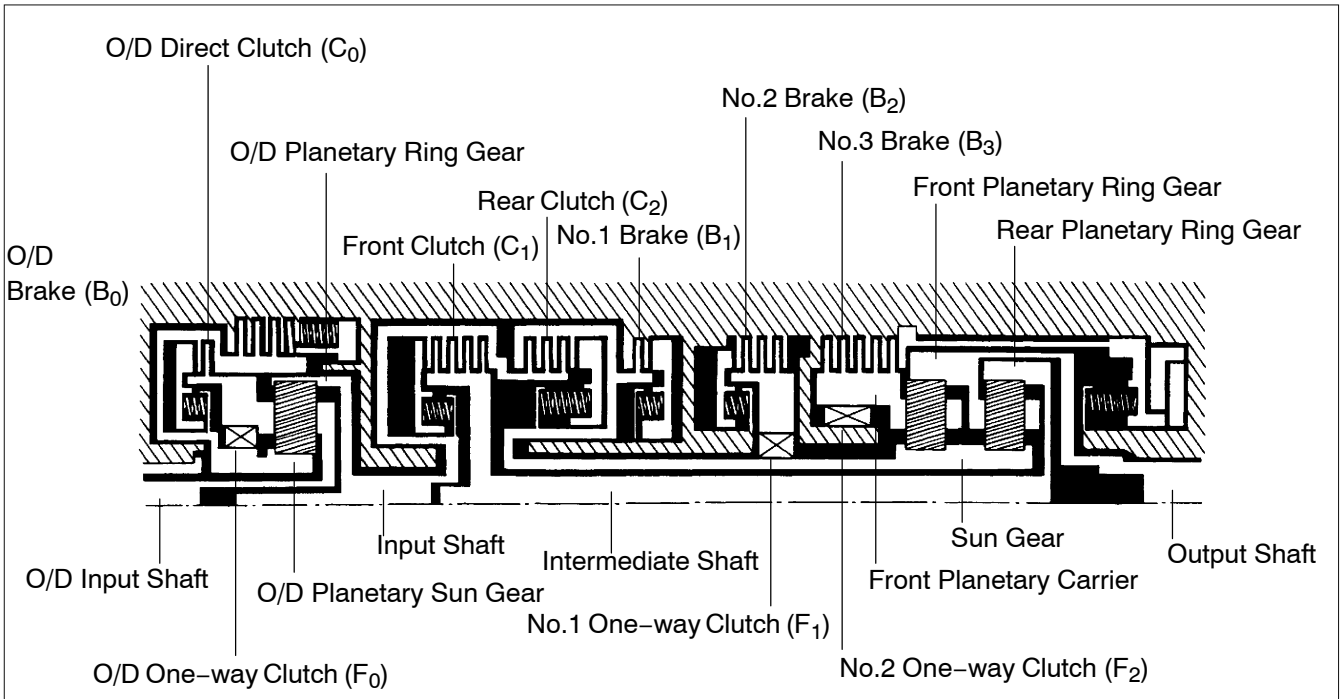
AUTOMATIC TRANSMISSION SYSTEM

OPERATION

AT0HY–01



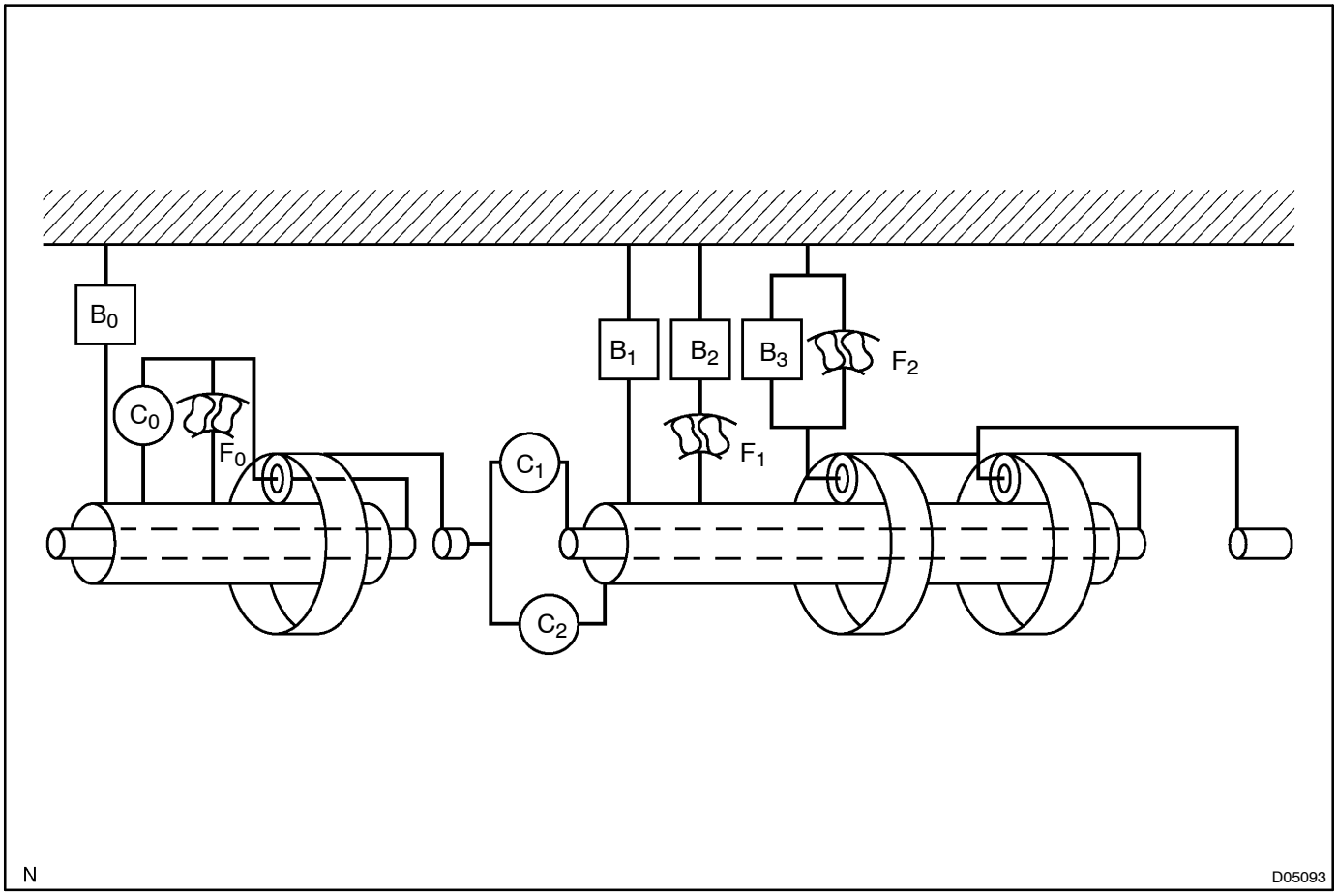
○..... Operating

Shift lever range	Gear position	C_0	C_1	C_2		B_0	B_1	B_2	B_3		F_0	F_1	F_2
				I.P.	O.P.				I.P.	O.P.			
P	Parking	○											
R	Reverse	○		○	○				○	○	○		
N	Neutral	○											
D	1st	○	○								○		○
	2nd	○	○					○			○	○	
	3rd	○	○	○				○			○		
	4th		○	○		○		○					
2	1st	○	○								○		○
	2nd	○	○				○	○			○	○	
L	1st	○	○						○	○	○		○

I.P.: Inner Piston
O.P.: Outer Piston

D00790

FUNCTION OF COMPONENTS

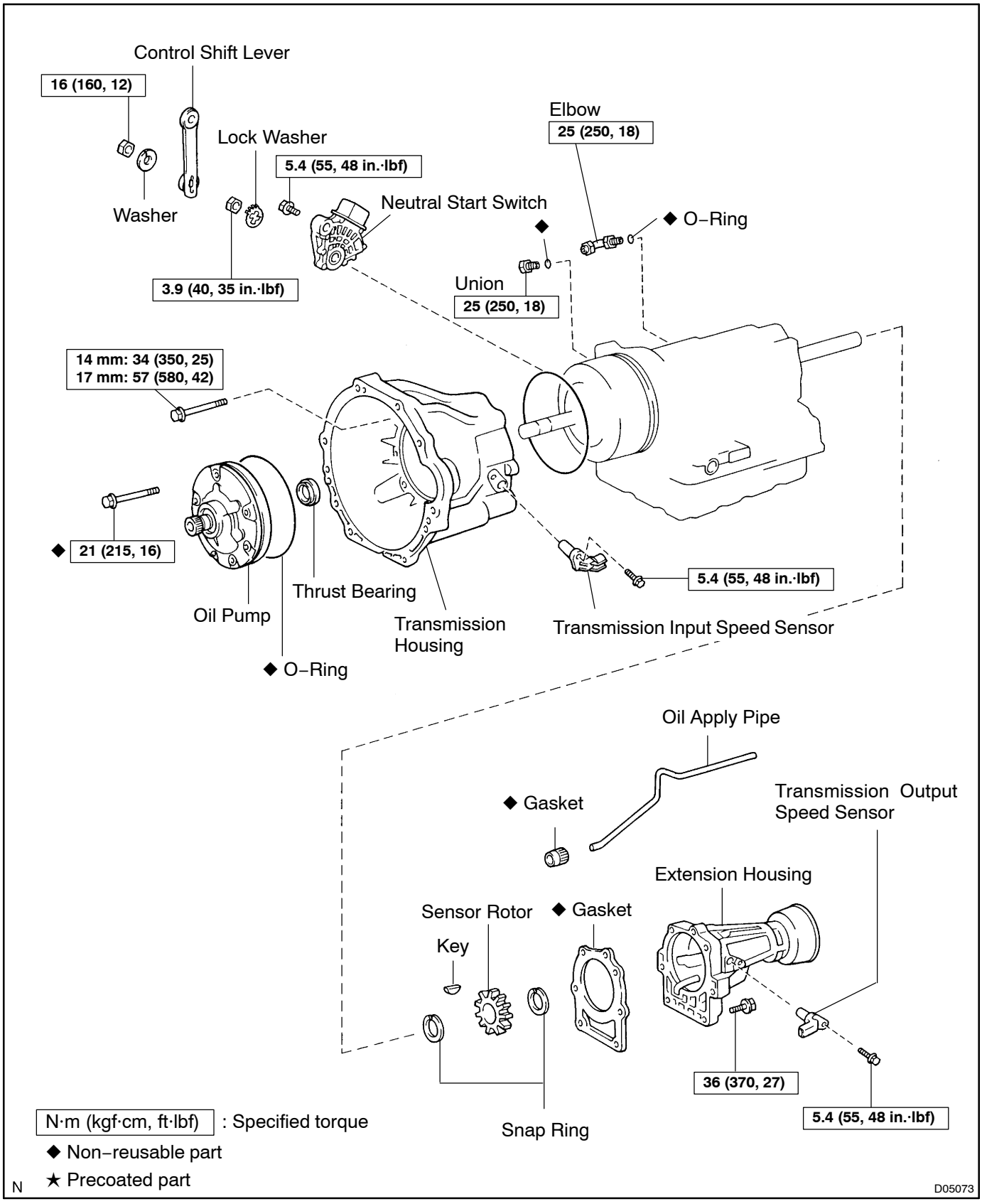


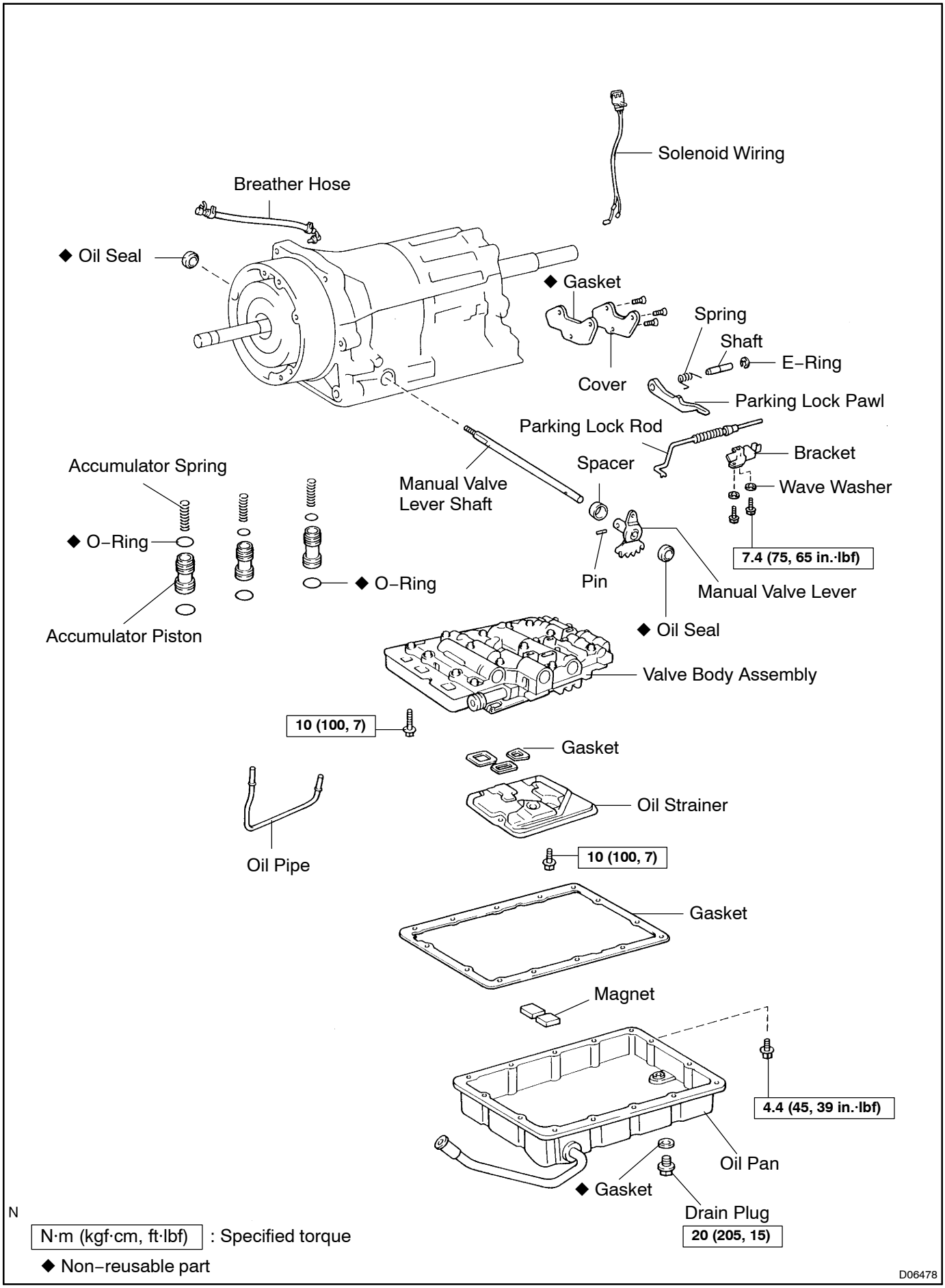
Component		Function
C_0	O/D Direct Clutch	Connects O/D sun gear & O/D planetary carrier.
C_1	Forward Clutch	Connects input shaft and intermediate shaft.
C_2	Direct Clutch	Connects input shaft and front & rear planetary sun gear.
B_0	O/D Brake	Prevents O/D sun gear from turning either clockwise or counterclockwise.
B_1	2nd Coast Brake	Prevents front & rear planetary sun gear from turning either clockwise or counterclockwise.
B_2	2nd Brake	Prevents outer race of F_1 from turning either clockwise or counterclockwise thus preventing the front & rear planetary sun gear from turning counterclockwise.
B_3	1st & Reverse Brake	Prevents from planetary carrier from turning either clockwise or counterclockwise.
F_0	O/D One–way Clutch	When the transmission is being driven by the engine, this clutch connects the O/D sun gear and O/D planetary carrier.
F_1	No. 1 One–way Clutch	When B_2 is operating, this clutch prevents the front & rear planetary sun gear from turning counterclockwise.
F_2	No. 2 One–way Clutch	Prevents from planetary carrier from turning counterclockwise.

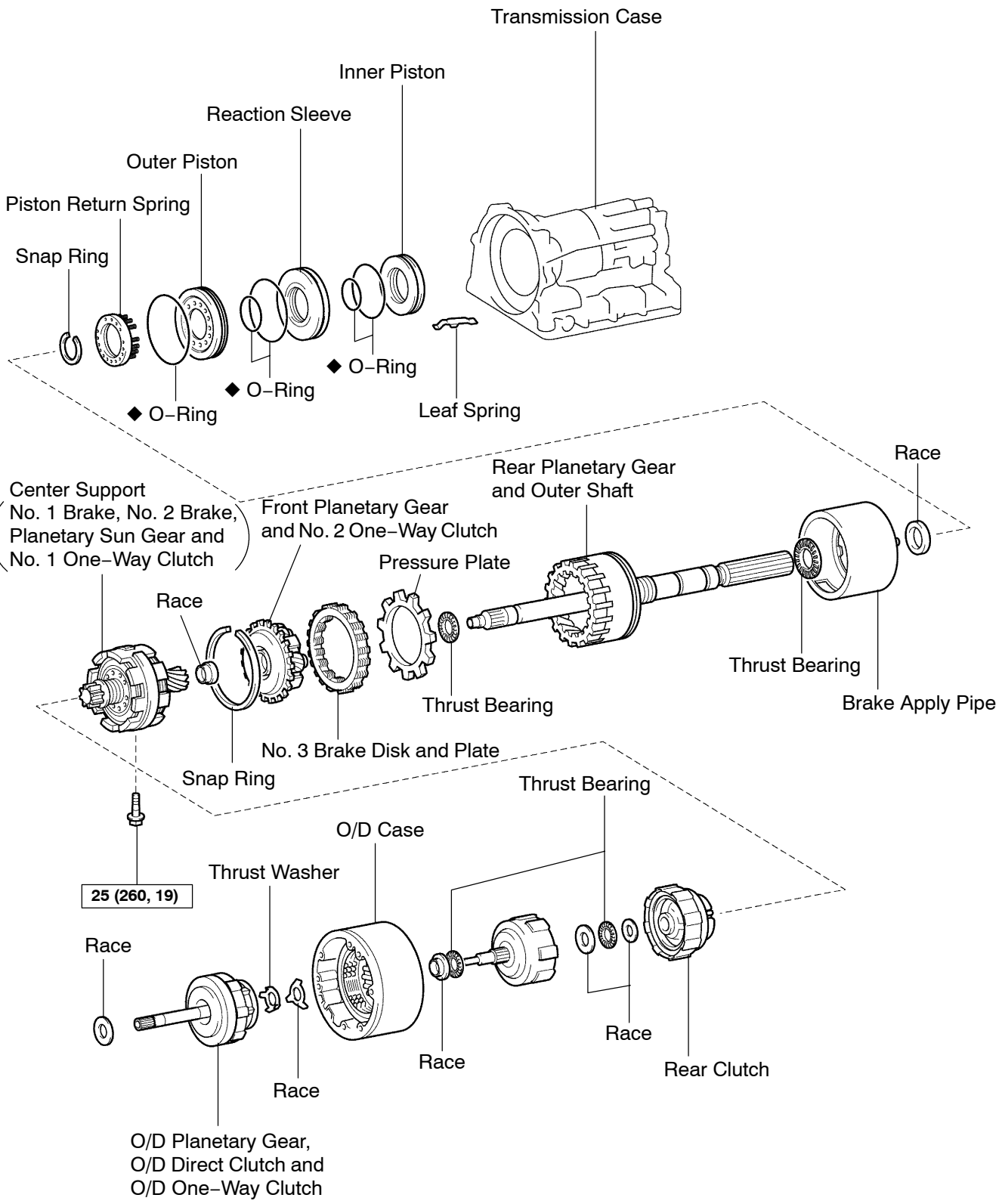
COMPONENT PARTS

COMPONENTS

AT0HZ–01




Solenoid Wiring
Breather Hose
◆ Oil Seal
◆ Gasket
Spring
Shaft
E–Ring
Cover
Parking Lock Pawl
Parking Lock Rod
Bracket
Spacer
Wave Washer
Accumulator Spring
Manual Valve
Lever Shaft
7.4 (75, 65 in.·lbf)
◆ O–Ring
◆ O–Ring
Pin
Manual Valve Lever
◆ Oil Seal
Accumulator Piston
Valve Body Assembly
10 (100, 7)
Gasket
Oil Strainer
Oil Pipe
10 (100, 7)
Gasket
Magnet
4.4 (45, 39 in.·lbf)
Oil Pan
◆ Gasket
Drain Plug
20 (205, 15)
N
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
D06478



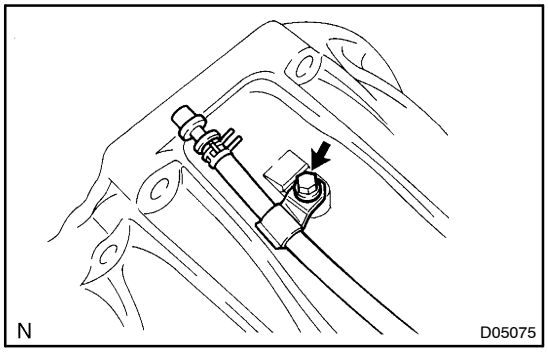
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

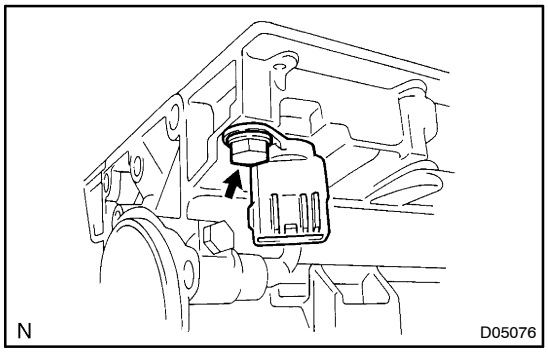
P D06413

AT0I0–01

DISASSEMBLY

1. REMOVE BREATHER HOSE

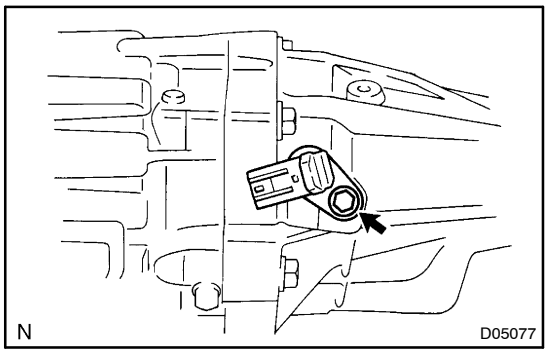




2. REMOVE SOLENOID WIRE RETAINING BOLT

NOTICE:

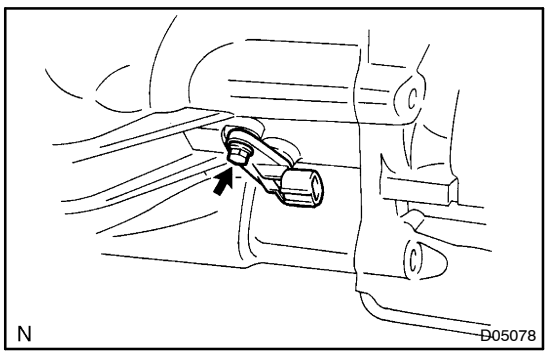
Remove the bolt only and do not remove the solenoid wire.



3. REMOVE TRANSMISSION OUTPUT SPEED SENSOR

(a) Remove the bolt and transmission output speed sensor.

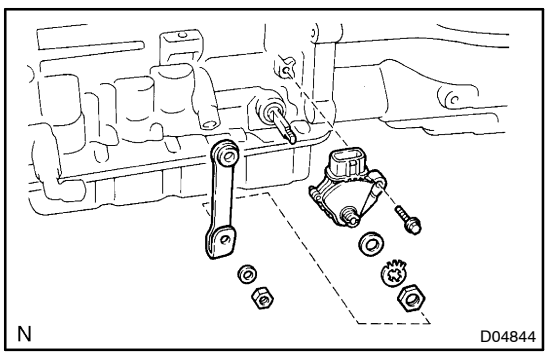
(b) Remove the O–ring from the sensor.



4. REMOVE TRANSMISSION INPUT SPEED SENSOR

(a) Remove the bolt and transmission input speed sensor.

(b) Remove the O–ring from the sensor.



5. REMOVE TRANSMISSION CONTROL SHIFT LEVER

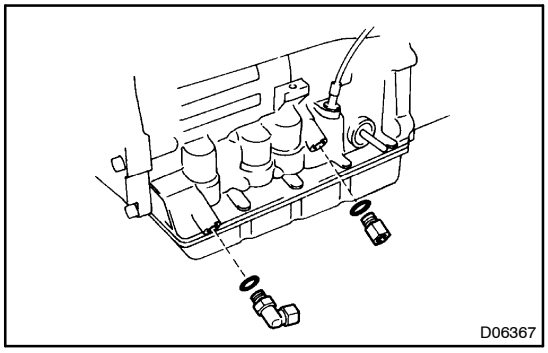
Remove the nut and washer.

6. REMOVE NEUTRAL START SWITCH

(a) Unstake the lock washer.

(b) Remove the lock washer.

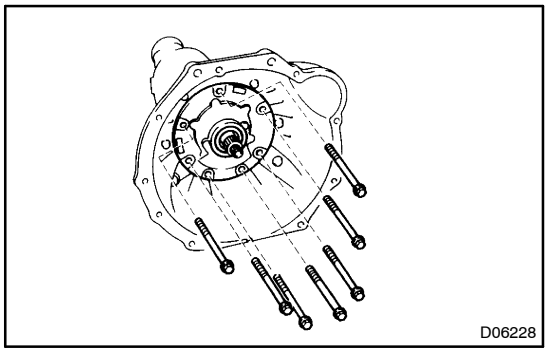
(c) Remove the nut and bolt, and then remove the neutral start switch.



7. REMOVE UNION AND ELBOW

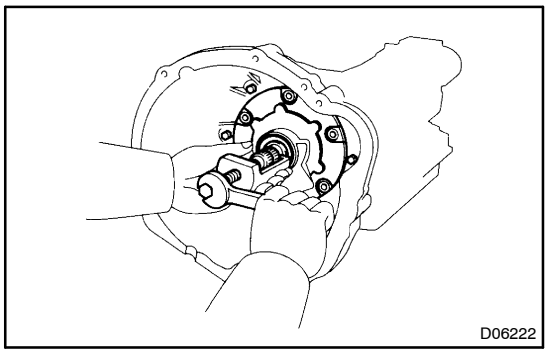
(a) Remove the union and elbow.

(b) Remove the 2 O–rings from the union and elbow.



8. REMOVE OIL PUMP

(a) Remove the 7 bolts holding the oil pump to the transmission case.

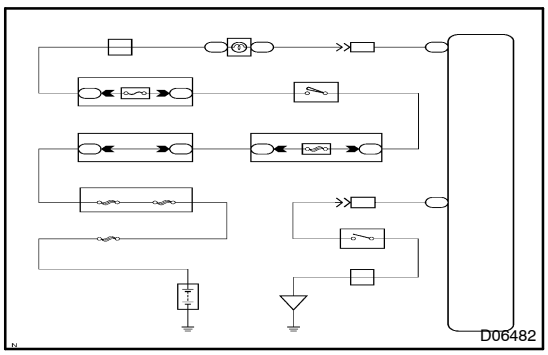


(b) Using SST, remove the oil pump.
SST 09610–20012

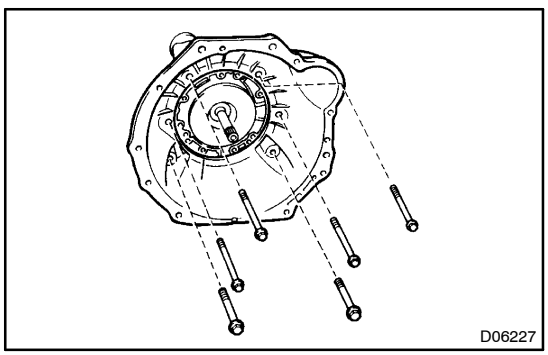
NOTICE:

Do not damage the stator shaft busing surface.

(c) Grasp the front pump stator shaft and pull the pump from the case.



9. REMOVE ASSEMBLED BEARING AND RACE FROM OIL PUMP

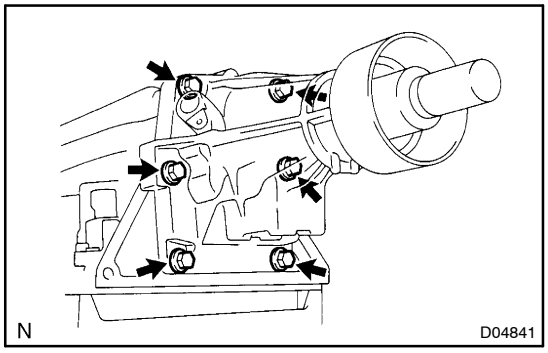


10. REMOVE TRANSMISSION HOUSING

(a) Remove the 6 bolts.

(b) While holding the input shaft, remove the transmission housing.

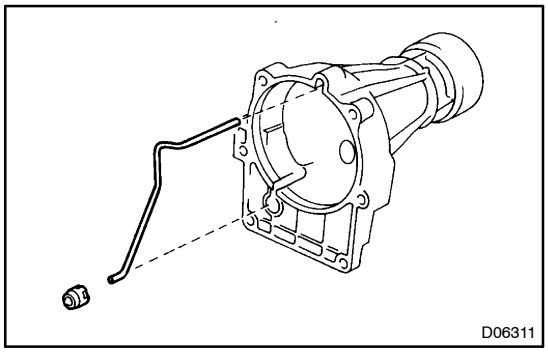
(c) Remove the O–ring from the O/D case.



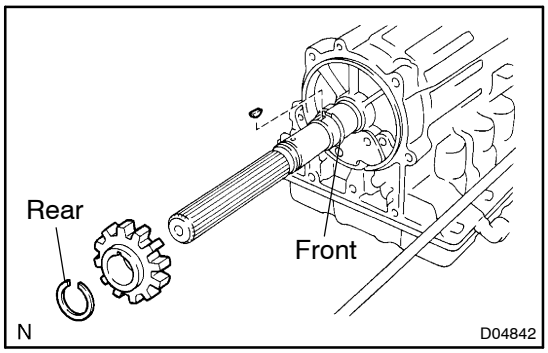
11. REMOVE EXTENSION HOUSING AND GASKET

(a) Remove the 6 bolts and extension housing.

(b) Remove the gasket.



(c) Remove the gasket and oil apply pipe from the extension housing.

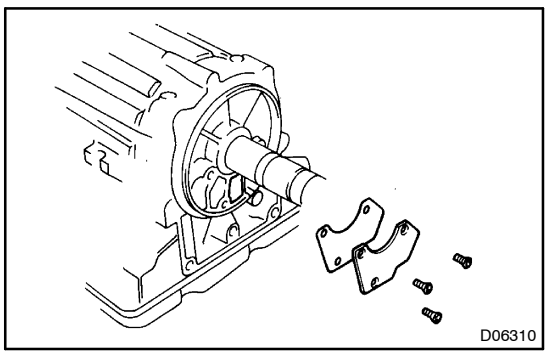


12. REMOVE SENSOR ROTOR AND KEY

(a) Using a snap ring expander, remove the rear side snap ring.

(b) Remove the sensor rotor and key.

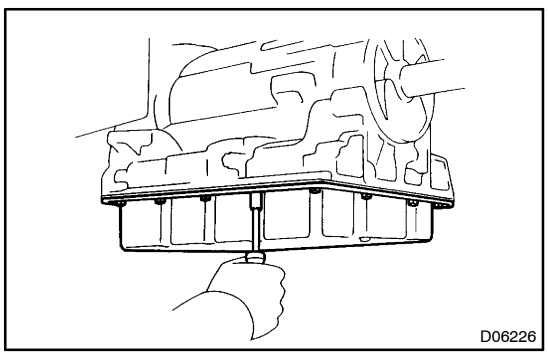
(c) Using a snap ring expander, remove the front side snap ring.



13. REMOVE GOVERNOR OIL STRAINER

(a) Remove the 3 screws, cover and gasket.

(b) Remove the governor oil strainer from the transmission case.



14. REMOVE OIL PAN

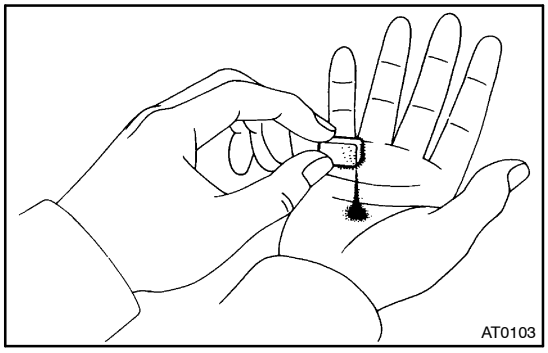
NOTICE:

Do not turn the transmission over as this will contaminate the valve body with any foreign matter at the bottom on the pan.

(a) Remove the 14 bolts.

(b) Remove the pan by lifting the transmission case.

(c) Remove the oil pan gasket.

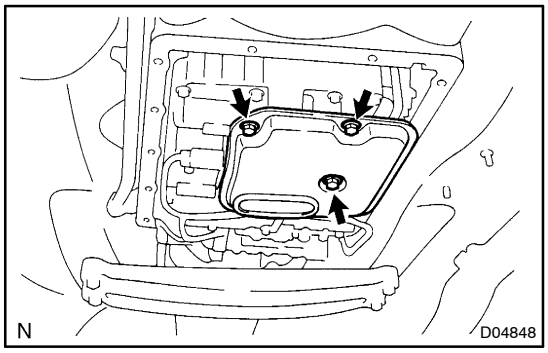


15. EXAMINE PARTICLES IN PAN

Remove the magnets and use then to collect any steel chips. Look carefully at the chips and particles in the pan and the magnet to anticipate what type of wear you will fine in the transmission.

Steel (magnetic): bearing, gear and plate wear

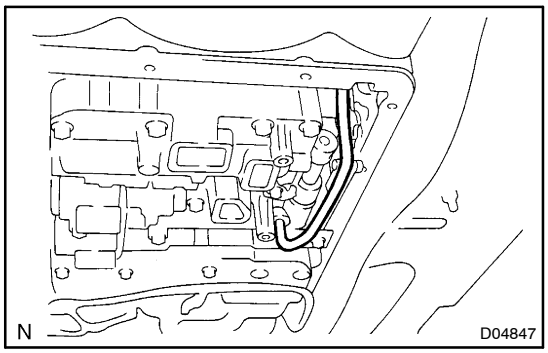
Brass (non–magnetic): bushing wear



16. REMOVE OIL STRAINER

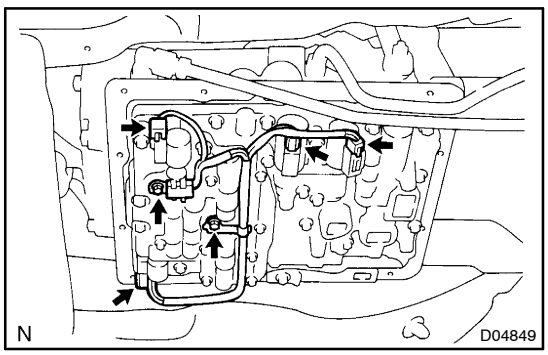
(a) Remove the 3 bolts and oil strainer.

(b) Remove the 3 gaskets.



17. REMOVE OIL PIPE

Pry up both oil pipe ends with a large screwdriver and remove the oil pipe.



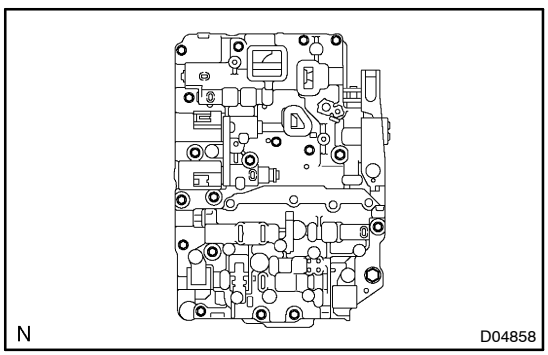
18. REMOVE SOLENOID WIRING WITH ATF TEMPERATURE SENSOR

(a) Remove the bolt and disconnect the ATF temperature sensor.

(b) Remove the bolt and clamp.

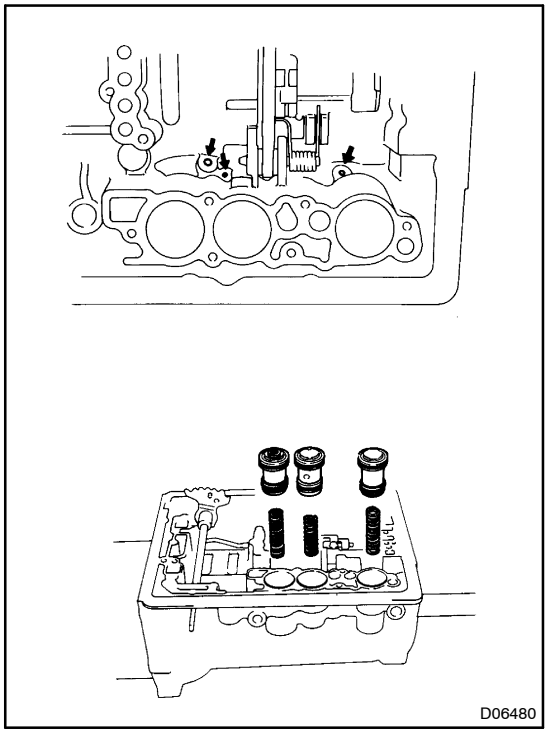
(c) Disconnect the 4 connectors from the solenoid.

(d) Remove the clamp from the ATF temperature sensor.



19. REMOVE VALVE BODY

(a) Remove the 17 bolts.



20. REMOVE ACCUMULATOR PISTON AND SPRING

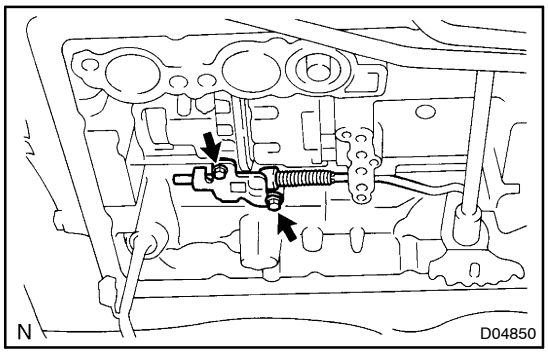
CAUTION:

Keep face away to avoid injury. Do not use regular high–pressure air.

(a) Position a rag to catch each piston.

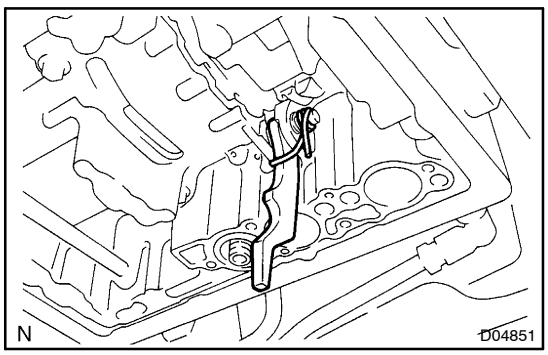
(b) Applying compressed air to the oil holes shown, and remove the 3 pistons and springs.

(c) Remove the 2 O–rings from each piston.

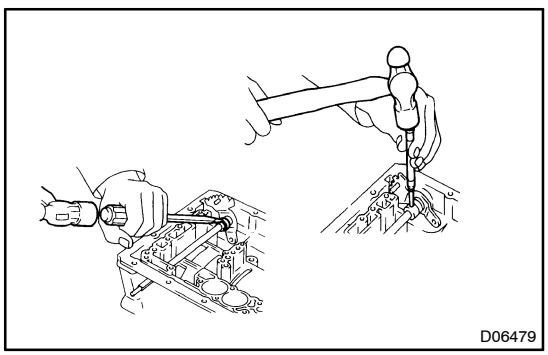


21. REMOVE PARKING LOCK PAWL BRACKET

Remove the 2 bolts and parking lock pawl bracket.



22. REMOVE SPRING, PARKING LOCK PAWL PIN AND PARKING LOCK PAWL

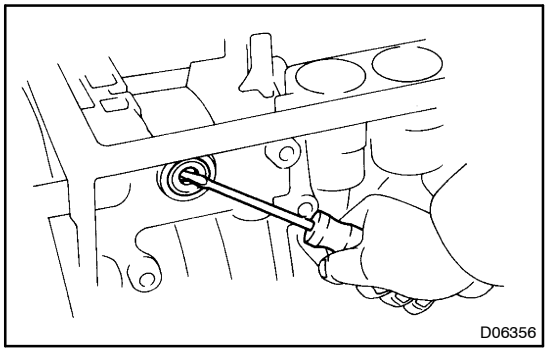


23. REMOVE MANUAL VALVE LEVER SHAFT

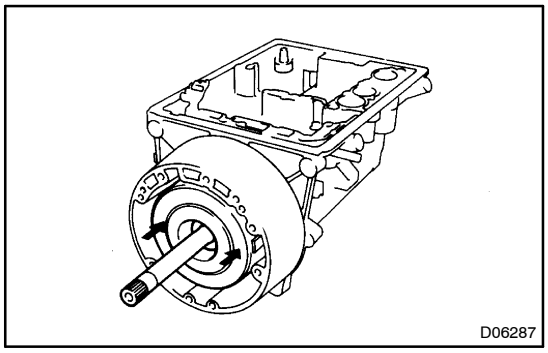
(a) Using a hammer and screwdriver, pry and shift the spacer.

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

(c) Slide the manual valve lever shaft out case and remove the manual valve lever and spacer.

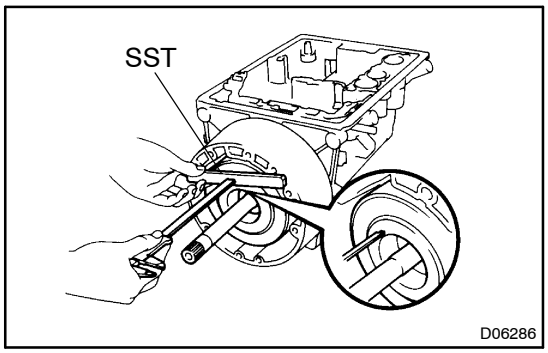


(d) Using a screwdriver, remove the 2 oil seals.



24. MEASURE INSTALLATION DISTANCE OF O/D DIRECT CLUTCH

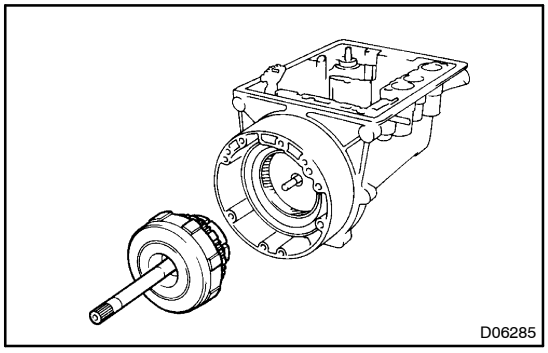
(a) Push the input shaft and drum toward the rear to make sure the O/D direct clutch is installed correctly.



(b) Place SST on the O/D case.
SST 09350–20015 (09370–12010)

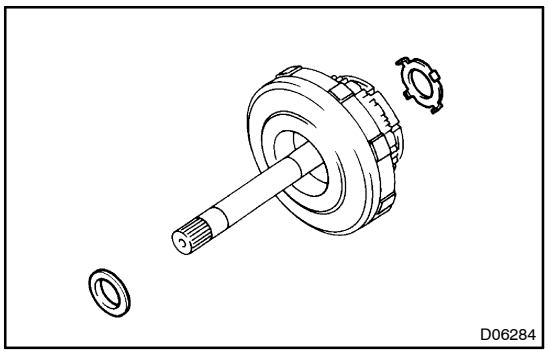
(c) Using calipers, measure distance between the tops of SST and clutch drum.

HINT:
Make a note of the measurement for the reference at assembly.

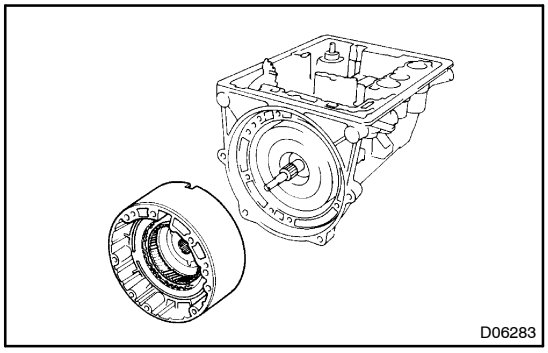


25. REMOVE O/D PLANETARY GEAR UNIT WITH O/D DIRECT CLUTCH AND ONE–WAY CLUTCH

(a) Remove the O/D planetary gear with the O/D direct clutch and one–way clutch from the O/D case.



(b) Remove the race and thrust washer.

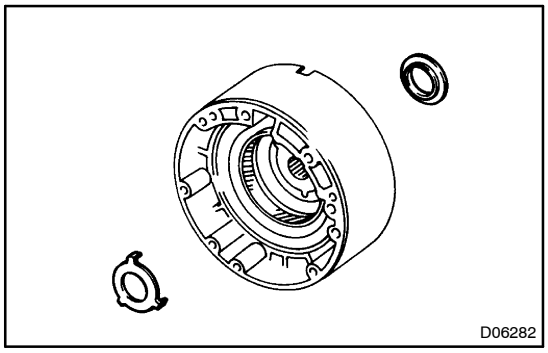


26. REMOVE O/D CASE

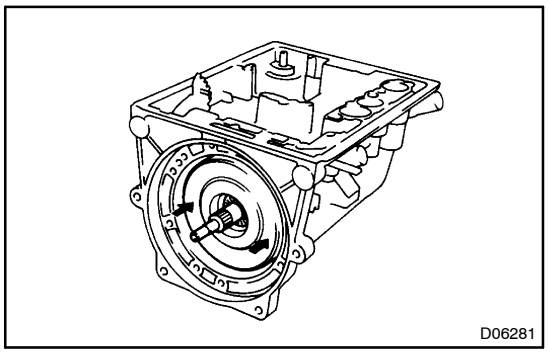
(a) Remove the O/D case from the transmission case.

HINT:

When the O/D case is removed, the front clutch sometimes adheres to it.

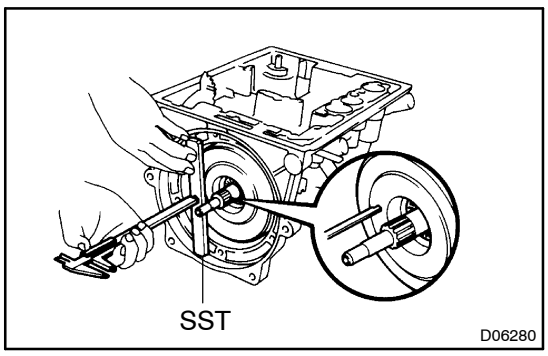


(b) Remove the 2 races.



27. MEASURE INSTALLATION DISTANCE OF FRONT CLUTCH

(a) Push the input shaft and drum toward the rear to make sure the front clutch is installed correctly.

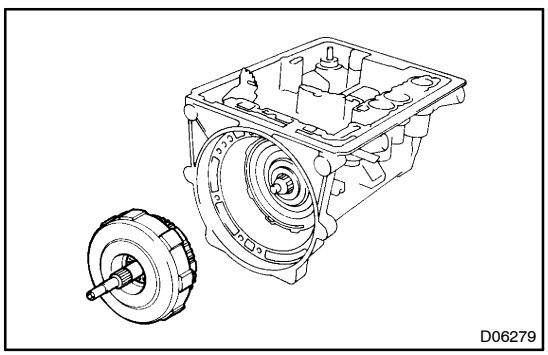


(b) Place SST on the transmission case.
SST 09350–20015 (09370–12010)

(c) Using calipers, measure distance between the tops of SST and clutch drum.

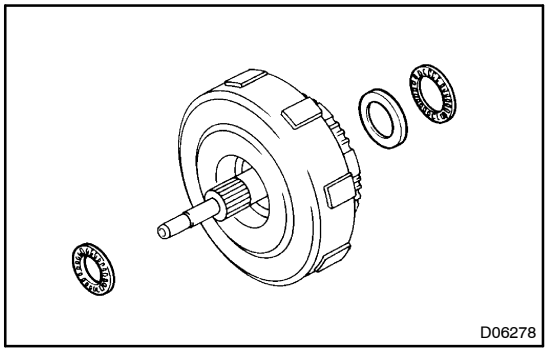
HINT:

Make a note of the measurement for the reference at assembly.

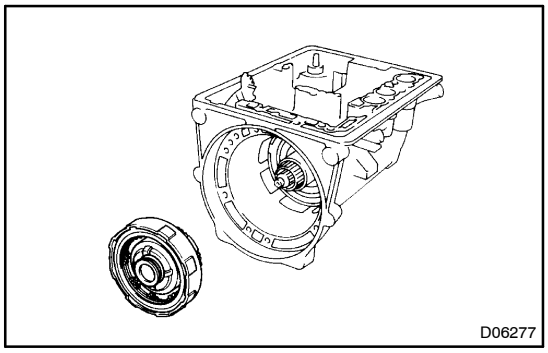


28. REMOVE FRONT CLUTCH

(a) Remove the front clutch from the transmission case.

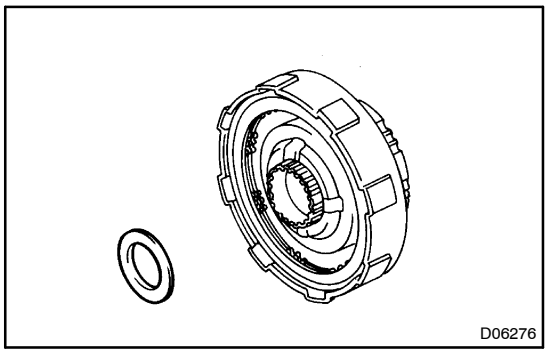


(b) Remove the 2 bearings and race.

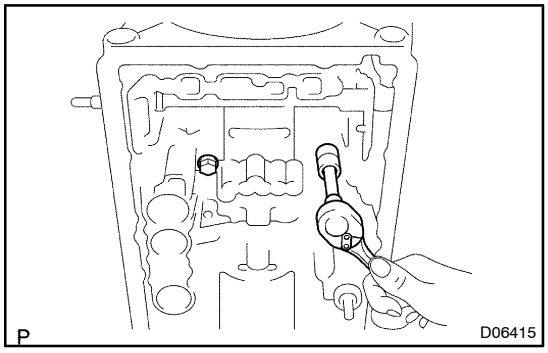


29. REMOVE REAR CLUTCH

(a) Remove the rear clutch from the transmission case.



(b) Remove the race.

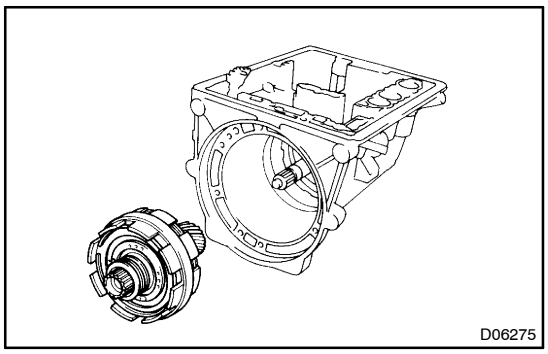


30. REMOVE CENTER SUPPORT

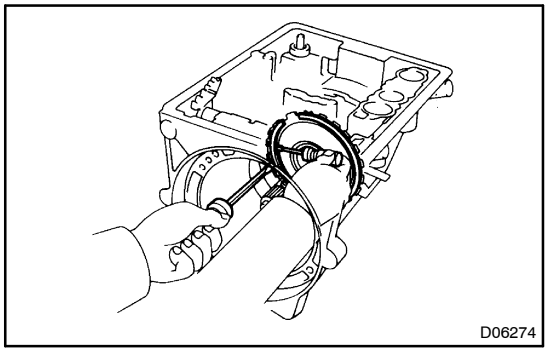
(a) Remove the 2 center support bolts and wave washers.

HINT:

After removing 1 bolt, the other 1 will be loose.

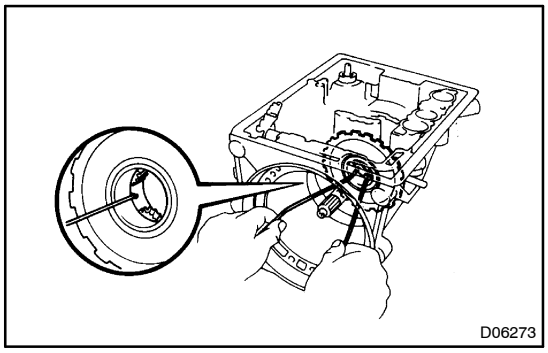


(b) Remove the center support form the transmission case.

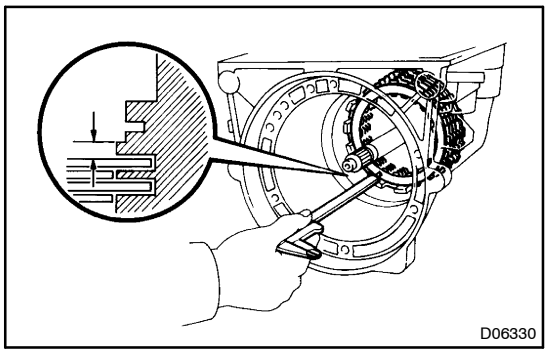


31. REMOVE FRONT PLANETARY GEAR UNIT

(a) Using 2 screwdrivers, remove the snap ring.



(b) Insert the 2 wires into the planetary gear nd remove it.



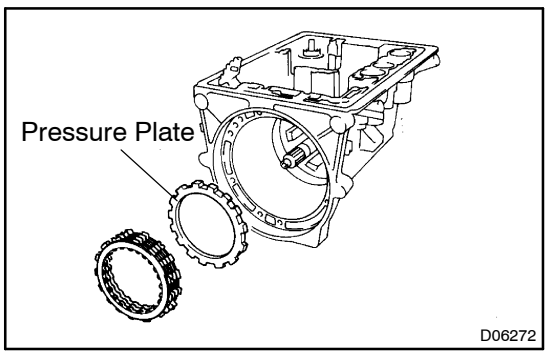
32. CHECK PACK CLEARANCE OF NO. 3 BRAKE

Using calipers, measure the clearance between the disc and transmission case, as shown.

Clearance:

0.52 – 1.27 mm (0.0205 – 0.0500 in.)

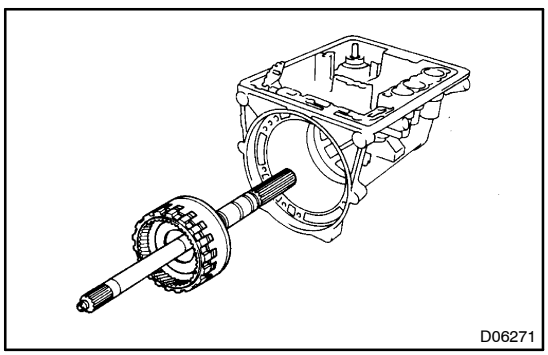
If the values are non–standard, inspect the discs (See page AT–78).



33. REMOVE NO. 3 BRAKE PACK AND PRESSURE PLATE

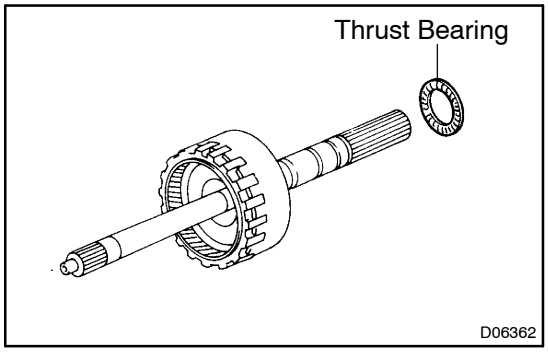
(a) Remove the 5 discs and 4 plates.

(b) Remove the pressure plate.

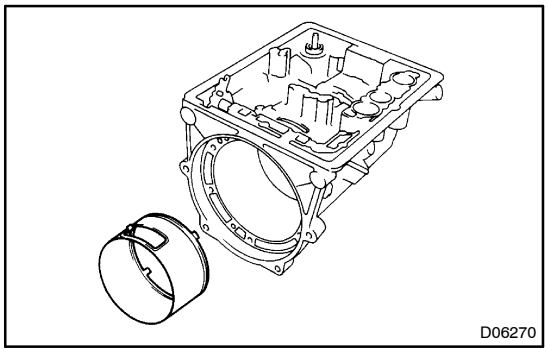


34. REMOVE REAR PLANETARY GEAR UNIT AND OUTPUT SHAFT

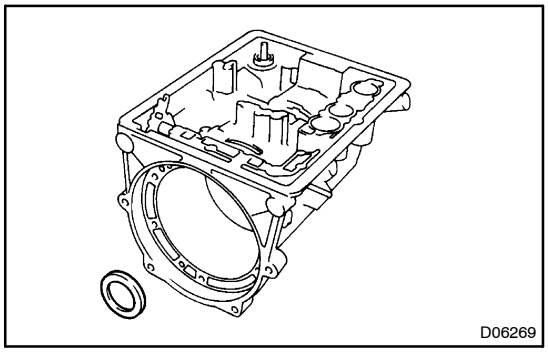
(a) Remove the rear planetary gear unit and output shaft.



(b) Remove the bearing.

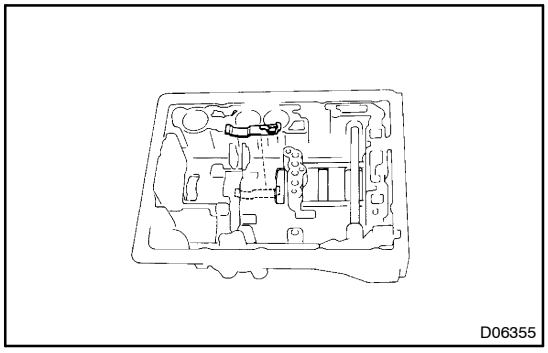


35. REMOVE BRAKE APPLY PIPE

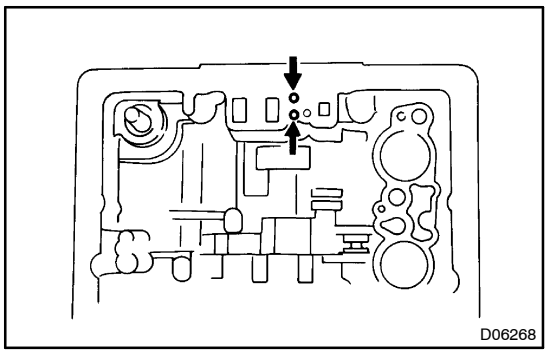


36. REMOVE RACE

Remove the race from the transmission case.

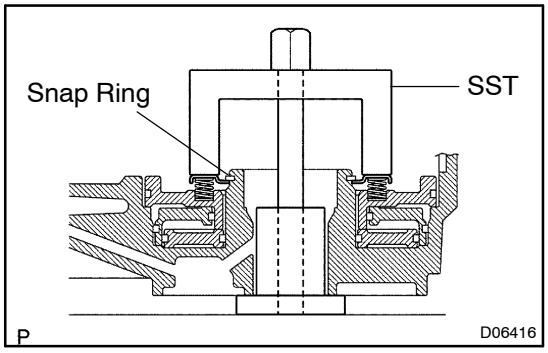


37. REMOVE LEAF SPRING



38. CHECK NO. 3 BRAKE PISTON MOVING

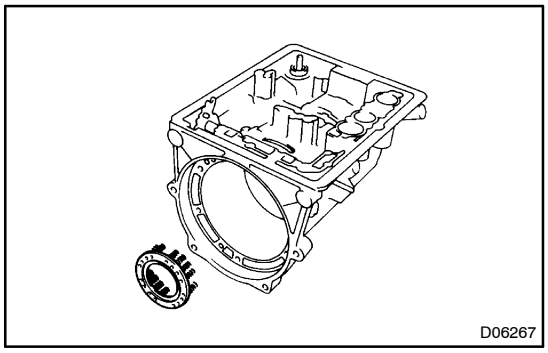
Make sure the No. 3 brake pistons move smoothly when applying and releasing the compressed air into the transmission case.



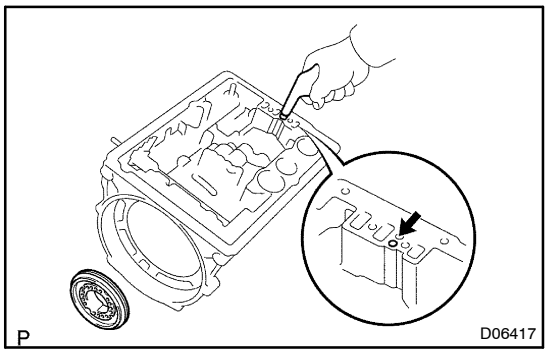
39. REMOVE COMPONENTS OF NO. 3 BRAKE PISTON

(a) Set SST on the spring retainer, and compress the return springs.
SST 09350–20015 (09369–20040)

(b) Using a snap ring expander, remove the snap ring.



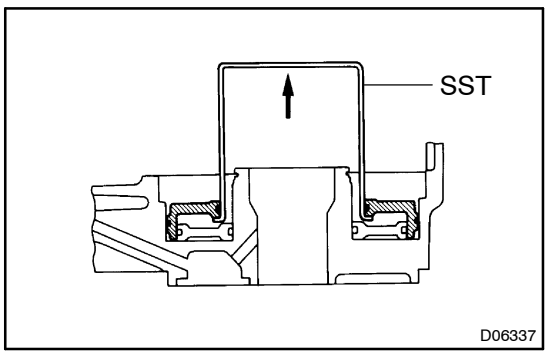
(c) Remove the piston return spring.



(d) Hold outer piston with hand, apply compressed air to the transmission case to remove the outer piston.

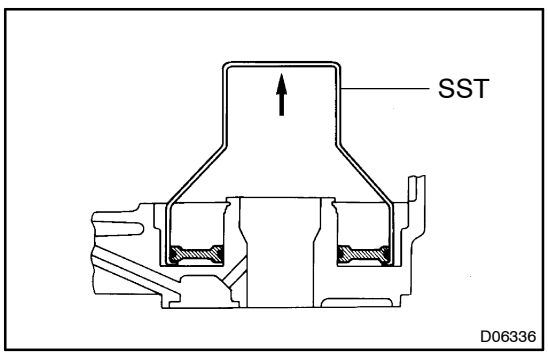
If the piston does not pop out with compressed air, lift the piston out with needle–nose pliers.

(e) Remove the O–ring from the outer piston.



(f) Insert SST behind the reaction sleeve and gradually lift it out of the transmission case.
SST 09350–30020 (09350–07080)

(g) Remove the 2 O–rings from the reaction sleeve.



(h) Insert SST behind the inner piston and gradually lift it out of the transmission case.
SST 09350–30020 (09350–07090)

(i) Remove the 2 O–rings from the inner piston.

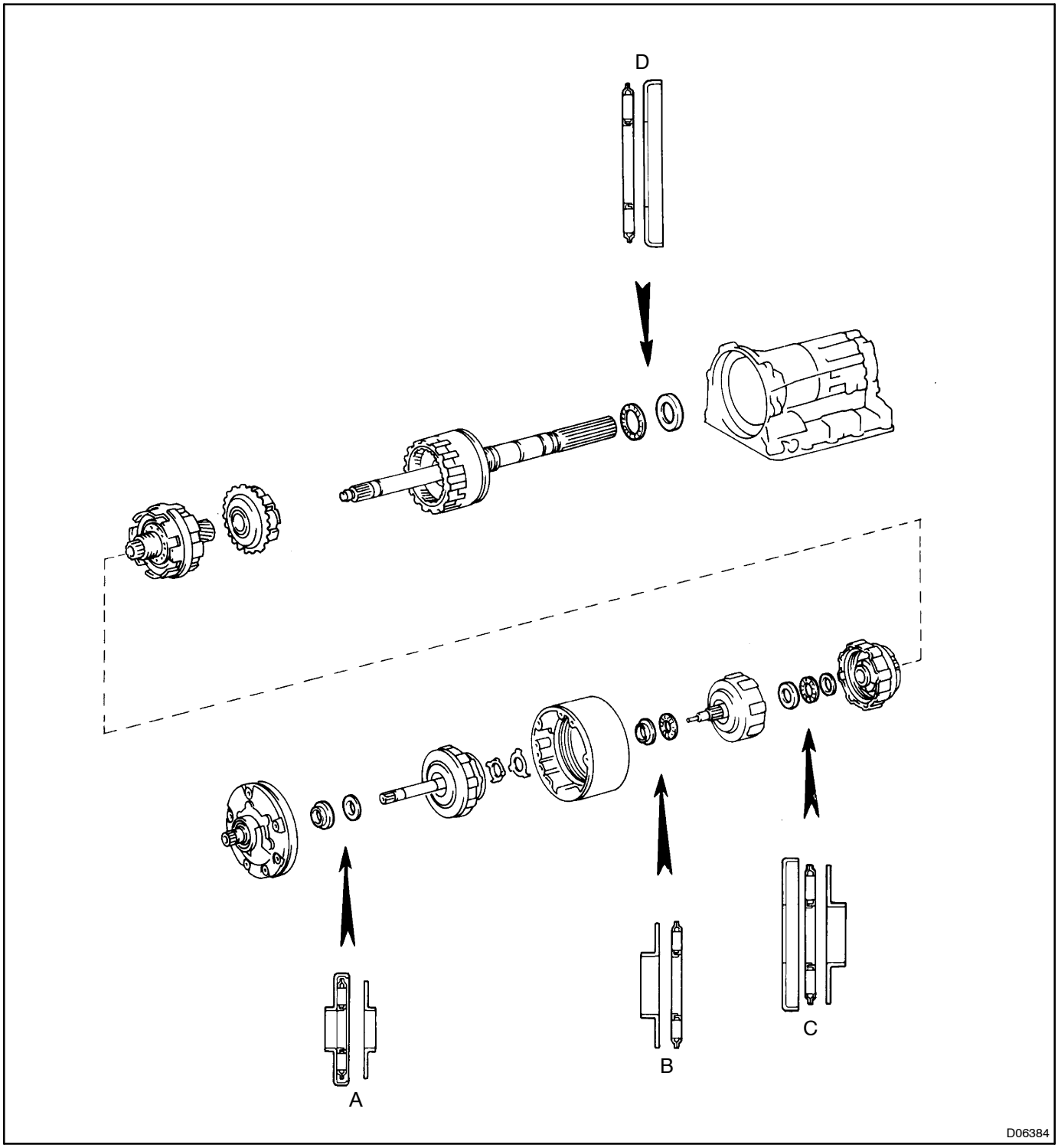
AT0I1–01

REASSEMBLY

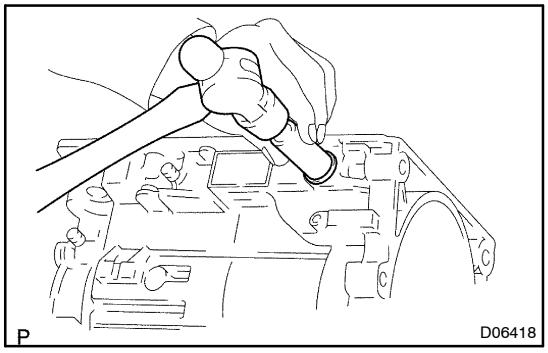
NOTICE:

- **The automatic transmission is composed of highly precision–finished parts, necessitating careful inspection before reassembly because even a small nick could cause fluid leakage or affect the performance. 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 sub–assemblies 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 reassembly before proceeding to the next component group. If a defect is found in a certain component group during reassembly, inspect and repair this group immediately. If a component group cannot be assembled because parts are being ordered, be sure to keep all parts of the group in a separate container while proceeding with disassembly, inspection, repair and reassembly of other component groups.**
  Recommended ATF: TYPE T–IV or equivalent
- **All disassembled parts should be washed clean and any fluid passages and holes should be blown through with compressed air.**
- **Dry all parts with compressed air–never use shop rags.**
- **When using compressed air, always aim away from yourself to prevent accidentally spraying ATF or kerosene on your face.**
- **The recommended automatic transaxle fluid or kerosene should be used for cleaning.**
- **After cleaning, the parts should be arranged in the correct order for efficient inspection, repairs, and reassembly.**
- **When disassembling a valve body, be sure to match each valve together with the corresponding spring.**
- **New discs for the brakes and clutches that are to be used for replacement must be soaked in ATF for at least 15 minutes before reassembly.**
- **All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with ATF prior to reassembly.**
- **All gaskets and rubber O–rings should be replaced.**
- **Do not apply adhesive cements to gaskets and similar parts.**
- **Make sure that the ends of a snap ring are not aligned with one of the cutouts and are installed in the groove correctly.**
- **If a worn bushing is to be replaced, the sub–assembly containing the bushing must also be replaced.**
- **Check thrust bearings and races for wear or damage. Replace if necessary.**
- **Use petroleum jelly to keep parts in place.**
- **When working with FIPG material, you must observe the following.**
  Using a razor blade and a gasket scraper, remove all the old packing (FIPG) material from the gasket surface.
  Thoroughly clean all components to remove all the loose material.
  Clean both sealing surfaces with a non–residue solvent.
  Parts must be reassembled within 10 minutes of application. Otherwise, the packing (FIPG) material must be removed and reapplied.

BEARING AND RACES INSTALLATION POSITION AND DIRECTION



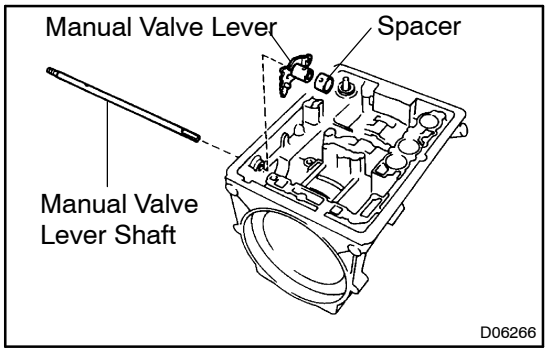
Mark	Front Race Diameter Inside / Outside mm (in.)	Thrust Bearing Diameter Inside / Outside mm (in.)	Rear Race Diameter Inside / Outside mm (in.)
A	–	24.3 (0.957) / 43.2 (1.701)	24.3 (0.957) / 39.1 (1.539)
B	24.1 (0.949) / 37.3 (1.469)	23.4 (0.921) / 37.5 (1.476)	–
C	30.1 (1.185) / 48.5 (1.909)	28.4 (1.118) / 46.4 (1.827)	27.6 (1.087) / 44.5 (1.752)
D	–	38.2 (1.504) / 55.2 (2.173)	39.2 (1.543) / 57.5 (2.264)



1. INSTALL MANUAL VALVE LEVER, SHAFT AND OIL SEAL

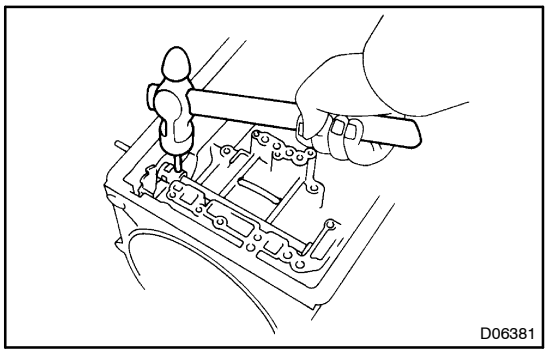
(a) Using SST, drive in 2 new oil seals as far as they will go.
SST 09350–20015 (09361–30011)

(b) Coat the oil seal lips with MP grease.

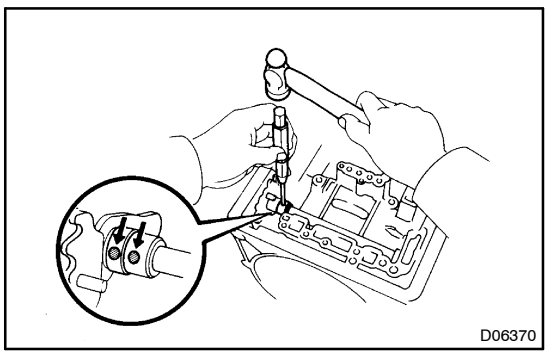


(c) Assembled a new spacer to the manual valve lever.

(d) Install the manual valve lever shaft to the transmission case through the manual valve lever.

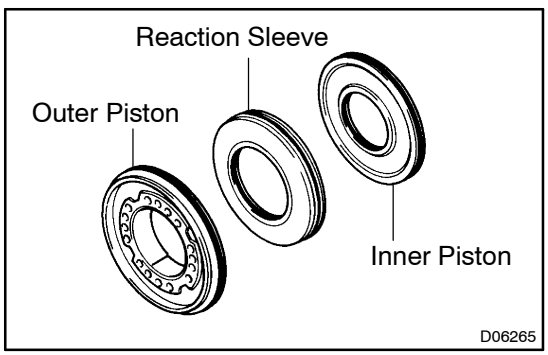


(e) Drive in the pin to the shaft.



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

(g) Make sure that the manual valve lever shaft turns smoothly.



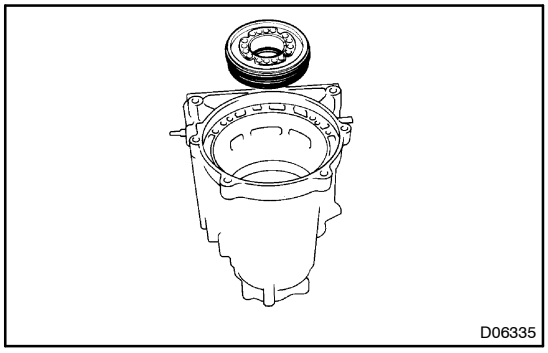
2. INSTALL COMPONENTS OF NO. 3 BRAKE PISTON

(a) Coat 5 new O–rings to the inner piston, reaction sleeve and outer piston.

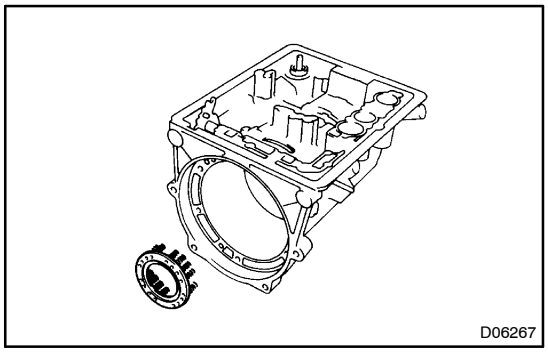
NOTICE:

The thinner O–ring goes on the outside of the reaction sleeve.

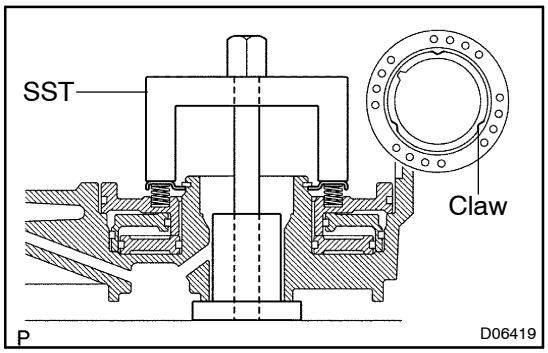
(b) Assemble the inner piston, reaction sleeve and outer piston.



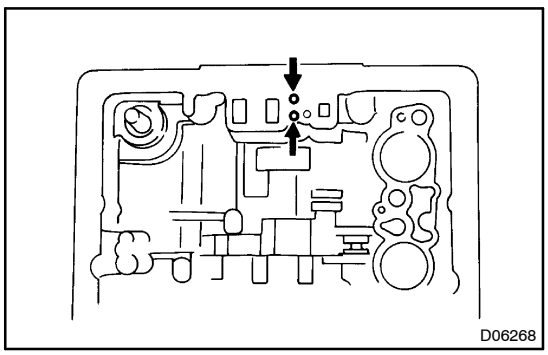
(c) Stand up the transmission case.
(d) Being careful not to damage the O–rings, press in the assembled pistons into the transmission case with hand.



(e) Place the piston return spring onto the outer piston.

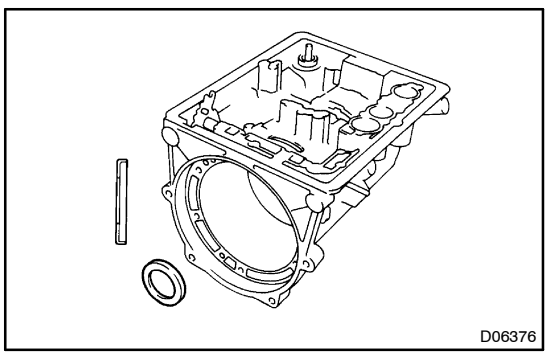


(f) Set SST as shown, and compress the return springs with SST.
SST 09350–20015 (09369–20040)
(g) Install the snap ring with a snap ring expander. Be sure that the end gap of the snap ring is not aligned with the spring seat claw.



3. CHECK NO. 3 BRAKE PISTONS MOVING

Make sure that the No. 3 brake pistons move smoothly when applying and releasing the compressed air into the transmission case.

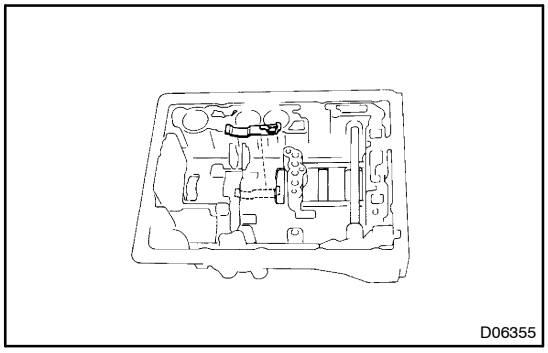


4. INSTALL RACE

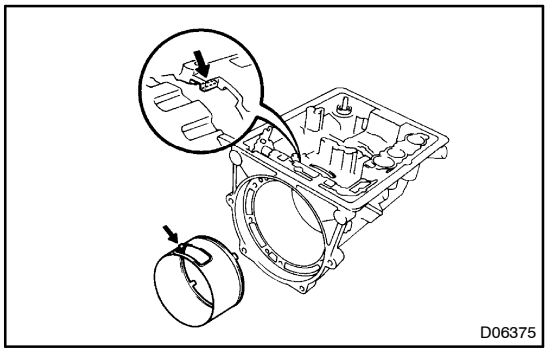
Coat the race with petroleum jelly and install it onto the transmission case.

Race diameter:

	Inside mm (in.)	Outside mm (in.)
Race	39.2 (1.543)	57.5 (2.264)



5. INSTALL LEAF SPRING

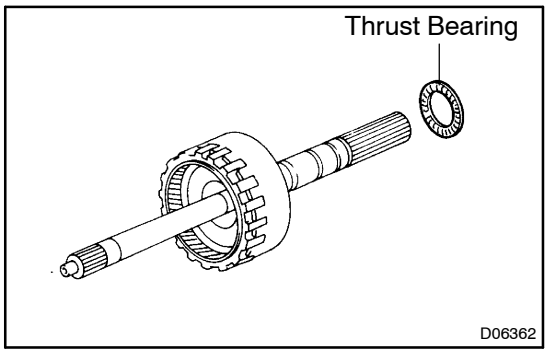


6. INSTALL BREAK APPLY PIPE

Install the pipe, aligning its locking tab with the cutout of the case.

HINT:

Make sure that the lips of the pipe end are completely inserted into the outer piston.

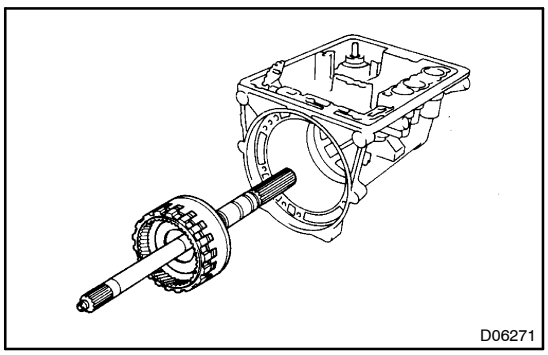


7. INSTALL REAR PLANETARY GEAR UNIT AND OUTPUT SHAFT

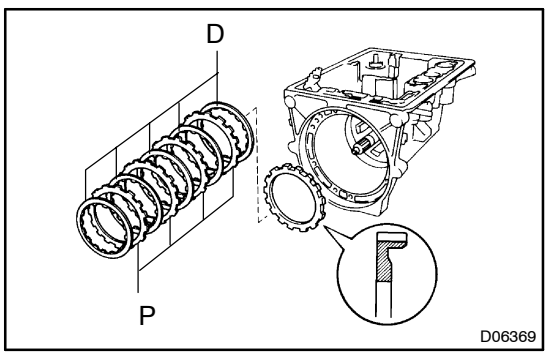
(a) Coat the bearing with petroleum jelly and install them onto the rear planetary gear unit.

Bearing diameter:

	Inside mm (in.)	Outside mm (in.)
Bearing	38.2 (1.504)	55.2 (2.173)



(b) Install the rear planetary gear unit to the transmission case.



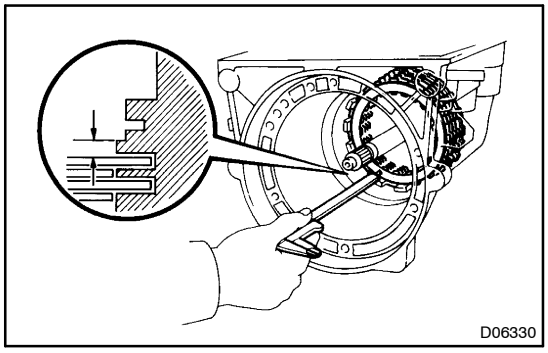
8. INSTALL PRESSURE PLATE, DISC AND PLATE

(a) Install the pressure plate, the flat surface facing forward.

(b) Install the 5 discs and 4 plates.

Install in order: P = Plate D = Disc

D – P – D – P – D – P – D – P – D



9. CHECK PACK CLEARANCE OF NO. 3 BRAKE

Using calipers, measure the clearance between the disc and transmission case, as shown.

Clearance:

0.52 – 1.27 mm (0.0205 – 0.0500 in.)

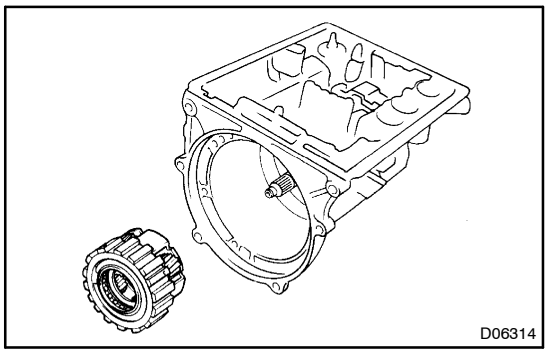
If the values are non–standard, select another flange.

HINT:

There are 6 different thickness for the flange.

Flange thickness:

No.	Thickness mm (in.)	No.	Thickness mm (in.)
–	3.00 (0.1181)	375	3.75 (0.1477)
325	3.25 (0.1280)	400	4.00 (0.1575)
350	3.50 (0.1378)	425	4.25 (0.1674)



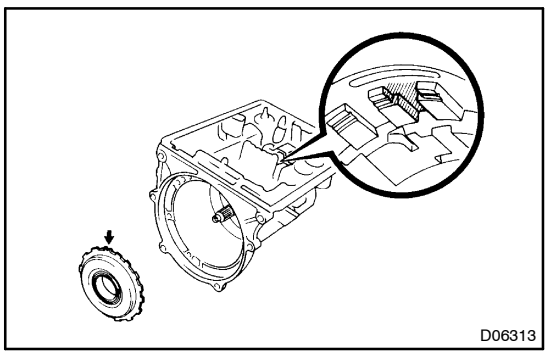
10. INSTALL FRONT PLANETARY GEAR UNIT

(a) Remove the one–way clutch inner race from the planetary gear unit.

(b) Install the front planetary gear unit.

HINT:

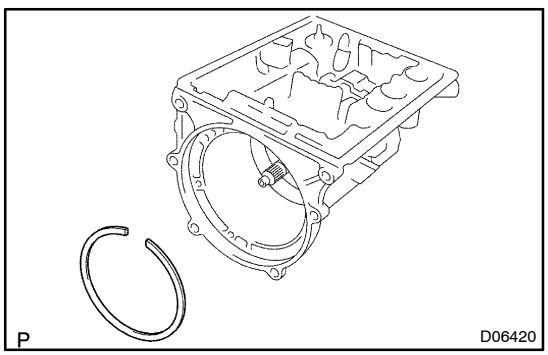
Mesh the splines of the planetary gear with the flukes of the discs by rotating and pushing the planetary gear.



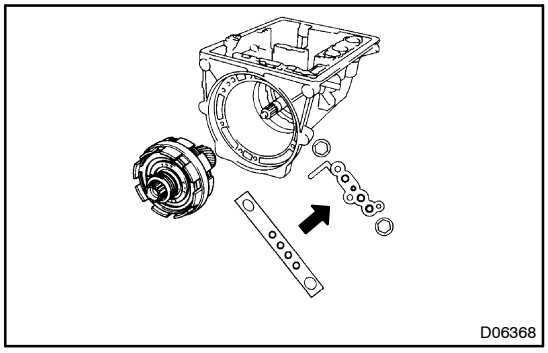
(c) Position the notched tooth of the inner race toward the valve body side of the case. Push it into place.

HINT:

The inner race is correctly installed if the snap rings groove is fully visible.

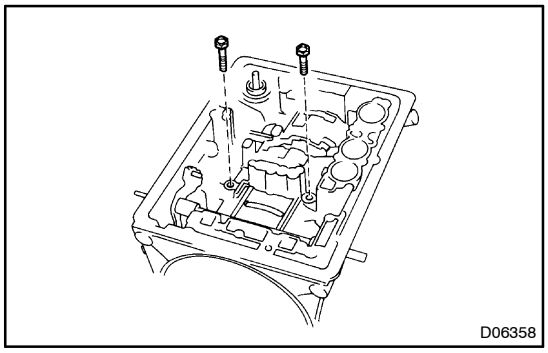


(d) Using a screwdriver, install the snap ring.



11. INSTALL CENTER SUPPORT

(a) Aim the bolt and oil holes of the center support toward the valve body side, and align them with the bolt and oil holes of the transmission case and insert.

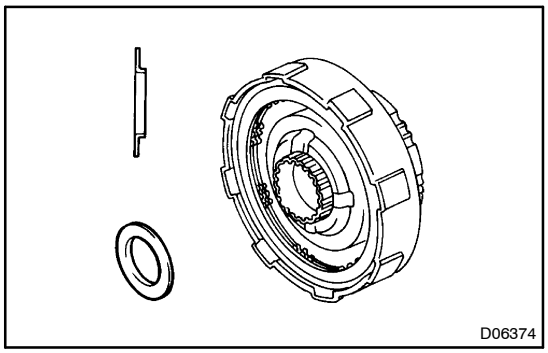


(b) Install the 2 wave washers and bolts.

HINT:

First tighten the accumulator piston side.

Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)

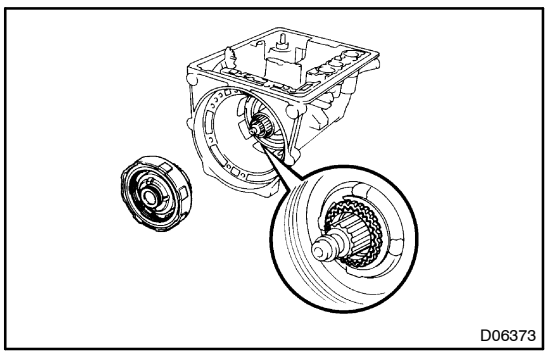


12. INSTALL REAR CLUTCH

(a) Coat the race with petroleum jelly and install it onto the rear clutch.

Race diameter:

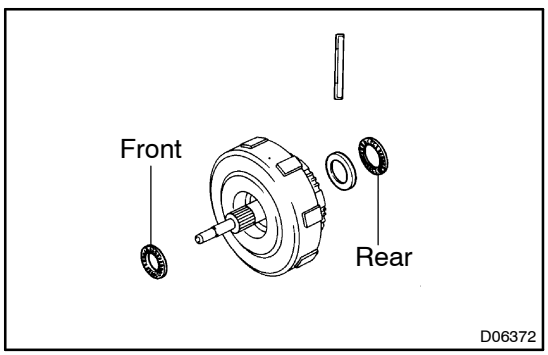
	Inside mm (in.)	Outside mm (in.)
Race	27.6 (1.087)	44.5 (1.752)



(b) Install the rear clutch.

HINT:

- Mesh the splines of the rear clutch with the flukes of the disc by rotating and pushing the rear clutch.
- If the rear clutch is fully meshed with the center support, the splined center of the clutch will be flush with the end of the sun gear shaft.

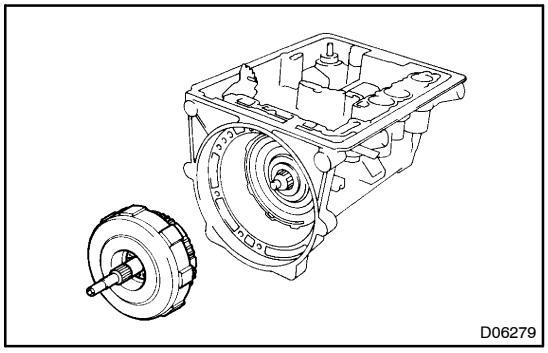


13. INSTALL FRONT CLUTCH

(a) Coat the bearings and race with petroleum jelly and install them onto the front clutch.

Bearing and race diameter:

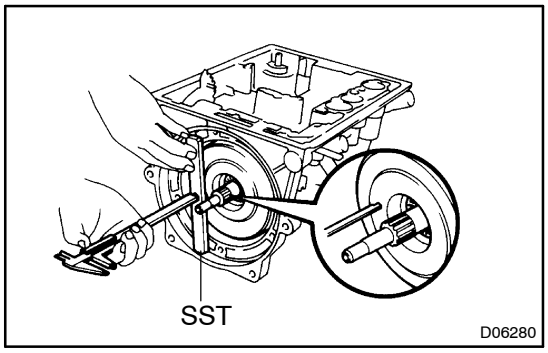
	Inside mm (in.)	Outside mm (in.)
Bearing (Front)	23.4 (0.921)	37.5 (1.476)
Race	30.1 (1.185)	48.5 (1.909)
Bearing (Rear)	28.4 (1.118)	46.4 (1.827)



(b) Install the front clutch.

HINT:

Mesh the splines of the front clutch with the flukes of the discs by rotating and pushing the front clutch.

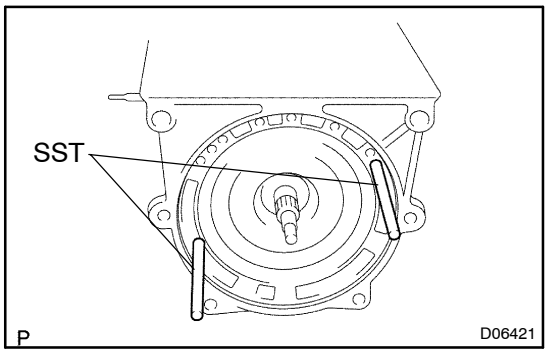


14. MEASURE INSTALLATION DISTANCE OF FRONT CLUTCH

(a) Place SST on the transmission case.
SST 09350–20015 (09370–12010)

(b) Using calipers, measure the distance between the tops of SST and the clutch drum.

If the distance corresponds to that during disassembly, the front clutch is installed correctly.

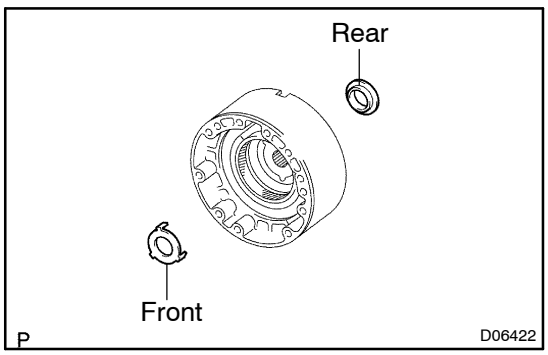


15. INSTALL O/D CASE

(a) Temporarily install 2 SSTs on the transmission case.
SST 09350–20015 (09362–30011)

HINT:

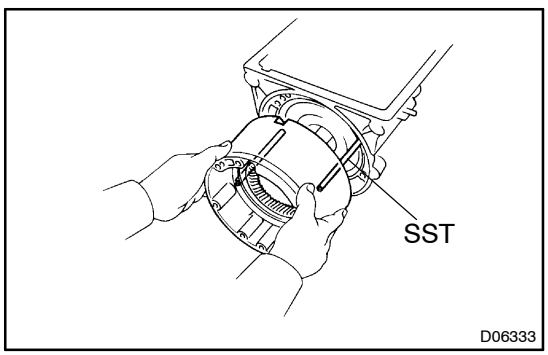
Remove the SST after installation of the oil pump.



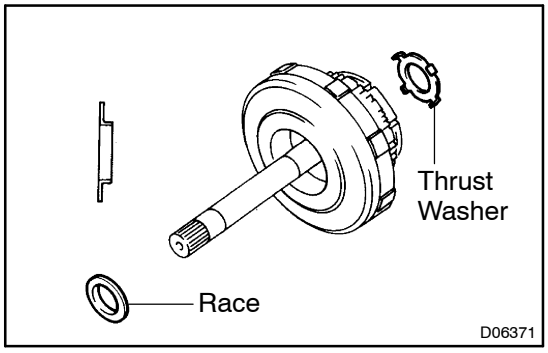
(b) Coat the races with petroleum jelly and install them onto the O/D case.

Races diameter:

	Inside mm (in.)	Outside mm (in.)
Race (Front)	23.0 (0.906)	48.0 (1.890)
Race (Rear)	24.1 (0.946)	37.3 (1.469)



(c) Insert the O/D case gently through the 2 guide bolts (SST) with cutout portion of the case facing the valve body side.



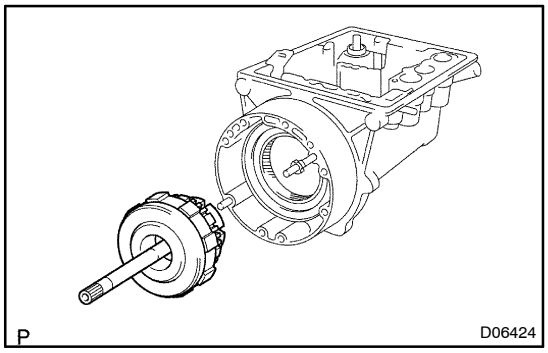
16. INSTALL O/D PLANETARY GEAR UNIT WITH O/D DIRECT CLUTCH AND ONE–WAY CLUTCH

(a) Coat the thrust washer with petroleum jelly and install it onto the O/D planetary gear.

(b) Coat the race with petroleum jelly and install it onto the O/D planetary gear.

Race diameter:

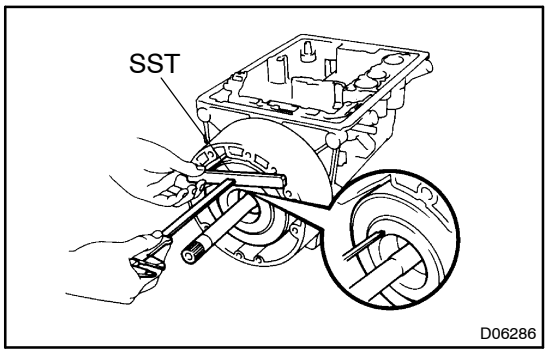
	Inside mm (in.)	Outside mm (in.)
Race	24.3 (0.957)	39.1 (1.539)



(c) Install the O/D planetary gear with the O/D direct clutch and one–way clutch.

HINT:

Mesh the splines of the O/D planetary gear with the flukes of the discs by rotating and pushing the O/D planetary gear.

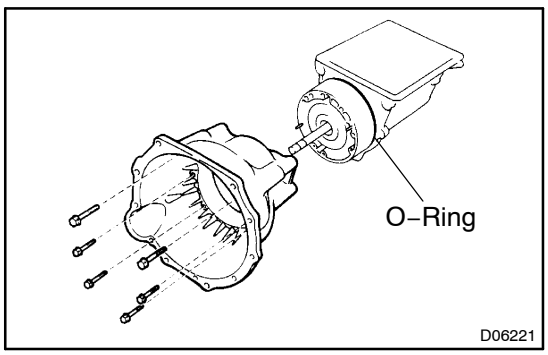


17. MEASURE INSTALLATION DISTANCE OF O/D DIRECT CLUTCH

(a) Place SST on the O/D case.
SST 09350–20015 (09370–12010)

(b) Using calipers, measure distance between the tops of SST and the clutch drum.

If the distance corresponds to that during disassembly, the O/D direct clutch is installed correctly.

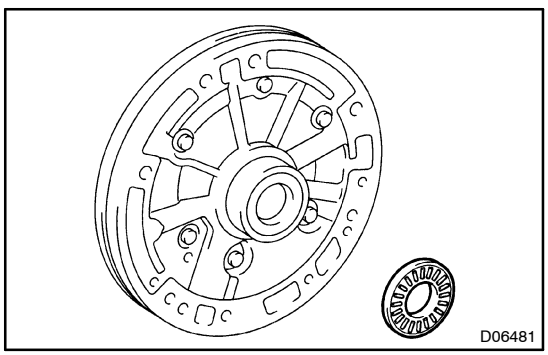


18. INSTALL TRANSMISSION HOUSING

(a) Coat a new O–ring with ATF and install it around the O/D case.

(b) Install the transmission housing and 6 bolts.

(c) Tighten the bolts.
Torque:
10 mm bolt: 34 N·m (345 kgf·cm, 25 ft·lbf)
12 mm bolt: 57 N·m (580 kgf·cm, 42 ft·lbf)

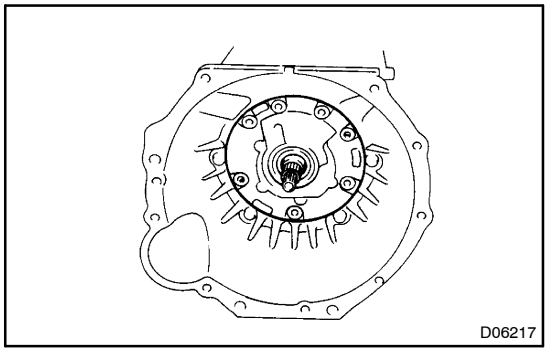


19. INSTALL OIL PUMP

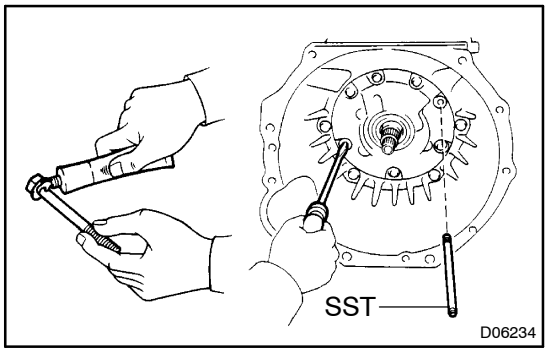
(a) Coat the assembled bearing and race with petroleum jelly and install it onto the oil pump.

Assembled bearing and race diameter:

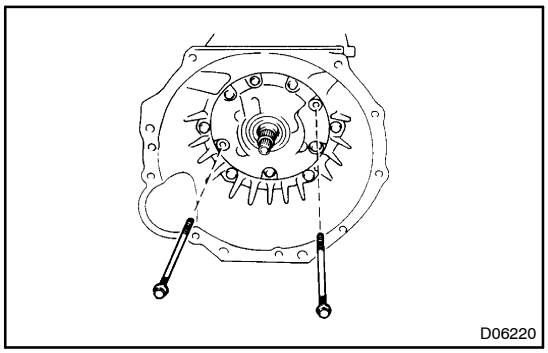
	Inside mm (in.)	Outside mm (in.)
Bearing and race	24.3 (0.957)	43.2 (1.701)



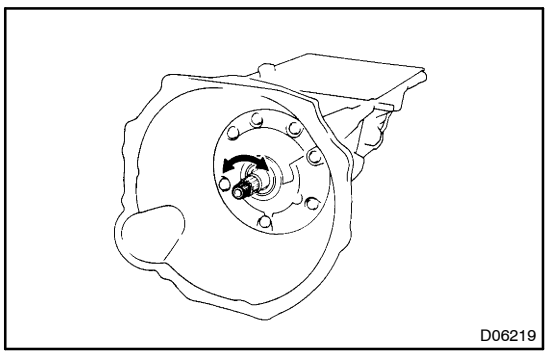
(b) Coat a new O–ring with ATF and install it around the pump body.



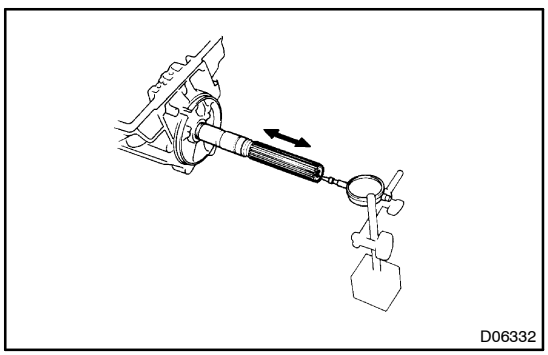
(c) Install the oil pump gently through the 2 guide bolts (SST).
(d) Apply sealant to the bolt heads.
FIPG: Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent
(e) Temporarily install the 5 bolts.
(f) Using a screwdriver, remove the 2 SSTs.



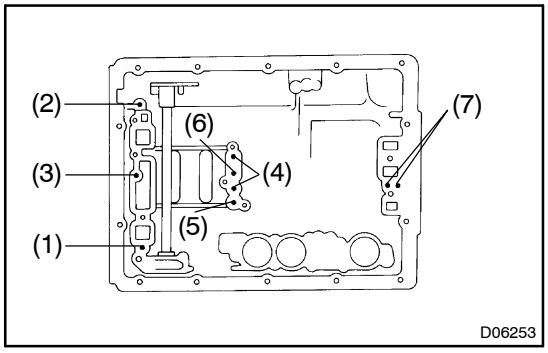
(g) Temporarily install the 2 bolts.
(h) Tighten the all bolts.
Torque: 21 N·m (215 kgf·cm, 16 ft·lbf)



20. CHECK INPUT SHAFT ROTATION
Make sure the input shaft rotates smoothly.



21. CHECK OUTPUT SHAFT
(a) Using a dial indicator, measure the end play of the output shaft with hand.
End play: 0.3 – 0.9 mm (0.012 – 0.035 in.)
If the values are non–standard, check for an improper installation.
(b) Check to see that output shaft rotates smoothly.

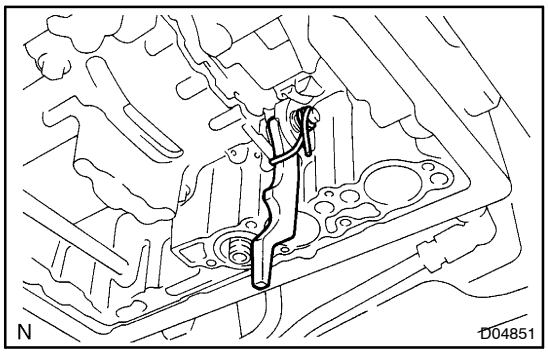


22. INDIVIDUAL PISTON OPERATION INSPECTION

Check for the sound of operation while applying compressed air into the oil holes indicated in the illustration.

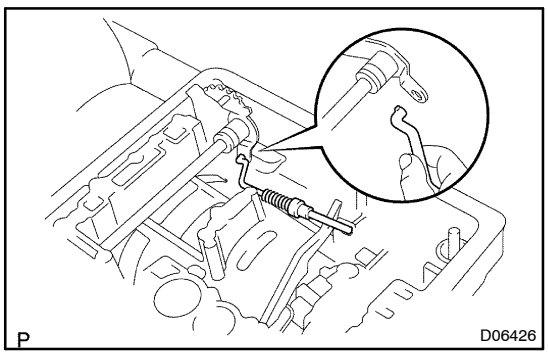
(1) O/D direct clutch
(2) O/D brake
(3) Rear clutch
(4) Front clutch
(5) No. 1 brake
(6) No. 2 brake
(7) No. 3 brake

If there is no noise, disassembled and check the installation condition of the parts.

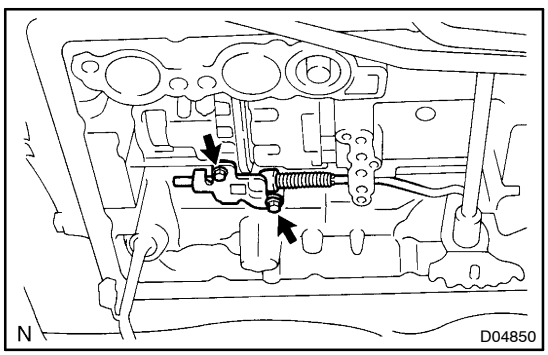


23. INSTALL PARKING LOCK PAWL AND ROD

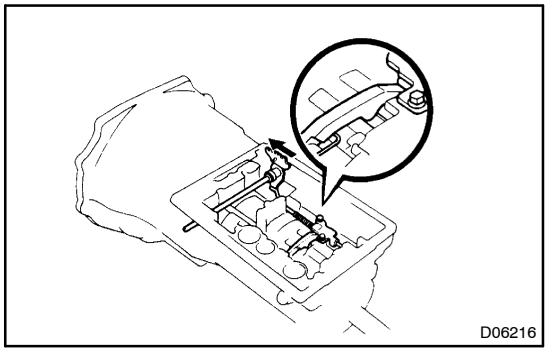
(a) Install the E–ring to the shaft.
(b) Install the parking lock pawl, shaft and spring.



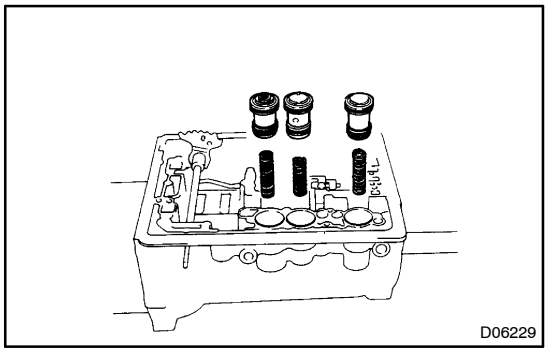
(c) Connect the parking lock rod to the manual valve lever.



(d) Install the parking lock pawl bracket.
(e) Install the 2 bolts with the wave washer.
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)



(f) Shift the manual valve lever to the P range, and confirm the planetary ring gear is correctly locked up by the lock pawl.



24. INSTALL ACCUMULATOR SPRING AND PISTON

(a) Coat new O–rings with ATF and install them to the pistons.

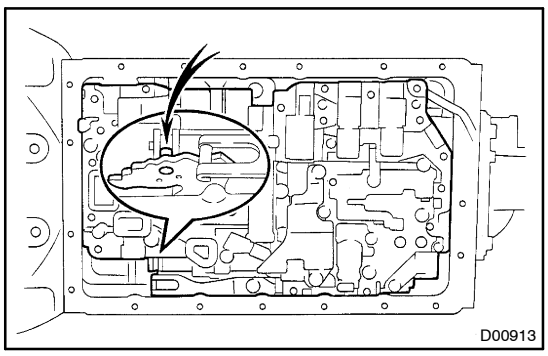
(b) Install the 3 springs and 3 accumulator pistons to the bore, as shown.

Piston

Piston	Outer diameter mm (in.)
C_1	31.8 (1.252)
C_2	31.8 (1.252)
B_2	34.8 (1.370)

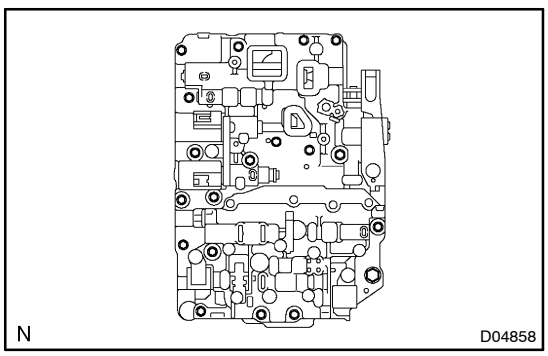
Spring

Spring (Color)		Free length mm (in.)	Outer diameter mm (in.)
C_1	(White or Blue)	75.03 (2.9540)	17.00 (0.6693)
C_2	(White or Purple)	57.74 (2.2732)	16.54 (0.6512)
B_2	(Green)	56.40 (2.2205)	18.79 (0.7398)

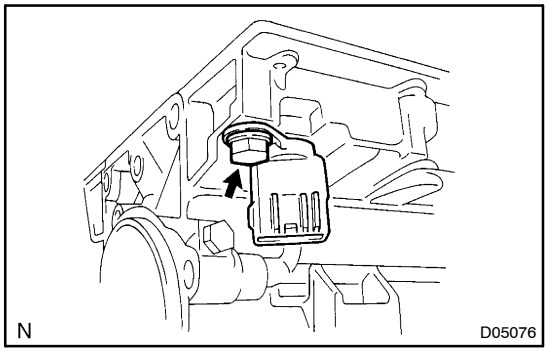


25. INSTALL VALVE BODY

(a) Align the groove of the manual valve to the pin of the lever.



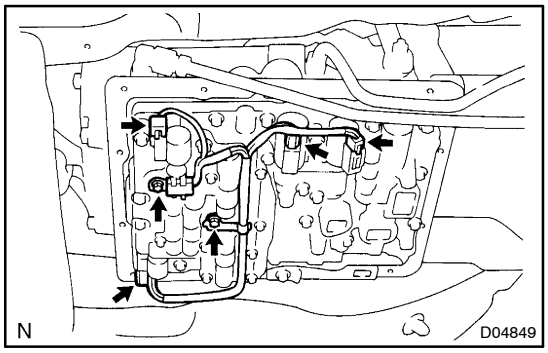
(b) Install the 17 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)



26. INSTALL SOLENOID WIRE

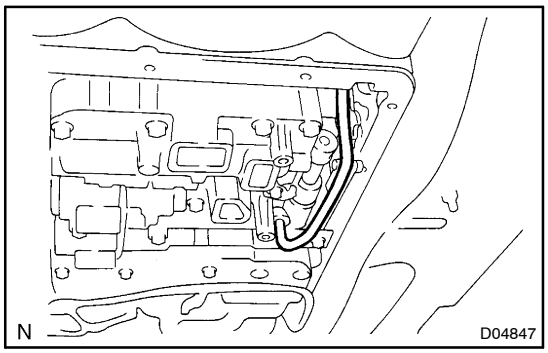
Install the solenoid wire retaining bolt with the bolt.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



27. INSTALL SOLENOID WIRING WITH ATF TEMPERATURE SENSOR

(a) Install the clamp to the ATF temperature sensor.
(b) Connect the 4 connectors to the solenoid.
(c) Install the clamp and bolt.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)
(d) Install the ATF temperature sensor with the bolt.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

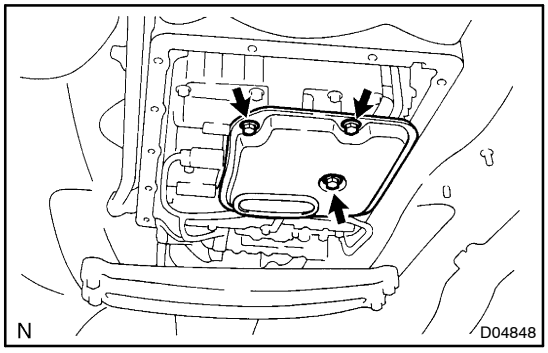


28. INSTALL OIL PIPE

Using a plastic hammer, install the oil pipe into position.

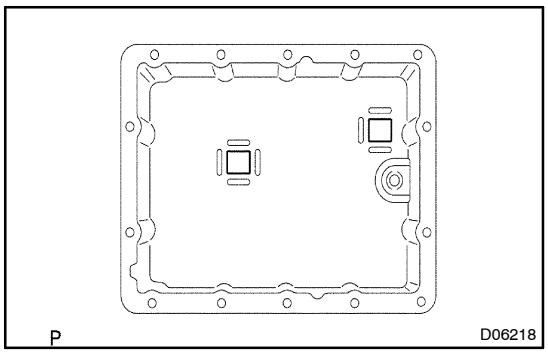
NOTICE:

Be careful not to bend or damage the pipe.



29. INSTALL OIL STRAINER

(a) Install a new gasket to the oil strainer.
(b) Install the oil strainer, oil stainer cover and 6 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

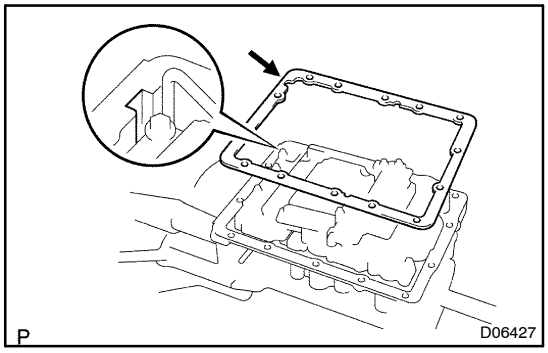


30. INSTALL OIL PAN

(a) Install the 2 magnets in the oil pan.

NOTICE:

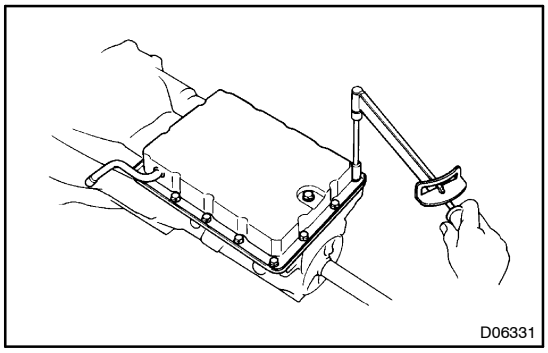
Make sure that the magnets do not interfere with the oil pipes.



(b) Install a new gasket to the transmission case.

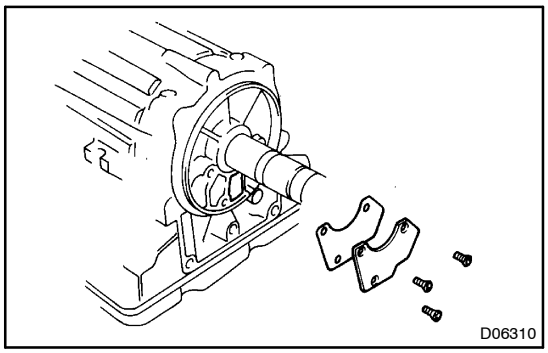
HINT:

Align the cut part of the gasket and case.



(c) Install the 14 bolts.

Torque: 4.4 N·m (45 kgf·cm, 39 in.·lbf)



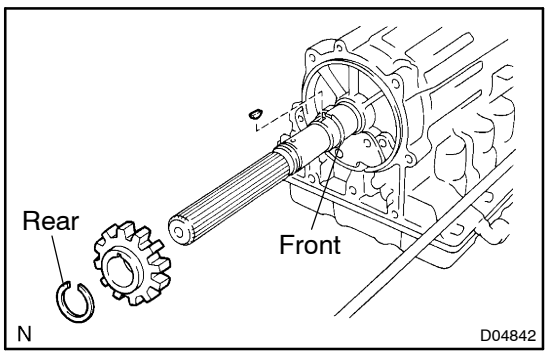
31. INSTALL GOVERNOR OIL STRAINER

(a) Insert the governor oil strainer into the transmission case.

(b) Install a new gasket and cover.

(c) Install the 3 screws.

Torque: 7.5 N·m (75 kgf·cm, 65 in.·lbf)

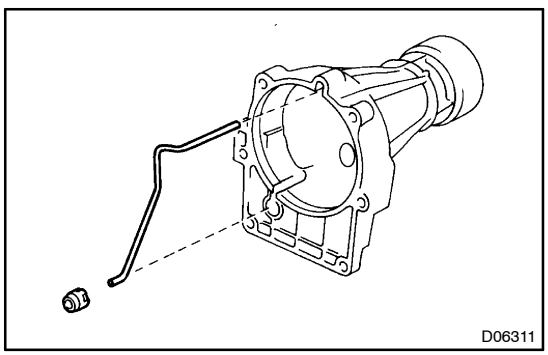


32. INSTALL KEY AND SENSOR ROTOR

(a) Using a snap ring expander, install the front side snap ring.

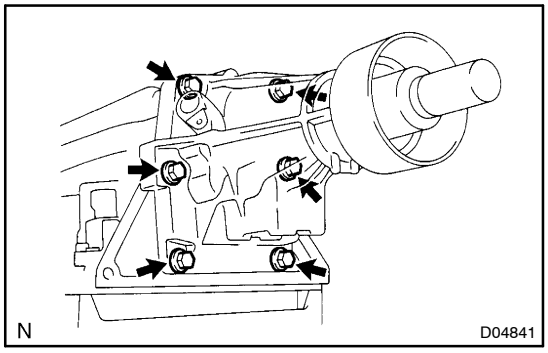
(b) Install the key and sensor rotor.

(c) Using a snap ring expander, install the rear side snap ring.



33. INSTALL EXTENSION HOUSING

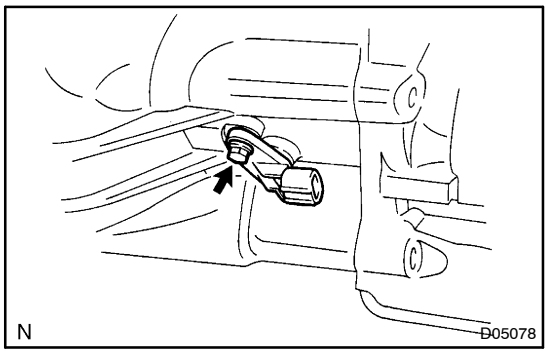
(a) Install the oil apply pipe and a new gasket to the extension housing.



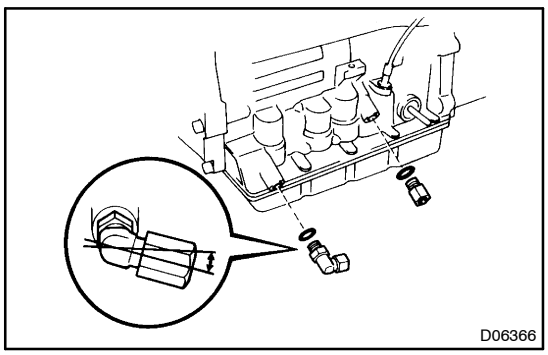
(b) Install the extension housing with a new gasket to the case.
(c) Apply sealant to the bolt A.
FIPG: Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent
(d) Install the 6 bolts.

HINT:
The 2 lower bolts are shorter.

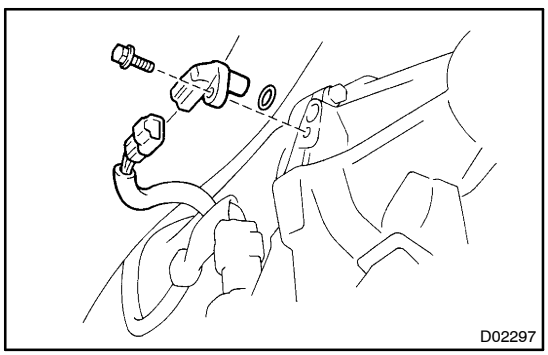
Torque: 36 N·m (370 kgf·cm, 27 ft·lbf)
Bolt length:
Bolt A: 45 mm (1.77 in.)
Bolt B: 35 mm (1.38 in.)



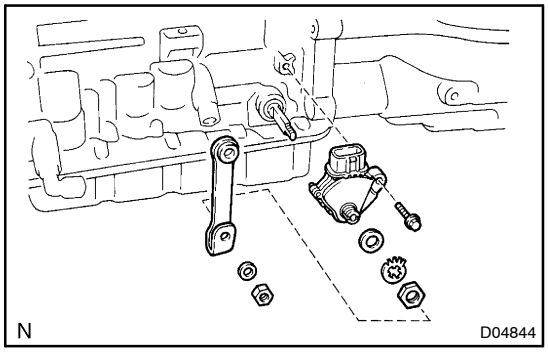
34. INSTALL TRANSMISSION INPUT SPEED SENSOR
(a) Coat a new O–ring with ATF and install it to the transmission input speed sensor.
(b) Install the transmission input speed sensor and bolt.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



35. INSTALL UNION AND ELBOW
(a) Coat new 2 O–rings with ATF and install them to union and elbow.
(b) Install the union and elbow.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)



36. INSTALL TRANSMISSION OUTPUT SPEED SENSOR
(a) Coat a new O–ring with ATF and install it to the transmission output speed sensor.
(b) Install the transmission output speed sensor and bolt.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



37. INSTALL NEUTRAL START SWITCH

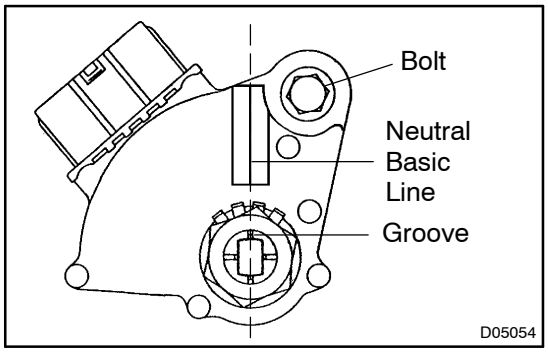
(a) Insert the neutral start switch onto the manual valve lever shaft and temporarily install the adjusting bolt.

(b) Install a new lock washer.

(c) Install and tighten the nut.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(d) Using the control shaft leer, fully turn the manual valve lever shaft back and return 2 notches. It is now in neutral.



(e) Align the neutral basic line and the switch groove, and tighten the adjusting bolt.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(f) Bend the tabs of the lock washer.

HINT:

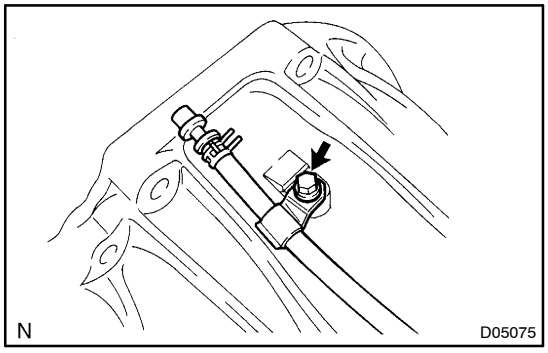
Bend at least 2 of the lock washer tabs.

38. INSTALL CONTROL SHAFT LEVER

(a) Install the control shaft lever with the spring washer and nut.

(b) Tighten the nut.

Torque: 6.9 N·m (70 kgf·cm, 61 in.·lbf)



39. INSTALL BREATHER HOSE

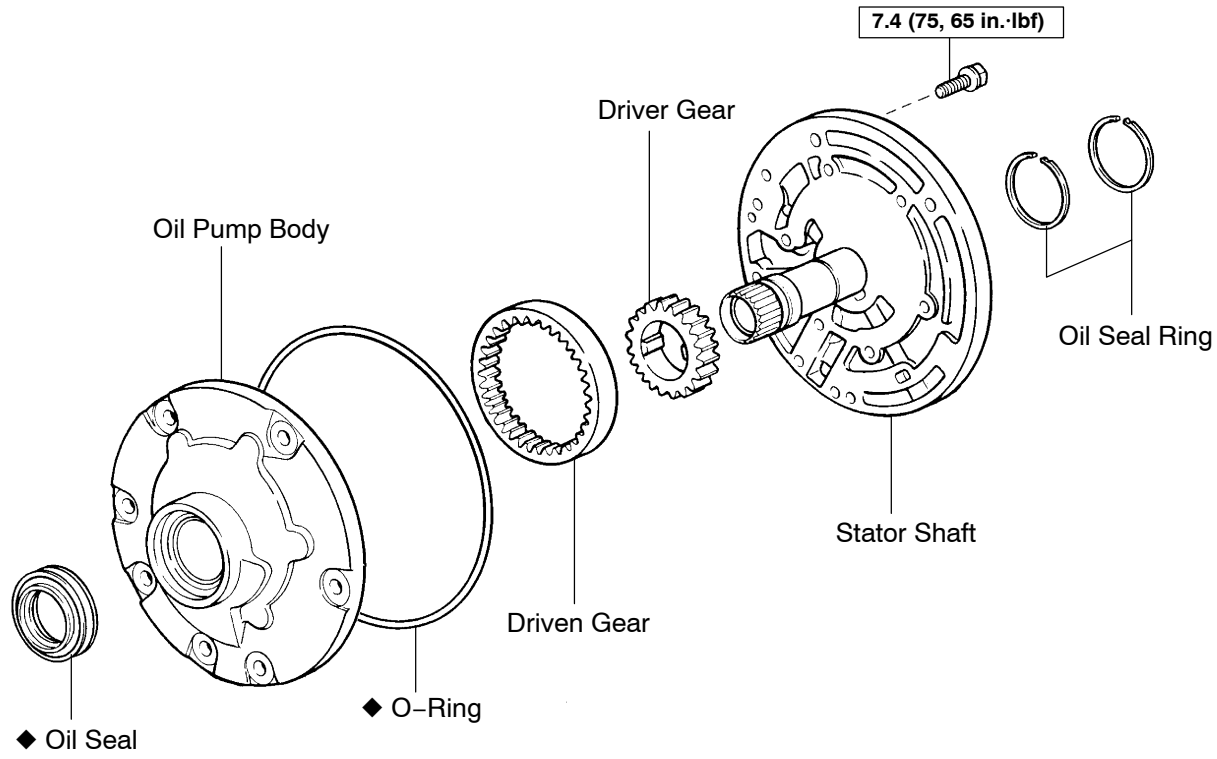
Install the breather hose with the bolt.

Torque: 7.5 N·m (75 kgf·cm, 65 in.·lbf)

OIL PUMP

COMPONENTS

AT0I2–01



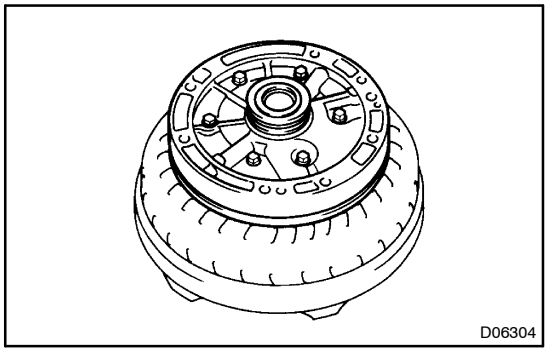
N·m (kgf·cm, ft·lbf) : Specified torque

N ◆ Non–reusable part

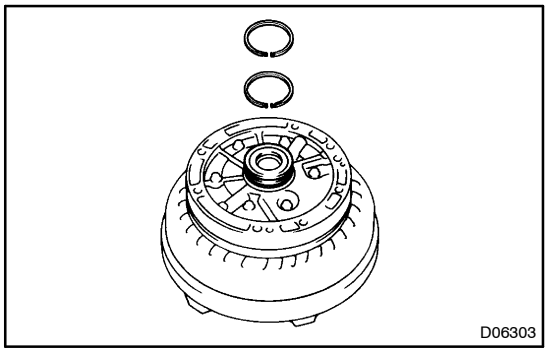
D06305

AT0I3–01

DISASSEMBLY

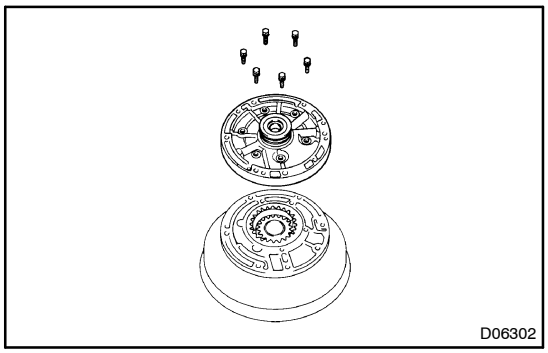

D06304

1. USE TORQUE CONVERTER AS WORK STAND


D06303

2. REMOVE OIL SEAL RING

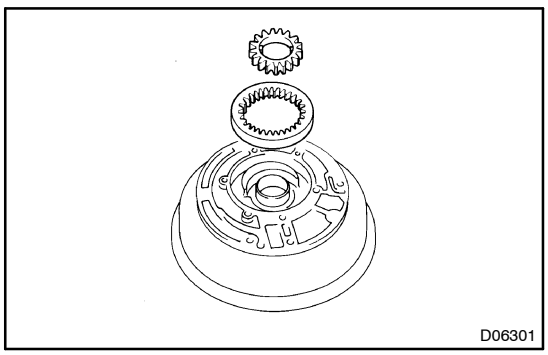
Remove the 2 oil seal rings.


D06302

3. REMOVE STATOR SHAFT

(a) Remove the 6 bolts, and then remove the stator shaft from the oil pump body.

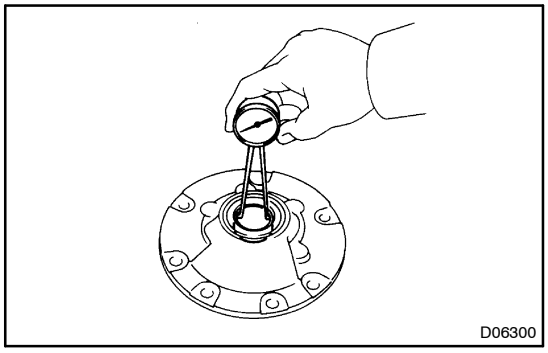
(b) Remove the O–ring from the oil pump body.


D06301

4. REMOVE OIL PUMP DRIVE GEAR AND DRIVEN GEAR

AT0I4–01

INSPECTION

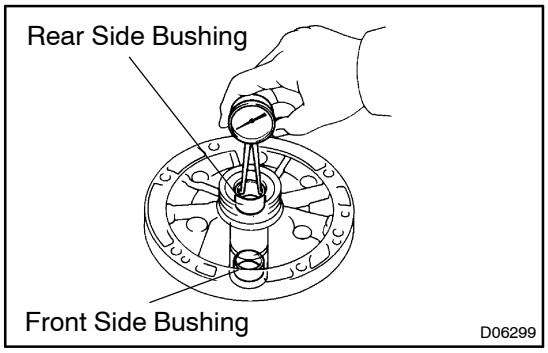


1. CHECK OIL PUMP BODY BUSHING

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

Maximum inside diameter: 38.19 mm (1.5035 in.)

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

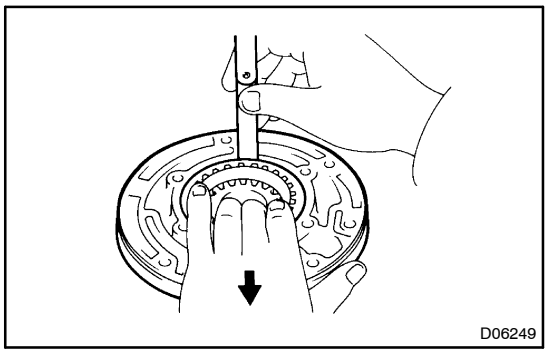


2. CHECK STATOR SHAFT BUSHING

Using a dial indicator, measure the inside diameter of the stator shaft bushings.

Maximum inside diameter:
Front and Rear side: 23.11 mm (0.9098 in.)

If the inside diameter is greater than the maximun, replace the stator shaft.



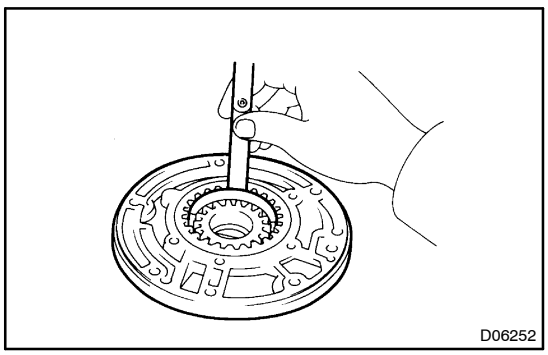
3. CHECK BODY CLEARANCE OF DRIVEN GEAR

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 maximun, replace the drive gear, driven gear or pump body.

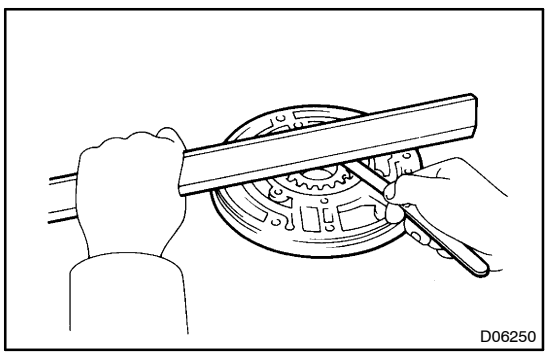


4. CHECK TIP CLEARANCE OF DRIVEN GEAR

Measure between the driven gear teeth and the crescent shaped part of the pump body.

Standard tip clearance:
0.11 – 0.14 mm (0.0043 – 0.0055 in.)
Maximum tip clearance: 0.3 mm (0.012 in.)

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



5. CHECK SIDE CLEARANCE OF BOTH GEARS

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

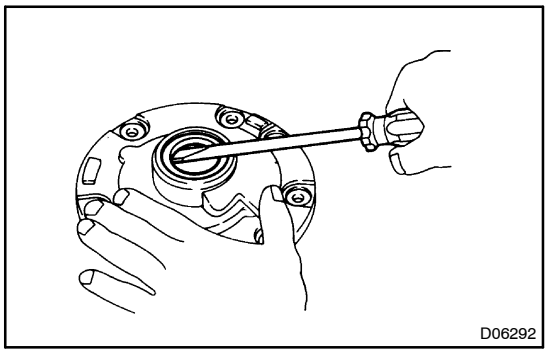
Standard side clearance:
0.02 – 0.05 mm (0.0008 – 0.0020 in.)
Maximum side clearance: 0.1 mm (0.004 in.)

There are 5 different thicknesses for drive and driven gears.

Drive and driven gear thickness:

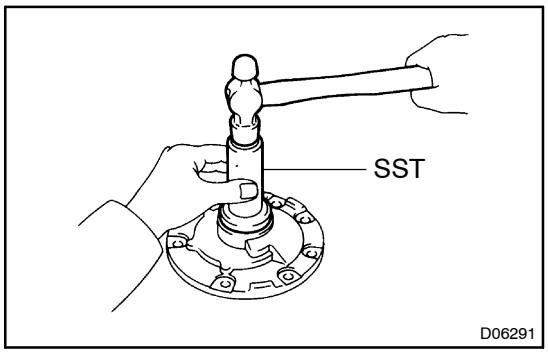
Mark	Thickness mm (in.)
1	17.235 – 17.244 (0.6785 – 0.6789)
2	17.245 – 17.254 (0.6789 – 0.6793)
3	17.255 – 17.265 (0.6793 – 0.6797)
4	17.266 – 17.275 (0.6798 – 0.6801)
5	17.276 – 17.285 (0.6802 – 0.6805)

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



6. IF NECESSARY, REPLACE OIL SEAL

(a) Using a screwdriver, pry off the oil seal.

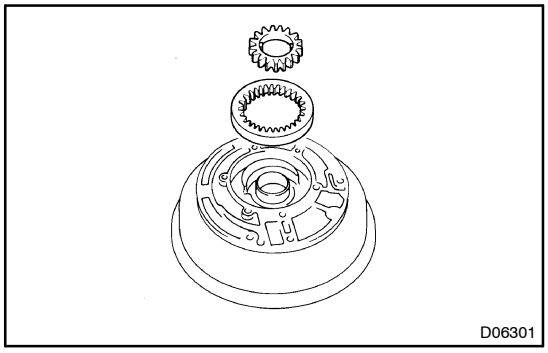


(b) Using SST and a hammer, install a new oil seal.
The oil seal end should be flushed with the outer edge of the pump body.
SST 09350–20015 (09388–20010)

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

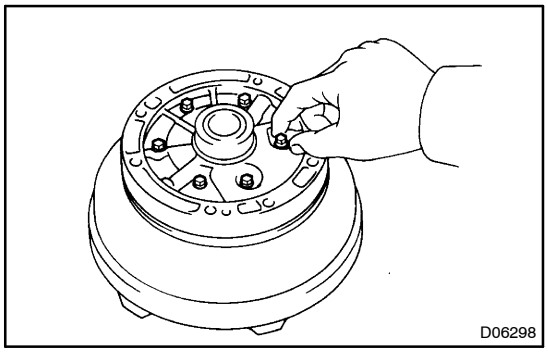
AT0I5–01

REASSEMBLY



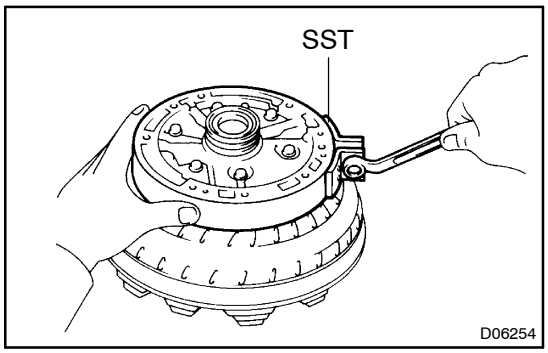
1. INSTALL DRIVEN GEAR AND DRIVE GEAR TO OIL PUMP BODY

(a) Install a new O–ring to the oil pump body.
(b) Place the oil pump body on the torque converter.
(c) Coat the drive gear and drive gear with ATF.
(d) Install the driven gear and drive gear.

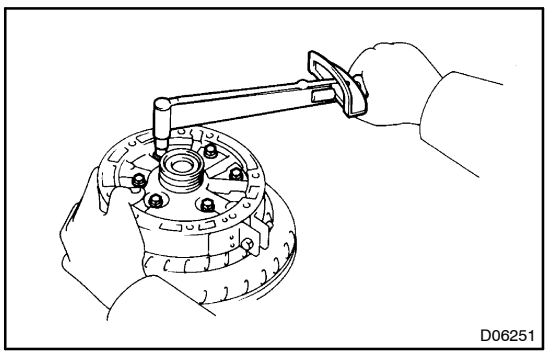


2. INSTALL STATOR SHAFT TO OIL PUMP BODY

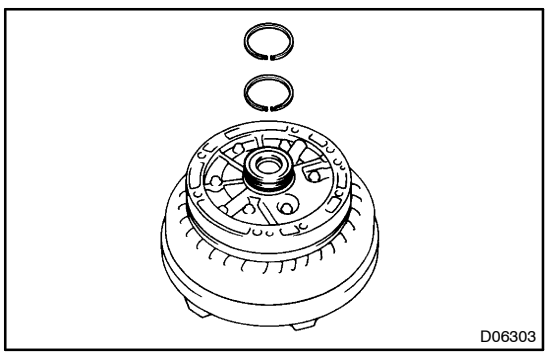
(a) Align the stator shaft with each bolt bole.
(b) Temporarily install the 6 bolts.



(c) Install SST around the pump body and stator shaft.
SST 09350–20015 (09363–20010)
(d) Tighten SST to align the pump body and stator shaft.



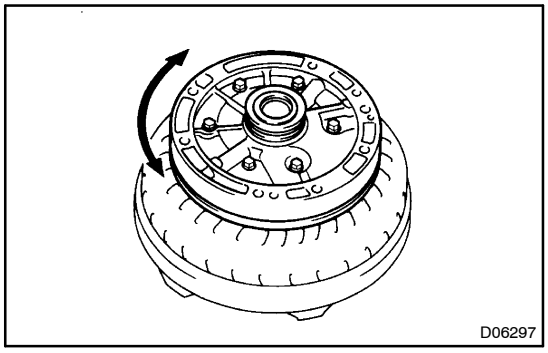
(e) Tighten the 6 bolts.
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)
(f) Remove SST.



3. INSTALL OIL SEAL RING

(a) Coat the 2 oil seal rings with ATF.
(b) Contract the oil seal rings and install them onto the stator shaft.

NOTICE:
Do not spread the ring ends too much.
HINT:
After installing the oil seal rings, check that they rotate smoothly.



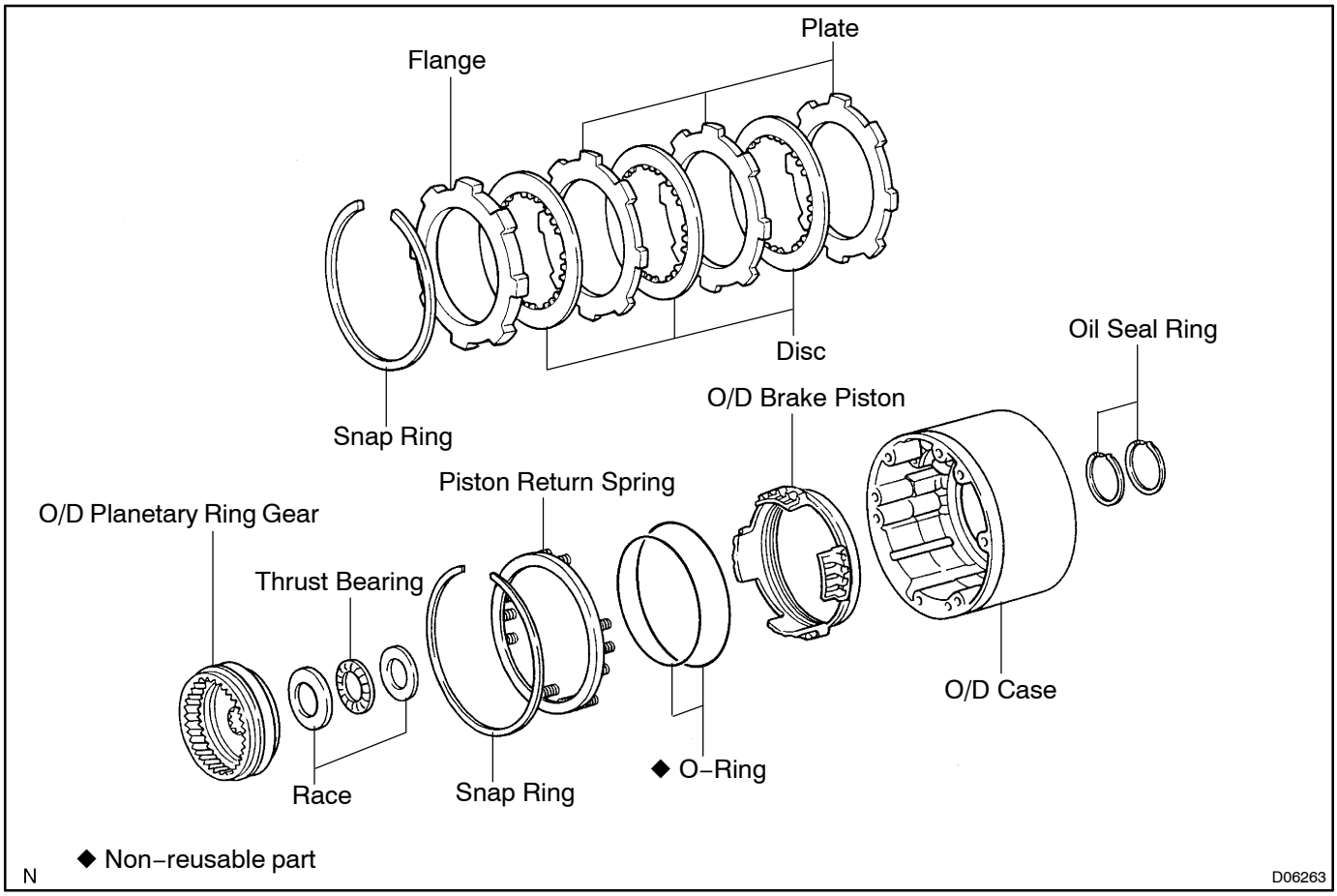
4. CHECK OIL PUMP DRIVE GEAR ROTATION

Make sure the drive gear rotates smoothly.

OVERDRIVE BRAKE

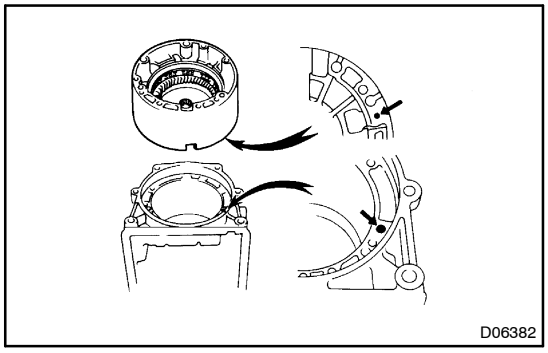
COMPONENTS

AT0I6–01



AT0I7–01

DISASSEMBLY

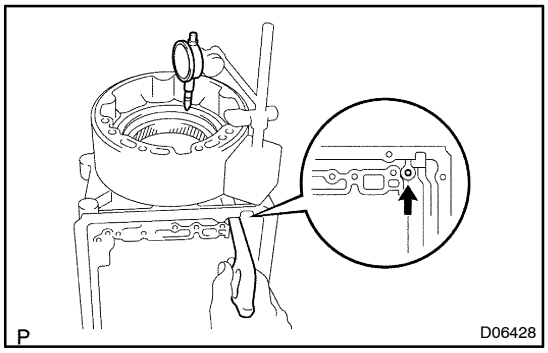

D06382

1. CHECK PACK CLEARANCE OF O/D BRAKE

(a) Place the O/D case assembly onto the transmission case, facing the cutout portion of the O/D case to the down side of the transmission case.

HINT:

Make sure that the oil hole of the O/D case is aligned with the oil hole of the transmission case.



D06428

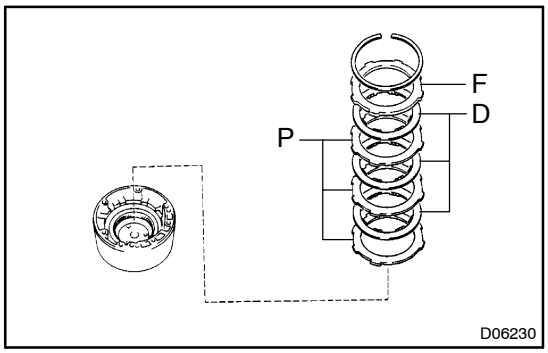
(b) Using a dial indicator, measure the O/D brake pack clearance applying and releasing the compressed air (392 – 785 kPa, 4 – 8 kgf/cm^2, 57–114 psi), as shown.

Pack clearance:

0.75 – 1.25 mm (0.0295 – 0.0492 in.)

If the values are nonstandard, inspect the discs.

(c) Remove the O/D case from the transmission case.

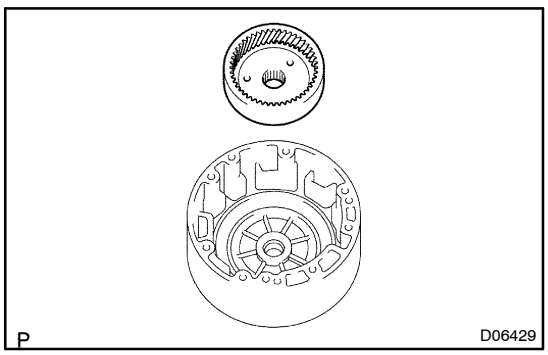


D06230

2. REMOVE FLANGE, DISC AND PLATE

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

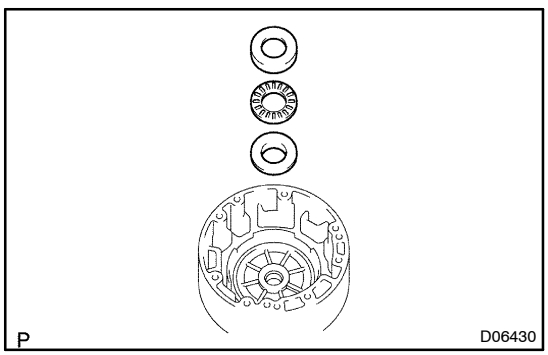
(b) Remove the flange, 3 discs and 3 plates.



D06429

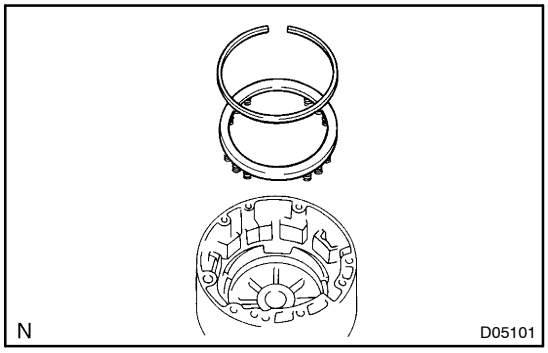
3. REMOVE O/D PLANETARY RING GEAR

(a) Remove the O/D planetary ring gear.



D06430

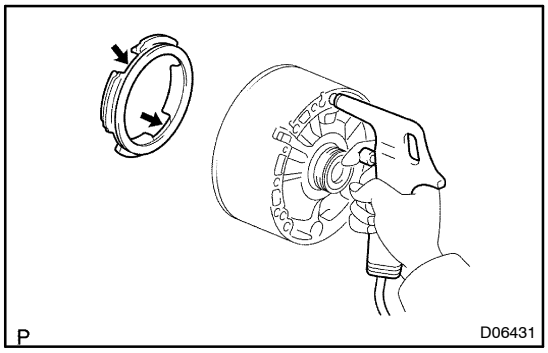
(b) Remove the bearing and 2 races.



4. REMOVE PISTON RETURN SPRING

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

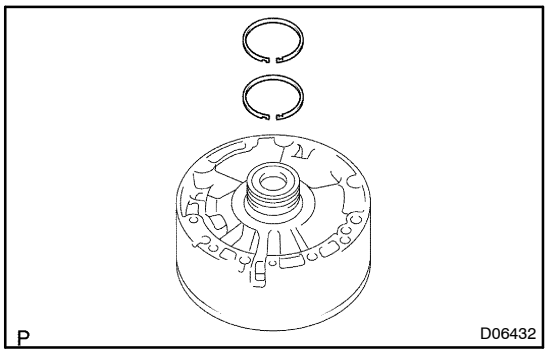
(b) Remove the piston return spring.



5. REMOVE O/D BRAKE PISTON

(a) Hold the O/D brake piston with hand, apply compressed air into the passage to remove the O/D brake piston.

(b) Remove the 2 O–rings from the piston.



6. REMOVE OIL SEAL RING

Remove the 2 oil seal rings.

AT0I8–01

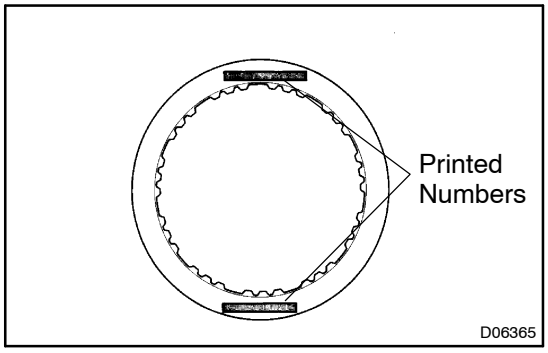
INSPECTION

1. INSPECT DISC, PLATE AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

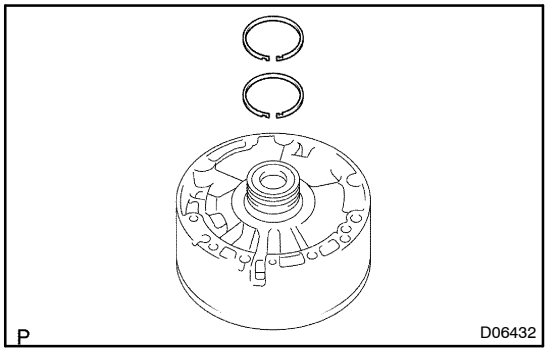
HINT:

- If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



AT0I9–01

REASSEMBLY



1. INSTALL OIL SEAL RING

(a) Coat the 2 oil seal rings with ATF.

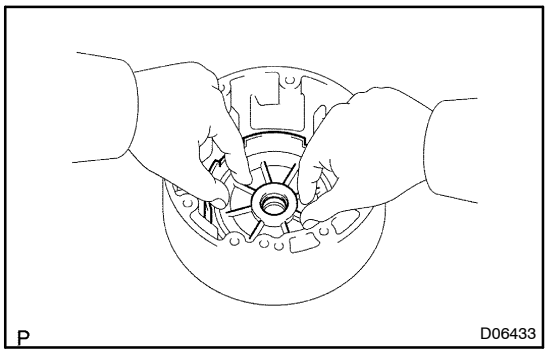
(b) Contact the oil seal rings and install them onto the O/D case.

NOTICE:

Do not spread the ring ends more than necessary.

HINT:

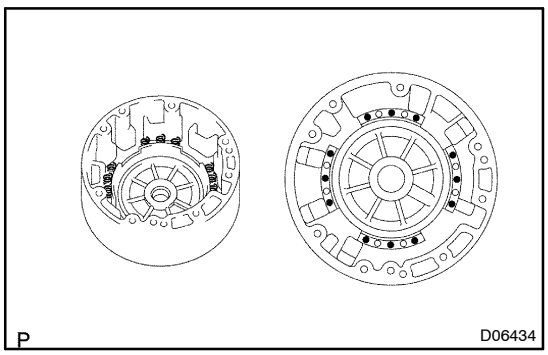
After installing the oil seal rings, check that they rotate smoothly.



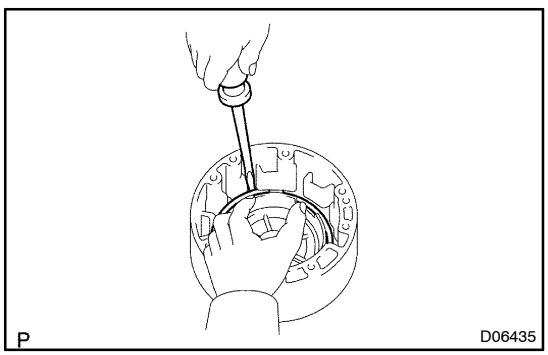
2. INSTALL O/D BRAKE PISTON

(a) Coat 2 new O–rings with ATF and install them on the O/D brake piston.

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



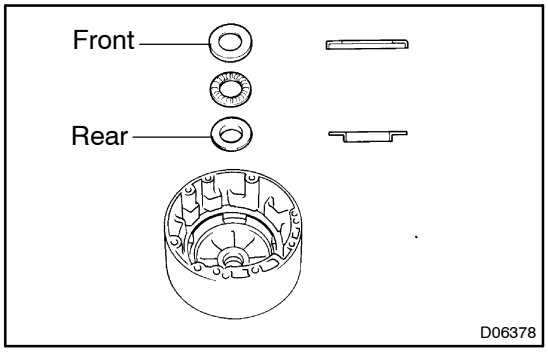
3. INSTALL PISTON RETURN SPRING



(a) Pushing the piston return spring and using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the O/D case.

HINT:

Make sure that the snap ring is inserted into its groove.



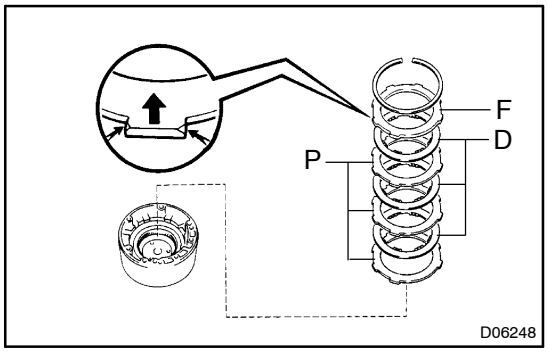
4. INSTALL O/D PLANETARY RING GEAR

(a) Coat the bearing and races with petroleum jelly and install them onto the O/D case.

Bearing and races diameter:

	Inside mm (in.)	Outside mm (in.)
Race (Front)	30.1 (1.185)	48.5 (1.909)
Bearing	28.4 (1.118)	46.4 (1.827)
Race (Rear)	27.6 (1.087)	44.5 (1.752)

(b) Install the O/D planetary ring gear.

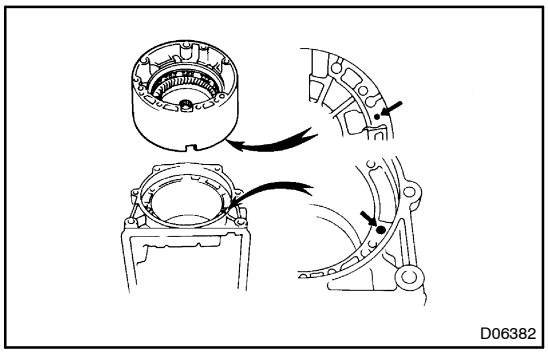


5. INSTALL FLANGE AND DISC AND PLATE

(a) Install the 3 plates and 3 discs.
Install in order: P = Plate D = Disc
P – D – P – D – P – D

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

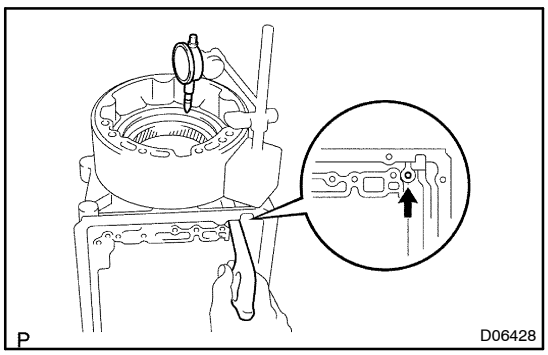
(c) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the O/D case.



6. CHECK PACK CLEARANCE OF O/D BRAKE

(a) Place the O/D case assembly onto the transmission case, facing the cutout portion of the O/D case to the down side of the transmission case.

HINT:
Make sure that the oil hole of the O/D case is aligned with the oil hole of the transmission case.



(b) Using a dial indicator, measure the O/D brake pack clearance applying and releasing the compressed air (392 – 785 kPa, 4 – 8 kgf/cm^2, 57 – 114 psi), as shown.

Pack clearance:
0.75 – 1.25 mm (0.0295 – 0.0492 in.)

If the pack clearance is less than the limit, parts may have been assembled incorrectly, check and reassemble again.
If the piston is nonstandard, select another plate.

HINT:
There are 2 different thickness for the plate.

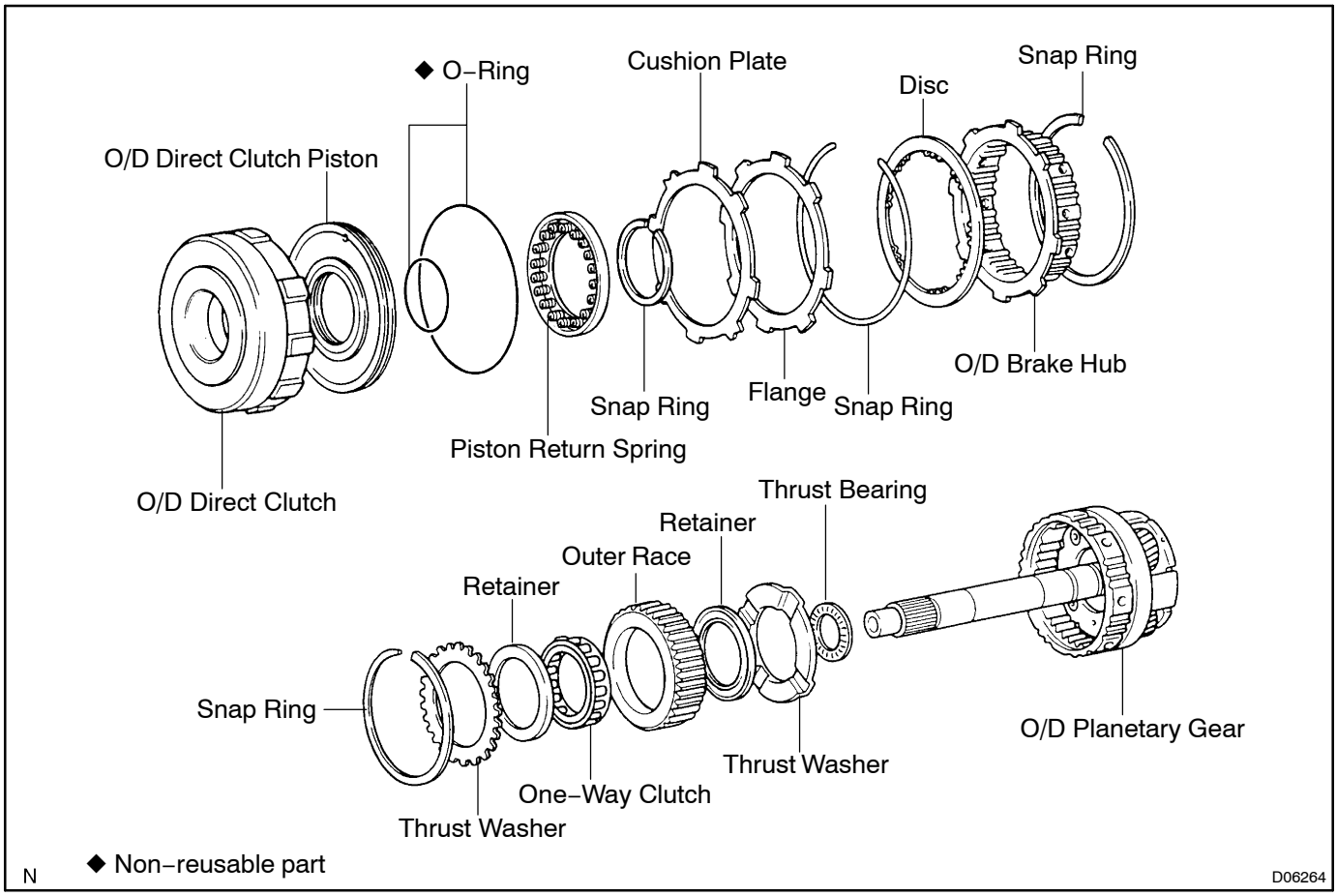
Plate thickness:

2.0 mm (0.079 in.)	2.3 mm (0.091 in.)

OVERDRIVE DIRECT CLUTCH

COMPONENTS

AT0IA–01

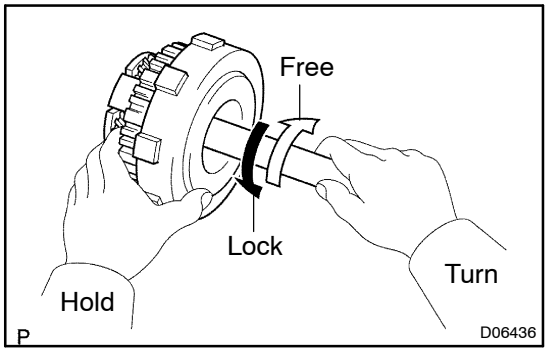


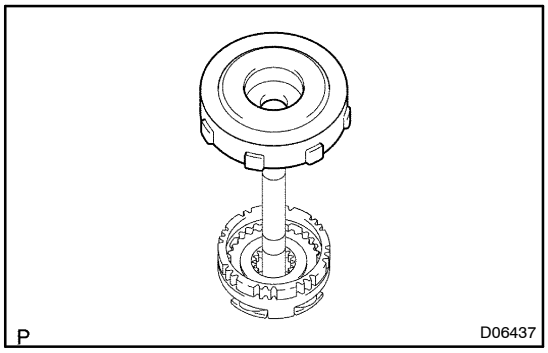
AT0IB–01

DISASSEMBLY

1. CHECK OPERATION OF ONE–WAY CLUTCH

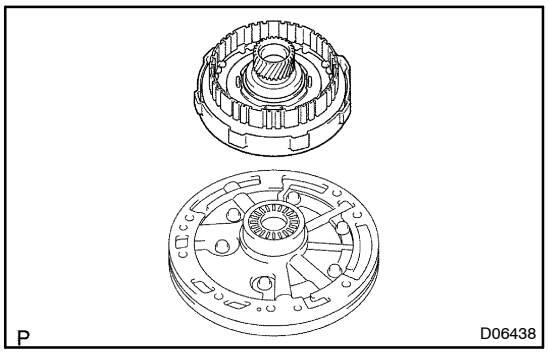
Hold the O/D direct clutch drum and turn the input shaft. The input shaft turns freely clockwise and locks counterclockwise.





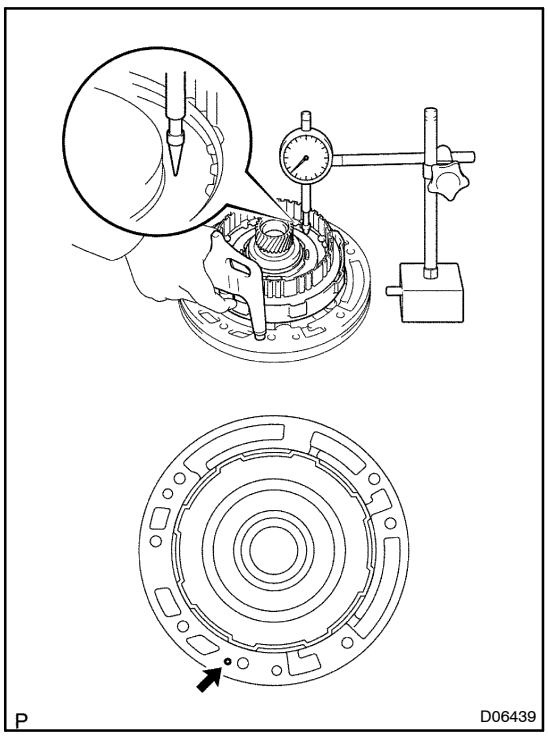
2. REMOVE O/D DIRECT CLUTCH ASSEMBLY FROM O/D PLANETARY GEAR

Remove the O/D direct clutch from the O/D planetary gear.



3. CHECK PISTON STROKE OF O/D DIRECT CLUTCH

(a) Place the O/D direct clutch assembly onto the oil pump.

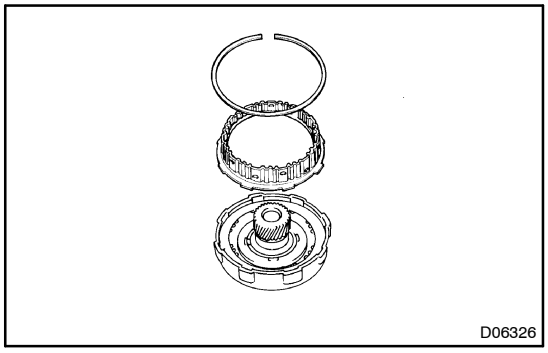


(b) Using a dial indicator, measure the O/D direct clutch piston stroke applying and releasing the compressed air (392 – 785 kPa, 4 – 8 kgf/cm^2, 57 – 114 psi), as shown.

Piston stroke: 1.74 – 2.44 mm (0.0685 – 0.0961 in.)

If the values are non–standard, inspect the discs.

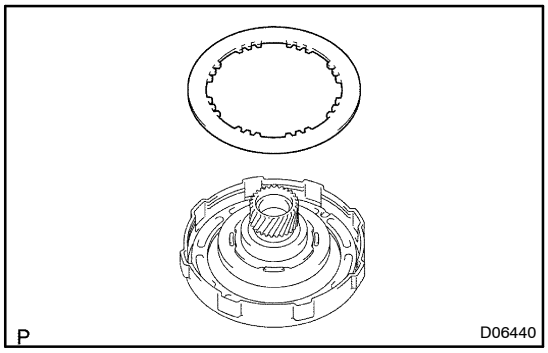
(c) Remove the O/D direct clutch assembly from the oil pump.



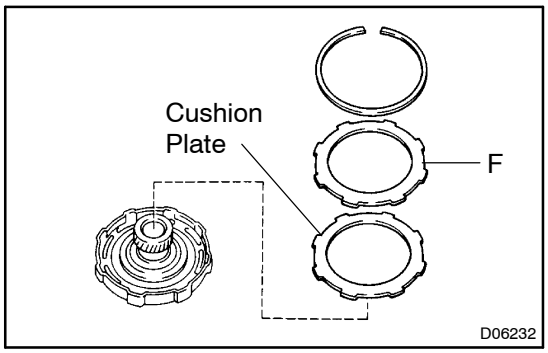
4. REMOVE O/D BRAKE HUB

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

(b) Remove the O/D brake hub.



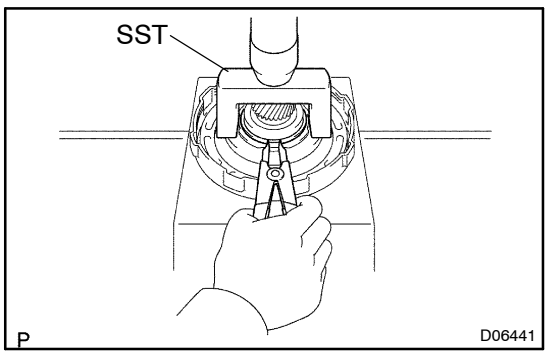
5. REMOVE DISC



6. REMOVE FLANGE AND CUSHION PLATE

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

(b) Remove the flange and cushion plate.

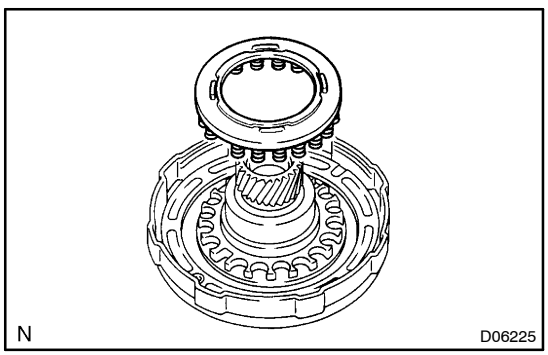


7. REMOVE PISTON RETURN SPRING

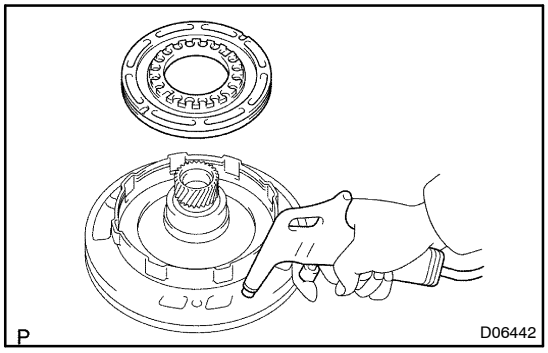
(a) Place SST on the piston return spring and compress the piston return spring with a shop press.

SST 09350–20015 (09369–20040)

(b) Using a snap ring expander, remove the snap ring.

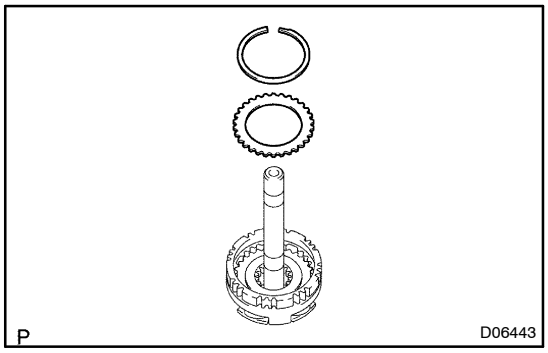


(c) Remove the piston return spring.



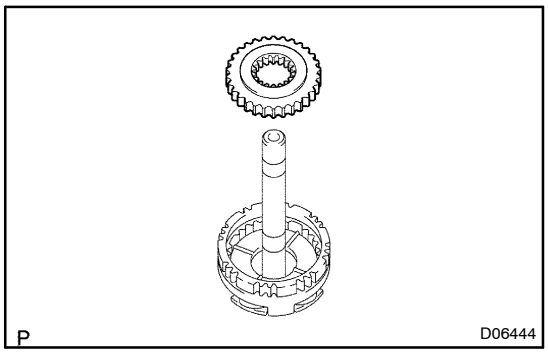
8. REMOVE O/D DIRECT CLUTCH PISTON

(a) Place the O/D direct clutch onto the oil pump.
(b) Hold the O/D direct clutch piston and apply compressed air to the oil pump to remove the O/D direct clutch piston.
(c) Remove the 2 O–rings from the piston.

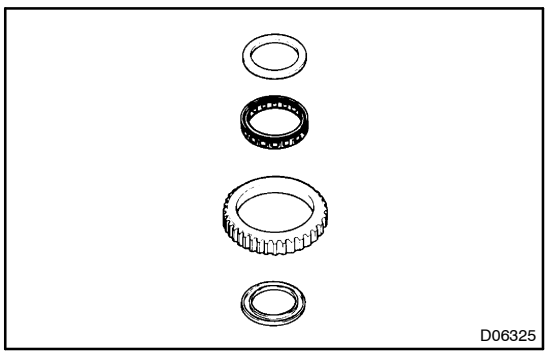


9. REMOVE THRUST WASHER

(a) Using a screwdriver, remove the snap ring.
(b) Remove the thrust washer.

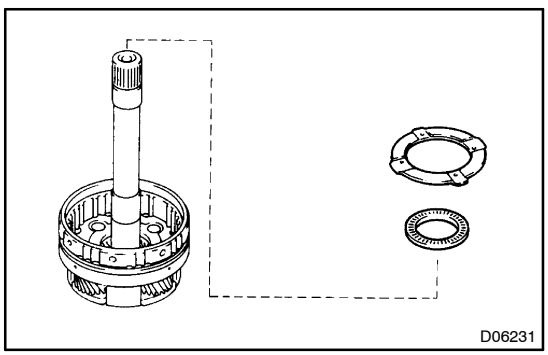


10. REMOVE ONE–WAY CLUTCH ASSEMBLY



11. DISASSEMBLE ONE–WAY CLUTCH

(a) Remove the 2 retainers from the both sides.
(b) Remove the one–way clutch from the outer race.

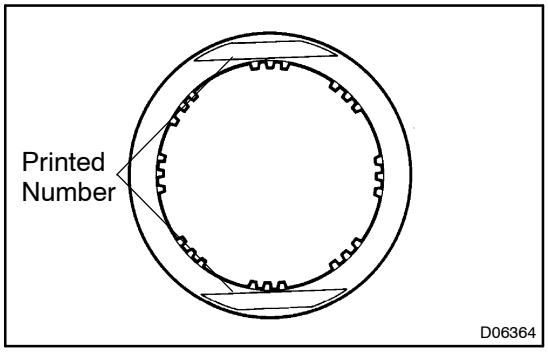


12. REMOVE THRUST WASHER

13. REMOVE ASSEMBLED BEARING AND RACE

AT0IC–01

INSPECTION

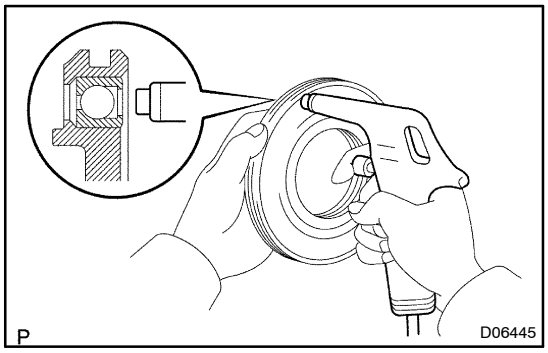


1. INSPECT DISC AND FLANGE

Check to see if the sliding surface of the disc and flange are worn or burnt. If necessary, replace them.

HINT:

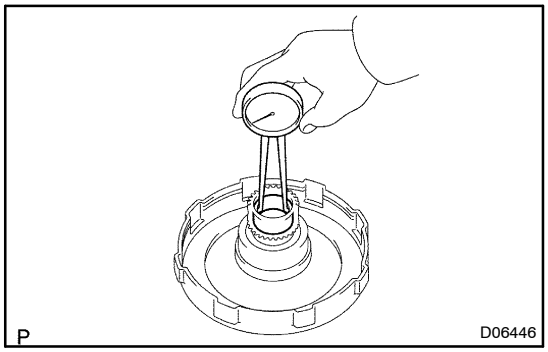
- If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace disc.
- Before assembling new disc, soak it in ATF for at least 15 minutes.



2. CHECK O/D 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.

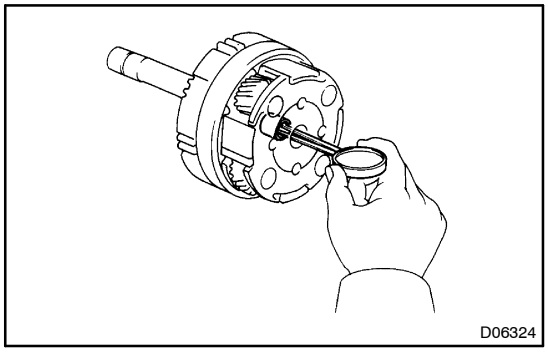


3. CHECK O/D DIRECT CLUTCH DRUM BUSHING

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

Maximum inside diameter: 23.14 mm (0.9110 in.)

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

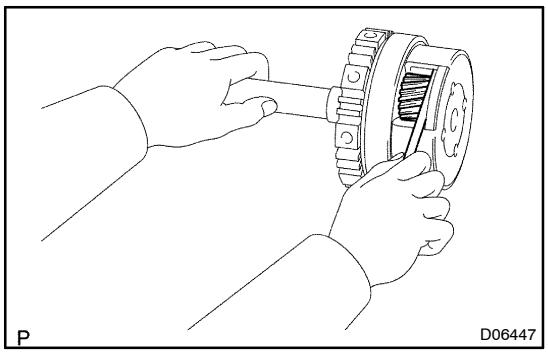


4. CHECK O/D PLANETARY GEAR BUSHING

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

Maximum inside diameter: 11.27 mm (0.4437 in.)

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



5. MEASURE PLANETARY PINION GEAR THRUST CLEARANCE

Using a feeler gauge, measure the planetary pinion gear thrust clearance.

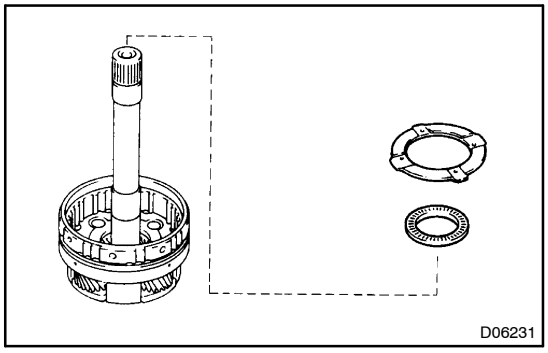
Standard clearance:

0.20 – 0.50 mm (0.0079 – 0.0197 in.)

If the clearance is non–standard, inspect the planetary gear thrust washer. If necessary, replace the planetary gear assembly.

AT0ID–01

REASSEMBLY



1. INSTALL ASSEMBLED BEARING AND RACE

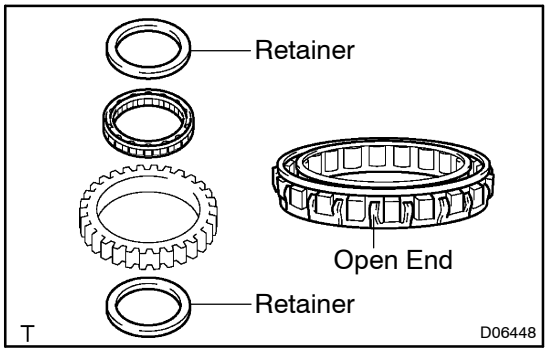
Coat the assembled bearing and race with petroleum jelly and install it onto the O/D planetary gear.

Assembled bearing and race diameter:

	Inside mm (in.)	Outside mm (in.)
Assembled bearing and race	37.3 (1.469)	52.5 (2.067)

2. INSTALL THRUST WASHER

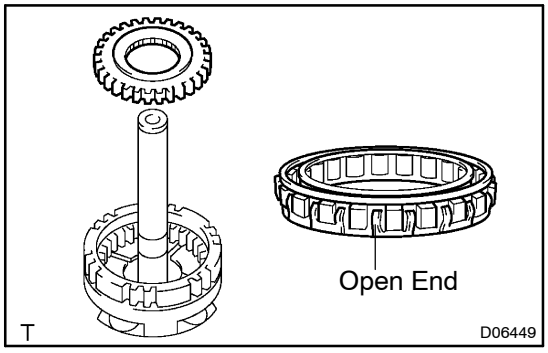
Install the thrust washer to the O/D planetary gear, the grooved side facing upward.



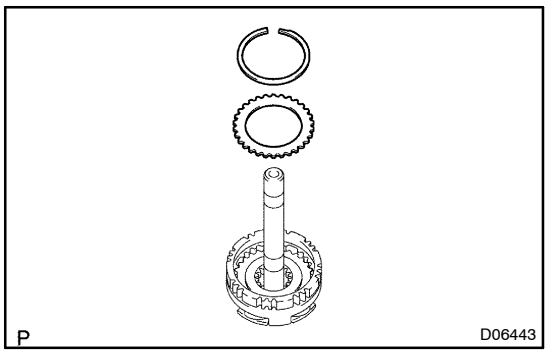
3. ASSEMBLE ONE–WAY CLUTCH

(a) Install the one–way clutch into the outer race, the open end of the retainers facing upward.

(b) Install the 2 retainers to both sides.



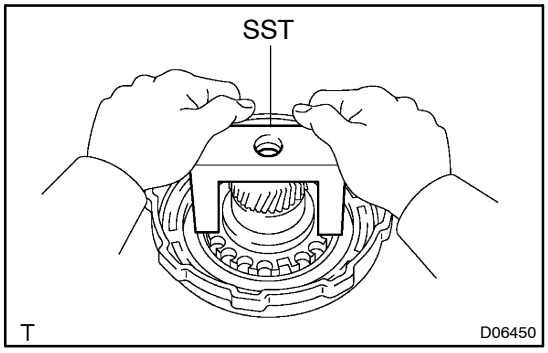
4. INSTALL ONE–WAY CLUTCH ASSEMBLY



5. INSTALL THRUST WASHER

(a) Install the thrust washer.

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

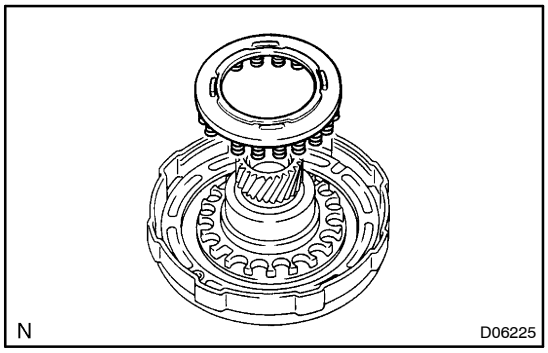


6. INSTALL O/D DIRECT CLUTCH PISTON

(a) Coat new O–rings with ATF and install them on the O/D direct clutch piston.

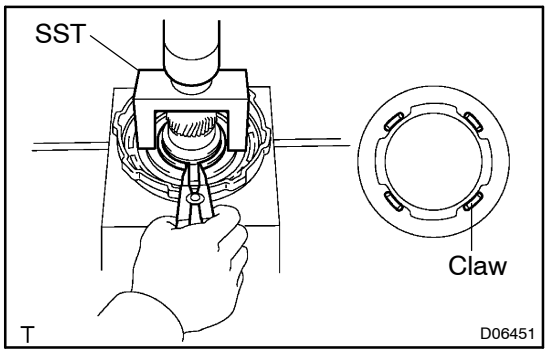
(b) Place SST on the direct clutch piston.
SST 09350–20015 (09369–20040)

(c) Being careful not to damage the O–rings, press in the direct clutch piston onto the clutch drum with both hands.



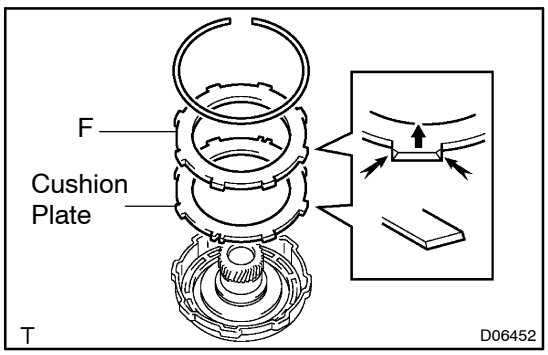
7. INSTALL PISTON RETURN SPRING

(a) Install the piston return spring.



(b) Place SST on the piston return spring, and compress the piston return spring with a shop press.
SST 09350–20015 (09369–20040)

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

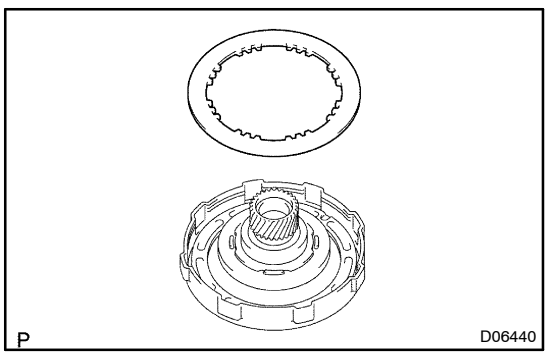


8. INSTALL CUSHION PLATE AND FLANGE

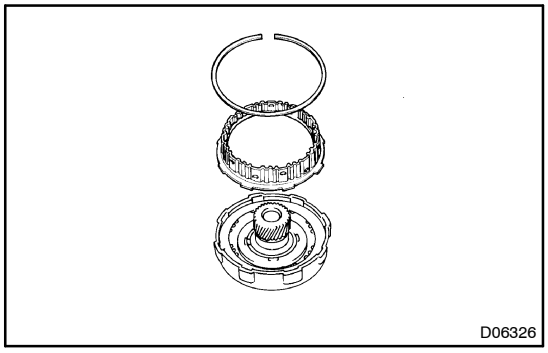
(a) Install the cushion plate.

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

(c) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the drum.



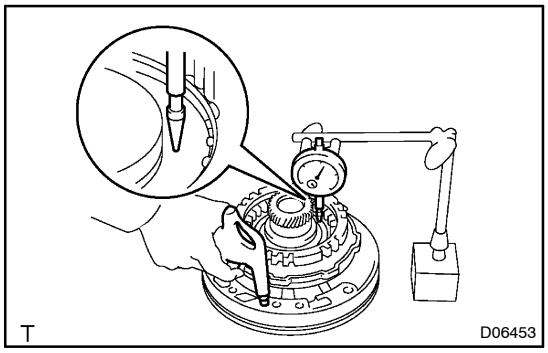
9. INSTALL DISC



10. INSTALL O/D BRAKE HUB

(a) Install the O/D brake hub.

(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the drum.



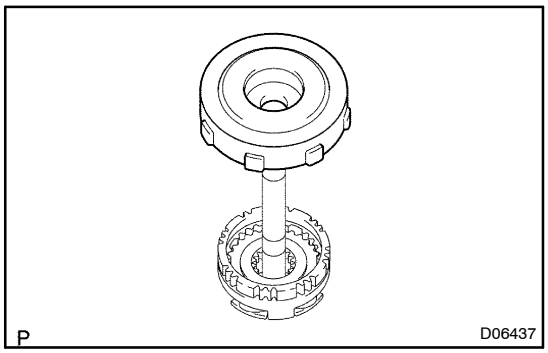
11. CHECK PISTON STROKE OF O/D DIRECT CLUTCH

(a) Place the O/D direct clutch assembly onto the oil pump.

(b) Using dial indicator, measure the O/D direct clutch piston stroke applying and releasing the compressed air (392 – 785 kPa, 4 – 8 kgf/cm^2, 57 – 114 psi), as shown.

Piston stroke: 1.74 – 2.44 mm (0.0685 – 0.0961 in.)

If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

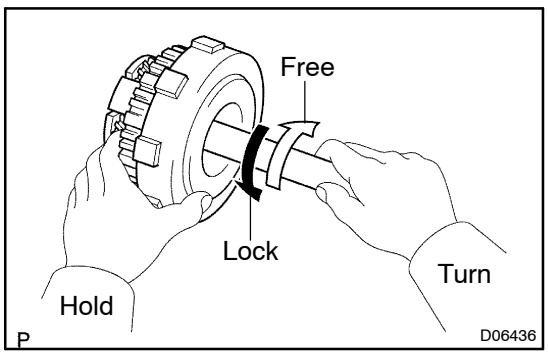


12. INSTALL O/D DIRECT CLUTCH ASSEMBLY

Install the direct clutch assembly onto the O/D planetary gear.

HINT:

Mesh the splines of the O/D planetary gear with the flukes of the disc by rotating and pushing the O/D planetary gear.



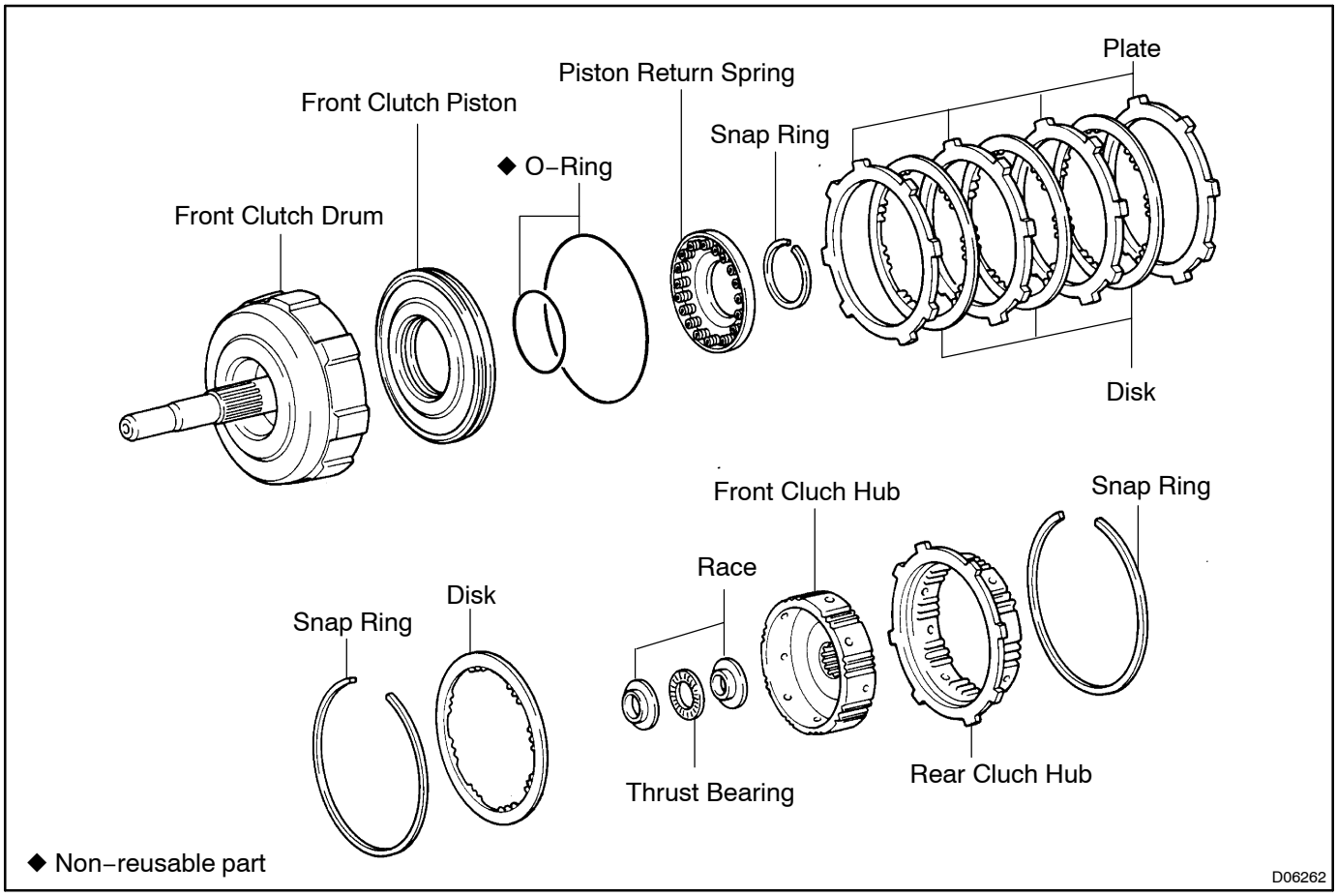
13. CHECK OPERATION OF ONE–WAY CLUTCH

Hold the O/D direct clutch drum and turn the input shaft. The input shaft turns freely clockwise and locks counterclockwise.

FRONT CLUTCH

COMPONENTS

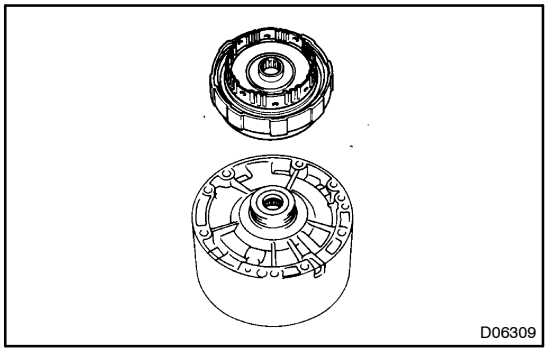
AT0IE–01



AT0IF–01

DISASSEMBLY

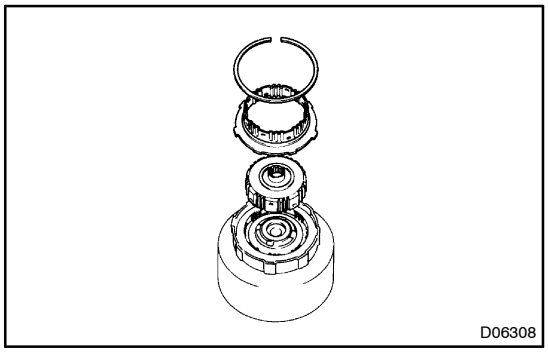
1. INSTALL FRONT CLUTCH ASSEMBLY TO O/D CASE



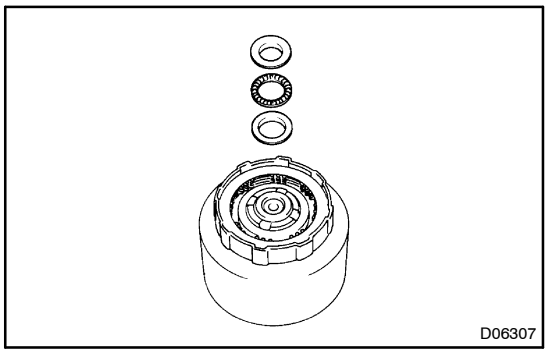
2. REMOVE REAR CLUTCH HUB AND FRONT CLUTCH HUB

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

(b) Remove the rear clutch hub and front clutch hub.



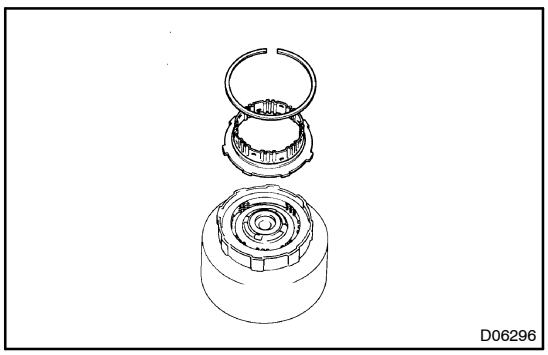
(c) Remove the bearing and 2 races.



3. CHECK PISTON STROKE OF FRONT CLUTCH

(a) For check of piston stroke, install the rear clutch hub.

(b) Install the snap ring.



(c) Using SST and a dial indicator, measure the front clutch piston stroke applying and releasing the compressed air (392 – 785 kPa, 4 – 8 kgf/cm^2, 57 – 114 psi), as shown.

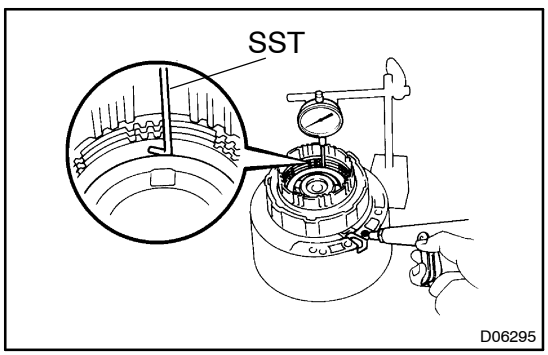
SST 09350–20015

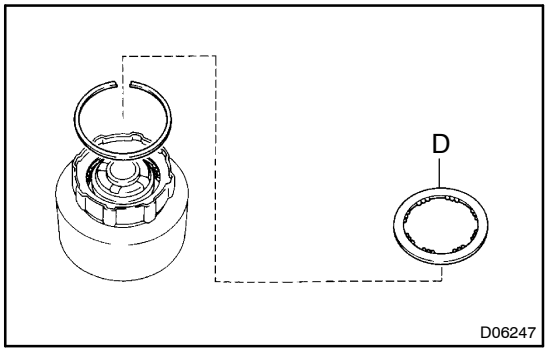
Piston stroke:

1.40 – 1.60 mm (0.0551 – 0.0630 in.)

If the values are non–standard, inspect the discs.

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

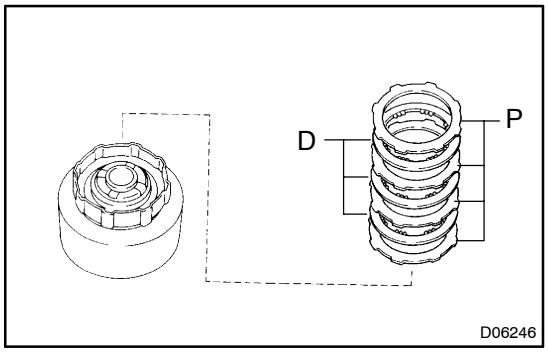




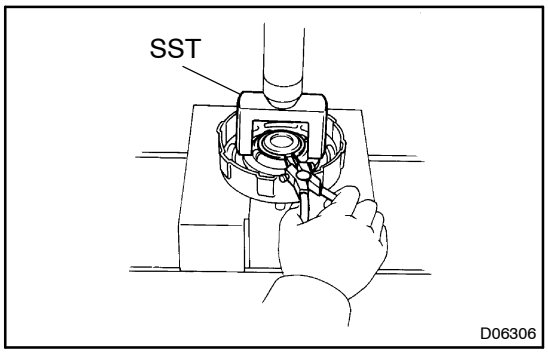
4. REMOVE PLATE AND DISC

(a) Remove the disc.

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



(c) Remove the 4 plates and 3 discs.

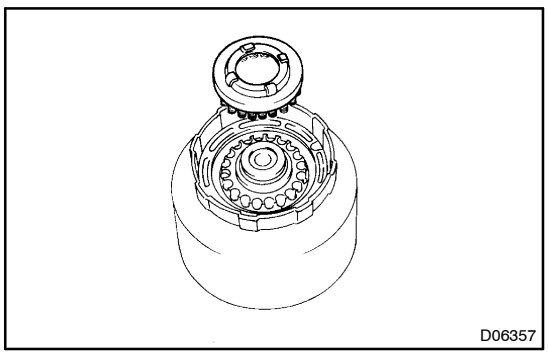


5. REMOVE PISTON RETURN SPRING

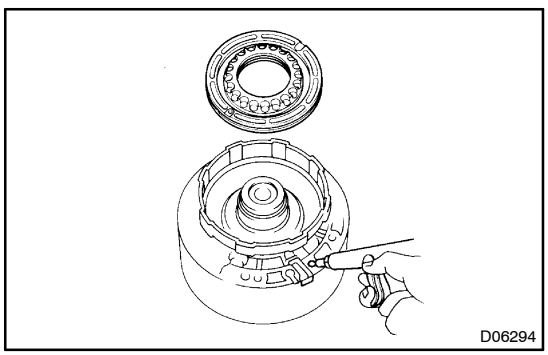
(a) Place SST on the spring seat and compress the return springs with a shop press.

SST 09350–20015 (09369–20040)

(b) Using a snap ring expander, remove the snap ring.



(c) Remove the piston return spring.



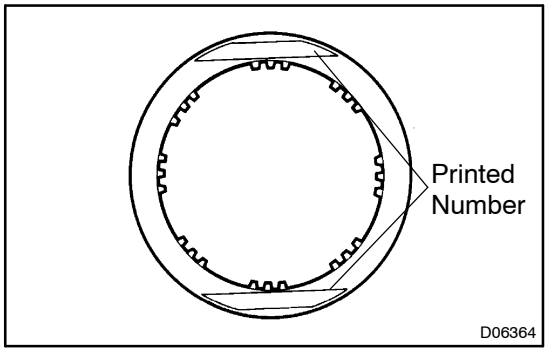
6. REMOVE FRONT CLUTCH PISTON

(a) Place the front clutch drum onto the O/D case.

(b) Hole the front clutch piston with hand, apply compressed air to the O/D case to remove the front clutch piston.

(c) Remove the 2 O–rings from the piston.

AT0IG–01



INSPECTION

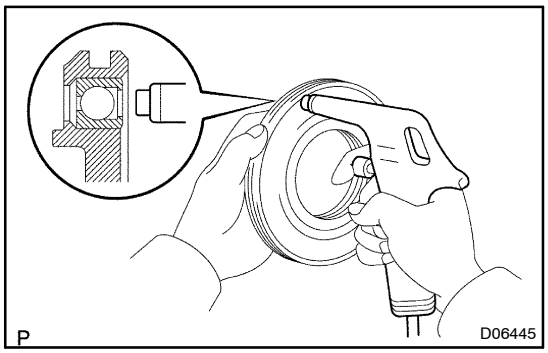
1. INSPECT DISC AND PLATE

Check to see if the sliding surface of the disc and plate are worn or burnt.

If necessary, replace them.

HINT:

- If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace all discs.
- Before assembling new discs soak them in ATF for at least 15 mionutes.



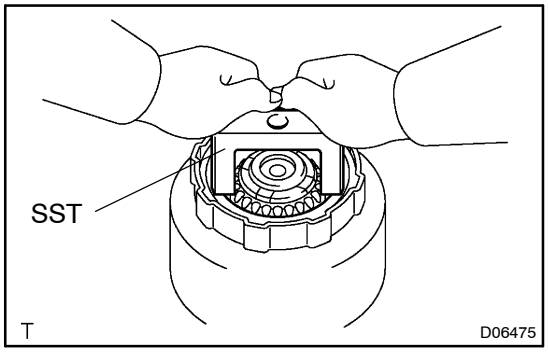
2. CHECK FRONT CLUTCH PISTON

(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.

AT0IH–01

REASSEMBLY

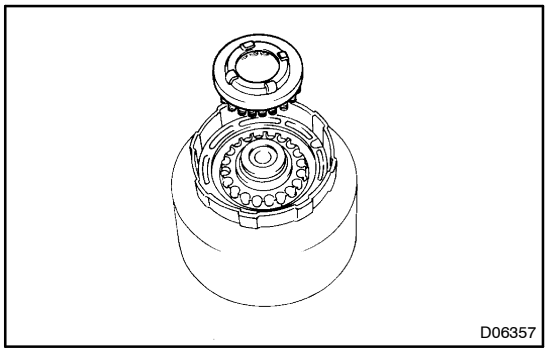


1. INSTALL FRONT CLUTCH PISTON

(a) Coat new O–rings with ATF and install them on the front clutch piston.

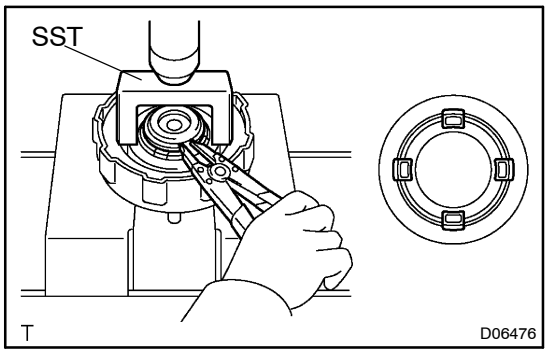
(b) Place SST on the front clutch piston.
SST 09350–20015 (09369–20040)

(c) Being careful not to damage the O–rings, press the clutch piston into the front clutch drum with both hands.



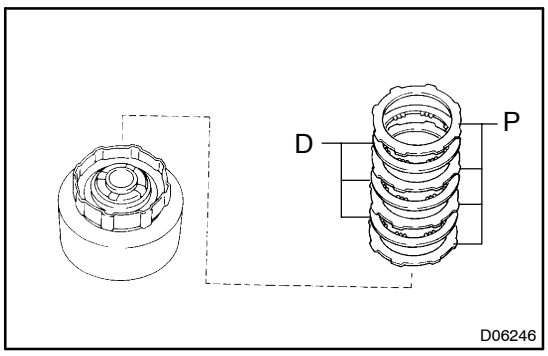
2. INSTALL PISTON RETURN SPRING

(a) Install the piston return spring.



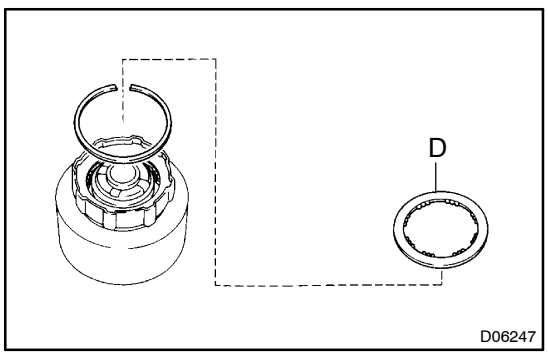
(b) Place SST on the spring seat, and compress the return spring with a shop press.
SST 09350–20015 (09369–20040)

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



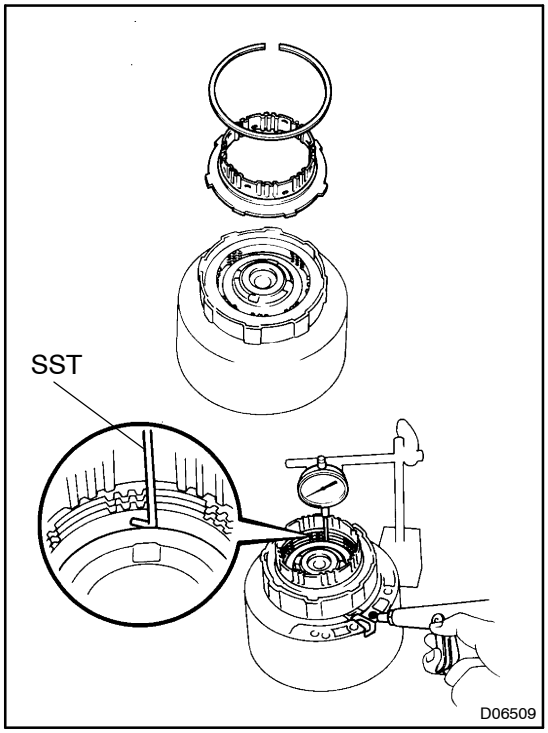
3. INSTALL PLATE AND DISC

(a) Install the 4 plates and 3 discs.
Install in order: P = Plate D = Disc
P – D – P – D – P – D – P



(b) Install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the front clutch drum.

(c) Install the disc.



4. CHECK PISTON STROKE OF FRONT CLUTCH

(a) For check of piston stroke, install the rear clutch hub.

(b) Install the snap ring.

(c) Using SST and a dial indicator, measure the front clutch piston stroke applying and releasing the compressed air (392 – 785 kPa, 4 – 8 kgf/cm^2, 57 – 114 psi), as shown.

SST 09350–20015 (09350–06120)

Piston stroke:

1.40 – 1.60 mm (0.0551 – 0.0630 in.)

If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

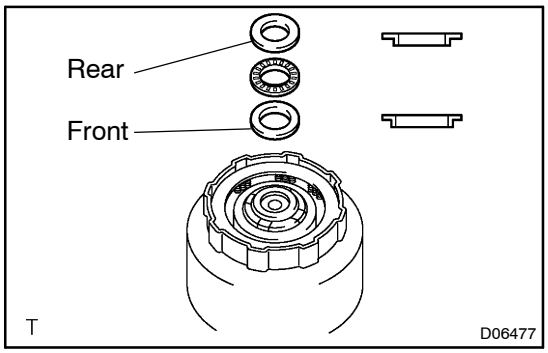
If the piston stroke is non–standard, select another plate.

HINT:

Thre are 2 different thicknesses for the plate.

Plate thickness:

1.8 mm (0.071 in.)	2.0 mm (0.079 in.)



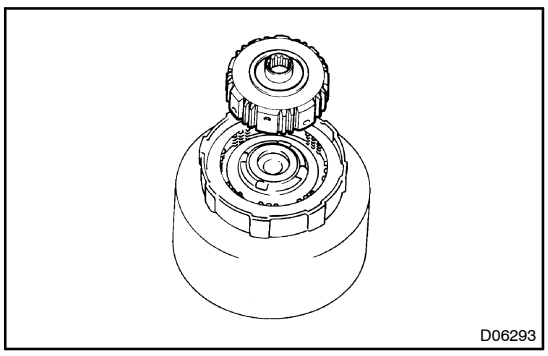
(d) Remove the snap ring and rear clutch hub.

5. INSTALL FRONT CLUTCH HUB

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

Bearing and races diameter:

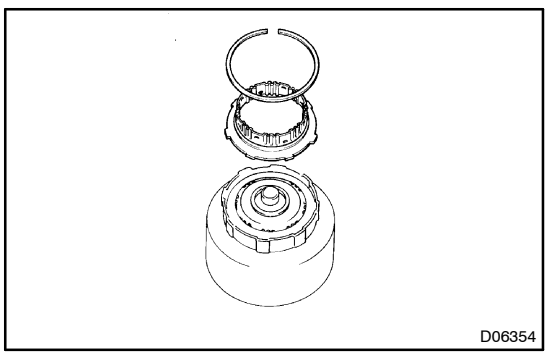
	Inside mm (in.)	Outside mm (in.)
Race (Rear)	21.4 (0.843)	37.3 (1.469)
Bearing	23.4 (0.921)	37.5 (1.476)
Race (Front)	24.1 (0.949)	37.3 (1.469)



(b) Install the front clutch hub into the front clutch drum.

HINT:

Mesh the splines of the front clutch hub with the flukes of the discs by rotating and pushing the front clutch hub.



6. INSTALL REAR CLUTCH HUB

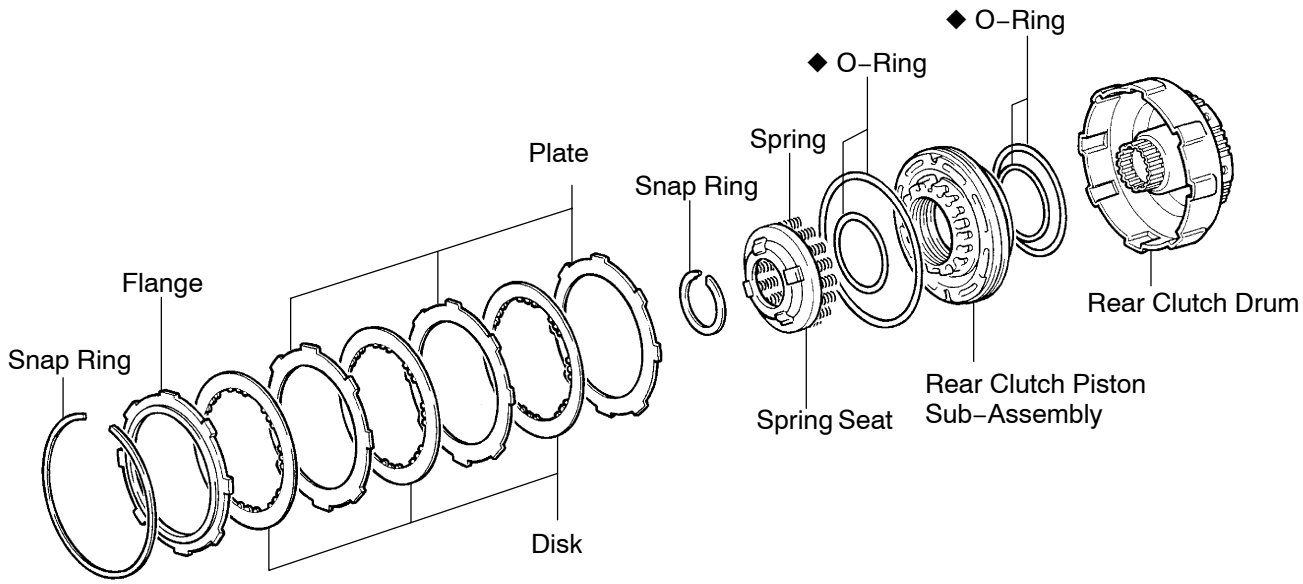
(a) Install the rear clutch hub.

(b) Install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the front clutch drum.

REAR CLUTCH

COMPONENTS

AT0II–01



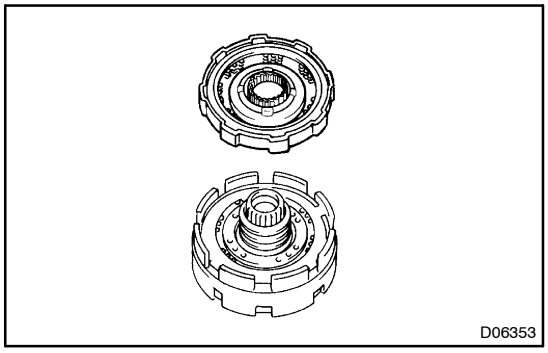
◆ Non–reusable part

N

D06261

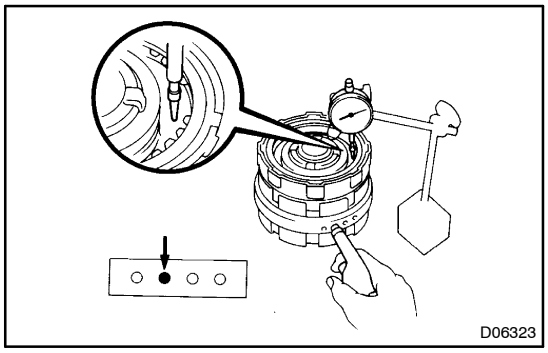
AT0IJ–01

DISASSEMBLY


D06353

1. CHECK PISTON STROKE OF REAR CLUTCH

(a) Place the rear clutch assembly onto the center support.

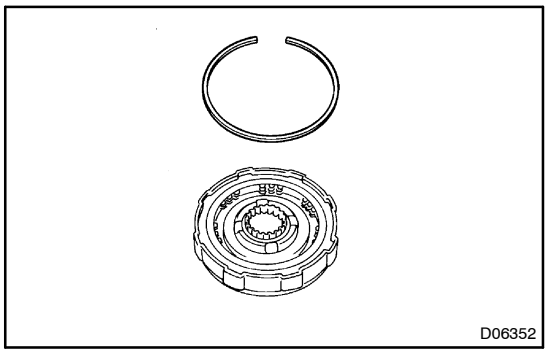

D06323

(b) Using a dial indicator, measure the rear clutch piston stroke applying and releasing the compressed air (392 – 785 kPa, 4 – 8 kgf/cm^2, 57 – 114 psi), as shown.

Piston stroke:

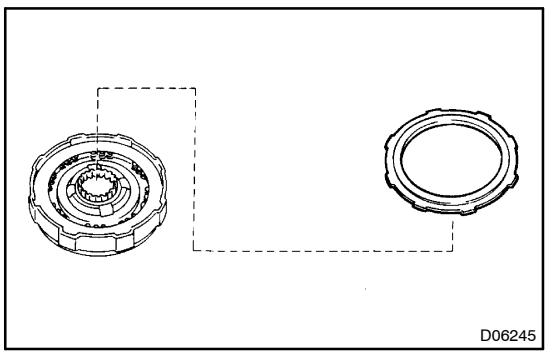
0.90 – 1.30 mm (0.0354 – 0.0512 in.)

If the values are non–standard, inspect the discs.

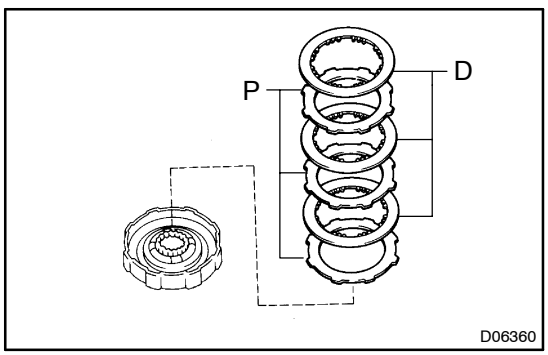

D06352

2. REMOVE FLANGE

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


D06245

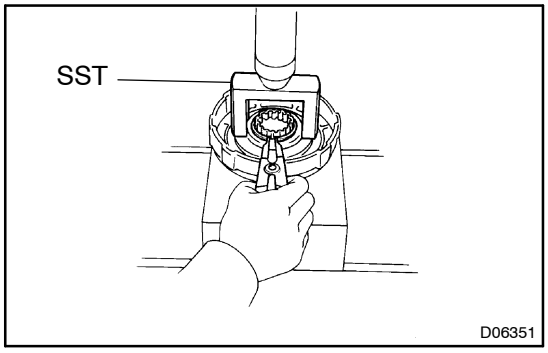
(b) Remove the flange.



D06360

3. REMOVE DISC AND PLATE

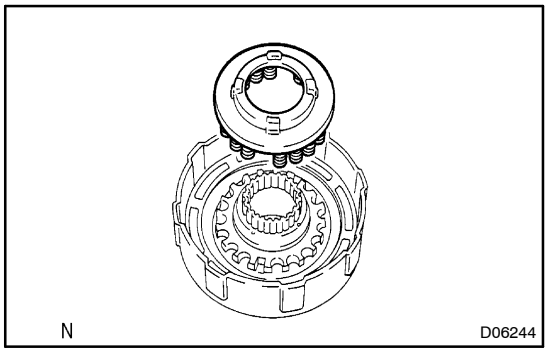
Remove the 3 discs and 3 plates.



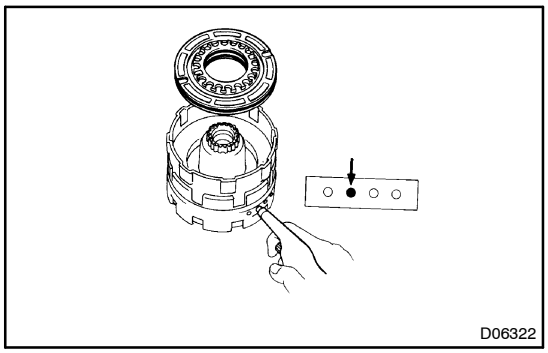
4. REMOVE PISTON RETURN SPRING

(a) Place SST on the piston return spring and compress the piston return spring with a shop press.
SST 09350–20015 (09369–20040)

(b) Using a snap ring expander, remove the snap ring.



(c) Remove the piston return spring.



5. REMOVE REAR CLUTCH PISTON

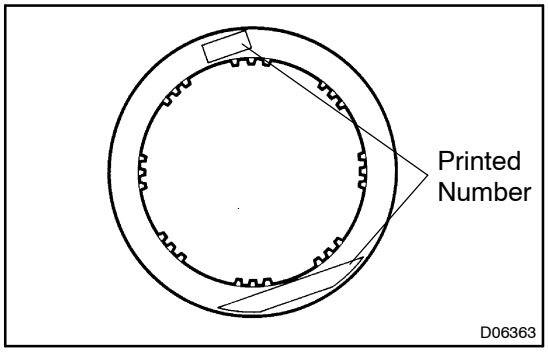
(a) Place the rear clutch drum onto the center support.

(b) Hold the rear clutch piston with hand, apply compressed air to the center support to remove the rear clutch piston.

(c) Remove the 4 O–rings from the piston.

AT0IK–01

INSPECTION



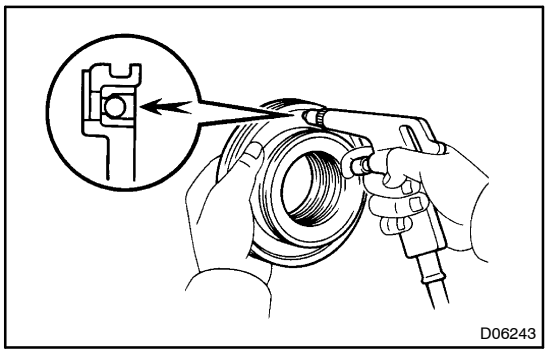
1. INSPECT DISC, PLATE AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt.

If necessary, replace them.

HINT:

- If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



2. CHECK REAR CLUTCH PISTON

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

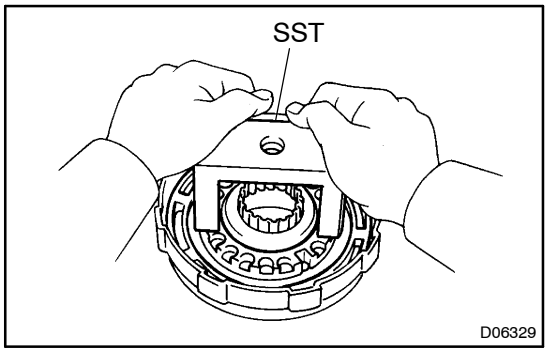
(b) Check that the valve does not leak by applying low–pressure compressed air.

AT0IL–01

REASSEMBLY

1. INSTALL REAR CLUTCH PISTON

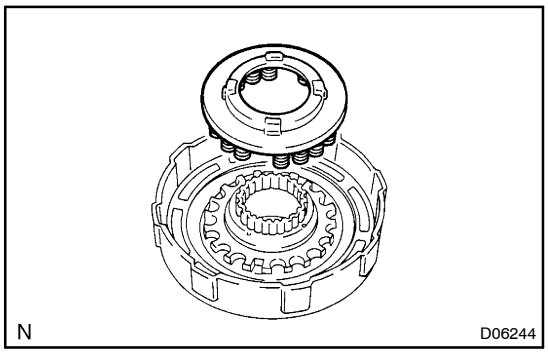
(a) Coat new O–rings with ATF and install them on the rear clutch piston.



(b) Install the rear clutch piston.

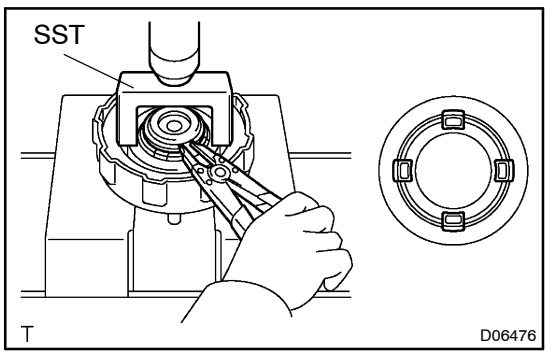
(c) Place SST on the rear clutch piston.
SST 09350–20015 (09369–20040)

(d) Being careful not to damage the O–rings, press in the rear clutch piston into the clutch drum with both hands.



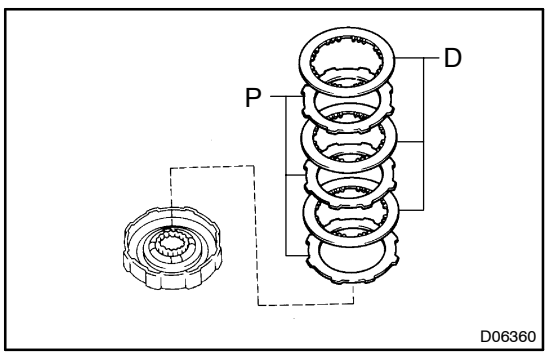
2. INSTALL PISTON RETURN SPRING

(a) Install the piston return spring.



(b) Place SST on the piston return spring, and compress the piston return spring with a shop press.
SST 09350–20015 (09369–20040)

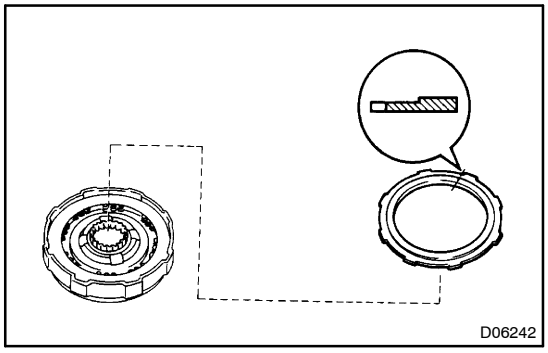
(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



3. INSTALL PLATE AND DISC

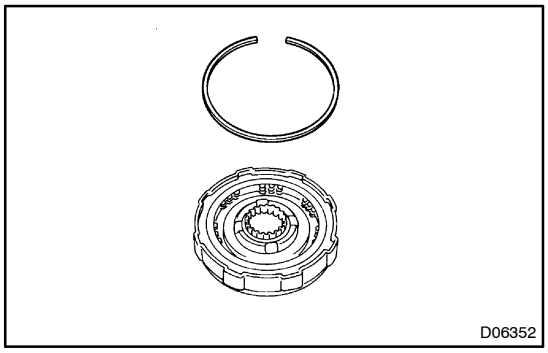
Install the 3 plates and 3 discs.

Install in order: P = Plate D = Disc
P – D – P – D – P – D

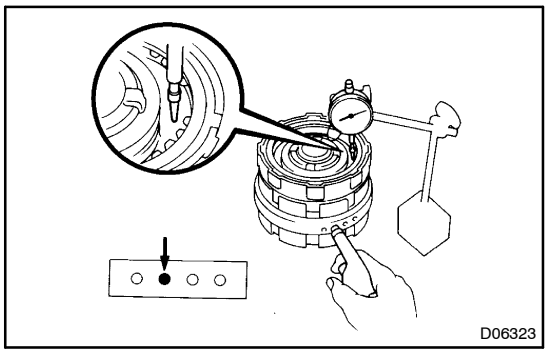

D06242

4. INSTALL FLANGE

(a) Install the flange, the flat end facing downward.


D06352

(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the rear clutch drum.


D06323

5. CHECK PISTON STROKE OF REAR CLUTCH

(a) Plate the rear clutch assembly onto the center support.

(b) Using a dial indicator, measure the rear clutch piston stroke applying and releasing the compressed air (392 – 785 kPa, 4 – 8 kgf/cm^2, 57 – 114 psi), as shown.

Piston stroke:

0.90 – 1.30 mm (0.0354 – 0.0512 in.)

If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

If the piston stroke is nonstandard, select another flange.

HINT:

There are 3 different thickness for thee flange.

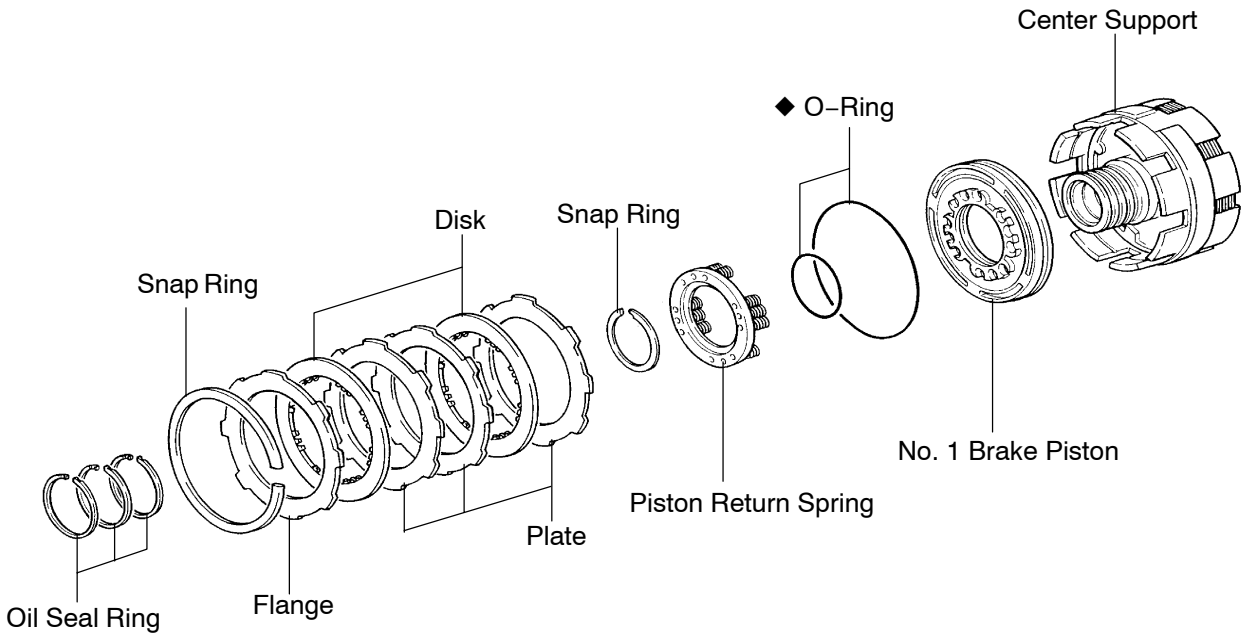
Flange thickness:

3.55mm (0.1398 in.)	4.00mm (0.1575 in.)
3.75mm (0.1477 in.)	–

NO.1 BRAKE

COMPONENTS

AT0IM–01



N

◆ Non reusable part

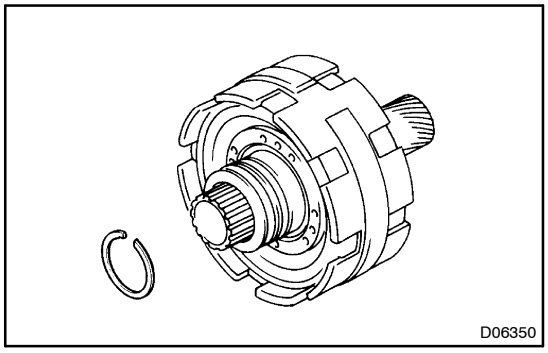
D06260

AT0IN–01

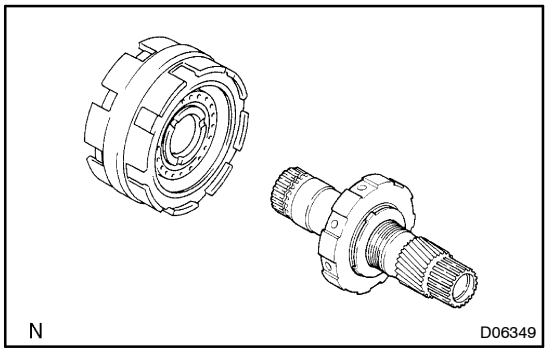
DISASSEMBLY

1. REMOVE PLANETARY SUN GEAR AND NO. 1 ONE–WAY CLUTCH

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



(b) Remove the planetary sun gear with the No. 1 one–way clutch.

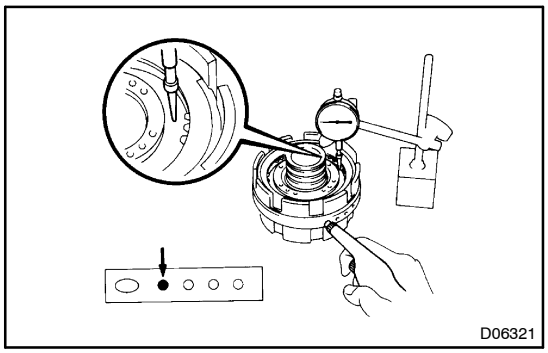


2. CHECK PISTON STROKE OF NO. 1 BRAKE

Using a dial indicator, measure the No. 1 brake piston stroke applying and releasing the compressed air (392 – 785 kPa, 4 – 8 kgf/cm^2, 57 – 114 psi), as shown.

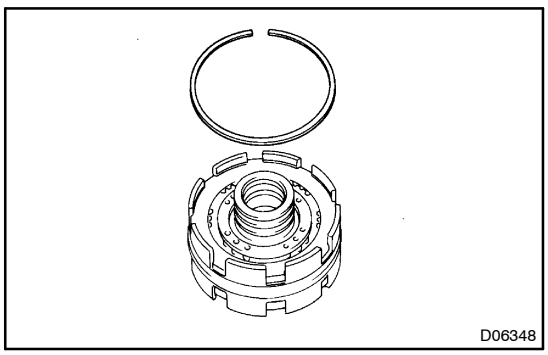
Piston stroke: 0.75 – 1.35 mm (0.0295 – 0.0531 in.)

If the values are non–standard, inspect the disc.

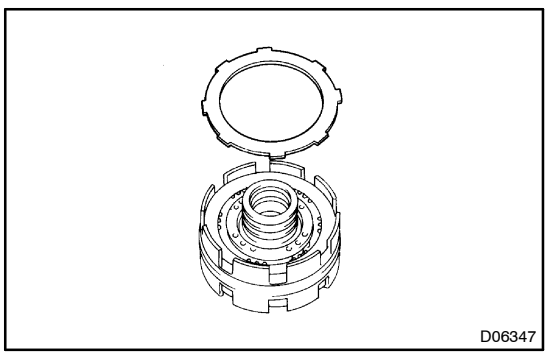


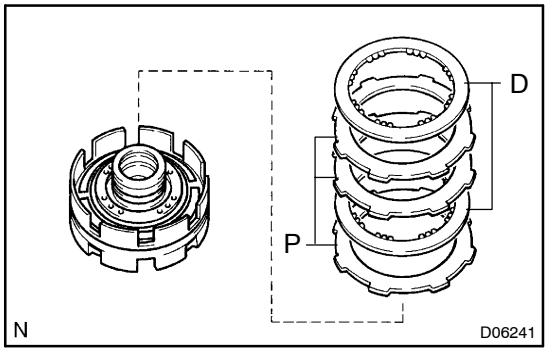
3. REMOVE FLANGE

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



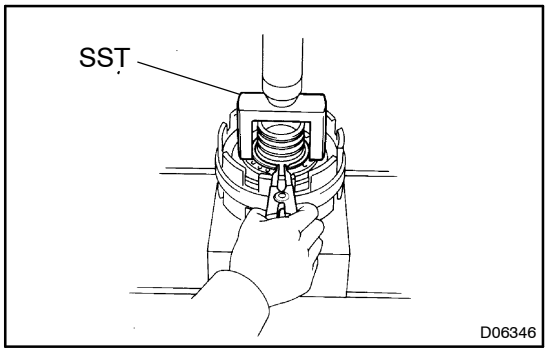
(b) Remove the flange.





4. REMOVE DISC AND PLATE

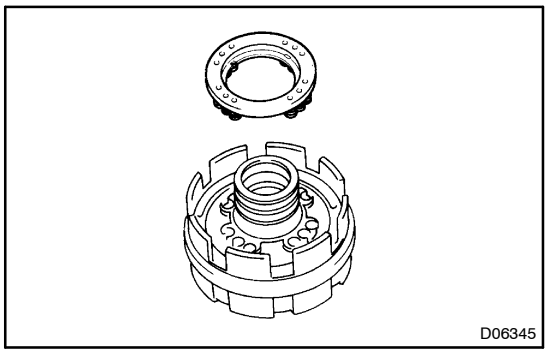
Remove the 2 discs and 3 plates.



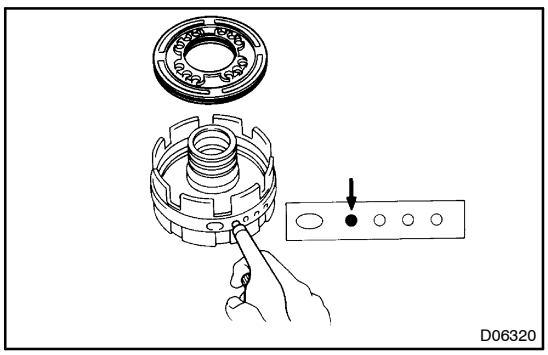
5. REMOVE PISTON RETURN SPRING

(a) Place SST on the spring seat and compress the return springs with a shop press.
SST 09350–20015 (09369–20040)

(b) Using a snap ring expander, remove the snap ring.



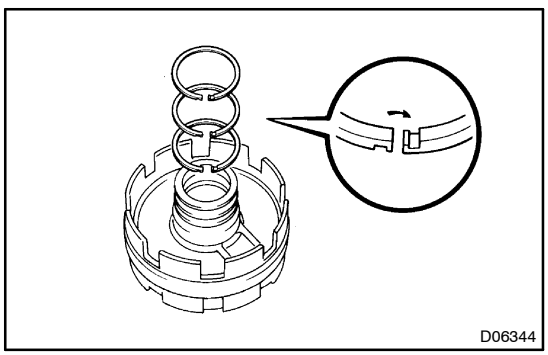
(c) Remove the piston return spring.



6. REMOVE NO. 1 BRAKE PISTON

(a) Hole the No. 1 brake piston with hand, apply compressed air to the center support to remove the No. 1 brake piston.

(b) Remove the 2 O–rings from the piston.

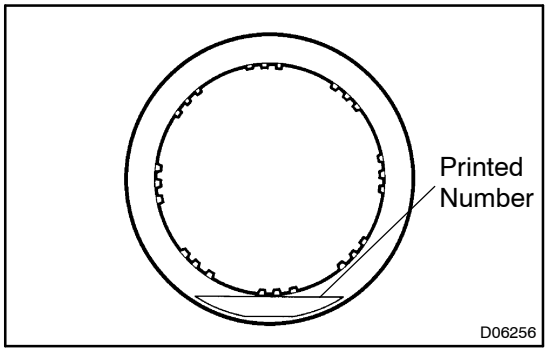


7. REMOVE OIL SEAL RING

Remove the 3 oil seal rings.

AT0IO–01

INSPECTION



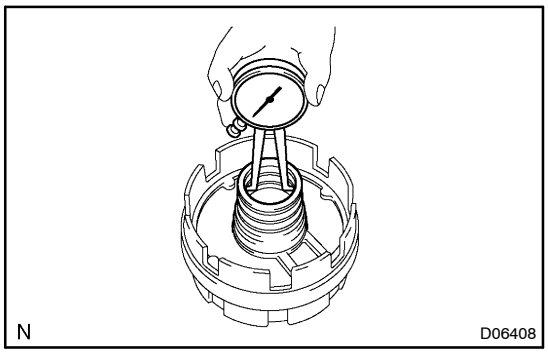
1. INSPECT DISC, PLATE AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt.

If necessary, replace them.

HINT:

- If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace disc.
- Before assembling new disc, soak it in ATF for at least 15 minutes.



2. CHECK CENTER SUPPORT BUSHING

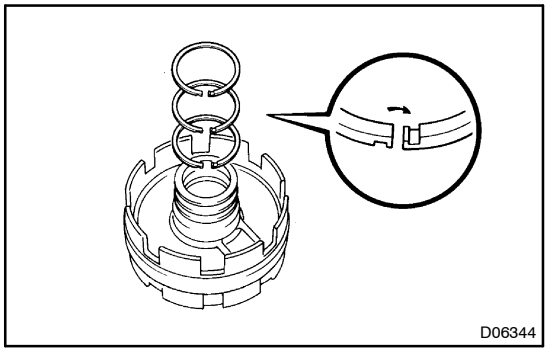
Using a dial indicator, measure the inside diameter of the center support bushing.

Maximum inside diameter: 36.46 mm (1.4354 in.)

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

AT0IP–01

REASSEMBLY



1. INSTALL OIL SEAL RING

(a) Coat the 3 oil seal rings with ATF.

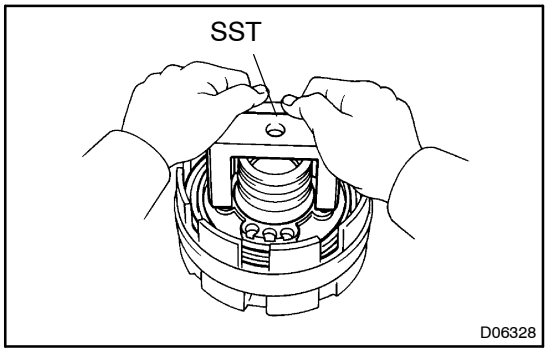
(b) Contract the oil seal rings and install them onto the center support.

NOTICE:

Donot spread the ring ends too much.

HINT:

After installing the oil seal rings, check that they rotate smoothly.

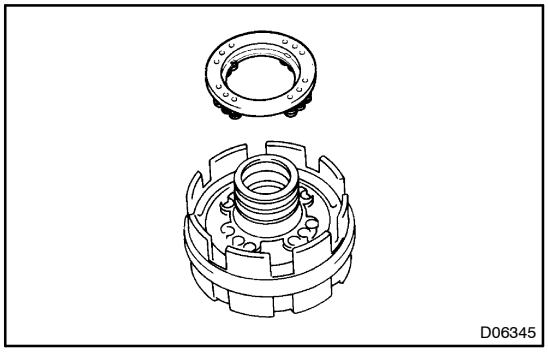


2. INSTALL NO. 1 BRAKE PISTON

(a) Coat new O–rings with ATF and install them on the No. 1 brake piston.

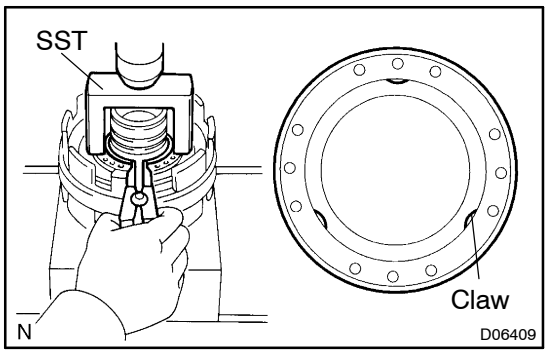
(b) Place SST on the No. 1 brake piston.
SST 09350–20015 (09369–20040)

(c) Being careful not to damage the O–rings, press in the No. 1 brake piston into the center support with both hands.



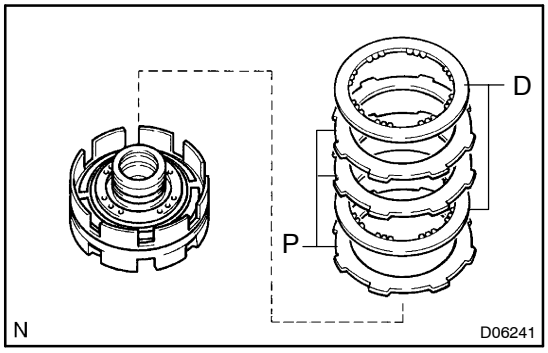
3. INSTQALL PISTON RETURN SPRING

(a) Install the piston return spring.



(b) Place SST on the spring seat, and compress the return springs with a shop press.
SST 09350–20015 (09369–20040)

(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring seat clow.

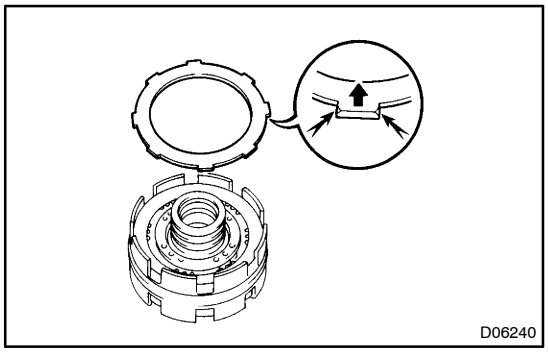


4. INSTALL PLATE AND DISC

Install the 3 plates and 2 discs.

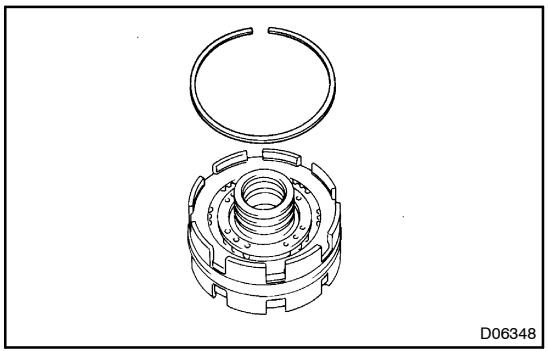
Install in order: P = Plate D = Disc

P – D – P – P – D

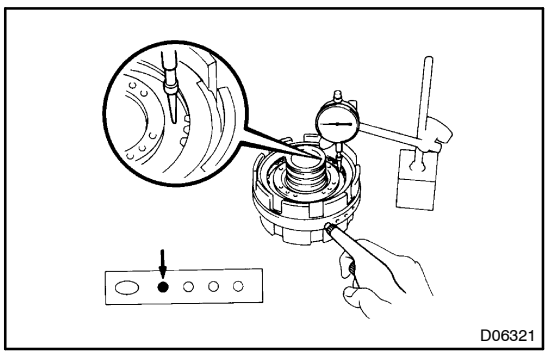


5. INSTALL FLANGE

(a) Install the flange, the rounded edge facing upward.



(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the center support.

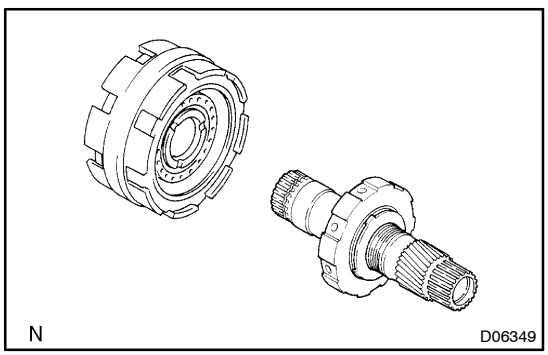


6. CHECK PISTON STROKE OF NO. 1 BRAKE

Using a dial indicator, measure the No. 1 brake piston stroke applying and releasing the compressed air (392 – 785 kPa, 4 – 8 kgf/cm^2, 57 – 114 psi), as shown.

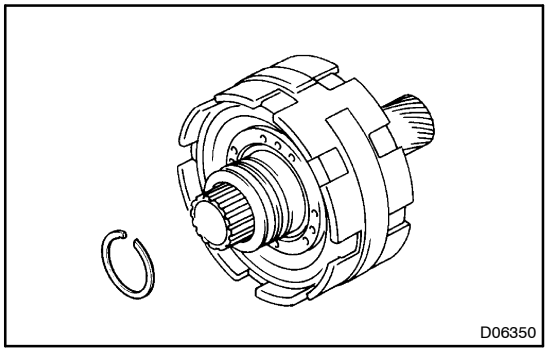
Piston stroke: 0.97 – 1.64 mm (0.03892 – 0.0646 in.)

If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.



7. INSTALL PLANETARY SUN GEAR AND NO. 1 ONE–WAY CLUTCH

(a) While turning the one–way clutch, install the planetary sun gear.

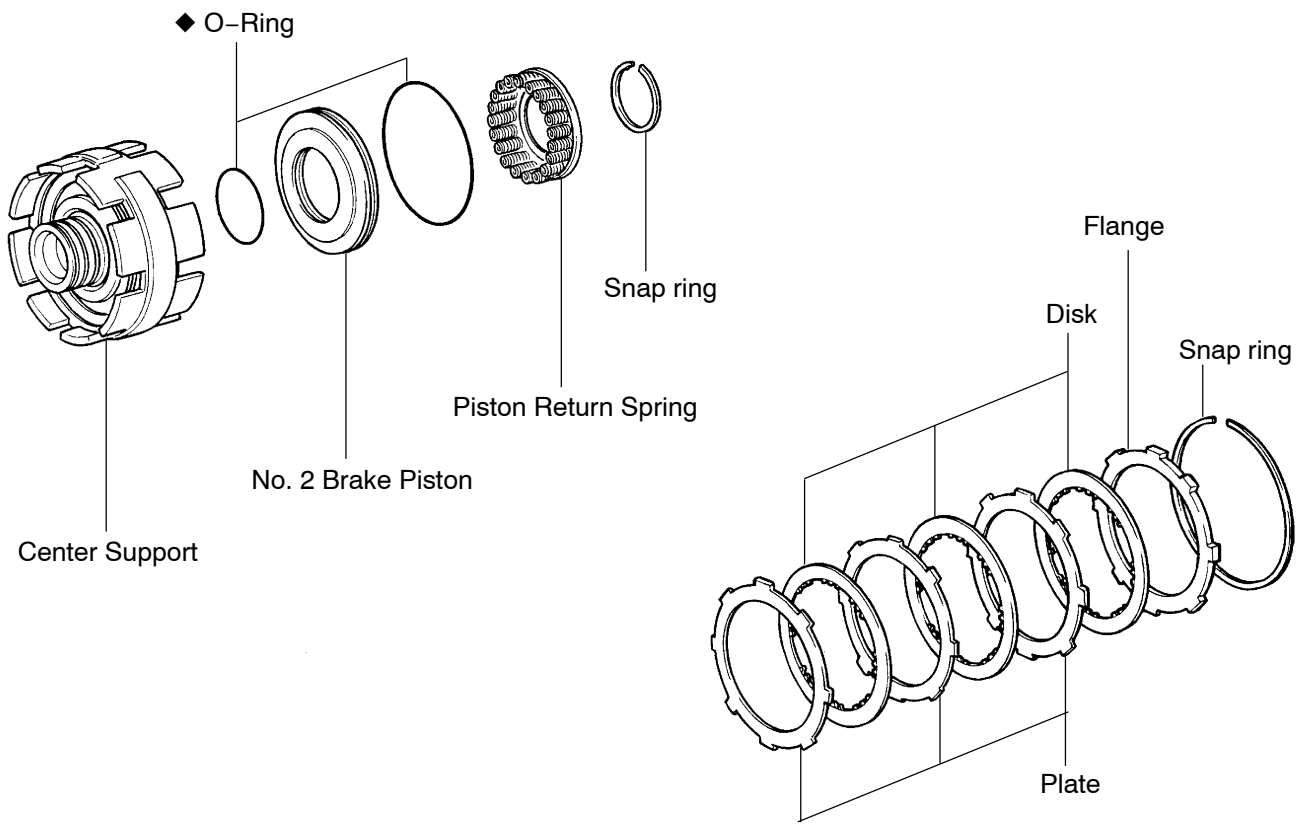


(b) Using a snap ring expander, install the snap ring.

NO.2 BRAKE

COMPONENTS

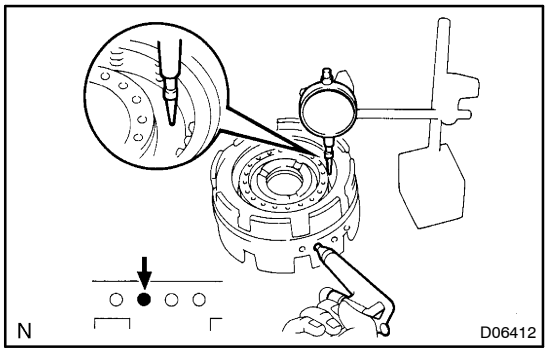
AT0IQ–01



AT0IR–01

DISASSEMBLY

1. REMOVE PLANETARY SUN GEAR AND NO. 1 ONE–WAY CLUTCH (See page AT–66)



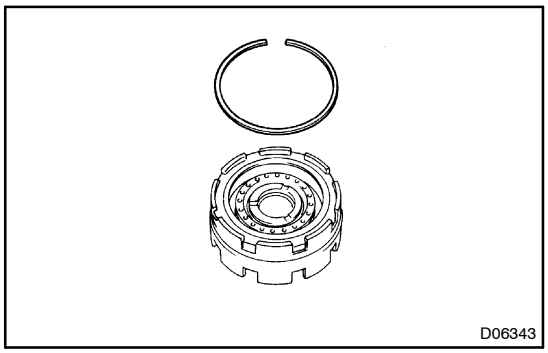
2. CHECK PISTON STROKE OF NO. 2 BRAKE

Using dial indicator, measure the No.2 brake piston stroke applying and releasing the compressed air (392 – 785 kPa, 4 – 8 kgf/cm^2, 57 – 114 psi), as shown.

Piston stroke:

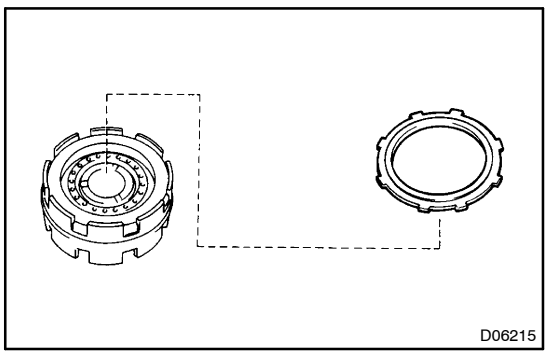
0.98 – 1.71 mm (0.03860 – 0.0673 in.)

If the values are non–standard, inspect the discs.

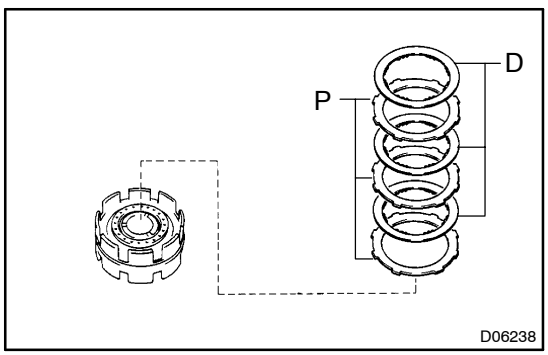


3. REMOVE FLANGE

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

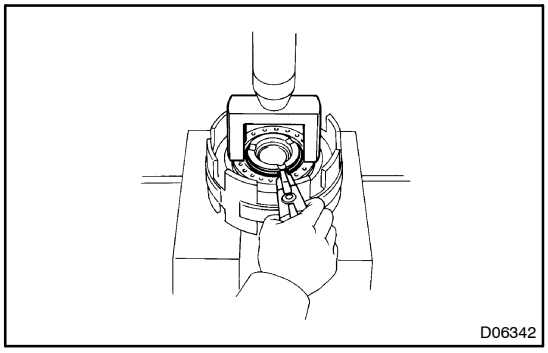


(b) Remove the flange.



4. REMOVE DISC AND PLATE

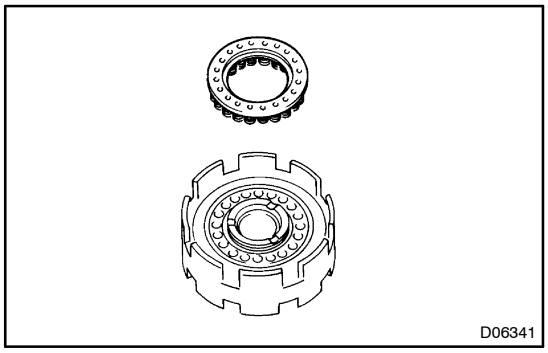
Remove the 3 discs and 3 plates.



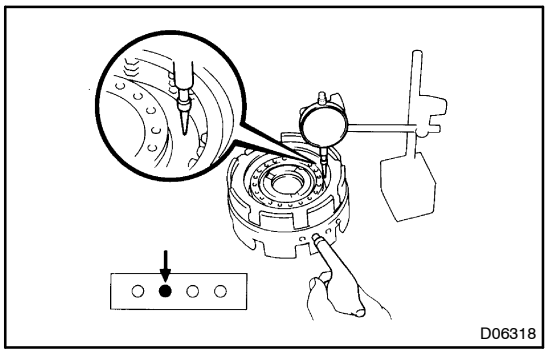
5. REMOVE PISTON RETURN SPRING

(a) Place SST on the spring seat and compress the return springs with a shop press.
SST 09350–20015 (09369–20040)

(b) Using a snap expander, remove the snap ring.



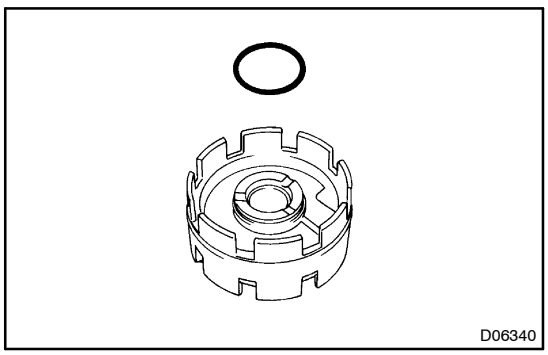
(c) Remove the piston return spring.



6. REMOVE NO. 2 BRAKE PISTON

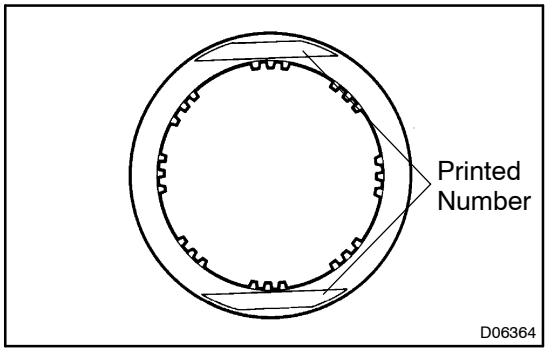
(a) Hold the No. 2 brake piston with hand, apply compressed air to the center support to remove the No. 2 brake piston.

(b) Remove the O–ring from piston.



(c) Remove the O–ring from the center support.

AT0IS–01



INSPECTION

1. INSPECT DISC, PLATE AND FLANGE

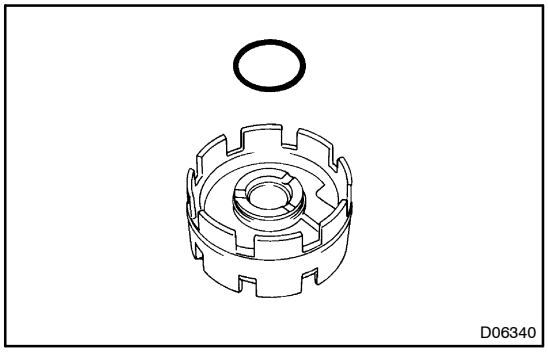
Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT:

- If the lining of the disc is peeling off or discolored, or even if parts of the printer numbers are defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.

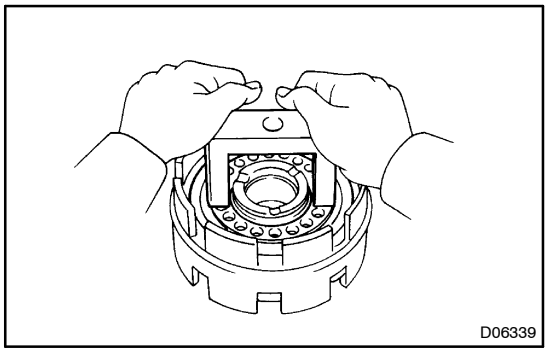
AT0IT–01

REASSEMBLY



1. INSTALL NO. 2 BRAKE PISTON

(a) Coat new O–ring with ATF and install it on the center support.

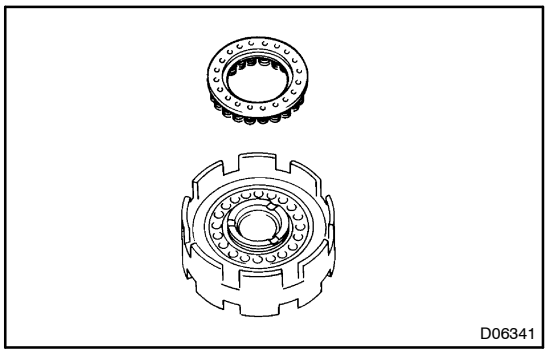


(b) Coat a new O¯ring with ATF and install it on the No. 2 brake piston.

(c) Place SST on the No. 2 brake piston.
SST 09350–20015 (09369–20040)

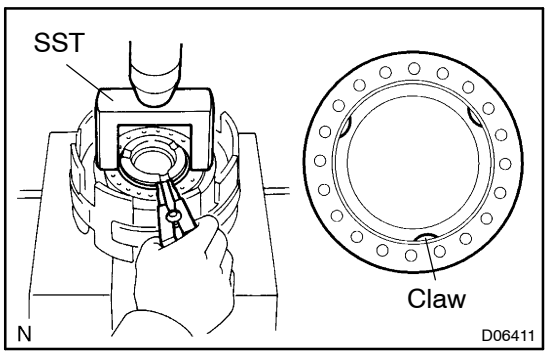
(d) Being careful not damage the O–rings, press in the No. 2 brake piston into the center support with both hands.

(e) Install the thrust washer into the front planetary gear.



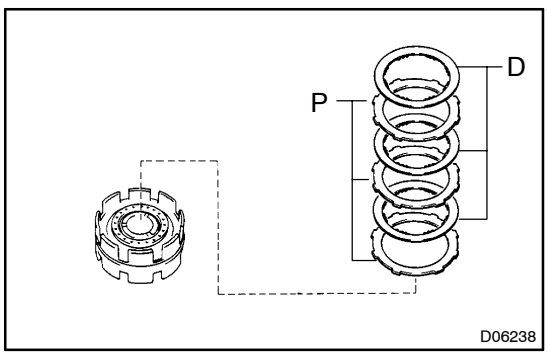
2. INSTALL PISTON RETURN SPRING

(a) Install the piston return spring.



(b) Place SST on the spring seat, and compress the return springs with a shop press.
SST 09350–20015 (09369–20040)

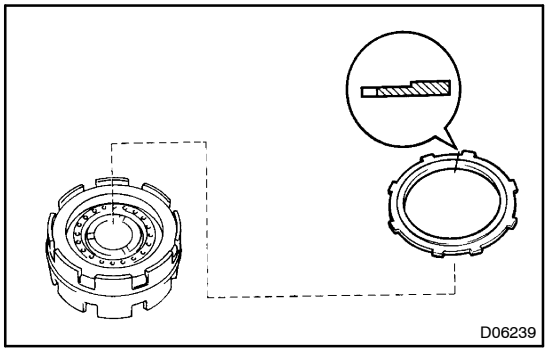
(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring seat claw.



3. INSTALL PLATE AND DISC

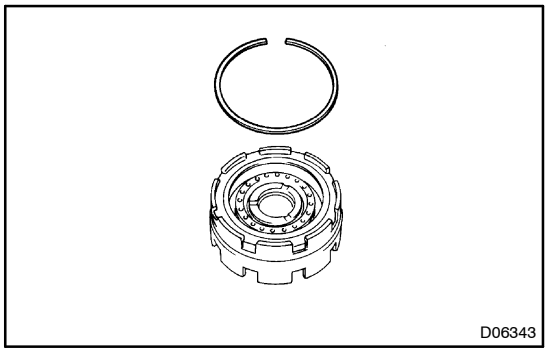
Install the 3 plates and 3 discs.

Install in order: P = Plate D = Disc
P – D – P – D – P – D

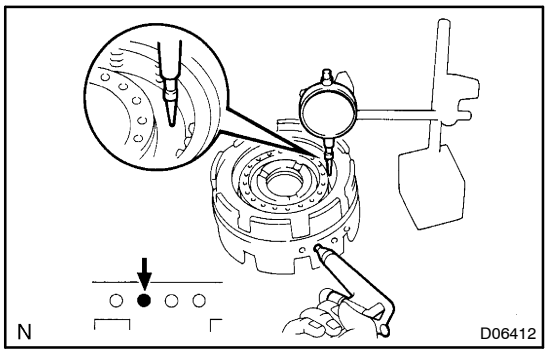


4. INSTALL FLANGE

(a) Install the flange, the flat end facing downward.



(b) Using a screwdriver, install the snap ring. Be sure the end gap of the snap ring is not aligned with the cutout portion of the center support.



5. CHECK PISTON STROKE OF NO. 2 BRAKE

Using a dial indicator, measure the No. 2 brake piston stroke applying and releasing the compressed air (392 – 785 kPa, 4 – 8 kgf/cm^2, 57 – 144 psi), as shown.

Piston stroke:

0.98 – 1.71 mm (0,0386 – 0.0673 in.)

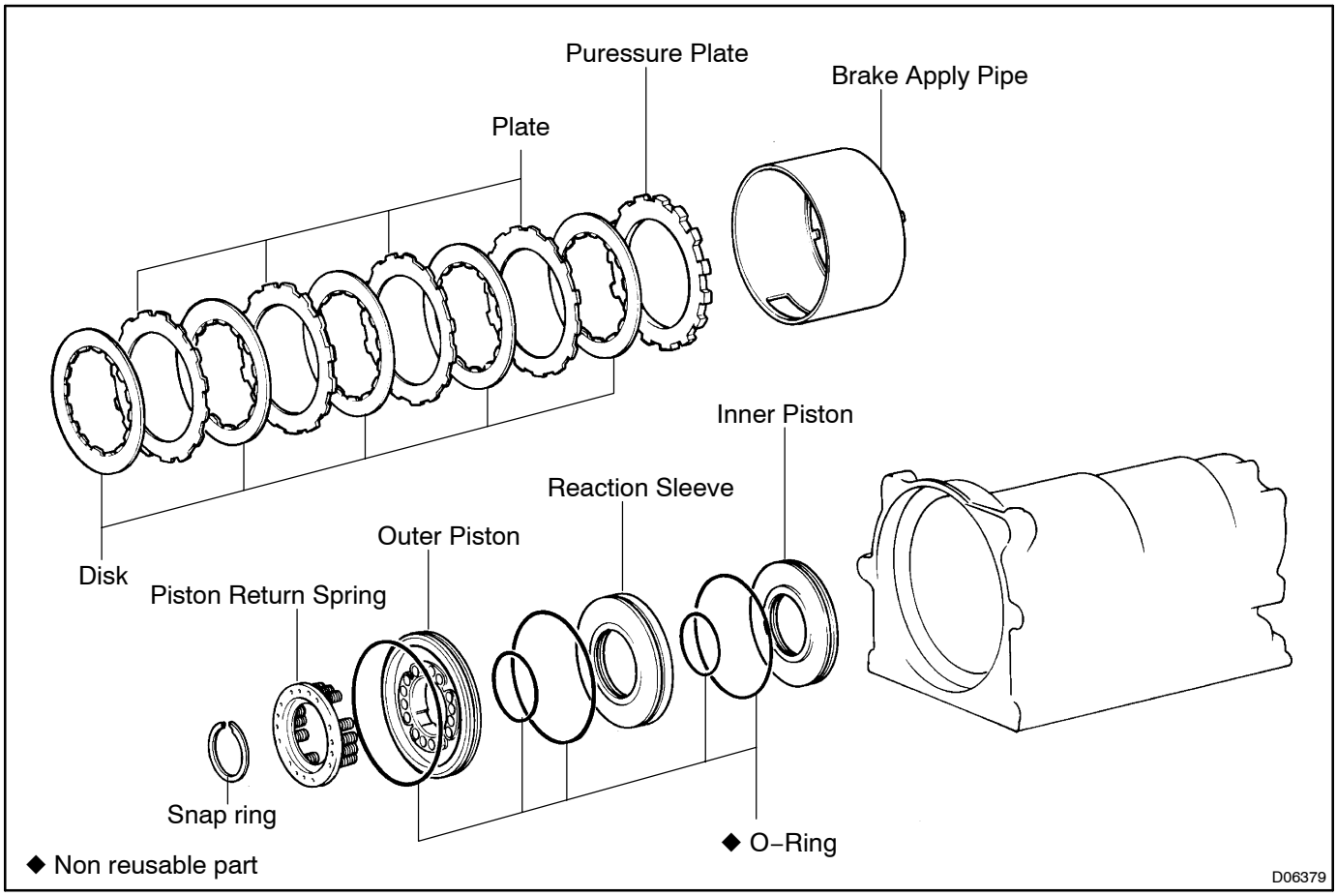
If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

6. INSTALL PLANETARY SUN GEAR AND NO. 1 ONE–WAY CLUTCH (See page AT–69)

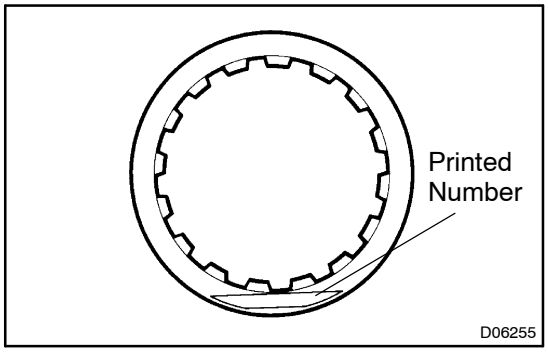
NO.3 BRAKE

COMPONENTS

AT0IU–01



AT0IV–01



INSPECTION

1. INSPECT DISC AND PLATE

Check to see if the sliding surface of the disc and plate are worn or burnt. If necessary, replace them.

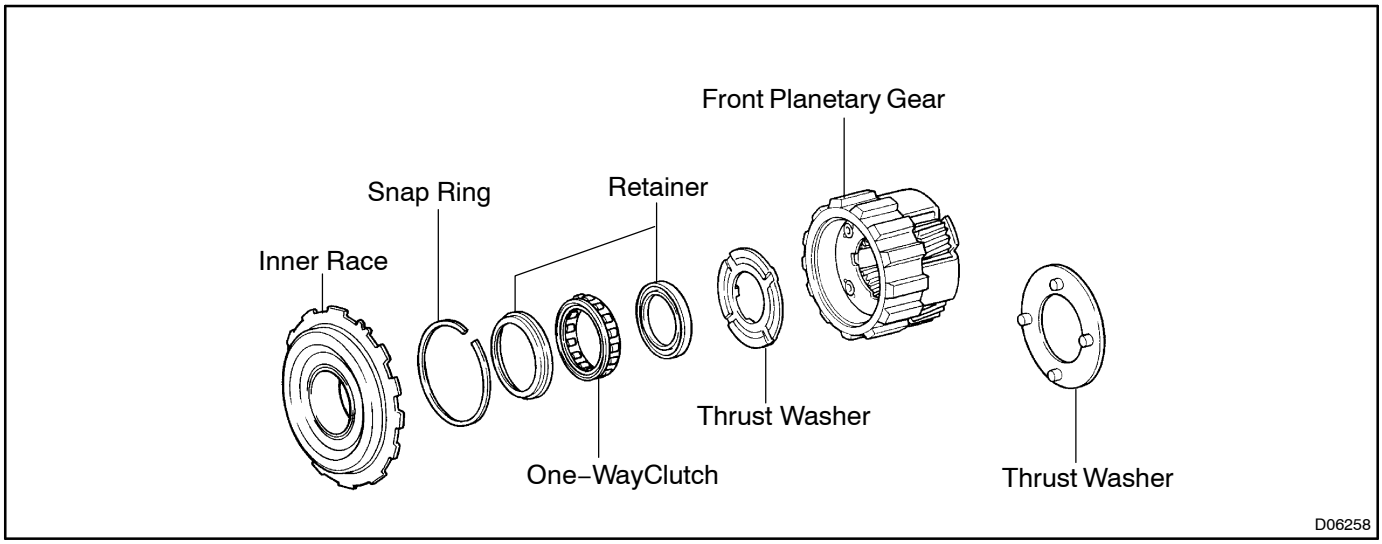
HINT:

- If the lining of the disc is peeling off or discolored, or even if parts of the printed numbers are defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.

FRONT PLANETARY GEAR

COMPONENTS

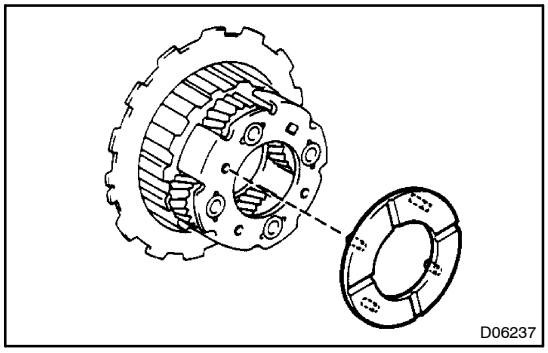
AT0IW–01

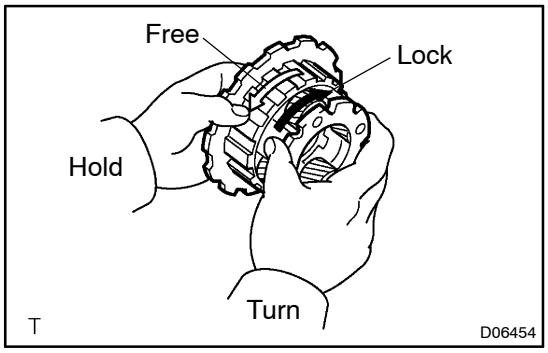


AT0IX–01

DISASSEMBLY

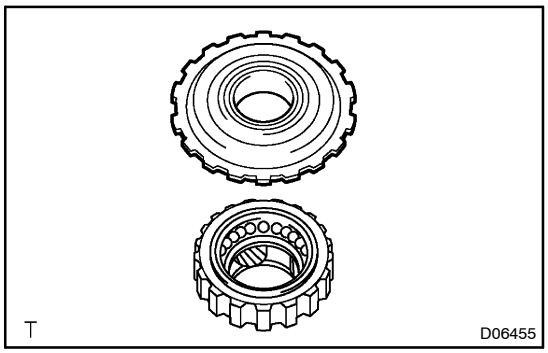
1. REMOVE THRUST WASHER FROM FRONT PLANETARY CARRIER



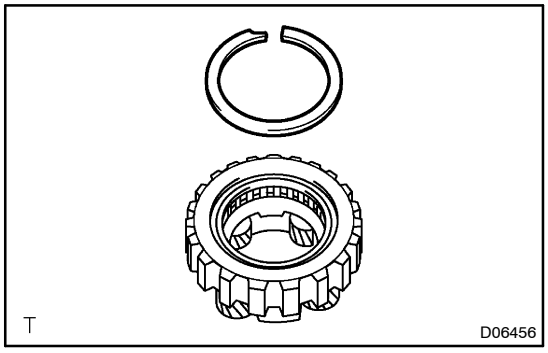


2. CHECK OPERATION OF NO. 2 ONE–WAY CLUTCH

Hold the one–way clutch inner race and turn the planetary gear. The planetary gear turns freely counterclockwise and locks clockwise.

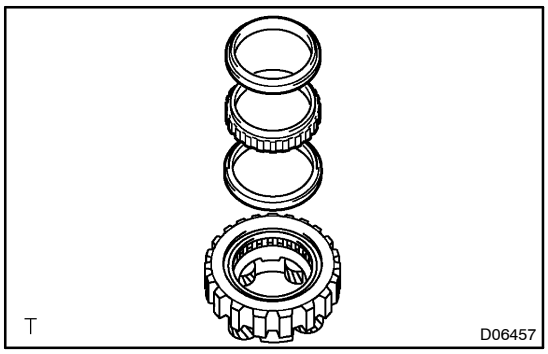


3. REMOVE ONE–WAY CLUTCH INNER RACE

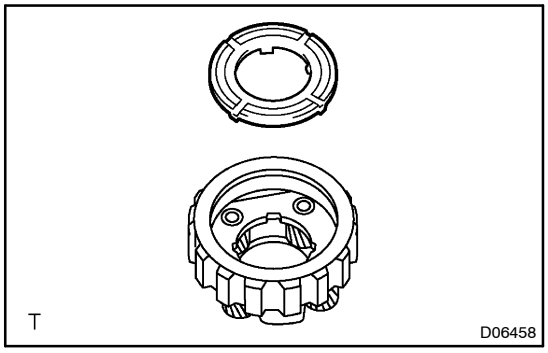


4. REMOVE NO. 2 ONE–WAY CLUTCH

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

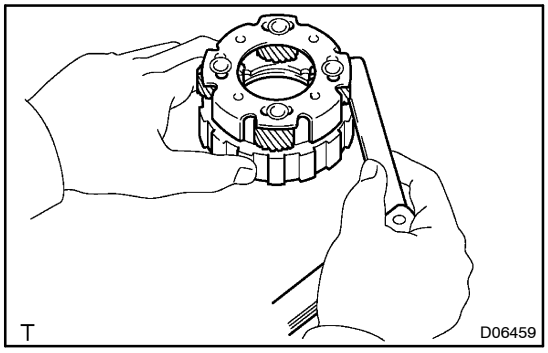


(b) Remove the one–way clutch and 2 retainers from the planetary gear.



5. REMOVE THRUST WASHER

AT0IY–01



INSPECTION

1. MEASURE PLANETARY PINION GEAR THRUST CLEARANCE

Using a feeler gauge, measure the planetary pinion gear thrust clearance.

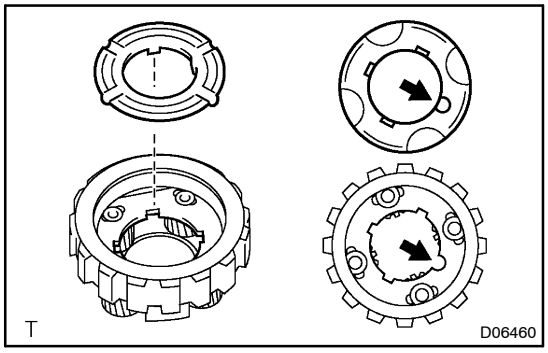
Standard clearance:

0.20 – 0.50 mm (0.0079 – 0.0197 in.)

If the clearance is non–standard, inspect the planetary gear thrust washer. If necessary, replace the planetary gear assembly.

AT0IZ–01

REASSEMBLY



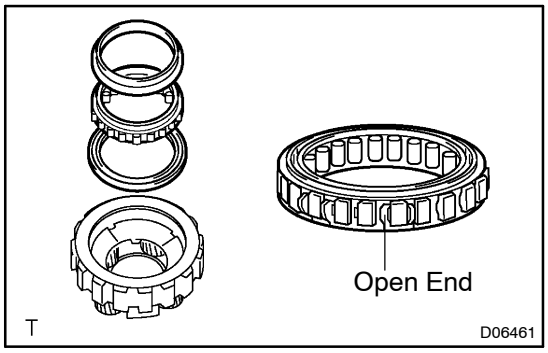
1. INSTALL THRUST WASHER

(a) Coat the thrust washer with petroleum jelly.

(b) Install the thrust washer into the front planetary gear.

HINT:

Make sure that the lug shapes match the cutout portions on the front planetary gear.

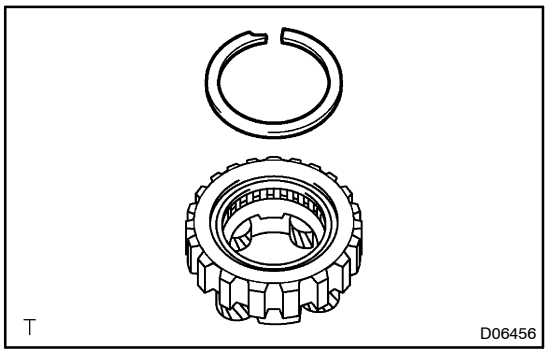


2. INSTALL NO. 2 ONE–WAY CLUTCH

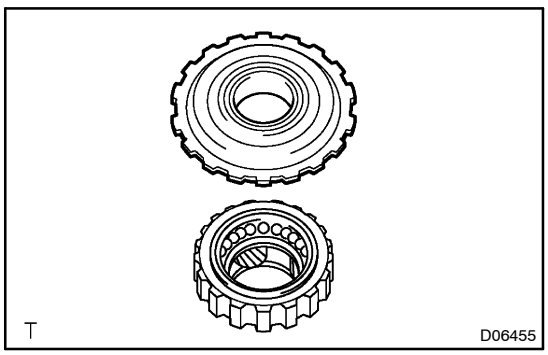
(a) Install the one–way clutch and 2 retainers into the front planetary gear, as shown.

HINT:

Make sure that the open end of the retainers on the one–way clutch are faced upward.

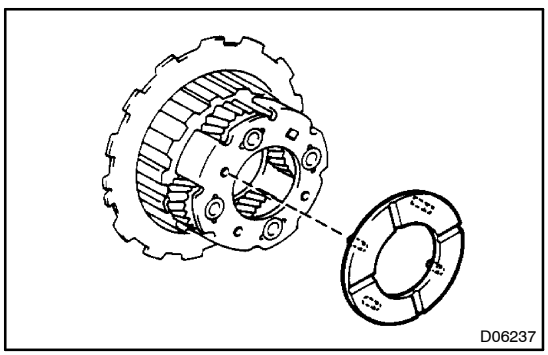


(b) Using a screwdriver, install the snap ring.



3. INSTALL ONE–WAY CLUTCH INNER RACE

Install the inner race while turning it counterclockwise.



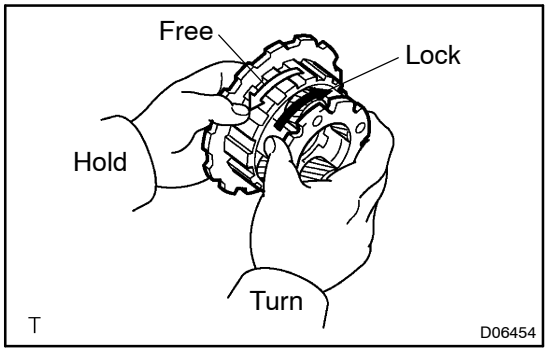
4. INSTALL THRUST WASHER

(a) Coat the thrust washer with petroleum jelly.

(b) Install thrust washer onto the front planetary gear.

HINT:

Make sure that the lug shapes match the holes on the front planetary gear.



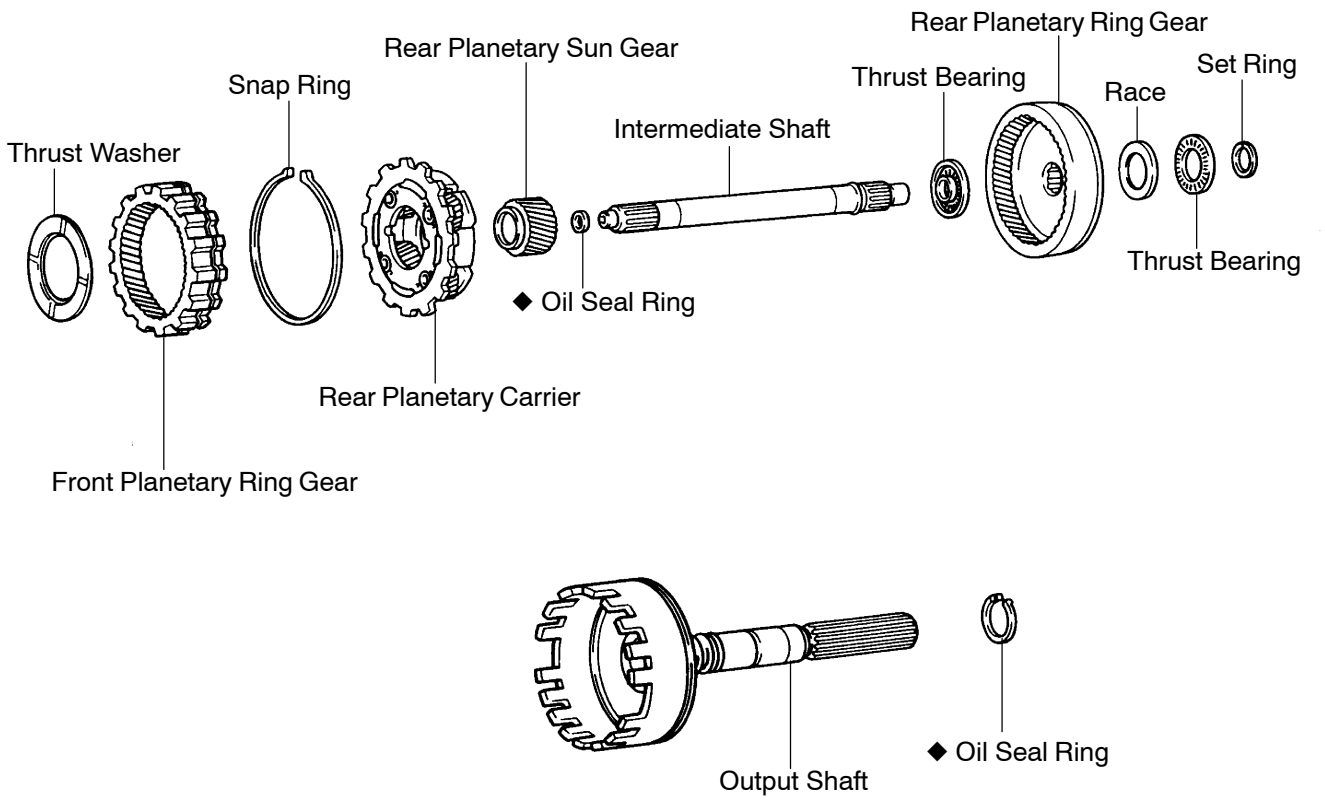
5. CHECK OPERATION OF NO. 2 ONE–WAY CLUTCH

Hold the one– way clutch inner race and turn the planetary gear. The planetary gear turns freely counterclockwise and locks clockwise.

REAR PLANETARY GEAR

COMPONENTS

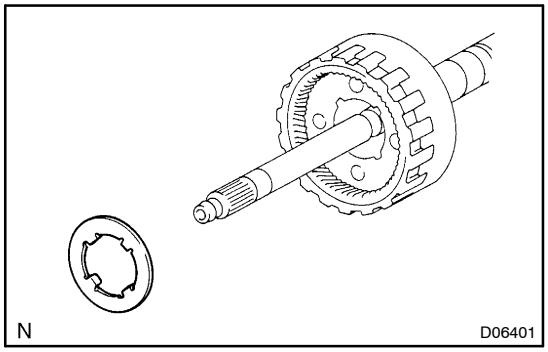
AT0J0–01



AT0J1–01

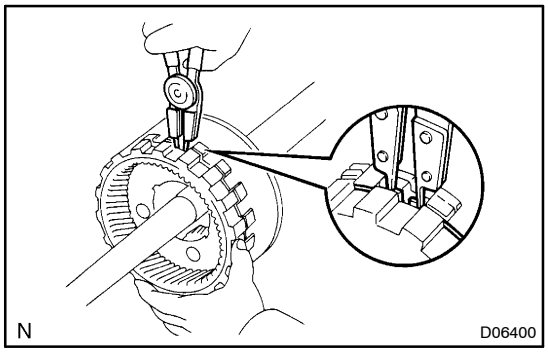
DISASSEMBLY

1. REMOVE THRUST WASHER FROM FRONT PLANETARY RING GEAR

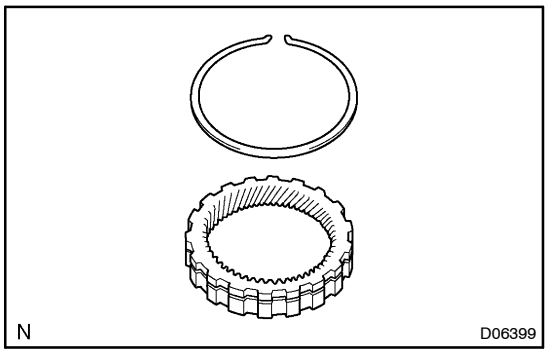


2. REMOVE FRONT PLANETARY RING GEAR

(a) Using a snap ring expander, pull out the ring gear while compressing the snap ring.

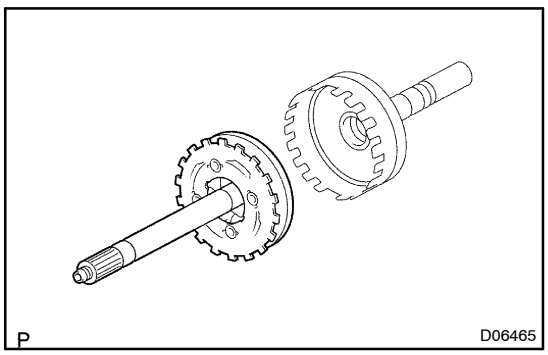


(b) Using a screwdriver, remove the snap ring from the ring gear.

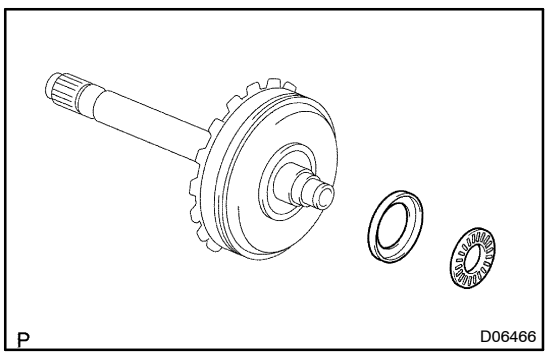


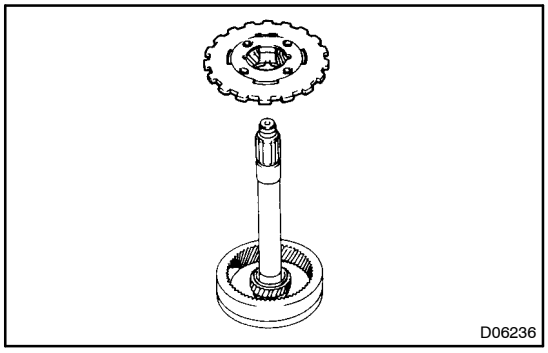
3. REMOVE REAR PLANETARY GEAR ASSEMBLY FROM OUTPUT SHAFT

(a) Pull out the rear planetary gear assembly.

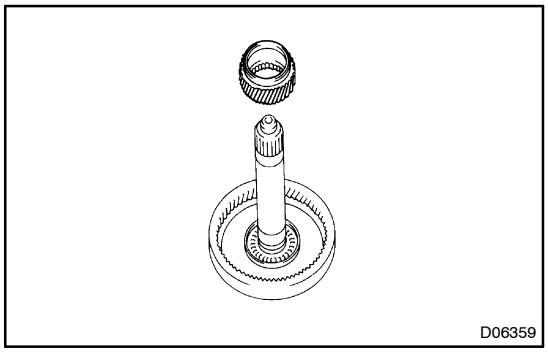


(b) Remove the bearing and race.

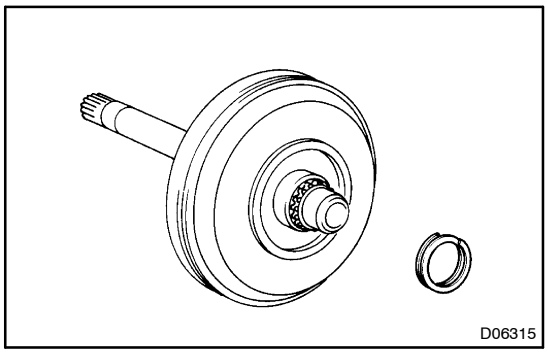



D06236

4. REMOVE REAR PLANETARY CARRIER FROM PLANETARY RING GEAR

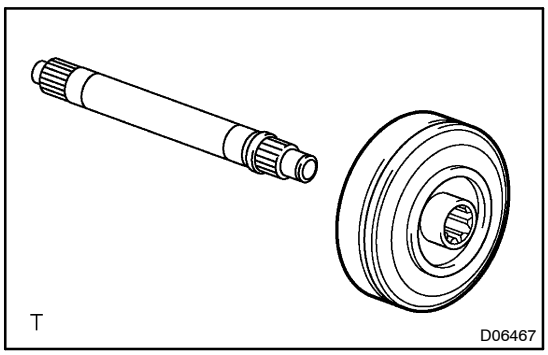

D06359

5. REMOVE PLANETARY SUN GEAR FROM PLANETARY RING GEAR

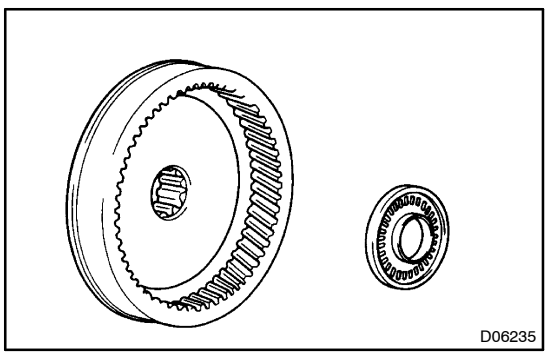

D06315

6. REMOVE PLANETARY RING GEAR

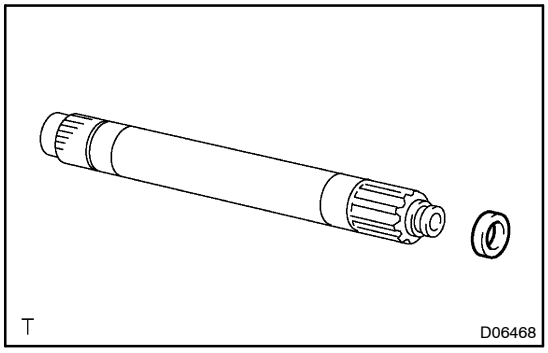
(a) Using a screwdriver, remove the set ring.


T
D06467

(b) Remove the planetary ring gear.

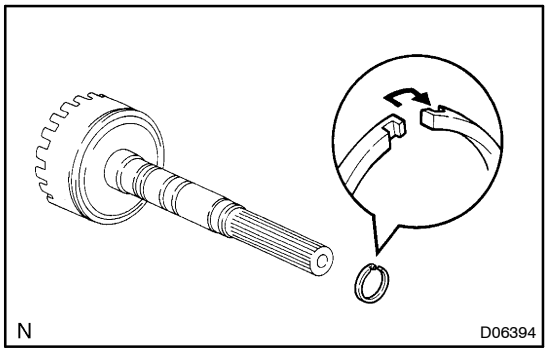

D06235

(c) Remove the assembled bearing from the ring gear.



7. REMOVE OIL SEAL RING FROM INTERMEDIATE SHAFT

Using a screwdriver, remove the oil seal ring.

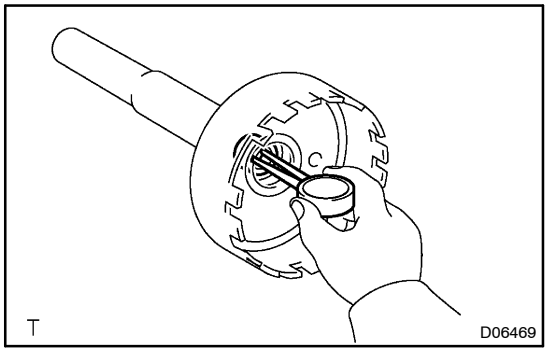


8. REMOVE OIL SEAL RING FROM OUTPUT SHAFT

Remove the oil seal ring.

AT0J2–01

INSPECTION

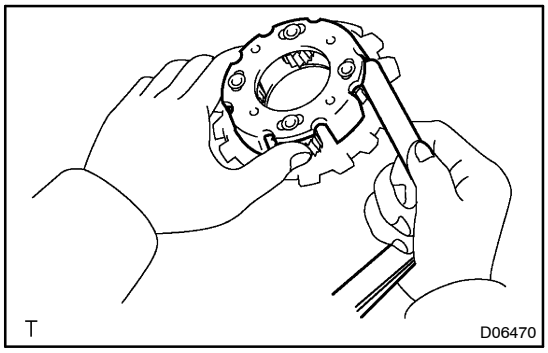


1. CHECK OUTPUT SHAFT BUSHING

Using a dial indicator, measure the inside diameter of the output shaft bushing.

Maximum inside diameter: 18.08 mm (0.7118 in.)

If the inside diameter is greater than the maximum, replace the output shaft.



2. MEASURE PLANETARY PINION GEAR THRUST CLEARANCE

Using a feeler gauge, measure the planetary pinion gear thrust clearance.

Standard clearance:

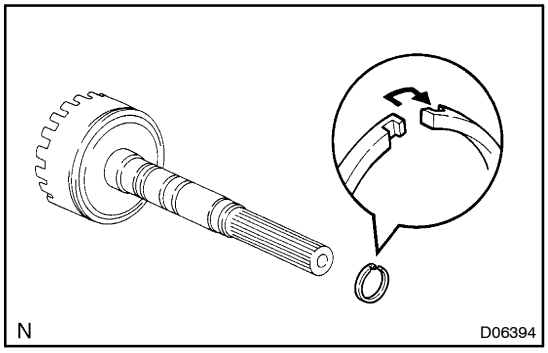
0.20 – 0.50 mm (0.0079 – 0.0197 in.)

If the clearance is non–standard, inspect the planetary gear thrust washer.

If necessary, replace the planetary gear assembly.

AT0J3–01

REASSEMBLY



1. INSTALL OIL SEAL RING

(a) Coat the oil seal ring with ATF.

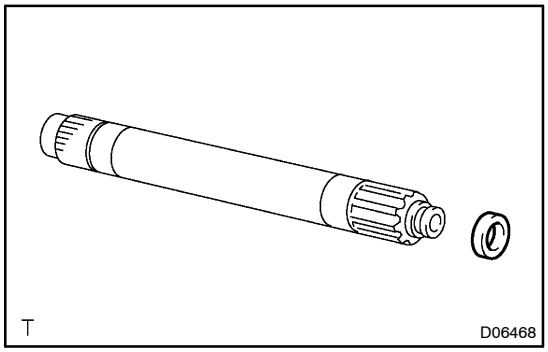
(b) Contract the oil seal rings, and install them onto the output shaft.

NOTICE:

Do not spread the ring ends too much.

HINT:

After installing the oil seal rings, check that they rotate smoothly.



2. INSTALL NEW OIL SEAL RING

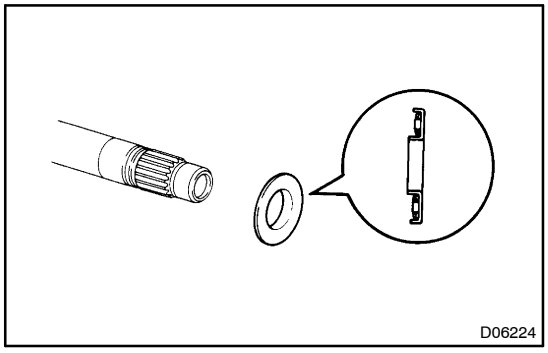
Coat a new oil seal ring with ATF and install it to the intermediate shaft.

NOTICE:

Do not spread the ring too much.

HINT:

After installing the oil seal ring, check that it rotates smoothly.

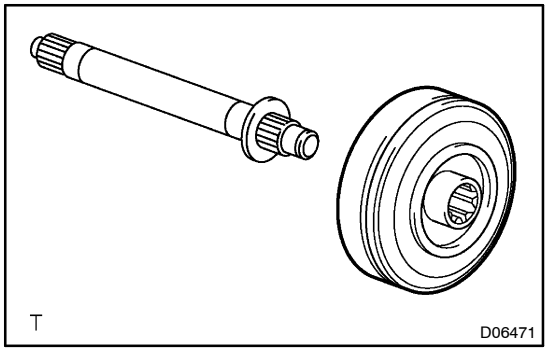


3. INSTALL PLANETARY RING GEAR

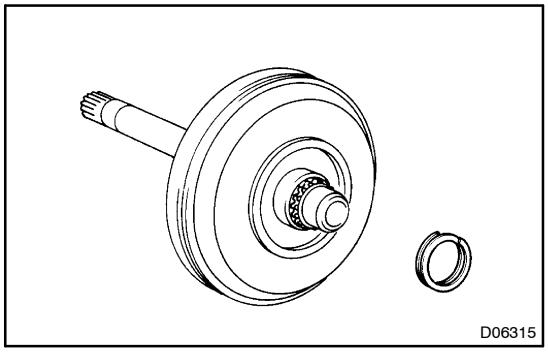
(a) Coat the assembled bearing and race with petroleum jelly and install it onto the ring gear.

Assembled bearing and race diameter:

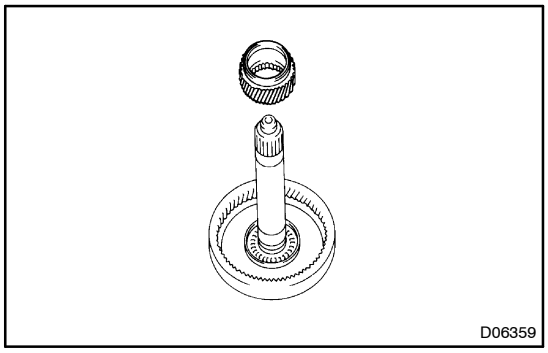
	Inside mm (in.)	Outside mm (in.)
Assembled bearing and race	21.4 (0.843)	47.3 (1.862)



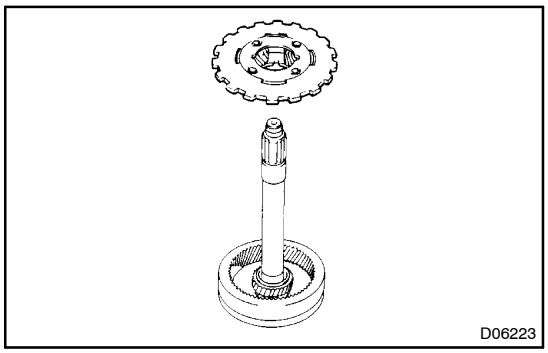
(b) Install the ring gear to the intermediate shaft.


D06315

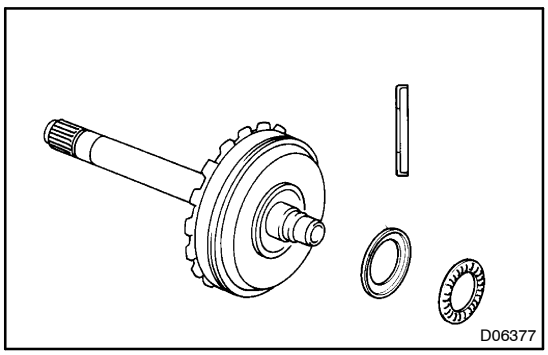
(c) Install the set ring.


D06359

4. INSTALL PLANETARY SUN GEAR TO PLANETARY RING GEAR


D06223

5. INSTALL REAR PLANETARY CARRIER TO PLANETARY RING GEAR

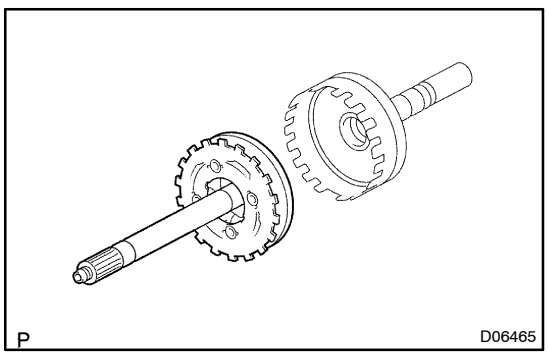

D06377

6. INSTALL REAR PLANETARY GEAR ASSEMBLY TO OUTPUT SHAFT

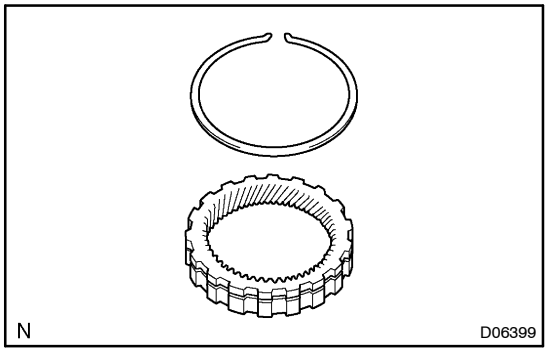
(a) Coat the bearing and race with petroleum jelly and install them onto the ring gear.

Bearing and race diameter:

	Inside mm (in.)	Outside mm (in.)
Race	30.1 (1.185)	48.5 (1.909)
Bearing	28.4 (1.118)	46.3 (1.823)

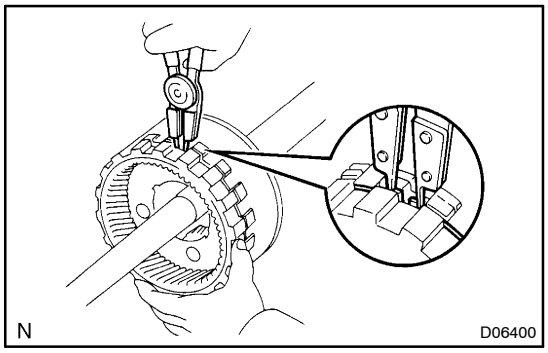

P D06465

(b) Instal the rear planetary gear assembly to the output shaft.



7. INSTALL FRONT PLANETARY RING GEAR

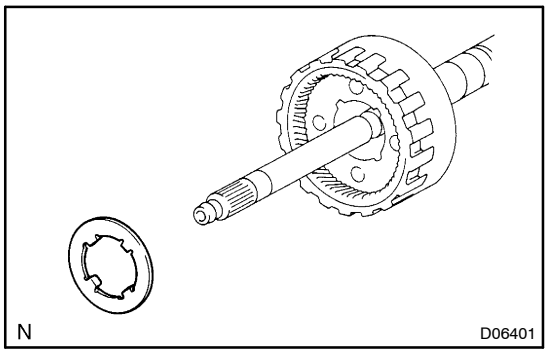
(a) Install the snap ring.



(b) Align the snap ring end with the wide cutout portion of the output shaft.

(c) Using a snap ring expander, install the ring gear while compressing the snap ring.

(d) Check that the snap ring is installed into the groove of the output shaft.



8. INSTALL THRUST WASHER

(a) Coat the thrust washer with petroleum jelly.

(b) Install the thrust washer onto the rear planetary carrier.

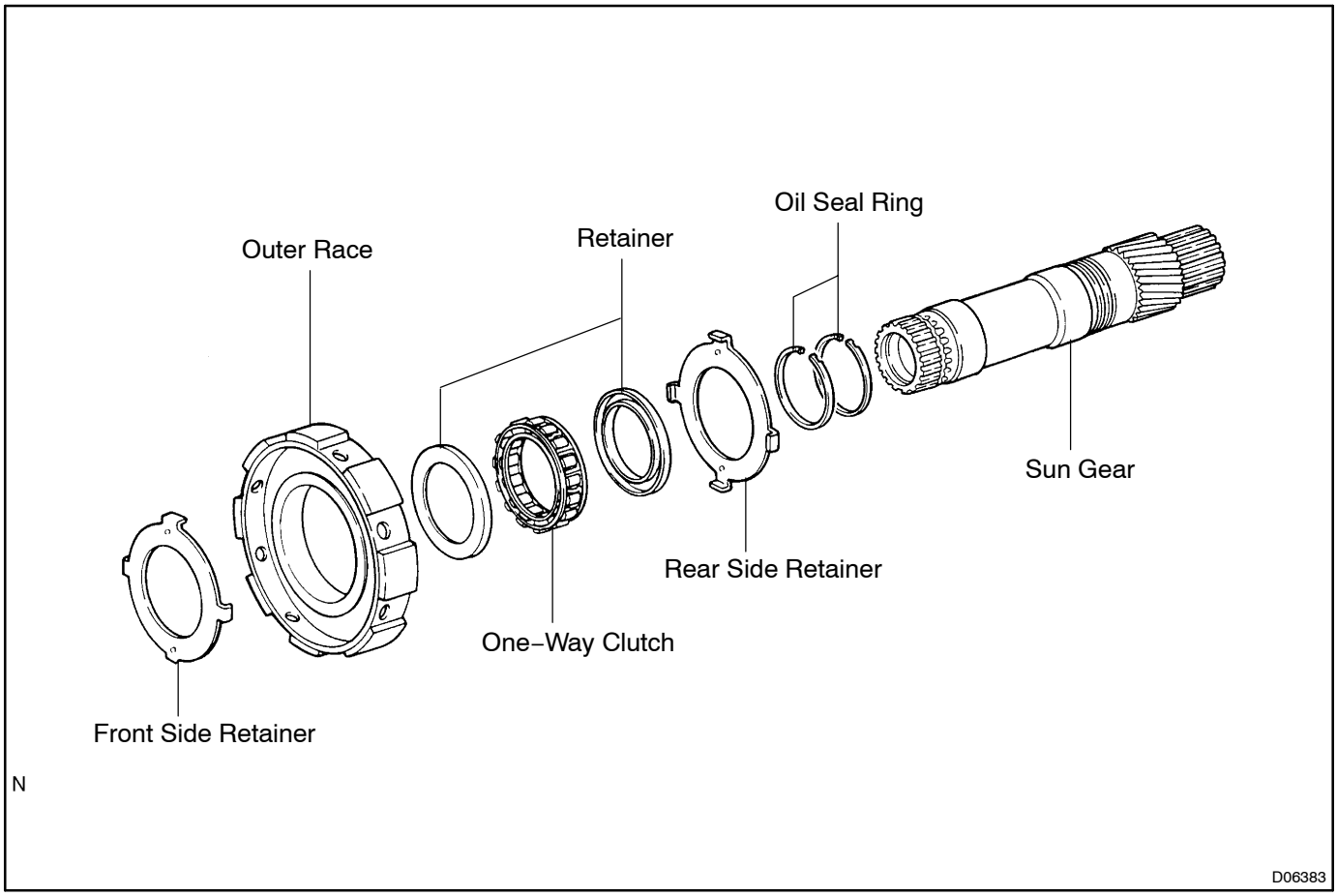
HINT:

Make sure that the lug shapes match the cutout portions on the rear planetary carrier.

PLANETARY SUN GEAR

COMPONENTS

AT0J4–01



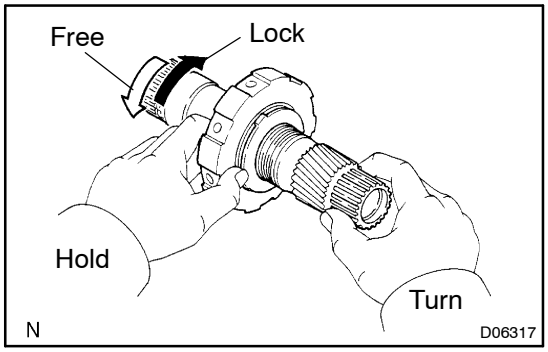
AT0J5–01

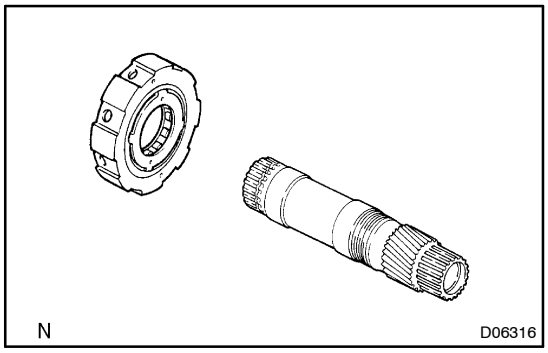
DISASSEMBLY

1. REMOVE PLANETARY SUN GEAR AND NO. 1 ONE–WAY CLUTCH (See page AT–65)

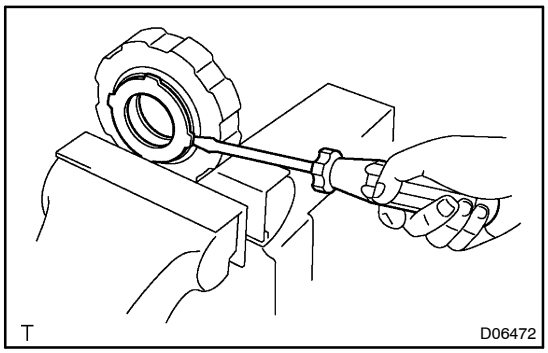
2. CHECK OPERATION OF NO. 1 ONE–WAY CLUTCH

Hold No. 1 one–way clutch and turn the planetary sun gear. The planetary sun gear turns freely counterclockwise and locks clockwise.





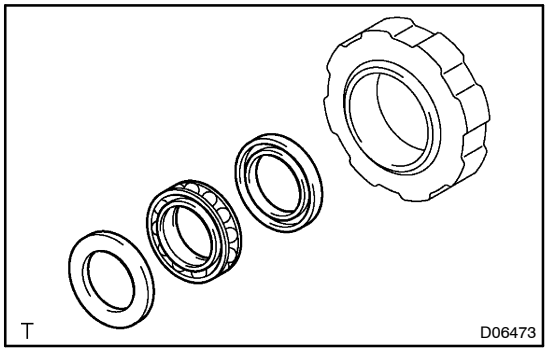
3. REMOVE NO. 1 ONE–WAY CLUTCH FROM PLANETARY SUN GEAR



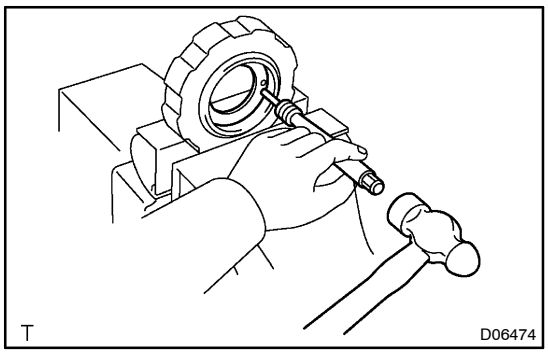
4. DISASSEMBLE NO. 1 ONE–WAY CLUTCH

(a) Using a screwdriver, loosen the staked parts of the rear side retainer.

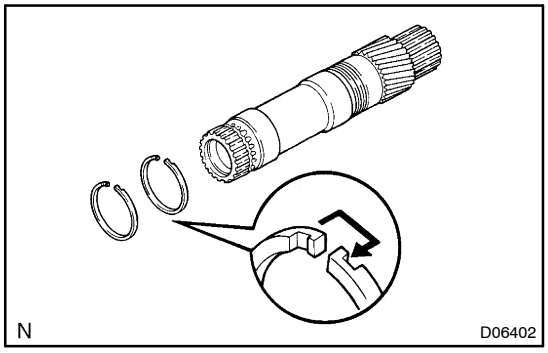
(b) Remove the retainer.



(c) Remove the one–way clutch and 2 retainers from the outer race.



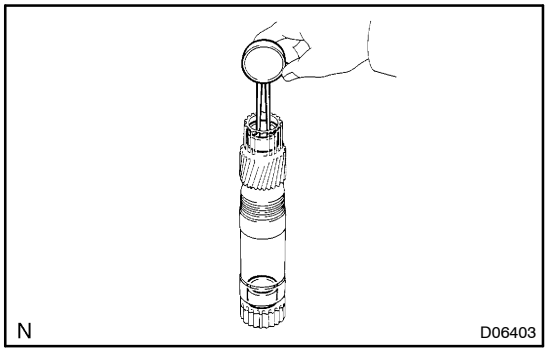
(d) Using a pin punch and hammer, remove the front side retainer.



5. REMOVE OIL SEAL RING

Remove the 2 oil seal rings.

AT0J6–01



INSPECTION

CHECK PLANETARY SUN GEAR BUSHING

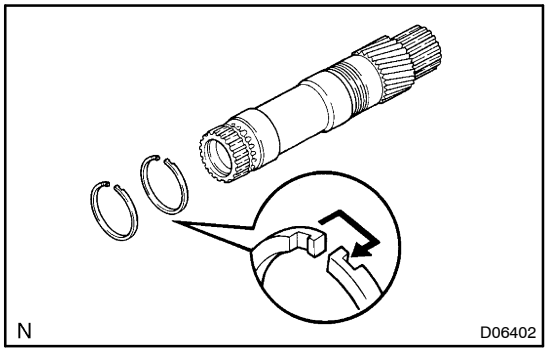
Using a dial indicator, measure the inside diameter of the planetary sun gear bushings.

Maximum inside diameter: 21.58 mm (0.896 in.)

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

AT0J7–01

REASSEMBLY



1. INSTALL OIL SEAL RING

(a) Coat the 2 oil seal rings with ATF.

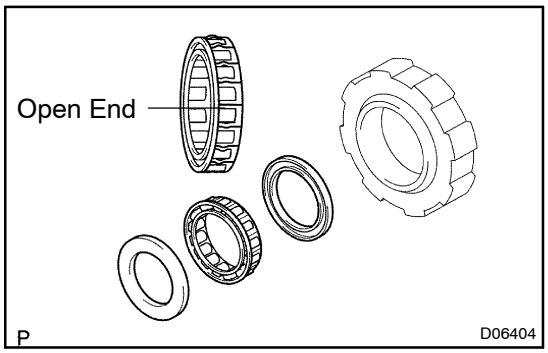
(b) Contract the oil seal rings, and install them into the planetary sung gear.

NOTICE:

Do not spread the ring ends too much.

HINT:

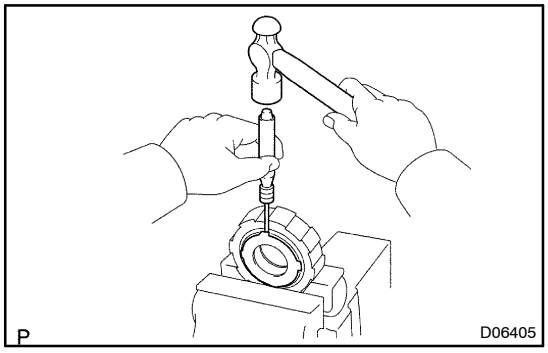
After installing the oil seal rings, check that they rotate smoothly.



2. ASSEMBLE NO. 1 ONE–WAY CLUTCH

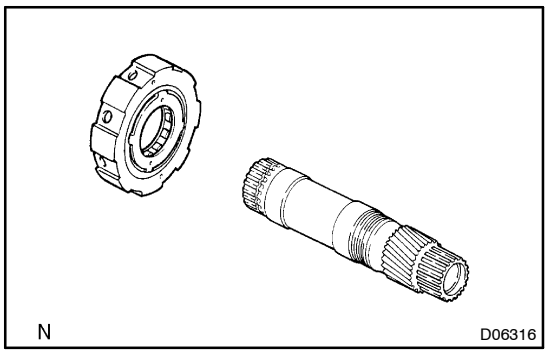
(a) Install the one–way clutch into the outer race, the open end of the retainers facing rearward.

(b) Install the 2 retainers into both sides.

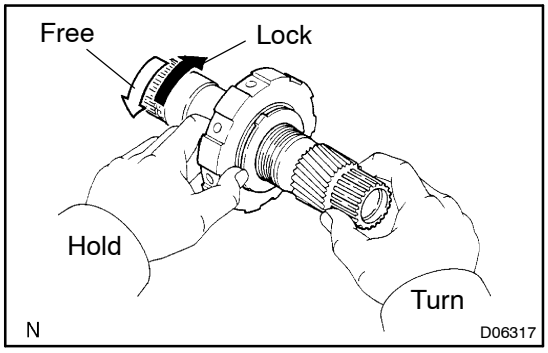


(c) Install 2 new retainers to the outer race.

(d) Using a pin punch and hammer, stake the claws.



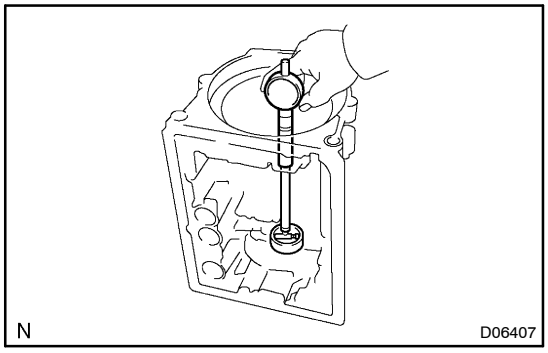
3. INSTALL NO. 1 ONE–WAY CLUTCH TO PLANETARY SUN GEAR



4. CHECK OPERATION OF NO. 1 ONE–WAY CLUTCH

Hold No. 1 one–way clutch and turn the planetary sun gear. The planetary sun gear turns freely counterclockwise and locks clockwise.

5. INSTALL PLANETARY SUN GEAR AND NO. 1 ONE–WAY CLUTCH (See page AT–65)



TRANSMISSION CASE

AT0J8–01

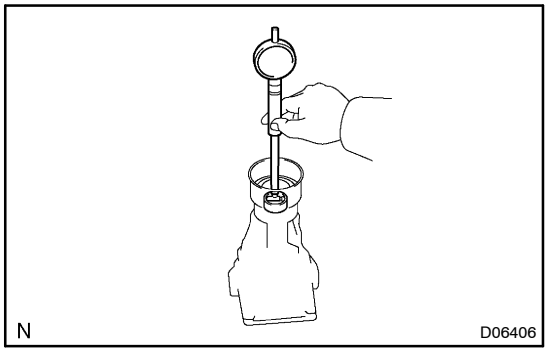
INSPECTION

INSPECT TRANSMISSION CASE BUSHING

Using a cylinder gauge, measure the inside diameter of the transmission case rear bushing.

Maximum inside diameter: 38.19 mm (1.5035 in.)

If the inside diameter is greater than the maximum, replace the transmission case.



EXTENSION HOUSING

AT0J9–01

INSPECTION

INSPECT EXTENSION HOUSING BUSHING

Using a cylinder gauge, measure the inside diameter of the extension housing bushing.

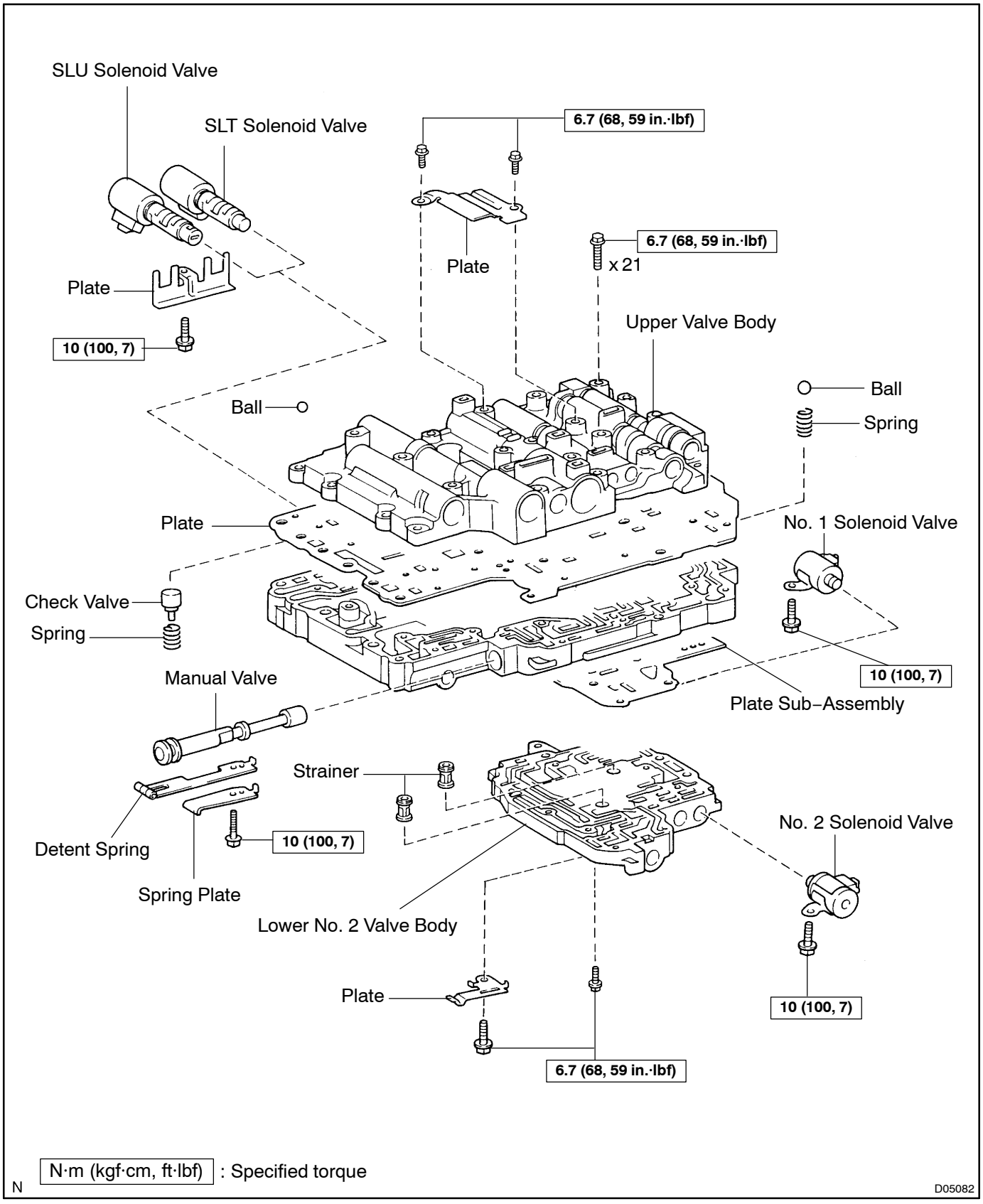
Maximum inside diameter: 38.09 mm (1.4996 in.)

If the inside diameter is greater than the maximum, replace the extension housing.

VALVE BODY

COMPONENTS

AT0JA–01



N·m (kgf·cm, ft·lbf) : Specified torque

N

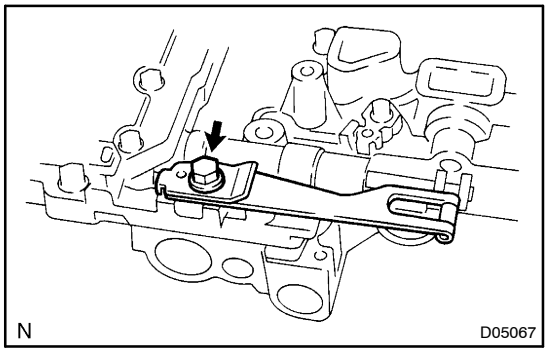
D05082

AT0JB–01

DISASSEMBLY

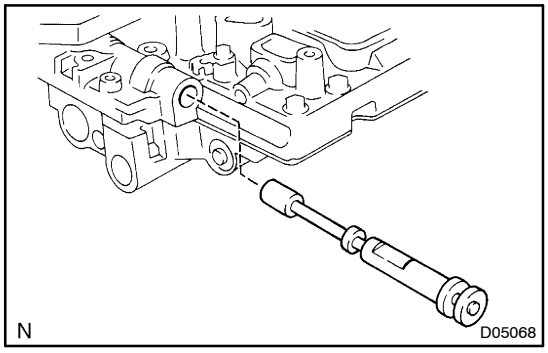
NOTICE:

- **Disassembling and reassembling should be conducted on a clean vinyl sheet or mat, or aluminum tray.**
- **Make the valve slide through the valve hole by its own weight. Do not forcibly pull out the valve using needle nose pliers. When having difficulty in removing it, slant and shake the valve body or use a magnet hand.**
- **Do not place the disassembled parts directly on metal work bench or waste cloth.**

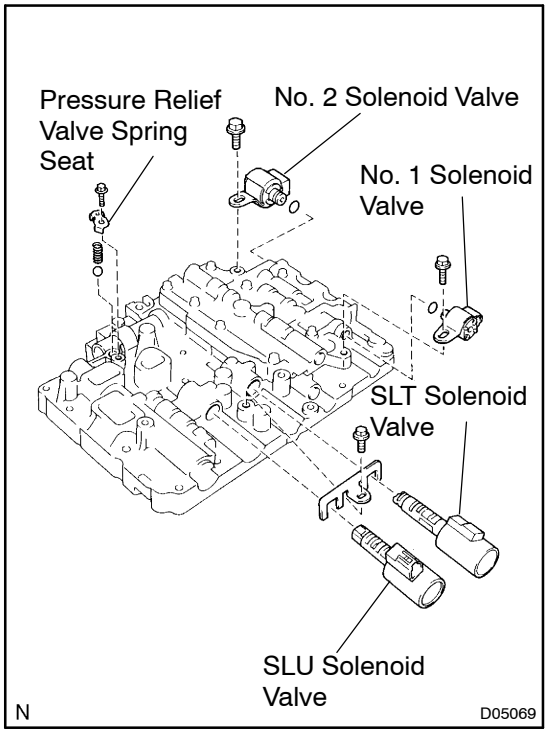


1. REMOVE DETENT SPRING AND SPRING PLATE

Remove the bolt, detent spring and spring plate.

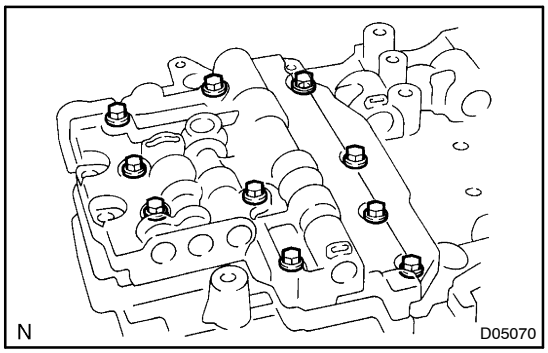


2. REMOVE MANUAL VALVE



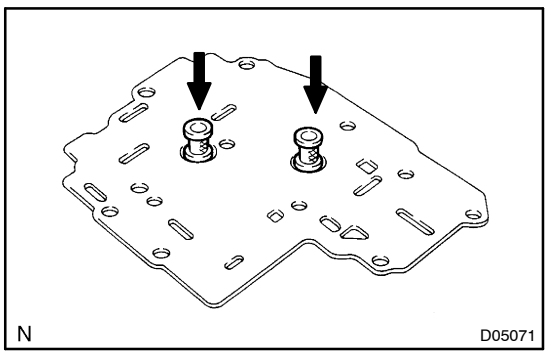
3. REMOVE 4 SOLENOIDS

(a) Remove the bolt and No. 1 solenoid valve.
(b) Remove the bolt and No. 2 solenoid valve.
(c) Remove the bolt, lock plate and SLU, SLT solenoid valves.
(d) Remove the 2 O–rings from the No. 1, No. 2 solenoid valves.
(e) Remove the bolt, pressure relief valve spring seat, spring and ball.

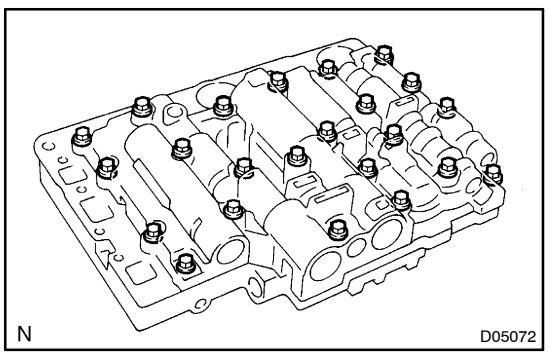


4. REMOVE LOWER NO. 2 VALVE BODY

(a) Remove the 10 bolts.
(b) Remove the lower No. 2 valve body.
(c) Remove the plate sub assembly.



(d) Remove the 2 strainers from the plate sub assembly.



5. REMOVE UPPER VALVE BODY

(a) Turn over assembly and remove the 23 bolts.
(b) Remove the plate from the upper valve body.
(c) Remove the upper valve body with the plate sub–assembly.
(d) Turn over upper valve body, remove the plate sub–assembly.

NOTICE:

Be careful that the check balls do not fall out.

(e) Remove the check valve and spring.

(f) Remove the ball and spring.
(g) Remove the check balls.

AT0JC–01

REASSEMBLY

NOTICE:

- **Do not use dropped parts.**
- **Make sure that no burr is identified before assembling.**

1. INSTALL UPPER VALVE BODY

(a) Install the check balls to the upper valve body.

(b) Install the spring and ball to the lower No. 1 valve body.

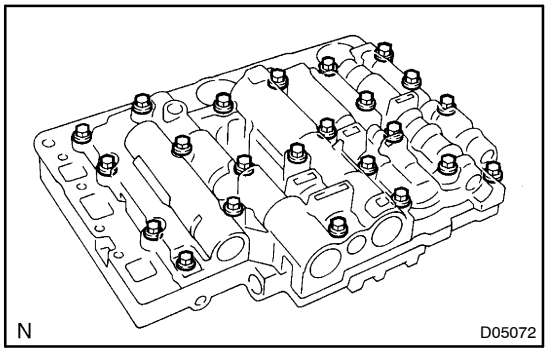
(c) Install the spring and check valve the lower No. 1 valve body.

(d) Place a new No. 1 plate sub–assembly on the upper valve body.

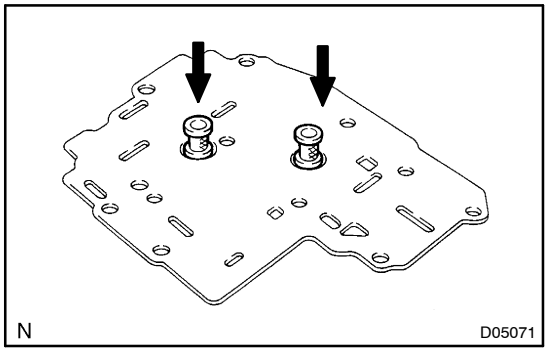
(e) Turn over the upper valve body with the plate together, and place them on the lower No. 1 valve body.

NOTICE:

Be careful that the plates and check balls do not fall out.



(f) Install the plate and 23 bolts.
Torque: 6.7 N·m (68 kgf·cm, 59 in.·lbf)

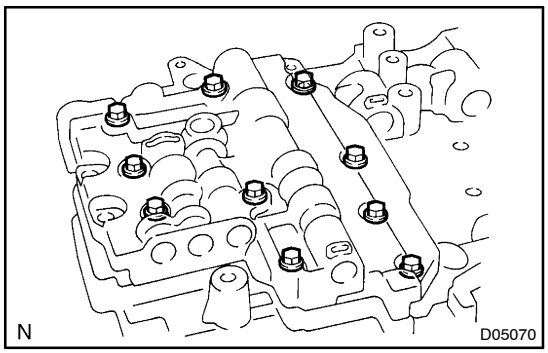


2. INSTALL LOWER NO. 2 VALVE BODY

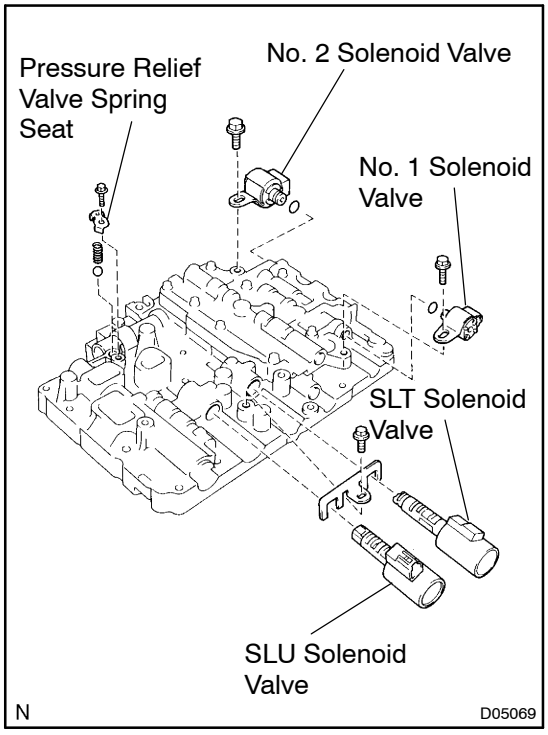
(a) Install the 2 strainers to No. 2 plate sub–assembly.

(b) Align the each hole in the lower No. 2 valve body and No. 2 plate sub–assembly.

(c) Place lower No. 2 valve body and No. 2 plate sub–assembly on the lower No. 1 valve body.



(d) Install the 10 bolts.
Torque: 6.7 N·m (68 kgf·cm, 59 in.·lbf)



3. INSTALL 4 SOLENOIDS

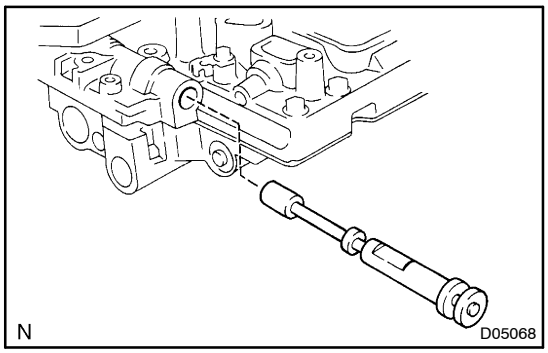
(a) Install the ball, spring and pressure relief valve spring seat with the bolt.
Torque: 6.7 N·m (68 kgf·cm, 59 in.·lbf)

(b) Install the 2 new O–rings to the No. 1, No. 2 solenoid valves.

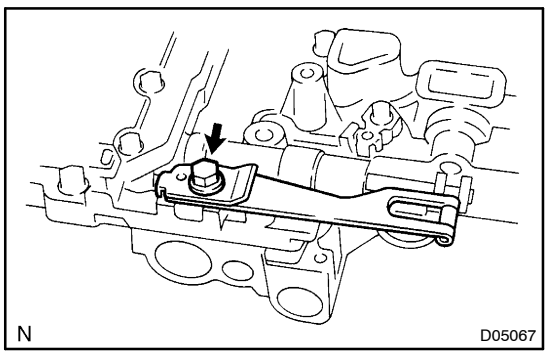
(c) Install the No. 1 solenoid valve with the bolt.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

(d) Install the No. 2 solenoid valve with the bolt.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

(e) Install the SLU, SLT solenoid valves with the plate and bolt.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)



4. INSTALL MANUAL VALVE



5. INSTALL DETENT SPRING AND SPRING PLATE

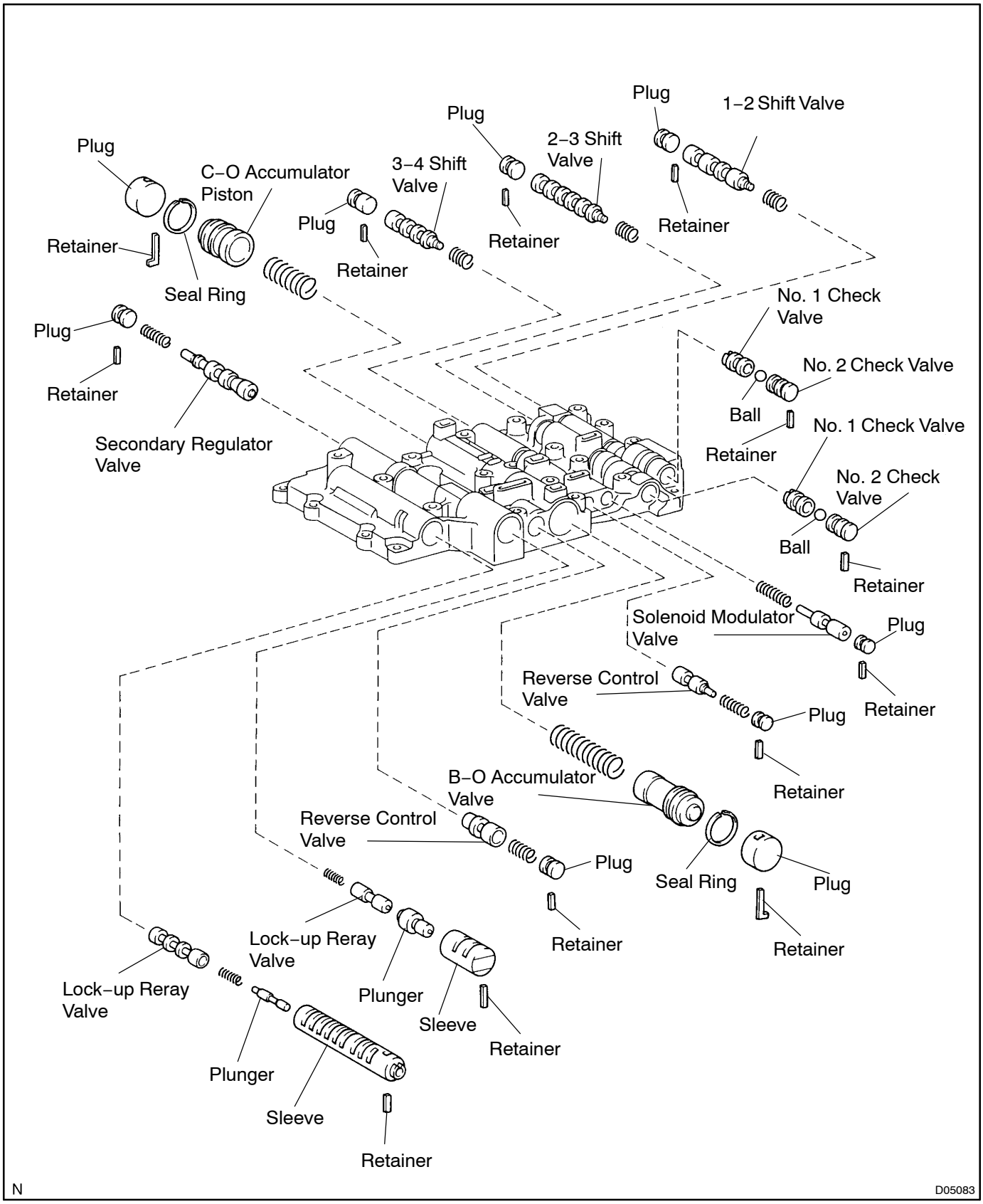
Install the detent spring and spring plate with the bolt.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

UPPER VALVE BODY

AT0JD–01

LOCATION

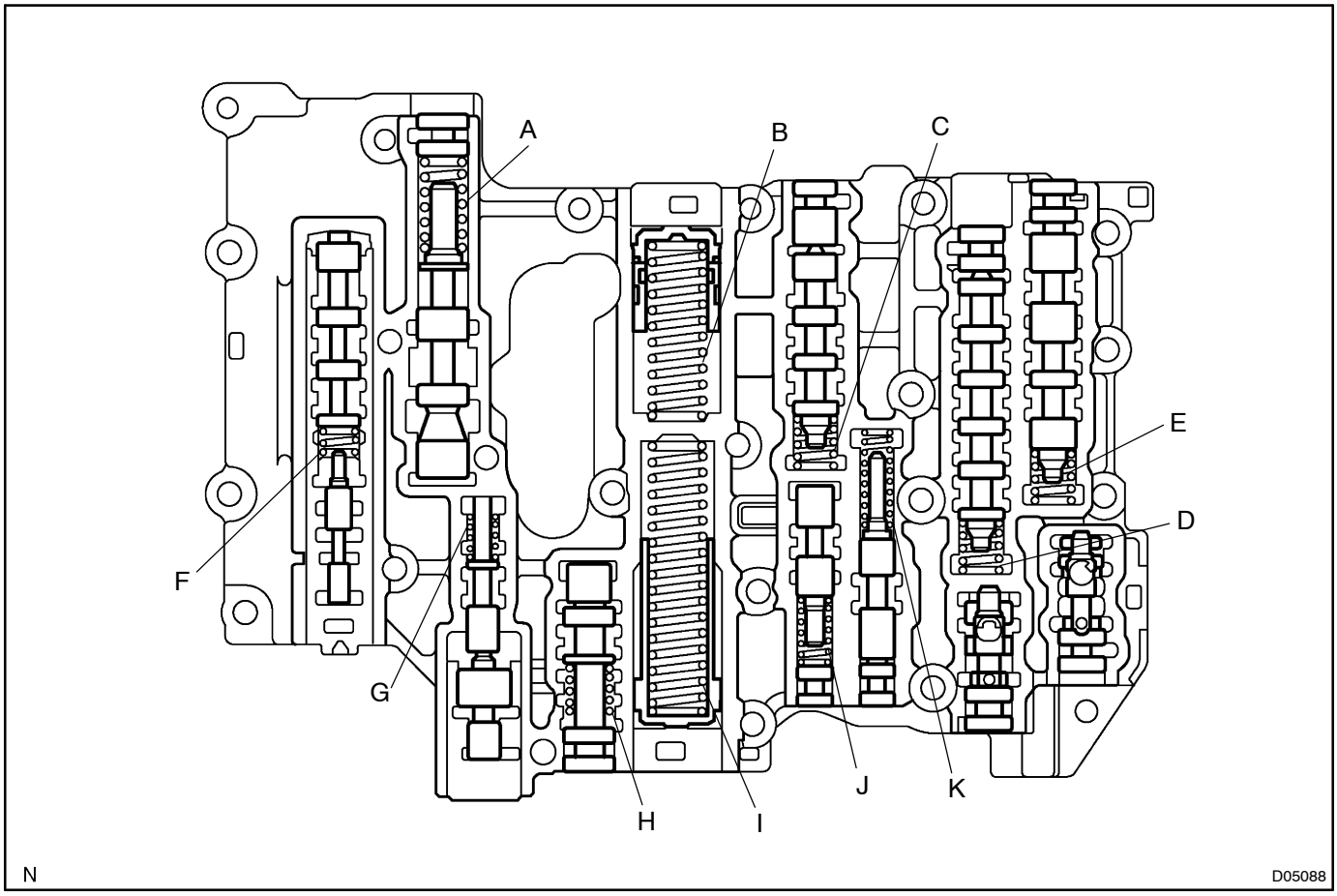
COMPONENTS



SPRING

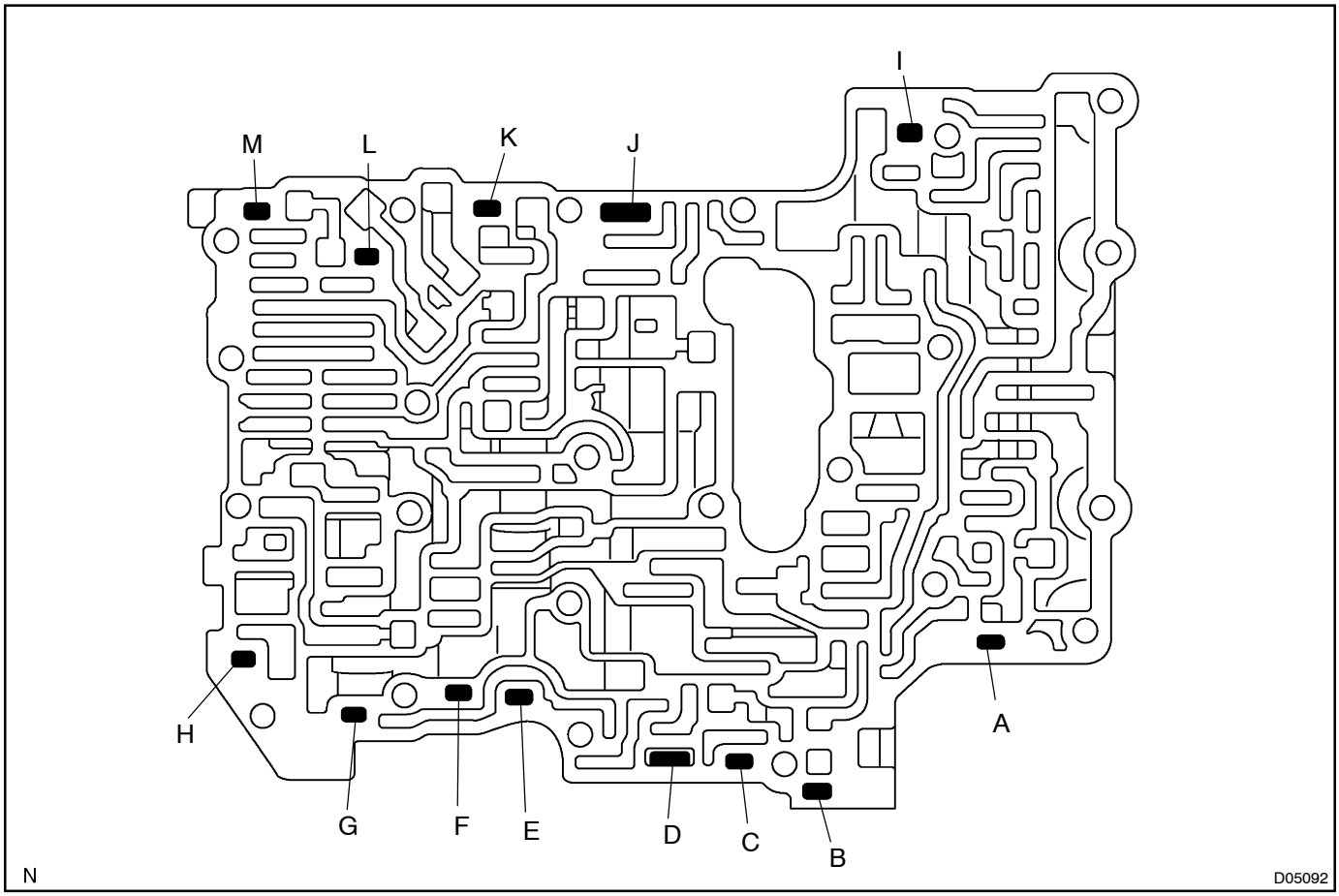
HINT:

During reassembly, please refer to the spring specifications below to help you differentiate among the different springs.



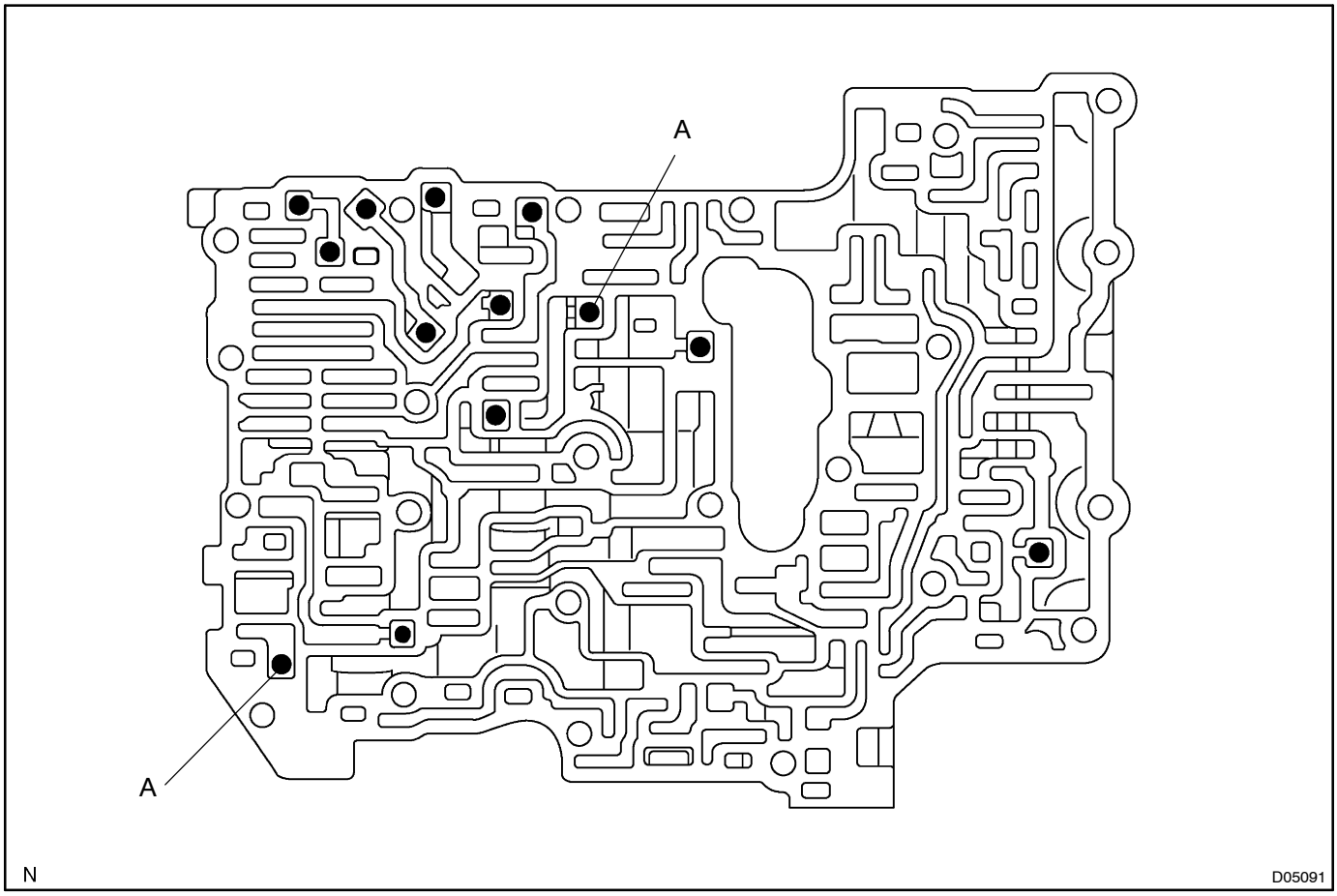
Mark	Name (Color)	Free lenger / Outer diameter mm (in.)	Total No. of coils
A	Secondary Regulator Valve (Purple)	32.88 (1.2944) / 10.60 (0.4173)	9.13
B	C – O Accumulator Piston (White or Pink)	54.41 (2.1421) / 15.00 (0.5906)	13.26
C	3 – 4 Shift Valve (Red)	25.50 (1.0039) / 9.73 (0.3831)	7.75
D	2 – 3 Shift Valve (Red)	25.50 (1.0039) / 9.73 (0.3831)	7.75
E	1 – 2 Shift Valve (Red)	25.50 (1.0039) / 9.73 (0.3831)	7.75
F	Lock–up Relay Valve (Red)	23.42 (0.9220) / 5.86 (0.2307)	12.25
G	Lock–up Control Valve (Yellow)	20.87 (0.8217) /5.55 (0.2185)	11.15
H	Reverse Control Valve (None)	25.85 (1.0071) / 8.64 (0.3402)	8.75
I	B – O Accumulator Valve (White or Red)	71.50 (2.8150) / 14.00 (0.5512)	19.81
J	Reverse Sequence Valve (Light blue)	26.73 (1.0523) / 8.20 (0.33228)	10.22
K	Solenoid Modulator Valve (Yellow)	32.13 (1.2649) / 8.00 (0.3150)	15.75

RETAINER



Mark	Retainer	Height / Width / Thickness mm (in.)
A	Lock–up Relay Valve	12.5 (0.492) / 5.0 (0.197) / 3.2 (0.126)
B	Lock–up Control Valve	19.0 (0.748) / 5.0 (0.197) / 3.2 (0.126)
C	Reverse Control Valve	14.0 (0.551) / 5.0 (0.197) / 3.2 (0.126)
D	B – O Accumulator Valve	36.5 (1.437) / – / 4.0 (0.157)
E	Reverse Sequence Valve	10.0 (0.397) / 5.0 (0.197) / 3.2 (0.126)
F	Solenoid Modulator Valve	10.0 (0.397) / 5.0 (0.197) / 3.2 (0.126)
G	No. 2 Check Valve	10.0 (0.397) / 5.0 (0.197) / 3.2 (0.126)
H	No. 2 Check Valve	21.2 (0.835) / 5.0 (0.197) / 3.2 (0.126)
I	Secondary Regulator Valve	19.0 (0.748) / 5.0 (0.197) / 3.2 (0.126)
J	C – O Accumulator Valve	36.5 (1.437) / – / 4.0 (0.157)
K	3 – 4 Shift Valve	21.2 (0.835) / 5.0 (0.197) / 3.2 (0.126)
L	2 – 3 Shift Valve	21.2 (0.835) / 5.0 (0.197) / 3.2 (0.126)
M	1 – 2 Shift Valve	21.2 (0.835) / 5.0 (0.197) / 3.2 (0.126)

CHECK BALL



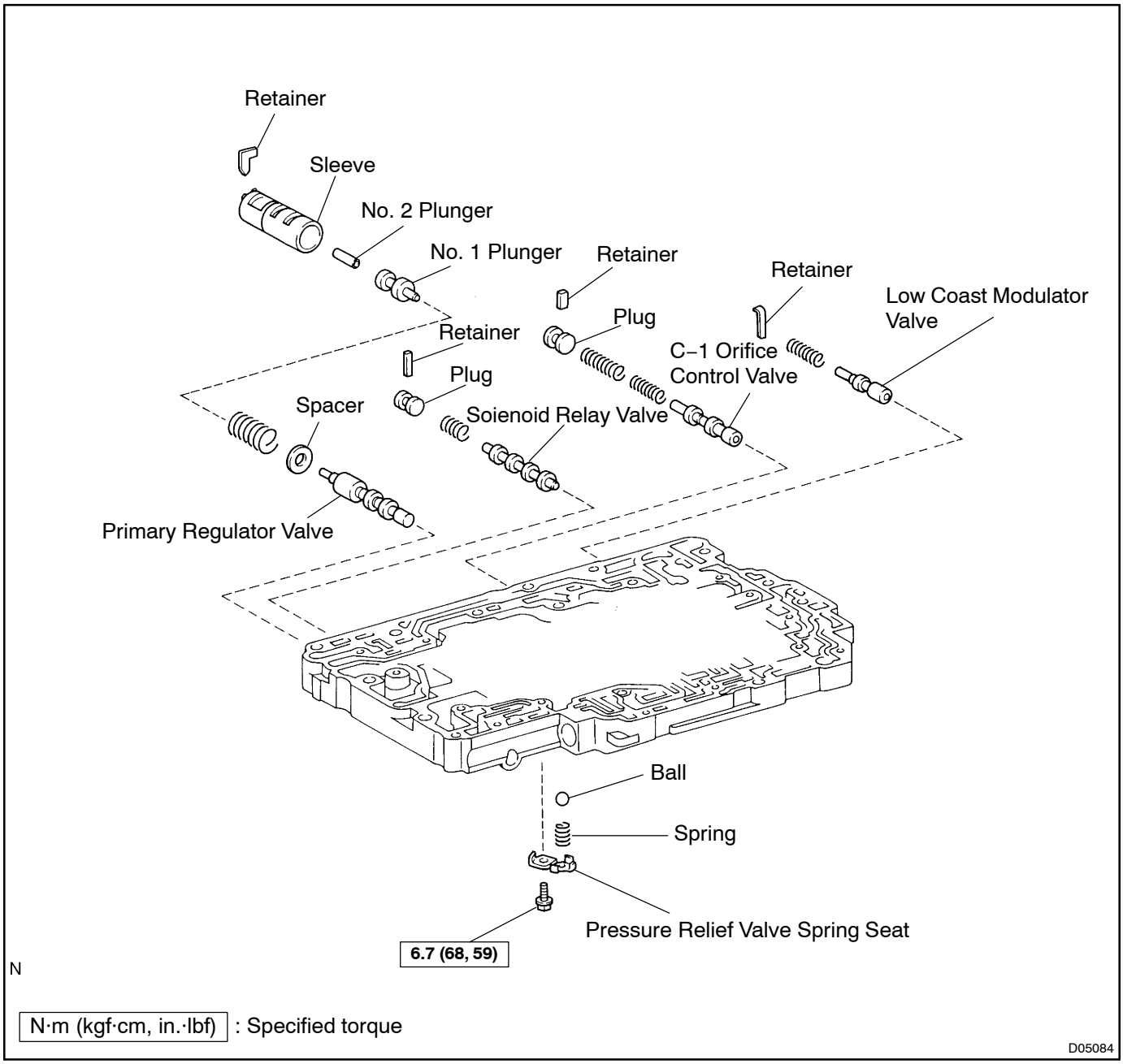
Mark	Check ball	Diameter mm (in.)
A	Rubber ball	6.35 (0.2500)
Except A	Rubber ball	5.54 (0.2181)

LOWER NO.1 VALVE BODY

AT0JF–01

LOCATION

COMPONENTS



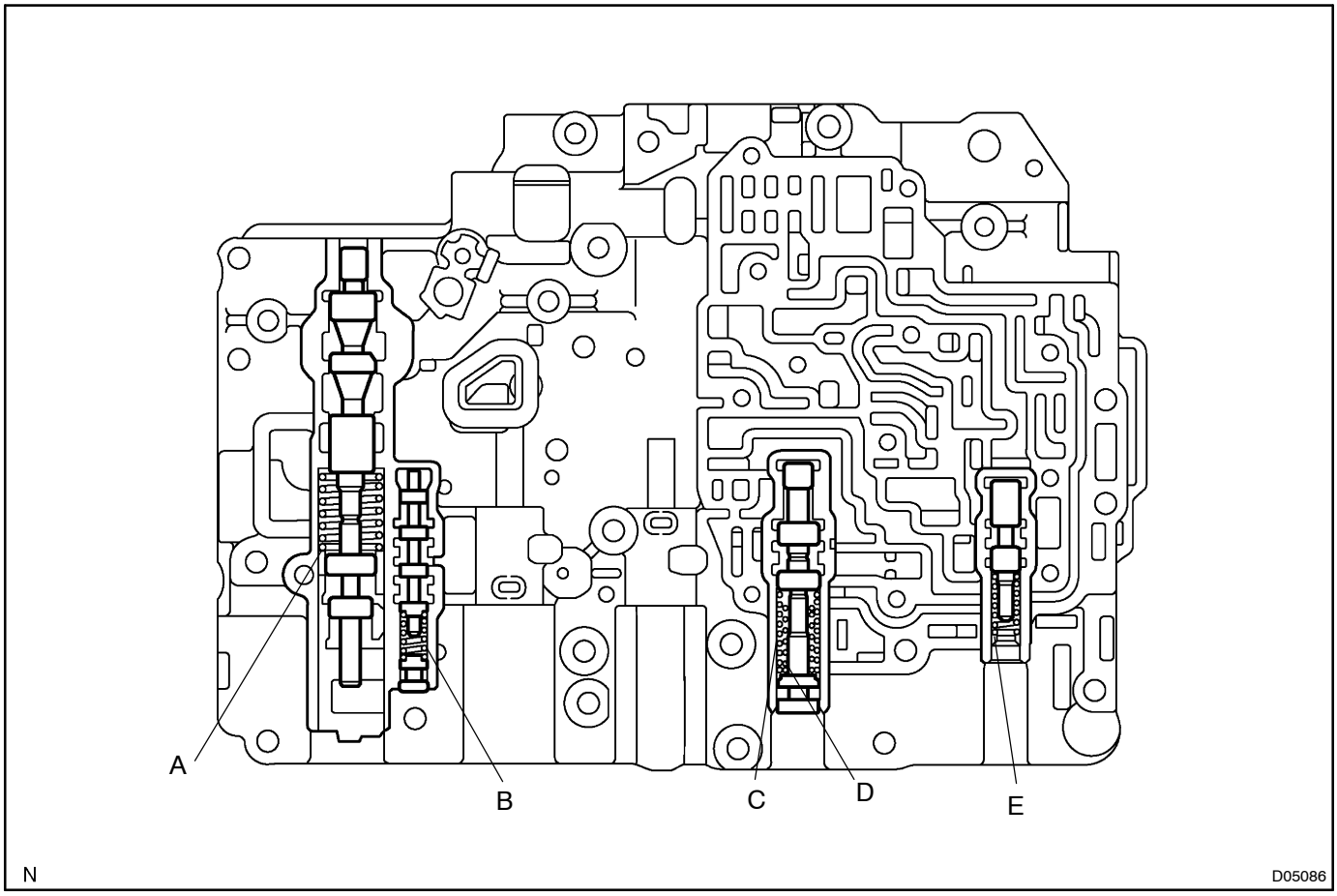
N·m (kgf·cm, in.·lbf) : Specified torque

D05084

SPRING

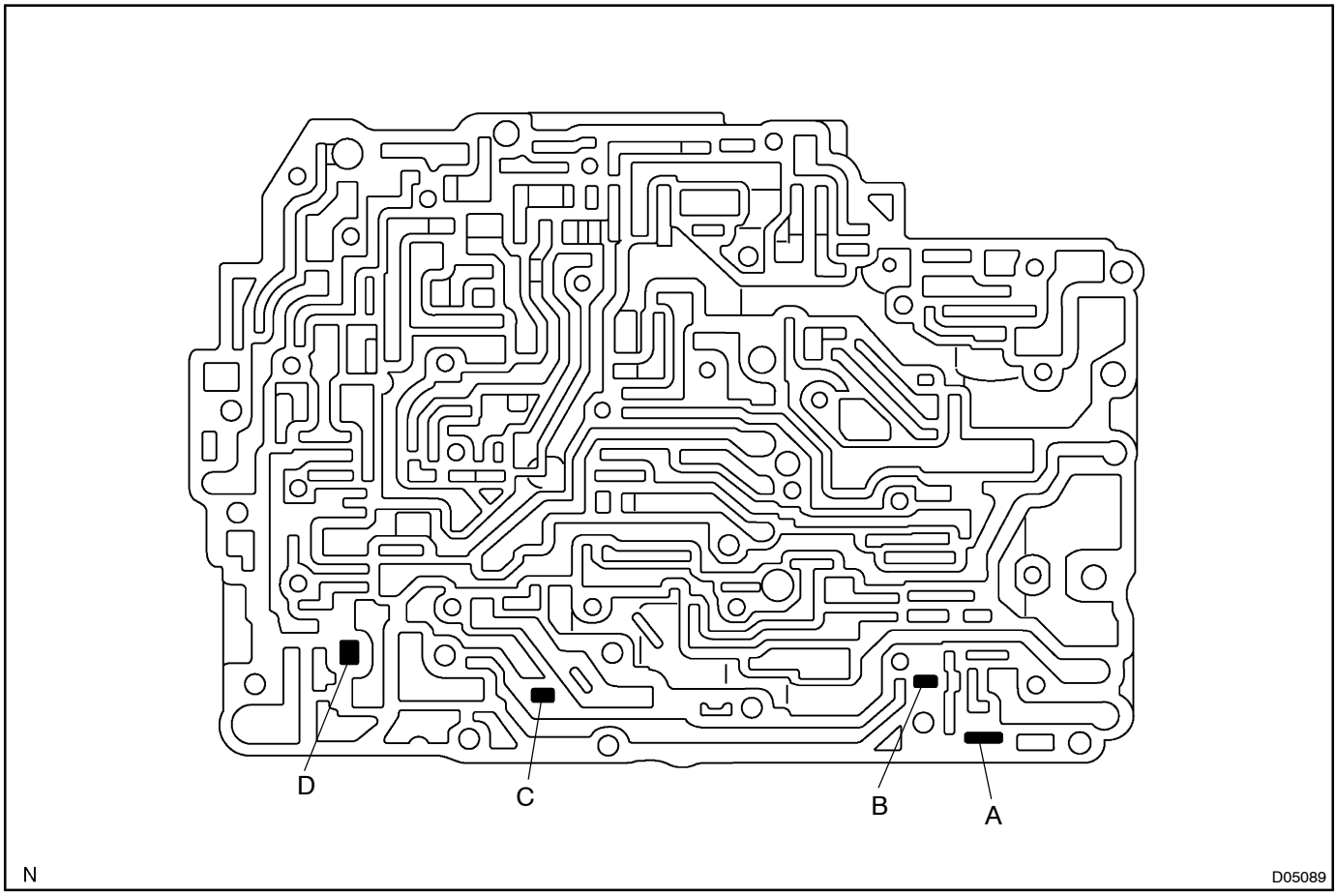
HINT:

During reassembly, please refer to the spring specifications below to help you differentiate among the different springs.



Mark	Name (Color)	Free length / Outer diameter mm (in.)	Total No. of coils
A	Primary Regulator Valve (Light blue)	37.38 (1.4717) / 18.88 (0.7433)	7.17
B	Cut Back Valve (None)	18.80 (0.7402) / 7.48 (0.2944)	7.50
C	C – 1 Orifice Control Valve (White)	37.13 (1.4618) / 11.14 (0.4386)	11.25
D	C – 1 Orifice Control Valve (Yellow)	19.77 (0.7783) / 7.76 (0.3055)	11.50
E	Low Coast Modulator Valve (Blue)	26.43 (1.0405) / 8.26 (0.3252)	10.51

RETAINER



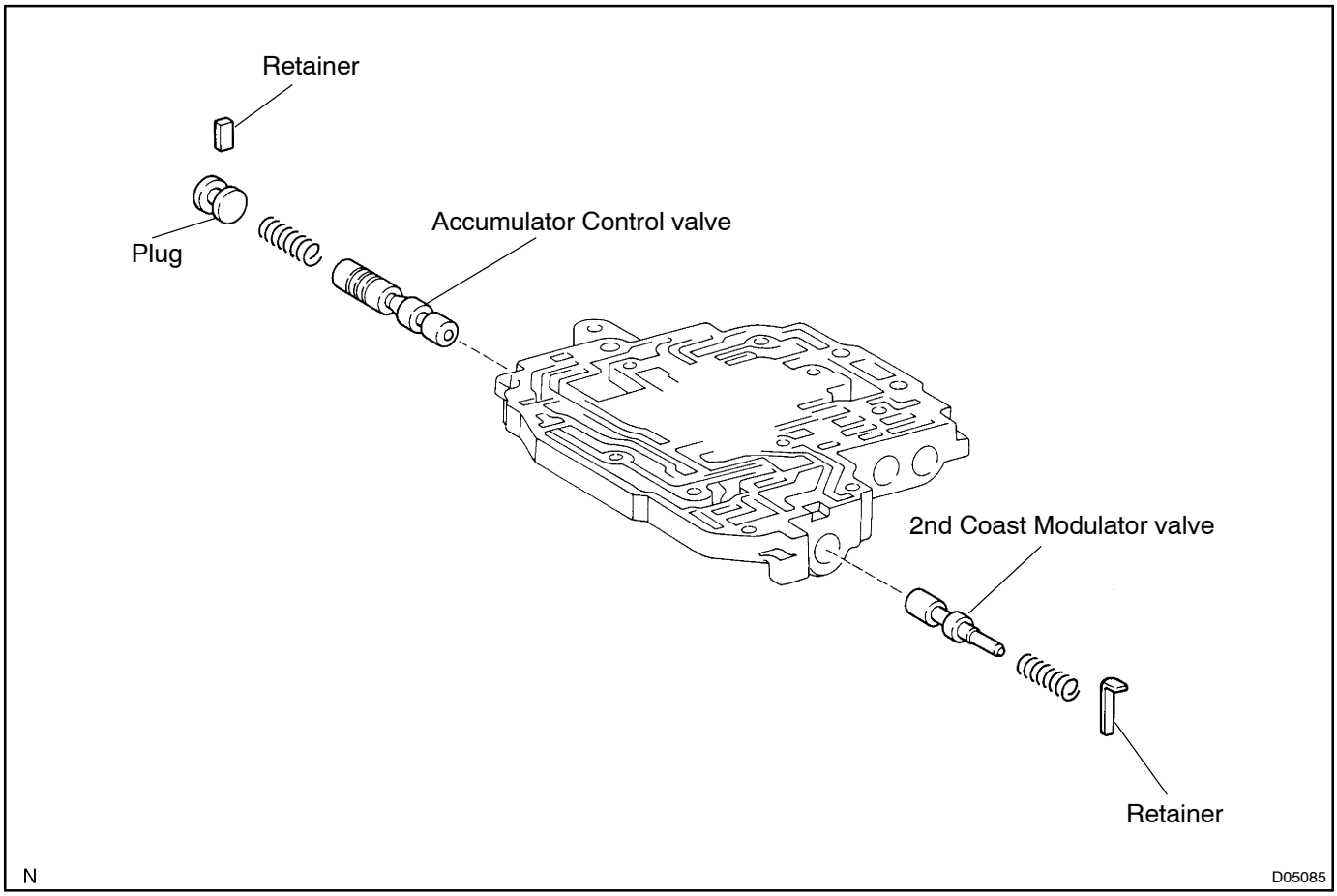
Mark	Retainer	Height / Width / Thickness mm (in.)
A	Primary Regulator Valve	13.0 (0.512) / – / 3.2 (0.126)
B	Cut Back Valve	19.0 (0.748) / 5.0 (0.197) / 3.2 (0.126)
C	C – 1 Orifice Control Valve	10.0 (0.394) / 5.0 (0.197) / 3.2 (0.126)
D	Low Coast Modulator Valve	21.5 (0.846) / – / 1.4 (0.055)

LOWER NO.2 VALVE BODY

AT0JH–01

LOCATION

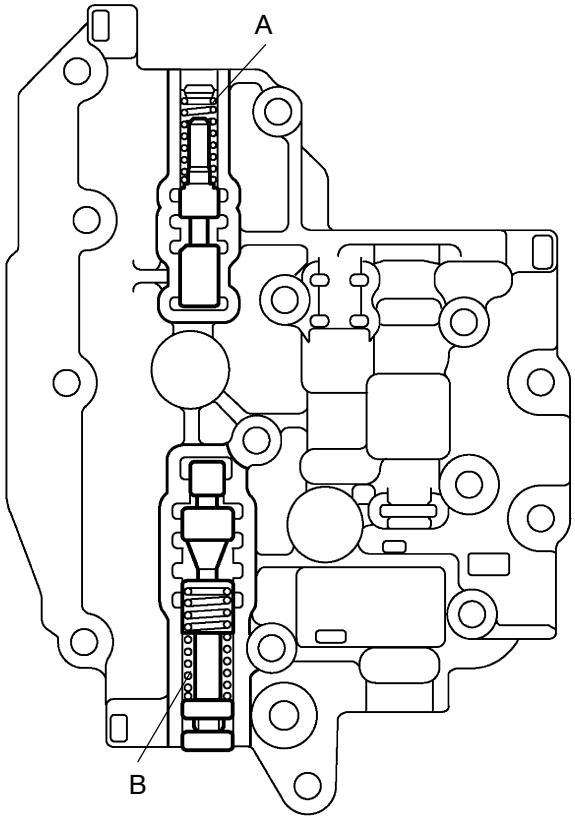
COMPONENTS



SPRING

HINT:

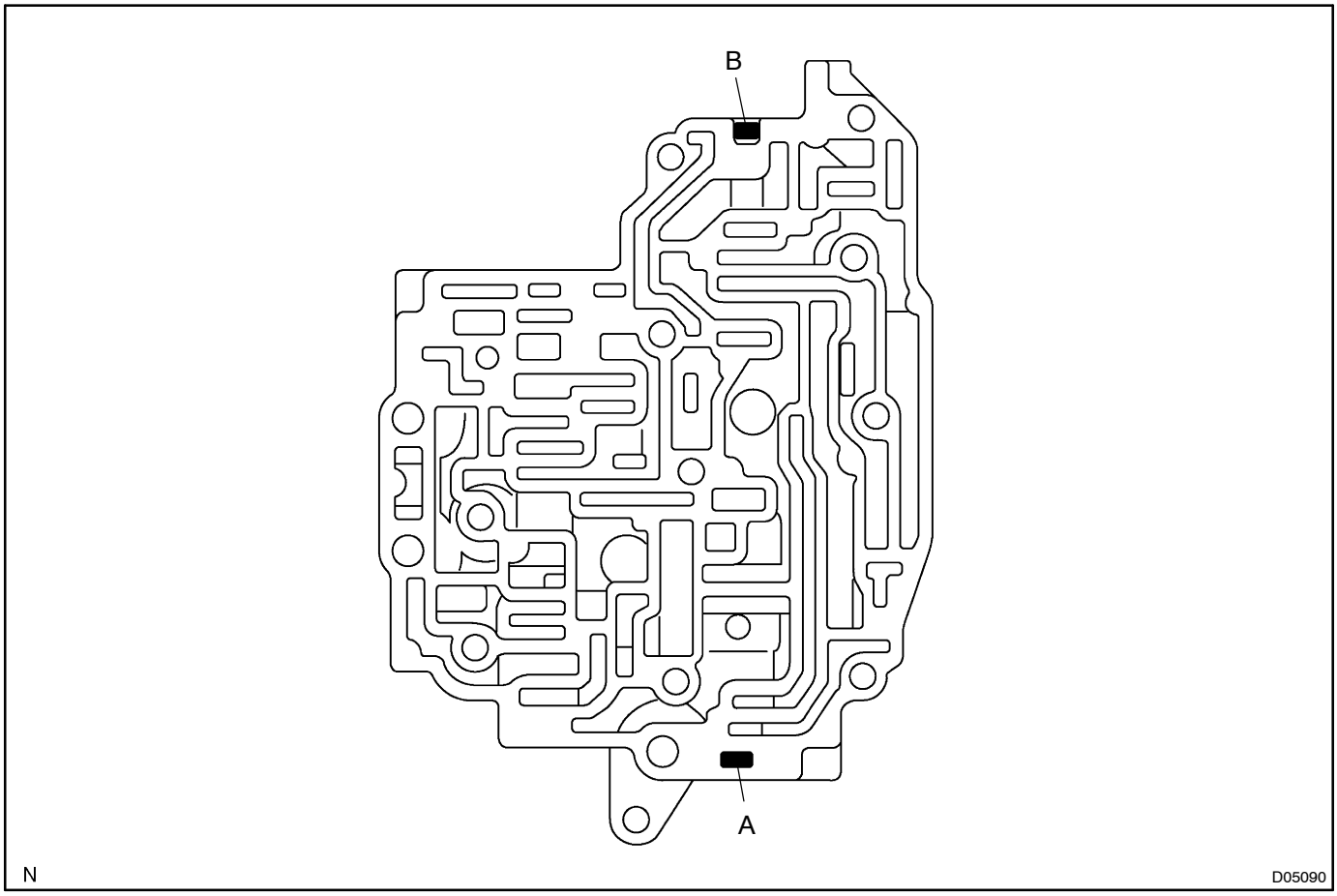
During reassembly, please refer to the spring specifications below to help you differentiate among the different springs.



N D05087

Mark	Name (Color)	Free length / Outer diameter mm (in.)	Total No. of coils
A	2nd Coast Modulator Valve (Blue)	32.31 (1.2720) / 8.30 (0.3268)	12.60
B	Accumulator Control Valve (White)	24.88 (0.9795) / 8.00 (0.3150)	14.34

RETAINER



Mark	Retainer	Height / Width / Thickness mm (in.)
A	Accumulator Control Valve	8.5 (0.335) / 5.0 (0.197) / 3.2 (0.126)
B	2nd Coast Modulator Valve	21.5 (0.846) / – / 1.4 (0.55)

HOW TO USE THIS MANUAL

IN047–04

GENERAL INFORMATION

1. INDEX

An INDEX is provided on the first page of each section to guide you to the item to be repaired. To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page.

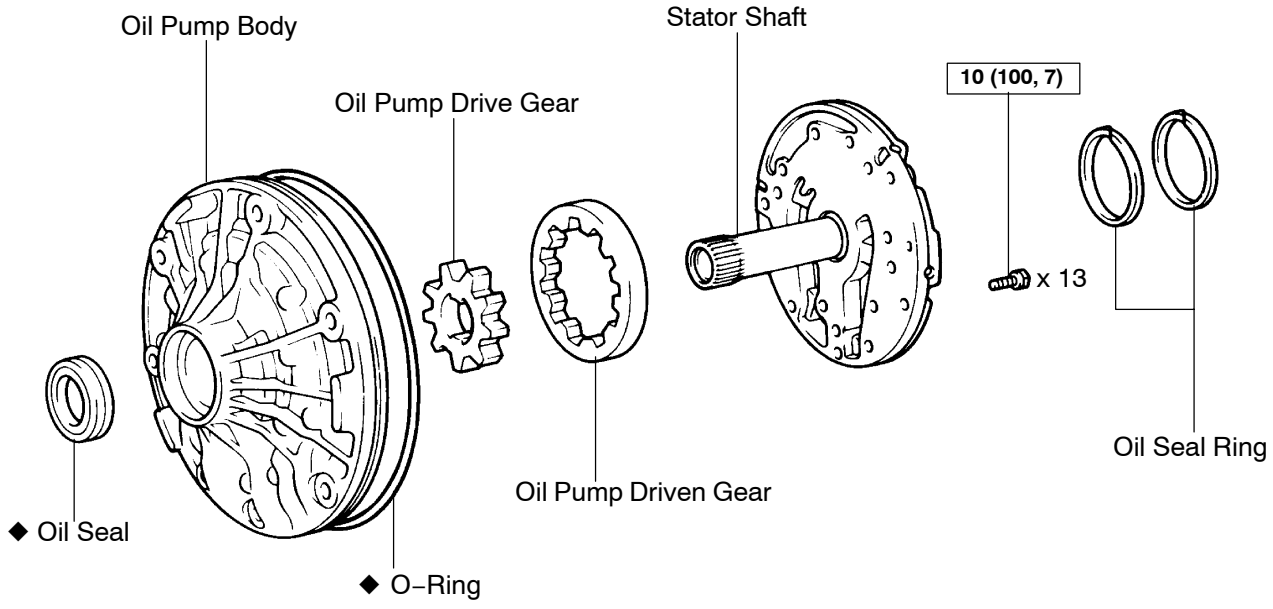
2. PREPARATION

Preparation lists the SST (Special Service Tools), recommended tools, equipment, lubricant and SSM (Special Service Materials) which should be prepared before beginning the operation and explains the purpose of each one.

3. REPAIR PROCEDURES

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

Example:



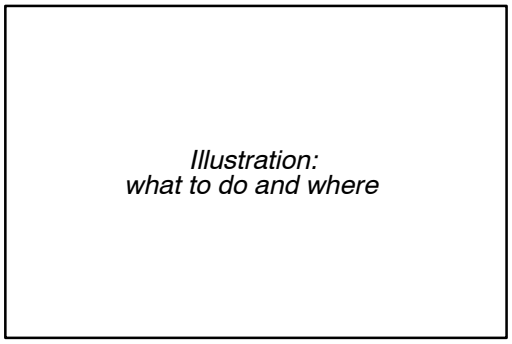
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

D01280

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 illustration.

SST 09350–30020 (09350–06120)

Set part No. *Component part No.*

Detailed text : how to do task

(b) Measure the stroke applying and releasing the compressed air (392 – 785 kPa, 4 – 8 kgf.cm^2 or 57 – 114 psi) as shown in the illustration.

Piston stroke: 1.40 — 1.70 mm (0.0551 — 0.0669 in.)

Specification

This format provides the experienced technician with a FAST TRACK to the information needed. The upper case task heading can be read at a glance when necessary, and the text below it provides detailed information. Important specifications and warnings always stand out in bold type.

4. REFERENCES

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

5. SPECIFICATIONS

Specifications are presented in bold type throughout the text where needed. You never have to leave the procedure to look up your specifications. They are also found in Service Specifications section for quick reference.

6. CAUTIONS, NOTICES, HINTS:

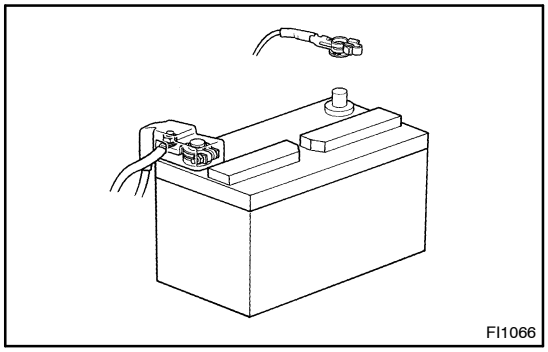
- CAUTIONS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- HINTS are separated from the text but do not appear in bold. They provide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

7. SI UNIT

The UNITS given in this manual are primarily expressed according to the SI UNIT (International System of Unit), and alternately expressed in the metric system and in the English System.

Example:

Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)


FI1066

REPAIR INSTRUCTIONS

IN048–01

GENERAL INFORMATION

BASIC REPAIR HINT

(a) Use fender, seat and floor covers to keep the vehicle clean and prevent damage.

(b) During disassembly, keep parts in the appropriate order to facilitate reassembly.

(c) Observe the following operations:
  (1) Before performing electrical work, disconnect the negative (–) terminal cable from the battery.
  (2) If it is necessary to disconnect the battery for inspection or repair, always disconnect the negative (–) terminal cable which is grounded to the vehicle body.
  (3) To prevent damage to the battery terminal, loosen the cable nut and raise the cable straight up without twisting or prying it.
  (4) Clean the battery terminals and cable ends with a clean shop rag. Do not scrape them with a file or other abrasive objects.
  (5) Install the cable ends to the battery terminals with the nut loose, and tighten the nut after installation. Do not use a hammer to tap the cable ends onto the terminals.
  (6) Be sure the cover for the positive (+) terminal is properly in place.

(d) Check hose and wiring connectors to make sure that they are secure and correct.

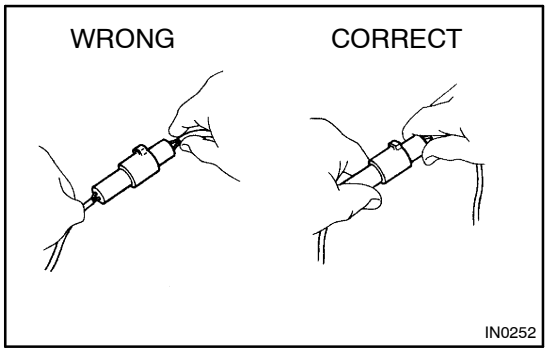
(e) Non–reusable parts
  (1) Always replace cotter pins, gaskets, O–rings and oil seals etc. with new ones.
  (2) Non–reusable parts are indicated in the component illustrations by the "◆" symbol.

(f) Precoated parts
  Precoated parts are bolts and nuts, etc. that are coated with a seal lock adhesive at the factory.
  (1) If a precoated part is retightened, or loosened or caused to move in any way, it must be precoated with the specified adhesive.
  (2) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads.
  (3) Precoated parts are indicated in the component illustrations by the "★" symbol.

(g) When necessary, use a sealer on gaskets to prevent leaks.

(h) Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.

(i) 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 in the preparation of AT section.



(j) To pull apart electrical connectors, pull the connector itself, not the wires.

TERMS

ABBREVIATIONS USED IN THIS MANUAL

IN049–04

Abbreviations	Meaning
A/T	Automatic Transmission
ATF	Automatic Transmission Fluid
B_0	Overdrive Brake
B_1	2nd Coast Brake
B_2	2nd Brake
B_3	1st & Reverse Brake
C_0	Overdrive Direct Clutch
C_1	Forward Clutch
C_2	Direct Clutch
D	Disc
F	Flange
F_0	Overdrive One–way Clutch
F_1	No.1 One–way Clutch
F_2	No.2 One–way Clutch
FIPG	Formed in Place Gasket
MP	Multipurpose
O/D	Overdrive
P	Plate
SSM	Special Service Materials
SST	Special Service Tools
w/	with
w/o	without

IN03Q–01

GLOSSARY OF SAE AND LEXUS TERMS

This glossary lists all SAE–J1930 terms and abbreviations used in this manual in compliance with SAE recommendations, as well as their Lexus equivalents.

SAE ABBREVIATIONS	SAE TERMS	LEXUS TERMS ( )––ABBREVIATIONS
A/C	Air Conditioning	Air Conditioner
ACL	Air Cleaner	Air Cleaner
AIR	Secondary Air Injection	Air Injection (AI)
AP	Accelerator Pedal	–
B+	Battery Positive Voltage	+B, Battery Voltage
BARO	Barometric Pressure	–
CAC	Charge Air Cooler	Intercooler
CARB	Carburetor	Carburetor
CFI	Continuous Fuel Injection	–
CKP	Crankshaft Position	Crank Angle
CL	Closed Loop	Closed Loop
CMP	Camshaft Position	Cam Angle
CPP	Clutch Pedal Position	–
CTOX	Continuous Trap Oxidizer	–
CTP	Closed Throttle Position	–
DFI	Direct Fuel Injection (Diesel)	Direct Injection (DI)
DI	Distributor Ignition	–
DLC1 DLC2 DLC3	Data Link Connector 1 Data Link Connector 2 Data Link Connector 3	1: Check Connector 2: Total Diagnosis Comunication Link (TDCL) 3: OBD II Diagnostic Connector
DTC	Diagnostic Trouble Code	Diagnostic Code
DTM	Diagnostic Test Mode	–
ECL	Engine Control Level	–
ECM	Engine Control Module	Engine ECU (Electronic Control Unit)
ECT	Engine Coolant Temperature	Coolant Temperature, Water Temperature (THW)
EEPROM	Electrically Erasable Programmable Read Only Memory	Electrically Erasable Programmable Read Only Memory (EEPROM), Erasable Programmable Read Only Memory (EPROM)
EFE	Early Fuel Evaporation	Cold Mixture Heater (CMH), Heat Control Valve (HCV)
EGR	Exhaust Gas Recirculation	Exhaust Gas Recirculation (EGR)
EI	Electronic Ignition	Distributorless Ignition (DI)
EM	Engine Modification	Engine Modification (EM)
EPROM	Erasable Programmable Read Only Memory	Programmable Read Only Memory (PROM)
EVAP	Evaporative Emission	Evaporative Emission Control (EVAP)
FC	Fan Control	–
FEEPROM	Flash Electrically Erasable Programmable Read Only Memory	–
FEPROM	Flash Erasable Programmable Read Only Memory	–
FF	Flexible Fuel	–
FP	Fuel Pump	Fuel Pump
GEN	Generator	Alternator
GND	Ground	Ground (GND)

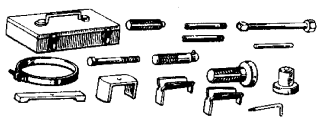
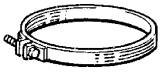
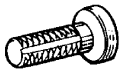
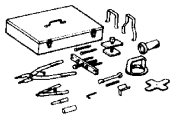
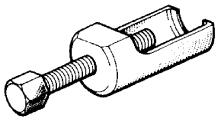
HO2S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO2S)
IAC	Idle Air Control	Idle Speed Control (ISC)
IAT	Intake Air Temperature	Intake or Inlet Air Temperature
ICM	Ignition Control Module	–
IFI	Indirect Fuel Injection	Indirect Injection
IFS	Inertia Fuel–Shutoff	–
ISC	Idle Speed Control	–
KS	Knock Sensor	Knock Sensor
MAF	Mass Air Flow	Air Flow Meter
MAP	Manifold Absolute Pressure	Manifold Pressure Intake Vacuum
MC	Mixture Control	Electric Bleed Air Control Valve (EBCV) Mixture Control Valve (MCV) Electric Air Control Valve (EACV)
MDP	Manifold Differential Pressure	–
MFI	Multiport Fuel Injection	Electronic Fuel Injection (EFI)
MIL	Malfunction Indicator Lamp	Check Engine Light
MST	Manifold Surface Temperature	–
MVZ	Manifold Vacuum Zone	–
NVRAM	Non–Volatile Random Access Memory	–
O2S	Oxygen Sensor	Oxygen Sensor, O_2 Sensor (O_2S)
OBD	On–Board Diagnostic	On–Board Diagnostic (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalyst Converter (OC), CCo
OP	Open Loop	Open Loop
PAIR	Pulsed Secondary Air Injection	Air Suction (AS)
PCM	Powertrain Control Module	–
PNP	Park/Neutral Position	–
PROM	Programmable Read Only Memory	–
PSP	Power Steering Pressure	–
PTOX	Periodic Trap Oxidizer	Diesel Particulate Filter (DPF) Diesel Particulate Trap (DPT)
RAM	Random Access Memory	Random Access Memory (RAM)
RM	Relay Module	–
ROM	Read Only Memory	Read Only Memory (ROM)
RPM	Engine Speed	Engine Speed
SC	Supercharger	Supercharger
SCB	Supercharger Bypass	–
SFI	Sequential Multiport Fuel Injection	Electronic Fuel Injection (EFI), Sequential Injection
SPL	Smoke Puff Limiter	–
SRI	Service Reminder Indicator	–
SRT	System Readiness Test	–
ST	Scan Tool	–
TB	Throttle Body	Throttle Body
TBI	Throttle Body Fuel Injection	Single Point Injection Central Fuel Injection (Ci)
TC	Turbocharger	Turbocharger
TCC	Torque Converter Clutch	Torque Converter

TCM	Transmission Control Module	Transmission ECU (Electronic Control Unit)
TP	Throttle Position	Throttle Position
TR	Transmission Range	–
TVV	Thermal Vacuum Valve	Bimetallic Vacuum Switching Valve (BVSV) Thermostatic Vacuum Switching Valve (TVSV)
TWC	Three–Way Catalytic Converter	Three–Way Catalytic (TWC) CC_{RO}
TWC+OC	Three–Way + Oxidation Catalytic Converter	CC_R + CCo
VAF	Volume Air Flow	Air Flow Meter
VR	Voltage Regulator	Voltage Regulator
VSS	Vehicle Speed Sensor	Vehicle Speed Sensor (Read Switch Type)
WOT	Wide Open Throttle	Full Throttle
WU–OC	Warm Up Oxidation Catalytic Converter	–
WU–TWC	Warm Up Three–Way Catalytic Converter	Manifold Converter
3GR	Third Gear	–
4GR	Fourth Gear	–

AUTOMATIC TRANSMISSION

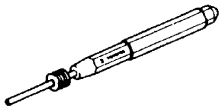
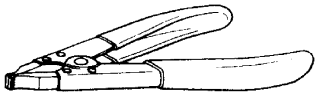
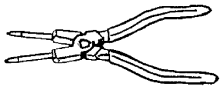
PP24I–01

SST (Special Service Tools)

	09350–20015	TOYOTA Automatic Transmission Tool Set	
	(09361–30011)	Manual Valve Lever Shaft Oil Seal Replacer	
	(09362–30011)	Guide Bolt	
	(09363–20010)	Oil Pump Body Setting Band	
	(09369–20040)	Piston Spring Compressor Set	
	(09370–12010)	Clutch Drum Thrust Play Gauge	
	(09388–20010)	Oil Seal Replacer	
	09350–30020	TOYOTA Automatic Transmission Tool Set	
	(09350–07080)	Brake Reaction Sleeve Puller	
	(09350–07090)	Brake No.1 Piston Puller	
	09610–20012	Pitman Arm Puller	

PP24J–01

RECOMMENDED TOOLS

	09031–00030	Pin Punch .	
	09905–00012	Snap Ring No.1 Expander .	
	09905–00013	Snap Ring Pliers .	

PP24K–01

EQUIPMENT

Feeler gauge	
Vernier calipers	
Dial indicator or dial indicator with magnetic base	
Dial indicator	
Straight edge	
Torque wrench	
Cylinder gauge	

PP24L–01

LUBRICANT

Item	Capacity	Classification
Automatic transmission fluid Dry fill Drain and refill	 6.6 liters (7.0 US qts, 5.8 Imp.qts) 2.4 liters (2.5 US qts, 2.1 Imp.qts)	 TYPE T–IV or equivalent

PP24M–01

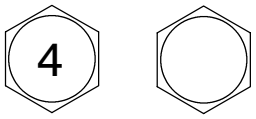
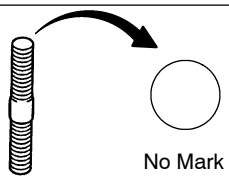
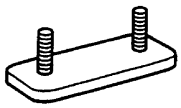
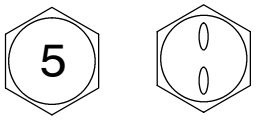
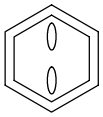
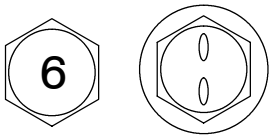
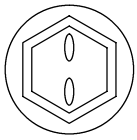
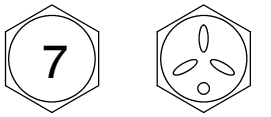
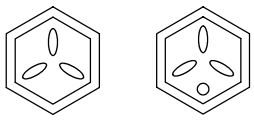
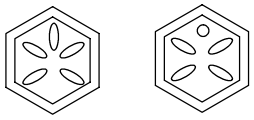
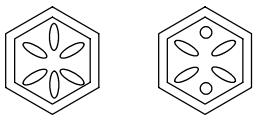
SSM (Special Service Materials)

08833–00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Oil pump set bolt Extension housing set bolt

STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

SS0ZS–01

Bolt Type				Class
Hexagon Head Bolt		Stud Bolt	Weld Bolt	
Normal Recess Bolt	Deep Recess Bolt			
 No Mark	 No Mark	 No Mark		4T
				5T
 w/ Washer	 w/ Washer			6T
				7T
				8T
				9T
				10T
				11T

B06431

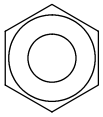
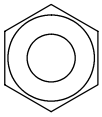
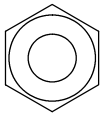
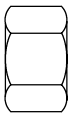
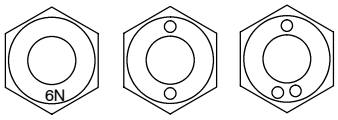
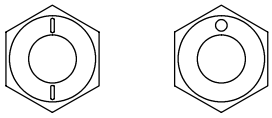
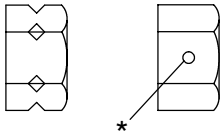
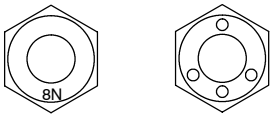
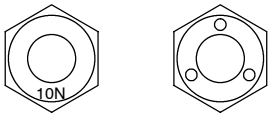
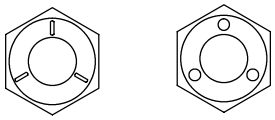
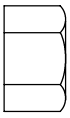
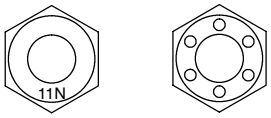
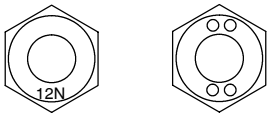
SS0ZT–01

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N·m	kgf·cm	ft·lbf	N·m	kgf·cm	ft·lbf
4T	6	1	5	55	48 in.·lbf	6	60	52 in.·lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	–	–	–
5T	6	1	6.5	65	56 in.·lbf	7.5	75	65 in.·lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	–	–	–
6T	6	1	8	80	69 in.·lbf	9	90	78 in.·lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	–	–	–
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	–	–	–
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

SS0ZU–01

HOW TO DETERMINE NUT STRENGTH

Nut Type			Class
Present Standard Hexagon Nut	Old Standard Hexagon Nut		
	Cold Forging Nut	Cutting Processed Nut	
 No Mark			4N
 No Mark (w/ Washer)	 No Mark (w/ Washer)	 No Mark	5N (4T)
 6N			6N
		 *	7N (5T)
 8N			8N
 10N		 No Mark	10N (7T)
 11N			11N
 12N			12N

*: Nut with 1 or more marks on one side surface of the nut.

B06432

HINT:

Use the nut with the same number of the nut strength classification or the greater than the bolt strength classification number when tightening parts with a bolt and nut.

Example: Bolt = 4T

Nut = 4N or more

AUTOMATIC TRANSMISSION

SERVICE DATA

SS13B–01

Oil pump		
Body clearance	STD	0.07 – 0.15 mm (0.0028 – 0.0059 in.)
	Max.	0.3 mm (0.012 in.)
Tip clearance	STD	0.11 – 0.14 mm (0.0043 – 0.0055 in.)
	Max.	0.3 mm (0.012 in.)
Side clearance	STD	0.02 – 0.05 mm (0.0008 – 0.0020 in.)
	Max.	0.1 mm (0.004 in.)
Pump body bushing inside diameter	Max.	38.19 mm (1.5035 in.)
Stator shaft bushing inside diameter		
Front side:	Max.	23.11 mm (0.9098 in.)
Rear side:	Max.	23.11 mm (0.9098 in.)

O/D Direct Clutch		
Clutch drum bushing inside diameter	Max.	23.14 mm (0.9110 in.)
O/D direct clutch piston stroke		1.74 – 2.44 mm (0.0685 – 0.0961 in.)
O/D planetary gear bushing	Max.	11.27 mm (0.4437 in.)
Planetary pinion gear thrust clearance	STD	0.20 – 0.50 mm (0.0079 – 0.0197 in.)

O/D Brake	
Pack clearance	0.75 – 1.25 mm (0.0295 – 0.0492 in.)
Plate thickness	2.0 mm (0.079 in.) 2.3 mm (0.091 in.)

Front Clutch	
Piston stroke	1.40 – 1.60 mm (0.0551 – 0.0630 in.)
Flange thickness	1.8 mm (0.071 in.) 2.0 mm (0.079 in.)

Rear Clutch	
Piston stroke	0.90 – 1.30 mm (0.0354 – 0.0512 in.)
Flange thickness	3.55 mm (0.1398 in.) 3.75 mm (0.1477 in.) 4.00 mm (0.1575 in.)

No. 1 Brake		
Piston stroke		0.97 – 1.64 mm (0.0382 – 0.0646 in.)
Center support bushing inside diameter	Max.	36.46 (1.4354 in.)

No. 2 Brake	
Piston stroke	0.98 – 1.71 mm (0.0386 – 0.0673 in.)

Planetary Sun Gear	
Maximum inside diameter	21.58 mm (0.8496 in.)

Front Planetary Gear	
Planetary pinion gear thrust clearance	0.20 – 0..50 mm (0.0079 – 0.0197 in.)

Rear Planetary Gear		
Rear planetary gear output shaft bushing	Max.	18.08 mm (0.7118 in.)
Planetary pinion gear thrust clearance		0.20 – 0.50 mm (0.0079 – 0.0197 in.)

No. 3 Brake	
Pack clearance	0.52 – 1.27 mm (0.0205 – 0.0500 in.)
Flange thickness	3.00 mm (0.1181 in.) 3.25 mm (0.1280 in.) 3.50 mm (0.1378 in.) 3.75 mm (0.1477 in.) 4.00 mm (0.1575 in.) 4.25 mm (0.1674 in.)

Valve body spring			
Spring (Color)	Free length	Coil outer diameter	Total No. of coils
Upper valve body			
Secondary regulator valve (Purple)	32.88 mm (1.2944 in.)	10.60 mm (0.4173 in.)	9.13
C–O accumulator piston (White or Pink)	54.41 mm (2.1421 in.)	15.00.mm (0.5906 in.)	13.26
3–4 shift valve (Red)	25.50 mm (1.0039 in.)	9.73 mm (0.3831 in.)	7.75
2–3 shift valve (Red)	25.50 mm (1.0039 in.)	9.73 mm (0.3831 in.)	7.75
1–2 shift valve (Red)	25.50 mm (1.0039 in.)	9.73 mm (0.3831 in.)	7.75
Lock–up relay valve (Red)	23.42 mm (0.9220 in.)	5.86 mm (0.2307 in.)	12.25
Lock–up control valve (Yellow)	20.87 mm (0.8217 in.)	5.55 mm (0.2185 in.)	11.15
Reverse control valve (None)	25.58 mm (1.0071 in.)	8.64 mm (0.3402 in.)	8.75
B–O accumulator valve (White or Red)	71.50 mm (2.8150 in.)	14.00 mm (0.5512 in.)	19.81
Reverse sequence valve (Light blue)	26.73 mm (1.0523 in.)	8.20 mm (0.3228 in.)	10.22
Solenoid modulator valve (Yellow)	32.13 mm (1.2649 in.)	8.00 mm (0.3150 in.)	15.75
Lower No. 1 valve body			
Primary regulator valve (Light blue)	37.38 mm (1.4717 in.)	18.88 mm (0.7433 in.)	7.17
Cut back valve (None)	18.80 mm (0.7402 in.)	7.48 mm (0.2944 in.)	7.50
C–1 orifice control valve (White)	37.13 mm (1.4618)	11.14 mm (0.4386 in.)	11.25
C–1 orifice control valve (Yellow)	19.77 mm (0.7783 in.)	11.14 mm (0.4386 in.)	11.25
Low coast modulator valve (Blue)	26.43 mm (1.0405 in.)	8.26 mm (0.3252 in.)	10.51
Lower No. 2 valve body			
2nd coast modulator valve (Blue)	32.31 mm (1.2720 in.)	8.30 mm (0.3268 in.)	12.60
Accumulator control valve (White)	24.88 mm (0.9795 in.)	8.00 mm (0.3150 in.)	14.34

Valve body retainer			
Retainer	Height	Width	Thickness
Upper valve body			
Lock–up relay valve	12.5 mm (0.492 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
Lock–up control valve	19.0 mm (0.748 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
Reverse control valve	14.0 mm (0.551 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
B–O accumulator valve	36.5 mm (1.437 in.)	–	4.0 mm (0.157 in.)
Reverse sequence valve	10.0 mm (0.397 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
Solenoid modulator valve	10.0 mm (0.397 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
No. 2 check valve	10.0 mm (0.397 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
No. 2 check valve	10.0 mm (0.397 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
Secondary regulator valve	19.0 mm (0.748 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
C–O accumulator piston	36.5 mm (1.437 in.)	–	4.0 mm (0.157 in.)
3–4 shift valve	21.2 mm (0.835 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
2–3 shift valve	21.2 mm (0.835 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
1–2 shift valve	21.2 mm (0.835 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
Lower No. 1 valve body			
Primary regulator valve	14.5 mm (0.571 in.)	–	3.2 mm (0.126 in.)
Cut back valve	19.0 mm (0.748 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
C–1 orifice control valve	10.0 mm (0.394 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
Low coast modulator valve	21.5 mm (0.846 in.)	–	1.4 mm (0.055 in.)

Check Ball	
Upper valve body	
Rubber ball	5.5 mm (0.217 in.) 6.4 mm (0.252 in.)
Lower No. 1 valve body	
Plastic ball	9.5 mm (0.374 in.)

Transmission Case	
Transmission case bushing Max.	38.19 mm (1.5035 in.)

Extension Housing	
Extension housing bushing Max.	38.09 mm (1.4996 in.)

Output Shaft	
End play	0.3 – 0.9 mm (0.012 – 0.035 in.)

Accumulator Piston	
C_1	31.8 (1.252)
C_2	31.8 (1.252)
B_2	34.8 (1.370)

Accumulator Spring		
Spring	Free length/Coil outer diameter	Color
C_1	75.03 mm (2.9540 in.) / 17.00 mm (0.6693 in.)	White or Blue
C_2	57.74 mm (2.2732 in.) / 16.54 mm (0.6512 in.)	White or Purple
B_2	56.40 mm (2.2205 in.) / 18.79 mm (0.7398 in.)	Green

SS13C–01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Stator shaft x Oil pump body		7.4	75	65 in.·lbf
Lower No. 1 valve body x Upper valve body		6.7	68	59 in.·lbf
Lower No. 1 valve body x Lower No. 2 valve body		6.7	68	59 in.·lbf
Lower No. 1 valve body x Pressure relief retainer		6.7	68	59 in.·lbf
Lower No. 1 valve body x No. 2 shift solenoid		10	100	7
Lower No. 2 valve body x No. 1 shift solenoid		10	100	7
Lower No. 1 valve body x Solenoid clamp		10	100	7
Transmission input speed sensor x Transmission housing		5.4	55	48 in.·lbf
Solenoid wire x Transmission case		16	160	12
Plg for line pressure test		7.5	75	66 in.·lbf
Detent spring x Valve body		10	100	7
Center support x Transmission case		25	260	19
Transmission housing x Transmission case	10 mm bolt	34	345	25
	12 mm bolt	57	580	42
Oil pump x Transmission case		21	215	16
Parking lock pawl bracket		7.4	75	65 in.·lbf
Valve body x Transmission case		10	100	7
Oil strainer x Valve body		10	100	7
Oil pan x Transmission case		4.4	45	39 in.·lbf
Oil pan x Drain plug		20	205	15
Governor oil strainer cover x Transmission case		7.5	75	65
Extension housing x Transmission case		36	370	27
Union		25	250	18
Neutral start switch adjusting bolt		5.4	55	48 in.·lbf
Neutral start switch		3.9	40	35 in.·lbf
Control shift lever		16	160	12
Vehicle speed sensor x Extension housing		5.4	55	48 in.·lbf
Throttle cable clamp		7.5	75	65 in.·lbf