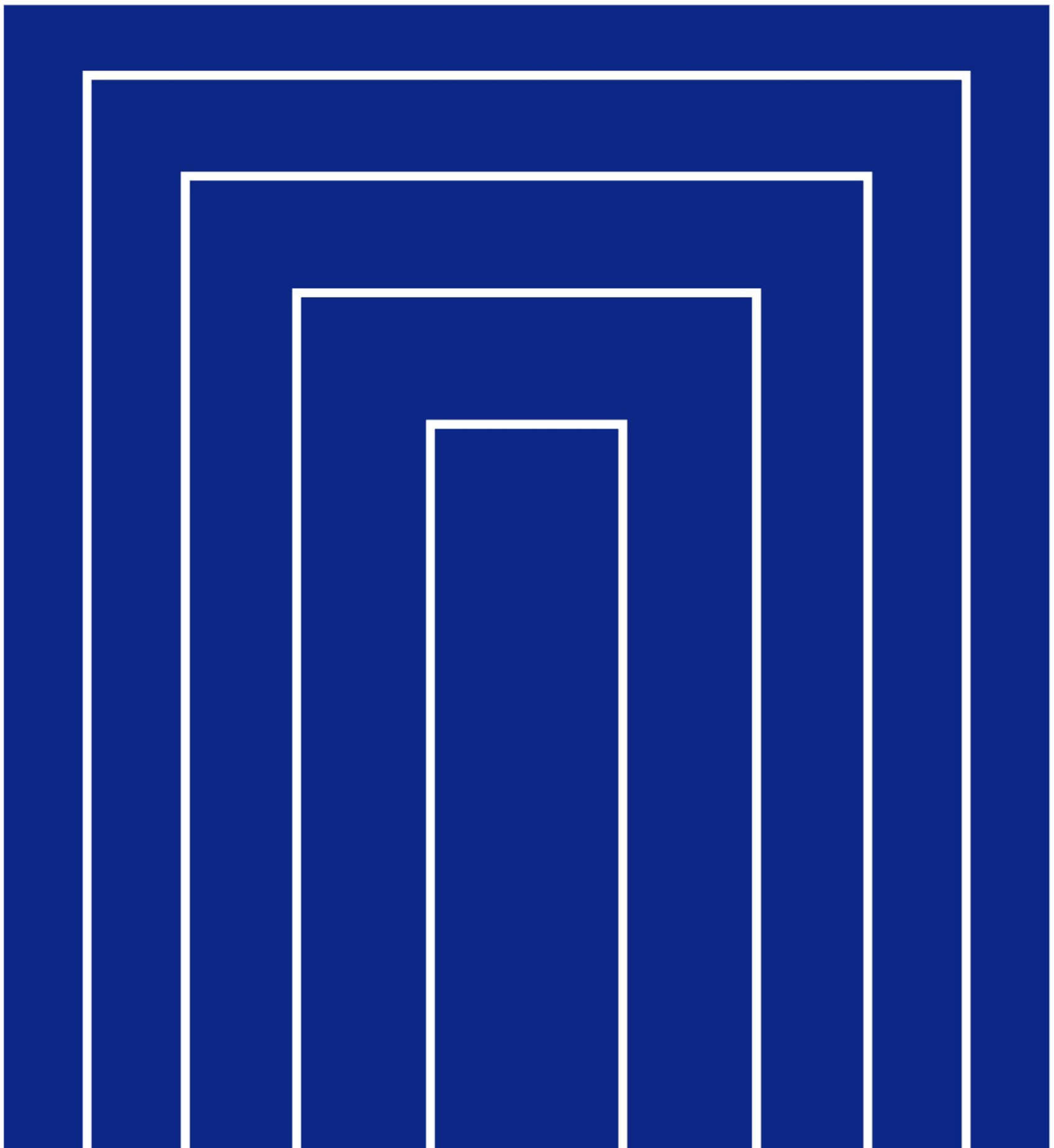
TOYOTA

A440F, A440L

AUTOMATIC TRANSMISSION

REPAIR MANUAL

Nov., 1984



Pub. No. 36264E

FOREWORD

This repair manual has been prepared to provide information covering general service repairs for the Automatic Transmission with Overdrive, A440F and A440L transmissions.

Applicable models:

A440F	FJ62 series
	FJ70, 73 series
	HJ60 series

All information contained in this manual is the most up-to-date at the time of publication. However specifications and procedures are subject to change without notice.

TOYOTA MOTOR CORPORATION

TOYOTA AUTOMATIC TRANSMISSION A440F, A440L REPAIR MANUAL

INTRODUCTION IN
AUTOMATIC TRANSMISSION AT
SERVICE SPECIFICATIONS A
STANDARD BOLT TORQUE SPECIFICATIONS B
SST AND SSM C
AUTOMATIC TRANSMISSION HYDRAULIC CIRCUIT D

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INTRODUCTION

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HOW TO USE THIS MANUAL

To assist in finding your way through the manual, the Section Title and major heading are given at the top of every page.

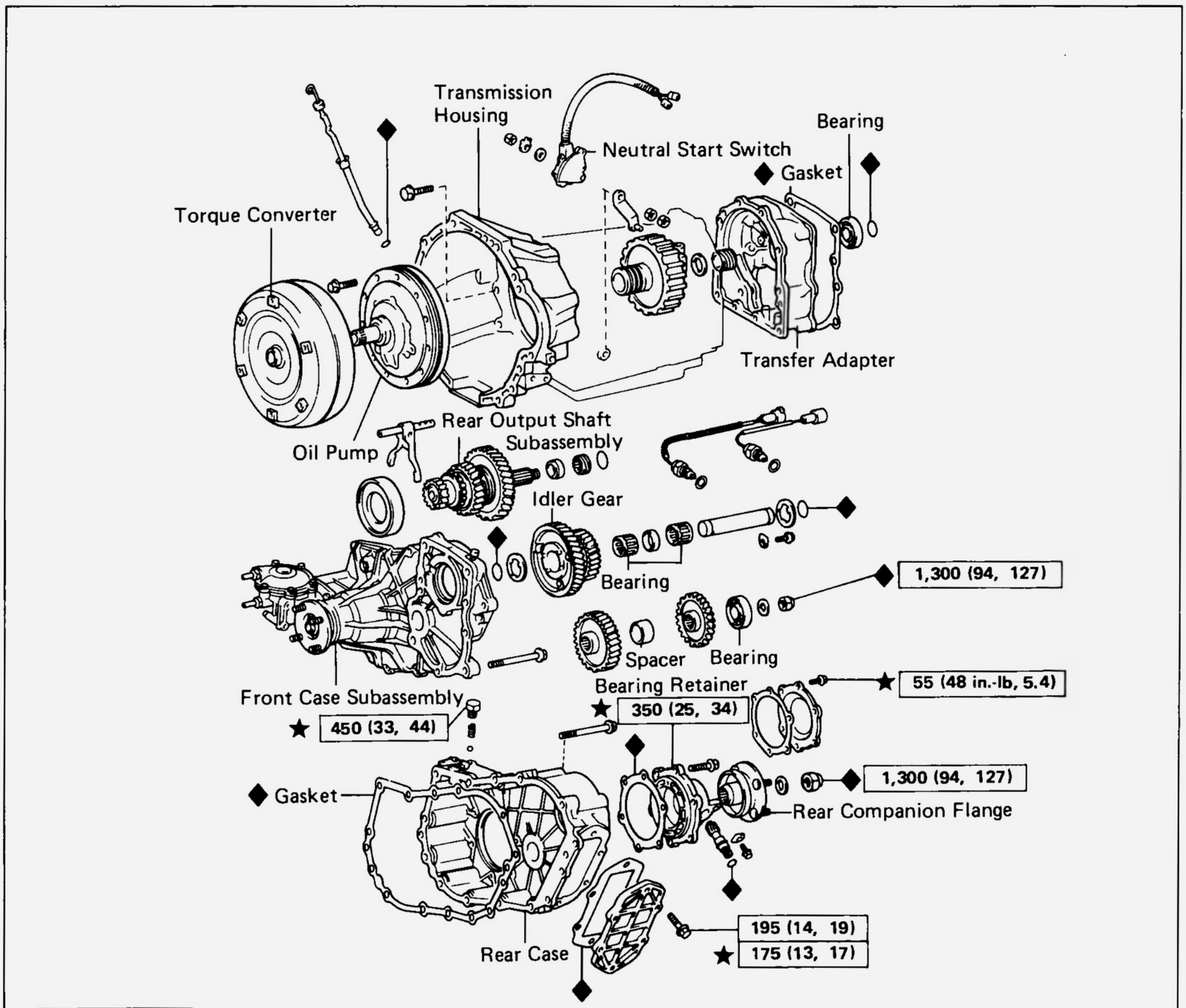
An **INDEX** is provided on the 1st page of each section to guide you to the item to be repaired.

At the beginning of each section, **PRECAUTIONS** are given that pertain to *all* repair operations contained in that section. *Read these precautions before starting any repair task.*

REPAIR PROCEDURES

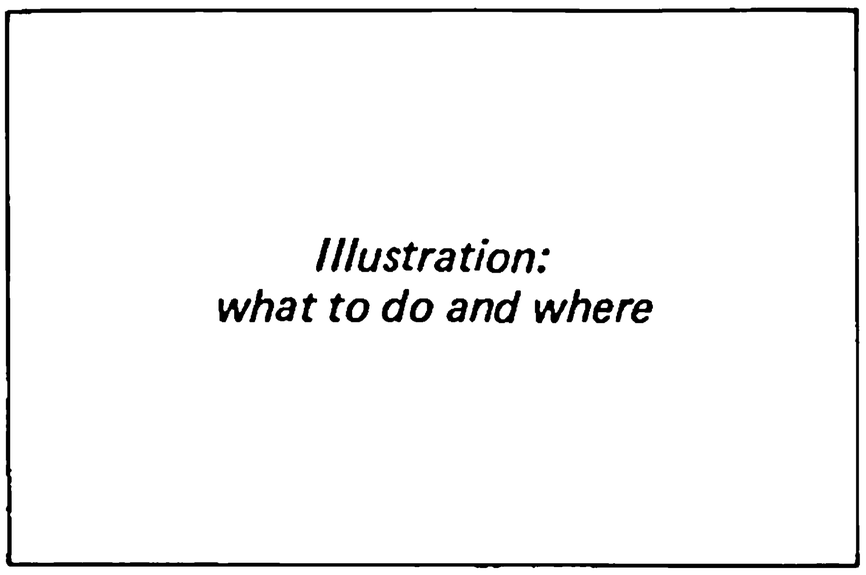
Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.

Example:



The procedures are presented in a step-by-step format:

- The illustration shows *what* to do and *where* to do it.
- The task heading tells *what* to do.
- The detailed text tells *how* to perform the task and gives other information such as specifications and warnings.



Example:

Task heading: what to do

21. CHECK PISTON STROKE OF OVERDRIVE BRAKE

(a) Place SST and a dial indicator onto the overdrive brake piston as shown in the figure.

SST 09350-30020 (09350-06120)

Set part No. *Component part No.*

Detail text: how to do it

(b) Measure the stroke applying and releasing the compressed air (4 – 8 kg-cm², 57 – 114 psi or 392 – 785 kPa) as shown in the figure.

Piston stroke: **1.4 – 1.7 mm (0.055 – 0.067 in.)**

Specification

This format enables the experienced technician to have a FAST TRACK. He can read the task headings and only refer to the detailed text when he needs it. Important specifications and warnings always stand out in bold type.

REFERENCES

References have been kept to a minimum. However, when they are required you are given the *page* to go to.

SPECIFICATIONS

Specifications are presented in bold type throughout the text in the applicable step. You never have to leave the procedure to look up your specs. All specifications are also found in Appendix A, specifications for quick reference.

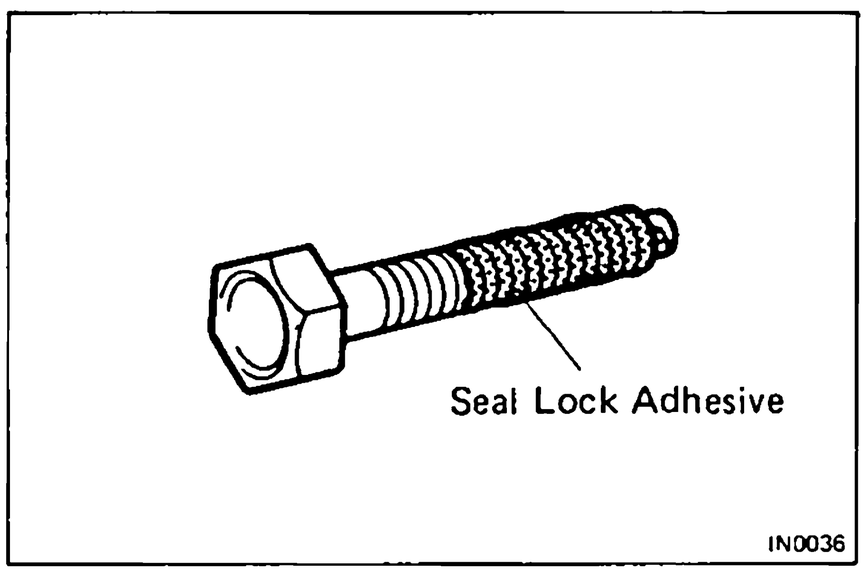
WARNINGS, CAUTIONS, NOTES:

- WARNINGS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- CAUTIONS are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- NOTES are separated from the text but do not appear in bold. They provide additional information to help you efficiently perform the repair.

GENERAL REPAIR INSTRUCTIONS

1. Use fender, seat and floor covers to keep the vehicle clean and prevent damage.
2. During disassembly, keep parts in order to facilitate reassembly.
3. Before performing electrical work, disconnect the cable from the battery terminal.
4. Check hose and wiring connectors to make sure that they are secure and correct.
5. Non-reusable Parts
   (a) Always replace cotter pins, gaskets, O-rings and oil seals etc. with new ones.
   (b) Non-reusable parts are indicated in the component illustrations by the "◆" symbol.
6. Precoated Parts

   Precoated parts are the bolts, nuts, etc. which are coated with a seal lock adhesive at the factory.
   (a) If a precoated part is retightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.
   (b) Recoating of Precoated Parts
      (1) Clean off the old adhesive from the bolt, nut or installation part threads.
      (2) Dry with compressed air.
      (3) Apply the specified seal lock adhesive to the bolt or nut threads.
   (c) Precoated parts are indicated in the component illustrations by the "★" symbol.



7. When necessary, use a sealer on gaskets to prevent leaks.
8. Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.
9. Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found at the back of this manual.
10. When replacing fuses, be sure the new fuse is the correct amperage rating. DO NOT exceed the fuse amp rating or use one of a lower rating.
11. Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations.
    (a) If the vehicle is to be jacked up only at the front or rear end, be sure to block the wheels to ensure safety.
    (b) After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on the vehicle raised on jack alone, even for a small job that can be finished quickly.

ABBREVIATIONS USED IN THIS MANUAL

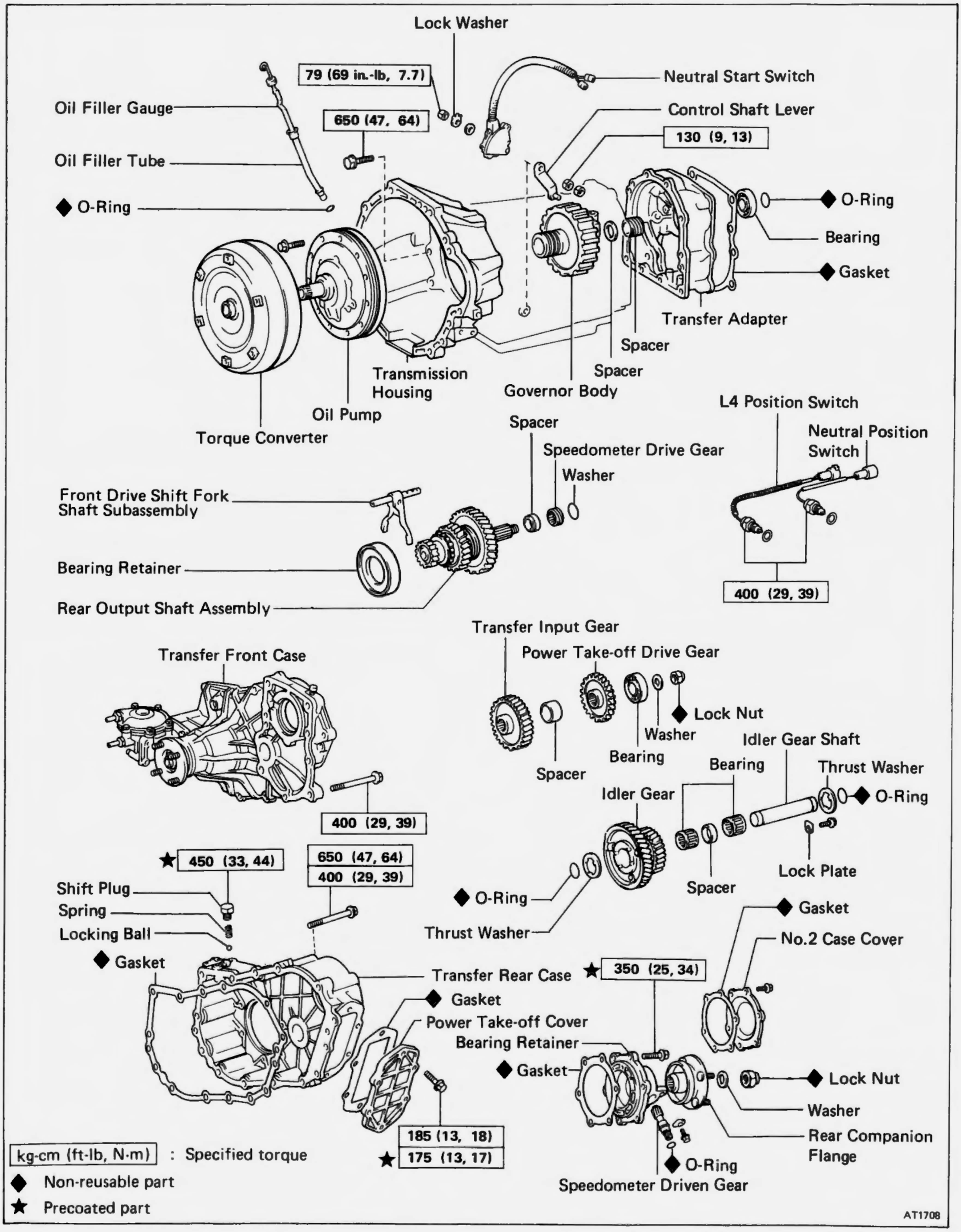
ATF	Automatic Transmission Fluid
B_0	Overdrive Brake
B_2	Second Brake
B_3	First and Reverse Brake
C_0	Overdrive Direct Clutch
C_1	Front Clutch
C_2	Rear Clutch
D	Disc
Ex.	Except
F_0	Overdrive One-way Clutch
F_2	No. 2 One-way Clutch
OD	Overdrive
P	Plate
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
w/	With
w/o	Without

AUTOMATIC TRANSMISSION

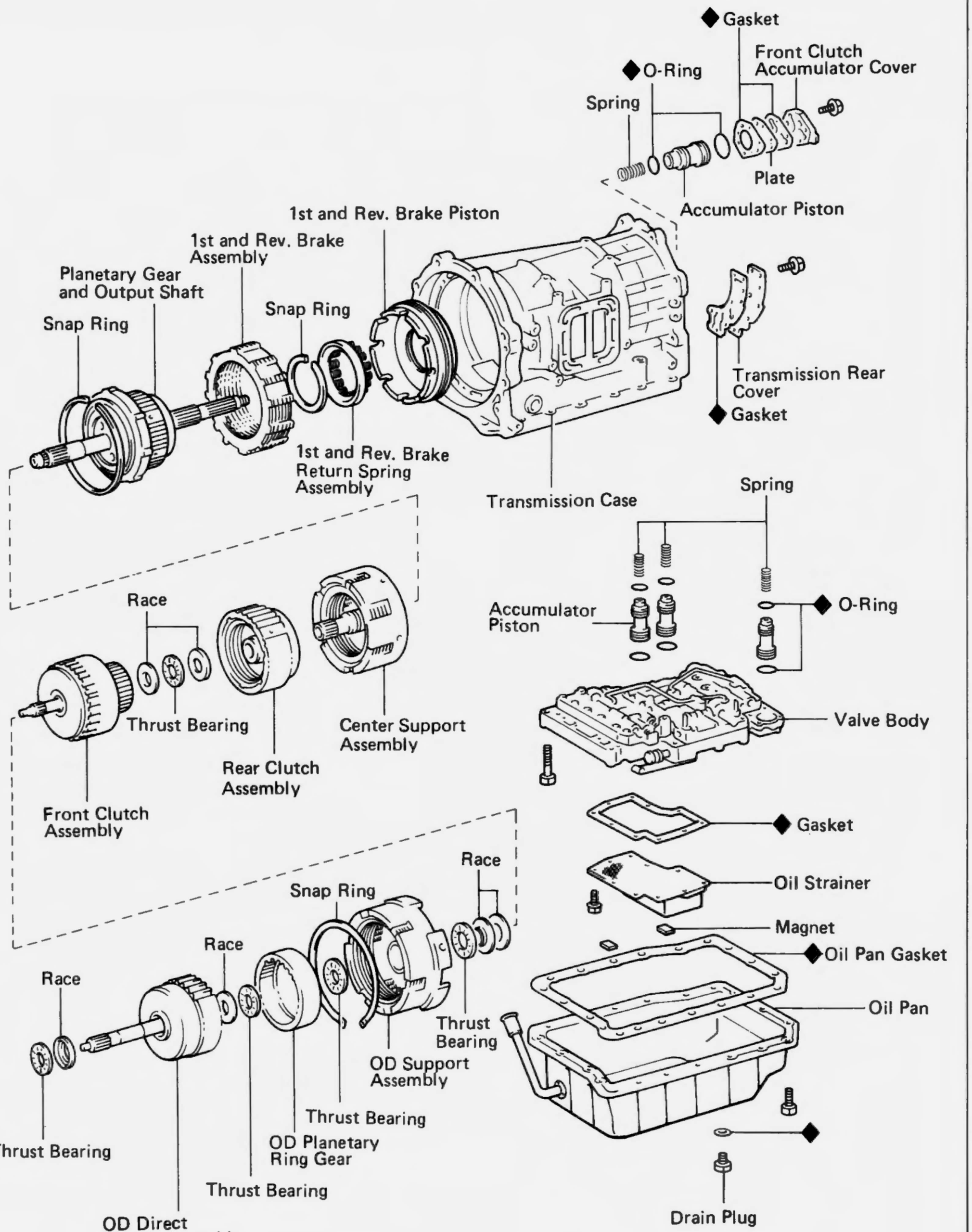
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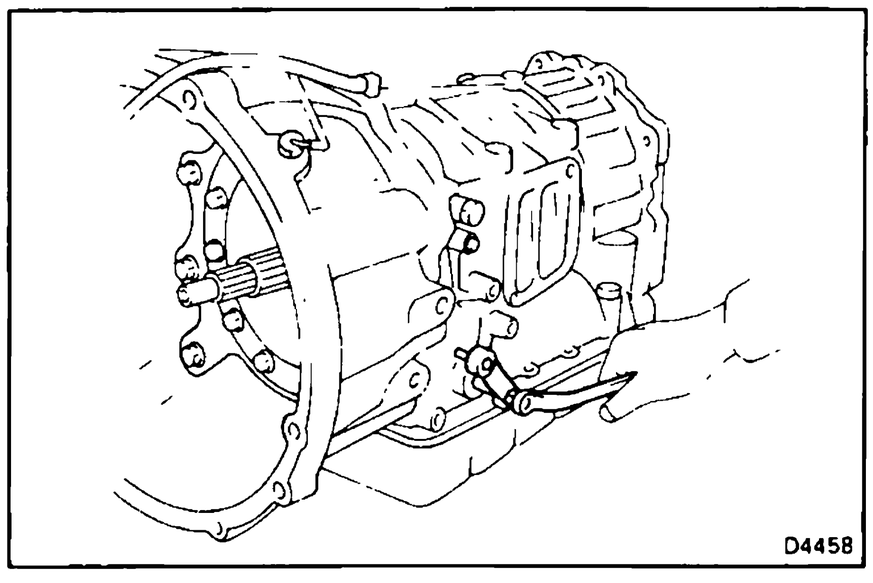
DISASSEMBLY OF TRANSMISSION (A440F)

COMPONENTS



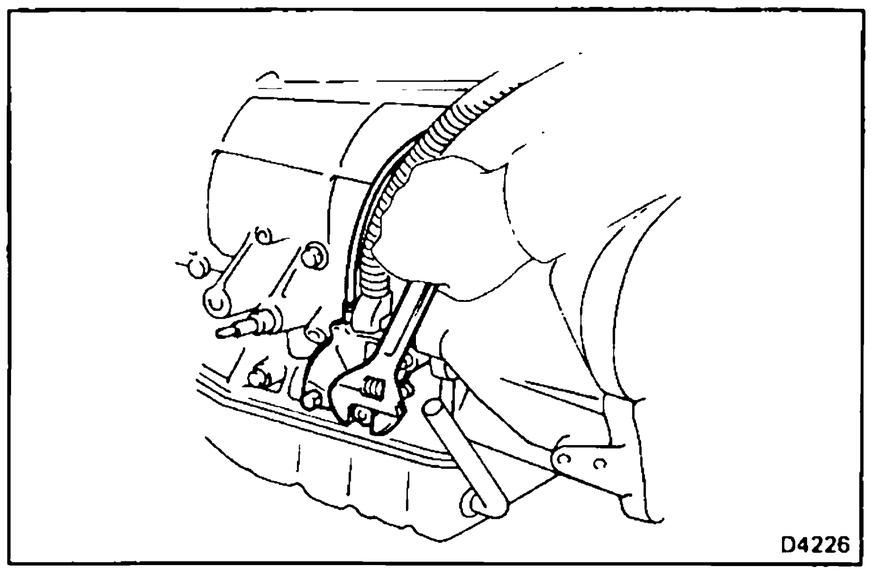
COMPONENTS (Cont'd)



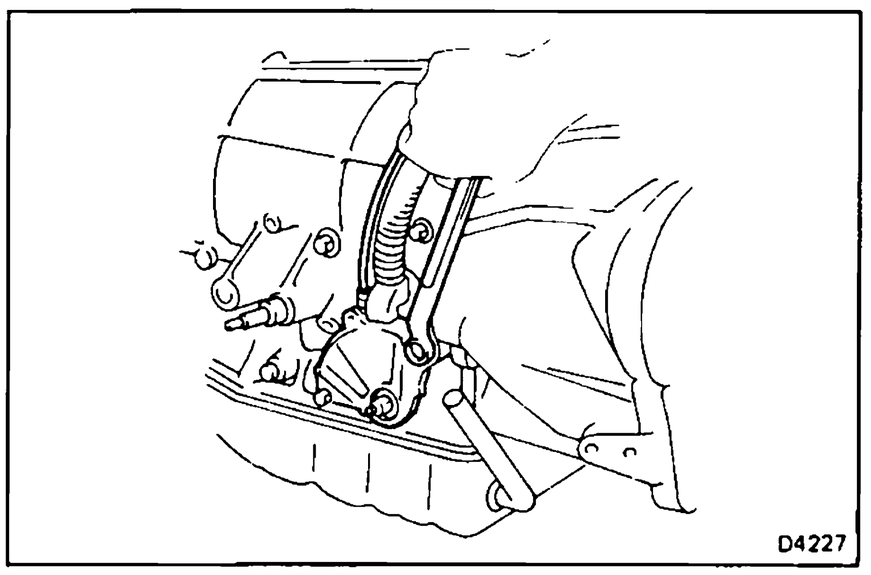


SEPARATE BASIC SUBASSEMBLY

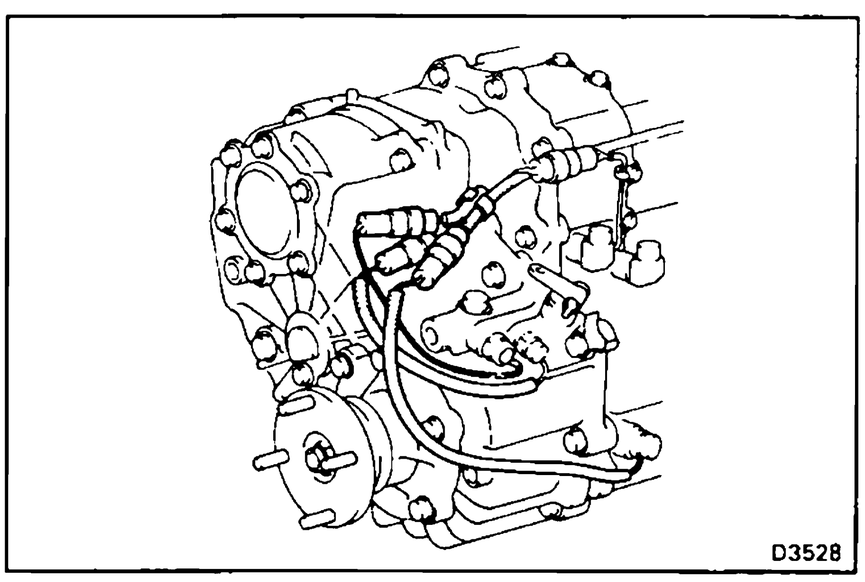
1. REMOVE TORQUE CONVERTER
2. REMOVE OIL FILLER GAUGE AND TUBE
3. REMOVE CONTROL SHAFT LEVER



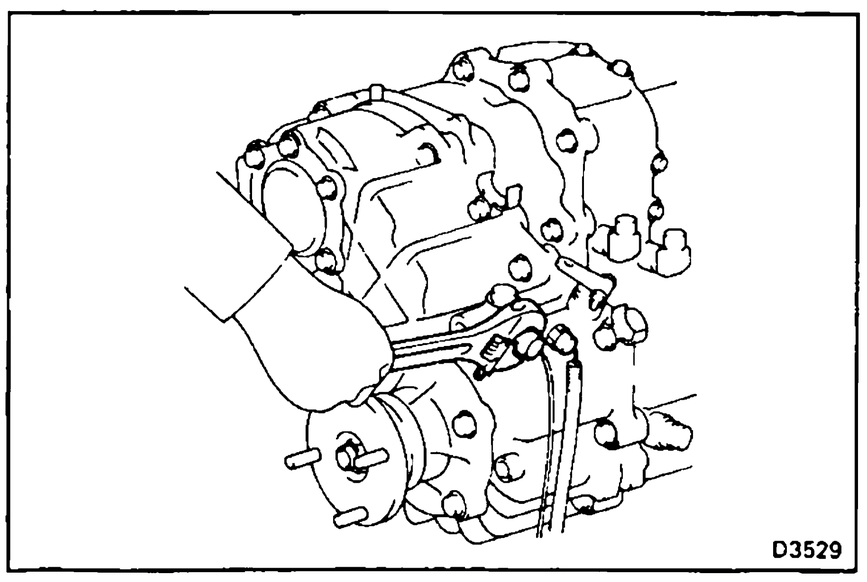
4. REMOVE NEUTRAL START SWITCH
   (a) Loosen the lock washer claw and remove the nut.



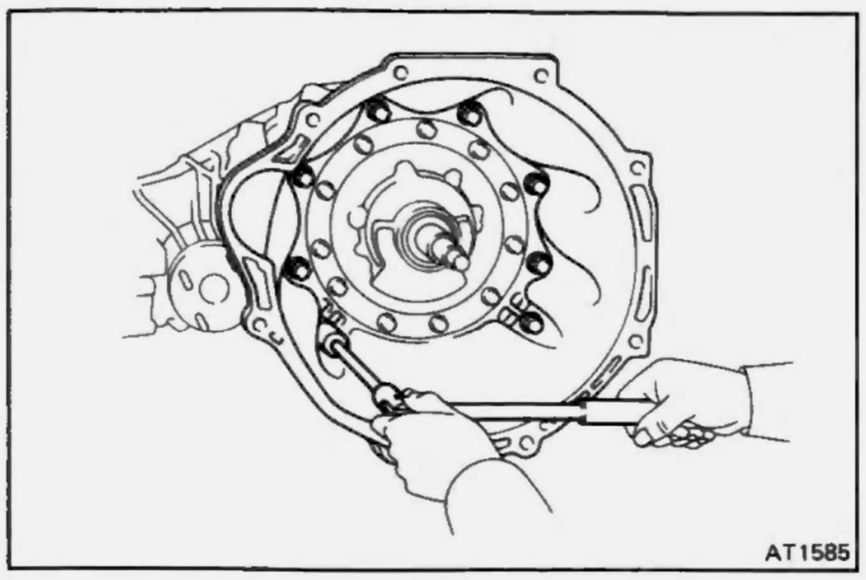
   (b) Remove the lock washer and grommet.
   (c) Remove the two bolts and neutral start switch.



5. REMOVE TRANSFER NEUTRAL SWITCH AND TRANSFER L4 POSITION SWITCH
   (a) Disconnect the three connectors.



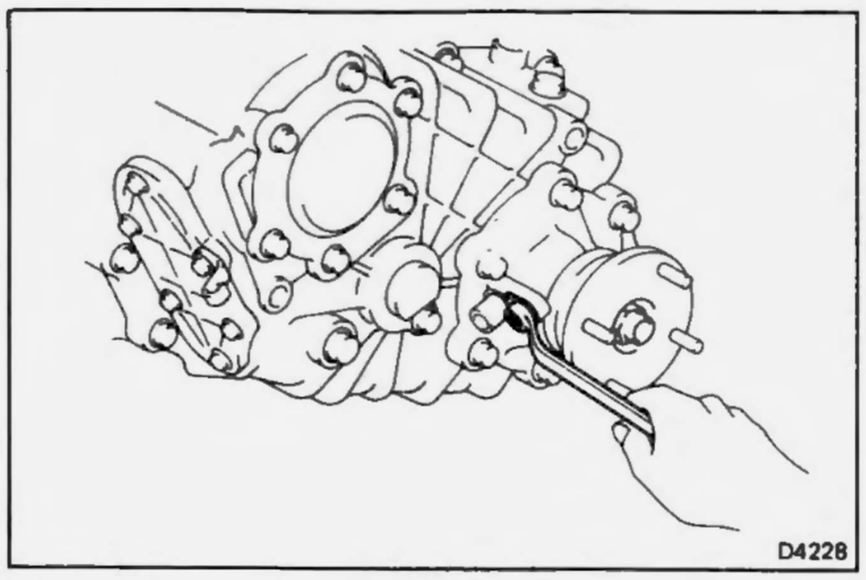
   (b) Remove the transfer neutral position switch.
   (c) Remove the transfer L4 position switch.



6. REMOVE TRANSMISSION HOUSING

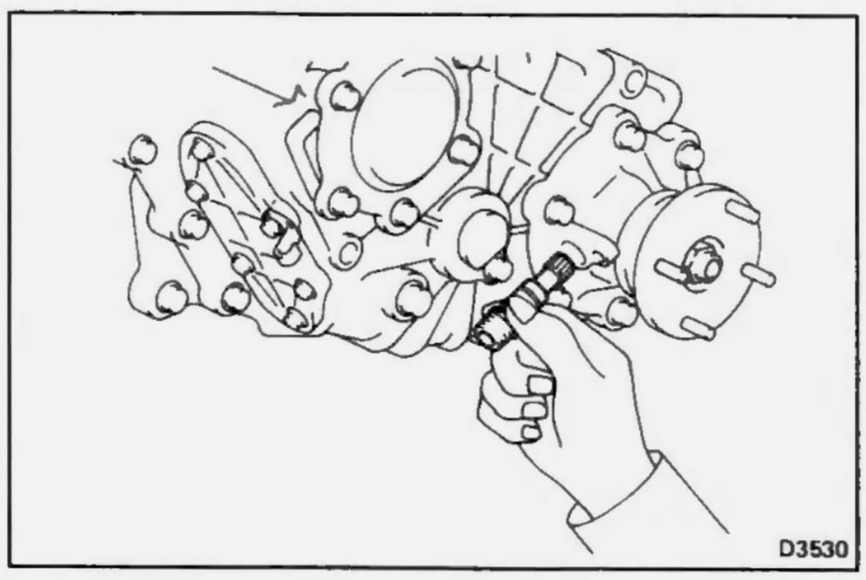
(a) Remove the throttle cable retaining plate.

(b) Remove the eight bolts and transmission housing.



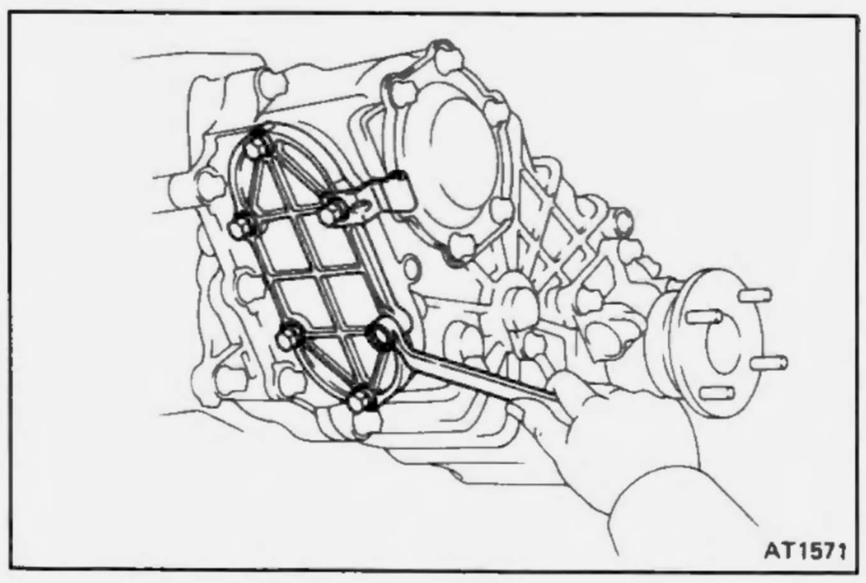
7. REMOVE SPEEDOMETER DRIVEN GEAR

(a) Remove the lock plate.



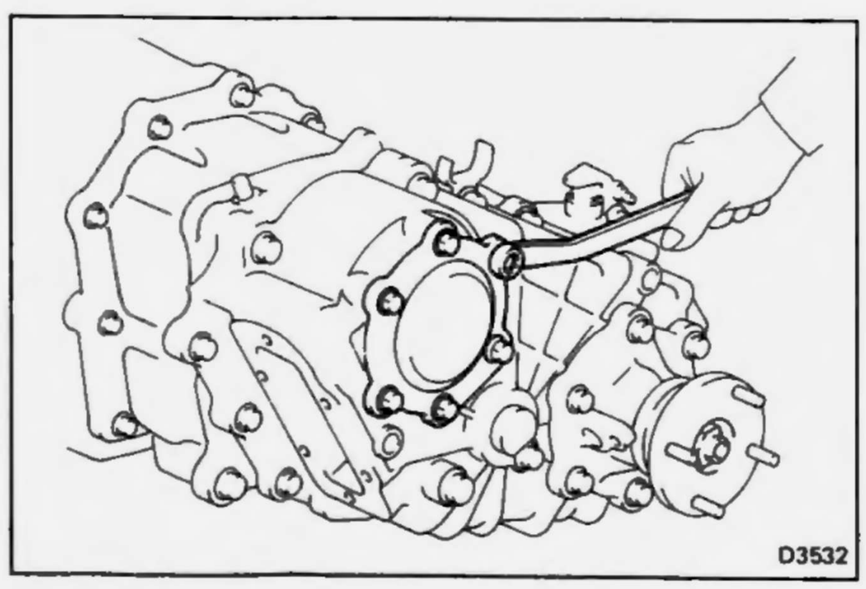
(b) Remove the speedometer driven gear.

(c) Remove the O-ring from the speedometer driven gear.



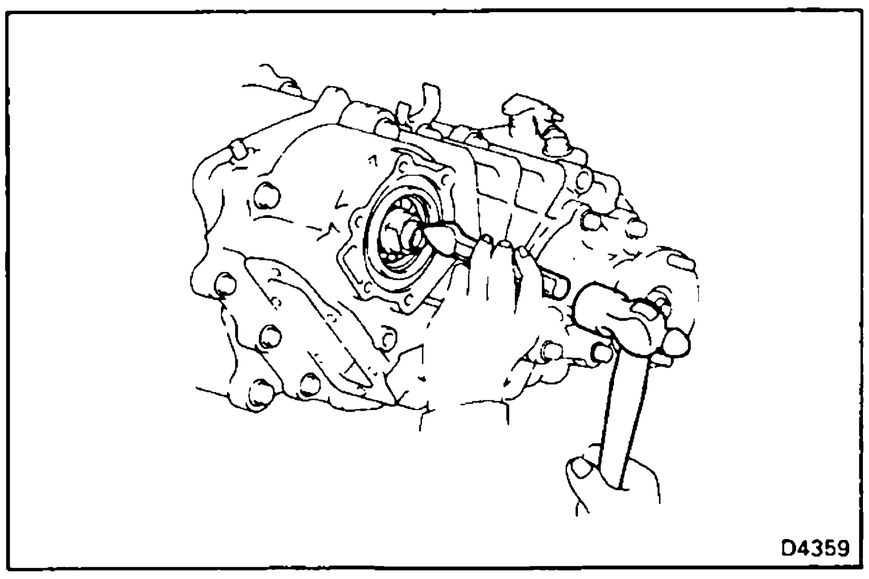
8. REMOVE POWER TAKE-OFF COVER

Remove the six bolts, and remove the power take-off cover and gasket.



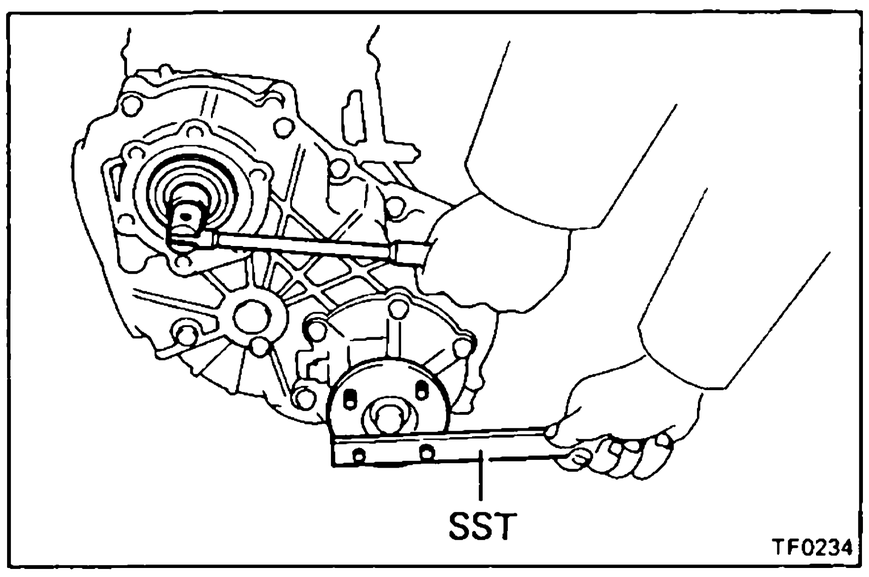
9. REMOVE TRANSFER NO. 2 CASE COVER

Remove the six bolts and remove the transfer No. 2 case cover and gasket.



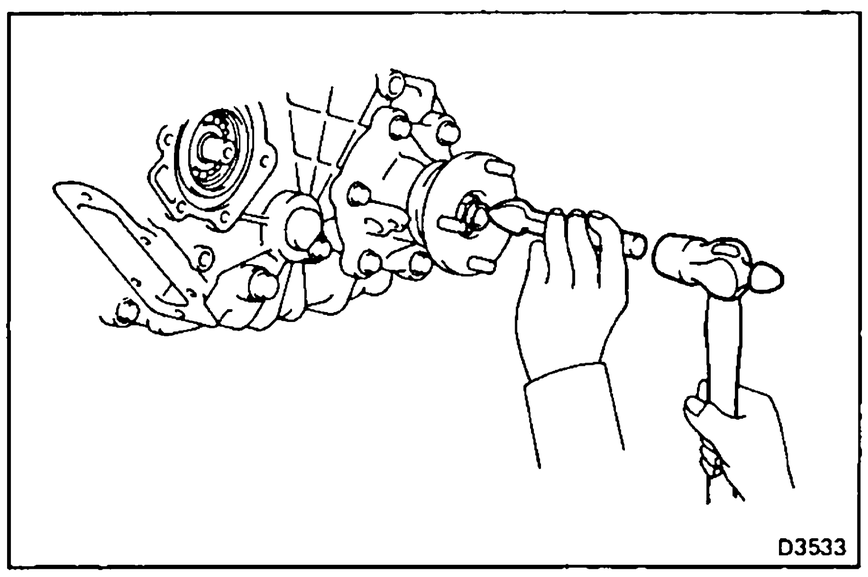
10. REMOVE TRANSMISSION OUTPUT SHAFT LOCK NUT

(a) Using a hammer and chisel, loosen the stacked part of the nut.



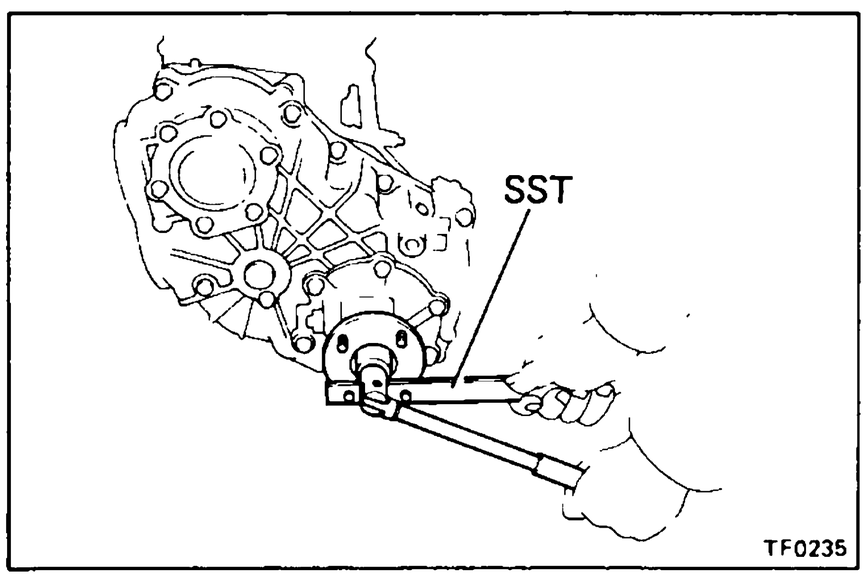
(b) Using SST to hold the rear companion flange, remove the transmission output shaft lock nut and washer.

SST 09330-00021



11. REMOVE REAR COMPANION FLANGE

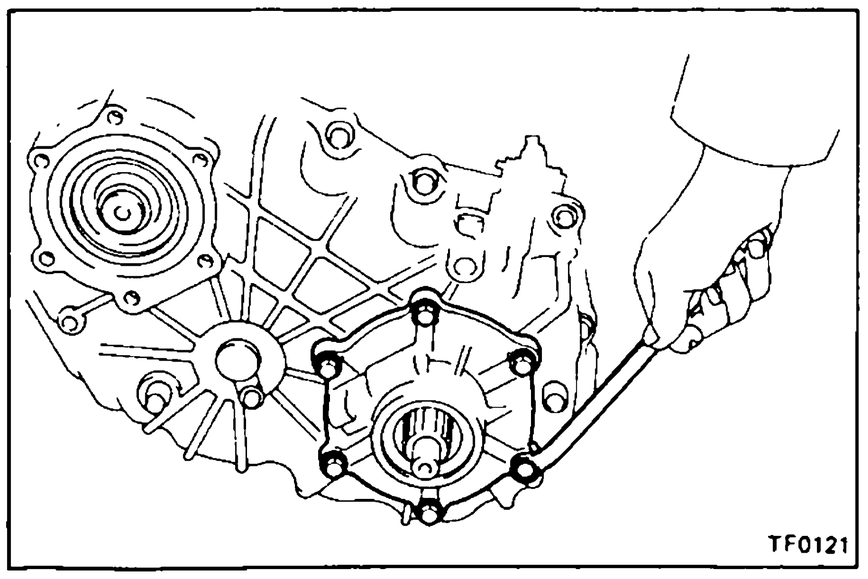
(a) Using a hammer and chisel, loosen the stacked part of the nut.



(b) Using SST to hold the rear companion flange, remove the companion flange lock nut and washer.

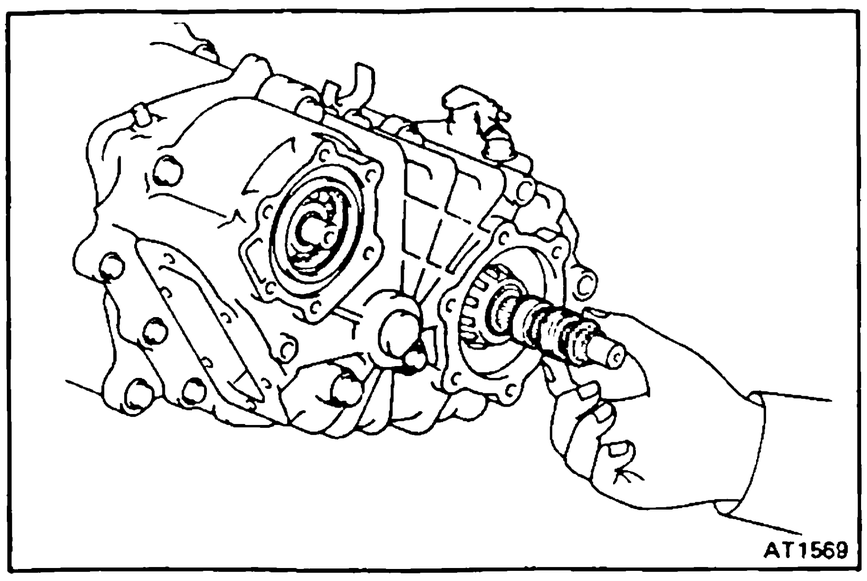
SST 09330-00021

(c) Remove the rear companion flange.

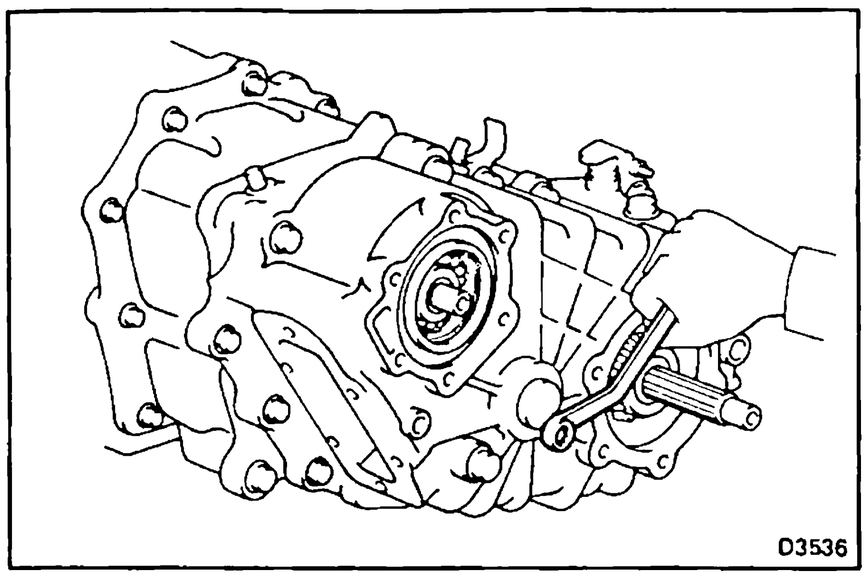


12. REMOVE REAR OUTPUT SHAFT BEARING RETAINER

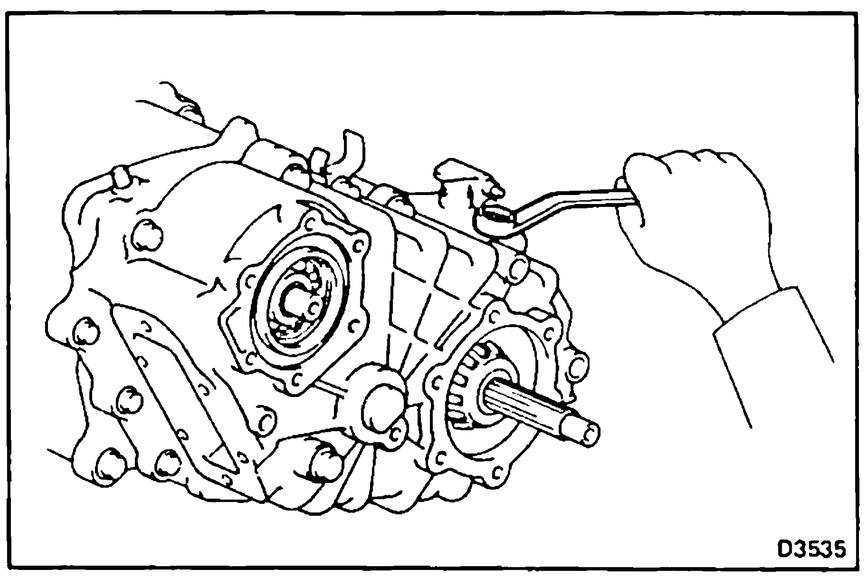
Remove the six bolts and remove the rear output shaft bearing retainer and gasket.



13. REMOVE WASHER, SPEEDOMETER DRIVE GEAR AND SPACER

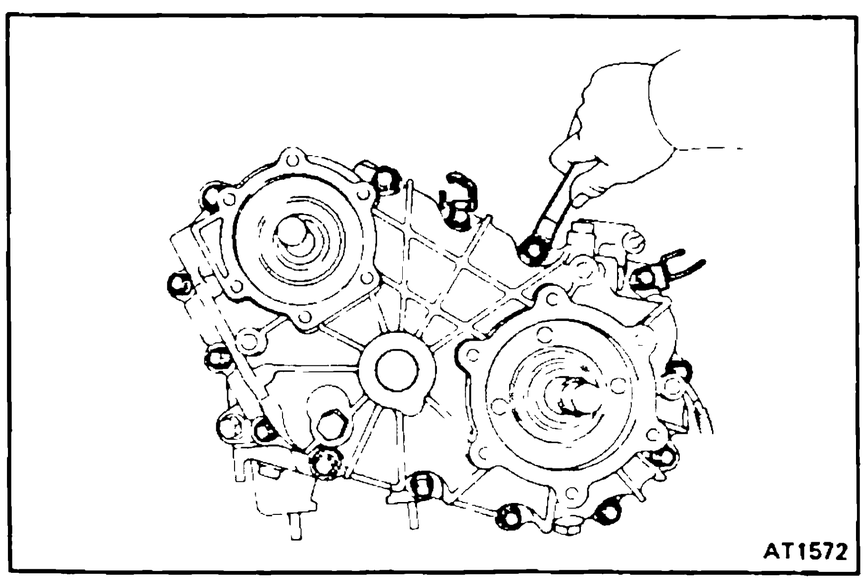


14. REMOVE IDLER GEAR SHAFT LOCK PLATE



15. REMOVE SHIFT PLUG

Remove the shift plug and using a magnetic finger, remove the spring and locking ball.

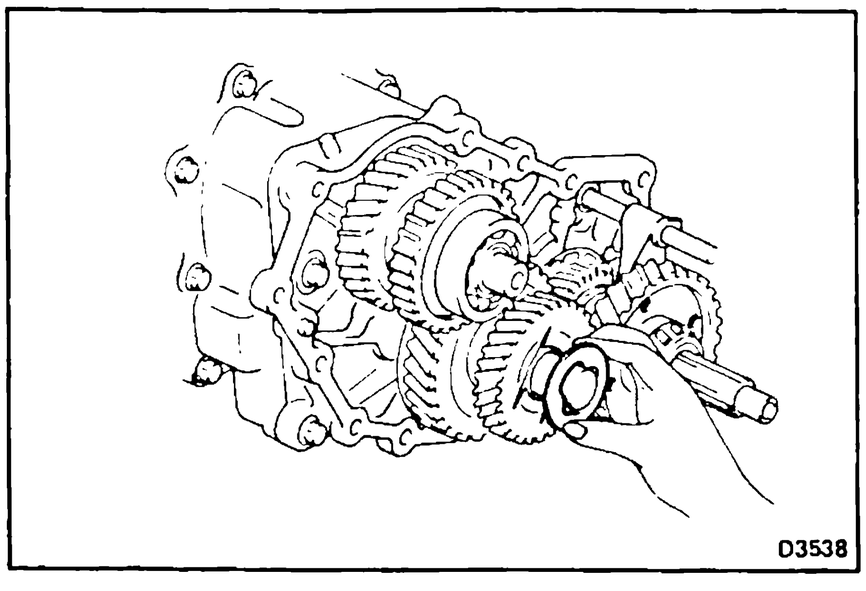


16. REMOVE TRANSFER REAR CASE

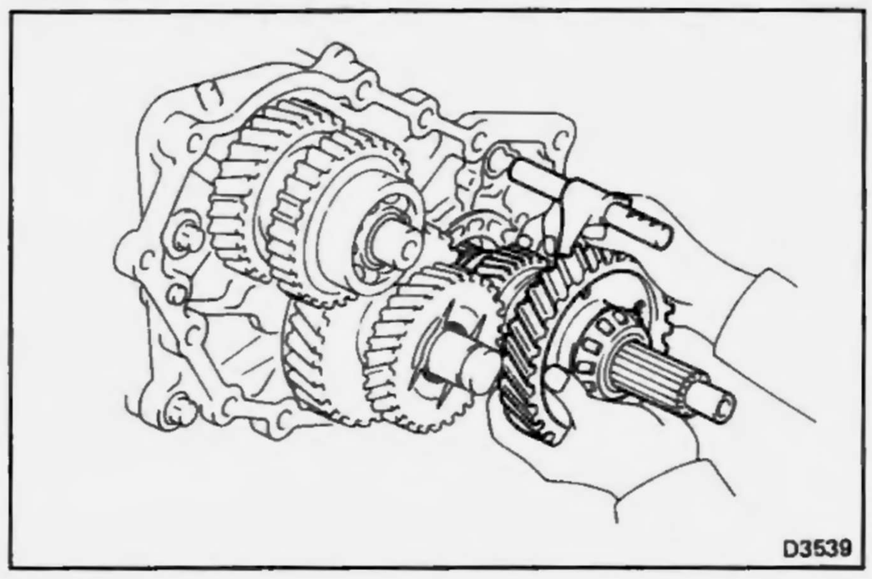
(a) Remove the fourteen bolts.

(b) Using a plastic hammer, remove the transfer rear case.

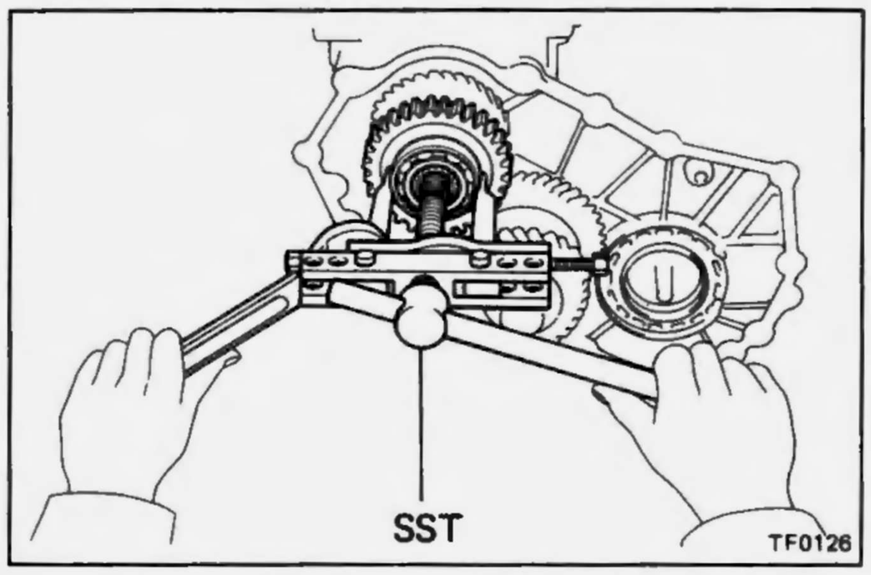
(c) Remove the gasket from the transfer front case.



(d) Remove the thrust washer from idler gear shaft.



17. REMOVE REAR OUTPUT SHAFT ASSEMBLY WITH FRONT DRIVE SHIFT FORK SHAFT SUBASSEMBLY

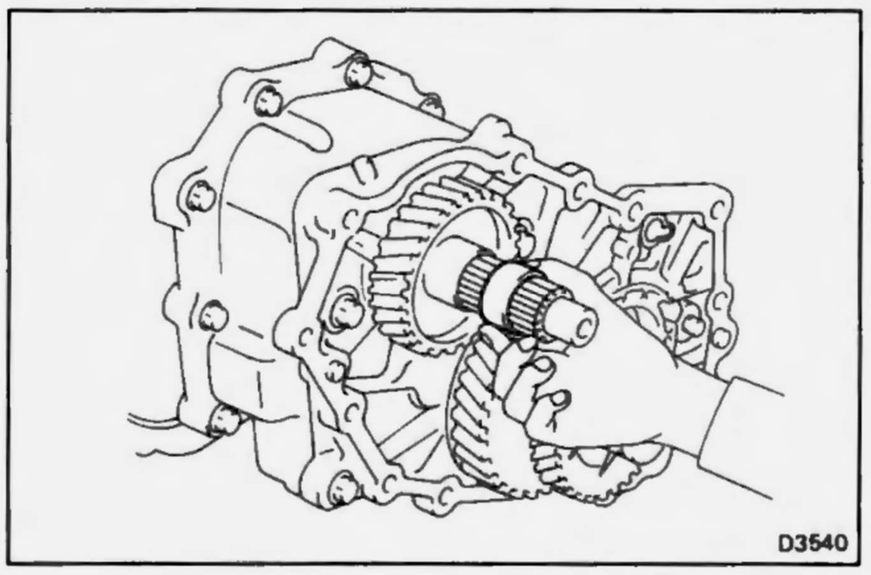


18. REMOVE POWER TAKE-OFF DRIVE GEAR

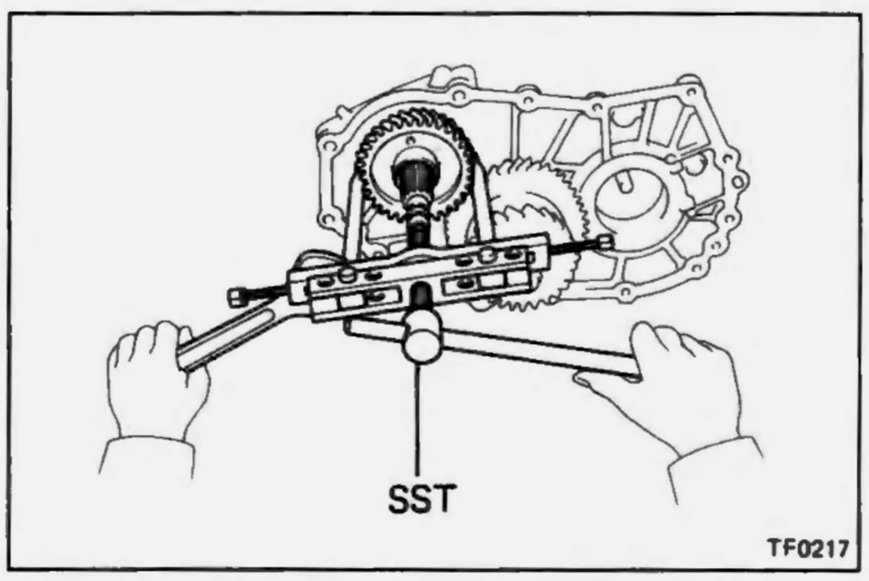
(a) Using SST, remove the transfer input gear bearing.

SST 09950-20016

(b) Remove the power take-off gear.



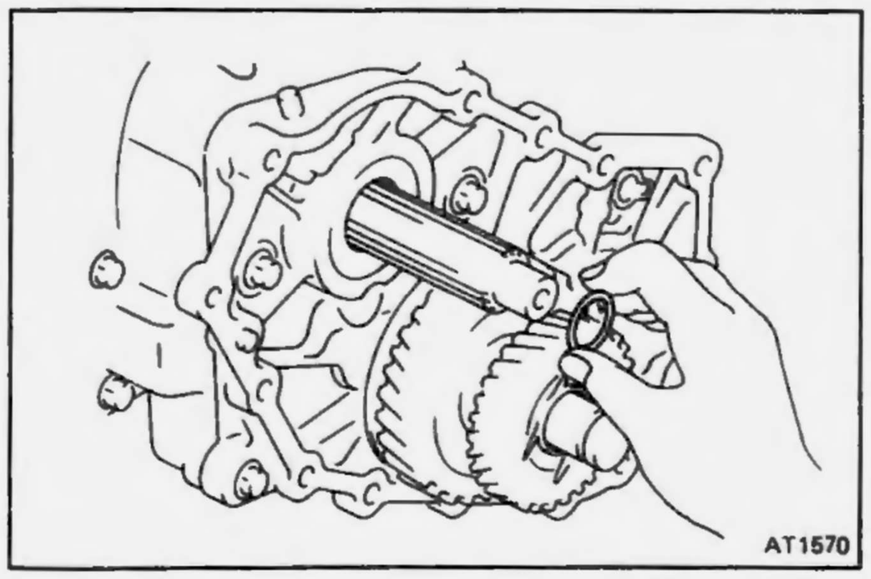
(c) Remove the spacer.



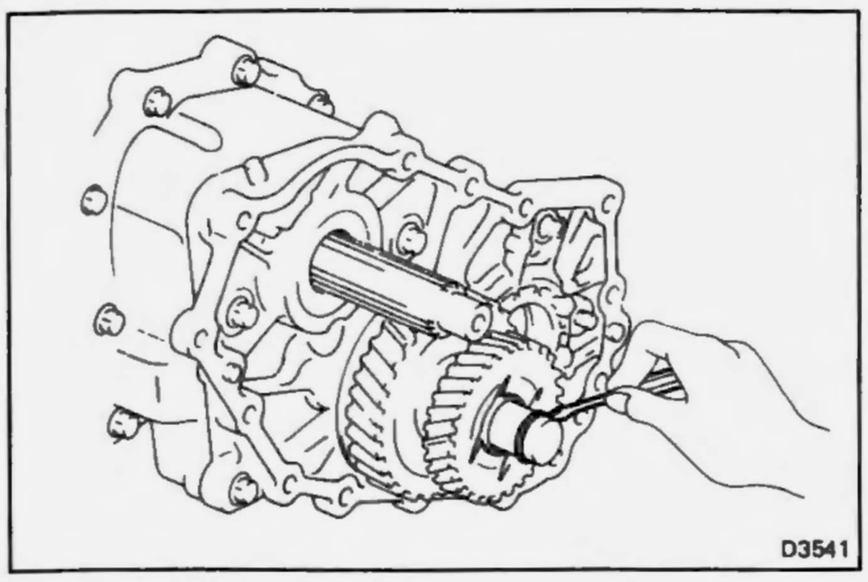
19. REMOVE TRANSFER INPUT GEAR

(a) Using SST, remove the transfer input gear.

SST 09950-20016

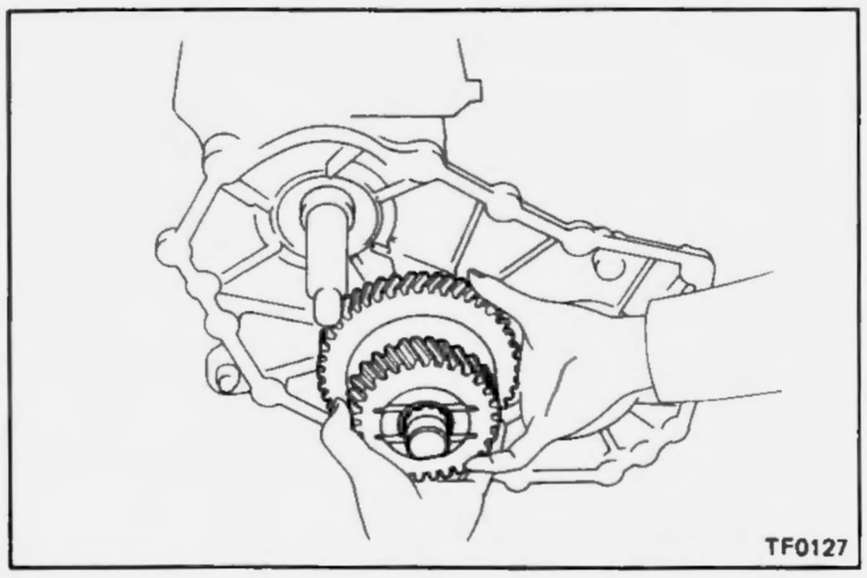


(b) Remove the O-ring from transmission output shaft.

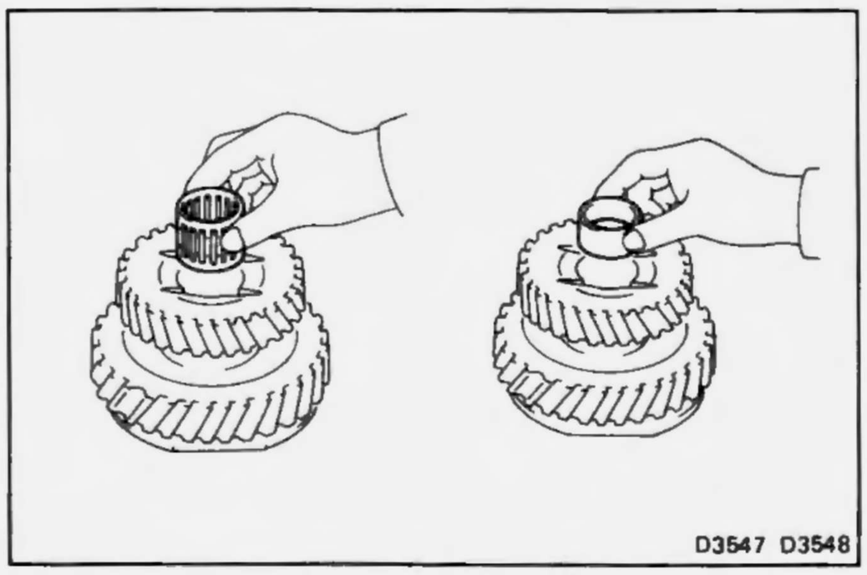


20. REMOVE IDLER GEAR, BEARING, SPACER AND IDLER GEAR SHAFT

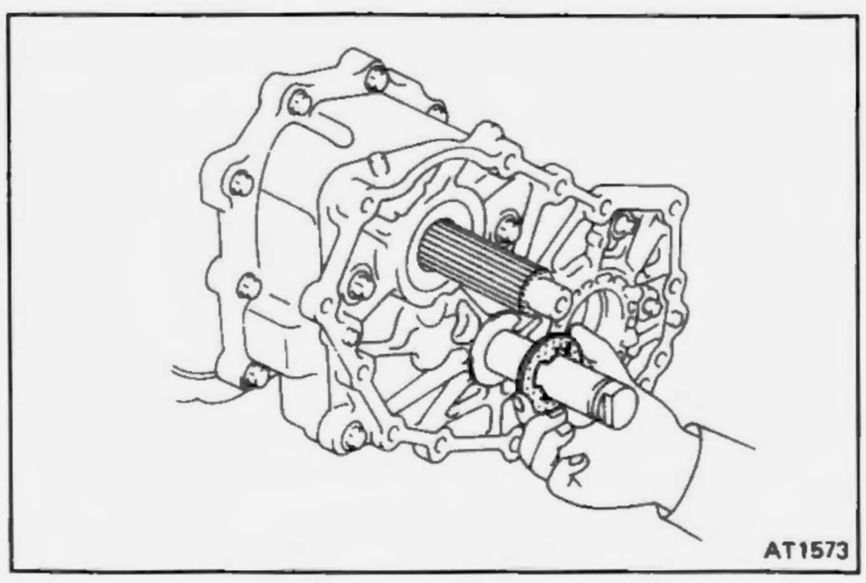
(a) Remove the O-ring from the idler gear shaft.



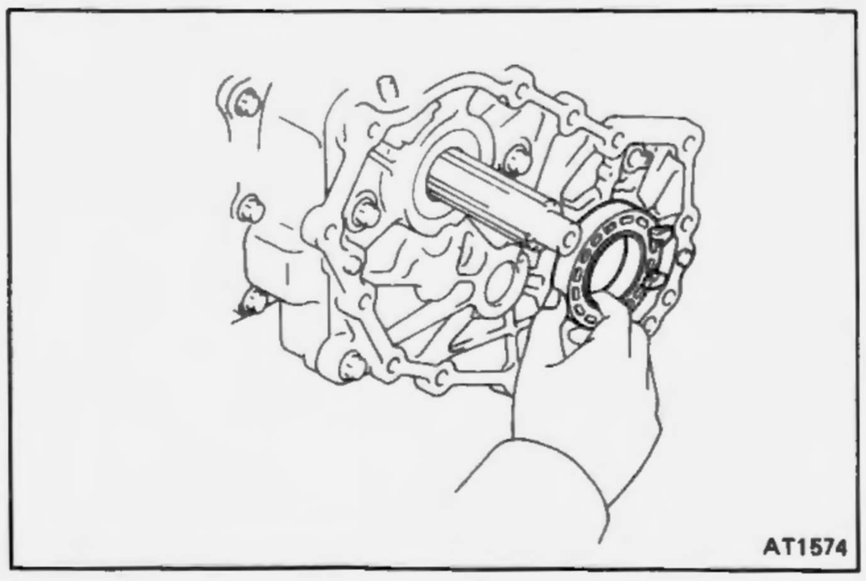
(b) Remove the idler gear with the two bearings and spacer.



(c) Remove the two bearings and spacer from the idler gear.

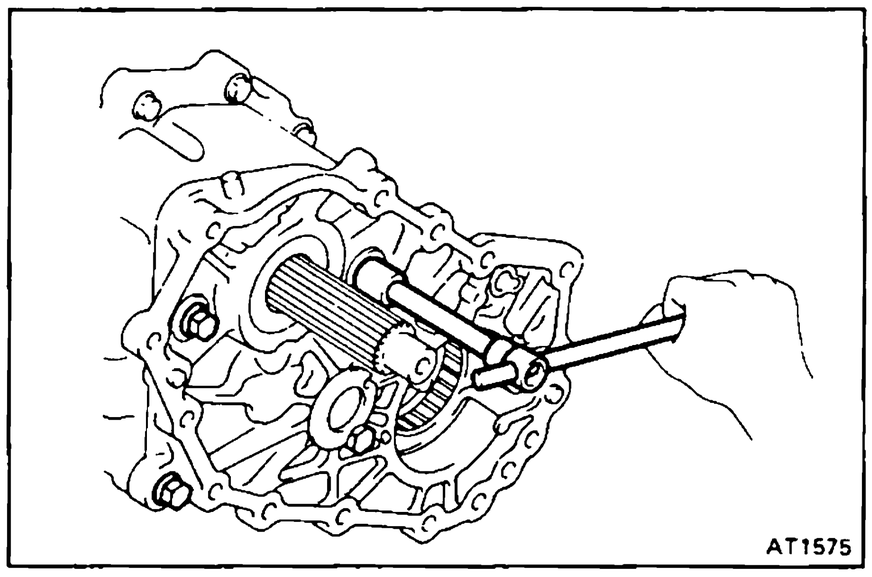


(d) Remove the thrust washer from idler gear shaft.



21. REMOVE REAR OUTPUT SHAFT FRONT BEARING RETAINER

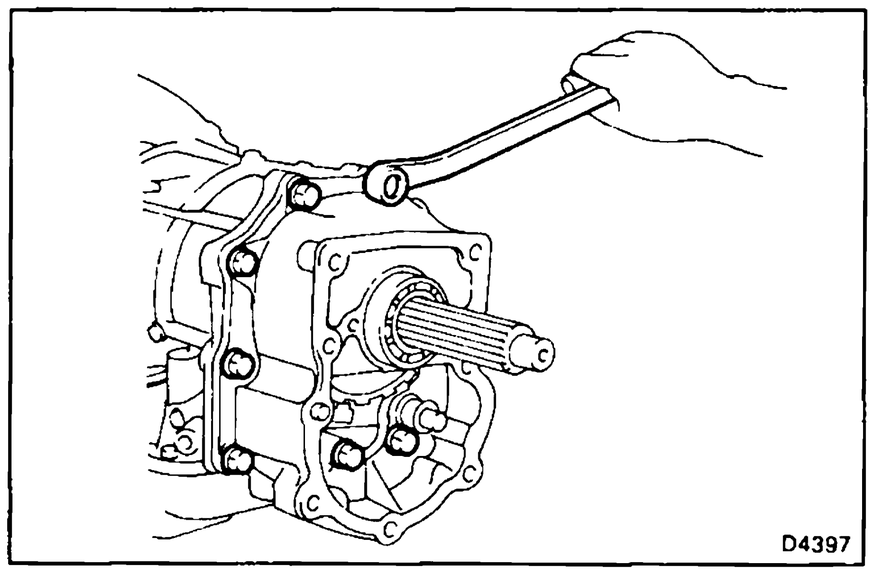
Remove the rear output shaft front bearing retainer from the transfer front case.



22. REMOVE TRANSFER FRONT CASE

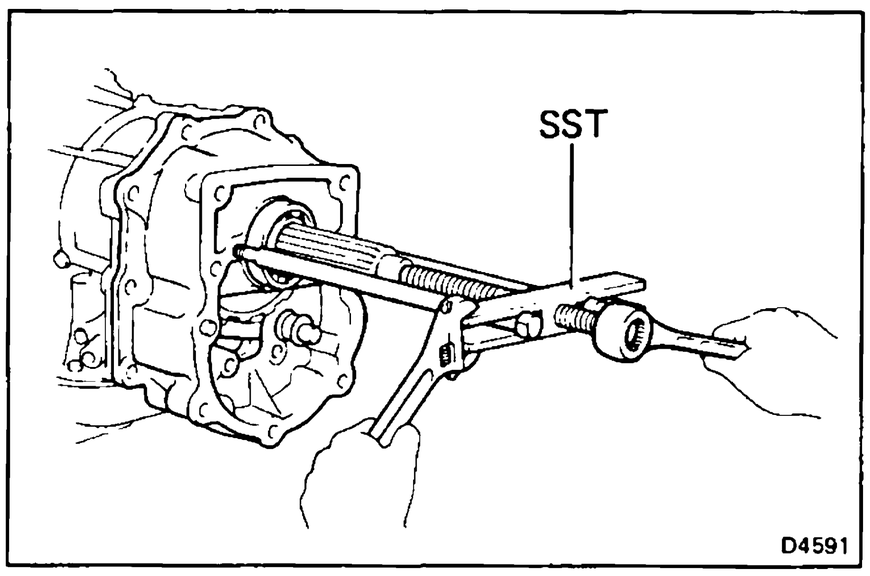
(a) Remove the four bolts and using a plastic hammer, remove the transfer front case.

(b) Remove the gasket and spacer.



23. REMOVE TRANSMISSION REAR BEARING

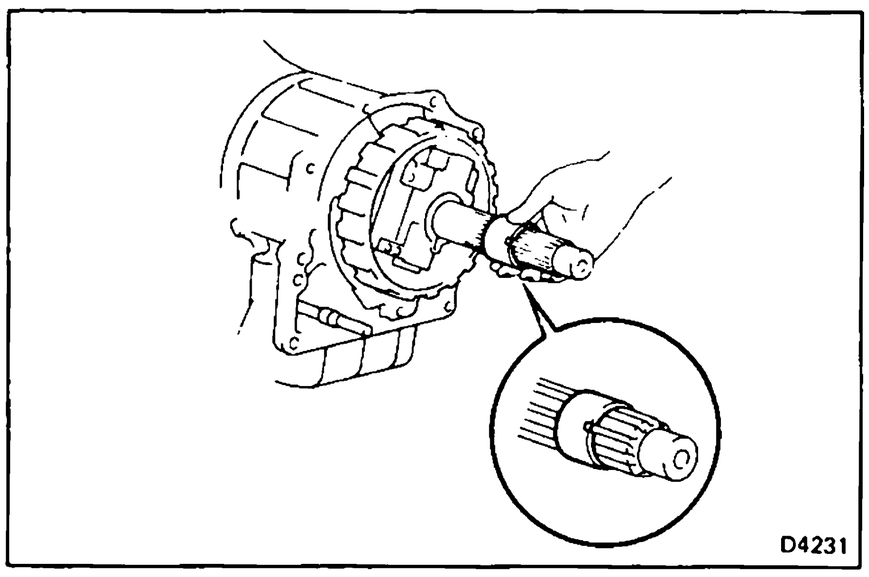
(a) Remove the ten transfer adapter installation bolts.



(b) Using SST, remove the transfer adapter with transmission rear bearing.

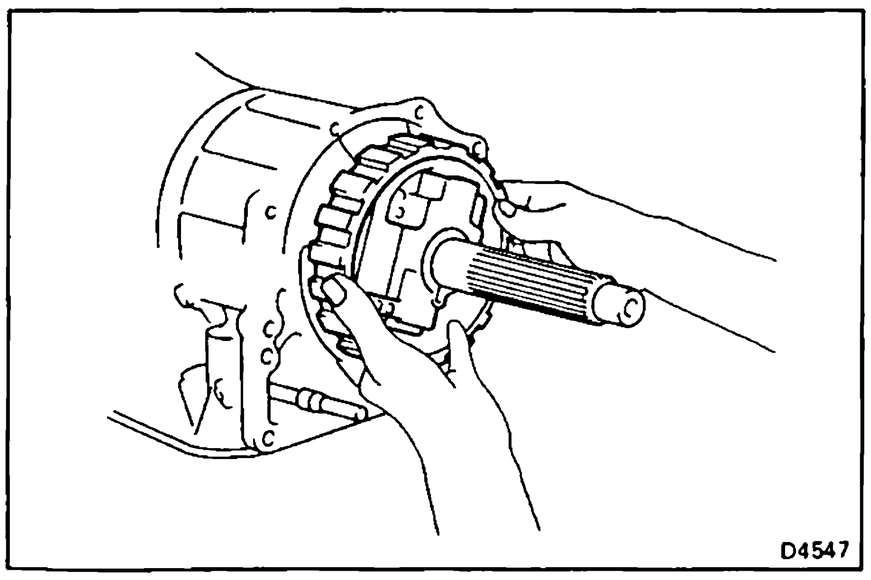
SST 09350-36010 (09350-06140)

(c) Remove the gasket.

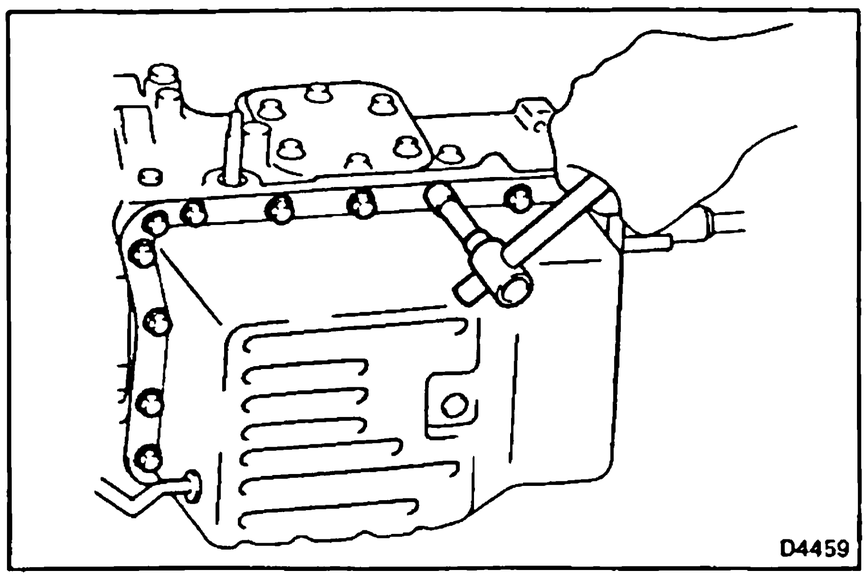


24. REMOVE GOVERNOR BODY

(a) Remove the spacer from the transmission output shaft.



(b) Remove the governor body.



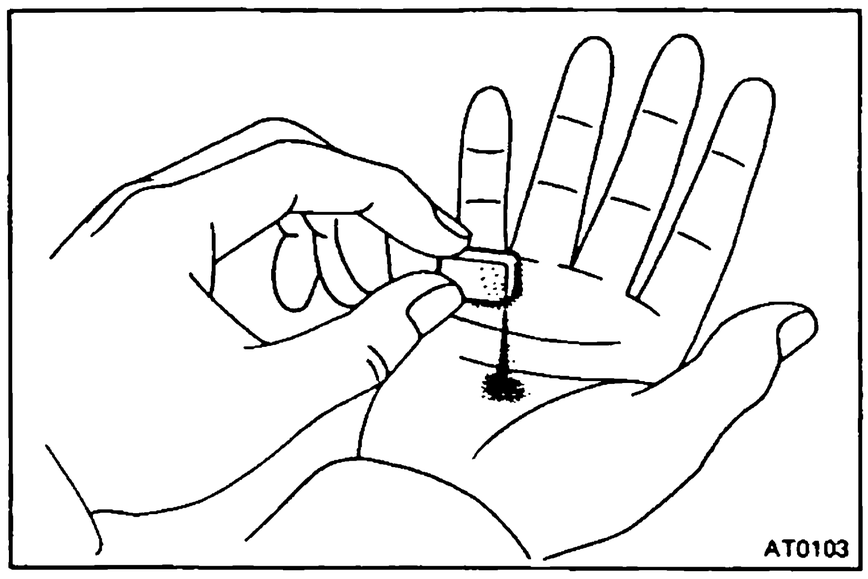
25. REMOVE OIL PAN

(a) Position the oil pan so it does not tilt upright.

(b) Remove the twenty bolts and remove the oil pan and gasket.

CAUTION:

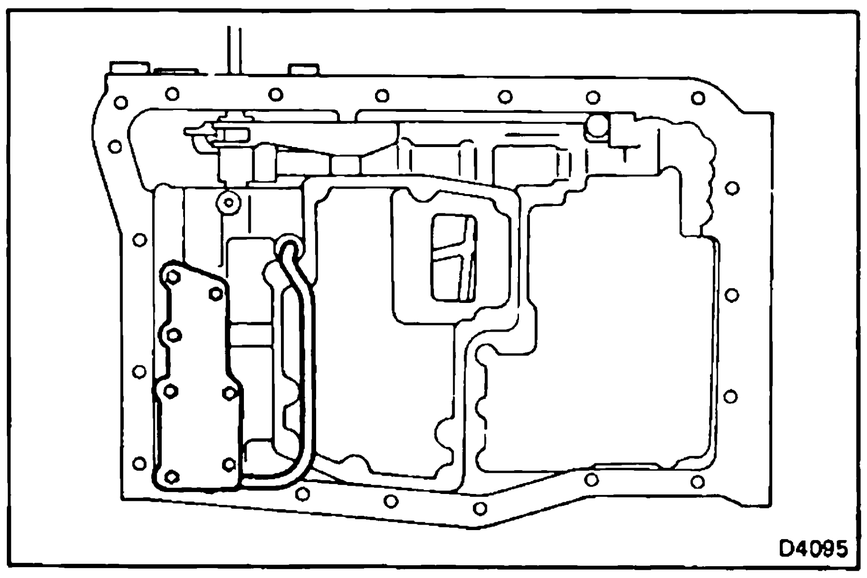
- **Do not dent the oil pan.**
- **Do not turn the transmission over, as this will contaminate the valve body with the foreign materials in the bottom of the pan.**



26. EXAMINE PARTICLES IN PAN

Remove the magnet and use it to collect any steel chips. Examine the chips and particles in the pan and on the magnet to anticipate what type of wear you will find in the transmission.

Steel (magnetic)...bearing, gear and clutch plate wear
Brass (non-magnetic)...bushing wear

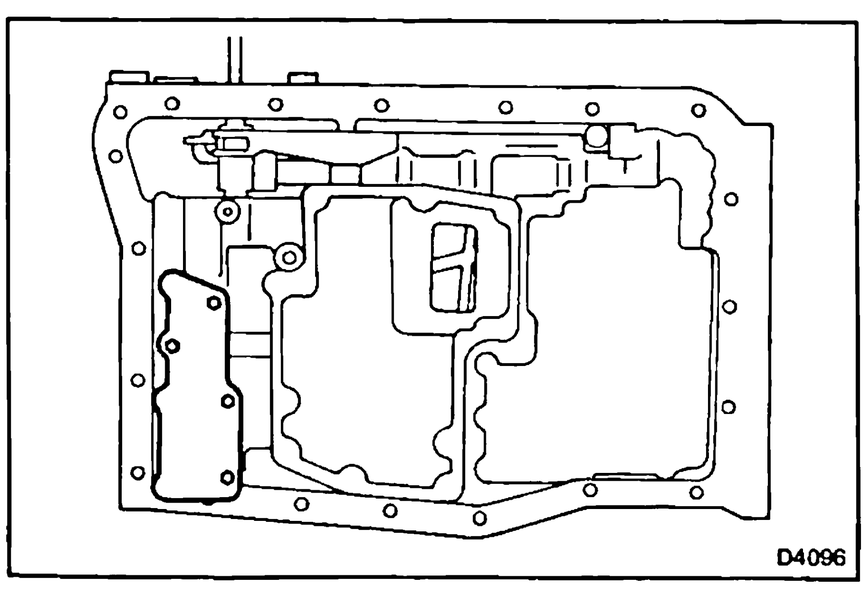


27. REMOVE OIL TUBE

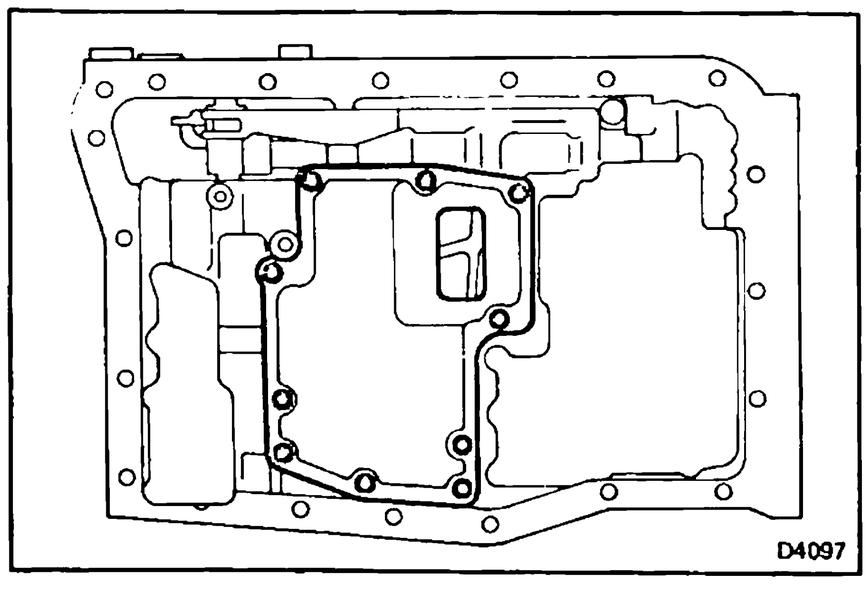
(a) Remove the lock up relay valve body plate.

NOTE: Do not drop the lock up relay valve pins.

(b) Pry up both tube ends with the large screwdriver and remove the oil tube.

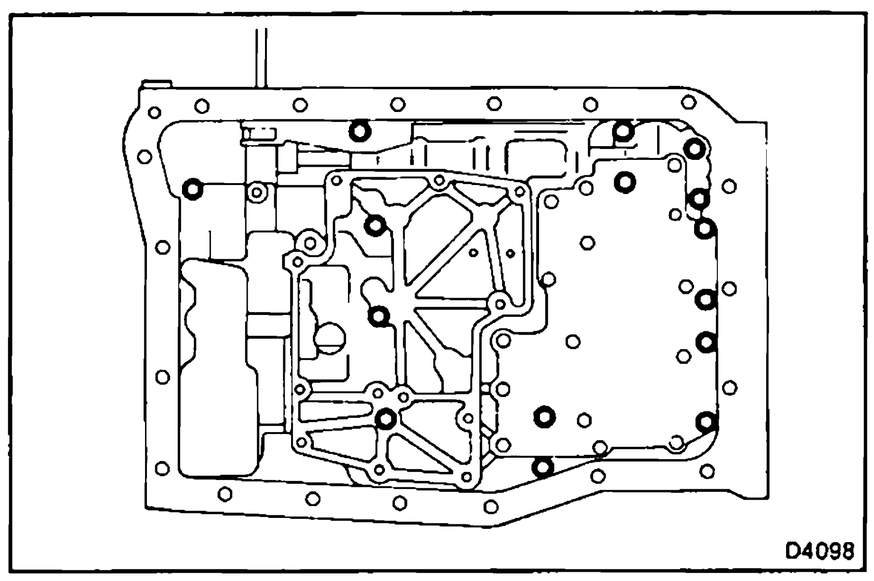


(c) Temporarily install the lock up relay valve body plate with four short bolts.



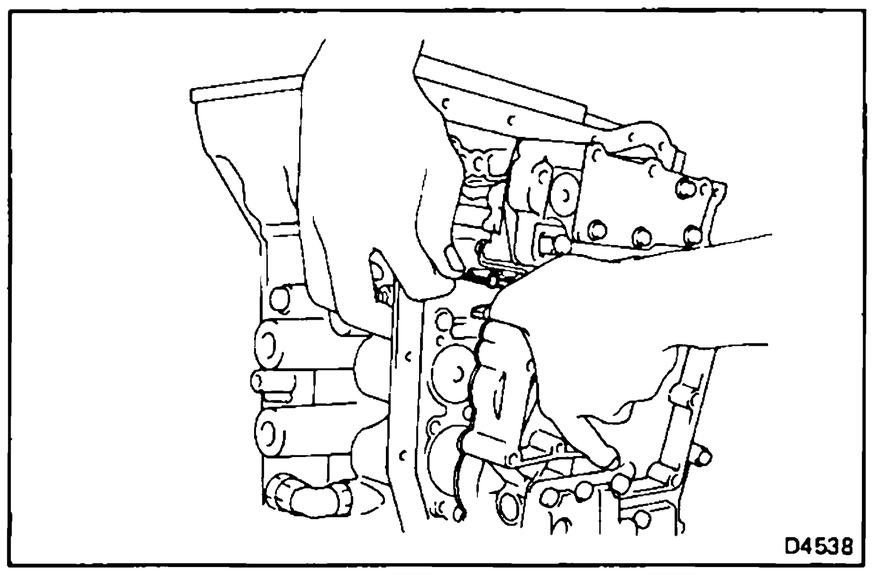
28. REMOVE OIL STRAINER

Remove the ten bolts and remove the oil strainer and gasket.



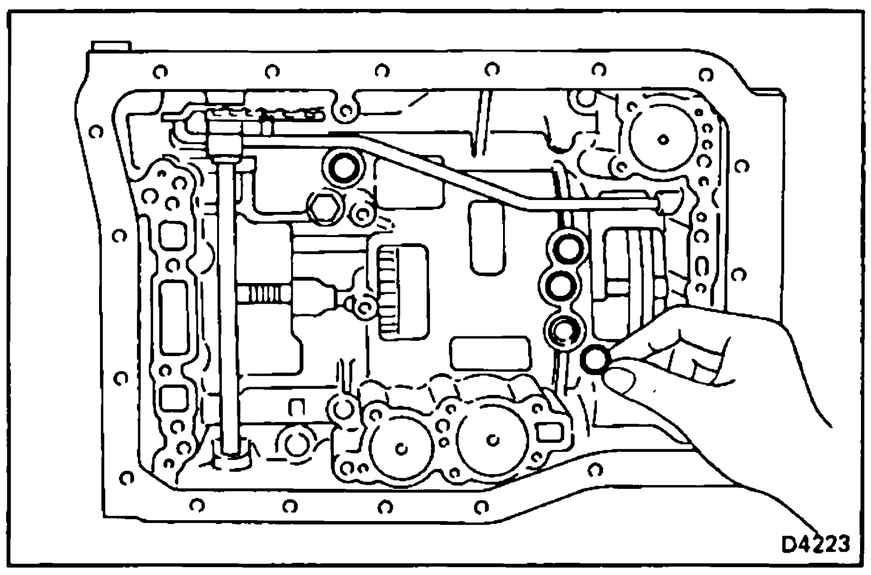
29. REMOVE VALVE BODY

(a) Remove the fifteen bolts.

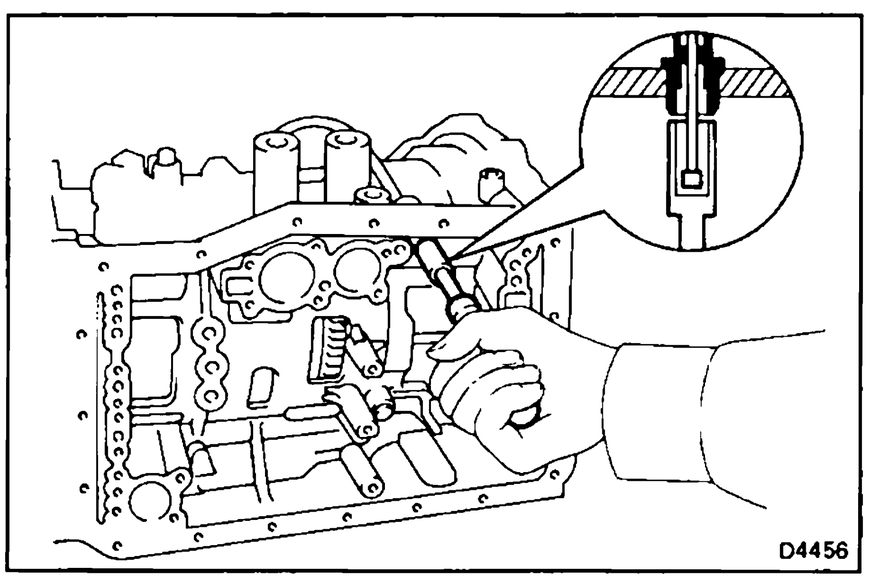


(b) Disconnect the throttle cable from the cam.

(c) Remove the valve body from the transmission case.

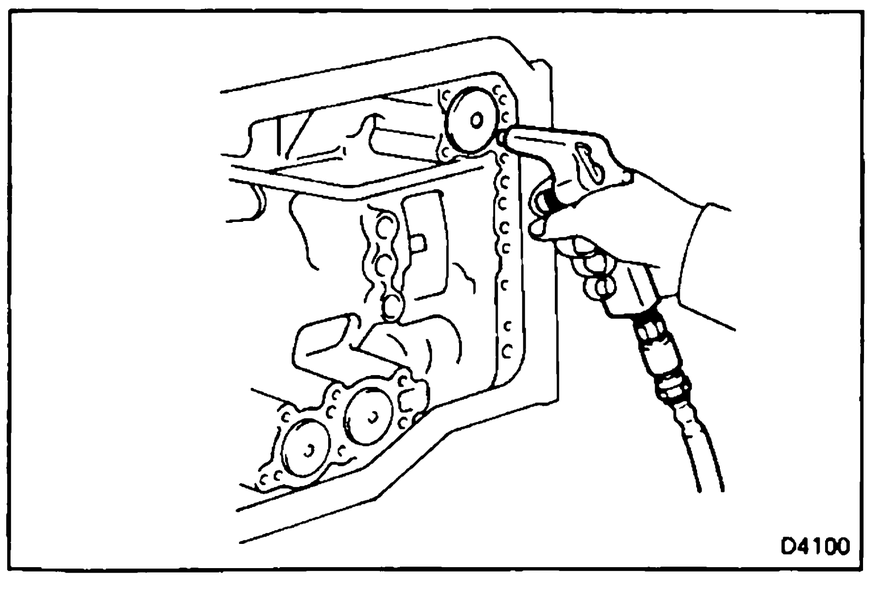


30. REMOVE FOUR TRANSMISSION CASE APPLICATION GASKETS



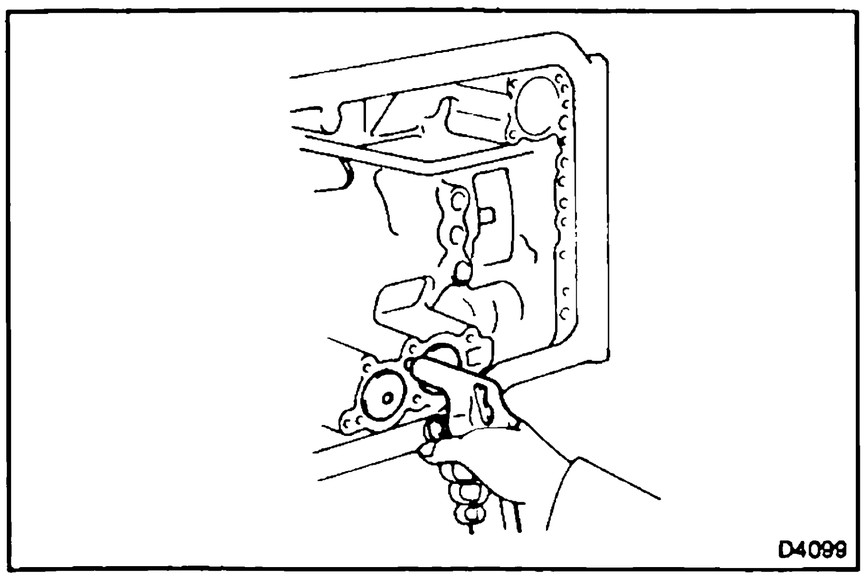
31. REMOVE THROTTLE CABLE

Using 10-mm socket, push the plastic throttle cable retainer, out of the transmission case.



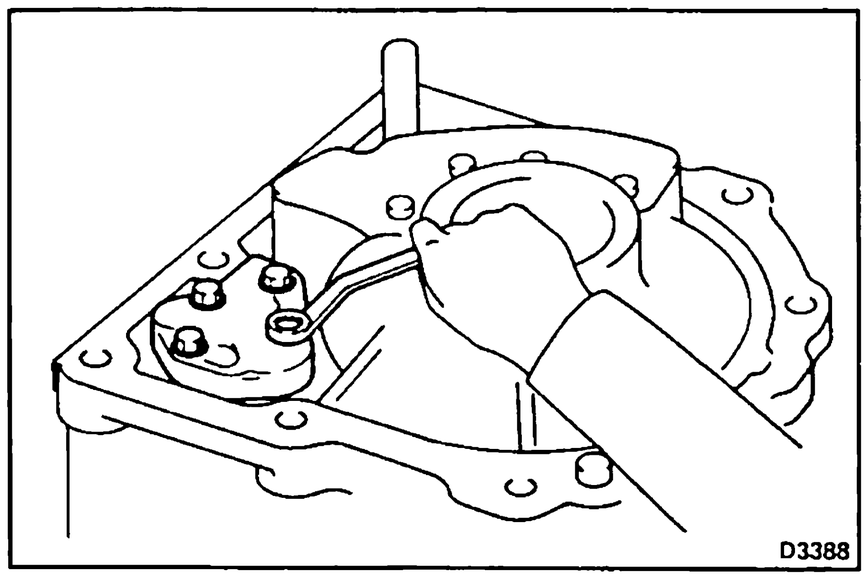
32. REMOVE C_2 ACCUMULATOR PISTON AND SPRING

Applying compressed air to the oil hole, remove the C_2 accumulator piston and spring as shown in the figure.



33. REMOVE B_0 AND B_2 ACCUMULATOR PISTONS AND SPRINGS

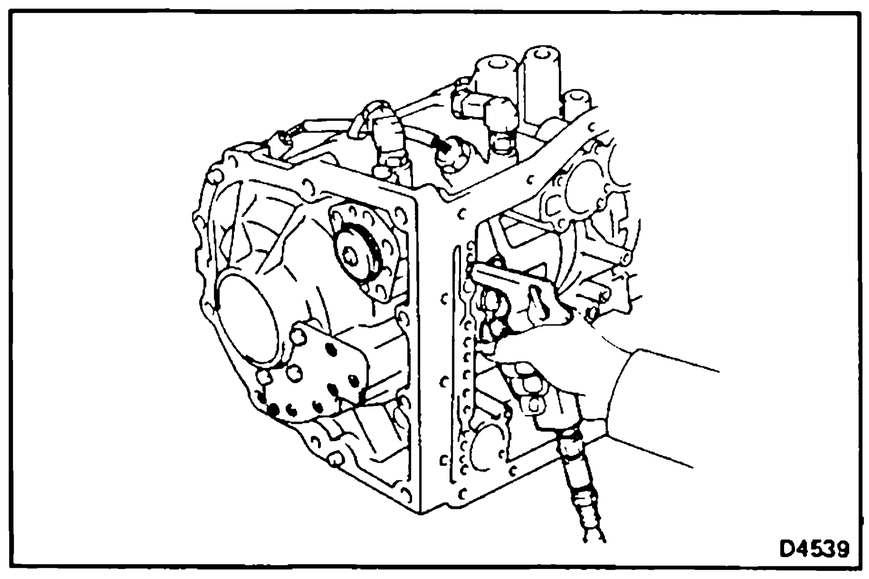
Applying compressed air to the oil hole, remove the B_0 and B_2 accumulator pistons and two springs as shown in the figure.



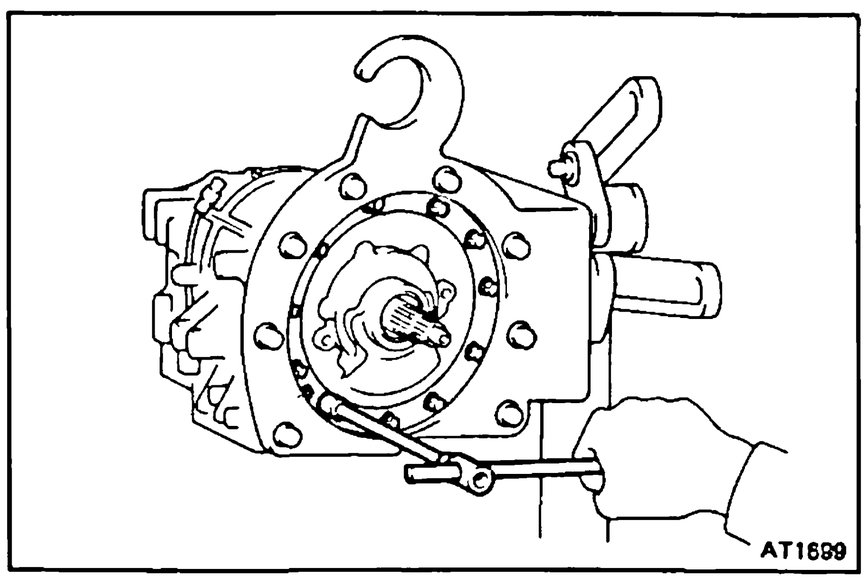
34. REMOVE C_1 ACCUMULATOR PISTON AND SPRING

(a) Remove the four bolts and remove the front clutch accumulator cover.

(b) Remove the plate and two gaskets.



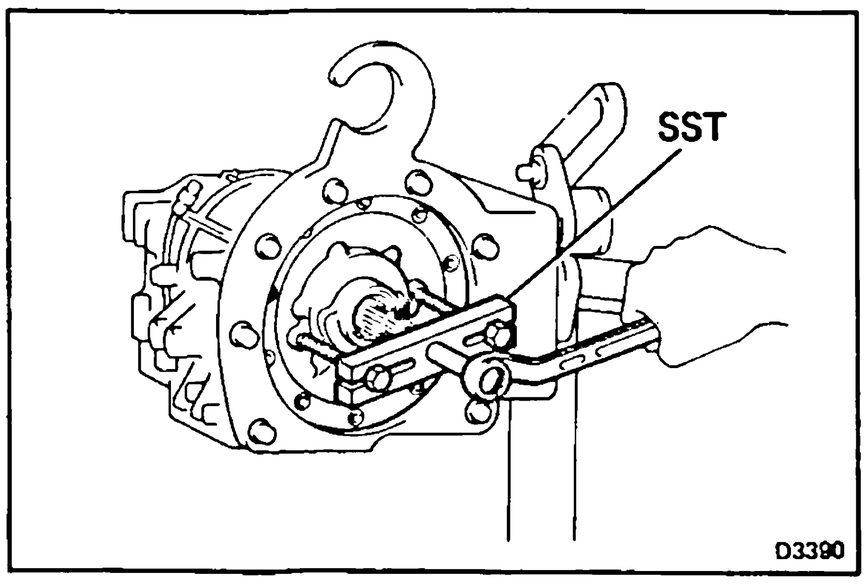
(c) Applying compressed air to the oil hole, remove the C_1 accumulator piston and spring as shown in the figure.



35. REMOVE OIL PUMP

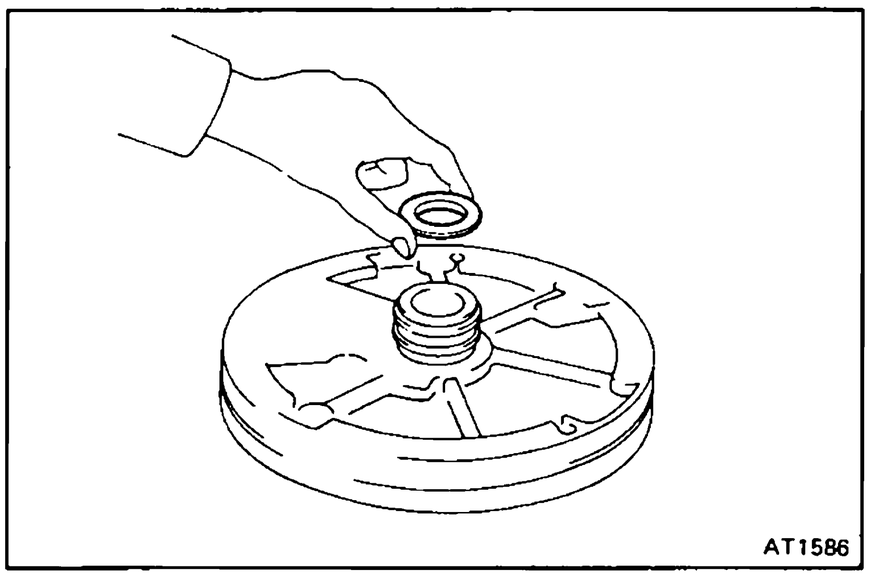
(a) Place matchmarks on the oil pump body and transmission case.

(b) Remove the eleven bolts.

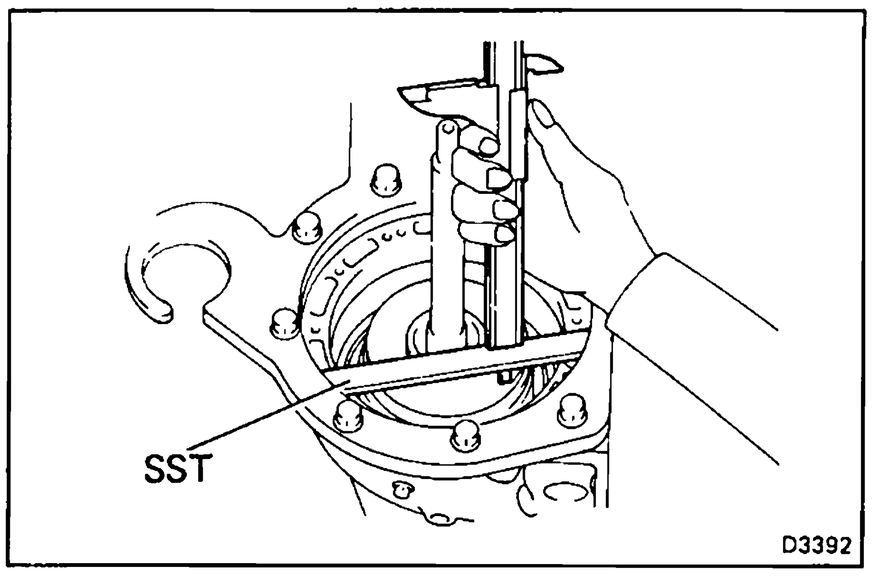


(c) Using SST, pull off the oil pump from the transmission case.

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(d) Remove the race and O-ring.

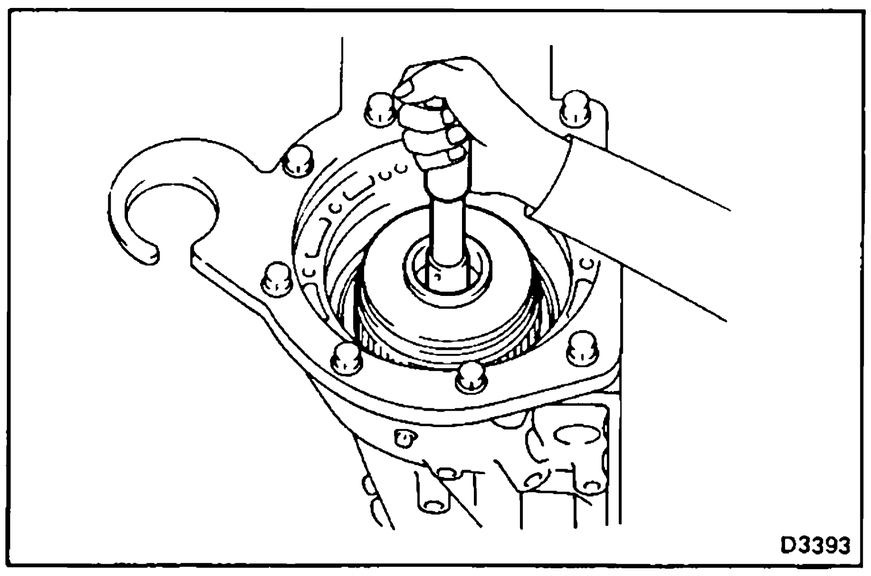


36. MEASURE DISTANCE BETWEEN TOP OF CASE AND CLUTCH DRUM

Set SST on the case as shown in the figure.

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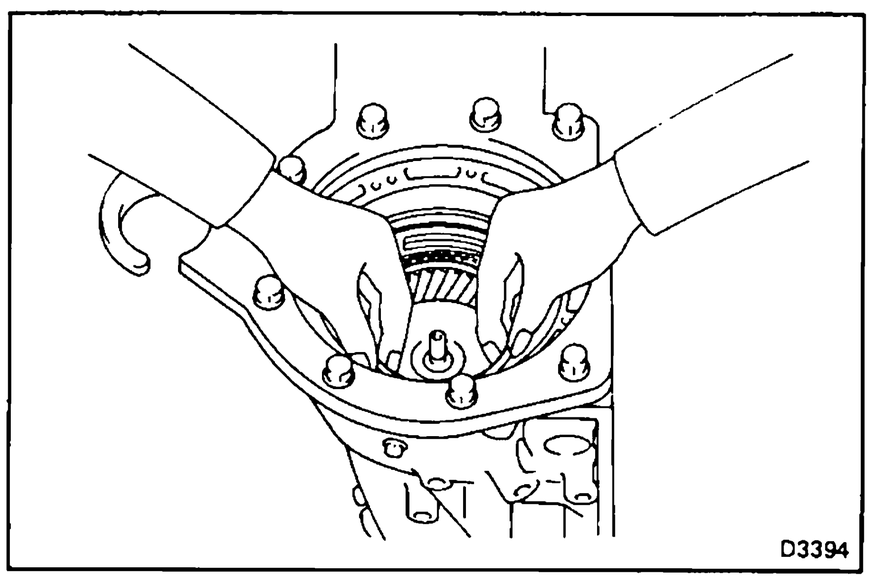
Make a note of the distance for assembly.



37. REMOVE OVERDRIVE DIRECT CLUTCH AND OVERDRIVE PLANETARY GEAR

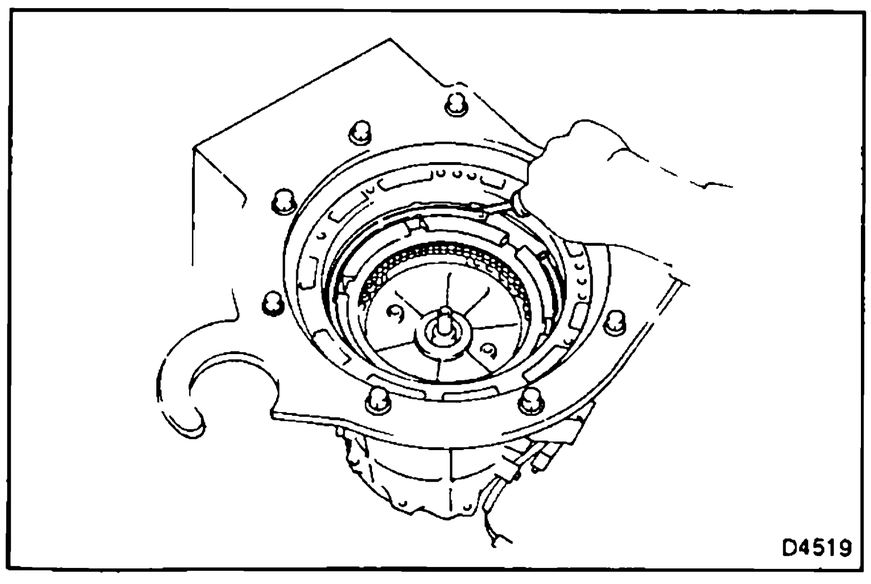
Grasp the shaft and pull out the overdrive direct clutch and overdrive planetary gear.

Watch for bearings and races on both sides of assembly.



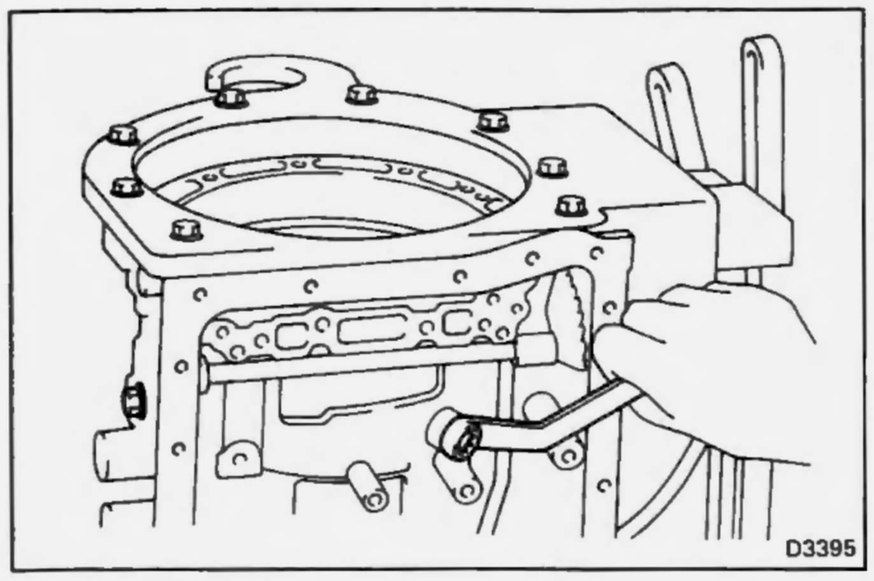
38. REMOVE OVERDRIVE PLANETARY RING GEAR

Watch for bearing and races on both sides of assembly.

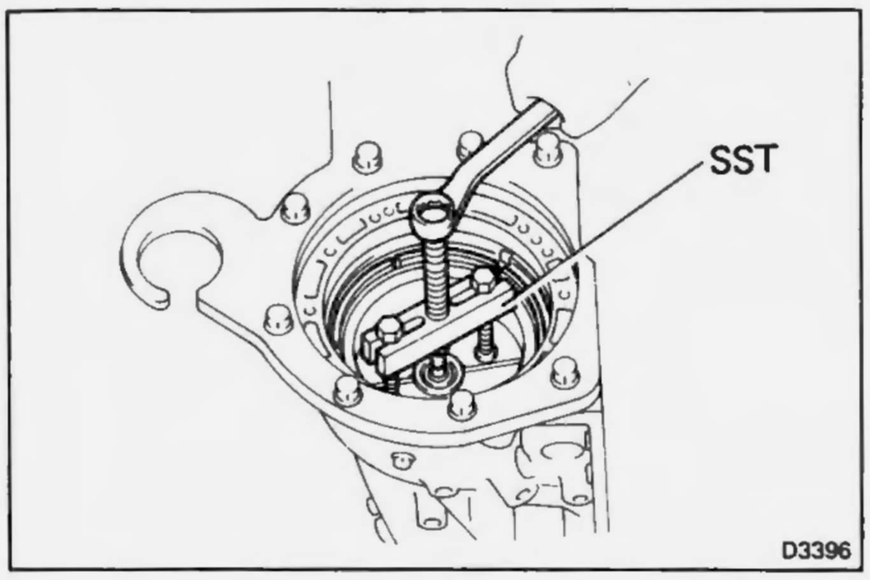


39. REMOVE OVERDRIVE SUPPORT

(a) Using a screwdriver, remove the snap ring.



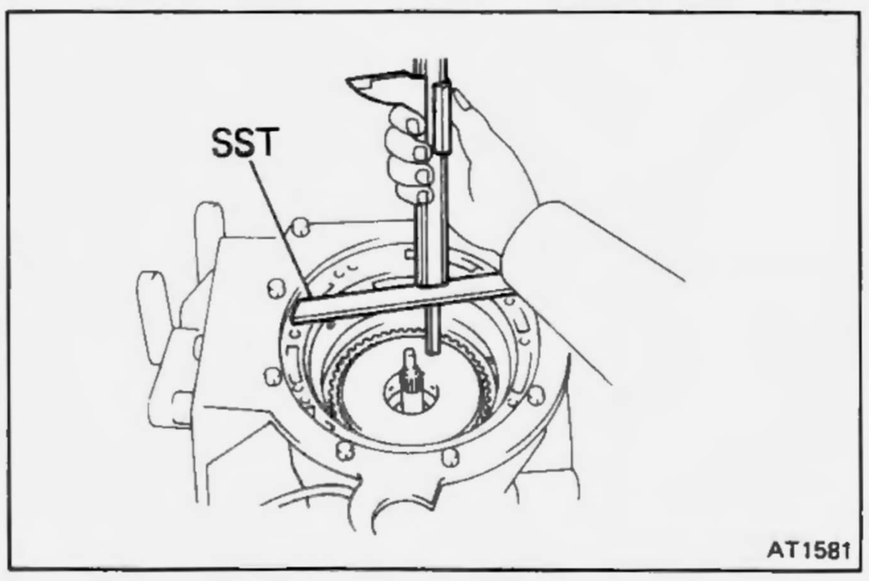
(b) Remove the three overdrive support lock bolts.



(c) Using SST, remove the overdrive support.

SST 09350-36010 (09350-06140)

(d) Remove the three O-rings from the overdrive support.

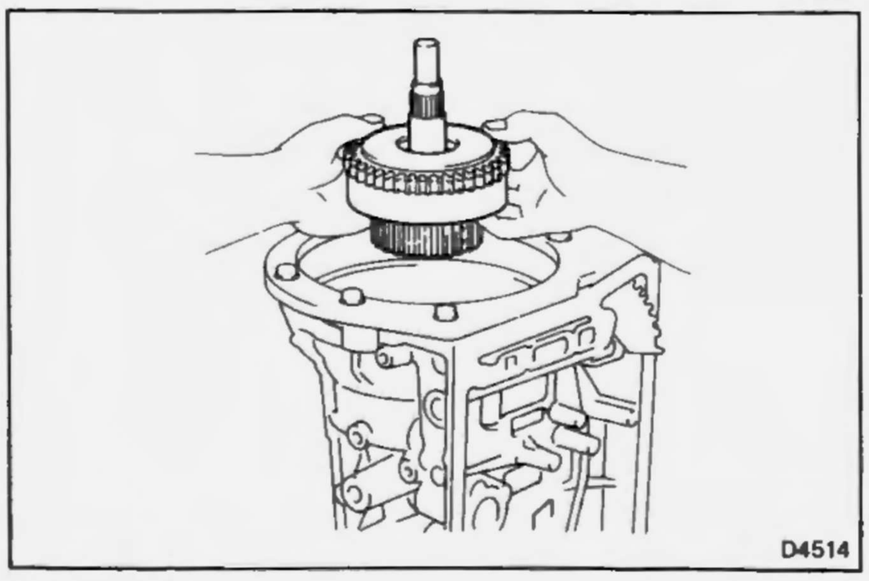


40. MEASURE DISTANCE BETWEEN TOP OF CASE AND CLUTCH DRUM

Set SST on the case as shown in the figure.

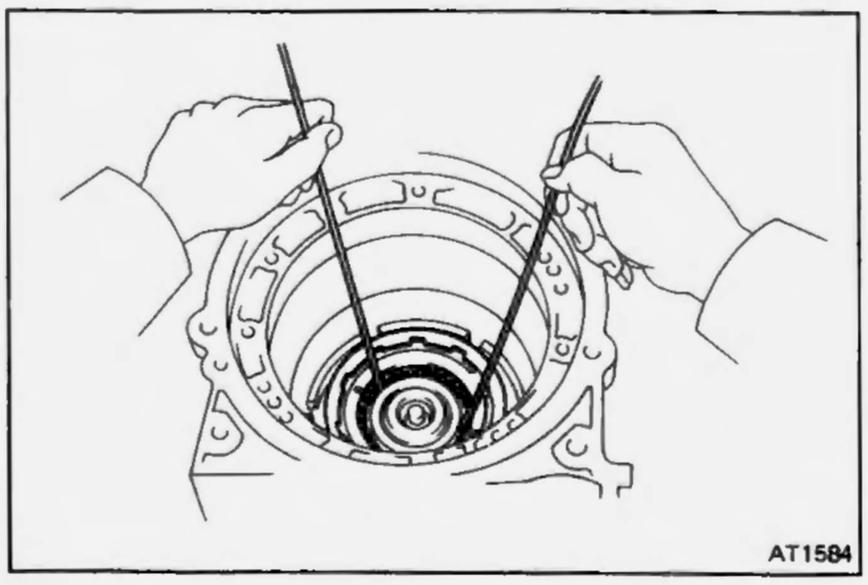
SST 09350-36010 (09350-06090)

Mark the note of the distance for assembly.



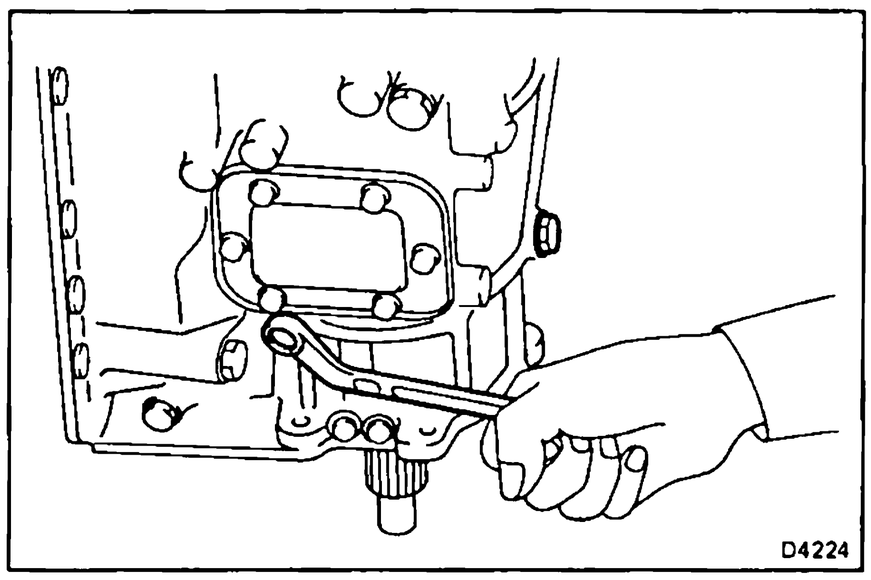
41. REMOVE FRONT CLUTCH ASSEMBLY

Remove the front clutch assembly from the rear clutch. Watch for bearing and races on both sides of assembly.



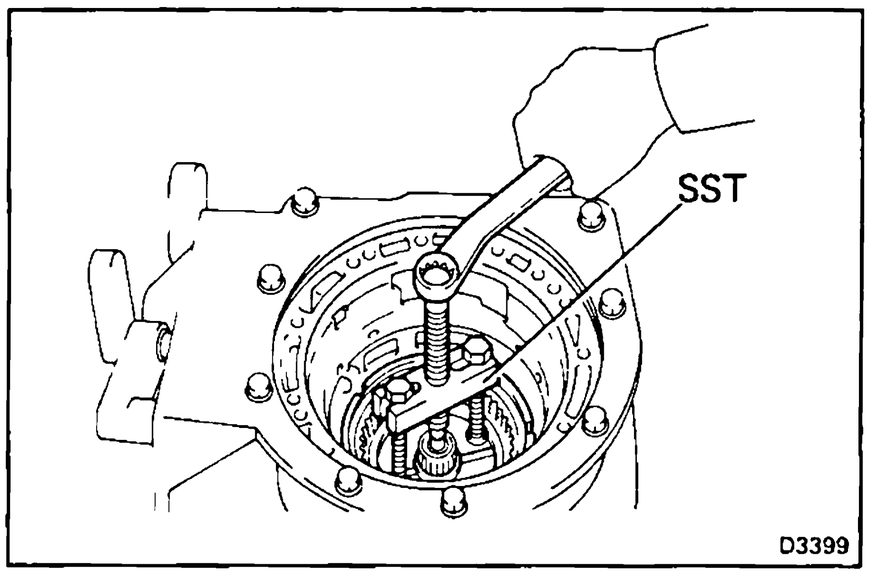
42. REMOVE REAR CLUTCH ASSEMBLY

Insert two wire hooks into flukes of the clutch disc and remove the rear clutch assembly.



43. REMOVE CENTER SUPPORT

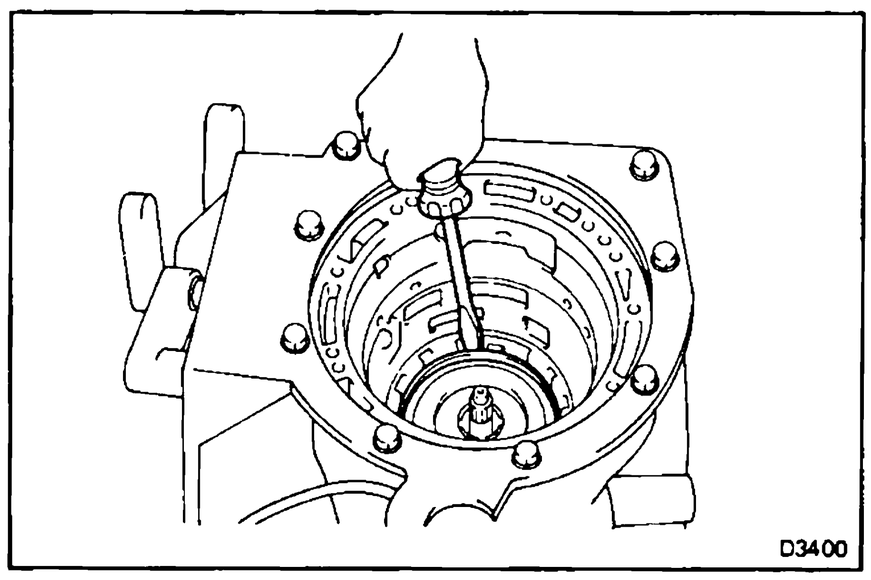
(a) Remove the three center support lock bolts.



(b) Using SST, remove the center support.

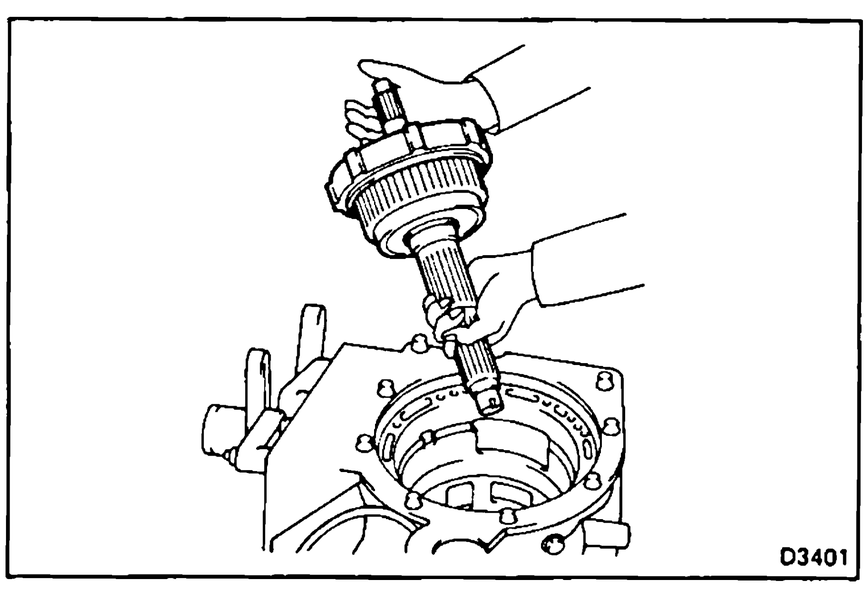
SST 09350-36010 (09350-06140)

(c) Remove the three O-rings from the center support.

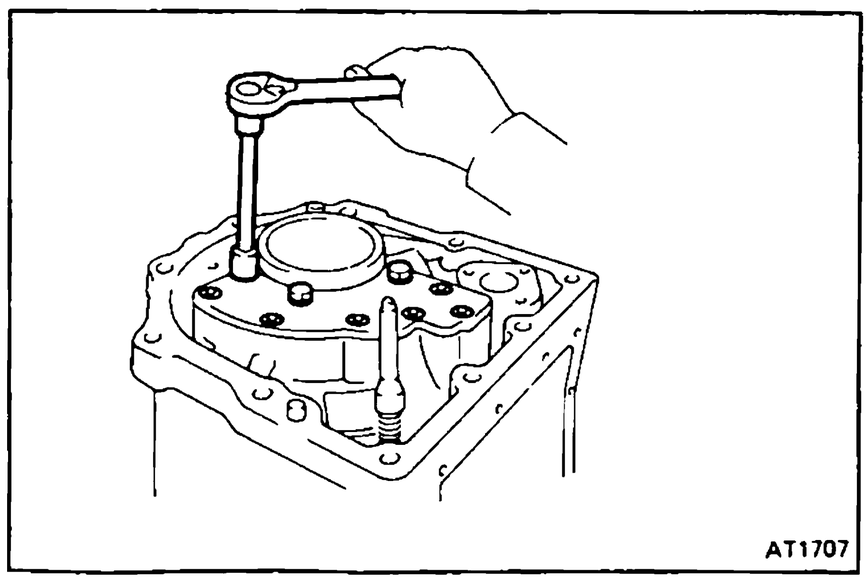


44. REMOVE PLANETARY GEAR AND OUTPUT SHAFT

(a) Using a screwdriver, remove the snap ring.



(b) Remove the planetary gear and output shaft with the one-way clutch.

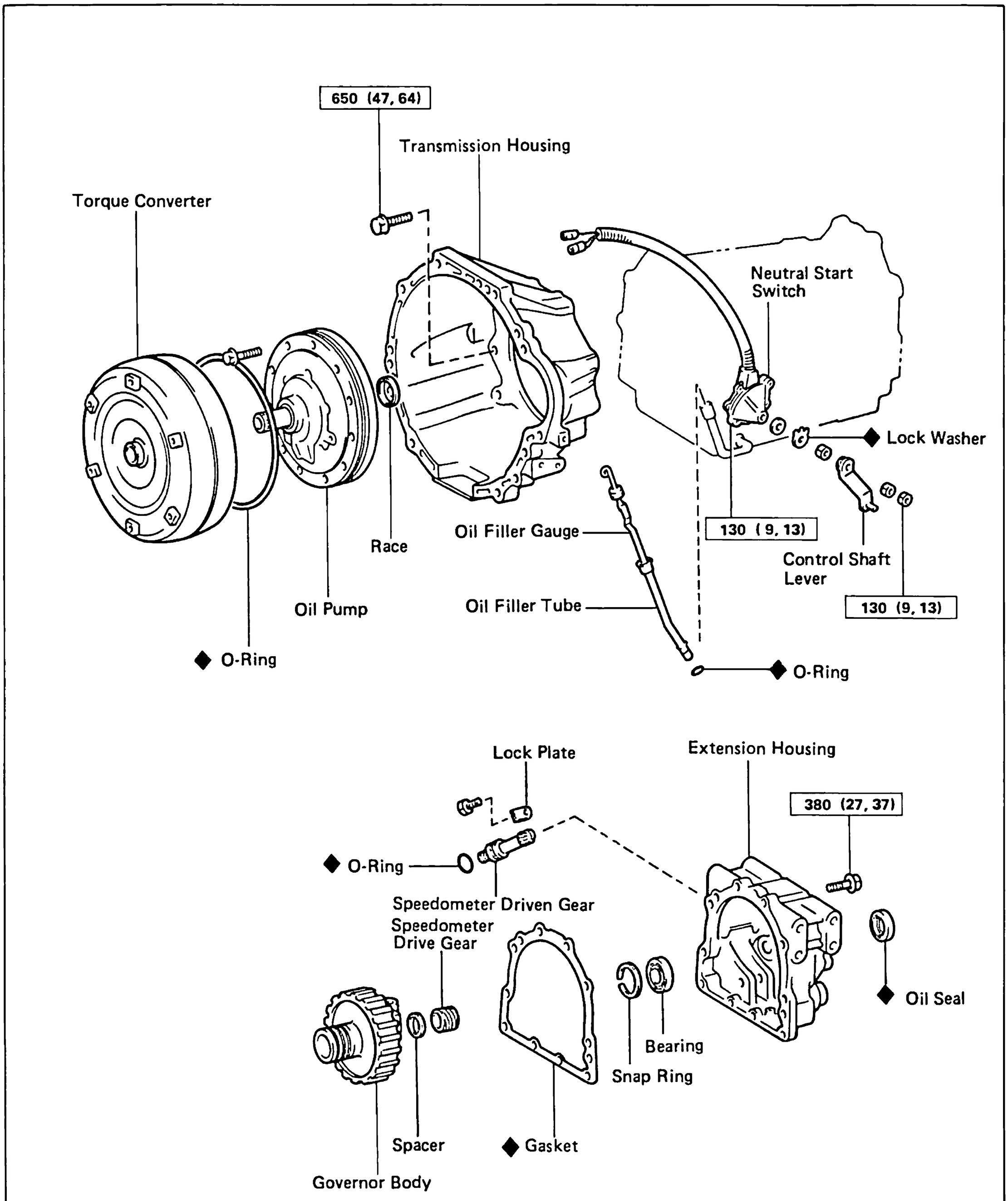


45. REMOVE TRANSMISSION REAR COVER

Remove the three bolts and six screws and remove the transmission rear cover and gasket.

DISASSEMBLY OF TRANSMISSION (A440L)

COMPONENTS

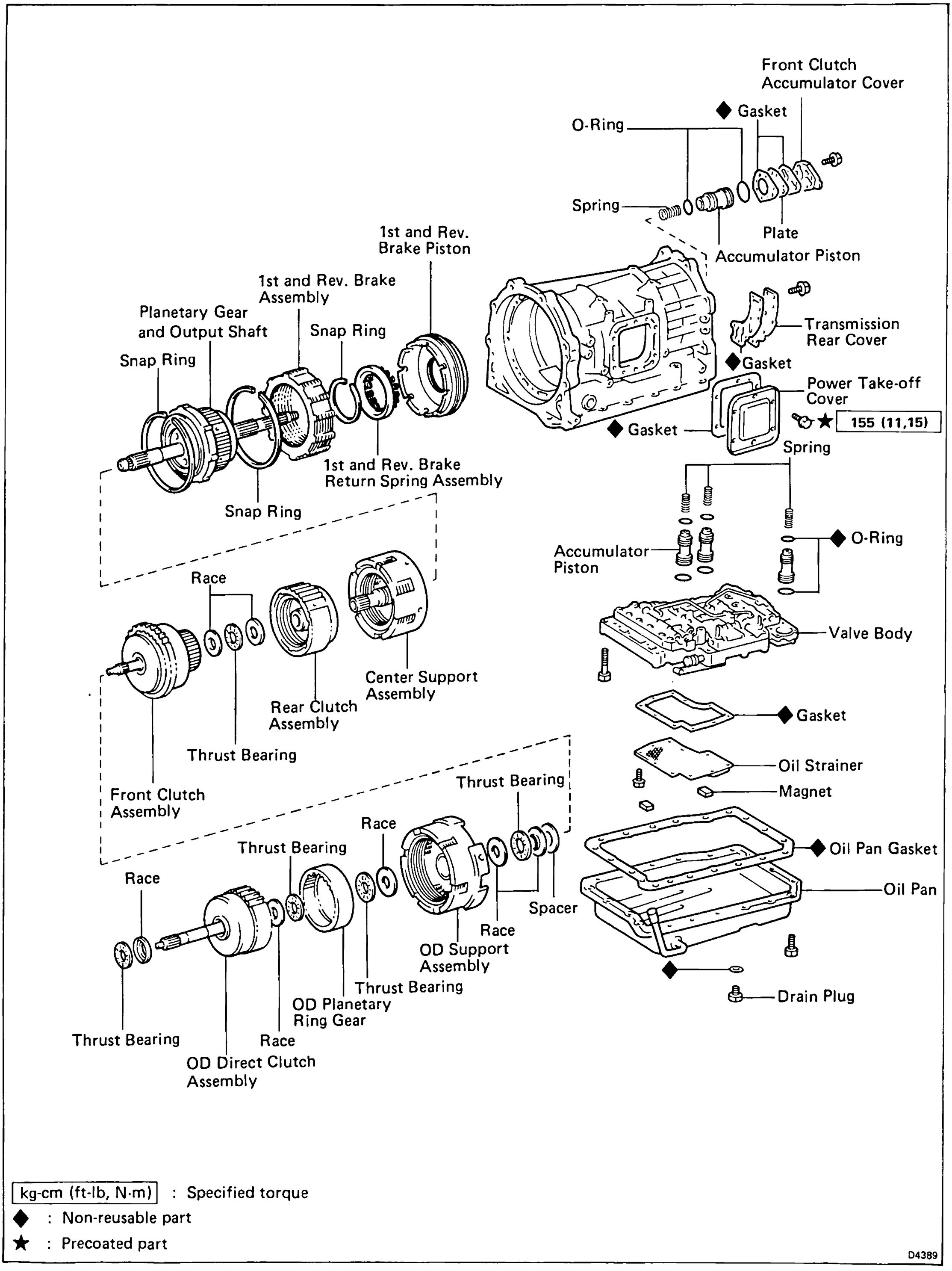


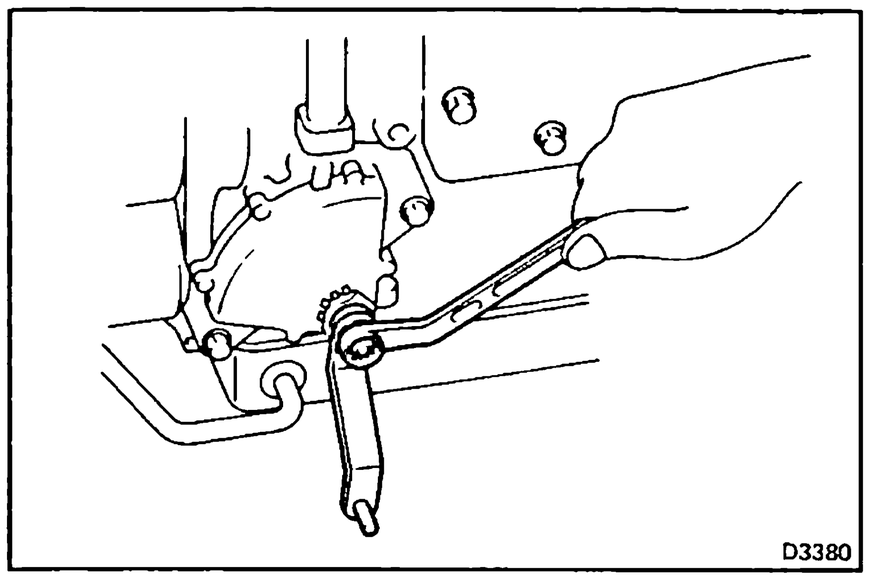
kg-cm (ft-lb, N·m) : Specified torque

◆ Non-reusable part

D4388

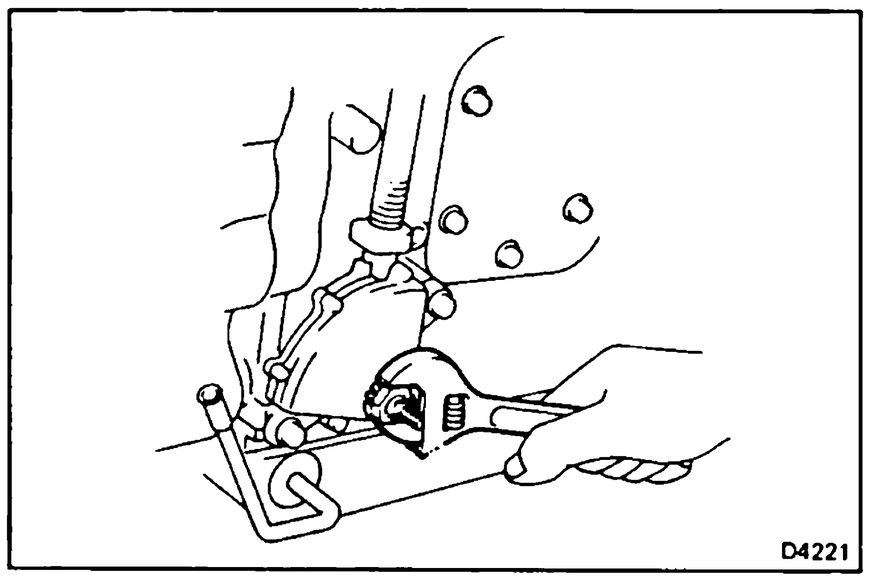
COMPONENTS (Cont'd)



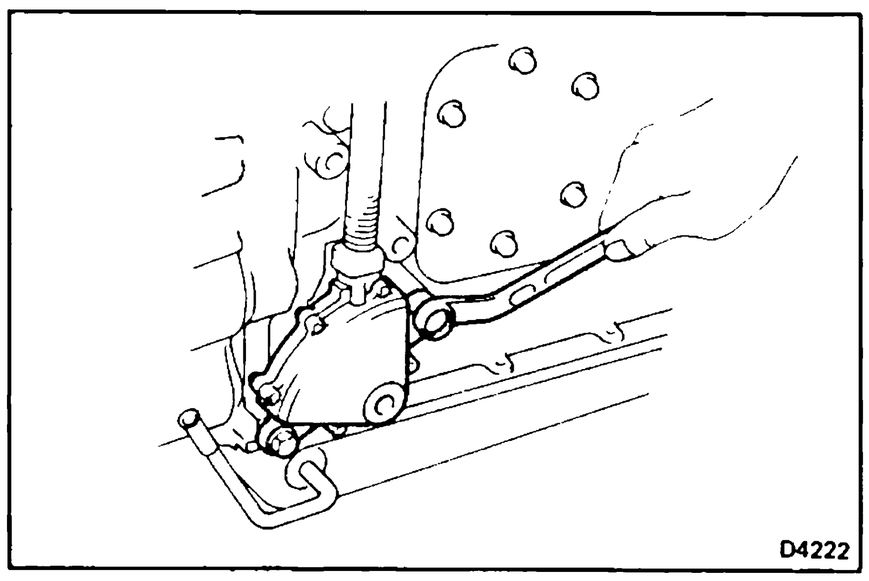


SEPARATE BASIC SUBASSEMBLY

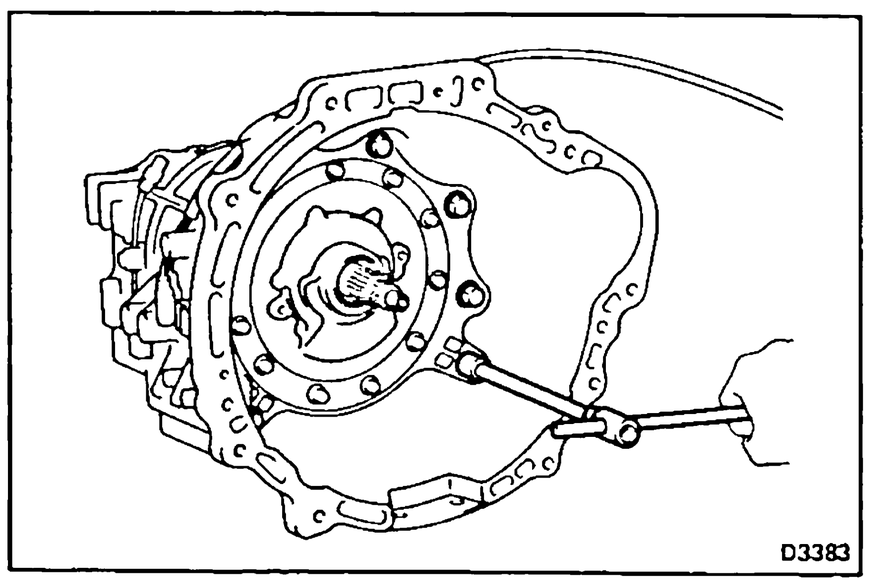
1. REMOVE TORQUE CONVERTER
2. REMOVE OIL FILLER GAUGE AND TUBE
3. REMOVE CONTROL SHAFT LEVER



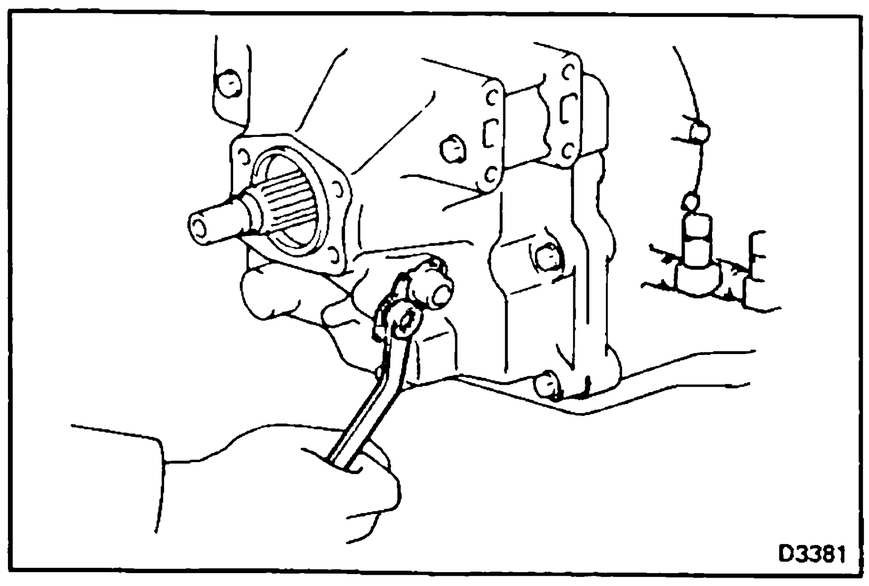
4. REMOVE NEUTRAL START SWITCH
   (a) Loosen the lock washer claw and remove the nut.
   (b) Remove the lock washer and grommet.



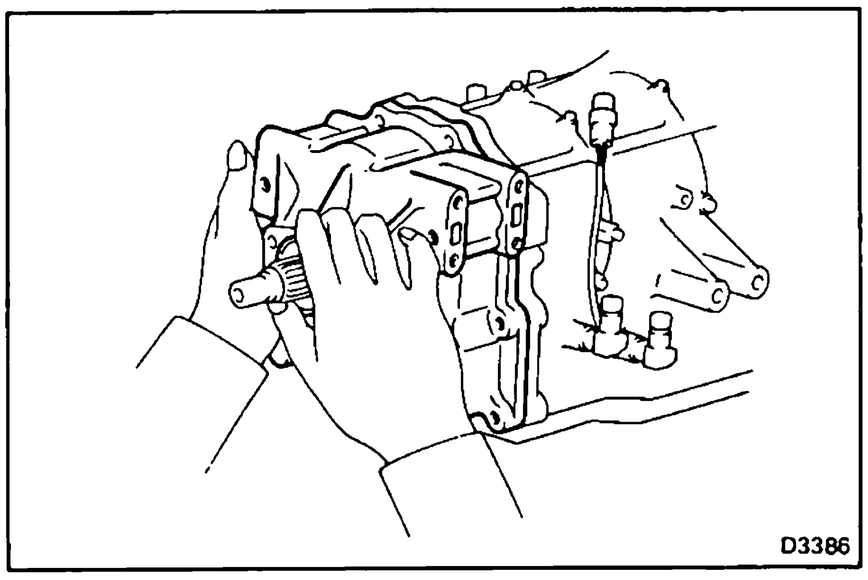
   (c) Remove the two bolts and neutral start switch.



5. REMOVE TRANSMISSION HOUSING
   (a) Remove the throttle cable retaining plate.
   (b) Remove the eight bolts and transmission housing.



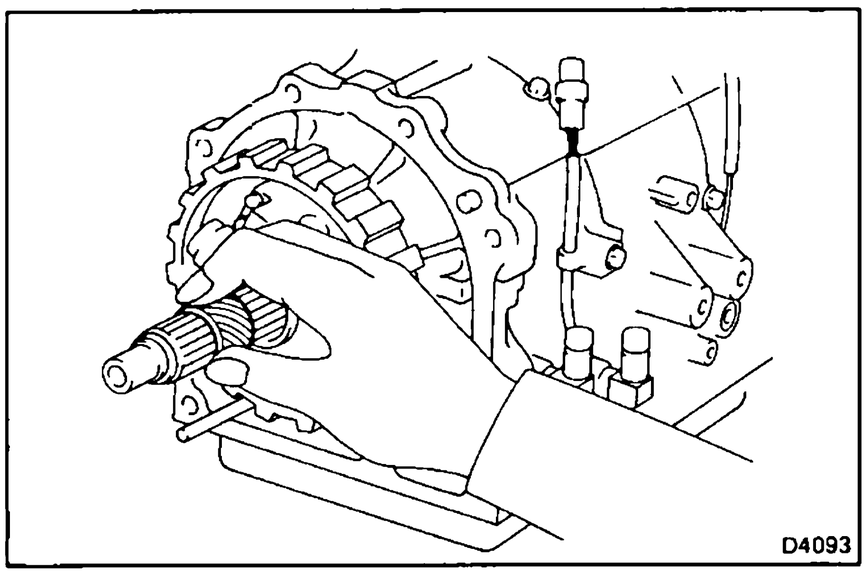
6. REMOVE SPEEDOMETER DRIVEN GEAR
   (a) Remove the lock plate
   (b) Remove the speedometer driven gear.
   (c) Remove the O-ring from the speedometer driven gear.



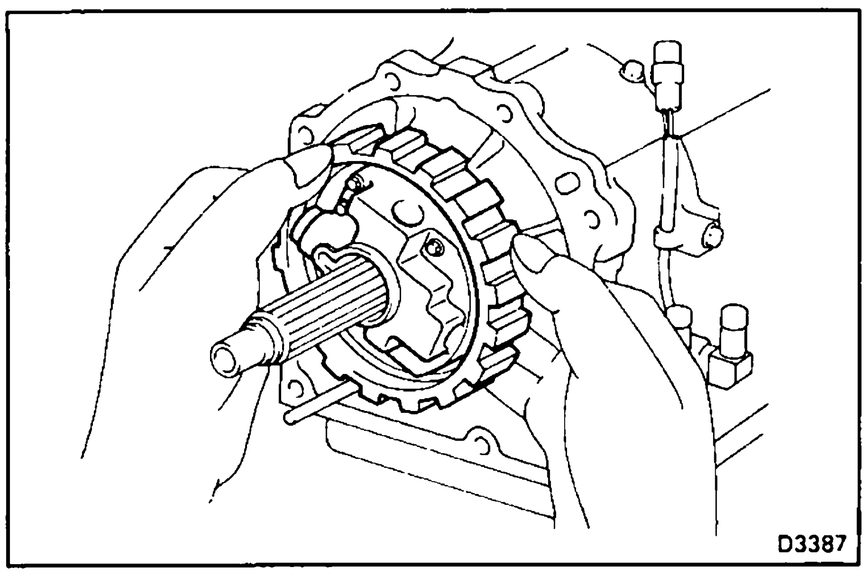
7. REMOVE EXTENSION HOUSING

(a) Remove the ten bolts and extension housing.

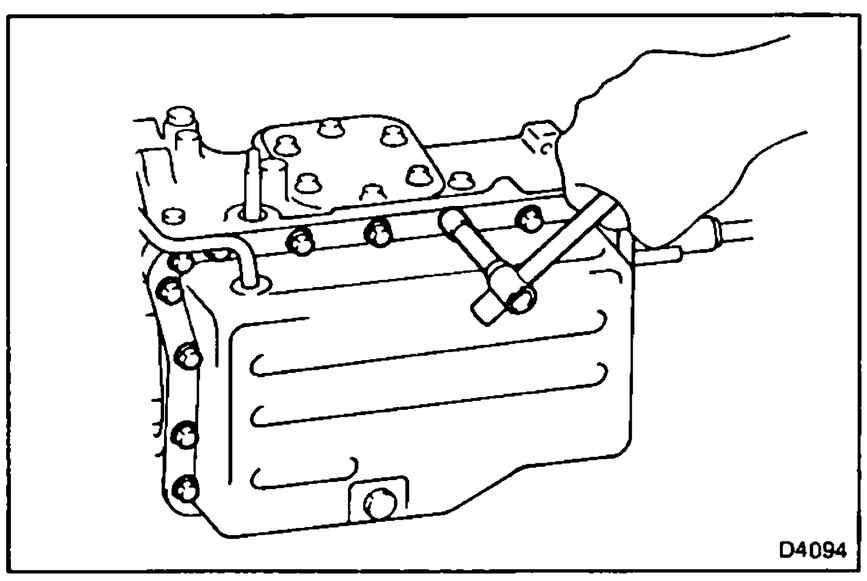
(b) Remove the gasket.



8. REMOVE SPEEDOMETER DRIVE GEAR AND SPACER



9. REMOVE GOVERNOR BODY



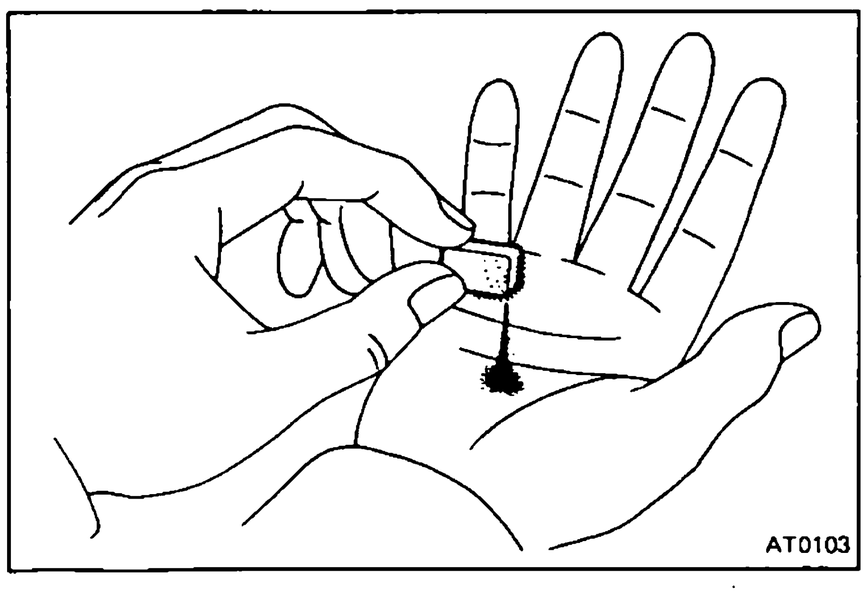
10. REMOVE OIL PAN

(a) Position the oil pan so it does not tilt upright.

(b) Remove the twenty bolts and remove the oil pan and gasket.

CAUTION:

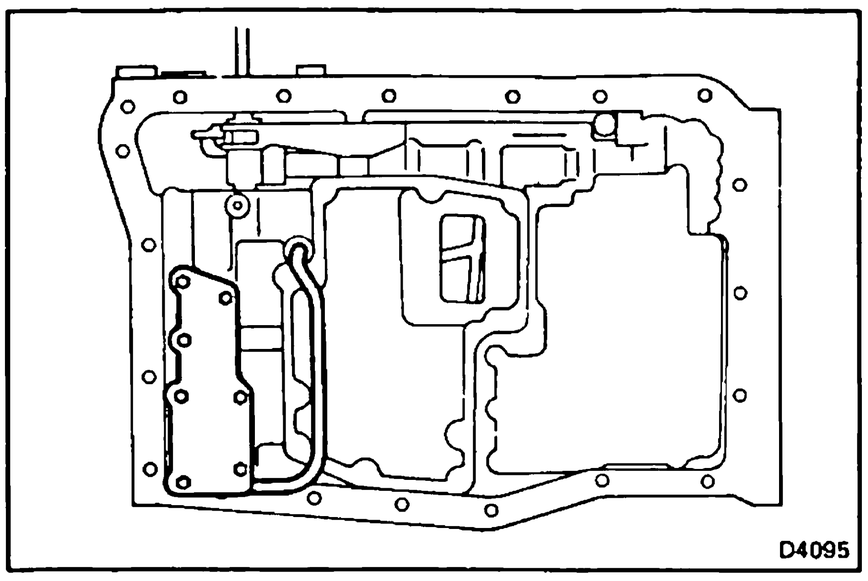
- **Do not dent the oil pan.**
- **Do not turn the transmission over, as this will contaminate the valve body with the foreign materials in the bottom of the pan.**



11. EXAMINE PARTICLES IN PAN

Remove the magnet and use it to collect any steel chips. Examine the chips and particles in the pan and on the magnet to anticipate what type of wear you will find in the transmission.

Steel (magnetic)...bearing, gear and clutch plate wear
Brass (non-magnetic)...bushing wear

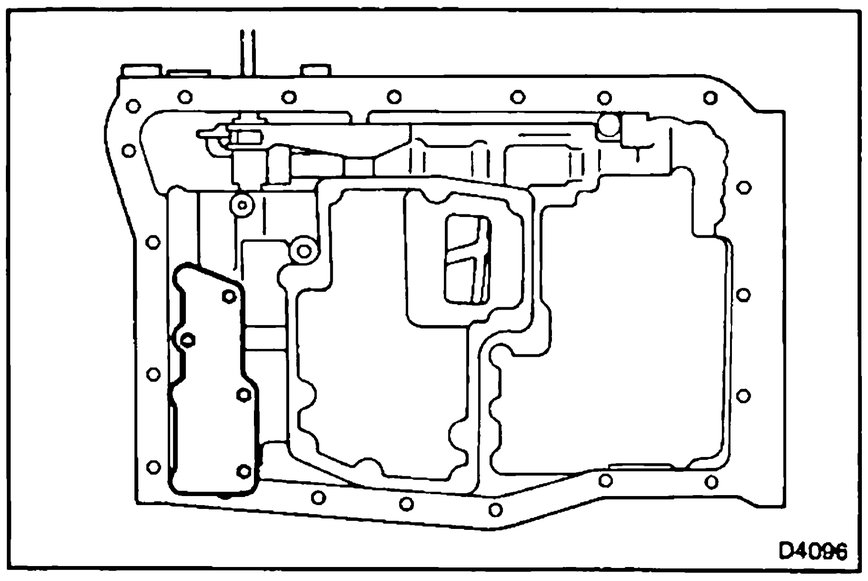

D4095

12. REMOVE OIL TUBE

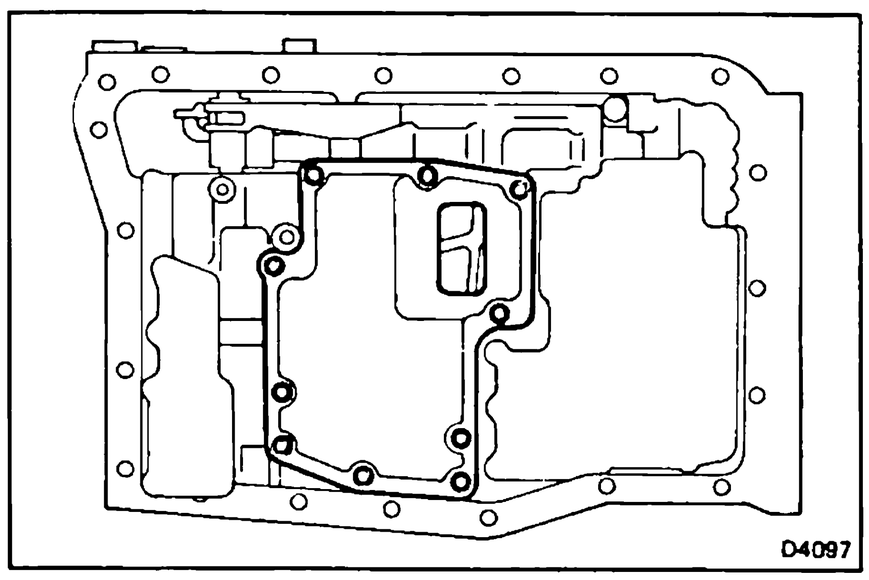
(a) Remove the lock up relay valve body plate.

NOTE: Do not drop the lock up relay valve pins.

(b) Pry up both tube ends with the large screwdriver and remove the oil tube.

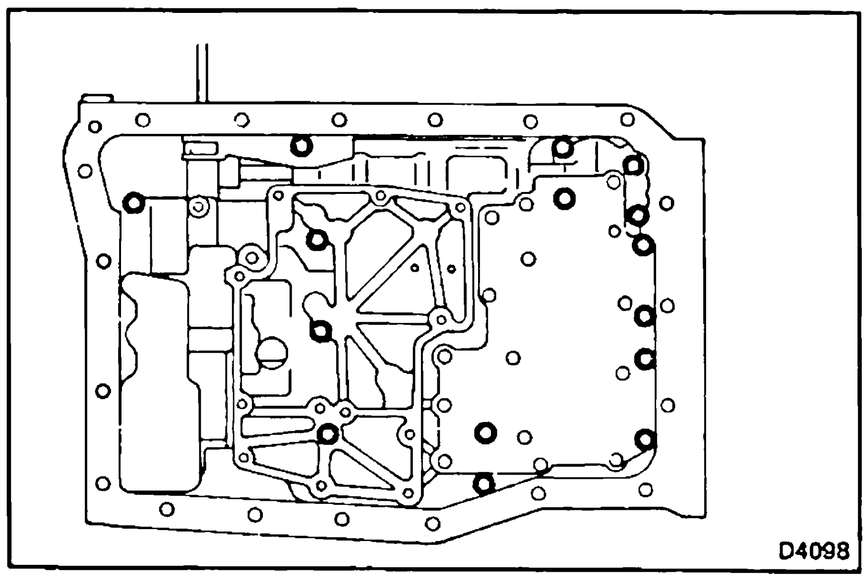

D4096

(c) Temporarily install the lock up relay valve body plate with the four short bolts.


D4097

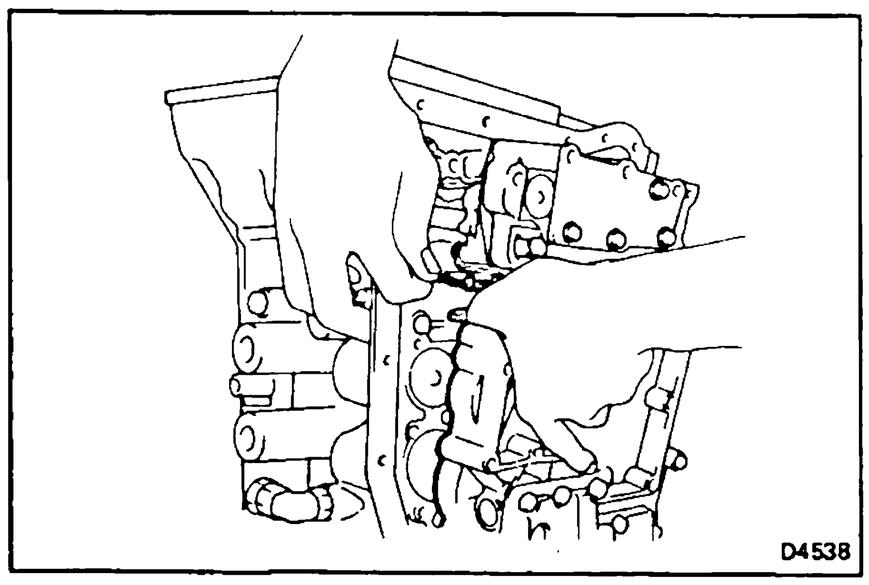
13. REMOVE OIL STRAINER

Remove the ten bolts and remove the oil strainer and gasket.


D4098

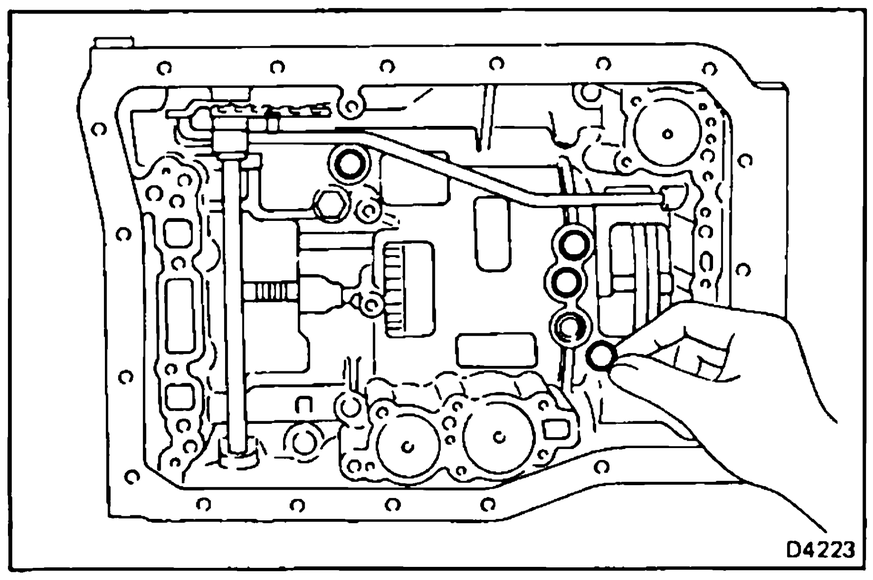
14. REMOVE VALVE BODY

(a) Remove the fifteen bolts.

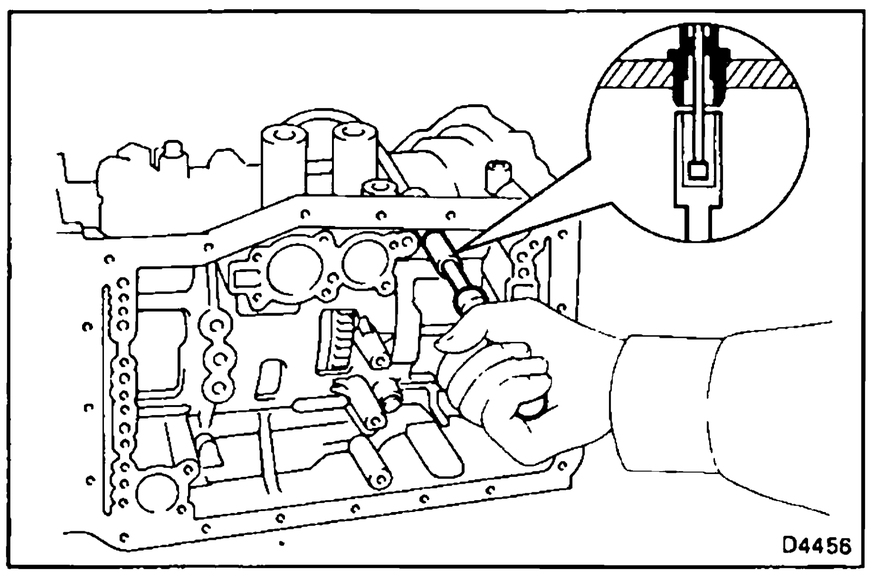

D4538

(b) Disconnect the throttle cable from the cam.

(c) Remove the valve body from the transmission case.

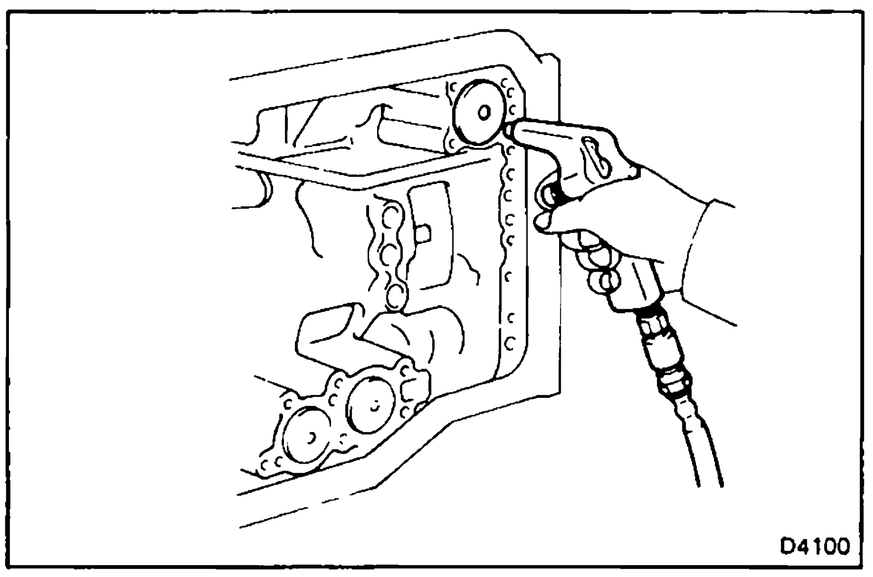


15. REMOVE FOUR TRANSMISSION CASE APPLICATION GASKETS



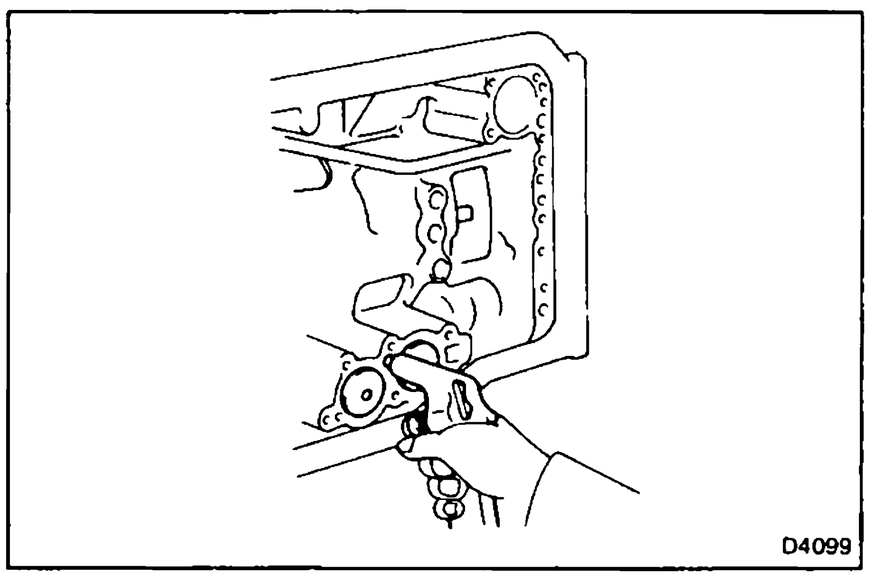
16. REMOVE THROTTLE CABLE

Using 10-mm socket, push the plastic throttle cable retainer, out of the transmission case.

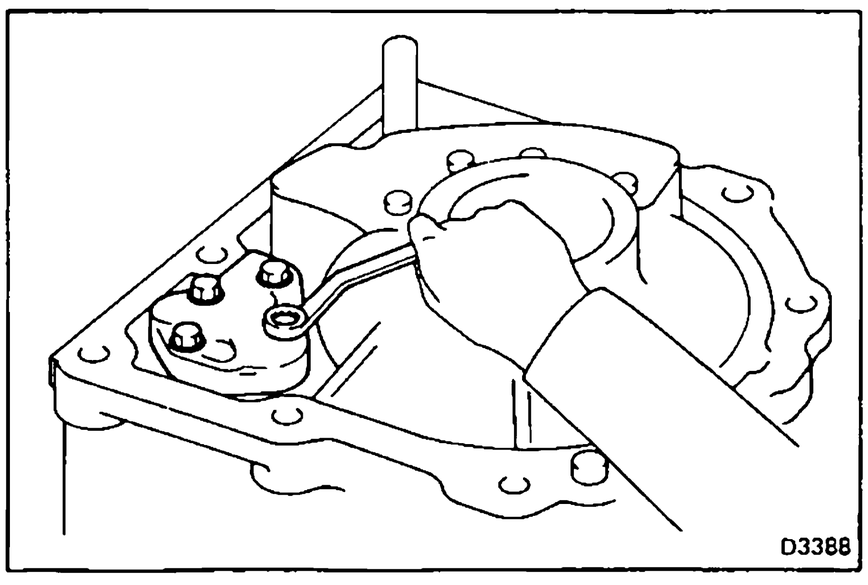


17. REMOVE C_2, B_0 AND B_2 ACCUMULATOR PISTONS AND SPRINGS

(a) Applying compressed air to the oil hole, remove the C_2 accumulator piston and spring as shown in the figure.



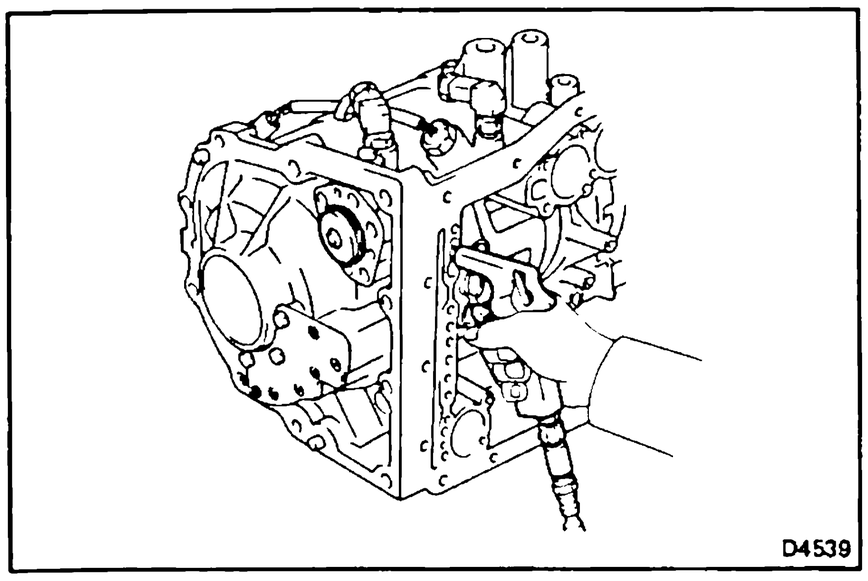
(b) Applying compressed air to the oil hole, remove the B_0 and B_2 accumulator pistons and two springs as shown in the figure.



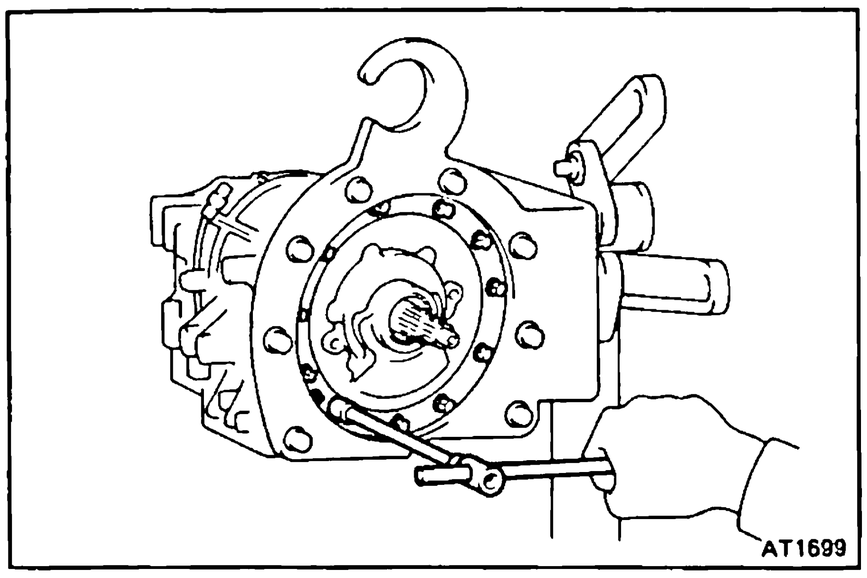
18. REMOVE C_1 ACCUMULATOR PISTON AND SPRING

(a) Remove the four bolts and remove the front clutch accumulator cover.

(b) Remove the plate and two gaskets.



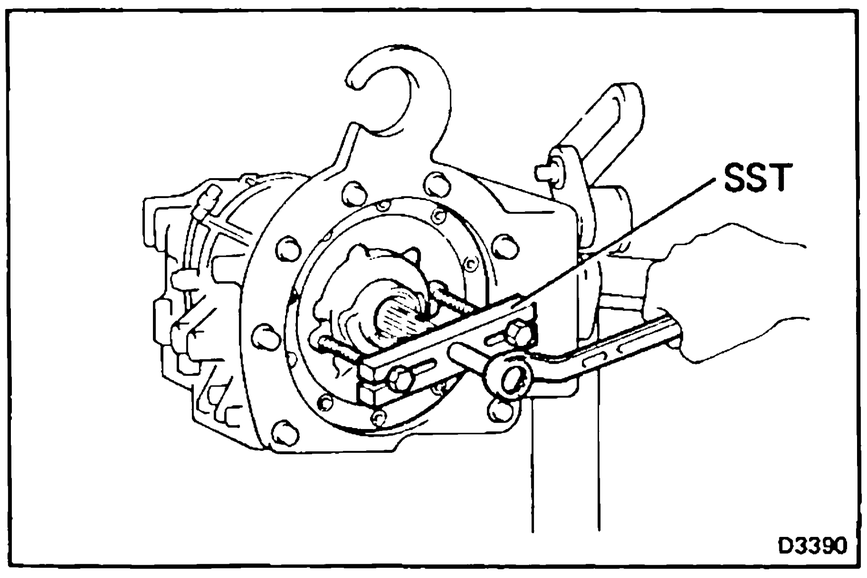
(c) Applying compressed air to the oil hole, remove the C_1 accumulator piston and spring as shown in the figure.



19. REMOVE OIL PUMP

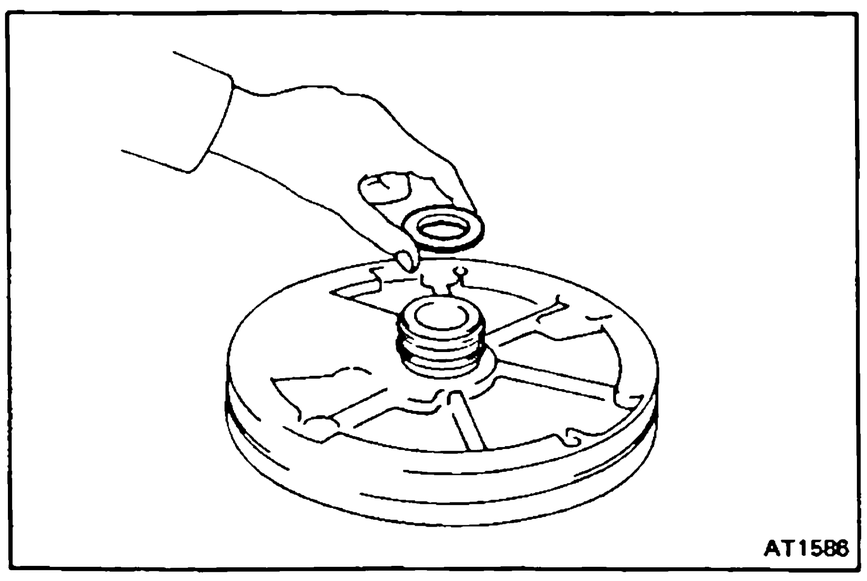
(a) Place matchmarks on the oil pump body and transmission case.

(b) Remove the eleven bolts.

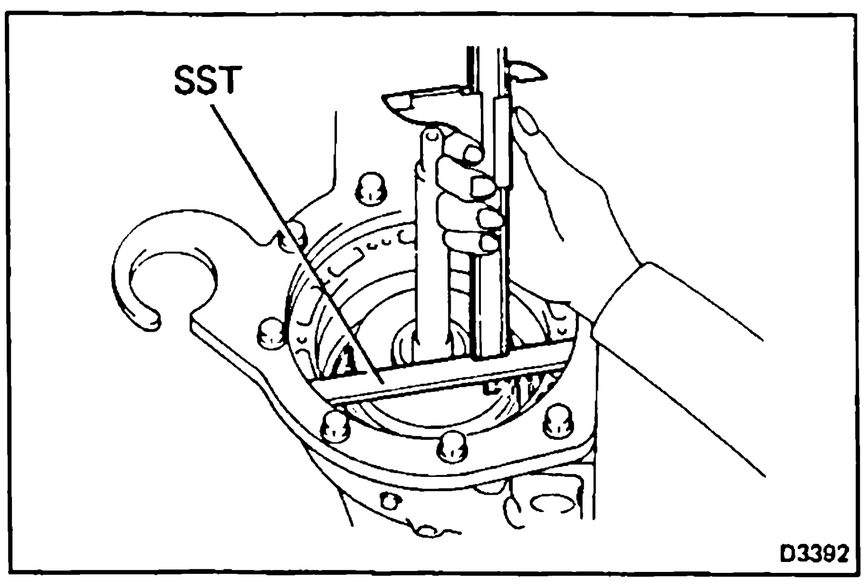


(c) Using SST, pull off the oil pump from the transmission case.

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(d) Remove the race and O-ring.

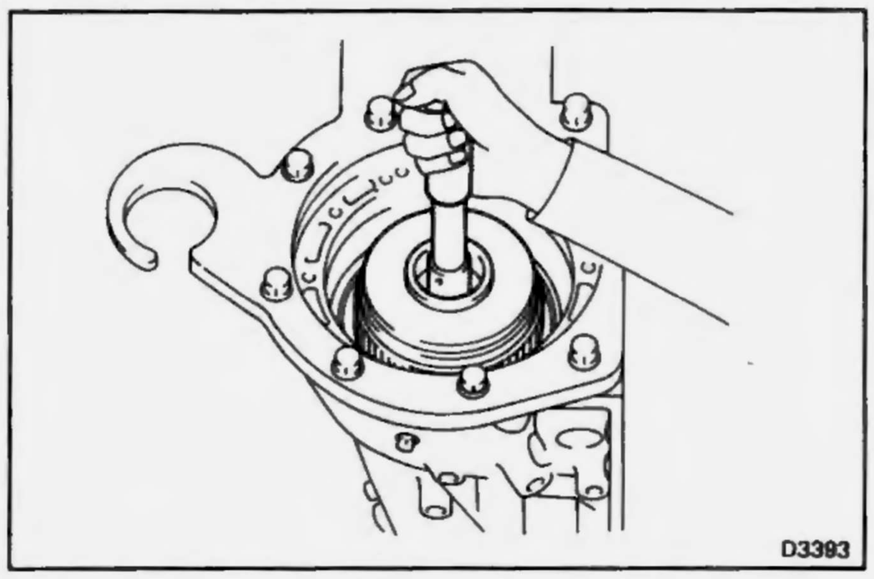


20. MEASURE DISTANCE BETWEEN TOP OF CASE AND CLUTCH DRUM

Set SST on the case as shown in the figure.

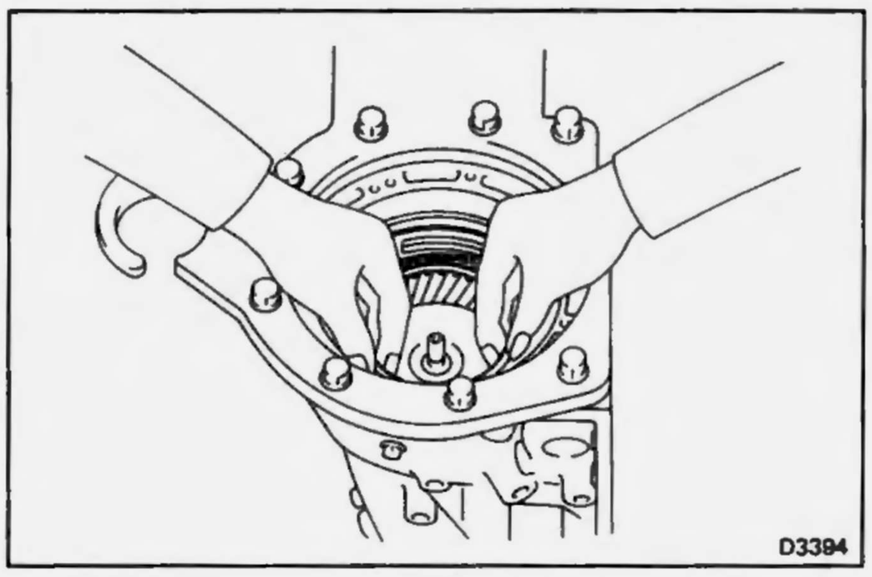
SST 09350-36010 (09350-06090)

Make a note of distance for reassembly.



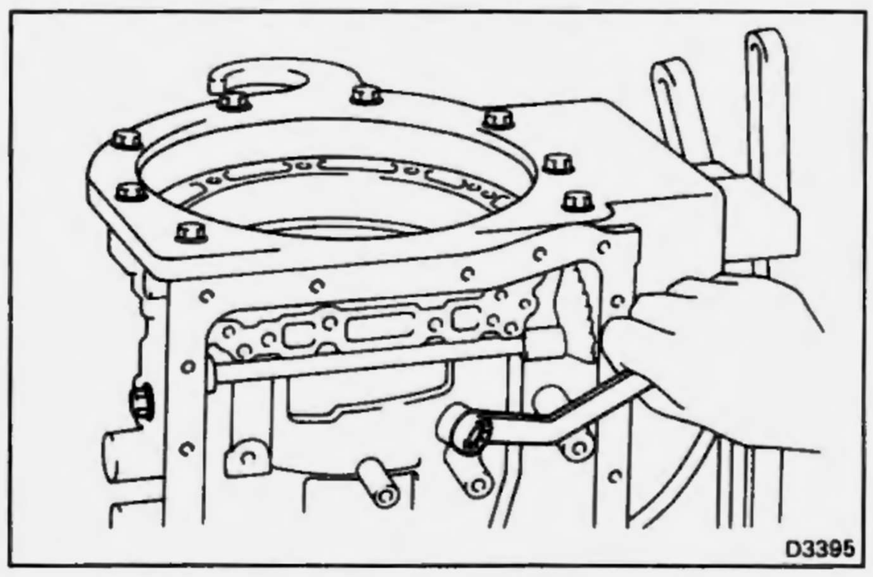
21. REMOVE OVERDRIVE DIRECT CLUTCH AND OVERDRIVE PLANETARY GEAR

Grasp the shaft and pull out the overdrive direct clutch and overdrive planetary gear.
Watch for bearings and races on both sides of the assembly.



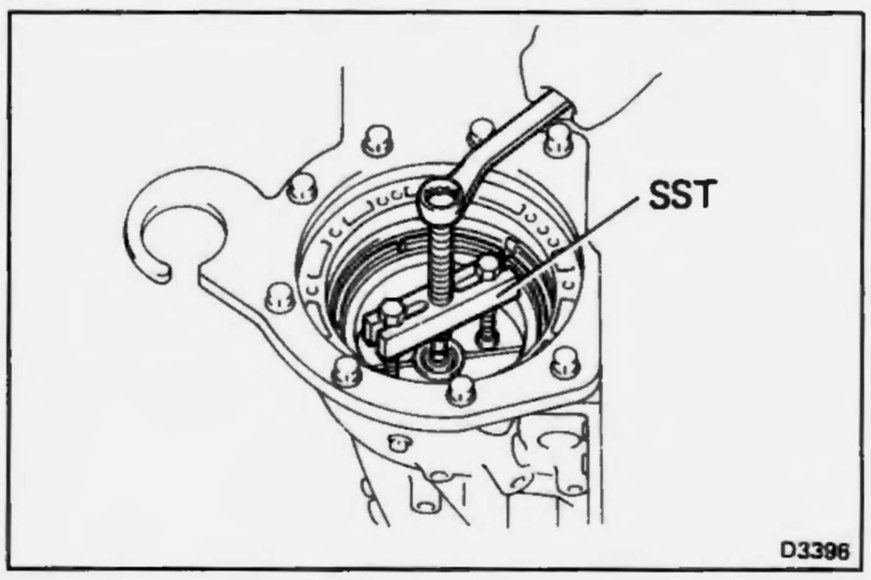
22. REMOVE OVERDRIVE PLANETARY RING GEAR

Watch for bearing and races on both sides of assembly.



23. REMOVE OVERDRIVE SUPPORT

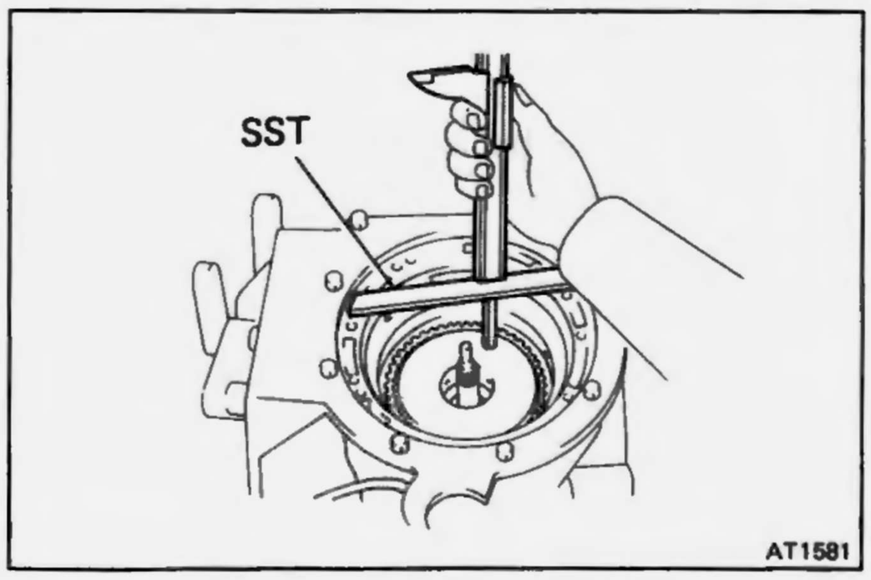
(a) Remove the three overdrive support lock bolts.



(b) Using SST, remove the overdrive support.

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(c) Remove the three O-rings from the overdrive support.

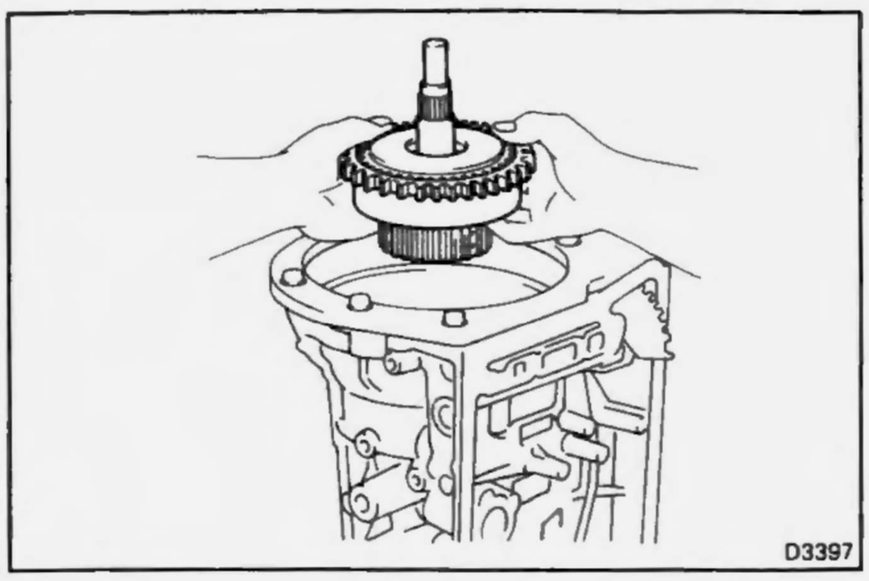


24. MEASURE DISTANCE BETWEEN TOP OF CASE AND CLUTCH DRUM

Set SST on the case as shown in the figure.

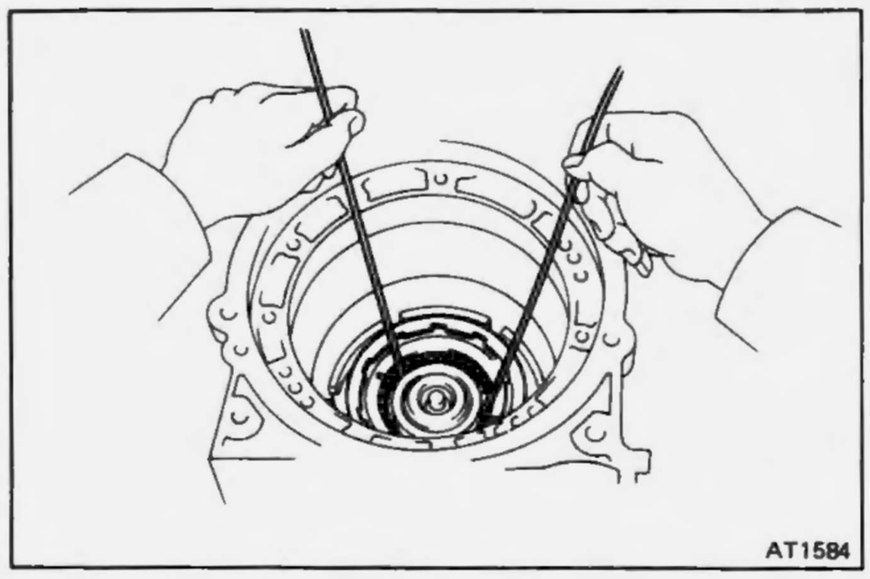
SST 09350-36010 (09350-06090)

Mark the note of the distance for assembly.



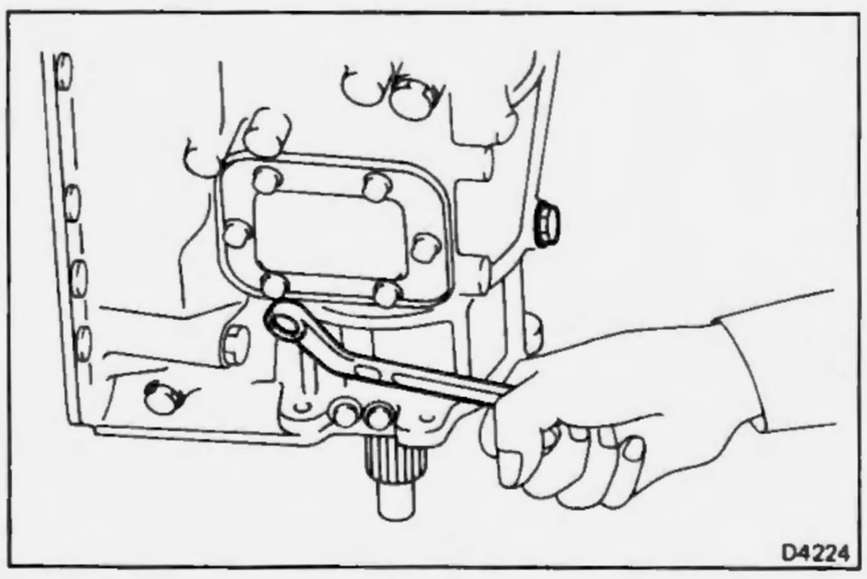
25. REMOVE FRONT CLUTCH ASSEMBLY

Remove the front clutch assembly from the rear clutch. Watch for bearing and races on both sides of assembly.



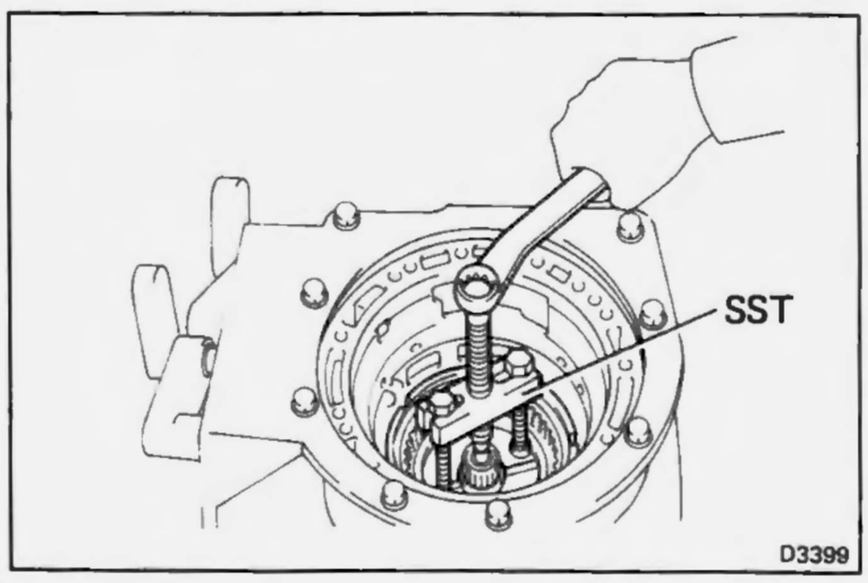
26. REMOVE REAR CLUTCH ASSEMBLY

Insert two wire hooks into the flukes of the clutch disc and remove.



27. REMOVE CENTER SUPPORT

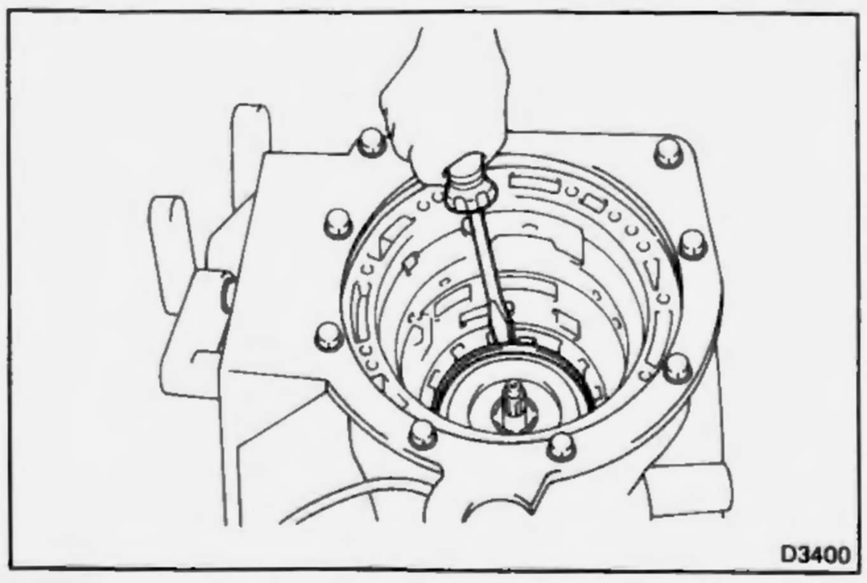
(a) Remove the three center support lock bolts.



(b) Using SST, remove the center support.

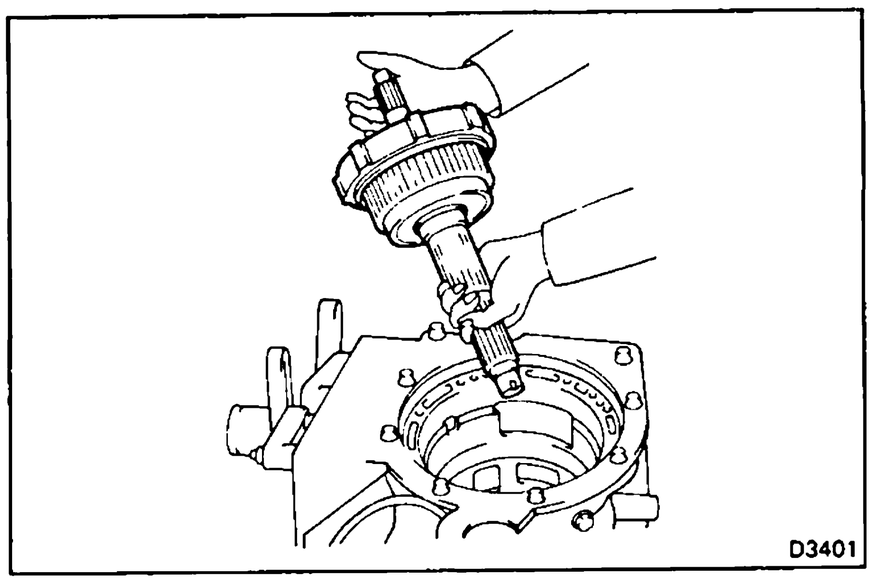
SST 09350-36010 (09350-06140)

(c) Remove the three O-rings from the center support.

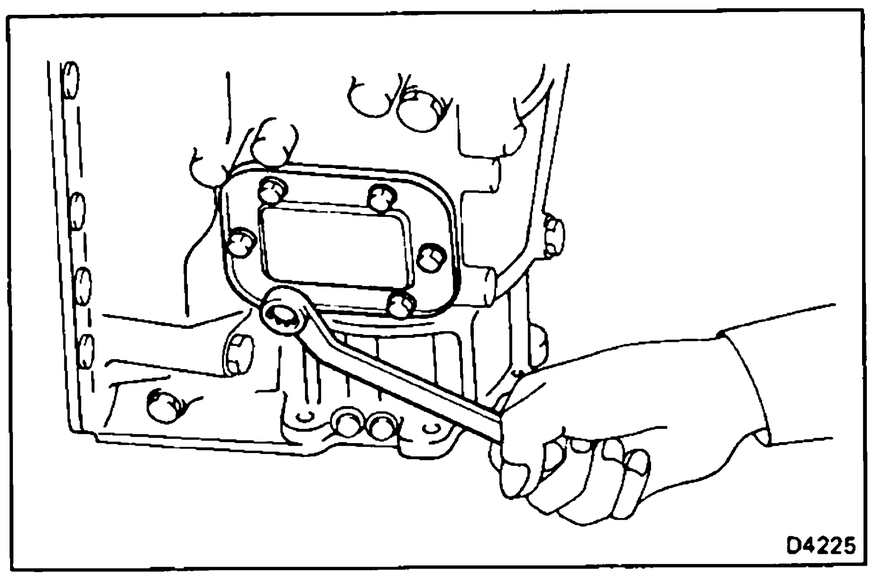


28. REMOVE PLANETARY GEAR AND OUTPUT SHAFT

(a) Using a screwdriver, remove the snap ring.

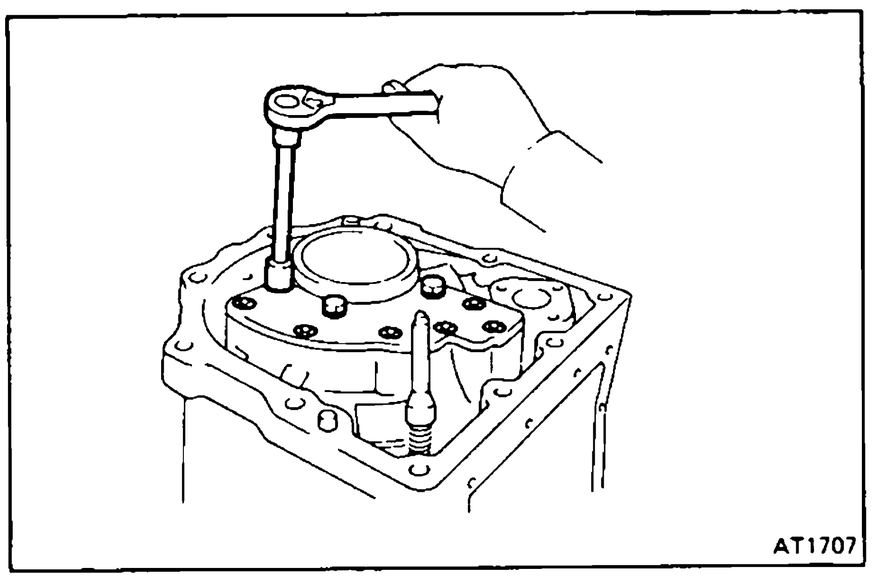


(b) Remove the planetary gear and output shaft with one-way clutch.



29. REMOVE POWER TAKE-OFF COVER

Remove the six bolts, and remove the power take-off cover and gasket.



30. REMOVE TRANSMISSION REAR COVER

Remove the three bolts and six screws and remove the transmission rear cover and gasket.

COMPONENT GROUP DISASSEMBLY, INSPECTION AND ASSEMBLY NOTES:

The instructions here are organized so that you work on only one component group at a time.
This will help avoid confusion from similar-looking parts of different subassemblies being on your workbench at the same time.
The component groups are inspected and repaired from the converter housing side.

As much as possible, complete the inspection, repair and assembly before proceeding to the next component group. If a component group cannot be assembled because parts are being ordered, be sure to keep all parts of that group in a separate container while proceeding with disassembly, inspection, repair and assembly of other component groups.
Recommended ATF type DEXRON® II.

GENERAL CLEANING NOTES:

1. All disassembled parts should be washed clean with any fluid passages and holes blown through with compressed air.
2. When using compressed air to dry parts, always aim away from yourself to present accidentally spraying automatic transmission fluid or kerosene in your face.
3. The recommended automatic transmission fluid or kerosene should be used for cleaning.

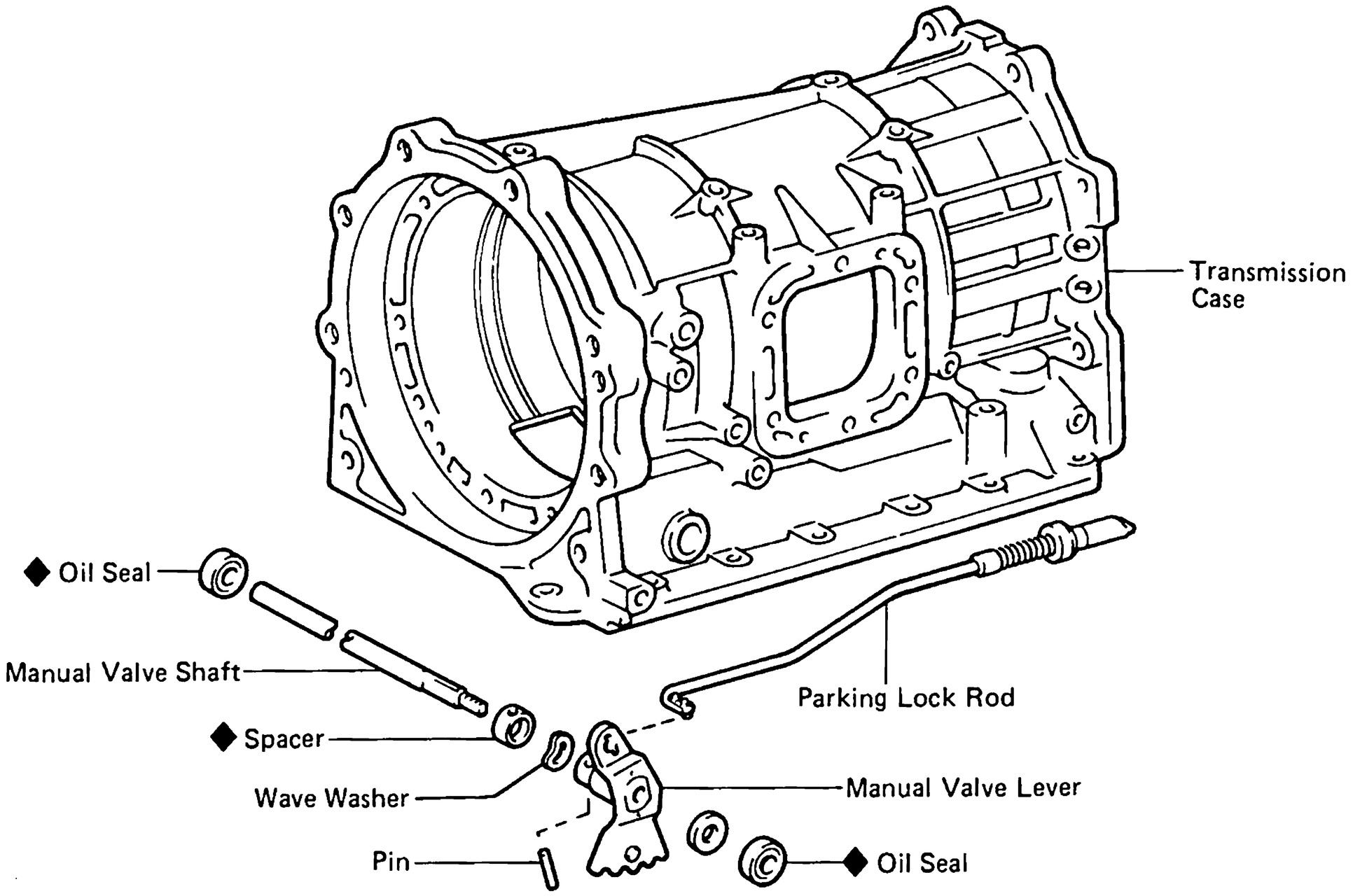
PARTS ARRANGEMENT:

1. After cleaning, the parts should be arranged in proper order to allow performing inspection, repairs, and reassembly with efficiency.
2. When disassembling a valve body, be sure to keep each valve together with the corresponding spring.
3. New brakes and clutches that are to be used for replacement must be soaked in transmission fluid for at least thirty minutes before assembly.

GENERAL ASSEMBLY:

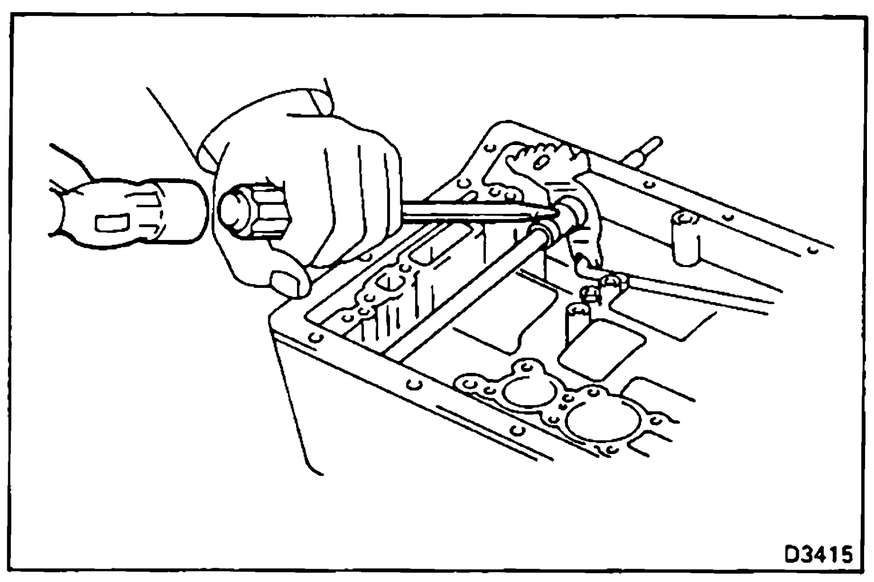
1. All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with transmission fluid prior to reassembly.
2. All gaskets and rubber O-rings should be replaced.
3. Make sure that the ends of a snap ring are not aligned with one of the cutouts and are installed in the groove correctly.
4. If a worn bushing is to be replaced, the subassembly containing that bushing must be replaced.
5. Check thrust bearings and races for wear or damage. Replace if necessary.
6. Use petroleum jelly to keep parts in place.

MANUAL VALVE LEVER AND SHAFT



◆ Non-reusable part

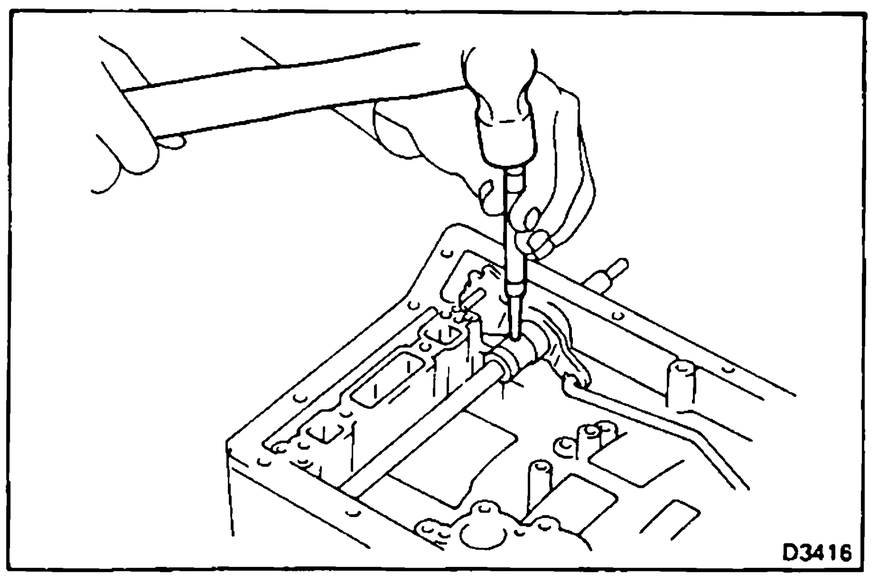
D4232



D3415

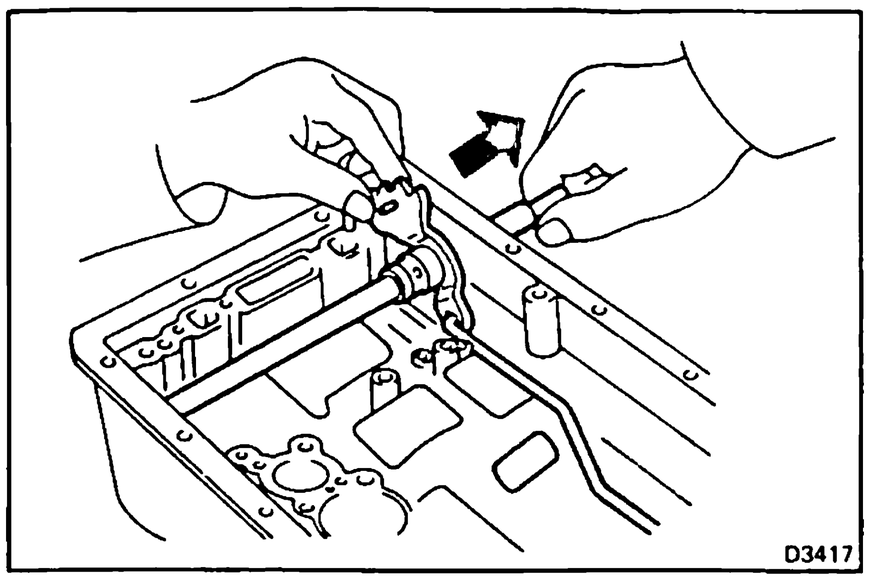
1. REMOVE MANUAL VALVE LEVER AND SHAFT

(a) Using a screwdriver or chisel, cut off the spacer and remove it from the shaft.



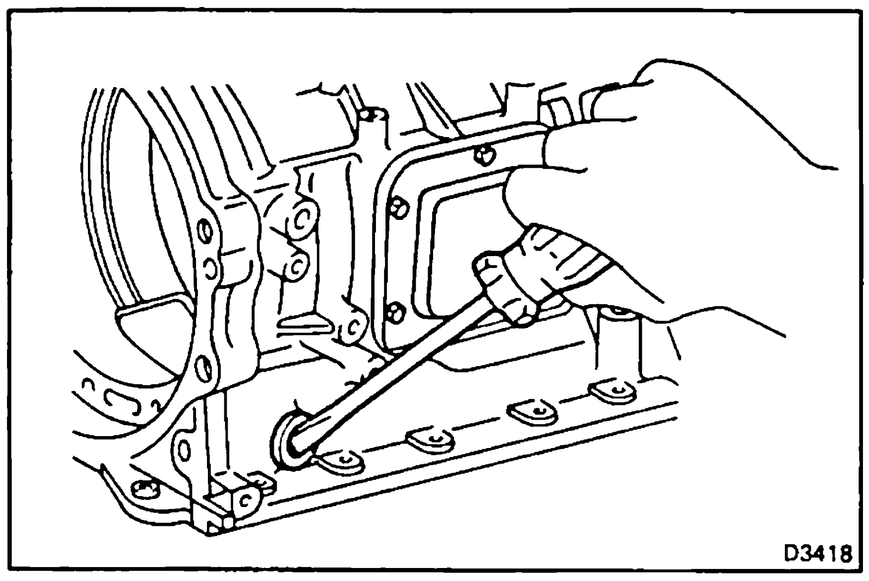
D3416

(b) Using a punch, drive out the pin.



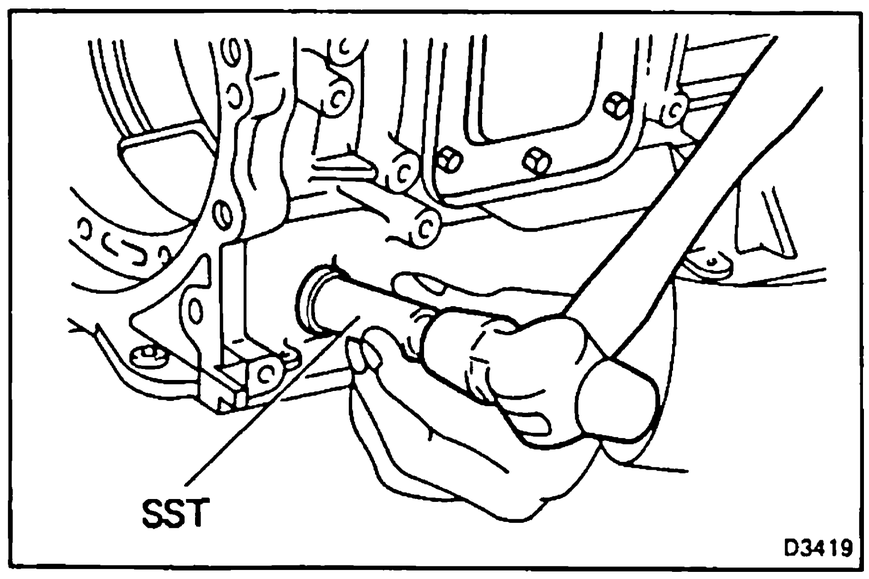
(c) Pull the manual valve shaft out through the case by the threads.

(d) Disconnect the parking lock rod from the manual valve lever.



2. REMOVE OIL SEAL

Using a screwdriver, remove the oil seal.

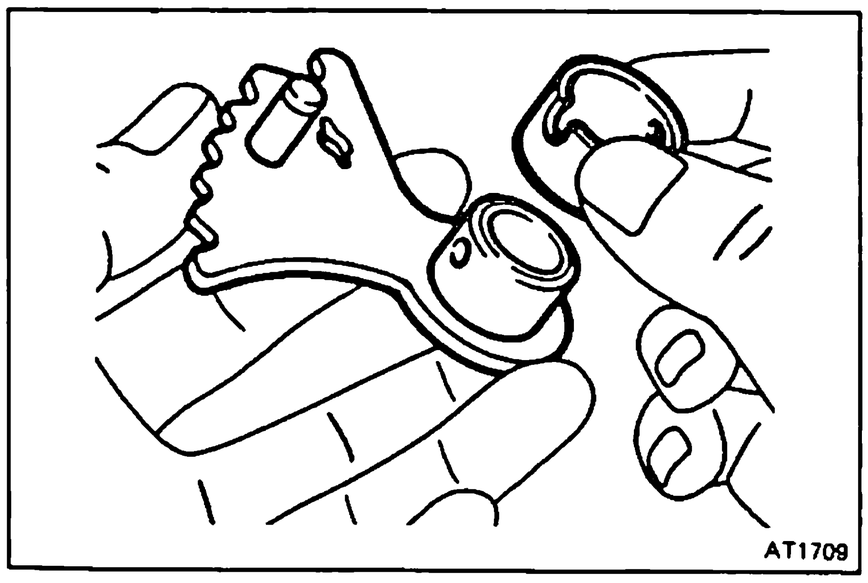


3. INSTALL NEW OIL SEAL

(a) Coat a new oil seal lip with MP grease.

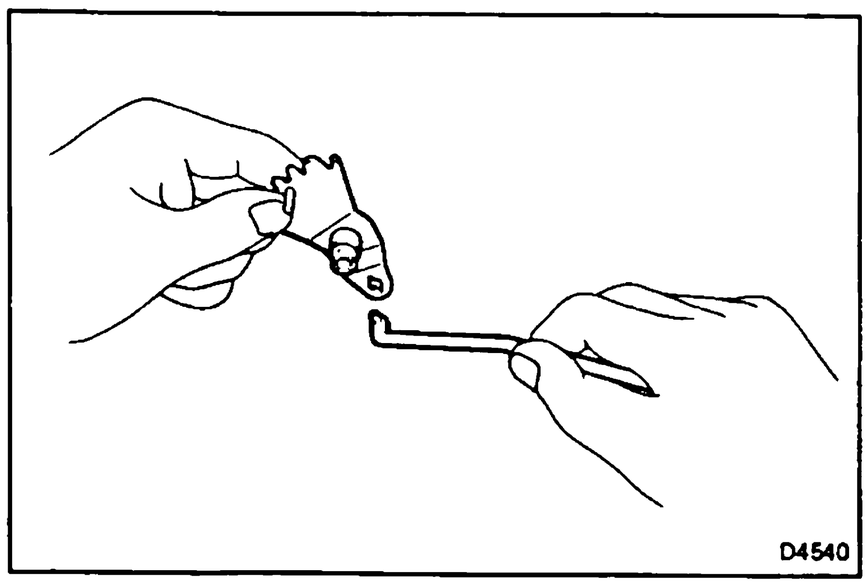
(b) Using SST, drive in the oil seal.

SST 09350-36010 (09350-06150)

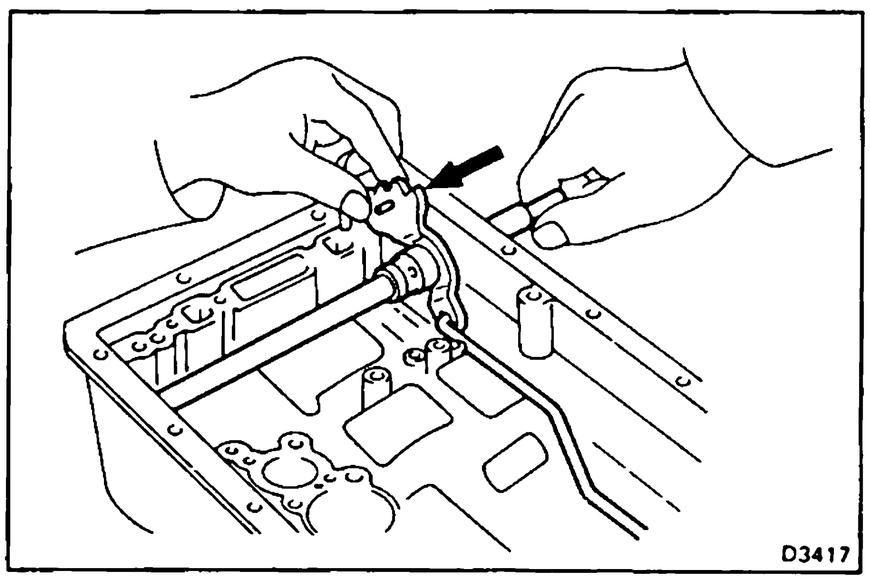


4. INSTALL MANUAL VALVE LEVER AND SHAFT

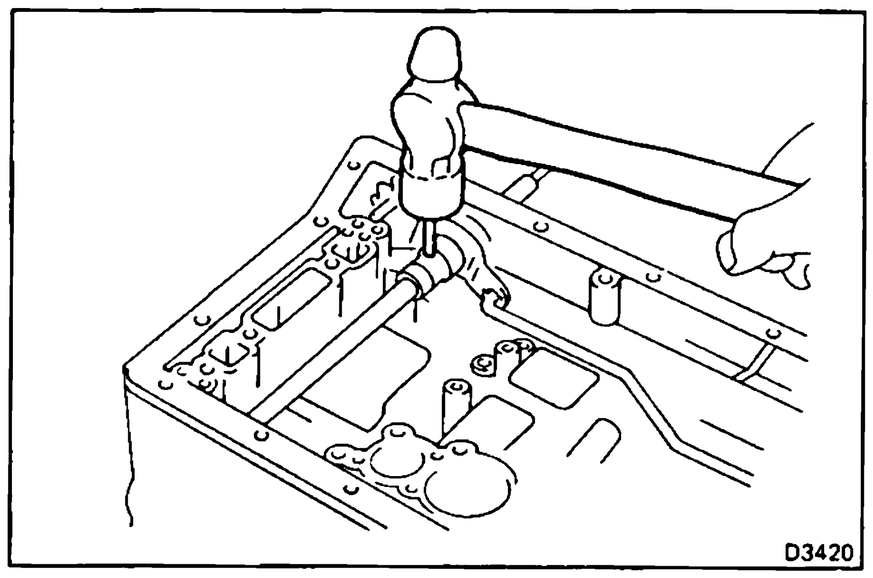
(a) Assemble a new spacer to the manual valve lever.



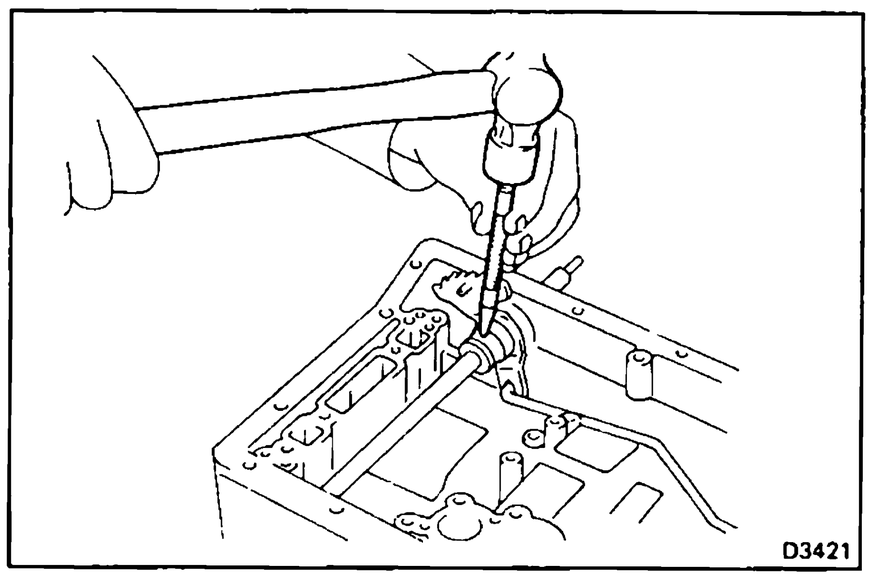
(b) Connect the parking lock rod to the manual valve lever.



(c) Install the manual valve shaft and wave washer to the transmission case through the manual valve lever by the thread.



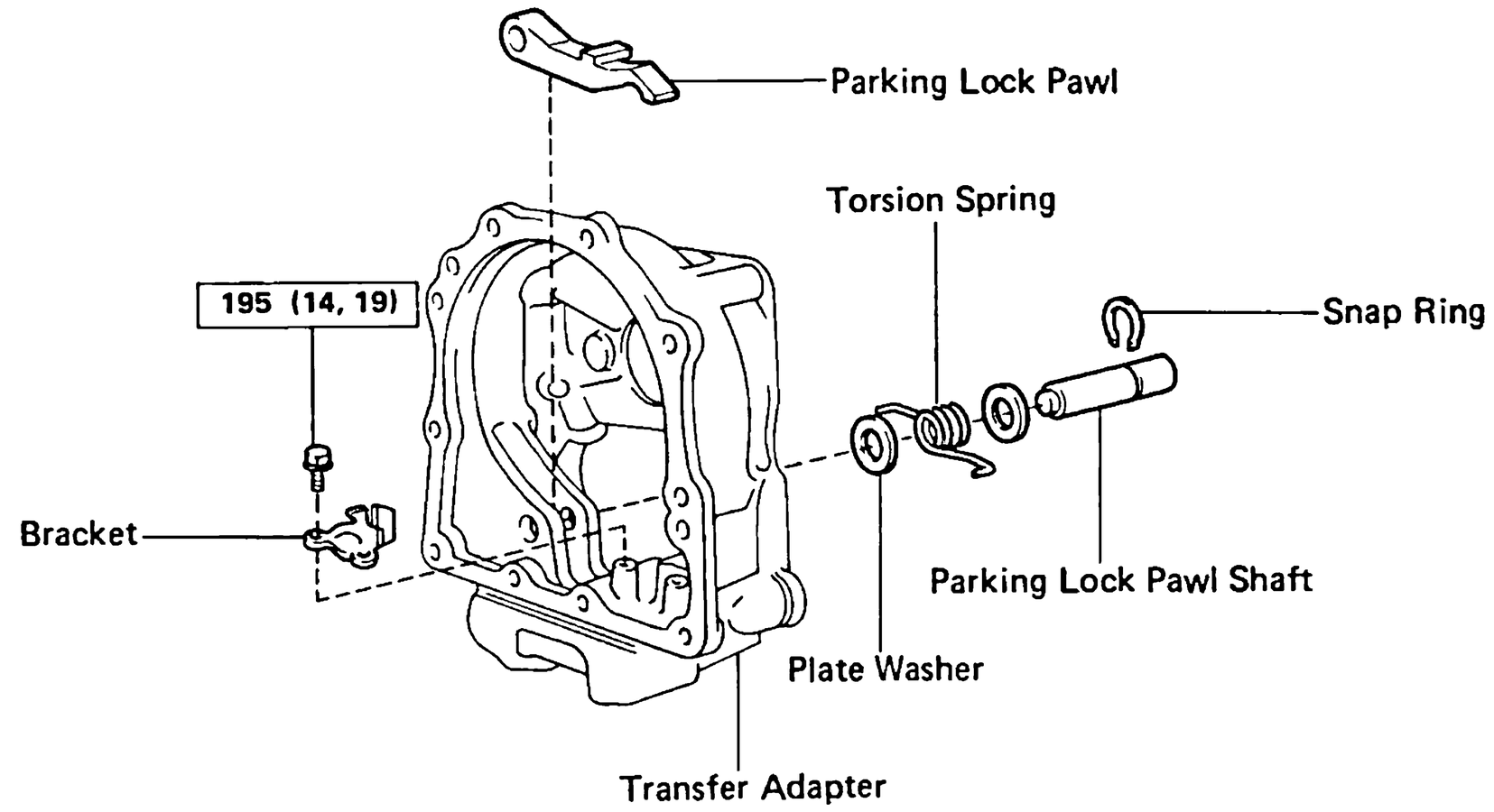
(d) Drive in the pin with slot at a right angle to the shaft.



(e) Match the spacer hole to the lever calking hollow and calk the spacer to the lever.

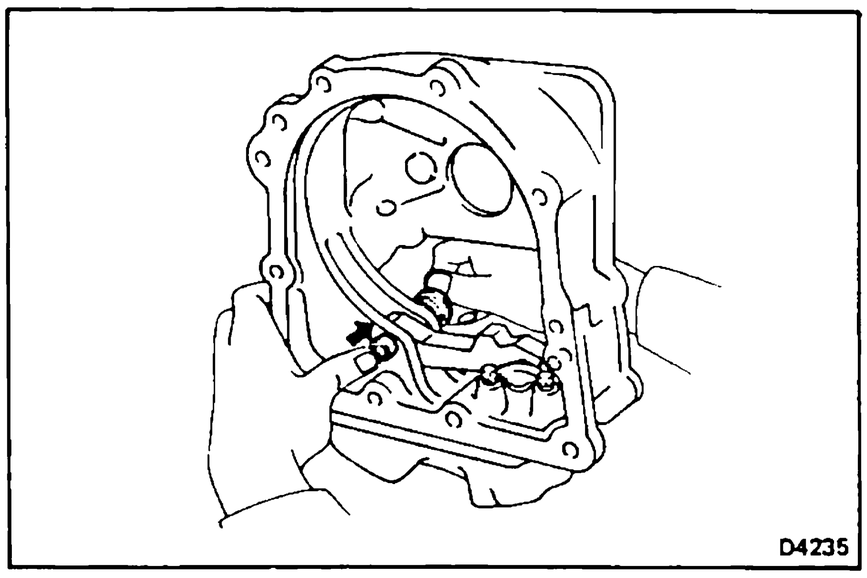
(f) Make sure the manual valve shaft turns smoothly.

PARKING LOCK PAWL (A440F)



kg-cm (ft-lb, N·m) : Specified torque

D4234

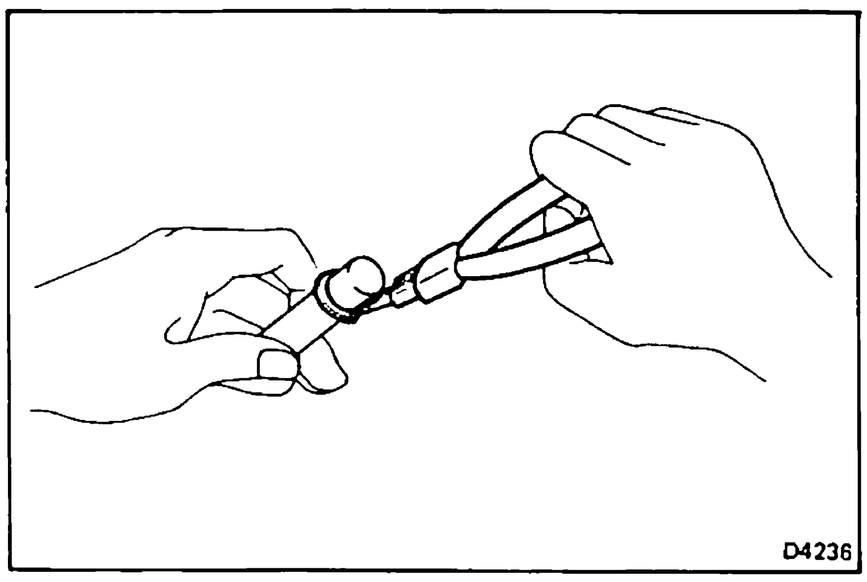


D4235

DISASSEMBLY OF PARKING LOCK PAWL

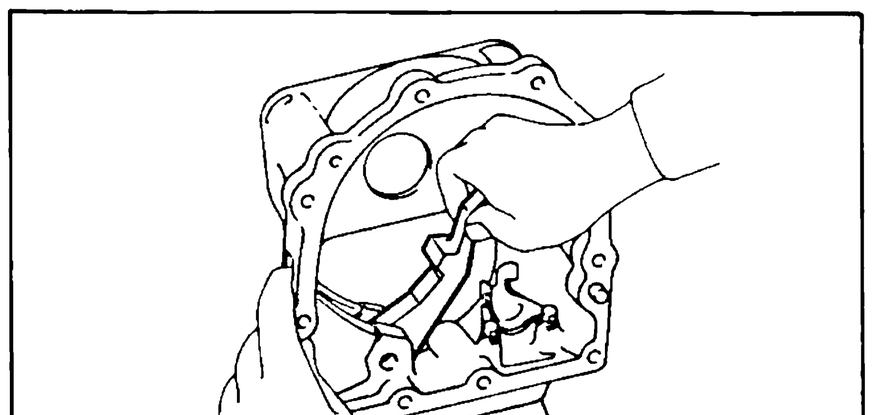
1. REMOVE PARKING LOCK PAWL SHAFT

Remove the pawl shaft, torsion spring and plate washers from the transfer adapter.



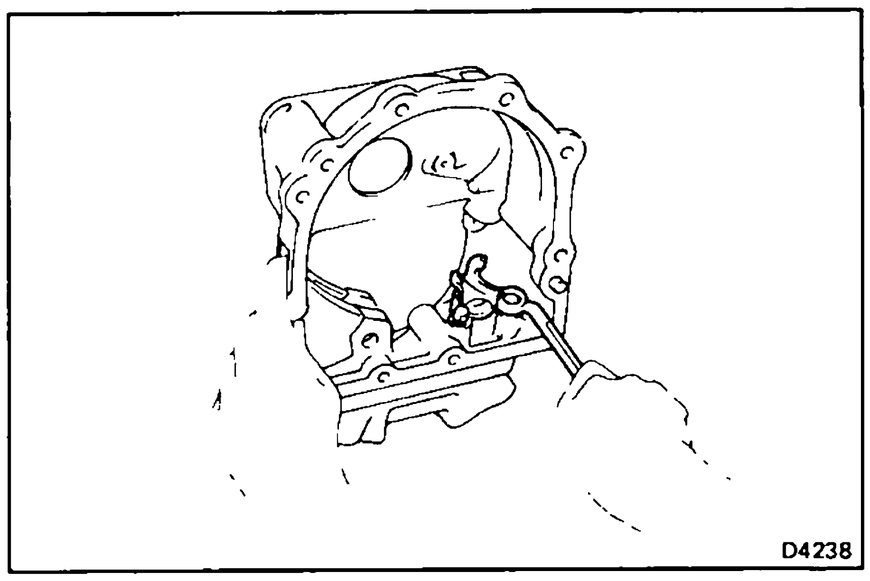
D4236

2. REMOVE SNAP RING FROM PAWL SHAFT WITH SNAP RING PLIERS

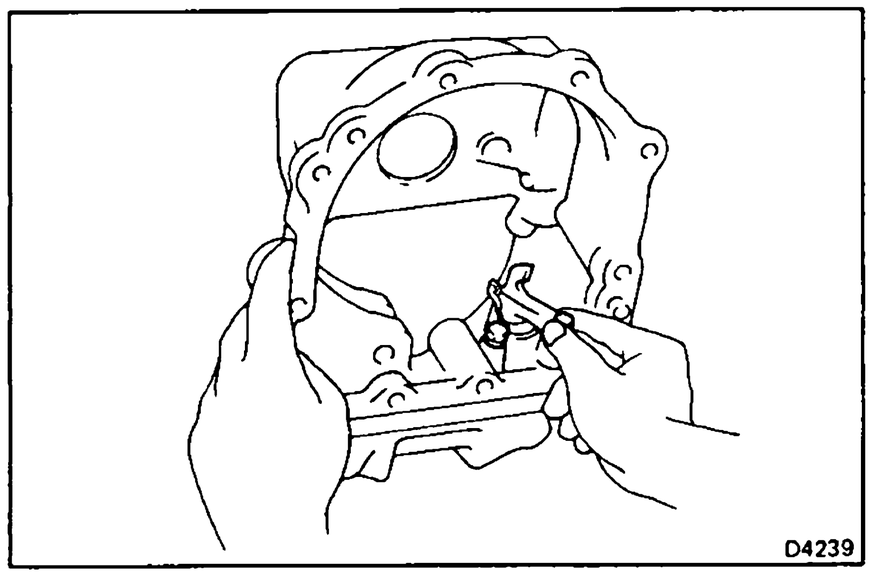


D4237

3. REMOVE PARKING LOCK PAWL FROM TRANSFER ADAPTER



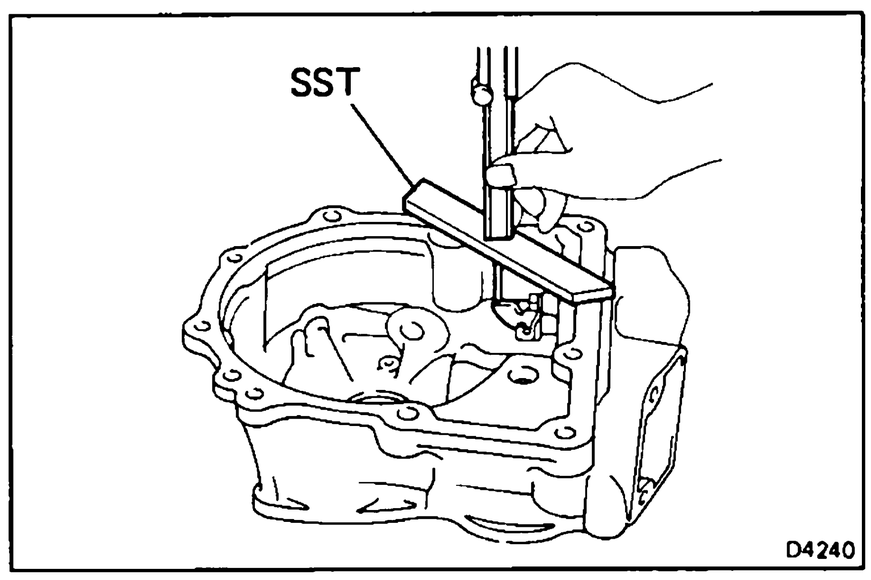
4. REMOVE BRACKET



ASSEMBLY OF PARKING LOCK PAWL

1. INSTALL BRACKET TO TRANSFER ADAPTER

(a) Temporarily install the bracket with the two bolts.



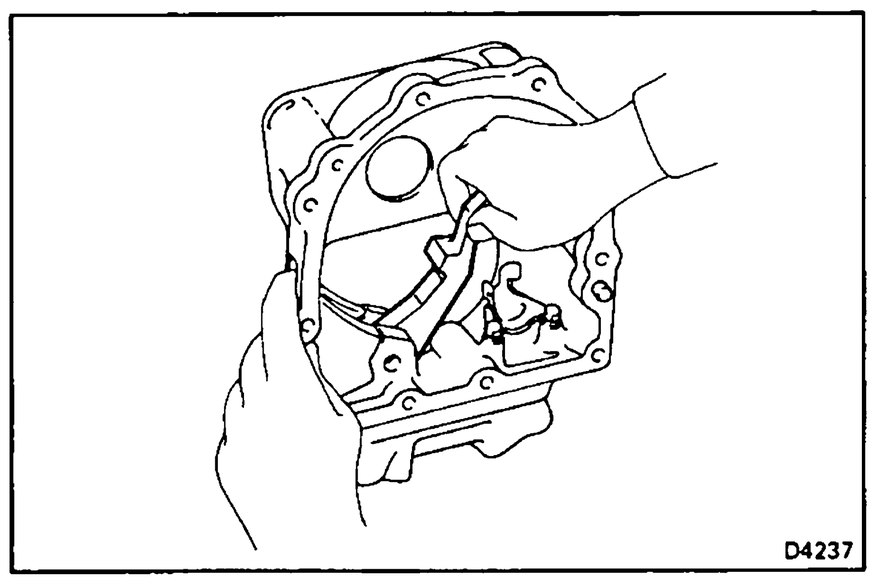
(b) Using SST and calipers, set the bracket so the distance between the transfer adapter surface and the top of the bracket tab is the standard distance.

Total distance – SST thickness = STD distance
STD distance: 47.5 – 47.6 mm (1.870 – 1.874 in.)

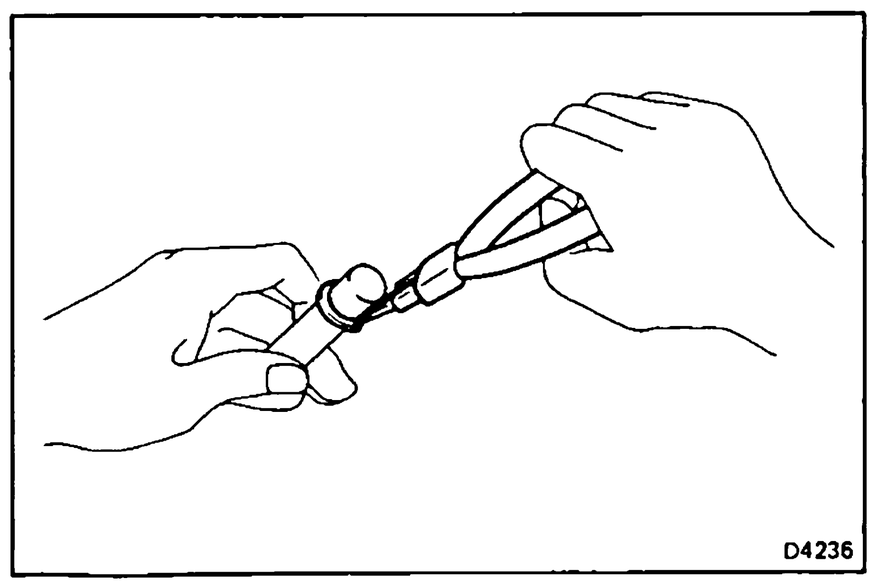
SST 09350-36010 (09350-06090)

(c) Tighten the two bolts.

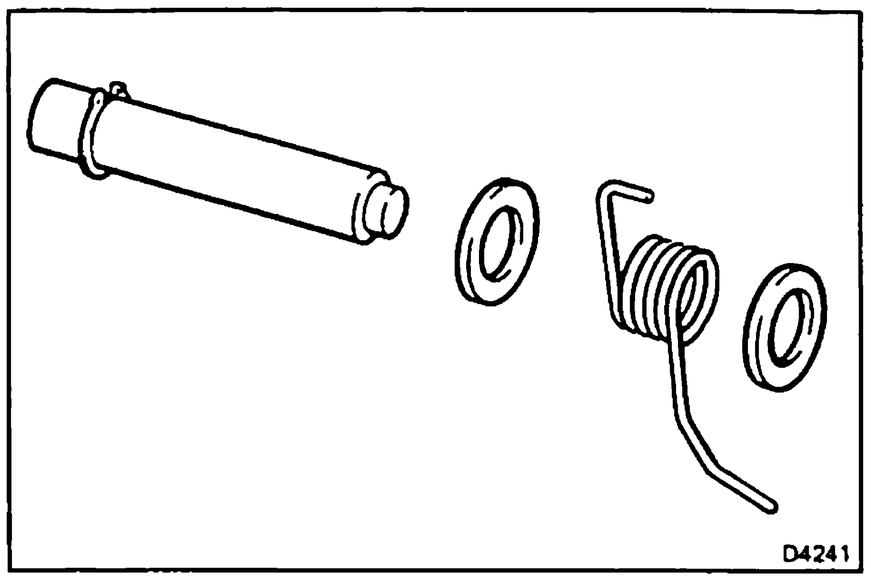
Torque: 195 kg-cm (14 ft-lb, 19 N·m)



2. INSTALL PARKING LOCK PAWL

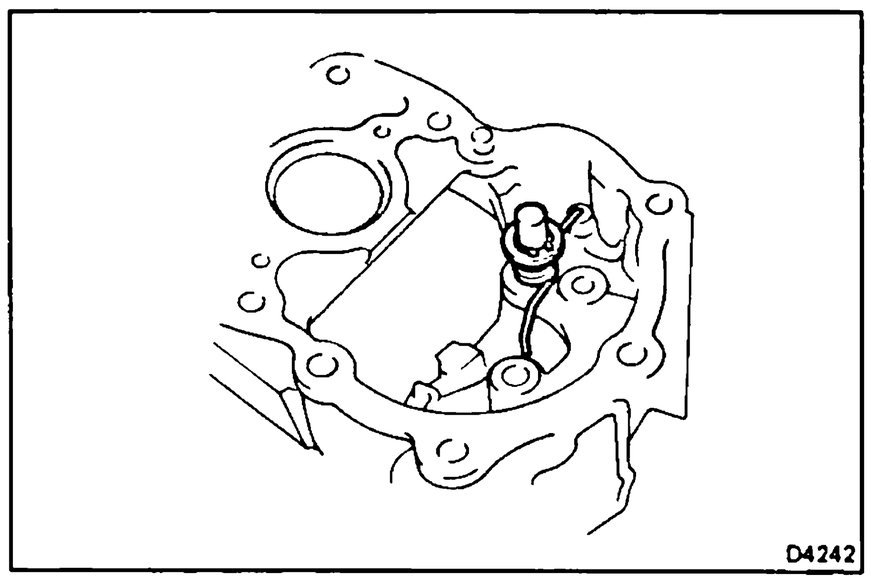


3. INSTALL SNAP RING TO PAWL SHAFT

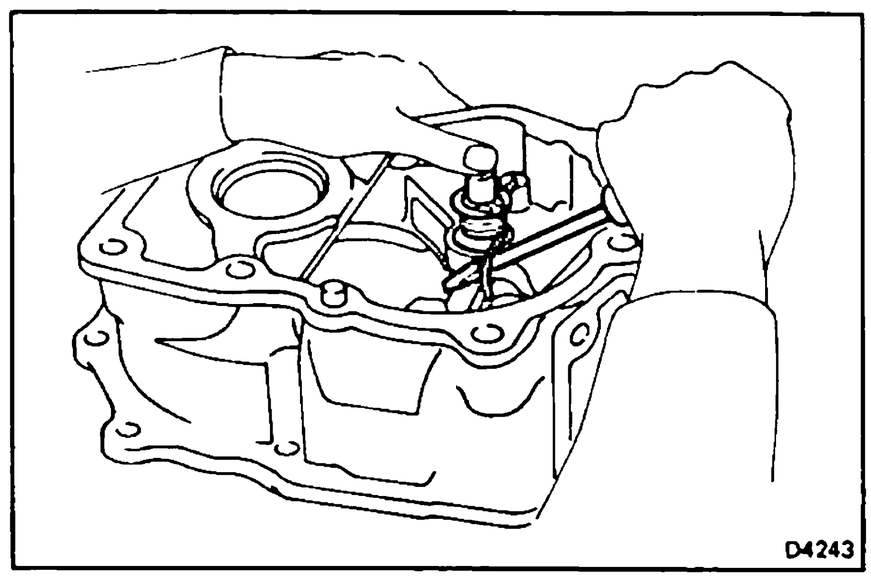


4. INSTALL PARKING LOCK PAWL SHAFT

(a) Install the two plate washers and torsion spring to the pawl shaft.



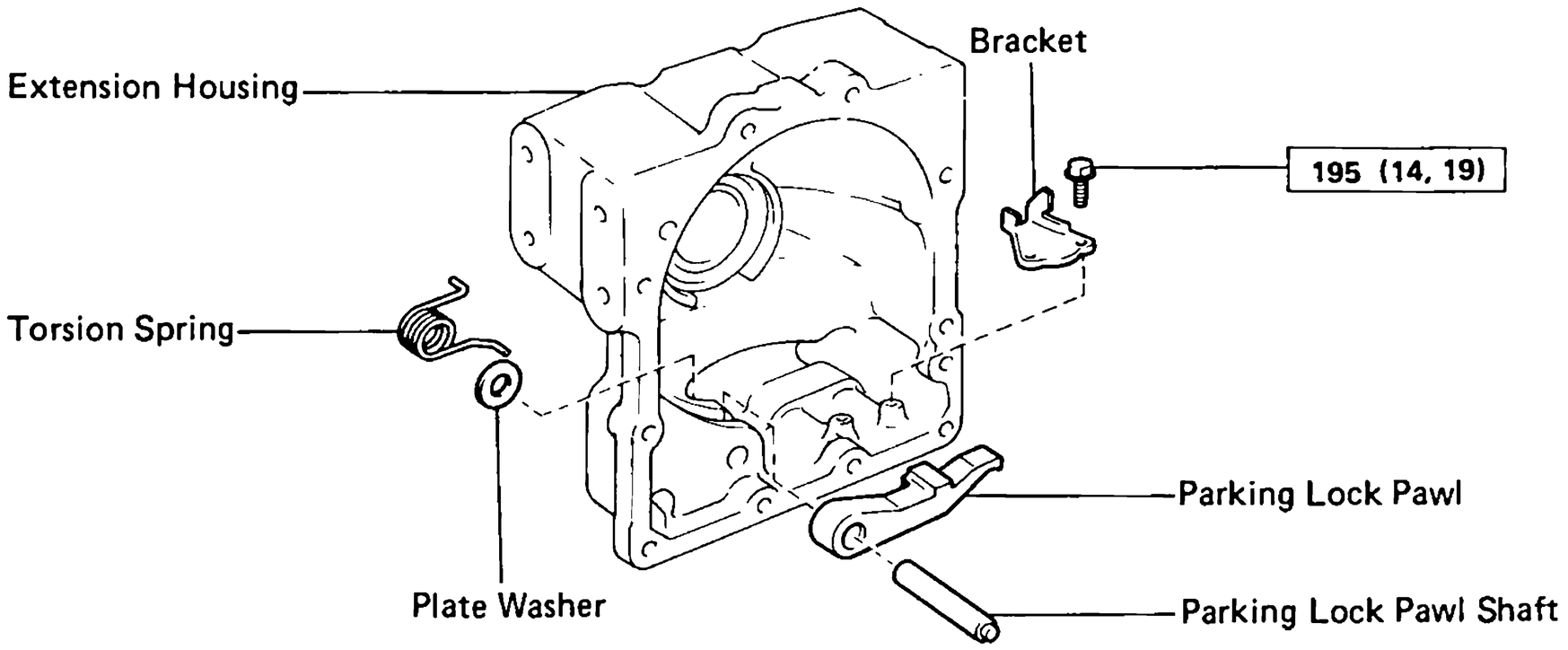
(b) Insert the spring end to the hole and install the pawl shaft.



(c) Hold the pawl shaft, hook another spring end to the parking lock pawl with a screwdriver.

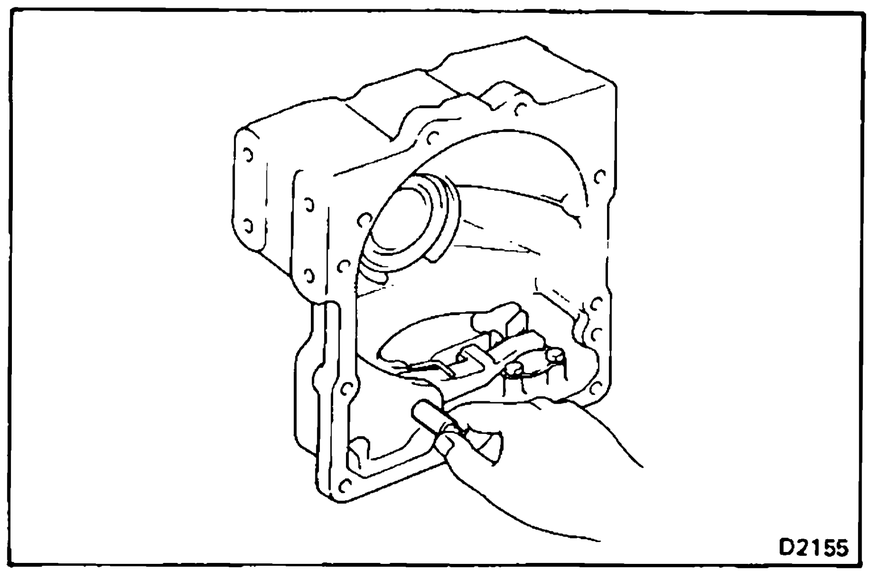
(d) Make sure the parking lock pawl moves smoothly.

PARKING LOCK PAWL (A440L)



kg-cm (ft-lb, N·m) : Specified torque

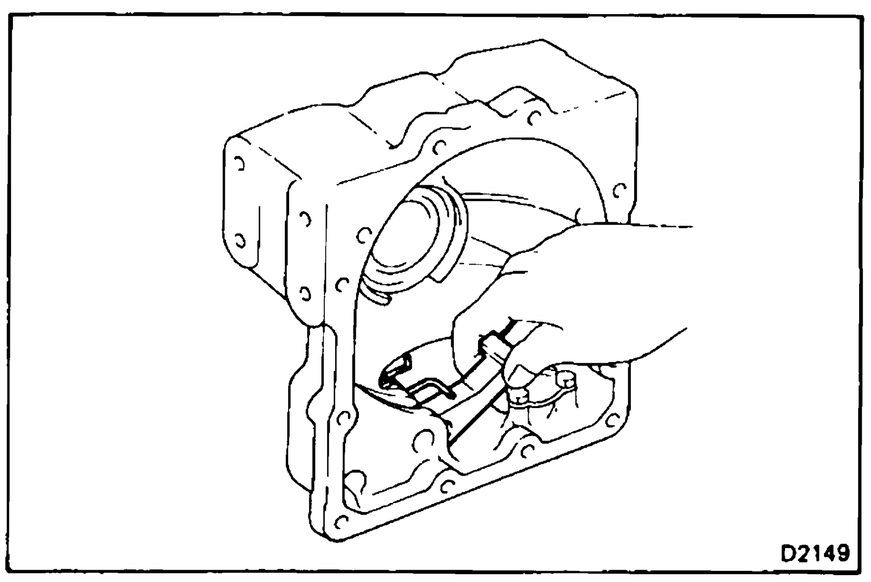
D4233



D2155

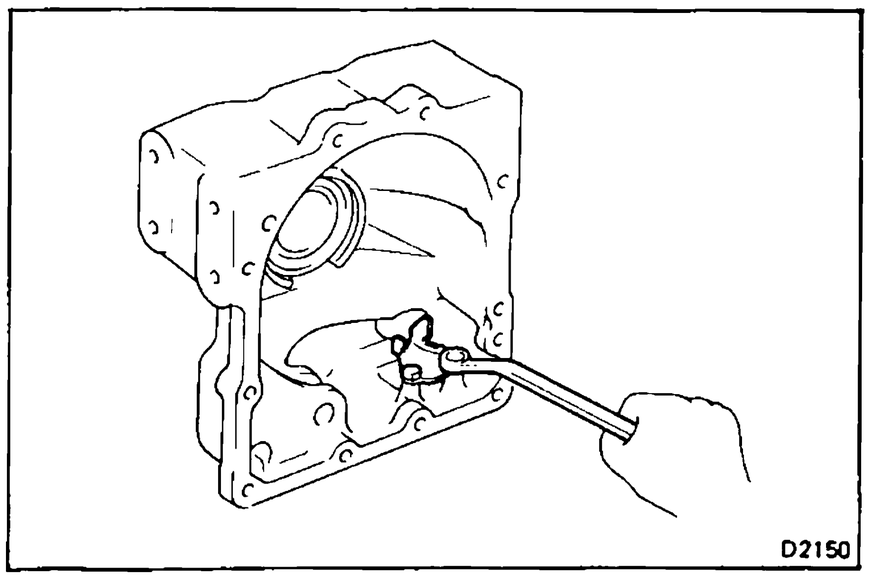
DISASSEMBLY OF PARKING LOCK PAWL

1. REMOVE PARKING LOCK PAWL SHAFT



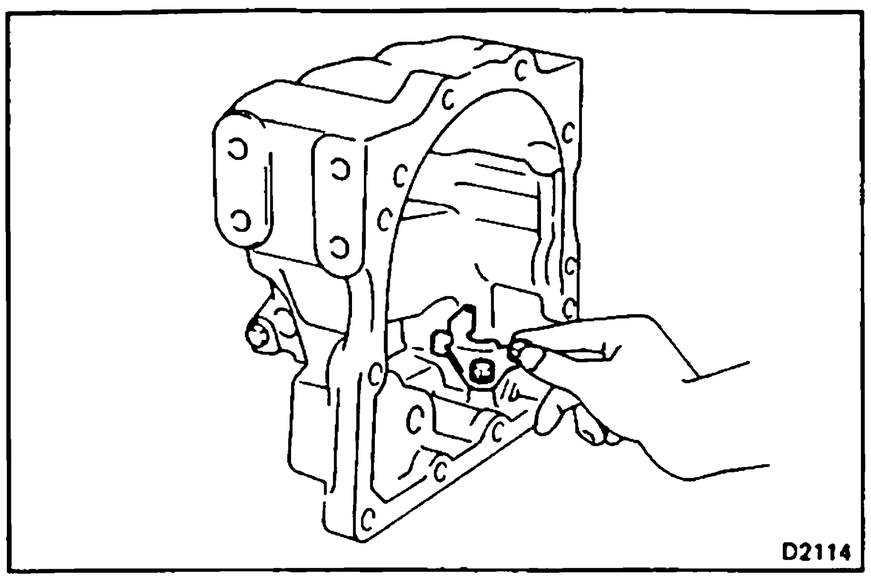
D2149

2. REMOVE PARKING LOCK PAWL, TORSION SPRING AND PLATE WASHER



D2150

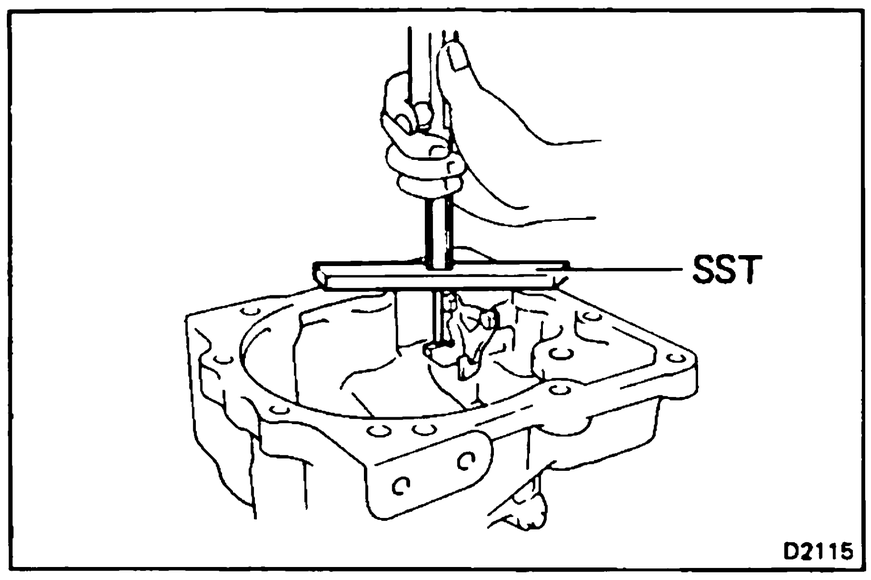
3. REMOVE BRACKET



ASSEMBLY OF PARKING LOCK PAWL

1. INSTALL BRACKET TO EXTENSION HOUSING

(a) Temporarily install the bracket with the two bolts.



(b) Using SST and calipers, set the bracket so the distance between the extension housing surface and the top of the bracket tab is the standard distance.

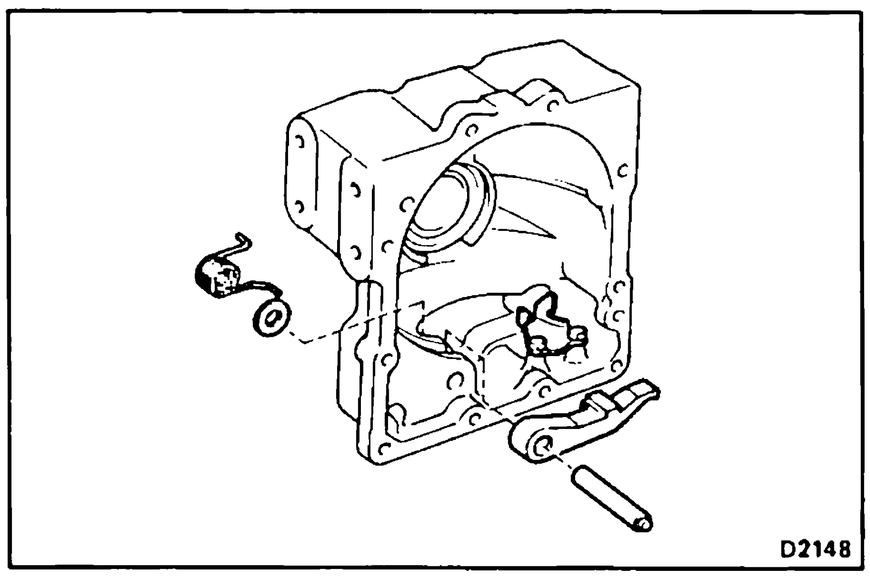
Total distance – SST thickness = STD distance
STD distance: 47.5 – 47.6 mm (1.870 – 1.874 in.)

SST 09350-36010 (09350-06090)

(c) Tighten the two bolts.

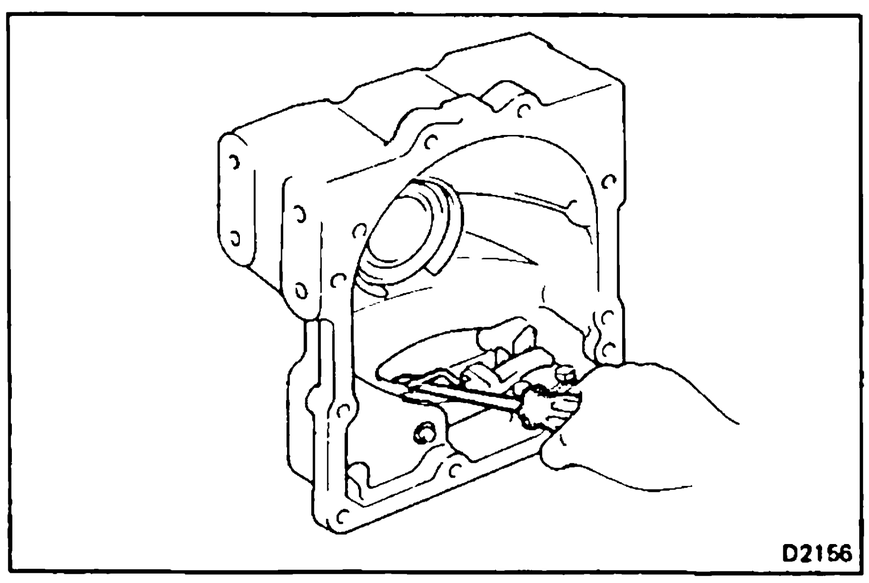
Torque: 195 kg-cm (14 ft-lb, 19 N·m)

2. INSTALL PARKING LOCK PAWL



(a) Insert the torsion spring end to the hole of the extension housing.

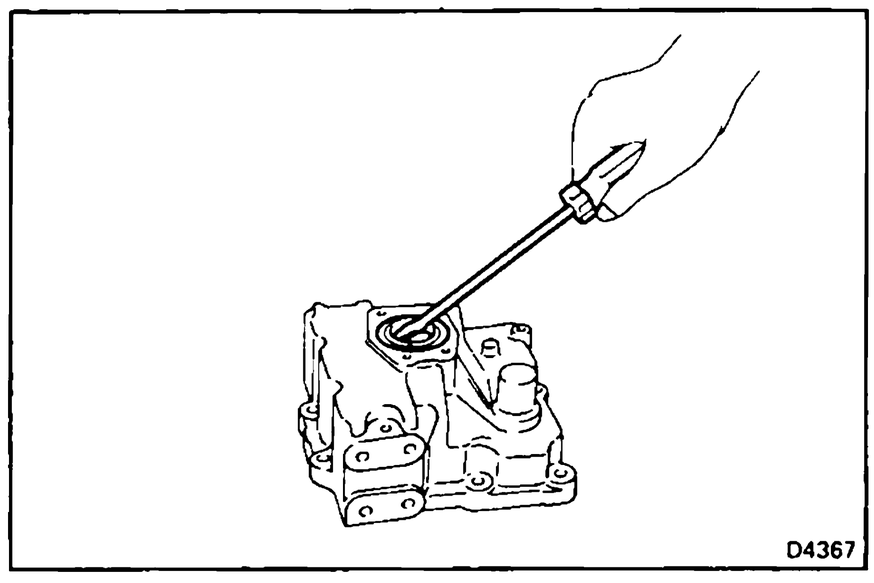
(b) Install the parking lock pawl, shaft and plate washer.



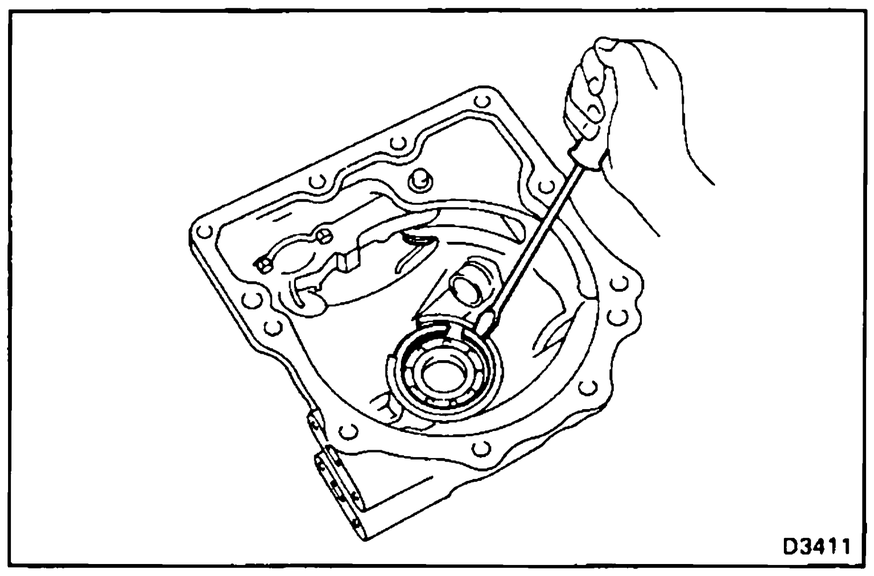
(c) Hook another spring end to the parking lock pawl.

(d) Make sure the parking lock pawl moves smoothly.

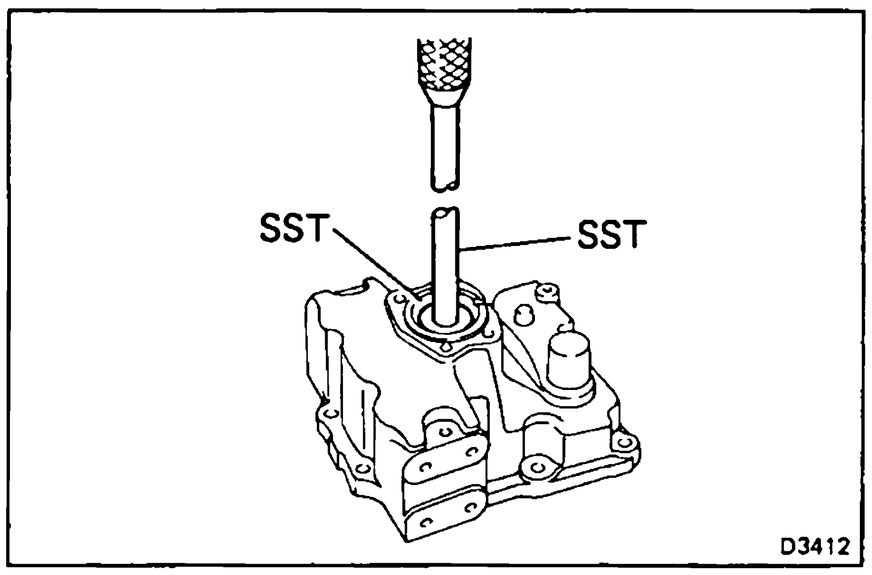
EXTENSION HOUSING (A440L)



1. REMOVE OIL SEAL WITH SCREWDRIVER



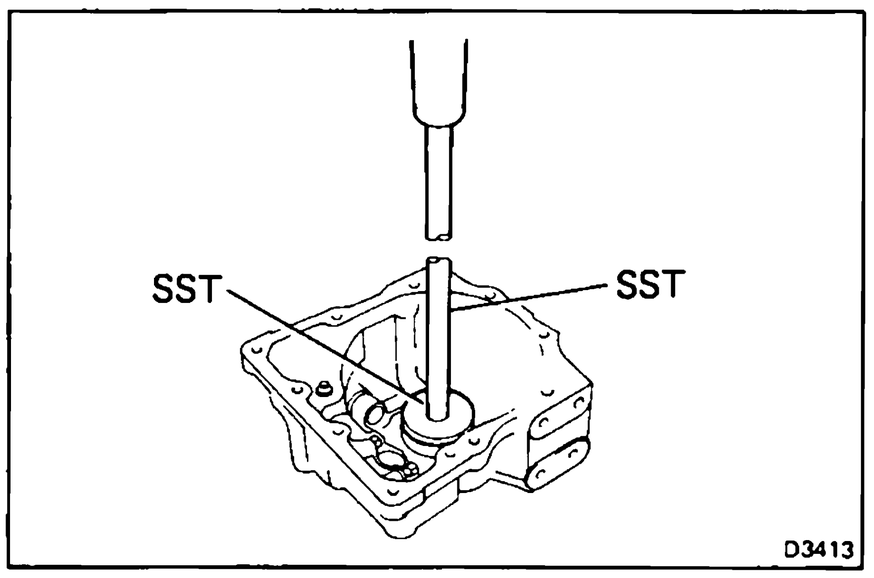
2. REMOVE SNAP RING WITH SCREWDRIVER



3. REMOVE OUTPUT SHAFT REAR BEARING

Using SST, press out the bearing from the extension housing.

SST 09350-36010 (09350-06050, 09350-06070)



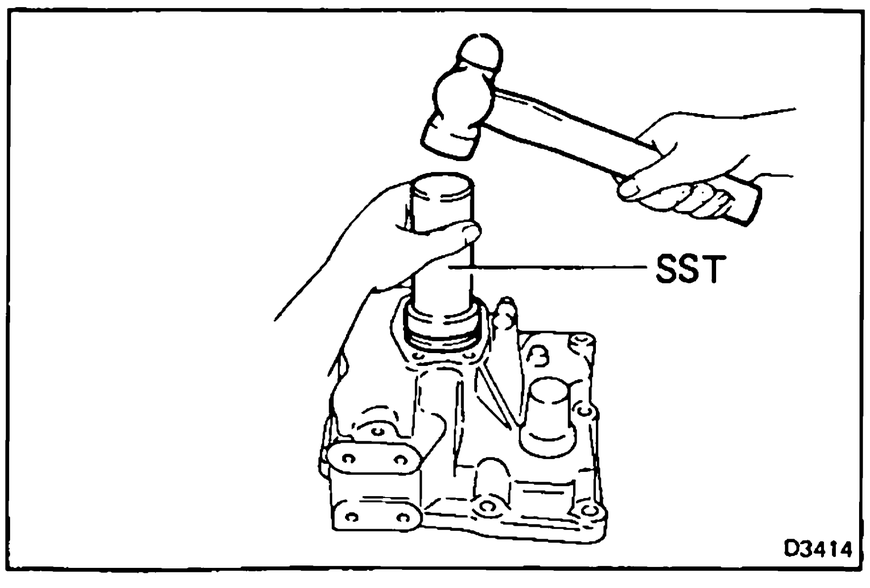
4. INSTALL OUTPUT SHAFT REAR BEARING

Using SST, press the bearing into the extension housing.

SST 09350-36010 (09350-06050, 09350-06080)

5. INSTALL SNAP RING

NOTE: Be sure the end gap of the snap ring is not aligned with one of the cutouts.



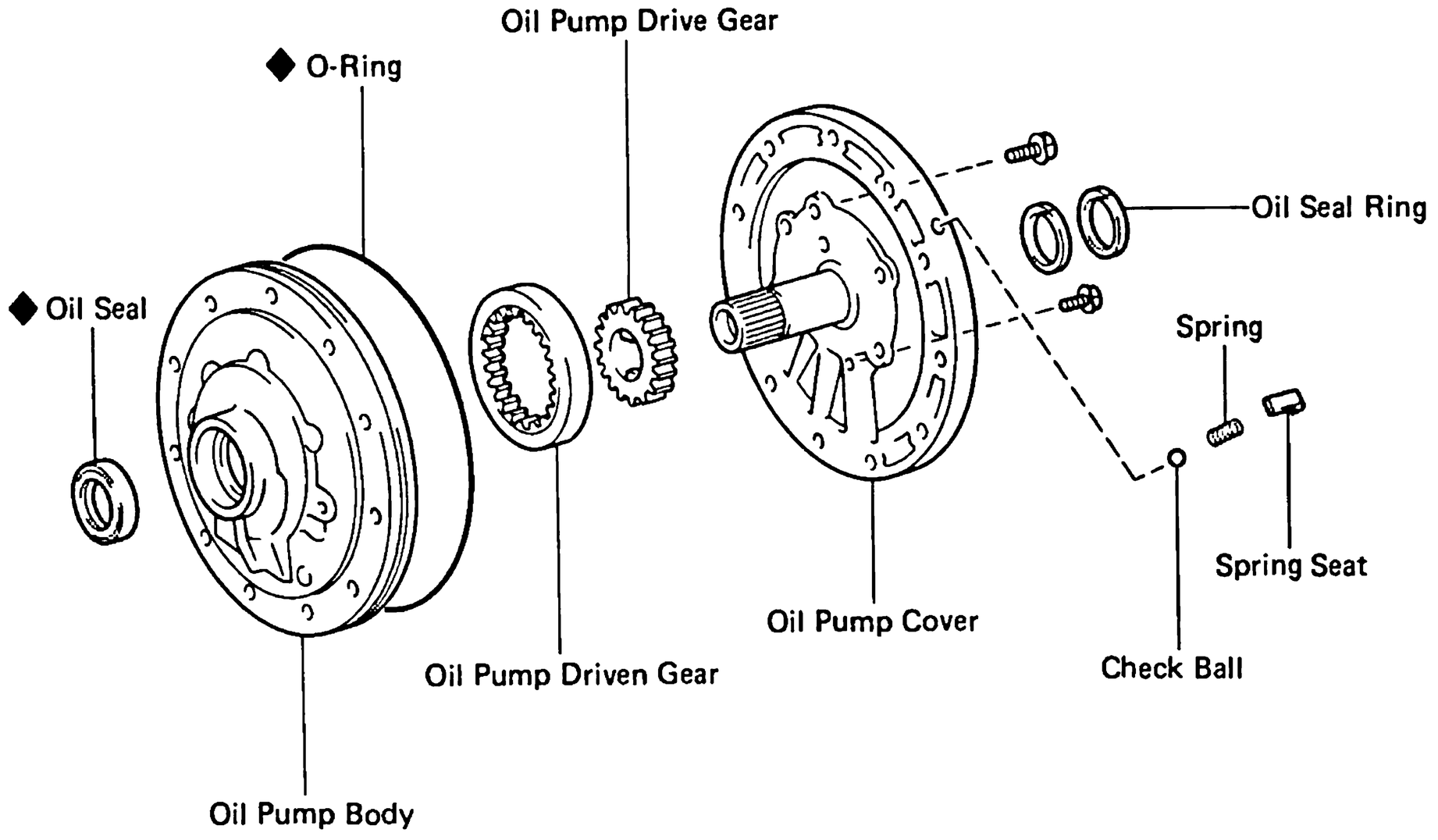
6. INSTALL NEW OIL SEAL

(a) Coat a new oil seal lip with MP grease.

(b) Using SST, drive in the oil seal.
The oil seal end should be flush with the outer edge of the extension housing.

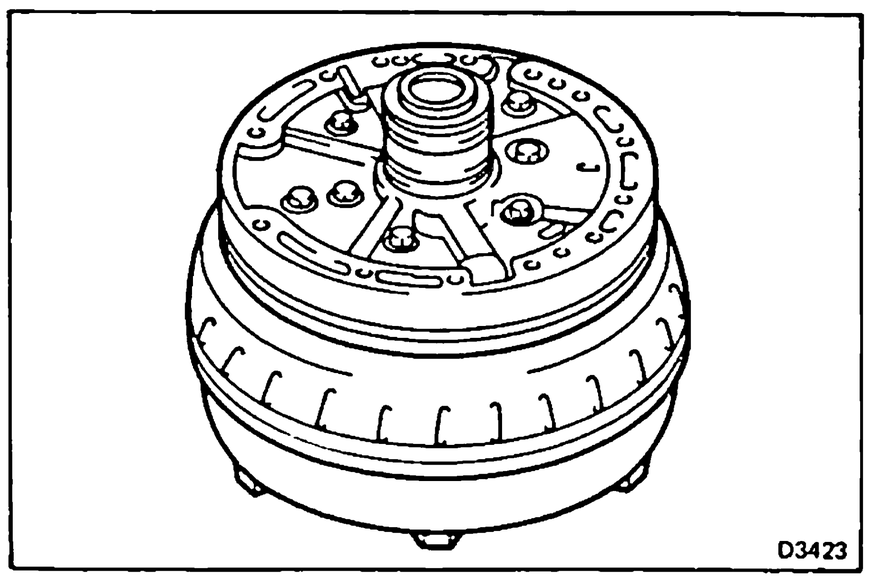
SST 09350-36010 (09350-06040)

OIL PUMP



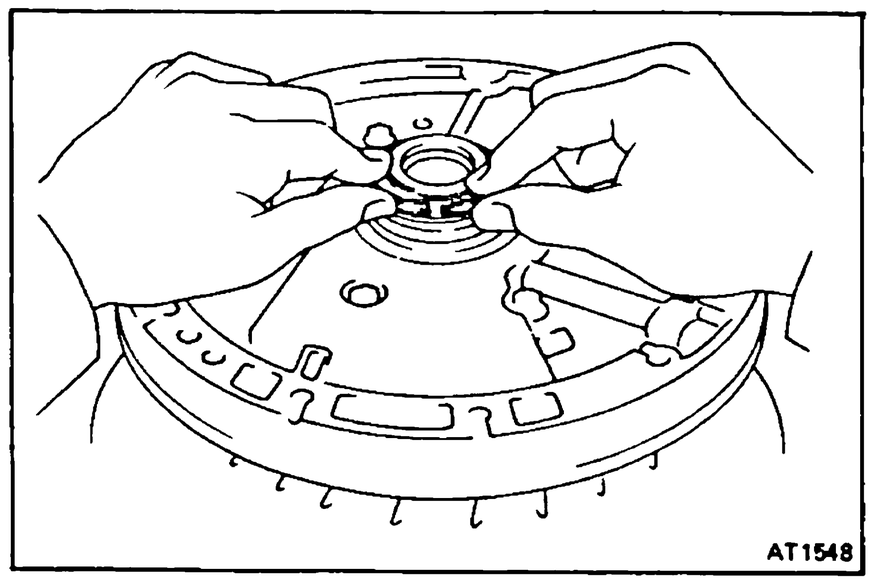
◆ Non-reusable part

D3422



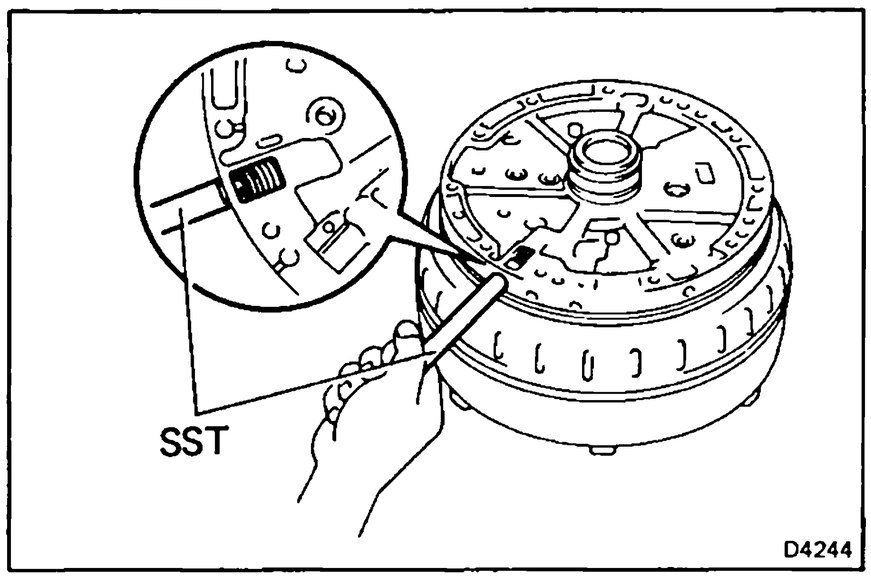
D3423

1. USE TORQUE CONVERTER AS WORK STAND
2. REMOVE O-RING



AT1548

3. REMOVE TWO OIL SEAL RINGS

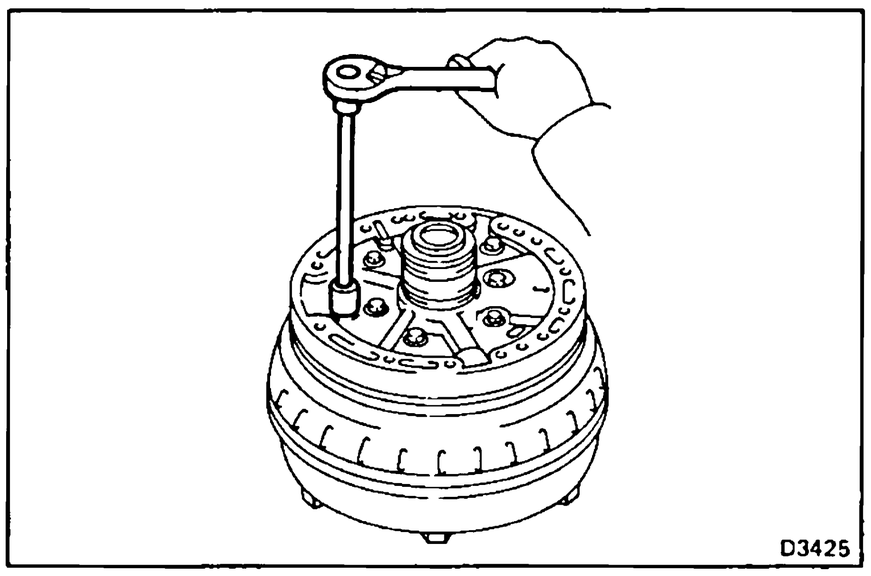


4. REMOVE CHECK BALL

(a) Using SST, compress the spring and remove the spring seat.

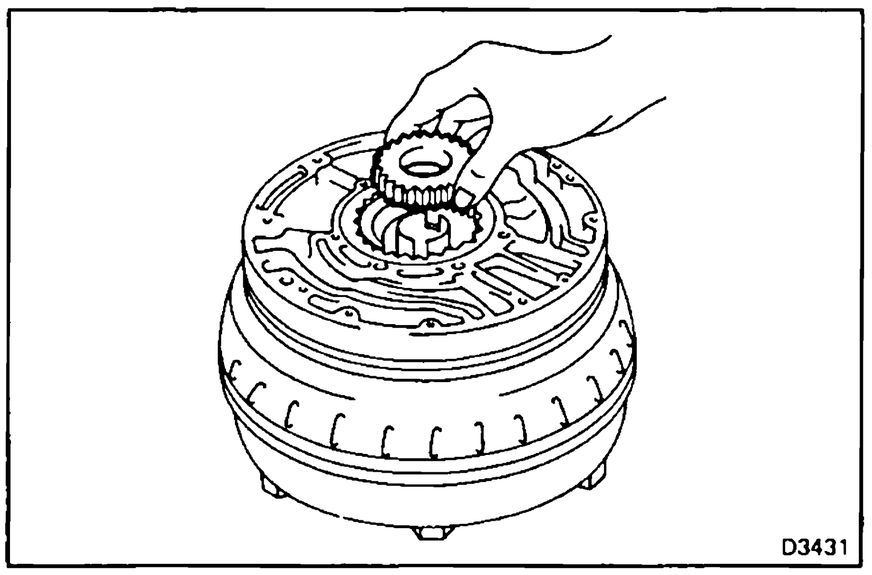
SST 09350-36010 (09350-06100)

(b) Remove the spring and check ball.



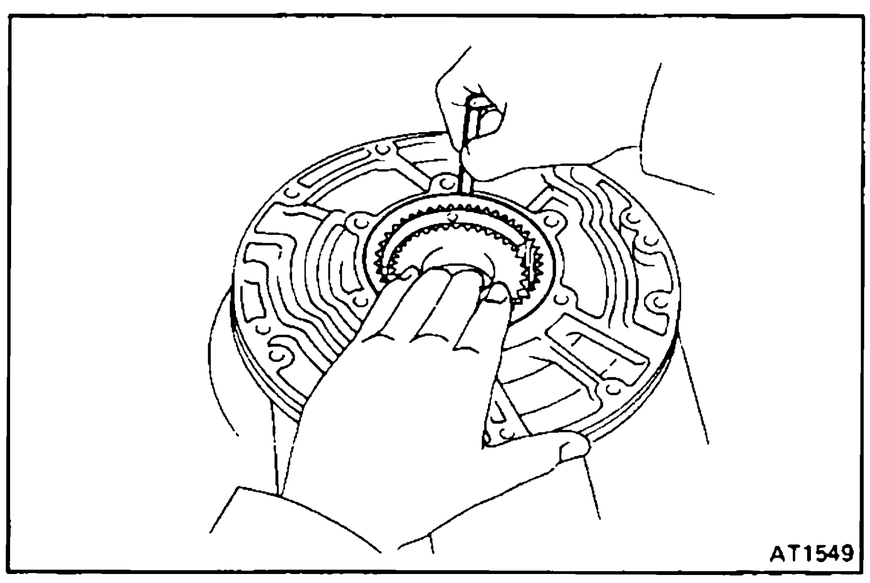
5. REMOVE OIL PUMP COVER

Remove the eight bolts, and then remove the oil pump cover from the oil pump body.



6. REMOVE OIL PUMP DRIVE GEAR AND DRIVEN GEAR

INSPECTION OF OIL PUMP



1. USE TORQUE CONVERTER AS WORK STAND

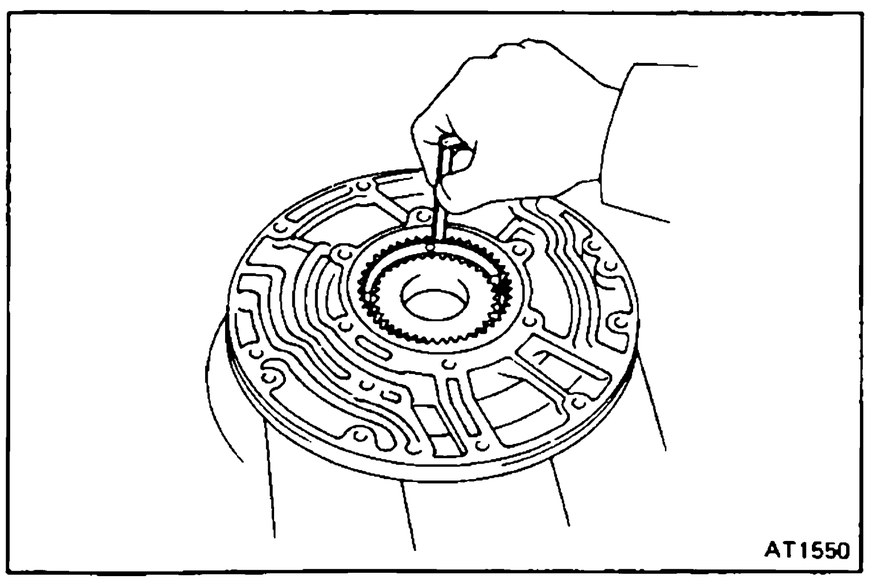
Place the torque converter and then place a wooden block, etc., on it.

2. CHECK BODY CLEARANCE OF DRIVEN GEAR

Push the driven gear to one side of the body.
Using a feeler gauge, measure the clearance.

Standard body clearance: **0.07 – 0.15 mm (0.0028 – 0.0059 in.)**
Maximum body clearance: **0.3 mm (0.012 in.)**

If the body clearance is greater than the maximum, replace the drive gear, driven gear or pump body.

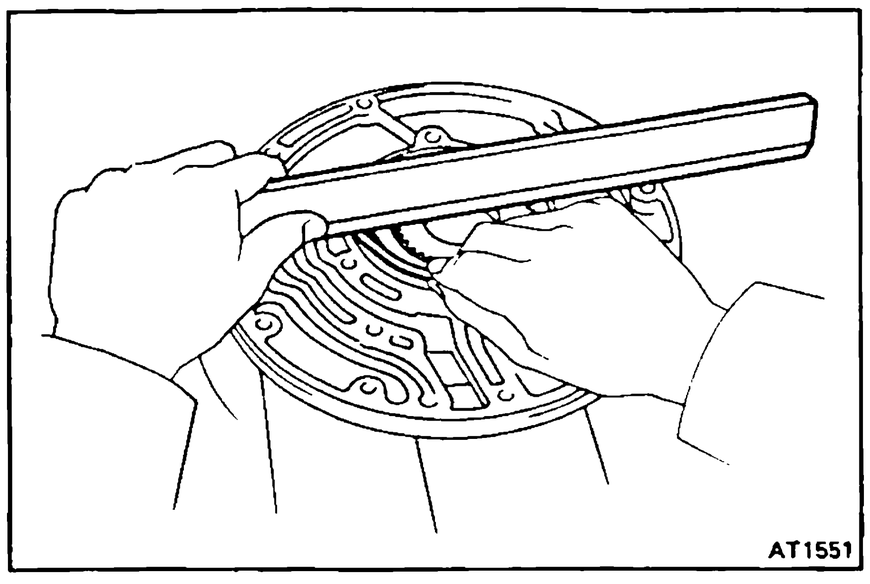


3. CHECK TIP CLEARANCE OF BOTH GEARS

Measure between the gear teeth and the cresent-shaped part of the pump body.

Standard tip clearance: **0.14 – 0.24 mm (0.0055 – 0.0094 in.)**
Maximum tip clearance: **0.3 mm (0.012 in.)**

If the tip clearance is greater than the maximum, replace the drive gear, driven gear or pump body.



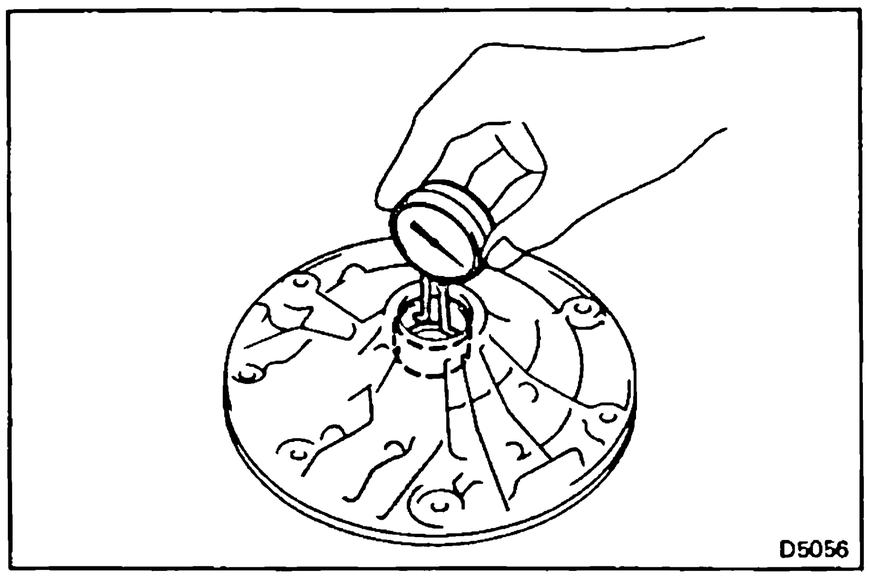
4. CHECK SIDE CLEARANCE OF BOTH GEARS

Using a steel straightedge and a feeler gauge, measure the side clearance of both gears.

Standard side clearance: 0.02 – 0.05 mm (0.0008 – 0.0020 in.)

Maximum side clearance: 0.1 mm (0.004 in.)

If the side clearance is greater than the maximum, replace the drive gear, driven gear or pump body.

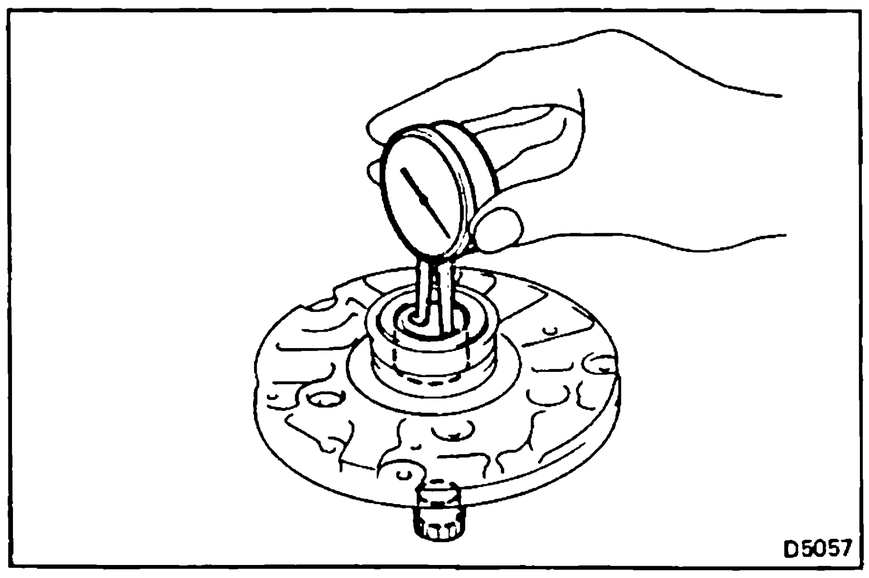


5. CHECK OIL PUMP BODY BUSHING

Using a dial indicator, measure the inside diameter of the oil pump body bushing.

Maximum inside diameter: 42.13 mm (1.6587 in.)

If the inside diameter is greater than the maximum, replace the oil pump body.

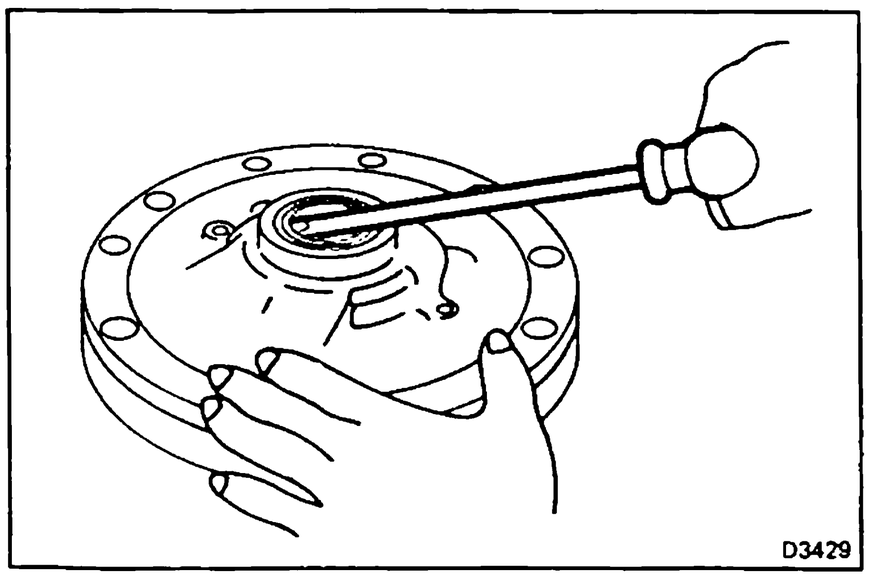


6. CHECK OIL PUMP COVER BUSHING

Using a dial indicator, measure the inside diameter, of the oil pump cover bushing.

Maximum inside diameter:

Front side	**24.07 mm**	**(0.9476 in.)**
Rear side	**26.57 mm**	**(1.0461 in.)**

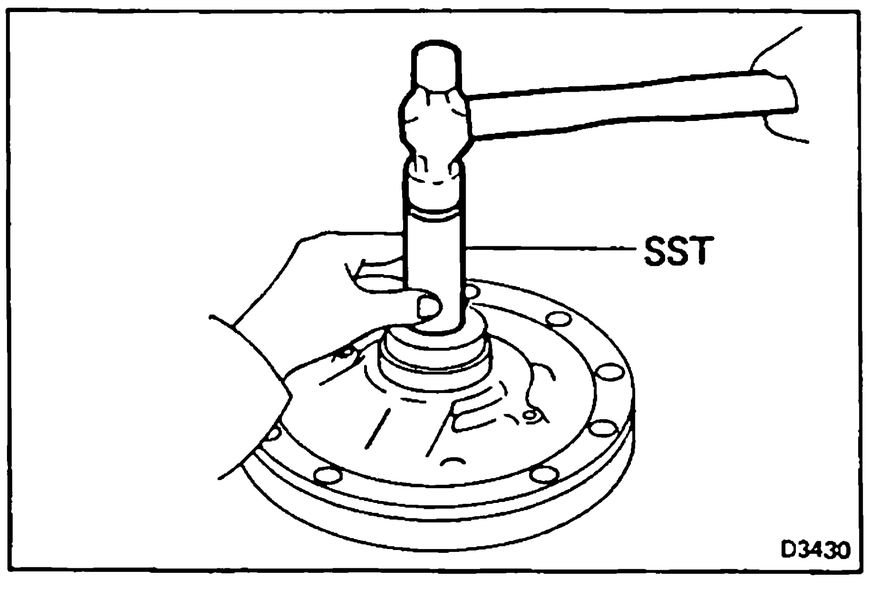


7. CHECK OIL SEAL

Check for wear, damage or cracks.

8. IF NECESSARY, REPLACE OIL SEAL

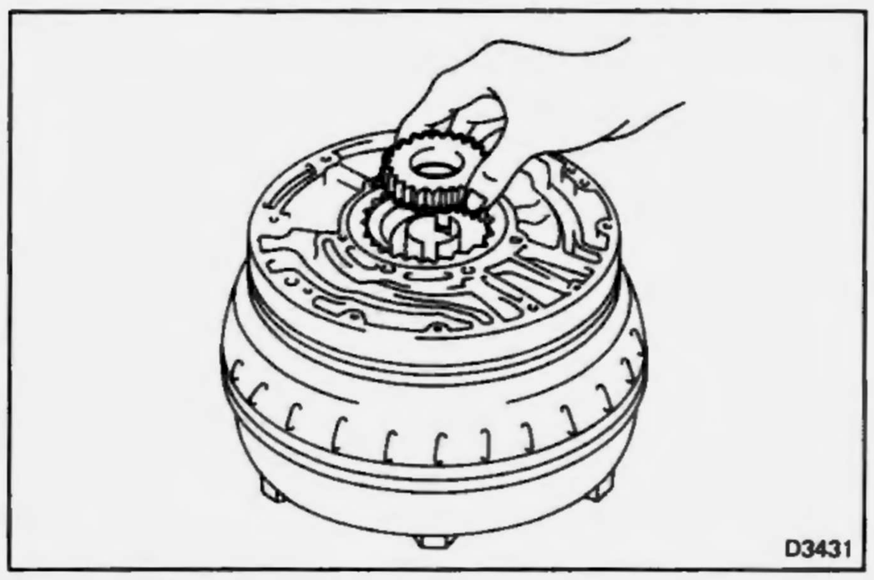
(a) Pry off the oil seal with a screwdriver.



(b) Using SST, install a new oil seal.
The oil seal end should be flush with the outer edge of the pump body.

SST 09350-36010 (09350-06040)

(c) Coat the oil seal lip with MP grease.



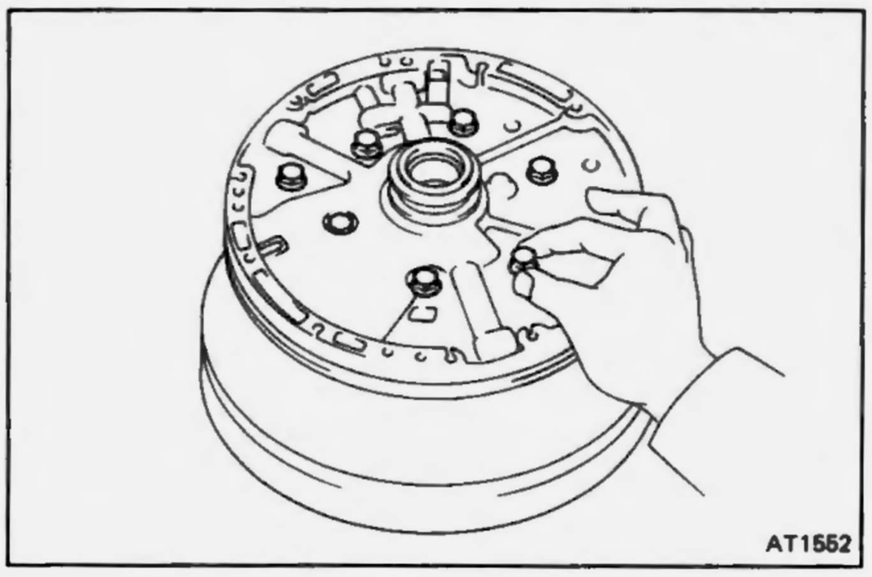
ASSEMBLY OF OIL PUMP

1. INSTALL OIL PUMP DRIVEN GEAR AND DRIVE GEAR

(a) Place the oil pump body on the torque converter.

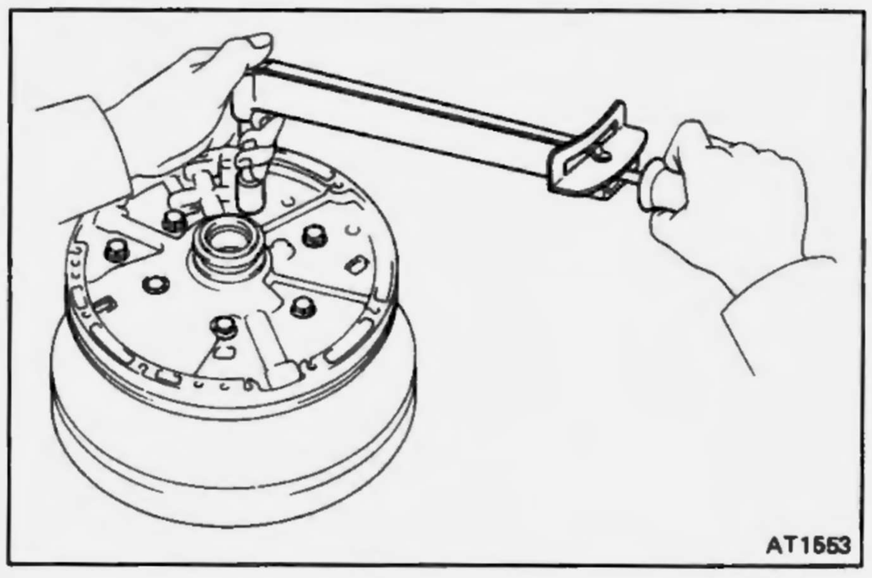
(b) Coat the both gears with ATF.

(c) Install the driven gear and drive gear.



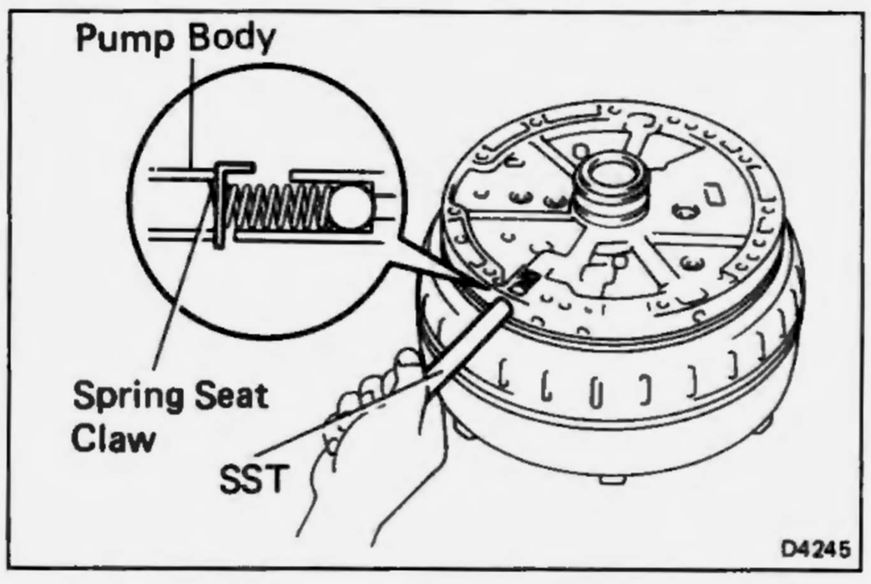
2. INSTALL OIL PUMP COVER

(a) Align the oil pump cover with the bolt holes and hand tighten the eight bolts.



(b) Tighten the eight bolts.

Torque: 6 mm 90 kg-cm (78 in.-lb, 8.8 N·m)
8 mm 210 kg-cm (15 ft-lb, 21 N·m)

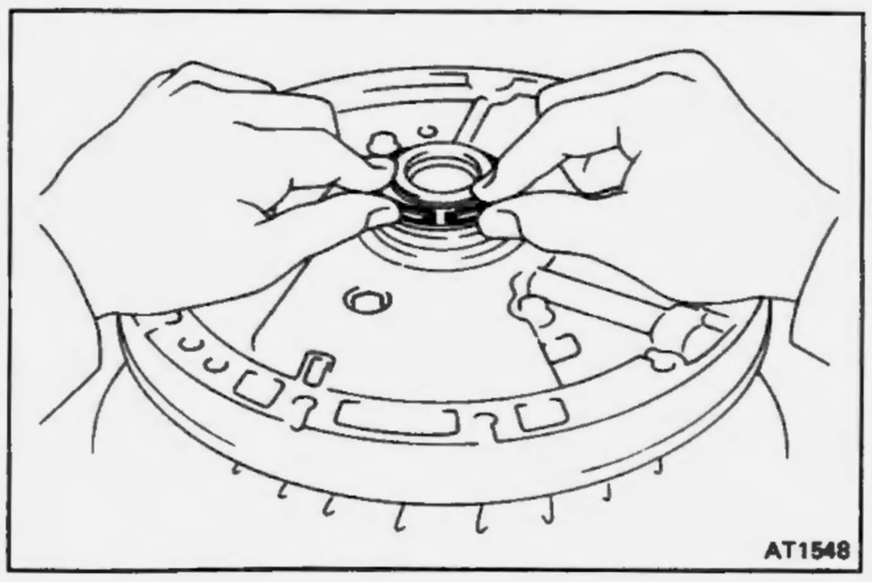


3. INSTALL CHECK BALL

(a) Install the check ball and spring.

(b) Using SST, compress the spring and install the spring seat.

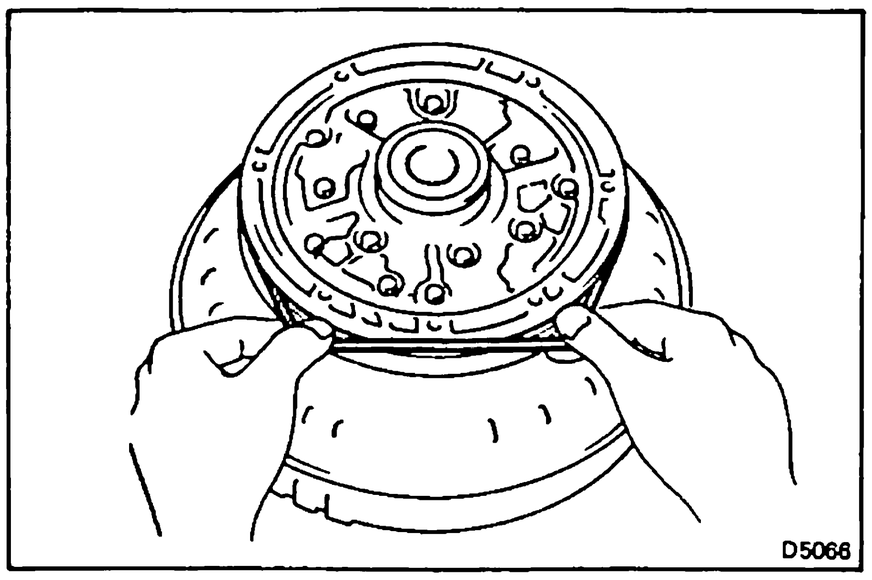
SST 09350-36010 (09350-06100)



4. INSTALL TWO OIL SEAL RINGS

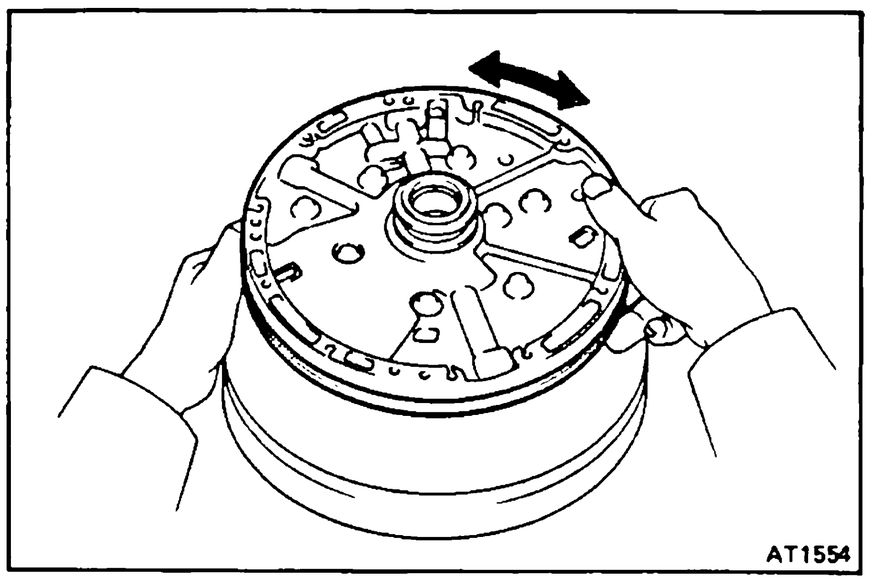
Coat the two oil seal rings with ATF and install.

CAUTION: Do not spread the ring ends more than necessary.



5. **INSTALL O-RING**

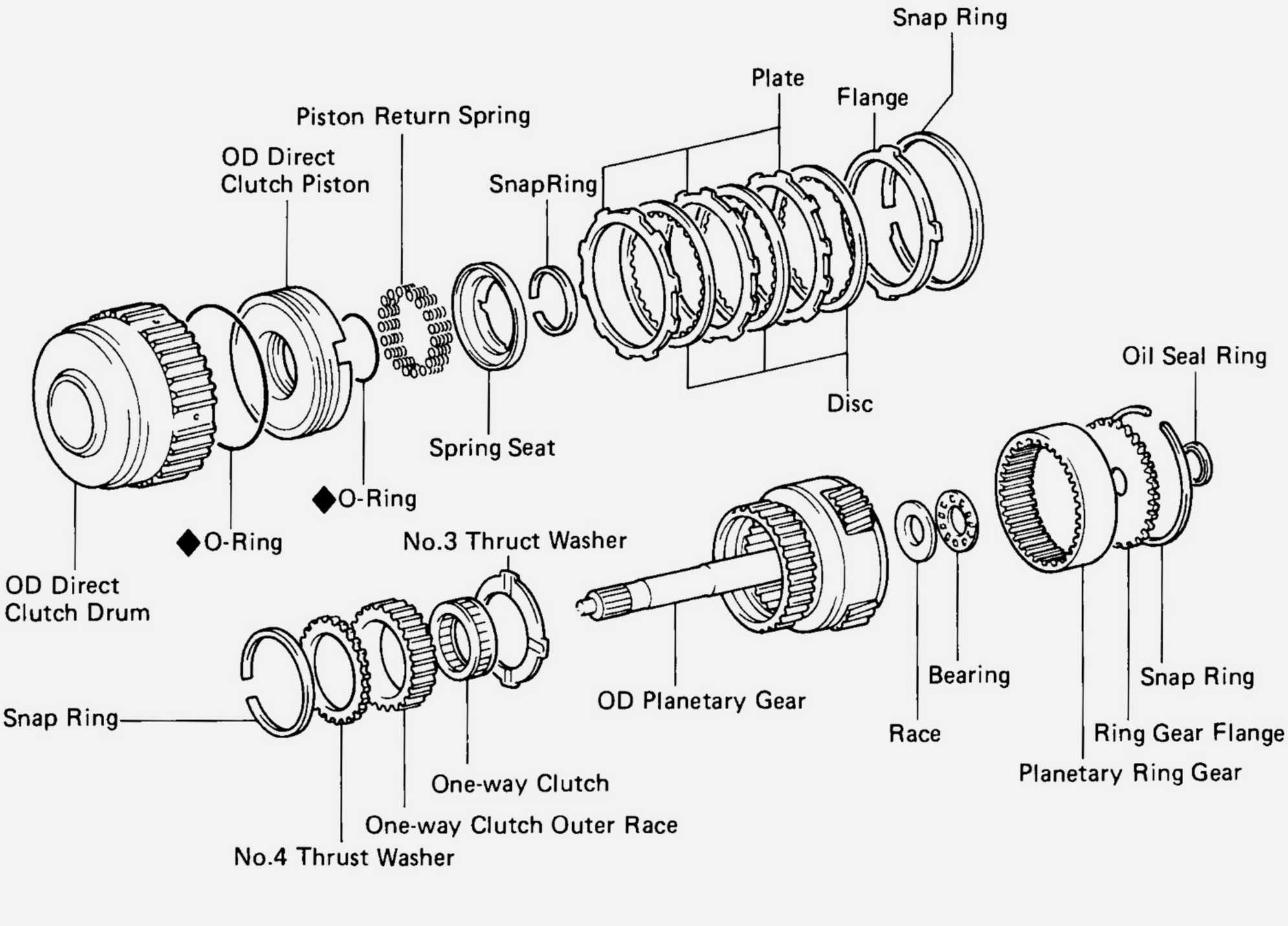
Coat new O-ring with ATF and install it to the oil pump body.

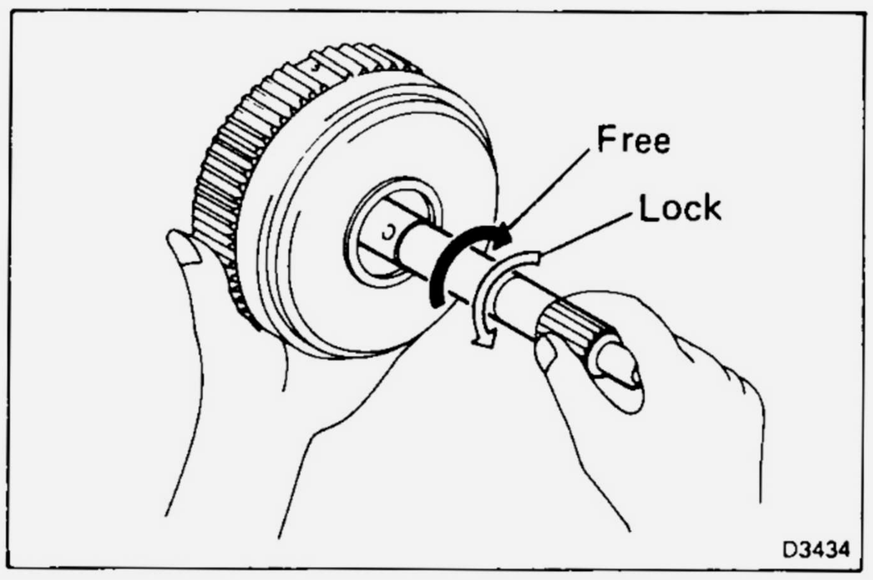


6. **CHECK OIL PUMP DRIVE GEAR ROTATION**

Make sure the drive gear rotates smoothly when installed to the torque converter.

OVERDRIVE PLANETARY GEAR AND OVERDRIVE DIRECT CLUTCH (C0)

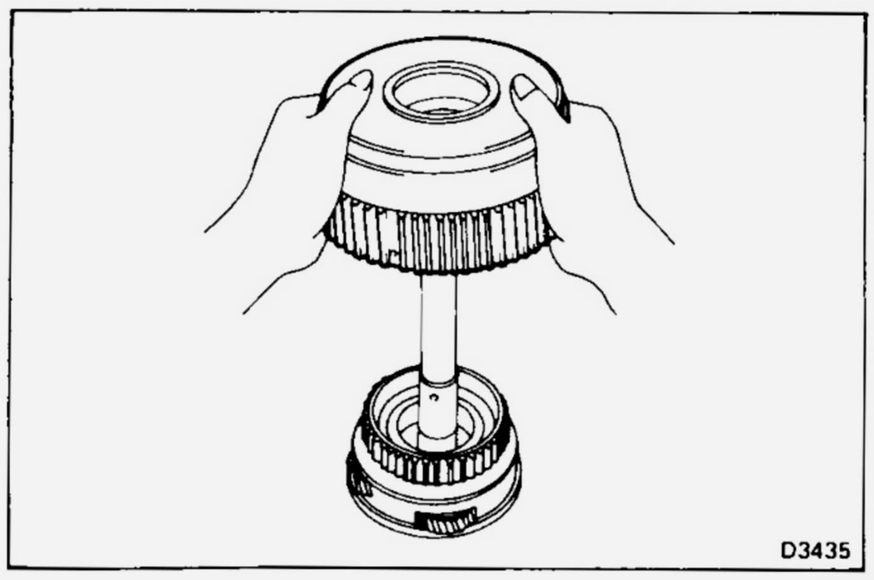




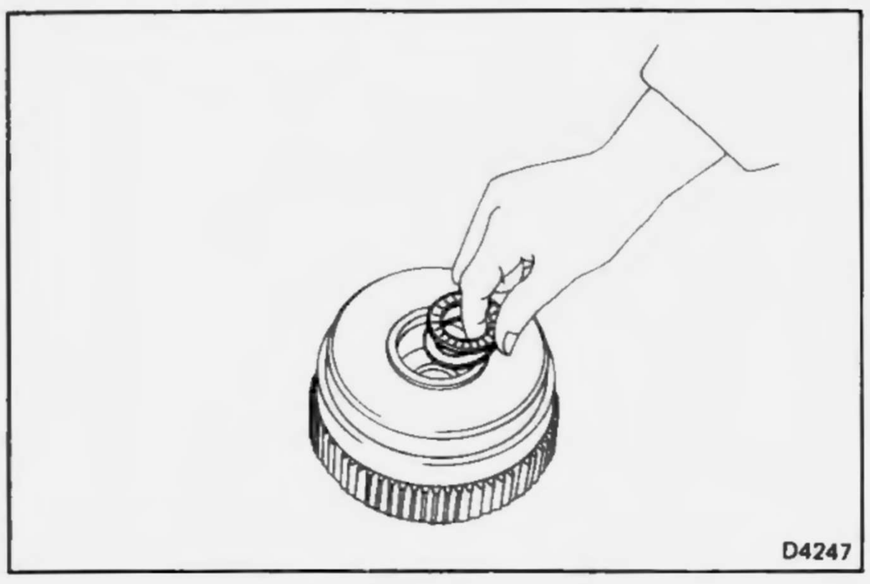
DISASSEMBLY OF OVERDRIVE PLANETARY GEAR AND OVERDRIVE DIRECT CLUTCH

1. CHECK OPERATION OF ONE-WAY CLUTCH

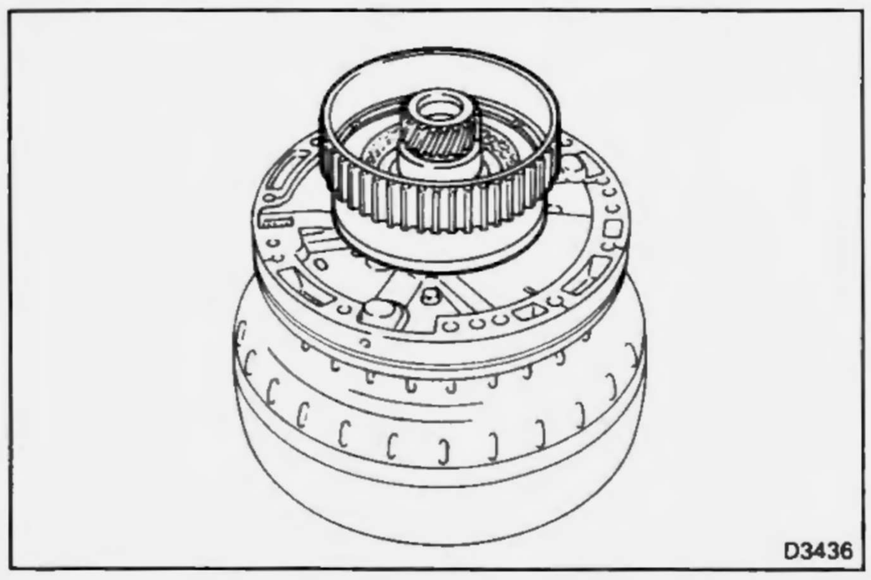
Hold the OD direct clutch drum and turn the input shaft. The input shaft should turn freely clockwise and should lock counterclockwise.



2. REMOVE OVERDRIVE DIRECT CLUTCH ASSEMBLY FROM OVERDRIVE PLANETARY GEAR

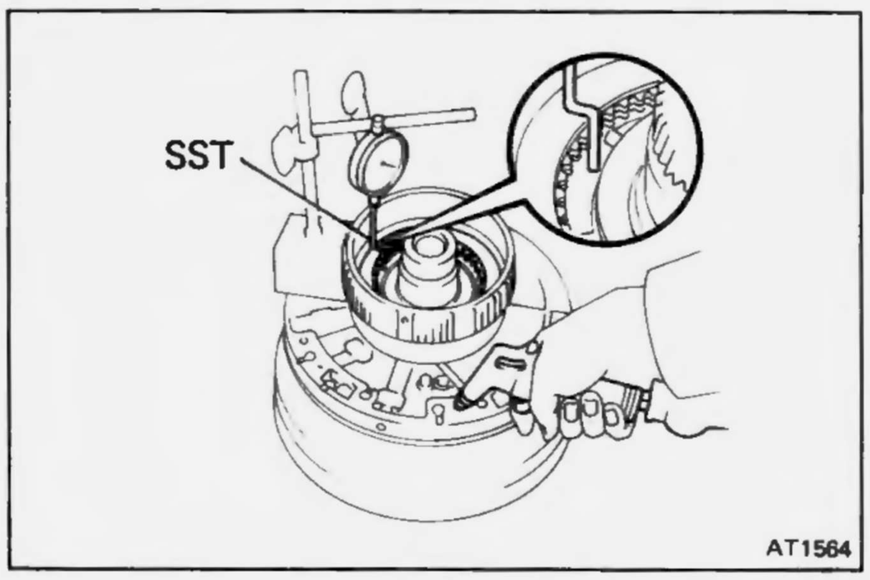


3. **REMOVE BEARING AND RACE FROM OVERDRIVE DIRECT CLUTCH**



4. **CHECK PISTON STROKE OF OVERDRIVE DIRECT CLUTCH (C_O)**

(a) Place the oil pump onto the torque converter. Then place the OD direct clutch onto the oil pump.

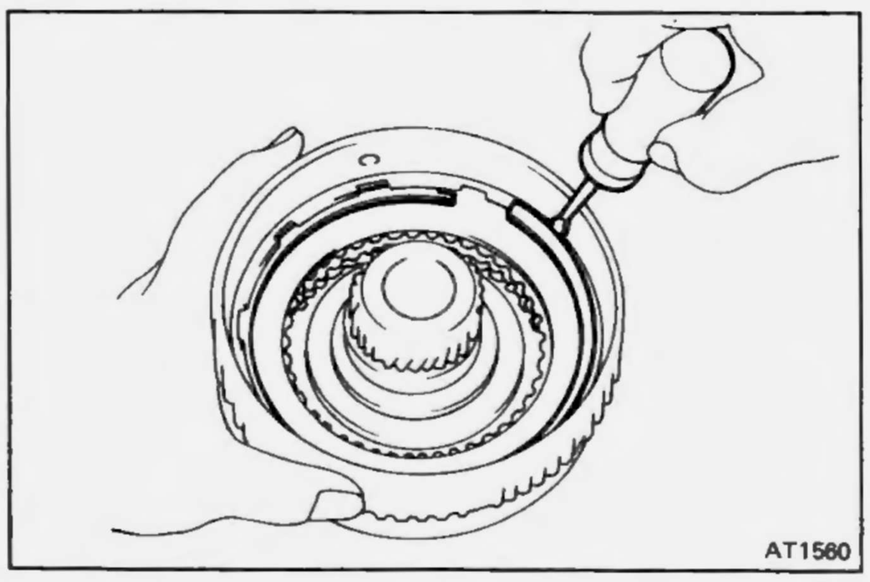


(b) Using SST and a dial indicator, measure the OD direct clutch piston stroke, applying and releasing the compressed air (4–8 kg/cm², 57–114 psi or 392–785 kPa) as shown.

SST 09350-36010 (09350–06110)

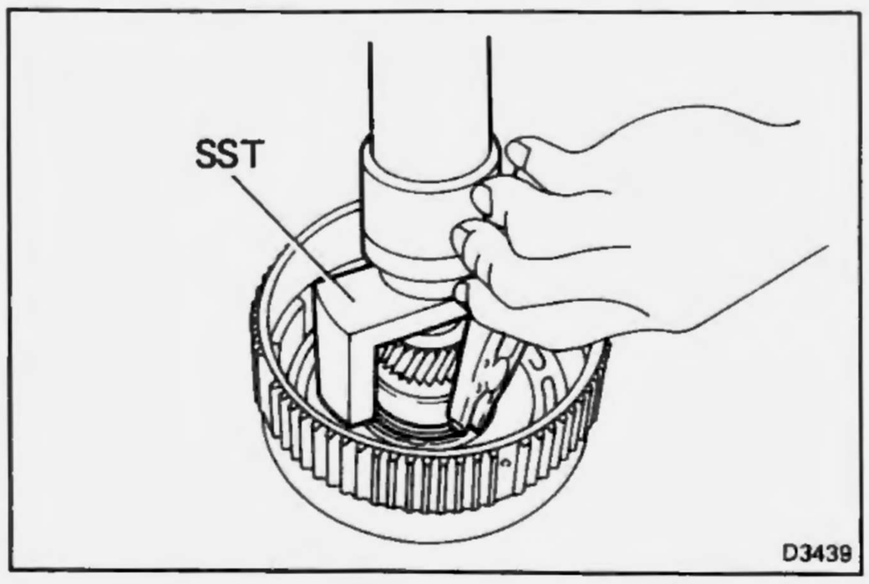
Piston stroke: 1.10 – 1.70 mm (0.0433 – 0.0669 in.)

If the stroke exceeds the limit, replace the discs and recheck the piston stroke. If the stroke is less than the limit, parts may be improperly assembled and require reassembly.



5. **REMOVE SNAP RING FROM OVERDRIVE DIRECT CLUTCH DRUM**

6. **REMOVE FLANGE, DISCS AND PLATES**

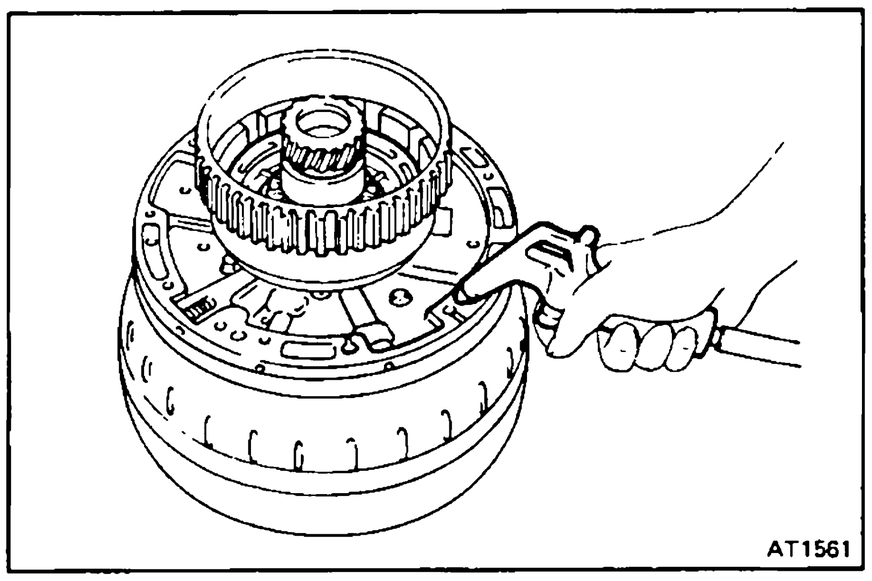


7. **COMPRESS PISTON RETURN SPRINGS AND REMOVE SNAP RING**

Place SST on the spring seat and compress the return spring with a shop press. Using snap ring pliers, remove the snap ring.

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8. **REMOVE SPRING SEAT AND TWENTY-FOUR RETURN SPRINGS**


AT1561

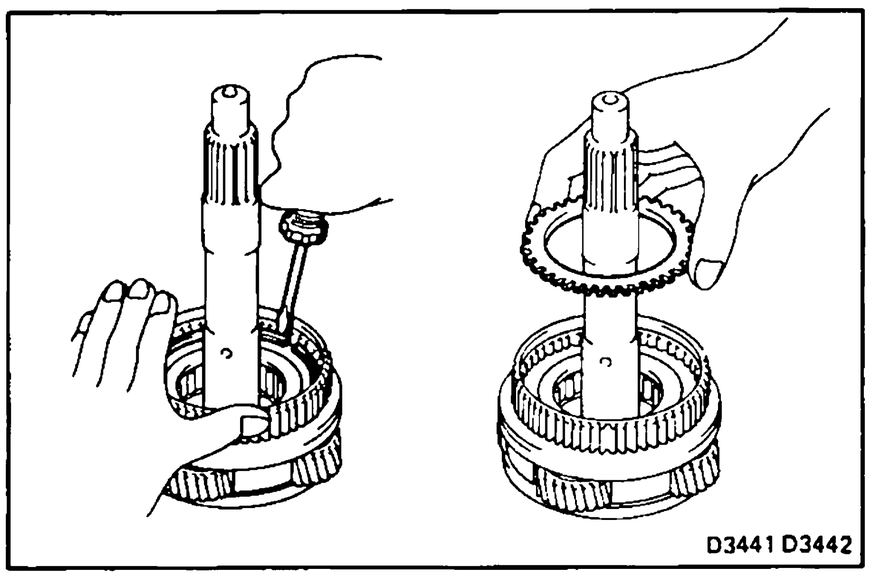
9. REMOVE OVERDRIVE DIRECT CLUTCH PISTON

(a) Place the oil pump onto the torque converter. Then place the OD direct clutch onto the oil pump.

(b) Holding the OD direct clutch piston by hand, apply compressed air to the oil pump to remove the OD direct clutch piston.

(c) Remove the OD direct clutch piston.

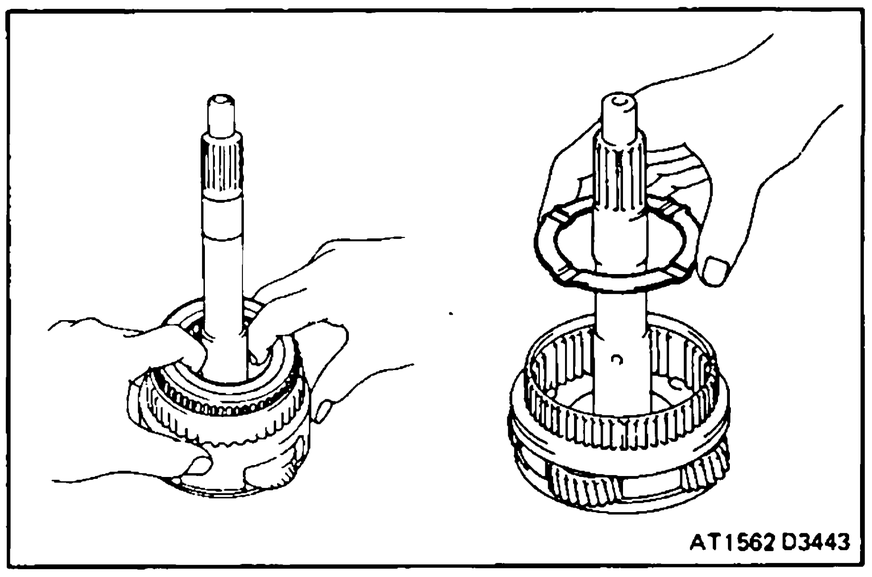
10. REMOVE TWO O-RINGS FROM PISTON


D3441 D3442

11. REMOVE ONE-WAY CLUTCH

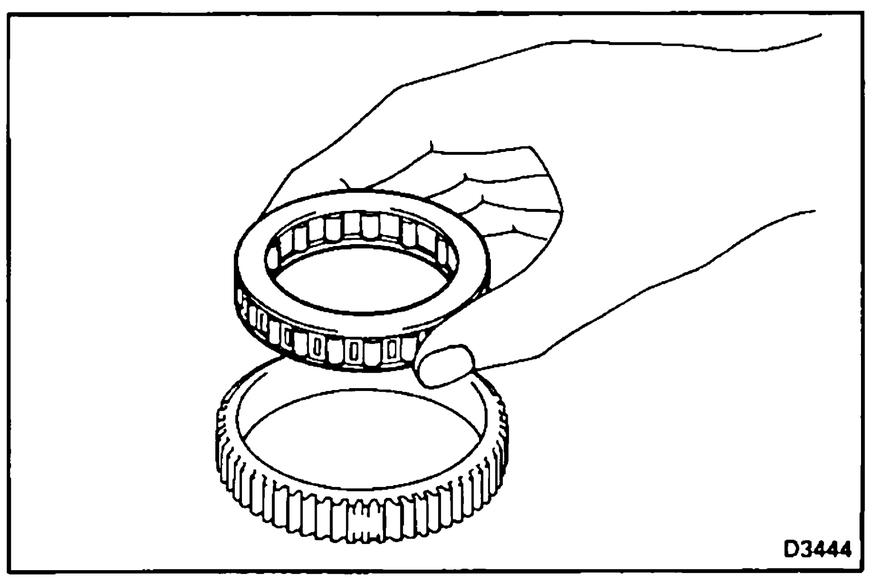
(a) Remove the snap ring with a screwdriver.

(b) Remove the No. 4 thrust washer.

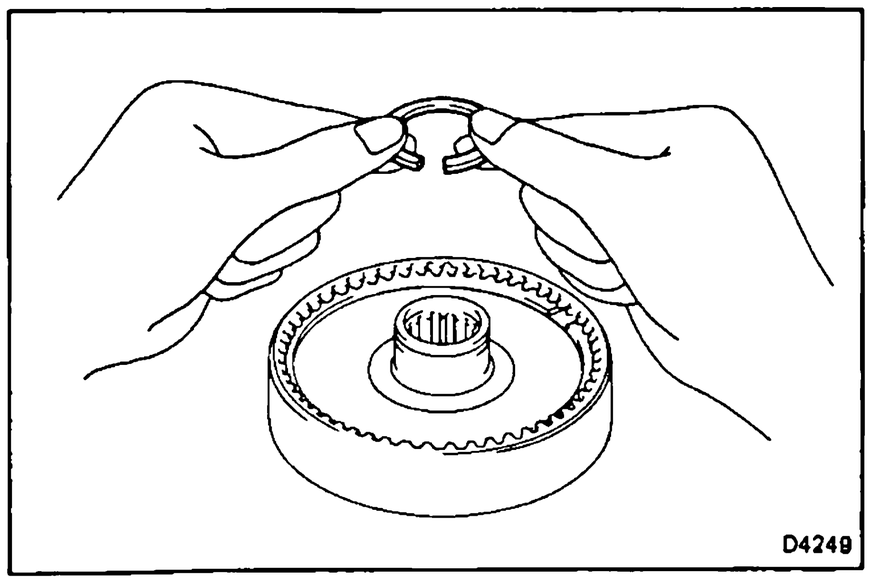

AT1562 D3443

(c) Remove the one-way clutch with outer race from the planetary gear.

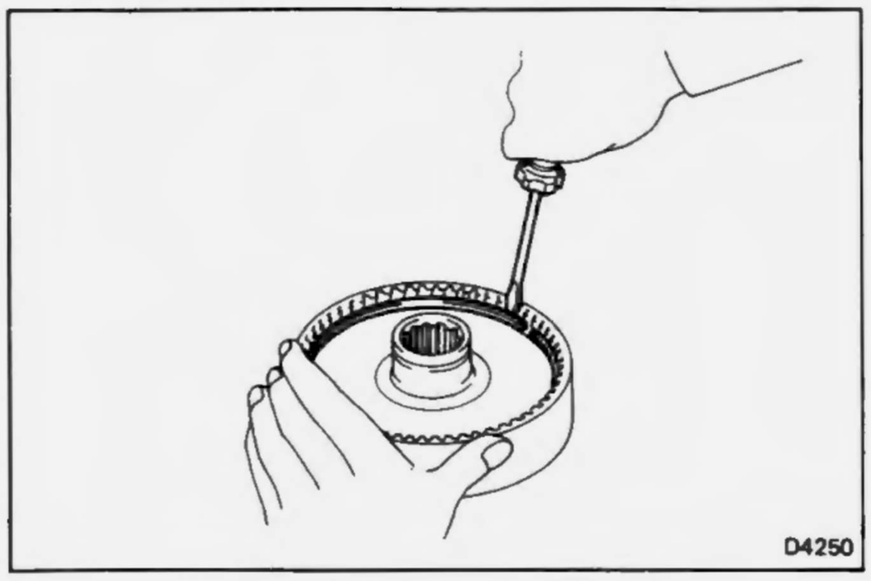
(d) Remove the No. 3 thrust washer.


D3444

(e) Remove the one-way clutch from the one-way clutch outer race.


D4249

12. REMOVE OIL SEAL RING FROM RING GEAR FLANGE

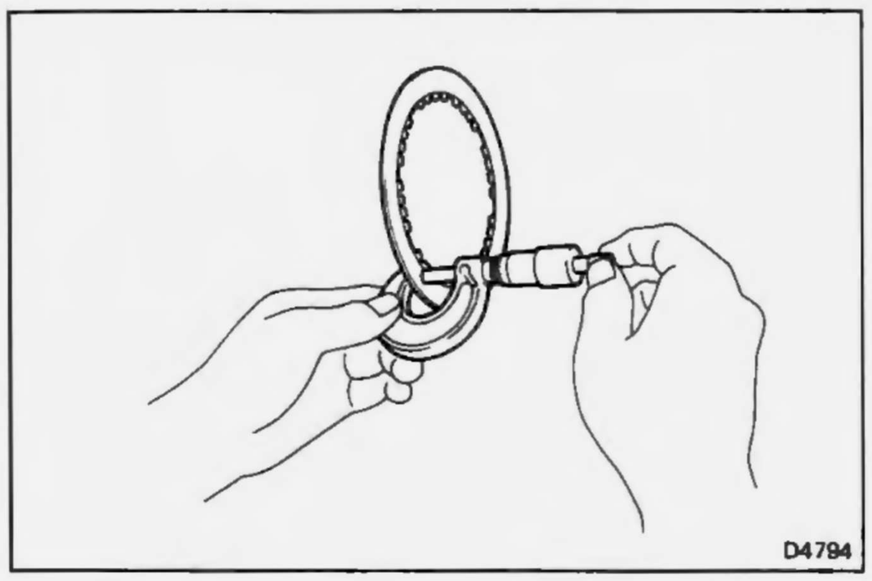


13. REMOVE SNAP RING AND RING GEAR FLANGE

(a) Remove the snap ring with a screwdriver.

(b) Remove the ring gear flange.

INSPECTION OF OVERDRIVE PLANETARY GEAR AND OVERDRIVE DIRECT CLUTCH

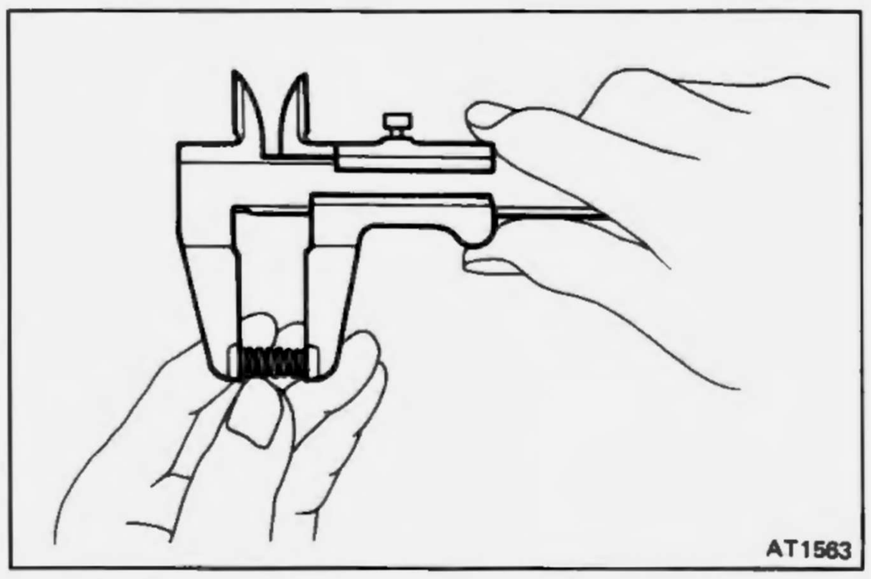


1. CHECK DISCS

Using a micrometer, measure the thickness of the discs.

Minimum thickness: 1.9 mm (0.075 in.)

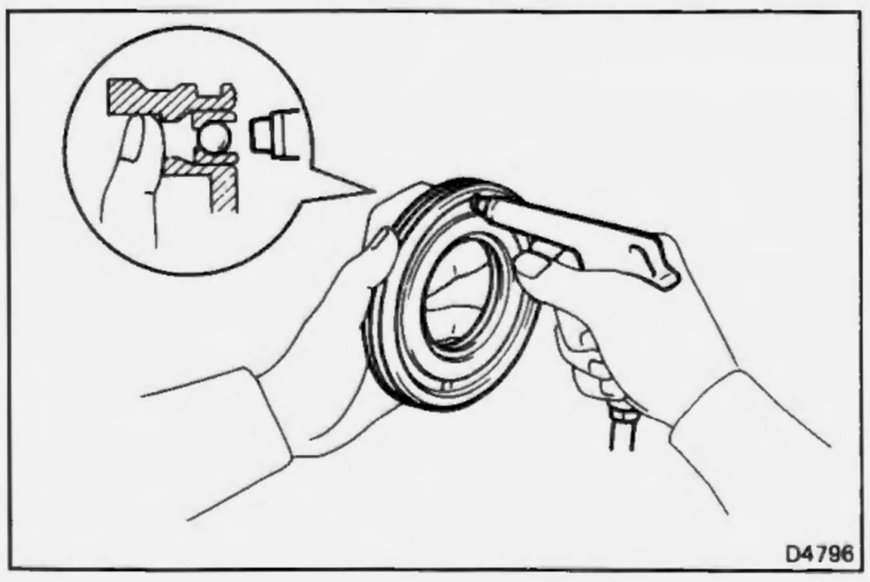
If the thickness is less than the minimum, replace the disc.



2. CHECK PISTON RETURN SPRINGS

Using calipers, measure the free length of the return springs.

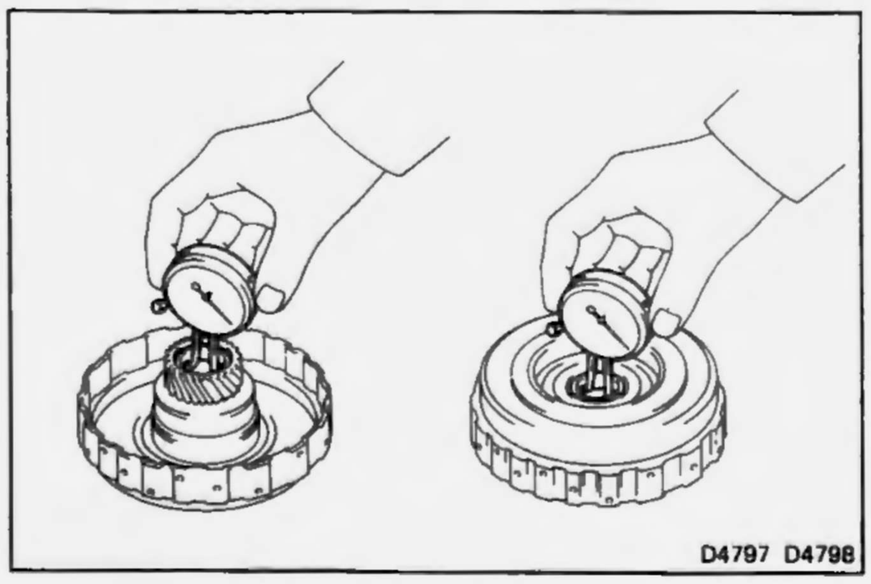
Standard length: 21.0 mm (0.827 in.)



3. CHECK OVERDRIVE DIRECT CLUTCH PISTON

(a) Check that check ball is free by shaking the piston.

(b) Check that the valve does not leak by applying low-pressure compressed air.

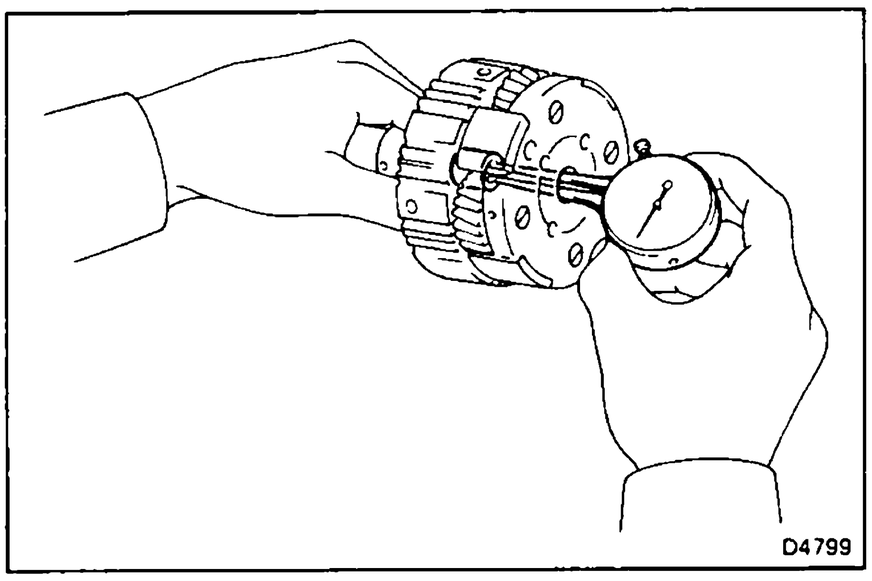


4. CHECK OVERDRIVE DIRECT CLUTCH DRUM BUSHING

Using a dial indicator, measure the inside diameter of the clutch drum bushings.

Maximum inside diameter: 26.57 mm (1.0461 in.)

If the inside diameter is greater than the maximum, replace the clutch drum.



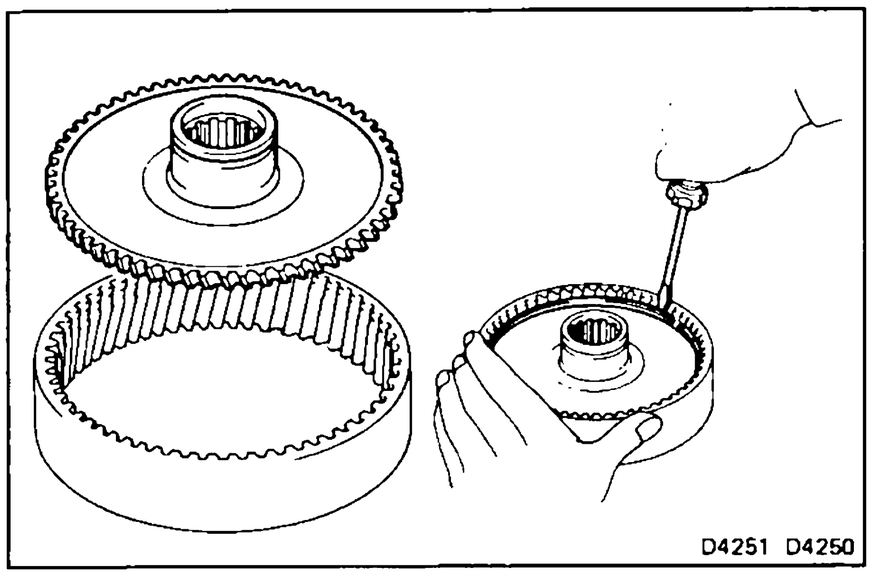
5. CHECK OVERDRIVE PLANETARY GEAR BUSHING

Using a dial indicator, measure the inside diameter of the planetary gear bushing.

Maximum inside diameter: 12.07 mm (0.4752 in.)

If the inside diameter is greater than the maximum, replace the planetary gear.

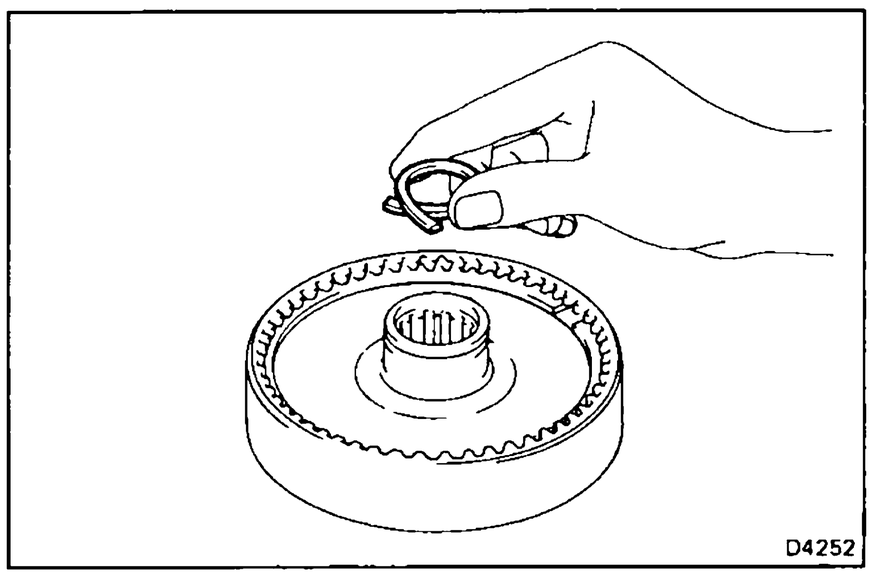
ASSEMBLY OF OVERDRIVE PLANETARY GEAR AND OVERDRIVE DIRECT CLUTCH



1. INSTALL RING GEAR FLANGE

(a) Install the ring gear flange to the ring gear.

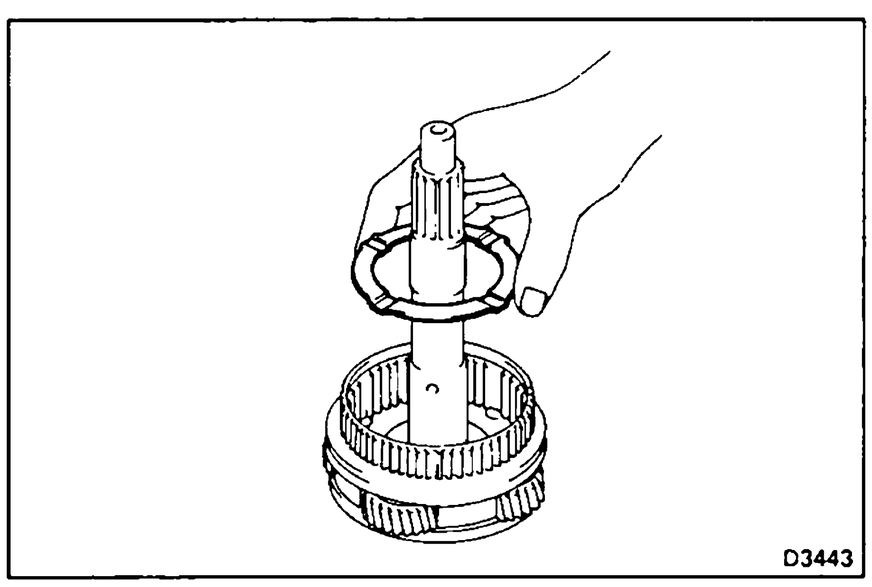
(b) Install the snap ring to the ring gear.



2. INSTALL OIL SEAL RING

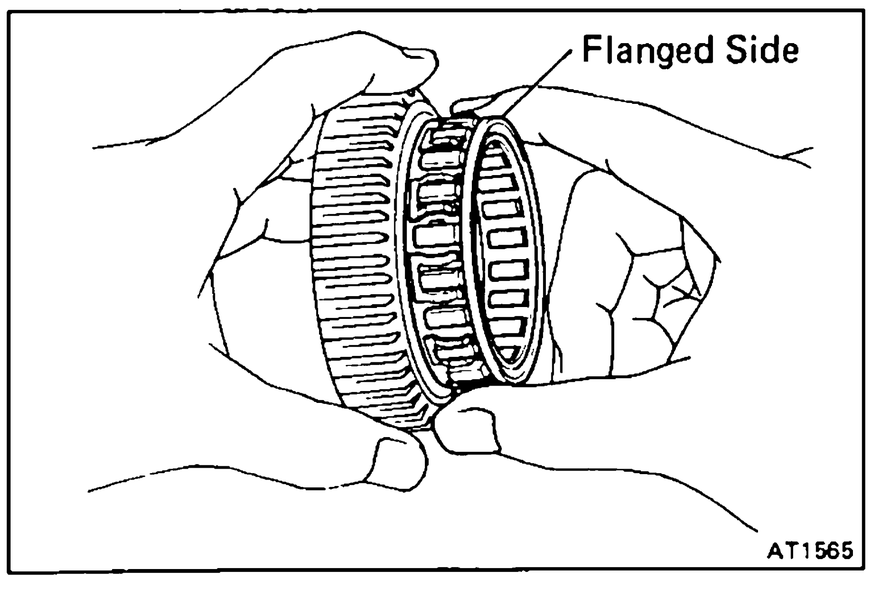
Coat the oil seal ring with ATF and install it to the ring gear flange.

CAUTION: Do not spread the ring ends more than necessary.

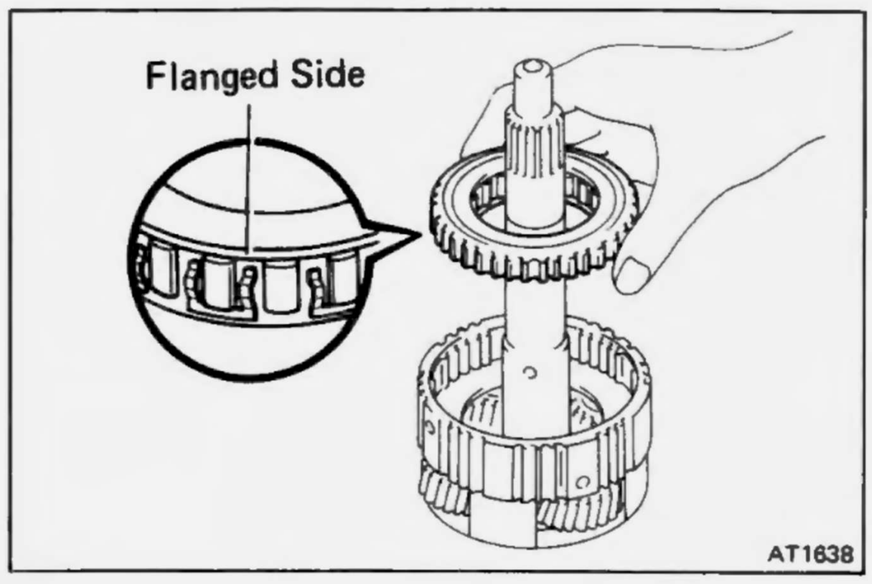


3. INSTALL ONE-WAY CLUTCH

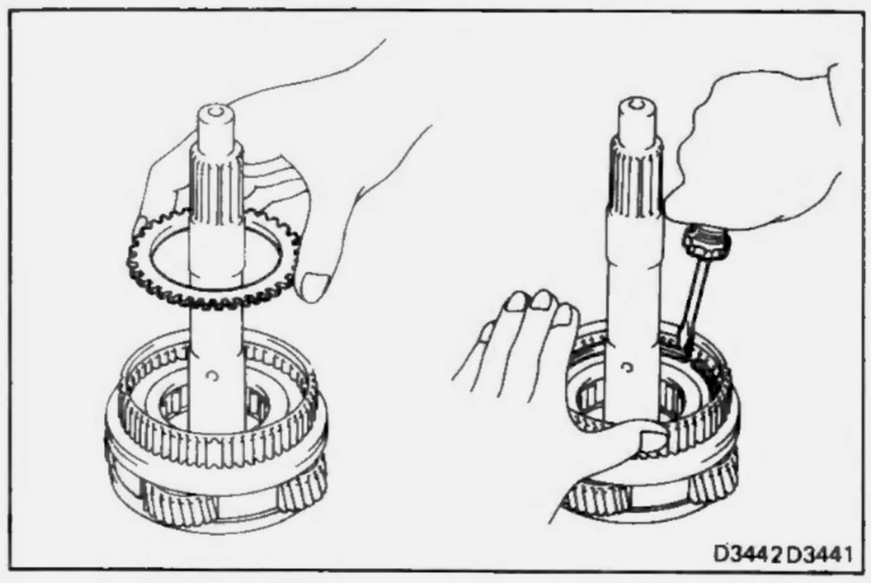
(a) Install the No. 3 thrust washer to the planetary gear, facing the grooved side upward.



(b) Install the one-way clutch into the outer race, facing the flanged side of the one-way clutch upward.

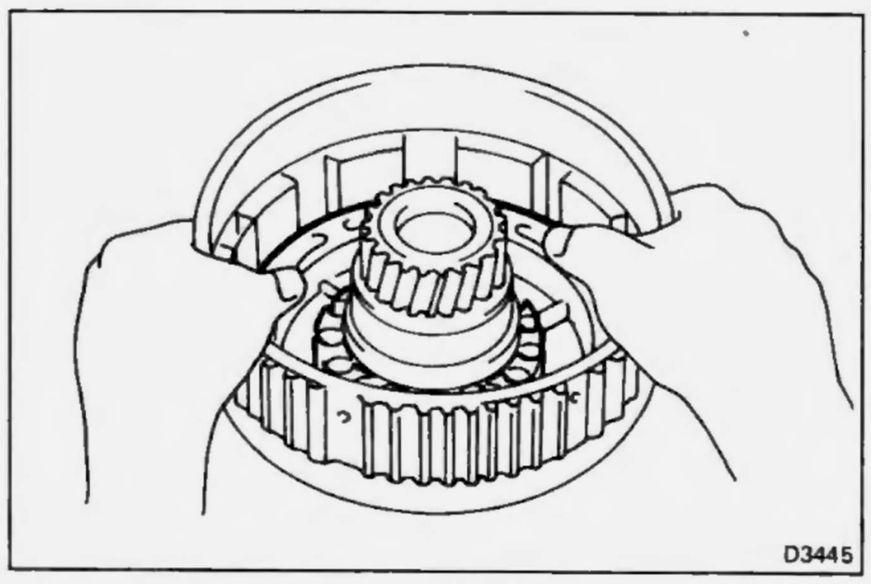


(c) Install the assembled one-way clutch and outer race to the planetary gear.



(d) Install the No. 4 thrust washer to the planetary gear.

(e) Install the snap ring to the planetary gear.

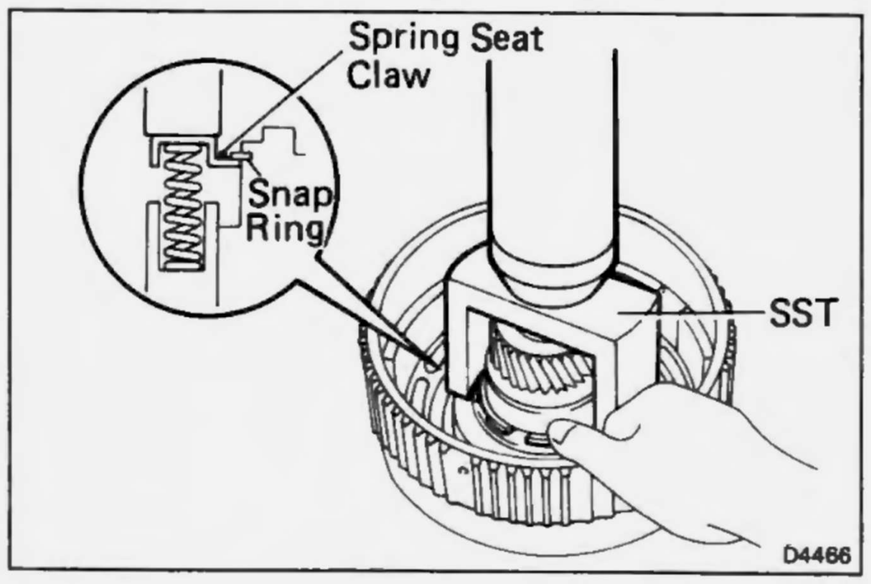


4. INSTALL NEW O-RINGS ON OVERDRIVE DIRECT CLUTCH PISTON

Coat new O-rings with ATF and install them on the OD direct clutch piston.

5. INSTALL OVERDRIVE DIRECT CLUTCH PISTON TO OVERDRIVE DIRECT CLUTCH DRUM

Being careful not to damage the O-rings, press the direct clutch piston into the clutch drum with both hands.



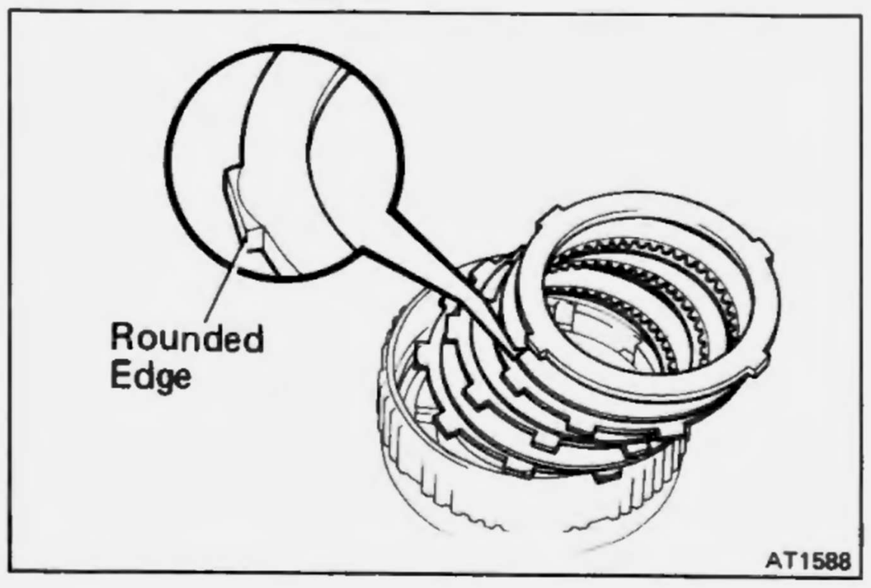
6. INSTALL TWENTY-FOUR PISTON RETURN SPRINGS AND SPRING SEAT

7. COMPRESS PISTON RETURN SPRINGS AND INSTALL SNAP RING IN GROOVE

(a) Place SST on the spring seat and compress the return springs with a shop press.

SST 09350-36010 (09350-06010)

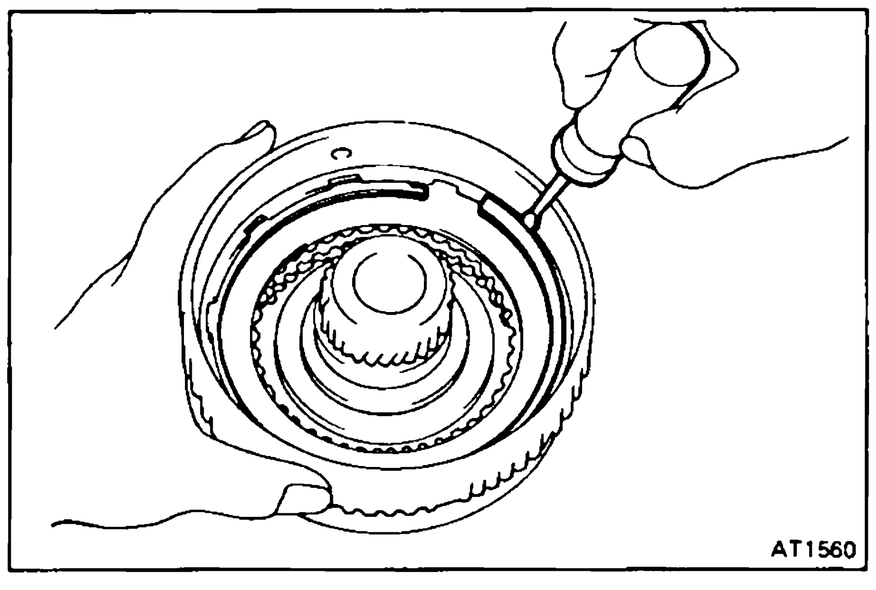
(b) Install the snap ring. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



8. INSTALL PLATES, DISCS AND FLANGE

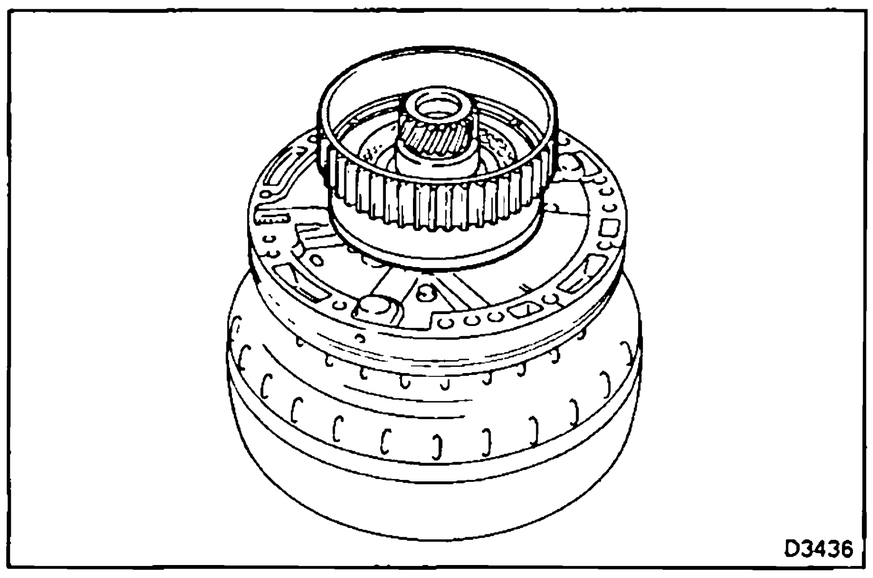
(a) Install in order: P–D–P–D–P–D

(b) Install the flange, facing the rounded edge downward.



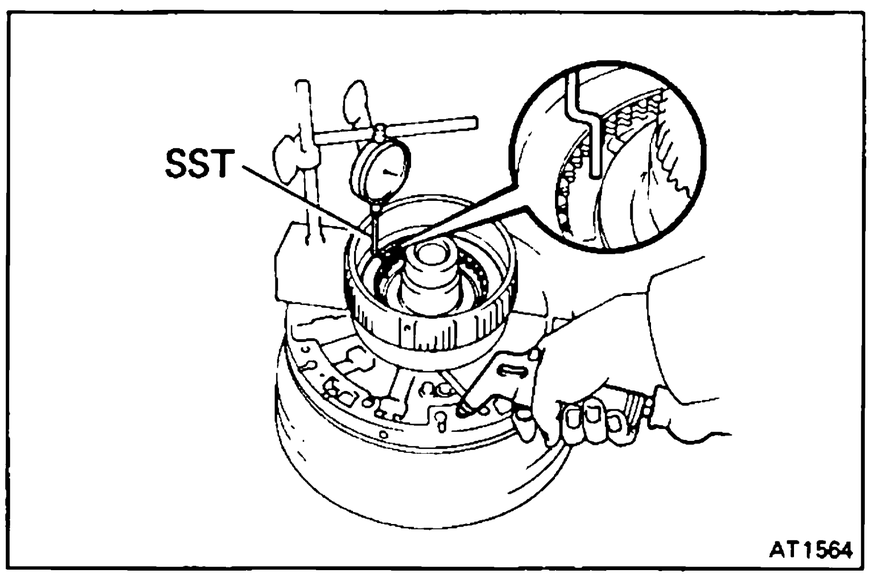
9. INSTALL SNAP RING

NOTE: Be sure the end gap of the snap ring is not aligned the cutout portion of the clutch drum.



10. CHECK PISTON STROKE OF OVERDRIVE DIRECT CLUTCH (C_O)

(a) Place the oil pump onto the torque converter, and then place the OD direct clutch assembly onto the oil pump.

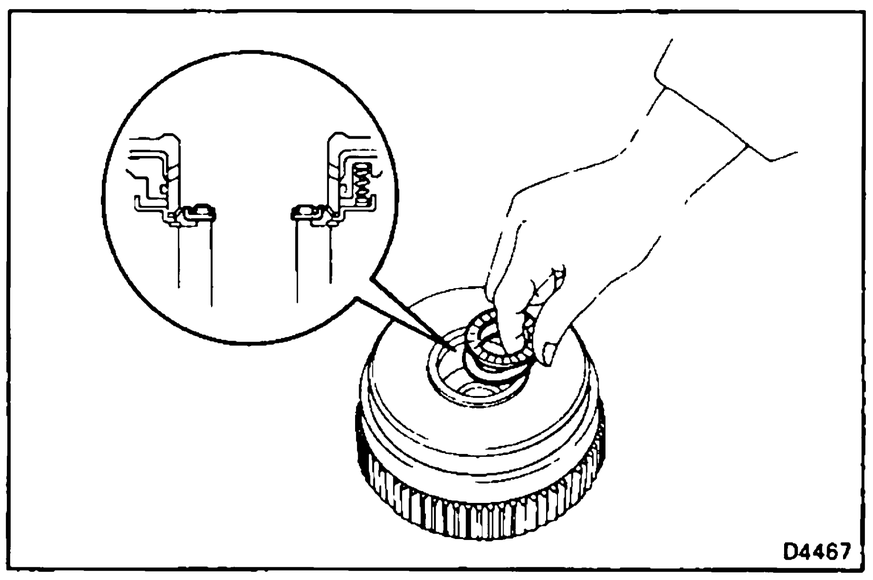


(b) Using SST and a dial indicator, measure the OD direct clutch piston stroke, applying and releasing the compressed air (4–8 kg/cm², 57–114 psi or 392–785 kPa) as shown.

SST 09350-36010 (09350-06110)

Piston stroke: 1.10 – 1.70 mm (0.0433 –0.0669 in.)

If the stroke exceeds the limit, replace the discs and recheck the piston stroke. If the stroke is less than the limit, parts may be improperly assembled and require reassembly.

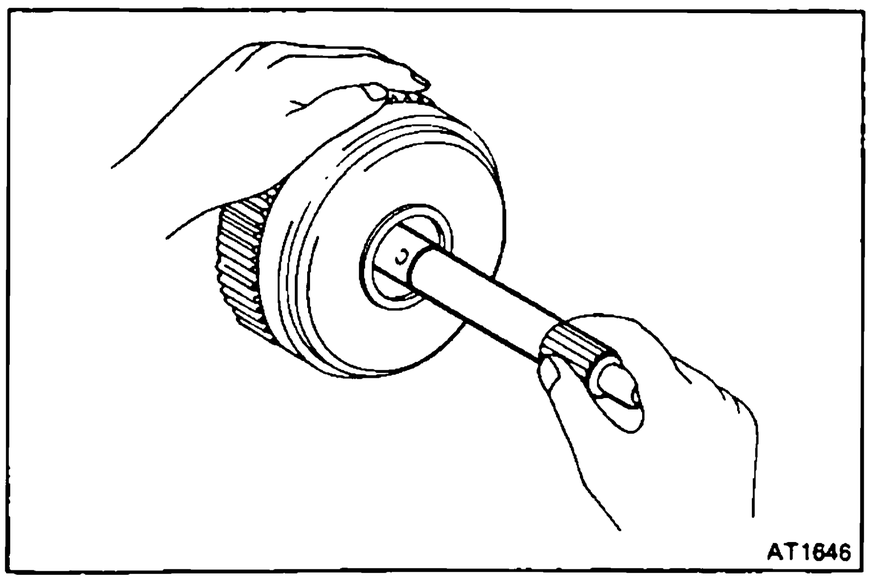


11. INSTALL RACE AND BEARING

Coat the race and bearing with petroleum jelly and install them onto the OD direct clutch.

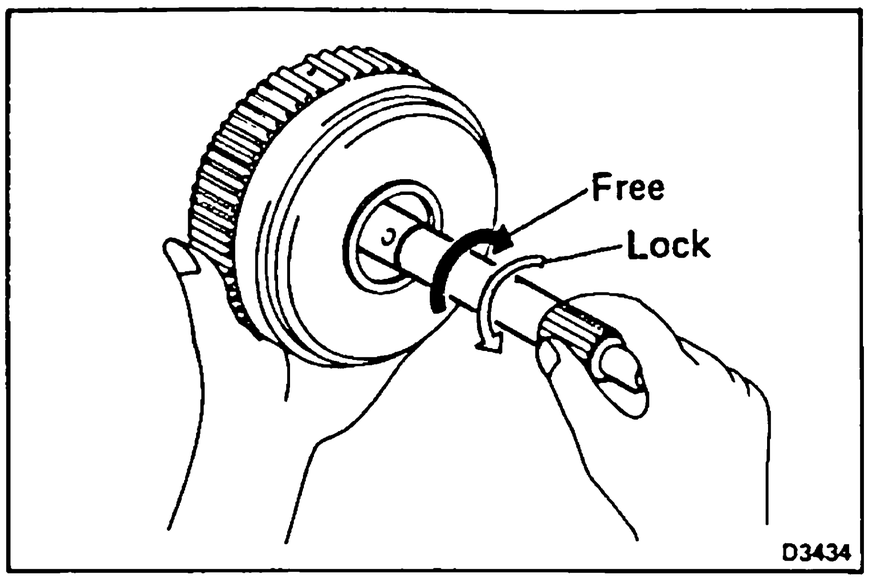
NOTE: Race and bearing diameter mm (in.)

	Inside	Outside
Race	28.5 (1.122)	48.0 (1.890)
Bearing	28.5 (1.122)	46.2 (1.819)



12. INSTALL OVERDRIVE DIRECT CLUTCH

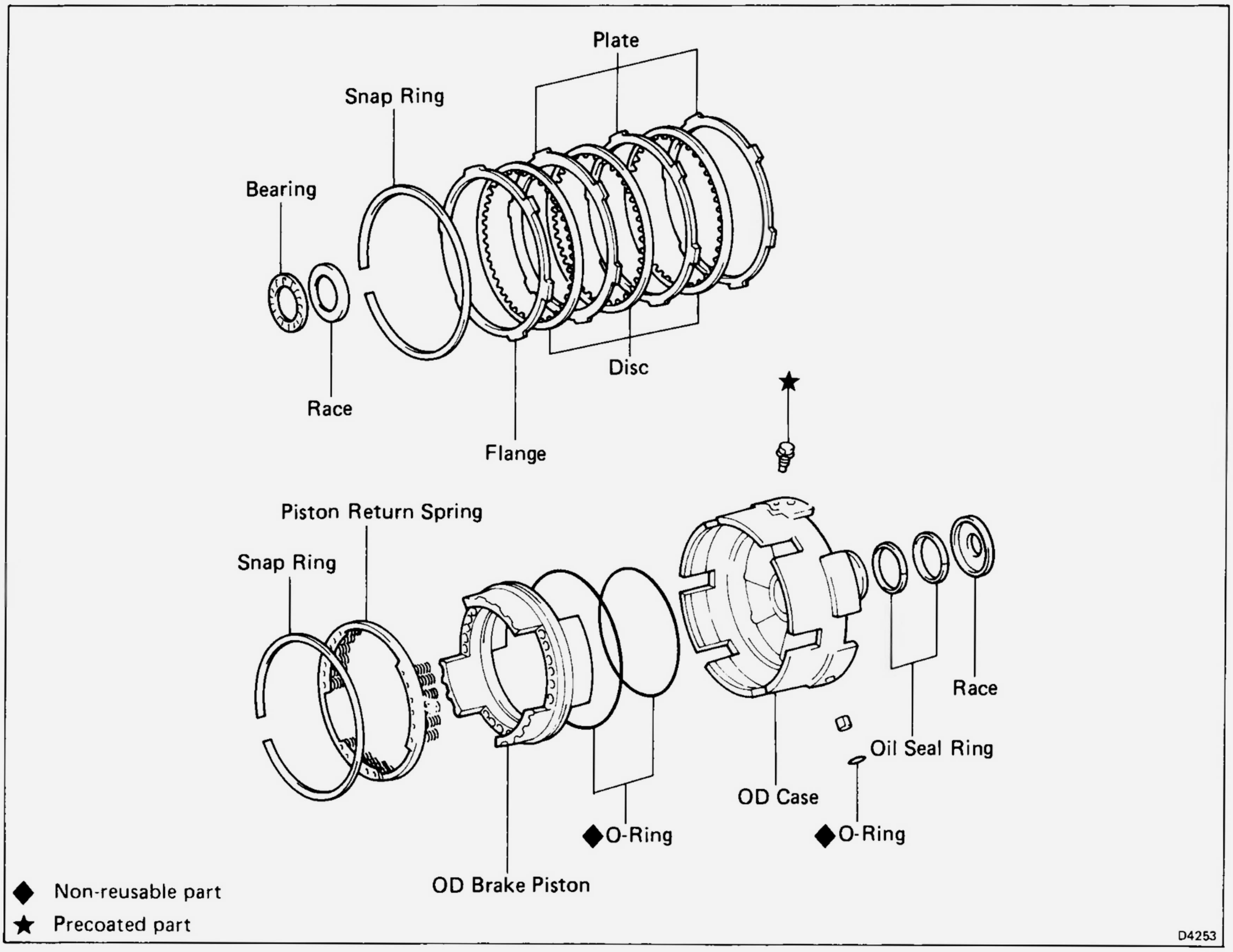
While pulling and turning the input shaft clockwise install the OD direct clutch assembly to the OD planetary gear.

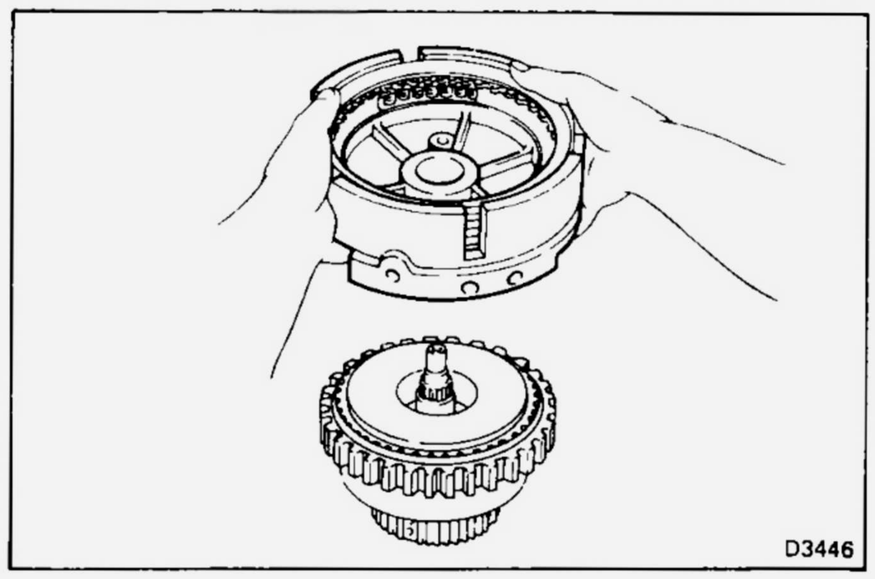


13. CHECK OPERATION OF ONE-WAY CLUTCH

Hold the OD direct clutch drum and turn the input shaft. The input shaft should freely turn clockwise and lock counterclockwise.

OVERDRIVE SUPPORT

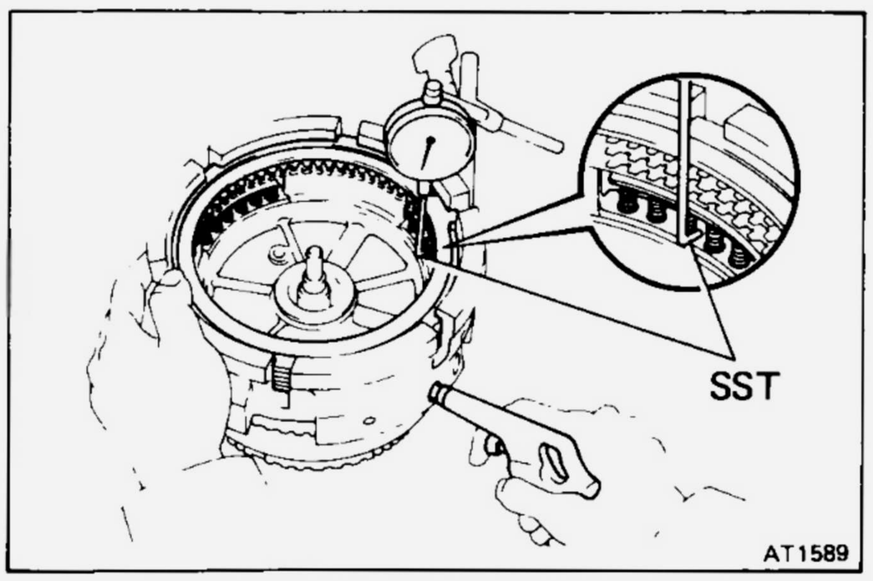




DISASSEMBLY OF OVERDRIVE SUPPORT

1. CHECK PISTON STROKE OF OVERDRIVE BRAKE (B_0)

(a) Place the OD case onto the front clutch.

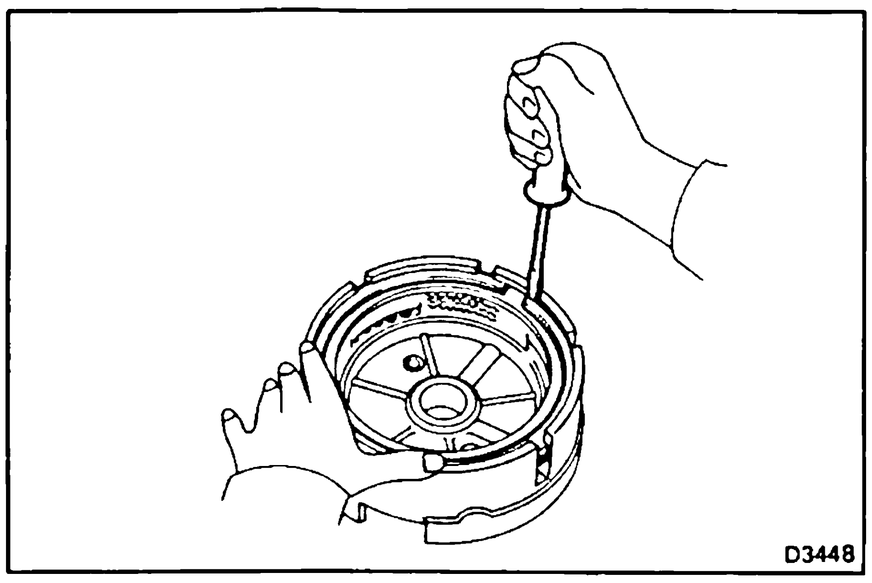


(b) Using SST and a dial indicator, measure the OD brake piston stroke, applying and releasing the compressed air (4–8 kg/cm², 57–114 psi or 392–785 kPa) as shown.

SST 09350-36010 (09350-06120)

Piston stroke: 1.25 – 1.85 mm (0.0492 – 0.0728 in.)

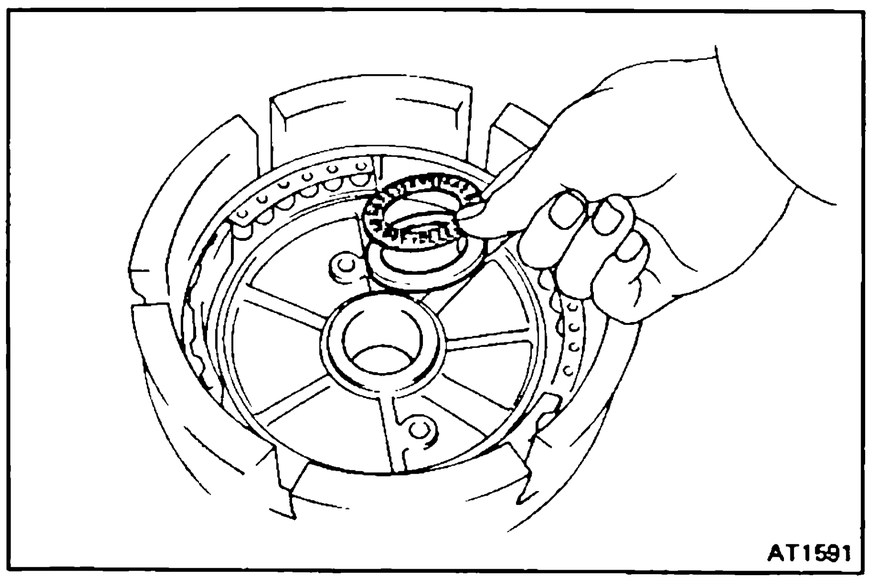
If the piston stroke exceeds the limit, replace the discs and recheck the piston stroke.



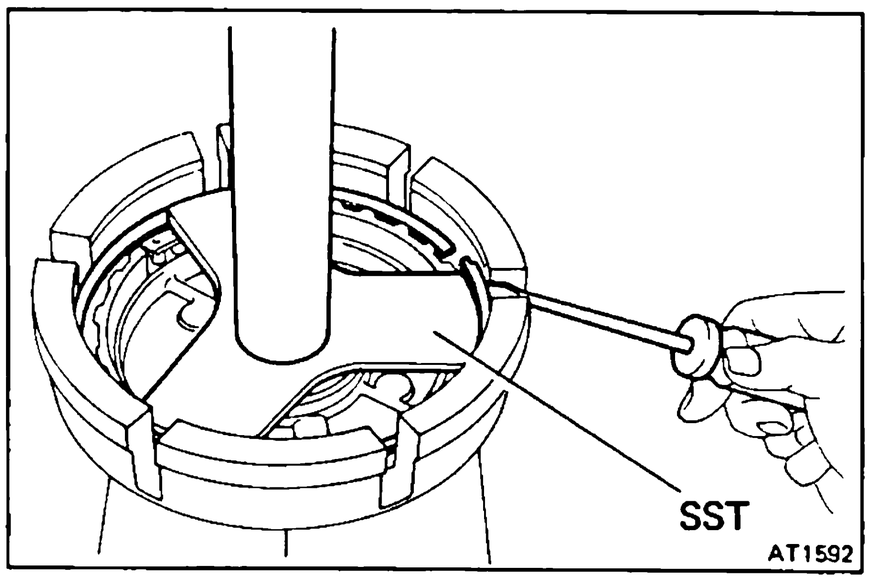
2. REMOVE SNAP RING, FLANGE, DISCS AND PLATES

(a) Remove the snap ring with a screwdriver.

(b) Remove the flange, discs and plates.



3. REMOVE BEARING AND RACE

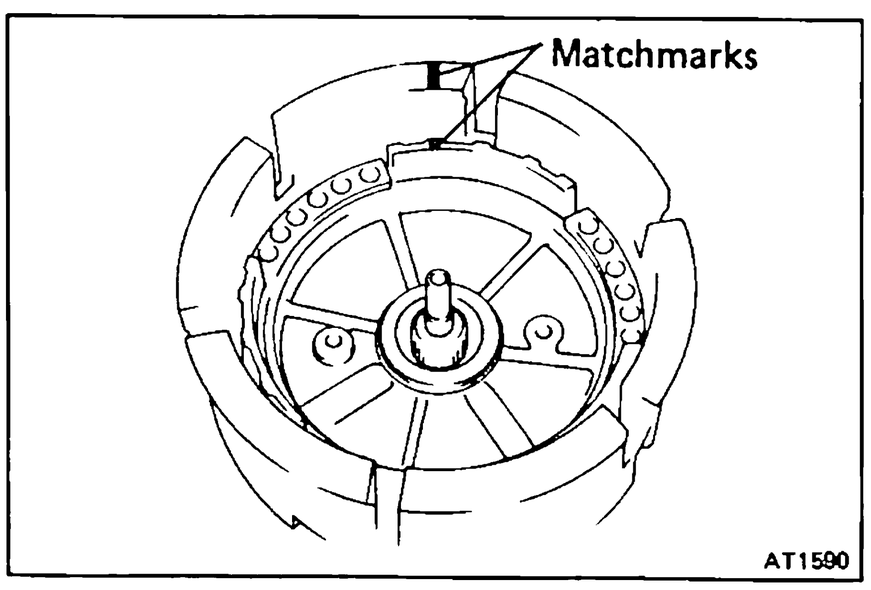


4. COMPRESS PISTON RETURN SPRING AND REMOVE SNAP RING

(a) Place SST on the spring retainer, and compress the return spring with a shop press.

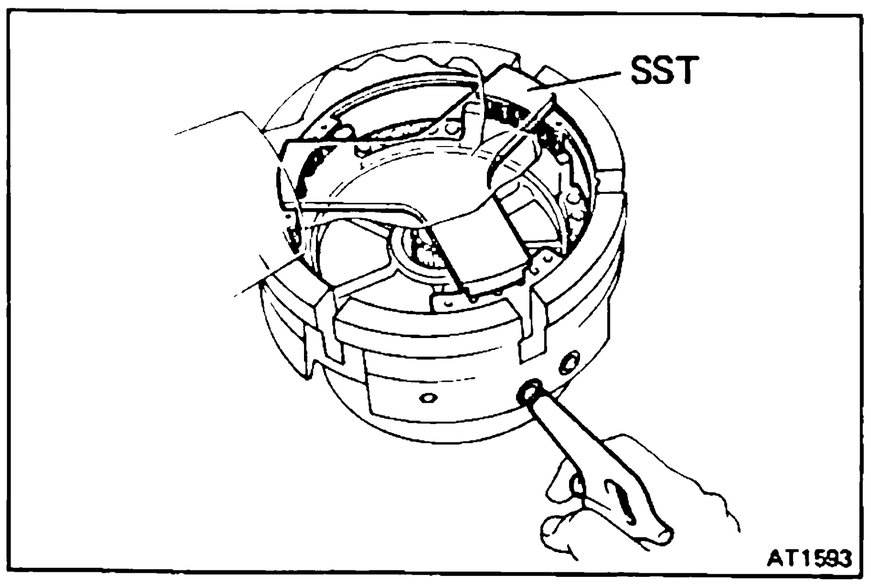
SST 09350-36010 (09350-06020)

(b) Remove the snap ring with a screwdriver.



5. REMOVE OVERDRIVE BRAKE PISTON

(a) Place the matchmarks on the OD brake piston and OD case.

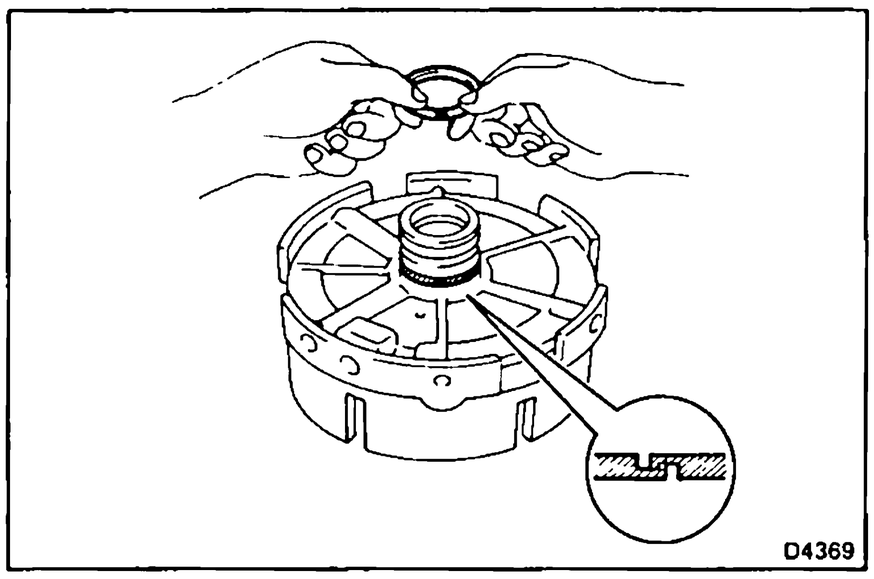


(b) Place the return spring on the OD brake piston and then place SST on the return spring.

(c) Hold SST so it is not slanted and apply compressed air into the passage to remove the OD brake piston.

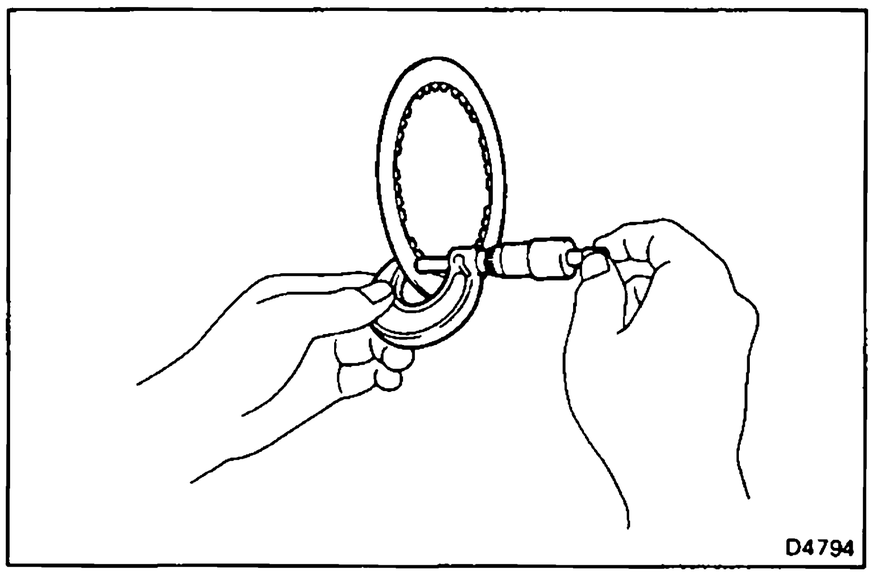
SST 09350-36010 (09350-06020)

(d) Remove the OD brake piston.



6. REMOVE TWO OIL SEAL RINGS

7. REMOVE THREE O-RINGS FROM OVERDRIVE CASE



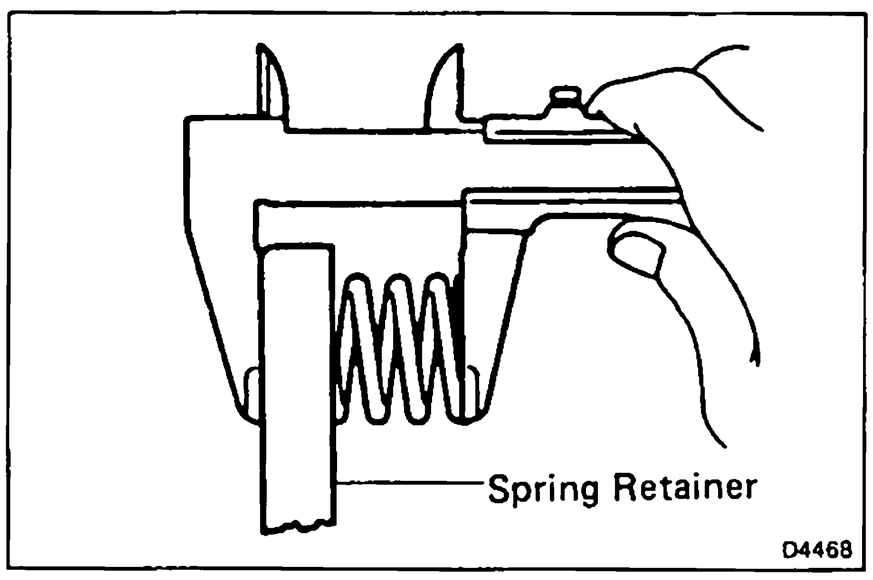
INSPECTION OF OVERDRIVE SUPPORT

1. CHECK DISCS

Using a micrometer, measure the thickness of the discs.

Minimum thickness: 1.9 mm (0.075 in.)

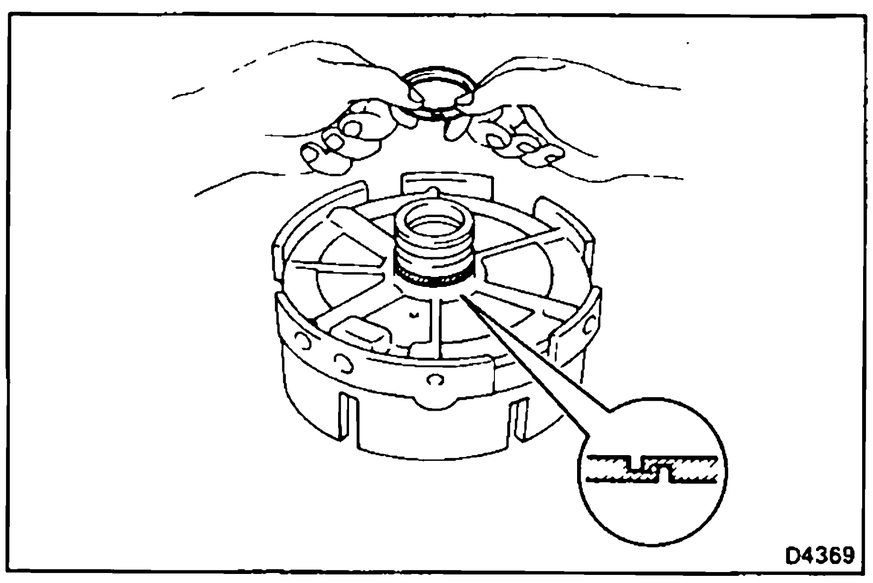
If the thickness is less than the minimum, replace the disc.



2. CHECK PISTON RETURN SPRING

Using calipers, measure the free length of the return spring.

Standard length: 22.75 mm (0.8957 in.)



ASSEMBLY OF OVERDRIVE SUPPORT

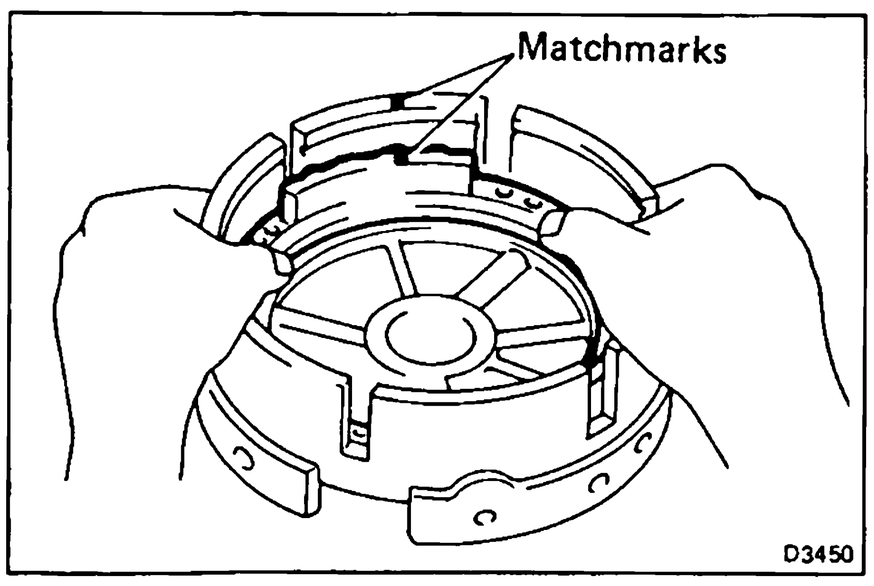
1. INSTALL TWO OIL SEAL RINGS

Coat the oil seal rings with ATF, contract them and install them onto the OD case.

CAUTION: Do not spread the ring ends too much.

2. INSTALL THREE NEW O-RINGS TO OVERDRIVE CASE

Coat new O-rings with ATF and install them to the OD case.



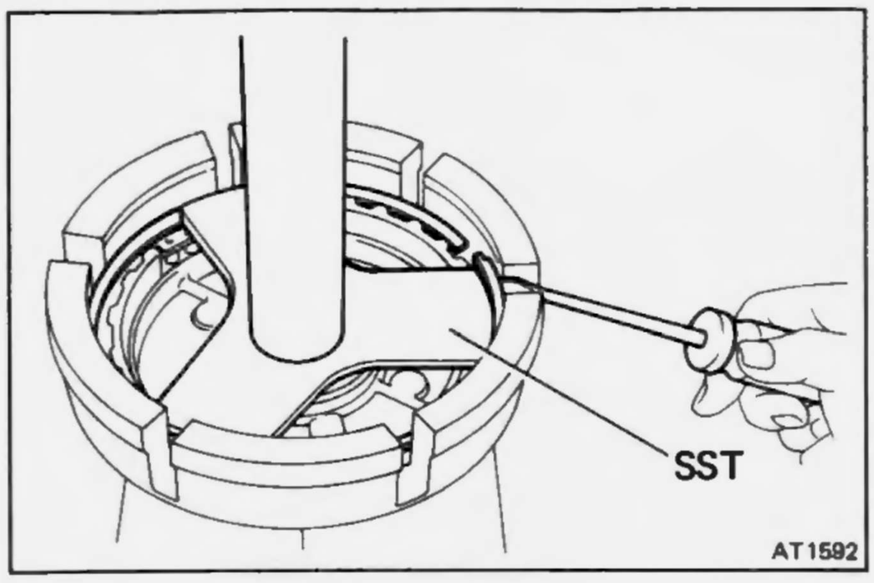
3. INSTALL NEW O-RINGS ON OVERDRIVE BRAKE PISTON

Coat new O-rings with ATF and install them on the OD brake piston.

4. INSTALL OVERDRIVE BRAKE PISTON

(a) Align the matchmarks on the piston and OD case.

(b) Being careful not to damage the O-rings, press in the brake piston into the OD case with both hands.



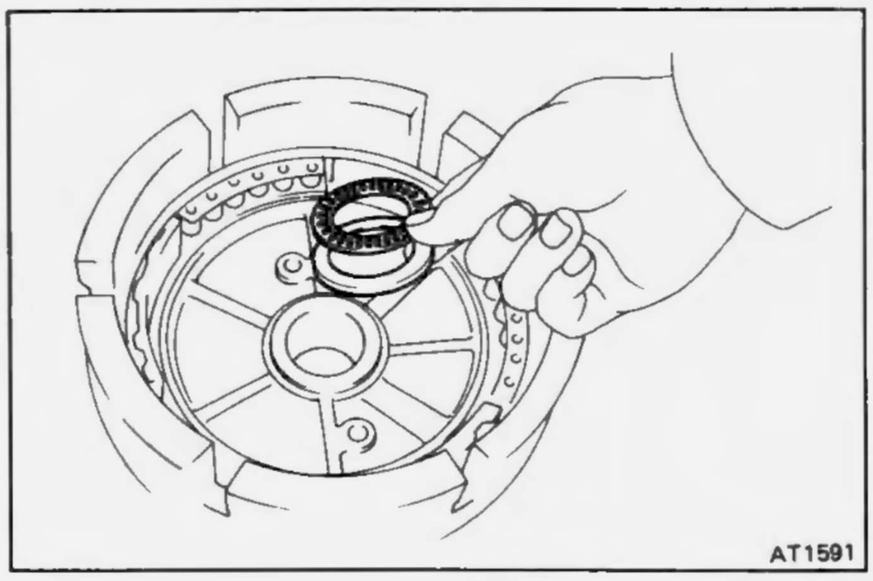
5. INSTALL PISTON RETURN SPRING

6. COMPRESS PISTON RETURN SPRING AND INSTALL SNAP RING IN GROOVE

(a) Place SST on the spring retainer, and compress the return spring with a shop press.

SST 09350-36010 (09350-06020)

(b) Install the snap ring with a screwdriver. Be sure the end gap of the snap ring is not aligned with the cut-out portion of the OD case.

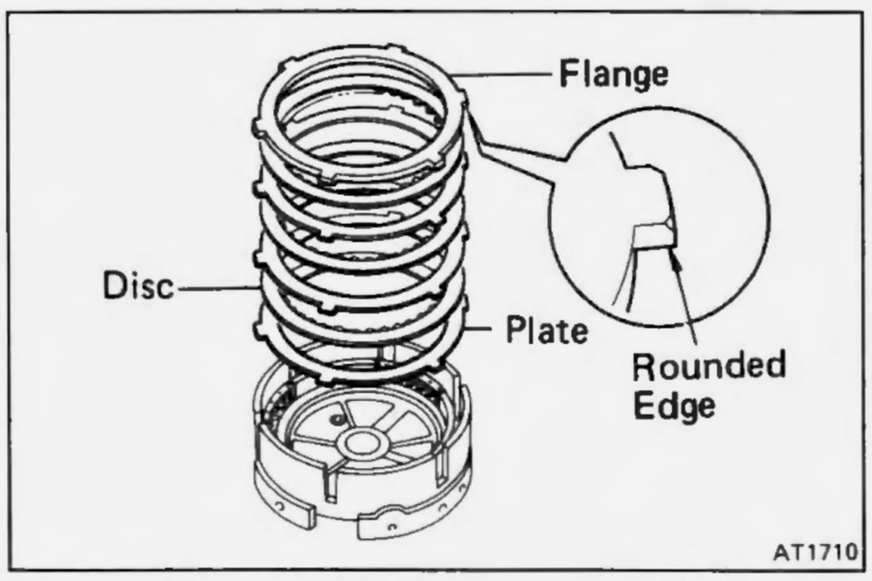


7. INSTALL RACE AND BEARING

Coat the race and bearing with petroleum jelly and install them onto the OD case.

NOTE: Race and bearing diameter mm (in.)

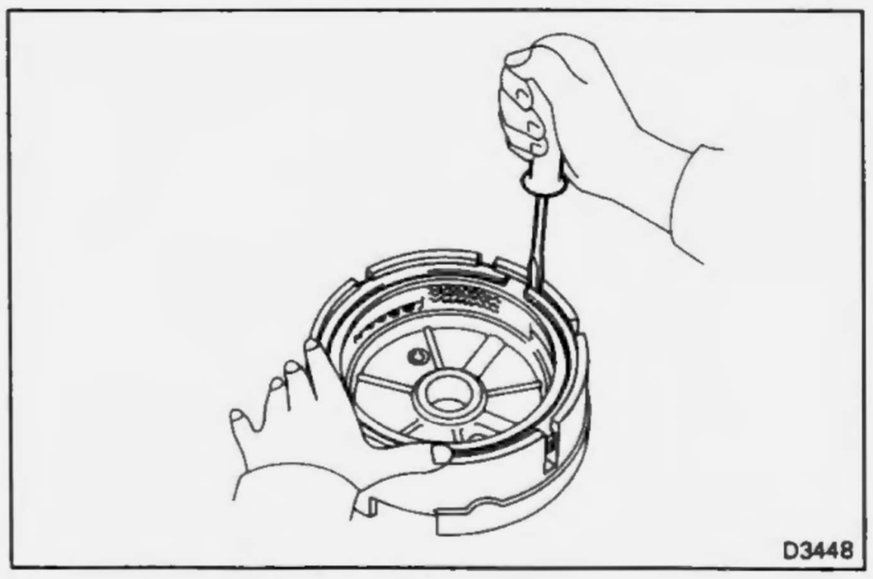
	Inside	Outside
Race	37.0 (1.457)	52.0 (2.047)
Bearing	34.7 (1.366)	52.0 (2.047)



8. INSTALL PLATES, DISCS AND FLANGE

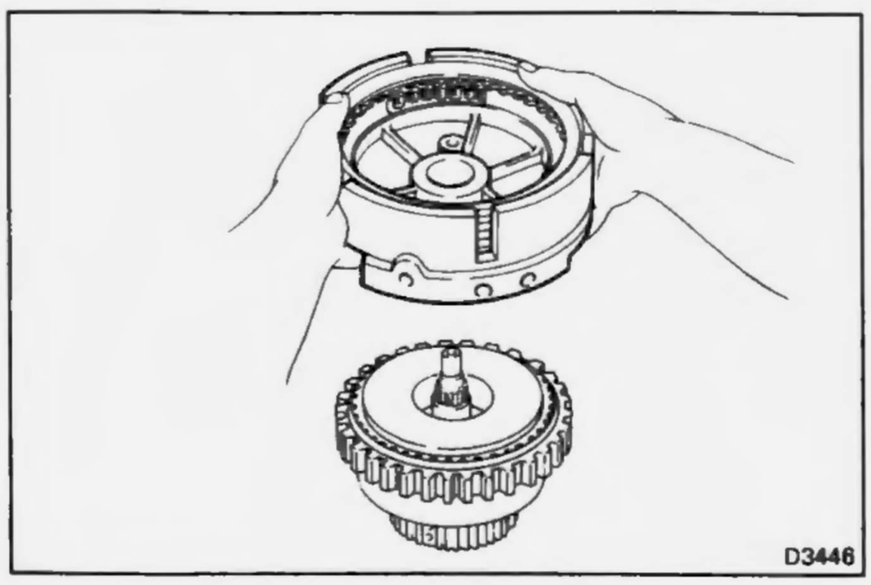
(a) Install in order: P—D—P—D—P—D

(b) Install the flange, facing the rounded edge downward.



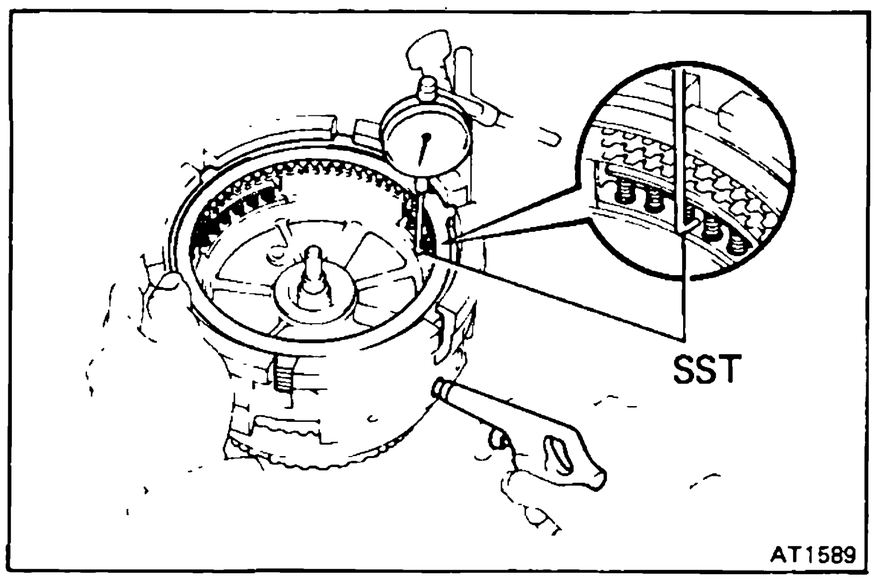
9. INSTALL SNAP RING

NOTE: Be sure the end gap of the snap ring is not aligned the cutout portion of the OD case.



10. CHECK PISTON STROKE OF OVERDRIVE BRAKE (B_O)

(a) Place the OD case onto the front clutch.



(b) Using SST and a dial indicator, measure the OD brake piston stroke, applying and releasing the compressed air (4–8 kg/cm², 57–114 psi or 392–785 kPa) as shown.

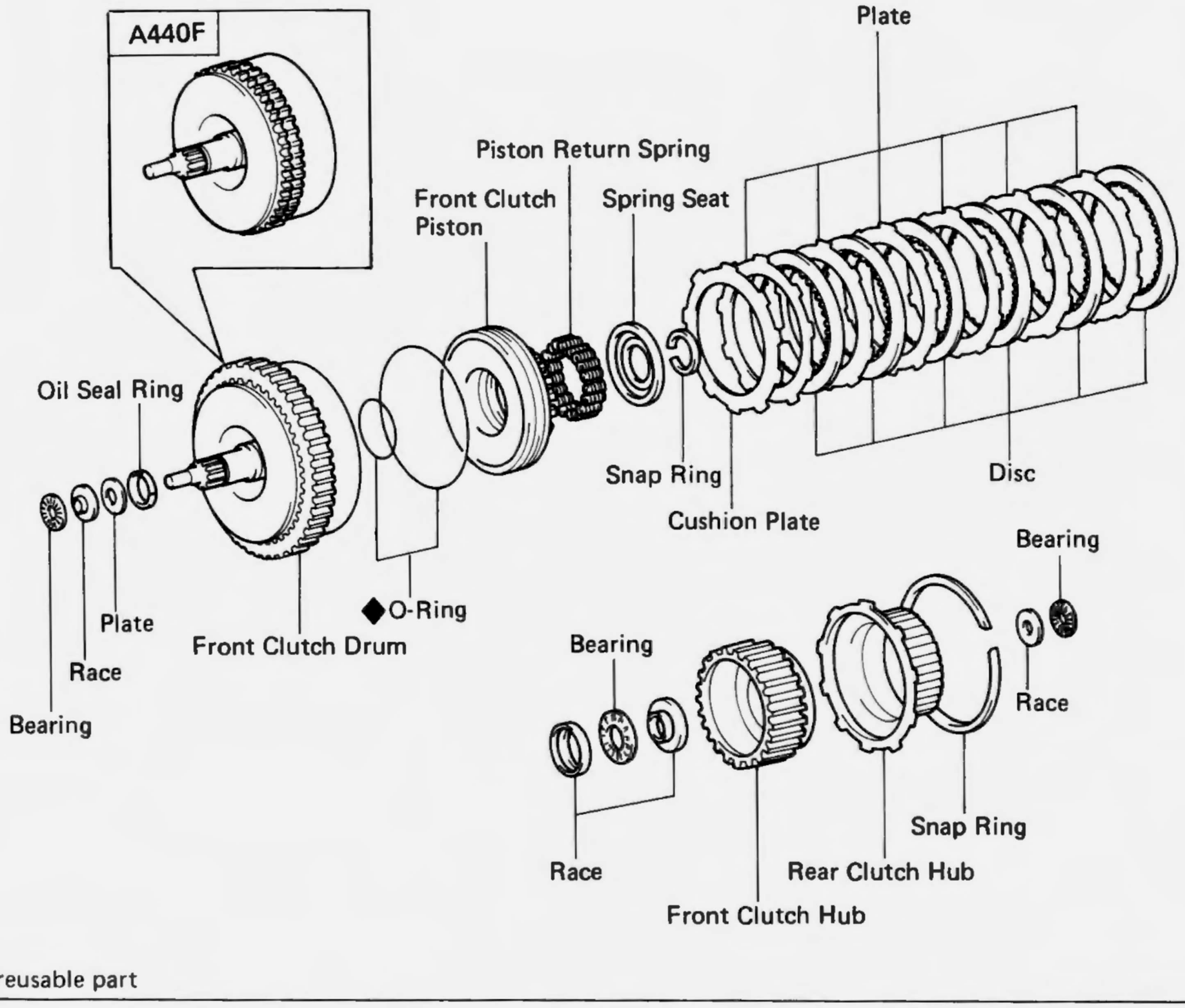
SST 09350-36010 (09350-06120)

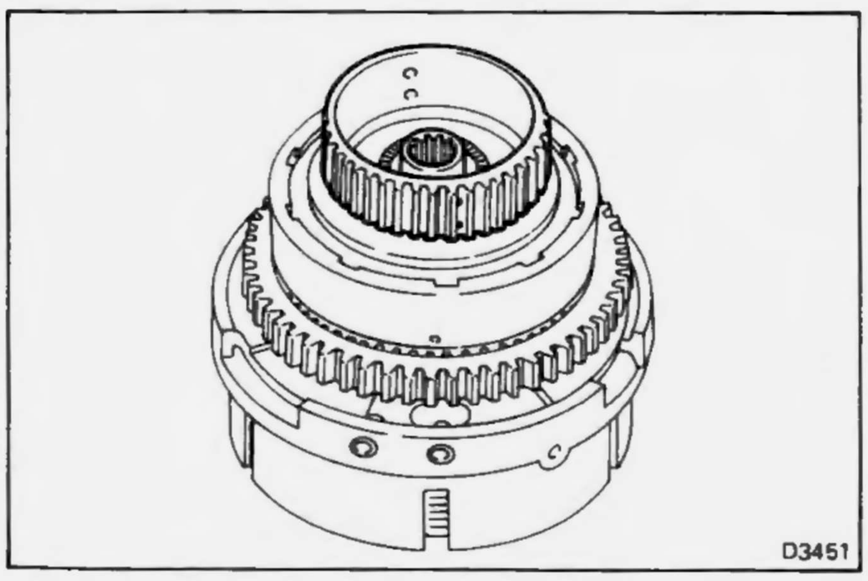
Piston stroke: 1.25 – 1.85 mm (0.0492 – 0.0728 in.)

If the piston stroke exceeds the limit, replace the discs and recheck the piston stroke.

If the stroke is less than the limit, parts may be improperly assembled and require reassembly.

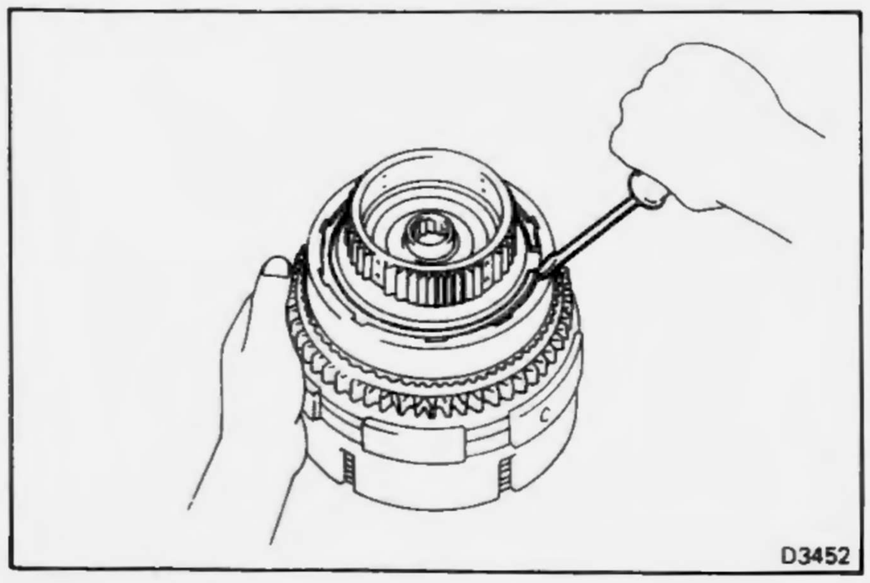
FRONT CLUTCH (C_1)



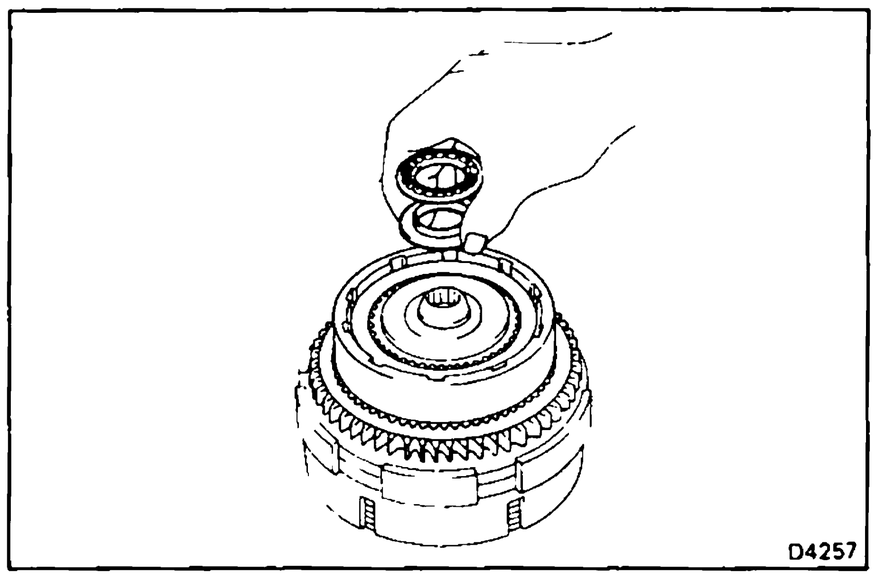


DISASSEMBLY OF FRONT CLUTCH

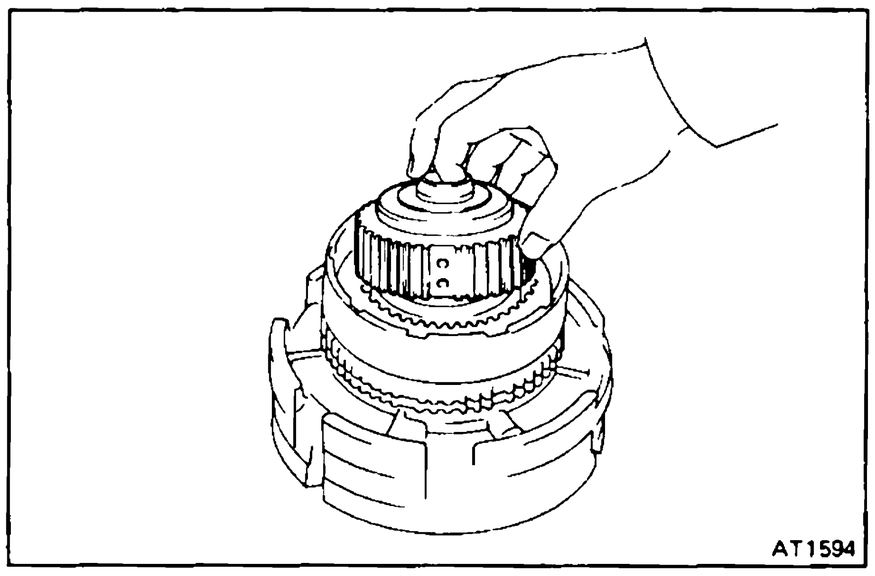
1. PLACE FRONT CLUTCH ASSEMBLY ONTO OVER-DRIVE CASE



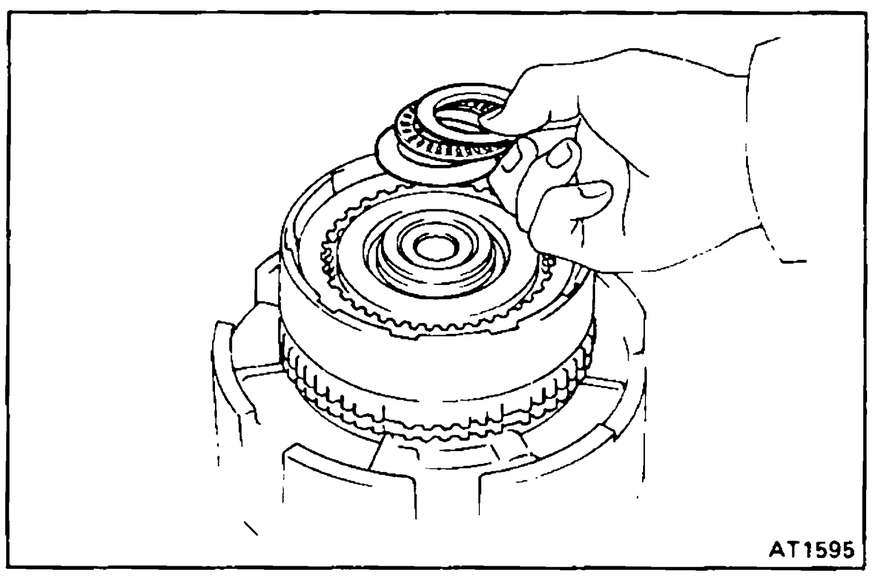
2. REMOVE REAR CLUTCH HUB
   (a) Remove the snap ring with a screwdriver.
   (b) Remove the rear clutch hub from the front clutch drum.



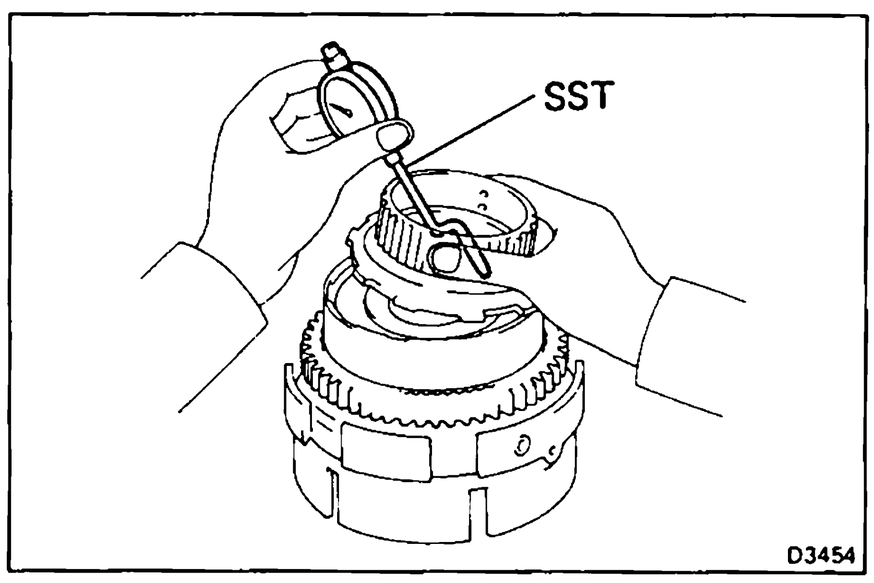
3. REMOVE BEARING AND RACE



4. REMOVE FRONT CLUTCH HUB FROM FRONT CLUTCH DRUM



5. REMOVE RACES AND BEARING FROM FRONT CLUTCH DRUM

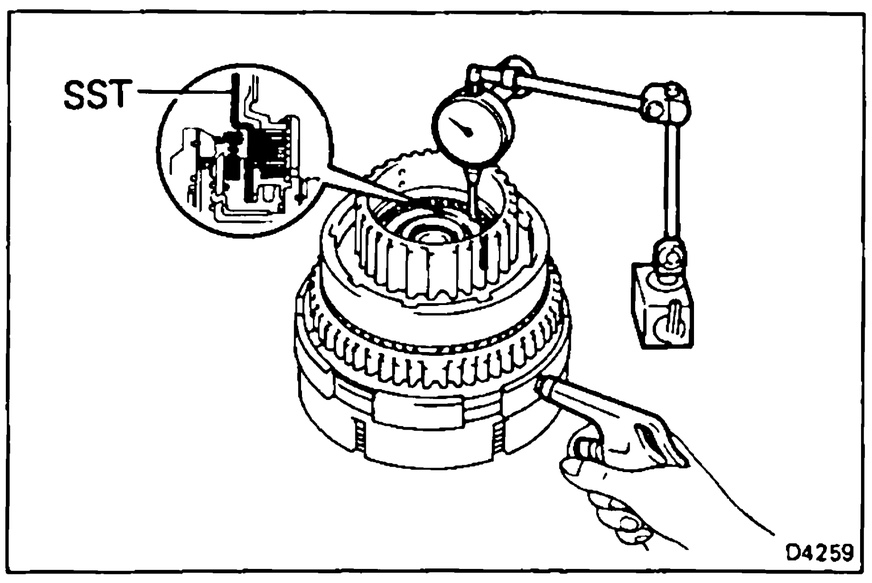


6. CHECK PISTON STROKE OF FRONT CLUTCH (C_1)

(a) Lift up the rear clutch hub and place the assembled SST and dial indicator.

SST 09350-36010 (09350-06110)

(b) Install the rear clutch hub and snap ring.



(c) Using SST and a dial indicator, measure the front clutch piston stroke, applying and releasing the compressed air (4–8 kg/cm², 57–114 psi or 392–785 kPa) as shown.

SST 09350-36010 (09350-06110)

Piston stroke: 3.93 – 4.23 mm (0.1547 – 0.1665 in.)

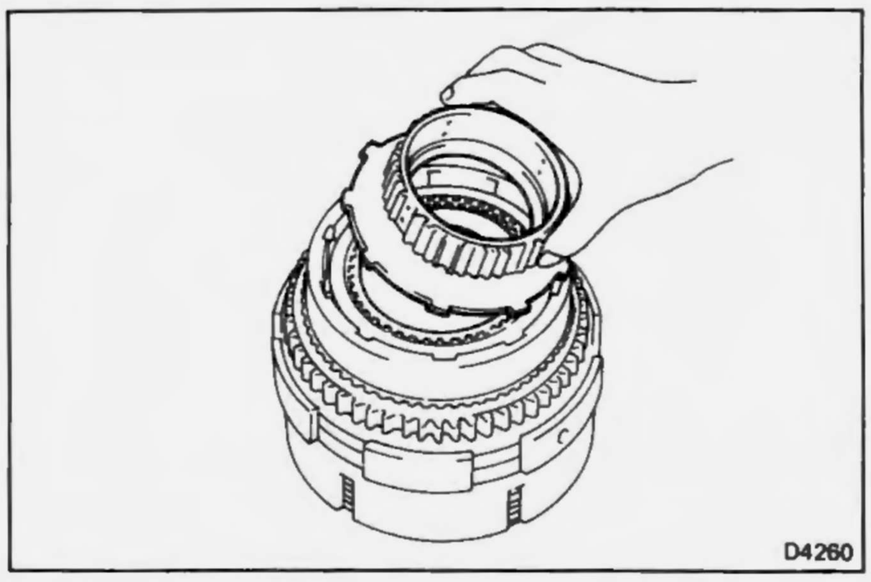
If the piston stroke exceeds the limit, replace the discs and recheck the piston stroke.

If the piston stroke is nonstandard, select another plate.

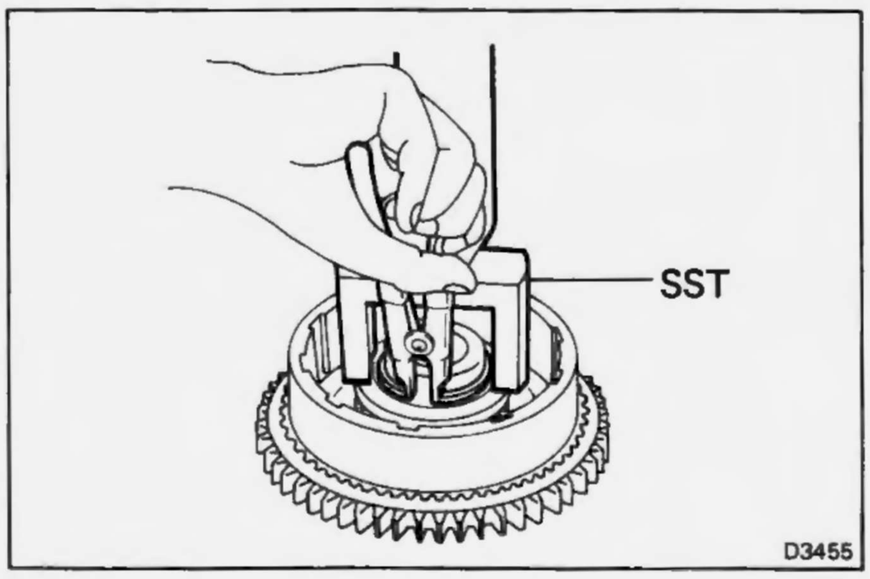
NOTE: There are four plates.

mm (in.)

Thickness	
1.8 (0.071)	2.2 (0.0866)
2.0 (0.079)	2.4 (0.0945)



7. **REMOVE REAR CLUTCH HUB, DISCS, PLATES AND CUSHION PLATE**
   (a) Remove the snap ring with a screwdriver.
   (b) Remove the rear clutch hub, discs and plates.
   (c) Remove the cushion plate.

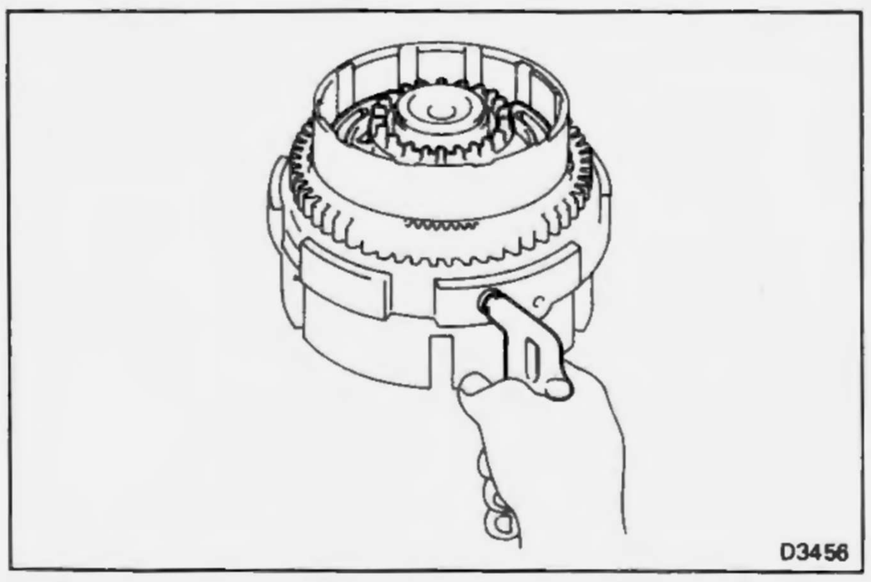


8. **COMPRESS PISTON RETURN SPRINGS AND REMOVE SNAP RING**
   (a) Place SST on the spring seat, and compress the return springs with a shop press.

   SST 09350-36010 (09350-06010)

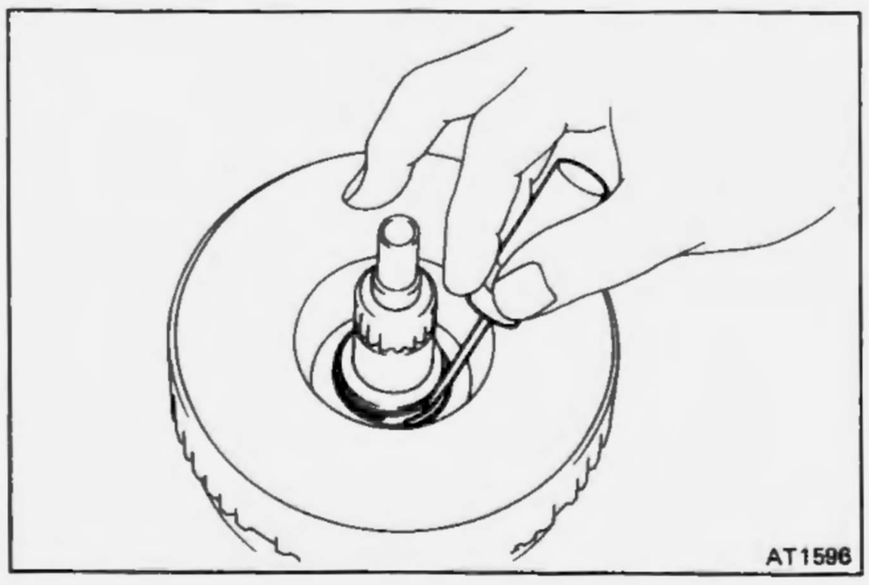
   (b) Remove the snap ring with snap ring pliers.

9. **REMOVE SPRING SEAT AND TWENTY-TWO RETURN SPRINGS**

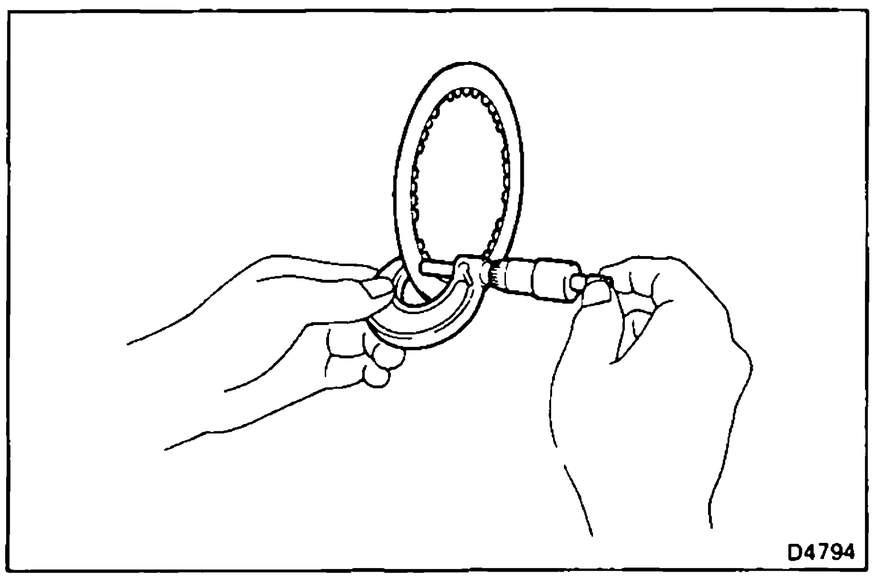


10. **REMOVE FRONT CLUTCH PISTON**
    (a) Holding the front clutch piston so it is not slanted, apply compressed air into the passage to remove the front clutch piston.
    (b) Remove the front clutch piston.

11. **REMOVE O-RINGS FROM FRONT CLUTCH PISTON**



12. **REMOVE OIL SEAL RING WITH SCREWDRIVER**



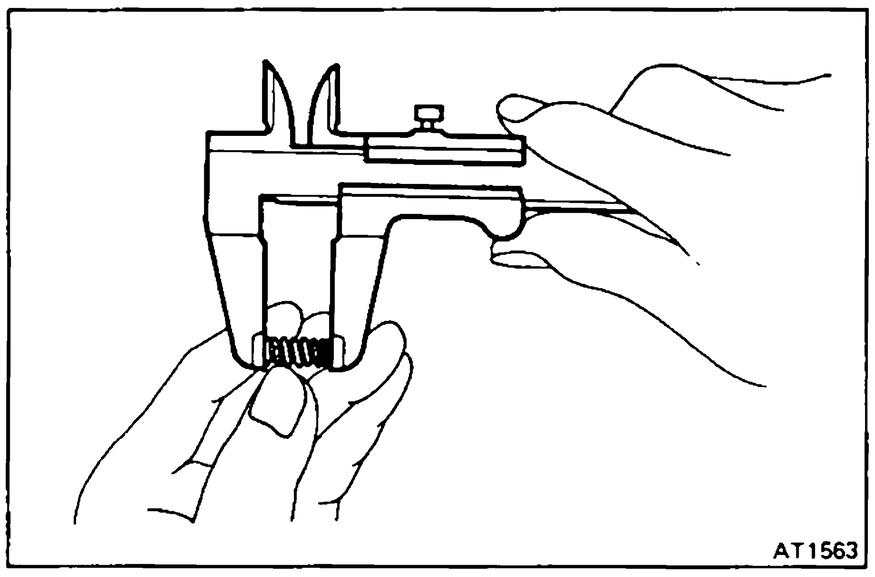
INSPECTION OF FRONT CLUTCH

1. CHECK DISCS

Using a micrometer, measure the thickness of the discs.

Minimum thickness: 1.9 mm (0.075 in.)

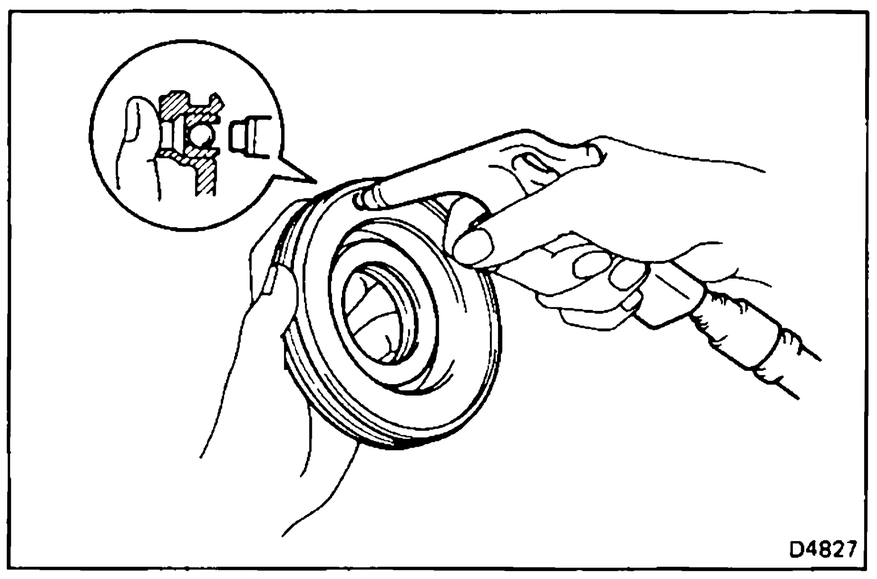
If the thickness is less than the minimum, replace the disc.



2. CHECK PISTON RETURN SPRINGS

Using calipers, measure the free length of the return springs.

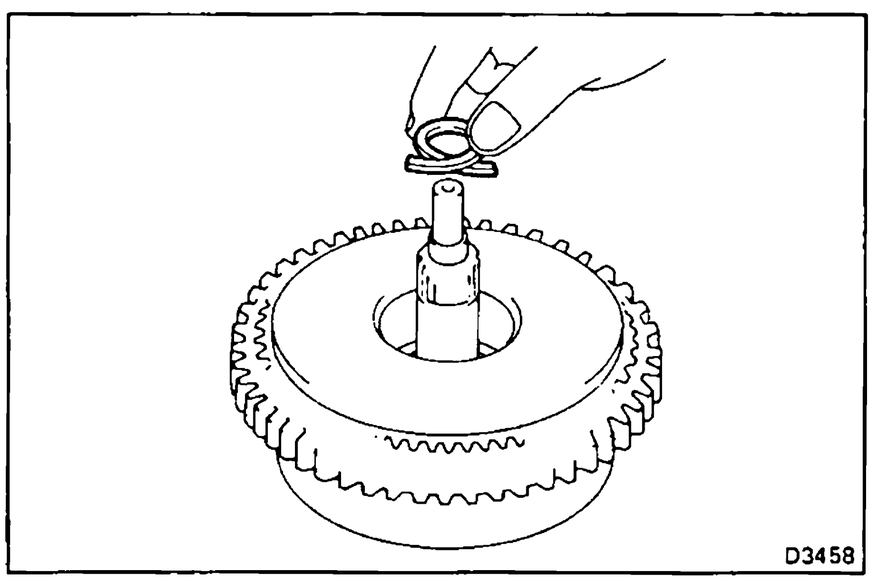
Standard length: 30.5 mm (1.201 in.)



3. CHECK FRONT CLUTCH PISTON

(a) Check that check ball is free by shaking the piston.

(b) Check that the valve does not leak by applying low-pressure compressed air.

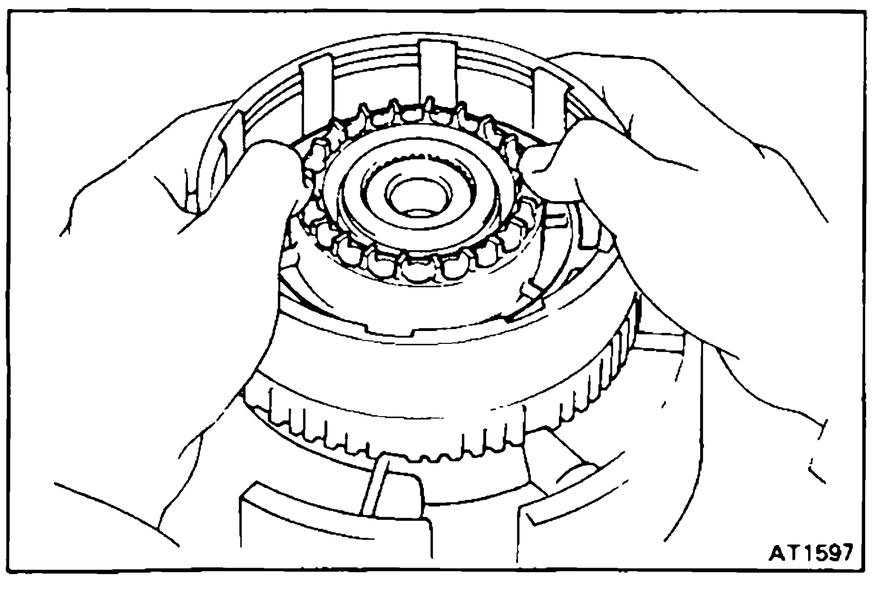


ASSEMBLY OF FRONT CLUTCH

1. INSTALL OIL SEAL RING

(a) Coat the oil seal ring with ATF.

(b) Contract the oil seal ring and install it to the input shaft.

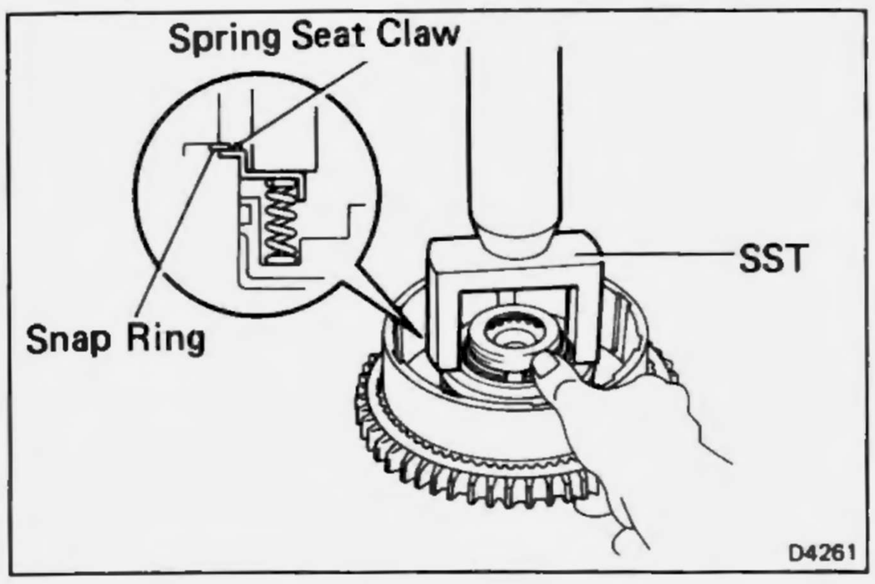


2. INSTALL TWO NEW O-RINGS ON FRONT CLUTCH PISTON

Coat new O-rings with ATF and install them on the front clutch piston.

3. INSTALL FRONT CLUTCH PISTON

Being careful not to damage the O-rings, press in the clutch piston into the front clutch drum by both hands.



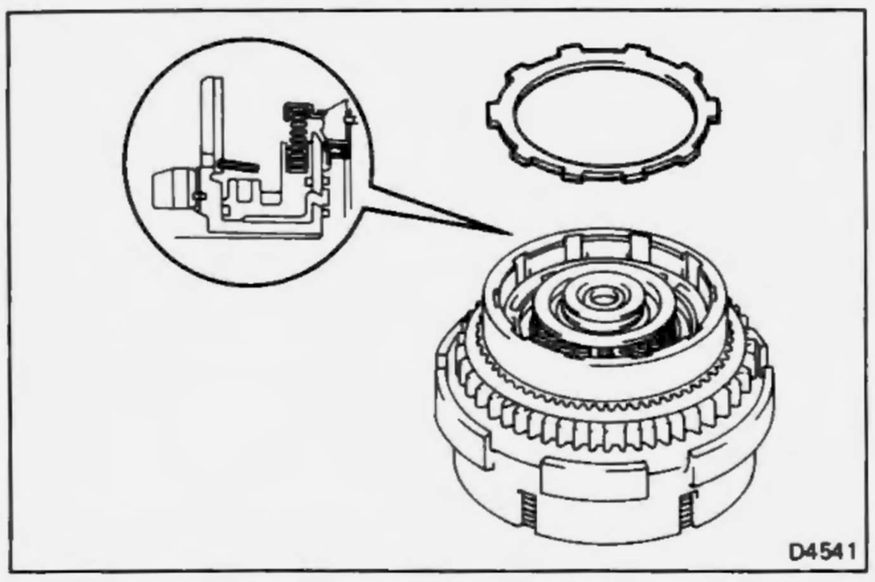
4. INSTALL TWENTY-TWO PISTON RETURN SPRINGS AND SPRING SEAT

5. COMPRESS PISTON RETURN SPRINGS AND INSTALL SNAP RING IN GROOVE

(a) Place SST on the spring seat, and compress the return springs with a shop press.

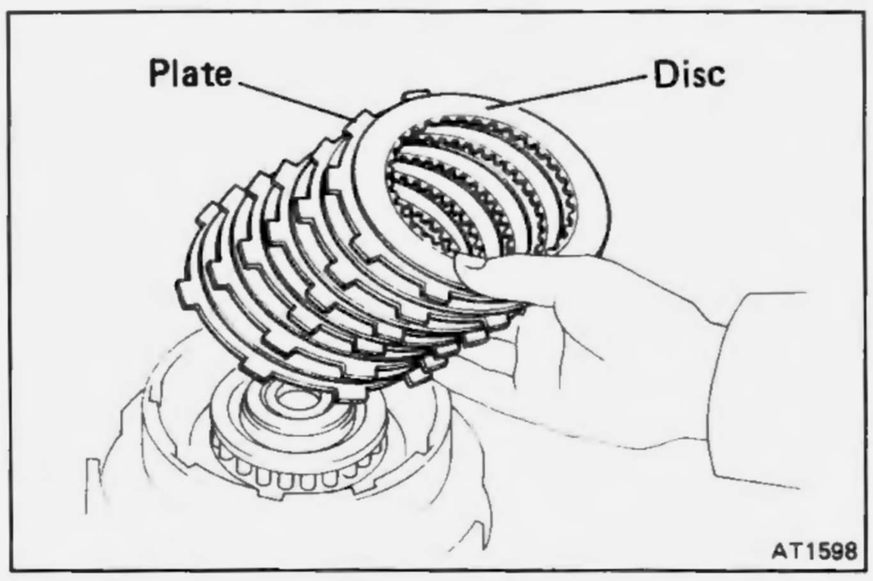
SST 09350-36010 (09350-06010)

(b) Install the snap ring by hand. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



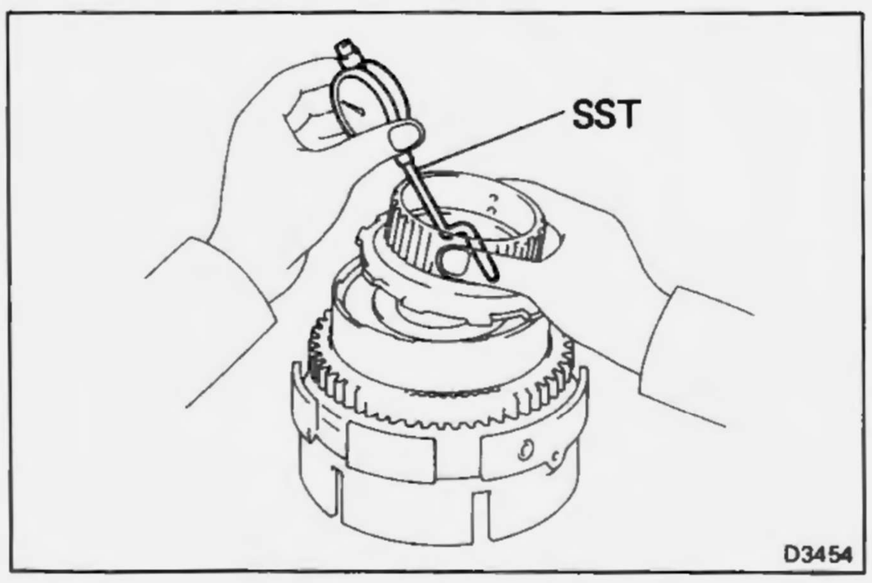
6. INSTALL CUSHION PLATE

Install the cushion plate rounded end down.



7. INSTALL PLATES AND DISCS

Install in order: P–D–P–D–P–D–P–D–P–D–P–D

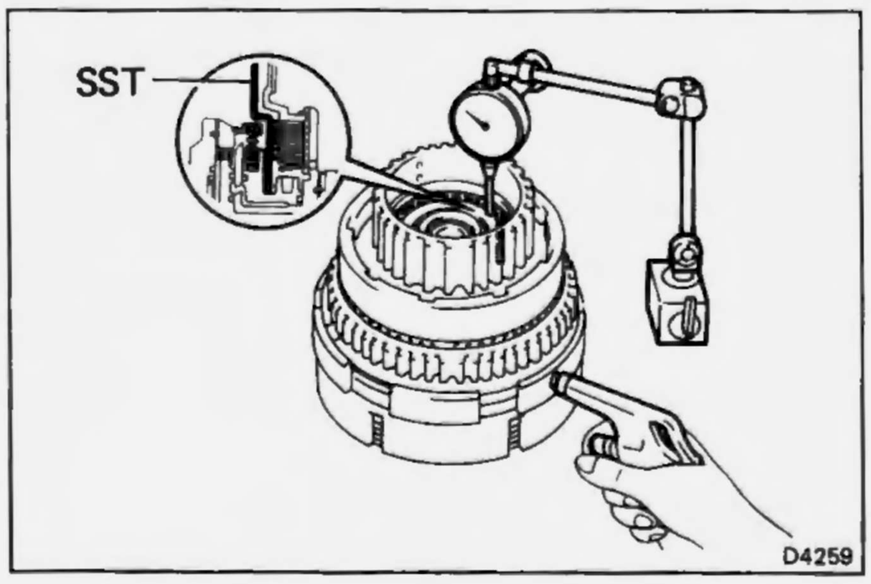


8. CHECK PISTON STROKE OF FRONT CLUTCH (C_1)

(a) Lift up the rear clutch hub and position the assembled SST and dial indicator.

SST 09350-36010 (09350-06110)

(b) Install the rear clutch hub and snap ring.

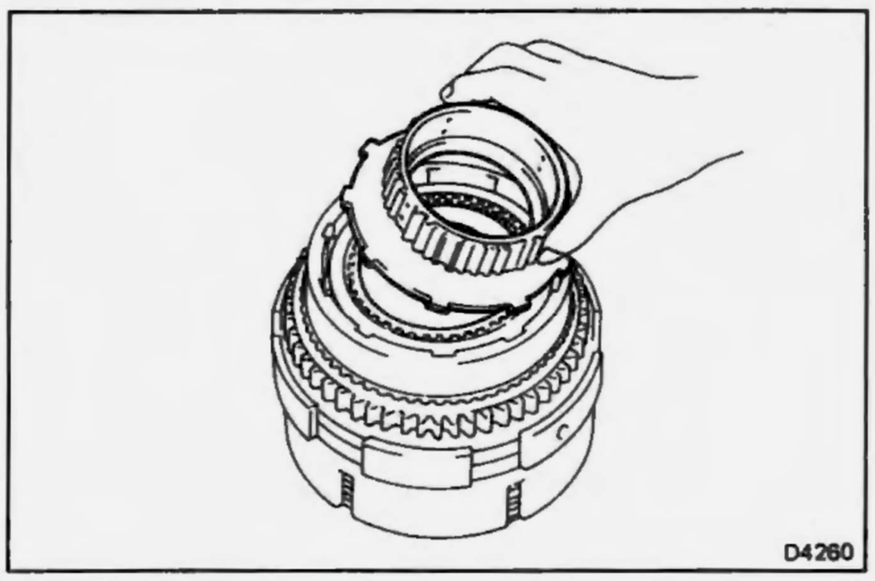


(c) Using SST and a dial indicator, measure the front clutch piston strokes, applying and releasing the compressed air (4–8 kg/cm², 57–114 psi or 392–785 kPa) as shown.

SST 09350-36010 (09350-06110)

Piston stroke: 3.93 – 4.23 mm (0.1547 – 0.1665 in.)

If the piston stroke exceeds the limit, replace the discs and recheck the piston stroke.

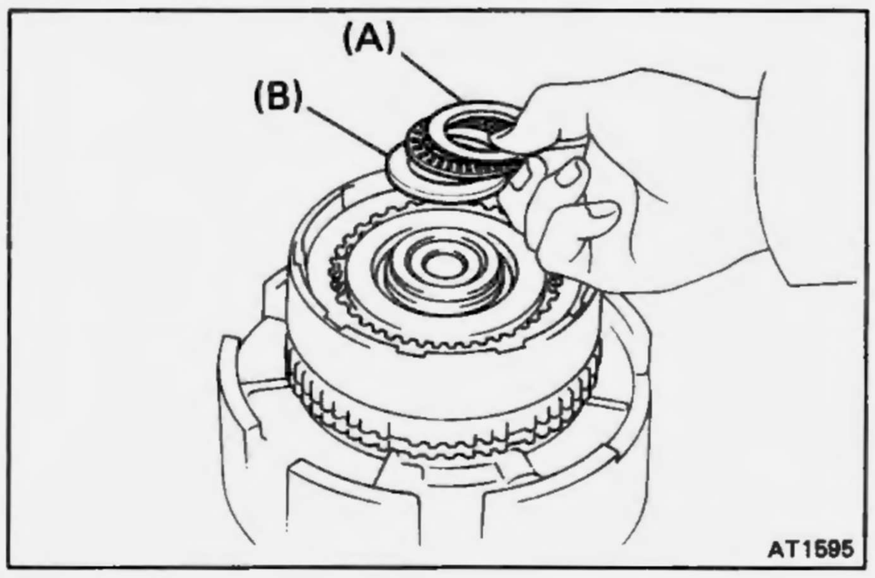


If the piston stroke is nonstandard, select another plate.

NOTE: There are four plates. mm (in.)

Thickness	
1.8 (0.071)	2.2 (0.0866)
2.0 (0.079)	2.4 (0.0945)

(d) Remove the snap ring and rear clutch hub.

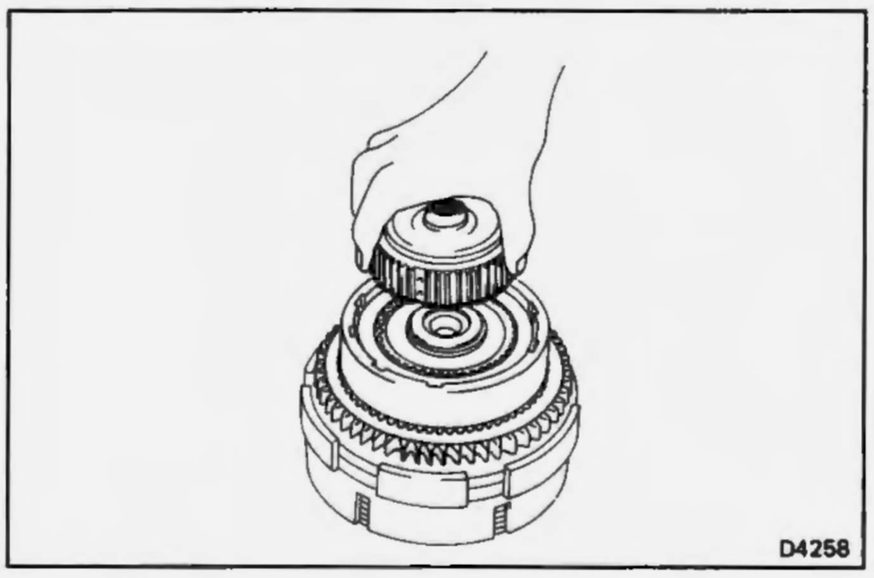


9. INSTALL RACES AND BEARING

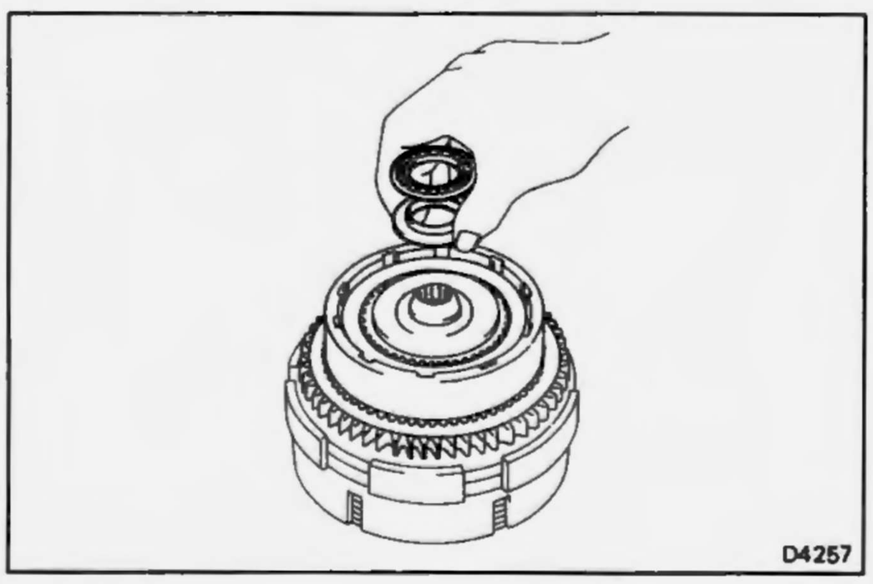
Coat the races and bearing with petroleum jelly and install them onto the front clutch drum.

NOTE: Races and bearing diameter. mm (in.)

	Inside	Outside
Race (A)	32.8 (1.291)	50.4 (1.984)
Bearing	34.7 (1.366)	52.0 (2.047)
Race (B)	37.0 (1.457)	52.0 (2.047)



10. INSTALL FRONT CLUTCH HUB

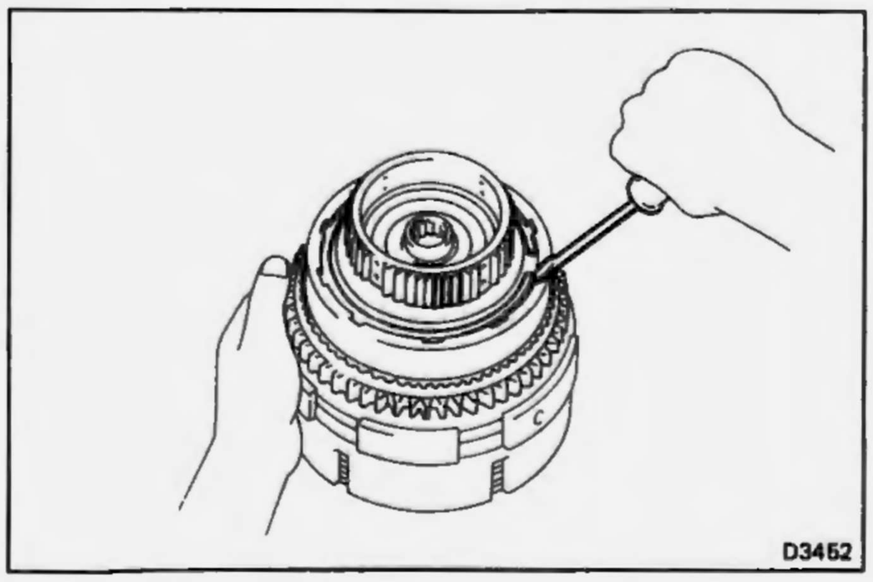


11. INSTALL RACE AND BEARING

Coat the race and bearing with petroleum jelly and install them onto the front clutch hub.

NOTE: Race and bearing diameter. mm (in.)

	Inside	Outside
Race	32.8 (1.291)	50.4 (1.984)
Bearing	34.7 (1.366)	52.0 (2.047)

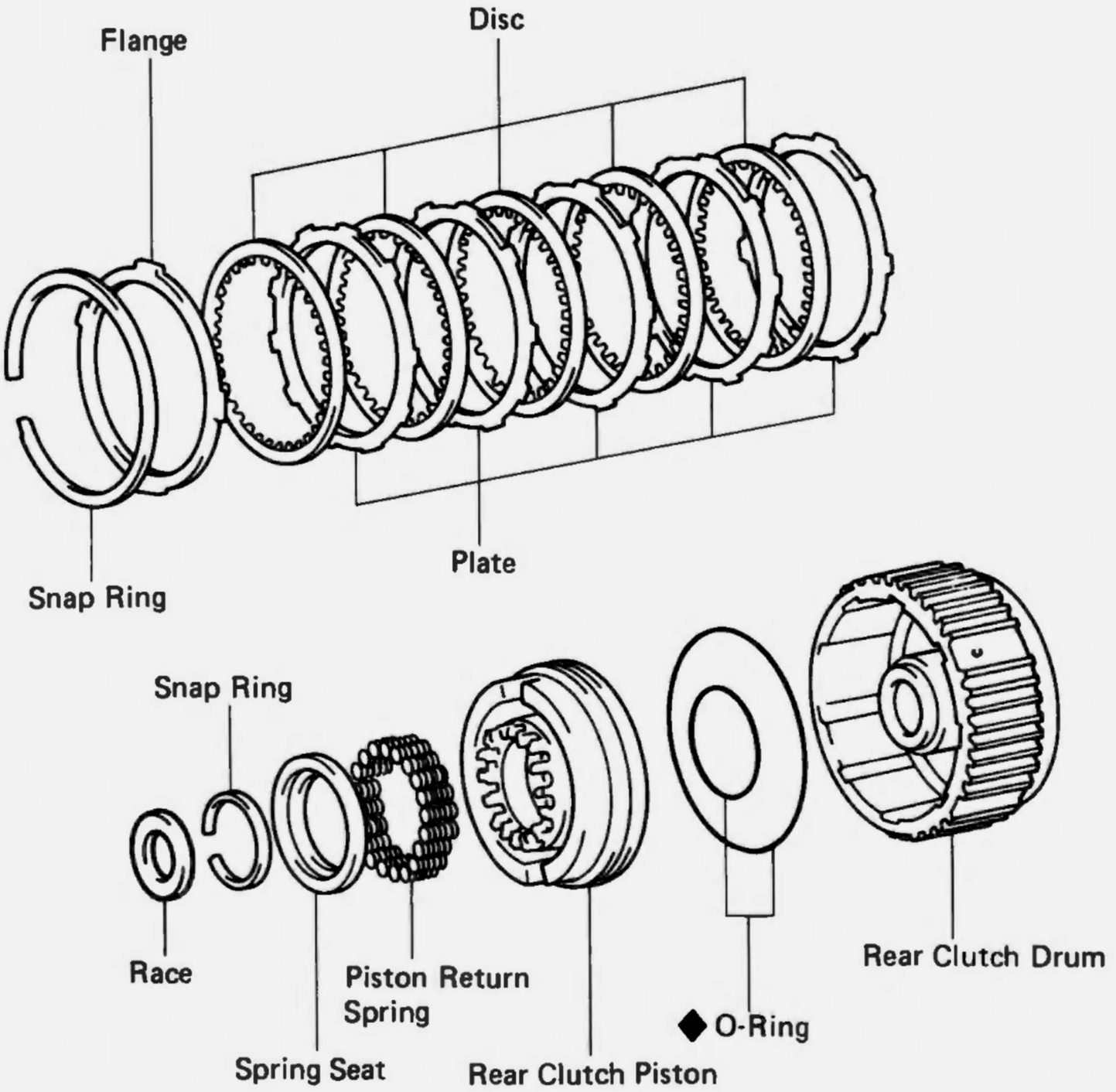


12. INSTALL REAR CLUTCH HUB

(a) Install the rear clutch hub onto the front clutch drum.

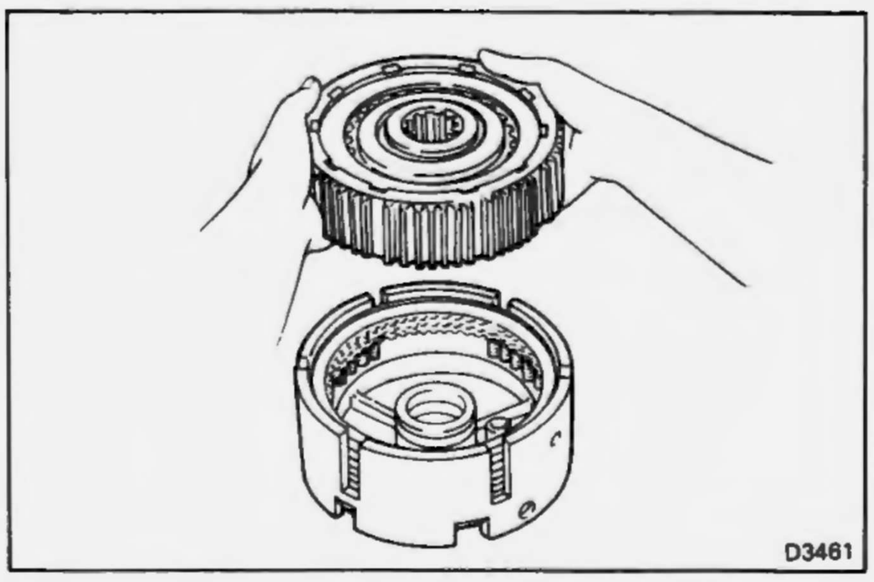
(b) Install the snap ring with a screwdriver.

REAR CLUTCH (C_2)



◆ Non-reusable part

D4262

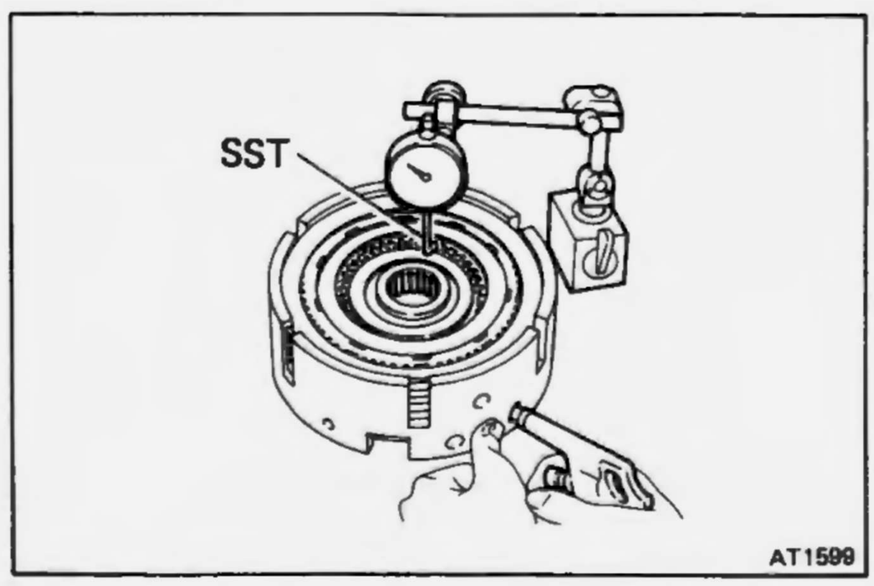


D3461

DISASSEMBLY OF REAR CLUTCH

1. CHECK PISTON STROKE OF FRONT CLUTCH (C_1)

(a) Place rear clutch drum into the center support.



AT1599

(b) Using SST and a dial indicator, measure the rear clutch piston stroke, applying and releasing the compressed air (4–8 kg/cm², 57–114 psi or 392–785 kPa) as shown.

SST 09350-36010 (09350-06110)

Piston stroke: 1.70 – 1.90 mm (0.0669 – 0.0748 in.)

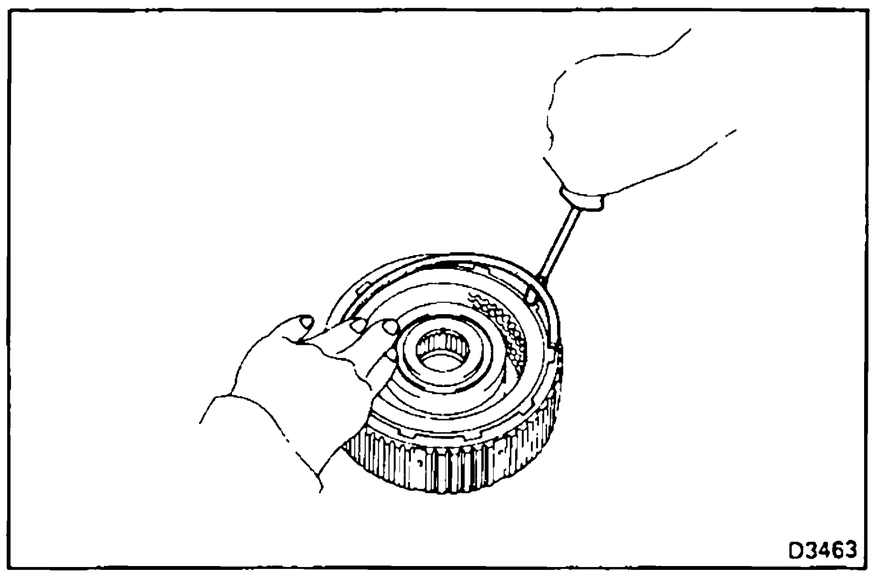
If the piston stroke exceeds the limit, replace the discs and recheck the piston stroke.

If the piston stroke is nonstandard, select another flange.

NOTE: There are four flanges.

mm (in.)

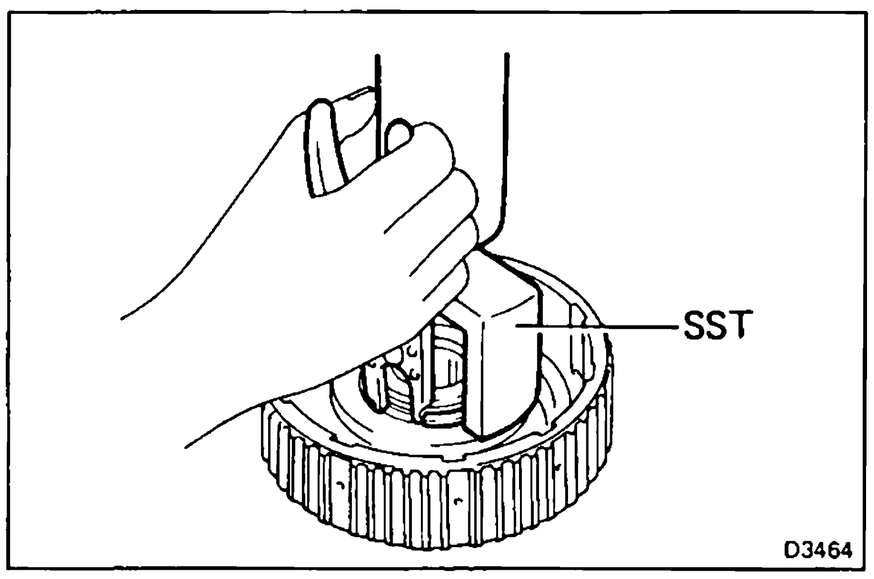
No.	Thickness	No.	Thickness
None	5.0 (0.197)	2	5.4 (0.213)
1	5.2 (0.205)	3	5.6 (0.220)



2. REMOVE FLANGE, DISCS AND PLATES

(a) Remove the snap ring with a screwdriver.

(b) Remove the flange, discs and plates.



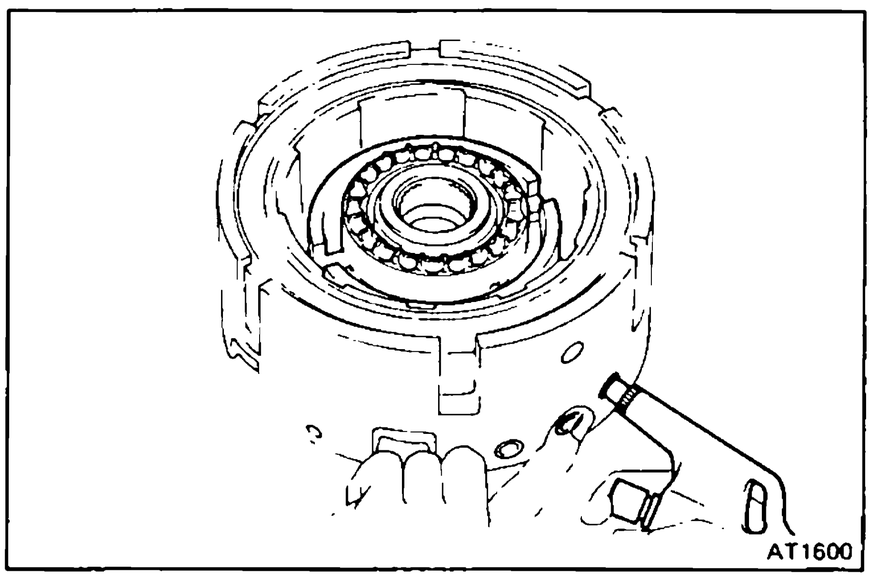
3. COMPRESS PISTON RETURN SPRINGS AND REMOVE SNAP RING

(a) Place SST on the spring seat and compress the return springs with a shop press.

SST 09350-36010 (09350-06010)

(b) Remove the snap ring with snap ring pliers.

4. REMOVE SPRING SEAT AND TWENTY-TWO PISTON RETURN SPRINGS



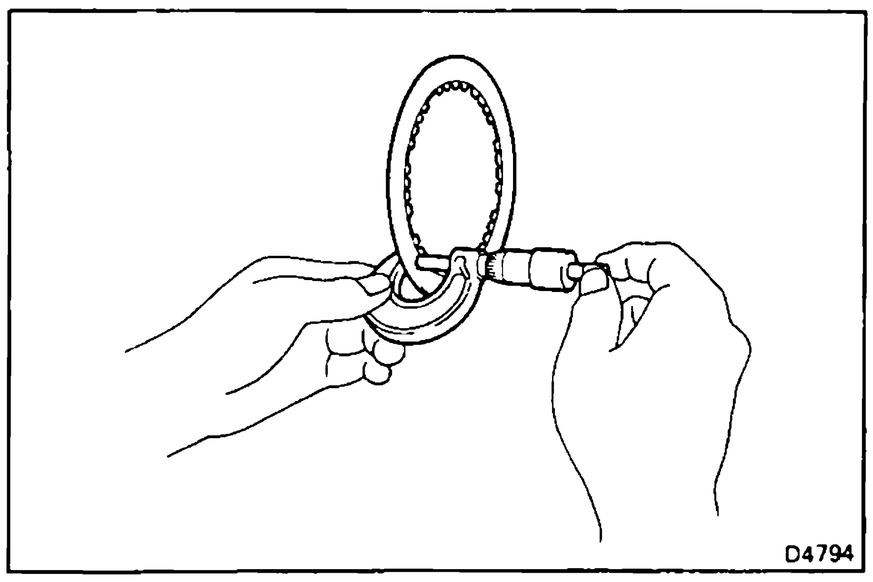
5. REMOVE REAR CLUTCH PISTON

(a) Place the rear clutch drum into the center support.

(b) Apply compressed air into the passage to remove the rear clutch piston as shown.

(c) Remove the rear clutch piston.

6. REMOVE O-RINGS FROM REAR CLUTCH PISTON



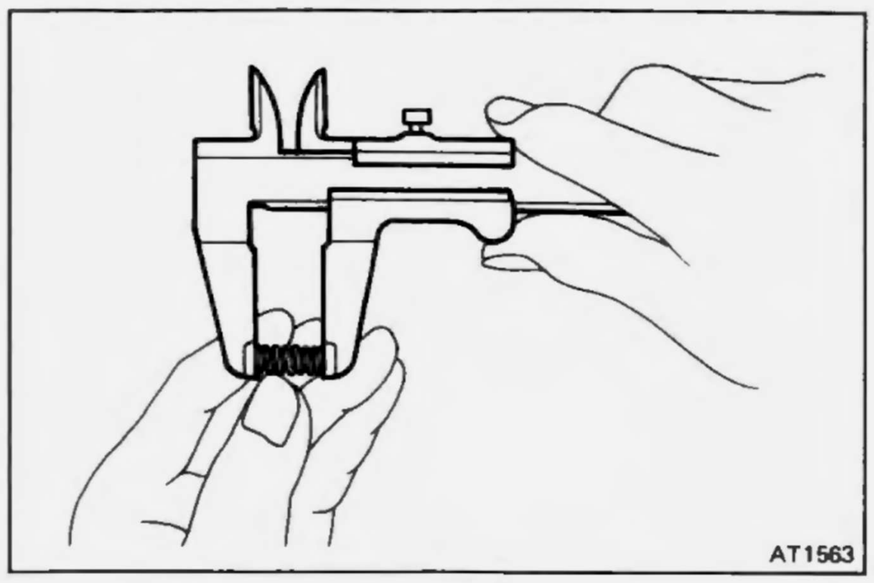
INSPECTION OF REAR CLUTCH

1. CHECK DISCS

Using a micrometer, measure the thickness of the discs.

Minimum thickness: 1.9 mm (0.075 in.)

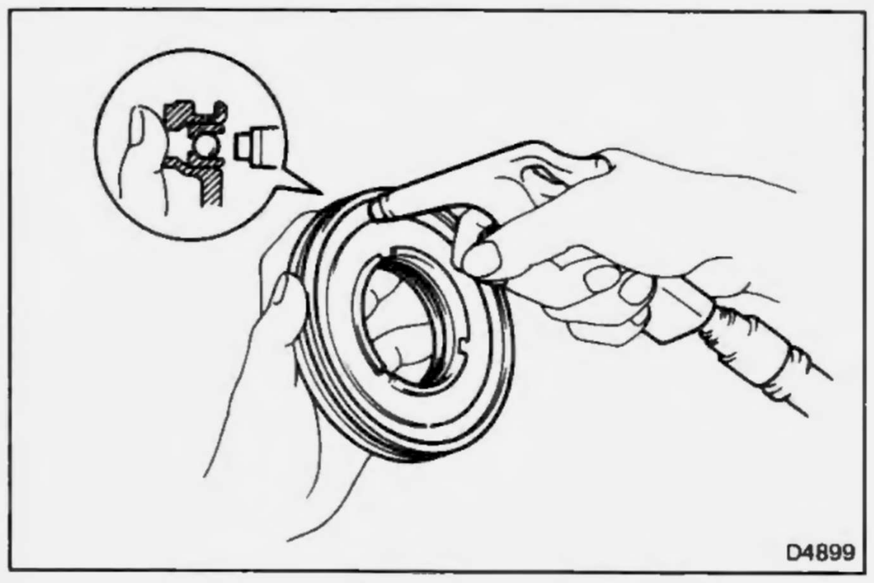
If the thickness is less than the minimum, replace the disc.



2. CHECK PISTON RETURN SPRINGS

Using calipers, measure the free length of the return springs.

Standard length: 31.24 mm (1.2299 in.)

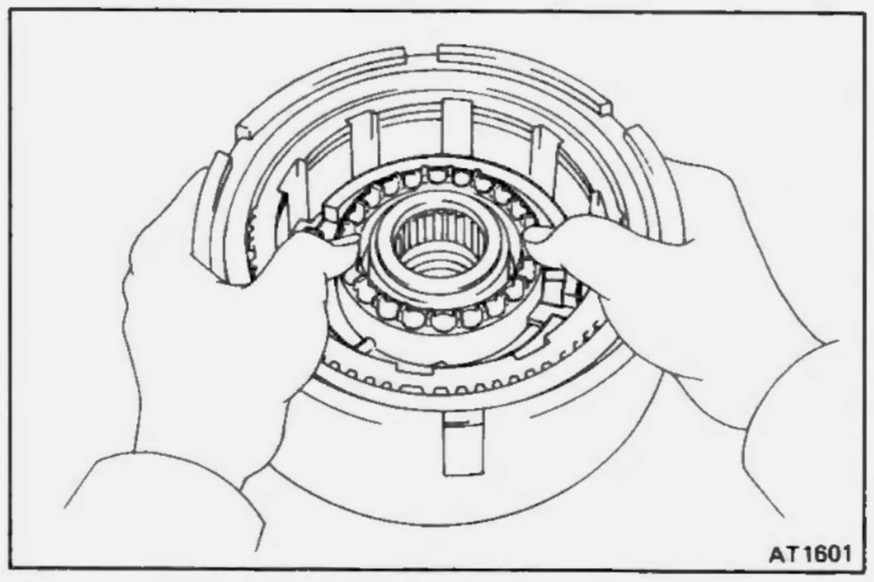


3. CHECK REAR CLUTCH PISTON

(a) Check that check ball is free by shaking the piston.

(b) Check that the valve does not leak by applying low-pressure compressed air to the hole.

ASSEMBLY OF REAR CLUTCH

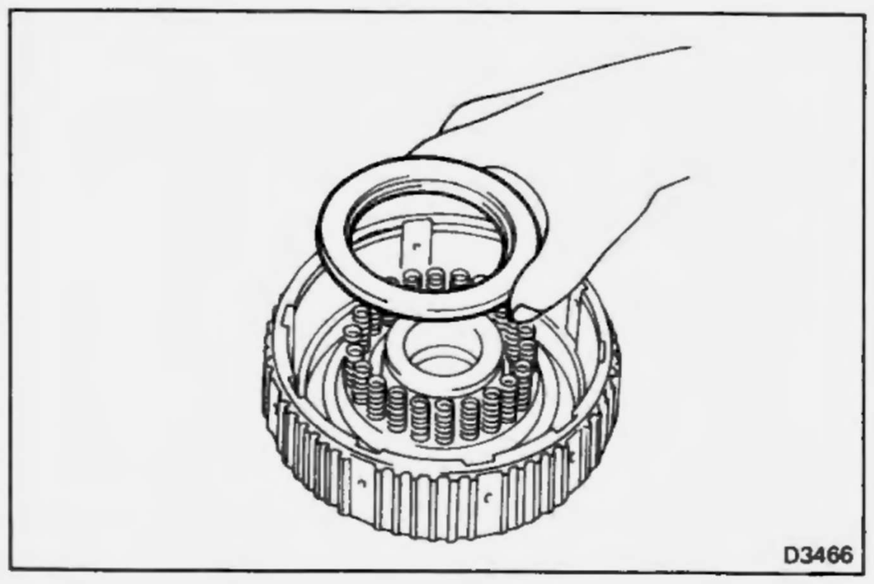


1. INSTALL NEW O-RINGS ON REAR CLUTCH PISTON

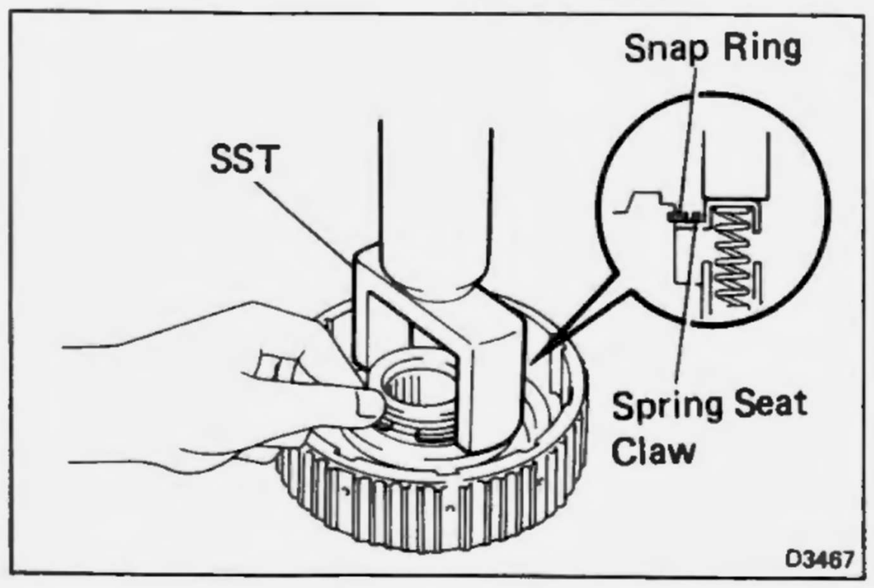
Coat new O-rings with ATF and install them on the rear clutch piston.

2. INSTALL REAR CLUTCH PISTON

Being careful not to damage the O-rings, press in the clutch piston into the rear clutch drum.



3. INSTALL TWENTY-TWO PISTON RETURN SPRINGS AND SPRING SEAT

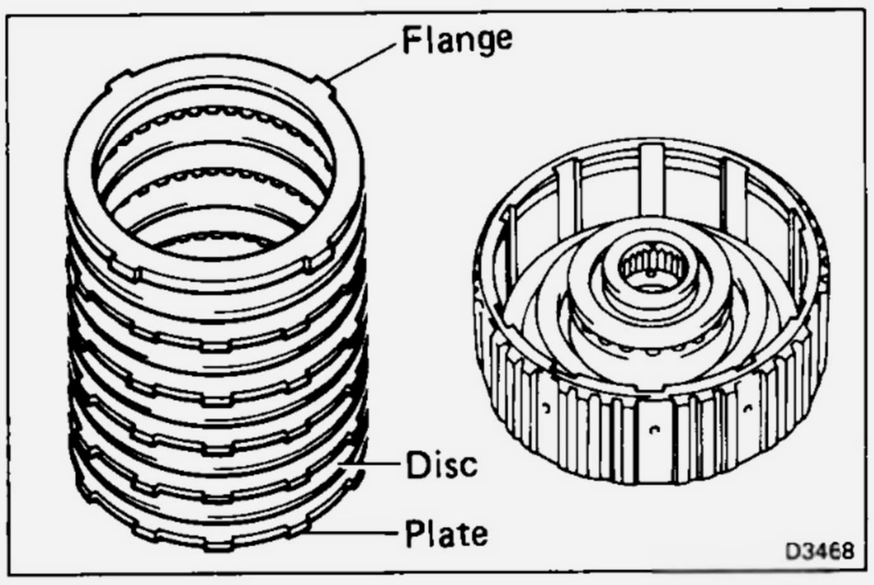


4. COMPRESS PISTON RETURN SPRINGS AND INSTALL SNAP RING IN GROOVE

(a) Place SST on the spring seat, and compress the return springs with a shop press.

SST 09350-36010 (09350-06010)

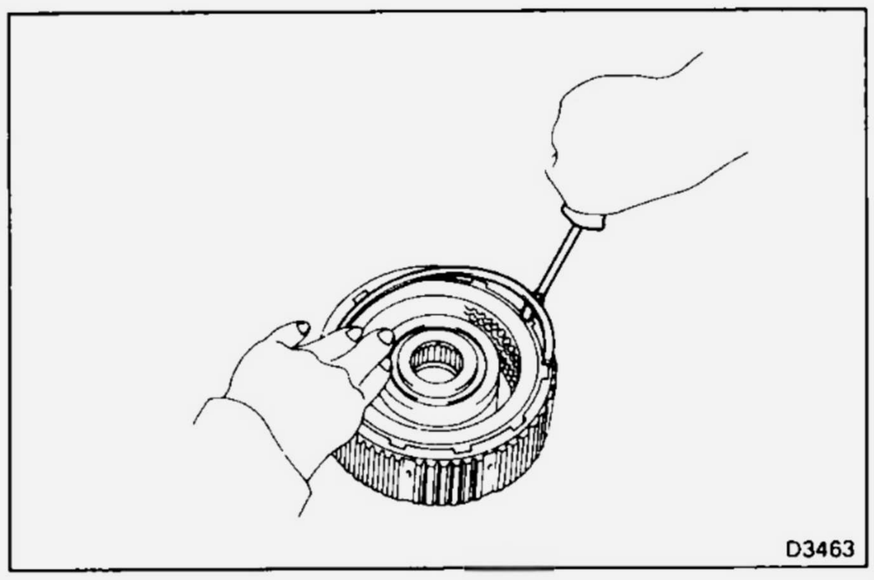
(b) Install the snap ring by hand. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



5. INSTALL PLATES, DISCS AND FLANGE

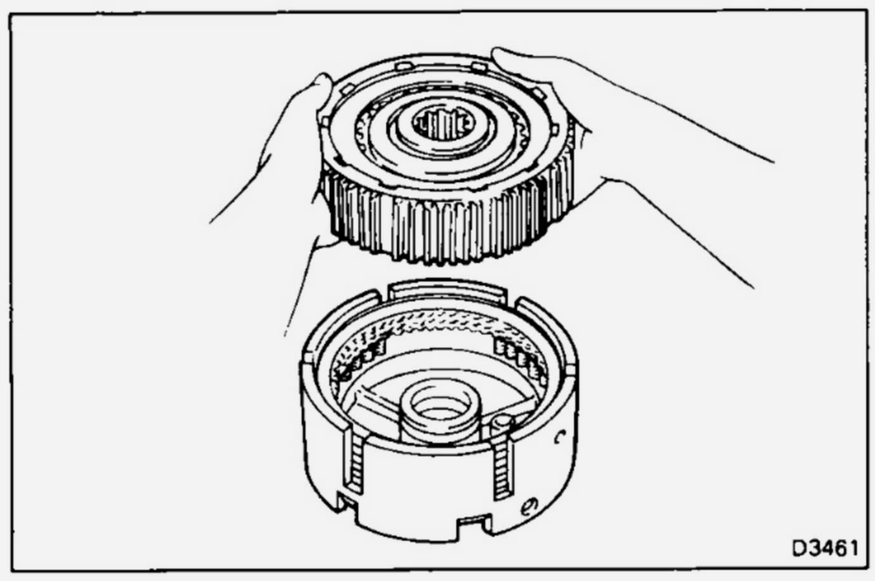
(a) Install in order: P–D–P–D–P–D–P–D–P–D

(b) Install the flange facing the rounded edge downward.



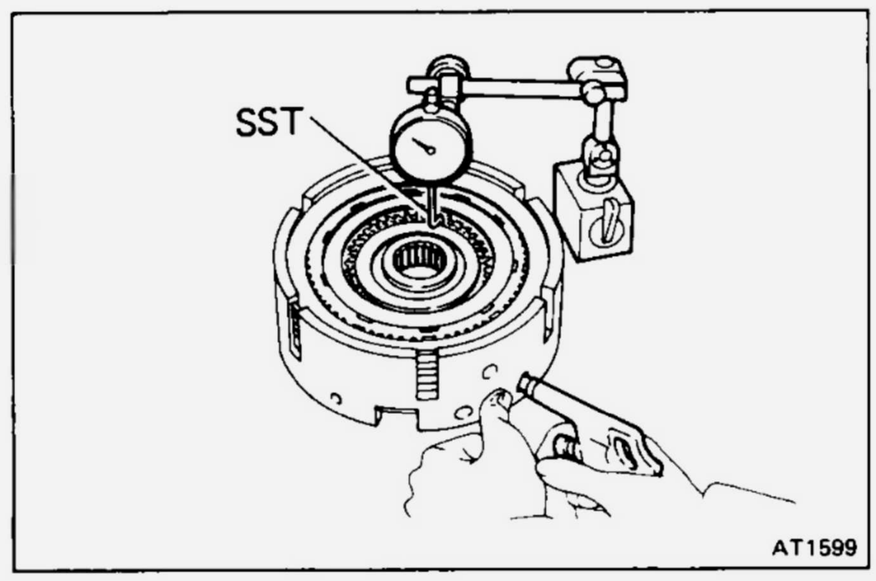
6. INSTALL SNAP RING

NOTE: Be sure the end gap of the snap ring is not aligned with the cutout portion of the rear clutch drum.



7. CHECK PISTON STROKE OF REAR CLUTCH (C_2)

(a) Place the rear clutch drum assembly into the center support assembly.



(b) Using SST and a dial indicator, measure the rear clutch piston stroke, applying and releasing the compressed air (4–8 kg/cm², 57–114 psi or 392–785 kPa) as shown.

SST 09350-36010 (09350-06110)

Piston stroke: 1.70 – 1.90 mm (0.0669 – 0.0748 in.)

If the piston stroke exceeds the limit, replace the discs and recheck the piston stroke.

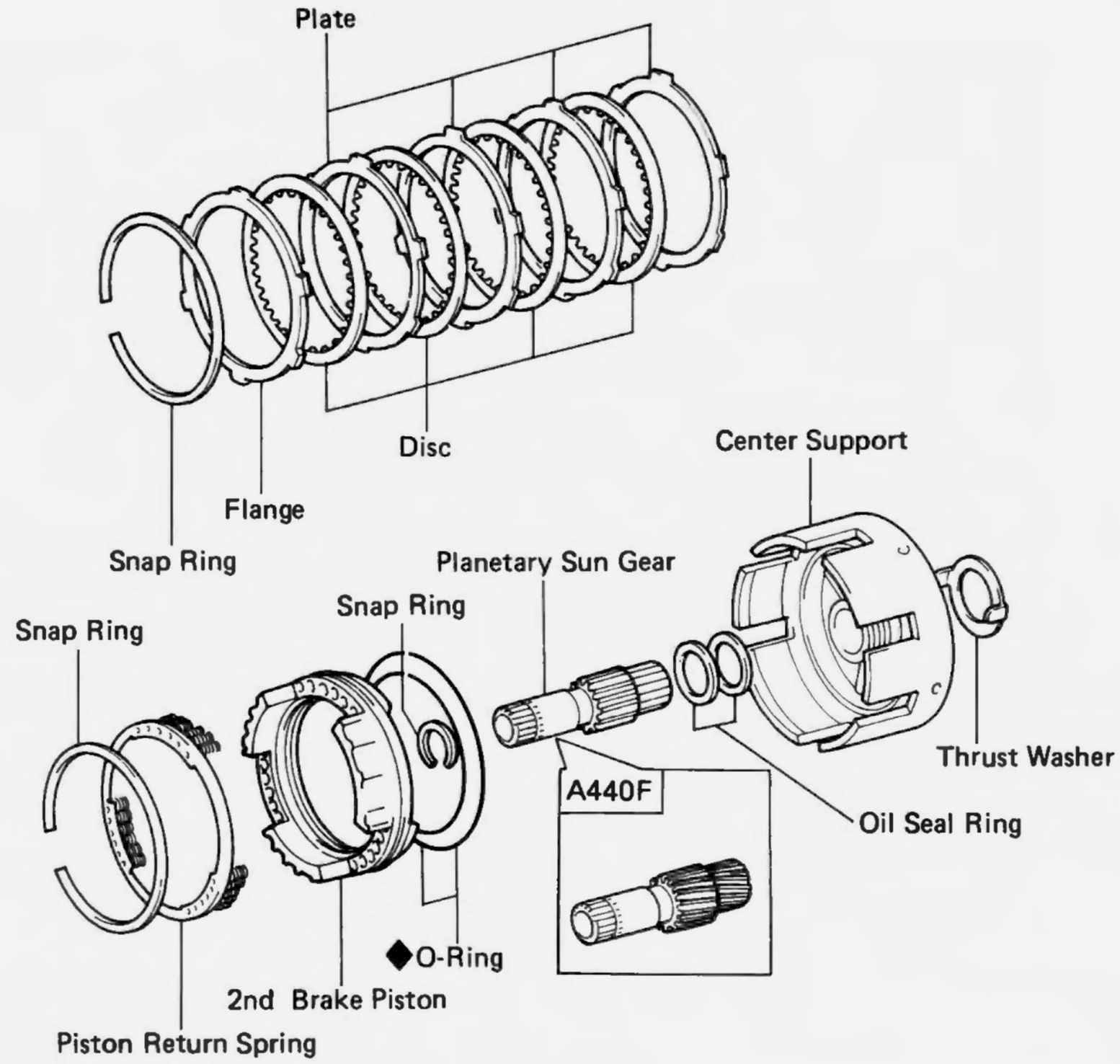
If the piston stroke is less than the limit, parts may be improperly installed and should be reassembled.

If the piston stroke is nonstandard, select another flange.

NOTE: There are four flanges. mm (in.)

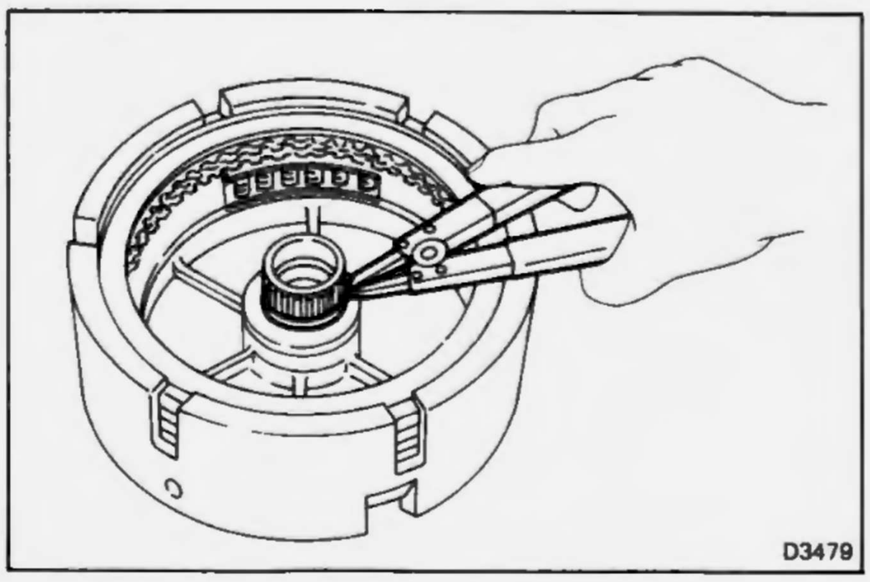
No.	Thickness	No.	Thickness
None	5.0 (0.197)	2	5.4 (0.213)
1	5.2 (0.205)	3	5.6 (0.220)

CENTER SUPPORT



◆ Non-reusable part

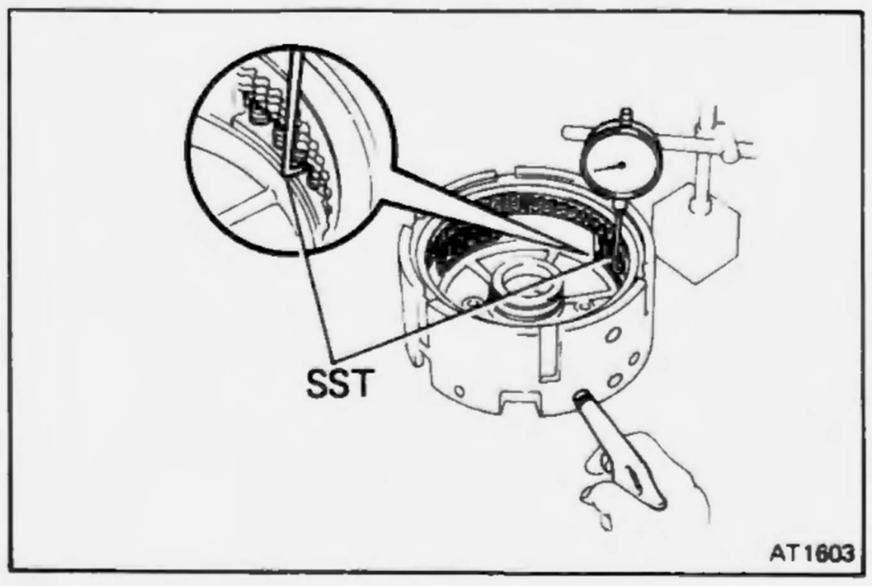
AT1711



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DISASSEMBLY OF CENTER SUPPORT

1. REMOVE PLANETARY SUN GEAR
   (a) Remove the snap ring with snap ring pliers.
   (b) Remove the planetary sun gear.



AT1603

2. CHECK PISTON STROKE OF SECOND BRAKE (B_1)

Using SST and a dial indicator, measure the 2nd brake piston stroke, applying and releasing the compressed air (4–8 kg/cm², 57–114 psi or 392–785 kPa) as shown.

SST 09350-36010 (09350-06120)

Piston stroke: 1.60 – 1.80 mm (0.0630 – 0.0709 in.)

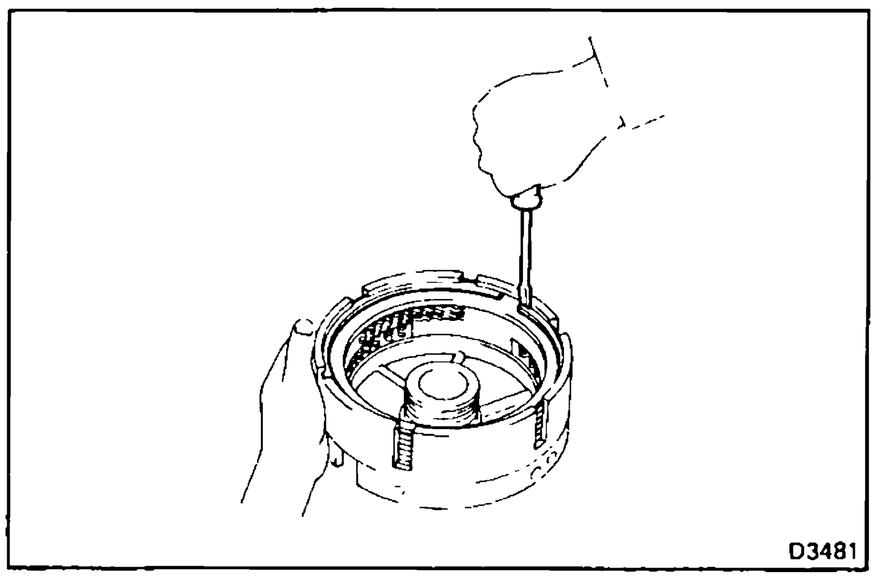
If the piston stroke exceeds the limit, replace the discs and recheck the piston stroke.

If the piston stroke is nonstandard, select another flange.

NOTE: There are four flanges.

mm (in.)

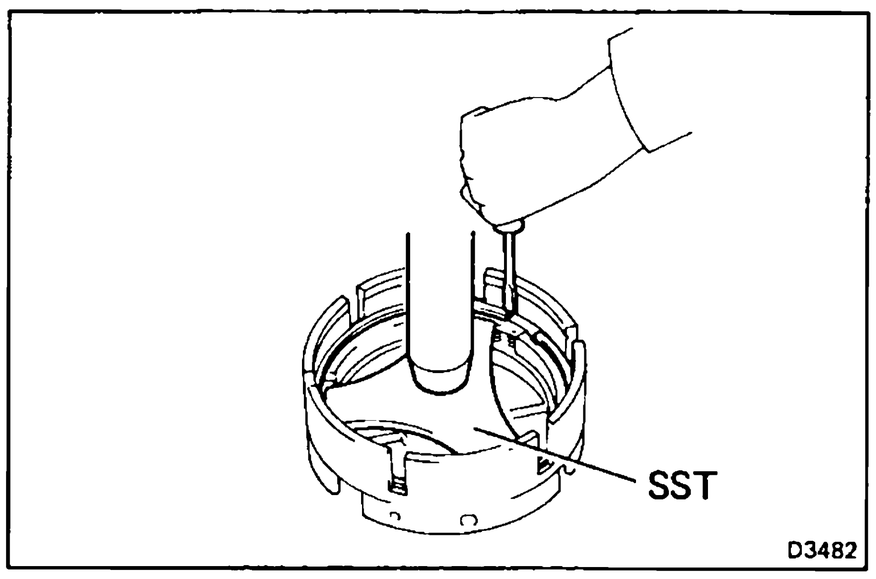
No.	Thickness	No.	Thickness
None	5.0 (0.197)	2	5.4 (0.213)
1	5.2 (0.205)	3	5.6 (0.220)



3. REMOVE FLANGE, DISCS AND PLATES

(a) Remove the snap ring with a screwdriver.

(b) Remove the flange, discs and plates.



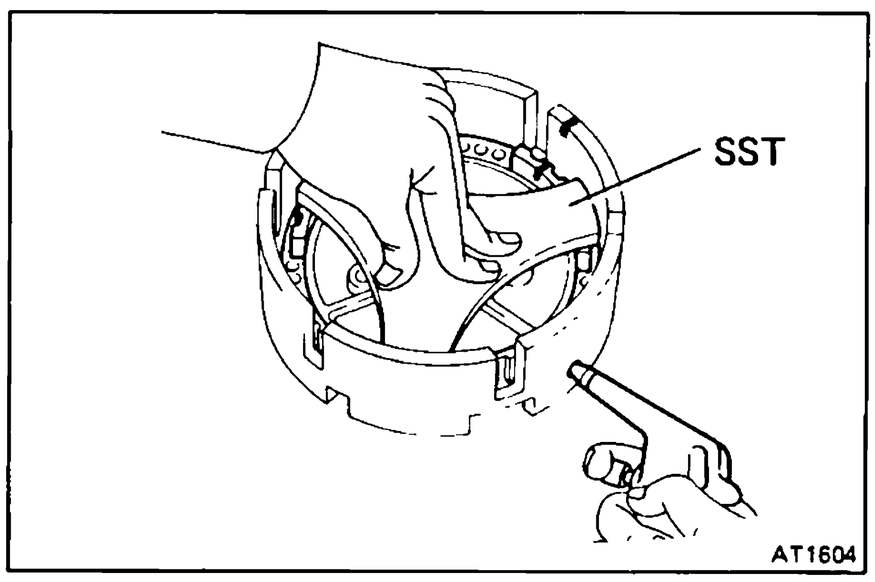
4. COMPRESS PISTON RETURN SPRING AND REMOVE SNAP RING

(a) Place SST on the spring retainer and compress the return spring with a shop press.

SST 09350-36010 (09350-06020)

(b) Remove the snap ring with a screwdriver.

5. REMOVE PISTON RETURN SPRING



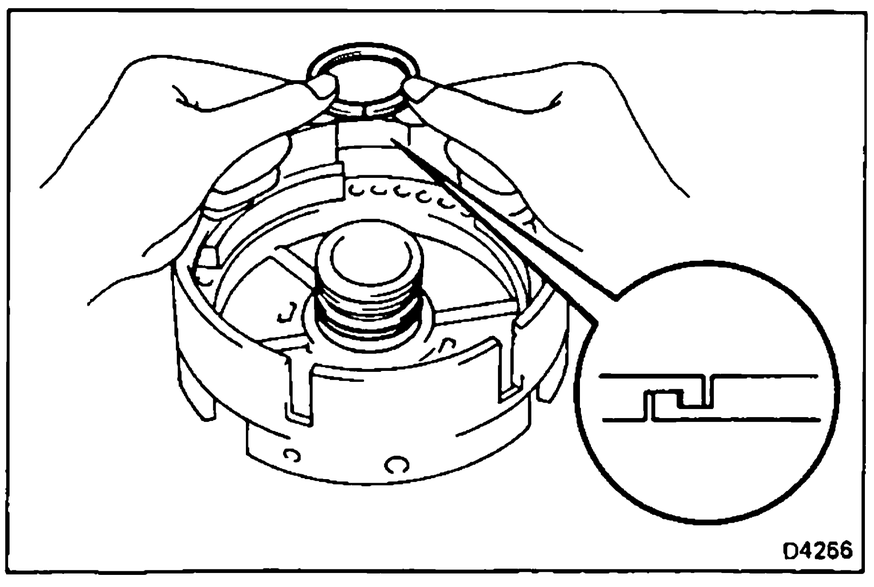
6. REMOVE SECOND BRAKE PISTON

(a) Place matchmarks on the piston and center support and then place SST on the piston.

(b) Holding SST so it is not slanted, apply compressed air into the passage to remove the 2nd brake piston.

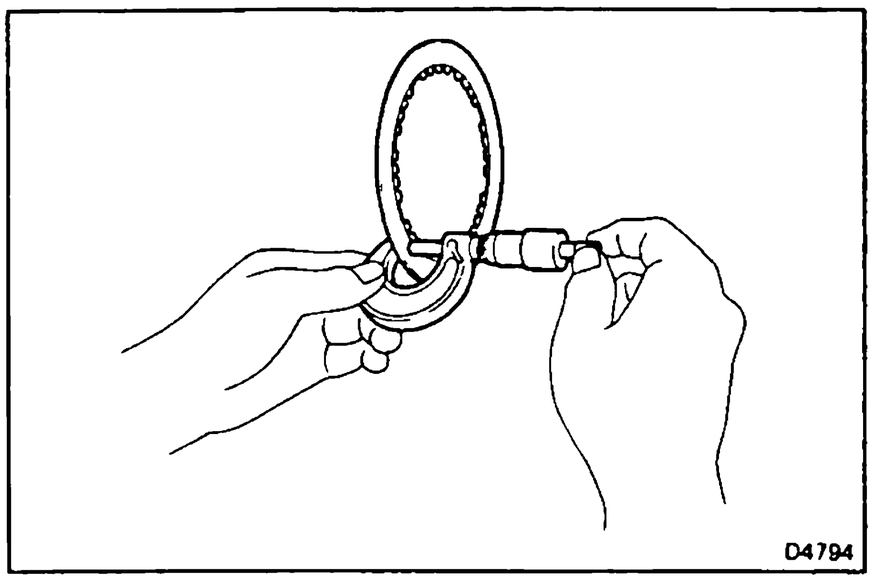
(c) Remove the 2nd brake piston and then remove the O-rings from the piston.

SST 09350-36010 (09350-06020)



7. REMOVE TWO OIL SEAL RINGS

8. REMOVE THREE O-RINGS FROM OIL HOLES OF CENTER SUPPORT



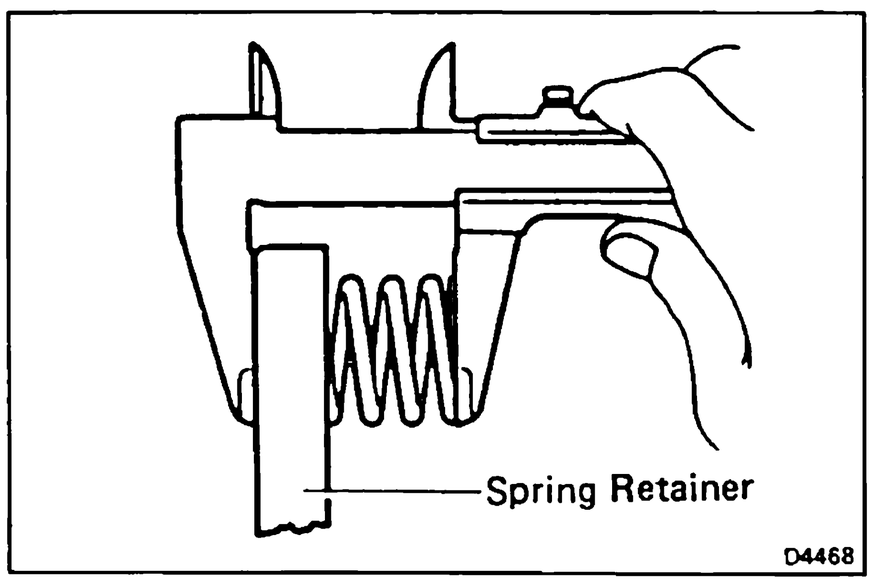
INSPECTION OF CENTER SUPPORT

1. CHECK DISCS

Using a micrometer, measure the thickness of the discs.

Minimum thickness: 1.9 mm (0.075 in.)

If the thickness is less than the minimum, replace the discs.



2. CHECK PISTON RETURN SPRING

Using calipers, measure the free length of the return spring.

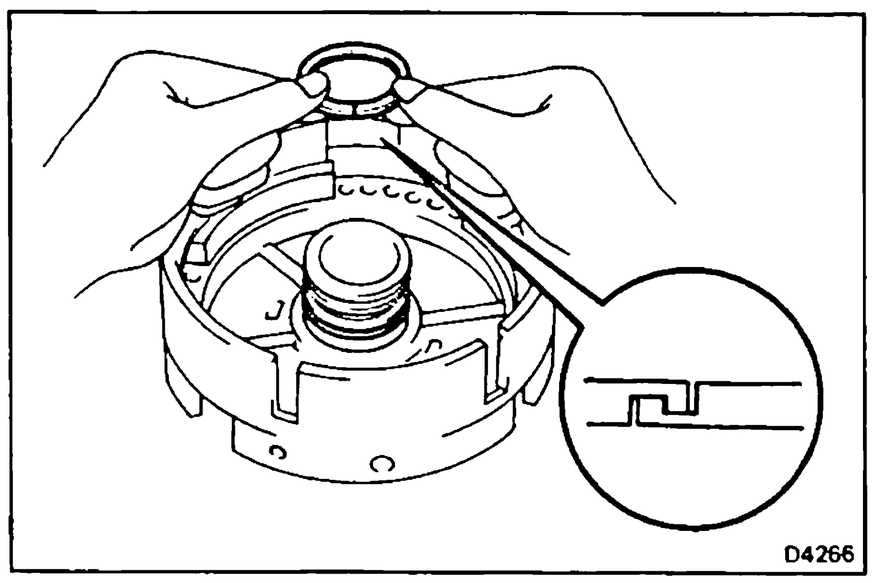
Standard length: 22.75 mm (0.8957 in.)

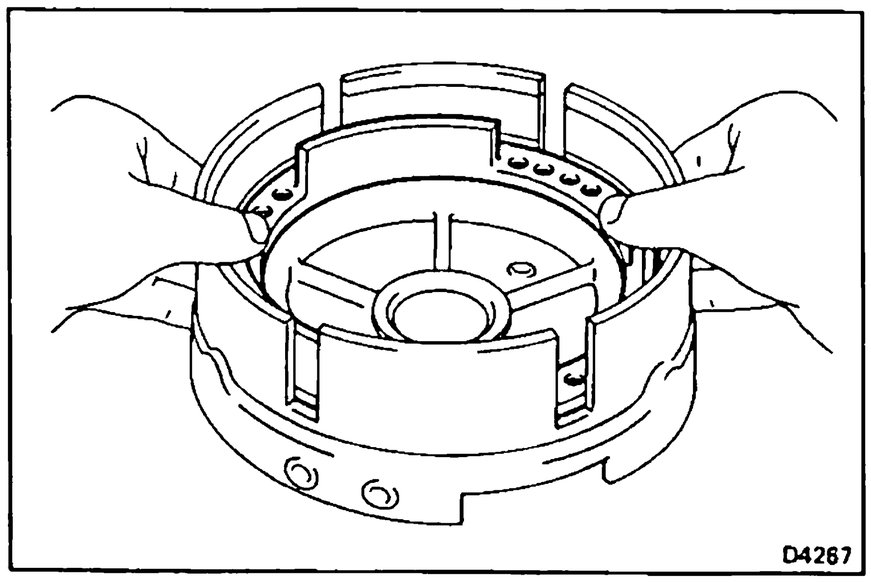
3. CHECK CENTER SUPPORT BUSHINGS

Using a dial indicator, measure the inside diameter of the center support bushings.

Maximum inside diameter: 35.08 mm (1.3811 in.)

If the inside diameter is greater than the maximum, replace the center support.





ASSEMBLY OF CENTER SUPPORT

1. INSTALL OIL SEAL RINGS

(a) Coat the two oil seal rings with ATF.

(b) Contract the oil seals and install them onto the center support.

CAUTION: Do not spread the ring ends more than necessary.

2. INSTALL THREE NEW O-RINGS

Coat three new O-rings with ATF and install them to the oil holes of the center support.

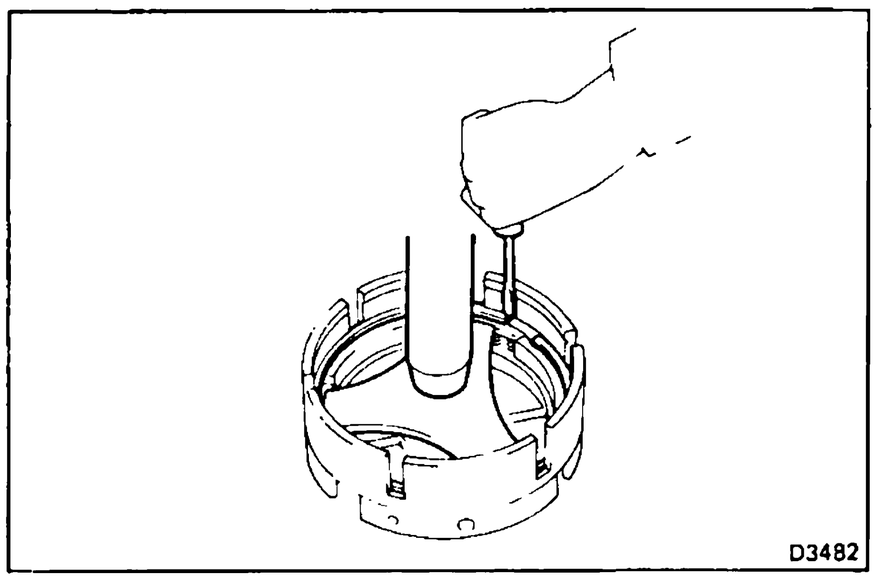
3. INSTALL NEW O-RINGS ON SECOND BRAKE PISTON

Coat two new O-rings with ATF and install them on the 2nd brake piston.

4. INSTALL SECOND BRAKE PISTON

(a) Align the matchmarks on the piston and center support.

(b) Being careful not to damage the O-rings, press in the brake piston into the center support by both hands.



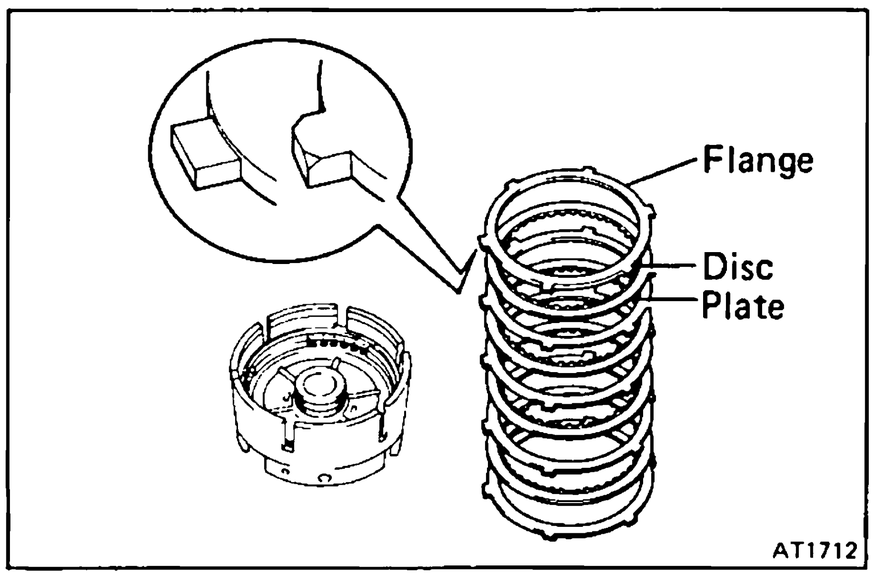
5. INSTALL PISTON RETURN SPRING

6. COMPRESS PISTON RETURN SPRING AND INSTALL SNAP RING IN GROOVE

(a) Place SST on the spring retainer, and compress the return spring with a shop press.

SST 09350-36010 (09350-06020)

(b) Install the snap ring with a screwdriver. Be sure the end gap of the snap ring is not aligned with the cut-out portion of the center support.



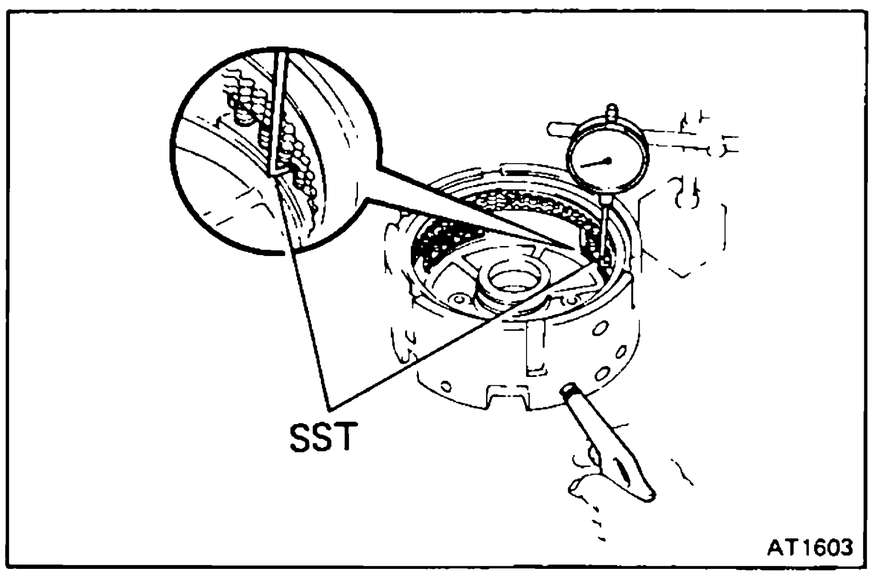
7. INSTALL PLATES, DISCS AND FLANGE

(a) Install in order: P–D–P–D–P–D–P–D

(b) Install the flange facing the rounded edge down.

8. INSTALL SNAP RING

Be sure end gap of the snap ring is not aligned with the cutout portion of the center support.



9. CHECK PISTON STROKE OF SECOND BRAKE (B_1)

Using SST and a dial indicator, measure the 2nd brake piston stroke, applying and releasing the compressed air (4–8 kg/cm², 57–114 psi or 392–785 kPa) as shown.

SST 09350-36010 (09350-06120)

Piston stroke: 1.60 – 1.80 mm (0.0630 – 0.0709 in.)

If the piston stroke exceeds the limit, replace the discs and recheck the piston stroke.

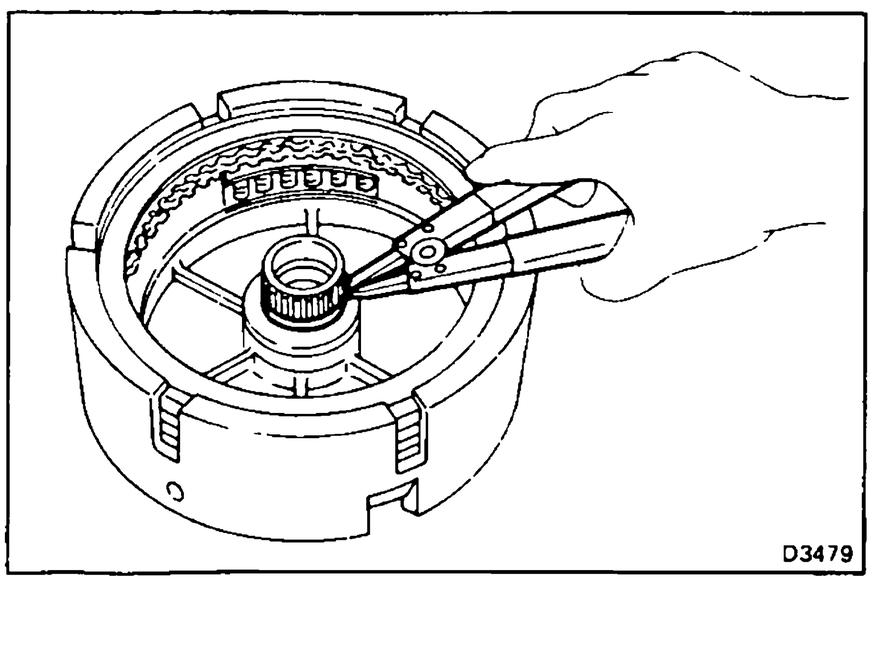
If the piston stroke is less than the limit, parts may be improperly assembled and require reassembly.

If the piston stroke is nonstandard, select another flange.

NOTE: There are four flanges.

mm (in.)

No.	Thickness	No.	Thickness
None	5.0 (0.197)	2	5.4 (0.213)
1	5.2 (0.205)	3	5.6 (0.220)

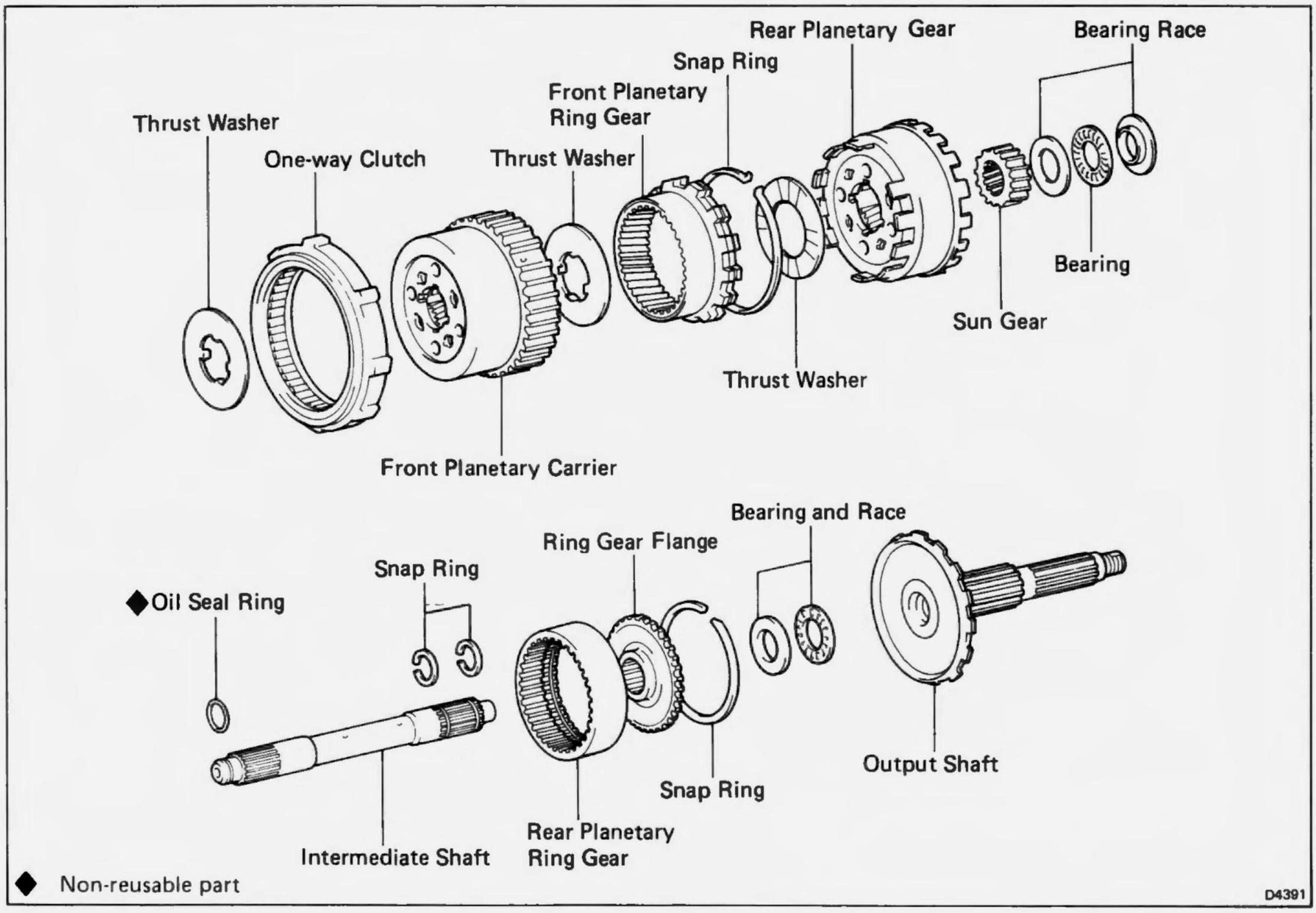


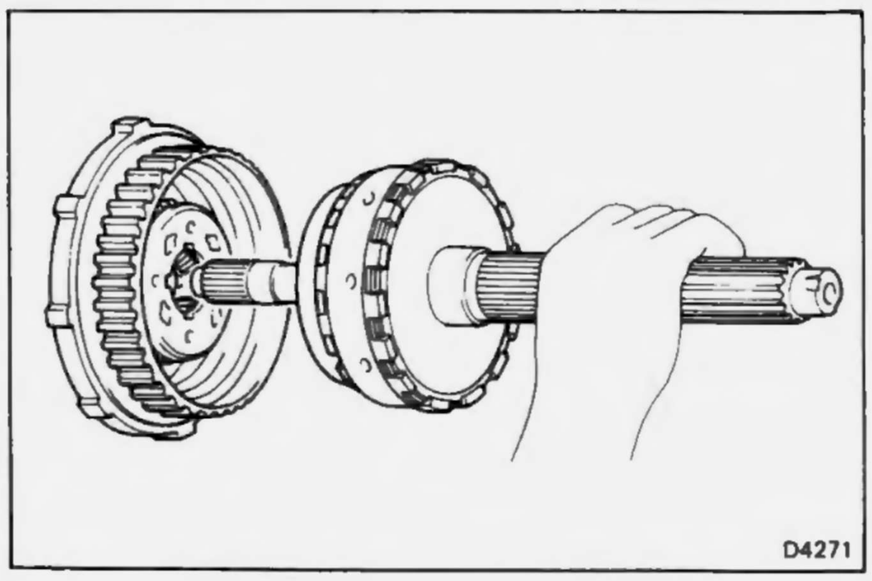
10. INSTALL PLANETARY SUN GEAR

Install the planetary sun gear and then install the snap ring.

PLANETARY GEAR AND OUTPUT SHAFT (A440F)

COMPONENTS

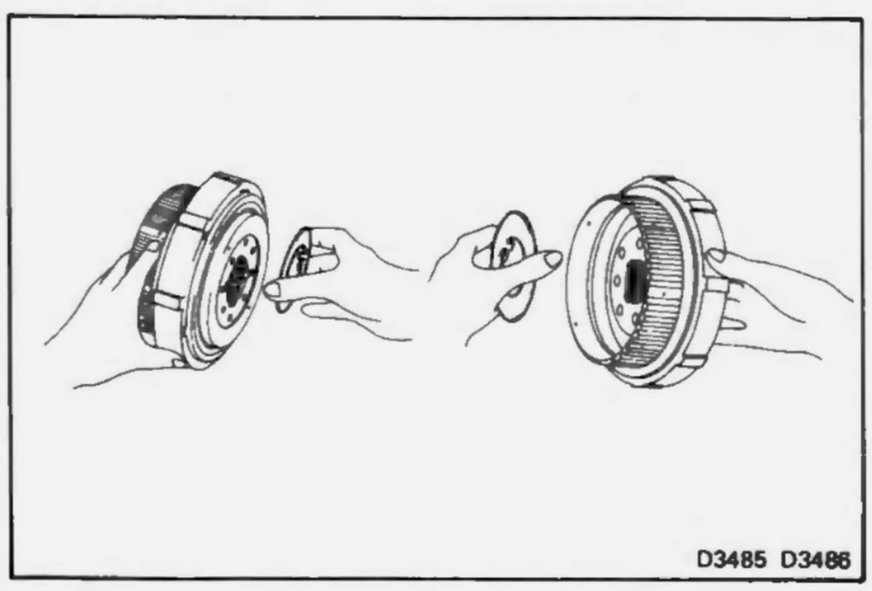




DISASSEMBLY OF PLANETARY GEAR AND OUTPUT SHAFT

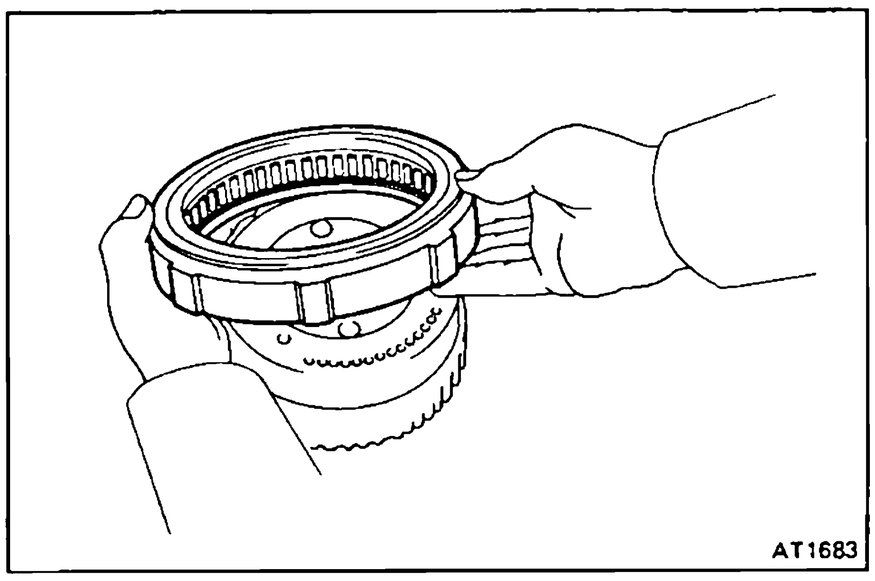
1. REMOVE FRONT PLANETARY CARRIER

Remove the front planetary carrier from the output shaft.



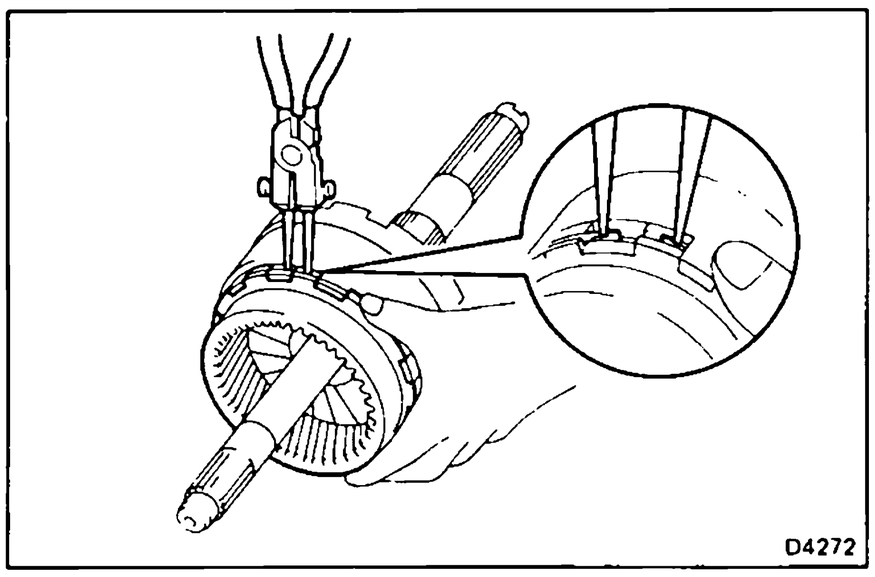
2. REMOVE THRUST WASHER

Remove the two thrust washers from the front planetary carrier.



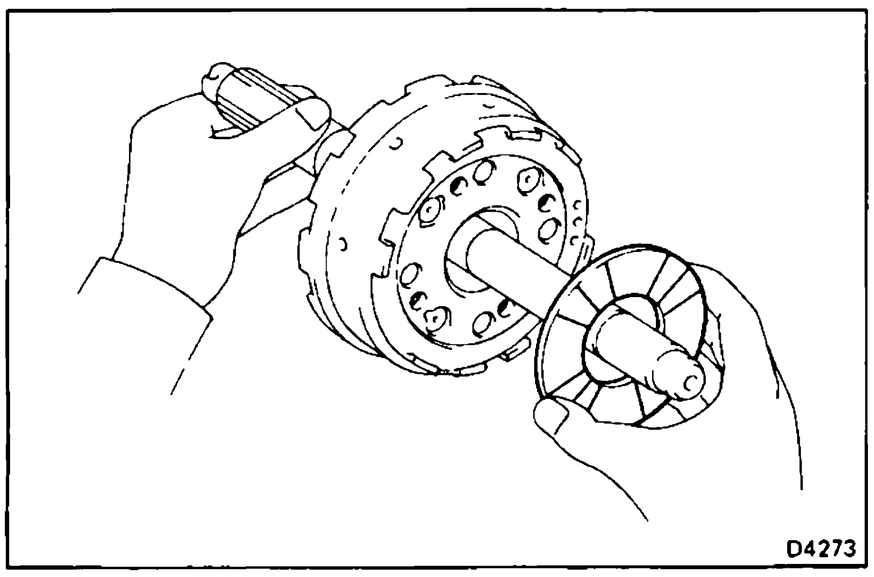
3. REMOVE ONE-WAY CLUTCH

Remove the one-way clutch from the front planetary carrier. Note the direction of the one-way clutch.



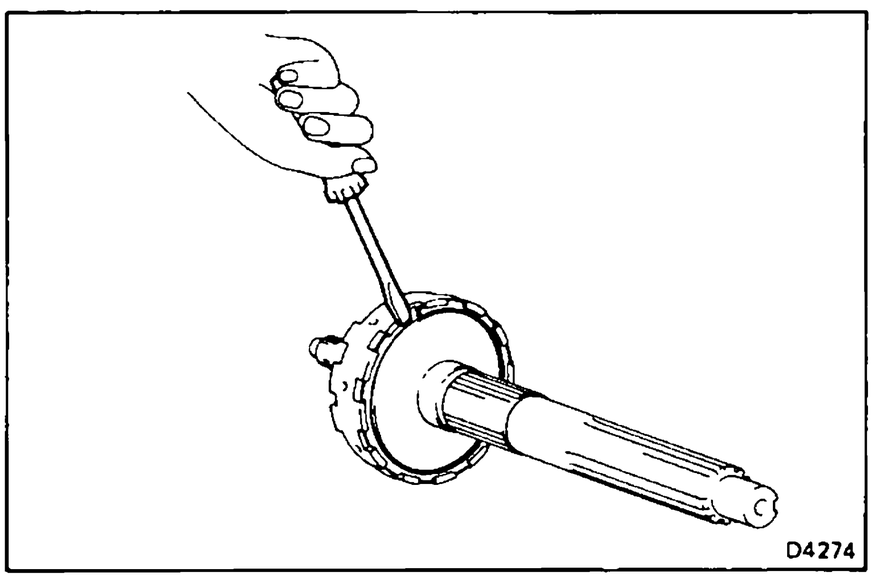
4. REMOVE FRONT PLANETARY RING GEAR

While compressing the snap ring with snap ring pliers remove the ring gear.



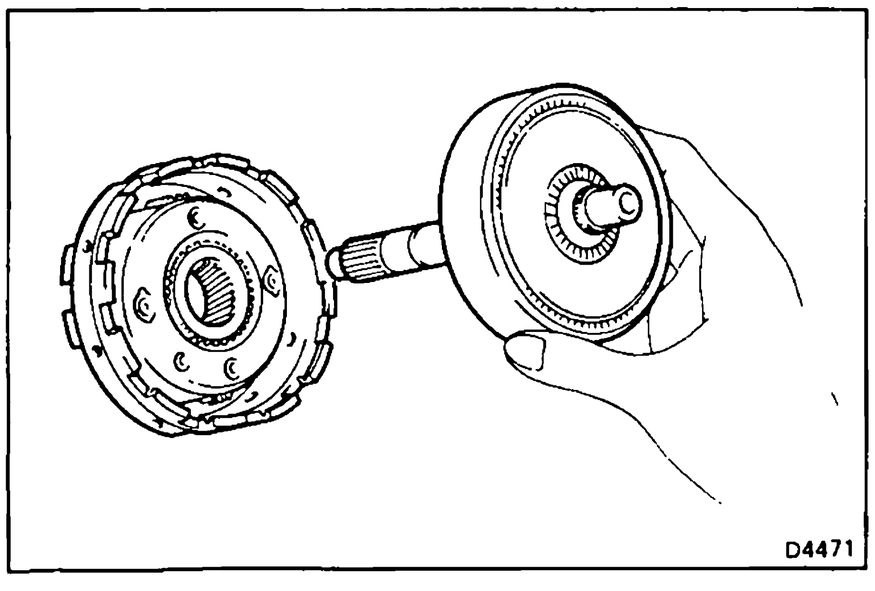
5. REMOVE OUTPUT SHAFT THRUST WASHER

Remove the thrust washer from the output shaft. Note the direction of thrust washer.

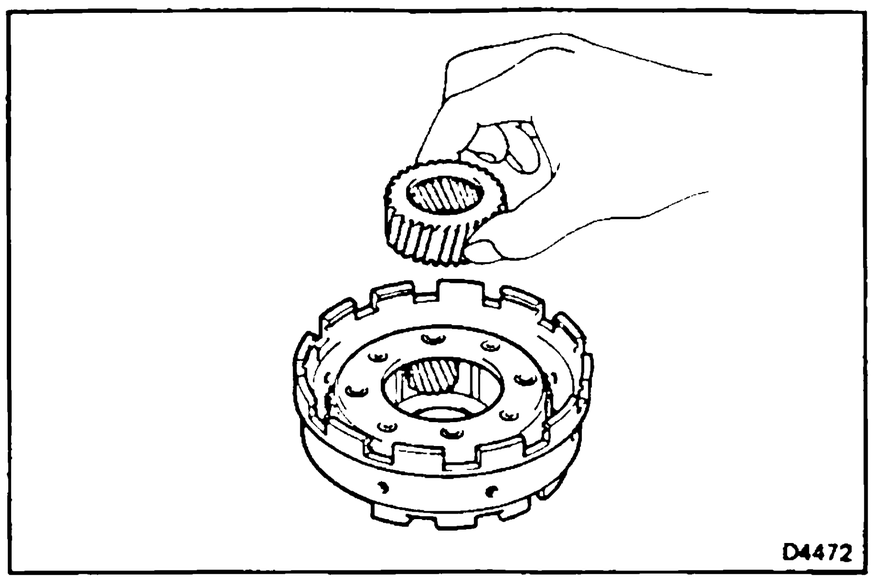


6. REMOVE REAR PLANETARY GEAR ASSEMBLY

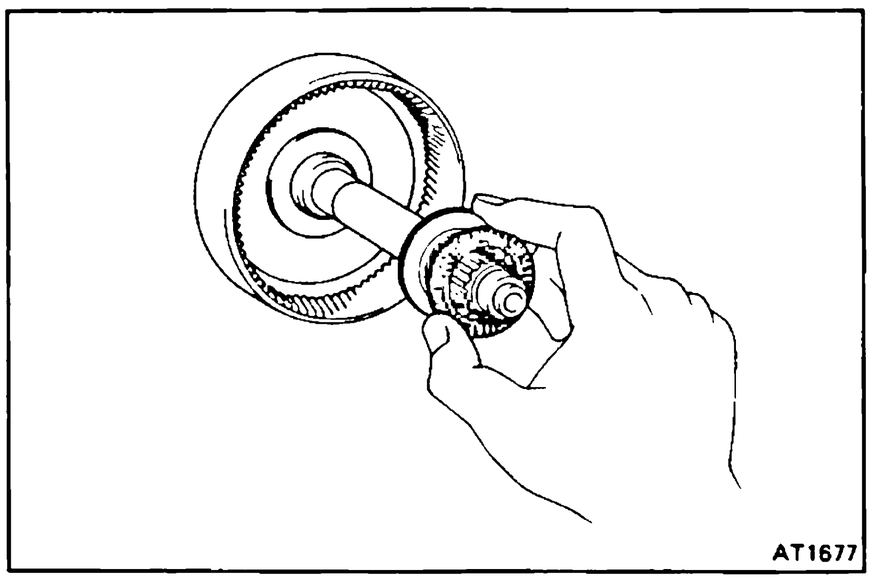
(a) Remove the snap ring and the rear planetary gear assembly from the output shaft.



(b) Remove the assembled rear planetary ring gear and intermediate shaft from the rear planetary gear assembly.

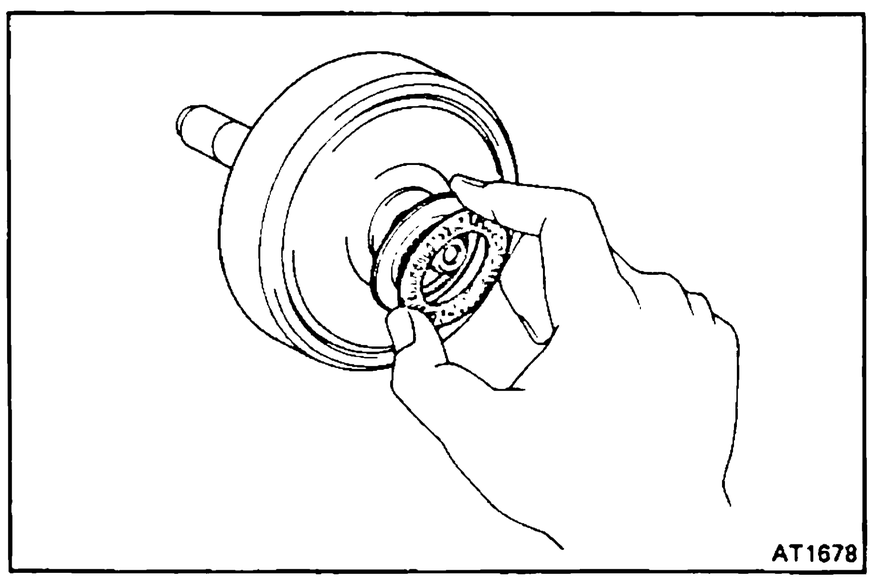


(c) Remove the sun gear from the rear planetary gear assembly.

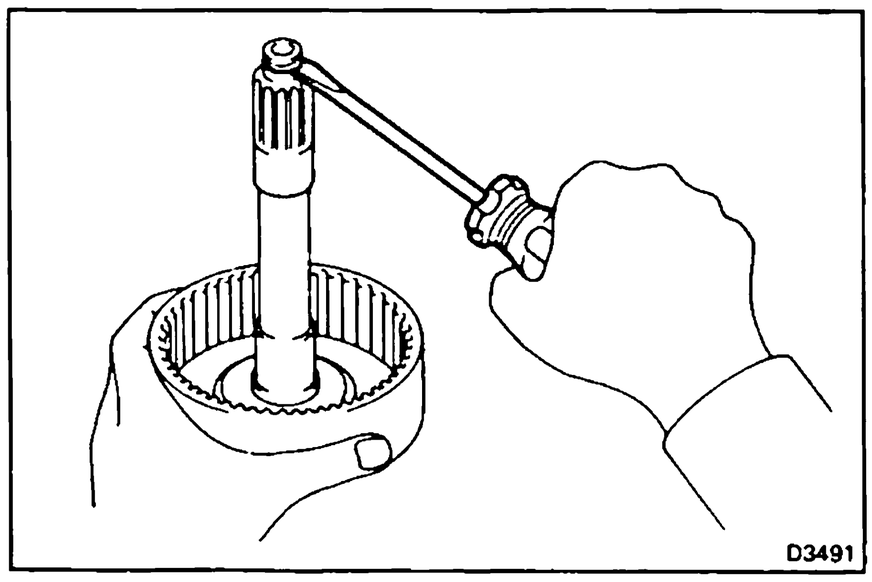


7. REMOVE REAR PLANETARY RING GEAR

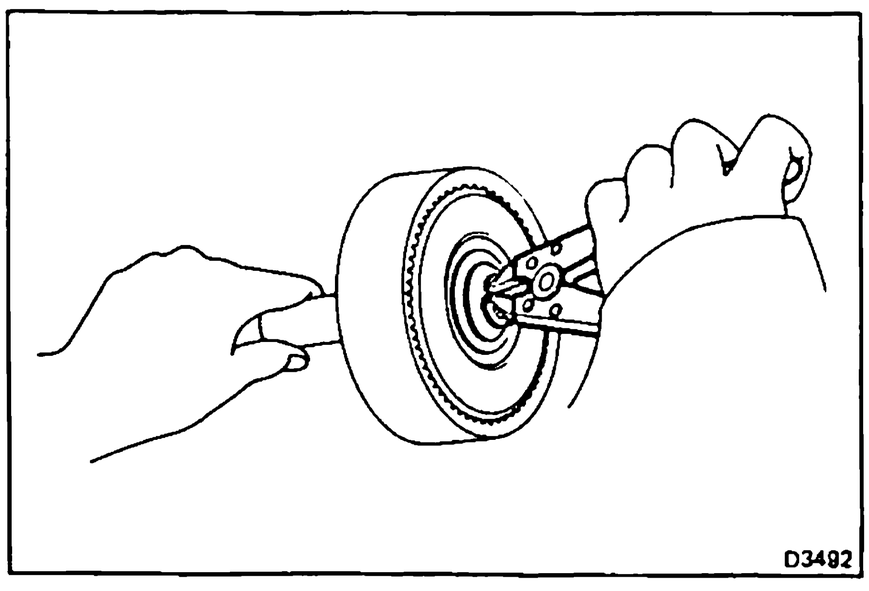
(a) Remove the thrust bearing and race from the rear planetary ring gear. Note the direction of the bearing and race.



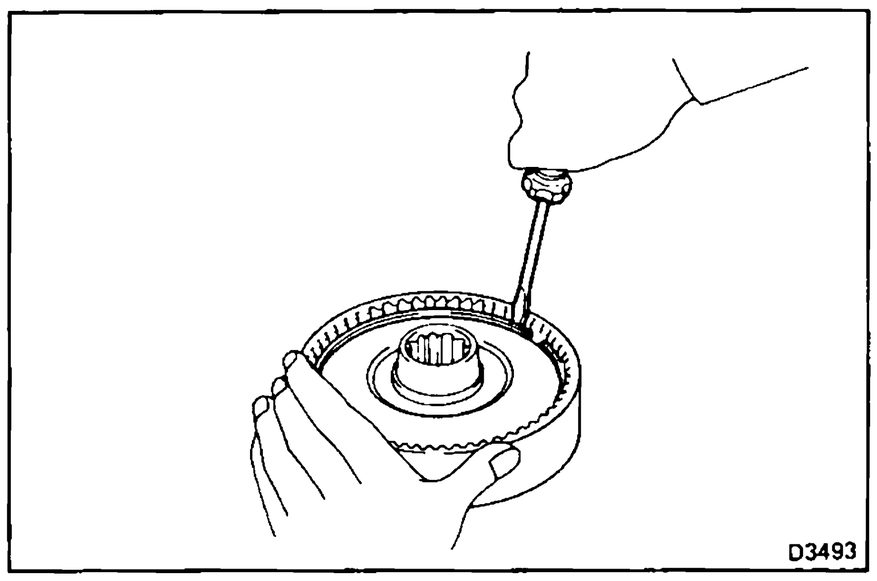
(b) Remove the thrust bearing and race from the rear planetary ring gear. Note the direction of the bearing and race.



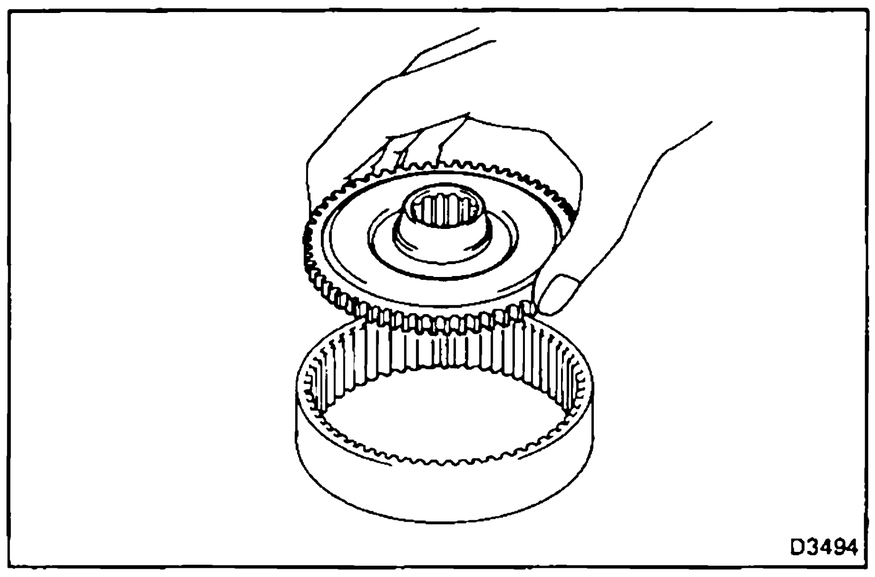
(c) Remove the oil seal ring from the intermediate shaft.



(d) Remove the snap ring and remove the rear planetary ring gear from the intermediate shaft.



(e) Remove the snap ring and remove the planetary gear flange from the rear planetary ring gear. Note the direction of the planetary gear flange.

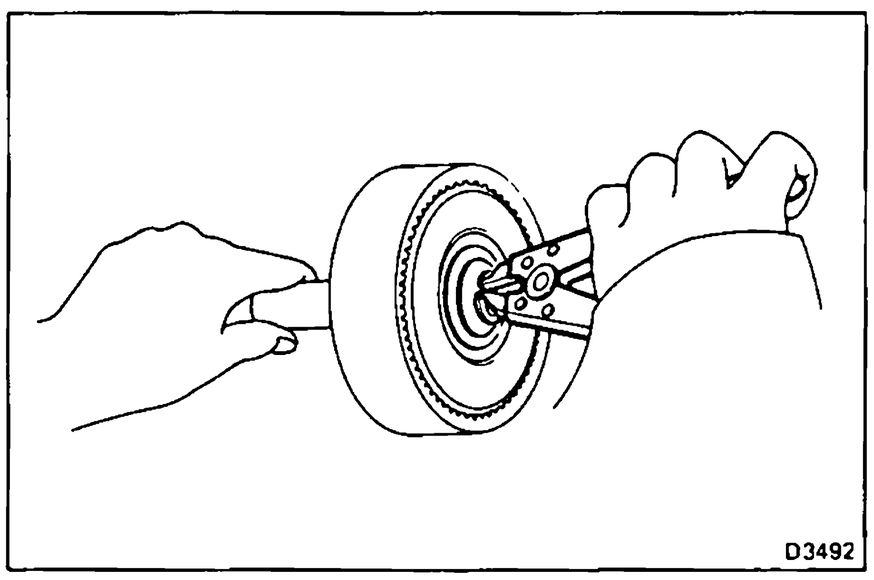


ASSEMBLY OF PLANETARY GEAR AND OUTPUT SHAFT

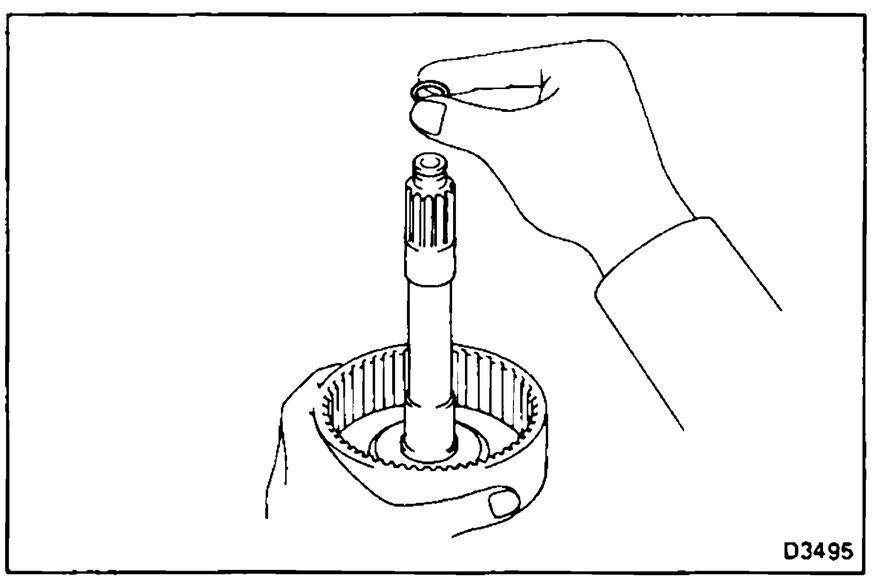
(See page AT-69)

1. INSTALL REAR PLANETARY RING GEAR

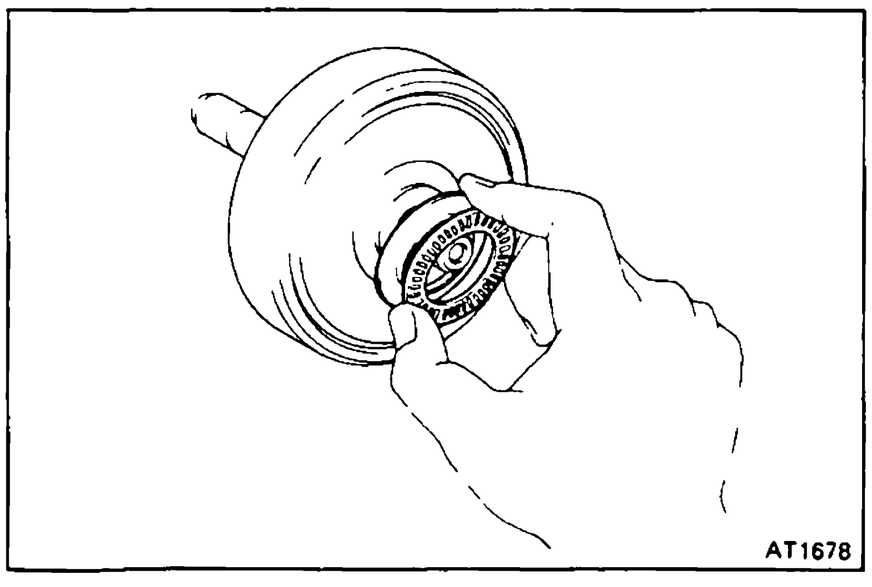
(a) Install the planetary gear flange and snap ring to the rear planetary ring gear. Make sure the direction of the planetary gear flange.



(b) Install the rear planetary ring gear and snap ring to the intermediate shaft.



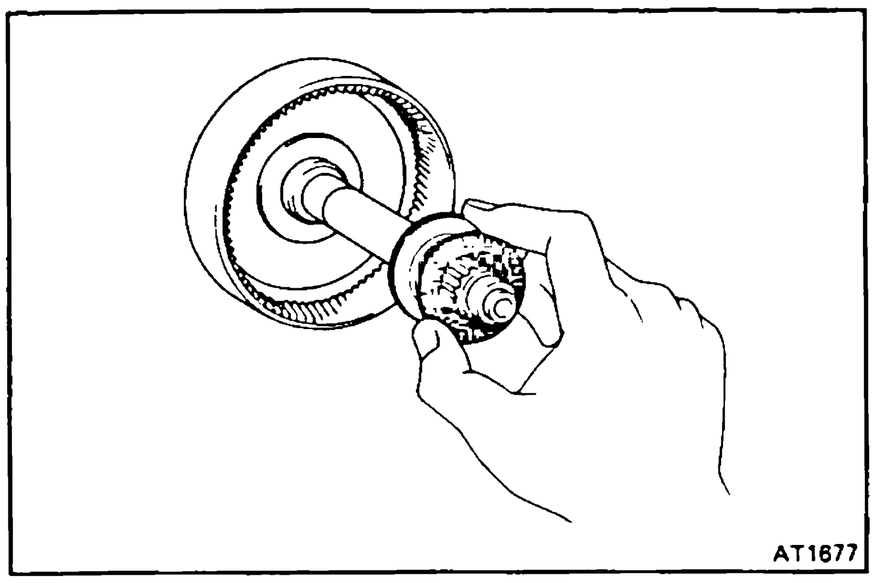
(c) Apply ATF to the new oil seal ring, and install it to the intermediate shaft.



(d) Install the race and thrust bearing to the rear planetary ring gear. Confirm the proper correct direction of the bearing and race.

NOTE: Race and bearing diameter. mm (in.)

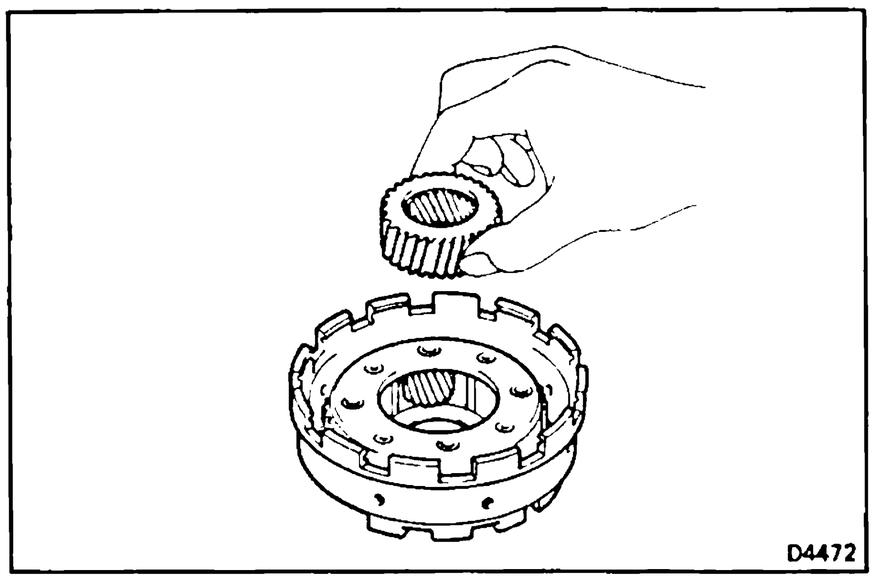
	Inside	Outside
Race	32.8 (1.291)	50.4 (1.984)
Bearing	34.7 (1.366)	52.0 (2.047)


AT1677

(e) Install the race and thrust bearing to the rear planetary ring gear. Confirm the proper direction of the bearing and race.

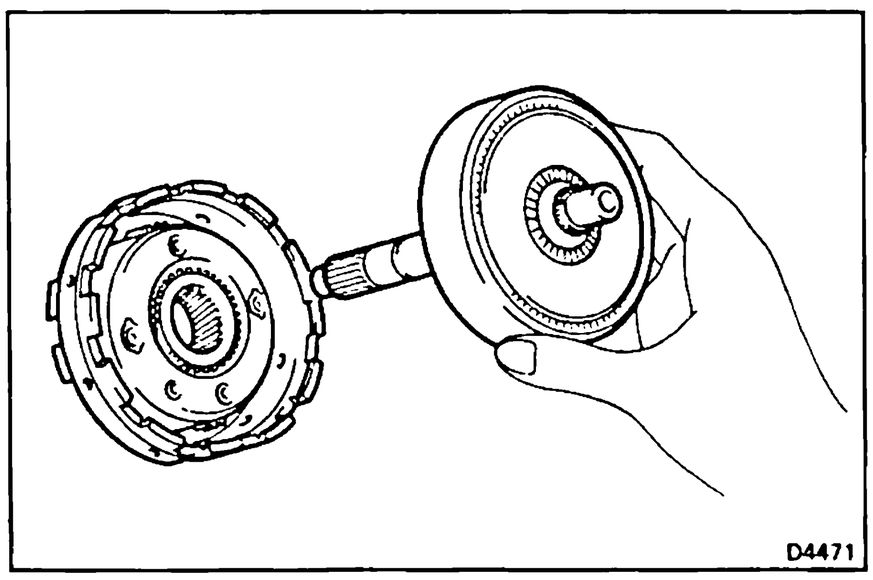
NOTE: Race and bearing diameter mm (in.)

	Inside	Outside
Race	32.8 (1.291)	50.4 (1.984)
Bearing	34.7 (1.366)	52.0 (2.047)

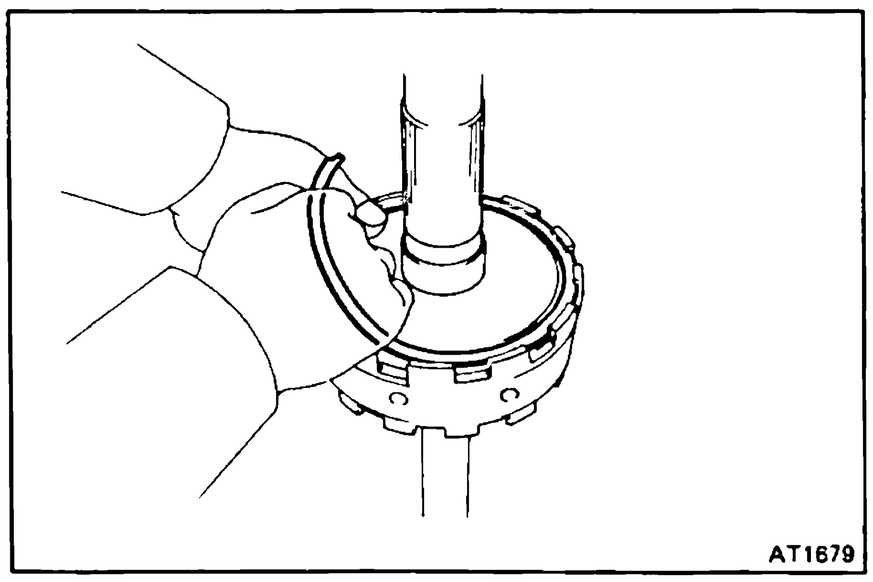

D4472

2. INSTALL REAR PLANETARY GEAR ASSEMBLY

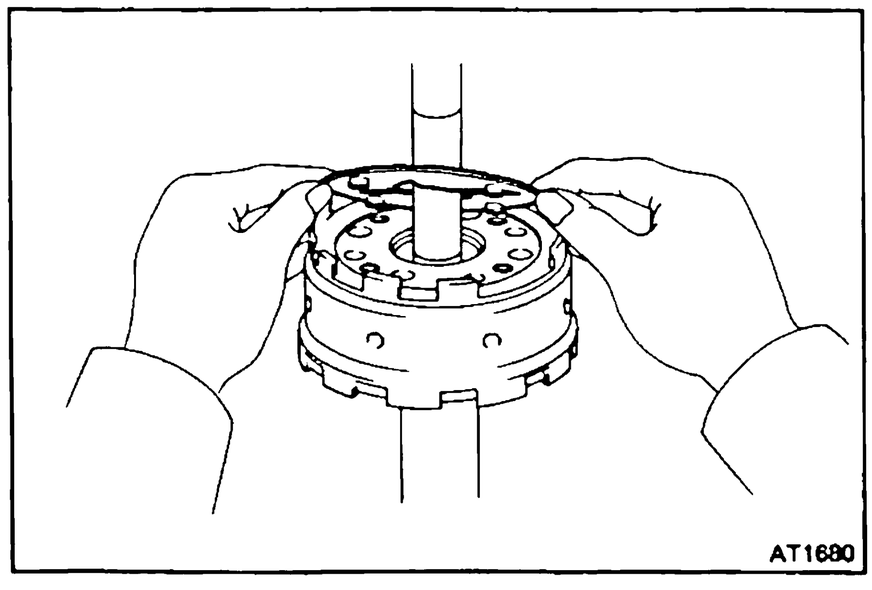
(a) Install the planetary sun gear to the rear planetary gear assembly.


D4471

(b) Install the assembled rear planetary ring gear and intermediate shaft to the rear planetary gear assembly.


AT1679

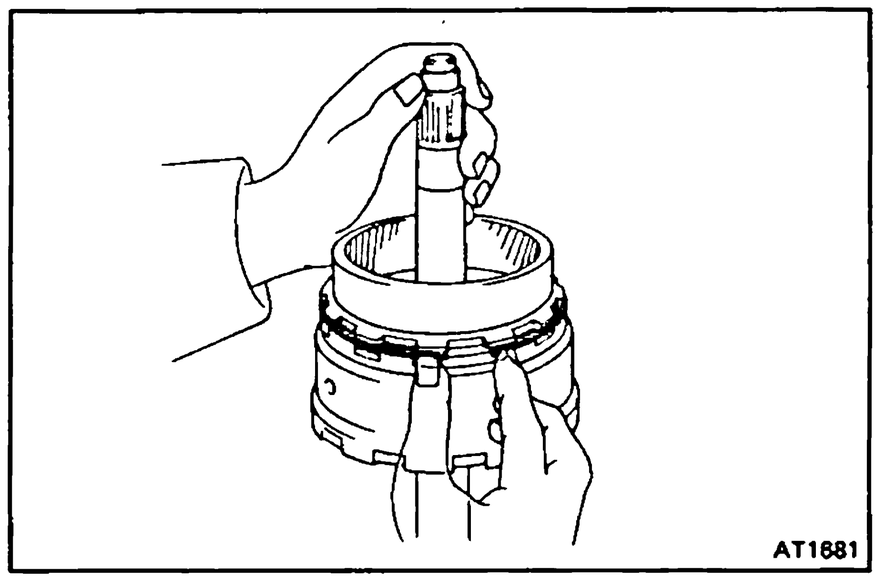
(c) Install the assembled rear planetary gear assembly and rear planetary ring gear to the output shaft.


AT1680

3. INSTALL OUTPUT SHAFT THRUST WASHER

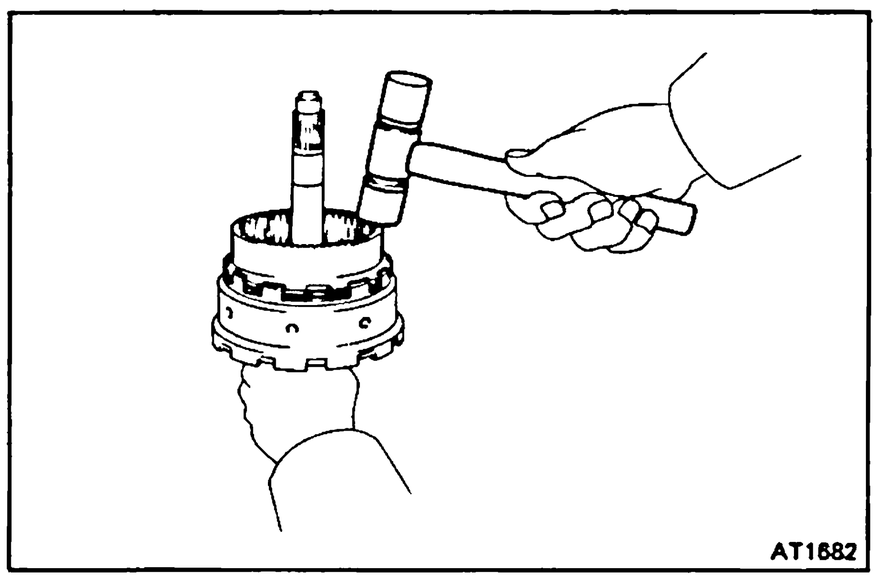
Install the thrust washer to the output shaft. Confirm the proper direction of the thrust washer.

NOTE: Securely fit the lip of the thrust washer into the groove of the planetary gear.

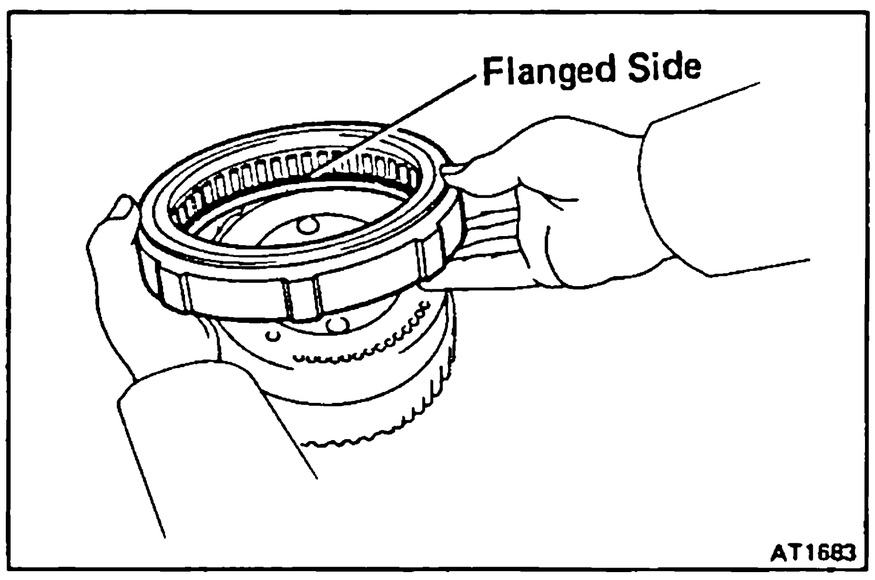


4. INSTALL FRONT PLANETARY RING GEAR

(a) Install the snap ring by hand.



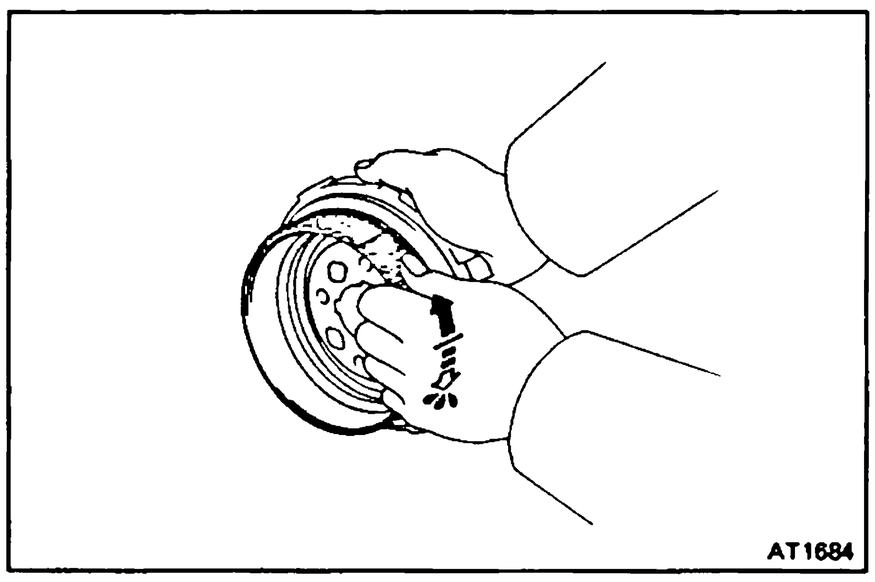
(b) Using a plastic hammer, lightly tap the planetary ring gear and install the snap ring into the groove.



5. INSTALL ONE-WAY CLUTCH

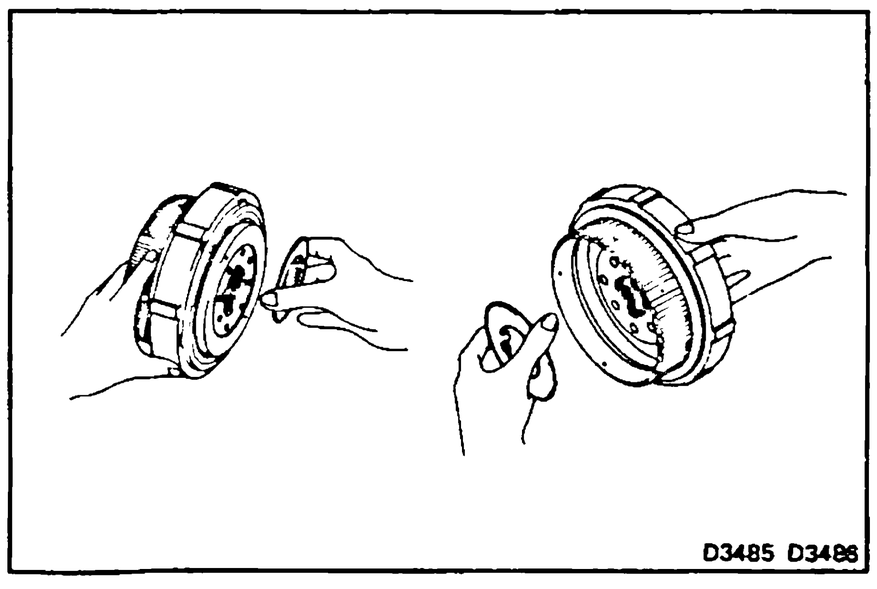
(a) Position the one-way clutch to the carrier facing the flanged side downward.

(b) While rotate the one-way clutch, install it to the carrier.



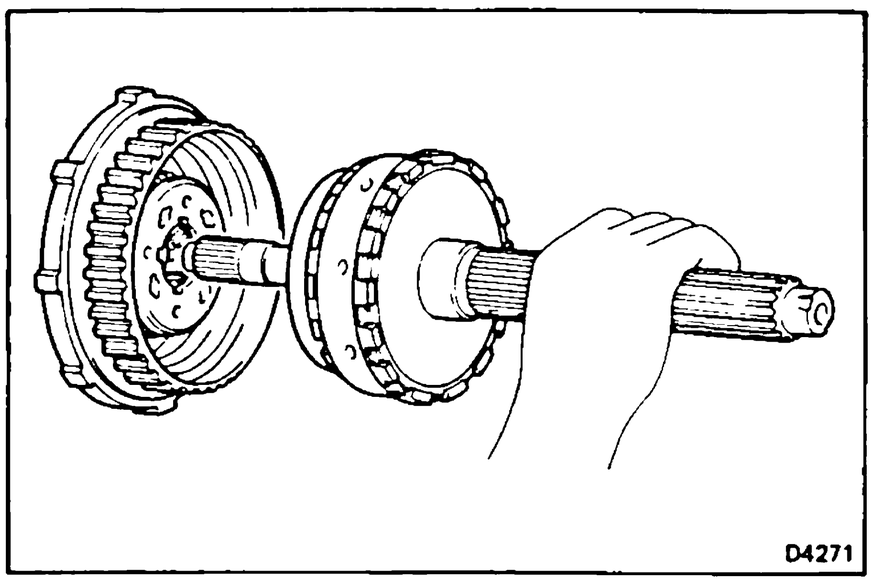
(c) Hold the one-way clutch outer race and must rotating freely counterclockwise and lock clockwise.

If the clutch does not work correctly, it must be replaced.



6. INSTALL FRONT PLANETARY CARRIER THRUST WASHER

Install the thrust washer to the front planetary carrier.

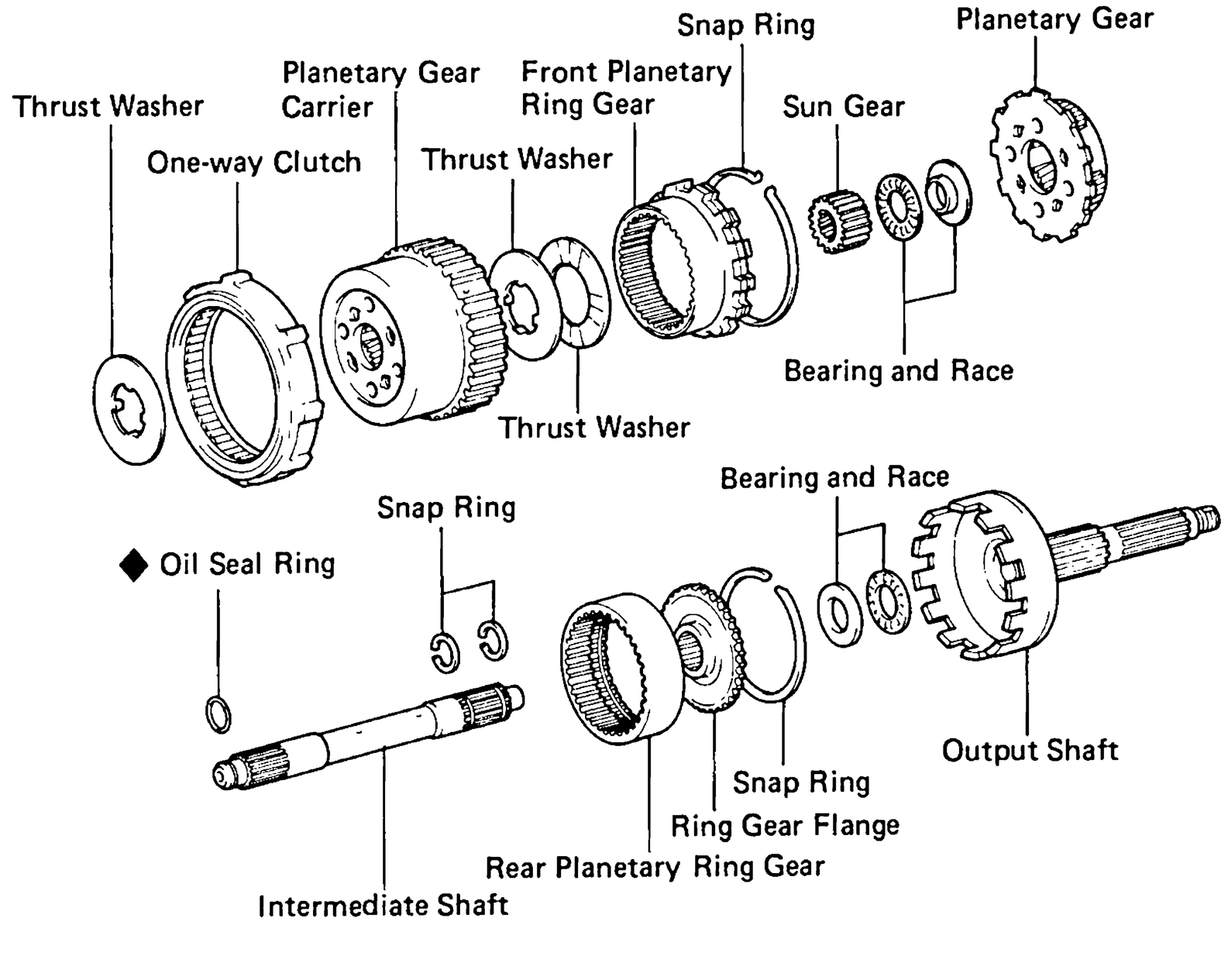


7. INSTALL FRONT PLANETARY CARRIER

Install the front planetary carrier to the output shaft.

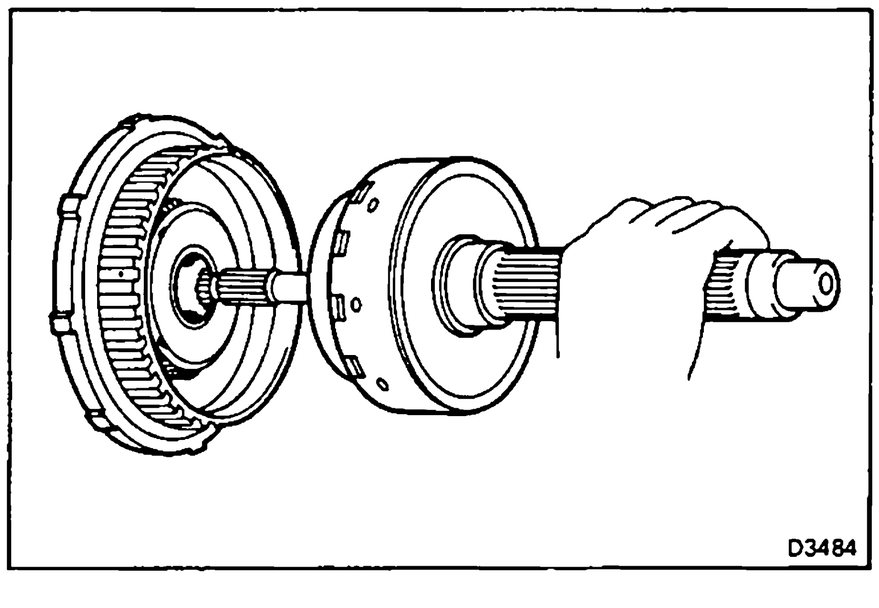
PLANETARY GEAR AND OUTPUT SHAFT (A440L)

COMPONENTS



◆ Non-reusable part

D4390

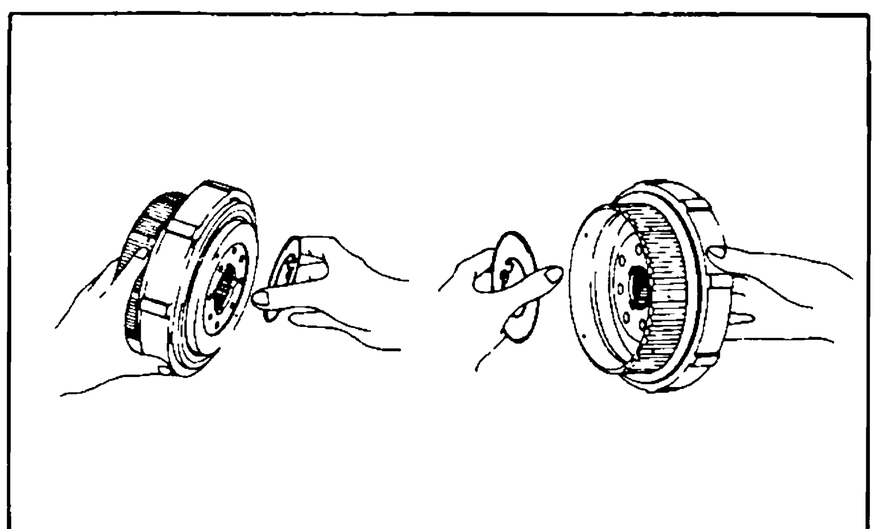


D3484

DISASSEMBLY OF PLANETARY GEAR AND OUTPUT SHAFT

1. REMOVE FRONT PLANETARY CARRIER

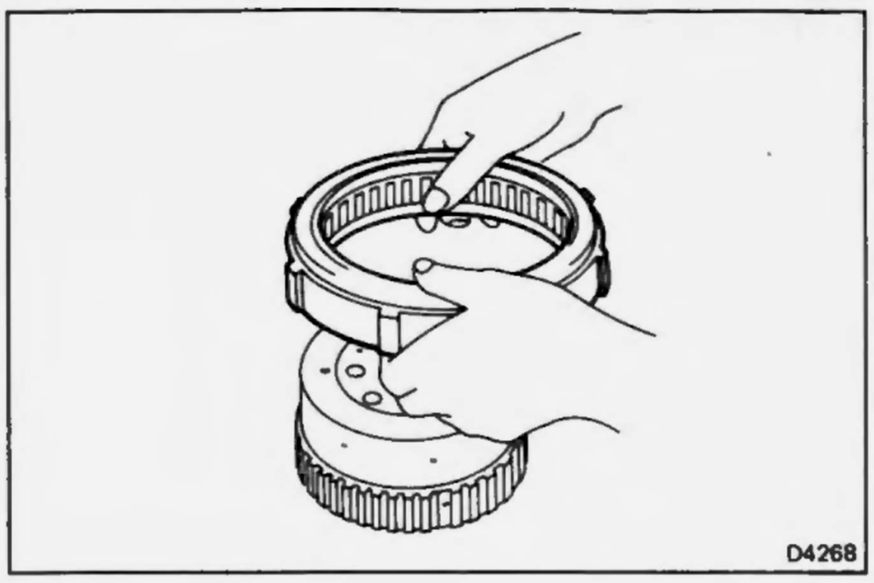
Remove the front planetary gear from the output shaft.



D3485 D3486

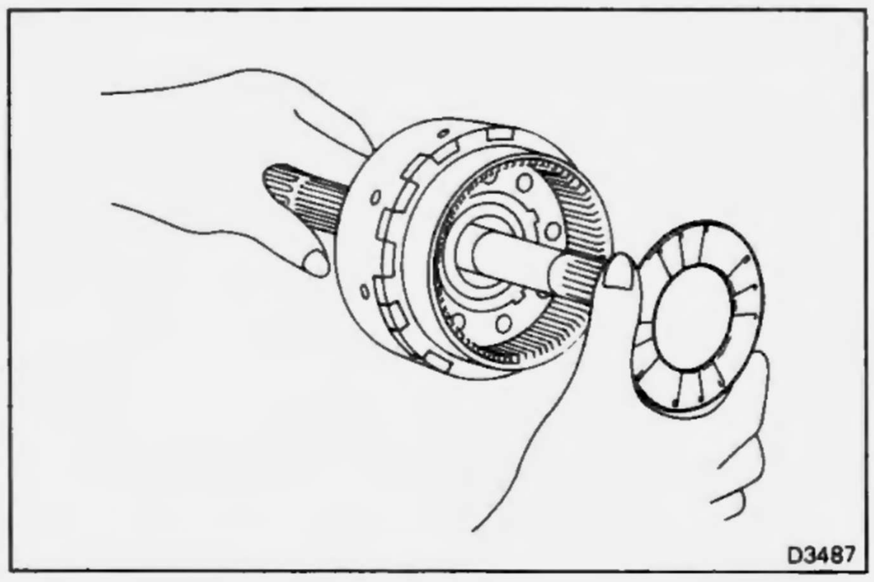
2. REMOVE FRONT PLANETARY CARRIER THRUST WASHER

Remove the two thrust washers from the front planetary carrier.



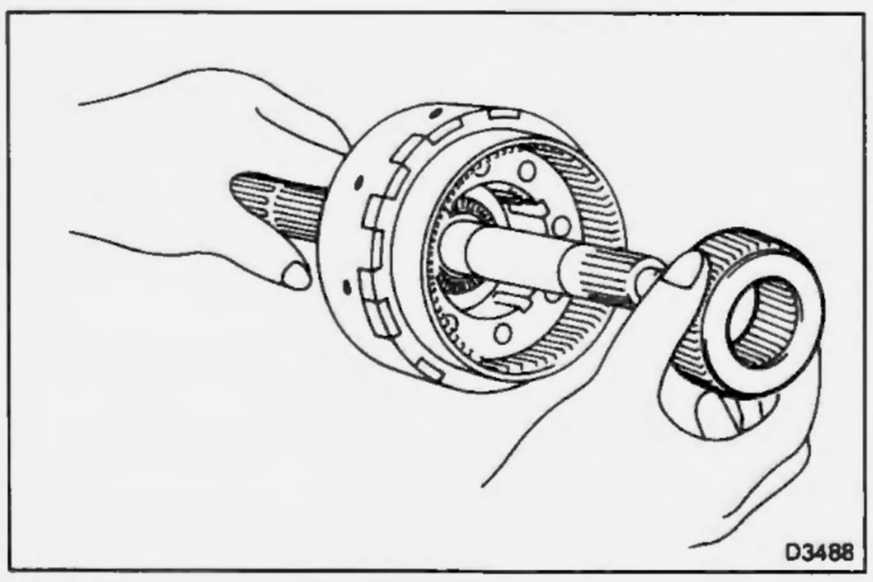
3. REMOVE ONE-WAY CLUTCH

Remove the one-way clutch from the front planetary carrier. Note the direction of the one-way clutch.



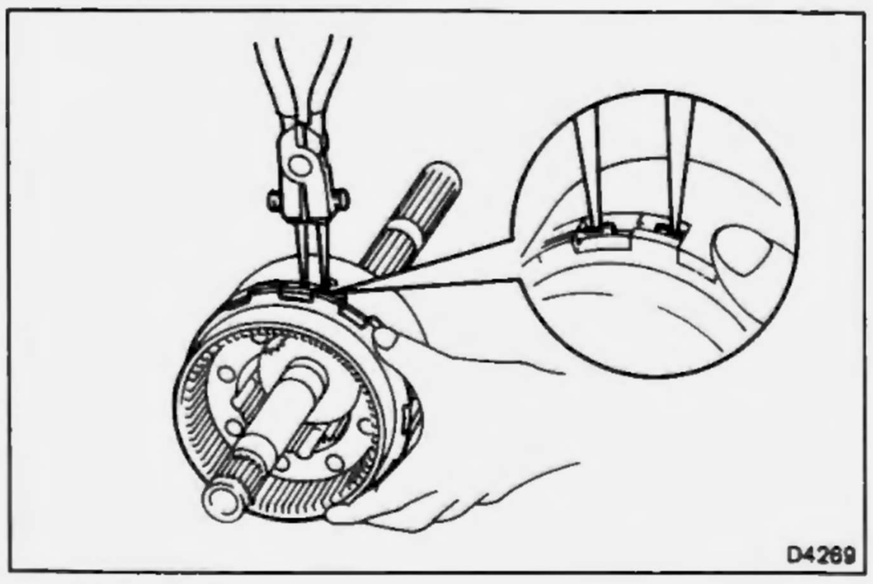
4. REMOVE OUTPUT SHAFT THRUST WASHER

Remove the thrust washer from the output shaft. Note the direction of the thrust washer.



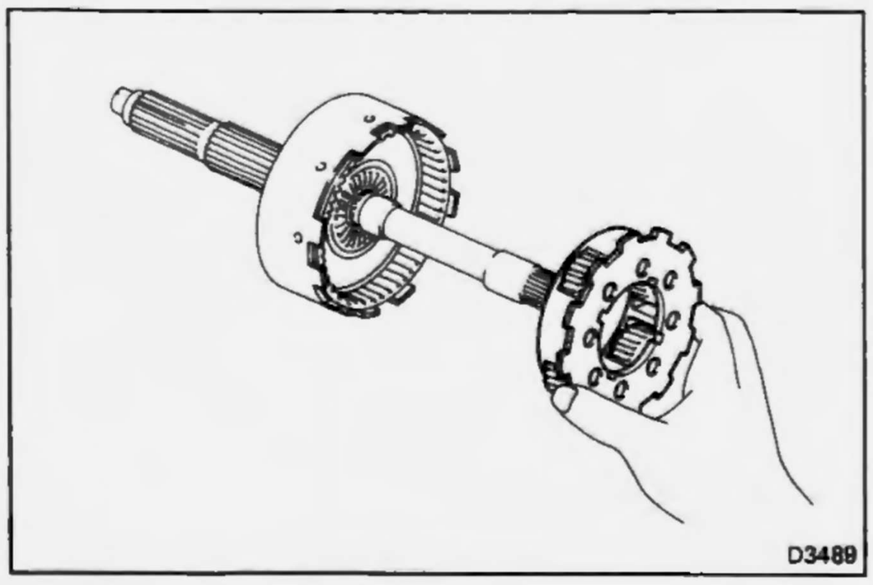
5. REMOVE PLANETARY SUN GEAR

Remove the planetary sun gear from the output shaft.



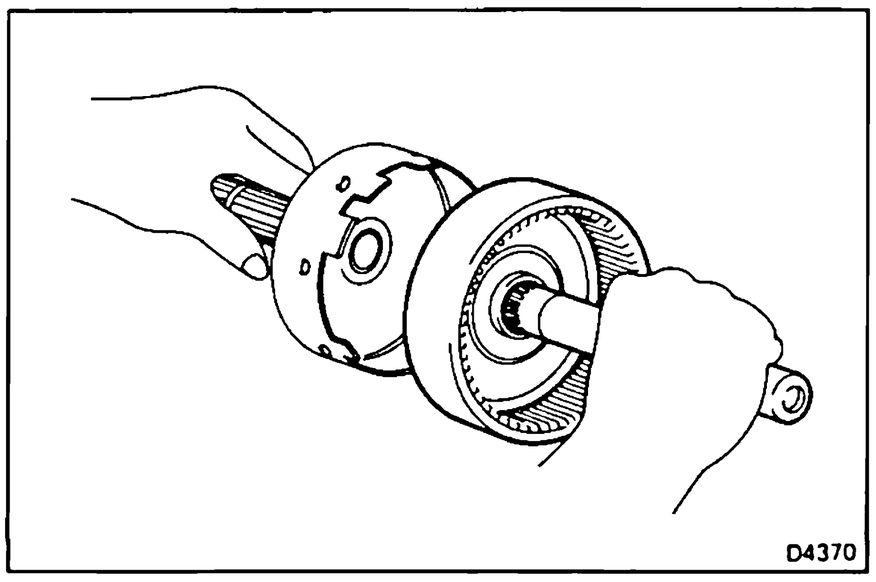
6. REMOVE PLANETARY RING GEAR

While compressing the snap ring remove the ring gear.



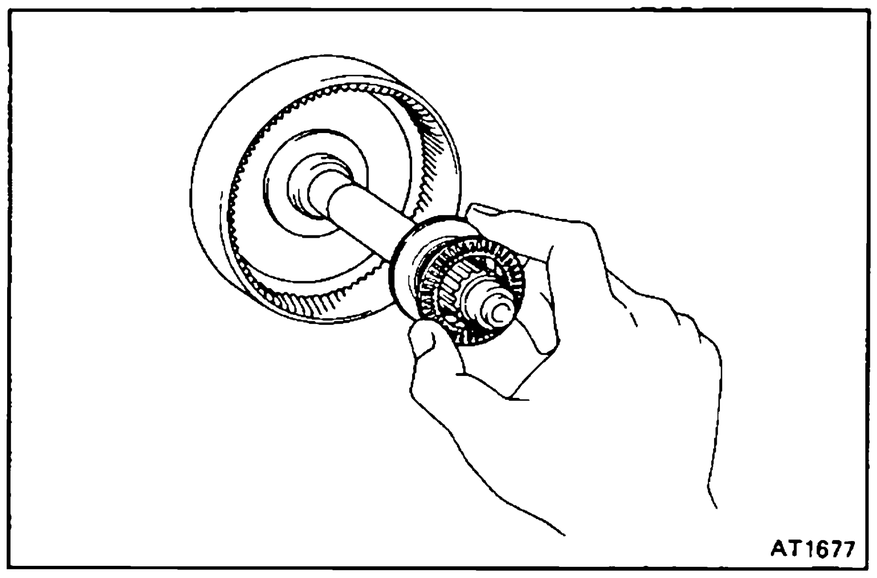
7. REMOVE REAR PLANETARY GEAR ASSEMBLY

Remove the rear planetary gear assembly from the output shaft.

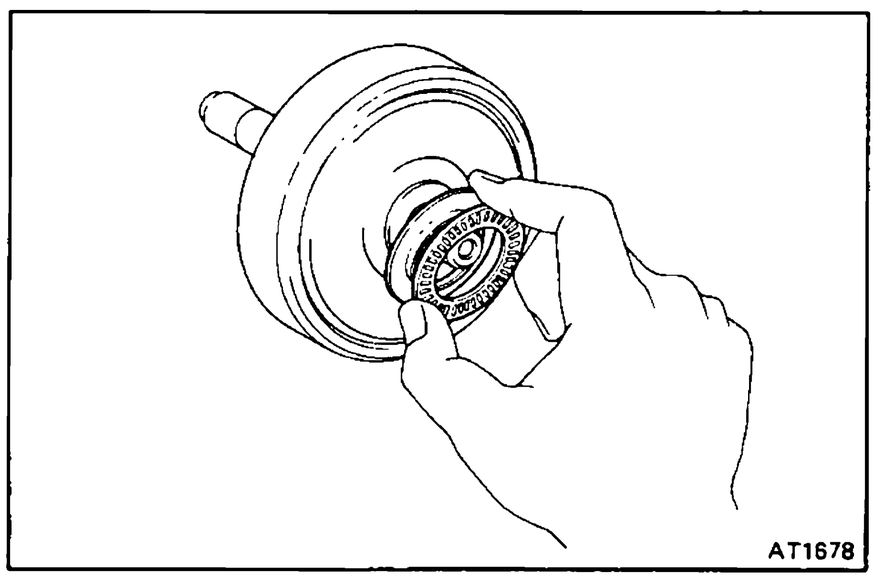


8. REMOVE REAR PLANETARY RING GEAR

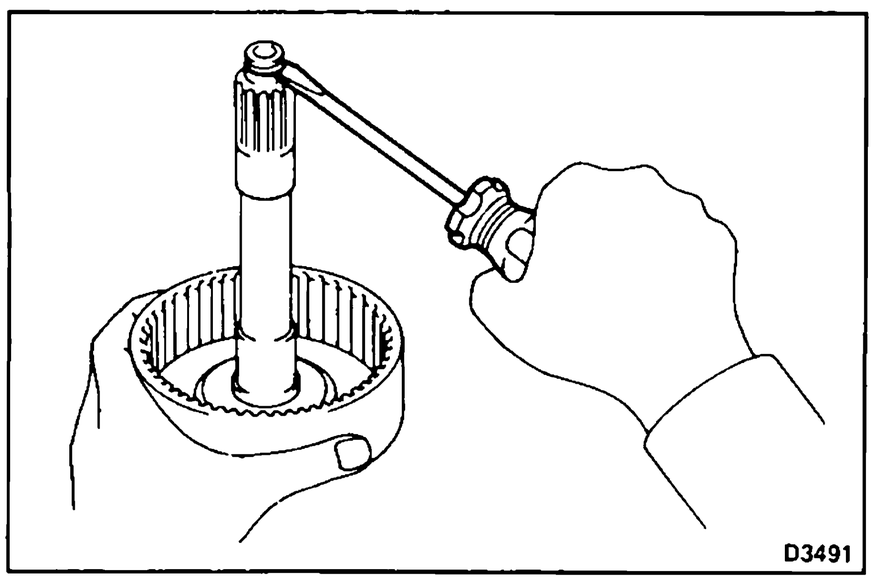
(a) Remove the assembled rear planetary gear and intermediate shaft from the output shaft.



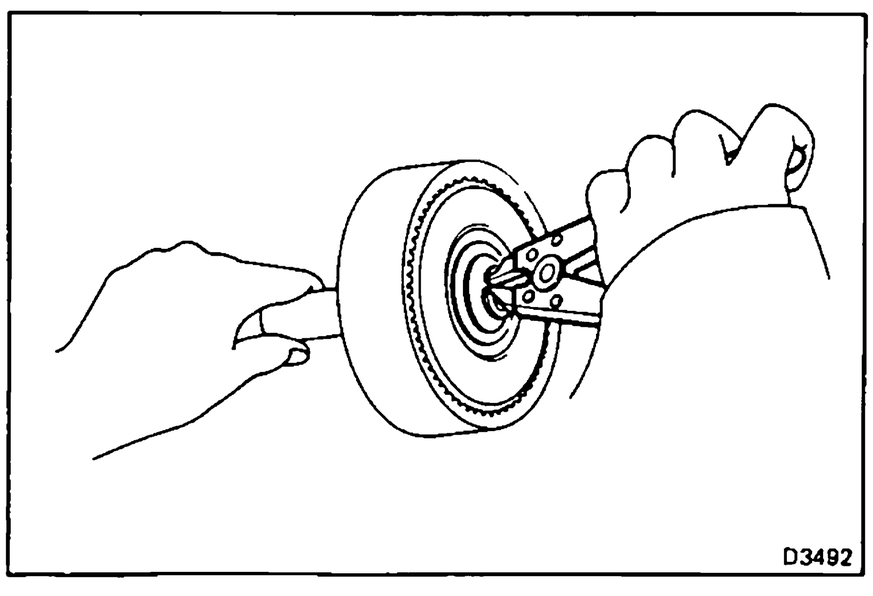
(b) Remove the thrust bearing and race from the rear planetary ring gear. Note the direction of the bearing and race.



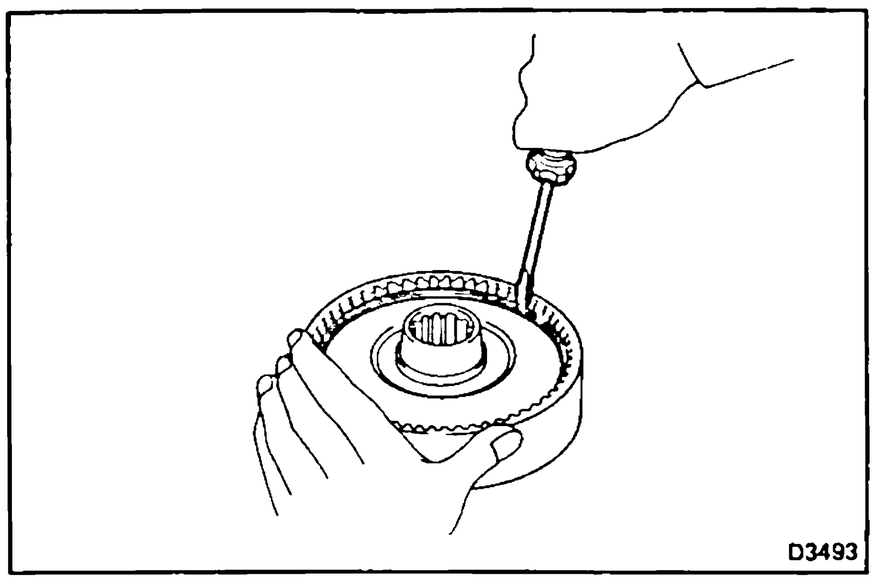
(c) Remove the thrust bearing and race from the rear planetary ring gear. Note the direction of the bearing and race.



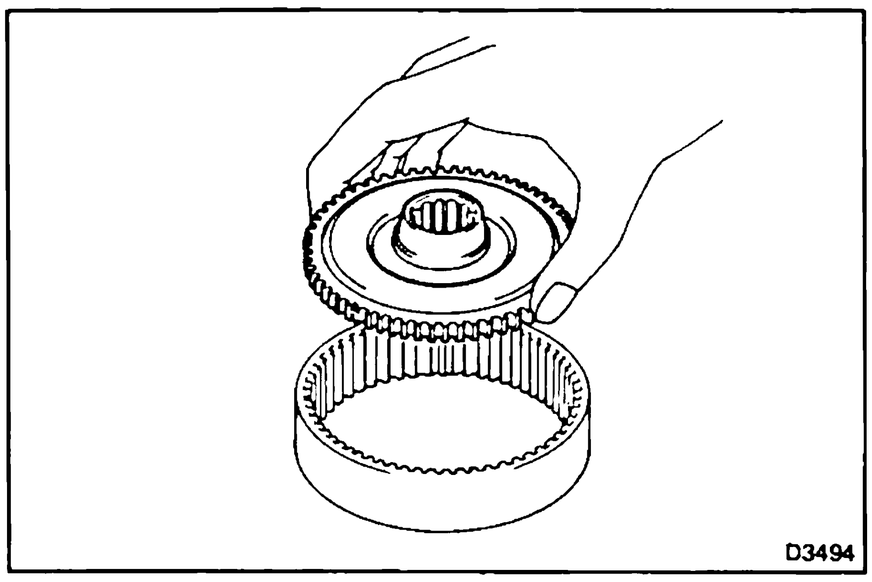
(d) Remove the oil seal ring from the intermediate shaft.



(e) Remove the snap ring and rear planetary ring gear from the intermediate shaft.


D3493

(f) Remove the snap ring and planetary gear flange from the rear planetary ring gear. Note the direction of the planetary gear flange.

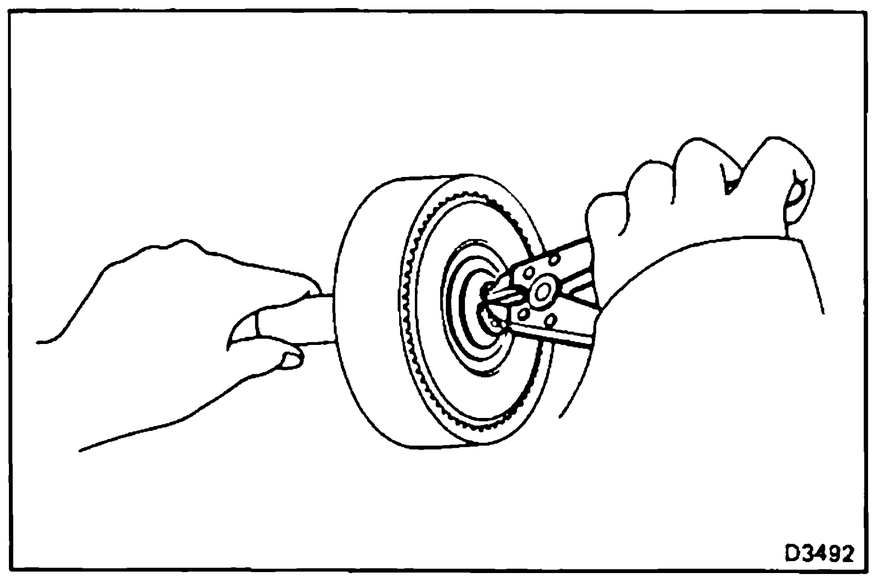

D3494

ASSEMBLY OF PLANETARY GEAR AND OUTPUT SHAFT

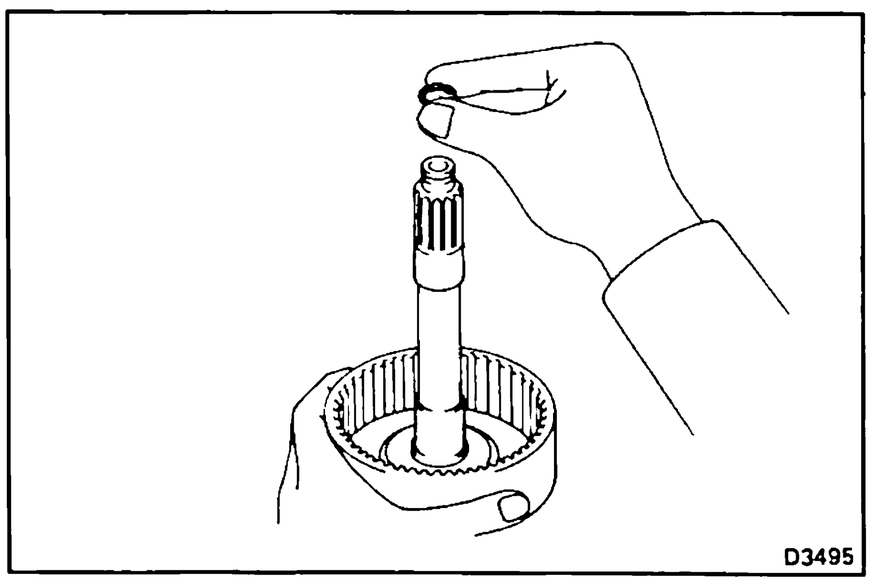
(See page AT-76)

1. INSTALL REAR PLANETARY RING GEAR

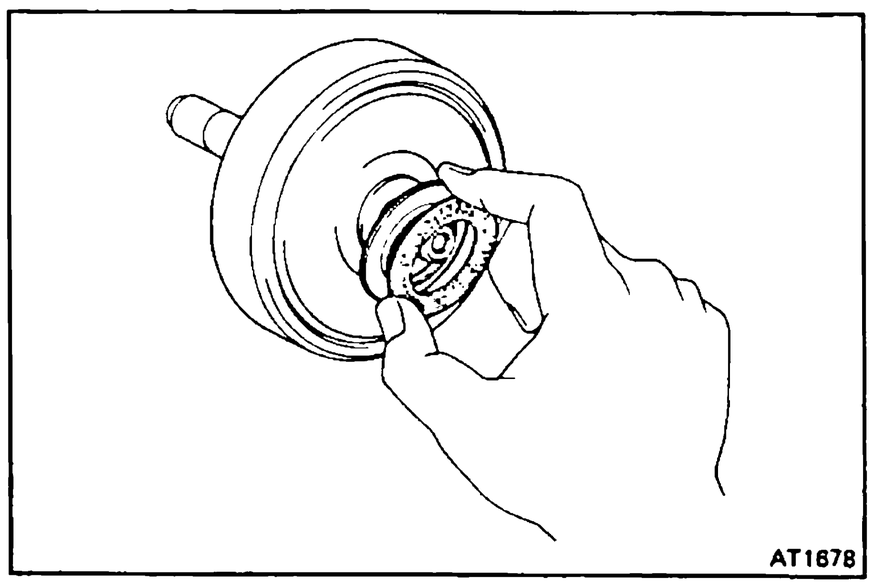
(a) Install the planetary gear flange and snap ring to the rear planetary ring gear. Confirm the proper direction of the planetary gear flange.


D3492

(b) Install the rear planetary ring gear and snap ring to the intermediate shaft.


D3495

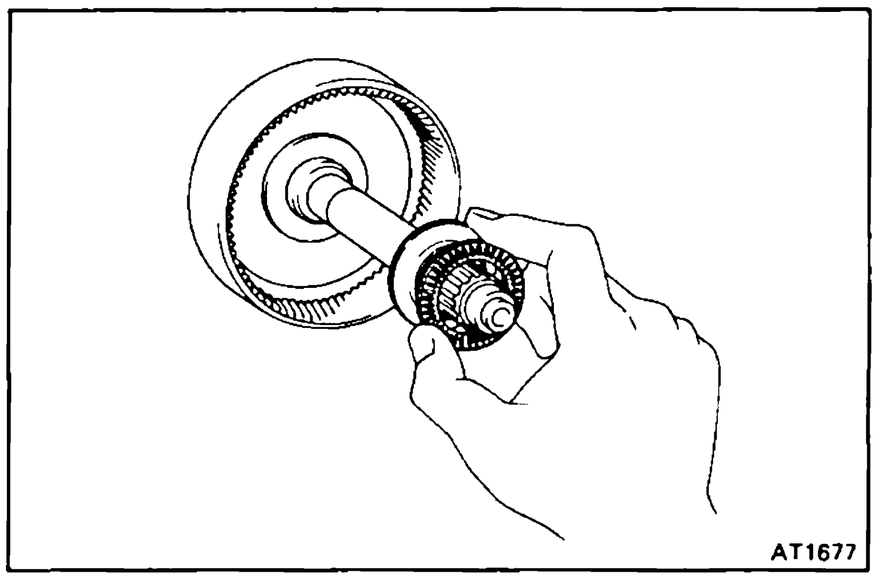
(c) Apply ATF to the new oil seal ring, and install it to the intermediate shaft.


AT1678

(d) Install the race and thrust bearing to the rear planetary ring gear. Make sure the correct direction of the bearing and race.

NOTE: Race and bearing diameter. mm (in.)

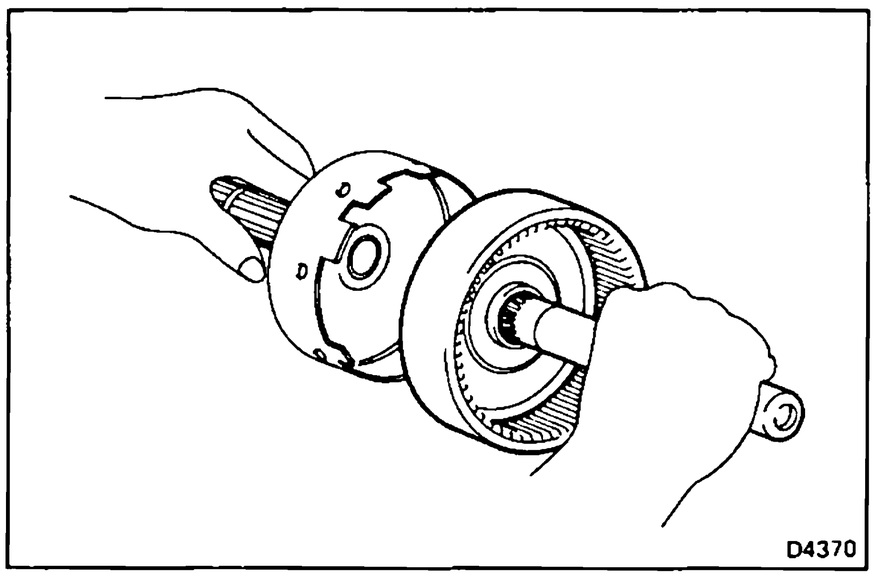
	Inside	Outside
Race	32.8 (1.291)	50.4 (1.984)
Bearing	34.7 (1.366)	52.0 (2.047)



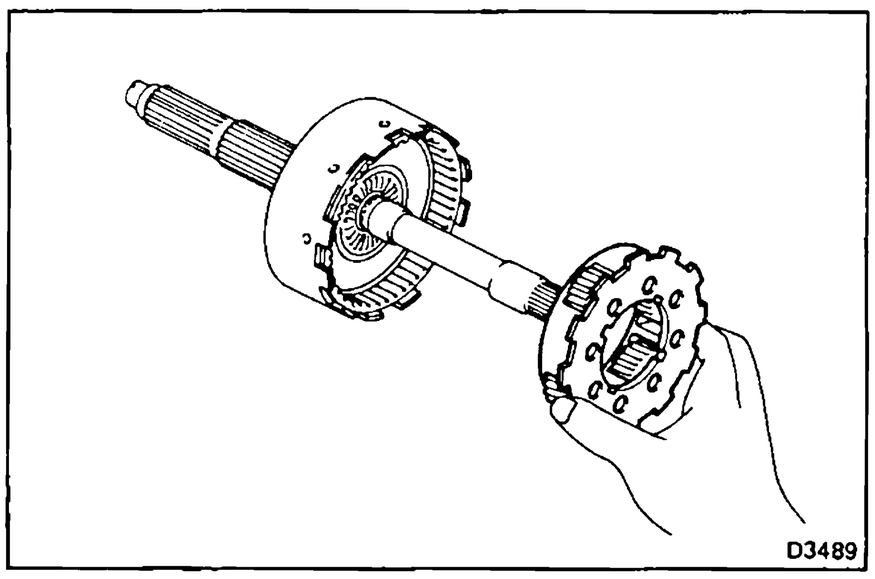
(e) Install the race and thrust bearing to the rear planetary ring gear. Confirm the proper direction of the bearing and race.

NOTE: Race and bearing diameter mm (in.)

	Inside	Outside
Race	32.8 (1.291)	50.4 (1.984)
Bearing	34.7 (1.366)	52.0 (2.047)

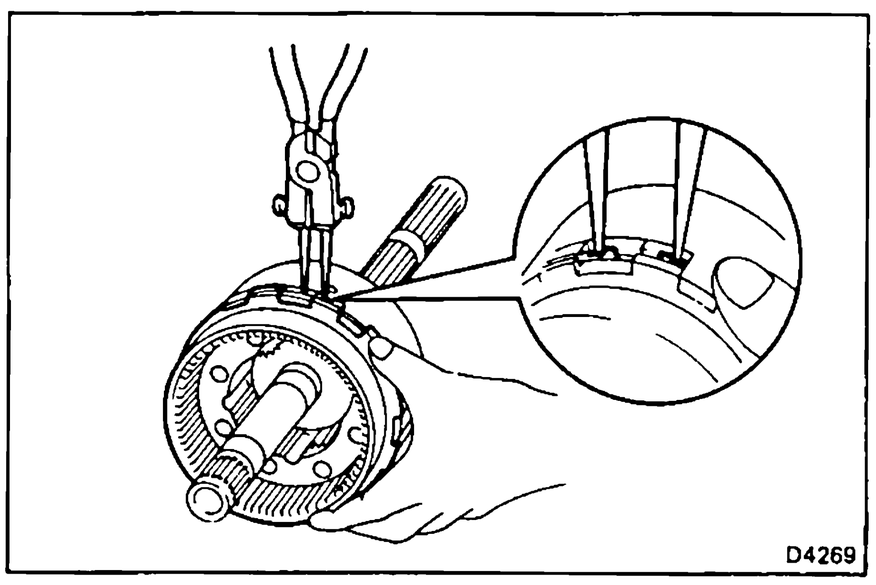


(f) Install the assembled rear planetary ring gear and intermediate shaft to the output shaft.



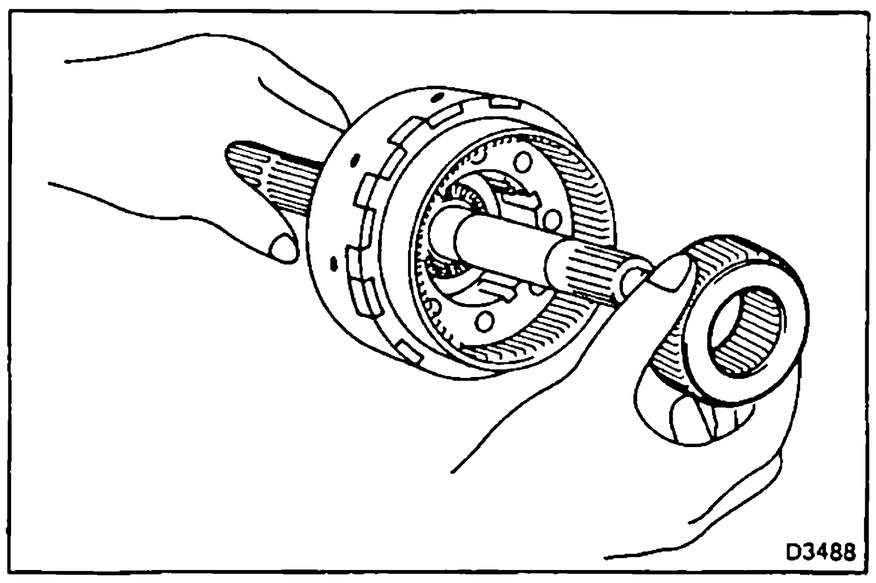
2. INSTALL REAR PLANETARY GEAR ASSEMBLY

Install the rear planetary ring gear assembly to the output shaft.



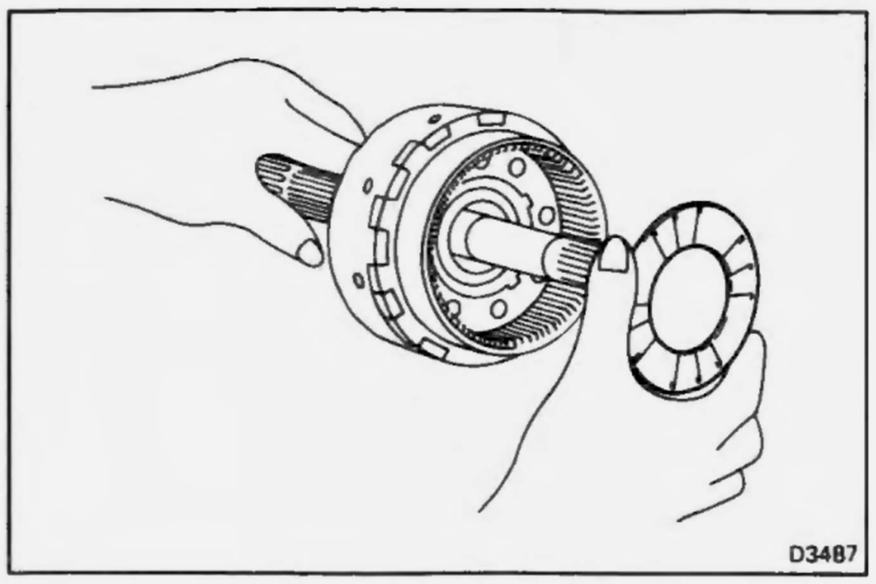
3. INSTALL FRONT PLANETARY RING GEAR

While compressing the snap ring install the ring gear.



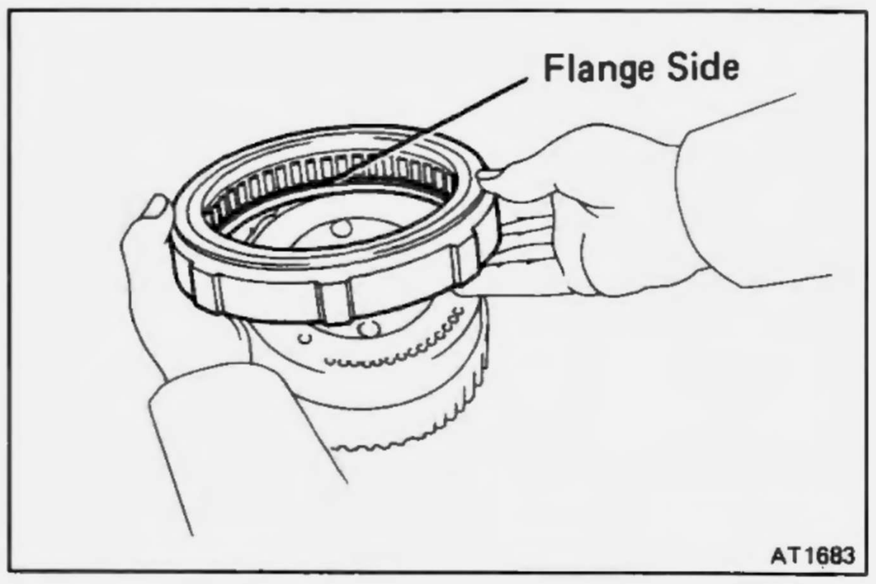
4. INSTALL PLANETARY SUN GEAR

Install the planetary sun gear to the output shaft.



5. INSTALL OUTPUT SHAFT THRUST WASHER

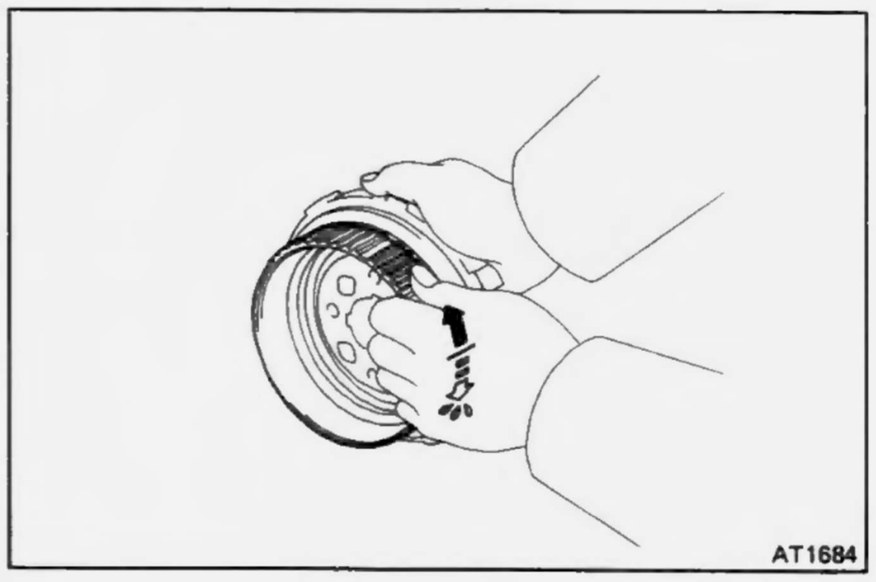
Install the thrust washer to the output shaft. Confirm the proper direction of the thrust washer.



6. INSTALL ONE-WAY CLUTCH

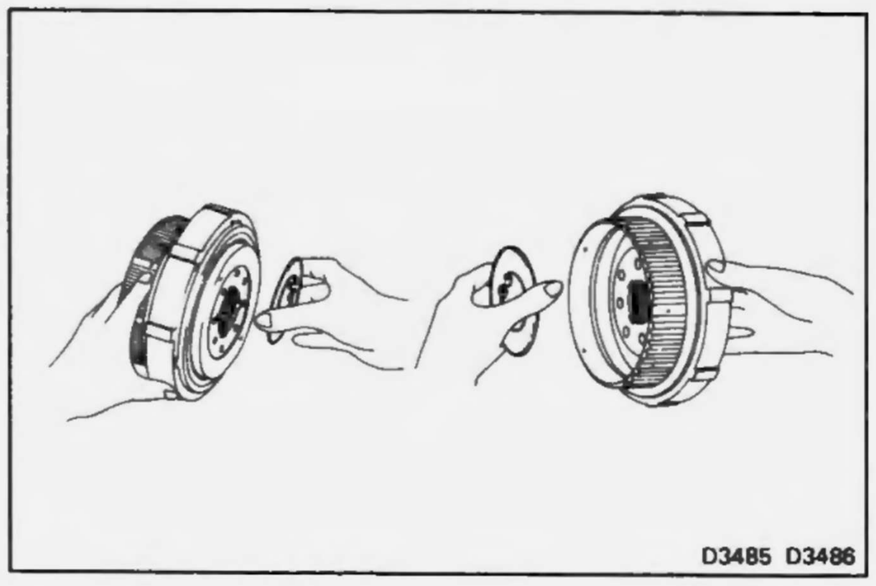
(a) Position the one-way clutch to the carrier.

(b) While rotate the one-way clutch, install it to the carrier.



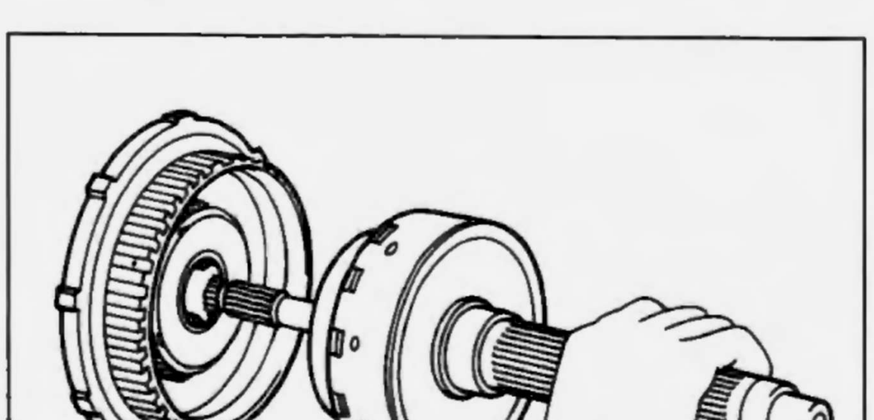
(c) Hold the one-way clutch outer race and must rotating freely counterclockwise and lock clockwise.

If the clutch does not work correctly, it must be replaced.



7. INSTALL FRONT PLANETARY CARRIER THRUST WASHERS

Install the thrust washers to the front planetary thrust washer.

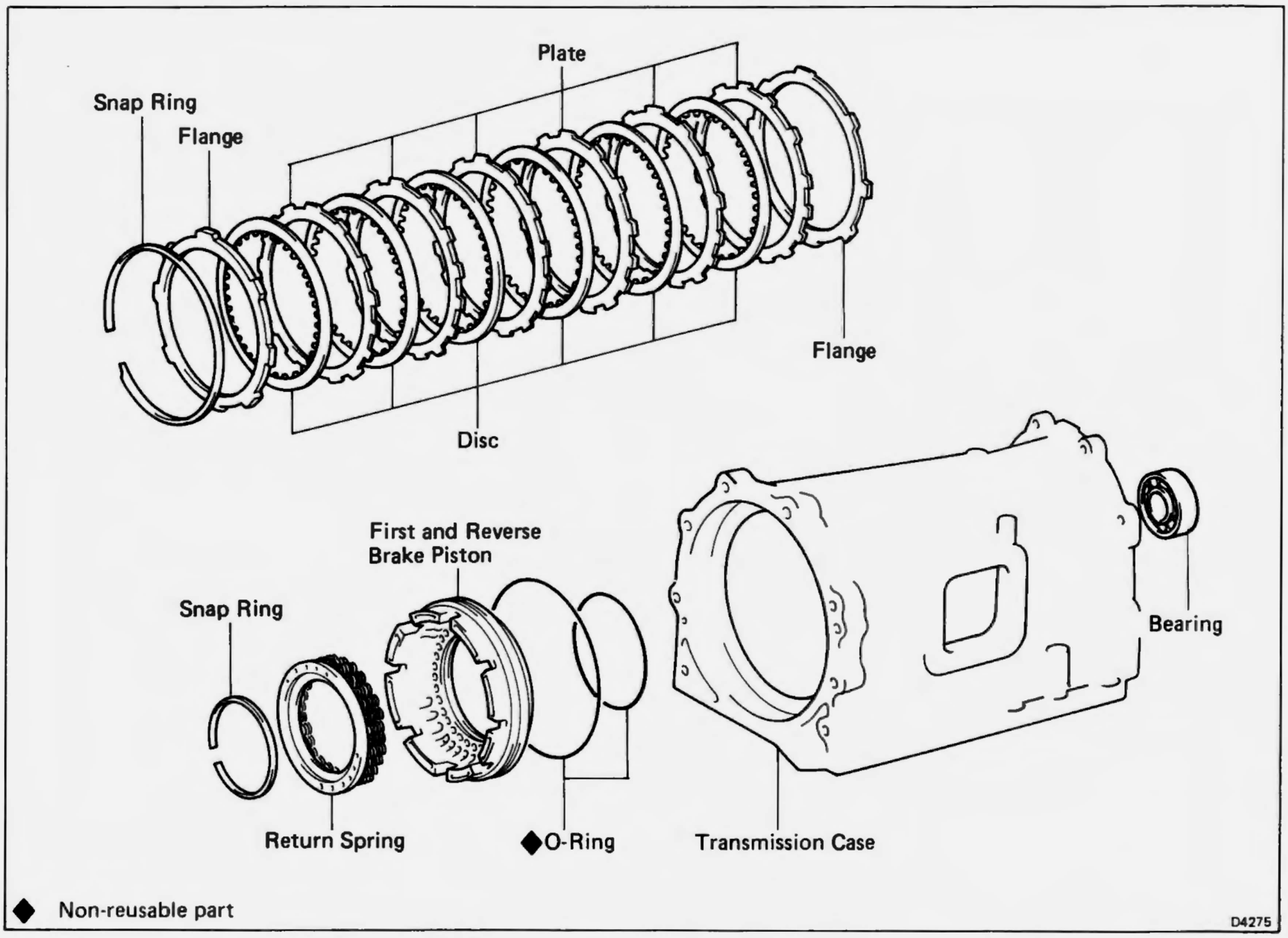


8. INSTALL FRONT PLANETARY CARRIER

Install the front planetary carrier to the output shaft.

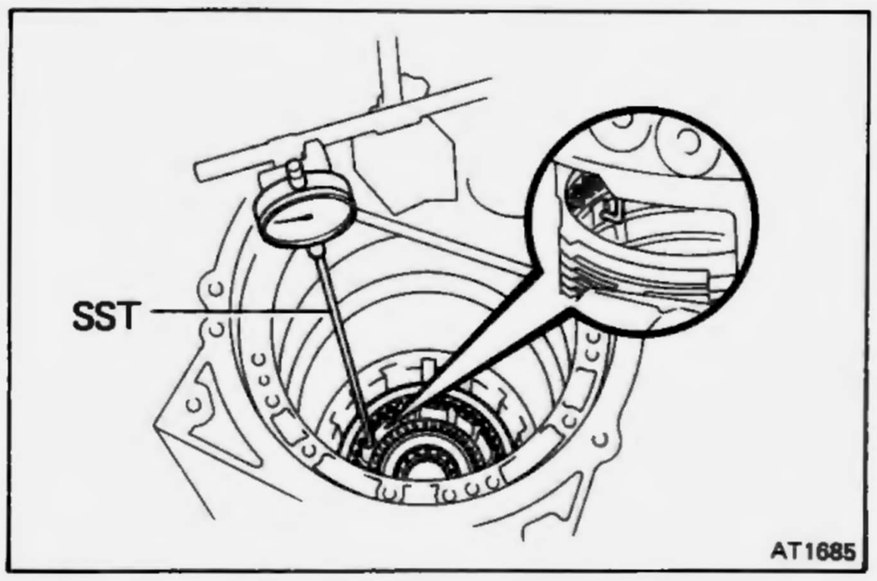
FIRST AND REVERSE BRAKE (B_3)

COMPONENTS



◆ Non-reusable part

D4275



AT1685

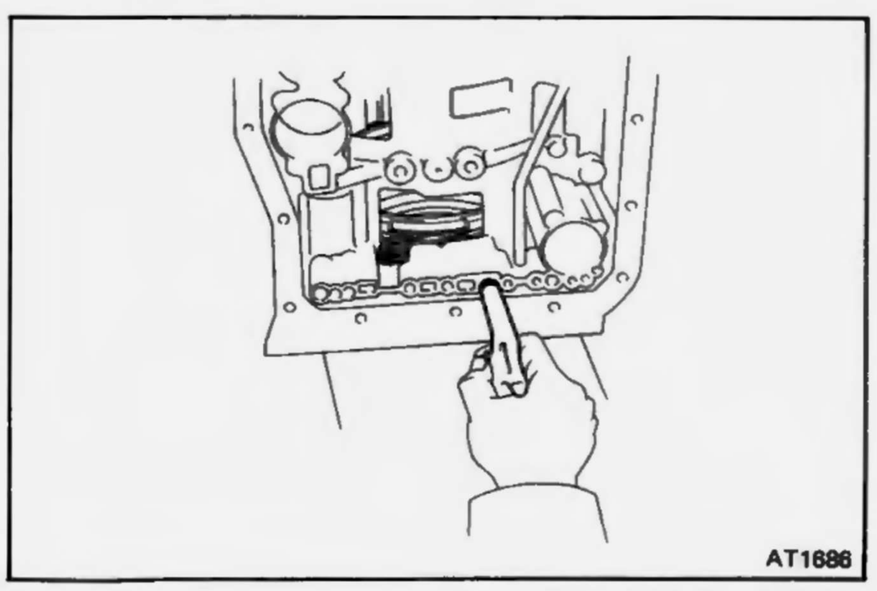
DISASSEMBLY OF FIRST AND REVERSE BRAKE

1. CHECK PISTON STROKE OF FIRST AND REVERSE BRAKE (B_3)

(a) Set the dial indicator and SST to the transmission case.

NOTE:
- The SST should be perpendicular to the piston.
- The SST should touch nothing but the piston.

SST 09350-36010 (09350-06120, 09350-06130)



AT1686

(b) Measure the piston stroke applying and releasing the compressed air (8 kg/cm², 114 psi or 785 kPa) as shown.

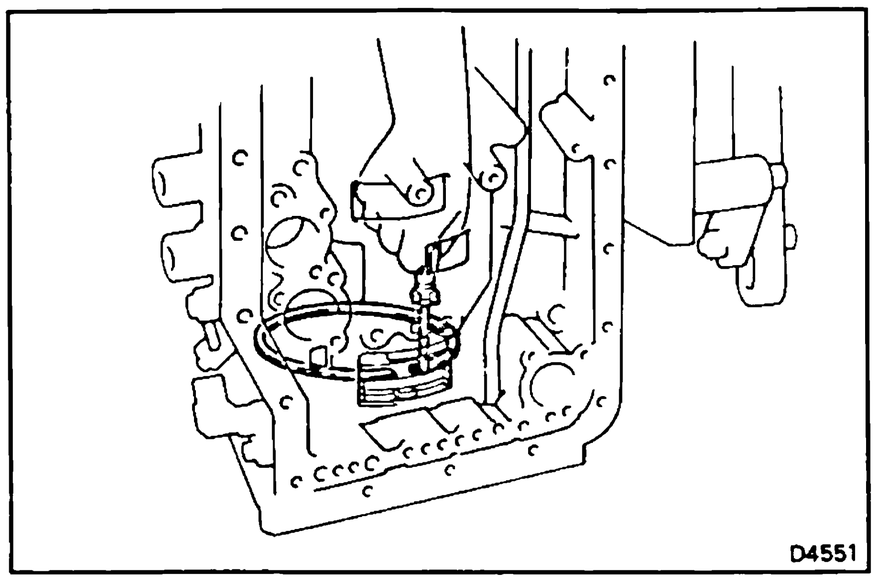
NOTE: Measure the piston stroke 2–3 times and take the average value.

Piston stroke: 3.30 – 3.80 mm (0.130 – 0.150 in.)

If the stroke exceeds the limit, replace the clutch discs.

Flange thickness: mm (in.)

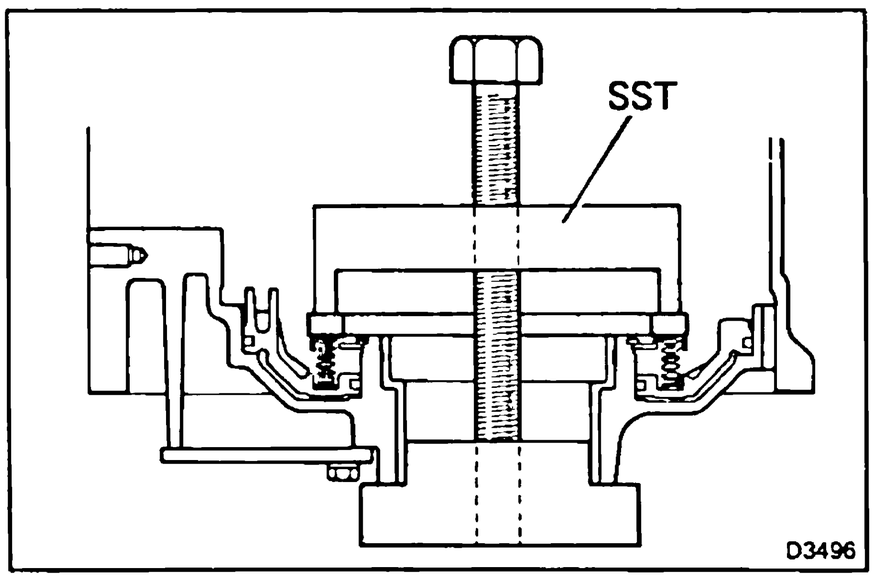
No.	Thickness
None	6.65 (0.2618)
1	7.05 (0.2776)
2	7.45 (0.2933)



2. REMOVE FLANGE, DISCS, PLATES AND CUSHION PLATE

(a) Remove the snap ring.

(b) Remove the flange, discs, plates and cushion plate. Note the direction of the cushion plate.

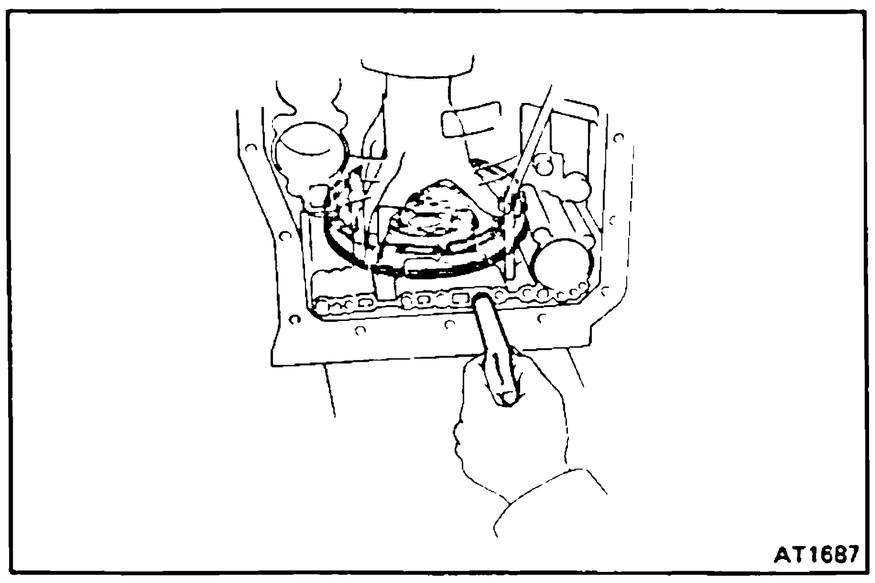


3. COMPRESS RETURN SPRINGS AND REMOVE SPRING RETAINER SNAP RING

(a) Install SST. Compress the springs evenly by tightening the bolt gradually. And remove the snap ring.

SST 09350-36010 (09350-06030)

(b) Remove the first and reverse brake piston return spring assembly.

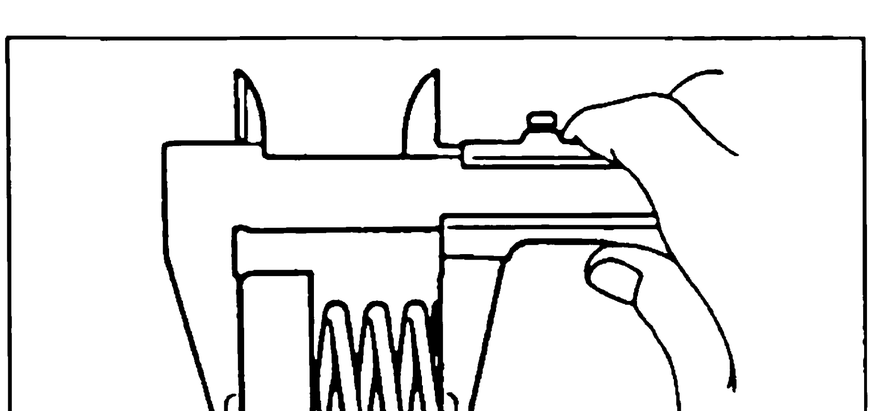


4. REMOVE FIRST AND REVERSE BRAKE PISTON

(a) Apply compressed air into the passage of the case to remove the piston.

(b) If the piston does not pop out with compressed air, use needle-nose pliers to remove it.

(c) Remove the two O-rings from the piston.

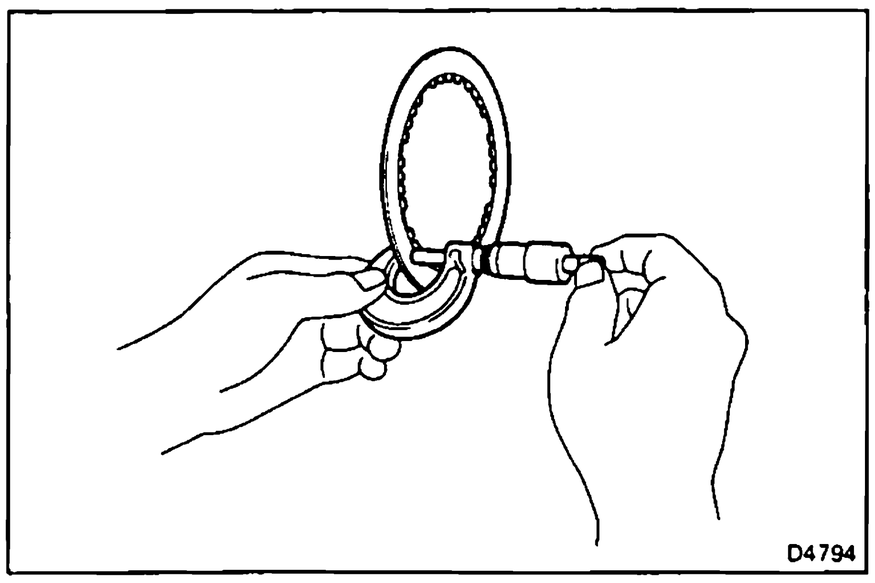


INSPECTION OF FIRST AND REVERSE BRAKE PISTON

1. INSPECT RETURN SPRING

Check for damage, squareness, rust and collapsed coils. Measure the spring free length and replace it if less than that specification.

Free length: 23.9 mm (0.0941 in.)



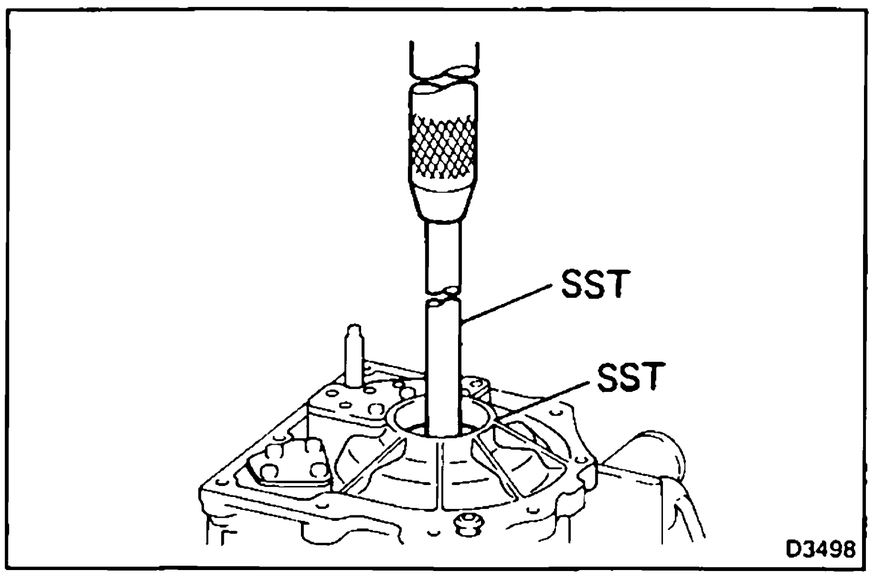
2. CHECK DISCS

Using a micrometer, measure the thickness of the discs.

Minimum thickness: 1.5 mm (0.059 in.)

If the thickness is less than the minimum, replace the discs.

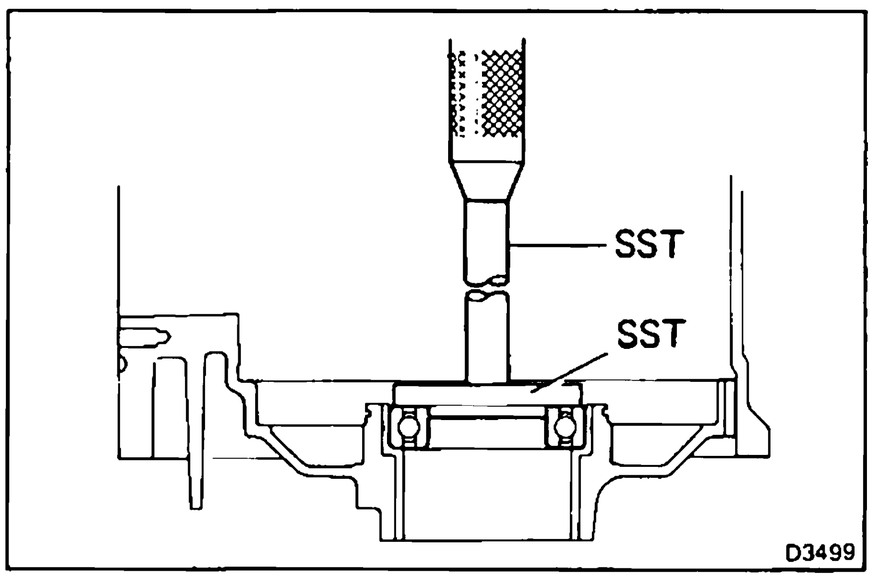
REPLACEMENT OF FRONT OUTPUT SHAFT BEARING



1. REMOVE FRONT OUTPUT SHAFT BEARING

Using SST, press out the front bearing from the transmission case.

SST 09350-36010 (09350-06050, 09350-06070)



2. INSTALL FRONT OUTPUT SHAFT BEARING

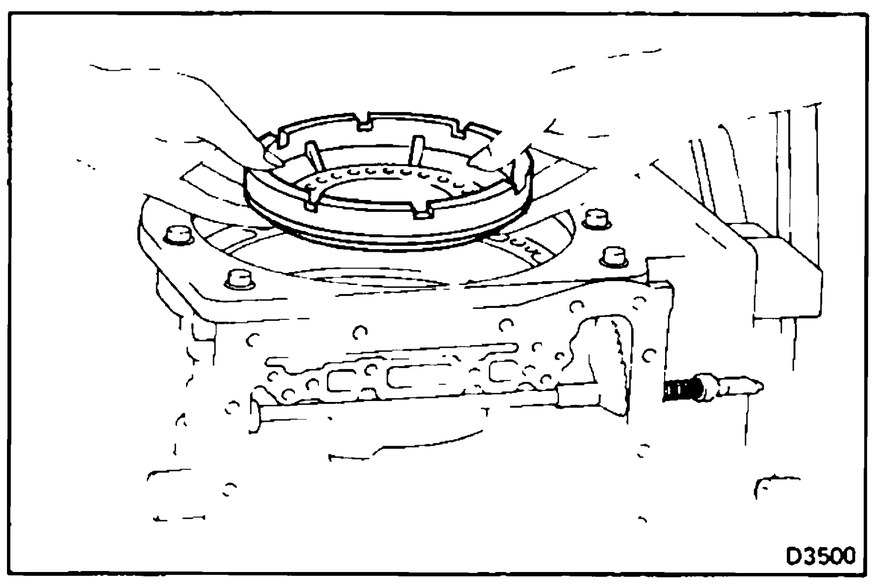
Using SST, press in the front bearing to the transmission case.

SST 09350-36010 (09350-06050, 09350-06060)

NOTE: Check that the bearing rotates smoothly.

ASSEMBLY OF FIRST AND REVERSE BRAKE PISTON

(See page AT-82)

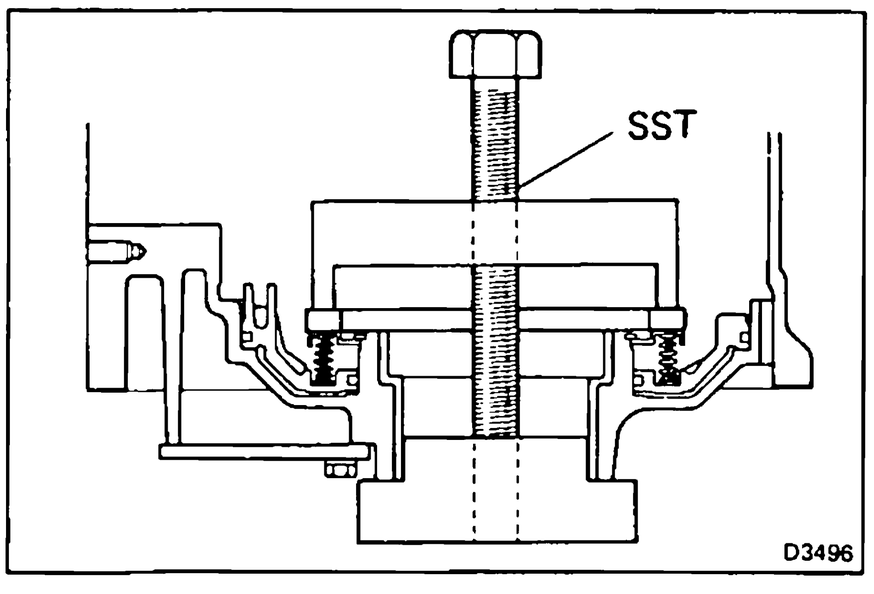


1. INSTALL FIRST AND REVERSE BRAKE PISTON

(a) Apply ATF to the two new O-rings, and install it to the piston.

(b) Install the first and reverse brake piston to the transmission case.

NOTE:
- Install the O-ring taking care not to damage screw.
- Using the side of a hammer, evenly press in the piston.



2. INSTALL PISTON RETURN SPRING ASSEMBLY AND SNAP RING

(a) Place SST base under case.

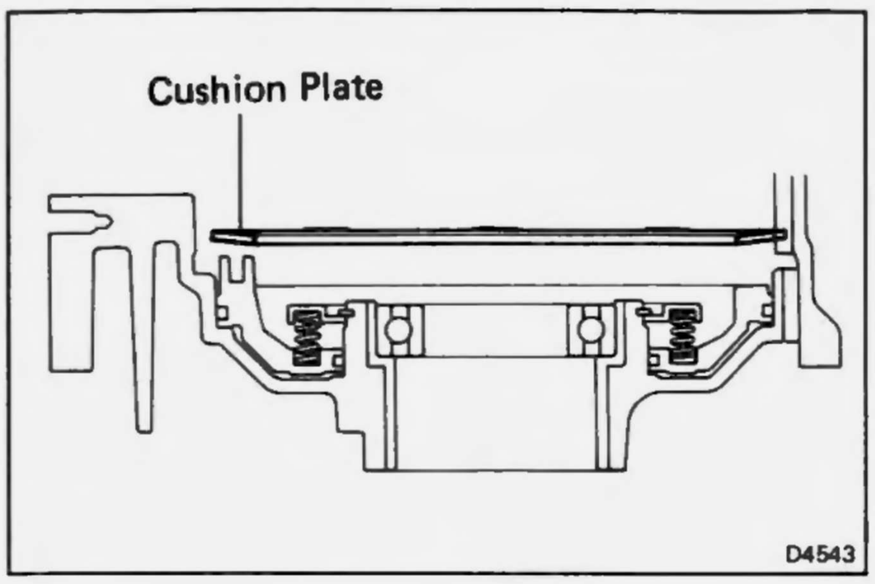
(b) Install the return spring, new snap ring and SST to the case.

(c) Using SST, compress the springs evenly by tightening the bolt gradually.

SST 09350-36010 (09350-06030)

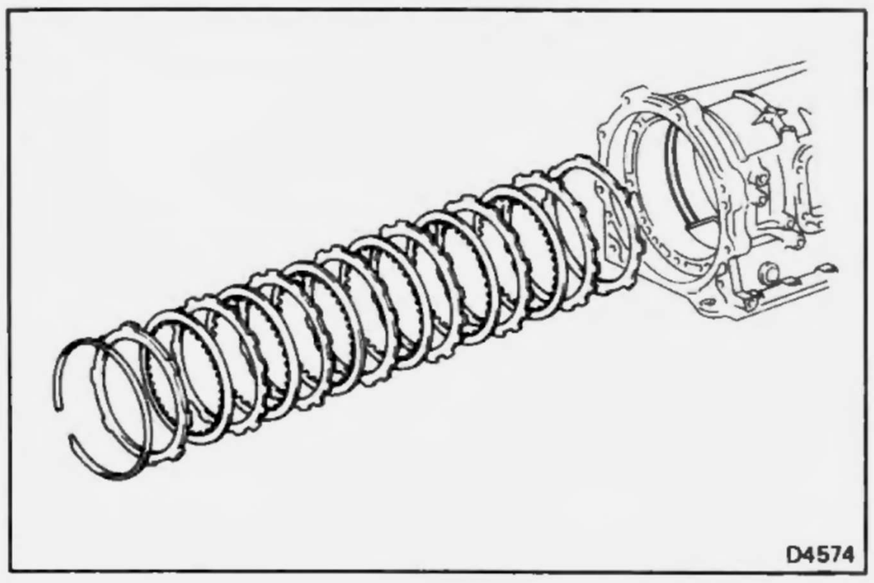
(d) Install the snap ring and remove SST.

CAUTION: Avoid overtightening the bolt and bearing the spring retainer.

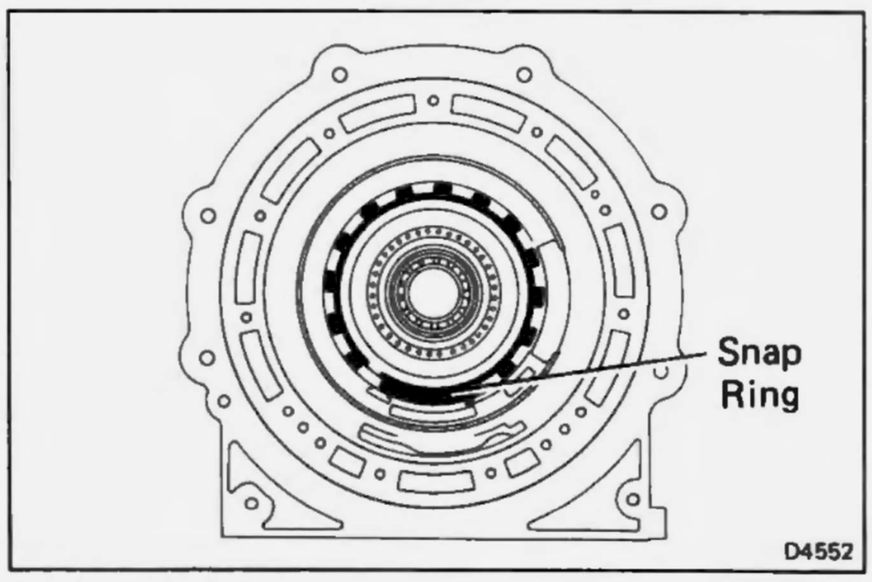


3. INSTALL CUSHION PLATE, PLATES, DISCS AND FLANGE

(a) Install the cushion plate. Confirm the proper direction of the cushion plate.



(b) Install the plates, discs and flange.
Install in order:
Plate—disc—plate—disc—plate—disc—plate—disc—plate—disc—plate—disc—flange



(c) Install the snap ring.

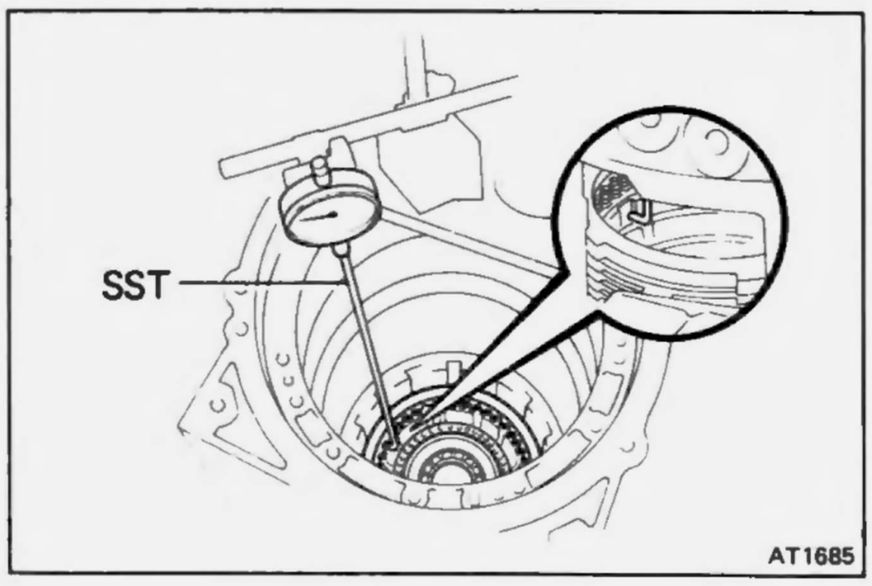
NOTE: Be sure the end gap of the snap ring is not aligned with one of the cutouts.

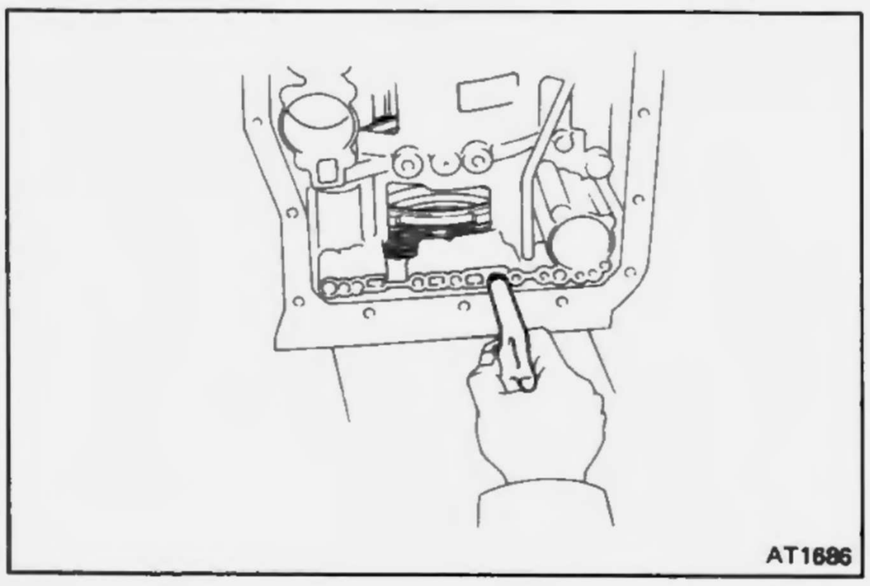
4. RECHECK PISTON STROKE OF FIRST AND REVERSE BRAKE

(a) Set a dial indicator and SST to the transmission case.

NOTE:
- The SST should be perpendicular to the piston.
- The SST should touch nothing but the piston.

SST 09350-36010 (09350-06120, 09350-06130)





(b) Measure the piston stroke by applying and releasing the compressed air (8 kg/cm^2, 114 psi or 785 kPa) as shown.

NOTE: Measure the piston stroke 2—3 times and take the average value.

Piston stroke: 3.30 — 3.80 mm (0.130 — 0.150 in.)

If the stroke exceeds the limit, replace the clutch discs and recheck the piston stroke.

If the piston stroke is less than the limit, parts may be improperly assembled and require reassembly.

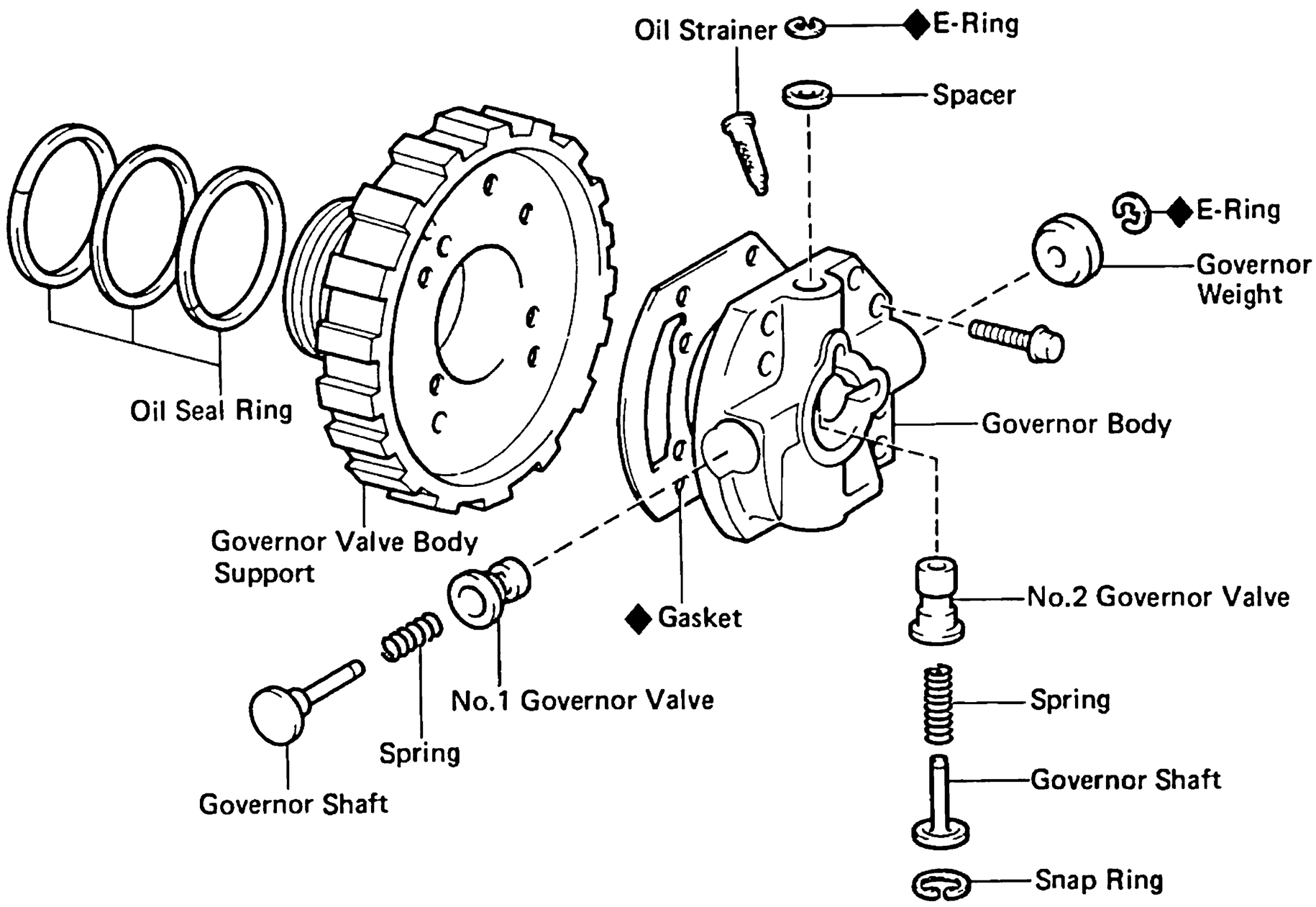
If the piston stroke nonstandard, select another flange.

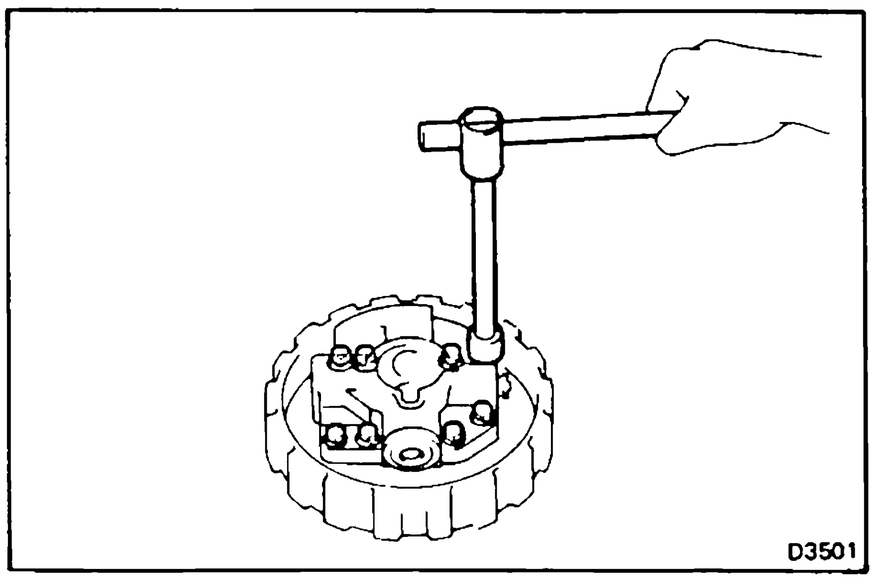
Flange thickness: mm (in.)

No.	Thickness
None	6.65 (0.2618)
1	7.05 (0.2776)
2	7.45 (0.2933)

GOVERNOR VALVE ASSEMBLY

COMPONENTS

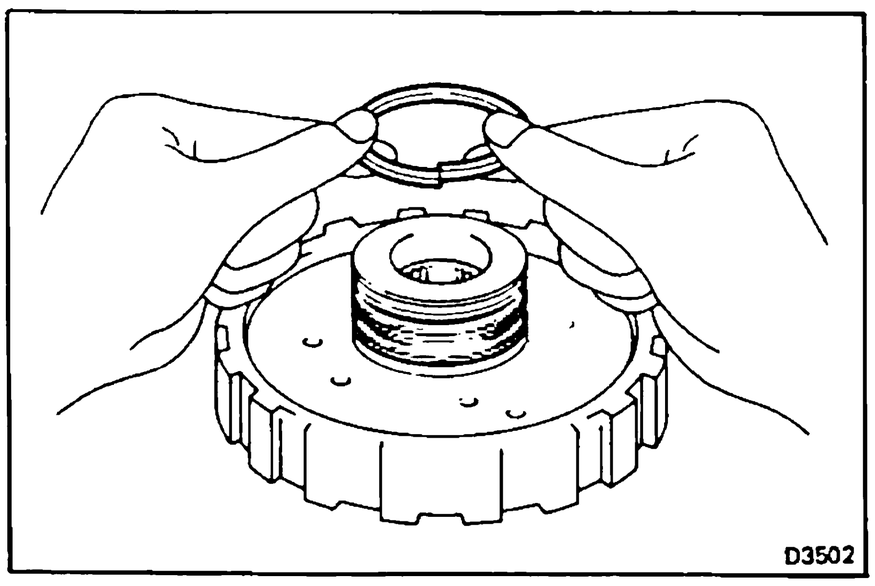




DISASSEMBLY OF GOVERNOR VALVE ASSEMBLY

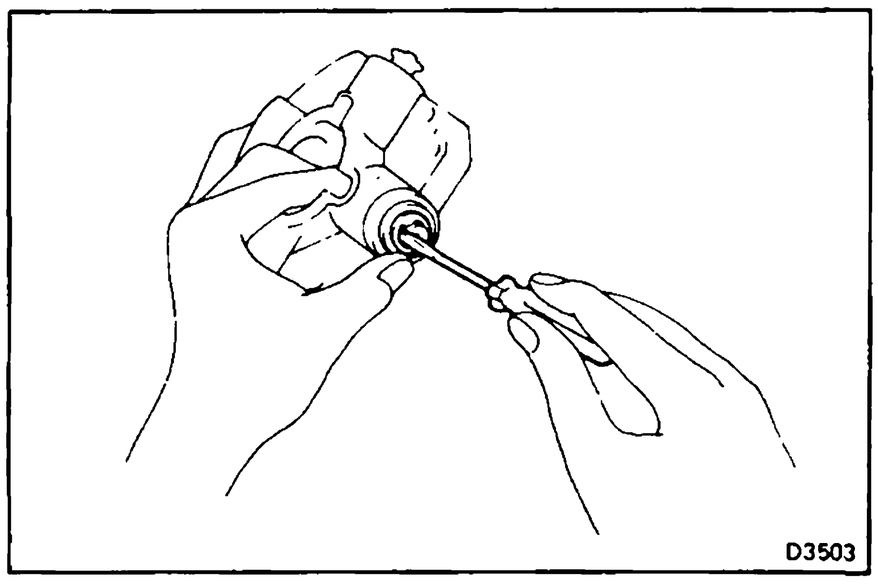
1. REMOVE GOVERNOR VALVE BODY

Remove the eight bolts and governor valve body from the body support.



2. REMOVE OIL SEAL RING

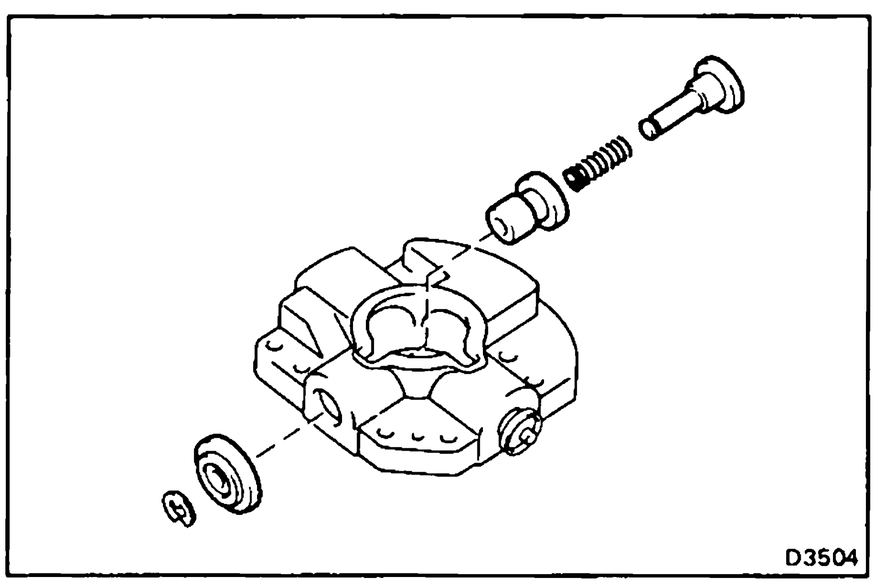
Remove the three oil seal rings from the body support.



3. REMOVE NO. 1 GOVERNOR VALVE

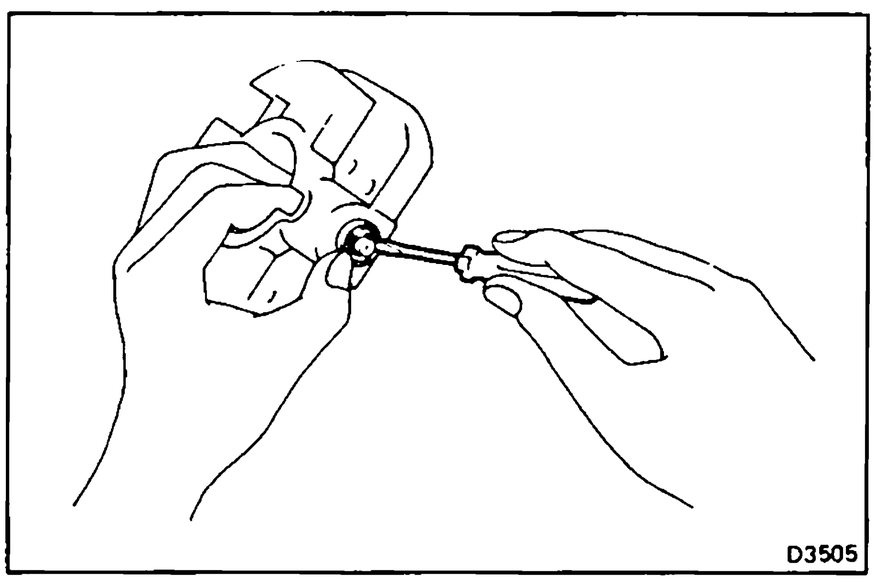
(a) While pushing the weight and valve shaft, remove the E-ring.

NOTE: Do not spread the ring ends more than necessary.



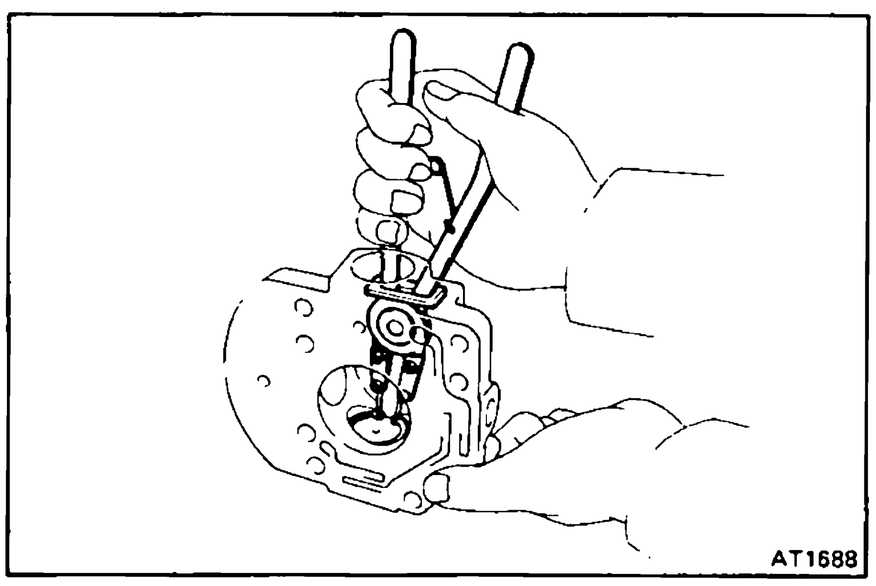
(b) Remove the governor weight from the governor body outside.

(c) Remove the valve shaft, spring and No.1 governor valve from the body inside.

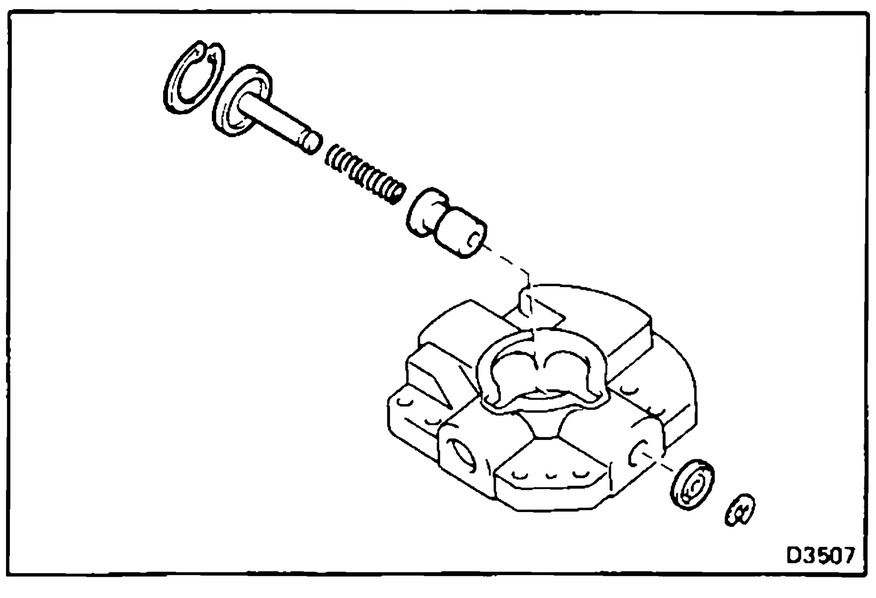


4. REMOVE NO. 2 GOVERNOR VALVE

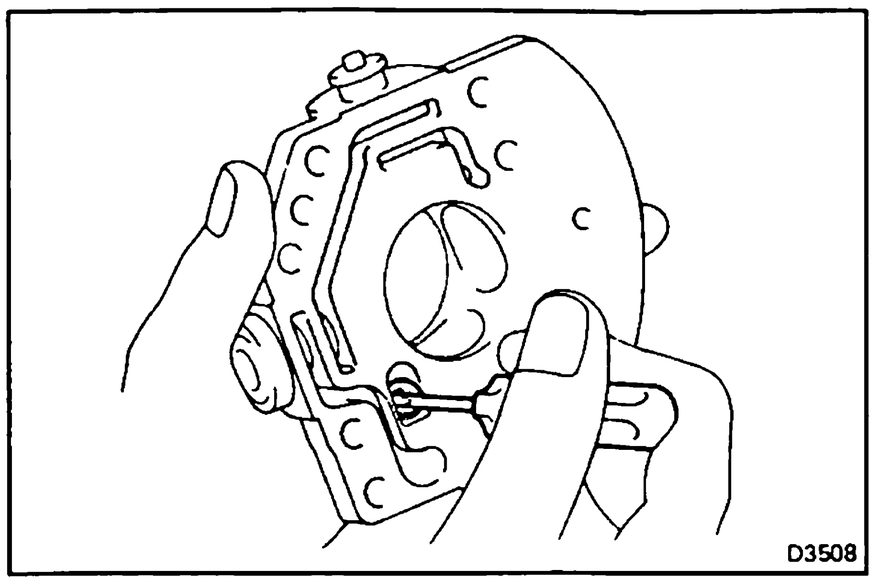
(a) While pushing the spacer, remove the E-ring and spacer.



(b) Remove the snap ring from the body inside.

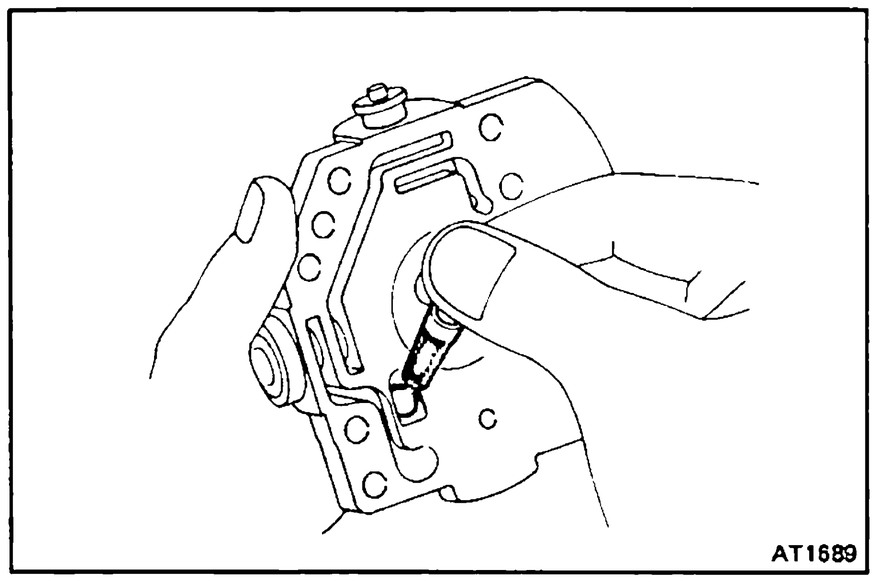


(c) Remove the valve shaft, spring and No. 2 governor valve from the body inside.



5. REMOVE GOVERNOR OIL STRAINER

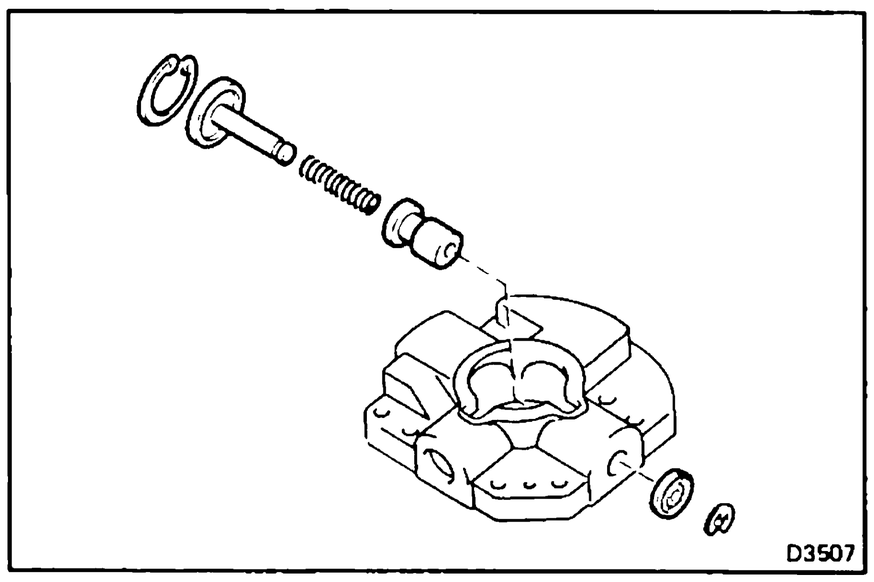
Using a screwdriver, remove the oil strainer.



ASSEMBLY OF GOVERNOR VALVE ASSEMBLY

(See page AT-87)

1. INSTALL GOVERNOR OIL STRAINER

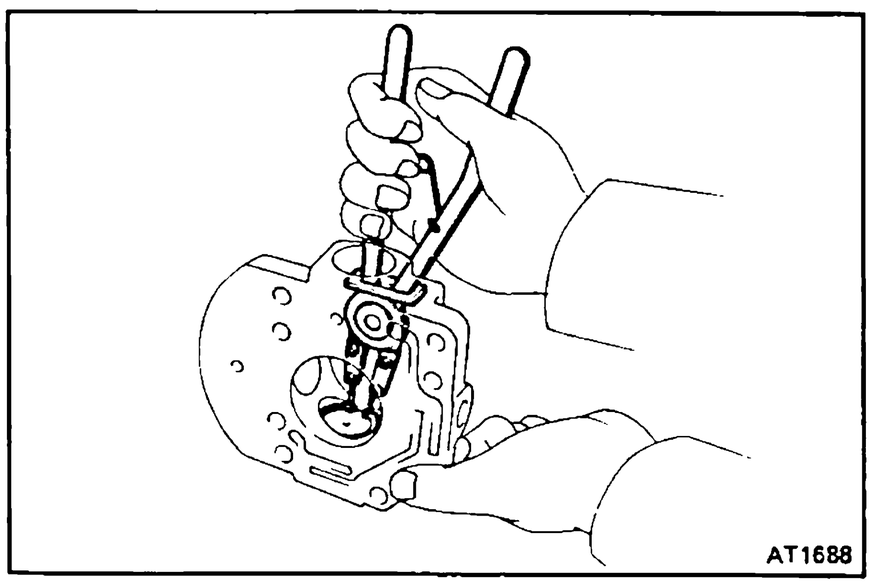


2. INSTALL NO. 2 GOVERNOR VALVE

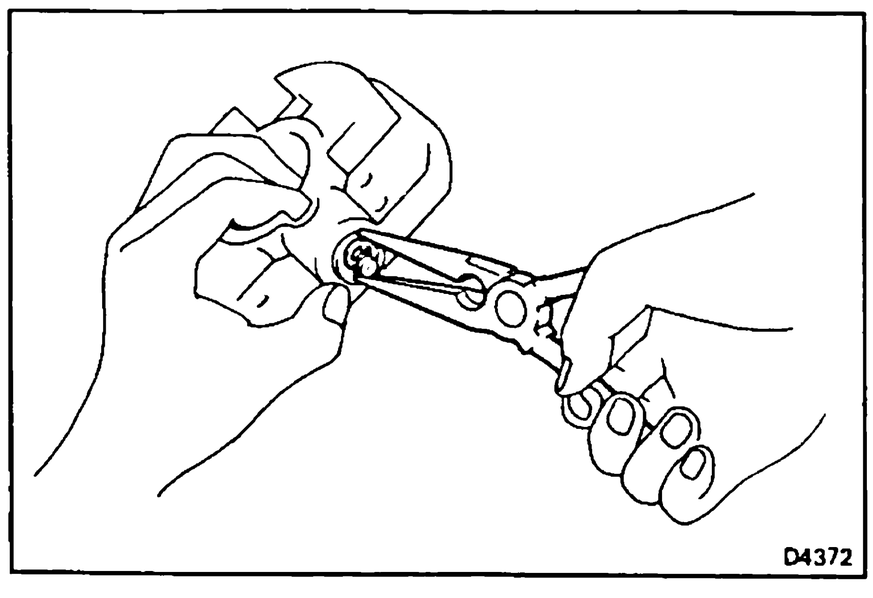
(a) Coat the ATF to the No. 2 governor valve and valve shaft.

(b) Install the No. 2 governor valve, spring and valve shaft to the body inside.

NOTE: Confirm that the governor valve moves smoothly.

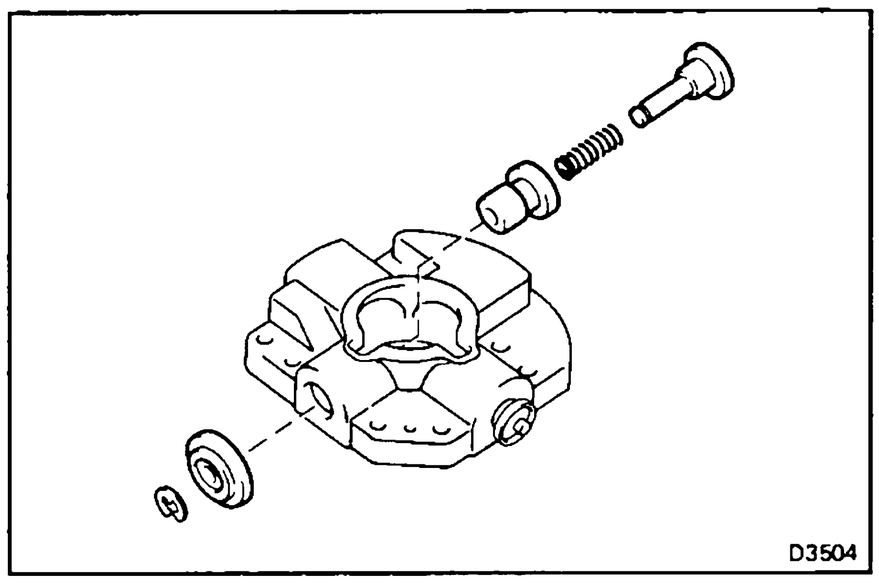


(c) Install the snap ring to the body.



(d) Install the spacer.

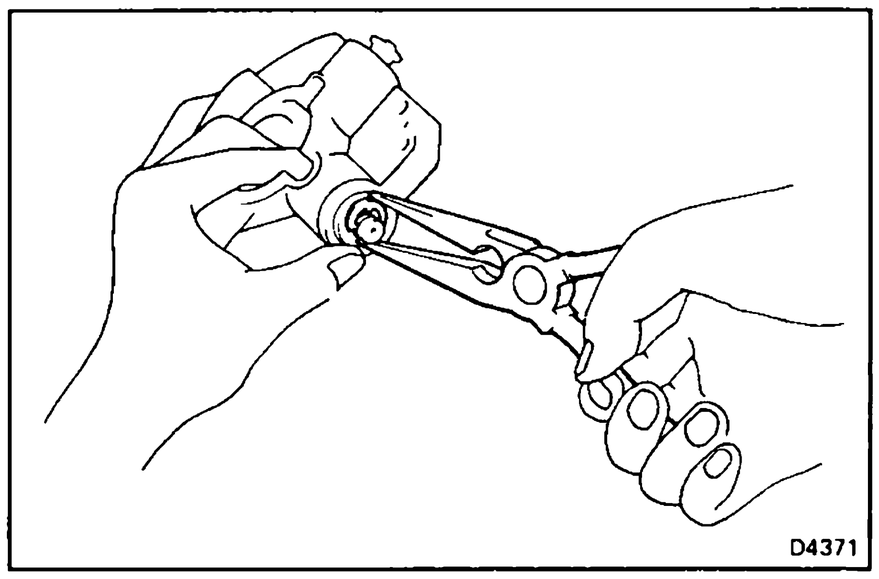
(e) While pushing the spacer install a new E-ring.



3. INSTALL NO. 1 GOVERNOR VALVE

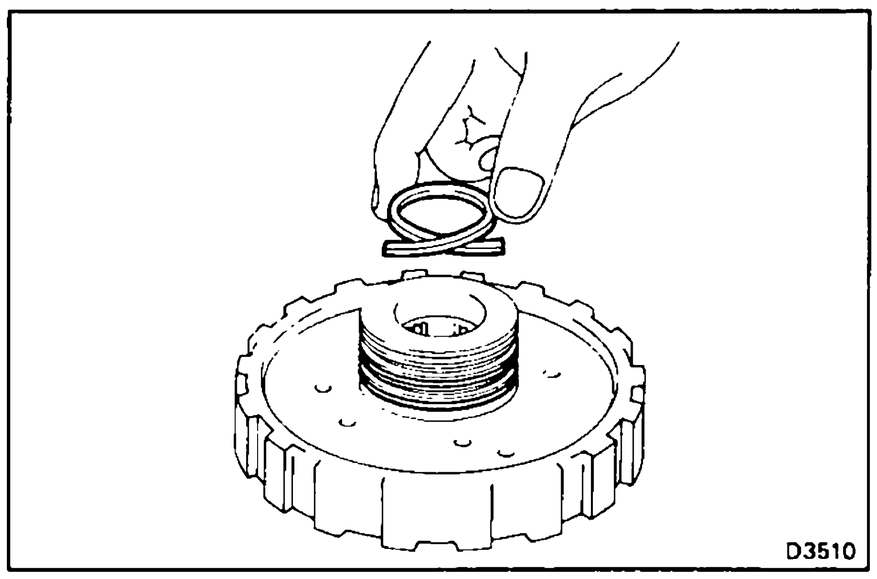
(a) Coat ATF to the No.1 governor valve and shaft.

(b) Install the No.1 governor valve, spring and valve shaft to the body inside.



(c) Install the governor weight.

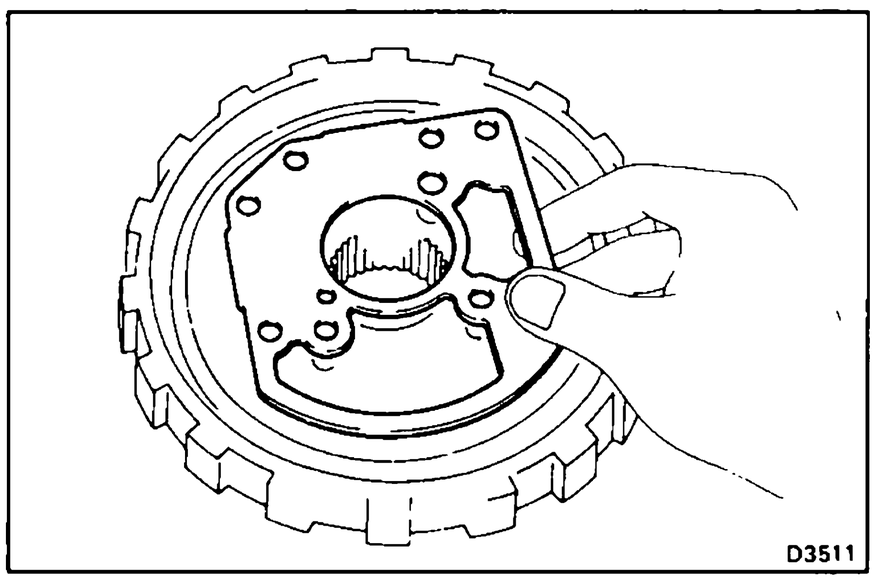
(d) While pushing the governor weight and No.1 governor valve, install the E-ring.



4. INSTALL NEW OIL SEAL RING

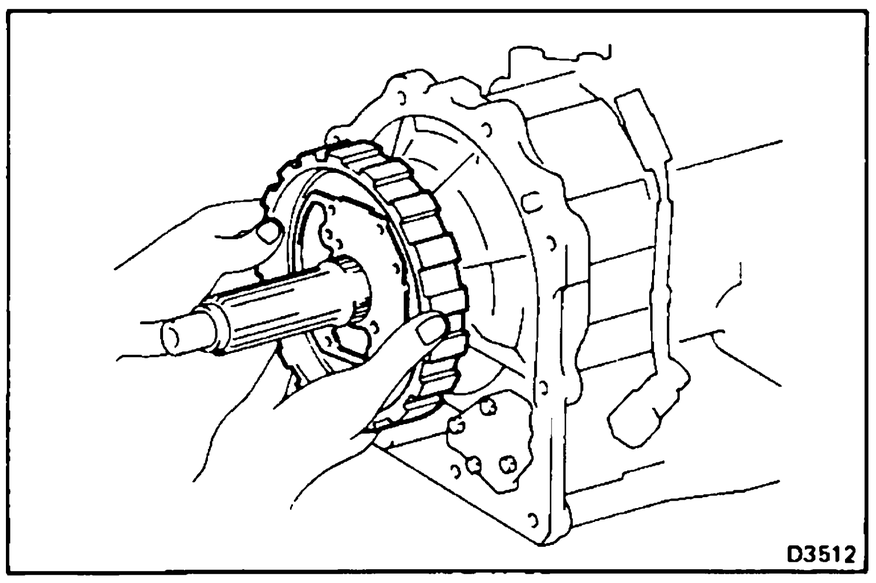
(a) Coat ATF to the three oil seal rings.

(b) Install the three oil seal ring to the body support.

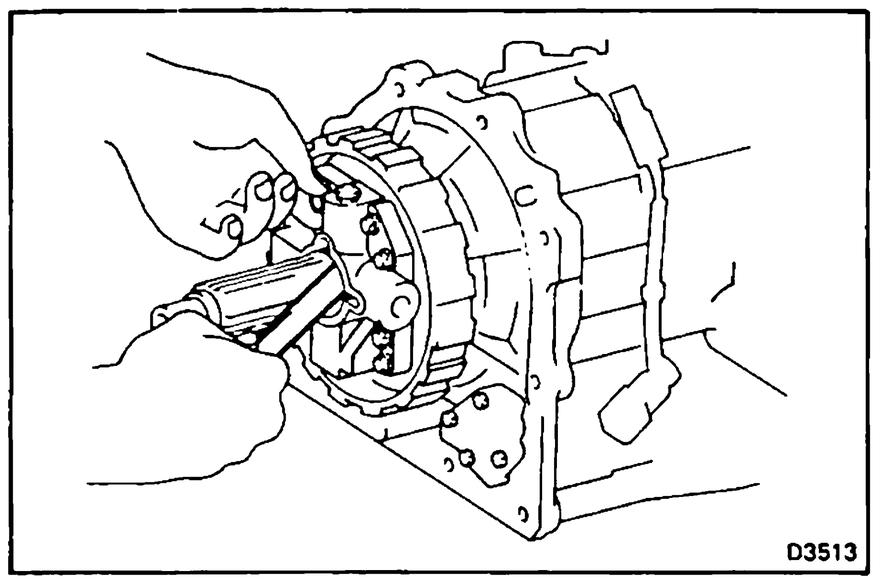


5. INSTALL GOVERNOR VALVE BODY

(a) Coat ATF to the new gasket, and install it to the body support.

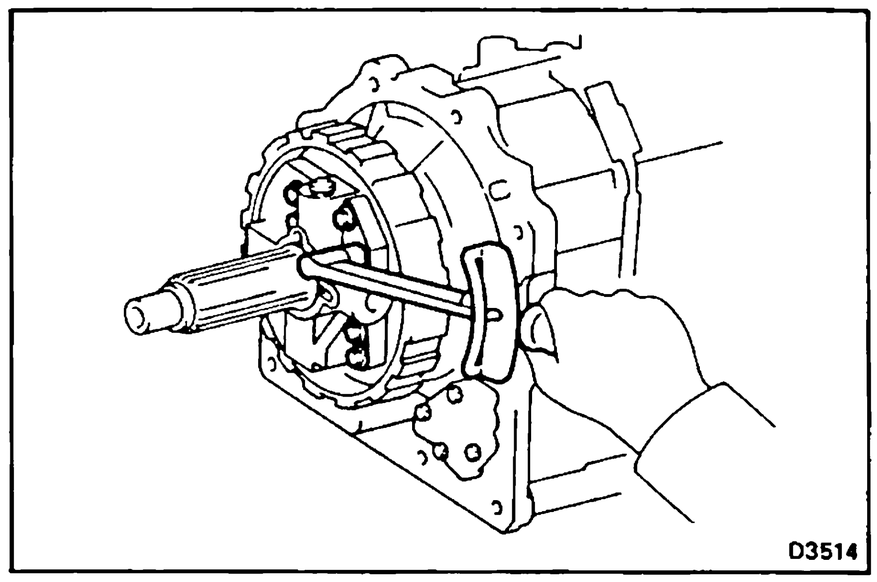


(b) Install the body support to the output shaft.



(c) Temporarily install the governor body to the body support.

(d) Insert a 0.01 mm thickness gauge between the output shaft and governor valve body and temporarily tighten the bolts.

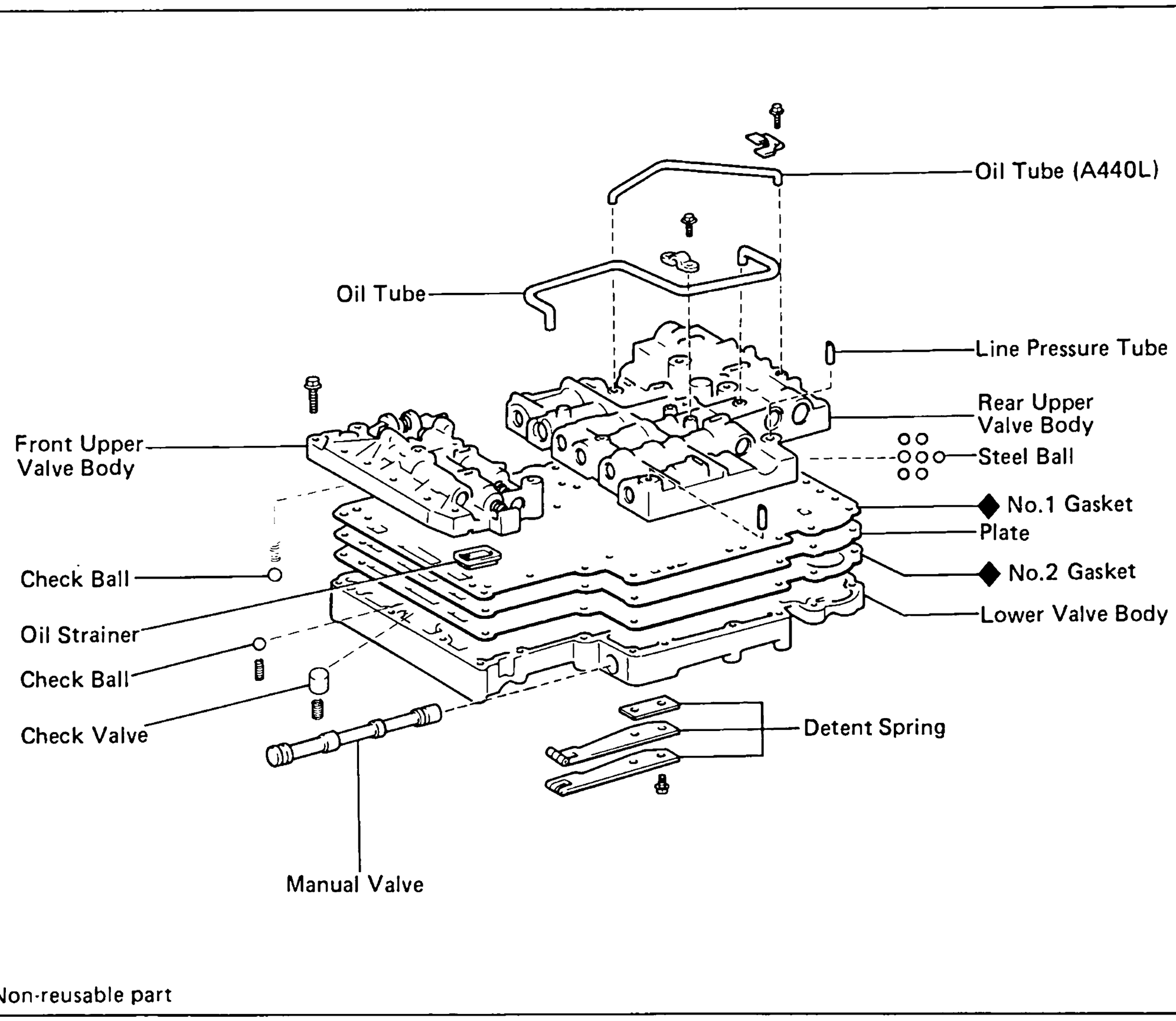


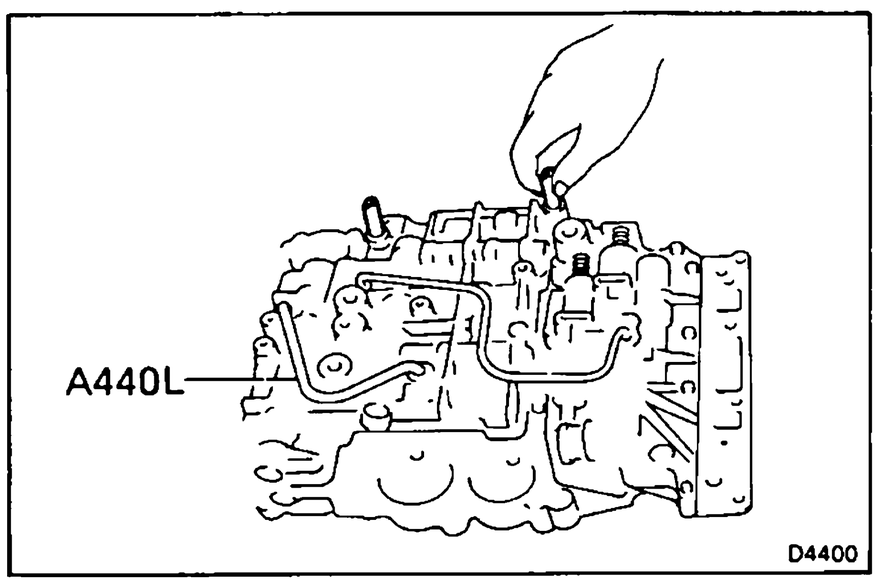
(e) Confirm that the gap between the output shaft and governor valve body are even.

(f) Torque the eight bolts.

Torque: 100 kg-cm (7 ft-lb, 10 N·m)

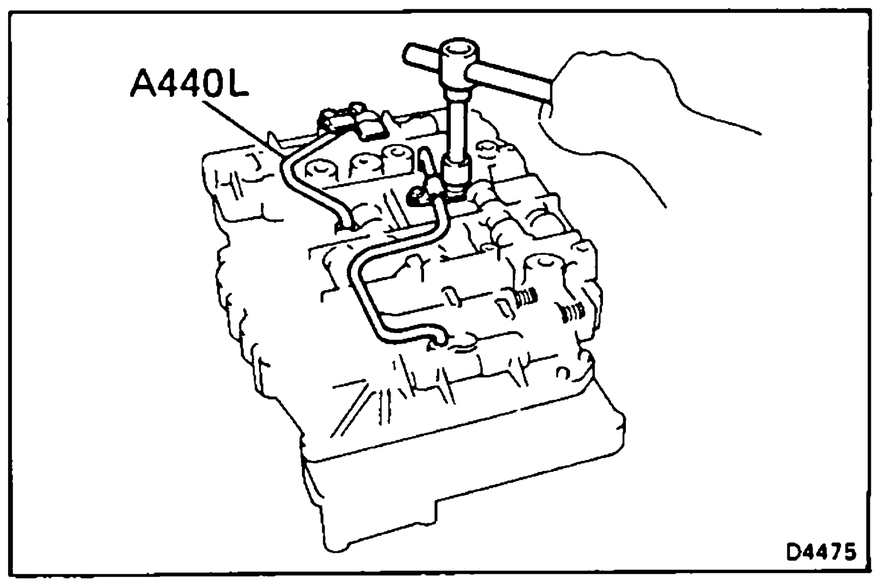
VALVE BODY





DISASSEMBLY OF VALVE BODY

1. REMOVE TWO LINE PRESSURE TUBES

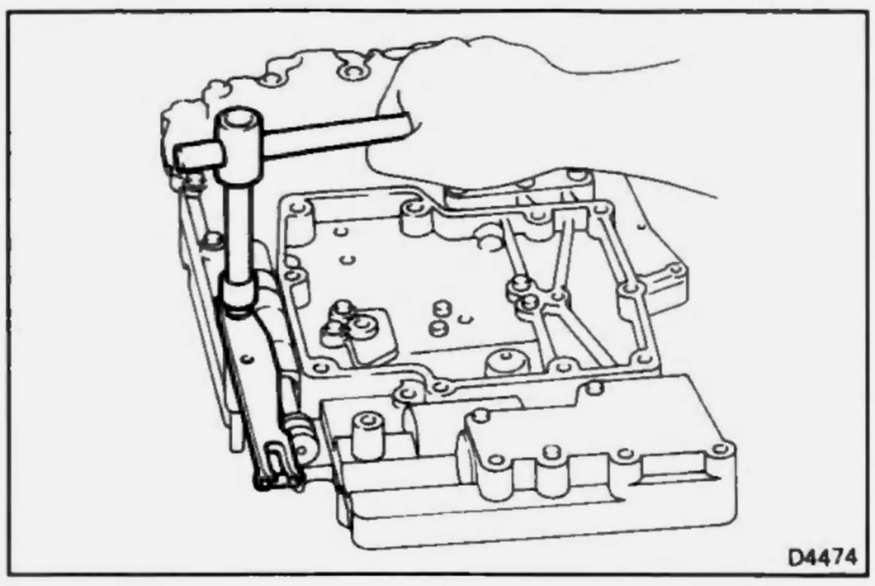


2. REMOVE OIL TUBE

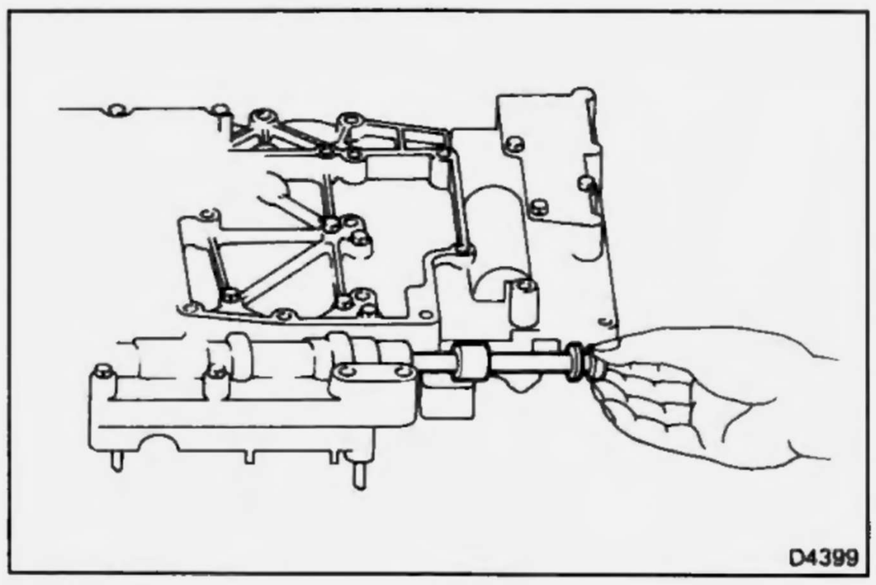
(a) Remove the clamp from the valve body.

(b) Pry up both tube ends with a large screwdriver and remove the tubes.

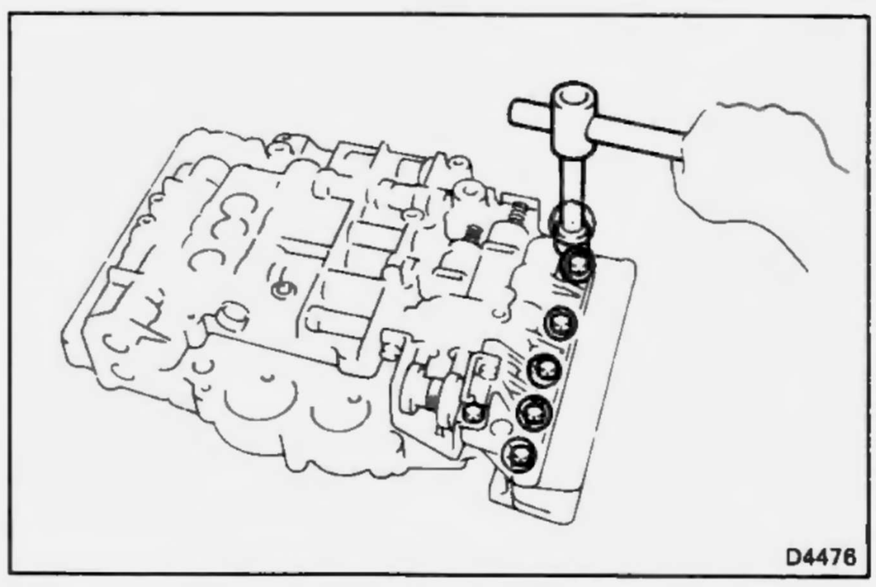
A440L : Two tubes
A440F : One tube



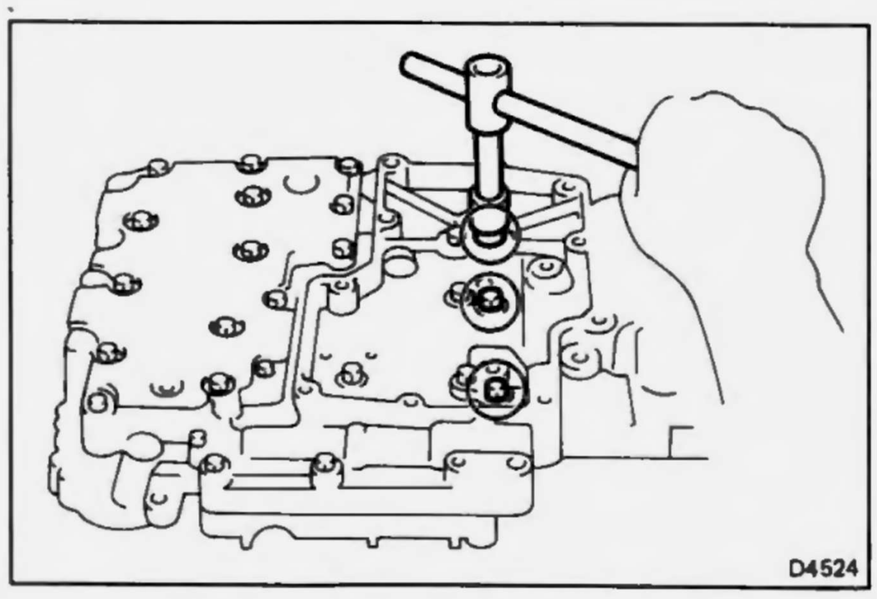
3. TURN OVER ASSEMBLY AND REMOVE DETENT SPRING



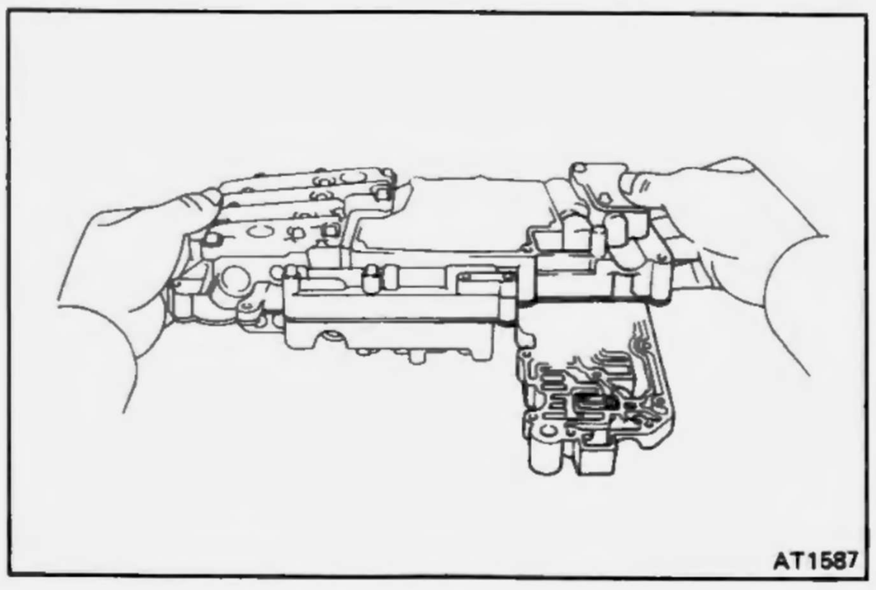
4. REMOVE MANUAL VALVE



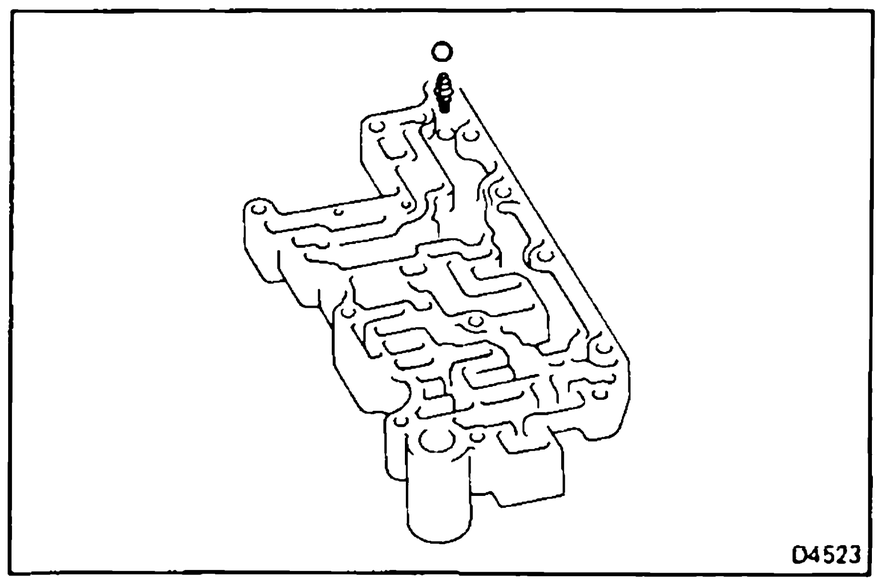
5. TURN OVER ASSEMBLY AND REMOVE SEVEN BOLTS FROM FRONT UPPER VALVE BODY



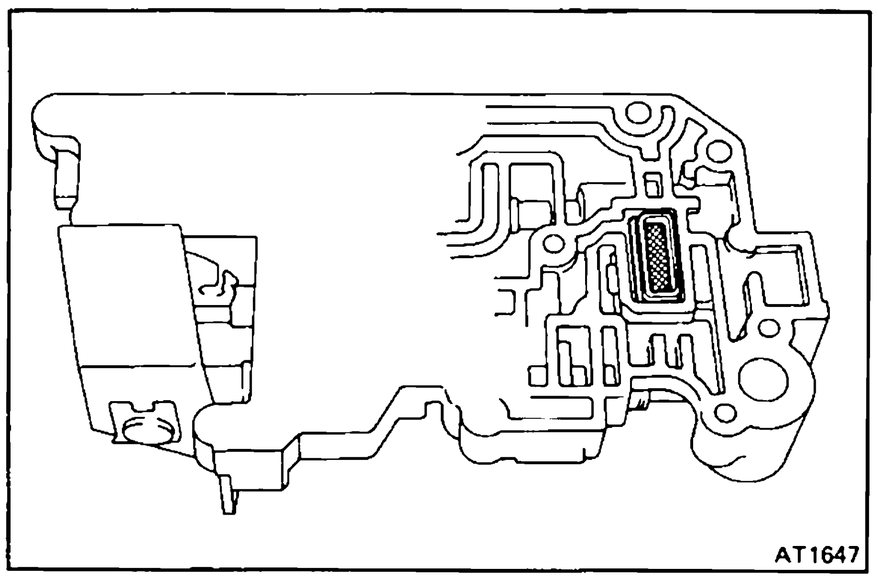
6. TURN OVER ASSEMBLY AND REMOVE THREE BOLTS FROM LOWER VALVE BODY



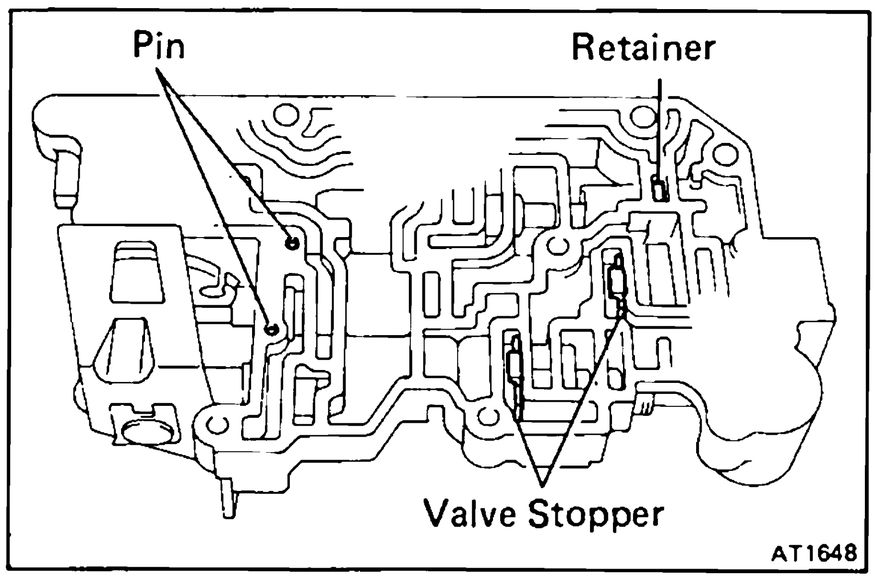
7. LIFT OFF LOWER VALVE BODY AND REAR UPPER VALVE BODY



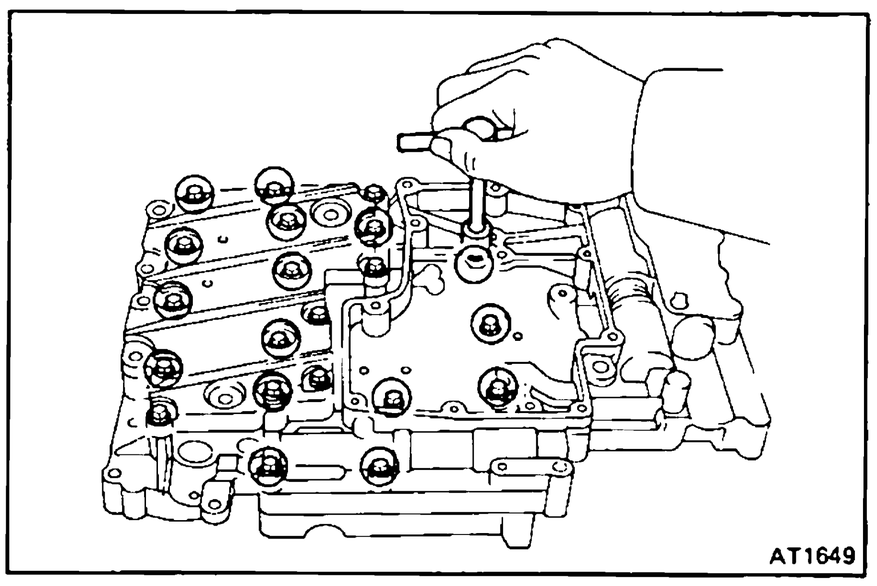
8. REMOVE CHECK BALL AND SPRING



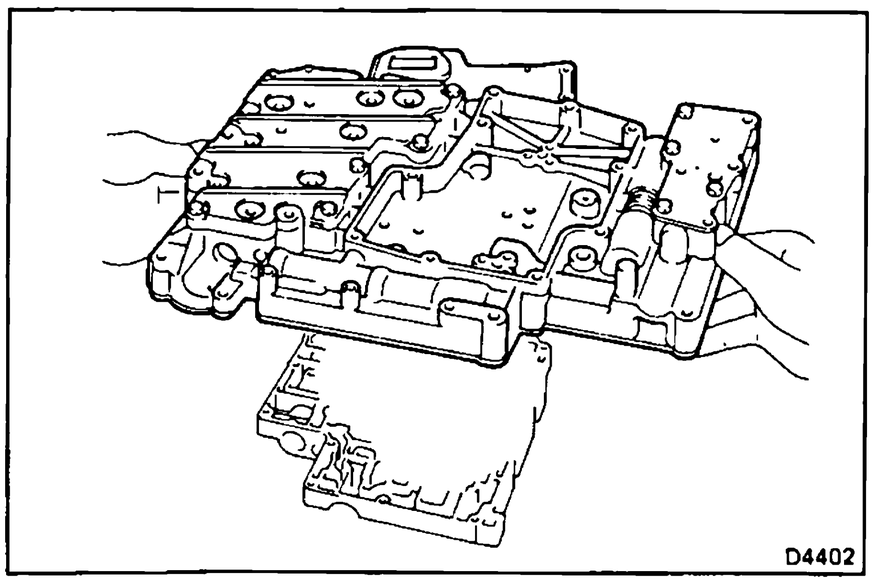
9. REMOVE OIL STRAINER



10. CONFIRM RETAINER, TWO VALVE STOPPERS AND TWO PINS ARE INSTALLED CORRECTLY



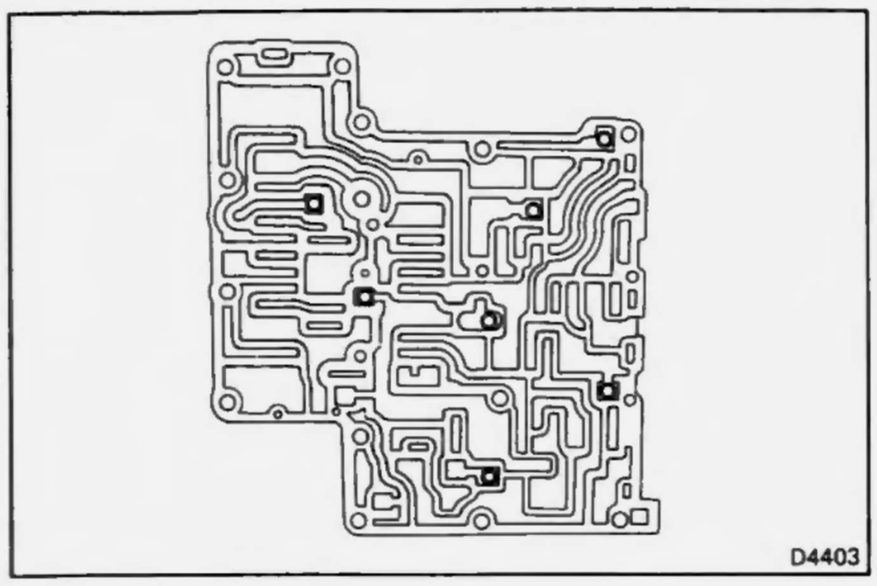
11. REMOVE SIXTEEN BOLTS FROM LOWER VALVE BODY



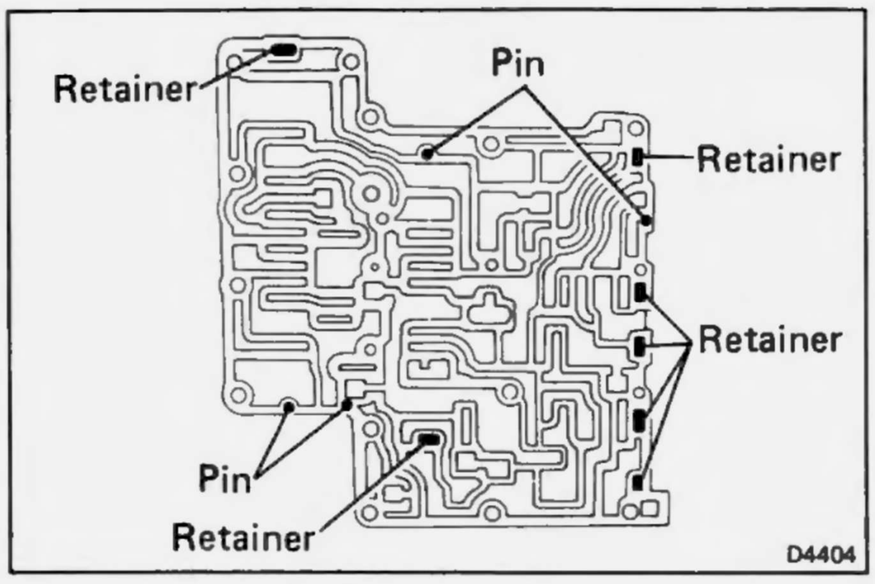
12. LIFT OFF LOWER VALVE BODY AND PLATE AS A SINGLE UNIT

Hold the valve body plate to the lower valve body.

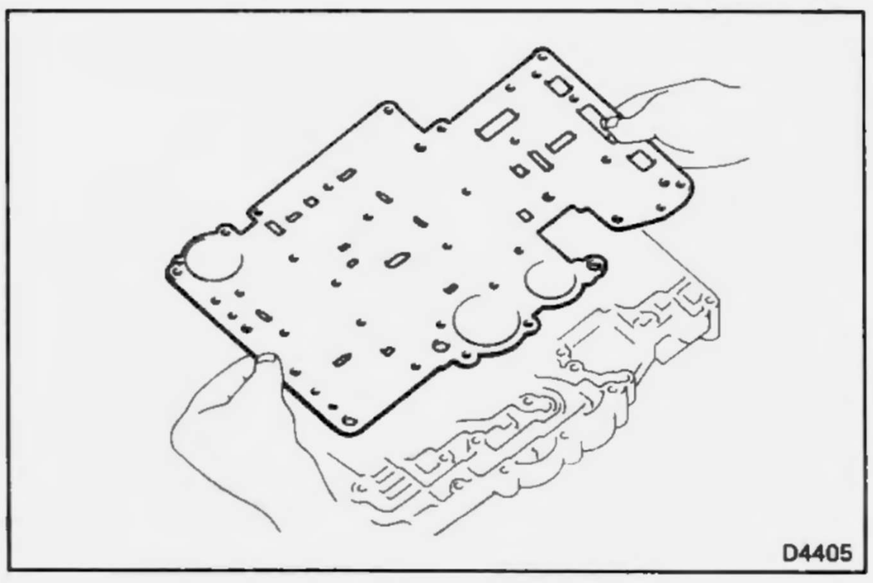
NOTE: Be careful that the check valve and keys do not fall out.



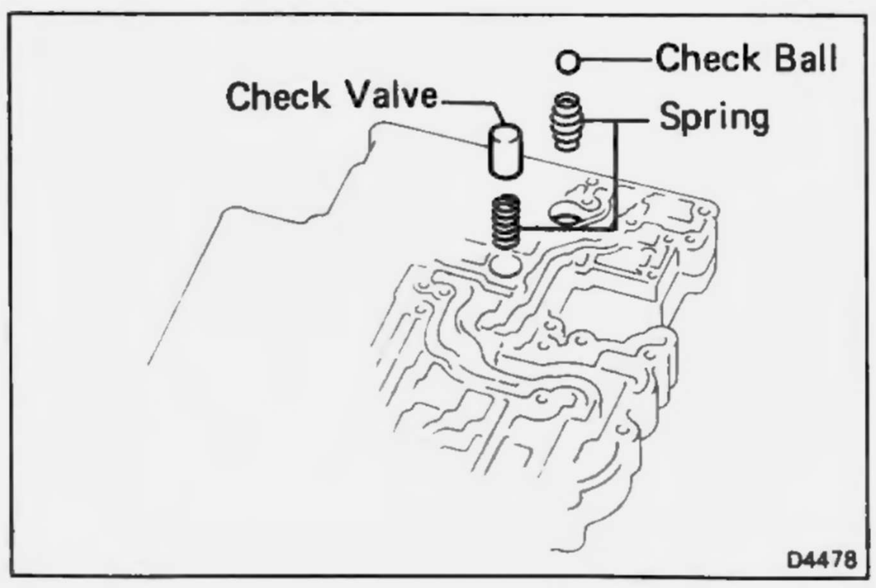
13. REMOVE SEVEN CHECK BALLS



14. CONFIRM FOUR PINS AND SEVEN RETAINERS ARE INSTALLED CORRECTLY

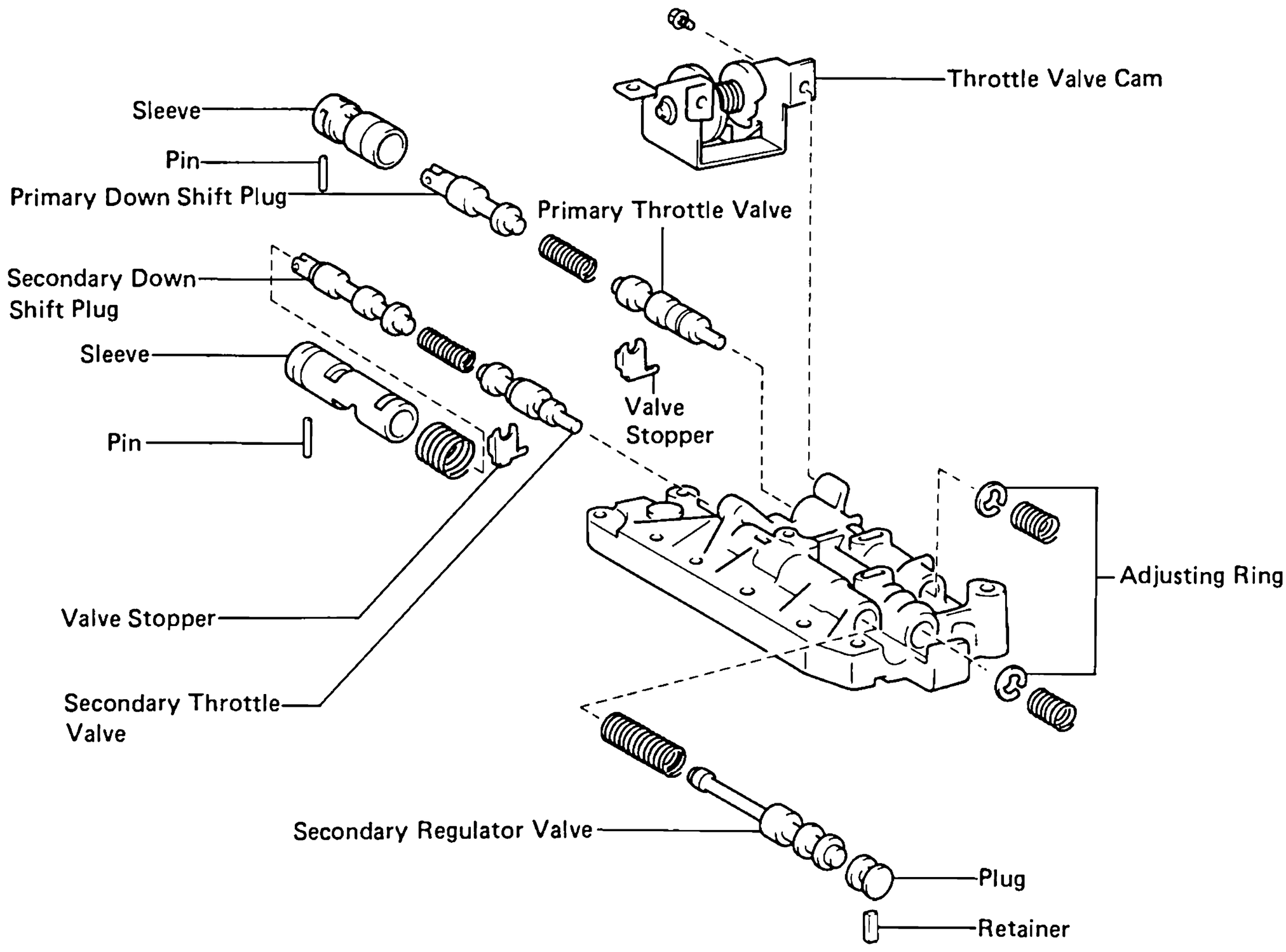


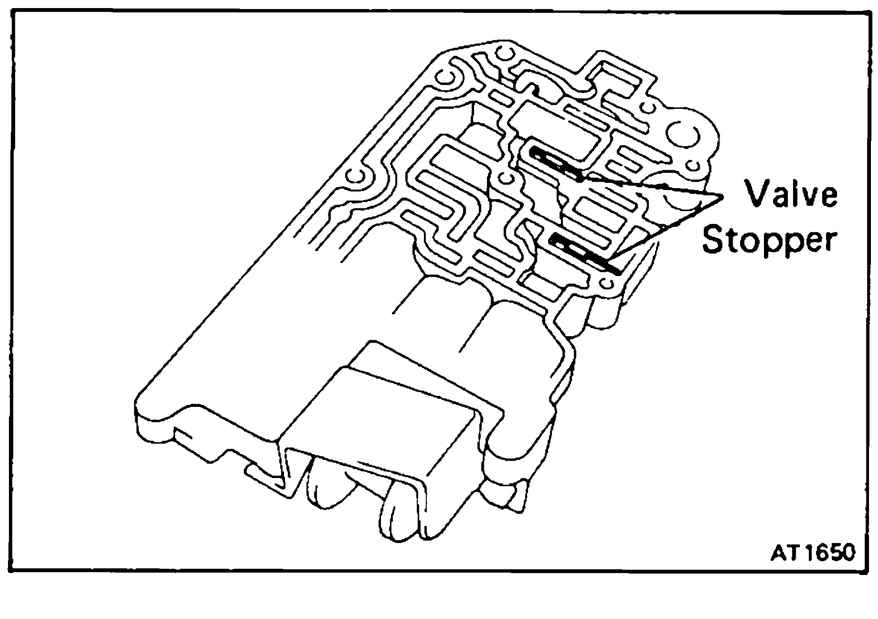
15. REMOVE PLATE AND GASKETS FROM LOWER VALVE BODY



16. REMOVE CHECK BALL, VALVE AND TWO SPRINGS

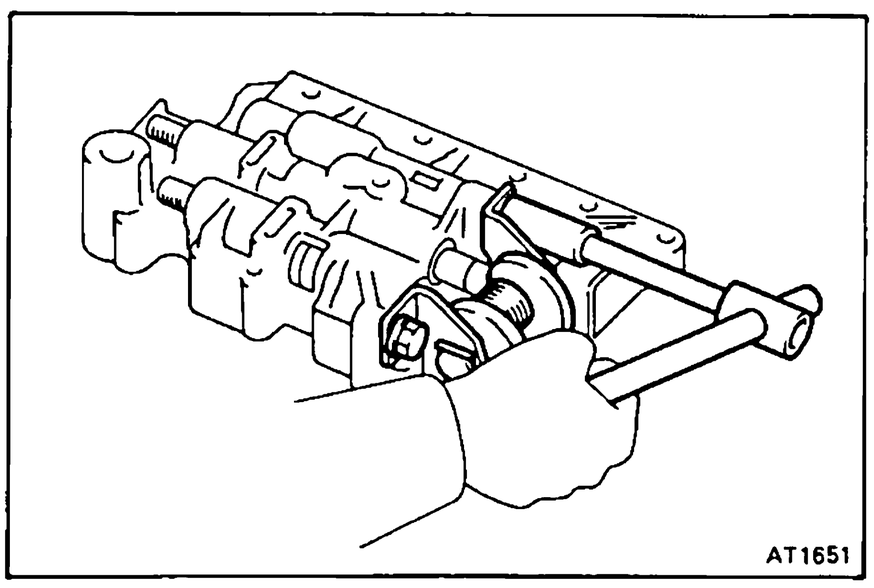
Front Upper Valve Body





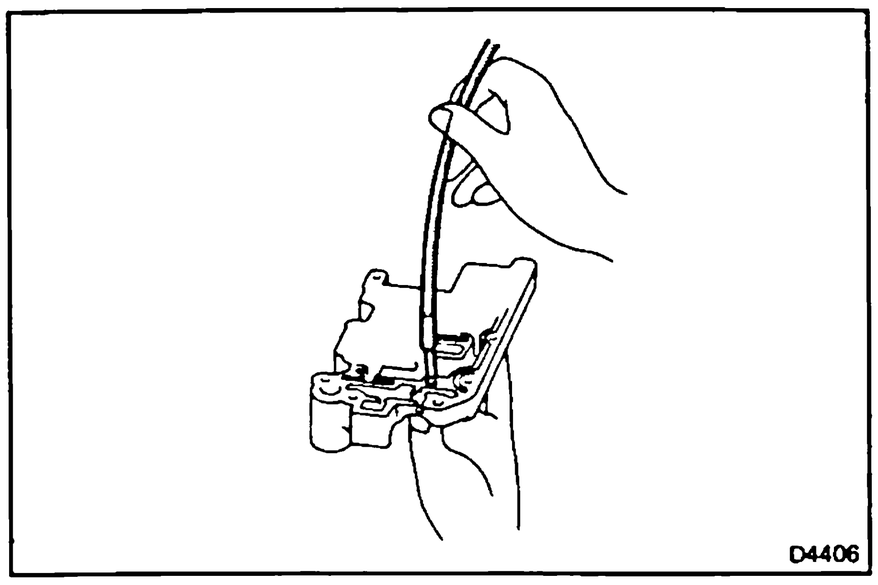
DISASSEMBLY OF FRONT UPPER VALVE BODY

1. REMOVE TWO VALVE STOPPERS



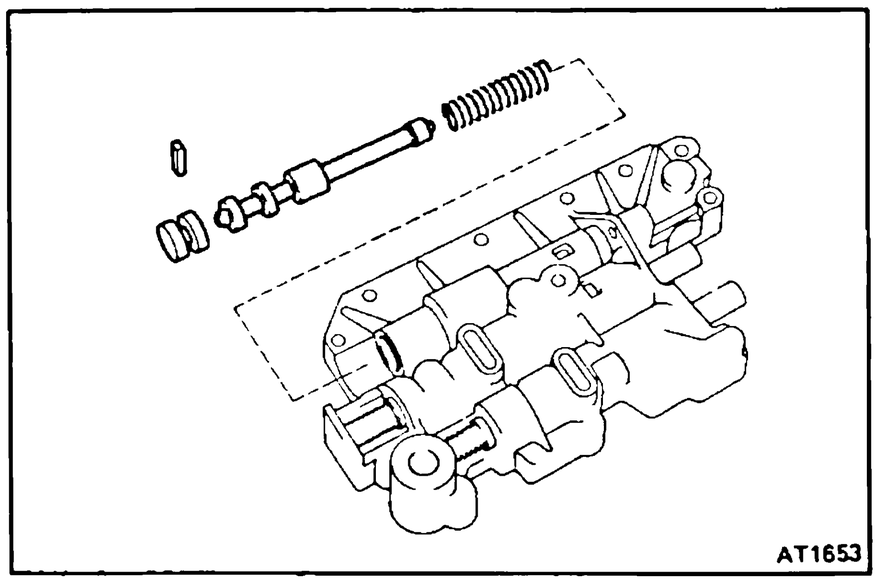
2. REMOVE THROTTLE VALVE CAM

NOTE: Note the number of shims installed.

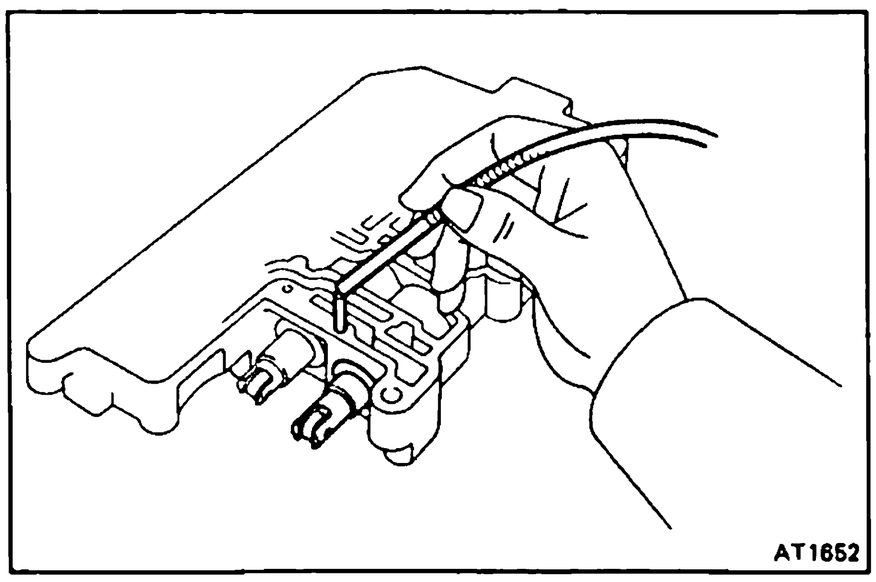


3. REMOVE SECONDARY REGULATOR VALVE

(a) Remove the retainer with a magnetic finger by pushing in the plug.

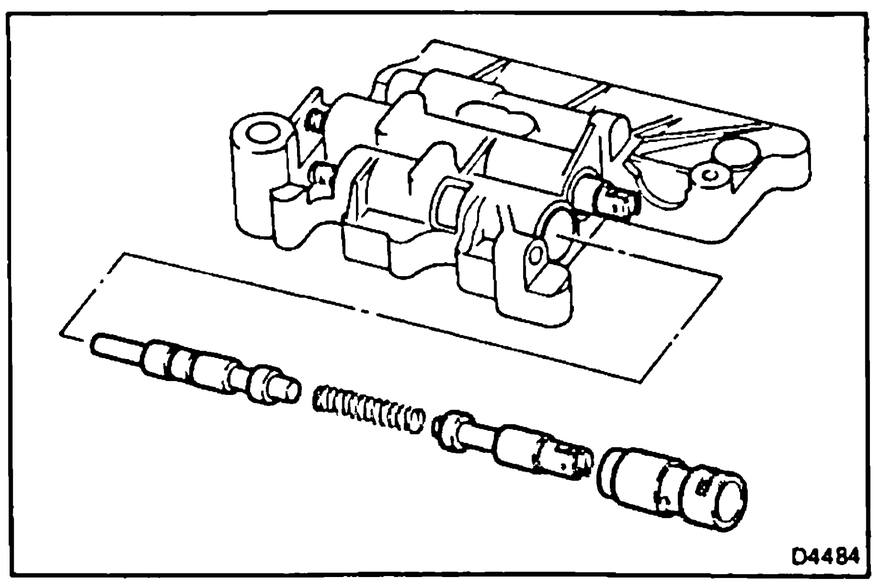


(b) Remove the plug, secondary regulator valve and spring.

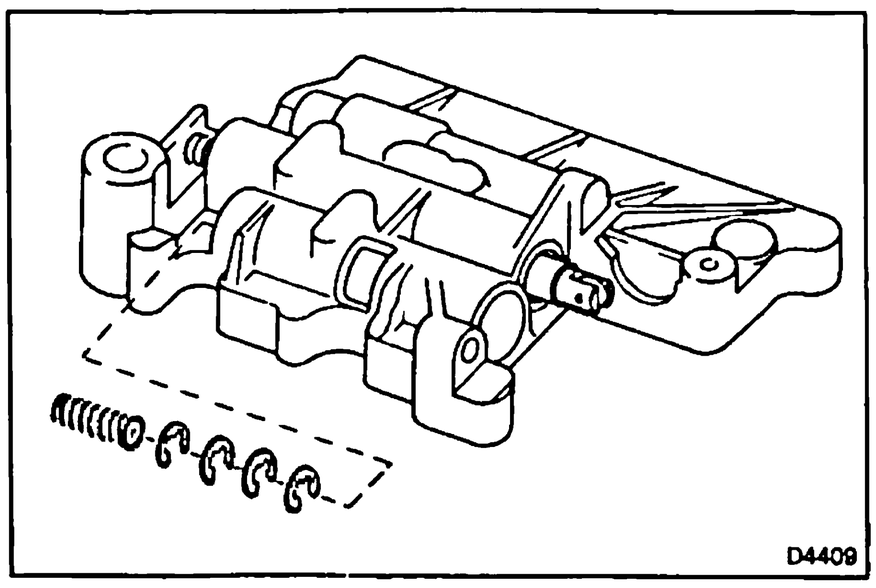


4. REMOVE PRIMARY THROTTLE VALVE

(a) Remove the pin with a magnetic finger.

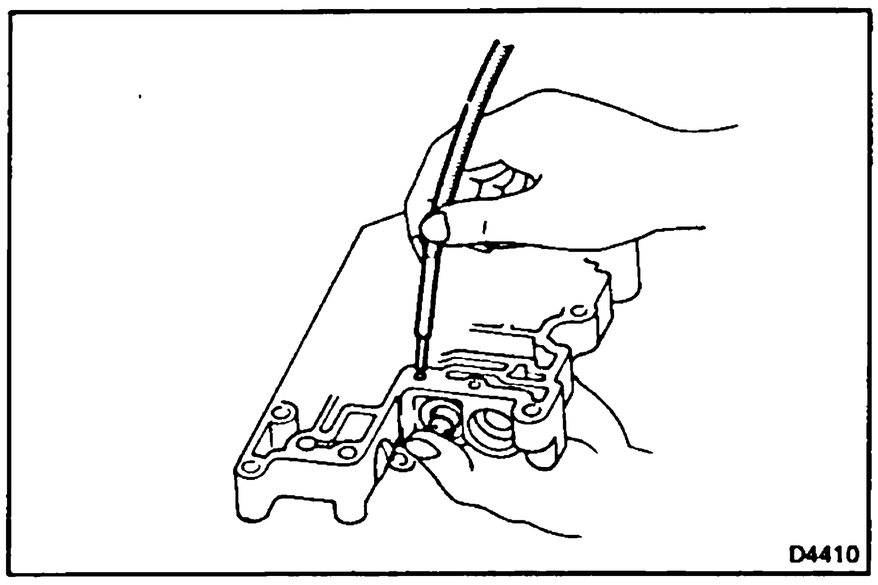


(b) Remove the sleeve, plug, spring and primary throttle valve.



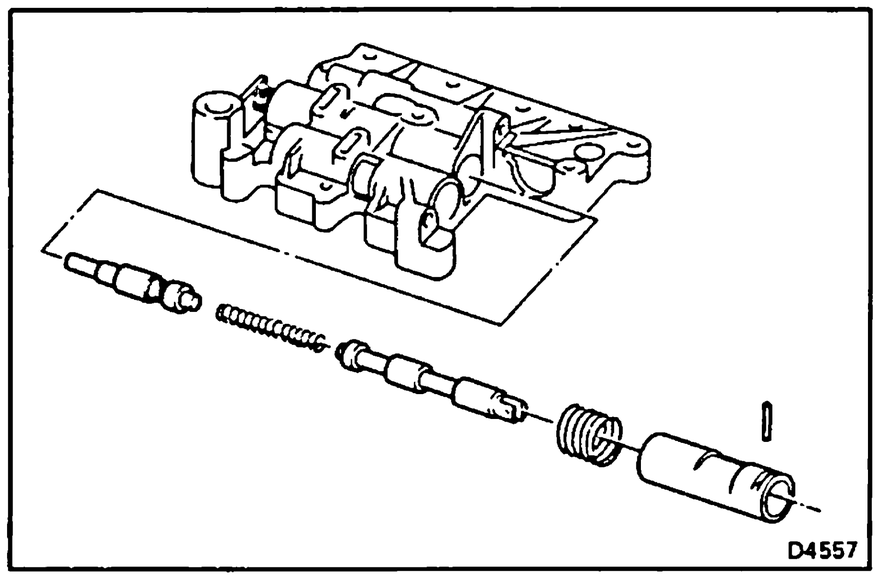
(c) Remove the spring and adjusting rings.

NOTE: Note the number of adjusting rings installed.

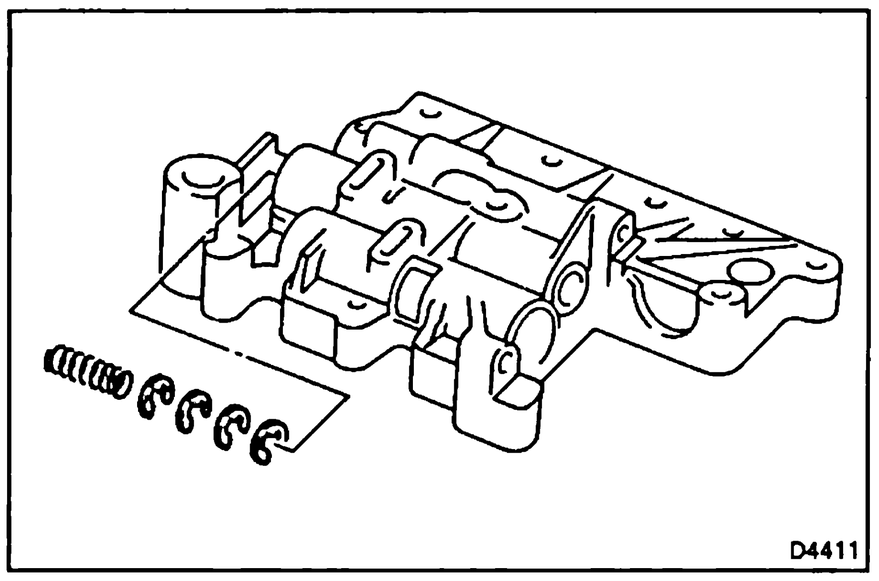


5. REMOVE SECONDARY THROTTLE VALVE

(a) Remove the pin with a magnetic finger by pushing in the sleeve.

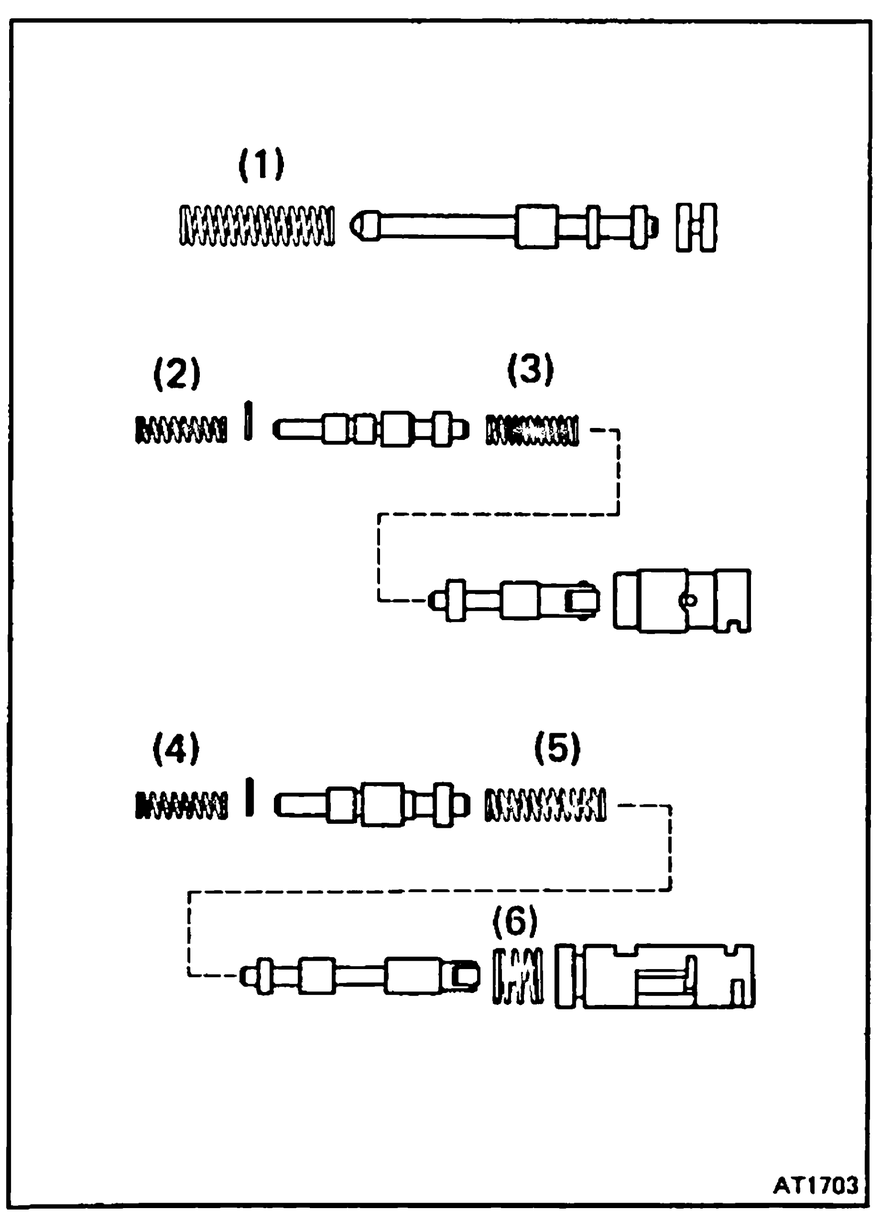


(b) Remove the sleeve, plug, secondary throttle valve and two springs.



(c) Remove the spring and adjusting rings.

NOTE: Note the number of adjusting rings installed.

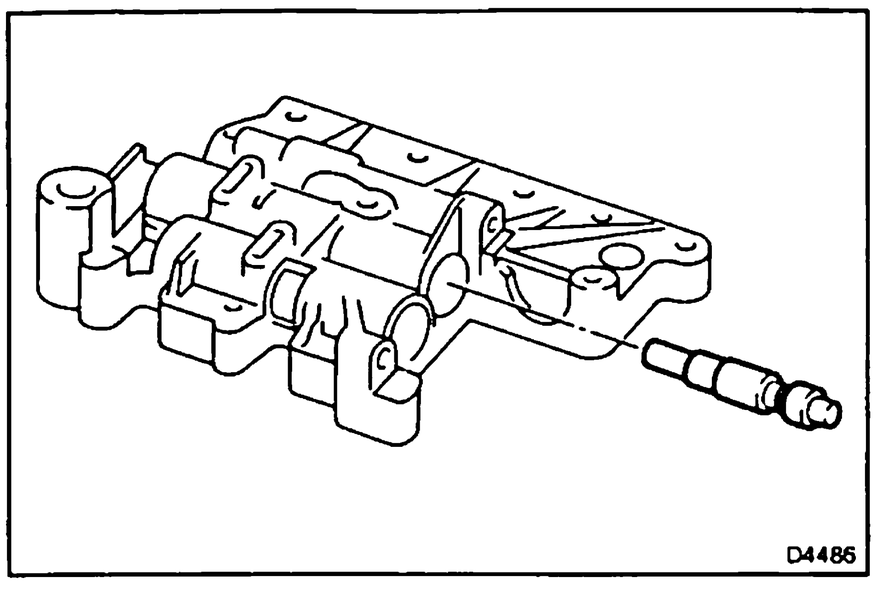


INSPECTION OF FRONT UPPER VALVE BODY

INSPECT VALVE SPRINGS

Check for damage, squareness, rust and distorted coils. Measure the spring free height and replace if less than that shown below.

Spring	Free length mm (in.)	
(1) Secondary regulator valve	46.00 (1.8110)	
(2) Primary throttle valve	25.30 (0.9961)	
(3) Primary down shift plug	26.85 (1.0571)	
(4) Secondary throttle valve	25.30 (0.9961)	
(5) Secondary down shift plug	HJ	32.78 (1.2905)
	FJ	32.57 (1.2823)
(6) Sleeve	10.80 (0.4252)	



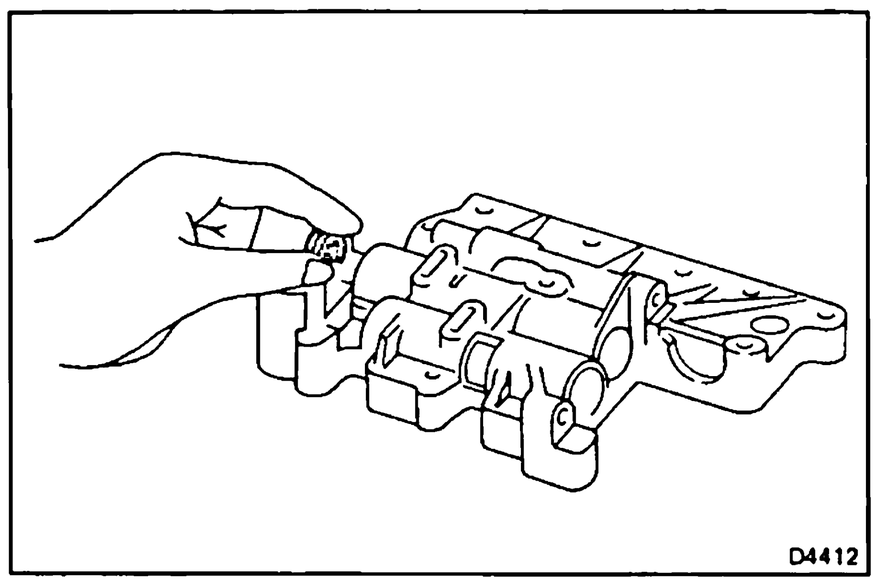
ASSEMBLY OF FRONT UPPER VALVE BODY

(See page AT-96)

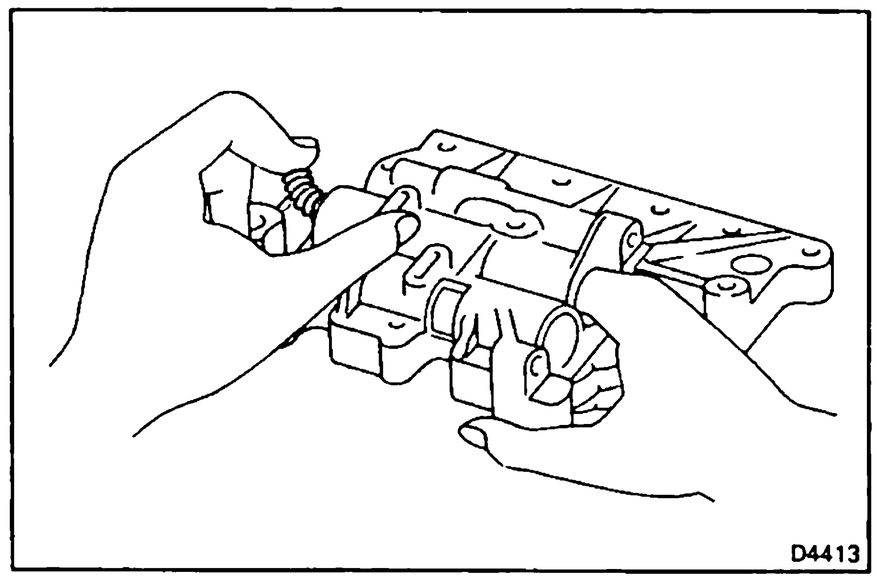
1. INSTALL SECONDARY THROTTLE VALVE

(a) Insert the secondary throttle valve into the bore.

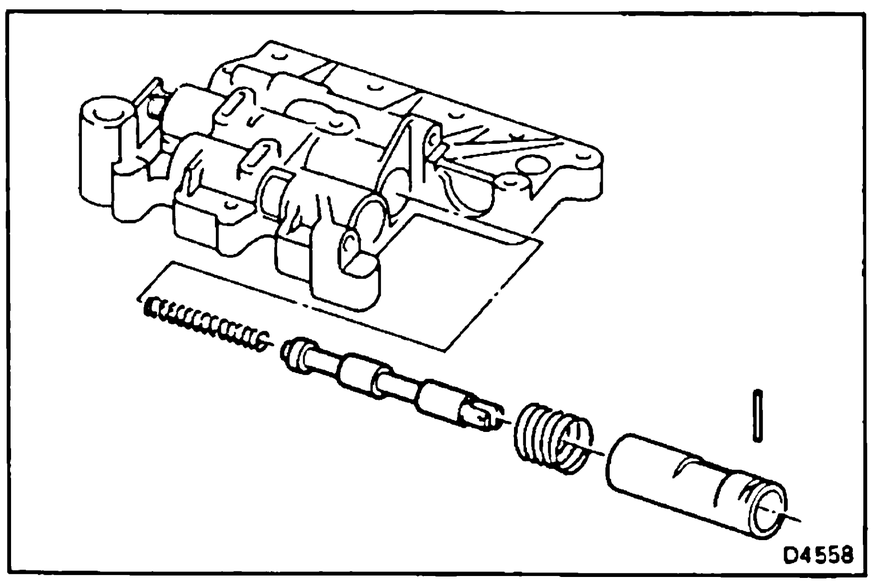
NOTE: Check that valve is fully installed into the bore.



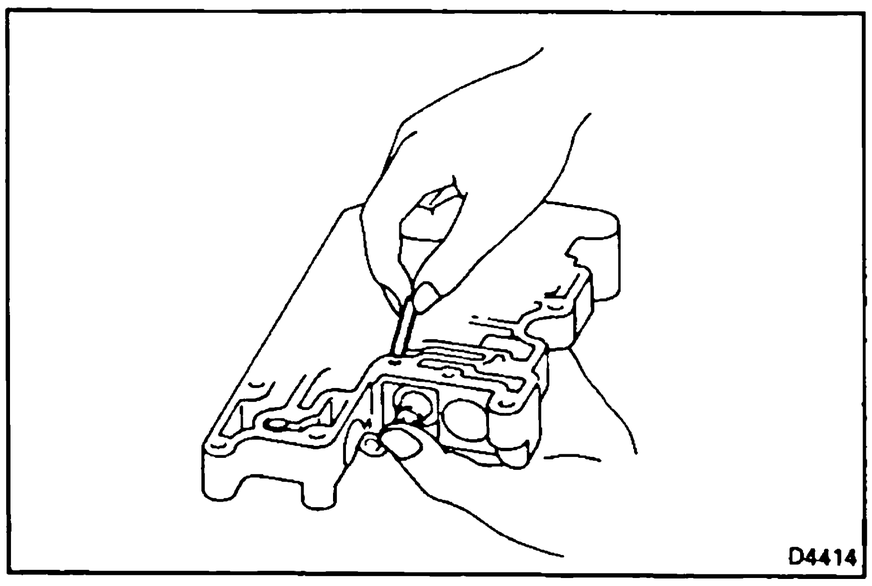
(b) Install the same number of adjusting rings as were removed during disassembly.



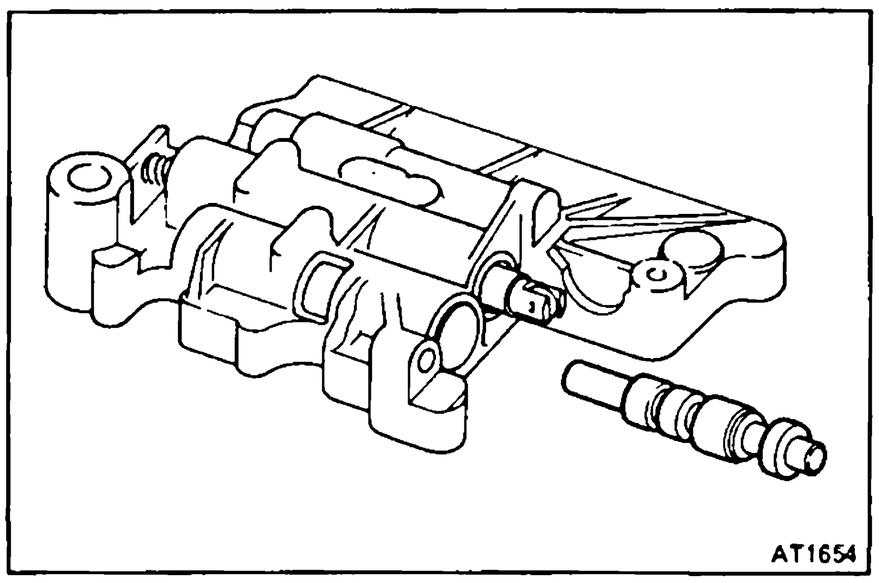
(c) Hold the valve by your finger and install the spring onto the end of the valve shaft.



(d) Install the secondary down shift plug, sleeve and two springs.



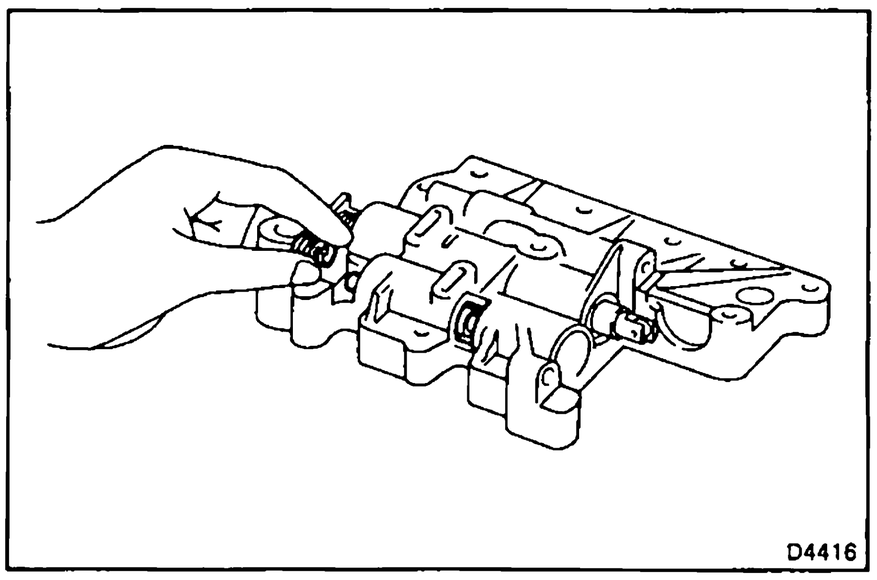
(e) Install the pin by pushing in the sleeve.



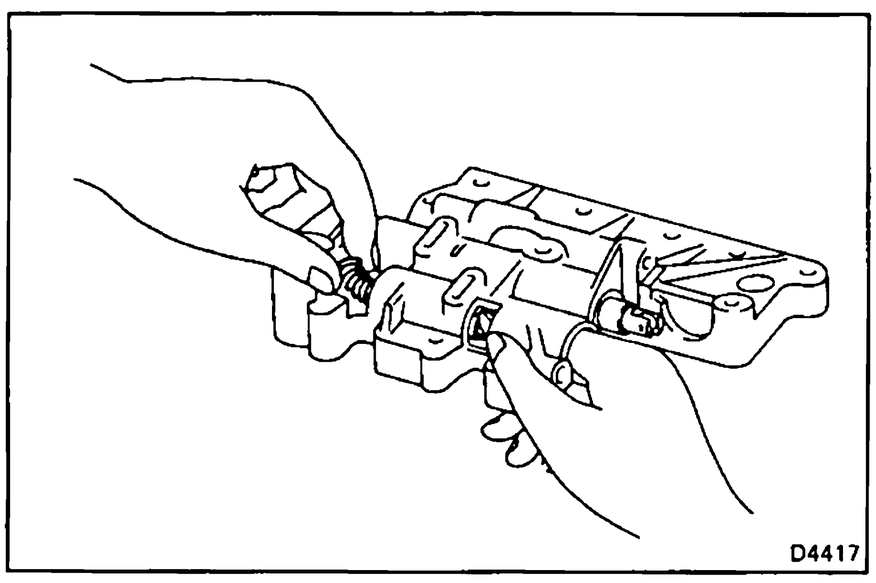
2. INSTALL PRIMARY THROTTLE VALVE

(a) Insert the primary throttle valve into the bore.

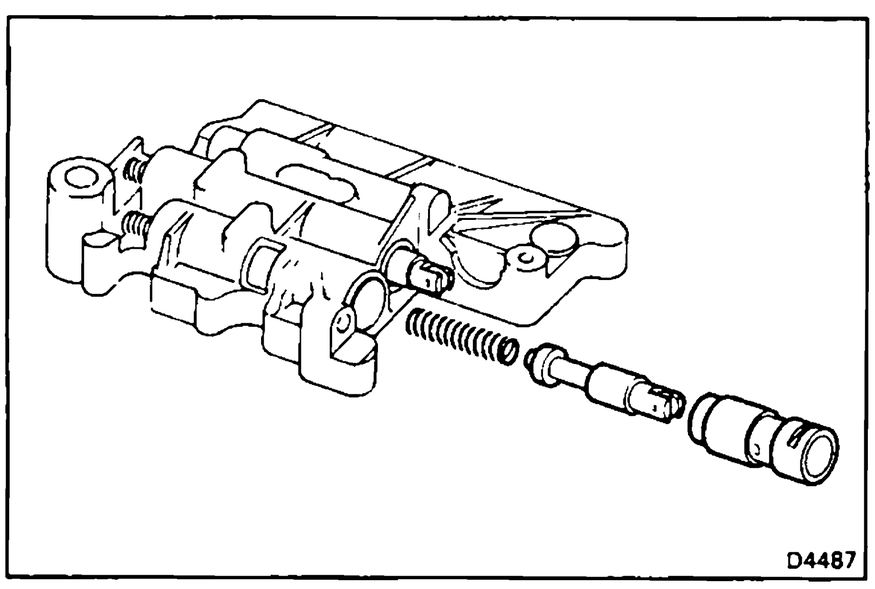
NOTE: Check that valve is fully installed into the bore.



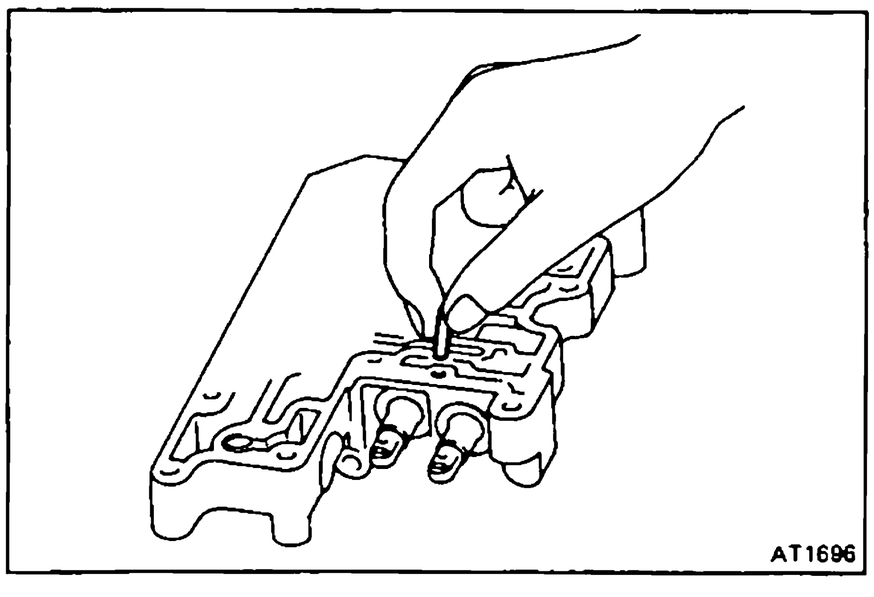
(b) Install the same number of adjusting rings as were removed during disassembly.



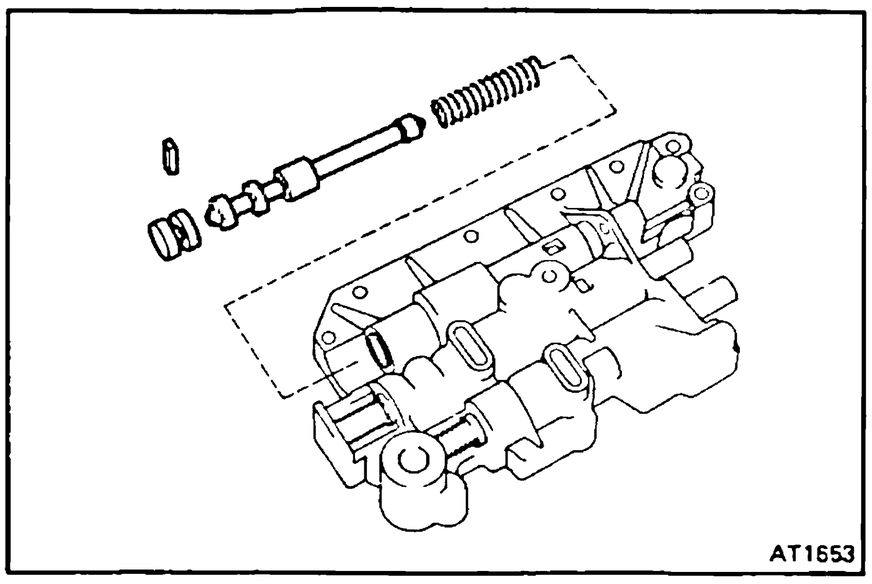
(c) Hold the valve by your finger and install the spring onto the end of the valve shaft.



(d) Install the spring, primary down shift plug and sleeve.

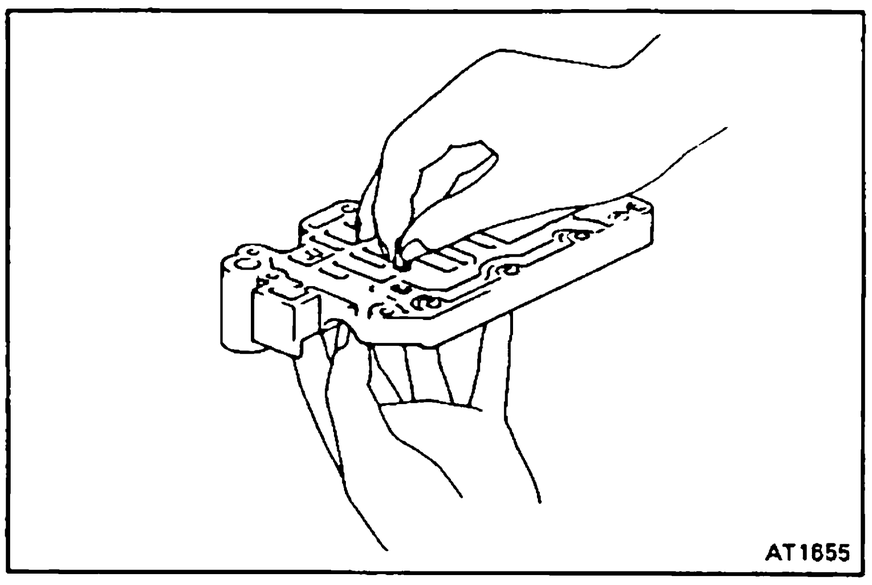


(e) Install the pin.

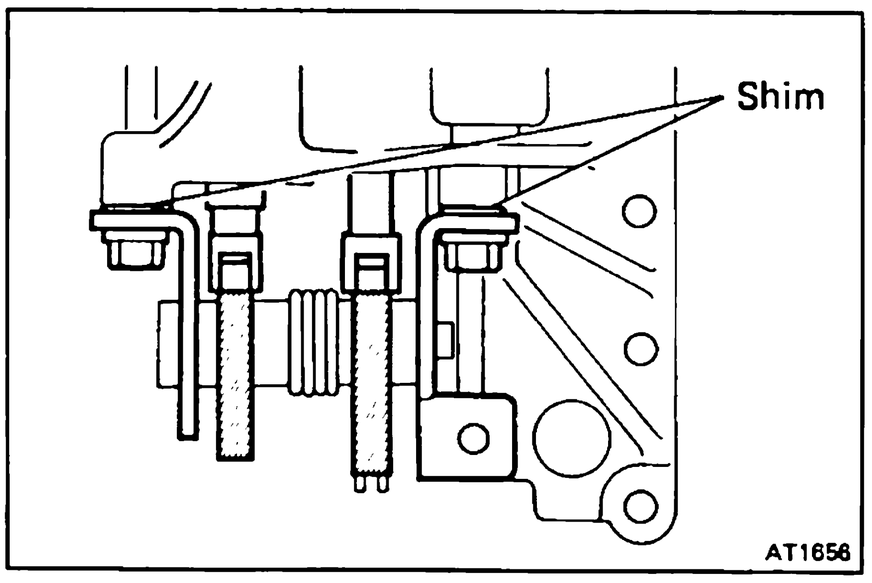

AT1653

3. INSTALL SECONDARY REGULATOR VALVE

(a) Install the spring, secondary regulator valve and plug.


AT1655

(b) Install the retainer by pushing in the plug.

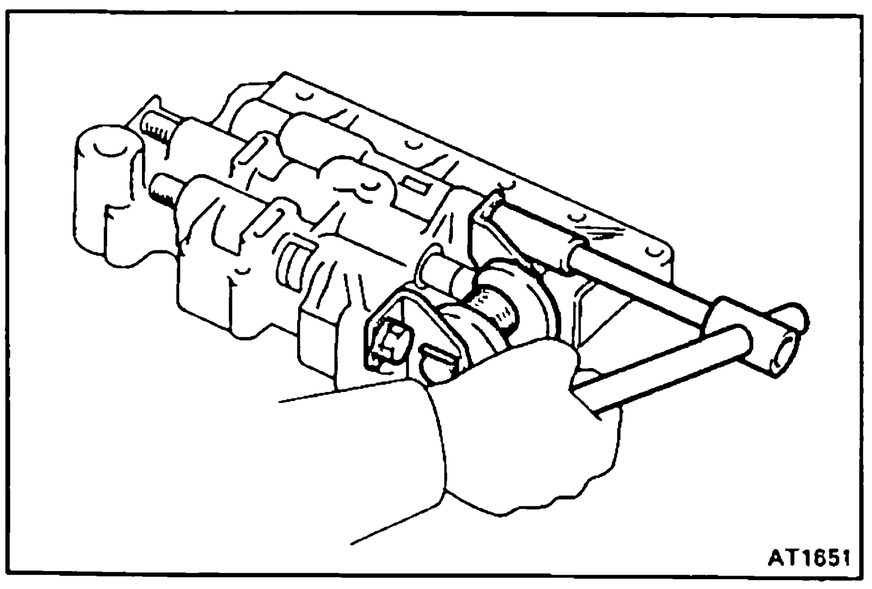


AT1656

4. INSTALL THROTTLE VALVE CAM

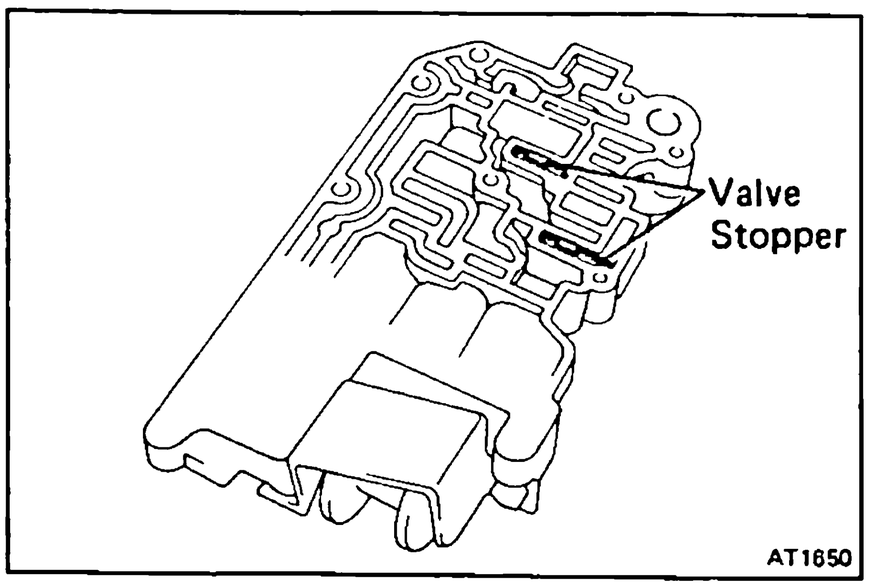
(a) Assemble the shim and throttle valve cam to the valve body so the plug roller is at the center of the cam.

NOTE: Install the same number of the shims as were removed during disassembly.


AT1651

(b) Install and torque the bolts.

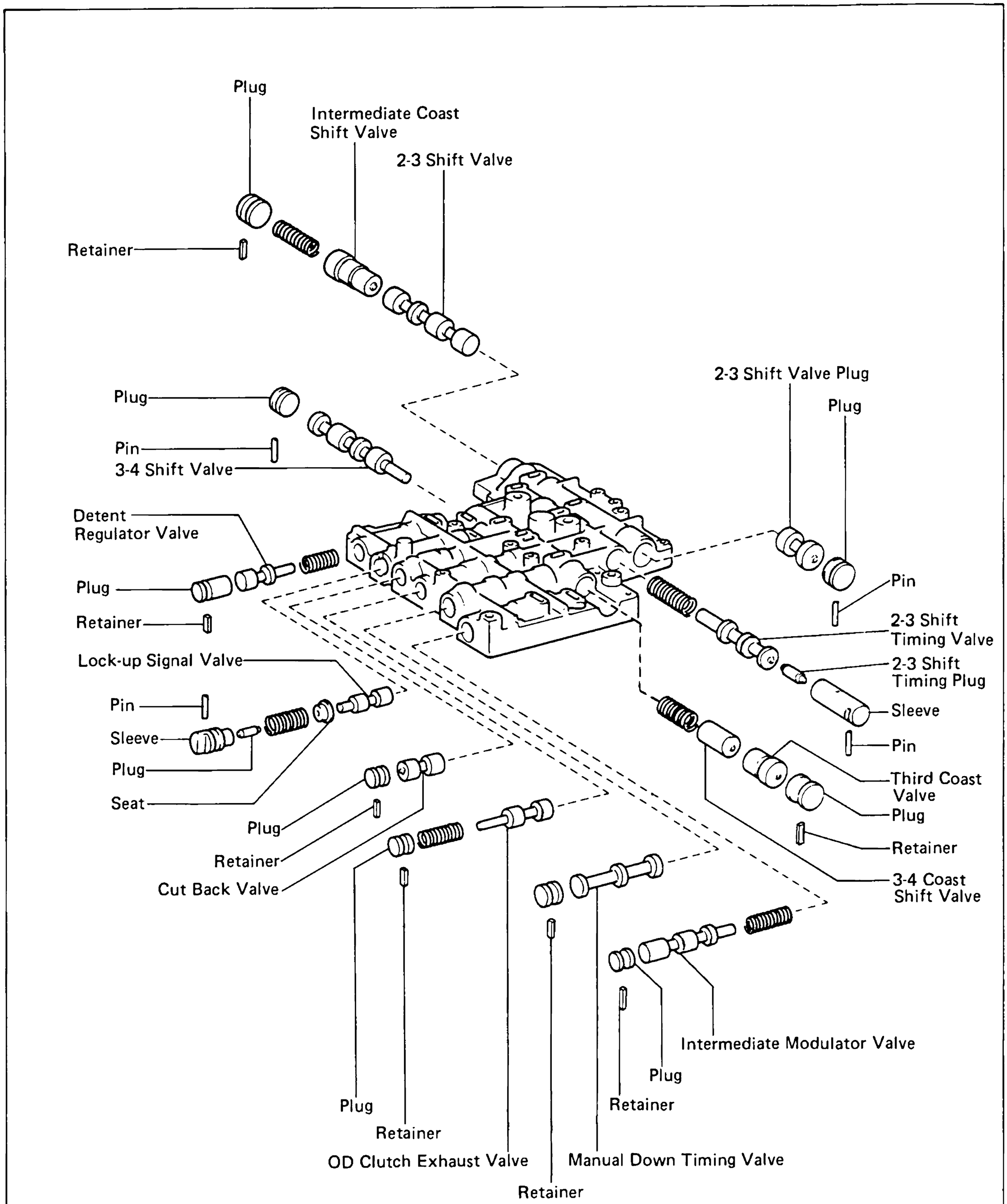
Torque: 100 kg-cm (7 ft-lb, 10 N·m)

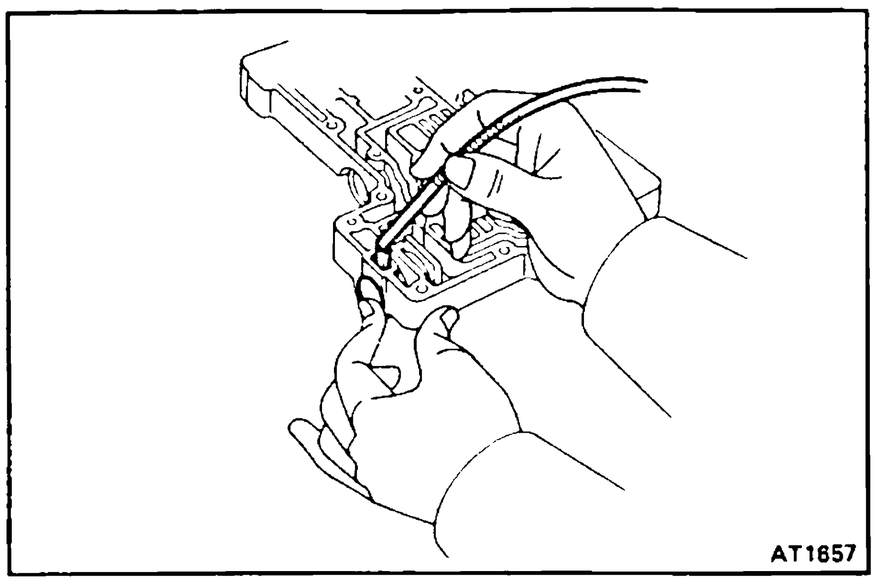


AT1650

5. INSTALL TWO VALVE STOPPERS

Rear Upper Valve Body

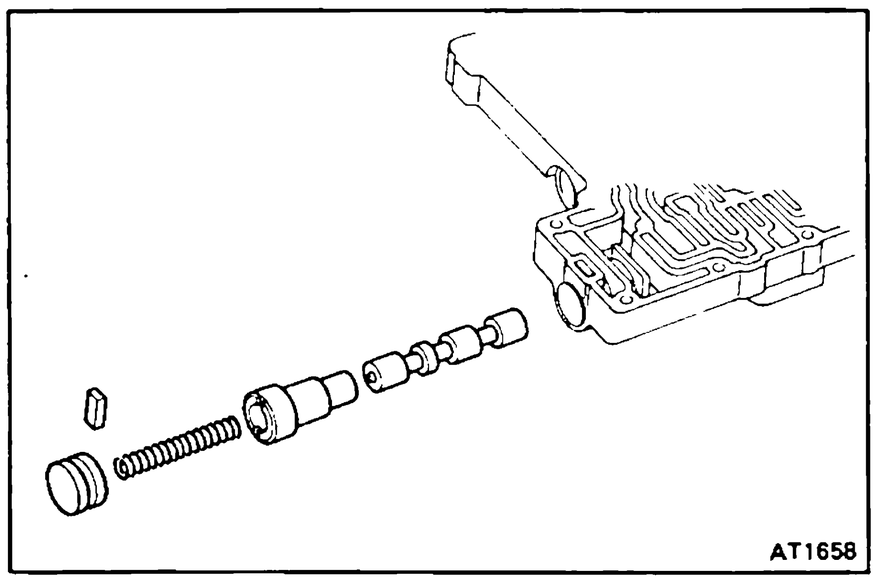




DISASSEMBLY OF REAR UPPER VALVE BODY

1. REMOVE 2-3 SHIFT VALVE

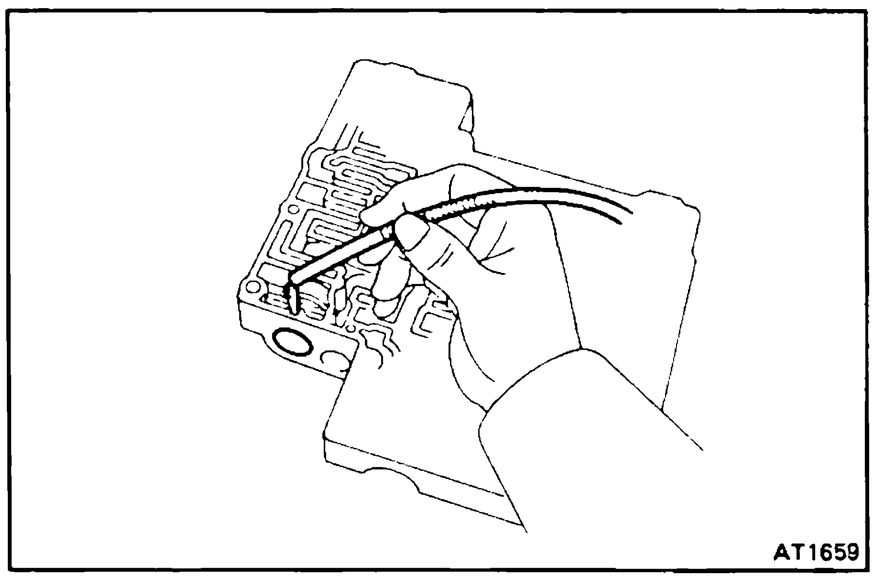
(a) Remove the retainer with a magnetic finger by pushing in the plug.



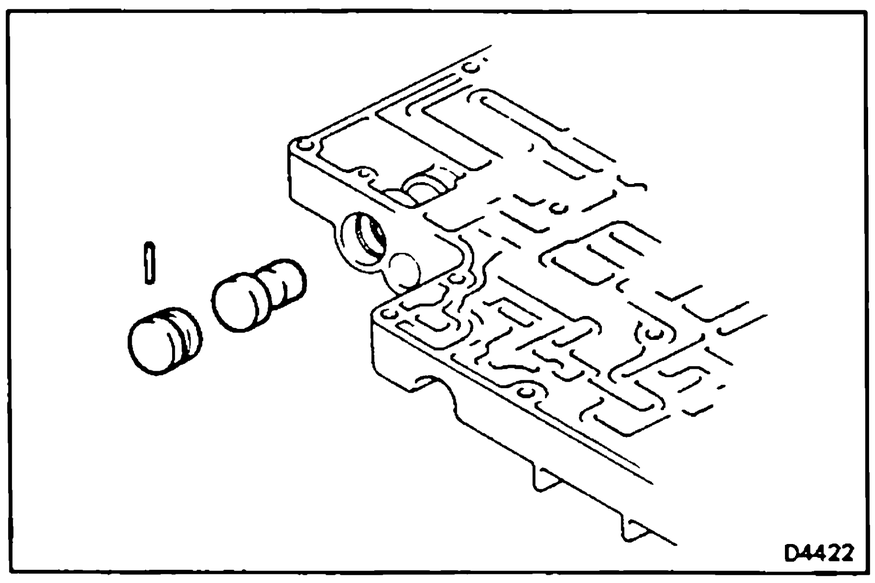
(b) Remove the plug, spring, intermediate coast shift valve and 2-3 shift valve.

2. REMOVE 2-3 SHIFT VALVE PLUG

(a) Remove the pin with the magnetic finger.

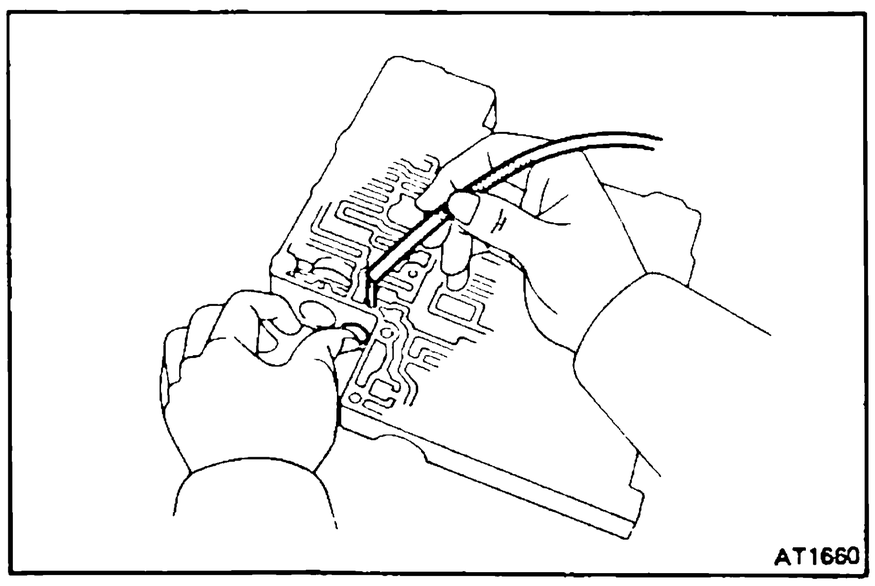


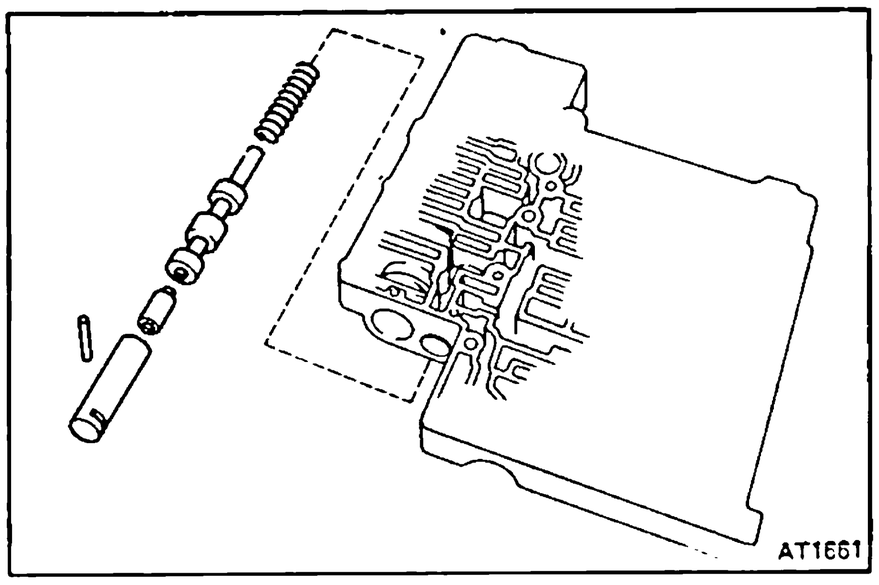
(b) Remove the plug and 2-3 shift valve plug.



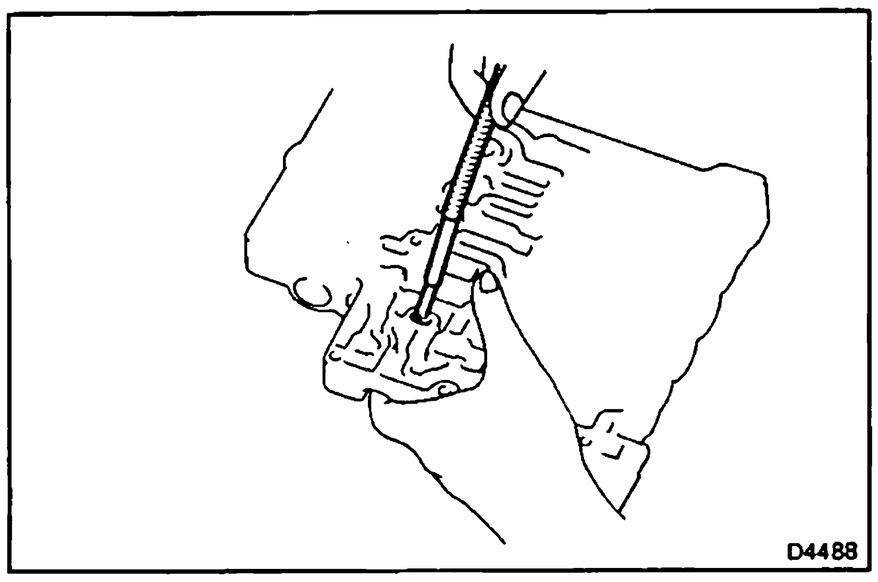
3. REMOVE 2-3 SHIFT TIMING VALVE

(a) Remove the pin with a magnetic finger by pushing in the sleeve.



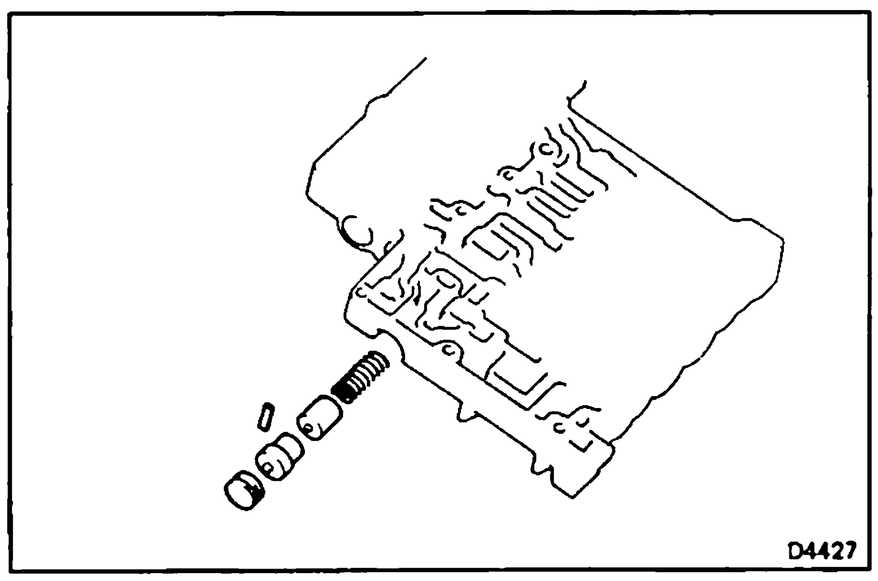


(b) Remove the sleeve, plug and 2-3 shift timing valve.

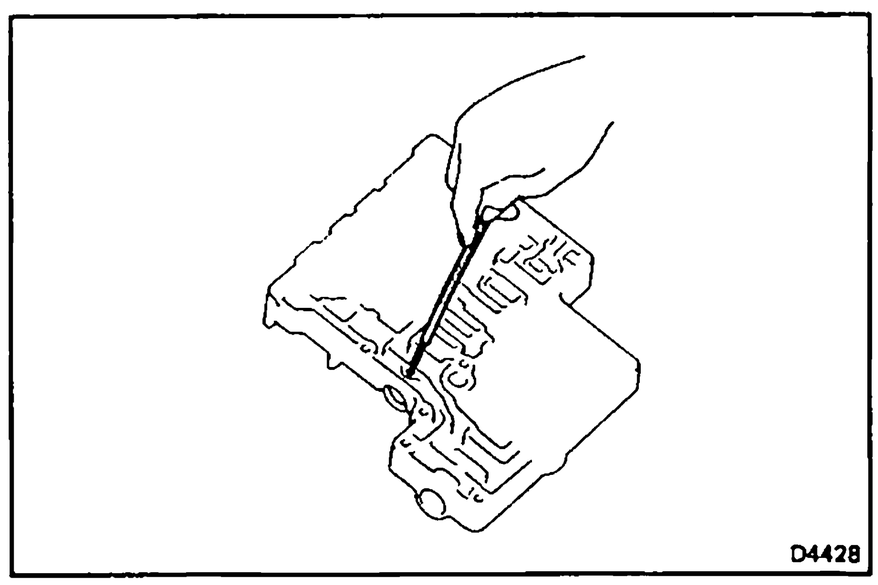


4. REMOVE 3-4 COAST SHIFT VALVE

(a) Remove the retainer with a magnetic finger by pushing in the plug.

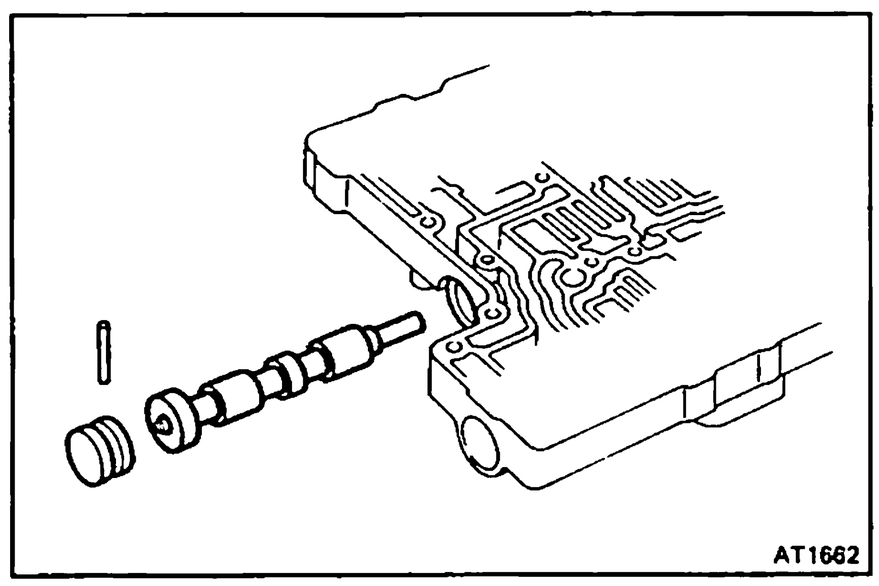


(b) Remove the plug, third coast valve and 3-4 coast shift valve.

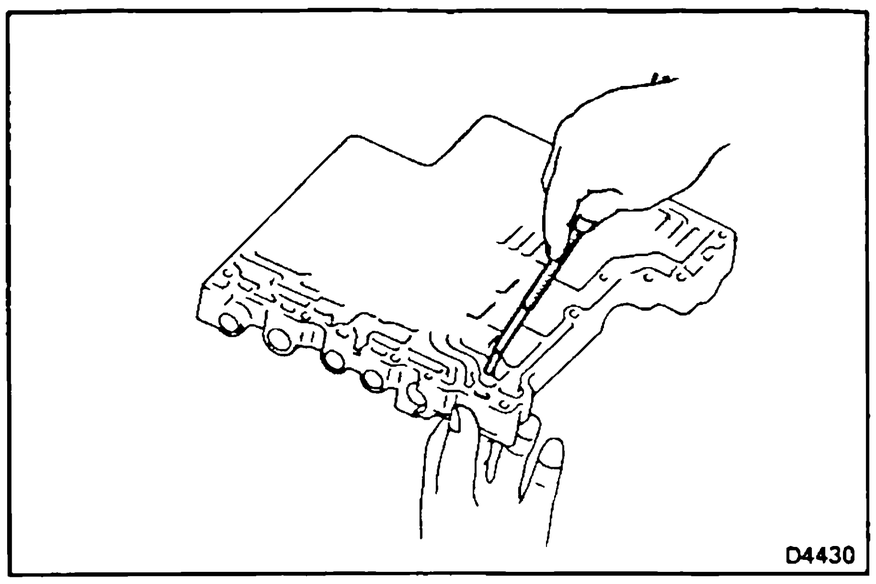


5. REMOVE 3-4 SHIFT VALVE

(a) Remove the pin with a magnetic finger.

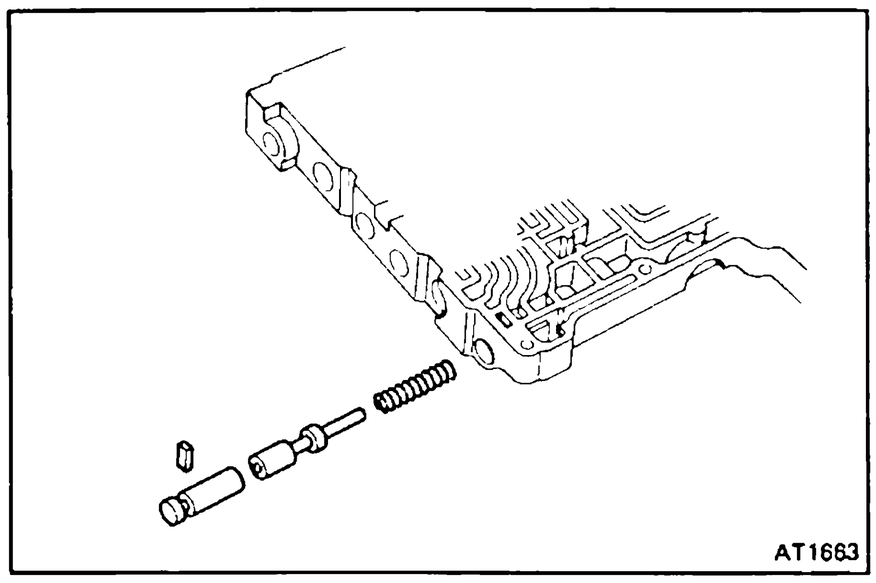


(b) Remove the plug and 3-4 shift valve.

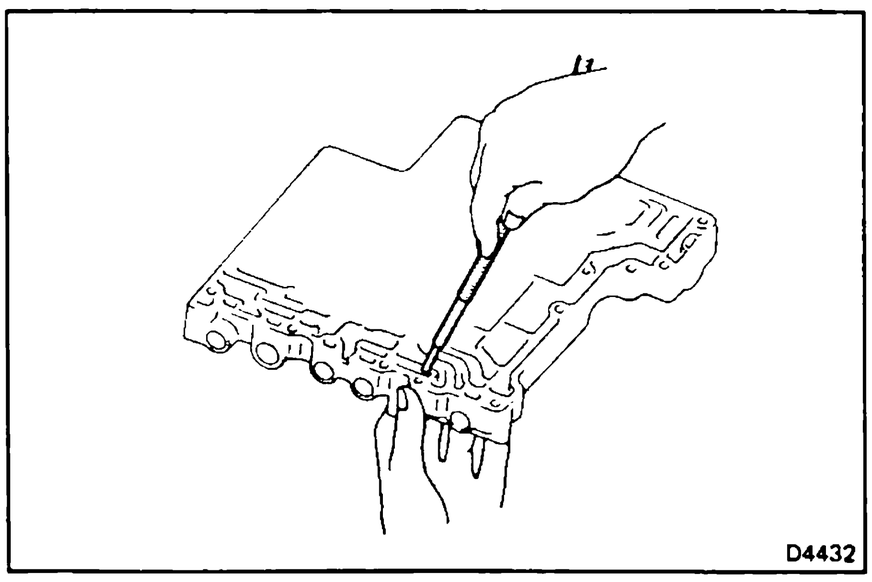


6. REMOVE DETENT REGULATOR VALVE

(a) Remove the retainer with a magnetic finger by pushing in the plug.

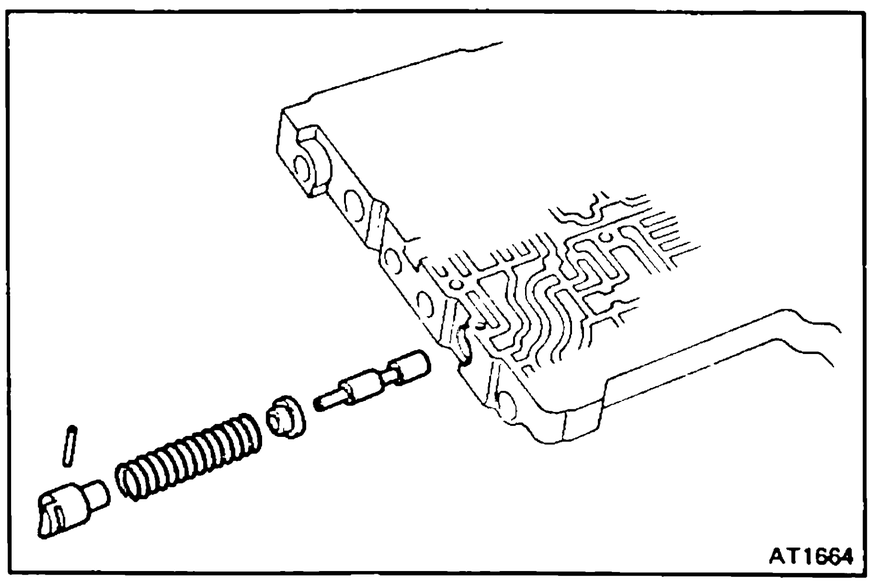


(b) Remove the plug, detent regulator plug and spring.

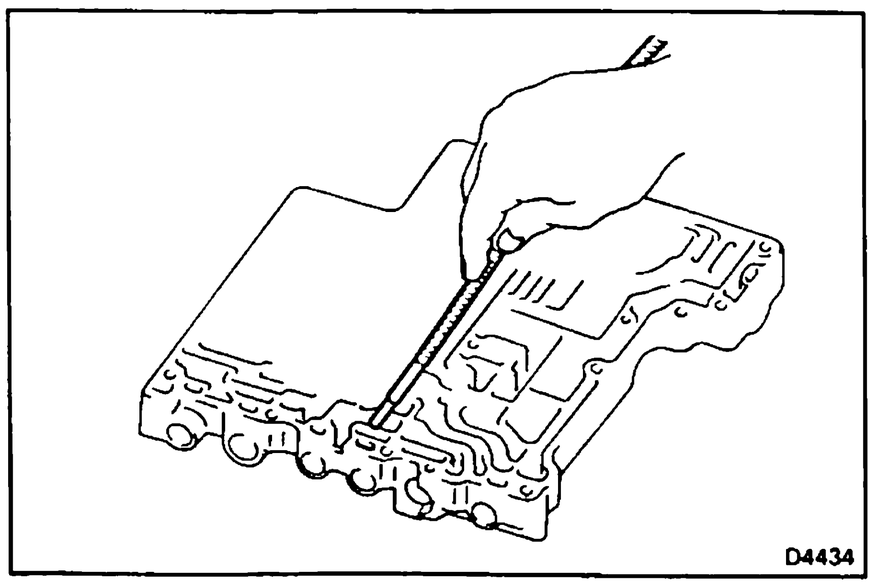


7. REMOVE LOCK-UP SIGNAL VALVE

(a) Remove the pin with a magnetic finger by pushing in the sleeve.

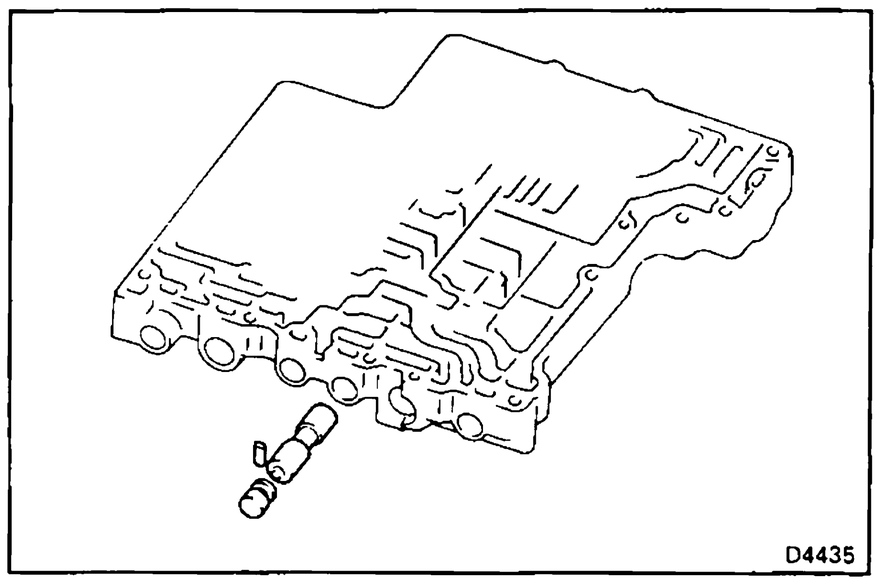


(b) Remove the sleeve, plug, spring, seat and lock-up signal valve.

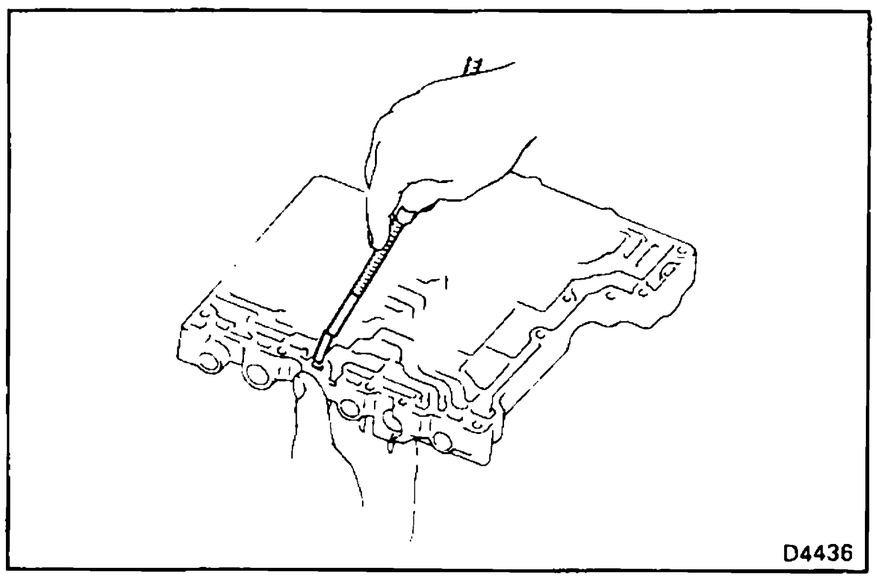


8. REMOVE CUT BACK VALVE

(a) Remove the retainer with a magnetic finger.

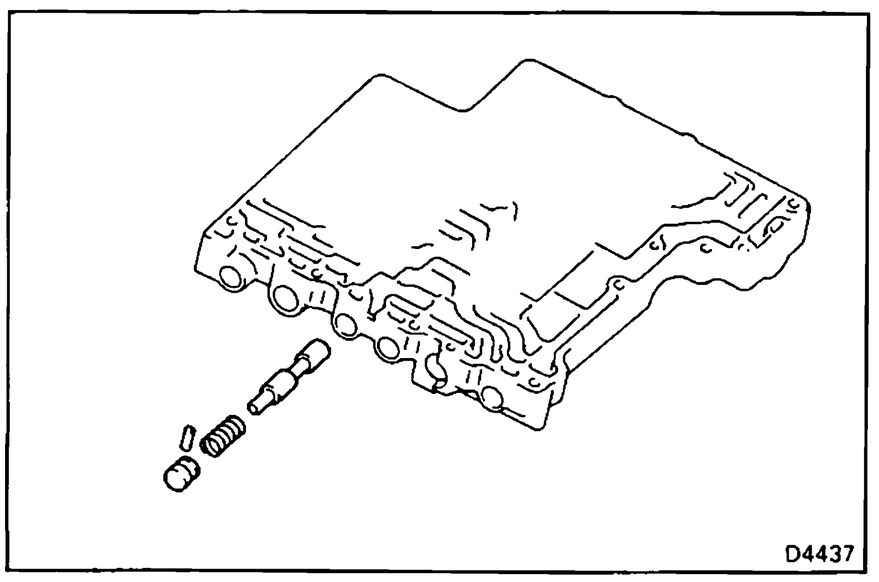


(b) Remove the plug and cut back valve.

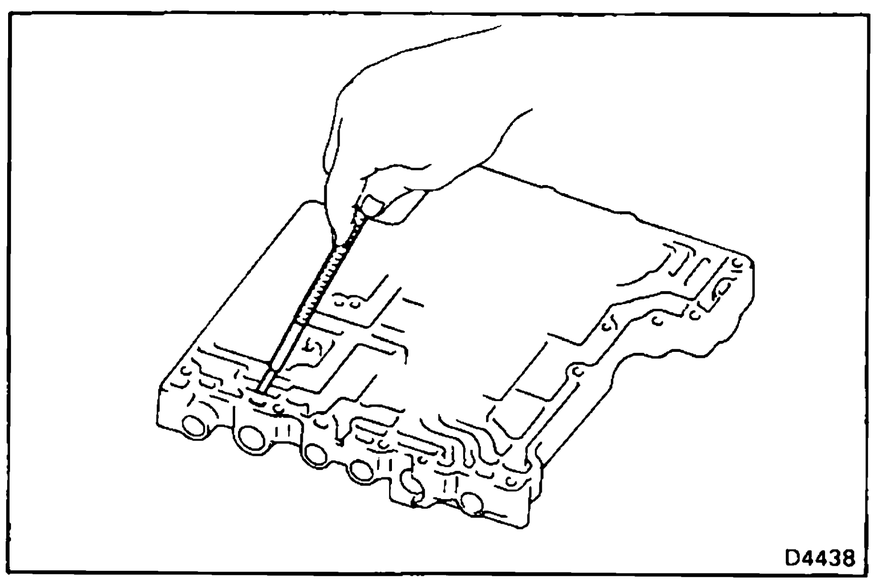


9. REMOVE OVERDRIVE CLUTCH EXHAUST VALVE

(a) Remove the retainer with a magnetic finger by pushing in the plug.

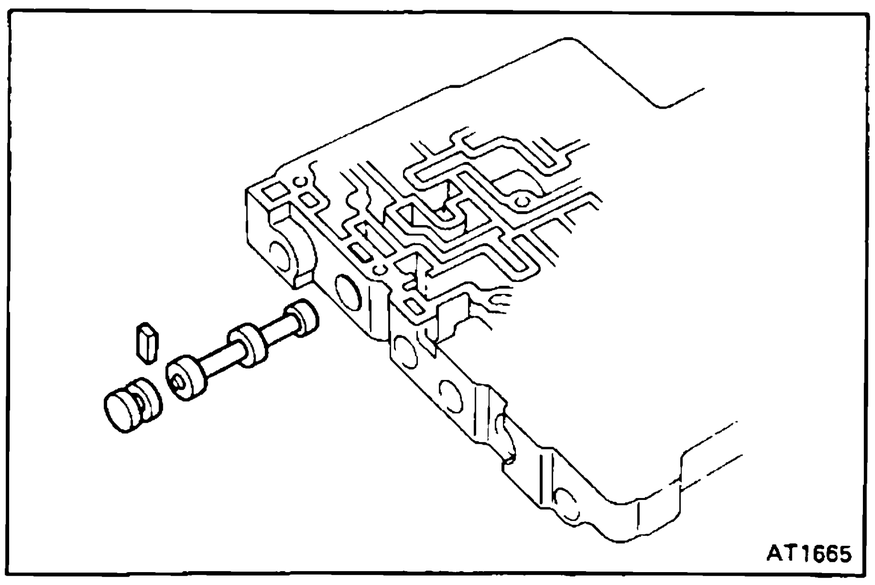


(b) Remove the plug, spring and overdrive clutch exhaust valve.

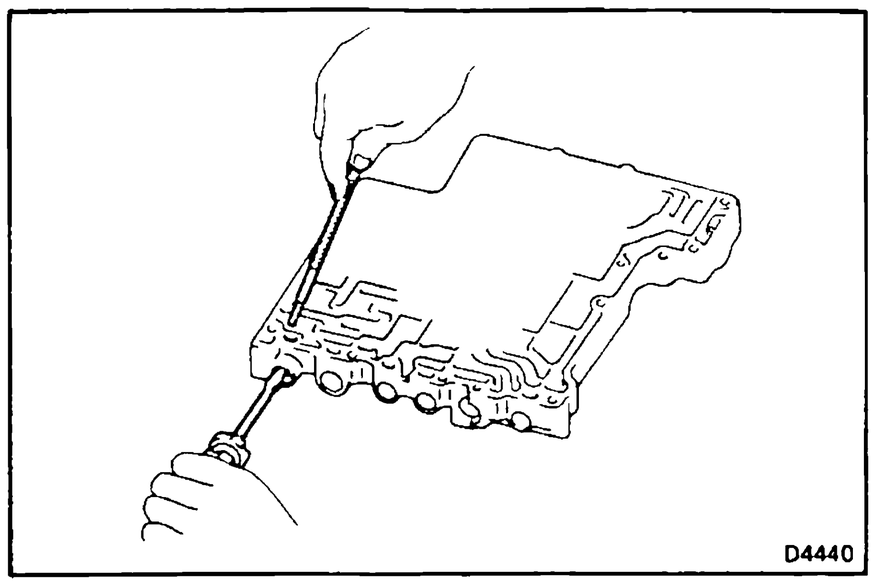


10. REMOVE MANUAL DOWN TIMING VALVE

(a) Remove the retainer with a magnetic finger.

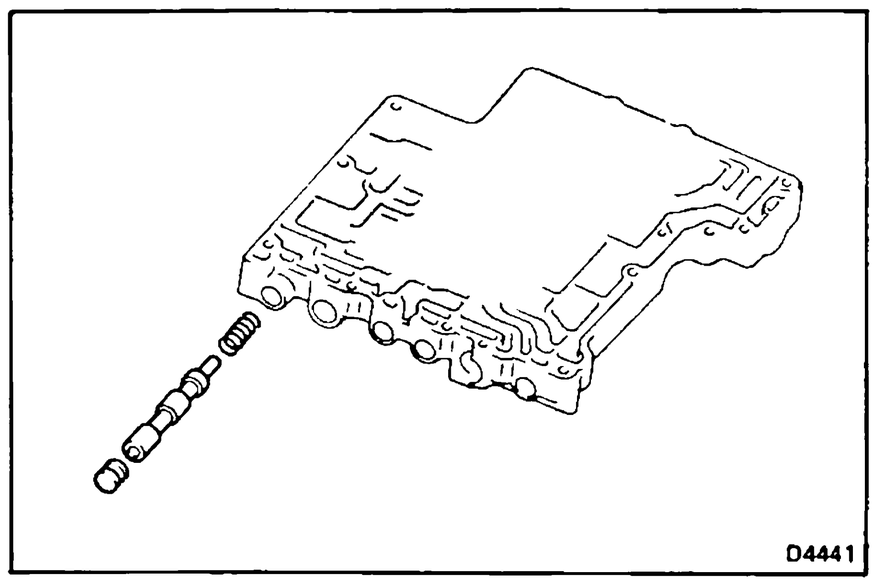


(b) Remove the plug and manual down timing valve.

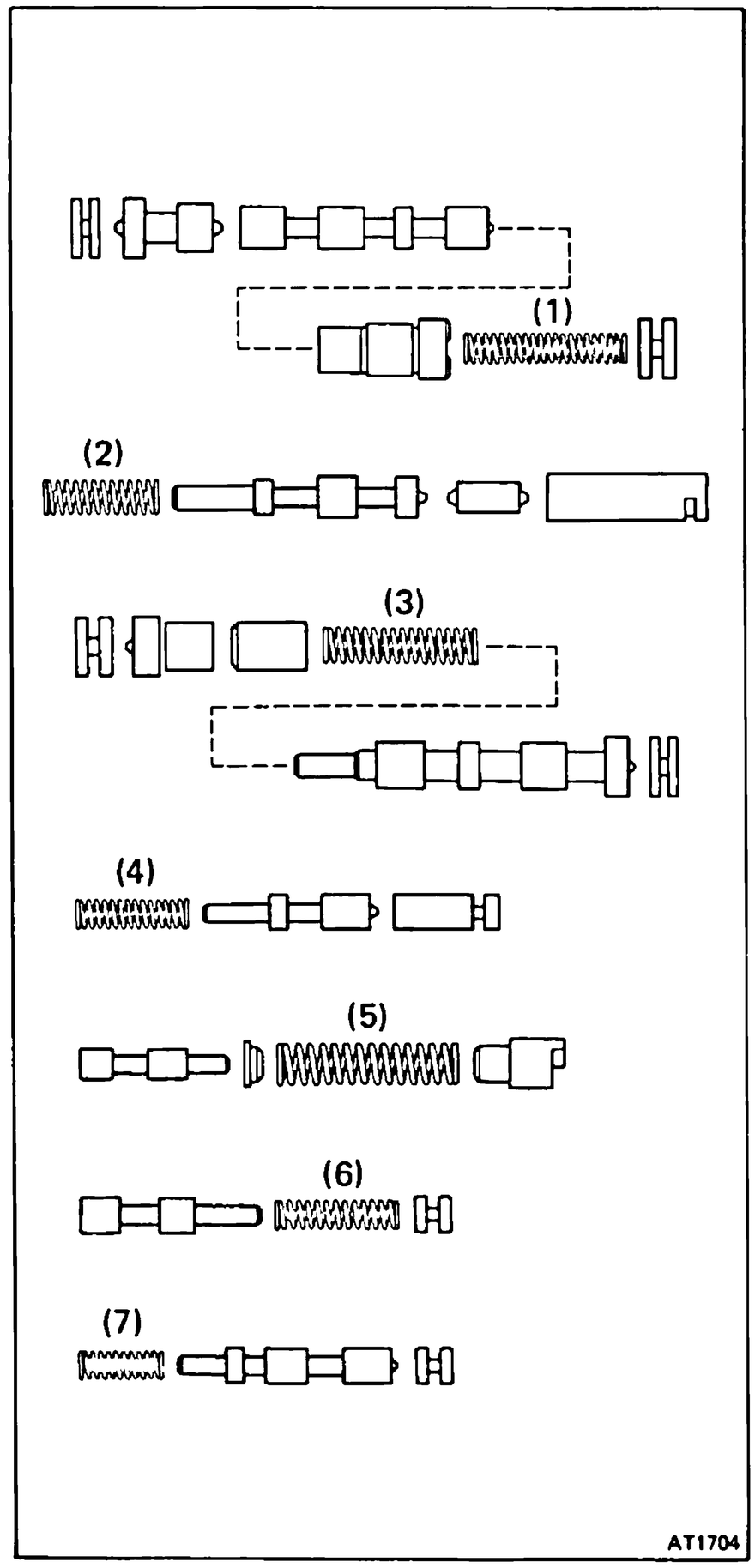


11. REMOVE INTERMEDIATE MODULATOR VALVE

(a) Remove the retainer with a magnetic finger by pushing in the plug.



(b) Remove the plug, intermediate modulator valve and spring.



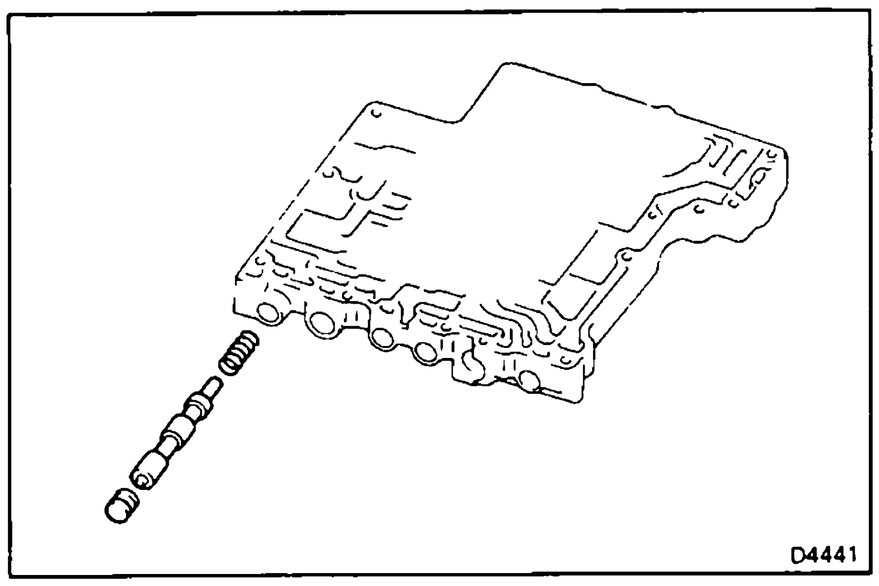
INSPECTION OF REAR UPPER VALVE BODY

INSPECT VALVE SPRINGS

Check for damage, squareness, rust and distorted coils. Measure the spring free height and replace if less than that shown below.

Spring			Free length mm (in.)
(1) 2-3 shift valve			44.65 (1.7579)
(2) 2-3 shift timing valve			29.40 (1.1575)
(3) 3-4 shift valve		HJ	39.40 (1.5512)
		FJ	38.32 (1.5087)
(4) Detent regulator valve		HJ	29.30 (1.1535)
		FJ	30.40 (1.1968)
(5) Lock-up signal valve	*18/6	FJ	52.83 (2.0799)
		HJ	53.41 (2.1028)
	17/6 16/6	FJ HJ	50.15 (1.9744)
(6) OD clutch exhaust valve			33.30 (1.3110)
(7) Intermediate modulator valve			22.50 (0.8858)

*: Speedometer drive and driven gear ratio.
Gear ratio is stamped on the driven gear.



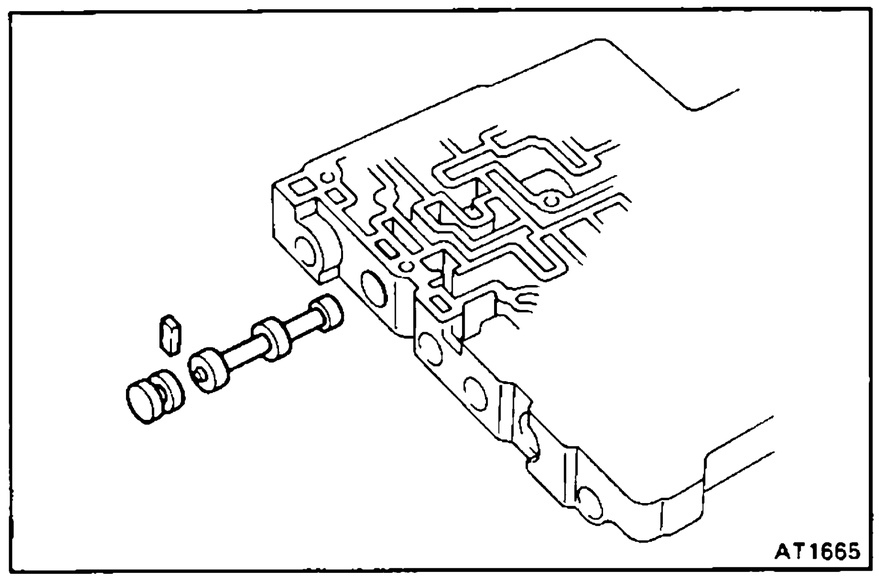
ASSEMBLY OF REAR UPPER VALVE BODY

(See page AT-102)

1. INSTALL INTERMEDIATE MODULATOR VALVE

(a) Install spring, intermediate modulator valve and plug.

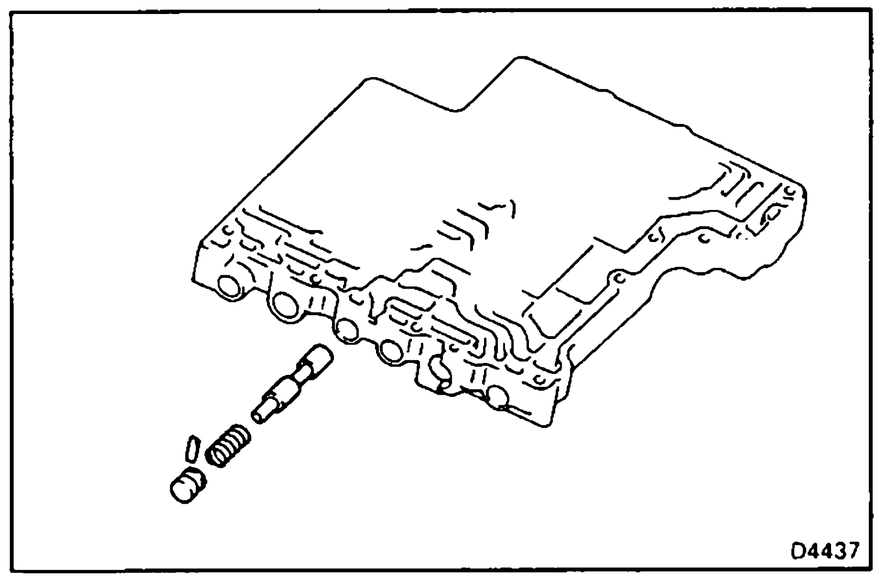
(b) Install the retainer by pushing in the plug.



2. INSTALL MANUAL DOWN TIMING VALVE

(a) Install the manual down timing valve and plug.

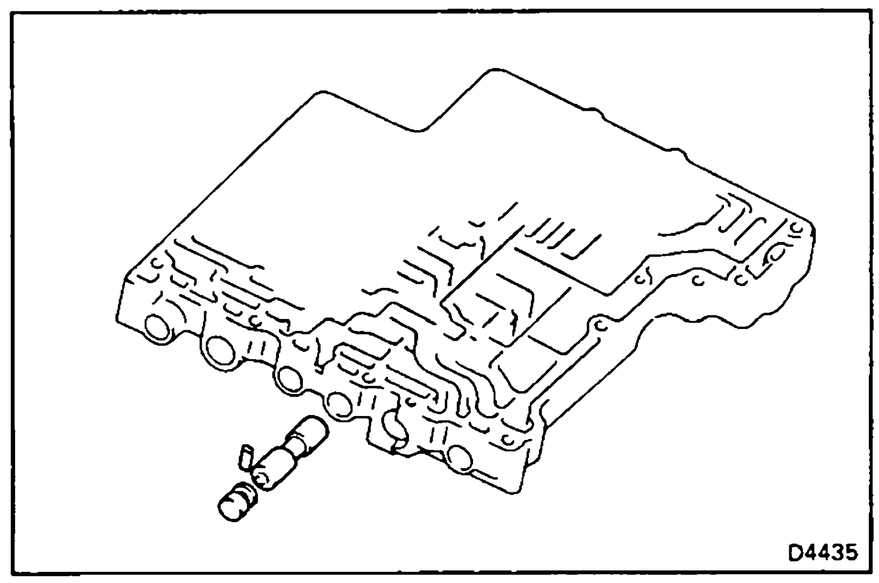
(b) Install the retainer.



3. INSTALL OVERDRIVE CLUTCH EXHAUST VALVE

(a) Install the overdrive clutch exhaust valve, spring and plug.

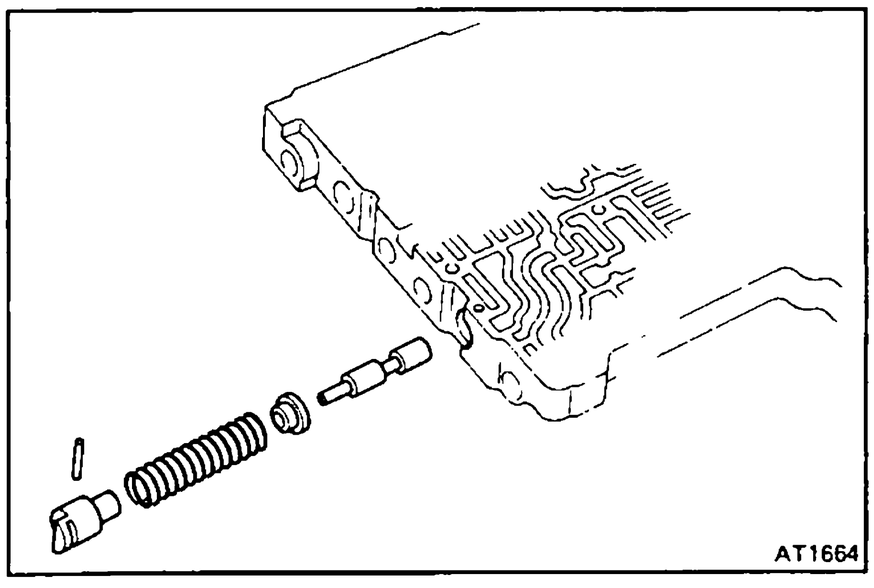
(b) Install the retainer by pushing in the plug.



4. INSTALL CUT BACK VALVE

(a) Install the cut back valve and plug.

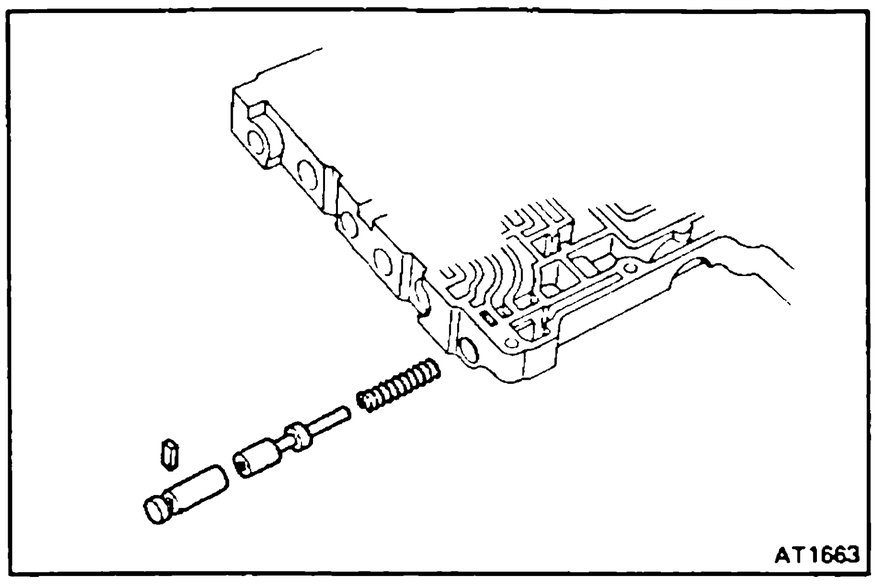
(b) Install the retainer.



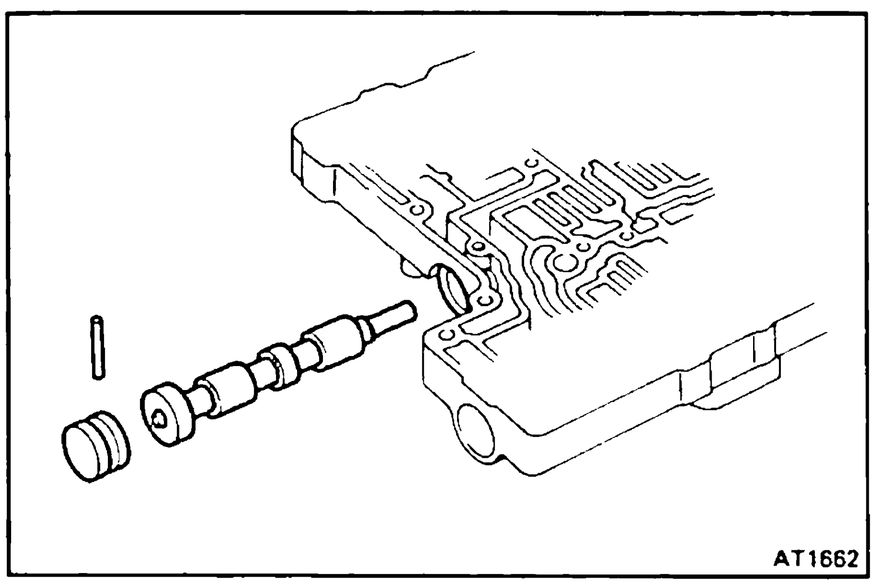
5. INSTALL LOCK-UP SIGNAL VALVE

(a) Install the lock-up signal valve, seat spring, plug and sleeve.

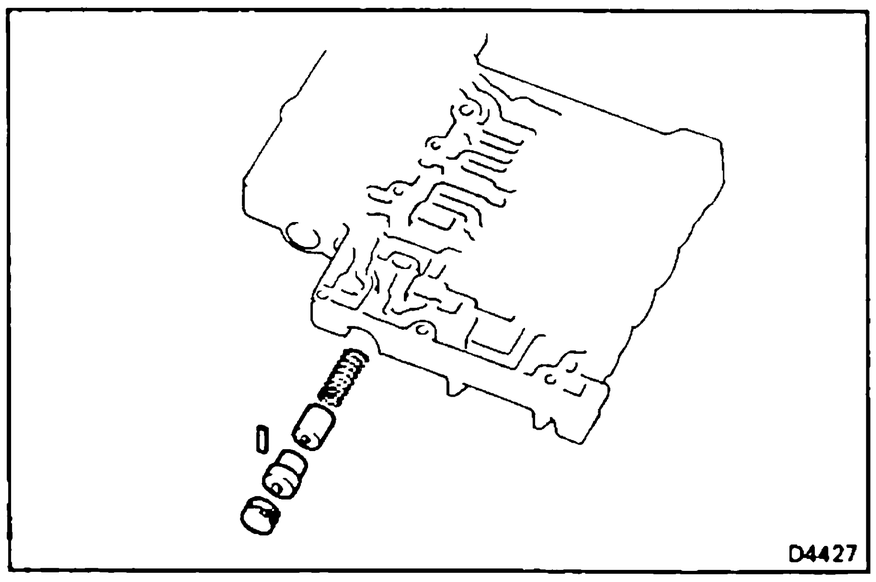
(b) Install the pin by pushing in the sleeve.



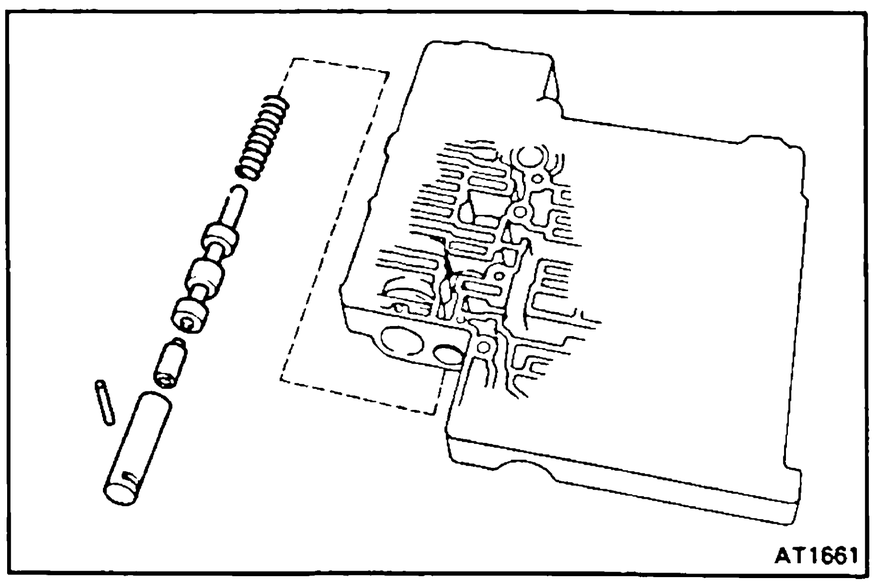
6. INSTALL DETENT REGULATOR VALVE
   (a) Install the spring, detent regulator valve and plug.
   (b) Install the retainer by pushing in the plug.



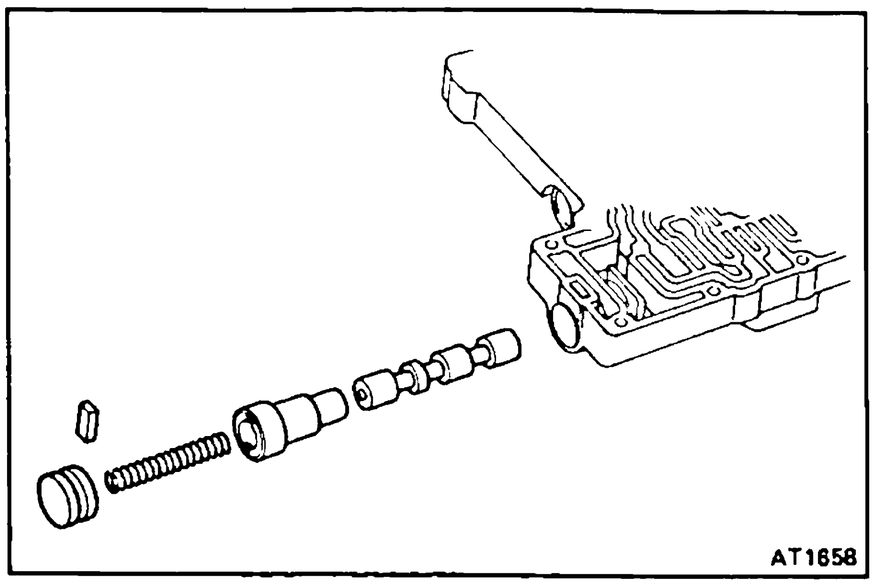
7. INSTALL 3-4 SHIFT VALVE
   (a) Install the 3-4 shift valve and pin.
   (b) Install the pin.



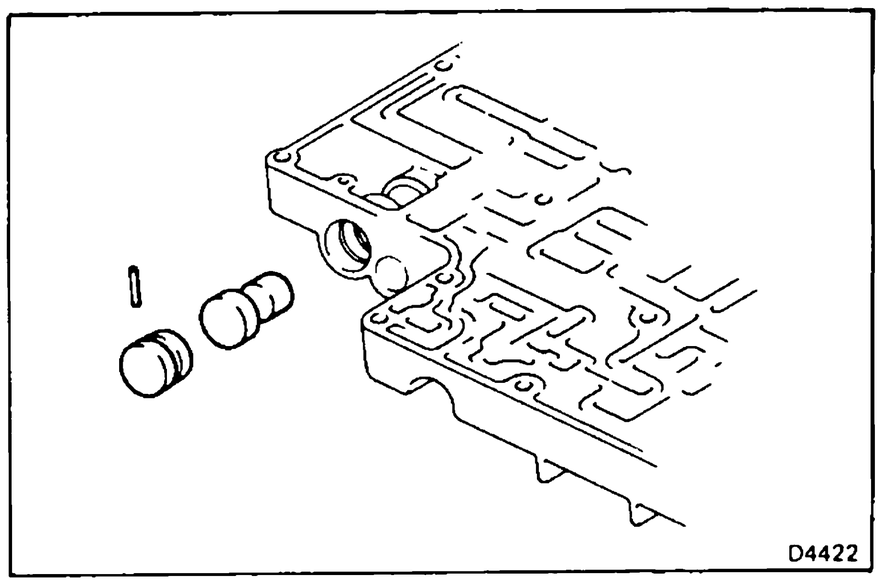
8. INSTALL 3-4 COAST SHIFT VALVE
   (a) Install the spring, 3-4 coast shift valve, third coast valve and plug.
   (b) Install the retainer by pushing in the plug.



9. INSTALL 2-3 SHIFT TIMING VALVE
   (a) Install the spring, 2-3 shift timing valve, 2-3 shift timing plug and sleeve.
   (b) Install the pin by pushing in the sleeve.



10. INSTALL 2-3 SHIFT VALVE PLUG
   (a) Install the 2-3 shift valve plug and plug.
   (b) Install the pin.

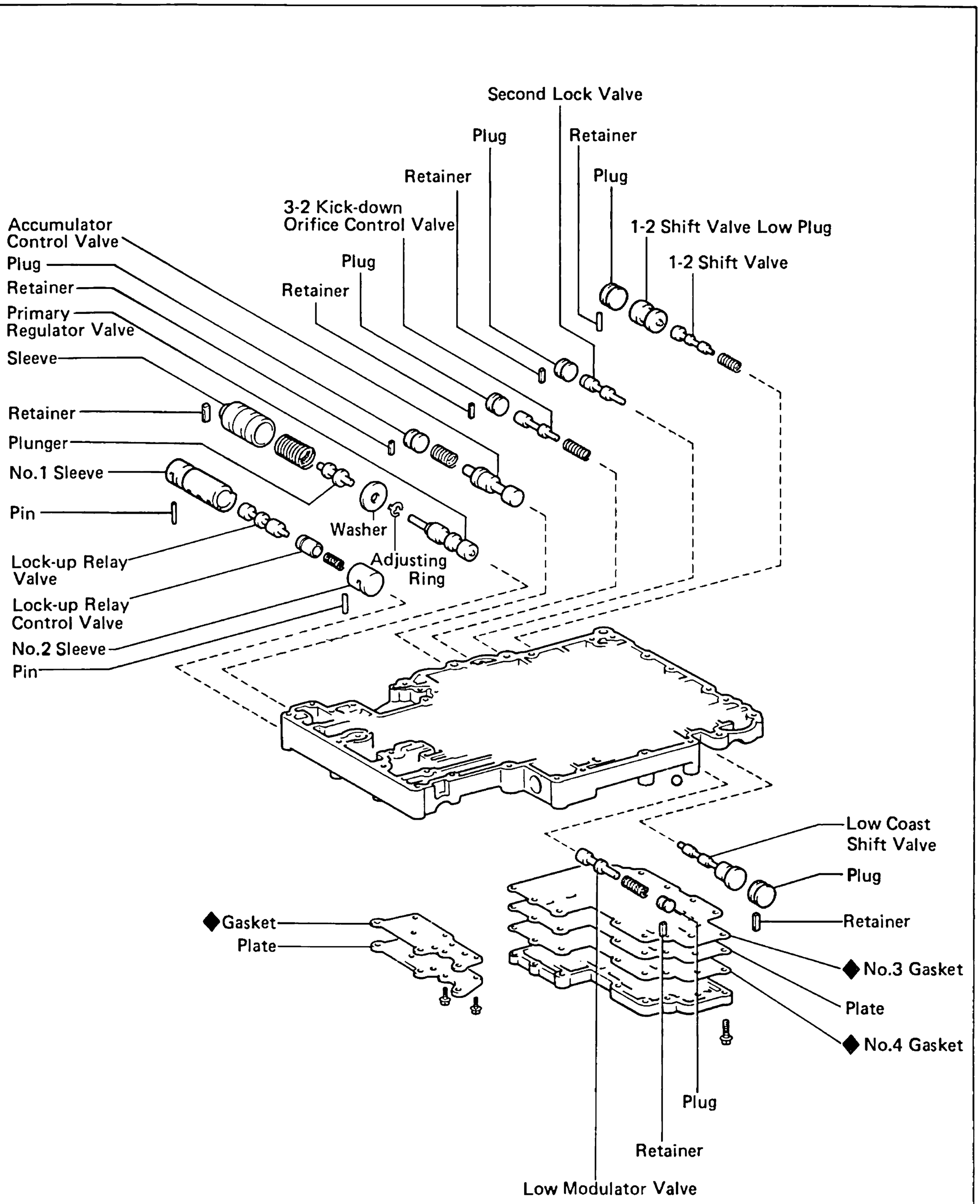


11. INSTALL 2-3 SHIFT VALVE

(a) Install the 2-3 shift valve, intermediate coast shift valve and plug.

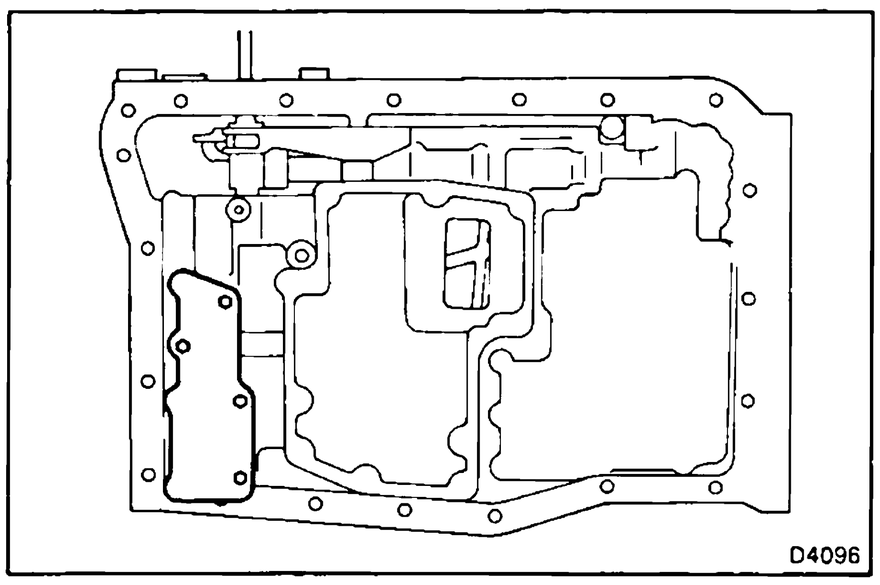
(b) Install the retainer by pushing in the plug.

Lower Valve Body



◆ Non-reusable part

AT1693

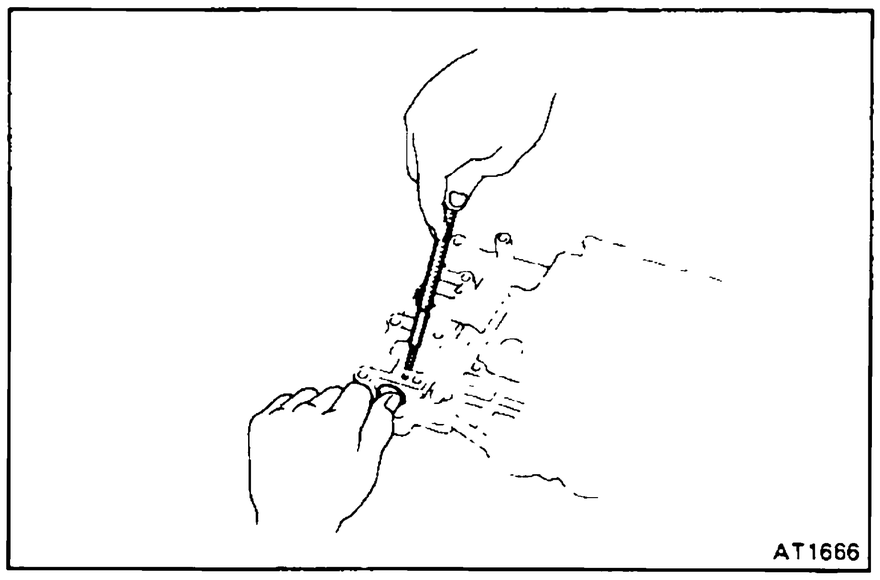


DISASSEMBLY OF LOWER VALVE BODY

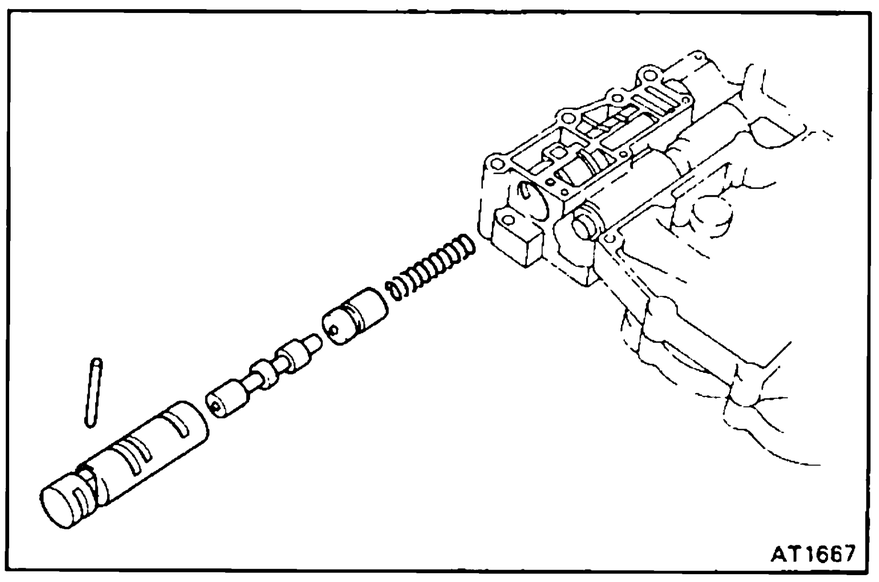
1. REMOVE LOCK-UP RELAY VALVE

(a) Remove the four bolts temporarily installed to valve body.

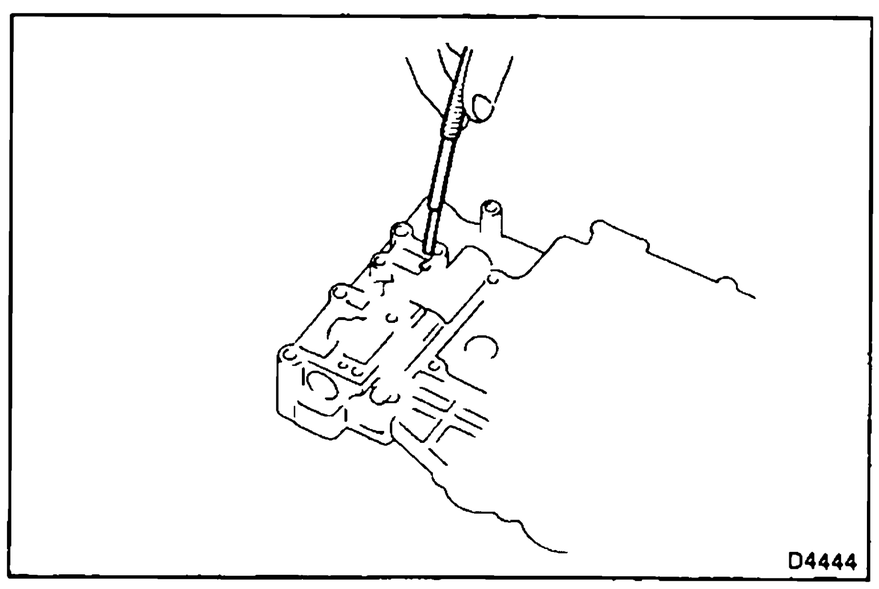
(b) Remove the lock-up relay valve plate.



(c) Remove the pin with a magnetic finger by pushing in the sleeve.

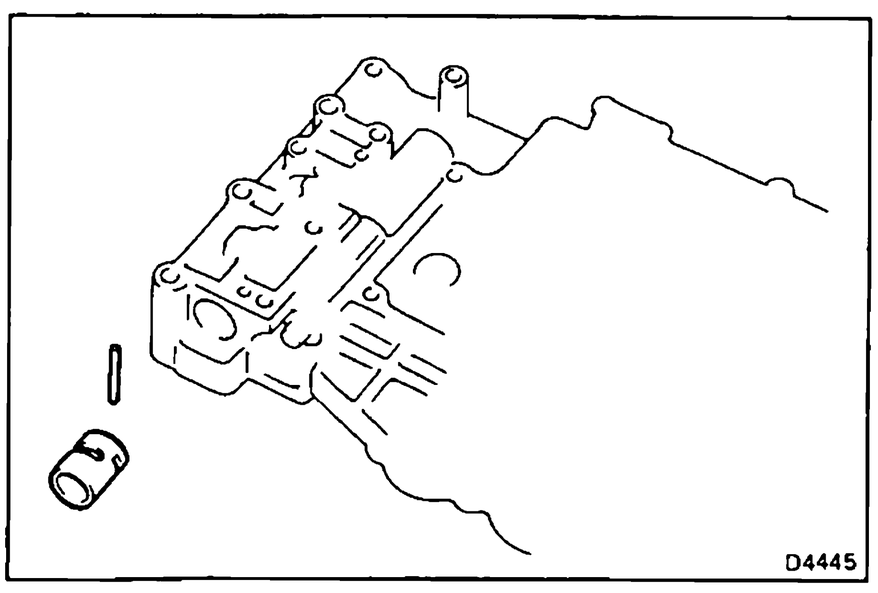


(d) Remove the No. 1 sleeve, lock-up relay valve, lock-up relay control valve and spring.

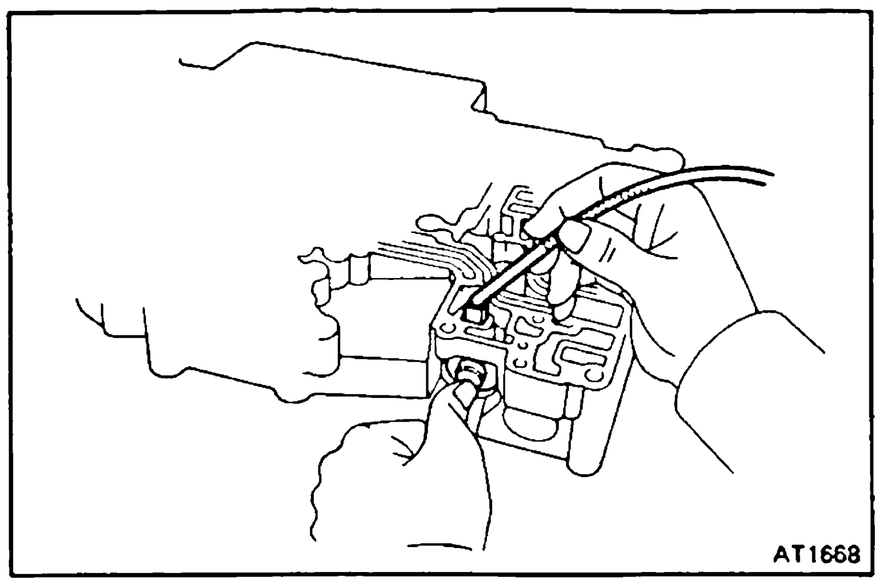


2. REMOVE NO. 2 SLEEVE (FOR LOCK-UP RELAY CONTROL VALVE)

(a) Remove the pin with a magnetic finger.

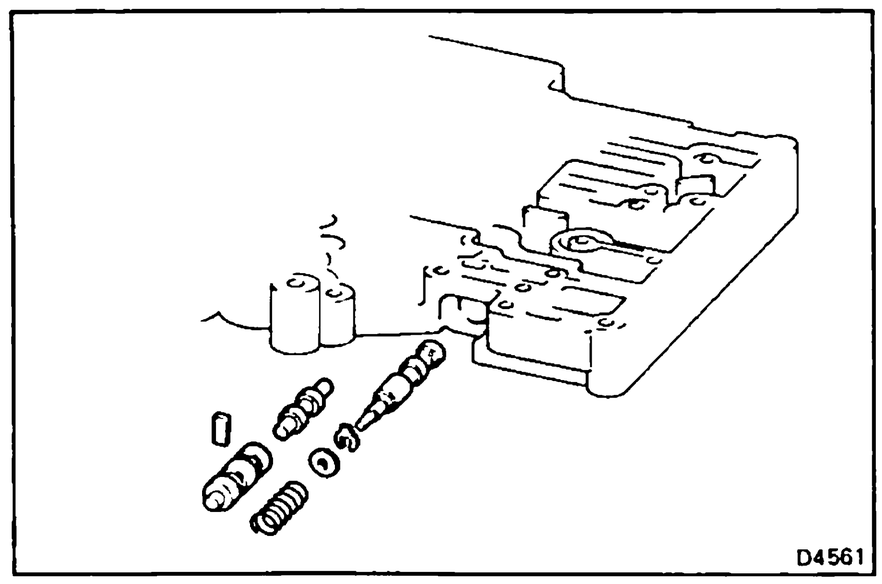


(b) Remove the No. 2 sleeve.



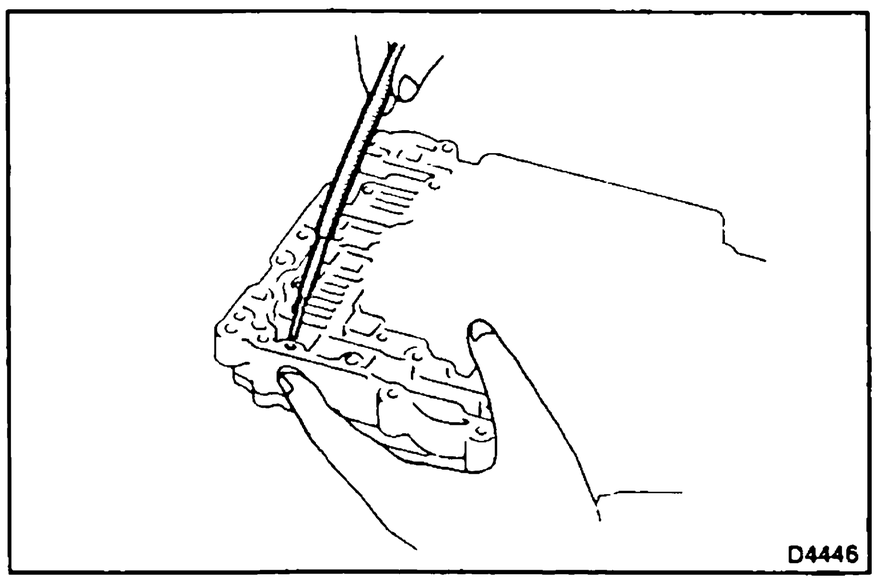
3. REMOVE PRIMARY REGULATOR VALVE

(a) Remove the retainer with a magnetic finger by pushing in the sleeve.



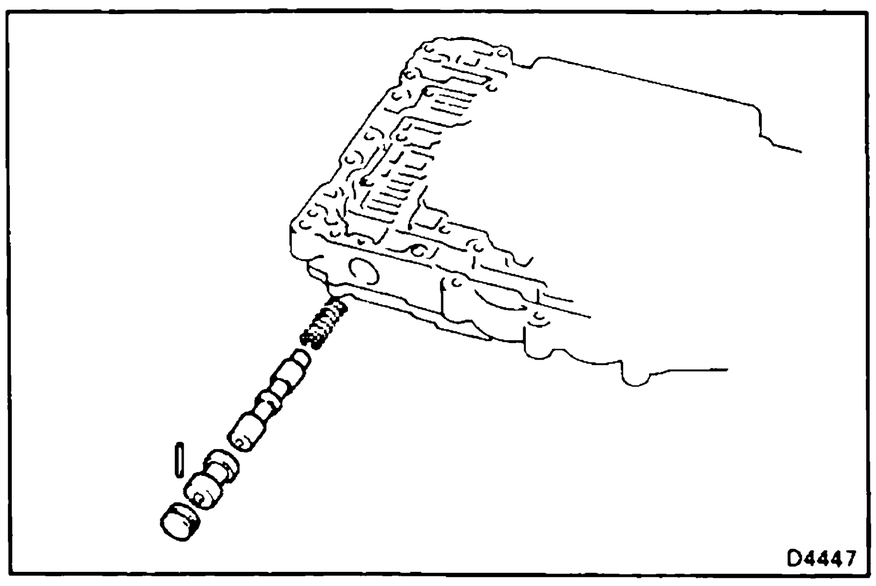
(b) Remove the sleeve, spring, plunger, washer, adjusting ring and primary regulator valve.

NOTE: Note the number of adjusting rings installed.

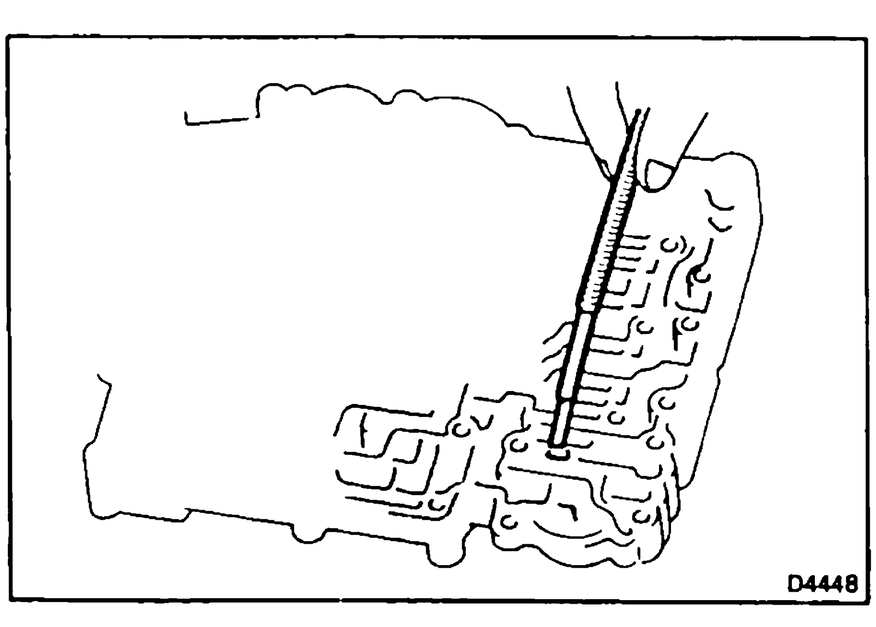


4. REMOVE 1-2 SHIFT VALVE

(a) Remove the pin with a magnetic finger by pushing in the plug.

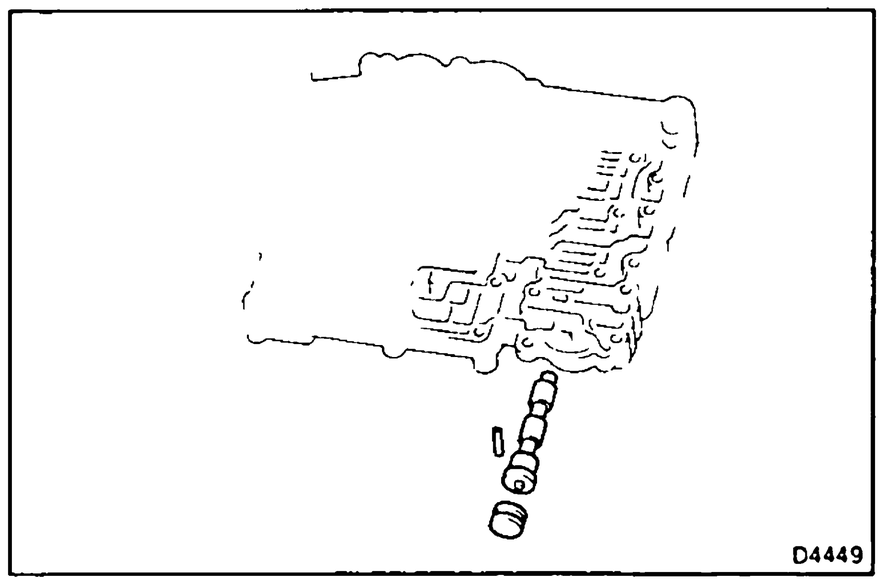


(b) Remove the plug, 1-2 shift valve low plug, 1-2 shift valve and spring.

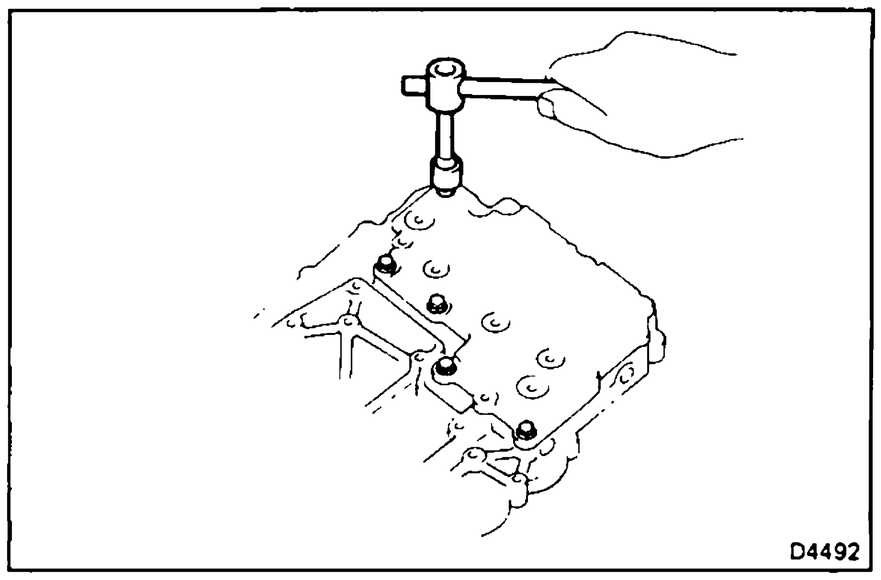


5. REMOVE LOW COAST SHIFT VALVE

(a) Remove the retainer with a magnetic finger.



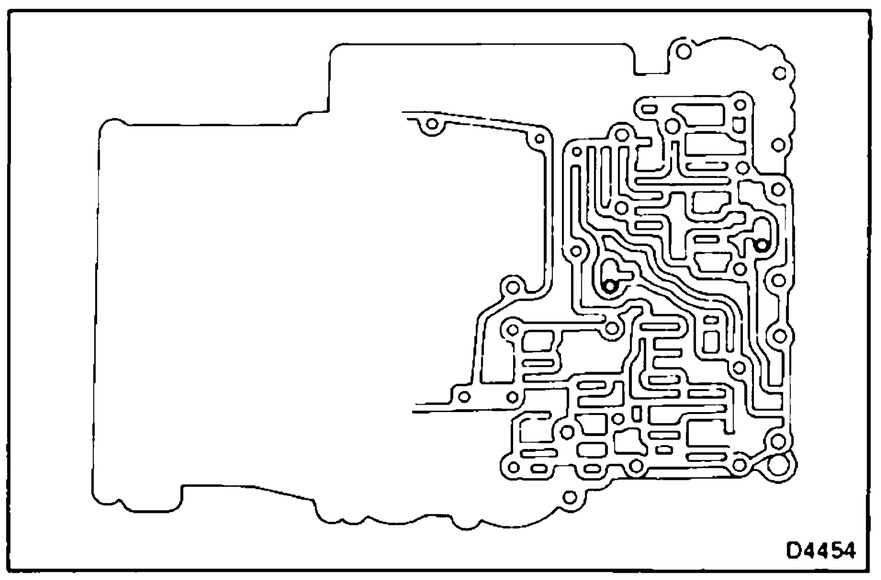
(b) Remove the plug and low coast shift valve.



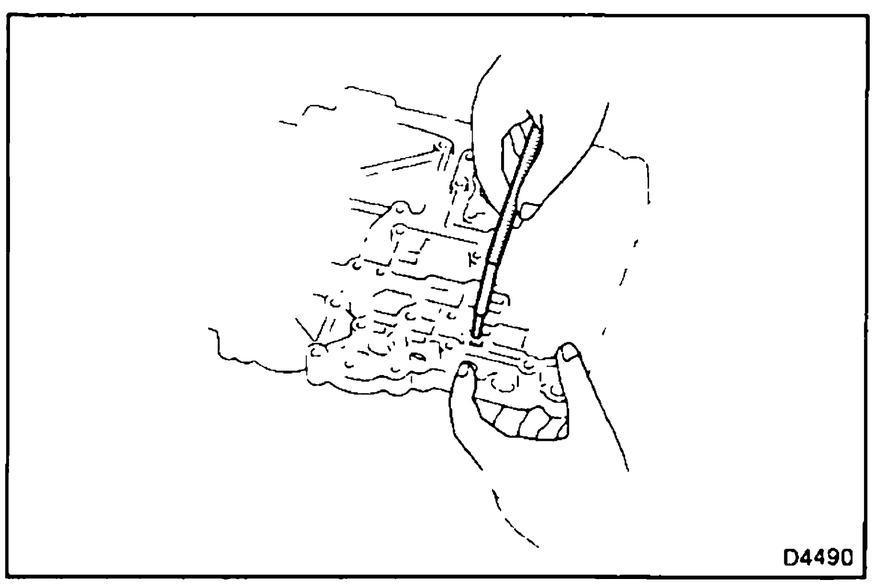
6. REMOVE LOWER VALVE BODY COVER

(a) Remove the five bolts holding the cover to the valve body.

(b) Remove the cover, plate and two gaskets.

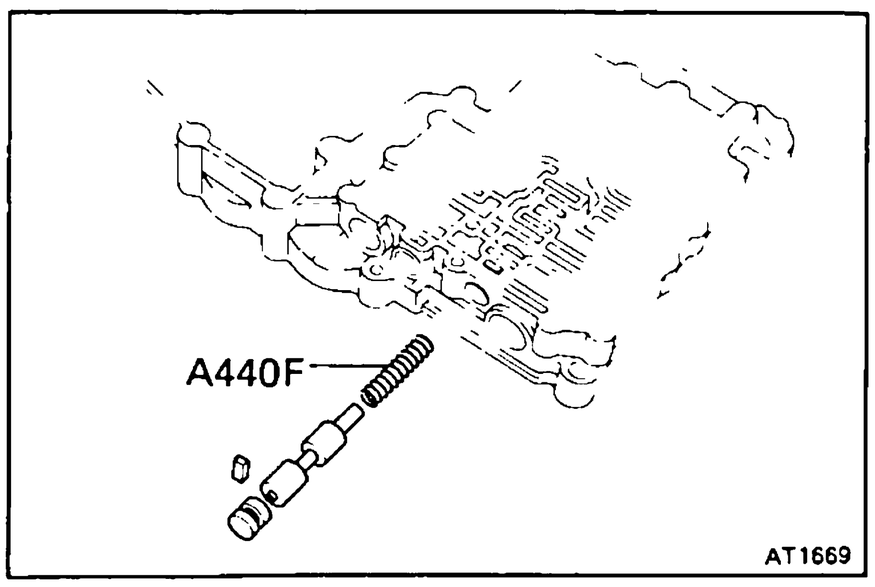


7. REMOVE TWO CHECK BALLS

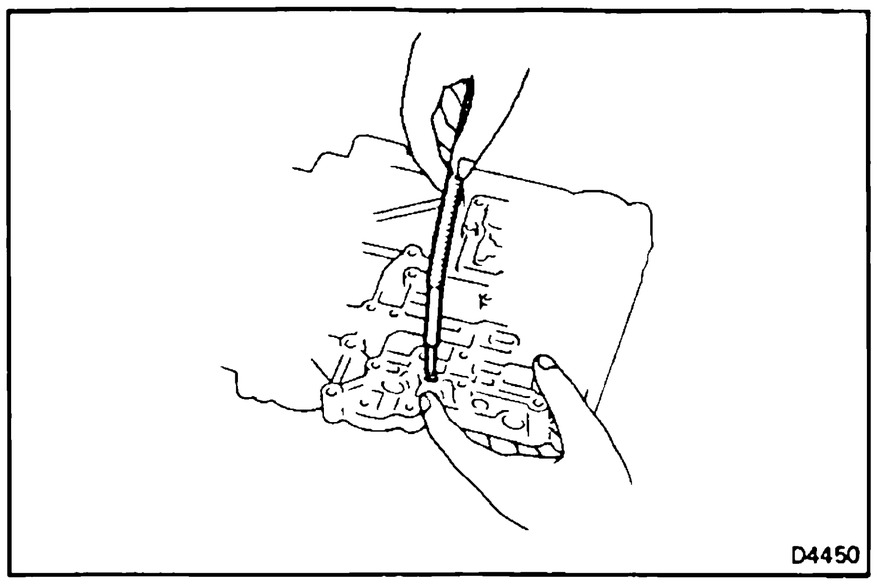


8. REMOVE SECOND LOCK VALVE

(a) Remove the retainer with a magnetic finger by pushing in the plug.

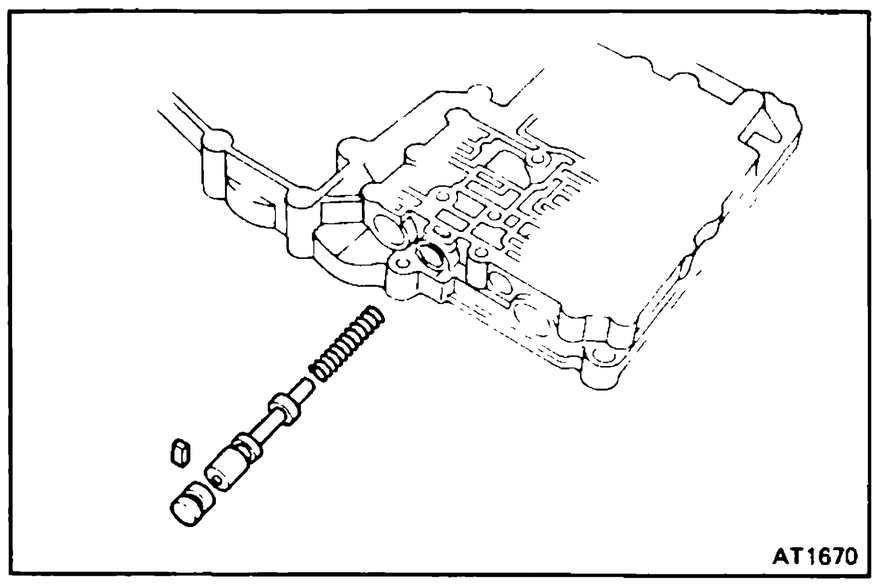


(b) Remove the plug, second lock valve and spring.

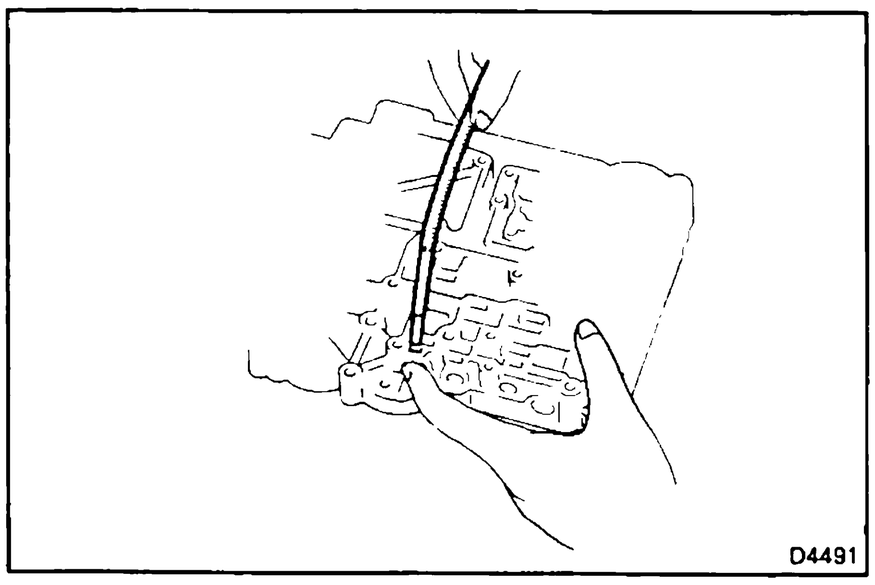


9. REMOVE 3-2 KICK-DOWN ORIFICE CONTROL VALVE

(a) Remove the retainer with a magnetic finger by pushing in the plug.

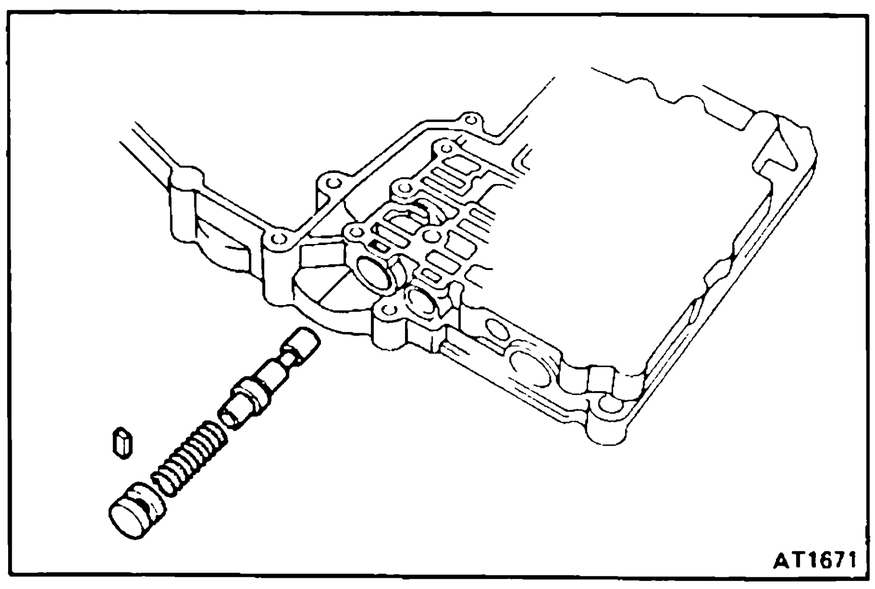


(b) Remove the plug, 3-2 kick-down orifice control valve and spring.

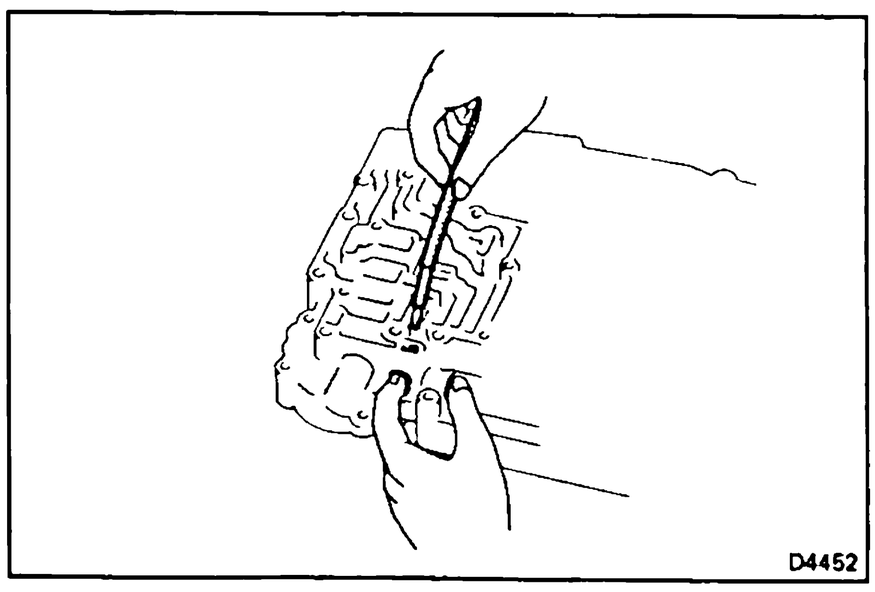


10. REMOVE ACCUMULATOR CONTROL VALVE

(a) Remove the retainer with a magnetic finger by pushing in the plug.

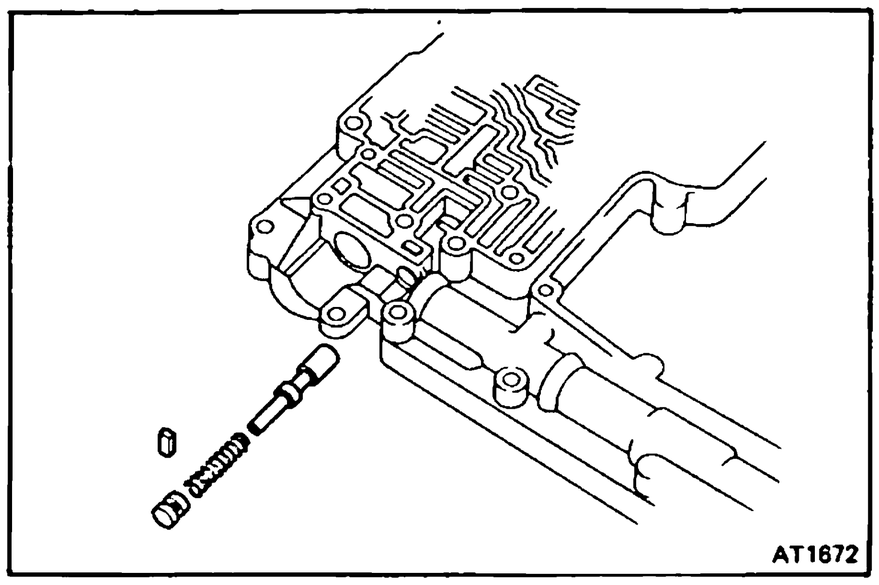


(b) Remove the plug, spring and accumulator control valve.

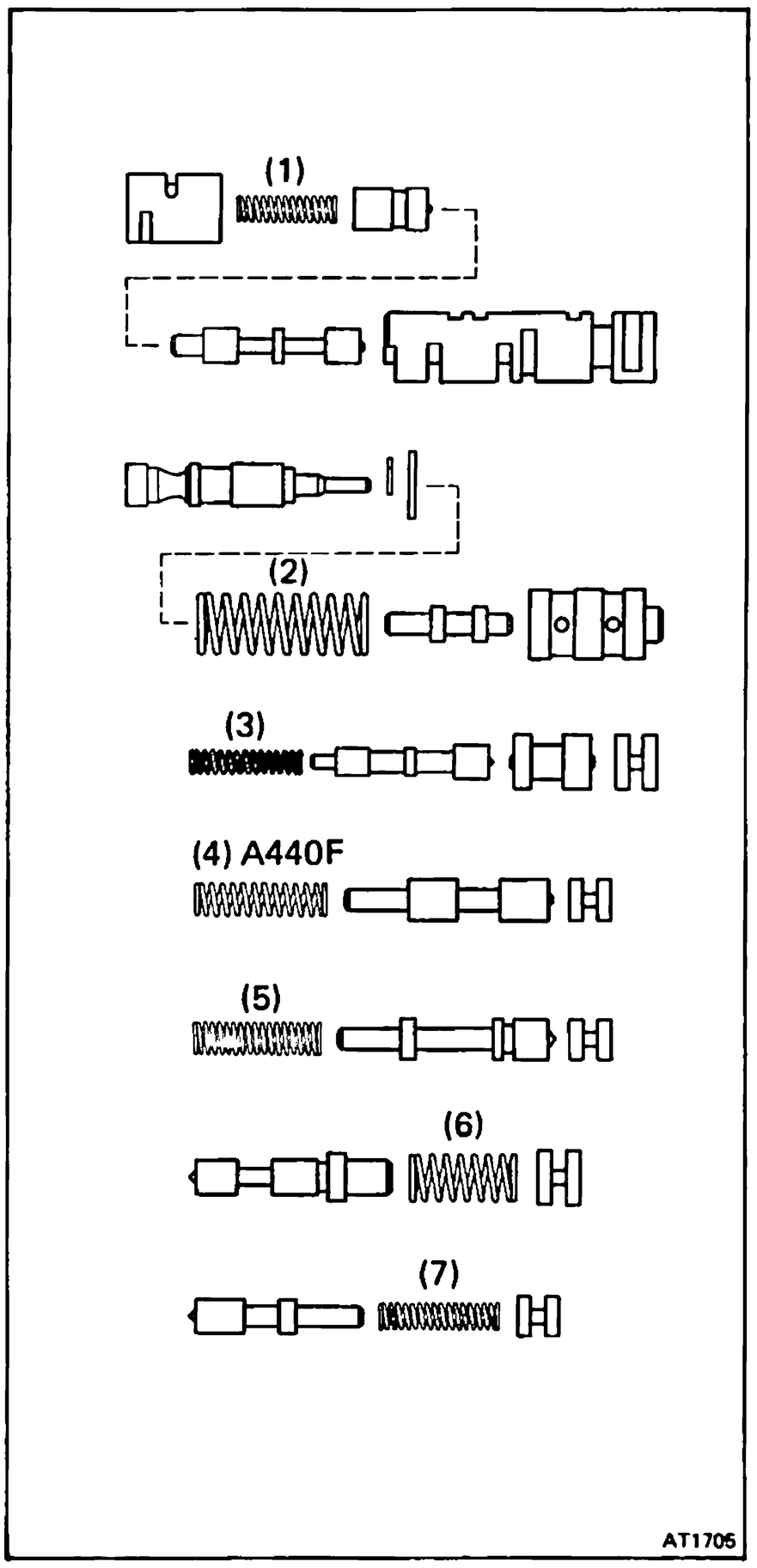


11. REMOVE LOW MODULATOR VALVE

(a) Remove the retainer with a magnetic finger by pushing in the plug.



(b) Remove the plug, spring and low modulator valve.

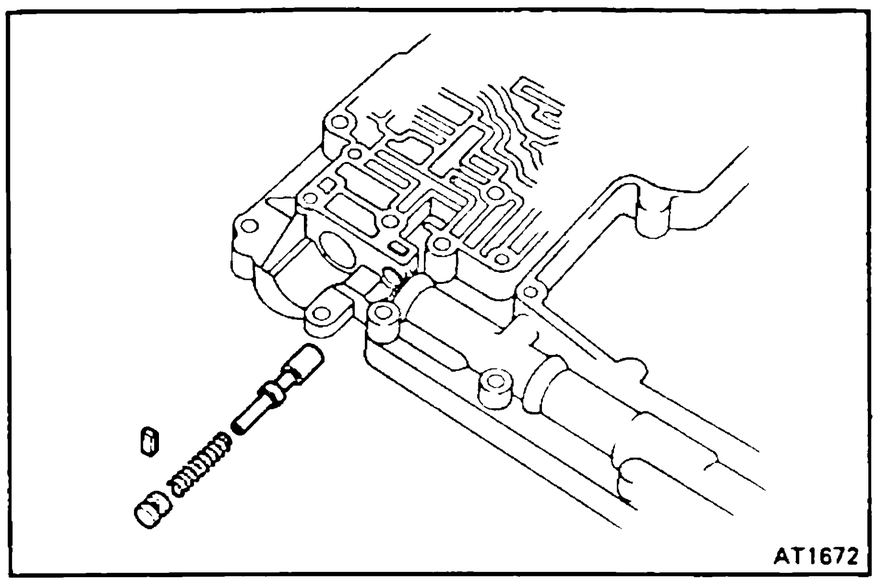


INSPECTION OF LOWER VALVE BODY

INSPECT VALVE SPRINGS

Check for damage, squareness, rust and distorted coils. Measure the spring free height and replace if less than that shown below.

Spring	Free length mm (in.)
(1) Lock-up relay valve	32.40 (1.2756)
(2) Primary regulator valve	58.20 (2.2913)
(3) 1-2 shift valve	26.58 (1.0465)
(4) Second lock valve (A440F)	29.40 (1.1575)
(5) 3-2 kick-down orifice control valve	32.45 (1.2776)
(6) Accumulator control valve	25.11 (0.9886)
(7) Low modulator valve	31.80 (1.2520)



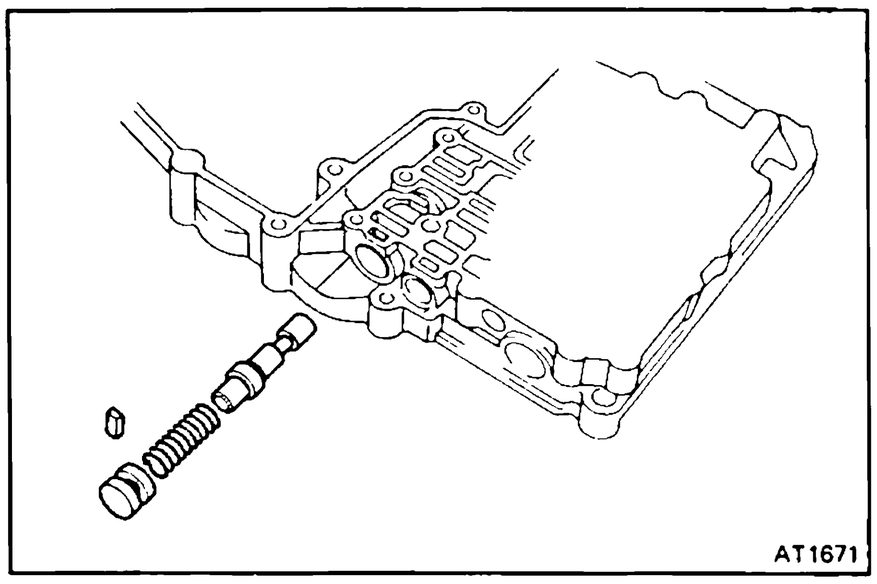
ASSEMBLY OF LOWER VALVE BODY

(See page AT-111)

1. INSTALL LOW MODULATOR VALVE

(a) Install the low modulator valve, spring and plug.

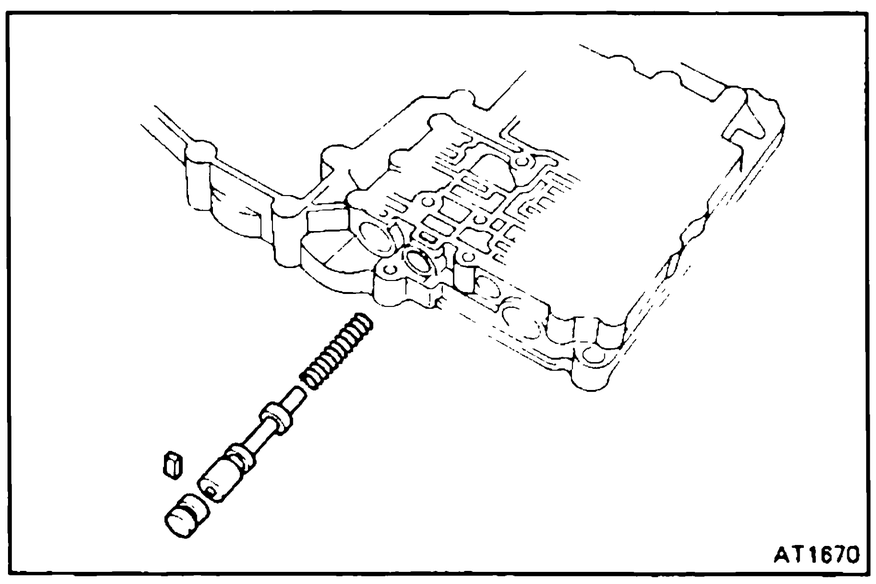
(b) Install the retainer by pushing in the plug.



2. INSTALL ACCUMULATOR CONTROL VALVE

(a) Install the accumulator control valve, spring and plug.

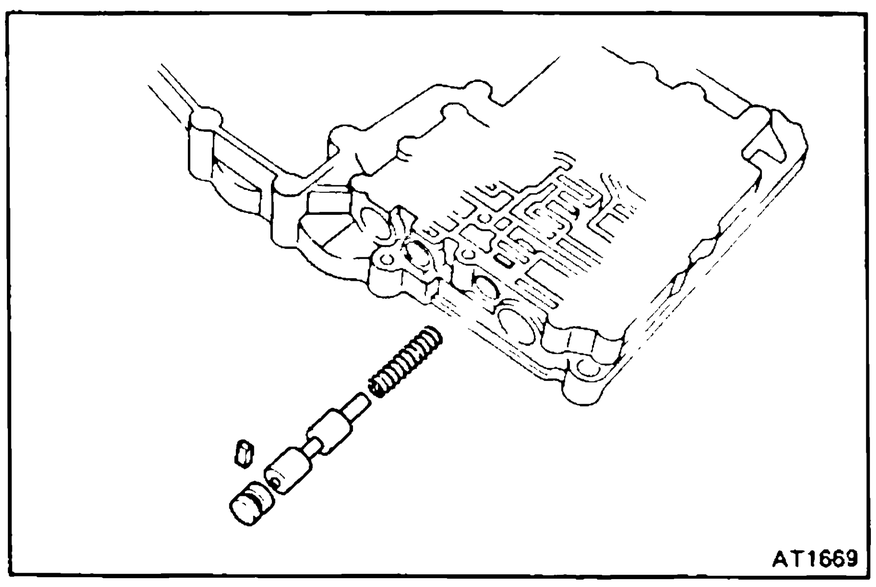
(b) Install the retainer by pushing in the plug.



3. INSTALL 3-2 KICK-DOWN OF ORIFICE CONTROL VALVE

(a) Install the 3-2 kick-down orifice control valve, spring and plug.

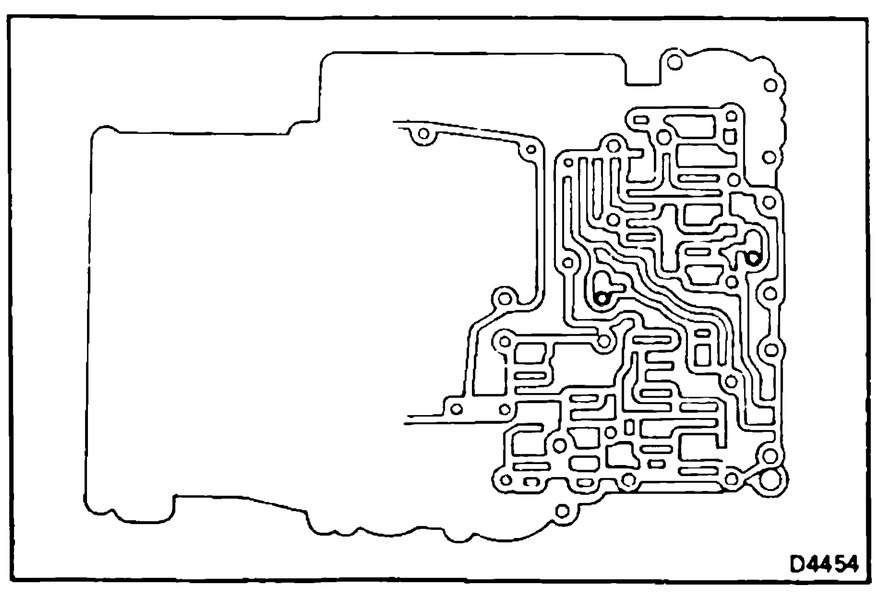
(b) Install the retainer by pushing in the plug.



4. INSTALL SECOND LOCK VALVE

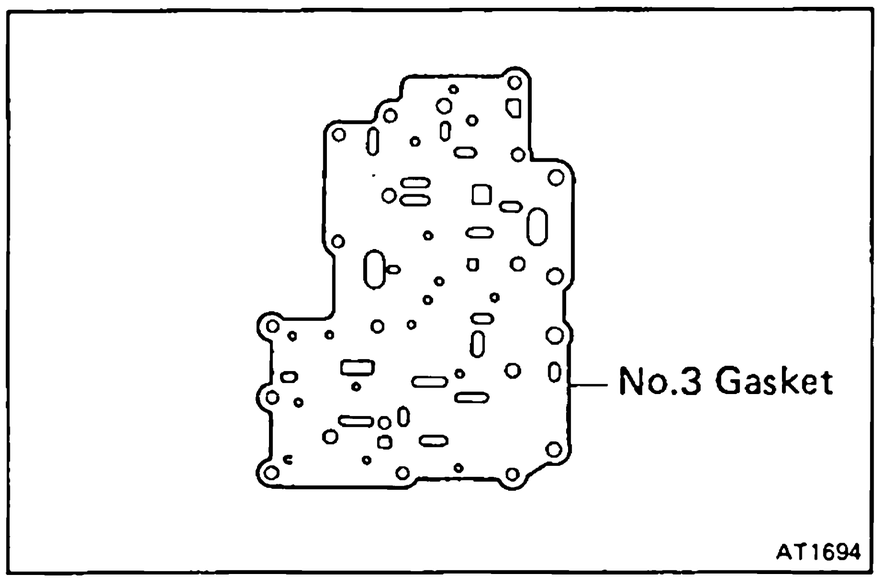
(a) Install the spring, second lock valve and retainer.

(b) Install the retainer by pushing in the plug.



5. INSTALL TWO CHECK BALLS

Install two check balls as shown in the figure.



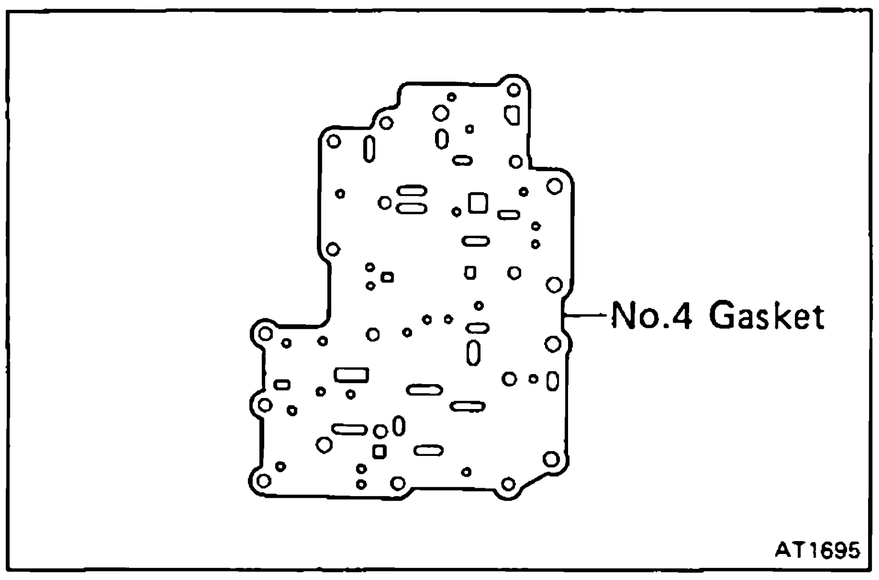
6. INSTALL LOWER VALVE BODY COVER

(a) Position a new No. 3 gasket on the lower valve body.

NOTE: Align a new No. 3 gasket at each bolt hole.

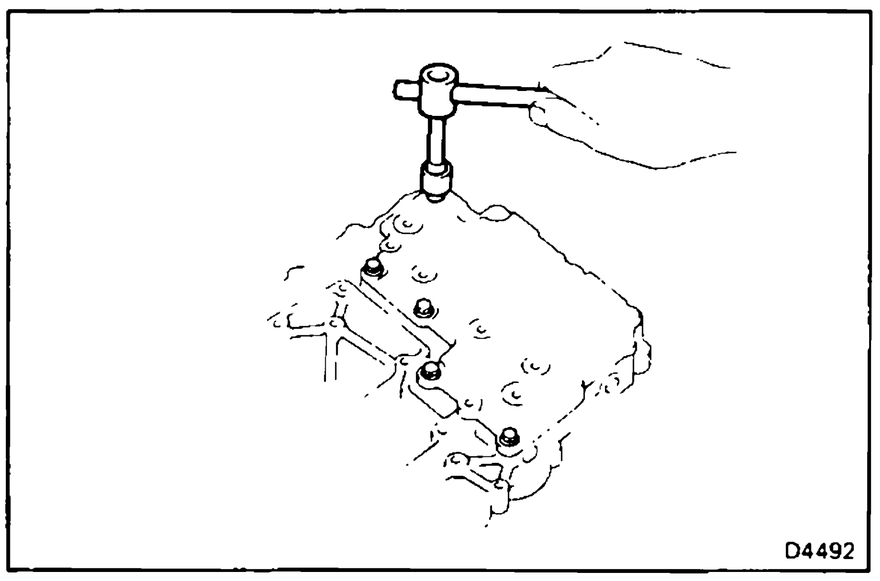
(b) Position the plate on the No. 3 gasket.

NOTE: Align the plate at each bolt hole.



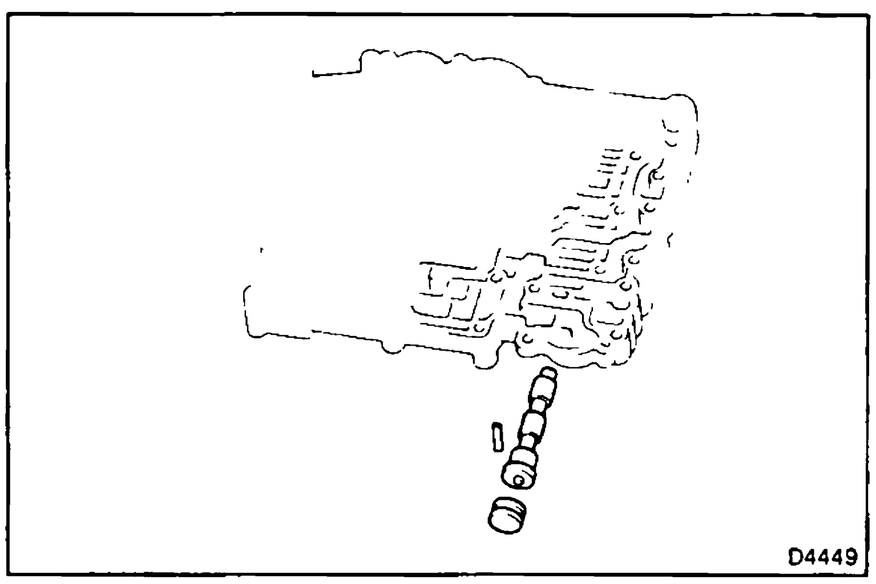
(c) Position a new No. 4 gasket on the plate.

NOTE: Align a new No. 4 gasket at each bolt hole.



(d) Install the lower valve body cover.
Torque the five bolts.

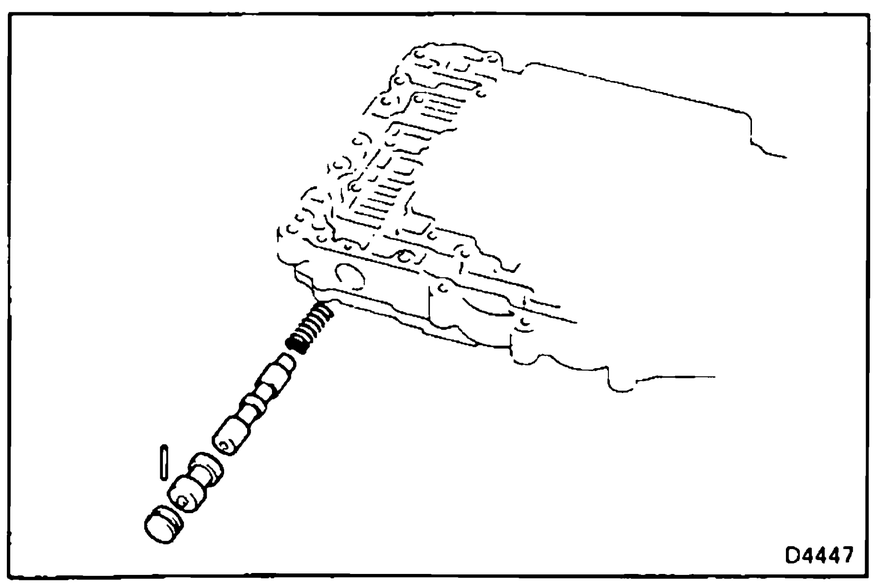
Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)



7. INSTALL LOW COAST SHIFT VALVE

(a) Install the low coast shift valve and plug.

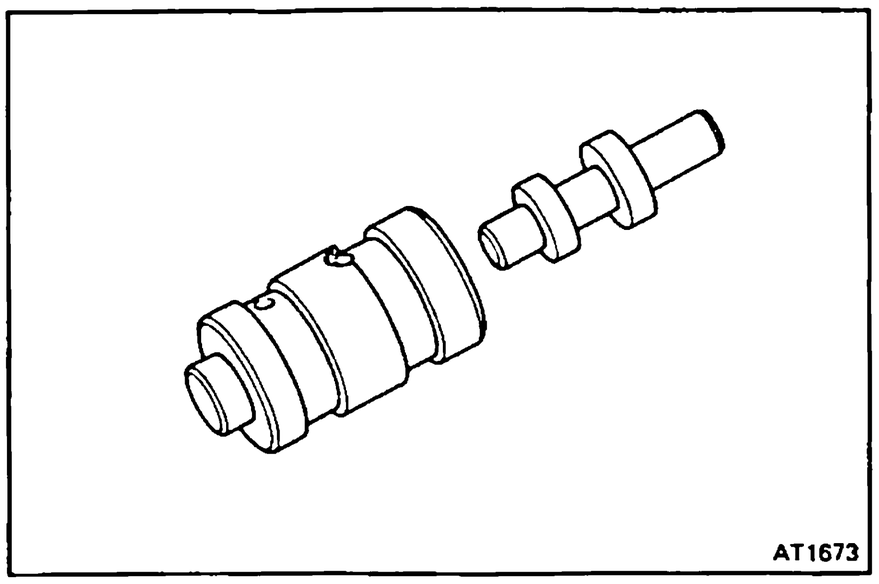
(b) Install the retainer.



8. INSTALL 1-2 SHIFT VALVE

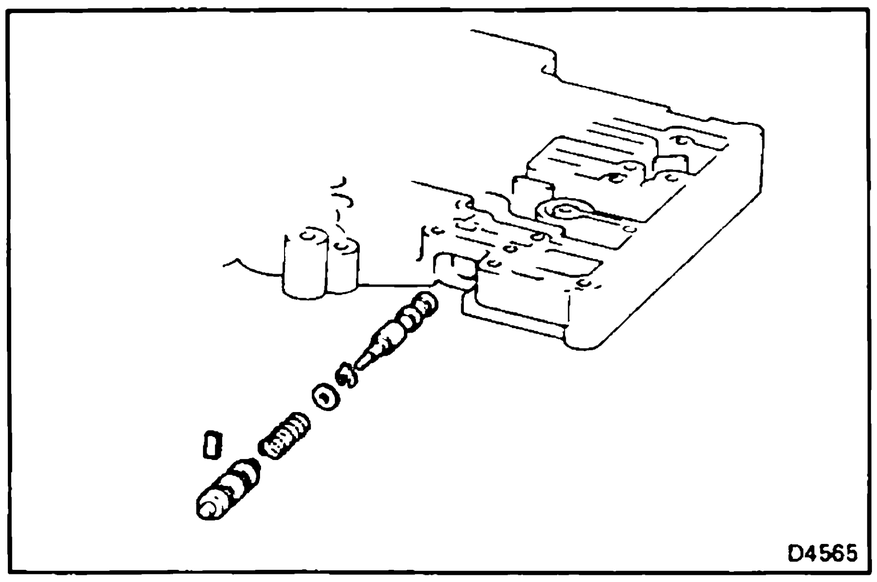
(a) Install the spring, 1-2 shift valve, 1-2 shift valve low plug and plug.

(b) Install the pin by pushing in the plug.


AT1673

9. INSTALL PRIMARY REGULATOR VALVE

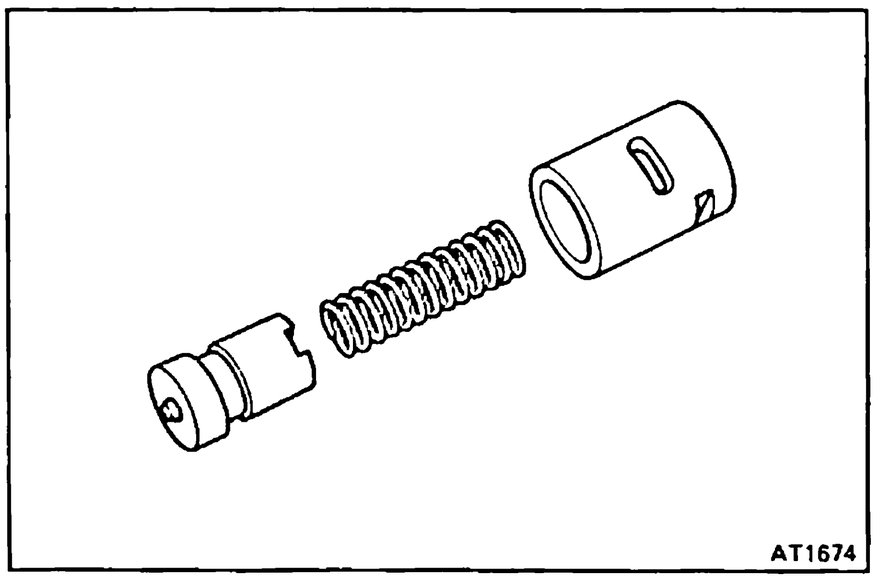
(a) Insert the plunger into the sleeve.


D4565

(b) Install the primary regulator valve, adjusting ring, washer, spring and sleeve into the bore.

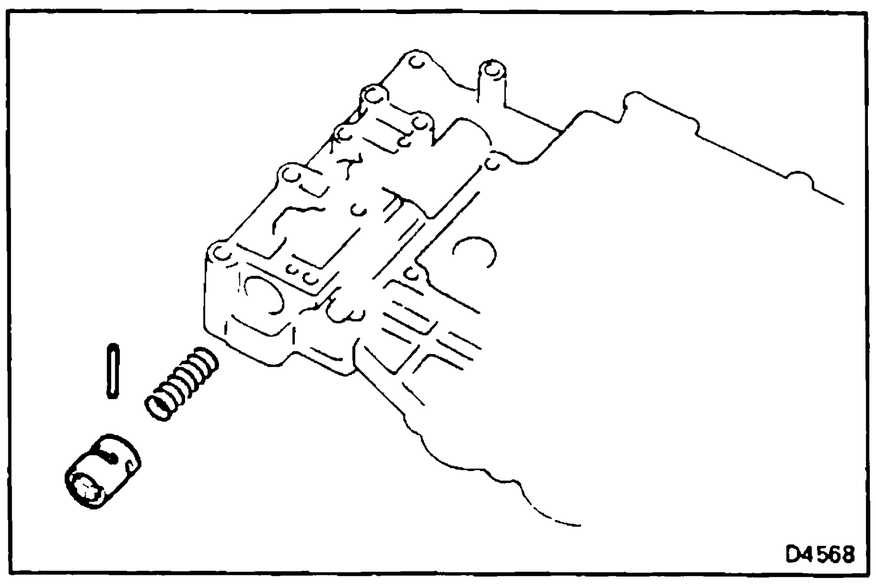
NOTE:
- Install the same number of adjusting rings as were installed during disassembly.
- Install the flukes of adjusting ring facing down.

(c) Install the retainer by pushing in the sleeve.


AT1674

10. INSTALL NO. 2 SLEEVE (FOR LOCK-UP RELAY CONTROL VALVE)

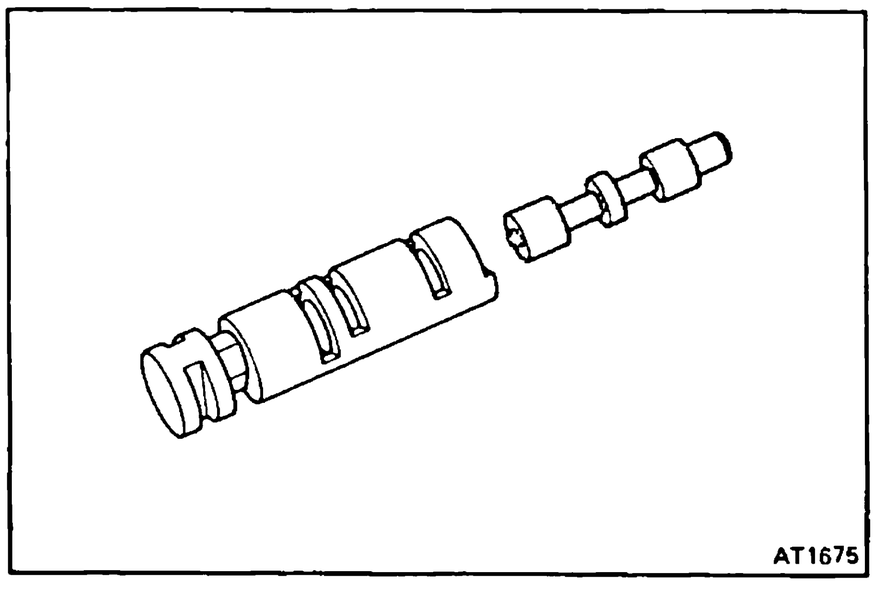
(a) Insert the spring and lock-up relay control valve into the No. 2 sleeve.


D4568

(b) Install the assembled spring, lock-up relay control valve and No. 2 sleeve into the bore.

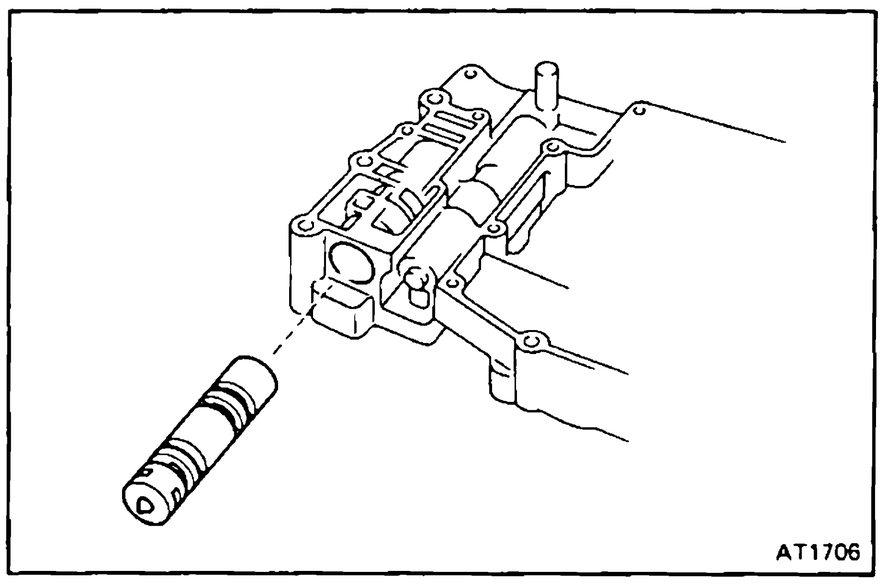
(c) Install the pin.

NOTE: Until the lock-up relay valve is installed, hold the lock-up relay control valve with a small screwdriver to prevent it from flying out.

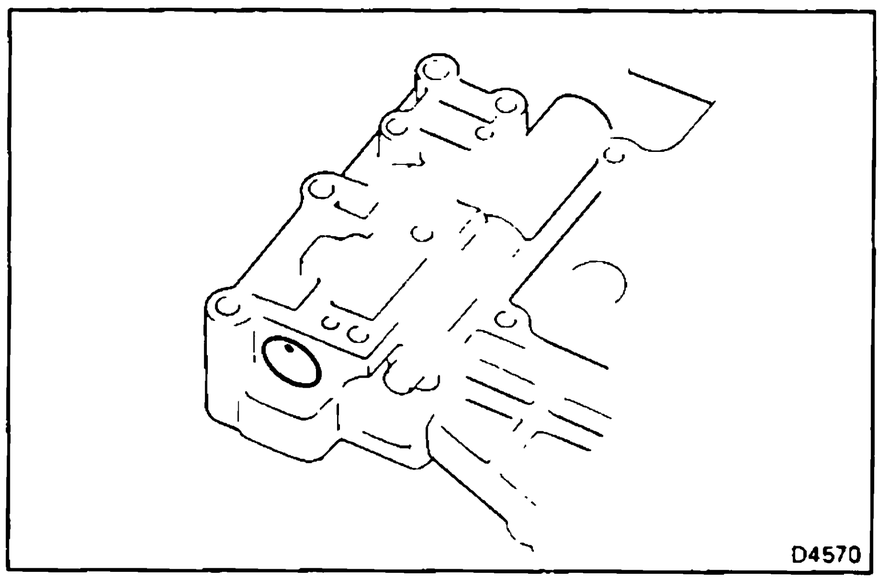

AT1675

11. INSTALL LOCK-UP RELAY VALVE

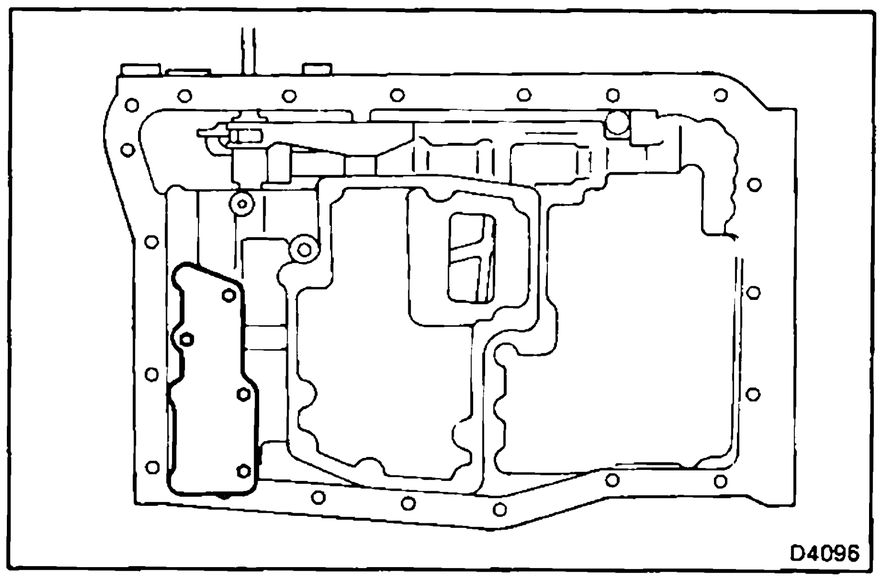
(a) Insert the lock-up relay valve into the No. 1 sleeve.



(b) Install the lock-up relay valve and No. 1 sleeve into the bore.

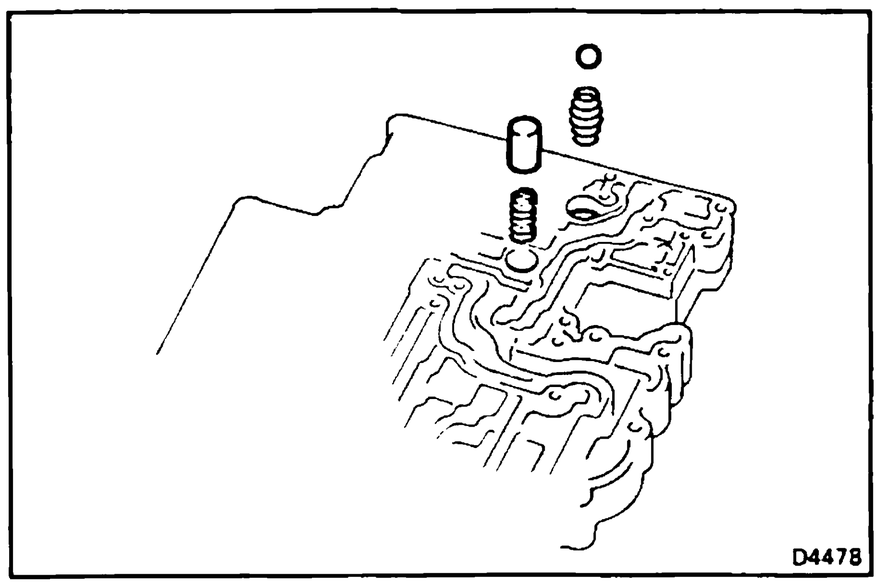


(c) Race the alignment mark of No. 1 sleeve up as shown in the figure and install the pin by pushing in the sleeve.



(d) Place the lock-up relay valve plate.

(e) Temporarily install the four bolts.

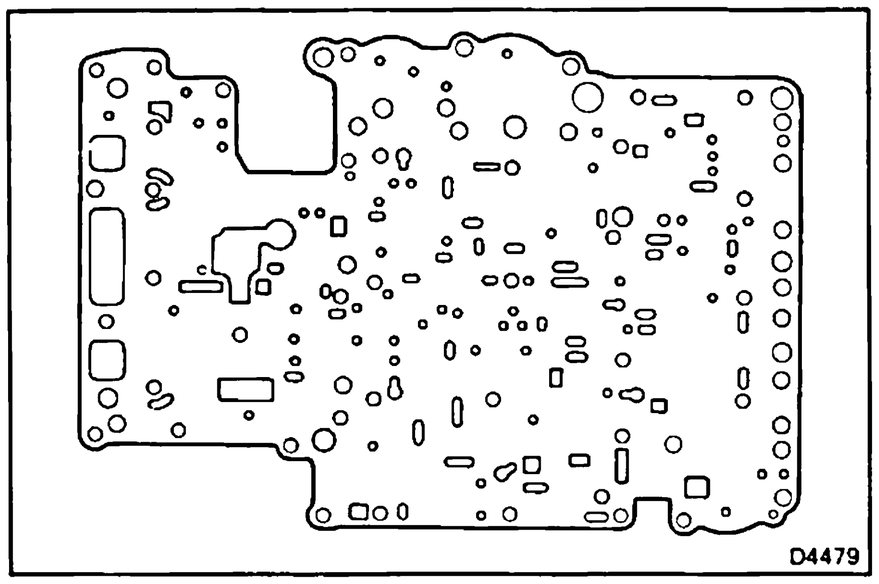


ASSEMBLY OF VALVE BODY

(See page AT-92)

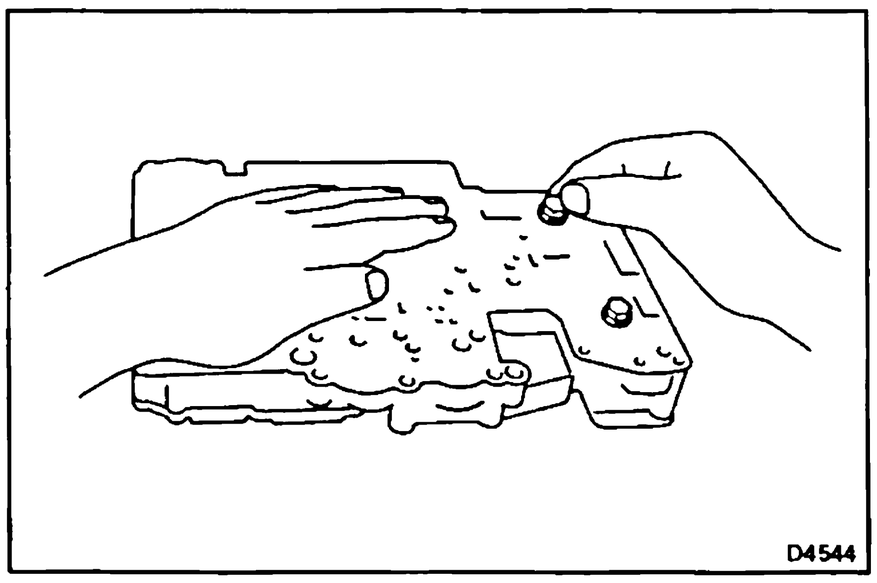
1. INSTALL CHECK BALL, VALVE AND TWO SPRINGS TO LOWER VALVE BODY

Install the check ball, valve two springs to the lower valve body as shown in the figure.



2. POSITION NEW NO. 2 GASKET ON LOWER VALVE BODY

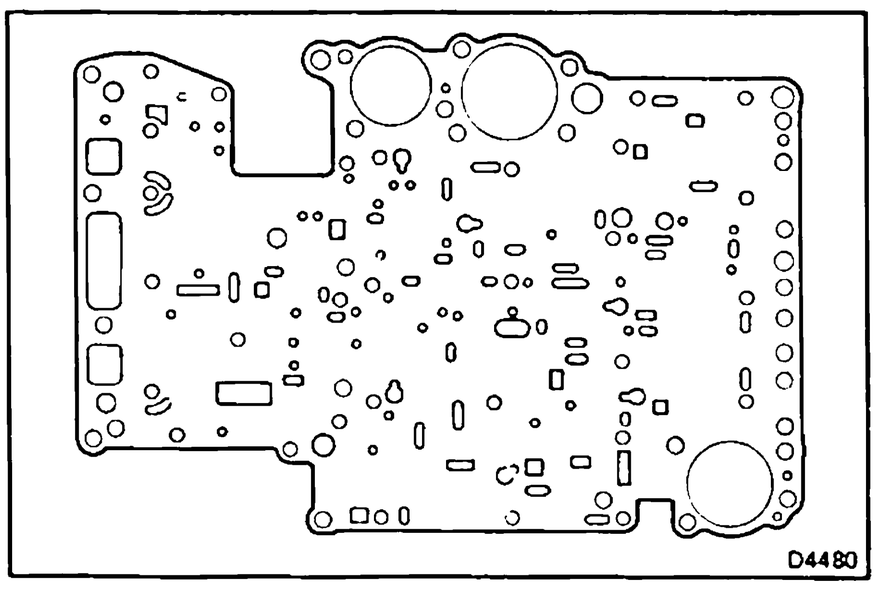
Align a new No. 2 gasket at each bolt hole.



3. TEMPORARILY INSTALL PLATE TO LOWER VALVE BODY

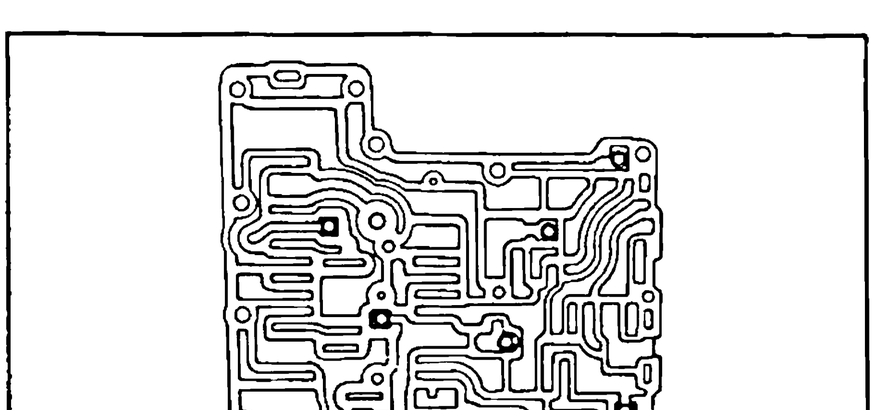
Position the plate on the No. 2 gasket. Temporarily install the two short bolts to compress the plate against the spring loaded check valve by hand.

NOTE: Use the bolt for the oil tube clamp.

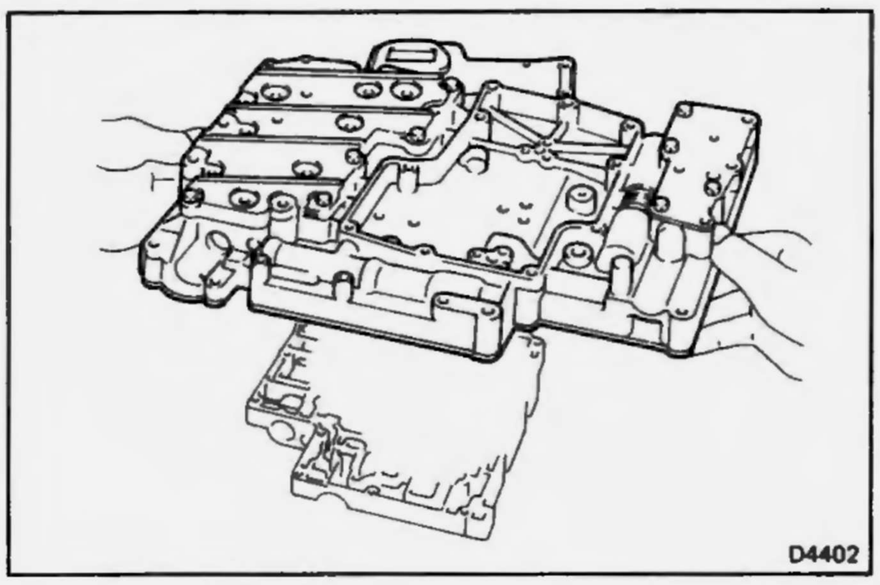


4. POSITION NO. 1 GASKET ON PLATE

Align a new No. 1 gasket at each bolt hole.

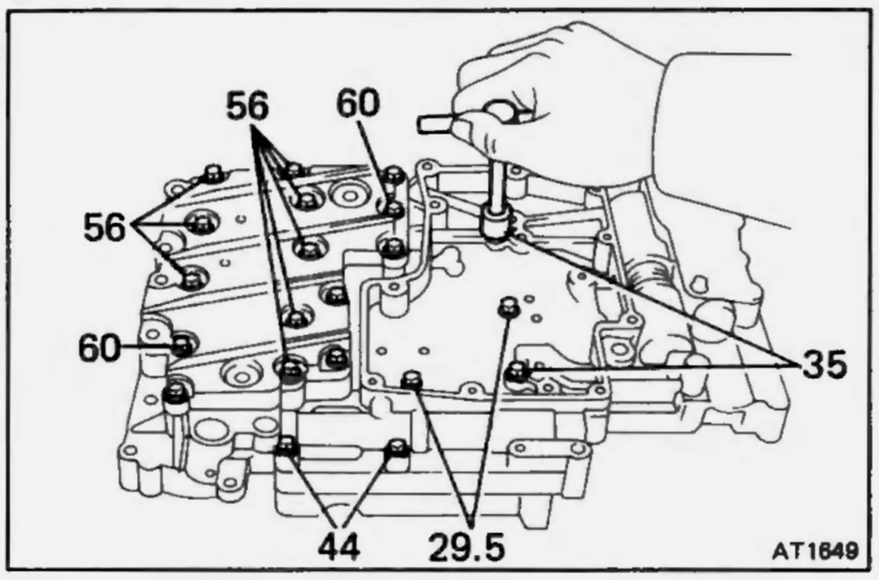


5. INSTALL SEVEN CHECK BALLS TO REAR UPPER VALVE BODY



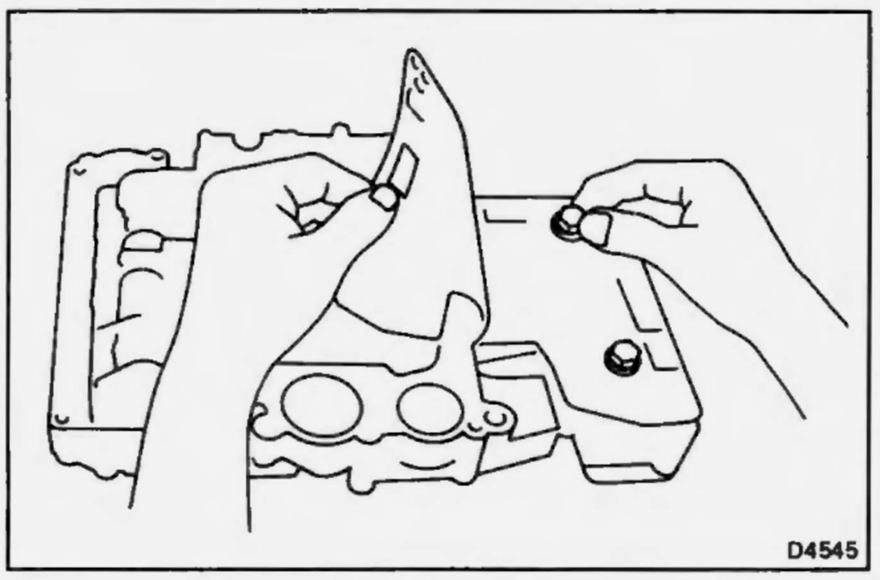
6. PLACE LOWER VALVE BODY WITH PLATE AND GASKETS ON TOP REAR UPPER VALVE BODY

Align each bolt hole and gasket in the valve body.

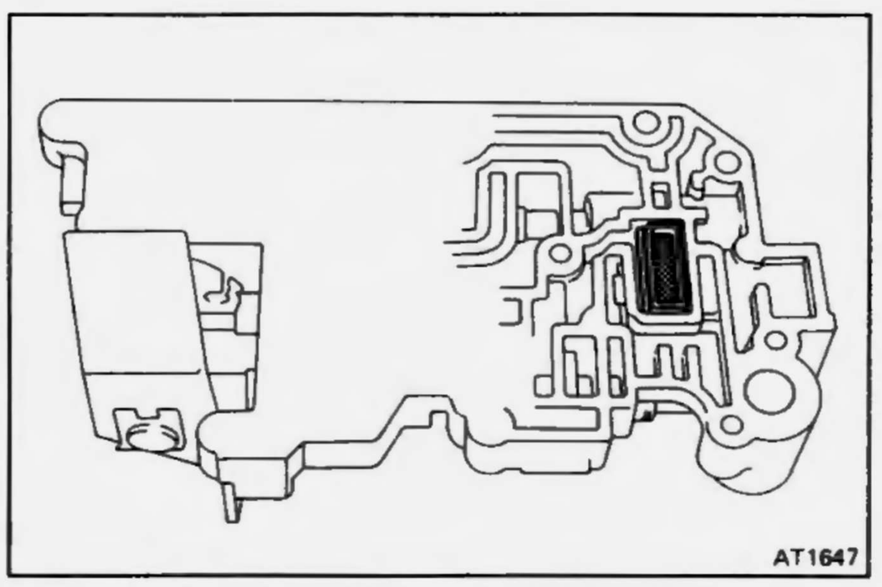


7. TEMPORARILY INSTALL SIXTEEN BOLTS TO LOWER VALVE BODY

NOTE: Each bolt length (mm) is indicated in the figure.

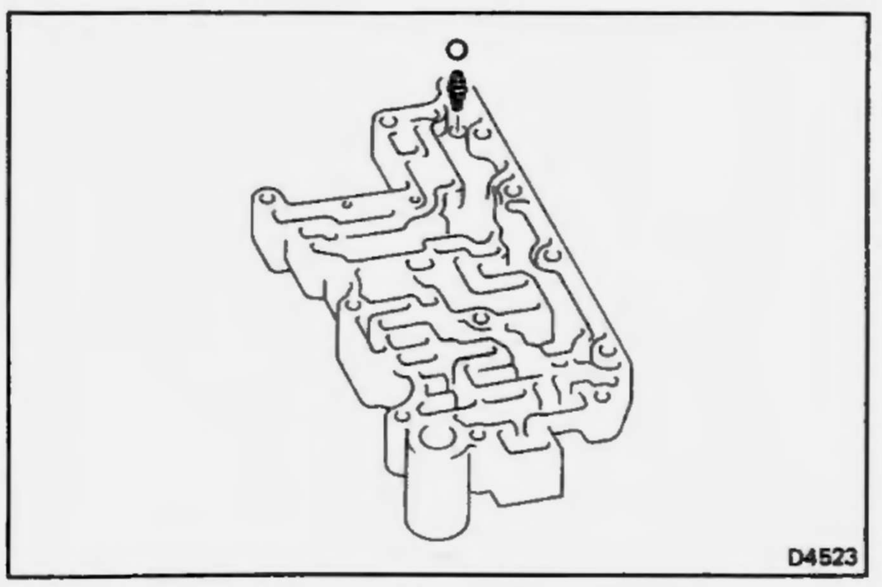


8. TURN OVER ASSEMBLY AND REMOVE TEMPORARY BOLTS OF LOWER VALVE BODY

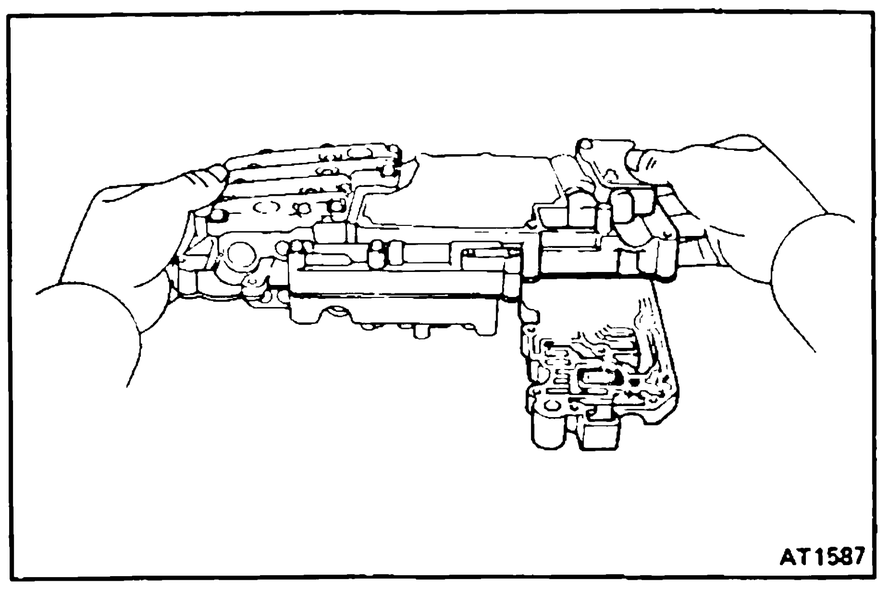


9. INSTALL OIL STRAINER TO FRONT UPPER VALVE BODY

Install the oil strainer with the raised strainer rim facing up.

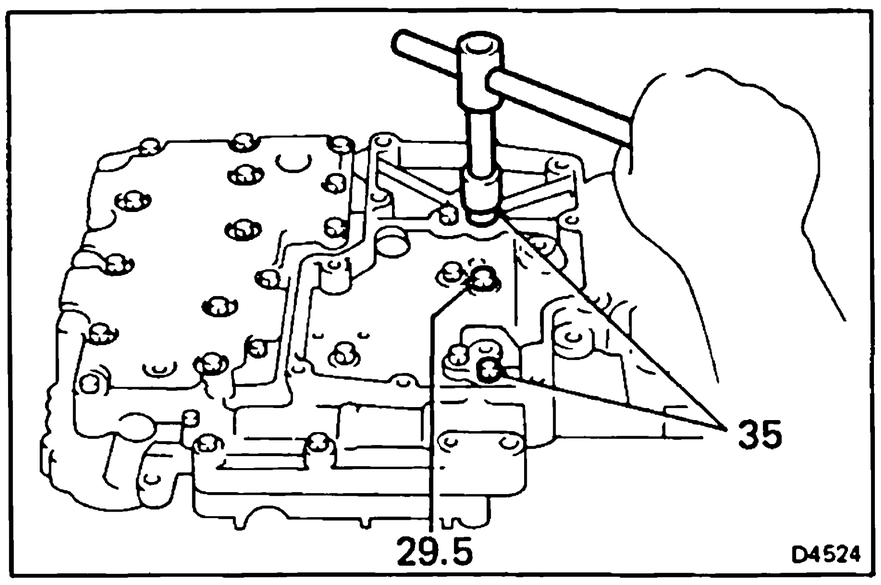


10. INSTALL CHECK BALL AND SPRING TO FRONT UPPER VALVE BODY



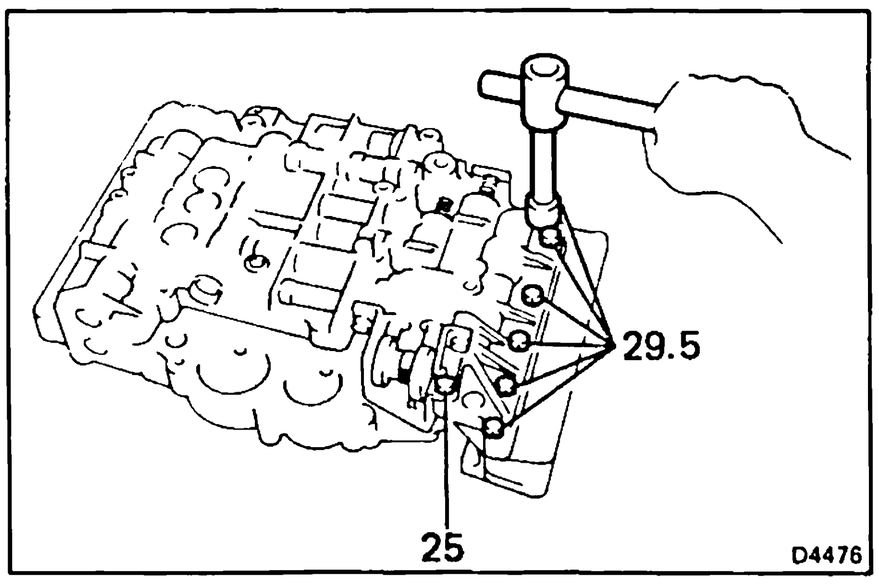
11. PLACE LOWER VALVE BODY AND REAR LOWER VALVE BODY ON TOP FRONT LOWER VALVE BODY

Align each bolt hole and gasket in the valve body.



12. TEMPORARILY INSTALL THREE BOLTS TO LOWER VALVE BODY

NOTE: Each bolt length (mm) is indicated in the figure.



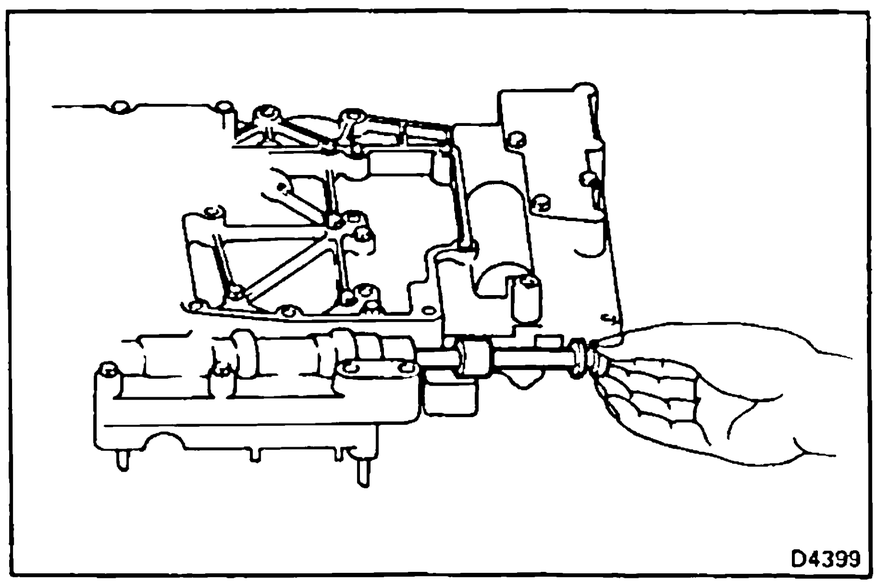
13. TURN OVER ASSEMBLY AND TEMPORARILY INSTALL SEVEN BOLTS TO FRONT UPPER VALVE BODY

NOTE: Each bolt length (mm) is indicated in the figure.

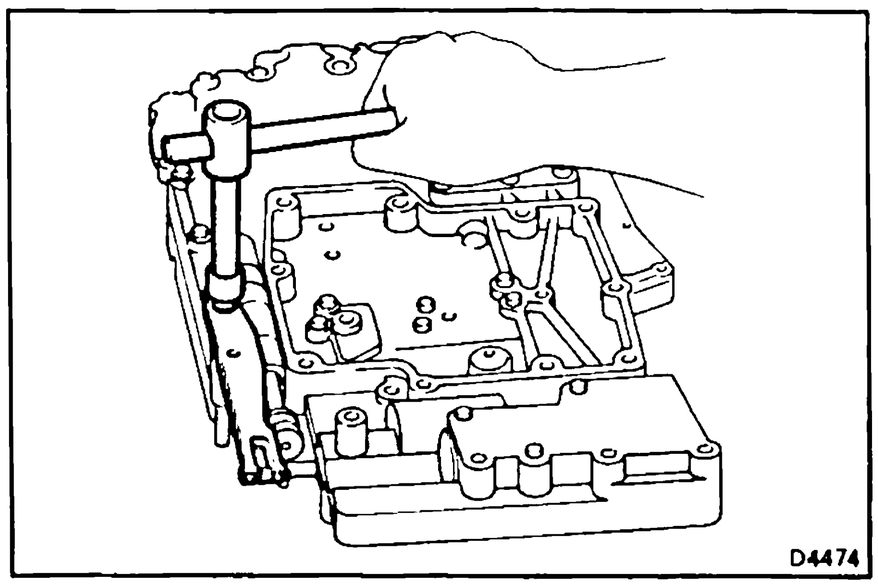
14. TIGHTEN BOLTS IN UPPER AND LOWER VALVE BODY

Recheck alignment of the gaskets.
Tighten the bolts.

Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)

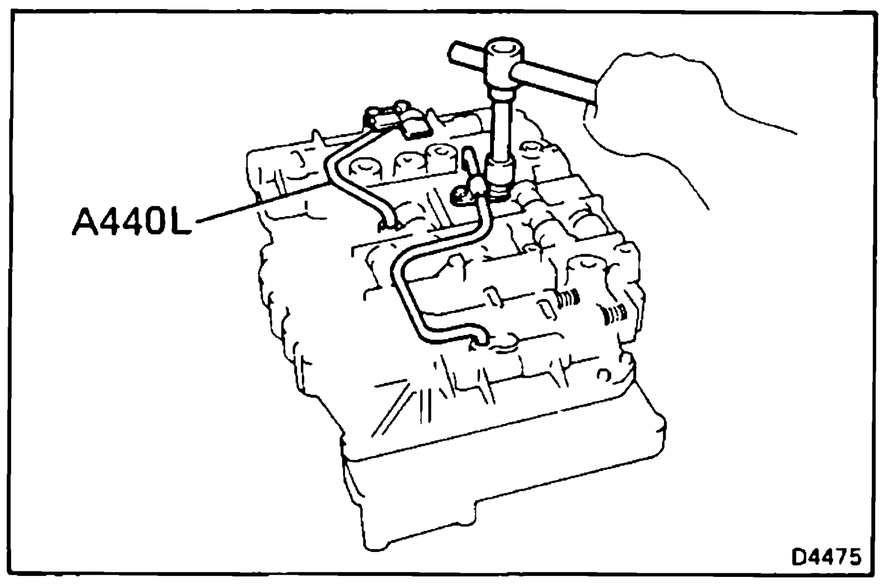


15. INSTALL MANUAL VALVE



16. INSTALL DETENT SPRING

Torque: 55 kg-cm (48 in.-lb, 5.4 N·m)



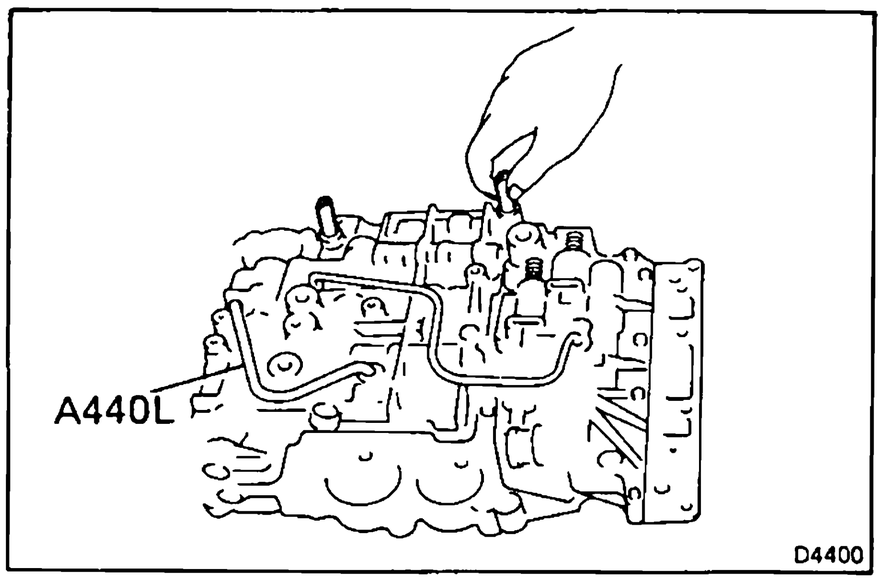
17. TURN OVER ASSEMBLY AND INSTALL OIL TUBE

(a) Using a plastic hammer, install the tube.

A440L : Two tubes
A440F : One tubes

CAUTION: Be careful not to bend or damage the tubes.

(b) Install the clamp to the tubes.



18. INSTALL TWO LINE PRESSURE TUBES

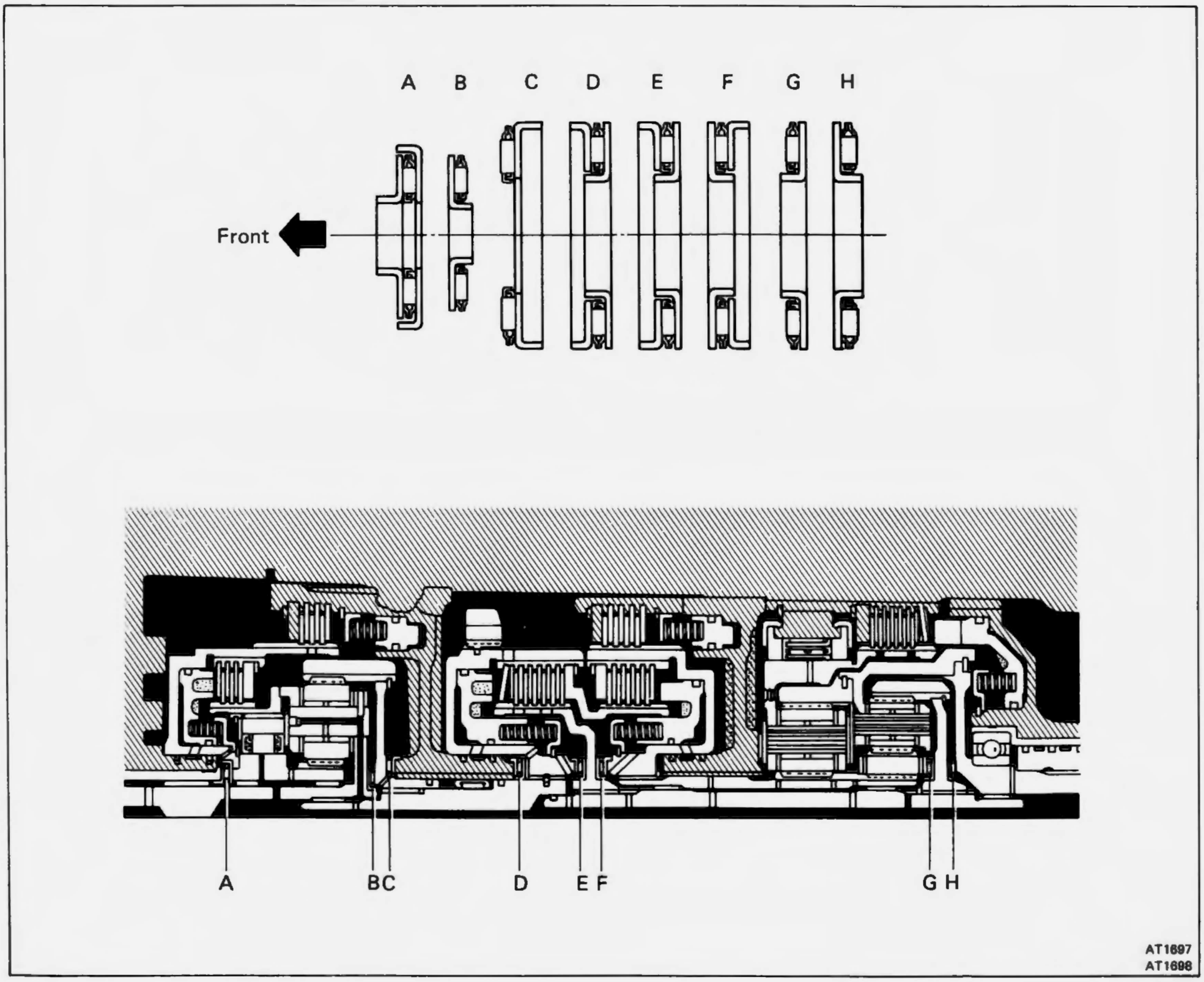
ASSEMBLY OF TRANSMISSION (A440F)

Disassembly, inspection and assembly of each component group has been indicated in the preceding chapter. Before assembly, make sure, all the component groups are assembled correctly.

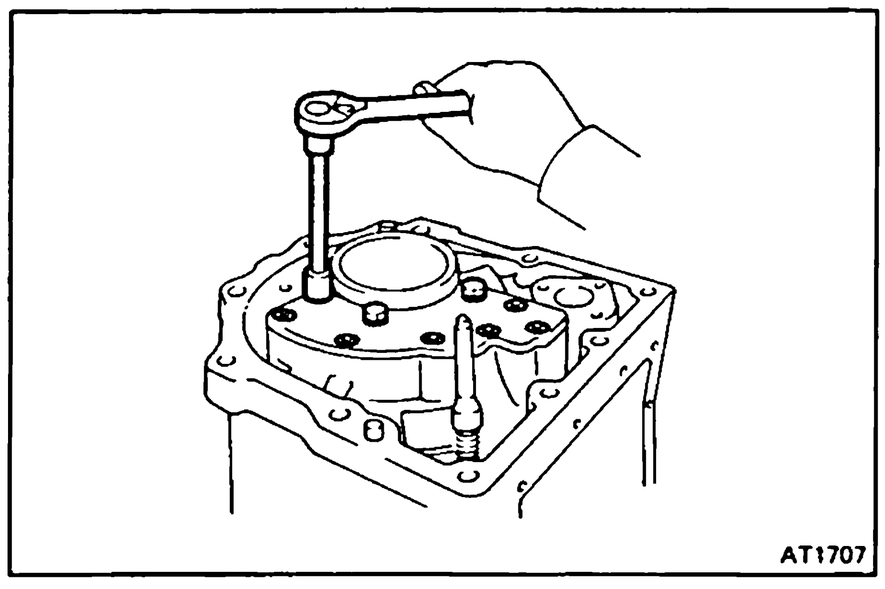
If something wrong is found in a certain component group during assembly, inspect and repair this group immediately. Recommended ATF: DEXRON® II.

GENERAL ASSEMBLY NOTES:

1. The automatic transmission is composed of highly precision-finished parts, requiring careful inspection before assembly, because even a small nick could cause fluid leakage or affect performance.
2. Before assembling new clutch discs, soak them in automatic transmission fluid for at least thirty minuites.
3. Apply automatic transmission fluid on the sliding or rotating surfaces of parts before assembly.
4. Use petroleum jelly to keep small parts in their places.
5. Do not use adhesive cements on gaskets and similar parts.
6. When assembling the transmission, be sure to use new gaskets and O-rings.
7. Dry all parts with compressed air—never use shop rags.
8. Be sure to install the thrust bearings and races in the correct direction and position.



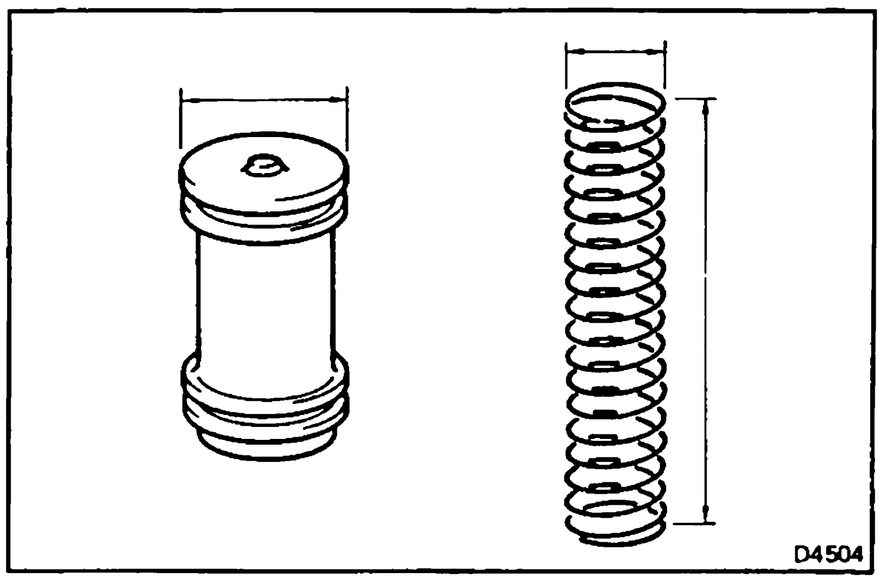
AT1697
AT1698



1. INSTALL TRANSMISSION REAR COVER

(a) Place the gasket on the transmission case.

(b) Install the transmission rear cover and torque the three bolts and six screws.

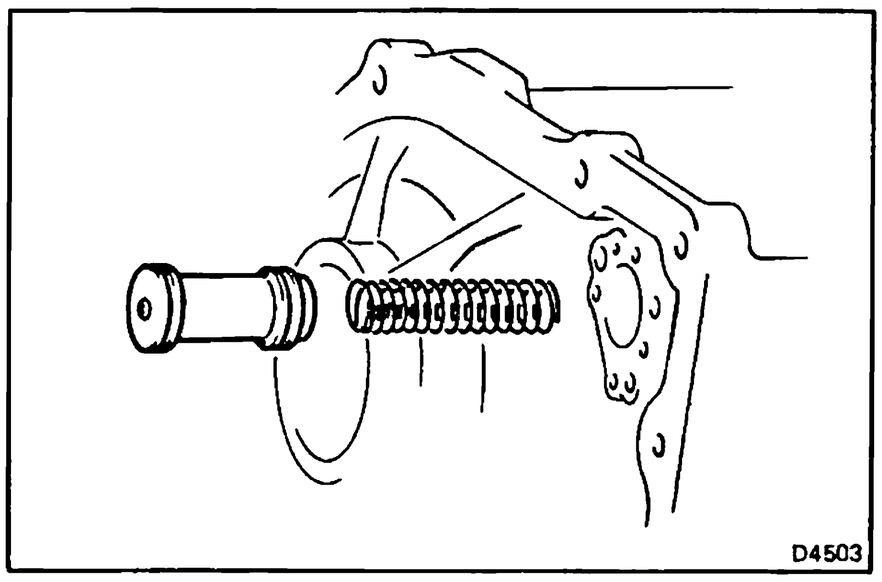


2. INSTALL C_1 ACCUMULATOR PISTON AND SPRING

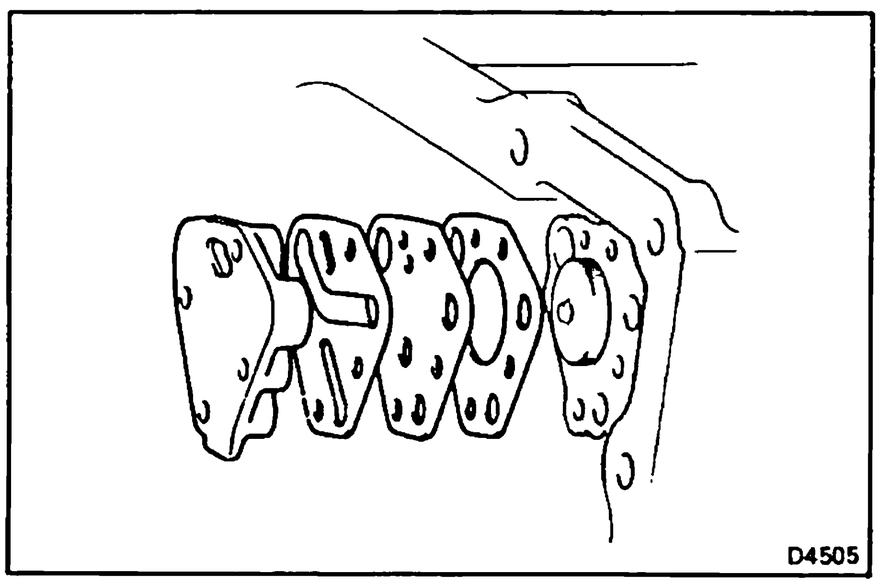
(a) Coat the O-rings with ATF and install it to the piston.

mm (in.)

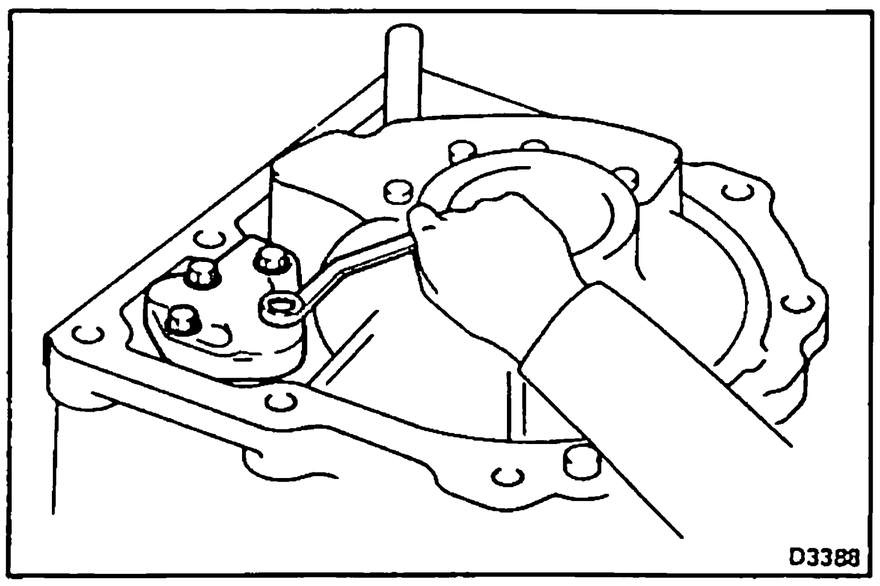
Piston diameter	Spring diameter	Spring free length
29.87 (1.1760)	17.92 (0.7055)	92.34 (3.6354)



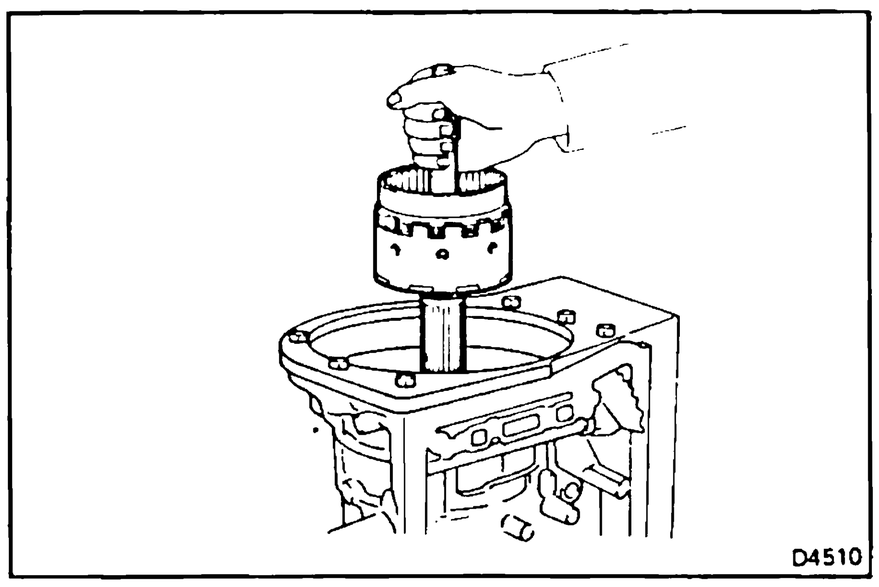
(b) Install the spring and piston for C_1.



(c) Place new two gaskets on the transmission case and plate as shown.

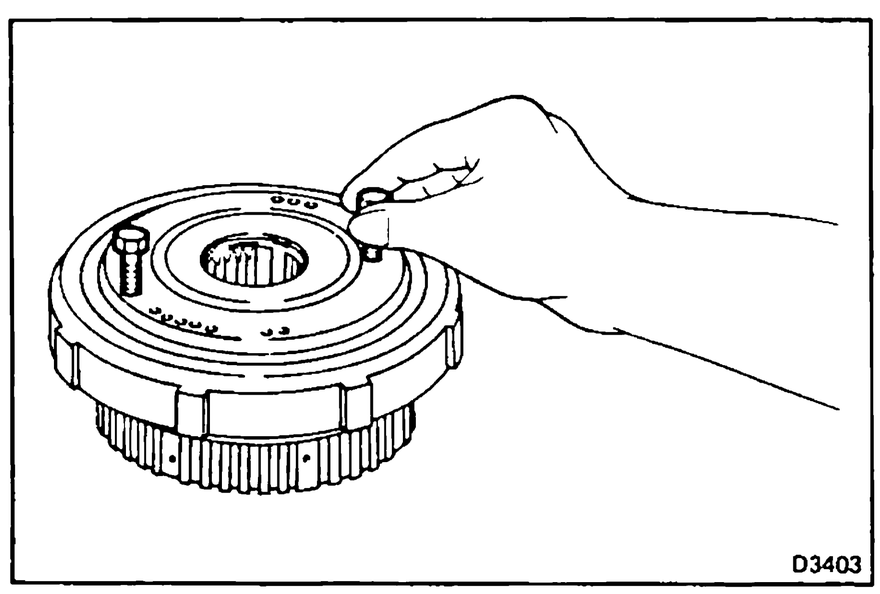


(d) Install the front clutch accumulator cover and torque the four bolts.



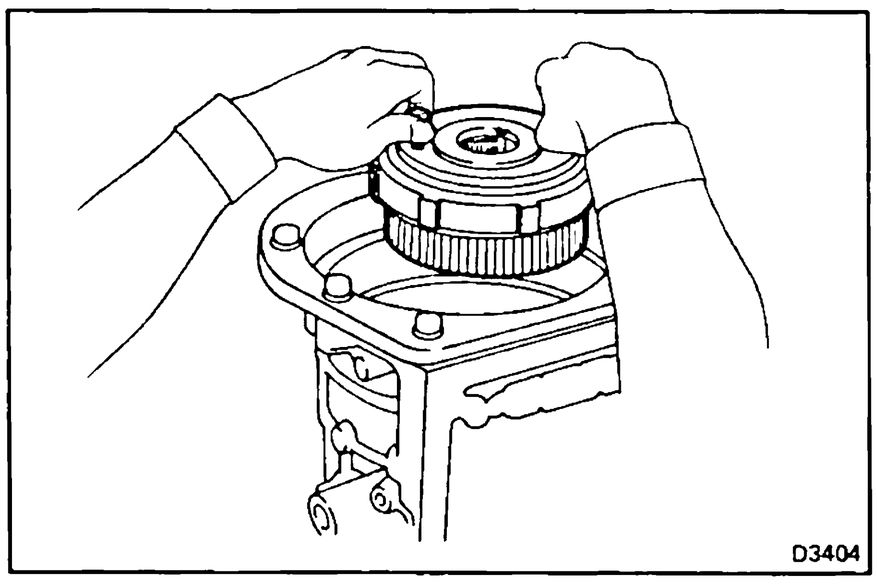
3. INSTALL PLANETARY GEAR AND OUTPUT SHAFT

(a) Install the planetary gear and output shaft to the transmission case.



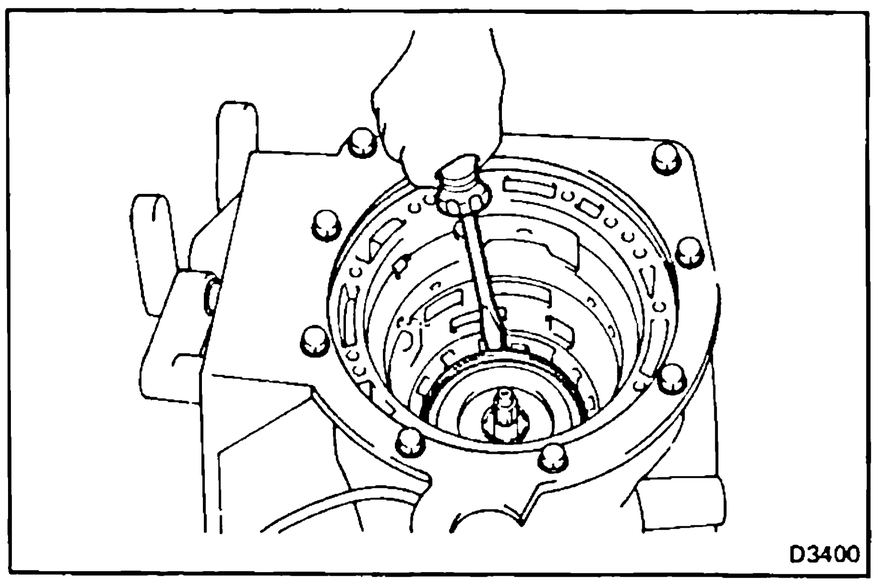
(b) Temporarily install the two bolts to the one-way clutch drum.

NOTE: Use two 6-mm (1 mm pitch) bolts. Do not tighten over 5 revolutions (5 mm).

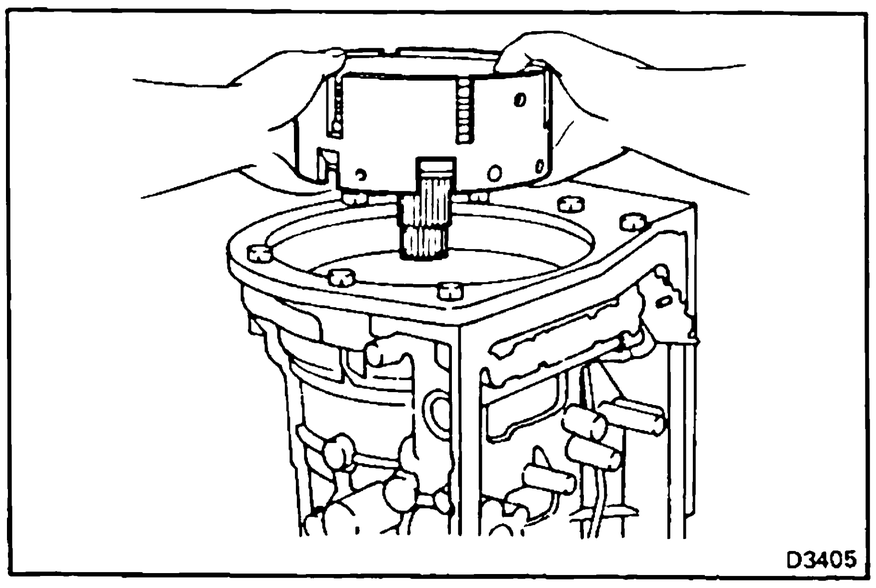


(c) Hold the drum by the bolts, and rotating it clockwise, install to the transmission case.

NOTE: If the one-way clutch drum will not rotate counterclockwise, check the installation of the one-way clutch.



(d) Using a screwdriver, install the snap ring.



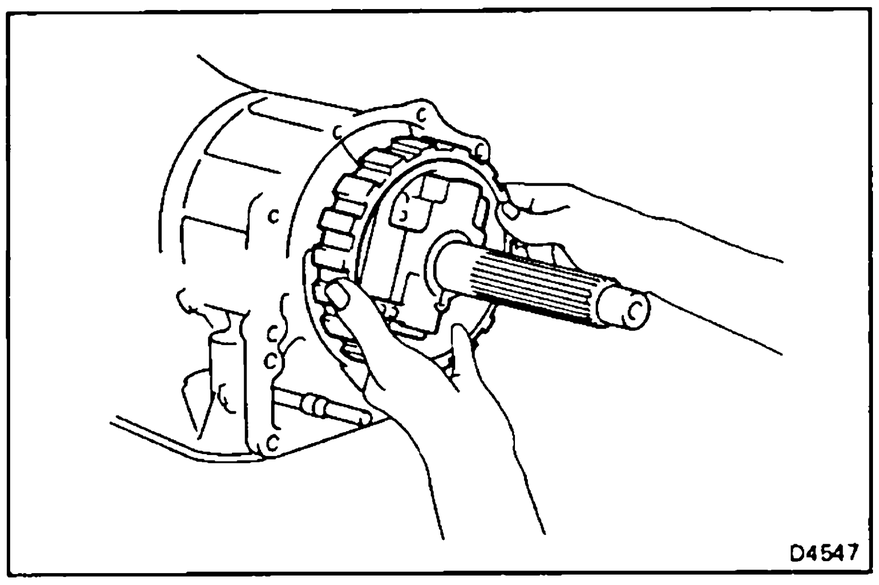
4. INSTALL CENTER SUPPORT

(a) Align the oil hole and bolt hole of the center support with those of the body side and insert the center support.

(b) Install and torque the three lock bolts.

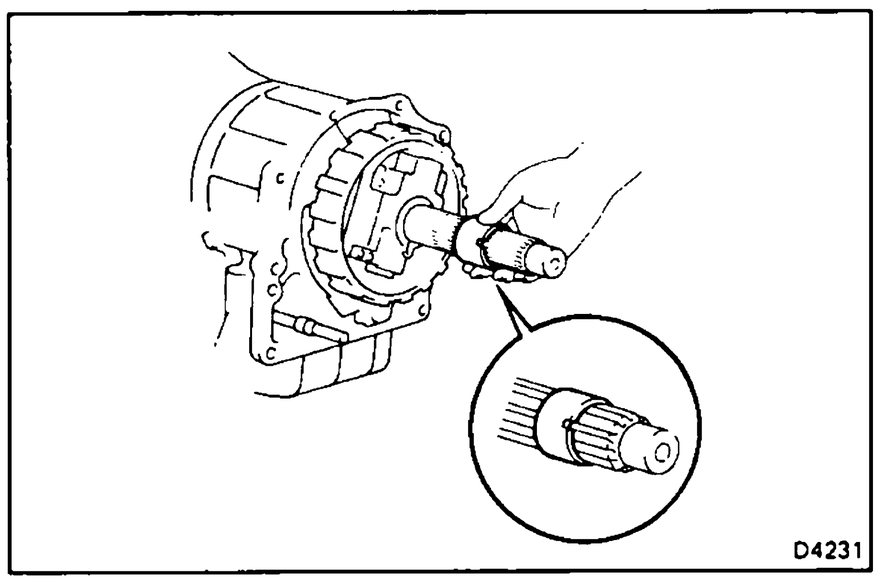
NOTE: Since the bolts are temporarily installed, do not coat with sealer.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)

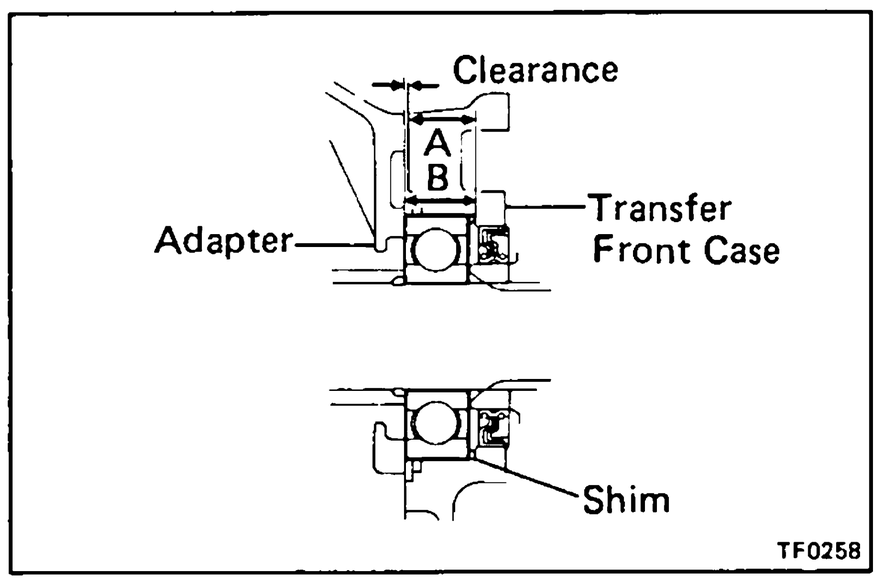


5. INSTALL GOVERNOR BODY

(a) Install the governor body onto the output shaft.



(b) Install the spacer onto the output shaft.



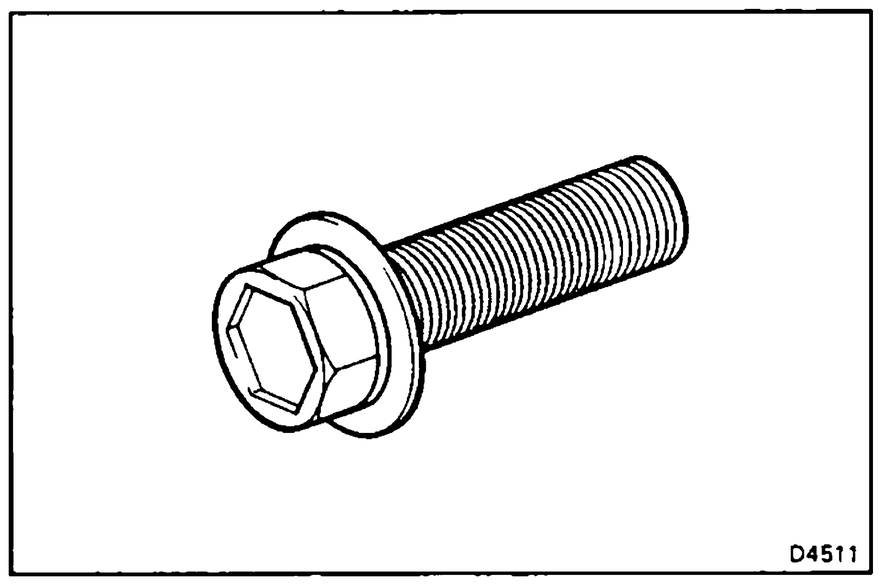
6. INSTALL ADJUSTING SHIM TO TRANSFER FRONT CASE

(a) Measure the difference of A and B (left) and select a shim of a thickness so the gap between the transfer adapter and front case is within the standard clearance.

Standard clearance: 0.4 – 0.5 mm (0.016 – 0.020 in.)

Adjusting shim thickness mm (in.)
2.3 (0.091)
2.4 (0.095)
2.5 (0.098)

(b) Install the adjusting shim to the transfer front case.

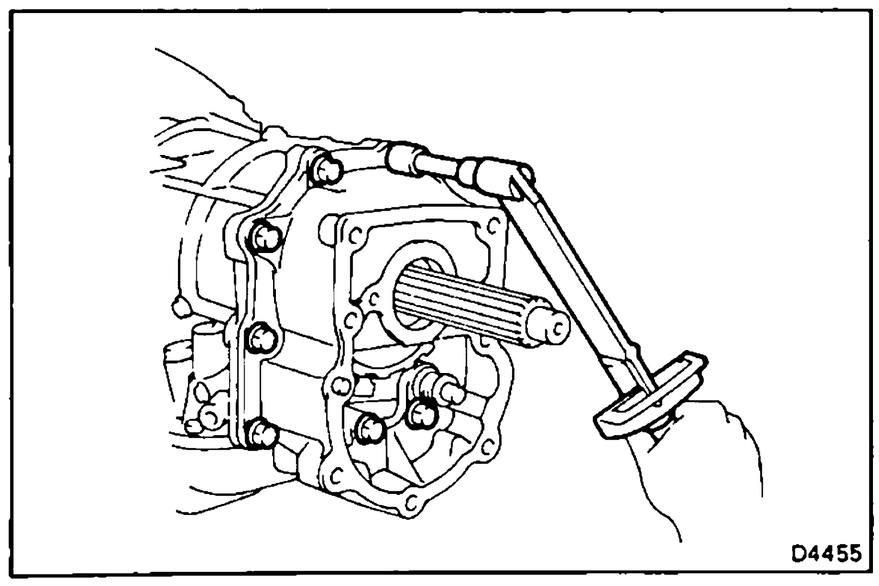


7. INSTALL TRANSFER ADAPTER

(a) Clean the threads of the bolt and case with white gasoline.

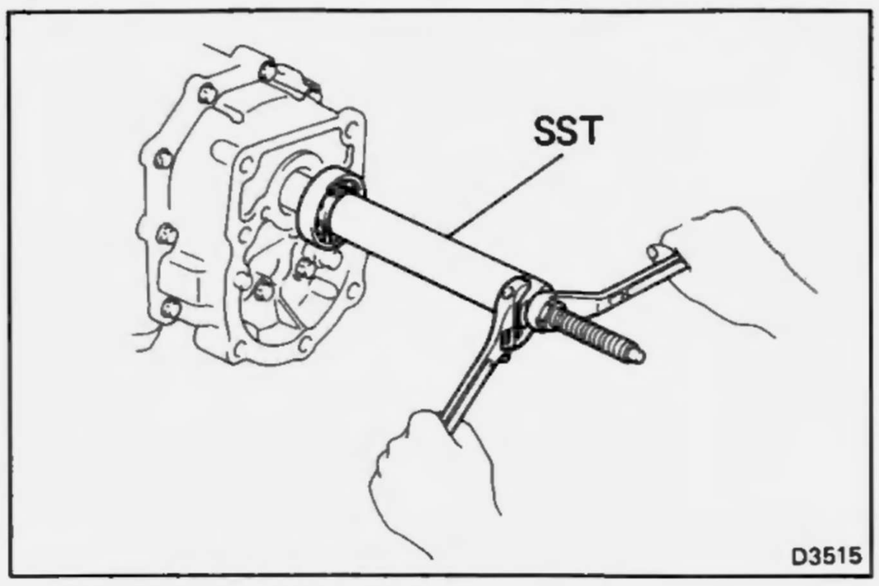
(b) Coat the threads of the bolts with sealer.

Sealer part No. 08833-00070 or THREE BOND 1324



(c) Install the transfer adapter with a new gasket and torque the ten bolts.

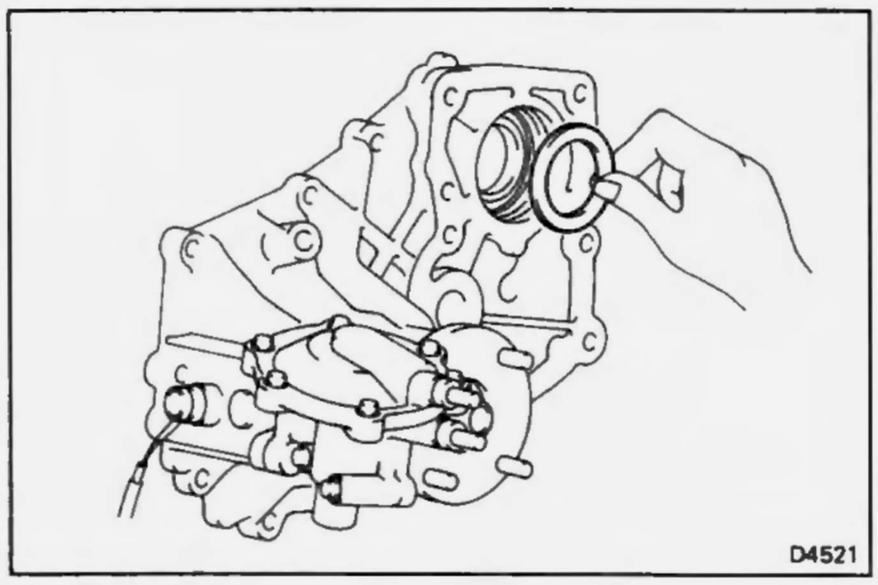
Torque: 380 kg-cm (27 ft-lb, 37 N·m)



8. INSTALL TRANSMISSION REAR BEARING

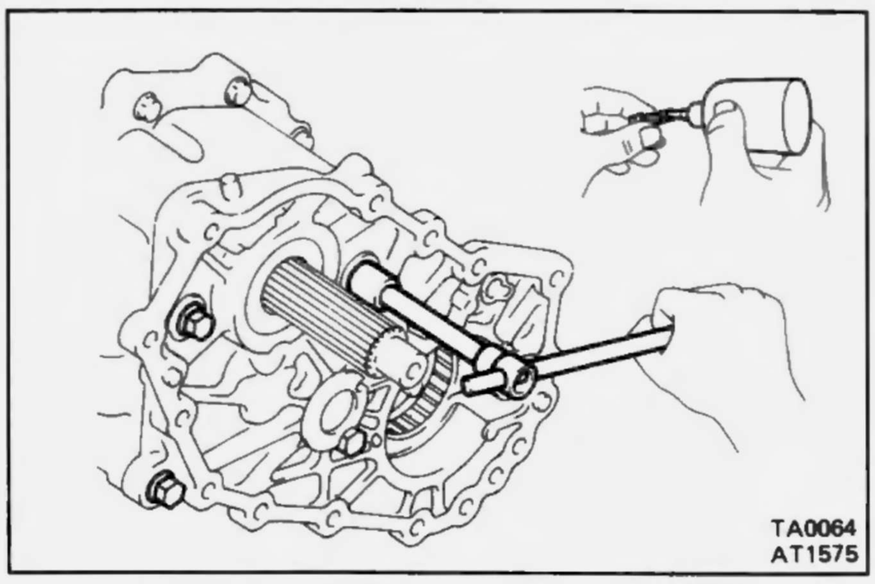
Using SST, insert the transmission rear bearing.

SST 09309-36033



9. INSTALL TRANSFER FRONT CASE

(a) Install the spacer to the transfer front case.



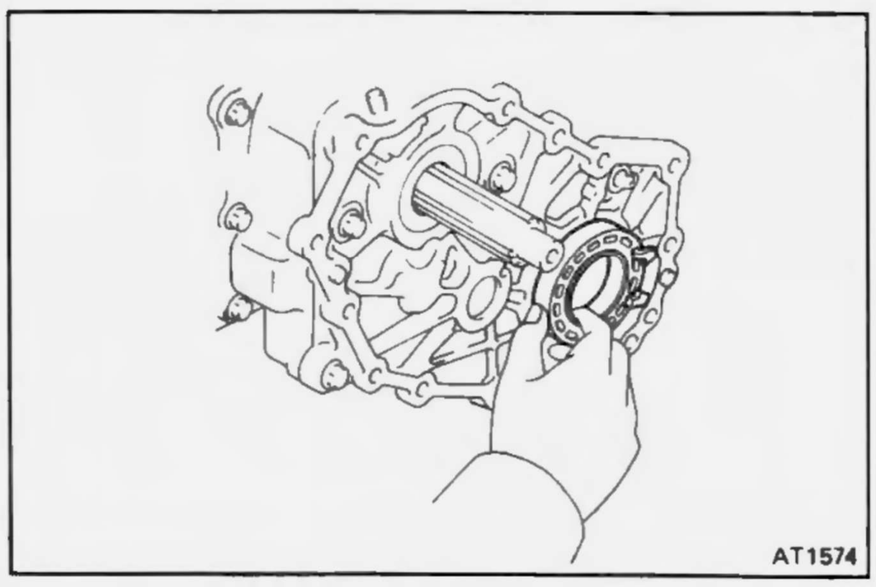
(b) Clean the threads of the bolts and case with white gasoline.

(c) Coat the threads of the bolts with sealer.

Sealer part No. 08833-00070 or THREE BOND 1324

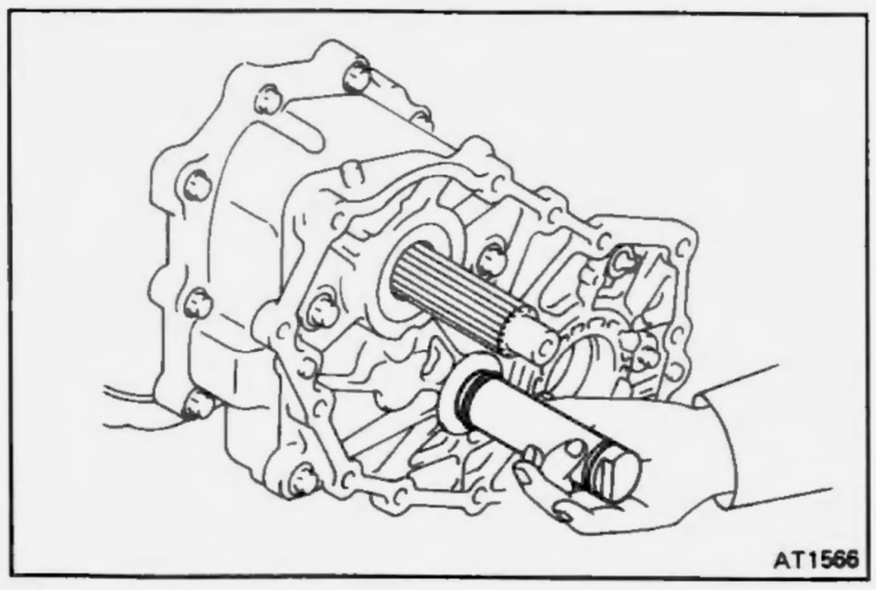
(d) Install the transfer front case with a new gasket and torque the four bolts.

Torque: 650 kg-cm (47 ft-lb, 64 N·m)



10. INSTALL REAR OUTPUT SHAFT FRONT BEARING RETAINER

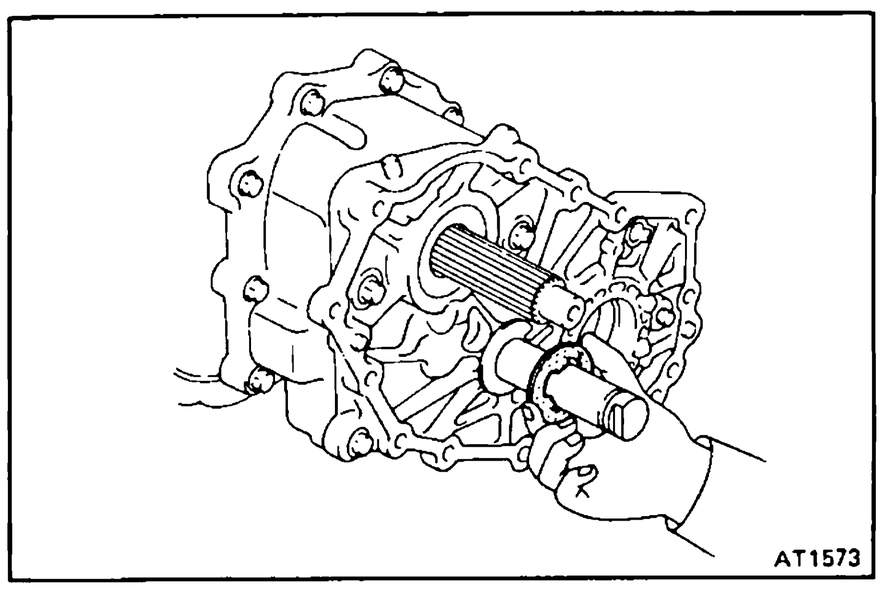
Install the rear output shaft front bearing retainer.



11. INSTALL IDLER GEAR AND IDLER GEAR SHAFT

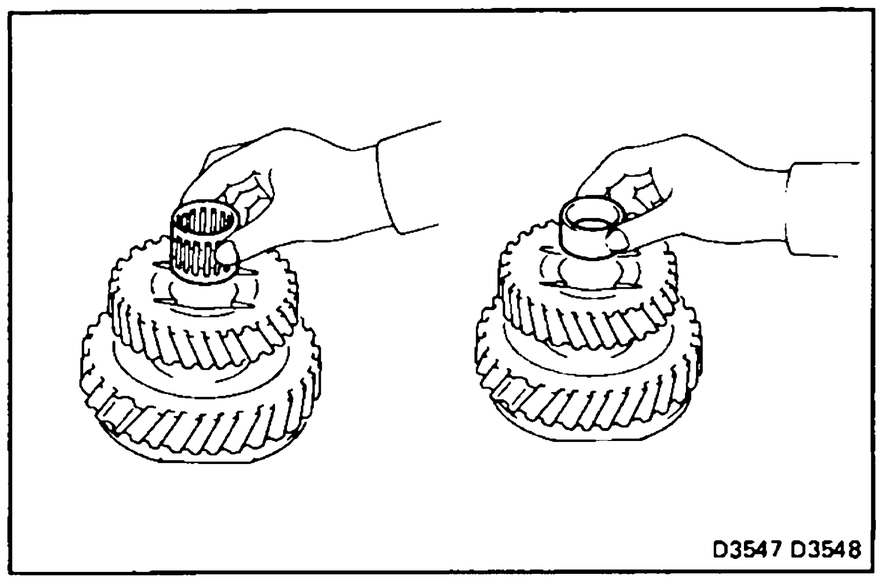
(a) Apply gear oil to a new O-ring and install it to the idler gear shaft front side groove.

(b) Install the idler gear shaft to the transfer front case.



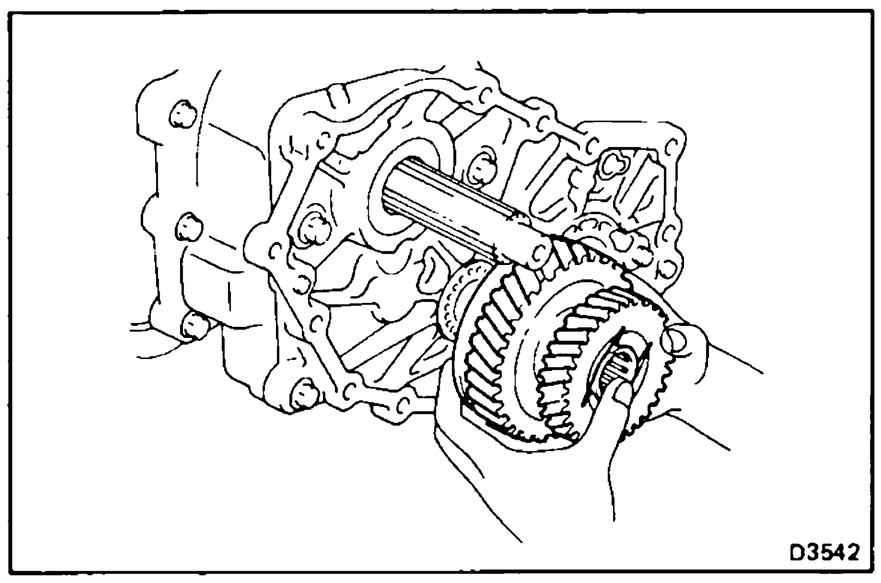
(c) Install the idler gear thrust washer.

NOTE: Be sure that protruding part of washer fits in the case groove.



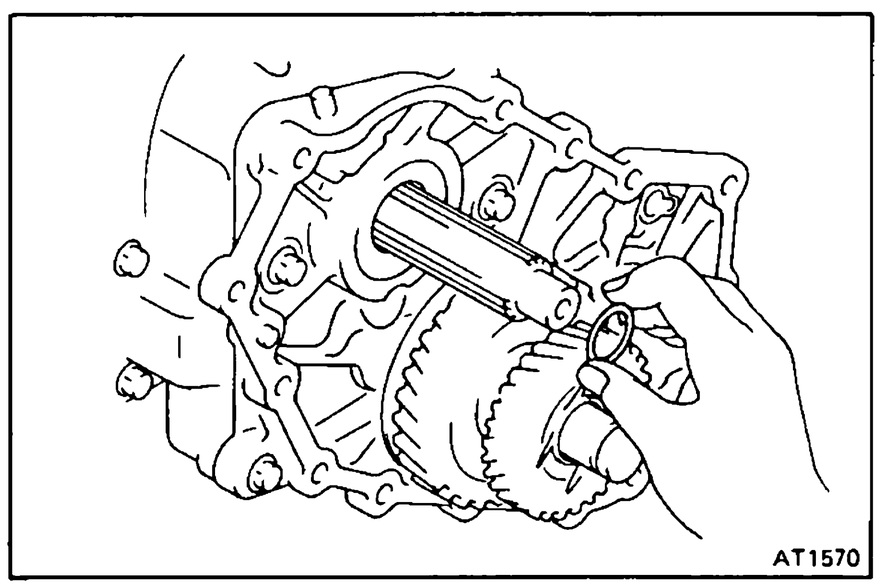
(d) Apply MP grease to the two bearings.

(e) Install the two bearings and spacer to the idler gear.



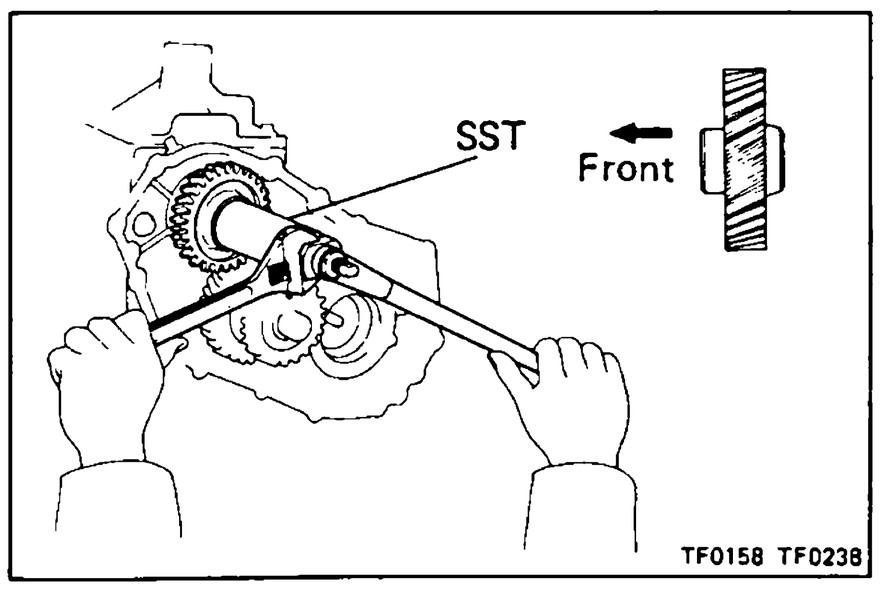
(f) Install the assembled idler gear, bearings and spacer to the idler gear shaft.

(g) Apply gear oil to a new O-ring and install it to the idler gear shaft rear side groove.



12. INSTALL O-RING TO TRANSMISSION OUTPUT SHAFT

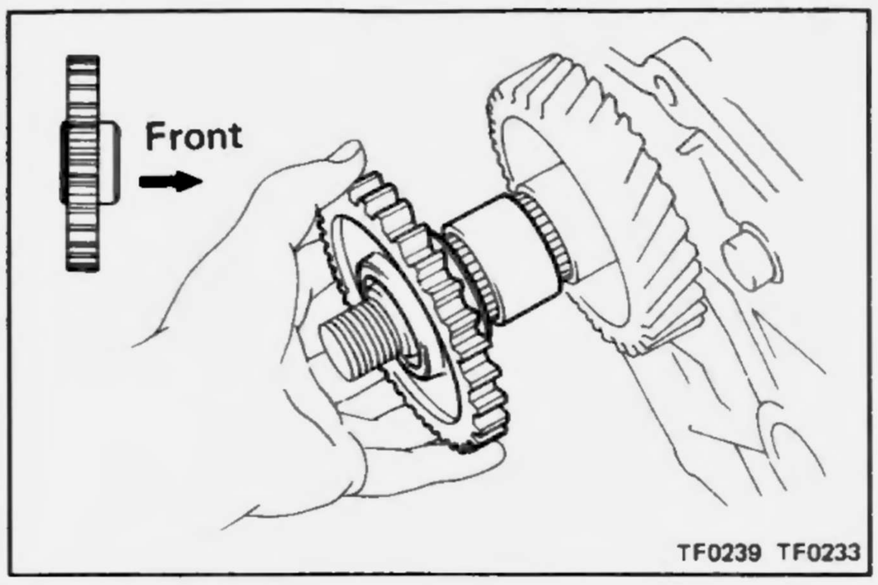
Apply ATF to a new O-ring and install it to the transmission output shaft.



13. INSTALL TRANSFER INPUT GEAR

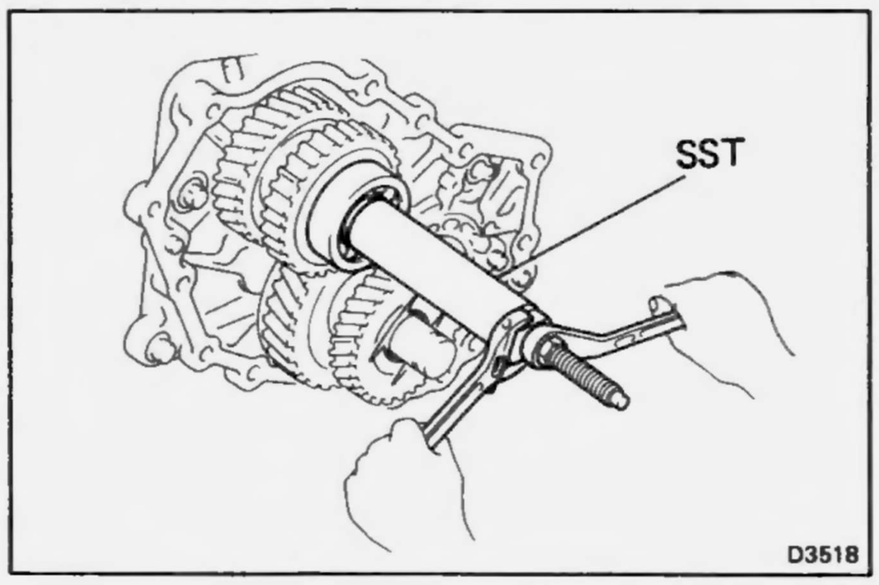
Using SST, install the transfer input gear.

SST 09309-36033



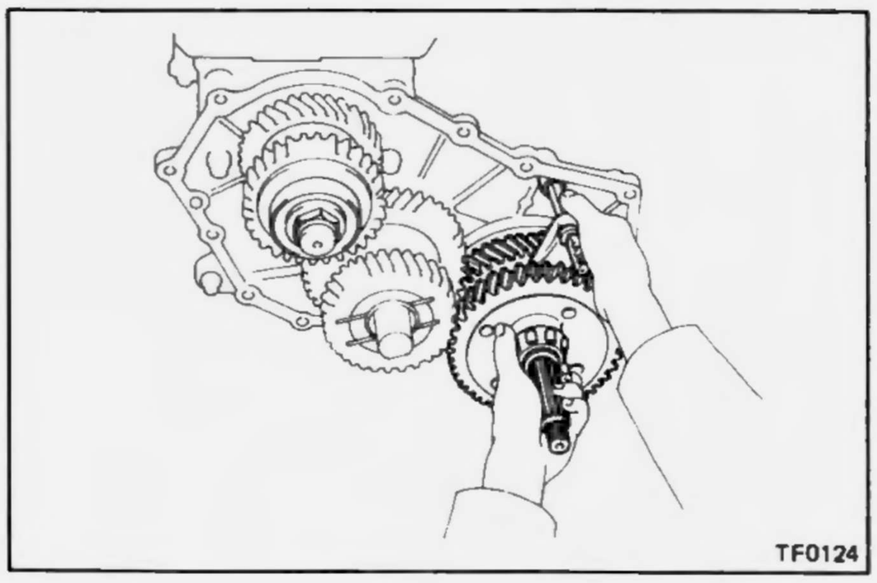
14. INSTALL POWER TAKE-OFF GEAR

(a) Install the spacer and power take-off gear to the transfer output shaft.

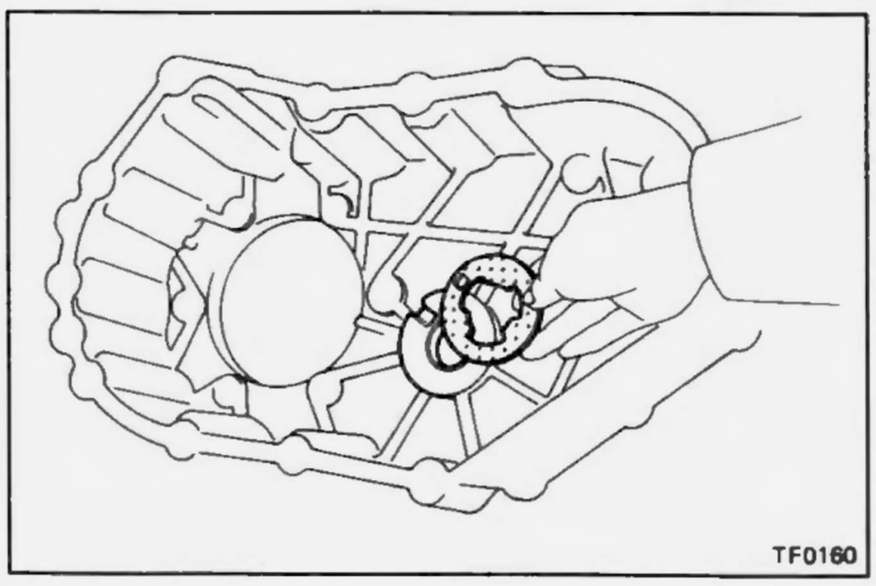


(b) Using SST, install the transmission output shaft rear bearing.

SST 09309-36033



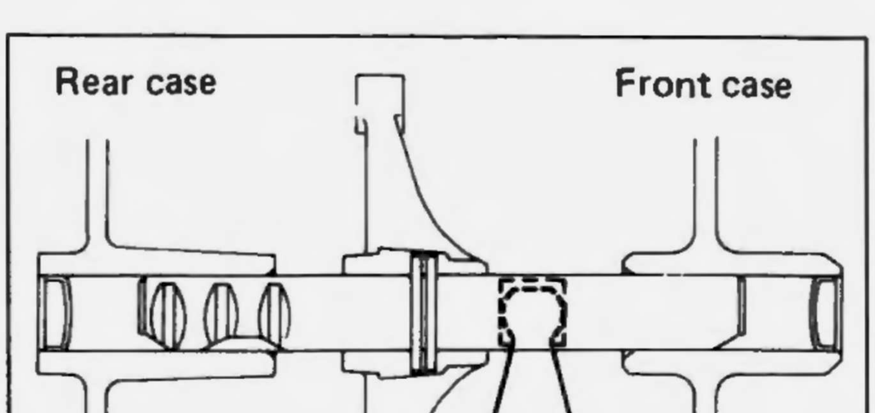
15. INSTALL REAR OUTPUT SHAFT WITH SHIFT FORK AND SHAFT



16. STICK ON THRUST WASHER

Stick the thrust washer to the transfer rear case with MP grease.

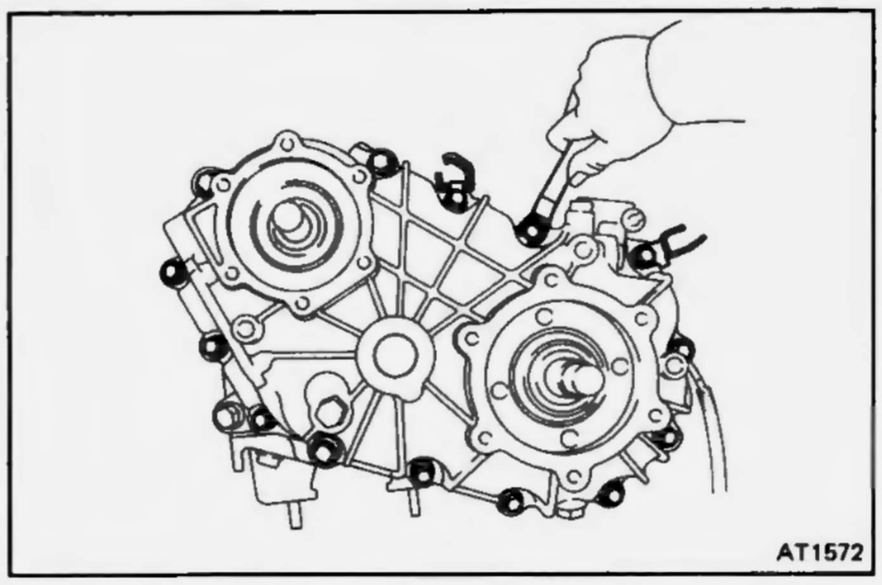
NOTE: Be sure the protruding part of washer fits in the case groove.



17. INSTALL TRANSFER REAR CASE

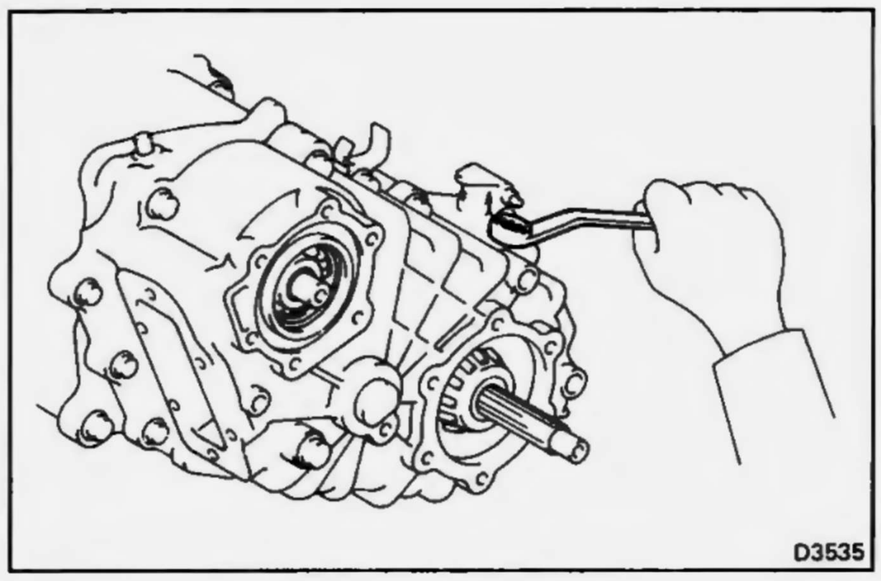
(a) Place a new gasket on the front case.

(b) While aligning the shift fork shaft and shifting lever, assemble the transfer rear case.



(c) Install and torque the fourteen bolts.

Torque: 12 mm 650 kg-cm (47 ft-lb, 64 N·m)
10 mm 400 kg-cm (29 ft-lb, 39 N·m)



18. INSTALL SHIFT PLUG

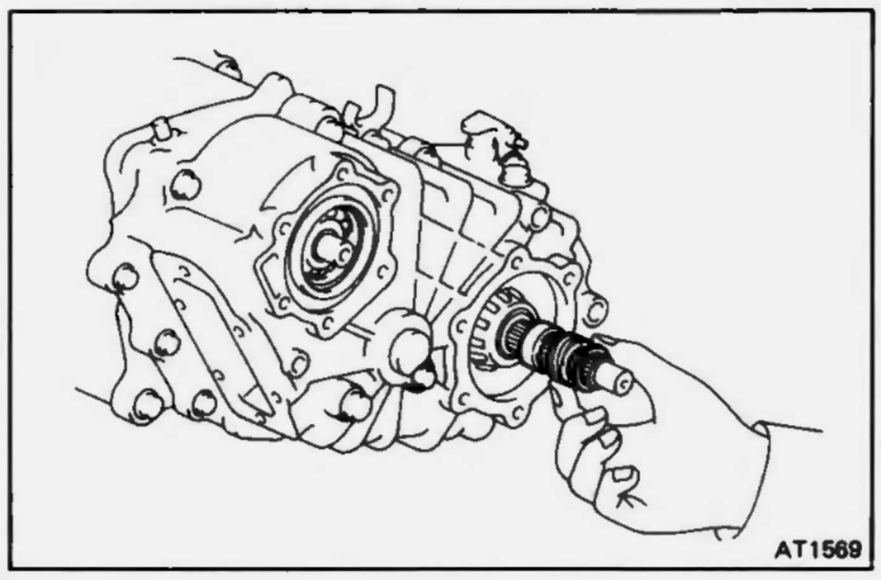
(a) Clean the threads of the plug and case with white gasoline.

(b) Coat the threads of the plug with sealer.

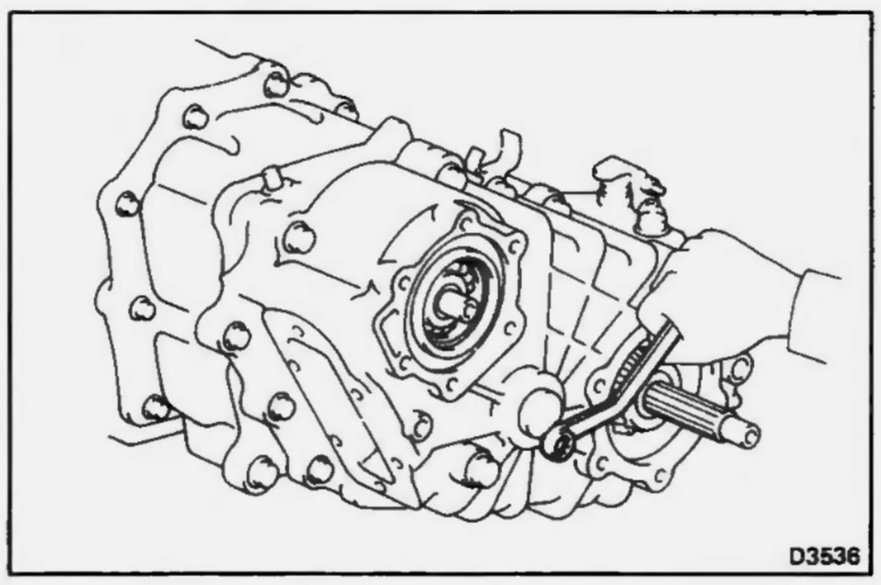
Sealer part No. 08833-00070 or THREE BOND 1324

(c) Install the locking ball and spring and torque the plug.

Torque: 450 kg-cm (33 ft-lb, 44 N·m)



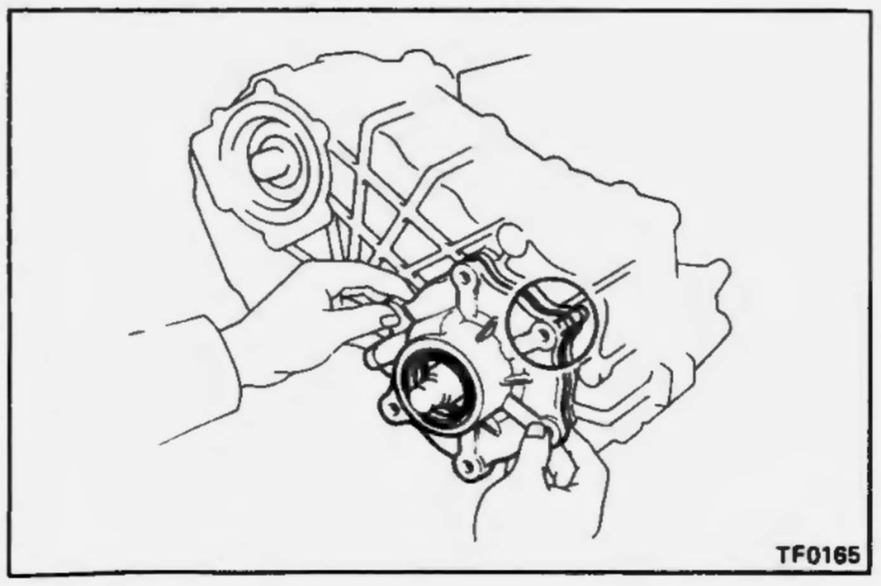
19. INSTALL SPACER, SPEEDOMETER DRIVE GEAR AND WASHER



20. INSTALL IDLER GEAR SHAFT LOCK PLATE

Install the lock plate and bolt. Tighten the bolt.

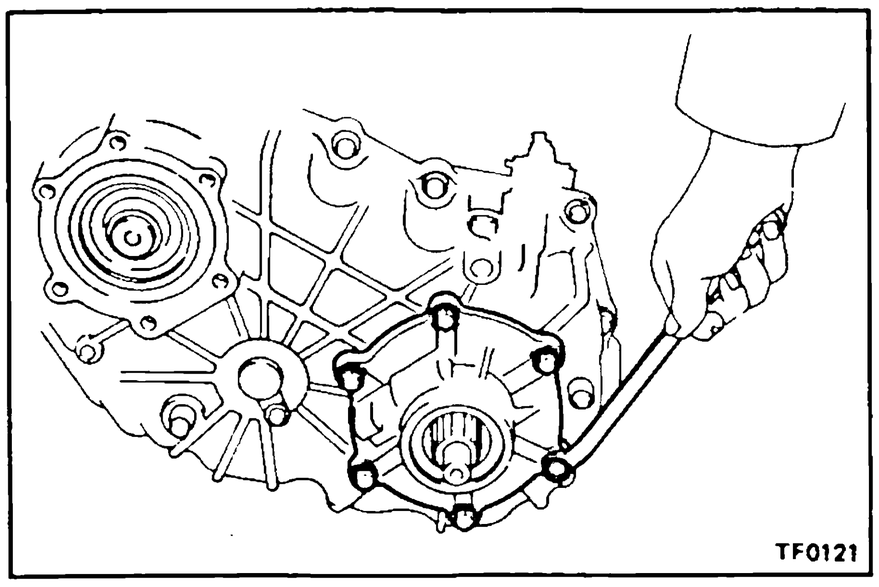
Torque: 130 kg-cm (9 ft-lb, 13 N·m)



21. ADJUST REAR OUTPUT SHAFT BEARINGS PRELOAD

(a) Install the rear output shaft rear bearing retainer.

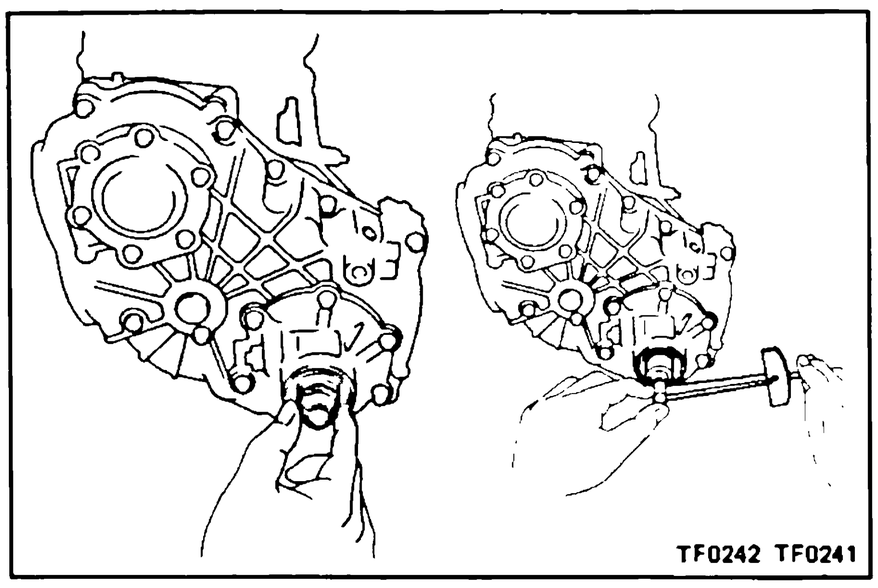
NOTE: Align the bearing retainer rib with the case.


TF0121

(b) Torque the six bolts.

Torque: 350 kg-cm (25 ft-lb, 34 N·m)

(c) Shift the transfer lever to the N position.


TF0242 TF0241

(d) Temporarily install the rear companion flange lock nut.

(e) Using a torque meter, measure the preload of the rear output shaft bearings. (Starting torque)

Preload:

New bearing	**15 – 24.7 kg-cm (13.0 – 21.4 in.-lb, 1.5 – 2.4 N·m)**
Reused bearing	**7 – 12 kg-cm (6.1 – 10.4 in.-lb, 0.7 – 1.2 N·m)**

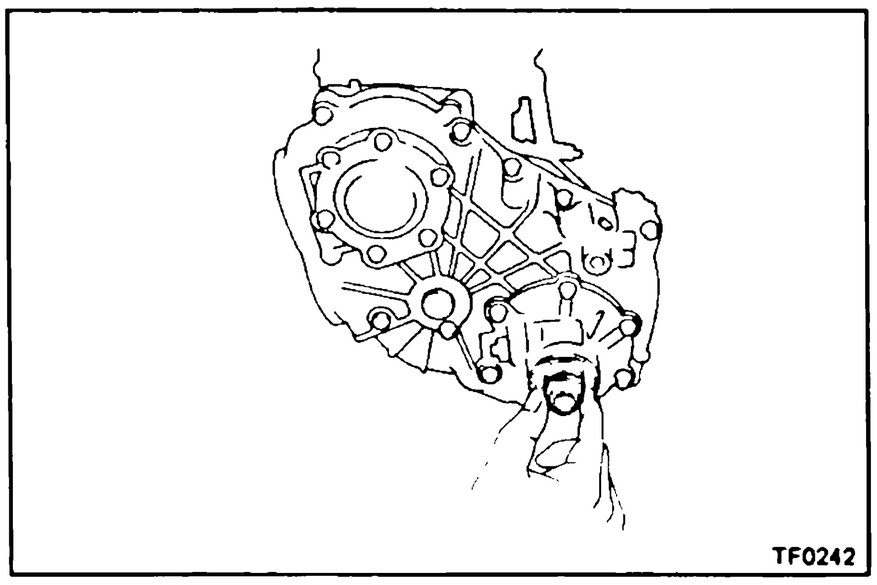
If the preload is not within specification, remove the outer race of the rear output shaft rear bearing with SST.

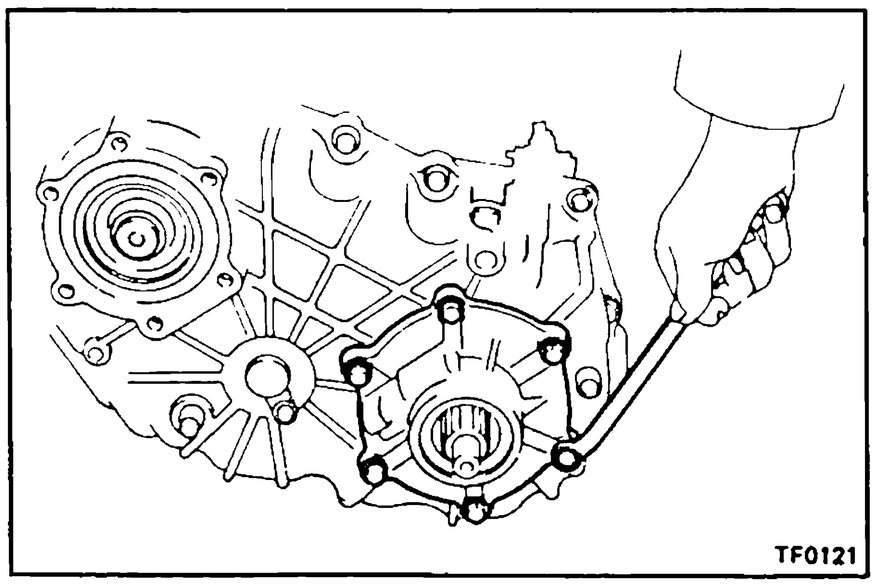
Reselect an adjusting shim.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
0	0.15 (0.0059)	10	1.0 (0.039)
4	0.4 (0.016)	11	1.1 (0.043)
5	0.5 (0.020)	12	1.2 (0.047)
6	0.6 (0.024)	13	1.3 (0.051)
7	0.7 (0.028)	14	1.4 (0.055)
8	0.8 (0.031)	15	1.5 (0.059)
9	0.9 (0.035)		

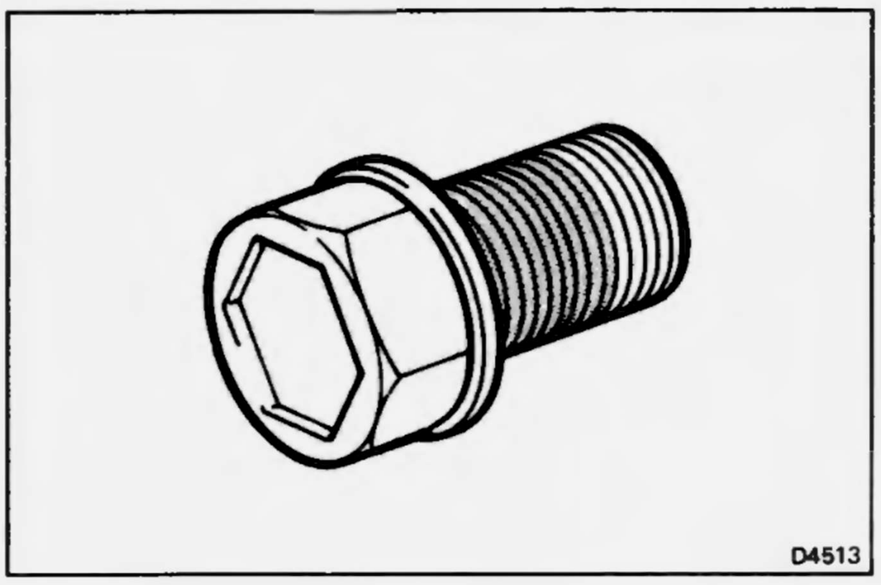
NOTE: The preload will change about 10.0 kg-cm (8.7 in.-lb, 1.0 N·m) with each shim thickness.

(f) Remove the rear companion flange lock nut.


TF0242


TF0121

22. REMOVE REAR OUTPUT SHAFT REAR BEARING RETAINER

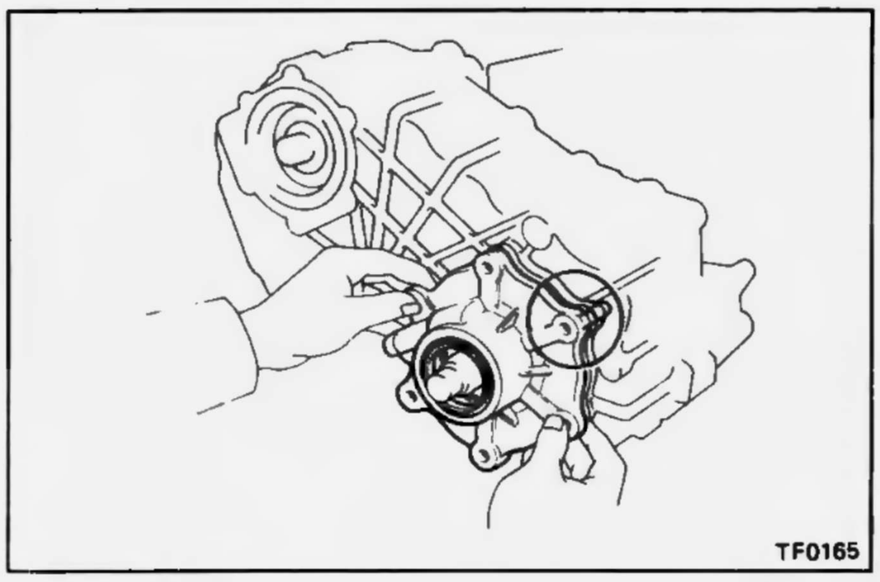

D4513

23. INSTALL REAR OUTPUT SHAFT REAR BEARING RETAINER

(a) Clean the threads of the bolts and case with white gasoline.

(b) Coat the threads of the bolts with sealer.

Sealer part No. 08833-00070 or THREE BOND 1324


TF0165

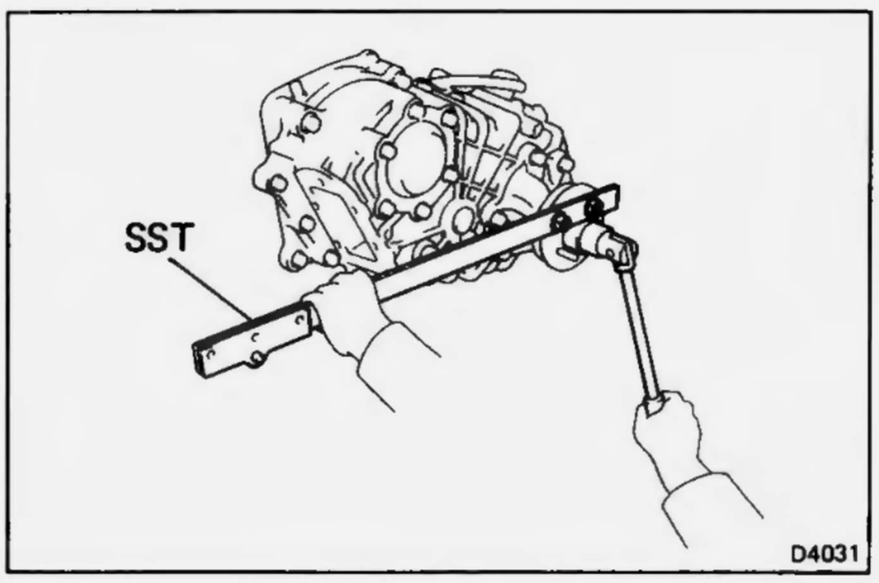
(c) Place a new gasket on the rear case.

(d) Install the rear output shaft rear bearing retainer.

NOTE: Align the bearing retainer rib with the case.

(e) Install and torque the six bolts.

Torque: 350 kg-cm (25 ft-lb, 34 N·m)



D4031

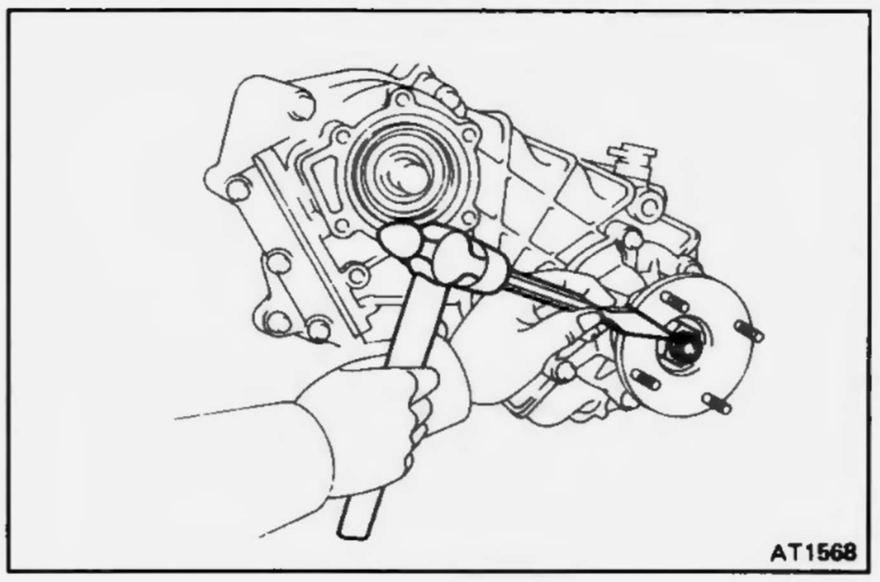
24. INSTALL REAR COMPANION FLANGE

(a) Install the companion flange.

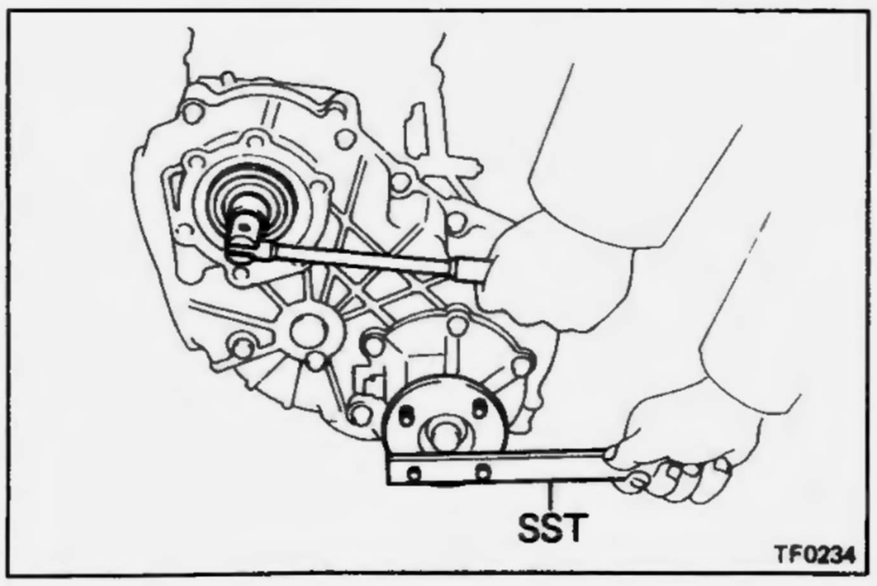
(b) Using SST to hold the companion flange, install a new companion flange lock nut.

SST 09330-00021

Torque: 1,300 kg-cm (94 ft-lb, 127 N·m)


AT1568

(c) Stake the companion flange lock nut.



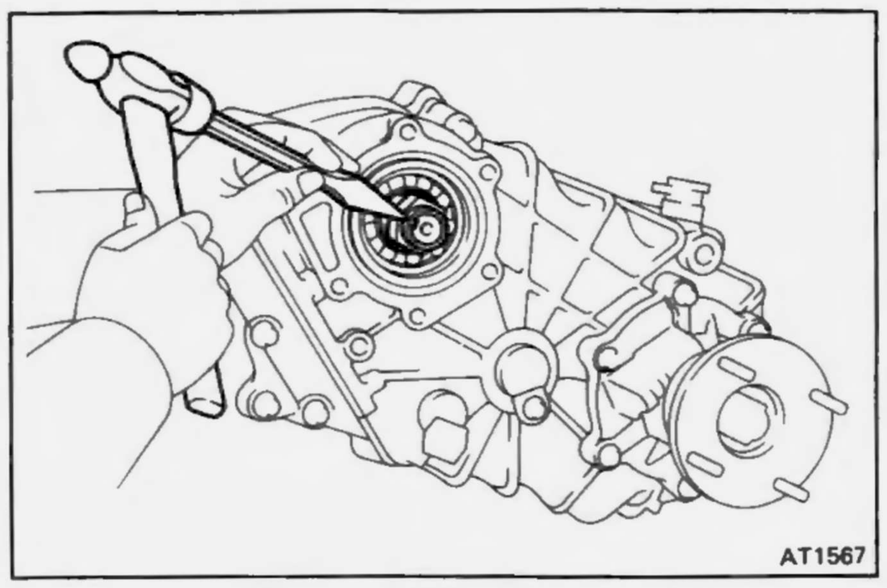
TF0234

25. INSTALL TRANSMISSION OUTPUT SHAFT LOCK NUT

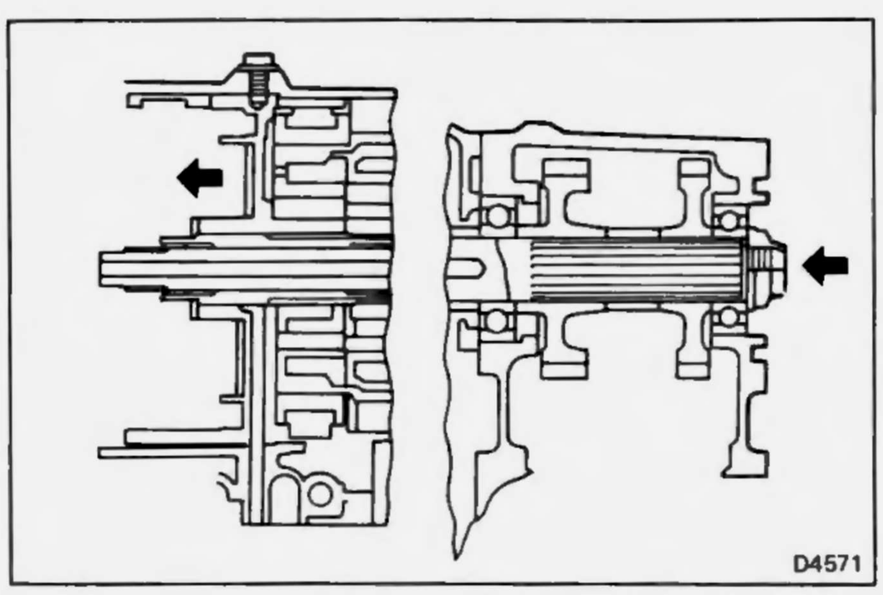
(a) Using SST to hold the companion flange, install a new transmission output shaft lock nut.

SST 09330-00021

Torque: 1,300 kg-cm (94 ft-lb, 127 N·m)



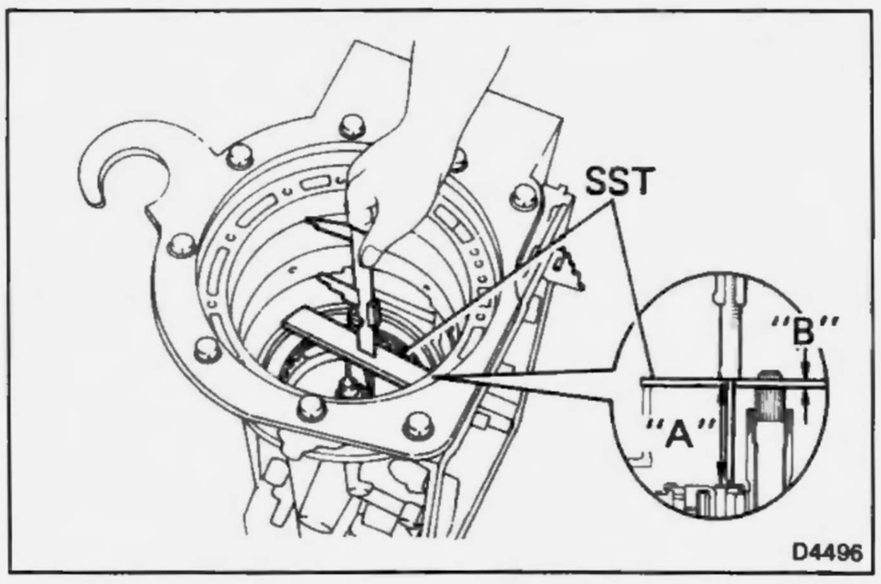
(b) Stake the transmission output shaft lock nut.



26. ADJUST CENTER SUPPORT THRUST CLEARANCE

(a) Face the transmission output shaft toward the front of the transmission, and push in using 5–10 kg (11.0–22.0 lb, 49–98 N) of pressure.

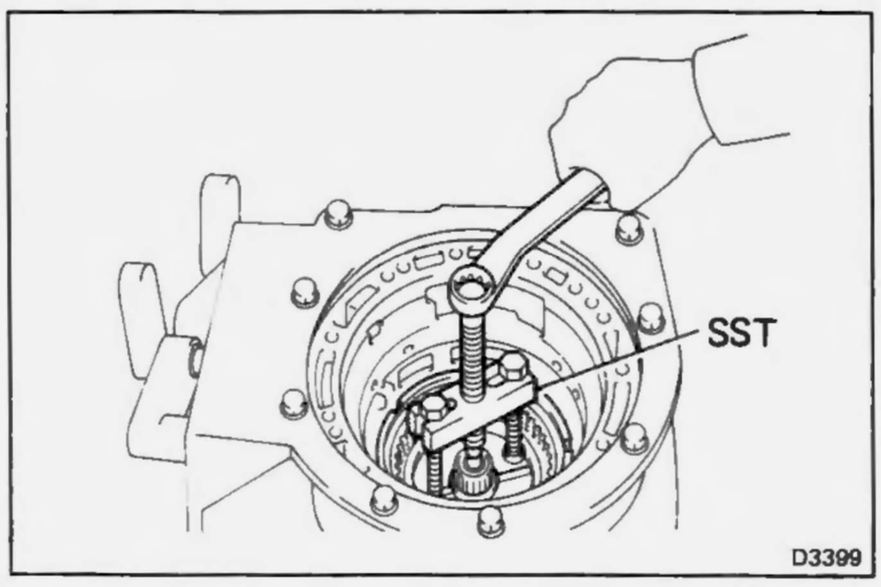
(b) Pull the center support toward the front of the transmission applying 5–10 kg (11.0–22.0 lb, 49–98 N) of pressure.



(c) Set SST on the center support as shown in the figure. Using calipers, measure the distance "A" between the top of SST and clutch drum.

SST 09350-36010 (09350-06090)

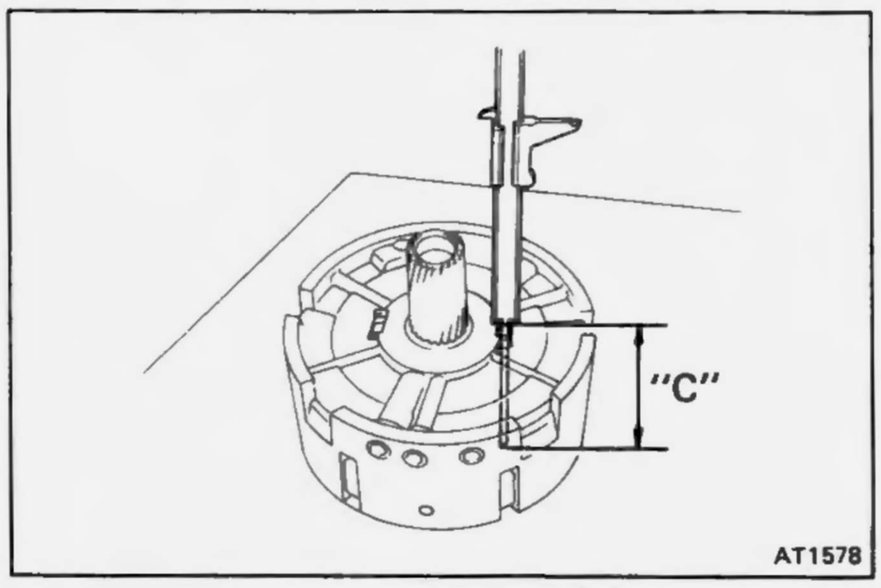
(d) Using a calipers, measure the SST thickness "B."



(e) Remove three center support lock bolt.

(f) Using SST, remove the center support.

SST 09350-36010 (09350-06140)

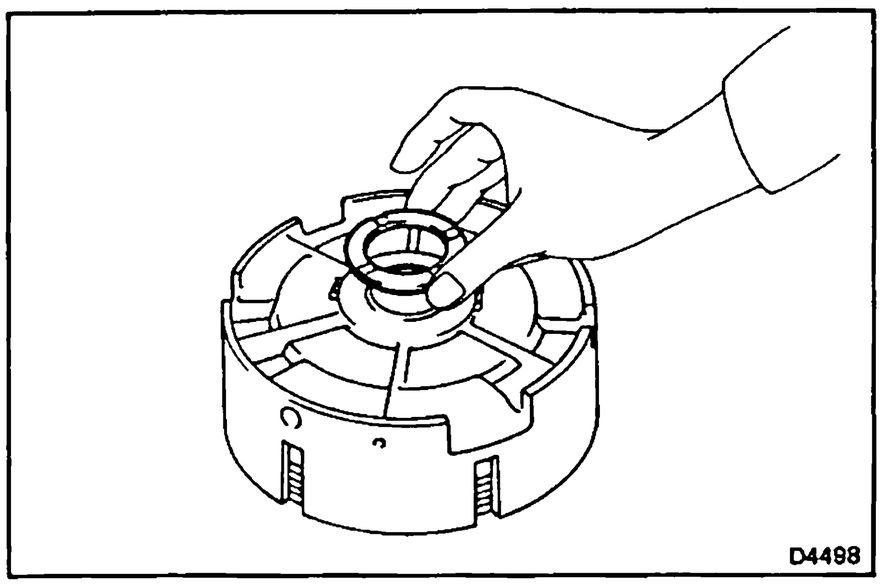


(g) Turn over the center support and plate it on a flat surface. Inserting calipers into the thrust washer hole, measure the distance "C" between it and the surface.

Center support thrust clearance = A – (B + C)

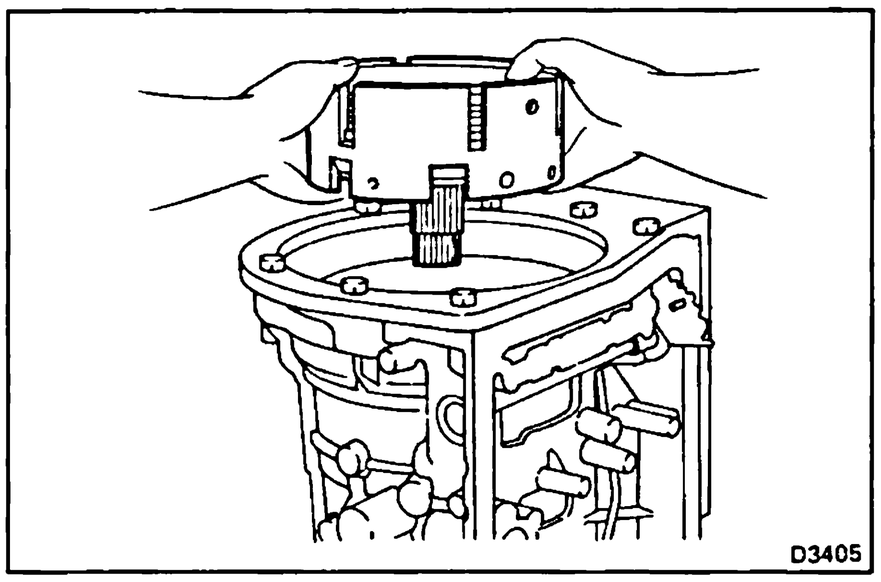
Standard clearance : 0.3 – 0.7 mm (0.012 – 0.028 in.)

Maximum clearance: 0.9 mm (0.035 in.)


D4498

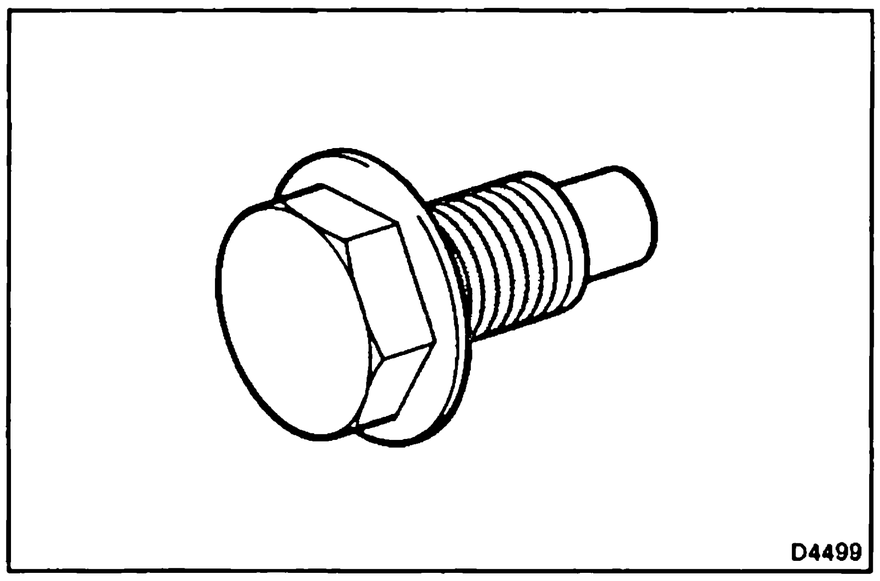
(h) Select a washer to make the space between the center support and one-way clutch standard.

Thrust washer thickness mm (in.)	
1.8	(0.071)
2.1	(0.083)
2.4	(0.094)
2.6	(0.102)


D3405

(i) Coat new three O-rings with ATF and install them to the center support.

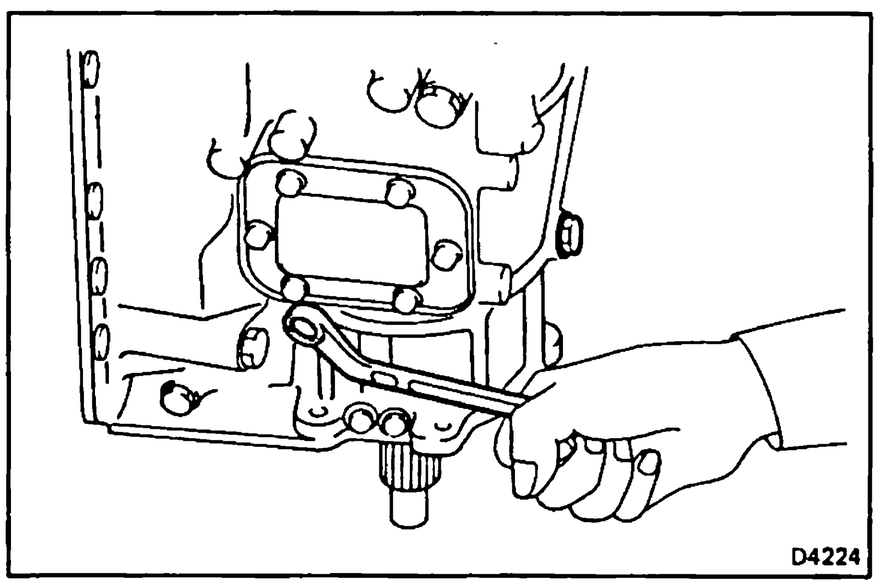
(j) Align the oil hole and bolt hole of the center support with those of the body side and insert the center support.


D4499

(k) Clean the threads of the bolts and case with white gasoline.

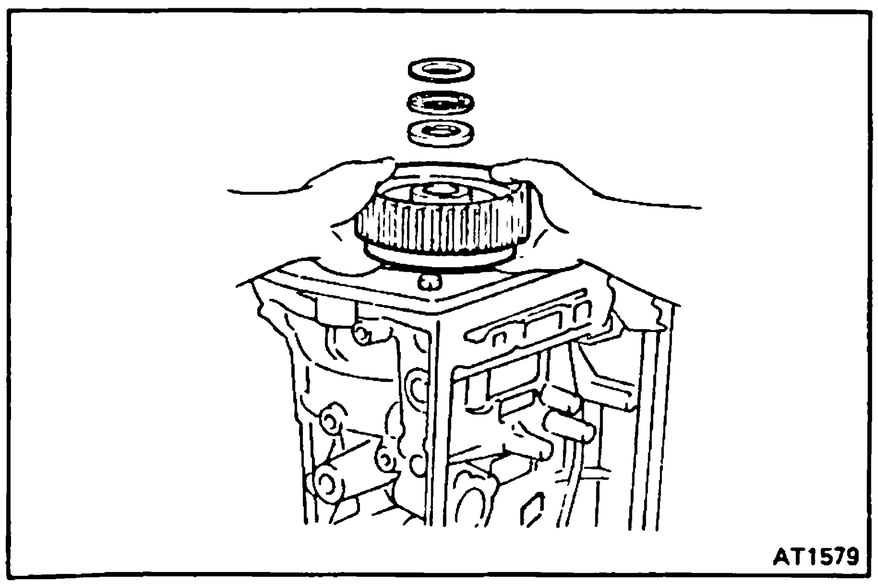
(l) Coat the threads of the bolts with sealer.

Sealer: LOCTITE 242


D4224

(m) Install and torque the center support lock bolts.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)


AT1579

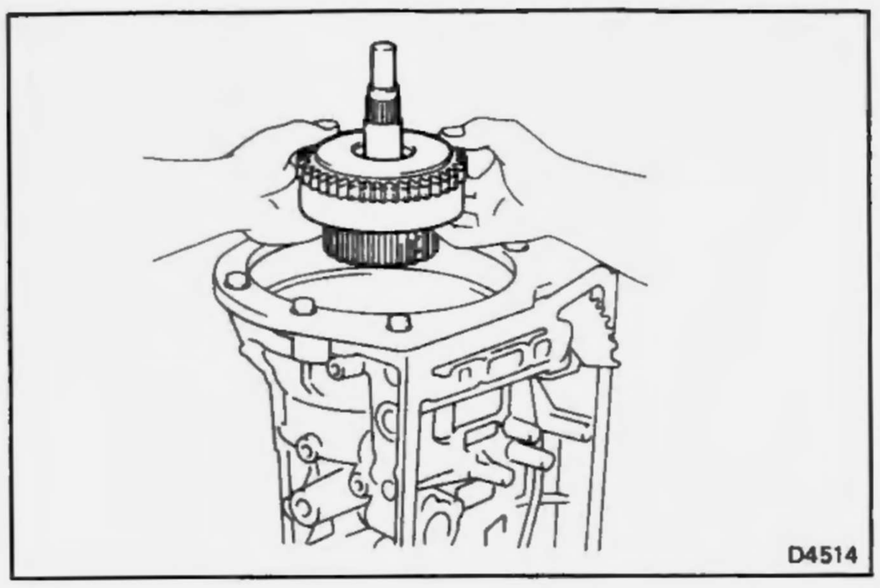
27. INSTALL REAR CLUTCH ASSEMBLY IN CASE

(a) Align flukes of the clutch disc and mesh them with the rear clutch. Push the rear clutch assembly into the case.

(b) Install the thrust bearing and two races on rear clutch.

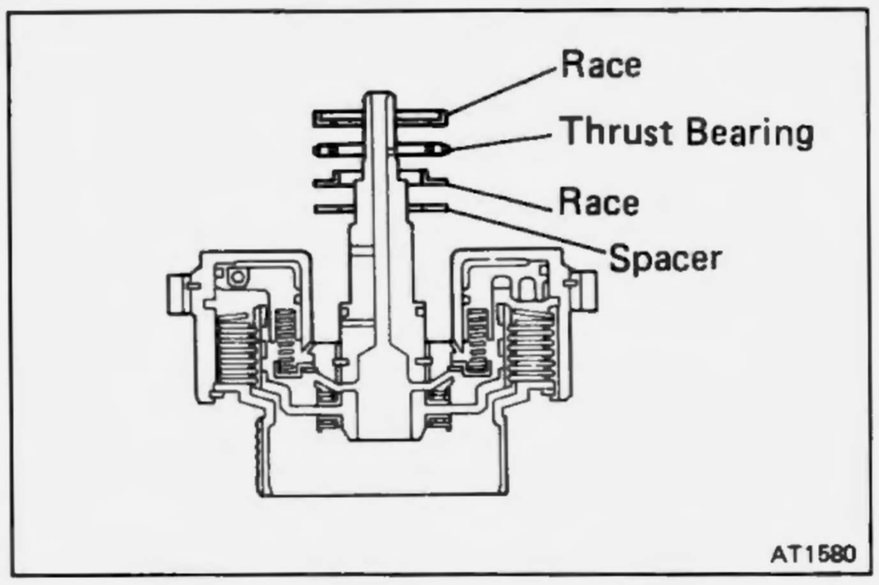
mm (in.)

	Outer diameter	Inner diameter
Upper race	50.4 (1.984)	32.8 (1.291)
Lower race	52.0 (2.047)	37.0 (1.457)
Thrust bearing	52.0 (2.047)	34.7 (1.366)



28. INSTALL FRONT CLUTCH ASSEMBLY

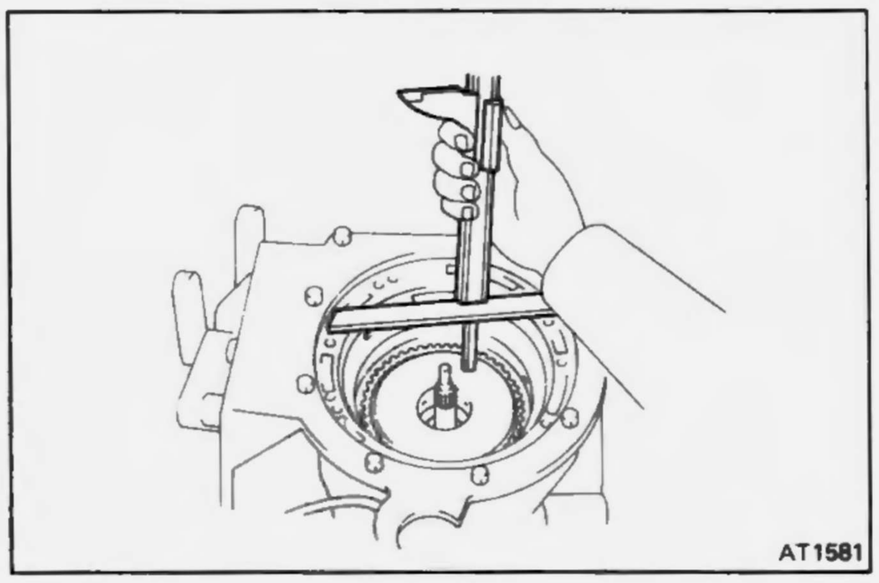
Align flukes of the rear clutch disc and mesh them with the front clutch hub. Push the front clutch assembly into the case.



29. INSTALL THRUST BEARING AND RACES

mm (in.)

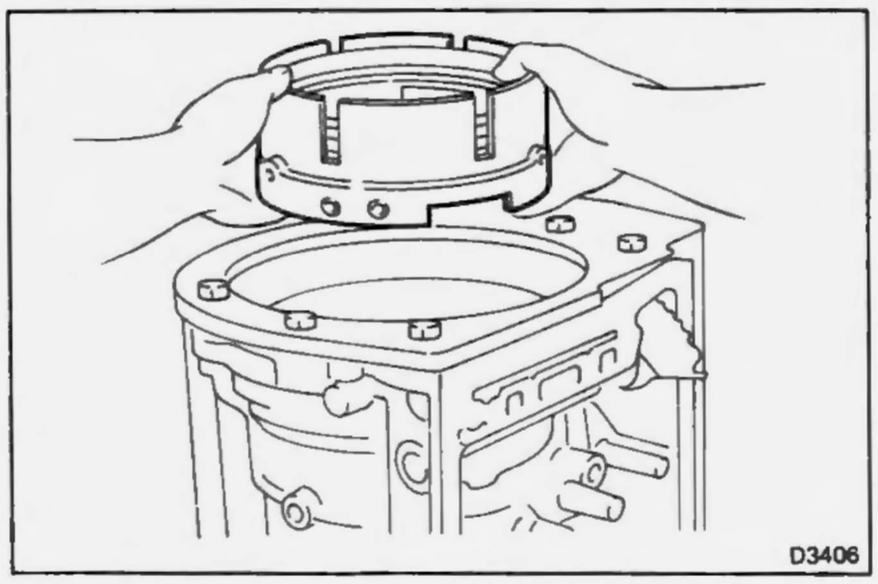
	Outer diameter	Inner diameter
Upper race	52.0 (2.047)	37.0 (1.457)
Lower race	50.4 (1.984)	32.8 (1.291)
Thrust bearing	52.0 (2.047)	34.7 (1.366)



30. CHECK CORRECT INSTALLATION OF FRONT CLUTCH

Set SST on the transmission case as shown in the figure. Measure the distance between the top surface of SST and front clutch assembly. If the distance corresponds to that during disassembly, the front clutch is installed correctly.

SST 09350-36010 (09350-06090)



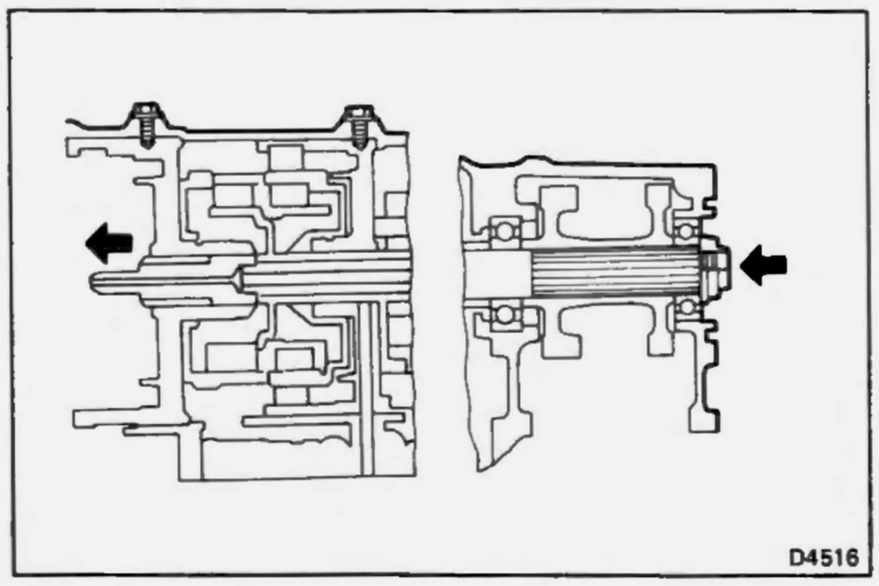
31. INSTALL OVERDRIVE SUPPORT

(a) Align the oil hole and bolt hole of the overdrive support with those of body side and install the overdrive support.

(b) Install and torque the three lock bolts.

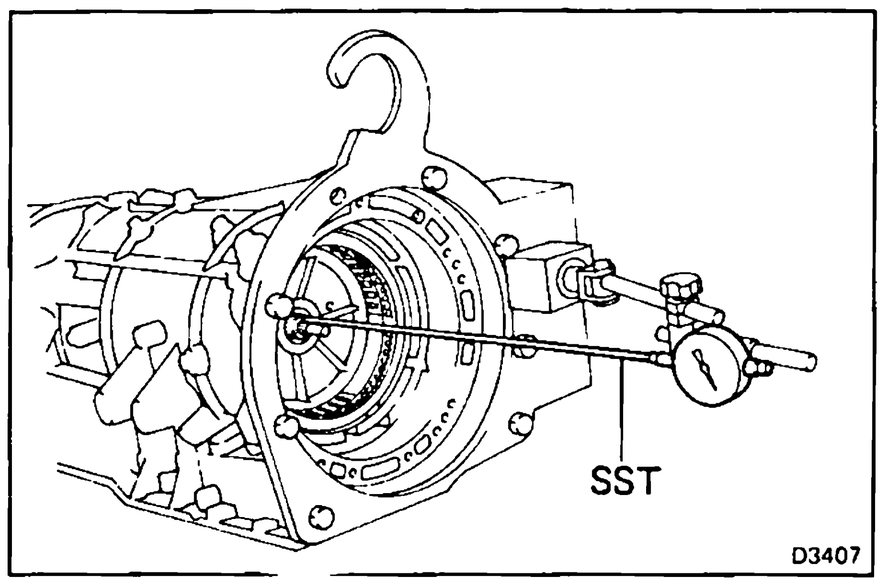
NOTE: Since the bolts are temporarily installed, do not coat with sealer.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)



(c) Face the transmission output shaft toward the front of the transmission, and push in using 5–10 kg (11.0 –22.0 lb, 49–98 N) of pressure.

(d) Pull the overdrive support toward the front of the transmission applying 5–10 kg (11.0–22.0 lb, 49–98 N) of pressure.



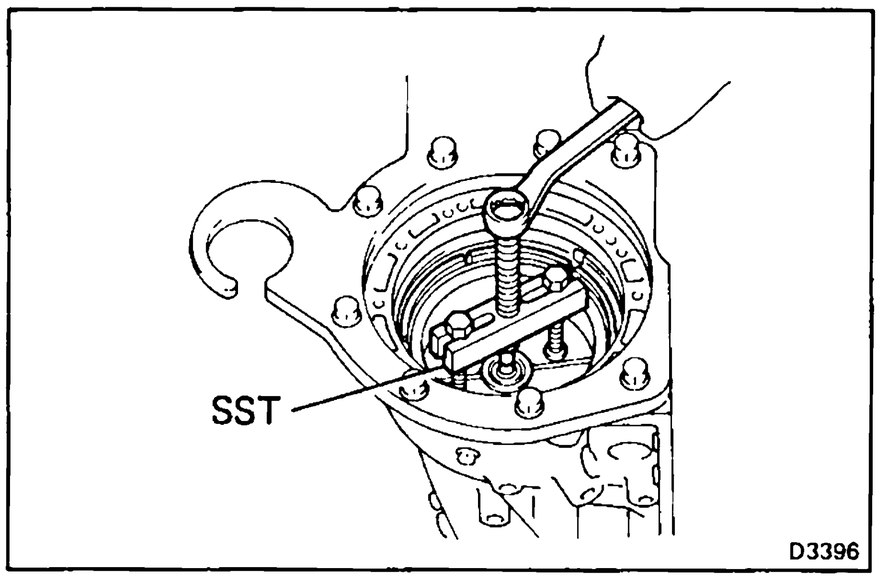
(e) Set the dial indicator installed by the SST to the input shaft face, and measure the input shaft thrust clearance.

SST 09350-36010 (09350-06130)

(f) Check that the thrust clearance of the input shaft is standard. If it exceeds the maximum, select a new spacer.

Standard clearance : 0.3 – 0.7 mm (0.012 – 0.028 in.)
Maximum clearance: 0.7 mm (0.028 in.)

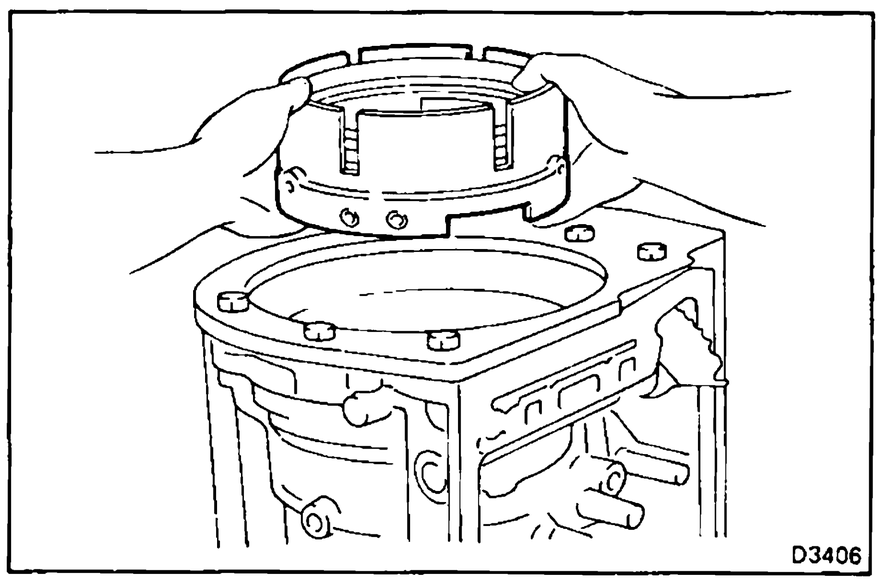
Spacer thickness	mm (in.)
0.9	(0.035)
1.2	(0.047)
1.5	(0.059)
1.8	(0.071)
2.1	(0.083)



(g) Remove the three overdrive support lock bolts.

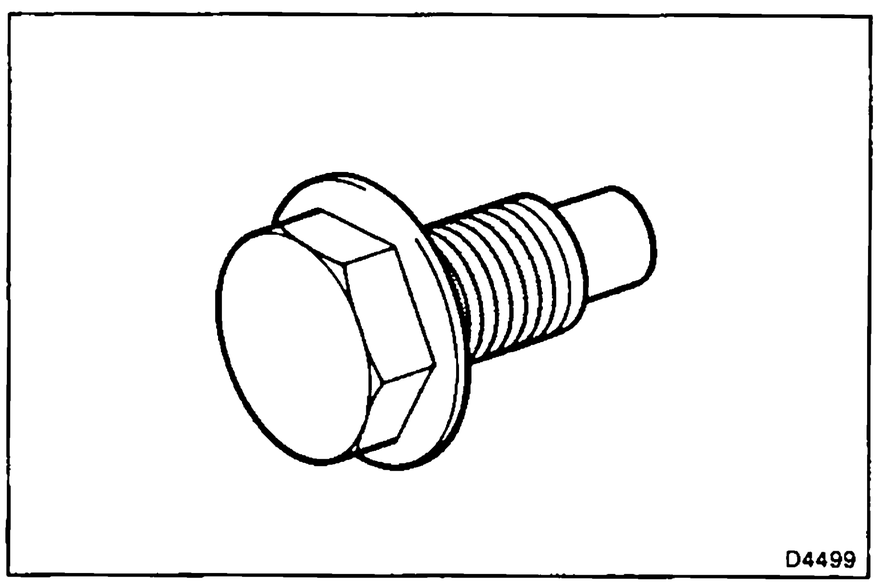
(h) Using SST, remove the overdrive support.

SST 09350-36010 (09350-06140)



(i) Apply ATF to three new O-rings and install it to the overdrive support.

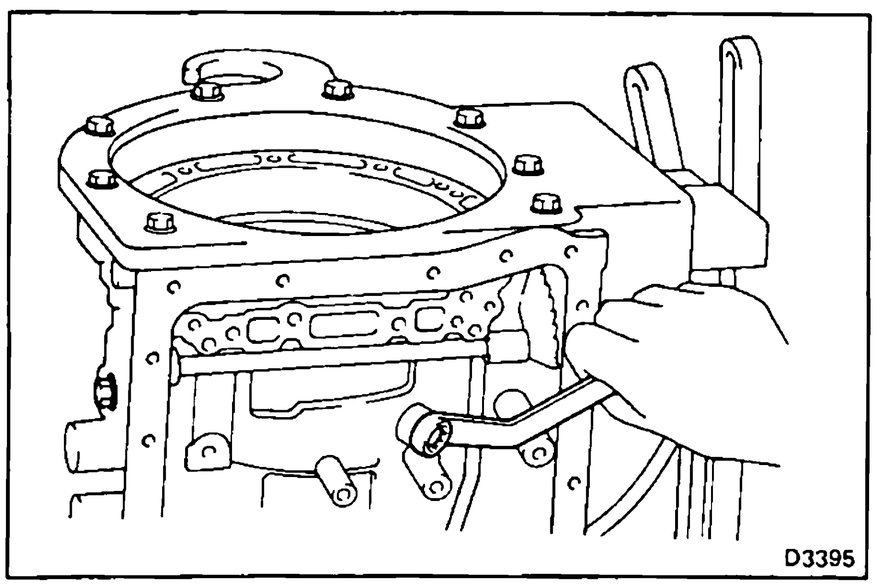
(j) Align the oil hole and bolt hole of the overdrive support with those of the body side and insert the overdrive support.



(k) Clean the threads of the bolts and case with white gasoline.

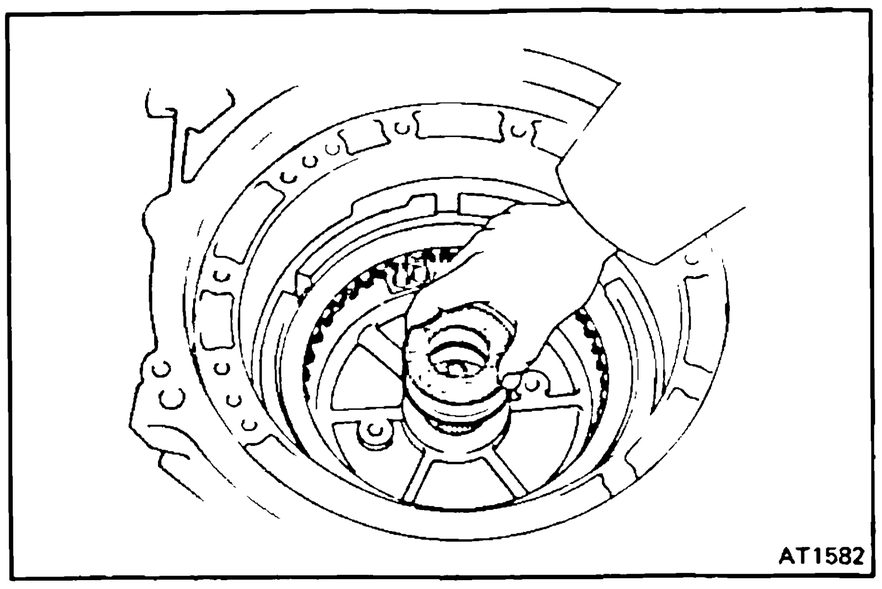
(l) Coat the threads of the bolts with sealer.

Sealer part LOCTITE 242



(m) Install and torque the overdrive support lock bolts.

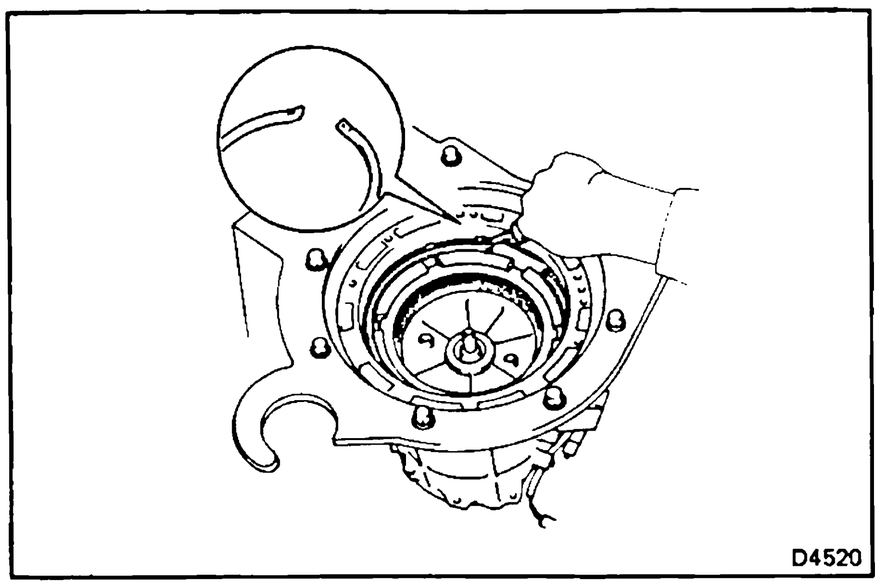
Torque: 250 kg-cm (18 ft-lb, 25 N·m)


AT1582

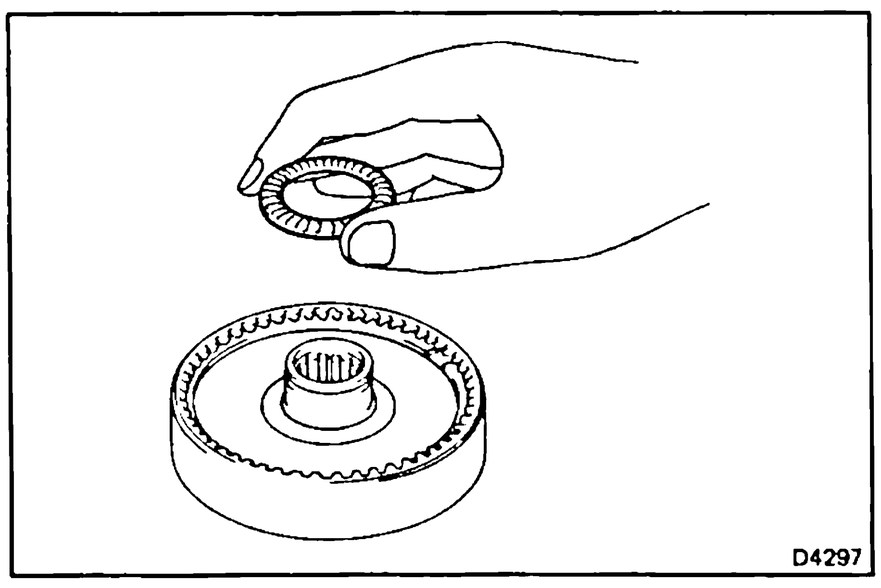
(n) Install the race on the overdrive support.

mm (in.)

	Outer diameter	Inner diameter
Race	52.0 (2.047)	37.0 (1.457)


D4520

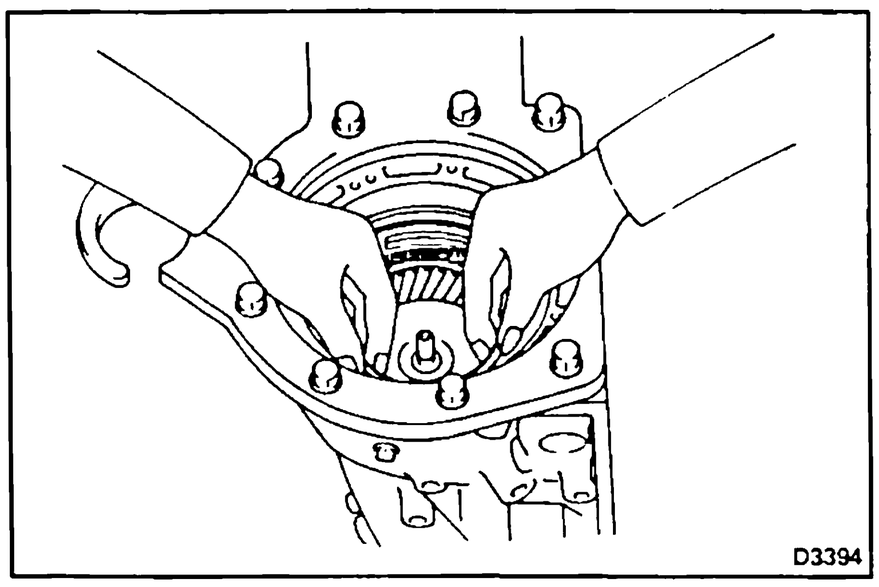
(o) Install the snap ring.


D4297

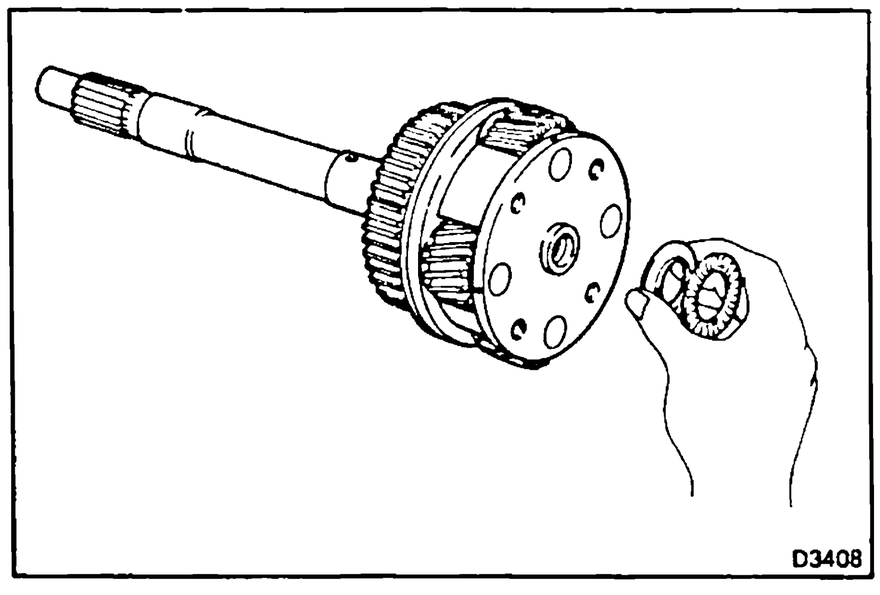
(p) Coat the bearing with petroleum jelly, and install it onto the overdrive planetary gear.

mm (in.)

	Outer diameter	Inner diameter
Bearing	52.0 (2.047)	34.7 (1.366)


D3394

(q) Install the overdrive ring gear to the overdrive support.

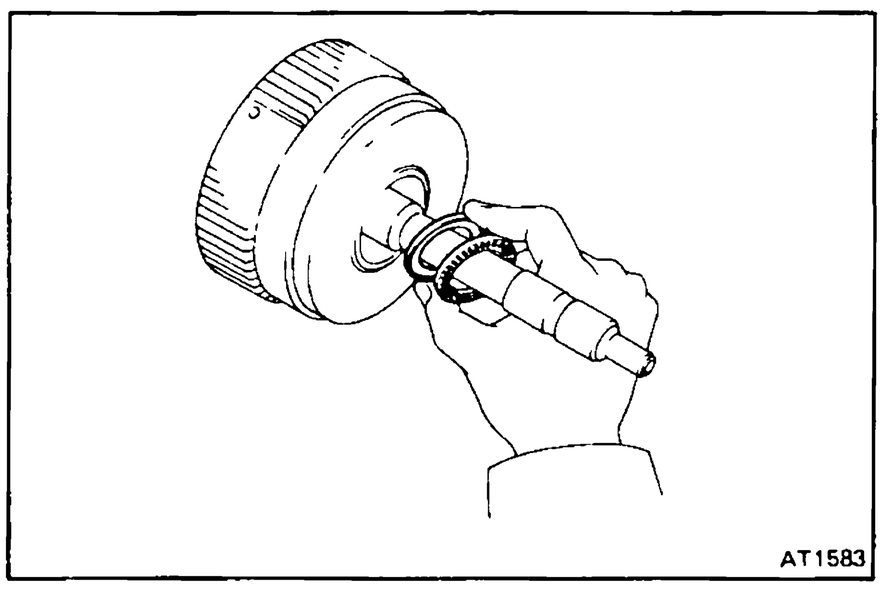

D3408

32. INSTALL OVERDRIVE DIRECT CLUTCH ASSEMBLY

(a) Coat the race and bearing with petroleum jelly, and install them onto the overdrive planetary gear.

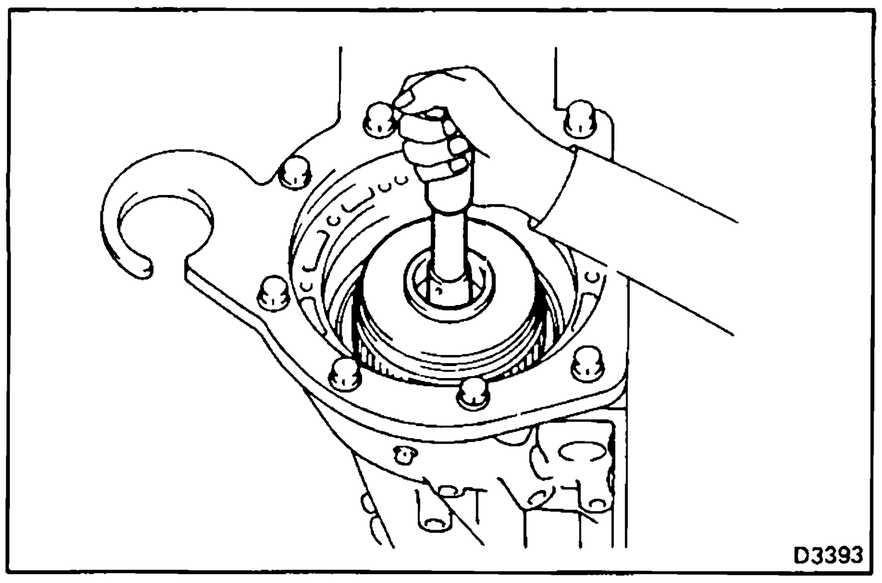
mm (in.)

	Outer diameter	Inner diameter
Bearing	42.0 (1.654)	25.0 (0.984)
Race	42.0 (1.654)	23.2 (0.913)

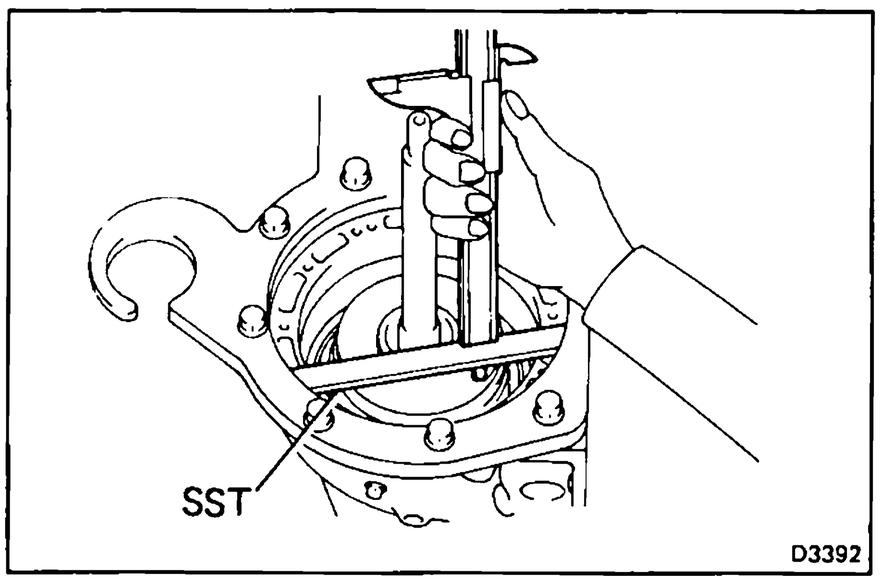

AT1583

(b) Install the race and bearing onto the overdrive clutch assembly.

	Outer diameter	Inner diameter
Race	48.0 (1.890)	28.5 (1.122)
Bearing	46.2 (1.819)	28.5 (1.122)


D3393

(c) Install the assembled overdrive planetary gear and overdrive clutch assembly to the overdrive support.

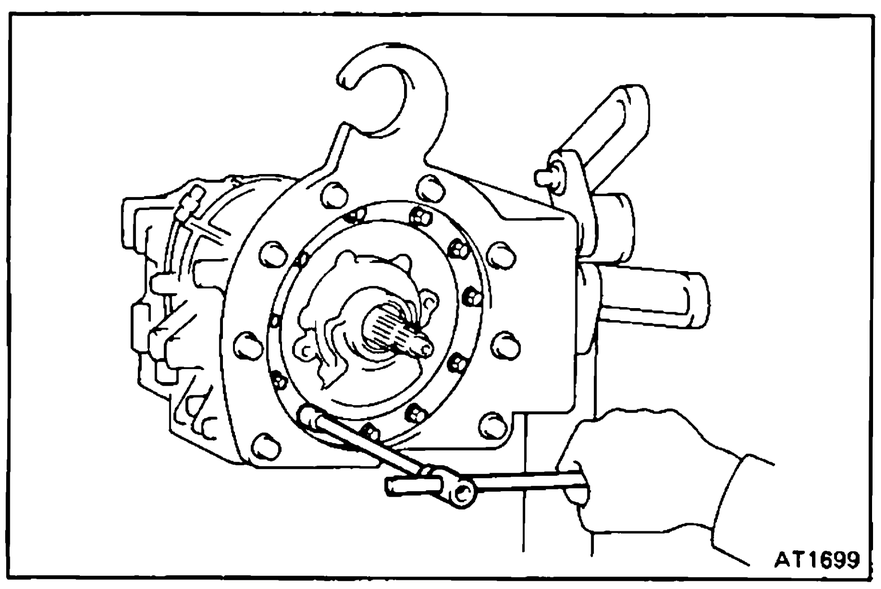


D3392

33. CHECK CORRECT INSTALLATION OF OVERDRIVE CLUTCH

Set SST on the transmission case as shown in the figure. Measure the distance between the top surface of SST and front clutch assembly. If the distance corresponds to that during disassembly, the overdrive clutch is installed correctly.

SST 09350-36010 (09350-06090)


AT1699

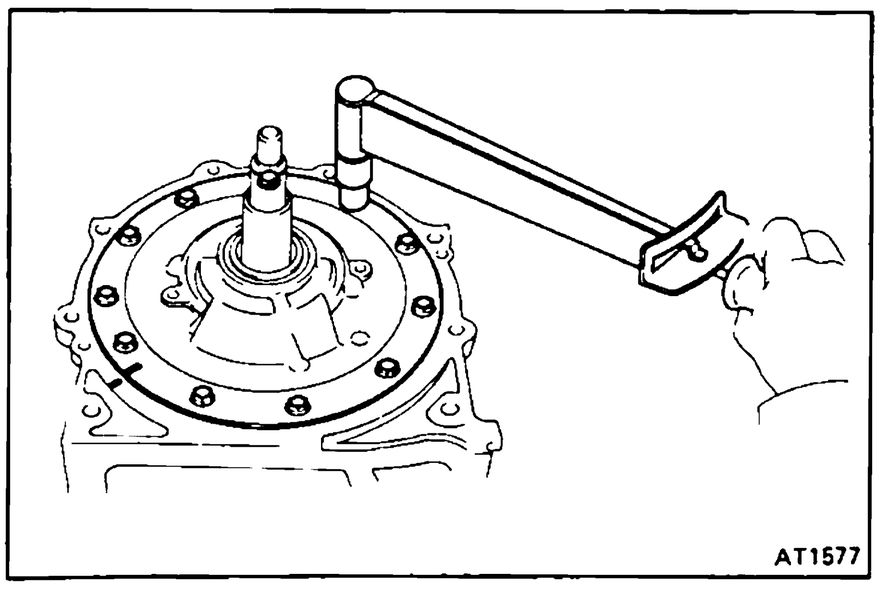
34. INSTALL OIL PUMP ASSEMBLY

(a) Install the race onto the oil pump assembly.

mm (in.)

	Outer diameter	Inner diameter
Race	43.0 (1.693)	27.1 – 28.3 (1.067 – 1.114)

(b) Place the gasket onto the transmission case.

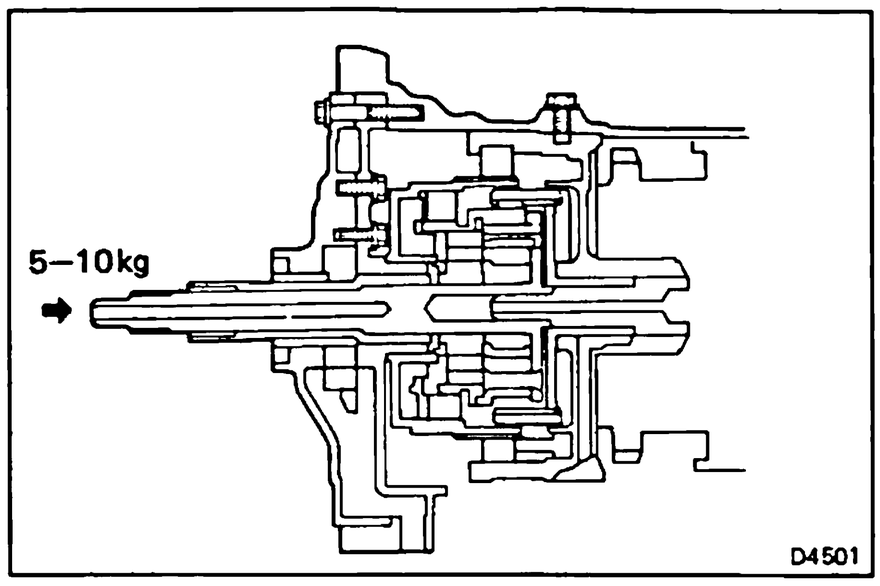

AT1577

(c) Align the matchmarks on the transmission case and oil pump assembly.

(d) Using a plastic hammer, tap the oil pump body and install the oil pump assembly to the transmission case.

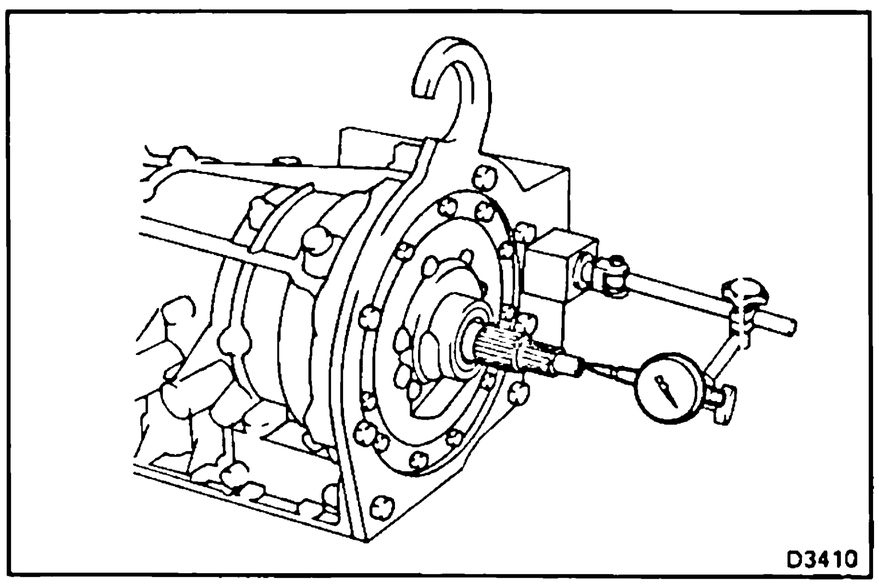
(e) Tighten the set bolts gradually and evenly.

Torque: 210 kg-cm (16 ft-lb, 21 N·m)



35. INSPECT OVERDRIVE INPUT SHAFT THRUST CLEARANCE

(a) Face the overdrive input shaft toward the rear of the transmission, and press in using 5–10 kg (11.0–22.0 lb, 49–98 N) of pressure.

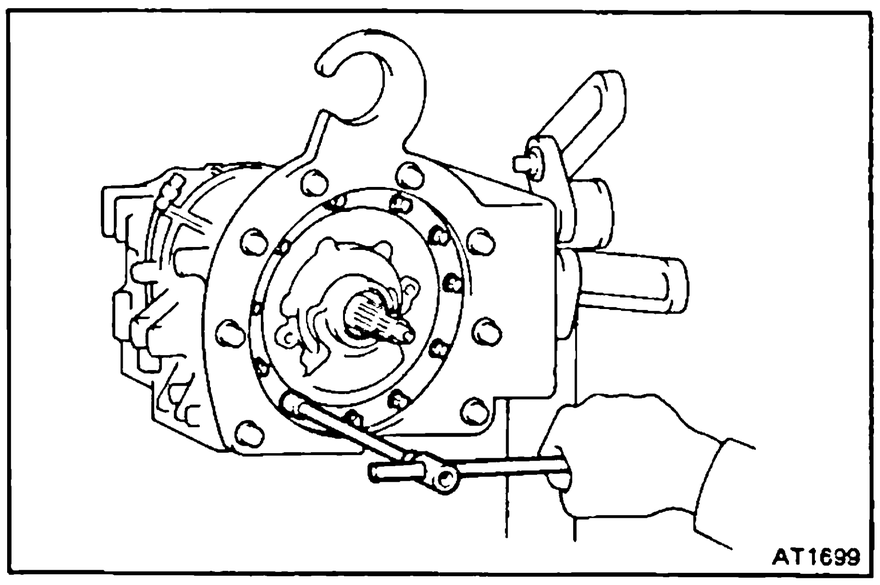


(b) Set the dial indicator into the input shaft.

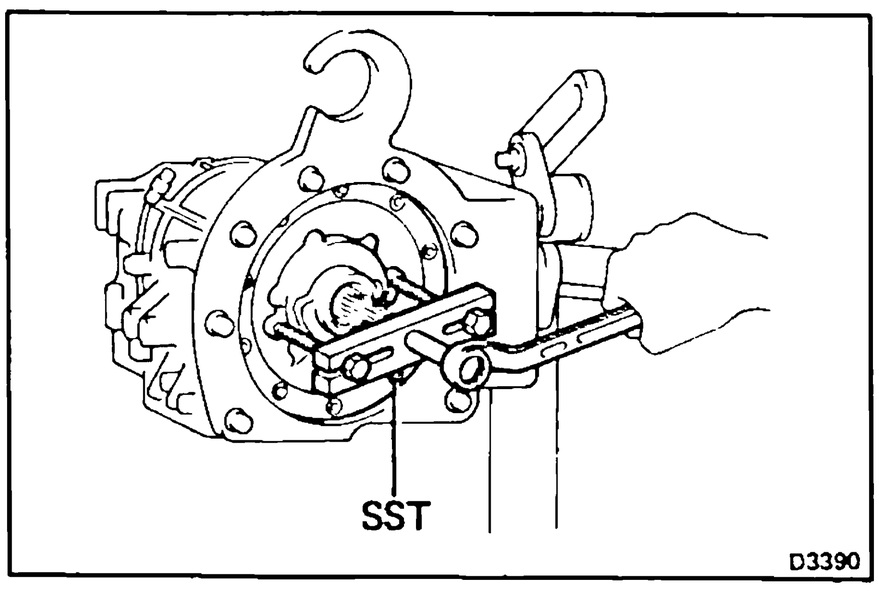
(c) Check that the thrust clearance of the input shaft is standard. If it exceeds the maximum, select a new race.

Standard clearance : 0.4 – 0.9 mm (0.016 – 0.035 in.)
Maximum clearance: 0.9 mm (0.035 in.)

Race thickness mm (in.)
0.8 (0.031)
1.0 (0.039)
1.4 (0.055)



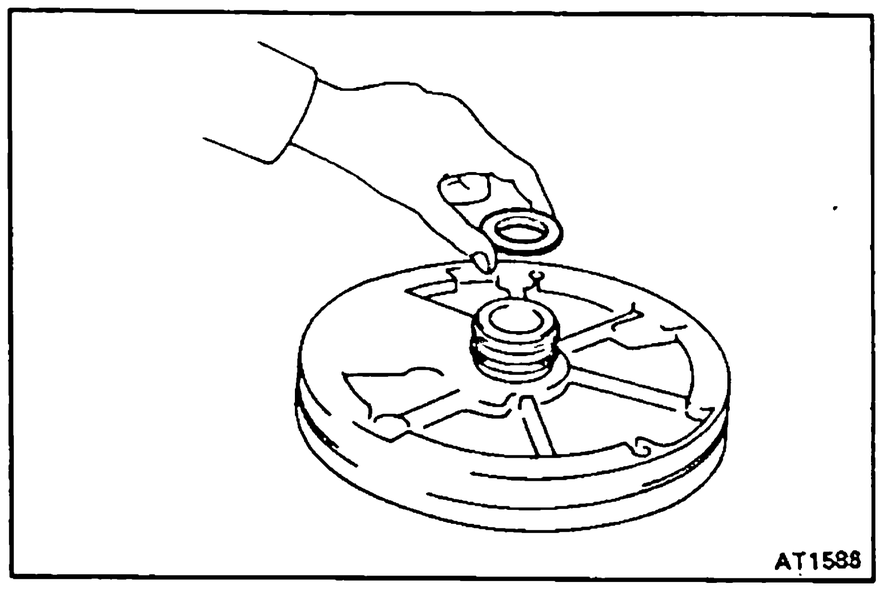
(d) Remove the oil pump set bolts.



(e) Remove the oil pump set bolt.

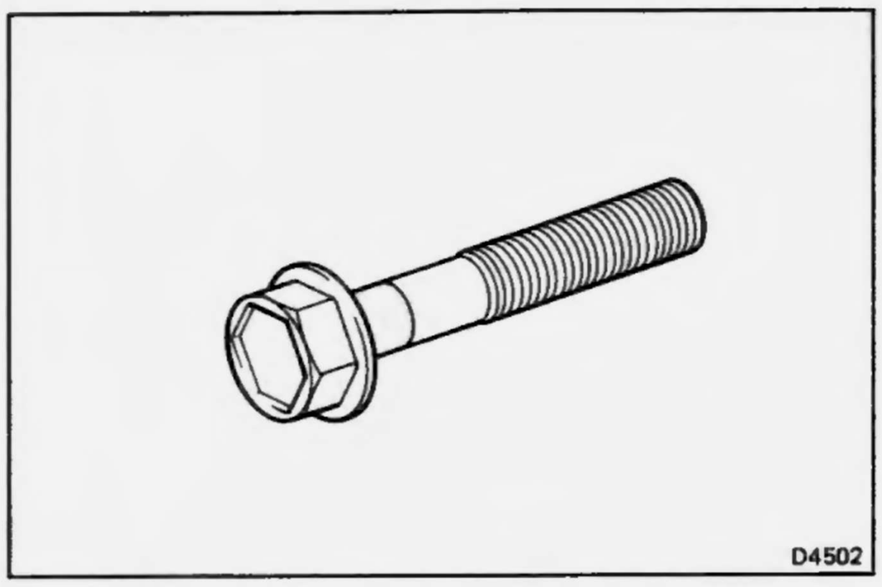
(f) Using SST, remove the oil pump assembly.

SST 09350-36010 (09350-06140)



(g) Coat a new O-ring with ATF and install it to the oil pump assembly.

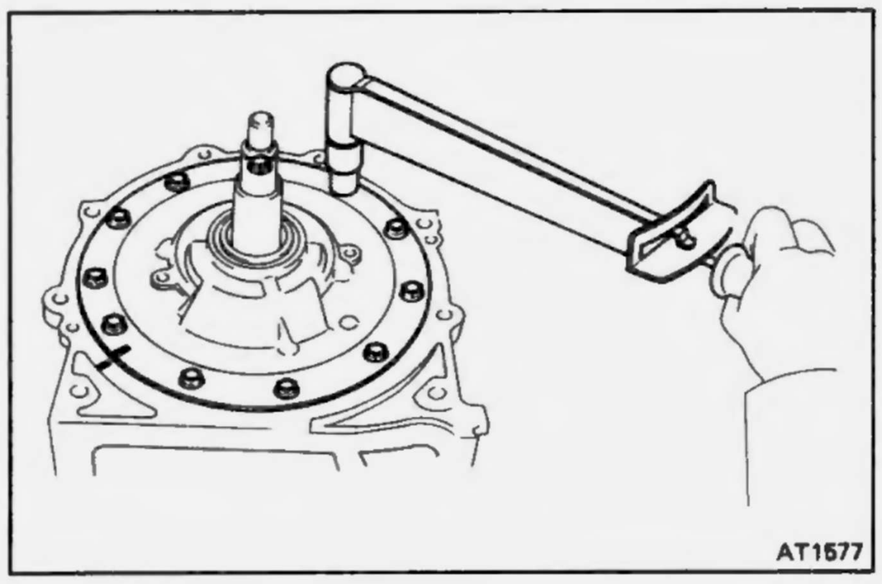
(h) Assemble bearing of step 35-(c) to the oil pump.


D4502

(i) Clean the threads of the bolts and case with white gasoline.

(j) Coat the threads of the bolts with sealer.

Sealer part LOCTITE 242


AT1577

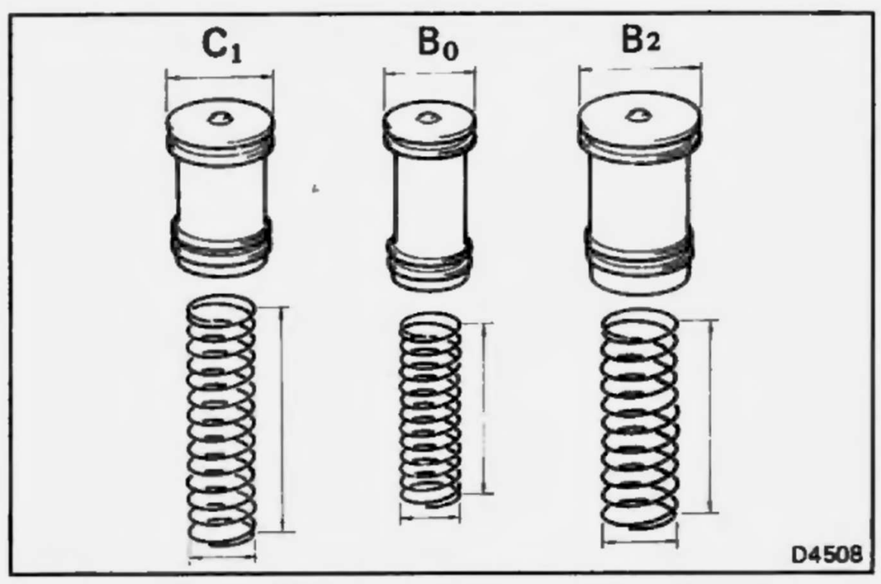
(k) Place a new gasket onto the transmission case.

(l) Align the matchmarks on the transmission case and oil pump body.

(m) Using a plastic hammer, tap the oil pump body and install the oil pump assembly to the transmission case.

(n) Tighten the set bolts gradually and evenly.

Torque: 210 kg-cm (18 ft-lb, 25 N·m)



D4508

36. INSTALL C_2, B_0, B_2 ACCUMULATOR PISTONS AND SPRINGS

(a) Coat the O-rings with ATF and install it to the piston.

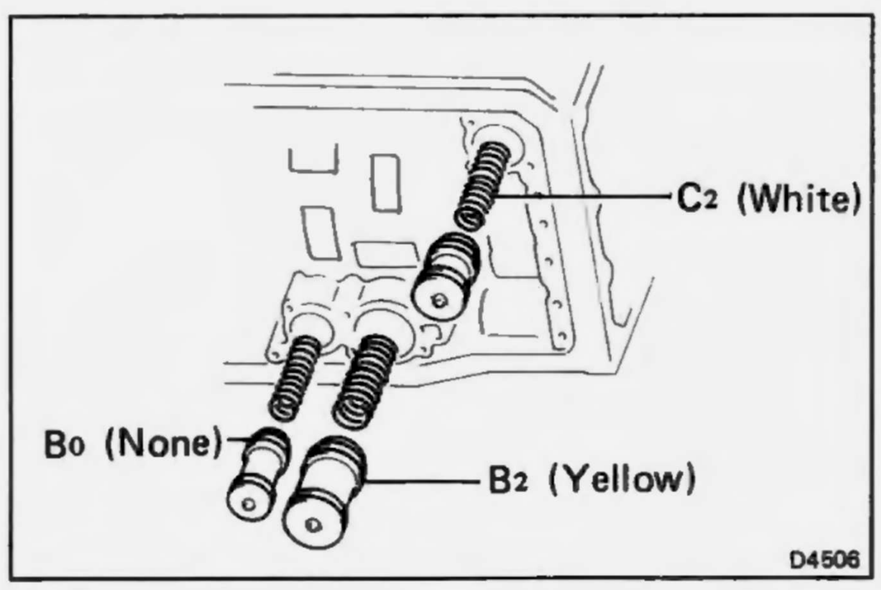
(b) Install the three springs and accumulator pistons to the transmission case.

Accumulator piston mm (in.)

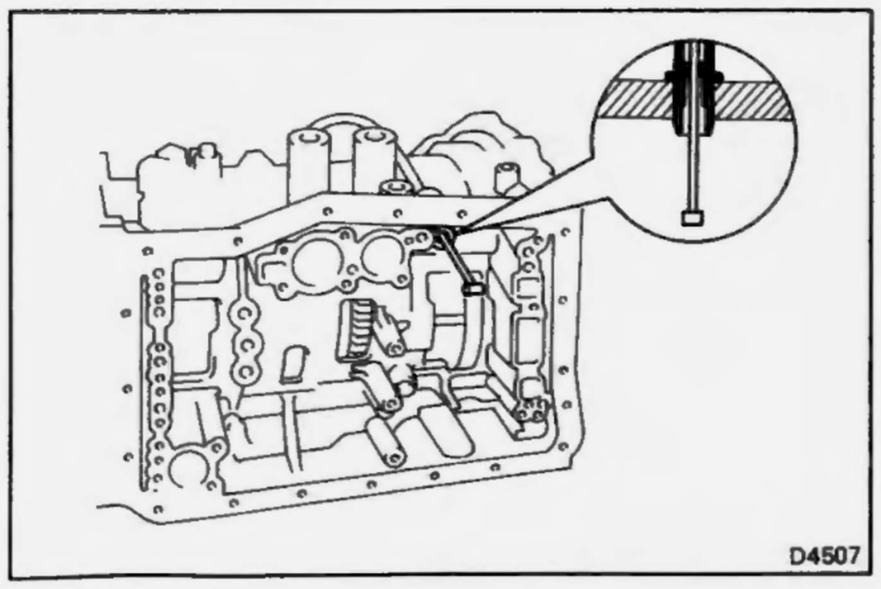
Piston	Outer diameter
C_2	35.87 (1.4122)
B_0	29.87 (1.1760)
B_2	39.87 (1.5697)

Spring mm (in.)

Spring		Color	Free length	Outer diameter
C_2		white	80.00 (3.1496)	21.80 (0.8583)
B_0	HJ	none	63.06 (2.4827)	20.70 (0.8150)
	FJ	none	64.09 (2.5232)	21.05 (0.8287)
B_2		yellow	65.00 (2.5591)	25.10 (0.9882)



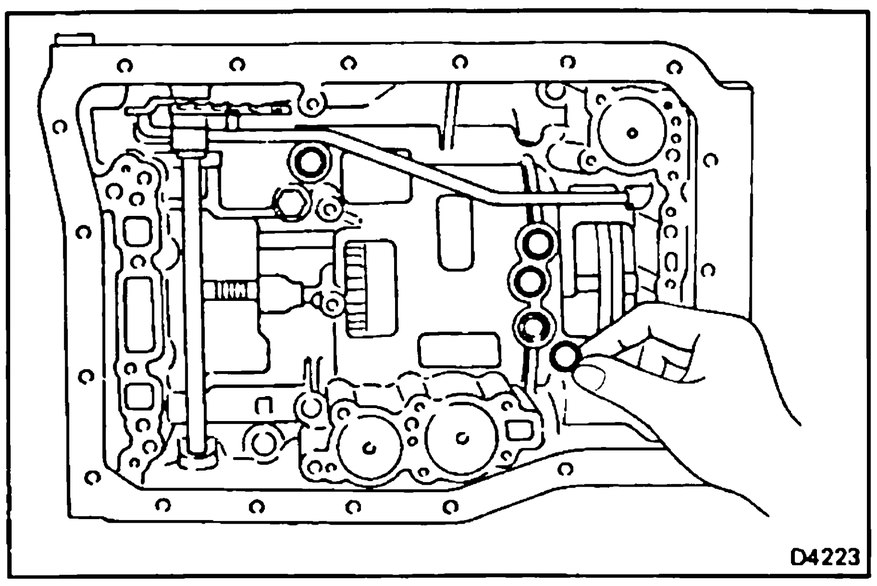
D4506


D4507

37. INSTALL THROTTLE CABLE

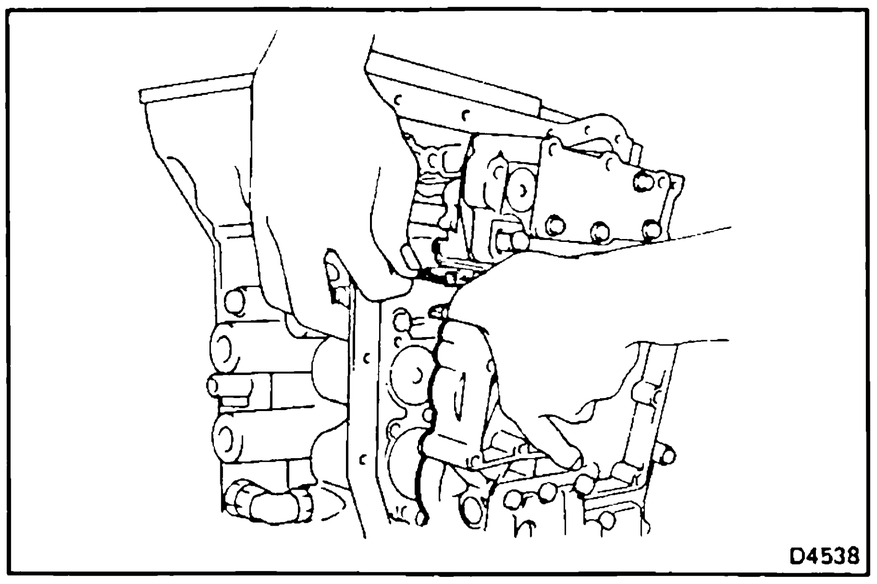
(a) Coat the O-ring with ATF and install it to the throttle cable.

(b) Push the cable through the transmission case, being careful not to damage the O-ring. Check for full seating.



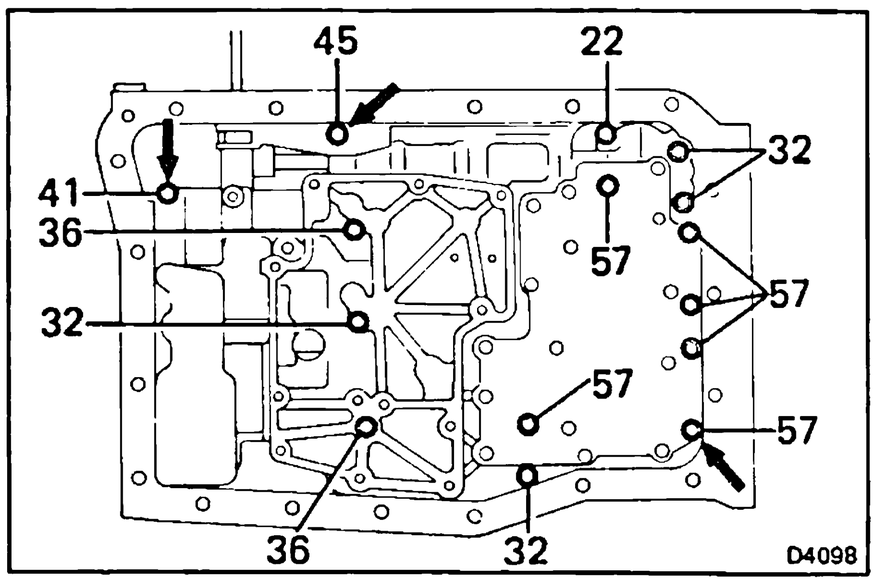
38. INSTALL FOUR TRANSMISSION APPLICATION GASKETS

Install the four transmission application gaskets facing the pitted side toward the transmission case.



39. CONNECT THROTTLE CABLE TO CAM

Push the cable fitting into the cam.



40. INSTALL VALVE BODY

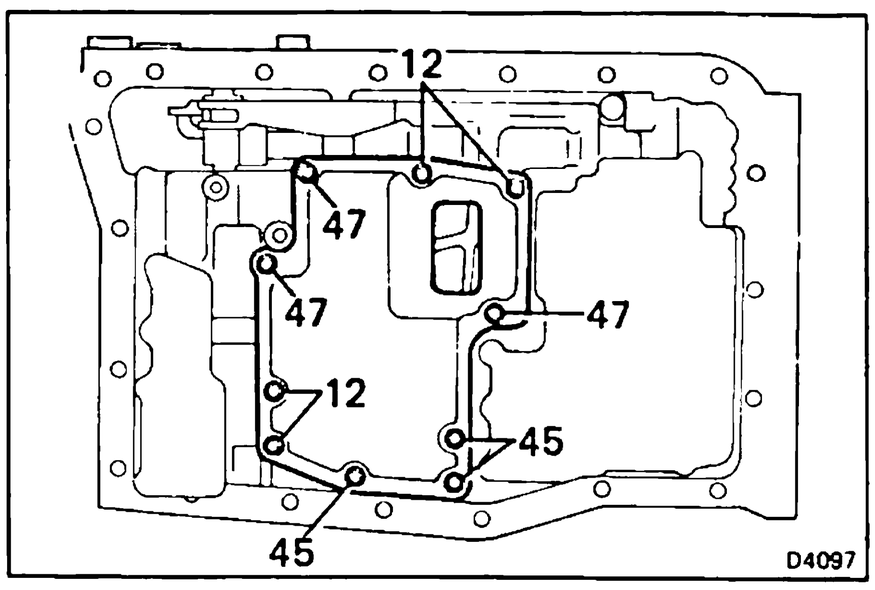
(a) Install the three bolts indicated by the arrows.

(b) Install the other bolts.

(c) Check that the manual valve lever contacts the center of the roller at the tip of the detent spring.

(d) Tighten the bolts.

Torque: 100 kg-cm (7 ft-lb, 10 N·m)

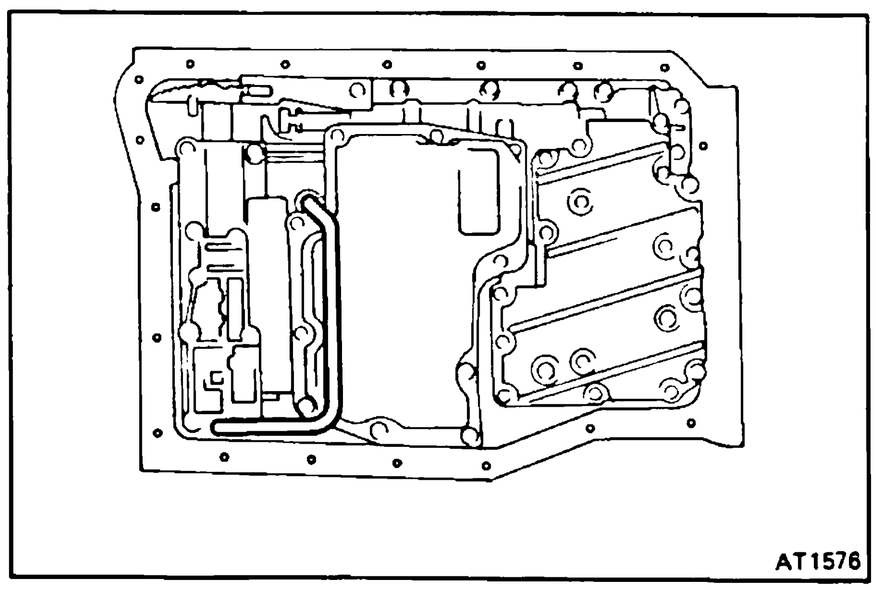


41. INSTALL OIL STRAINER AND BOLTS

(a) Place a new gasket on the valve body.

(b) Install the bolts as shown.

Torque: 5 mm 55 kg-cm (48 in.-lb, 5.4 N·m)
6 mm 100 kg-cm (7 ft-lb, 10 N·m)



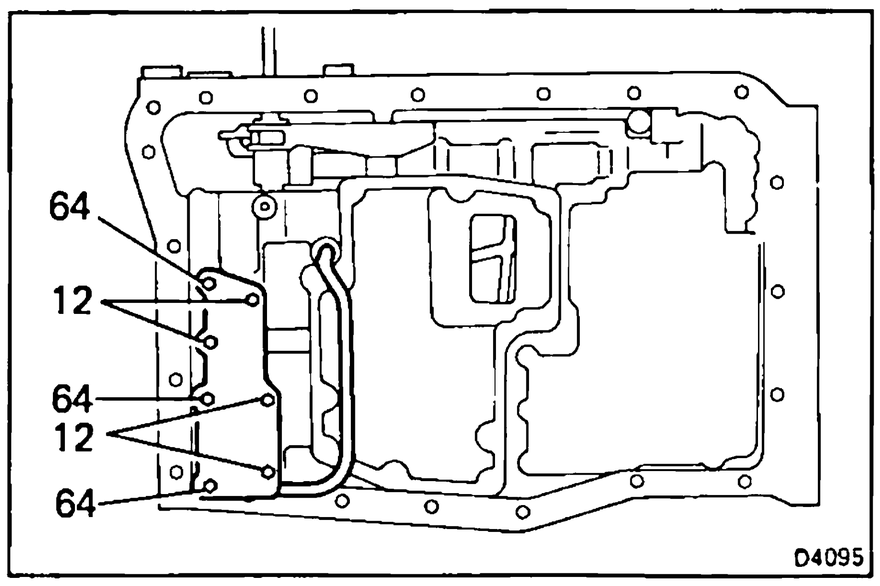
42. INSTALL OIL TUBE

(a) Remove the lock up relay valve body plate.

NOTE: Do not drop the lock up relay valve pins.

(b) Tap the tube with a plastic hammer to install it into the position indicated in the figure.

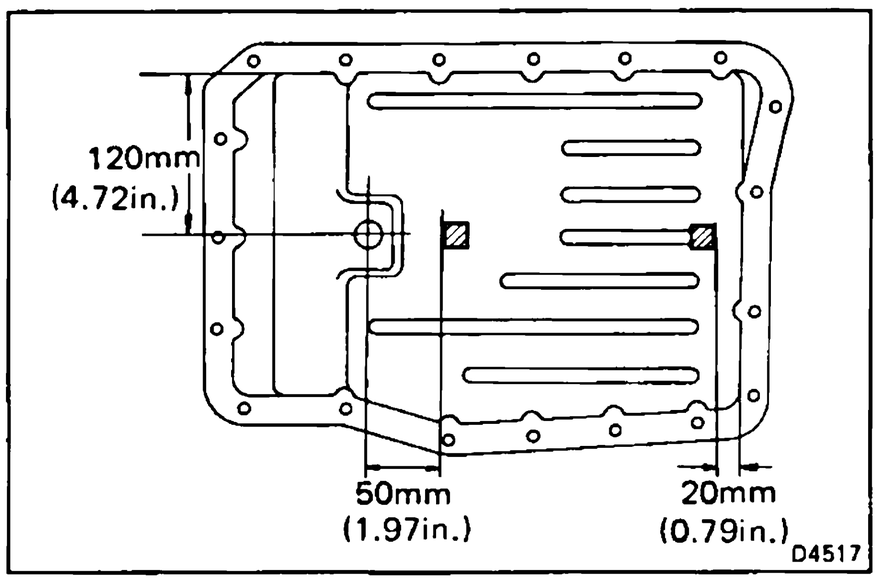
CAUTION: Be careful not to bend or damage the tube.



(c) Place a new gasket on the valve body.

(d) Install the lock up relay valve body plate and install the bolts.

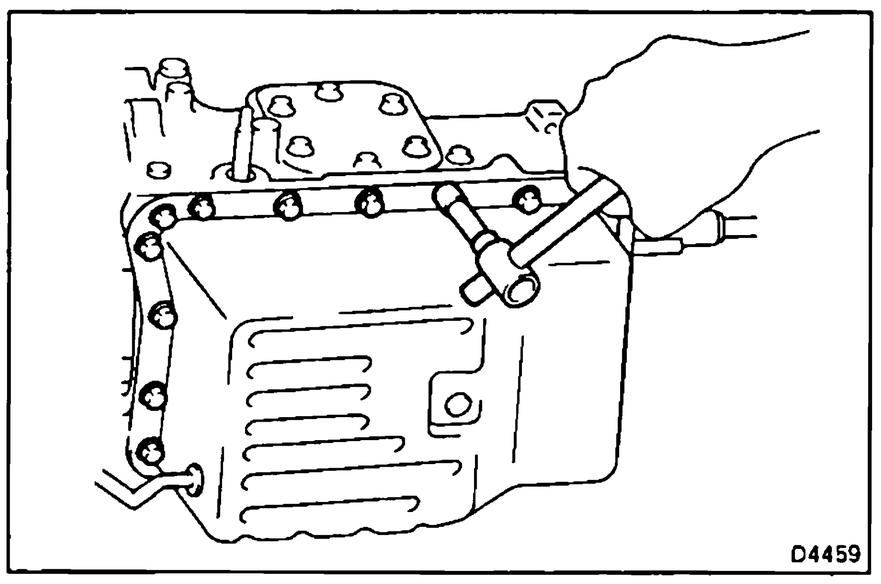
NOTE: Each bolts length (mm) is indicated in the figure.



43. INSTALL TWO MAGNETS IN PAN

Install two magnets as shown in the figure.

CAUTION: Make sure that the two magnets do not interfere with the oil tube.

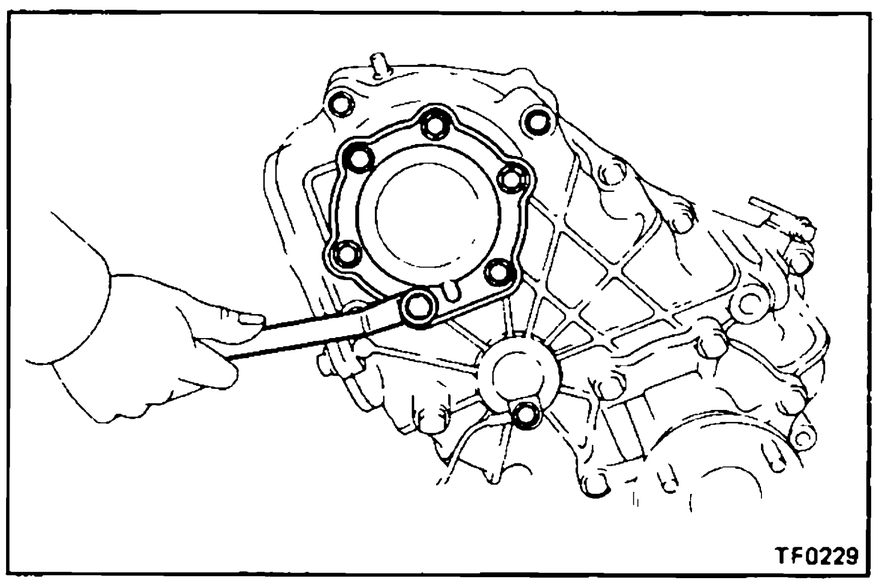


44. INSTALL PAN WITH NEW GASKET

(a) Place a new gasket on the transmission case.

(b) Tighten the twently bolts evenly.

Torque: 70 kg-cm (61 in.-lb, 6.9 N·m)



45. INSTALL TRANSFER NO. 2 CASE COVER

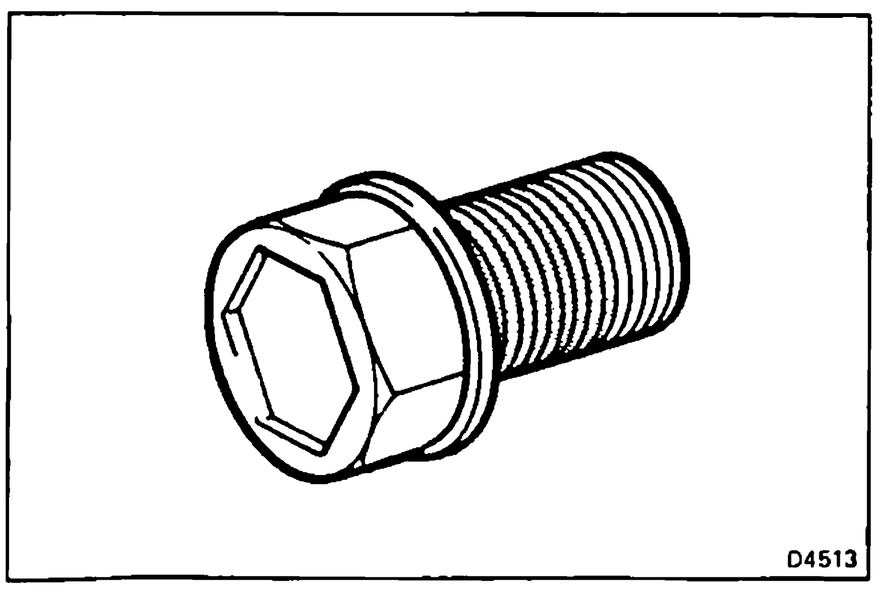
(a) Clean the threads of the bolts and case with white gasoline.

(b) Coat the threads of the bolts with sealer.

Sealer part No. 08833-00070 or THREE BOND 1324

(c) Install the transfer No. 2 case cover with a new gasket, and torque the six bolts.

Torque: 155 kg-cm (11 ft-lb, 15 N·m)

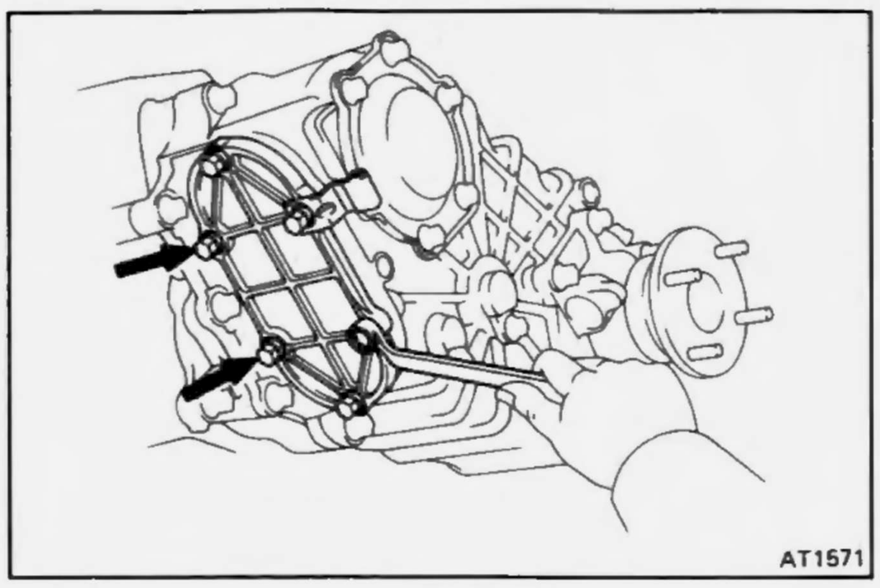


46. INSTALL POWER TAKE-OFF COVER

(a) Clean the threads of the two bolts and case with white gasoline.

(b) Coat the threads of the two bolts with sealer.

Sealer part No. 08833-00070 or THREE BOND 1324



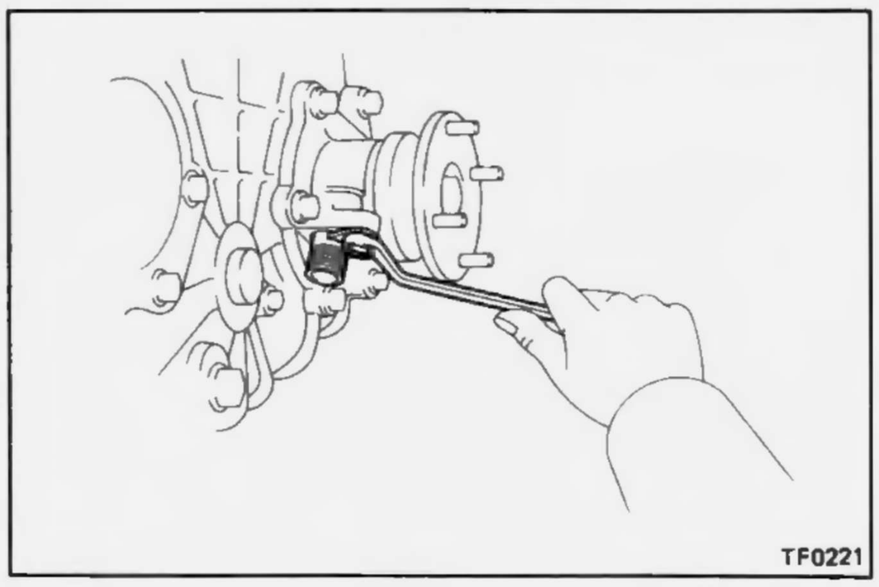
(c) Install the power take-off cover with a new gasket.

(d) Install and torque the two sealer coated bolts as shown in the figure.

Torque: 170 kg-cm (12 ft-lb, 17 N·m)

(e) Install and torque the other bolts.

Torque: 185 kg-cm (13 ft-lb, 18 N·m)

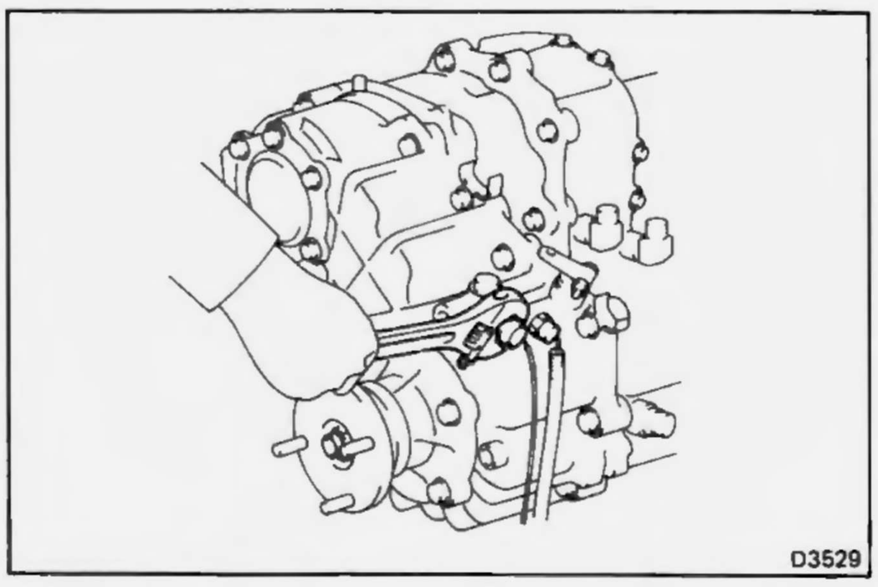


47. INSTALL SPEEDOMETER DRIVEN GEAR

(a) Coat the O-ring with gear oil and install it to the speedometer driven gear.

(b) Install the speedometer driven gear and lock plate, and torque the bolt.

Torque: 130 kg-cm (9 ft-lb, 13 N·m)



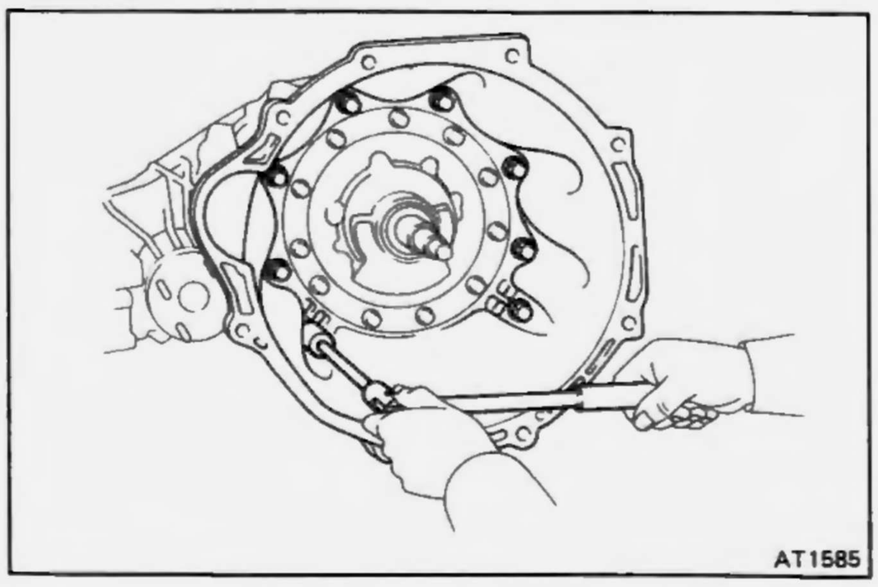
48. INSTALL TRANSFER NEUTRAL POSITION SWITCH AND TRANSFER L4 POSITION SWITCH

(a) Install the transfer L4 position switch.

Torque: 400 kg-cm (29 ft-lb, 39 N·m)

(b) Install the transfer neutral position switch.

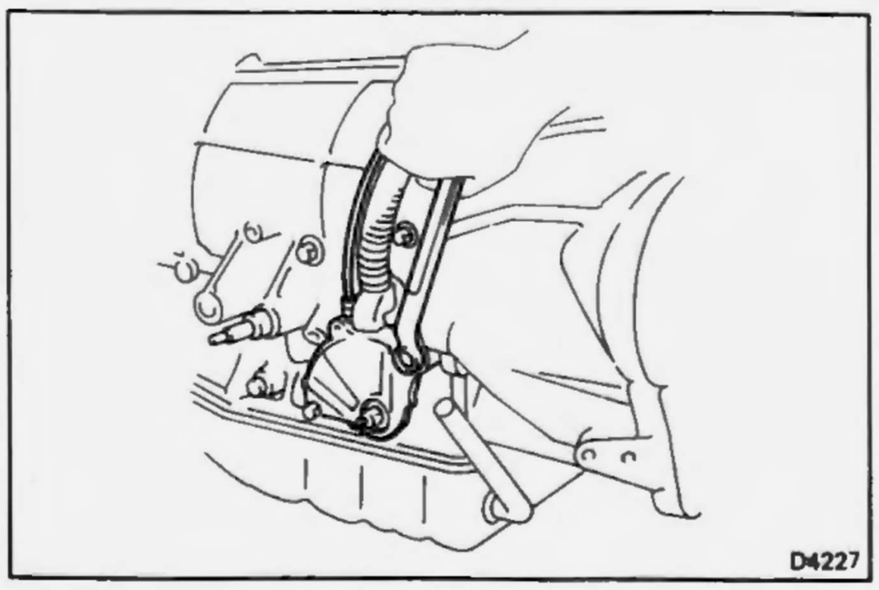
Torque: 400 kg-cm (29 ft-lb, 39 N·m)



49. INSTALL TRANSMISSION HOUSING

Install the transmission housing to the transmission case and torque the bolts.

Torque: 650 kg-cm (47 ft-lb, 64 N·m)



50. INSTALL NEUTRAL START SWITCH

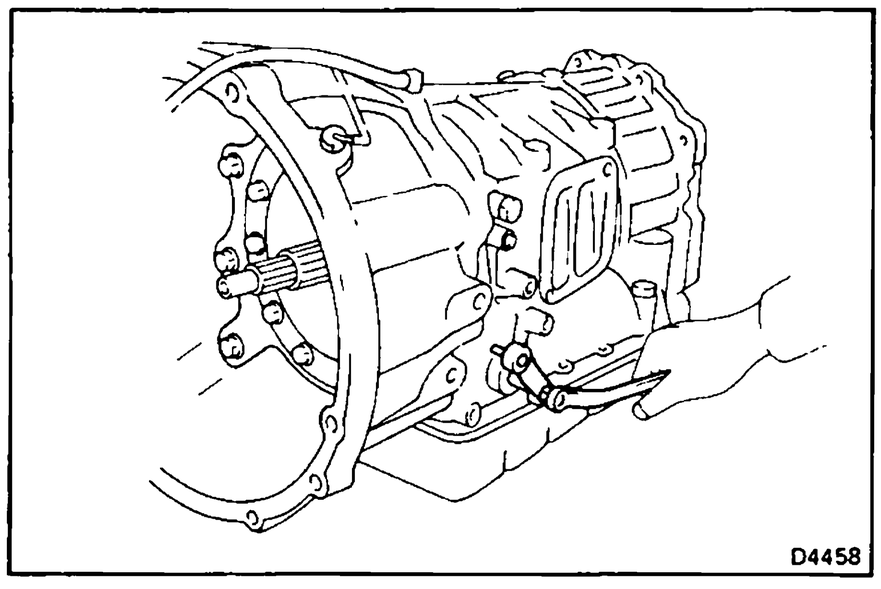
(a) Install the neutral start switch and torque the bolts.

Torque: 130 kg-cm (9 ft-lb, 13 N·m)

(b) Install the grommet and lock washer, and torque the nut.

Torque: 70 kg-cm (61 in.-lb, 6.9 N·m)

(c) Using a screwdriver, stake the lock washer.



51. INSTALL CONTROL SHAFT LEVER

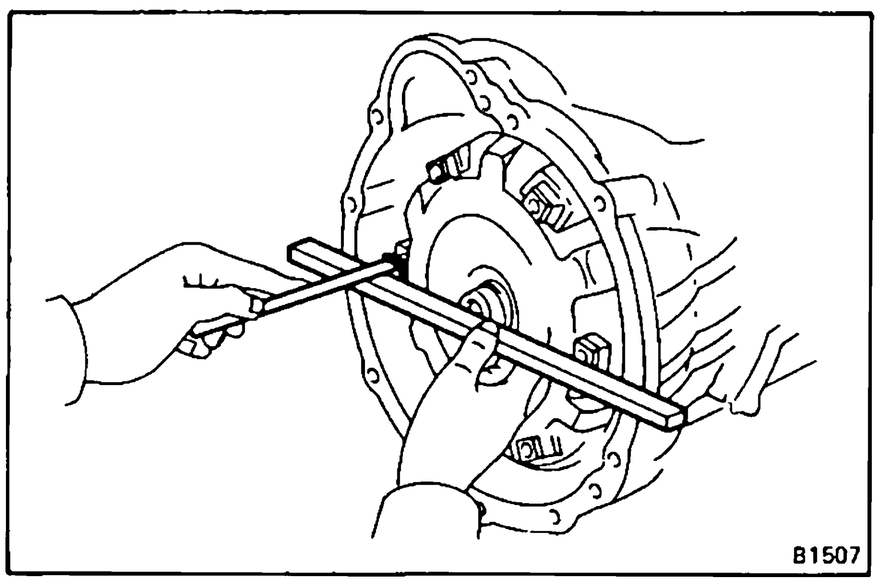
Install the control shaft lever with the two nuts.

Torque: 130 kg-cm (9 ft-lb, 13 N·m)

52. INSTALL TUBE AND OIL FILLER GAUGE

(a) Coat the O-ring with ATF and install it to the tube.

(b) Install the tube and oil filler gauge.



53. INSTALL TORQUE CONVERTER

54. CHECK TORQUE CONVERTER INSTALLATION

Using calipers and a straight edge, measure from the installed surface to the front surface of the transmission housing.

Correct distance:

3F engine 16.5 mm (0.650 in.) or more
2H engine 41.2 mm (1.622 in.) or more

CAUTION: Install the converter holizontaly to prevent oil seal from damage.

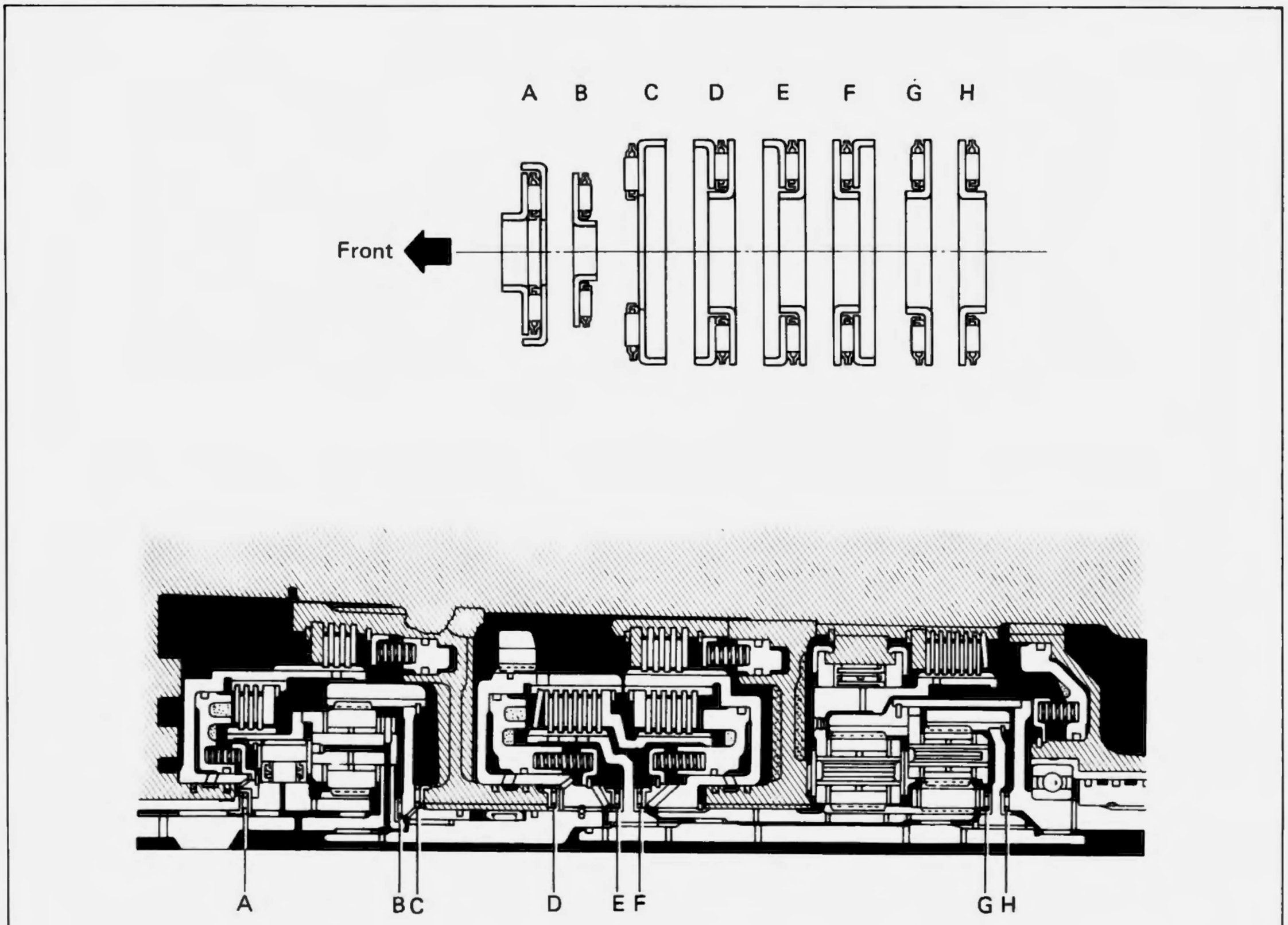
ASSEMBLY OF TRANSMISSION (A440L)

Disassembly, inspection and assembly of each component group has been indicated in the preceding chapter. Before assembly, make sure, all the component groups are assembled correctly.

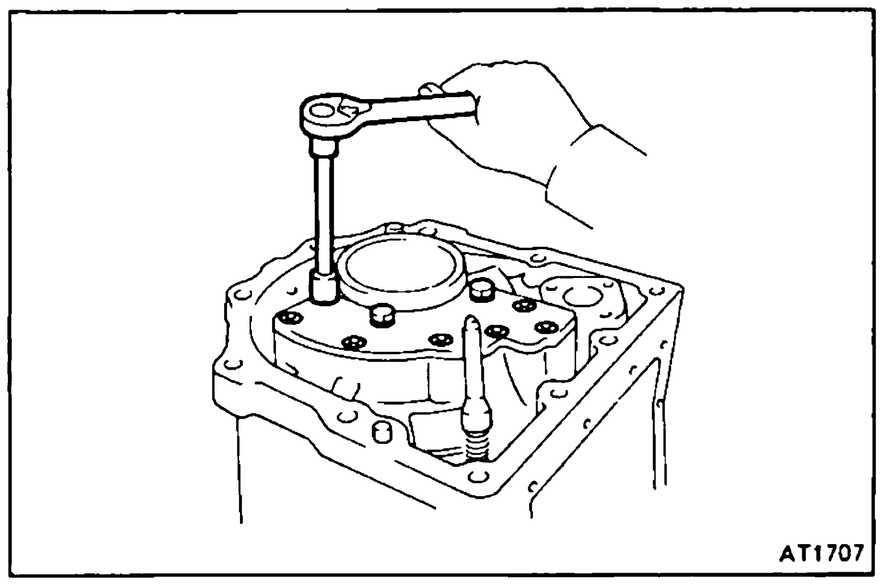
If something wrong is found in a certain component group during assembly, inspect and repair this group immediately. Recommended ATF: DEXRON® II.

GENERAL ASSEMBLY NOTES:

1. The automatic transmission is composed of highly precision-finished parts, necessitating careful inspection before assembly because even a small nick could cause fluid leakage or affect performance.
2. Before assembling new clutch discs, soak them in automatic transmission fluid for at least thirty minutes.
3. Apply automatic transmission fluid on the sliding or rotating surfaces of parts before assembly.
4. Use petroleum jelly to keep small parts in their places.
5. Do not use adhesive cements on gaskets and similar parts.
6. When assembling the transmission, be sure to use new gaskets and O-rings.
7. Dry all parts with compressed air – never use shop rags.
8. Be sure to install the thrust bearings and races in the correct direction and position.



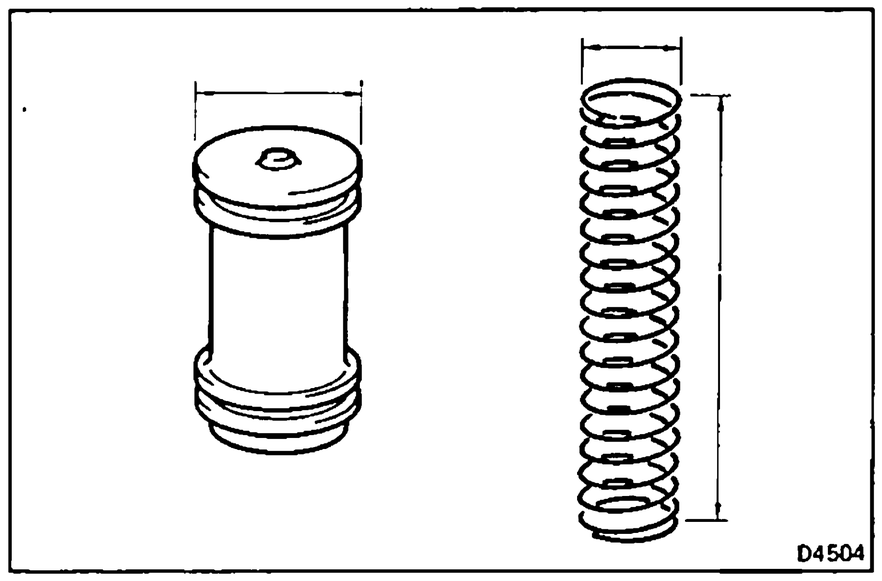
AT1700
AT1701



1. INSTALL TRANSMISSION REAR COVER

(a) Place a new gasket on the transmission case.

(b) Install the transmission rear cover and torque the four bolts and six screws.

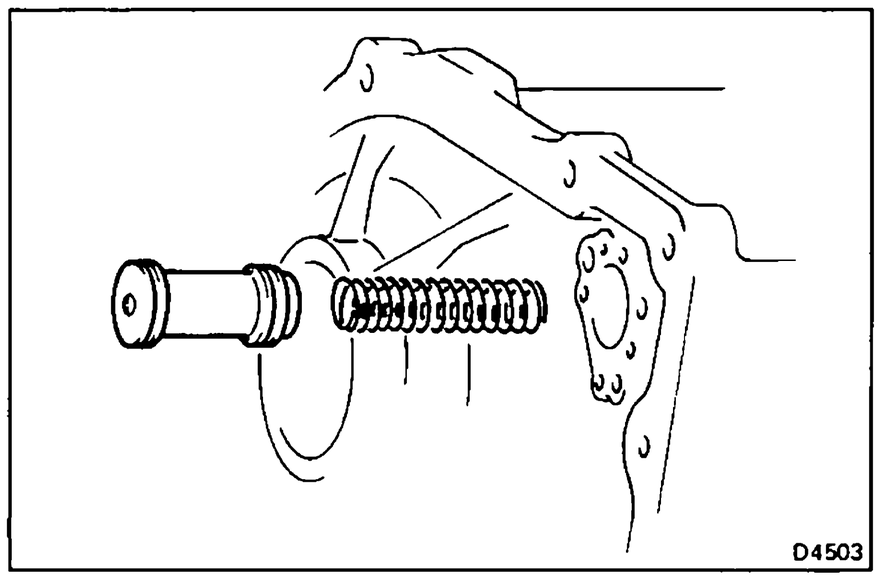


2. INSTALL C_1 ACCUMULATOR PISTON AND SPRING

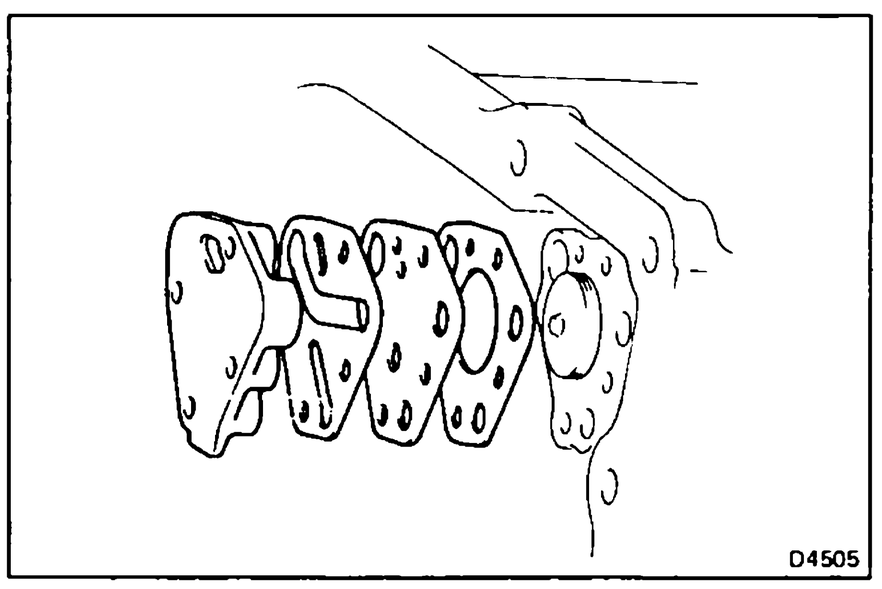
(a) Coat the O-rings with ATF and install it to the piston.

mm (in.)

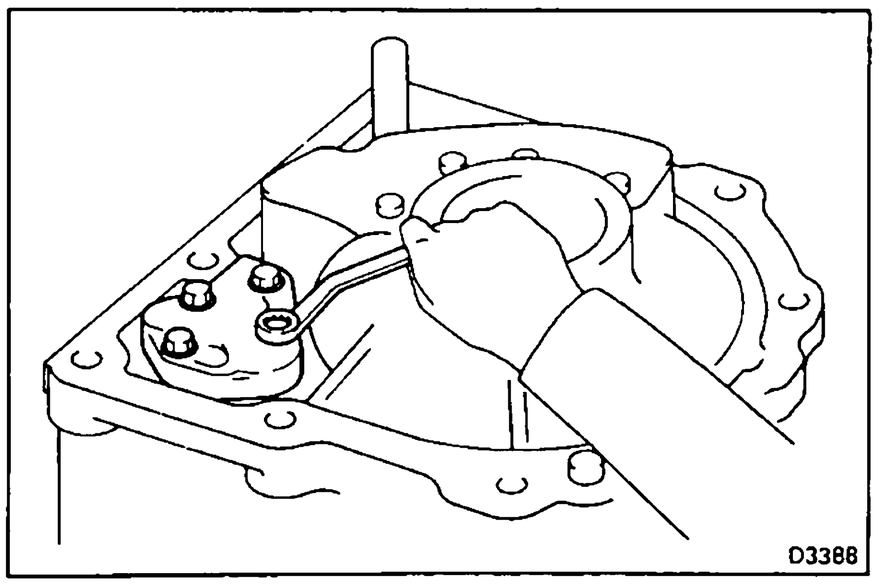
Piston diameter	Spring diameter	Spring free length
29.87 (1.1760)	17.92 (0.7055)	92.34 (3.6354)



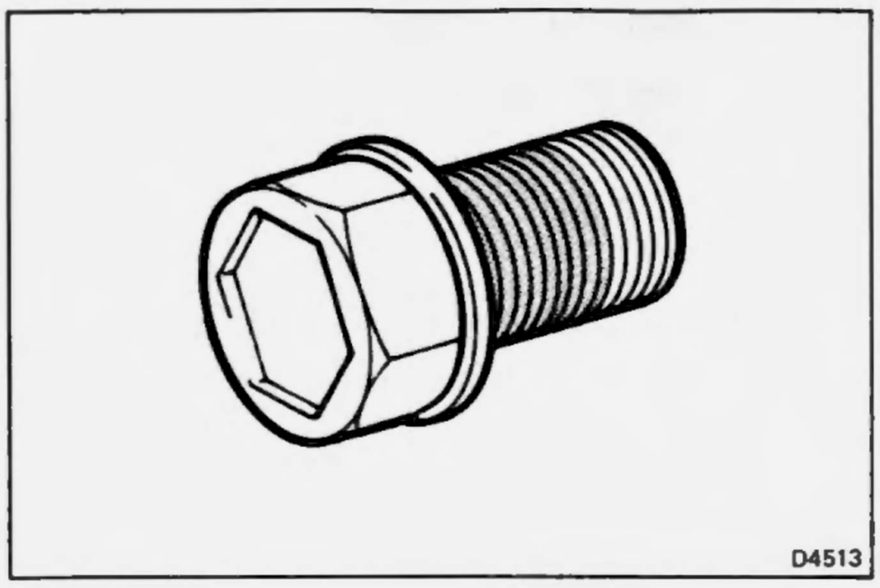
(b) Install the spring and piston for C_1.



(c) Place two new gaskets on the transmission case and plate as shown.



(d) Install the front clutch accumulator cover and torque the four bolts.

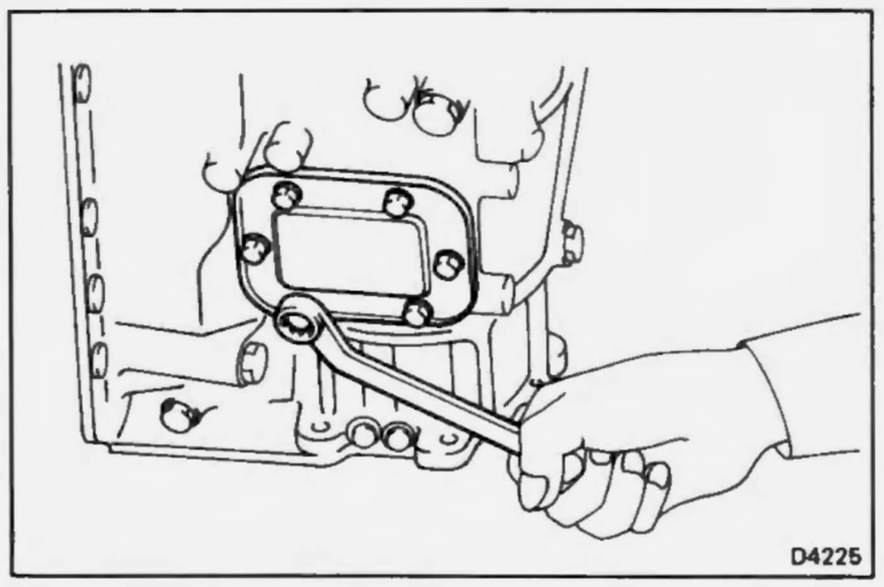

D4513

3. INSTALL POWER TAKE-OFF COVER

(a) Clean the threads of the bolts and case with white gasoline.

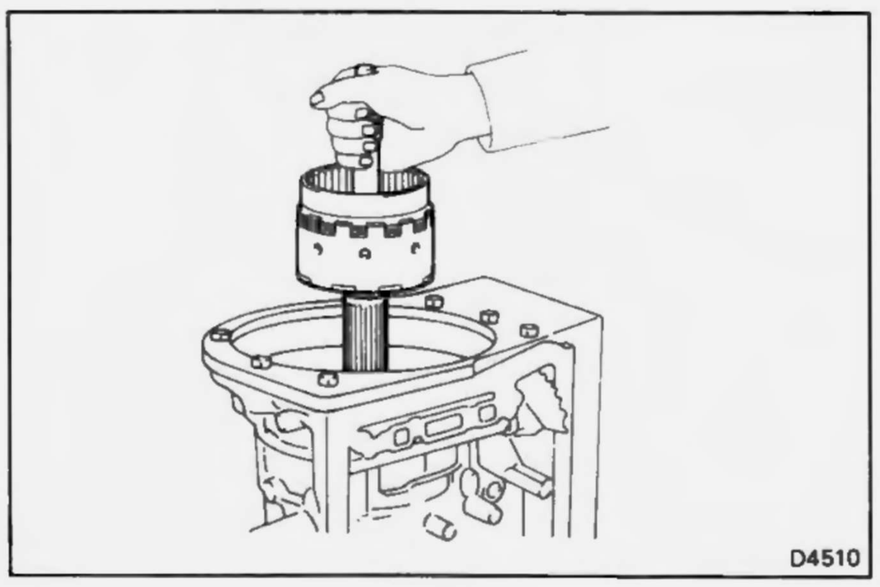
(b) Coat the threads of the bolts with sealer.

Sealer part LOCTITE 242


D4225

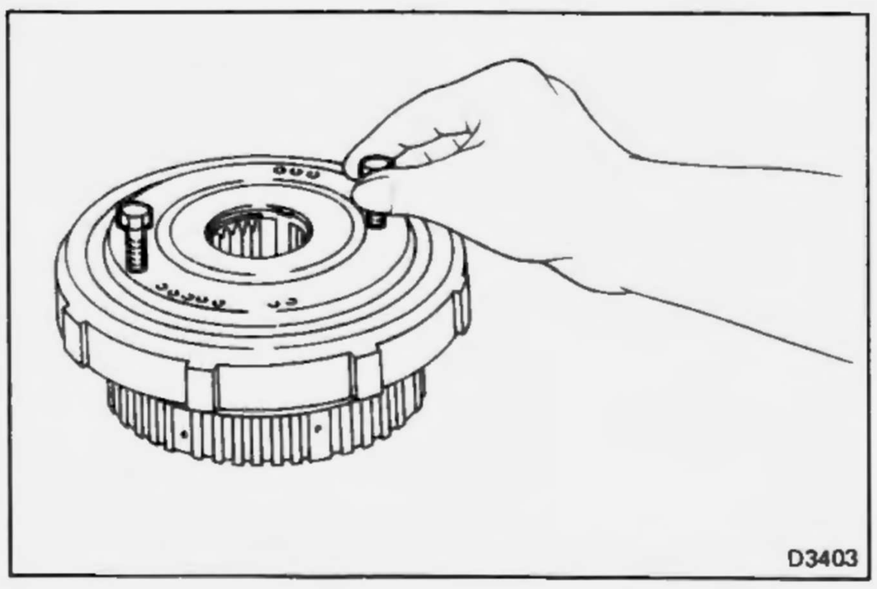
(c) Install the power take-off cover with a new gasket and torque the bolts.

Torque: 155 kg-cm (11 ft-lb, 15 N·m)


D4510

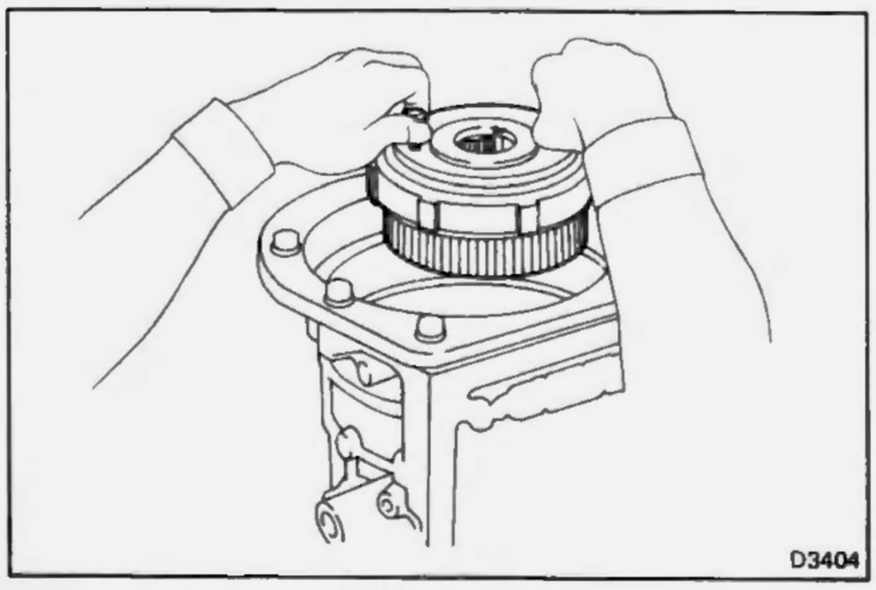
4. INSTALL PLANETARY GEAR AND OUTPUT SHAFT

(a) Install the planetary gear and output shaft to the transmission case.


D3403

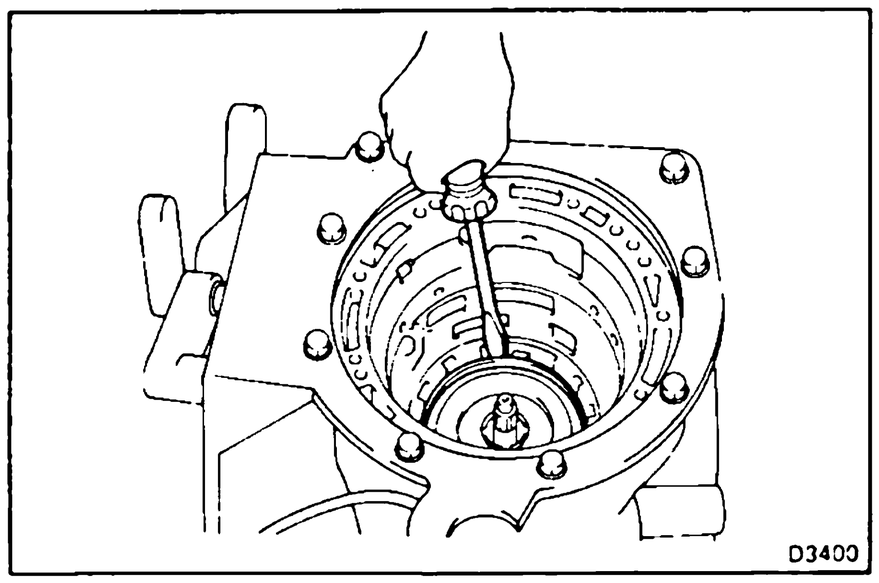
(b) Temporarily install the two bolts to the one-way clutch drum.

NOTE: Use two 6-mm (1 mm pitch) bolts. Do not tighten over 5 revolutions (5 mm).


D3404

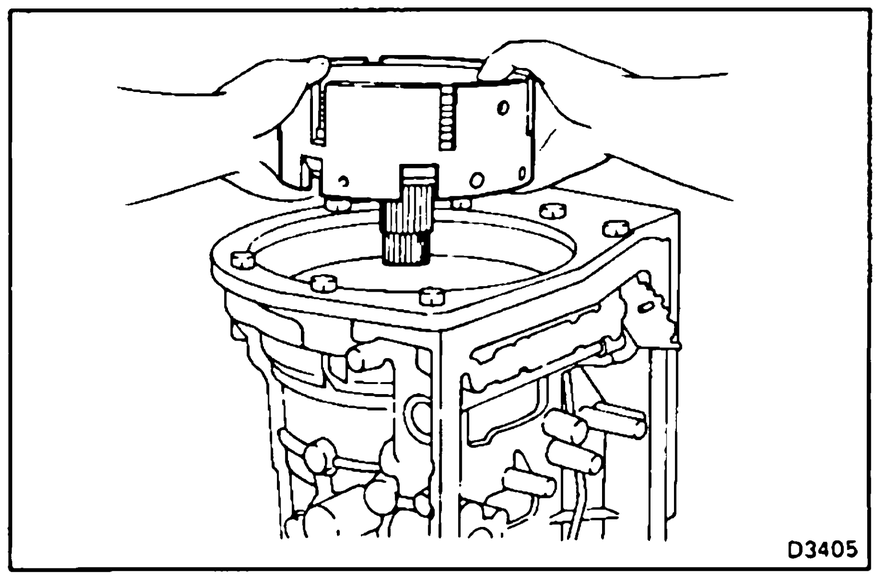
(c) Hold the drum by the bolts, and rotating it clockwise, install to the transmission case.

NOTE: If the one-way clutch drum will not rotate counterclockwise, check the installation of the one-way clutch.


D3400

(d) Using a screwdriver, install the snap ring.

NOTE: Be sure the end gap of the snap ring is not aligned with one of the cutouts.


D3405

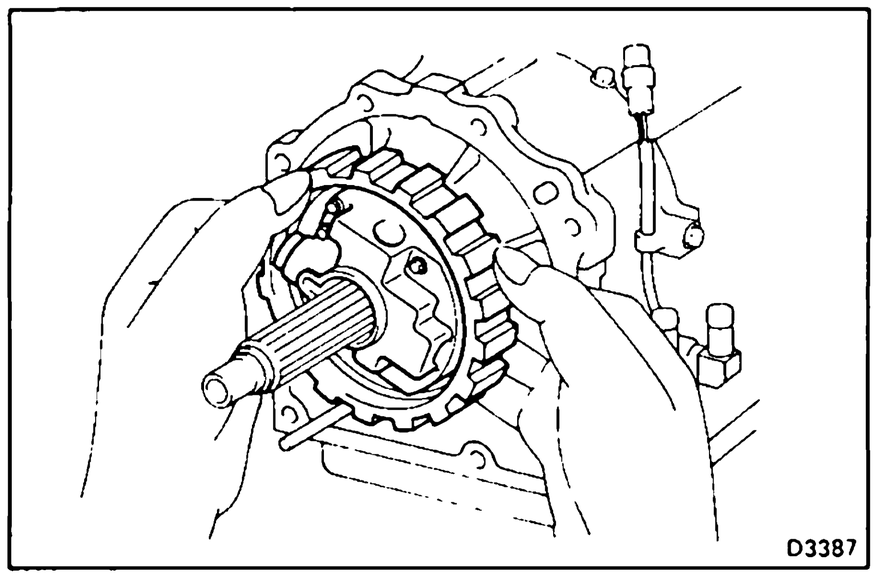
5. INSTALL CENTER SUPPORT

(a) Align the oil hole and bolt hole of the center support with those of the body side and insert the center support.

(b) Install and torque the three lock bolts.

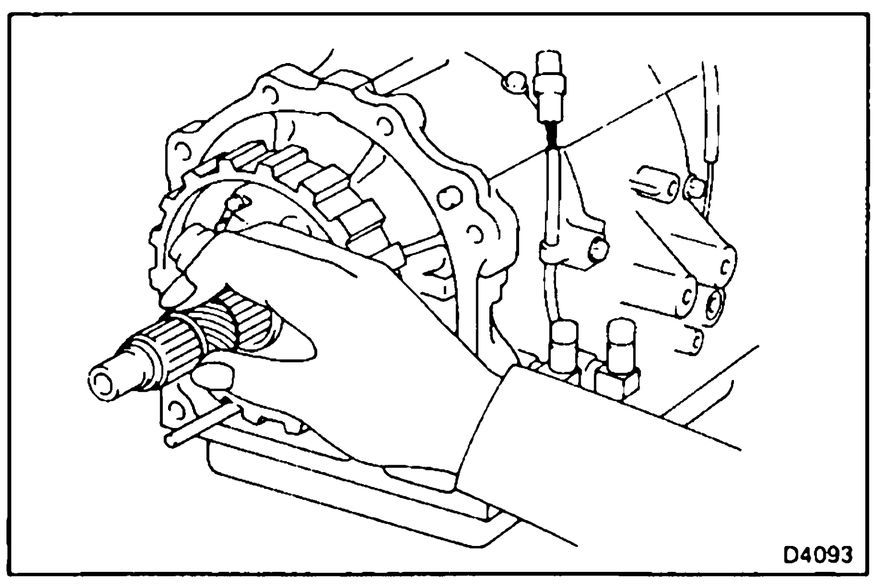
NOTE: Since the bolts are temporarily installed, do not coat with sealer.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)


D3387

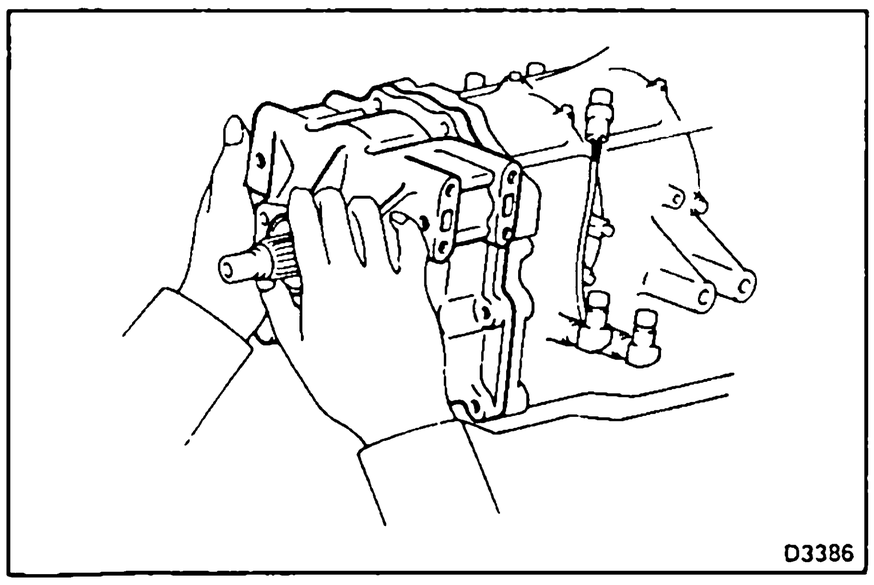
6. INSTALL GOVERNOR BODY

Install the governor body onto the output shaft.


D4093

7. INSTALL SPEEDOMETER DRIVE GEAR

Install the spacer and speedometer drive gear.

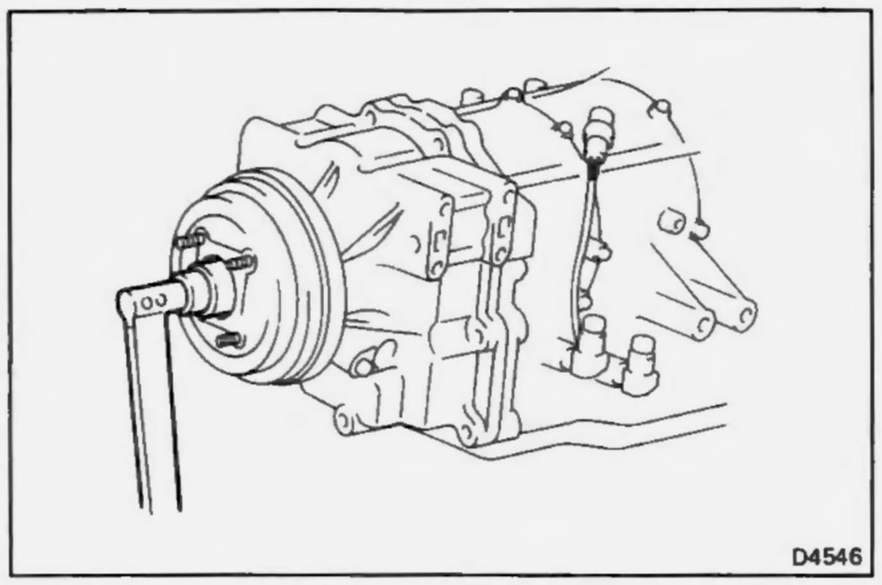

D3386

8. INSTALL EXTENSION HOUSING

(a) Install the extension housing with a new gasket.

(b) Install and torque the ten bolts.

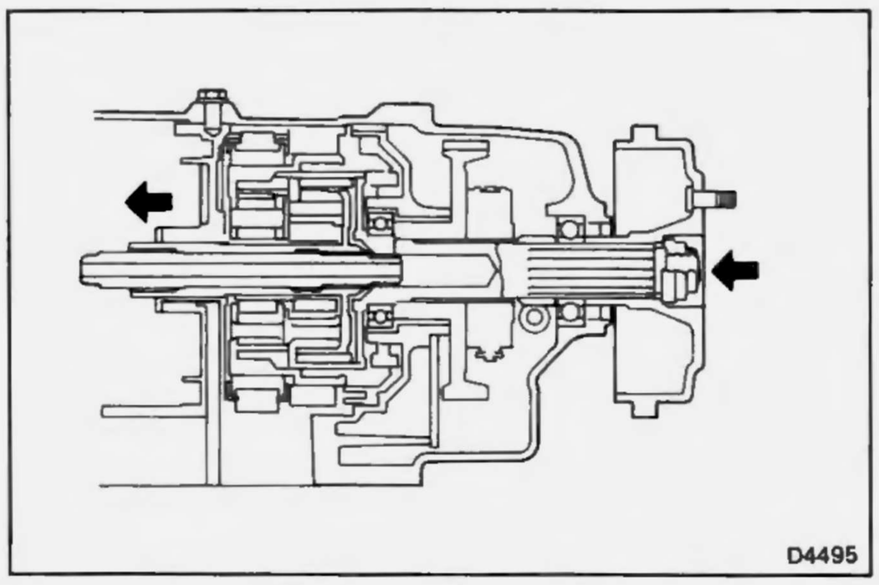
Torque: 380 kg-cm (27 ft-lb, 37 N·m)



9. INSTALL PARKING BRAKE DRUM

Temporarily install the parking brake drum and torque the nut.

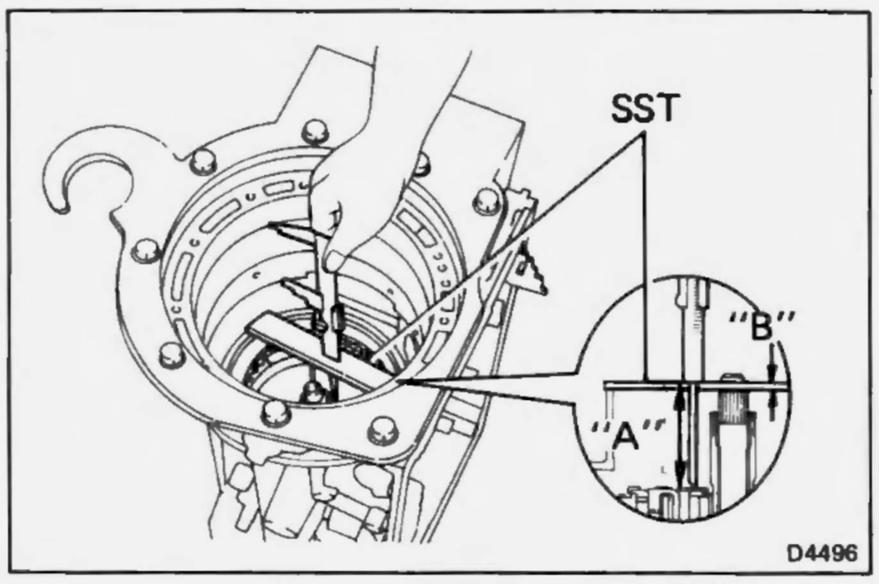
Torque: 1,300 kg-cm (94 ft-lb, 127 N·m)



10. ADJUST CENTER SUPPORT THRUST CLEARANCE

(a) Face the transmission output shaft toward the front of the transmission, and push in using 5–10 kg (11.0–22.0 lb, 49–98 N) of pressure.

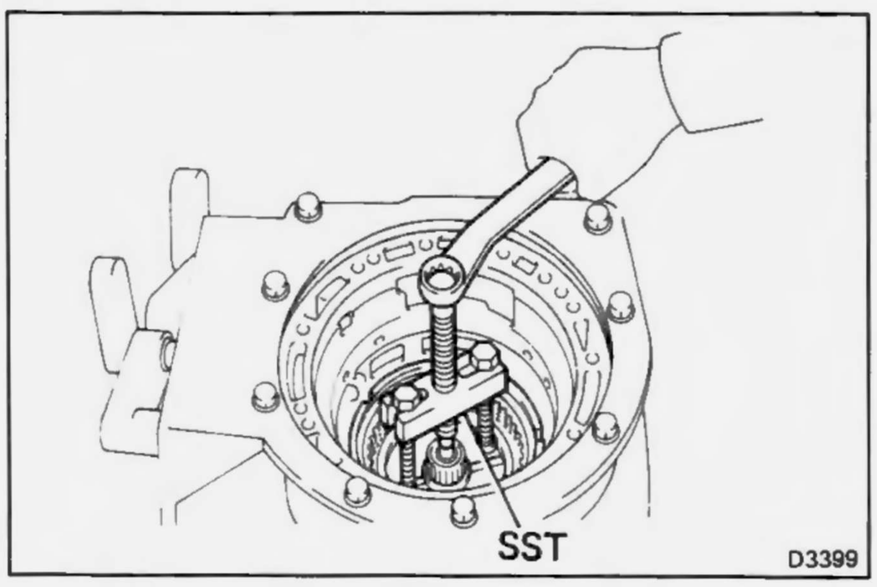
(b) Pull the center support toward the front of the transmission applying 5–10 kg (11.0–22.0 lb, 49–98 N) of pressure.



(c) Set SST on the center support as shown in the figure. Using calipers, measure the distance "A" between the top of SST and the clutch drum.

SST 09350-36010 (09350-06090)

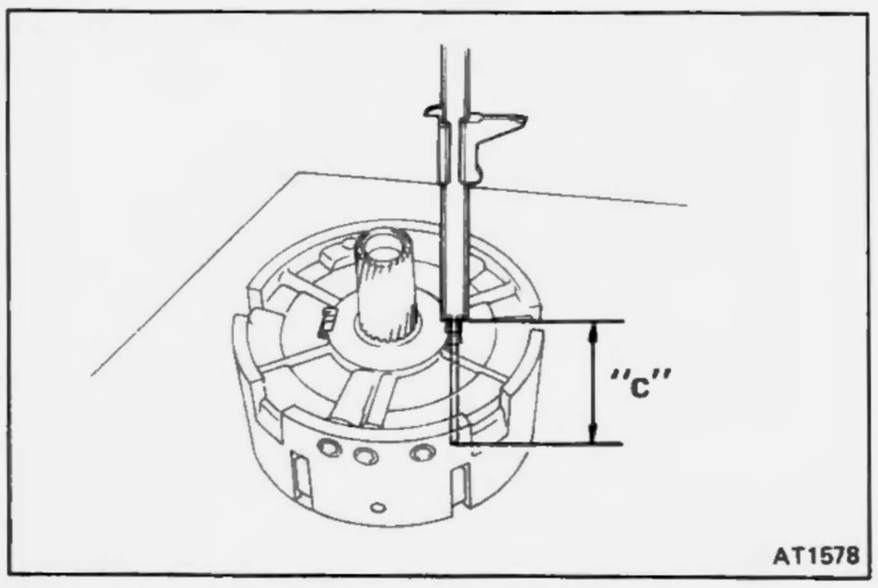
(d) Using calipers, measure the SST thickness "B."



(e) Remove the three center support bolts.

(f) Using SST, remove the center support.

SST 09350-36010 (09350-06140)

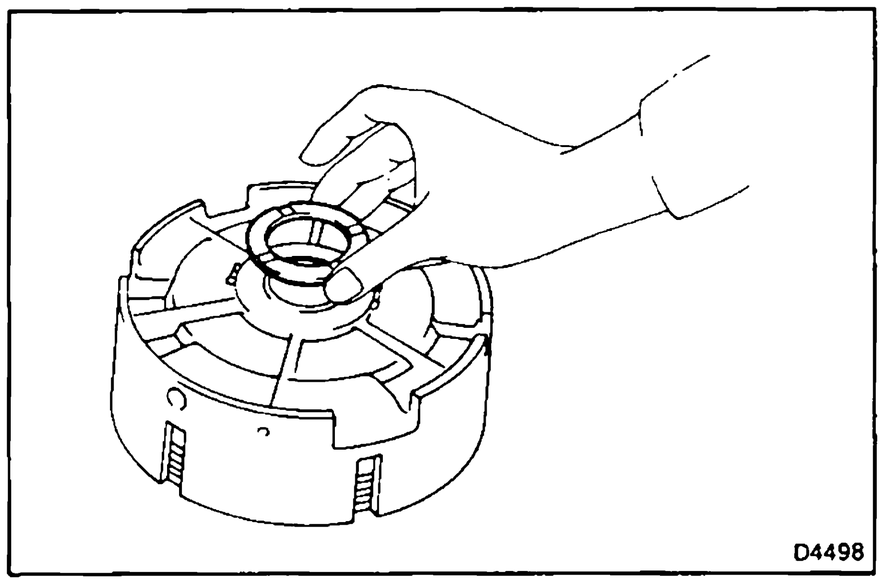


(g) Turn over the center support and plate it on a flat surface. Inserting calipers into the thrust washer hole and, measure the distance "C" between it and the surface.

Center support thrust clearance = A – (B + C)

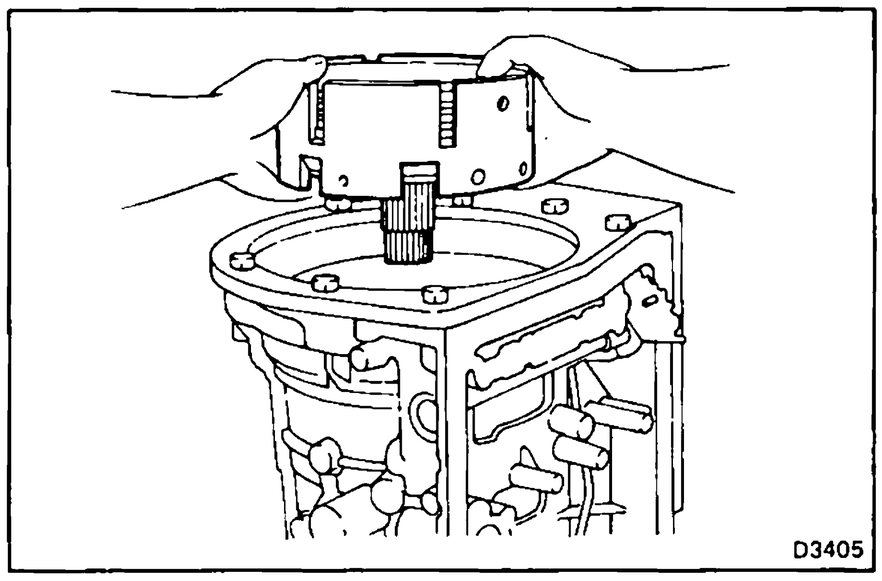
Standard clearance: 0.3 – 0.7 mm (0.012 – 0.028 in.)

Maximum clearance: 0.7 mm (0.028 in.)


D4498

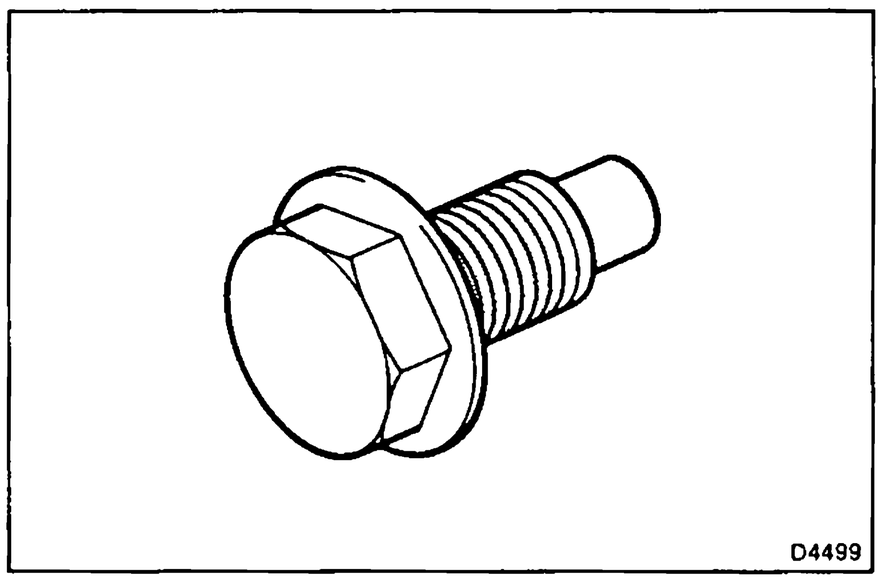
(h) Select a washer to bring the space between the center support and one-way clutch within standard.

Thrust washer thickness	mm (in.)
1.8	(0.071)
2.1	(0.083)
2.4	(0.094)
2.6	(0.102)


D3405

(i) Coat three new O-rings with ATF and install them to the center support.

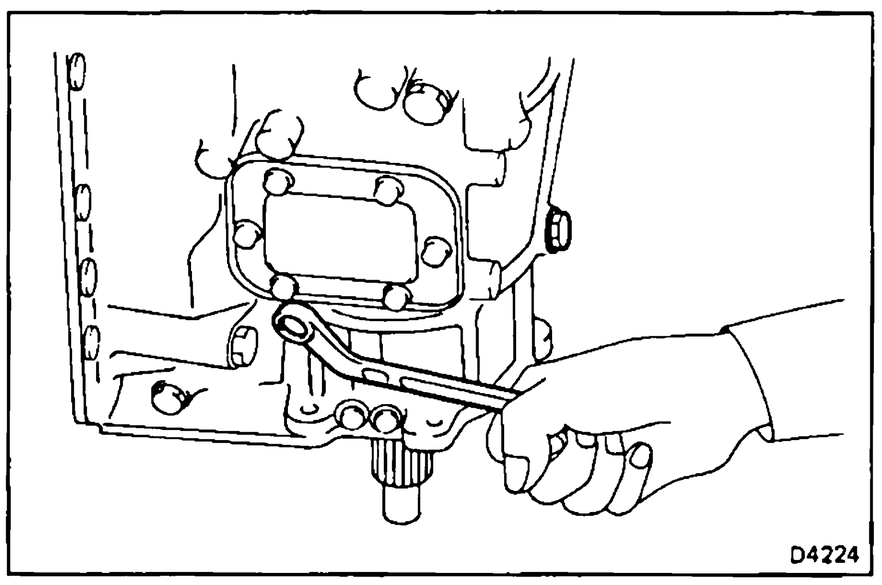
(j) Align the oil hole and bolt hole of the center support with those of the body side, and insert the center support.


D4499

(k) Clean the threads of the bolts and case with white gasoline.

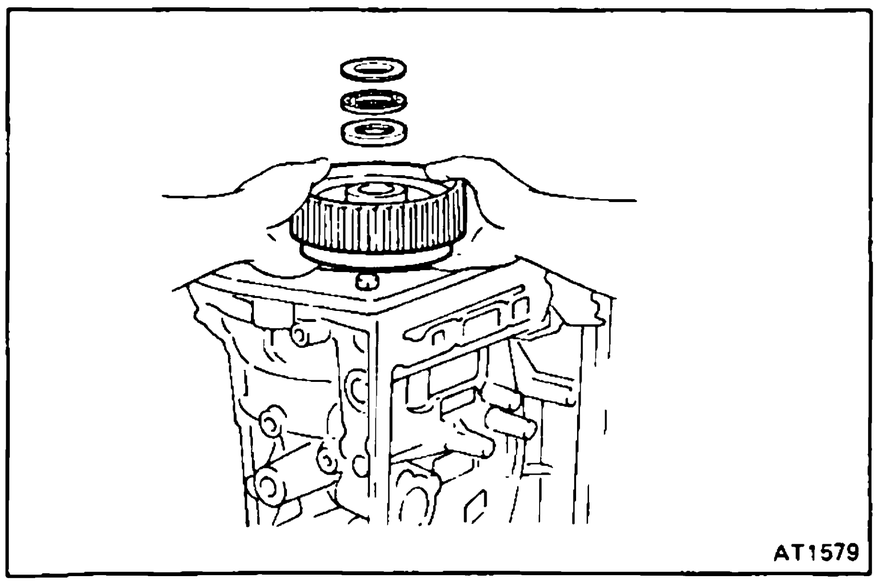
(l) Coat the threads of the bolts with sealer.

Sealer part LOCTITE 242


D4224

(m) Install and torque the center support lock bolts.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)


AT1579

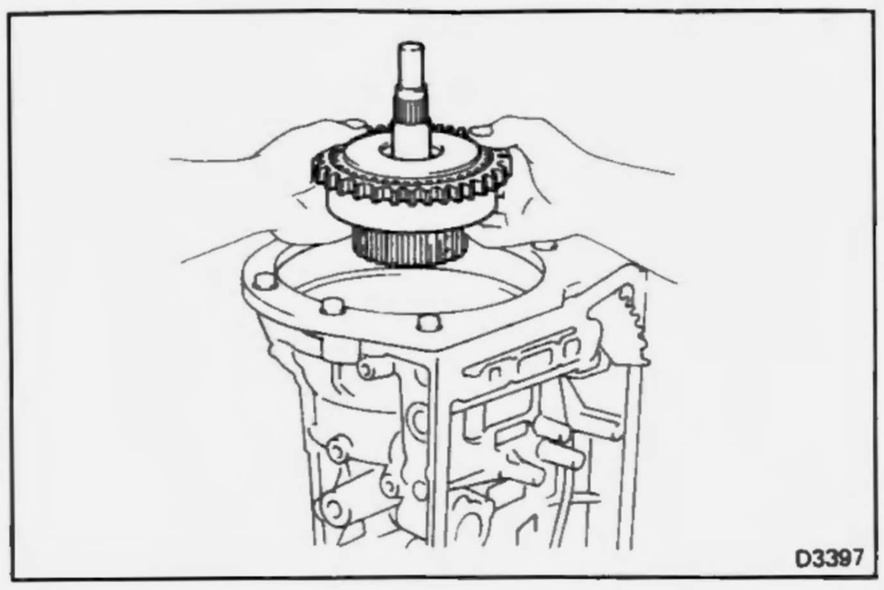
11. INSTALL REAR CLUTCH ASSEMBLY IN CASE

(a) Align flukes of the clutch disc and mesh them with the rear clutch. Push the rear clutch assembly into the case.

(b) Install the thrust bearing and two races on rear clutch.

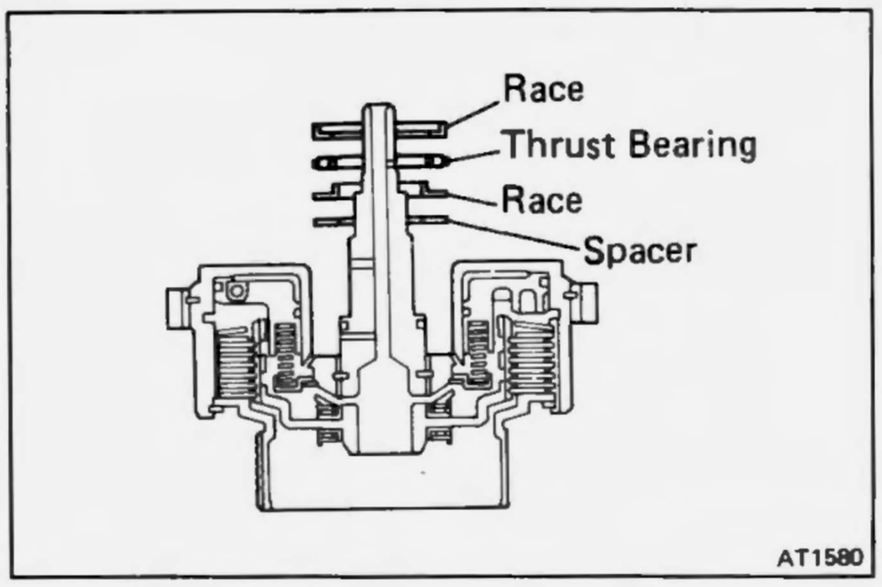
mm (in.)

	Outer diameter	Inner diameter
Upper race	50.4 (1.984)	32.8 (1.291)
Lower race	52.0 (2.047)	37.0 (1.457)
Thrust bearing	52.0 (2.047)	34.7 (1.366)



12. INSTALL FRONT CLUTCH ASSEMBLY

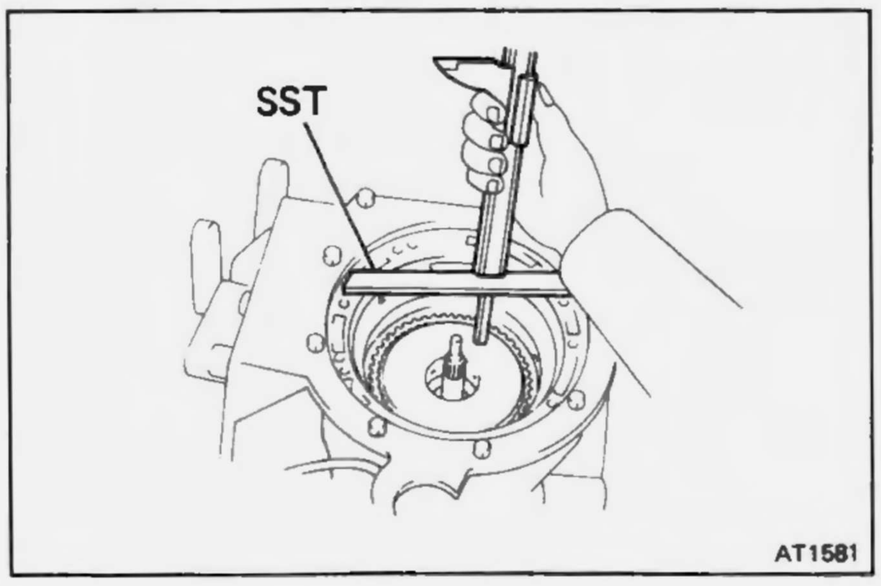
Align flukes of the rear clutch disc and mesh them with the front clutch hub. Push the front clutch assembly into the case.



13. INSTALL THRUST BEARING AND RACES

mm (in.)

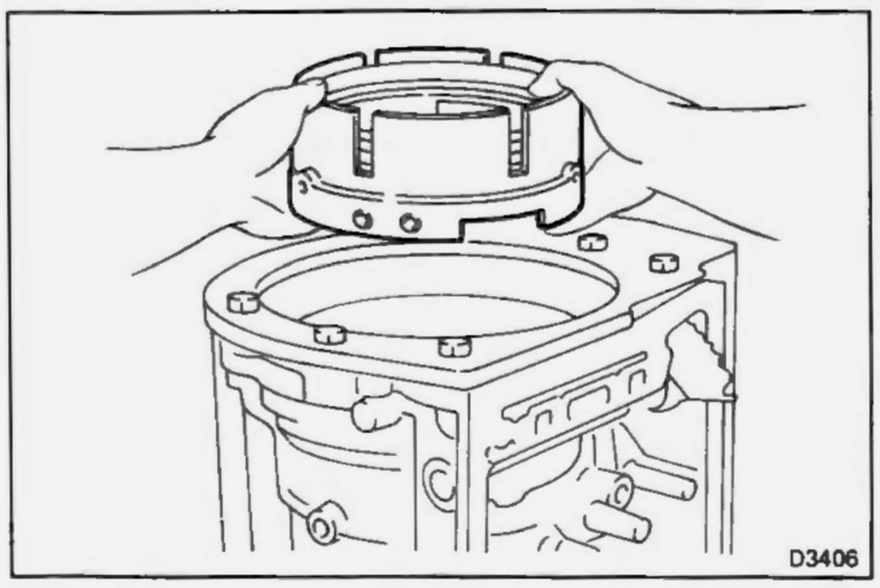
	Outer diameter	Inner diameter
Upper race	52.0 (2.047)	37.0 (1.457)
Lower race	50.4 (1.984)	32.8 (1.291)
Thrust bearing	52.0 (2.047)	34.7 (1.366)



14. CHECK CORRECT INSTALLATION OF FRONT CLUTCH

Set SST on the transmission case as shown in the figure. Measure the distance between the top surface of SST and front clutch assembly. If the distance corresponds to that during disassembly, the front clutch is installed correctly.

SST 09350-36010 (09350-06090)



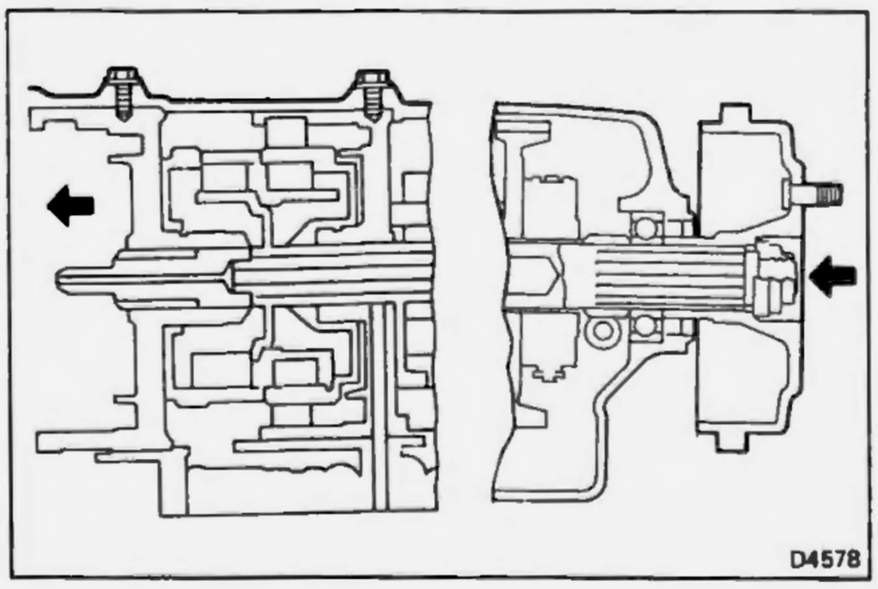
15. INSTALL OVERDRIVE SUPPORT

(a) Align the oil hole and bolt hole of the overdrive support with those of the body side, and install the overdrive support.

(b) Install and torque the three lock bolts.

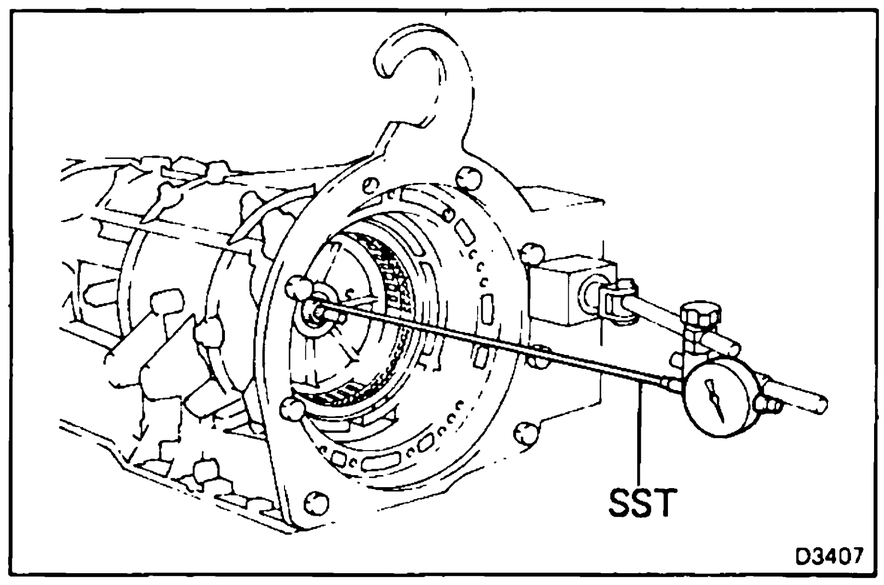
NOTE: Since the bolts are temporarily installed, do not coat sealer.

Torque: 250 kg-cm (18 ft-lb, 25 N·m)



(c) Face the transmission output shaft toward the front of the transmission, and push in using 5–10 kg (11.0 –22.0 lb, 49–98 N) of pressure.

(d) Pull the overdrive support toward the front of the transmission applying 5–10 kg (11.0–22.0 lb, 49–98 N) of pressure.



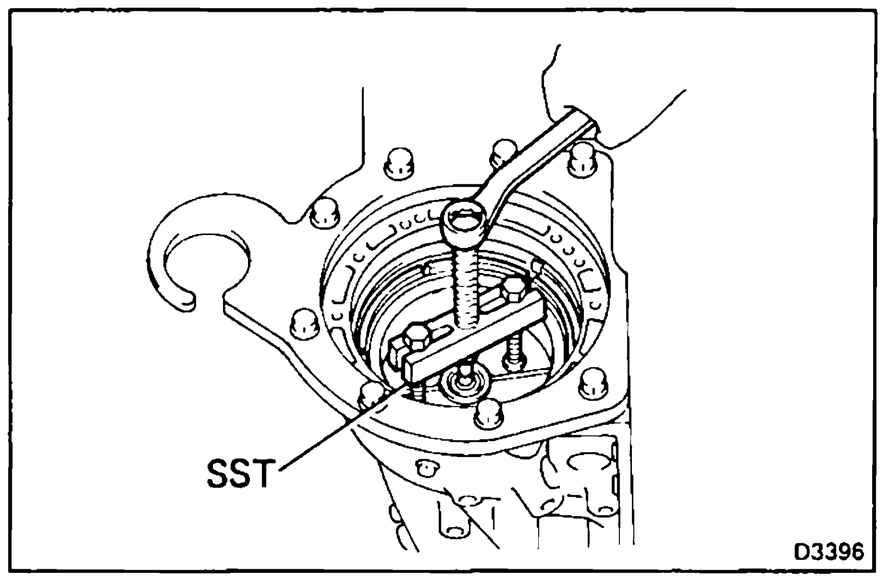
(e) Set the dial indicator installed by the SST to the input shaft face, and measure the input shaft thrust clearance.

SST 09350-36010 (09350-06130)

(f) Check that the thrust clearance of the input shaft is standard. If it exceeds the maximum clearance, select a new spacer.

Standard clearance : 0.3 – 0.7 mm (0.012 – 0.028 in.)
Maximum clearance: 0.7 mm (0.028 in.)

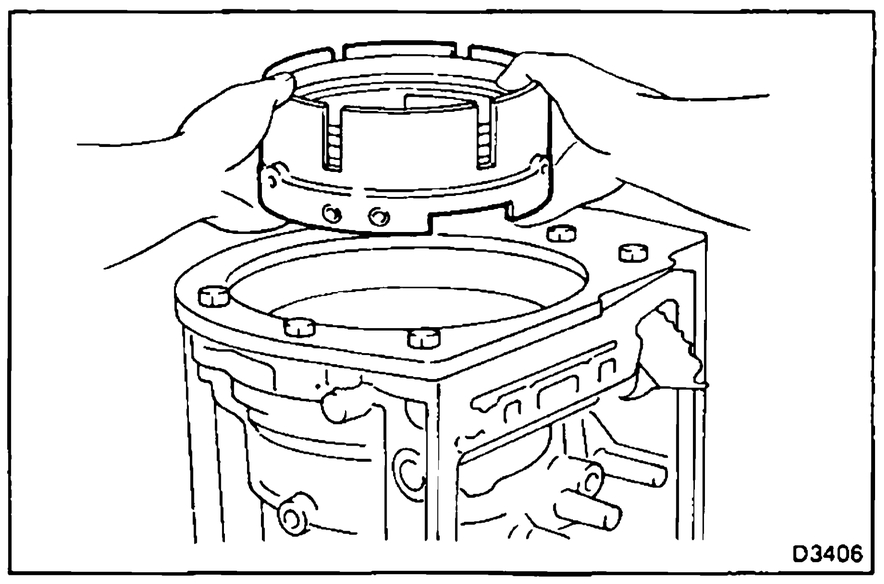
Spacer thickness mm (in.)
0.9 (0.035)
1.2 (0.047)
1.5 (0.059)
1.8 (0.071)
2.1 (0.083)



(g) Remove the three overdrive support lock bolts.

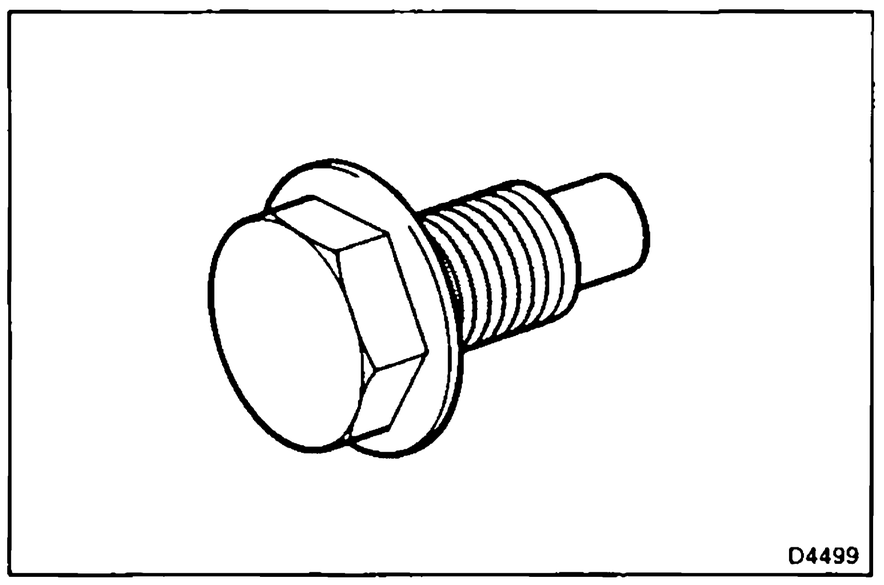
(h) Using SST, remove the overdrive support.

SST 09350-36010 (09350-06140)



(i) Coat three new O-rings with ATF and install them to the overdrive support.

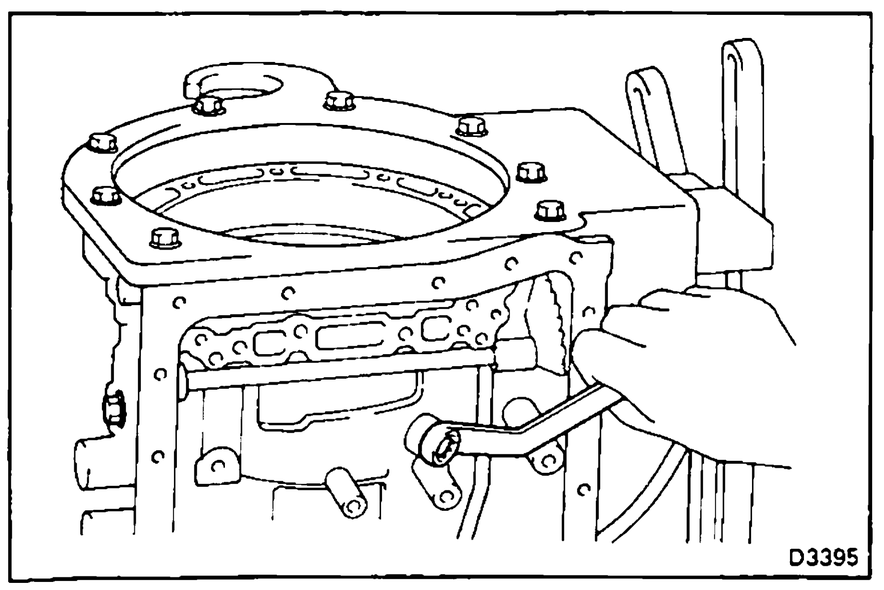
(j) Align the oil hole and bolt hole of the overdrive support with those of the body side and insert the overdrive support.



(k) Clean the threads of the bolts and case with white gasoline.

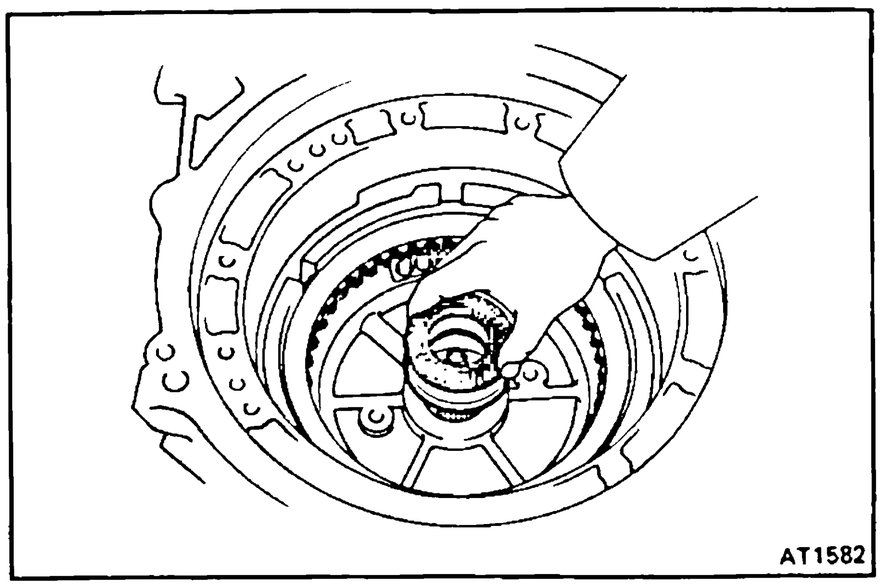
(l) Coat the threads of the bolts with sealer.

Sealer: LOCTITE 242



(m) Install and torque the overdrive support lock bolts.

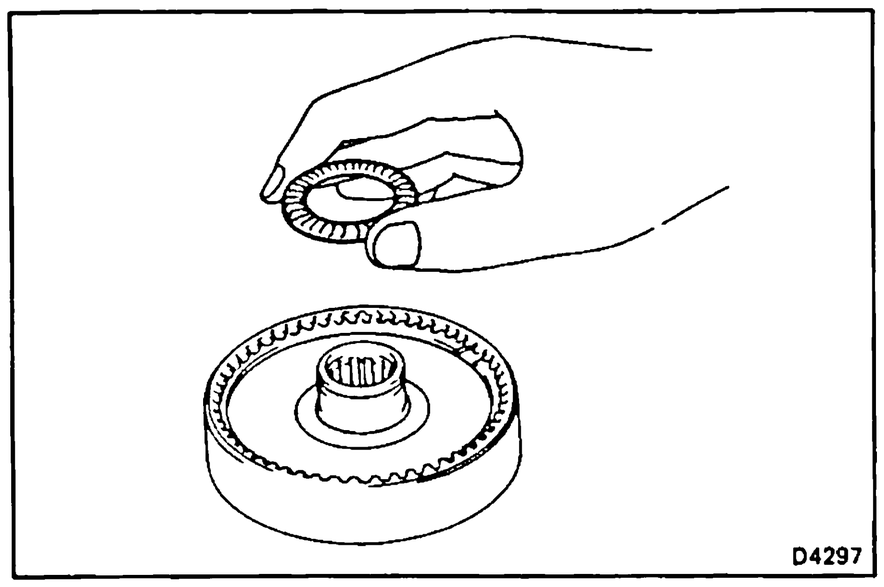
Torque: 250 kg-cm (18 ft-lb, 25 N·m)


AT1582

(n) Install the race on the overdrive support.

mm (in.)

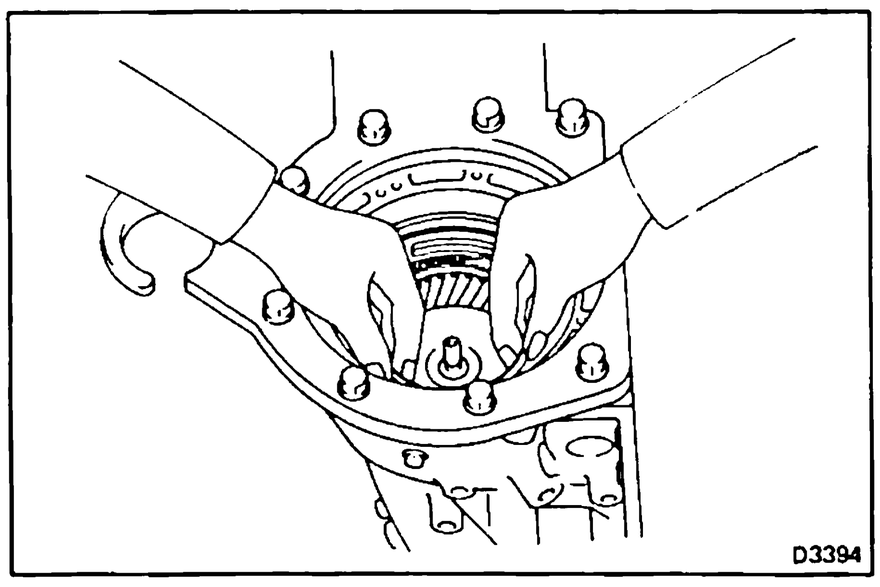
	Outer diameter	Inner diameter
Race	52.0 (2.047)	37.0 (1.457)


D4297

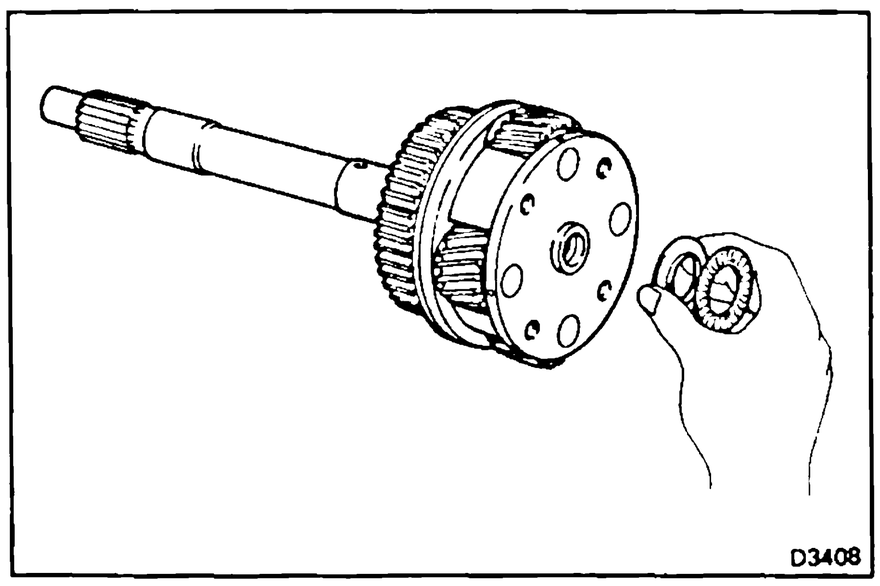
(o) Coat the bearing with petroleum jelly, and install it onto the overdrive planetary gear.

mm (in.)

	Outer diameter	Inner diameter
Bearing	52.0 (2.047)	34.7 (1.366)


D3394

(p) Install the overdrive ring gear to the overdrive support.

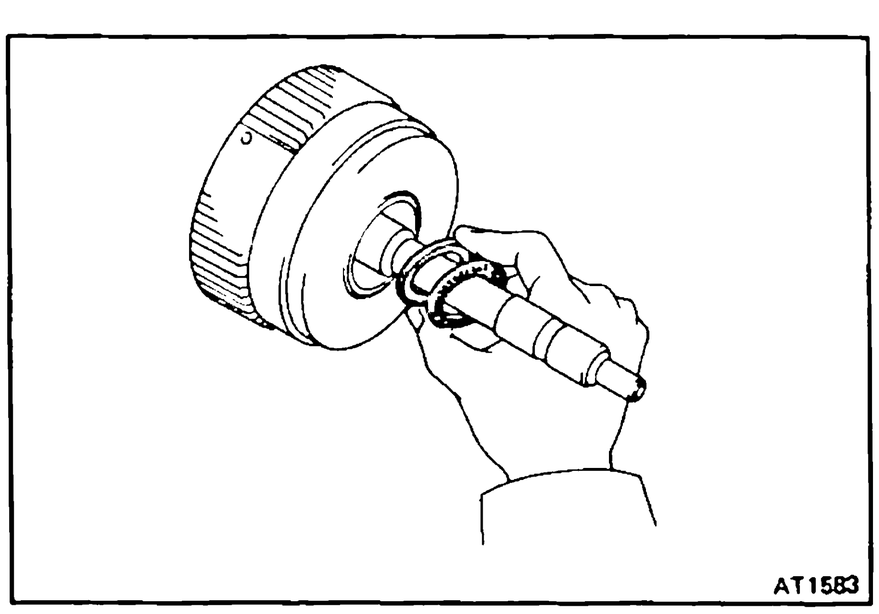

D3408

16. INSTALL OVERDRIVE DIRECT CLUTCH ASSEMBLY

(a) Coat the race and bearing with petroleum jelly, and install them onto the overdrive planetary gear.

mm (in.)

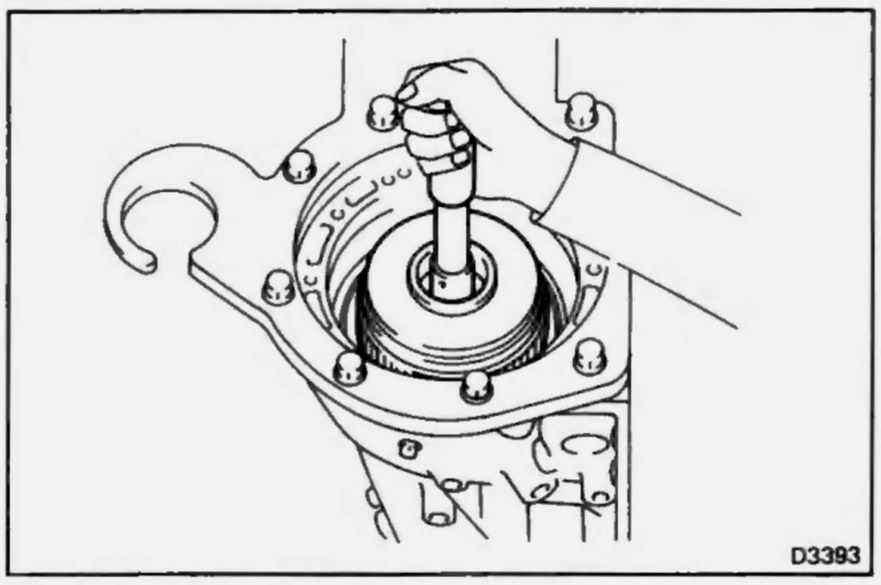
	Outer diameter	Inner diameter
Bearing	42.0 (1.654)	25.0 (0.984)
Race	42.0 (1.654)	23.2 (0.913)


AT1583

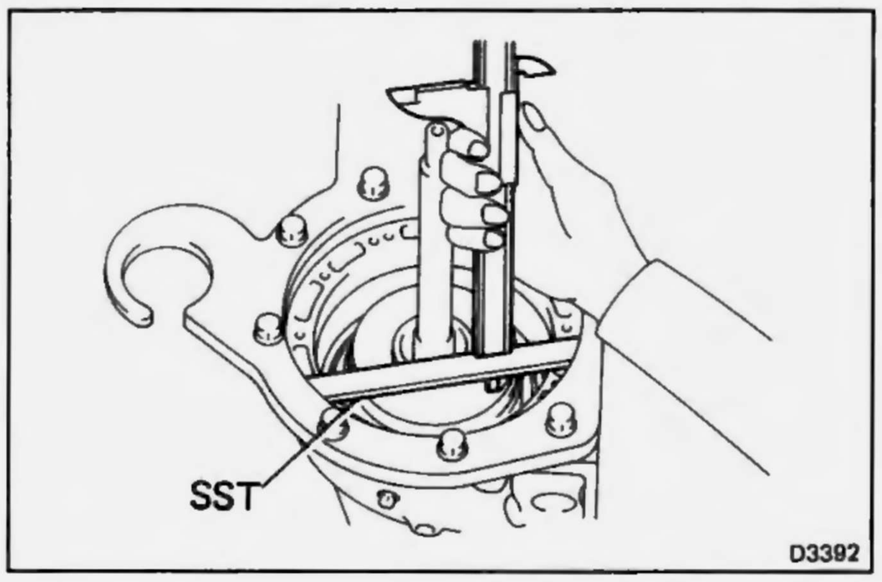
(b) Install the race and bearing onto the overdrive clutch assembly.

mm (in.)

	Outer diameter	Inner diameter
Race	48.0 (1.890)	28.5 (1.122)
Bearing	46.2 (1.819)	28.5 (1.122)



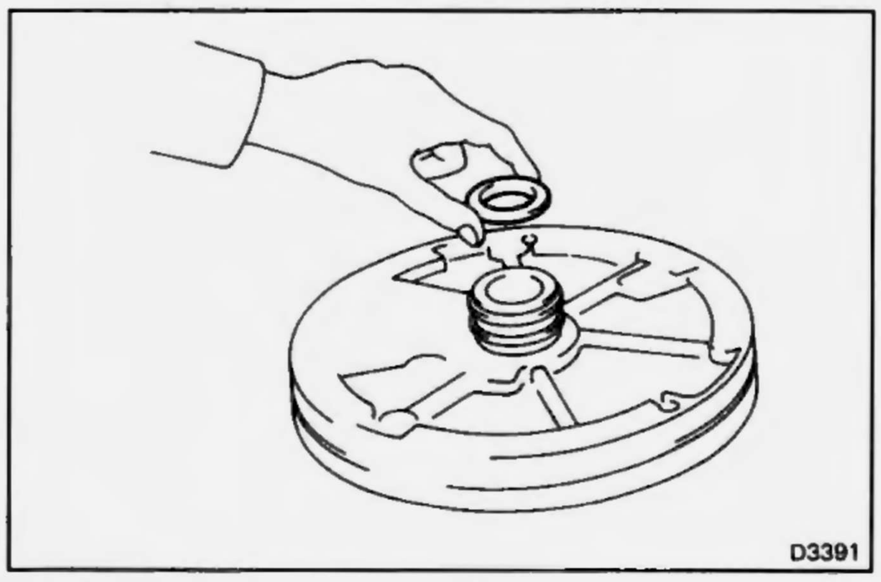
(c) Install the assembled overdrive planetary gear and overdrive clutch assembly to the overdrive support.



17. CHECK CORRECT INSTALLATION OF OVERDRIVE CLUTCH

Set SST on the transmission case as shown in the figure. Measure the distance between the top surface of the SST and front clutch assembly. If the distance corresponds to that during disassembly, the overdrive clutch is installed correctly.

SST 09350-36010 (09350-06090)



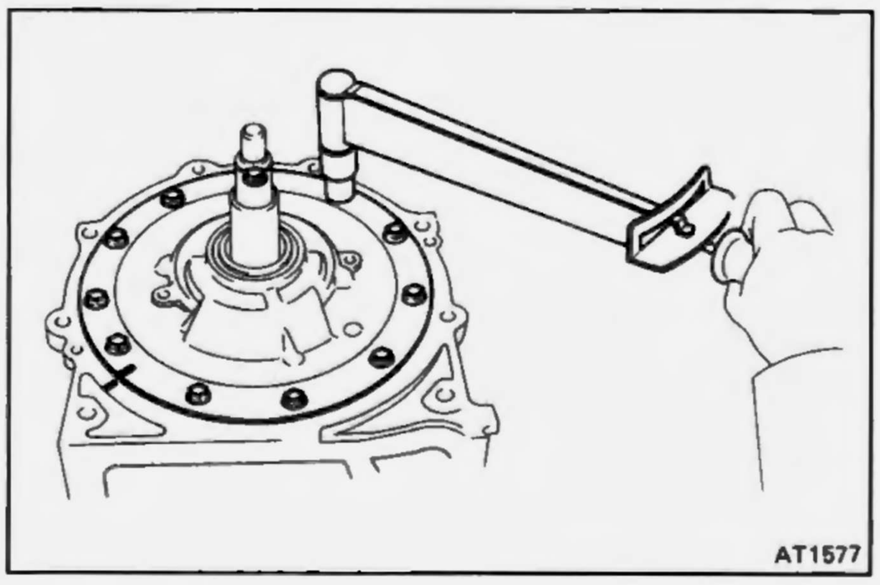
18. INSTALL OIL PUMP ASSEMBLY

(a) Install the race onto the oil pump assembly.

mm (in.)

	Outer diameter	Inner diameter
Race	43.0 (1.693)	27.1 – 28.3 (1.067 – 1.114)

(b) Place the gasket onto the transmission case.

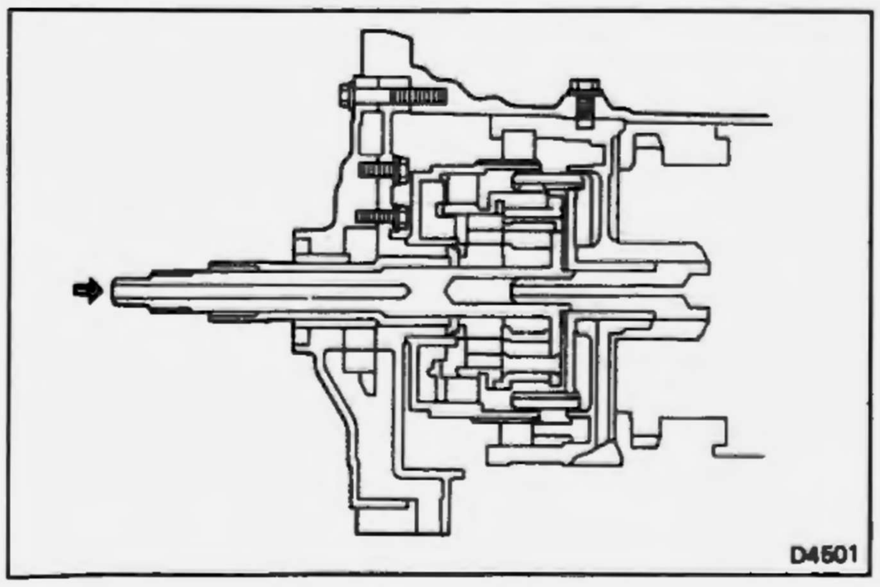


(c) Align the matchmarks on the transmission case and oil pump assembly.

(d) Using a plastic hammer, tap the oil pump body and install the oil pump assembly to the transmission case.

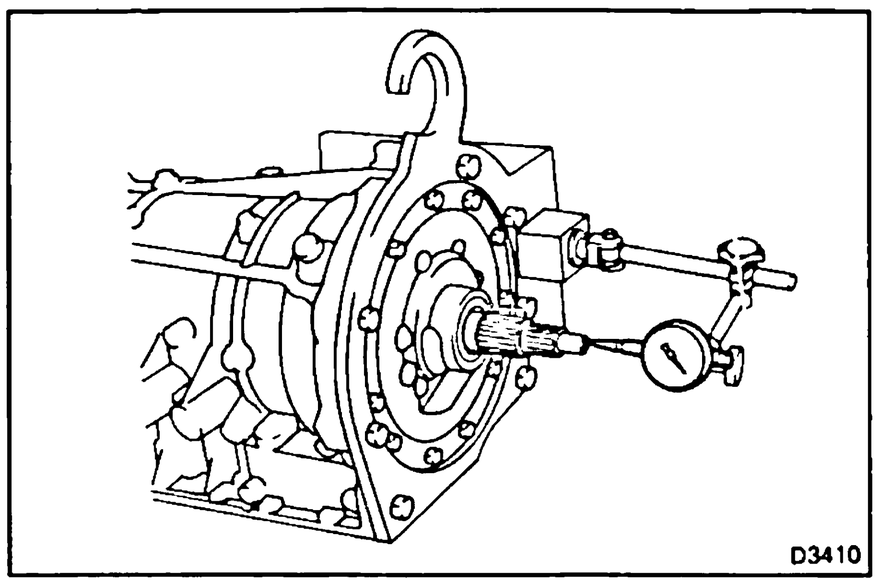
(e) Tighten the set bolts gradually and evenly.

Torque: 210 kg-cm (15 ft-lb, 21 N·m)



19. INSPECT INPUT SHAFT THRUST CLEARANCE

(a) Face the overdrive input shaft toward the rear of the transmission, and press in using 5—10 kg (11.0—22.0 lb, 49—98 N) of pressure.

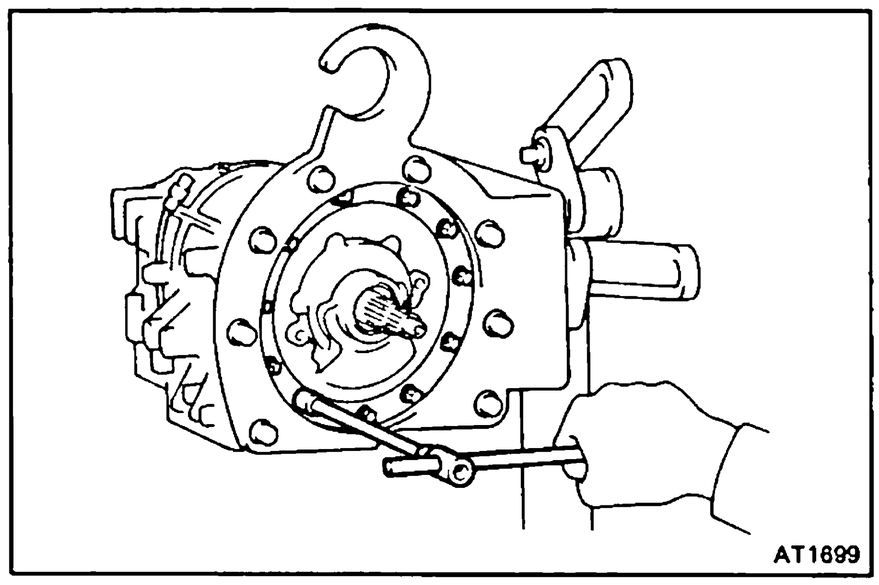

D3410

(b) Set the dial indicator into the input shaft.

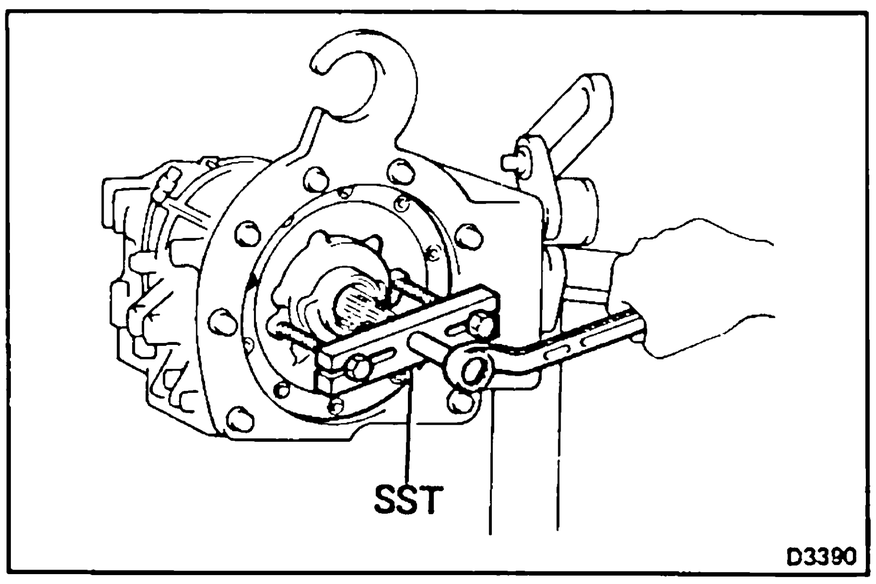
(c) Check that the thrust clearance of the input shaft is standard. If it exceeds the maximum, select a new race.

Standard clearance: : 0.4 – 0.9 mm (0.016 – 0.035 in.)
Maximum clearance: 0.9 mm (0.035 in.)

Race thickness mm (in.)
0.8 (0.031)
1.0 (0.039)
1.4 (0.055)


AT1699

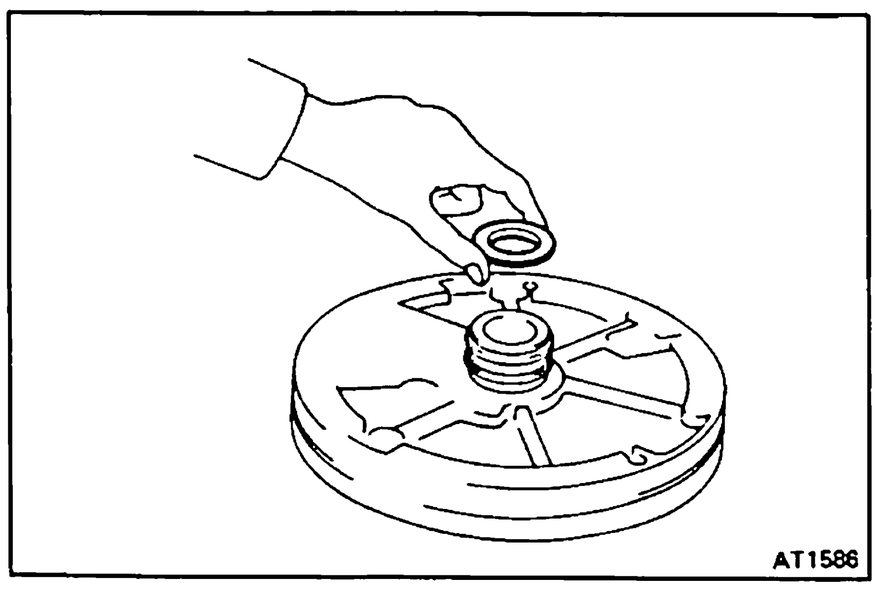
(d) Remove the oil pump set bolts.



D3390

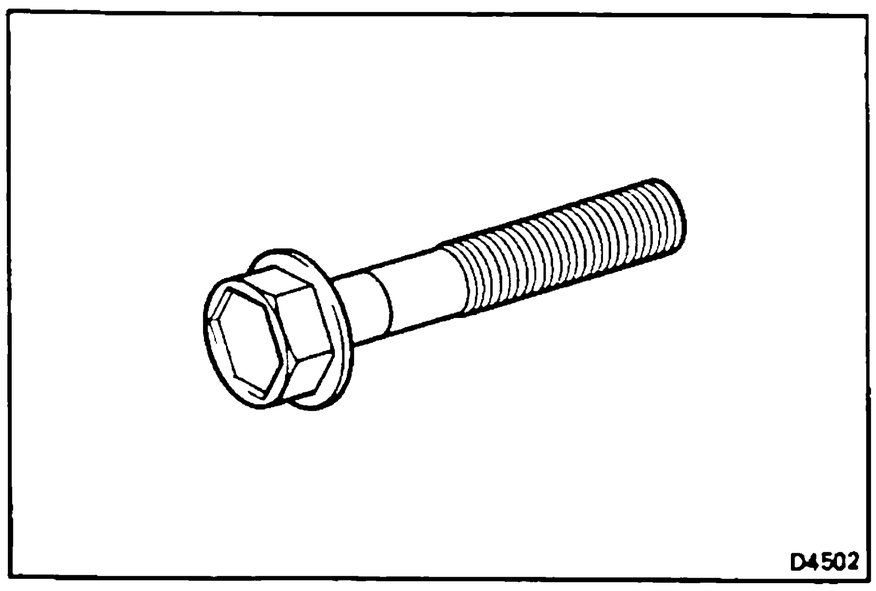
(e) Using SST, remove the oil pump assembly.

SST 09350-36010 (09350-06140)


AT1586

(f) Coat a new O-ring with ATF and install it to the oil pump assembly.

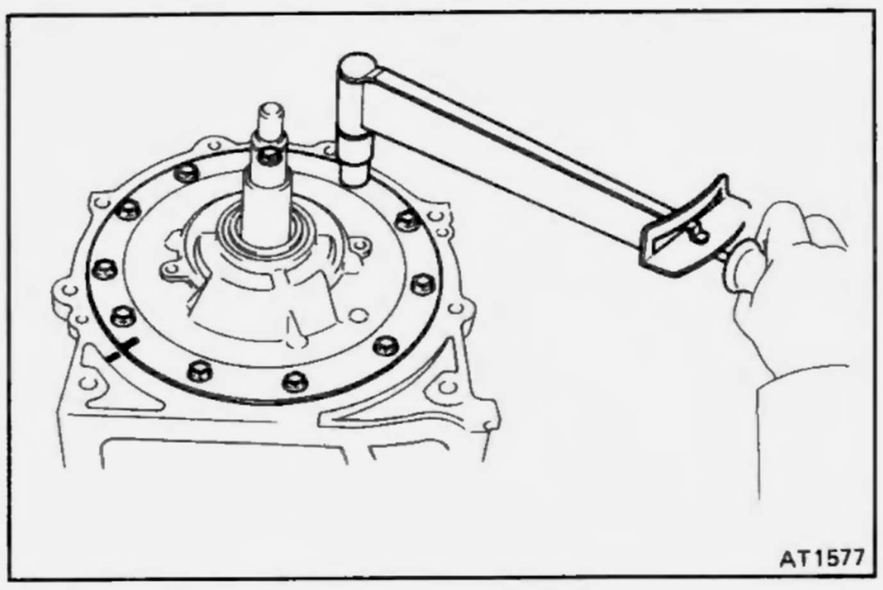
(g) Assemble bearing of step 19-(b) to the oil pump.


D4502

(h) Clean the threads of the bolts and case with white gasoline.

(i) Coat the threads of the bolts with sealer.

Sealer: LOCKTITE 242



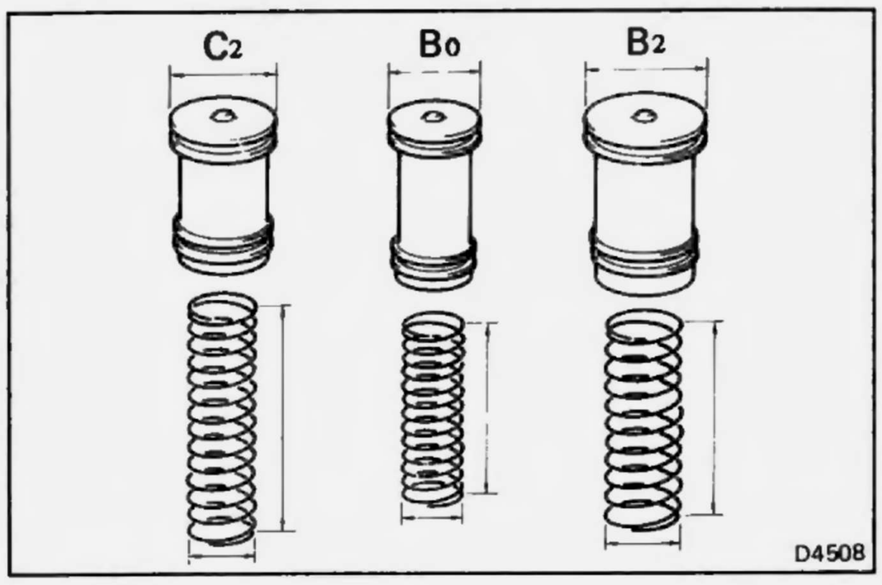
(j) Place a new gasket onto the transmission case.

(k) Align the matchmarks on the transmission case and oil pump body.

(l) Using a plastic hammer, tap the oil pump body and install the oil pump assembly to the transmission case.

(m) Tighten the set bolts gradually and evenly.

Torque: 210 kg-cm (15 ft-lb, 21 N·m)



20. INSTALL C_2, B_0, B_2 ACCUMULATOR PISTONS AND SPRINGS

(a) Coat the O-rings with ATF and install it to the piston.

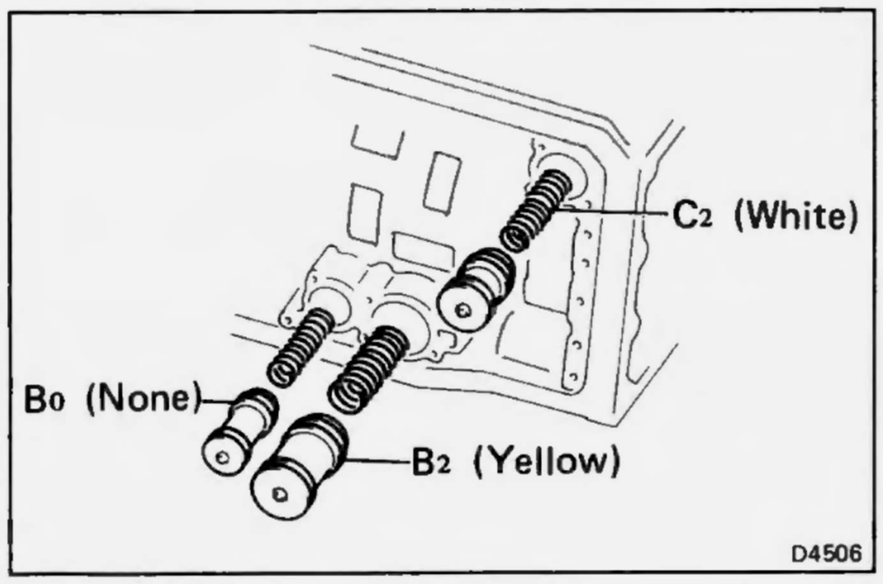
(b) Install the three springs and accumulator pistons to the transmission case.

Accumulator piston mm (in.)

Piston	Outer diameter
C_2	35.87 (1.4122)
B_0	29.87 (1.1760)
B_2	39.87 (1.5697)

Spring mm (in.)

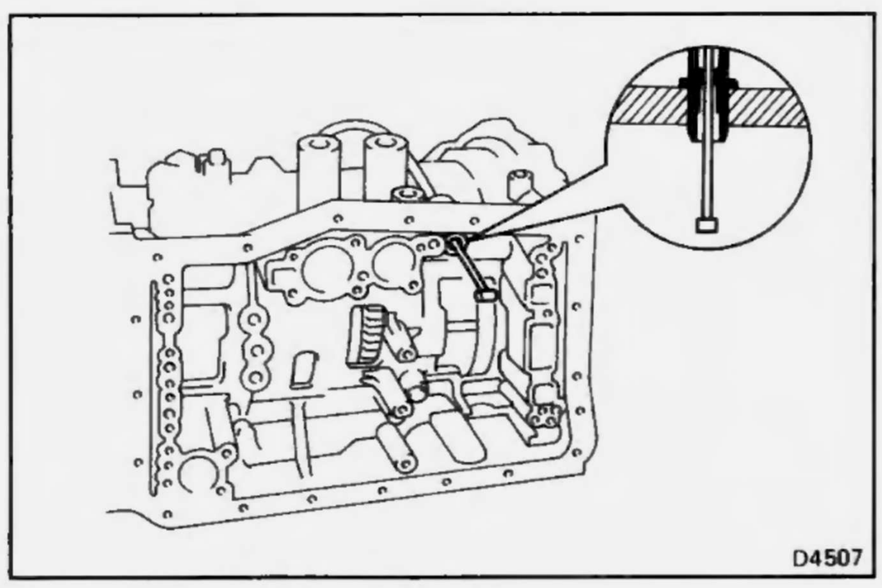
Spring	Color	Free length	Outer diameter
C_2	white	80.00 (3.1496)	21.80 (0.8583)
B_0	none	63.06 (2.4827)	20.70 (0.8150)
B_2	yellow	65.00 (2.5591)	25.10 (0.9882)



21. INSTALL THROTTLE CABLE

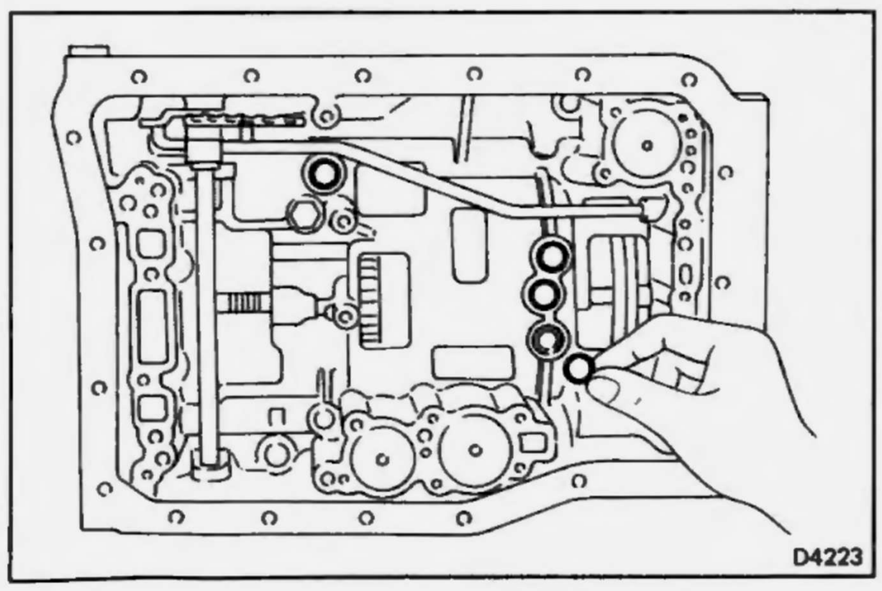
(a) Coat the O-ring with ATF and install it to the throttle cable.

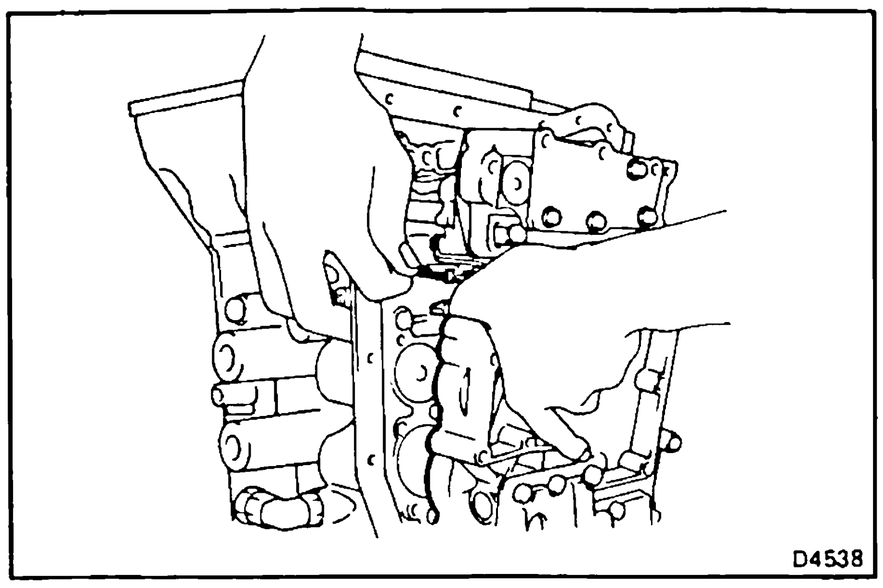
(b) Push the cable through the transmission case, being careful not to damage the O-ring. Check for full seating.



22. INSTALL FOUR TRANSMISSION APPLICATION GASKETS

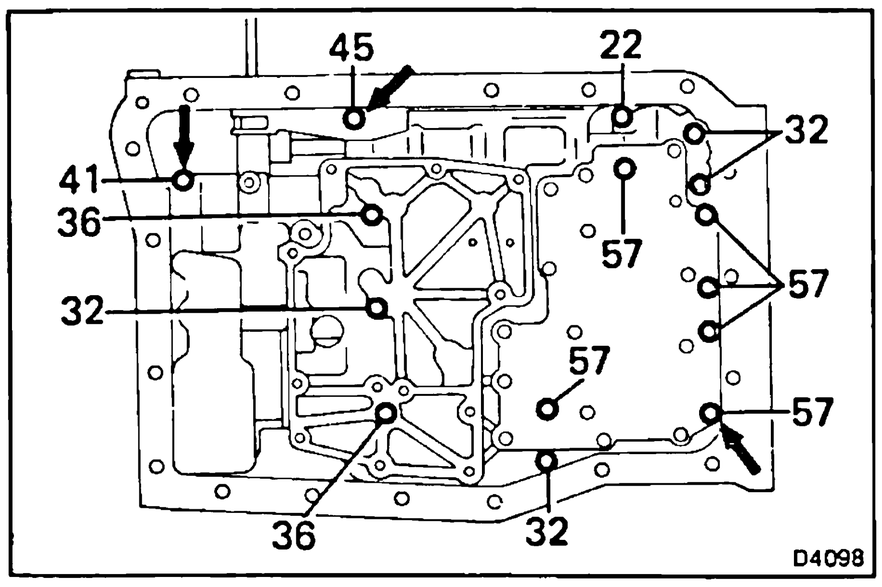
Install the four transmission application gaskets facing the pitted side toward the transmission case.





23. CONNECT THROTTLE CABLE TO CAM

Push the cable fitting into the cam.



24. INSTALL VALVE BODY

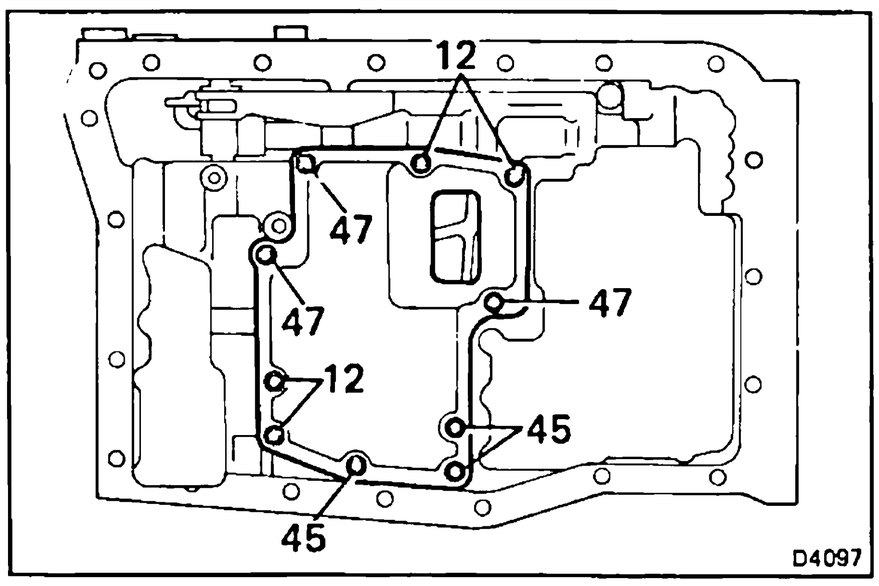
(a) Install the three bolts indicated by the arrows.

(b) Install the other bolts.

(c) Check that the manual valve lever contacts the center of the roller at the tip of the detent spring.

(d) Tighten the bolts.

Torque: 100 kg-cm (7 ft-lb, 10 N·m)

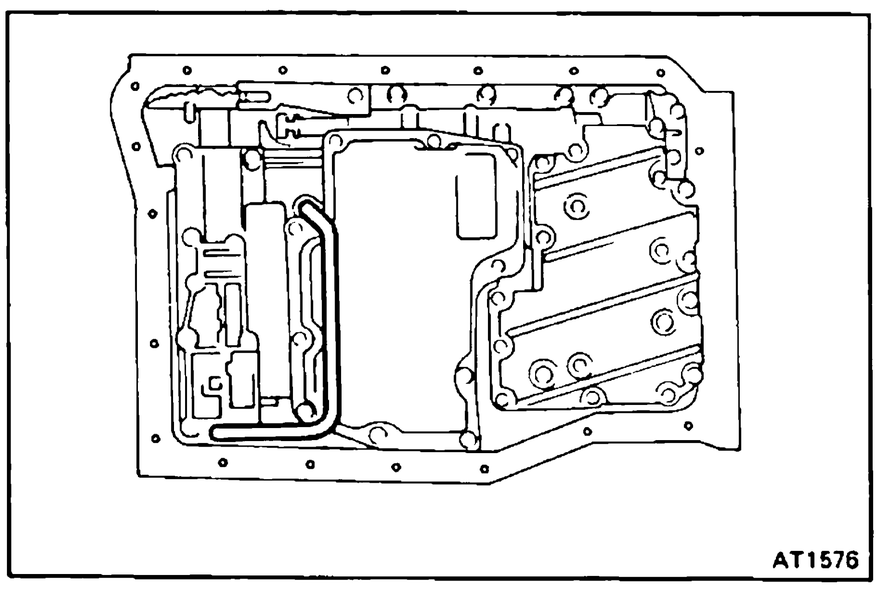


25. INSTALL OIL STRAINER AND BOLTS

(a) Place the gasket on the valve body.

(b) Install the bolts as shown.

Torque: 5 mm 55 kg-cm (48 in.-lb, 5.4 N·m)
6 mm 100 kg-cm (7 ft-lb, 10 N·m)



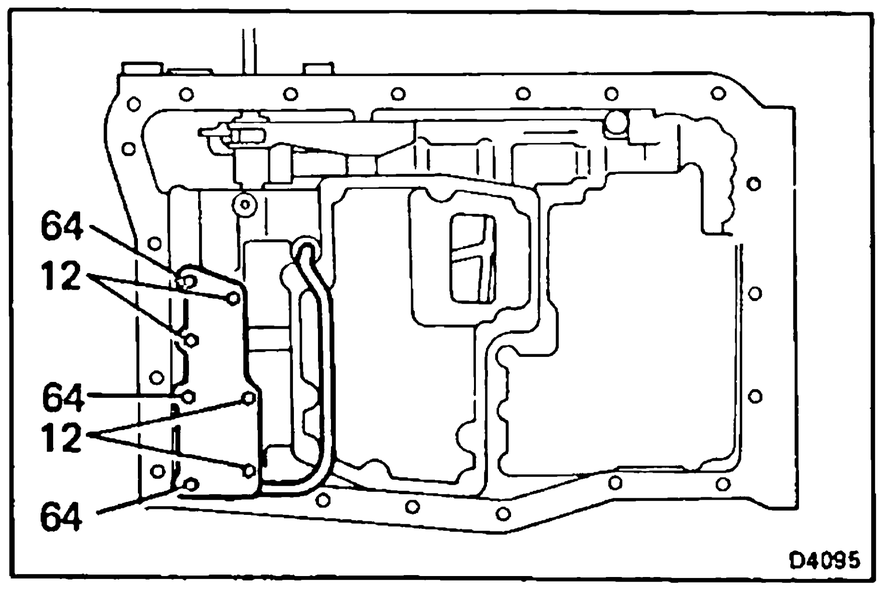
26. INSTALL OIL TUBE

(a) Remove the lock up relay valve body plate.

NOTE: Do not drop the lock up relay valve pins.

(b) Tap the tube with a plastic hammer to install it into the position indicated in the figure.

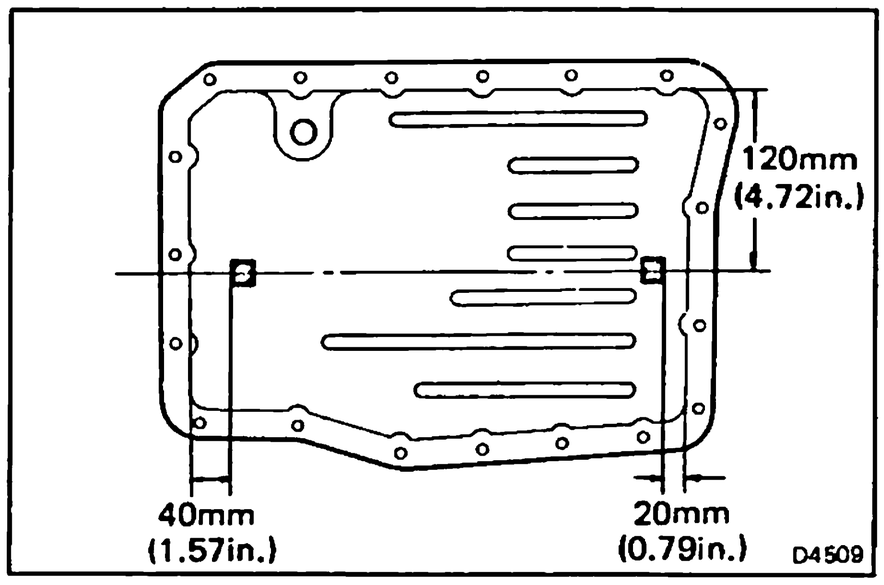
CAUTION: Be careful not to bend or damage the tube.



(c) Place a new gasket on the valve body.

(d) Install the lock up relay valve body plate and install the bolts.

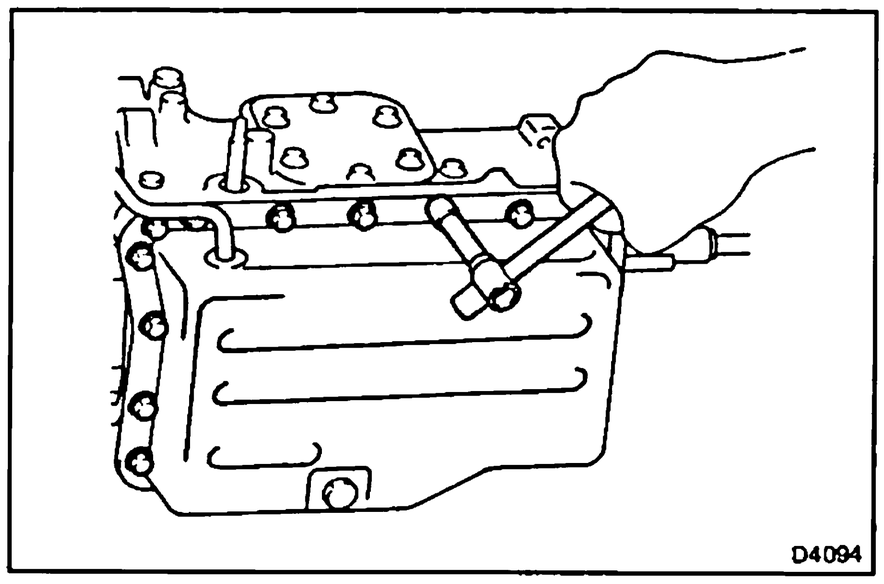
NOTE: Each bolt length (mm) is indicated in the figure.



27. INSTALL TWO MAGNETS IN PAN

Install two magnets as shown in the figure.

CAUTION: Make sure that the two magnets do not interfere with the oil tube.

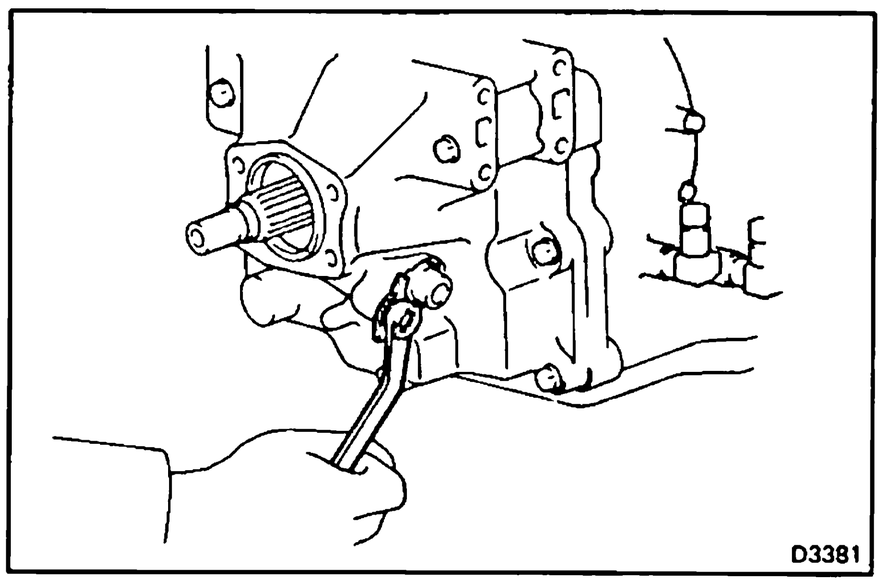


28. INSTALL PAN WITH NEW GASKET

(a) Place a new gasket on the transmission case.

(b) Tighten the twenty bolts evenly.

Torque: 70 kg-cm (61 in.-lb, 6.9 N·m)



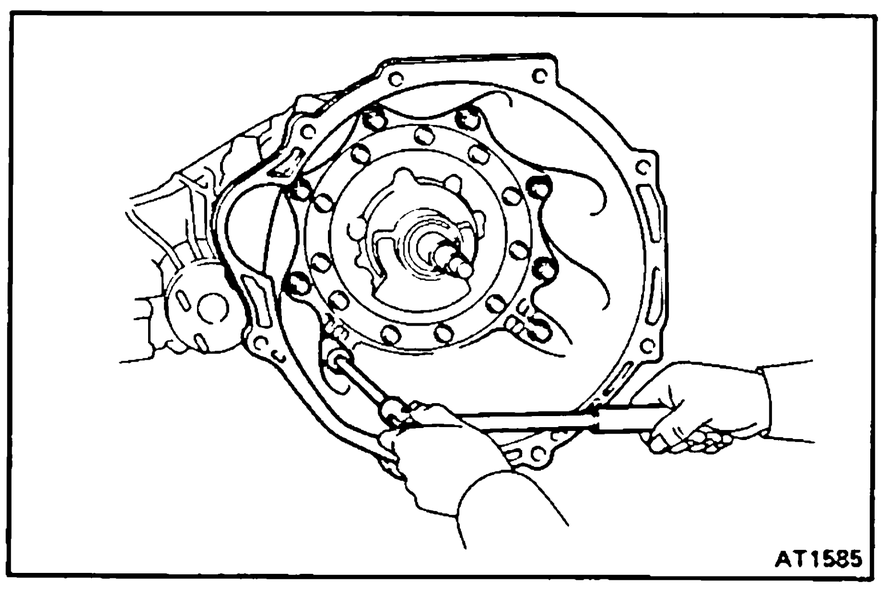
29. INSTALL SPEEDOMETER DRIVEN GEAR

(a) Coat a new O-ring with ATF and install it to the speedometer driven gear.

(b) Install the speedometer driven gear to the extension housing.

(c) Install the lock plate and torque the bolt.

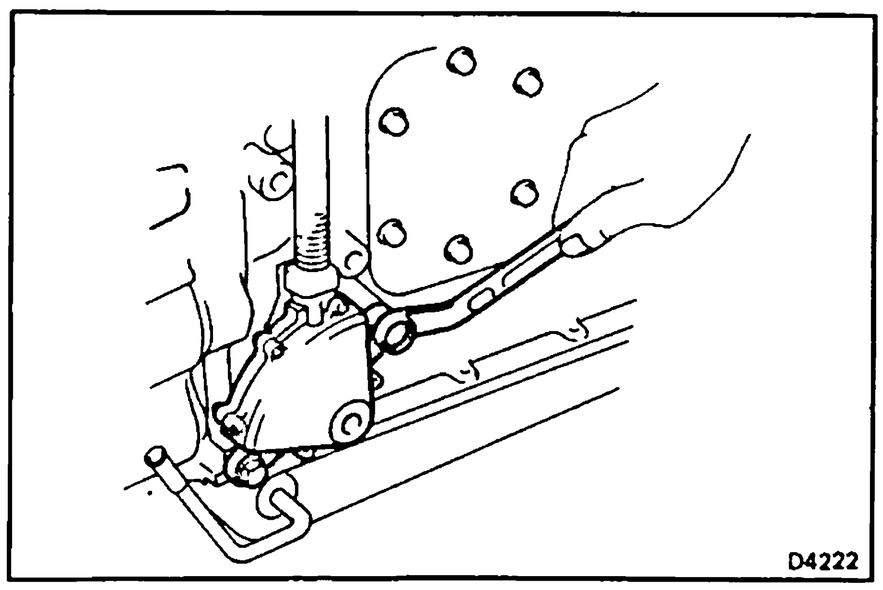
Torque: 130 kg-cm (9 ft-lb, 13 N·m)



30. INSTALL TRANSMISSION HOUSING

Install the transmission housing to the transmission case and torque the bolts.

Torque: 650 kg-cm (47 ft-lb, 64 N·m)



31. INSTALL NEUTRAL START SWITCH

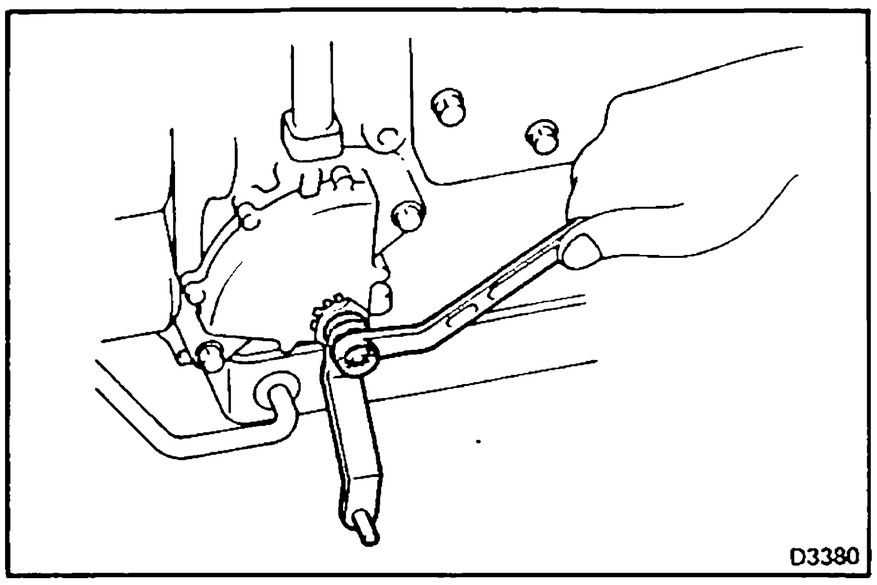
(a) Install the neutral start switch and torque the bolts.

Torque: 130 kg-cm (9 ft-lb, 13 N·m)

(b) Install the grommet and lock washer, and torque the nut.

Torque: 70 kg-cm (61 in.-lb, 6.9 N·m)

(c) Using a screwdriver, stake the lock washer.



32. INSTALL CONTROL SHAFT LEVER

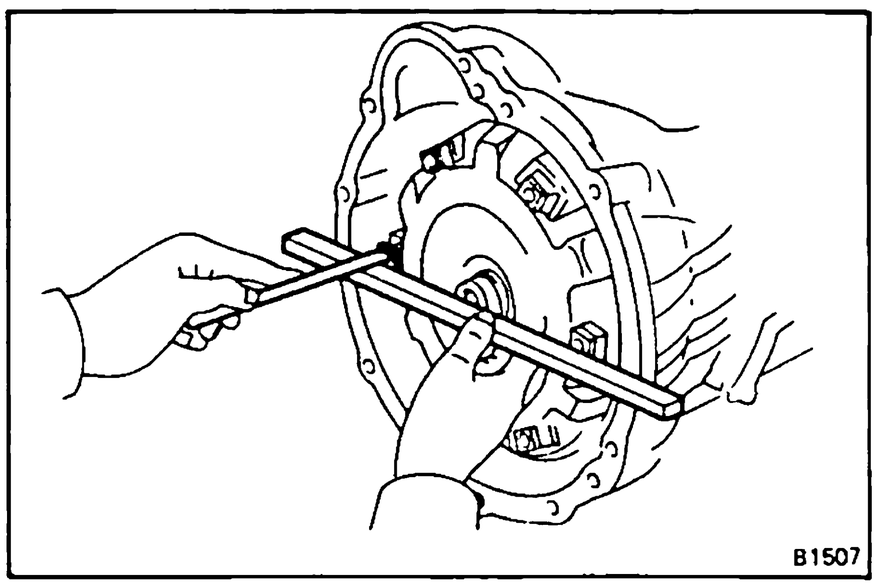
Install the control shaft lever with the nut.

Torque: 130 kg-cm (9 ft-lb, 13 N·m)

33. INSTALL TUBE AND OIL FILLER GAUGE

(a) Coat the O-ring with ATF and install it to the tube.

(b) Install the tube and oil filler gauge.



34. INSTALL TORQUE CONVERTER

35. CHECK TORQUE CONVERTER INSTALLATION

Using calipers and a straight edge, measure from the installed surface to the front surface of the transmission housing.

Correct distance: 25.4 mm (1.000 in.) or more

SERVICE SPECIFICATIONS

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AUTOMATIC TRANSMISSION

Specifications

Oil pump	Body clearance	STD	0.07 – 0.15 mm	0.0028 – 0.0059 in.
		Limit	0.3 mm	0.012 in.
	Tip clearance	STD	0.14 – 0.24 mm	0.0055 – 0.0094 in.
		Limit	0.3 mm	0.012 in.
	Side clearance	STD	0.02 – 0.05 mm	0.0008 – 0.0020 in.
			0.1 mm	0.004 in.
Bushing bore	Oil pump body	Limit	42.13 mm	1.6587 in.
	Oil pump cover (FR)	Limit	24.07 mm	0.9476 in.
	(RR)	Limit	26.57 mm	1.0461 in.
	OD direct clutch drum	Limit	26.57 mm	1.0461 in.
	OD planetary gear	Limit	12.07 mm	0.4752 in.
	Center support drum	Limit	35.08 mm	1.3811 in.
	Planetary sun gear (FR)	Limit	24.07 mm	0.9476 in.
	(RR)	Limit	24.07 mm	0.9476 in.
	Output shaft	Limit	17.07 mm	0.6720 in.
Piston return spring length	OD direct clutch (C_0)	STD	21.0 mm	0.827 in.
	OD brake (B_0)	STD	22.75 mm	0.8957 in.
	Front clutch (C_1)	STD	30.5 mm	1.201 in.
	Rear clutch (C_2)	STD	31.24 mm	1.2299 in.
	Second brake (B_2)	STD	22.75 mm	0.8957 in.
	First and reverse brake (B_3)	STD	23.9 mm	0.941 in.
Disc thickness	OD direct clutch (C_0)	Limit	1.9 mm	0.075 in.
	Front clutch (C_1)	Limit	1.9 mm	0.075 in.
	Rear clutch (C_2)	Limit	1.9 mm	0.075 in.
	First and reverse brake (B_3)	Limit	1.5 mm	0.059 in.
	OD brake (B_0)	Limit	1.9 mm	0.075 in.
	Second brake (B_2)	Limit	1.9 mm	0.075 in.
Flange thickness	Front clutch (C_1)		1.8 mm	0.071 in.
			2.0 mm	0.079 in.
			2.2 mm	0.087 in.
			2.4 mm	0.094 in.
	Rear clutch (C_2)	None	5.0 mm	0.197 in.
		No. 1	5.2 mm	0.205 in.
		No. 2	5.4 mm	0.213 in.
		No. 3	5.6 mm	0.220 in.
	Second brake (B_2)	None	5.0 mm	0.197 in.
		No. 1	5.2 mm	0.205 in.
		No. 2	5.4 mm	0.213 in.
		No. 3	5.6 mm	0.220 in.
	First and reverse brake (B_3)	None	6.65 mm	0.2618 in.
		No. 1	7.05 mm	0.2776 in.
		No. 2	7.45 mm	0.2933 in.

Specifications (Cont'd)

Clutch piston stroke		Disc No.		
	OD direct clutch (C_0)	3	1.10 — 1.70 mm	0.0433 — 0.0669 in.
	Front clutch (C_1)	6	3.93 — 4.23 mm	0.1547 — 0.1665 in.
	Rear clutch (C_2)	5	1.70 — 1.90 mm	0.0669 — 0.0748 in.
Brake piston stroke		Disc No.		
	OD brake (B_0)	3	1.25 — 1.85 mm	0.0492 — 0.0728 in.
	Second brake (B_2)	4	1.60 — 1.80 mm	0.0630 — 0.0709 in.
	First and reverse brake (B_3)	6	3.30 — 3.80 mm	0.1299 — 0.1496 in.

Valve body spring mm (in.)		Free length	Coil outer diameter	No. coils	Wire diameter
	Front upper valve body				
	Secondary regulator valve	46.00 (1.8110)	13.30 (0.5236)	15	1.7 (0.067)
	Primary throttle valve	25.30 (0.9961)	9.20 (0.3622)	9.5	0.7 (0.028)
	Primary down shift plug	26.85 (1.0571)	8.97 (0.3531)	10.5	1.1 (0.043)
	Secondary throttle valve	25.30 (0.9961)	9.20 (0.3622)	9.5	0.7 (0.028)
	Secondary down shift plug				
	(HJ)	32.78 (1.2905)	9.79 (0.3854)	13.5	1.0 (0.039)
	(FJ)	32.57 (1.2823)	9.74 (0.3835)	13	1.0 (0.039)
	Sleeve	10.80 (0.4252)	18.20 (0.7165)	4	1.5 (0.059)
	Rear upper valve body				
	2-3 shift valve	44.65 (1.7579)	8.90 (0.3504)	22	1.1 (0.043)
	2-3 shift timing valve	29.40 (1.1575)	8.60 (0.3386)	15.5	0.9 (0.035)
	3-4 shift valve (HJ)	39.40 (1.5512)	9.70 (0.3819)	17	1.0 (0.039)
	(FJ)	38.32 (1.5087)	9.70 (0.3819)	17	1.0 (0.039)
	Detent regulator valve (HJ)	29.30 (1.1535)	7.40 (0.2913)	16	0.9 (0.035)
	(FJ)	30.40 (1.1968)	7.40 (0.2913)	16	0.9 (0.035)
	Lock-up signal valve				
	*: Speedometer drive and driven gear ratio *18/6 (HJ)	53.41 (2.1028)	13.70 (0.5394)	16	1.2 (0.047)
	18/6 (FJ)	52.83 (2.0799)	13.50 (0.5315)	17	1.1 (0.043)
	17/6, 16/6	50.15 (1.9744)	13.70 (0.5394)	16	1.2 (0.047)
	OD clutch exhaust valve	33.30 (1.3110)	8.20 (0.3228)	14	0.7 (0.028)
	Intermediate modulator valve	22.50 (0.8858)	7.70 (0.3031)	12	1.0 (0.039)
	Lower valve body				
	Lock-up relay valve	32.40 (1.2756)	9.30 (0.3661)	15	1.1 (0.043)
	Primary regulator valve	58.20 (2.2913)	20.90 (0.8228)	11	1.9 (0.075)
	1-2 shift valve	26.58 (1.0465)	6.90 (0.2717)	16	0.7 (0.028)
	Second lock valve	29.40 (1.1575)	8.30 (0.3268)	14	0.8 (0.031)
	3-2 KD orifice control valve	32.45 (1.2776)	8.33 (0.3280)	14	0.8 (0.031)
	Accumulator control valve	25.11 (0.9886)	12.50 (0.4921)	8.5	1.2 (0.047)
	Low modulator valve	31.80 (1.2520)	7.30 (0.2874)	16	0.8 (0.031)
Accumulator spring mm (in.)	C_1	92.34 (3.6354)	17.92 (0.7055)	20	2.7 (0.106)
	C_2	80.00 (3.1496)	21.80 (0.8583)	16	3.5 (0.138)
	B_0 (HJ)	63.06 (2.4827)	20.70 (0.8150)	13	3.2 (0.126)
	(FJ)	64.09 (2.5232)	21.05 (0.8287)	13	3.3 (0.130)
	B_2	65.00 (2.5591)	25.10 (0.9882)	8.5	4.0 (0.157)

Specifications (Cont'd)

Parking lock pawl bracket installation height (between the transfer adapter surface and the top of the bracket tabs)	47.5 – 47.6 mm	1.870 – 1.874 in.
Clearance between the transfer adapter and front case	0.4 – 0.5 mm	0.016 – 0.020 in.
Rear output shaft bearings preload — New bearing	15 – 24.7 kg-cm	(13.0 – 21.4 in.-lb, 1.5 – 2.4 N·m)
Rear output shaft bearings preload — Reused bearing	7 – 12 kg-cm	(6.1 – 10.4 in.-lb, 0.7 – 1.2 N·m)
Center support thrust clearance	0.3 – 0.7 mm	0.012 – 0.028 in.
Input shaft thrust clearance	0.3 – 0.7 mm	0.012 – 0.028 in.
OD input shaft thrust clearance	0.4 – 0.9 mm	0.016 – 0.035 in.
Transfer front case adjusting shim thickness	2.3 mm	0.091 in.
	2.4 mm	0.094 in.
	2.5 mm	0.098 in.
Rear output shaft bearings preload adjusting shim thickness		
Mark		
0	0.15 mm	0.0059 in.
4	0.4 mm	0.016 in.
5	0.5 mm	0.020 in.
6	0.6 mm	0.024 in.
7	0.7 mm	0.028 in.
8	0.8 mm	0.031 in.
9	0.9 mm	0.035 in.
10	1.0 mm	0.039 in.
11	1.1 mm	0.043 in.
12	1.2 mm	0.047 in.
13	1.3 mm	0.051 in.
14	1.4 mm	0.055 in.
15	1.5 mm	0.059 in.
Center support thrust washer thickness	1.8 mm	0.071 in.
	2.1 mm	0.083 in.
	2.4 mm	0.094 in.
	2.6 mm	0.102 in.
Input shaft spacer thickness	0.9 mm	0.035 in.
	1.2 mm	0.047 in.
	1.5 mm	0.059 in.
	1.8 mm	0.071 in.
	2.1 mm	0.083 in.
Race (for OD input shaft thrust clearance adjustment)	0.8 mm	0.031 in.
	1.0 mm	0.039 in.
	1.4 mm	0.055 in.

Torgue Specifications

Part tightened		kg-cm	ft-lb	N·m
Transmission housing x Transmission case		650	47	64
Parking lock pawl bracket		195	14	19
Oil pump cover x Oil pump body	6 mm	90	78 in.-lb	8.8
	8 mm	210	15	21
Center support x Transmission case		250	18	25
Transfer adapter x Transmission case (A440F)		380	27	37
Transfer front case x Transfer adapter (A440F)		650	47	64
Transfer rear case x Transfer front case (A440F)				
	12 mm	650	47	64
	10 mm	400	29	39
Shift plug (A440F)		450	33	44
Rear output shaft rear bearing retainer (A440F)		350	25	34
Rear companion flange (A440F)		1,300	94	127
Output shaft lock nut (A440F)		1,300	94	127
Overdrive support x Transmission case		250	18	25
Oil pump x Transmission case		210	15	21
Valve body x Transmission case		100	7	10
Oil strainer x Valve body	5 mm	55	48 in.-lb	5.4
	6 mm	100	7	10
Oil pan		70	61 in.-lb	6.9
Transfer case cover (A440F)		155	11	15
PTO cover (A440F)		170	12	17
		185	13	18
Transfer L4 position switch (A440F)		400	29	39
Transfer neutral switch (A440F)		400	29	39
Neutral start switch (bolt)		130	9	13
Neutral start switch (nut)		70	61 in.-lb	6.9
Control shift lever		130	9	13
PTO cover (A440L)		155	11	15
Extension housing x Transmission case (A440L)		380	27	37
Parking brake drum (A440L)		1,300	94	127

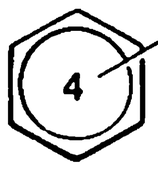
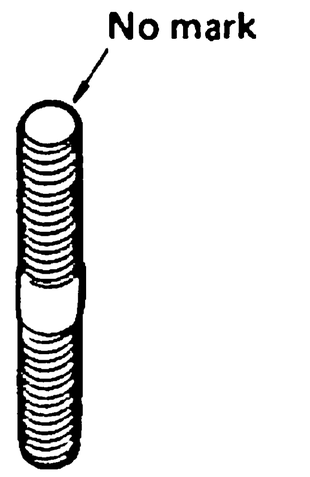
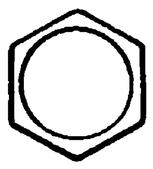
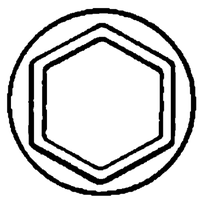
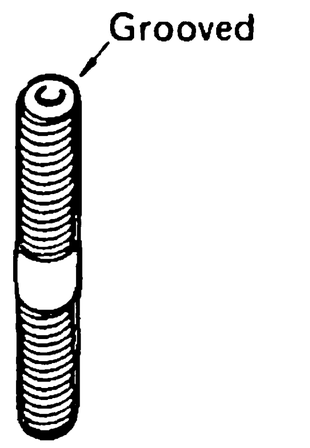
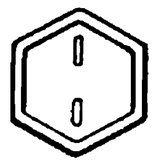
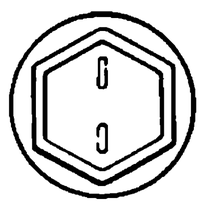
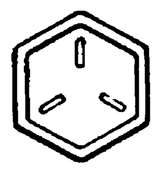
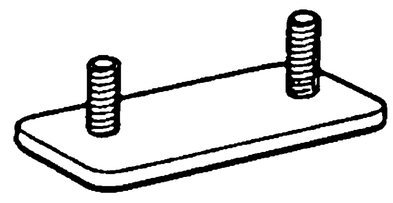
STANDARD BOLT TORQUE SPECIFICATIONS

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STANDARD BOLT TORQUE SPECIFICATIONS

HOW TO DETERMINE BOLT STRENGTH

<table>
<tr><th></th><th colspan="2">Mark</th><th>Class</th><th></th><th>Mark</th><th>Class</th></tr>
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</td><td>4–
5–
6–
7–</td><td>4T
5T
6T
7T</td><td rowspan="5">Stud bolt</td><td rowspan="2"> 
</td><td rowspan="2">4T</td></tr>
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</td><td rowspan="3">6T</td></tr>
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<tr><td>Hexagon flange bolt
w/washer hexagon bolt</td><td>  </td><td>Two protruding lines</td><td>6T</td></tr>
<tr><td>Hexagon head bolt</td><td>  </td><td>Three protruding lines</td><td>7T</td><td>Welded bolt</td><td>  </td><td>4T</td></tr>
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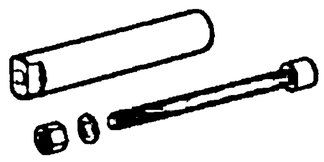
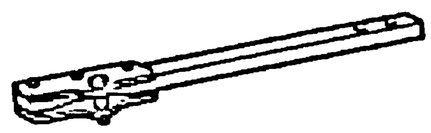
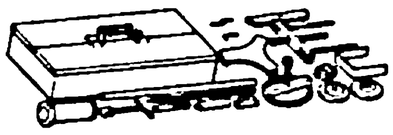
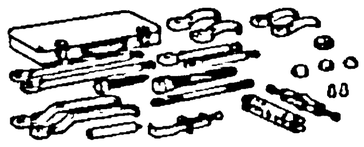
SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Hexagon head bolt			Hexagon flange bolt		
			kg-cm	ft-lb	N·m	kg-cm	ft-lb	N·m
4T	6	1	55	48 in.-lb	5.4	60	52 in.-lb	5.9
	8	1.25	130	9	13	145	10	14
	10	1.25	260	19	25	290	21	28
	12	1.25	480	35	47	540	39	53
	14	1.5	760	55	75	850	61	83
	16	1.5	1,150	83	113		–	
5T	6	1	65	56 in.-lb	6.4		–	
	8	1.25	160	12	16		–	
	10	1.25	330	24	32		–	
	12	1.25	600	43	59		–	
	14	1.5	930	67	91		–	
	16	1.5	1,400	101	137		–	
6T	6	1	80	69 in.-lb	7.8	90	78 in.-lb	8.8
	8	1.25	195	14	19	215	16	21
	10	1.25	400	29	39	440	32	43
	12	1.25	730	53	72	810	59	79
	14	1.5		–		1,250	90	123
7T	6	1	110	8	11	120	9	12
	8	1.25	260	19	25	290	21	28
	10	1.25	530	38	52	590	43	58
	12	1.25	970	70	95	1,050	76	103
	14	1.5	1,500	108	147	1,700	123	167
	16	1.5	2,300	166	226		–	

SST AND SSM

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SST (SPECIAL SERVICE TOOLS)	C-2
SSM (SPECIAL SERVICE MATERIALS)	C-2

SST(SPECIAL SERVICE TOOLS)

Section / Illustration • Part No. • Part Name	A440F	A440L
 09309-36033 (Transmission Bearing Replacer)	●	
 09330-00021 (Companion Flange Holding Tool)	●	
 09350-36010 (TOYOTA Automatic Transmission Tool Set)	●	●
 09950-20016 (Universal Puller)	●	

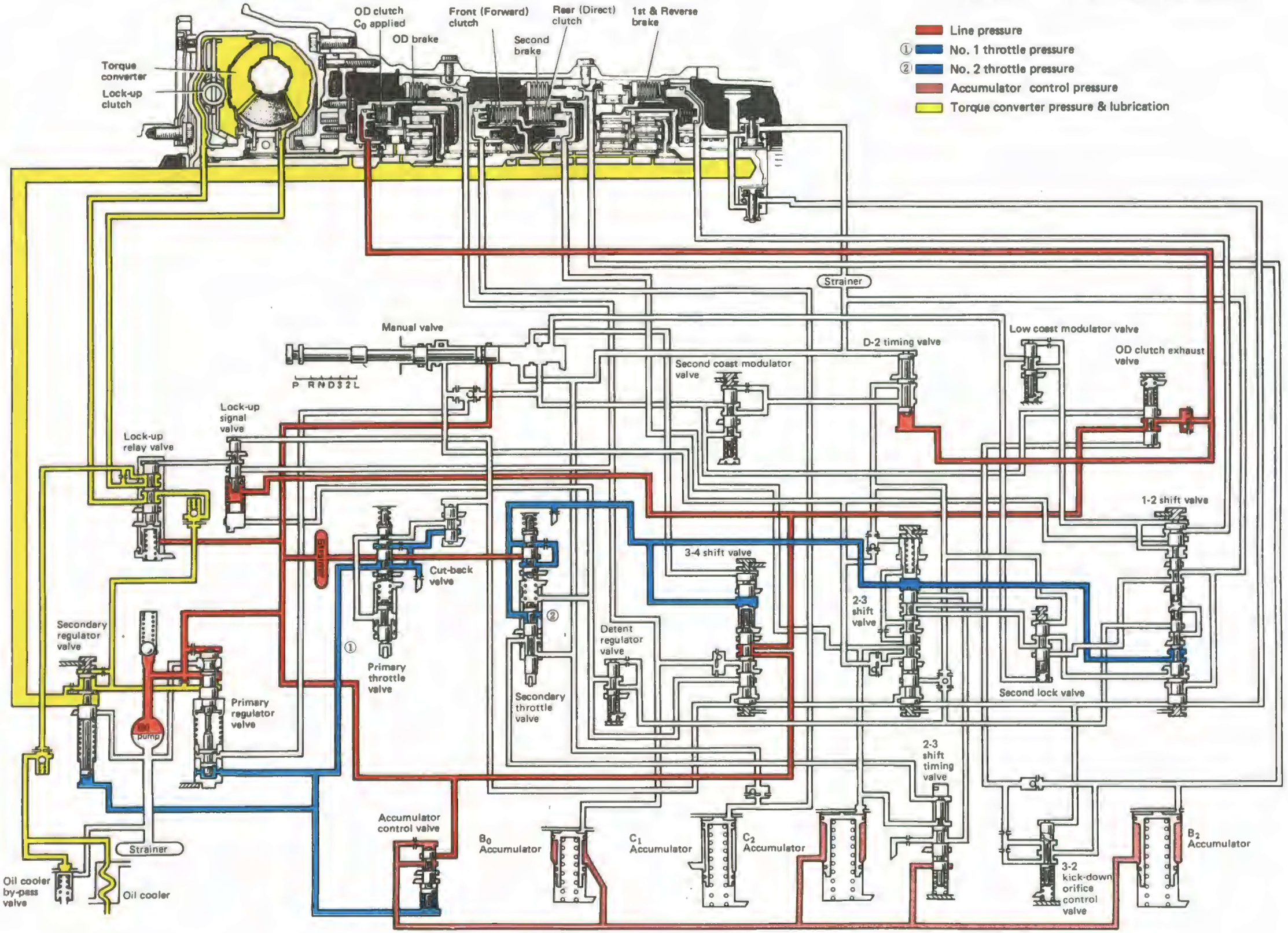
SSM(SPECIAL SERVICE MATERIALS)

Part Name	Part No.	Sec.	Use, etc.
Seal packing (THREE BOND 1324)	08833-00070	AT	Transmission case x Transfer adapter Transfer rear case x Bearing retainer Transfer No. 2 case cover x Rear case Power take-off cover x Rear case
Seal packing (LOCTITE No. 242)	—	AT	Center support x Transmission case Overdrive support x Transmission case Oil pump x Transmission case Power take-off cover x Transmission case

AUTOMATIC TRANSMISSION HYDRAULIC CIRCUIT

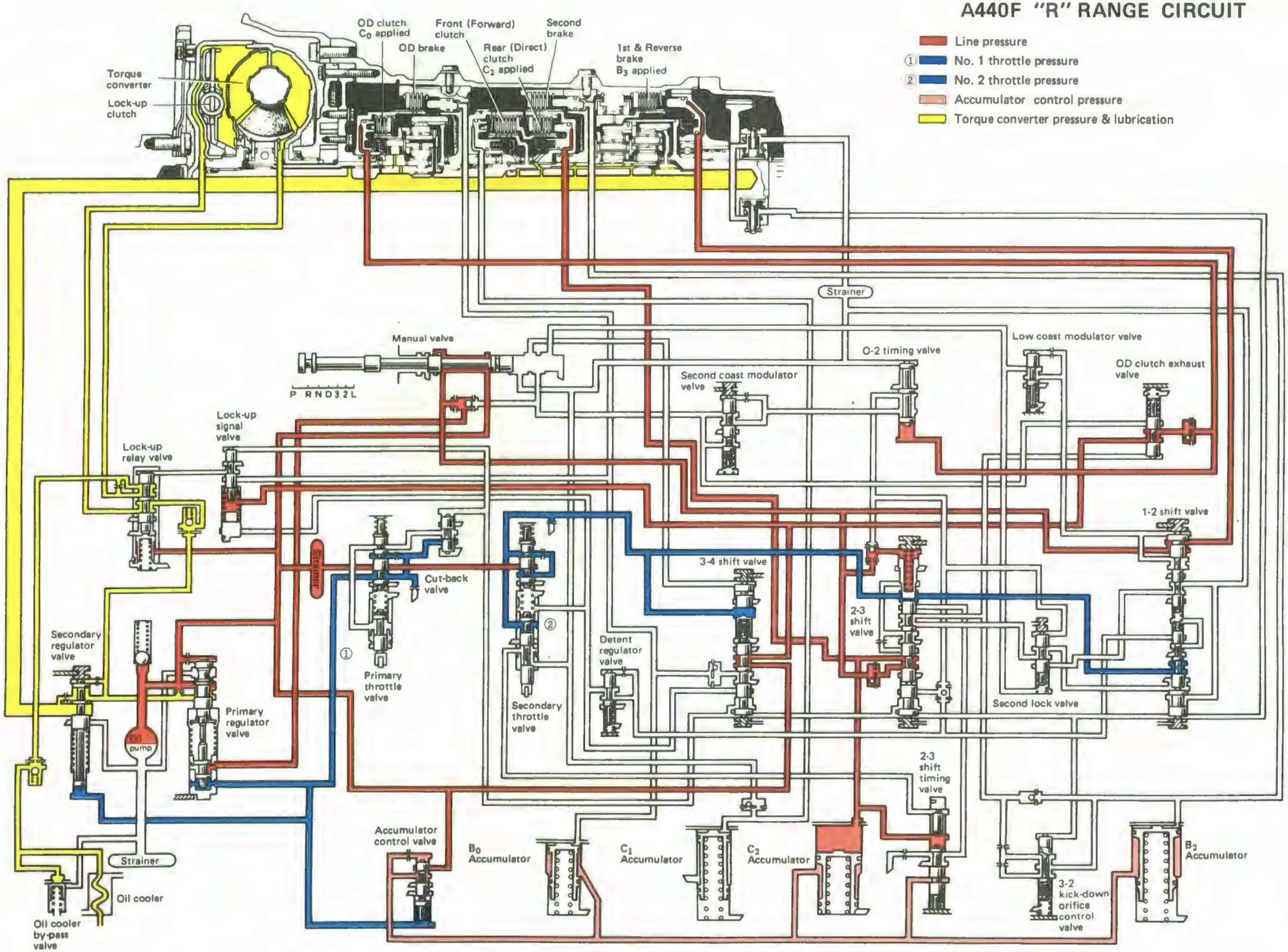
	Page
A440F HYDRAULIC CIRCUIT	D-2
DIFFERENCE BETWEEN THE A440L AND A440F	D-15

A440F "P" RANGE CIRCUIT

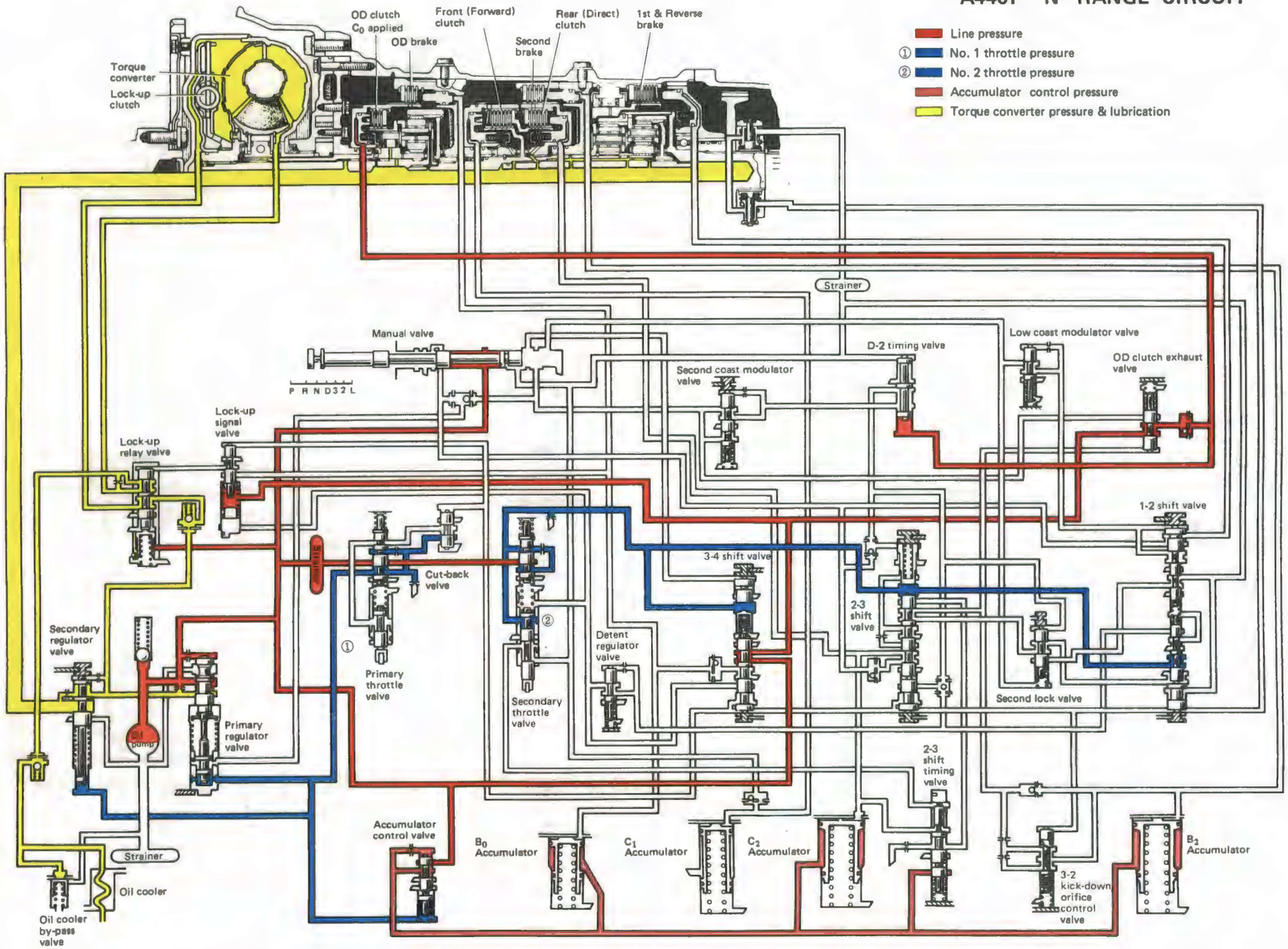


A440F "R" RANGE CIRCUIT

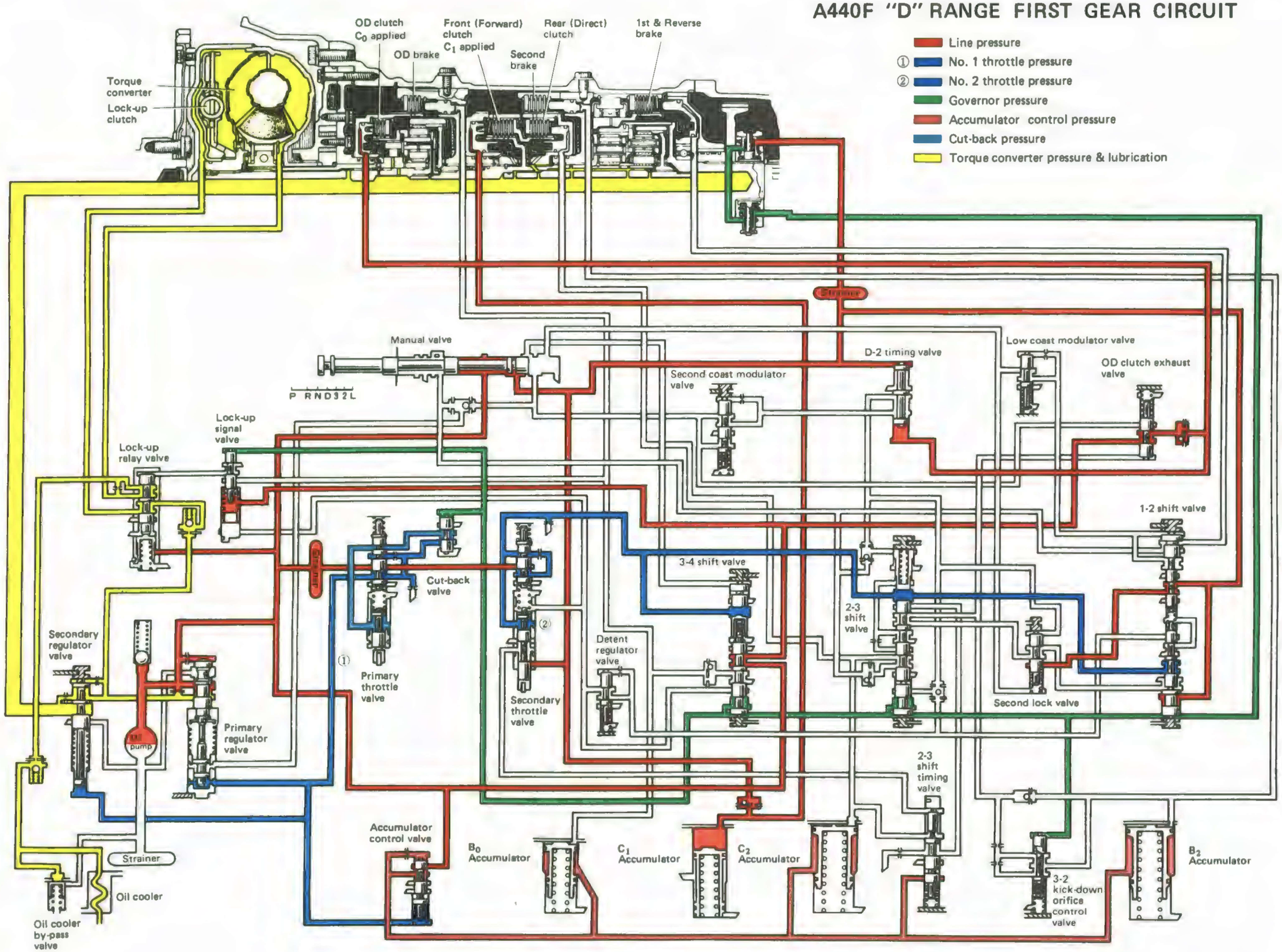
Line pressure
① No. 1 throttle pressure
② No. 2 throttle pressure
Accumulator control pressure
Torque converter pressure & lubrication



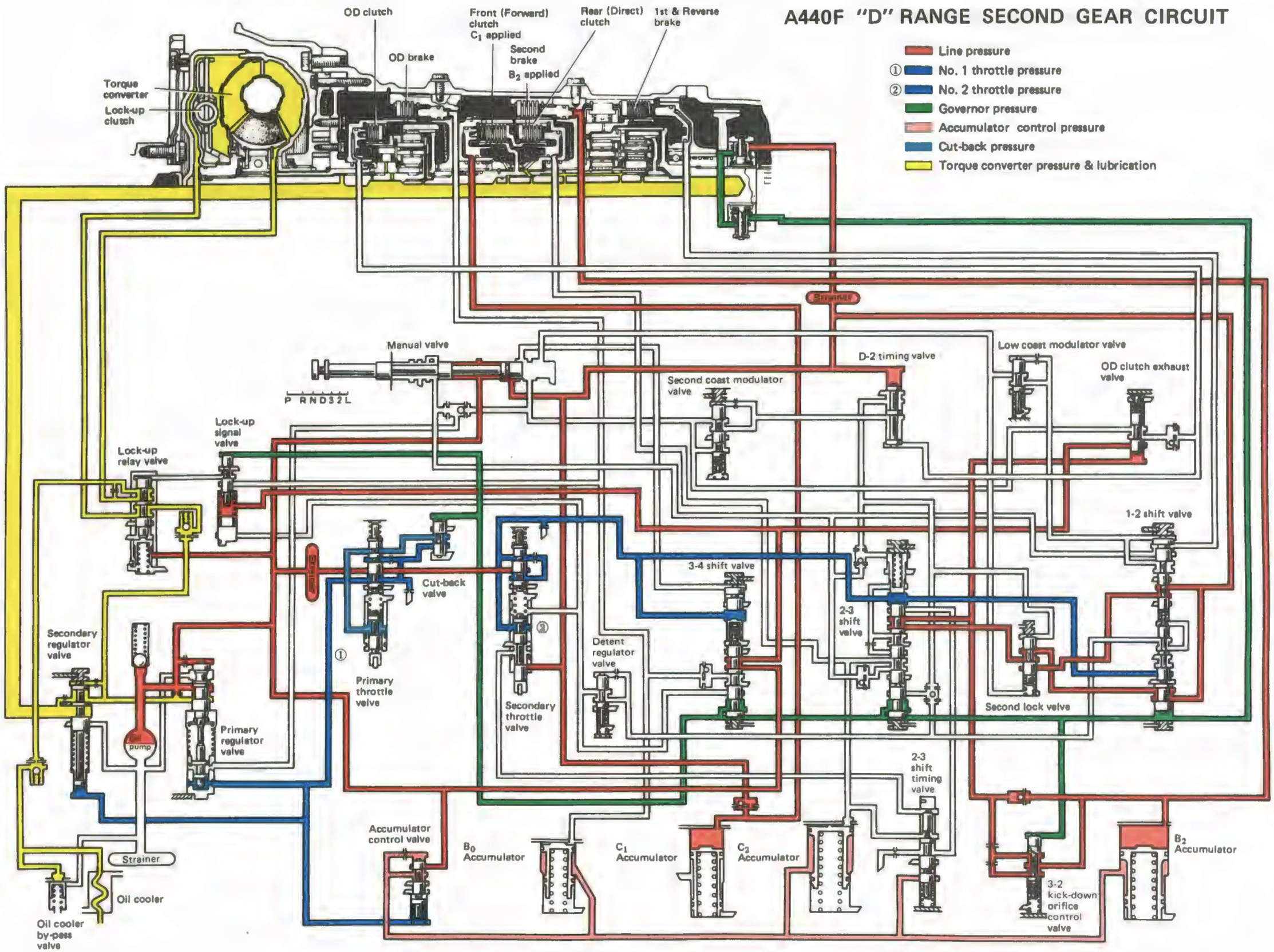
A440F "N" RANGE CIRCUIT



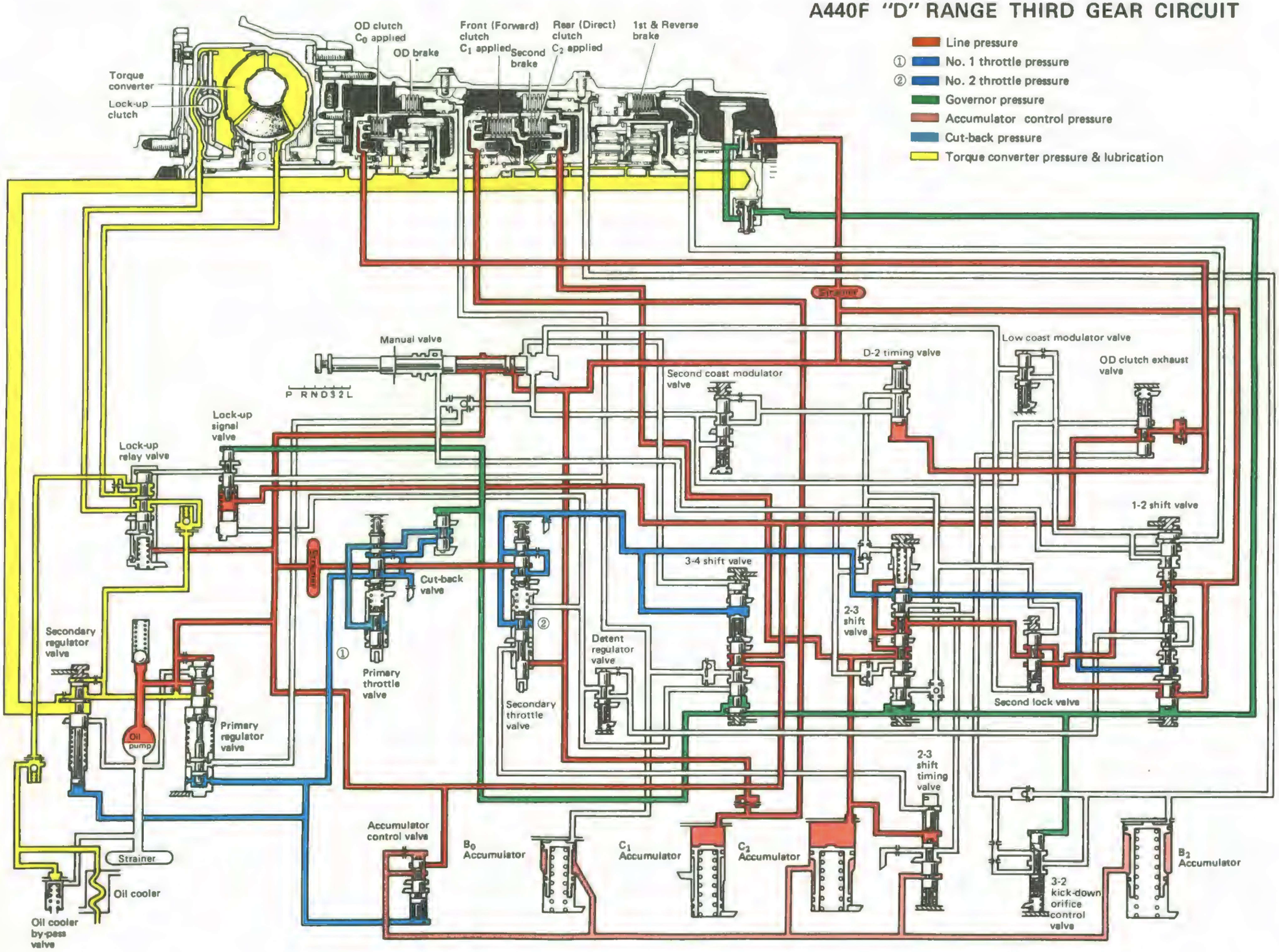
A440F "D" RANGE FIRST GEAR CIRCUIT



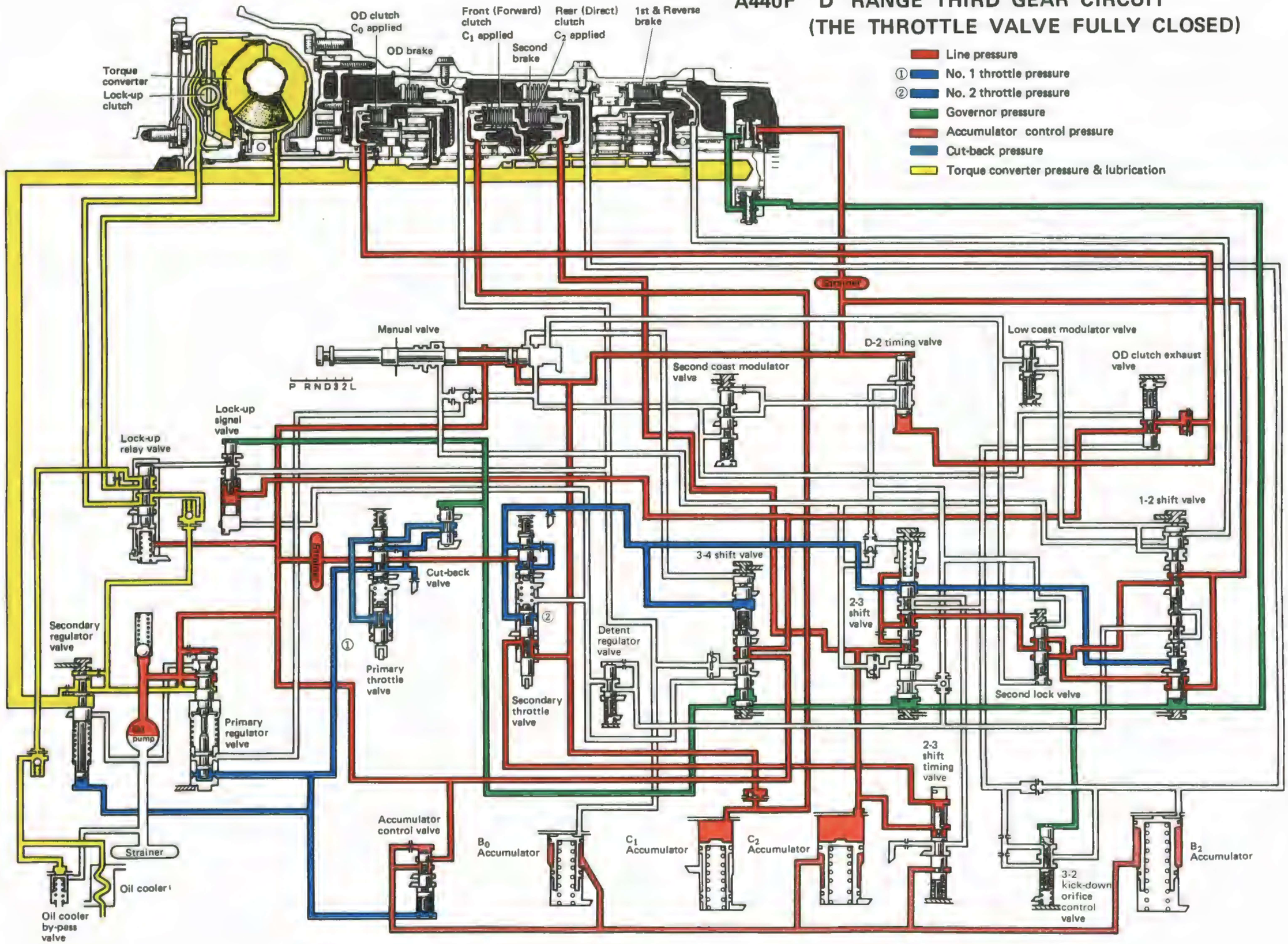
A440F "D" RANGE SECOND GEAR CIRCUIT



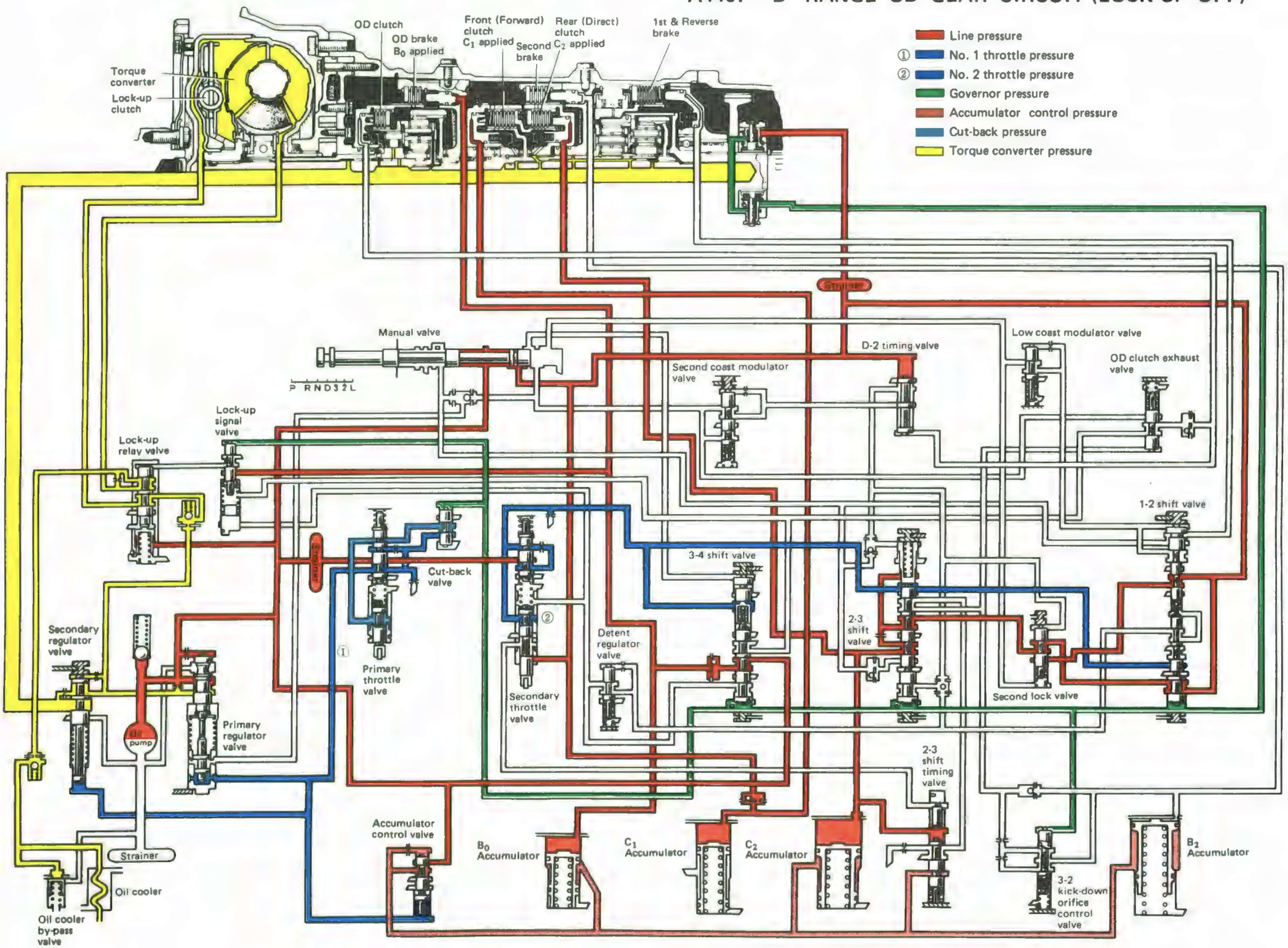
A440F "D" RANGE THIRD GEAR CIRCUIT



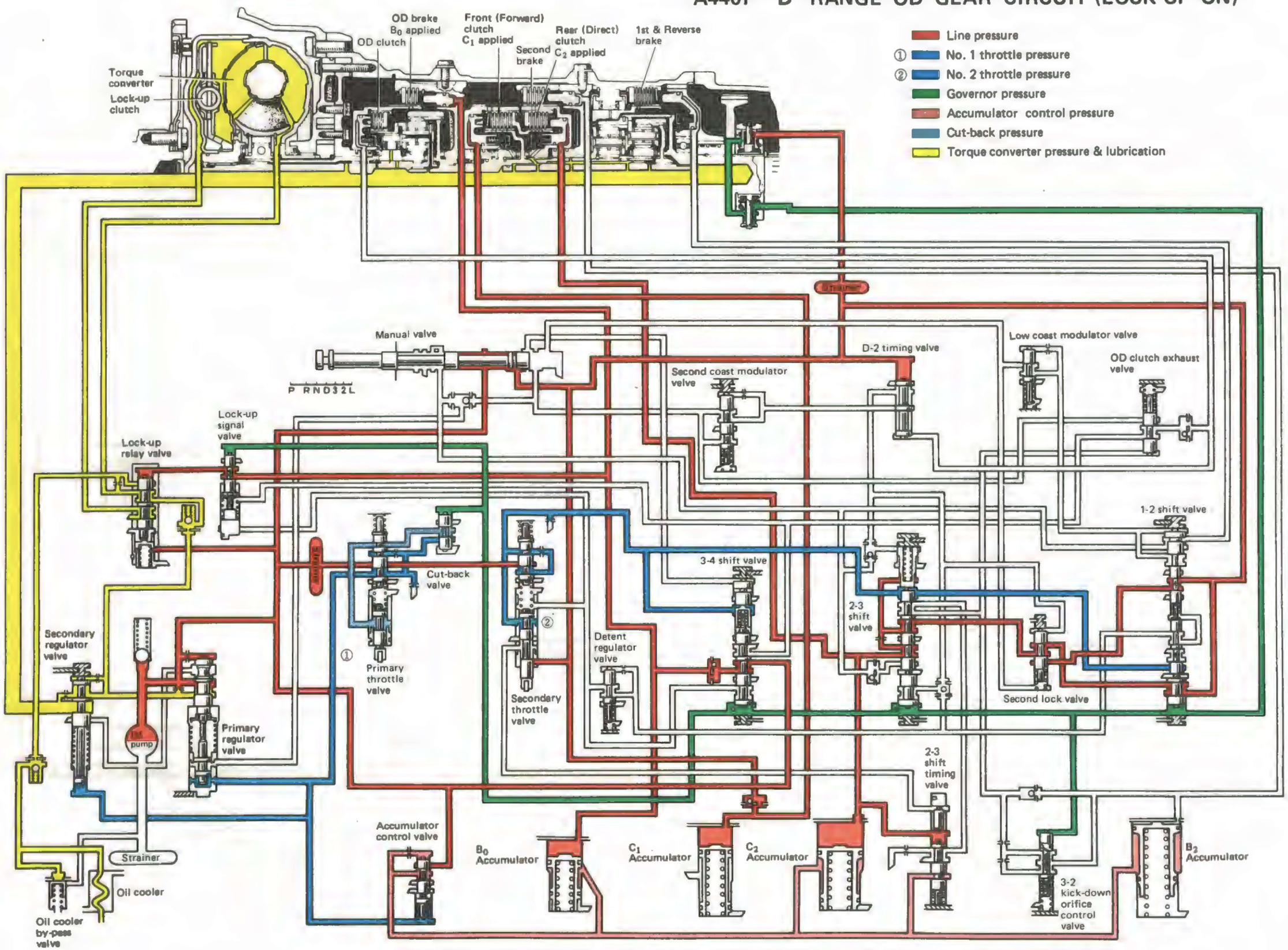
A440F "D" RANGE THIRD GEAR CIRCUIT (THE THROTTLE VALVE FULLY CLOSED)



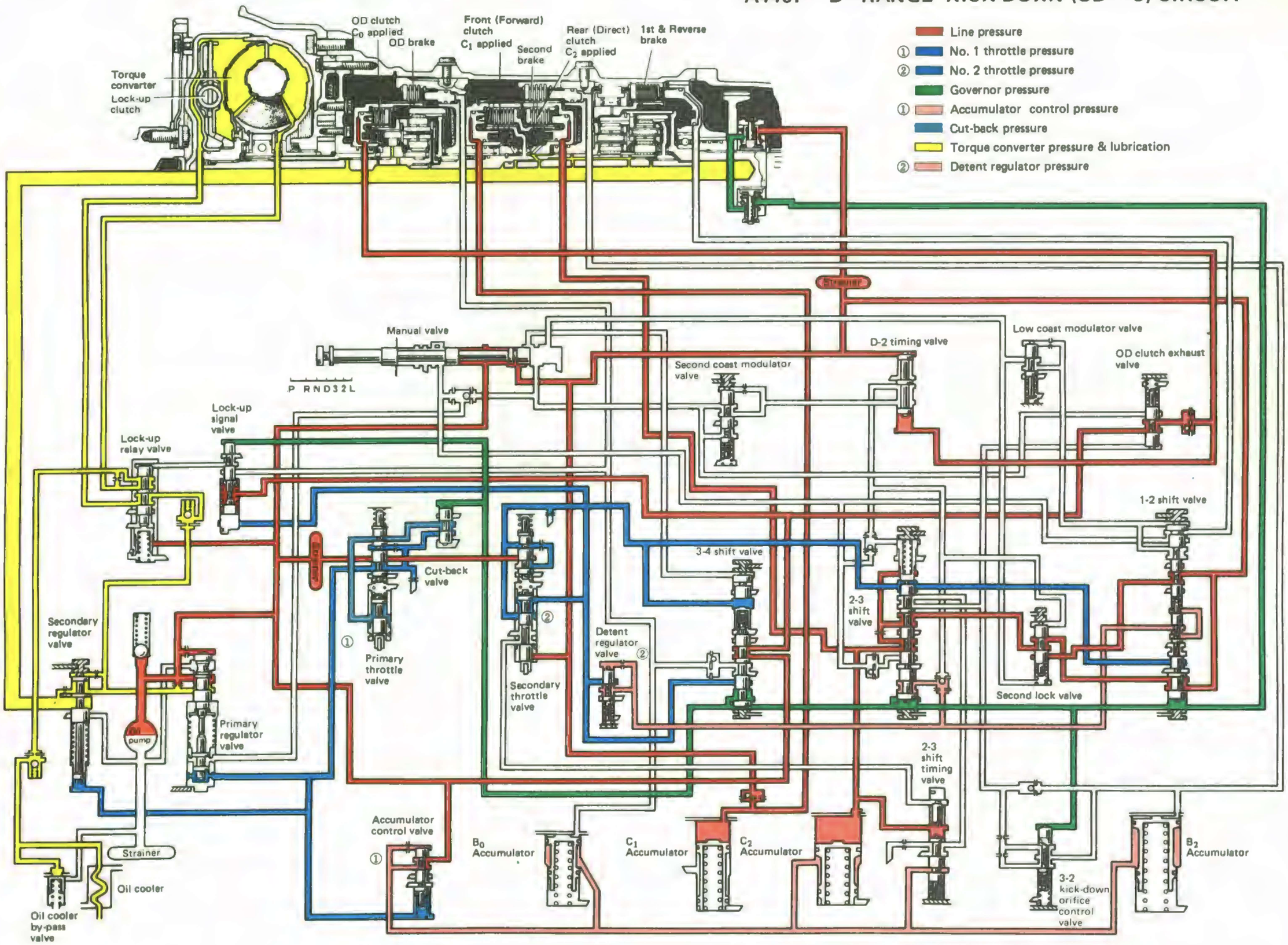
A440F "D" RANGE OD GEAR CIRCUIT (LOCK-UP OFF)



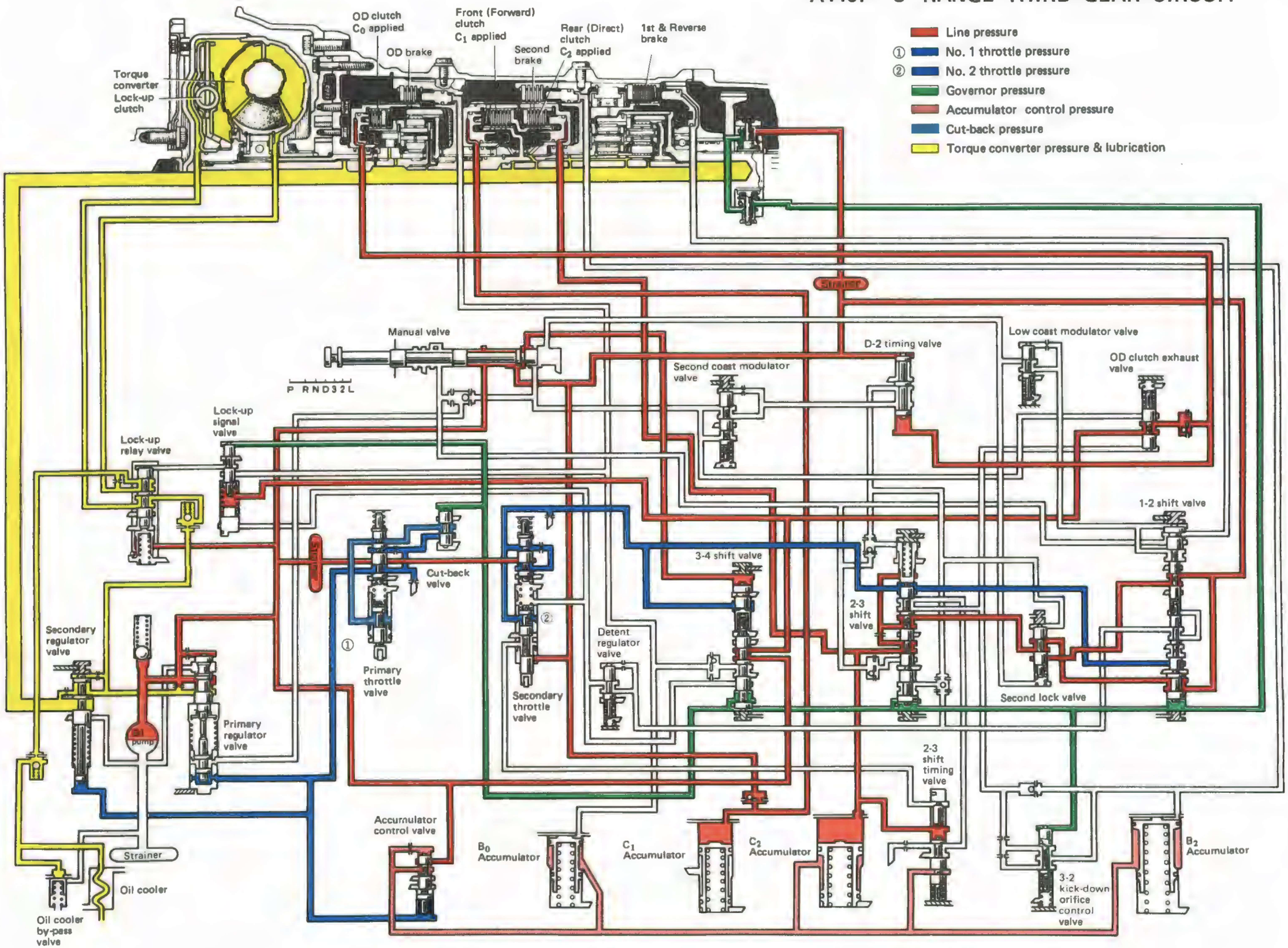
A440F "D" RANGE OD GEAR CIRCUIT (LOCK-UP ON)



A440F "D" RANGE KICK-DOWN (OD → 3) CIRCUIT

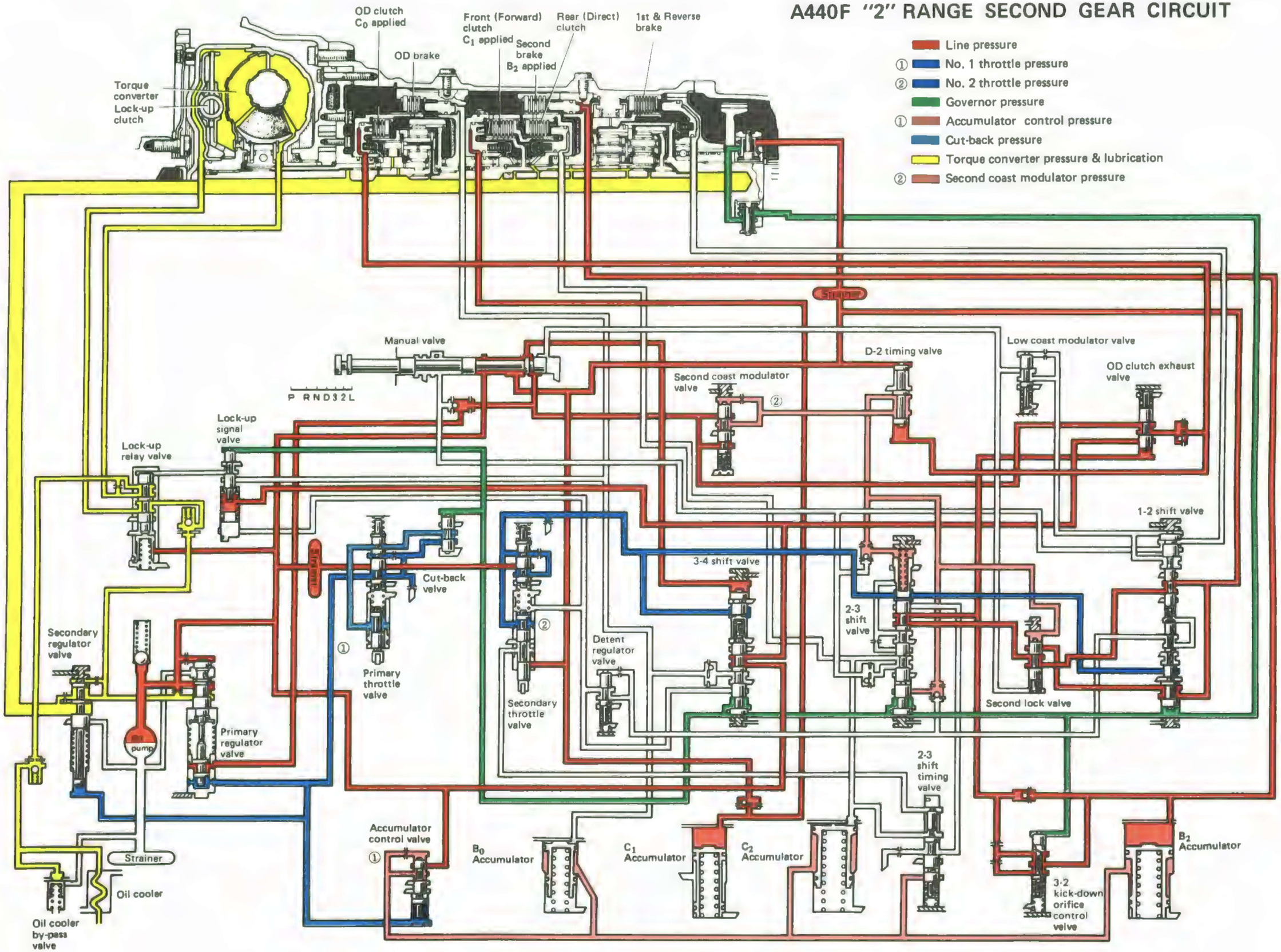


A440F "3" RANGE THIRD GEAR CIRCUIT

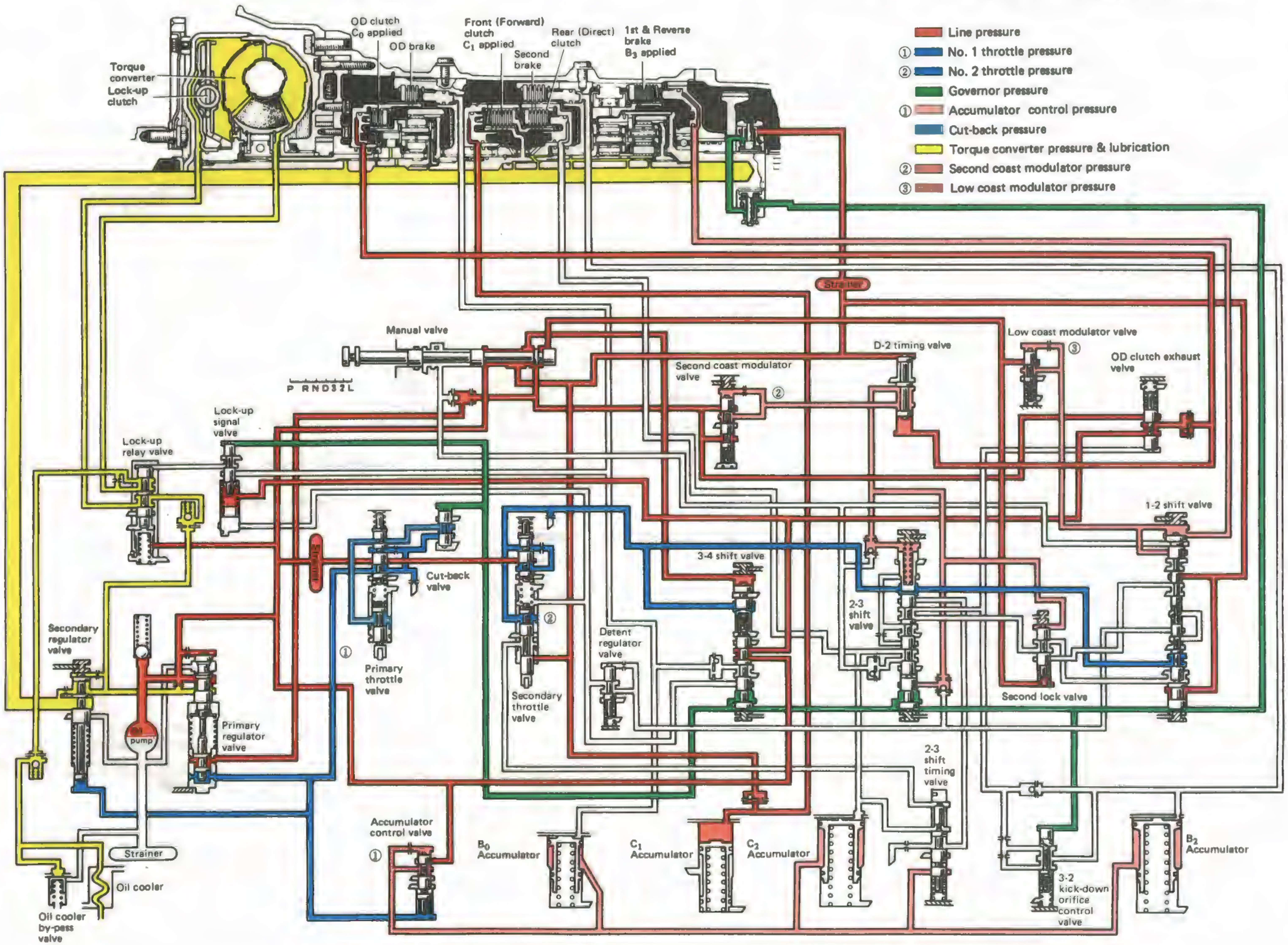


A440F "2" RANGE SECOND GEAR CIRCUIT

- Line pressure
- ① No. 1 throttle pressure
- ② No. 2 throttle pressure
- Governor pressure
- ① Accumulator control pressure
- Cut-back pressure
- Torque converter pressure & lubrication
- ② Second coast modulator pressure



A440F "L" RANGE FIRST GEAR CIRCUIT



DIFFERENCE BETWEEN THE A440L AND A440F

