

2003 Toyota 4Runner SR5

2003-06 AUTOMATIC TRANSMISSIONS A750E & A750F Overhaul

2003-06 AUTOMATIC TRANSMISSIONS

A750E & A750F Overhaul

APPLICATION

CAUTION: Flush oil cooler and oil cooler lines prior to transmission installation. Oil cooling system contamination may cause premature transmission failure.

TRANSMISSION APPLICATION

Application ⁽¹⁾	Transmission Model
Lexus	
GX 470	A750F
LX 470	A750F
Toyota	
Land Cruiser	A750F
Sequoia	
2WD	A750E
4WD	A750F
Tacoma & Tundra	
2WD	A750E
4WD	A750F
4Runner	
2WD	A750E
4WD	A750F
(1) With 4.7L engine.	

IDENTIFICATION

TRANSMISSION

Vehicle Identification Number (VIN) is used for current application of component parts and assemblies. VIN is stamped on vehicle identification number plate located at top left corner of dash, and on certification label located on driver's door jam. See **Fig. 1**. Transmission serial number is located on side of transmission. See **Fig. 2** and **Fig. 3**.

GEAR RATIOS

TRANSMISSION GEAR RATIOS

Gear Range	Gear Ratio
1st	3.520:1
2nd	2.042:1

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3rd	1.400:1
OD	1.000:1
5th	0.716:1
Reverse	3.224:1

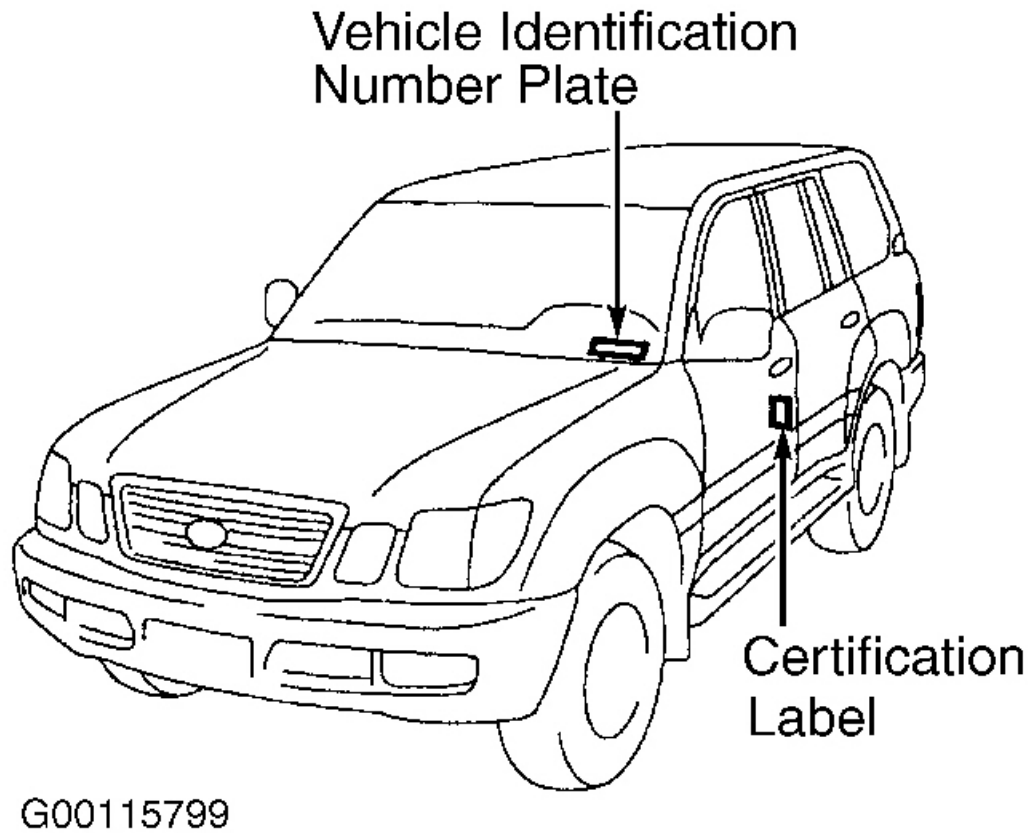
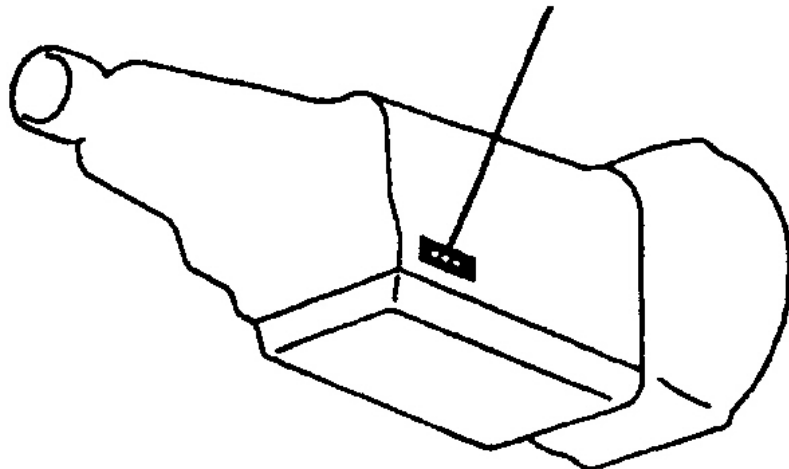


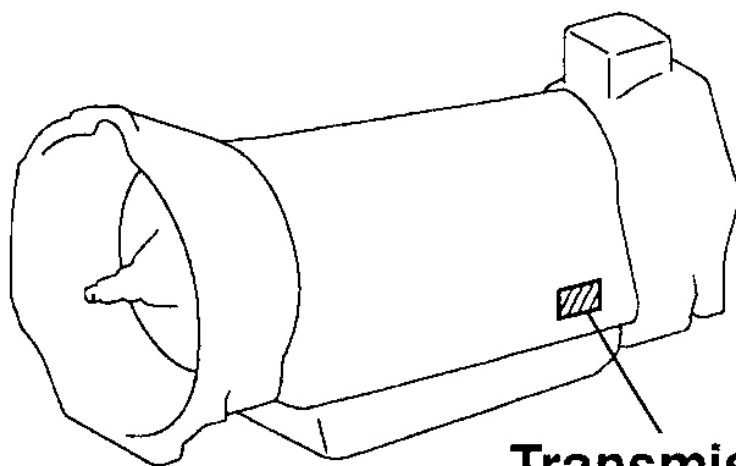
Fig. 1: Locating Vehicle Identification Number Plate & Certification Label
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Transmission Serial Number



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Fig. 2: Locating Transmission Serial Number (A750E)
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**Transmission Serial
Number**

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Fig. 3: Locating Transmission Serial Number (A750F)

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DESCRIPTION & OPERATION

INTRODUCTION

The A750E and A750F transmission is a 5-speed electronic controlled transmission. A750F transmission is used on 4WD vehicles. Transmission consists of lock-up type torque converter, No. 1 clutch, No. 2 clutch, No. 3 clutch, (also referred to as forward clutch, direct clutch and reverse clutch), No. 1 brake, No. 2 brake, No. 3 brake, No. 4 brake, 2nd brake, 3 one-way clutches, 3 planetary gears, hydraulic control system and electronic control system. See **Fig. 5**.

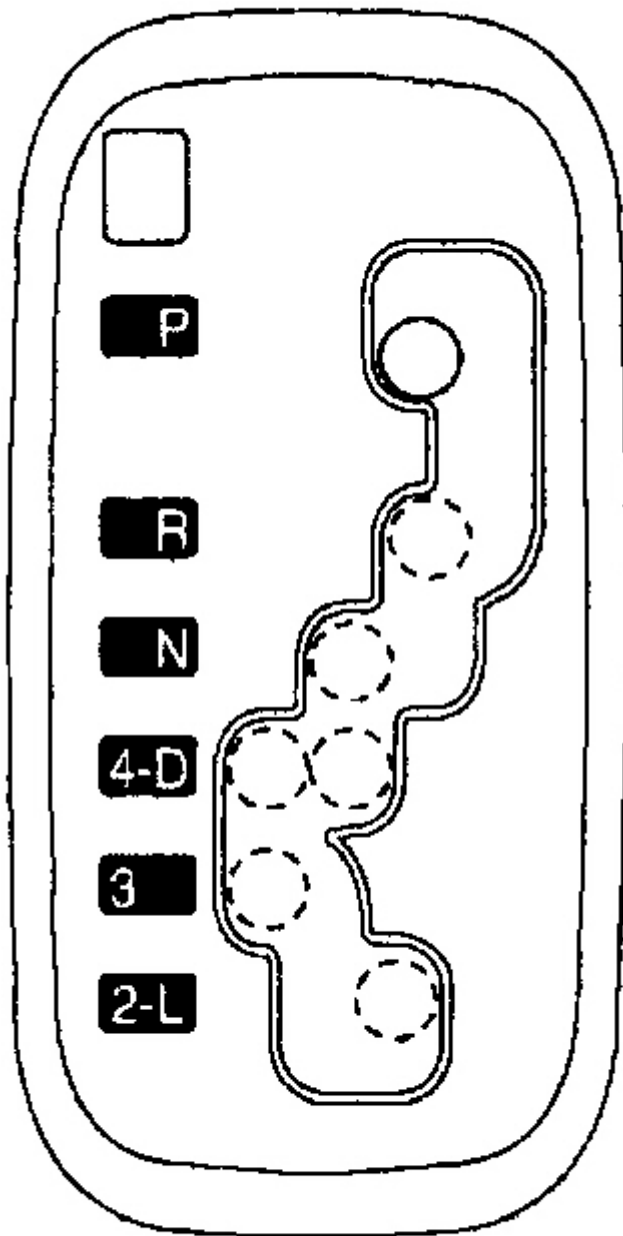
Shift solenoids are controlled by an Engine Control Module (ECM). Shift solenoids are located in valve body. For electronic diagnosis, see appropriate DIAGNOSIS article. ECM receives signals from various input devices and uses these signals to control solenoids for transmission shifting and shift solenoid SLU for torque converter lock-up.

A gate type gearshift lever is used in conjunction with the 5-speed transmission. Gearshift lever button and overdrive switch have been discontinued. Overdrive is only available when gearshift lever is in "D" position. Transmission can be upshifted or downshifted using gearshift lever. For gearshift pattern, see **Fig. 4**. When gearshift lever is shifted into "D" position, transmission will perform normal shift pattern including overdrive. When gearshift lever is shifted into "4" position, engine braking occurs and transmission downshifts to "4" gear. Shifting into overdrive is not possible. Transmission will select appropriate gear for current conditions such as hill climbing, hard towing, etc.

A pattern select switch (if equipped) is located near gearshift lever on center console. Pattern select switch contains a POWER (PWR), NORMAL (ECT) and 2nd operating positions. When pattern select switch is depressed to PWR position, transmission upshifts and downshifts will occur at a higher vehicle speed than with switch released. An ECT PWR indicator light on instrument panel indicates pattern select switch is in PWR (on) position. When pattern select switch is depressed to 2nd position, transmission starts out in 2nd gear. Switch is used when driving vehicle in sand, mud, ice or snow.

A 2nd STRT switch (if equipped), located to right of steering column on instrument panel, is used when driving vehicle in sand, mud, ice or snow. When switch is applied, vehicle will start out in 2nd gear. The 2nd STRT indicator on instrument panel will illuminate when switch is applied.

Transmission is equipped with a shift lock and key lock system. Shift lock system prevents gearshift lever from being moved from Park unless brake pedal is depressed. Key lock system prevents ignition key from being moved from ACC to LOCK position on ignition switch unless gearshift lever is in Park. For more information on shift lock and key lock system, see appropriate SHIFT INTERLOCK SYSTEMS article.



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Fig. 4: Identifying Gearshift Lever Positions
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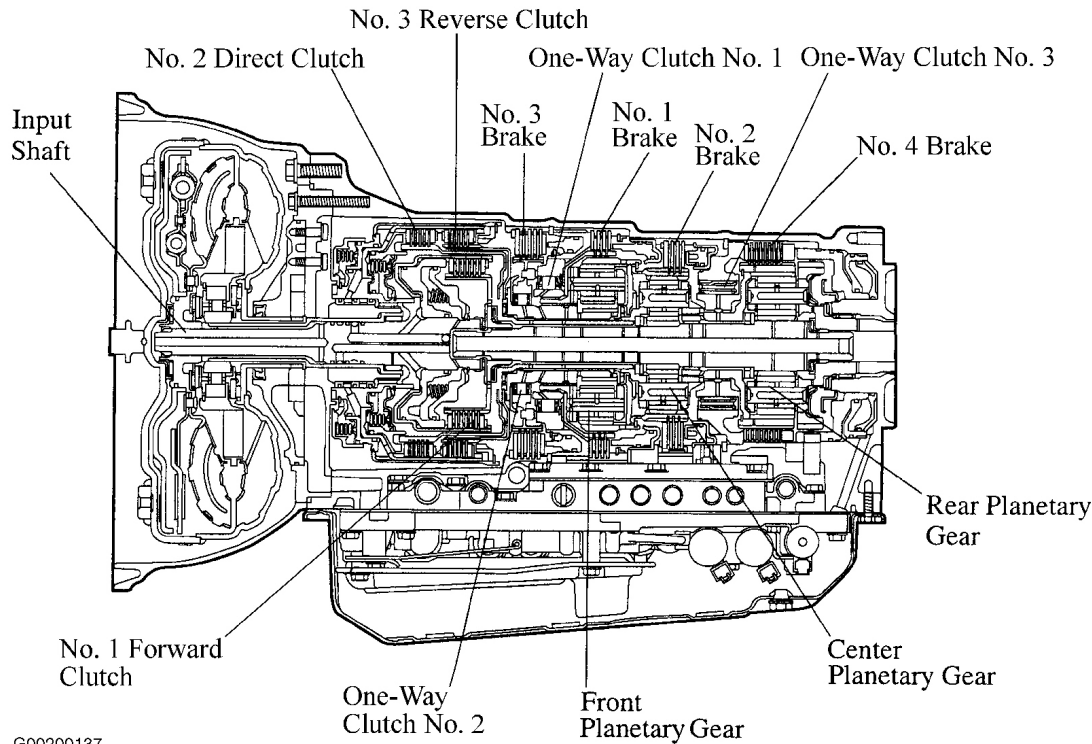


Fig. 5: Identifying Transmission Component Locations
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LUBRICATION

NOTE: See appropriate **SERVICING** article.

TROUBLE SHOOTING

NOTE: Transmission malfunctions may be caused by poor engine performance, improper adjustments, fluid condition or failure of hydraulic, mechanical or electronic components. Ensure all concerns have been properly checked prior to transmission overhaul. See appropriate **DIAGNOSIS** article.

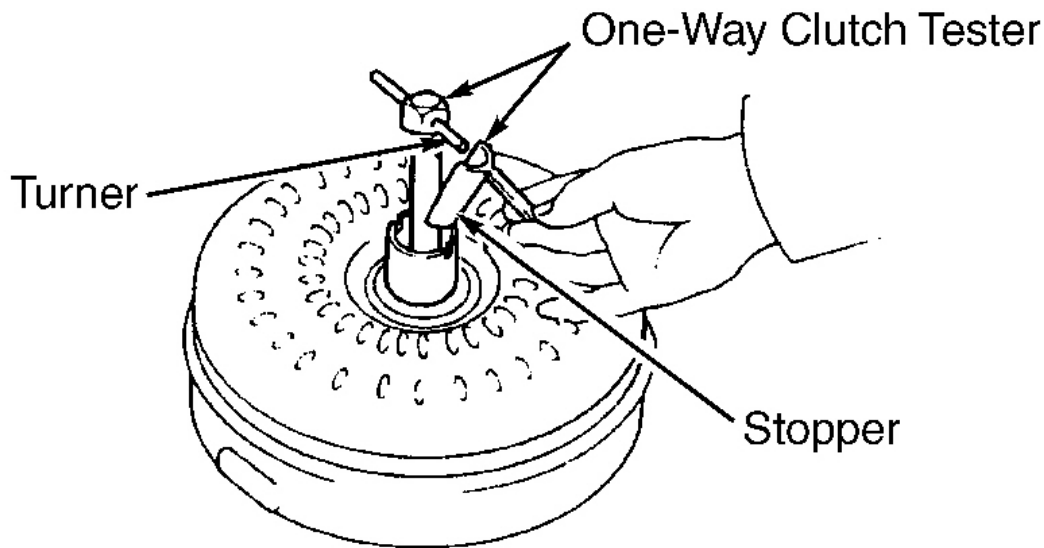
COMPONENT TESTS

TORQUE CONVERTER

NOTE: Torque converter is a sealed unit and is serviced as complete assembly. Perform following tests to check for defective converter. Torque converter and transmission cooler must be thoroughly cleaned and flushed if transmission is contaminated.

One-Way Clutch Check

1. Install turner and stopper of One-Way Clutch Tester (09350-30020) in torque converter. See **Fig. 6**. Turner fits in inner race of one-way clutch. Stopper fits in notch of converter hub and outer race of one-way clutch.
2. Clutch should lock when turned counterclockwise, but should turn freely when rotated clockwise. If necessary, clean converter and retest clutch. Replace converter if clutch still fails test.

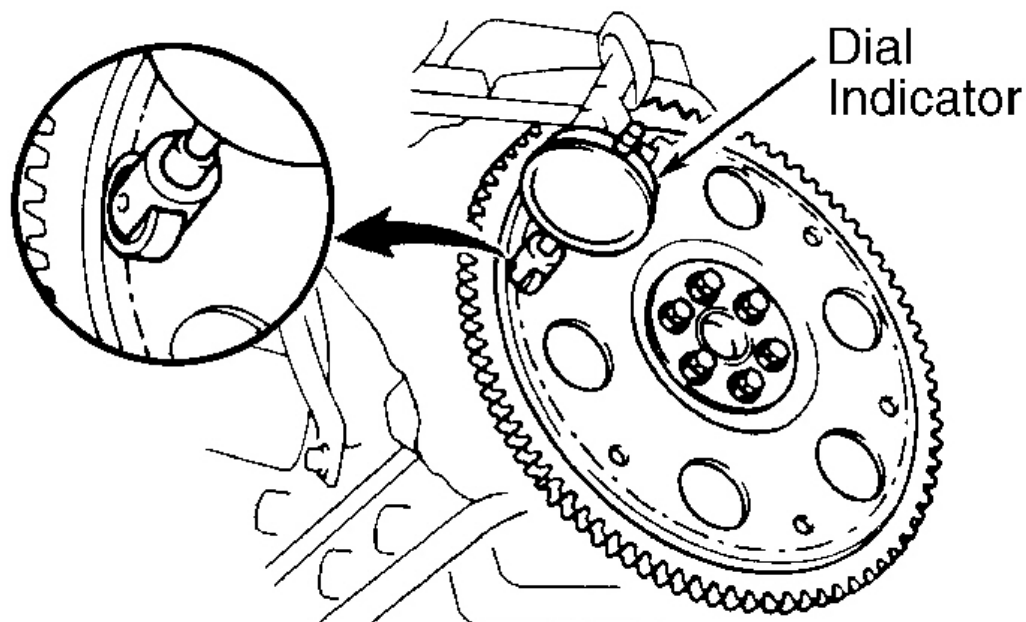


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Fig. 6: Checking Condition Of One-Way Clutch
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Drive Plate (Flywheel) Runout Check

Using dial indicator, measure drive plate runout. See **Fig. 7**. If runout exceeds .008" (.20 mm), or if ring gear is damaged, replace drive plate. If installing a NEW drive plate, note position of spacers. Tighten bolts in a crisscross pattern to 36 ft. lbs. (49 N.m), then tighten each bolt an additional 90 degrees.



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Fig. 7: Measuring Drive Plate Runout

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Converter Sleeve Runout Check

Temporarily mount torque converter to drive plate. Mount a dial indicator with needle resting on converter sleeve. See **Fig. 8**. Rotate converter. If runout exceeds .012" (.30 mm), reposition converter on drive plate and recheck runout. If runout exceeds specification, replace torque converter.

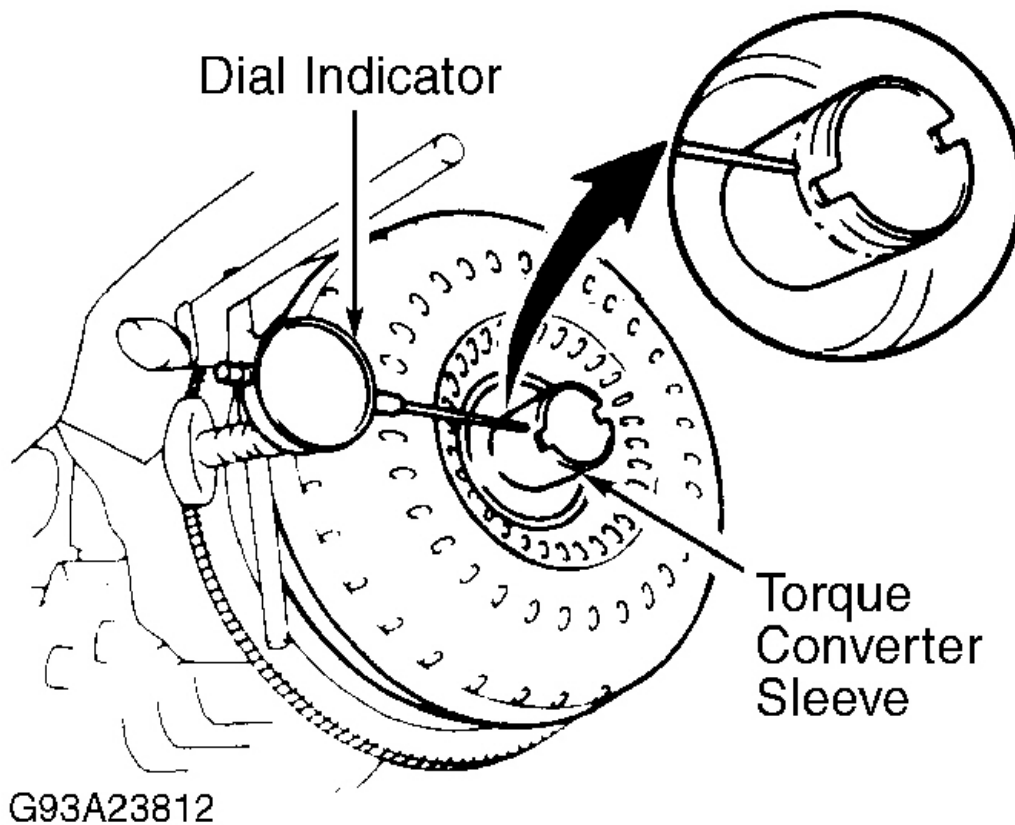


Fig. 8: Measuring Converter Sleeve Runout
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TRANSMISSION DISASSEMBLY

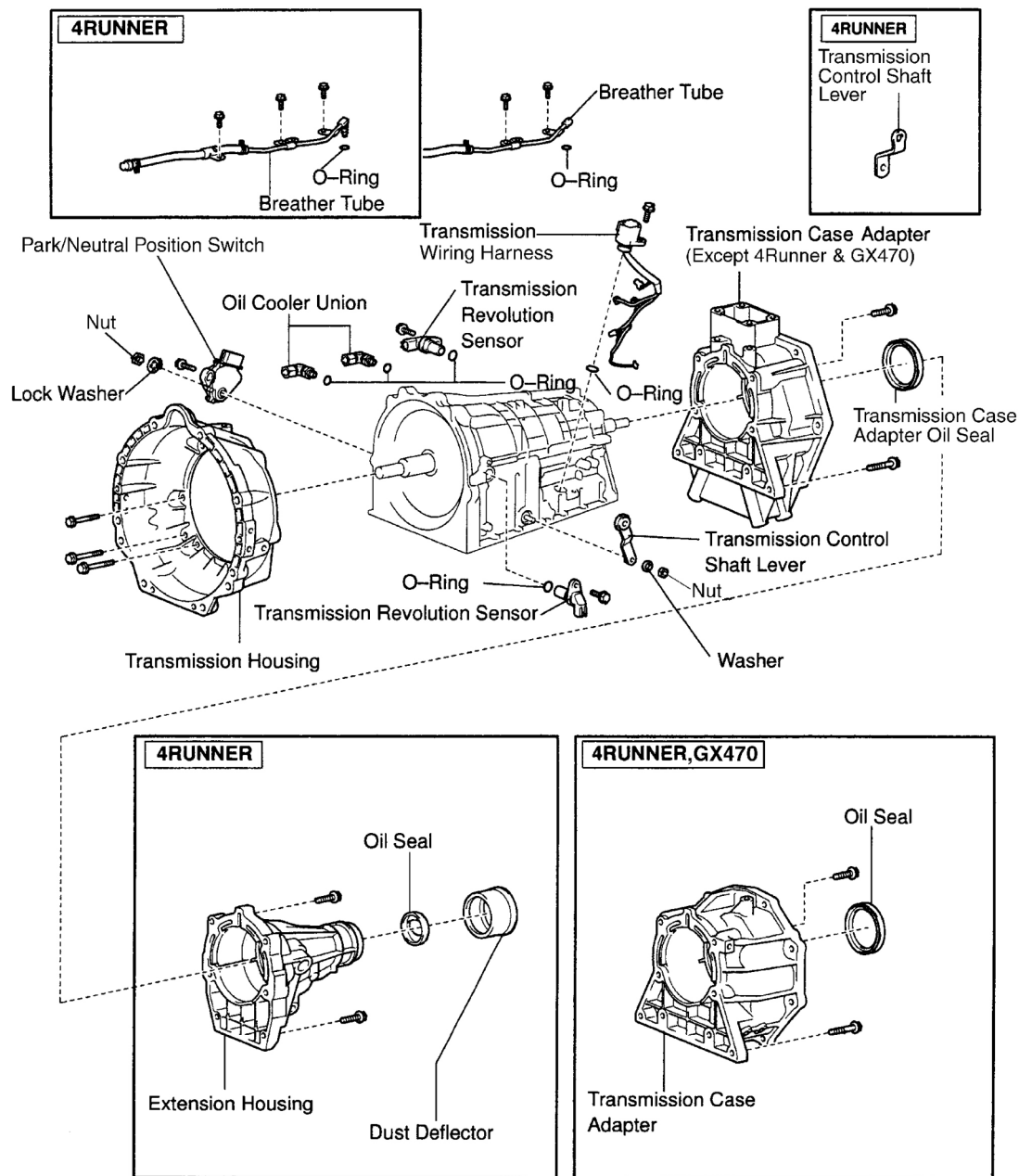
1. Remove nut, washer and control shaft lever. Using a screwdriver, unstake lock washer at park/neutral position switch. Remove lock washer, nut and bolt. Remove park/neutral position switch. Remove oil cooler unions. Remove "O" rings from unions. Remove 2 bolts and transmission revolution sensors from transmission case. Remove "O" rings from speed sensors. Remove bolts and remove breather tube. Remove "O" ring from breather tube. See **Fig. 9**.
2. Remove 10 bolts and remove transmission housing from transmission case. See **Fig. 87**. On 2WD models, remove 6 bolts and remove extension housing. Use a brass drift and hammer to separate extension housing from transmission case. Remove gasket from extension housing. Using snap ring pliers, remove snap ring. See **Fig. 10**. Remove thrust needle roller bearing and 2 bearing races. See **Fig. 42**. Using a brass drift and a hammer, remove extension housing dust deflector. See **Fig. 9**. Using appropriate puller, remove oil seal from extension housing.
3. On 4WD models, remove 8 bolts and remove transmission case adapter. See **Fig. 9**. Use a brass drift and hammer to separate case adapter from transmission case. Remove gasket from transmission case adapter.

Using a screwdriver, remove transmission case adapter oil seal.

4. On all models, install transmission overhaul attachment to transmission and secure attachment. See **Fig. 11**. Position transmission with oil pan facing down. To prevent contamination of valve body, do not turn transmission over. Remove drain plug and drain fluid. Remove 20 bolts and remove oil pan. Remove magnets from oil pan. Note location of magnets. See **Fig. 12**. Check for steel (magnetic) bearing, gear and clutch plate wear material in oil pan. Also check for brass (non-magnetic) bushing wear. Note findings for reference.
5. Turn transmission over with oil strainer facing upward. Remove 4 bolts and oil strainer from valve body. Remove "O" ring from oil strainer. See **Fig. 12**. Remove ATF temperature sensor. Remove bolts and clamps securing wiring harness. Disconnect 7 connectors from shift solenoid valves. See **Fig. 83**.
6. Remove wiring harness bolt from transmission case. Pull transmission wiring harness out of transmission case. Remove "O" ring from transmission wiring harness. Remove 19 valve body bolts and valve body. Note bolt length and location for reassembly reference. See **Fig. 82**. Remove 3 transmission case gaskets. See **Fig. 13**. Remove 3 brake drum gaskets. See **Fig. 14**.

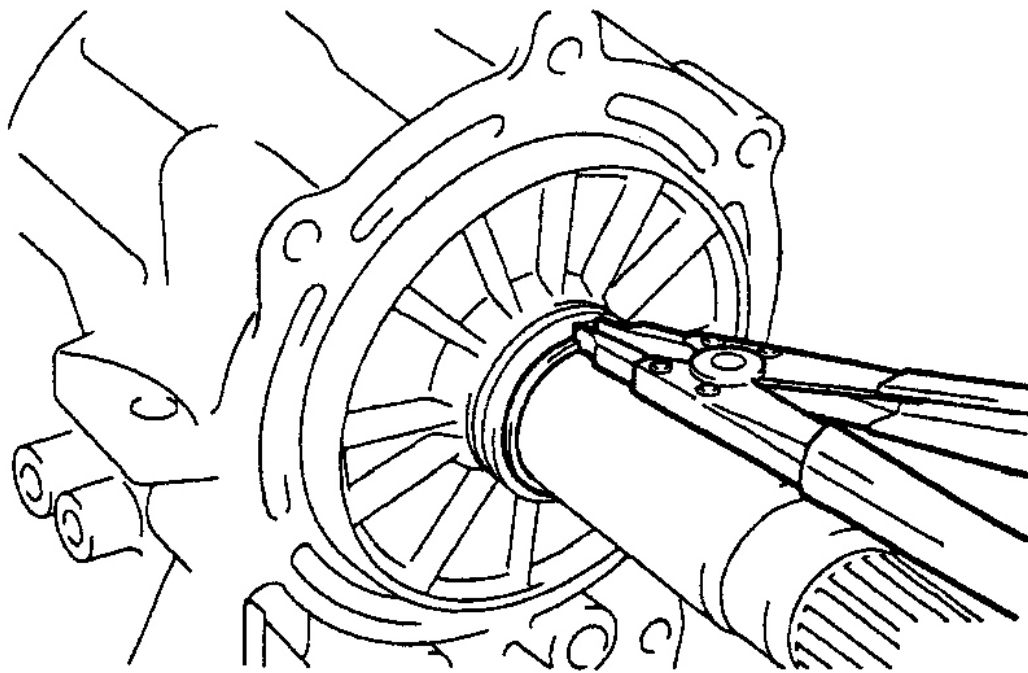
CAUTION: Use care when removing direct clutch accumulator piston. Reverse clutch and No. 3 brake accumulator pistons may jump out when air pressure is applied to transmission case.

7. Remove check ball body and spring. See **Fig. 15**. Apply air pressure to oil passage of transmission case to remove direct clutch and No. 3 brake accumulator pistons and springs. Apply air pressure to oil passage of transmission case to remove reverse clutch accumulator piston and spring. See **Fig. 16** and **Fig. 17**. Remove "O" rings from accumulator pistons. Remove forward clutch accumulator valve and 2 springs. See **Fig. 18**.
8. Remove 3 bolts and remove parking lock pawl bracket. Disconnect parking lock rod from manual valve lever. See **Fig. 19**. Pull out parking lock pawl shaft from front side, then remove lock pawl and torsion spring. See **Fig. 20**. Remove "E" ring from shaft. Using a chisel and a hammer, cut and remove spacer from shaft. See **Fig. 21**. Using a pin punch and a hammer, drive out spring pin. Prevent spring pin from falling into transmission case. Pull manual valve lever shaft out through transmission case. Remove manual valve lever.
9. Using a screwdriver, remove 2 manual valve lever shaft oil seals from transmission case. Remove 10 bolts holding oil pump in transmission case. Using appropriate puller, remove oil pump from transmission case. See **Fig. 22**. Remove thrust bearing race No. 1 from oil pump. Remove clutch drum and input shaft assembly from transmission case. Remove clutch drum thrust washer No. 2 and thrust needle roller bearing. See **Fig. 23**.
10. Check one-way clutch assembly No. 2 operation. Hold reverse clutch hub and turn one-way clutch assembly No. 2. See **Fig. 24**. Ensure one-way clutch assembly No. 2 turns freely clockwise and locks when turned counterclockwise.



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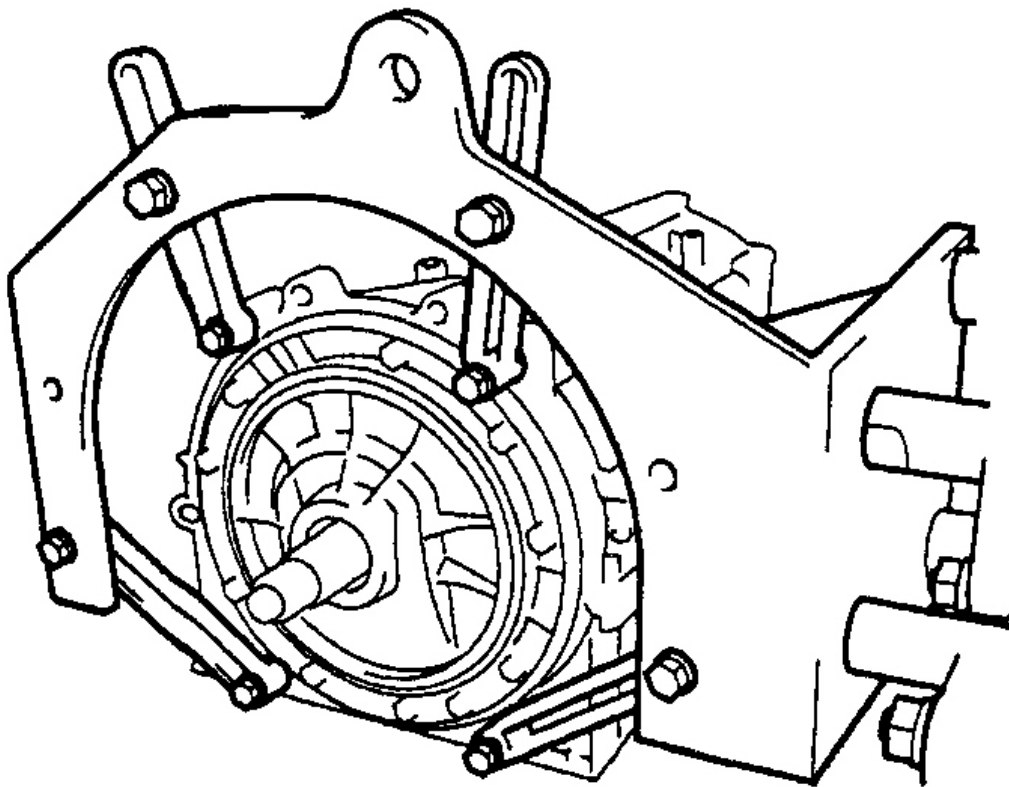
Fig. 9: Exploded View Of Transmission Case External Components
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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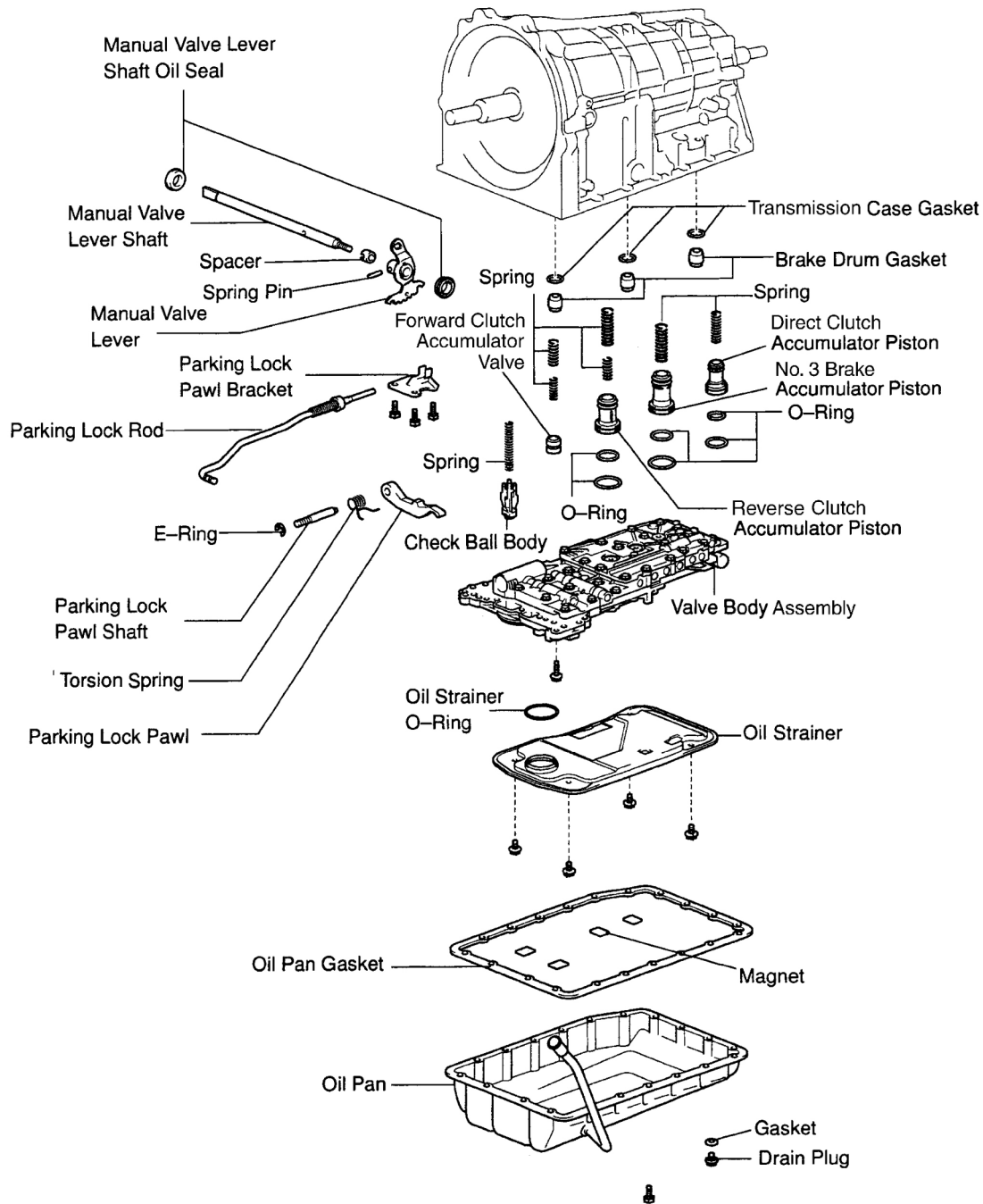
Fig. 10: Removing Snap Ring From Shaft

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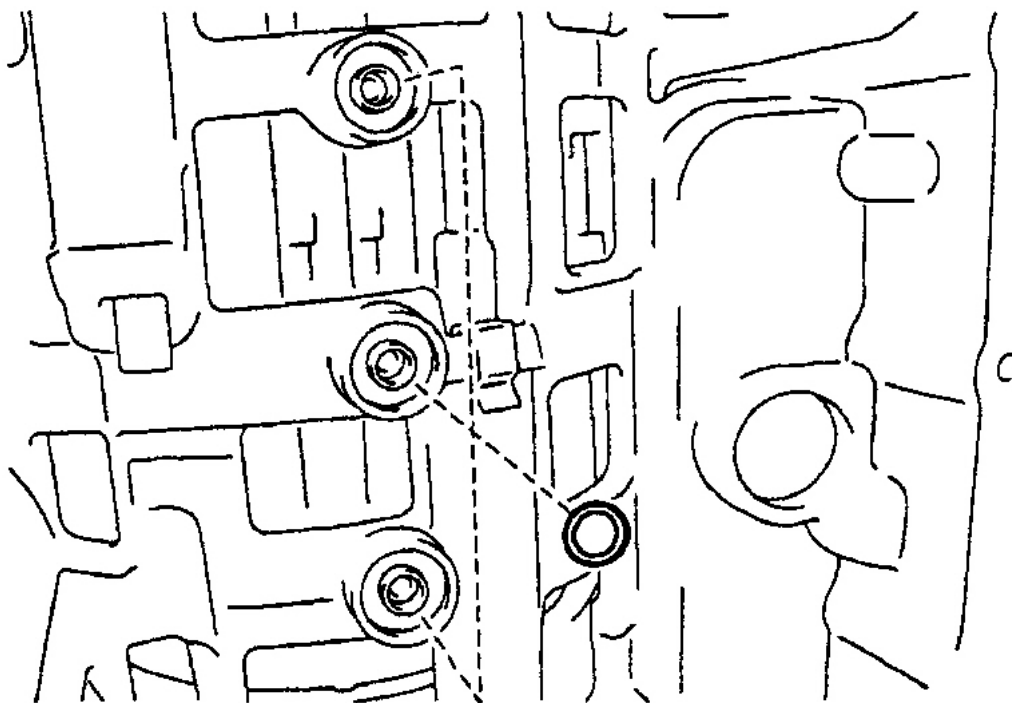
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Fig. 11: Securing Transmission To Attachment
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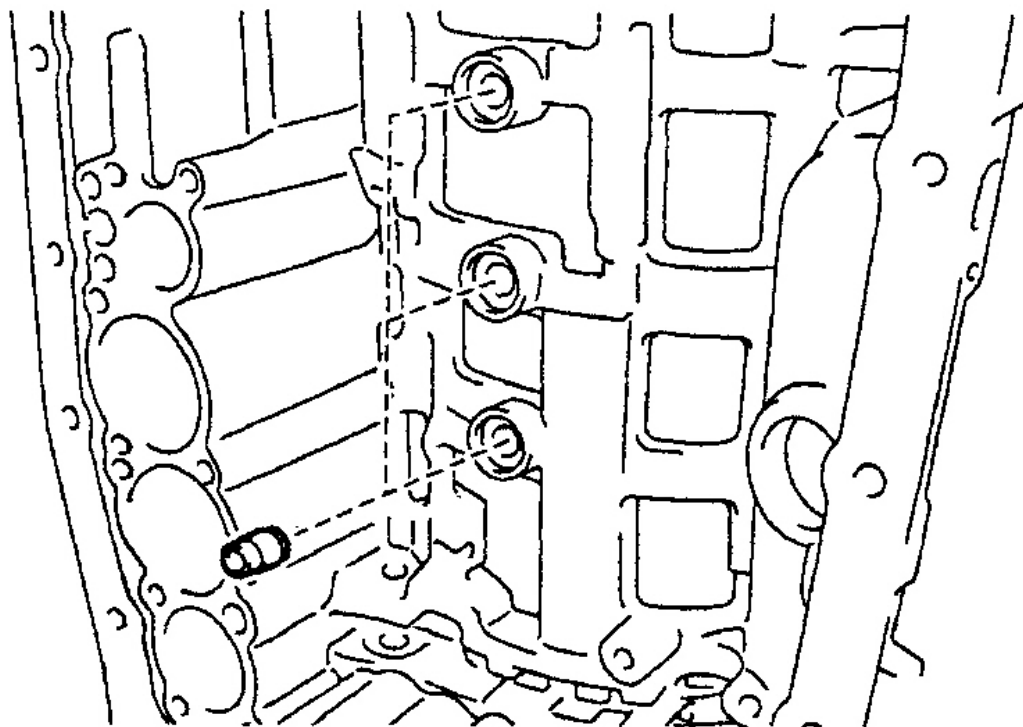
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Fig. 12: Removing Oil Pan, Oil Strainer & Shift Linkage
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 13: Removing Transmission Case Gaskets
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Fig. 14: Removing Brake Drum Gaskets

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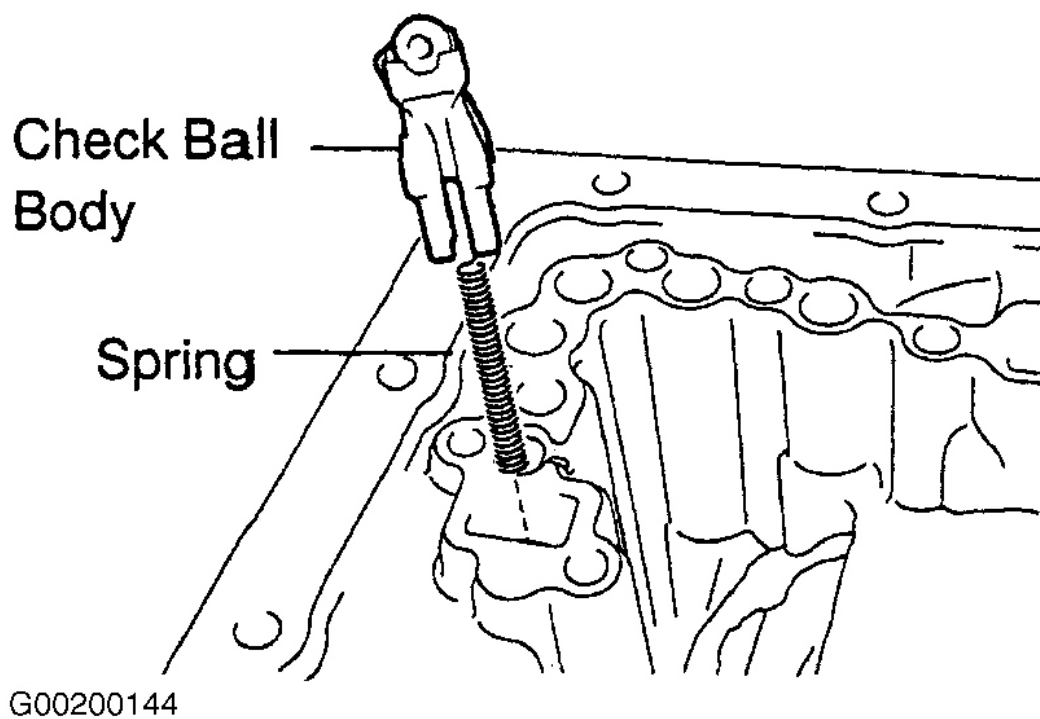
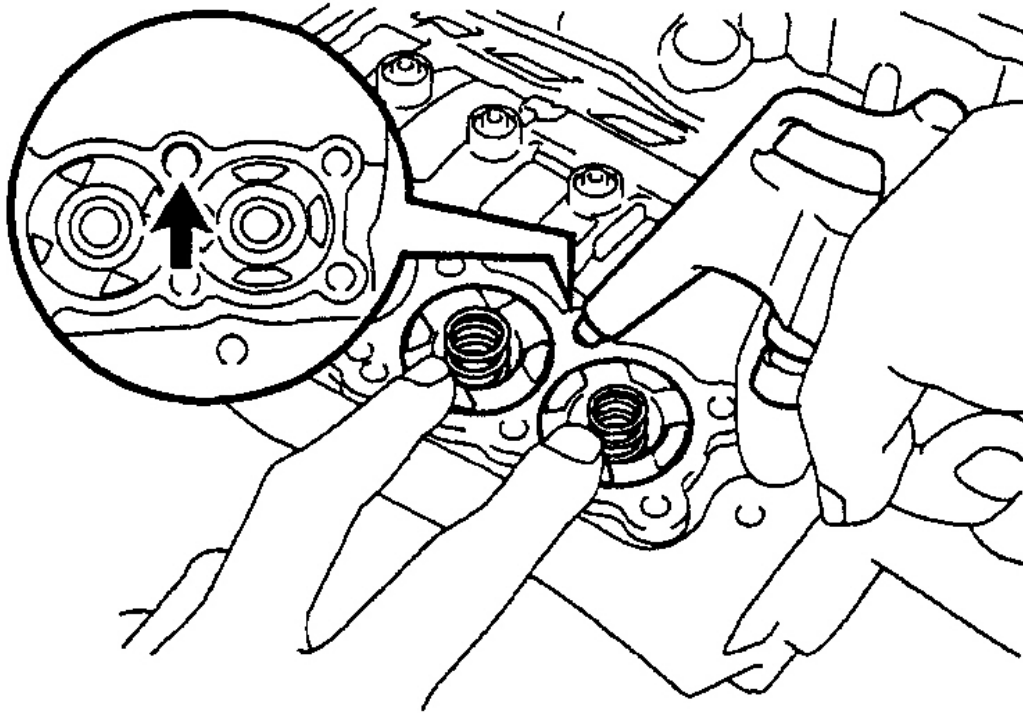
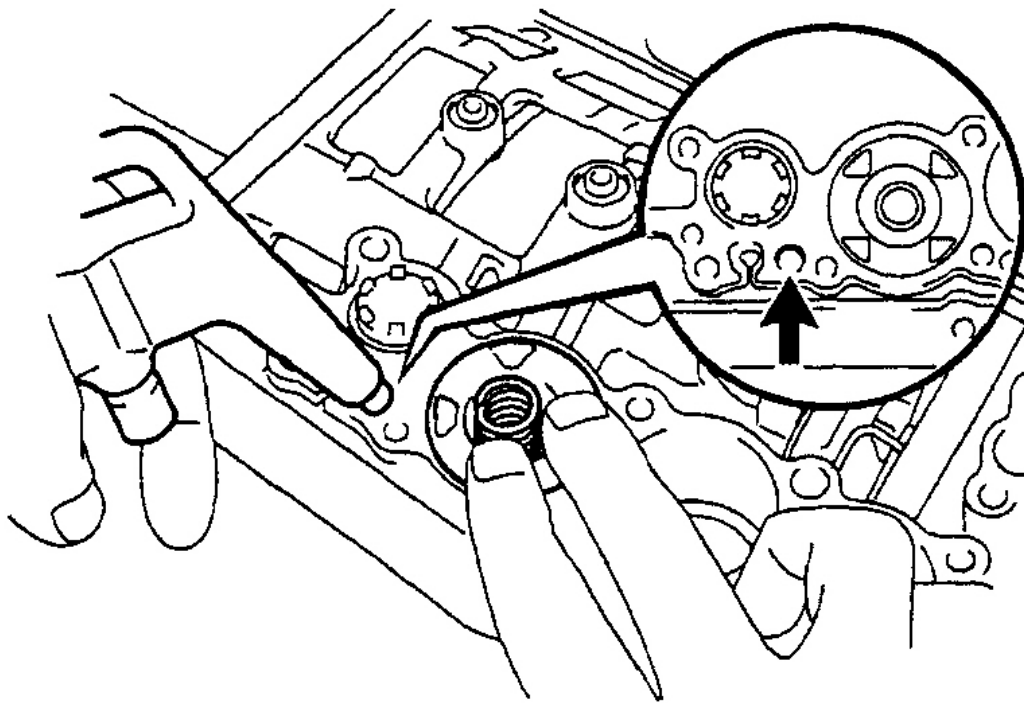


Fig. 15: Removing Check Ball Body & Spring
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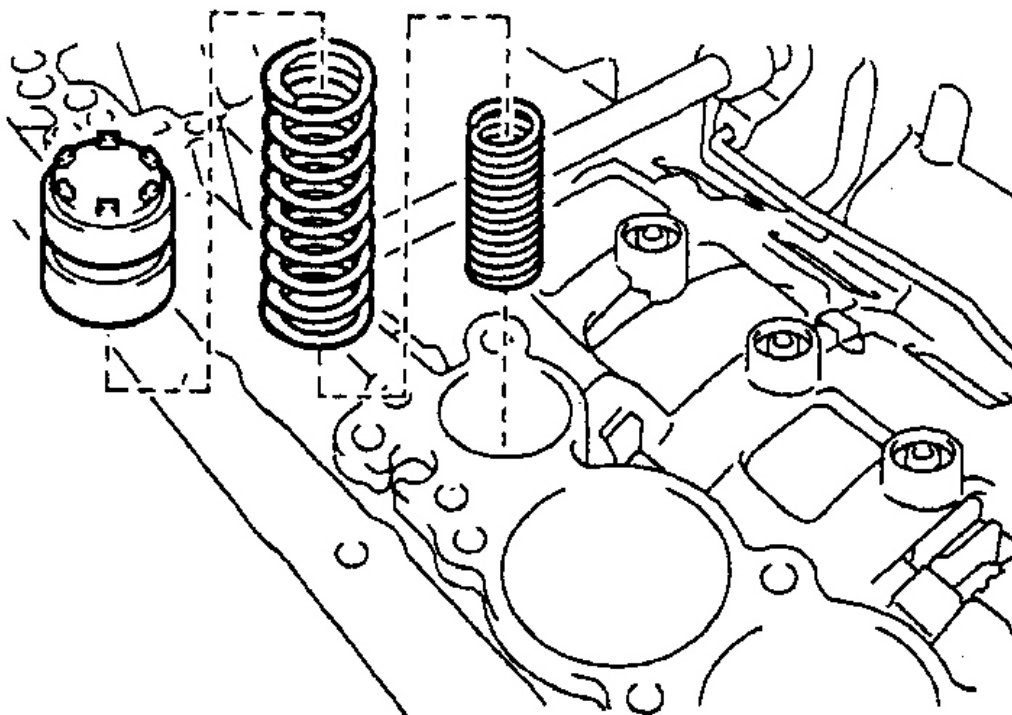
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Fig. 16: Removing Direct Clutch & No. 3 Brake Accumulator Pistons & Springs
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



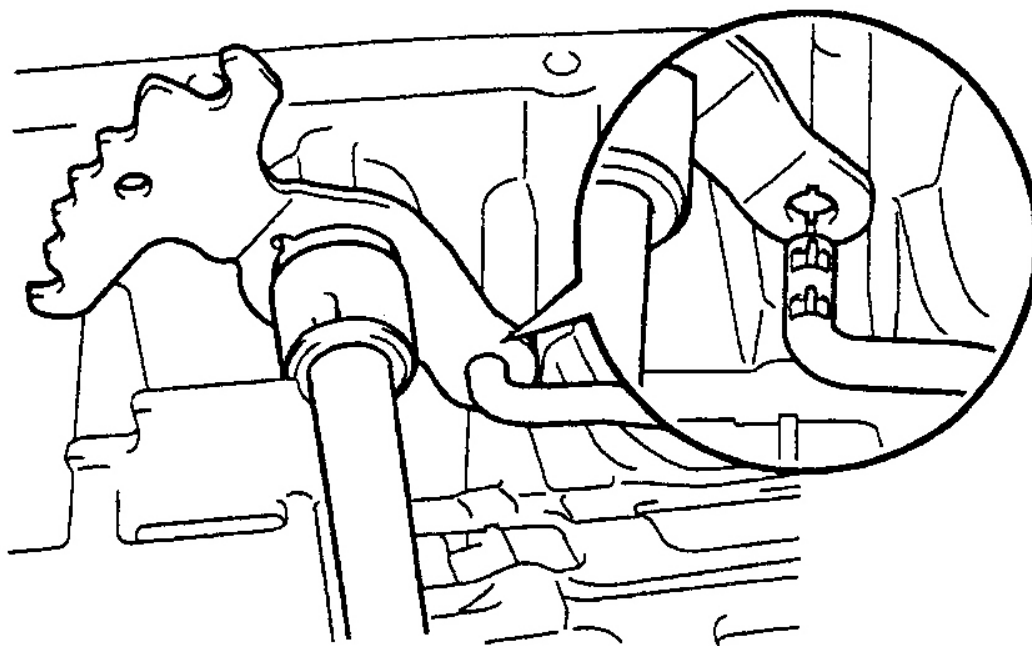
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Fig. 17: Removing Reverse Clutch Accumulator Piston & Springs
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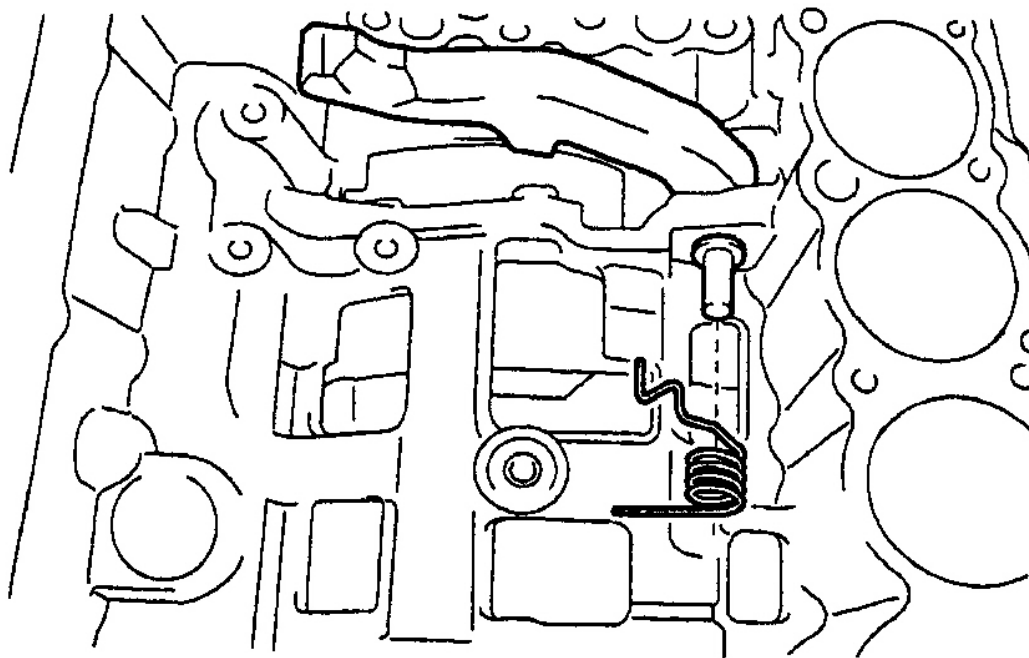
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Fig. 18: Removing Forward Clutch Accumulator Valve & Springs
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 19: Disconnecting Parking Lock Rod From Manual Valve Lever
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 20: Removing Parking Lock Pawl & Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

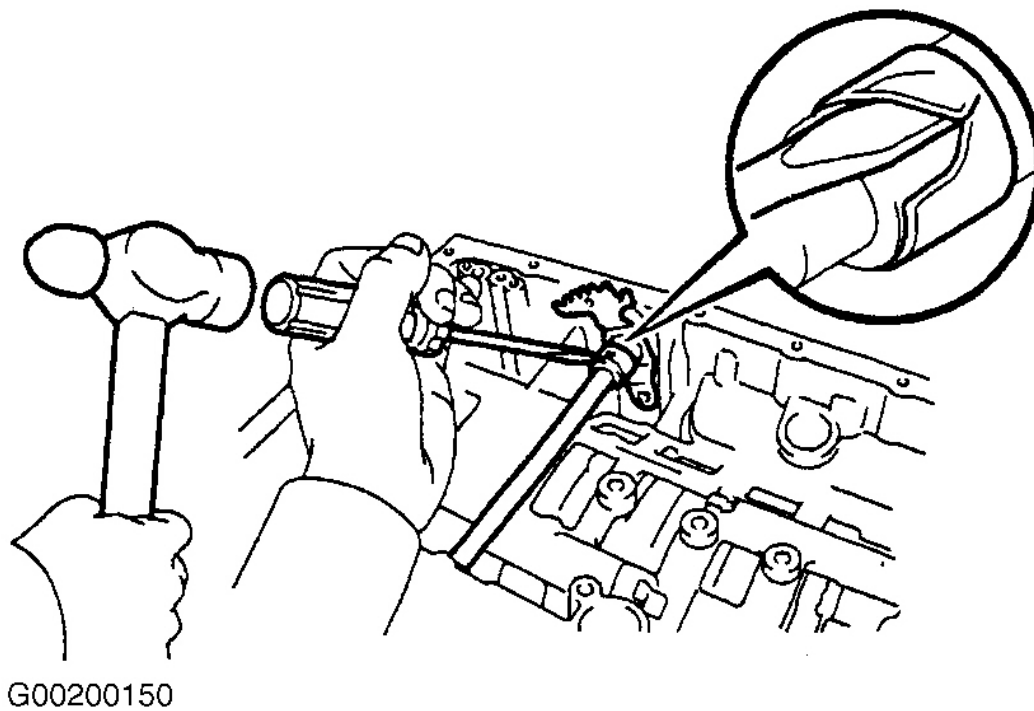
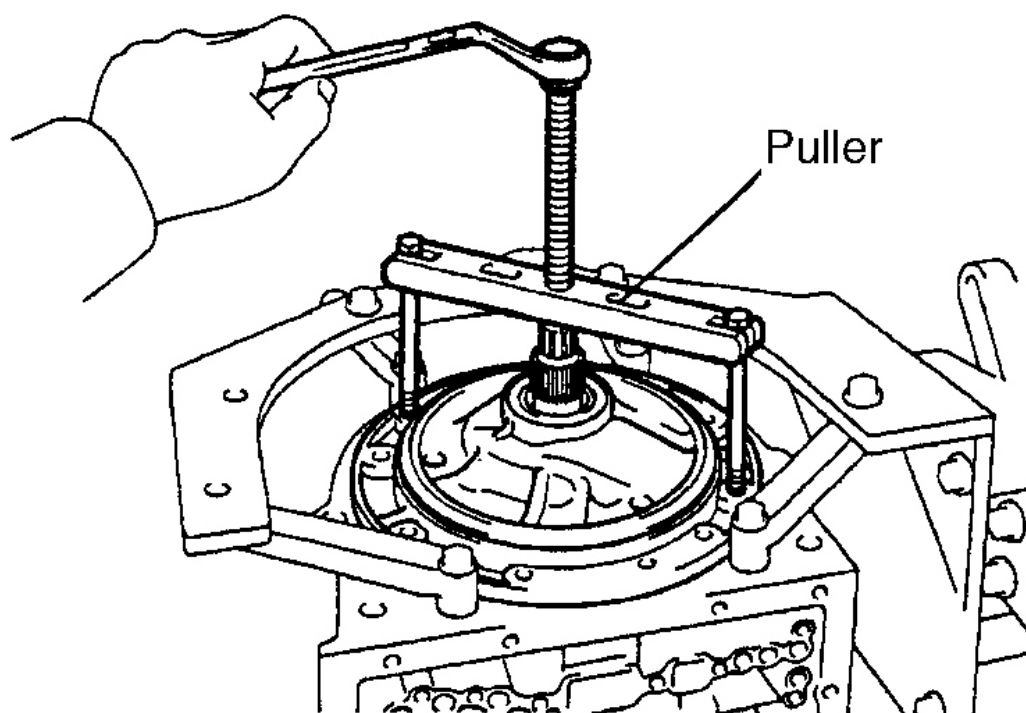


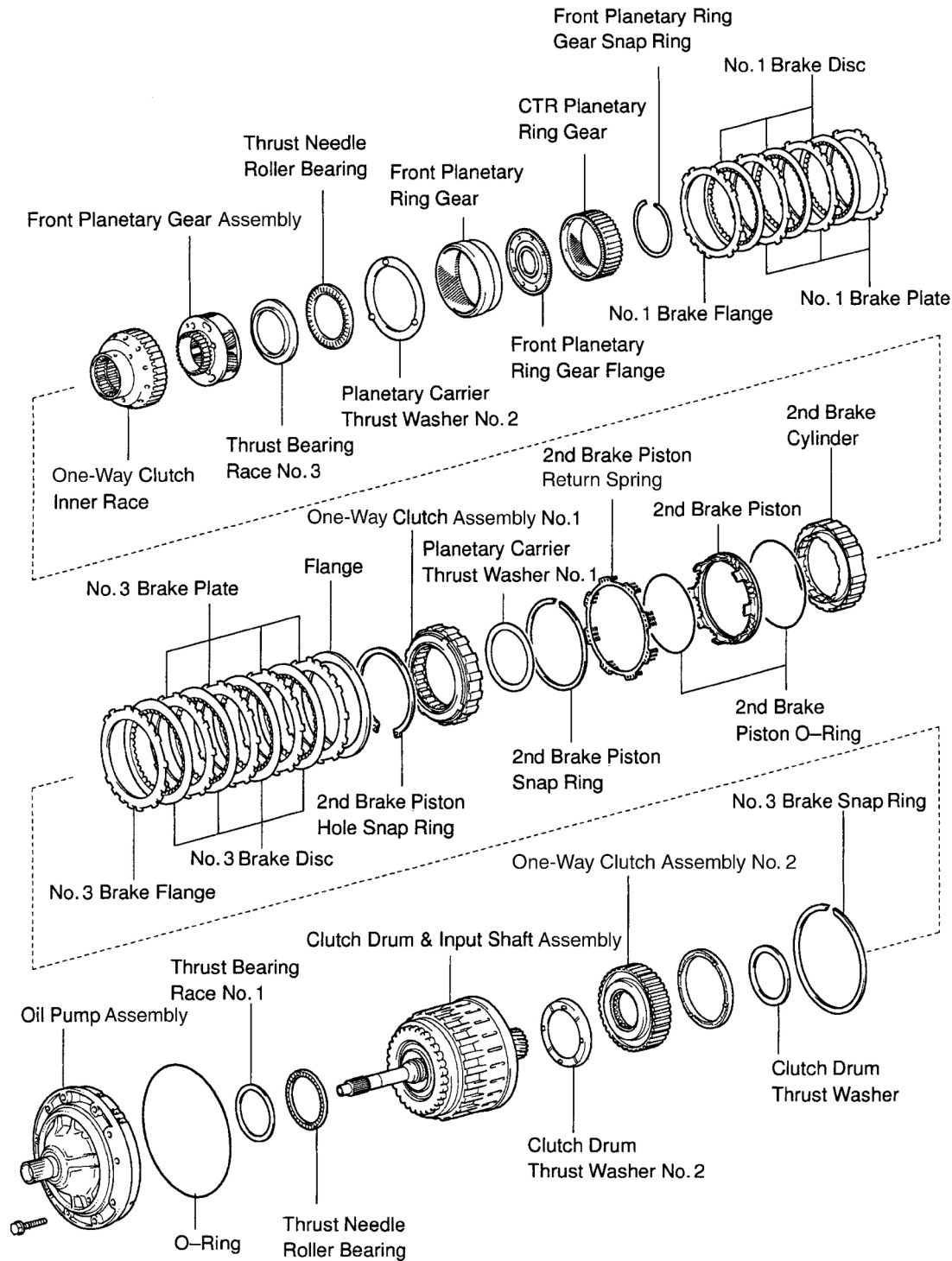
Fig. 21: Cutting Off Shaft Spacer

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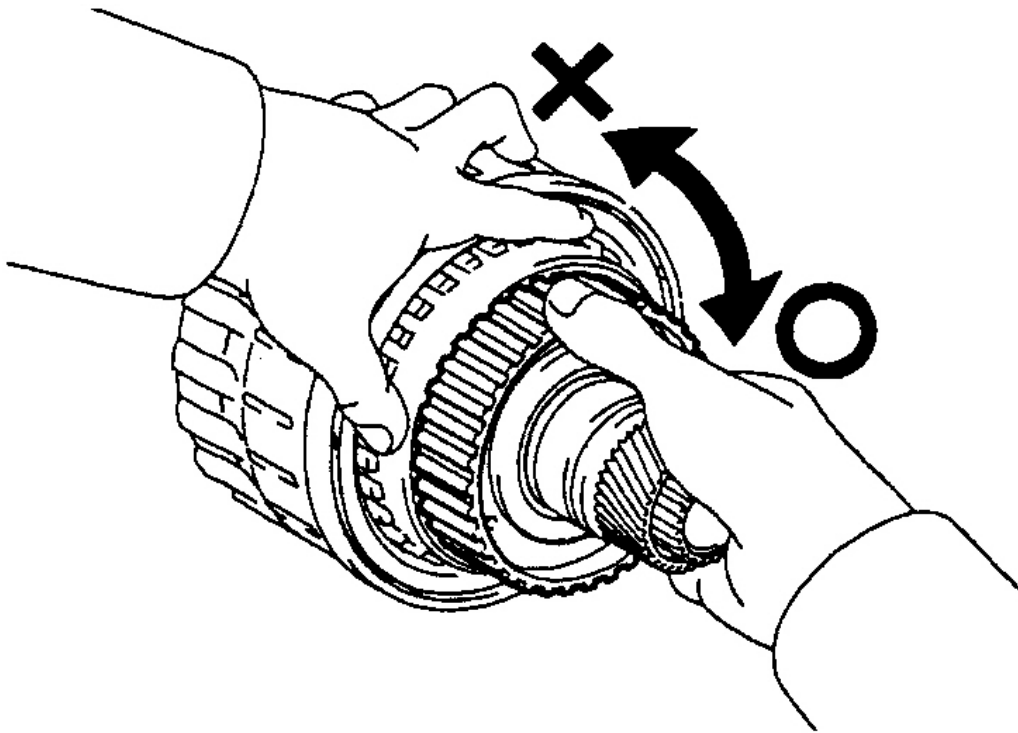
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Fig. 22: Removing Oil Pump From Transmission Case
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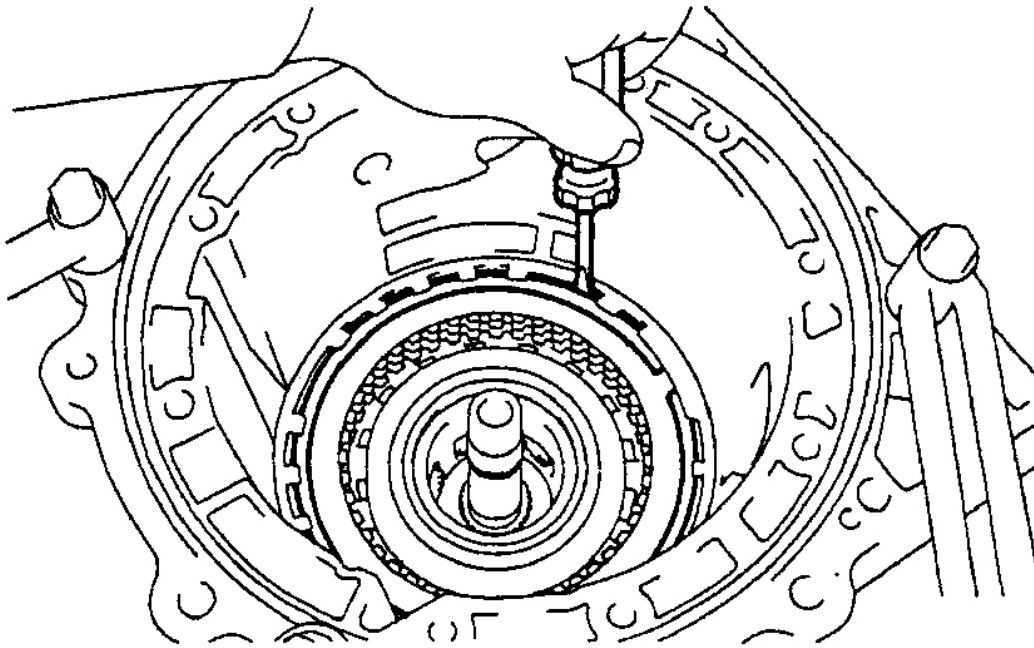
Fig. 23: Exploded View Of Transmission Internal Components (1 Of 2)
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Fig. 24: Checking One-Way Clutch Assembly No. 2 Operation
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. Using feeler gauge, measure No. 3 brake pack clearance between snap ring and flange. See **Fig. 77**. Clearance should be .017-.028" (.42-.72 mm). Note measurement for reference.
12. Remove one-way clutch assembly No. 2 and clutch drum thrust washer No. 2 from clutch drum and input shaft assembly. See **Fig. 23**. Using a screwdriver, remove No. 3 brake snap ring from transmission case. See **Fig. 25**. Remove flange, cushion plate, 4 discs and 4 plates from case. Note location of all components. Remove 2nd brake piston hole snap ring from transmission case. See **Fig. 23**. Remove one-way clutch assembly No. 1 and planetary carrier thrust washer No. 1 from transmission case.



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Fig. 25: Removing No. 3 Brake Snap Ring

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13. Remove 2nd brake cylinder from transmission case. Using appropriate adapter and a press, remove 2nd brake piston snap ring and piston return spring. Hold 2nd brake piston and apply 57 psi (4 kg/cm²) of compressed air to 2nd brake cylinder to remove 2nd brake piston. See **Fig. 26**. Remove 2 "O" rings from 2nd brake piston.
14. Using vernier calipers, measure brake piston return spring free length. Include spring seat in measurement. Free length should be .619" (15.72 mm). Remove front planetary gear and one-way clutch inner race from transmission case. See **Fig. 23**. Remove thrust needle roller bearing, thrust bearing race No. 3 and planetary carrier thrust washer No. 2 from front planetary gear.

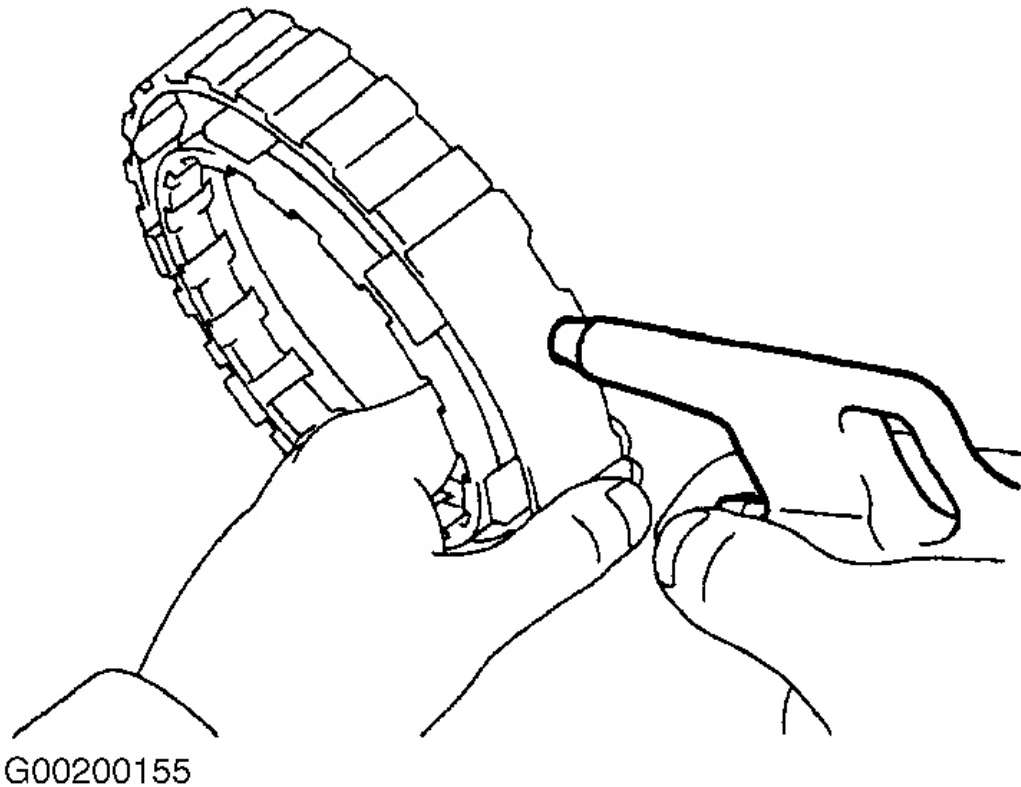
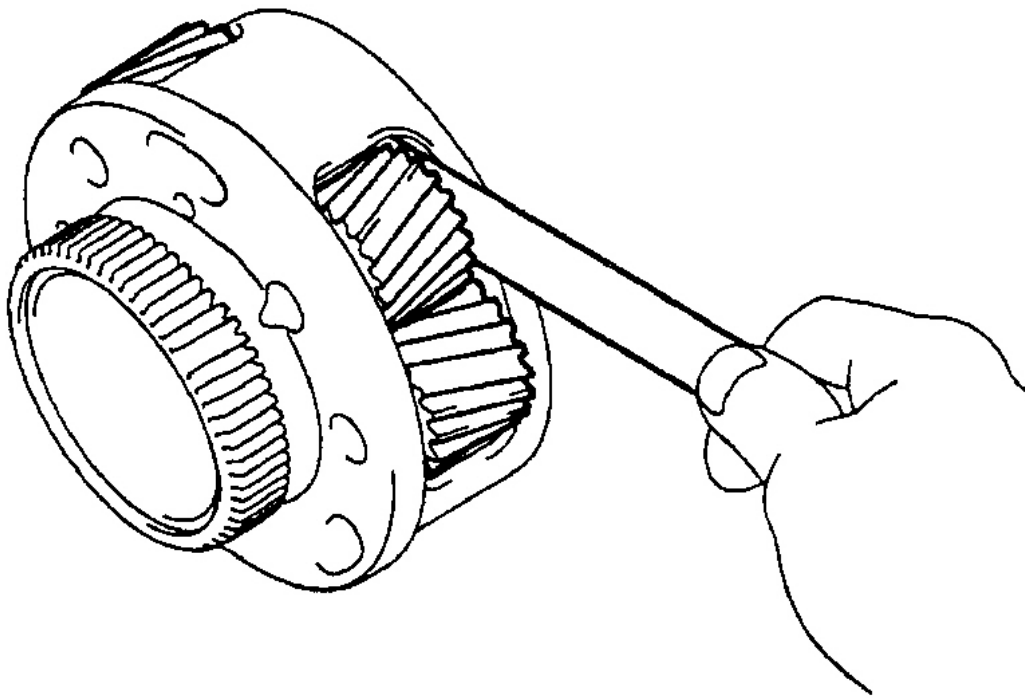


Fig. 26: Removing 2nd Brake Piston From 2nd Brake Cylinder
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

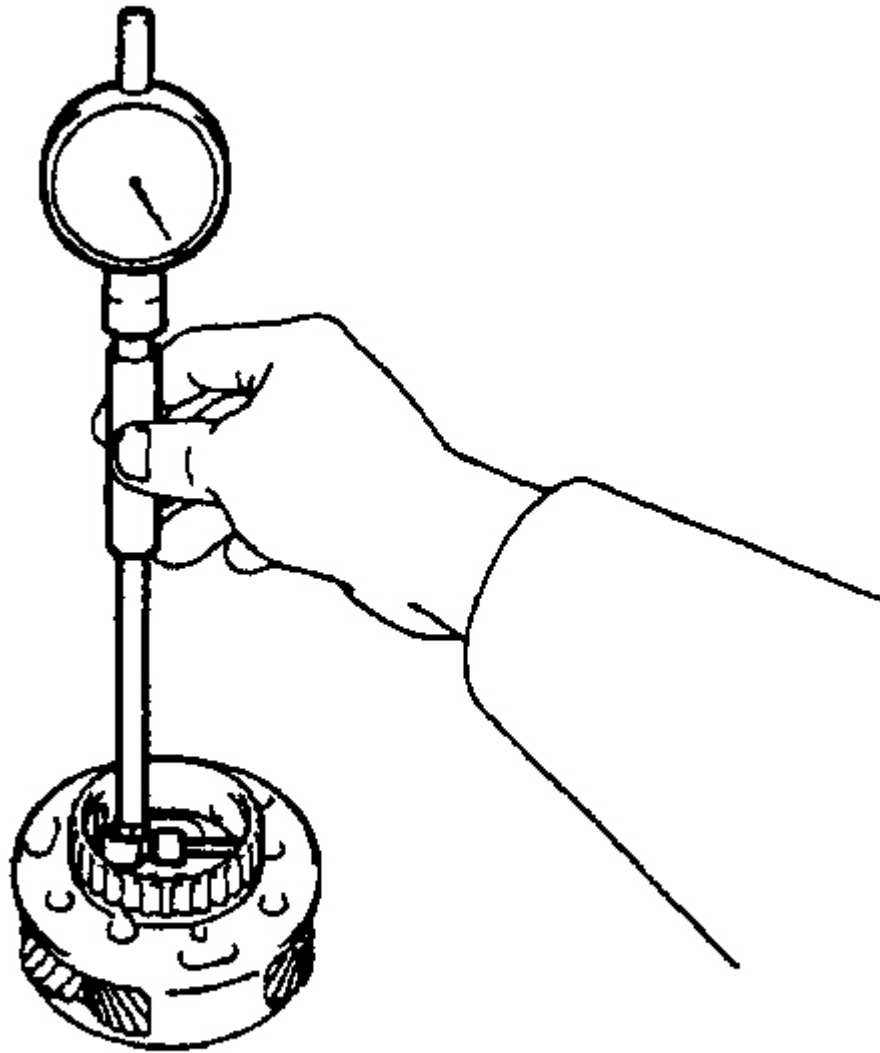
15. Using a feeler gauge, measure front planetary pinion gear thrust clearance. See **Fig. 27**. Standard clearance should be .008-.024" (.20-.61 mm). Maximum clearance should be .026" (.65 mm). If clearance is greater the maximum specification, replace front planetary gear.



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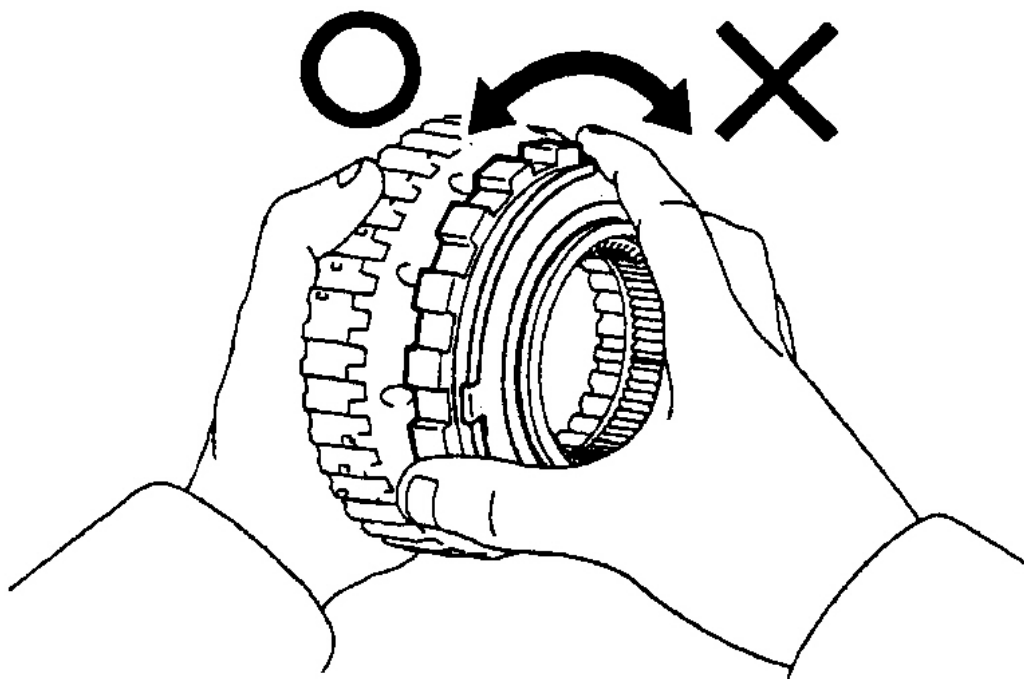
Fig. 27: Measuring Planetary Pinion Gear Thrust Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. Using a dial indicator, measure inside diameter of front planetary gear bushing. See **Fig. 28**. Maximum inside diameter should be 2.263" (57.48 mm). If inside diameter exceeds specification, replace front planetary gear.
17. Install one-way clutch assembly No. 1 to one-way clutch inner race. Hold one-way clutch inner race and turn one-way clutch assembly No. 1. See **Fig. 29**. Ensure one-way clutch assembly No. 1 turns freely counterclockwise and locks when turned clockwise. Remove one-way clutch assembly No. 1 from one-way clutch inner race.
18. Remove front planetary ring gear and bearing from transmission case. See **Fig. 30**. Using a screwdriver, remove front planetary ring gear snap ring. Remove center (CTR) planetary ring gear and front planetary ring gear flange from front planetary ring gear. See **Fig. 23**.



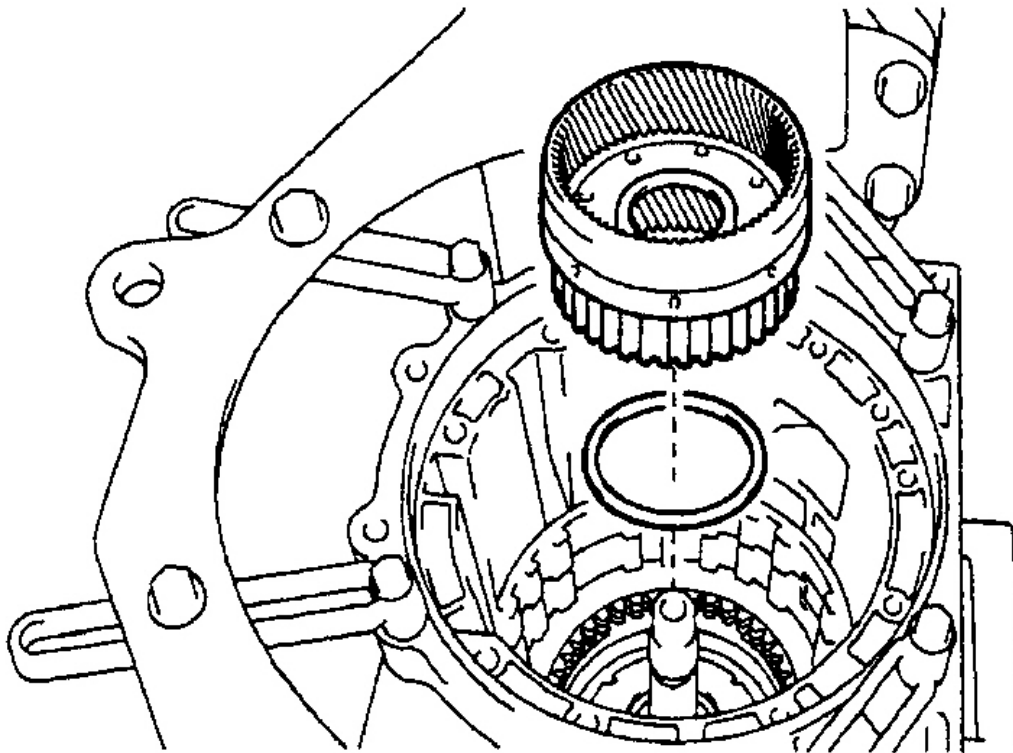
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Fig. 28: Measuring Front Planetary Gear Bushing Inside Diameter
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Fig. 29: Checking One-Way Clutch Assembly No. 1 Operation
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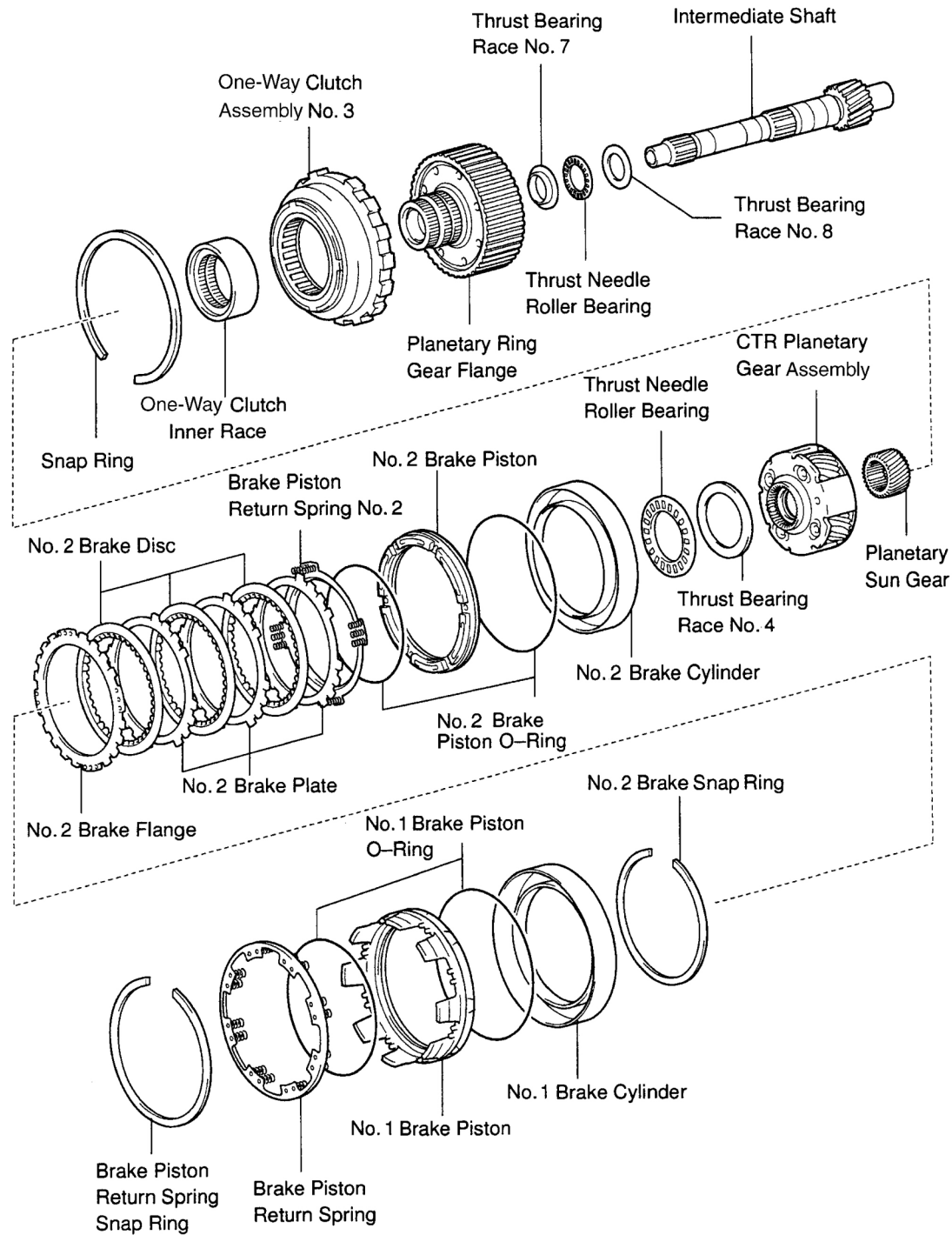
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Fig. 30: Removing Front Planetary Ring Gear & Bearing From Transmission Case
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19. Remove No. 1 brake flange, 3 plates and 3 discs from transmission case. Note location of all components. Using a screwdriver, remove brake piston return spring snap ring from transmission case. Remove brake piston return spring and No. 1 brake piston with No. 1 brake cylinder from transmission case. See **Fig. 31**.
20. Using vernier calipers, measure brake piston return spring free length. Include spring seat in measurement. See **Fig. 32**. Free length should be .671" (17.05 mm). Hold No. 1 brake piston and apply 57 psi (4 kg/cm²) of compressed air to brake cylinder to remove No. 1 brake piston. See **Fig. 33**. Remove 2 "O" rings from No. 1 brake piston.
21. Using a screwdriver, remove No. 2 brake piston snap ring from transmission case. See **Fig. 34**. Remove flange, brake piston return spring, 3 plates and 3 discs from transmission case. Note location of all components. Using vernier calipers, measure brake piston return spring free length. Include spring seat in measurement. Free length should be .687" (17.45 mm).
22. Apply 57 psi (4 kg/cm²) of compressed air to transmission case and remove No. 2 brake piston from transmission case. See **Fig. 35**. If piston will not pop out of transmission case, use needle nose pliers to remove piston. Remove "O" rings from No. 2 brake piston.
23. Remove center (CTR) planetary gear assembly, planetary sun gear and thrust bearing race No. 4 from

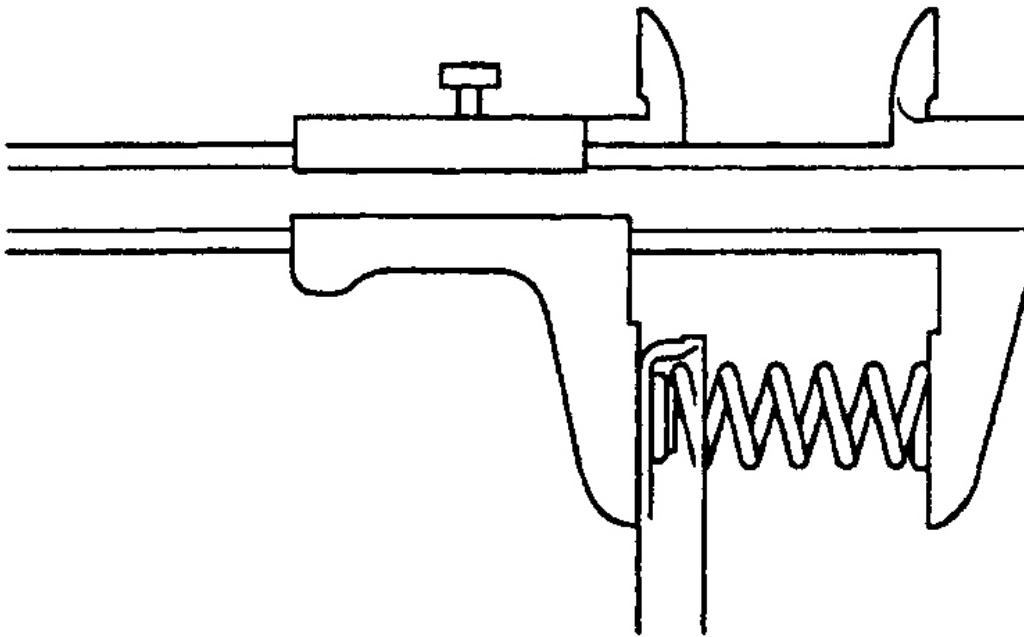
transmission case. See **Fig. 31**. Using a feeler gauge, measure center (CTR) planetary gear pinion thrust clearance. See **Fig. 36**. Standard clearance should be .005-.027" (.12-.68 mm). Maximum clearance should be .029" (.73 mm). If clearance is greater the maximum specification, replace center (CTR) planetary gear assembly.

24. Using a screwdriver, remove intermediate shaft snap ring from transmission case. Remove intermediate shaft with one-way clutch assembly No. 3 from transmission case. See **Fig. 31**. Hold planetary ring gear flange and turn one-way clutch assembly No. 3. Ensure one-way clutch assembly No. 3 turns freely counterclockwise and locks when turned clockwise. See **Fig. 37**. Remove one-way clutch assembly No. 3 and one-way clutch inner race from intermediate shaft. See **Fig. 31**.
25. Remove thrust bearing race No. 8, thrust needle roller bearing, thrust bearing race No. 7, and planetary ring gear flange from intermediate shaft. See **Fig. 31**. Using a dial indicator, measure inside diameter of planetary ring gear flange bushing. See **Fig. 38**. Maximum inside diameter should be 1.267" (32.18 mm). If inside diameter exceeds specification, replace planetary ring gear flange.



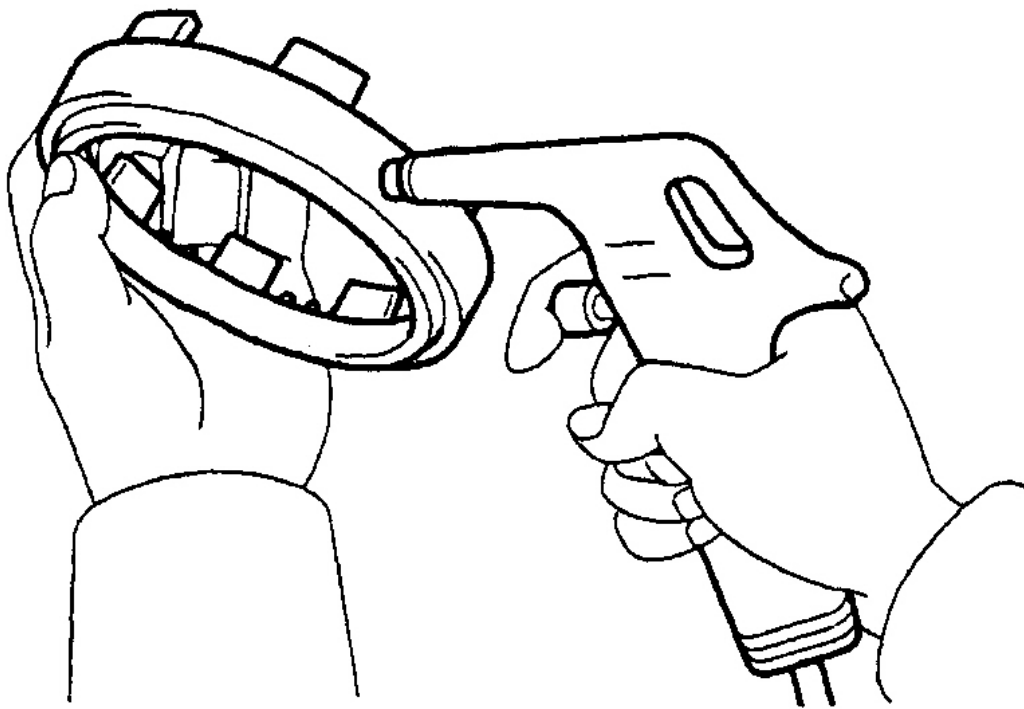
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Fig. 31: Exploded View Of Transmission Internal Components (2 Of 2)
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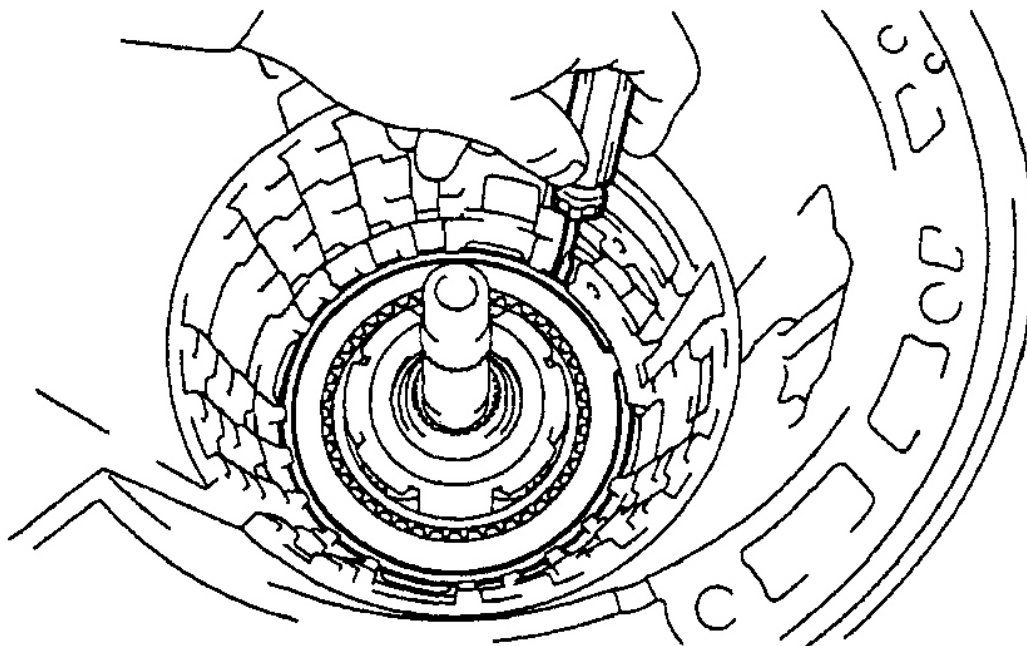
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Fig. 32: Measuring Spring Free Length With Spring Seat
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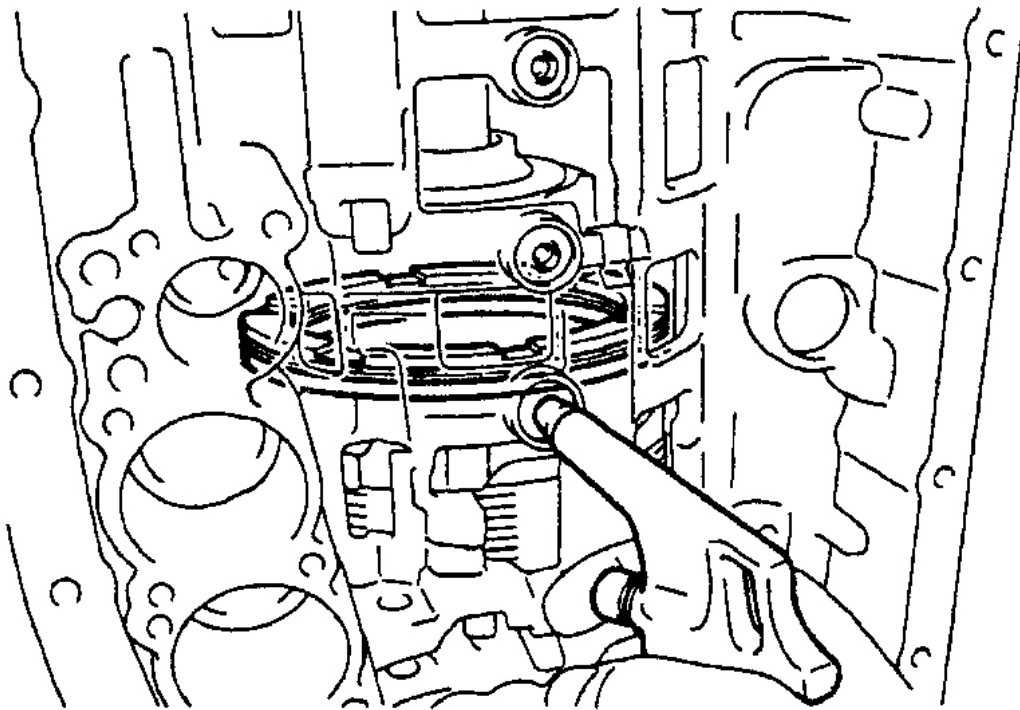
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Fig. 33: Removing No. 1 Brake Piston From No. 1 Brake Cylinder
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



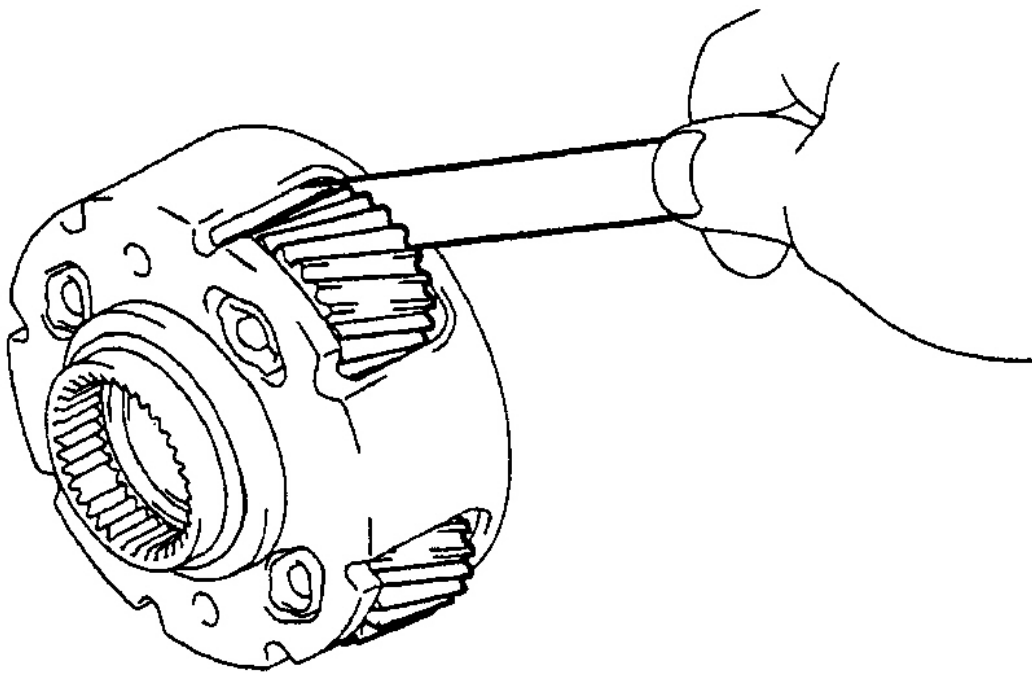
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Fig. 34: Removing No. 2 Brake Snap Ring From Transmission Case
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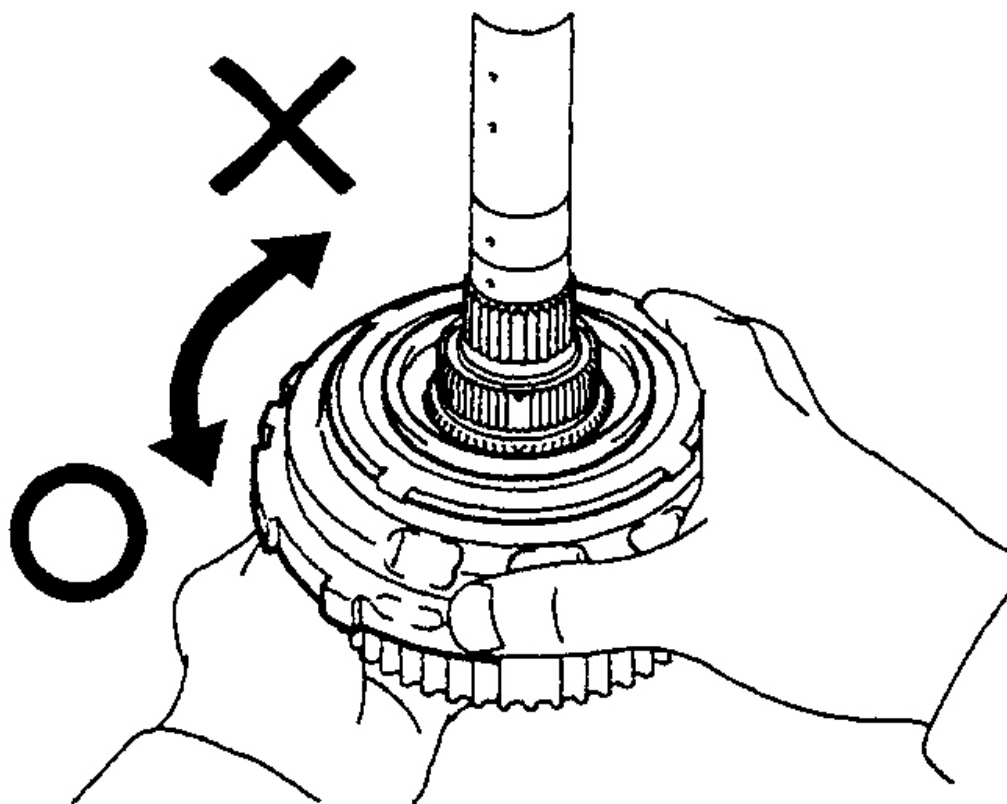
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Fig. 35: Removing No. 2 Brake Piston From Transmission Case
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



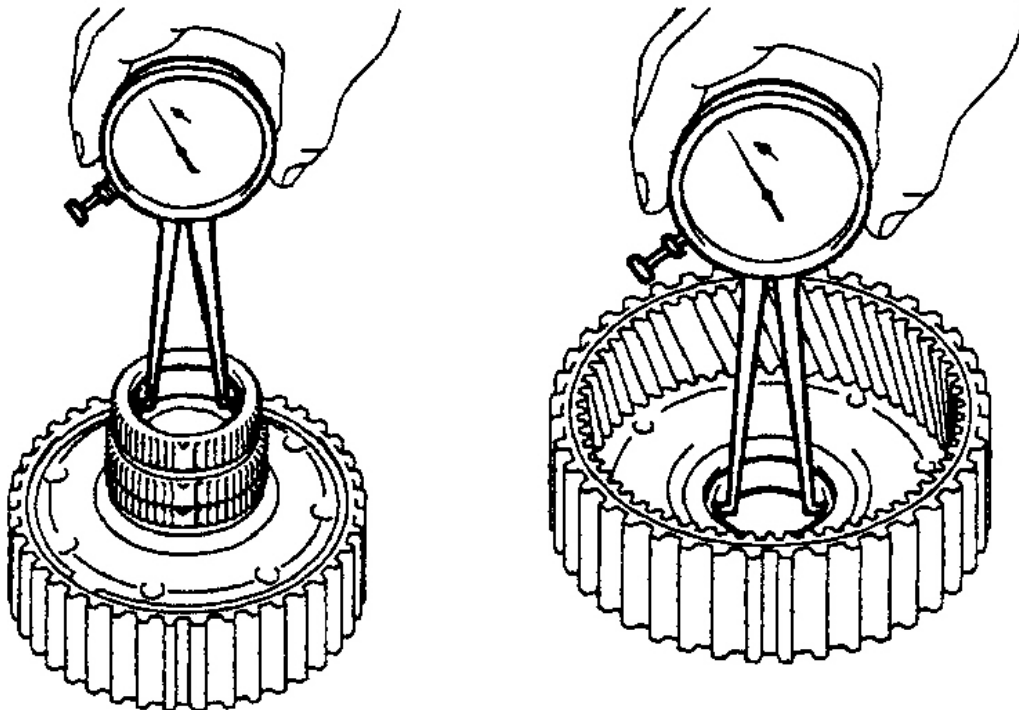
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Fig. 36: Measuring Center (CTR) Planetary Gear Pinion Thrust Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00200166

Fig. 37: Checking One-Way Clutch Assembly No. 3 Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00200167

Fig. 38: Measuring Planetary Ring Gear Flange Bushing Inside Diameter
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

26. Using a dial indicator, check intermediate shaft runout. Maximum runout is .003" (.08 mm). See **Fig. 39**. If runout exceeds specifications, replace intermediate shaft. Using a micrometer, check outer diameter of intermediate shaft at specified locations. See **Fig. 40**. See **INTERMEDIATE SHAFT SPECIFICATIONS** table. Replace intermediate shaft if any diameter is out of specification.

INTERMEDIATE SHAFT SPECIFICATIONS

Shaft Location & Diameter ⁽¹⁾	In. (mm)
A	
Standard	1.022-1.023 (25.96-25.98)
Minimum	1.020 (25.91)
B	
Standard	1.022-1.023 (25.96-25.98)
Minimum	1.020 (25.91)
C	

Standard	1.262-1.263 (32.06-32.08)
Minimum	1.260 (32.01)
D	
Standard	1.262-1.263 (32.06-32.08)
Minimum	1.260 (32.01)
(1) For measurement locations, see Fig. 40 .	

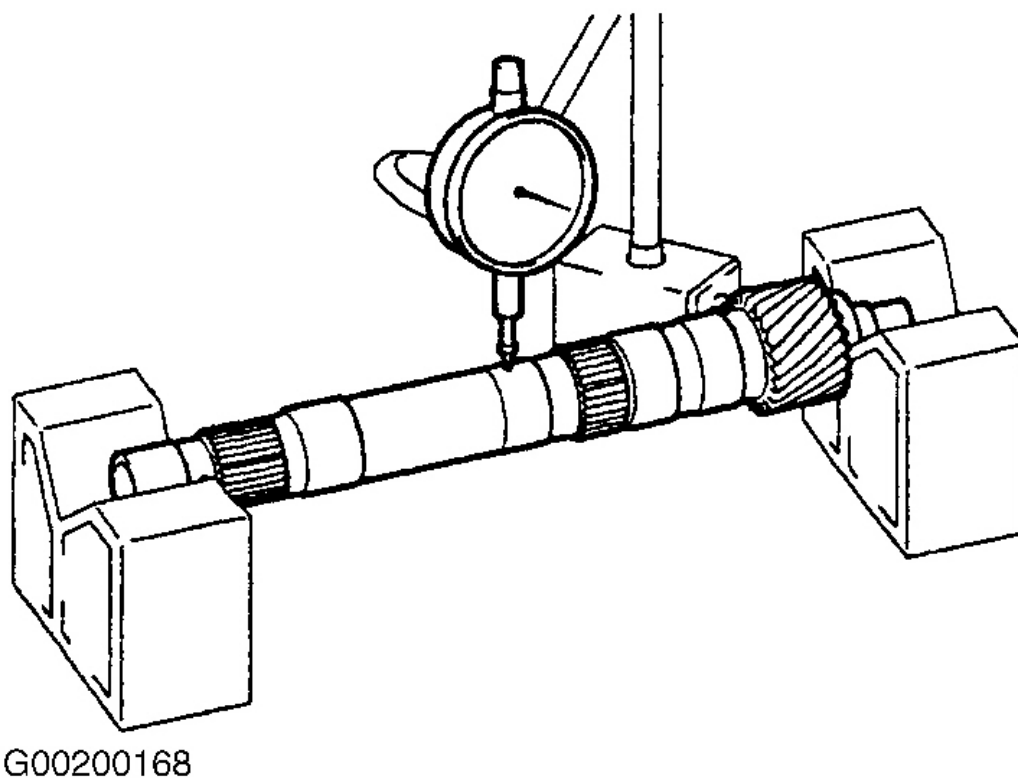
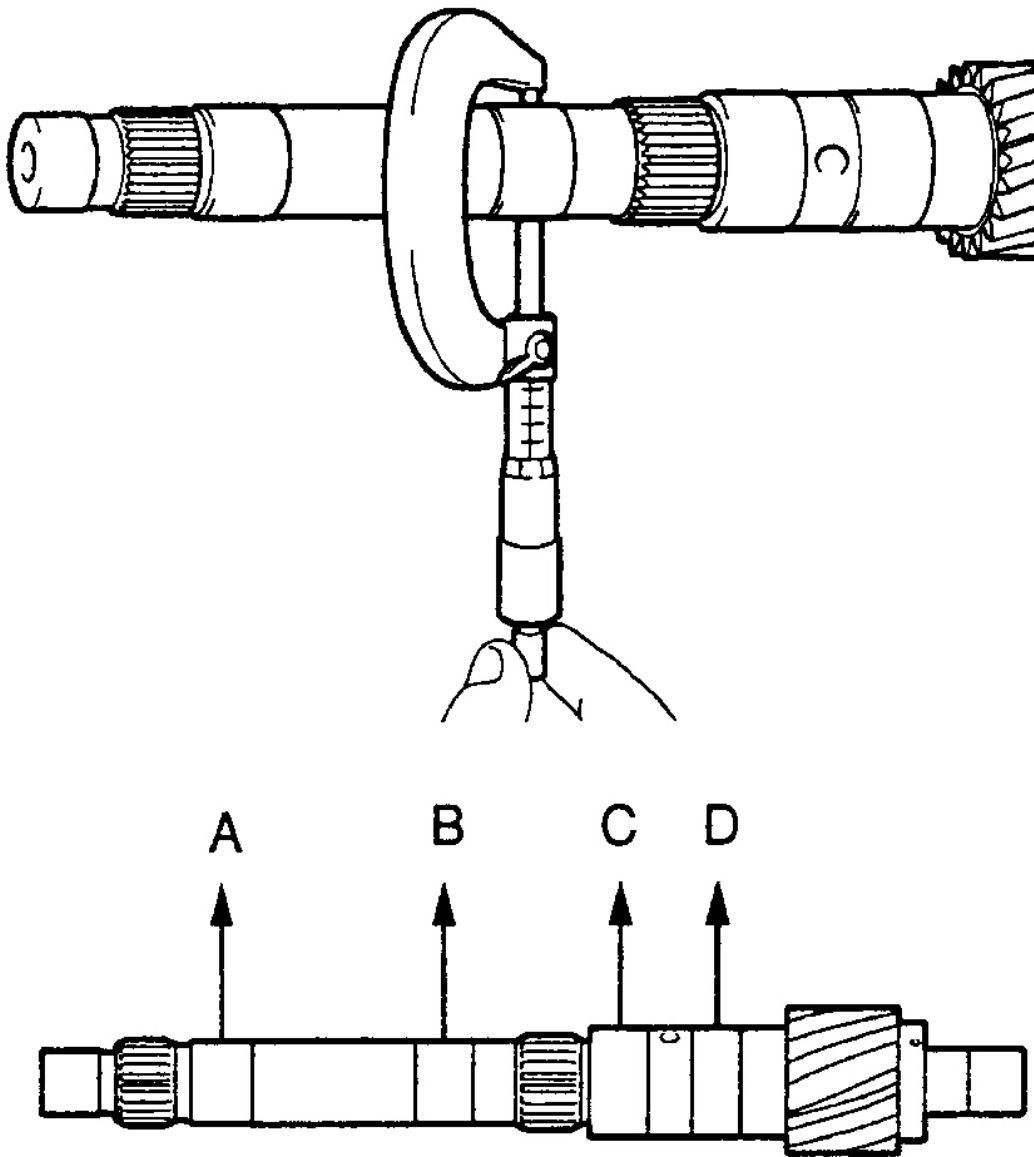


Fig. 39: Measuring Intermediate Shaft Runout
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00200169

Fig. 40: Measuring Intermediate Shaft Outer Diameter
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

27. Remove brake plate stopper spring. See **Fig. 41**. Remove No. 4 brake plates (7), discs (8) and 2 flanges from transmission case. Remove rear planetary gear assembly from transmission case. Remove thrust bearing race No. 9 and thrust needle roller bearing from rear planetary gear assembly. See **Fig. 42**. Remove thrust needle roller bearing from transmission case.
28. Using a feeler gauge, measure rear planetary gear pinion thrust clearance. See **Fig. 43**. Standard clearance

should be .008-.024" (.20-.61 mm). Maximum clearance should be .026" (.65 mm). If clearance is greater than the maximum specification, replace rear planetary gear assembly.

29. Using a dial indicator, measure inside diameter of rear planetary gear bushing. See **Fig. 44**. Maximum inside diameter should be .790" (20.08 mm). If inside diameter is greater than maximum specification, replace rear planetary gear assembly.
30. Position appropriate spring compressor over 1st and reverse brake return spring, and compress return spring. Remove snap ring, spring compressor and brake return spring. Using vernier calipers, measure brake piston return spring free length. Include spring seat in measurement. Free length should be .935" (23.74 mm).
31. Hold thumb over case oil passage and apply 57 psi (4 kg/cm²) of compressed air to transmission case to remove 1st and reverse brake piston. See **Fig. 45**. If piston does not pop out with compressed air, lift out piston using needle nose pliers. Remove "O" ring from 1st and reverse brake piston.
32. Insert Sleeve Remover (09350-07080) behind brake reaction sleeve. Remove brake reaction sleeve from transmission case. See **Fig. 46**. Insert Piston Remover (09350-07090) behind No. 4 brake piston. Remove No. 4 brake piston from transmission case. See **Fig. 47**. Remove "O" rings from brake reaction sleeve and No. 4 brake piston.

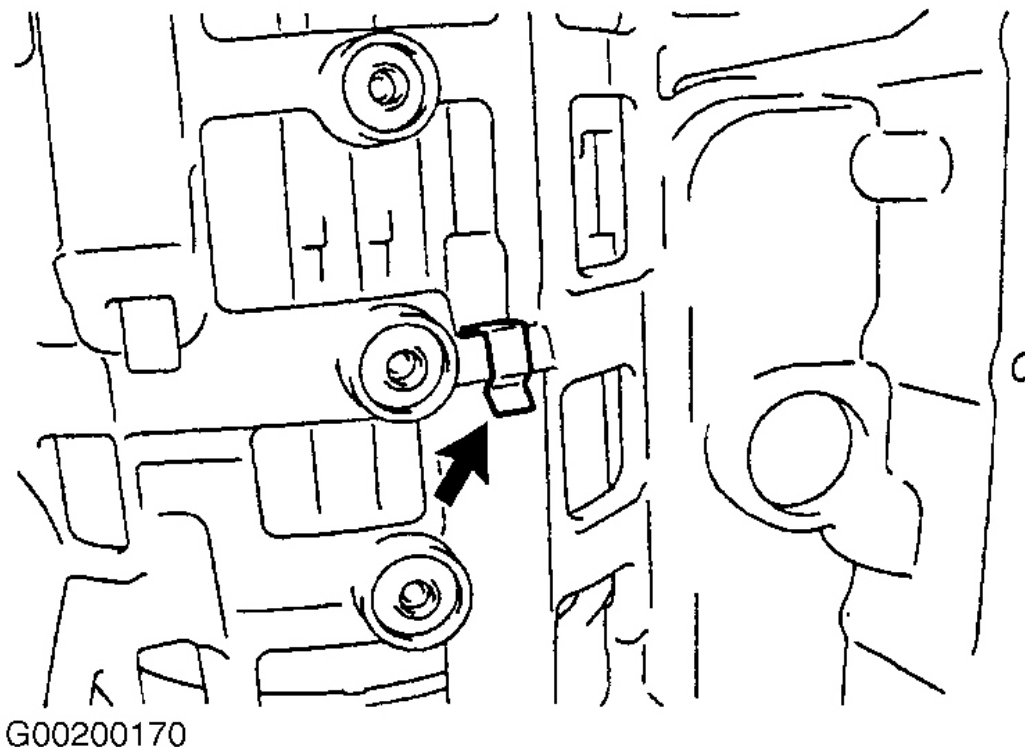
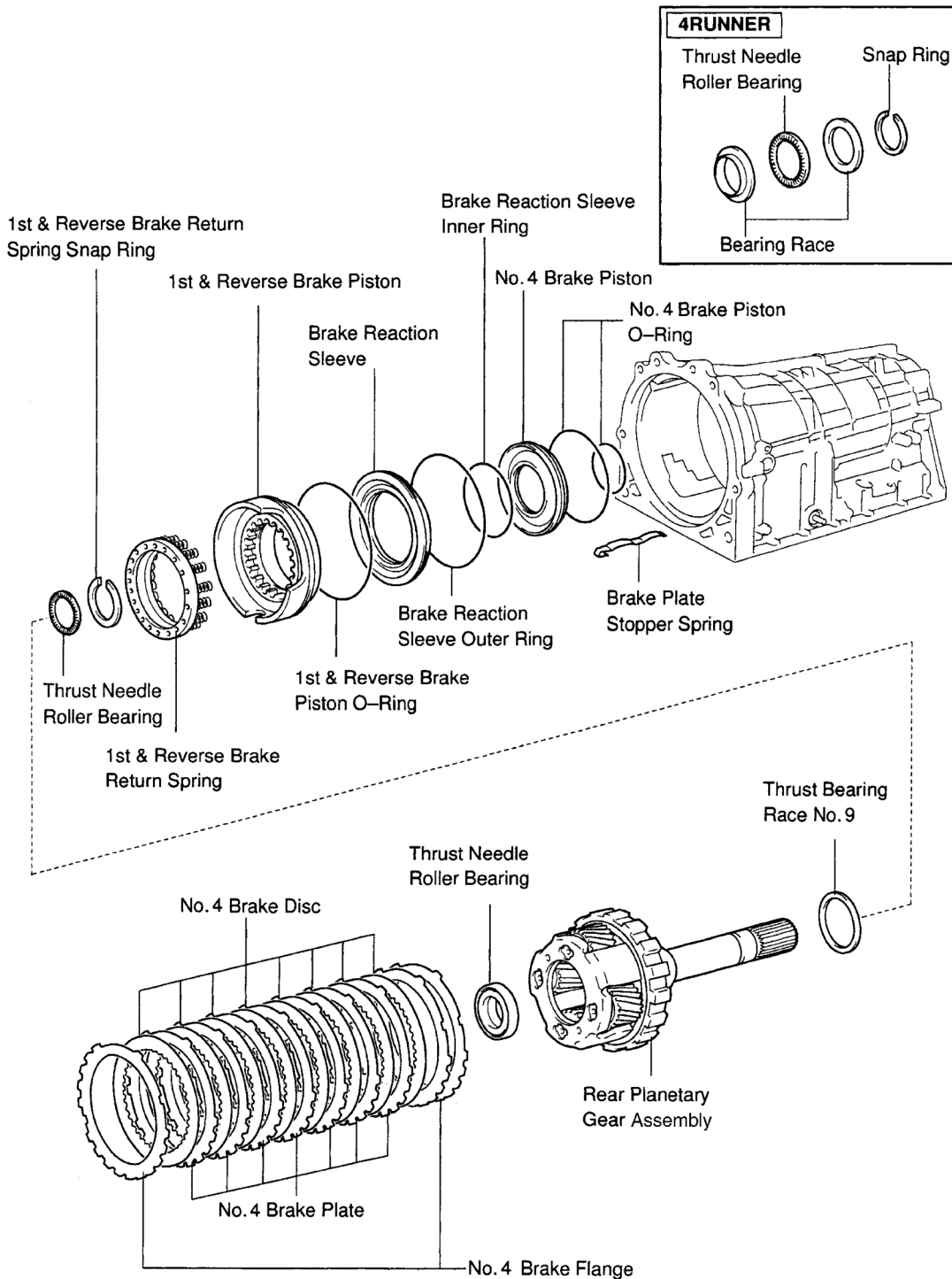
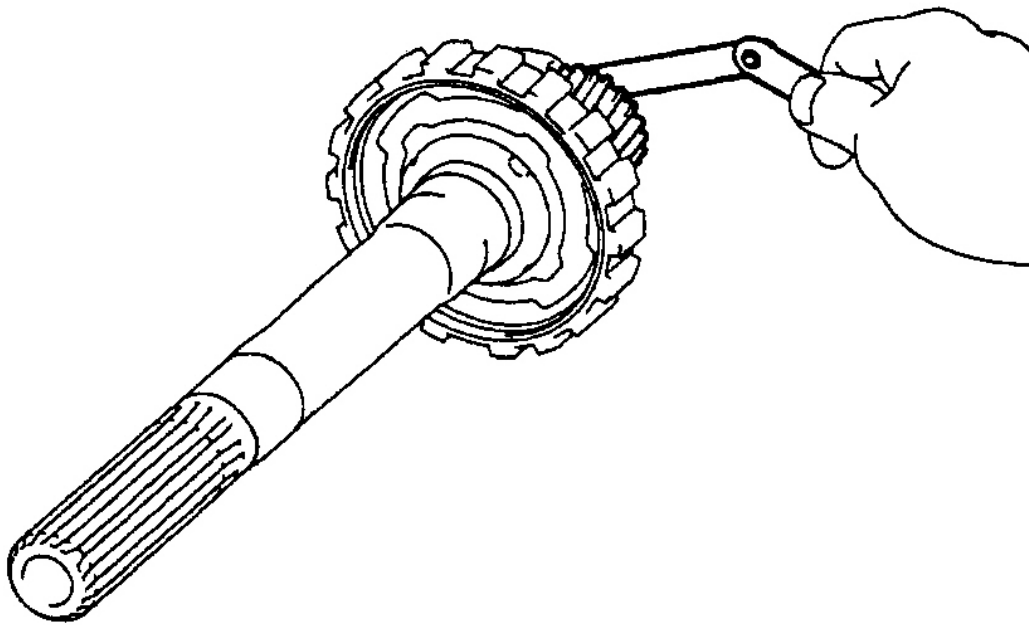


Fig. 41: Removing Brake Plate Stopper Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



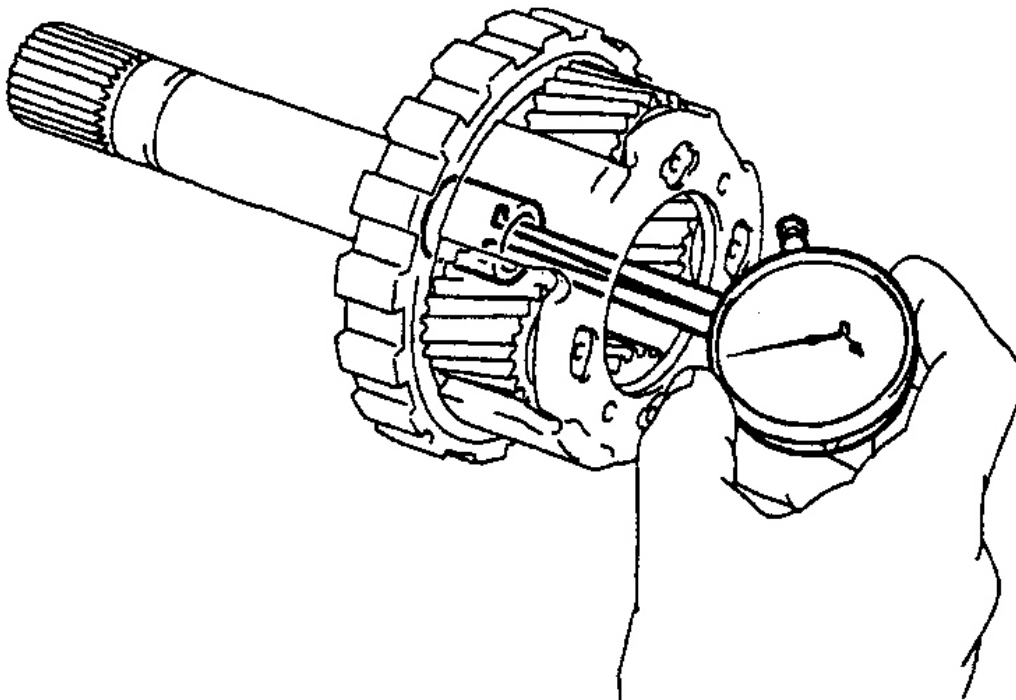
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Fig. 42: Exploded View Of No. 4 Brake & 1st & Reverse Brake
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



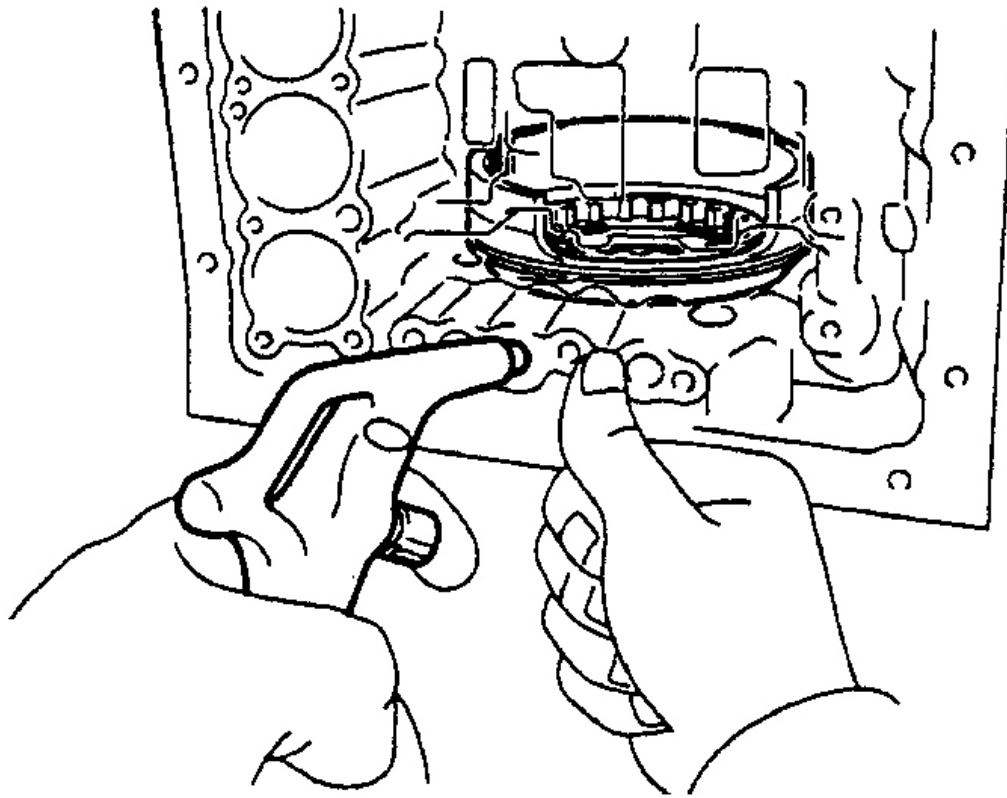
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Fig. 43: Measuring Rear Planetary Gear Pinion Thrust Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 44: Measuring Rear Planetary Gear Bushing Inside Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00200174

Fig. 45: Removing 1st & Reverse Brake Piston From Transmission Case
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

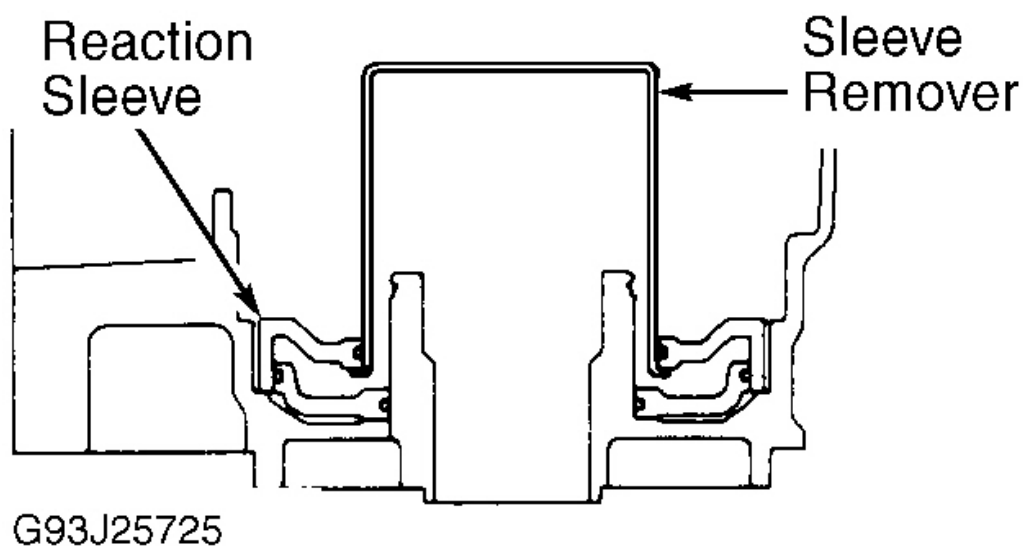


Fig. 46: Removing Brake Reaction Sleeve

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

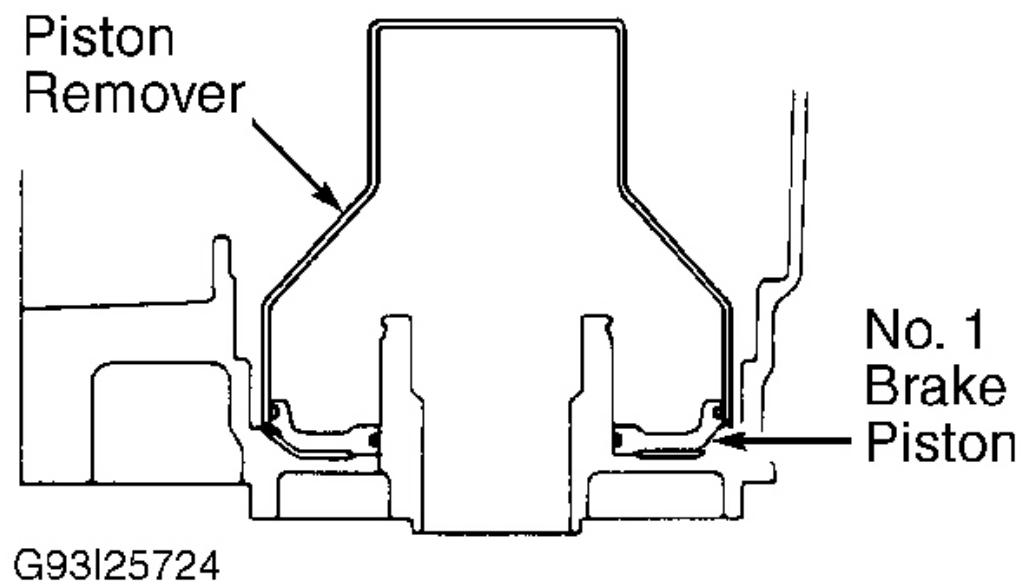


Fig. 47: Removing No. 4 Brake Piston

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

COMPONENT DISASSEMBLY & REASSEMBLY**OIL PUMP****Disassembly**

1. Remove "O" rings (2) from oil pump assembly. Place oil pump assembly on torque converter while working on pump. Remove 3 oil seal rings from rear of oil pump. Remove 14 bolts from rear of stator shaft. Remove stator shaft from oil pump body. See **Fig. 48**. Remove oil pump body from torque converter.
2. After inspection procedure is performed, place reference marks on drive and driven gears for reassembly reference and remove from oil pump body. If oil seal requires replacement, pry seal from body with a screwdriver.

Cleaning & Inspection

1. Clean all components in solvent. Dry with compressed air. Inspect contact surfaces between body and driven gear for wear. Check gears for wear and damage. Check pump gear contact surface on stator shaft for damage and wear.
2. Using a dial indicator, measure inside diameter of oil pump body and stator shaft bushings. See **Fig. 49** and **Fig. 50**. See **OIL PUMP CLEARANCE SPECIFICATIONS** table. If bushing diameters exceed specification, replace oil pump body or stator shaft as necessary.
3. Measure driven gear-to-body clearance and gear tip clearance. Using feeler gauge and straightedge, measure gear side clearance between pump body face and top of gears. See **Fig. 51-Fig. 53**. See **OIL PUMP CLEARANCE SPECIFICATIONS** table.
4. If clearance(s) are not within specifications, replace worn component(s). Pump gears must be replaced as a matched set. For available gear thicknesses, see **DRIVE & DRIVEN GEAR THICKNESS SPECIFICATIONS** table.

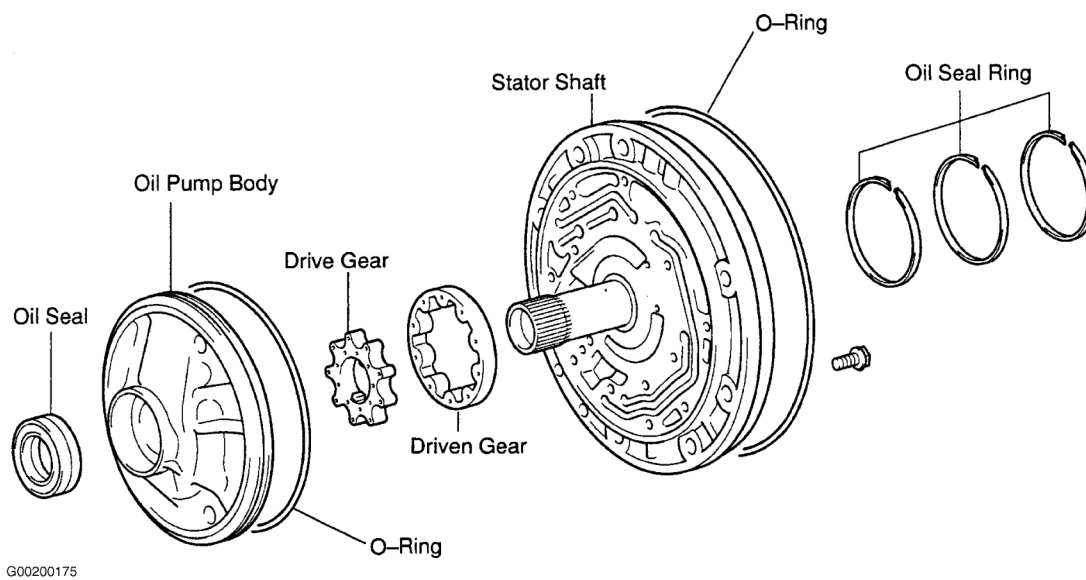
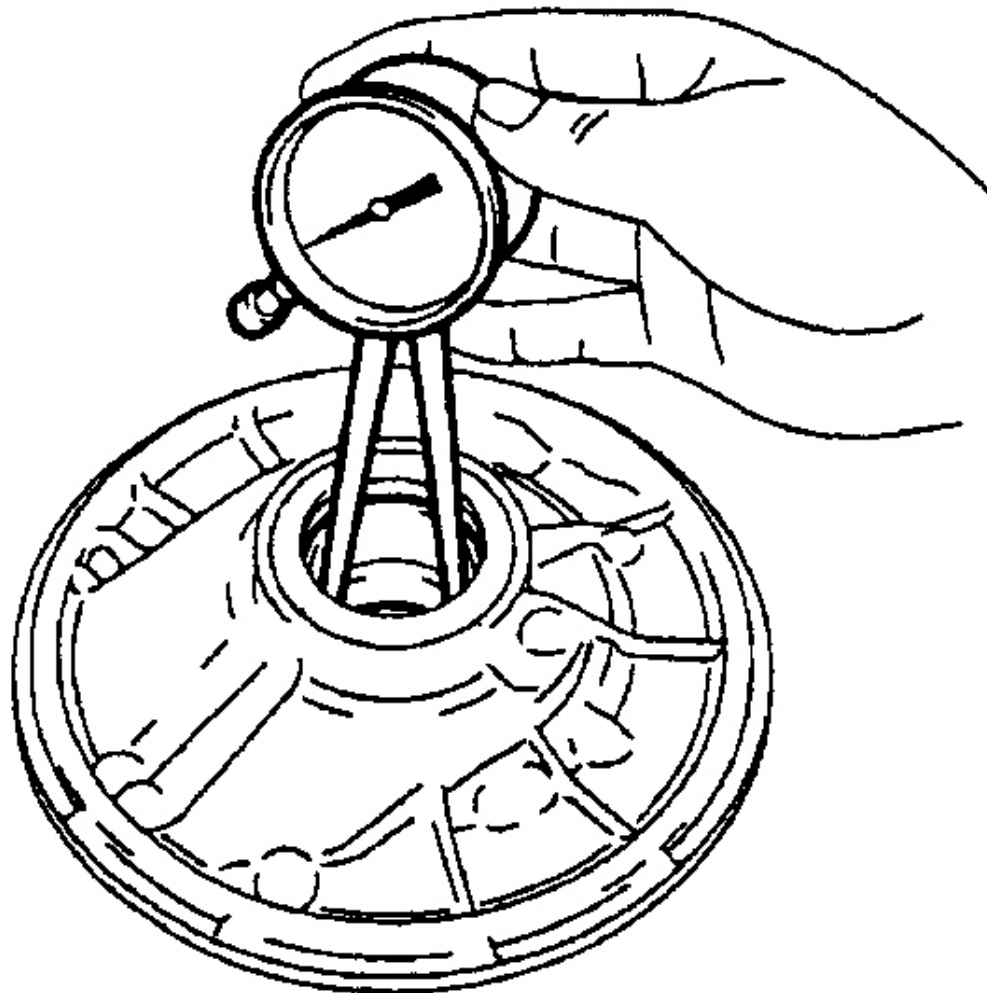
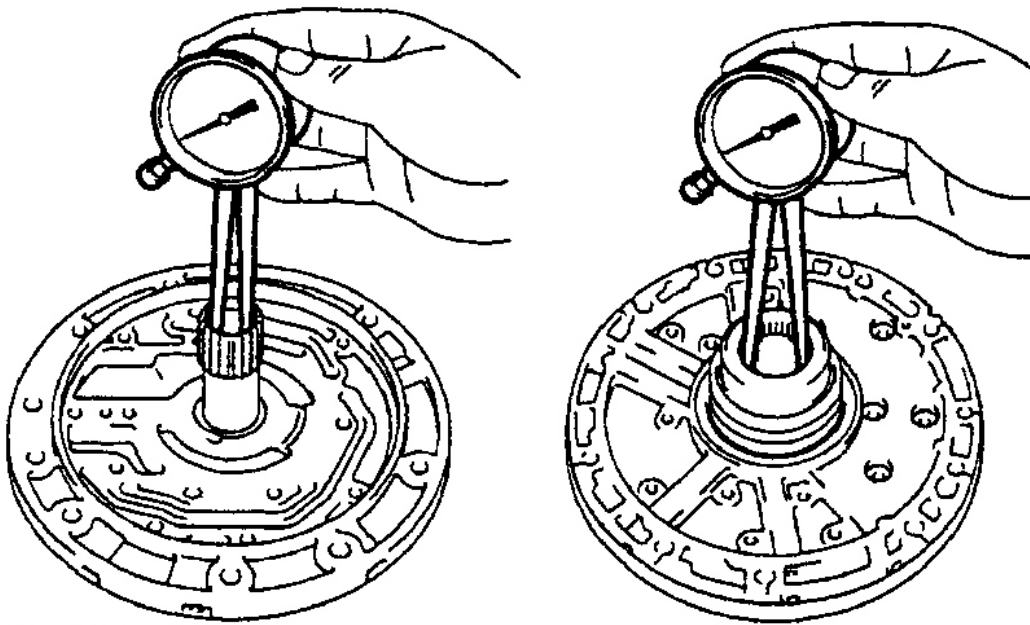


Fig. 48: Exploded View Of Oil Pump Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



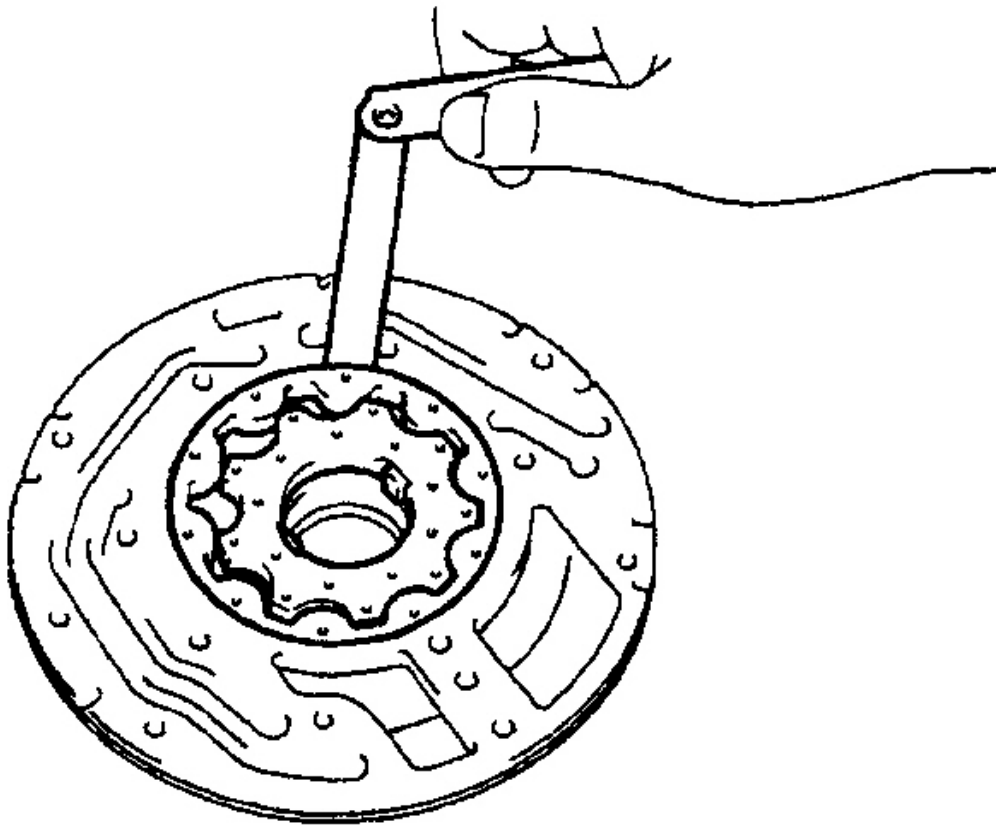
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Fig. 49: Measuring Oil Pump Body Bushing Inside Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



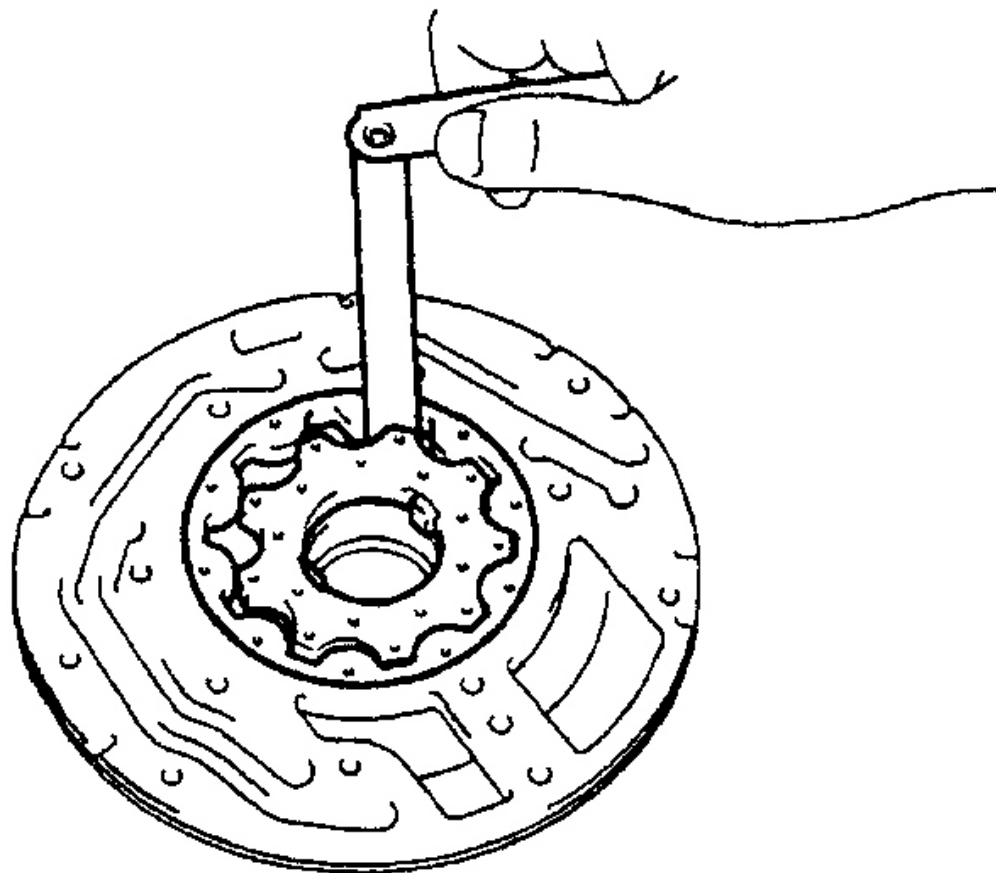
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Fig. 50: Measuring Stator Shaft Bushing Inside Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



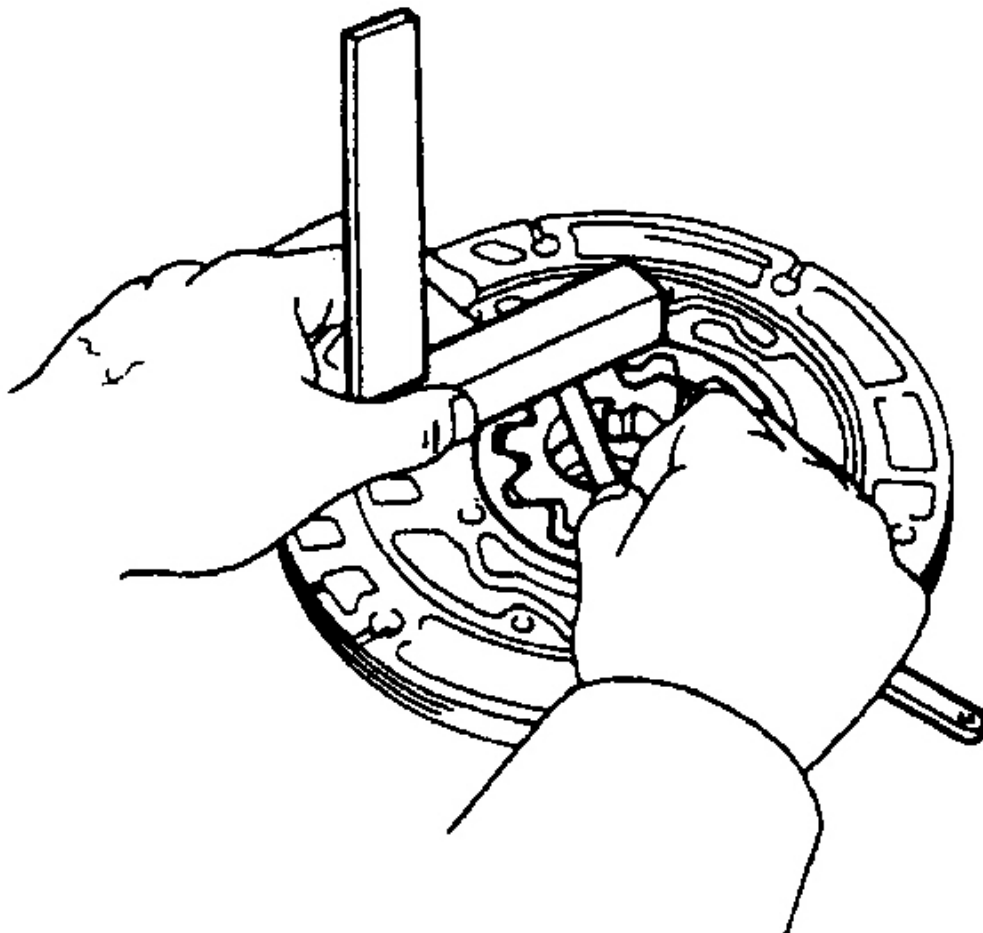
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Fig. 51: Measuring Driven Gear-To-Body Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00200179

Fig. 52: Measuring Clearance Between Gear Teeth
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00200180

Fig. 53: Measuring Gear Side Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OIL PUMP CLEARANCE SPECIFICATIONS

Application	In. (mm)
Gear-To-Body	
Standard	.004-.007 (.10-.17)
Maximum	.007 (.17)
Gear Tip Clearance	
Standard	.003-.006 (.07-.15)
Maximum	.006 (.15)

2003 Toyota 4Runner SR5**2003-06 AUTOMATIC TRANSMISSIONS A750E & A750F Overhaul****Gear Side Clearance**

Standard	.0008-.0020 (.020-.050)
Maximum	.0020 (.050)
Oil Pump Body Bushing (Maximum)	1.504 (38.19)
Stator Shaft Bushing (Maximum)	
Front	.850 (21.58)
Rear	1.263 (32.08)

DRIVE & DRIVEN GEAR THICKNESS SPECIFICATIONS

Identification Mark	In. (mm)
0	.4228-.4231 (10.740-10.749)
1	.4232-.4236 (10.750-10.759)
2	.4236-.4240 (10.760-10.770)
3	.4241-.4244 (10.771-10.780)
4	.4244-.4248 (10.781-10.790)

Reassembly

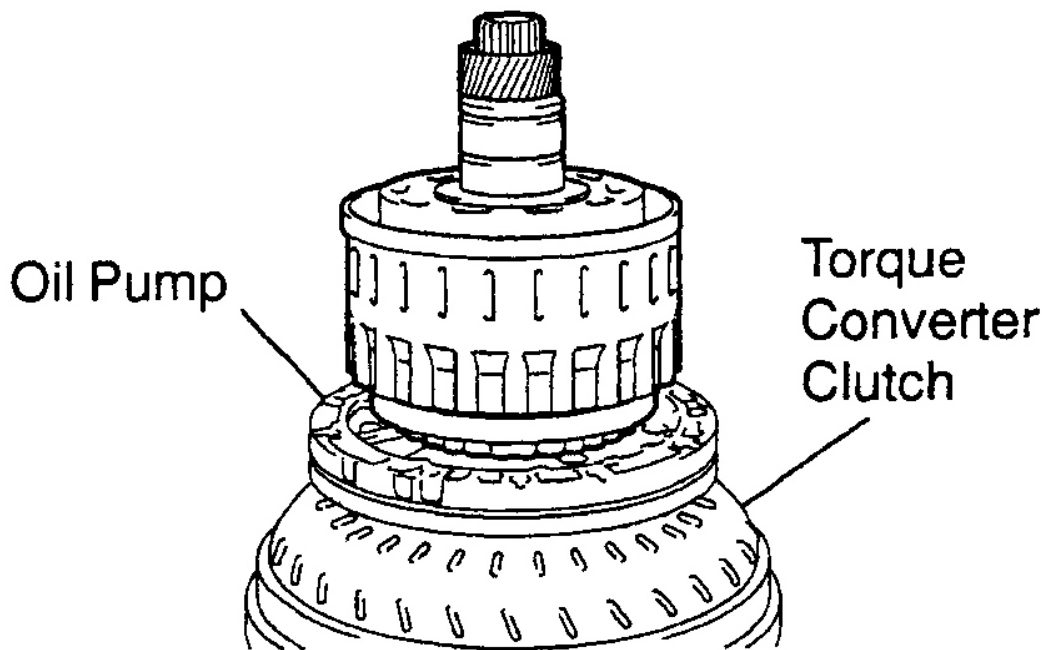
1. Install oil seal until seal is even with outer edge of pump body. Place oil pump body on torque converter while working on oil pump. Coat all components with ATF. See **Fig. 48**.
2. Align reference marks made on gears during disassembly and install gears. To complete reassembly, reverse disassembly procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**. DO NOT over expand seal rings during installation. Ensure seal rings move smoothly after installation. Ensure drive gear rotates smoothly with oil pump installed on torque converter. Remove oil pump assembly from torque converter. Install NEW oil pump assembly "O" rings.

CLUTCH DRUM & INPUT SHAFT ASSEMBLY**Disassembly**

1. Place oil pump assembly onto torque converter clutch, and then place clutch drum and input shaft assembly onto oil pump. See **Fig. 54**. Using a screwdriver, remove snap ring from clutch drum and input shaft assembly.
2. Remove reverse clutch hub assembly from clutch drum. Components within assembly consist of reverse clutch reaction sleeve, clutch cushion plate, reverse clutch flange, 5 discs and 4 plates. See **Fig. 57**.
3. Remove reverse clutch reaction sleeve from reverse clutch hub. Remove clutch cushion plate, reverse clutch flange, 5 reverse clutch discs and 4 reverse clutch plates from reverse clutch hub. See **Fig. 57**.
4. Remove forward clutch hub assembly from clutch drum. Remove 2 thrust needle roller bearings from forward clutch hub assembly.
5. Remove clutch hub (for multiple disc clutch) from forward clutch drum. Remove thrust bearing race No. 2 and input shaft thrust bearing race from clutch hub. Remove thrust needle roller bearing from clutch drum. Remove input shaft from clutch drum. See **Fig. 57**.
6. Remove 3 oil seal rings from input shaft. Using a screwdriver, remove hole snap ring. Remove 2 forward clutch flanges, 6 discs and 5 plates from input shaft. Position appropriate adapter and a press on clutch

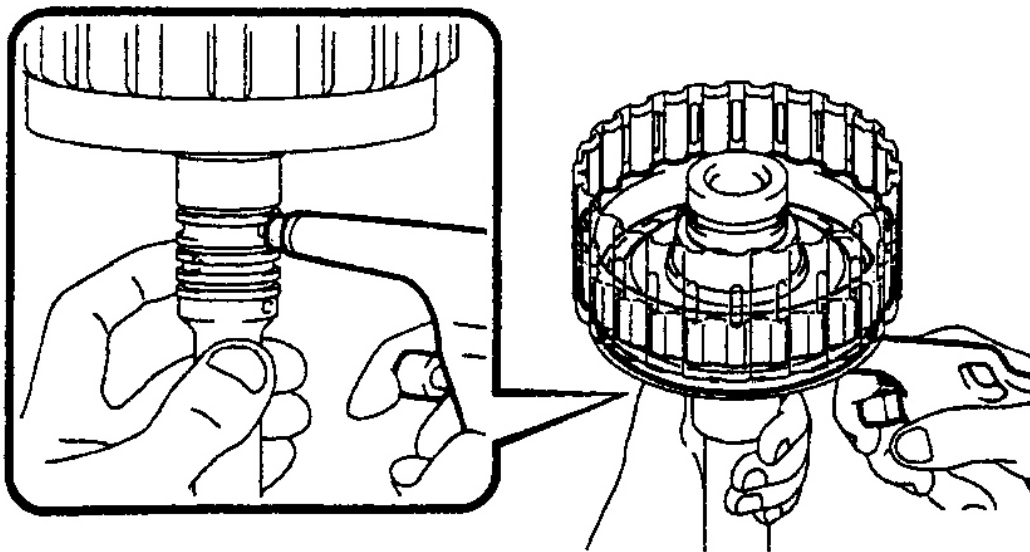
balancer No. 1, and compress forward clutch return spring. Remove snap ring, adapter, press, clutch balancer No. 1 and forward clutch return spring from input shaft. See **Fig. 57**. Remove "O" ring from clutch balancer No. 1.

7. Hold input shaft and apply 57 psi (4 kg/cm²) of compressed air to input shaft to remove forward clutch piston. See **Fig. 55**. Remove "O" rings from forward clutch piston.
8. Remove reverse clutch flange from clutch drum. Using a screwdriver, remove 2 hold snap rings from clutch drum. Remove reverse clutch flange, direct clutch plates (6) and discs (5) from clutch drum. See **Fig. 57**.
9. Position appropriate adapter and a press on clutch balancer No. 3, and compress reverse clutch return spring. Remove snap ring, adapter, press, clutch balancer No. 3 and reverse clutch return spring from reverse clutch piston. See **Fig. 57**. Remove outer "O" ring from reverse clutch piston.
10. Remove reverse clutch piston from clutch drum. Remove inner "O" ring from reverse clutch piston. Remove small "O" ring from clutch drum.
11. Position appropriate adapter and a press on clutch balancer No. 2, and compress direct clutch return spring. Remove snap ring, adapter, press, clutch balancer No. 2 and direct clutch return spring from clutch drum. See **Fig. 57**. Using 2 screwdrivers, remove direct clutch piston from clutch drum. See **Fig. 56**. Remove 2 "O" rings from direct clutch piston. Remove outer "O" ring from clutch drum.



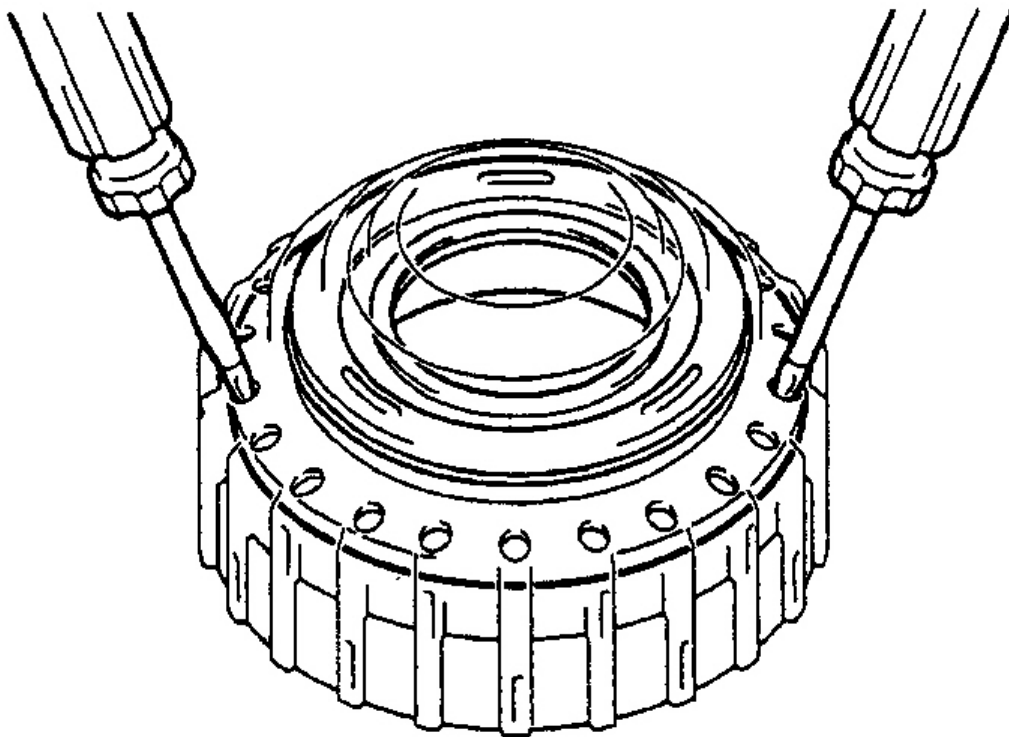
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Fig. 54: Installing Clutch Drum & Input Shaft Assembly To Torque Converter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00200182

Fig. 55: Removing Forward Clutch Piston
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00200183

Fig. 56: Removing Direct Clutch Piston
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

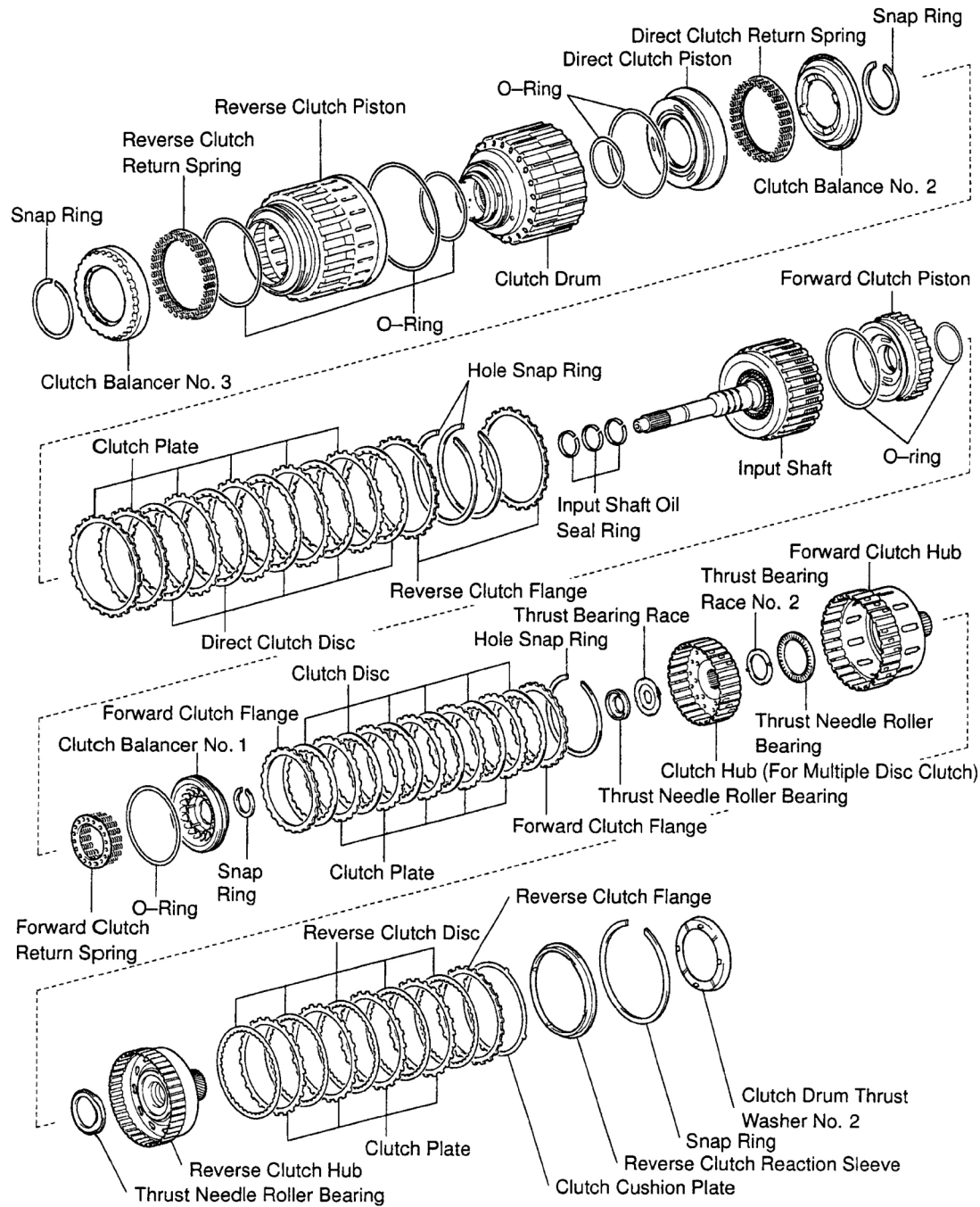


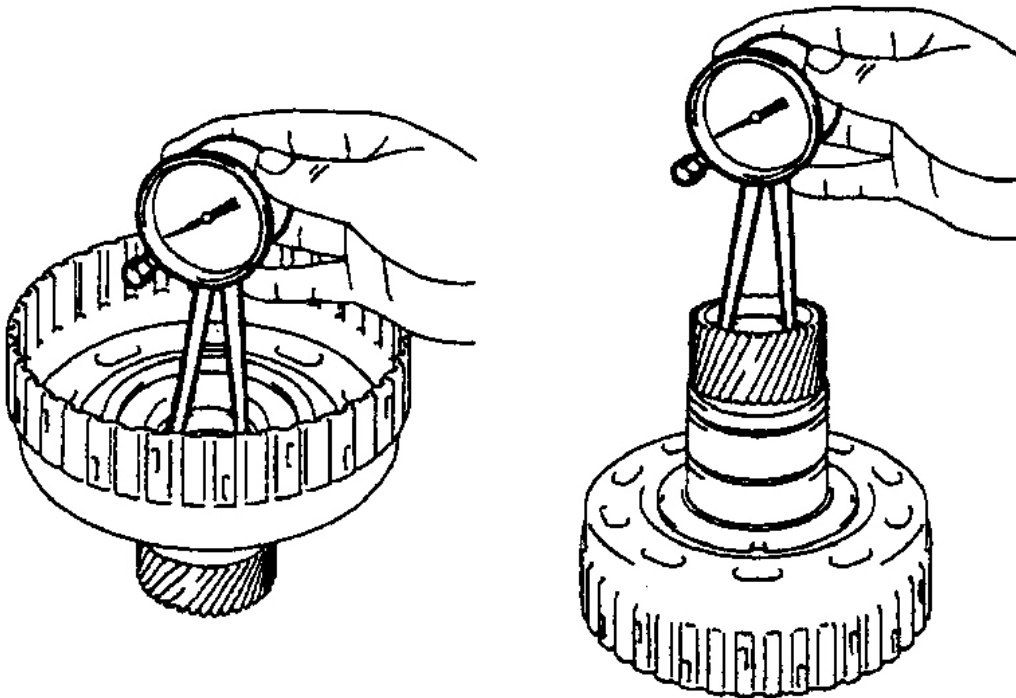
Fig. 57: Exploded View Of Clutch Drum & Input Shaft Assembly Components
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

1. Clean all parts (except discs) with solvent. Dry parts using compressed air. Inspect discs and plates for wear or burnt areas. If disc lining is peeled or discolored, replace discs as necessary. Replace all damaged

components.

2. Using a dial indicator, measure inside diameter of reverse clutch hub bushing. See **Fig. 58**. Standard inside diameter should be 1.410-1.411" (35.81-35.84 mm). Maximum inside diameter should be 1.413" (35.89 mm). If inside bushing diameter exceeds maximum specification, replace reverse clutch hub.
3. Using a dial indicator, measure inside diameter of forward clutch hub bushing. See **Fig. 59**. Standard inside diameter should be 1.025-1.026" (26.04-26.06 mm). Maximum inside diameter should be 1.028" (26.11 mm). If inside bushing diameter exceeds maximum specification, replace forward clutch hub.
4. Using vernier calipers, measure forward clutch return spring free length. Include spring seat in measurement. Free length should be 1.053" (26.74 mm).
5. Using vernier calipers, measure reverse clutch return spring free length. Include spring seat in measurement. Free length should be .828" (21.04 mm).
6. Using vernier calipers, measure direct clutch return spring free length. Include spring seat in measurement. Free length should be .768" (19.51 mm).



G00200185

Fig. 58: Measuring Reverse Clutch Hub Bushing Inside Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

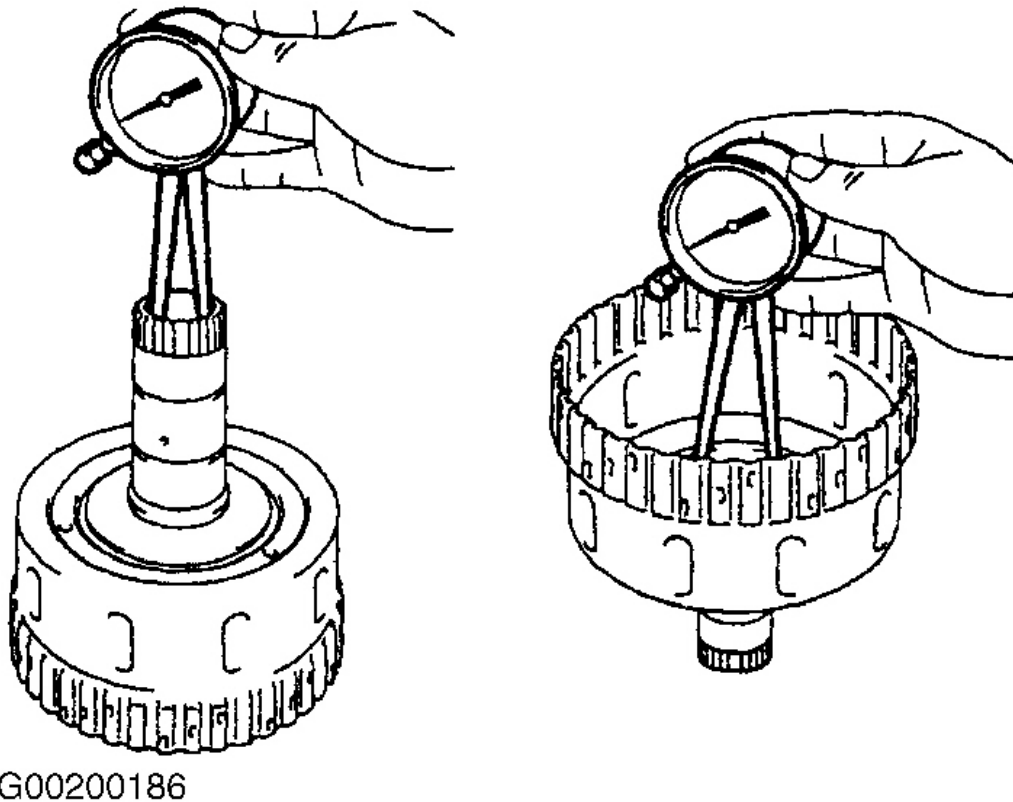


Fig. 59: Measuring Forward Clutch Hub Bushing Inside Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

NOTE: New discs must be soaked in ATF at least 15 minutes prior to reassembly.

1. Coat 2 NEW "O" rings with ATF and install them on direct clutch piston. Install clutch balancer No. 2 and direct clutch return spring to direct clutch piston. Coat NEW "O" ring with ATF and install it on clutch drum. Do not damage "O" rings. Using hand pressure, install direct clutch piston into clutch drum.

NOTE: In the following step, stop press when piston return spring seat is lowered .039-.079" (1.00-2.00 mm) from snap ring groove. This prevents spring seat from becoming deformed. DO NOT expand snap ring excessively.

2. Position appropriate adapter and a press on clutch balancer No. 2, and compress direct clutch return spring. Install snap ring using snap ring pliers. Ensure end gap of snap ring is not aligned with spring retainer claw. Do not expand snap ring excessively.

3. Set end gap of snap ring in piston as shown in illustration. See **Fig. 60**. Coat NEW small "O" ring with ATF and install it on clutch drum. Coat NEW "O" ring with ATF and install it on reverse clutch piston. Do not damage "O" rings. Using hand pressure, install clutch drum into reverse clutch piston.

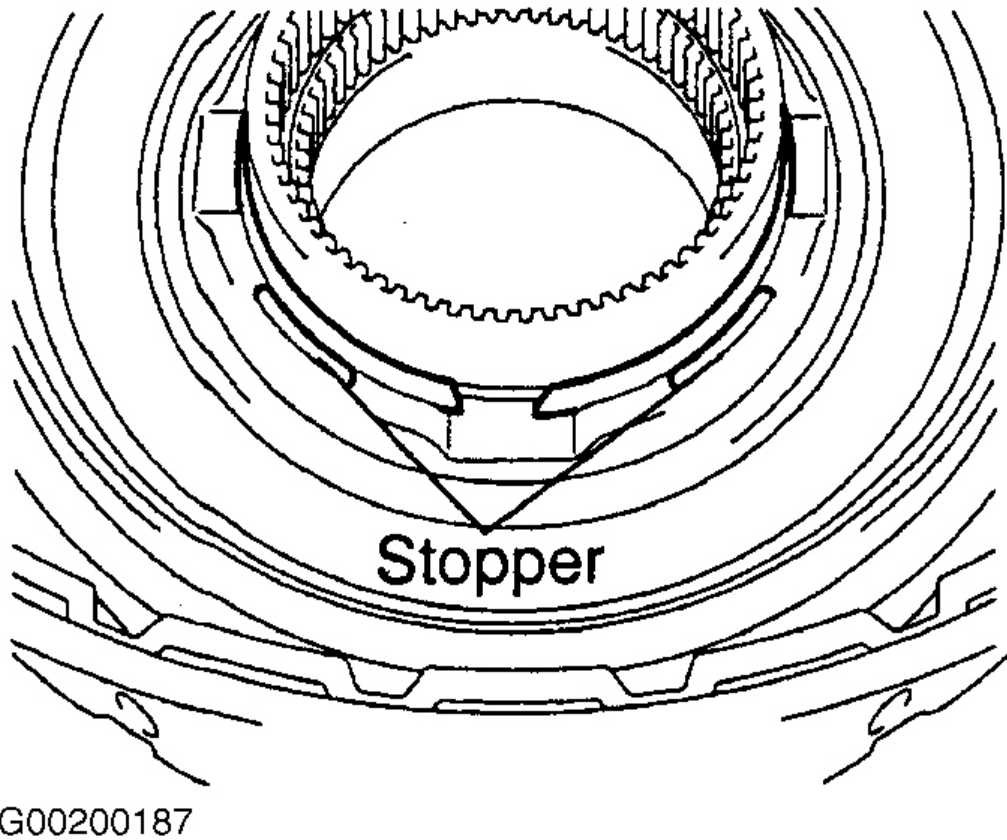


Fig. 60: Positioning End Gap Of Direct Clutch Snap Ring In Clutch Drum
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

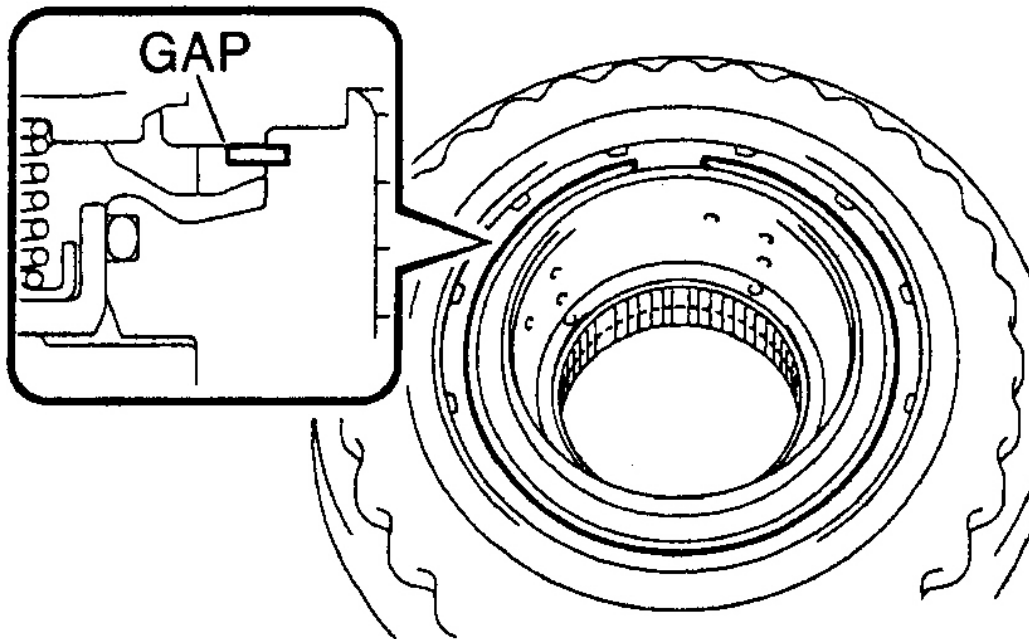
4. Coat NEW "O" ring with ATF and install it on reverse clutch piston at return spring. Install reverse clutch return spring onto reverse clutch piston.

NOTE: In the following step, stop press when piston return spring seat is lowered .039-.079" (1.00-2.00 mm) from snap ring groove. This prevents spring seat from becoming deformed. DO NOT expand snap ring excessively.

5. Position appropriate adapter and a press on clutch balancer No. 3, and compress reverse clutch return spring. Install snap ring using snap ring pliers. Ensure end gap of snap ring is not aligned with spring

retainer claw. Do not expand snap ring excessively.

6. Set end gap of snap ring in piston as shown in illustration. See **Fig. 61**. Install reverse clutch flange, 6 plates and 5 discs for direct clutch into clutch drum. Using a screwdriver, install 2 hole snap rings on clutch drum.

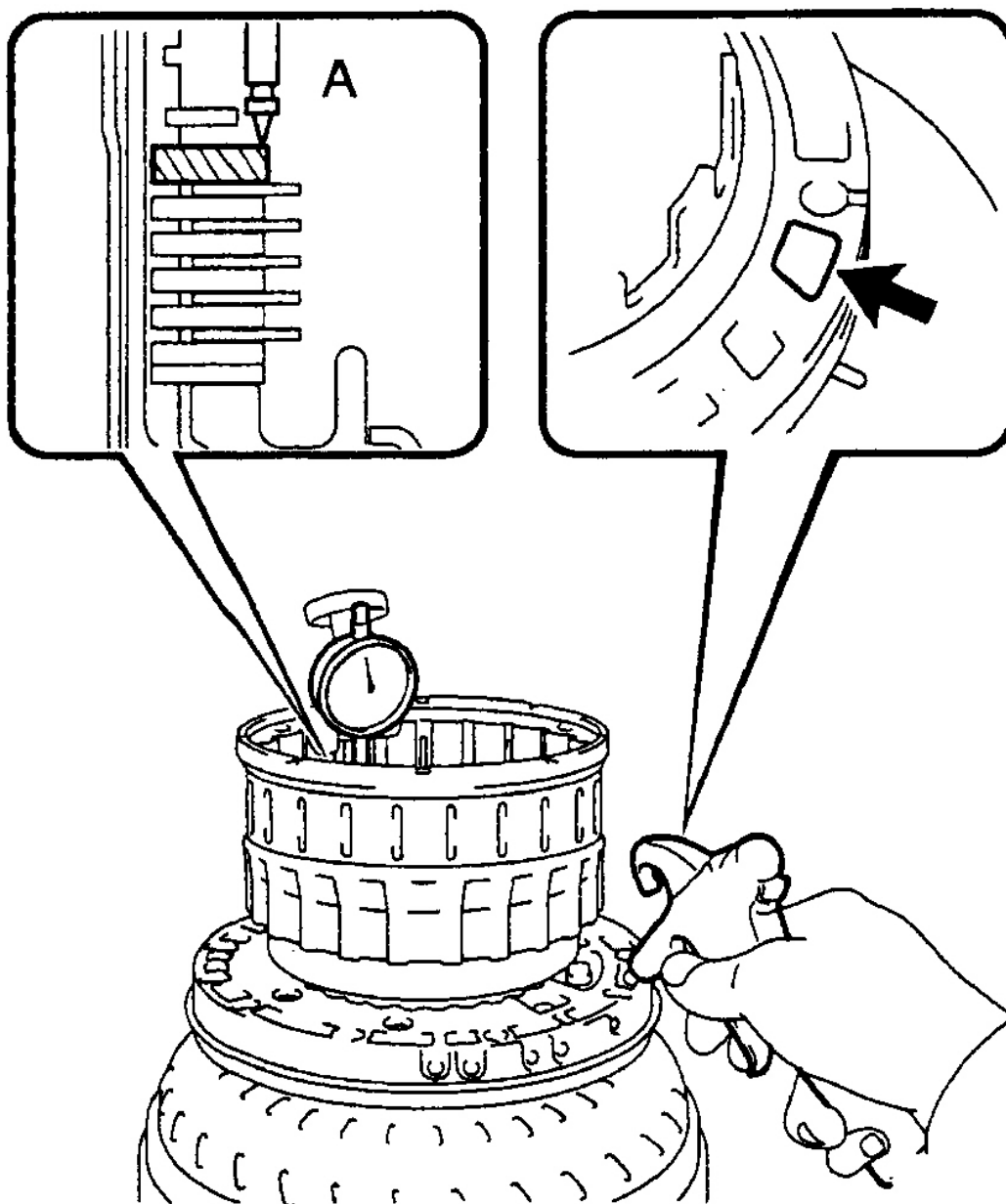


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Fig. 61: Positioning End Gap Of Reverse Clutch Snap Ring On Clutch Drum
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: In the following step, install a selective flange .134" (3.40 mm) thick when measuring moving distance.

7. Using a dial indicator, measure moving distance ("A") of clutch flange at both ends across diameter while applying air to oil passage. See **Fig. 62**. Calculate average measurement. This is direct clutch pack clearance. Clutch pack clearance should be .020-.031 (.50-.80 mm).
8. Flange moving distance "A" equals .012" (.26 mm) minus .039" (1.14 mm). Clutch pack clearance equals flange moving distance "A" minus .0019" (.050 mm). If clutch pack clearance is not within specification, select and install appropriate clutch flange to ensure clutch pack clearance is within specification. Flanges are available in thicknesses from .118" (3.00) to .150" (3.80 mm), in increments of .004" (.10 mm). Flanges are marked with numbers from zero to No. 8.



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Fig. 62: Measuring Direct Clutch Pack Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. Install reverse clutch flange to clutch drum. Install reverse clutch reaction sleeve, clutch cushion plate, reverse clutch flange, 5 discs and 4 plates to reverse clutch hub. Using a screwdriver, install hole snap ring. See [Fig. 57](#).

NOTE: In the following step, install a selective flange .130" (3.30 mm) thick when measuring moving distance.

10. Using a dial indicator, measure reverse clutch piston stroke (distance "A") and moving distance "B" of reverse clutch flange at both ends across diameter while applying 57 psi (4 kg/cm²) of air to oil passage. See **Fig. 63**. Calculate average measurement. This is reverse clutch pack clearance. Clutch pack clearance should be .020-.031 (.50-.80 mm).
11. Piston stroke distance "A" equals .041" (1.05 mm) minus .085" (2.15 mm). Flange moving distance "B" equals .028" (.72 mm) minus .043" (1.08 mm). Clutch pack clearance equals piston stroke "A" minus flange moving distance "B" minus .0024" (.060 mm). If clutch pack clearance is not within specification, select and install appropriate clutch flange to ensure clutch pack clearance is within specification.
12. Flanges are available in thicknesses from .110" (2.80) to .150" (3.80 mm), in increments of .004" (.10 mm). Flanges (10) are marked with numbers from zero to No. 9. Largest flange is marked with the letter "A".

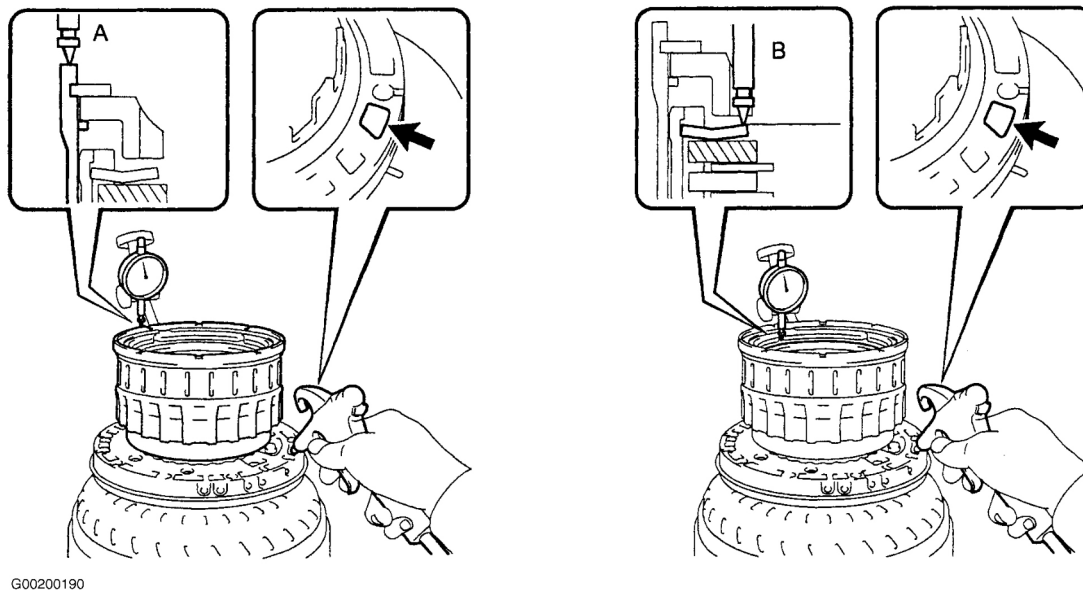


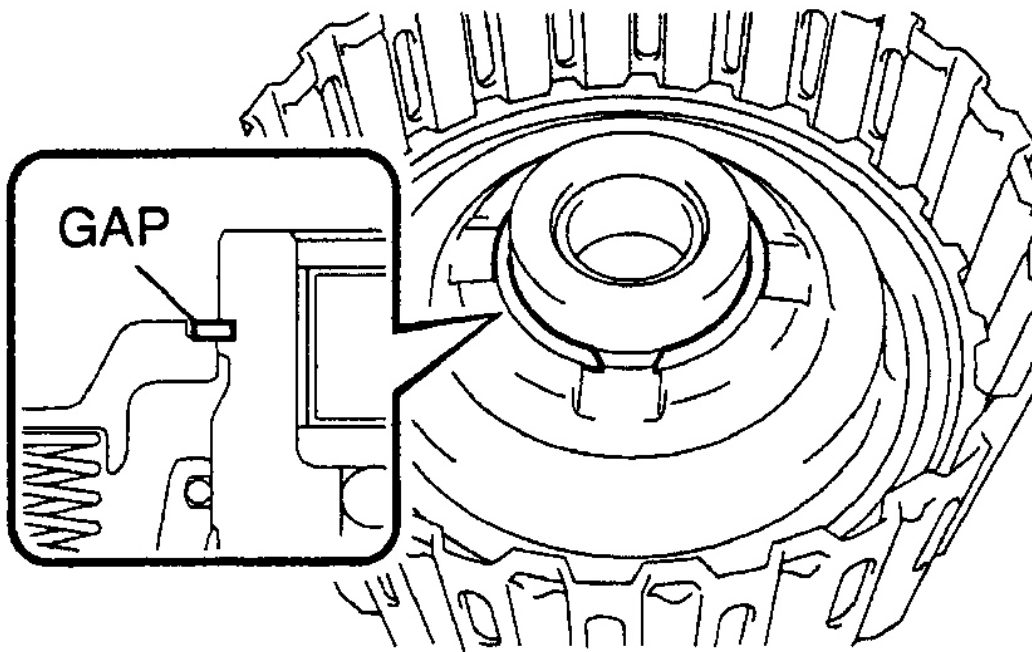
Fig. 63: Measuring Reverse Clutch Pack Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. Using a screwdriver, remove snap ring from clutch drum. Remove reverse clutch reaction sleeve, clutch cushion plate, reverse clutch flange, 5 discs and 4 plates from reverse clutch hub. See **Fig. 57**. Coat NEW "O" rings with ATF and install them on forward clutch piston.
14. Coat NEW "O" ring with ATF and install it on clutch balancer No. 1. Install clutch balancer No. 1 and forward clutch return spring. Do not damage "O" ring.

NOTE: In the following step, stop press when piston return spring seat is lowered .039-.079" (1.00-2.00 mm) from snap ring groove. This prevents spring seat from becoming deformed. DO NOT expand snap ring

excessively.

15. Position appropriate adapter and a press on clutch balancer No. 1, and compress forward clutch return spring. Install snap ring using snap ring pliers. Ensure end gap of snap ring is not aligned with spring retainer claw. Do not expand snap ring excessively.
16. Set end gap of snap ring in piston as shown in illustration. See **Fig. 64**. Install 2 flanges, 6 discs and 5 plates into input shaft. Using a screwdriver, install hole snap ring. See **Fig. 57**. Coat 3 oil seal rings with ATF and install on input shaft. Do not over expand oil seal ring ends. After installing oil seal rings, ensure rings rotate smoothly.



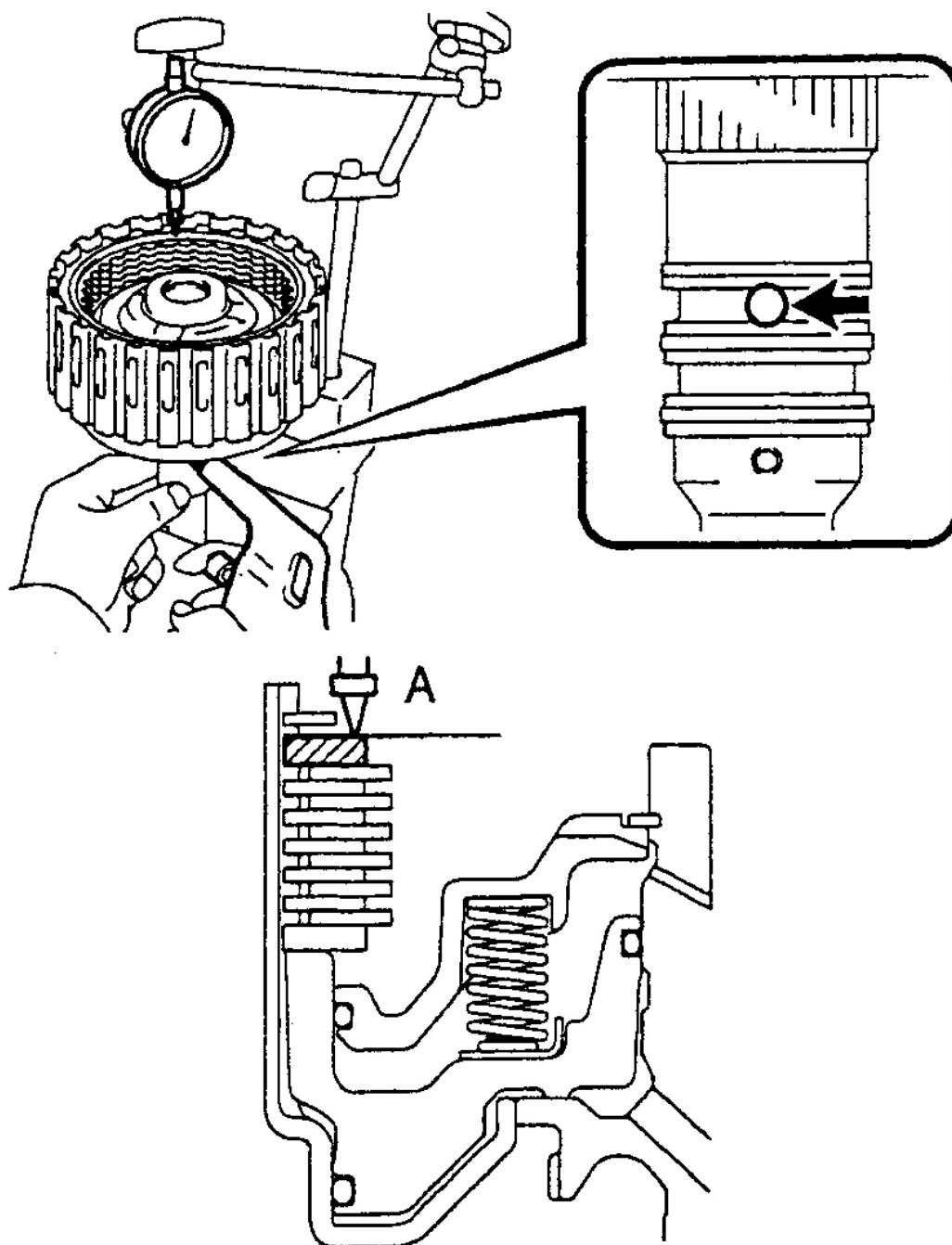
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Fig. 64: Positioning End Gap Of Forward Clutch Snap Ring In Input Shaft Drum
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: In the following step, install a selective flange .134" (3.40 mm) thick when measuring moving distance.

17. Using a dial indicator, measure moving distance ("A") of clutch flange at both ends across diameter while applying air to oil passage. See **Fig. 65**. Calculate average measurement. This is forward clutch pack clearance. Clutch pack clearance should be .023-.035 (.60-.90 mm).
18. Flange moving distance "A" equals .012" (.26 mm) minus .054" (1.36 mm). Clutch pack clearance equals flange moving distance "A" minus .0004" (.010 mm). If clutch pack clearance is not within specification, select and install appropriate clutch flange to ensure clutch pack clearance is within specification. Flanges

are available in thicknesses from .118" (3.00) to .158" (4.00 mm), in increments of .004" (.10 mm). Flanges (10) are marked with numbers from zero to No. 9. Largest flange is marked with the letter "A".



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Fig. 65: Measuring Forward Clutch Pack Clearance

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

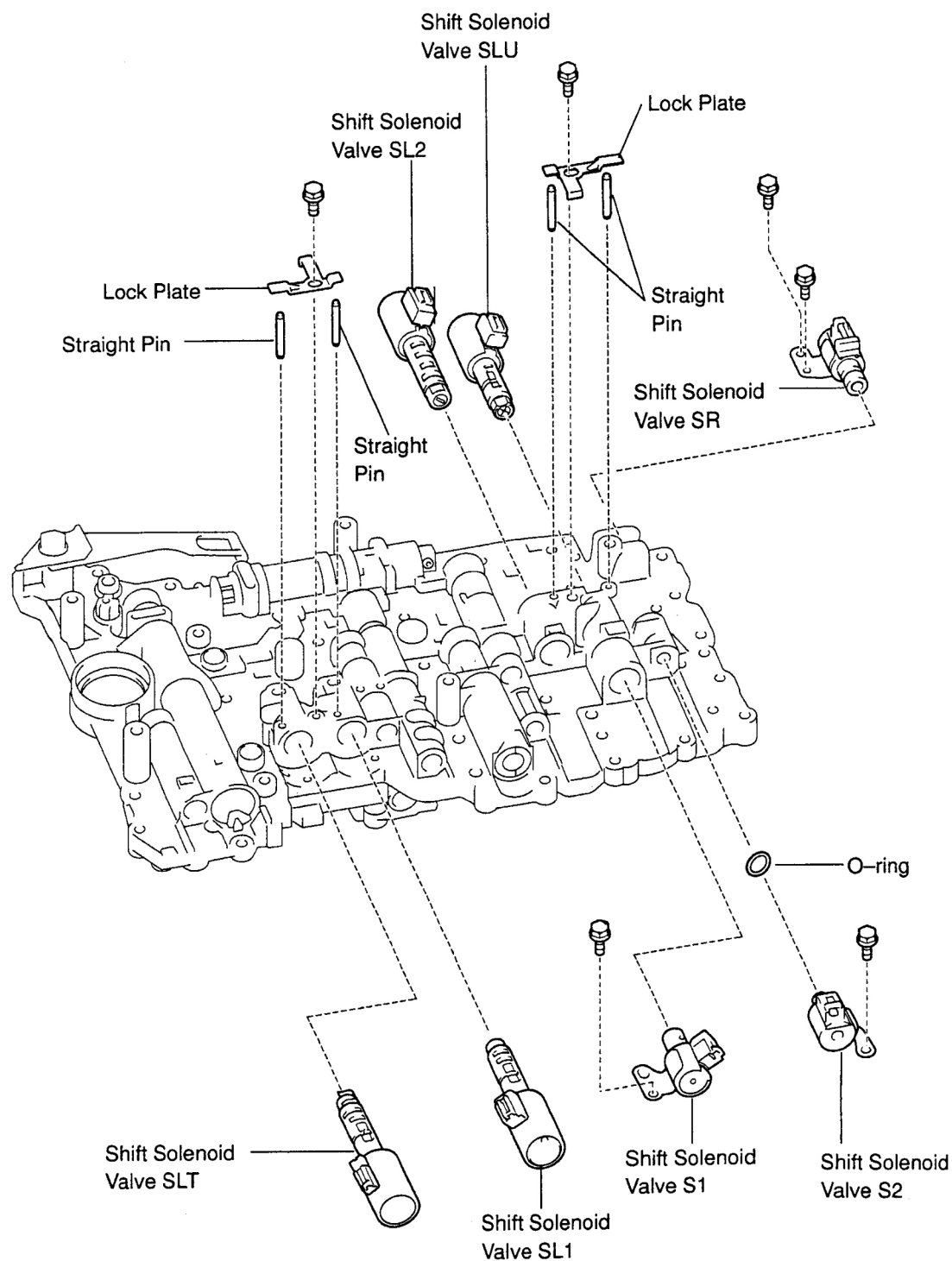
19. Install input shaft to clutch drum. Install thrust needle roller bearing to clutch drum. Outside diameter of bearing is 1.618" (41.10). Install thrust bearing race No. 2 and input shaft thrust bearing race to (multiple disc clutch) clutch hub. Bearing race No. 2 outer diameter is 2.480" (63.00 mm). Input shaft thrust bearing race outer diameter is 2.362" (60.00 mm). Install clutch hub (multiple disc clutch) to clutch drum. See **Fig. 57**.
20. Install 2 thrust needle roller bearings to forward clutch hub. Shaft bearing outer diameter is 2.409" (61.20 mm). Hub bearing outer diameter is 2.228" (56.60 mm). Install forward clutch hub assembly to clutch drum. Install clutch cushion plate, reverse clutch flange, 4 plates and 5 discs to reverse clutch hub. See **Fig. 57**.
21. Install reverse clutch reaction sleeve to reverse clutch hub. Install reverse clutch hub assembly (reverse clutch reaction sleeve, clutch cushion plate, reverse clutch flange, 5 discs and 4 plates) to clutch drum. See **Fig. 57**. Using a screwdriver, install snap ring on clutch drum and input shaft assembly.

VALVE BODY ASSEMBLY

NOTE: All valve body components must be installed in original location. Lay all components in sequence during removal for reassembly reference. Manufacturer does not supply exploded views or specifications for valve body assembly.

Disassembly, Inspection & Reassembly

1. Remove 6 bolts, 2 lock plates and 7 shift solenoid valves. Remove straight pins. See **Fig. 66**. Clean all valve body parts with solvent. Dry parts with compressed air. Ensure all valve body oil passages are clear. Inspect valves for scoring or roughness. Inspect valve springs for damage, squareness, rust and collapsed coils. For valve body and valve locations, see **Fig. 67-Fig. 70**.
2. Install 7 shift solenoid valves, 2 lock plates and bolts. Tighten lock plate bolts to 57 INCH lbs. (6.4 N.m). Tighten shift solenoid valves SR and S1 bolts to 57 INCH lbs. (6.4 N.m). Tighten shift solenoid valve S2 bolt to 89 INCH lbs. (10 N.m).



G00200193

Fig. 66: Locating Shift Solenoid Valves On Valve Body Assembly
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

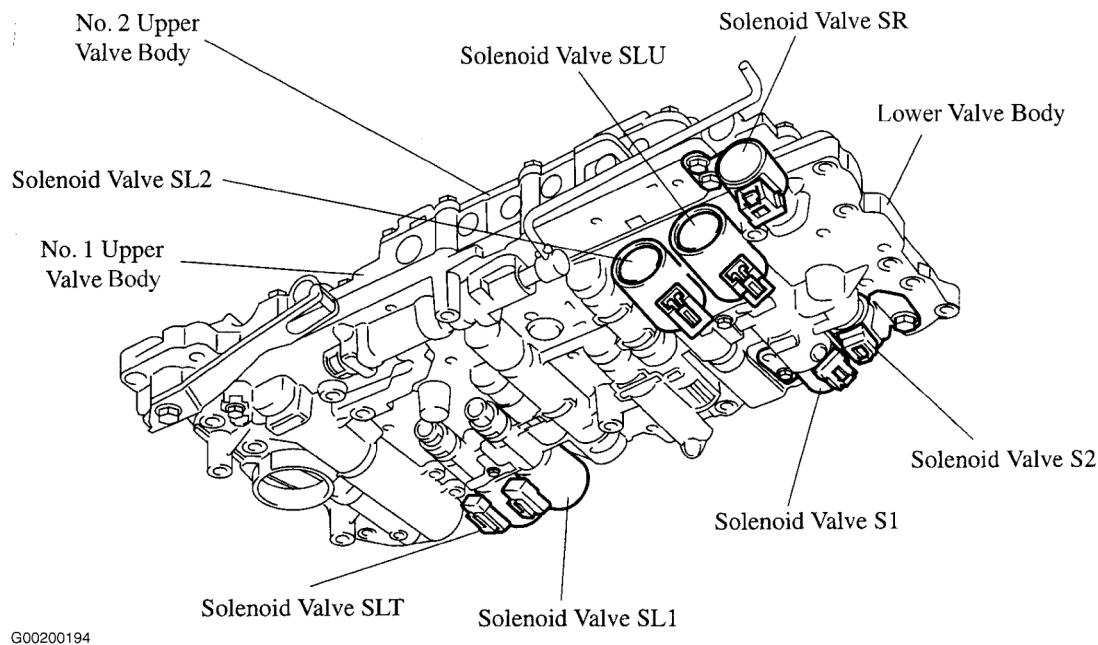


Fig. 67: Locating No. 1 Upper, No. 2 Upper & Lower Valve Bodies
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

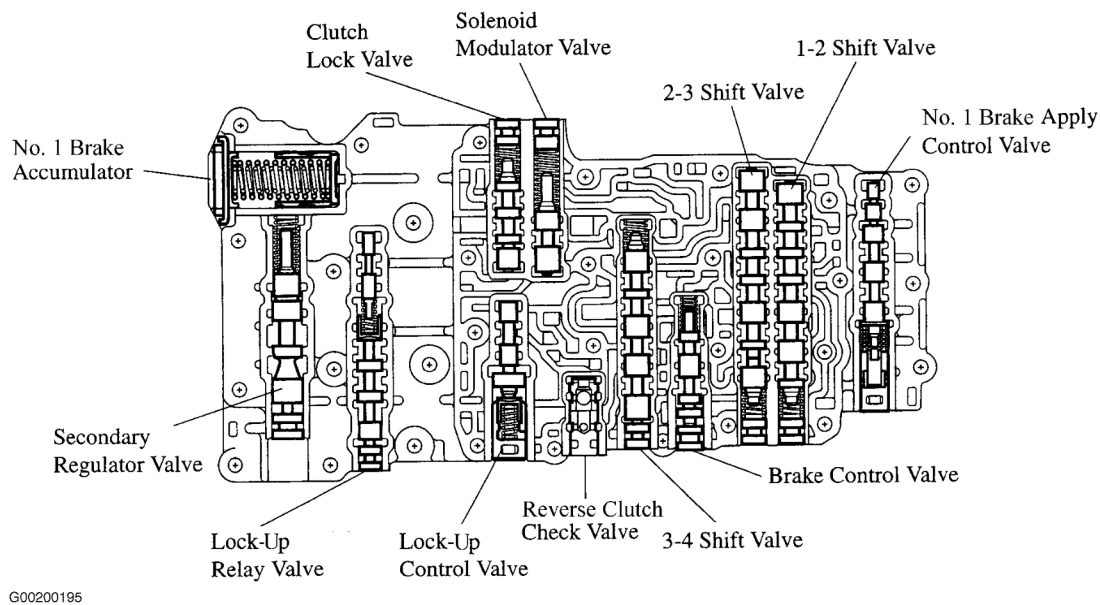
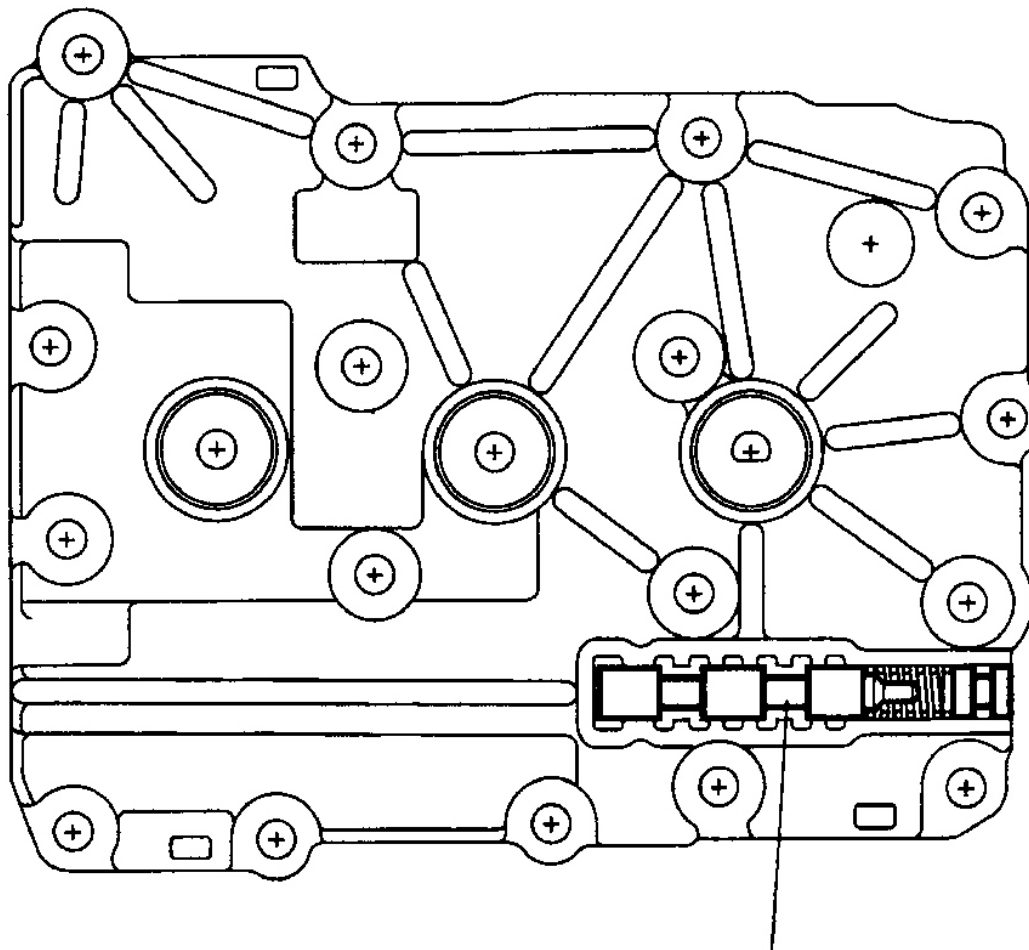


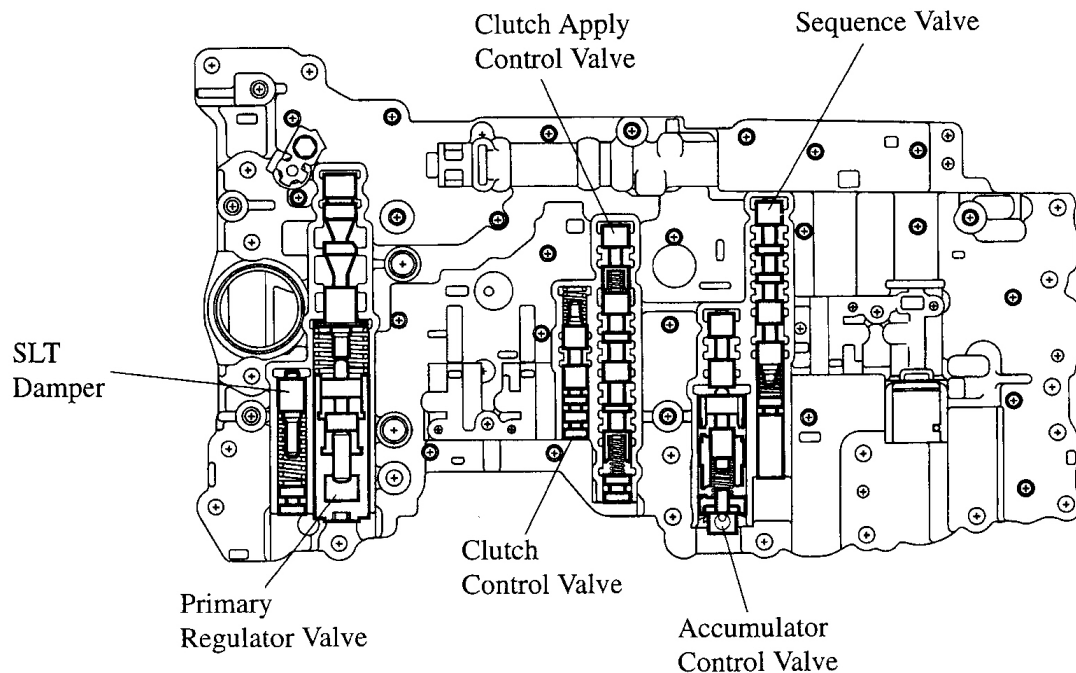
Fig. 68: Locating No. 1 Upper Valve Body Valves
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



Coast Brake
Relay Valve

G00200196

Fig. 69: Locating No. 2 Upper Valve Body Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00200197

Fig. 70: Locating Lower Valve Body Valves

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TRANSMISSION REASSEMBLY

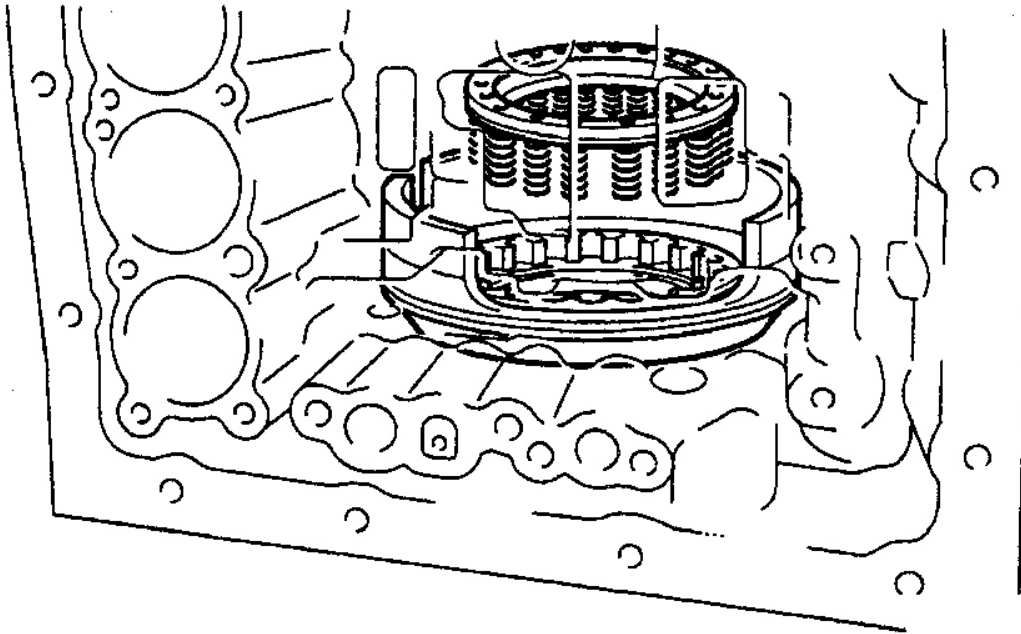
NOTE: Coat all oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces with ATF prior to reassembly. All gaskets and rubber "O" rings should be replaced. Ensure ends of snap rings are not aligned with cutouts and are installed correctly in groove. If a worn bushing is to be replaced, replacement must be made with subassembly containing that bushing. Check thrust bearings and races for wear or damage. Use petroleum jelly to hold parts in place. Replace parts as necessary. Clutch discs should be soaked in ATF for 15 minutes before installation.

NOTE: For thrust bearing and race identification and installation positions, refer to illustration. See [Fig. 91](#).

1. Coat 2 NEW "O" rings with ATF and install them onto brake reaction sleeve. Coat 2 NEW "O" rings with ATF and install them onto No. 4 brake piston. Install No. 4 brake piston to brake reaction sleeve. Coat NEW "O" ring with ATF and install it on brake reaction sleeve. With No. 4 brake piston below sleeve, install brake reaction sleeve and No. 4 brake piston to transmission case. See [Fig. 42](#).
2. Coat NEW "O" ring with ATF and install it onto 1st and reverse brake piston. With spring seat of piston facing upward, place piston into transmission case. Be careful not to damage "O" ring. Place piston return spring inside 1st and reverse brake piston onto No. 4 brake piston. See [Fig. 71](#). Position appropriate

adapter and a press onto spring retainer. Compress piston return spring and install snap ring. Remove press and adapter.

3. Install thrust needle roller bearing. Bearing outside diameter is 2.520" (64.00 mm). Install thrust needle roller bearing onto rear planetary gear. Coat thrust bearing race No. 9 with petroleum jelly, and install it onto rear planetary gear (shaft side). Bearing outside diameter is 1.606" (40.80 mm). Race No. 9 outside diameter is 2.469" (62.70 mm). Install rear planetary gear into transmission case.

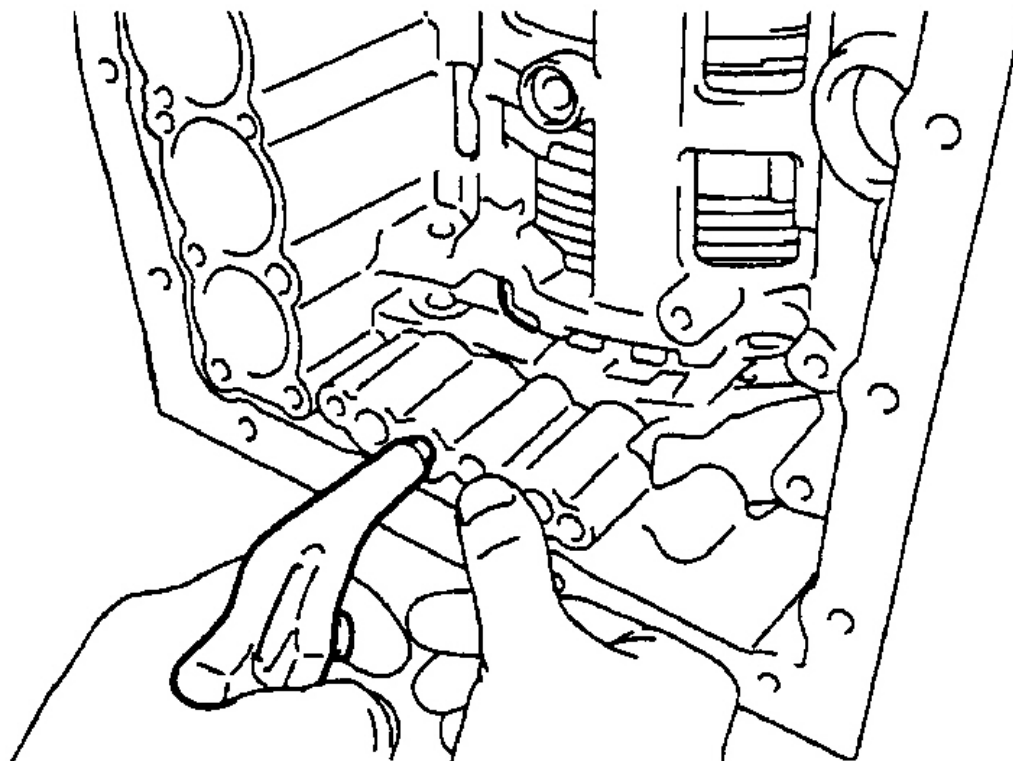


G00200198

Fig. 71: Installing Piston Return Spring Inside 1st & Reverse Brake Piston
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

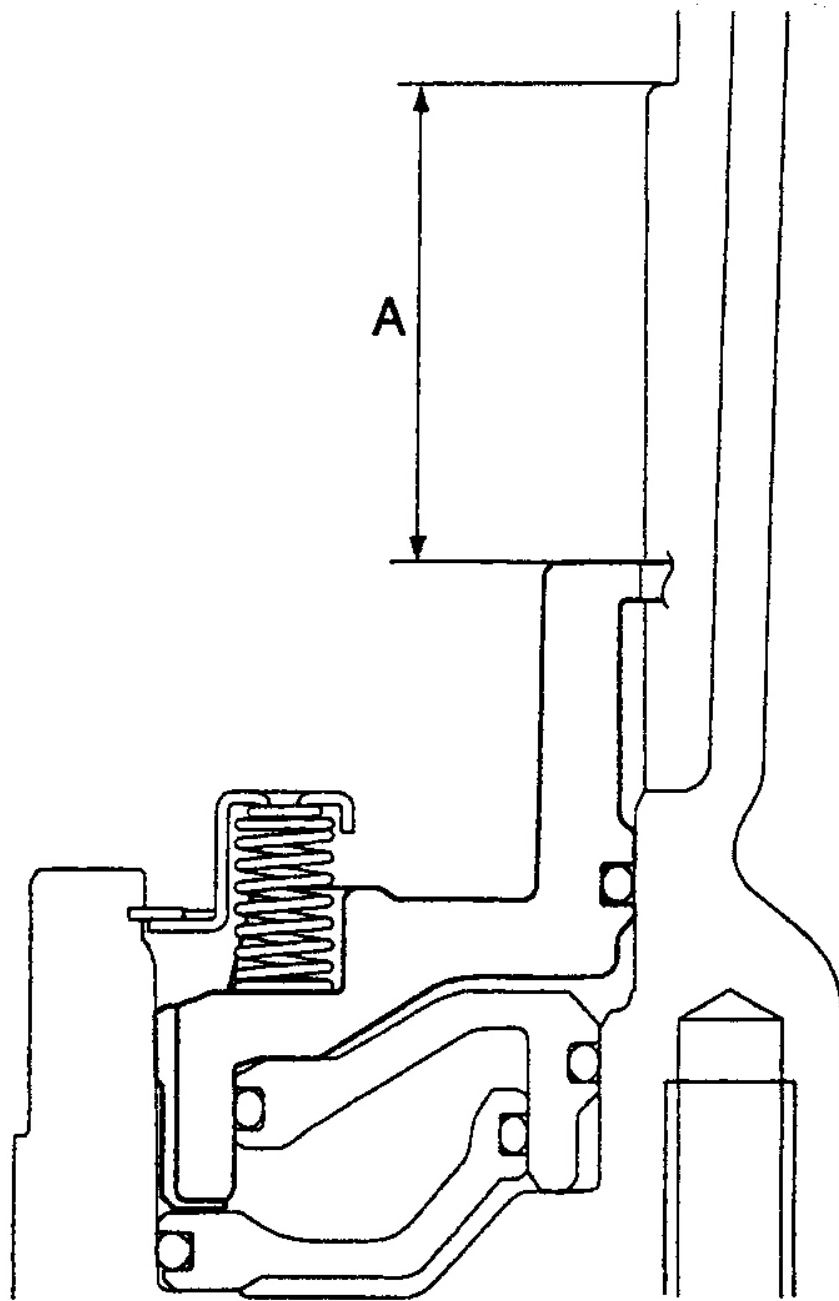
4. Ensure 1st and reverse brake piston moves smoothly when applying and releasing compressed air into transmission case. See **Fig. 72**. Using vernier calipers, measure level difference (length "A") between upper surface of 1st and reverse brake piston and hitting surface of No. 4 brake flange at both ends across diameter. See **Fig. 73**. Calculate average measurement. Length "A" equals 1.431" (36.35 mm) minus 1.460" (37.09 mm). Ensure 1st and reverse brake piston is installed tightly to end face of transmission case.
5. Using vernier calipers, measure thickness (length "B") of 2 brake flanges, No. 4 brake plates (7) and No. 4 brake discs (8) all together at both ends across diameter. See **Fig. 74**. Calculate average measurement. Pack clearance should be .031-.043" (.80-1.10 mm). Length "B" equals 1.419" (36.04 mm) minus 1.462" (37.14 mm). Pack clearance equals length "A" (in previous step) minus length "B", minus .010" (.25 mm), minus .071" (1.80 mm).
6. If pack clearance is not within specification, select and install a brake flange that ensures pack clearance is within specification. Brake flanges are available in 7 thicknesses from .008" (.20 mm) to .055" (1.40

mm), in increments of .008" (.20 mm). Install No. 4 brake plates (7), discs (8) and 2 flanges. See **Fig. 42**. Install brake plate stopper spring. See **Fig. 41**.



G00200199

Fig. 72: Checking 1st & Reverse Brake Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00200200

Fig. 73: Measuring Distance (Length "A") Between Upper Surface Of Brake Piston & Brake Flange

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

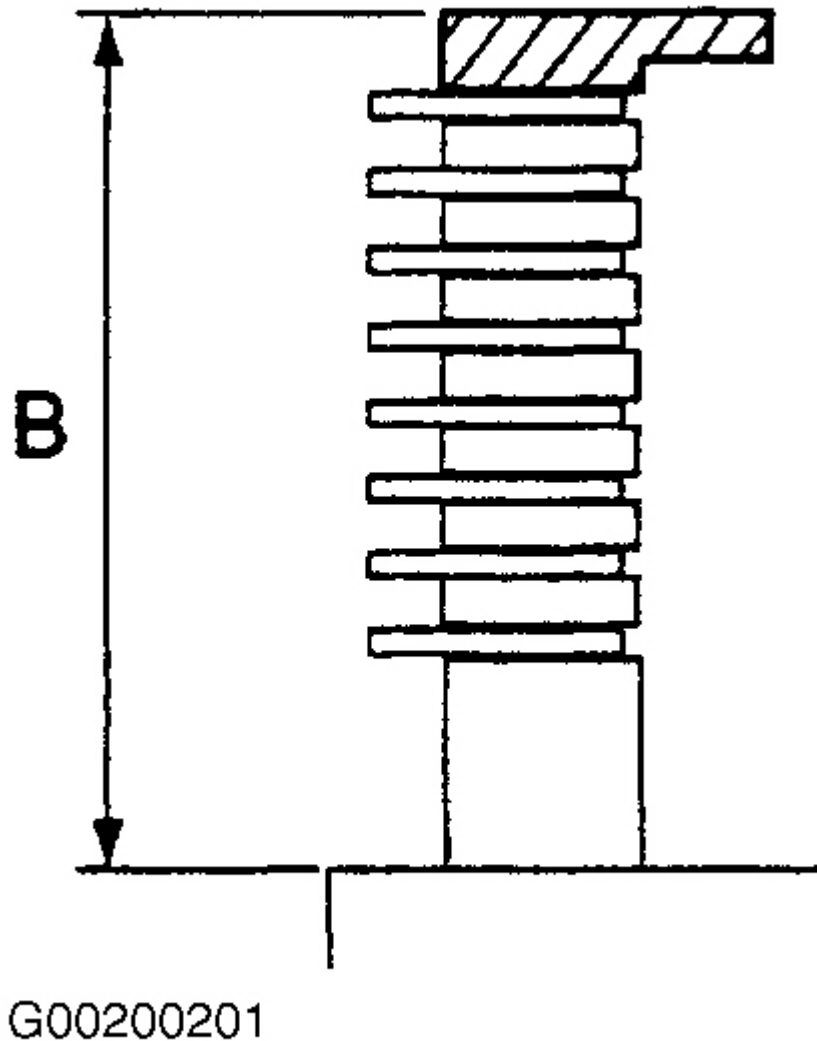
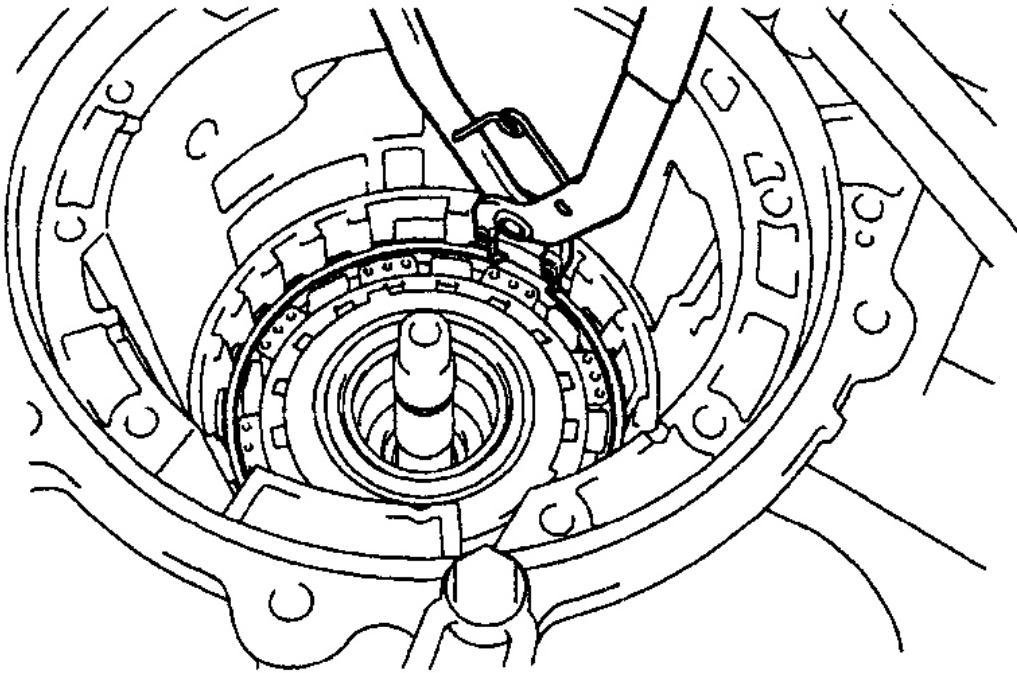


Fig. 74: Measuring Thickness (Length "B") Of Flanges, Plates & Discs
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. Install thrust bearing No. 8, thrust needle roller bearing, thrust bearing race No. 7 and planetary ring gear flange onto intermediate shaft. See **Fig. 31**. Race No. 7 outside diameter is 1.929" (49.00 mm). Roller bearing outside diameter is 1.943" (49.35 mm). Race No. 8 outside diameter is 1.929" (49.00 mm). Install one-way clutch assembly No. 3 and one-way clutch inner race to intermediate shaft. See **Fig. 31**.
8. Install intermediate shaft with one-way clutch assembly No. 3 into transmission case. Using appropriate snap ring pliers, install snap ring into transmission case. See **Fig. 75**. Install center (CTR) planetary gear assembly and planetary sun gear into transmission case. Coat thrust bearing race No. 4 with petroleum

jelly and install it onto center (CTR) planetary gear assembly. Race No. 4 outside diameter is 2.913" (74.00 mm). See **Fig. 31**.



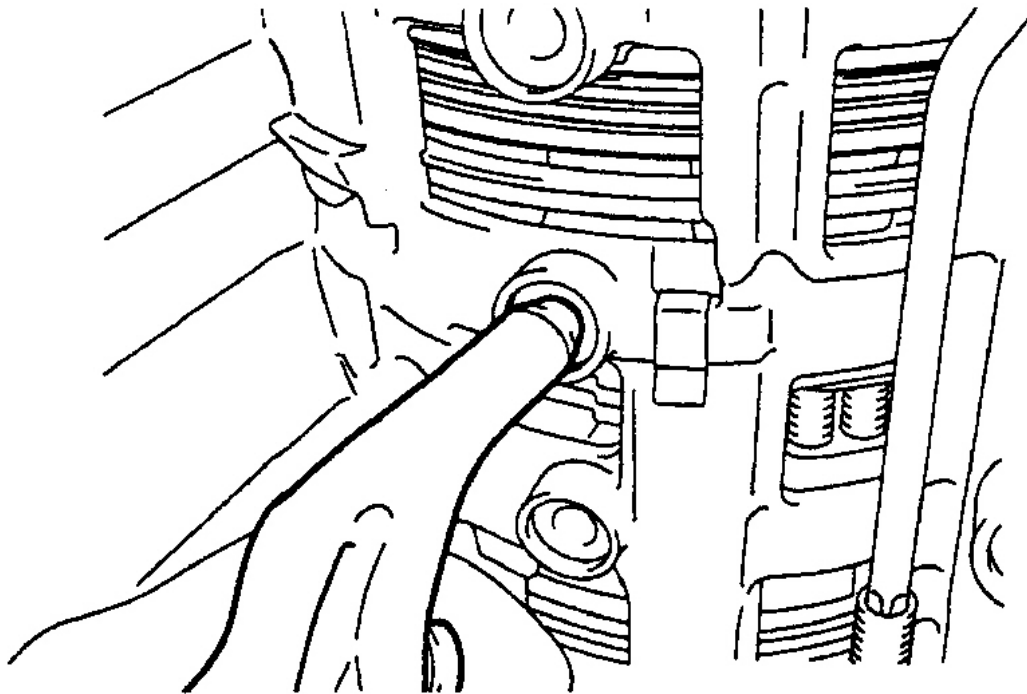
G00200202

Fig. 75: Installing Intermediate Shaft Snap Ring Into Transmission Case
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. Coat NEW "O" rings with ATF and install them onto No. 2 brake piston. Using hand pressure, press No. 2 brake piston into No. 2 brake cylinder. Do not damage "O" rings. Install No. 2 brake piston into transmission case. Install flange, No. 2 brake plates (3), discs (3) and brake piston return spring. Position appropriate adapter and a press onto spring retainer. Compress piston return spring and install No. 2 brake return spring snap ring. See **Fig. 31**.
10. Coat NEW "O" rings with ATF and install them onto No. 1 brake piston. Using hand pressure, press No. 1 brake piston into No. 1 brake cylinder. Do not damage "O" rings. Install brake piston return spring and No. 1 brake piston with No. 1 brake cylinder into transmission case. Position appropriate adapter and a press onto spring retainer. Compress piston return spring and install brake piston return spring snap ring. See **Fig. 31**.
11. Install No. 1 brake plates (3), discs (3) and flange. Install center (CTR) planetary ring gear and front planetary ring gear flange on front planetary ring gear. Using a screwdriver, install snap ring. See **Fig. 23**. Install front planetary ring gear and thrust needle roller bearing into transmission case. Roller bearing outside diameter is 3.008" (76.40 mm). Install thrust needle roller bearing and planetary carrier thrust washer No. 2. Roller bearing outside diameter is 2.295" (58.30 mm). Coat thrust bearing race No. 3 with

petroleum jelly and install it onto front planetary gear. Race No. 3 outside diameter is 2.244" (57.00 mm). Install front planetary gear assembly and one-way clutch inner race into transmission case.

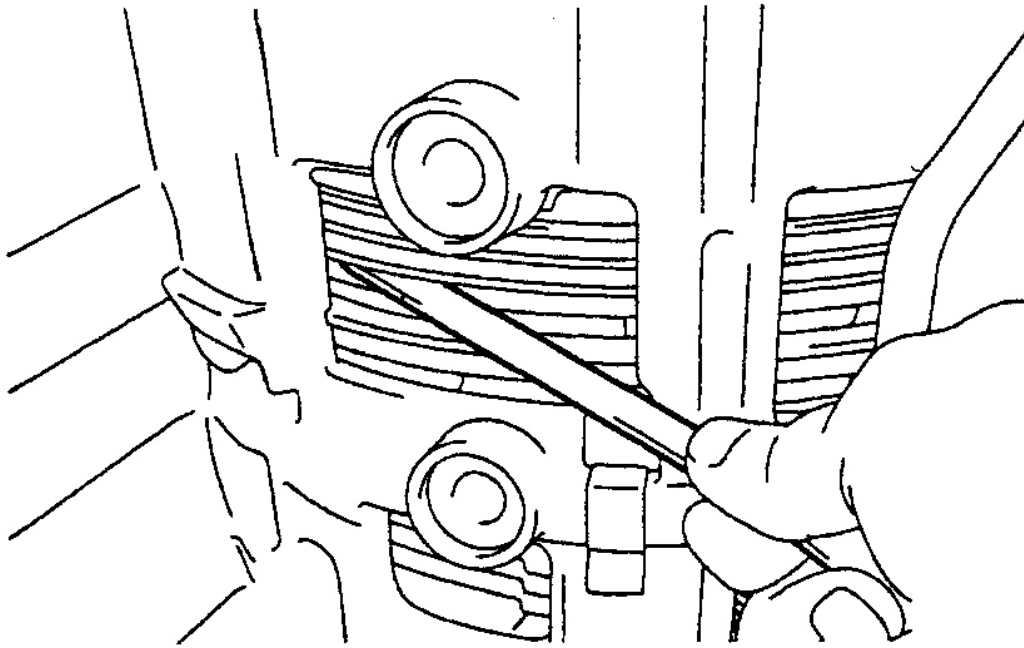
12. Ensure No. 1 brake piston moves smoothly when applying and releasing compressed air into transmission case. See **Fig. 76**. Using feeler gauge, measure No. 3 brake pack clearance between snap ring and flange. See **Fig. 77**. Clearance should be .017-.028" (.42-.72 mm). If clearance is not within specification, ensure components were assembled correctly. Recheck clearance. If clearance is still not within specification, select another flange. Flanges are available in thicknesses from .079" (2.00 mm) to .102" (2.60 mm), in increments of .008" (.20 mm).



G00200203

Fig. 76: Checking No. 1 Brake Piston Operation

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00200204

Fig. 77: Measuring No. 3 Brake Pack Clearance

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. Coat NEW "O" rings with ATF and install them onto 2nd brake piston. Using hand pressure, press 2nd brake cylinder into 2nd brake piston. See **Fig. 23**. Do not damage "O" rings. Install 2nd brake piston return spring onto piston. Using appropriate adapter and a press, compress return spring and install snap ring. Ensure end gap of snap ring is not aligned with spring retainer claw. Install 2nd brake cylinder into transmission case.
14. Install one-way clutch assembly No. 1 and planetary carrier thrust washer No. 1 into transmission case. Using snap ring pliers, install snap ring into transmission case. See **Fig. 75**. Install flange, No. 3 brake discs (4), plates (4) and flange into transmission case. See **Fig. 23**. Using a screwdriver, install snap ring into transmission case.
15. Install one-way clutch assembly No. 2 and clutch drum thrust washer No. 2 onto clutch drum and input shaft assembly. Install thrust needle roller bearing onto clutch drum and input shaft assembly. Roller bearing outside diameter is 3.370" (85.60 mm). Coat clutch drum thrust washer with petroleum jelly and install it onto one-way clutch assembly No. 2. See **Fig. 23**. Thrust washer (race) outside diameter is 4.016" (102.00 mm). Install clutch drum and input shaft assembly into transmission case.
16. Install thrust bearing race No. 1 onto oil pump. See **Fig. 23**. Race outside diameter is 3.454" (87.74 mm). Coat NEW "O" ring with ATF and install it around oil pump body. Place oil pump through input shaft, and align bolt holes of oil pump with transmission case. Hold input shaft and apply light pressure on oil pump body to slide oil seal rings into direct clutch drum. Do not apply extreme pressure on oil pump or oil seal rings will stick to direct clutch drum.

17. Install 10 oil pump bolts. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**. Using appropriate driver and a hammer, install 2 manual valve lever shaft oil seals. Coat oil seal lips with lubricant. Using compressed air, check individual piston operation. Listen for operating sound while applying compressed air into oil passages in transmission case. See **Fig. 78**. When checking direct clutch, check with reverse clutch accumulator piston hole plugged. If no sound is heard, disassemble component and recheck parts installation. Repair as necessary.

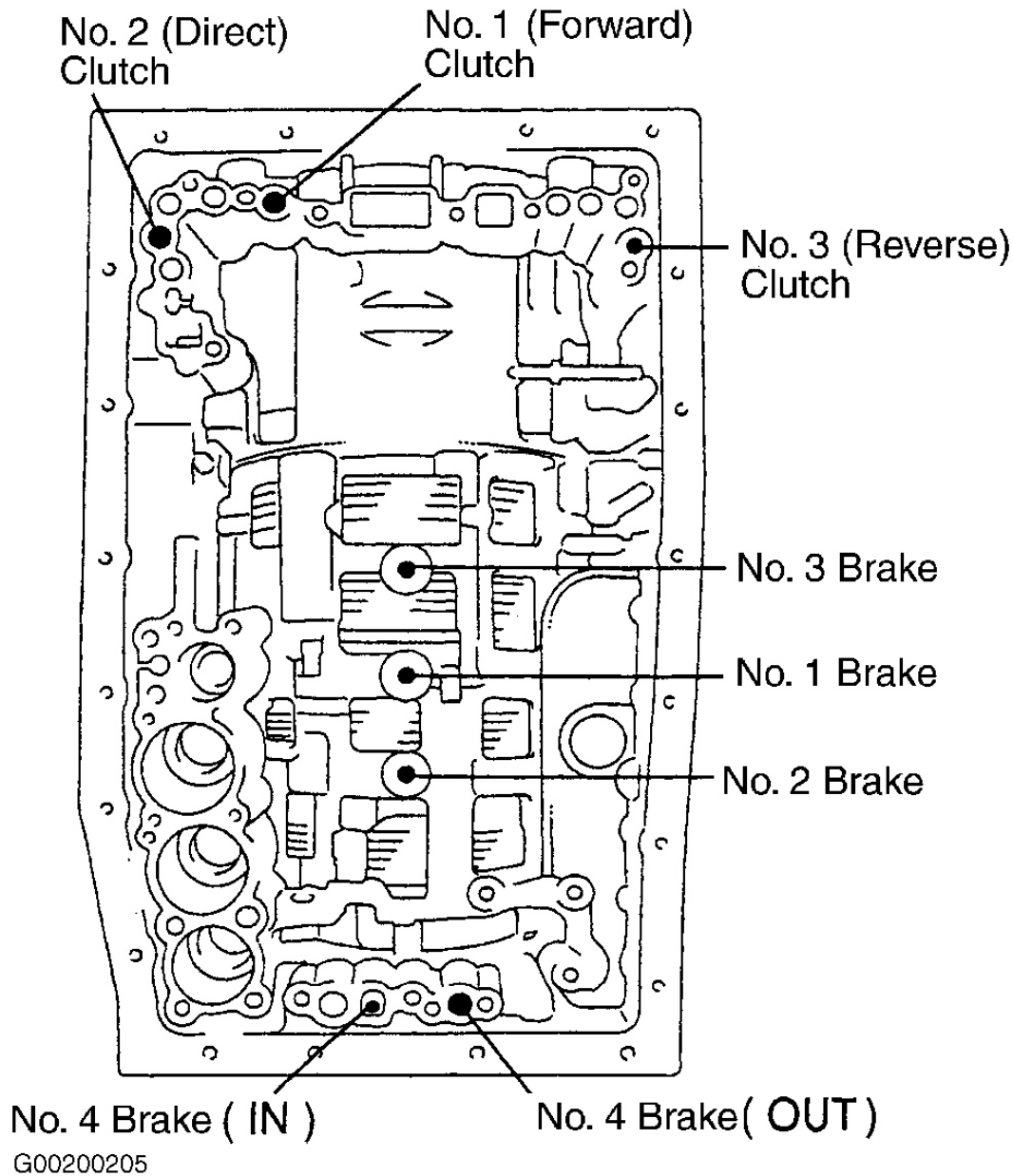
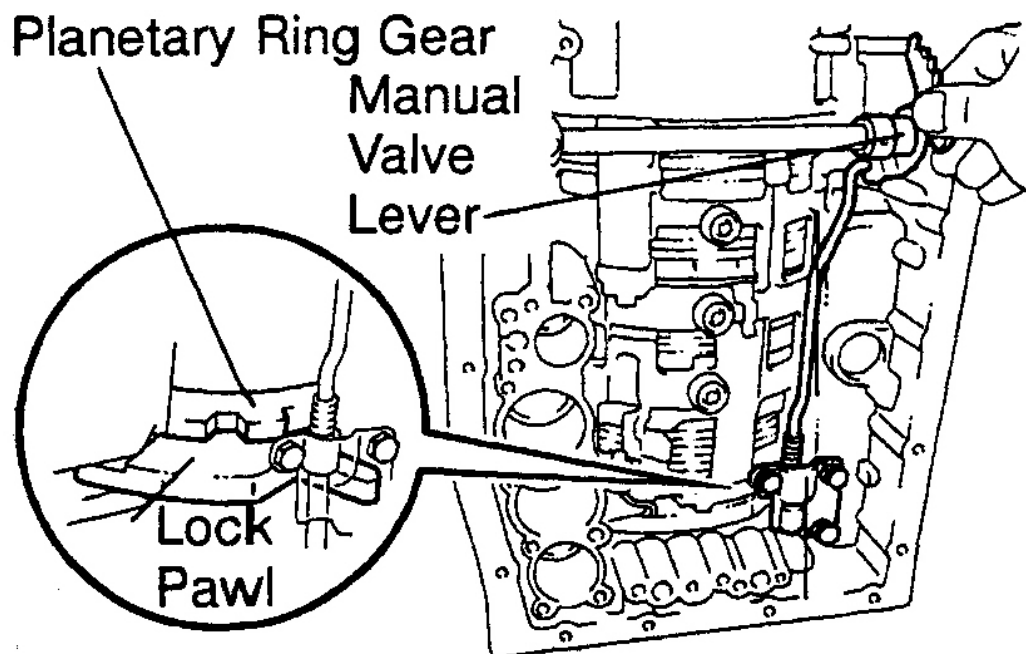


Fig. 78: Air Checking Transmission Components
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

18. Install NEW spacer to manual valve lever. Install manual valve lever shaft into transmission case through manual valve lever. Using a hammer, drive in NEW spring pin. See **Fig. 23**. Align manual valve lever indentation with spacer hole, and stake them together with a pin punch. Ensure shaft rotates smoothly.
19. Install "E" ring to shaft. Install parking lock pawl, shaft and spring. See **Fig. 20**. Connect parking lock rod to manual valve lever. See **Fig. 19**. Place parking lock pawl bracket onto transmission case. Install 3 bolts and tighten to specification. See **TORQUE SPECIFICATIONS**.
20. Shift manual valve lever to "P" position, and confirm planetary ring gear is correctly locked up by the lock pawl. See **Fig. 79**. Install forward clutch accumulator spring and valve. See **Fig. 80**. Coat NEW "O" rings with ATF and install on accumulator pistons. Install remaining accumulator springs and pistons in correct locations. See **Fig. 80**. For spring specifications, see **ACCUMULATOR SPRING SPECIFICATIONS** table.

ACCUMULATOR SPRING SPECIFICATIONS

Component, (Code) & Color (1)	Free Length - In. (mm)	Diameter - In. (mm)
Direct Clutch (C2) White	2.441 (62.00)	.626 (15.90)
Forward Clutch (C1)		
Inner (Pink)	1.197 (30.40)	.449 (11.40)
Outer (Light Green)	1.920 (48.76)	.654 (16.60)
Reverse Clutch (C3)		
Inner (Yellow)	1.732 (44.00)	.551 (14.00)
Outer (Red)	2.888 (73.35)	.783 (19.90)
No. 3 Brake (B3) Purple	2.776 (70.50)	.776 (19.70)
(1) For accumulator spring locations, see Fig. 80 .		



G00200206

Fig. 79: Checking Planetary Ring Gear Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

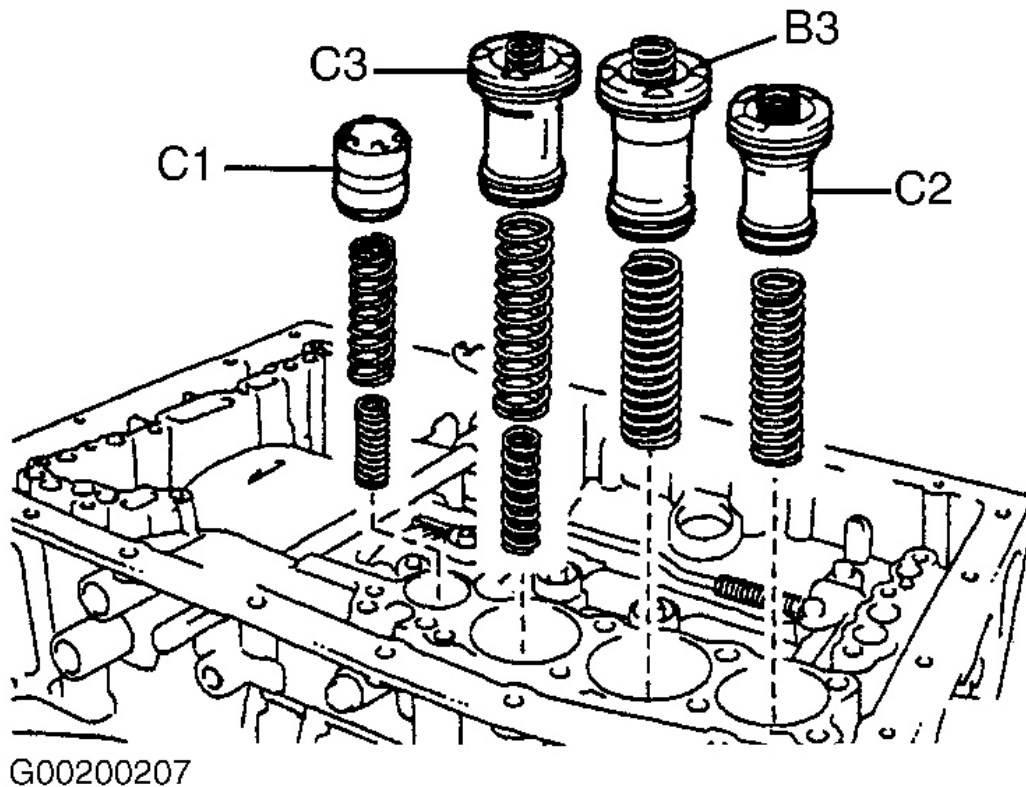


Fig. 80: Identifying Accumulator Piston, Spring & Valve Locations
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

21. Install check ball body and spring. See **Fig. 15**. Install 3 brake drum gaskets. See **Fig. 14**. Install 3 transmission case gaskets. See **Fig. 13**. Prior to installing valve body assembly, align groove of manual valve with pin of manual valve lever. See **Fig. 81**. Install valve body assembly and 19 valve body bolts. Ensure bolts are installed in correct locations. See **Fig. 82**. For bolt identification, see **VALVE BODY BOLT SPECIFICATION** table.

VALVE BODY BOLT SPECIFICATIONS

Bolt Application ⁽¹⁾	In. (mm)
A	.98 (25.0)
B	1.42 (36.0)

(1) For bolt locations, see **Fig. 82**.

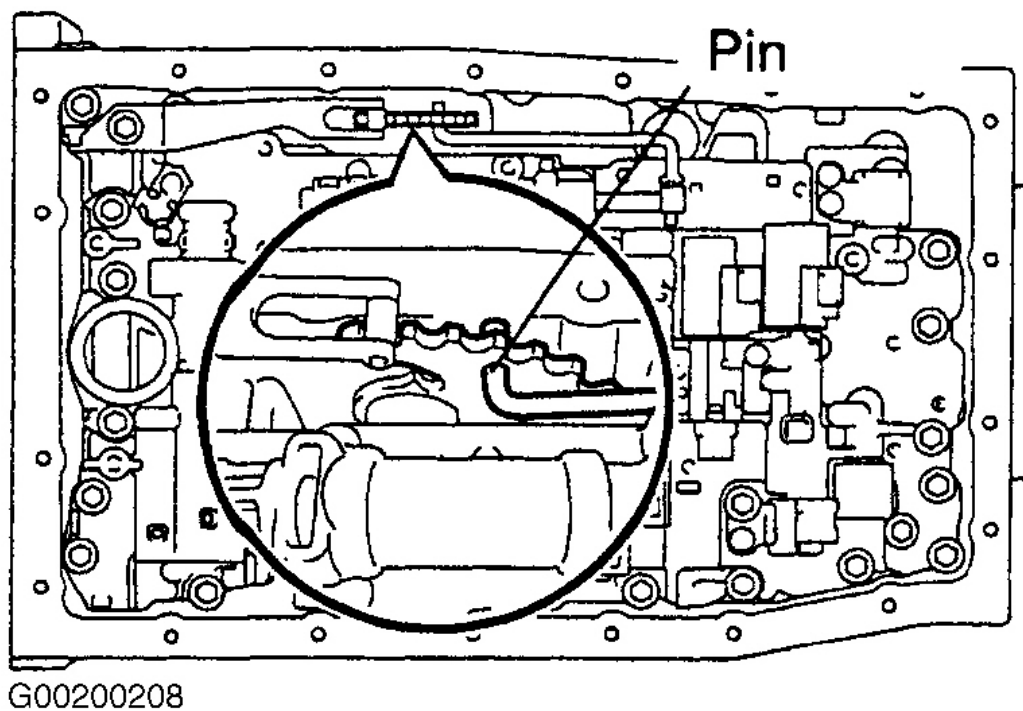
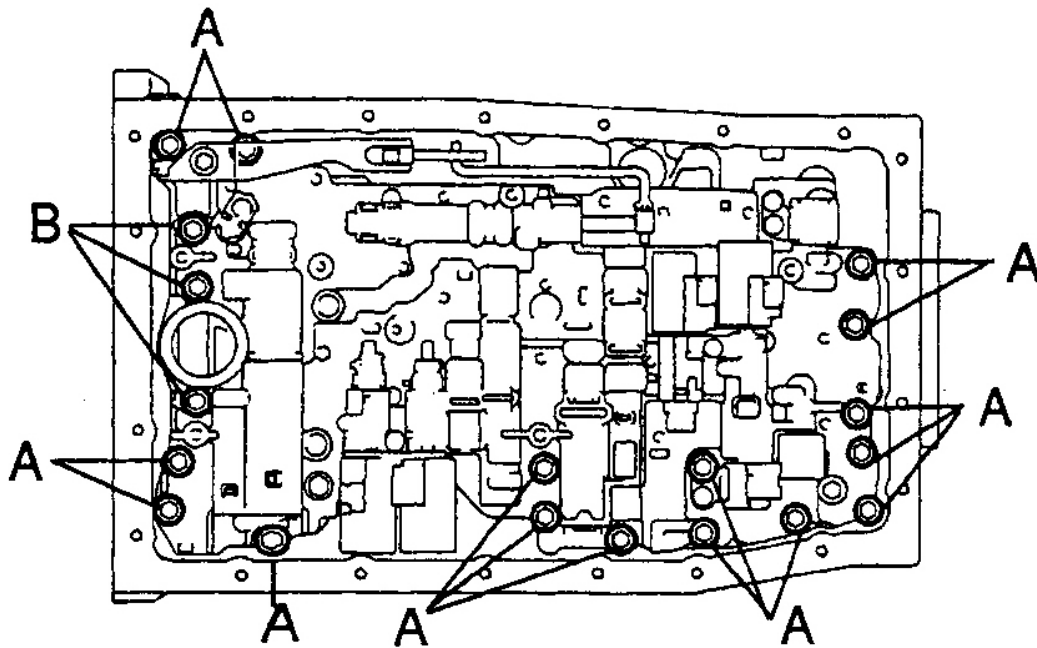


Fig. 81: Aligning Manual Valve Groove With Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



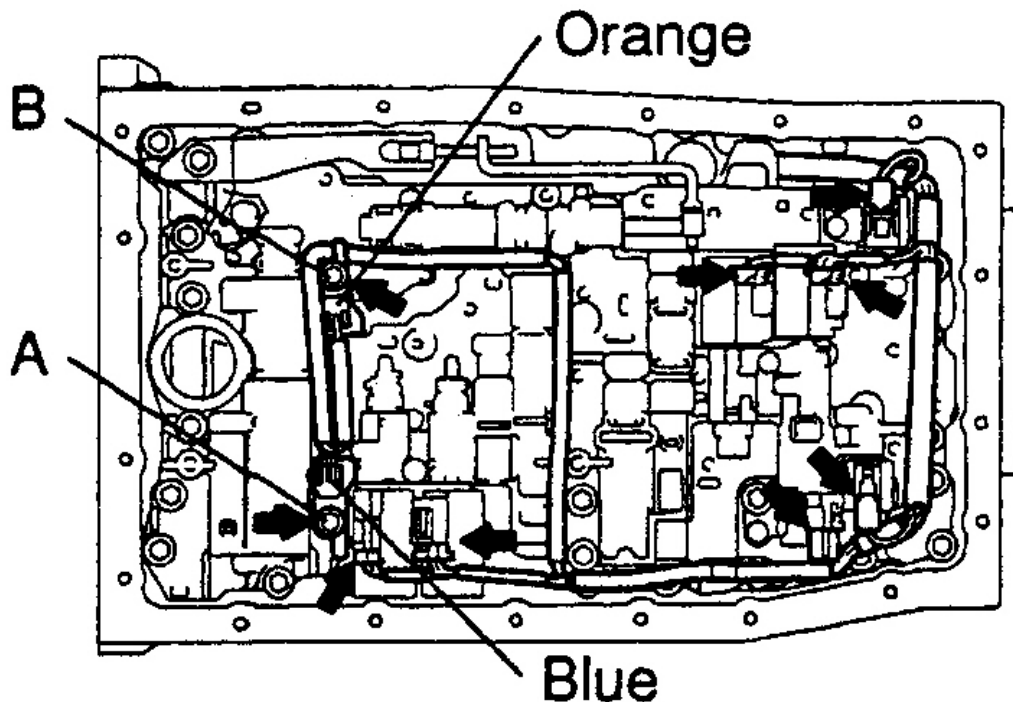
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Fig. 82: Locating Valve Body Assembly Bolts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

22. Install NEW "O" ring on transmission wiring harness and install harness into transmission case. Install bolt and tighten to specification. See **TORQUE SPECIFICATIONS**. Connect 7 shift solenoid valves connectors. Install ATF temperature sensor. Sensor wire color is Blue. Orange wire connects at solenoid location shown in **Fig. 83**. Install clamps and 2 bolts and tighten to specification. For clamp bolt length specifications, see **CLAMP BOLT LENGTH SPECIFICATIONS** table.

CLAMP BOLT LENGTH SPECIFICATIONS

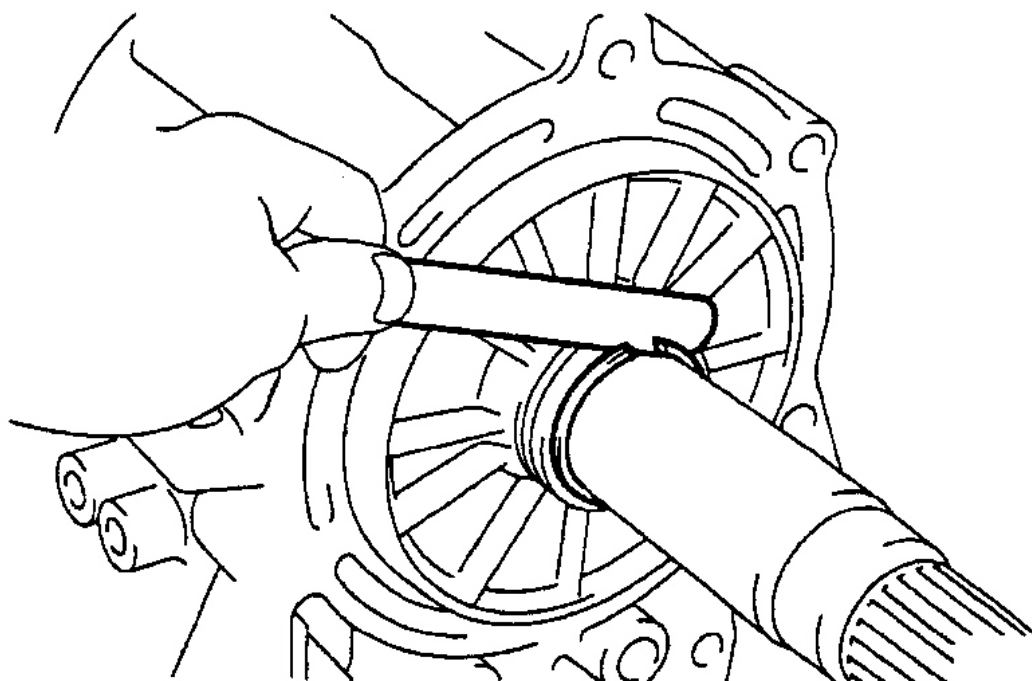
Bolt Application ⁽¹⁾	In. (mm)
A	1.42 (36.0)
B	.47 (12.0)
(1) For bolt locations, see Fig. 83 .	



G00200210

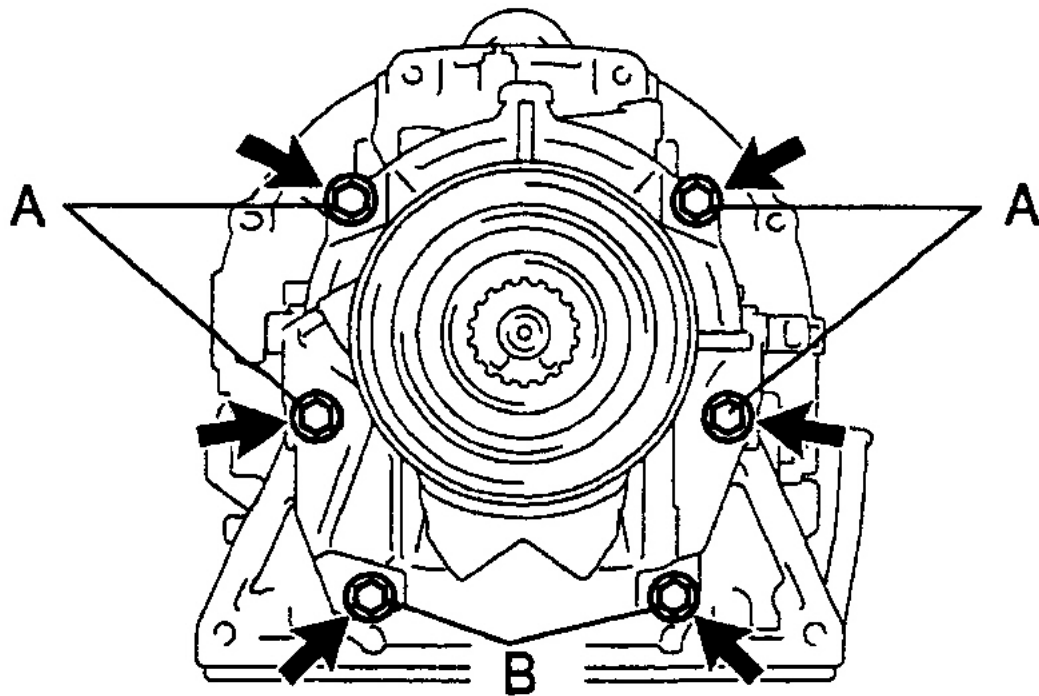
Fig. 83: Locating Shift Solenoid Connectors, Clamps & Sensor
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

23. Coat NEW "O" ring with ATF and install on oil strainer. Install oil strainer and bolts. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**. Install 4 magnets in oil pan. See **Fig. 12**. Install NEW gasket and oil pan. Install 20 oil pan bolts and tighten to specification. Install drain plug and tighten to specification.
24. Using appropriate adapter, driver and a hammer, install NEW oil seal in extension housing (2WD) or case adapter (4WD). Using appropriate adapter and a hammer, install NEW dust deflector into extension housing (2WD). On 2WD models, install thrust needle roller bearing and 2 bearing races. See **Fig. 42**.
25. Using snap ring pliers, install snap ring on rear planetary gear assembly shaft. Using a feeler gauge, measure clearance between snap ring and race. See **Fig. 84**. Clearance should be .002-.013" (.05-.33 mm). If clearance is not within specification, select another race. Races are available in thicknesses from .146" (3.70 mm) to .165" (4.20 mm), in increments of .004" (.10 mm).
26. On 2WD models, install gasket on extension housing. Ensure bolt threads and contact surfaces are clean. Apply a bead of Three Bond (1281) or equivalent about .039-.059" (1.00-1.50 mm) thick around inside edge of extension housing contact surface. Install extension housing bolts and tighten to specification. Ensure 1.378" (35.00 mm) short bolts "B" are installed at bottom of extension housing. See **Fig. 85**.



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Fig. 84: Measuring Clearance Between Snap Ring & Race
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



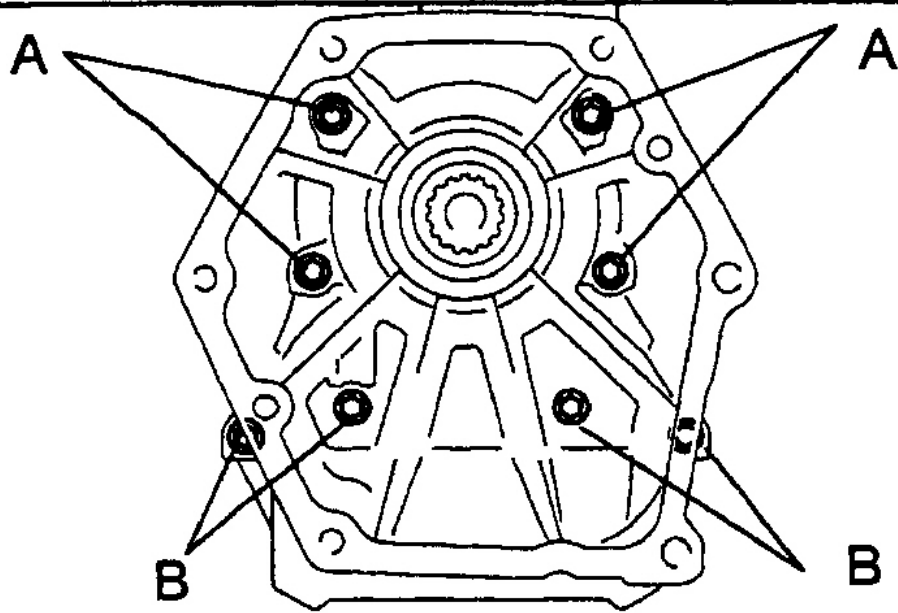
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Fig. 85: Identifying Extension Housing Bolt Locations

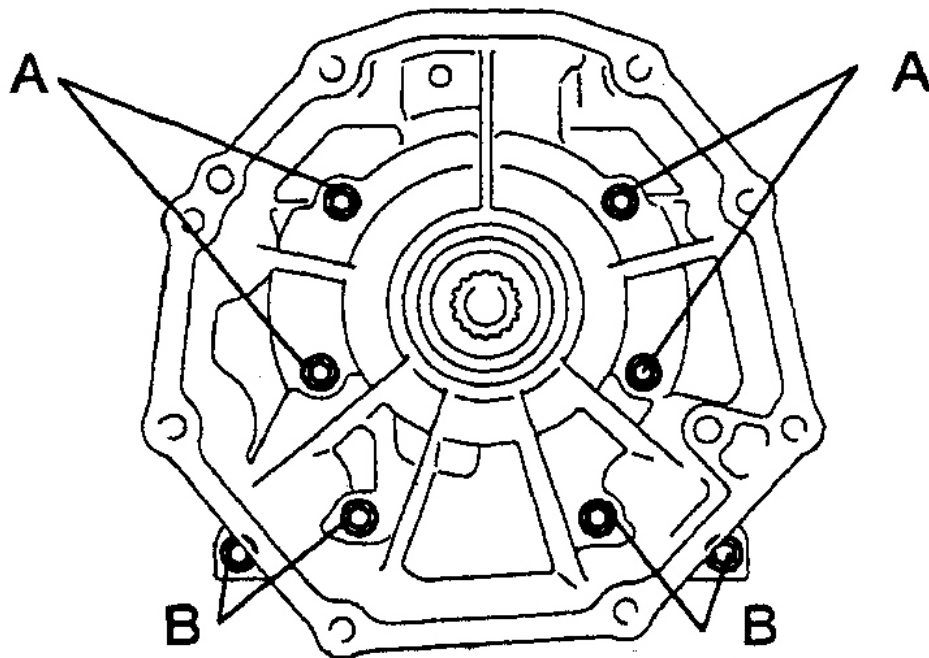
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

27. On 4WD models, apply thread sealant to 8 case adapter bolts. Apply a bead of Three Bond (1281) or equivalent about .039-.059" (1.00-1.50 mm) thick around inside edge of case adapter contact surface. Install transmission case adapter and 8 bolts. Tighten bolts to specification. Ensure 1.575" (40.00 mm) short bolts "B" are installed at bottom of transmission case adapter. See **Fig. 86**.
28. On all models, ensure transmission housing bolt threads and contact surfaces are clean. Install transmission housing to transmission case. Install 14 mm bolts at locations "A" and "C". Install 17 mm bolts in locations "B". See **Fig. 87**. Tighten bolts to specification. Install a NEW "O" ring to breather tube. Install bolts and breather tube. See **Fig. 9**. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**. Coat NEW "O" rings with ATF and install on transmission revolution sensors. Install sensors and bolts to transmission case. Tighten bolts to specification.

A750F(EXCEPT 4 RUNNER GX470)



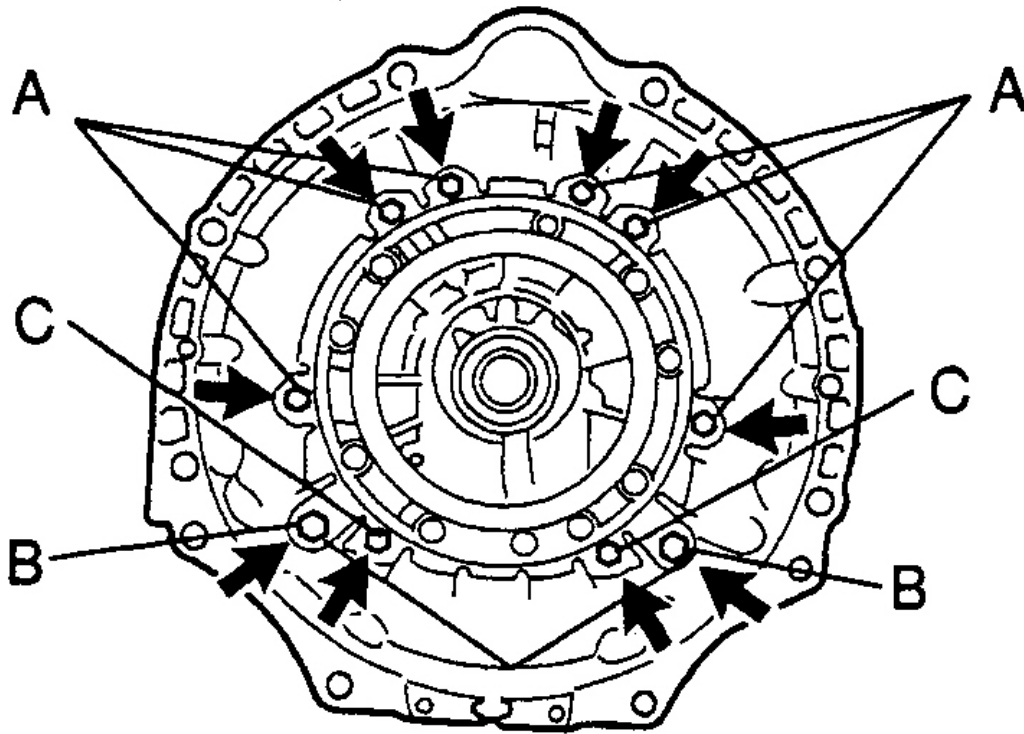
A750F (4 RUNNER, GX470)



G00200213

Fig. 86: Identifying Adapter Case Bolt Locations

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00200214

Fig. 87: Identifying Transmission Housing Bolt Locations

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

29. Coat NEW "O" rings with ATF and install on oil cooler unions. Install oil cooler unions to transmission case and tighten to specification. See **TORQUE SPECIFICATIONS**. Install park/neutral position switch onto manual valve lever shaft. See **Fig. 9**. Temporarily install adjusting bolt. Install NEW lock washer. Install nut and tighten to specification.
30. Using control shaft lever, fully turn manual lever shaft back, and then return 2 notches. Transmission is now in Neutral. Align neutral basic line (12 to 6 o'clock position on switch) with switch groove. Tighten adjusting bolt to specification. Using a screwdriver, bend at least 2 lock washer tabs onto nut. Install control shaft lever, washer and nut. Tighten nut to specification.
31. On GX 470 and 4Runner, go to next step. On Land Cruiser and LX 470, install torque converter into transmission housing while rotating. Using straightedge and depth gauge, measure distance from front of converter to front mounting surface of transmission housing. See **Fig. 88**. Ensure torque converter is fully installed at correct depth. See **TORQUE CONVERTER DISTANCE SPECIFICATIONS** table.
32. Install torque converter into transmission housing while rotating. Ensure converter is properly installed by

measuring the following dimensions. Using vernier calipers, measure dimension "A" between transaxle fitting part and converter fitting part of drive plate. See **Fig. 89**. Using vernier calipers and a straightedge, measure dimension "B" as shown in **Fig. 90**. Ensure dimension "B" is greater than dimension "A". Do not add thickness of straightedge. Standard measurement is dimension "A" plus .039" (1.00 mm) or more.

TORQUE CONVERTER DISTANCE SPECIFICATIONS (LAND CRUISER & LX 470)

Application	Distance - In. (mm)
Land Cruiser & LX 470	.673 (17.10)

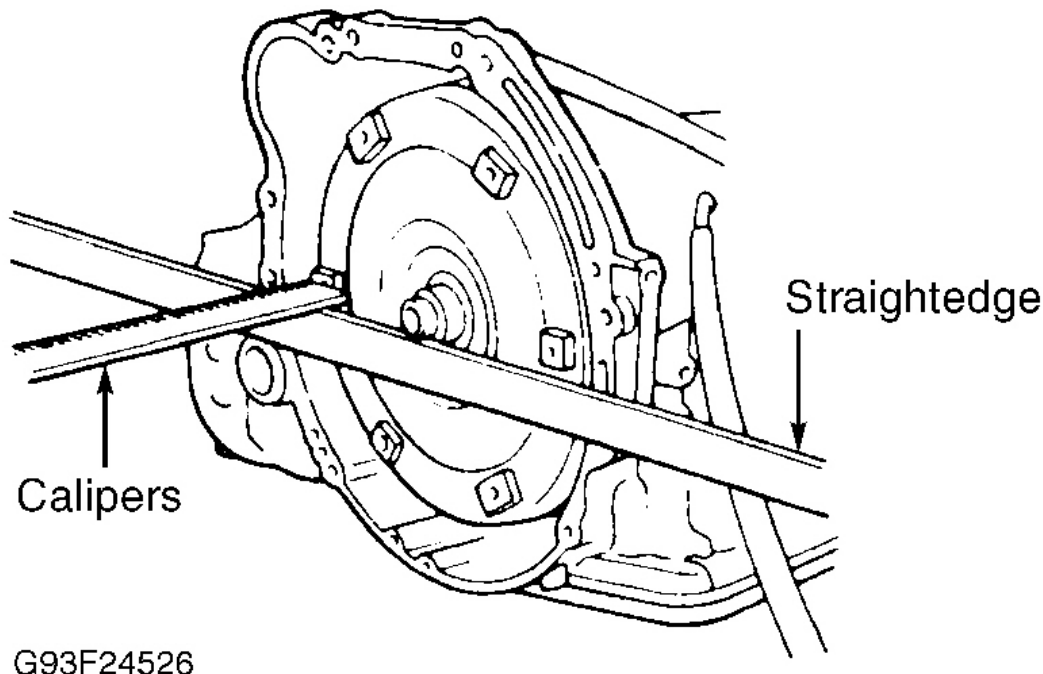
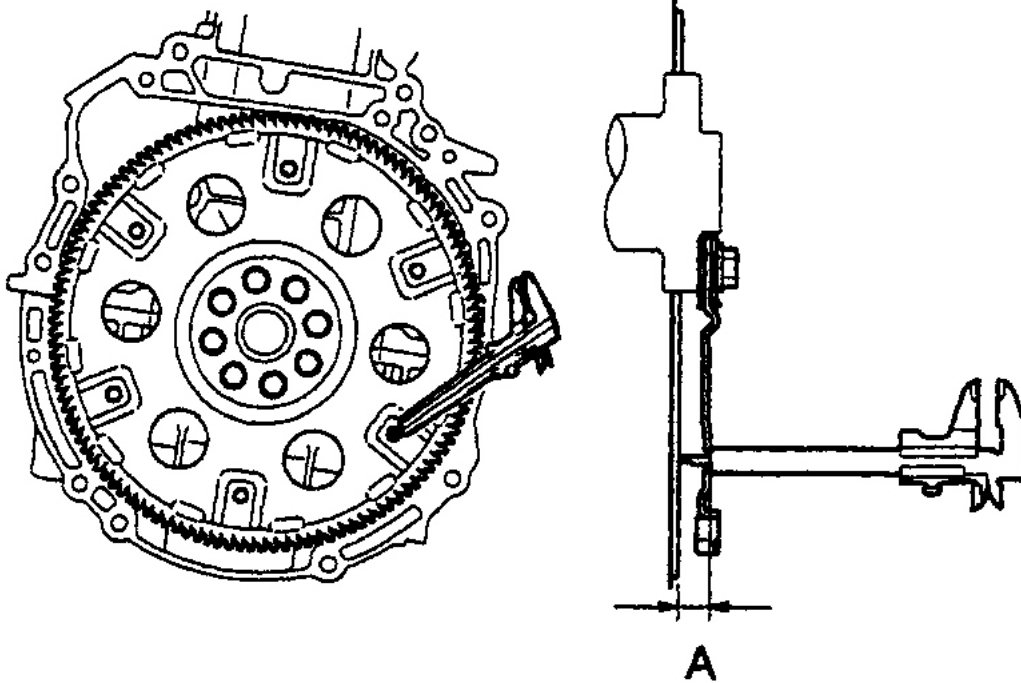
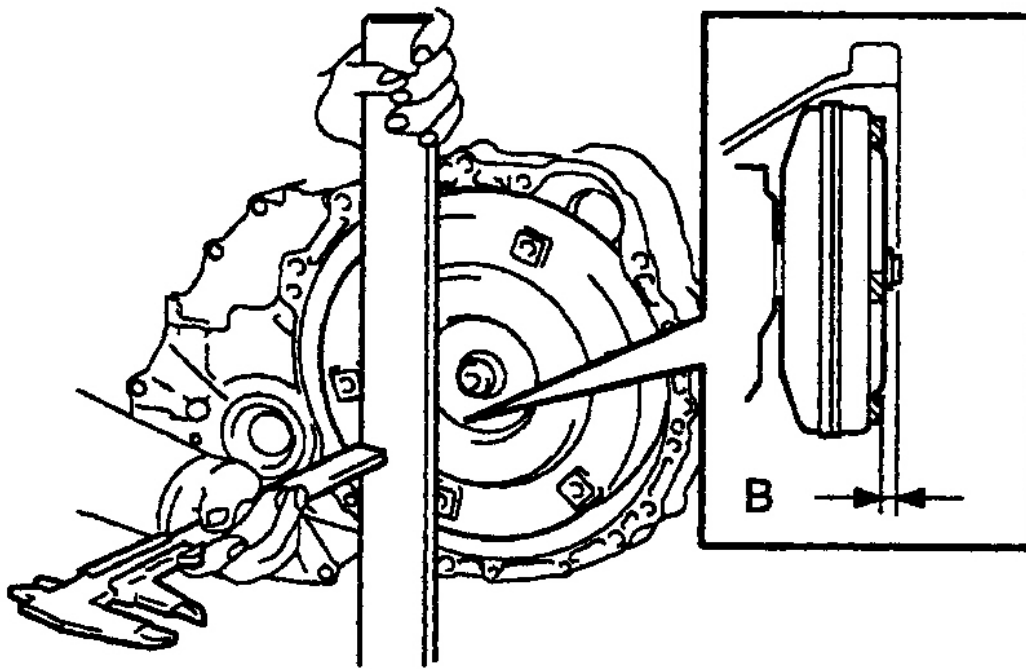


Fig. 88: Measuring Torque Converter Depth (Except GX 470 & 4Runner)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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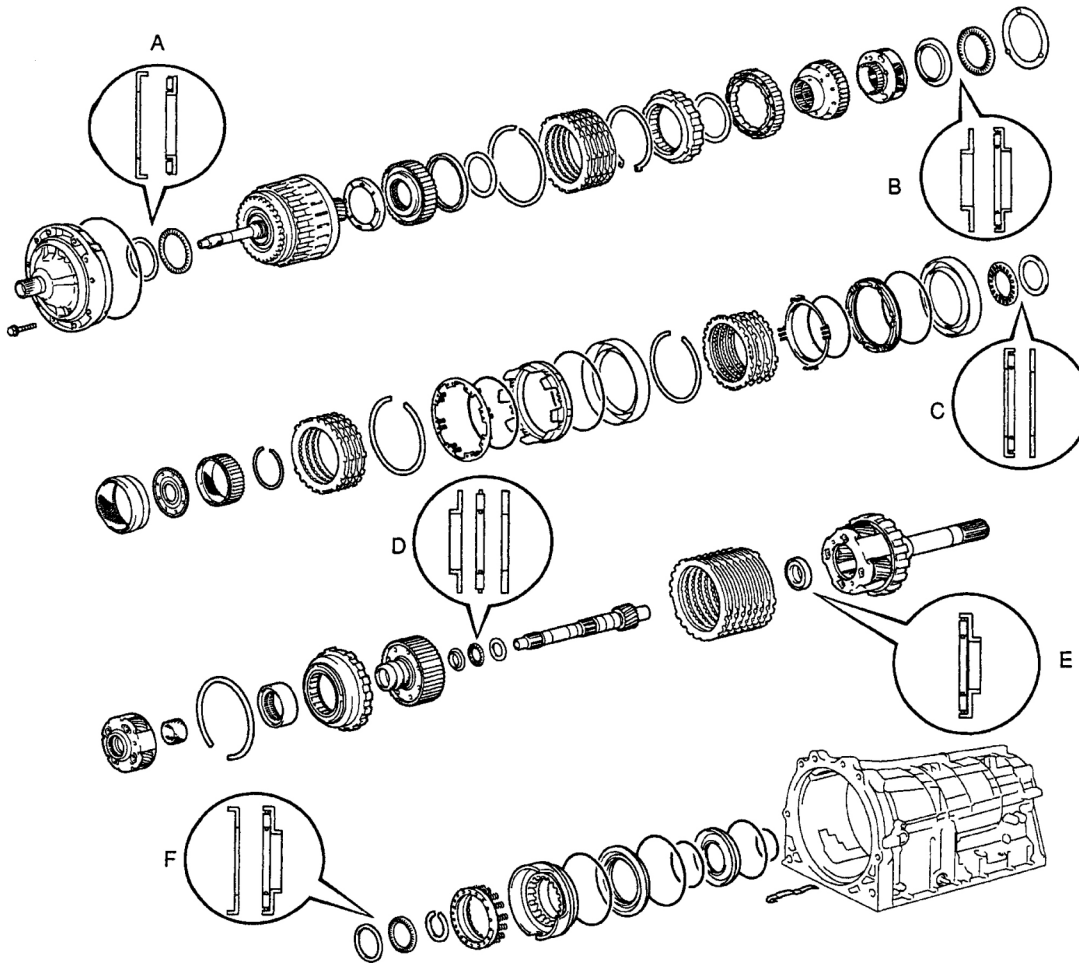
Fig. 89: Measuring Dimension "A" Between Transmission & Drive Plate (GX 470 & 4Runner)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00182304

Fig. 90: Measuring Distance "B" Between Torque Converter & Transmission Housing (GX 470 & 4Runner)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G00200215

Fig. 91: Identifying Thrust Bearing & Race Installation Positions
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

THRUST BEARING & RACE SPECIFICATIONS

Application ⁽¹⁾	Inner Diameter - In. (mm)	Outer Diameter - In. (mm)
"A"		
Front Race	2.898 (73.60)	4.016 (102.00)
Bearing	2.831 (71.90)	3.370 (85.60)
"B"		
Front Race	1.496 (38.00)	2.244 (57.00)
Bearing	1.709 (43.40)	2.295 (58.30)
"C"		
Bearing	2.193 (55.70)	3.008 (76.40)
Rear Race	2.114 (53.70)	2.913 (74.00)
"D"		

2003 Toyota 4Runner SR5

2003-06 AUTOMATIC TRANSMISSIONS A750E & A750F Overhaul

Front Race	1.315 (33.40)	1.929 (49.00)
Bearing	1.264 (32.10)	1.943 (49.35)
Rear Race	1.264 (32.10)	1.929 (49.00)
"E"		
Bearing	.846 (21.50)	1.606 (40.80)
"F"		
Front Race	1.909 (48.50)	2.468 (62.70)
Bearing	1.807 (45.90)	2.520 (64.00)
(1) For bearing and race locations, see Fig. 91 .		

TORQUE SPECIFICATIONS**TORQUE SPECIFICATIONS**

Application	Ft. Lbs. (N.m)
Case Adapter Bolt	25 (34)
Cooler Union	21 (29)
Drain Plug	21 (29)
Drive Plate Bolt	⁽¹⁾ 36 (49)
Extension Housing Bolt	25 (34)
Oil Pump-To-Case Bolt	15 (21)
Torque Converter-To-Drive Plate Bolt	35 (48)
Transmission Control Shaft Lever Nut	12 (16)
Transmission Housing Bolt	
14-mm	25 (34)
17-mm	42 (57)
INCH Lbs. (N.m)	
Breather Tube Bolt	48 (5.4)
Lock Plate Bolt	57 (6.4)
Oil Pan Bolt	39 (4.4)
Oil Pump-To-Stator Shaft Bolt	106 (12)
Oil Strainer Bolt	89 (10)
Parking Lock Pawl Bracket Bolt	65 (7.4)
Park/Neutral Position Switch	
Adjusting Bolt	115 (13)
Retaining Nut	61 (6.9)
Revolution Sensor Bolt	48 (5.4)
Shift Solenoid-To-Valve Body Bolt	
SR & S1	57 (64)
S2	89 (10)
Valve Body-To-Case Bolt	97 (11)
Wire Clamp Bolt	

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12-mm	89 (10)
36-mm	97 (11)
Wiring Harness Bolt	48 (5.4)

(1) Tighten each bolt in a crisscross pattern an additional 90 degrees.

TRANSMISSION SPECIFICATIONS**TRANSMISSION SPECIFICATIONS**

Application	In. (mm)
Bushing Maximum Diameter	
Forward Clutch Drum	1.028 (26.11)
Front Planetary Gear	2.263 (57.48)
Oil Pump Body	1.504 (38.19)
Planetary Ring Gear Flange	1.267 (32.18)
Rear Planetary Gear	.790 (20.08)
Reverse Clutch Hub	1.413 (35.89)
Stator Shaft	
Front Side	.850 (21.58)
Rear Side	1.263 (32.08)
Center Planetary Pinion Gear Clearance	
Standard	.005-.027 (.12-.68)
Maximum	.029 (.73)
Clutch Pack Clearance	
Direct Clutch	.020-.031 (.50-.80)
Forward Clutch	.024-.035 (.60-.90)
Reverse Clutch	.020-.031 (.50-.80)
1st & Reverse Brake	.031-.043 (.80-1.10)
No. 3 Brake Piston Stroke	.017-.028 (.42-.72)
Front & Rear Planetary Pinion Gear Clearance	
Standard	.008-.024 (.20-.61)
Maximum	.026 (.65)
Intermediate Shaft Runout	.003 (.08)
Output Shaft Bearing Clearance	.002-.013 (.05-.33)

CLUTCH DISC & PLATE QUANTITY

Component	Disc Quantity	Plate Quantity
Direct Clutch	5	6
Forward Clutch	6	5
Reverse Clutch	5	4
No. 1 Brake	3	3
No. 2 Brake	3	3

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No. 3 Brake	4	4
No. 4 Brake	8	7