1988-90 AUTOMATIC TRANSMISSIONS

Toyota A-241E, A-241H, A-241L & A-243L - Overhaul

APPLICATION

TRANSMISSION APPLICATIONS

Vehicle Application	Transmission Model
1990 Celica (GTS)	A-241E
1990 Celica (ST)	A-241L
1990 Celica (GT)	A-243L
1988-90 Corolla (All-Trac 4WD)	A-241H
1988-90 MR2	A-241E

IDENTIFICATION

Vehicle Identification Number (VIN) is stamped on cowl panel, manufacturer's plate, vehicle identification number plate and certification regulation label.

DESCRIPTION

Models A-241L and A-243L transaxles feature a torque converter with lock-up clutch, 4-speed planetary gear unit, hydraulic control system and electronic control system. To minimize possibility of incorrect operation of vehicle transaxle, a shift lock mechanism is incorporated.

The A-241E transaxle is an Electronically Controlled Transaxle (ECT). Transaxle control ECU has been integrated with engine ECU. When shifting transaxle, engine torque is controlled and clutch hydraulic in transaxle is electronically controlled to reduce transmission shift shock. The MR2 A-241E Transaxle is installed in rear of vehicle.

Model A-241H is a 4WD automatic transaxle. A-241H transaxle has a center differential and a transfer case attached. This transaxle has a hydraulic multiplate clutch in center differential limiting control mechanism. Fluid pressure acting on hydraulic multiplate clutch is controlled by the Electronic Control Unit (ECU) according to vehicle driving conditions. Torque is distributed to front and rear wheels appropriately at all times to maximize overall performance of the 4WD vehicle.

NOTE: Special handling methods are necessary for full time 4WD vehicles during inspection and maintenance. Refer to TRANSMISSION SERVICING.

LUBRICATION

See appropriate article in AUTOMATIC TRANSMISSION SERVICING.

TESTING

PRELIMINARY CHECKS

Before testing transaxle, ensure fluid level is correct, transfer oil level is correct, gear selector and throttle cable are adjusted, neutral start switch is adjusted and idle speed is correct. To aid in transaxle fault diagnosis, determine if fault is hydraulic, electronic or a combination of both. The A-241E transaxle control unit is capable of storing self-diagnostic codes. To determine if a fault is electrical, retrieve any stored diagnostic codes. Rectify associated electrical fault. See appropriate AUTO TRANS DIAGNOSIS article.

ROAD TEST

NOTE: Perform test at normal operating fluid temperature 122-176° F (50-80° C). Conduct a test under both NORMAL and POWER patterns on A-241E. There is no overdrive upshift when coolant temperature is below 127° F (53° C). When coolant temperature is below 140° F (60° C), shift is lower than specified in A-241E SHIFT SPEED SPECIFICATION tables.

"D" Range Test

1. Shift into "D" range. Hold accelerator pedal constantly at full throttle position. Check 1-2, 2-3 and 3-OD upshift points.
   - If no 1-2 upshift occurs, governor valve is defective or 1-2 shift valve is faulty or No. 2 solenoid is faulty on A-241E.
   - If no 2-3 gear upshift occurs, 2-3 shift valve is faulty or No. 1 solenoid is faulty on A-241E.
   - If no 3-OD gear upshift occurs (with throttle valve opening at less than 86%), 3-4 shift valve is faulty or solenoid valve or circuit defective.
   - Incorrect shift points indicate that throttle cable requires adjustment or throttle valve, 1-2, 2-3 or 3-OD shift valves are faulty or defective.
   - If no lock-up occurs, No. 3 solenoid or lock-up relay valve is faulty on A-241E.
2. Use procedure outlined in step 1) to check shock and slip between 1st-2nd gear, 2nd-3rd gear and 3rd-OD upshifts. Excessive shock can be caused by excessive line pressure, defective accumulator or defective check ball.
3. While driving in "D" range (3rd gear or overdrive) check for unusual noise and vibration. Abnormal noise and vibration may be due to an unbalanced axle shaft, differential, tires, torque converter or other drive train components.

NOTE: Steps 4) and 5) DO NOT apply to model A-241E.

4. While driving in "D" range (2nd, 3rd and OD gears), check kickdown speed for 2nd-1st, 3rd-2nd and OD-3rd downshifts. If kickdown speeds are incorrect, check throttle cable adjustment, throttle valve, and shift valves (1-2, 2-3 and 3-OD).
5. Drive vehicle faster than 29 MPH (37 MPH for A-241H) in OD range. Release foot from accelerator and shift into "L" range. Check downshift speed for OD-3rd, 3rd-2nd and 2nd-1st gears.

Lock-Up Mechanism

Connect tachometer to engine. Drive vehicle at approximately 42 MPH (A-241L), 47 MPH (A-243L), 43 MPH (A-241H) and 41-43 MPH (A-241E) lock-up ON. Lightly depress accelerator pedal. Ensure that RPM does not change abruptly. Large increase in engine RPM indicates that lock-up mechanism is defective.

"2" Range Test

1. Shift to "2" range, while driving with accelerator pedal held constantly at full throttle valve opening position, push in one of the pattern selectors. Ensure 1-2 upshift takes place and shift point conforms to SHIFT SPEED SPECIFICATIONS tables.

NOTE: To prevent overrun, transaxle shifts into 3rd gear at 101 MPH. 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, second coast brake is defective.
3. Check for abnormal noise and shock at acceleration and deceleration.

"L" Range Test

Operate in "L" range. Note that no upshift to 2nd gear occurs. Release accelerator pedal. Check for engine braking. If there is no engine braking effect, 1st/Reverse brake are defective. Note abnormal noise at acceleration and deceleration.

NOTE: To prevent overrun, transaxle upshifts into 2nd gear at 33 MPH on A-241E.

"R" Range Test

Shift into "R"' range. While starting at full throttle, check for slipping.

"P" Range Test

Stop vehicle on slight grade. Shift transaxle into "P". Release parking brake. Ensure parking pawl holds vehicle.

CELICA (GTS) A-241E SHIFT SPEED SPECIFICATIONS (1) (1990)

Application	MPH
"D" Range	
NORM	
1st-2nd	32-35
2nd-3rd	62-66
3rd-OD	83-88
(2) 3rd-OD	24-27
OD-3rd	11-14
OD-3rd	79-85
3rd-2nd	57-62
2nd-1st	27-30

PWR	
1st-2nd	32-35
2nd-3rd	62-66
3rd-OD	83-88
(2) 3rd-OD	39-42
(2) OD-3rd	11-14
(1) OD-3rd	79-85
(1) 3rd-2nd	58-64
(1) 2nd-1st	27-30
"2" Range	
NORM Or PWR	
1st-2nd	32-35
2nd-1st	27-30
"L" Range	
NORM Or PWR	
2nd-1st	21-24
(1) Wide open throttle.	
(2) Fully closed throttle.	

CELICA (GTS) A-241E LOCK-UP SPEEDS (1) (1990)

Application	MPH
"D" Range (2)	
NORM	
Lock-Up ON in OD	41-43
Lock-Up OFF in OD	37-40
PWR	
Lock-Up ON in OD	48-51
Lock-Up OFF in OD	44-47
(1) Throttle valve opening 5%.	
(2) There is no lock-up in "L" or "2" range.	

COROLLA (ALL TRAC 4WD) A-241H SHIFT SPEED SPECIFICATIONS (1)

Application	MPH
"D" Range	
1st-2nd	29-38 (6)
2nd-3rd	56-65 (6)
(2) 3rd-OD	TO MAX SPEED, (5) 19-29, (4) 11-19, (3)
(2) OD-3rd	TO MAX SPEED,(5) 9-16,(4) 9-16, (3)

3rd-2nd	52-63 (6)
2nd-1st	20-26, (5) 24-29 (3) (4)
"L" Range	2nd-1st, (2) 26-3, (6)

(1) Wide open throttle.

(2) Fully closed throttle.

(3) 1990 Models

(4) 1989 Models

(5) 1988 Models

(6) 1988-90 Models unless noted.

COROLLA (ALL-TRAC 4WD) A-241H LOCK-UP SPEEDS (1) (1988-90)

Application	MPH
(2) "D" Range	
Lock-Up ON in OD	41-47
Lock-Up OFF in OD	39-45

(1) Throttle valve closed.

(2) There is no lock-up in "L" or "2" ranges.

MR2 A-241E SHIFT SPEED SPECIFICATIONS (1) (1988-89)

Application	MPH
(2) "D" Range	
NORM	
1st-2nd	29-31
2nd-3rd	55-60
3rd-OD	82-87
(2) 3rd-OD	19-22
(2) OD-3rd	12-14
OD-3rd	78-83
3rd-2nd	51-56
2nd-1st	26-29
PWR	
1st-2nd	32-35
2nd-3rd	59-64
3rd-OD	93-99
(2) 3rd-OD	25-29
(2) OD-3rd	12-14

OD-3rd	89-94
3rd-2nd	55-60
2nd-1st	26-29
"2" Range	
NORM Or PWR	
1st-2nd	32-35
2nd-1st	26-29
"L" Range	
NORM Or PWR	
2nd-1st	29-31
(1) Wide open throttle.	
(2) Fully closed throttle.	

MR2 A-241E LOCK-UP SPEEDS (1) (1988-89)

Application	MPH
(2) "D" Range	
NORM	
(3) Lock-Up ON in 3rd	41-43
(3) Lock-Up OFF in 3rd	37-40
Lock-Up ON in OD	34-37
Lock-Up OFF in OD	32-35
PWR	
(3) Lock-Up ON in 3rd	64-70
(3) Lock-Up OFF in 3rd	59-64
Lock-Up ON in OD	50-55
Lock-Up OFF in OD	48-51
(1) Throttle valve opening 5%.	
(2) There is no lock-up in "L" or "2" range.	
(3) With OD switch off.	

CELICA (ST) A-241L SHIFT SPEED SPECIFICATIONS (1) (1990)

Application	MPH
"D" Range	
1st-2nd	27-37
2nd-3rd	54-63
(2) 3rd-OD	15-23
OD-3rd	(3) 3
3rd-2nd	51-62

2nd-1st	20-26
"L" Range	
2nd-1st	25-32

(1) With throttle wide open.

(2) With throttle fully closed.

(3) Possible up to maximum speed.

CELICA (ST) A-241L LOCK-UP SPEEDS (1) (1990)

Application	MPH
"D" Range (2) (3)	
Lock-Up ON	39-45
Lock-Up OFF	37-43

(1) With throttle fully closed.

(2) There is no lock-up in "L" or "2" range.

(3) Differential gear ratio: 3.034.

CELICA (GT) A-243L SHIFT SPEED SPECIFICATIONS (1) (1990)

Application	MPH
"D" Range	
1st-2nd	27-37
2nd-3rd	54-63
(2) 3rd-OD	16-24
OD-3rd	(3)
3rd-2nd	52-62
2nd-1st	20-26
"L" Range	
2nd-1st	25-32

(1) With throttle wide open.

(2) With throttle fully closed.

(3) Possible up to maximum speed.

CELICA (ST) A-243L LOCK-UP SPEEDS (1) (1990)

Application	MPH
"D" Range (2) (3)	
Lock-Up ON	44-50
Lock-Up OFF	37-43

(1) With throttle fully closed.

(2) There is no lock-up in "L" or "2" ranges.

(3) Differential gear ratio: 3.034.

STALL SPEED TEST

CAUTION: Perform test at normal operating fluid temperature, 122-176° F (50-80° C). DO NOT continue test longer than 5 seconds.

1. Object of test is to check overall performance of transmission and engine by measuring maximum engine speeds in "D" and "R" ranges.
2. Block front and rear wheels. Connect engine tachometer. Apply parking and service brakes. Start engine.
3. Position transmission in "D" range. Fully depress accelerator pedal. Immediately note highest engine RPM. DO NOT perform test longer than 5 seconds. See **STALL SPEED SPECIFICATIONS** table.
4. Repeat test in "R" range. Check for insufficient engine output or defective stator one-way clutch if stall speed is low but the same for both ranges.

STALL SPEED SPECIFICATIONS

Applications	RPM
A-241E (5S-FE)	2400-2700
A-241E (4A-GZE)	2500-2800
A-241H	2200-2500
A-241L (5S-FE)	2200-2500
A-243L (4A-FE)	2050-2550

5. High stall speed in "D" range may be caused by low line pressure, forward clutch slipping, defective No. 2 one-way clutch or defective underdrive one-way clutch.
6. High stall speed in "R" range may be caused by low line pressure, direct clutch slipping, 1st/Reverse brake slipping or underdrive one-way clutch slipping. High stall speed in "'D" and "R" ranges may be caused by low fluid level, low line pressure or defective underdrive one-way clutch.

TIME LAG TEST

CAUTION: Perform this test at normal operating fluid temperature 122-17° F (50-80° C). Allow a one minute interval between tests. Make 3 measurements and take the average value.

1. If shift lever is actuated with engine idling, a time lag will be noted before shock can be felt. This test is used for checking condition of overdrive clutch, forward clutch, direct clutch and 1st/Reverse brake.
2. Apply parking brake. Start engine. Ensure idle speed is correct. Refer to IDLE SPEED SPECIFICATIONS table. Shift transmission from "N" into "D" range. Use a stop watch to measure elapsed time between shifting of lever until shock is felt.

IDLE SPEED SPECIFICATIONS

Application	RPM
A-241E (5S-FE)	700-750
A-241E (4A-GZE)	800
A-241H	750-900
A-241L (5S-FE)	700-750
A-243L (4A-FE)	750-850

3. Move shift lever from "N" to "D"' range. Measure time required for shock to be felt. Time tag must be less than 1.2 seconds. Repeat procedure shifting from "N" to "R" range. Time lag must be less than 1.5 seconds.
4. Excessive time lag for "N" to "D" range may be caused by low line pressure, defective forward clutch or defective underdrive one-way clutch. Excessive time lag for "N" to "R" range may be caused by low line pressure, defective direct clutch, 1st/Reverse brake or defective underdrive one-way clutch.

HYDRAULIC PRESSURE TEST

CAUTION: Hydraulic pressure test should be performed with transmission fluid temperature of 122-176° F (50-80°C).

Line Pressure Test

1. Remove transmission test plugs and connect pressure gauge. See **Fig. 1** . Block all wheels. Apply parking brake. Start engine and shift into "D" range.
2. Apply brakes and depress accelerator. Note pressure readings at idle and stall speed. Repeat test in "R" range. Compare pressure readings to those listed in appropriate LINE PRESSURE SPECIFICATIONS table.
3. If pressure is lower than specified, check throttle cable adjustment.
4. Perform test again after adjustment. High pressure in both ranges indicates that throttle cable may be out of adjustment, defective throttle valve or regulator valve.
5. Low pressure in both ranges indicates throttle cable may be out of adjustment, defective oil pump, throttle valve, regulator valve or underdrive one-way clutch.
6. Low pressure in "D" range only, indicates "D" range circuit leaking pressure, defective forward clutch or underdrive one-way clutch. Low pressure in "R" range only, indicates "R" range circuit leaking pressure, defective direct clutch, 1st/Reverse brake or underdrive one-way clutch.

MR2 A-241E LINE PRESSURE SPECIFICATIONS

Application	psi (kg/cm^2)
"D" Range	
Idle Speed	53-61 (3.7-4.3)
Stall Speed	131-152 (9.2-10.7)
"R" Range	
Idle Speed	90-115 (6.3-8.1)

Stall Speed	226-274 (15.9-19.3)

CELICA A-241E LINE PRESSURE SPECIFICATIONS

Application	psi (kg/cm^2)
"D" Range	
Idle Speed	54-61 (3.8-4.3)
Stall Speed	104-125 (7.3-8.8)
"R" Range	
Idle Speed	92-115 (6.5-8.1)
Stall Speed	193-229 (13.6-16.1)

COROLLA A-241H LINE PRESSURE SPECIFICATIONS

Application	psi (kg/cm^2)
"D" Range	
Idle Speed	53-61 (3.7-4.3)
Stall Speed	131-152 (9.2-10.7)
"R" Range	
Idle Speed	77-102 (5.4-7.2)
Stall Speed	205-239 (14.4-16.8)

CELICA A-241L LINE PRESSURE SPECIFICATIONS

Application	psi (kg/cm^2)
"D" Range	
Idle Speed	54-61 (3.8-4.3)
Stall Speed	131-152 (9.2-10.7)
"R" Range	
Idle Speed	226-275 (15.9-19.3)
Stall Speed	(...)

CELICA A-243L LINE PRESSURE SPECIFICATIONS

Application	psi (kg/cm^2)
"D" Range	
Idle Speed	54-61 (3.8-4.3)
Stall Speed	131-152 (9.2-10.7)
"R" Range	
Idle Speed	80-102 (5.6-7.2)
Stall Speed	205-242 (14.4-17.0)

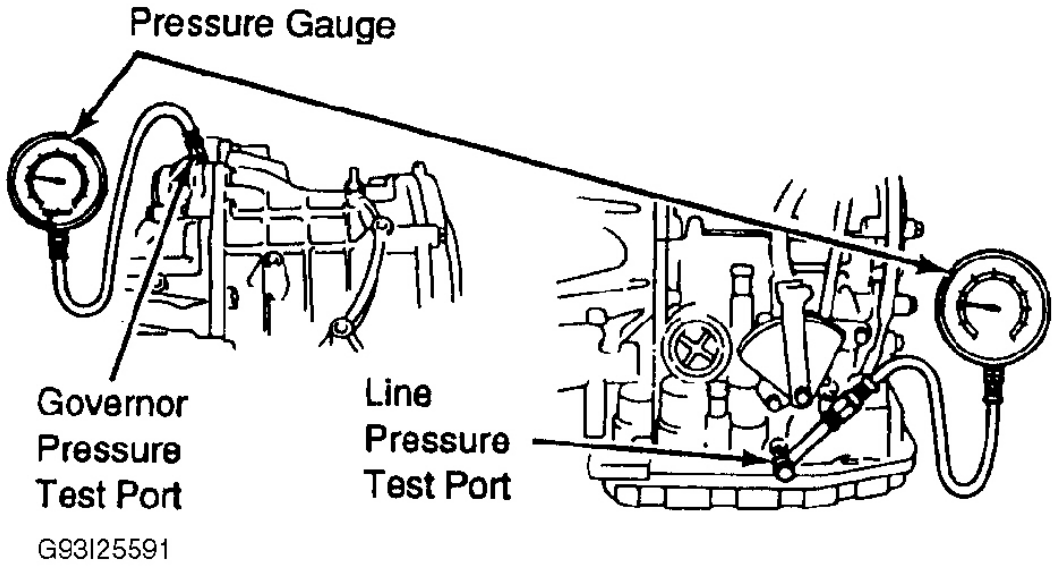

Fig. 1: Checking Governor & Line Pressure
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

GOVERNOR PRESSURE TEST (A-241H, A-241L & A-243L)

1. Transaxle must be at normal operating temperature of 122-176° F (50-80° C). Block rear wheels. DO NOT apply parking brake. Raise vehicle if equipped with A-241H. Shift mode selector lever into LOCK position (A-241H).

   CAUTION: After finishing inspection, ensure return to mode select lever FREE position.

2. Remove transaxle test plugs and connect pressure gauge. See **Fig. 1** . Start engine. Shift into "D" range. Measure governor pressure at speeds specified in GOVERNOR PRESSURE SPECIFICATIONS table.

GOVERNOR PRESSURE SPECIFICATIONS (1)

Engine RPM	Speed (MPH)	psi (kg/cm^2)
A-241H (1989-90)		
800	17	13-24 (.9-1.7)
1600	35	26-37 (1.8-2.6)
2400	53	47-58 (3.3-4.1)
A-241H (1988)		
800	19	14-26 (1.0-1.8)
1600	37	28-40 (2.0-2.8)

2400	56	51-63 (3.6-4.4)
A-241L		
1300	29	26-30 (1.8-2.1)
2600	58	60-71 (4.2-5.0)
A-243L		
490	11	3-7 (.2-.5)
1300	29	26-30 (1.8-2.1)
2600	58	60-71 (4.2-5.0)
(1) Governor is replaced by speed sensor on A-241E.		

3. Incorrect governor pressure may be caused by incorrect line pressure, leakage at governor pressure circuit or defective governor valve.

Center Differential Control Pressure Test (A-241H)

1. Perform test at normal operating fluid temperature of 122-176° F (50-80° C). Measure line pressure. Remove transaxle test plug and connect pressure gauge. See **Fig. 3** .
2. Fully apply parking brake. Start engine. Shift into "D" range. Measure center differential pressure at speeds specified in CENTER DIFFERENTIAL PRESSURE SPECIFICATIONS table.
3. Incorrect center differential pressure may be caused by incorrect line pressure, leakage at center differential control pressure regulator valve or defective center differential control valve.

CLUTCH AND BAND APPLICATION (ELEMENTS IN USE)

Selector Lever Position	Forward Clutch	Direct Clutch	Under-drive Clutch	2nd Coast Brake	2nd Brake	1st & Reverse Brake	Under-drive Brake	No. 1 One-Way Clutch	No. 2 One-Way Clutch	Underdrive One-Way Clutch
"P" – PARK							X			
"R" – REVERSE		X				X	X			
"N" – NEUTRAL							X			
"D" – DRIVE										
First	X						X		X	X
Second	X				X		X	X		X
Third	X	X			X		X			X
OD	X	X	X		X					
"2" – SECOND										
First	X						X		X	X
Second [1]	X			X	X		X	X		X
Third [2]	X	X			X		X			X
"1" – LOW										
First	X					X	X		X	X
Second [1]	X			X	X		X	X		X

[1] – Downshift only in 3rd gear for "2" range and 2nd gear for "L" range-No upshift.
[2] – 3rd gear for "2" range not applicable for A-241H.

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Fig. 2: Clutch & Band Application (Elements In Use)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

CENTER DIFFERENTIAL PRESSURE SPECIFICATIONS

Differential Control Switch Position	Engine RPM	"D" Range psi (kg/cm^2)	"L" Range psi (kg/cm^2)	"R" Range psi (kg/cm^2)
AUTO	Idling	21-28 (1.5-2.0)	100-122 (7.0-8.6)	0
AUTO	Stall	105-131 (7.4-9.2)	125-152 (8.8-10.7)	0
OFF	Idling	0	0	0
OFF	Stall	0	0	0

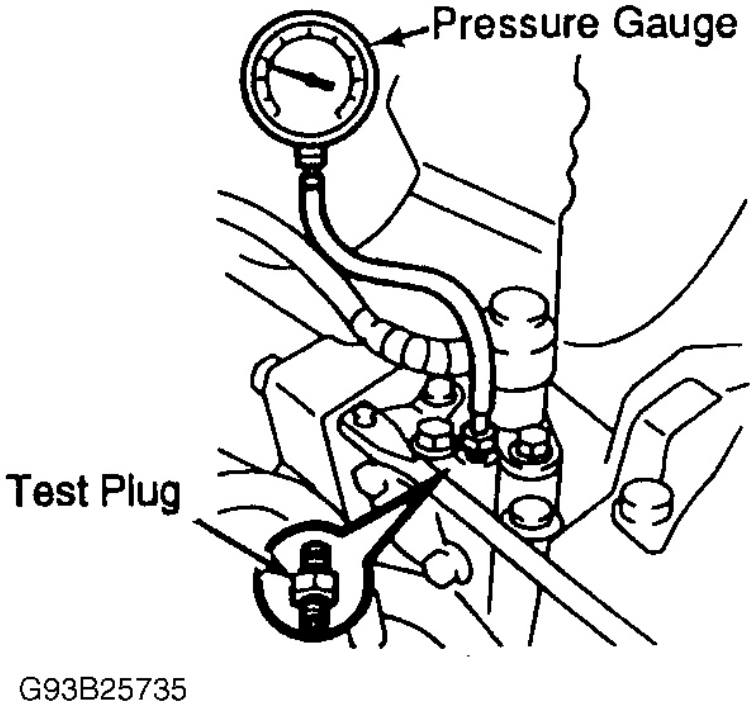

Fig. 3: Checking Center Differential Line Pressure
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TROUBLE SHOOTING

NOTE: See appropriate AUTO TRANS DIAGNOSIS article for troubleshooting solenoids, sensors and computer control unit.

FLUID DISCOLORED OR SMELLS BURNT

Fluid contaminated. Torque converter faulty. Transaxle faulty.

VEHICLE DOES NOT MOVE IN ANY FORWARD RANGE OR REVERSE

Shift cable out of adjustment. Valve body or primary regulator faulty. Parking lock pawl faulty. Torque converter faulty. Converter drive plate broken. Oil pump intake screen blocked. Transaxle faulty.

SHIFT LEVER POSITION INCORRECT

Shift cable out of adjustment. Manual valve and lever faulty. Transaxle faulty.

HARSH ENGAGEMENT INTO ANY DRIVE RANGE

Throttle cable out of adjustment. Valve body or primary regulator faulty. Accumulator pistons faulty. Transaxle faulty.

DELAYED 1-2, 2-3 OR 3-OD UPSHIFT, OR DOWNSHIFTS FROM OD-3 OR 3-2 THEN SHIFTS BACK TO OD OR 3

Electronic control faulty. Valve body faulty. Solenoid valve faulty. Governor faulty.

SLIPS ON 1-2, 2-3 OR 3-OD UPSHIFT, OR SLIPS OR SHUDDERS ON ACCELERATION

Shift cable out of adjustment. Throttle cable out of adjustment. Valve body faulty. Solenoid valve faulty. Transaxle faulty.

DRAG, BINDING OR TIE-UP ON 1-2, 2-3 OR 3-OD UPSHIFTS

Shift cable out of adjustment. Valve body faulty. Transaxle faulty.

NO LOCK-UP IN 2ND, 3RD OR OD

Electronic control faulty. Valve body faulty. Solenoid valve faulty. Transaxle faulty.

HARSH DOWNSHIFT

Throttle cable out of adjustment. Throttle cable and cam faulty. Accumulator pistons faulty. Valve body faulty. Transaxle faulty.

NO DOWNSHIFT WHEN COASTING

Valve body faulty. Solenoid valve faulty. Electronic control faulty. Governor faulty.

DOWNSHIFT OCCURS TOO SOON OR TOO LATE WHILE COASTING

Throttle cable faulty. Valve body faulty. Transaxle faulty. Solenoid valve faulty. Electronic control faulty. Governor faulty.

NO OD-3, 3-2 OR 2-1 KICKDOWN

Solenoid valve faulty. Electronic control faulty. Valve body faulty. Governor faulty.

NO ENGINE BRAKING IN "2" OR "L" RANGE

Solenoid valve faulty. Electronic control faulty. Valve body faulty. Transaxle faulty.

VEHICLE DOES NOT HOLD IN "P" RANGE

Shift cable out of adjustment. Parking lock pawl and spring faulty.

NO CENTER DIFFERENTIAL CONTROL

Electronic control faulty. Valve body faulty. Transfer faulty. Hydraulic multiplate clutch faulty.

REMOVAL & INSTALLATION

For transaxle removal procedure, see appropriate AUTOMATIC TRANSMISSION REMOVAL article in TRANSMISSION SERVICING.

TORQUE CONVERTER

NOTE: The torque converter is a sealed unit and must be serviced as complete unit. Perform following tests to ensure converter is defective. Torque converter and transaxle cooler must be thoroughly cleaned and flushed if transaxle is contaminated.

ONE-WAY CLUTCH TEST

1. Install Clutch Tester (09351-32010) in inner race of torque converter one-way clutch. Position Stator Stopper (09351-32020) so it engages in notch of converter hub and one-way clutch.
2. Rotate clutch tester. The one-way clutch should lock when turned counterclockwise. Clutch should rotate freely and smoothly when turned clockwise requiring less than 22 INCH lbs. (2.5 N.m) of torque to rotate clutch. See **Fig. 4** .
3. Clean torque converter and retest if clutch does not operate within specification. Replace converter if not within specification.

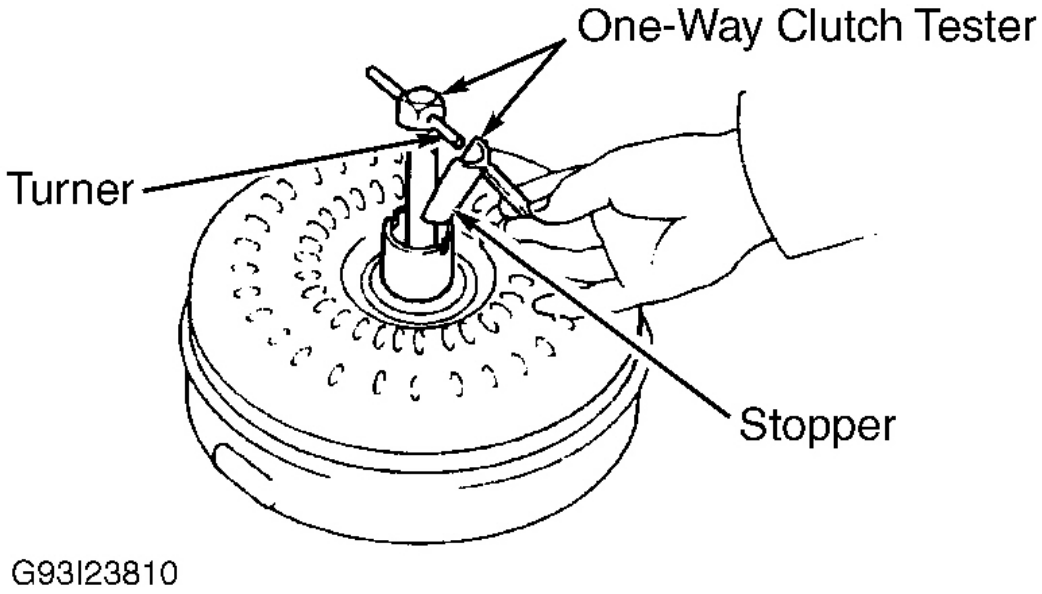

Fig. 4: Checking Torque Converter One-Way Clutch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

CONVERTER SLEEVE RUNOUT TEST

1. Temporarily mount torque converter to drive plate. Tighten torque converter bolts to 20 ft. lbs. (27 N.m). Mount a dial indicator with needle resting on converter sleeve. See **Fig. 5** . Rotate converter. If runout exceeds .0118" (.300 mm), ensure converter is properly mounted to drive plate.
2. If converter is properly mounted and runout exceeds specifications, replace torque converter. Mark position of converter to ensure correct installation. Remove converter.

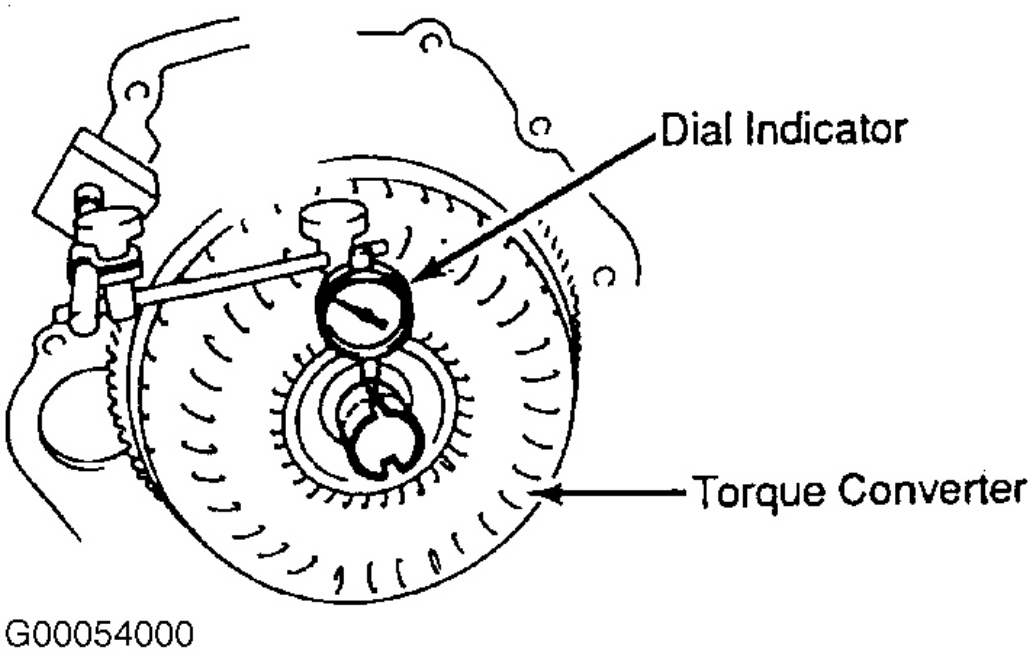

Fig. 5: Measuring Torque Converter Sleeve Runout
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DRIVE PLATE RUNOUT TEST

Measure drive plate runout. See **Fig. 6** . If runout exceeds .0079" (.200 mm), or if ring gear is damaged, replace drive plate. If installing a new drive plate, note position of spacers. Torque bolts.

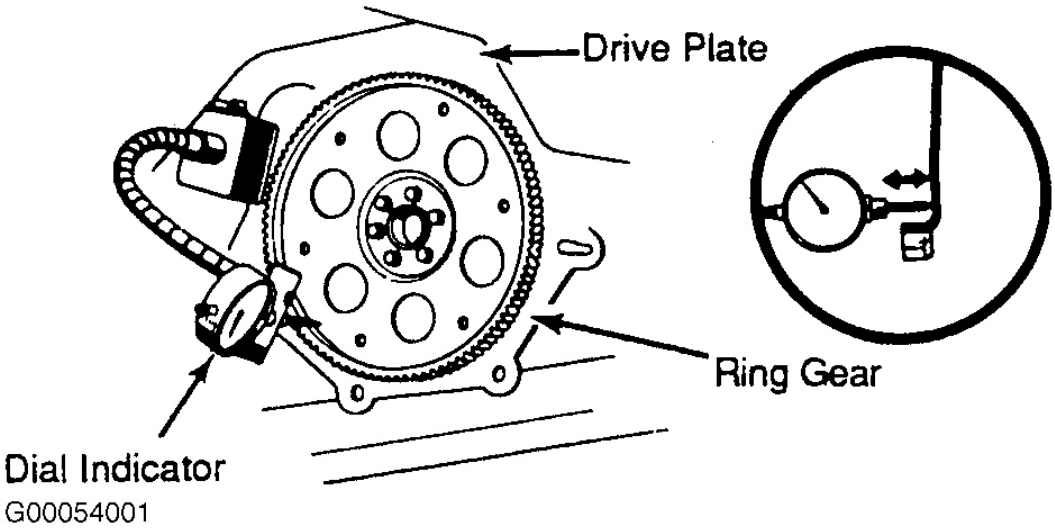

Fig. 6: Measuring Drive Plate Runout
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TRANSAXLE DISASSEMBLY

1. On A-241H models, remove transfer assembly prior to transaxle disassembly. Screw in suitable bolt with washer into side gear intermediate. Using Remover/Installer (09520-32012), remove side gear intermediate shaft. See Fig. 13 .
2. On all models, remove oil cooler pipes, manual shift lever and neutral start switch. Remove filter tube and dipstick. Remove throttle cable retaining plate. Remove solenoid wire retaining plate. See **Fig. 8** , **Fig. 11** and**Fig. 14** .
3. On A-241H, A-241L & A-243L models, remove governor cover bracket. Remove governor cover and "O" ring. Remove governor body, thrust washer, governor body adapter and gasket. On A-241E models, remove speed sensor cover and sensor. See **Fig. 8** , **Fig. 11** and**Fig. 14** .
4. On all models, remove oil pan and gasket. Remove magnet from oil pan. Remove oil tubes and strainer. Remove valve body. See VALVE BODY under ON-VEHICLE SERVICE. Remove throttle cable from case. Remove solenoid wire. Remove 2nd brake apply gasket. Remove 2nd brake drum seal. See **Fig. 8** **Fig. 11** and**Fig. 14** .
5. Loosen accumulator cover bolts evenly until spring tension is released. Remove cover and gasket. Remove forward clutch, direct clutch and 2nd brake pistons and springs. Apply 14 psi (1 kg/cm2) to hole indicated to force piston and spring from bore. See **Fig. 7** . Remove underdrive clutch accumulator piston in similar manner.
6. Using Wire Gauge Set (09240-00020), measure piston stroke of 2nd coast brake. Piston travel must be within .059-.118" (1.5-3.0 mm). Replace brake band if not within specification.
7. On all models, remove snap ring. Using low pressure compressed air, in apply hole, pop out piston 2nd coast brake into a shop cloth. Remove cover, piston and spring. See **Fig. 8** , **Fig. 11** and **Fig. 14** .

8. Remove oil pump retaining bolts. Using Puller (09351-32061), pull oil pump free from case. Remove oil pump. DO NOT drop or damage races or bearings behind oil pump.
9. Remove forward clutch with bearing and race. Remove thrust washer, bearing and races from forward clutch. See **Fig. 9** , **Fig. 12** and **Fig. 15** .
10. Using small screwdriver, push 2nd coast brake band pin inward and remove from oil pump mounting bolt hole. Remove 2nd coast brake band. Remove front planetary ring gear. Remove race and bearing from ring gear.
11. Remove front planetary gear. Remove bearing and race from planetary gear. Remove planetary sun gear, planetary sun gear input drum, thrust washer, 2nd brake hub and No. 1 one-way clutch. Using compressed air, confirm 2nd brake piston moves smoothly. Remove 2nd coast brake band guide. See **Fig. 9** **Fig. 12** and **Fig. 15** .
12. Remove snap ring holding 2nd brake drum to case. Remove 2nd brake drum. If brake drum is difficult to remove, lightly tap drum with a wooden block. Remove 2nd brake drum seal. Remove 2nd brake piston return spring and thrust washer. Remove clutch plate, discs and flange. Note direction of components.
13. Remove No. 2 one-way clutch retaining snap ring. Remove No. 2 one-way clutch and rear planetary gear. Remove thrust washer from gear. See **Fig. 9** , **Fig. 12** and **Fig. 15** .
14. Remove rear planetary ring gear with bearing and races. Remove bearing and races from ring gear. Using compressed air, confirm that 1st/Reverse brake piston moves smoothly.
15. Remove flange retaining snap ring. Remove flanges, plates and discs. Note location of components. Remove engine mounting left bracket (A-241E). Remove transaxle rear cover bolts. Tap transaxle cover using a plastic hammer. Remove cover. Remove intermediate shaft. See **Fig. 9** , **Fig. 12** and **Fig. 15** .
16. On all models, remove snap ring. On A-241H models, using Spring Compressor (09351-32040), compress return spring until snap ring is free from spring seat. Remove snap ring. Remove spring compressor. Remove return spring from case. Apply compressed air into passage of case to remove piston. If piston does not pop out with compressed air, use needle-nose pliers to remove piston. Remove 2 "O" rings from piston. On all models, remove transaxle housing-to-case bolts. Remove transaxle housing. Remove differential, governor driven gear and thrust washer.
17. On all models, remove apply gaskets. See **Fig. 9** , **Fig. 12** and **Fig. 15** . On A-241H models, measure countershaft end play. End play should be .0091-.0350" (.230-.890 mm).
18. Using a chisel, release staked area of countershaft lock nuts. Using Holder (09330-00021) and Adapter (09351-32032), remove front and rear countershaft lock nuts. See **Fig. 10** , **Fig. 13** and **Fig. 16** .
19. Using Puller (09351-32061), remove counter driven gear. Remove thrust needle bearing. Remove countershaft assembly. Remove thrust bearing with race from countershaft. See **Fig. 10** , **Fig. 13** and **Fig. 16** . Remove underdrive clutch drum and anti-rattle clip. Using compressed air, confirm underdrive brake piston moves smoothly. Remove oil seal rings. See **Fig. 10** , **Fig. 13** and **Fig. 16** .
20. Using Spring Compressor (09351-32070) and arbor press, compress flange until snap ring is free from flange. Remove snap ring with a screwdriver. Remove flange, plates and discs. Note location of components. Remove underdrive brake return spring. Remove underdrive brake piston using compressed air. Remove 2 "O" rings from piston.
21. Remove parking lock pawl stopper plate, torsion spring and spring guide. Remove pawl shaft clamp. Remove parking lock sleeve and cam guide bracket. Remove manual valve shaft spacer and lock pin. On A-241H models, remove transaxle case plate. On all other models, remove spring from manual valve shaft. Remove manual valve shaft, lever and washer. See **Fig. 10** , **Fig. 13** and **Fig. 16** .
22. Using screwdriver and hammer, remove manual shaft oil seal. Remove oil seal rings. Using a 14mm

socket and hammer, drive in new oil seal. Apply MP grease to oil seal lip.

23. Remove oil galley cover and gasket. Remove underdrive brake accumulator piston and spring. See **Fig. 10** -**Fig. 14** .
24. Remove oil tube clamps. Using screwdriver carefully remove oil tubes. Remove oil tube apply cover, gasket and strainer. Remove bearing bolt and stopper or retainer. Using Puller (09308-00010), remove bearing from housing. On A-241H models, use Puller (09612-65014) to remove bearing. Remove oil seal ring (if installed). See **Fig. 10** , **Fig. 13** and **Fig. 14** .

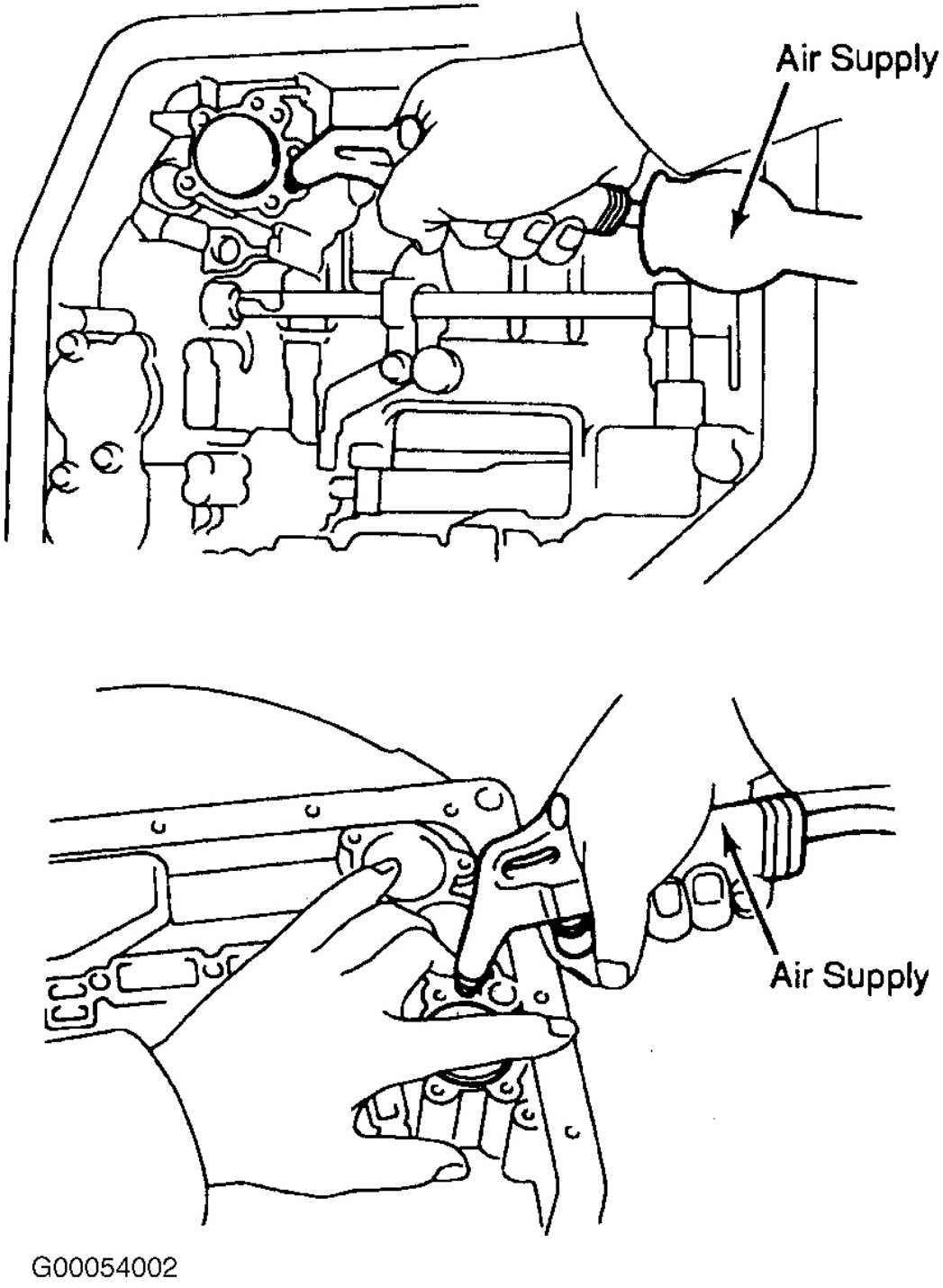

Fig. 7: Removing Accumulator Pistons & Springs
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

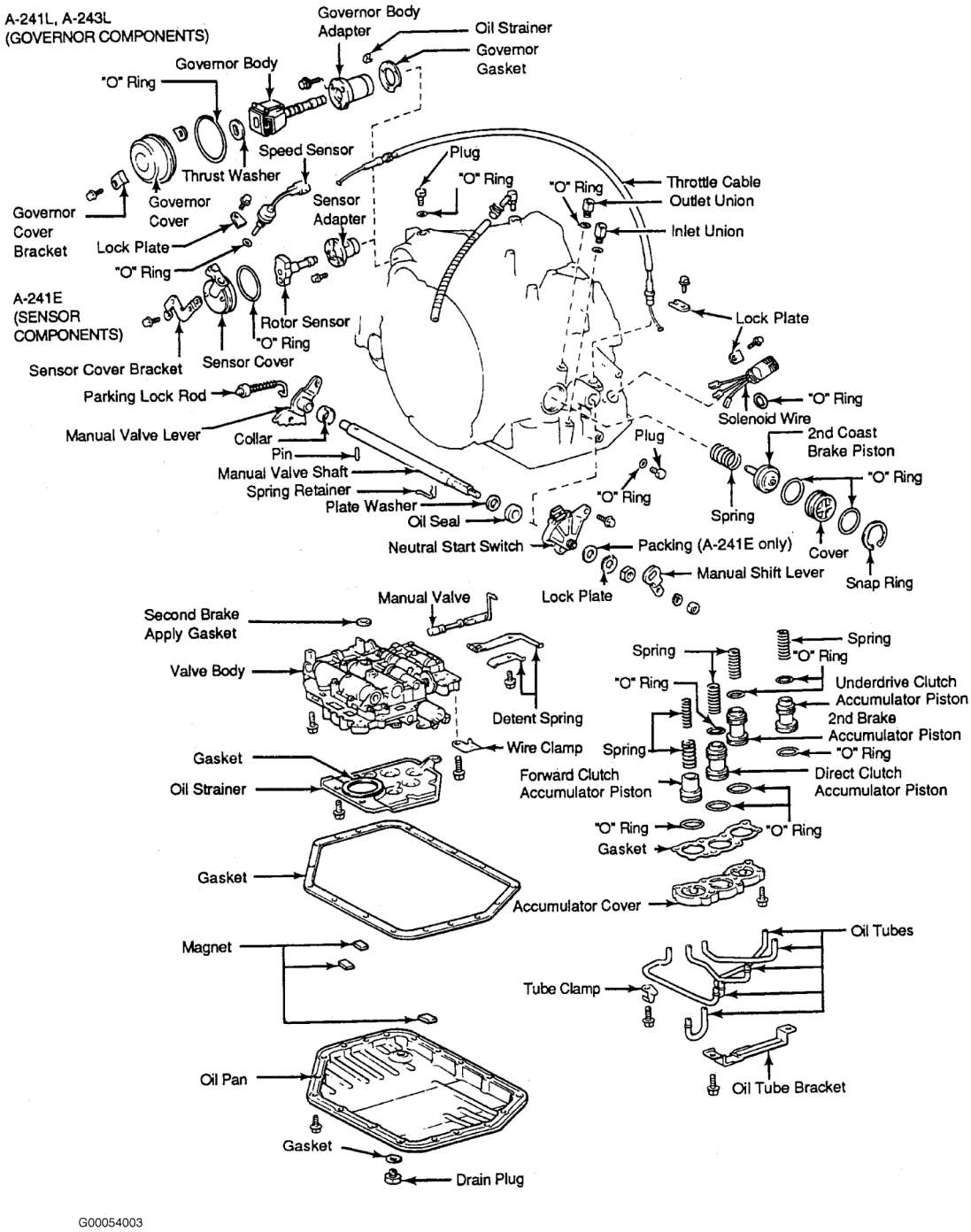

Fig. 8: Exploded View Of External Components (A-241E, A-241L & A-243L)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

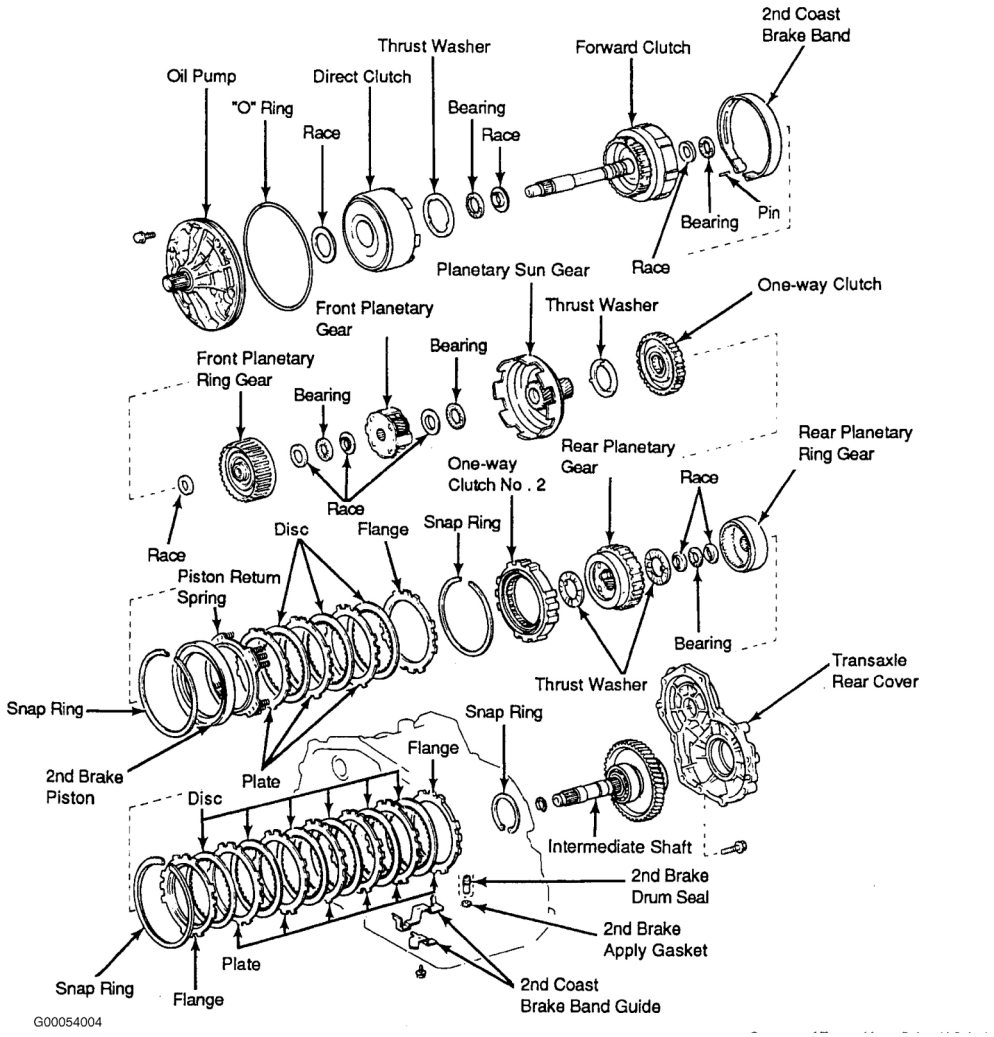

Fig. 9: Exploded View Of Front Components (A241E, A-241L & A-243L)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

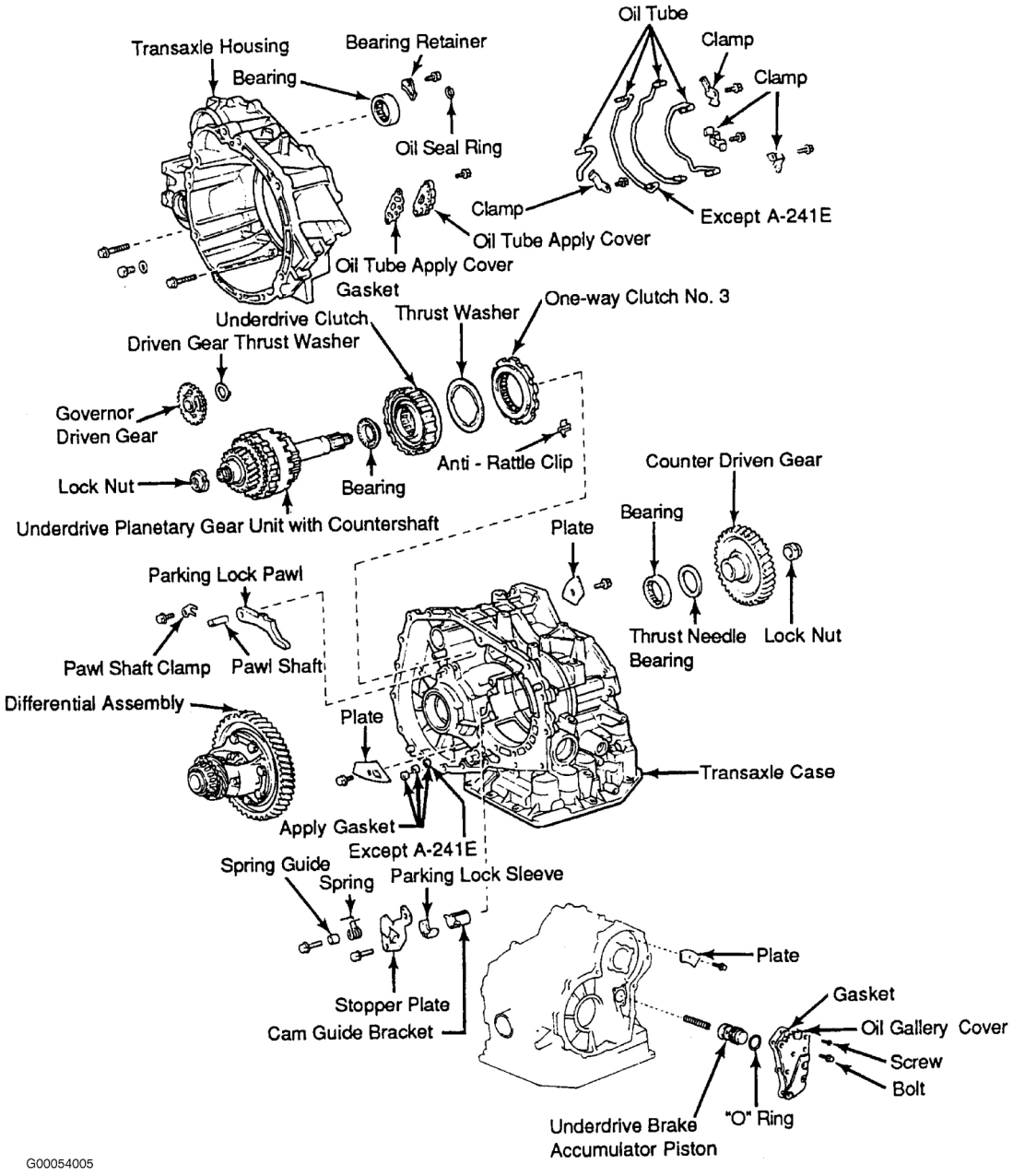

Fig. 10: Exploded View Of Rear Components (A-241L, A-243L & A-241E Except MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

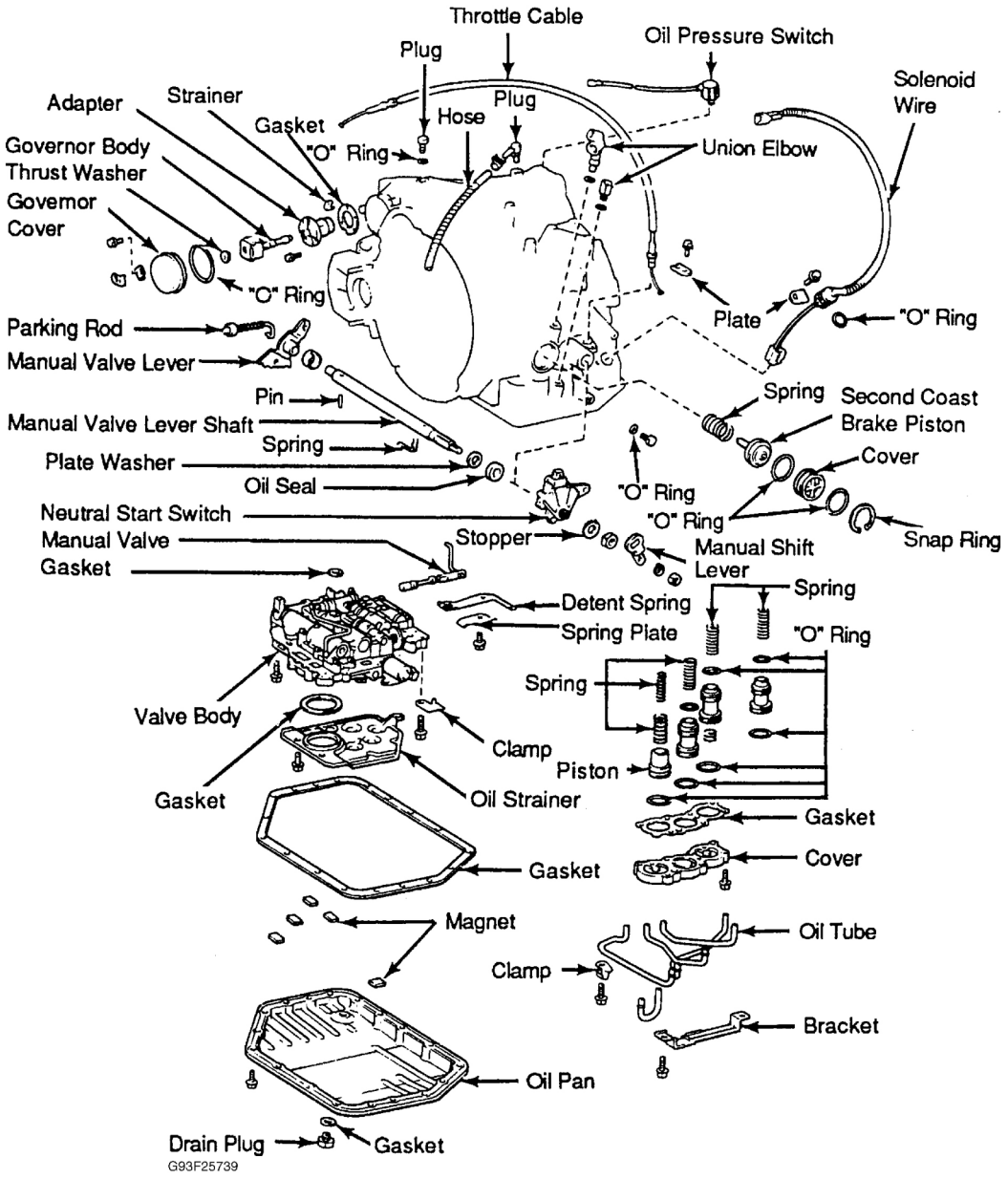

Fig. 11: Exploded View Of External Components (A-241H)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

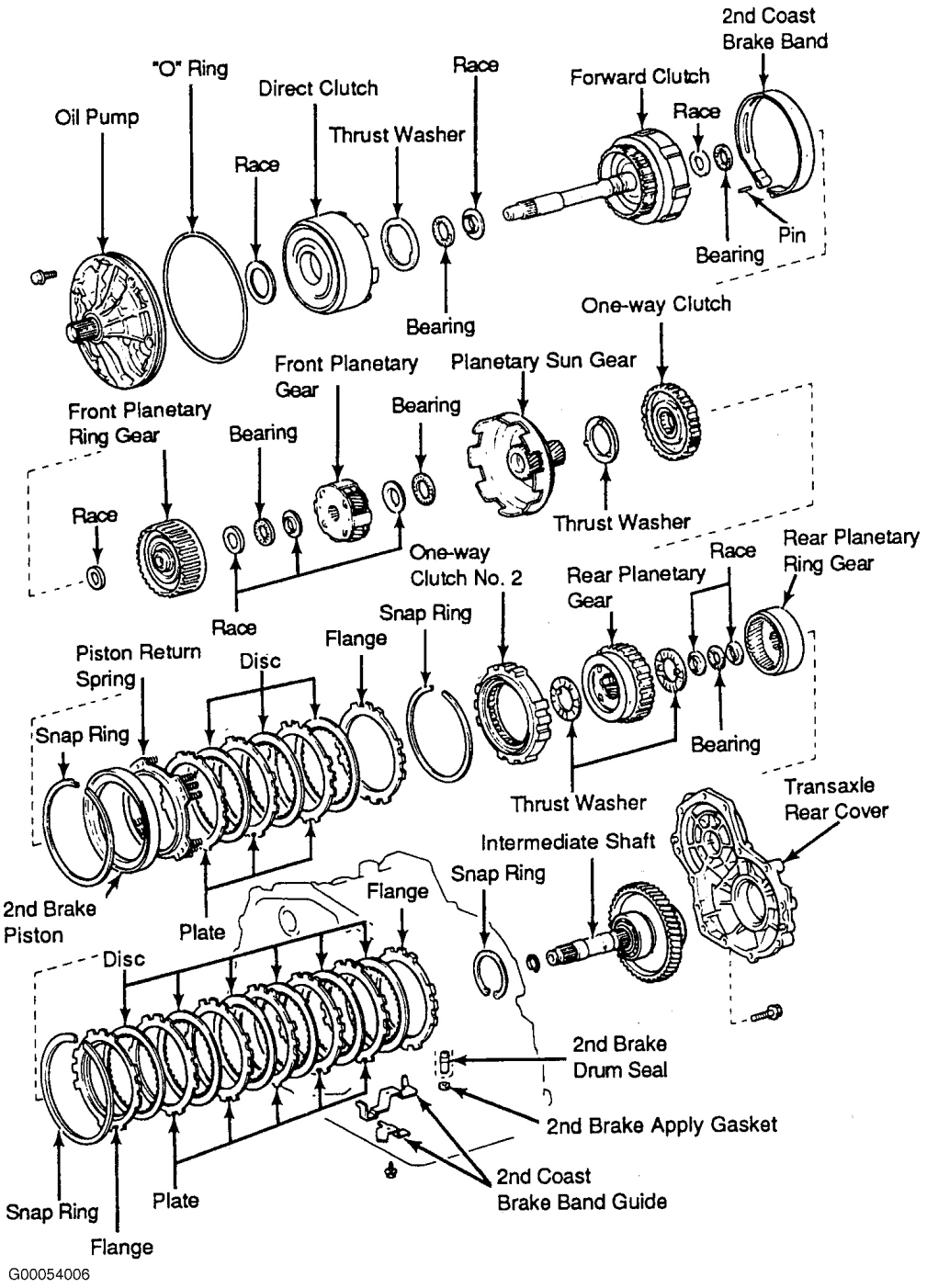

Fig. 12: Exploded View Of Front Components (A-241H)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

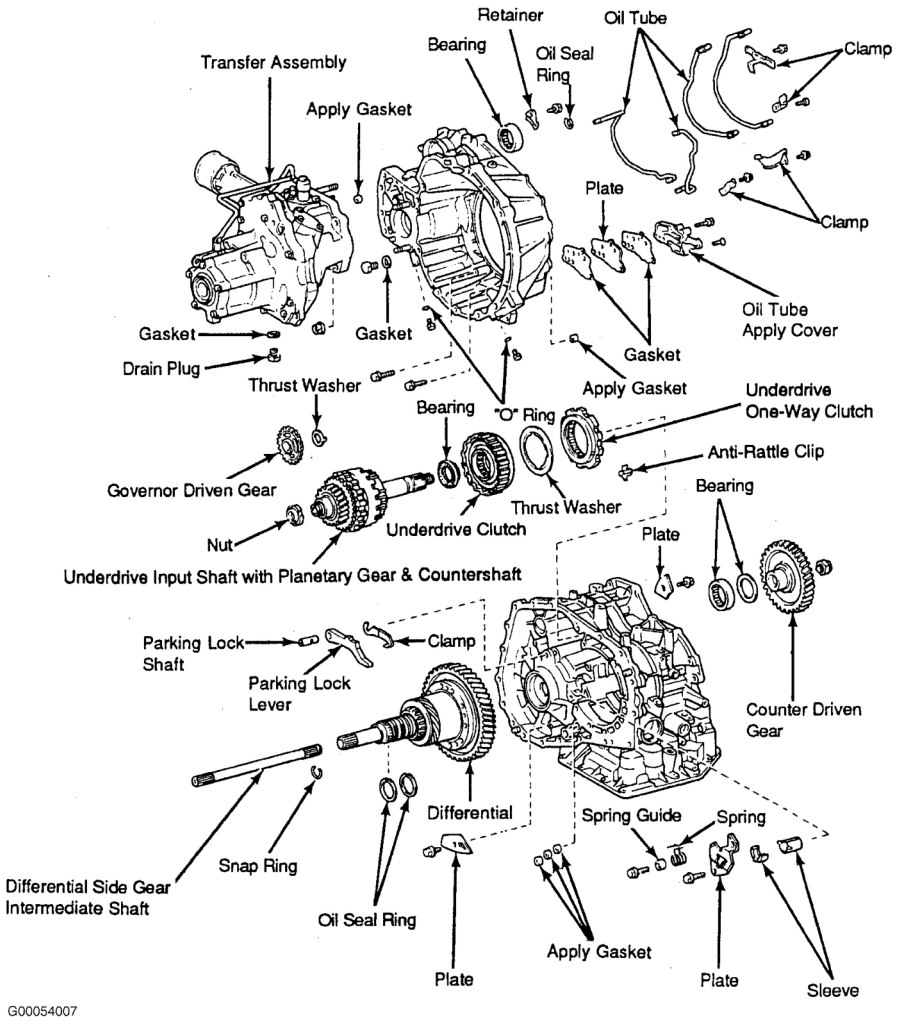

Fig. 13: Exploded View Of Rear Components (A-241H)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

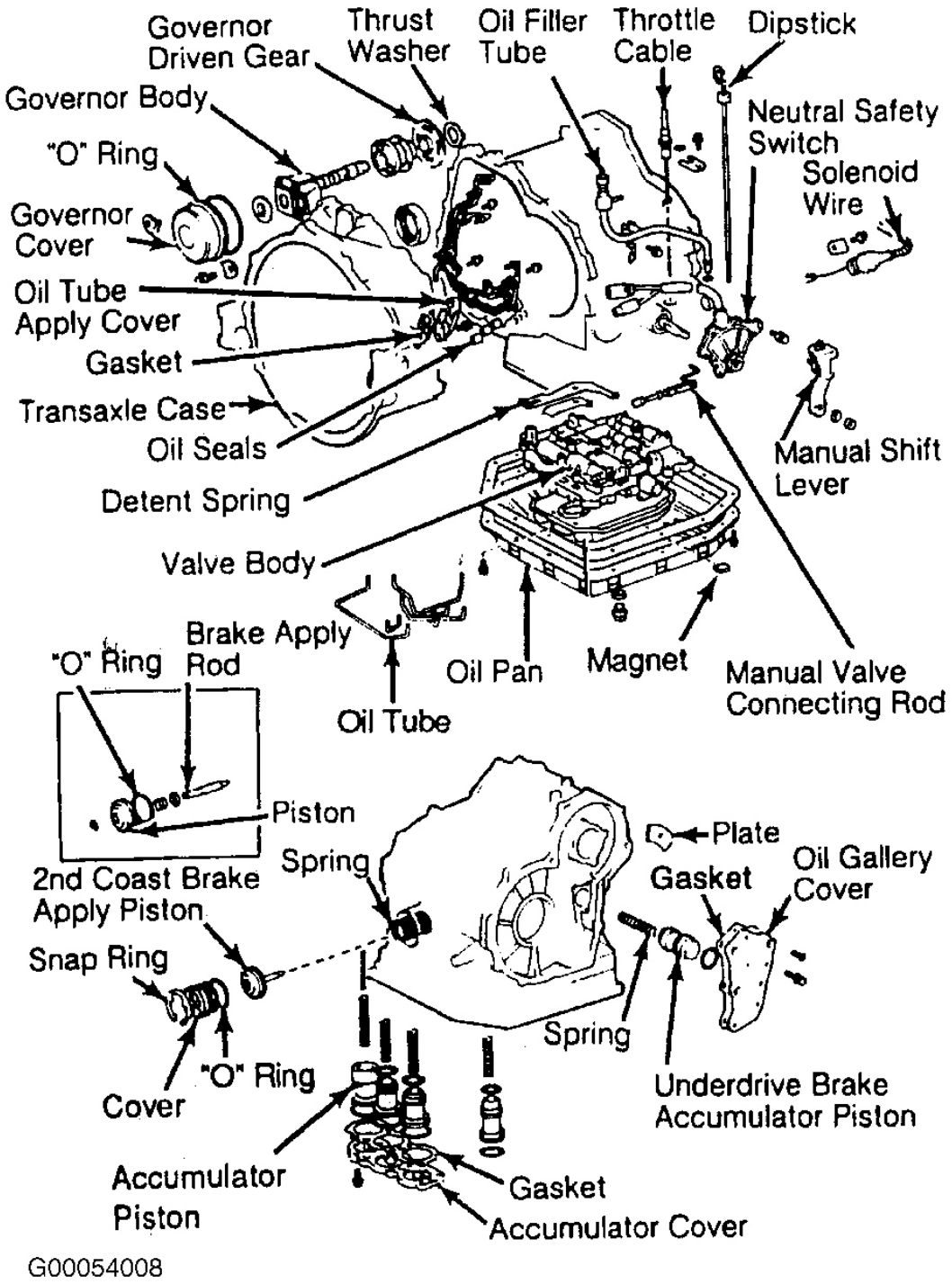

Fig. 14: Exploded View Of External Components (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

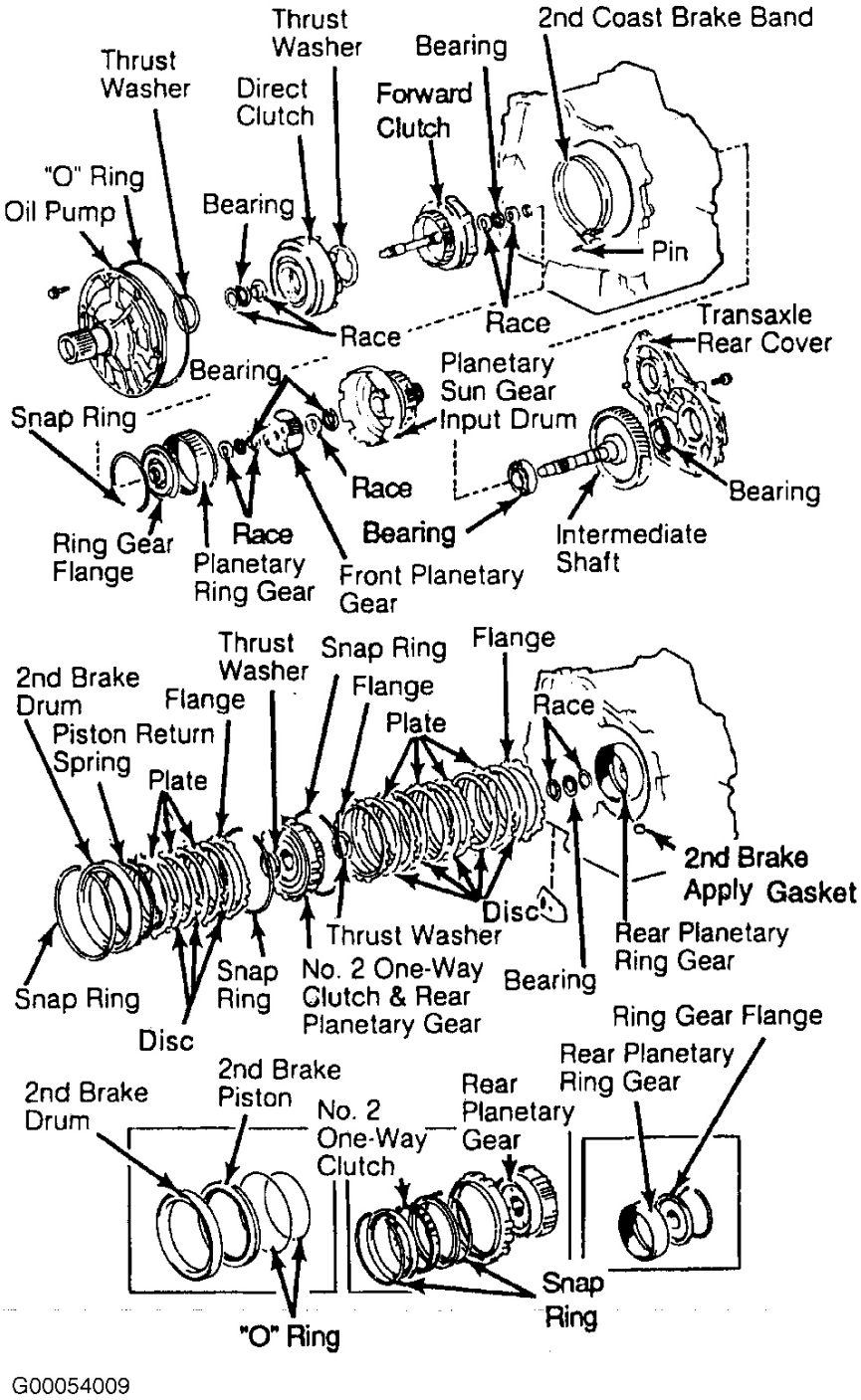

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Fig. 15: Exploded View Of Front Components (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

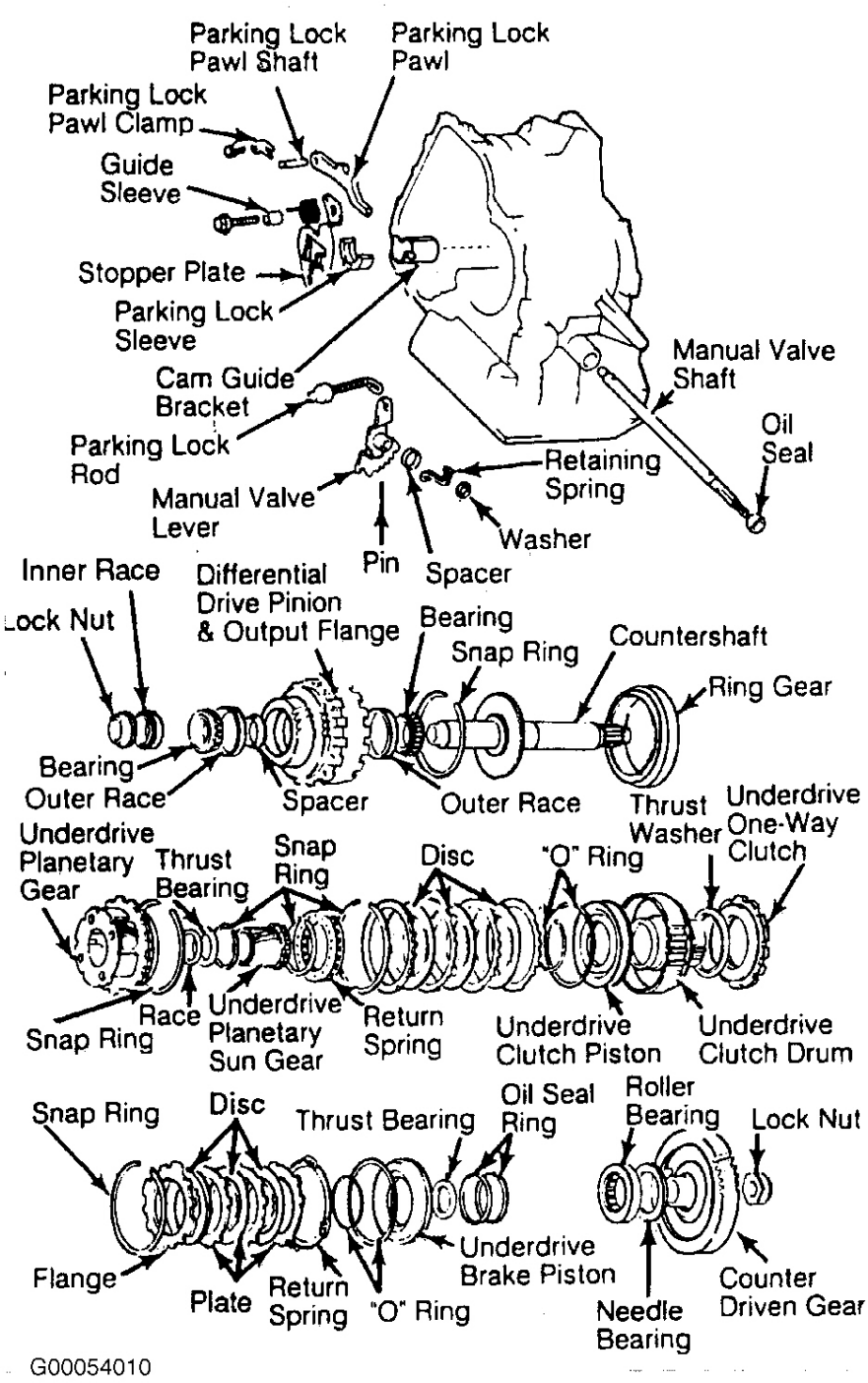


Fig. 16: Exploded View Of Rear Components (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

COMPONENT DISASSEMBLY & REASSEMBLY

OIL PUMP

Disassembly

1. Remove race from stator shaft. Remove "O" ring and oil seal rings from pump body and stator shaft. Remove clutch drum thrust washer from stator shaft.
2. Mark stator shaft and pump body for location. Remove stator shaft retaining bolts. Separate stator shaft and pump body. Mark gear location for reassembly reference. See **Fig. 17** . Remove pump gears. Using screwdriver, remove front seal.

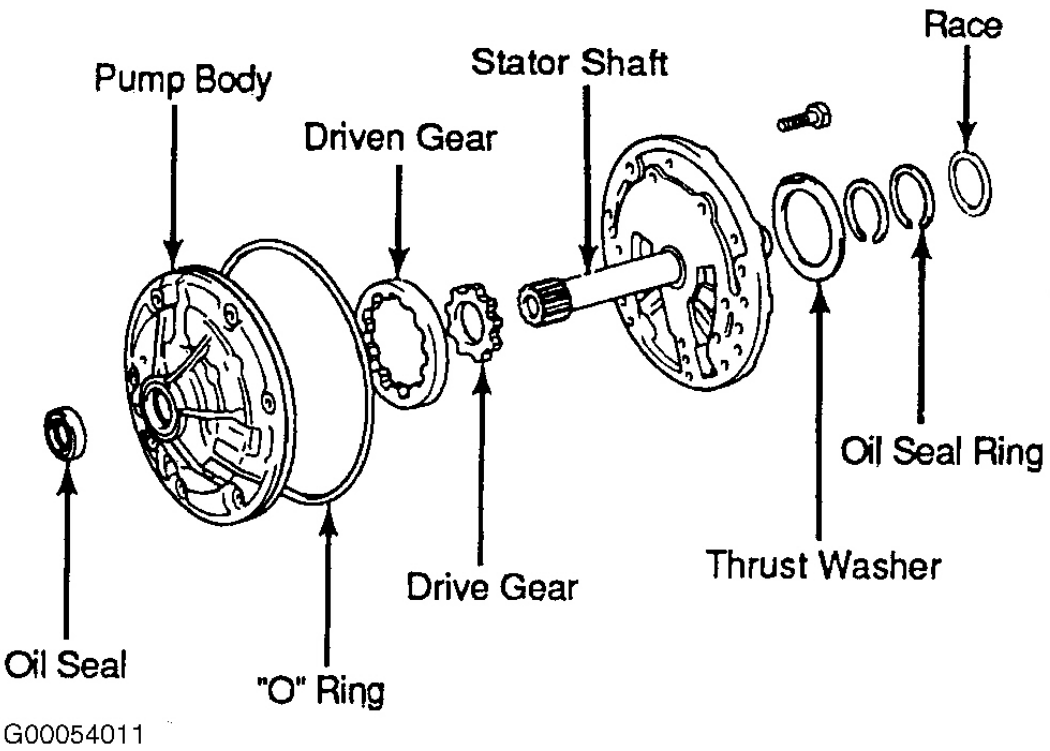


Fig. 17: Exploded View Of Pump Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

1. Note position of oil pump gears. Clean all parts with solvent or ATF. Use compressed air to ensure that passages are free.
2. Check driven gear-to-body clearance. Push driven gear against one side of pump. Measure clearance between driven gear and pump body. See **Fig. 18** . Replace drive gear, driven gear or pump housing if not within specification. See **OIL PUMP CLEARANCE SPECIFICATIONS** table.

OIL PUMP CLEARANCE SPECIFICATIONS

Application	In. (mm)
Driven Gear-To-Pump Body	
Standard	.0026-.0059 (.071-.149)
Maximum	.012 (.30)
Gear-To-Crescent	
Standard	.0043-.0055 (.109-.139)
Maximum	.012 (.30)
Gear Side Clearance	
Standard	.0008-.0020 (.020-.050)
Maximum	.004 (.10)

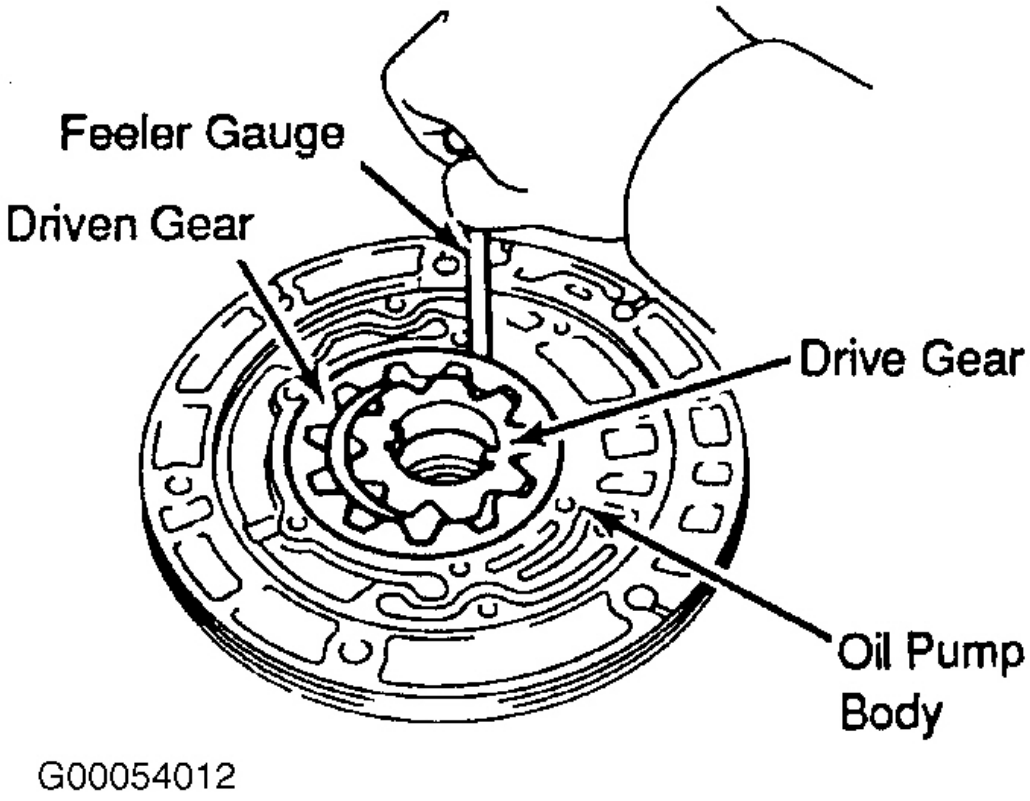


Fig. 18: Checking Oil Pump Driven Gear Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Measure tip clearance between both gears and crescent-shaped part of pump body. See **Fig. 19** . Replace drive, driven gear or pump housing if not within specification.
4. Using feeler gauge and straightedge, measure side clearance of both gears. See **Fig. 20** . Replace drive,

driven gear or pump housing if not within specification.

5. There are 3 different thicknesses for drive and driven gears available for A-241H and A-243L. See **OIL PUMP DRIVE & DRIVEN GEAR SPECIFICATIONS** table. If thickest gear can not make side clearance within specification, replace oil pump body.

OIL PUMP DRIVE & DRIVEN GEAR SPECIFICATIONS

Identifying Mark	Thickness In. (mm)
A-241E & A-241L	.4219 (10.715)
A-241H & A-243L	
A	.3717-.3723 (9.440-9.456)
B	.3723-.3730 (9.456-9.474)
C	.3730-.3736 (9.474-9.490)

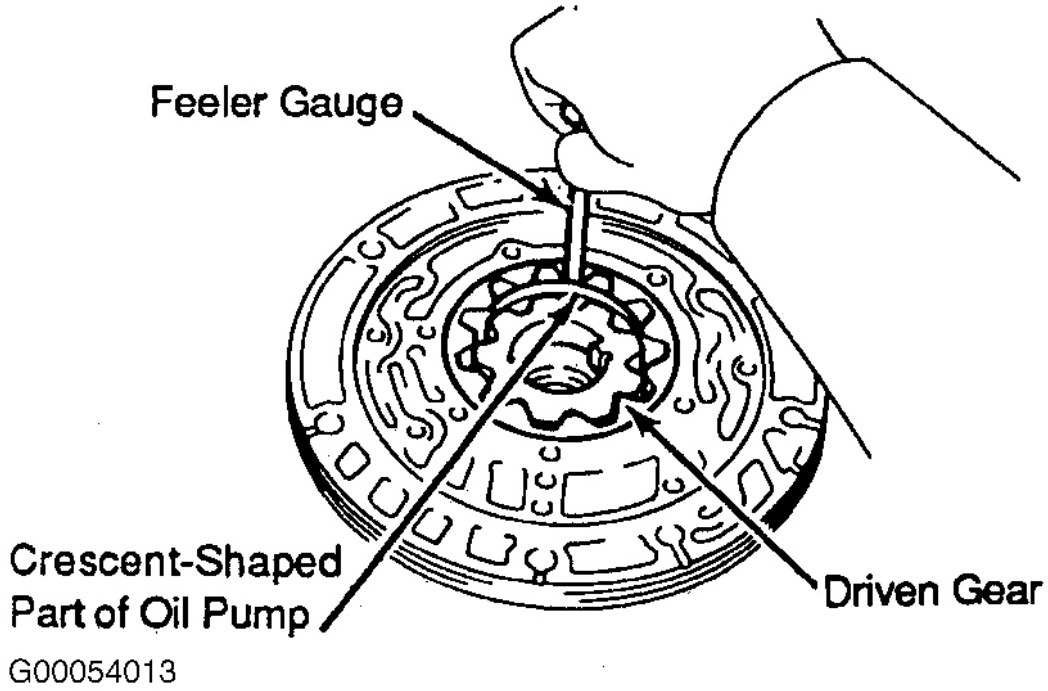


Fig. 19: Checking Oil Pump Gear Tip Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

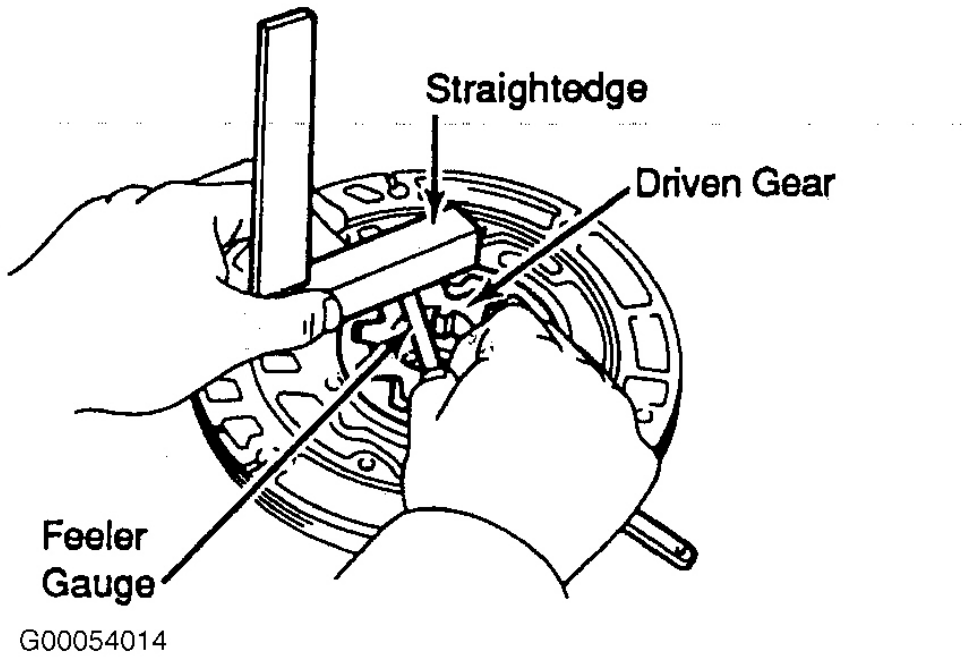


Fig. 20: Checking Oil Pump Gear Side Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. Measure inside diameter of oil pump body bushing. Maximum inside diameter is 1.5031" (38.180 mm). If inside diameter is excessive, replace oil pump body. Measure inside diameter of stator shaft bushing. Maximum inside diameter is .8492" (21.570 mm). If inside diameter is excessive, replace stator shaft.
7. Inspect front oil seal for cracks, damage or wear. Use screwdriver to remove oil seal (if replacement is necessary).

Reassembly

1. Using Seal Installer (09350-32140), install new oil seal. Seal must be even with edge of pump body. Coat all components with ATF.
2. Install driven gear and drive gear. Ensure identifying marks are facing upward. Install stator shaft on pump body. Align bolt holes. Install 11 stator shaft-to-oil pump body bolt. Torque bolts to 89 INCH lbs. (10 N.m).
3. Coat thrust bearing with petroleum jelly. Align tab of washer with hollow of pump body. Install thrust washer. Install 2 oil seal rings on oil pump. DO NOT spread ring ends more than required for installation. Ensure oil seal rings move smoothly.
4. Turn drive gear with screwdrivers to ensure smooth rotation. DO NOT damage oil seal lip. Install race on stator shaft.

DIRECT CLUTCH

Disassembly

1. Remove snap ring from clutch drum. Remove flange, discs and plates. Remove cushion plate on A-241H and A-243L models. Note location of components. Using Clutch Spring Compressor (09351-32070) and arbor press, compress spring retainer and springs. Remove snap ring, clutch spring compressor, spring retainer and piston return springs. See **Fig. 21** .
2. Install direct clutch on oil pump. Apply compressed air to oil pump oval shaped passage to remove piston. See **Fig. 22** . Remove direct clutch from oil pump. Remove clutch piston "O" ring.

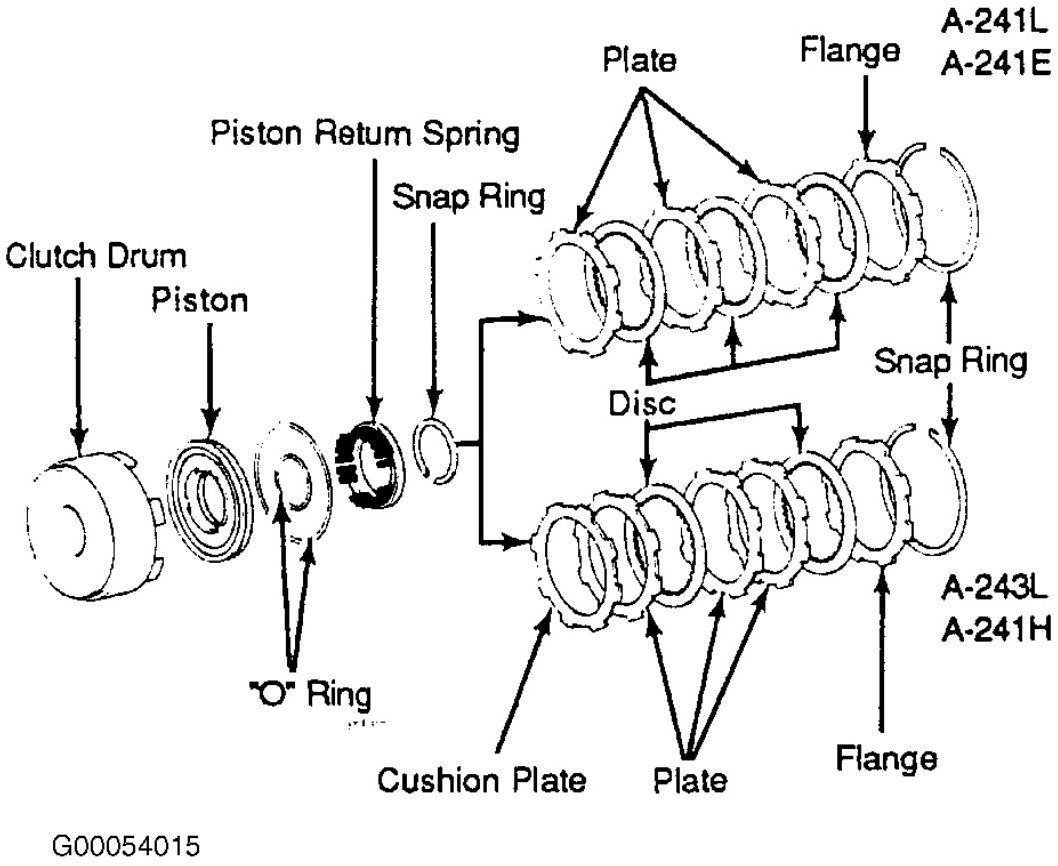


Fig. 21: Exploded View Of Direct Clutch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

Clean all parts with solvent of ATF. Dry all 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. Replace all damaged components. Measure inside diameter of direct clutch bushing. Maximum inside diameter is 1.8531" (47.070 mm). If inside diameter is excessive, replace direct clutch.

NOTE: New discs or plates must be soaked in ATF at least 2 hours prior to reassembly.

Reassembly

1. Install new "O" rings on piston and coat with ATF. 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. See **Fig. 21** .
2. Install cushion plate rounded end down on A-241H and A-243L models. Install in order: Plate, disc, plate, disc, plate, disc on A-241E and A-241L models and Plate, disc plate, plate, disc on A-241H and A-243L models. Install flange with flat end facing inward. Install outer snap ring. Ensure end-gap of snap ring is not aligned with cut-outs in direct clutch drum.
3. Install direct clutch on oil pump. Use dial indicator to check direct clutch piston stroke. Apply air pressure to oil pump passage and note reading. See **DIRECT CLUTCH PISTON STROKE SPECIFICATIONS** table. See **Fig. 22** . If piston stroke is excessive, replace flange.

DIRECT CLUTCH PISTON STROKE SPECIFICATIONS

Model Application	Thickness In. (mm)
A-241E (Except MR2) & A-241L	.0437-.0579 (1.110-1.470)
A-241H	.0445-.0591 (1.130-1.500)
A-243L	.0642-.0776 (1.630-1.970)
MR2 (A-241E)	.0445-.0591 (1.130-1.500)

4. Flange is available in various thickness. See **DIRECT CLUTCH FLANGE SPECIFICATIONS** table.

DIRECT CLUTCH FLANGE SPECIFICATIONS

Model Application	Thickness In. (mm)
A-241E (Except MR2) & A-241L	.102 (2.60)
A-241E (Except MR2) & A-241L	.118 (3.00)
A-241H	.118 (3.00)
A-241H	.133 (3.37)
A-243L	.102 (2.60)
A-243L	.110 (2.80)
A-243L	.118 (3.00)
MR2 (A-241E)	.102 (2.60)
MR2 (A-241E)	.118 (3.00)

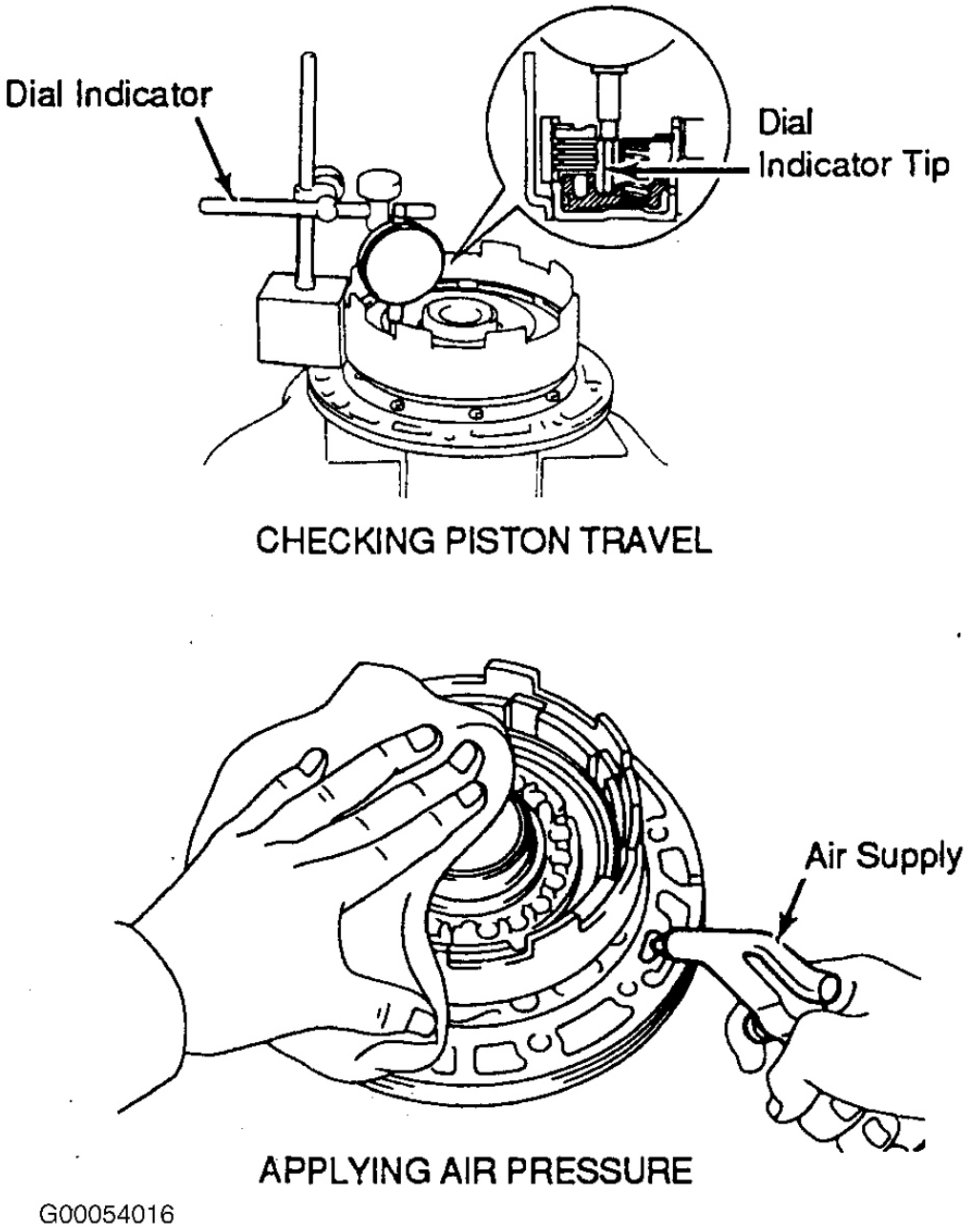


Fig. 22: Checking Direct Clutch Piston Stroke
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

FORWARD CLUTCH

Disassembly

1. Remove thrust washer. Remove thrust bearings and races from both sides of clutch on MR2 models. Remove clutch drum snap ring. Remove flange, discs and plates. Note location of components.
2. Using Clutch Spring Compressor (09351-32070) and arbor press, compress return springs. Remove snap ring. Remove spring compressor and return springs.
3. Remove piston. Apply compressed air to oil passage hole (nearest piston) on rear of forward clutch shaft. This will force piston from clutch drum. If necessary, remove oil seal rings.

Inspection

See INSPECTION under DIRECT CLUTCH.

NOTE: New discs or plates must be soaked in ATF at least 2 hours prior to reassembly.

Reassembly

1. Install new seal rings. Use care not to over expand seal rings. Install new "O" rings on piston and coat with ATF. Install piston in clutch drum with cup side upward. Use care not to damage "O" rings. See **Fig. 23** .
2. 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.
3. Install in order: plate, disc, plate, disc, plate, disc, plate, disc and flange. Install flange with flat end facing inward. Install outer snap ring. Ensure end gap of ring is not aligned with cut-outs in clutch drum.
4. Use dial indicator to check direct clutch piston stroke. Attach dial indicator to forward clutch drum. Position dial indicator tip against piston.
5. Apply compressed air to oil passage hole (nearest piston) on rear of forward clutch shaft and note reading. Clutch piston stroke must be within .0559-.0713" (1.419-1.811 mm).
6. Flange is available in different thickness .1181" (2.999 mm) and .1327" (3.370 mm). Ensure piston operates. Coat thrust washer, races and bearing with petroleum jelly and install.

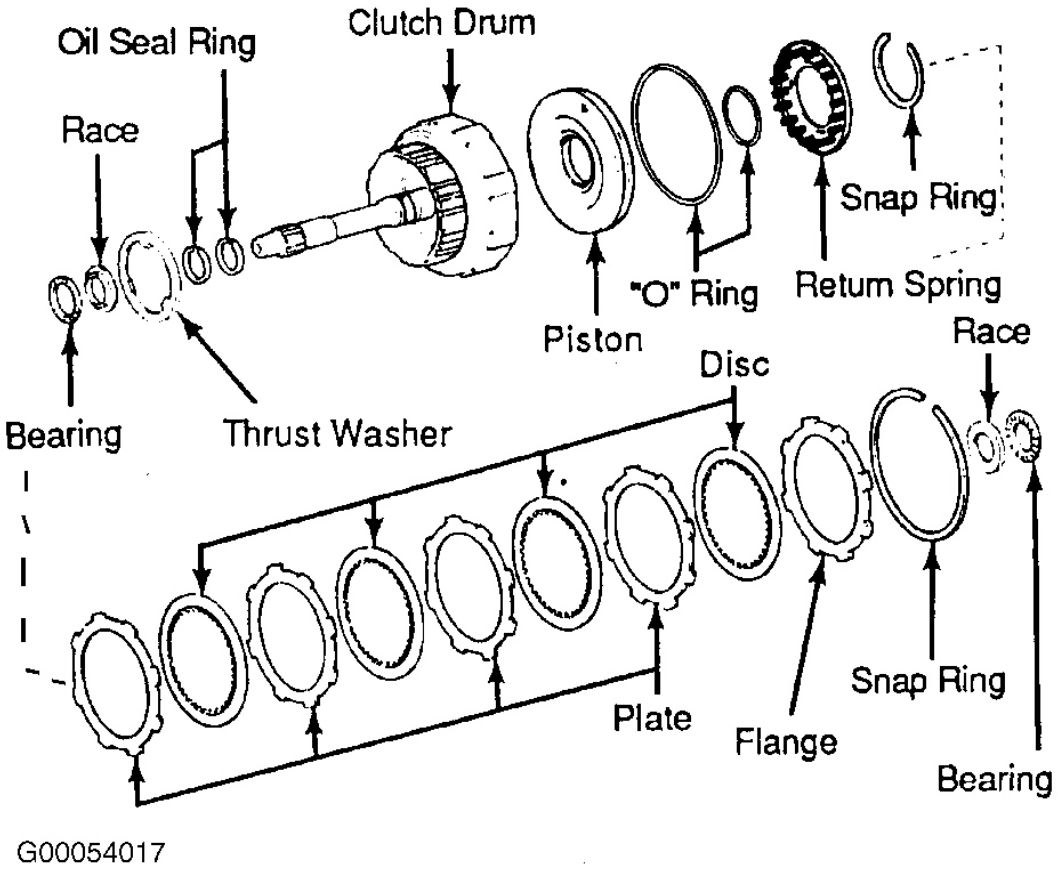


Fig. 23: Exploded View Of Forward Clutch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

FRONT PLANETARY GEAR

Disassembly

1. Hold sun gear and turn hub. Hub should rotate freely clockwise and lock when turned counterclockwise. See **Fig. 24** . Remove No. 2 brake hub and one-way clutch from sun gear.
2. Remove thrust washer from sun gear input drum. See **Fig. 12** and **Fig. 25** . Remove snap ring. Remove sun gear input drum.

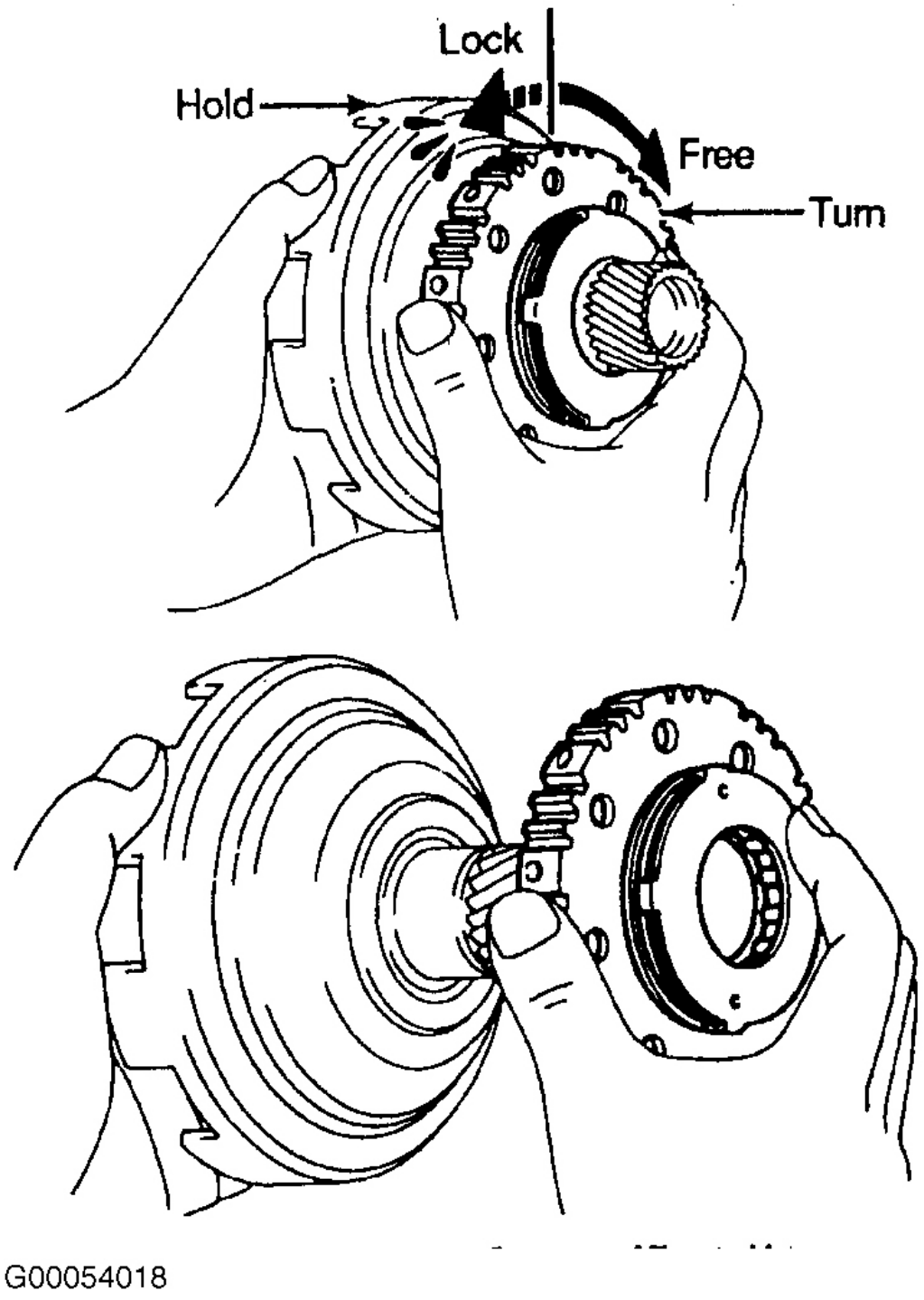


Fig. 24: Installing & Checking No. 1 One-Way Clutch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

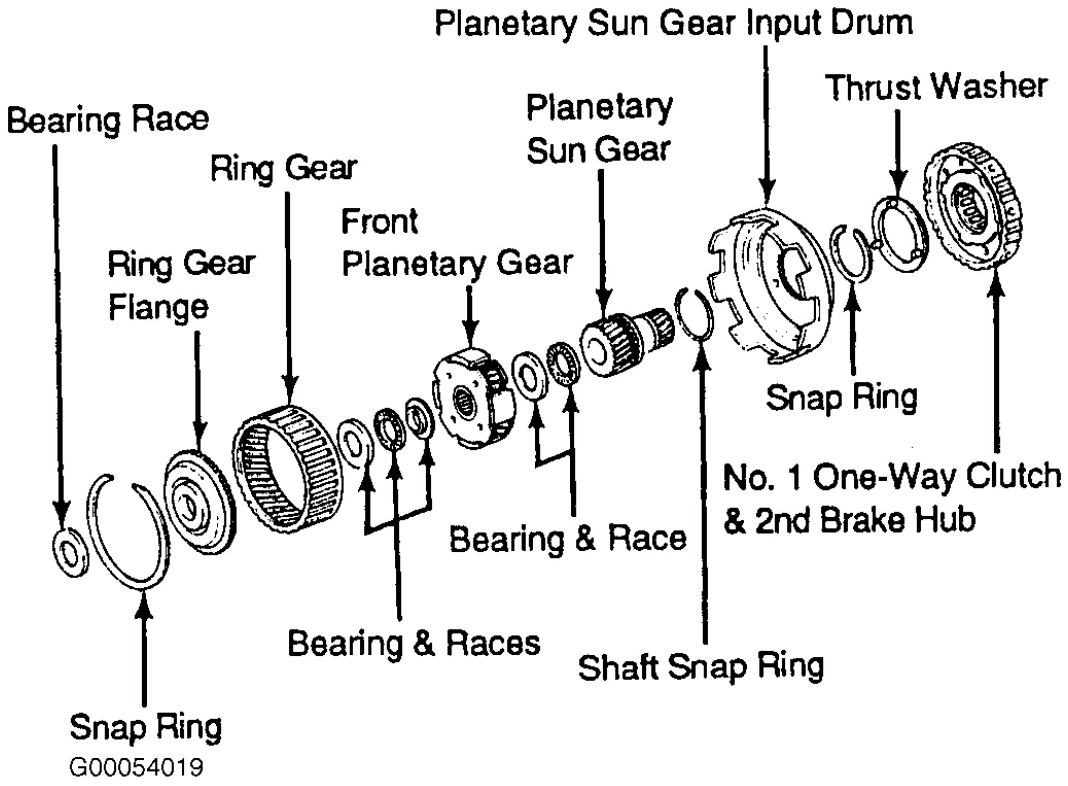


Fig. 25: Exploded View Of Front Planetary Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

1. Measure inside diameter of sun gear flange bushings. Standard inside diameter should be between .8671-.8680" (22.025-22.046 mm). Maximum inside diameter is .8699" (22.096 mm). If inside diameter is excessive, replace sun gear. Measure inside diameter of ring gear flange bushing. Maximum inside diameter is .749-.750" (19.03-19.05 mm). If inside diameter is excessive, replace ring gear flange.
2. Measure planetary pinion gear thrust clearance. Standard clearance is .008-.020" (.20-.50 mm). Maximum clearance is .020" (.50 mm). If clearance is excessive, replace planetary gear assembly. See **Fig. 26** .

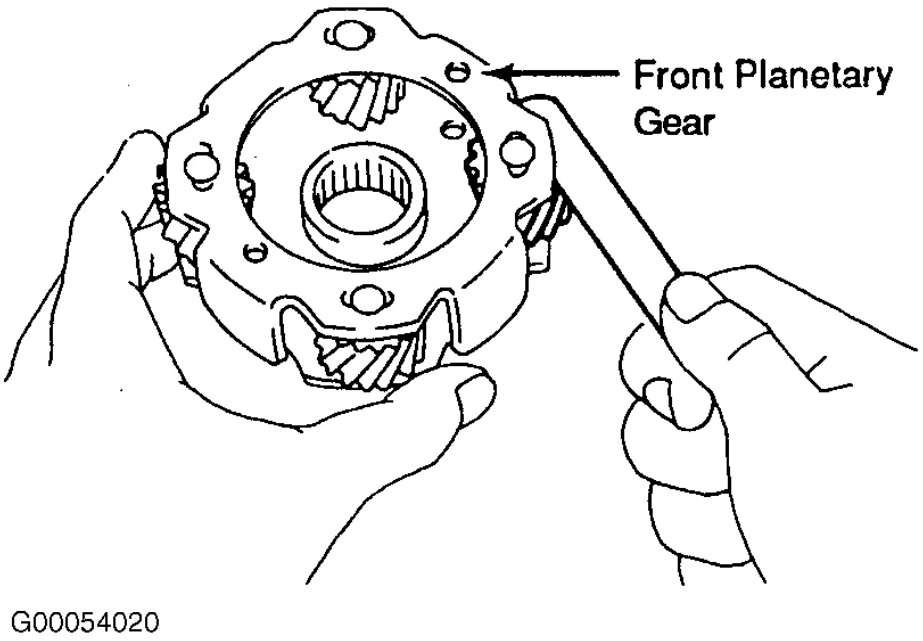


Fig. 26: Measuring Planetary Gear Thrust Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

1. Position flange into ring gear. Using a screwdriver, install snap ring.
2. Install shaft snap ring on sun gear. Install sun gear input drum on sun gear. Install snap ring. Install thrust washer on sun gear input drum.
3. While turning hub clockwise, slide one-way clutch on sun gear. Recheck operation of No. 1 one-way clutch.

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. 27** .
2. Remove thrust washers from both sides of planetary gear. Remove hub and rear planetary gear from No. 2 one-way clutch. Remove snap rings and side retainers from one-way clutch. Note position of No. 2 one-way clutch and remove from outer race. See **Fig. 12** and **Fig. 28** .

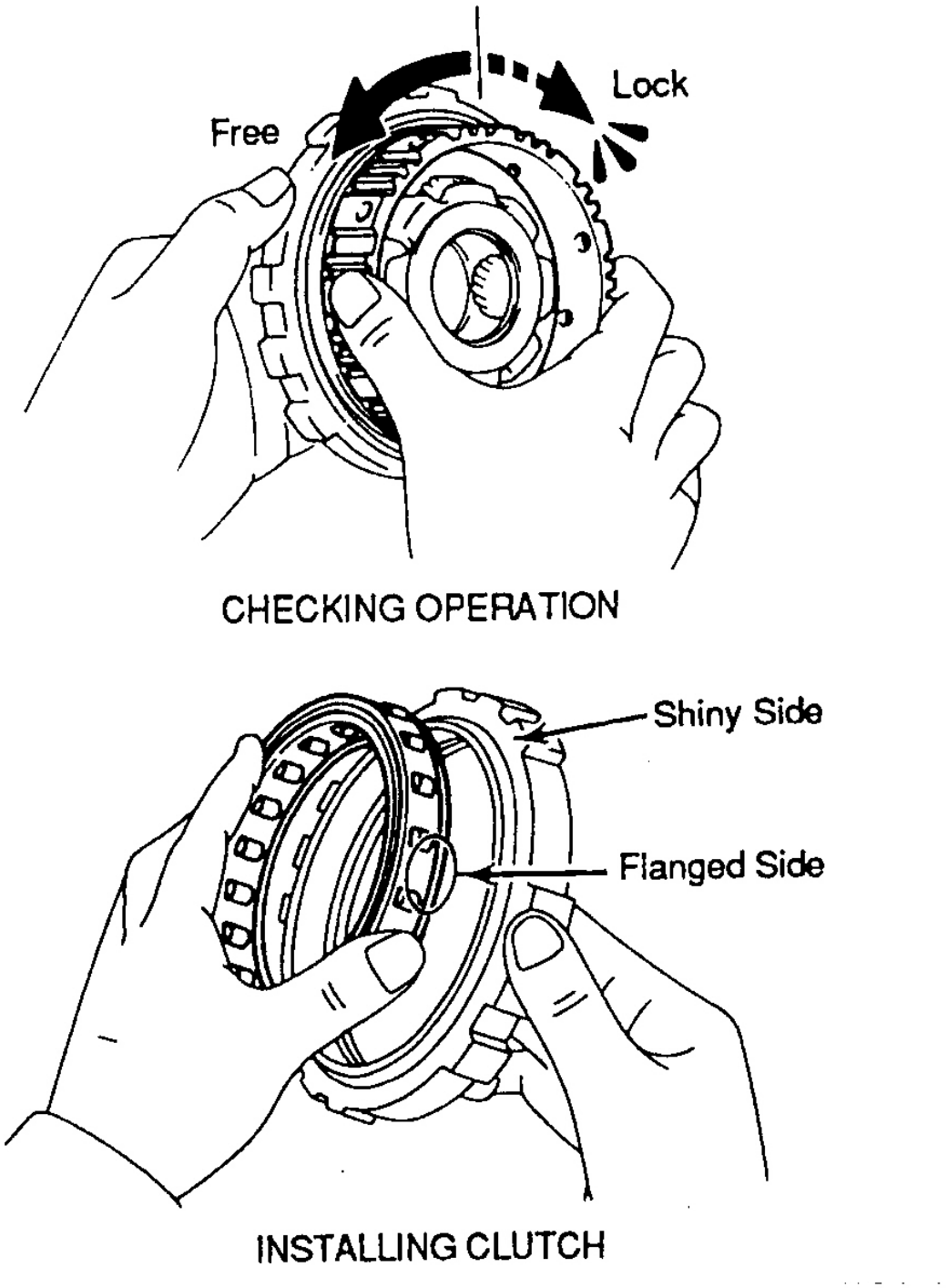


Fig. 27: Installing & Checking No. 2 One-Way Clutch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

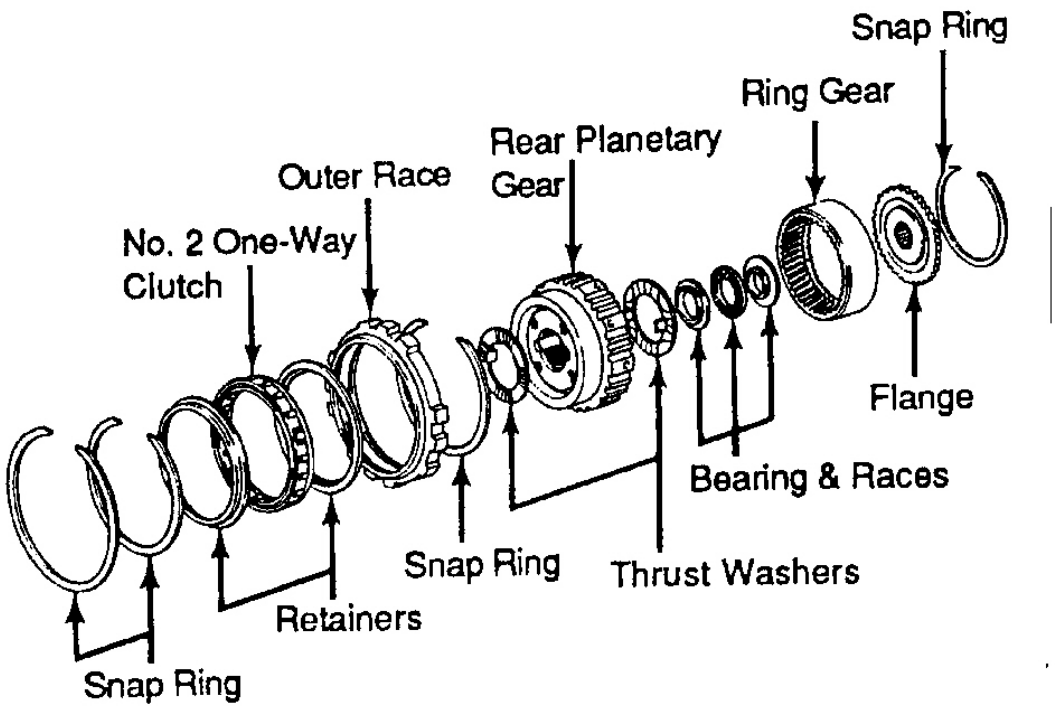


Fig. 28: Exploded View Of Rear Planetary Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

Measure rear planetary pinion gear thrust clearance. Standard clearance is .008-.020" (.20-.50 mm). Maximum clearance is .020" (.50 mm). If clearance is excessive, replace planetary gear assembly.

Reassembly

1. Install No. 2 one-way clutch in outer race. Face flanged side of No. 2 one-way clutch inward from shiny side of outer race. Install 2 side retainers and 2 snap rings.
2. Install planetary gear into No. 2 one-way clutch facing inner race of planetary gear inward from back side of outer race. Check operation of No. 2 one-way clutch. Coat thrust washers with petroleum jelly. Install thrust washer on both sides of carrier. Align tab of washers with hollow of carrier. See **Fig. 12** and **Fig. 28** .

1ST & REVERSE BRAKE

Disassembly & Inspection

1. On MR2 models, using Spring Compressor (09350-32013), compress springs by tightening bolt

gradually. Remove spring retainer snap ring. Remove compressor. Remove snap ring and return spring. See **Fig. 29** .

2. On all other models, remove snap ring from 1st/Reverse brake. Remove flanges, discs and plates. Note location of components. See **Fig. 30** . Using Spring Compressor (09351-32070), compress piston return spring. Remove snap ring. Remove piston return spring.
3. Apply compressed air to oil passage in transaxle case to remove piston. Hold air gun away from hole. Remove piston "O" rings. Clean all parts with solvent or ATF. Dry all parts using compressed air. Inspect piston for roughness or damage, replace (as necessary). Inspect discs, plates and flange.

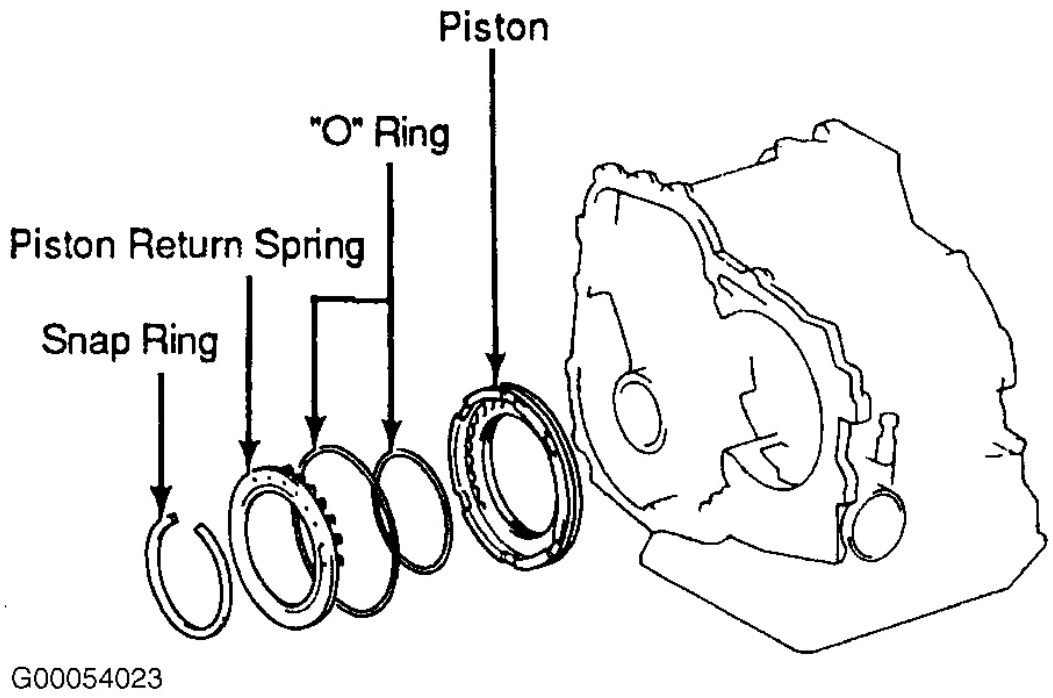


Fig. 29: Exploded View Of 1st/Reverse Brake (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

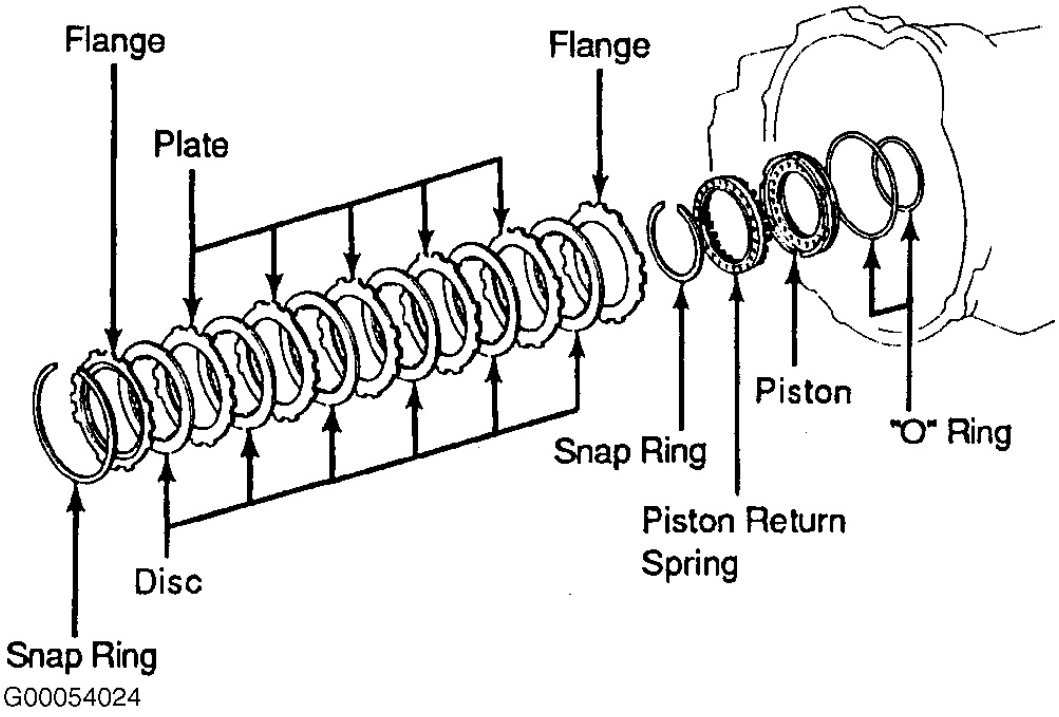


Fig. 30: Exploded View Of 1st/Reverse Brake (Except MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

1. Install new "O" rings on piston and coat with ATF. Install piston in case with spring seats facing upward. Install piston return spring and snap ring in place.
2. On MR2 models, using spring compressor, compress piston return springs. Avoid overtightening compressor to prevent bending spring retainer or damaging case. Push snap ring into place with fingers. Ensure snap ring is fully seated and centered by spring retainer lugs. Snap ring end gap must not align with spring retainer claw. Remove spring compressor.
3. On all other models, install in order: Flange, disc, plate, disc, plate, disc, plate, disc, plate, disc, plate, disc, flange. Install outer snap ring. Ensure end-gap of snap ring is not aligned with cut-outs. See **Fig. 30** .

2ND BRAKE

Disassembly & Inspection

Apply compressed air to oil hole to remove piston. Remove 2 "O" rings from piston. Check discs, plates and flange. See manufacturers TSB TM91-007.

Reassembly

Coat a NEW "O" ring with ATF. Install 2 "O" rings on piston. Press piston into drum, being careful not to damage "O"' rings. See **Fig. 31** .

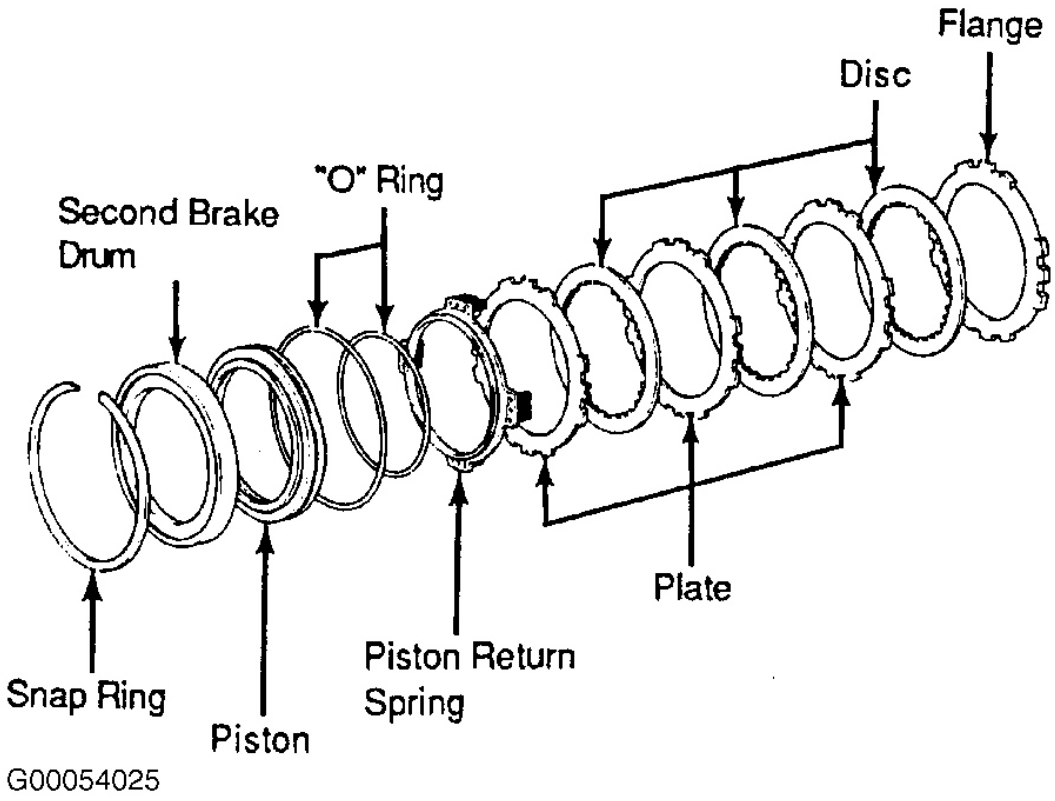


Fig. 31: Exploded View Of 2nd Brake
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2ND COAST BRAKE

Disassembly

Remove oil seal ring from piston. remove piston rod "E" ring while pushing piston with needle nose pliers. Remove inner spring, plate washer and piston rod.

Inspection

Inspect brake band lining for condition. If brake band is serviceable but piston stroke is not within specification, select a new piston. Piston stroke should be .059-.118" (1.50-3.00 mm). Select from 2 length of piston rod. Piston rod lengths are 2.870" (72.90 mm) and 2.811" (71.40 mm).

Reassembly

Install washer and spring to piston rod. Install "E" ring while pushing piston. Apply ATF to oil seal ring to piston. DO NOT spread ring ends more than necessary for installation. See **Fig. 32** .

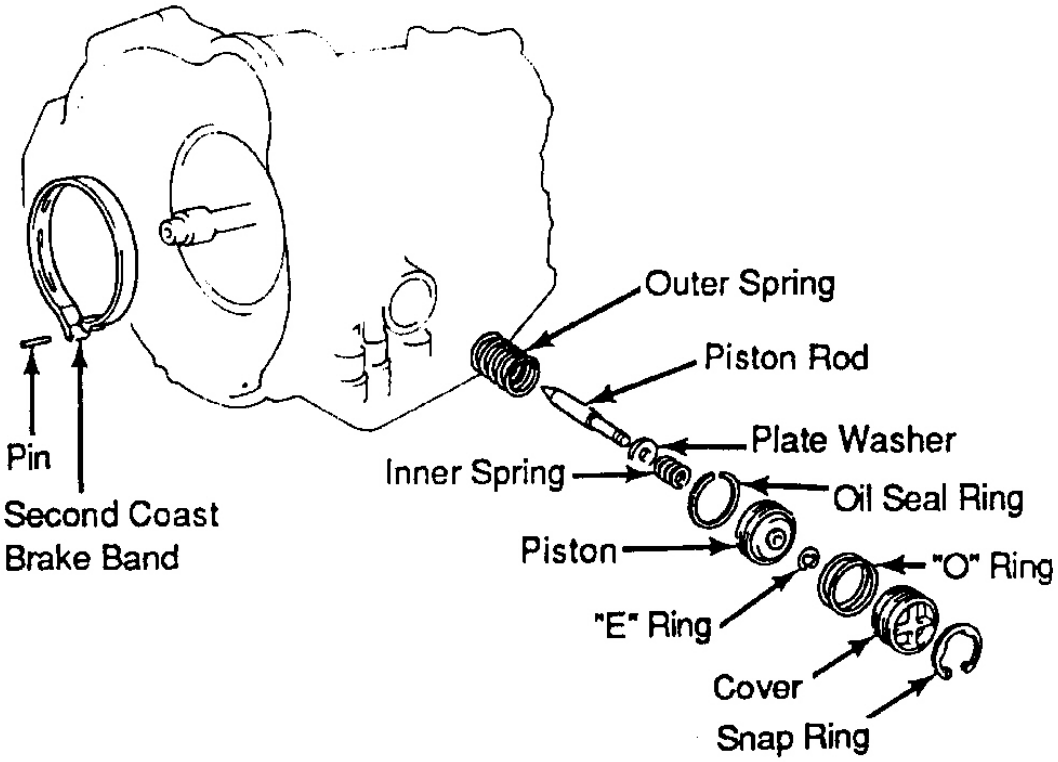


Fig. 32: Exploded View Of Second Coast Brake
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INTERMEDIATE SHAFT

Disassembly & Reassembly

Using Puller (09555-55010), press intermediate shaft bearings from shaft. Using Bearing Replacer (09351-32120) for front bearing and Oil Seal Replacer (09351-32150) for rear bearing, press in new bearings. Ensure gear flange end to intermediate shaft end measurements is within specification. See **Fig. 33** .

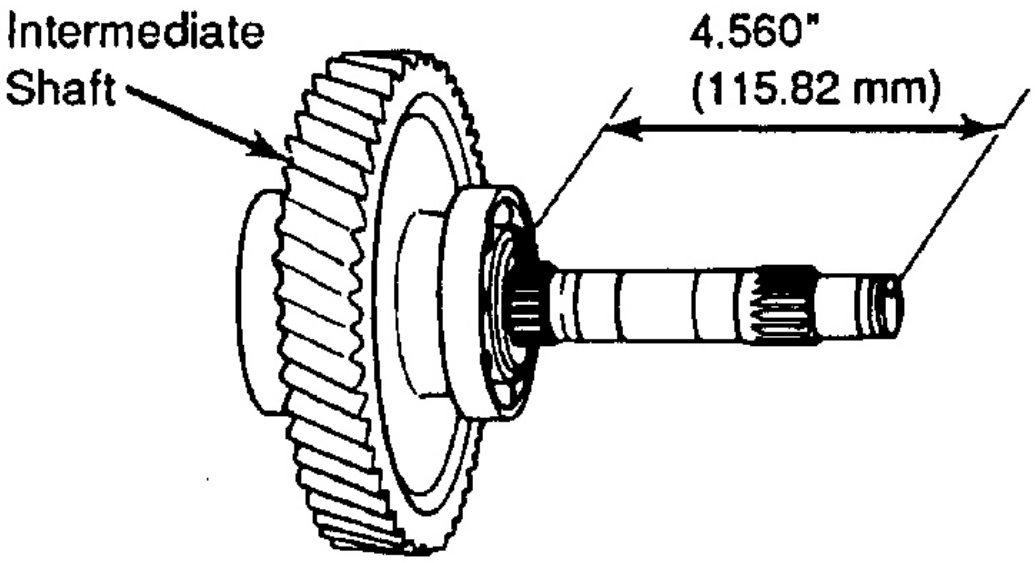


Fig. 33: Checking Intermediate Shaft Gear Flange
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

COUNTERSHAFT

Disassembly

1. Remove thrust bearing from countershaft. Remove underdrive planetary sun gear from countershaft. Remove snap ring from sun gear and countershaft assembly. Remove underdrive planetary gear, thrust bearing and race. See **Fig. 34** .
2. Using A/T Tool Set (09350-32014), Bearing Replacer (09555-55010) and arbor press, remove drive pinion with output flange, bearing, race and spacer. Note thickness and size of bearing race. Remove ring gear retaining snap ring. Remove ring gear from countershaft.
3. Using Bearing Remover (09550-00020) and arbor press, remove remaining bearing from countershaft. Remove bearing race from drive pinion using a brass punch and hammer. Note size of bearing and bearing race.
4. On MR2 models, remove underdrive one-way clutch and thrust washer from underdrive clutch drum. Remove snap ring from underdrive clutch drum. Remove flange, disc and plates. Note location of components. Using Spring Compressor (SST 09351-32070) and arbor press, compress piston return spring. Remove snap ring. Remove spring compressor and return spring. Apply compressed air to oil passage in underdrive clutch drum to remove piston.

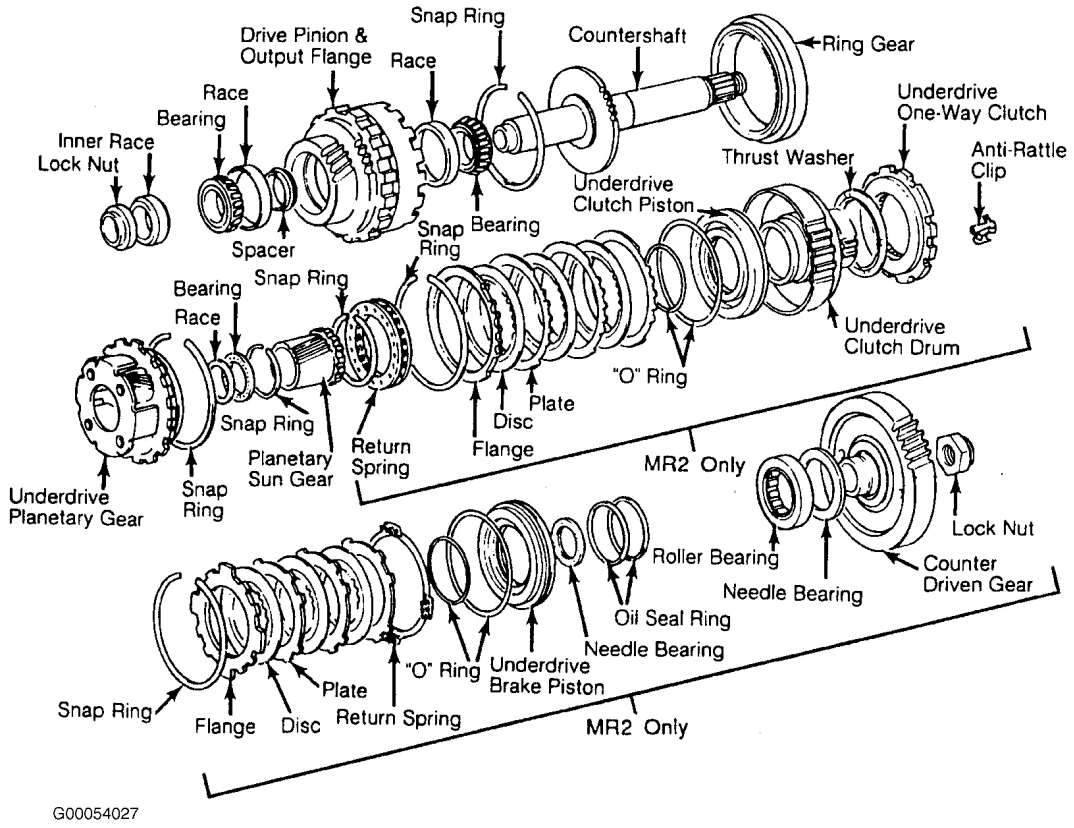


Fig. 34: Exploded View Of Countershaft Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

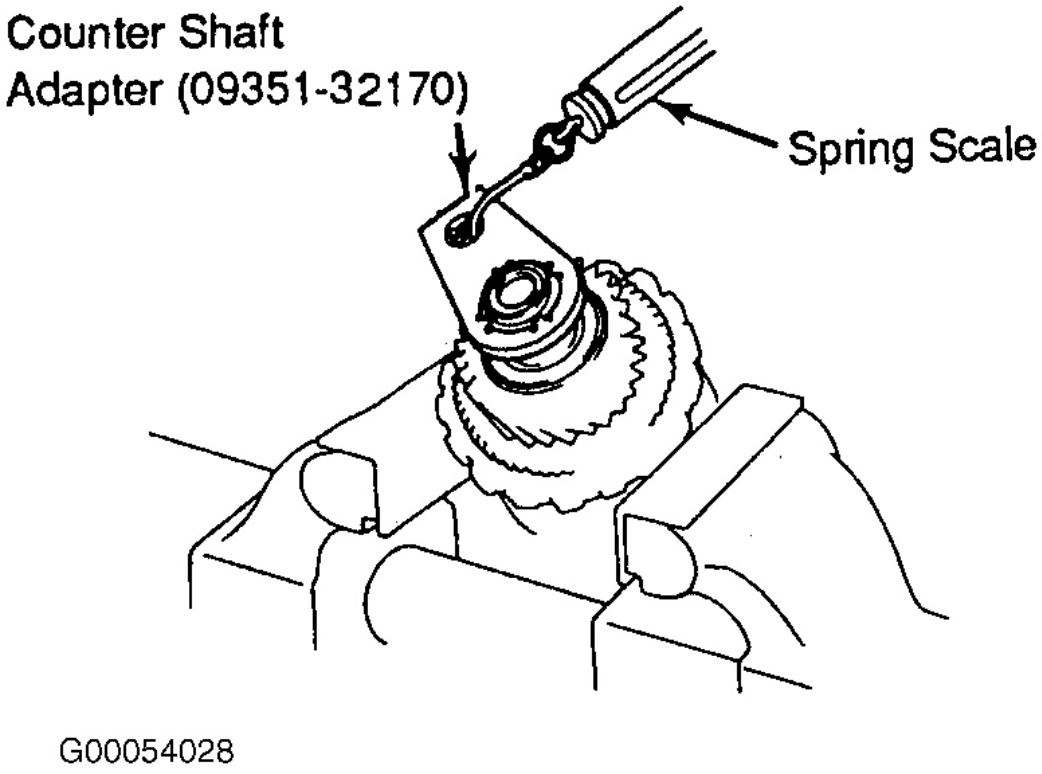


Fig. 35: Measuring Countershaft Torque
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

1. Ensure check ball is free in underdrive clutch 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 area. Replace all damaged components.

VALVE BODY

NOTE: Count number of adjusting rings before disassembly of valve body. Throttle pressure is changed according to number of rings. Some valve bodies DO NOT have adjusting rings. Note which step at end of plunger sleeve is in contact with valve body before disassembly. Line pressure is affected by plunger location.

Disassembly (Valve Body)

1. On A-241H models, remove tube clamp and oil tube, No. 2 pressure regulator valve body, gasket and plate from upper valve body . On all models, remove solenoid valve(s). Remove lower valve body cover, gasket, and plate. Remove oil strainer (if installed).

2. Remove bolts from upper valve body. Remove bolts from lower valve body. Hold plate against lower valve body. Remove lower valve body slowly. DO NOT allow valves, springs and strainer to drop out. Remove plate and gaskets from lower valve body. Note location of check balls, retainers, keys and pins in valve body. See manufacturers TSB TM91-007.

Disassembly (Upper Valve Body)

1. Remove throttle valve retainer and check balls. Note which step from end of primary regulator valve sleeve contacts valve body.
2. Push primary regulator valve sleeve inward and remove pin. Remove valve sleeve, primary regulator valve, valve plunger, plunger sleeve, shim and spring. See **Fig. 36** and **Fig. 37** .
3. Remove lock-up relay valve. Remove control sleeve lock-up relay valve, spring and release valve. Remove 2nd coast or low coast valve and spring. Remove throttle cam, collar and spring.
4. Remove throttle valve sleeve, kickdown valve or downshift plug, throttle valve and spring. Remove spring and adjusting shims. Note number of shims for reassembly reference. Remove throttle modulator valve.
5. Remove accumulator control valve. Remove cut-back valve. Remove manual valve pin and plug.
6. On A-241H models, remove No. 2 pressure regulator valve. Remove plug, plungers, valve and spring.

Disassembly (Lower Valve Body)

1. To disassemble lower valve body, remove lower valve body plate and gaskets. Remove by-pass valve and spring. Remove pressure relief valve, spring and strainer. See **Fig. 38** and **Fig. 39** .
2. If equipped, remove 3-4 shift valve and spring. Remove key, plug, 3-4 shift control valve and 3rd coast shift valve. Remove low coast shift valve. Remove 1-2 shift lower and upper valve.
3. Remove secondary regulator, intermediate shift valve and 2-3 shift valve. Remove low modulator valve, lock-up signal valve and detent regulator valve. Remove 3-4 switch valve.

Inspection

1. Clean all parts with solvent or ATF. Clean all fluid passages and holes. Using compressed air, ensure passages or holes are clear.
2. Inspect valve for scoring or roughness. Inspect valve springs for damage, squareness, rust and collapsed coils. Measure spring free length. Replace spring if free length is not within specification. See appropriate VALVE BODY VALVE SPRING SPECIFICATIONS table. Valve body springs must be arranged with corresponding valve.

UPPER VALVE BODY VALVE SPRING SPECIFICATIONS

Spring/ Transaxle Application	Color Code Free Length In. (mm)	Free Length In. (mm)
Primary Regulator Valve		
All Except MR2	Purple	2.626 (66.7)
MR2	Purple	2.622 (66.6)
Lock-Up Relay Valve		
ALL	None	.740 (18.8)

Low Coast Modulator Valve		
A-241E	Yellow	1.083 (27.5)
2nd Coast Modulator Valve		
A-241L; A-243L	Red	1.169 (29.7)
A241H	Blue	1.283 (32.6)
Downshift Plug		
A241E, A241L,A243L	Red	1.173 (29.8)
A-241H	Pink	1.154 (29.3)
Throttle Valve		
All except MR2	Lt. Green	1.150 (29.2)
MR2	Yel/Grn	1.150 (29.2)
Throttle Modulator Valve		
All	Green	1.177 (29.9)
Accumulator Control Valve		
A-241E	Orange	1.307 (33.2)
A-241H, A-243L	Yellow	1.504 (38.2)
A-241L, MR2	Blue	1.413 (35.9)
No. 2 Pressure Regulator Valve		
A-241H	Red	1.157 (29.4)
Kickdown Valve		
MR2	White	1.173 (29.8)

LOWER VALVE BODY VALVE SPRING SPECIFICATIONS

Spring/ Transaxle Application	Color Code	Free Length - In. (mm)
Secondary Regulator Valve		
ALL	Blue	1.079 (27.4)
1-2 Shift Valve		
A-241H,A-241L, A-243L	Yellow	1.071 (27.2)
A-241E	Purple	1.213 (30.8)
MR2	Purple	1.209 (30.7)
2-3 Shift Valve		
A-241H,A-241L, A-243L	None	1.091 (27.7)
A-241E	Purple	1.213 (30.8)
MR2	Purple	1.209 (30.7)
3-4 Shift Valve		
A-241H, A-243L	None	1.374 (34.9)
A-243L	None	1.091 (27.7)
A-241E	Purple	1.213 (30.8)
MR2	Purple	1.209 (30.7)
3-4 Switch Valve		
A-241H,A-241L, A-243L	None	1.217 (30.9)

Low Modulator Valve		
A-241H, A-241L A-243L	None	1.150 (29.2)
Cooler By-Pass Valve		
ALL	Yellow	.720 (18.3)
Pressure Relief Valve		
ALL	None	.441 (11.2)
Lock-Up Signal Valve		
A-241E, MR2	Orange	1.181 (30.0)
A-241H, A-243L	White	1.630 (41.4)
A-243L	Blue	.717 (18.2)
Detent Regulator Valve		
A-241H,A-241L, A-243L	Brown	1.260 (32.0)
2nd Coast Modulator Valve		
A-241E, MR2	Red	1.165 (29.6)

Reassembly (Upper Valve Body)

1. Coat all components with ATF. Reverse removal procedure for reassembly. Note special procedures listed. To assemble upper valve body, install cut-back valve with small end first.
2. Install accumulator control valve plug with thick end installed first. Install throttle modulator valve plug with flat end first. Install throttle valve with small end first.
3. Ensure throttle cam spring is hooked through hole. Ensure throttle cam moves on kickdown valve roller. Install release valve in valve sleeve flat end first.
4. Install primary regulator valve with small end first into plunger sleeve. Ensure that plunger is installed with same end contacting valve body as during disassembly.
5. Coat manual valve retaining pin with petroleum jelly prior to installation. Coat valve retainer with petroleum jelly prior to installation. Install check balls in proper location. See **Fig. 40** .

Reassembly (Lower Valve Body)

1. Coat all components with ATF. Reverse removal procedure for reassembly. Note special procedures listed.
2. During lower valve body reassembly, install 2-3 shift valve and low coast shift valve small end first. Install low coast shift valve plug with thin end first.
3. Coat intermediate shift valve key with petroleum jelly prior to installation. Install 3-4 shift control valve cut side first. Install 3rd coast shift valve with flat end first.
4. Install lower 1-2 shift valve flat end first. Install 1-2 shift plug thin end first.

Reassembly (Valve Body)

1. Position proper gasket and plate on lower valve body. See **Fig. 41** and **Fig. 42** .
2. Place lower valve body with plate and gaskets on upper valve body. Hold lower valve body, gaskets and plate securely to prevent plate from separating during installation. Align valve body bolt holes with gaskets and plate.

3. Install and finger tighten bolts in lower valve body to secure upper valve body. Ensure correct length bolts are installed in original positions. See **Fig. 43** .
4. Install and finger tighten bolts in upper valve body. Ensure correct length bolts are installed in original positions. See **Fig. 44** . Install strainer, new gaskets and plate.
5. Install lower valve body cover bolts. See **Fig. 45** . Torque upper and lower valve body bolts to 56 INCH lbs. (6.4 N.m).
6. Install solenoid on A241H, A241L and A243L models. Torque to 56 INCH lbs. (6.4 N.m) Install No. 1, No. 2 and No. 3 solenoids on A-241E models. Torque No. 1 and No. 2 solenoids to 89 INCH lbs. (10 N.m). Torque No. 3 solenoids to 57 INCH lbs. (6.4 N.m).
7. On 241AH models, install gaskets plate No. 2 pressure regulator valve on upper valve body. Install and torque bolts to 57 INCH lbs. (6.4 N.m). Install oil tube and clamp. Torque bolt to 57 INCH lbs. (6.4 N.m).

DIFFERENTIAL (A241E, A-241L & A-243L)

Disassemble & Inspection

1. Mark ring gear and differential for reassembly reference. Loosen staked part of locking plate. Remove bolts and locking plates. Using plastic hammer, tap ring gear from differential case. See **Fig. 46** and **Fig. 47** .
2. Remove speedometer driven gear. Remove speed sensor and sensor rotor. Remove oil pump. Remove transaxle housing. Remove differential. Using Puller (09502-10012), remove side bearings from differential case. Remove speedometer drive gear.
3. Disassemble differential case. Drive out pinion shaft lock pin from ring gear. Remove pinion shaft from case. Remove 2 pinions, 2 side gears and 4 thrust washers. Remove oil seal from transaxle housing.
4. Remove side bearing outer race and shim of transaxle housing using Remover (09351-32090). Remove oil seal from transaxle case. Using Seal Replacer (09351-32150) and Handle (09351-32130), remove side bearing outer race and adjusting shim from case.
5. Clean all parts with solvent or ATF. Use compressed air to dry all parts. Check bearings and gears for wear or damage, replace (if necessary).

Reassembly

1. Place shim on transaxle housing. Using Bearing Replacer (09351-32111) and an arbor press, press a new outer race into housing. Install side bearing outer race on transaxle case.
2. Assemble differential case. Install thrust washers to side gears. Install side gears with thrust washers, pinion gears and pinion thrust washers into differential case. Align lock pin holes on pinion shaft and differential case. Install pinion shaft.
3. Measure side gear backlash while holding one pinion gear toward case. Backlash should be .0020-.0079" (.050-.200 mm). Select thrust washers that will ensure correct side gear backlash. Thrust washer thickness is available from .95 mm to 1.20 mm in .05 mm increments. Install thrust washers and side gears in case. Install same size thrust washers on both sides (if possible). Recheck gear backlash.
4. Once backlash is correct, using hammer and punch, drive lock pin through case and into pinion shaft. Stake differential case to retain lock pin. Using Remover/Installer (09710-03160) and an arbor press, install side bearing into differential case. Install speedometer drive gear to case.
5. Install differential in transaxle case. Install transaxle housing. Install and torque bolts to 21 ft. lbs. (29

N.m). Measure differential bearing preload, using Differential Preload Adapter (09564-32011) and an INCH lbs. torque wrench. See **Fig. 48** .

6. Preload must be within specification. Preload at starting point for a new bearing should be 7.1-12.4 INCH lbs. (.8-1.4 N.m) and 3.5-6.2 INCH lbs. (.4-.7 N.m) for a used bearing. If preload is incorrect, remove differential from transaxle case and change adjustment shim on transaxle case side. Adjust shims are available in thicknesses from 2.00 mm to 2.90 mm in .05 mm increments. Preload will change approximately 2.7-3.5 INCH lbs. (.3-.4 N.m) with each shim thickness.
7. Once correct preload is obtained, 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 above 230°F (110° C). Clean contact surface of ring gear with cleaning solvent. Quickly install ring gear on differential case. Install new locking plates and set bolts. Torque bolts evenly to 72 ft. lbs. (97 N.m). See **Fig. 49** . Stake one tab flush with flat surface of nut. Stake second tab against corner of nut on tightening side.

NOTE: Bolt length is indicated in millimeters.

8. Using Remover/Installer (09351-3211) and Handle (09351-32130), install oil seals into transaxle case. Coat lip of oil seal with MP grease. Using Seal Installer (09350-32150) and Handle (09351-32130), install transaxle housing oil seals.
9. On MR2 models, install differential. Apply seal packing Three Bond (1131) to transaxle housing. Install transaxle housing bolts and torque to 21 ft. lbs. (29 N.m). Install oil pump. Install sensor rotor and speed sensor. Install speedometer driven gear.

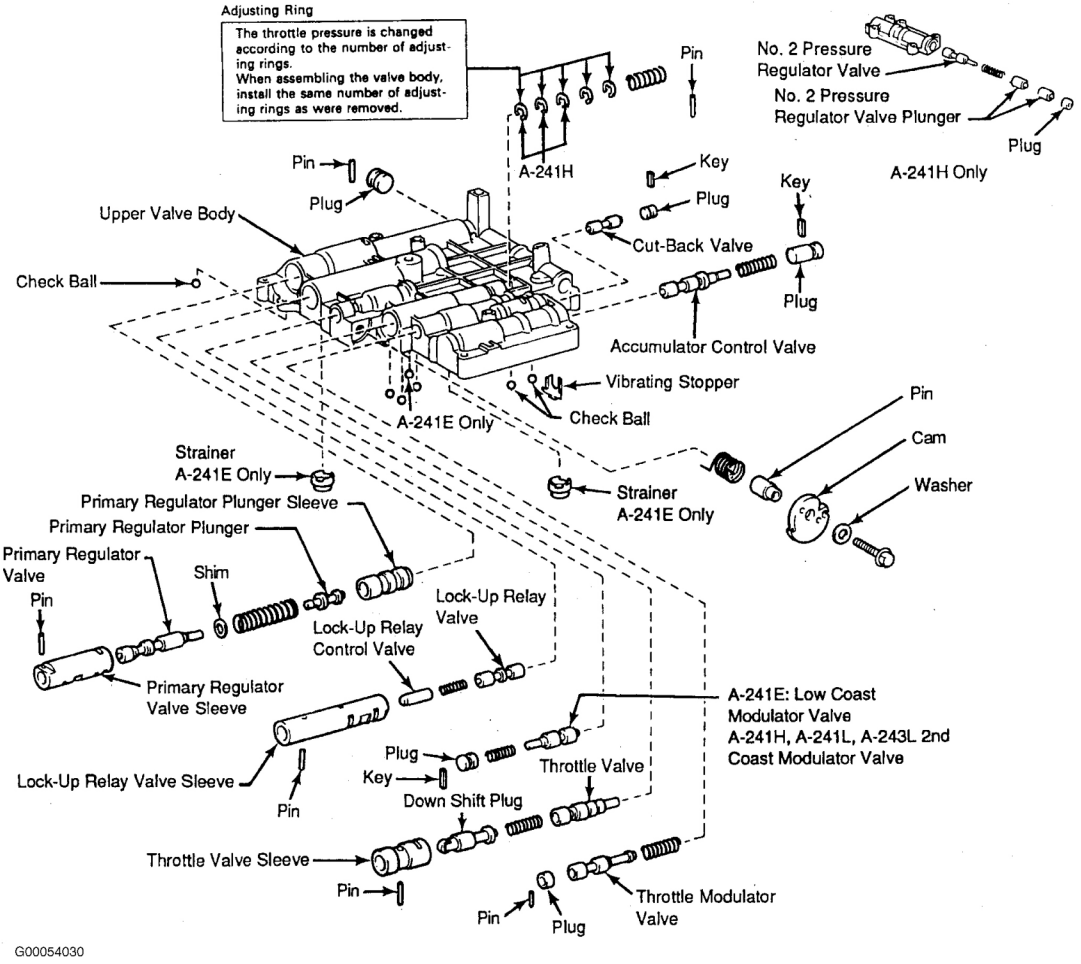


Fig. 36: Exploded View Of Upper Valve Body (Except MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

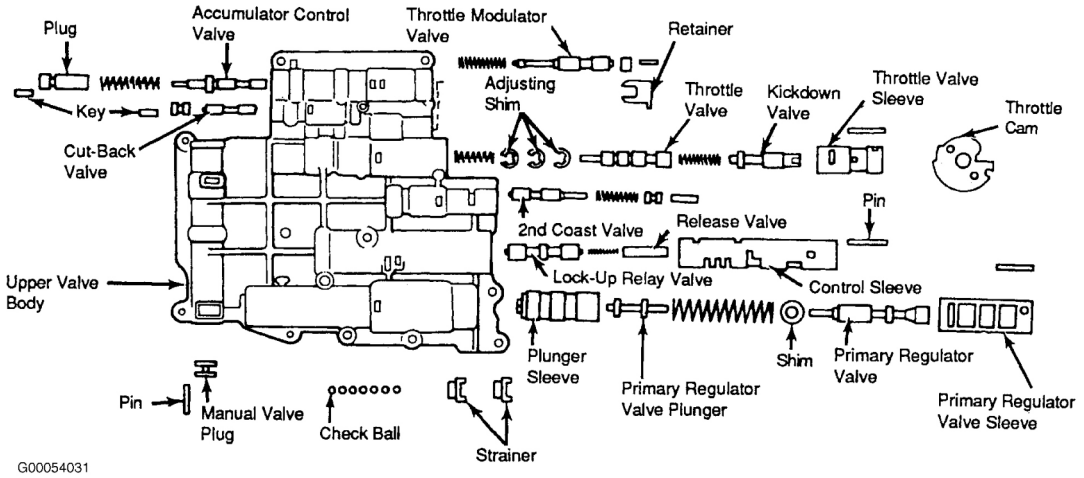


Fig. 37: Exploded View Of Upper Valve Body (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

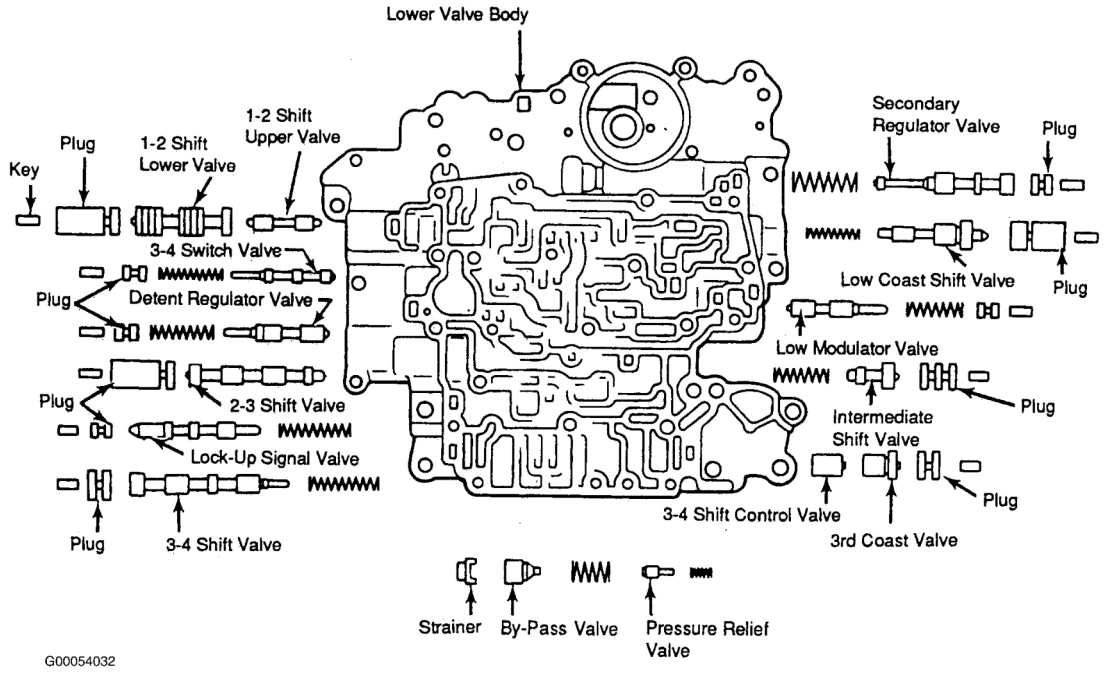


Fig. 38: Exploded View Of Lower Valve Body (A-241H, A-241L & A-243L)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

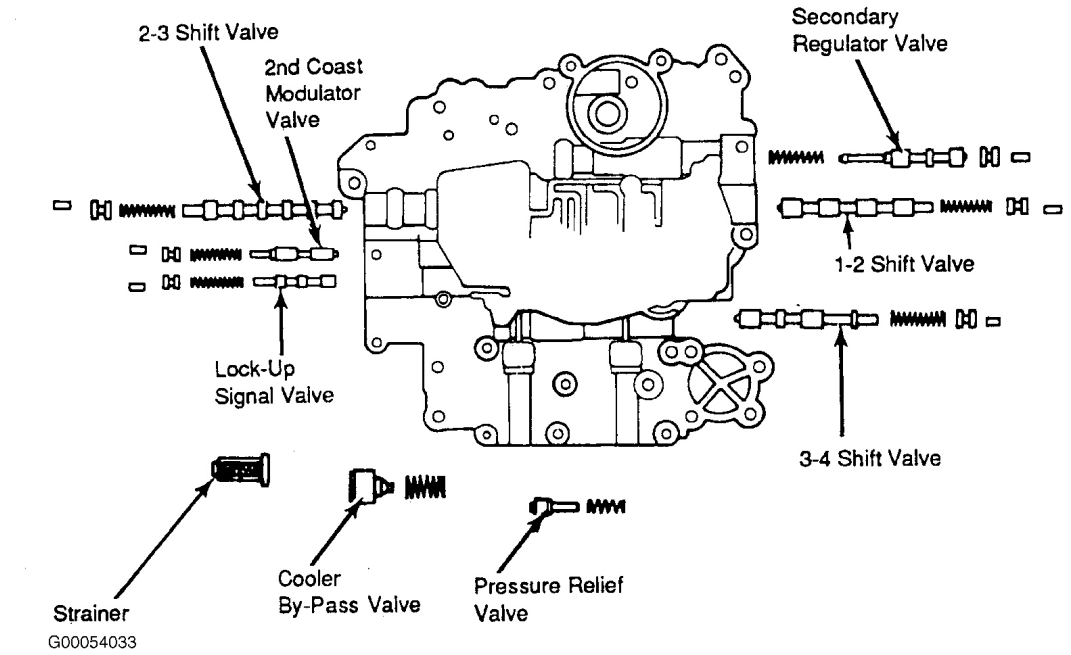


Fig. 39: Exploded View Of Lower Valve Body (A-241E)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

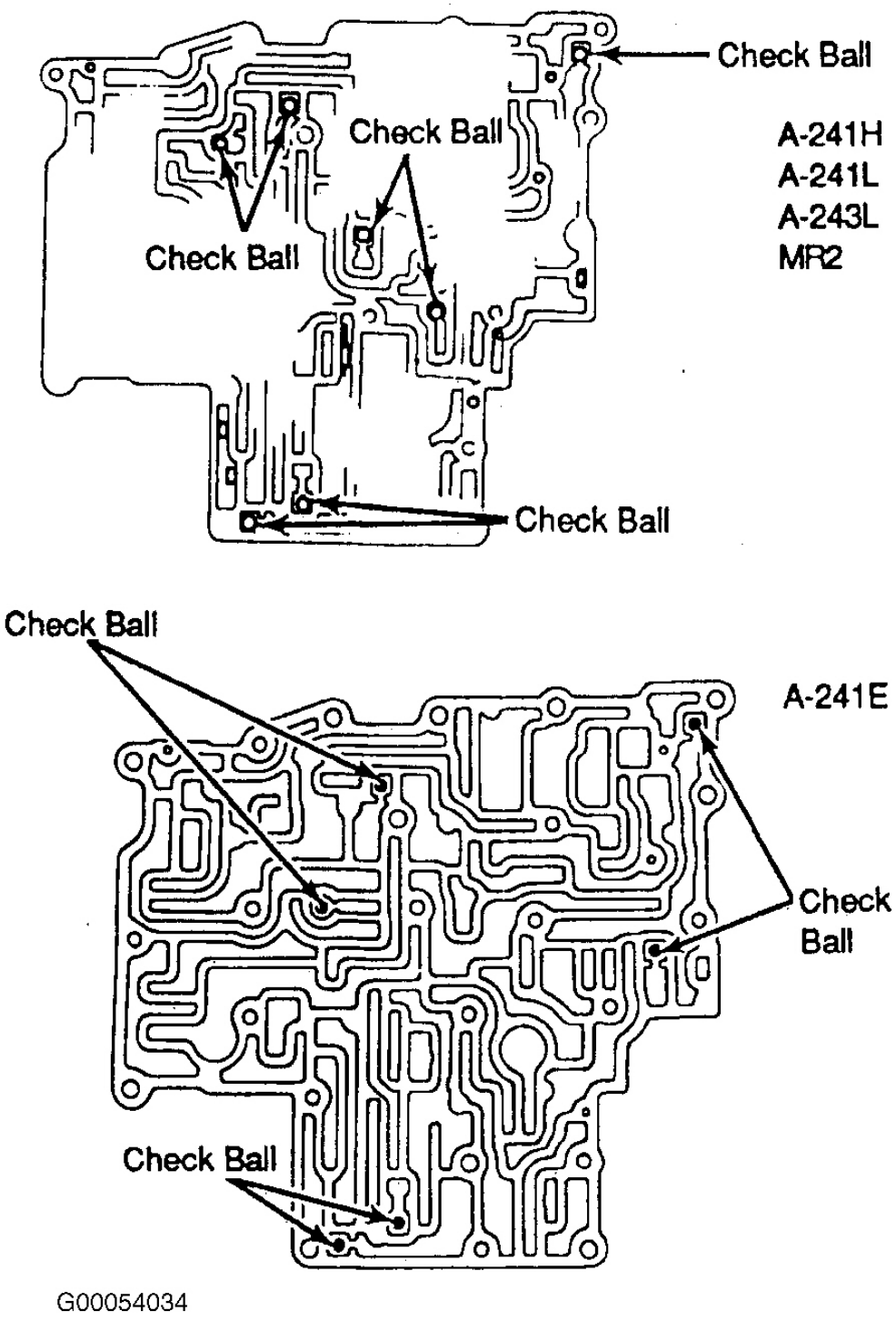
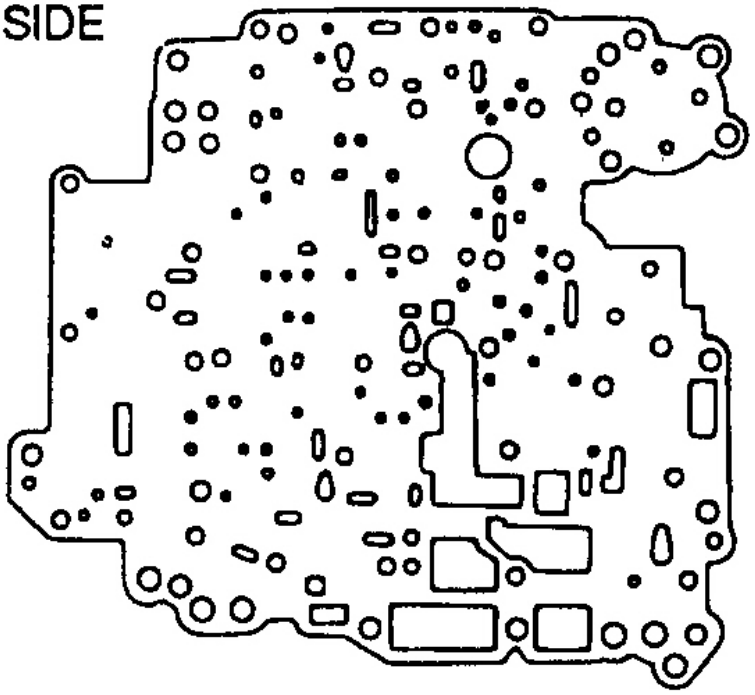


Fig. 40: Installing Valve Body Check Balls
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

LOWER SIDE



UPPER SIDE

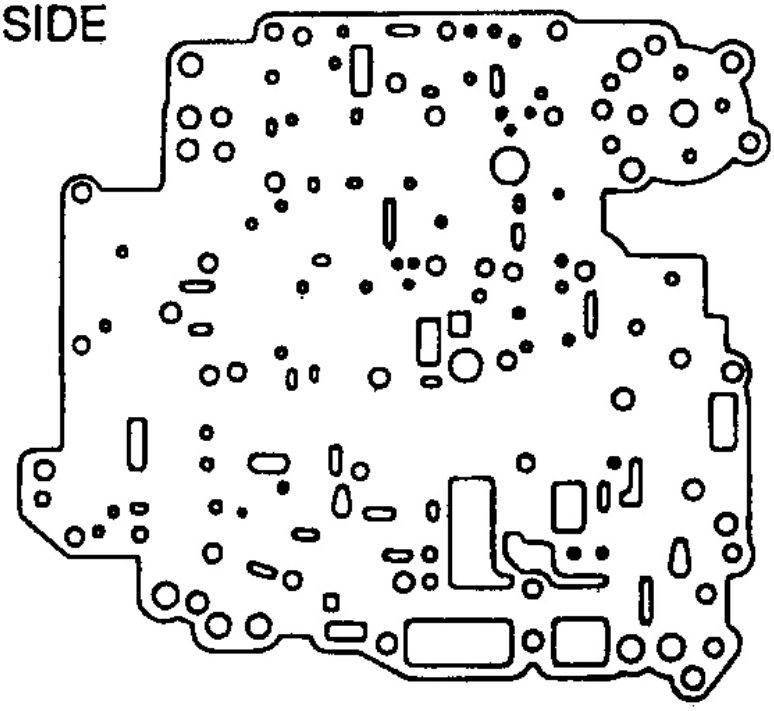


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Fig. 41: Valve Body Gasket Identification (Except A-241E)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

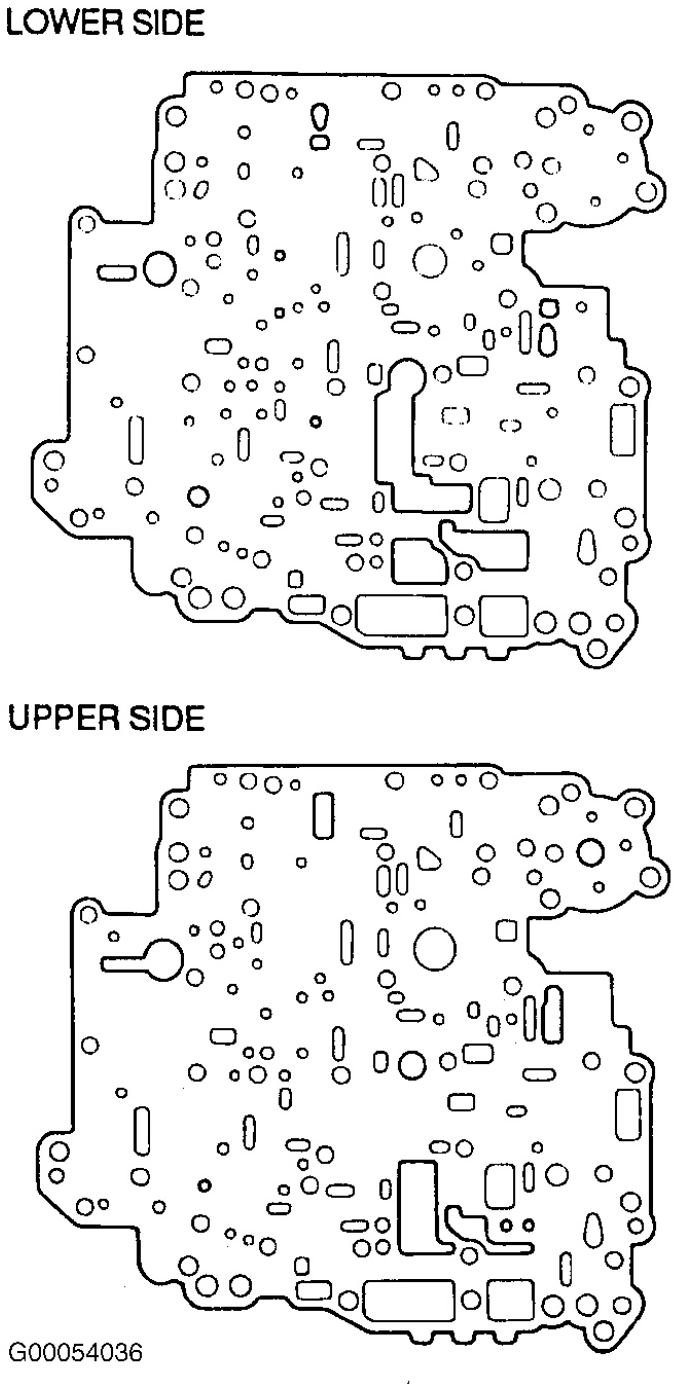


Fig. 42: Valve Body Gasket Identification (A-241E)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

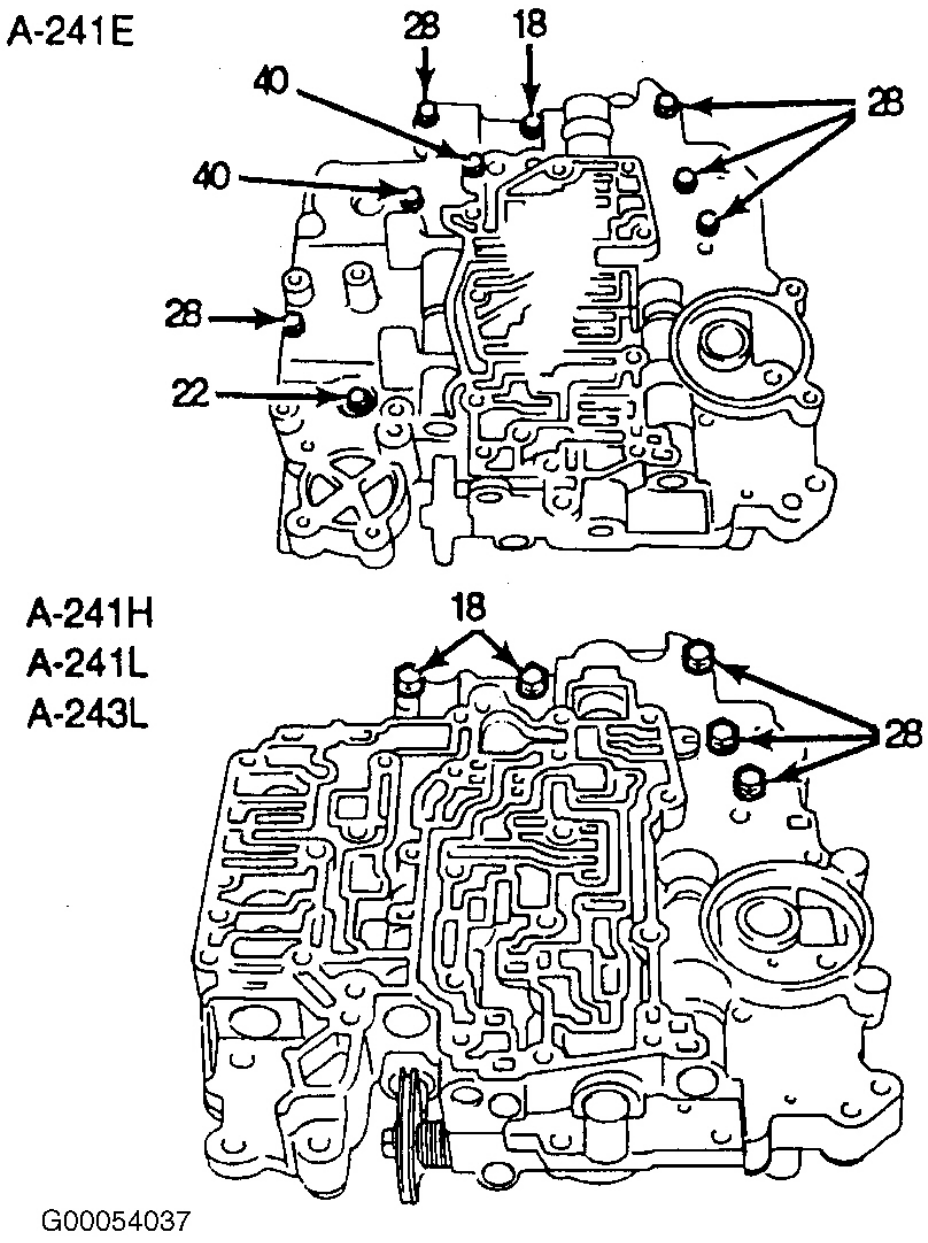


Fig. 43: Installing Lower Valve Body Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

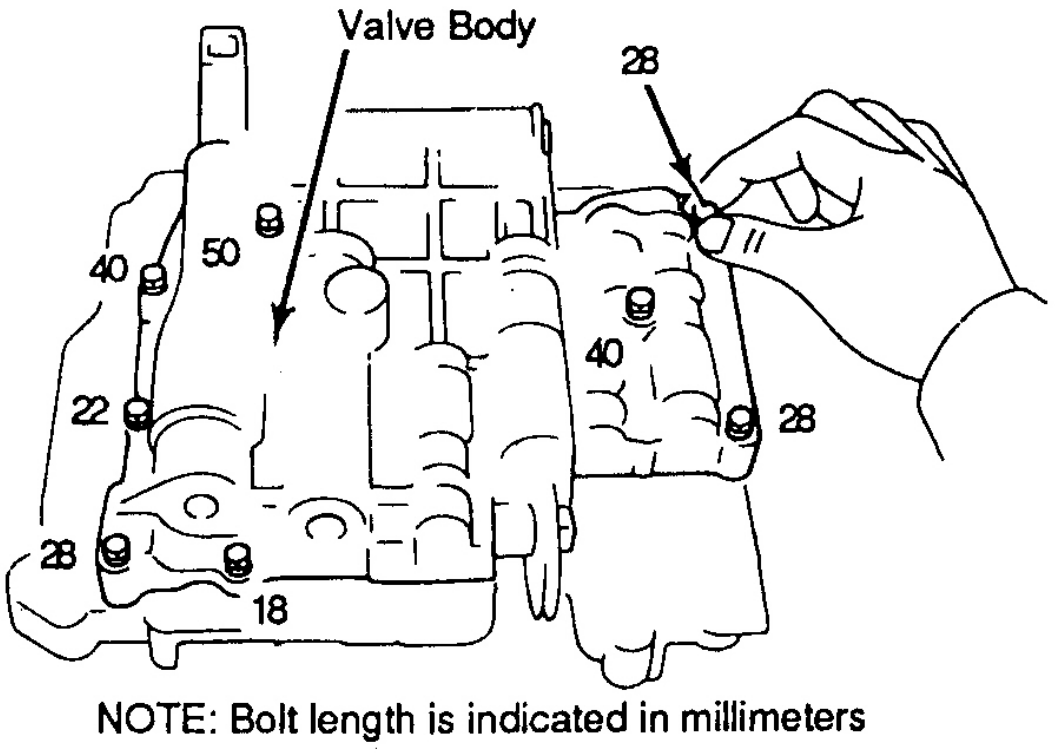
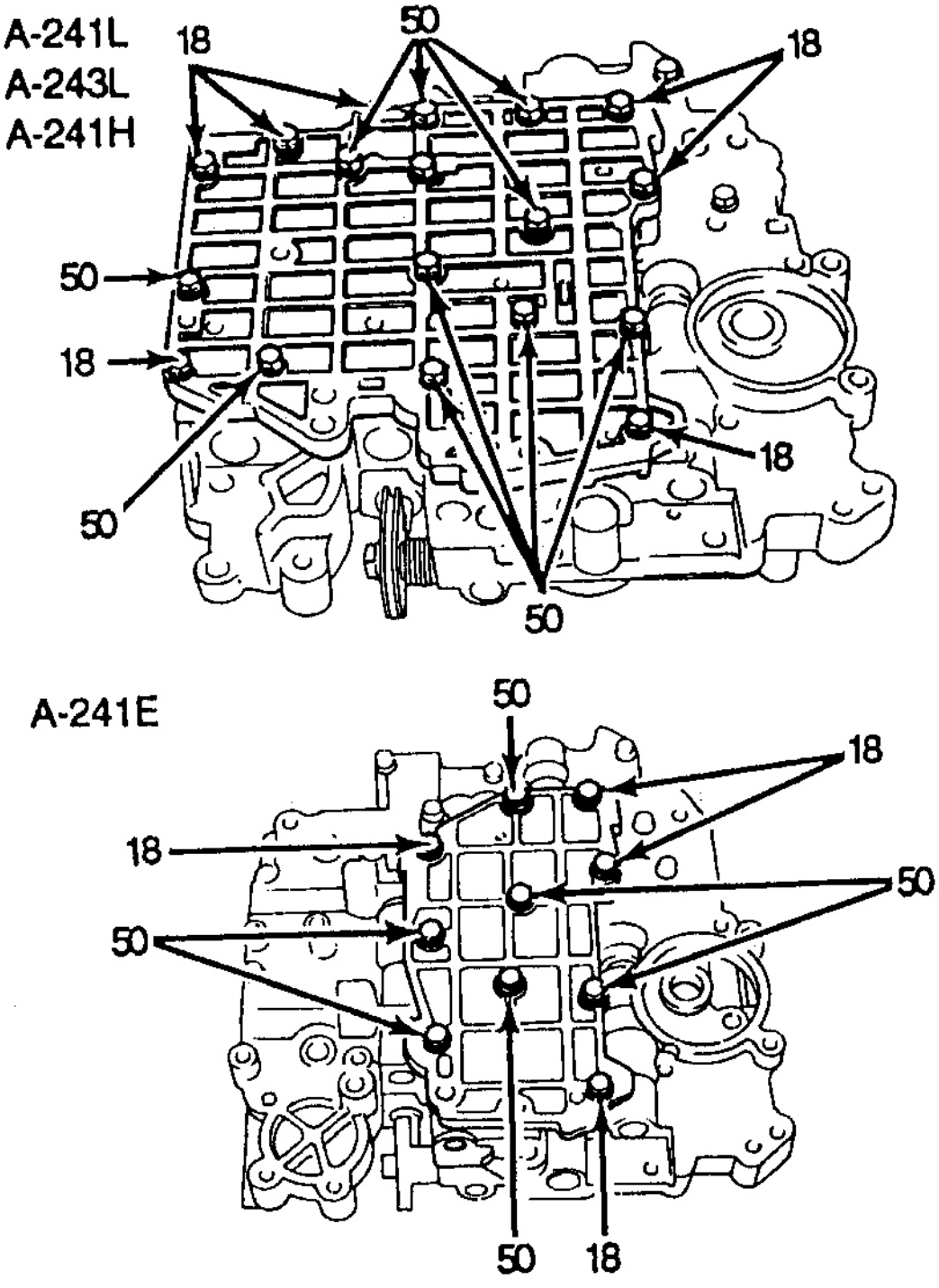


Fig. 44: Installing Upper Valve Body & Cover Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



NOTE: Bolt length is indicated in millimeters

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Fig. 45: Installing Lower Valve Body Cover Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DIFFERENTIAL ASSEMBLY (A-241H)

Disassembly & Inspection

1. Using a dial indicator, measure differential end play. End play should be .0071-.0323" (.180-.820 mm). Remove 2 oil seal rings from ring gear mounting right case. Remove speedometer drive gear. Mark ring gear mounting left and right case for reassembly reference. Remove left case. See **Fig. 50** .
2. Place left case on A/T Tool Set (09350-32014), using a plastic hammer, remove ring gear from left case. Remove No. 2 thrust washer. Remove front differential case from ring gear mounting right case.
3. Using a torx wrench, remove 8 screws from left case. Separate left and right cases. Do not scratch contact surface of needle bearing.
4. Remove differential pinion shaft, shaft pin, 2 pinion gears, 2 pinion thrust washers, 2 side gears and 2 side gear thrust washers from front differential cases.
5. Remove No. 1 thrust washer. Check operation of differential lock clutch piston. Plug one hole of right case with your hand. Apply compressed air into other hole. Confirm piston moves.
6. Remove differential lock clutch. Using a screwdriver, remove snap ring. Remove flange, 7 discs and 7 plates. Using Spring Compressor (09351-32070), compress return spring. Remove snap ring. Apply compressed air to right case hole to remove No. 1 piston. Remove "O" ring from piston. Using a small screwdriver, remove reaction sleeve and No. 2 piston. Remove 3 "O" rings from reaction sleeve and No. 2 piston.
7. Using a screwdriver, remove transaxle case oil seal. Remove transmission oil baffle. Using Bearing Remover (09950-0020) and Attachment (09950-00030), remove ring gear mounting case bearings. Using A/T Tool Set (09350-32014) and an arbor press, install ring gear mounting left case bearing.
8. Using a chisel and hammer, cut out ring gear mounting right case bearing cage. DO NOT damage right case. Using A/T Tool Set (09350-32014) and an arbor press, remove bearing inner race. Using Bearing Replacer (09316-60010) and an arbor press, install new ring gear mounting right case bearing.
9. Using a pin punch and hammer, drive out ring gear mounting case bearing outer race from transaxle housing. Using brass bar and hammer, drive out outer race and plate washer from transaxle case. Using Bearing Tool Set (09608-35014) and an arbor press, install ring gear mounting case bearing outer race into transaxle housing. Install plate washer in transaxle case. Using bearing tool set and an arbor press, install outer race in transaxle case.
10. Inspect discs, plates and flange. Before assembling new discs, soak discs in ATF for 2 hours.

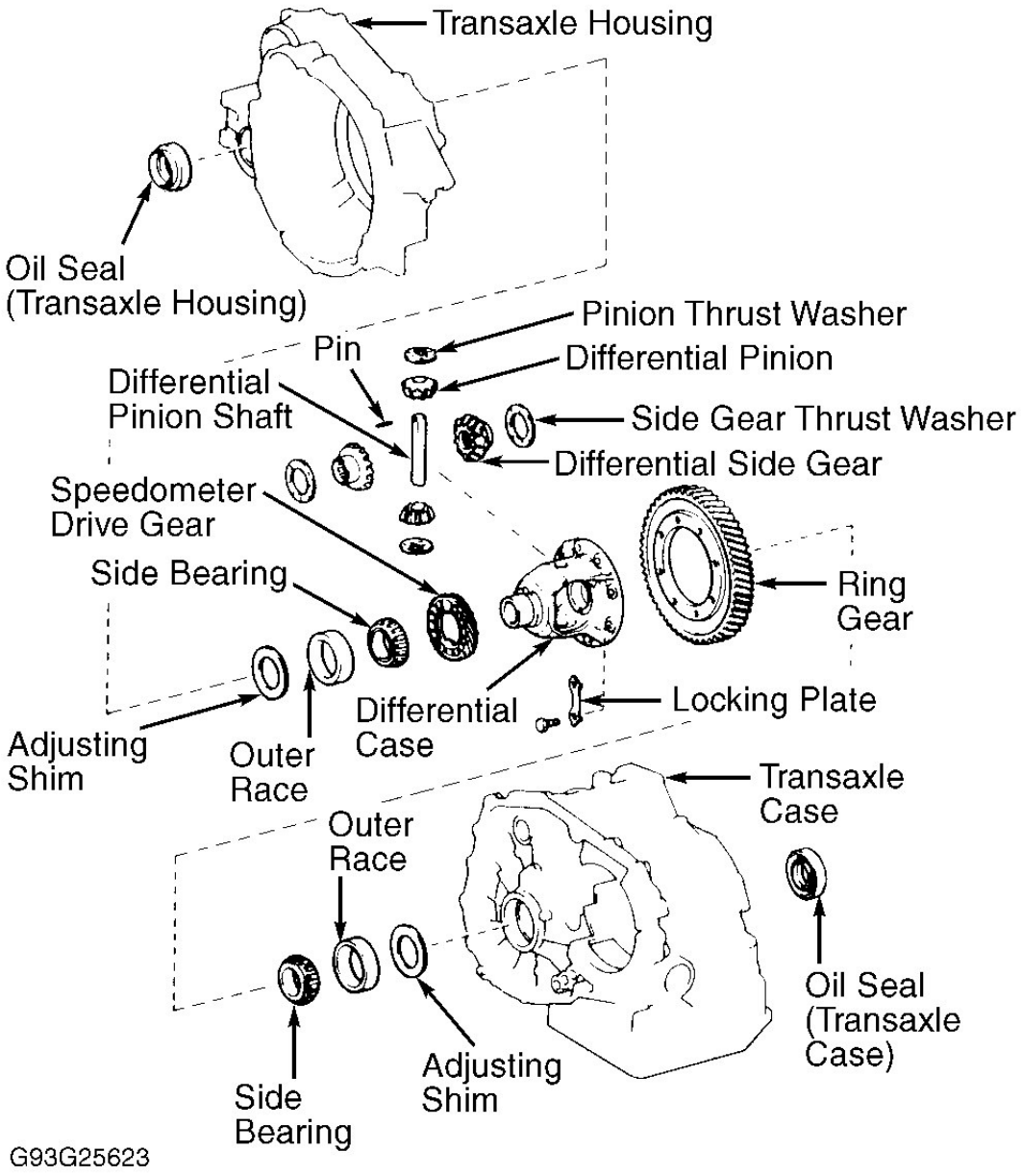

Fig. 46: Exploded View Of Differential (Except MR2 & A-241H)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

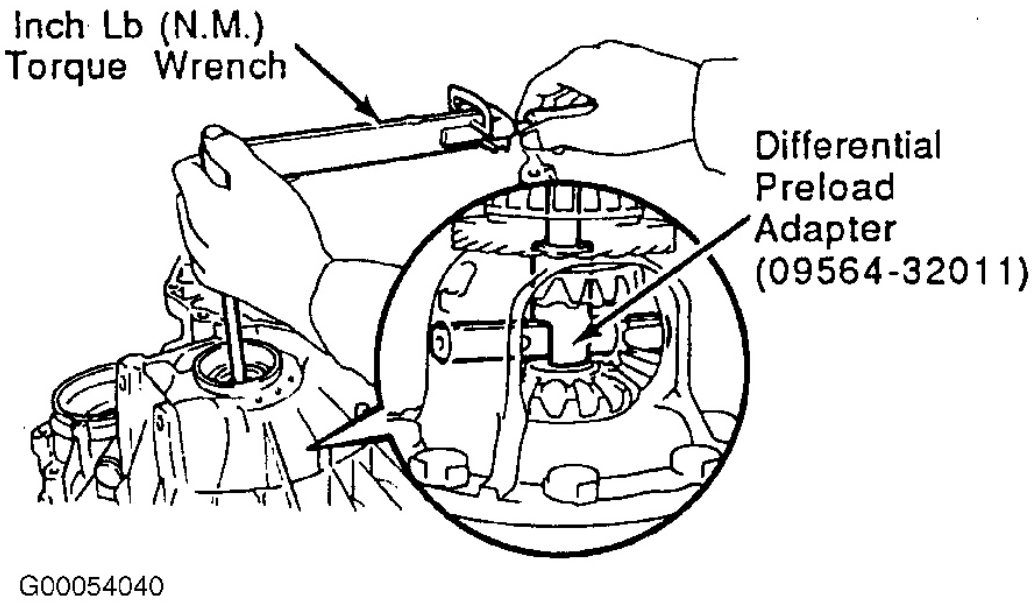

Fig. 47: Exploded View Of Differential (MR2)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

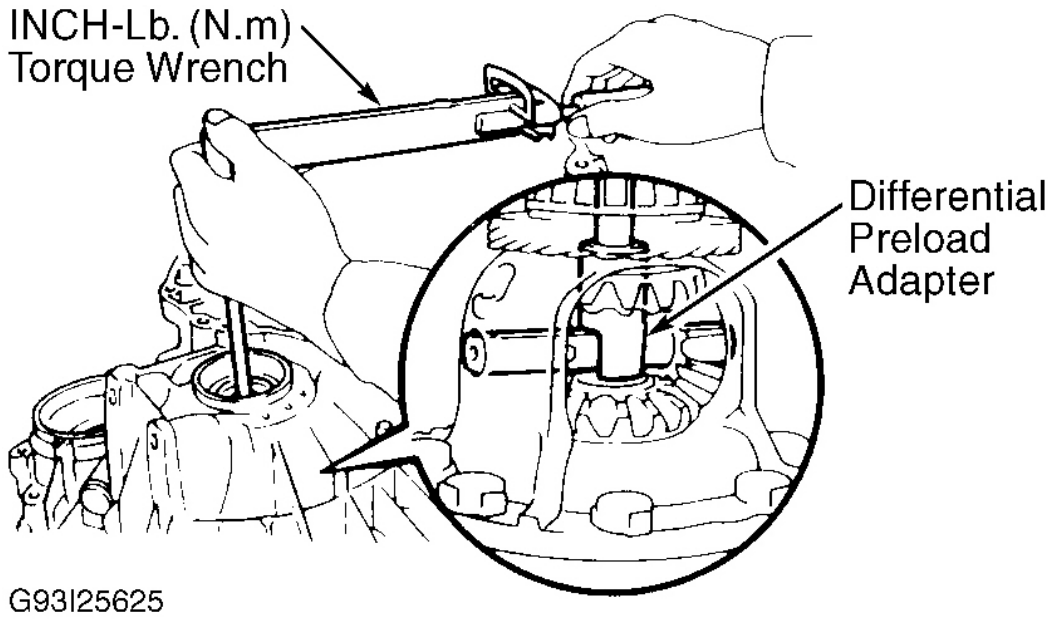

Fig. 48: Measuring Differential Bearing Preload

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

Reassembly

1. Coat 4 "O" rings with ATF. Install "O" rings to reaction sleeve and differential lock clutch pistons. Install No. 1 and No. 2 pistons and reaction sleeve to ring gear mounting right case.
2. Place return spring on piston. Install Spring Compressor (09351-32070) on spring retainer, compress return spring with an arbor press. Install snap ring.
3. Install in order: plate, disc, plate, disc, plate, disc, plate, disc, plate, disc, plate, disc, plate, disc and flange. Install flange with flat end facing inward. Install snap ring. Check operation of differential lock clutch piston. Plug one hole. Apply compressed air into other hole. Ensure pistons move. Install No. 1 thrust washer.
4. Install side gear thrust washer, side gear, 2 differential pinion gears, 2 pinion gear thrust washers, pinion shaft and pinion shaft pin on front differential left case.
5. Check and adjust front differential side gear backlash. Measure backlash of one pinion gear while holding side gear toward case. Back-lash should be .0020-.0079" (.050-.200 mm). If backlash exceeds specifications, select thrust washers of different thicknesses. Refer to SIDE GEAR & BEARING THRUST WASHER SPECIFICATIONS table.
6. Perform same procedure described in step 5) for front differential right case. Install front differential left case to right case. Align reference marks. Tighten Torx screws to 24 ft. lbs. (33 N.m). DO NOT scratch contact surface of needle bearing.
7. Install front differential case to ring gear mounting right case. Install No. 2 thrust washer. Clean ring gear mounting left case contact surface. Heat ring gear to about 212° F (100° C) in an oil bath. DO NOT heat ring gear above 230°F (110°C). Clean control surface of ring gear with cleaning solvent. Quickly install ring gear on differential case. Align reference marks on ring gear mounting left case and ring gear. Torque bolts to 91 ft. lbs. (124 N.m).

SIDE GEAR & BEARING THRUST WASHER SPECIFICATIONS

Identifying Mark	Thickness In. (mm)
Backlash Thrust Washers	
A	.0394 (1.000)
B	.0413 (1.050)
C	.0433 (1.100)
D	.0453 (1.150)
E	.0472 (1.200)
F	.0492 (1.250)
G	.0512 (1.300)
Preload Thrust Washers	
51	.0787 (2.000)
B	.0799 (2.030)
C	.0811 (2.060)
D	.0823 (2.090)
E	.0835 (2.120)

54	.0846 (2.150)
G	.0858 (2.180)
H	.0870 (2.210)
J	.0882 (2.240)
K	.0894 (2.270)
57	.0906 (2.300)
M	.0917 (2.330)
N	.0929 (2.360)
P	.0941 (2.390)
Q	.0953 (2.420)
60	.0965 (2.450)
61	.0984 (2.500)
62	.1004 (2.550)
63	.1024 (2.600)
64	.1043 (2.650)
65	.1063 (2.700)
66	.1083 (2.750)
67	.1102 (2.800)
68	.1122 (2.850)

8. Ensure front differential turns smoothly. Place speedometer drive gear on ring gear mounting case. Install snap ring. Check and adjust differential side bearing preload. Install differential assembly to transaxle case. Install transaxle housing to case. Torque to 21 ft. lbs. (29 N.m). Turn differential counterclockwise and clockwise several times. Using a spring tension gauge, measure differential side bearing preload. Preload at starting point for new bearings should be 5.5-9.7 lbs. (2.5-4.4 kg) and 2.9-4.9 lbs. (1.3-2.2 kg) for reused bearings. If preload is not correct, select thrust washer from SIDE GEAR & BEARING THRUST WASHER SPECIFICATIONS table.
9. Once correct preload is obtained, remove differential assembly from transaxle case. Install 2 oil seal rings to ring gear mounting case lower side grooves. Install transmission oil baffle. Using Seal Replacer (09223-15010), install a new oil seal on transaxle case. Coat oil seal lip with MP grease.

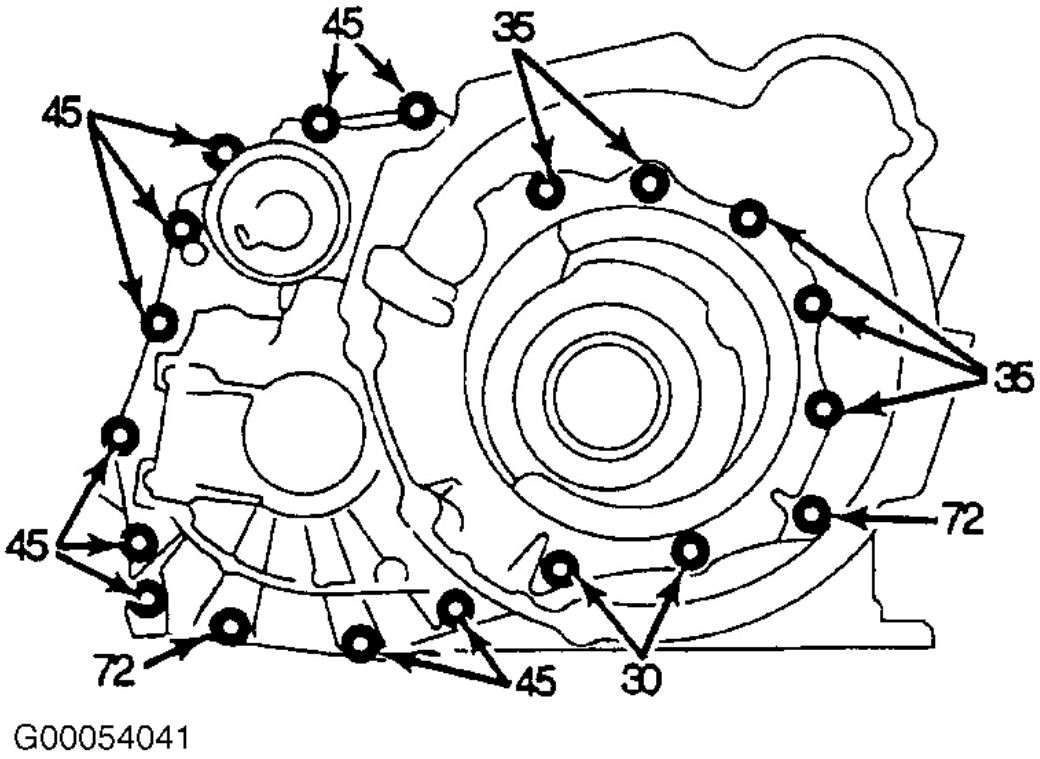

Fig. 49: Installing Transaxle Housing Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

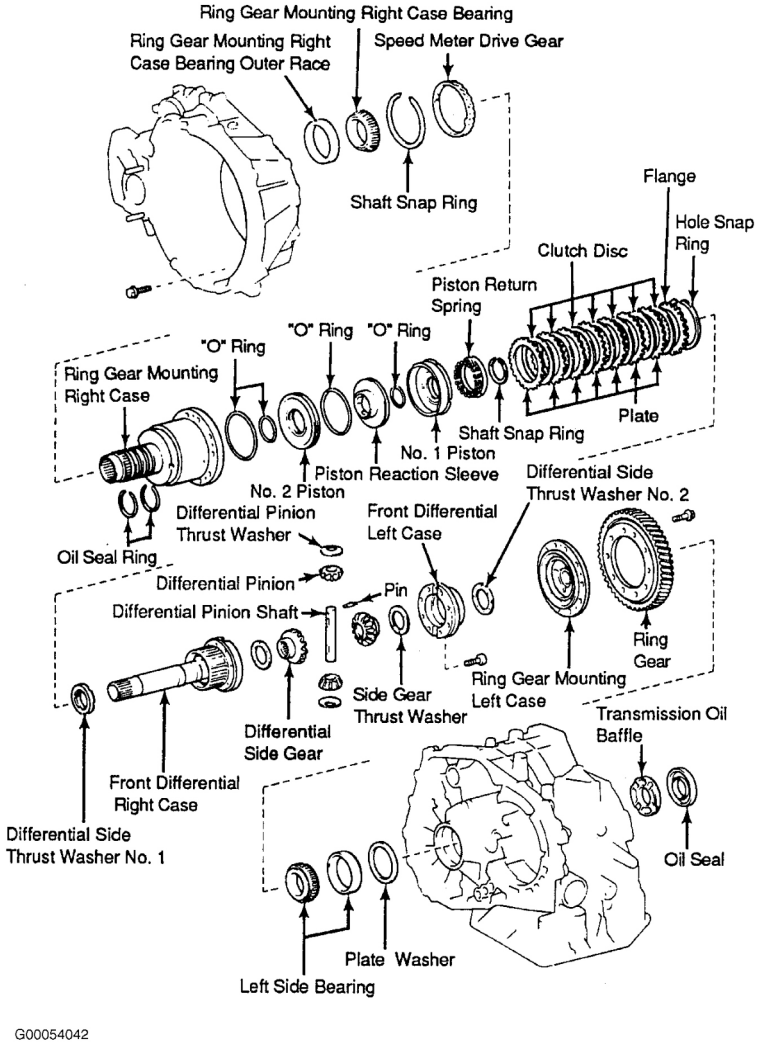

Fig. 50: Exploded View Of Differential (A-241H)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

UNDERDRIVE CLUTCH & ONE-WAY CLUTCH NO. 3

Disassembly

1. Remove one-way clutch and thrust washer from underdrive clutch drum. Remove snap ring. See **Fig. 51** .
2. Remove flange, discs and plates from clutch drum. Using Spring Compressor (09351-32070) and an arbor press, compress return spring retainer. Remove snap ring. Remove return spring and spring plate.
3. Install underdrive clutch to transaxle case. Before installing clutch, install oil seal rings to transaxle case. Apply compressed air into oil passage of case. Remove piston from clutch drum. If piston does not pop out, use needle-nose pliers to remove piston. Using a screwdriver, remove 2 "O" rings from underdrive piston.

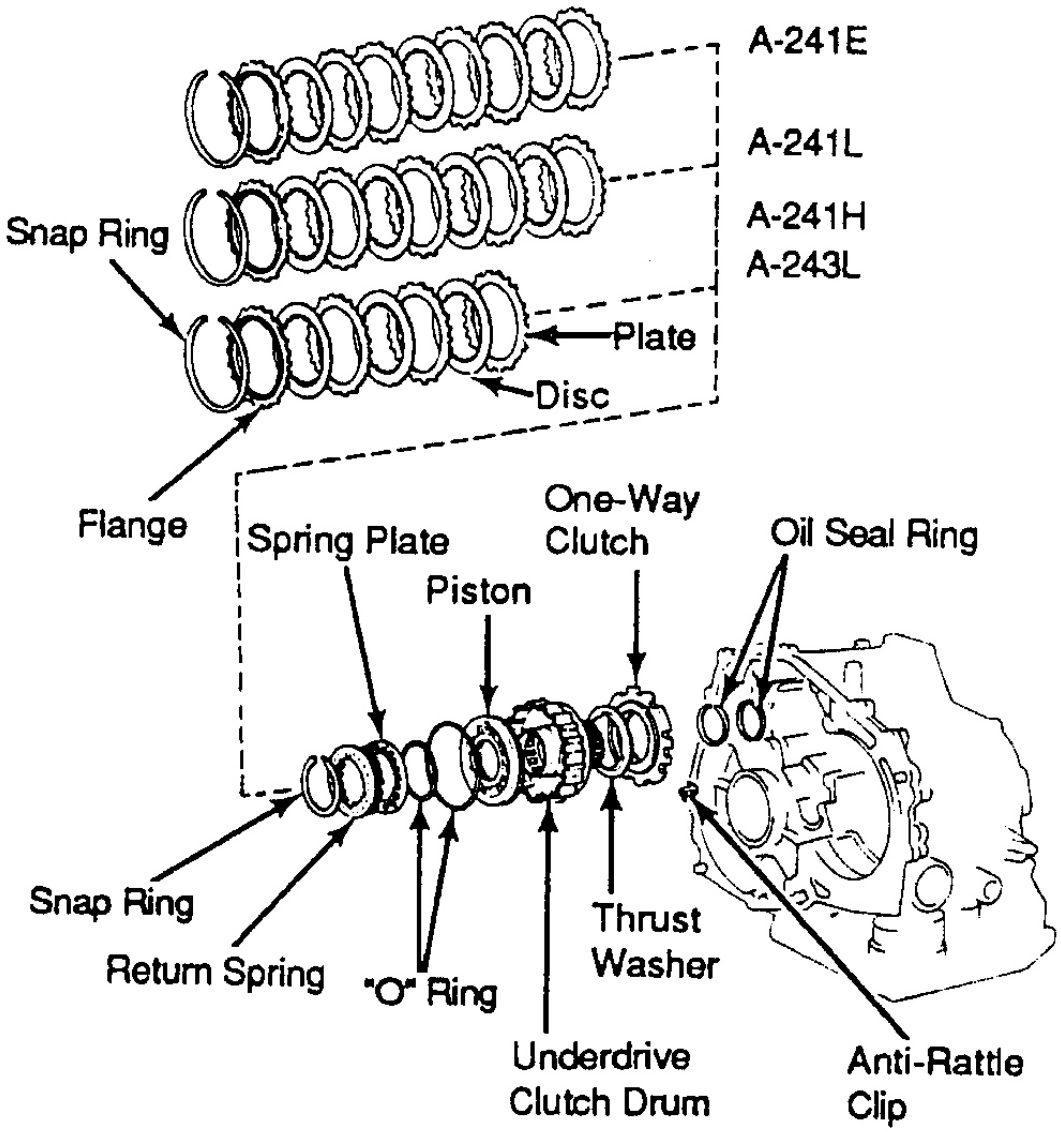

Fig. 51: Exploded View Of UD Clutch & One-Way Clutch No. 3
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

1. Inspect discs, plates and flanges for condition. Before assembling new discs, soak discs in ATF for at least 2 hours.
2. Inspect underdrive clutch piston. Ensure check ball is free by shaking piston. Ensure valve does not leak by applying low pressure compressed air.
3. Inspect underdrive clutch drum. Measure bushing inside diameter of underdrive clutch drum. Standard

inside diameter is 1.8307-1.8317" (46.500-46.525 mm) for front side and 2.1654-2.1665" (55.000-55.030 mm) for rear side. Maximum inside diameter is 1.8335" (46.570 mm) for front side and 2.1685" (55.080 mm) for rear side. Replace underdrive clutch drum if not within specifications.

Reassembly

1. Coat "O" rings with ATF. Install "O" rings on piston. Carefully install underdrive clutch into clutch drum.
2. Install spring seat and return spring to underdrive clutch. Using Spring Compressor (09351-32070) and an arbor press, compress return spring retainer. Install snap ring.
3. Install plates, discs and flange. Install in order: A-241E plate, disc, plate, plate, disc, plate, plate, disc and flange. A-241H and A-243L plate, disc, plate, disc, plate, disc and flange. A-241L plate, disc, plate, plate, disc, plate, plate, disc and flange. Install flange with flat end facing inward. Install snap ring.
4. Install one-way clutch to clutch drum. Install thrust washer to clutch drum. Install one-way clutch with claw of retainer up. Check operation of one-way clutch. Hold one-way clutch drum and turn one-way clutch. Ensure one-way clutch turns freely counterclockwise and locks clockwise.

UNDERDRIVE BRAKE & B4 ACCUMULATOR PISTON

Disassembly

1. While pushing return spring with Spring Compressor (09351-32070) remove snap ring. Remove plates, discs and flanges. Remove return spring. Remove oil seal rings (if required). See **Fig. 52** .
2. Blow out underdrive piston from case by applying compressed air to oil hole and remove piston. Ensure piston does not tilt. Remove "O" rings from piston. Inspect disc, plate and flange. If disc are replaced, allow discs to soak at least 2 hours in ATF.
3. Remove oil gallery cover and gasket. Remove B4 accumulator piston and spring from case. Remove "O" ring from piston. See **Fig. 52** .

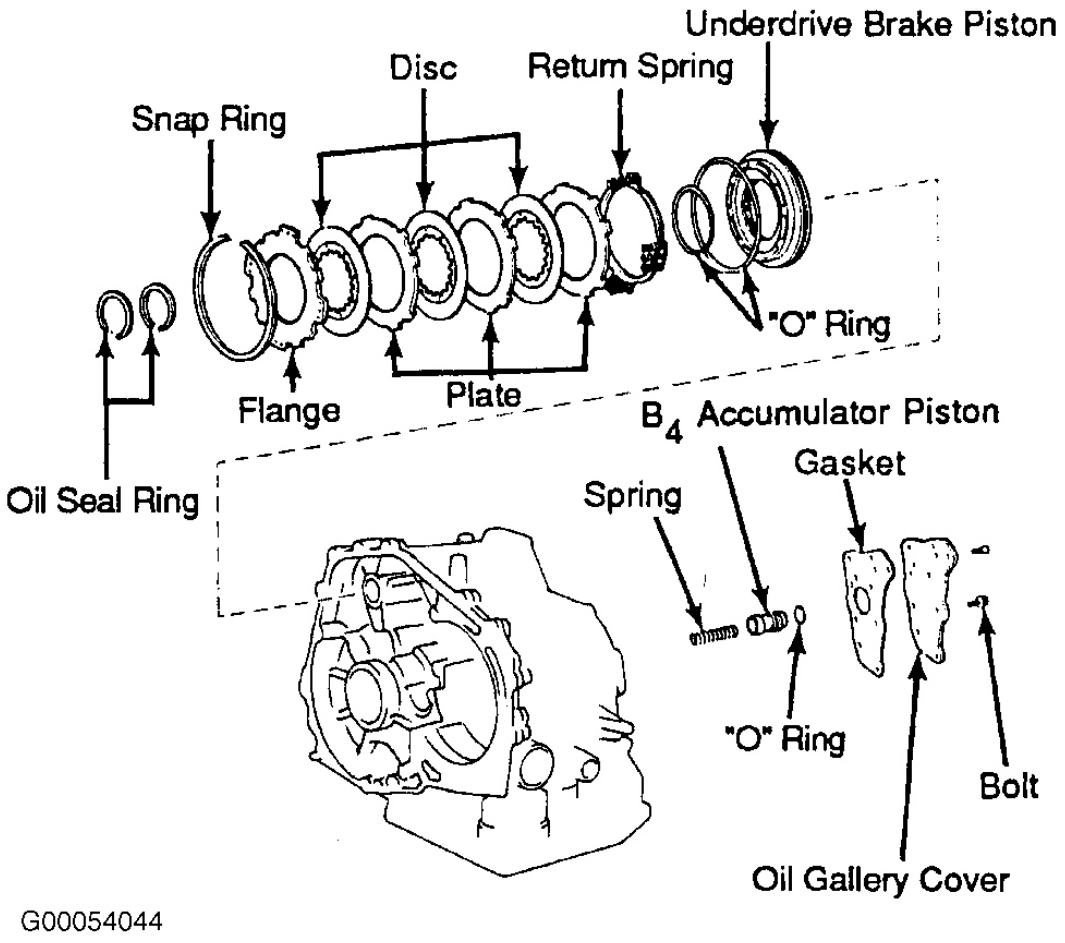

Fig. 52: Exploded View Of UD Brake & B4 Accumulator
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

1. Coat "O" ring with ATF. Install NEW "O" ring on B4 accumulator piston. Install accumulator piston and spring. Install oil gallery gasket and cover. Torque bolts to 89 INCH lbs. (10 N.m). Apply seal packing Three Bond (1324) to screw for oil gallery cover. Install screws and torque to 65 INCH lbs. (7.4 N.m).
2. Install underdrive brake piston "O" rings. Coat "O" rings with ATF. Install piston in case with cupped side upward. Use care not to damage "O" rings. Install brake piston return spring. Install 3 plates and 3 discs. Start with plate and alternate with disc ending with disc. 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, confirm that underdrive brake piston moves smoothly.

TRANSFER CASE (A-241H)

Disassembly (Transfer Case Housing)

1. Remove mode select lever and rod. Remove extension housing. Remove "O" ring from housing. Using plastic hammer, remove right case retainer. Remove "O" ring and apply gasket from retainer. Remove transfer inspection hole cover. See **Fig. 53** .
2. Using Lock Nut Wrench (09326-20011) and spring tension gauge, measure driven pinion preload at ring gear backlash position. Starting preload should be 2.0-3.1 lbs. (.9-1.4 kg). Total preload should include 1.1-2.0 lbs. (.5-.9 kg) of differential ring gear starting preload. Total starting preload for driven pinion gear and differential ring gear should be 3.1-5.1 lbs. (1.4-2.3 kg).
3. Measure ring gear backlash. Backlash should be between .0051-.0071" (.130-.180 mm). Remove driven pinion bearing cage using a plastic hammer. Remove "O" ring and shims from bearing cage. Remove transfer right case. Remove center differential assembly. Remove apply gasket from left case.
4. Remove oil pump strainer and oil pump driven gear. Remove adjusting nut lock plate from right case. Remove "O" ring from bolt. Using Adjusting Nut Wrench (09318-12010), remove adjusting nut and oil reserver from right case. Using a brass bar, remove outer race. Using Oil Seal Puller (09308-00010), remove differential left side bearing outer race and left case oil seal.

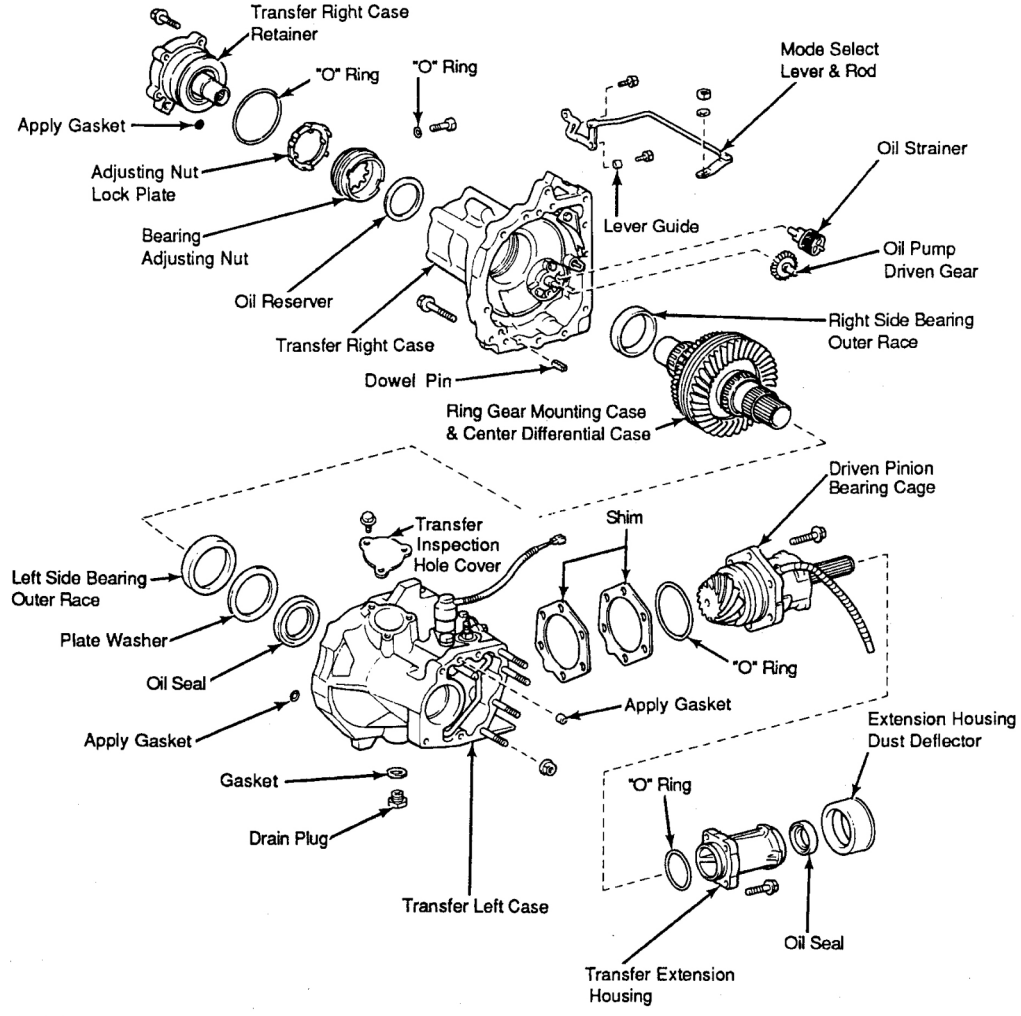

Fig. 53: Exploded View Of Transfer Case (A-241H)

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

Disassembly (Transfer Case Driven Pinion Bearing Cage)

1. Using chisel and hammer, unstake lock nut. Using Lock Nut Wrench (09326-20011), remove lock nut. Use soft jaws for holding driven pinion in vise.
2. Remove driven pinion, rear side bearing and spacer with arbor press. Using Bearing Remover (09950-00020) remove front side housing. Using brass bar and hammer, remove bearing outer races. Using low pressure air, remove plug and oil strainer. Remove "O" ring from plug. See **Fig. 54** .

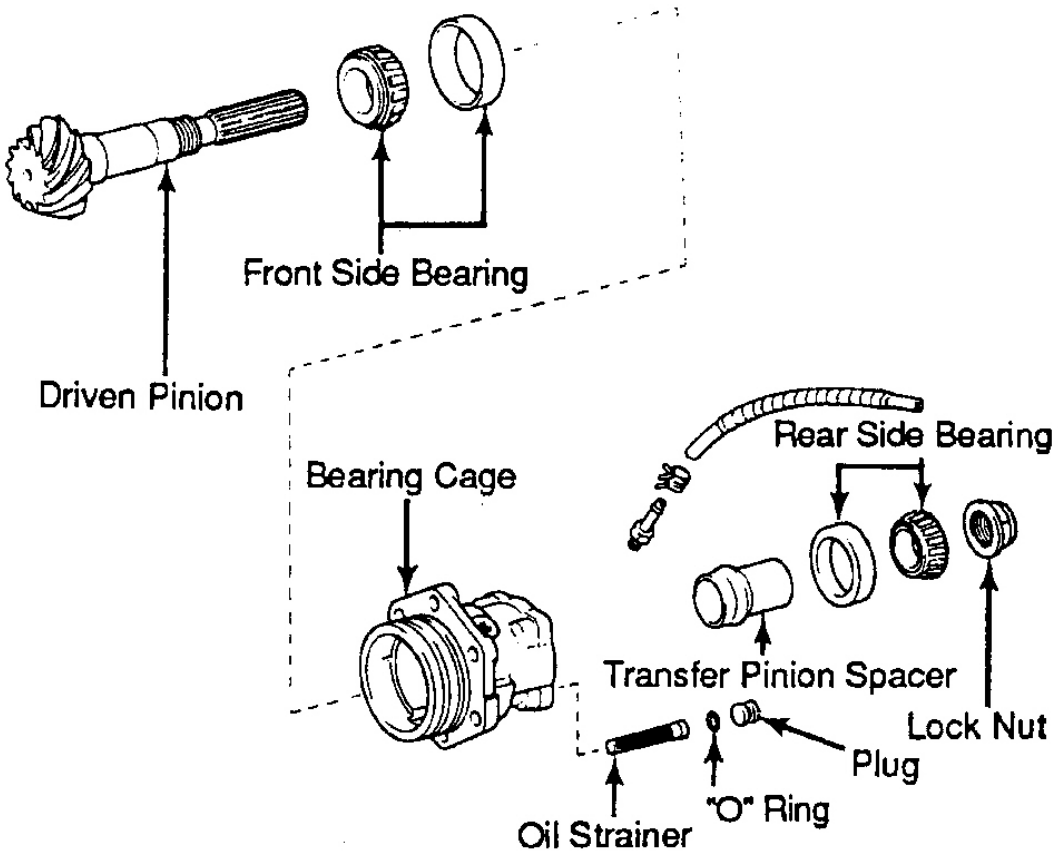

Fig. 54: Exploded View Of Driven Pinion Bearing Cage
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

1. Apply AT to new "O" rings. Install oil strainer and plug. Using Bearing Tool (09608-35014), install front side bearing outer race to bearing cage. Using Bearing Replacer (09608-30022), install rear side bearing outer race.

2. Using Bearing Replacer (09506-35010), install driven pinion front side bearing. Install new spacer to driven pinion. Install bearing cage to driven pinion. Using bearing replacer, install rear side bearing to driven pinion.
3. Adjust drive pinion preload. Using Lock Nut Wrench (09326-20011) and torque wrench, tighten nut to 72 ft. lbs. (98 N.m). Using lock nut wrench and spring tension gauge, measure preload. Rotate driven pinion counterclockwise and clockwise several times to allow bearings to settle. Measure preload of driven pinion at starting point. Preload with new bearing is 4.0-6.4 lbs. (1.8-2.9 kg). With old bearing, preload should be 2.0-3.1 lbs. (.9-1.4 kg).
4. If preload exceeds specifications, replace bearing spacer. If preload is less than specifications, retighten nut 5-10 degrees at a time until specified preload is reached.
5. If maximum torque is exceeded with retightening nut, replace bearing spacer. Repeat preload procedure. Do not back off pinion nut to reduce preload. Maximum nut torque is 159 ft. lbs. (216 N.m). Stake lock nut with a punch and hammer.

Disassembly (Transfer Right Case Retainer)

Using a screwdriver, remove oil seal. Remove snap ring. Remove side gear shaft holder. Remove snap ring. Using an arbor press, remove holder bearing. Remove oil seal. See **Fig. 55** .

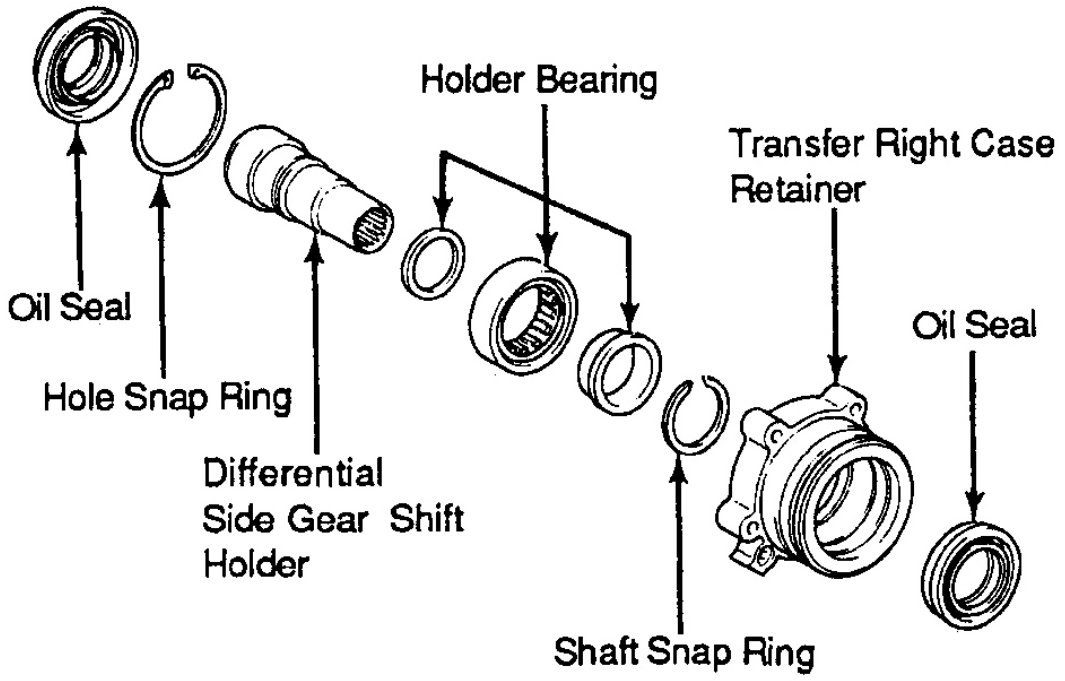

Fig. 55: Exploded View Of Transfer Right Case Retainer
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

Using Bearing Replacer (09226-10010) and an arbor press, install holder bearing. Install snap ring. Install side gear shaft holder. Install snap ring. Coat new oil seal lip with MP grease. Using hammer and Bearing Replacer (09316-60010), install left side oil seal. Using hammer and Seal Replacer (09608-32010), install right side oil seal.

Disassembly (Transfer Right Case)

Check oil pump operation. Oil pump should turn smoothly with oil pump driven gear. See **Fig. 56** . Remove oil pump cover, drive rotor and driven rotor. Remove relief valve and spring. Remove level gauge guide plate.

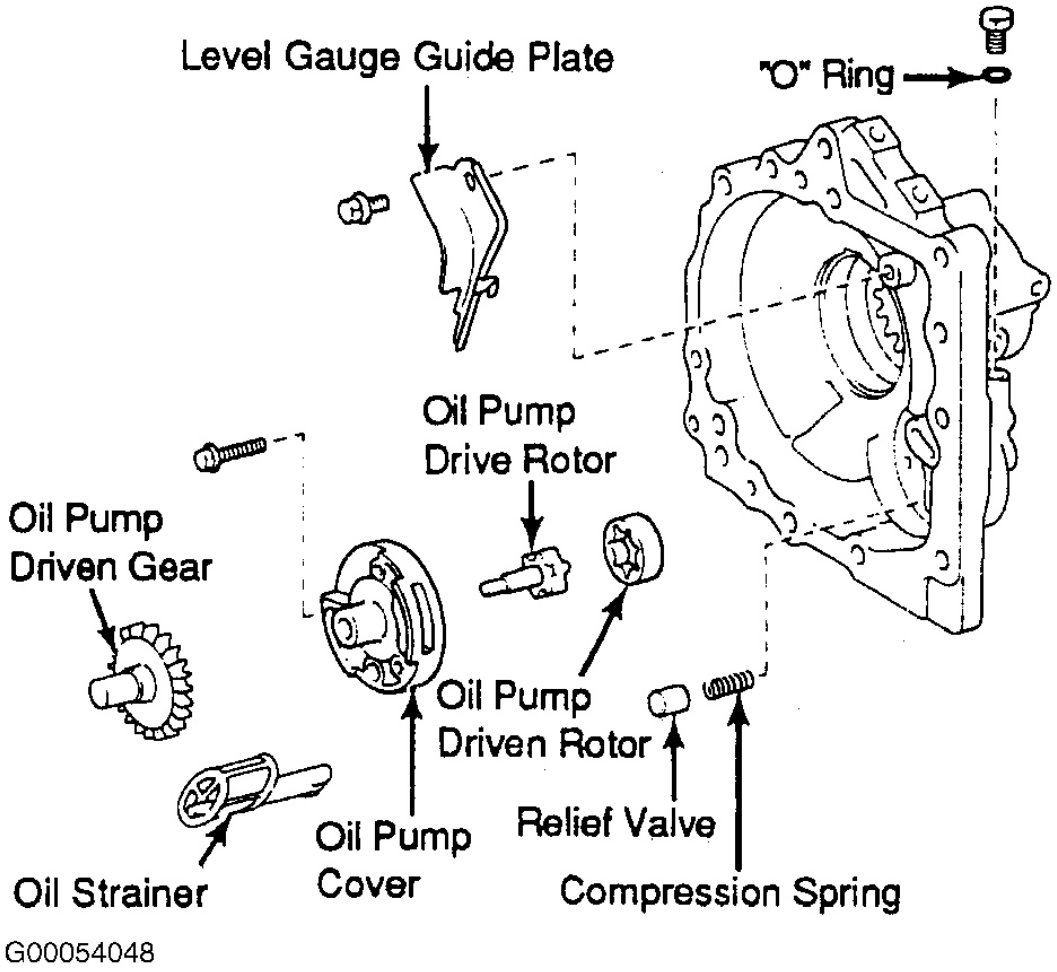

Fig. 56: Exploded View Of Transfer Right Case
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

Install level gauge guide plate. Torque to 89 INCH lbs. (10 N.m). Install relief valve and spring. Install oil pump drive rotor and driven rotor. Install oil pump cover. Torque bolts to 89 INCH lbs. (10 N.m). Insert oil pump driven gear to drive rotor. Ensure drive rotor turns smoothly.

Disassembly (Ring Gear Mounting Case & Center Differential Case)

1. Remove shaft snap ring. Remove oil pump drive gear. Place matchmarks on differential left and right case. Remove 12 bolts. Remove differential left case upward. See **Fig. 57** .
2. Place matchmarks on differential left case and ring gear. Using a plastic hammer, tap out ring gear. Remove "O" ring from case. Using Bearing Remover (099050-00020) and an arbor press, remove left case bearing.
3. Remove thrust washer. Remove center differential case assembly. Remove shaft snap ring. Remove spacer. Remove following parts from case: 4 pinion shafts, pinion shaft holder, 4 differential pinions, 4 pinion thrust washers, differential side left gear and side gear thrust washer.
4. Remove differential side right gear and conical spring washer. Using bearing puller and an arbor press, remove right case bearing.

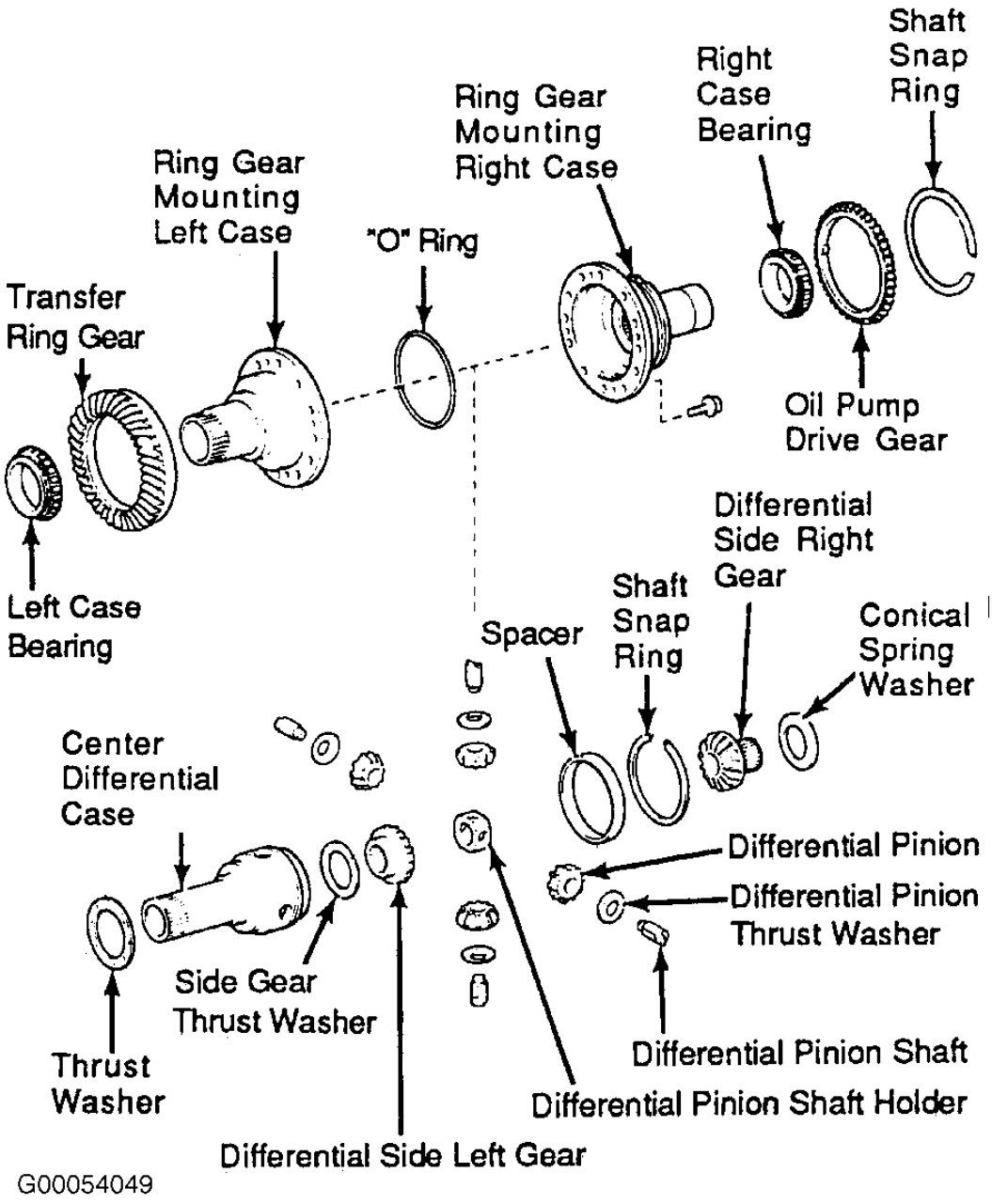

Fig. 57: Exploded View Of Ring Gear Mounting & Center Differential Case
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

1. Using Bearing Replacer (09316-20011) and Bearing Tool Set (09608-35014), press in right case bearing with an arbor press. Using Bearing Replacer (09316-12010) and Bearing Tool Set (09608-35014), press in left case bearing with an arbor press.

2. Clean contact surface of ring gear mounting left case. Heat ring gear to about 212° F (100° C) in an oil bath. DO NOT heat ring above 230° F (110° C). Clean contact surface of ring gear with cleaning solvent. Quickly install ring gear on ring gear mounting left case.
3. Install following parts to center differential case: side gear thrust washer, differential side left gear 4 pinion thrust washers, 4 differential pinions, pinion shaft holder and 4 pinion shafts. Install spacer to center differential case. Measure side gear backlash while holding one pinion toward case. Backlash is .0024-.0087" (.060-.220 mm). If backlash exceeds specifications, install correct thrust washer on side gears. Refer to CENTER DIFFERENTIAL SIDE GEAR THRUST WASHER SPECIFICATIONS table. Install shaft snap ring.

CENTER DIFFERENTIAL SIDE GEAR THRUST WASHER SPECIFICATIONS

Identifying Mark	Thickness In. (mm)
A	.0394 (1.000)
B	.0413 (1.050)
C	.0433 (1.100)
D	.0453 (1.150)
E	.0472 (1.200)
F	.0492 (1.250)
G	.0512 (1.300)
H	.0531 (1.350)
J	.0551 (1.400)
K	.0571 (1.450)
L	.0591 (1.500)

4. Install differential side right gear. Do not install conical spring washer. Install center differential case. Install thrust washer. Align matchmarks on left and right cases. Install 12 bolts. Torque to 71 ft. lbs. (97 N.m). Do not install "O" ring. Measure thrust clearance of center differential case while holding ring gear mounting case. Refer to CENTER DIFFERENTIAL SIDE GEAR THRUST WASHER SPECIFICATIONS table to select thrust washer which will ensure backlash is within specification. Install differential side gear and conical spring washer. Ensure correct direction of conical spring washer. See **Fig. 58** .
5. Install center differential case. Install correct thrust washer. Install new "O" ring on left case. Align matchmarks on right and left case. Install 12 bolts. Torque to 71 ft. lbs. (97 N.m). Install oil pump drive gear. Install shaft snap ring.

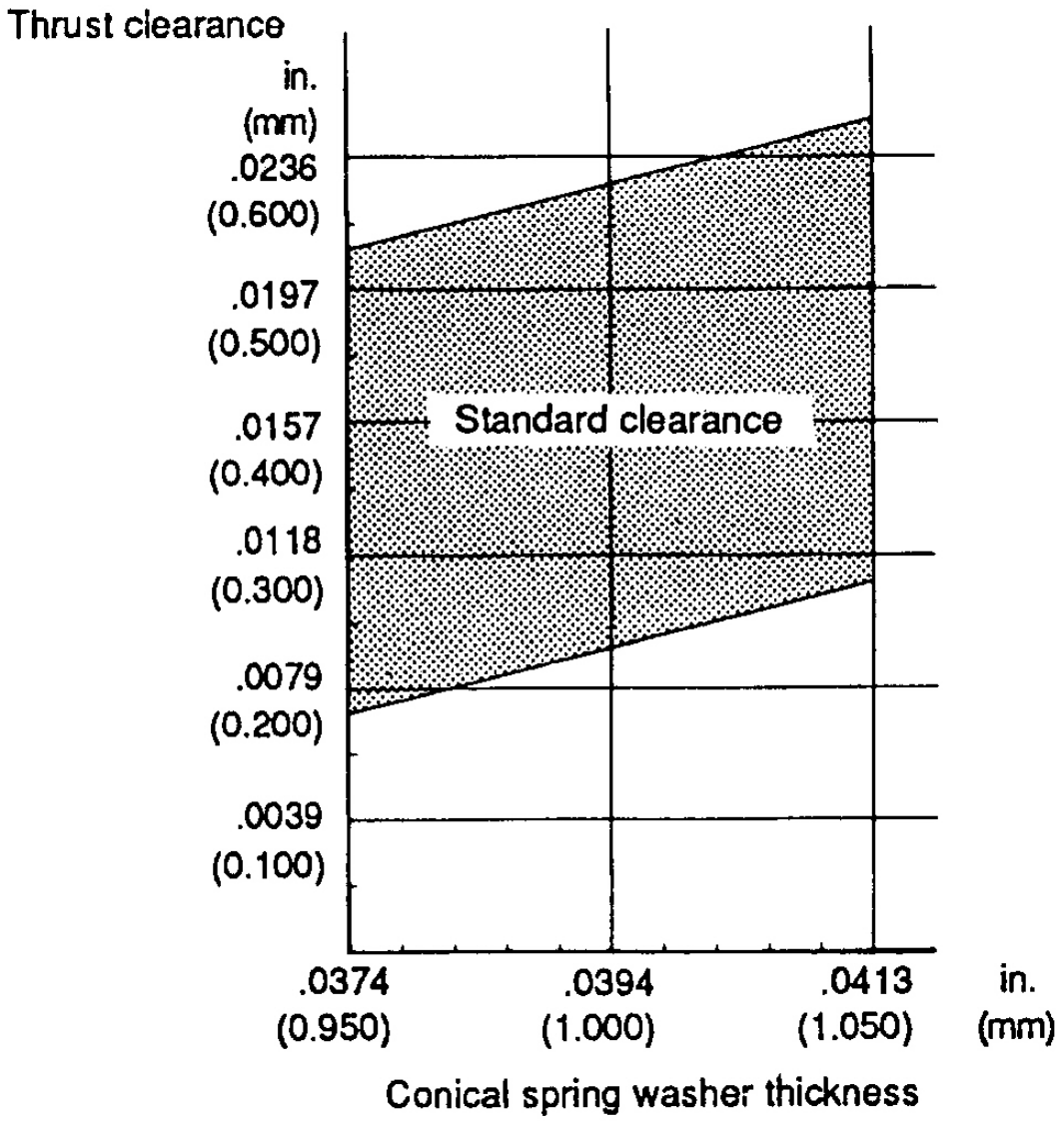

Fig. 58: Center Differential Side Gear Thrust Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Disassembly (Transfer Left Case)

1. Remove apply tube. Remove center differential control solenoid. Remove plug, compression spring and ball. Remove solenoid. Remove 2 "O" rings from solenoid. See **Fig. 59** .
2. Remove differential control shift fork shaft, shift fork and sleeve. Remove transfer shift lever. Cut out spacer with a screwdriver and hammer. Using pin punch and hammer, drive out straight pin. Remove shift lever shaft and shift lever. Remove oil seal.

3. Remove 2 plugs. Remove "O" rings from plugs. Remove differential control valve. Remove control valve sleeve cover. Remove straight pin and control valve sleeve. Remove valve spring retainer, compression spring, control valve and solenoid oil strainer from control valve sleeve.

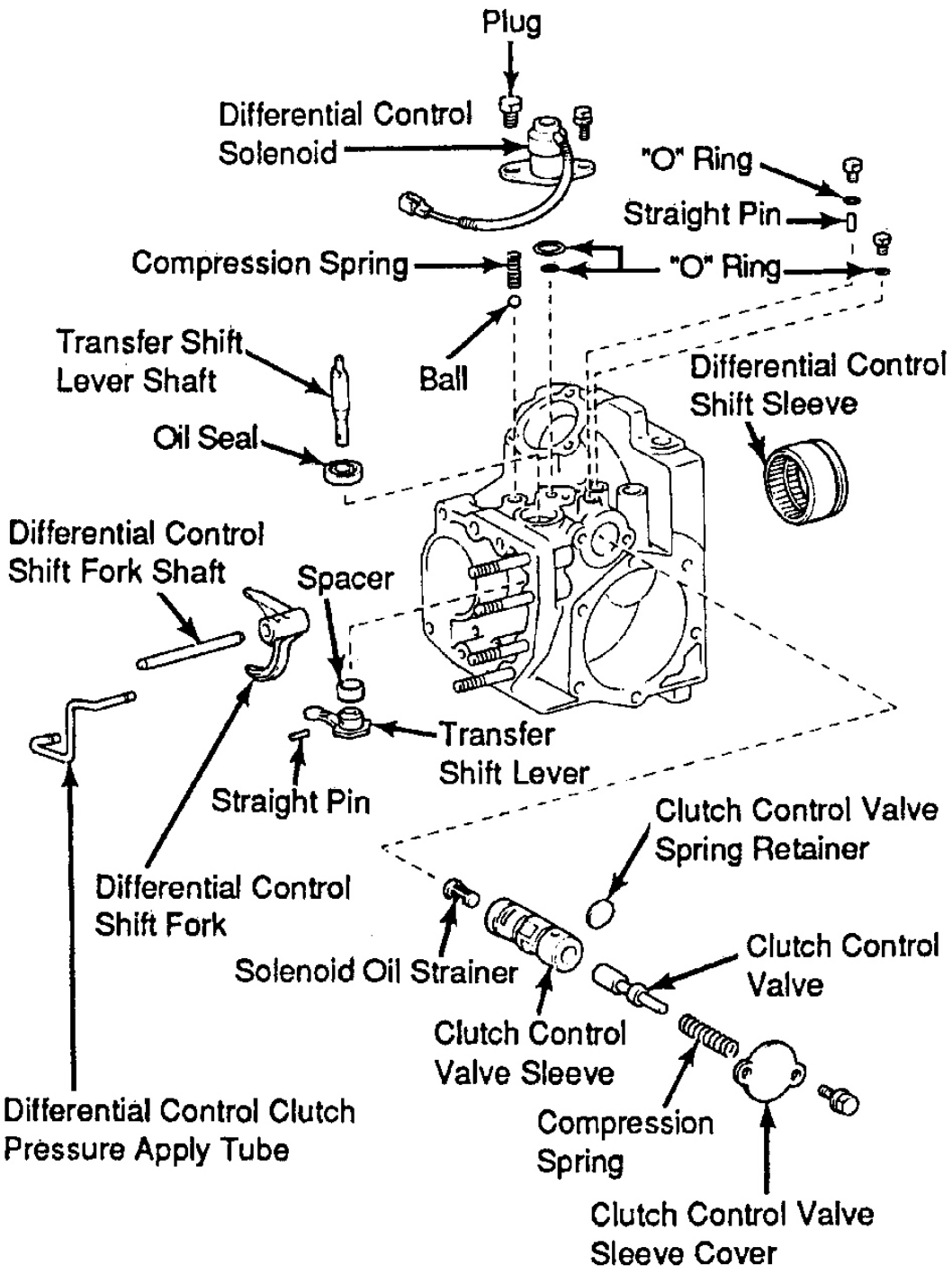

Fig. 59: Exploded View Of Transfer Left Case
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

1. Install differential lock clutch control valve. Reassemble control valve sleeve parts. Install control valve sleeve and straight pin. Apply seal packing Three Bond (1281) to rear cover. Install control valve sleeve cover. Torque bolts to 115 INCH lbs. (13 N.m).
2. Coat "O"' rings with ATF and install on plugs. Install 2 plugs. Coat lip of new oil seal with MP grease. Using a 17 mm socket and hammer, drive in oil seal. Install transfer shift lever shaft, new spacer and shift lever. Install pin with a pin punch and hammer. Install and stake spacer. Install differential control shift fork, sleeve and shift fork shaft. Engage shift fork and transfer shift lever.
3. Install ball and compression spring. Coat 2 new "O" rings with ATF. Install "O" rings on solenoid. Install center differential control solenoid. Install and torque plug to 22 ft. lbs. (29 N.m). Install and torque bolt to 115 INCH lbs. (13 N.m). Install apply tube. DO NOT bend or damage tubes.

Reassembly (Transfer Case)

1. Install left case side plate washer. Using Bearing Replacer (09316-60010) and an arbor press, install left case side outer race. Using bearing replacer and an arbor press, install right case side outer race. Install bearing adjusting nut and oil reserver until nut and reserver touch outer race.
2. Install shim to driven pinion bearing cage assembly. Install same thickness shims as removed. Install driven pinion bearing cage. Torque to 29 ft. lbs. (39 N.m). Do not install "O" ring. Install ring gear mounting case and center differential case. Using dial indicator, measure ring gear backlash. Backlash is .0051-.0071" (.130-.180 mm). If backlash exceeds specifications, install correct plate washer on ring gears. Refer to RING GEAR PLATE WASHER SPECIFICATIONS table.

RING GEAR PLATE WASHER SPECIFICATIONS

Identifying Mark	Thickness In. (mm)
71	.0839 (2.130)
72	.0850 (2.160)
73	.0862 (2.190)
74	.0874 (2.220)
75	.0886 (2.250)
76	.0898 (2.280)
77	.0909 (2.310)
78	.0921 (2.340)
79	.0933 (2.370)
80	.0945 (2.400)
81	.0957 (2.430)
82	.0969 (2.460)
83	.0980 (2.490)
84	.0992 (2.520)
85	.1004 (2.550)
86	.1016 (2.580)
87	.1028 (2.610)
88	.1039 (2.640)

89	.1051 (2.670)
90	.1063 (2.700)
91	.1075 (2.730)
92	.1087 (2.760)
93	.1098 (2.790)
94	.1110 (2.820)

3. Install transfer right case. Torque bolts to 32 ft. lbs. (44 N.m). DO NOT apply seal packing or install gasket during checking procedure. Using Lock Nut Wrench (09326-20011) and spring tension gauge, measure total starting preload. If a new pinion bearing is used add 2.9-3.1 lbs. (1.3-1.4 kg) to differential starting preload. If original bearing is used, add 1.1-2.0 lbs. (.5-.9 kg) to differential starting preload. Adjust total preload by tightening driven pinion adjusting nut. Use Adjusting Nut Wrench (09318-12010). Tighten bearing adjusting nut in small increments.
4. Measure ring gear backlash. Backlash should be .0051-.0071" (.13-.18 mm). If backlash exceeds specifications, install correct plate washer on ring gear. Refer to RING GEAR PLATE WASHER SPECIFICATIONS table.
5. Check tooth contact. Coat 3 or 4 teeth at 4 different positions on ring gear with Red lead. Rotate ring gear. Inspect teeth pattern. See **Fig. 60** . If teeth are not meshing properly, install proper shim and plate washer. Refer to RING GEAR SHIM SPECIFICATIONS table.

RING GEAR SHIM SPECIFICATIONS

Identifying Mark	Thickness In. (mm)
A	.0118 (.300)
B	.0130 (.330)
C	.0142 (.360)
D	.0154 (.390)
E	.0165 (.420)
F	.0177 (.450)
G	.0189 (.480)
H	.0201 (.510)
J	.0213 (.540)
K	.0224 (.570)

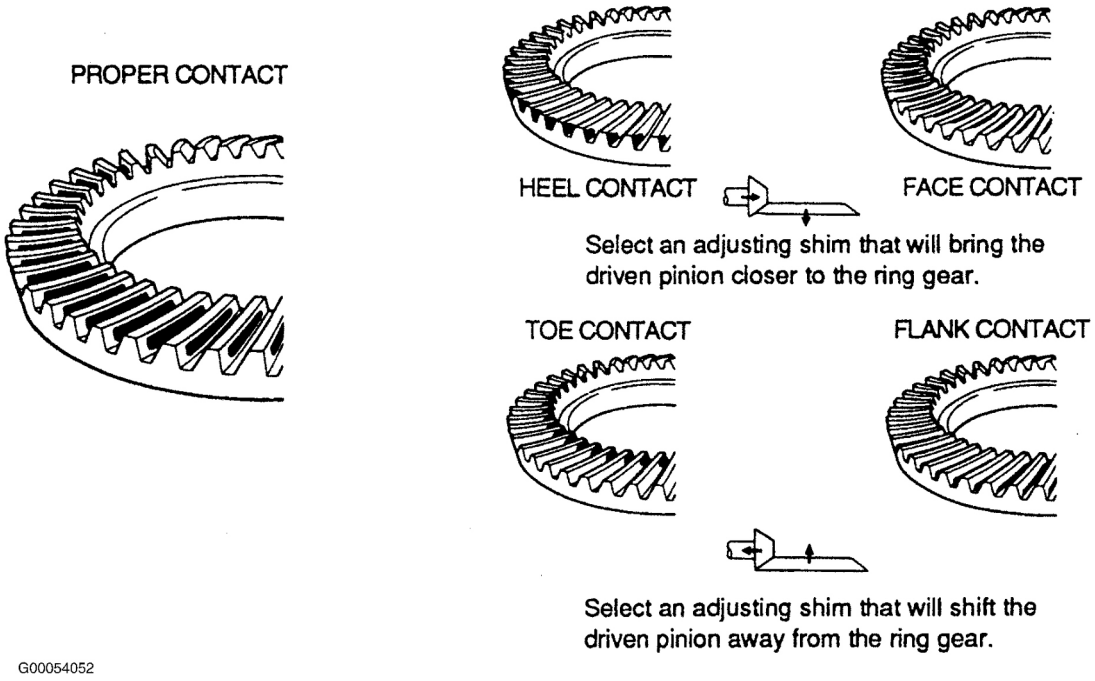

Fig. 60: Checking Ring Gear Tooth Contact
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. Remove 10 bolts. Remove transfer right case. Remove ring gear mounting case and center differential case. Remove driven pinion bearing cage assembly. Using Oil Seal Puller (09308-00010), remove left case bearing outer race and plate washer.
7. Using Bearing Replacer (09316-60010), install new oil seal. Oil seal depth is .12" (3 mm). Coat lip of oil seal with MP grease. Install plate washer. Using Bearing Replacer (09316-60010) and an arbor press, install left case bearing outer race.
8. Coat "O" ring with gear oil and install on driven pinion bearing cage assembly. Install driven pinion bearing cage with adjust shim to transfer left case. Torque bolts to 29 ft. lbs. (39 N.m). Install ring gear mounting case and center differential case.
9. Install new apply gasket to left case. Install oil pump strainer and driven gear to right case. Apply seal packing Three Bond (1281) to left case. Install right case and torque bolts to 32 ft. lbs. (44 N.m). Check total preload as described in Step 3 .
10. Install lock plate so that projection from lock plate fits properly into groove of adjusting nut. When lock plate cannot be installed, tighten adjusting nut smallest amount possible.
11. Apply seal packing Three Bond (1281) to left case. Install hole cover to transfer left case. Torque bolts to 12 ft. lbs. (16 N.m). Coat new "O" ring with gear oil. Install "O" ring and new apply gasket. Install right case retainer to transfer right case. Torque bolts to 18 ft. lbs. (25 N.m).
12. Using Oil Plug (09325-20010) and a hammer, install new oil seal in extension housing. Coat lip of oil seal with MP grease. Coat new "O" ring with gear oil. Install dust deflector and "O" ring to extension housing. Install extension housing to driven pinion bearing cage. Torque bolts to 18 ft. lbs. (25 N.m). Install transfer mode select lever and rod. Install lever, rod and lever guide. Torque bolts to 115 INCH lbs. (13 N.m). Install bolt while setting lever. Torque to 115 INCH lbs. (13 N.m).

TRANSAXLE 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 cut-outs and are installed correctly in groove. If a worn bushing is to be replaced, replacement must be made with the 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. Soak clutch plates in ATF for at least 2 hours prior to installation.

1. Using Bearing Installer (09351-32140), press bearing in transaxle housing. Install bearing stopper. Install oil tube apply cover, gasket and strainer. Install oil tubes. Install oil tube clamps. Press bearing into transaxle case. Install underdrive brake accumulator piston and spring.
2. On MR2 models, install oil gallery cover and gasket. Tighten bolts to specification. Apply Seal Packing Three Bond (1324) to screws for oil gallery cover. Install screws and tighten. Install oil seal rings on transaxle case.
3. Install parking lock rod to manual valve lever. Install manual shaft, washer, spacer and lever. Install retaining spring. Ensure washer is located between retaining spring and case. Install pin. Stake spacer in proper position. Install cam guide bracket.
4. 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.
5. On A-241E, A-241L and A-243L models, install 1st/Reverse brake piston in case. Push piston into bore of case, facing spring seal upward. Install piston return spring. Using Spring Compressor (09351-32040), compress return spring evenly by tightening bolt gradually. Install snap ring. Ensure snap ring is fully seated and centered by 3 lugs on spring retainer. Ensure snap ring end gap is not aligned with spring retainer claw. Install snap ring to transaxle case.
6. On all models, install underdrive brake piston "O" rings. Coat "O" rings with ATF. Install piston in case with cupped side upward. Use care not to damage "O" rings. Install brake piston return spring. Install 3 plates and 3 discs. Start with plate and alternate with disc ending with disc. Install flange with flat end up.
7. Using Spring Compressor (09351-32070), 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. Install oil seal rings to transaxle case (on all models except MR2).
8. Install underdrive one-way clutch assembly. Install anti-rattle clip. Align clutch disc tabs. Install underdrive clutch assembly. Check operation of underdrive one-way clutch. Clutch should turn freely counterclockwise and lock clockwise.
9. Check clutch assembly height from sleeve to inner race. Height should be .681-.717" (17.29-18.21 mm). Using Dial Indicator (09351-32190), check piston stroke of underdrive clutch. Apply compressed air to activate clutch piston. See **Fig. 61** . Piston stroke should be .0591-.0732" (1.500-1.860 mm). If piston stroke is not within specification, ensure assembly order is correct. Flange is available in different thicknesses, replace (if necessary). Refer to **UNDERDRIVE CLUTCH FLANGE SPECIFICATION** table.

UNDERDRIVE CLUTCH FLANGE SPECIFICATIONS

Applications	Thickness In. (mm)
A-241H, A-241L	.0803 (2.040)
A-241E, A-243L	.0906 (2.300)
A-241H, A-241L	.0945 (2.400)
A-241E, A-243L	.0984 (2.500)
A-241E, A-243L	.1063 (2.700)

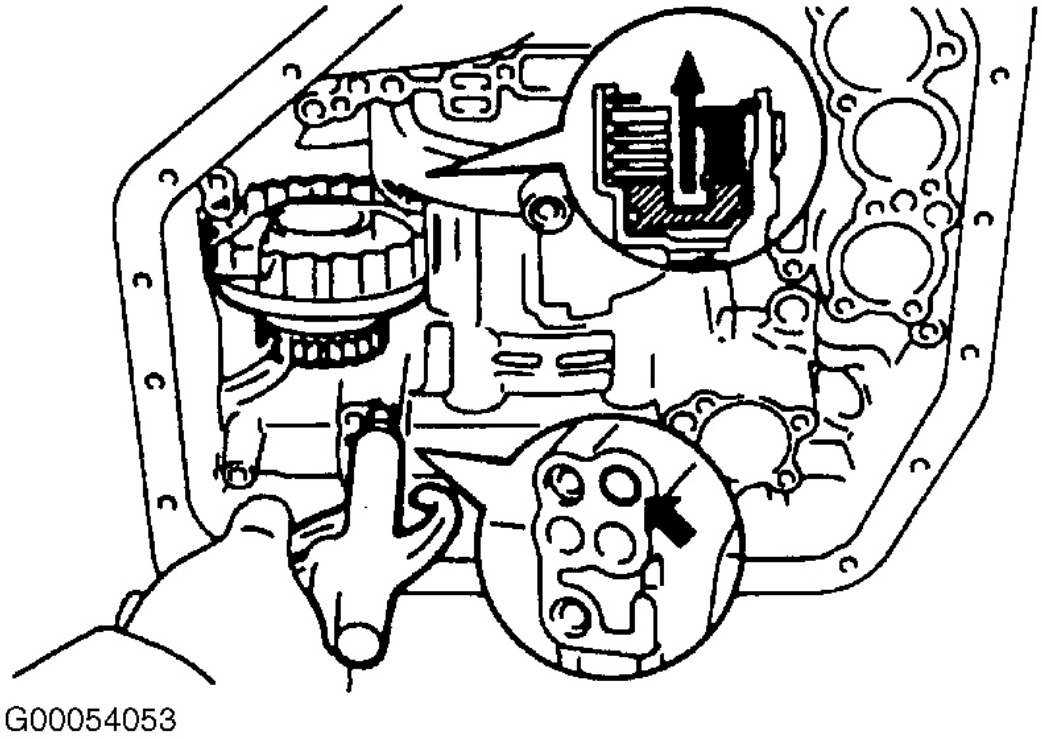

Fig. 61: Checking Underdrive Clutch Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. Install thrust bearing and race. Bearing facing upward. Bearing outer diameter should be 1.72" (43.7 mm) and inner diameter should be 1.22" (31.0 mm). Install sun gear snap ring. Install sun gear to case.
11. Align clutch disc tabs. Install countershaft assembly. Check countershaft height. Measure distance from tip of countershaft to bolt seat of clutch support. Countershaft height should be 1.311-1.398" (33.30-35.50 mm).
12. Install needle thrust bearing. Bearing outer diameter is 2.272" (57.70 mm) and inner diameter is 1.614" (41.00 mm). Using Bearing Replacer (09351-32100) and Seal Replacer (09351-32140) with an arbor press, install counter driven gear. Install new lock nut. Using holder and adapter torque lock nut to 116 ft. lbs. (157 N.m). Check end play of countershaft with dial indicator. End play should be .0091-.0350" (.231-.889 mm). Stake lock nut.

13. On A-241H models, install 1st/Reverse brake piston in case. See step 14) for procedure. On all models, install snap ring in transaxle case. Install intermediate shaft. Apply Loctite (518) to rear cover sealing areas. On all models except MR2, torque bolts to 22 ft. lbs. (29 N.m). On MR2 models, torque bolts to 18 ft. lbs. (25 N.m). Install thrust washer and governor driven gear. Install new apply gaskets or oil seals in transaxle case. Ensure intermediate shaft rotates smoothly.
14. Install 1st/Reverse brake in case. Install inner flange with flat end facing upward. Install 6 discs and 5 plates. Start with disc, alternate with plate, ending with disc. Install outer flange with flat area facing inward. Install snap ring in groove. Ensure end gap does not align with case cutout. Using compressed air confirm 1st/Reverse brake piston moves smoothly. See **Fig. 62** .
15. On MR2 models, install No. 2 planetary carrier thrust washer on carrier. Ensure tabs align with grooves of carrier. Install thrust bearing and races in ring gear.
16. Align clutch disc tabs. Install rear planetary ring gear. Align clutch disc tabs. Install rear planetary. Install No. 2 one-way clutch with shiny side upward. Rotate planetary gear clockwise while installing one-way clutch.
17. Check one-way clutch operation. Planetary gear should rotate clockwise and lock counterclockwise. Install snap ring. Ensure end gap is not aligned with case cutouts.
18. Install 2nd coast brake band guide with tip contacting case. Install 2nd brake flange with flat end facing upward. Install 3 discs and 3 plates, starting with disc and alternating with plate and ending with plate.
19. Install piston return spring assembly with springs over case protrusions. Align 2nd brake drum groove with bolt in case. Install 2nd brake drum.
20. Install snap ring in groove while compressing piston return springs with hammer handles. Ensure end gap is not aligned with case cutouts. Apply compressed air into 2nd brake oil passage in case nearest manual valve shaft. Ensure piston movement.
21. Install 2nd brake drum gasket in center oil passage until it contacts 2nd brake drum. 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. Distance should be approximately .20" (5 mm).
22. While turning sun gear, sun gear input drum and thrust washer clockwise, install into No. 1 one-way clutch. Install bearings and races on planetary gear and planetary . Install front planetary gear. Refer to **FRONT PLANETARY GEAR BEARING & RACE SPECIFICATIONS** table.

FRONT PLANETARY GEAR BEARING & RACE SPECIFICATIONS

Nomenclature	Inner Diameter In. (mm)	Outer Diameter In. (mm)
Planetary Gear		
Race	1.102 (28.00)	1.772 (45.00)
Bearing	1.181 (30.00)	1.772 (45.00)
Planetary Ring Gear		
Front Race	.866 (22.00)	1.492 (37.90)
Bearing	.874 (22.20)	1.421 (36.10)
Rear Race	.748 (19.00)	1.378 (35.00)
Ring Gear Flange		
Front Race	.866 (22.00)	1.492 (37.90)
Bearing	.874 (22.20)	1.421 (36.10)
Rear Race	.906 (23.00)	1.406 (35.70)

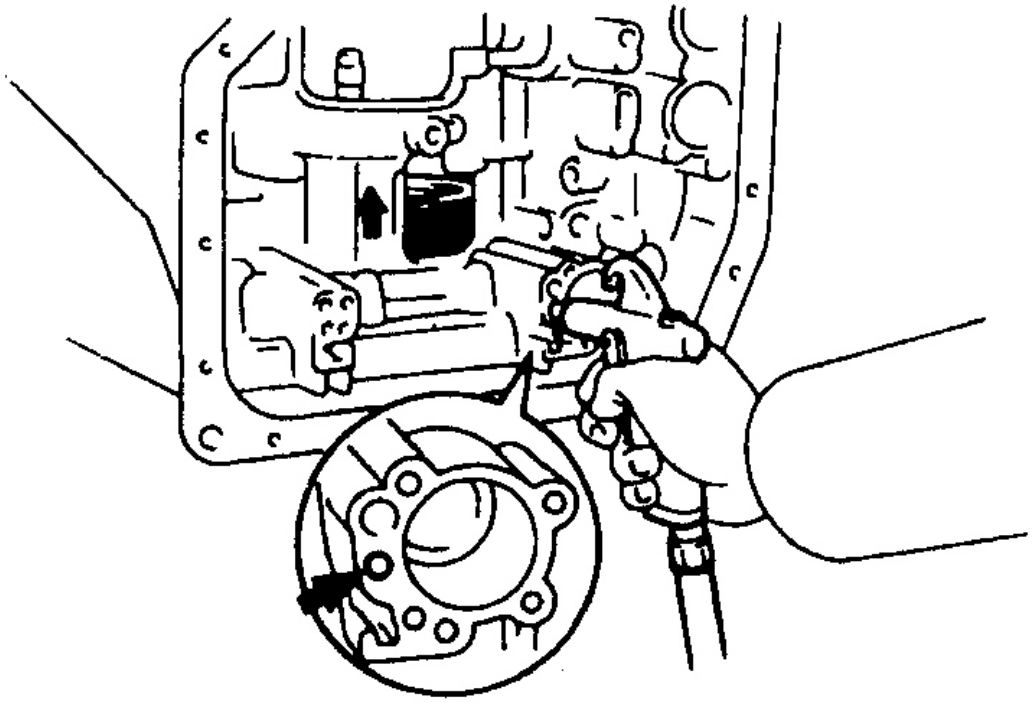

Fig. 62: Checking 1st/Reverse Brake Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

23. Install front planetary ring gear. If correctly installed, end of ring gear flange bushing will be even with intermediate shaft. Install thrust bearing and races on tip of ring gear flange. Install 2nd coast brake band. Install pin through oil pump mounting bolt hole.
24. Install bearing and race on forward clutch drum. Install direct clutch drum thrust washer with oil groove upward on clutch drum. Align clutch disc tabs. Mesh hub with tabs of direct clutch while rotating clutch drum or forward clutch. While rotating forward clutch to mesh front planetary ring gear and discs, install direct clutch and forward clutch. Direct clutch is properly installed when clutch drum bushing is even with thrust bearing on forward clutch.
25. Install differential. Apply seal packing Loctite (518) to transaxle housing. Install and torque bolts to 21 ft. lbs. (29 N.m). Check differential side bearing preload. See DIFFERENTIAL.
26. Install oil seal rings. Install race on stator shaft. Race outer diameter is 1.693" (43.00 mm). Race outer diameter is 1.201" (30.50 mm). 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 torque 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.

27. Measure input shaft end play in axial direction using a dial indicator. On all models except MR2, end play should be .012-.035" (.39-.90 mm). On MR2 models end play should be .008-.035" (.20-.90 mm). Change oil pump race if end play is incorrect. Oil pump races are available in thicknesses of .031" (.80 mm) and .055" (1.40 mm). Ensure input shaft rotates smoothly.
28. Install "O" rings on cover. Install 2nd coast brake piston, spring and cover into bore. Install snap ring while pressing cover. Ensure front end of piston rod contacts center of 2nd brake band depression.
29. Apply small amount of paint to piston rod at point rod meets case. Using Wire Gauge (09240-00020), measure piston stroke using compressed air. Piston stroke is .059-.118" (1.50-3.00 mm). If travel exceeds specification, replace 2nd coast brake band.
30. Install accumulator pistons and springs. See **Fig. 63** . Coat accumulator piston "O" rings with ATF. Install "O" rings. Install pistons and springs. Install accumulator cover and gasket. Torque bolts to 89 INCH lbs. (10 N.m). Refer to **ACCUMULATOR SPRING FREE LENGTH SPECIFICATIONS** table.

ACCUMULATOR SPRING FREE LENGTH SPECIFICATIONS

Application (Spring)	Color	Free Length - In. (mm)
A-241E		
C1 (Forward Clutch Outer)	Pink	2.917 (74.10)
C1 (Forward Clutch Inner)	Pink	1.614 (41.00)
C2 (Direct Clutch)	Pink	2.461 (62.50)
C2 (Direct Clutch MR2)	Light Green	2.468 (62.70)
B2 (2nd Brake)	Green	2.539 (64.50)
B2 (2nd Brake MR2)	Gray	2.625 (66.70)
C3 (UD Clutch Inner)	Green	2.570 (65.20)
C3 (UD Clutch Outer)	Green	1.890 (48.00)
C3 (UD Clutch	White	2.420 (61.50)

MR2)		
A-241H		
C1 (Forward Clutch Outer)	Pink	2.917 (74.10)
C1 (Forward Clutch Inner)	Pink	1.614 (41.00)
C2 (Direct Clutch)	Blue	2.606 (66.20)
B2 (2nd Brake No. 1)	White	1.437 (36.50)
B2 (2nd Brake No. 2)	Yellow	2.232 (56.70)
C3 (UD Clutch)	Light Green	2.445 (62.10)
A-241L		
C1 (Forward Clutch Outer)	White	2.421 (61.50)
C1 (Forward Clutch Inner)	None	1.457 (37.00)
C2 (Direct Clutch)	Blue & Pink	2.657 (67.50)
B2 (2nd Brake)	Red	2.626 (66.70)
C3 (UD Clutch Outer)	Yellow	2.232 (56.70)
C3 (UD Clutch Inner)	Purple	.512 (13.00)
A-243L		
C1 (Forward Clutch	White	2.799 (71.10)

Outer)		
C1 (Forward Clutch Inner)	None	1.673 (42.50)
C2 (Direct Clutch)	Blue & Light Blue	2.815 (71.50)
B2 (2nd Brake)	Yellow	2.232 (56.70)
C3 (UD Clutch)	Red & Yellow	2.547 (64.70)

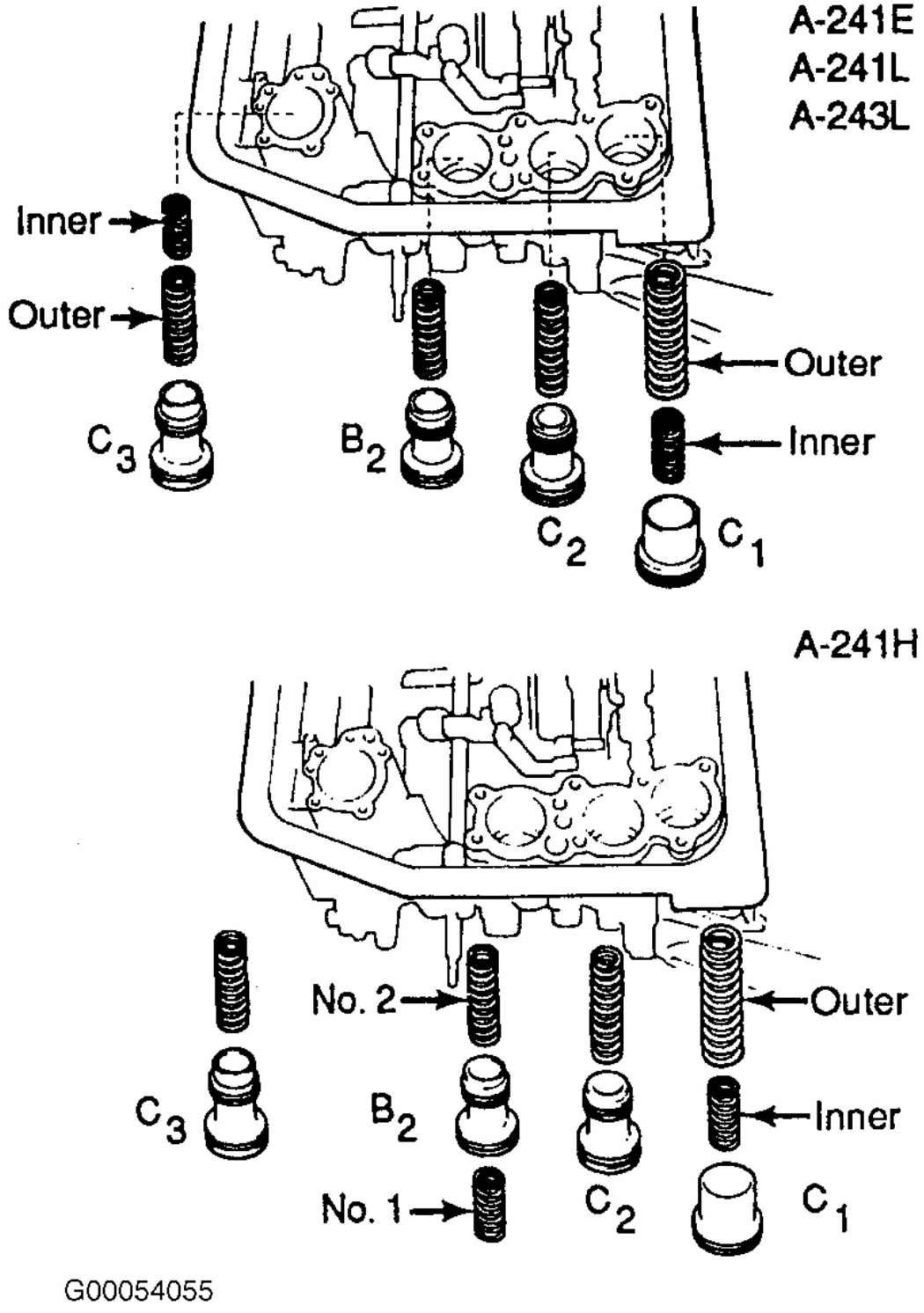

Fig. 63: Exploded View Of Accumulator Pistons & Springs

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

31. Install 2nd brake "O" ring. Ensure cable is fully seated in case. DO NOT roll case over cable. Install solenoid(s) in case.
32. Install valve body. See VALVE BODY under ON-VEHICLE SERVICE. Ensure proper length bolt is installed in proper location.
33. Connect solenoid connectors. Install manual detent spring and cover. Hand tighten bolt then torque to 89 INCH lbs. (10 N.m). Ensure manual lever is in contact with center of roller at tip of detent spring.
34. Install oil tubes with a plastic hammer. DO NOT bend or damage tubes. Install oil tube clamp and bracket. Torque bolts to 89 INCH lbs. (10 N.m). Install oil strainer. Torque bolts to 89 INCH lbs. (10 N.m). Install magnets in oil pan. Ensure magnets do not interfere with oil tubes. Install oil pan with a new gasket. Torque bolts to 89 INCH lbs. (10 N.m).
35. On A-241E models, install speed sensor and sensor rotor. Install sensor cover to case. Install sensor cover bracket. Torque to 115 INCH lbs. (13 N.m). Install speed sensor and retaining plate. Torque to 89 INCH lbs. (10 N.m).
36. On A-241H, A-241L and A-243L models install governor oil strainer to case. Install gasket, governor body adapter, governor body and thrust washer. Install "O" ring on cover. Install cover to case. Install cover brackets. Torque bolts to 115 ft. lbs. (13 N.m).
37. On A-241E models, install throttle cable and solenoid wire retaining plates. On all models, install neutral start switch to manual valve shaft. Install packing. Install nut and lock stopper. Torque nut to 61 INCH lbs. (6.9 N.m). Temporarily install manual shift lever. Turn lever counterclockwise until lever stops. Turn lever clockwise 2 notches. Remove manual shift lever. Align groove and neutral basic line. Install and torque bolts to 48 INCH lbs. (5.4 N.m). Using a screwdriver, stake nut with nut stopper. Install manual shift lever with washer. Torque nut to 115 INCH lbs. (13 N.m).
38. Install filler tube and transmission dipstick. Install oil cooler pipes. Torque to 25 ft. lbs. (34 N.m). On A-241H transaxle, install differential side gear intermediate shaft. Install new snap ring to shaft groove. Using a plastic hammer, install shaft. Keeping shaft on differential pinion shaft, measure protrusion length. Protrusion length should be 10.0" (254 mm). Install new apply gasket to transfer left case.
39. On A-241H models, install transfer assembly. Apply seal packing Three Bond (1131) to transfer. Install transfer assembly. Coat threads of bolts with sealer Three Bond (1324). Install and torque bolts to 51 ft. lbs. (69 N.m). Inspect mode select lever position. After inspection, ensure mode select lever position is on FREE mode and attach lock bolt.

OVERHAUL

DRIVE AXLE SHAFTS

See AXLE SHAFTS article in AXLE SHAFTS & TRANSFER CASES.

THROTTLE CABLE

Removal

Disconnect throttle cable from throttle linkage. Disconnect transaxle control cable from manual shift lever. Remove manual shift lever. Remove neutral safety switch. Remove valve body. See VALVE BODY. Remove throttle cable bolt and retaining plate. Pull throttle cable from transaxle.

Installation

1. Install throttle cable in transaxle case. Ensure cable is fully seated. Install retaining bolt and plate. Install valve body. On new throttle cables stopper must have a indicator mark painted on cable. Bend cable in approximately a 8" (203 mm) radius.
2. Stake the stopper .031-.059" (.78-1.49 mm) from outer cable housing. See **Fig. 64** . Connect throttle cable on throttle linkage and install neutral safety switch.
3. Adjust throttle cable and neutral safety switch. See appropriate article in TRANSMISSION SERVICING. Install manual shift lever. Install transaxle control cable. Test drive vehicle.

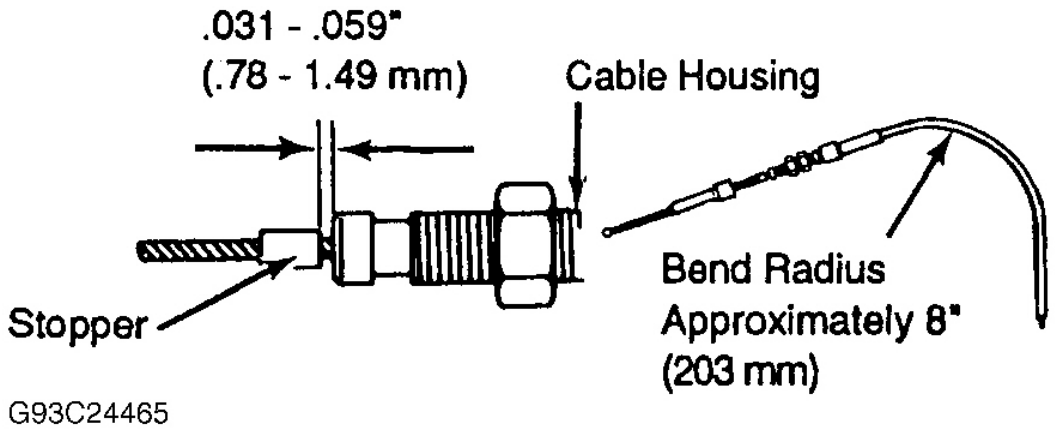

Fig. 64: Locating Throttle Cable Stopper
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

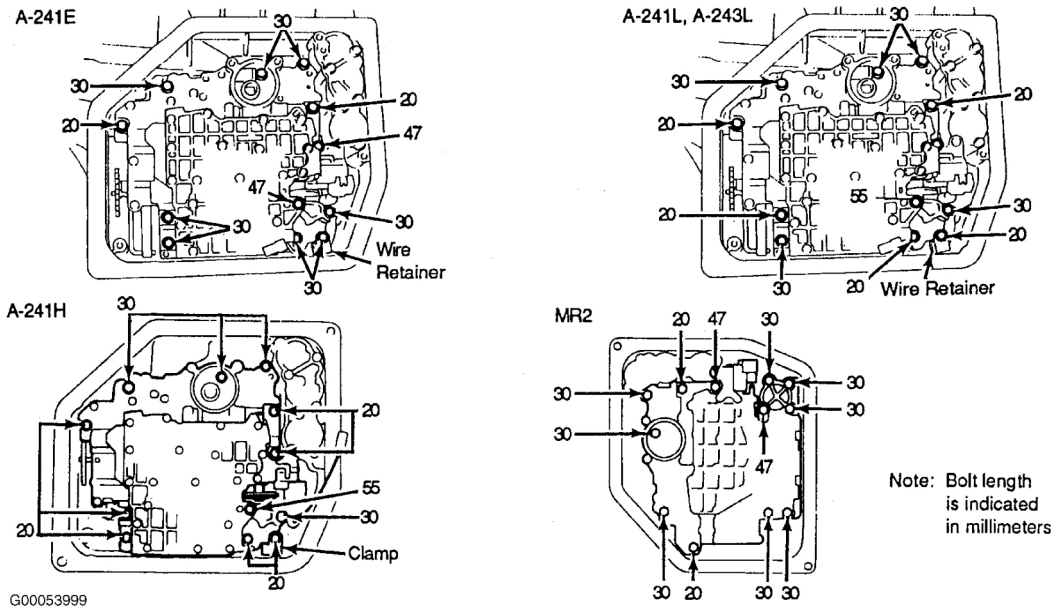

Fig. 65: Locating Valve Body Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

VEHICLE SPEED SENSOR (A-241E)

Removal

On MR2, remove airflow meter and air cleaner hose. On all models, disconnect speed sensor connector. Remove speed sensor lock plate bolt. Remove speed sensor.

Inspection

Connect an ohmmeter to speed sensor terminals. The ohmmeter needle should deflect when the sensor is brought close to a magnet, then moved away from magnet.

Installation

Install speed sensor and tighten lock plate bolt. Connect speed sensor wiring connector. Install airflow meter, air cleaner hose and intercooler.

GOVERNOR ASSEMBLY (A-241H, A-241L & A-243L)

Removal

Disconnect speedometer cable. Remove governor cover and "O" ring. Remove governor body and thrust washer. Remove governor body adapter and gasket. To test governor see GOVERNOR PRESSURE TEST under HYDRAULIC PRESSURE TEST.

Installation

To install, reverse removal procedure. Use new gasket and tighten bolts to specification.

VALVE BODY ASSEMBLY

CAUTION: Note bolt length and location. Proper length bolts must be installed to prevent case damage.

Removal

1. Clean exterior of transaxle. Drain transaxle. Remove oil pan and gasket. Remove strainer and apply tube bracket. Note location of oil tubes. Using large screwdriver, remove oil tubes.
2. Remove detent spring on all models. Note bolt location and length. Disconnect solenoid connector(s). Remove valve body bolts.
3. Remove throttle cable (if equipped). Disconnect manual valve connecting rod. Remove valve body. Remove 2nd brake apply gasket.

Installation

1. Install 2nd brake apply gasket. Hold valve body cam downward and install throttle cable in slot. On all models, install manual valve connecting rod.
2. Install valve body. Ensure kickdown switch wire is not under valve body. Install valve body bolts finger tight. Ensure proper length bolts are installed in proper areas. Install solenoid connector(s). Torque bolts to 89 INCH lbs. (10 N.m). See **Fig. 65** .
3. On all models, install detent spring and tighten bolts to specification. Ensure manual valve lever contacts center of roller on detent spring. Using a plastic hammer, tap oil tubes into place.
4. Install tube clamp, bolt and tighten. Install oil strainer. Install magnet in oil pan. Ensure magnet does not interfere with oil tubes. Install oil pan and gasket.
5. Torque bolts to specification. Fill transaxle using proper fluid.

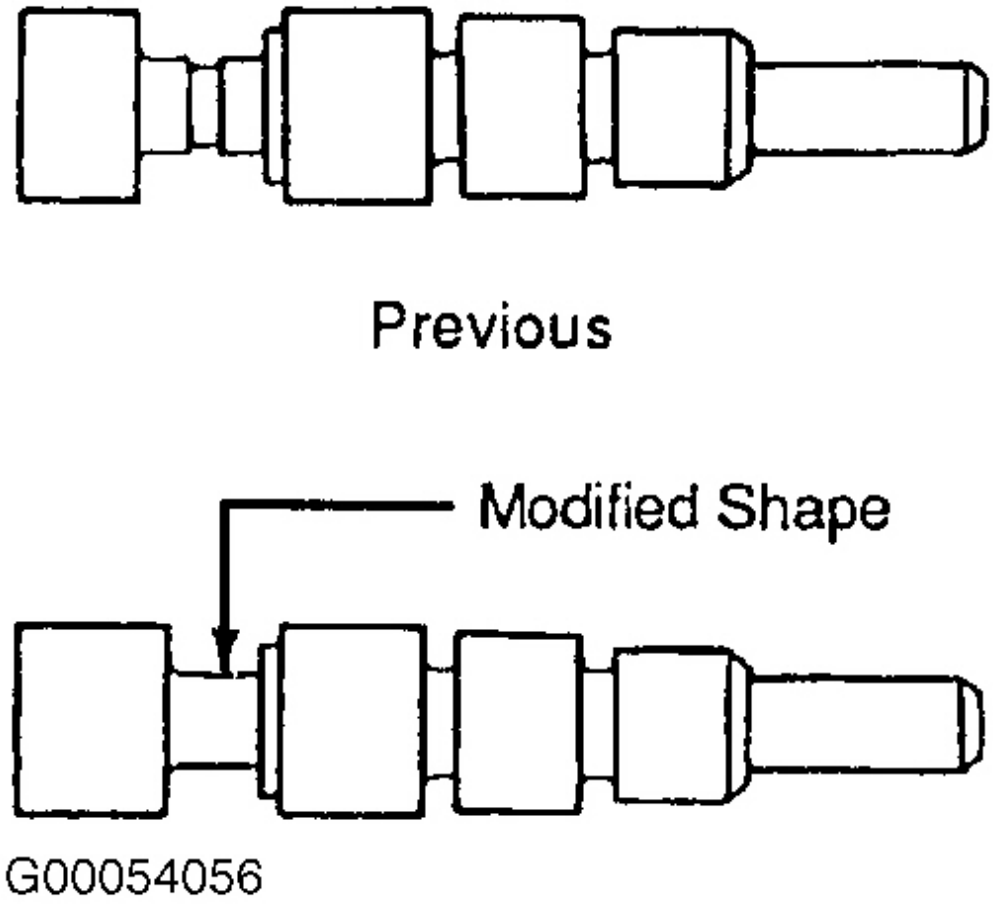

Fig. 66: New Design Throttle Valve For A-241E
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N. m)
Countershaft-To-Driven Gear Nut	116 (157)
Drive Plate-To-Crankshaft Bolts	61 (83)
Extension Housing-To-Driven Pinion Bearing Cage Bolt	18 (25)
Oil Cooler Pipes	25 (34)
Oil Pump-To-Transaxle Case Bolts	18 (25)
Oil Pump-To-Transaxle Case Bolts (A-241H)	16 (22)

Ring Gear-To-Differential Case Bolts	71 (97)
Transaxle Housing-To-Case Bolts	21 (29)
Transaxle Housing-To-Engine Bolts (12 mm)	47 (64)
Transaxle Rear Cover-To-Case Bolts	21 (29)
Transfer Case Driven Pinion Lock nut (A-241H)	72-159 (98-216)
Transfer Right Case Bolts	32 (44)
Transfer Right Case Retainer Bolts	18 (25)
Torque Converter-To-Drive Bolts	20 (27)
	INCH Lbs. (N.m)
Accumulator Cover-To-Case Bolts	89 (10)
Governor Body Adaptor Bolts	89 (10)
Governor Cover Bracket Bolts	115 (13)
Manual Detent Spring-To-Case Bolts	89 (10)
Neutral Start Switch-To-Case Bolts	8 (5.4)
Neutral Start Switch-To-Manual Valve Shaft Nut	61 (6.9)
Oil Pan Bolts	44 (5.0)
Oil Pump Body-To-Stator Shaft Bolts	89 (10)
Oil Strainer-To-Valve Body Bolts	89 (10)
Oil Tube Bracket Bolts	89 (10)
No. 2 Pressure Regulator Valve Body-To-Upper Valve Body Bolts	57 (6.4)
Parking Lock Pawl Stopper Plate Bolts	65 (7.4)
Speed Sensor-To-Case Bolts	89 (10)
Sensor Adapter Bolts	89 (10)
Sensor Cover Bracket Bolts	115 (13)
Solenoid-To-Lower Valve Body Bolts	89 (10)
Testing Plug	65 (7.4)
Transfer Mode Select Lever Bolts	115 (13)
Upper-To-Lower Valve Body Bolts	57 (6.4)
Valve Body-To-Case Bolts	89 (10)

