

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

1988-94 AUTOMATIC TRANSMISSIONS

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

APPLICATION

TRANSMISSION APPLICATIONS

Vehicle Model	Transmission Model
1988-92 Corolla (4WD)	A-241H
1988-94 MR2	A-241E
1990-93 Celica (GTS)	A-241E
1990-93 Celica (ST)	A-241L
1990-93 Celica (GT)	A-243E

IDENTIFICATION

Vehicle Identification Number (VIN) is used for correct application of component parts and assemblies. VIN is stamped on cowl panel, manufacturer's plate, vehicle identification number plate and certification regulation plate.

DESCRIPTION

Model A-241H is a 4-speed automatic transaxle for full time 4WD vehicles. A-241H transaxle has a center differential and a transfer case attached. This transaxle has a hydraulic multi-plate clutch in center differential limiting control mechanism. Fluid pressure acting on hydraulic multi-plate 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. See appropriate **AUTOMATIC TRANSMISSION SERVICING** article in **TRANSMISSION SERVICING**. For transaxle removal procedure, see appropriate **AUTOMATIC TRANSMISSION REMOVAL** article in **TRANSMISSION SERVICING**. For drive axle shaft service procedures, see appropriate **AXLE SHAFTS - FWD** article in **AXLE SHAFTS & TRANSFER CASES**.

LUBRICATION & ADJUSTMENTS

See appropriate **AUTOMATIC TRANSMISSION SERVICING** article in **TRANSMISSION SERVICING**.

ON-VEHICLE SERVICE

GOVERNOR ASSEMBLY (A-241H)

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, refer to **GOVERNOR PRESSURE TEST (A-241H)** under HYDRAULIC PRESSURE TEST.

Installation

To install, reverse removal procedure. Use new gasket and tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

CONTROL VALVE ASSEMBLY

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

Removal

1. Clean exterior of transaxle. Remove oil pan plug. Drain transaxle. Remove oil pan and gasket. Discard gasket. Remove oil strainer. Note location of magnets in oil pan. Remove magnets. Examine particles in pan. Steel (magnetic) particles indicate bearing, gear, or plate wear. Brass (non-magnetic) particles indicate bushing wear.
2. Remove tube bracket. Note location of oil tubes, and remove oil tubes. Disconnect solenoid wiring connector(s). Remove manual detent spring. Disconnect throttle cable from cam. Remove control valve assembly. Remove 2nd brake apply gasket.

Installation

1. Install new 2nd brake apply gasket. While holding cam down, slip cable end into slot. **DO NOT** tangle solenoid wire. Install control valve assembly. Hand tighten control valve assembly bolts. See **Fig. 1** . Tighten bolts to 97 INCH lbs. (11 N.m). Connect solenoid wiring connector(s).
2. Align manual valve with pin on manual shaft lever. Lower manual valve body into position. Install 5 bolts finger tight. See **Fig. 3** . Tighten bolts to 97 INCH lbs. (11 N.m).
3. Install detent spring. Ensure manual valve lever is in contact with center of roller at tip of detent spring. Install 2 bolts finger tight. Tighten bolts to 97 INCH lbs. (11 N.m).
4. Tap oil tubes into position. **DO NOT** bend or damage tubes during installation. Install oil tube bracket. Tighten bolts to 89 INCH lbs. (10 N.m).
5. Install oil strainer. Tighten bolts to 97 INCH lbs. (11 N.m). Install magnets in oil pan. Ensure magnets do not interfere with oil tubes. Install oil pan and new gasket. Tighten bolts to 43 INCH lbs. (4.9 N.m). Install drain plug with new washer gasket. Fill transmission with ATF.

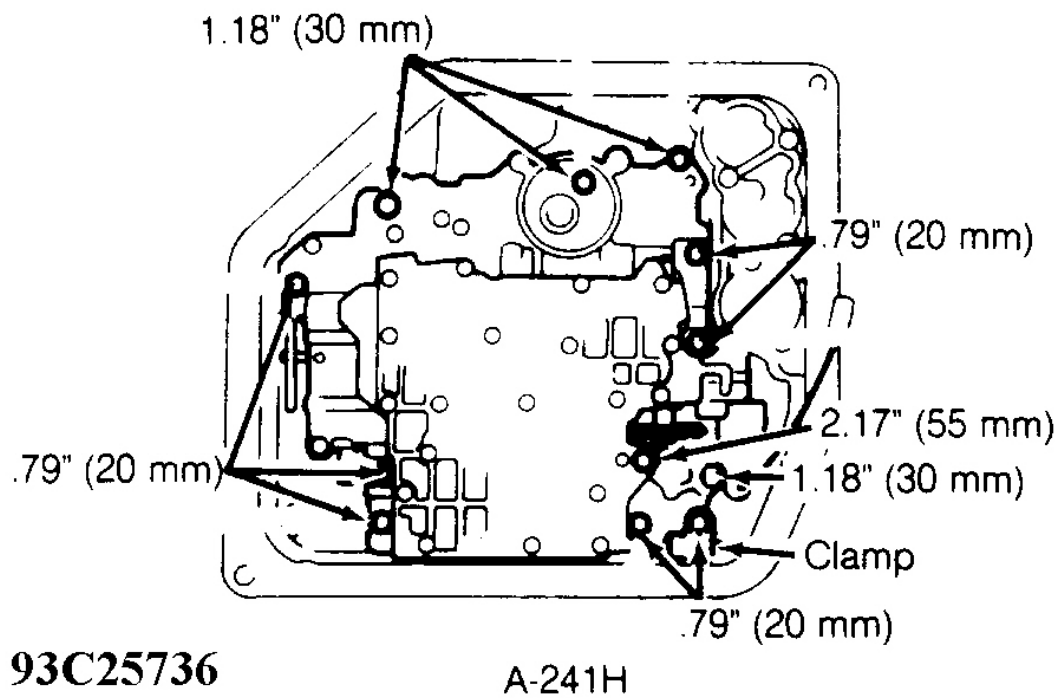


Fig. 1: Locating Control Valve Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

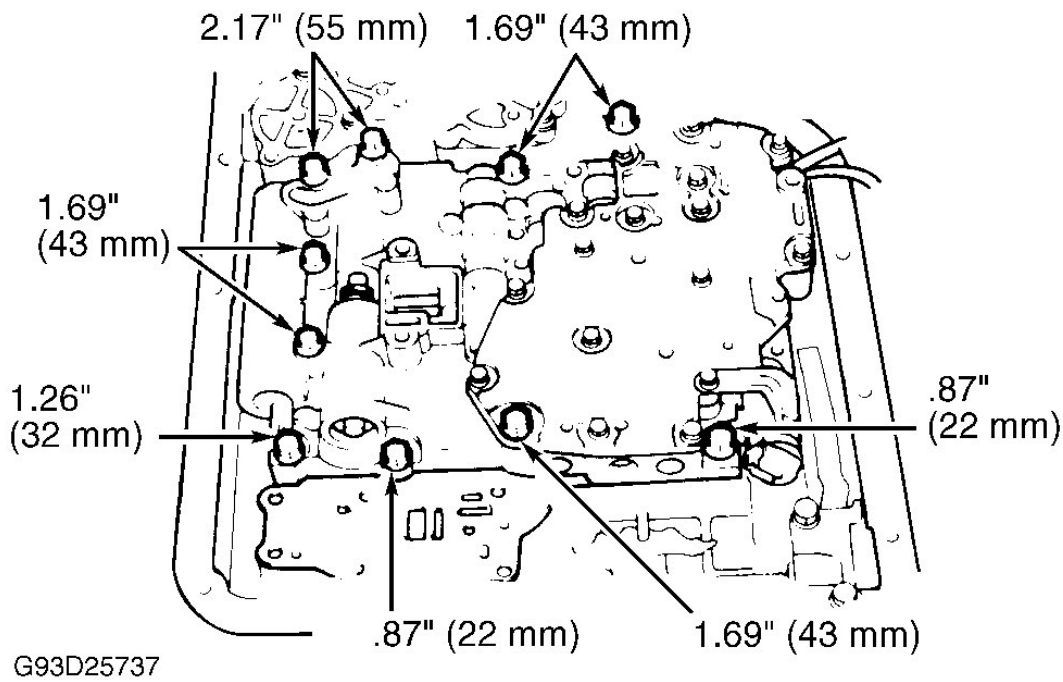


Fig. 2: Locating Control Valve Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

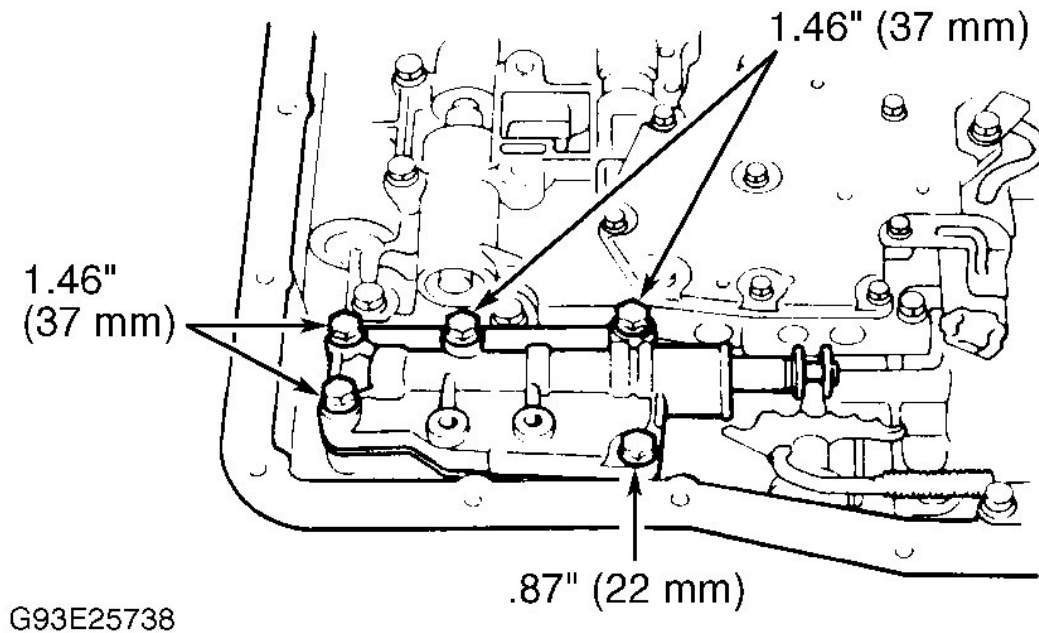


Fig. 3: Locating Manual Valve Body Bolts (A-241H)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

LEFT SIDE GEAR SHAFT SEAL (A-241H)

Removal & Installation

1. Remove dust cover and fender apron seal. Drain gear oil. Remove axle shaft. Using Remover/Installer (09520-32012), remove side gear shaft. Remove side bearing retainer. Using Puller (09308-00010), remove seal from retainer.
2. To install, use Replacer Set (09608-30022) to press new seal into retainer. Seal should be recessed .020" (0.50 mm) when installed.
3. Coat lip of seal with grease. Install side bearing retainer. Tighten retainer bolts to correct specification. See **TORQUE SPECIFICATIONS**.
4. Using Remover/Installer (09520-32012), install side gear shaft until shaft contacts pinion shaft. Install snap ring. Install drive shaft. Ensure drive shaft cannot be pulled out. Fill differential with ATF. Install fender apron seal and dust cover.

RIGHT SIDE GEAR SHAFT SEAL (A-241H)

Removal & Installation

1. Remove dust cover and fender apron seal. Drain gear oil. Remove bearing lock bolt. Remove snap ring. Pull out drive shaft with Puller (09308-00010). Using a screwdriver, remove oil seal.

2. To install, coat lip of seal with grease. Using Replacer Set (09608-30022), drive seal into case. Seal should be recessed .012"(0.30 mm) when installed.
3. Using Remover/Installer (09520-32012), install side gear shaft. Install snap ring and drive shaft. Ensure drive shaft cannot be pulled out. Fill differential with ATF. Install fender apron seal and dust cover.

TROUBLE SHOOTING

NOTE: For electronic diagnosis and component testing of A-241H transaxle, see appropriate TOYOTA ELECTRONIC CONTROLS article. For transaxle component location, see Fig. 4 .

SYMPTOM DIAGNOSIS

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. See CLUTCH & BAND APPLICATION table.

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.

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. See CLUTCH & BAND APPLICATION table.

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.

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

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.

Downshift Occurs Too Soon Or Too Late While Coasting

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

No OD-3, 3-2 Or 2-1 Kickdown

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

No Engine Braking In "2" Or "L" Range

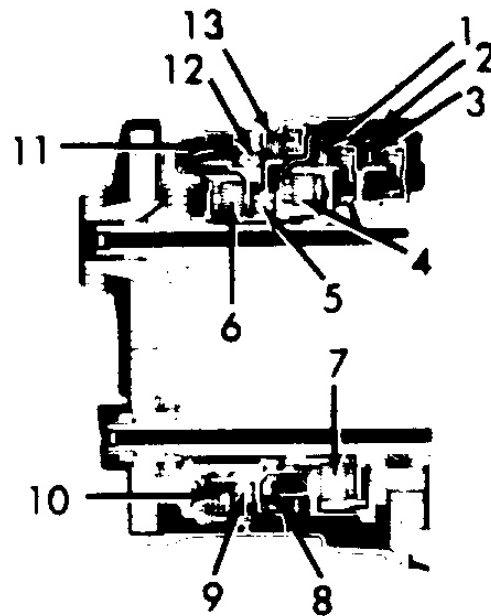
Solenoid valve faulty. Electronic control faulty. Valve body faulty. Transaxle faulty.

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 multi-plate clutch faulty.



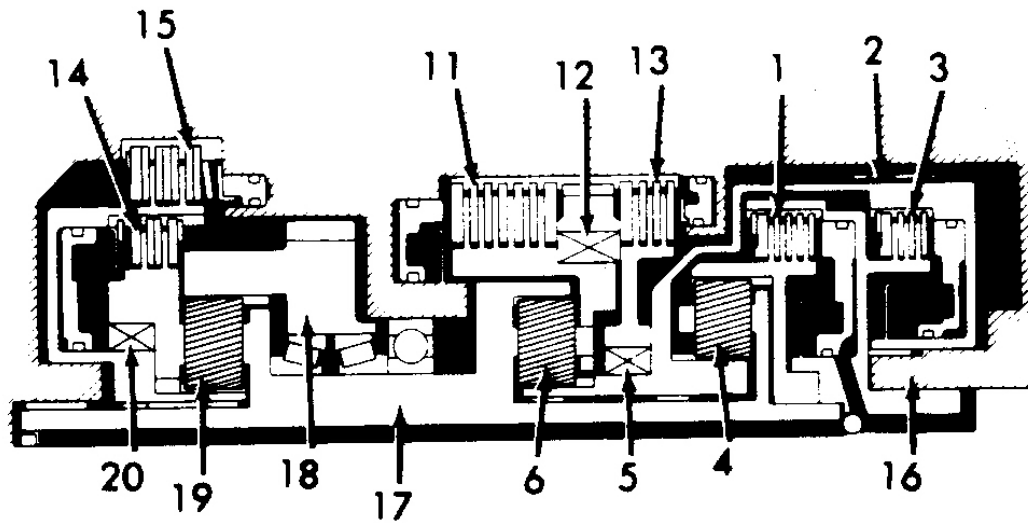
A-241H

- | | |
|------------------------------|------------------------------|
| 1. Forward Clutch | 11. 1st & Reverse Brake |
| 2. 2nd Coast Brake | 12. No. 2 One-Way Clutch |
| 3. Direct Clutch | 13. 2nd Brake |
| 4. Front Planetary Gear | 14. Overdrive Direct Clutch |
| 5. No. 1 One-Way Clutch | 15. Overdrive Brake |
| 6. Rear Planetary Gear | 16. Input Shaft |
| 7. Underdrive Planetary Gear | 17. Intermediate Shaft |
| 8. Underdrive Clutch | 18. Counter Drive Gear |
| 9. Underdrive One-Way Clutch | 19. Overdrive Planetary Gear |
| 10. Underdrive Brake | 20. Overdrive One-Way Clutch |

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Fig. 4: Identifying Transaxle Component Locations

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



A-540E & A-540H

- | | |
|------------------------------|------------------------------|
| 1. Forward Clutch | 11. 1st & Reverse Brake |
| 2. 2nd Coast Brake | 12. No. 2 One-Way Clutch |
| 3. Direct Clutch | 13. 2nd Brake |
| 4. Front Planetary Gear | 14. Overdrive Direct Clutch |
| 5. No. 1 One-Way Clutch | 15. Overdrive Brake |
| 6. Rear Planetary Gear | 16. Input Shaft |
| 7. Underdrive Planetary Gear | 17. Intermediate Shaft |
| 8. Underdrive Clutch | 18. Counter Drive Gear |
| 9. Underdrive One-Way Clutch | 19. Overdrive Planetary Gear |
| 10. Underdrive Brake | 20. Overdrive One-Way Clutch |

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Fig. 5: Identifying Transaxle Component Locations
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

CLUTCH & BAND APPLICATION

Selector Lever Position	Elements In Use
"D" (Drive)	
First Gear	Forward Clutch, No. 2 One-Way Clutch, Under-Drive Brake & Under-Drive One-Way Clutch
Second Gear	Forward Clutch, No. 1 One-Way Clutch No. 2 One-Way Clutch, No. 2 Brake, Under-Drive Brake & Under-Drive

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

	One-Way Clutch
Third Gear	Direct Clutch, Forward Clutch, No. 2 Brake, Under-Drive Brake & Under-Drive One- Way Clutch
OD (Fourth Gear)	Direct Clutch, Forward Clutch, No. 2 Brake & Under-Drive Clutch
"2" (Intermediate)	
First Gear	Forward Clutch, No. 2 One- Way Clutch Under-Drive Brake & Under-Drive One- Way Clutch
Second Gear	Forward Clutch, No. 2 Brake, No. 1 One-Way Clutch, Under- Drive Brake Under-Drive One- Way Clutch & 2nd Coast Brake
Third Gear ⁽¹⁾	Direct Clutch, Forward Clutch No. 2 Brake, Under-Drive Brake & Under-Drive One- Way Clutch
"L" (Low)	
First Gear	Forward Clutch, No. 3 Brake, No. 2 One-Way Clutch, Under- Drive One-Way Clutch & 1st & Reverse Brake
Second Gear ⁽²⁾	Forward Clutch, 2nd Coast Brake No. 2 Brake, No. 1 One- Way Clutch, Under-Drive Brake & Under-Drive One- Way Clutch
"R" (Reverse)	Direct Clutch, Under-Drive Brake & 1st & Reverse Brake
"N" (Neutral)	Under-Drive Brake
"P" (Park)	Under-Drive Brake
(1) Downshift only in 3rd gear for "2" position.	
(2) Downshift only in 2nd gear for "L" position. Upshift does not occur.	

TESTING**PRELIMINARY CHECK**

Troubles occurring with Electronic Controlled Transaxle (ECT) can be caused by engine, ECT electrical control

or transmission. It is necessary to isolate these 3 areas before proceeding with trouble shooting. Ensure following items are checked prior to testing. See appropriate AUTOMATIC TRANSMISSION SERVICING article in TRANSMISSION SERVICING.

- Check transaxle oil level.
- Check transfer case oil level (A-241H).
- Check throttle cable mark.
- Check shift cable.
- Check neutral start switch.
- Check idle speed.
- Check tire inflation pressure.

ROAD TEST

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

"D" Range Test

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 gear upshift occurs, governor valve, 1-2 shift valve or No. 2 solenoid is faulty.
 - If no 2-3 gear upshift occurs, 2-3 shift valve or No. 1 solenoid is faulty.
 - If no 3-OD gear upshift occurs, 3-OD shift valve is faulty or solenoid valve or circuit is faulty.
 - If all shift points are incorrect, throttle cable adjustment, throttle valve, 1-2 shift valve, 2-3 shift valve or 3-OD shift valve is faulty.
 - If all lock-up points are incorrect, lock-up relay valve or lock-up solenoid is faulty.
2. Use procedure outlined in step 1 to check for shock and slip between 1-2 gear, 2-3 gear and 3-OD gear upshifts. If shock is harsh, line pressure is too high on the accumulator or check ball is faulty.

CAUTION: When checking for abnormal noise or vibration, use extreme care, as problem may be due to an out-of-balance drive shaft, differential, torque converter, tire, or faulty power train rubber mounts.

3. Run vehicle in "D" range lock-up or overdrive gear. Check for abnormal noise and vibration. Ensure lock-up occurs at appropriate speeds. Refer to appropriate table under **SHIFT SPEED SPECIFICATIONS**.
4. While running in "D" range, 2nd, 3rd and OD gears, confirm correct kickdown vehicle speed limits for 2nd-1st, 3rd-2nd and OD-3rd gears. Check for abnormal shock and slip at kickdown. Abnormal shock and slip at kickdown may be caused by throttle cable misadjustment, faulty throttle valve, or faulty shift valves.
5. While running at 37 MPH in "D" range, OD gear, or lock-up, lightly depress accelerator pedal. Ensure engine RPM does not change abruptly. If a large increase in RPM occurs, lock-up mechanism is faulty.

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

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" Range Test

1. Shift to "2" range. While driving with the accelerator pedal held constantly at full throttle valve opening position, push in one of the pattern selectors. Ensure that 1-2 upshift takes place and shift point conforms to correct specifications. Refer to appropriate table under **SHIFT SPEED SPECIFICATIONS**.
2. While driving in "2" range, 2nd gear, release accelerator pedal and check engine braking effect. If there is no engine braking effect, 2nd coast brake is faulty.
3. Check for abnormal noise and shock at acceleration and deceleration.

"L" Range Test

1. While running in "L" range, ensure there is no upshift to 2nd gear.
2. While running in "L" range, release accelerator pedal. If there is no engine braking effect, 1st and reverse brake are faulty. Check for abnormal noise at acceleration and deceleration.

"R" Range Test

Shift into "R" range. Accelerate vehicle from a stop at full throttle. Ensure slipping does not occur.

"P" Range Test

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

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

Application	MPH
"D" Range	
1st-2nd	29-38
2nd-3rd	56-65
3rd-OD ⁽²⁾	16-24
OD-3rd ⁽²⁾	9-16
3rd-2nd	52-63
2nd-1st	24-29
"L" Range ⁽²⁾	
2nd-1st	26-33
(1) Wide open throttle.	
(2) Fully closed throttle.	

COROLLA (4WD) A-241H LOCK-UP SPEEDS ⁽¹⁾

Application	MPH
"D" Range ⁽²⁾	
Lock-Up ON	41-47
Lock-Up OFF	39-45
(1) Throttle valve fully closed.	
(2) There is no lock-up in "L" or "2" ranges.	

STALL SPEED TEST

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

- Object of test is to check overall performance of transmission and engine by measuring maximum engine speeds in "D" and "R" ranges.
- Block front and rear wheels. Connect engine tachometer. Apply parking and service brakes. Start engine. 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. Repeat test in "R" range.

STALL SPEED SPECIFICATIONS

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

- If stall speed is same for both ranges, but lower than specified RPM, engine output may be insufficient or stator one-way clutch is not operating properly.
- If stall speed in "D" range is higher than specifications, forward clutch may be slipping, one-way clutch No. 2 and overdrive are not operating properly, or line pressure is too low.
- If stall speed in "R" range is higher than specifications, direct clutch is slipping, 1st and reverse brake is slipping, line pressure is too low or overdrive one-way clutch is not operating properly.
- If stall speed in "R" and "D" ranges is higher than specifications, line pressure is too low, fluid level is incorrect or overdrive one-way clutch is not operating properly.

TIME LAG TEST

CAUTION: Perform this test at normal operating fluid temperature of 122-176°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 and reverse brake.
2. Apply parking brake. Start engine. Ensure idle speed is correct. See **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. Standard time lag is less than 1.2 seconds.

IDLE SPEED SPECIFICATIONS

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

3. Repeat procedure outlined in step 2) to measure time lag for "N" to "R". Standard lag is less than 1.5 seconds.
4. If "N" to "D" time lag is longer than specification, line pressure is too low, forward clutch may be worn, or overdrive one-way clutch is not operating properly.
5. If "N" to "R" time lag is longer than specified, direct clutch may be worn, 1st and reverse brake may be worn, line pressure is too low or overdrive one-way clutch is not operating properly.

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. Ensure transmission fluid is at operating temperature. Block wheels. Support vehicle on safety stands. Remove transmission case test plug(s). Install hydraulic pressure gauge(s). See **Fig. 6**.
2. Fully apply parking brake. Start engine. Apply brakes. Shift into "D" range.
3. On A-241H, depress the accelerator. Note the pressure readings at idle and stall speed. Repeat test in "R" range. Compare the pressure readings to the specifications. Refer to **COROLLA A-241H LINE PRESSURE SPECIFICATIONS** table.
4. If pressures exceed specifications in all ranges, regulator valve or throttle valve is faulty or throttle cable is out of adjustment.
5. If pressures in all ranges are lower than specifications, oil pump, regulator valve, throttle valve or

overdrive clutch is faulty or throttle cable is out of adjustment.

6. If pressure is lower than specifications in "D" range only, forward clutch is faulty or "D" range circuit has a fluid leak.
7. If pressure is lower than specifications in "R" range only, direct clutch is faulty, 1st and reverse brake is faulty or "R" range circuit has a fluid leak.

COROLLA A-241H LINE PRESSURE SPECIFICATIONS

Selector Position	Pressure psi (kg/cm ²)
At Idle	
"D" Range	53-61 (3.7-4.3)
"R" Range	77-102 (5.4-7.2)
AT WOT Stall	
"D" Range	131-152 (9.2-10.7)
"R" Range	205-239 (14.4-16.8)

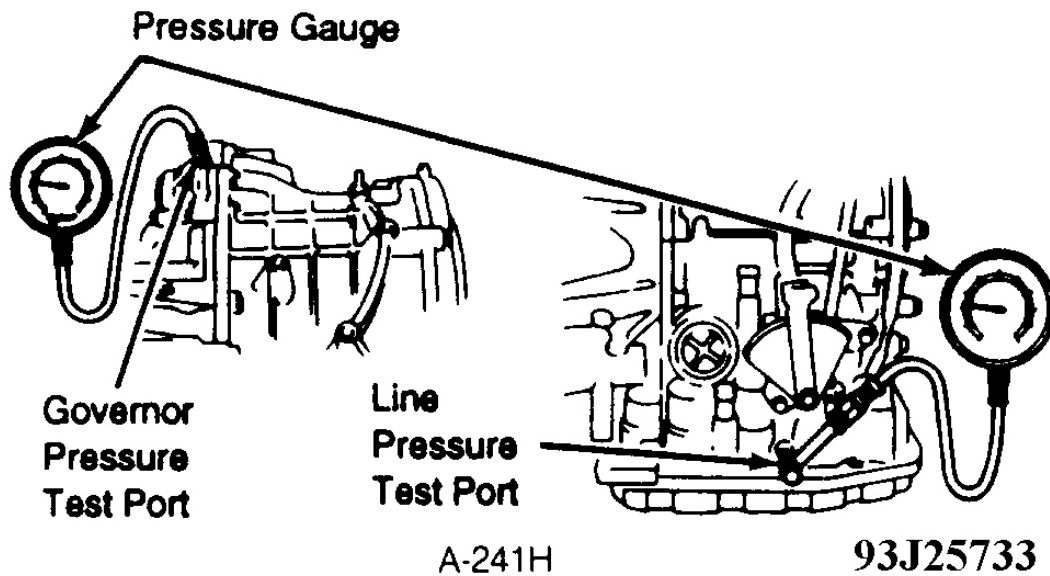
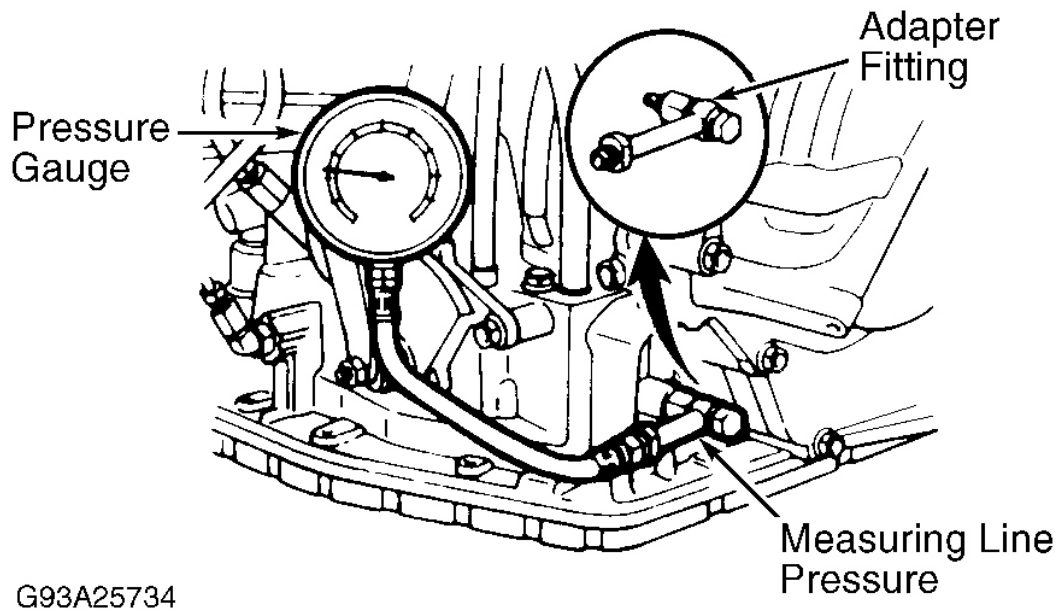


Fig. 6: Checking Hydraulic Pressure

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

**Fig. 7: Checking Hydraulic Pressure**

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

Governor Pressure Test (A-241H)

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. Shift mode selector lever into LOCK position.

CAUTION: After finishing inspection, ensure selector lever is returned to FREE mode position.

2. Remove transaxle test plugs and connect pressure gauge. See **Fig. 6** . Start engine. Shift into "D" range. Measure governor pressure at speeds specified in **GOVERNOR PRESSURE SPECIFICATIONS** table.

GOVERNOR PRESSURE SPECIFICATIONS

Engine RPM	Speed (MPH)	psi (kg/cm ²)
800	17	13-24 (.9-1.7)
1600	35	26-37 (1.8-2.6)
2400	53	47-58 (3.3-4.1)

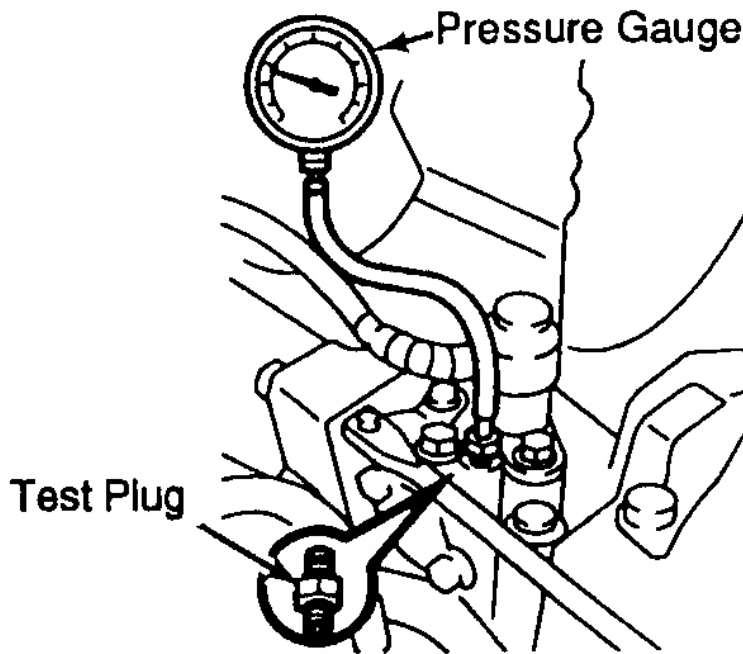
3. Incorrect governor pressure may be caused by incorrect line pressure, leakage at governor pressure circuit or faulty governor valve.

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. 8**.
2. Fully apply parking brake. Start engine. Shift into "D" range. Measure center differential pressure at specified speeds. See **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 faulty center differential control valve.

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	125-152	0
OFF	Idling	0	0	0
OFF	Stall	0	0	0



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Fig. 8: Checking Center Differential Line Pressure
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

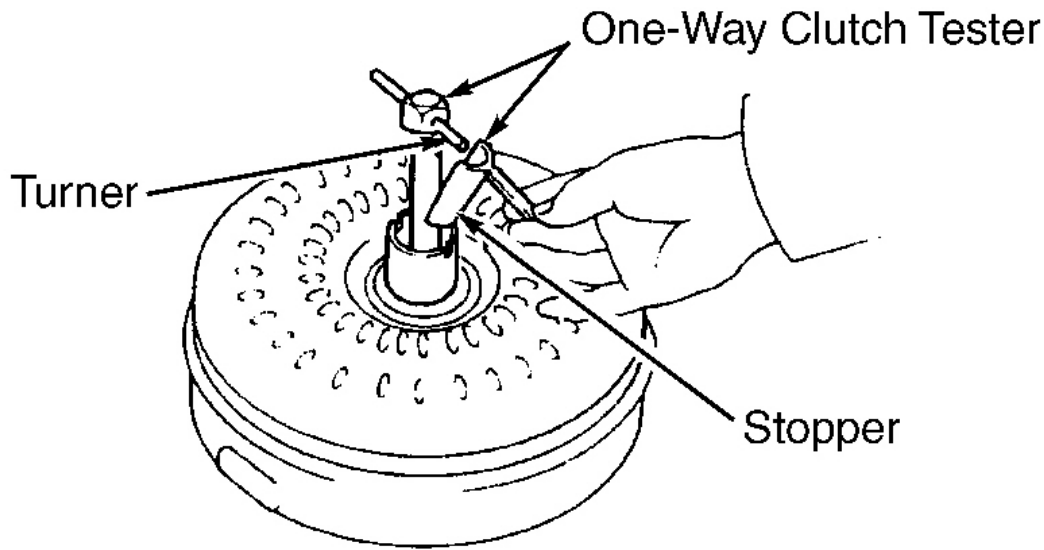
COMPONENT TESTS

TORQUE CONVERTER

NOTE: If transmission is contaminated, torque converter and transmission cooler should be thoroughly flushed with ATF.

ONE-WAY CLUTCH TESTING

1. Insert a turning tool into inner race of one-way clutch. Install Tester (09351-32010) so that it fits in notch of converter hub and outer race of one-way clutch. See **Fig. 9**.
2. With converter in normal operating position, clutch should lock-up when turned counterclockwise, and should rotate freely and smoothly when turned clockwise. If necessary, clean converter. Retest clutch. If clutch fails test, replace converter.



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Fig. 9: Testing One-Way Clutch

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

REMOVAL & INSTALLATION

TRANSAXLE

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

TRANSAXLE DISASSEMBLY

1. On A-241H, remove bolts and nuts on transfer case assembly. Remove transfer case assembly from transaxle. Remove apply gasket. Using Remover/Installer (09520-32012), remove differential side gear intermediate shaft. See [Fig. 16](#) .
2. On all models, remove manual shift lever and neutral start switch. Remove throttle cable bolt and plate. Remove solenoid wire bolt. See [Fig. 10](#) or [Fig. 11](#) .
3. On A-241H, remove governor cover bracket. Remove governor cover and "O" ring. Remove governor body, thrust washer, governor body adapter and gasket.

CAUTION: DO NOT turn transaxle over, as this will contaminate valve body with any foreign material that is trapped in the oil pan.

4. On all models, remove oil pan bolts and oil pan. See [Fig. 12](#) . Place transaxle on wooden blocks to prevent damage to pipe bracket. Examine particles found in oil pan. If particles are magnetic (steel), bearing, gear and clutch plate wear are indicated. If particles are non-magnetic (brass), bushing wear is indicated.
5. Turn transaxle over. Remove tube bracket, oil strainer and solenoid connectors (if equipped). Using screwdriver, remove oil tubes.
6. On all models, remove control valve assembly bolts. Disconnect throttle valve cable from cam. Remove control valve assembly. Remove throttle cable. Remove solenoid wiring from case (if equipped). Remove 2nd brake apply gasket.
7. To remove accumulator pistons and springs, loosen 5 bolts one turn at a time until spring tension is released. Remove cover and gasket. Remove piston and spring for forward clutch.
8. Using 14 psi (1 kg/cm²) of compressed air in apply hole, pop out direct clutch and 2nd brake accumulator pistons and springs into a shop cloth. See [Fig. 13](#) .
9. Using Wire Gauge Set (09240-00020), measure piston stroke of 2nd coast brake. On A-241H, piston stroke should be .059-.118" (1.5-3.0 mm). On all models, if piston stroke exceeds specification, inspect 2nd coast brake band.
10. To remove 2nd coast brake band, remove snap ring and cover. Remove 2nd coast brake piston and outer return spring.

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul



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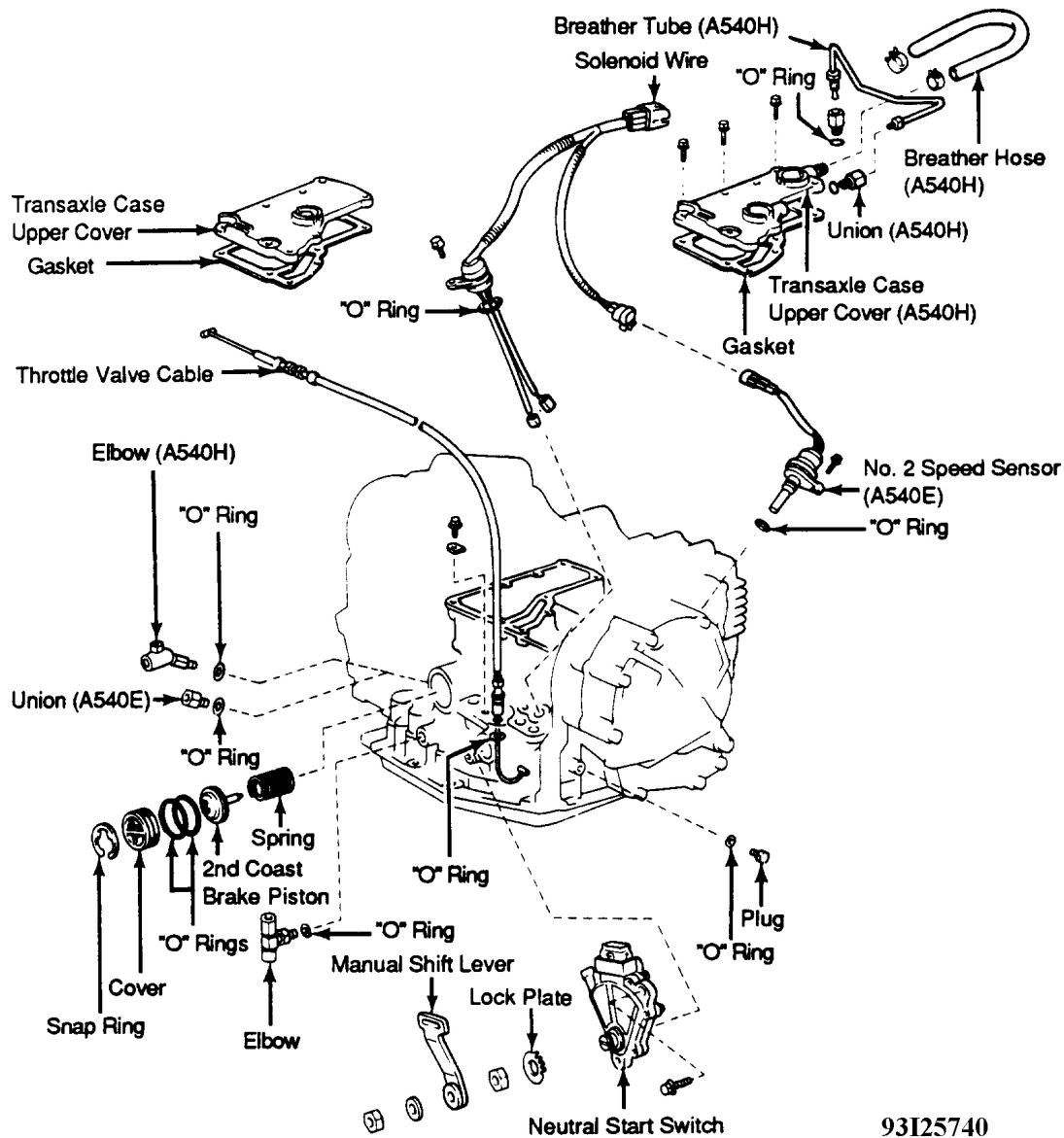


Fig. 11: Exploded View Of External Components (A-540E & A-540H)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

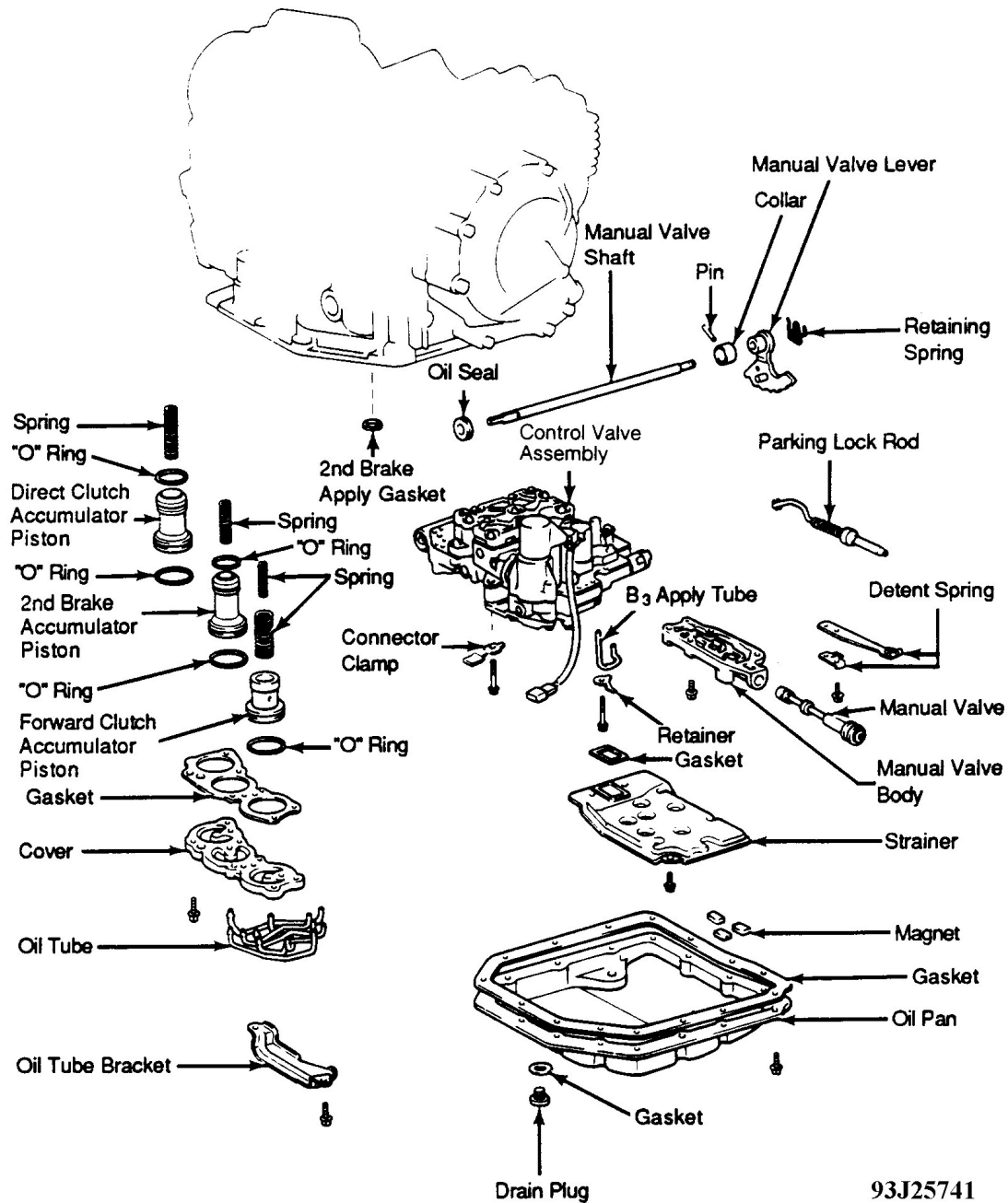


Fig. 12: Exploded View Of Lower External Components (A-540E & A-540H Shown; A-241H Is Similar)

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

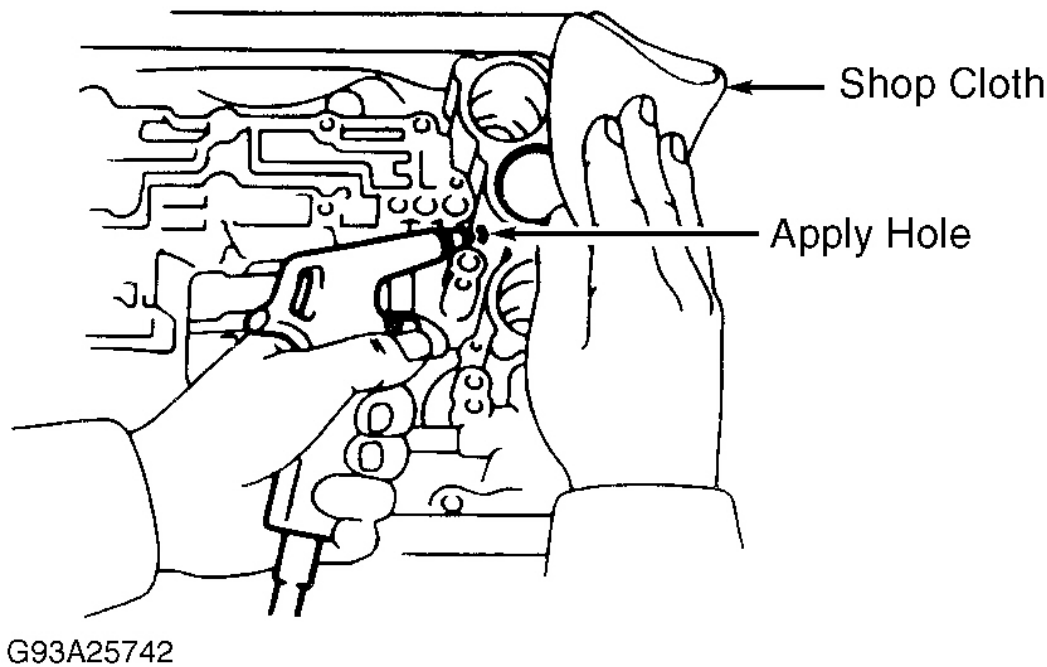


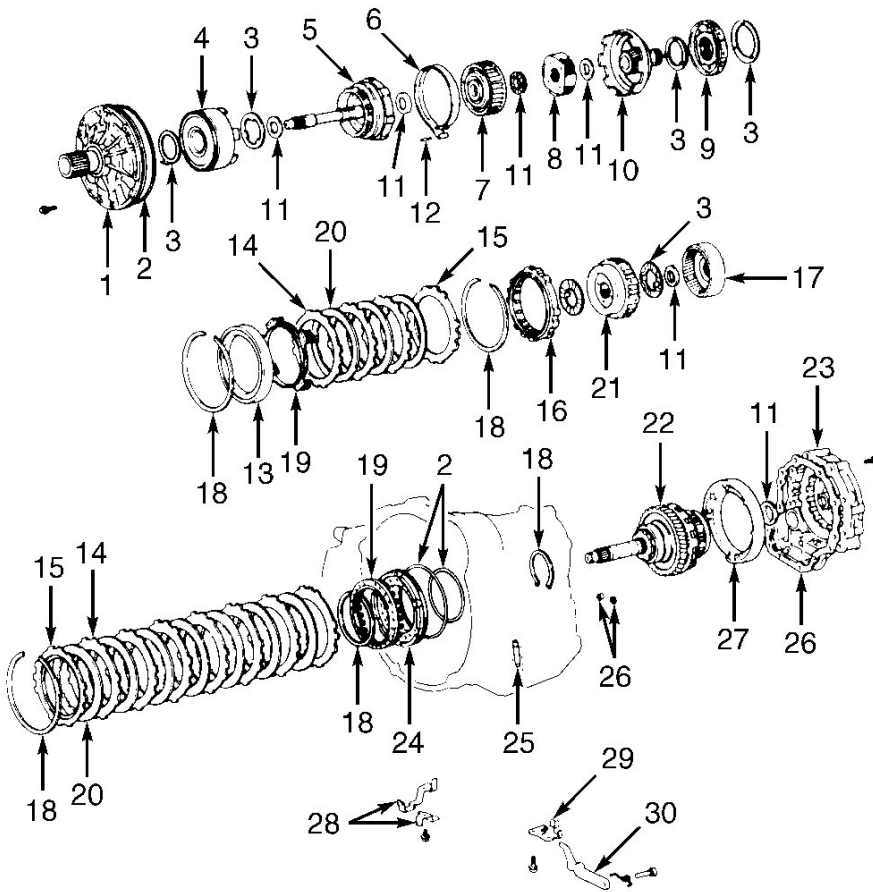
Fig. 13: Removing Accumulator Pistons & Springs
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Before removing oil pump, remove 2nd coast brake piston.

11. Remove oil pump-to-case bolts. Using Puller (09350-32014), pull oil pump from case. Remove direct clutch and forward clutch. Separate direct clutch and forward clutch. Remove thrust washer from direct clutch. Remove bearings from forward clutch. Push pin with a small screwdriver to remove pin from bolt hole of oil pump mounting, and remove 2nd coast brake band. See **Fig. 14**.
12. Remove front planetary ring gear. Remove front planetary gear. Remove 2 bearings from planetary gear. Remove sun gear and sun gear drum. Remove thrust washer from sun gear input drum. Check operation of 2nd brake piston by applying compressed air into case passage and confirming that piston moves. If piston does not move, disassemble and inspect. Remove 2nd coast brake band guide.
13. 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 piston return spring. Remove clutch plate, discs and flange. Remove 2nd brake drum gasket.
14. Remove snap ring holding No. 2 one-way clutch outer race to case. Remove the No. 2 one-way clutch and rear planetary gear. On A-241H, remove thrust washer from rear planetary gear. Remove rear planetary ring gear, bearing and race.
15. Check operation of 1st and reverse brake piston. Apply compressed air into case passage and confirm that piston moves. If piston does not move, disassemble and inspect.

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul



- | | |
|------------------------------|--------------------------------|
| 1. Oil Pump | 16. No. 2 One-Way Clutch |
| 2. "O" Ring | 17. Rear Planetary Ring Gear |
| 3. Thrust Washer | 18. Snap Ring |
| 4. Direct Clutch | 19. Spring |
| 5. Forward Clutch | 20. Disc |
| 6. 2nd Coast Brake Band | 21. Rear Planetary Gear |
| 7. Front Planetary Ring Gear | 22. Overdrive Planetary Gear |
| 8. Front Planetary Gear | 23. Overdrive Case |
| 9. No. 1 One-Way Clutch | 24. 1st & Reverse Brake Piston |
| 10. Drum & Sun Gear | 25. 2nd Brake Drum Gasket |
| 11. Bearing | 26. Gasket |
| 12. Pin | 27. Overdrive Brake Drum |
| 13. Second Brake Drum | 28. 2nd Coast Brake Band Guide |
| 14. Plate | 29. Bracket |
| 15. Flange | 30. Parking Lock Pawl |

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Fig. 14: Exploded View Of Internal Components (A-540E & A-540H Shown; A-241H Is Similar)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

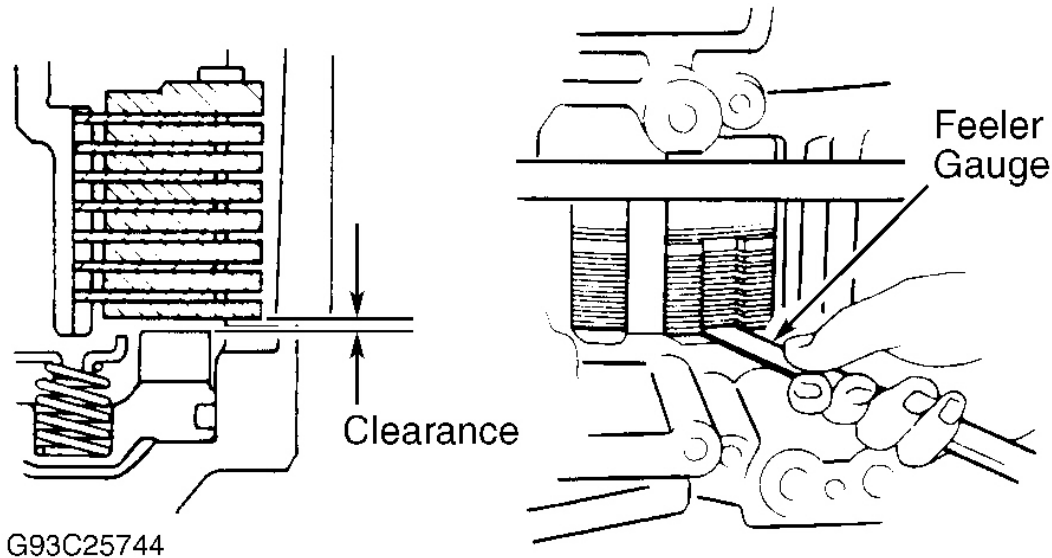
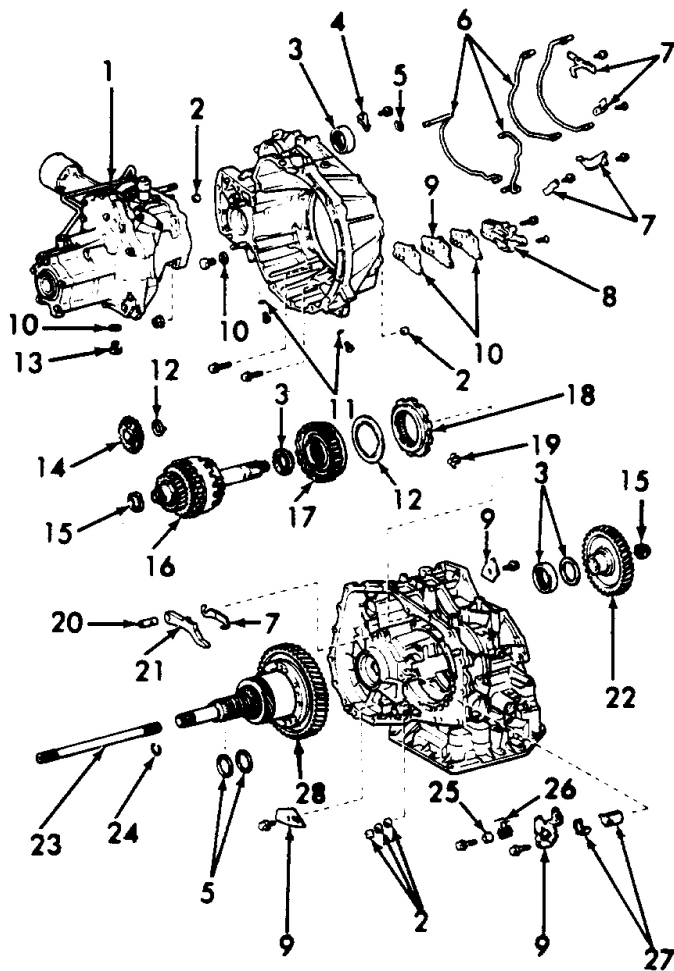


Fig. 15: Checking 1st & Reverse Brake Pack Clearance
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. Remove snap ring holding flange to case. Remove flange, discs and plates of 1st and reverse brake. Turn transaxle case around. Remove 13 bolts attaching overdrive case to transaxle.
17. On A-241H, tap transaxle cover using a plastic hammer. Remove cover. Remove intermediate shaft. Remove snap ring. 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. Remove transaxle housing-to-case bolts. Remove transaxle housing. Remove differential, governor driven gear and thrust washer.
18. Remove apply gaskets. Measure countershaft end play. End play should be .0091-.0350" (.230-.890 mm).
19. 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. 16**.
20. Using Puller (09351-32061), remove counter driven gear. Remove thrust needle bearing. Remove countershaft assembly. Remove thrust bearing with race from countershaft. Remove underdrive clutch drum and anti-rattle clip. Using compressed air, confirm underdrive brake piston moves smoothly. Remove oil seal rings. See **Fig. 16**.
21. 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.
22. Remove parking lock pawl stopper plate, torsion spring and spring guide. Remove pawl shaft clamp. Remove parking lock sleeve and cam guide bracket. Remove transaxle case plate. Remove manual valve shaft spacer and pin. Remove spring from manual valve shaft. Remove manual valve shaft, lever and washer. See **Fig. 10**.

23. Using screwdriver and hammer, remove manual shaft oil seal. Remove oil seal rings. Using a 14-mm socket and hammer, drive in new oil seal. Apply grease to oil seal lip.
24. Remove oil galley cover and gasket. Remove underdrive brake accumulator piston and spring. See **Fig. 12** and **Fig. 13** . Using Puller (09308-00010), remove bearing from housing. Remove apply gasket from transaxle housing.
25. 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 (09612-65014), remove bearing. Remove oil seal ring (if installed).



- | | |
|--------------------------|---|
| 1. Transfer Assembly | 15. Countershaft Lock Nut |
| 2. Apply Gasket | 16. Underdrive Planetary Countershaft |
| 3. Bearing | 17. Underdrive Clutch |
| 4. Retainer | 18. Underdrive One-Way Clutch |
| 5. Oil Seal Ring | 19. Anti-Rattle Clip |
| 6. Oil Tube | 20. Parking Lock Shaft |
| 7. Clamp | 21. Parking Lock Lever |
| 8. Oil Tube | 22. Counter Driven Gear |
| 9. Apply Cover | 23. Differential Side Gear Intermediate Shaft |
| 10. Gasket | 24. Snap Ring |
| 11. "O" Ring | 25. Spring Guide |
| 12. Thrust Washer | 26. Spring |
| 13. Drain Plug | 27. Sleeve |
| 14. Governor Driven Gear | |

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Fig. 16: Exploded View Of Rear Components (A-241H)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

COMPONENT DISASSEMBLY & REASSEMBLY

OIL PUMP

Disassembly

1. Remove "O" rings and 2 oil seal rings from pump body and stator shaft. Remove race from stator shaft. Remove clutch drum thrust washer from stator shaft.
2. Remove 11 bolts attaching oil pump body and stator shaft. Identify top and bottom and keep parts in order. Separate stator shaft and pump body. Mark gear location for reassembly reference. See **Fig. 17** . Using screwdriver, remove front seal.

Inspection

1. Check body clearance of driven gear. Push gear to one side of body. Measure body clearance. Clearance is .0028-.0059" (.070-.150 mm). Maximum clearance is .012" (.30 mm). If body clearance is greater than maximum specification, replace drive gear, driven gear or pump body.
2. Check tip clearance of both gears. Measure between gear teeth and crescent-shaped part of pump body. Tip clearance is .0043-.0055" (.110-.140 mm). Maximum tip clearance is .012" (.30 mm). If tip clearance is greater than maximum specification, replace drive gear, driven gear or pump body.
3. Check side clearance of both gears. Using a steel straightedge and feeler gauge, measure side clearance of both gears. Clearance is .0008-.0020" (.020-.050 mm). Maximum side clearance is .004" (.10 mm). If side clearance is greater than the maximum allowable specification, replace drive gear, driven gear or pump body. There are 3 different thicknesses for drive and driven gears. Refer to the **OIL PUMP DRIVE & DRIVEN GEAR SPECIFICATIONS** table.

OIL PUMP DRIVE & DRIVEN GEAR SPECIFICATIONS

ID Mark	Thickness: In. (mm)
"A"	.3717-.3723 (9.440-9.456)
"B"	.3723-.3730 (9.456-9.474)
"C"	.3730-.3736 (9.474-9.490)

4. Measure inside diameter of oil pump body bushing. Maximum inside diameter is 1.5031" (38.180 mm). If inside diameter is greater than maximum specification, replace oil pump body. On A-241H, measure inside diameter of stator shaft bushings. Maximum inside diameter of front side bushing is .8492" (21.570 mm). Maximum inside diameter of rear side bushing is 1.0657" (27.070 mm). If inside diameter is excessive, replace stator shaft.
5. Inspect front oil seal for cracks, damage or wear. Use screwdriver to remove oil seal if replacement is necessary.

Reassembly

1. Using Seal Installer (09351-32140), install a NEW oil seal. Seal is properly installed when it is flush with outer edge of pump body.
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 bolts. Tighten to 89 INCH lbs. (10 N.m).
3. Coat thrust washer 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 freely.

- Turn drive gear with screwdriver to ensure smooth rotation. **DO NOT** damage oil seal lip. Install race on stator shaft.

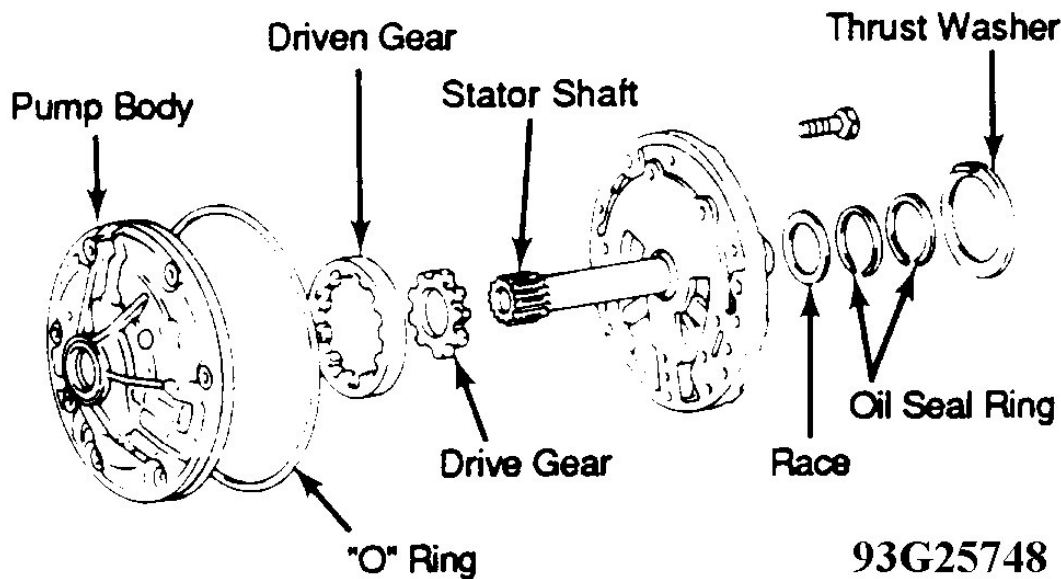


Fig. 17: Exploded View Of Oil Pump

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

DIRECT CLUTCH

Disassembly

- Prior to disassembly, check piston stroke of direct clutch. Measure piston stroke by applying 57-114 psi (4-8 kg/cm²) of compressed air. See **Fig. 18**. Piston stroke should be .0535-.0669" (1.360-1.710 mm) for A-241H. If piston stroke is greater than maximum, inspect each component.
- Remove snap ring from clutch drum. Remove flange, discs and plates. To compress piston return springs and remove snap ring, place Compressor Block (09351-32070) on spring retainer. Compress springs with an arbor press. See **Fig. 19**.
- Remove spring retainer and 18 springs. Slide direct clutch on oil pump. Remove piston by applying low pressure compressed air. If piston does not completely come out, remove with needle-nose pliers. Remove direct clutch from oil pump. Remove "O" ring from clutch piston. See **Fig. 20**.

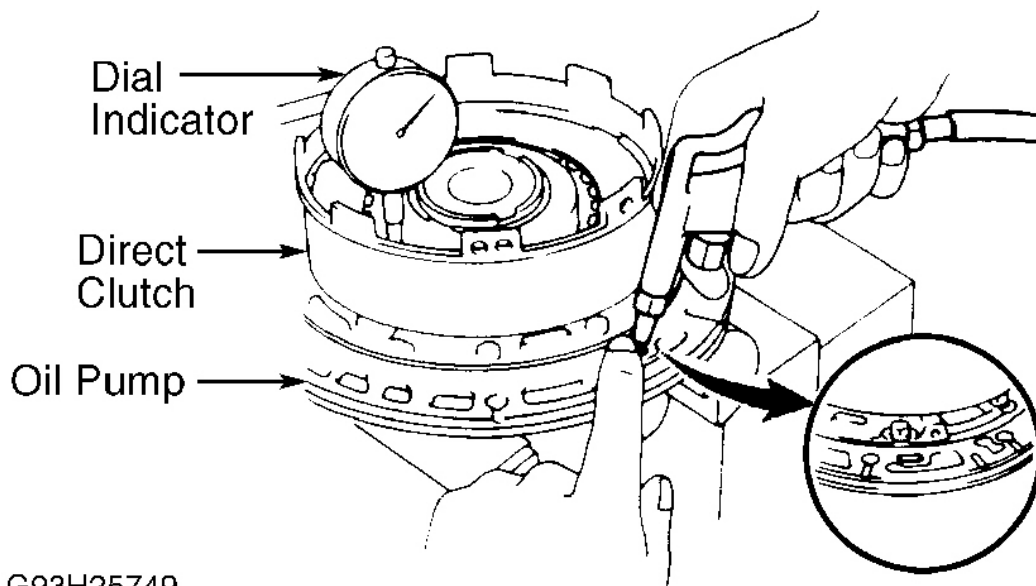
Inspection

Shake piston to ensure direct clutch piston check ball is free. Ensure valve does not leak by applying low pressure compressed air. Inspect discs, plates and flange. Measure inside diameter of direct clutch bushing. For

A-241H, maximum inside diameter is 1.8531" (47.070 mm). If inside diameter is excessive, replace direct clutch.

Reassembly

1. Install NEW "O" rings on piston. Coat rings with ATF. Press piston in drum with cup side up. Ensure "O" ring is not damaged. Install piston return springs. Install retainer and snap ring.
2. Using Compressor Block (09351-32070) and an arbor press, compress return springs. See **Fig. 19** . Using snap ring pliers, install snap ring in groove. Ensure end-gap of spring is not aligned with spring retainer claw.
3. For A-241H, install in order: plate, disc, plate, plate, disc, and flange. Install flange with flat side facing inward. Install outer snap ring. Ensure end gap of snap ring is not aligned with cut-outs in direct clutch drum.
4. Install direct clutch on oil pump. If disc, plate or flange have been replaced, check piston stroke. Using a dial indicator, measure piston stroke by applying and releasing 57-114 psi (4-8 kg/cm²) of compressed air. See **Fig. 18** .
5. Piston stroke should be .0535-.0669" (1.360-1.710 mm) for A-241H. If piston stroke is less than specification, replace flange.
6. Flange is available in 2 thicknesses, .1181" (3.000 mm) or .1327" (3.370 mm) for A-241H.
7. Check operation of direct clutch. Apply compressed air to passage of oil pump body. Ensure movement of piston. If piston does not move, disassemble and inspect unit.



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Fig. 18: Checking Direct Clutch Piston Stroke
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

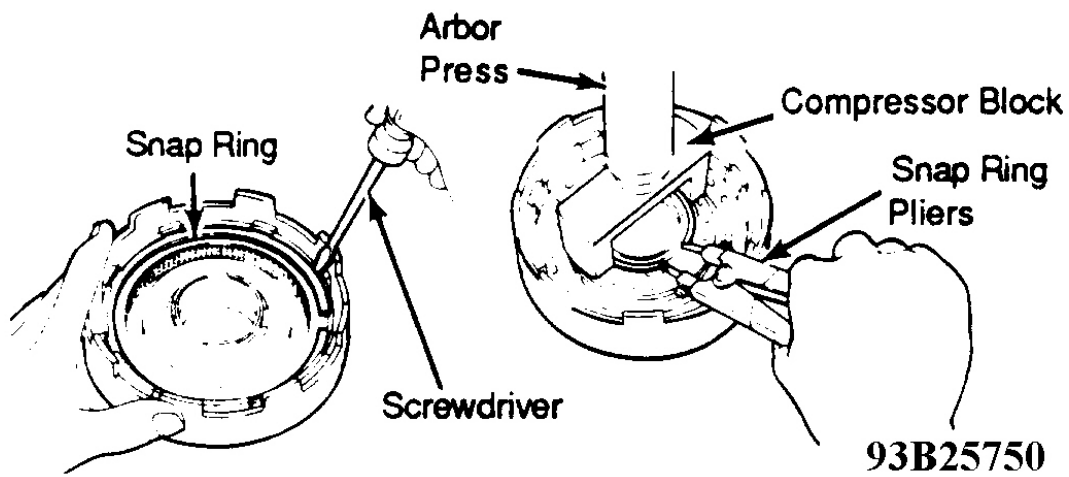


Fig. 19: Removing & Installing Direct Clutch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

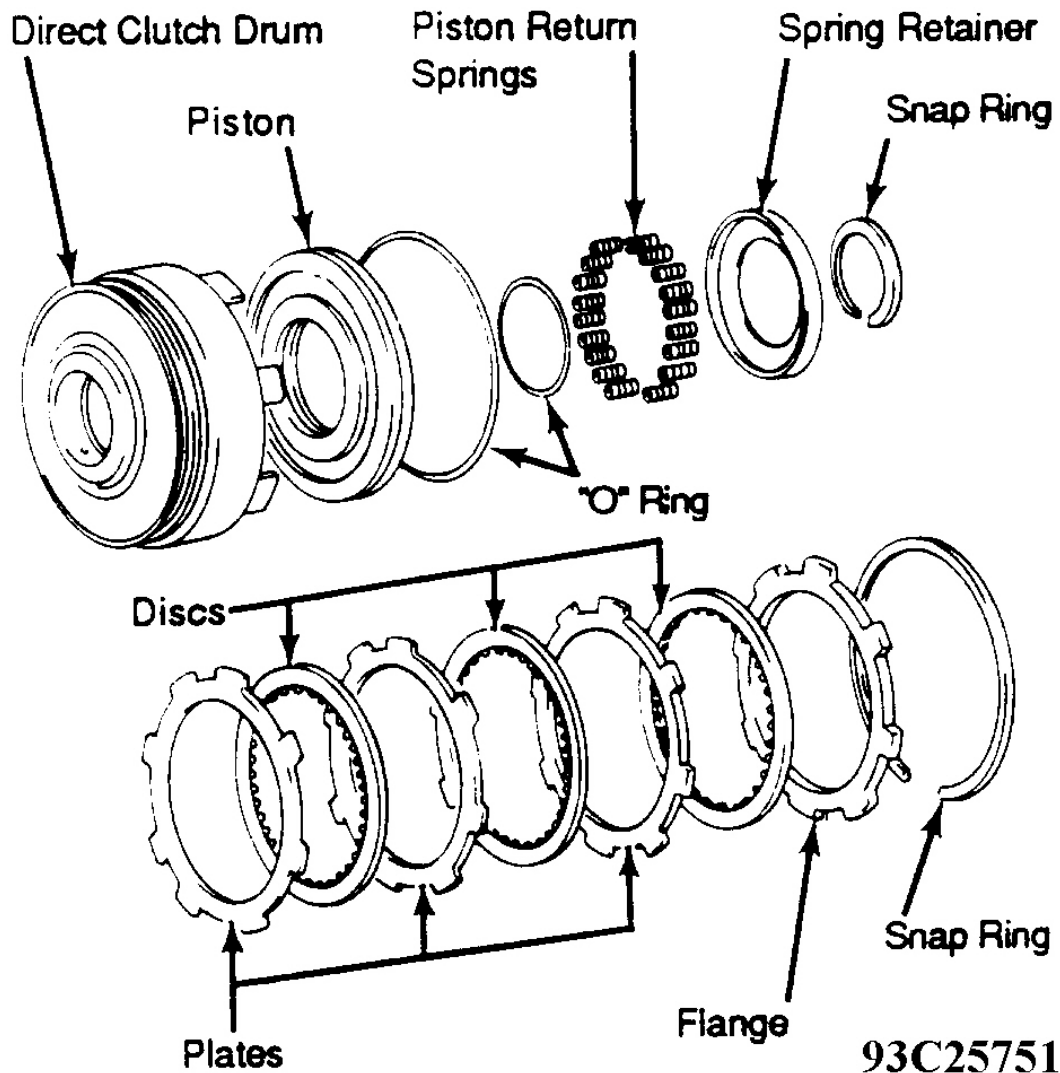


Fig. 20: Exploded View Of Direct Clutch (A-540H Shown; A-241H Is Similar)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

FORWARD CLUTCH

Disassembly

1. Prior to disassembly, check piston stroke of forward clutch. Using a dial indicator, measure piston stroke by applying and releasing 54-114 psi (4-8 kg/cm²) of compressed air. See **Fig. 21**. Piston stroke should be .0559-.0713" (1.420-1.810 mm) for A-241H. If piston stroke is greater than maximum, inspect each component.
2. Remove snap ring from clutch drum. See **Fig. 22**. Remove flange, discs and plates. Place Compressor Block (09351-32070) on spring retainer.

- Using an arbor press, compress springs. On A-241H, remove return spring assembly. Apply compressed air to oil passage to remove piston. If piston does not come out, remove piston with needle-nose pliers. If necessary, remove oil seal rings.

Inspection

Inspect clutch piston. Shake piston to ensure check ball is free. Ensure valve does not leak by applying low pressure air. Replace oil seal rings. **DO NOT** spread ring ends more than required for installation. Inspect discs, plates and flanges.

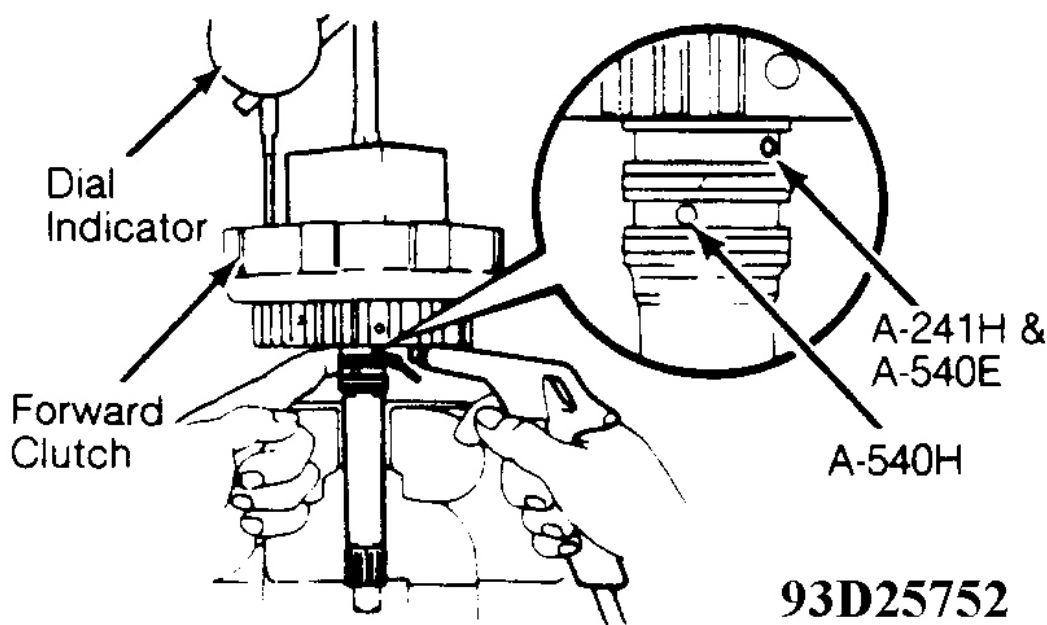


Fig. 21: Checking Forward Clutch Piston Stroke
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

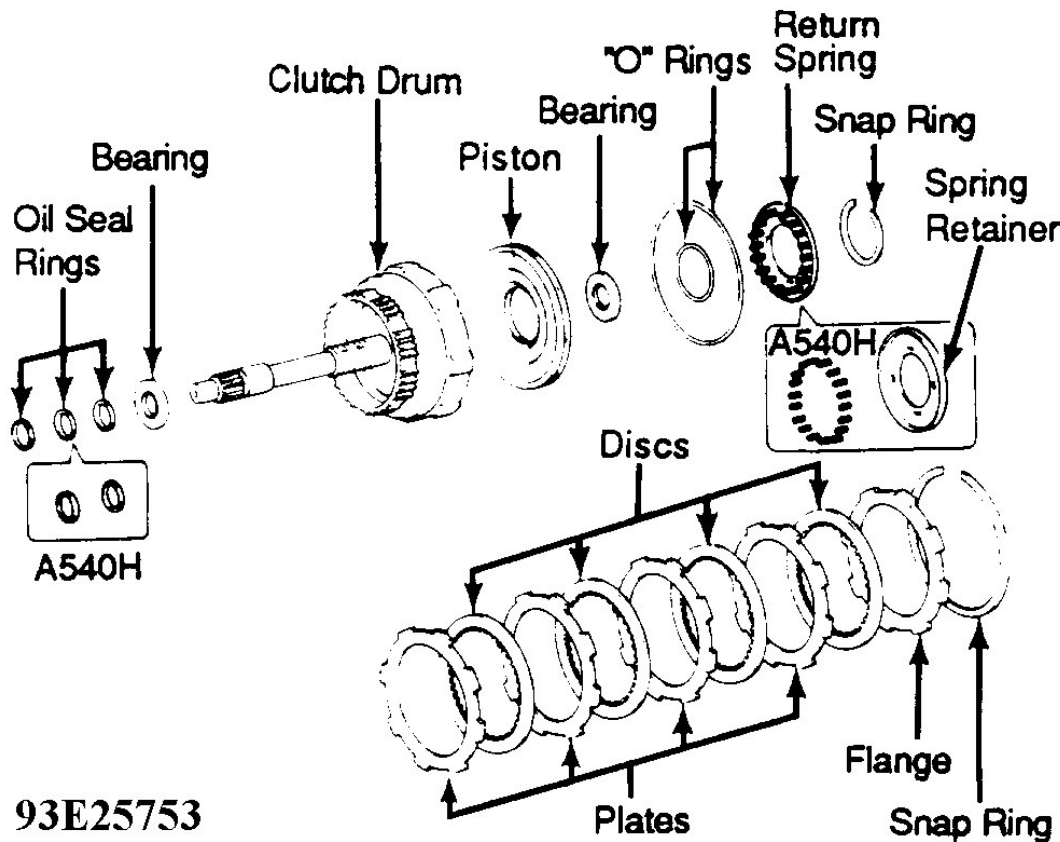


Fig. 22: Exploded View Of Forward Clutch (A-540H Shown; A-241H Similar)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE: Before assembling new pistons, soak them in ATF for at least 15 minutes.

Reassembly

1. Coat NEW "O" rings with ATF. Install "O" rings on piston. See **Fig. 22** . Press piston into drum with cup side up. Ensure "O" ring is not damaged.
2. Install return springs, retainer and snap ring in drum. Place compressor block on top of retainer. Compress unit using an arbor press. Using pliers, install snap ring in groove. Ensure end-gap of snap ring is not aligned 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. If disc, plate or flange have been replaced, check piston stroke. Measure piston stroke by applying 57-114 psi (4-8 kg/cm²) of compressed air. See **Fig. 21** .
5. Piston stroke should be .0559-.0713" (1.420-1.810 mm). If piston stroke is less than specification, replace flange. Flange is available in 2 thicknesses: .1181" (3.00 mm) or .1327" (3.370 mm).

6. To check operation of forward clutch, apply compressed air into oil passage of shaft. Ensure piston moves. If piston does not move, disassemble and inspect.

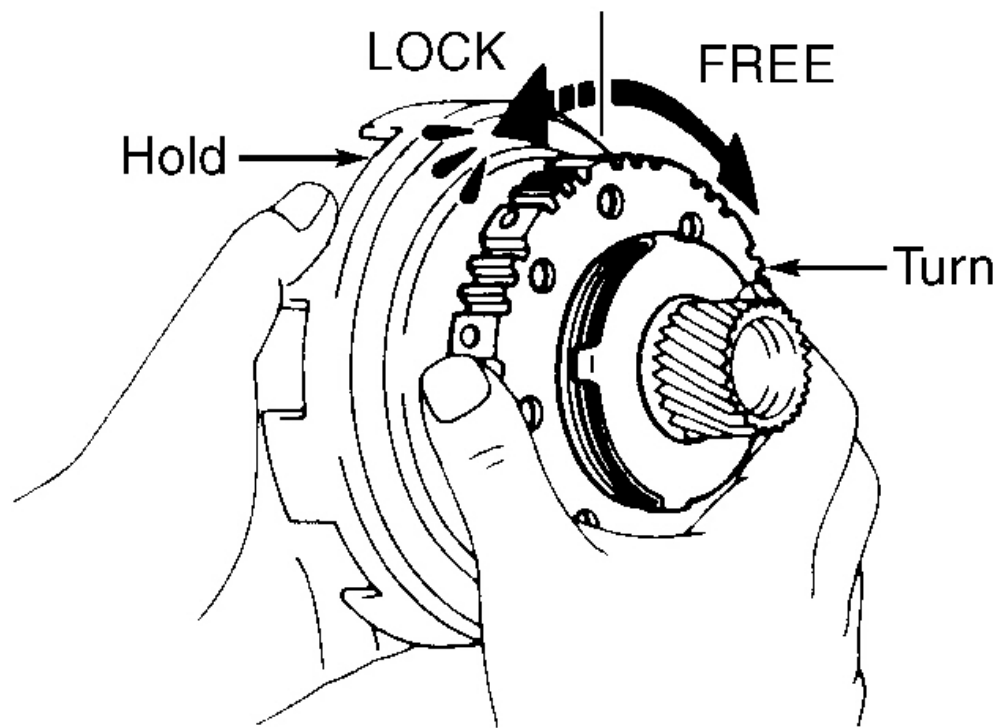
FRONT PLANETARY GEAR

Disassembly

1. Check operation of one-way clutch. Holding sun gear, turn hub. Hub should turn freely clockwise and should lock when turned counterclockwise. See **Fig. 23**.
2. Turning hub clockwise, remove one-way clutch from sun gear. Remove thrust washer from sun gear input drum. Remove snap ring. Remove sun gear input drum. See **Fig. 24**.
3. Using a screwdriver, remove ring gear snap ring. Remove ring gear flange from ring gear. Remove front planetary gear from sun gear.

Inspection

1. Measure inside diameter of sun gear. Maximum inside diameter for A-241H is .8699" (22.096 mm). If inside diameter exceeds specification, replace sun gear.
2. Measure planetary pinion gear thrust clearance. Standard clearance is .0063-.0220" (.160-.560 mm). See **Fig. 25**. Maximum clearance is .024" (.61 mm). If clearance exceeds specification, replace planetary gear assembly.



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Fig. 23: Checking One-Way Clutch Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

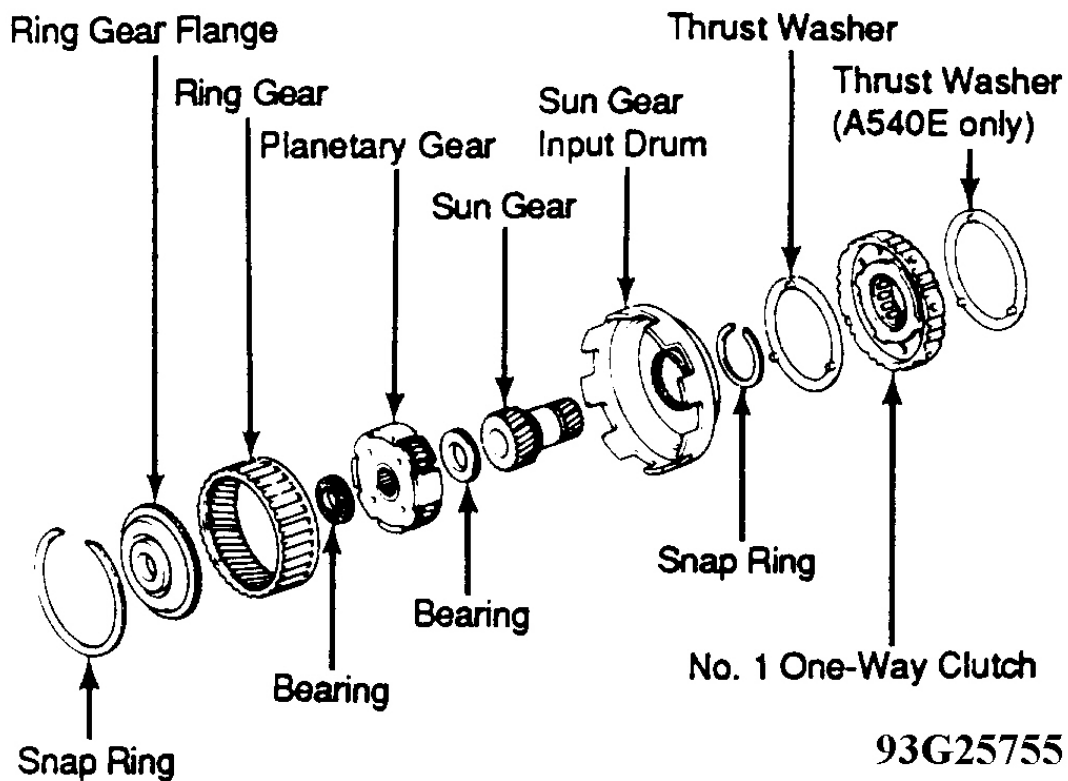


Fig. 24: Exploded View Of Front Planetary Gear
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

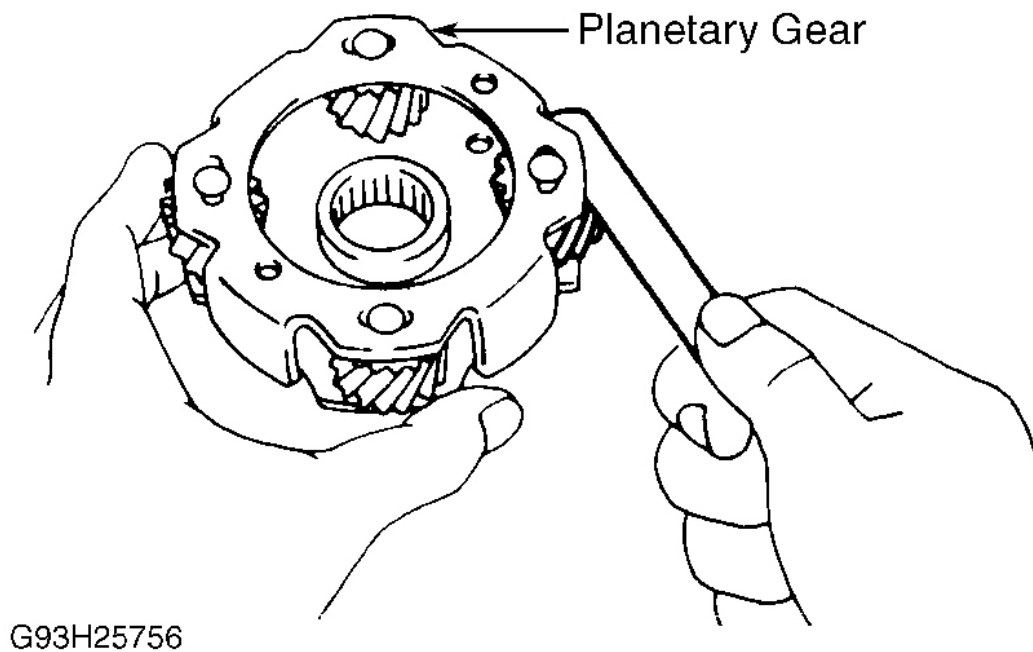


Fig. 25: Measuring Planetary Pinion Gear Thrust Clearance
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

1. Position flange into ring gear. Using a screwdriver, install snap ring. See **Fig. 24**.
2. Install shaft snap ring on sun gear. Install sun gear input drum on sun gear. Install shaft 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 one-way clutch.

REAR PLANETARY GEAR

Disassembly

1. Check operation of No. 2 one-way clutch. Hold outer race and turn hub. Hub should turn freely counterclockwise and should lock when turned clockwise. See **Fig. 26**. Separate No. 2 one-way clutch and rear planetary gear.
2. Remove thrust washers from both sides of planetary gear. Remove snap rings and retainers from both sides. Remove No. 2 one-way clutch from outer race. See **Fig. 27**.

Inspection

Measure rear planetary pinion gear thrust clearance. Standard clearance is .0080-.0200" (.200-.500 mm). Maximum clearance is .020" (.50 mm). Replace planetary gear assembly if clearance is excessive.

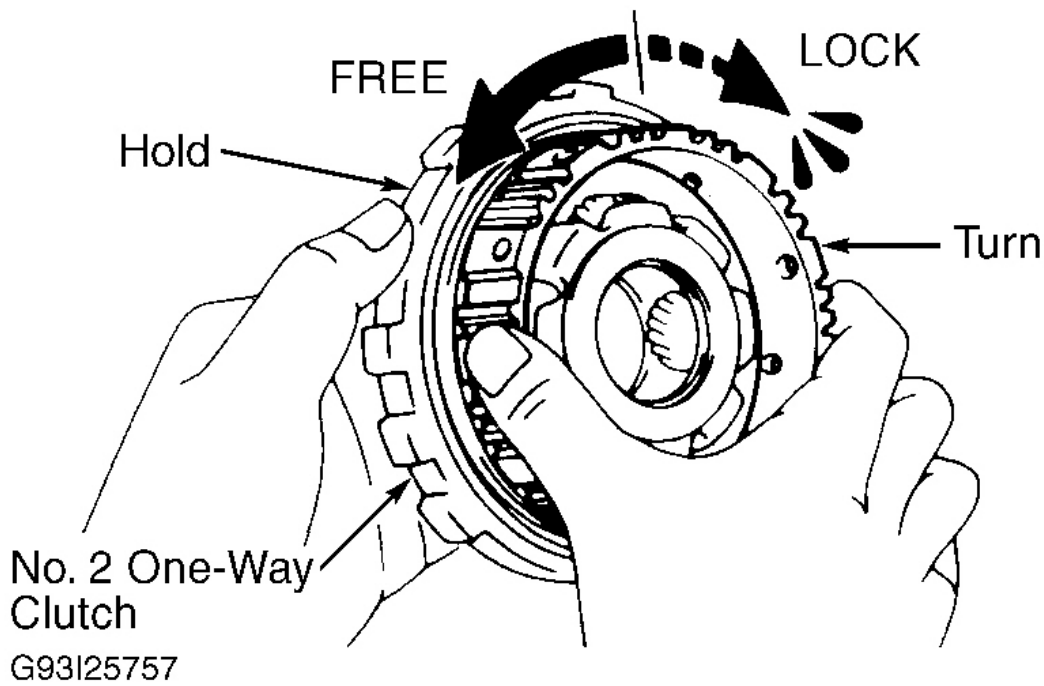


Fig. 26: Checking No. 2 One-Way Clutch Operation
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

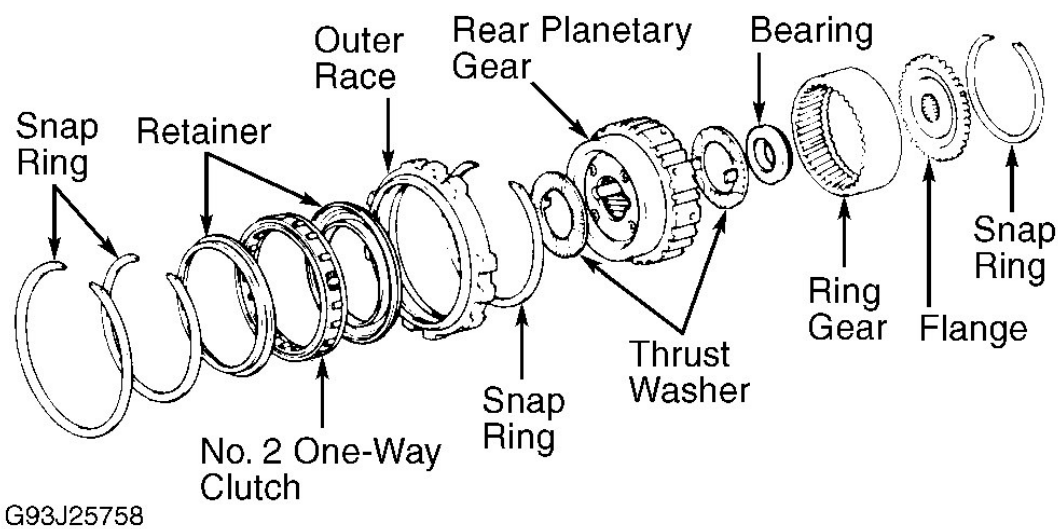


Fig. 27: Exploded View Of Rear Planetary Gear (A-540H Shown; A-241H Similar)

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

Reassembly

1. Install No. 2 one-way clutch into outer race. Face No. 2 one-way clutch flanged side toward outer race shiny side. Install retainers and snap rings to both sides of No. 2 one-way clutch.
2. Install planetary gear into No. 2 one-way clutch facing inner race of planetary gear inward from Black 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.

1ST & REVERSE BRAKE

Disassembly & Inspection

1. Remove snap ring from 1st and reverse brake. Remove flange, discs and plates. Note location of components. See **Fig. 28**.
2. Using Compressor Block (09351-32070), evenly and gradually tighten tool bolt to compress springs. See **Fig. 29**.
3. Using snap ring pliers, remove snap ring. Remove piston return spring assembly. Apply compressed air into oil passage of case to remove piston. Hold air gun away from hole. Ensure piston does not tilt during removal. Remove "O" rings from piston. Inspect discs, plates and flanges. If any disc is defaced, replace all discs.

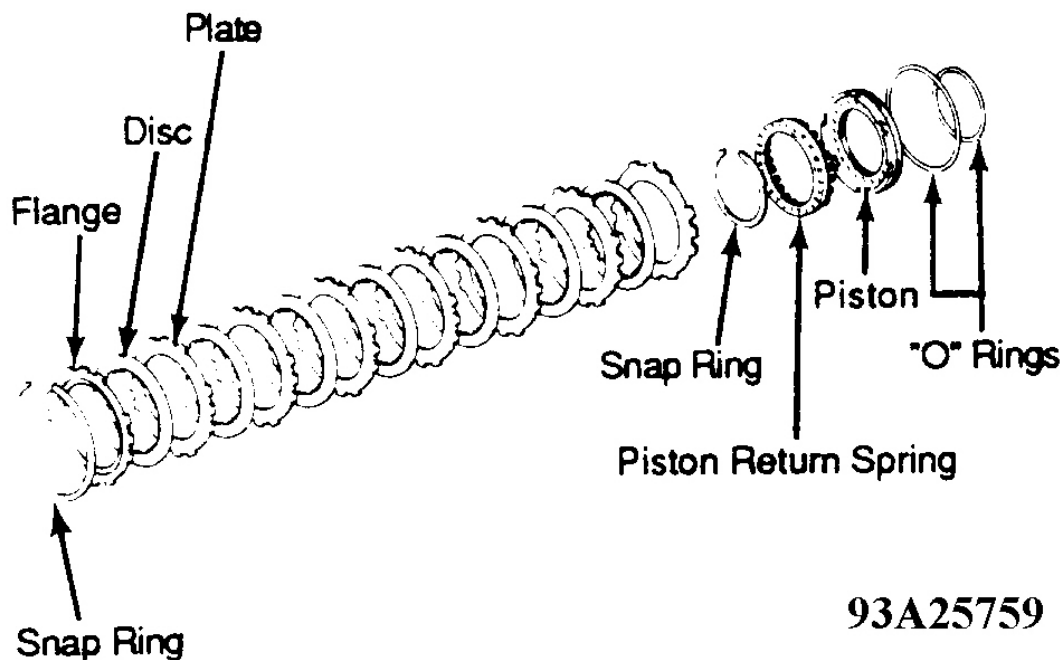


Fig. 28: Exploded View Of 1st & Reverse Brake Piston (A-540E Shown; A-241H Similar)

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

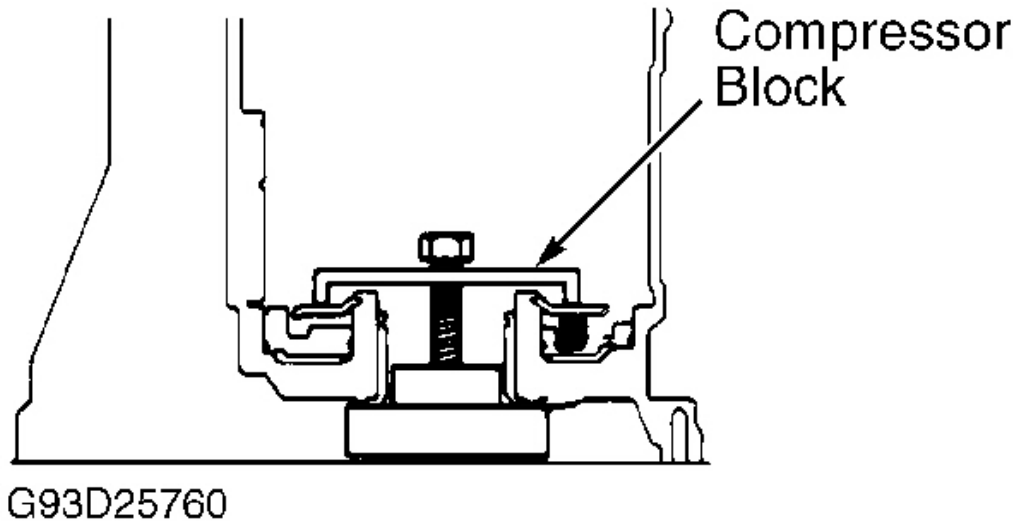


Fig. 29: Compressing Springs Of 1st & Reverse Brake Piston
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

1. Install NEW "O" rings on piston. Coat rings with ATF. Install piston in bore of case, facing spring seats upward. Place base of spring compressor under case. Install piston return springs and retainer. Set snap ring in place.
2. Compress piston return springs slowly and evenly to allow installation of snap ring. **DO NOT** overtighten bolt, as it will cause spring retainer to bend.
3. Push snap ring in place with fingers. Ensure snap ring is fully seated and centered on 3 lugs of spring retainer. Ensure end gap of ring is not aligned with spring retainer claw. Remove compressor tool. Install discs, plates and flange. See **Fig. 28** .

2ND BRAKE

Disassembly & Inspection

Apply compressed air to oil hole to remove piston. Remove 2 "O" rings from piston. Inspect discs, plates and flange. See **Fig. 30** .

Reassembly

Coat NEW "O" rings with ATF. Install 2 "O" rings on piston. Press piston into drum, being careful not to

damage "O" rings. Install discs, plates and flange.

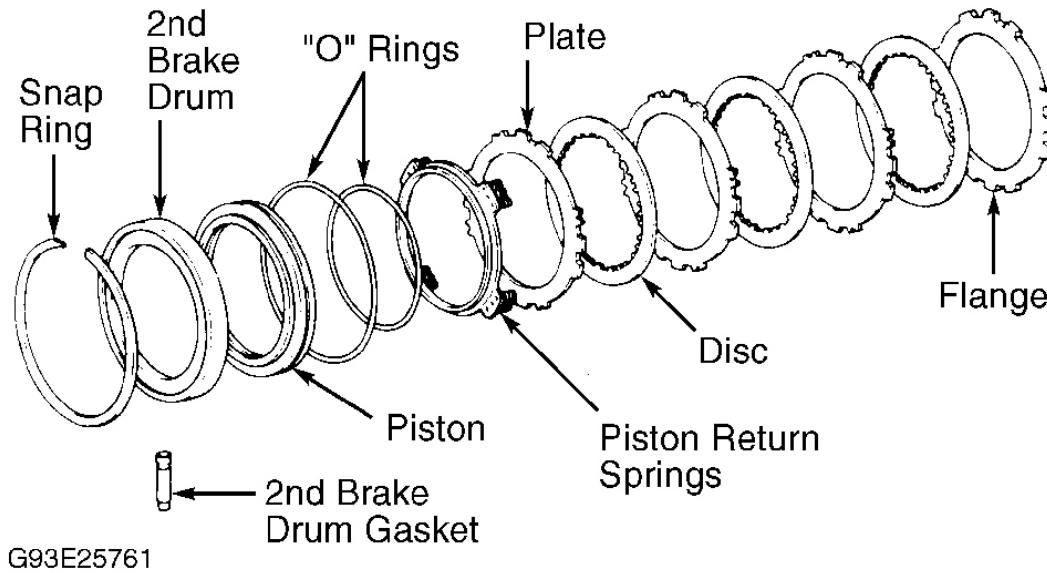


Fig. 30: Exploded View Of 2nd Brake (A-540H Shown; A-241H Similar)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2ND COAST BRAKE

Disassembly

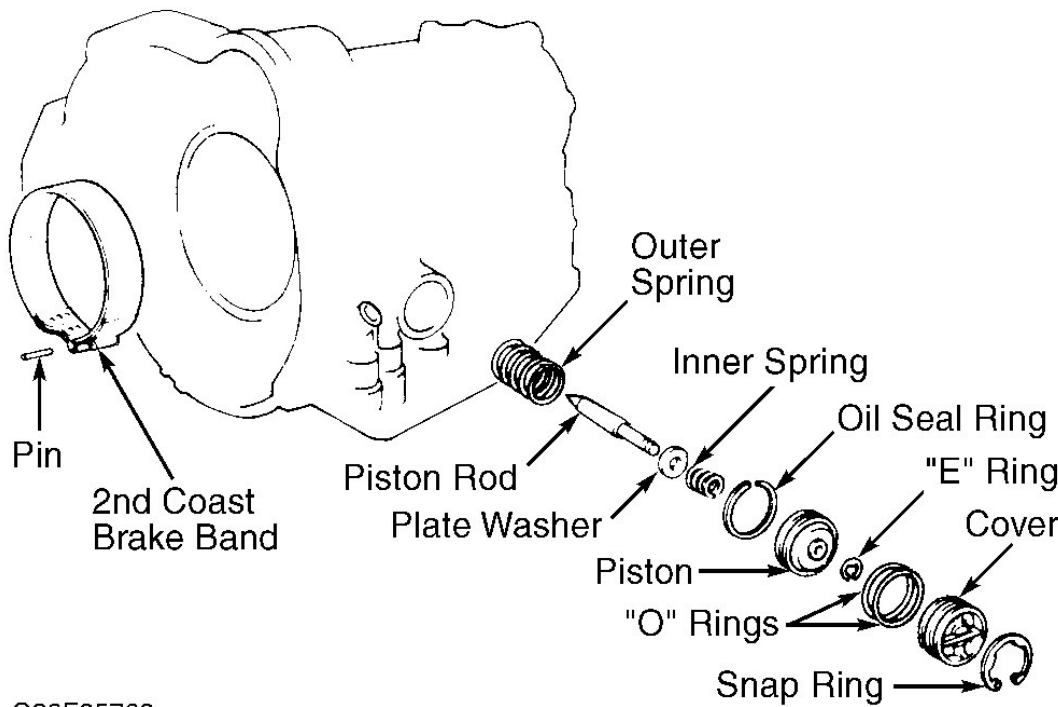
Remove oil seal ring from piston. Remove piston rod "E" ring while pushing piston with needle-nose pliers. Remove inner spring, plate washer and piston rod. See **Fig. 31**.

Inspection

Inspect brake band lining condition. If brake band is serviceable but piston stroke is not within standard value, select a new piston. Piston stroke should be .059-.118" (1.50-3.00 mm) for A-241H. Select from 2 types of piston rod. Piston rod lengths are 2.870" (72.90 mm) and 2.811" (71.40 mm) for A-241H.

Reassembly

On all models, install plate washer and inner spring to piston rod. Install "E" ring while pushing piston. Apply ATF to oil seal ring. Install oil seal ring to piston. **DO NOT** spread ring ends more than necessary for installation.



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Fig. 31: Exploded View Of 2nd Coast Brake

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

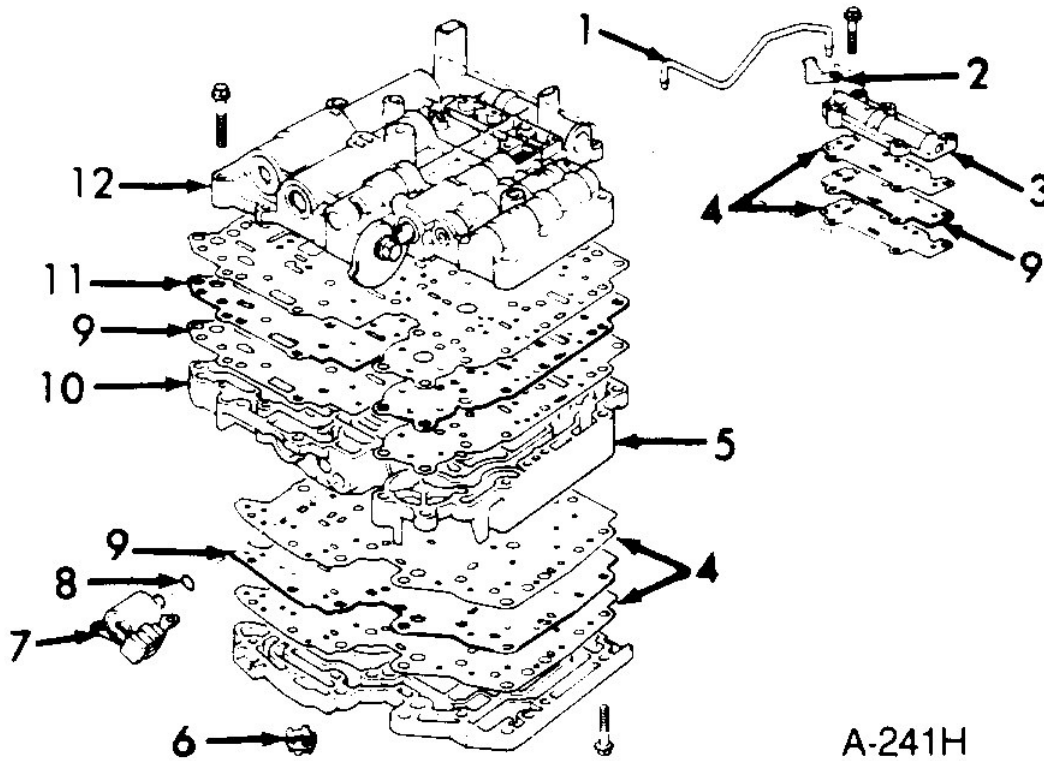
CONTROL VALVE ASSEMBLY

CAUTION: Count number of adjusting rings before disassembly of control valve assembly. Throttle pressure is changed according to number of rings. Some valve bodies DO NOT have adjusting rings. Note which step at end of plunger sleeves is in contact with valve body before disassembly. Line pressure is affected by plunger location. When disassembling control valve assembly, DO NOT damage or deform plate that overhangs valve body.

Disassembly (Control Valve Assembly)

1. On A-241H models, remove tube clamp and oil tube, No. 2 pressure regulator valve body, gasket and plate from upper valve body. See **Fig. 32**. On all models, remove solenoid(s). See **Fig. 32**. **DO NOT** use a screwdriver to pry up solenoid(s). Remove "O" ring(s) from solenoid(s).
2. On A-241H, remove lower valve body cover, gasket and plate. Remove oil strainer (if installed).
3. Remove bolts from upper valve body and cover. Note bolt length and location for reassembly reference. Remove upper valve body cover, oil strainer, gaskets and plate. On A-241H, remove lock-up relay valve pin.

4. Remove bolts from lower valve body and cover. Carefully remove lower valve body cover gaskets and plate. Note location of check balls, retainers, keys and pins in valve body.



- | | |
|---|---|
| 1. Oil Tube | 12. Upper Valve Body |
| 2. Clamp | 13. No. 1 Plate |
| 3. No. 2 Pressure
Regulator Valve Body | 14. Lock-Up Solenoid |
| 4. Gasket | 15. Check Ball |
| 5. Lower Valve Body | 16. No. 2 Plate |
| 6. Strainer | 17. Lower Valve Body Cover |
| 7. Solenoid | 18. Piston |
| 8. "O" Ring | 19. Spring |
| 9. Plate | 20. Accumulator Cylinder |
| 10. No. 2 Gasket | 21. Lock-Up Relay Valve
Sleeve Stopper |
| 11. No. 1 Gasket | 22. Upper Valve Body Cover |

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Fig. 32: Exploded View Of Valve Body Assembly

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

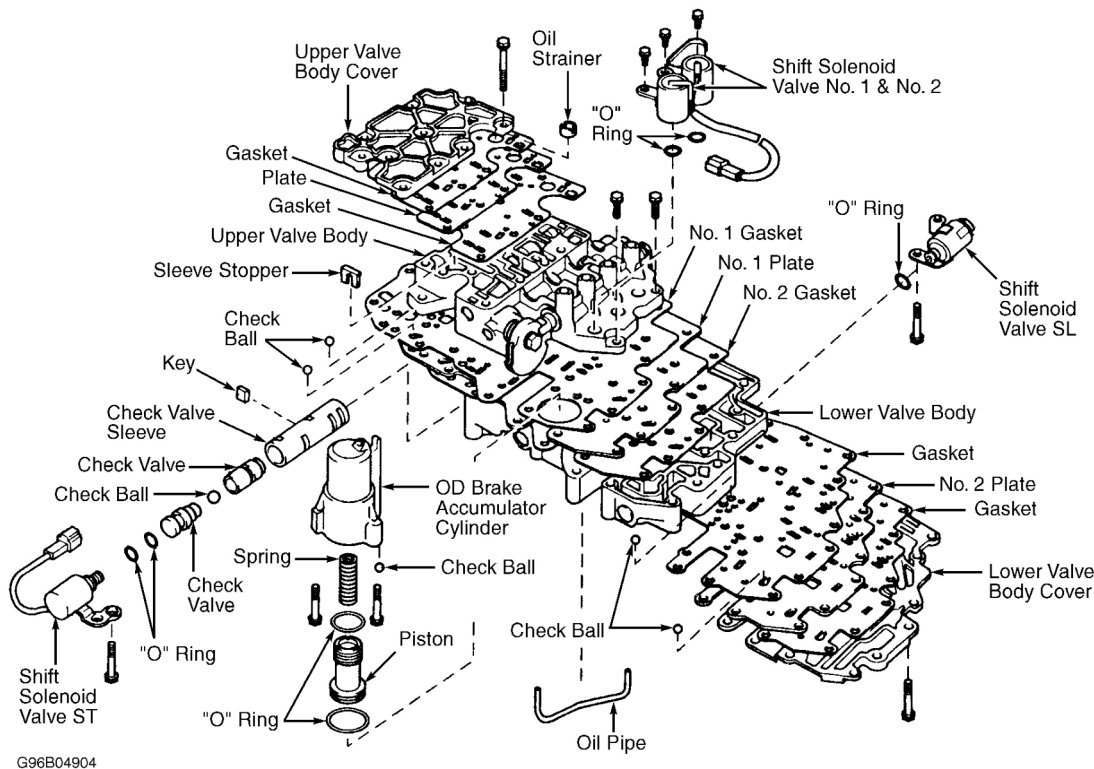


Fig. 33: Exploded View Of Valve Body Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Disassembly (Upper Valve Body A-241H)

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. 34**.
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. Remove No. 2 pressure regulator valve. Remove plug, plungers, valve and spring.

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

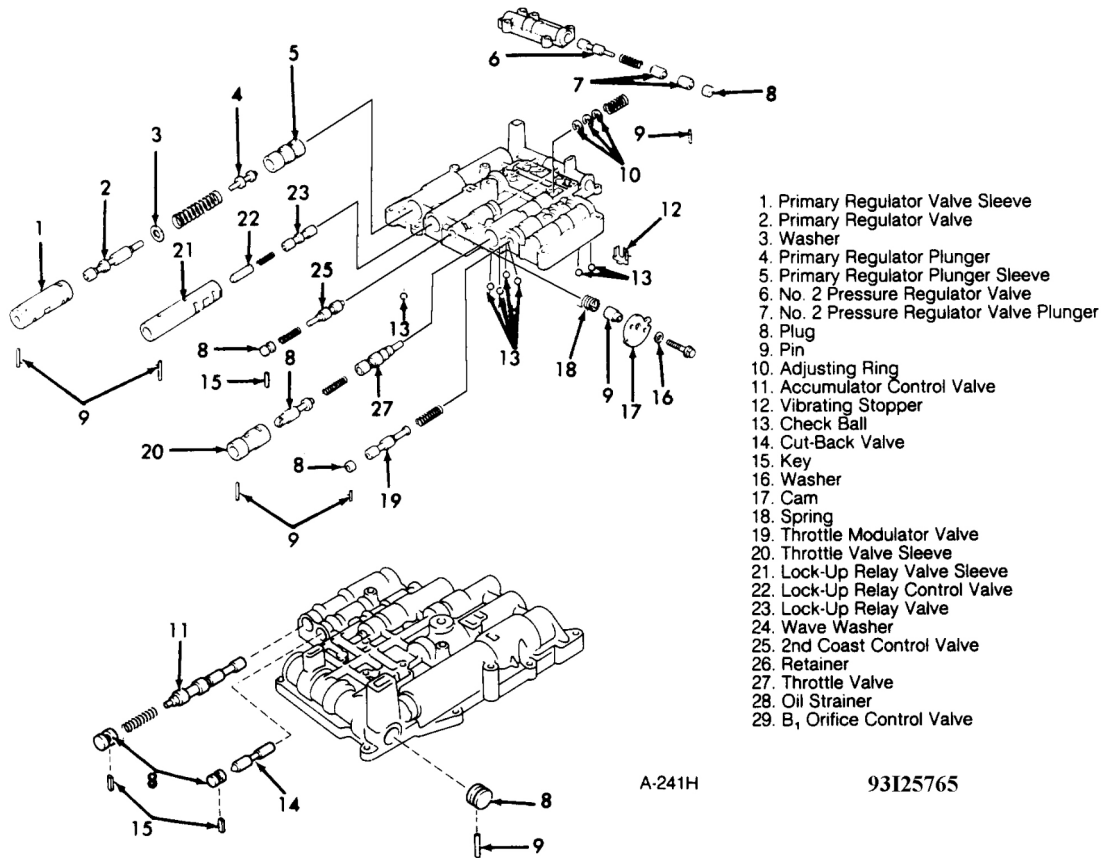


Fig. 34: Exploded View Of Upper Valve Body (View 1)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

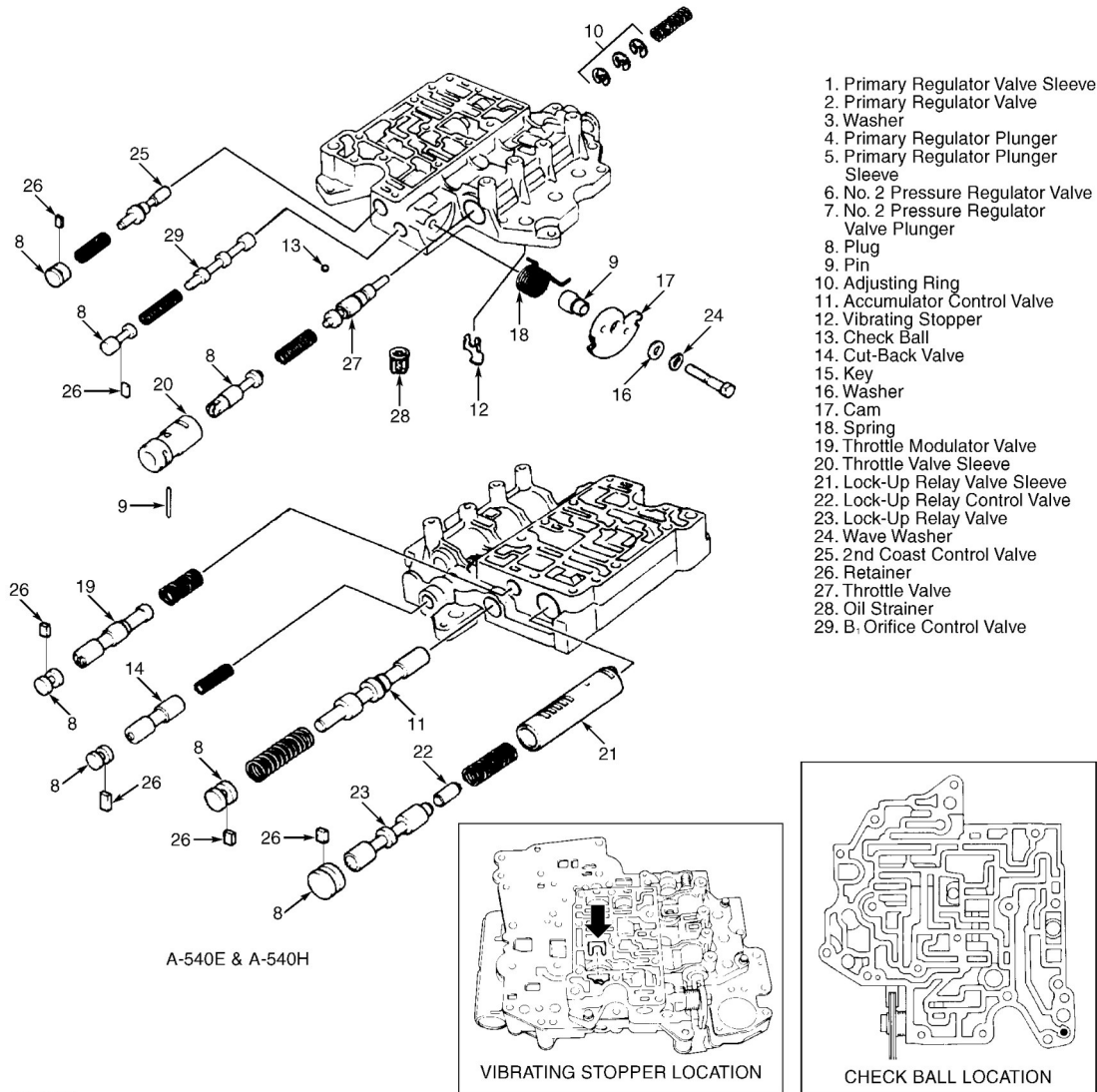


Fig. 35: Exploded View Of Upper Valve Body (View 2)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

Inspect the valve springs for damage, squareness, rust and/or collapsed coils. Measure spring free height. Replace spring if any specification is exceeded. See **UPPER VALVE BODY VALVE SPRING SPECIFICATIONS** table.

UPPER VALVE BODY VALVE SPRING SPECIFICATIONS (A-241 SERIES)

Application	Color Code	Free Length In. (mm)
Primary Regulator Valve	Purple	2.626 (66.7)
Lock-Up Relay Valve	None	.740 (18.8)
2nd Coast Modulator	Blue	1.283 (32.6)

1991 Toyota MR2

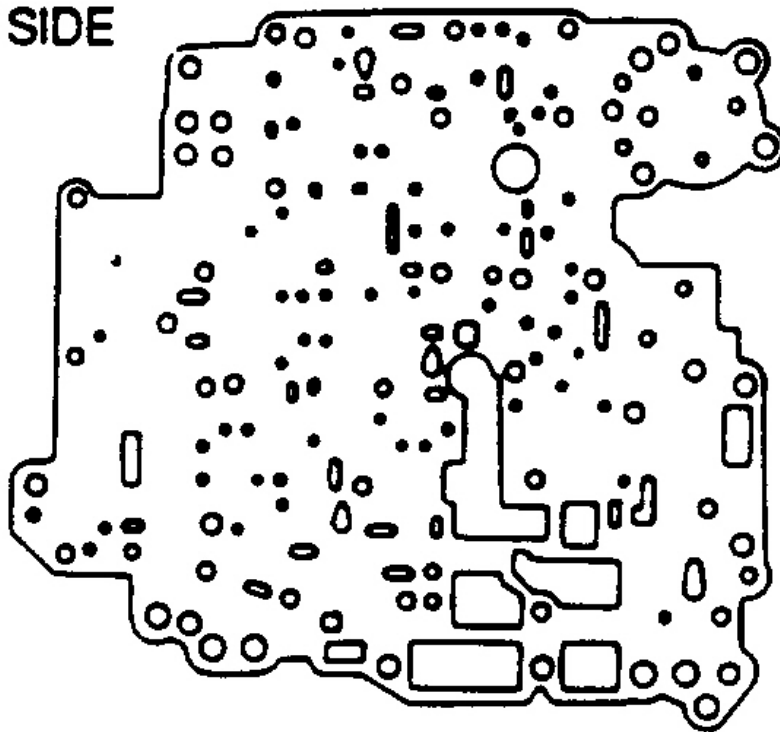
1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

Downshift Plug	Blue	1.181 (30.0)
Throttle Valve	Lt. Green	1.150 (29.2)
Throttle Modulator Valve	Green	1.177 (29.9)
Accumulator Control Valve	Yellow	1.504 (38.2)
No. 2 Pressure Regulator Valve	Red	1.157 (29.4)

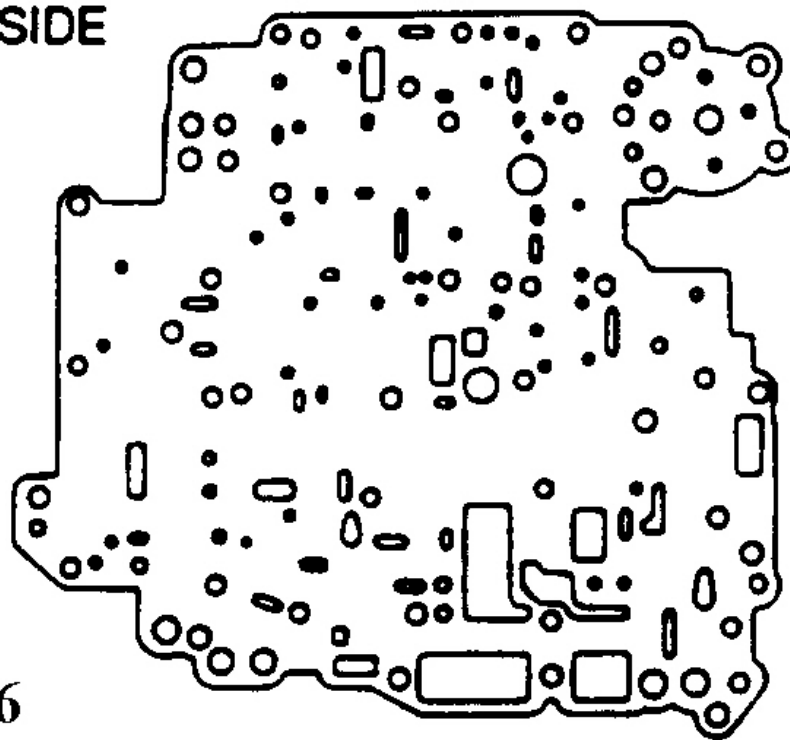
Reassembly (Upper Valve Body A-241 Series)

1. Coat all components with ATF. To reassemble, reverse disassembly procedure. 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. 36** .

LOWER SIDE



UPPER SIDE



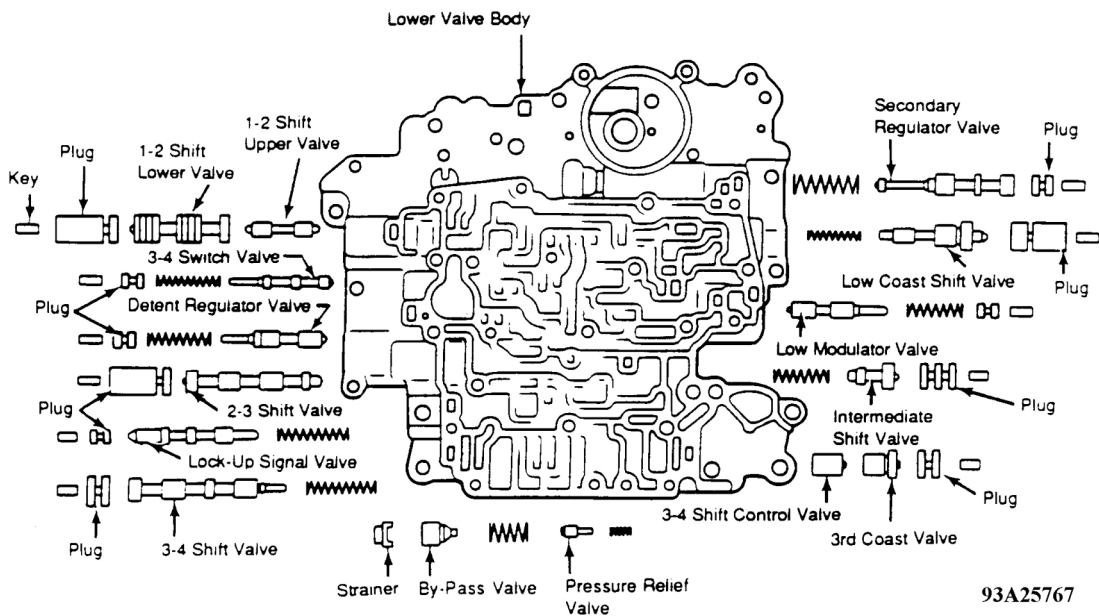
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Fig. 36: Valve Body Gasket Identification

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

Disassembly (Lower Valve Body A-241 Series)

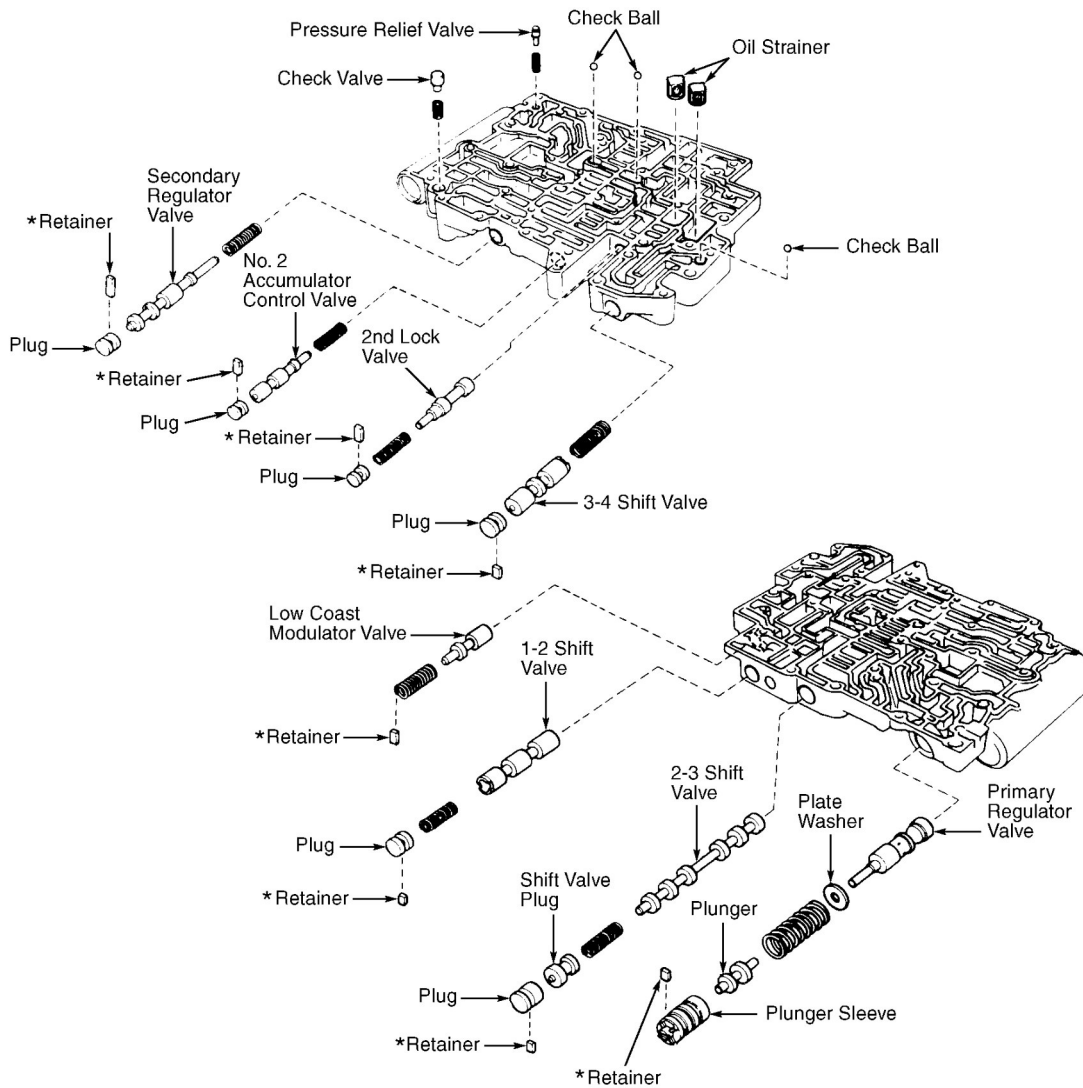
1. To disassemble lower valve body, remove lower valve body plate and gaskets. Remove by-pass valve and spring. Remove pressure relief valve, spring and strainer. See **Fig. 37**.
2. If equipped, remove 3-4 shift valve and spring. Remove key, plug, 3-4 shift control valve and 3rd coast shift valve. Remove low coast shift valve. Remove 1-2 shift lower and upper valve.
3. Remove secondary regulator valve, 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.

**Fig. 37: Exploded View Of Lower Valve Body (A-241H)**

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

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul



* NOTE: The line pressure changes according to the part of the plunger sleeve which comes into contact with the retainer. When reassembling the valve body, position the retainer in the same position.

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Fig. 38: Exploded View Of Lower Valve Body (Viewed From Both Ends)

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

Inspection

Inspect the valve springs for damage, squareness, rust and/or distorted coils. Measure the springs for free height. Replace springs if specification is exceeded. See **LOWER VALVE BODY VALVE SPRING SPECIFICATIONS** table.

LOWER VALVE BODY VALVE SPRING SPECIFICATIONS (A-241H)

Application	Color Code	Free Length In. (mm)
Secondary Regulator Valve	Blue	1.079 (27.4)

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

1-2 Shift Valve	Yellow	1.071 (27.2)
2-3 Shift Valve	None	1.091 (27.7)
3-4 Shift Valve	None	1.374 (34.9)
3-4 Switch Valve	None	1.217 (30.9)
Low Modulator Valve	None	1.150 (29.2)
Cooler By-Pass Valve	Yellow	.720 (18.3)
Pressure Relief Valve	None	.441 (11.2)
Lock-Up Signal Valve	White	1.630 (41.4)
Detent Regulator Valve	Brown	1.260 (32.0)

Reassembly (Lower Valve Body A-241 Series)

1. Coat all components with ATF. To reassemble, reverse disassembly procedure. 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.

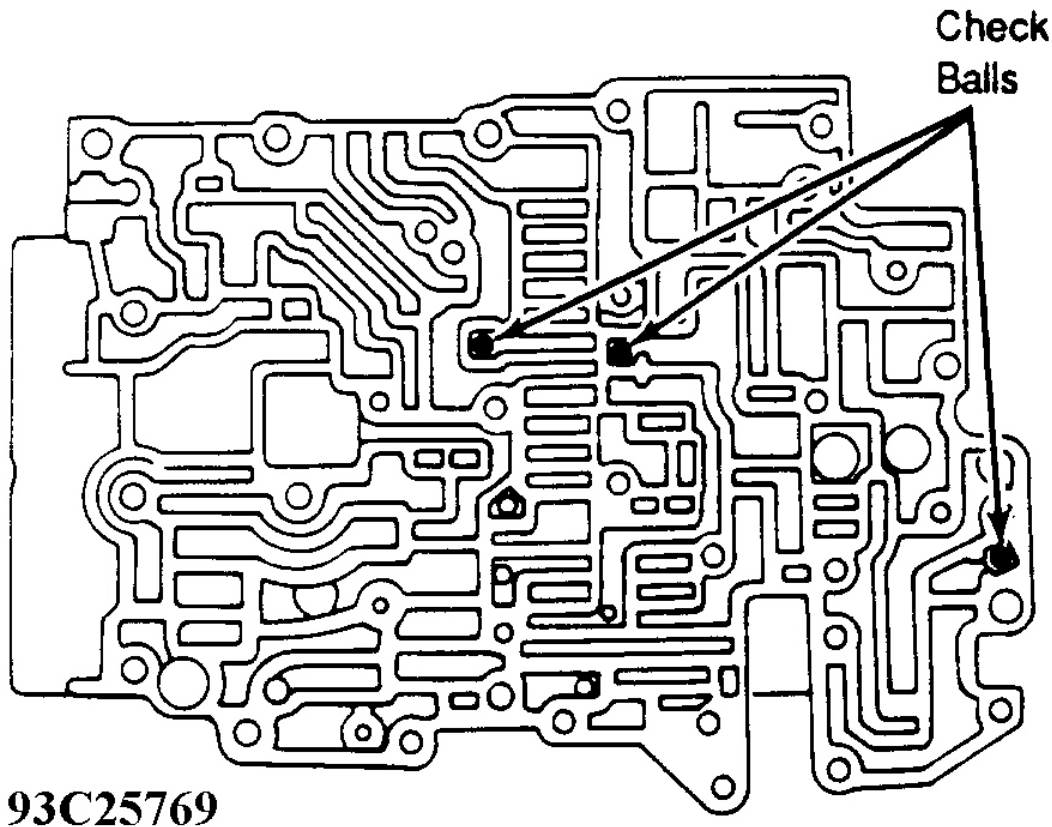


Fig. 39: Locating Lower Valve Body Check Balls
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly (Control Valve Assembly A-241 Series)

1. Position proper gasket and plate on lower valve body. See **Fig. 36**.
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. 40**.
4. Install and finger tighten bolts in upper valve body. Ensure correct length bolts are installed in original positions. See **Fig. 41**. Install strainer, new gaskets and plate.
5. Install lower valve body cover bolts. See **Fig. 42**. Tighten upper and lower valve body bolts to 56 INCH lbs. (6.4 N.m).

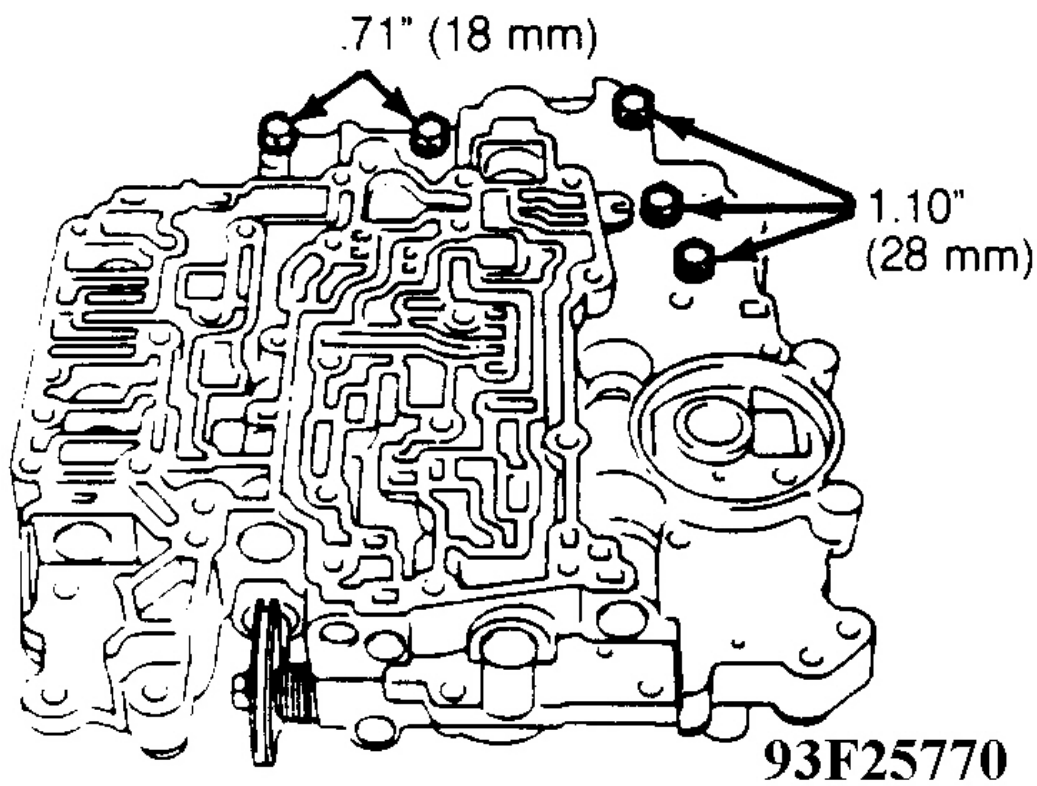


Fig. 40: Installing Lower Valve Body Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

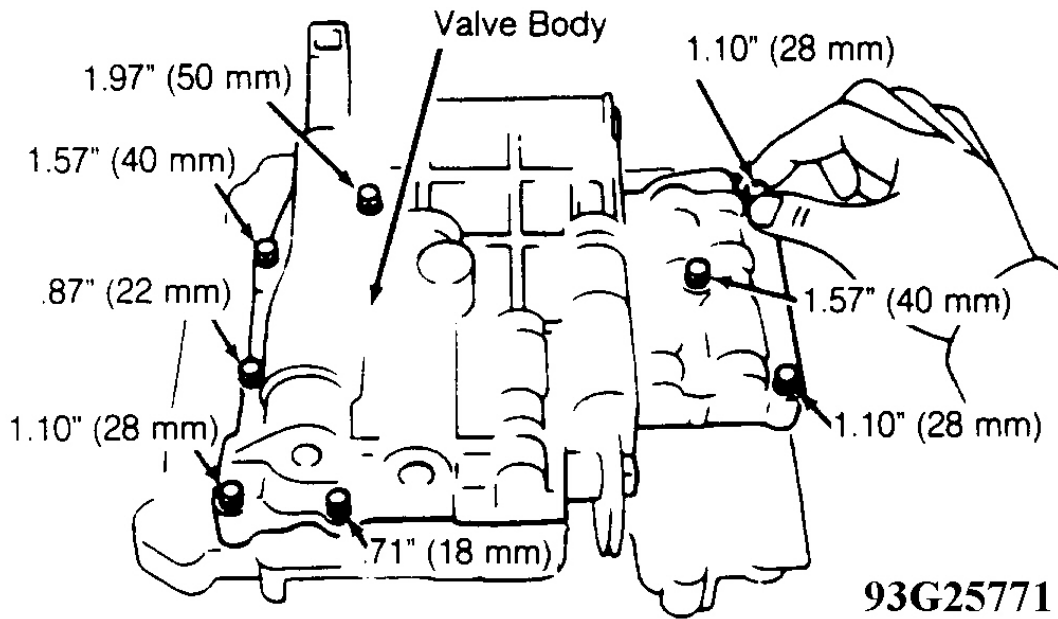


Fig. 41: Installing Upper Valve Body & Cover Bolts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

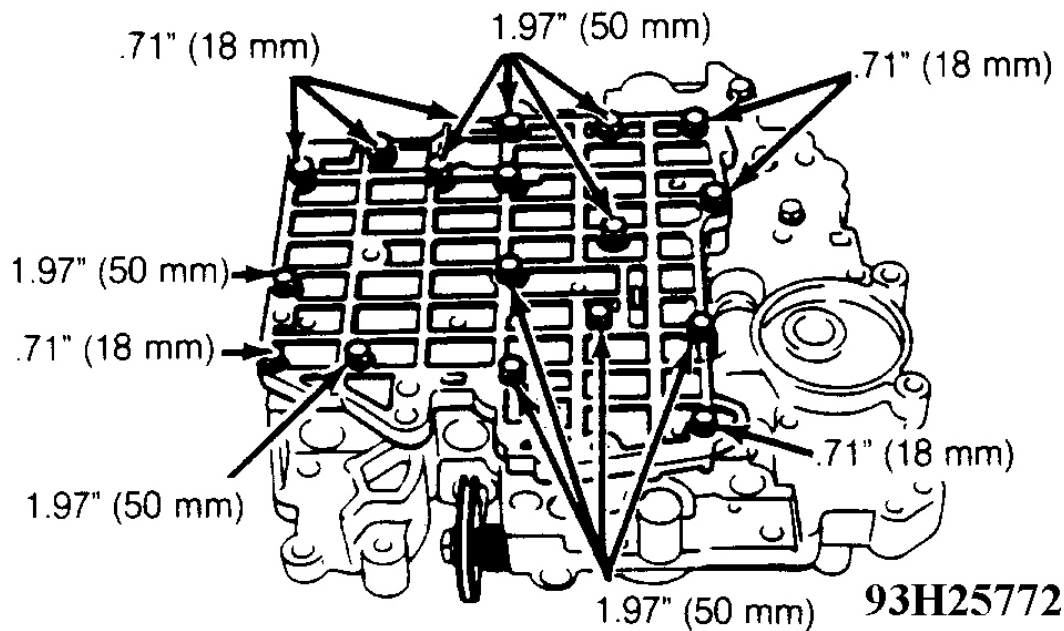


Fig. 42: Installing Lower Valve Body Cover Bolts

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

DIFFERENTIAL ASSEMBLY (A-241/243 SERIES)

Disassembly

1. Use a dial indicator to measure differential end play. End play should be .0071-.0323" (.180-.820 mm). See **Fig. 43** . Remove 2 oil seal rings from ring gear mounting right case. Remove snap ring and speedometer drive gear.
2. Place match marks on ring gear mounting left case and right case. Remove bolts and left case. Place match marks on ring gear and left case. Place left case on A/T Tool Set (09350-32014). Using a plastic hammer, remove ring gear from left case.
3. Remove No. 2 thrust washer. Remove front differential left case from ring gear mounting right case.
4. Using a Torx wrench, remove screws from left case. Separate left and right cases. **DO NOT** scratch contact surface of needle bearing.
5. Remove the following parts from front differential cases: on A-241H, remove differential pinion shaft and shaft pin. On both models, remove 2 differential side gears and 2 side thrust washers.
6. Remove No. 1 thrust washer. Check operation of clutch pistons. Plug one hole in right case with your hand. Apply compressed air into other hole and confirm pistons move. See **Fig. 44** .

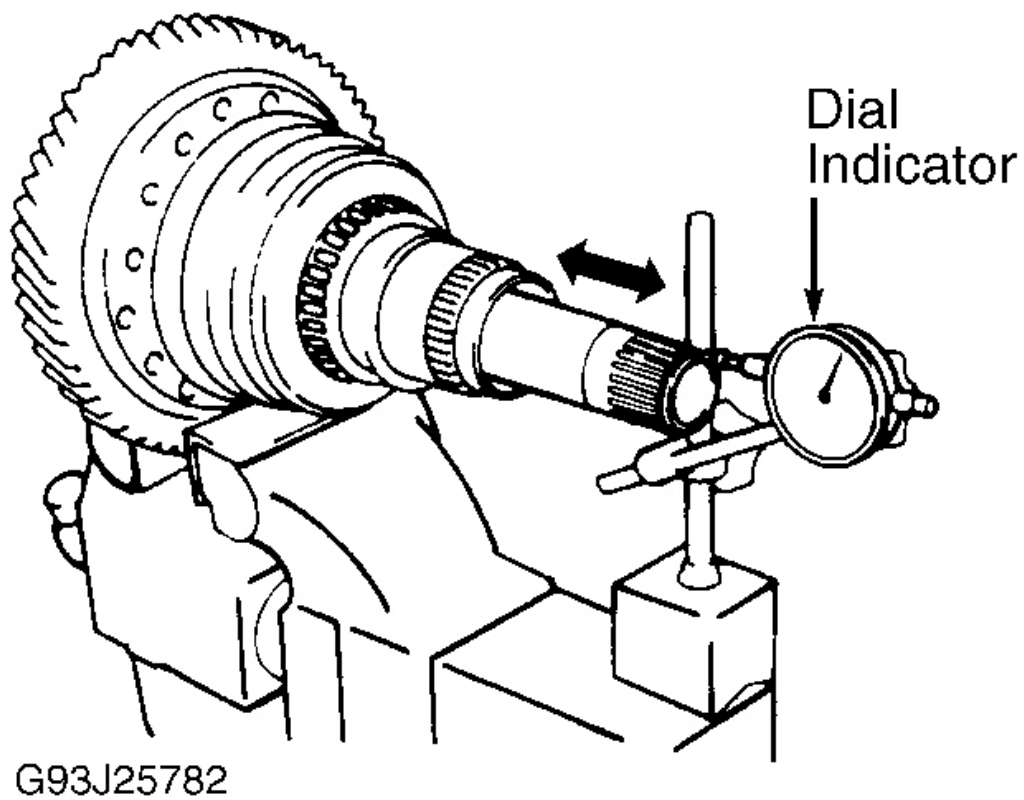


Fig. 43: Checking Differential End Play
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

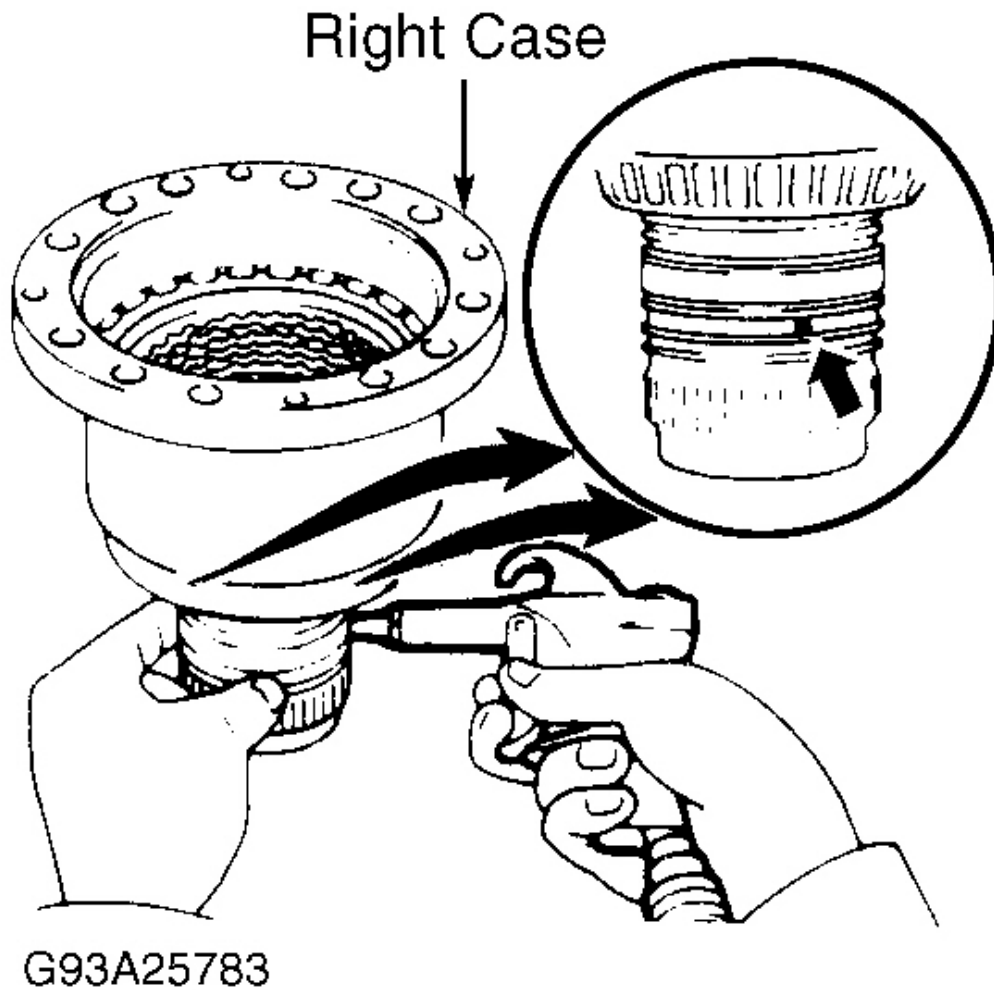


Fig. 44: Checking Operation Of Differential Clutch Pistons

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

7. Remove hydraulic multi-plate clutch discs and plates. Remove snap ring. Remove flange, discs and plates. Using Spring Compressor (09350-32014), compress return spring. Remove snap ring. Apply compressed air to right case hole. Remove No. 1 piston. Remove "O" ring from No. 1 piston. Using small screwdriver, remove reaction sleeve and No. 2 piston. Remove 3 "O" rings from reaction sleeve and No. 2 piston.
8. Using Bearing Remover and Attachment (09950-00020, 09950-00030), remove ring gear mounting left case bearing. Using A/T Tool Set (09350-32014) and arbor press, install ring gear mounting left case bearing.
9. 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 arbor press, remove bearing inner race. Using Bearing Replacer (09316-60010) and arbor press, install new ring gear mounting right case bearing.

10. Use hammer and brass bar to drive out inner race and plate from left bearing retainer. Place plate into left bearing retainer. Use A/T Tool Set (09350-32014) and arbor press to install outer race and plate or shim.

Reassembly

1. Coat 4 "O" rings with ATF. Install "O" rings on reaction sleeve and pistons. Install No. 1 piston, No. 2 piston and reaction sleeve to ring gear mounting right case.
2. Place return spring on piston. Install A/T Tool Set (09350-32014) on piston return spring retainer, compress spring with arbor press. Install snap ring.
3. On A-241H, 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 downward. Install snap ring. Check operation of clutch pistons. Plug one hole with your hand. Apply compressed air into other hole. Ensure pistons move. Install No. 1 thrust washer.
4. On A-241H, install following parts in front differential left case: side gear thrust washer, side gear, 2 differential pinion gears, 2 pinion gear thrust washers, pinion shaft and pinion shaft pin. Use a dial indicator to measure backlash of one pinion gear while holding side gear toward case. See **Fig. 45** . Backlash should be .0020-.0079" (.050-.200 mm). If backlash exceeds specification, install thrust washers of different thickness. **DO NOT** overtighten vise.
5. Perform same procedure described in step 4 for front differential right case. See **Fig. 45** .

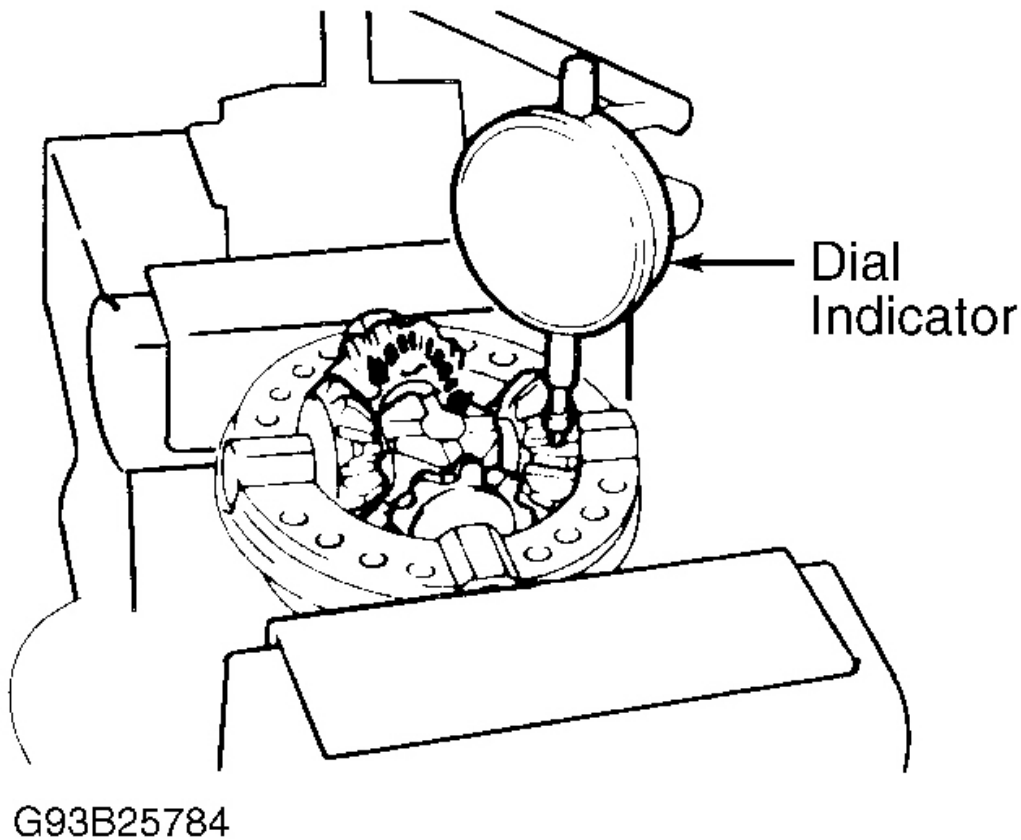


Fig. 45: Measuring Front Differential Side Gear Backlash
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. Install front differential left case to right case. Align match marks on left and right cases. Tighten Torx screws to 25 ft. lbs. (33 N.m). Install front differential case to ring gear mounting right case. Align flukes of discs in hydraulic multi-plate clutch. Install No. 2 washer.
7. 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 match marks on ring gear mounting left case and ring gear. Install ring gear and mounting left case on mounting right case. Install 12 bolts. Align match marks on ring gear mounting left and right cases. Tighten bolts to 91 ft. lbs. (124 N.m).
8. Ensure front differential turns smoothly. Place speedometer drive gear on ring gear mounting case. Install snap ring. Install oil seal rings to ring gear mounting right case. Install ring gear mounting case sleeve.

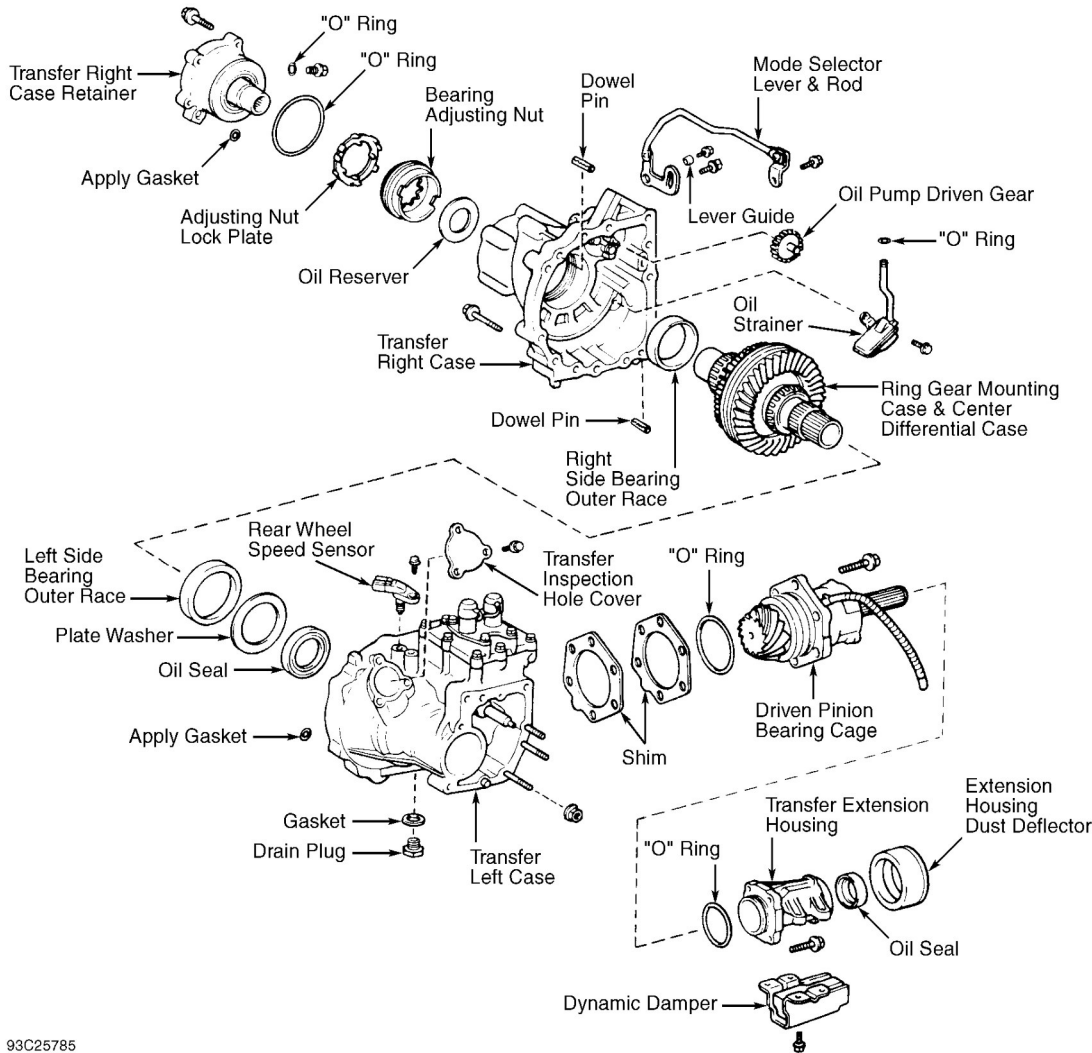
TRANSFER CASE (A-241H)

Disassembly (Transfer Case)

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

1. Remove mode select lever and rod.
2. Remove dust deflector from extension housing. Remove 4 bolts. Remove "O" ring from housing. Using Seal Puller (09308-00010), remove extension housing oil seal.
3. Remove 5 bolts from transfer right case retainer. Using plastic hammer, remove right case retainer. Remove "O" ring and apply gasket from retainer. Remove transfer inspection hole cover.
4. Using Lock Nut Wrench (09326-20011) and spring tension gauge, measure driven pinion preload and backlash between driven pinion and ring gear. Driven pinion preload at starting point is 2.0-3.1 lbs. (.9-1.4 kg). Using lock nut wrench and spring gauge, measure total preload. Total preload at starting point is 1.1-2.0 lbs. (.5-.9 kg). Add driven pinion preload.
5. Using dial indicator, measure ring gear backlash. Backlash should be between .0051-.0071" (.130-.180 mm).
6. Remove driven pinion bearing cage. Remove "O" ring and shim from bearing cage. Remove transfer right case. Remove center differential assembly. Remove apply gasket from left case.
7. Remove oil pump driven gear and strainer. Remove "O" ring from oil pump strainer. Remove adjusting nut lock plate. Remove "O" ring from bolt.
8. Using Adjusting Nut Wrench (09318-12010), remove adjusting nut and oil reserver from right case. Remove outer race with a brass bar and hammer. Using Oil Seal Puller (09308-00010), remove outer race and plate washer. Remove oil seal.



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Fig. 46: Transfer Case (A-540H Shown; A-241H Is Similar)

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. See **Fig. 47**.
3. On A-241H, use low air pressure to remove oil plug and oil strainer. Remove "O" ring from oil plug.

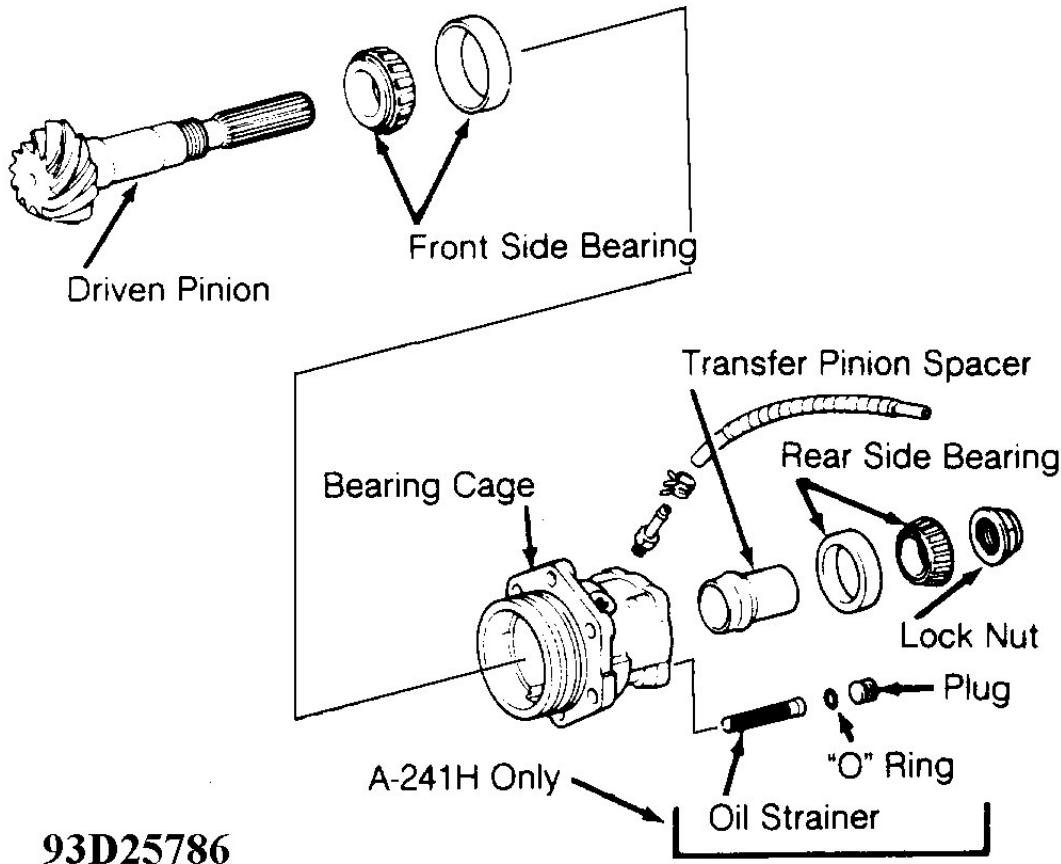


Fig. 47: Exploded View Of Transfer Driven Pinion Bearing Cage (A-241H Shown; A-540H Is Similar)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

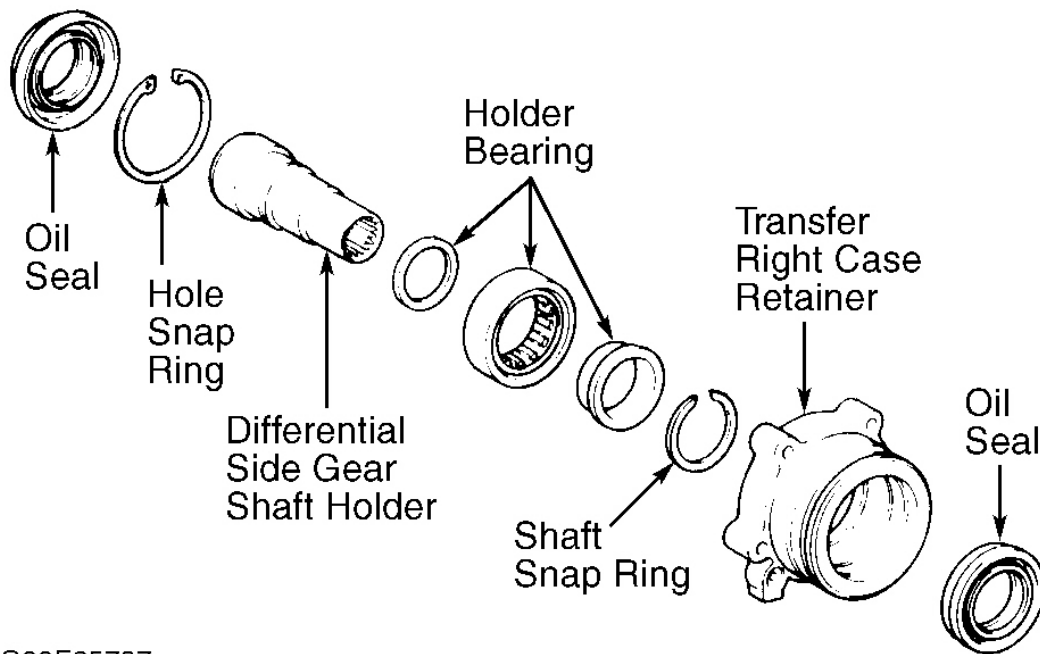
Reassembly

1. On A-241H, apply ATF to NEW oil plug "O" ring. Install "O" ring on oil plug. Install oil strainer and plug. On both models, use Bearing Tool (09608-35014) to install front side bearing outer race to bearing cage. Using Bearing Replacer (09608-30022), install rear side bearing outer race. Using Bearing Replacer (09506-35010), install front side bearing. Install NEW spacer to driven pinion.
2. 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 specification, replace bearing spacer. If preload is less than specification, retighten nut 5-10 degrees at a time until specified preload is reached.
5. If maximum torque is exceeded by retightening nut, replace bearing spacer. Repeat preload procedure.

DO NOT back off pinion nut to reduce preload. Maximum nut torque is 174 ft. lbs. (235 N.m). Stake lock nut.

Disassembly (Transfer Right Case Retainer)

1. Using a screwdriver, remove oil seal. Remove snap ring. Remove side gear shaft holder with a plastic hammer.
2. Remove snap ring. Using an arbor press, remove holder bearing. Remove oil seal. See **Fig. 48**.



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Fig. 48: Exploded View Of Transfer Right Case Retainer
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

1. Using Bearing Replacer (09226-10010) and an arbor press, install holder bearing. Install snap ring.
2. Install side gear shaft holder. Install snap ring. Coat oil seal lip with grease. Using a 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)

1. Check oil pump operation. Oil pump should turn smoothly with oil pump driven gear.
2. Remove oil pump driven gear stopper. Remove oil pump cover, drive rotor and driven rotor. Remove relief valve and spring. On A-241H, remove level gauge guide plate. See **Fig. 49**.

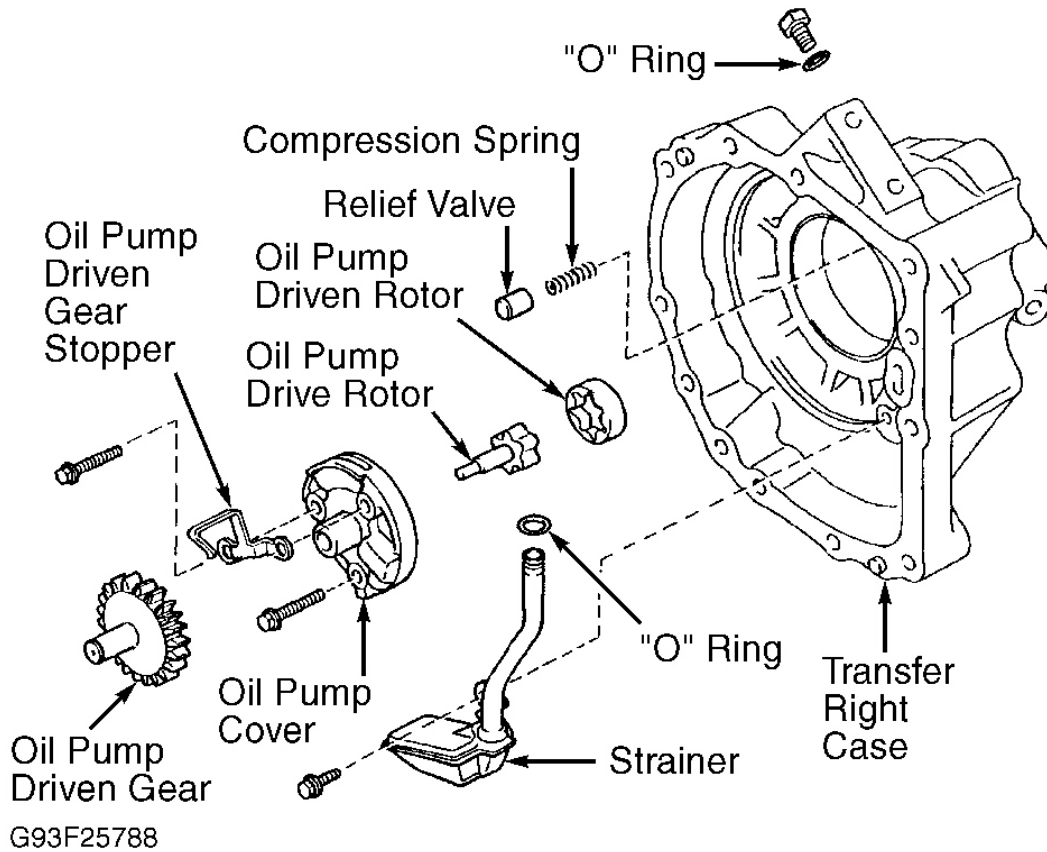


Fig. 49: Exploded View Of Transfer Right Case
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

1. On A-241H, install level gauge guide plate. Tighten bolt to 84 INCH lbs. (10 N.m). On both models, install relief valve and spring. Install oil pump drive rotor and driven rotor.
2. Install oil pump cover and driven gear stopper. On A-241H, tighten 3 bolts to 84 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 match marks on differential left and right case. Remove 12 bolts. Remove differential left case upward. See **Fig. 50**.
2. Place match marks on differential left case and ring gear. Using a plastic hammer, tap out ring gear. Remove "O" ring from case. Using Bearing Remover (09950-00020) and an arbor press, remove left case bearing.
3. Remove thrust washer. Remove center differential case assembly. Remove shaft snap rings. Remove spacer. Remove following parts from case: 4 pinion shafts, pinion shaft holder, 4 differential pinions, 4

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

pinion thrust washers, differential side left gear and side gear thrust washer.

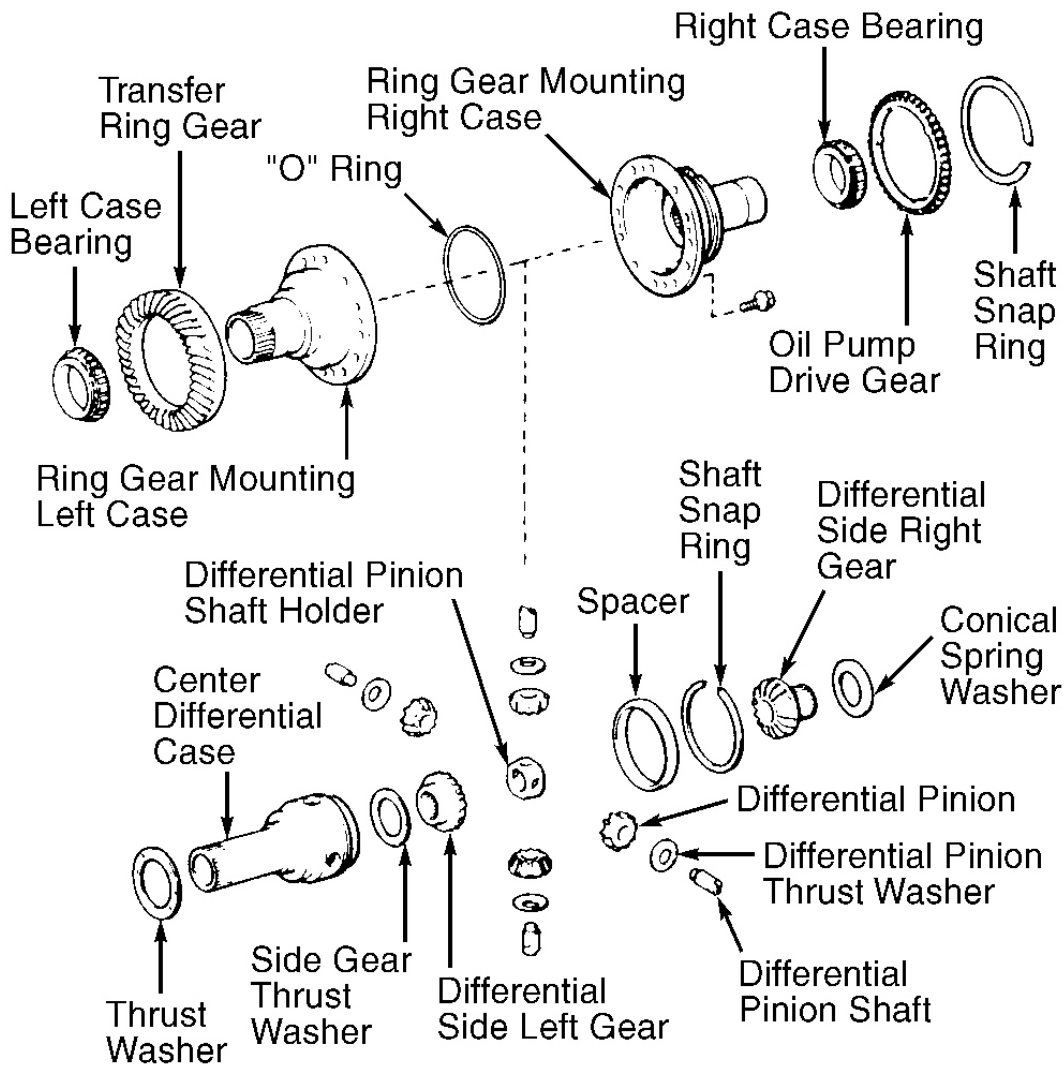
4. Remove differential side right gear and conical spring washer. Note direction of conical spring washer for reassembly reference. Using bearing puller and an arbor press, remove right case bearing.

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. Using a dial indicator, measure side gear backlash while holding one pinion toward case. Backlash on A-241H is .0024-.0087" (.060-.220 mm). If backlash exceeds specification, install the correct thrust washer on the side gears. Refer to the **SIDE GEAR THRUST WASHER SPECIFICATIONS** table Also, see **Fig. 52** .
4. Install differential side right gear. **DO NOT** install conical spring washer. Install center differential case. Install thrust washer. Align match marks on left and right cases. Install 12 bolts. Tighten to 72 ft. lbs. (97 N.m). **DO NOT** install "O" ring. Using a caliper, measure conical spring washer. Measure thrust clearance of center differential case while holding ring gear mounting case. See **Fig. 51** and **Fig. 52** .
5. 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.
6. Install center differential case. Install correct thrust washer. Install new "O" ring on left case. Align match marks on right and left case. Install 12 bolts. Tighten to 72 ft. lbs. (97 N.m). Install oil pump drive gear. Install shaft snap ring.

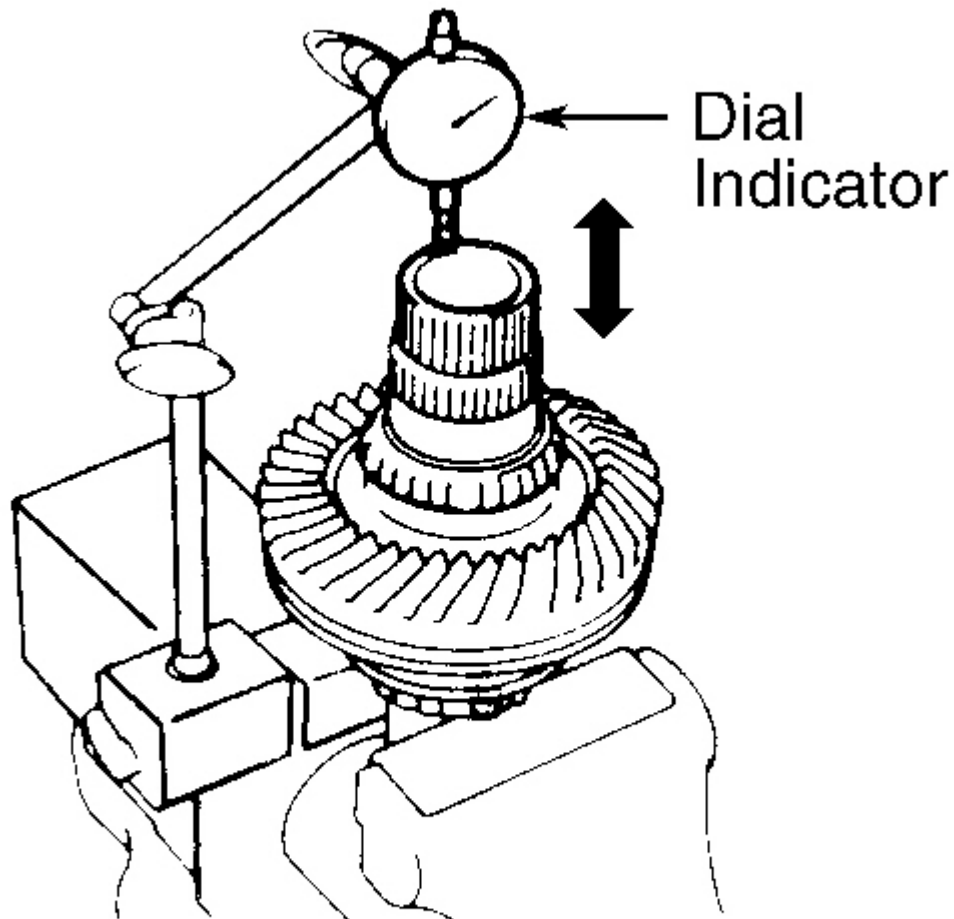
SIDE GEAR THRUST WASHER SPECIFICATIONS

ID Mark	Thickness: In. (mm)
None	.0315 (0.800)
None	.0354 (0.900)
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)



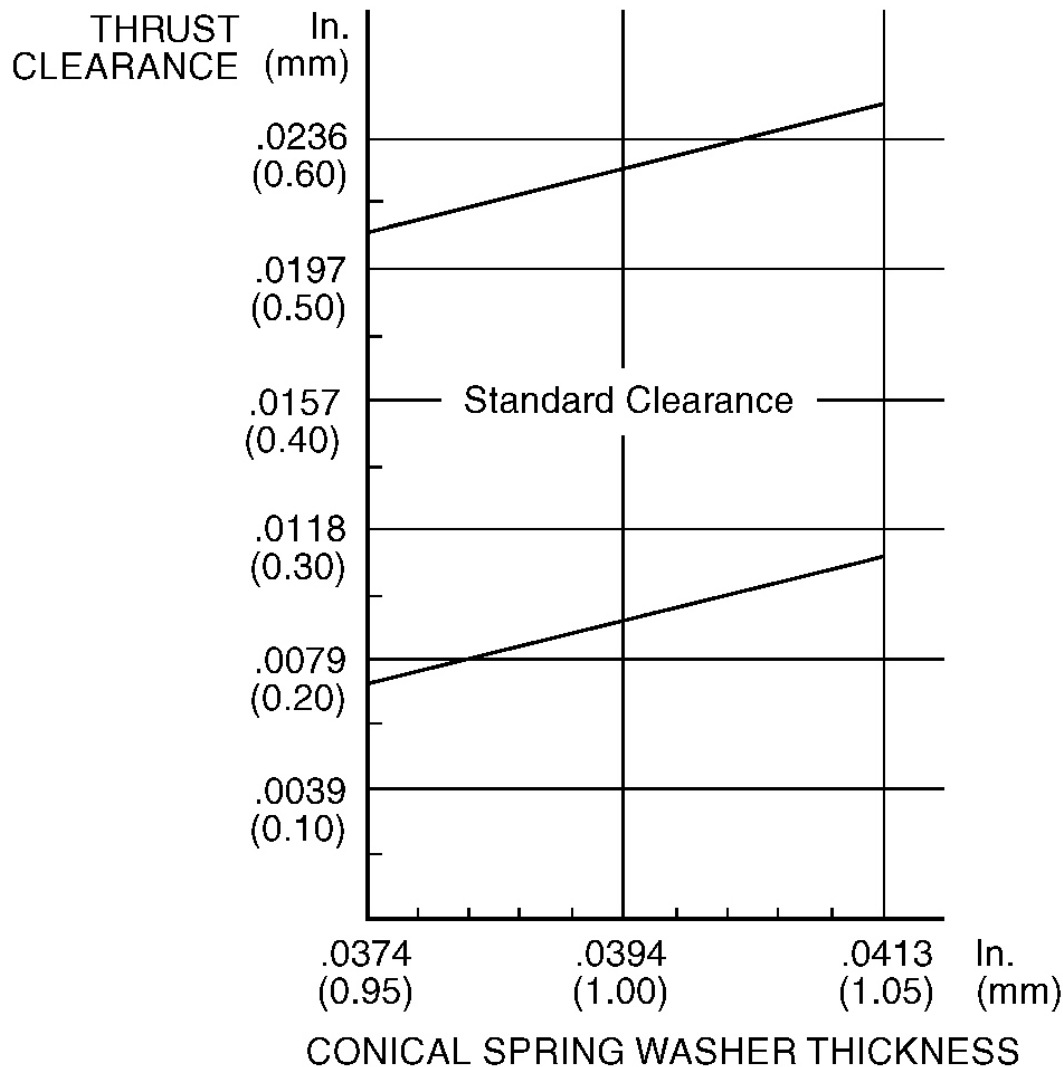
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Fig. 50: Exploded View Of Ring Gear Mounting & Center Differential Case
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 51: Measuring Center Differential Thrust Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 52: Checking Center Differential Side Gear Thrust Clearance
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Disassembly (Transfer Left Case)

1. On A-241H, remove differential control clutch pressure apply tube. On both models, remove center differential control solenoid(s). Remove "O" rings from solenoid(s). See **Fig. 53**.

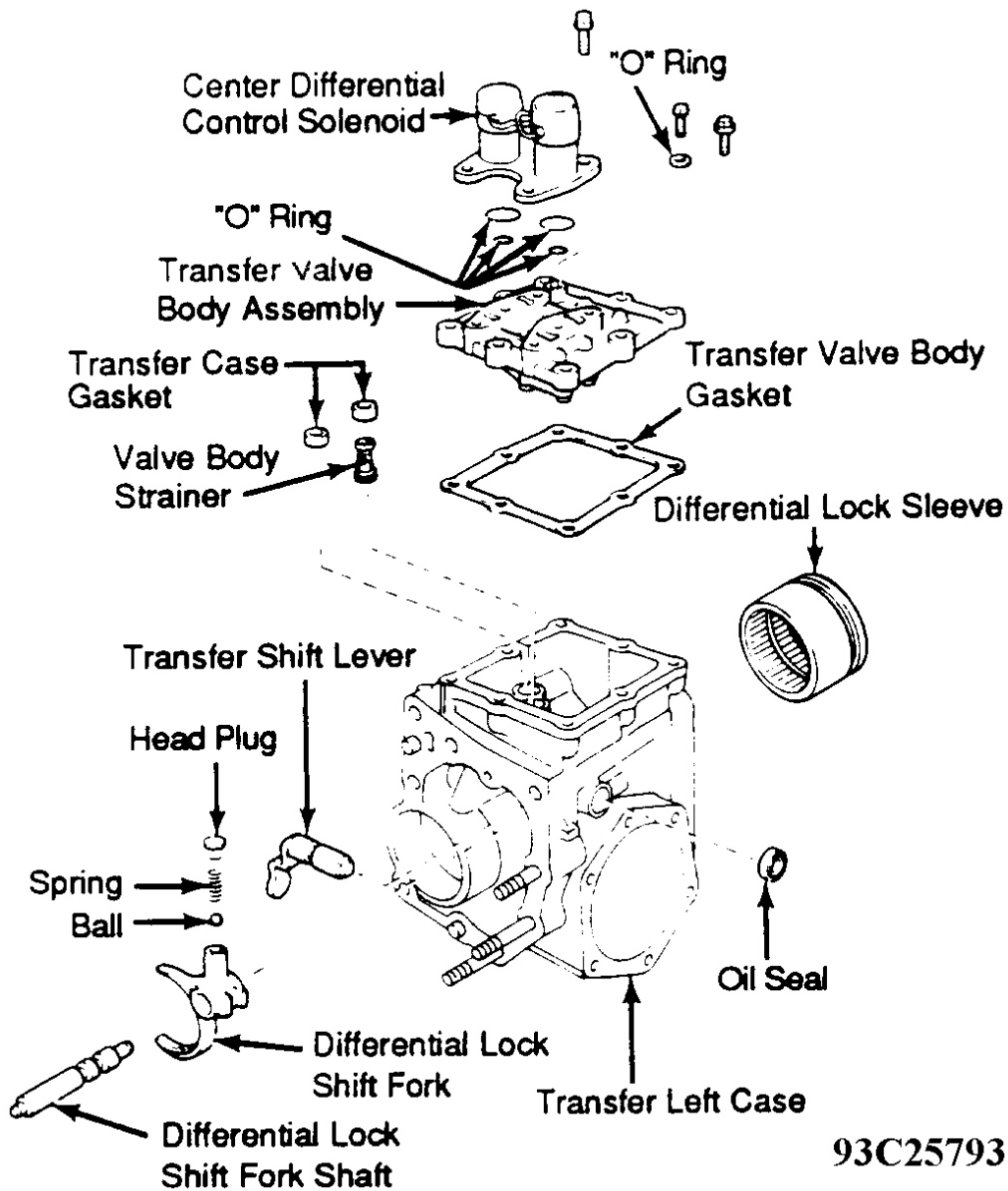


Fig. 53: Exploded View Of Transfer Left Case
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

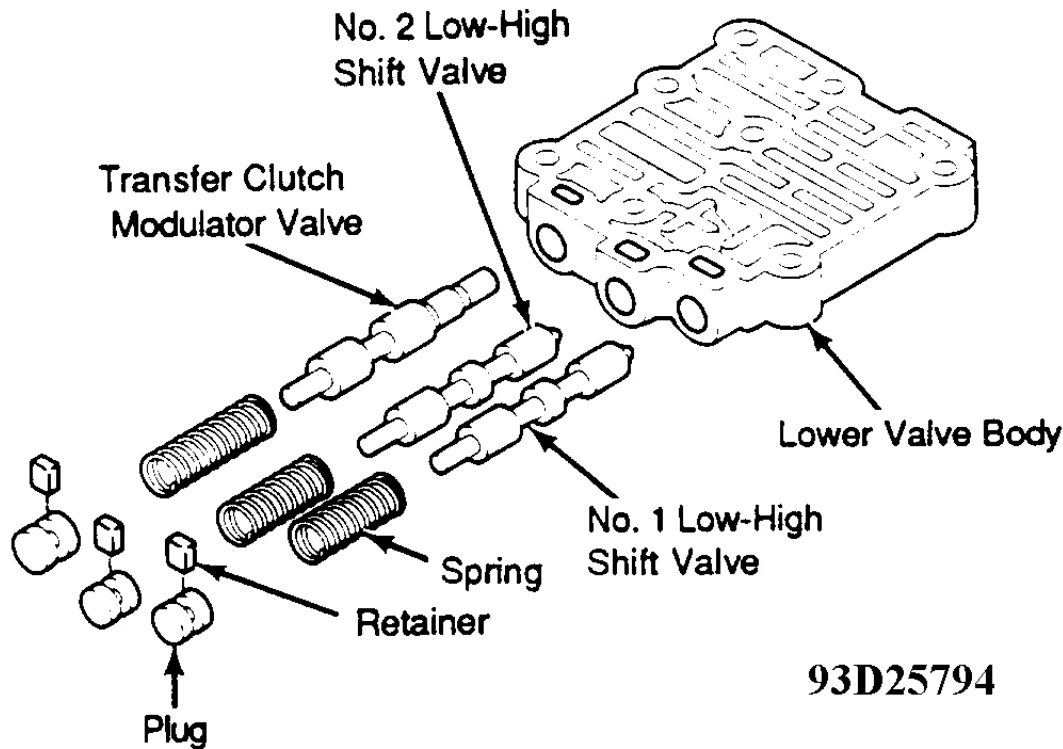


Fig. 54: Exploded View Of Transfer Lower Valve Body
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Remove lock bolt and transfer shift lever. Remove oil seal. Remove shift fork shaft, shift fork and sleeve. Remove head plug, spring and ball. Remove shift fork shaft from shift fork.
3. Remove clutch control valve sleeve cover. Remove clutch control valve and sleeve. Remove oil strainer from sleeve.

Reassembly

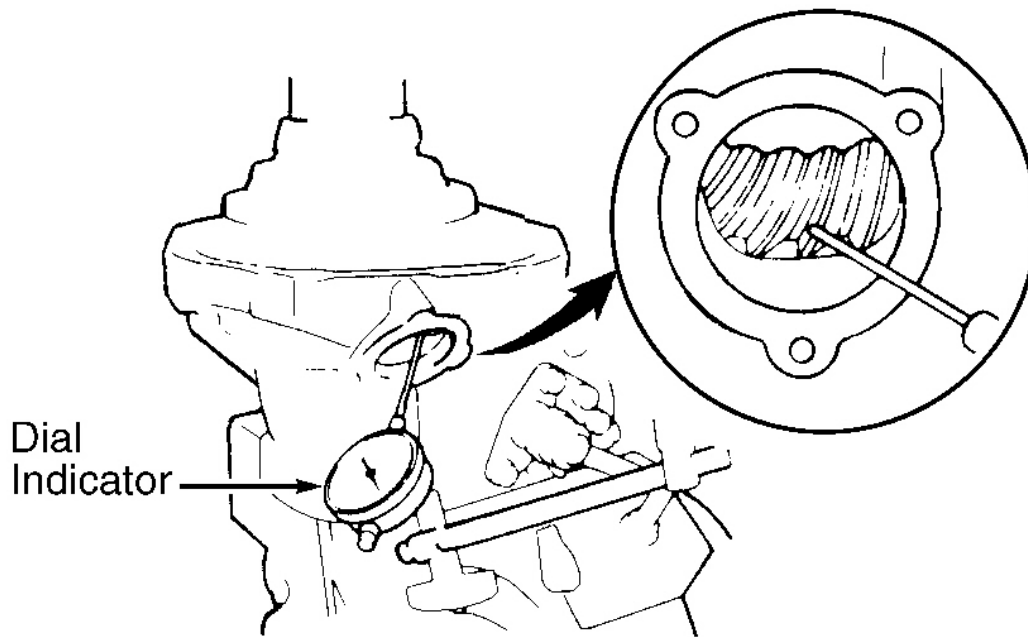
1. On A-241H, install oil strainer in sleeve. Install clutch control valve sleeve. Apply seal packing Three Bond (1281) to sleeve cover. Install control valve sleeve cover. Tighten bolts to 115 INCH lbs. (13 N.m). On both models, insert shift fork shaft into shift fork. Install ball, spring and head plug. Tighten plug to 18 ft. lbs. (25 N.m). Install shift fork shaft, shift fork and sleeve. Coat lip of new seal with grease. Using a 17-mm socket wrench and hammer, install oil seal into transfer shift lever. Install transfer shift lever. Engage shift fork and transfer shift lever. Install and tighten lock bolts to 35 INCH lbs. (3.9 N.m).
2. Install "O" rings on solenoid(s). Install center differential control solenoid(s). Tighten to 10 ft. lbs. (14 N.m). On A-241H, install apply tube. **DO NOT** bend or damage tubes.

Reassembly (Transfer Case)

1. Install case side plate washer. Using Bearing Replacer (09316-60010) and an arbor press, install 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. See **Fig. 55** .

2. Install shim(s) to driven pinion bearing cage assembly. Install same thickness shim(s) as removed. Install driven pinion bearing cage. Tighten to 29 ft. lbs. (39 N.m). **DO NOT** install "O" ring. Install ring gear mounting case and center differential case. Using a dial indicator, measure ring gear backlash. Backlash should be .0051-.0071" (.130-.180 mm). See **Fig. 55** . If backlash exceeds specification, install correct plate washer on ring gears. See **RING GEAR PLATE WASHER SPECIFICATIONS** table.



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Fig. 55: Measuring Ring Gear Backlash

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

RING GEAR PLATE WASHER SPECIFICATIONS

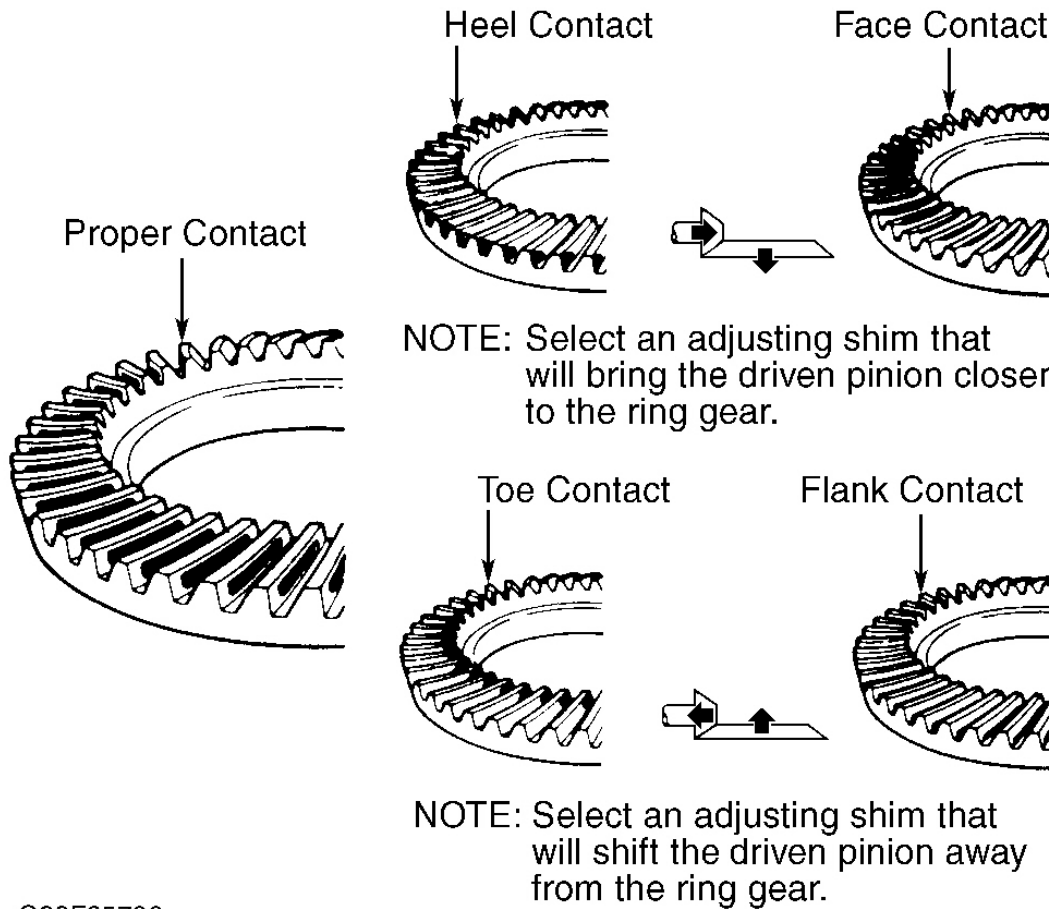
ID Mark	Thickness: In. (mm)
71	.0839 (2.130)
72	.0850 (2.160)
73	.0862 (2.190)
74	.0874 (2.220)
75	.0886 (2.250)
76	.0898 (2.280)
77	.0909 (2.310)
78	.0921 (2.340)
79	.0933 (2.370)

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

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. **DO NOT** apply seal packing and gasket. Tighten bolts to 32 ft. lbs. (44 N.m). Using Lock Nut Wrench (09326-20011) and spring tension gauge, measure total preload. Total preload at starting point is 1.1-2.0 lbs. (.5-.9 kg). Add drive pinion preload. Rotate drive pinion counterclockwise and clockwise several times. Using Adjusting Nut Wrench (09318-12010) and tighten wrench, adjust total preload by tightening bearing adjusting nut in small increments. Measure ring gear backlash. Backlash should be .0051-.0071" (.130-180 mm). If backlash exceeds specification, install correct plate washer on ring gear. See **RING GEAR PLATE WASHER SPECIFICATIONS** table.
4. Check ring gear tooth contact. Coat 3 or 4 teeth at 4 different positions on ring gear with Red lead. Rotate the ring gear, and inspect teeth pattern. See **Fig. 56** . If the teeth are not meshing properly, install proper shim and plate washer. See **RING GEAR SHIM SPECIFICATIONS** table and **RING GEAR PLATE WASHER SPECIFICATIONS** tables.



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Fig. 56: Checking Ring Gear Tooth Contact
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

RING GEAR SHIM SPECIFICATIONS

ID 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)

5. 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 outer race and plate washer.
6. Using Bearing Replacer (09316-60010), install new oil seal. Oil seal depth is .12" (3 mm). Coat lip of oil seal with grease. Install plate washer. Using Bearing Replacer (09316-60010) and an arbor press, install left case bearing outer race.
7. Coat "O" ring with gear oil and install on driven pinion bearing cage assembly. Install driven pinion bearing cage with adjusting shim to transfer left case. Install 6 bolts. Tighten bolts to 29 ft. lbs. (39 N.m). Install ring gear mounting case and center differential case.
8. Install new apply gasket to left case. Coat "O" ring with gear oil. Install "O" ring to oil pump strainer. Install strainer to transfer right case. Install bolts. Tighten to 48 INCH lbs. (5.4 N.m) Install oil pump driven gear. Apply Three Bond (1281) seal packing to left case. Install right case as soon as seal packing is applied. Install right case to left case. Install 10 bolts. Tighten to 32 ft. lbs. (44 N.m). Check total preload as shown in step 3 .
9. 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. Coat new "O" ring with gear oil. Install "O" ring on lock bolt. Install and tighten lock nut to 63 INCH lbs. (7 N.m).
10. Apply seal packing Three Bond (1281) to left case. Install inspection hole cover as soon as seal packing is applied. Install hole cover to transfer left case. Install 3 bolts. Tighten to 12 ft. lbs. (16 N.m).
11. Coat new "O" ring with gear oil. Install "O" ring and new apply gasket. Install right case retainer to transfer right case. Install 5 bolts. On A-241H, tighten bolts to 19 ft. lbs. (25 N.m).
12. Use Oil Plug (09325-20010) and a hammer to install new oil seal in extension housing. Coat lip of oil seal with grease. Install new "O" ring in extension housing. Install extension housing to driven pinion bearing cage. Install 4 bolts. Tighten to 18 ft. lbs. (25 N.m). Using a hammer, install dust deflector. Install dynamic damper. Tighten to 18 ft. lbs. (25 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 15 minutes prior to installation.

Reassembly (A-241H)

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 in transaxle case. Install underdrive brake accumulator piston and spring.
2. 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.
3. 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.

4. 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.
5. 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.
6. 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.
7. 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. 57** . 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 2 thicknesses: .0803" (2.040 mm) and .0945" (2.400 mm). Replace if necessary.

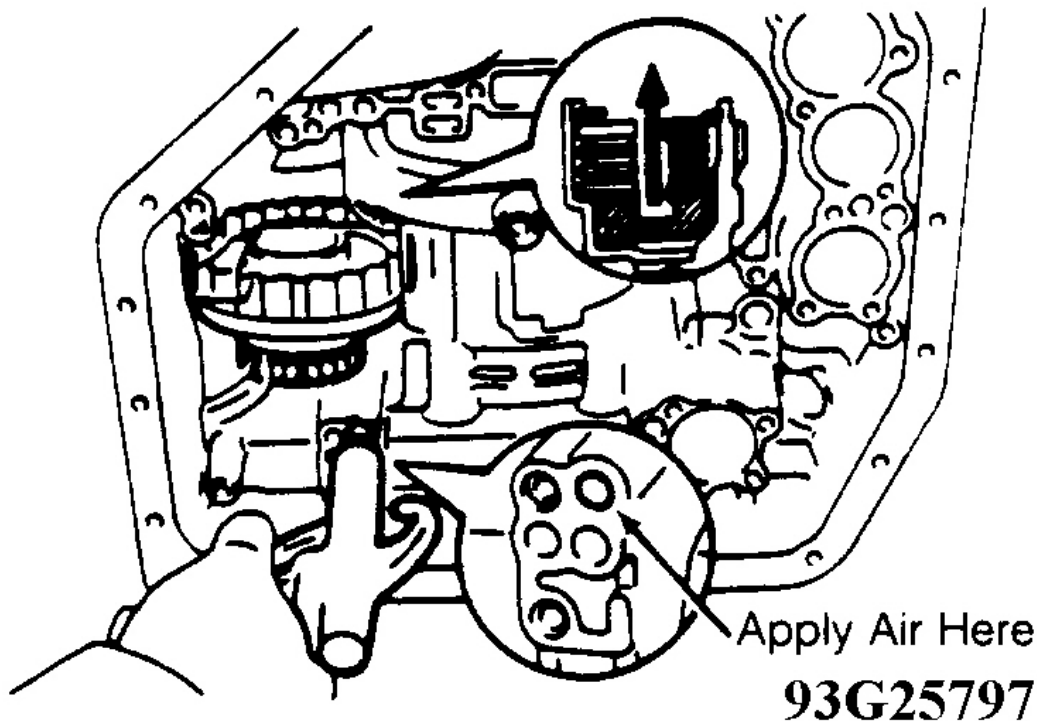


Fig. 57: Checking Underdrive Clutch Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. 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.
9. 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).
 10. 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, tighten 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.
 11. Install 1st and 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 and reverse brake piston moves smoothly. See **Fig. 58**.

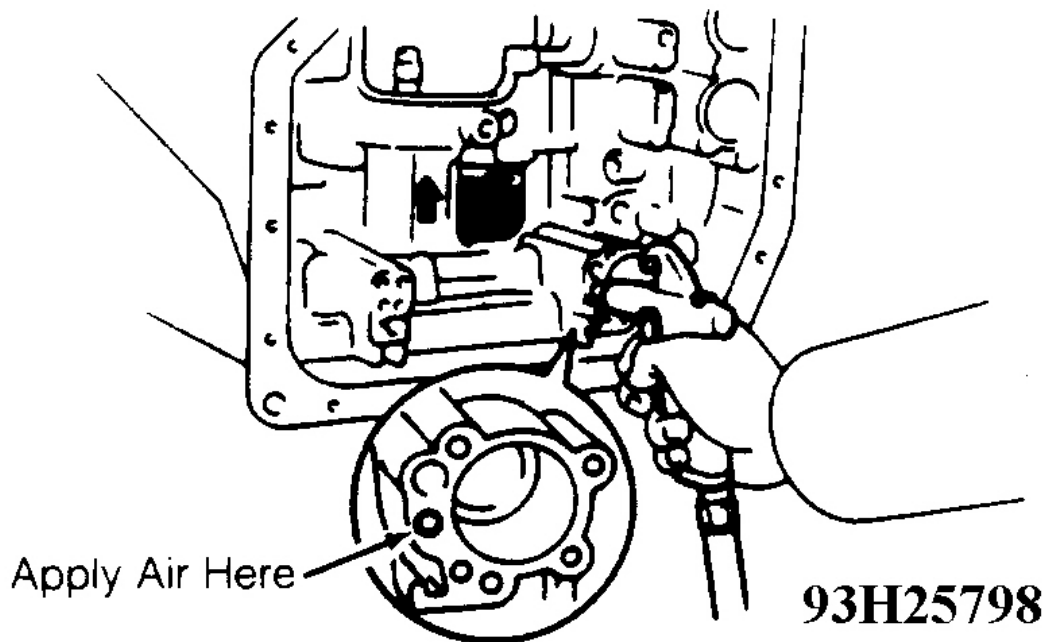


Fig. 58: Checking 1st & Reverse Brake Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. Install snap ring in transaxle case. Install intermediate shaft. Apply Loctite (518) to rear cover sealing areas. Tighten bolts to 22 ft. lbs. (29 N.m). Install thrust washer and governor driven gear. Install new apply gaskets or oil seals in transaxle case. Ensure intermediate shaft rotates smoothly.
13. Align clutch disc tabs. Install rear planetary ring gear. Align clutch disc tabs. Install rear planetary gear. Install No. 2 one-way clutch with shiny side upward. Rotate planetary gear clockwise while installing one-way clutch.

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

14. 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.
15. 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 a disc, alternating with a plate and ending with a plate.
16. Install piston return spring assembly with springs over case protrusions. Align 2nd brake drum groove with bolt in case. Install 2nd brake drum.
17. 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.
18. 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).
19. 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. Install front planetary gear. Refer to the **FRONT PLANETARY GEAR BEARING & RACE SPECIFICATIONS** table.

FRONT PLANETARY GEAR BEARING & RACE SPECIFICATIONS

Part	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)

20. 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.
21. 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.
22. Install differential. Apply seal packing Loctite (518) to transaxle housing. Install and tighten bolts to 21

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

ft. lbs. (29 N.m). Check differential side bearing preload. See **DIFFERENTIAL ASSEMBLY** . (A-241H).

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

23. Install oil seal rings. Install race on stator shaft. Race outer diameter is 1.693" (43.00 mm). Race inner 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 tighten bolts to 18 ft. lbs. (25 N.m).
24. Measure input shaft end play in axial direction using a dial indicator. End play should be .012-.035" (.39-.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.
25. 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.
26. 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.
27. Install accumulator pistons and springs. See **Fig. 59** . Coat the accumulator piston "O" rings with ATF. Install "O" rings. Install the pistons and springs. Install the accumulator cover and gasket. Tighten retaining bolts to 89 INCH lbs. (10 N.m). Refer to the **ACCUMULATOR SPRING FREE LENGTH SPECIFICATIONS** table.

ACCUMULATOR SPRING FREE LENGTH SPECIFICATIONS

Application (Spring)	Color	Free Length In. (mm)
Forward Clutch Outer	Pink	2.917 (74.10)
Forward Clutch Inner	Pink	1.614 (41.00)
Direct Clutch	Blue	2.606 (66.20)
2nd Brake No. 1	White	1.437 (36.50)
2nd Brake No. 2	Yellow	2.232 (56.70)
Underdrive Clutch	Light Green	2.445 (62.10)

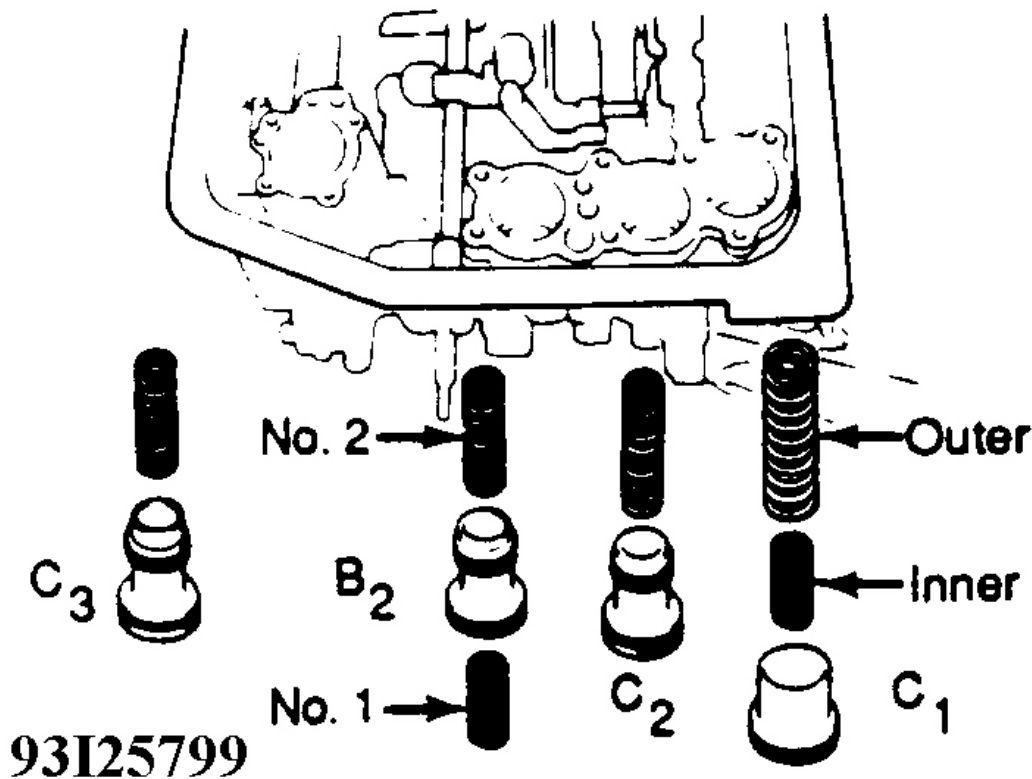


Fig. 59: Exploded View Of Accumulator Pistons & Springs
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

28. Install 2nd brake apply gasket. Install throttle cable. Use care not to damage "O" ring. Ensure cable is fully seated in case. **DO NOT** roll case over cable. Install solenoid in case.
29. Install valve body. See **CONTROL VALVE ASSEMBLY** under ON-VEHICLE SERVICE. Ensure proper length bolt is installed in proper location.
30. Connect solenoid connector. Install manual detent spring and cover. Hand tighten bolt, then tighten to 89 INCH lbs. (10 N.m). Ensure manual lever is in contact with center of roller at tip of detent spring.
31. Install oil tubes with a plastic hammer. **DO NOT** bend or damage tubes. Install oil tube clamp and bracket. Tighten bolts to 89 INCH lbs. (10 N.m). Install oil strainer. Tighten 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. Tighten bolts to 89 INCH lbs. (10 N.m).
32. 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. Tighten bolts to 115 ft. lbs. (13 N.m).
33. Install neutral start switch to manual valve shaft. Install packing. Install nut and lock stopper. Tighten 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.

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

Install and tighten bolts to 48 INCH lbs. (5.4 N.m). Using a screwdriver, stake nut with nut stopper. Install manual shift lever with washer. Tighten nut to 115 INCH lbs. (13 N.m).

34. Install filler tube and transmission dipstick. Install oil cooler pipes. Tighten to 25 ft. lbs. (34 N.m). 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.
35. 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 tighten 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.

TORQUE SPECIFICATIONS**TORQUE SPECIFICATIONS (A-241H)**

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	16 (22)
Ring Gear-To-Differential Case Bolts	71 (97)
Torque Converter-To-Drive Bolts	20 (27)
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	72-159 (98-216)
Transfer Right Case Bolts	32 (44)
Transfer Right Case Retainer Bolts	18 (25)
INCH Lbs. (N.m)	
Accumulator Cover-To-Case Bolts	89 (10)
Governor Body Adapter Bolts	89 (10)
Governor Cover Bracket Bolts	115 (13)
Manual Detent Spring-To-Case Bolts	89 (10)
Neutral Start Switch-To-Case Bolts	48 (5.4)
Neutral Start Switch-To-Manual Valve Shaft Nut	61 (6.9)
No. 2 Pressure Regulator Valve Body-To-Upper Valve Body Bolts	57 (6.4)
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)
Parking Lock Pawl Stopper Plate Bolts	65 (7.4)
Sensor Adapter Bolts	89 (10)

1991 Toyota MR2

1988-94 AUTOMATIC TRANSMISSIONS Toyota A-241E, A-241H, A-241L & A-243E Overhaul

Sensor Cover Bracket Bolts	115 (13)
Solenoid-To-Lower Valve Body Bolts	89 (10)
Speed Sensor-To-Case 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)