HOW TO USE THIS MANUAL

IN002-01

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

IN

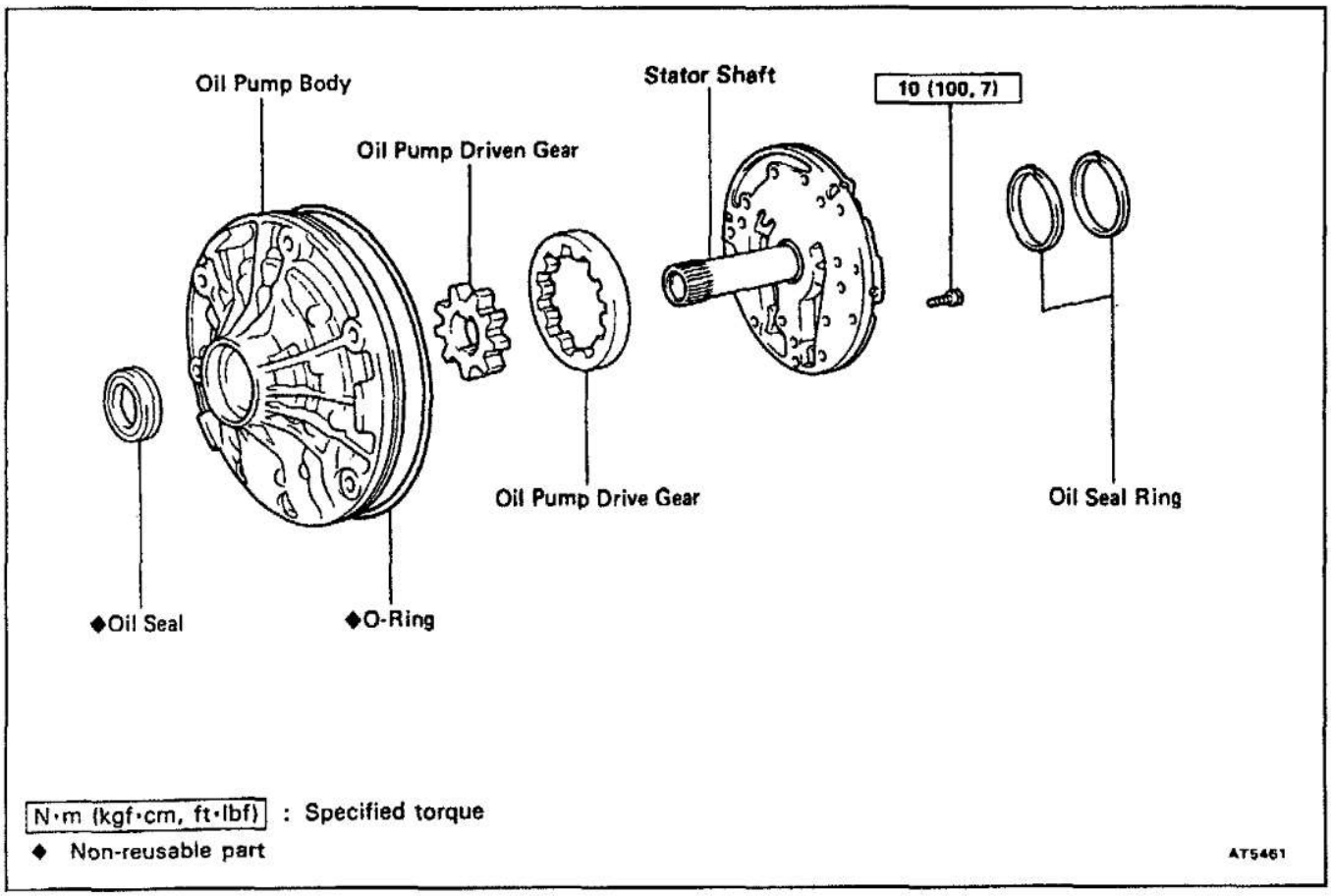
PREPARATION

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.

REPAIR PROCEDURES

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

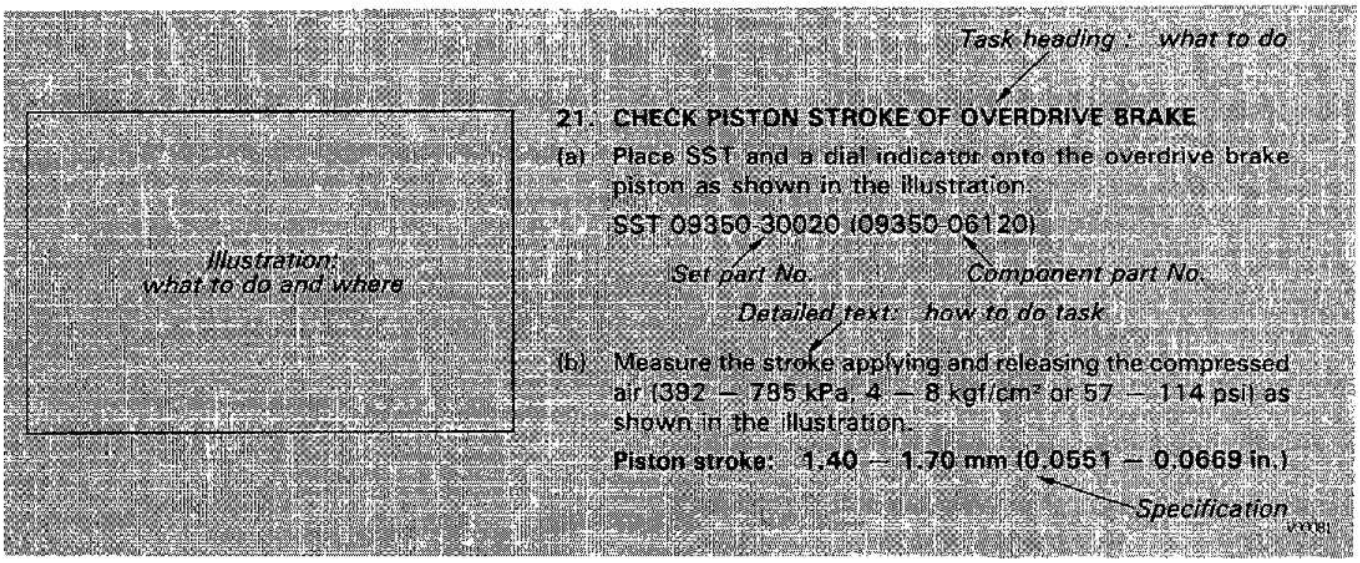
Example:



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

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

Example:



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.

REFERENCES

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

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 at the back of AT section, for quick reference.

CAUTIONS, NOTICES, HINTS:

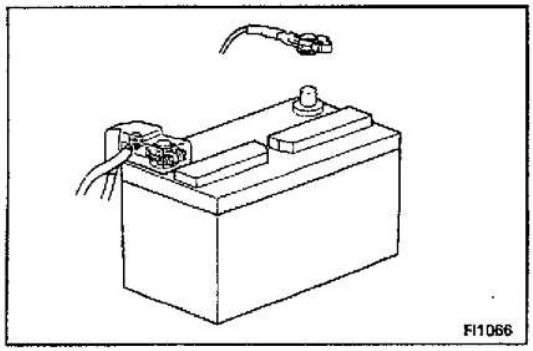
- CAUTIONS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- HINTS are separated from the text but do not appear in bold. They provide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

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:

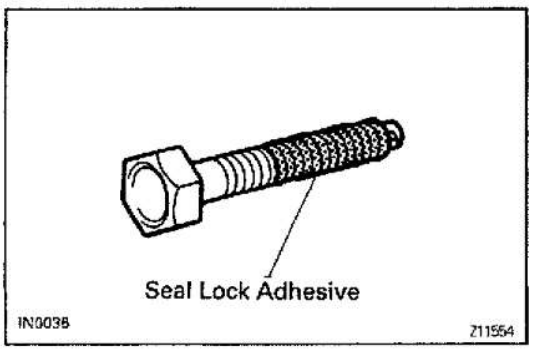
Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)



GENERAL REPAIR INSTRUCTIONS

IN022-02

1. Use fender, seat and floor covers to keep the vehicle clean and prevent damage.
2. During disassembly, keep parts in the appropriate order to facilitate reassembly.
3. Observe the following:
   (a) Before performing electrical work, disconnect the negative cable from the battery terminal.
   (b) If it is necessary to disconnect the battery for inspection or repair, always disconnect the cable from the negative (−) terminal which is grounded to the vehicle body.
   (c) To prevent damage to the battery terminal post, loosen the terminal nut and raise the cable straight up without twisting or prying it.
   (d) Clean the battery terminal posts and cable terminals with a clean shop rag. Do not scrape them with a file or other abrasive objects.
   (e) Install the cable terminal to the battery post with the nut loose, and tighten the nut after installation. Do not use a hammer to tap the terminal onto the post.
   (f) Be sure the cover for the positive (+) terminal is properly in place.
4. Check hose and wiring connectors to make sure that they are secure and correct.
5. Non−reusable parts
   (a) Always replace cotter pins, gaskets, O−rings and oil seals etc. with new ones.
   (b) Non−reusable parts are indicated in the component illustrations by the "◆" symbol.

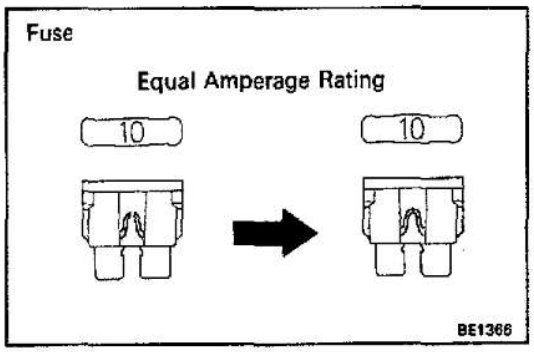


6. Precoated parts
   Precoated parts are bolts and nuts, etc. that are coated with a seal lock adhesive at the factory.
   (a) If a precoated part is retightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.

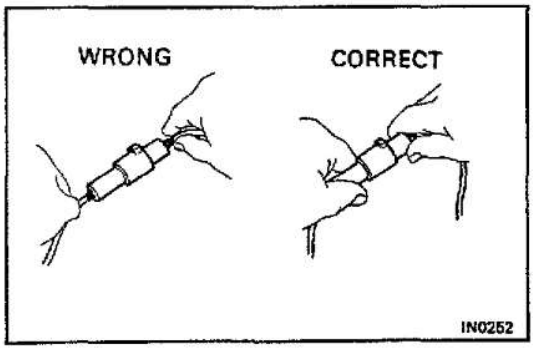
IN

(b) 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.
(c) Precoated parts are indicated in the component illustrations by the "★" symbol.

7. When necessary, use a sealer on gaskets to prevent leaks.
8. Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.
9. Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found at the preparation of AT section.



10. When replacing fuses, be sure the new fuse has the correct amperage rating. DO NOT exceed the rating or use one with a lower rating.



11. To pull apart electrical connectors, pull on the connector itself, not the wires.
12. Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations.
(a) If the vehicle is to be jacked up only at the front or rear end, be sure to block the wheels at the opposite end in order to ensure safety.
(b) After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on a vehicle raised on a jack alone, even for a small job that can be finished quickly.

ABBREVIATIONS USED IN THIS MANUAL

IN01K–01

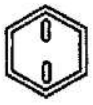
A/T ATM	Automatic Transmission
ATF	Automatic Transmission Fluid
B_0	Overdrive Brake
B_1	Second Coast Brake
B_2	Second Brake
B_3	First and Reverse Brake
C_0	Overdrive Direct Clutch
C_1	Forward Clutch
C_2	Direct Clutch
D	Disc
F	Flange
F_0	Overdrive One–way Clutch
F_1	No.1 One–way Clutch
F_2	No.2 One–way 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
1st	First
2nd	Second

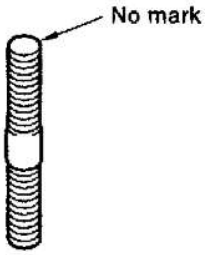
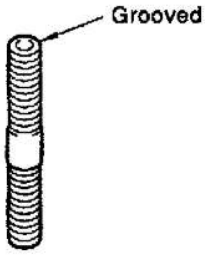
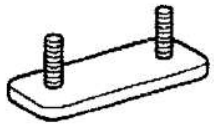
STANDARD BOLT TORQUE SPECIFICATIONS

IN008–02

IN

HOW TO DETERMINE BOLT STRENGTH

	Mark	Class
Hexagon head bolt	 Bolt head No. 4– 5– 6– 7– 8– 9– 10– 11–	4T 5T 6T 7T 8T 9T 10T 11T
	 No mark	4T
Hexagon flange bolt w/ washer hexagon bolt	 No mark	4T
Hexagon head bolt	 2 Protruding lines	5T
Hexagon flange bolt w/ washer hexagon bolt	 2 Protruding lines	6T
Hexagon head bolt	 3 Protruding lines	7T
Hexagon head bolt	 4 Protruding lines	8T

	Mark	Class
Hexagon flange bolt w/ washer hexagon bolt	 4 Protruding lines	9T
Hexagon flange bolt w/ washer hexagon bolt	 5 Protruding lines	10T
Hexagon flange bolt w/ washer hexagon bolt	 6 Protruding lines	11T
Stud bolt	 No mark	4T
	 Grooved	6T
Welded bolt		4T

V06821

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

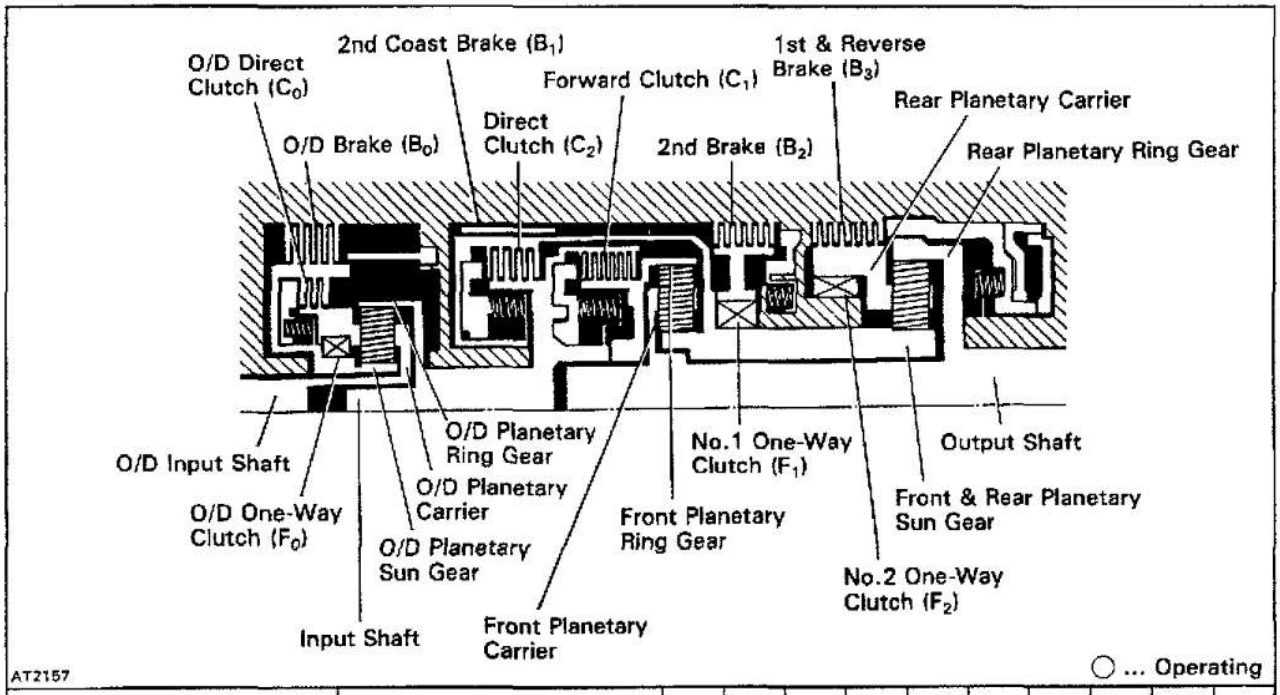
V00079

– MEMO –

IN

OPERATION

AT147-02



AT2157

○ ... 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
P	Parking	○									
R	Reverse	○		○				○	○		
N	Neutral	○									
D	1st	○	○						○		○
	2nd	○	○				○		○	○	
	3rd	○	○	○			○		○		
	O/D		○	○	○		○				
2	1st	○	○						○		○
	2nd	○	○			○	○		○	○	
	*1 3rd	○	○	○			○		○		
L	1st	○	○					○	○		○
	*2 2nd	○	○			○	○		○	○	

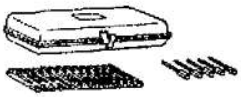
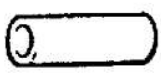
*1 Down-shift only in the 2 range and 3rd gear — no up-shift.
*2 Down-shift only in the L range and 2nd gear — no up-shift.

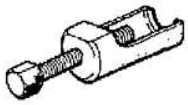
V07929

PREPARATION

SST (SPECIAL SERVICE TOOLS)

AT0S3–07

	09032–00100 Oil Pan Seal Cutter	
	09240–00020 Wire Gauge Set	
	09350–30020 TOYOTA Automatic Transmission Tool Set	
	(09350–06120) No.2 Measure Terminal	
	(09350–07020) Oil Pump Puller	
	(09350–07030) No.1 Piston Spring Compressor	
	(09350–07040) No.2 Piston Spring Compressor	
	(09350–07050) No.3 Piston Spring Compressor	
	(09350–07060) No.1 Snap Ring Expander	
	(09350–07070) No.2 Snap Ring Expander	
	(09350–07080) Brake Reaction Sleeve Puller	
	(09350–07090) Brake No.1 Piston Puller	
	(09350–07110) Oil Seal Replacer	

	09350–36010 TOYOTA Automatic Transmission Tool Set	
	(09350–06090) Plate	
	09610–20012 Pitman Arm Puller	Remove oil pump.

AT

AT064–05

RECOMMENDED TOOLS

	09031–00030 Pin Punch .	
	09905–00013 Snap Ring Pliers .	

AT065–05

EQUIPMENT

Feeler gauge	Check major clearance.
Vernier calipers	Check length of 2nd coast brake piston rod.
Dial indicator or dial indicator with magnetic base	Check piston stroke and end play of the output shaft.
Straight edge	Check side clearance of oil pump.
Torque wrench	
Cylinder gauge	Check inside diameter of the transmission case rear bushing.

AT066–05

LUBRICANT

Item	Capacity	Classification
Dry fill	10.1 liters (10.7 US qts, 8.9 Imp. qts)	ATF D — II or DEXRON®III (DEXRON®II)
Drain and refill	2.0 liters (2.1 US qts, 1.8 Imp. qts)	

AT067–05

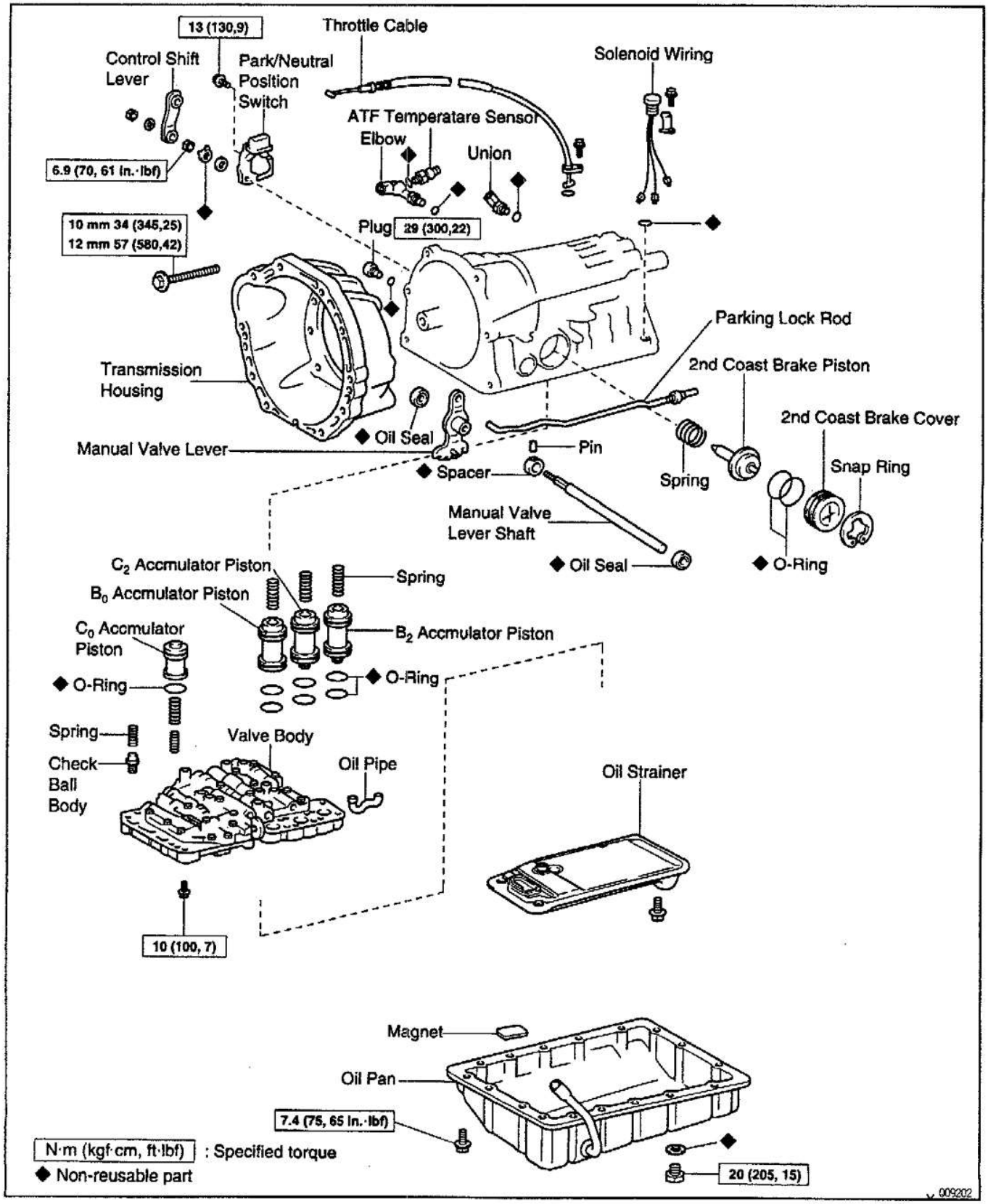
SSM (SPECIAL SERVICE MATERIALS)

	08826–00090 Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	Oil pan Transfer case

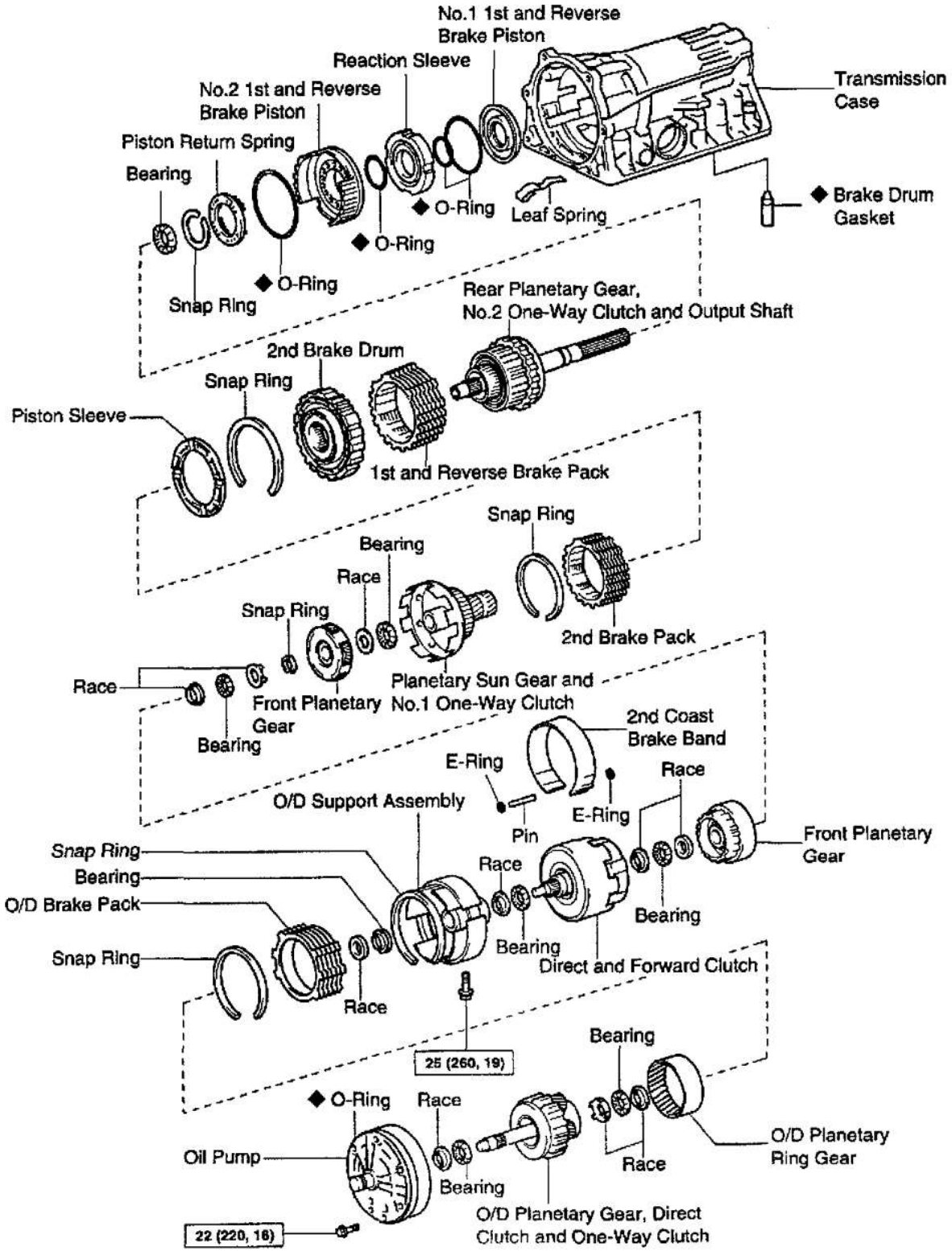
COMPONENT PARTS REMOVAL

COMPONENTS

AT048–03

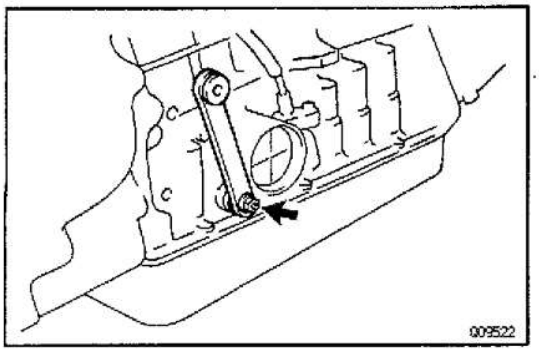


AUTOMATIC TRANSMISSION — COMPONENT PARTS REMOVAL

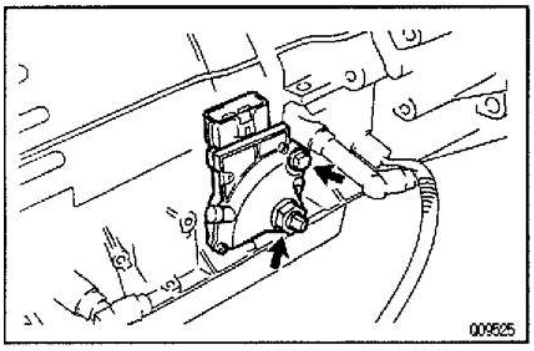


AT170–01

TRANSMISSION DISASSEMBLY

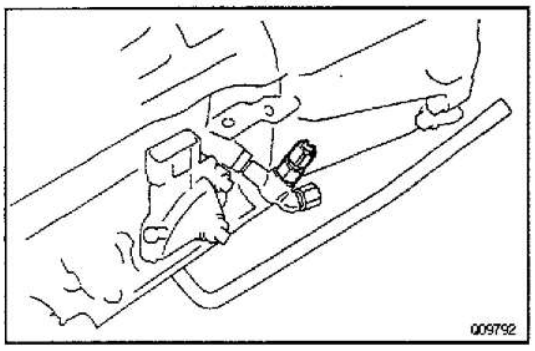


1. REMOVE TRANSMISSION CONTROL SHAFT LEVER



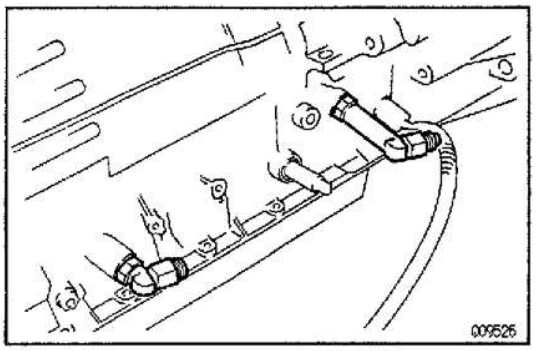
2. REMOVE NEUTRAL START SWITCH

(a) Unstake the lock washer.
(b) Remove the nut and bolt, and then remove the neutral start switch.
(c) Remove the lock washer and grommet.



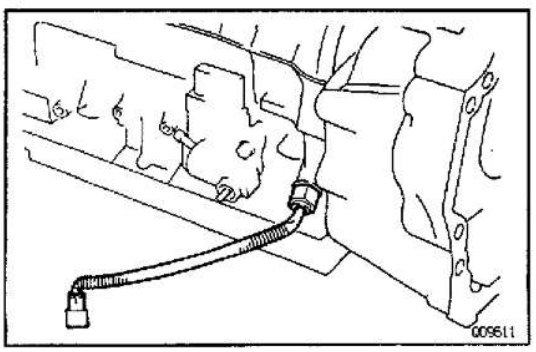
3. 1KZ–TE Engine:
REMOVE ATF TEMPERATURE SENSOR

(a) Remove the ATF temperature sensor.
(b) Remove the O–ring from the sensor.



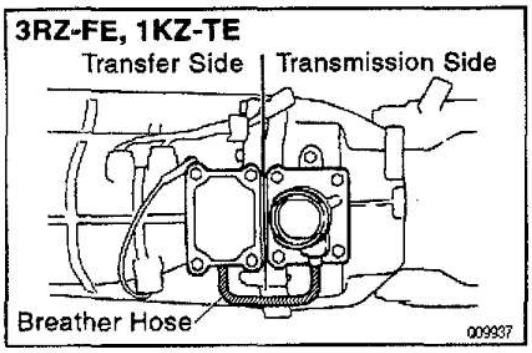
4. REMOVE TRANSMISSION SIDE UNION AND ELBOW

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



5. 3RZ–FE, 5VZ–FE Engine:
REMOVE ATF TEMPERATURE SENSOR

(a) Remove the ATF temperature sensor.
(b) Remove the O–ring from the sensor.



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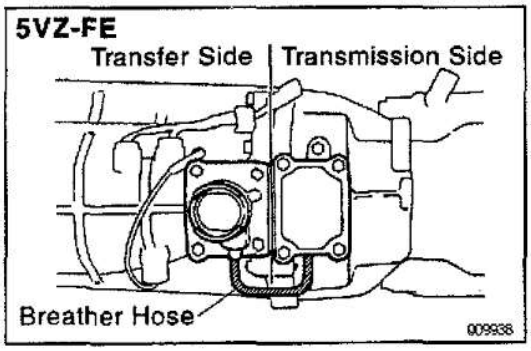
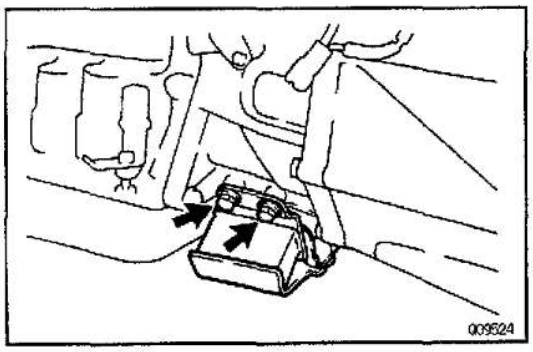
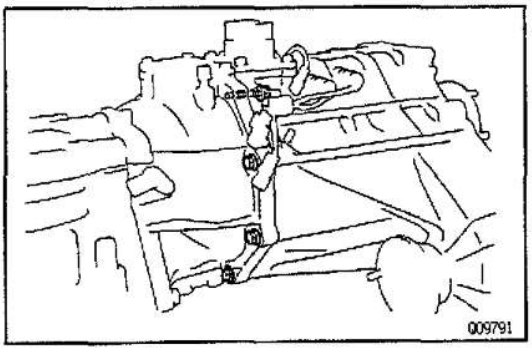


6. REMOVE BREATHER HOSE

Remove the breather hose from transfer upper cover and transmission control retainer.

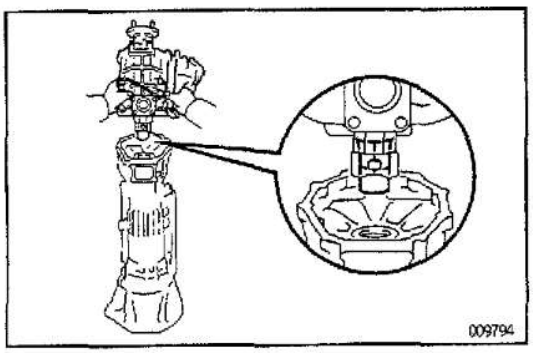


7. REMOVE ENGINE REAR MOUNTING

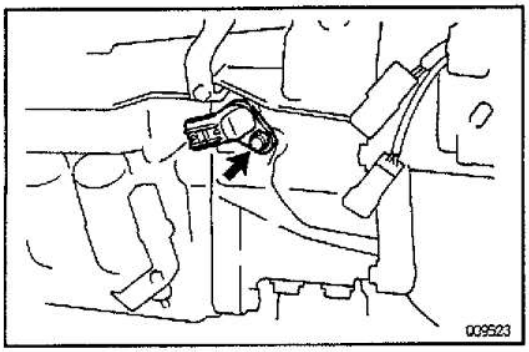


8. REMOVE TRANSFER FROM TRANSMISSION

(a) Remove the transfer adaptor rear mounting bolts.



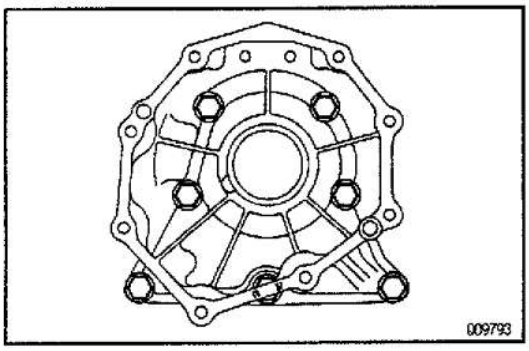
(b) Pull the transfer straight up and remove it from the transmission.



9. REMOVE SPEED SENSOR

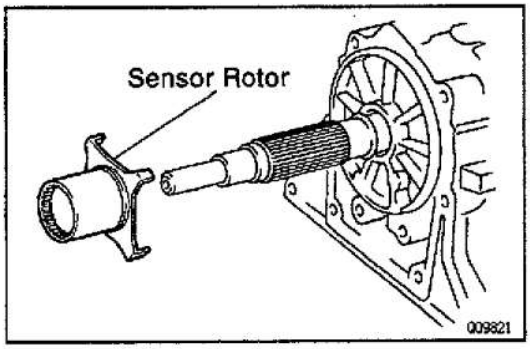
(a) Remove the bolt and speed sensor.

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



10. REMOVE TRANSFER ADAPTER

Remove the 7 bolts and case.

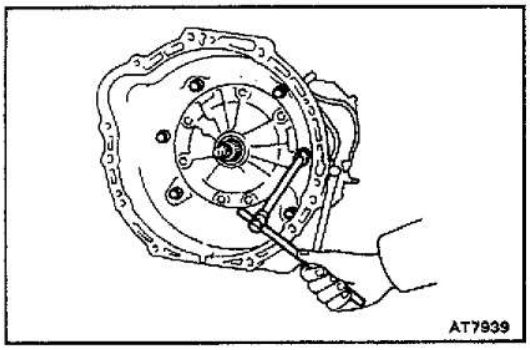


11. REMOVE SPEED SENSOR ROTOR AND KEY

(a) Remove the throttle cable mounting bolts.

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

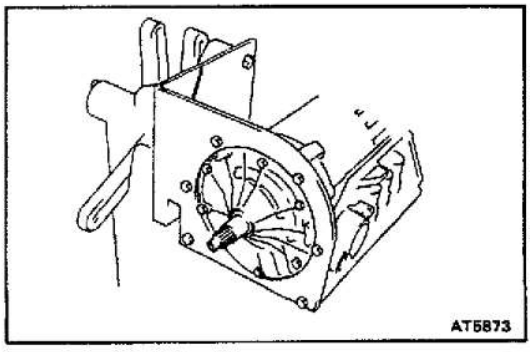
(c) Remove the sensor rotor and key.



12. REMOVE TRANSMISSION HOUSING

(a) Remove the 6 bolts.

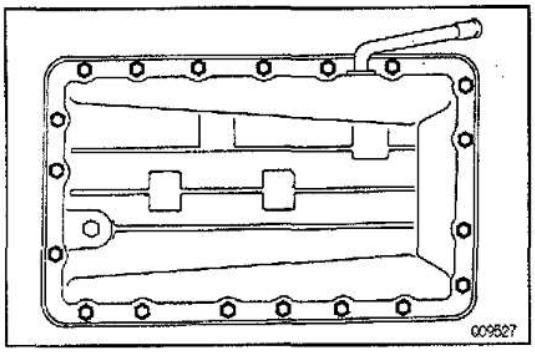
(b) Remove the transmission housing.



13. INSTALL TRANSMISSION CASE

Install the transmission case on the overhaul attachment.

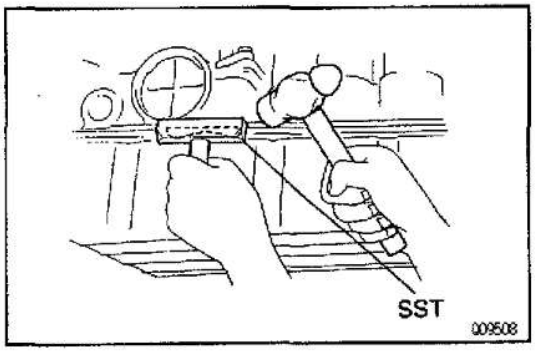
AT



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.

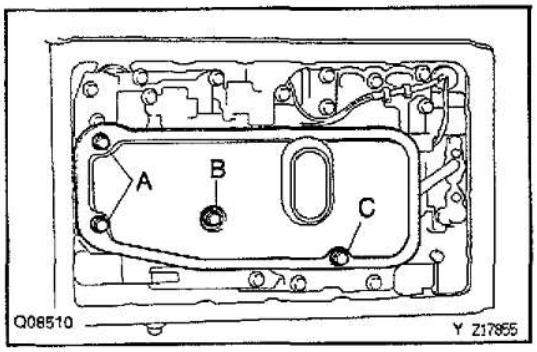
(a) Remove the 19 bolts.



(b) Install the blade of SST between the transmission case and oil pan, cut off applied sealer.
SST 09032–00100

NOTICE: Be careful not to damage the oil pan flange.

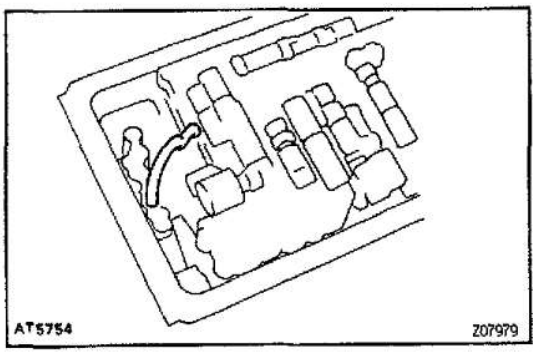
(c) Remove the pan by lifting the transmission case.



15. REMOVE OIL STRAINER AND GASKETS

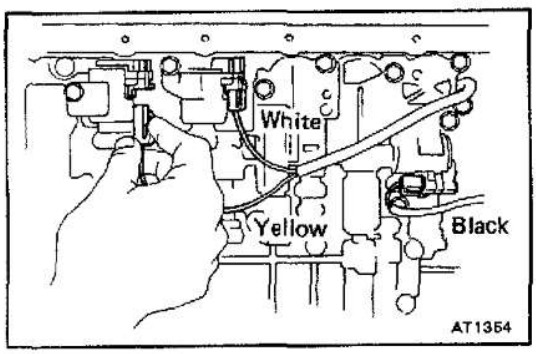
(a) Remove the 4 bolts and oil strainer case.

(b) Remove the gaskets from the oil strainer case.



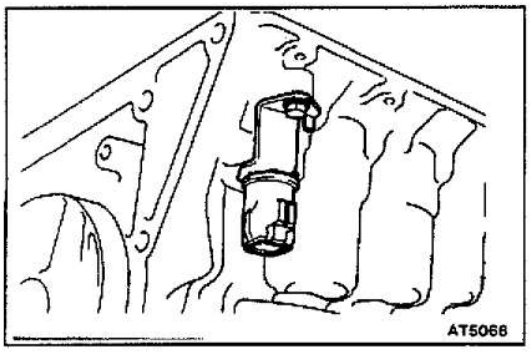
16. REMOVE OIL PIPE

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

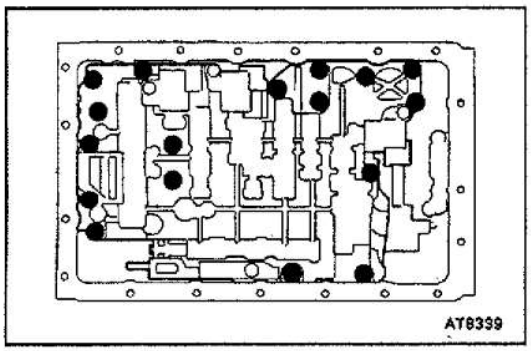


17. REMOVE SOLENOID WIRING

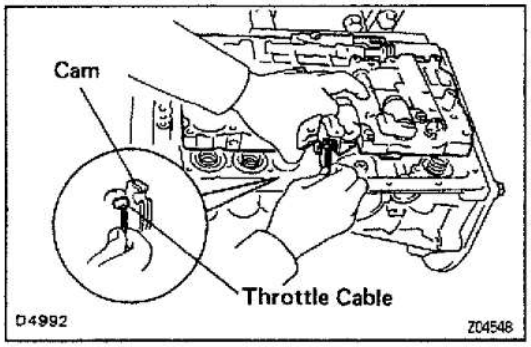
(a) Disconnect the 3 connectors from the No.1, No.2 and SL solenoid valves.



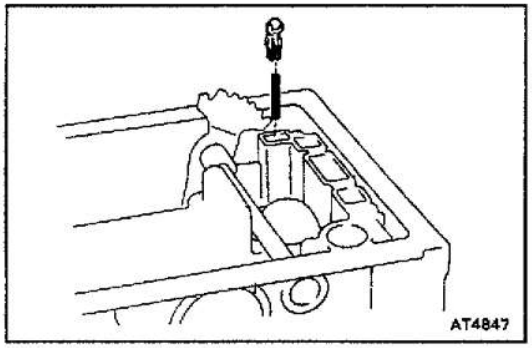
(b) Remove the stopper plate from the case.
(c) Pull out the solenoid wiring from the transmission case.
(d) Remove the O—ring from the grommet.



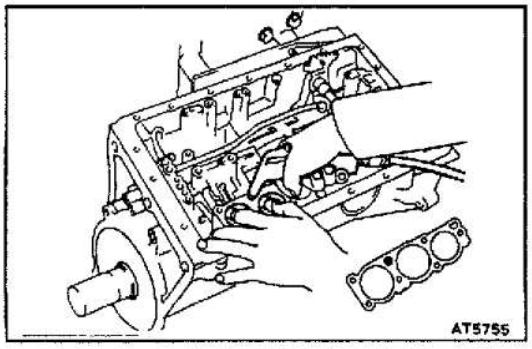
18. REMOVE VALVE BODY
(a) Remove the 17 bolts.



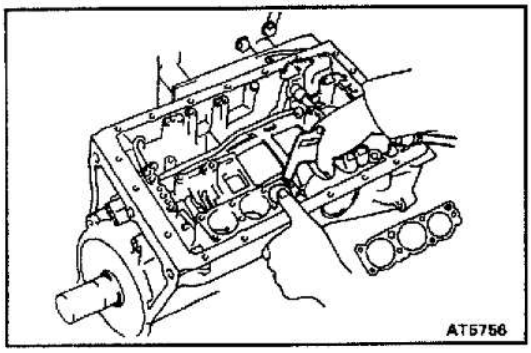
(b) Disconnect the throttle cable from the cam and remove the valve body.



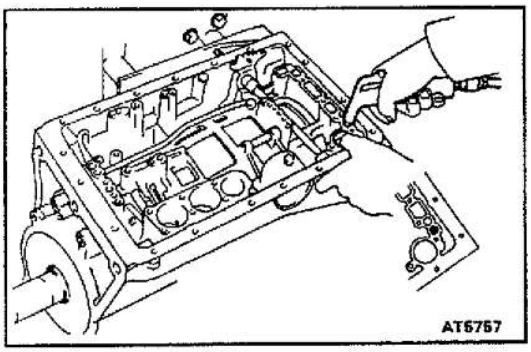
19. REMOVE CHECK BALL BODY
Remove the check ball body and spring.



20. REMOVE ACCUMULATOR PISTONS AND SPRINGS
(a) Applying compressed air to the oil hole, remove the B_2 and C_2 accumulator pistons and 3 springs.
(b) Remove the O—ring from each piston.

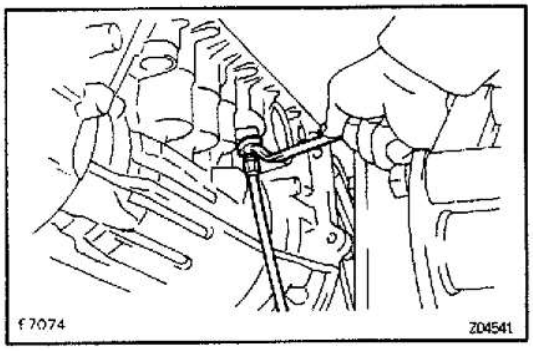


(c) Applying compressed air to the oil hole, remove the B_0 accumulator piston and spring.



(d) Applying compressed air to the oil hole, remove the C_0 accumulator piston and spring.

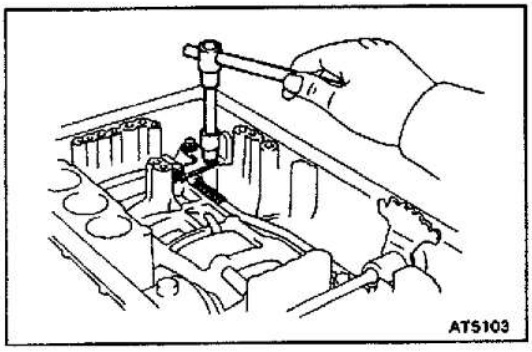
(e) Remove the O–ring from the piston.



21. REMOVE THROTTLE CABLE

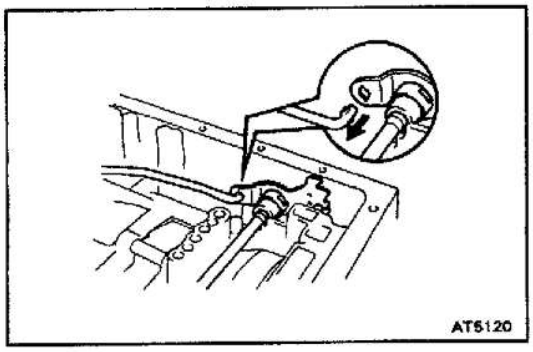
(a) Remove the retaining bolt and pull out the throttle cable.

(b) Remove the O–ring from the cable.

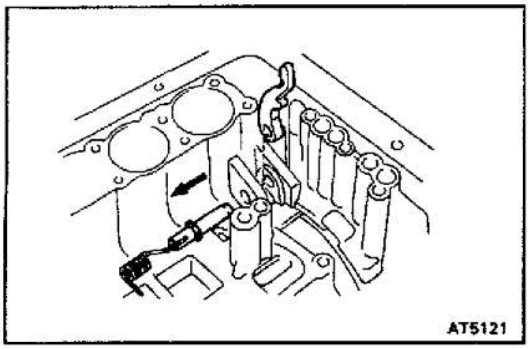


22. REMOVE PARKING LOCK ROD AND PAWL

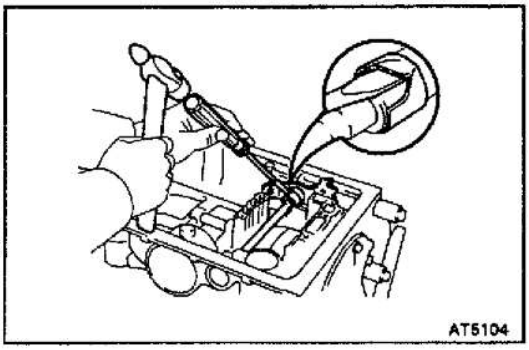
(a) Remove the 3 bolts and parking lock pawl bracket.



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

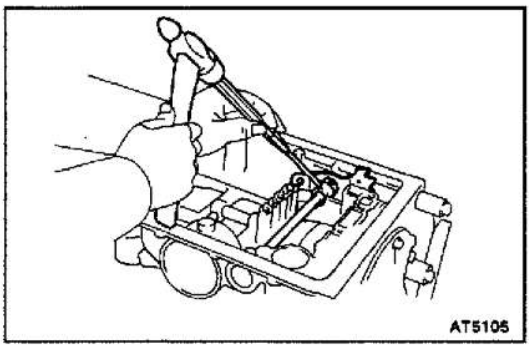


(c) Remove the E—ring from the shaft.
(d) Pull the parking lock pawl shaft out from the front side, then remove the pawl and spring.

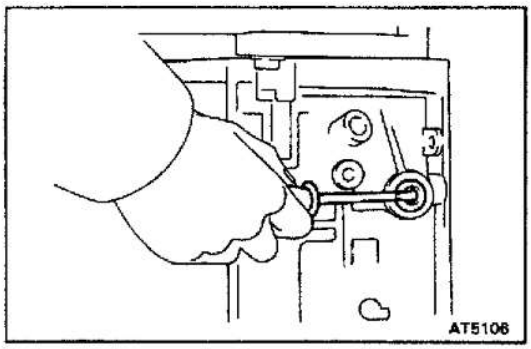


23. REMOVE MANUAL VALVE LEVER SHAFT

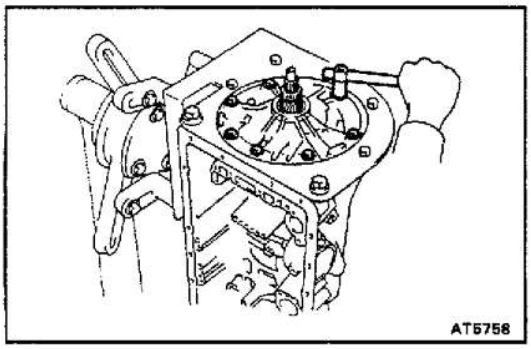
(a) Using a screwdriver and hammer, cut off the spacer and remove it from the shaft.



(b) Using a pin punch, drive out the spring pin.
HINT: Slowly drive out the spring pin so it does not fall into the transmission case.
(c) Pull the manual valve lever shaft out through the case and remove the manual valve lever.

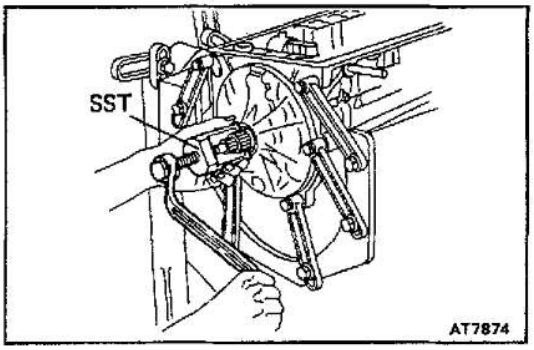


(d) Using a screwdriver, remove the 2 oil seals.

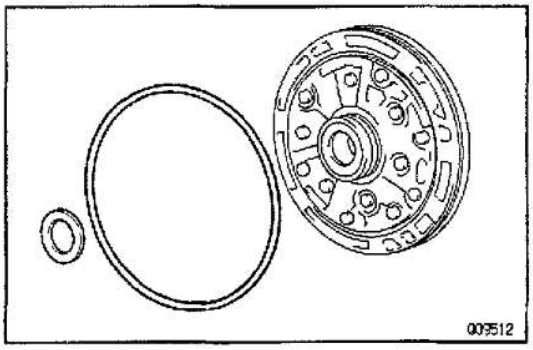


24. REMOVE OIL PUMP

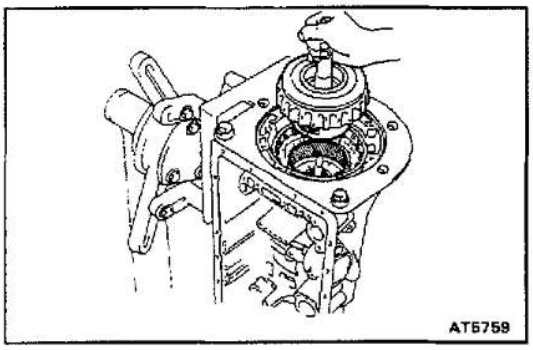
(a) Stand up the transmission.
(b) Remove the 7 bolts holding the oil pump to the transmission case.



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

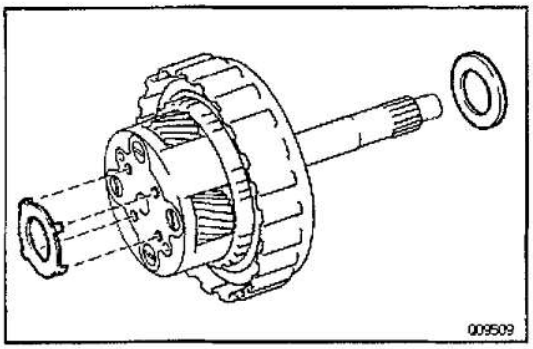


(d) Remove the race from the oil pump.
(e) Remove the O–ring from the oil pump.

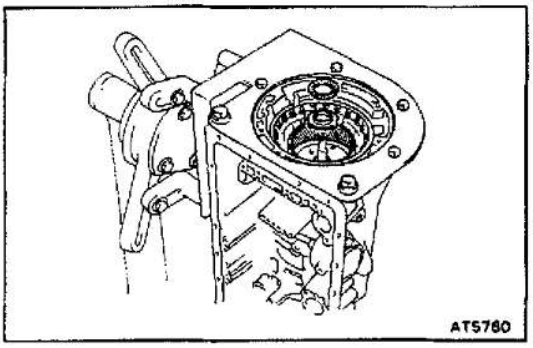


25. REMOVE O / D PLANETARY GEAR WITH O / D DIRECT CLUTCH AND ONE–WAY CLUTCH

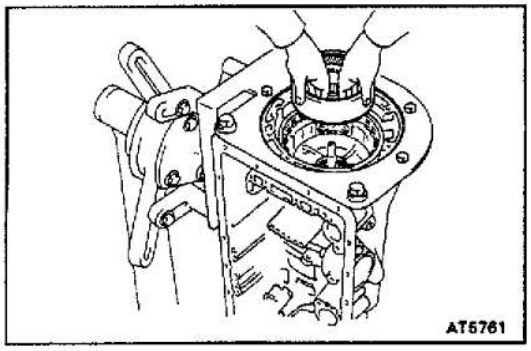
(a) Remove the O/D planetary gear with the O/D direct clutch and one–way clutch from the transmission case.



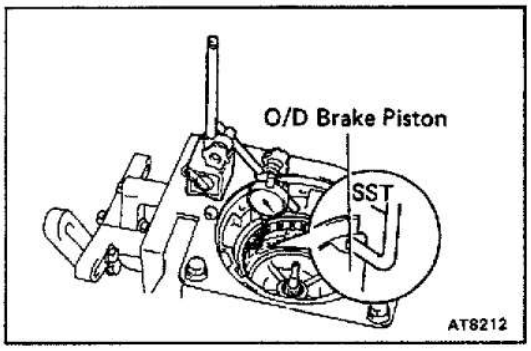
(b) Remove the assembled bearing and race.



(c) Remove the bearing and race.

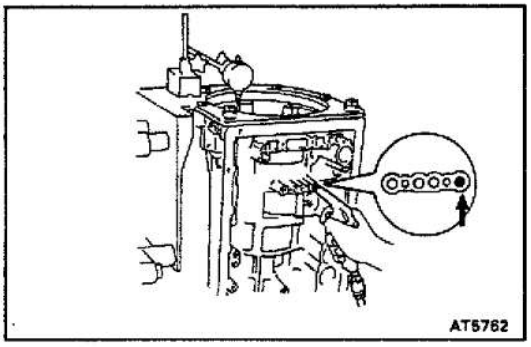


(d) Remove the O/D planetary ring gear from the transmission case.



26. CHECK PISTON STROKE OF O/D BRAKE

(a) Place SST and a dial indicator onto the O/D brake piston.
SST 09350—30020 (09350—06120)

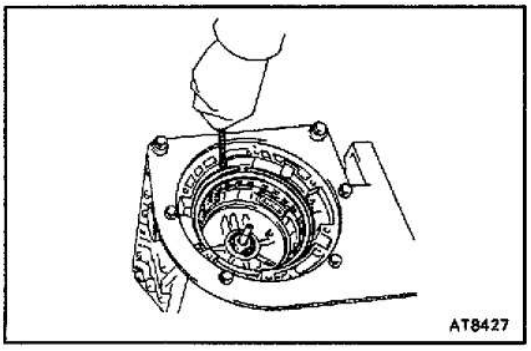


(b) Measure the stroke while applying and releasing compressed air (392—785 kPa, 4—8kgf/cm², 57—114 psi).

Piston stroke:

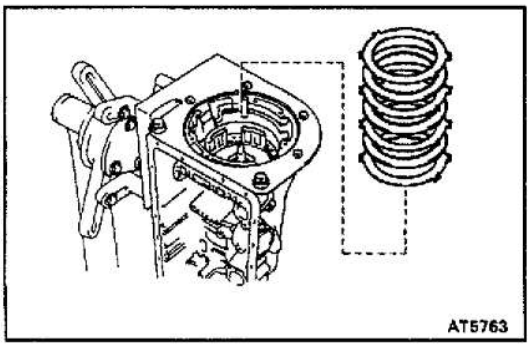
3RZ—FE, 5VZ—FE:
1.40 — 1.70 mm (0.0551 — 0.0669 in.)
1KZ—TE:
1.32 — 1.62 mm (0.0520 — 0.0638 in.)

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

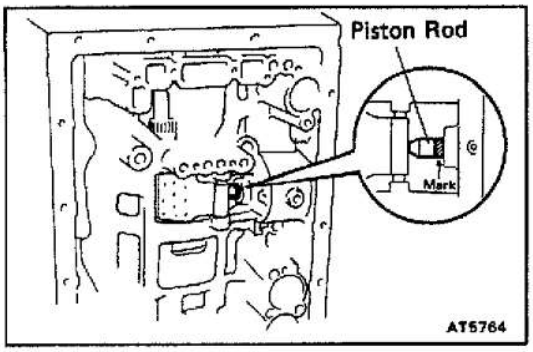


27. REMOVE FLANGES, PLATES AND DISCS OF O/D BRAKE

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



(b) Remove the flanges, plates and discs as a set.



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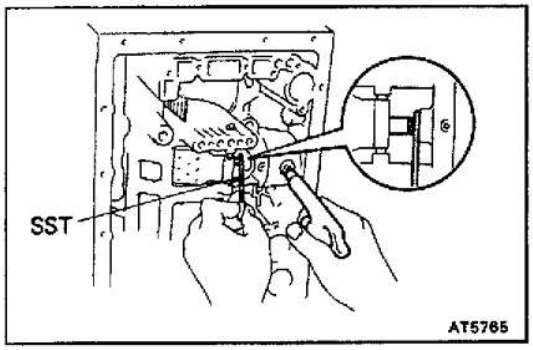
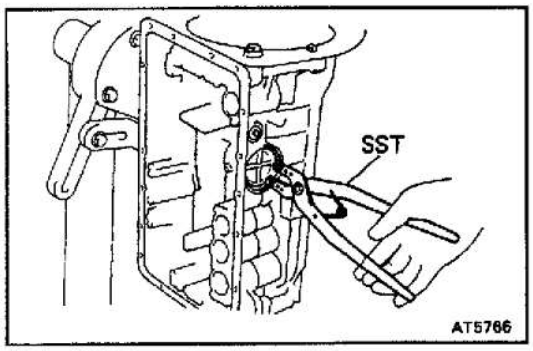
28. CHECK PISTON ROD STROKE OF 2 ND COAST BRAKE

(a) Place a mark on the 2nd coast brake piton rod.

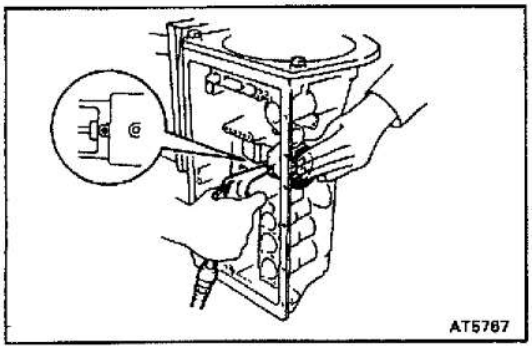


(b) Using SST, measure the stroke while applying compressed air (392 – 785 kPa, 4 – 8 kgf/cm², 57 – 114 psi.)
SST 09350–30020 (09350–00020)
Piston stroke: 1.5 – 3.0 mm (0.059 – 0.118 in.)
If the values are non–standard, inspect the brake band.

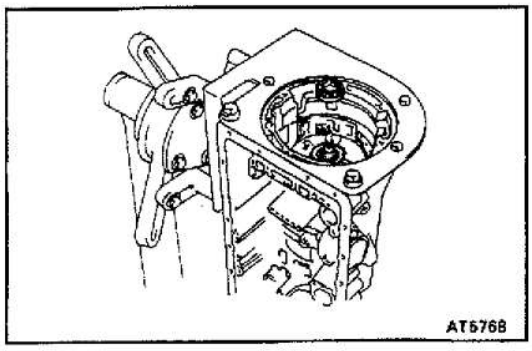


29. REMOVE 2ND COAST BRAKE COVER, PISTON ASSEMBLY AND SPRING

(a) Using SST, remove the snap ring.
SST 09350–30020 (09350–07060)

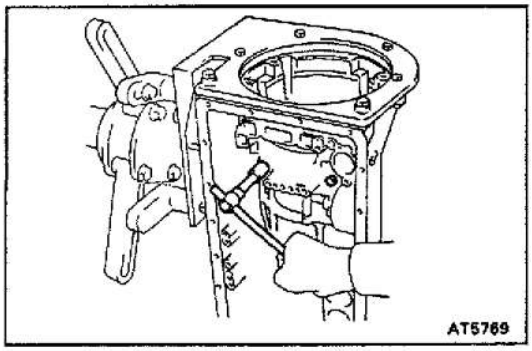


(b) Applying compressed air to the oil hole, remove the 2nd coast brake cover, piston assembly and spring.
(c) Remove the 2 O–rings from the cover.

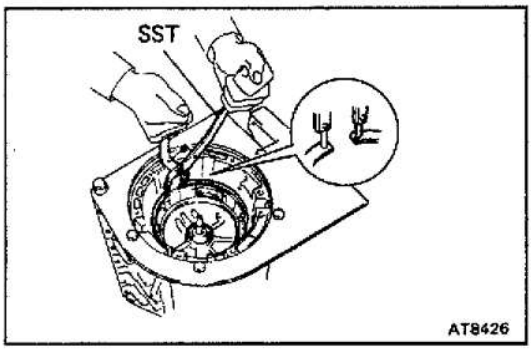


30. REMOVE O/D SUPPORT ASSEMBLY

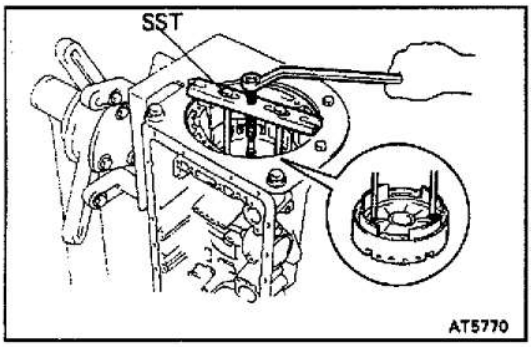
(a) Remove the assembled bearing.



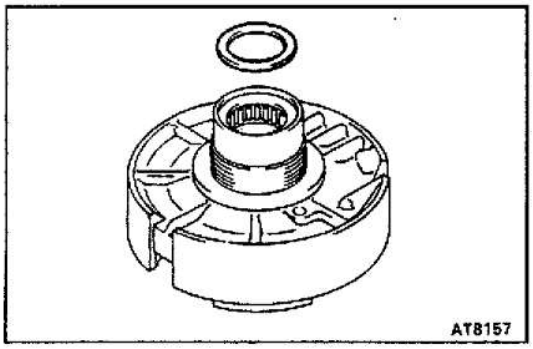
(b) Remove the 2 bolts holding the O/D support assembly to the case.



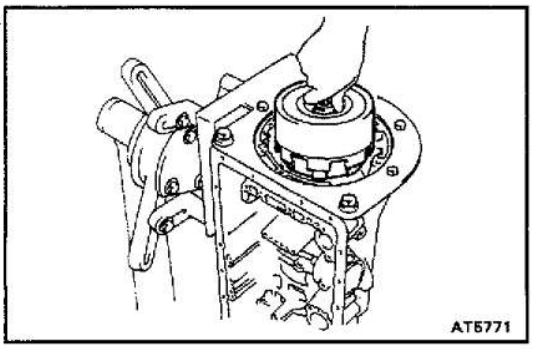
(c) Using SST, remove the snap ring.
SST 09350–30020 (09350–07060)



(d) Using SST, remove the O/D support assembly.
SST 09350–30020 (09350–07020)



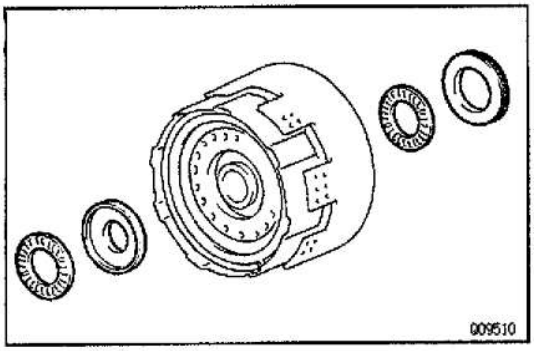
(e) Remove the race.



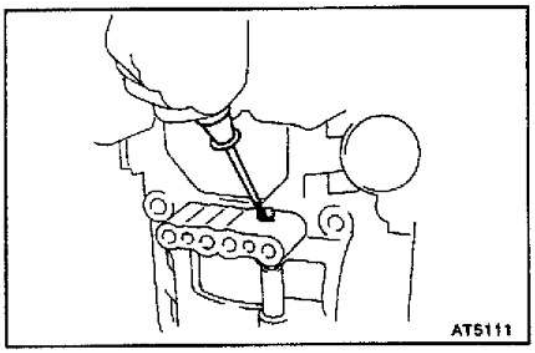
31. REMOVE DIRECT CLUTCH WITH FORWARD CLUTCH

(a) Remove the direct clutch with the forward clutch from the case.

AT



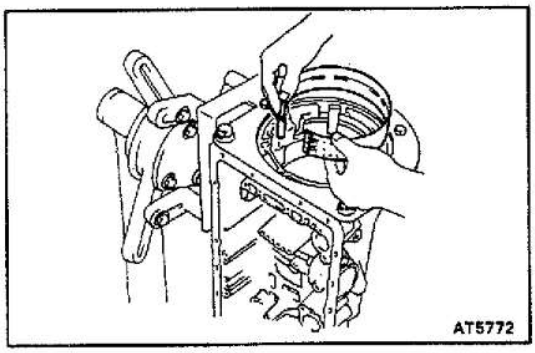
(b) Remove the 2 bearings and races.



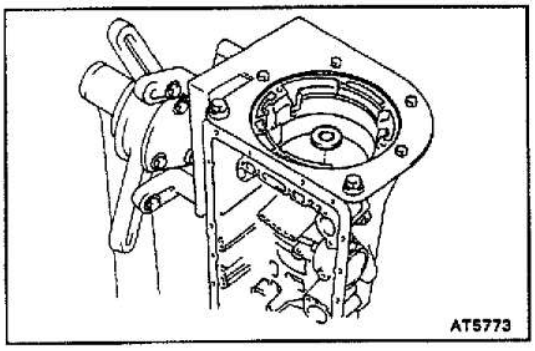
32. REMOVE 2ND COAST BRAKE BAND

(a) Remove the E–ring from the pin.

(b) Remove the pin from the brake band.

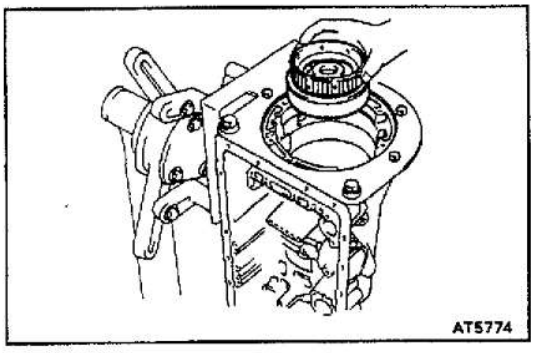


(c) Remove the 2nd coast brake band from the case.

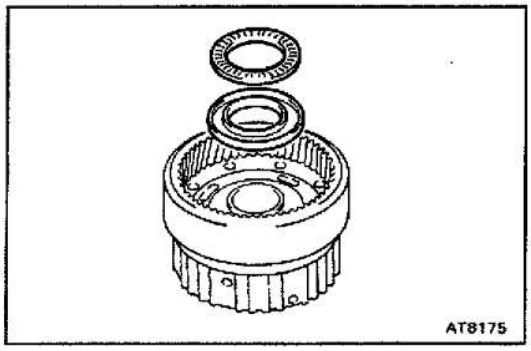


33. REMOVE FRONT PLANETARY GEAR UNIT

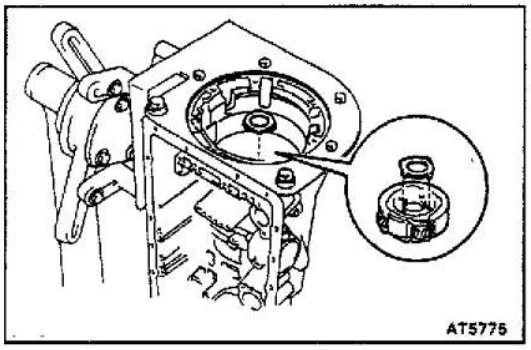
(a) Remove the race.



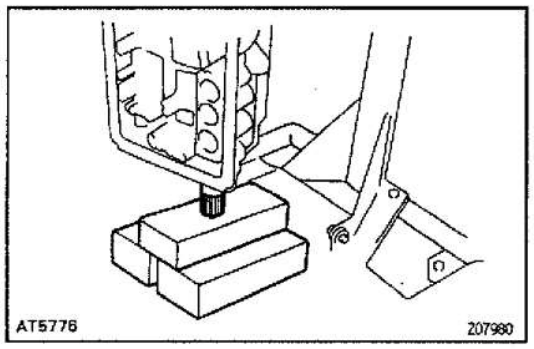
(b) Remove the front planetary ring gear from the case.



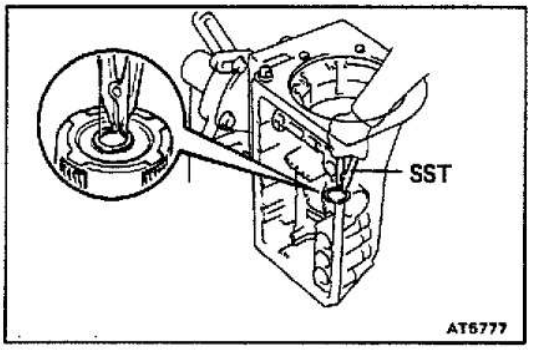
(c) Remove the bearing and race.



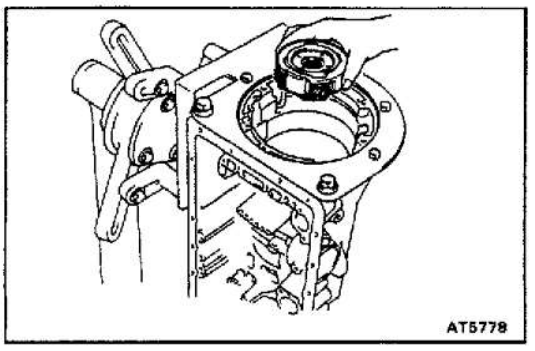
(d) Remove the race.



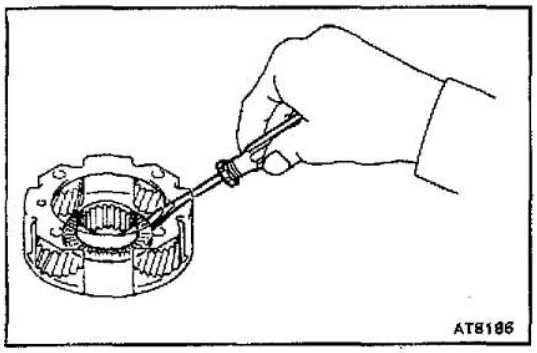
(e) With wooden blocks or equivalent under the output shaft, stand the transmission on the output shaft.



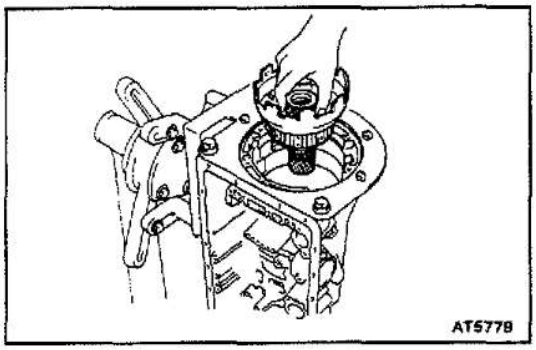
(f) Using SST, remove the snap ring.
SST 09350–30020 (09350–07070)



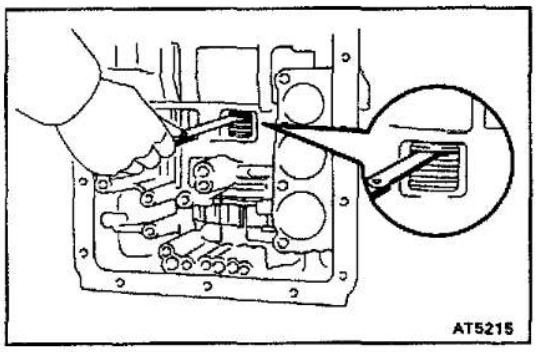
(g) Remove the front planetary gear from the case.



(h) Using a screwdriver, remove the bearing and race from the front planetary gear.



34. REMOVE PLANETARY SUN GEAR WITH NO.1 ONE —WAY CLUTCH

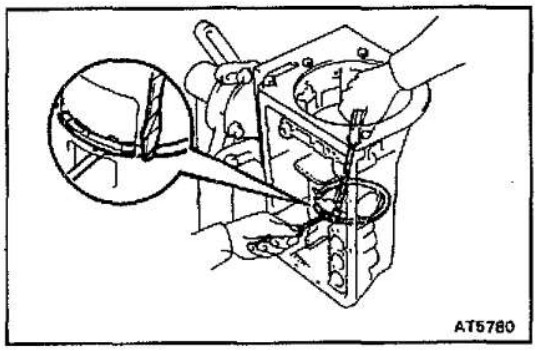


35. CHECK PACK CLEARANCE OF 2ND BRAKE

Using a feeler gauge, measure the clearance between the snap ring and flange.

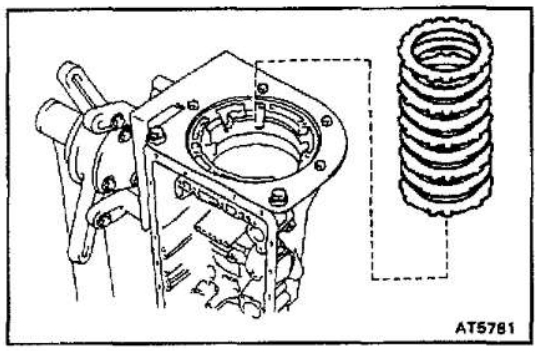
Pack clearance: 0.62 — 1.98 mm (0.0244 — 0.0780 in.)

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

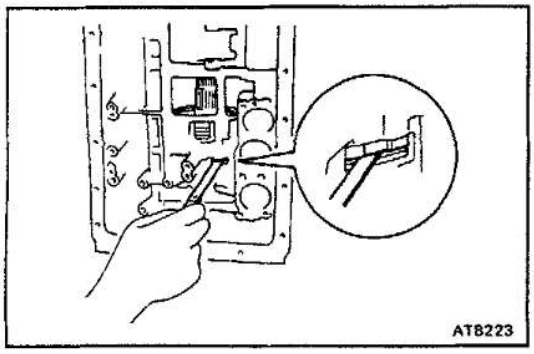


36. REMOVE FLANGE, PLATES AND DISCS OF 2ND BRAKE

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



(b) Remove the flange, plates and discs as a set.

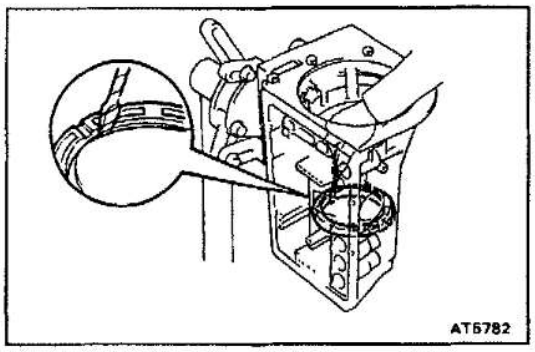


37. CHECK PACK CLEARANCE OF 1ST AND REVERSE BRAKE

Using a feeler gauge, measure the clearance between the plate and second brake drum.

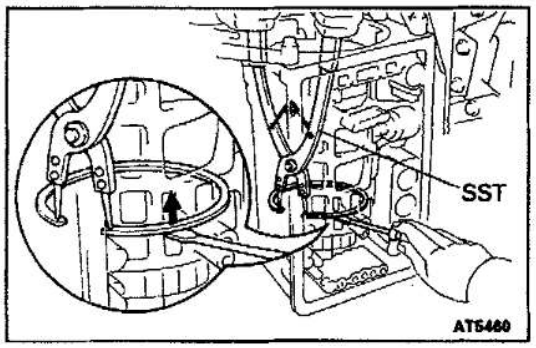
Pack clearance: 0.60 – 1.12 mm (0.0236 – 0.0441 in.)

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



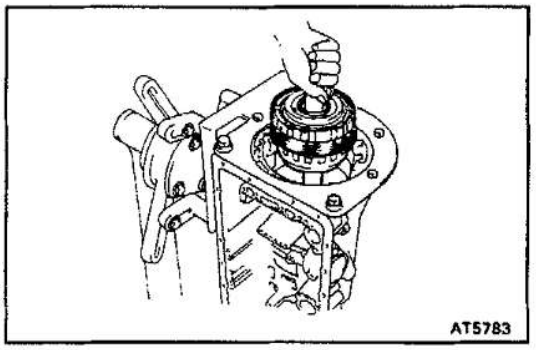
38. REMOVE 2ND BRAKE PISTON SLEEVE

Using a screwdriver, remove the 2nd brake piston sleeve.

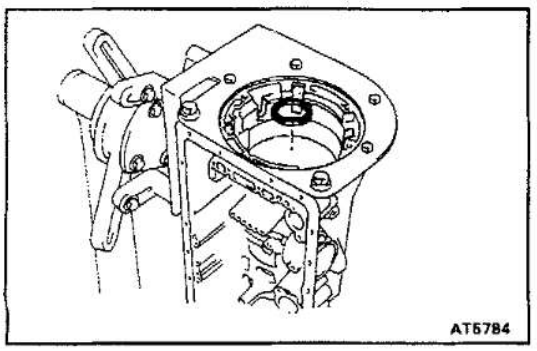


39. REMOVE REAR PLANETARY GEAR WITH 2 ND BRAKE DRUM, 1ST AND REVERSE BRAKE PACK AND OUTPUT SHAFT

(a) Using SST and 2 screwdrivers, remove the snap ring.
SST 09350–30020 (09350–07060)

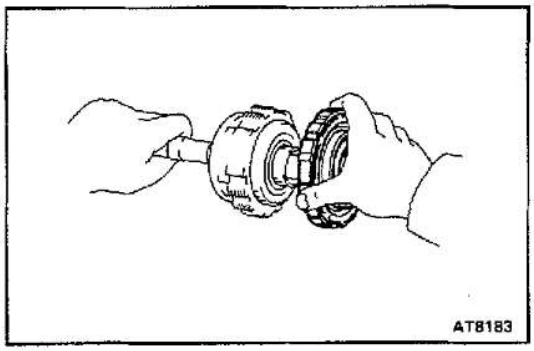


(b) Remove the rear planetary gear, 2nd brake drum, 1st and reverse brake pack and output shaft as an assembly.

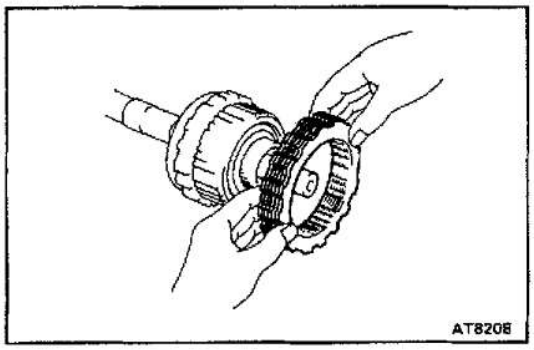


(c) Remove the assembled thrust bearing from the case.

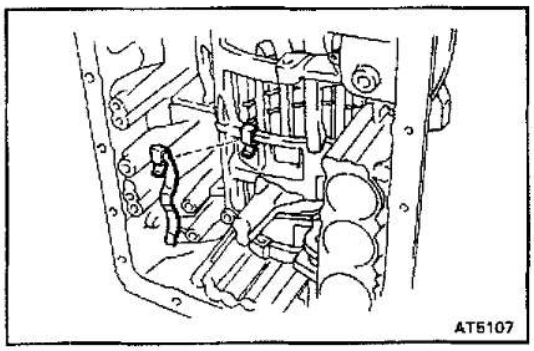
AT



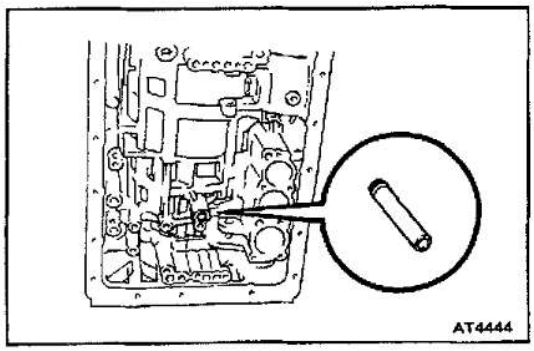
(d) Remove the 2nd brake drum assembly.



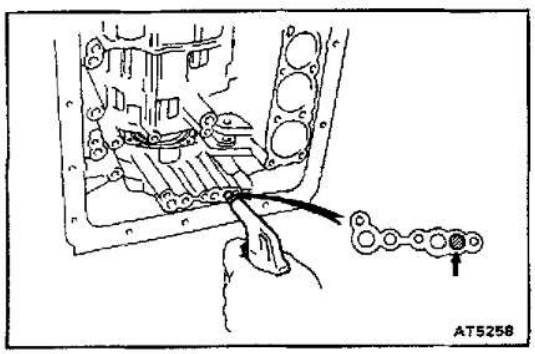
(e) Remove the cushion plate, flange, plates and discs of the 1st and reverse brake.



40. REMOVE LEAF SPRING

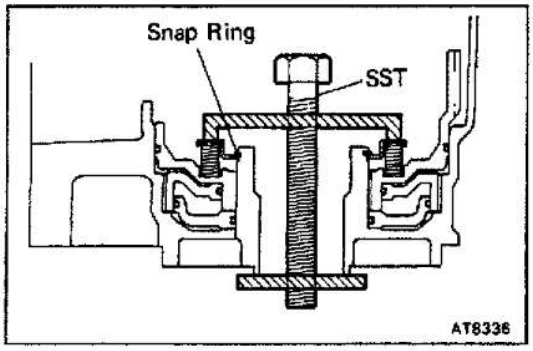


41. REMOVE BRAKE DRUM GASKET



42. CHECK PISTON STROKE OF 1ST AND REVERSE BRAKE

Make sure the 1st and reverse brake pistons move smoothly when applying and releasing the compressed air into the transmission case.



43. REMOVE COMPONENTS OF 1 ST AND REVERSE BRAKE PISTON

(a) Set SST on the spring retainer, and compress the return spring.
SST 09350–30020 (09350–07050)

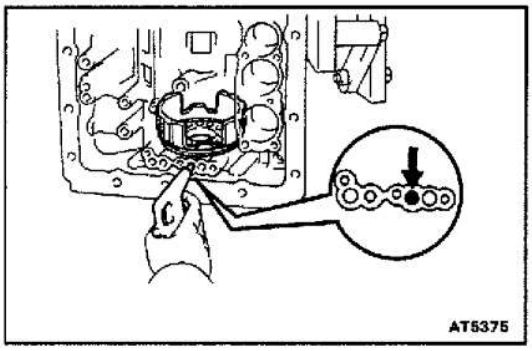
(b) Remove the snap ring with snap ring pliers.

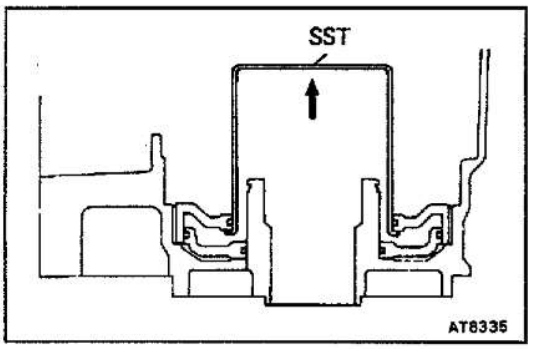
(c) Remove the piston return spring.

(d) Hold the No.2 1st and reverse brake piston with hand, apply compressed air to the transmission case to remove the No.2 1st and reverse brake piston.

(e) Remove the No.2 1st and reverse brake piston.
If the piston does not pop out with compressed air, lift the position out with needle–nose pliers.

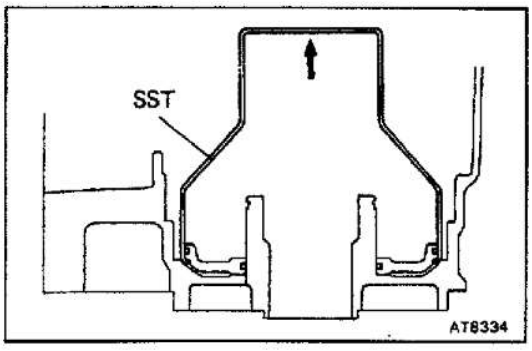
(f) Remove the O–ring from the No.2 piston.





(g) Install SST behind the reaction sleeve and gradually lift it out on the transmission case.
SST 09350–30020 (09350–07080)

(h) Remove the O–ring from the reaction sleeve.



(i) Install SST behind the No.1 brake piston and gradually lift it out of the transmission case.
SST 09350–30020 (09350–07090)

(j) Remove the 2 O–rings from the No.1 piston.

COMPONENT PARTS

AX0AF-00

General Notes

The instructions here are organized so that you work on only one component group at a time.
This will help avoid confusion from similar—looking parts of different subassemblies being on your workbench at the same time.
The component groups are inspected and repaired from the converter housing side.
As much as possible, complete the inspection, repair and assembly before proceeding to the next component group. If a component group can not be assembled because parts are being ordered, be sure to keep all parts of that group in a separate container while proceeding with disassembly, inspection, repair and assembly of other component groups.
Recommended ATF: D— II or DEXRON® III (DEXRON® II)

AT

GENERAL CLEANING NOTES:

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

PARTS ARRANGEMENT:

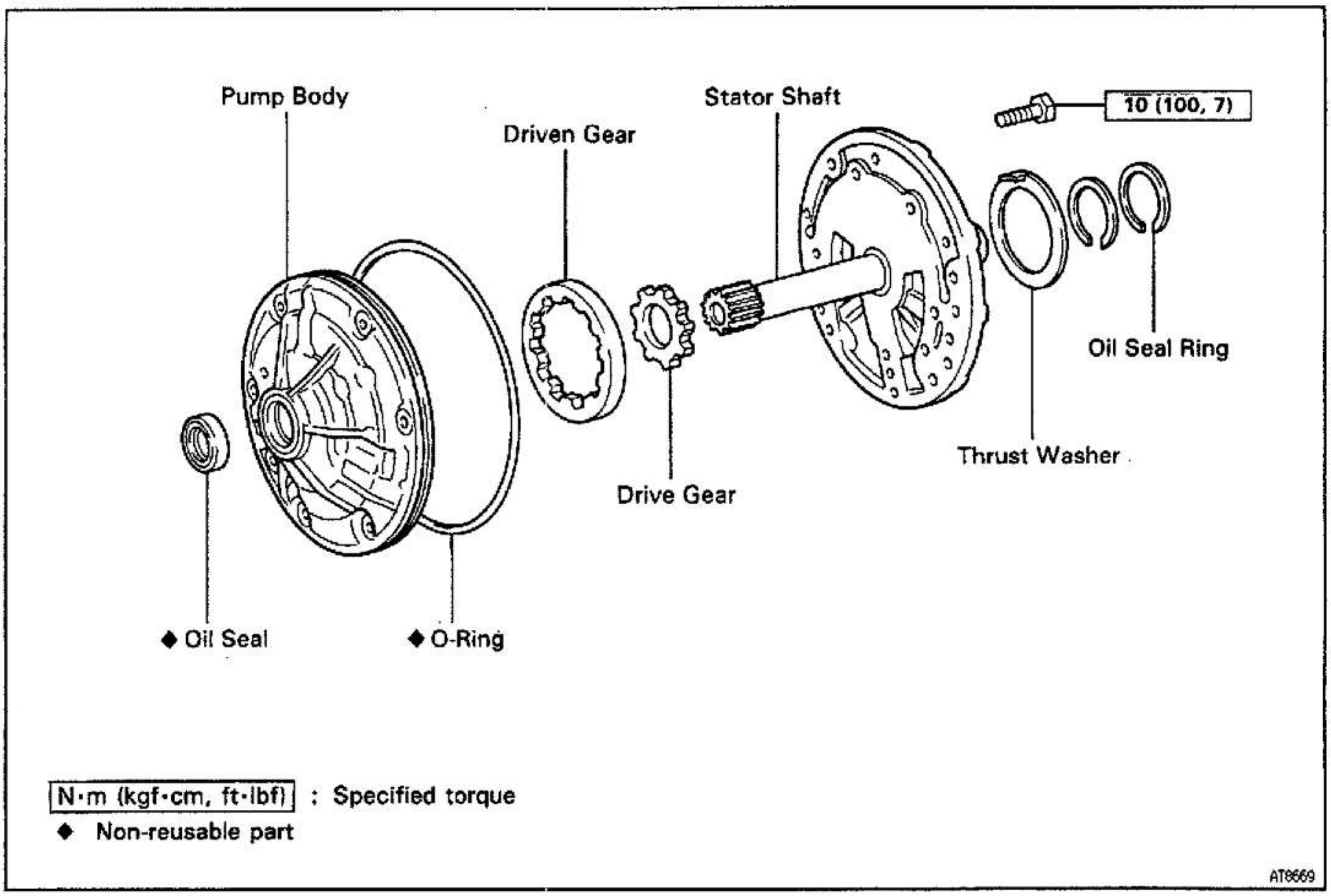
1. After cleaning, the parts should be arranged in the correct order to allow efficient inspection, repairs and reassembly.
2. When disassembling a valve body, be sure to keep each valve together with the corresponding spring.
3. New discs for the brakes and clutches that are to be used for replacement must be soaked in ATF for at least 15 minutes before assembly.

GENERAL ASSEMBLY:

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

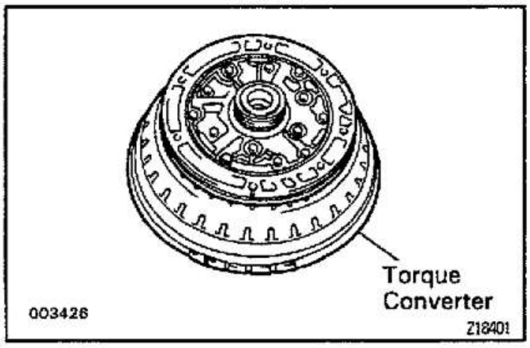
OIL PUMP
COMPONENTS

AX0AL-0C

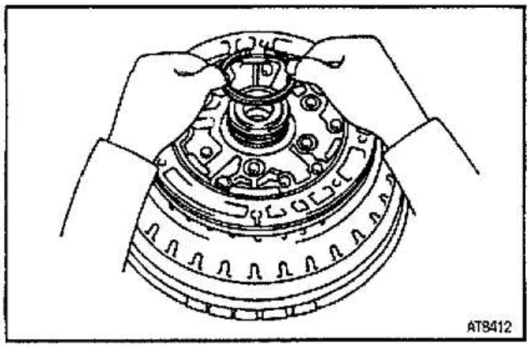


OIL PUMP DISASSEMBLY

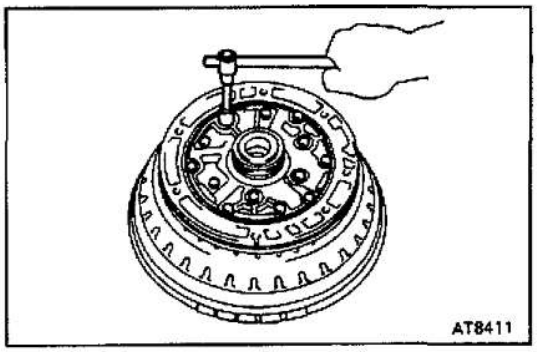
AT140-03



1. **USE TORQUE CONVERTER AS WORK STAND**
   Place the oil pump body on the torque converter.



2. **REMOVE OIL SEAL RING**
   Remove the 2 oil seal rings from the stator shaft back side.
3. **REMOVE THRUST WASHER FROM STATOR SHAFT BACK SIDE**

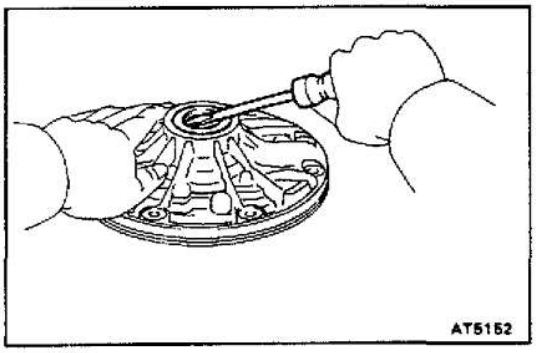


4. REMOVE STATOR SHAFT

(a) Remove the 13 bolts, and then remove the stator shaft from the oil pump body.

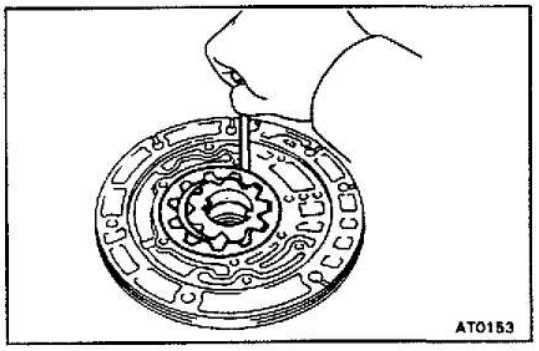
(b) Remove the oil pump body from the torque converter.

5. REMOVE OIL PUMP DRIVE GEAR AND DRIVEN GEAR



6. REMOVE OIL SEAL

Pry off the oil seal with a screwdriver.



OIL PUMP INSPECTION

AXOAN-0F

1. CHECK BODY CLEARANCE OF DRIVEN GEAR

Push the driven gear to one side of the body.

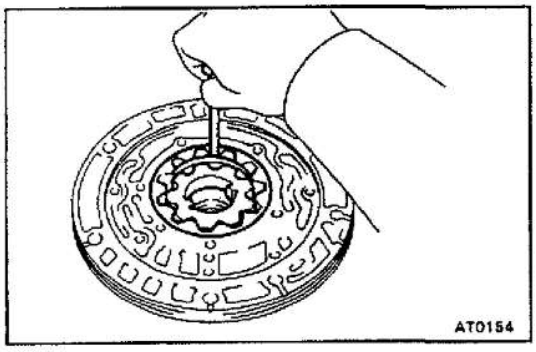
Using a feeler gauge, measure the clearance.

Standard body clearance:

0.07 — 0.15 mm (0.0028 — 0.0059 in.)

Maximum body clearance: 0.30 mm (0.0120 in.)

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



2. CHECK TIP CLEARANCE OF DRIVEN GEAR

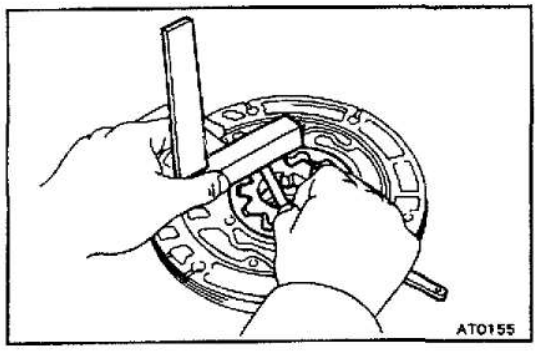
Using a feeler gauge, measure between the driven gear teeth and the crescent—shaped part of the pump body.

Standard tip clearance:

0.11 — 0.14 mm (0.0043 — 0.0055 in.)

Maximum tip clearance: 0.30 mm (0.0120 in.)

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



3. CHECK SIDE CLEARANCE OF BOTH GEARS

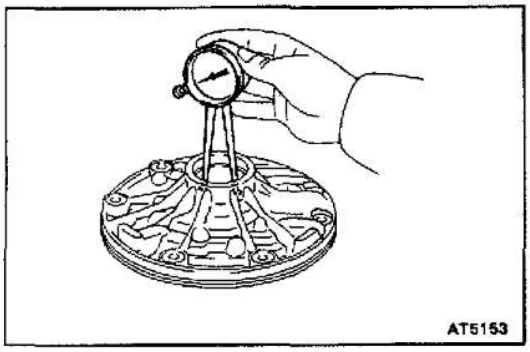
Using a steel straight edge and a feeler gauge, measure the side clearance of both gears.

Standard side clearance:

0.02 — 0.05 mm (0.0008 — 0.0020 in.)

Maximum side clearance: 0.10 mm (0.0040 in.)

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

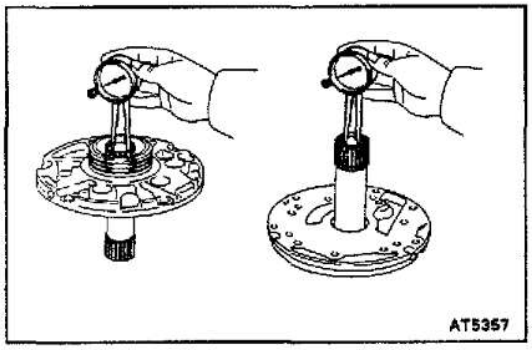


4. CHECK OIL PUMP BODY BUSHING

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 maximum, replace the oil pump body.



5. CHECK STATOR SHAFT BUSHINGS

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

Maximum inside diameter:

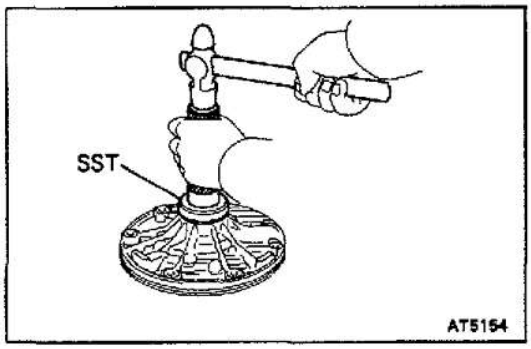
Front side 21.58 mm (0.8496 in.)

Rear side 27.08 mm (1.0661 in.)

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

AX0AP–0E

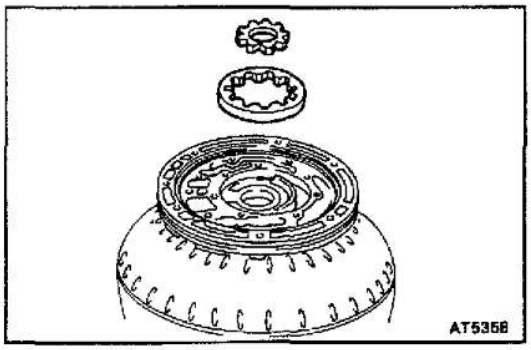
OIL PUMP ASSEMBLY



1. INSTALL FRONT OIL SEAL

(a) Using SST and a hammer, install a new oil seal. The seal end should be flush with the outer edge of the pump body.
SST 09350–30020 (09351–32140)

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

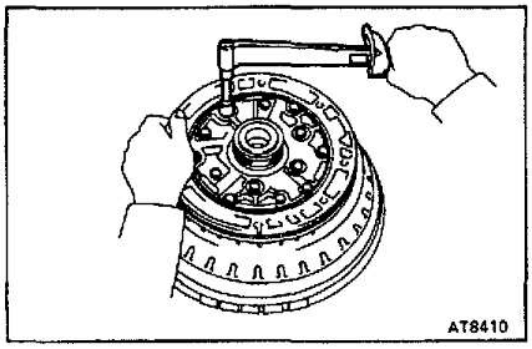


2. INSTALL DRIVEN GEAR AND DRIVE GEAR TO OIL PUMP BODY

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

(b) Coat the driven gear and drive gear with ATF.

(c) Install the driven gear and drive gear.

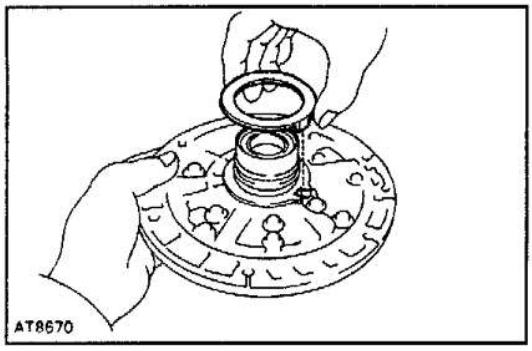


3. INSTALL STATOR SHAFT TO PUMP BODY

(a) Align the stator shaft with each bolt hole.

(b) Tighten the 13 bolts.

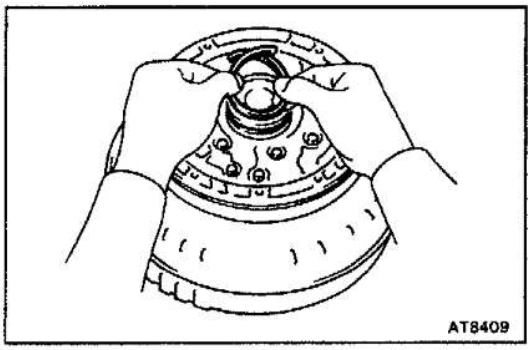
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)



4. INSTALL THRUST WASHER

(a) Coat the thrust washer with petroleum jelly.

(b) Align the tab of the washer with the hollow of the pump body.



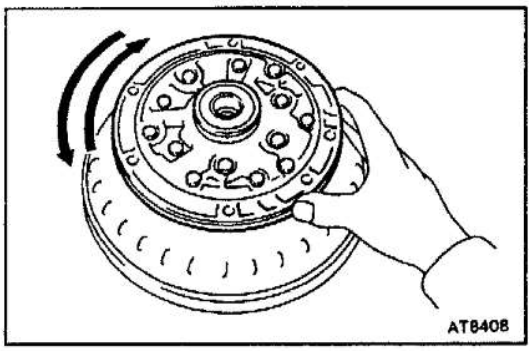
5. INSTALL OIL SEAL RINGS

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

(b) Install the 2 oil seal rings to the stator shaft groove, then snug them down by squeezing their ends together.

NOTICE: Do not spread the ring ends too much.

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



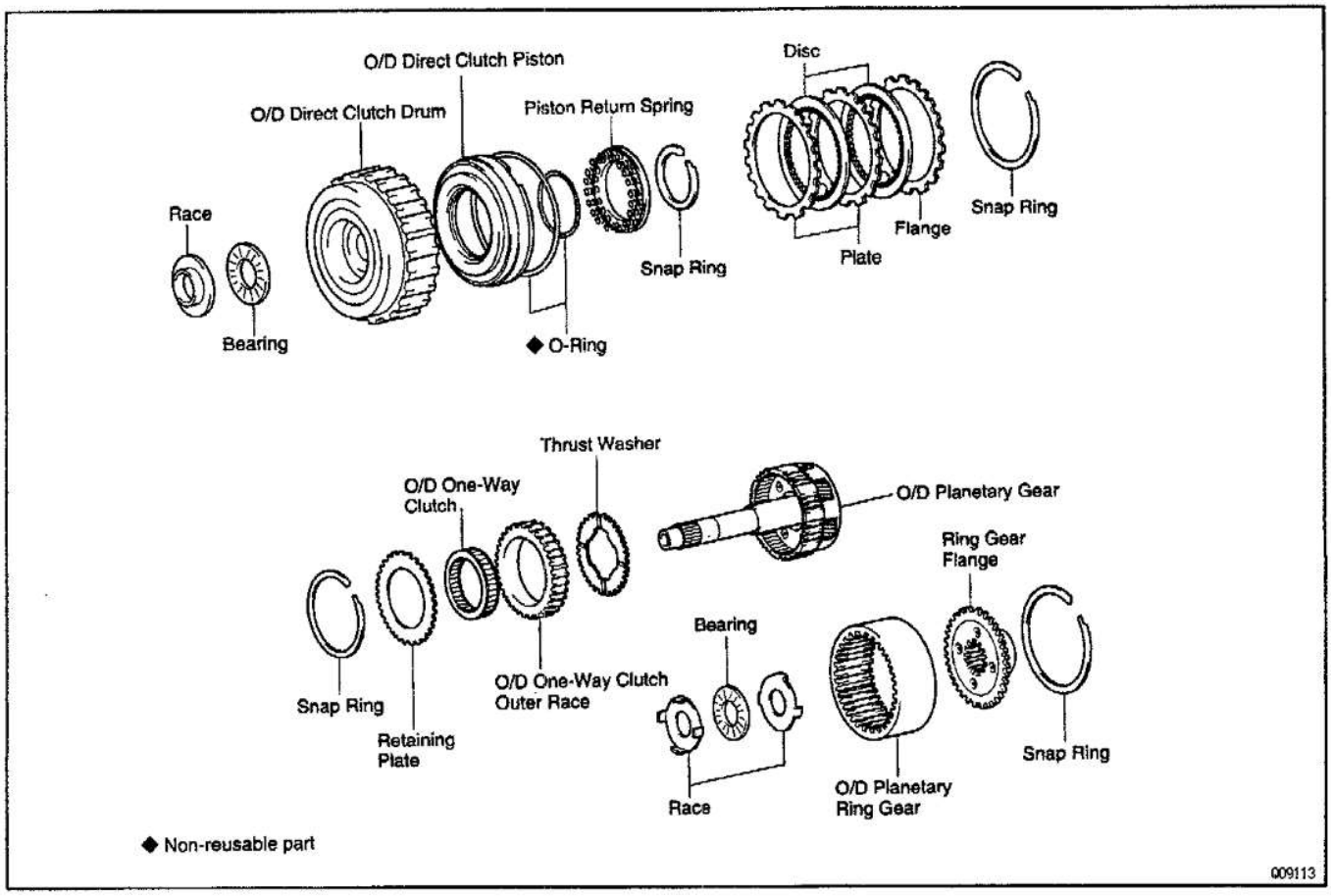
6. CHECK OIL PUMP DRIVE GEAR ROTATION

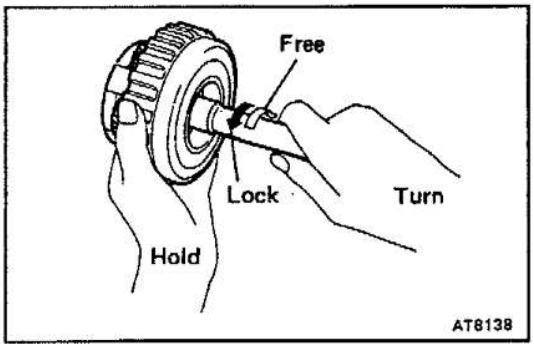
Make sure the drive gear rotates smoothly.

OVERDRIVE DIRECT CLUTCH

COMPONENTS

AT060-06





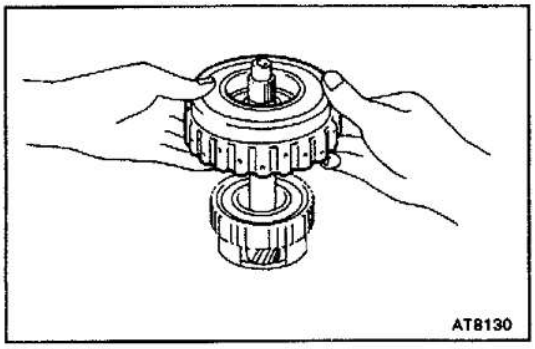
AT14A-03

O/D PLANETARY GEAR, DIRECT CLUTCH AND ONE–WAY CLUTCH DISASSEMBLY

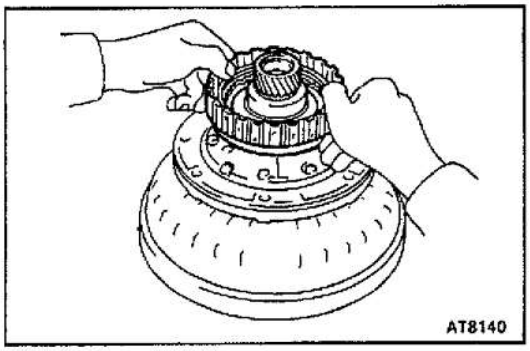
1. CHECK OPERATION OF ONE–WAY CLUTCH

Hold the O/D direct clutch drum and turn the input shaft.

Check that the input shaft must be able to turn freely clockwise and locks counterclockwise.

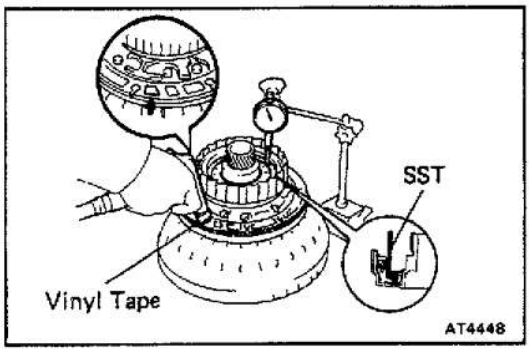


2. REMOVE O/D DIRECT CLUTCH ASSEMBLY FROM O/D PLANETARY GEAR

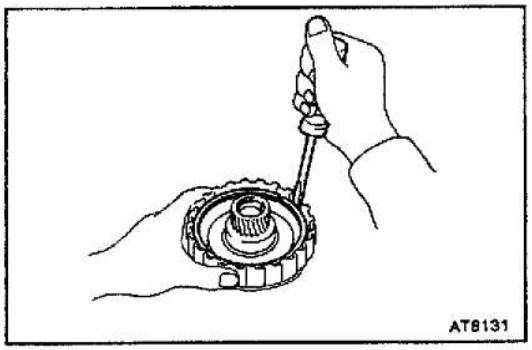


3. CHECK PISTON STROKE OF O/D DIRECT CLUTCH

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

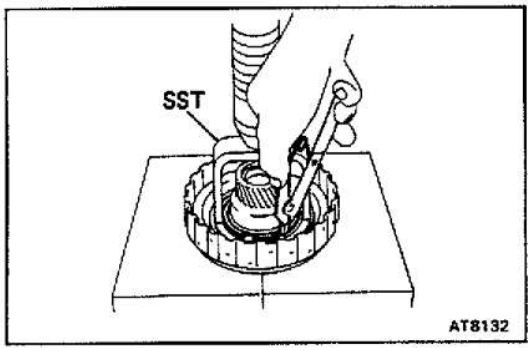


(b) Using SST and a dial indicator, measure the O/D direct clutch piston stroke while applying and releasing compressed air (392–785 kPa, 4–8 kgf/cm², 57–114 psi).
SST 09350–30020 (09350–06120)
Piston stroke: 1.85 – 2.15 mm (0.0728 – 0.0846 in.)
If the values are non–standard, inspect the discs.



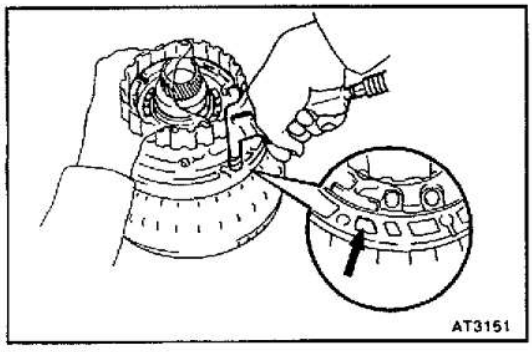
4. REMOVE FLANGE, PLATE AND DISC

(a) Using a screwdriver, remove the snap ring from the O/D direct clutch drum.
(b) Remove the flange, plate and disc.



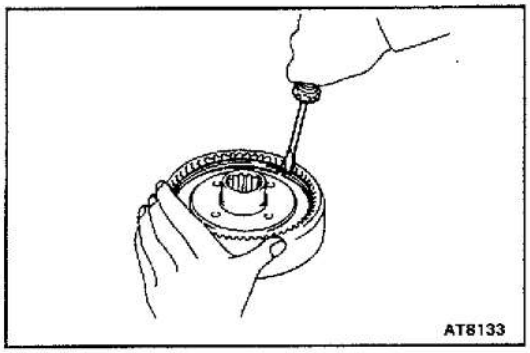
5. REMOVE PISTON RETURN SPRING

(a) Place SST on the spring retainer and compress the return spring with a press.
SST 09350–30020 (09350–07040)
(b) Using snap ring pliers, remove the snap ring.
(c) Remove the piston return spring.



6. REMOVE O/D DIRECT CLUTCH PISTON

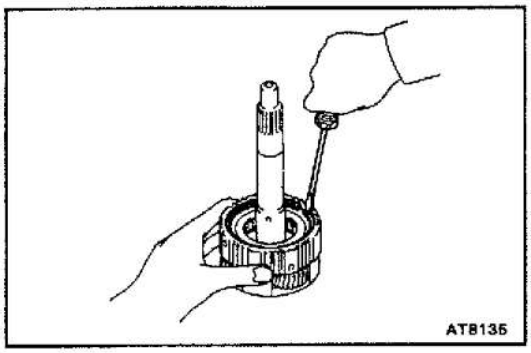
(a) Place the oil pump onto the torque converter and then place the O/D direct clutch onto the oil pump.
(b) Hold the O/D direct clutch piston with hand, apply compressed air to the oil pump to remove the O/D direct clutch piston.
(c) Remove the O/D direct clutch piston.
(d) Remove the 2 O–rings from the piston.



7. REMOVE RING GEAR FLANGE

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

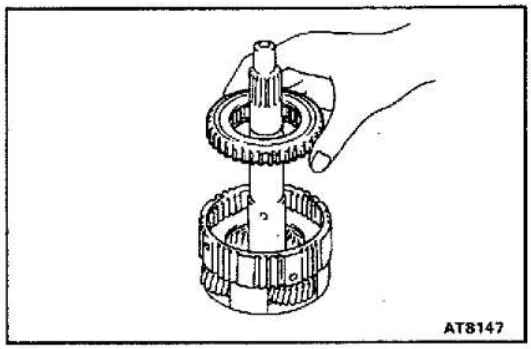
(b) Remove the ring gear flange.



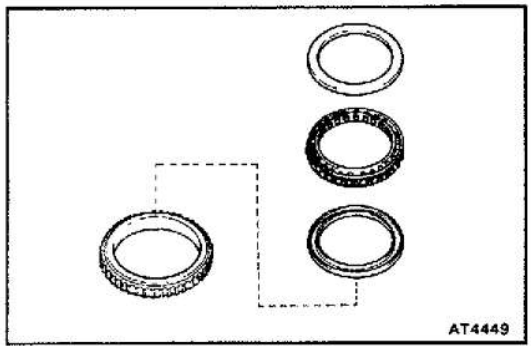
8. REMOVE RETAINING PLATE

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

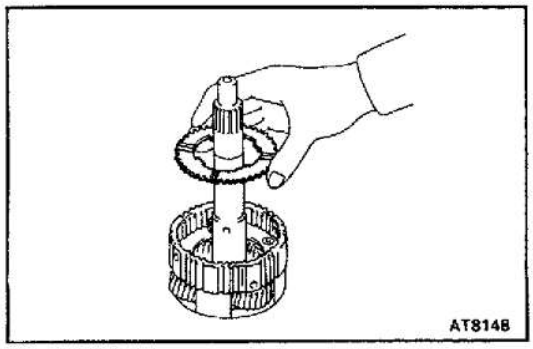
(b) Remove the retaining plate.



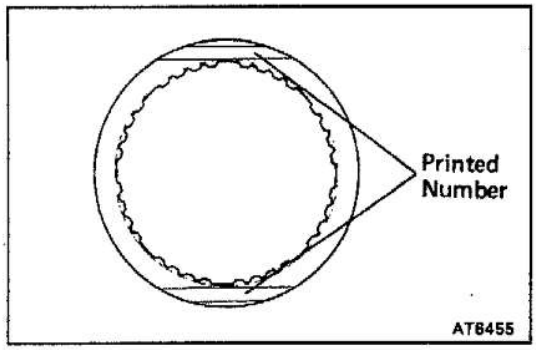
9. REMOVE O/D ONE–WAY CLUTCH WITH OUTER RACE



10. REMOVE ONE–WAY CLUTCH FROM OUTER RACE



11. REMOVE THRUST WASHER



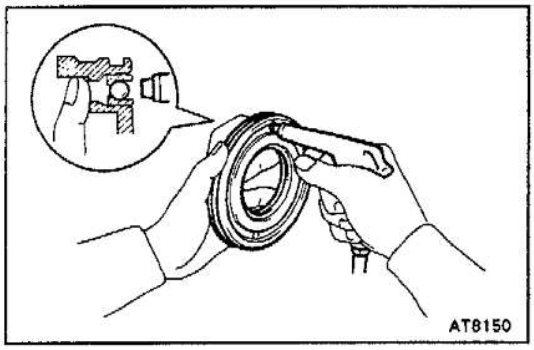
AT

O/D PLANETARY GEAR AND O/D DIRECT CLUTCH INSPECTION AT05D-08

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.

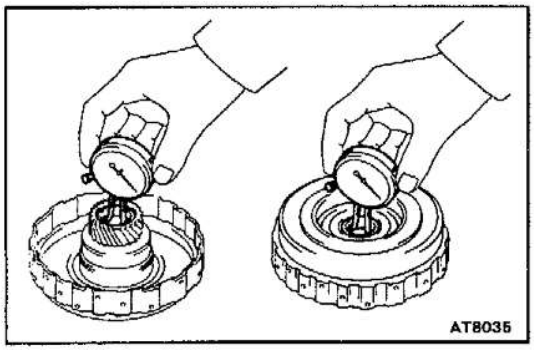
HINT: If the lining of the disc is peeling off or discolored, or even if a part of the printed numbers are defaced, replace discs.



2. CHECK O/D DIRECT 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.

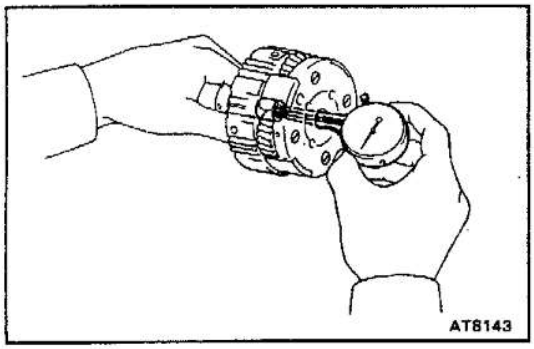


3. CHECK O/D DIRECT CLUTCH DRUM BUSHINGS

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

Maximum inside diameter: 27.11 mm (1.0673 in.)

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

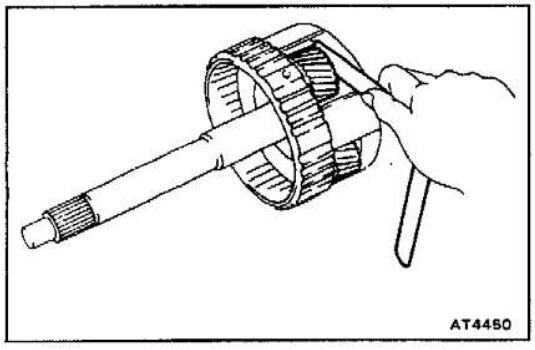


4. CHECK O/D PLANETARY GEAR BUSHING

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

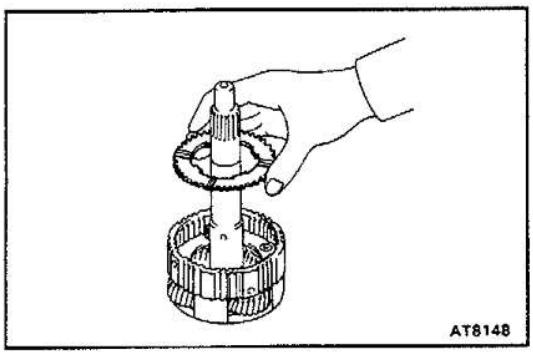
Using a feeler gauge, measure the planetary pinion gear thrust clearance.

Standard clearance:

0.20 – 0.60 mm (0.0079 – 0.0236 in.)

Maximum clearance: 1.00 mm (0.0394 in.)

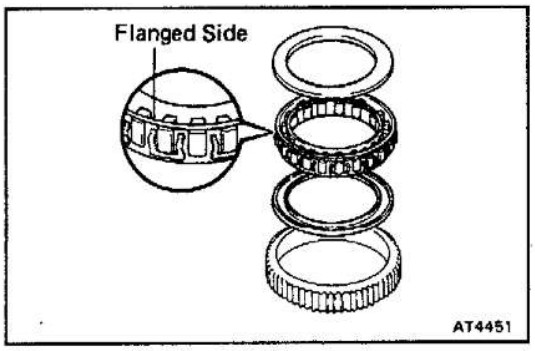
If the clearance is greater than the maximum, replace the planetary gear assembly.



O/D PLANETARY GEAR, DIRECT CLUTCH AND ONE–WAY CLUTCH ASSEMBLY AT148-04

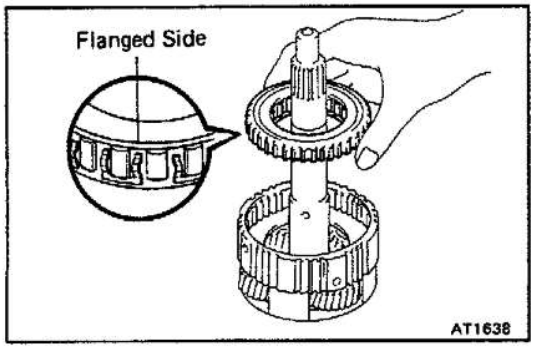
1. INSTALL THRUST WASHER TO O/D PLANETARY GEAR

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

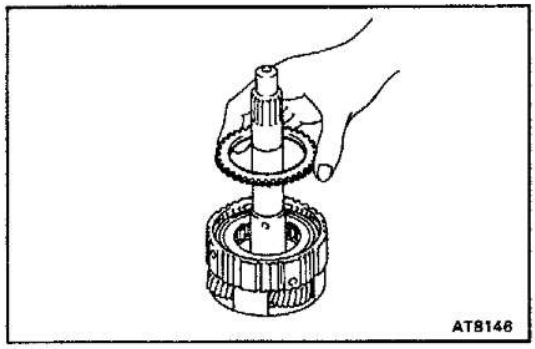


2. INSTALL O/D ONE–WAY CLUTCH

(a) Install the one–way clutch into the outer race, the flange side of the one–way clutch facing upward.

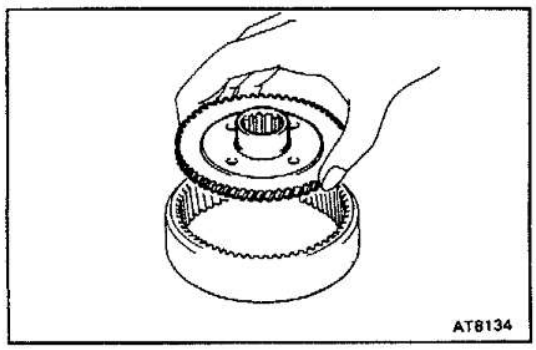


(b) Install the O/D one–way clutch with the outer race to the O/D planetary gear.



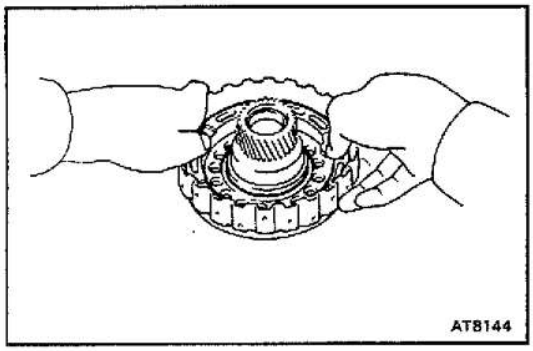
3. INSTALL RETAINING PLATE

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



4. INSTALL RING GEAR FLANGE TO O/D PLANETARY RING GEAR

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

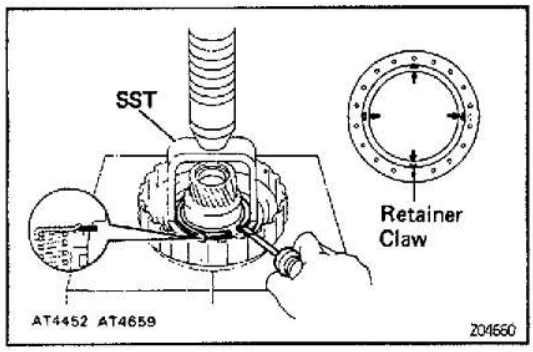


AT

5. INSTALL O/D DIRECT CLUTCH PISTON

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

(b) Be careful not to damage the O–rings, press in the direct clutch piston into the clutch drum with both hands.

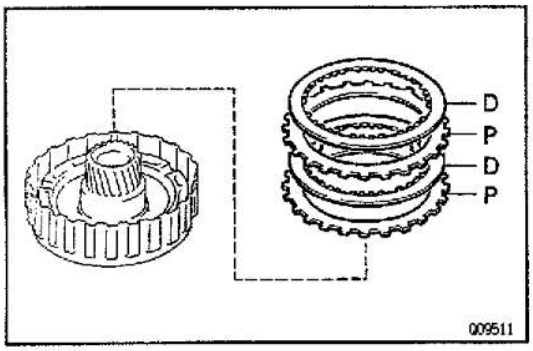


6. INSTALL PISTON RETURN SPRING

(a) Install the piston return spring to the piston.

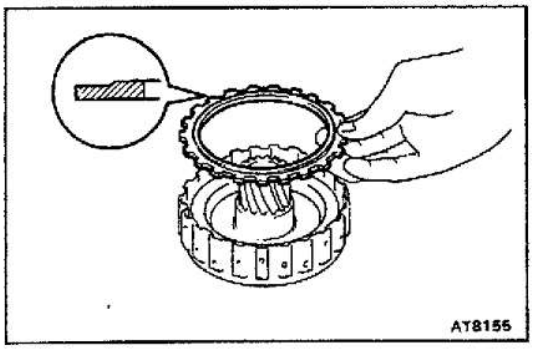
(b) Place SST on the spring retainer, and compress the return spring with a press.
SST 09350–30020 (09350–07040)

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



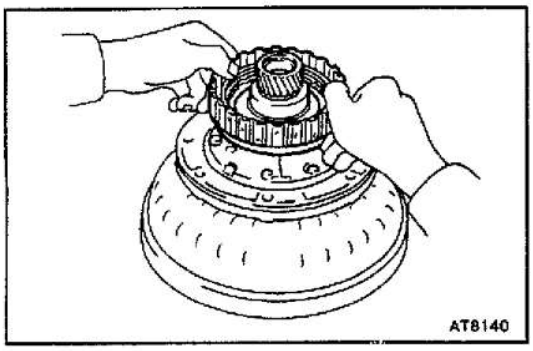
7. INSTALL PLATES, DISCS AND FLANGE

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



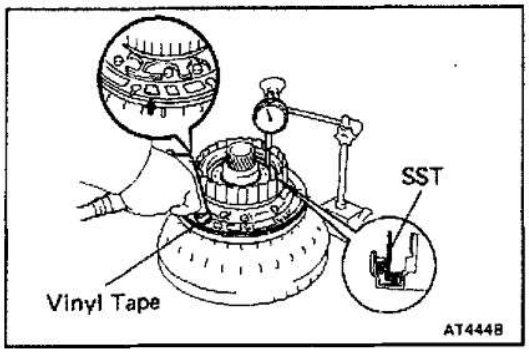
(b) Install the flange, the flat end facing downward.

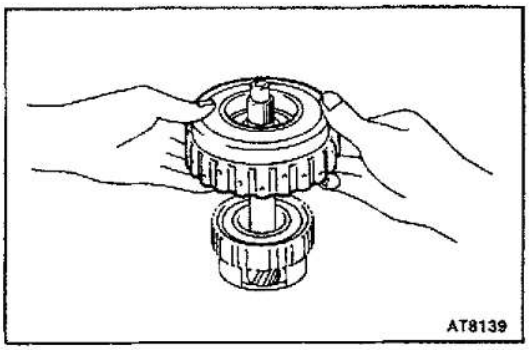
(c) Using a screwdriver, install the snap ring.



8. CHECK PISTON STROKE OF O/D DIRECT CLUTCH

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





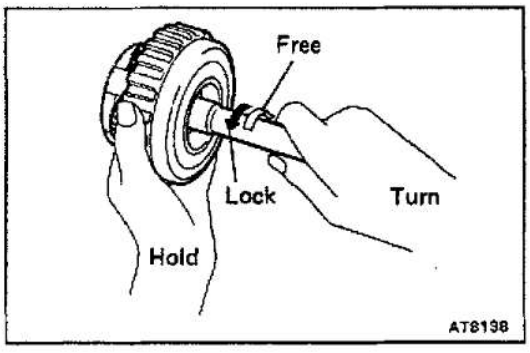
(b) Using SST and a dial indicator, measure the O/D direct clutch piston stroke while applying and releasing compressed air (392–785 kPa, 4–8 kgf/cm², 57–114 psi).
SST 09350–30020 (09350–06120)
Piston stroke: 1.85 – 2.15 mm (0.0728 – 0.0846 in.)
If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.
If the piston stroke is non–standard, select another flange.
HINT: There are 6 different thicknesses for the flange.
Flange thickness

mm (in.)

No.	Thickness	No.	Thickness
16	3.6 (0.142)	19	3.3 (0.130)
17	3.5 (0.138)	20	3.2 (0.126)
18	3.4 (0.134)	21	3.1 (0.122)

9. INSTALL O/D DIRECT CLUTCH ASSEMBLY

(a) Align the flukes of the discs in the direct clutch.
(b) Install the direct clutch assembly onto the O/D planetary gear.



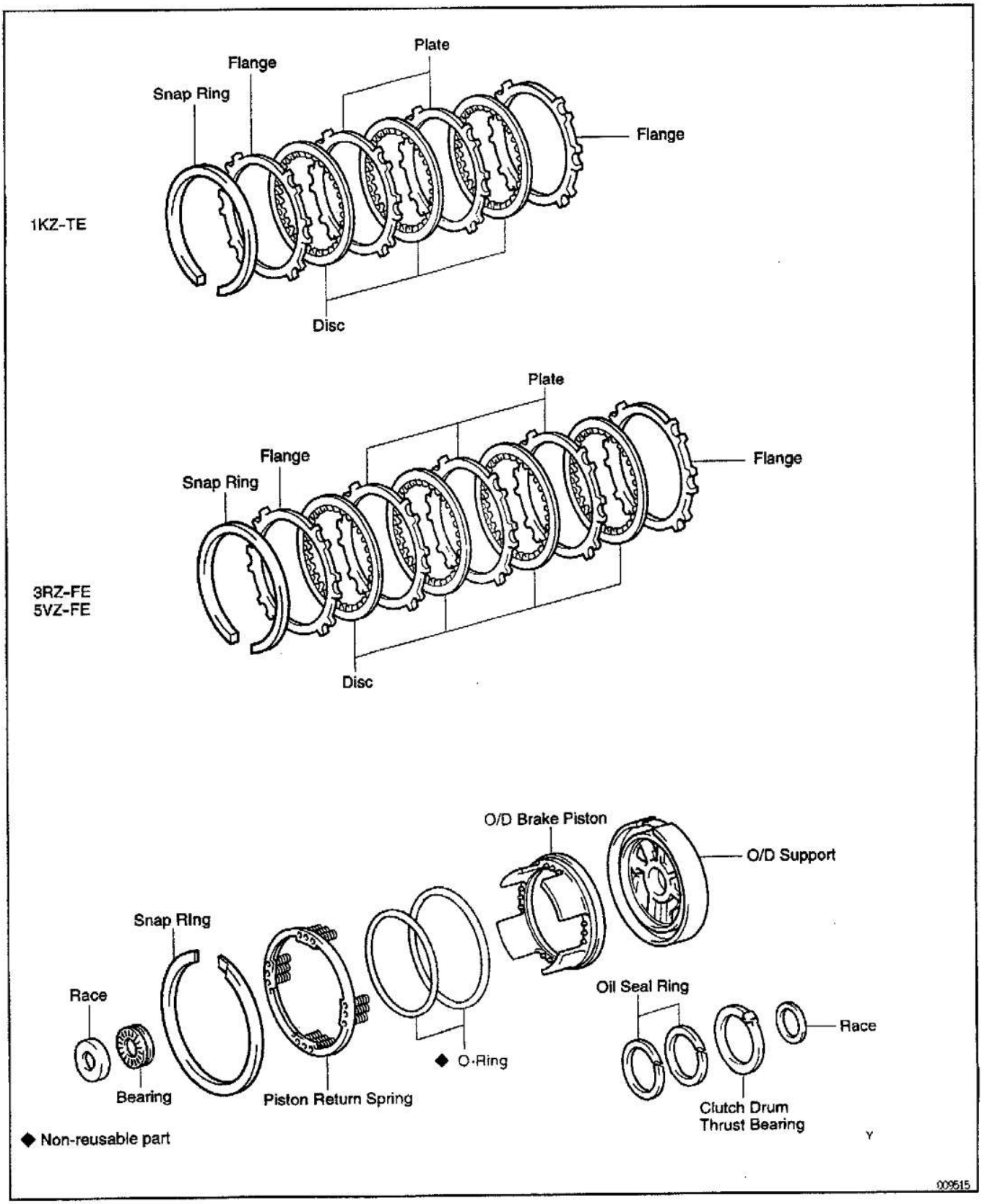
10. CHECK OPERATION OF ONE–WAY CLUTCH

Hold the O/D direct clutch drum and turn the input shaft.
Check that the input shaft must be able to turn freely clockwise and locks counterclockwise.

OVERDRIVE BRAKE
COMPONENTS

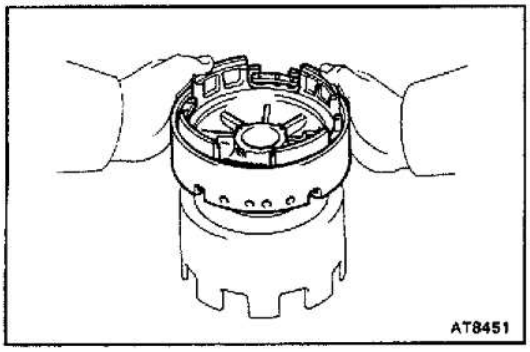
A705F-07

AT



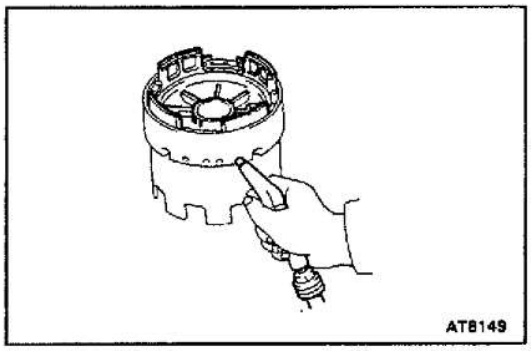
AT14C-02

O/D BRAKE DISASSEMBLY



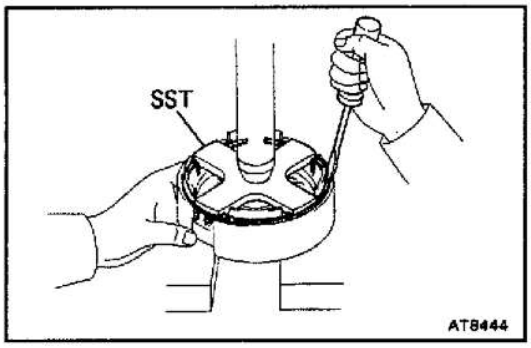
1. CHECK O/D BRAKE PISTON MOVEMENT

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



(b) Apply compressed air into the oil passage as shown, and be sure that the O/D brake piston moves smoothly.

2. REMOVE CLUTCH DRUM THRUST WASHER FROM O/D SUPPORT

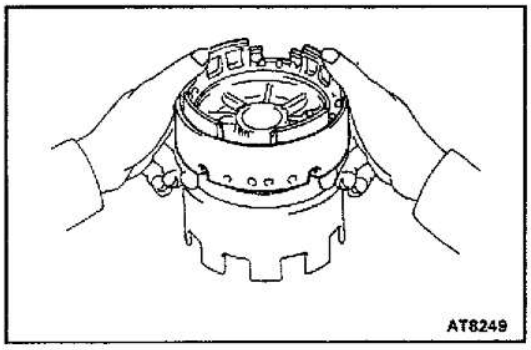


3. REMOVE PISTON RETURN SPRING

(a) Place SST on the spring retainer, and compress the return spring with a press.
SST 09350—30020 (09350—07030)

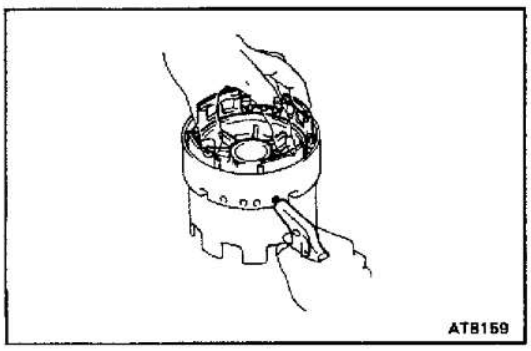
(b) Remove the snap ring with a screwdriver.

(c) Remove the piston return spring.



4. REMOVE O/D BRAKE PISTON

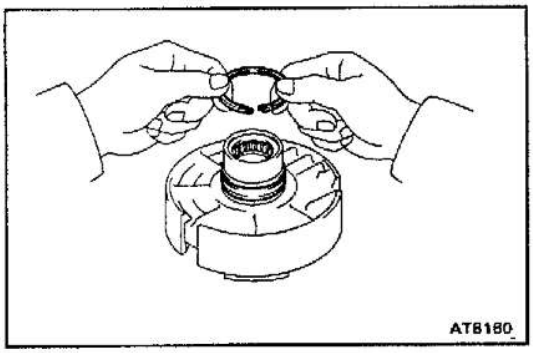
(a) Place the O/D support onto the direct clutch assembly.



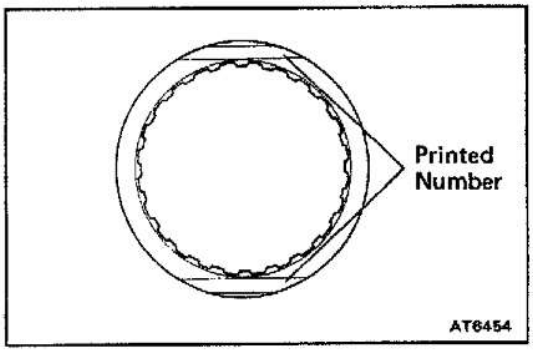
(b) Hold the O/D brake piston so it does not slant, and apply compressed air into the passage to remove the O/D brake piston.

(c) Remove the O/D brake piston.

(d) Remove the 2 O—rings from the piston.



5. REMOVE 2 OIL SEAL RINGS



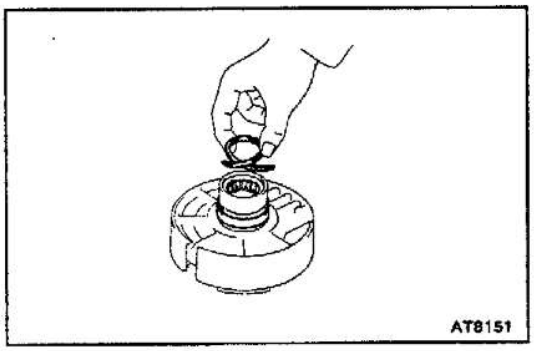
O/D BRAKE INSPECTION

AT05H-08

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 a part of the printed numbers are defaced, replace all discs.



O/D BRAKE ASSEMBLY

AT05J-08

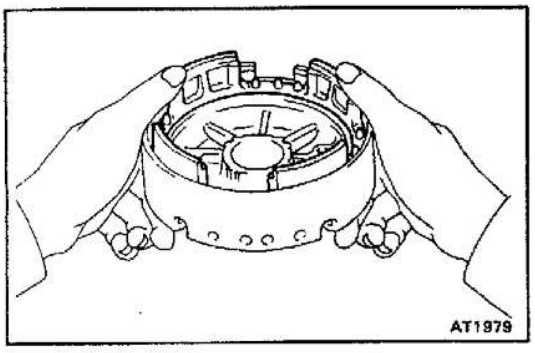
1. INSTALL OIL SEAL RINGS

(a) Coat 2 oil seal rings with ATF.

(b) Install the 2 oil seal rings to the O/D support groove, then settle them down by squeezing their ends together.

NOTICE: Do not squeezed the ring ends more than necessary.

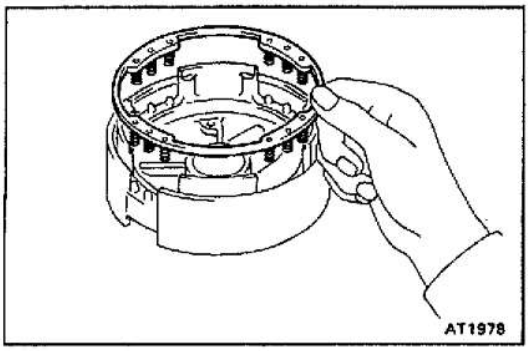
HINT: After installing the oil seal rings, check that they rotate smoothly.



2. INSTALL O/D BRAKE PISTON

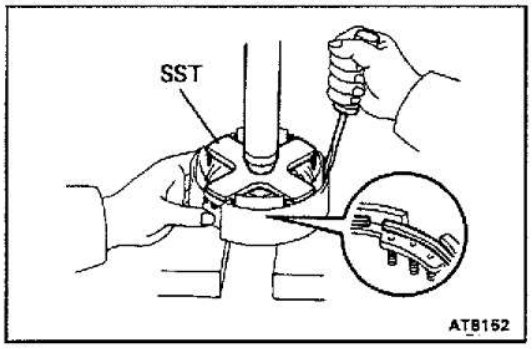
(a) Coat 2 new O—rings with ATF and install them on the O/D brake piston.

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



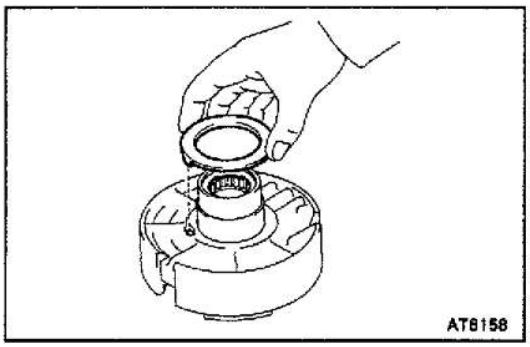
3. INSTALL PISTON RETURN SPRING

(a) Install the piston return spring.



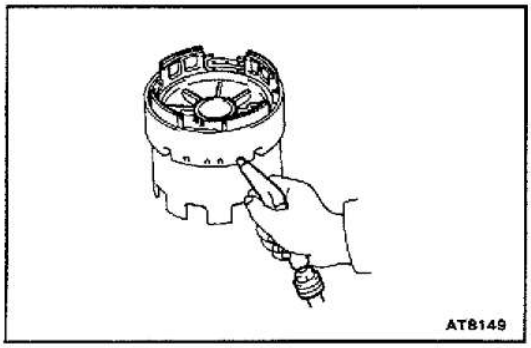
(b) Place SST on the spring retainer, and compress the return spring with a press.
SST 09350−30020 (09350−07030)

(c) Install the snap ring with a screwdriver. Be sure the end gap of the snap ring is not aligned with the cutout portion of the O/D support.



4. INSTALL CLUTCH DRUM THRUST WASHER

Coat the thrust washer with petroleum jelly and install it onto the O/D support.
HINT: Make sure that the lug shape matches the hole on the O/D support.



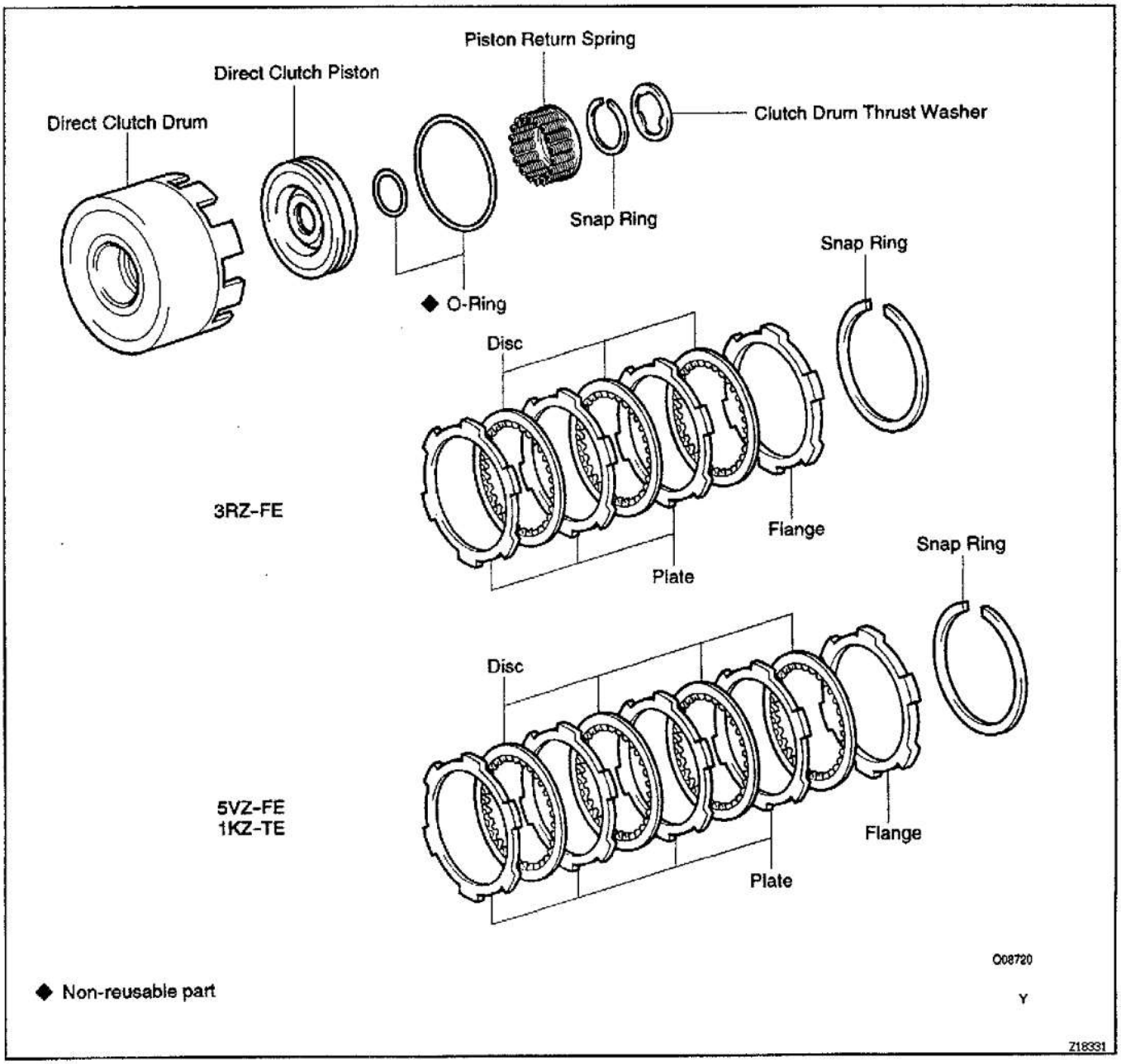
5. CHECK O/D BRAKE PISTON MOVEMENT

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

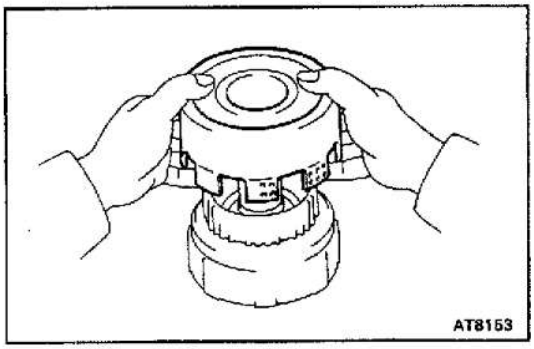
(b) Apply compressed air into the oil passage as shown, and be sure that the O/D brake piston moves smoothly.

DIRECT CLUTCH
COMPONENTS

AT056K–07

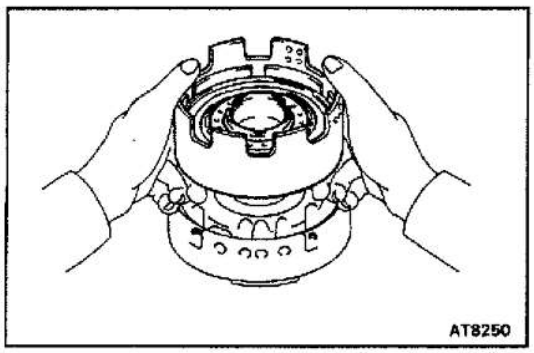


AT140–03



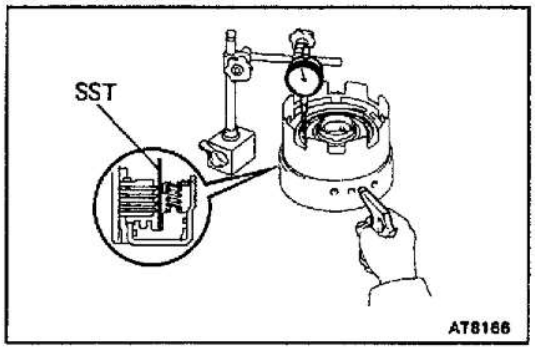
DIRECT CLUTCH DISASSEMBLY

1. REMOVE DIRECT CLUTCH DRUM FROM FORWARD CLUTCH
2. REMOVE CLUTCH DRUM THRUST WASHER FROM DIRECT CLUTCH

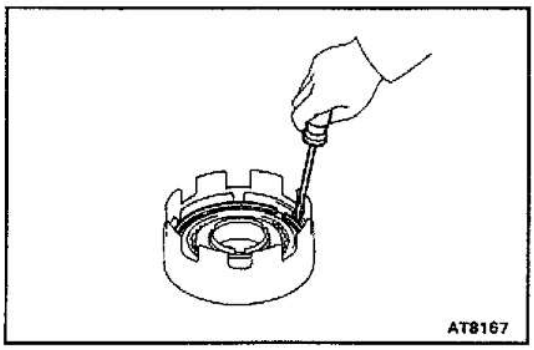


3. CHECK PISTON STROKE OF DIRECT CLUTCH

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

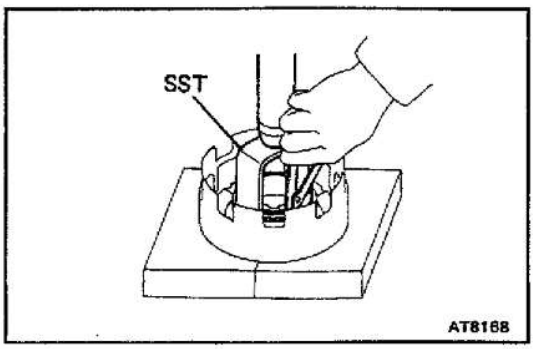


(b) Using SST and a dial indicator, measure the direct clutch piston stroke while applying and releasing compressed air (392–785 kPa, 4–8kgf/cm², 57–114 psi).
SST 09350–30020 (09350–06120)
Piston stroke:
5VZ–FE, 1KZ–TE:
1.37 – 1.60 mm (0.0539 – 0.0630 in.)
3RZ–FE:
1.03 – 1.33 mm (0.0406 – 0.0524 in.)
If the values are non–standard, inspect the discs.



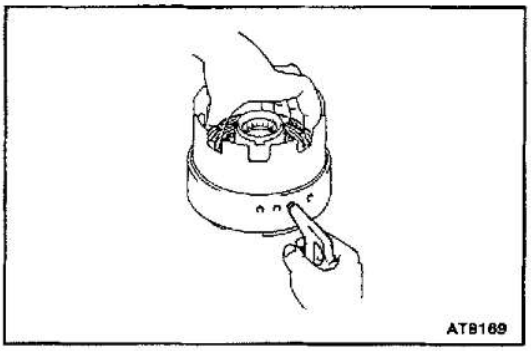
4. REMOVE FLANGE, PLATES AND DISCS

(a) Using a screwdriver, remove the snap ring from the direct clutch drum.
(b) Remove the flange, plates and discs.



5. REMOVE PISTON RETURN SPRING

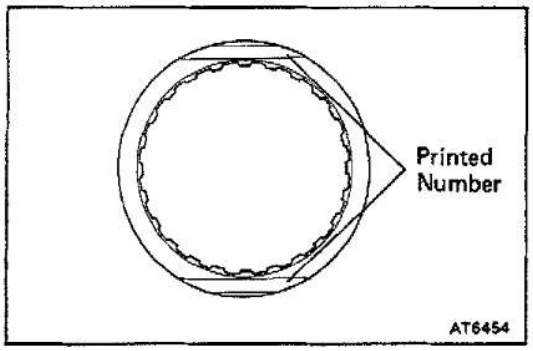
(a) Place SST on the spring retainer and compress the return spring with a press.
SST 09350–30020 (09350–07040)
(b) Using snap ring expander, remove the snap ring.
(c) Remove the piston return spring.



AT

6. REMOVE DIRECT CLUTCH PISTON

(a) Place the direct clutch drum onto the O/D support.
(b) Hold the direct clutch piston, apply compressed air to the O/D support to remove the direct clutch piston.
(c) Remove the direct clutch piston.
(d) Remove the 2 O–rings from the piston.

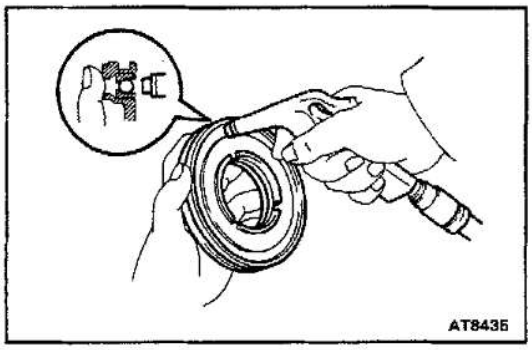


DIRECT CLUTCH INSPECTION

1. INSPECT DISC, PLATE AND FLANGE

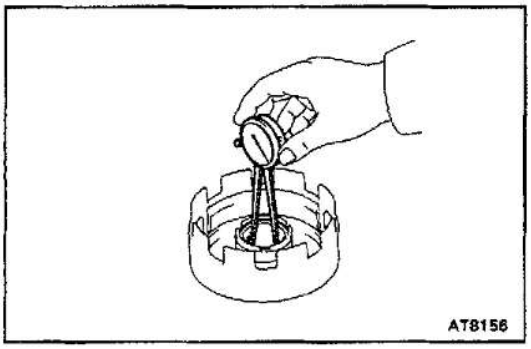
Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT: If the lining of the disc is peeling off or discolored, or even if a part of the printed numbers are defaced, replace all discs.



2. CHECK DIRECT 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.

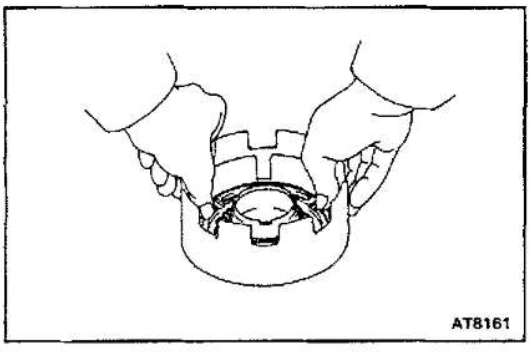


3. CHECK DIRECT CLUTCH DRUM BUSHING

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

Maximum inside diameter: 53.99 mm (2.1256 in.)

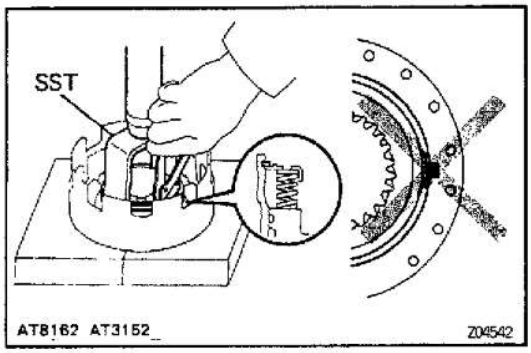
If the inside diameter is greater than the maximum, replace the clutch drum.



DIRECT CLUTCH ASSEBMLY

1. INSTALL DIRECT CLUTCH PISTON TO DIRECT CLUTCH DRUM

(a) Coat 2 new O–rings with ATF and install them on the direct clutch piston.
(b) Being careful not to damage the O–rings, press in the direct clutch piston into the clutch drum with both hands.

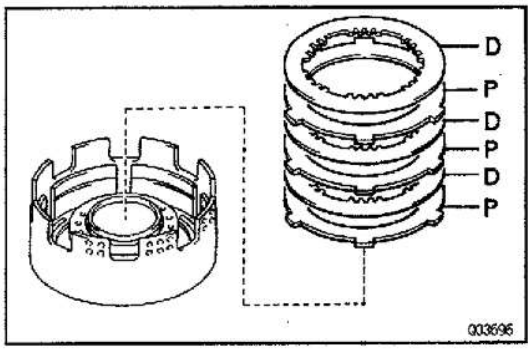


2. INSTALL PISTON RETURN SPRING

(a) Install the piston return spring.

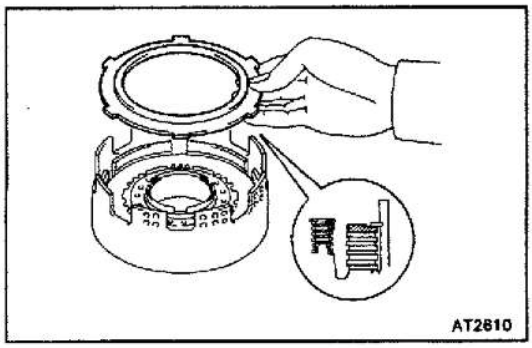
(b) Place SST on the spring retainer, and compress the return spring with a press.
SST 09350–30020 (09350–07040)

(c) Install the snap ring with snap ring pliers. Be sure the end gap of the snap ring is not aligned with the spring retainer.

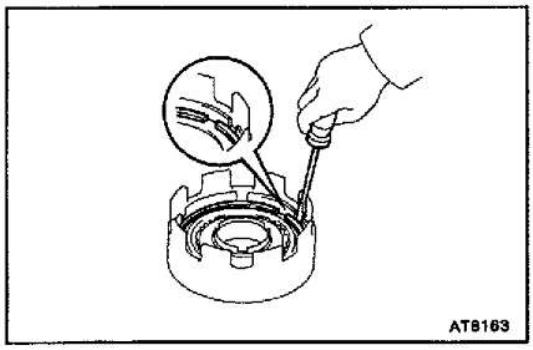


3. INSTALL PLATES, DISCS AND FLANGE

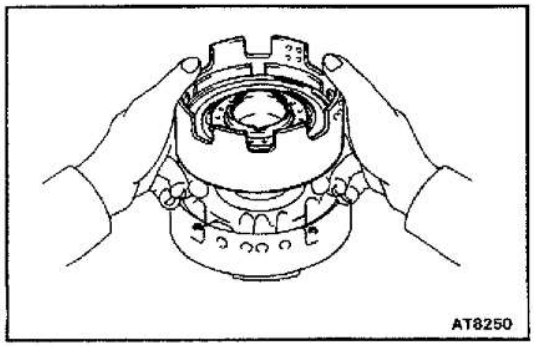
(a) Install the plates and discs.
Install in order: P = Plate D = Disc
3RZ–FE, 1KZ–TE
P–D–P–D–P–D
5VZ–FE
P–D–P–D–P–D–P–D



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

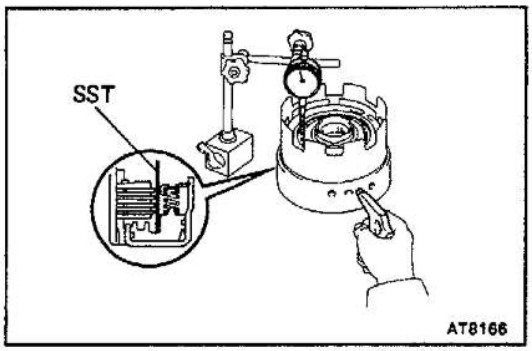


(c) Install the snap ring with a screwdriver. Be sure the end gap of the snap ring is not aligned with the cutout portion of the direct clutch drum.



4. CHECK PISTON STROKE OF DIRECT CLUTCH

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



AT

(b) Using SST and a dial indicator, measure the direct clutch piston stroke while applying and releasing compressed air (392—785 kPa, 4—8 kgf/cm², 57—114 psi).

SST 09350—30020 (09350—06120)

Piston stroke:

5VZ—FE, 1KZ—TE:

1.37 — 1.60 mm (0.0539 — 0.0630 in.)

3RZ—FE:

1.03 — 1.33 mm (0.0406 — 0.0524 in.)

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

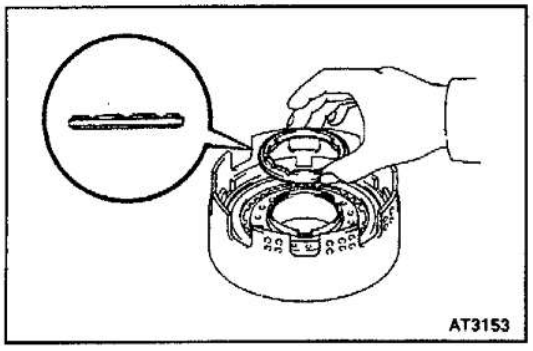
If the piston stroke is non—standard, select another flange.

HINT: There are 8 different thicknesses for the flange.

Flange thickness

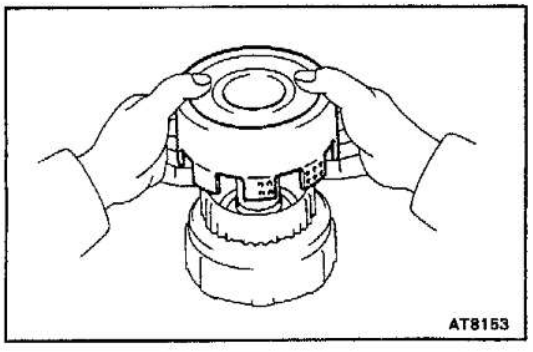
mm (in.)

No.	Thickness	No.	Thickness
33	3.0 (0.118)	29	3.4 (0.134)
32	3.1 (0.122)	28	3.5 (0.138)
31	3.2 (0.126)	27	3.6 (0.142)
30	3.3 (0.130)	34	3.7 (0.146)



5. INSTALL CLUTCH DRUM THRUST WASHER

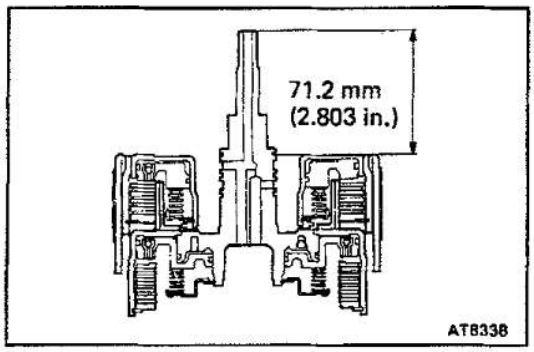
Coat the thrust washer with petroleum jelly and install it onto the direct clutch.



6. INSTALL DIRECT CLUTCH TO FORWARD CLUTCH

(a) Align the flukes of discs in the direct clutch.

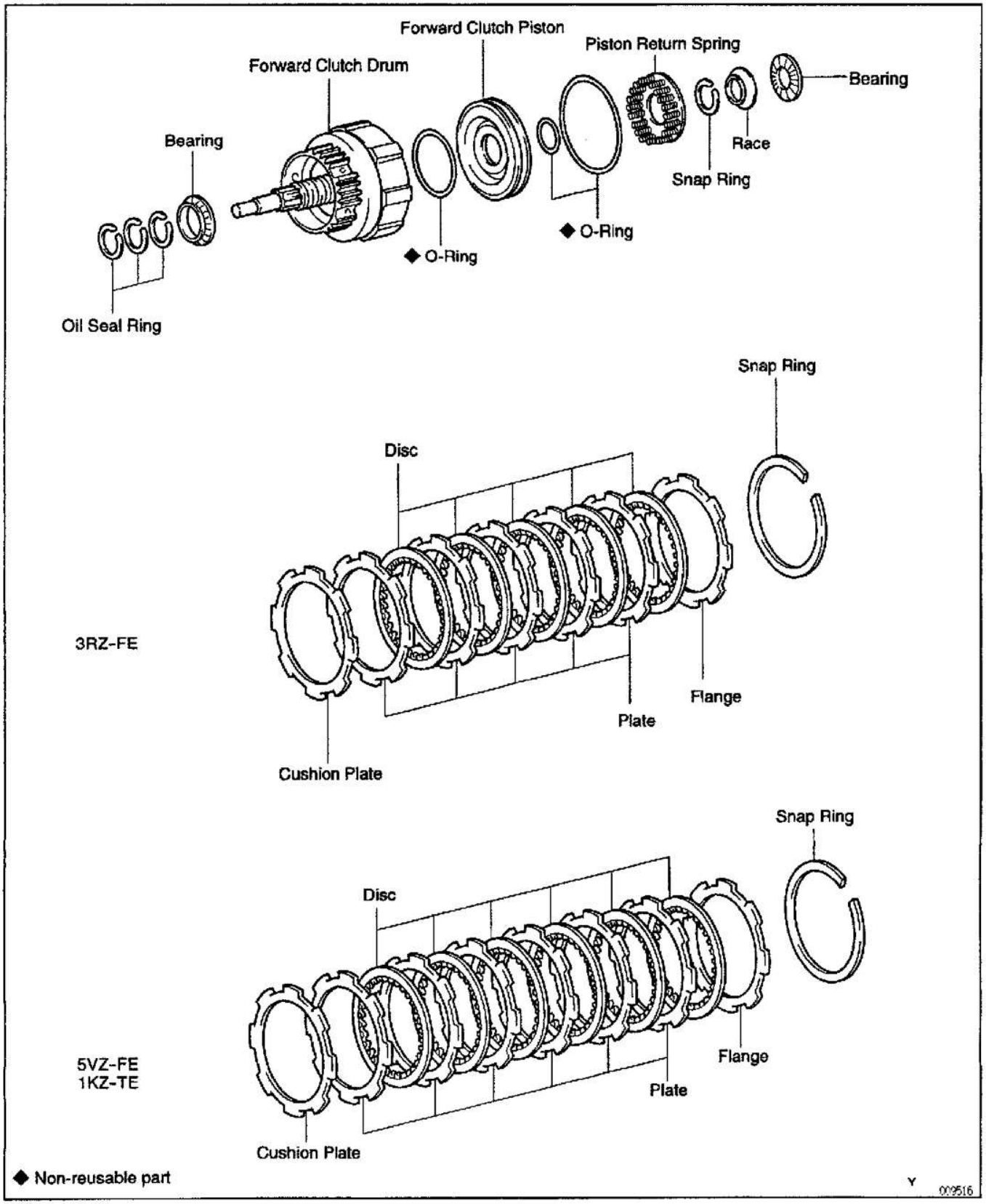
(b) Install the direct clutch onto the forward clutch.

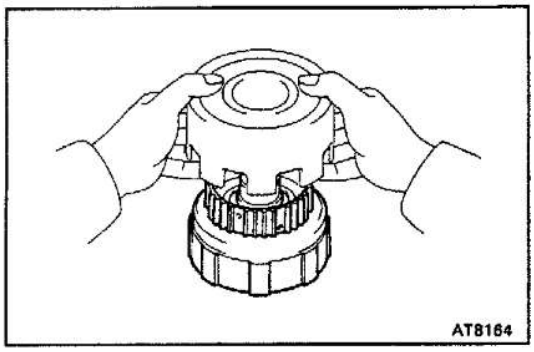


(c) Check that the distance from the direct clutch end to the forward clutch end is 71.2 mm (2.803 in.).
If the distance is less than the above value, parts may have been assembled incorrectly, check and reassemble again.

FORWARD CLUTCH
COMPONENTS

AT058P–07

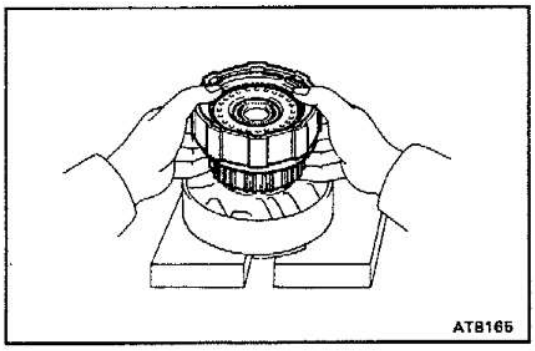




AT14F-03

FORWARD CLUTCH DISASSEMBLY

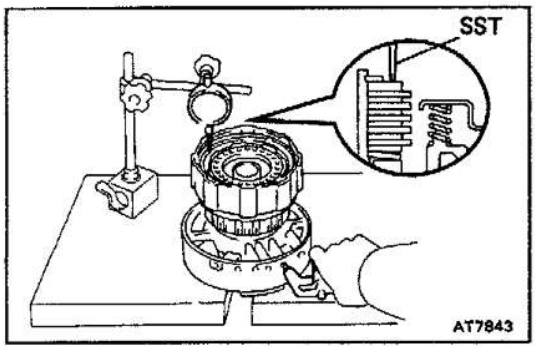
1. REMOVE FORWARD CLUTCH FROM DIRECT CLUTCH



2. PLACE FORWARD CLUTCH ONTO O/D SUPPORT

(a) Place wooden blocks or similar, to prevent forward clutch shaft from touching the work stand, and place the O/D support on them.

(b) Place the forward clutch onto the O/D support.



3. CHECK PACK CLEARANCE OF FORWARD CLUTCH

Using SST and a dial indicator, measure the forward clutch piston stroke while applying and releasing compressed air (392–785 kPa, 4–8 kgf/cm², 57–114 psi).

SST 09350–30020 (09350–06120)

Pack clearance:

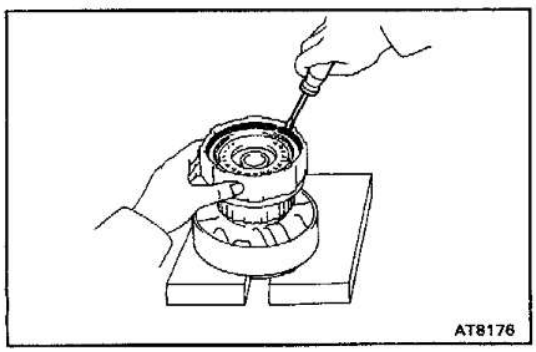
5VZ–FE, 1KZ–TE:

0.60 – 1.00 mm (0.0236 – 0.0394 in.)

3RZ–FE:

0.50 – 0.90 mm (0.0197 – 0.0354 in.)

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

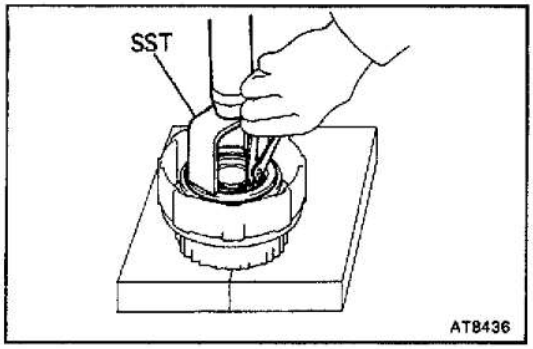


4. REMOVE FLANGE, PLATES AND DISCS

(a) Using a screwdriver, remove the snap ring from the forward clutch drum.

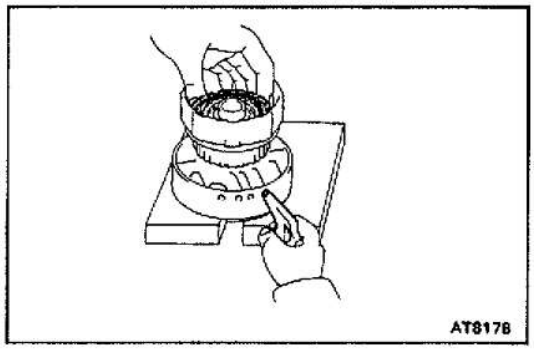
(b) Remove the flange, plates and discs.

5. REMOVE CUSHION PLATE



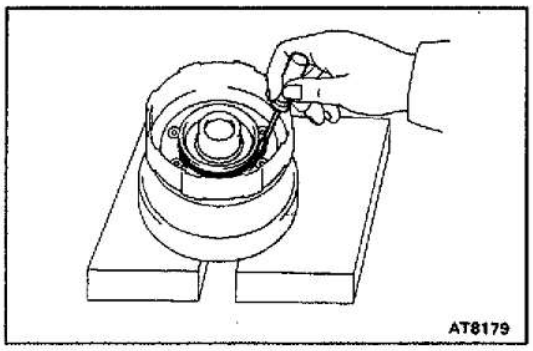
6. REMOVE PISTON RETURN SPRING

(a) Place SST on the spring retainer and compress the return spring with a press.
SST 09350–30020 (09350–07040)
(b) Using snap ring expander, remove the snap ring.
(c) Remove the piston return spring.



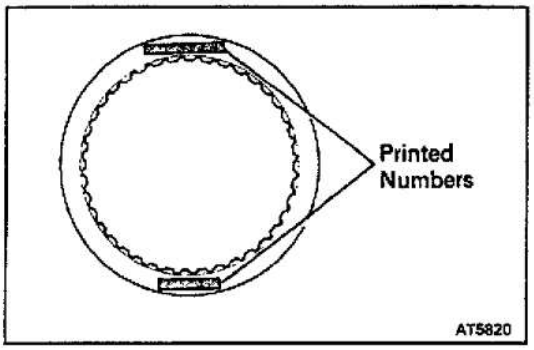
7. REMOVE FORWARD CLUTCH PISTON

(a) Place the forward clutch drum onto the O/D support.
(b) Hold the forward clutch piston with hand, apply compressed air to the O/D support to remove the forward clutch piston.
(c) Remove the forward clutch piston.
(d) Remove the 2 O–rings from the piston.



8. REMOVE O – RING FROM FORWARD CLUTCH DRUM

9. REMOVE 3 OIL SEAL RINGS



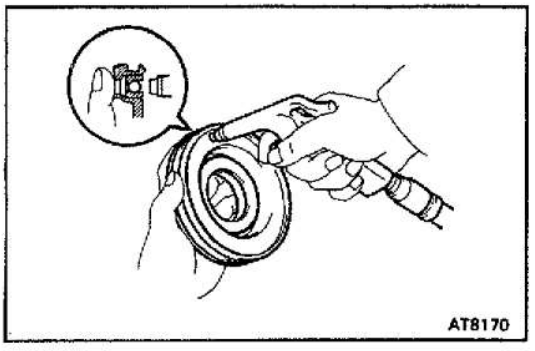
FORWARD CLUTCH INSPECTION

AT06R–09

1. INSPECT DISC, PLATE AND FLANGE

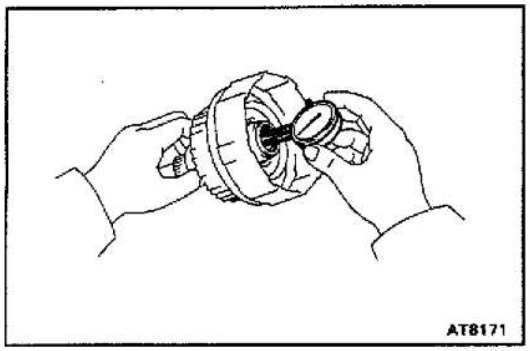
Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT: If the lining of the disc is peeling off or discolored, or even if a part of the printed numbers are defaced, replace all discs.



2. CHECK FORWARD 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.

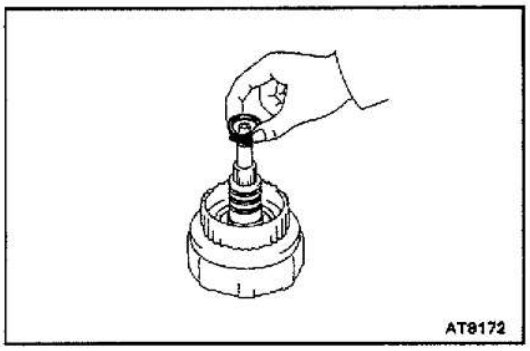


3. CHECK FORWARD CLUTCH DRUM BUSHING

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

Maximum inside diameter: 24.08 mm (0.9480 in.)

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



FORWARD CLUTCH ASSEMBLY

AT140-03

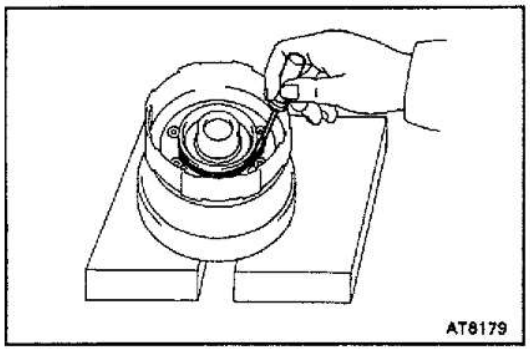
1. INSTALL OIL SEAL RINGS

(a) Coat 3 oil seal rings with ATF.

(b) Install the 3 oil seal rings to the forward clutch drum groove, then snug them down by squeezing their ends together.

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

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

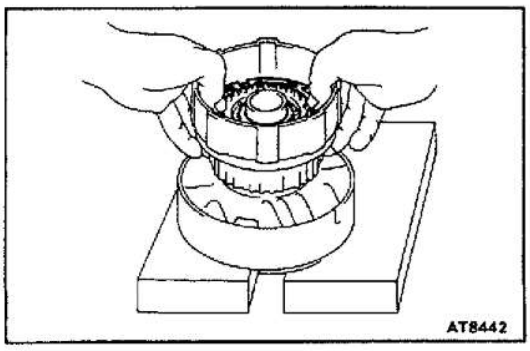


2. INSTALL NEW O–RING TO FORWARD CLUTCH DRUM

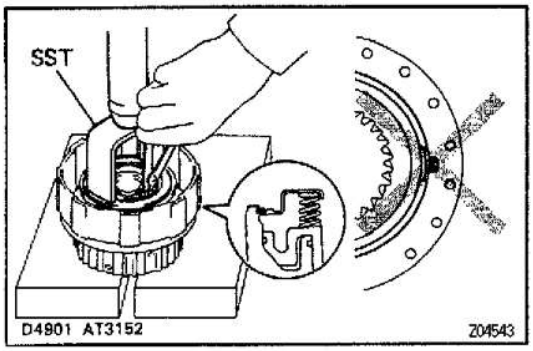
Coat a new O–ring with ATF and install it on the forward clutch drum.

3. INSTALL FORWARD CLUTCH PISTON

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



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

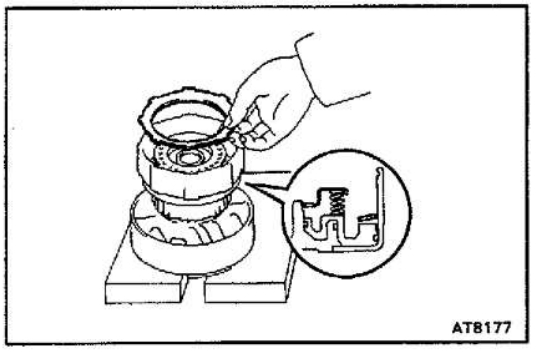


4. INSTALL PISTON RETURN SPRING

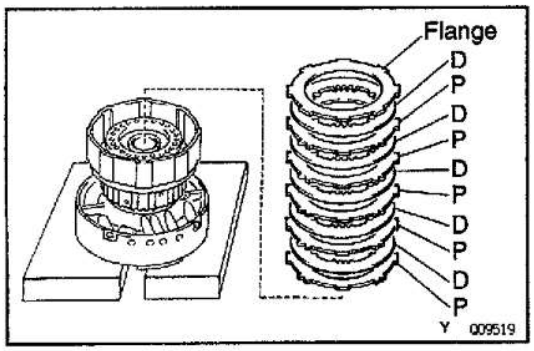
(a) Install the piston return spring.

(b) Place SST on the spring retainer, and compress the return spring with a press.
SST 09350–30020 (09350–07040)

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



5. INSTALL CUSHION PLATE ROUNDED END DOWN, AS SHOWN



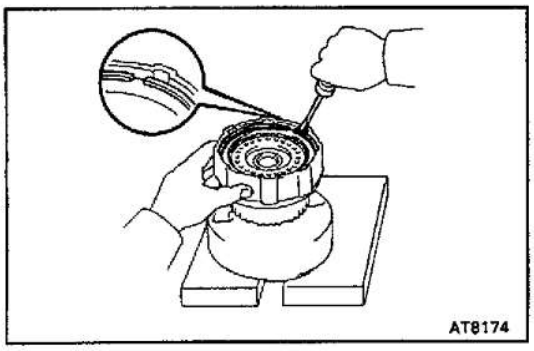
6. INSTALL PLATES, DISCS AND FLANGE

(a) Install in order: P = Plate D = Disc
3RZ–FE
P–D–P–D–P–D–P–D–P–D
5VZ–FE, 1KZ–FE
P–D–P–D–P–D–P–D–P–D–P–D

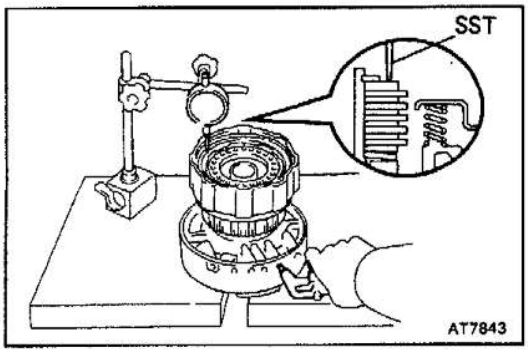
(b) And then install the flange, the rounded edge facing downward.
HINT: There are 8 different thicknesses for the flange.
Flange thickness

mm (in.)

No.	Thickness	No.	Thickness
61	3.0 (0.118)	44	3.8 (0.150)
60	3.2 (0.126)	42	4.0 (0.157)
45	3.4 (0.134)	63	4.2 (0.165)
62	3.6 (0.142)	64	4.4 (0.173)



(c) Install the snap ring with a screwdriver. Be sure the end gap of the snap ring is not aligned with the cutout portion of the forward clutch drum.



7. CHECK PACK CLEARANCE OF FORWARD CLUTCH

Using SST and a dial indicator, measure the forward clutch piston stroke while applying and releasing compressed air (392–785 kPa, 4–8 kgf/cm², 57–114 psi).

SST 09350–30020 (09350–06120)

Pack clearance:

5VZ–FE, 1KZ–TE:

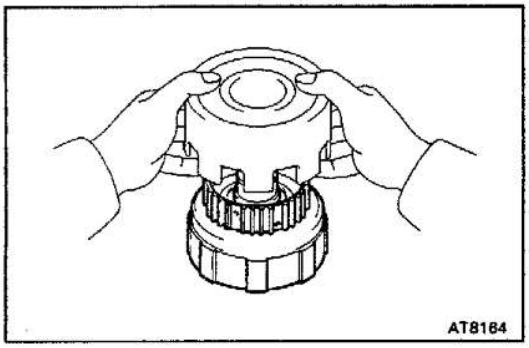
0.60 – 1.00 mm (0.0236 – 0.0394 in.)

3RZ–FE:

0.50 – 0.90 mm (0.0197 – 0.0354 in.)

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

AT

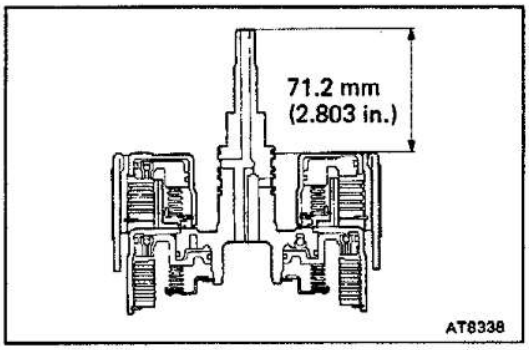


8. INSTALL DIRECT CLUTCH TO FORWARD CLUTCH

(a) Make sure that the thrust washer is installed to the direct clutch drum.

(b) Align the flukes of discs in the direct clutch.

(c) Install the direct clutch onto the forward clutch.

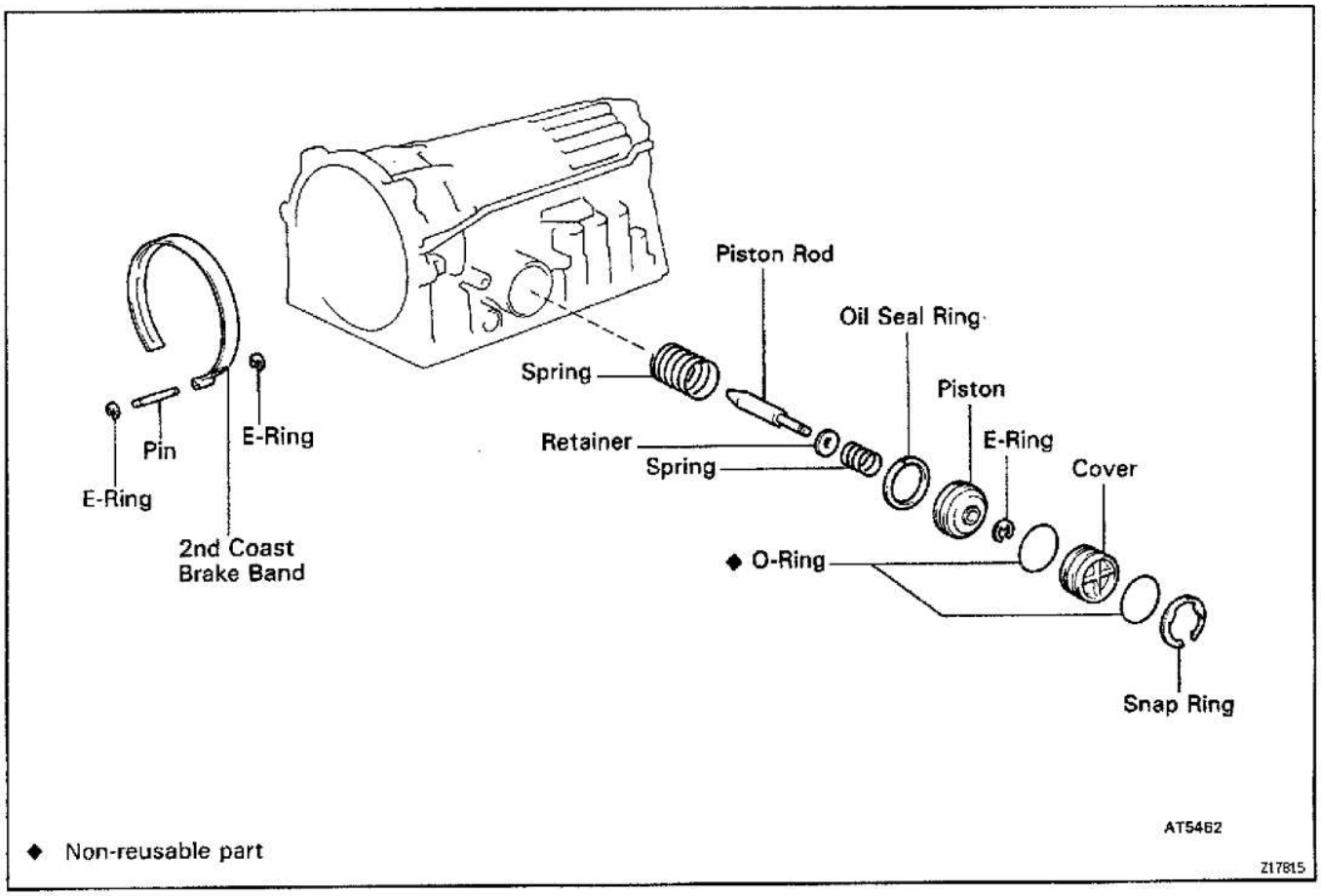


(d) Check that the distance from the direct clutch end to the forward clutch end is 71.2 mm (2.803 in.).
If the distance is less than the above value, parts may have been assembled incorrectly, check and reassemble again.

SECOND COAST BRAKE
COMPONENTS

AX0AG–0C

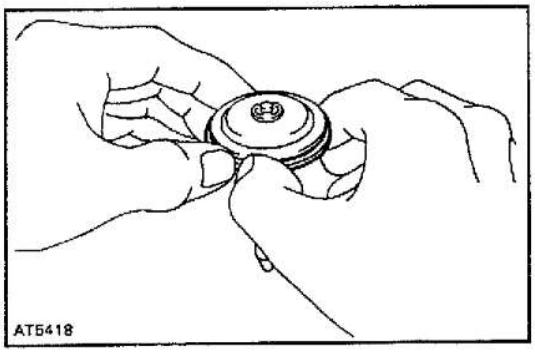
AT



◆ Non-reusable part

Z17815

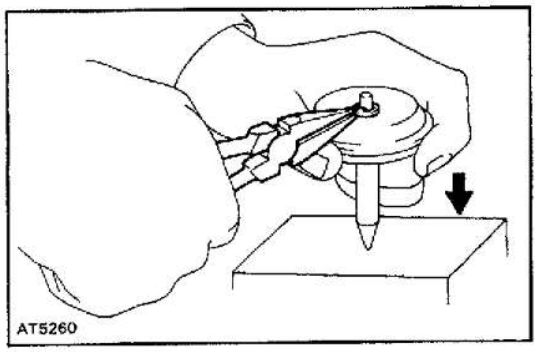
AT14H–02



2ND COAST BRAKE DISASSEMBLY

1. REMOVE 2ND COAST BRAKE PISTON OIL SEAL RING

Remove the oil seal ring from the piston.

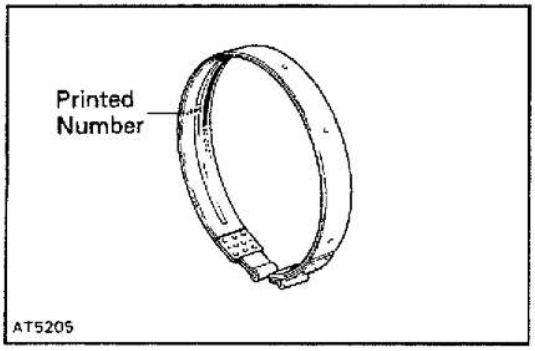


2. REMOVE 2ND COAST BRAKE PISTON ROD

(a) Firmly hold down the piston, then compress the compression spring.

(b) Using needle nose–pliers, remove the E–ring.

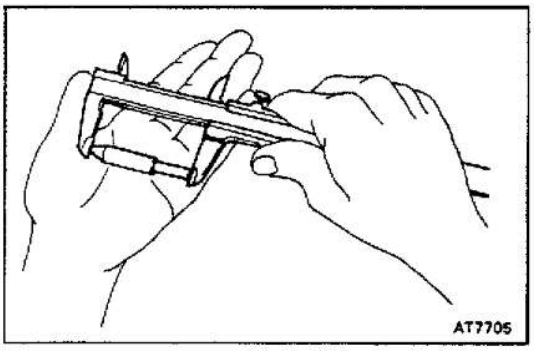
(c) Remove the compression spring, retainer and piston rod.



2ND COAST BRAKE BAND INSPECTION AXDAJ~0D

INSPECT BRAKE BAND

If the lining of the brake band is peeling off or discolored, or even part of the printed numbers are defaced, replace the brake band.



2ND COAST BRAKE PISTON ASSEMBLY AXDAK~0G

1. SELECT PISTON ROD

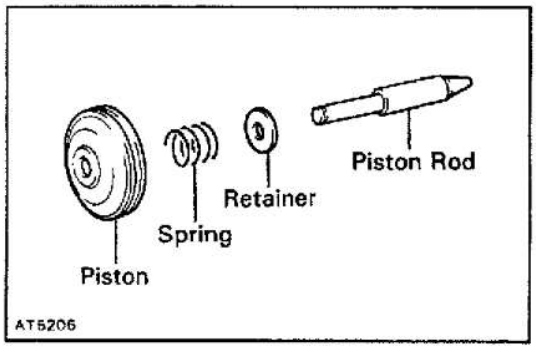
If the band is OK with piston stroke not within the standard value, select a new piston rod.

There are 2 different lengths of piston rod.

Piston rod length:

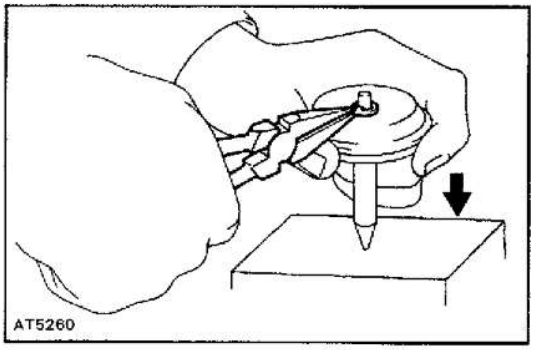
71.4 mm (2.811 in.)

72.9 mm (2.870 in.)



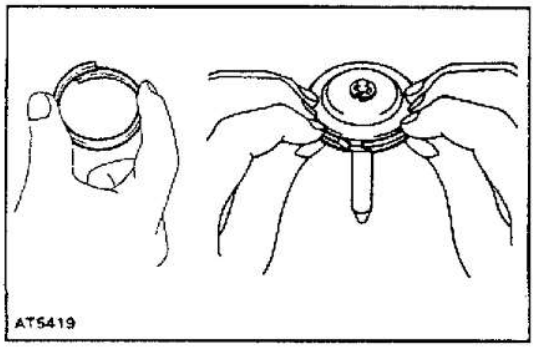
2. INSTALL PISTON ROD

(a) Install the retainer, compression spring and piston to the piston rod.



(b) Firmly hold down the piston, then compress the compression spring.

(c) Using needle—nose pliers, install the E—ring.



3. INSTALL 2ND COAST BRAKE PISTON OIL SEAL RING

(a) Coat a oil seal ring with ATF.

(b) Install the oil seal ring to the piston groove, then snug it down by squeezing its ends together.

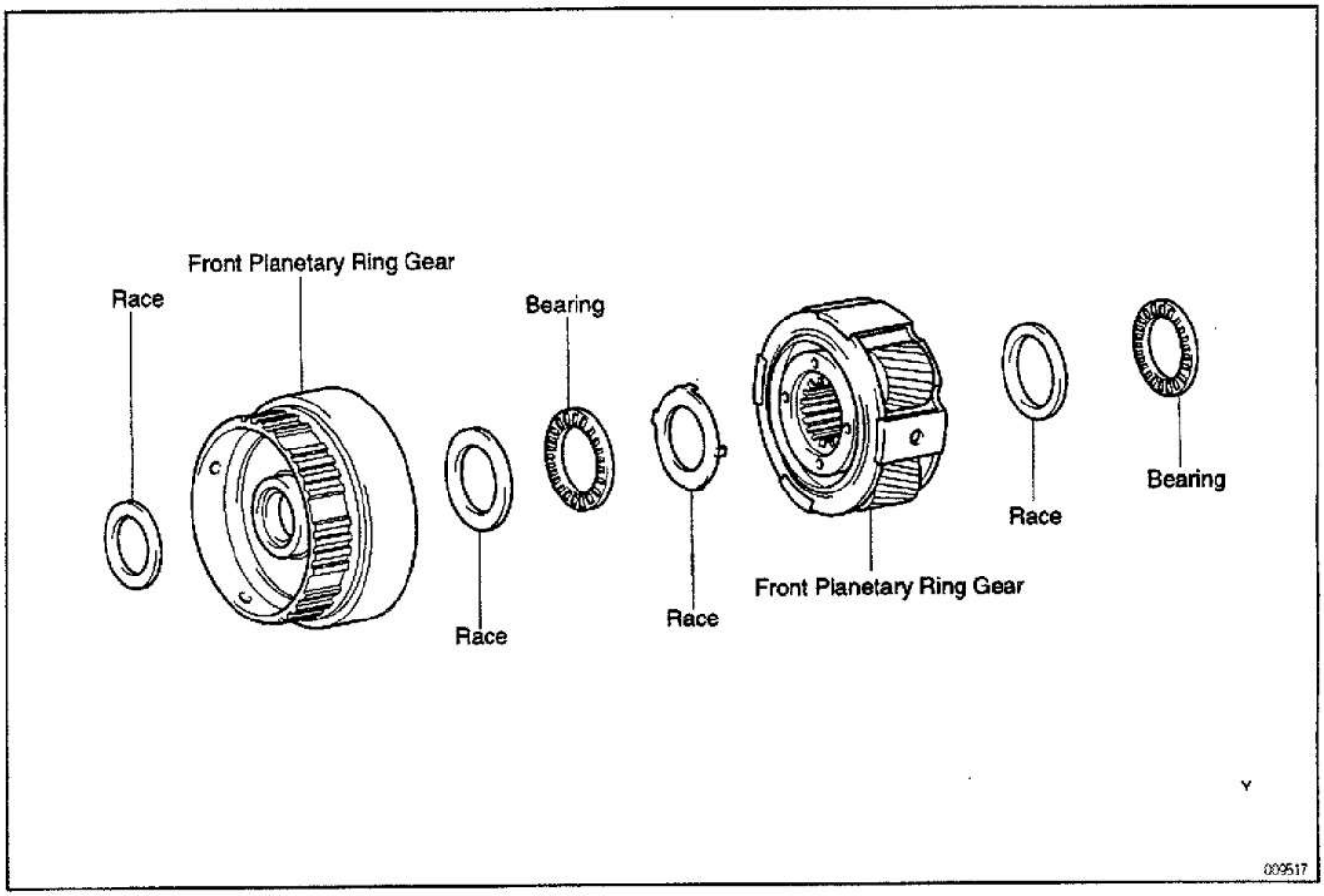
NOTICE: Do not spread the ring ends more than necessary.

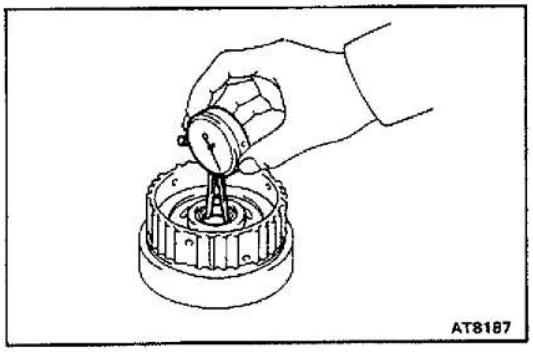
FRONT PLANETARY GEAR

COMPONENTS

AT06T–05

AT

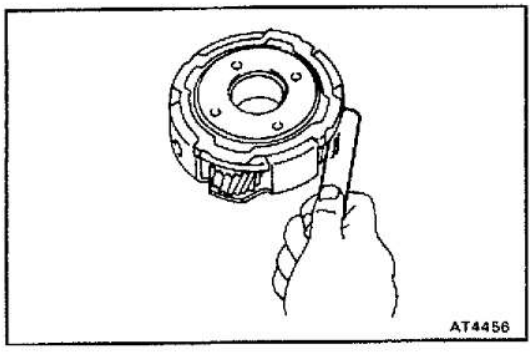




FRONT PLANETARY GEAR INSPECTION

AT06U–06

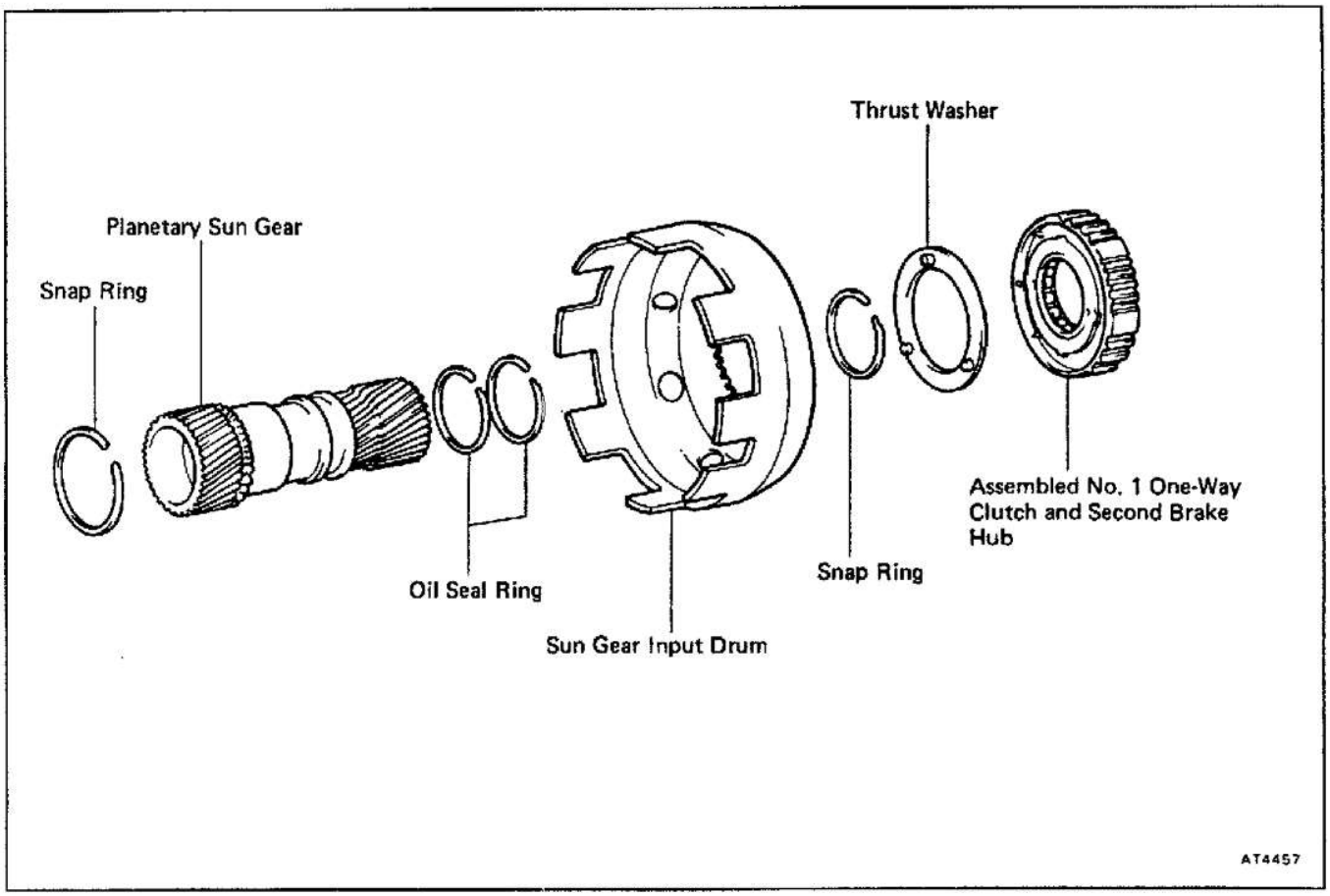
1. **CHECK FRONT PLANETARY RING GEAR BUSHING**
Using a dial indicator, measure the inside diameter of the planetary ring gear bushing.
Maximum inside diameter: 24.08 mm (0.9480 in.)
If the inside diameter is greater than the maximum, replace the planetary ring gear.

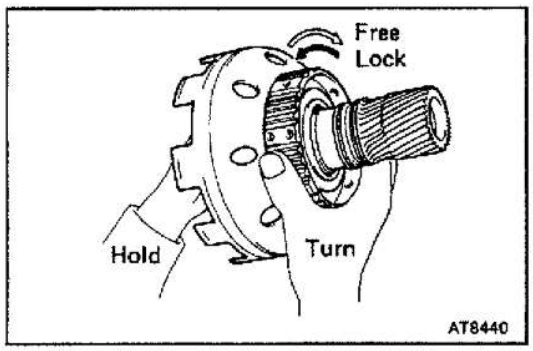


2. **MEASURE PLANETARY PINION GEAR THRUST CLEARANCE**
Using a feeler gauge, measure the planetary pinion gear thrust clearance.
Standard clearance:
0.20 – 0.60 mm (0.0079 – 0.0236 in.)
Maximum clearance: 1.00 mm (0.0394 in.)
If the clearance is greater than the maximum, replace the planetary gear assembly.

PLANETARY SUN GEAR
COMPONENTS

AT08V-05

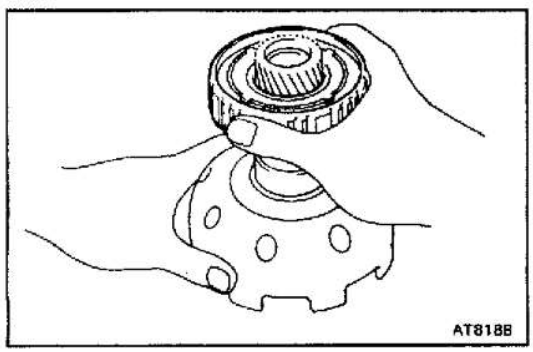




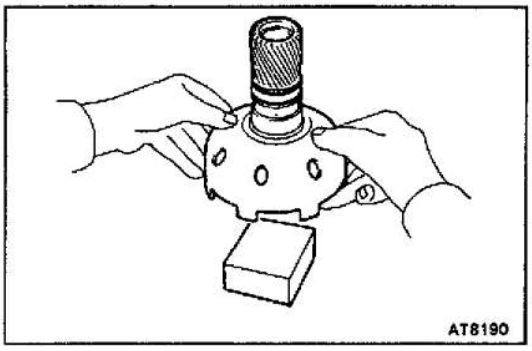
AT14J-02

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

1. **CHECK OPERATION OF NO.1 ONE–WAY CLUTCH**
   Hold the planetary sun gear and turn the 2nd brake hub. Check that the 2nd brake hub must be able to turn freely clockwise and locks counterclockwise.

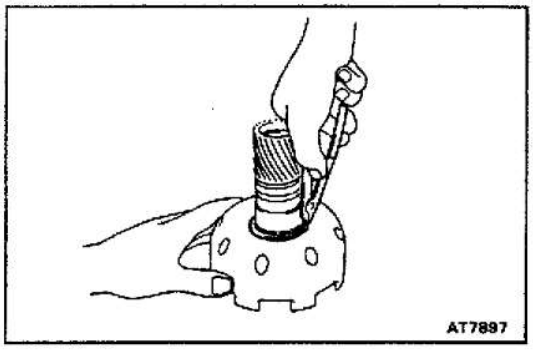


2. **REMOVE ASSEMBLED NO.1 ONE–WAY CLUTCH AND 2ND BRAKE HUB**
3. **REMOVE THRUST WASHER FROM SUN GEAR INPUT DRUM**
4. **REMOVE 2 OIL SEAL RINGS**



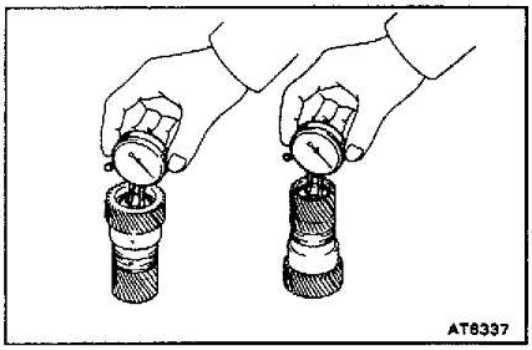
5. REMOVE SUN GEAR INPUT DRUM FROM PLANETARY SUN GEAR

(a) Use a wooden block or similar, as work stand.



(b) Using snap ring pliers, remove the snap ring.
(c) Remove the sun gear input drum from the planetary sun gear.

6. REMOVE SNAP RING FROM PLANETARY SUN GEAR



PLANETARY SUN GEAR INSPECTION

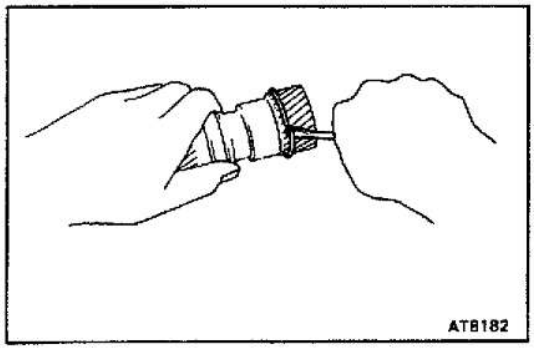
AT09K-05

CHECK PLANETARY SUN GEAR BUSHINGS

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

Maximum inside diameter: 27.08 mm (1.0661 in.)

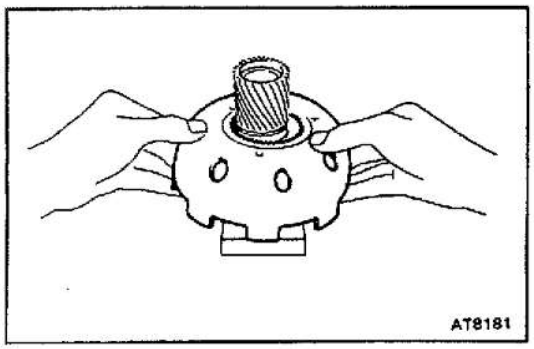
If the inside diameter is greater than the maximum, replace the planetary sun gear.



PLANETARY SUN GEAR AND NO.1 ONE-WAY CLUTCH ASSEMBLY

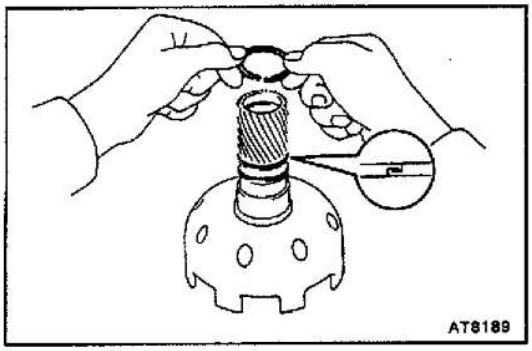
AT14K-02

1. INSTALL SNAP RING TO PLANETARY SUN GEAR



2. INSTALL SUN GEAR INPUT DRUM

(a) Place a wooden block or similar, as a work stand and place the planetary sun gear onto it.
(b) Install the sun gear input drum onto the planetary sun gear.
(c) Install the snap ring with snap ring pliers.



3. INSTALL OIL SEAL RINGS

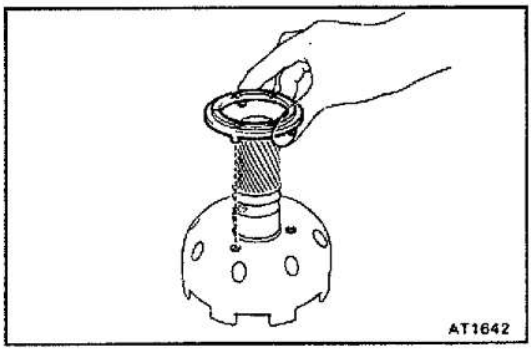
(a) Coat 2 oil seal rings with ATF.

(b) Install the 2 oil seal rings onto the planetary sun gear.

NOTICE: Do not spread the ring ends too much.

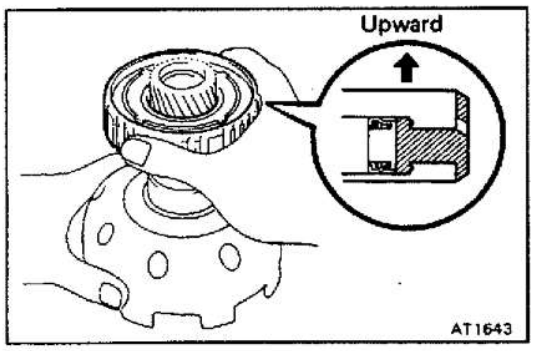
HINT: After installing the oil seal rings, check that they rotate smoothly.

AT

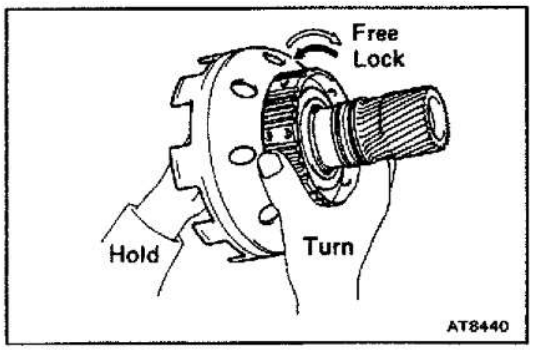


4. INSTALL THRUST WASHER

HINT: Make sure that the lug shapes match the holes on the sun gear input drum.



5. INSTALL ASSEMBLED NO.1 ONE–WAY CLUTCH AND 2 ND BRAKE HUB ONTO PLANETARY SUN GEAR



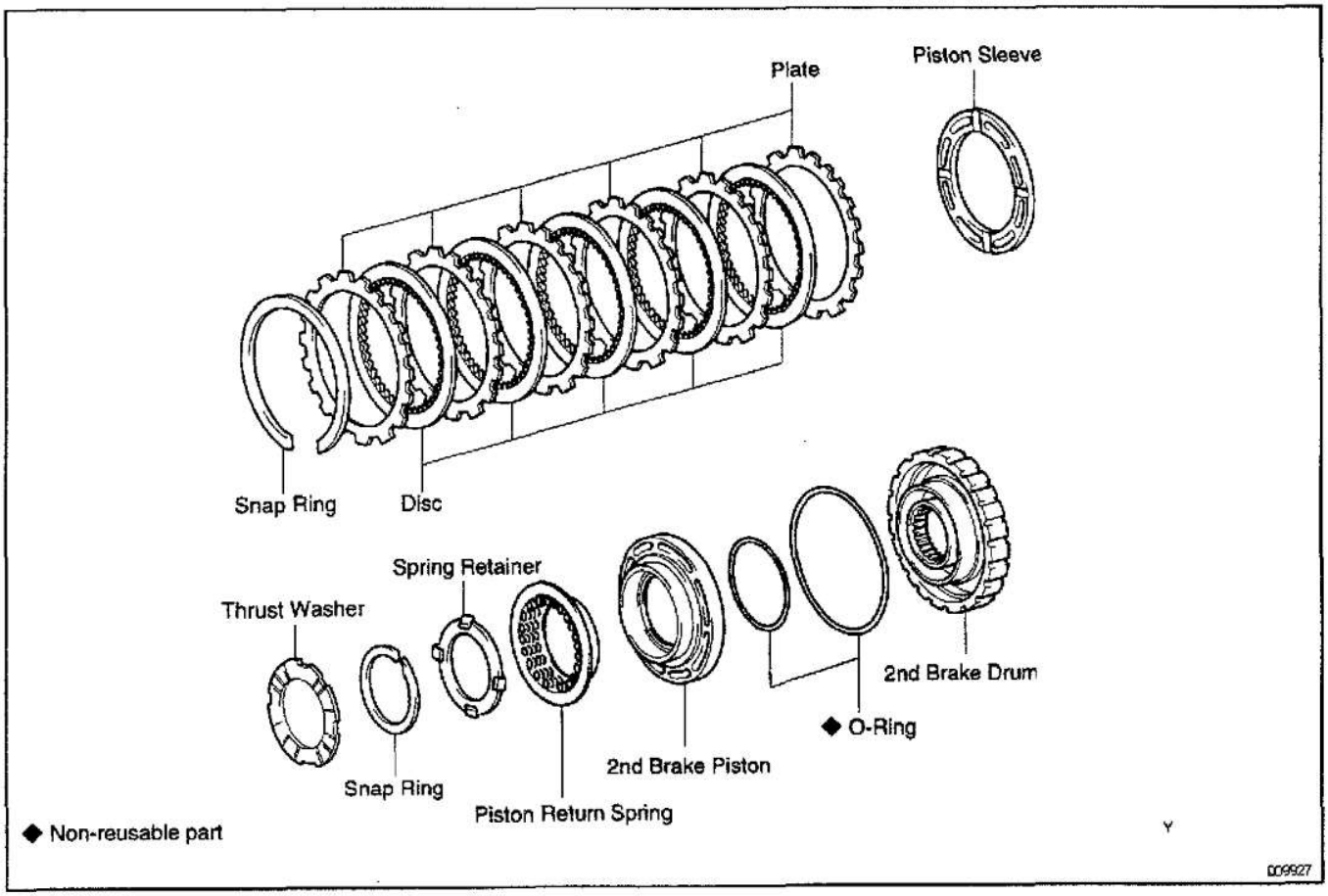
6. CHECK OPERATION OF NO.1 ONE–WAY CLUTCH

Hold the planetary sun gear and turn the 2nd brake hub. Check that the 2nd brake hub must be able to turn freely clockwise and locks counterclockwise.

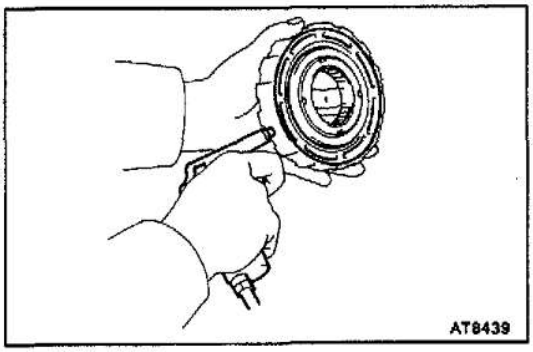
SECOND BRAKE
COMPONENTS

AT062–07

AT

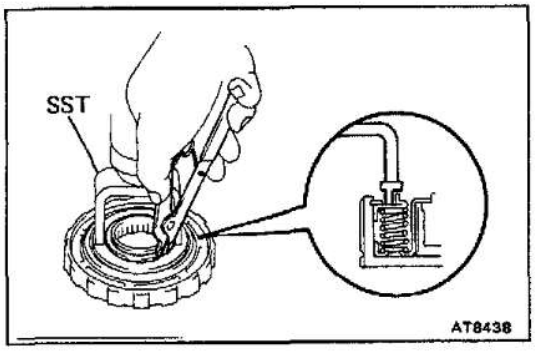


AT14L–02

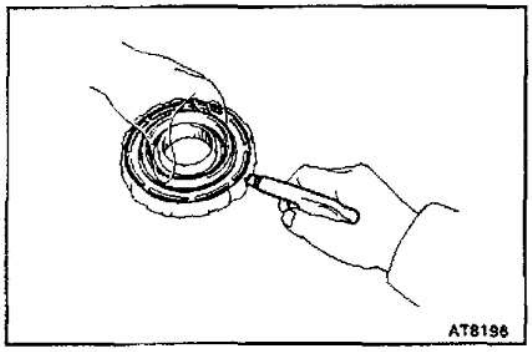


2ND BRAKE DISASSEMBLY

1. **REMOVE THRUST WASHER FROM 2 ND BRAKE DRUM**
2. **CHECK 2ND BRAKE PISTON MOVEMENT**
   Make sure the 2 nd brake piston moves smoothly when applying and releasing low – pressure compressed air to the 2nd brake drum.



3. **REMOVE PISTON RETURN SPRING**
   (a) Place SST on the spring retainer, and compress the return spring with a press.
   SST 09350–30020 (09350–07040)
   (b) Using snap ring pliers, remove the snap ring.
   (c) Remove the spring retainer.
   (d) Remove the piston return spring.

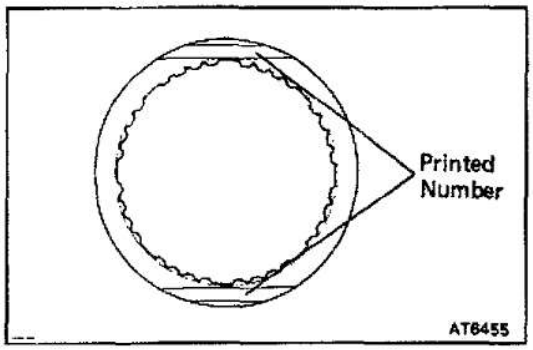


4. REMOVE 2ND BRAKE PISTON

(a) Hold the 2nd brake piston with hand, apply compressed air to the 2nd brake drum to remove the 2nd brake piston.

(b) Remove the 2nd brake piston.
HINT: If the piston is at an angle and cannot be removed, press down on the side jutting out and again apply compressed air, or else wind vinyl tape around the piston end and remove it with needle–nose pliers.

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



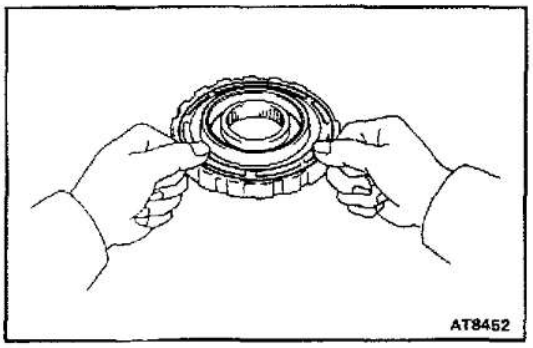
AT081–09

2ND BRAKE INSPECTION

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 a part of the printed numbers are defaced, replace all discs.



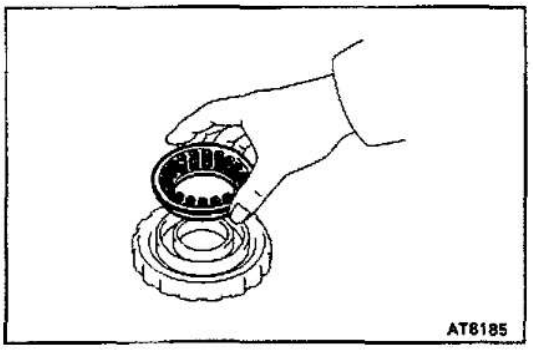
AT082–08

2ND BRAKE ASSEMBLY

1. INSTALL 2ND BRAKE PISTON

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

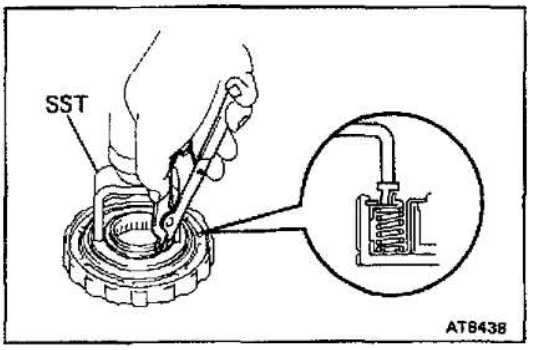
(b) Being careful not to damage the O–rings, press the 2nd brake piston into the 2nd brake drum with both hands.



2. INSTALL PISTON RETURN SPRING

(a) Install the piston return spring.

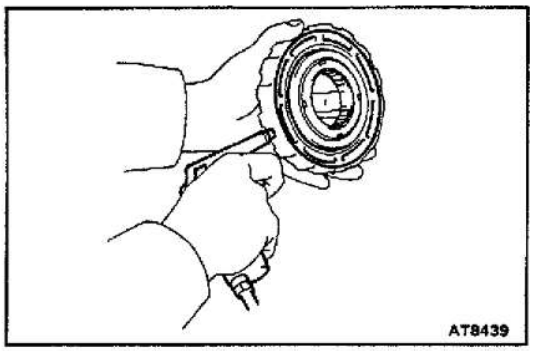
(b) Install the spring retainer.



(c) Place SST on the spring retainer, and compress the return spring with a press.
SST 09350–30020 (09350–07040)

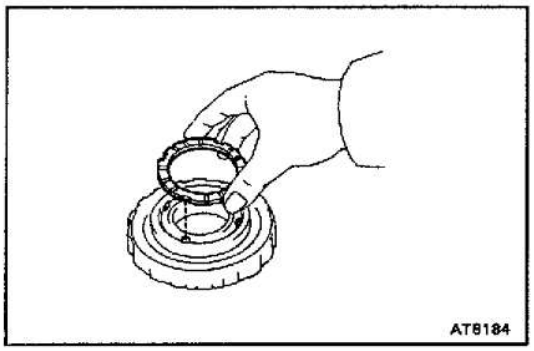
(d) Using snap ring pliers, install the snap ring.

AT



3. CHECK 2ND BRAKE PISTON MOVEMENT

Make sure the 2nd brake piston moves smoothly when applying and releasing low — pressure compressed air to the 2nd brake drum.



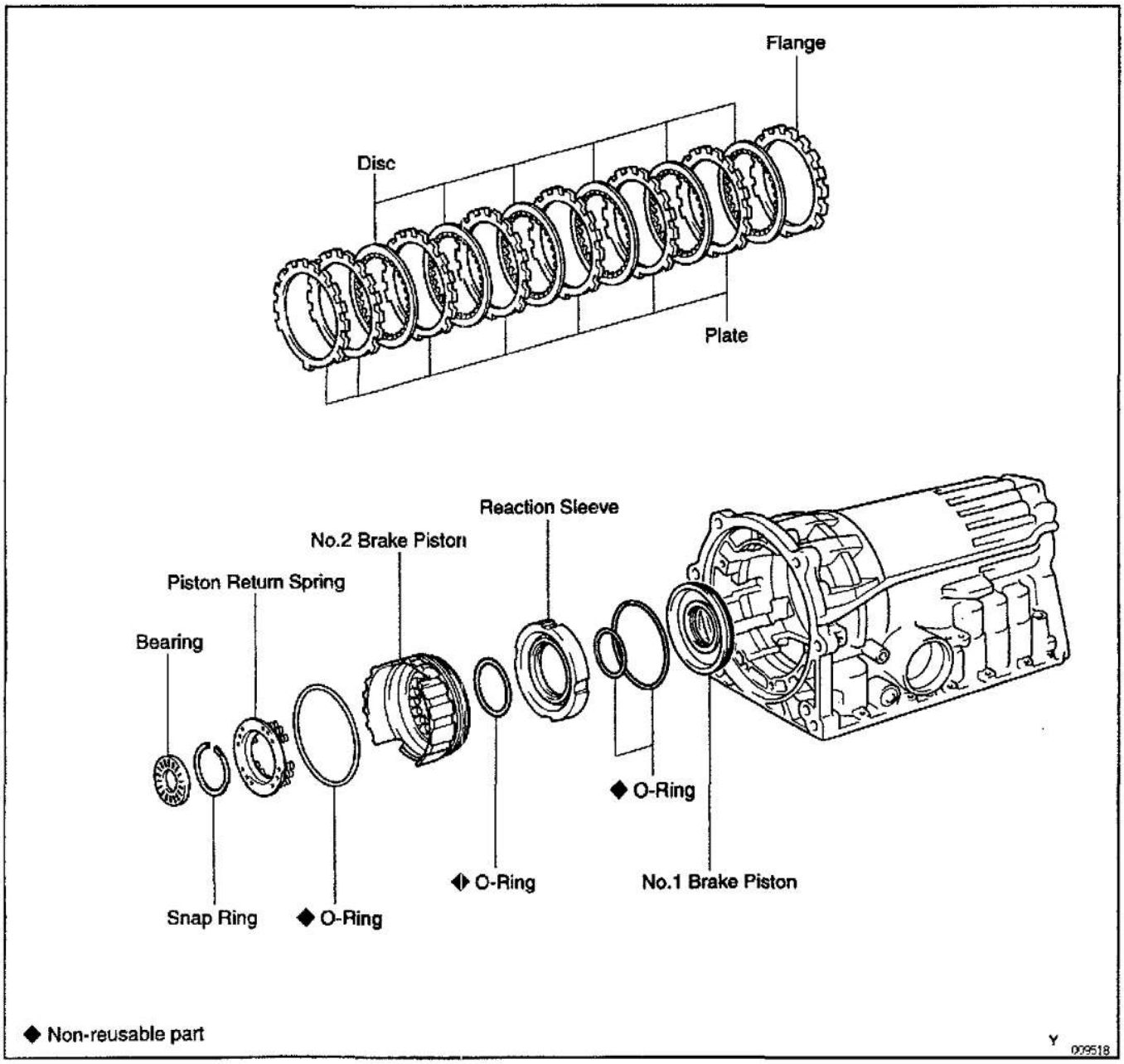
4. INSTALL THRUST WASHER

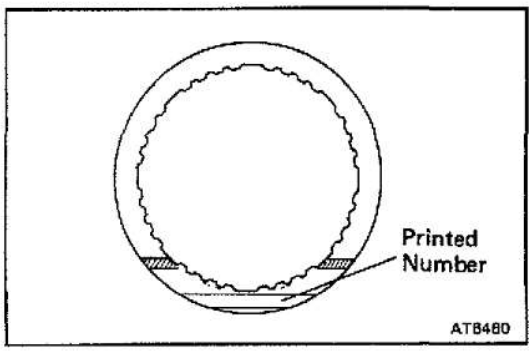
Coat the thrust washer with petroleum jelly and install it.

HINT: Make sure that the cutout portions of thrust washer match teeth of the spring retainer.

FIRST AND REVERSE BRAKE
COMPONENTS

AT063-07





1ST AND REVERSE BRAKE INSPECTION

AT064-06

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.

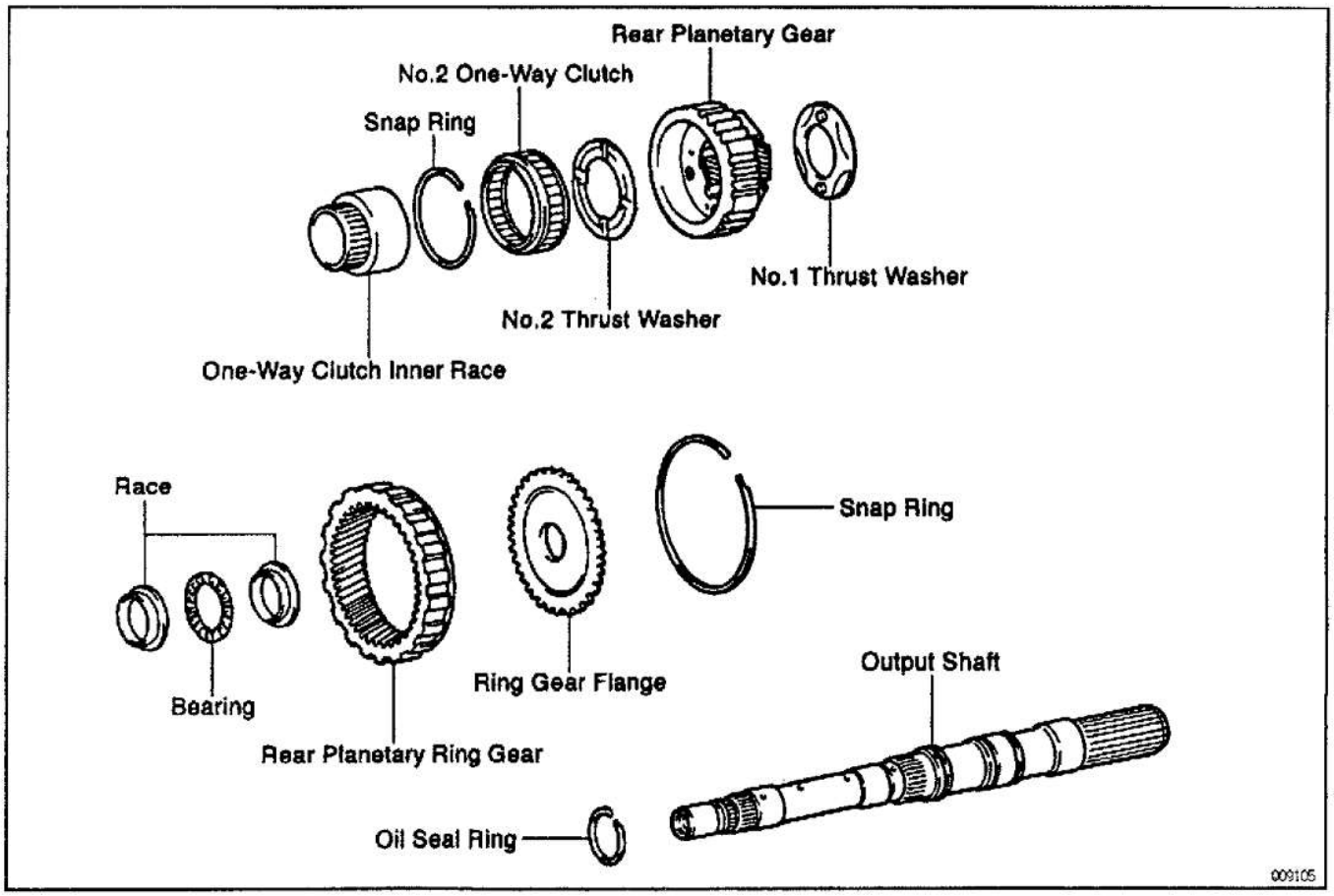
HINT: If the lining of the disc is peeling off or discolored, or even if a part of the printed numbers are defaced, replace all discs.

REAR PLANETARY GEAR

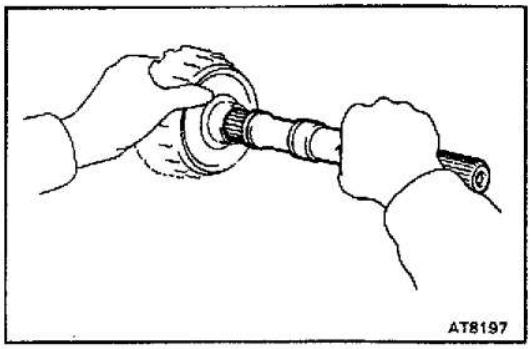
COMPONENTS

AT068-05

AT

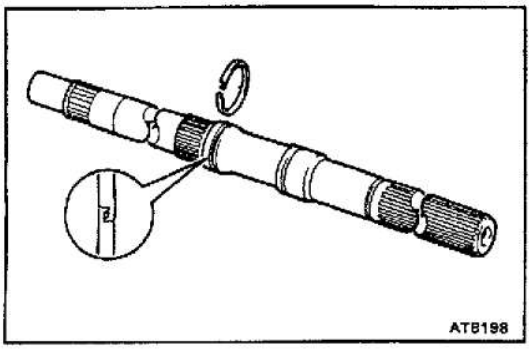


AT14M-02

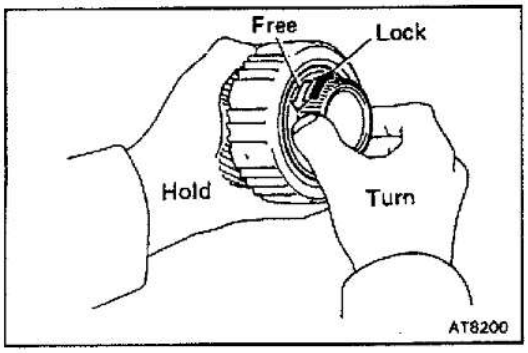


REAR PLANETARY GEAR, NO.2 ONE-WAY CLUTCH AND OUTPUT SHAFT DISASSEMBLY

1. REMOVE OUTPUT SHAFT FROM REAR PLANETARY GEAR ASSEMBLY

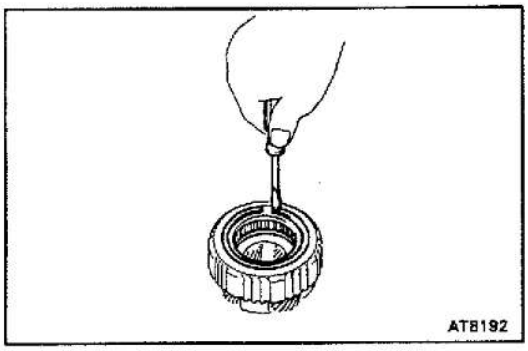


2. REMOVE OIL SEAL RING FROM OUTPUT SHAFT
3. REMOVE REAR PLANETARY GEAR FROM REAR PLANETARY RING GEAR



4. CHECK OPERATION OF NO.2 ONE-WAY CLUTCH

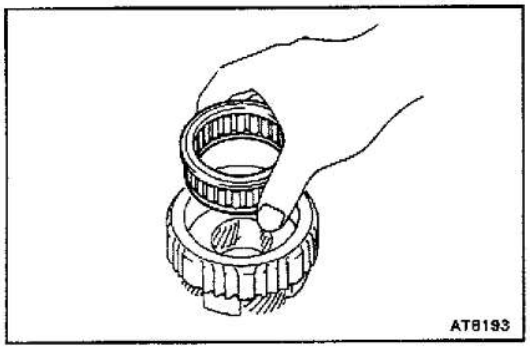
Hold the planetary gear and turn the one-way clutch inner race. Check that the one-way clutch inner race must be able to turn freely counterclockwise and locks clockwise.



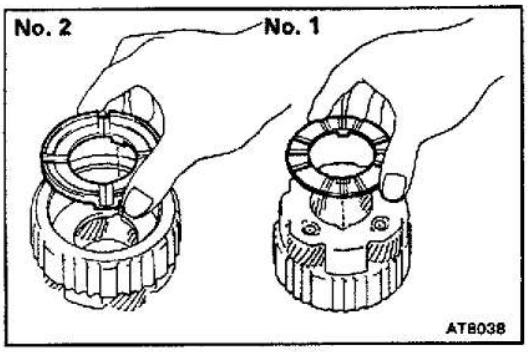
5. REMOVE NO.2 ONE-WAY CLUTCH

(a) Remove the one-way clutch inner race from the rear planetary gear.

(b) Remove the snap ring with a screwdriver.

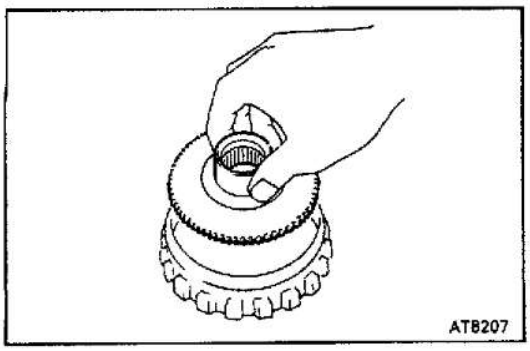


(c) Remove the No. 2 one-way clutch with retainers from the planetary gear.



6. REMOVE NO.2 AND NO.1 THRUST WASHERS

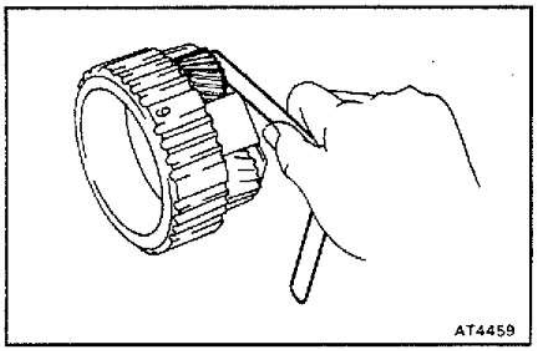
7. REMOVE RACES AND BEARING FROM REAR PLANETARY RING GEAR



8. REMOVE RING GEAR FLANGE

(a) Remove the snap ring with a screwdriver.

(b) Remove the ring gear flange.



AT

REAR PLANETARY GEAR INSPECTION

AT067-06

MEASURE PLANETARY PINION GEAR THRUST CLEARANCE

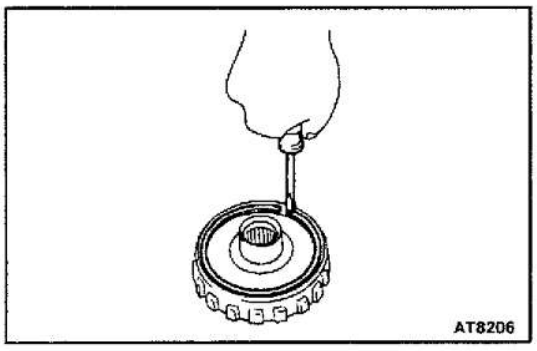
Using a feeler gauge, measure the planetary pinion gear thrust clearance.

Standard clearance:

0.20 — 0.60 mm (0.0079 — 0.0236 in.)

Maximum clearance: 1.00 mm (0.0394 in.)

If the clearance is greater than the maximum, replace the planetary gear assembly.



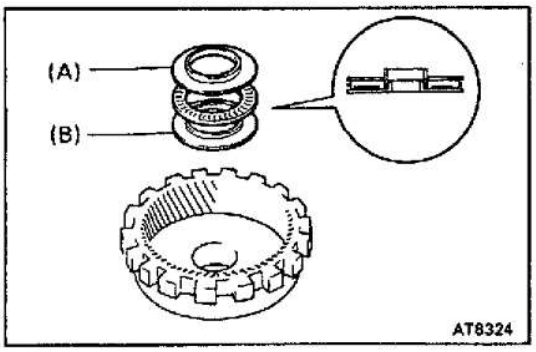
REAR PLANETARY GEAR, NO.2 ONE-WAY CLUTCH AND OUTPUT SHAFT ASSEMBLY

AT14N-02

1. INSTALL RING GEAR FLANGE

(a) Install the ring gear flange.

(b) Using a screwdriver, ist washers with petroleum jelly.



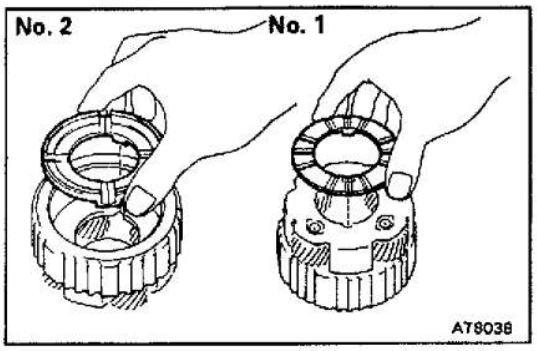
2. INSTALL RACES AND BEARING

Coat the races and bearing with petroleum jelly, and install them onto the rear planetary ring gear.

Races and bearing diameter:

mm (in.)

	Inside	Outside
Race (A)	28.8 (1.134)	44.8 (1.764)
Bearing	30.1 (1.185)	44.7 (1.760)
Race (B)	27.8 (1.094)	44.8 (1.764)

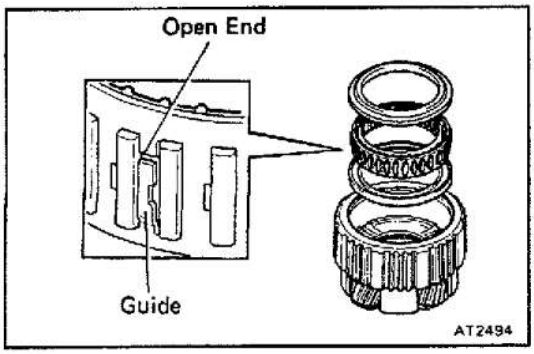


3. INSTALL NO.1 AND NO.2 THRUST WASHERS

(a) Coat the thrust washers with petroleum jelly.

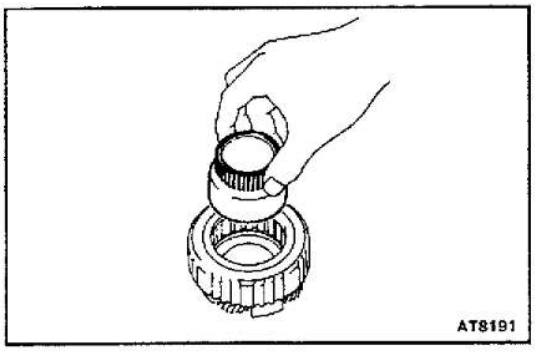
(b) Install the thrust washers onto both sides of the rear planetary gear.

HINT: Make sure that the lug shapes match the cut out protions on the rear planetary gear.

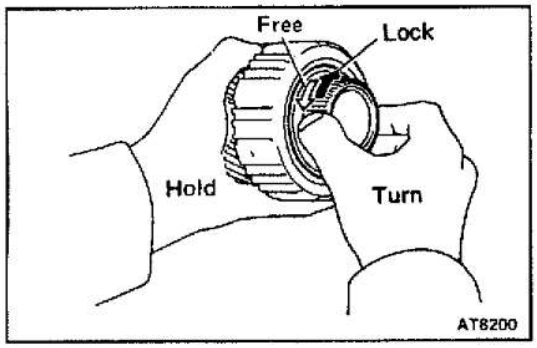


4. INSTALL NO.2 ONE–WAY CLUTCH

(a) Install the one–way clutch and 2 retainers into the rear planetary gear.
HINT: Make sure that the open ends of the guides on the one–way clutch are faced upward.

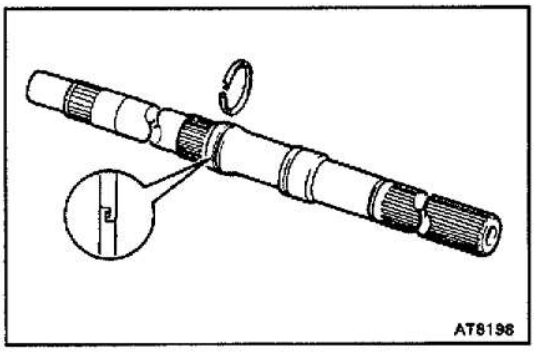


(b) Using a screwdriver, install the snap ring.
(c) While turning counterclockwise, install the one–way clutch inner race to rear planetary gear.

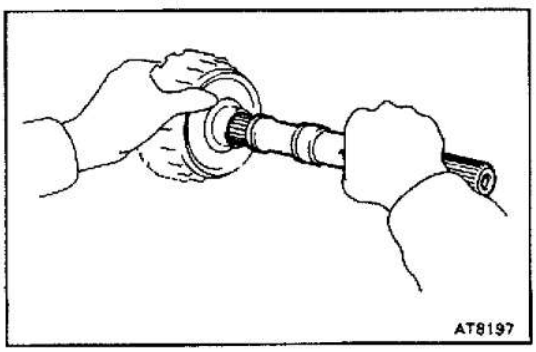


5. CHECK OPERATION OF NO.2 ONE–WAY CLUTCH
Hold the planetary gear and turn the one–way clutch inner race. Check that the one–way clutch inner race must be able to turn freely counterclockwise and locks clockwise.

6. INSTALL REAR PLANETARY GEAR ONTO REAR PLANETARY RING GEAR



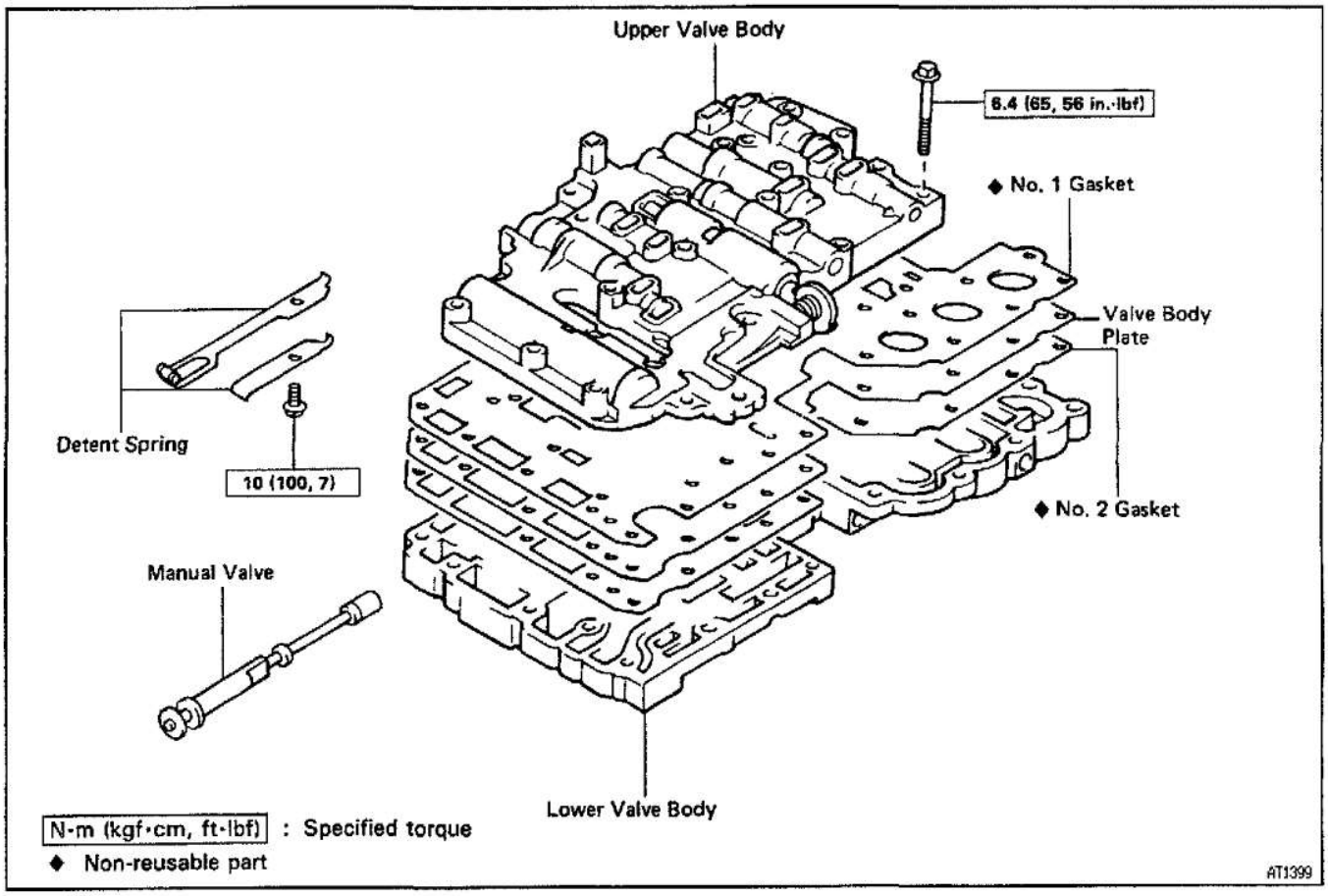
7. INSTALL OIL SEAL RING
Coat oil seal ring with ATF and install it to the output shaft.
NOTICE: Do not spread the ring ends too match.
HINT: After installing the oil seal ring, check that it rotates smoothly.



8. INSTALL OUTPUT SHAFT INTO REAR PLANETARY GEAR ASSEMBLY

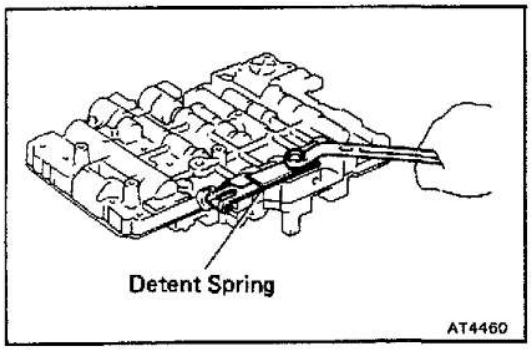
VALVE BODY
COMPONENTS

AT

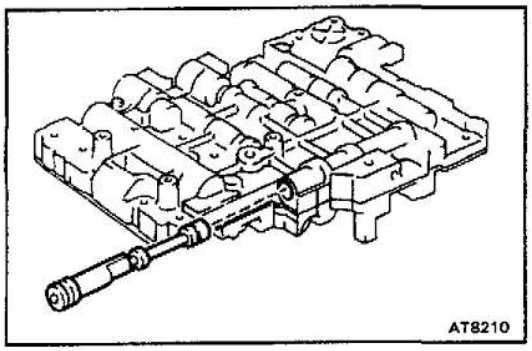


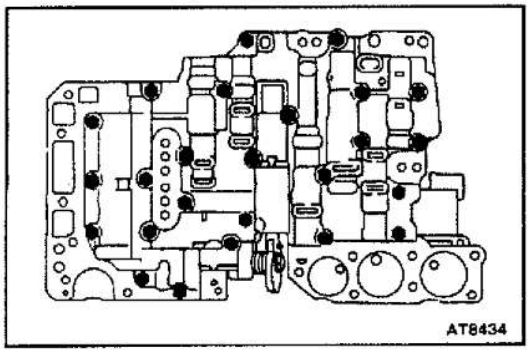
VALVE BODY DISASSEMBLY

1. UNBOLT AND REMOVE DETENT SPRING

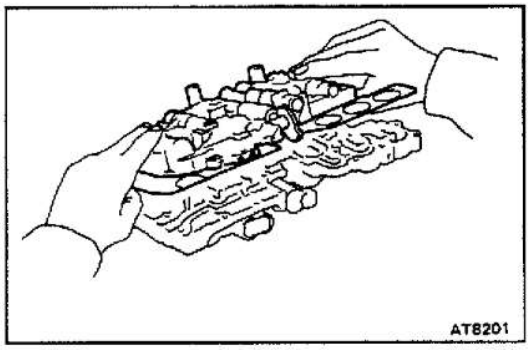


2. REMOVE MANUAL VALVE





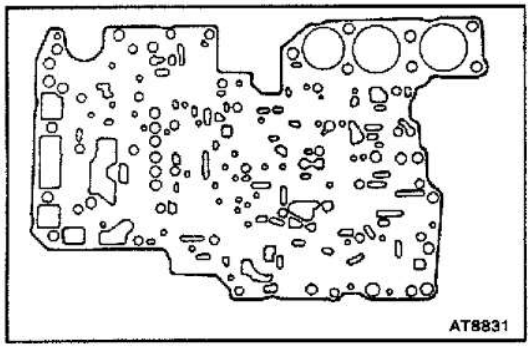
3. **TURN OVER ASSEMBLY AND REMOVE 25 BOLTS**



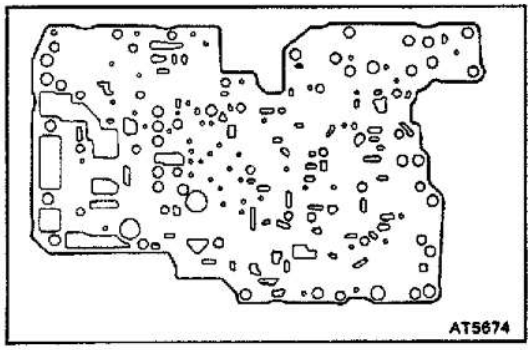
4. **LIFT OFF UPPER VALVE BODY AND PLATE AS A SINGLE UNIT**
Hold the valve body plate to the upper valve body.
HINT: Be careful that the check balls and strainer do not fall out.

VALVE BODY ASSEMBLY

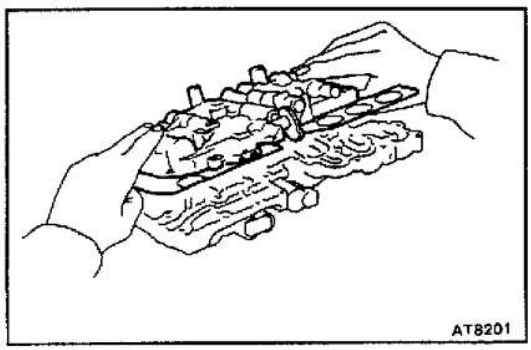
AT068-04



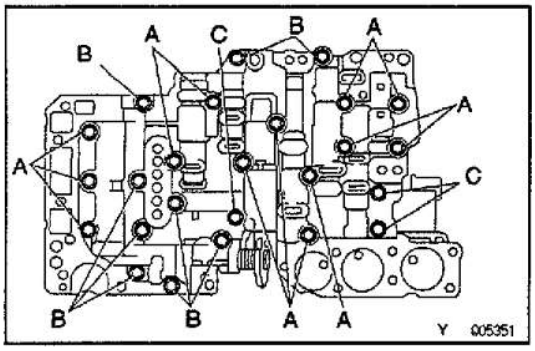
1. **POSITION NEW NO.1 GASKET ON UPPER VALVE BODY**
Align a new No.1 gasket at each bolt hole.
2. **POSITION VALVE BODY PLATE ON NO.1 GASKET**
Align the plate at each bolt hole.



3. **POSITION NEW NO.2 GASKET ON PLATE**
Align a new No.2 gasket at each bolt hole.



4. **PLACE UPPER VALVE BODY WITH PLATE AND GASKETS ON TOP OF LOWER VALVE BODY**
Align each bolt hole and gasket in the valve body.



5. INSTALL 25 BOLTS TO UPPER VALVE BODY

HINT: Each bolt length is indicated below.

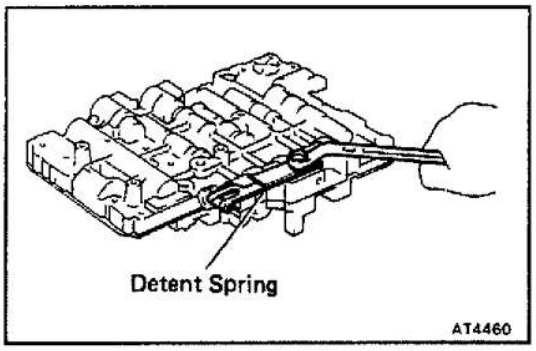
Torque: 6.4 N·m (65 kgf·cm, 56 in.·lbf)

Bolt length:

Bolt A: 38 mm (1.50 in.)

Bolt B: 20 mm (0.79 in.)

Bolt C: 28 mm (1.10 in.)



6. INSTALL MANUAL VALVE

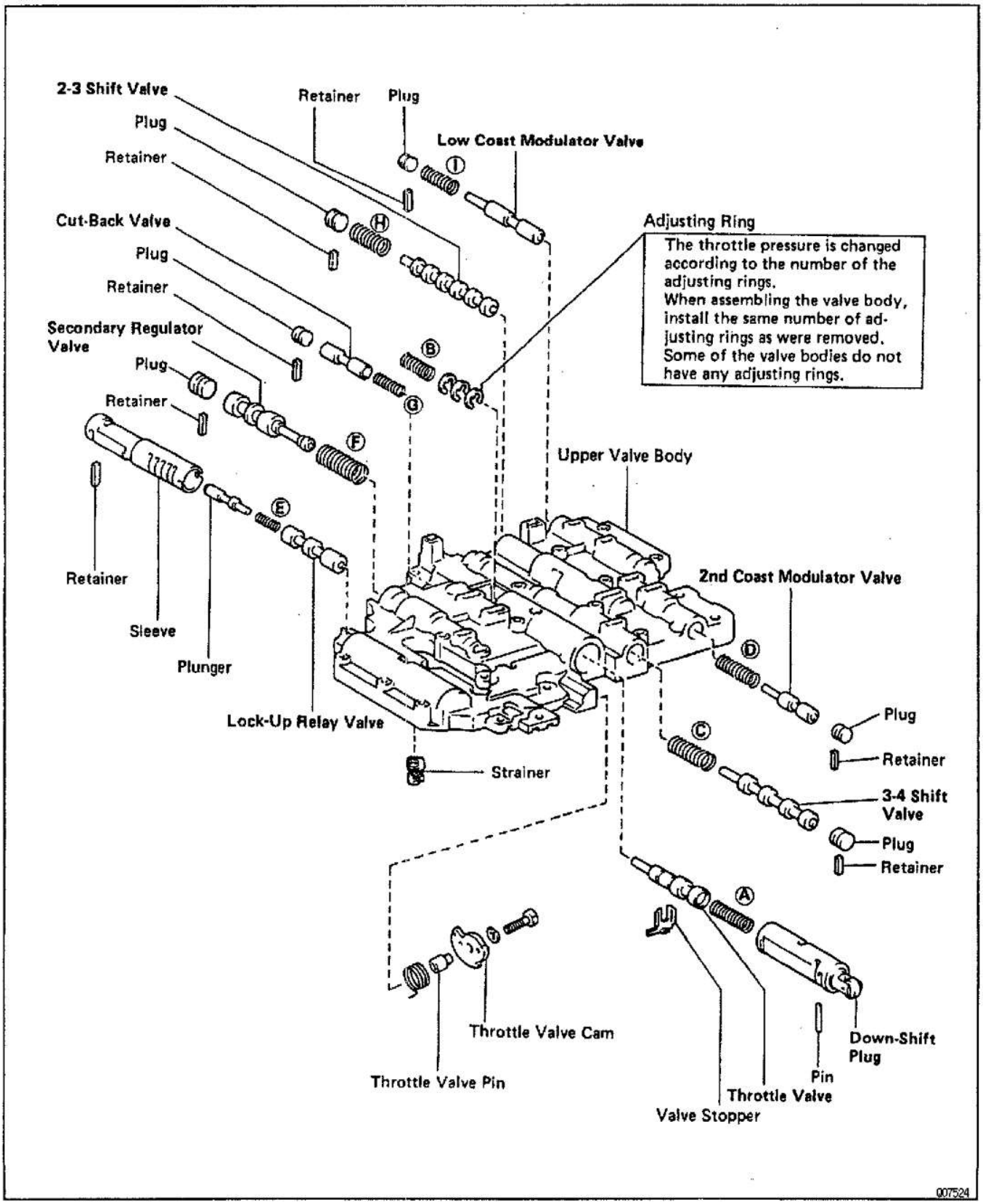
7. INSTALL DETENT SPRING

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

8. MAKE SURE MANUAL VALVE MOVES SMOOTHLY

UPPER VALVE BODY
COMPONENTS

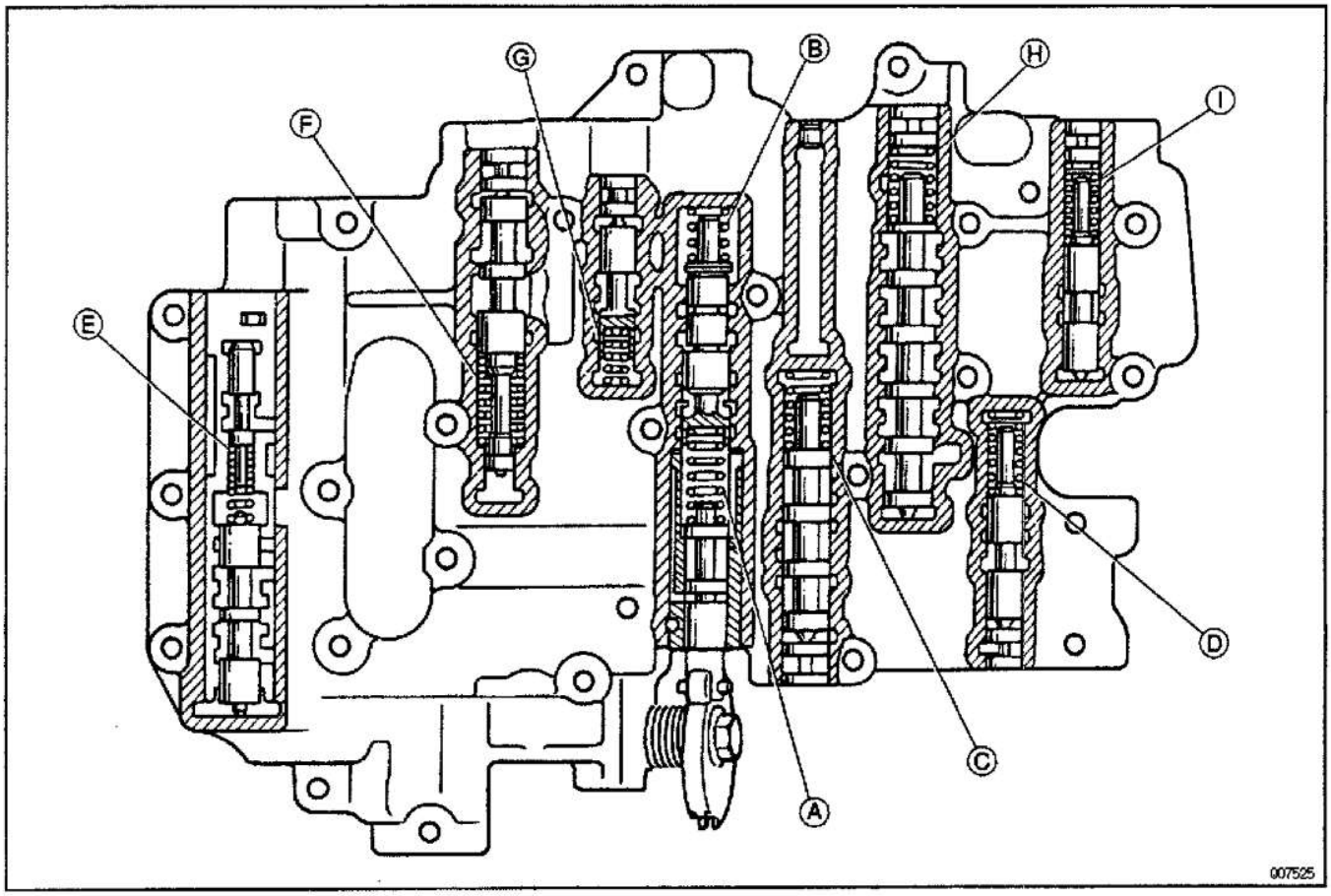
AT06C-05



VALVE BODY SPRING SPECIFICATIONS

AT06D–06

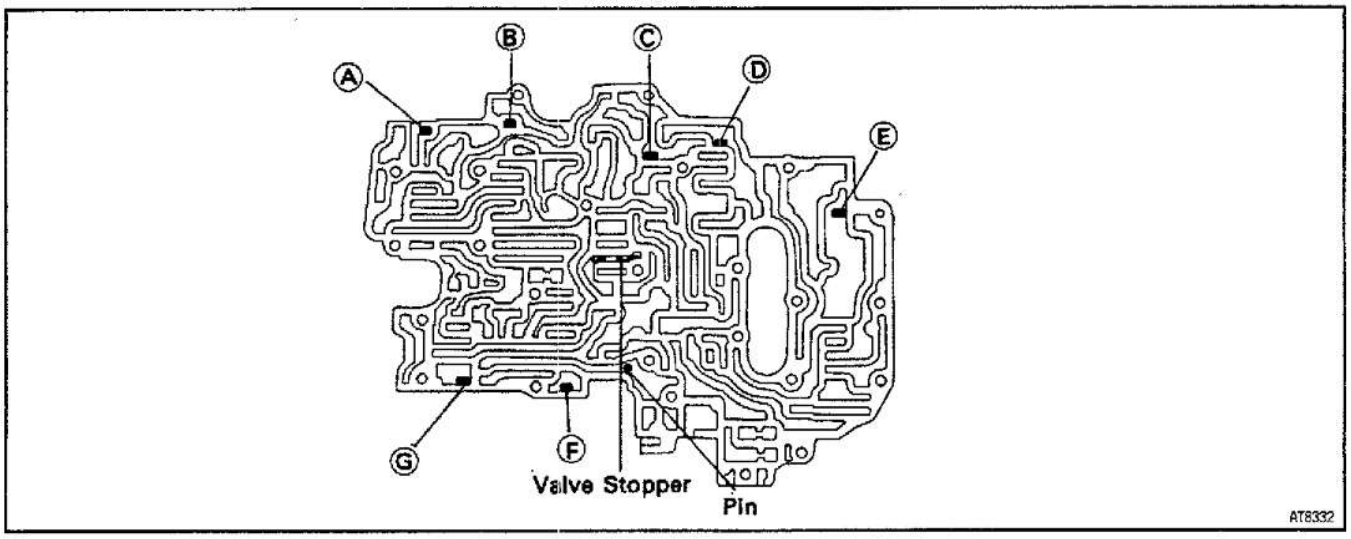
HINT: During reassembly please refer to the spring specifications below to help you to identify the different springs.



Mark	Name	Free length / Outer diameter mm(in.)	Color
Ⓐ	Down–shift plug	27.3 (1.075) / 8.7 (0.343)	Yellow
Ⓑ	Throttle valve	20.6 (0.811) / 9.2 (0.362) or 23.3 (0.917) / 9.2(0.362)	Blue White
Ⓒ	3–4 shift valve	30.8 (1.213) / 9.7 (0.382)	Purple
Ⓓ	2nd coast modulator valve	25.3 (0.996) / 8.6 (0.339)	Orange
Ⓔ	Lock–up relay valve	21.4 (0.843) / 5.5 (0.217)	Light Gray
Ⓕ	Secondary regulator valve	30.9 (1.217) / 11.2 (0.441)	Blue
Ⓖ	Cut–back valve	21.8 (0.858) / 6.0 (0.236)	Red
Ⓗ	2–3 Shift valve	30.8 (1.213) / 9.7 (0.382)	Blue
Ⓘ	Low coast modulator valve	30.4 (1.197) / 8.3 (0.327)	Light Green

RETAINERS, PIN, STOPPER, CHECK BALLS AND STRAINER LOCATION A106E-08

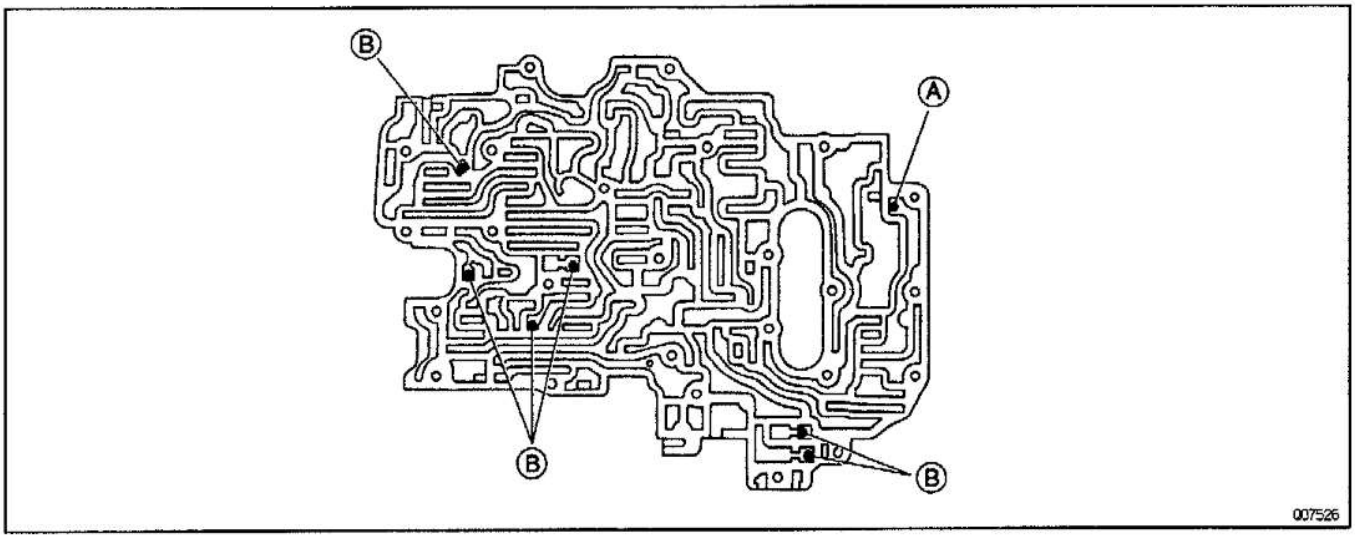
1. RETAINER, STOPPER AND PIN



Mark	Retainer	Height / Width / Thickness mm (in.)
Ⓐ	Low coast modulator valve	14.5 (0.571) / 5.0 (0.197) / 3.2 (0.126)
Ⓑ	2–3 shift valve	14.0 (0.551) / 5.0 (0.197) / 3.2 (0.126)
Ⓒ	Cut–back valve	15.0 (0.591) / 5.0 (0.197) / 3.2 (0.126)
Ⓓ	Secondary regulator valve	14.0 (0.551) / 5.0 (0.197) / 3.2 (0.126)
Ⓔ	Lock–up relay valve	21.2 (0.835) / 5.0 (0.197) / 3.2 (0.126)
Ⓕ	3–4 shift valve	16.5 (0.650) / 6.0 (0.236) / 3.2 (0.126)
Ⓖ	2nd coast modulator valve	16.5 (0.650) / 6.0 (0.236) / 3.2 (0.126)

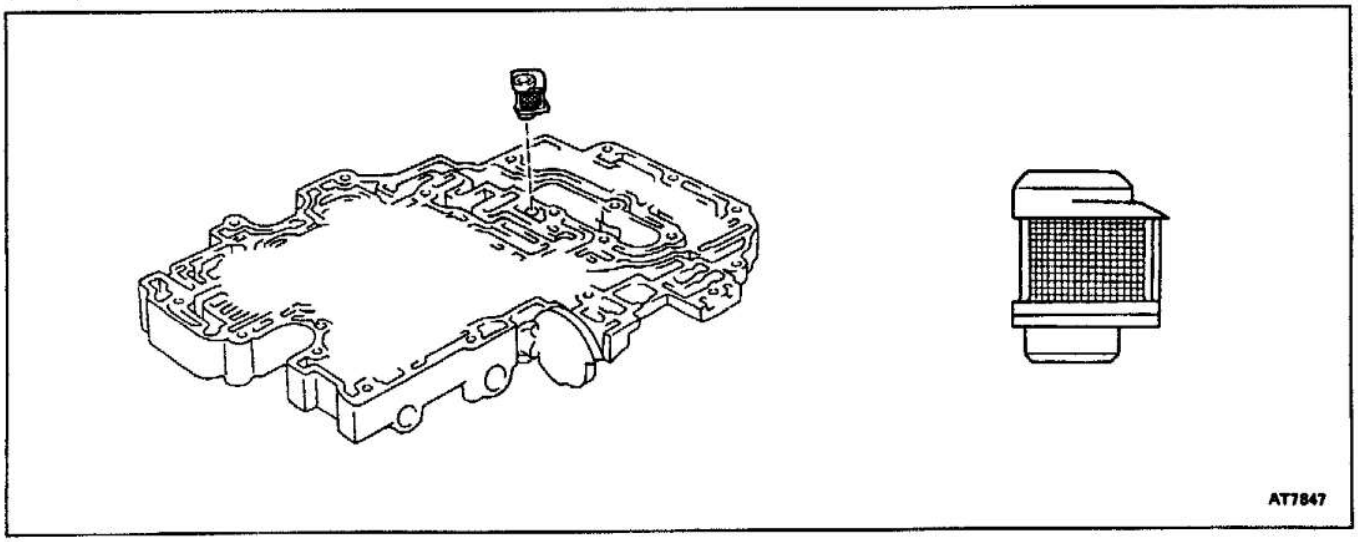
2. CHECK BALL

AT



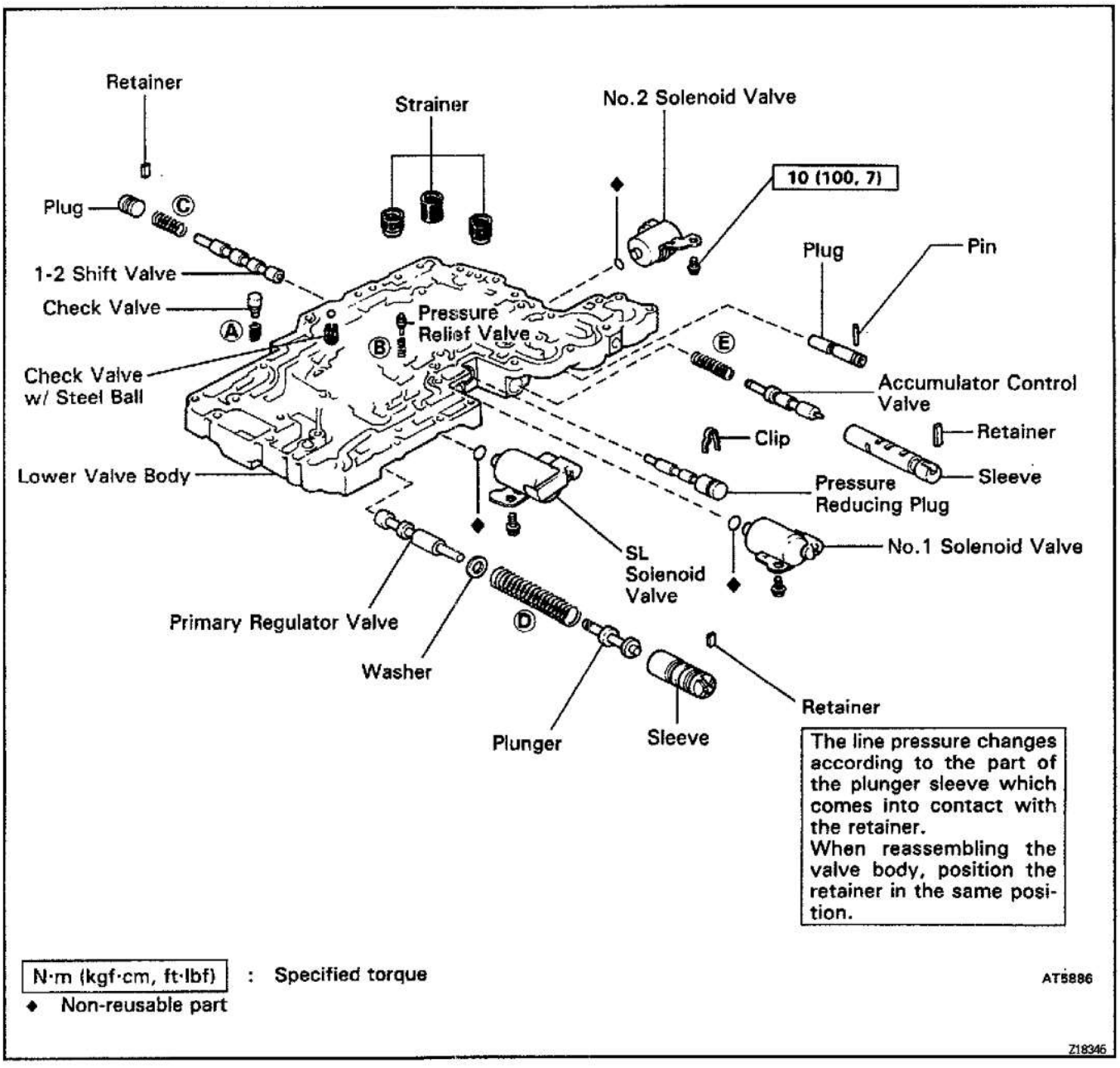
Mark	Check ball	Diameter mm (in.)
Ⓐ	Rubber ball	6.35 (0.2500)
Ⓑ	Rubber ball	5.45 (0.2181)

3. STRAINER



LOWER VALVE BODY
COMPONENTS

AT06F–05

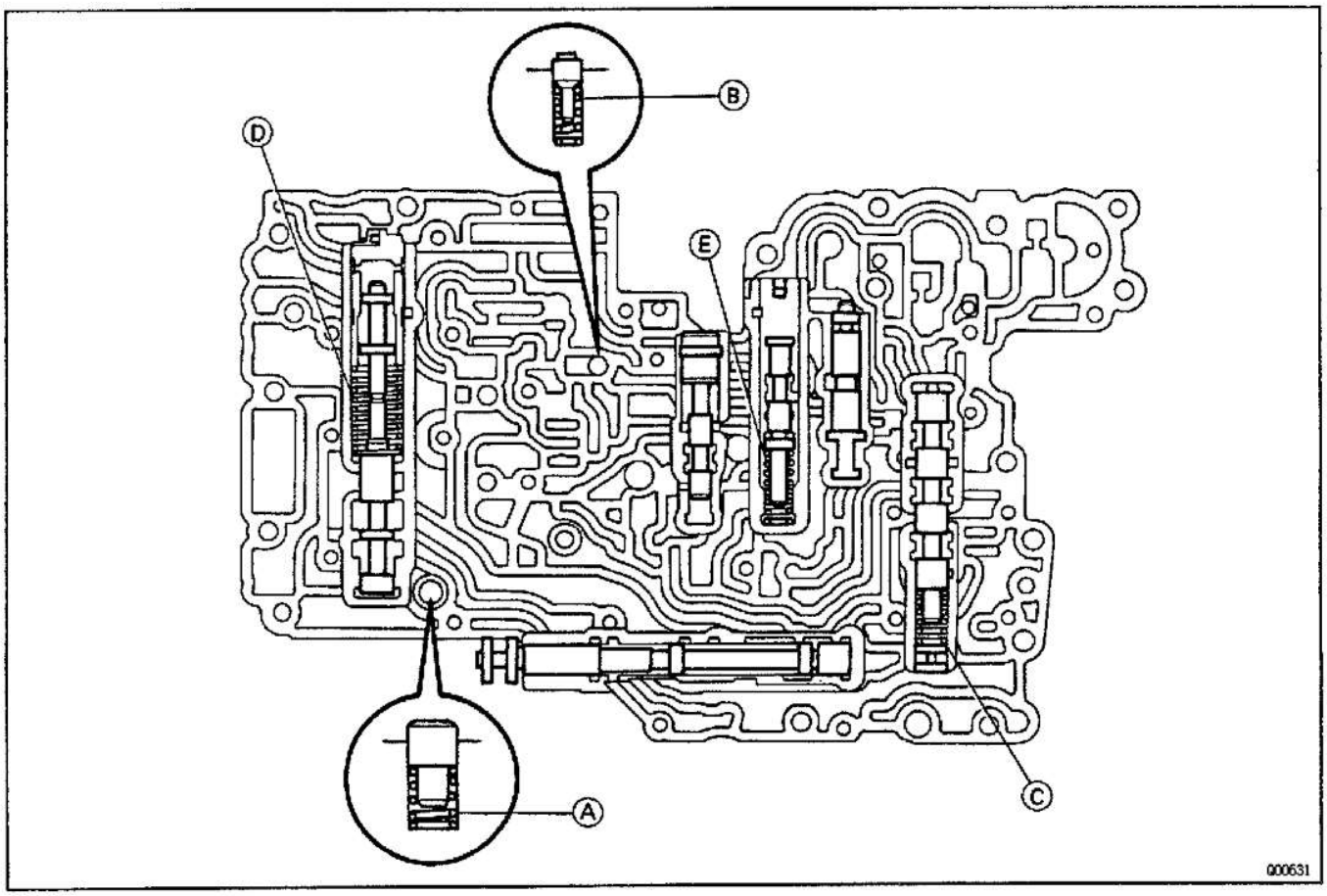


AT0GG–07

VALVE BODY SPRING SPECIFICATIONS

HINT: During reassembly please refer to the spring specifications below to help you to identify the different springs.

AT

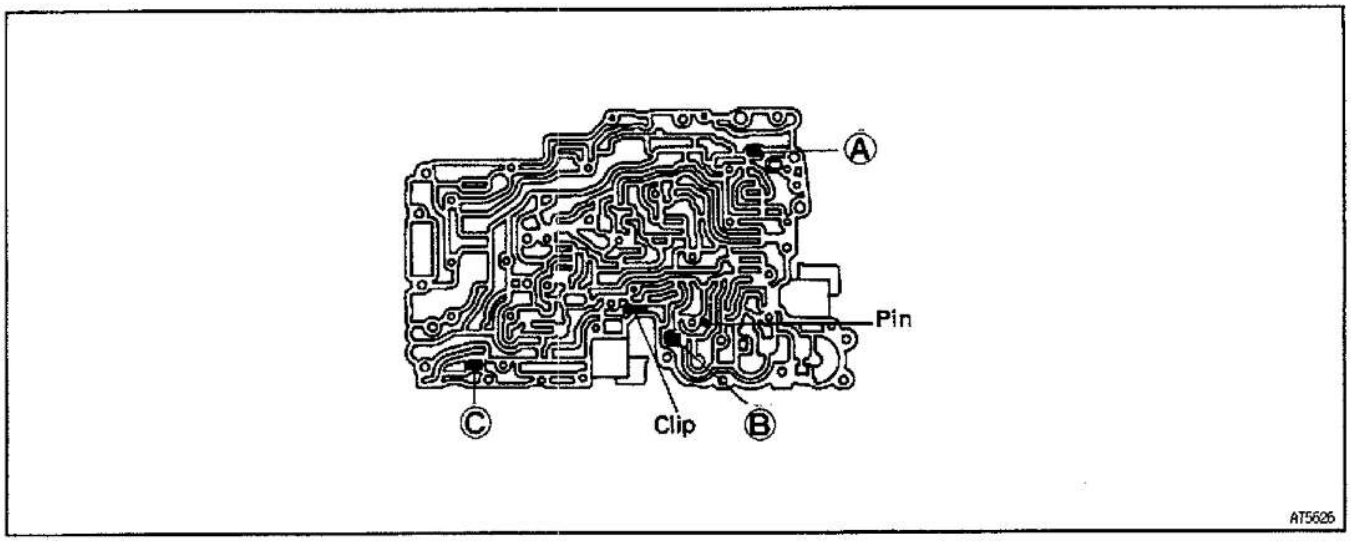


Mark	Name	Free length / Outer diameter mm(in.)	Color
Ⓐ	Check valve	20.2 (0.796) / 12.1 (0.476)	None
Ⓑ	Pressure relief valve	11.2 (0.441) / 6.4 (0.252)	None
Ⓒ	1–2 shift valve	30.8 (1.213) / 9.7(0.382)	Purple
Ⓓ	Primary regulator valve	62.3 (2.453) / 18.6 (0.732)	Purple
Ⓔ	Accumulator control valve	33.9 (1.335) / 8.8 (0.346)	Pink

RETAINERS, CLIP, CHECK BALLS, STRAINERS, SPRINGS AND VALVES AT06H-09

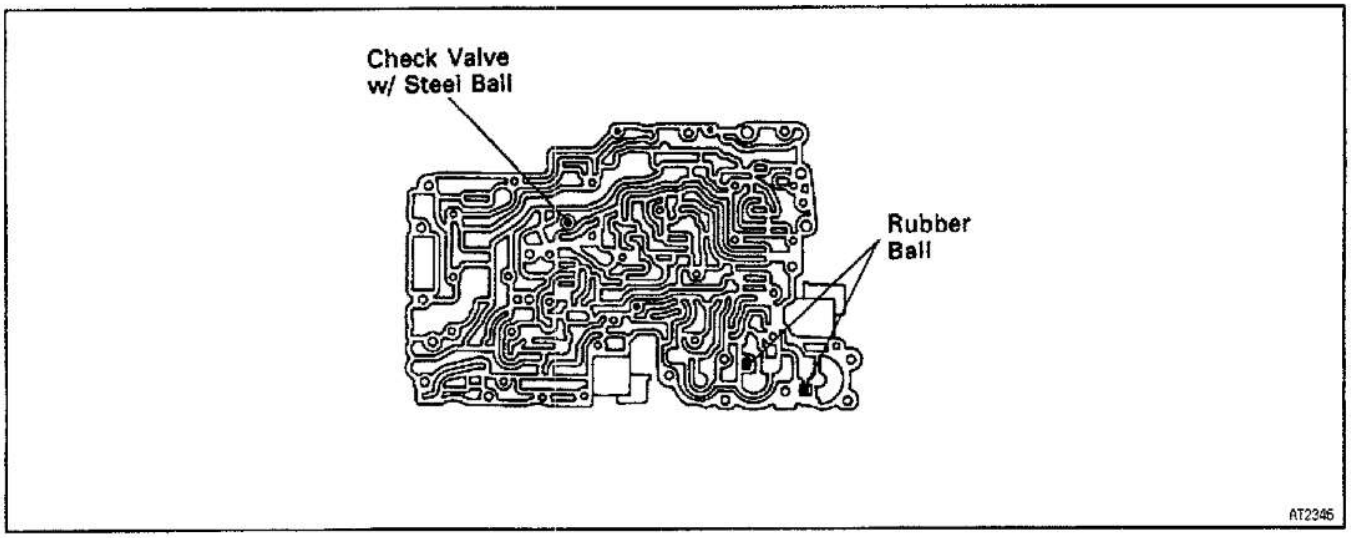
LOCATION

1. RETAINER AND CLIP



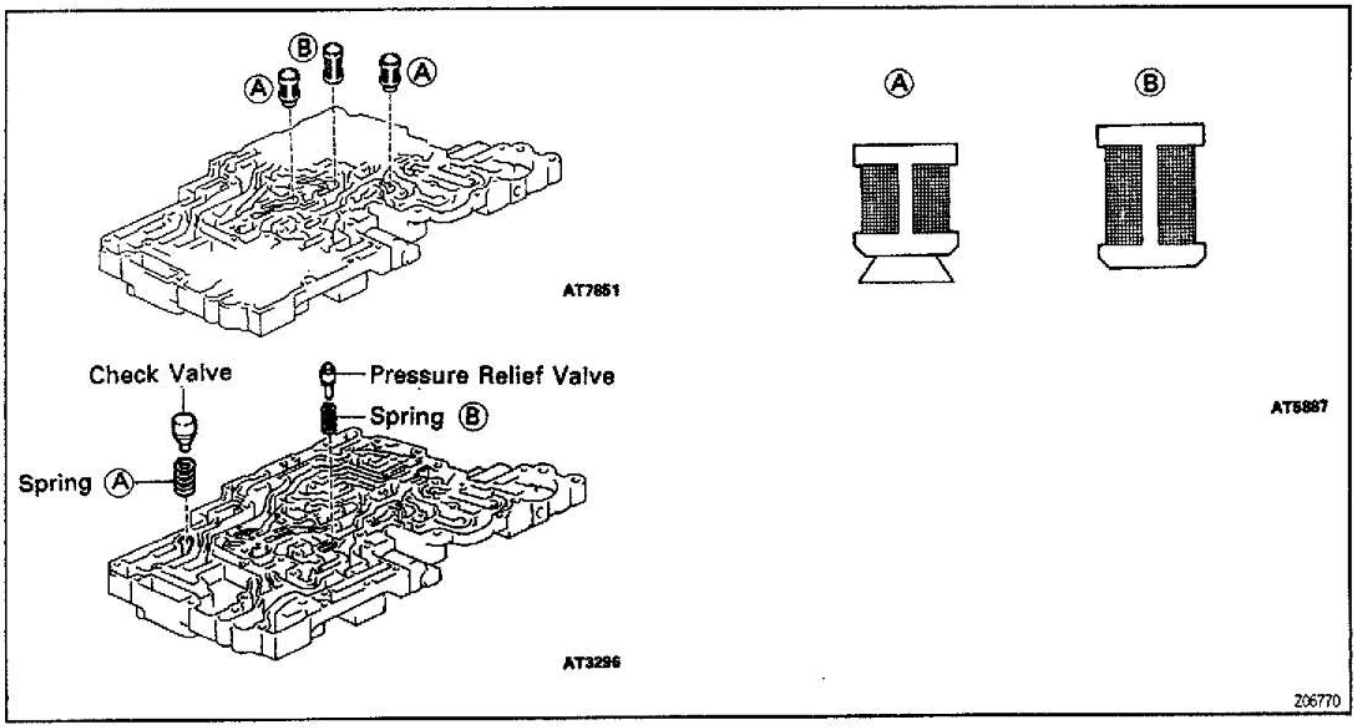
Mark	Retainer	Height / Width / Thickness mm (in.)
Ⓐ	1–2 shift valve	16.5 (0.650) / 6.0 (0.236) / 3.2 (0.126)
Ⓑ	Accumulator control valve	21.2 (0.835) / 5.0 (0.197) / 3.2 (0.126)
Ⓒ	Primary regulator valve	16.2 (0.638) / 5.0 (0.197) / 3.2 (0.126)

2. CHECK BALL

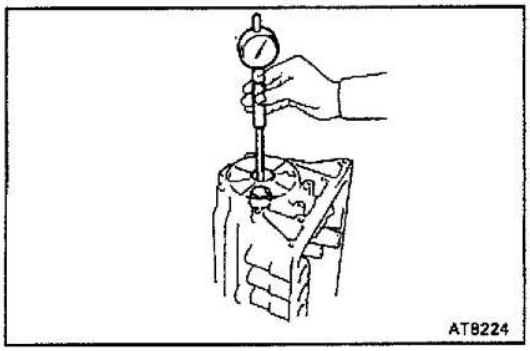


Check ball	Diameter mm (in.)
Steel ball	6.35 (0.2500)

3. STRAINER, SPRING AND VALVE



Mark	Strainer	Height / Diameter mm (in.)
Ⓐ	Solenoid oil strainer	12.4 (0.448) / 10.3 (0.406)
Ⓑ	Throttle oil strainer	19.5 (0.768) / 10.3 (0.406)



TRANSMISSION CASE

TRANSMISSION CASE INSPECTION

AT06J-08

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.

AT

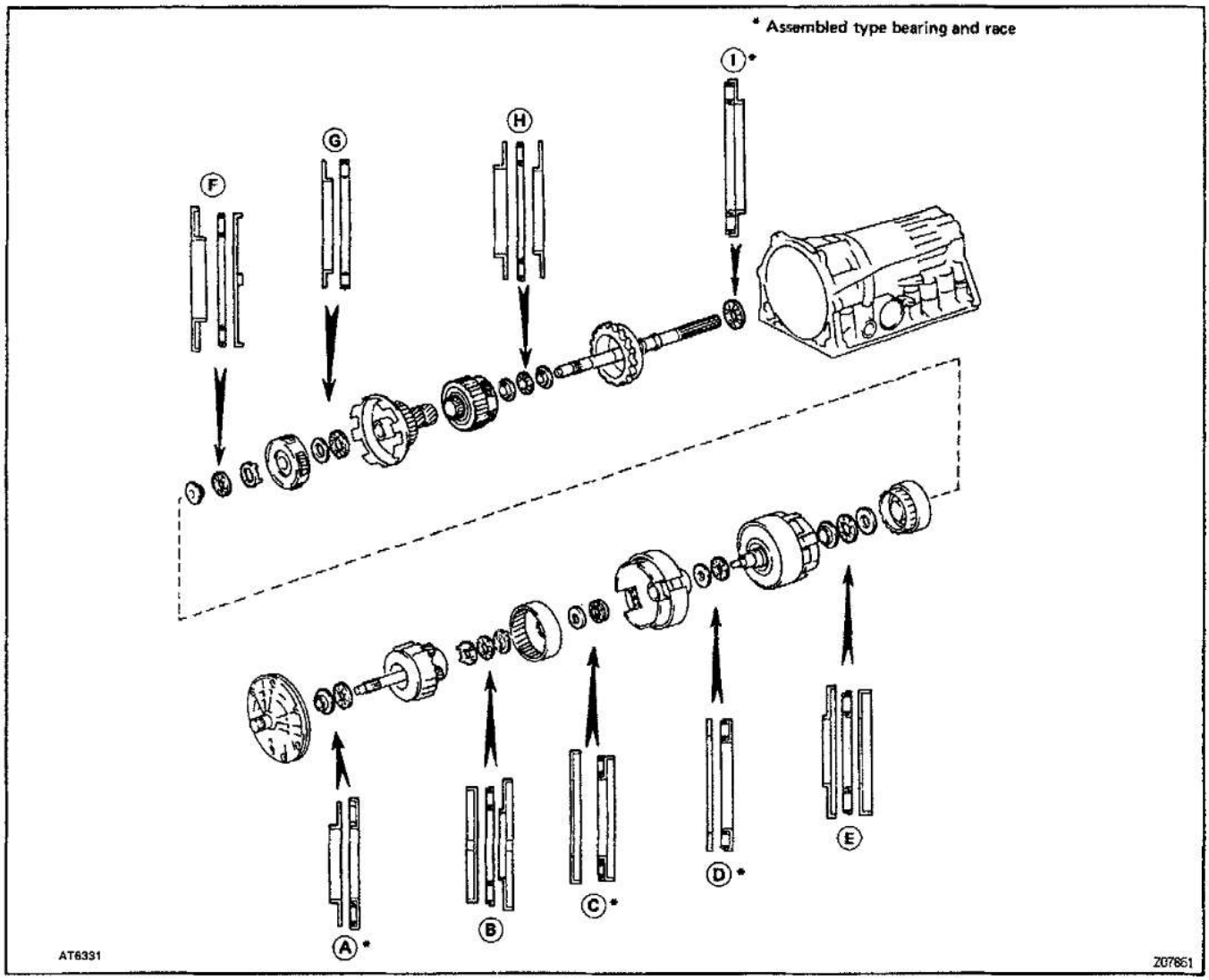
COMPONENT PARTS INSTALLATION

AT171–01

Disassembly, inspection and assembly of each component group have been indicated in the preceding chapter. Before assembly, make sure again that all component groups are assembled correctly.
If something wrong is found in a certain component group during assembly, inspect and repair this group immediately.m jelly to keep small parts in their place.

5. Do not use adhesive cements on gaskets and similar parts.
6. When assembling the transmission, be sure to use new gaskets and O—rings.
7. Dry all parts with compressed air — never use shop rags.
8. When working with FIPG material, you must observe the following.
   - Using a razor blade and gasket scraper, remove all the old FIPG material from the gasket surfaces.
   - Thoroughly clean all components to remove all the loose material.
   - Clean both sealing surfaces with a non—residue solvent.
   - Parts must be assembled within 10 minutes of application. Otherwise, the FIPG material must be removed and reapplied.

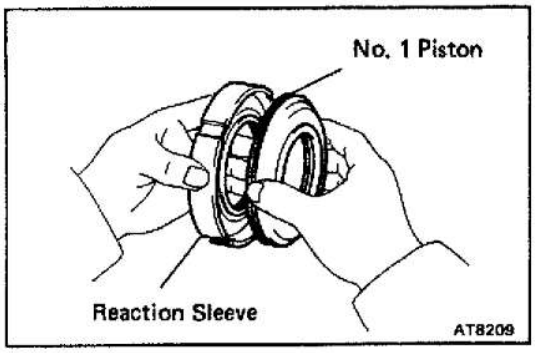
BEARINGS AND RACES INSTALLATION POSITION AND DIRECTION



Mark	Front Race Diameter Inside / Outside mm (in.)	Thrust Bearing Diameter Inside / Outside mm (in.)	Rear Race Diameter Inside / Outside mm (in.)
Ⓐ	28.080 (1.10551) / 47.500 (1.87006)	28.800 (1.13386) / 50.400 (1.98425)	–
Ⓑ	27.200 (1.07086) / 42.000 (1.65354)	25.900 (1.01968) / 47.000 (1.85039)	24.000 (0.94488) / 48.000 (1.88976)
Ⓒ	37.100 (1.46063) / 59.000 (2.32283)	33.600 (1.32283) / 50.300 (1.98031)	–
Ⓓ	37.000 (1.45669) / 51.000 (2.00787)	33.500 (1.31890) / 47.800 (1.88189)	–
Ⓔ	25.980 (1.02283) / 48.870 (1.92401)	25.900 (1.01968) / 47.000 (1.85039)	26.500 (1.04331) / 47.020 (1.85118)
Ⓕ	34.000 (1.33858) / 49.300 (1.94094)	32.500 (1.27953) / 48.000 (1.88976)	30.630 (1.20590) / 53.750 (2.11614)
Ⓖ	33.500 (1.31890) / 47.800 (1.88189)	35.400 (1.39370) / 48.000 (1.88976)	–
Ⓗ	27.600 (1.08661) / 45.000 (1.77165)	30.000 (1.18110) / 45.000 (1.77165)	28.780 (1.13307) / 45.000 (1.77165)
Ⓘ	–	39.215 (1.54389) / 57.720 (2.27243)	–

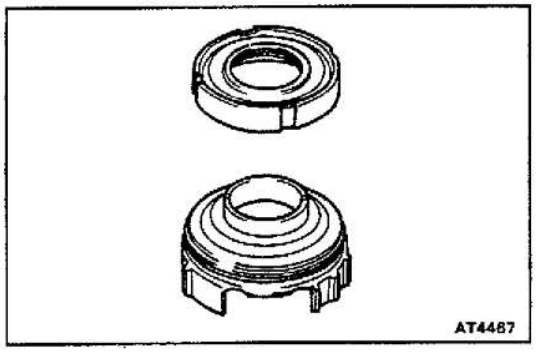
AT172-01

TRANSMISSION INSTALLATION

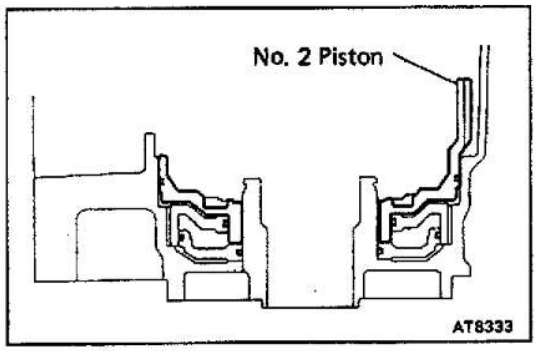


1. INSTALL COMPONENTS OF 1 ST AND REVERSE BRAKE PISTON

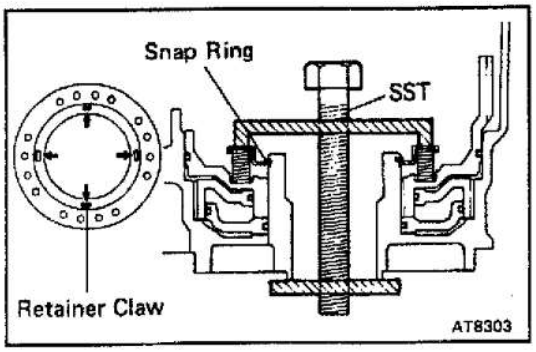
(a) Coat 3 new O–rings with ATF.
(b) Install the 2 O–rings on the No.1 piston.
(c) Install the O–ring on the reaction sleeve.
(d) Install the No.1 piston to the reaction sleeve.



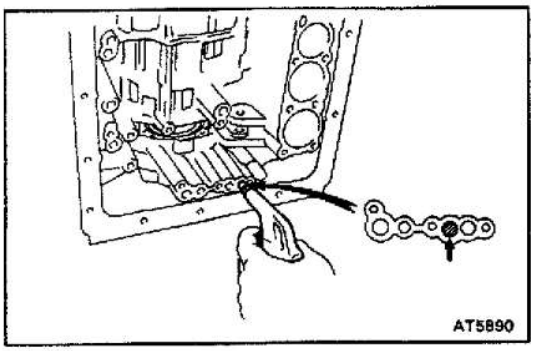
(e) Coat a new O–ring with ATF and install it on the No. 2 piston.
(f) Install the No.1 piston with the reaction sleeve onto the No.2 piston.



(g) Align the teeth of the No.2 piston into the proper grooves.
(h) Being careful not to damage the O–rings, press in the No.2 and No.1 1st and reverse brake pistons into the transmission case.
(i) Place the piston return spring onto the No.2 piston.

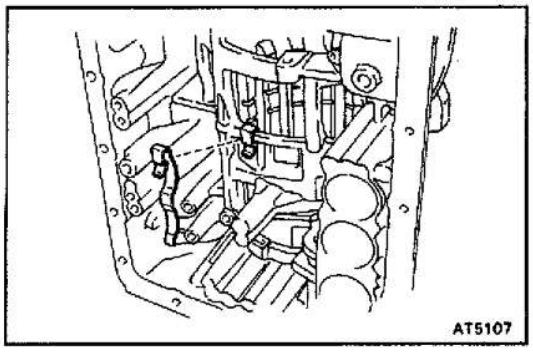


(j) Set SST as shown, and compress the return spring with SST.
SST 09350–30020 (09350–07050)
(k) Install the snap ring with a screwdriver. Be sure the end gap of the snap ring is not aligned with the spring retainer claw.

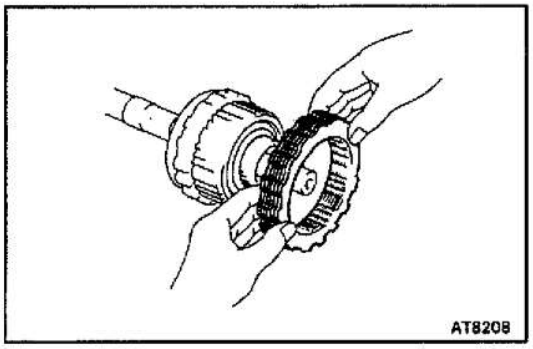


2. CHECK PISTON STROKE OF 1ST AND REVERSE BRAKE

Make sure the 1st and reverse brake pistons move smoothly when applying and releasing the compressed air into the transmission case.



3. INSTALL LEAF SPRING

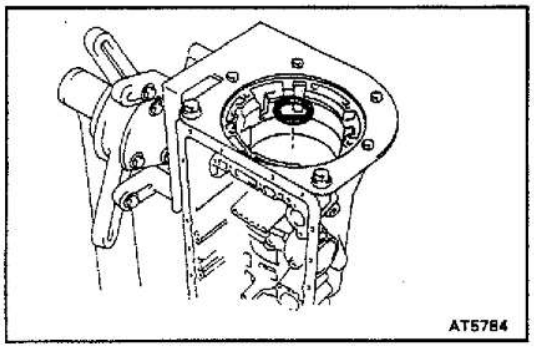


4. INSTALL REAR PLANETARY GEAR UNIT WITH 2ND BRAKE DRUM, 1ST AND REVERSE BRAKE PACK AND OUTPUT SHAFT

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

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

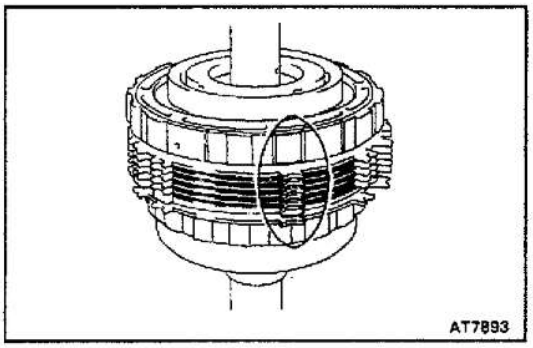
(c) Install the 2nd brake drum assembly.



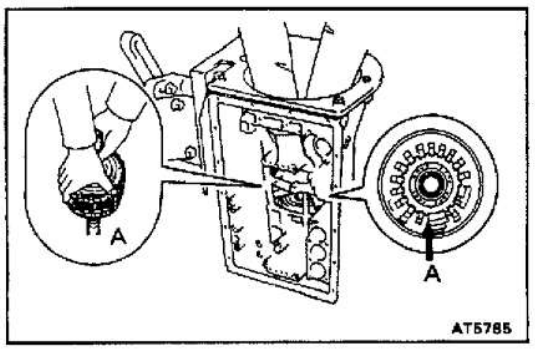
(d) Coat the assembled bearing and race with petroleum jelly and install it onto the case.
Assembled bearing and race diameter

mm (in.)

	Inside	Outside
Assembled bearing and race	39.215 (1.54389)	57.720 (2.27243)

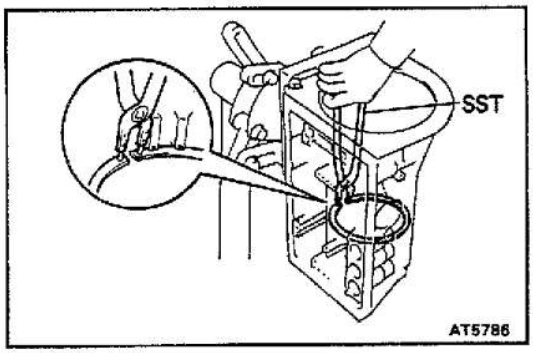


(e) Align the teeth of the 2nd brake drum, flange, discs and plates.

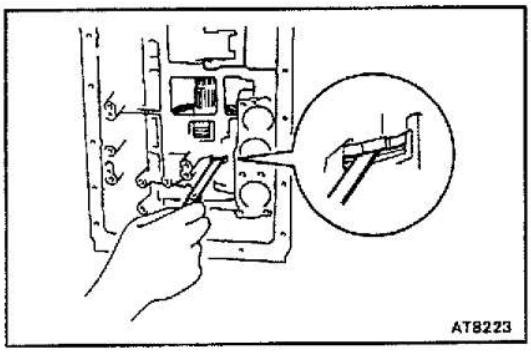


(f) Align the splines of the transmission case and the assembled rear planetary gear, 2nd brake drum, 1st and reverse brake pack and output shaft, indicated by A.

(g) Hold the output shaft with wooden blocks or equivalents.



(h) Using SST, install the snap ring.
SST 09350—30020 (09350—07060)



5. CHECK PACK CLEARANCE OF 1ST AND REVERSE BRAKE

Using a feeler gauge, measure the clearance between the plate and 2nd brake drum.

Clearance: 0.60 — 1.12 mm (0.0236 — 0.0441 in.)

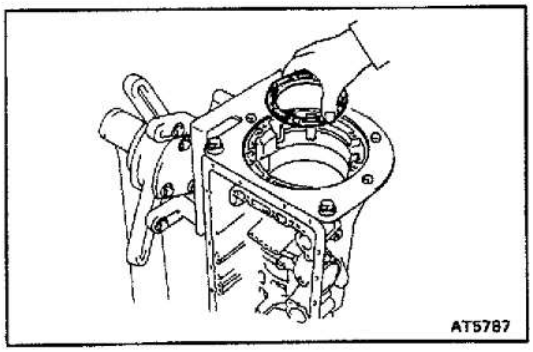
If the values are non—standard, select another flange.

HINT: There are 6 different thicknesses for the flange.

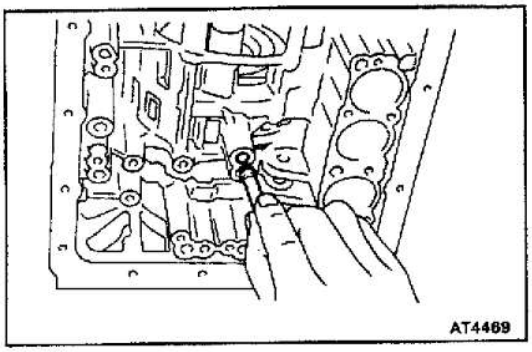
Flange thickness

mm (in.)

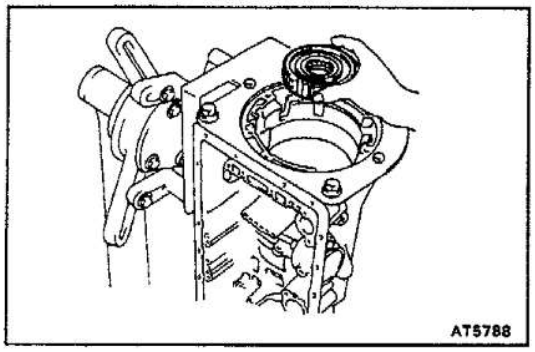
No.	Thickness	No.	Thickness
50	5.0 (0.197)	53	4.4 (0.173)
51	4.8 (0.189)	54	4.2 (0.165)
52	4.6 (0.181)	55	4.0 (0.157)



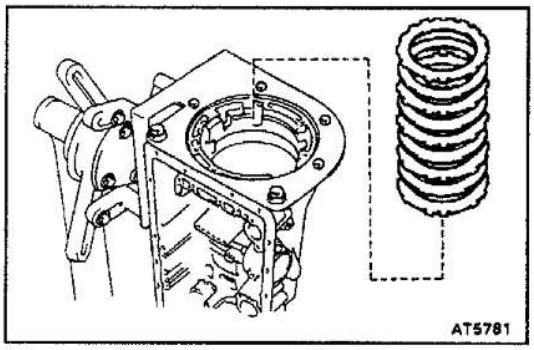
6. INSTALL 2ND BRAKE PISTON SLEEVE



7. INSTALL NEW BRAKE DRUM GASKET



8. INSTALL NO.1 ONE–WAY CLUTCH



9. INSTALL FLANGE, PLATES AND DISCS OF 2ND BRAKE

(a) Install the 1.8 mm (0.071 in.) thick plate with the rounded edge side of the plate facing the disc.

(b) Install the plates and discs.

Plate thickness: 2.5 mm (0.098 in.)

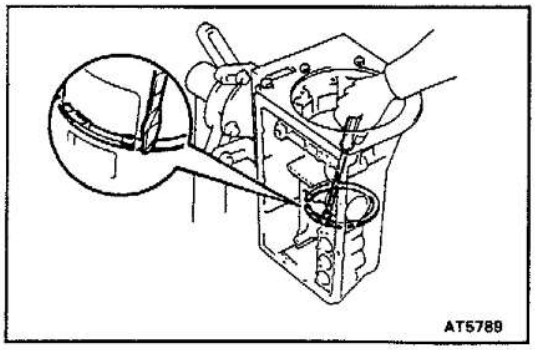
Install in order: P = Plate D = Disc

3RZ–FE

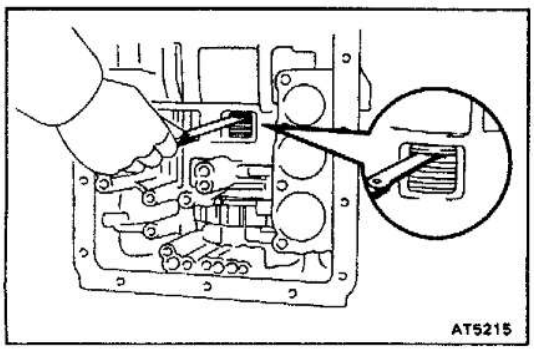
D–P–D–P–D–P

5VZ–FE, 1KZ–TE

D–P–D–P–D–P–D–P



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



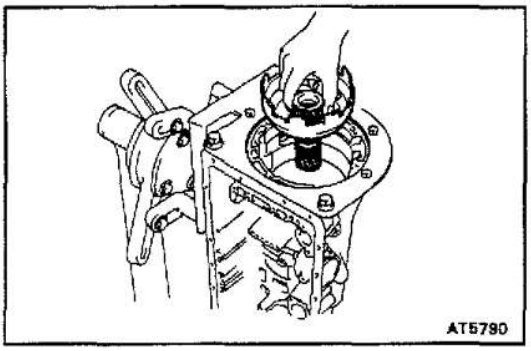
10. CHECK PACK CLEARANCE OF 2ND BRAKE

Using a feeler gauge, measure the clearance between the snap ring and flange.

Clearance: 0.62 – 1.98 mm (0.0244 – 0.0780 in.)

If the values are non–standard, check for an improper installation.

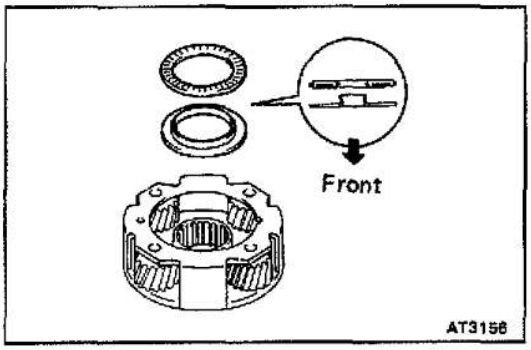
AT



11. INSTALL PLANETARY SUN GEAR

While turning the planetary sun gear clockwise, install it into the No.1 one–way clutch.

HINT: Confirm the thrust washer is installed correctly.



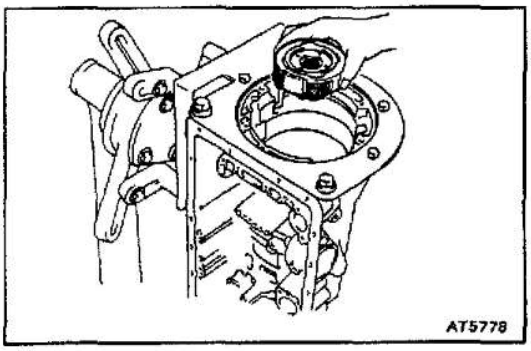
12. INSTALL FRONT PLANETARY GEAR

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

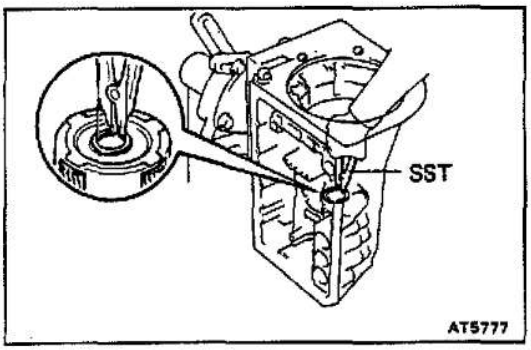
Bearing and race diameter

mm (in.)

	Inside	Outside
Bearing	35.400 (1.39370)	48.000 (1.88976)
Race	33.500 (1.31890)	47.800 (1.88189)

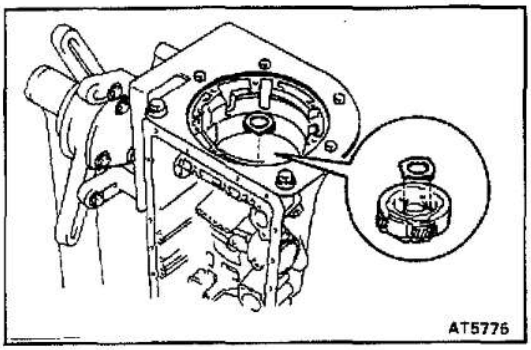


(b) Install the front planetary gear to the sun gear.



(c) Using SST, install the snap ring.
SST 09350–30020 (09350–07070)

(d) Remove the wooden blocks or equivalent under the output shaft.

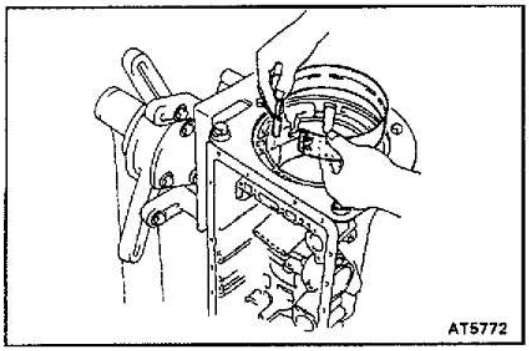


(e) Coat the bearing race with petroleum jelly and install it onto the front planetary gear.

Race diameter

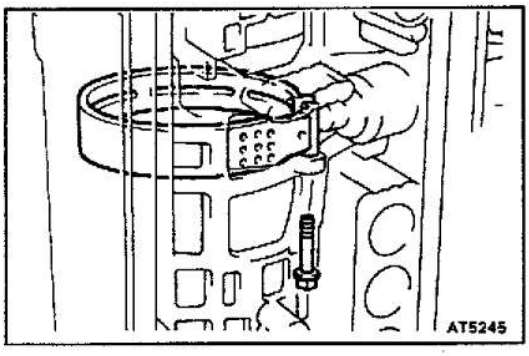
mm (in.)

	Inside	Outside
Race	30.630 (1.20590)	53.750 (2.11614)

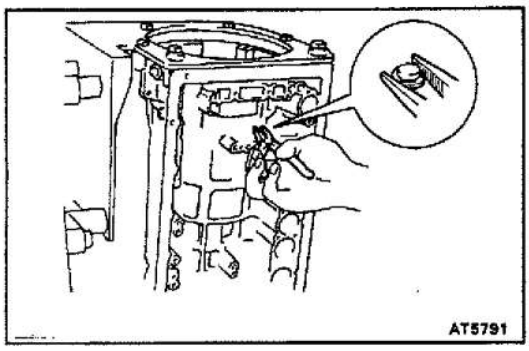


13. INSTALL 2ND COAST BRAKE BAND

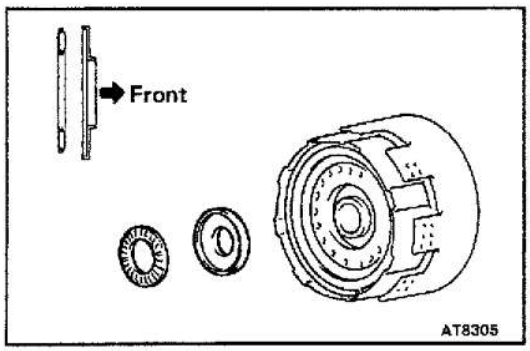
(a) Install the 2nd coast brake band to the case.



(b) Install the pin through the brake band.



(c) Using needle—nose pliers, install the E—ring to the pin.



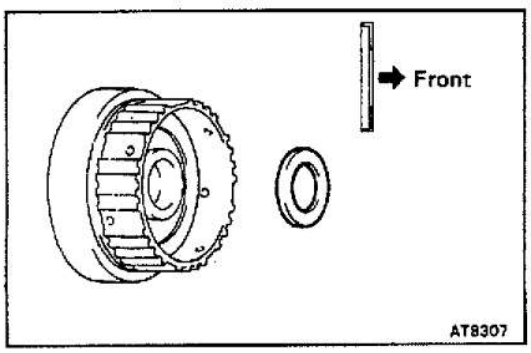
14. INSTALL FRONT PLANETARY RING GEAR TO FORWARD AND DIRECT CLUTCH

(a) Coat the bearing and race with petroleum jelly and install them onto the forward clutch.

Bearing and race diameter

mm (in.)

	Inside	Outside
Bearing	25.980 (1.02283)	48.870 (1.92401)

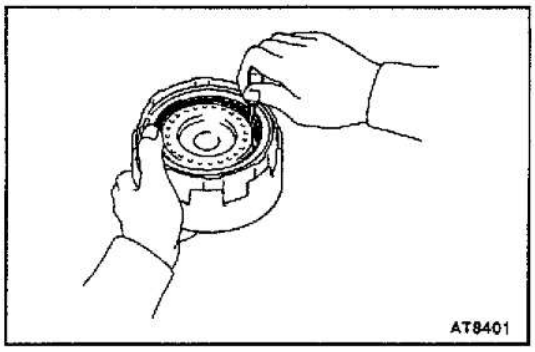


(b) Coat the race with petroleum jelly and install it onto the front planetary ring gear.

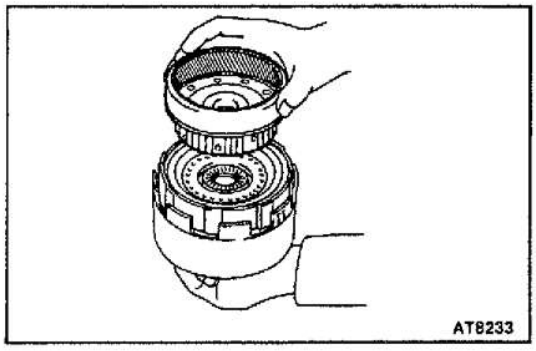
Race diameter

mm (in.)

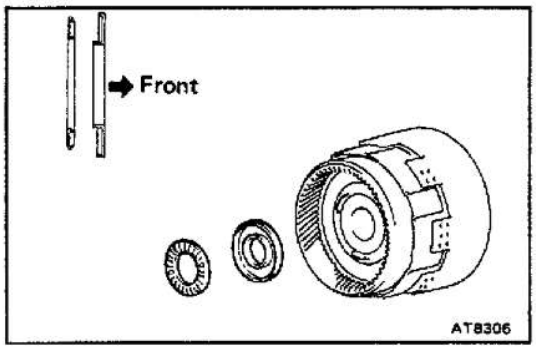
	Inside	Outside
Race	26.500 (1.04331)	47.020 (1.85118)



(c) Align the flukes of the discs in the forward clutch.



(d) Align the splines of the front planetary ring gear with the flukes of the discs and install the front planetary ring gear to the forward cluch.



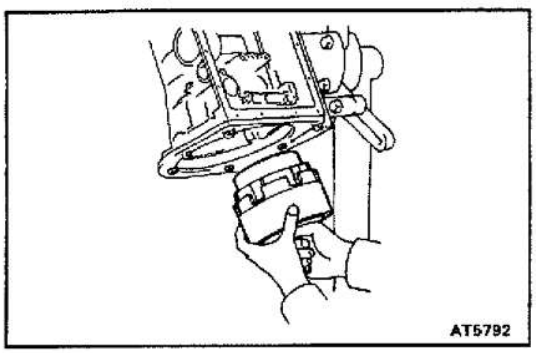
15. INSTALL ASSEMBLED DIRECT CLUTCH, FORWARD CLUTCH AND FRONT PLANETARY RING GEAR INTO CASE

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

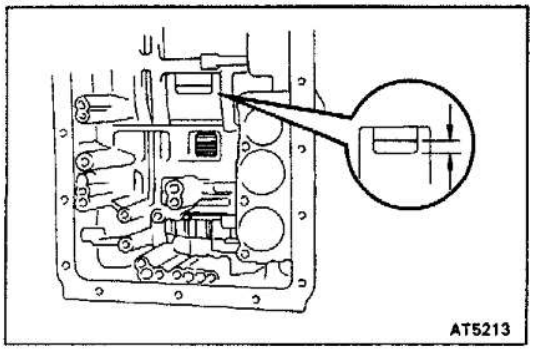
Bearing and race diameter

mm (in.)

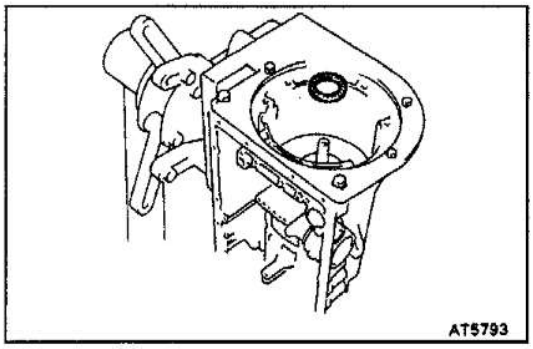
	Inside	Outside
Bearing	32.500 (1.27953)	48.000 (1.88976)
Race	34.000 (1.33858)	49.300 (1.94094)



(b) Install the assembled direct clutch, forward clutch and front planetary ring gear into the transmission case.



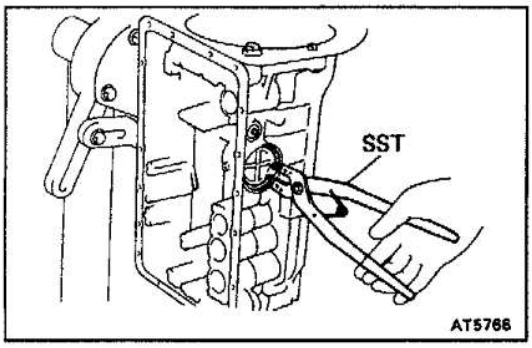
(c) Using vernier calipers, measure the distance between the sun gear input drum and direct clutch drum.
Height: 5.3 – 7.3 mm (0.209 – 0.287 in.)
If the values are non–standard, check for an improper installation.



(d) Coat the assembled bearing and race with petroleum jelly and install it onto the forward clutch.
Assembled bearing and race diameter

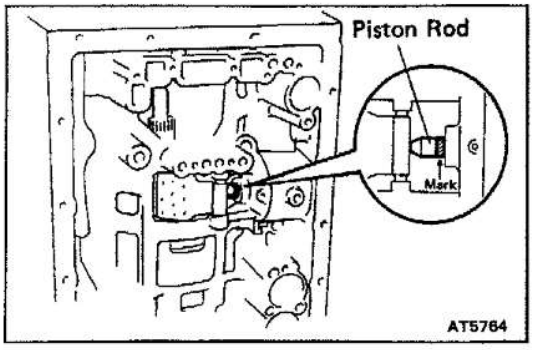
mm (in.)

	Inside	Outside
Assembled bearing	33.500 (1.31890)	47.800 (1.88189)



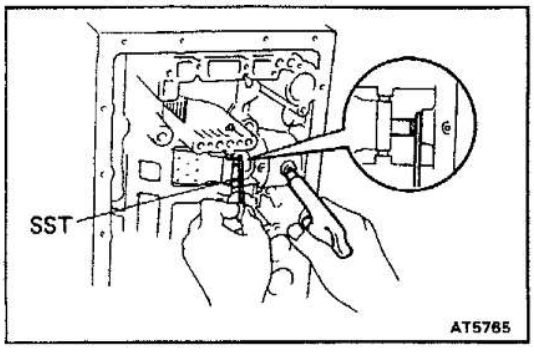
16. INSTALL 2ND COAST BRAKE COVER, PISTON ASSEMBLY AND SPRING

(a) Coat 2 new O–rings with ATF and install them to the cover.
(b) Install the spring, piston assembly and cover to the case.
(c) Using SST, install the snap ring.
SST 09350–30020 (09350–07060)

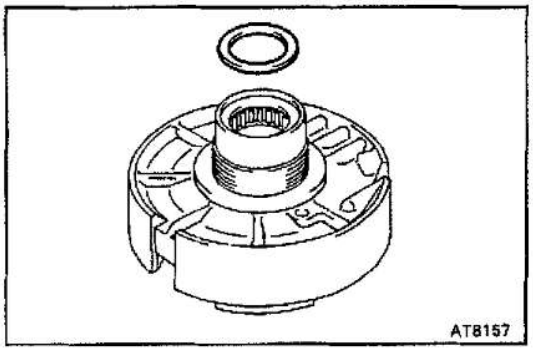


17. CHECK PISTON ROD STROKE OF 2 ND COAST BRAKE

(a) Place a mark on the 2nd coast brake piston rod.



(b) Using SST, measure the stroke while applying and releasing compressed air (392–785 kPa, 4–8 kgf/cm², 57–114 psi).
SST 09240–00020
Piston rod stroke: 1.5 – 3.0 mm (0.059 – 0.118 in.)
If it is still more than standard value, replace the brake band with a new one.



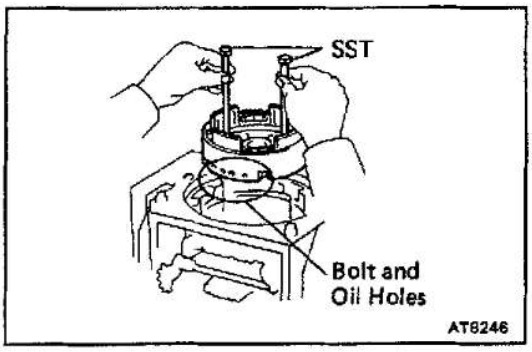
18. INSTALL O/D SUPPORT ASSEMBLY

(a) Coat the race with petroleum jelly and install it onto the O/D support assembly.

Race diameter

mm (in.)

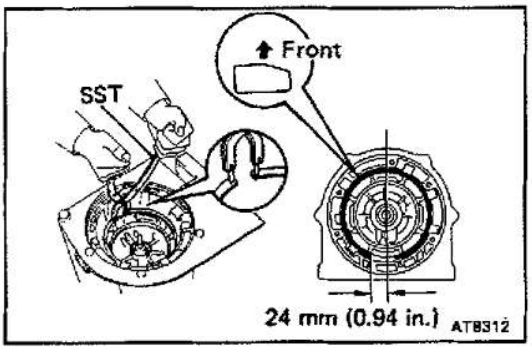
	Inside	Outside
Race	37.000 (1.45669)	51.000 (2.00787)



(b) Using 2 bolts of SST, aim the bolt and oil holes of the O/D support toward the valve body side, and align them with the bolt holes of the transmission case and insert.

SST 09350–30020 (09350–07020)

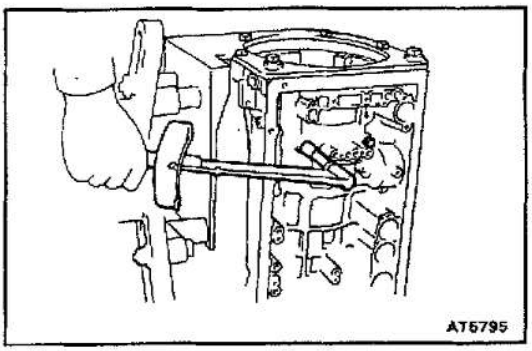
(c) Temporarily tighten the 2 bolts.



(d) Using SST, install the snap ring.

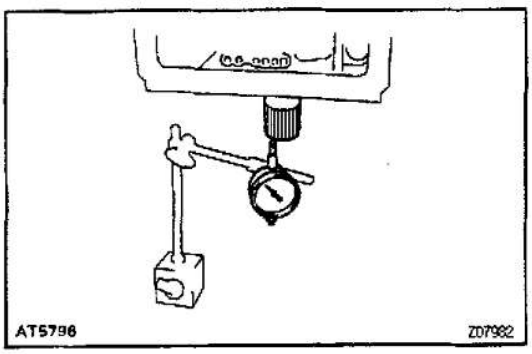
SST 09350–30020 (09350–07060)

HINT: Install the snap ring open end toward the valve body.



(e) Torque the 2 bolts.

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



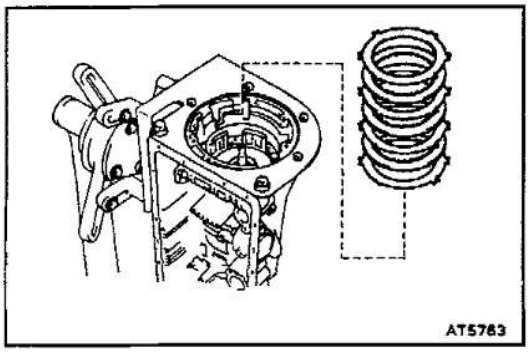
19. CHECK OUTPUT SHAFT

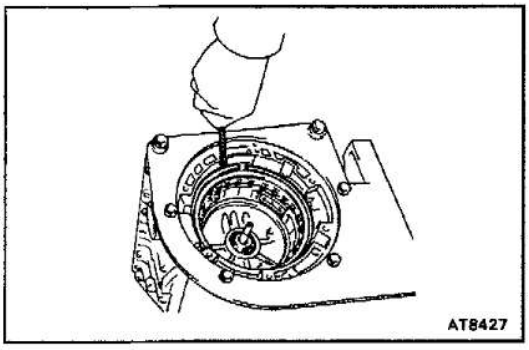
(a) Using a dial indicator, measure the end play of the output shaft with hand.

End play: 0.27 – 0.86 mm (0.0106 – 0.0339 in.)

If the values are non–standard, check for an improper installation.

(b) Check to see that output shaft rotates smoothly.





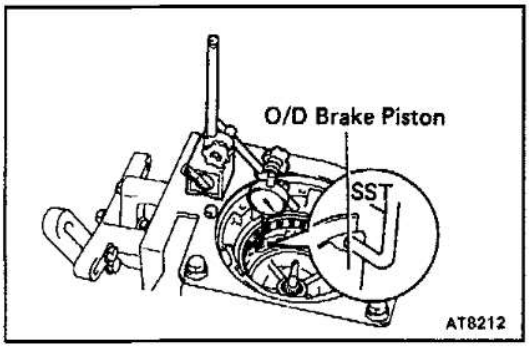
20. INSTALL FLANGES, PLATES AND DISCS OF O/D BRAKE

(a) Install the 4.0 mm (0.157 in.) thick flange (flat ring) with the rounded edge side of the flange facing the discs.

(b) Install the plates and discs.
Install in order: P = Plate D = Disc
1KZ–TE
D–P–D–P–D
3RZ–FE, 5VZ–FE
D–P–D–P–D–P–D

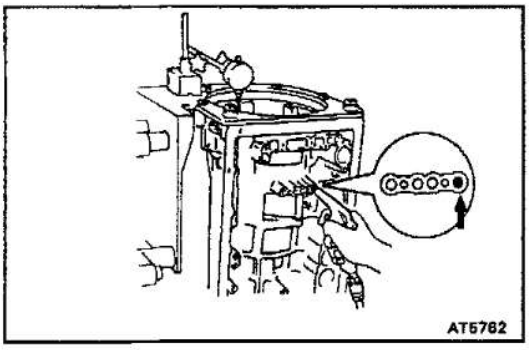
(c) Install the flange (stepped ring) with the flat side of the flange facing the disc.

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



21. CHECK PISTON STROKE OF O/D BRAKE

(a) Place SST and a dial indicator onto the O/D brake piston.
SST 09350–30020 (09350–06120)



(b) Measure the stroke while applying and releasing compressed air (392–785 kPa, 4–8 kgf/cm², 57–114 psi).

Piston stroke:

3RZ–FE, 5VZ–FE:
1.40 – 1.70 mm (0.0551 – 0.0670 in.)
1kZ–TE:
1.32 – 1.62 mm (0.0520 – 0.0638 in.)

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

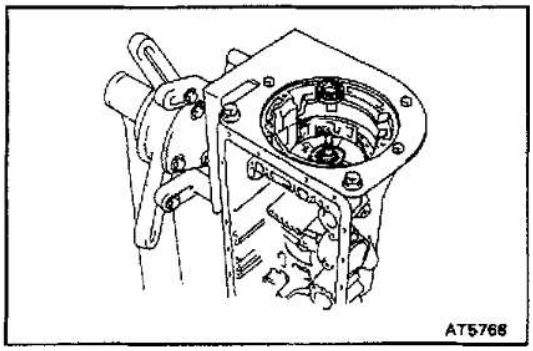
If the piston stroke is nonstandard, select another flange.

HINT: There are 7 different thicknesses for the flange.

Flange thickness

mm (in.)

No.	Thickness	No.	Thickness
77	3.3 (0.130)	81	3.8 (0.150)
78	3.5 (0.138)	82	3.9 (0.154)
79	3.6 (0.142)	None	4.0 (0.157)
80	3.7 (0.146)	–	–


AT5768

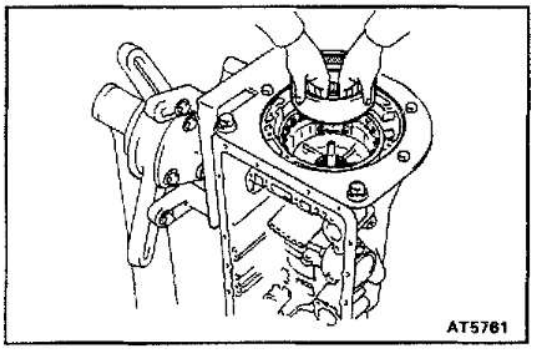
22. INSTALL O/D PLANETARY GEAR UNIT WITH O/D DIRECT CLUTCH AND ONE–WAY CLUTCH

(a) Coat the assembled bearing and race with petroleum jelly and install it onto the O/D support.

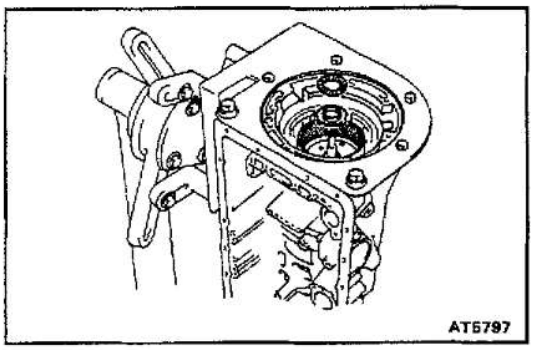
Assembled bearing and race diameter

mm (in.)

	Inside	Outside
Assembled bearing	37.100 (1.46063)	59.000 (2.32283)


AT5761

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

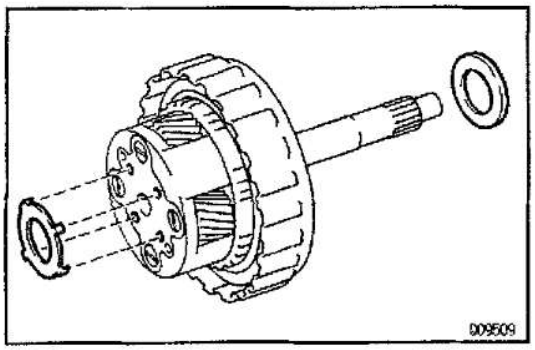

AT5797

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

Bearing and race diameter

mm (in.)

	Inside	Outside
Bearing	25.900 (1.01968)	47.000 (1.85039)
Race	24.000 (0.94488)	48.000 (1.88976)

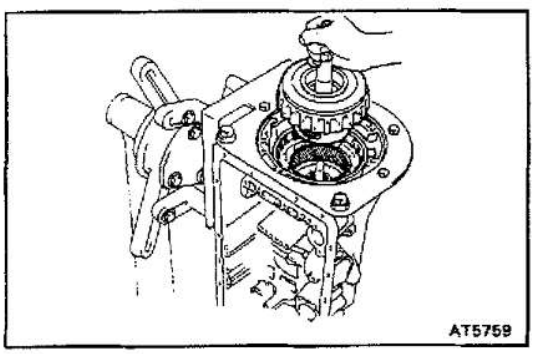

009509

(d) Coat the race with petroleum jelly and install it onto the planetary gear.

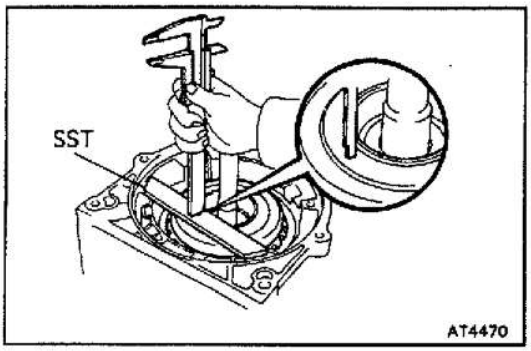
Race diameter

mm (in.)

	Inside	Outside
Race	27.200 (1.07086)	42.000 (1.65354)

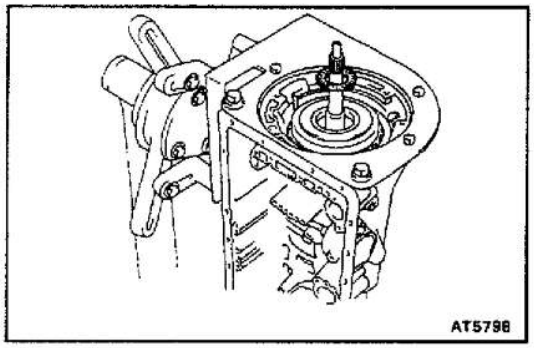

AT5759

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



(f) Place SST on the transmission case.
SST 09350–36010 (09350–06090)

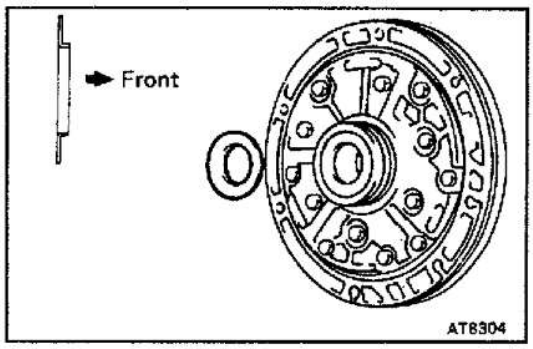
(g) Using calipers, measure distance between the tops of SST and the clutch drum.
Standard distance: 15.5 – 16.5 mm (0.610 – 0.650 in.)
If the values are non–standard, check for an improper installation.



(h) Coat the assembled bearing and race with petroleum jelly and install it onto the O/D direct clutch.
Assembled bearing and race diameter

mm (in.)

	Inside	Outside
Assembled bearing	28.800 (1.13386)	50.400 (1.98425)



23. INSTALL OIL PUMP INTO CASE

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

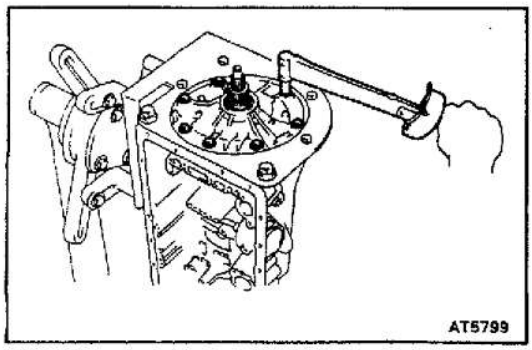
mm (in.)

	Inside	Outside
Race	28.080 (1.10551)	47.500 (1.87006)

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

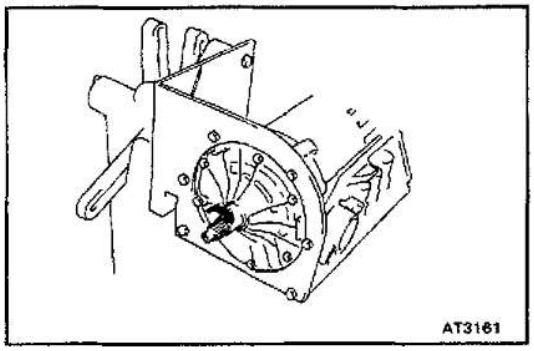
(c) Place the oil pump through the input shaft, and align the bolt holes of the pump body with the transmission case.

(d) Hold the input shaft, and lightly press the oil pump body to slide the oil seal rings into the O/D direct clutch drum.
NOTICE: Do not push on the oil pump strongly, or the oil seal ring will stick to the direct clutch drum.



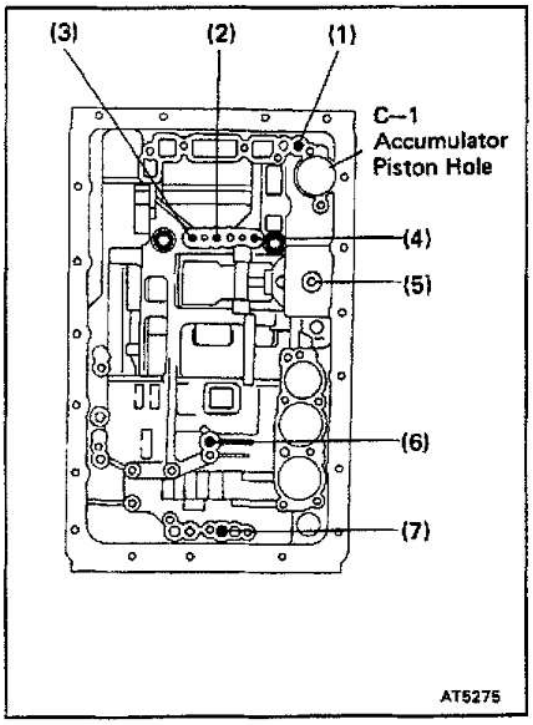
(e) Install the 7 bolts.
Torque: 22 N·m (220 kgf·cm, 16 ft·lbf)

AT



24. CHECK INPUT SHAFT ROTATION

Make sure the input shaft rotates smoothly.



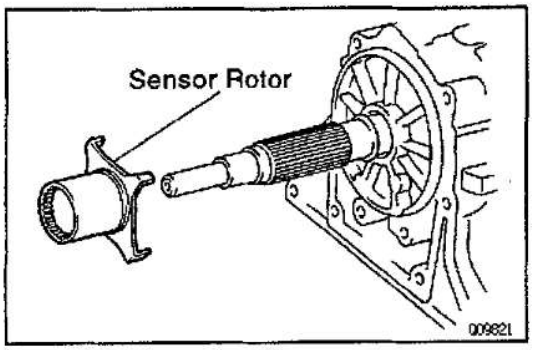
25. INDIVIDUAL PISTON OPERATION INSPECTION

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

HINT: When inspecting the O/D direct clutch, check with the C_0 accumulator piston hole closed.

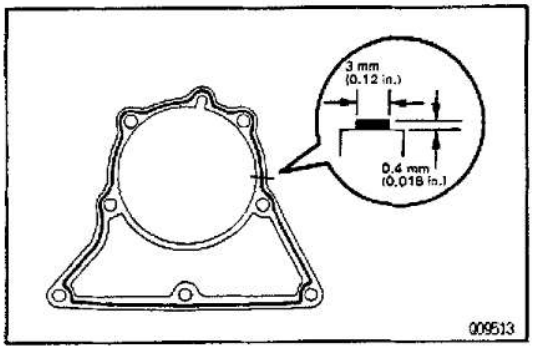
If there is no noise, disassemble and check the installation condition of the parts.

(1) O/D direct clutch
(2) Direct clutch
(3) Forward clutch
(4) O/D brake
(5) 2nd coast brake



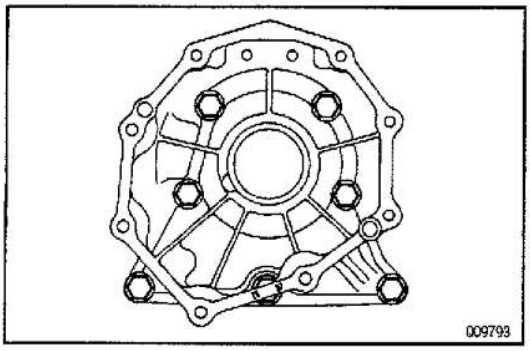
26. INSTALL SPEED SENSOR ROTOR AND KEY

(a) Install the key on the output shaft.
(b) Align the groove of the sensor rotor with the key, install the sensor rotor.
(c) Using snap ring pliers, install the snap ring.

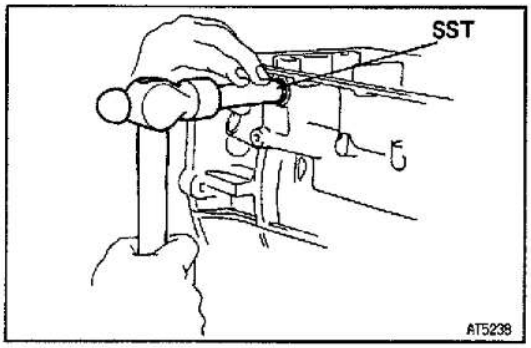


27. INSTALL TRANSFER CASE

(a) Clean contacting surface of any residual packing material using gasoline alcohol.
(b) Apply FIPG to the case.
FIPG: Part No. 08826–00090, THREE BOND 1281 or equivalent



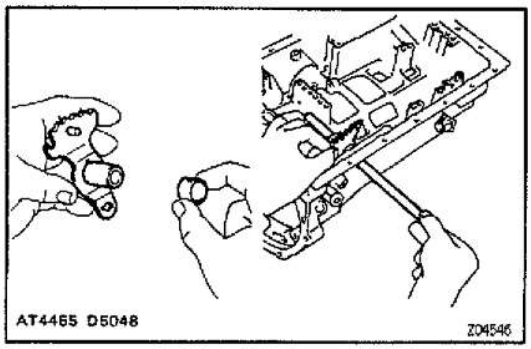
(c) Install the case and torque the 7 bolts.
Torque: 34 N·m (345 kgf·cm, 25 ft·lbf)



28. INSTALL MANUAL VALVE LEVER, SHAFT AND OIL SEALS

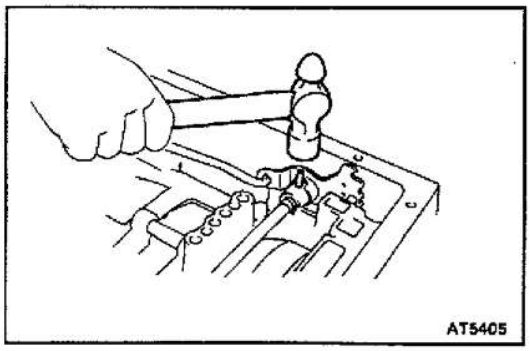
(a) Using SST and a hammer, drive in 2 new oil seals.
SST 09350−30020 (09350−07110)

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

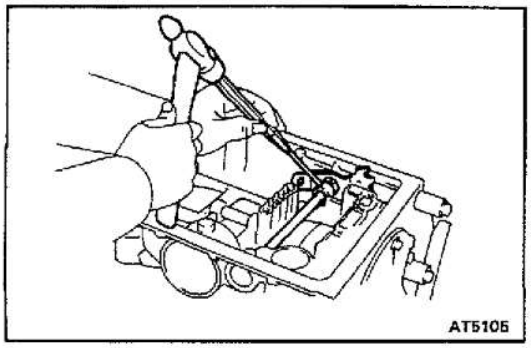


(c) Install a new spacer to the manual valve lever.

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

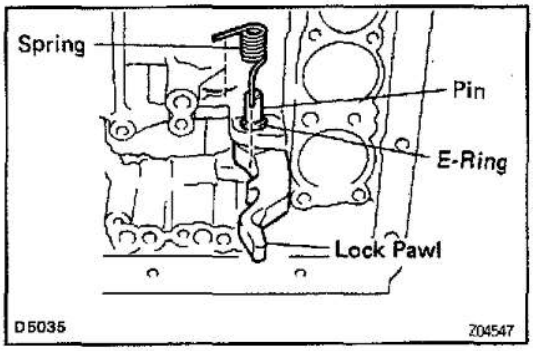


(e) Using a hammer, drive in a new spring pin.



(f) Match the manual valve lever indentation with the spacer hole and caulk them the punch.

(g) Make sure the shaft rotates smoothly.

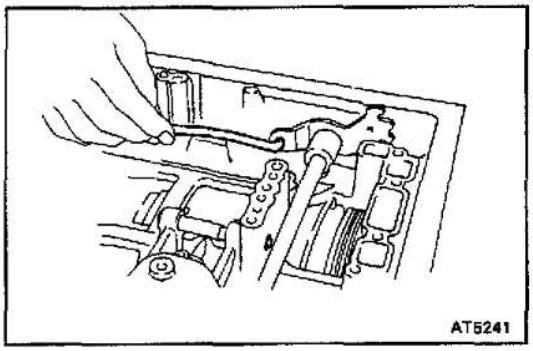


AT

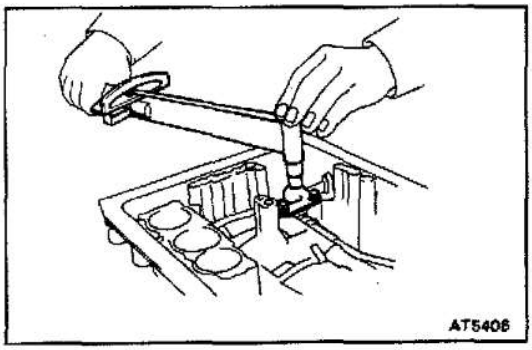
29. INSTALL PARKING LOCK PAWL AND ROD

(a) Install the E—ring to the shaft.

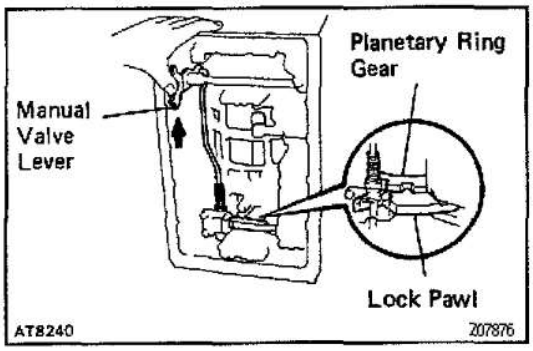
(b) Install the parking lock pawl, shaft and spring.



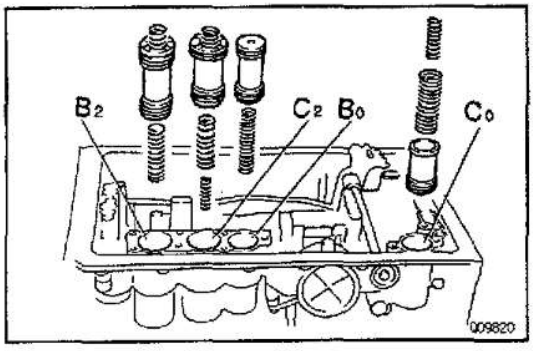
(c) Connect the parking lock rod to the manual valve lever.



(d) Place the parking lock pawl bracket onto the transmission case and torque the 3 bolts.
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)



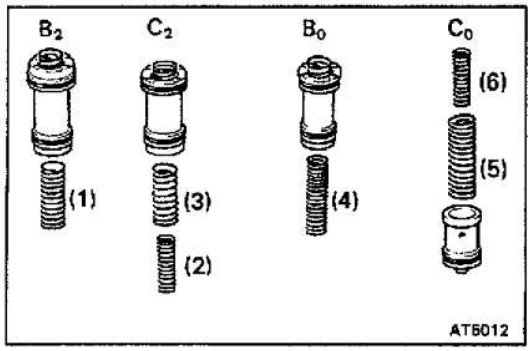
(e) Shift the manual valve lever to the P position, and confirm the planetary ring gear is correctly locked up by the lock pawl.



30. INSTALL ACCUMULATOR SPRINGS AND PISTONS

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

(b) Install the 6 springs and pistons to the bore.

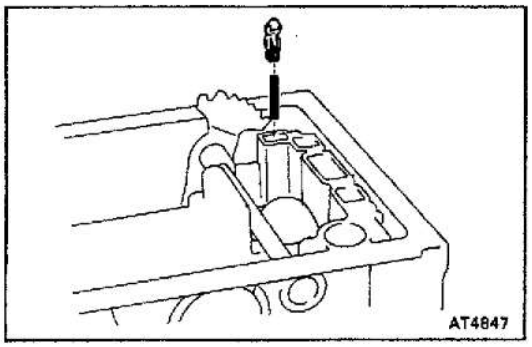


HINT: The pistons are marked in relief with either C_0, B_0, C_2 or B_2 to differentiate between them.

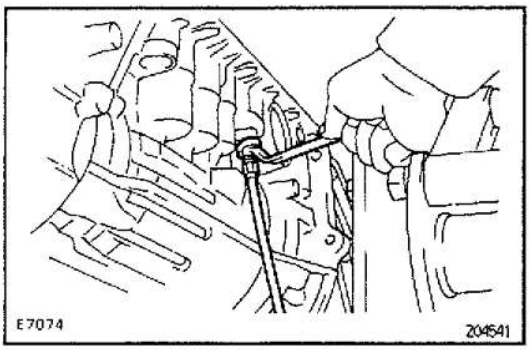
- **Accumulator Spring**

mm (in.)

Spring		Free length	Color
(1) B_2	3RZ–FE	70.50 (2.7756)	White
	5VZ–FE	70.50 (2.7756)	Yellow
	1KZ–TE	72.55 (2.8563)	Grey
(2) C_2	Inner	42.06 (1.6559)	Pink
(3) C_2			
	3RZ–FE, 5VZ–FE	64.00 (2.5197)	Green
	1KZ–TE	68.53 (2.6980)	Bule
(4) B_0			
	3RZ–FE, 1KZ–TE	62.00 (2.4409)	Green
	5VZ–FE	63.60 (2.5039)	Red
(5) C_0	Inner	46.00 (1.8110)	Yellow
(6) C_0	Outer	74.60 (2.9370)	Orange



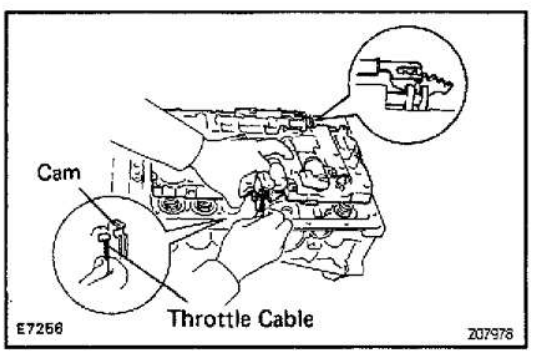
31. INSTALL CHECK BALL BODY AND SPRING



32. INSTALL THROTTLE CABLE

(a) Coat a new O–ring with ATF and install it to the cable.

(b) Install the cable to the case.



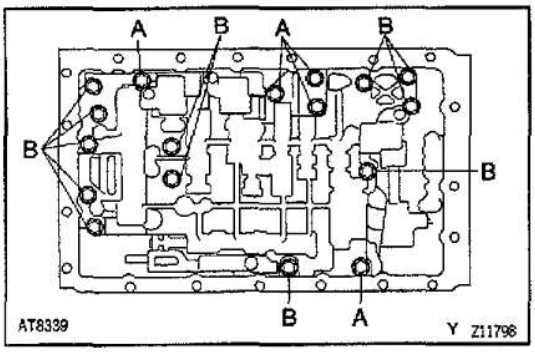
AT173–01

33. INSTALL VALVE BODY

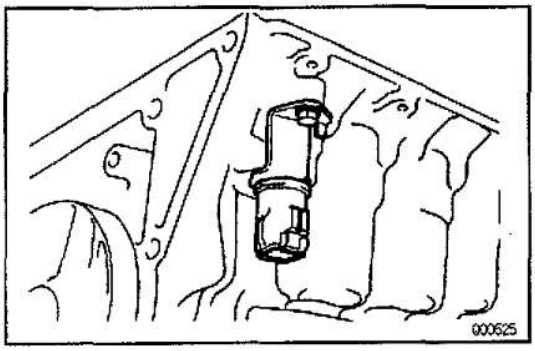
(a) Align the groove of the manual valve to pin of the lever.

(b) Connect the throttle cable to the cam.

(c) Confirm the springs into the accumulator pistons are installed correctly.

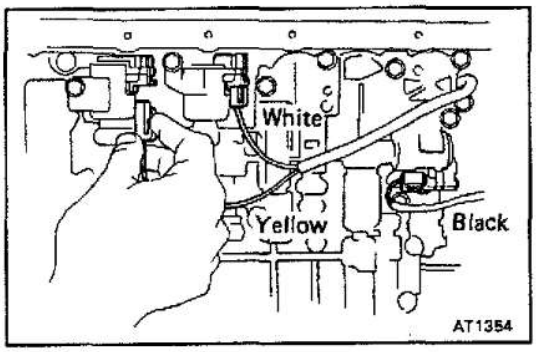


(d) Install the 17 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)
HINT: Each bolt length is indicated in the illustration.
Bolt length:
Bolt A: 23 mm (0.91 in.)
Bolt B: 32 mm (1.26 in.)

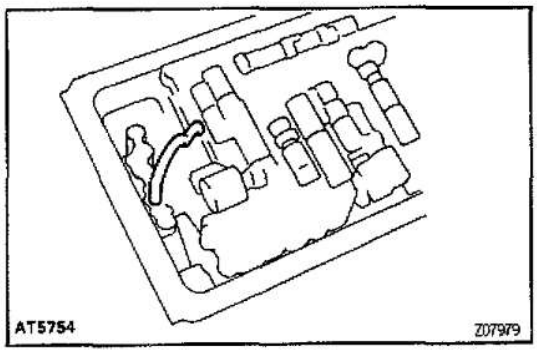


34. INSTALL TRANSMISSION SOLENOID WIRING

(a) Coat a new O–ring with ATF and install it to the grommet.
(b) Insert the solenoid wiring to the case and install the stopper plate.

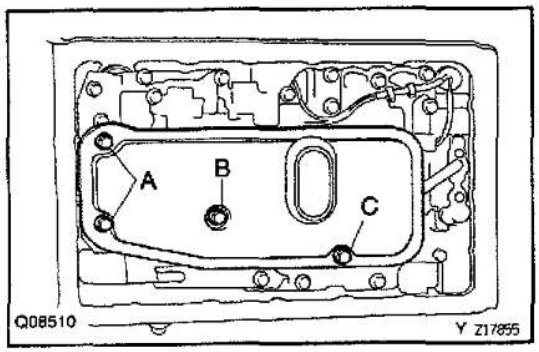


(c) Connect the connectors to the No.1, No.2 and SL solenoid valves.



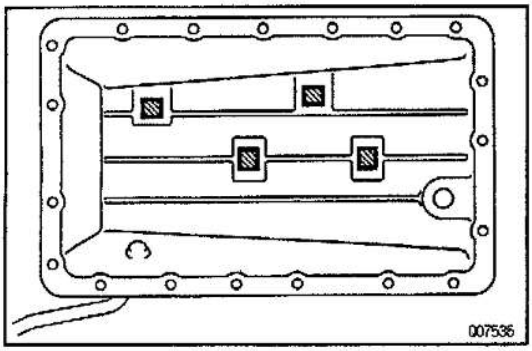
35. INSTALL OIL PIPE

Using a plastic hammer, install the pipe into position.
NOTICE: Be careful not to bend or damage the pipe.



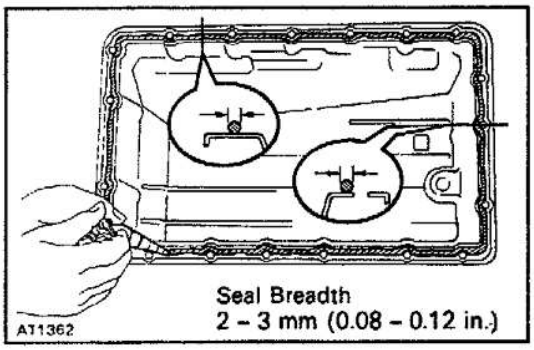
36. INSTALL OIL STRAINER AND GASKETS

(a) Install 2 new gaskets to the oil strainer.
(b) Install the oil strainer and torque the 4 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)
Bolt length:
Bolt A: 16 mm (0.63 in.)
Bolt B: 20 mm (0.79 in.)
Bolt C: 28 mm (1.10 in.)



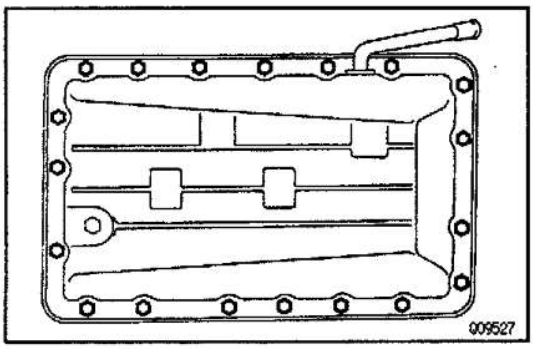
37. INSTALL OIL PAN

(a) Install the 4 magnets.

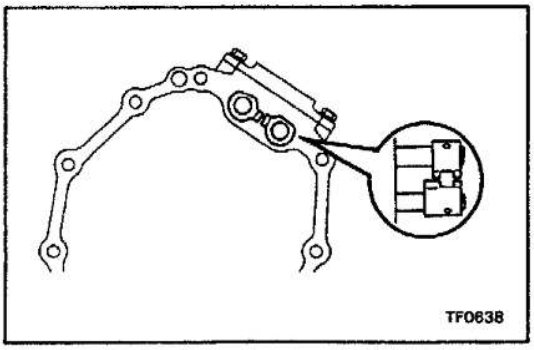


(b) Remove any packing material and be careful not to drop oil on the contacting surfaces of the transmission case and oil pan.

(c) Apply FIPG to the oil pan.
FIPG: Part No. 08826–00090, THREE BOND 1281 or equivalent

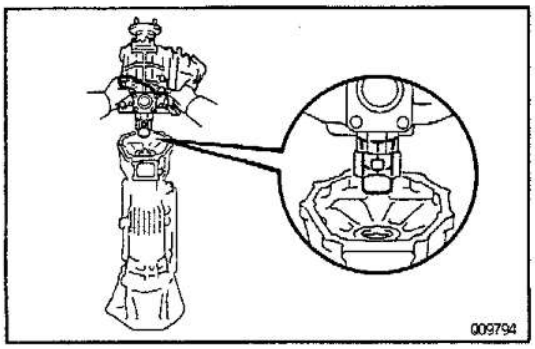


(d) Install and torque the 11 bolts.
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)



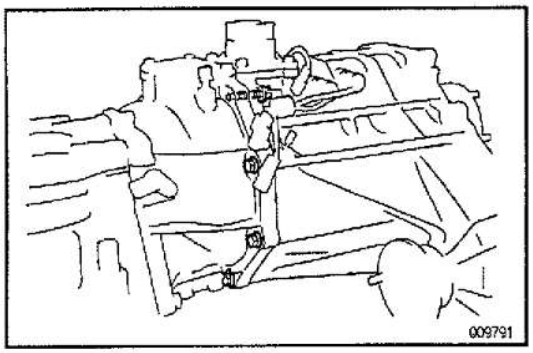
38. INSTALL TRANSFER COVER TO TRANSMISSION

(a) Shift the 2 shift fork shafts to the high—4 position.

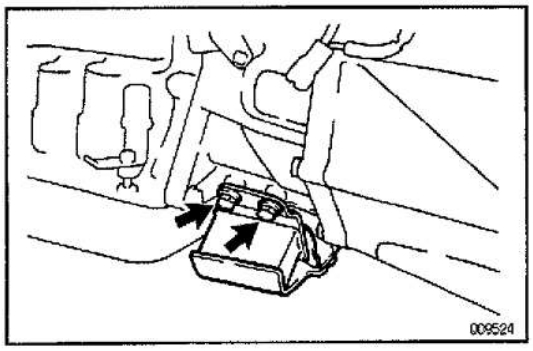


(b) Apply MP grease to the adaptor oil seal.

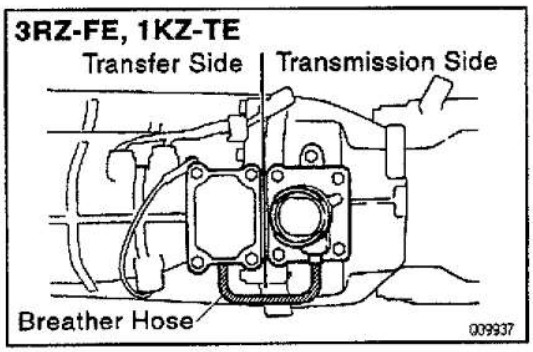
(c) Install the transfer to the transmission.
HINT: Take care not to damage the oil seal by the input gear spline when installing the transfer.



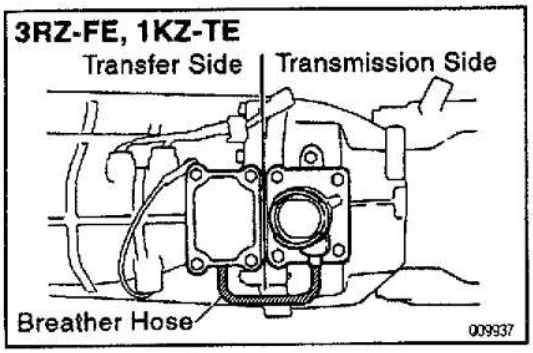
(d) Install and torque the bolts.
Torque: 24 N·m (240 kgf·cm, 17 ft·lbf)

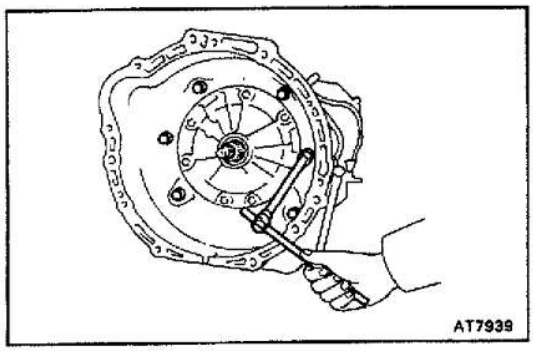


39. INSTALL ENGINE REAR MOUNTING
Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)

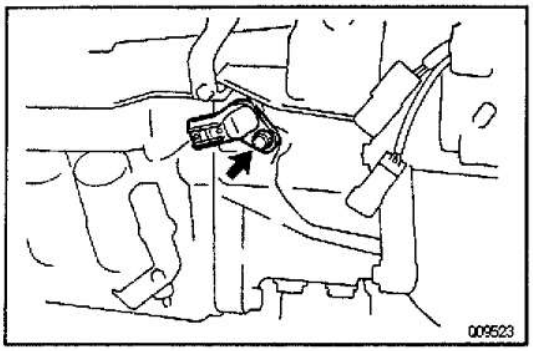


40. INSTALL BREATHER HOSE
Connect the breather hose for transfer upper cover and transmission control retainer.
Hose depth: 13 mm (0.51 in.)





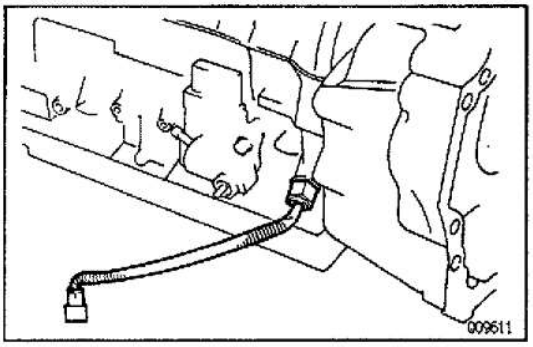
41. INSTALL TRANSMISSION HOUSING
Install and torque the 6 bolts.
Torque:
14 mm bolt 34 N·m (345 kgf·cm, 25 ft·lbf)
17 mm bolt 57 N·m (580 kgf·cm, 42 ft·lbf)



42. INSTALL SPEED SENSOR

(a) Coat a new O–ring with ATF and install it to the sensor.

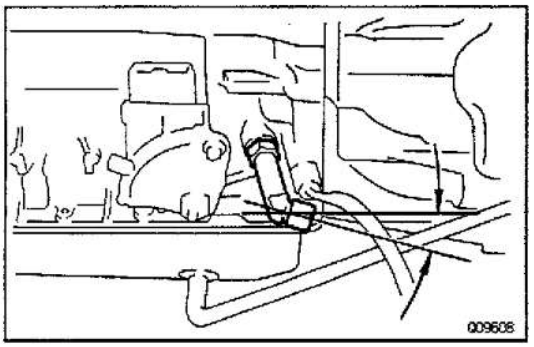
(b) Install the speed sensor with the bolt.
Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)



43. 3RZ–FE, 5VZ–FE Engine:
INSTALL ATF TEMPERATURE SENSOR

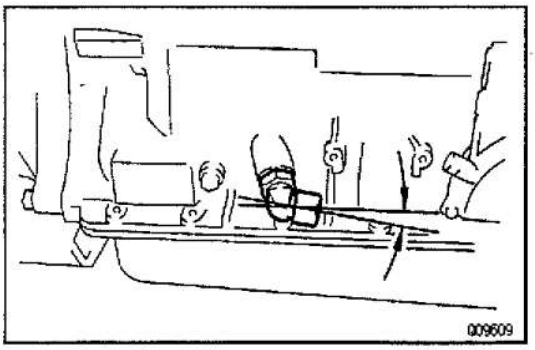
(a) Coat a new O–ring with ATF and install it to the sensor.

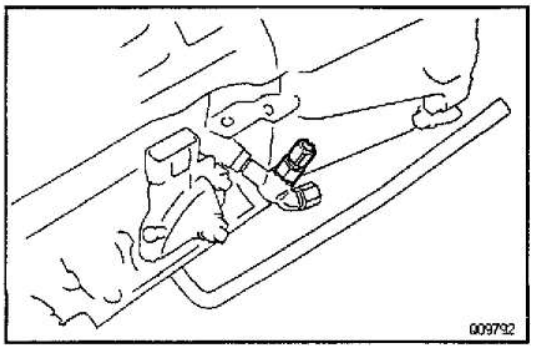
(b) Install the ATF temperature sensor.



44. INSTALL UNION AND ELBOW

(a) Coat new O–rings with ATF and install them to the union and elbow.
Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

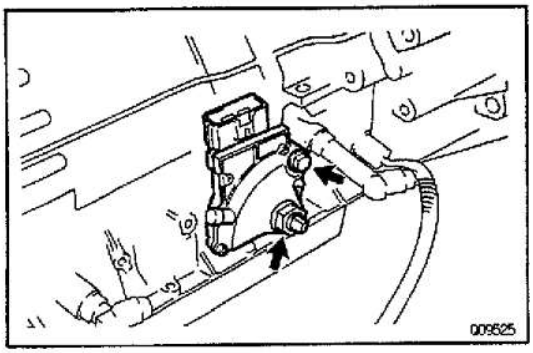




45. 1KZ–TE Engine:
INSTALL ATF TEMPERATURE SENSOR

(a) Coat a new O–ring with ATF and install it to the sensor.

(b) Install the ATF temperature sensor.

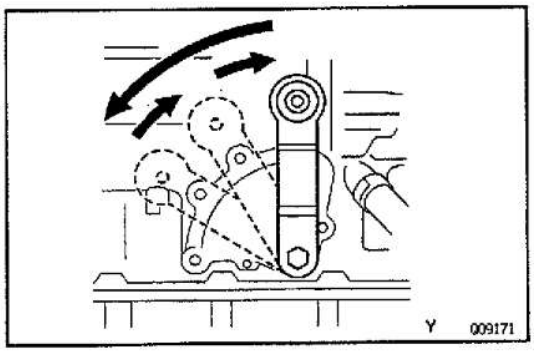


46. INSTALL NEUTRAL START SWITCH

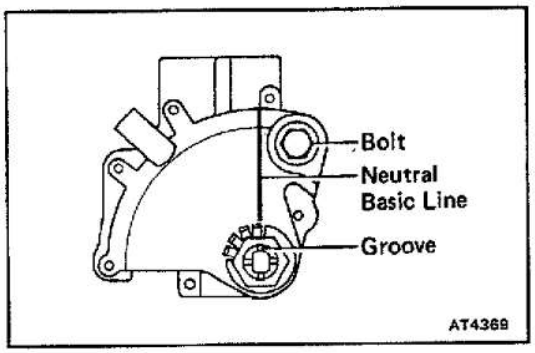
(a) Install the neutral start switch onto the manual valve lever shaft and temporarily tighten the adjusting bolt.

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

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



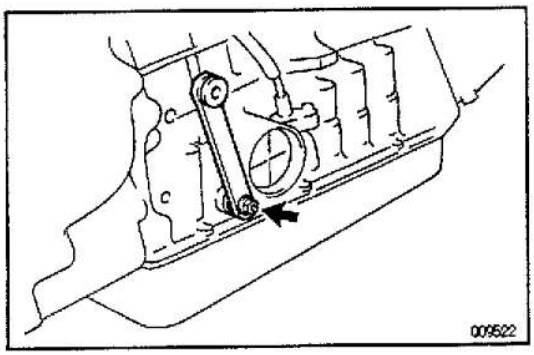
(c) Using the control shaft lever, fully turn the manual lever shaft back and return 2 notches. It is now in neutral.



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

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

HINT: Bend at least 2 of the lock washer tabs.



47. INSTALL TRANSMISSION CONTROL SHAFT LEVER

Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)

SERVICE SPECIFICATIONS

SERVICE DATE

AT06P-0K

Oil Pump

Body clearance	Standard	0.07 – 0.15 mm	0.0028 – 0.0059 in.
	Maximum	0.30 mm	0.0120 in.
Tip clearance	Standard	0.11 – 0.14 mm	0.0043 – 0.0055 in.
	Maximum	0.3 mm	0.012 in.
Side clearance	Standard	0.02 – 0.05 mm	0.0008 – 0.0020 in.
	Maximum	0.1 mm	0.004 in.
Pump body bushing inside diameter	Maximum	38.19 mm	1.5035 in.
Stator shaft bushing inside diameter			
Front side	Maximum	21.58 mm	0.8496 in.
Rear side	Maximum	27.08 mm	1.0661 in.

O/D Direct Clutch

Clutch drum bushing inside diameter	Maximum	27.11 mm	1.0673 in.
O/D direct clutch piston stroke		1.65 – 2.15 mm	0.0728 – 0.0846 in.
O/D planeatary gear busing	Maximum	11.27 mm	0.4437 in.
Planetary pinion gear thrust clearance	Standard	0.20 – 0.60 mm	0.0079 – 0.0236 in.
	Maximum	1.00 mm	0.0394 in.
Flange thickness	No.16	3.6 mm	0.142 in.
	No.17	3.5 mm	0.138 in.
	No.18	3.4 mm	0.134 in.
	No.19	3.3 mm	0.130 in.
	No.20	3.2 mm	0.126 in.
	No.21	3.1 mm	0.122 in.
Torque converter housing installation surface of case and O/D direct clutch drum distance	Standard	15.5 – 16.5 mm	0.610 – 0.650 in.

O/D Brake

Piston stroke	3RZ–FE, 5VZ–FE	1.40 – 1.70 mm	0.0551 – 0.0669 in.
	1KZ–TE	1.32 – 1.62 mm	0.0520 – 0.0638 in.
Flange thickness	No.77	3.3 mm	0.130 in.
	No.78	3.5 mm	0.138 in.
	No.79	3.6 mm	0.142 in.
	No.80	3.7 mm	0.146 in.
	No.81	3.8 mm	0.150 in.
	No.82	3.9 mm	0.154 in.
	None	4.0 mm	0.157 in.

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Direct Clutch

Piston stroke	5VZ–FE, 1KZ–TE	1.37 – 1.60 mm	0.0539 – 0.0630 in.
	3RZ–FE	1.03 – 1.33 mm	0.0406 – 0.0524 in.
Drum bushing inside diameter		53.99 mm	2.1256 in.
Flange thickness	No.33	3.0 mm	0.118 in.
	No.32	3.1 mm	0.122 in.
	No.31	3.2 mm	0.126 in.
	No.30	3.3 mm	0.130 in.
	No.29	3.4 mm	0.134 in.
	No.28	3.5 mm	0.138 in.
	No.27	3.6 mm	0.142 in.
	No.34	3.7 mm	0.146 in.

Forward Clutch

Pack clearance	5VZ–FE, 1KZ–TE	0.60 –1.00 mm	0.0236 –0.0394 in.
	3RZ–FE	0.50 – 0.90 mm	0.0197 – 0.0354 in.
Drum bushing inside diameter		24.08 mm	0.9480 in.
Flange thickness	No.61	3.0 mm	0.118 in.
	No.60	3.2 mm	0.126 in.
	No.45	3.4 mm	0.134 in.
	No.62	3.6 mm	0.142 in.
	No.44	3.8 mm	0.150 in.
	No.42	4.0 mm	0.157 in.
	No.63	4.2 mm	0.165 in.
	No.64	4.4 mm	0.173 in.

2nd Coast Brake

Piston stroke		1.5 – 3.0 mm	0.059 – 0.118 in.
Piston rod length		72.9 mm	2.870 in.
		71.4 mm	2.811 in.

Front Planetary Gear

Maximum inside diameter		24.08 mm	0.9480 in.
Planetary pinion gear thrust clearance	Standard	0.20 – 0.60 mm	0.0079 – 0.0236 in.
	Maximum	1.00 mm	0.0394 in.

Planetary Sun Gear

Sun gear bushing inside diameter	Maximum	27.08 mm	1.0661 in.

2nd Brake

Pack clearance		0.62 – 1.98 mm	0.0244 – 0.0780 in.
Plate thickness		2.5 mm	0.098 in.

1st and Reverse Brake

Pack clearance		0.60 — 1.12 mm	0.0236 — 0.0441 in.
Flange thickness	No.50	5.0 mm	0.197 in.
	No.51	4.8 mm	0.189 in.
	No.52	4.6 mm	0.181 in.
	No.53	4.4 mm	0.173 in.
	No.54	4.2 mm	0.165 in.
	No.55	4.0 mm	0.157 in.

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Rear Planetary Gear

Planetary pinion gear thrust clearance	Standard	0.20 — 0.60 mm	0.0079 — 0.0236 in.
	Maximum	1.00 mm	0.0394 in.

Valve Body Spring

Spring	Free length and Coil outer diameter mm (in.)		Color
Upper valve body			
Secondary regulator valve	30.9 (1.217)	11.2 (0.441)	Blue
Lock—up relay valve	21.4 (0.843)	5.5 (0.217)	Light Gray
3 — 4 shift valve	30.8 (1.213)	9.7 (0.382)	Purple
Down shift plug	27.3 (1.075)	8.7 (0.343)	Yellow
Throttle valve	20.6 (0.811)	9.2 (0.362)	Blue
	or 23.3 (0.917)	9.2(0.362)	White
2nd coast modulator valve	25.3 (0.996)	8.6 (0.339)	Orange
Cut—back valve	21.8 (0.858)	6.0 (0.236)	Red
2 — 3 shift valve	30.8 (1.213)	9.7 (0.382)	Blue
Low coast modulator valve	30.4 (1.197)	8.3 (0.327)	Light Green
Lower valve body			
Check valve	20.2 (0.796)	12.1 (0.476)	None
Pressure relief valve	11.2 (0.441)	6.4 (0.252)	None
1 — 2 shift valve	30.8 (1.213)	9.7 (0.382)	Purple
Primary regulator valve	62.3 (2.453)	18.6 (0.732)	Purple
Accumulator control valve	33.9 (1.335)	8.8 (0.346)	Pink

Valve Body Key

Retainer	Height mm (in.)	Width mm (in.)	Thickness mm (in.)
Upper valve body			
Low coast modulator valve	14.5 (0.571)	5.0 (0.197)	3.2 (0.126)
2 – 3 shift valve	14.0 (0.551)	5.0 (0.197)	3.2 (0.126)
Cut–back valve	15.0 (0.591)	5.0 (0.197)	3.2 (0.126)
Secondary regulator valve	14.0 (0.551)	5.0 (0.197)	3.2 (0.126)
Lock–up relay valve	21.2 (0.835)	5.0 (0.197)	3.2 (0.126)
3 – 4 shift valve	16.5 (0.650)	5.0 (0.197)	3.2 (0.126)
2nd coast modulator valve	16.5 (0.650)	5.0 (0.197)	3.2 (0.126)
Lower valve body			
Accumulator control valve	21.2 (0.835)	5.0 (0.197)	3.2 (0.126)
1 – 2 shift valve	16.5 (0.650)	6.0 (0.236)	3.2 (0.126)
Primary regulator valve	16.2 (0.638)	5.0 (0.197)	3.2 (0.126)

Check Ball

Upper valve body		
Rubber ball Ⓐ diameter	6.35 mm	0.2500 in.
Rubber ball Ⓑ diameter	5.45 mm	0.2181 in.
Lower valve body		
Steel ball diameter	6.35 mm	0.2500 in.

Strainer

	Height mm (in.)	Diameter mm (in.)
Solenoid oil strainer	12.4 (0.448)	10.3 (0.406)
Throttle oil strainer	19.5 (0.768)	10.3 (0.406)

Transmission Case

Transmission case bushing	Maximum	38.19 mm	1.5035 in.
Breather hose depth		13 mm	0.51 in.

Output Shaft

End play	0.27 – 0.86 mm	0.0106 – 0.0339 in.

Accumulator Spring

Spring		Free length mm (in.)	Color
(1) B_2	3RZ—FE	70.50 (2.7756)	White
	5VZ—FE	70.50 (2.7756)	Yellow
	1KZ—TE	72.55 (2.8563)	Grey
(2) C_2	Inner	42.06 (1.6559)	Pink
(3) C_2			
	3RZ—FE, 5VZ—FE	64.00 (2.5197)	Green
	1KZ—TE	68.53 (2.6980)	Bule
(4) B_0			
	3RZ—FE, 1KZ—TE	62.00 (2.4409)	Green
	5VZ—FE	63.60 (2.5039)	Red
(5) C_0	Inner	46.00 (1.8110)	Yellow
(6) C_0	Outer	74.60 (2.9370)	Orange

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AT000-00

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Stator shaft x Oil pump body		10	100	7
Upper valve body x Lower valve body		6.4	65	56 in.·lbf
Detent spring x Valve body		10	100	7
Parking lock pawl bracket		7.4	75	65 in.·lbf
O/D support x Transmission		25	260	19
Oil pump x Transmission case		22	220	16
Valve body x Transmission case		10	100	7
Oil strainer x Valve body		10	100	7
Solenoid valve x Valve body		10	100	7
Oil pan x Transmission case		7.4	75	65 in.·lbf
Transmission housing	14 mm bolt	34	345	25
	17 mm bolt	57	580	42
Union		29	300	22
Speed sensor		16	160	12
Neutral start switch		6.9	70	61 in.·lbf
Neutral start switch adjusting bolt		13	130	9
Control shaft lever		16	160	12
Transmission case x Transfer adaptor		34	345	25
Transfer adaptor x Transfer		24	240	17
Drain plug		20	205	15
Engine rear mounting x Transfer case		25	260	19

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