

2000 Chevrolet Prizm

2000 AUTOMATIC TRANSMISSIONS Toyota A-240 "E" Series Overhaul

2000 AUTOMATIC TRANSMISSIONS

Toyota A-240 "E" Series Overhaul

APPLICATION

CAUTION: Vehicles are equipped with a Supplemental Restraint System (SRS). When servicing vehicle, use care to avoid accidental air bag deployment. All SRS electrical connections and wiring harness are covered by Yellow insulation. SRS-related components are located in steering column, center console, instrument panel and lower panel on instrument panel. **DO NOT** use electrical test equipment on these circuits. If necessary, deactivate SRS before servicing components. See **AIR BAG DEACTIVATION PROCEDURES** article in **GENERAL INFORMATION**.

AUTOMATIC TRANSAXLE APPLICATIONS

Application	Transaxle Model
Chevrolet Prizm (LSi)	A-245E
Toyota	
Corolla 1.8L	A-245E
RAV4 (2WD)	A-247E

NOTE: Chevrolet Prizm and other imported vehicles sold by domestic manufacturers are normally covered in 2000 MITCHELL(R) TRANSMISSION SERVICE & REPAIR for DOMESTIC CARS, LIGHT TRUCKS & VANS. The Chevrolet Prizm is covered in this article due to limited use of this model transaxle in domestic vehicles.

IDENTIFICATION

Transaxles may be identified by using the Vehicle Identification Number (VIN). VIN locations are on top left corner of instrument panel or on driver's door post. On Chevrolet Prizm, transaxle identification number is located on transaxle, above transaxle rear cover.

GEAR RATIOS

TRANSAXLE GEAR RATIOS

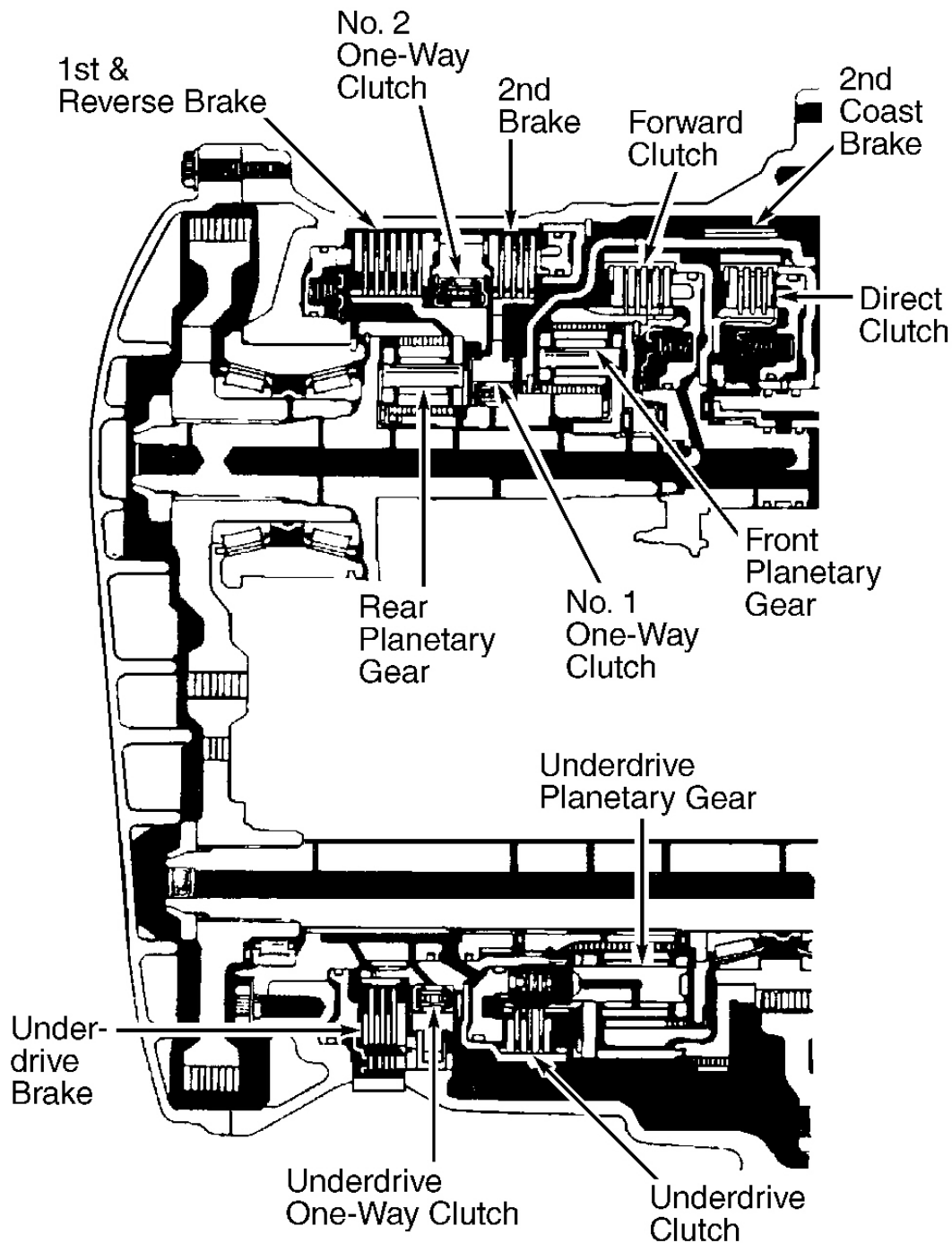
Gear Range	Gear Ratio
1st	3.643:1
2nd	2.008:1
3rd	1.296:1
OD	0.892:1
Reverse	2.977:1

DESCRIPTION & OPERATION

Transaxles have 4 forward speeds and reverse. Transaxle assemblies consists of a lock-up torque converter clutch, oil pump, valve body assembly, forward clutch, direct clutch, underdrive clutch, differential, 3 planetary gear sets and 3 one-way clutches. See **Fig. 1** .

The A-240E series transaxle shifting and torque converter clutch lock-up are controlled by an Engine Control Module (ECM) on Toyota models or a Powertrain Control Module (PCM) on Chevrolet Prizm.

To minimize possibility of incorrect operation of vehicle transaxle, a shift lock mechanism has also been added. For more information on Toyota shift lock and key lock system, see TOYOTA & LEXUS SHIFT LOCK SYSTEMS article. For more information on Chevrolet Prizm shift lock and key lock system, see GENERAL MOTORS SHIFT INTERLOCK SYSTEMS - CARS article.



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Fig. 1: Identifying Transaxle Internal Component Locations
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

LUBRICATION

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RECOMMENDED FLUID

Transaxle uses DEXRON III transmission fluid.

FLUID CAPACITIES

FLUID CAPACITIES

Application	Capacity - Qts. (L)
Chevrolet Prizm (LSi)	
Drain & Refill	3.3 (3.1)
Dry Refill	5.2 (4.9)
Toyota	
Corolla	
Drain & Refill	3.5 (3.3)
Dry Refill	8.0 (7.6)
RAV4 (2WD)	
Drain & Refill	3.5 (3.3)
Dry Refill	8.5 (8.0)

ON-VEHICLE SERVICE

The following components can be serviced without transaxle removal:

- Drive Axles
- Speed Sensor & Driven Gear
- Throttle Valve Cable
- Valve Body Assembly
- Park/Neutral Position Switch

For removal and installation of components, see **REMOVAL & INSTALLATION** .

TROUBLE SHOOTING

PRELIMINARY INSPECTION

Automatic transaxle malfunctions can be caused by either engine or transaxle. Isolate malfunction to engine or transaxle before proceeding with trouble shooting. Prior to trouble shooting, check and adjust throttle cable, shift linkage, and park/neutral position switch. Ensure idle speed RPM is adjusted to specification. Ensure fluid level is correct. Check tires for correct inflation. Battery must be fully charged for accurate testing. To determine if a fault is electrical, retrieve stored Diagnostic Trouble Codes (DTC). See **RETRIEVING DIAGNOSTIC TROUBLE CODES** under **DIAGNOSIS & TESTING** in **TOYOTA A-240 "E" SERIES ELECTRONIC CONTROLS** article. If no DTCs are stored and visual checks are okay, diagnose by symptom. See **SYMPTOM DIAGNOSIS** .

SYMPTOM DIAGNOSIS**Fluid Discolored Or Smells Burnt**

Fluid contaminated. Torque converter faulty. Transaxle faulty.

Vehicle Does Not Move In Any Forward Gear Or Reverse

Check manual valve, parking lock pawl, primary regulator valve, underdrive (U/D) one-way clutch, U/D clutch, U/D brake, front planetary gear, rear planetary gear, U/D planetary gear and torque converter.

Vehicle Does Not Move In Any Forward Gear

Check forward clutch, No. 2 one-way clutch, 1st and reverse brake, 2nd coast brake, 2nd brake and direct clutch.

Vehicle Does Not Move In Reverse Gear

Check 1-2 shift valve, 2-3 shift valve, 2nd coast brake, front planetary gear, rear planetary gear, direct clutch, U/D clutch and 1st and reverse brake.

No 1-2 &/Or 2-3 Upshift

Check Throttle Position (TP) sensor circuit, No. 1 and No. 2 shift solenoid circuit, Vehicle Speed Sensor (VSS) circuit, ECM/PCM, 1-2 shift valve, 2-3 shift valve, 2nd brake, direct clutch and No. 1 one-way clutch.

No 3-O/D Upshift

Check O/D switch and O/D OFF indicator switch circuit, O/D cancel signal circuit, No. 1 and No. 2 shift solenoid circuit, VSS circuit, Engine Coolant Temperature (ECT) sensor circuit, ECM/PCM, 3-4 shift valve and U/D brake.

No O/D-3 Downshift

Check No. 1 and No. 2 shift solenoid valve, VSS circuit, O/D cancel signal circuit, ECM/PCM circuit and 3-4 shift valve.

No 3-2 &/Or 2-1 Downshift

Check No. 1 and No. 2 shift solenoid valve, VSS circuit, TP sensor circuit, ECM/PCM circuit, 2-3 shift valve, 1-2 shift valve and 2nd coast brake.

No Torque Converter Lock-Up

Check shift solenoid valve SL circuit, TP sensor circuit, VSS circuit, O/D cancel circuit, brakelight circuit, ECT sensor circuit, ECM/PCM circuit, lock-up relay valve and torque converter clutch.

Torque Converter Lock-Up Will Not Release

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Check shift solenoid valve SL circuit, TP sensor circuit, IDL switch circuit, brakelight circuit, ECM/PCM circuit, lock-up relay valve and torque converter clutch.

Shift Speeds Too High Or Too Low

Check TP sensor circuit, VSS circuit, shift solenoid valve SL circuit, O/D cancel signal circuit, pattern select switch circuit and ECM/PCM.

Harsh Engagement Neutral To Reverse

Check direct clutch accumulator, direct clutch, throttle valve and, 1st and reverse brake.

Harsh Engagement Neutral To Drive

Check forward clutch accumulator, throttle valve and forward clutch.

No Engine Braking In Low

Check low coast modulator valve and, 1st and reverse brake.

No Engine Braking In 2nd

Check 2nd coast modulator valve and 2nd coast brake.

CLUTCH & BRAKE APPLICATIONS

CLUTCH & BRAKE APPLICATIONS

Selector Lever Position	Elements In Use
"D" (Drive)	
1st Gear	Forward Clutch, No. 2 One-Way Clutch, Underdrive One-Way Clutch & Underdrive Brake
2nd Gear	Forward Clutch, No. 1 One-Way Clutch, 2nd Brake, Underdrive Brake & Underdrive One-Way Clutch
3rd Gear	Direct Clutch, Forward Clutch, 2nd Brake, Underdrive Brake & Underdrive One-Way Clutch
Overdrive	Direct Clutch, Forward Clutch, 2nd Brake & Underdrive Clutch
"2" (2nd)	
1st Gear	Forward Clutch, No. 2 One-Way Clutch, Underdrive One-Way Clutch & Underdrive Brake
2nd Gear	Forward Clutch, 2nd Brake, No. 1 One-Way Clutch, Underdrive Brake, Underdrive One-Way Clutch & 2nd Coast Brake
3rd Gear ⁽¹⁾	Direct Clutch, Forward Clutch, 2nd Brake, Underdrive Brake & Underdrive One-Way Clutch
"L" (Low)	

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1st Gear	Forward Clutch, Underdrive Brake, No. 2 One-Way Clutch, Underdrive One-Way Clutch, & 1st & Reverse Brake
2nd Gear ⁽²⁾	Forward Clutch, 2nd Coast Brake, 2nd Brake, No. 1 One-Way Clutch, Underdrive One-Way Clutch & Underdrive Brake
"R" (Reverse)	Direct Clutch, Underdrive Brake, & 1st & Reverse Brake
"N" (Neutral)	Underdrive Brake
"P" (Park)	Underdrive Brake
(1) Downshift only in 3rd gear for "2" position.	
(2) Downshift only in 2nd gear for "L" position. Upshift does not occur.	

PERFORMANCE TESTS

ROAD TEST

NOTE: Ensure transaxle is at normal operating temperature. There is no OD upshift or torque converter lock-up when fluid temperature is less than 140°F (60°C).

"D" Range Test

- Shift into "D" range. Hold accelerator pedal constant at full throttle. Check 1-2, 2-3, and 3-OD lock-up and upshift points. See appropriate SHIFT SPEED SPECIFICATIONS table under **SHIFT SPEED SPECIFICATIONS**. If shift points are not as specified, see diagnose by symptom. See **SYMPTOM DIAGNOSIS** under TROUBLE SHOOTING.

NOTE: There is no torque converter clutch lock-up when vehicle speed is 6 MPH less than cruise control set speed. Ensure cruise control is off during road test.

- Use procedure outlined in step 1 to check for shock and slip between 1-2, 2-3, and 3-OD upshifts. If shock is harsh, line pressure may be too high. Check accumulator or check ball.
- Run vehicle in "D" range lock-up or overdrive gear. Check for abnormal noise and vibration.

NOTE: Check for cause of abnormal noise and vibration must be made with extreme care as problem could be due to an unbalanced drive axle, differential, tire, torque converter, etc.

- While running in "D" range, confirm correct kickdown vehicle speed limits for 2-1, 3-2, OD-3 shift points. Check for abnormal shock and slip at kickdown.
- Check lock-up function. Drive vehicle in OD gear of "D" range with lock-up on. Hold vehicle speed steady at about 47 MPH. Lightly depress accelerator pedal. Ensure engine RPM does not change abruptly. Large increase in engine RPM indicates lock-up function is faulty.

"2" Range Test

1. Shift to "2" range. Drive with accelerator pedal held constantly at full throttle. Ensure 1-2 upshift points take place and are operating properly. See appropriate SHIFT SPEED SPECIFICATIONS table under **SHIFT SPEED SPECIFICATIONS** . If shift points are not as specified, see diagnose by symptom. See **SYMPTOM DIAGNOSIS** under TROUBLE SHOOTING.

NOTE: In "2" range there will be no lock-up to 2nd gear.

2. While driving in "2" range, 2nd gear, release accelerator pedal and check engine braking effect. If there is no engine braking effect, check for faulty 2nd coast brake, or sticking or binding 2nd coast modulator valve in valve body. Check for abnormal noise and shock at acceleration and deceleration.

"L" Range Test

While running in "L" range, ensure there is no upshift to 2nd gear. While running in "L" range, release accelerator pedal. If there is no engine braking effect, check for faulty 1st and reverse brake, or sticking or binding low coast modulator valve in valve body. Check for abnormal noise at acceleration and deceleration.

"R" Range Test

Shift into "R" range. Accelerate vehicle from a stop at full throttle. Ensure slipping does not occur. Check for faulty direct clutch, 1st and reverse brake, sticking or binding primary regulator valve, or restricted oil filter.

"P" Range Test

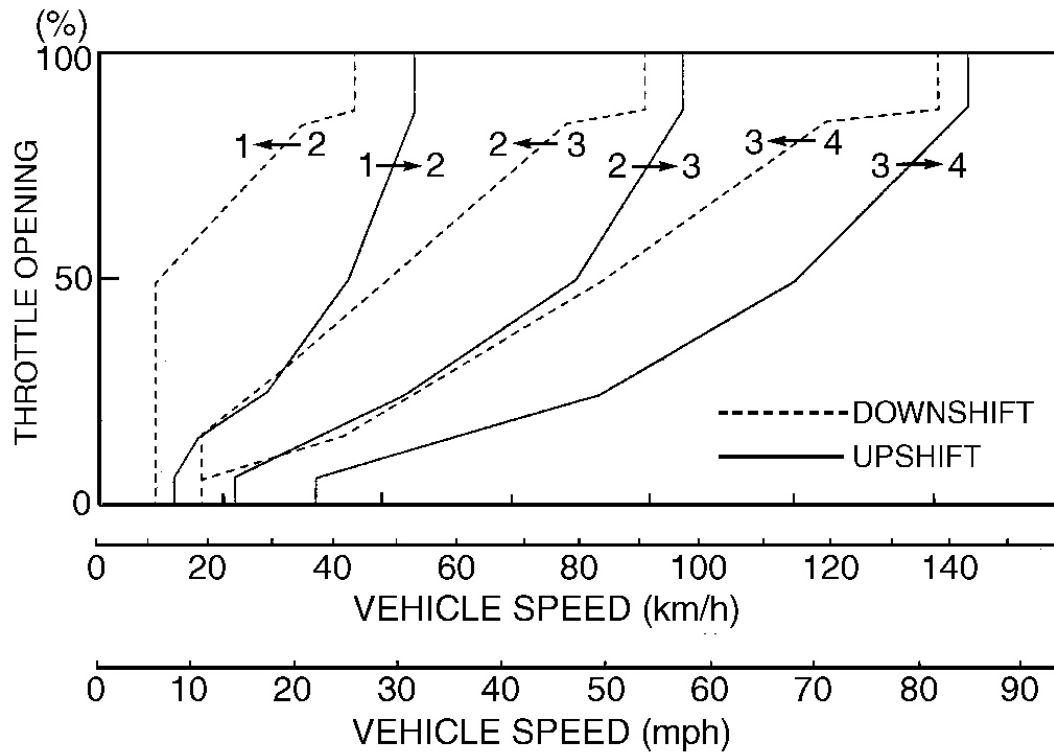
Stop vehicle on 5 degree or more gradient. Shift transaxle into "P" range. Release parking brake. Ensure parking pawl holds vehicle.

SHIFT SPEED SPECIFICATIONS

NOTE: For Chevrolet Prizm LSi (A-245E) shift speed specifications, See **Fig. 2** .

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Fig. 2: Chevrolet Prizm LSi (A-245E) Shift Speed Diagram
Courtesy of GENERAL MOTORS CORP.

SHIFT SPEED SPECIFICATIONS (COROLLA 1.8L - A-245E) ⁽¹⁾

Application	MPH
"D" Position	
1st-2nd	36-42
2nd-3rd	67-74
3rd-OD	92-101
3rd-OD ⁽²⁾	22-26
OD-3rd ⁽²⁾	11-14
OD-3rd	89-98
3rd-2nd	60-65
2nd-1st	25-29
"2" Position	
1st-2nd	34-39
3rd-2nd	56-62
2nd-1st	25-29
"L" Position (2nd-1st)	
	27-31

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- (1) Wide open throttle.
(2) Fully closed throttle.

LOCK-UP SPEED SPECIFICATIONS (COROLLA 1.8L - A-245E)⁽¹⁾

Application	MPH
"D" Position ⁽²⁾	
3rd Gear	
Lock-Up On	39-44
Lock-Up Off	34-39
OD	
Lock-Up On	39-43
Lock-Up Off	34-39
(1) With throttle valve open 5 percent.	
(2) There is no torque converter clutch lock-up in "2" or "L" position.	

SHIFT SPEED SPECIFICATIONS (RAV4 2WD - A-247E)⁽¹⁾

Application	MPH
"D" Position	
1st-2nd	36-42
2nd-3rd	68-74
3rd-OD	102-110
3rd-OD ⁽²⁾	22-25
OD-3rd ⁽²⁾	9-13
OD-3rd	91-99
3rd-2nd	64-69
2nd-1st	25-29
"2" Position	
1st-2nd	37-42
OD-3rd	N/A
3rd-2nd	68-73
2nd-1st	25-29
"L" Position	
3rd-2nd	N/A
2nd-1st	31-35
(1) Wide open throttle.	
(2) Fully closed throttle.	

LOCK-UP SPEED SPECIFICATIONS (RAV4 2WD - A-247E) ⁽¹⁾

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Application	MPH
"D" Position ⁽²⁾	
3rd Gear	
Lock-Up On	60-65
Lock-Up Off	53-58
OD	
Lock-Up On	45-50
Lock-Up Off	43-47
(1) With throttle valve opened 5 percent.	
(2) There is no torque converter clutch lock-up in "2" or "L" position.	

TORQUE CONVERTER**Stall Speed Test**

CAUTION: DO NOT maintain stall speed RPM for more than 5 seconds. Allow vehicle to idle in Neutral or Park for at least 2 minutes before performing next test.

1. Operate engine and transaxle at normal operating temperature. Connect scan tool to vehicle to monitor engine RPM. Apply parking brake and block front and rear wheels.
2. Start engine, apply service brakes and shift vehicle into "D" position. Depress accelerator to full throttle and note maximum RPM obtained. Repeat test in "R" position. For stall speeds, see **STALL SPEED SPECIFICATIONS** table. If stall speeds are not as specified, check for the following conditions:
 - If stall speed is same in both positions, but less than specified, check for insufficient engine output or defective stator one-way clutch.
 - If stall speed is high in "D" position, check for low line pressure, forward clutch slipping or defective No. 2 one-way clutch or underdrive one-way clutch.
 - If stall is speed high in "R" position, check for low line pressure, direct clutch, 1st and reverse brake or underdrive brake slipping.
 - If stall speed is high in both positions, check for low line pressure, improper fluid level or underdrive brake slipping.

STALL SPEED SPECIFICATIONS ⁽¹⁾

Application	Transaxle Model	RPM
Chevrolet Prizm	A-245E	2000-2500
Toyota		
Corolla 1.8L	A-245E	2350-2650
RAV4 2WD	A-247E	2220-2520
(1) If stall speed RPM is more than 600 RPM below specified value, torque converter may be faulty.		

TIME LAG TEST

CAUTION: Perform test with fluid at normal operating temperature of 122-176°F (50-80°C). Allow a one minute interval between tests. Record 3 measurements and use average value.

1. If selector lever is actuated with engine idling, a time lag will be noted before engagement shock can be felt. This test is used for checking condition of underdrive clutch, forward clutch, direct clutch and 1st and reverse brake. Apply parking brake and start engine. Ensure idle speed is set to specification. See **IDLE SPEED SPECIFICATIONS** table.
2. Move selector lever from "N" to "D" position. Measure time required for shock to be felt. Time lag must be less than 1.2 seconds. Repeat procedure shifting from "N" to "R" position. Time lag must be less than 1.5 seconds. If time lag is not as specified, check for the following conditions:
 - Excessive Time Lag From "N" To "D" Position: Low line pressure, defective forward clutch or No. 2 and underdrive one-way clutch.
 - Excessive Time Lag From "N" To "R" Position: Low line pressure, defective direct clutch, 1st and reverse brake or underdrive brake worn.

IDLE SPEED SPECIFICATIONS ⁽¹⁾

Application	Transaxle Model	RPM
Chevrolet Prizm	A-245E	700
Toyota		
Corolla 1.8L	A-245E	700
RAV4	A-247E	700
(1) Idle speed is computer controlled and is not adjustable.		

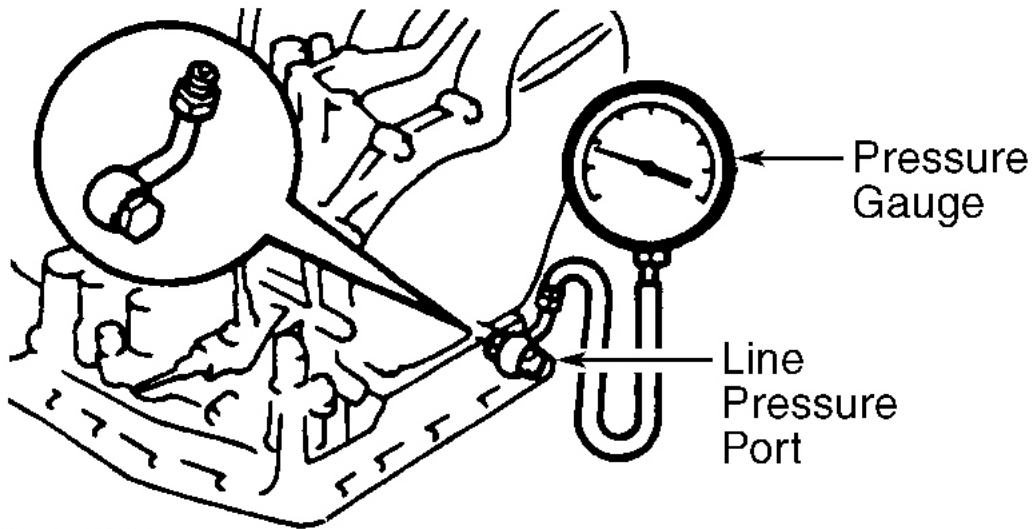
HYDRAULIC PRESSURE TESTS

CAUTION: Perform test at normal operating fluid temperature of 122-176°F (50-80°C).

Line Pressure Test

1. Remove appropriate transaxle plug and connect pressure gauge. See **Fig. 3** . Block all wheels. Apply parking brake. Start engine and shift into "D" position.
2. Apply service brakes. Note pressure readings at idle. Depress accelerator and note pressure readings at stall speed. Repeat test in "R" position. Compare pressure readings to those listed in appropriate table in **LINE PRESSURE SPECIFICATIONS** . If line pressure is not as specified, check for the following conditions:
 - If line pressure is high in both positions, check throttle cable adjustment, defective throttle valve or regulator valve.
 - If line pressure is low in both positions, check throttle cable adjustment, defective oil pump, throttle valve, regulator valve, underdrive brake or underdrive one-way clutch.
 - If line pressure is low in "D" position only, check "D" position circuit for leaking pressure, or defective forward clutch.

- If line pressure is low in "R" position only, check "R" position circuit for leaking pressure, defective direct clutch or 1st and reverse brake.



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Fig. 3: Checking Line Pressure

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

LINE PRESSURE SPECIFICATIONS**LINE PRESSURE SPECIFICATIONS (COROLLA - A-245E)**

Application	psi (kg/cm ²)
"D" Position	
Idle Speed	54-64 (3.8-4.5)
Stall Speed	142-165 (10.0-11.6)
"R" Position	
Idle Speed	87-104 (6.1-7.3)
Stall Speed	202-249 (14.2-17.5)

LINE PRESSURE SPECIFICATIONS (PRIZM - A-245E)

Application	psi (kg/cm ²)
"D" Position	
Idle Speed	53-61 (3.7-4.3)
Stall Speed	131-152 (9.2-10.7)
"R" Position	

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Idle Speed	78-102 (5.4-7.2)
Stall Speed	149-199 (10.5-14.0)

LINE PRESSURE SPECIFICATIONS (RAV4 2WD - A-247E)

Application	psi (kg/cm ²)
"D" Position	
Idle Speed	54-64 (3.8-4.5)
Stall Speed	142-165 (10.0-11.6)
"R" Position	
Idle Speed	87-104 (6.1-7.3)
Stall Speed	202-249 (14.2-17.5)

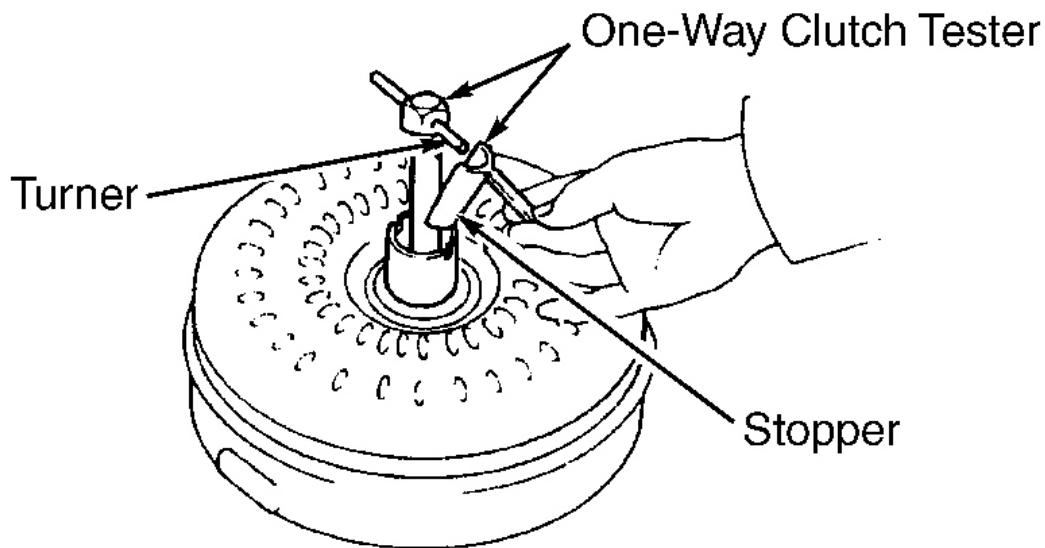
COMPONENT TESTS

TORQUE CONVERTER

NOTE: Torque converter is a sealed unit and must be serviced as complete assembly. Perform following tests to check converter condition. Torque converter and oil cooler lines must be thoroughly cleaned and flushed if transaxle fluid is contaminated.

One-Way Clutch Test

1. Install turner and stopper of One-Way Clutch Tester (09350-32014) in torque converter. See **Fig. 4** . 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 rotated counterclockwise, and turn freely when rotated clockwise. If necessary, clean converter and retest clutch. Replace converter if clutch does not test as described.



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Fig. 4: Checking Torque Converter One-Way Clutch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Drive Plate Runout Test

Measure drive plate runout. See **Fig. 5**. 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. On Corolla and Prizm, tighten bolts to 47 ft. lbs. (64 N.m). On RAV4, tighten bolts to 61 ft. lbs. (83 N.m).

Converter Sleeve Runout Test

1. Temporarily mount torque converter to drive plate. Mount a dial indicator with needle resting on converter sleeve. See **Fig. 6**. Rotate converter. If runout exceeds .012" (.30 mm), ensure converter is properly mounted to drive plate.
2. If converter is properly mounted and runout exceeds specification, replace torque converter. Mark position of converter on drive plate to ensure correct installation. Remove converter from drive plate.

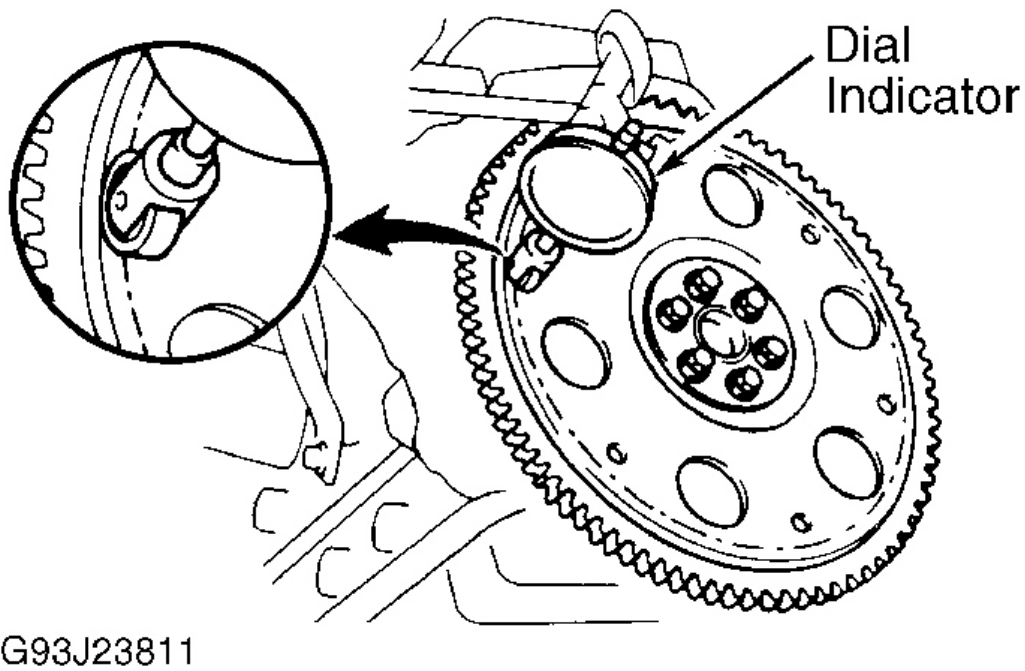


Fig. 5: Checking Drive Plate Runout

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

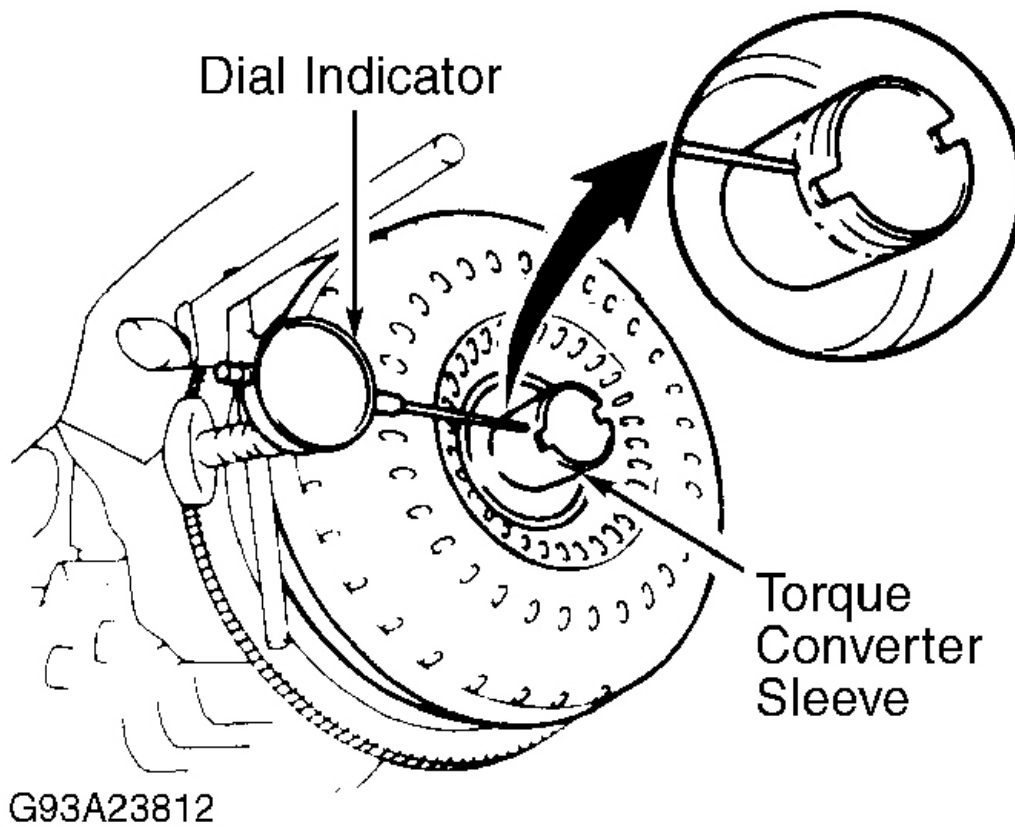


Fig. 6: Checking Converter Sleeve Runout

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

REMOVAL & INSTALLATION

TRANSAXLE

NOTE: For transaxle removal and installation procedure, see appropriate **AUTOMATIC TRANSMISSION REMOVAL** article in **TRANSMISSION SERVICING**.

DRIVE AXLES

See appropriate article in **DRIVE AXLES**.

SPEED SENSOR & DRIVEN GEAR

Removal & Installation

Remove engine cover (if equipped). Disconnect speed sensor electrical connector. Remove retaining plate and pull out speed sensor. Remove "O" ring from speed sensor. Remove clip and speedometer driven gear from speed sensor. To install, reverse removal procedure. Install NEW "O" ring on speed sensor. Tighten bolt to 48 INCH lbs. (5.4 N.m).

THROTTLE CABLE

Removal

Disconnect throttle cable from throttle linkage. Disconnect transaxle control cable from manual shift lever. Remove manual shift lever. Remove park/neutral position switch. Remove valve body assembly. See **VALVE BODY ASSEMBLY** under REMOVAL & INSTALLATION. Remove throttle cable retaining bolt. Pull throttle cable from transaxle.

Installation

1. Install throttle cable in transaxle case. Ensure cable is fully seated. Install retaining bolt. Install valve body assembly. On NEW throttle cables, stopper must be staked on inner cable. Bend cable in about 7.87" (200 mm) radius.
2. Pull inner cable lightly, until a slight resistance is felt, and hold in place. Stake stopper on inner cable, leaving a .031-.059" (.80-1.49 mm) gap between cable housing and stopper. See **Fig. 7**.
3. Adjust throttle cable and park/neutral position switch (if necessary). See appropriate AUTOMATIC TRANSMISSION SERVICING article in TRANSMISSION SERVICING. Install manual shift lever. Install transaxle control cable. Test drive vehicle.

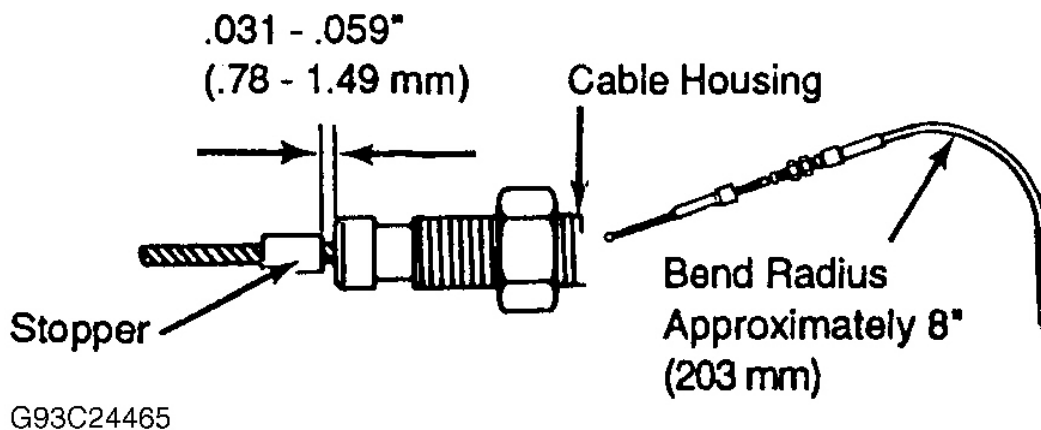


Fig. 7: Locating Throttle Cable Stopper

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

VALVE BODY ASSEMBLY

CAUTION: Note valve body assembly bolts length and location. Proper length bolts must be installed in correct location to prevent case damage.

Removal

1. Clean exterior of transaxle oil pan. Remove drain plug and drain transaxle. Remove oil pan and gasket. Remove oil strainer (filter) and apply tube bracket. Note location of oil tubes. Using large screwdriver, carefully remove oil tubes.
2. Remove manual detent spring. Disconnect solenoid connector(s). Remove valve body assembly bolts. Note bolt length and location. See **Fig. 8** . Remove throttle cable. Disconnect manual valve connecting rod. Remove valve body assembly.

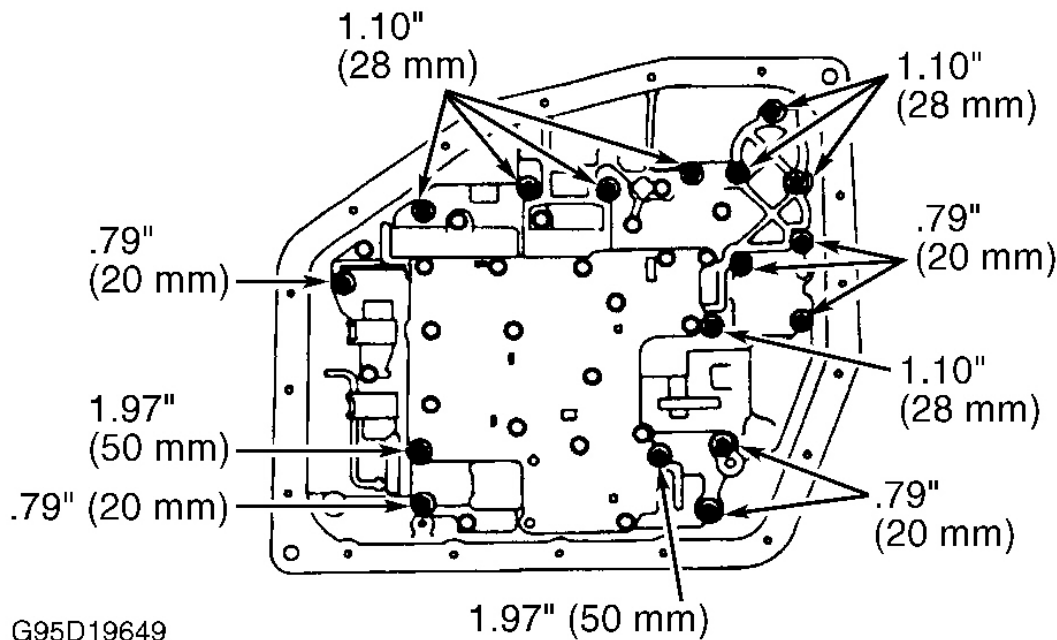


Fig. 8: Valve Body Assembly Bolts

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

Installation

1. Hold valve body cam downward and install throttle cable in slot. Install manual valve connecting rod. Install valve body assembly. Ensure kickdown switch wire is not pinched under valve body assembly.
2. Install valve body assembly bolts finger tight. Ensure proper length bolts are installed in correct location. See **Fig. 8** . Tighten bolts to 89 INCH lbs. (10 N.m). Connect solenoid connector(s). Install detent spring and tighten bolt to 89 INCH lbs. (10 N.m). Ensure manual valve lever contacts center of roller on detent spring. Using a plastic hammer, tap oil tubes into place.
3. Install oil tube clamp and bolt and tighten bolt to 89 INCH lbs. (10 N.m). Install oil strainer. Install

magnet(s) in oil pan. Ensure magnet(s) does not interfere with oil tubes. Install oil pan and gasket. Tighten oil pan bolts to specification. See **TORQUE SPECIFICATIONS** . Install drain plug and tighten to 13 ft. lbs. (17 N.m). Fill transaxle with fluid and check for leaks.

TRANSAXLE DISASSEMBLY

1. Remove oil cooler pipes, breather hose, manual shift lever and park/neutral position switch. Remove filler tube and dipstick. Remove throttle cable retaining bolt. Remove solenoid harness connector retaining bolt.
2. Remove oil pan and gasket. Remove magnet(s) from oil pan. Remove oil strainer (filter). Remove manual detent spring. Disconnect solenoid connectors. Remove valve body assembly. See **VALVE BODY ASSEMBLY** under REMOVAL & INSTALLATION. Remove throttle cable and solenoid sub-harness from transaxle case. Remove check ball body and spring, next to 2nd brake accumulator. Remove 2nd brake apply gasket. Remove 2nd brake drum seal. See **Fig. 9** and **Fig. 10** .
3. Apply 14 psi (1 kg/cm²) of compressed air to oil passage to remove underdrive clutch accumulator piston and spring. See **Fig. 11** . Apply 14 psi (1 kg/cm²) of compressed air to oil passage at base of piston housing to remove forward clutch accumulator piston and springs. Apply 14 psi (1 kg/cm²) of compressed air to oil passage to remove direct clutch accumulator piston and spring. See **Fig. 12** .
4. Apply 14 psi (1 kg/cm²) of compressed air to oil passage to remove 2nd brake accumulator piston and spring. See **Fig. 13** .

NOTE: If manual shift linkage is damaged or needs to be disassembled, see **MANUAL SHIFT LINKAGE** under **COMPONENT DISASSEMBLY & REASSEMBLY**.

5. Remove 2nd coast brake band guide. Remove transaxle housing bolts. Remove transaxle housing. Remove differential assembly. Remove oil tube bracket and tubes. Remove apply gasket. Unbolt and remove oil pump assembly.
6. Apply mark to 2nd coast brake servo apply piston rod where it meets case. Apply air 57-114 psi (4-8 kg/cm²) and measure piston rod travel (stroke). See **Fig. 14** . Piston rod travel should be .059-.138" (1.50-3.50 mm). If rod travel is not within specification, inspect band further during disassembly.
7. Remove 2nd coast brake piston snap ring. Apply 14 psi (1 kg/cm²) of compressed air to oil passage to remove 2nd coast brake cover. Remove 2nd coast brake piston and spring. See **Fig. 15** .
8. Remove direct clutch with forward clutch from transaxle case. Remove direct clutch from forward clutch. Remove thrust washer, bearings and races from forward clutch. See **Fig. 16** .
9. Pull 2nd coast brake band pin and remove. Remove 2nd coast brake band. Remove front planetary ring gear. Remove race and bearing from ring gear. See **Fig. 16** .
10. Remove front planetary gear. Remove bearings and races from both sides of planetary gear. Remove sun gear, sun gear input drum, thrust washer, 2nd brake hub and No. 1 one-way clutch. Using compressed air, confirm 2nd brake piston operates smoothly. See **Fig. 17** . Remove 2nd coast brake band guide.
11. Remove 2nd brake drum retaining snap ring. Remove 2nd brake drum. Remove thrust washer and 2nd brake piston return spring. Remove plates, discs and flange. Note number and location of components for reassembly reference. Remove No. 2 one-way clutch retaining snap ring. Remove No. 2 one-way clutch and rear planetary gear. See **Fig. 16** .

12. Remove thrust washers from both sides of planetary gear. Remove rear planetary ring gear with bearing and races. Using feeler gauge, measure 1st and reverse pack clearance. See **Fig. 18** . Clearance should be .047-.093" (1.19-2.35 mm) for A-245E models. Clearance should be .047-.087" (1.19-2.25 mm) for A-247E models.
13. Remove flange retaining snap ring. Remove flange, plates and discs. Note number and location of components for reassembly reference. Remove transaxle rear cover bolts. Tap rear cover using a plastic hammer. Remove cover. Using chisel, release staked area of intermediate shaft lock nut.
14. Secure counterdriven gear with appropriate holder. Remove intermediate shaft lock nut. Remove intermediate shaft. Press out counterdrive gear. Using chisel, release staked area of countershaft lock nuts. Remove both lock nuts.
15. Using appropriate puller, remove counterdriven gear with thrust bearing. Remove countershaft assembly. Remove thrust bearing and race from countershaft. Remove underdrive clutch drum and anti-rattle clip. Using compressed air, confirm underdrive brake piston operates smoothly. See **Fig. 19** . Remove oil seal rings. Using appropriate press and adapter, carefully remove underdrive brake snap ring.
16. Remove flange, plates and discs. Note number and location of components for reassembly reference. Remove piston return spring. Using compressed air, remove underdrive brake piston. See **Fig. 19** . Using appropriate compressor, gradually compress spring assembly and remove snap ring. See **Fig. 20** .
17. Remove return spring assembly. Apply compressed air to oil passage in transaxle case and remove 1st and reverse brake piston. See **Fig. 21** . If piston does not pop out, remove using needle-nose pliers.
18. Remove parking lock pawl stopper plate, torsion spring and spring guide. Remove pawl shaft clamp, shaft and lock pawl. Remove parking lock sleeve and cam guide bracket. See **Fig. 22** . Remove underdrive brake accumulator piston cover and gasket. Remove accumulator piston and spring.
19. Using appropriate puller, remove bearing from transaxle housing. Remove 3 bolts and oil pipe clamps inside transaxle housing. Remove 2 oil pipes. Remove bearing retainer bolt and retainer. Using appropriate puller, remove bearing from transaxle housing.

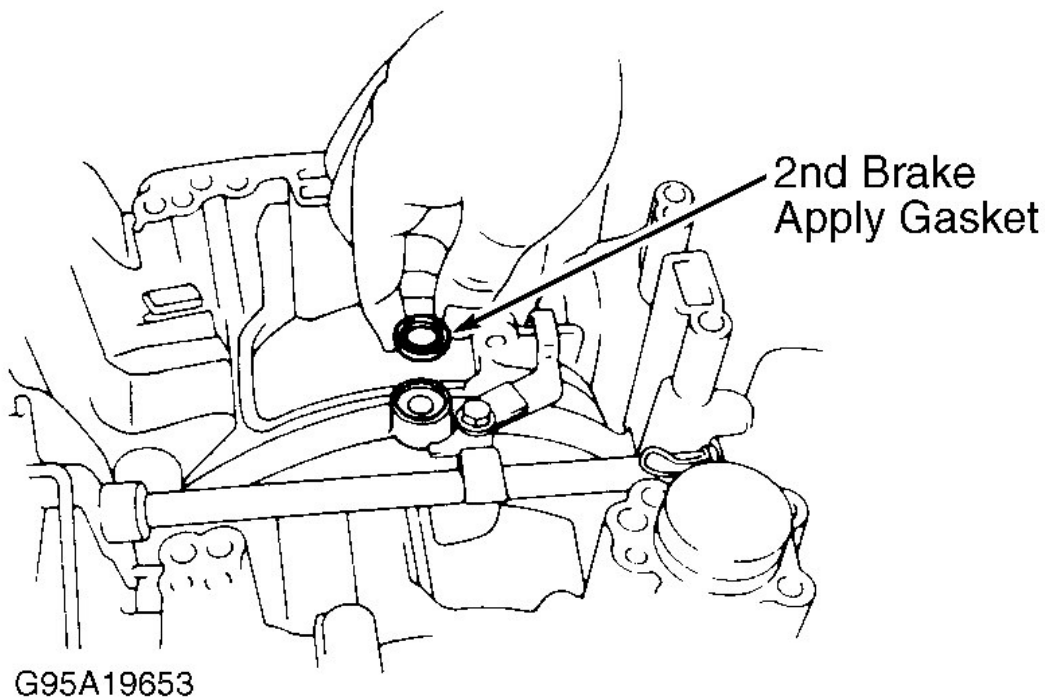


Fig. 9: Removing 2nd Brake Apply Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

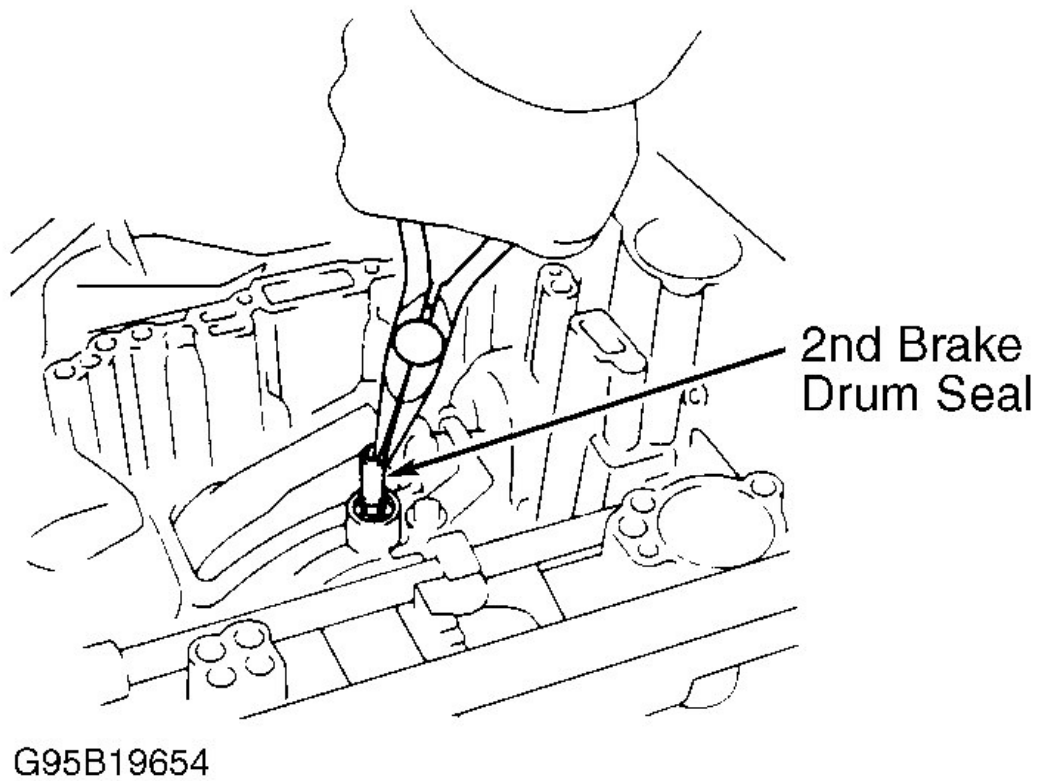


Fig. 10: Removing 2nd Brake Drum Seal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

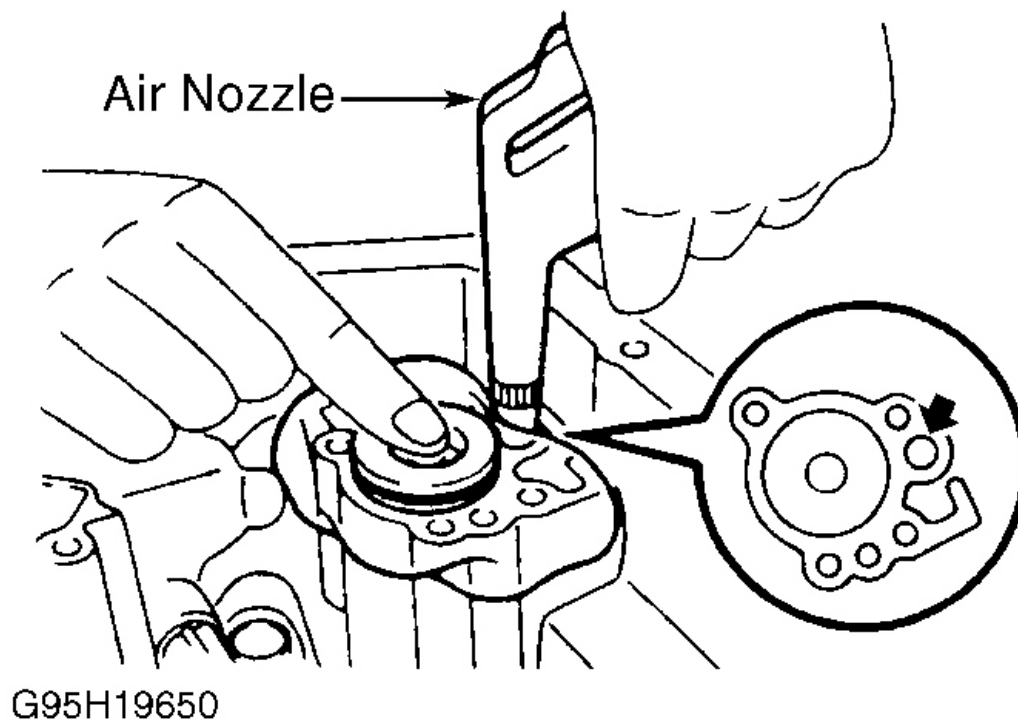


Fig. 11: Removing Underdrive Clutch Accumulator Piston & Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

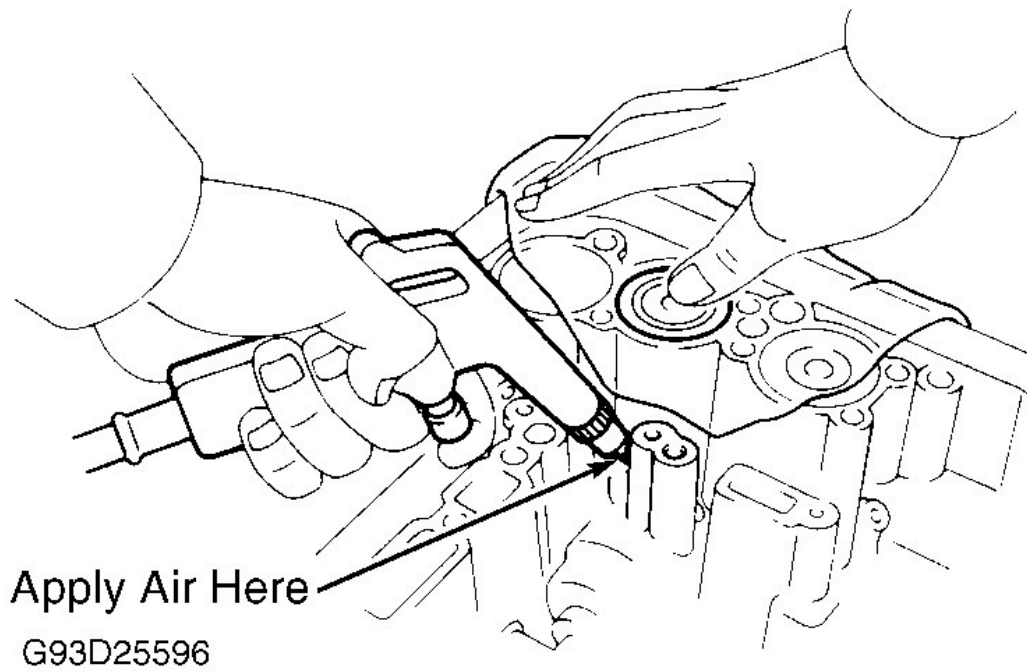


Fig. 12: Removing Direct Clutch Accumulator Piston & Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

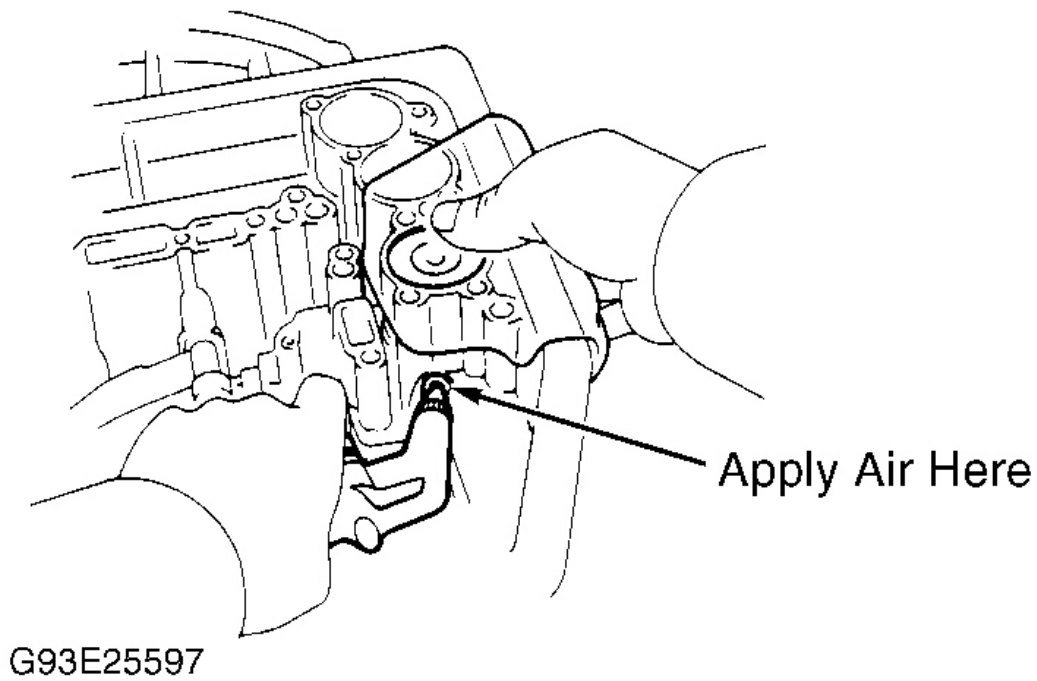
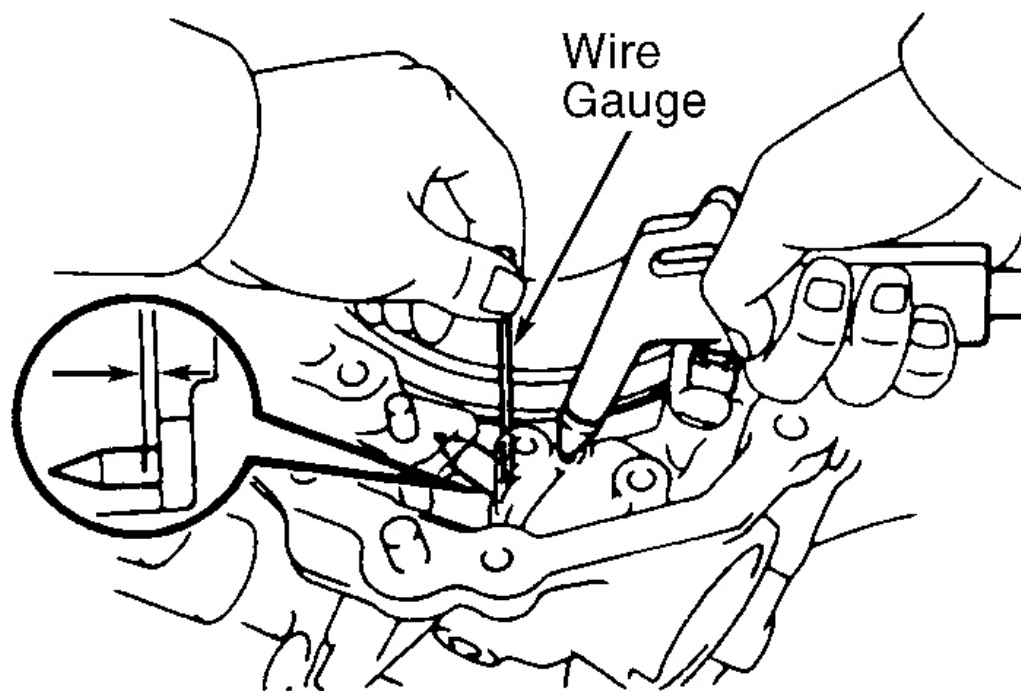


Fig. 13: Removing 2nd Brake Accumulator Piston & Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 14: Checking 2nd Coast Brake Piston Stroke
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

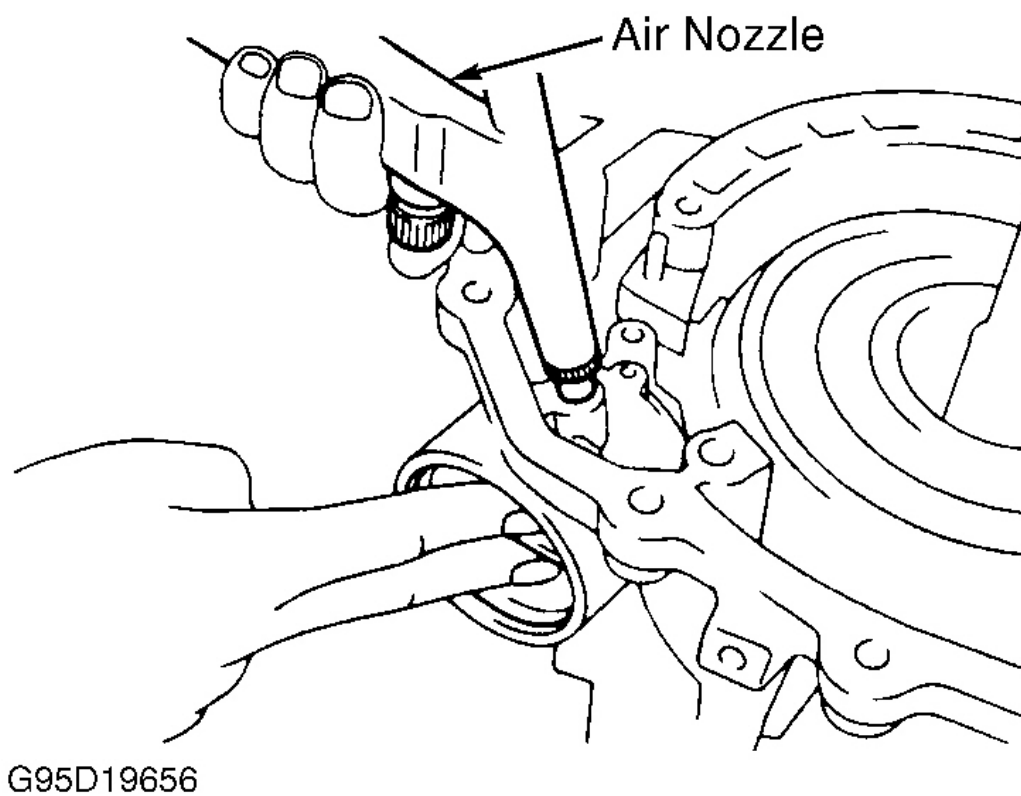
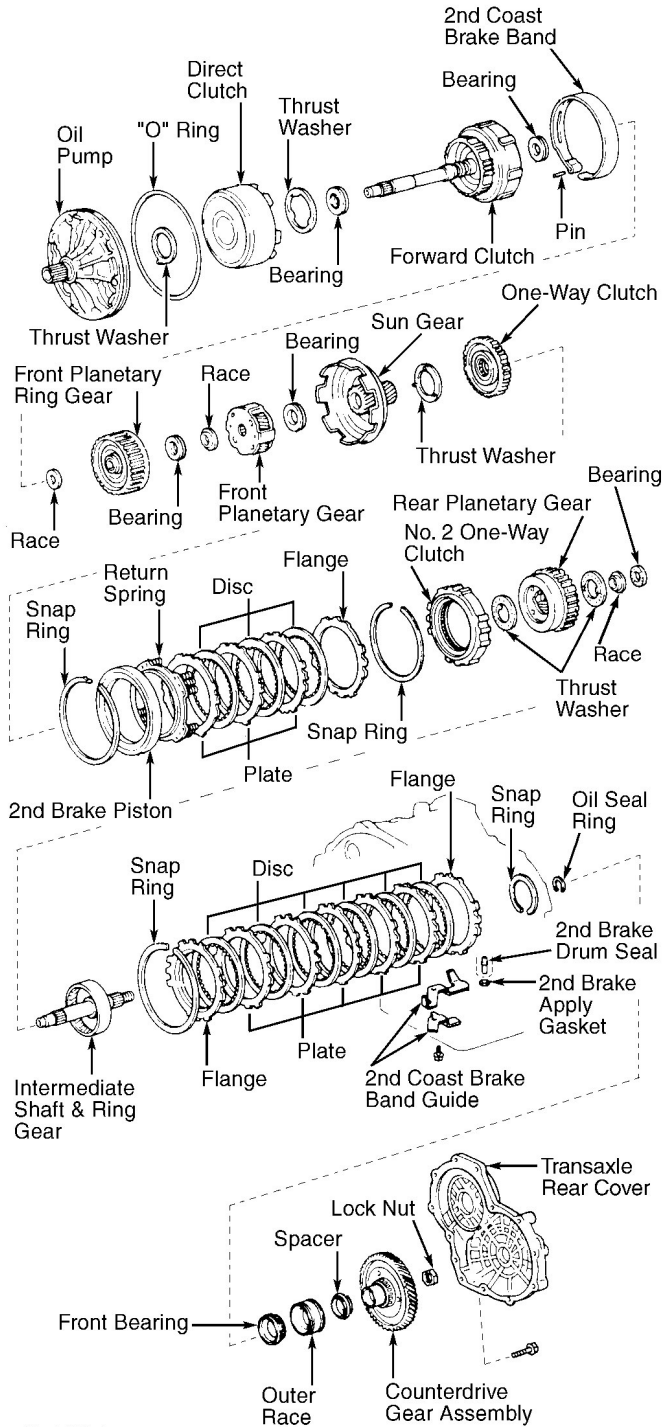


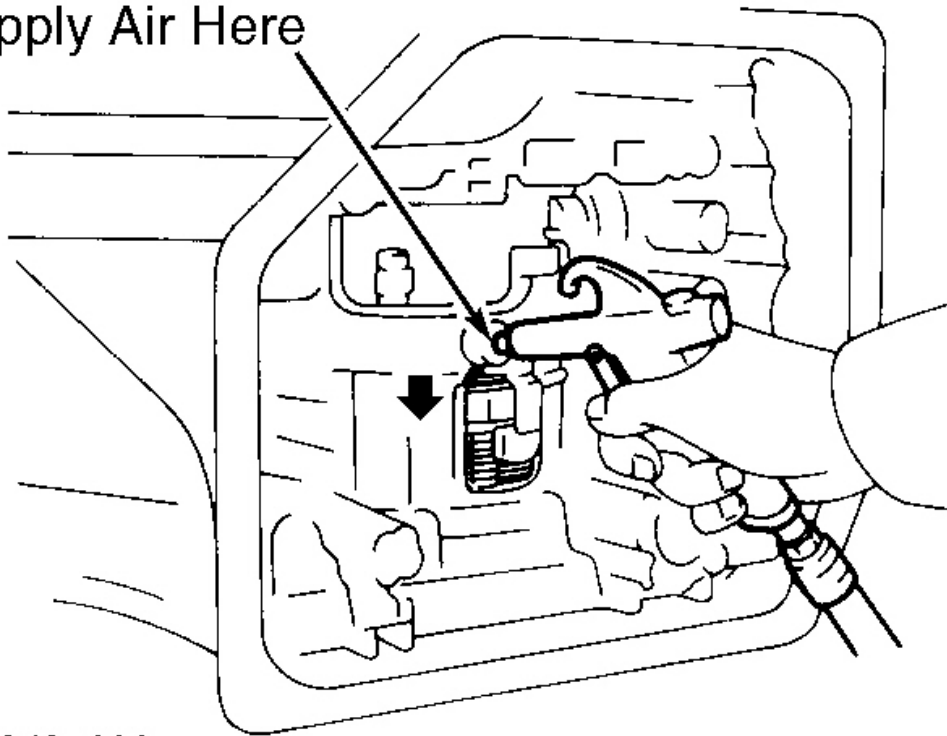
Fig. 15: Removing 2nd Coast Brake Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 16: Exploded View Of Transaxle Case Internal Components
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Apply Air Here



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Fig. 17: Checking & Removing 2nd Brake Piston
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

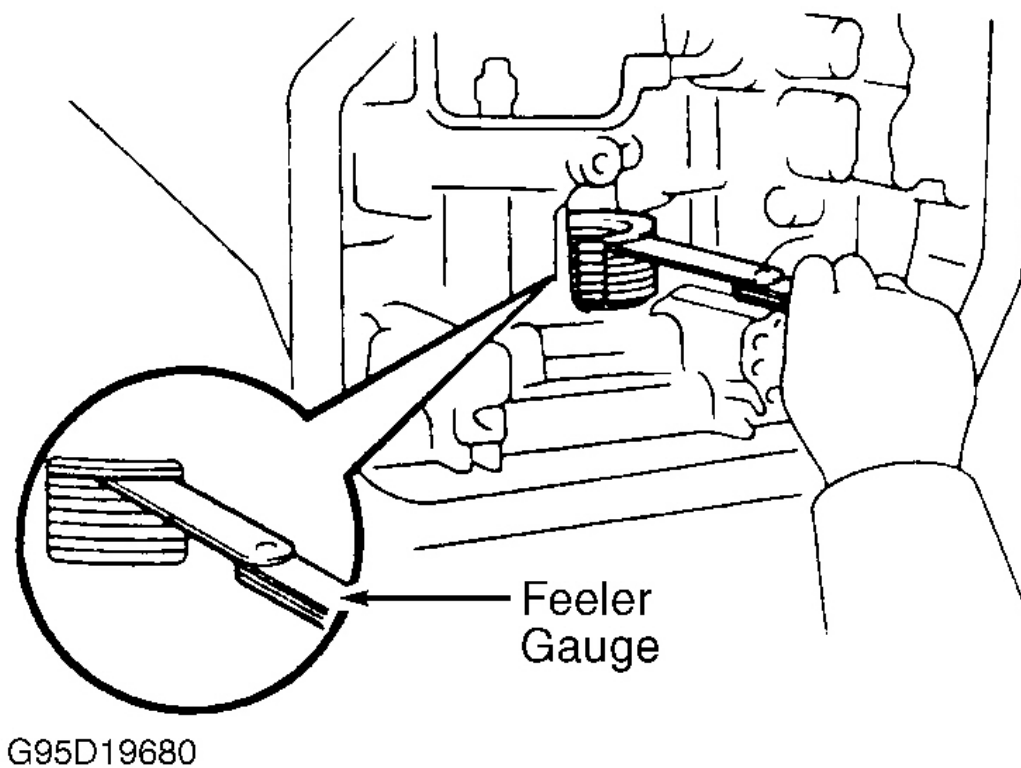


Fig. 18: Check 1st & Reverse Brake Clutch Pack Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

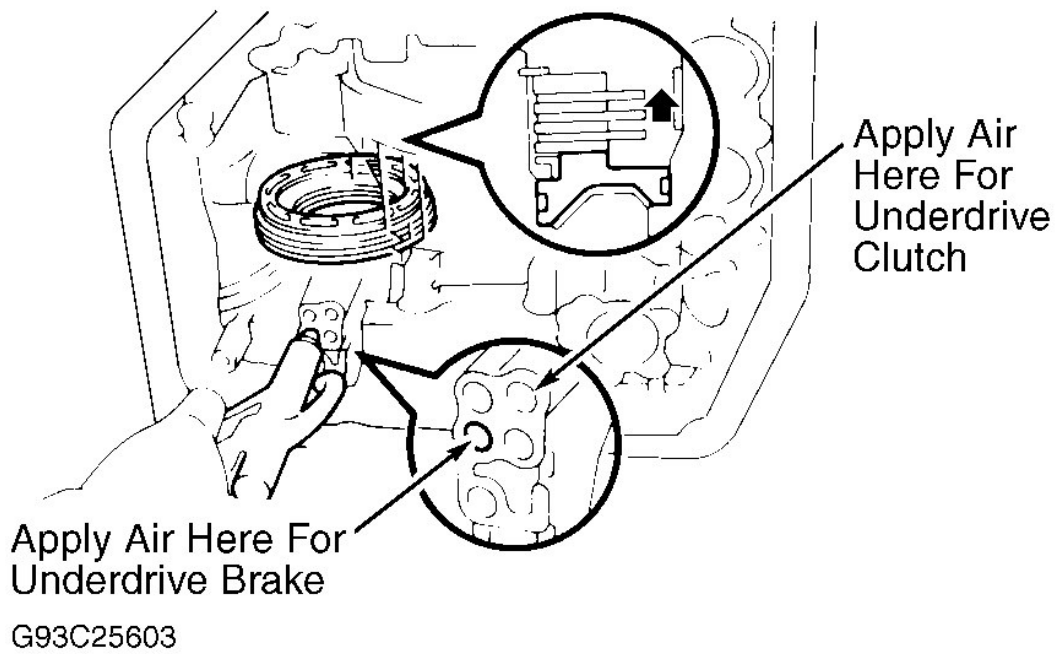
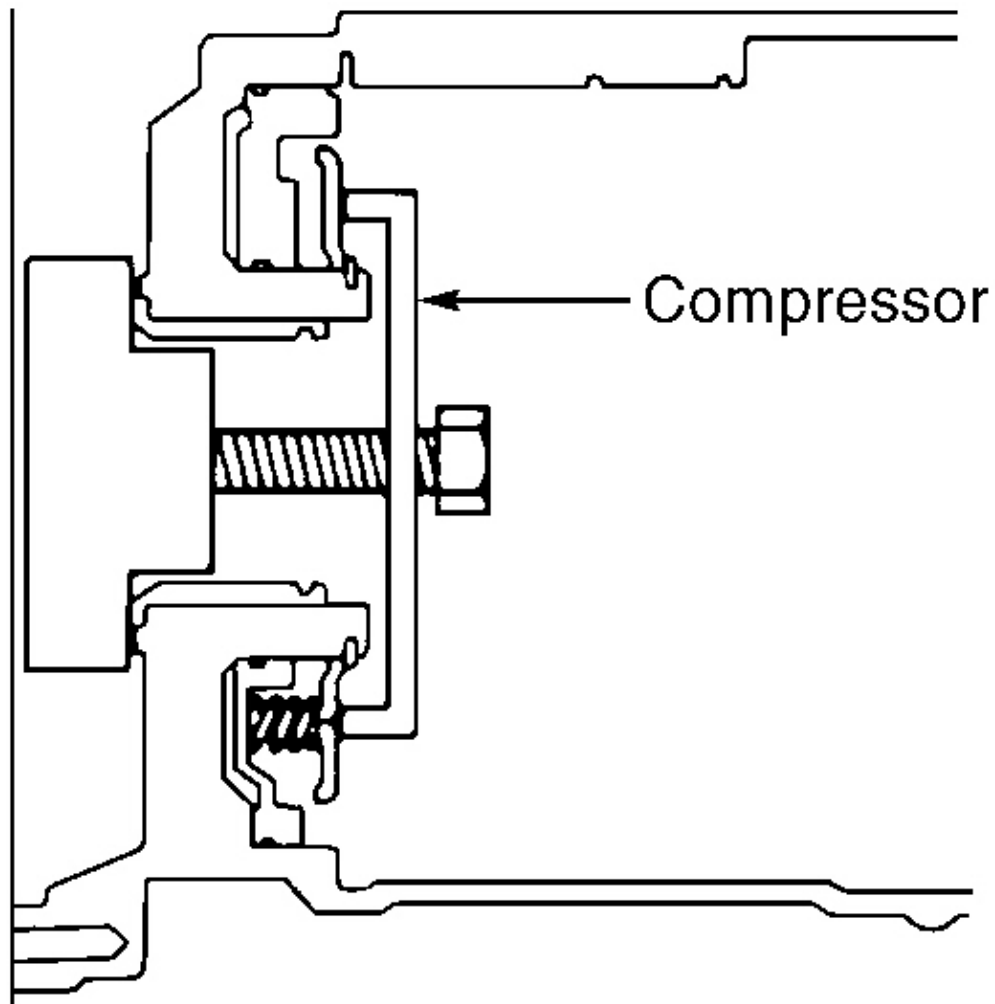


Fig. 19: Checking Underdrive Brake & Clutch Piston Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 20: Compressing 1st & Reverse Brake Piston Return Springs
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

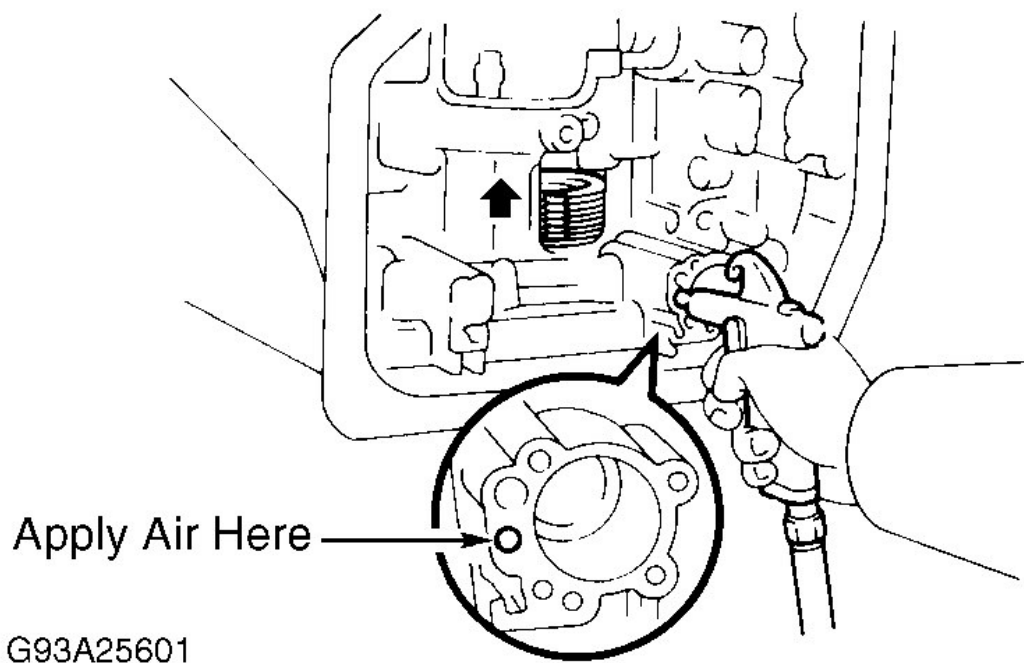
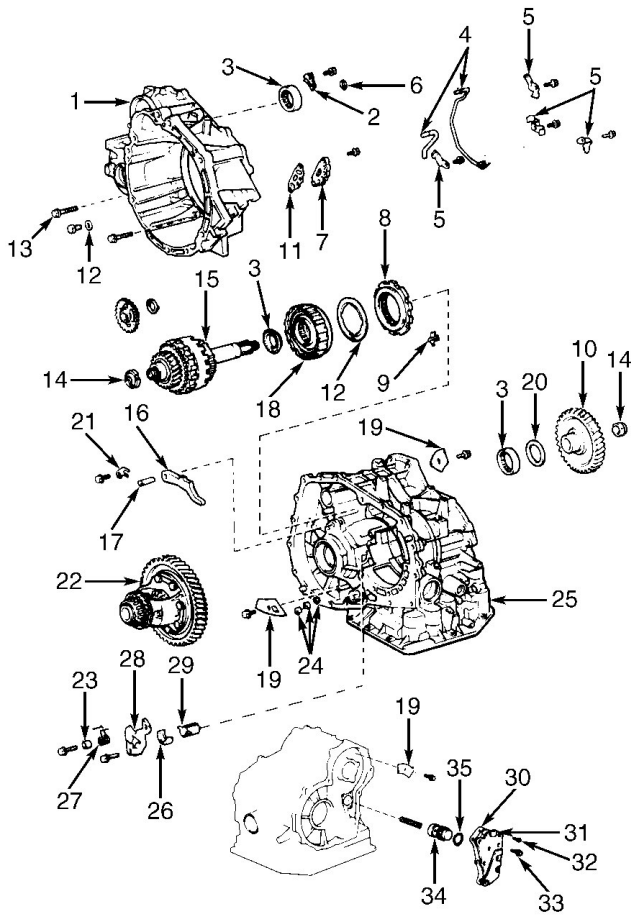


Fig. 21: Checking & Removing 1st & Reverse Piston
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



- | | |
|---|---|
| 1. Transaxle Housing | 18. Underdrive Clutch |
| 2. Bearing Retainer | 19. Plate |
| 3. Bearing | 20. Thrust Needle Bearing |
| 4. Oil Tubes | 21. Pawl Shaft Clamp |
| 5. Clamp | 22. Differential Assembly |
| 6. Oil Seal Ring | 23. Spring Guide |
| 7. Oil Tube Apply Cover | 24. Apply Gaskets |
| 8. No. 3 One-Way Clutch | 25. Transaxle Case |
| 9. Anti-Rattle Clip | 26. Parking Lock Sleeve |
| 10. Counter-Driven Gear | 27. Spring |
| 11. Oil Tube Apply Cover Gasket | 28. Stopper Plate |
| 12. Washer | 29. Cam Guide Bracket |
| 13. Bolt | 30. Gasket |
| 14. Lock Nut | 31. Oil Gallery Cover |
| 15. Underdrive Planetary Gear With Countershaft | 32. Screw |
| 16. Parking Lock Pawl | 33. Bolt |
| 17. Pawl Shaft | 34. Underdrive Brake Accumulator Piston |
| | 35. "O" Ring |

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Fig. 22: Exploded View Of Transaxle Housing & Case Components (Typical)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

COMPONENT DISASSEMBLY & REASSEMBLY

OIL PUMP

Disassembly

1. Remove race from stator shaft. Remove "O" ring and oil seal rings from oil pump body and stator shaft. Remove clutch drum thrust washer from stator shaft.
2. Mark stator shaft and oil pump body for reassembly reference. Remove stator shaft bolts. Separate stator shaft and oil pump body. Mark gear location for reassembly reference. Remove pump gears. Using screwdriver, remove front seal. See **Fig. 23**.

Inspection

1. Note position of oil pump gears. Clean all parts with solvent. Dry parts using compressed air. Ensure oil passages are clear. Check driven gear-to-body clearance. Push driven gear against one side of oil pump. Measure clearance between driven gear and oil pump body. See **Fig. 24**. Replace oil pump body if clearance is not within specification. See **OIL PUMP CLEARANCE SPECIFICATIONS** table.
2. Measure tip clearance between driven gear and crescent-shaped part of oil pump body. See **Fig. 25**. Replace oil pump body if clearance is not within specification. See **OIL PUMP CLEARANCE SPECIFICATIONS** table.
3. Using feeler gauge and straightedge, measure side clearance of both gears. See **Fig. 26**. Replace oil pump body if clearance is not within specification. See **OIL PUMP CLEARANCE SPECIFICATIONS** table.
4. Using a dial indicator, measure inside diameter of oil pump body bushing. Maximum inside diameter should be 1.503" (38.18 mm). If inside diameter exceeds specification, replace oil pump body.
5. Measure inside diameter of stator shaft bushings. Maximum front side bushing inside diameter should be .849" (21.57 mm). Maximum rear side bushing inside diameter should be 1.066" (27.07 mm). If inside diameter exceeds specification, replace stator shaft.

OIL PUMP CLEARANCE SPECIFICATIONS

Application	In. (mm)
Driven Gear-To-Pump Body	
Standard	.0030-.0059 (.075-.149)
Maximum	.012 (.30)
Gear-To-Crescent	
Standard	.0002-.0098 (.004-.248)
Maximum	.012 (.30)
Gear Side Clearance	
Standard	.0008-.0020 (.020-.050)
Maximum	.004 (.10)

Reassembly

1. Install NEW oil seal. Seal must be even with edge of oil pump body. Coat all components with ATF. Install pump gears aligning reference marks. Install stator shaft on pump body. Align bolt holes and tighten bolts to 89 INCH lbs. (10 N.m).
2. Coat thrust washer with petroleum jelly. Install thrust washer on oil pump body. Align washer tab with oil

pump body. Install oil seal rings. Use care not to over expand rings. Using screwdrivers, check drive gear for smooth rotation. Install "O" ring. Install race on stator shaft. See **Fig. 23** .

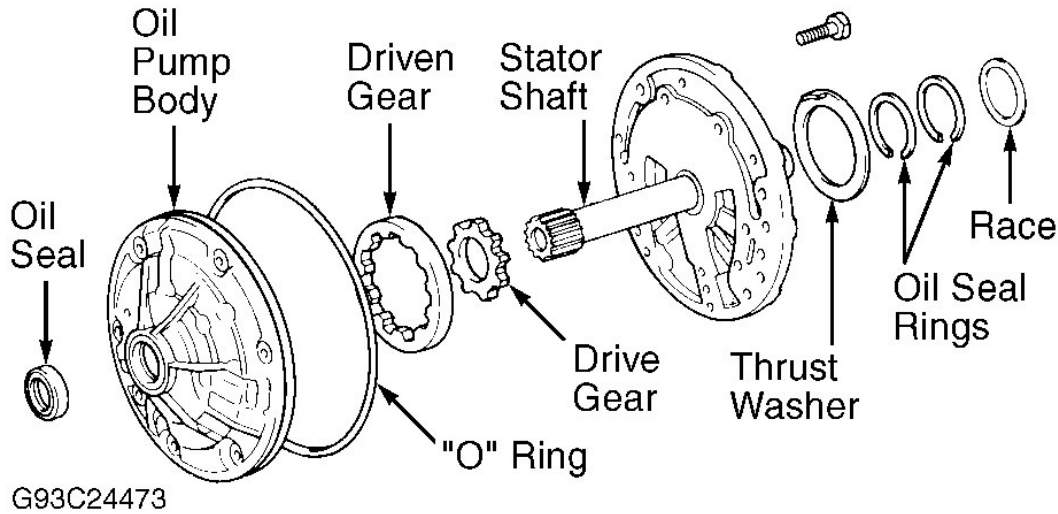


Fig. 23: Exploded View Of Oil Pump Assembly
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

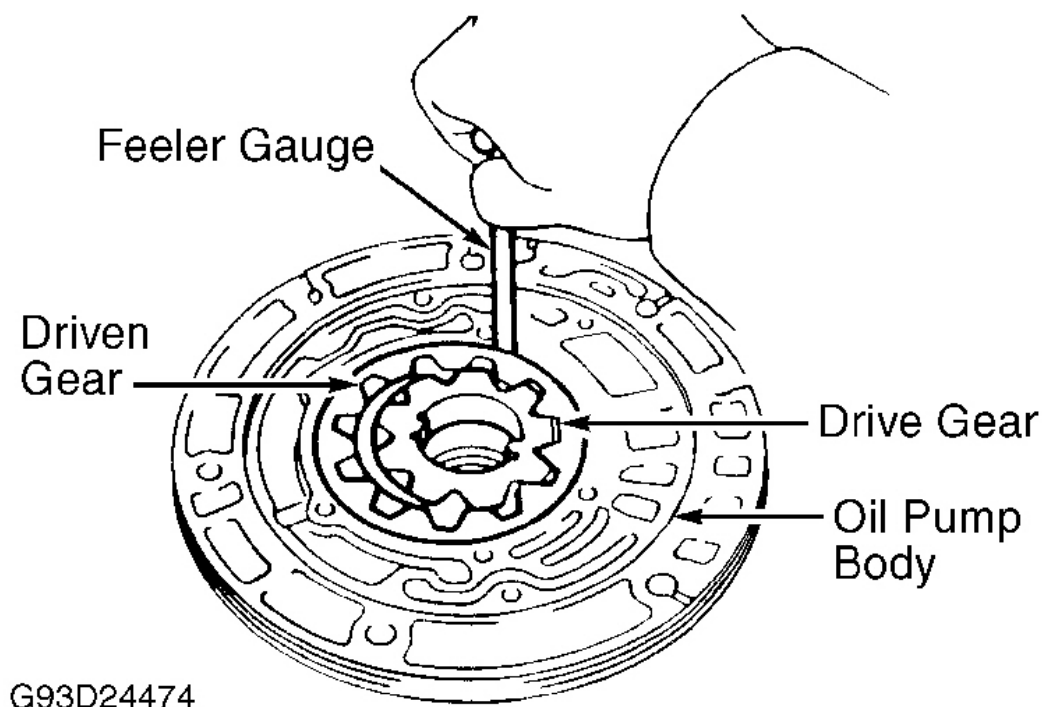


Fig. 24: Checking Oil Pump Driven Gear Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

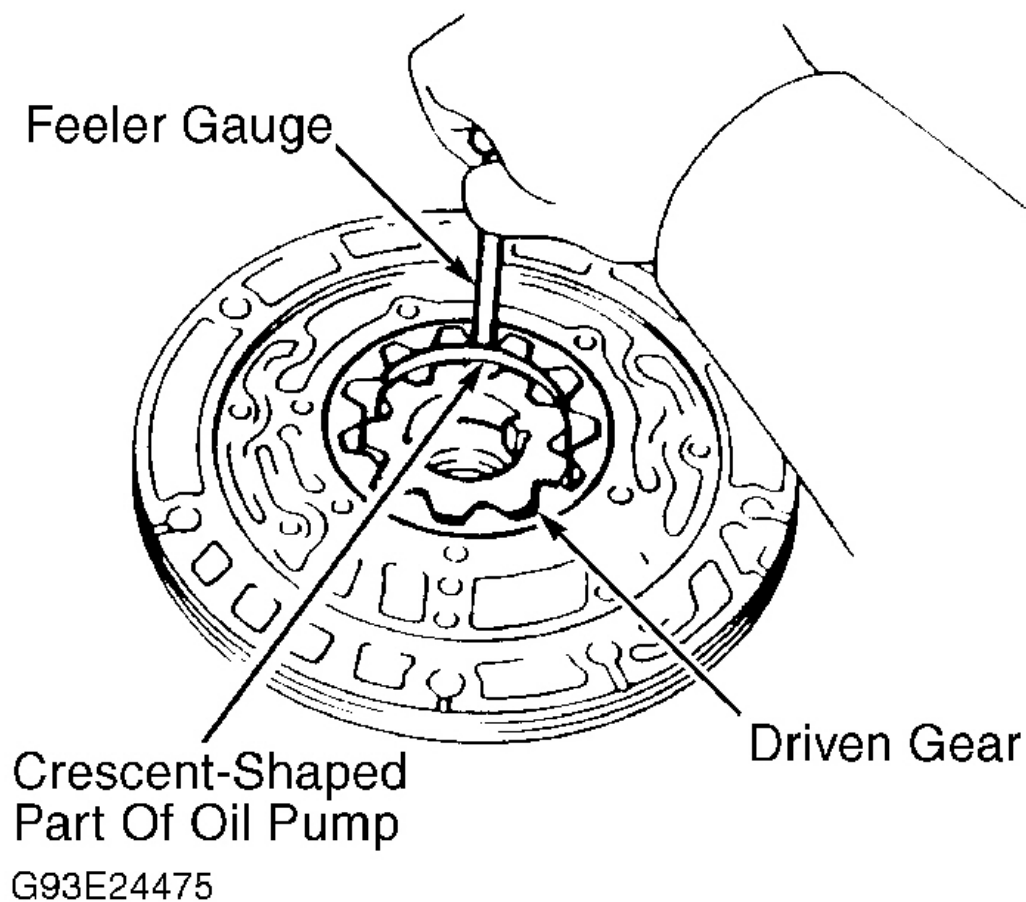


Fig. 25: Checking Oil Pump Gear Tip Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

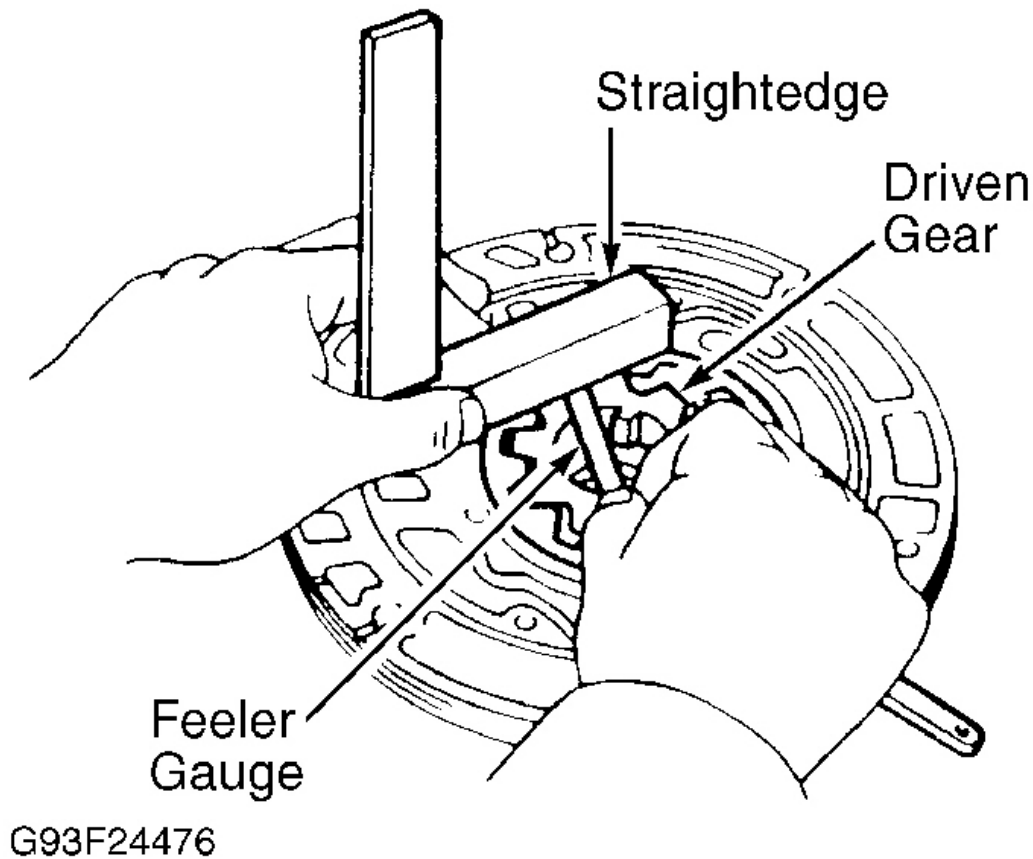


Fig. 26: Checking Oil Pump Gear Side Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIRECT CLUTCH

Disassembly

1. Remove snap ring from direct clutch drum. Remove flange, discs and plates. Note number and location of components for reassembly reference. See **Fig. 27** . Using appropriate spring compressor, compress spring retainer and springs. Remove snap ring, clutch spring compressor, spring retainer and piston return springs.
2. Install direct clutch on oil pump. Apply compressed air to oil pump oval shaped oil passage to remove piston. See **Fig. 28** . Remove direct clutch from oil pump. Remove clutch piston "O" rings.

Inspection

1. Clean all parts (except discs) with solvent. Dry parts using compressed air. Ensure check ball is free in

piston. Apply low air pressure to small hole in piston to check for air leakage around piston valve. Inspect discs and plates for wear or burnt areas. If disc lining is peeled or discolored, replace discs as necessary. Replace all damaged components as necessary.

NOTE: **New discs must be soaked in ATF for 15 minutes prior to reassembly.**

2. Measure inside diameter of direct clutch bushing. Inside diameter should be 1.900" (48.27 mm). If inside diameter exceeds specification, replace direct clutch.

Reassembly

1. Install NEW "O" rings on piston and coat with ATF. Using hand pressure, press direct clutch piston into clutch drum with cup side upward. Use care not to damage "O" rings. Install piston return springs, retainer and snap ring. Compress return springs and retainer using clutch spring compressor.
2. Ensure snap ring gap does not align with spring retainer claw. Install plates and discs in reverse order of removal. Install flange with flat side facing downward. Install snap ring. Ensure snap ring gap does not align with drum cutout.
3. Install direct clutch on oil pump. Using a dial indicator, measure direct clutch piston stroke. Apply compressed air to oil pump passage and note dial indicator reading. See **Fig. 28**. Piston stroke should be .044-.060" (1.12-1.52 mm). If piston stroke is not as specified, select appropriate flange to obtain correct piston stroke. Flanges are available in thicknesses of .102-.126" (2.60-3.20 mm) in .008" (.20 mm) increments.

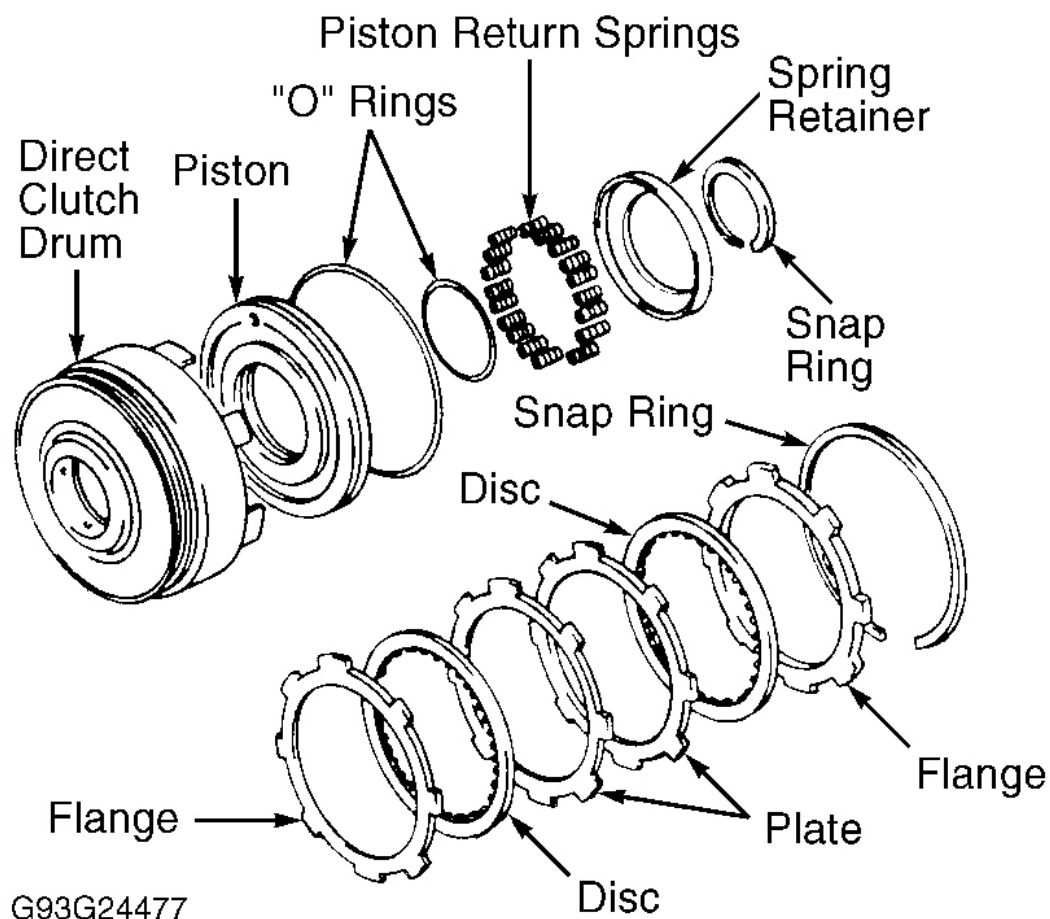
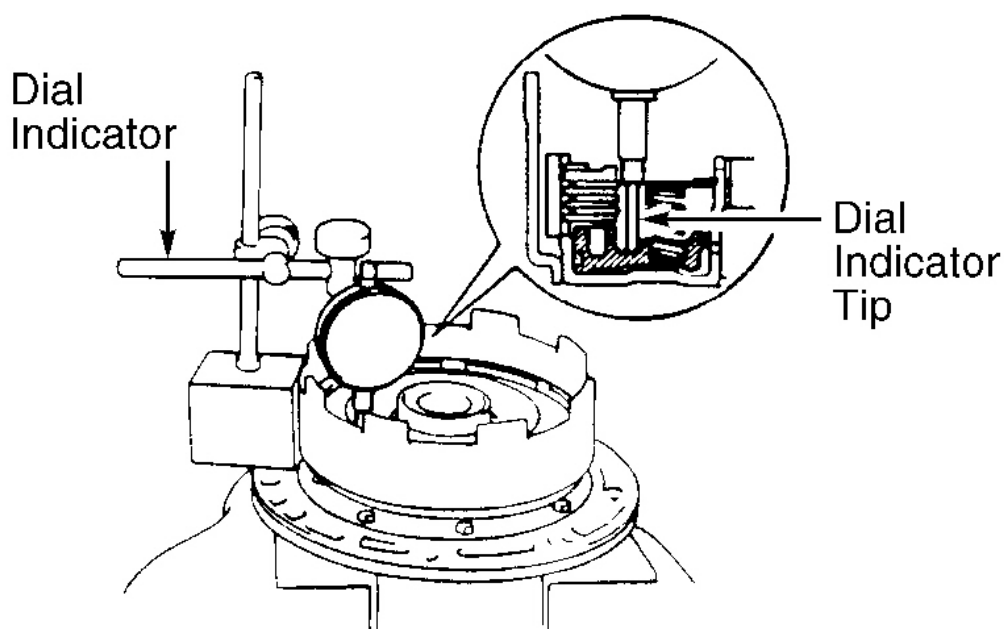
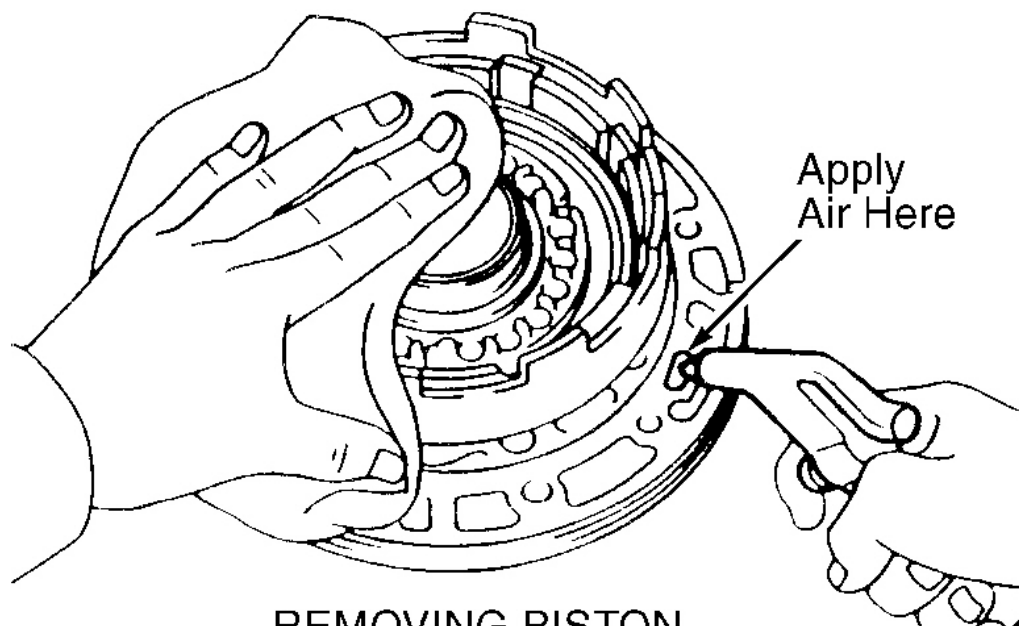


Fig. 27: Exploded View Of Direct Clutch Assembly (Typical)

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



CHECKING PISTON TRAVEL



REMOVING PISTON

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Fig. 28: Checking & Removing Direct Clutch Piston
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

FORWARD CLUTCH

Disassembly

1. Remove thrust washer. Remove thrust bearings and races from both sides of clutch. Remove clutch drum snap ring. Remove flange, discs and plates. Note number and location of components for reassembly reference. See **Fig. 29** . Using appropriate spring compressor, compress spring retainer and return springs.
2. Remove snap ring. Remove spring compressor, spring retainer and return springs. To remove piston from clutch drum, apply compressed air to oil passage (hole nearest piston) on rear of forward clutch shaft. Remove "O" rings from piston. If necessary, remove oil seal rings.

Inspection

Clean all parts (except discs) with solvent. Dry parts using compressed air. Ensure check ball is free in piston. Apply low air pressure to small hole in piston to check for air leakage around piston valve. Inspect discs and plates for wear or burnt areas. If disc lining is peeled or discolored, replace discs as necessary. Replace all damaged components as necessary.

NOTE: **New discs must be soaked in ATF for 15 minutes prior to reassembly.**

Reassembly

1. Install NEW oil seal rings (if necessary). DO NOT over expand seal rings. Install NEW "O" rings on piston and coat with ATF. Using hand pressure, install piston in clutch drum with cup side upward. Use care not to damage "O" rings. Install piston return springs, retainer and snap ring. Compress return springs and retainer using clutch spring compressor. Install snap ring so ring gap does not align with spring retainer claw.
2. Install plate and disc in reverse order of removal. Install flange with flat side facing inward. Install snap ring. Ensure end gap of snap ring is not aligned with drum cutout. Position dial indicator on piston flange. Measure piston stroke by applying compressed air to oil passage (hole nearest piston) on rear of forward clutch shaft and note dial indicator reading.
3. Piston stroke should be .056-.071" (1.42-1.81 mm). If piston stroke is not as specified, select appropriate flange to obtain correct piston stroke.
4. Flanges are available in thicknesses of .110-.142" (2.80-3.60 mm) in .008" (.20 mm) increments. Coat thrust washer, races and bearings with petroleum jelly and install components. See **Fig. 29** .

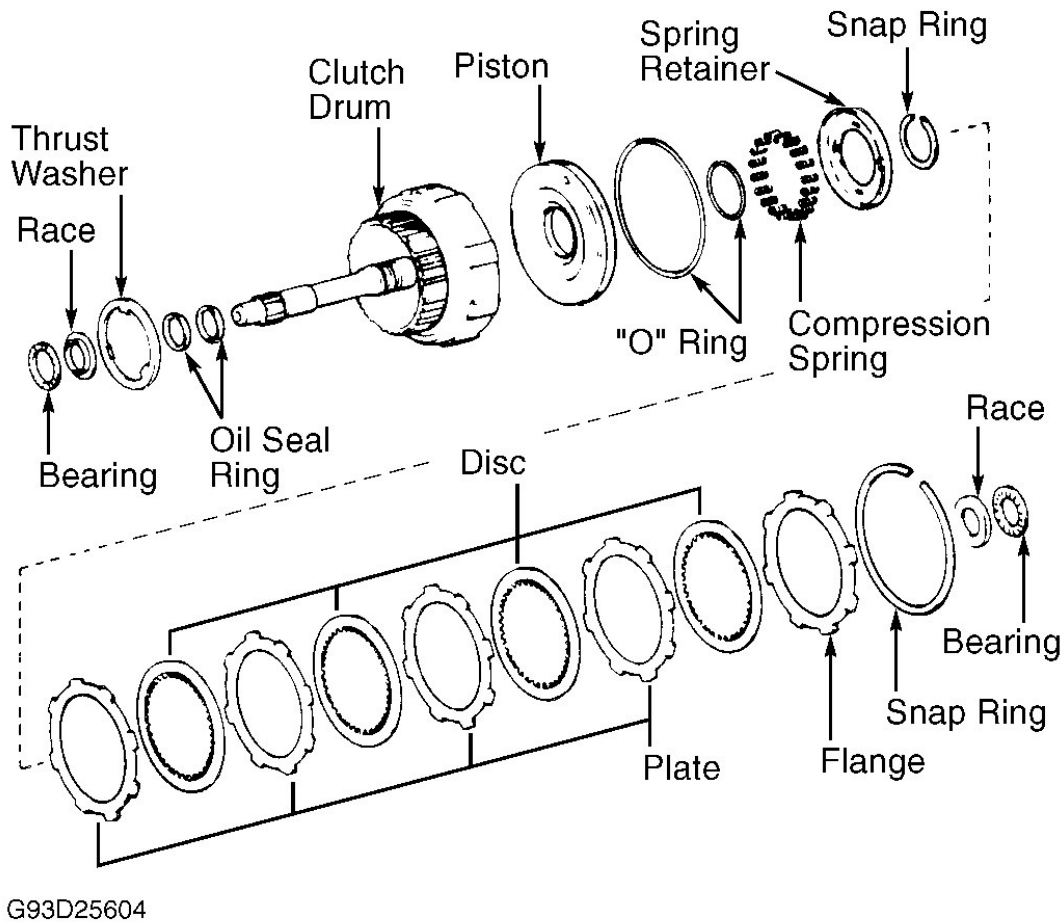


Fig. 29: Exploded View Of Forward Clutch (Typical)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

FRONT PLANETARY GEAR

Disassembly

1. Check No. 1 one-way clutch operation. Hold sun gear (shell) and turn hub. Hub should rotate freely clockwise and lock when turned counterclockwise. See **Fig. 30** . Remove 2nd brake hub and No. 1 one-way clutch from sun gear.
2. Remove thrust washer from sun gear input drum. Remove snap ring. Remove sun gear input drum. Remove shaft snap ring from sun gear. Remove one-way clutch retainer if clutch requires replacement. Remove one-way clutch from hub. See **Fig. 31** .

Inspection

1. Clean all parts with solvent. Dry parts using compressed air. Check thrust bearings, races and one-way clutch for wear or damage. Replace if necessary.

2. Measure inside diameter of sun gear flange bushing. Standard inside diameter should be .867-.868" (22.03-22.05 mm). Maximum inside diameter is .870" (22.10 mm). If inside diameter exceeds specification, replace flange.
3. Measure planetary pinion gear thrust clearance. Standard clearance should be .008-.020" (.20-.50 mm). Maximum clearance is .020" (.50 mm). If clearance exceeds specification, replace planetary gear. See **Fig. 32**.
4. Measure inside diameter of ring gear flange bushing. Standard inside diameter should be .749-.750" (19.03-19.05 mm). If inside diameter exceeds specification, replace flange.

Reassembly

Install shaft snap ring to sun gear. Install sun gear to drum. Install snap ring to drum. Install thrust washer to sun gear input drum. See **Fig. 31**. Rotate hub clockwise. Install one-way clutch and 2nd brake hub. Check one-way clutch operation. Hold sun gear and rotate hub. Hub should rotate freely clockwise and lock counterclockwise.

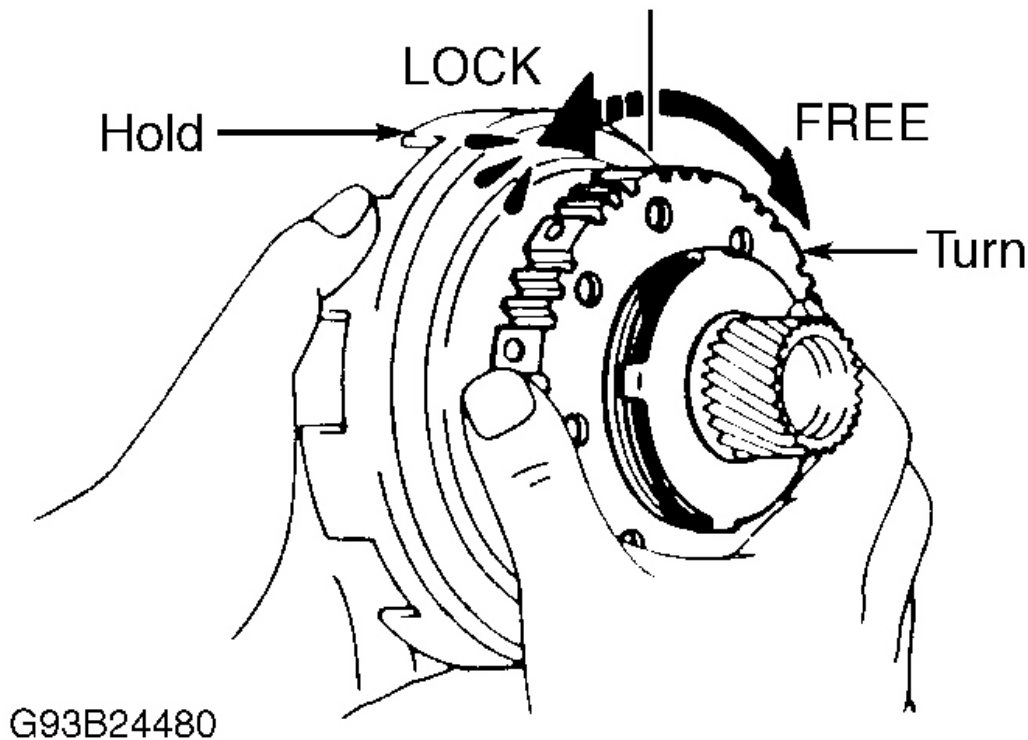


Fig. 30: Checking No. 1 One-Way Clutch

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

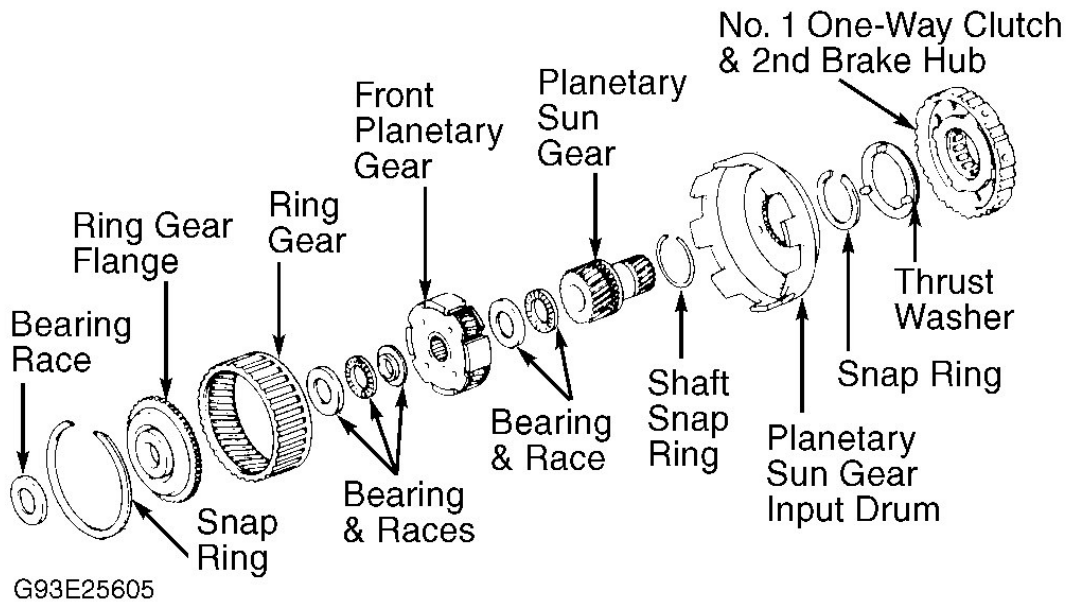


Fig. 31: Exploded View Of Front Planetary Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

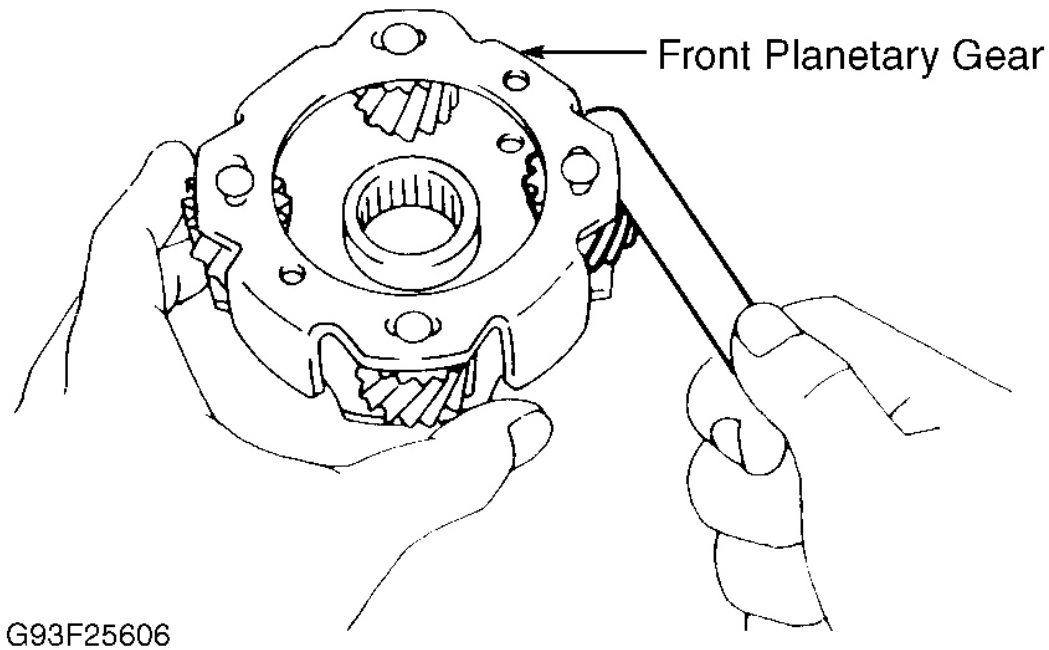


Fig. 32: Measuring Planetary Gear Thrust Clearance

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

REAR PLANETARY GEAR

Disassembly

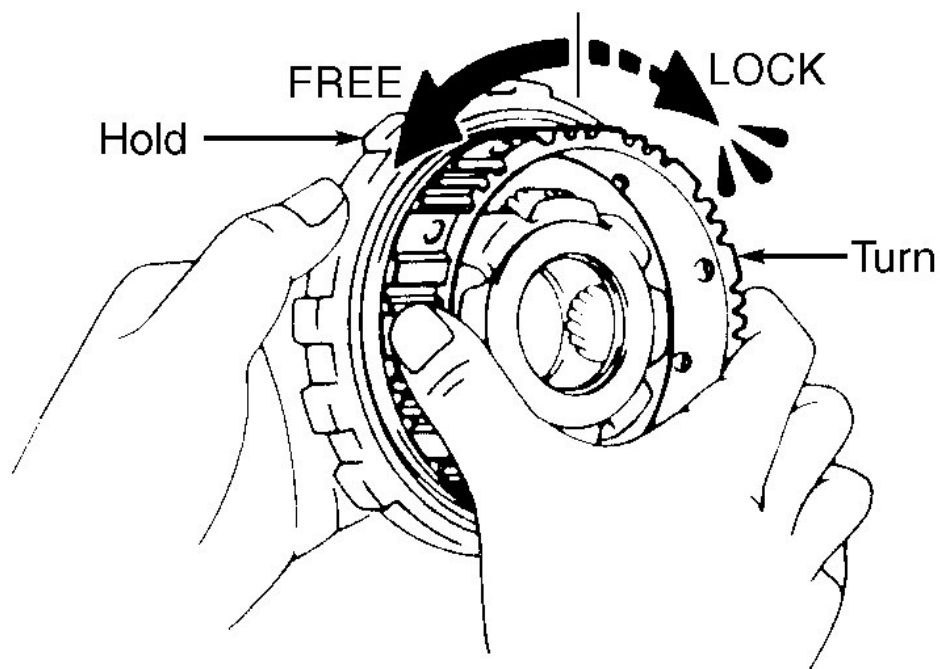
1. Check No. 2 one-way clutch operation. Hold outer race and rotate hub. Hub should rotate freely counterclockwise and lock clockwise. See **Fig. 33** .
2. Remove thrust washers from both sides of planetary gear. Separate No. 2 one-way clutch and planetary gear. Remove snap rings and side retainers from No. 2 one-way clutch. Note position of No. 2 one-way clutch and remove from outer race. See **Fig. 34** .

Inspection

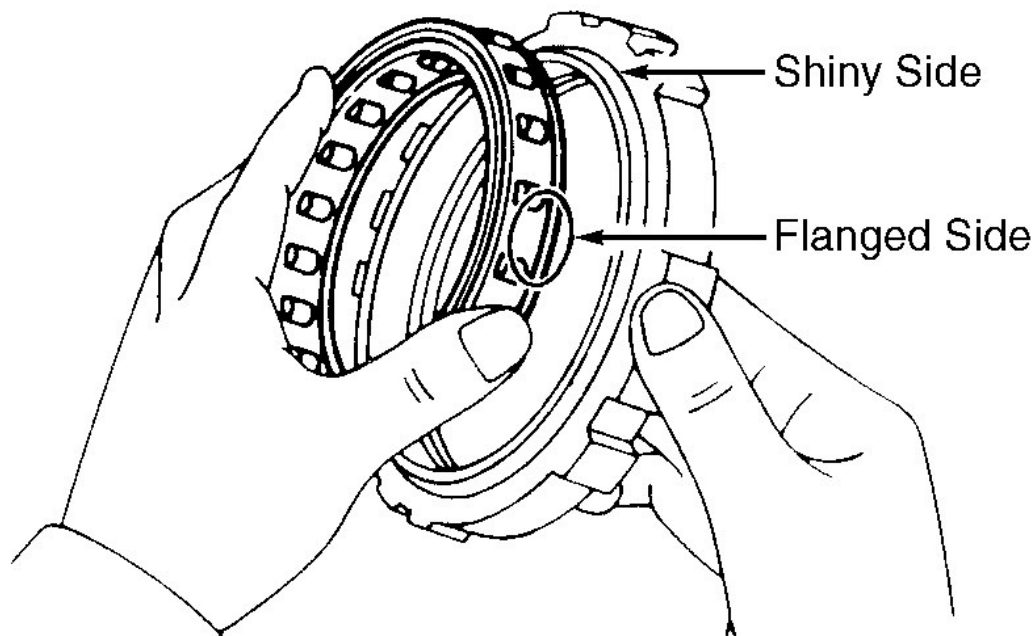
Clean all parts with solvent. Dry parts using compressed air. Check thrust washers and one-way clutch for wear or damage. Replace damaged parts as necessary. Measure planetary pinion gear thrust clearance. Standard clearance should be .008-.020" (.20-.50 mm). Maximum clearance is .020" (.50 mm). If clearance exceeds specification, replace planetary gear. See **Fig. 32** .

Reassembly

1. Coat all parts with ATF. Install one-way clutch into outer race. Flanged side should face inward away from shiny side of outer race. See **Fig. 33** . Install side retainers and snap rings.
2. Install planetary gear into one-way clutch. Planetary gear inner race should face inward from back side of outer race. Check operation of one-way clutch. See **Fig. 33** . Coat thrust washers with petroleum jelly. Install thrust washers on both sides of gear, aligning thrust washer tab with hollow area in gear.



CHECKING OPERATION



INSTALLING CLUTCH

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Fig. 33: Installing & Checking No. 2 One-Way Clutch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

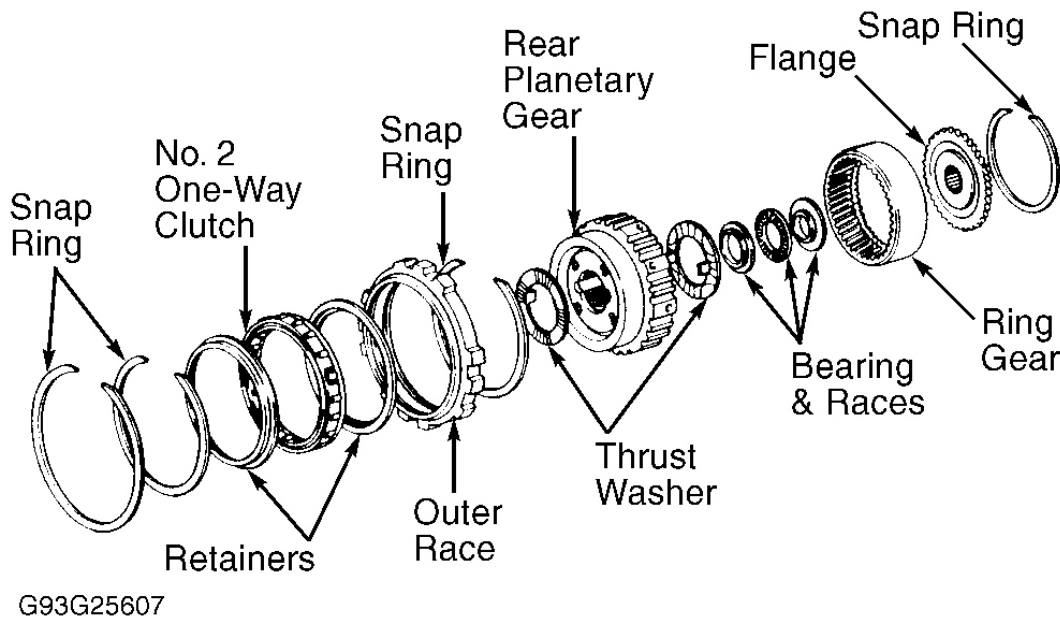


Fig. 34: Exploded View Of Rear Planetary Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1ST & REVERSE BRAKE PISTON

Disassembly

1. Using appropriate compressor, compress springs. See **Fig. 35** . Remove spring retainer snap ring and compressor.
2. Remove piston return spring assembly. Apply compressed air to oil passage in transaxle case to remove piston. See **Fig. 21** . Remove piston "O" rings.

Inspection

Clean all parts with solvent. Dry parts using compressed air. Inspect piston for roughness or damage. Replace as necessary.

Reassembly

1. Install NEW "O" rings on piston and coat with ATF. Install piston in transaxle case with spring seats facing upward. Position piston return spring assembly and snap ring in place. See **Fig. 35** .
2. Using clutch spring compressor, compress piston return springs. Avoid bending spring retainer or damaging transaxle case by overtightening compressor. Push snap ring into place with fingers.

3. Ensure snap ring is fully seated and centered by spring retainer lugs. Ensure snap ring end gap is not aligned with cutouts. Remove spring compressor.

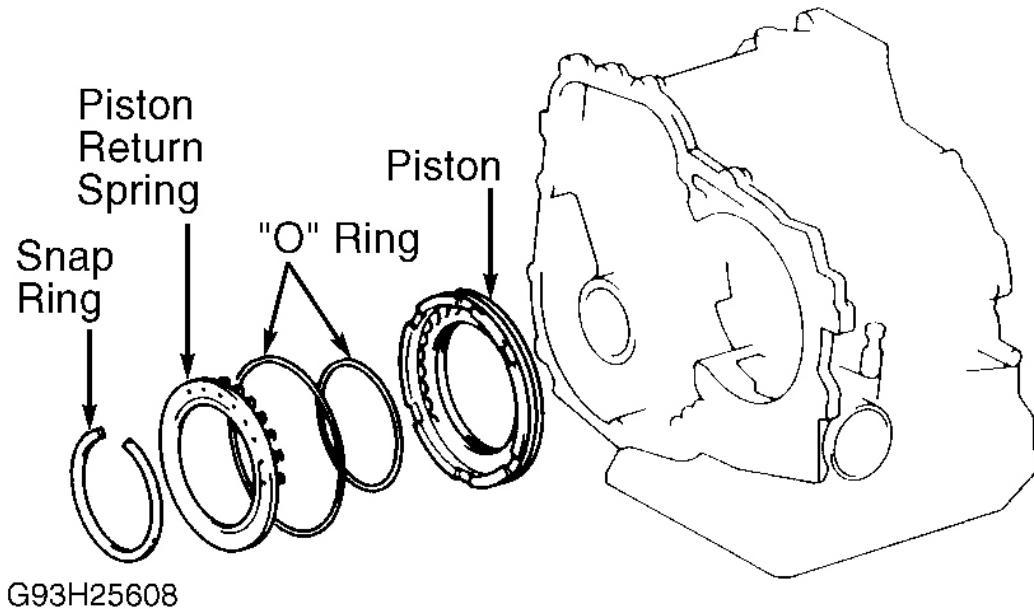


Fig. 35: Exploded View Of 1st & Reverse Brake Piston
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2ND COAST BRAKE

Disassembly

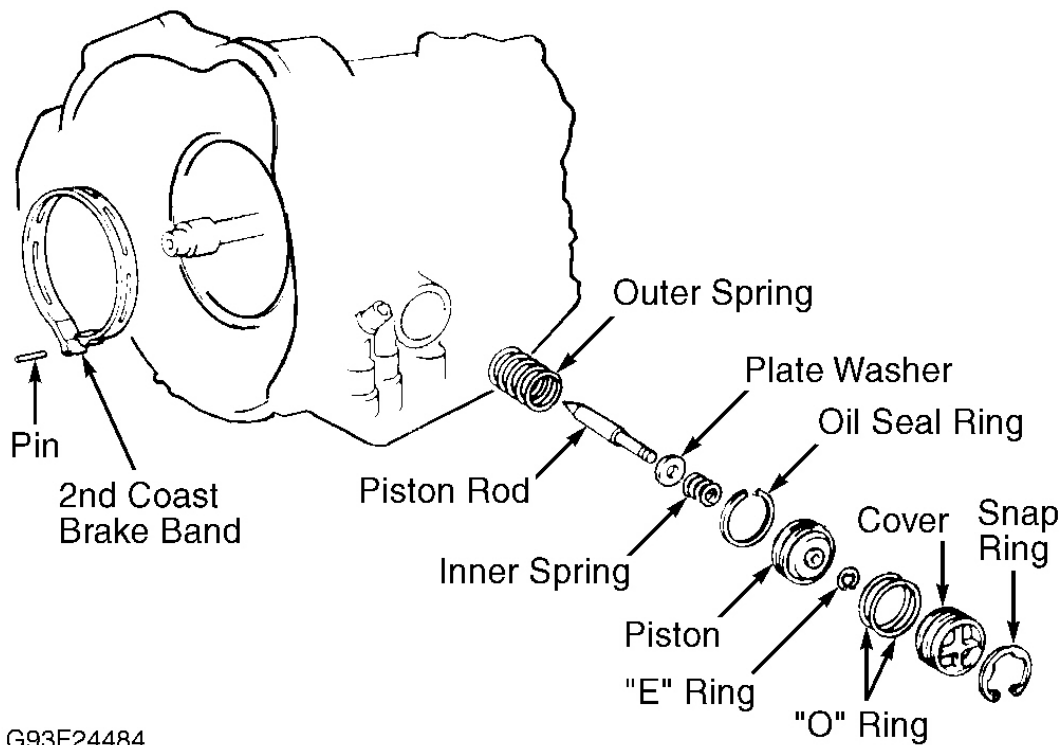
1. Prior to disassembly, check brake piston stroke. Apply paint to piston rod at point rod meets transaxle case. Apply compressed air to oil passage and measure piston stroke using appropriate wire gauge set. Piston stroke should be .059-.138" (1.50-3.50 mm). See **Fig. 14**.
2. If piston stroke exceeds specification, check brake band. If brake band is serviceable but piston rod stroke is not within specification, select NEW piston rod. Piston rod is available in lengths of 2.811" (71.40 mm) and 2.870" (72.90 mm).
3. Remove oil seal from piston. Remove "E" ring while pushing piston with needle-nose pliers. Remove spring, washer and piston rod. See **Fig. 36**.

Inspection

Replace brake band if lining is peeled or discolored or printed numbers are defaced. Before assembling NEW band, soak in ATF for 15 minutes.

Reassembly

Install washer and spring to piston rod. Install "E" ring. Install oil seal ring. DO NOT expand oil seal ring ends more than necessary for installation. See **Fig. 36** .



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Fig. 36: Exploded View Of 2nd Coast Brake
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2ND BRAKE PISTON

Disassembly & Reassembly

Apply compressed air to oil passage and remove 2nd brake piston. See **Fig. 17** . Remove "O" rings from piston. Coat NEW "O" rings with ATF and install. Carefully press 2nd brake piston into 2nd brake drum. See **Fig. 37** .

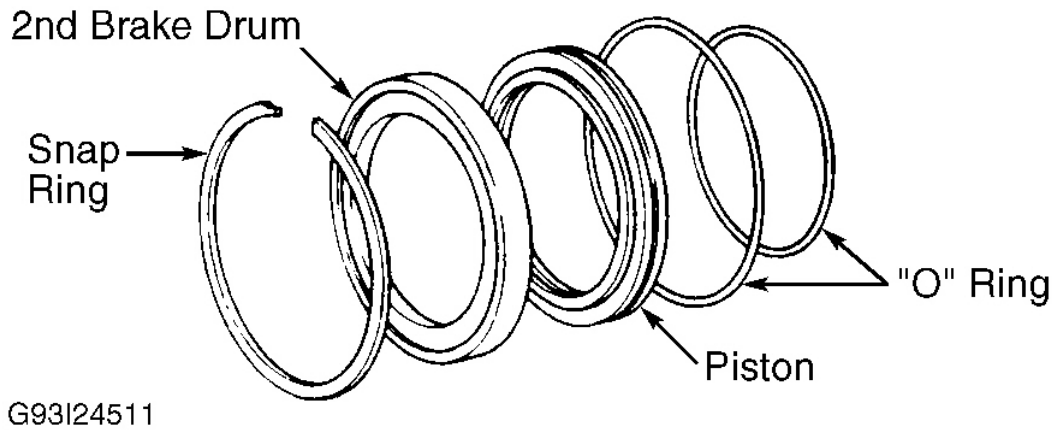


Fig. 37: Exploded View Of 2nd Brake Piston
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

COUNTERSHAFT ASSEMBLY

Disassembly

1. Remove planetary sun gear from countershaft. Remove snap ring from sun gear and countershaft assembly. Remove underdrive planetary gear, thrust bearing and race. See **Fig. 38**.
2. Remove drive pinion with output flange, outer bearing, race and spacer. Note thickness and size of bearing race. Remove ring gear retaining snap ring. Remove ring gear from countershaft.
3. Remove remaining bearing from countershaft. Remove outer bearing race from drive pinion using a brass punch and hammer. Note size of bearing and bearing race.

Inspection

1. Clean all parts with solvent. Dry parts using compressed air. Inspect bearings, races, thrust bearing and race, drive pinion and gears for wear or damage. Replace components as necessary.
2. Measure inside diameter of planetary sun gear bushing. Standard diameter should be 1.173-1.174" (29.80-29.83 mm). Maximum inside diameter is 1.176" (29.87 mm). If clearance exceeds specification, replace planetary sun gear.
3. Measure planetary pinion gear thrust clearance. Standard clearance should be .008-.020" (.20-.50 mm). See **Fig. 32**. If clearance exceeds specification, replace planetary gear assembly.

Reassembly

1. Press bearing of thick inner race on countershaft. Install ring gear and snap ring to countershaft. Install bearing outer races to drive pinion. Press thick bearing race into flange side of drive pinion. Using adapters, press thin bearing race on remaining side of drive pinion. See **Fig. 38**.
2. Install NEW spacer on countershaft. Install drive pinion on countershaft. Using bearing installer, install

remaining countershaft bearing. Ensure clearance exists between output flange and bearing. Install inner race.

3. Temporarily install counterdriven gear on countershaft. Secure counterdriven gear. Install NEW lock nut. DO NOT use old lock nut. Countershaft bearing preload must be checked. Tighten lock nut to 130-159 ft. lbs. (177-216 N.m).
4. Using Countershaft Adapter (09351-32170) and a spring scale, measure starting torque of countershaft. Before measuring starting torque, turn countershaft firmly to seat bearing. Starting torque should be 2.6-4.4 lbs. (1.2-2.0 kg). Replace spacer if starting torque exceeds specification. Recheck starting torque. See **Fig. 39**.
5. Using a punch and hammer, stake lock nut. Remove counterdriven gear. Install thrust bearing and race "H". See **Fig. 64**. Install underdrive planetary gear and snap ring. Install snap ring to sun gear. Install planetary sun gear to countershaft. See **Fig. 38**.

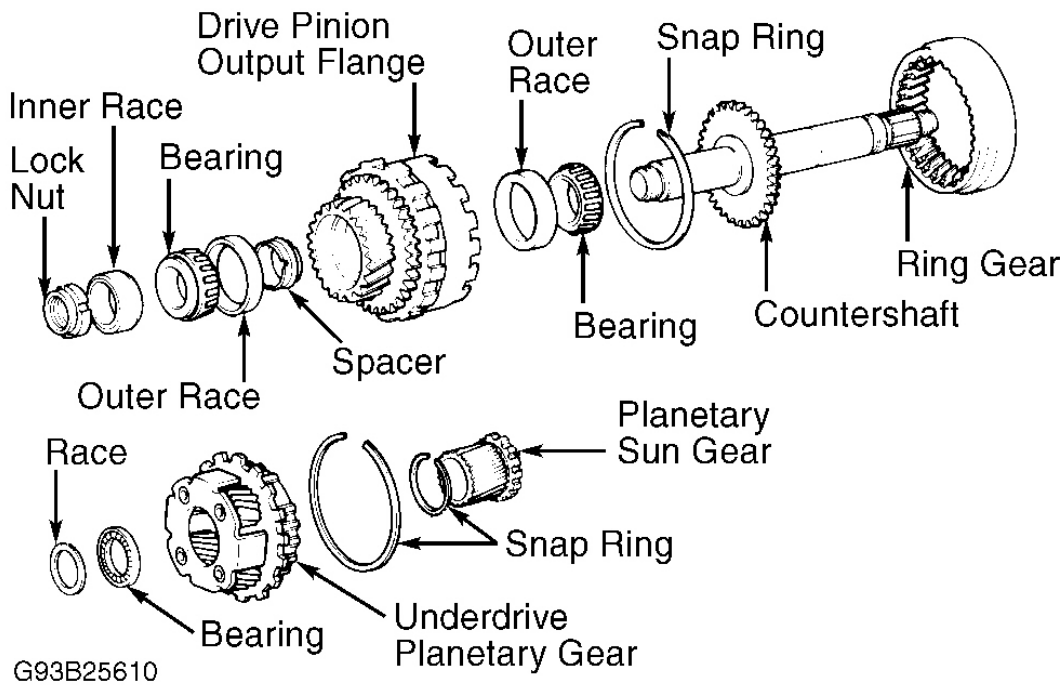


Fig. 38: Exploded View Of Countershaft Assembly
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

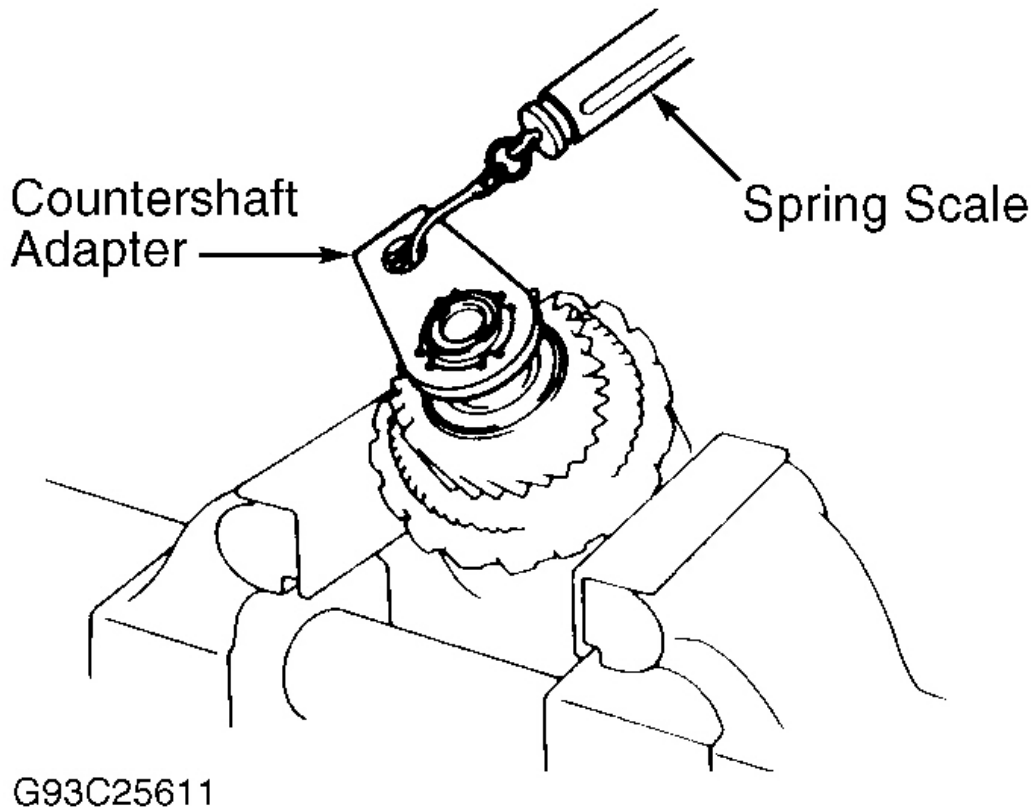


Fig. 39: Measuring Countershaft Torque
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

UNDERDRIVE CLUTCH & NO. 3 ONE-WAY CLUTCH

Disassembly

1. Remove one-way clutch and thrust washer from underdrive clutch drum. Remove snap ring from underdrive clutch drum. See **Fig. 40** . Remove flange, discs and plates from clutch drum. Note number and location of components for reassembly reference. Using appropriate spring compressor, compress return spring plate.
2. Remove snap ring. Remove return spring and spring plate. Install oil seal rings to transaxle case (if necessary). Install underdrive clutch to transaxle case. Apply compressed air to oil passage in transaxle case to remove piston. See **Fig. 19** . Remove "O" rings from piston.

Inspection

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

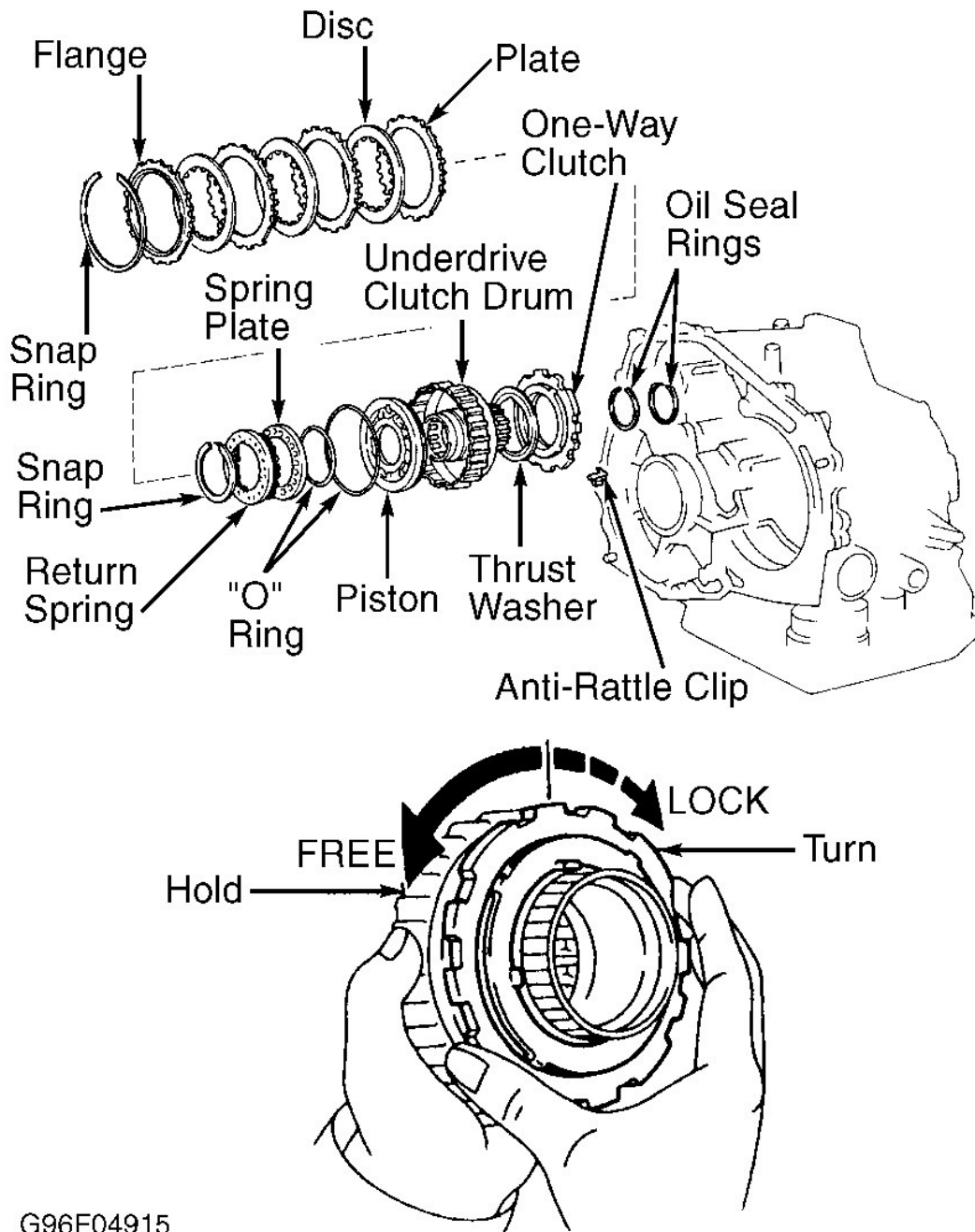
2. Ensure check ball is free in piston. Apply low air pressure to small hole in piston to check for air leakage around piston valve. Inspect discs and plates for wear or burnt areas. Replace all damaged components.

NOTE: **New discs must be soaked in ATF for 15 minutes prior to installation.**

3. Measure inside diameter of underdrive clutch drum bushing. Standard diameter for front side of bushing should be 1.831-1.832" (46.50-46.53 mm). Standard diameter for rear side of bushing should be 2.165-2.167" (55.00-55.03 mm). Maximum inside diameter should be 1.833" (46.57 mm) for front side and 2.169" (55.08 mm) for rear side. Replace underdrive clutch drum if not within specification.

Reassembly

1. Coat "O" rings with ATF. Install "O" rings on piston. Carefully install underdrive clutch into clutch drum. Install spring plate and return spring to underdrive clutch. Compress return spring and install snap ring.
2. Ensure snap ring end does not align with spring retainer claw. Install plates and discs in reverse order of disassembly, ending with disc. Install flange with round end facing inward. Install snap ring.
3. Measure underdrive clutch piston stroke. Mount dial indicator so tip rests on underdrive clutch assembly. Apply air pressure to activate piston. See **Fig. 19** . Piston stroke should be .059-.075" (1.50-1.90 mm). If piston stroke is not within specification, replace flange.
4. Flanges are available in thicknesses of .080" (2.04 mm), .087" (2.20), .094" (2.40 mm) and .098" (2.50 mm). Install appropriate flange to obtain correct clearance.
5. Install thrust washer on underdrive clutch drum. Install underdrive one-way clutch on underdrive clutch drum. Retainer claw must be facing upward. Check operation of one-way clutch. Hold clutch drum and rotate one-way clutch. One-way clutch should turn freely counterclockwise and lock clockwise. See **Fig. 40** .



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Fig. 40: Exploded View Of Underdrive Clutch & No. 3 One-Way Clutch
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

UNDERDRIVE BRAKE & ACCUMULATOR

Disassembly

1. Compress return spring and remove snap ring. Remove plates, discs and flange. Note number and location of components for reassembly reference. Remove return spring. Remove oil seal rings (if necessary).
2. Apply compressed air to oil passage in transaxle case to remove underdrive piston from transaxle case. See **Fig. 19** . Remove "O" rings from piston. Remove oil gallery cover and gasket. Remove accumulator piston and spring from transaxle case. Remove "O" ring from piston. See **Fig. 41** .

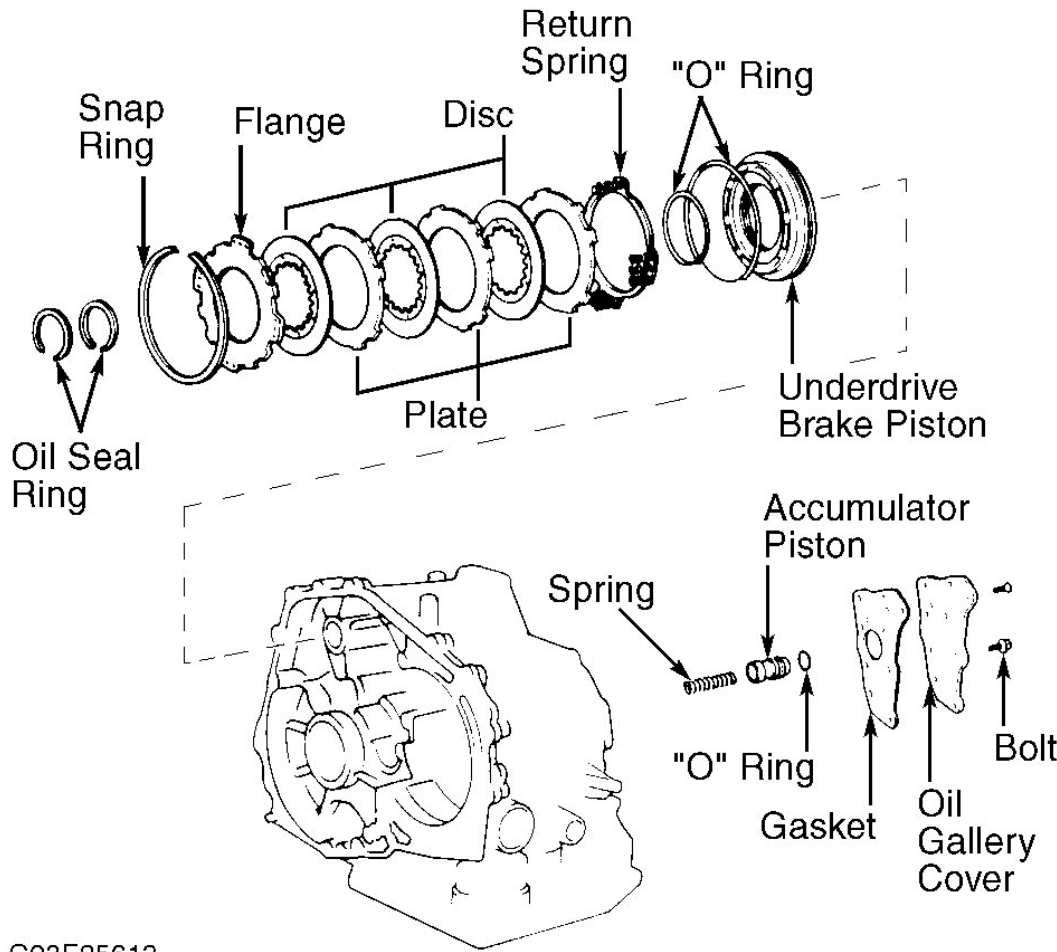
Inspection

1. Clean all parts (except discs) with solvent. Dry parts using compressed air. Inspect discs and plates for wear or burnt areas. If discs are peeled or discolored, replace discs as necessary.
2. Inspect underdrive brake piston. Ensure check ball is free by shaking piston. Ensure valve does not leak by applying low pressure compressed air to small hole in piston.

NOTE: **New discs must be soaked in ATF for 15 minutes prior to reassembly.**

Reassembly

1. Coat NEW "O" ring with ATF and install on accumulator piston. Install accumulator piston and spring. Install oil gallery gasket and cover. Tighten bolts to 89 INCH lbs. (10 N.m). Apply thread sealant to screws for oil gallery cover. Install screws and tighten to 65 INCH lbs. (7.4 N.m).
2. Install underdrive brake piston "O" rings. Coat "O" rings with ATF. Install piston in transaxle case with cupped side upward. Use care not to damage "O" rings. Install brake piston return spring. Install plates and discs. Install flange with flat end facing inward.
3. Using spring compressor, compress return spring. Install snap ring. Ensure snap ring end gap is not aligned with cutout. Using compressed air, ensure underdrive brake piston operates smoothly. See **Fig. 19** .



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Fig. 41: Exploded View Of Underdrive Brake & Accumulator
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

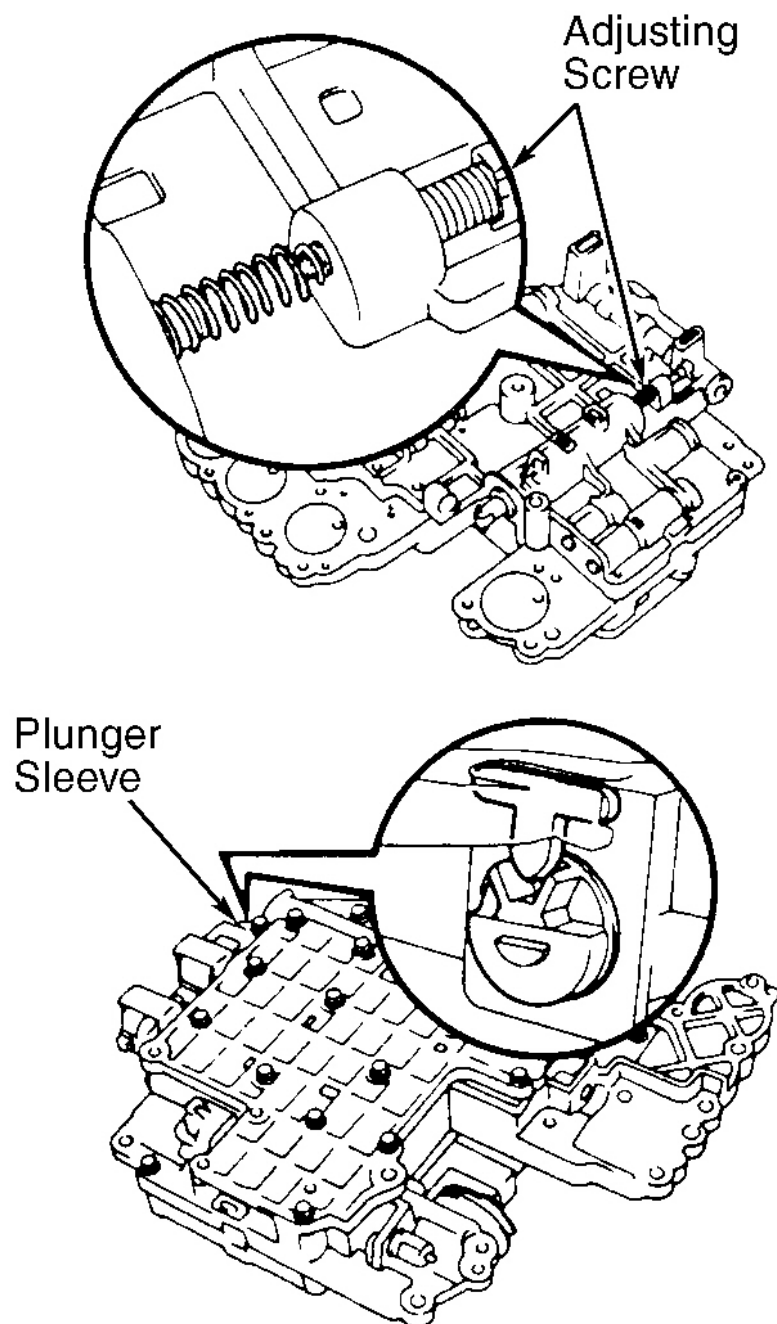
VALVE BODY ASSEMBLY

NOTE: All valve body assembly components must be installed in original location. Arrange components in sequence during removal for reassembly reference. Throttle pressure is changed according to number of adjusting rings. When assembling valve body, install same number of adjusting rings as were removed. Some valve bodies do not have adjusting rings.

CAUTION: Note position of throttle valve adjusting screw before disassembly. Note which step at end of primary regulator valve sleeve contacts valve body prior to removal. Line pressure is affected by plunger location. See [Fig. 42](#).

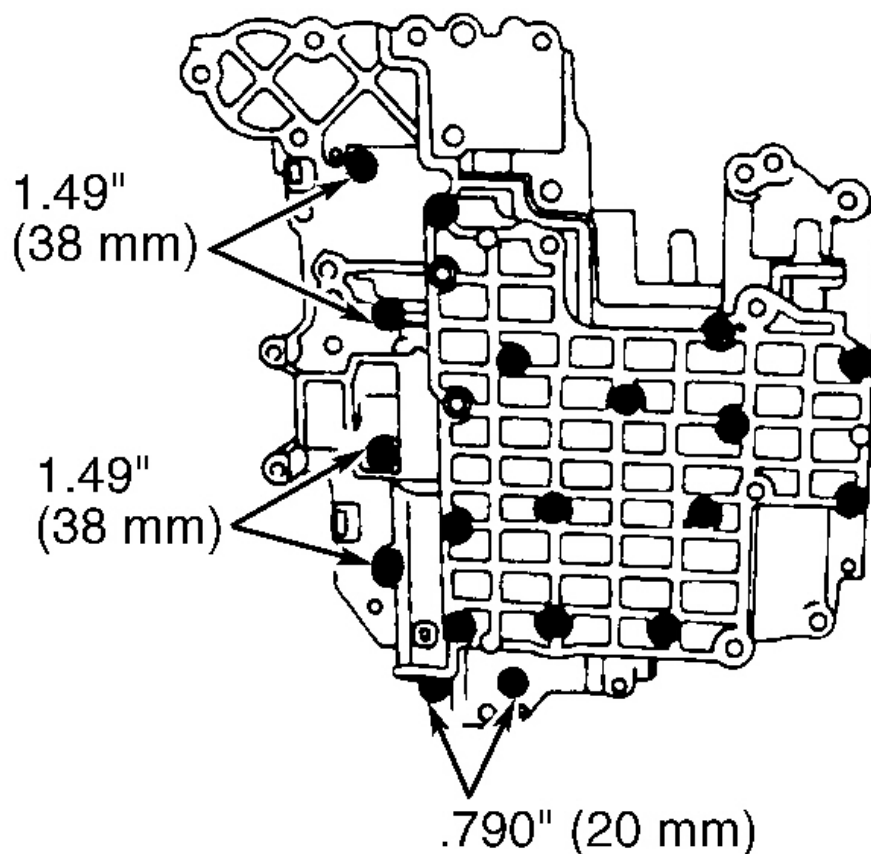
Disassembly

Remove throttle cam. Remove solenoids. Remove pressure relief valve. Remove 19 bolts from lower valve body. See **Fig. 43** . Hold plate against lower valve body and carefully remove lower valve body. DO NOT lose check balls. Note location of check balls, retainers, pins and plugs in valve body. Remove plate and gasket. See **Fig. 44** .



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Fig. 42: Identifying Adjusting Screw & Plunger Sleeve Locations
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

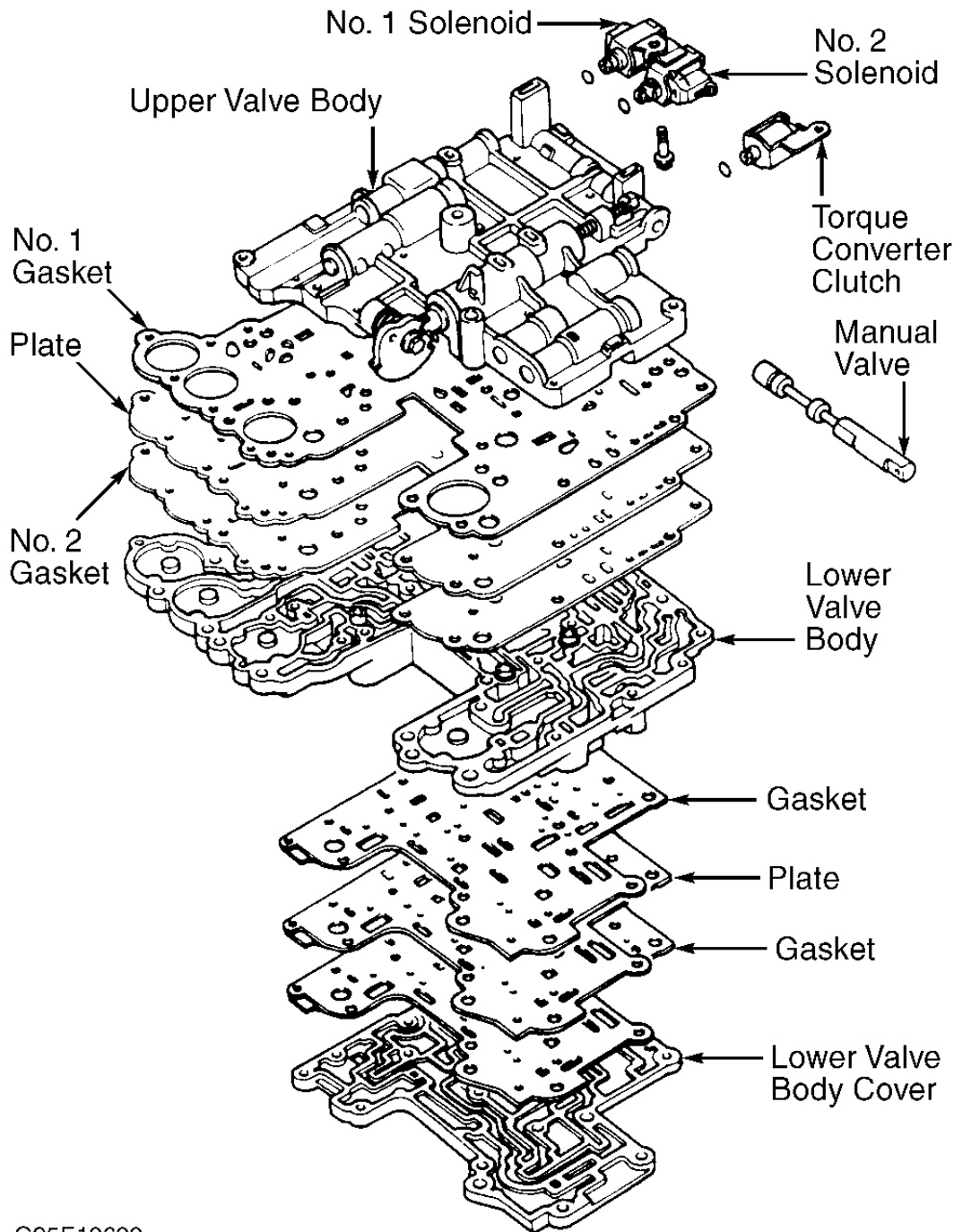


NOTE: All remaining bolts are 1.97" (50 mm).

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Fig. 43: Identifying Lower Valve Body Bolts

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

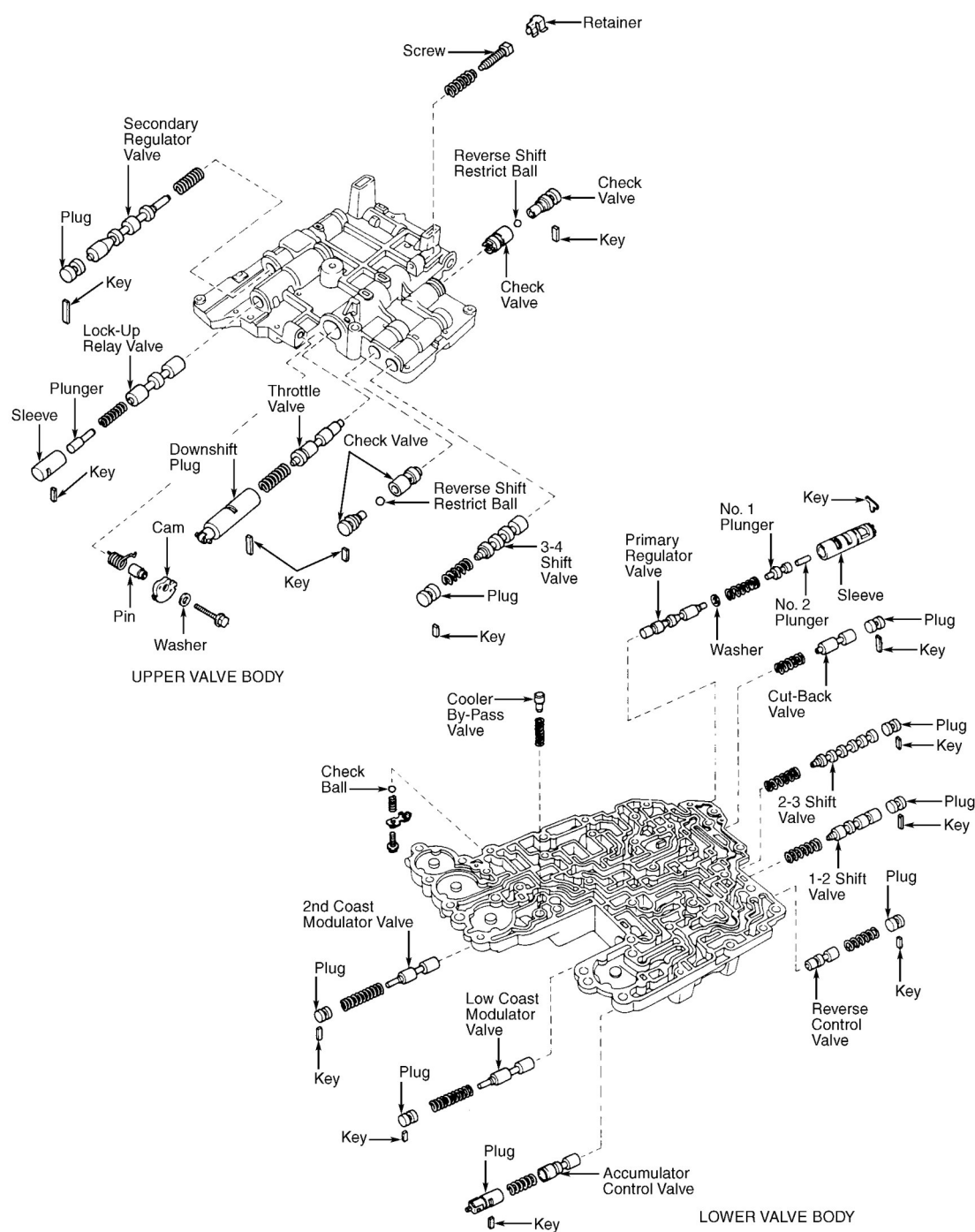


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Fig. 44: Exploded View Of Valve Body Assembly
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

1. Clean all parts with solvent. Dry parts with compressed air. When disassembling upper or lower valve body, maintain parts in order for reassembly reference. Ensure each valve is kept with corresponding spring. For upper and lower valve body exploded views, see **Fig. 45** .
2. Ensure all valve body oil passages are clear. Inspect valves for scoring or roughness. Inspect valve springs for damage, squareness, rust and collapsed coils. Measure spring free length and outer diameter.
3. Replace spring if not within specification. See appropriate VALVE BODY SPRING SPECIFICATIONS table. Ensure valve body springs correspond with appropriate valve. Ensure check balls, pins, retainers, strainers and vibrating stopper are installed in appropriate locations. See **Fig. 46** .



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Fig. 45: Exploded View Of Upper & Lower Valve Bodies
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

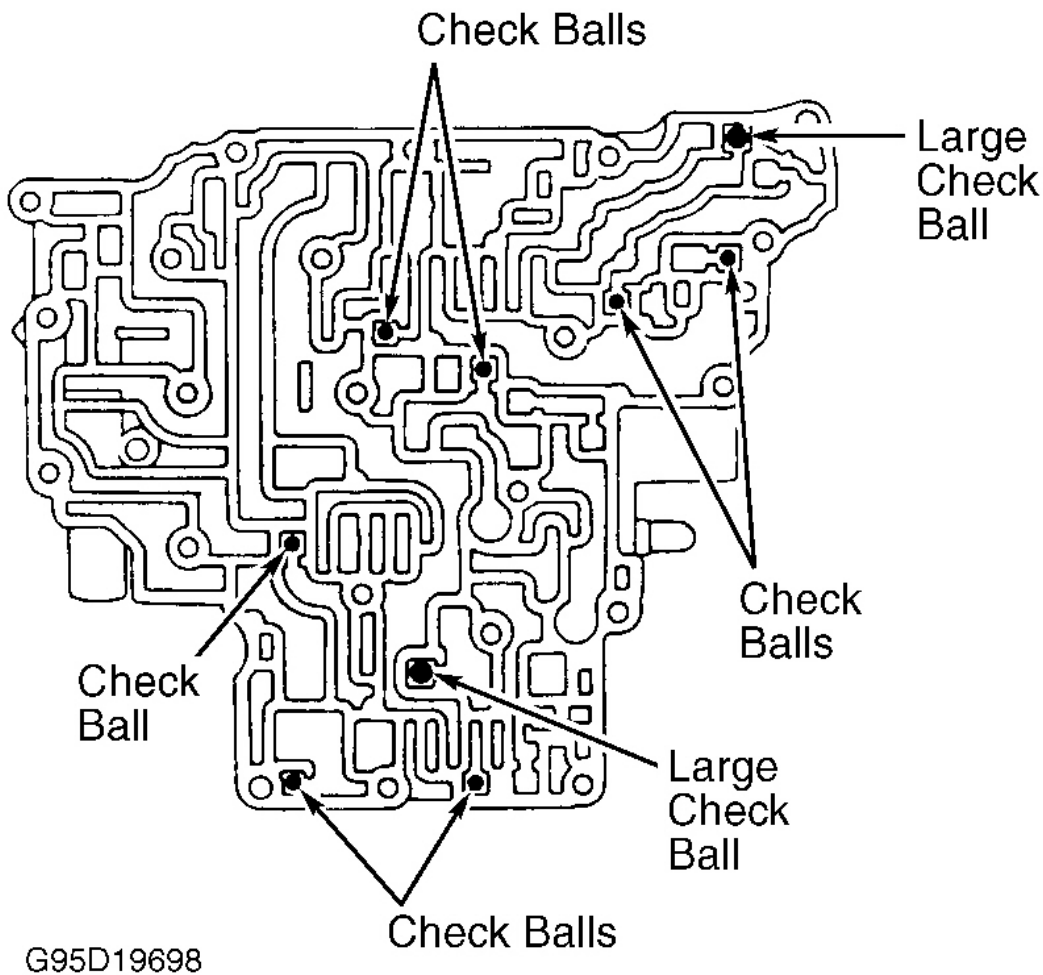


Fig. 46: Upper Valve Body Check Ball Locations
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

VALVE BODY SPRING SPECIFICATIONS (LOWER)

Application	Color	Free Length - In. (mm)
Cooler By-Pass Valve	None	.965 (24.50)
Pressure Relief Valve	Red	.709 (18.00)
2-3 Shift Valve	Red	1.004 (25.50)
2nd Coast Modulator Valve	White	1.268 (32.20)
Cut-Back Valve	None	.740 (18.80)
Primary Regulator Valve	Red	1.638 (41.60)
1-2 Shift Valve	Red	1.004 (25.50)
Reverse Control Valve	None	1.008 (25.60)
Accumulator Control Valve	Pink	1.154 (29.30)

Low Coast Modulator Valve	Blue	1.122 (28.50)
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VALVE BODY SPRING SPECIFICATIONS (UPPER)

Application	Color	Free Length - In. (mm)
Secondary Regulator Valve	None	1.449 (36.80)
Lock-Up Relay Valve	None	.740 (18.80)
3-4 Shift Valve	Red	1.004 (25.50)
Downshift Plug	Yellow	1.075 (27.30)
Throttle Valve	Red	.689 (17.50)

Reassembly

1. Coat all components with ATF. To reassemble, reverse disassembly procedure. Position NEW No. 2 gasket, plate and NEW No. 1 gasket on lower valve body. Ensure gaskets are installed in correct locations. See **Fig. 47**.
2. Place lower valve body with plate and gaskets on upper valve body. DO NOT let components separate. Align each bolt hole in valve bodies with gaskets and plate. Turn assembly over and install lower valve body cover.
3. Install and finger tighten bolts in lower valve body to secure upper valve body. See **Fig. 43**. Tighten valve body bolts to specifications. See **TORQUE SPECIFICATIONS**. Install NEW "O" rings on solenoids. Lubricate "O" rings with ATF and install solenoids. Tighten torque converter clutch solenoid bolt to 58 INCH lbs. (6.5 N.m). Tighten No. 2 solenoid bolt to 89 INCH lbs. (10 N.m).

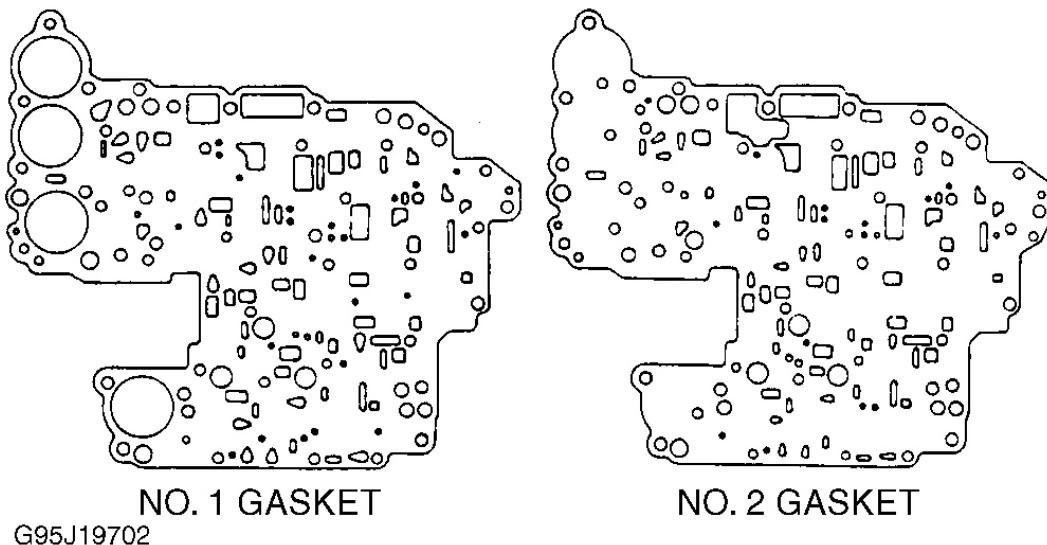


Fig. 47: Identifying Valve Body Gaskets

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

MANUAL SHIFT LINKAGE

Disassembly & Reassembly

Unstake manual valve shaft spacer and remove. Drive out roll pin. Remove retaining hitch pin. Slide out shaft and remove manual valve lever and washer. Replace shaft seal as needed. To reassemble, reverse disassembly procedure.

DIFFERENTIAL

Disassembly

1. Mark ring gear and differential case for reassembly reference. Remove ring gear bolts and lock tabs. Using brass hammer, tap ring gear from differential case. Remove bearings from differential case using appropriate bearing splitter and puller. Remove speedometer drive gear.
2. Use a dial indicator to check side gear backlash. Hold one pinion against differential case. Measure side gear backlash. See **Fig. 48** . Backlash should be .002-.008" (.05-.20 mm). If backlash is not within specification, side gear thrust washers must be replaced.
3. Drive out pinion shaft lock pin from ring gear side. Remove pinion shaft, pinion gears, side gears, and thrust washers. See **Fig. 49** . Remove oil seals from transaxle housing and transaxle case. Remove bearing outer races and shims from transaxle case and housing.

Inspection

Clean all parts with solvent. Dry parts using compressed air. Check bearings and gears for wear or damage. Replace parts as necessary.

Reassembly

1. Install bearing outer races and original shims in transaxle housing and case. Select thrust washers that will ensure correct side gear backlash. Thrust washers are available in .002" (.05 mm) increments, in thicknesses from .037-.047" (.95-1.20 mm). Install thrust washers and side gears in differential case.
2. If possible, install same size thrust washers on both sides. Install pinion gears and pinion shaft. Check gear backlash to ensure proper thrust washers are used. When backlash is correct, drive lock pin through differential case and into pinion shaft. Stake differential case to retain lock pin.
3. Press side bearing on differential case. Install speedometer drive gear on differential case. Install remaining side bearing on differential case.
4. Install differential in transaxle case. Install transaxle housing. Install bolts in correct locations and tighten bolts to 21 ft. lbs. (29 N.m). See **Fig. 50** . Measure differential bearing preload, using Differential Preload Adapter (09564-32011) and an INCH-lb. torque wrench. See **Fig. 51** .
5. Preload must be within specification. See **DIFFERENTIAL PRELOAD SPECIFICATIONS** table. If preload is incorrect, remove differential from transaxle case and replace adjusting shim under bearing. Adjusting shims are available in thicknesses of .079-.114" (2.00-2.90 mm) in .002" (.05 mm) increments. Preload will change approximately 2.6-3.5 INCH lbs. (.3-.4 N.m) with each shim thickness.
6. When correct preload is obtained, remove differential from transaxle case. Install ring gear on differential case. Clean ring gear and mounting surface. Heat ring gear to 212°F (100°C) in an oil bath. DO NOT heat

ring gear to temperatures greater than 230°F (110°C). Align ring gear on differential case and install NEW bolts. Tighten bolts evenly in crisscross pattern to 72 ft. lbs. (97 N.m).

7. Stake locking tabs. Stake one tab flush with flat surface of nut. Stake 2nd tab against corner of nut on tightening side. Coat lip of oil seals with multipurpose grease.

DIFFERENTIAL PRELOAD SPECIFICATIONS

Application	INCH Lbs. (N.m)
New Bearings	7.1-12.4 (.8-1.4)
Used Bearings	3.5-6.2 (.4-.7)

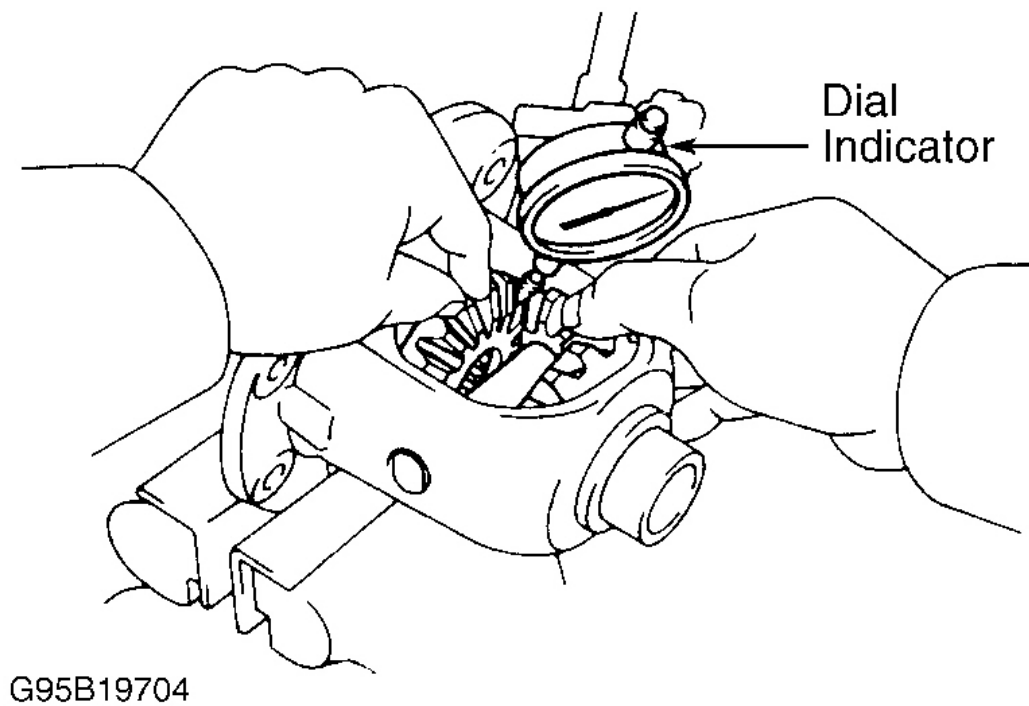


Fig. 48: Measuring Differential Pinion Gear Backlash
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

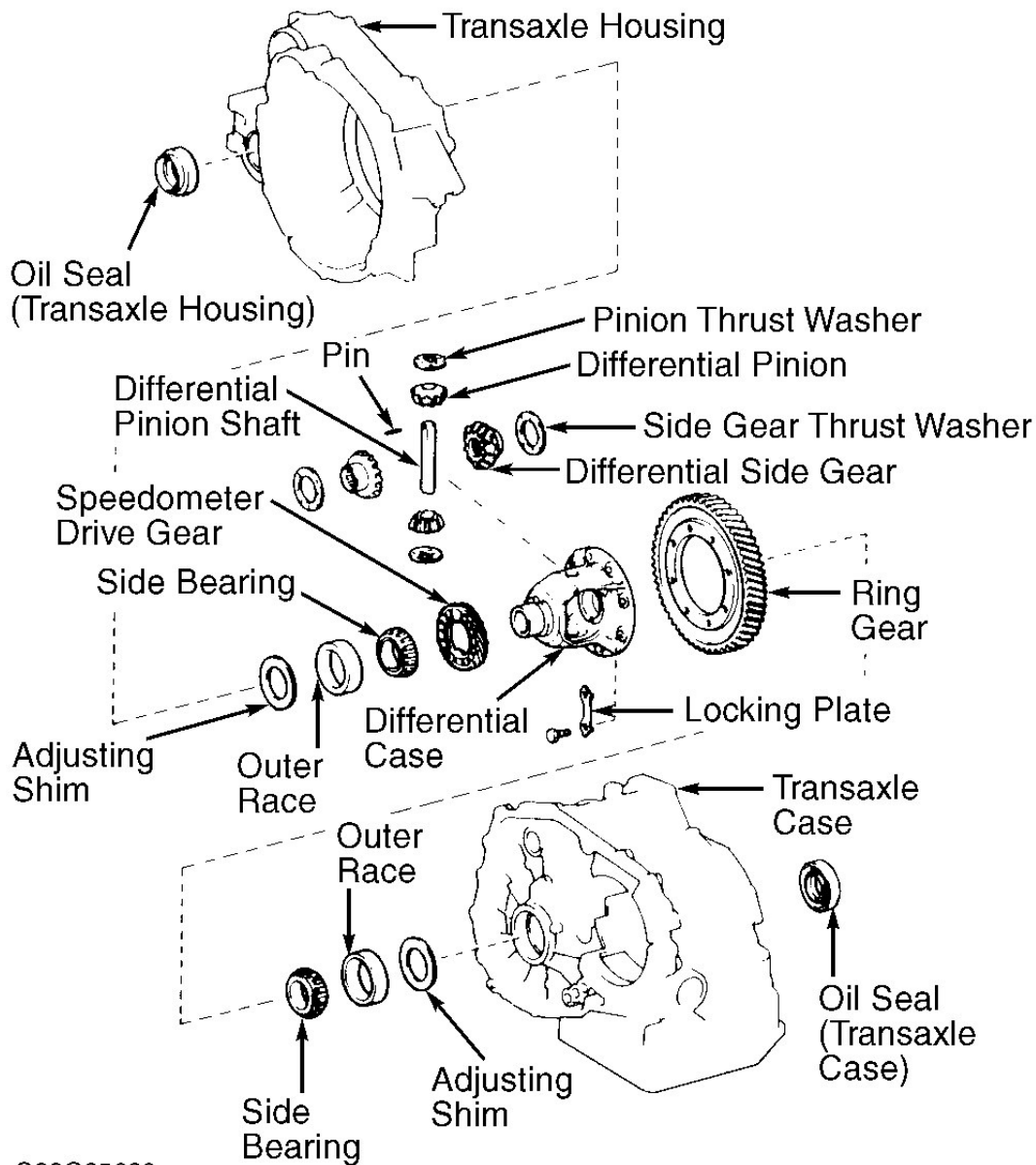


Fig. 49: Exploded View Of Differential Assembly
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

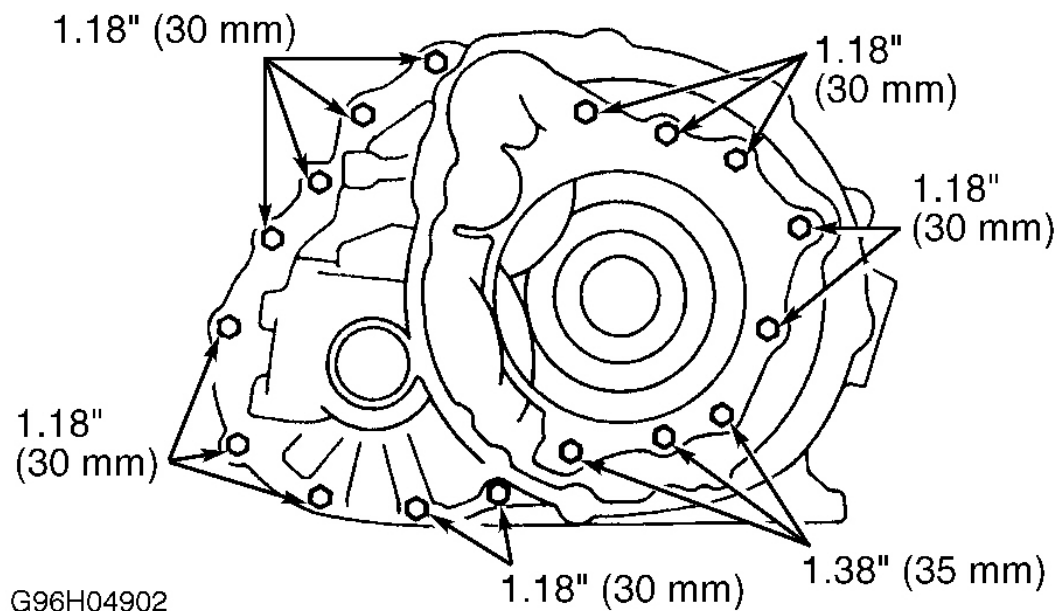


Fig. 50: Installing Transaxle Housing Bolts

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

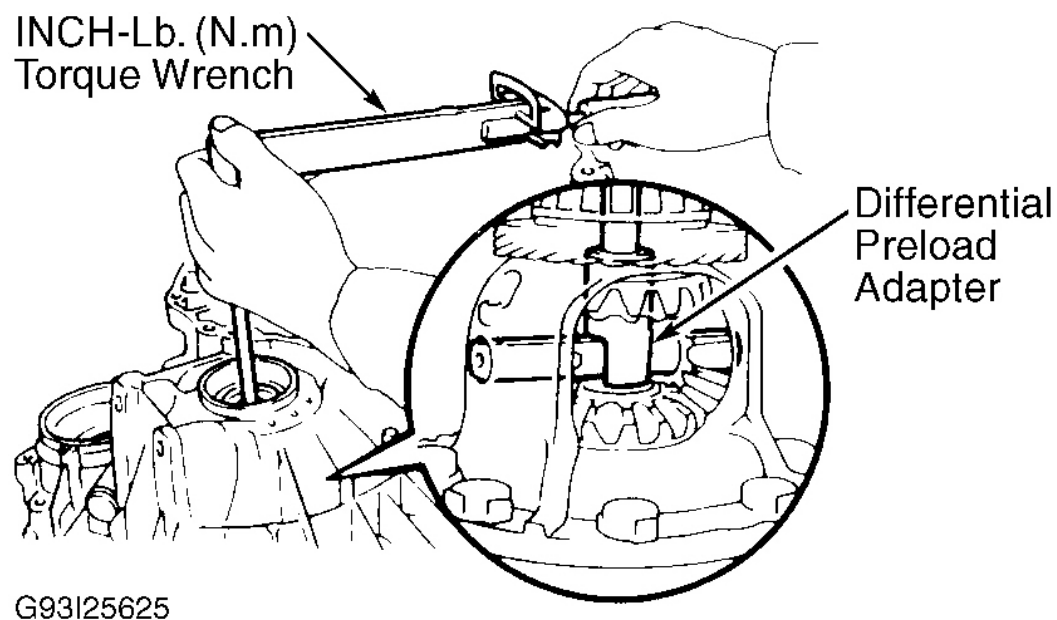


Fig. 51: Measuring Differential Bearing Preload

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

TRANSAXLE REASSEMBLY

NOTE: Coat all oil seal rings, discs, plates, rotating parts and sliding surfaces with ATF prior to reassembly. Use petroleum jelly to hold bearings and races in place. Discs should be soaked in ATF for at least 15 minutes prior to installation.

NOTE: For bearing race and thrust bearing specifications and location, see [Fig. 64](#).

1. Install oil tube apply cover and gasket (if equipped). Install oil tubes. Install oil tube clamps. Install underdrive brake accumulator piston and spring. See [Fig. 22](#).
2. Install oil gallery cover and gasket. Tighten bolts to 89 INCH lbs. (10 N.m). Apply thread sealant to screws for oil gallery cover. Install screws and tighten to 65 INCH lbs. (7.0 N.m).
3. Install cam guide bracket. Install parking lock rod in guide bracket. Install parking lock sleeve with raised portion up. Install stopper plate on raised portion of lock sleeve. Install guide sleeve and spring. Install parking lock pawl, pawl shaft and shaft clamp. See [Fig. 22](#).
4. Install NEW "O" rings on 1st and reverse brake piston. Lubricate "O" rings with ATF. Using appropriate compressor, press 1st and reverse brake piston into transaxle case.
5. Install piston return spring and snap ring. Avoid bending spring retainer by overtightening bolt. See [Fig. 20](#). Ensure snap ring is fully seated and centered by 3 lugs on spring retainer. Ensure end gap of snap ring is not aligned with spring retainer claw.
6. Install underdrive brake piston "O" rings. Coat "O" rings with ATF. Install piston in transaxle case with cup side upward. Use care not to damage "O" rings. Install brake piston return spring. Install plates and discs. Start with plate and alternate with disc ending with disc. Install flange with flat end down.
7. Using appropriate compressor, compress return spring. Install snap ring. Ensure snap ring end gap is not aligned with cutout. Using compressed air, confirm underdrive brake piston moves smoothly. See [Fig. 19](#). Install oil seal rings to transaxle case.
8. Place counterdrive gear on press platform with NEW spacer installed. Place case on gear. Press bearing onto counterdrive shaft until seated. Install intermediate shaft. Install lock nut. Secure counterdrive gear from turning and tighten lock nut to 131 ft. lbs. (177 N.m).
9. Using INCH-lb. torque wrench, measure starting torque of intermediate shaft at counterdrive gear lock nut. Starting torque for new bearings is 2.7-6.2 INCH lbs. (.3-.7 N.m). Starting torque for used bearings is 1.8-3.5 INCH lbs. (.2-.4 N.m).
10. If starting torque is less than specification, replace spacer and recheck. Stake lock nut in place.
11. Install underdrive one-way clutch assembly. Install anti-rattle clip. Align clutch disc tabs in underdrive brake and install underdrive clutch assembly. Check operation of underdrive one-way clutch. Clutch should turn freely counterclockwise and lock clockwise. See [Fig. 52](#).
12. Measure clutch assembly height from sleeve to inner race. Height should be .681-.717" (17.29-18.21 mm). See [Fig. 53](#). Check underdrive clutch piston stroke. Position dial indicator stem on underdrive clutch assembly. See [Fig. 54](#). Apply compressed air to oil passage in transaxle case. See [Fig. 19](#).
13. Piston stroke should be .059-.075" (1.50-1.90 mm). If piston stroke is not within specification, install correct flange. Flanges are available in thicknesses of .080" (2.04 mm), .087" (2.20 mm), .094" (2.40 mm) and .098" (2.50 mm). Install thrust bearing "G". See [Fig. 64](#). Install sun gear in transaxle case.

14. Align clutch disc tabs in underdrive clutch. Install countershaft assembly. Check countershaft height. Measure distance from tip of countershaft to bolt seat of clutch support. See **Fig. 55** . Countershaft height should be 1.193-1.280" (30.30-32.50 mm).
15. Install thrust bearing "F". See **Fig. 64** . Press in counterdriven gear. Install NEW lock nut. Using holder and adapter, tighten lock nut to 133 ft. lbs. (180 N.m). Stake lock nut. Using a dial indicator, measure countershaft end play. End play should be .008-.035" (.20-.89 mm).
16. Apply gasket sealer to rear cover sealing areas. Install transaxle rear cover and bolts. Ensure bolts are installed in correct locations. See **Fig. 56** . Tighten bolts to 89 INCH lbs. (10 N.m). Ensure intermediate shaft turns smoothly.

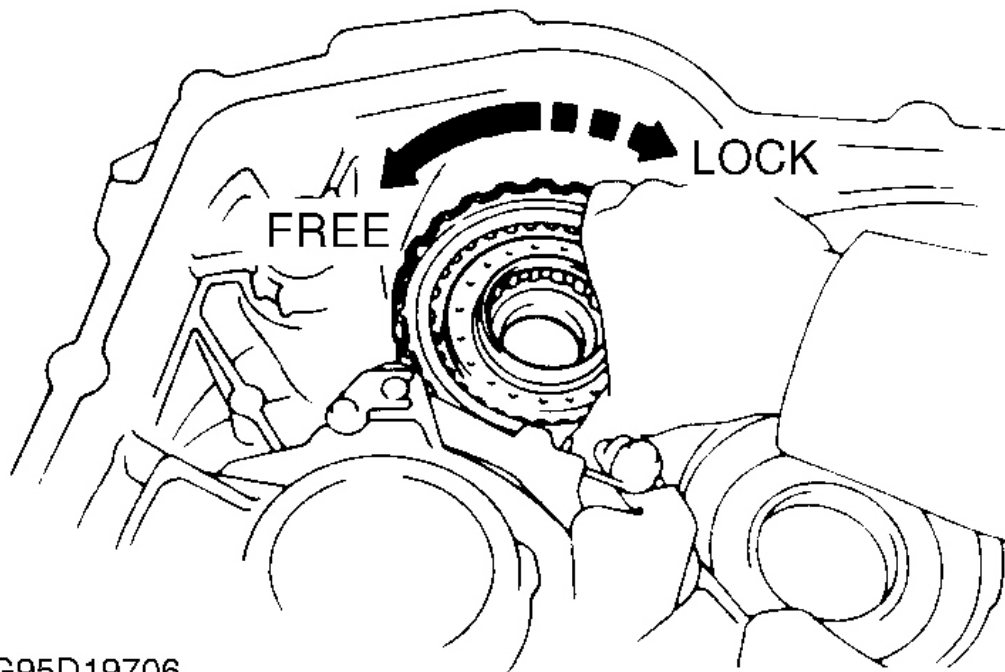


Fig. 52: Checking Underdrive Clutch Operation

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

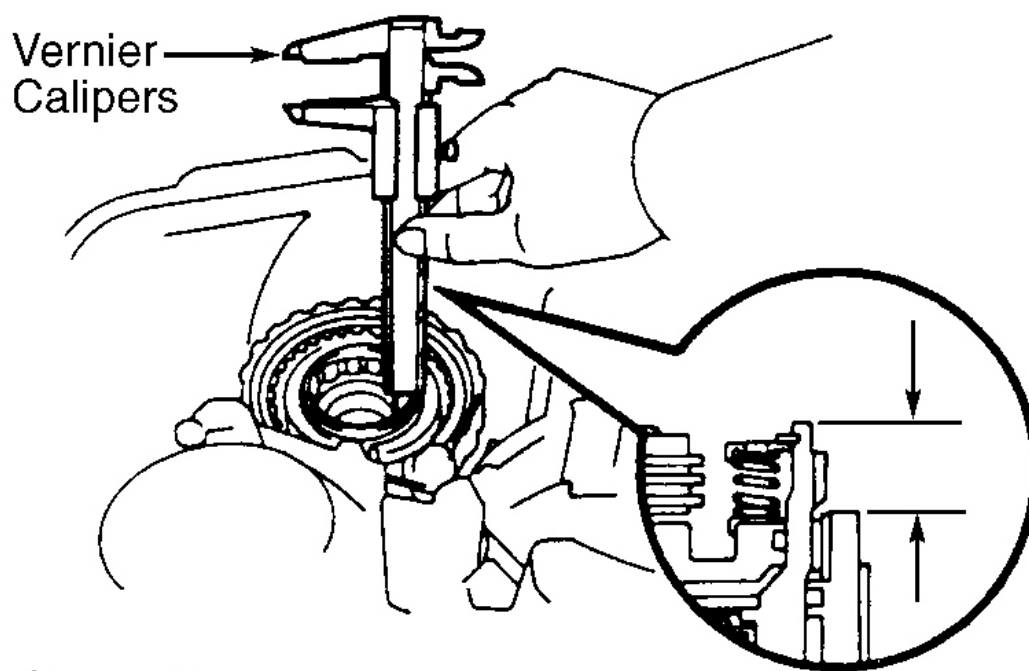
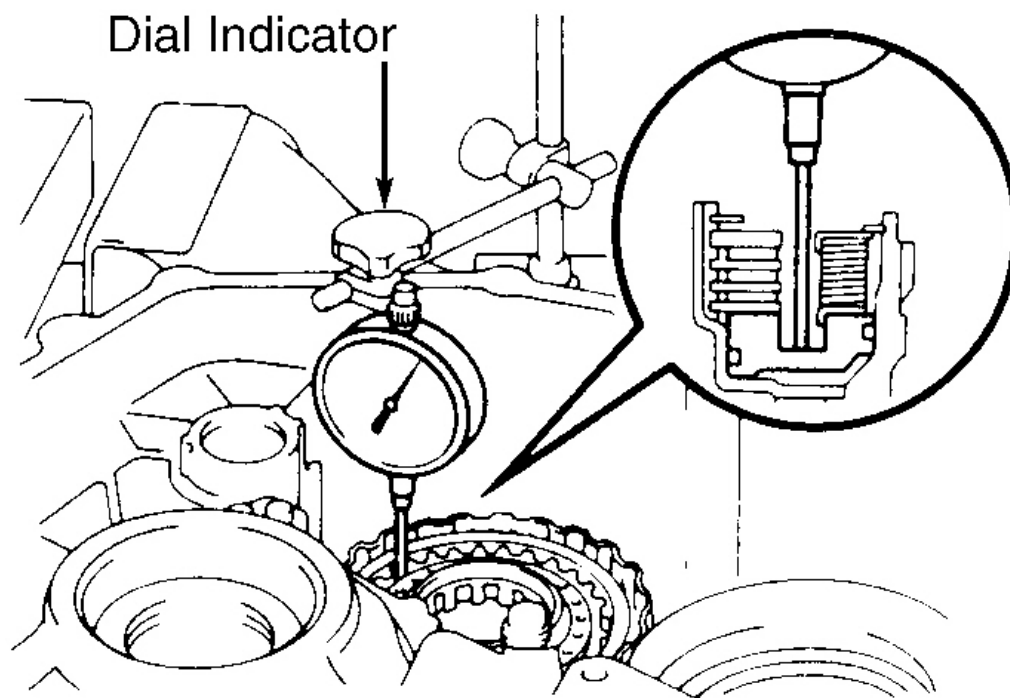


Fig. 53: Measuring Underdrive Clutch Assembly Height
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 54: Measuring Underdrive Clutch Piston Stroke
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

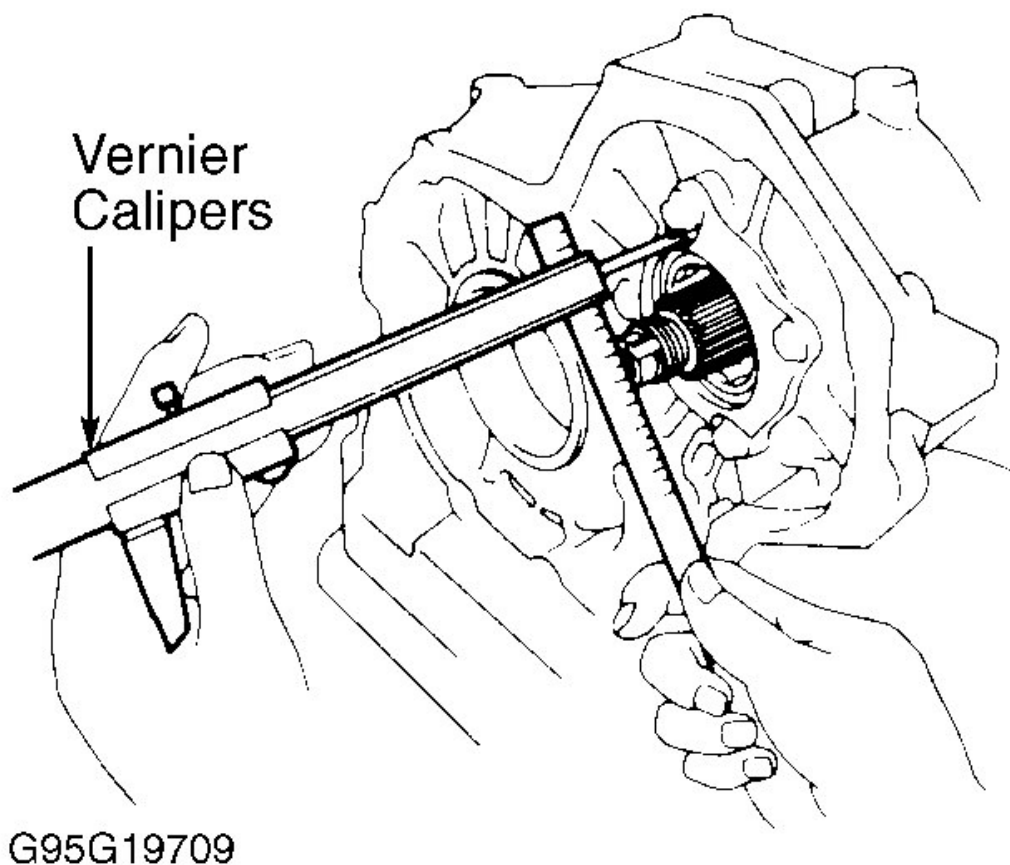


Fig. 55: Measuring Height Of Countershaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

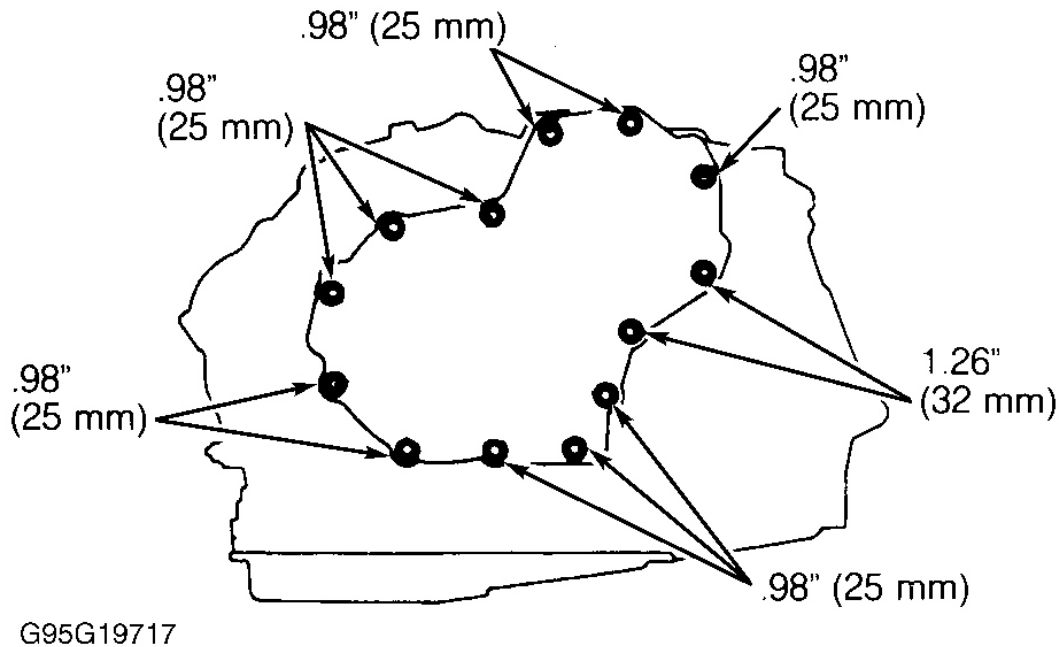


Fig. 56: Identifying Transaxle Rear Cover Bolts

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

17. Install 1st and reverse brake components in transaxle case. Install discs and plates. Start with plate, alternate with disc, ending with disc. Install outer flange with flat area facing inward. Install snap ring in groove. Ensure end gap does not align with transaxle case cutout.
18. Check 1st and reverse brake clutch pack clearance. See **Fig. 18**. Clearance should be .047-.093" (1.19-2.35 mm) on A-245E models. Clearance should be .047-.089" (1.19-2.25 mm) on A-247E models. On all models, install thrust bearing and races "A" in rear planetary ring gear. See **Fig. 64**. Align disc tabs. Install thrust washer on rear planetary gear. Ensure tabs align with grooves of gear.
19. Align spline of planetary gear with tabs of 1st and reverse brake discs. Install rear planetary gear into 1st and reverse brake. Ensure inner surface of rear planetary gear is below upper surface of flange. See **Fig. 57**. Install No. 2 one-way clutch with shiny side upward. Rotate planetary gear clockwise while installing No. 2 one-way clutch.
20. Check No. 2 one-way clutch operation. Planetary gear should rotate clockwise and lock counterclockwise. See **Fig. 58**. Install thrust washer on planetary gear. Install snap ring. Ensure end gap of snap ring is not aligned with case cutouts.
21. Install 2nd brake flange with flat end facing upward. Install discs and plates, starting with disc, alternating with plate and ending with plate. Install piston return spring assembly with springs over case protrusions. Install 2nd brake band guide with tip contacting transaxle case. Align 2nd brake drum groove with bolt in transaxle case.
22. Install 2nd brake drum. Install snap ring in groove while compressing piston return springs with hammer handles. Ensure end gap of snap ring is not aligned with transaxle case cutouts. Install 2nd brake drum gasket in center oil passage until it contacts 2nd brake drum. Apply compressed air into 2nd brake oil

passage in transaxle case. Ensure 2nd brake piston operates smoothly. See **Fig. 17**.

23. Align 2nd brake disc tabs. Install No. 1 one-way clutch and 2nd brake hub. Check distance between surface of 2nd brake hub and rear planetary gear. See **Fig. 59**. Distance should be approximately .20" (5.0 mm). Install thrust washer on sun gear input drum. Install sun gear and sun gear input drum. Rotate sun gear clockwise while installing gear into one-way clutch.
24. Install thrust bearing and race "B" on front planetary gear. See **Fig. 64**. Install planetary gear. Install thrust bearing and race "C" on front planetary ring gear. See **Fig. 64**. Install front planetary ring gear. Install intermediate shaft oil seal ring.
25. If components installed in transaxle case are correctly installed, end of ring gear flange bushing will be even or slightly lower than intermediate shaft shoulder. See **Fig. 60**. Install thrust bearing and races "D" on tip of ring gear flange. Install 2nd coast brake band into transaxle case. Install pin.
26. Install thrust bearing and race "E" on forward clutch drum. See **Fig. 64**. Install clutch drum thrust washer on direct clutch drum with oil groove facing upward. Align clutch disc tabs. Install direct clutch into forward clutch. If tabs are aligned with hub correctly, end of direct clutch drum bushing will be flush with surfaces of forward clutch.
27. Rotate forward clutch to mesh with front planetary gear and discs. Install direct clutch and forward clutch into transaxle case. Check installation of direct/forward clutch assembly. Measure distance between direct clutch and sun gear drum (shell). See **Fig. 61**. Distance should be .118" (3.0 mm).
28. Install spring, 2nd coast brake piston and cover into bore. Install snap ring. Ensure front end of piston rod contacts center of 2nd brake band depression.
29. Measure 2nd coast brake piston stroke by applying compressed air to oil passage in transaxle case. See **Fig. 14**. Piston stroke should be .059-.138" (1.50-3.50 mm). Replace rod if stroke is not within specification. Rod lengths are available in lengths of 2.811" (71.40 mm) and 2.870" (72.90 mm). Install apply gasket in transaxle case.
30. Install differential. Install apply tube if removed. Apply gasket sealer (Three Bond 1281 or equivalent) to transaxle housing. Install transaxle housing. Install mounting bolts in original locations. Apply thread sealant to 1.38" (35 mm) bolt threads. See **Fig. 50**. Tighten bolts to 21 ft. lbs. (29 N.m). Check differential side bearing preload. See **DIFFERENTIAL** under COMPONENT DISASSEMBLY & REASSEMBLY.
31. Install race on stator shaft. Install "O" ring on oil pump. Install oil pump. Hold input shaft and lightly press oil pump body to slide oil seal rings on stator shaft through direct clutch drum. Install and tighten bolts to 18 ft. lbs. (25 N.m).

NOTE: **DO NOT apply excessive pressure on oil pump. Seal rings will stick to direct clutch drum if excessive pressure is used.**

32. Ensure input shaft rotates smoothly. Using a dial indicator, measure input shaft end play. End play should be .012-.035" (.30-.90 mm). Replace oil pump race if end play is incorrect. Oil pump races are available in thicknesses of .031" (.80 mm) and .055" (1.40 mm).
33. Coat accumulator piston "O" rings with ATF. Install "O" rings on accumulator pistons. Measure spring free length and replace as necessary. See **ACCUMULATOR SPRING SPECIFICATIONS (A-245E)** or **ACCUMULATOR SPRING SPECIFICATIONS (A-247E)** table. Install pistons and springs in transaxle case. See **Fig. 62**.

ACCUMULATOR SPRING SPECIFICATIONS (A-245E) ⁽¹⁾

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Application	Color	Free Length - In. (mm)
Direct Clutch	Blue	2.768 (70.30)
Forward Clutch		
Inner Spring	Red	1.437 (36.50)
Outer Spring	Red	2.480 (63.00)
Underdrive Clutch		
Inner Spring	Yellow	1.969 (50.00)
Outer Spring	White	2.815 (71.50)
2nd Brake	Brown	2.547 (64.70)
(1) For accumulator spring locations, refer to illustration. See Fig. 62 .		

ACCUMULATOR SPRING SPECIFICATIONS (A-247E) ⁽¹⁾

Application	Color	Free Length - In. (mm)
Direct Clutch	Green	2.547 (64.70)
Forward Clutch		
Inner Spring	Red	1.437 (36.50)
Outer Spring	Red	2.780 (70.60)
Underdrive Clutch		
Inner Spring	(2)	(2)
Outer Spring	White	2.815 (71.50)
2nd Brake	Yellow	2.685 (68.20)
(1) For accumulator spring locations, refer to illustration. See Fig. 62 .		
(2) Information is not available from manufacturer.		

34. Install 2nd brake apply gasket. Install check ball body and spring in passage next to 2nd brake accumulator. Install throttle cable. Use care not to damage "O" ring. Ensure cable is fully seated in transaxle case. Install solenoid wire(s) in transaxle case. Install valve body assembly. See **VALVE BODY ASSEMBLY** under REMOVAL & INSTALLATION. Ensure proper length bolt is installed in proper location. Connect solenoid wiring.
35. Install manual detent spring and cover. Install bolt and tighten bolt to 89 INCH lbs. (10 N.m). Ensure manual valve lever is in contact with center of roller at tip of detent spring. Install oil tubes. Install oil tube clamp and bracket. Tighten bolts to 89 INCH lbs. (10 N.m). Install oil strainer (filter) with NEW

gasket.

36. Install magnet(s) in oil pan. Install NEW oil pan gasket and install oil pan. Tighten oil pan bolts to 46 INCH lbs. (5.2 N.m). Install throttle cable and solenoid lock plates.
37. Install oil cooler pipe unions (if necessary). Install park/neutral position switch to manual valve shaft. Install packing, nut, stopper and nut. Tighten nut to 106 INCH lbs. (12 N.m). Adjust park/neutral position switch (if necessary) and tighten adjusting bolts to 48 INCH lbs. (5.4 N.m). See appropriate AUTOMATIC TRANSMISSION SERVICING article in TRANSMISSION SERVICING. Stake nut to stopper. Install manual shift lever and tighten nut. Install filler tube and dipstick. Install oil cooler pipes.
38. Install torque converter on transaxle. Using a straightedge and calipers, measure torque converter installed depth. For torque converter depth specifications, see **TORQUE CONVERTER DEPTH SPECIFICATIONS** table. See **Fig. 63**.

TORQUE CONVERTER DEPTH SPECIFICATIONS

Application	In. (mm)
Chevrolet Prizm	.906 (23.00)
Corolla 1.8L	.528 (13.40)
RAV4	.502 (12.75)

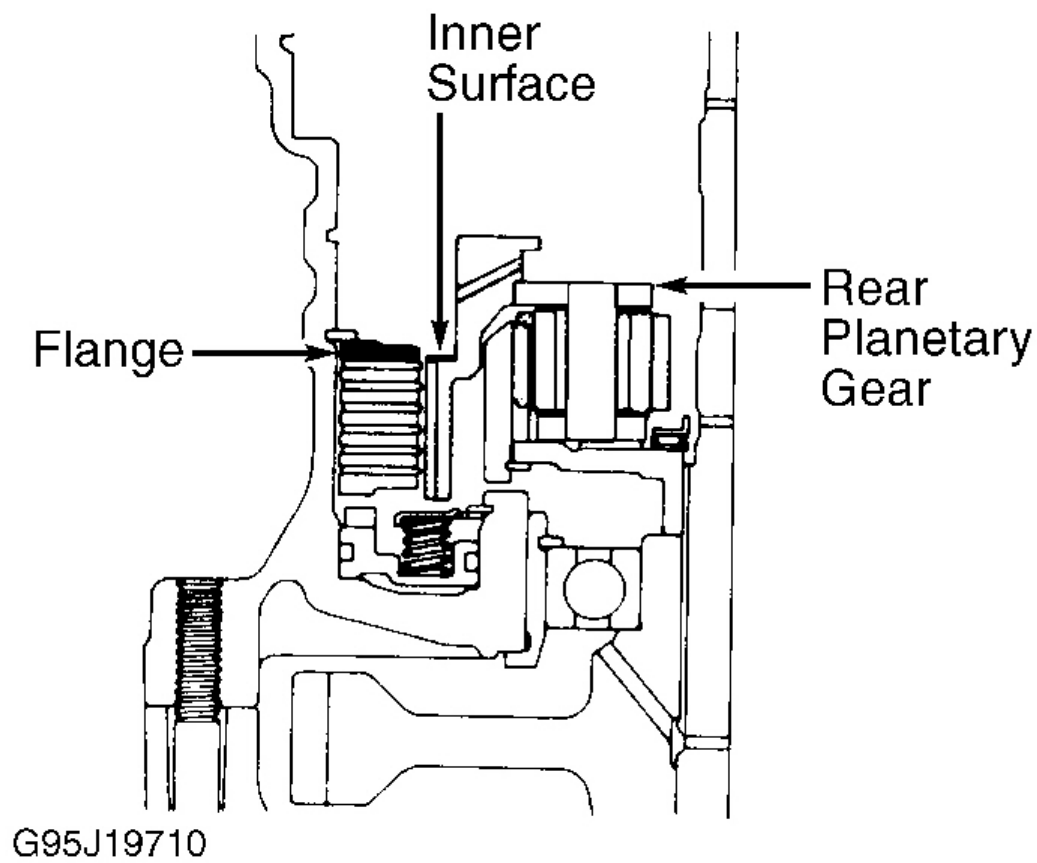


Fig. 57: Checking Rear Planetary Installation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

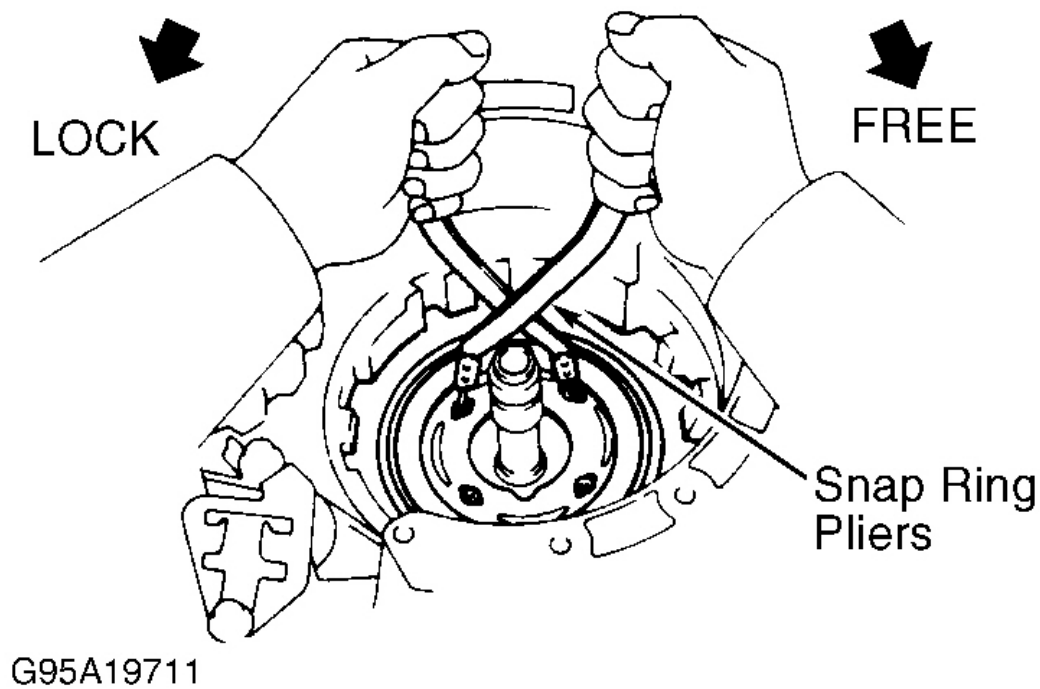
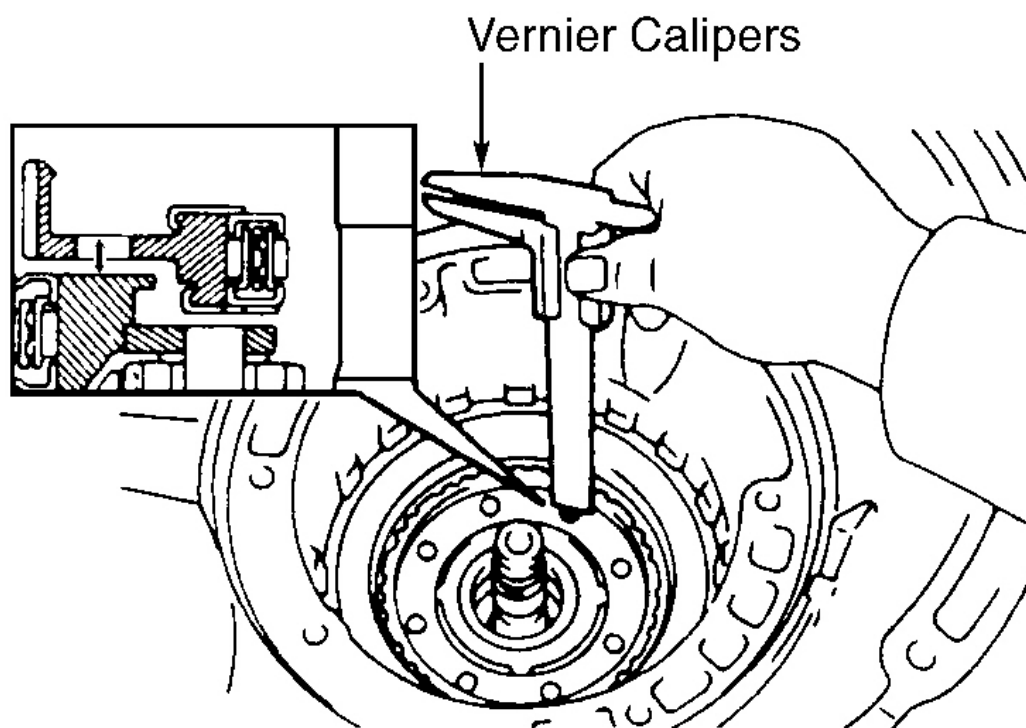


Fig. 58: Checking No. 2 One-Way Clutch Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



G95B19712

Fig. 59: Checking 2nd Brake Hub Installation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

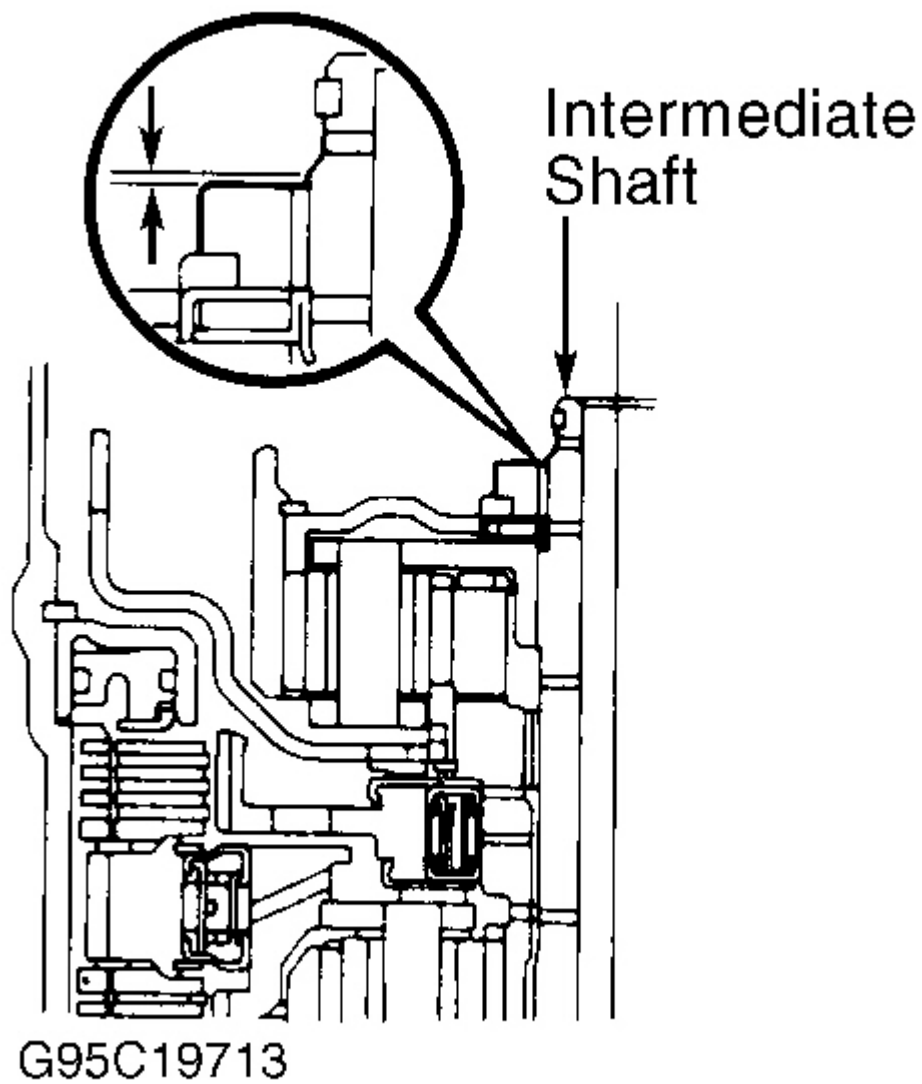


Fig. 60: Checking Front Planetary Ring Gear Installation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

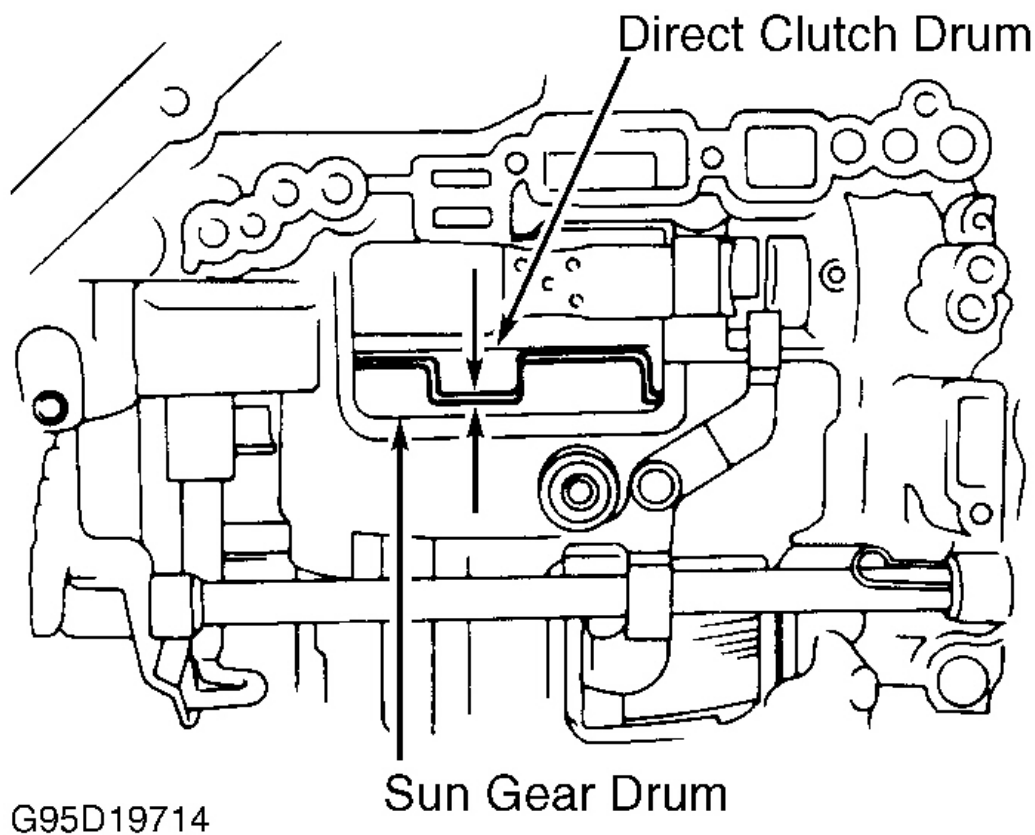


Fig. 61: Checking Direct/Forward Clutch Drum Assembly Installation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

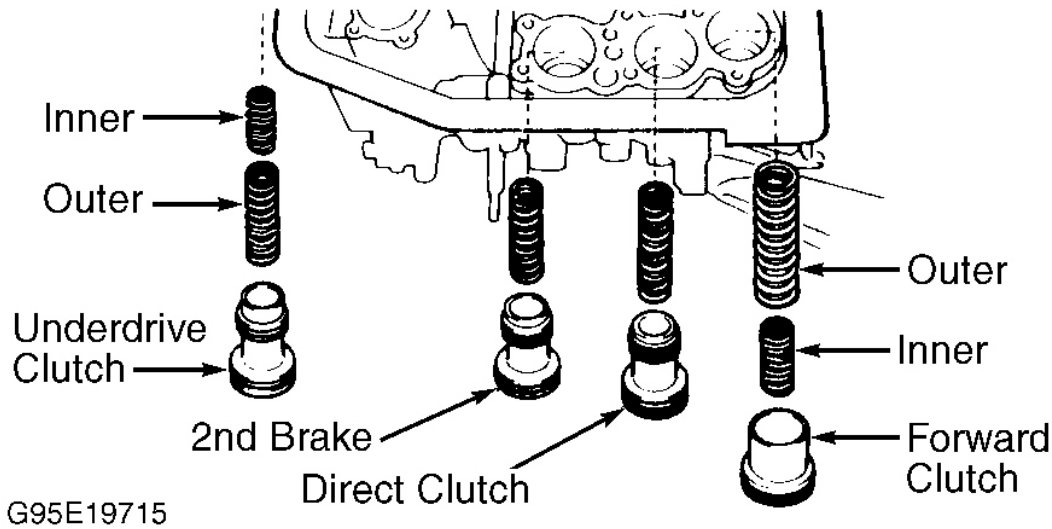


Fig. 62: Identifying Accumulator Pistons & Springs
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

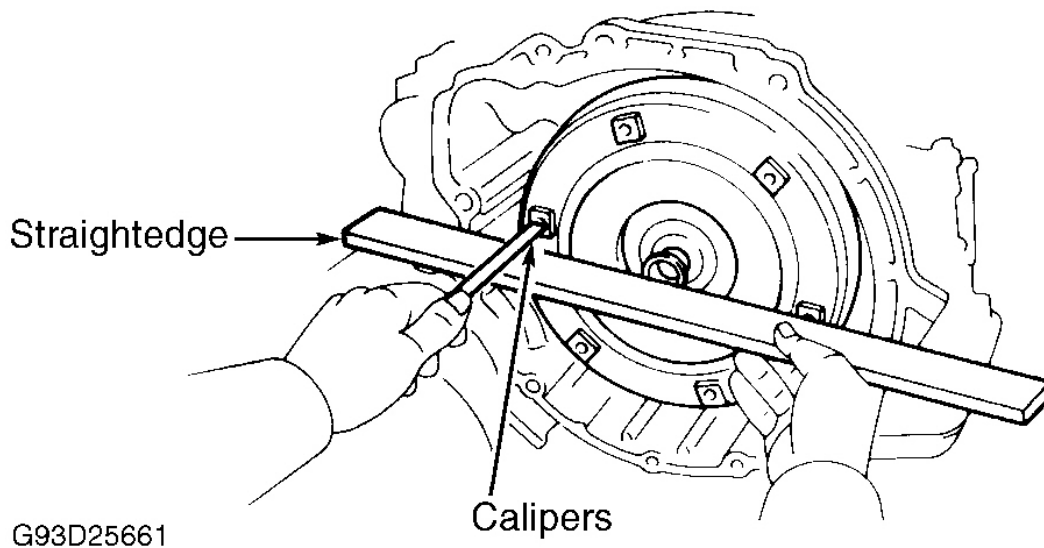


Fig. 63: Measuring Torque Converter Depth
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

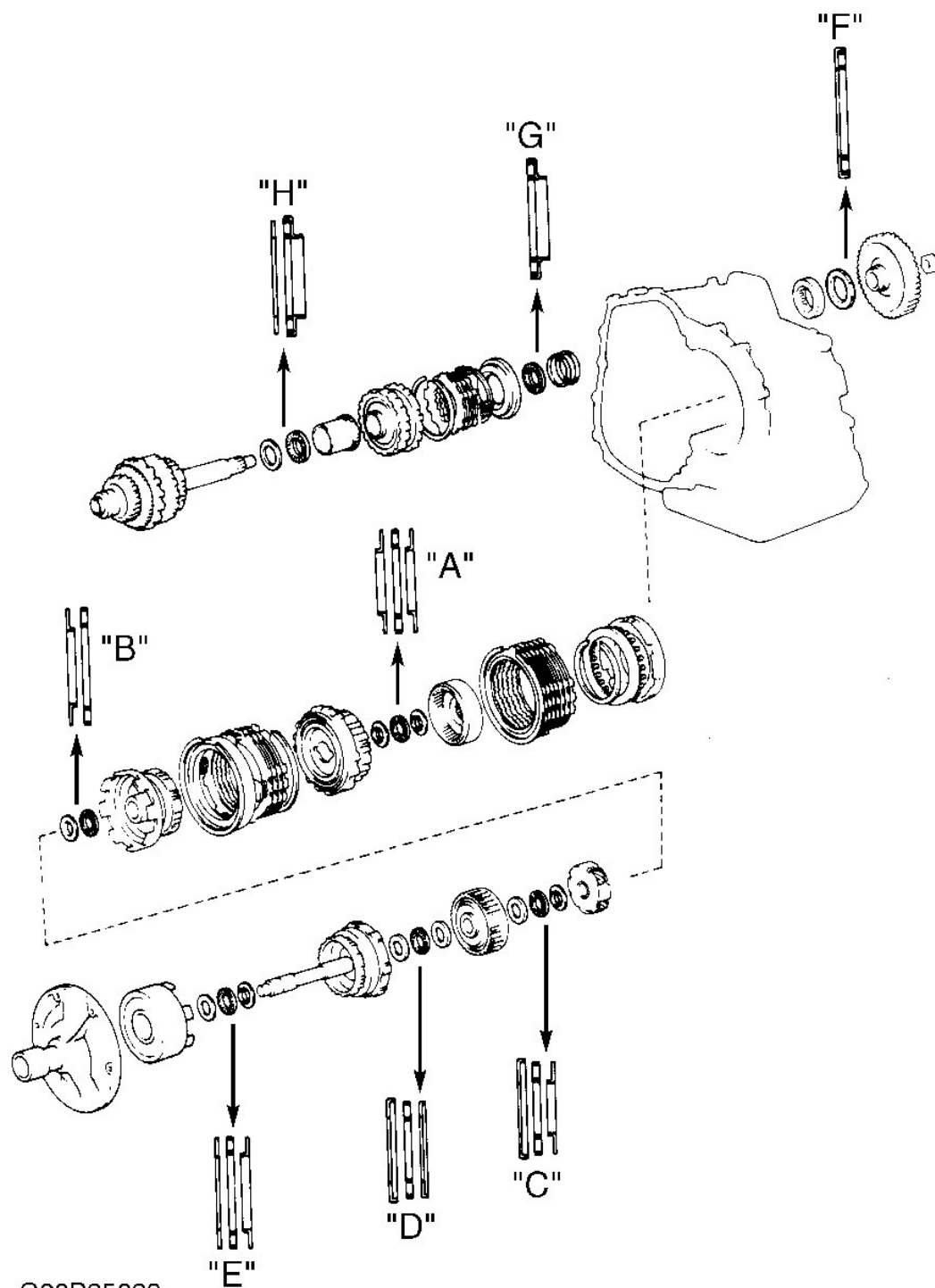


Fig. 64: Identifying Bearing Race & Thrust Bearing Locations
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Bearing Retainer Bolt	13 (17)
Converter-To-Drive Plate Bolt	
Chevrolet Prizm	14 (19)
Corolla	18 (25)
RAV4	20 (27)
Countershaft Gear Lock Nut	131-159 (177-216)
Drain Plug	13 (17)
Drive Plate Bolt	
Chevrolet Prizm & RAV4	61 (83)
Corolla	47 (64)
Oil Cooler Union Nut	22 (30)
Oil Pump Bolt	18 (25)
Ring Gear Bolt	72 (97)
Transaxle Housing Bolt	21 (29)
	INCH Lbs. (N.m)
Accumulator Cover Bolt	89 (10)
Apply Pipe Bracket Bolt	48 (5.4)
Brake Band Guide Bolt	48 (5.4)
Manual Detent Spring Bolt	89 (10)
Oil Gallery Cover Bolt	89 (10)
Oil Pan Bolt	
Chevrolet Prizm	43 (4.9)
Corolla	48 (5.4)
RAV4	47 (5.2)
Oil Pump Stator Shaft Bolt	89 (10)
Oil Strainer Bolt	89 (10)
Oil Tube Clamp Bolt	
Except RAV4	89 (10)
RAV4	48 (5.4)
Park/Neutral Position Switch	
Adjusting Bolt	106 (12)
Retaining Nut	48 (5.4)
Parking Lock Pawl Bracket Bolt	65 (7.4)
Parking Lock Pawl Spring Bolt	115 (13)
Pressure Relief Valve	57 (6.4)
Sensor Bracket Bolt	115 (13)
Sensor Cover Bolt	48 (5.4)

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Solenoid Bolt

Single Solenoid	58 (6.5)
Other Solenoids	89 (10)
Speed Sensor Bolt	48 (5.4)
Transaxle Rear Cover Bolt	89 (10)
Upper-To-Lower Valve Body Bolt	58 (6.5)
Underdrive Brake Accumulator	
Bolt	89 (10)
Screw	65 (7.4)
Valve Body-To-Transaxle Bolt	89 (10)

CLUTCH DISC & PLATE SPECIFICATIONS**NOTE:** Information for A-247E transaxle is not available from manufacturer.**CLUTCH DISC & PLATE QUANTITY (A-245E)**

Application	Disc	Plate
Direct Clutch	3	3
Forward Clutch	4	4
Underdrive Brake	3	3
Underdrive Clutch	3	3
1st & Reverse Brake	6	6
2nd Brake	3	3

THRUST BEARING & RACE SPECIFICATIONS**THRUST BEARING & RACE SPECIFICATIONS (1) (2)**

Application	O.D. - In. (mm)	I.D. - In. (mm)
"A"		
Front Race	1.480 (37.6)	.949 (24.1)
Bearing	1.480 (37.6)	.870 (22.1)
"B" Bearing	1.772 (45)	1.106 (28.1)
"C"		
Rear Race	1.378 (35)	.748 (19.0)
Bearing	1.496 (38)	.866 (22.0)
"D"		
Rear Race	1.555 (39.5)	1.024 (26.0)
Bearing	1.654 (42)	1.016 (25.8)
"E" Bearing	1.811 (46)	1.209 (30.7)
"F" Bearing	2.283 (58)	1.614 (41.0)
"G" Bearing	1.728 (43.9)	1.220 (31.0)

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"H"

Front Race	1.646 (41.8)	1.181 (30.0)
Bearing	1.728 (43.9)	1.220 (31.0)

(1) For bearing race and thrust bearing specifications and location, see **Fig. 64** .

(2) O.D. = Outside Diameter; I.D. = Inside Diameter.

TRANSAXLE SPECIFICATIONS

TRANSAXLE SPECIFICATIONS

Application	In. (mm)
Assembly Height (Underdrive Clutch)	.681-.717 (17.29-18.21)
Bushing Inside Diameter	
Direct Clutch	1.900 (48.27)
Oil Pump Body	1.503 (38.18)
Planetary Sun Gear	
Standard	1.173-1.174 (29.80-29.83)
Maximum	1.176 (29.87)
Ring Gear Flange	.749-.750 (19.03-19.05)
Stator Shaft	
Front	.849 (21.57)
Rear	1.066 (27.07)
Sun Gear Flange	.867-.868 (22.03-22.05)
Underdrive Clutch (Front)	
Standard	1.831-1.832 (46.50-46.53)
Maximum	1.833 (45.57)
Underdrive Clutch (Rear)	
Standard	2.165-2.167 (55.00-55.03)
Maximum	2.169 (55.08)
Countershaft End Play	.008-.035 (.20-.89)
Countershaft Height	1.193-1.280 (30.30-32.50)
Input Shaft End Play	.012-.035 (.30-.90)
Piston Stroke	
Direct Clutch	.044-.060 (1.12-1.52)
Forward Clutch	.056-.071 (1.42-1.81)
Underdrive Clutch	.059-.075 (1.50-1.90)
2nd Coast Brake	.059-.138 (1.50-3.50)
Planetary Pinion Gear	
Thrust Clearance	.008-.020 (.20-.50)
Side Gear Backlash	.002-.008 (.05-.20)
Underdrive Brake Clutch Pack Clearance	.045-.078 (1.15-1.97)

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1st & Reverse Brake Pack Clearance

A-245E	.047-.093 (1.19-2.35)
A-247E	.047-.089 (1.19-2.25)