

1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul

1989-94 AUTOMATIC TRANSMISSIONS

Toyota A-540E, A-540H & A-541E Overhaul

APPLICATION

TRANSMISSION APPLICATIONS

Vehicle Model	Transmission Model
1989-91 Camry (4WD)	A-540H
1989-93 Camry (V6)	A-540E
1990-91 Lexus ES250	A-540E
1992-93 Lexus ES300	A-540E
1994 Camry (V6)	A-541E
1994 Lexus ES300	A-541E

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

The A-540E automatic transaxle is a 4-speed, Electronic Control Transaxle (ECT) developed for use with high output 2VZ-FE engine. A-540E transaxle features a torque converter with lock-up clutch, 4-speed planetary gear unit, differential, hydraulic control system and electronic control system. A shift lock mechanism has been added to minimize possibility of incorrect operation of transaxle.

The A-540H 4WD automatic transaxle has a center differential and electronic transfer case attached. This transaxle has the same hydraulic multi-plate clutch in center differential limiting control mechanism as A-241H transaxle. 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 the 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** section. For drive axle shaft service procedures, see appropriate **FWD AXLE SHAFTS** article in **AXLE SHAFTS & TRANSFER CASES**.

LUBRICATION & ADJUSTMENTS

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

ON-VEHICLE SERVICE

LEFT SIDE GEAR SHAFT SEAL (A-540E & A-540H)

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.

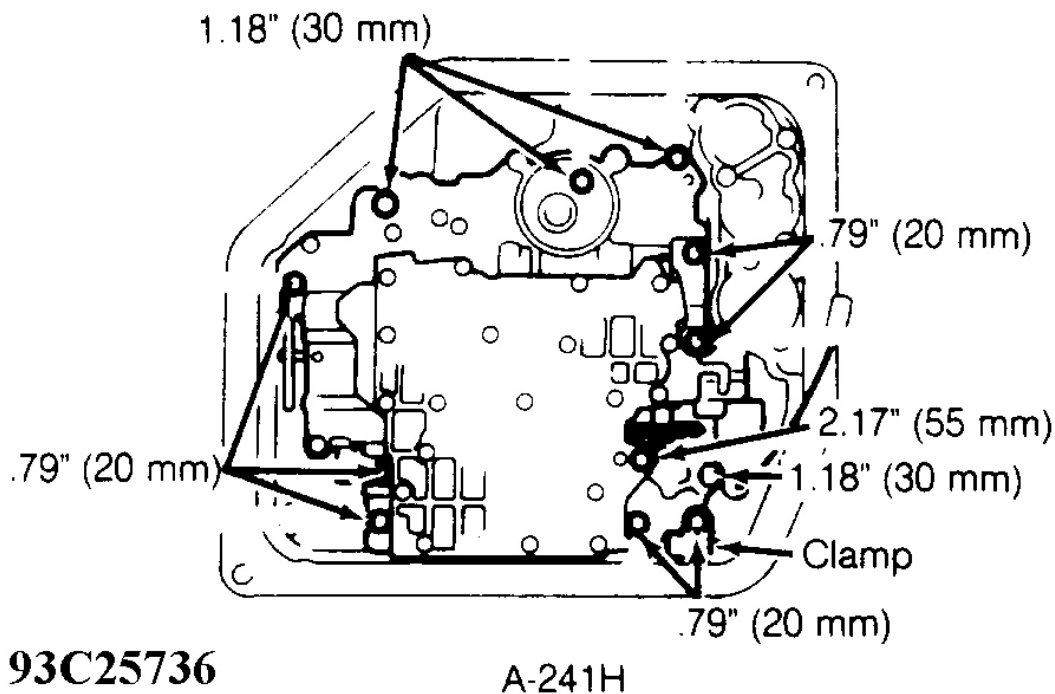


Fig. 1: Locating Control Valve Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

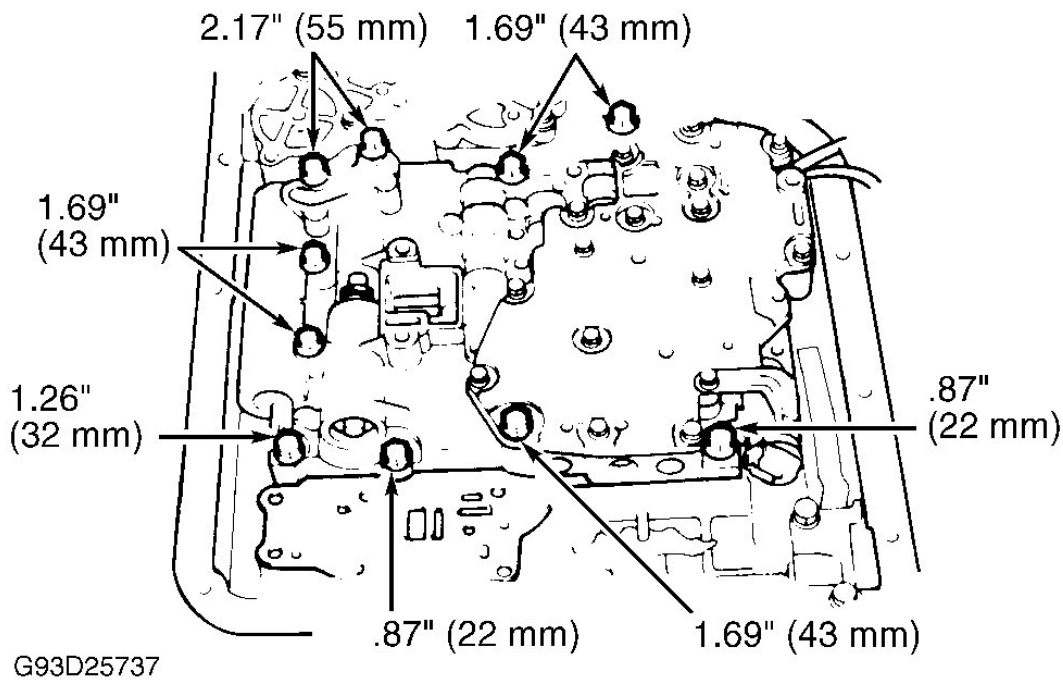


Fig. 2: Locating Control Valve Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

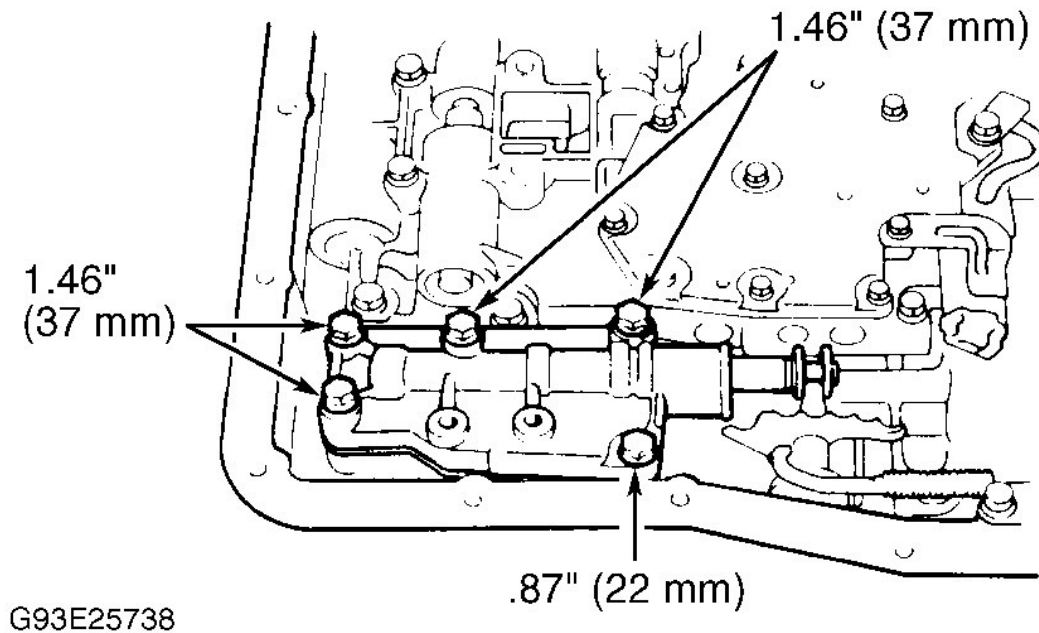


Fig. 3: Locating Manual Valve Body Bolts (A-540E & A-540H)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

RIGHT SIDE GEAR SHAFT SEAL (A-540H)

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-540E and A-540H transaxles, see appropriate TOYOTA ELECTRONIC CONTROLS article. For transaxle component location, see [Fig. 4](#).

SYMPTOM DIAGNOSIS

Fluid Discolored Or Smells Burnt

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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.

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

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

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

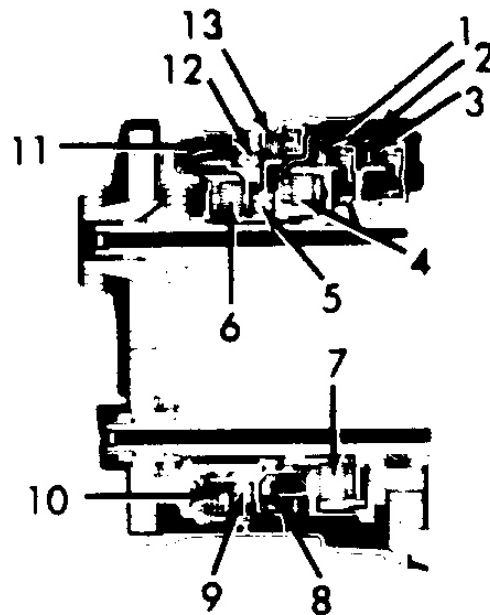
Solenoid valve faulty. Electronic control faulty. Valve body faulty. Transaxle faulty.

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.



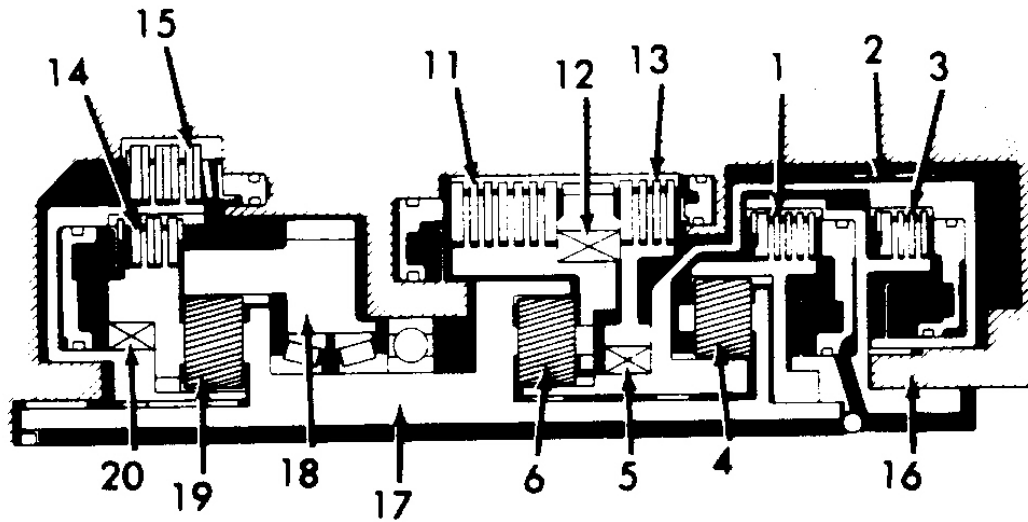
A-241H

- | | |
|------------------------------|------------------------------|
| 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 |

93I25732**Fig. 5: Identifying Transaxle Component Locations**

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

CLUTCH & BAND APPLICATION (A-540E & A-540H)

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

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	Clutch, OD One-Way Clutch, No. 1 One-Way Clutch & 2nd Brake
Third Gear	Forward Clutch, Direct Clutch, OD Direct Clutch, One-Way Clutch & 2nd Brake
OD (Fourth Gear)	Direct Clutch, Forward Clutch, OD Brake & 2nd Brake
"2" (Intermediate)	
First Gear	Forward Clutch, OD Direct Clutch, OD Direct Clutch & No. 2 One-Way Clutch
Second Gear	Forward Clutch, OD Direct Clutch, OD One-Way Clutch, 2nd Brake, 2nd Coast Brake & No. 1 One-Way Clutch
Third Gear ⁽¹⁾	Forward Clutch, Direct Clutch, OD Direct Clutch, OD One- Way Clutch & 2nd Brake
"L" (Low)	
First Gear	Forward Clutch, OD Direct Clutch, OD One-Way Clutch, & 1st & Reverse Brake
Second Gear ⁽²⁾	Forward Clutch, OD Direct Clutch, OD One-Way Clutch, No. 1 One-Way Clutch, 2nd Brake & 2nd Coast Brake
"R" (Reverse)	Direct Clutch, OD Direct Clutch & 1st & Reverse Brake
"N" (Neutral)	OD Direct Clutch
"P" (Park)	OD Direct Clutch
(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.

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- Check transfer case oil level (A-540H).
- 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) on A-540E, or 122°F (50°C) on A-540H.

"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 speeds are as specified. See appropriate table under **LOCK-UP 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 47 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.

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

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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. See 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

SHIFT SPEED SPECIFICATIONS ⁽¹⁾ CAMRY (4WD) A-540H

Application	MPH
"D" Range	
NORM	
1st-2nd	25-28
2nd-3rd	49-53
3rd-OD	73-76
3rd-OD ⁽²⁾	16-18
OD-3rd ⁽²⁾	9-12
OD-3rd	68-72
3rd-2nd	47-49
2nd1st	22-24
PWR 1st-2nd	30-32
2nd-3rd	56-60
3rd-OD	78-83
3rd-OD ⁽²⁾	17-19
OD-3rd ⁽²⁾	9-12
OD-3rd	70-73
3rd-2nd	53-57

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2nd-1st	25-27
"2" Range	
NORM Or PWR	
1st-2nd	25-28
2nd-1st	22-24
"L" Range	
NORM Or PWR	
2nd-1st	23-25
(1) Wide open throttle.	
(2) Fully closed throttle.	

CAMRY (V6) A-540E SHIFT SPEED SPECIFICATIONS (1)

Application	MPH
"D" Range	
NORM	
1st-2nd	34-37
2nd-3rd	62-68
3rd-OD	96-102
3rd-OD (2)	22-24
OD-3rd (2)	12-15
OD-3rd	92-98
3rd-2nd	55-60
2nd-1st	30-33
PWR 1st-2nd	38-41
2nd-3rd	72-78
3rd-OD	112-119
3rd-OD (2)	22-24
OD-3rd (2)	12-15
OD-3rd	107-113
3rd-2nd	66-71
2nd-1st	30-33
"2" Range	
NORM Or PWR	
1st-2nd	38-41
2nd-1st	30-33
"L" Range	
NORM Or PWR	
2nd-1st	32-35
(1) Wide open throttle.	

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(2) Fully closed throttle.

LEXUS ES250 A-540E SHIFT SPEED SPECIFICATIONS (1)

Application	MPH
"D" Range (2)	
NORM	
1st-2nd	34-35
2nd-3rd	62-65
3rd-OD	93-99
3rd-OD (2)	20-22
OD-3rd (2)	11-13
OD-3rd	89-95
3rd-2nd	53-57
2nd-1st	30-32
PWR	
1st-2nd	35-37
2nd-3rd	66-71
3rd-OD	107-111
3rd-OD (2)	22-24
OD-3rd (2)	11-13
OD-3rd	99-105
3rd-2nd	62-67
2nd-1st	30-33
"2" Range	
NORM Or PWR	
1st-2nd	35-37
2nd-1st	30-33
"L" Range	
NORM Or PWR	
2nd-1st	30-32
(1) Wide open throttle.	
(2) Fully closed throttle.	

LOCK-UP SPEED SPECIFICATIONS**CAMRY (4WD) A-540H LOCK-UP SPEEDS (1)**

Application	MPH
"D" Range (2)	
NORM	

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Lock-Up ON In 3rd ⁽³⁾	30-33
Lock-Up OFF In 3rd ⁽³⁾	23-25
Lock-Up ON In OD	35-38
Lock-Up OFF In OD	29-32
PWR	
Lock-Up ON In 3rd ⁽³⁾	37-39
Lock-Up OFF In 3rd ⁽³⁾	29-32
Lock-Up ON In OD	41-43
Lock-Up OFF In OD	35-38
(1) Throttle valve opening 5%.	
(2) There is no lock-up in "L" or "2" ranges.	
(3) With OD switch off.	

CAMRY (V6) A-540E LOCK-UP SPEEDS ⁽¹⁾

Application	MPH
"D" Range ⁽²⁾	
NORM	
Lock-Up ON In 3rd ⁽³⁾	48-51
Lock-Up OFF In 3rd ⁽³⁾	42-45
Lock-Up ON In OD	40-43
Lock-Up OFF In OD	38-41
PWR	
Lock-Up ON In 3rd ⁽³⁾	48-51
Lock-Up OFF In 3rd ⁽³⁾	42-45
Lock-Up ON In OD	40-43
Lock-Up OFF In OD	38-41
(1) Throttle valve opening 5%.	
(2) There is no lock-up in "L" or "2" ranges.	
(3) With OD switch off.	

LEXUS ES250 A-540E LOCK-UP SPEEDS ⁽¹⁾

Application	MPH
"D" Range ⁽²⁾	
NORM Or PWR	
Lock-Up ON In 3rd ⁽³⁾	50-52
Lock-Up OFF In 3rd ⁽³⁾	40-41
Lock-Up ON In OD	41-43

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Lock-Up OFF In OD

36-39

- (1) Throttle valve opening 5%.
- (2) There is no lock-up in "L" or "2" ranges.
- (3) With OD switch off.

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.

1. Object of test is to check overall performance of transmission and engine by measuring maximum engine speeds in "D" and "R" ranges.
2. Block front and rear wheels. Connect engine tachometer. Apply parking and service brakes. Start engine. 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-540E (Camry)	2300-2600
A-540E (Lexus)	2350-2650
A-540H	2170-2470

3. 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.
4. 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.
5. 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.
6. 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

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shifting of lever until shock is felt. Standard time lag is less than 1.2 seconds.

IDLE SPEED SPECIFICATIONS

Application	RPM
A-540E & A-540H	700

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. Ensure throttle is fully opened. Measure line pressure. See appropriate table under **LINE PRESSURE SPECIFICATIONS**. Repeat test in "R" range.
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.

LINE PRESSURE SPECIFICATIONS

CAMRY A-540E LINE PRESSURE SPECIFICATIONS

Selector Position	Pressure psi (kg/cm ²)
At Idle	
"D" Range	51-60 (3.6-4.2)
"R" Range	81-94 (5.7-6.6)
At WOT Stall	
"D" Range	107-124 (7.5-8.7)

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"R" Range

168-196 (11.8-13.8)

CAMRY A-540H LINE PRESSURE SPECIFICATIONS

Selector Position	Pressure psi (kg/cm ²)
At Idle	
"D" Range	51-60 (3.6-4.2)
"R" Range	94-109 (6.6-7.7)
At WOT Stall	
"D" Range	107-124 (7.5-8.7)
"R" Range	192-225 (13.5-15.8)

LEXUS A-540E LINE PRESSURE SPECIFICATIONS

Selector Position	Pressure psi (kg/cm ²)
At Idle	
"D" Range	51-60 (3.6-4.2)
"R" Range	81-94 (5.7-6.6)
At WOT Stall	
"D" Range	107-125 (7.5-8.8)
"R" Range	168-195 (11.8-13.7)

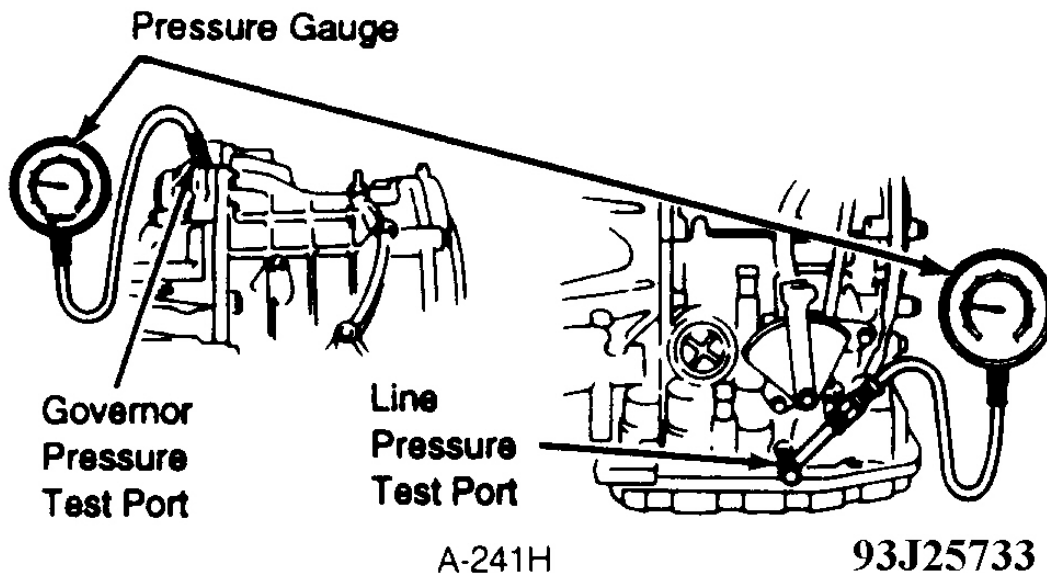


Fig. 6: Checking Hydraulic Pressure

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

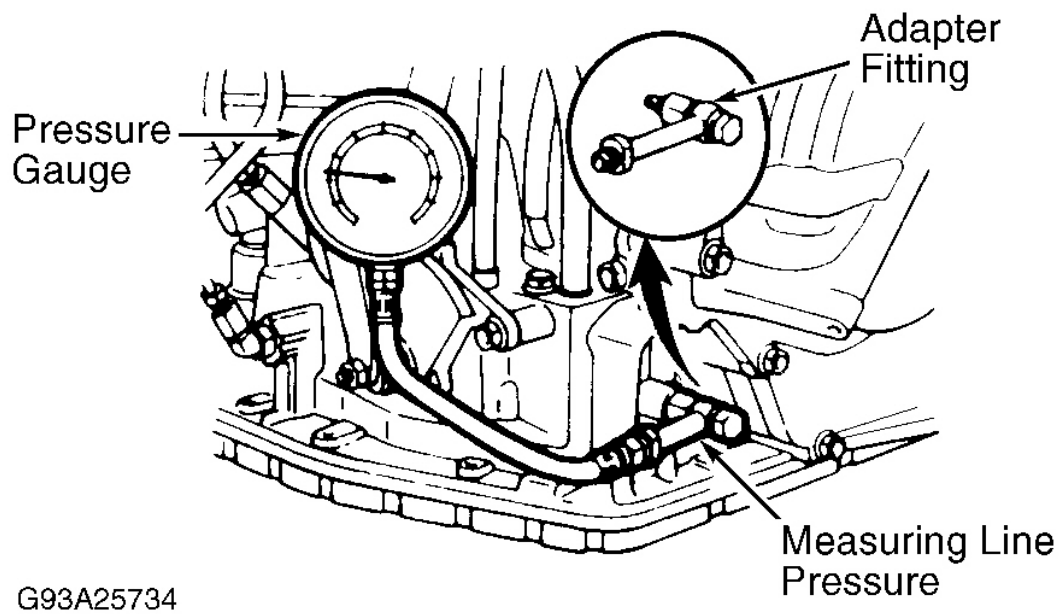
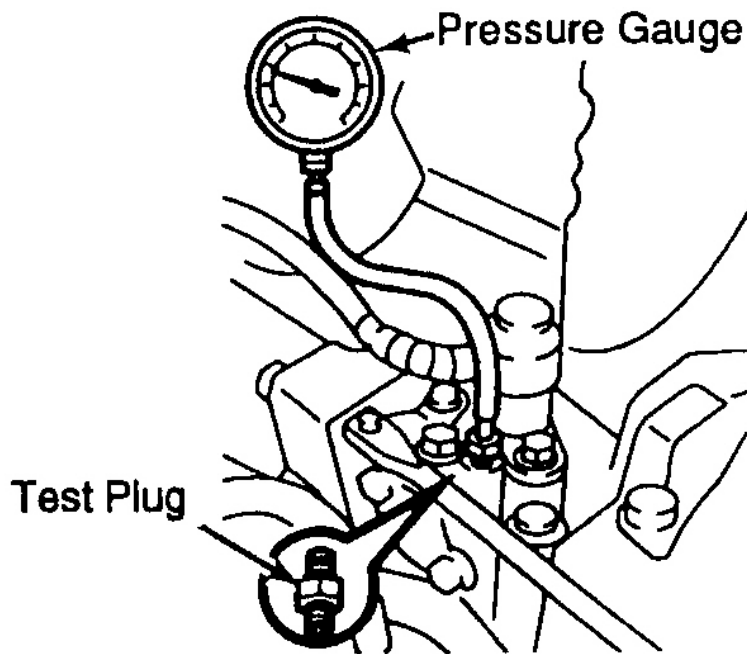


Fig. 7: Checking Hydraulic Pressure

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



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

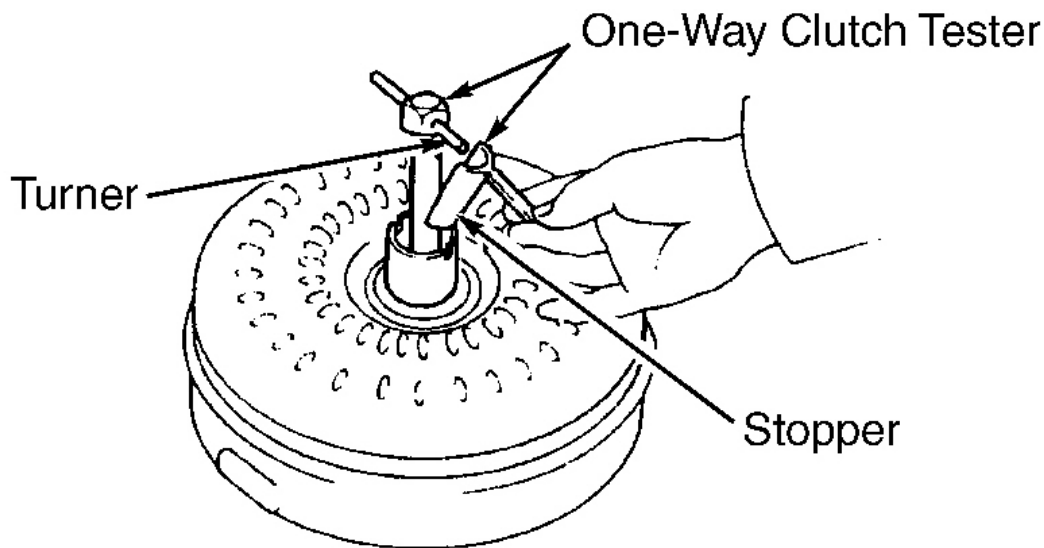
COMPONENT TESTS

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

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

TRANSAXLE DISASSEMBLY

1. On A-540H, 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. 15](#) or [Fig. 16](#) . On A-540E and A-540H, remove union and elbow.
2. Remove manual shift lever and neutral start switch. Remove throttle cable retaining bolt and plate. Remove solenoid wire bolt. See [Fig. 10](#) .
3. On A-540E and A-540H, unplug speed sensor connector. Remove cover bracket, speed sensor and "O" ring.

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

4. Remove oil pan bolts and oil pan. See [Fig. 11](#) . 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.

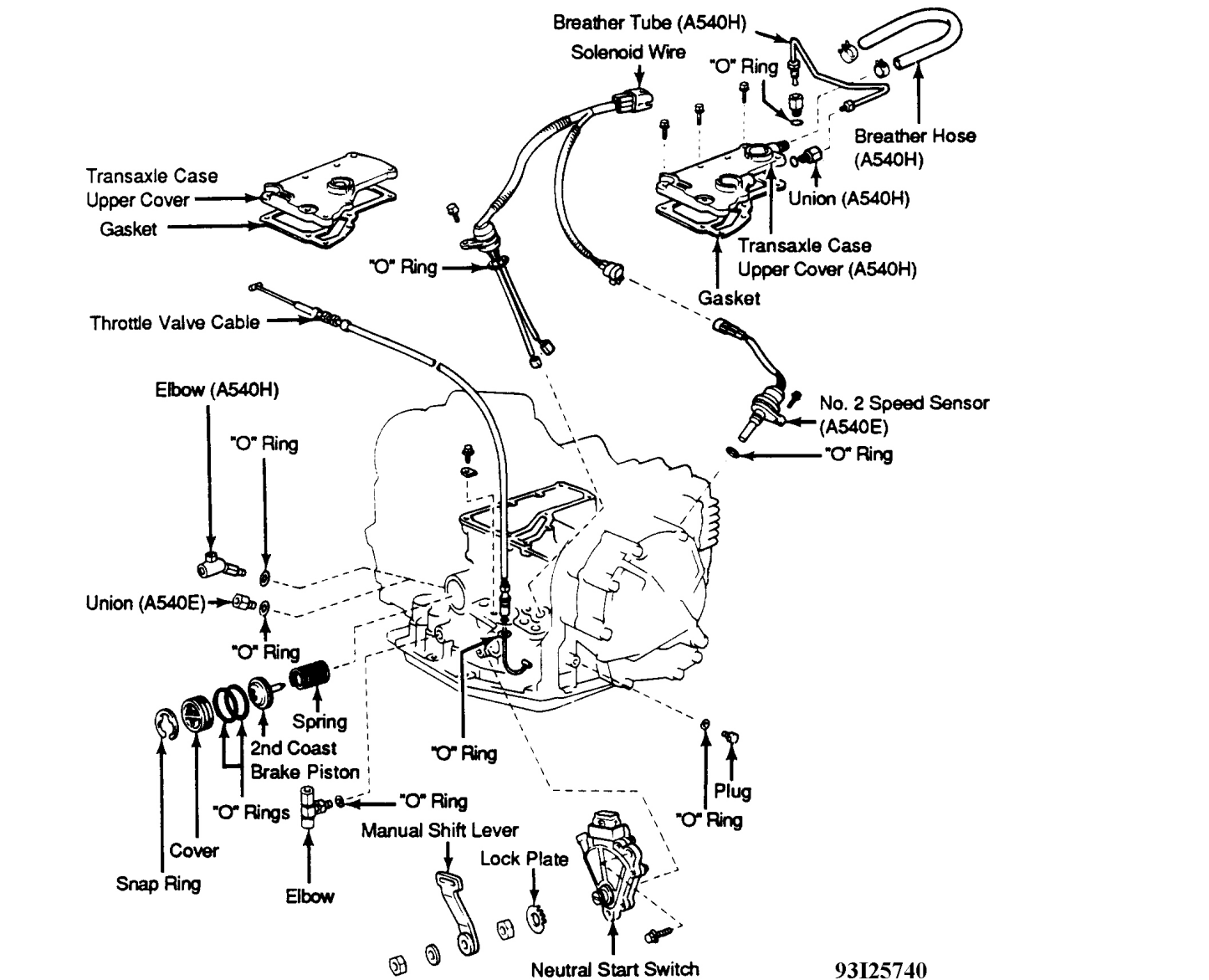
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5. Turn transaxle over. Remove tube bracket, oil strainer and solenoid connectors (if equipped). Using screwdriver, remove oil tubes. Remove manual detent spring and manual valve (A-540E and A-540H).
6. On all models, remove control valve assembly 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. 12**.
9. Using Wire Gauge Set (09240-00020), measure piston stroke of 2nd coast brake. Piston stroke should be .079-.138" (2.00-3.50 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.

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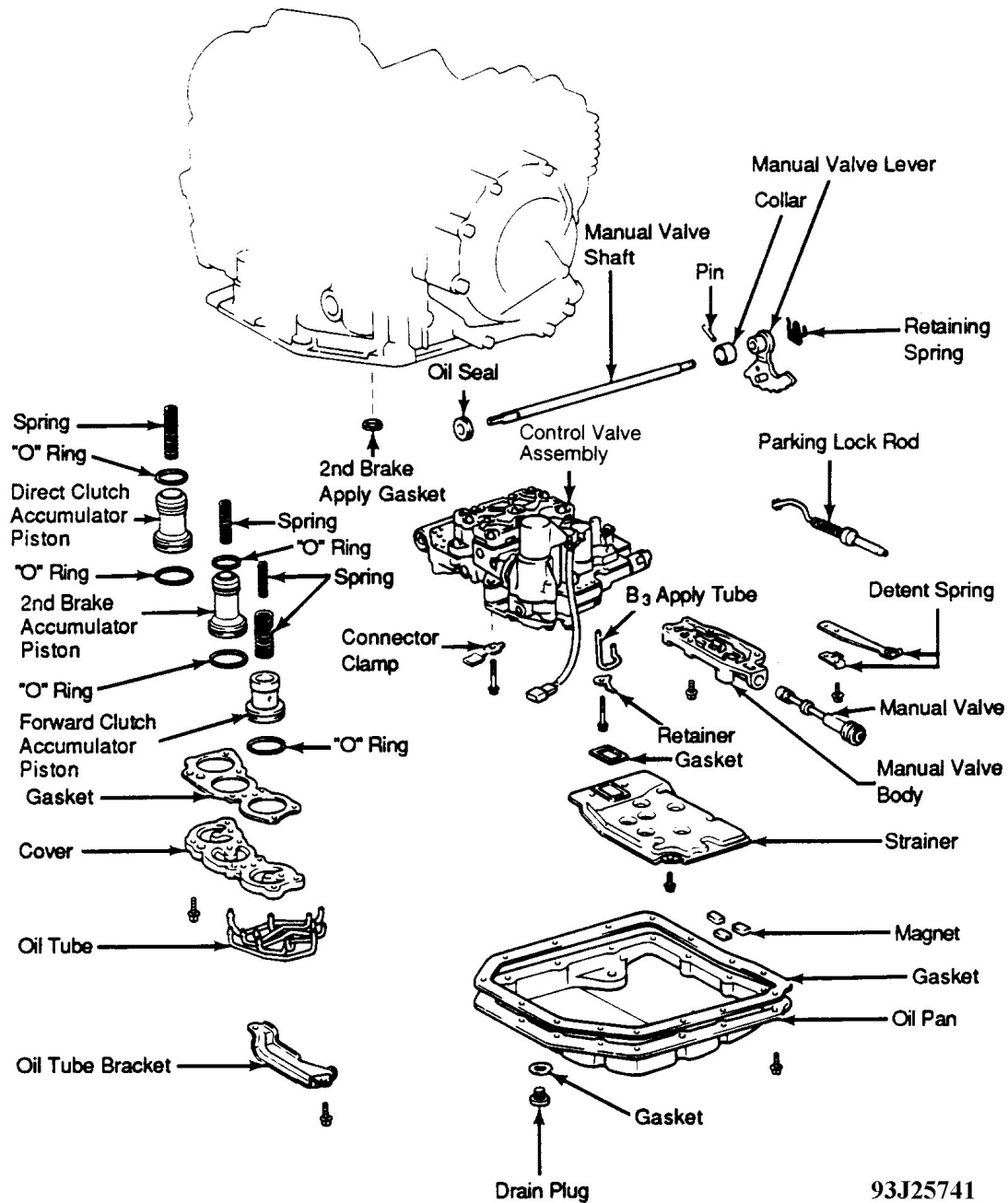
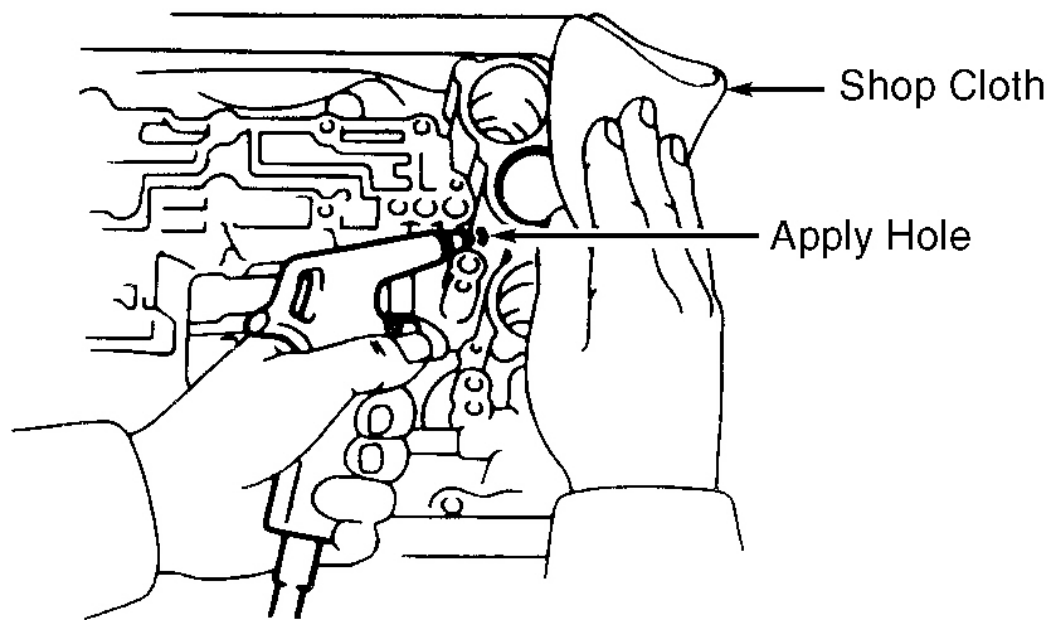


Fig. 11: Exploded View Of Lower External Components (A-540E & A-540H)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



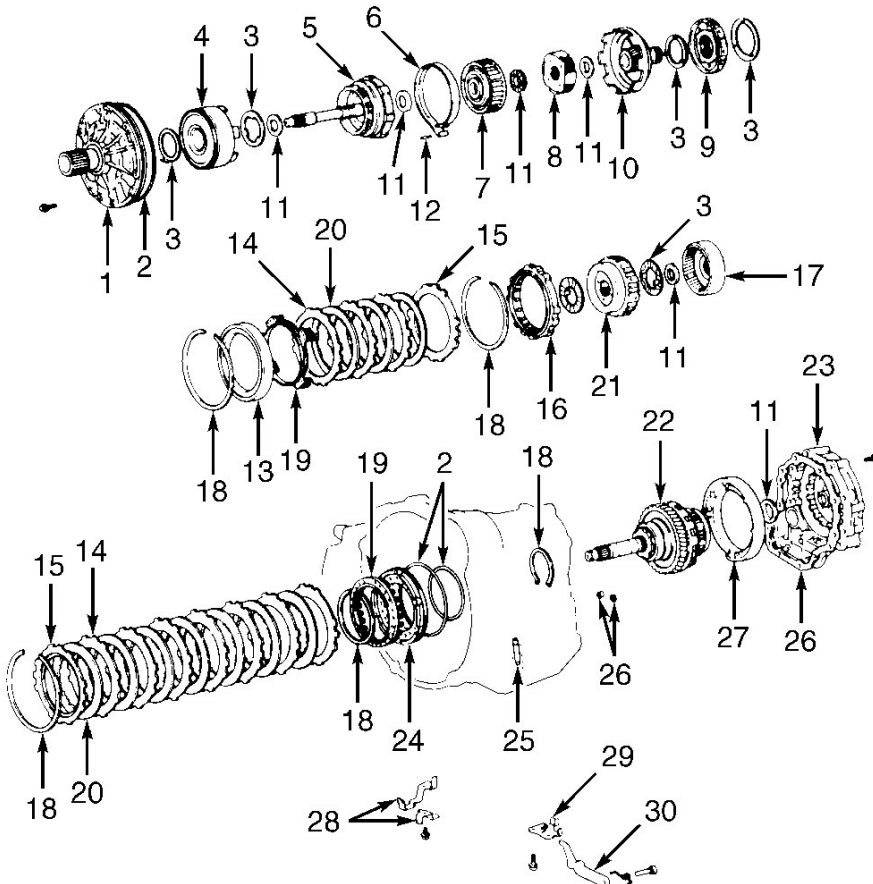
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Fig. 12: Removing Accumulator Pistons & Springs
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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. 13**.
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. On A-540E and A-540H, remove No. 1 one-way clutch. On all models, 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-540H, 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. On A-540E and A-540H, use a feeler gauge to check pack clearance of 1st and reverse brake. Clearance must be .033-.081" (.85-2.05 mm) for

A-540E and .041-.085" (1.04-2.16 mm) for A-540H. See **Fig. 14** . If pack clearance is not within specification, disassemble and inspect.



- | | |
|------------------------------|--------------------------------|
| 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. 13: Exploded View Of Internal Components

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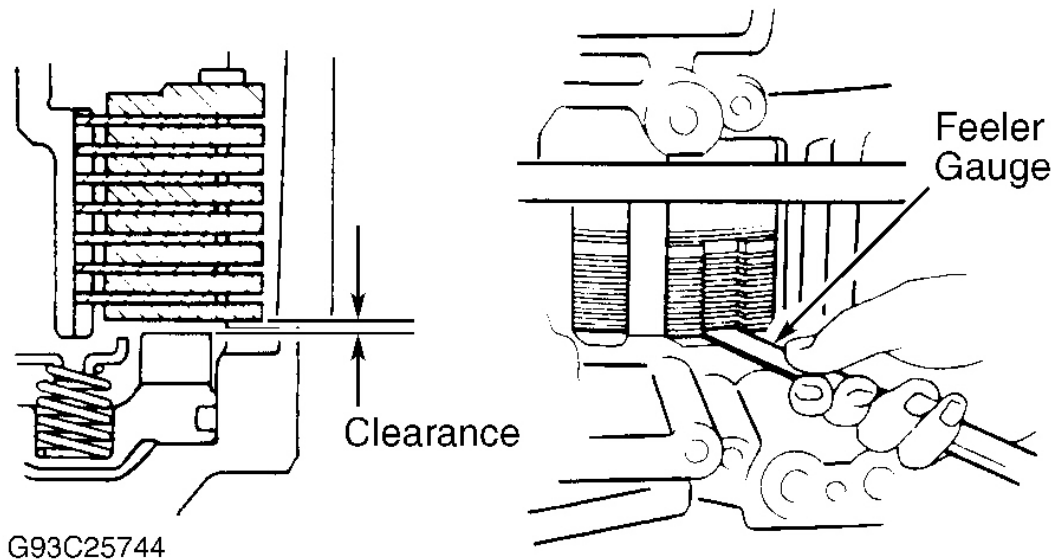


Fig. 14: Checking 1st & Reverse Brake Pack Clearance
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

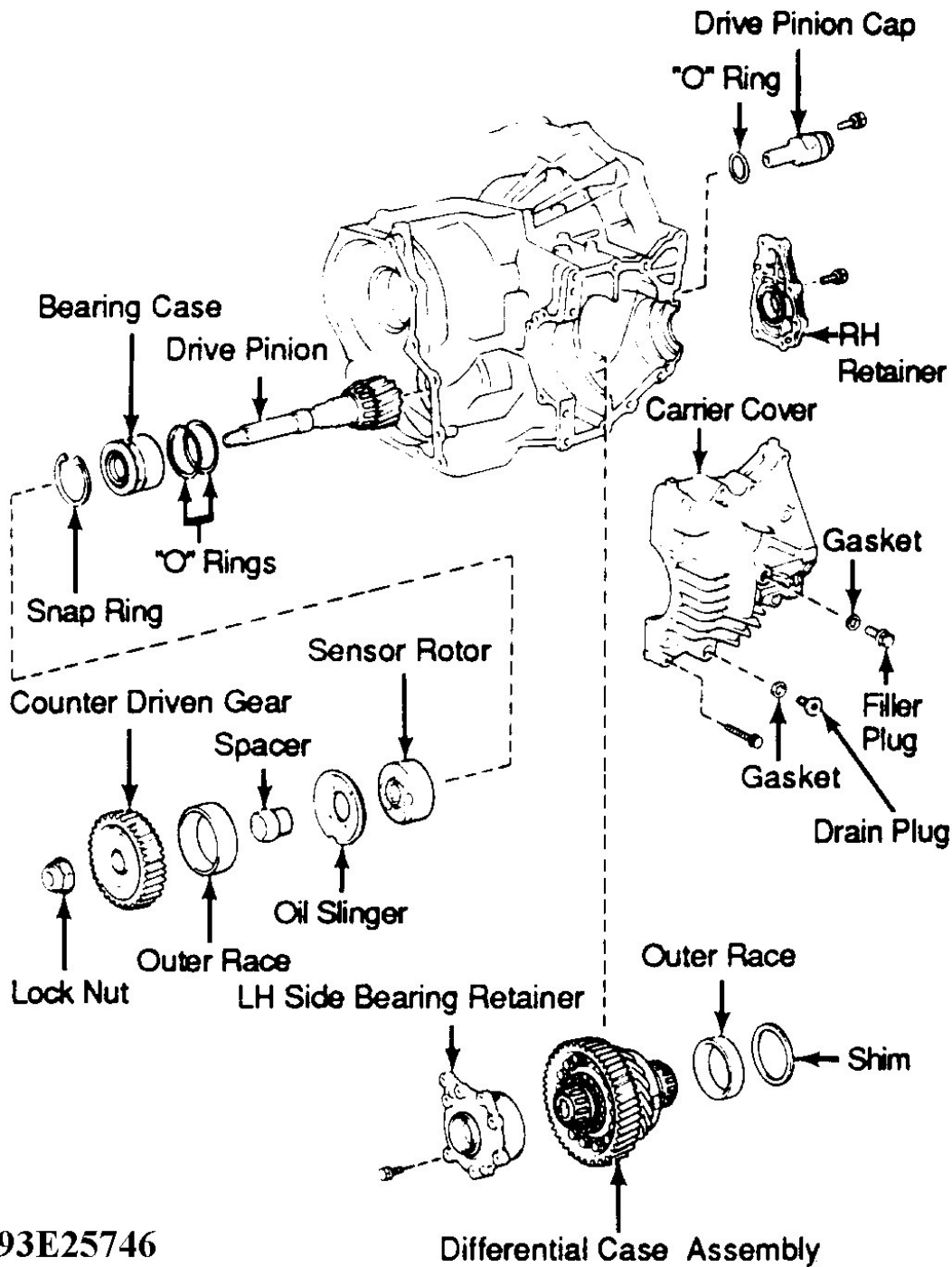
16. On all models, remove snap ring holding flange to case. Remove flange, discs and plates of 1st and reverse brake. Turn transaxle case around. Remove 13 bolts attaching overdrive case to transaxle.
17. On A-540E and A-540H, to remove overdrive unit, tap on circumference of overdrive case with a plastic hammer. Remove overdrive planetary gear and overdrive brake drum from transaxle case. Remove overdrive clutch and overdrive brake apply gaskets.
18. Using Puller (09351-32040), remove 1st and reverse brake piston return spring. Remove snap ring. Remove puller and lift out return spring from case. Apply compressed air into case passage to remove piston. If piston does not pop out with compressed air, use needle-nose pliers to remove. Remove 2 "O" rings from piston.
19. Remove snap ring from transaxle case. Remove parking lock pawl bracket. Remove manual valve shaft collar, retaining spring and pin. Slide shaft out from case. Remove manual valve lever and parking lock rod. Using a screwdriver, remove manual valve shaft oil seal. Remove pin, spring and parking lock pawl.
20. Using a torque wrench, measure differential total preload. Note measurement for reassembly reference. Using large screwdriver, remove LH bearing retainer. See **Fig. 15** or **Fig. 16**.
21. On A-540E, using same procedure as step 30), remove RH bearing retainer. On both models, tap cover with plastic hammer and remove carrier cover.
22. On A-540E, remove differential case, outer race and shim from transaxle case. On A-540H, remove differential assembly and 2 apply gaskets. On both models, remove drive pinion cap.
23. Using a torque wrench, measure drive pinion preload. Preload with old bearing should be 4.3-6.9 INCH lbs. (.5-.8 N.m). The total preload measured in step 20 minus drive pinion preload should equal 1.1-1.7 INCH lbs. (.1-.2 N.m). If preload is not within specification, side bearing preload requires adjustment.
24. Using a chisel, loosen staked part of nut. Using Holding Tool (09330-00021) and Holding Tool (09351-

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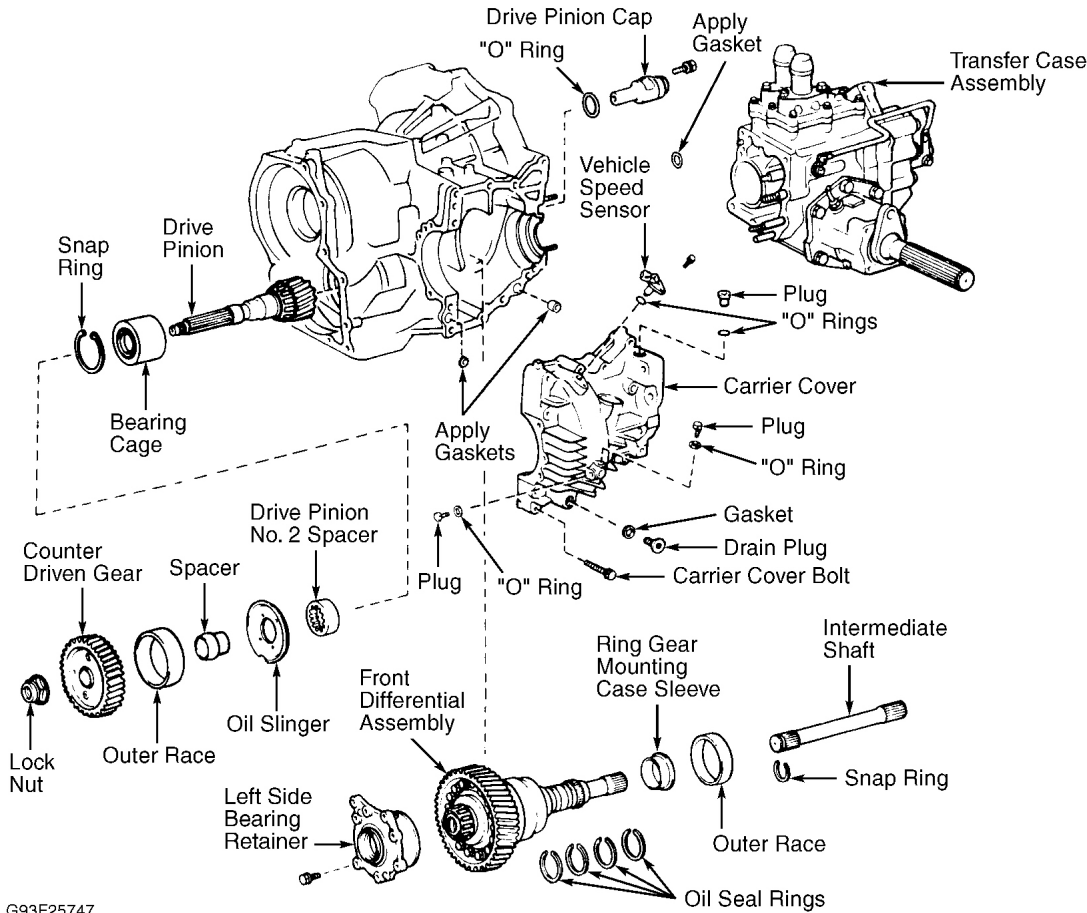
32032), remove counter driven gear nut. Using Puller (09351-32061), remove counter driven gear and bearing.

25. Using Puller (09308-10010), remove outer race. Remove spacer and oil slinger. See **Fig. 15** or **Fig. 16** . On A-540E, remove sensor rotor. On A-540H, remove drive pinion No. 2 spacer.
26. Using Expander (09351-32050), remove drive pinion snap ring. Insert bar into case hole to remove drive pinion. Using an arbor press, press out drive pinion from transaxle case. On A-540E, remove "O" rings from bearing cage. On both models, remove bearing cage from drive pinion.



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Fig. 15: Exploded View Of Rear Components (A-540E)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 16: Exploded View Of Rear Components (A-540H)
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

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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 maximum specification, replace drive gear, driven gear or pump body. There are 3 different thicknesses for drive and driven gears. See **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. Measure inside diameter of stator shaft bushing. Maximum diameter of stator shaft bushing is .8492" (21.570 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.
4. Turn drive gear with screwdriver to ensure smooth rotation. **DO NOT** damage oil seal lip. Install race on stator shaft.

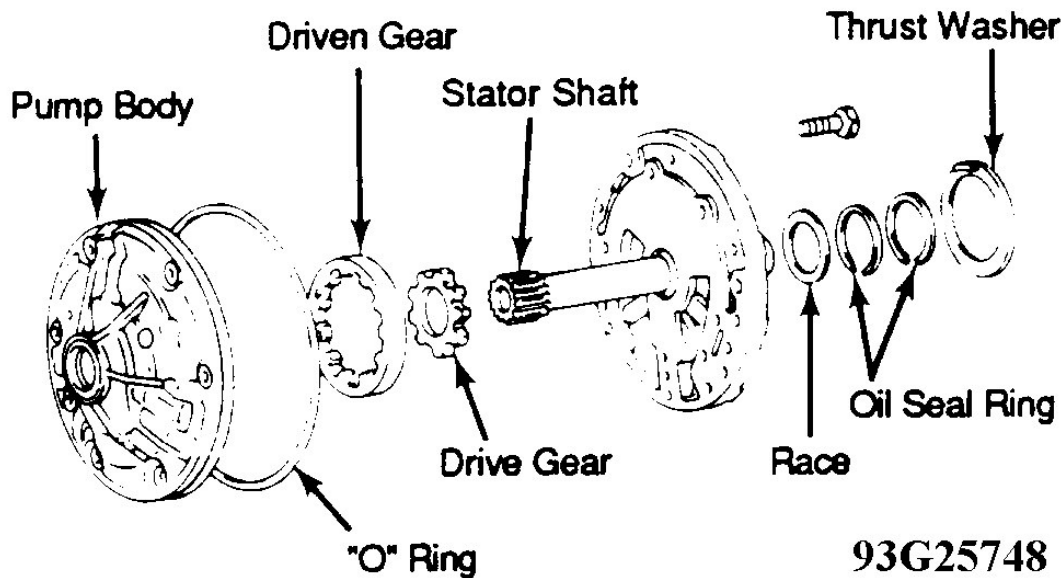


Fig. 17: Exploded View Of Oil Pump

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DIRECT CLUTCH

Disassembly

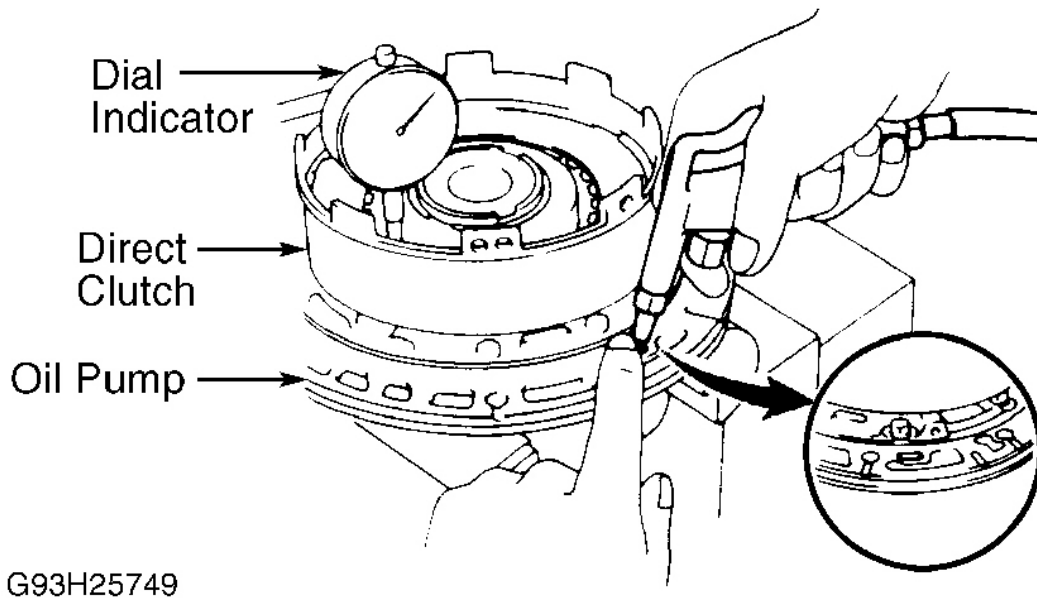
1. Prior to disassembly, check piston stroke of direct clutch. Measure piston stroke by applying 57-114 psi (4-8 kg/cm²) of compressed air. See **Fig. 18**. Piston stroke should be .0358-.0531" (.910-1.350 mm) for A-540E, and .0437-.0579" (1.110-1.470 mm) for A-540H. If piston stroke is greater than maximum, inspect each component.
2. 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**.
3. 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-540E and A-540H, maximum inside diameter is 1.9004" (48.270 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. Install in order: plate, disc, plate, disc, 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 .0358-.0531" (.910-1.350 mm) for A-540E, and .0437-.0579" (1.110-1.470 mm) for A-540H. If piston stroke is less than specification, replace flange.
6. Flange is available in 2 thicknesses, .1063" (2.700 mm) or .1181" (3.000 mm) for A-540E and A-540H.
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

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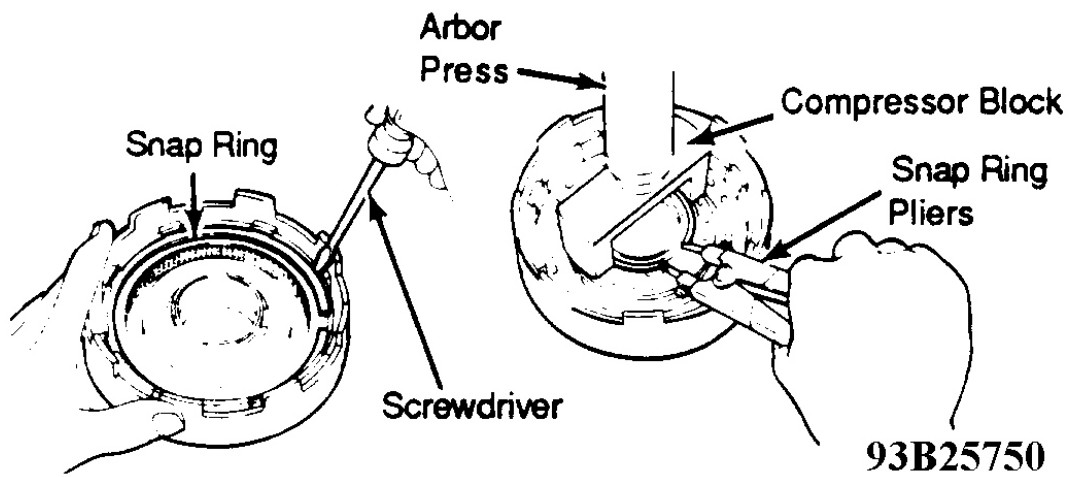


Fig. 19: Removing & Installing Direct Clutch

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

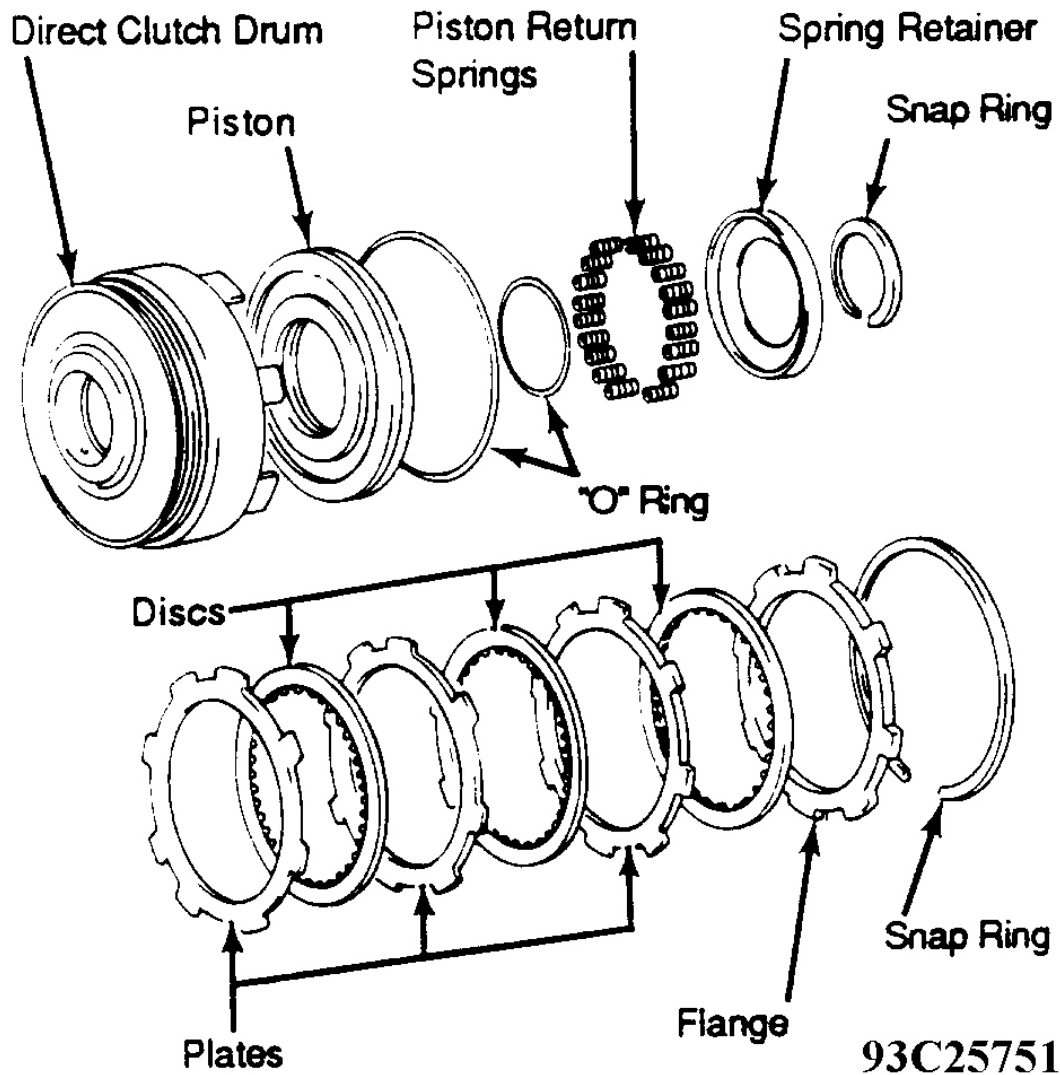


Fig. 20: Exploded View Of Direct Clutch
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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 .0555-.0717" (1.410-1.820 mm) for A-540E and A-540H. 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.

3. Using an arbor press, compress springs. On A-540E, remove return spring assembly. On A-540H, remove retainer and 18 springs. On all models, 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.

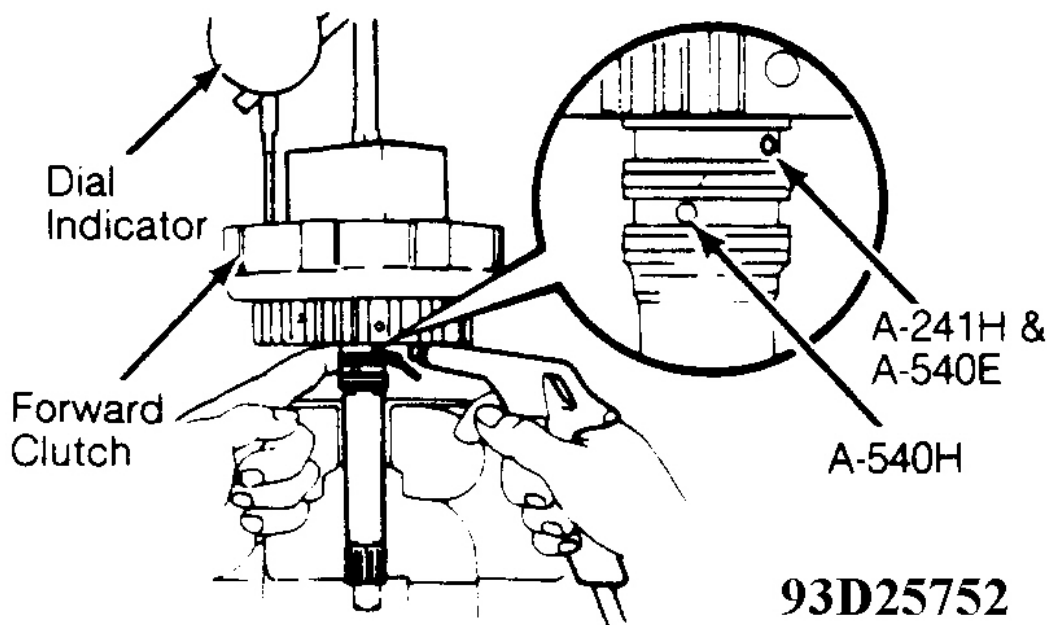


Fig. 21: Checking Forward Clutch Piston Stroke
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

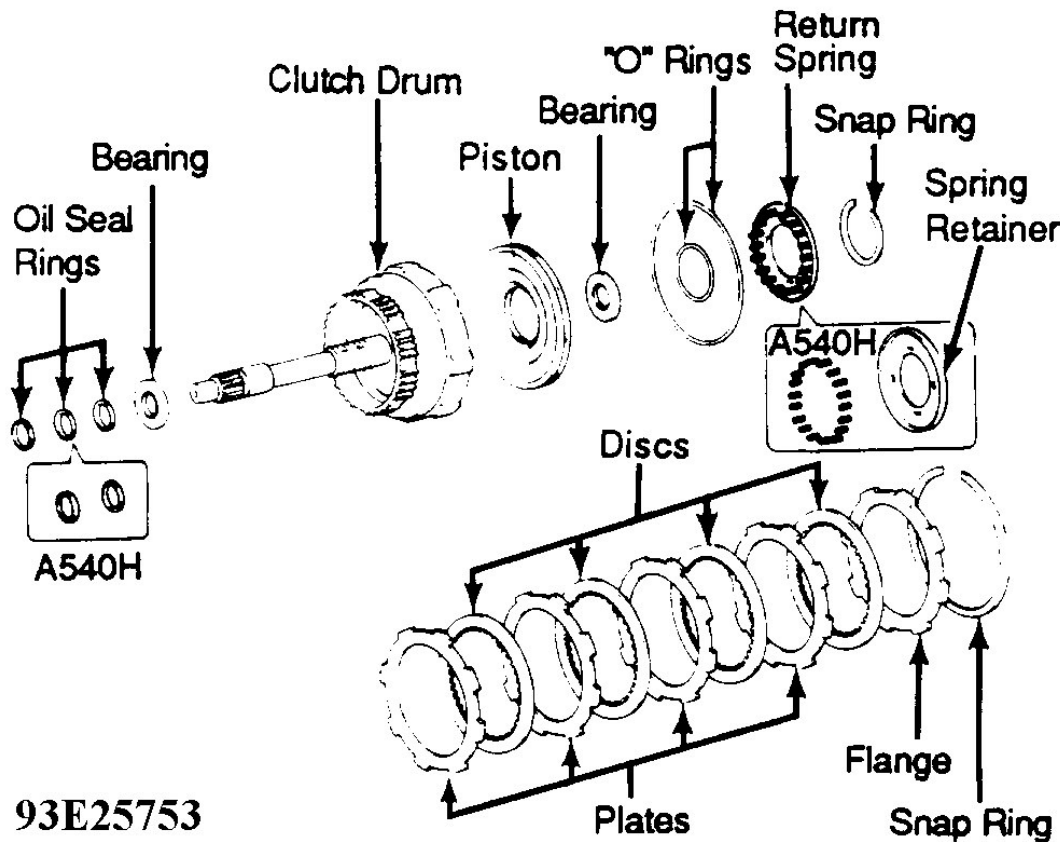


Fig. 22: Exploded View Of Forward Clutch
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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 .0555-.0717" (1.410-1.820 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.

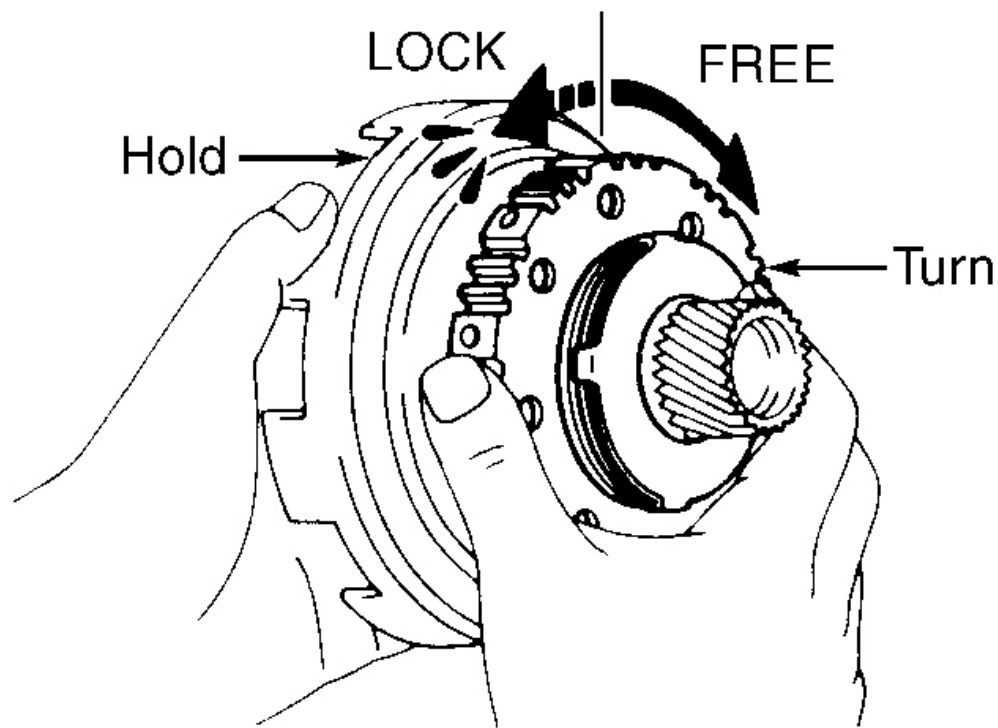
FRONT PLANETARY GEAR

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-540E and A-540H is .8894" (22.590 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.

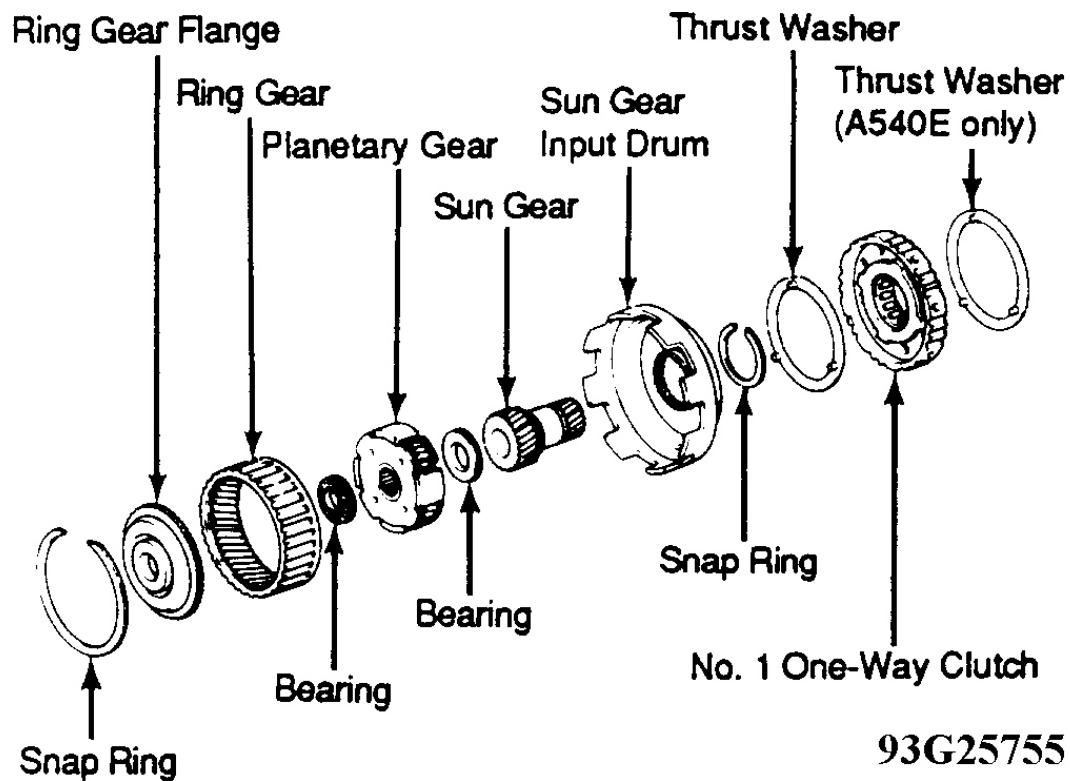


Fig. 24: Exploded View Of Front Planetary Gear
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

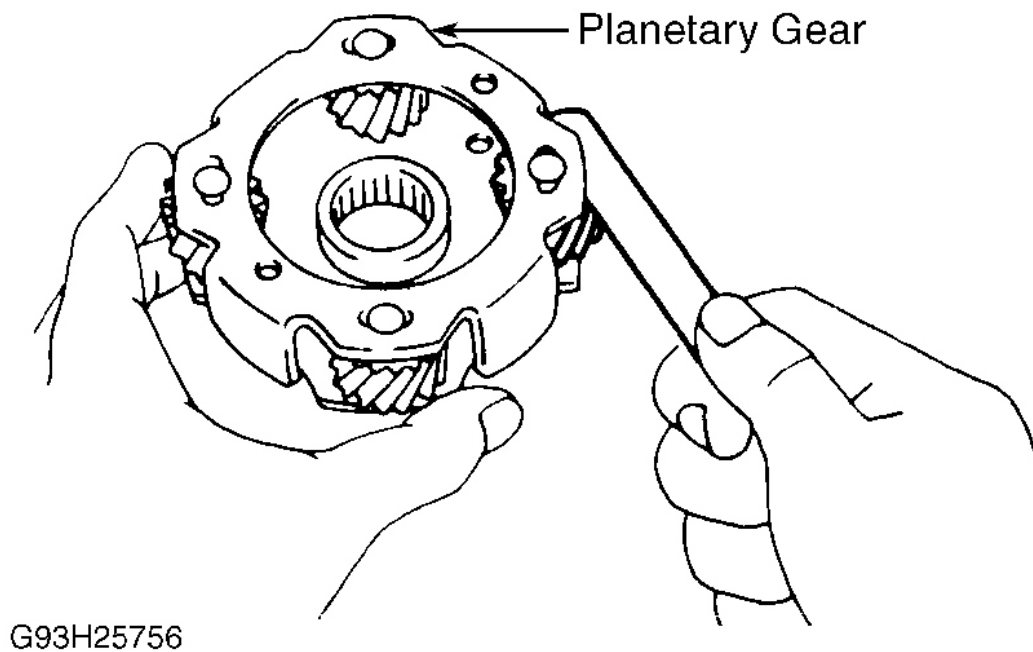


Fig. 25: Measuring Planetary Pinion Gear Thrust Clearance
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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 washer on rear side of planetary gear on A-540E models and thrust washers from both sides on A-540H models.
3. On all models, 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 .0063-.0220" (.160-.560 mm). Maximum clearance is .024" (.61 mm). Replace planetary gear assembly if clearance is excessive.

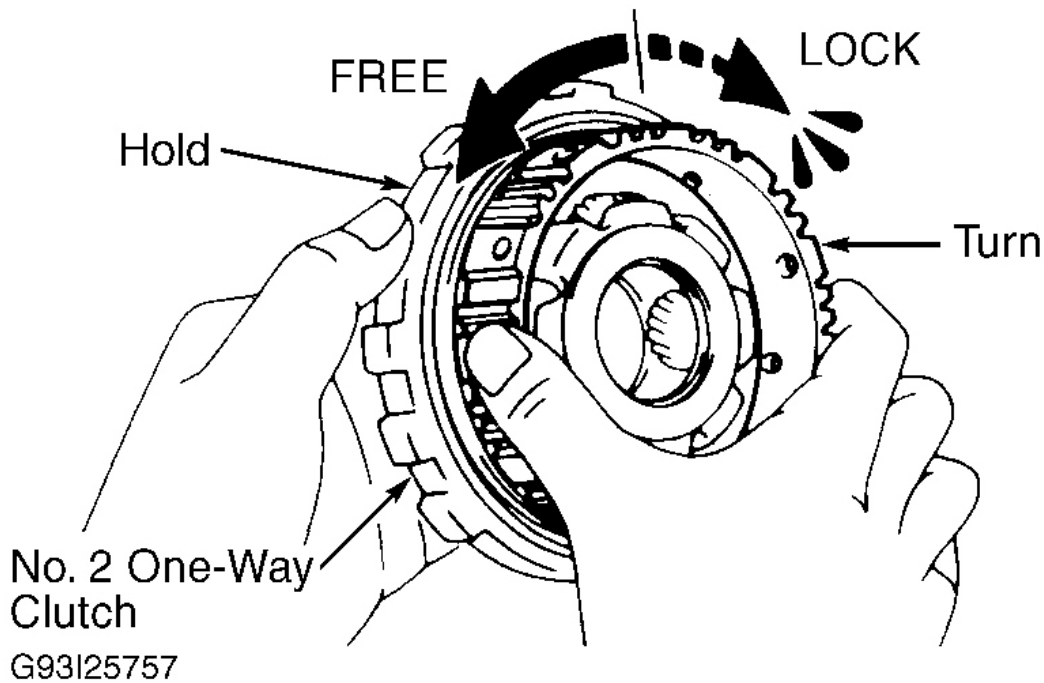


Fig. 26: Checking No. 2 One-Way Clutch Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

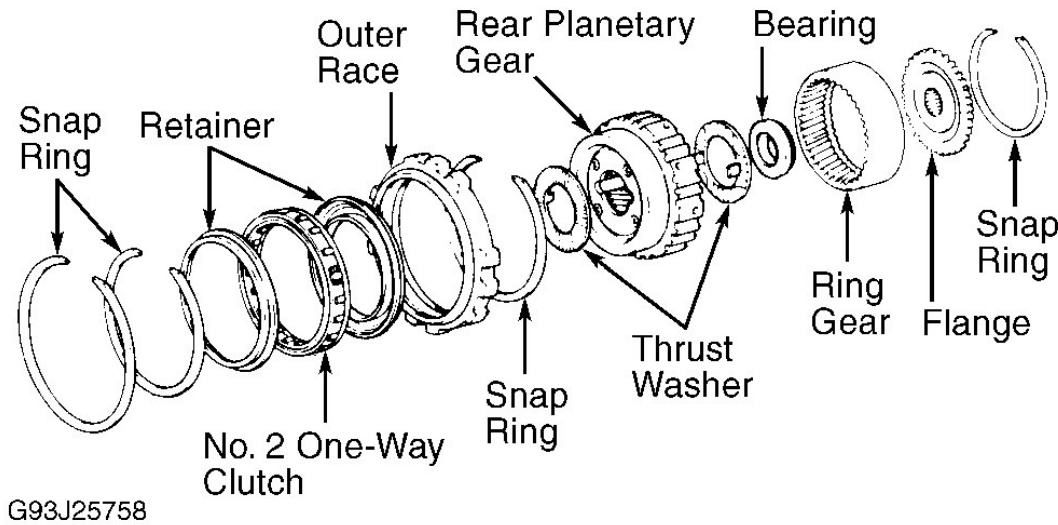


Fig. 27: Exploded View Of Rear Planetary Gear (A-540H Shown; A-540E is Similar)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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.

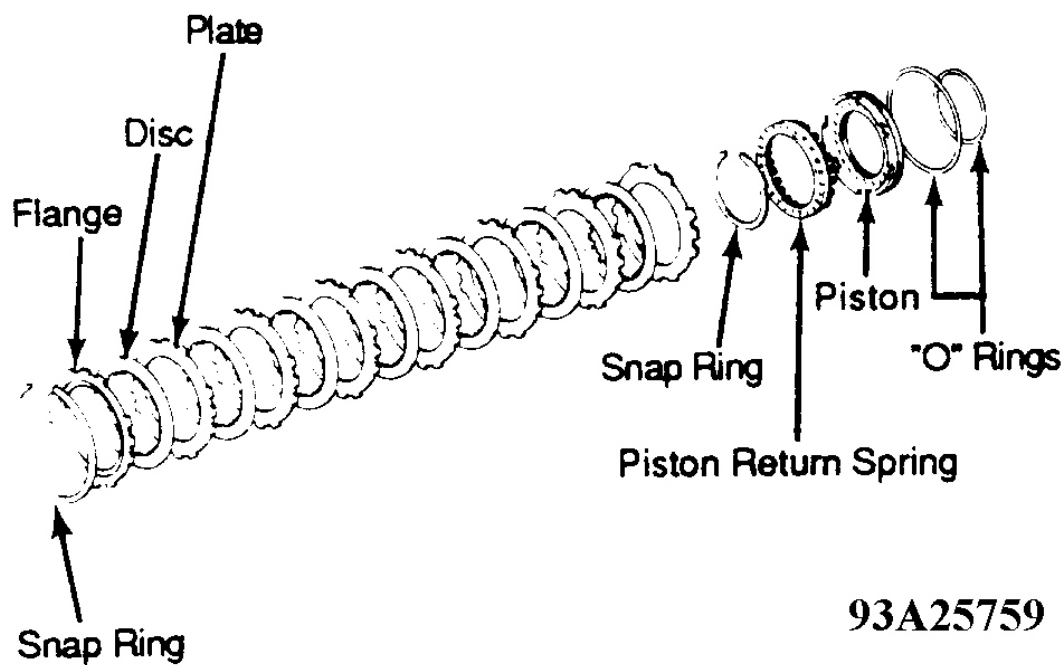


Fig. 28: Exploded View Of 1st & Reverse Brake Piston (A-540E Shown; A-540H is Similar)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

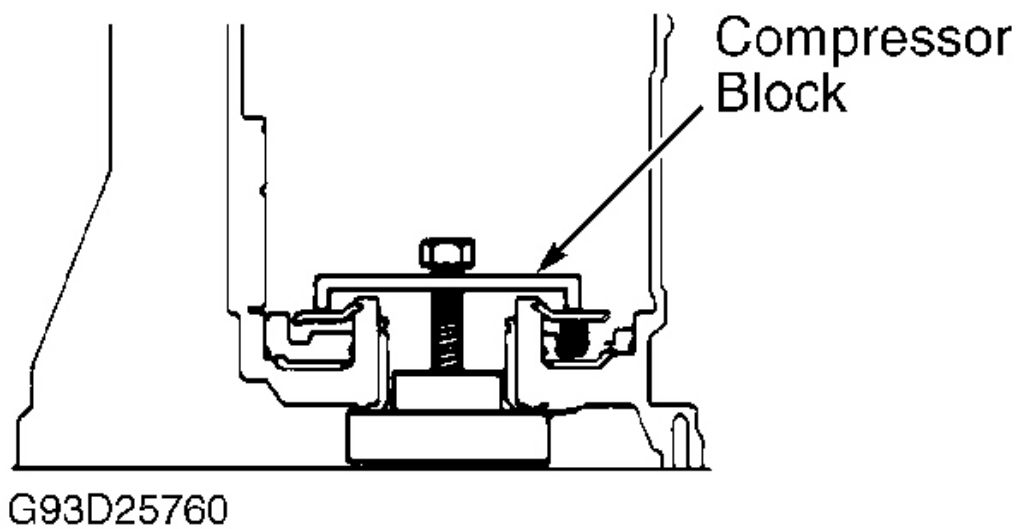


Fig. 29: Compressing Springs Of 1st & Reverse Brake Piston

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

Reassembly

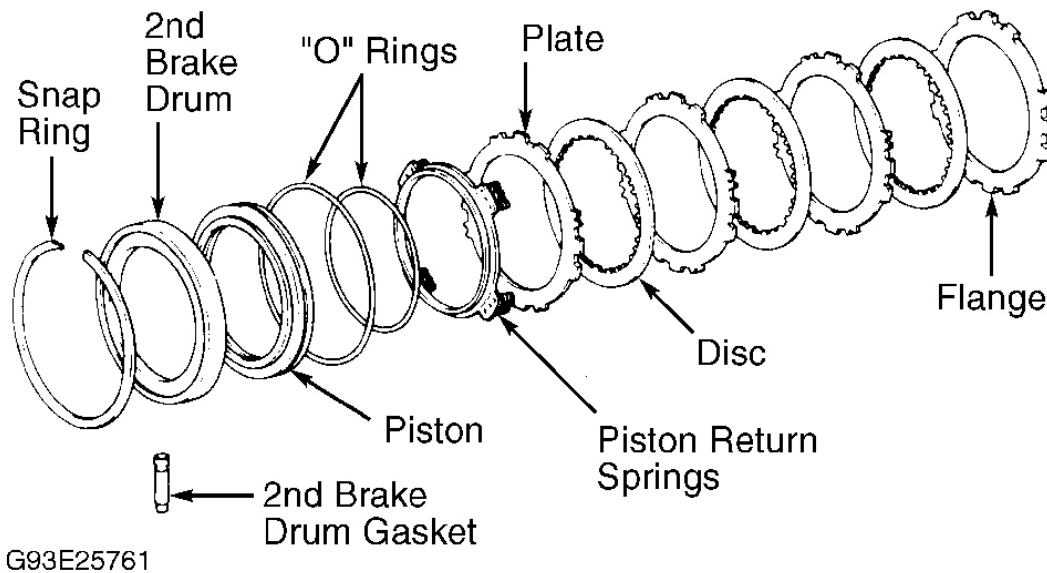
1. Install NEW "O" rings on piston. Coat rings with ATF. Install piston in bore of case, facing spring seats upward. Place base of spring compressor under case. Install piston return springs and retainer. Set snap ring in place.
2. Compress piston return springs slowly and evenly to allow installation 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**

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

2ND COAST BRAKE

Disassembly

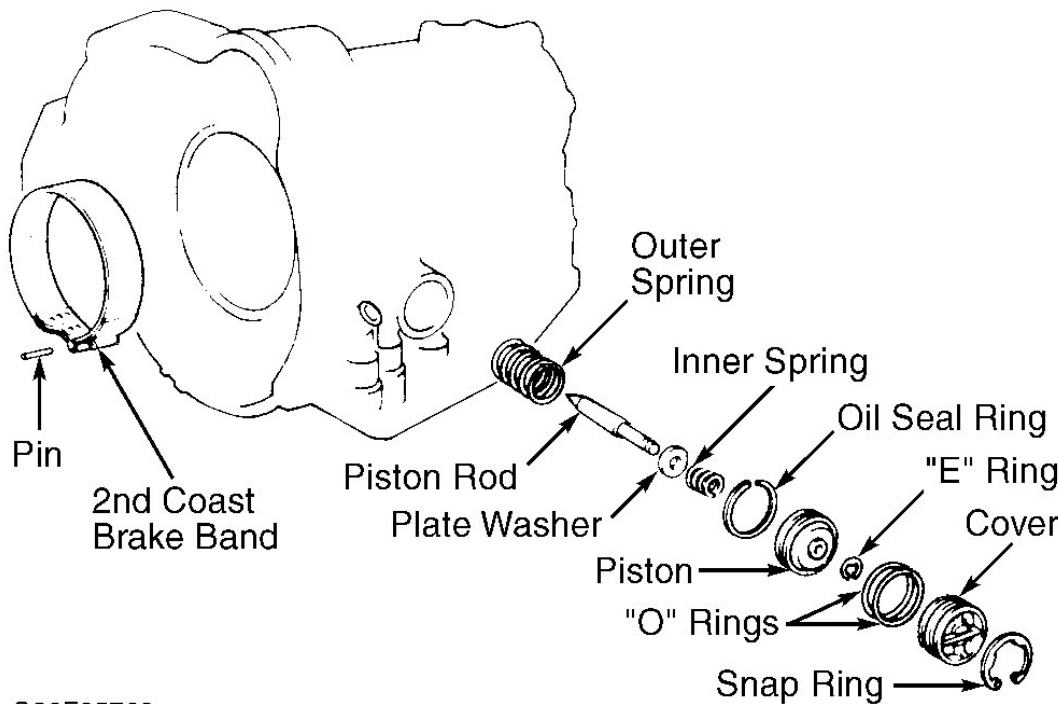
Remove oil seal ring from piston. Remove piston rod "E" ring while pushing piston with needle-nose pliers. Remove inner spring, plate washer and piston rod. See **Fig. 31**.

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 .079-.138" (2.00-3.50 mm) for A-540E and A-540H. Select from 2 types of piston rod. Piston rod lengths are 3.748" (95.20 mm) and 3.791" (96.30 mm) for A-540E and A-540H.

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. Remove solenoid(s). See **Fig. 32** . **DO NOT** use a screwdriver to pry up solenoid(s). Remove "O" ring(s) from solenoid(s).
2. Remove accumulator assembly. Remove check ball on No. 1 plate. Applying compressed air to accumulator cylinder hole, remove piston and spring. Remove 2 "O" rings from piston. See **Fig. 32** .
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. Remove lock-up relay valve sleeve stopper. See **Fig. 32** . Turn assembly over.
4. On all models, 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.
5. On A-540E and A-540H, remove 2 check balls from lower valve body. Remove 1 bolt from lower valve body. Remove 3 bolts from upper valve body. Hold No. 1 plate to upper valve body. Lift off upper valve body and plate as a unit. **DO NOT** lose steel balls, retainers and pins in valve body.

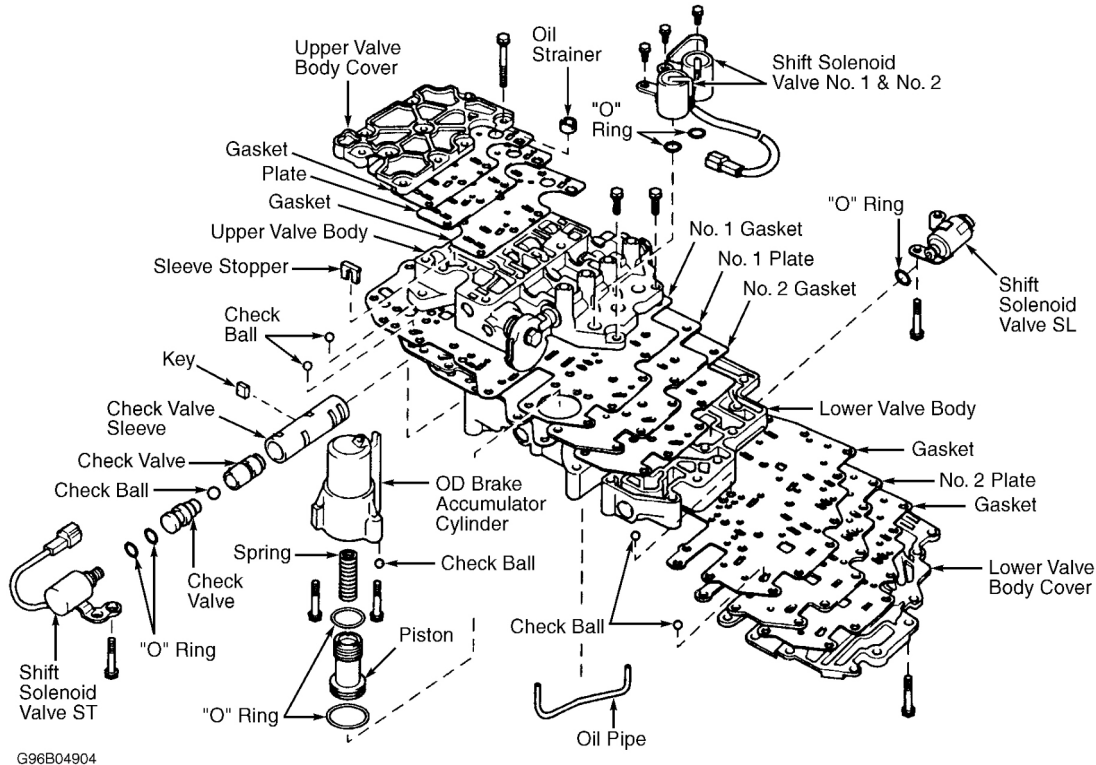


Fig. 32: Exploded View Of Valve Body Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Disassembly (Upper Valve Body A-540E & A-540H)

1. To remove 2nd coast modulator valve, remove retainer with a magnet. Remove plug, spring and valve. To remove B1 orifice control valve, remove retainer with a magnet. Remove plug, spring and valve. See **Fig. 33**.
2. To remove throttle cam, loosen bolt. Remove cam, spring and pin. To remove down shift plug and spring, remove pin with a magnet. Remove downshift plug with sleeve and spring. Remove throttle valve. Remove spring and adjusting rings.
3. To remove throttle modulator valve, remove retainer with a magnet. Remove plug, valve and spring. To remove cut-back valve, remove retainer with a magnet. Remove plug, valve and spring.
4. To remove No. 1 accumulator control valve, remove retainer with a magnet. Remove plug, spring and control valve. To remove lock-up relay control valve, remove retainer for plug with a magnet. Remove plug. Remove lock-up relay valve, control valve and spring.

1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul

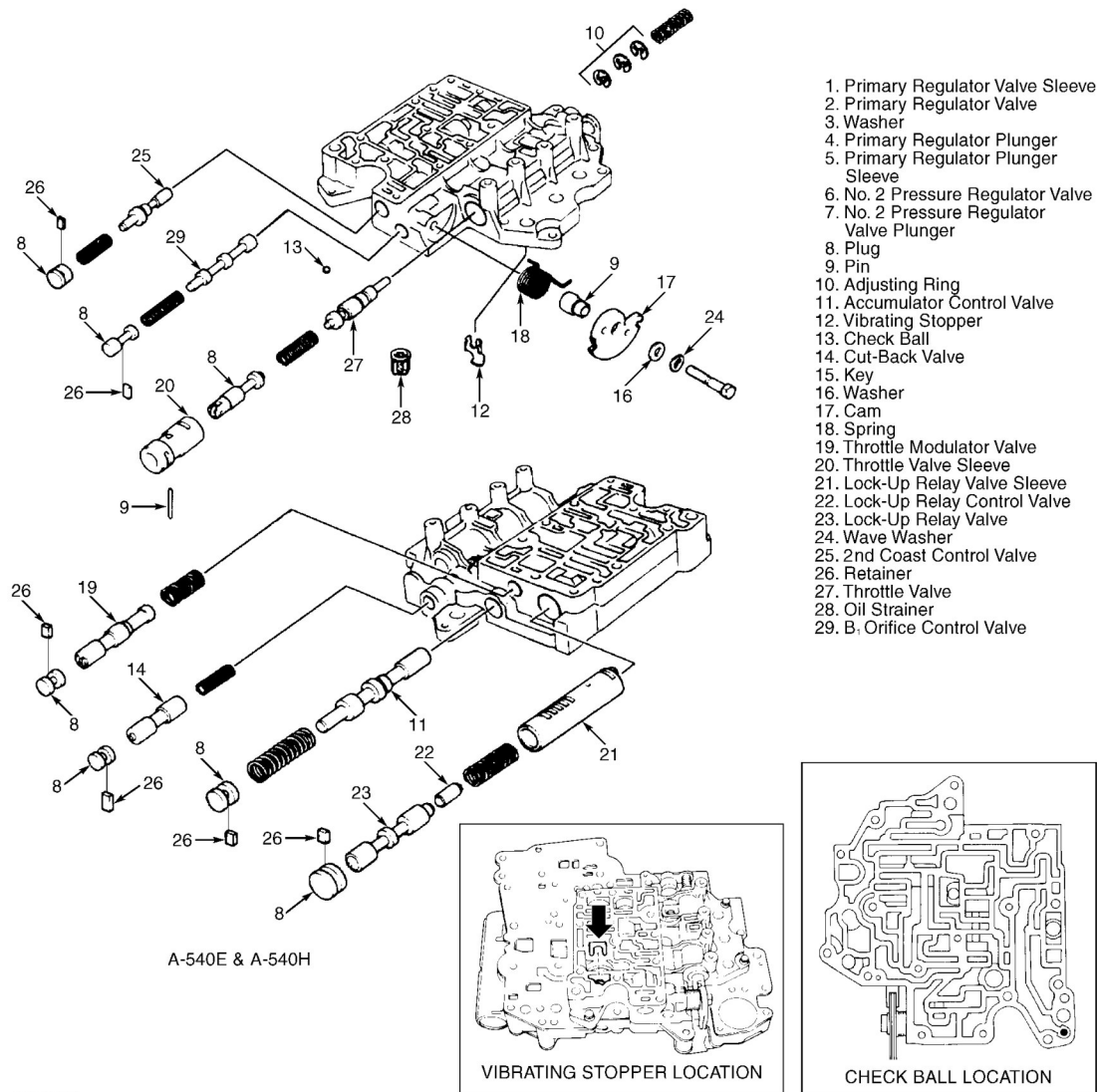


Fig. 33: Exploded View Of Upper Valve Body (Viewed From Both Ends)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

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

UPPER VALVE BODY VALVE SPRING SPECIFICATIONS (A-540E & A-540H)

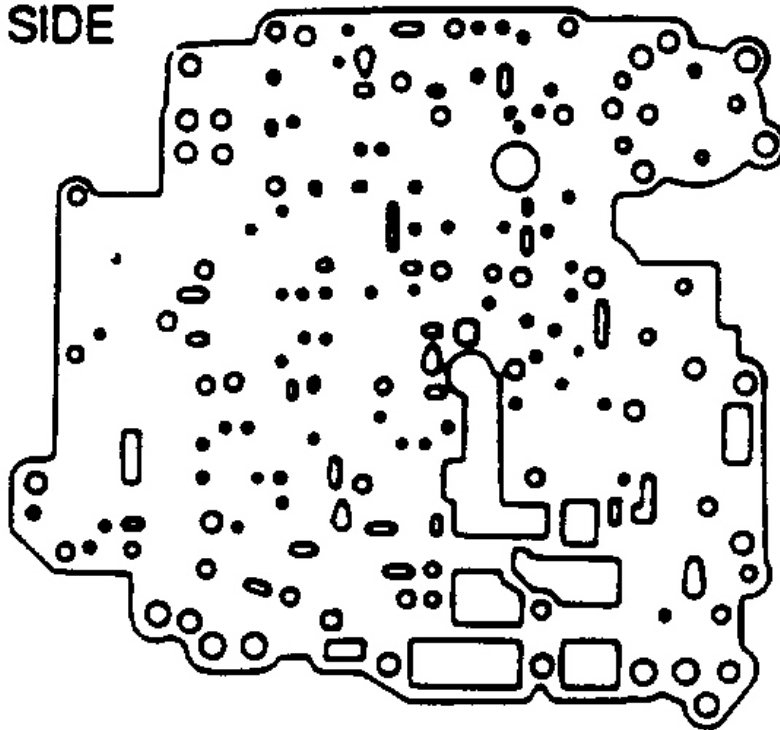
Application	Color	Free Height: In. (mm)
2nd Coast Modulator Valve	Brown	1.083 (27.50)
B1 Orifice Control Valve	White	.976 (24.80)
Downshift Plug	Yellow	1.173 (29.80)

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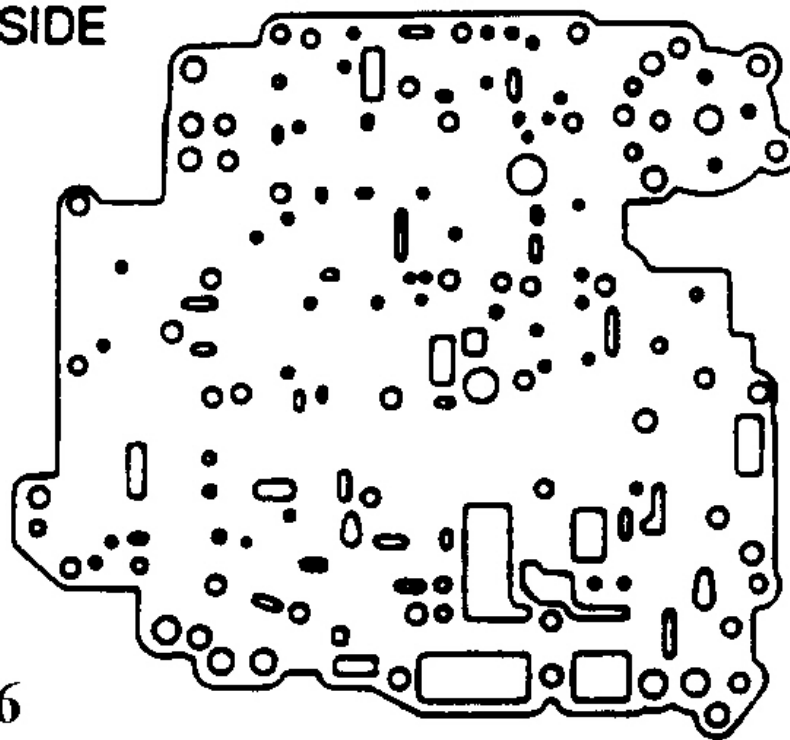
1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul

Throttle Valve	Purple	1.209 (30.70)
Throttle Modulator Valve	Orange	.854 (21.70)
Cut-Back Valve	Red	.858 (21.80)
No. 1 Accumulator Control Valve	Yellow	1.106 (28.10)
Lock-Up Relay Valve	Green	1.047 (26.60)

LOWER SIDE



UPPER SIDE



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Fig. 34: Valve Body Gasket Identification**Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.****Reassembly (Upper Valve Body A-540E & A-540H)**

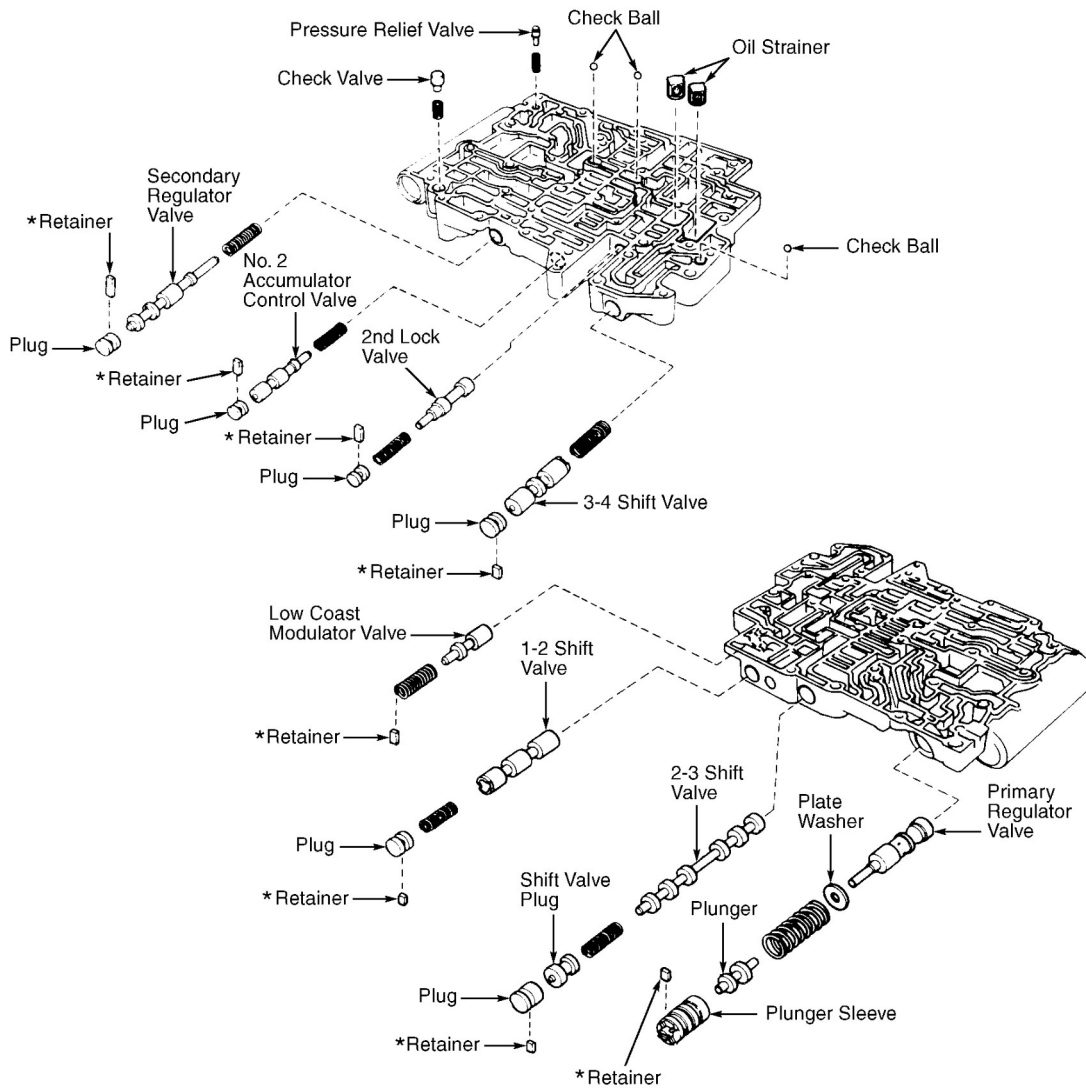
1. Install lock-up relay sleeve in bore. Coat retainer with petroleum jelly. Install retainer on end of sleeve. Install control valve, spring and lock-up relay valve in bore. Install unit in a horizontal position. Push in relay valve by hand until control valve touches end of sleeve. Install plug and retainer.
2. To install cut-back valve, install spring, install valve cup side first. Install plug and retainer. To install throttle modulator valve, install spring and valve. Install plug and retainer.
3. To install No. 1 accumulator control valve, install valve and spring. Install plug and retainer. To install low coast modulator valve, install valve and spring. Install plug and pin.
4. To install 2nd coast modulator valve, install valve and spring. Compress spring. Allow retainer to fall into place. Ensure retainer fully covers end of spring. Install throttle valve. Coat retainer with petroleum jelly. Install retainer in valve body.
5. Install same number of adjusting rings on throttle valve shaft as were removed during disassembly. Compress and slide spring over end of valve shaft.
6. Install spring in throttle valve. Install downshift plug with sleeve. Coat pin with petroleum jelly. Install pin to hold sleeve in place. To assemble throttle cam, install spring with hood through hole in cam.
7. Install cam assembly on upper valve body. Check position of spring ends. Tighten cam mounting bolt to 65 INCH lbs. (7.3 N.m). Ensure cam moves on roller of downshift plug. Ensure pins and retainer are installed correctly.
8. To install B1 orifice control valve, install valve and spring. Install plug and retainer.

Disassembly (Lower Valve Body A-540E & A-540H)

1. Remove pressure relief valve and spring. Remove check valve and spring. Remove 3 check balls and oil strainer. See **Fig. 35** .
2. To remove primary regulator valve, remove retainer, plug, sleeve and plunger. Note position of retainers. See box in **Fig. 35** . Remove spring and valve. Note number of adjusting rings.
3. To remove secondary regulator valve, remove retainer and plug. Remove valve and spring. To remove 2nd lock valve, compress spring with a screwdriver. Remove retainer with a magnet. Remove plug, spring and valve.
4. To remove 2-3 shift valve, remove retainer, plug, spring and valve. To remove 1-2 shift valve, remove retainer, plug, spring and valve.
5. To remove 3-4 shift valve, remove retainer with a magnet. Remove plug. Remove 3-4 shift valve. See **Fig. 35** .
6. To remove low coast modulator valve, remove retainer. Remove valve. To remove No. 2 accumulator control valve, remove retainer with a magnet. Remove plug, spring and control valve.

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* 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. 35: 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 the **LOWER VALVE BODY VALVE SPRING SPECIFICATIONS** table.

LOWER VALVE BODY VALVE SPRING SPECIFICATIONS (A-540E & A-540H)

Application	Color	Free Height: In. (mm)
Pressure Relief Valve	None	.441 (11.20)

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1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul

Check Valve	None	.783 (19.90)
Secondary Regulator Valve	Purple	1.516 (38.50)
No. 2 Accumulator Control Valve	Gray	.906 (23.00)
2nd Lock Valve	Orange	.815 (20.70)
3-4 Shift Valve	Light Green	1.150 (29.20)
Low Coast Modulator Valve	Purple	.795 (20.20)
1-2 Shift Valve	Light Green	1.150 (29.20)
2-3 Shift Valve	None	1.102 (28.00)
Primary Regulator Valve	None	2.528 (64.20)

Reassembly (Lower Valve Body A-540E & A-540H)

1. To install primary regulator valve, install adjusting rings and spring seat. Install same number of rings as were removed. Place valve in bore in horizontal position.
2. Stand valve body upward. Push valve into bore until valve tip touches bore. Install valve spring. Insert plunger with short end first. Ensure plunger is fully inserted. Plunger should be recessed inside sleeve. Install sleeve with plunger. Ensure regulator valve fits in bore. Install retainer. See **Fig. 35**.

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

3. To install secondary regulator valve, install spring, valve, plug and retainer. To install 2nd lock-up valve, install valve and spring. Compress spring with a screwdriver. Install retainer.
4. To install 2-3 shift valve, install valve, spring, plug and retainer. To install 1-2 shift valve, install valve, spring, plug and retainer. To install 3-4 shift valve, install valve (flat end first), spring, plug and retainer.
5. To install low coast modulator valve, install valve, spring and retainer. To install No. 2 accumulator control valve, install valve and spring. Install plug and retainer.
6. Install pressure relief valve and spring. Install check valve and spring. Install 3 check balls. See **Fig. 36**. Install strainer on lower valve body.

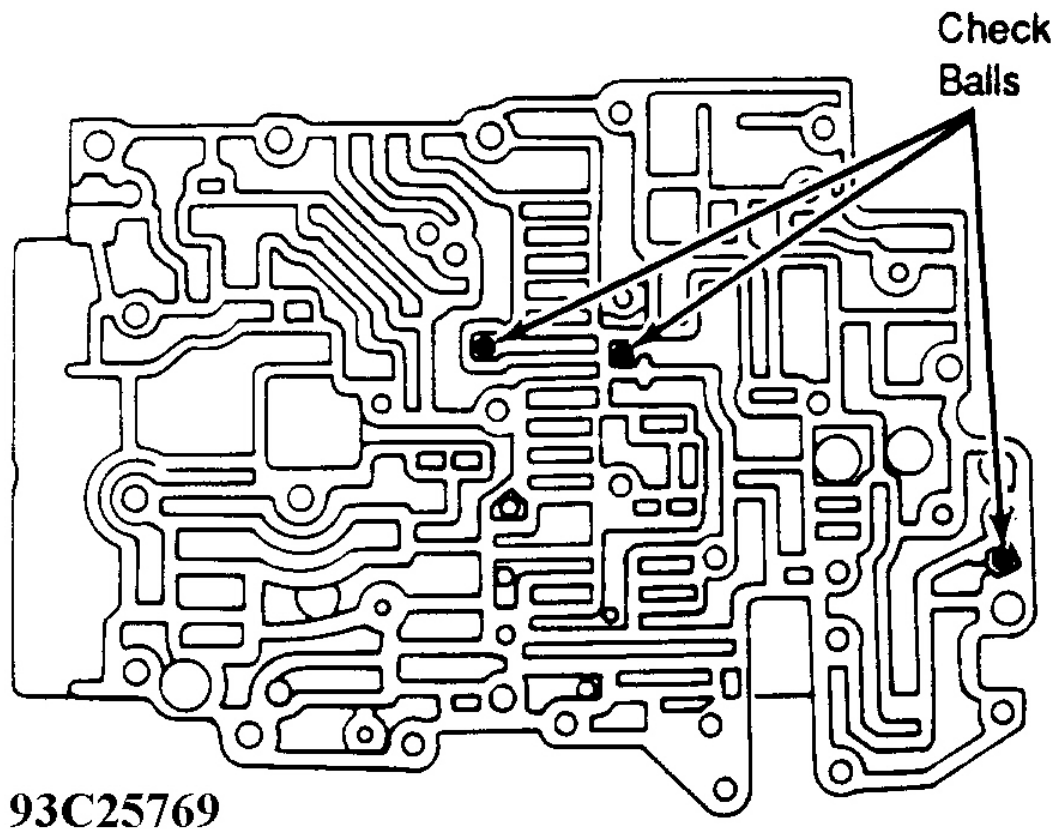


Fig. 36: Locating Lower Valve Body Check Balls
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

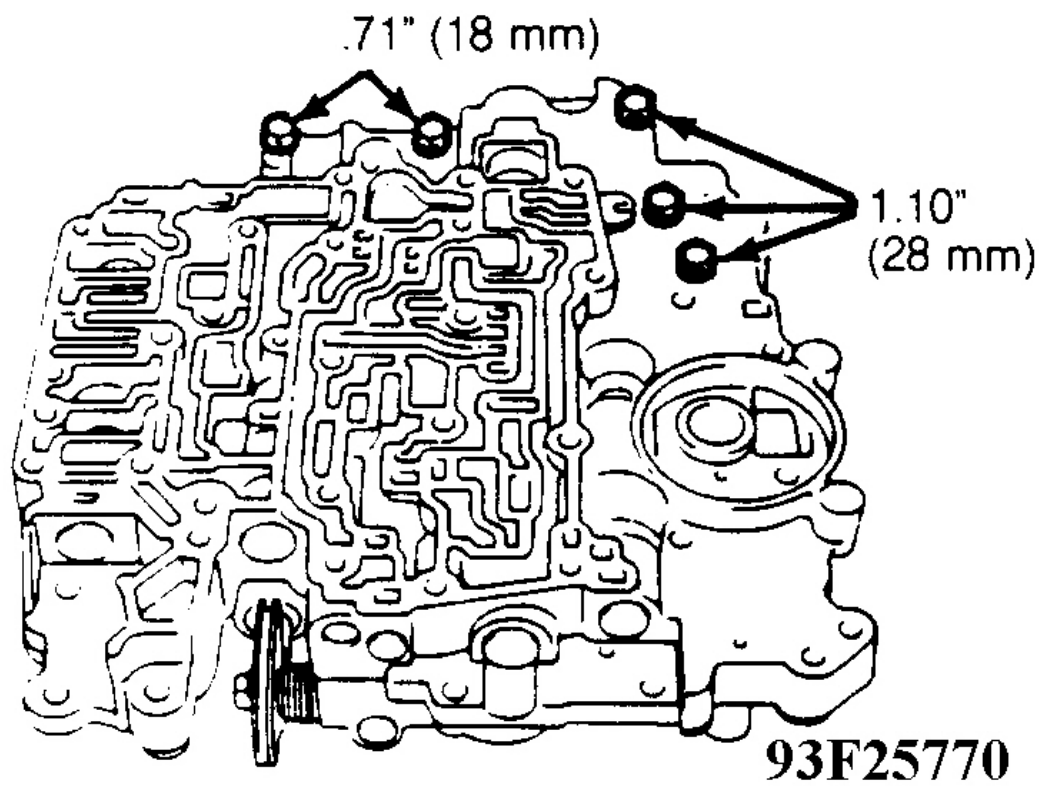


Fig. 37: Installing Lower Valve Body Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

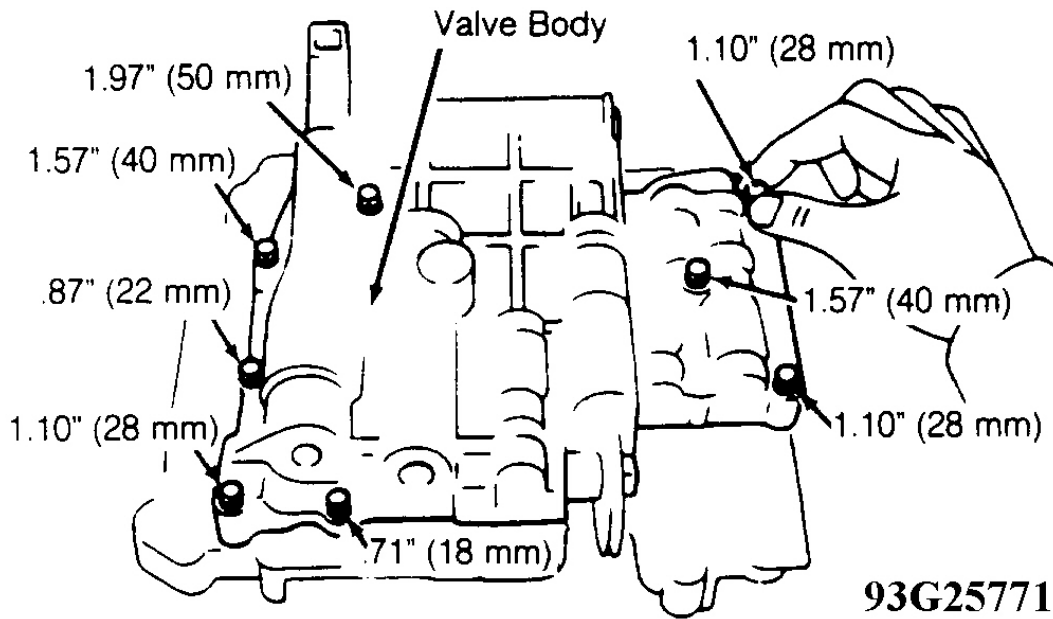


Fig. 38: Installing Upper Valve Body & Cover Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

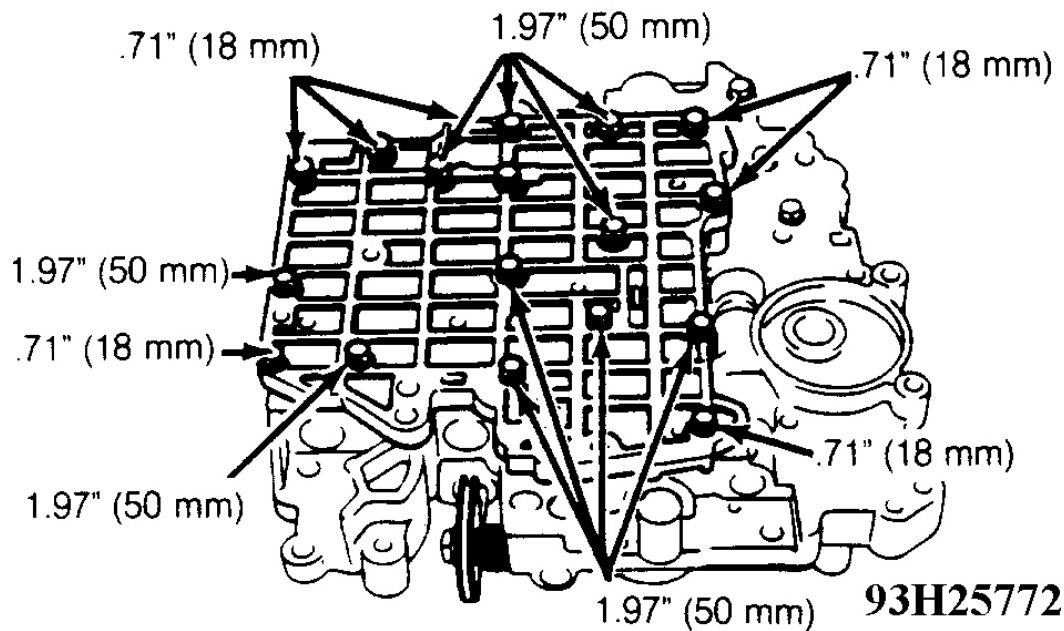


Fig. 39: Installing Lower Valve Body Cover Bolts

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

Reassembly (Control Valve Assembly A-540E & A-540H)

1. Position NEW No. 1 gasket, No. 1 plate and NEW No. 2 gasket on upper valve body. Place upper valve body with No. 1 plate and gaskets on lower valve body. Hold upper valve body, No. 1 plate and gaskets so they do not separate. Align each bolt hole in valve bodies with gaskets and plate. Note length and location of bolts. Install and finger tighten 3 bolts in upper valve body to secure lower valve body. See **Fig. 40**.
2. Install lock-up relay valve sleeve stopper. Install upper valve body cover gaskets, plate and throttle modulator oil strainer. Install upper valve body cover, and finger tighten 11 bolts in valve body cover. See **Fig. 40**. Install and finger tighten bolts in lower valve body.
3. Install 2 check balls into lower valve body. Install lower valve body cover gaskets and No. 2 plate. Install lower valve body cover and finger tighten 12 bolts in valve body cover. Tighten 13 bolts in lower valve body to 58 INCH lbs. (6.6 N.m). Tighten 14 bolts in upper valve body to 58 INCH lbs. (6.6 N.m).
4. Install accumulator. Coat NEW "O" rings with ATF. Install "O" rings on piston. Insert spring and piston into cylinder. Place check ball on No. 1 gasket. Install accumulator. Install and tighten 3 bolts to 58 INCH lbs. (6.6 N.m).
5. Install lock-up solenoid. Tighten bolt to 58 INCH lbs. (6.6 N.m). Install No. 1 and No. 2 solenoids. Tighten bolts to 58 INCH lbs. (6.6 N.m).

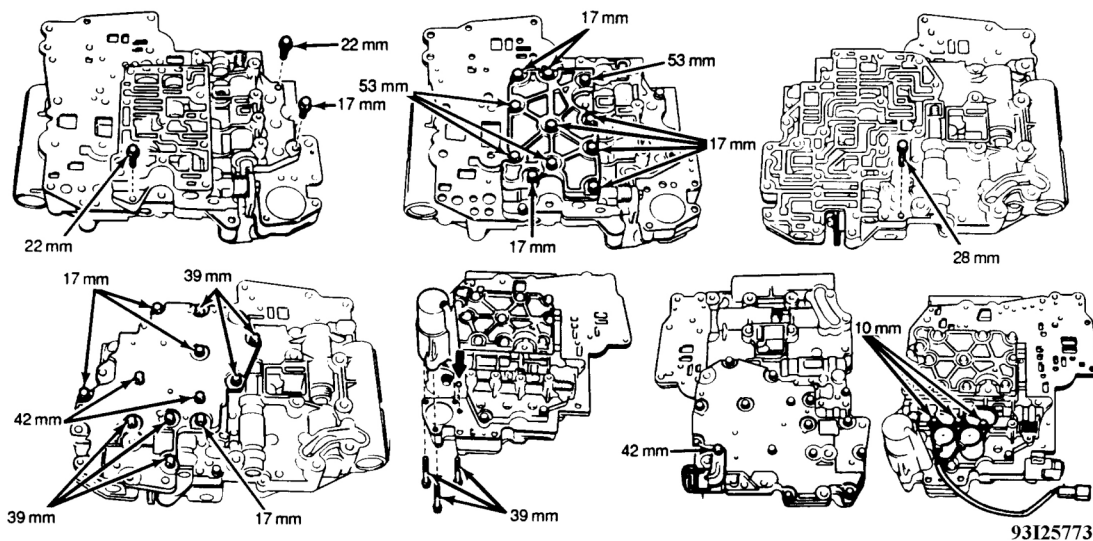


Fig. 40: Locating Valve Body Bolts

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

OVERDRIVE UNIT (A-540E & A-540H)

Disassembly (Overdrive Brake)

1. While pushing return spring, remove snap ring with a screwdriver. Remove piston return spring. Remove plates, discs and flange. See **Fig. 41**.

2. Blow out piston from drum by applying compressed air to oil hole and remove piston. Ensure piston does not tilt. Remove "O" ring from piston. Inspect disc, plate and flange. If discs are replaced, allow discs to soak at least 15 minutes in ATF.

Reassembly (Overdrive Brake)

1. Install "O" rings on piston. Coat "O" rings with ATF. Install piston in drum. Ensure "O" ring is not damaged. Install flange facing flat end upward.
2. Install following parts in order: disc, plate, disc, plate, disc, plate. Install cushion plate with rounded end upward. Install piston return spring assembly. Install snap ring into case. Ensure end gap of snap ring is not aligned with one of cutouts.

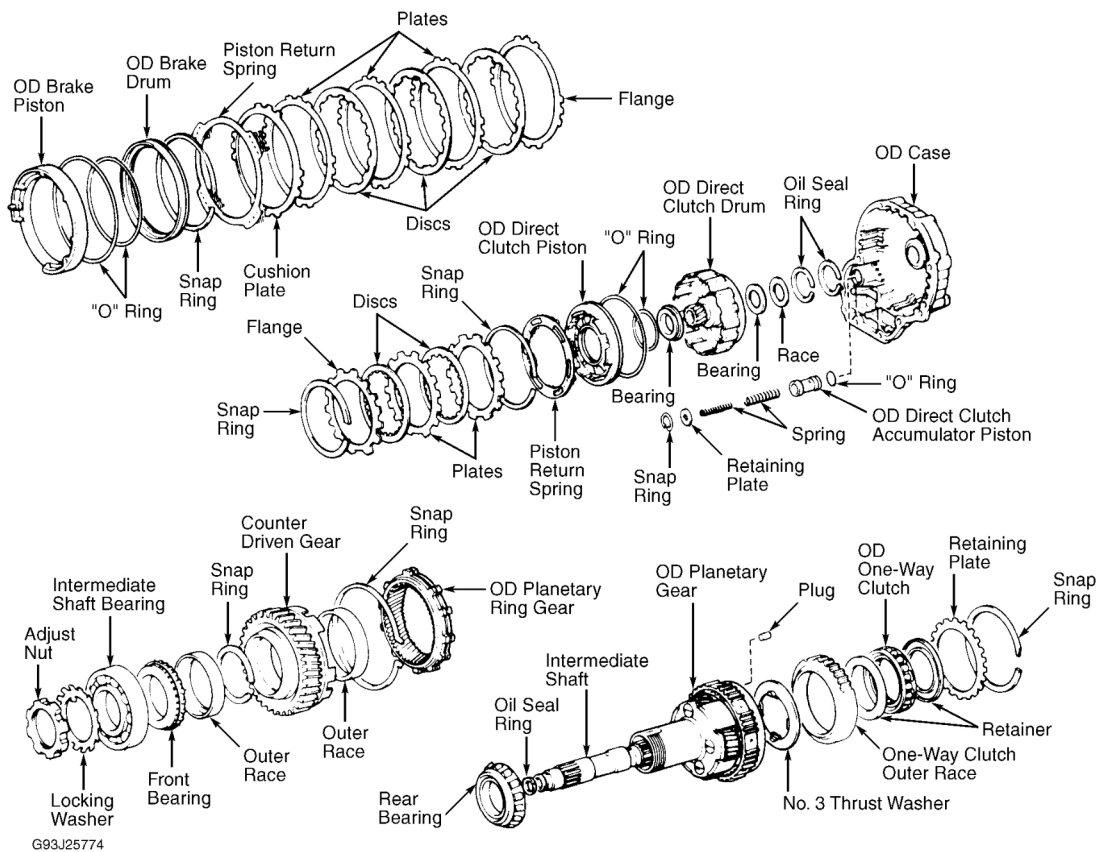


Fig. 41: Exploded View Of Overdrive Assembly
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Disassembly (Overdrive Direct Clutch)

1. Remove overdrive direct clutch from case. Remove bearing and race from clutch drum and case. Using a screwdriver, remove snap ring. Remove flanges, discs and plates.
2. Using Compressor Block (09351-32070) and arbor press to compress piston return spring, remove snap ring. Remove piston return spring.

3. Apply compressed air to pressure apply hole. Remove OD direct clutch drum from case. See **Fig. 42** . If piston does not completely come out, use needle-nose pliers to remove piston. Remove "O" rings from piston.

Inspection

Inspect check ball of piston for free movement by shaking piston. Ensure valve does not leak by applying low pressure compressed air. If discs are replaced, allow discs to soak at least 15 minutes in ATF. Measure inside diameter of 2 direct clutch bushings. Maximum inside diameter is .8713" (22.130 mm). If inside diameter exceeds maximum diameter, replace direct clutch drum.

Reassembly (Overdrive Direct Clutch)

1. Coat NEW "O" ring with ATF. Install "O" ring on piston. Press piston in drum with cup side up. **DO NOT** damage "O" ring. Install return spring and set snap ring in place. See **Fig. 41** .
2. Set spring compressor block on spring retainer. Use an arbor press to compress springs. Install snap ring by hand. Ensure end gap of ring is aligned with groove of clutch drum.
3. Install following parts in order: plate, disc, plate, disc and flange. Using a screwdriver, install snap ring. Ensure snap ring end gap is aligned with groove of clutch drum.
4. Coat bearing with petroleum jelly and install race facing downward to direct drum. Bearing outer diameter should be 1.823" (46.30 mm). Inner diameter should be 1.031" (26.20 mm). Coat race with petroleum jelly and install to case. Race outer diameter should be 1.693" (43.00 mm). Inner diameter should be .965" (24.50 mm). Install overdrive clutch drum to case.
5. Measure piston stroke by applying and releasing 57-114 psi (4-8 kg/cm²) of compressed air. Piston stroke is .0689-.0980" (1.750-2.490 mm). Ensure piston moves freely. See **Fig. 43** . If piston does not move, disassemble and inspect.

Disassembly (Overdrive Counter Drive Gear)

1. Install overdrive direct clutch into one-way clutch. Hold overdrive direct clutch and turn intermediate shaft. Shaft should turn freely clockwise and lock counterclockwise. See **Fig. 44** . Remove overdrive direct clutch.
2. Check counter drive gear preload. Hold overdrive planetary gear in a soft-jawed vise. **DO NOT** let counter drive gear touch the vise. Using a tension gauge, measure preload. See **Fig. 45** . Turn counter drive gear right and left several times before measuring preload. Preload at starting point should be 2.1-3.4 lbs. (.95-1.54 kg).
3. Remove snap ring and retaining plate. Remove overdrive one-way clutch and outer race as an assembly. Remove one-way clutch from outer race, noting direction of one-way clutch.
4. Remove No. 3 planetary gear thrust washer. Using a magnet, carefully remove 4 plugs from planetary gear. Pry off lock washer with screwdriver. Hold shaft in soft-jawed vise. Using A/T Tool Set (09350-32014), loosen adjusting nut. Remove nut and washer.
5. Using a bearing puller and arbor press, remove intermediate shaft bearing.
6. Using press, remove counter drive gear and front bearing together. Remove rear bearing using bearing puller and arbor press. Tag bearings to show location for reassembly.
7. To remove overdrive planetary ring gear from counter drive gear, pull up ring gear. Compress snap ring

with needle-nose pliers. Remove snap ring from groove.

8. Remove ring gear from counter drive gear. Using a brass drift bar and hammer, drive outer races from counter drive gear. Remove snap ring from counter drive gear. Tag races to show location for reassembly.

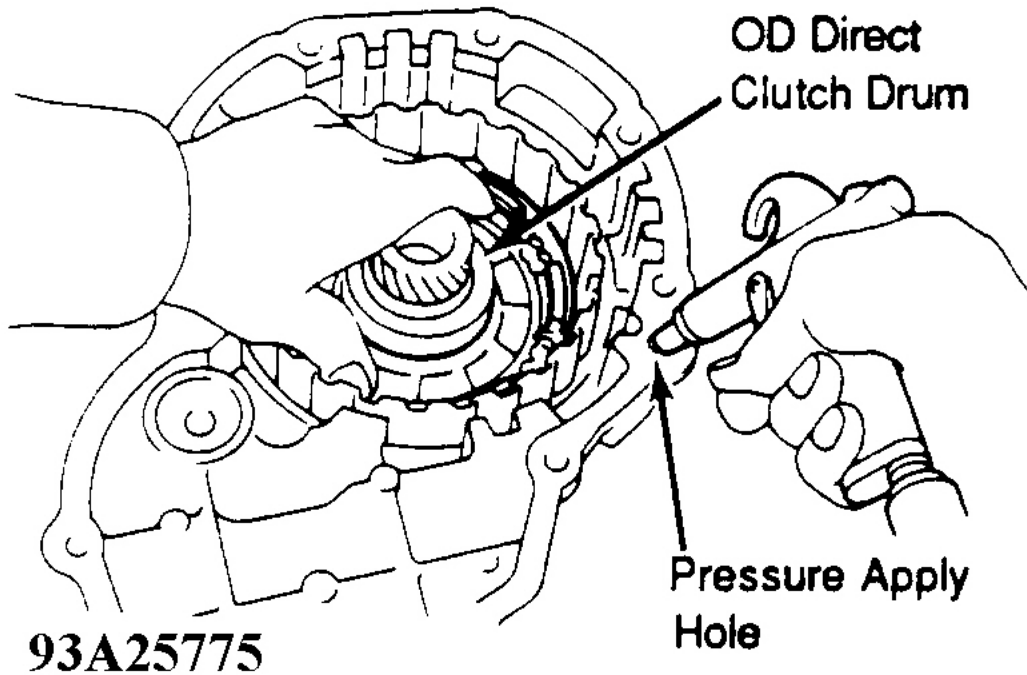


Fig. 42: Removing OD Direct Clutch From Case
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

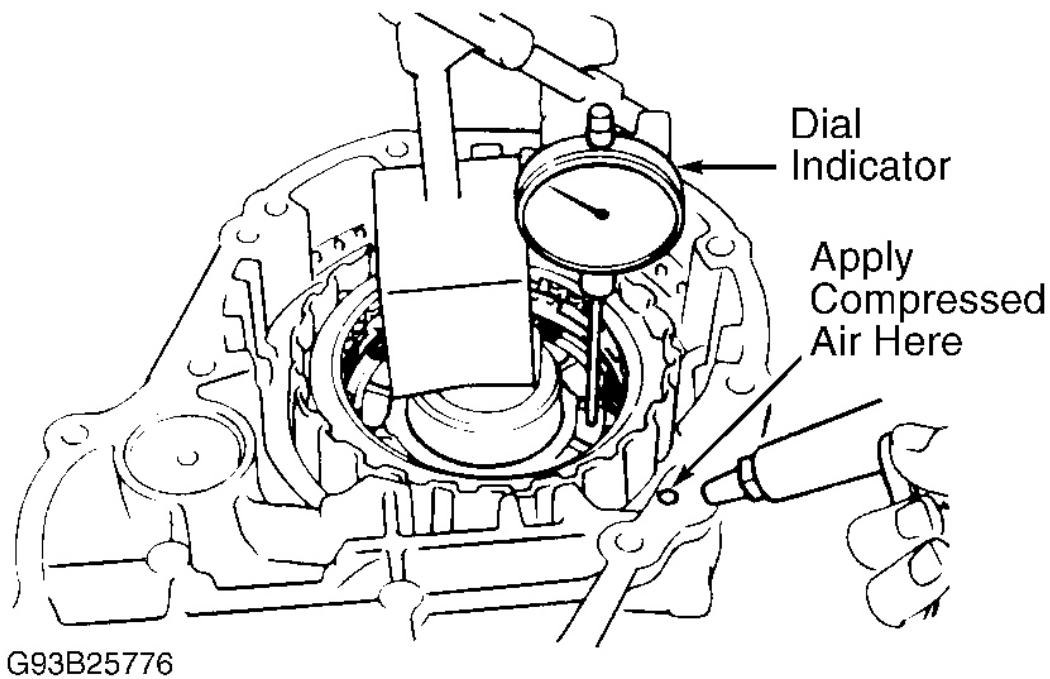
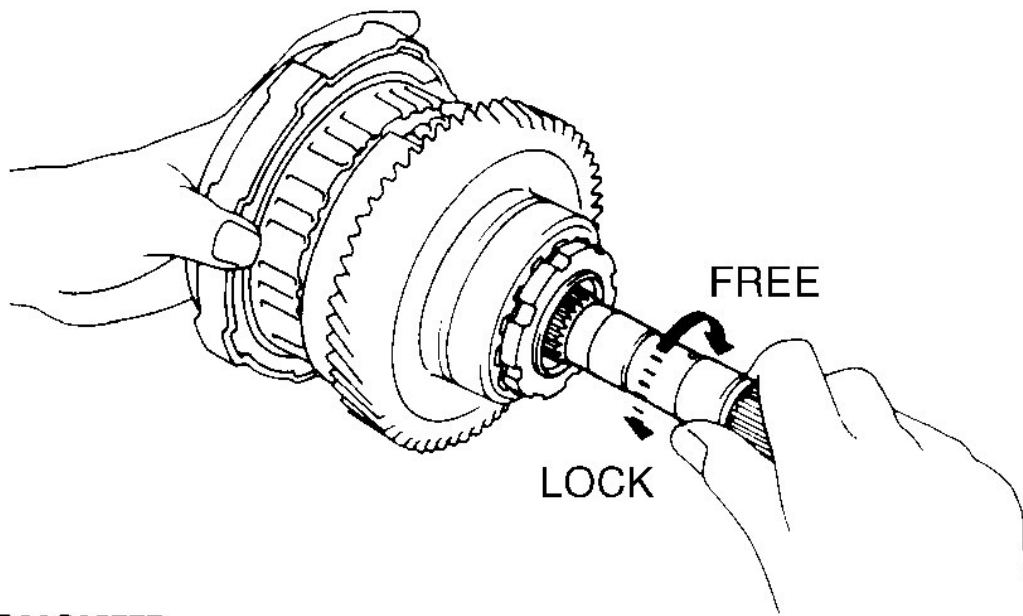


Fig. 43: Checking Overdrive Direct Clutch Piston Stroke
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 44: Checking OD One-Way Clutch Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

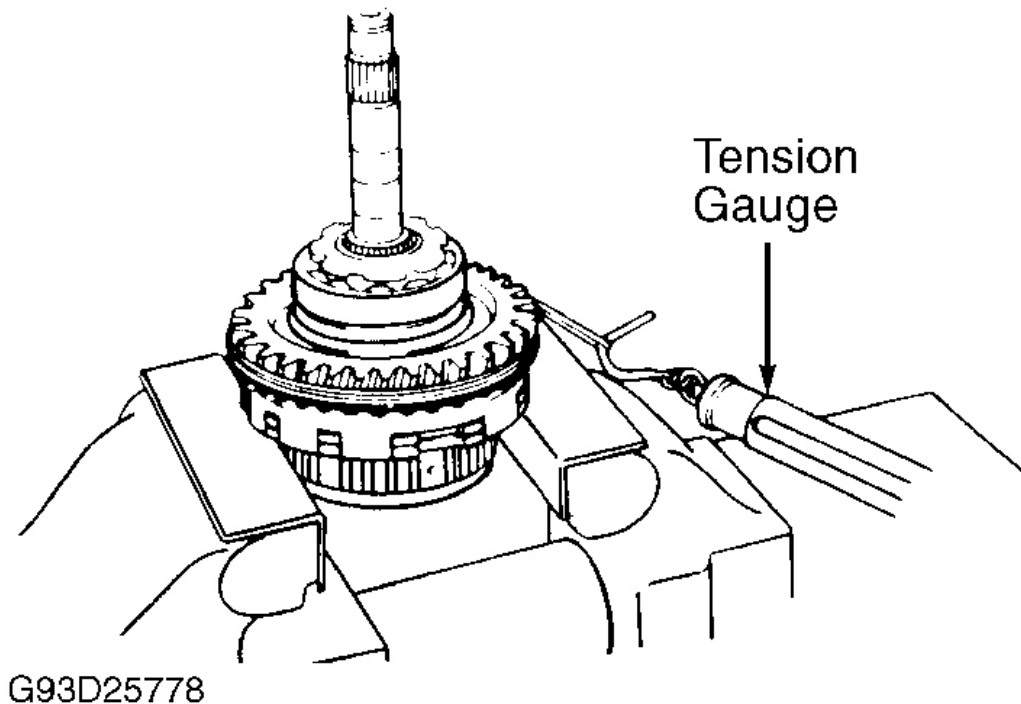


Fig. 45: Checking Counter Drive Gear Preload
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

Measure planetary pinion gear thrust clearance. Standard clearance is .0063-.0220" (.160-.560 mm). Maximum clearance is .024" (.61 mm). If clearance is excessive, replace planetary gear assembly.

Reassembly (Overdrive Counter Drive Gear)

1. Install snap ring in counter drive gear. Use a bearing race installer and arbor press to install 2 outer races to both sides of counter drive gear. Press in outer races until races touch snap ring.
2. Install snap ring to ring gear. While pushing down on ring gear, squeeze snap ring end with needle-nose pliers. Install overdrive planetary ring gear into counter drive gear.
3. Using a plate and arbor press, install rear bearing on shaft. Press in bearing until side surface of inner race touches planetary carrier. Install counter drive gear on shaft. Mesh ring gear with planetary pinions. Place front bearing on shaft. Hold ring gear to prevent shaft from falling.
4. Press in bearing until there is slight play between bearings. Using A/T Tool Set (09350-32014) and arbor press, install intermediate shaft bearing. Press bearing until bearing slightly touches front bearing of counter drive gear.
5. Place NEW locking washer and adjusting nut on intermediate shaft. Adjust preload of counter drive gear.

Holding shaft in a soft-jawed vise and using a tension gauge and lock nut wrench on adjusting nut, tighten adjusting nut.

6. Rotate counter drive gear right and left several times before measuring preload. Tighten adjusting nut until preload is 2.1-3.4 lbs. (.95-1.54 kg). Bend locking washer tab until even with adjusting nut groove.
7. Install 4 plugs into pinion shaft. Install No. 3 thrust washer with groove facing overdrive case. Install one-way clutch into outer race. Install retainers on both sides of one-way clutch. Install one-way clutch into overdrive planetary gear. Ensure one-way clutch is installed in correct direction. Install retaining plate and snap ring.
8. Hold overdrive clutch and turn intermediate shaft. Shaft should turn freely clockwise and lock counterclockwise. See [Fig. 44](#) . Remove overdrive clutch from one-way clutch.
9. While turning overdrive planetary gear clockwise, install gear on overdrive direct clutch. If overdrive planetary gear is properly installed, clearance between counter drive gear and overdrive case will be .94" (24 mm). See [Fig. 46](#) .

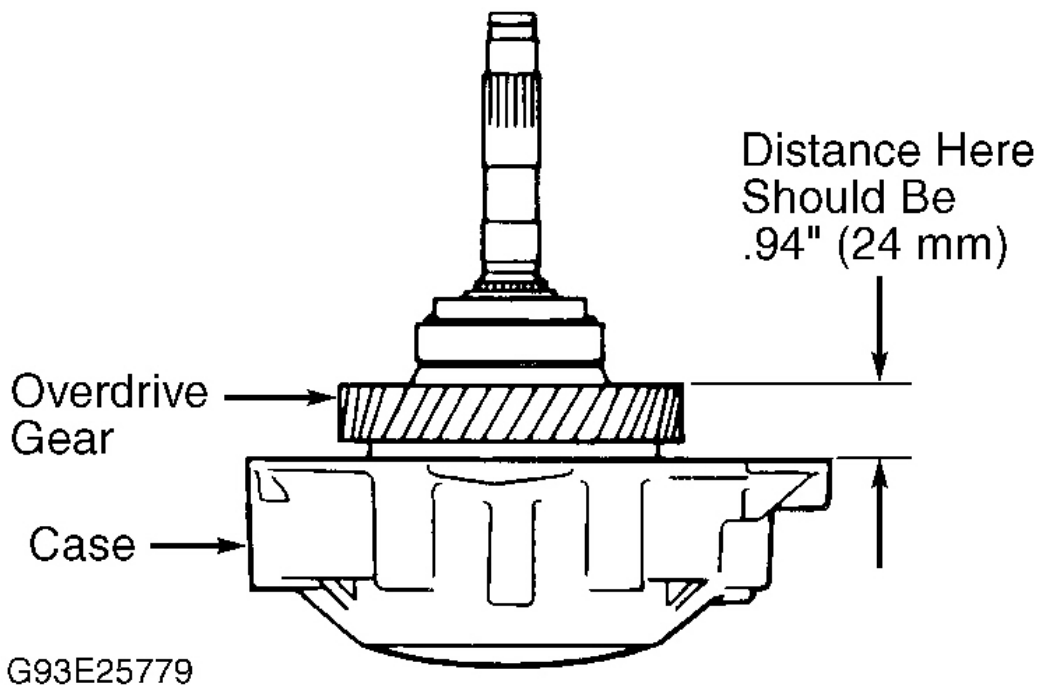


Fig. 46: Checking Distance Between Overdrive Gear & Case
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Disassembly (Overdrive Case)

Remove snap ring. Remove retaining plate and 2 springs. Remove accumulator piston from overdrive case. Remove "O" ring from piston. Spread 2 oil seal rings apart and remove rings.

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Reassembly (Overdrive Case)

Spread rings and install in grooves. After installing oil seal rings, check for smooth movement. Coat "O" ring with ATF. Install NEW "O" ring on accumulator piston. Install accumulator piston, springs, retaining plate and snap ring.

DIFFERENTIAL ASSEMBLY (A-540E)

Disassembly

1. Using Universal Puller (09950-20017), remove 2 side bearings. Place match marks on both differential case and ring gear. Remove 16 bolts. Tap ring gear with a plastic hammer to remove gear. See **Fig. 47**.
2. Place match marks on differential right and left case. Remove 16 Torx screws. Using a plastic hammer, tap out differential left case. Remove speedometer drive gear from differential right case.
3. Remove differential side gears, side thrust washers, differential spider, differential pinions and pinion washers from differential left case.
4. Using a hammer and screwdriver, remove oil seal. Remove oil baffle from left bearing retainer. Drive out outer race and adjusting shim from left bearing retainer with a hammer and brass bar. Remove right oil seal from retainer.

Reassembly

1. Using Bearing Replacer (09316-60010), install right oil seal to retainer. Drive in new oil seal until seal surface is flush with surface of retainer. Coat oil seal lip with grease.
2. Install adjusting shim and bearing outer race to left bearing retainer. Shim measurement is .0945" (2.400 mm). Using bearing replacer tool, press outer race into left retainer. Install oil baffle and oil after adjusting differential side bearing preload. See **TRANSAXLE REASSEMBLY**.
3. Assemble differential case. Coat all sliding and rotating surfaces with ATF before assembly. Install thrust washer to side gear. Install pinions and thrust washers to spider. Install side gear and spider with pinions to differential left case. Using a dial indicator, measure side gear backlash while holding one pinion against carrier casing. Backlash should be between .0020-.0079" (.050-.200 mm). Install side gear and spider with pinions to right side of differential case. Check pinion gear backlash.
4. Select side gear thrust washer which ensures backlash is within specification. See **SIDE GEAR THRUST WASHER SPECIFICATIONS** table. Select washers of the same size for both sides. Install speedometer driven gear.

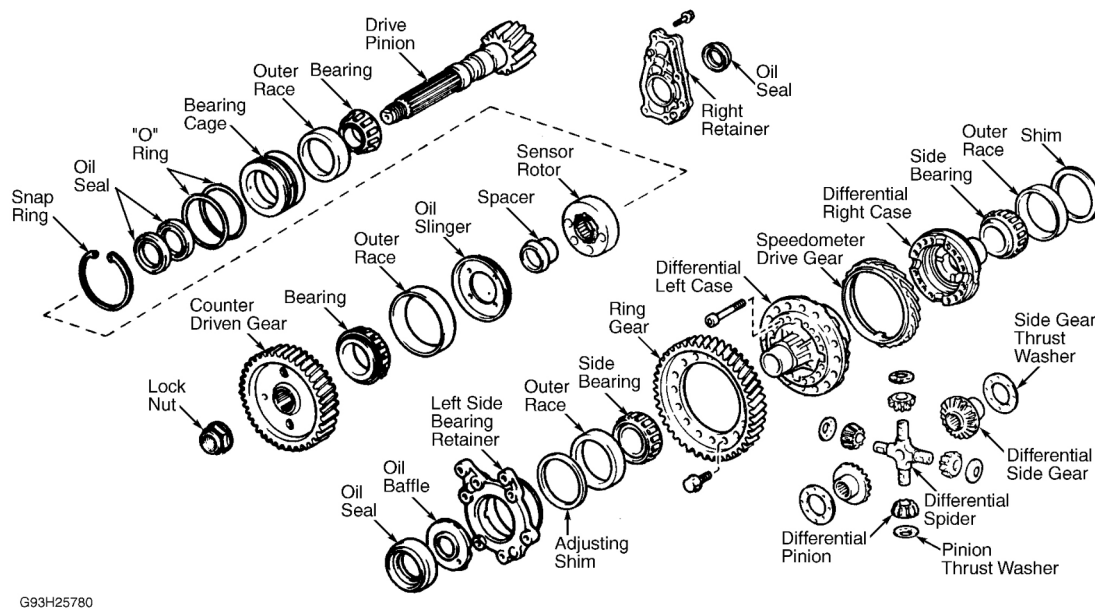
SIDE GEAR THRUST WASHER SPECIFICATIONS

ID Mark	Thickness: In. (mm)
N/A ⁽¹⁾	.0315 (0.800)
N/A ⁽¹⁾	.0354 (0.900)
A	.0394 (1.000)
B	.0413 (1.050)
C	.0433 (1.100)
D	.0453 (1.150)
E	.0472 (1.200)

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F	.0492 (1.250)
G	.0512 (1.300)
H	.0531 (1.350)
J	.0551 (1.400)
K	.0571 (1.450)
L	.0591 (1.500)
(1) No identifying mark for A-540E model only.	



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Fig. 47: Exploded View Of Differential Assembly (A-540E)

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

- Align match marks on differential cases. Using plastic hammer, carefully tap differential right case. Using a Torx wrench, install and tighten 16 Torx screws to 46 ft. lbs. (63 N.m).
- Clean differential case contact surface with cleaning solvent. Heat ring gear to about 212°F (100°C) in an oil bath. **DO NOT** heat ring above 230°F (110°C). Clean control surface of ring gear with cleaning solvent. Quickly install ring gear on differential case. Tighten bolts to 91 ft. lbs. (214 N.m).
- Using a bearing installer and arbor press, install right and left side bearing to differential case.

DIFFERENTIAL ASSEMBLY (A-540H)

Disassembly

- On A-540H, remove right case bearing outer race. See **Fig. 48**. On both models, use a dial indicator to measure differential end play. End play should be .0071-.0323" (.180-.820 mm). See **Fig. 49**. On A-540H, remove ring gear mounting case sleeve. Remove 4 oil seal rings from ring gear mounting right case. Remove snap ring and speedometer drive gear.

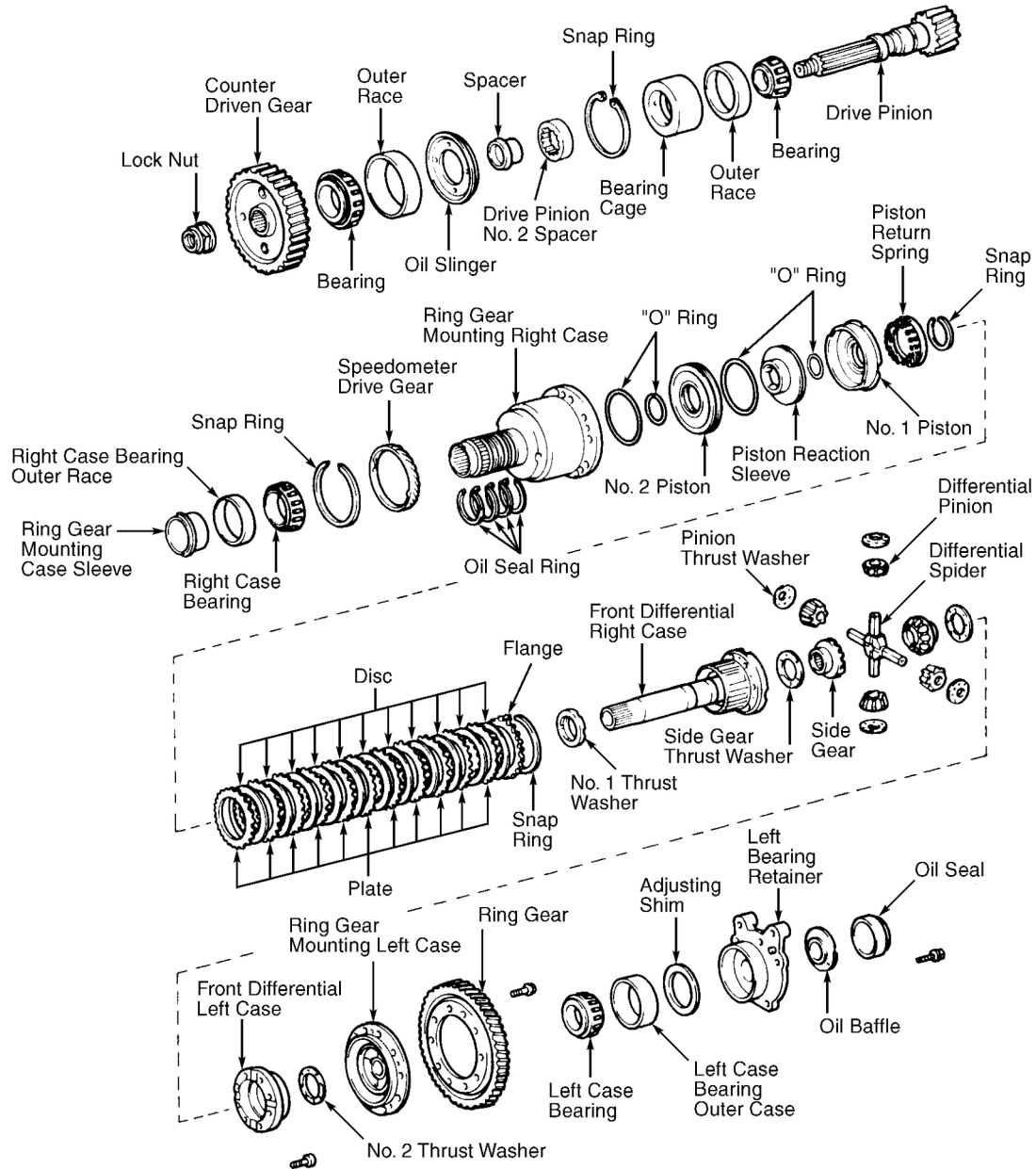
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2. Place match marks on ring gear mounting left case and right case. Remove bolts and left case. Place match marks on ring gear and left case. Place left case on A/T Tool Set (09350-32014). Using a plastic hammer, remove ring gear from left case.
3. 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: 2 differential side gears and 2 side thrust washers. On A-540H, remove differential spider, 4 differential pinions and 4 pinion 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. 50** .

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1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul



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Fig. 48: Exploded View Of Differential Assembly (A-540H)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

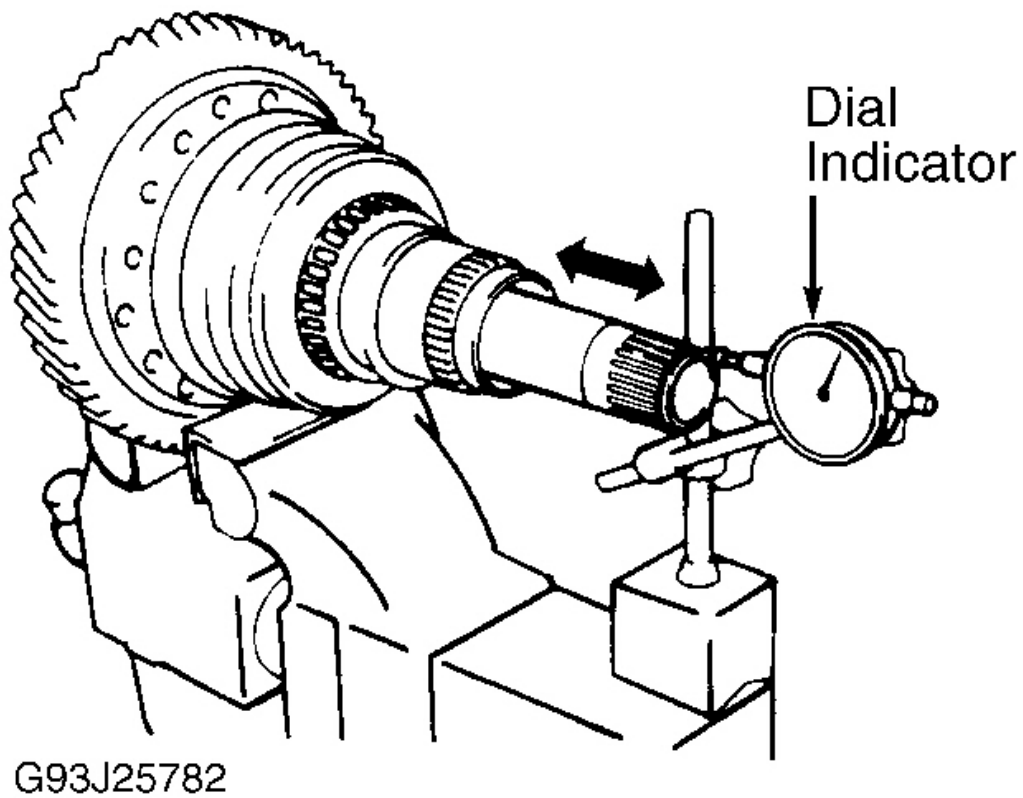


Fig. 49: Checking Differential End Play
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

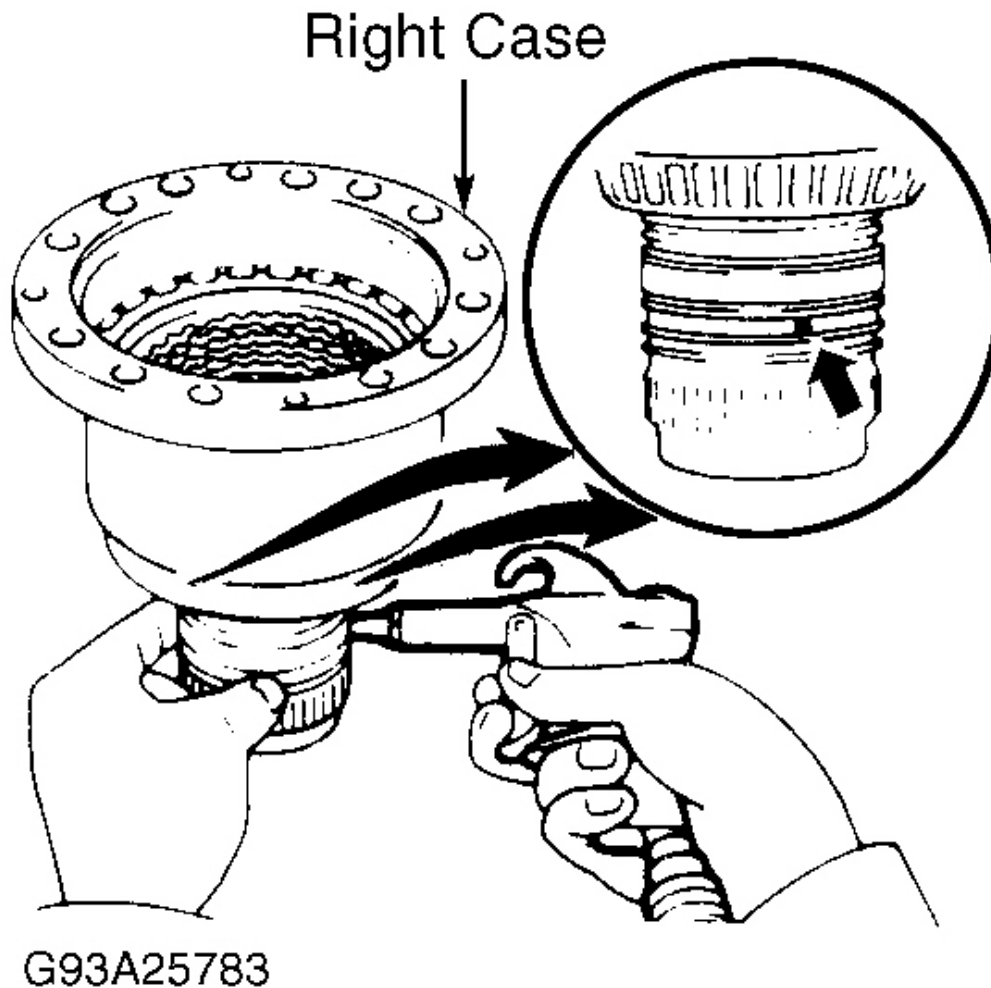


Fig. 50: Checking Operation Of Differential Clutch Pistons

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 screwdriver to remove oil seal from ring gear mounting left case. Remove oil baffle from left bearing retainer. Use hammer and brass bar to drive out adjusting shim from left bearing retainer. Place adjusting shim into left bearing retainer. Use either original shim or shim with thickness of .0945" (2.400 mm). Use A/T Tool Set (09350-32014) and arbor press to install outer race and plate or shim. Install oil baffle and oil seal after adjusting differential side bearing preload. See **TRANSAXLE REASSEMBLY**.

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. Install in order: plate, disc, plate, disc, plate, disc, 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. Install following parts in front differential left case: side gear thrust washer, side gear, 4 differential pinion gears, 4 pinion gear thrust washers and differential spider into front differential left case. On both models, use a dial indicator to measure backlash of one pinion gear while holding side gear toward case. See **Fig. 51**. Backlash should be .0020-.0079" (.050-.200 mm). If backlash exceeds specification, install thrust washers of different thickness. **DO NOT** overtighten vise. Under DIFFERENTIAL ASSEMBLY (A-540E) see **SIDE GEAR THRUST WASHER SPECIFICATIONS** table.
5. Perform same procedure described in step 4 for front differential right case. See **Fig. 51**.

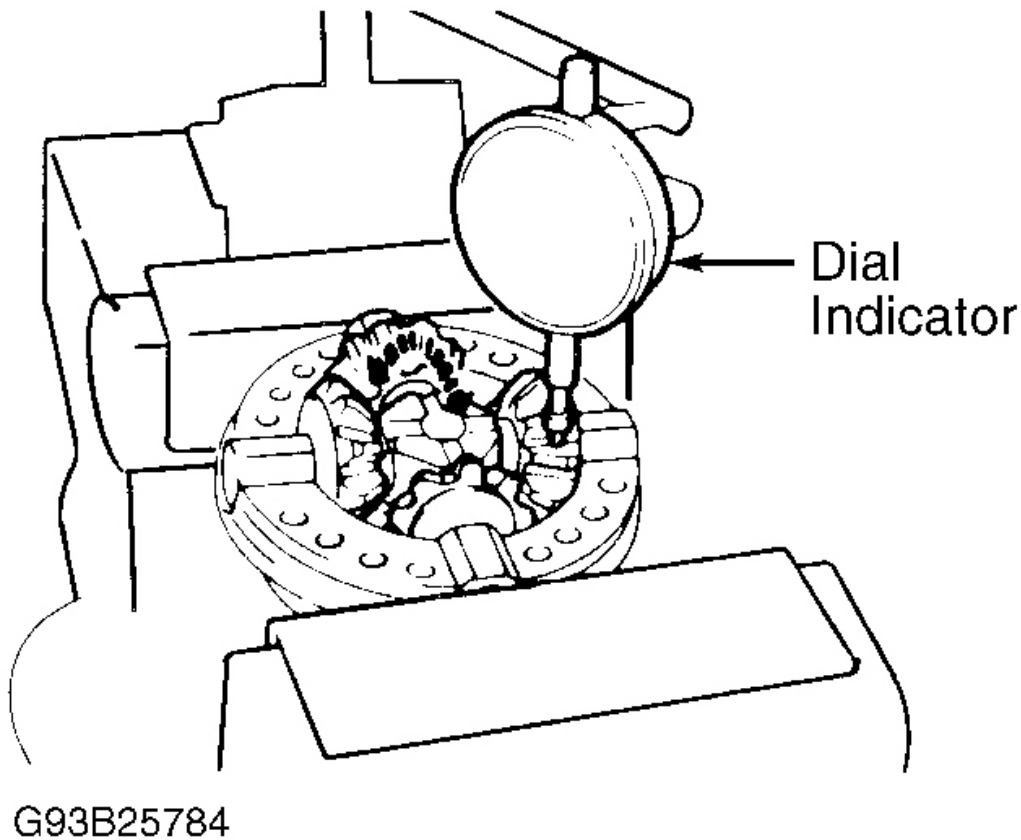


Fig. 51: Measuring Front Differential Side Gear Backlash
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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. On A-540H, install right case bearing outer race.

DIFFERENTIAL DRIVE PINION (A-540E & A-540H)

Disassembly

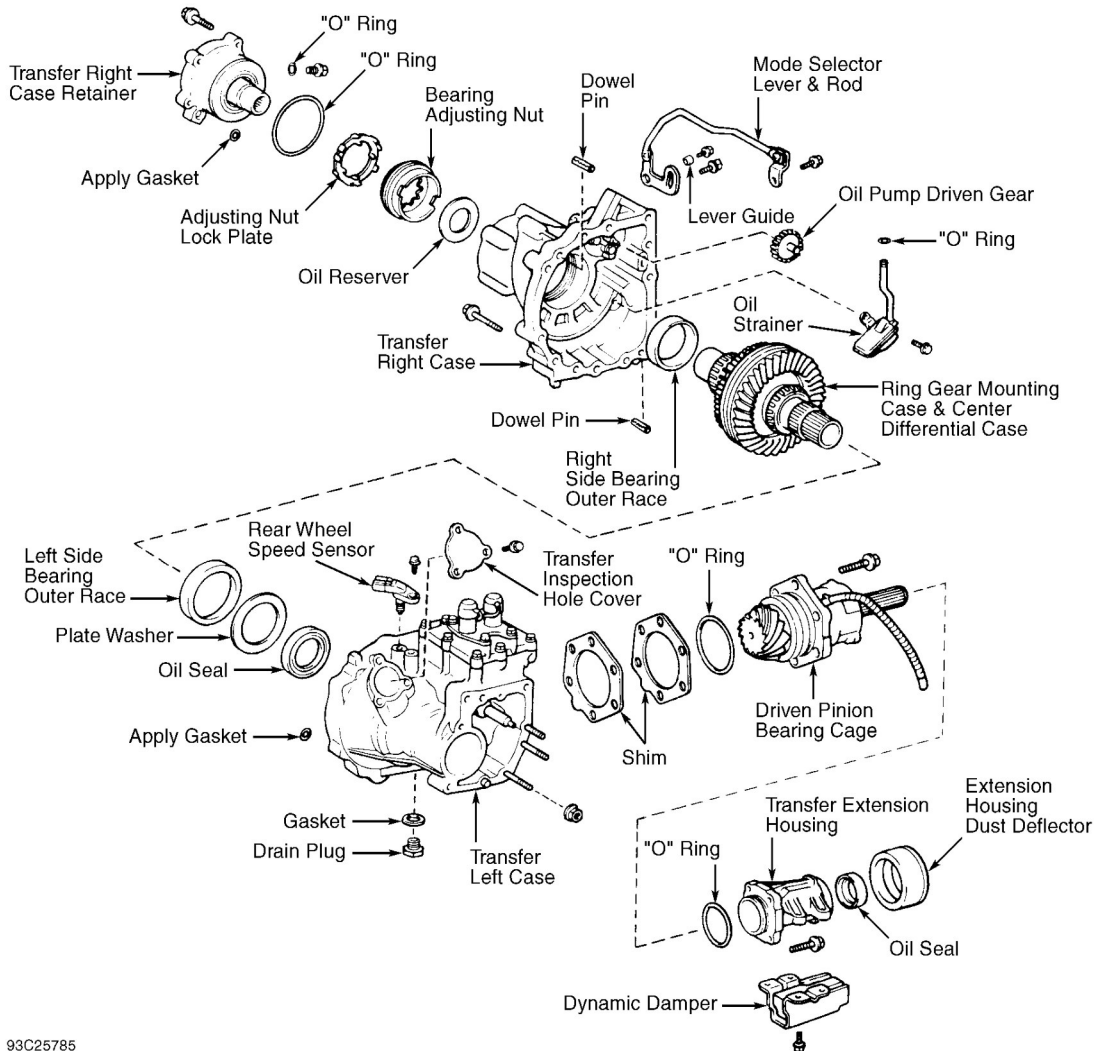
Using Bearing Remover (09950-00020), remove drive pinion shaft bearing. Remove oil seals from cage. Remove pinion shaft bearing outer race from cage. Using Bearing Remover (09950-00020) and an arbor press, remove counter driven gear bearing.

Reassembly

1. Using A/T Transmission Tool Set (09350-32014), press in new counter driven gear bearing on both models. On A-540E models, install new oil seal with lip facing downward. Oil seal press depth is .169" (4.30 mm). With oil seal lip facing upward, use tool set to press in a new seal until seal end is flush with surface of cage. Coat oil seal lips with grease.
2. On both models, install drive pinion shaft bearing outer race to cage. Install drive pinion shaft bearing.

TRANSFER CASE (A-540H)**Disassembly (Transfer Case)**

1. Remove mode select lever and rod. On A-540H, remove rear wheel speed sensor. Remove "O" ring from speed sensor. Remove dynamic damper. See **Fig. 52**.
2. On both models, 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. 52: Exploded View Of Transfer Case
 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. 53**.

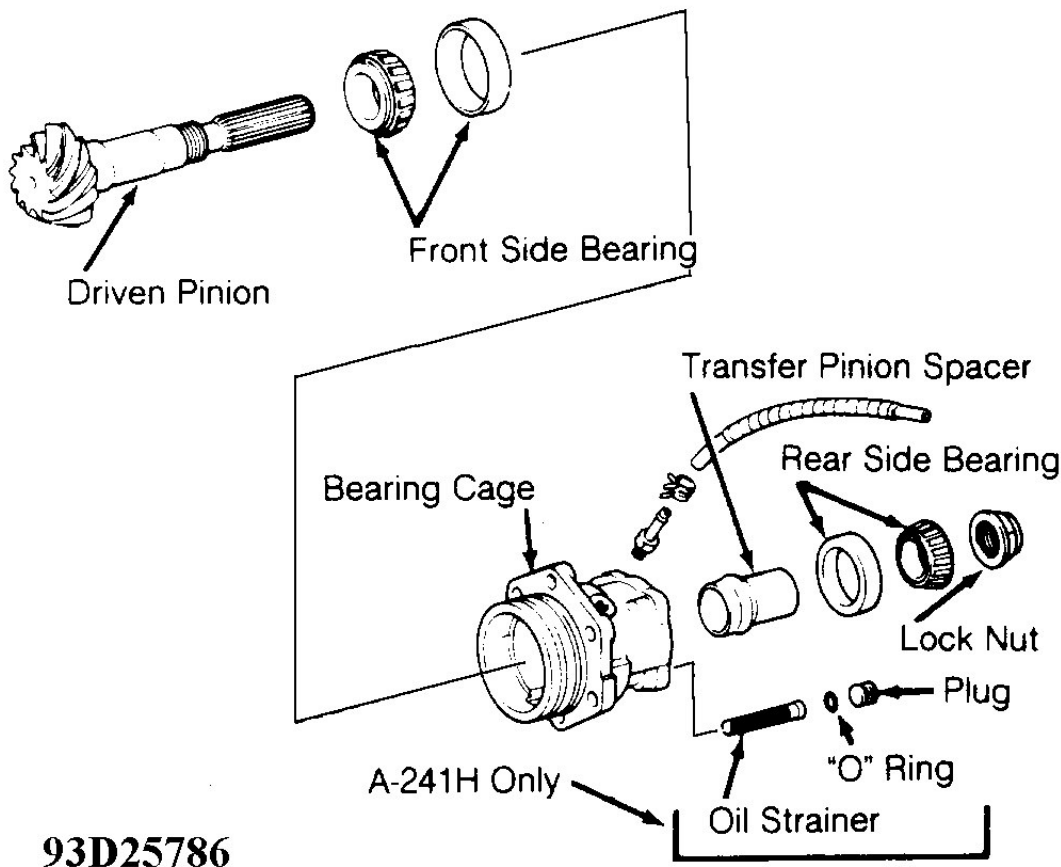


Fig. 53: Exploded View Of Transfer Driven Pinion Bearing Cage (A-241H Shown; A-540H Is Similar)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

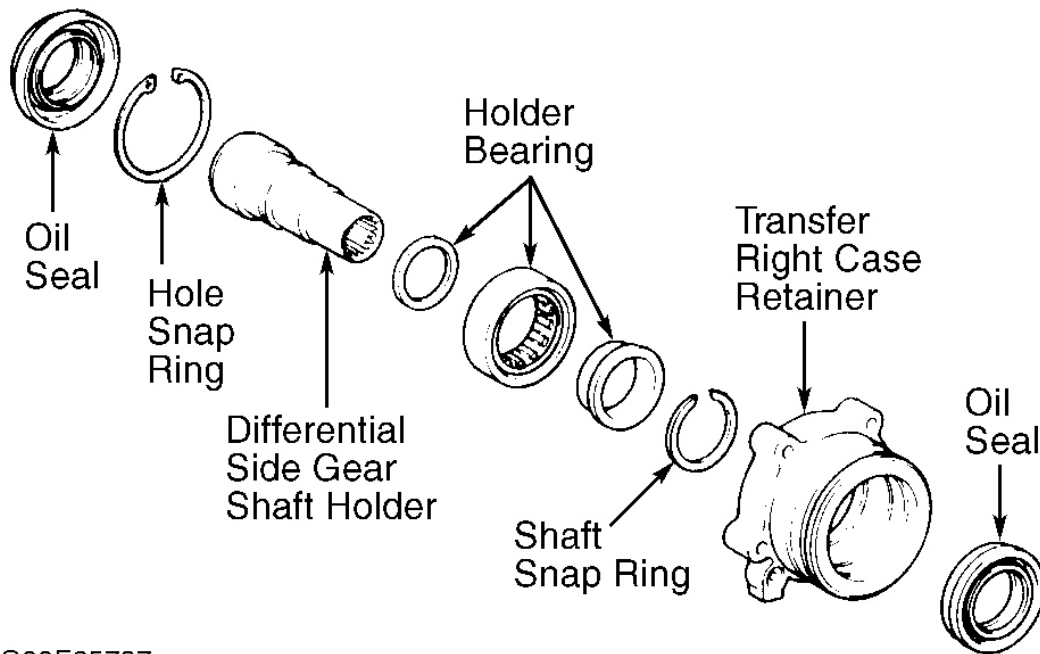
Reassembly

1. 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. 54**.



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Fig. 54: 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. See **Fig. 55**.

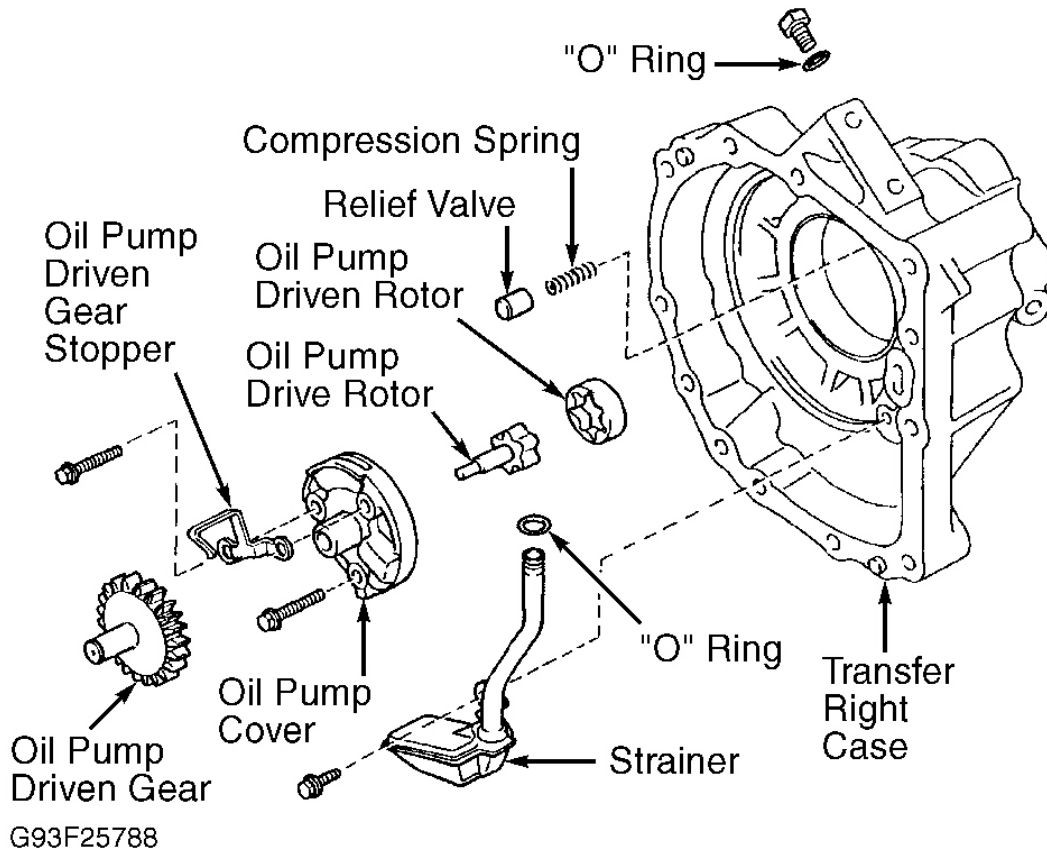


Fig. 55: Exploded View Of Transfer Right Case (A-241H Shown; A-540H Is Similar)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

1. Install relief valve and spring. Install oil pump drive rotor and driven rotor.
2. Install oil pump cover and driven gear stopper. Tighten 3 bolts to 69 INCH lbs. (7.8 N.m). Insert oil pump driven gear to drive rotor. Ensure drive rotor turns smoothly.

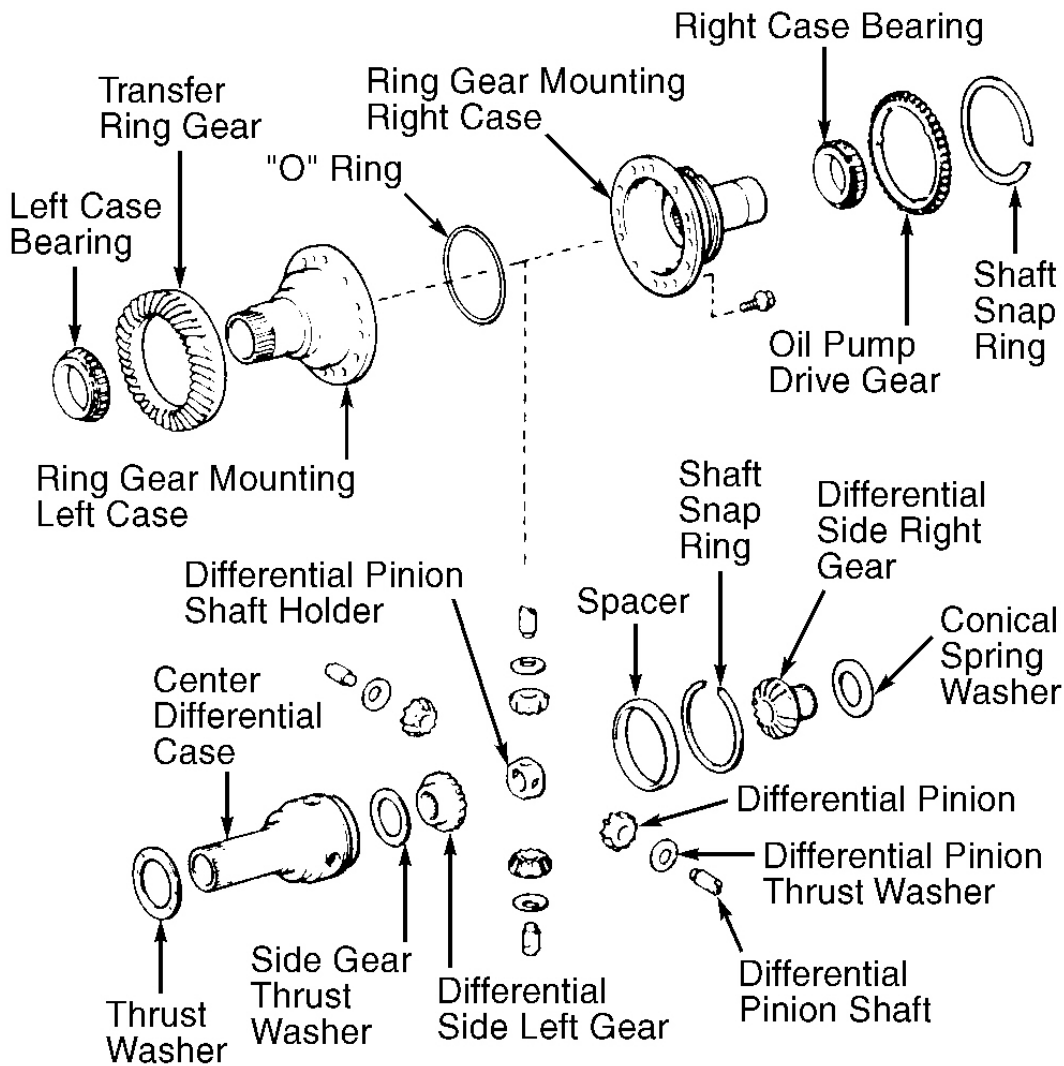
Disassembly (Ring Gear Mounting Case & Center Differential Case)

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. 56**.
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 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.

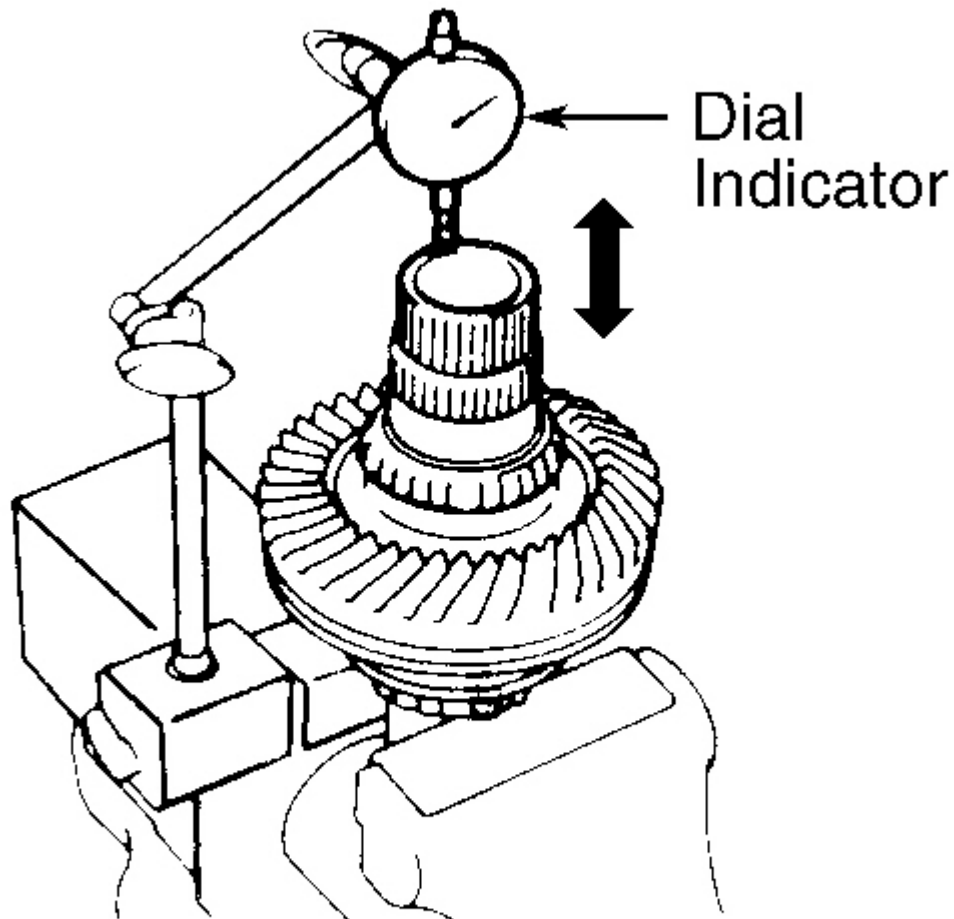
Reassembly

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-540H is .0020-.0079" (.050-.200 mm). If backlash exceeds specification, install correct thrust washer on side gears. See **SIDE GEAR THRUST WASHER SPECIFICATIONS** table for correct washer to install.
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. 57** and **Fig. 58** .
5. See **SIDE GEAR THRUST WASHER SPECIFICATIONS** table under DIFFERENTIAL ASSEMBLY (A-540E). 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.



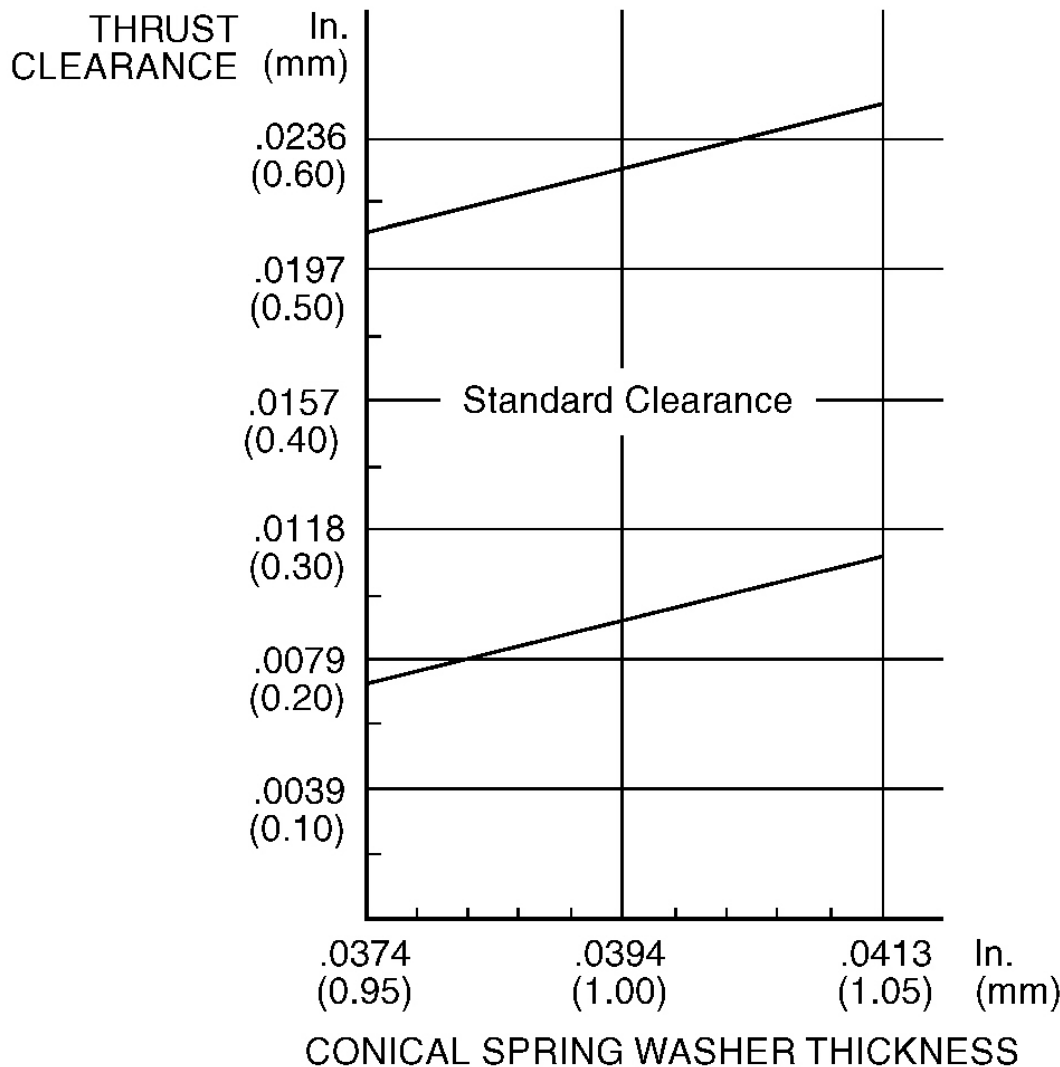
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Fig. 56: Exploded View Of Ring Gear Mounting & Center Differential Case
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 57: Measuring Center Differential Thrust Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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

Disassembly (Transfer Left Case)

1. Remove center differential control solenoid(s). Remove "O" rings from solenoid(s). See **Fig. 59**.
2. Remove transfer valve body assembly, located under center differential control solenoids. Remove valve body gasket. Remove transfer case gaskets and valve body strainer. Remove 8 bolts. Remove transfer lower valve body. See **Fig. 60**. Remove 2 gaskets and plate from transfer upper valve body.

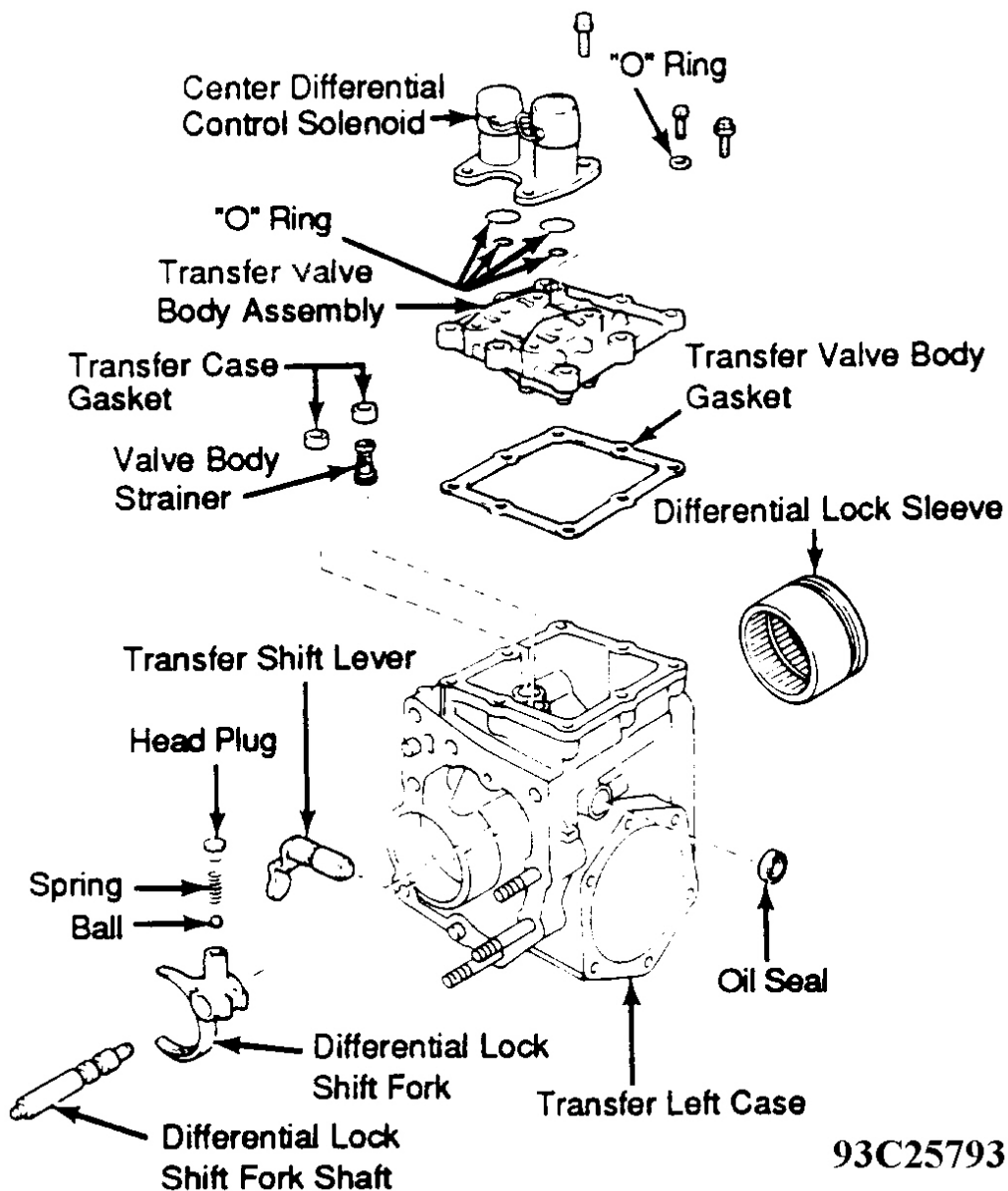


Fig. 59: Exploded View Of Transfer Left Case (A-241H Shown; A-540H Is Similar)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

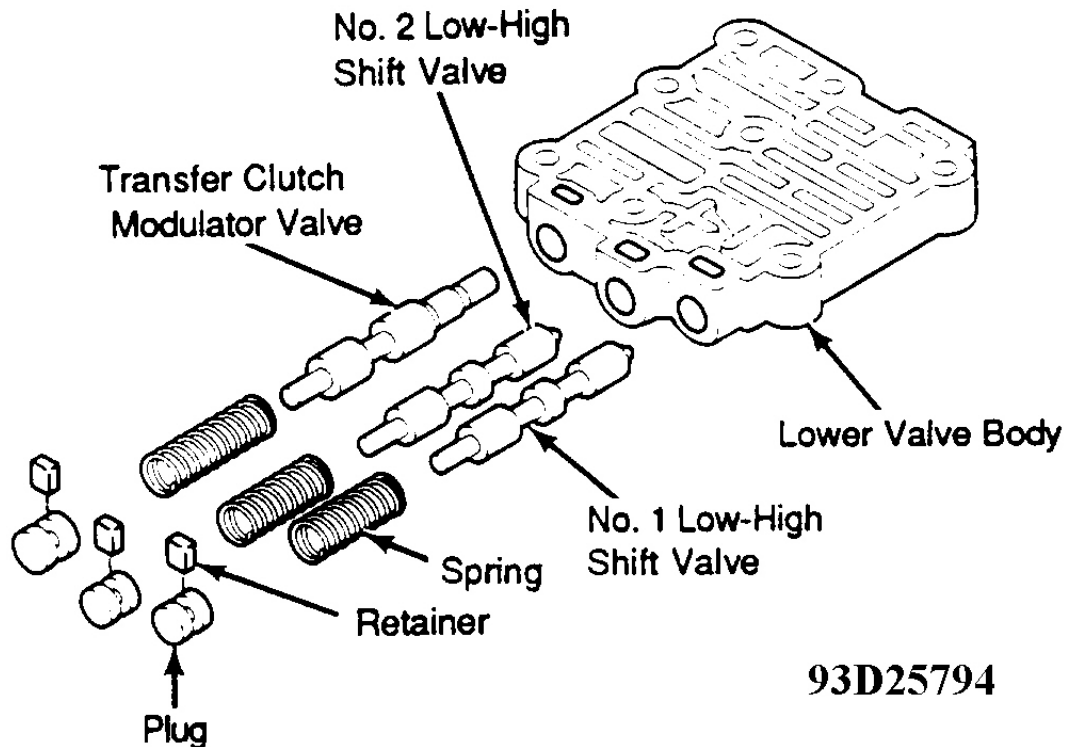


Fig. 60: Exploded View Of Transfer Lower Valve Body
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- On both models, 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.

Reassembly

- 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).
- On A-540H, install plate and new gaskets on transfer lower valve body. Ensure valve body springs and retainers are installed in correct locations. See **TRANSFER LOWER VALVE BODY SPRING SPECIFICATIONS (A-540H)** table and **TRANSFER LOWER VALVE BODY RETAINER SPECIFICATIONS (A-540H)** table. Lower transfer lower body into place. Install 8 bolts finger tight. Tighten bolts to 58 INCH lbs. (6.6 N.m).

TRANSFER LOWER VALVE BODY SPRING SPECIFICATIONS (A-540H)

Spring	Free Length: In. (mm)	Color
Transfer Clutch	1.272 (32.30)	None

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Modulator Valve		
No. 2 Low-High Shift Valve	1.138 (28.90)	None
No. 1 Low-High Shift Valve	1.138 (28.90)	None

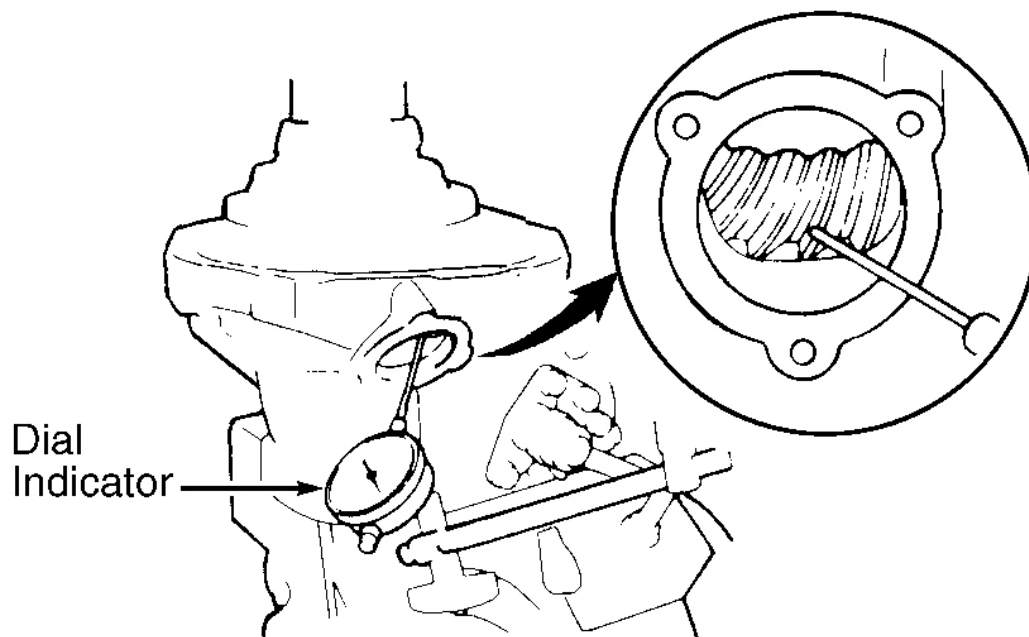
TRANSFER LOWER VALVE BODY RETAINER SPECIFICATIONS (A-540H)

Retainer	Height In. (mm)	Width In. (mm)	Thickness In. (mm)
Transfer Clutch Modulator Valve	.256 (6.50)	.197 (5.00)	.126 (3.20)
No. 2 Low-High Shift Valve	.256 (6.50)	.197 (5.00)	.126 (3.20)
No. 1 Low-High Shift Valve	.256 (6.50)	.197 (5.00)	.126 (3.20)

3. Install new transfer case gaskets and valve body strainer. Install new transfer valve body gasket. Install transfer valve body assembly. Tighten bolts to 97 INCH lbs. (11 N.m).
4. Install "O" rings on solenoid(s). Install center differential control solenoid(s). Tighten to 10 ft. lbs. (14 N.m).

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. 52**.
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. 61**. If backlash exceeds specification, install correct plate washer on ring gears. See **RING GEAR PLATE WASHER SPECIFICATIONS** table.



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Fig. 61: Measuring Ring Gear Backlash

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

RING GEAR PLATE WASHER SPECIFICATIONS

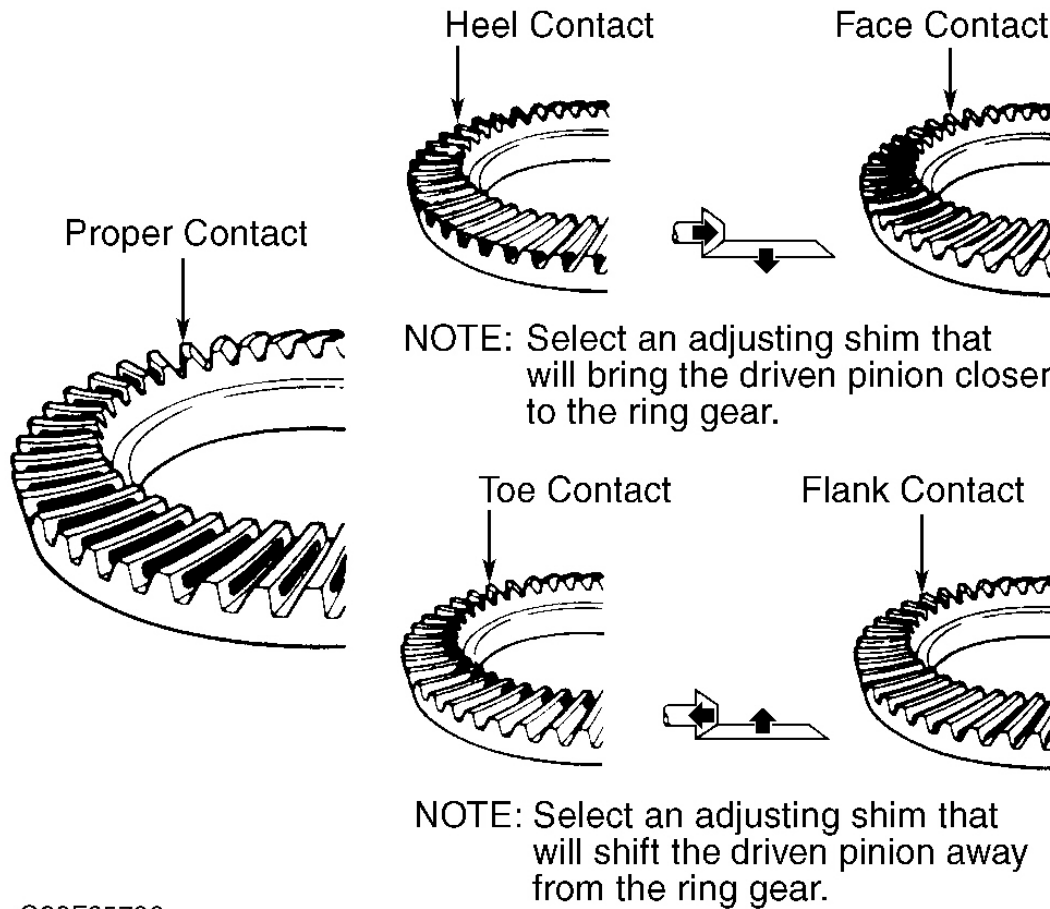
ID Mark	Thickness: In. (mm)
71	.0839 (2.130)
72	.0850 (2.160)
73	.0862 (2.190)
74	.0874 (2.220)
75	.0886 (2.250)
76	.0898 (2.280)
77	.0909 (2.310)
78	.0921 (2.340)
79	.0933 (2.370)
80	.0945 (2.400)
81	.0957 (2.430)
82	.0969 (2.460)
83	.0980 (2.490)
84	.0992 (2.520)
85	.1004 (2.550)
86	.1016 (2.580)

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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. Refer to specifications in the **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. 62** . If the teeth are not meshing properly, install the proper shim and plate washer. Refer to specifications in the **RING GEAR SHIM SPECIFICATIONS** table and the **RING GEAR PLATE WASHER SPECIFICATIONS** table.



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Fig. 62: 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.
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).
13. On A-540H, install NEW "O" ring on speed sensor. Install speed sensor to transfer left case. Tighten to 48 INCH lbs. (5.4 N.m). On both models, install transfer mode selector lever, rod and lever guide. Tighten 2 lever bolts to 96 INCH lbs. (11 N.m). Tighten guide bolt to 48 INCH lbs. (5.4 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-540E & A-540H)

1. Install bearing cage on drive pinion shaft. On A-540E, **DO NOT** damage oil seals with pinion shaft. See **Fig. 14** . Install 2 new "O" rings to bearing cage. On both models, use a hammer and brass bar to lightly tap bearing cage in transaxle case until snap ring groove in bore is visible. Install snap ring. On A-540E, install sensor rotor on drive pinion shaft. On A-540H, install drive pinion bearing No. 2 spacer (A-540H).

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On both models, install oil slinger and new spacer. Install spacer with small end downward. Using A/T Tool Set (09350-32014) and an arbor press, install outer race to transaxle case.

- Place A/T Tool Set (09350-32014) into transaxle hole to hold drive pinion shaft. Using A/T tool set, press in counter driven gear until it can be installed on thread of shaft. Be careful not to damage transaxle case.
- Install new lock nut. Using A/T Tool Set (09350-32014) and Companion Flange Holder (09330-00021) to hold gear, tighten nut to 152 ft. lbs. (206 N.m). Rotate gear counterclockwise and clockwise several times. Use a torque meter to measure preload of drive pinion at starting point. Preload with new bearing is 8.7-13.9 INCH lbs. (1.0-1.6 N.m). With old bearing, preload should be 4.3-6.9 INCH lbs. (.5-.8 N.m). If preload exceeds specification, replace bearing spacer. If preload is less than specification, retighten shaft nut 115 INCH lbs. (13 N.m) at a time until specified preload is reached. Maximum shaft nut torque is 260 ft. lbs. (353 N.m). If maximum torque is exceeded while retightening shaft nut, replace bearing spacer. Repeat preload procedure. **DO NOT** back off nut to reduce preload. Stake lock nut.
- On A-540E, place outer race and selected adjusting shim on right side bearing. Place differential case in transaxle case. Ensure shim is properly installed. Ensure ring gear mount case sleeve and outer race are properly installed.
- On A-540H, apply seal packing Three Bond (1281) to carrier cover. Install 2 apply gaskets. Install 11 carrier cover bolts. Tighten bolts to 29 ft. lbs. (39 N.m).
- On both models, contact surfaces of left bearing retainer and transaxle case. Apply seal packing Three Bond (1281) to case and carrier cover. Install left bearing retainer by tapping while keeping carrier centered with retainer. Coat threads with sealer Three Bond (1324). Tighten bolts to 14 ft. lbs. (19 N.m). Seat bearings by turning differential case several times.
- Using a torque wrench, measure total preload. On A-540E, drive pinion preload at starting point with a new bearing is 2.4-3.8 INCH lbs. (.3-.4 N.m) greater than drive pinion shaft preload. If an old bearing is reused, preload is 1.2-1.9 INCH lbs. (.1-.2 N.m) greater than the drive pinion shaft preload. On A-540H, drive pinion preload at starting point with a new bearing is 2.0-3.2 INCH lbs. (.2-.4 N.m) greater than drive pinion shaft preload. If an old bearing is reused, preload is 1.0-1.6 INCH lbs. (.1-.2 N.m) greater than the drive pinion shaft preload. If preload exceeds specifications, replace the adjusting shim in the left bearing retainer. Select a shim from the **PINION SIDE BEARING ADJUSTING SHIM SPECIFICATIONS** table. Recheck differential total preload.

PINION SIDE BEARING ADJUSTING SHIM SPECIFICATIONS

ID Mark	Thickness: In. (mm)
0	.0787 (2.000)
1	.0807 (2.050)
2	.0827 (2.100)
3	.0846 (2.150)
4	.0866 (2.200)
5	.0886 (2.250)
6	.0906 (2.300)
7	.0925 (2.350)
8	.0945 (2.400)
9	.0965 (2.450)
"A"	.0984 (2.500)
"B"	.1004 (2.550)

1990 Toyota Camry

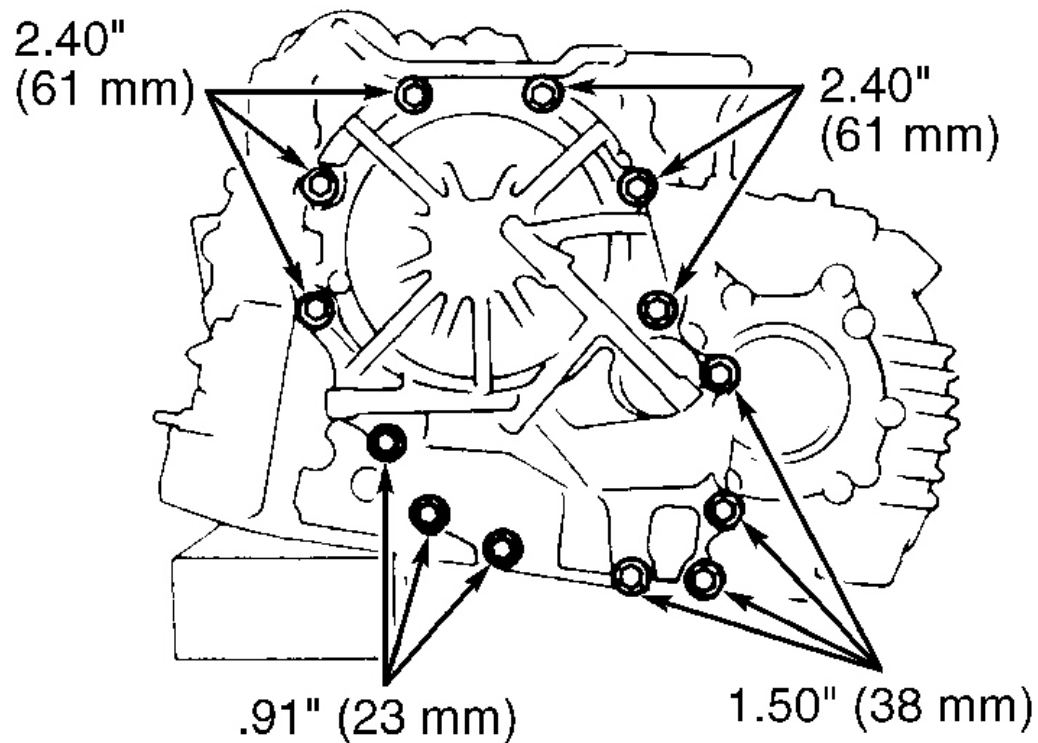
1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul

"C"	.1024 (2.600)
"D"	.1043 (2.650)
"E"	.1063 (2.700)
"F"	.1083 (2.750)
"G"	.1102 (2.800)
"H"	.1122 (2.850)

8. On both models, place oil baffle on left bearing retainer. Using Oil Seal Replacer (09223-15010), press in oil seal until flush with surface of retainer. On A-540E, apply seal packing Three Bond (1281) to right retainer. Coat bolt threads with sealer Three Bond (1324). On both models, tighten bolts to 14 ft. lbs. (19 N.m). Install drive pinion cap to transaxle case.
9. Install parking lock pawl. Hook spring ends to case and pawl. Install pin in hole of case through spring and pawl. Install manual valve shaft oil seal to case. Assemble new collar to manual valve lever. Install manual valve shaft to case through manual valve lever. Install parking lock rod. Using a pin punch, drive in roll pin until pin surface is flush with manual valve lever surface. Align collar hole with notch in lever and stake in position using a hammer and punch. Install retaining spring.
10. Install parking lock pawl bracket. Tighten bolts to 65 INCH lbs. (7.4 N.m). Check operation of parking lock pawl. Ensure counter driven gear is locked when manual valve lever is in "P" range.
11. Install 2 "O" rings on 1st and reverse brake piston. Install 1st and reverse brake piston in case. Push piston into bore of case, facing spring seat upward. Install piston return spring. Using Spring Compressor (09351-32040), compress return spring evenly by tightening bolt gradually. Install snap ring. Ensure snap ring is fully seated and centered by 3 lugs on spring retainer. Ensure snap ring end gap is not aligned with spring retainer claw. Install snap ring to transaxle case.
12. Install overdrive brake and overdrive clutch apply gaskets over appropriate case opening. Install overdrive brake drum to case. Install new case gasket. Ensure length from top surface of case to counter driven gear top surface is .94" (24 mm). See **Fig. 46** . Align each bolt hole in gasket case. Install overdrive assembly over gasket to transaxle case. Coat threads of 23-mm bolts with sealer Three Bond (1324). See **Fig. 63** . Install and tighten bolts to 18 ft. lbs. (25 N.m).
13. Check intermediate shaft end play. Ensure shaft has thrust play in axial (in and out) direction. Thrust clearance is .0185-.0591" (.470-1.500 mm). Ensure shaft turns smoothly. If thrust play is not within specification, check installation of intermediate shaft. See **Fig. 64** .

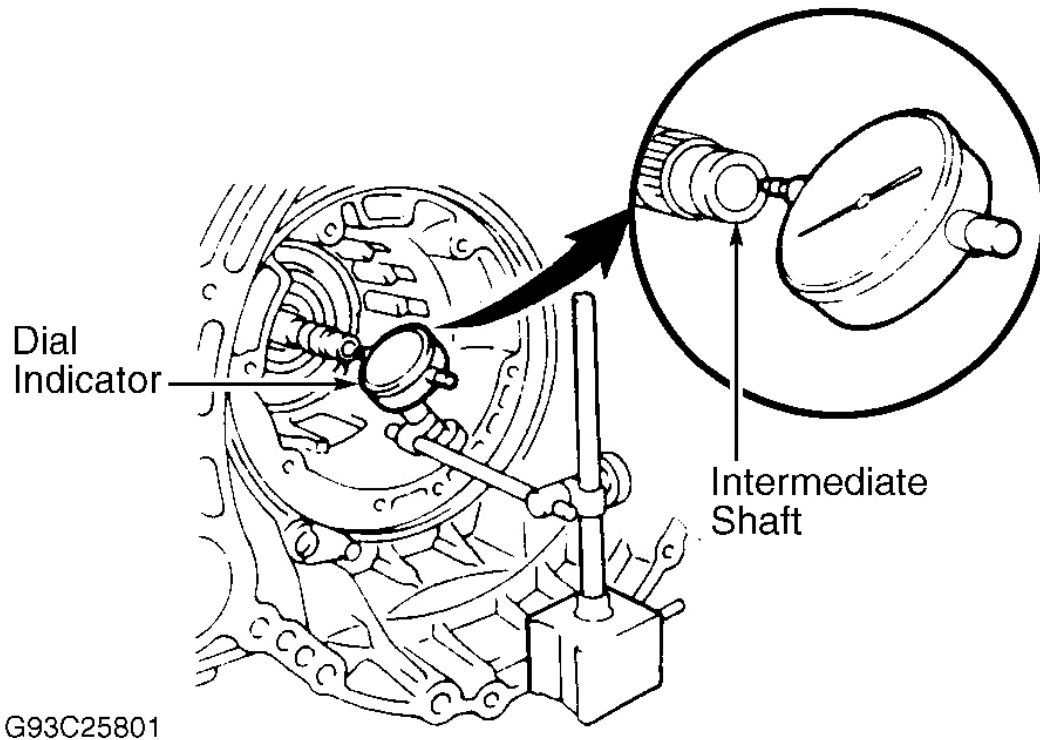
NOTE: **A one piece bearing is used on A-540E transaxles. A 3-piece bearing and race set is used on A-540H transaxle.**

14. Install rear planetary ring gear. On A-540E, place bearing on ring gear. On A-540H, coat races and bearing with petroleum jelly and on ring gear. Coat thrust washer with petroleum jelly and install on rear planetary gear. Install rear planetary gear. See **REAR PLANETARY GEAR BEARING & RACE SPECIFICATIONS** table.



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Fig. 63: Locating Overdrive Assembly Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

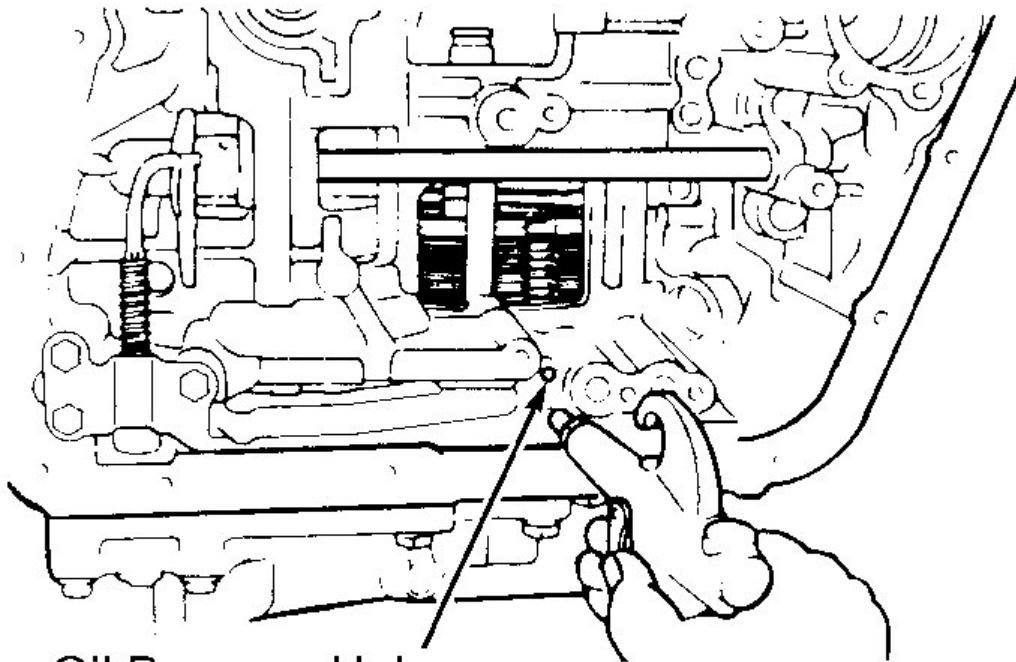
**Fig. 64: Checking Intermediate Shaft End Play**

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

REAR PLANETARY GEAR BEARING & RACE SPECIFICATIONS

Application	Outer Diameter In. (mm)	Inner Diameter In. (mm)	Part
Bearing	A-540E	1.524 (38.70)	.890 (22.60)
Front Race	A-540H	1.469 (37.30)	.949 (24.10)
Bearing	A-540H	1.480 (37.60)	.945 (24.00)
Rear Race	A-540H	1.480 (37.60)	.874 (22.20)

15. On both models, install discs, plates and flange on 1st and reverse brake. Install following parts in order: A-540E: Plate, disc, plate, disc, plate, disc, plate, disc, plate, disc, plate, disc, plate, disc. A-540H: Plate, disc, plate, disc, plate, disc, plate, disc, plate, disc, plate, disc, plate, disc. Install outer flange flat side facing toward piston side. Install snap ring. Ensure snap ring end-gap is not aligned with cutouts.
16. Check operation of 1st and reverse brake. Apply compressed air at oil passage of transaxle case to confirm piston movement. See **Fig. 65** . Check pack clearance of 1st and reverse brake. Clearance for A-540E is .033-.081" (.85-2.05 mm). Clearance for A-540H is .041-.085" (1.04-2.16 mm). See **Fig. 65** .



Oil Passage Hole

G93D25802

Fig. 65: Checking Operation Of 1st & Reverse Brake

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17. Install No. 2 one-way clutch in case. Install one-way clutch while turning planetary gear clockwise with Snap Ring Expander (09351-32050). Check operation of No. 2 one-way clutch by turning planetary gear. Gear should turn freely clockwise and lock counterclockwise. Install snap ring. Ensure end gap is not aligned with cutouts. On A-540H, coat thrust washer with petroleum jelly and install on rear planetary gear.
18. On both models, install 2nd coast brake band guide. Coat thrust washer with petroleum jelly. Install on No. 1 one-way clutch. Place No. 1 one-way clutch on rear planetary gear.
19. Install 2nd brake flange facing flat end toward 2nd brake piston. Install following parts in order: flange, disc, plate, disc, plate, disc, plate. Place piston return spring in case. Place 2nd brake drum in case. Align groove of drum with bolt. Place snap ring in case so end gap is installed in groove. While compressing piston return springs over drum with hammer handles, install snap ring in groove. Ensure snap ring end gap is not aligned with cutouts. Install new 2nd brake gasket until contact is made with 2nd brake drum.
20. Check operation of 2nd brake by applying compressed air into oil passage. Ensure piston moves freely. See **Fig. 66** .

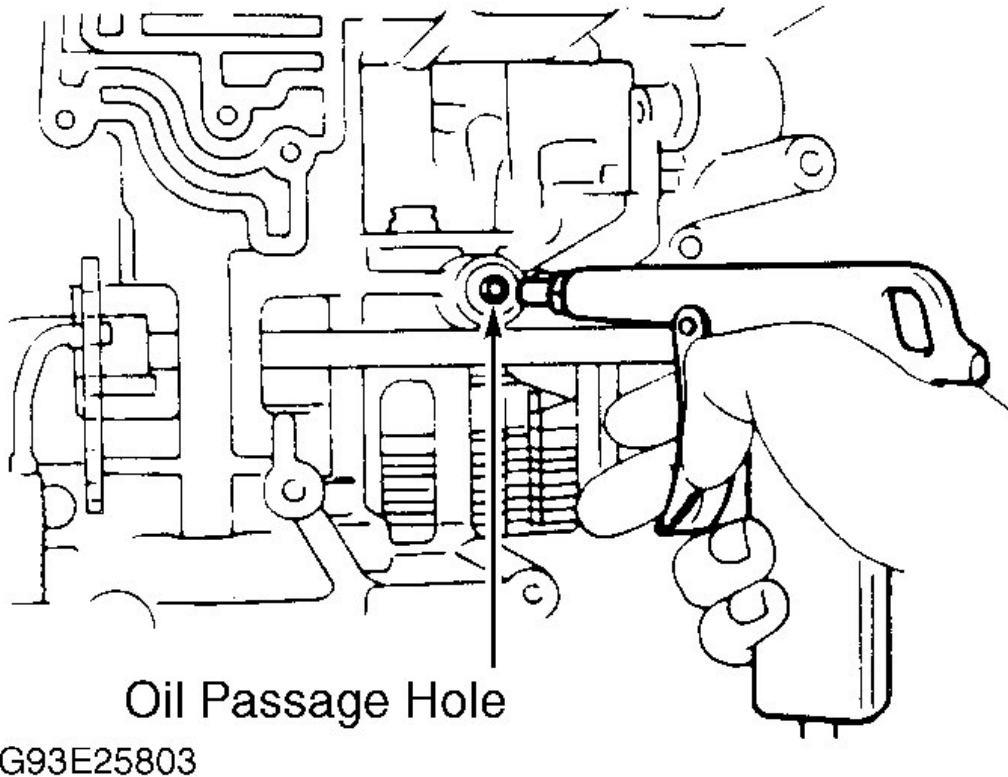
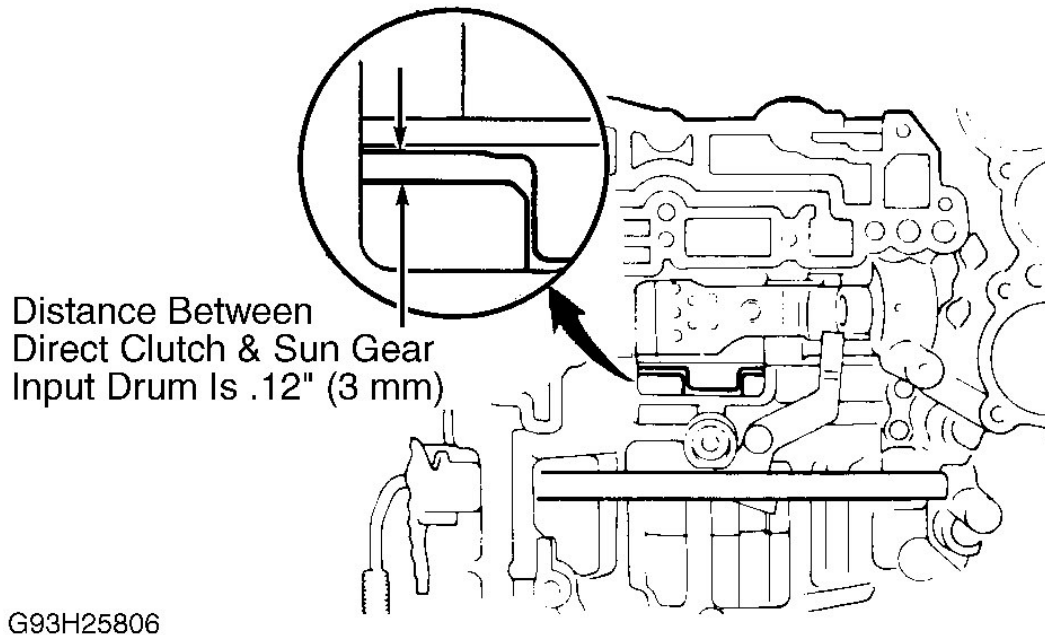


Fig. 66: Checking Operation Of 2nd Brake
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

21. Install thrust washer on sun gear input drum. Install sun gear by turning clockwise and installing in one-way clutch. Install oil seal ring to intermediate shaft.
22. To install front planetary gear on sun gear, coat races and bearings with petroleum jelly. Install races and bearings on both sides of planetary gear. Install planetary gear on sun gear. Coat race with petroleum jelly. On A-540H, install race onto tip of ring gear. On both models, install 2nd coast brake band into case. Install pin through oil pump mounting bolt hole.
23. Install forward clutch in case by coating races and bearings with petroleum jelly. Install races and bearings on both sides of forward clutch. Coat clutch drum thrust washer with petroleum jelly. Install thrust washer with oil groove facing upward onto direct clutch drum. Mesh hub of forward clutch with flukes of direct clutch discs. Ensure bearing and thrust washer do not move out of place. Install direct and forward clutch into case. Hold direct clutch toward forward clutch to prevent thrust washer from moving out of place. Check distance between direct clutch drum and sun gear input drum. See **Fig. 67** . Distance should be .12" (3 mm).



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Fig. 67: Checking Direct Clutch & Sun Gear Drum Clearance
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

24. Coat new "O" ring with ATF. Install "O" ring on oil pump. Place oil pump through input shaft. Align bolt holes of pump body with transaxle case. **DO NOT** push on oil pump hard, or oil seal ring will stick to direct clutch drum. Install and tighten bolts to 16 ft. lbs. (22 N.m). Measure thrust play of input shaft. See **Fig. 68**. Thrust play should be .0051-.0354" (.130-.900 mm). There are 2 different thicknesses of bearings for end of stator shaft on A-540E: .1417" (3.600 mm) and .1650" (4.190 mm). There are 2 different thicknesses of races for end of stator shaft on A-540H: .031" (.80 mm) and .055" (1.40 mm). Check input shaft rotation. Ensure shaft turns smoothly.

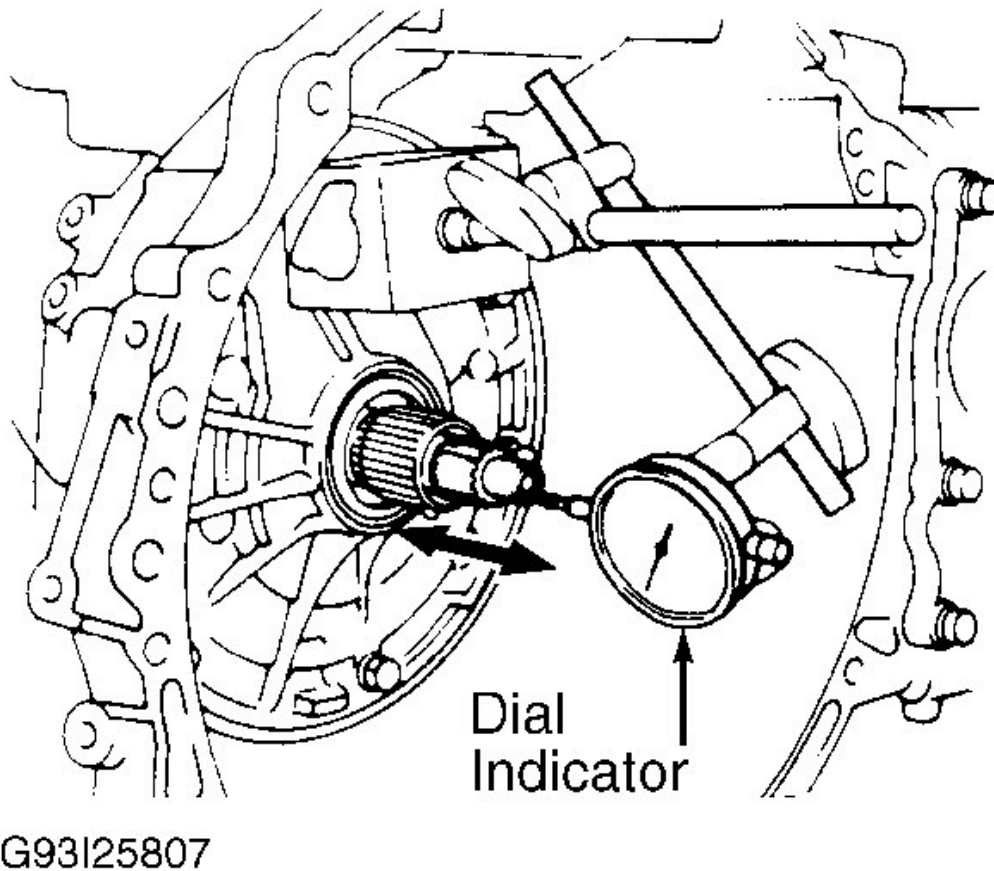
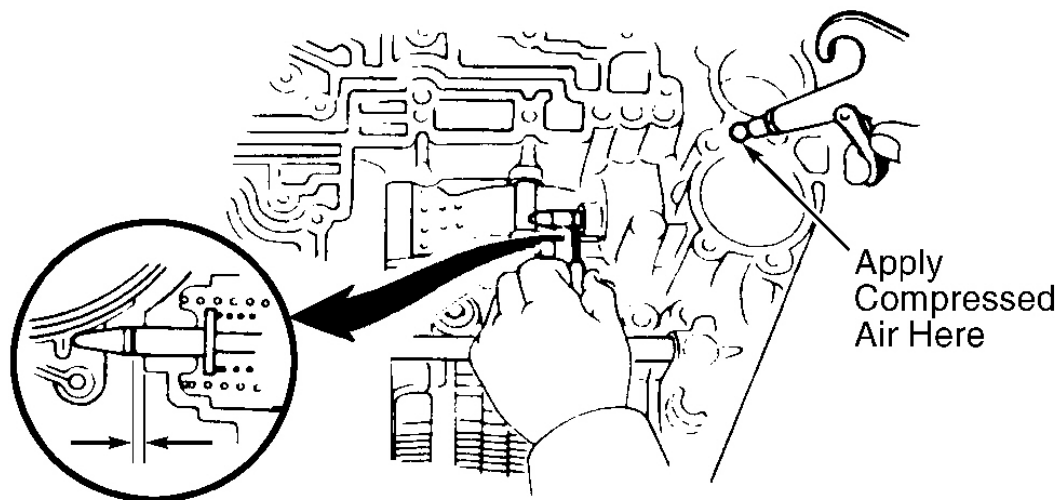


Fig. 68: Measuring Input Shaft Thrust Play
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

25. Install 2nd coast brake piston. Install outer spring with piston. Place cover in bore. Install snap ring while pressing in on cover. Ensure front end of piston rod contacts center of 2nd brake band depression.
26. Check 2nd coast brake piston stroke. Apply a small amount of paint to piston rod at point where piston rod contacts case. Measure 2nd coast piston stroke by applying and releasing 57-114 psi (4-8 kg/cm²) of compressed air. See **Fig. 69**. Piston stroke is .079-.138" (2.00-3.50 mm). If stroke exceeds specification, replace piston rod with longer rod. Piston rods are available in 2 sizes: 3.748" (95.20 mm) or 3.791" (96.30 mm). After installation of new rod, re-measure stroke. If stroke exceeds specification, replace brake band.
27. Install the accumulator pistons and springs into their bores. Refer to the **ACCUMULATOR SPRING SPECIFICATIONS** table. Also, see **Fig. 70**.
28. Install accumulator cover with new gasket. Install 5 bolts. Tighten to 89 INCH lbs. (10 N.m). See **Fig. 71**.



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Fig. 69: Checking Operation Of 2nd Coast Brake
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

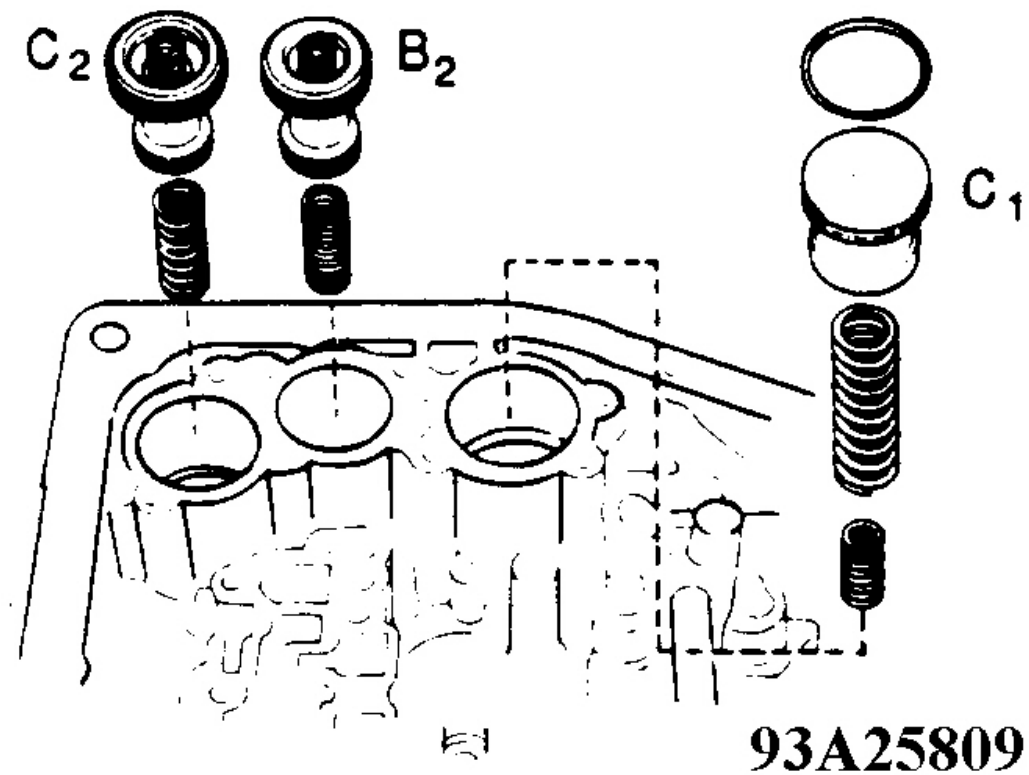
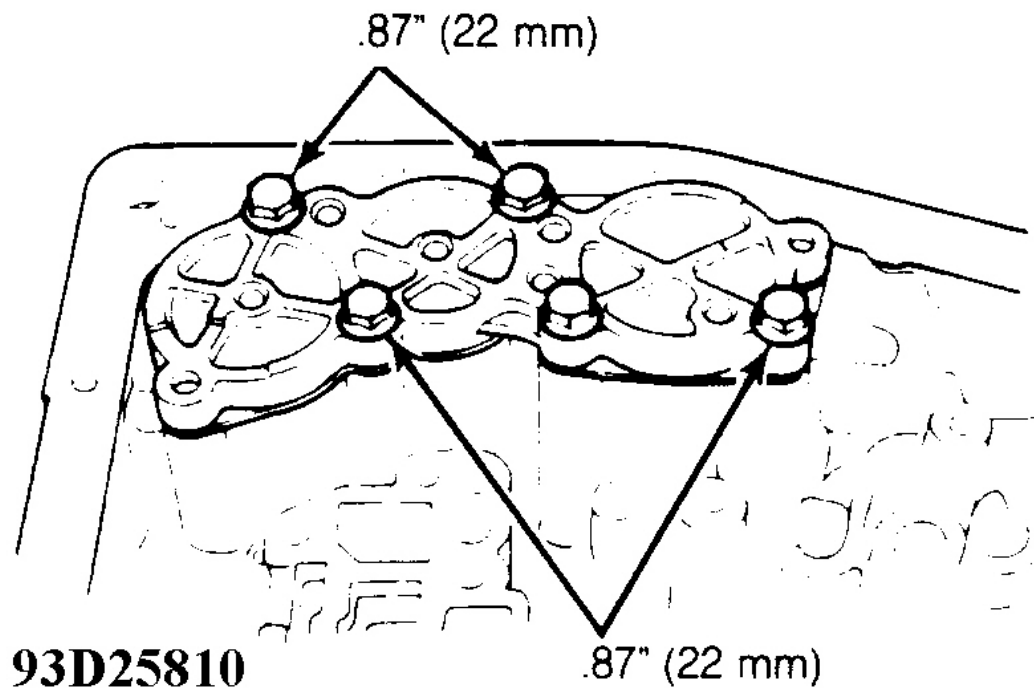


Fig. 70: Exploded View Of Accumulator Pistons & Springs
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

**Fig. 71: Locating Accumulator Bolts**

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

ACCUMULATOR SPRING SPECIFICATIONS

Application	Color	Free Length: In. (mm)
C2	Red	2.008 (57.00)
B2	Orange	2.303 (58.50)
C1 Outer	Blue	2.803 (71.20)
C1 Inner	Light Green	1.709 (43.40)

29. Install new 2nd brake apply gasket. Install throttle valve cable and solenoid wire. Place valve body on transaxle. While holding cam down with hand, slip cable end in slot. Lower valve body into position. **DO NOT** entangle throttle valve cable. Install valve body bolts. Ensure proper length and location of bolts. See **Fig. 1** . Finger tighten all bolts. Tighten bolts to 97 INCH lbs. (11 N.m).
30. Install B3 apply tube. See **Fig. 72** . Install connector clamp and tube retainer. Install and tighten bolts to 97 INCH lbs. (11 N.m). Using a plastic hammer, install oil tubes. See **Fig. 73** . **DO NOT** bend or damage tubes. Tighten bolts to 48 INCH lbs. (5.4 N.m).

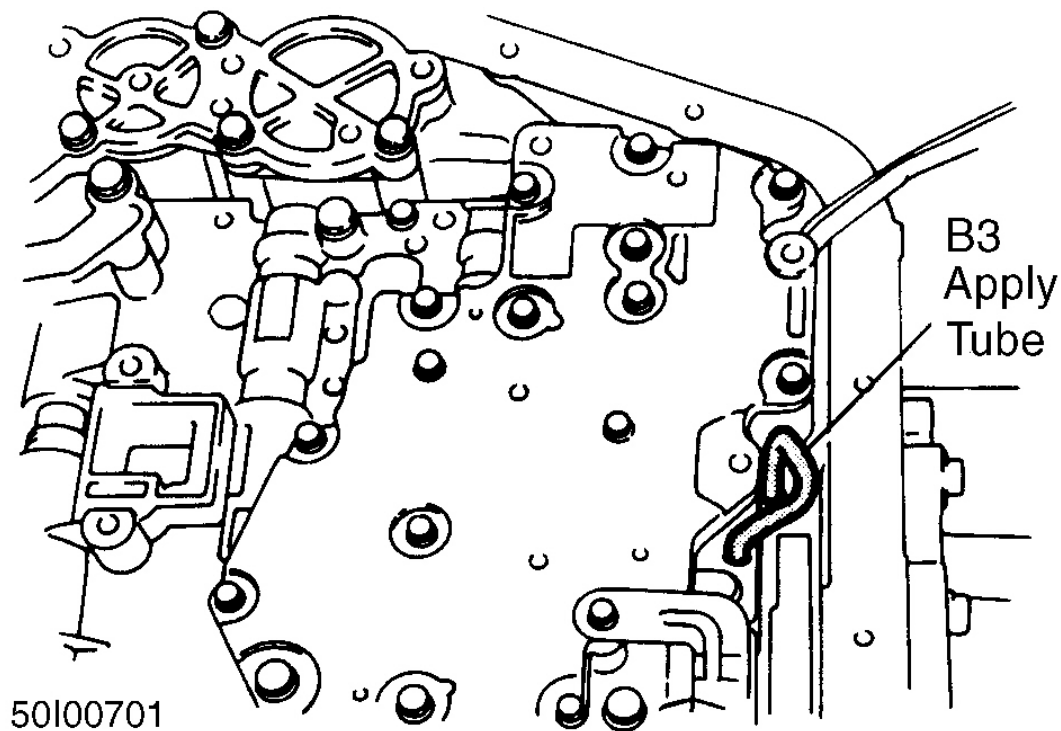
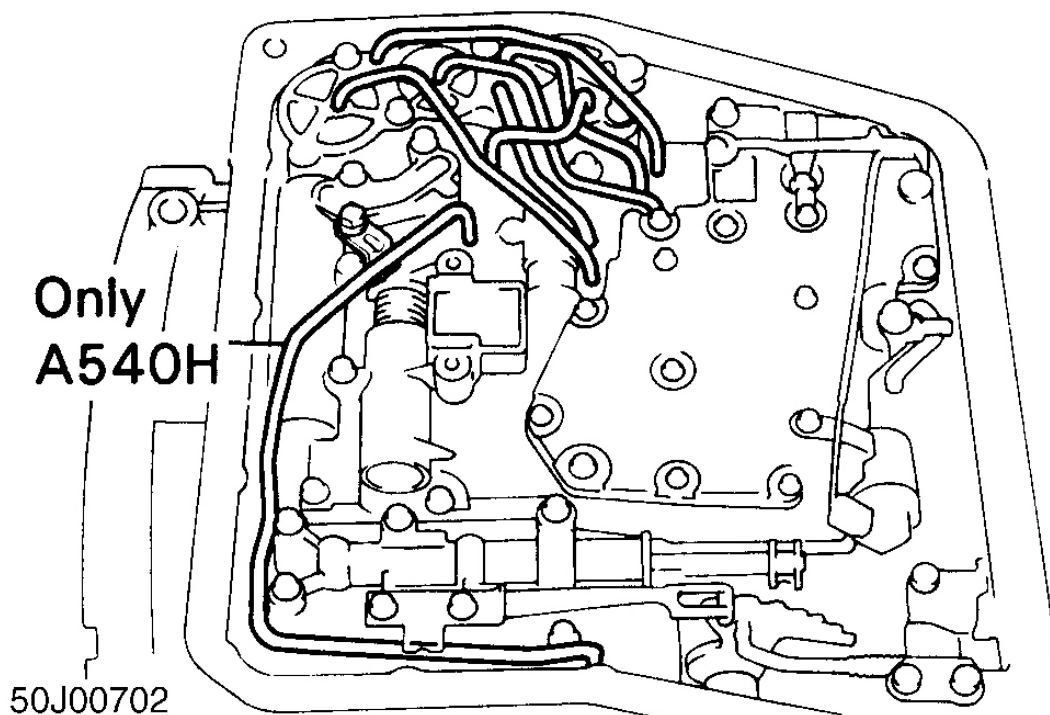


Fig. 72: B3 Apply Tube Installation Location
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

**Fig. 73: Oil Tube Installation Locations**

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

31. Place manual valve and body on transmission. Align manual lever with pin of manual shaft lever. Lower valve body into position. Ensure proper length and location of bolts. See **Fig. 3** . Finger tighten bolts. Evenly tighten bolts to 97 INCH lbs. (11 N.m).
32. Install detent spring. Ensure proper length and location of each bolt. See **Fig. 1** . Finger tighten bolts. Tighten bolts to 97 INCH lbs. (11 N.m). Check for correct operation of manual valve lever. Ensure lever is touching center of detent spring tip roller.
33. Install tube bracket and oil strainer. Tighten tube bracket bolts to 89 INCH lbs. (10 N.m). Tighten oil strainer bolts to 97 INCH lbs. (11 N.m). Install magnets in oil pan. Ensure magnets do not interfere with oil tubes. Install oil pan with new gasket. Tighten pan bolts to 43 INCH lbs. (4.9 N.m).
34. Install vehicle speed sensor with "O" ring. Tighten bolt. Install speed sensor connector. Install throttle cable retaining plate. Install solenoid wire.
35. Install neutral start switch to manual valve shaft. Install new locking plate. Tighten nut and stake with locking plate. Adjust neutral start switch by aligning groove and neutral basic line. Install manual shift lever. Install union and elbow. Install elbow at right angles to bottom of case. Tighten bolt to 20 ft. lbs. (27 N.m)
36. On A-540H transaxle, install differential side gear intermediate shaft. Keeping intermediate shaft on pinion shaft of differential, measure protrusion length. Protrusion length should be 10.059" (255.50 mm). See **Fig. 74** . Install apply gasket on differential carrier cover.

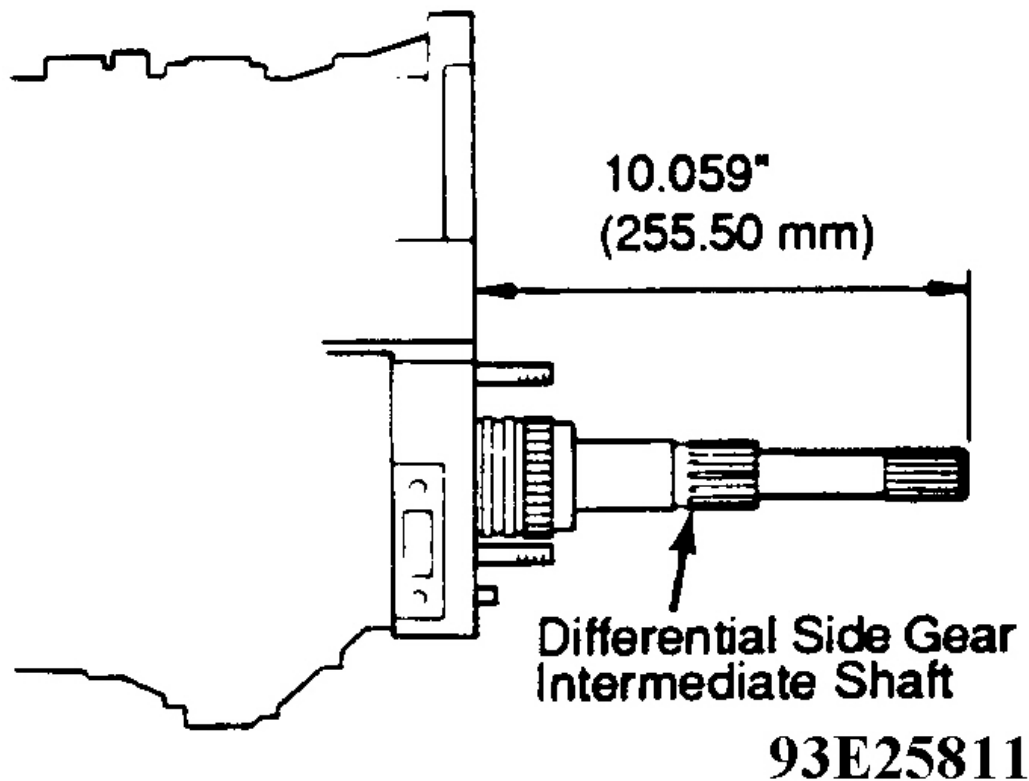


Fig. 74: Intermediate Shaft Measuring Protrusion Length
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

37. On A-540H transaxle, install transfer assembly. Apply seal packing Three Bond (1131) or Loctite (518) to case. Install transfer assembly. Coat threads of bolts with sealer Three Bond (1324). Install and tighten bolts to 51 ft. lbs. (69 N.m).
38. On both models, install torque converter into transaxle. Using a scale and straightedge, measure from installed surface to front surface of transaxle housing. Correct distance is .906" (23.00 mm) or more. Install torque converter mounting bolts. Coat threads of bolts with sealer Three Bond (1324). Tighten bolts evenly to 20 ft. lbs. (27 N.m).
39. Inspect mode select lever position. After inspection, ensure select lever position is on FREE mode and attach lock bolt.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS (A-540E & A-540H)

Application	Ft. Lbs. (N.m)
Center Differential Control Solenoid-To-Transfer Valve Body Bolts	10 (14)

1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul

Converter-To-Transaxle Case Bolts	20 (27)
Differential	
Carrier Cover Bolts	29 (39)
Front Right Case-To-Front Left Case	24 (33)
Left Case-To-Right Case Bolts (A-540E)	46 (63)
Left Side Bearing Retainer Bolts	14 (19)
Right Retainer Bolts	14 (19)
Driven Pinion Bearing Cage-To-Transfer Extension Housing Bolts	18 (25)
Oil Cooler Pipe Union Bolt	20 (27)
Oil Pump-To-Transaxle Case Bolts	16 (22)
Overdrive Case-To-Transaxle Case Bolts	18 (25)
Ring Gear-To-Differential Case Bolts	91 (124)
Transfer Assembly-To-Transaxle Case Bolts	51 (69)
Transfer Extension Housing-To-Dynamic Damper Bolts	18 (25)
Transfer Left Case-To-Drain Plug Bolt	29 (39)
Transfer Left Case-To-Drive Pinion Bearing Cage Bolts	29 (39)
Transfer Left Case-To-Inspection Hole Cover Bolts	12 (16)
Transfer Right Case-To-Transfer Left Case Bolts	32 (44)
Transfer Right Case Retainer-To-Case Bolts	22 (29)
Transfer Ring Gear-To-Ring Gear Mounting Case Bolts	72 (97)
INCH Lbs. (N.m)	
Accumulator-To-Cover Bolts	89 (10)
Cam Assembly Mounting Bolt	65 (7.3)
Neutral Start Switch Bolt	48 (5.4)
Neutral Start Switch Nut	61 (6.9)
Oil Pan Bolts	43 (4.9)
Oil Pump Body-To-Stator Shaft Bolts	89 (10)
Parking Lock Pawl Bracket Bolt	65 (7.4)
Transfer Left Case-To-Rear Wheel Speed Sensor Bolts	48 (5.4)
Transfer Right Case-To-Adjusting Nut Lock-Plate Lock Nut	63 (7.2)
Transfer Right Case-To-Oil Pump Cove Bolts	69 (7.8)
Transfer Right Case-To-Oil Strainer Bolts	48 (5.4)
Transfer Valve Body-To-Transfer Left Case Bolts	97 (11)
Upper Valve Body-To-Lower Valve Body Bolts	58 (6.6)
Valve Body-To-Transaxle Case Bolts	97 (11)

WIRING DIAGRAMS

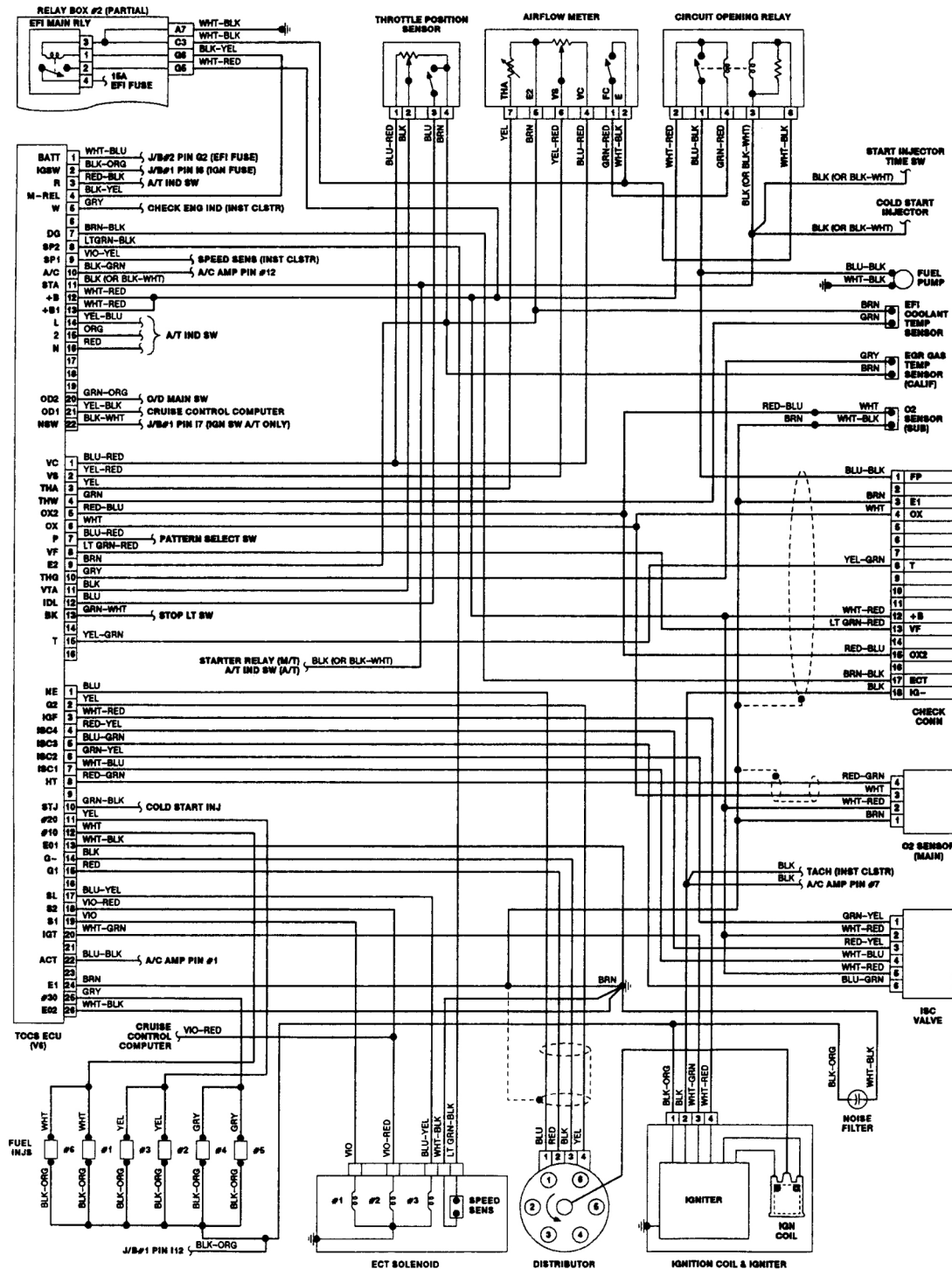
1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul



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1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul



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Fig. 76: Transmission Wiring Diagram (1989 Camry 2.5L)

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul



1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul

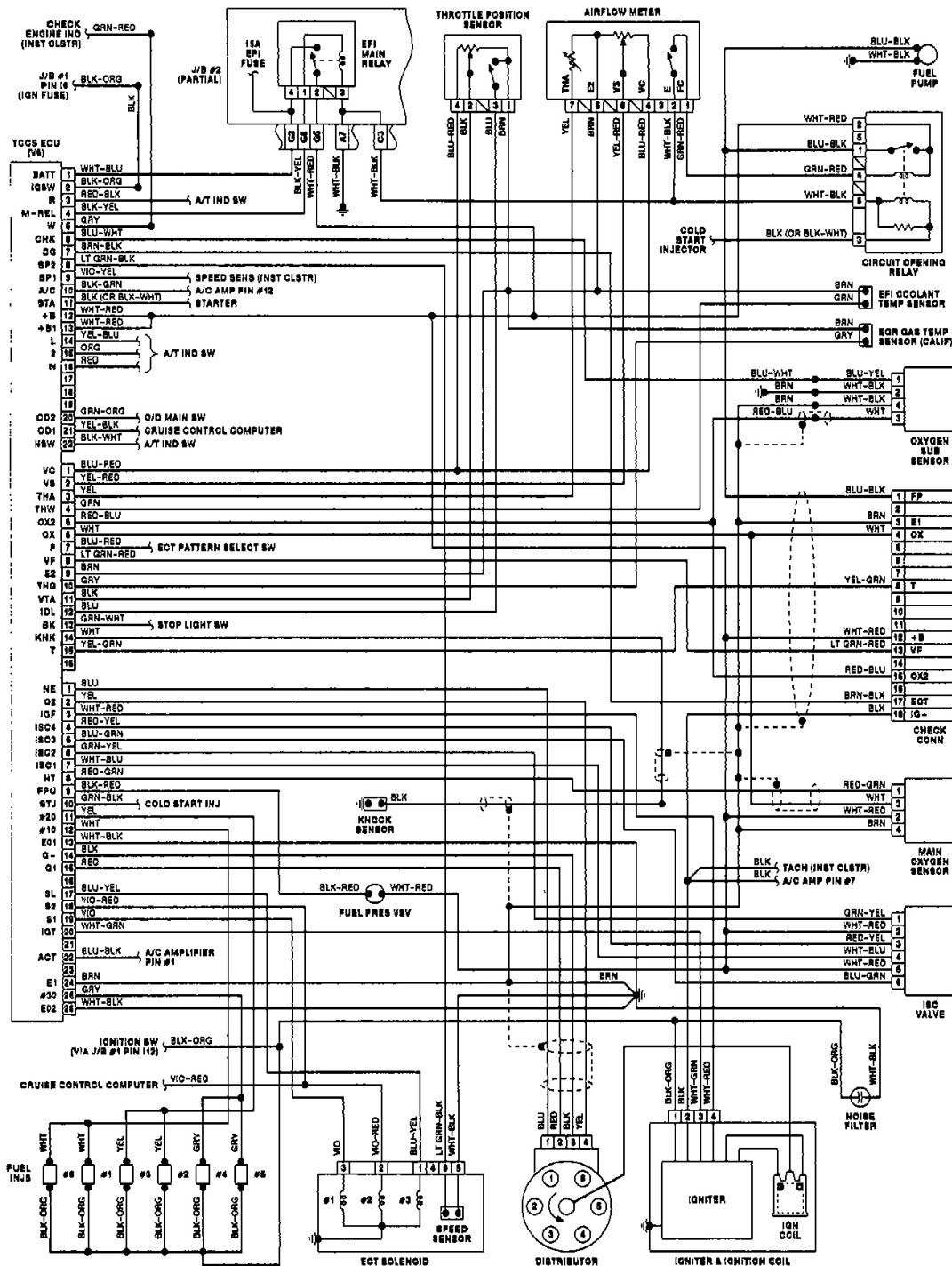


Fig. 78: Transmission Wiring Diagram (1990 Camry 2.5L)

1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul

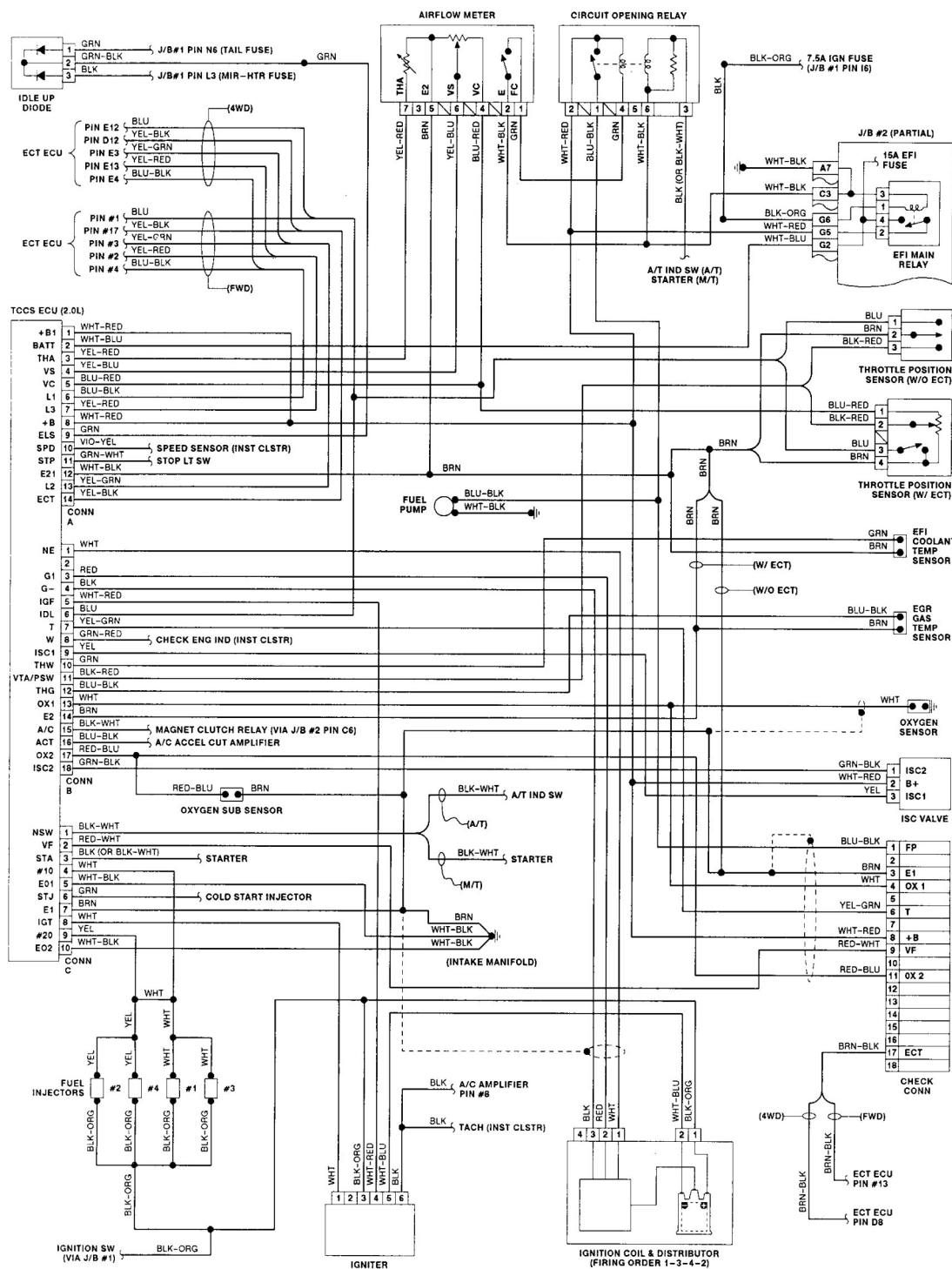


Fig. 79: Transmission Wiring Diagram (1991 Camry 2.0L)

1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul

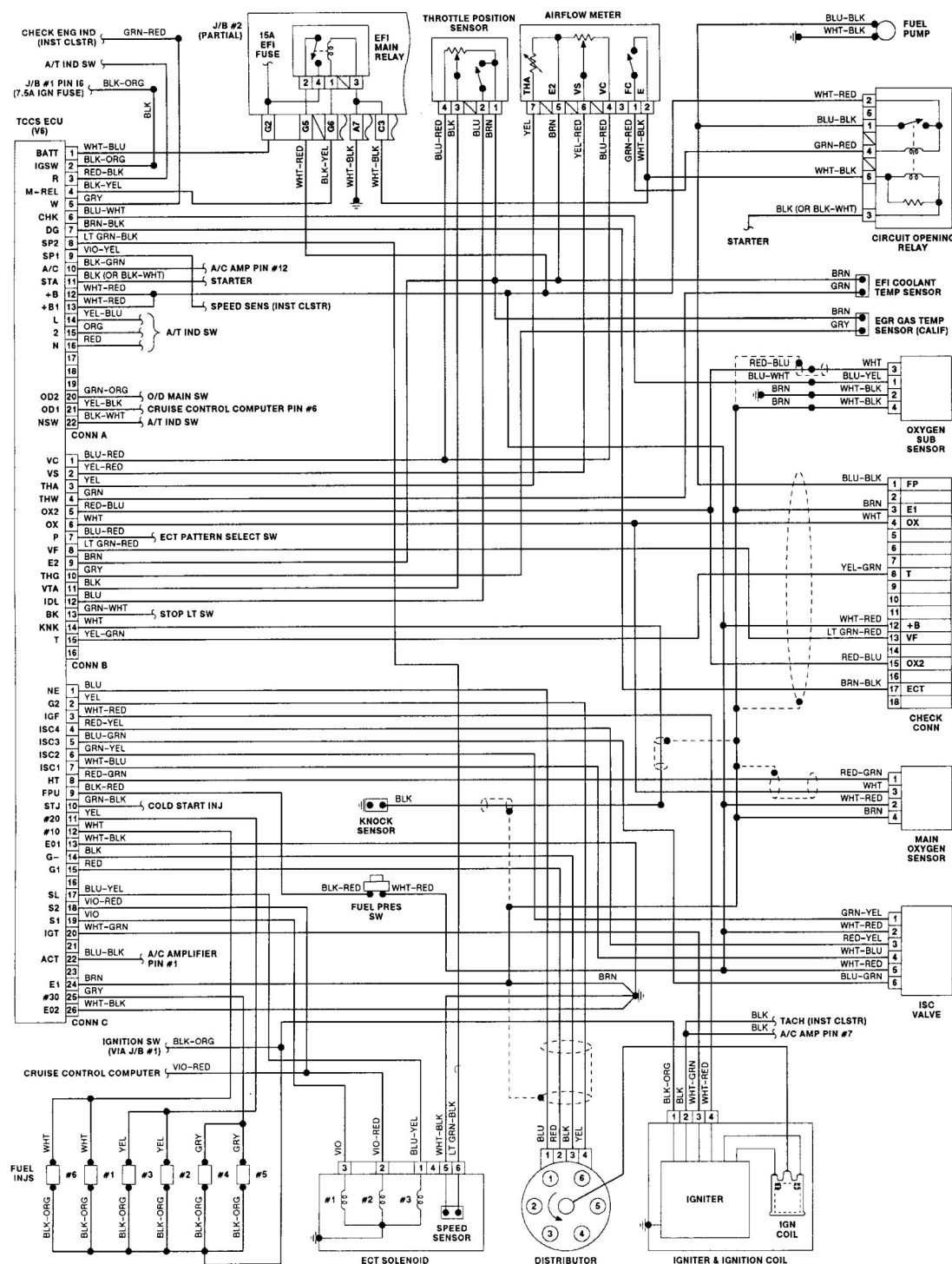
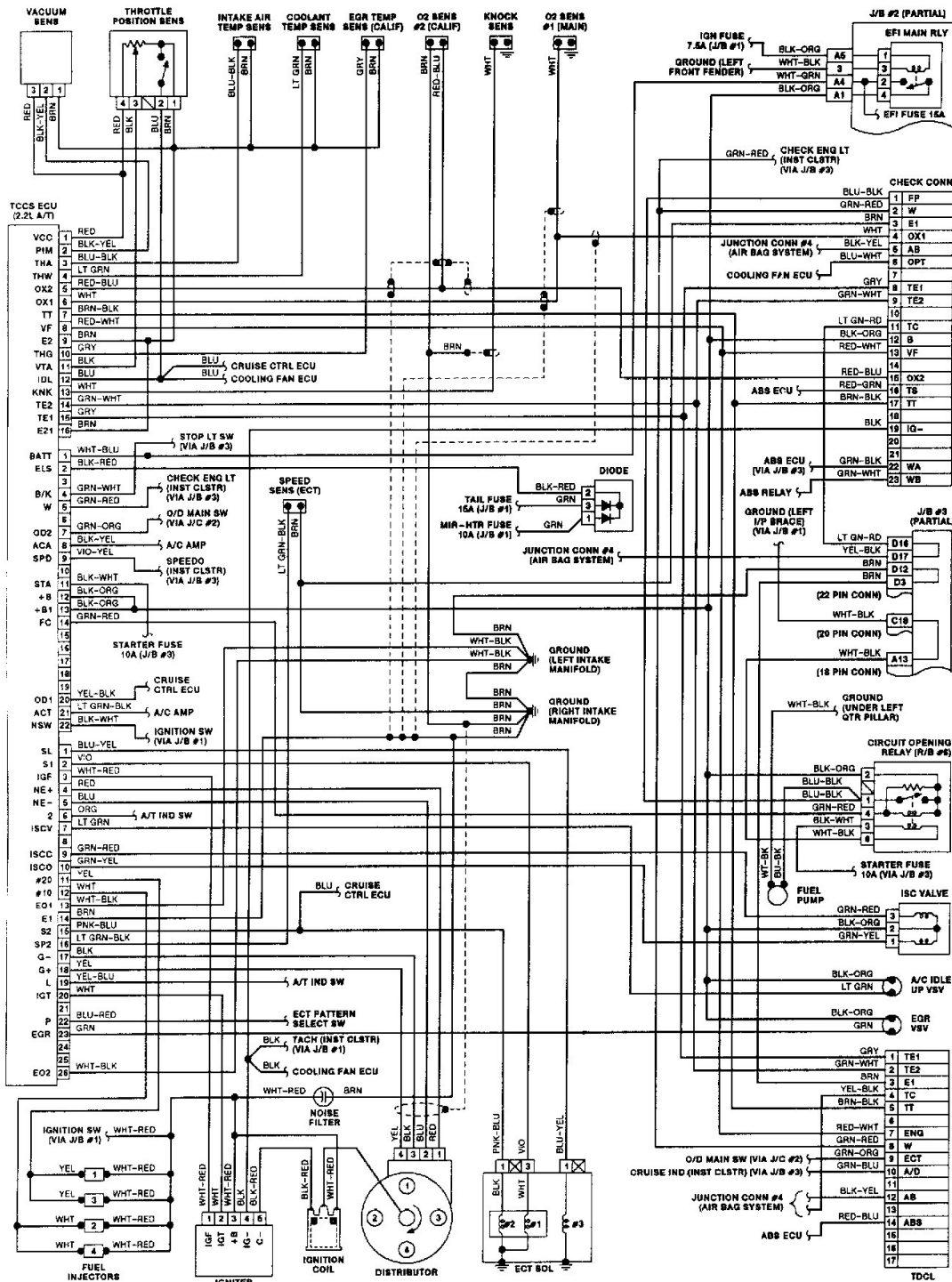


Fig. 80: Transmission Wiring Diagram (1991 Camry 2.5L)

1990 Toyota Camry

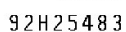
1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul



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Fig. 81: Transmission Wiring Diagram (1992 Camry 2.2L)

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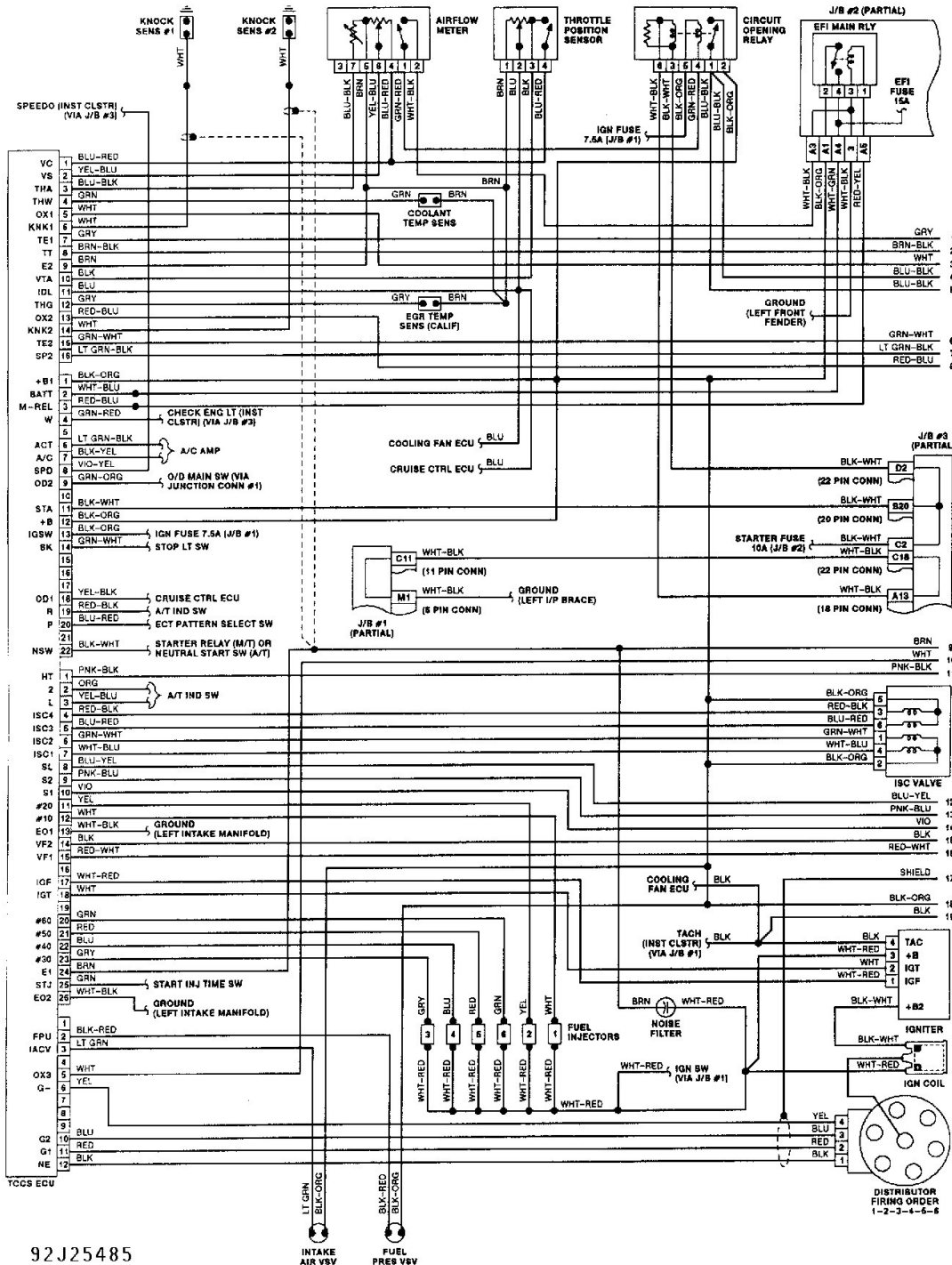
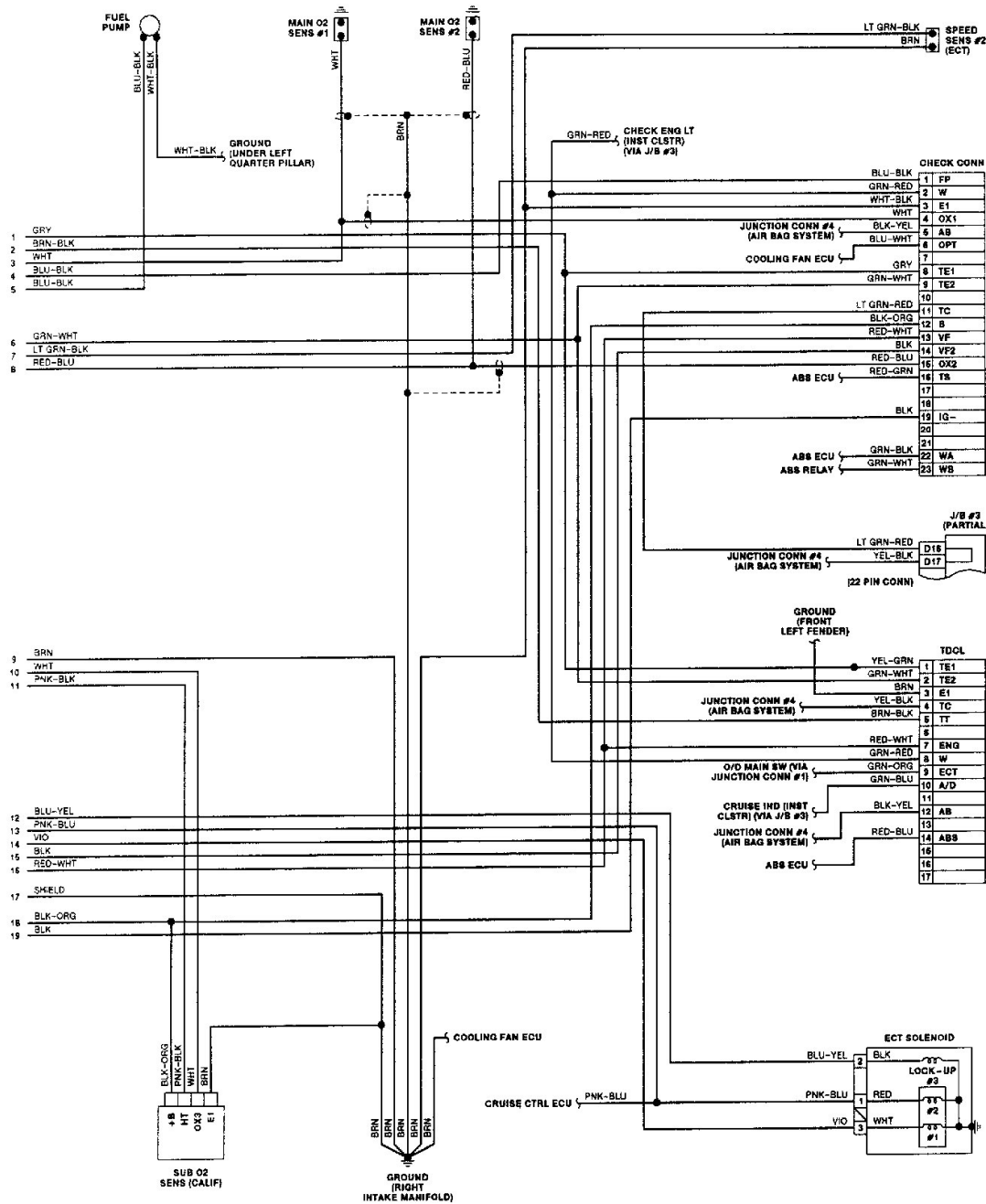


Fig. 83: Transmission Wiring Diagram (1992 Camry 3.0L - 1 Of 2)

1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul



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Fig. 84: Transmission Wiring Diagram (1992 Camry 3.0L - 2 Of 2)

1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul



Fig. 85: Transmission Wiring Diagram (1993 Camry)

1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul



Fig. 86: Transmission Wiring Diagram (1994 Camry 2.2L)

1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul



Fig. 87: Transmission Wiring Diagram (1994 Camry 3.0L)

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul



1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul

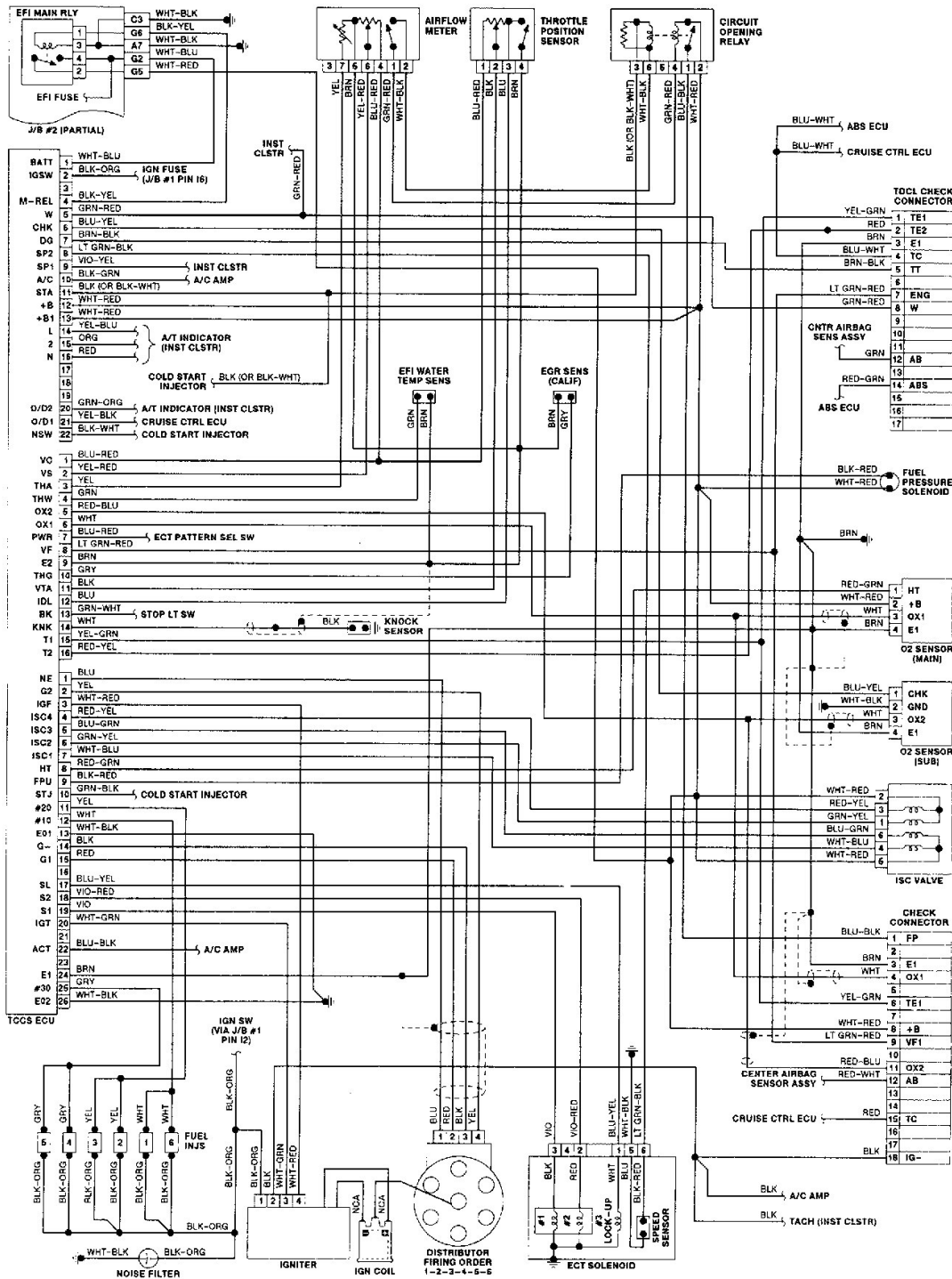


Fig. 89: Transmission Wiring Diagram (1991 ES250)

1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul

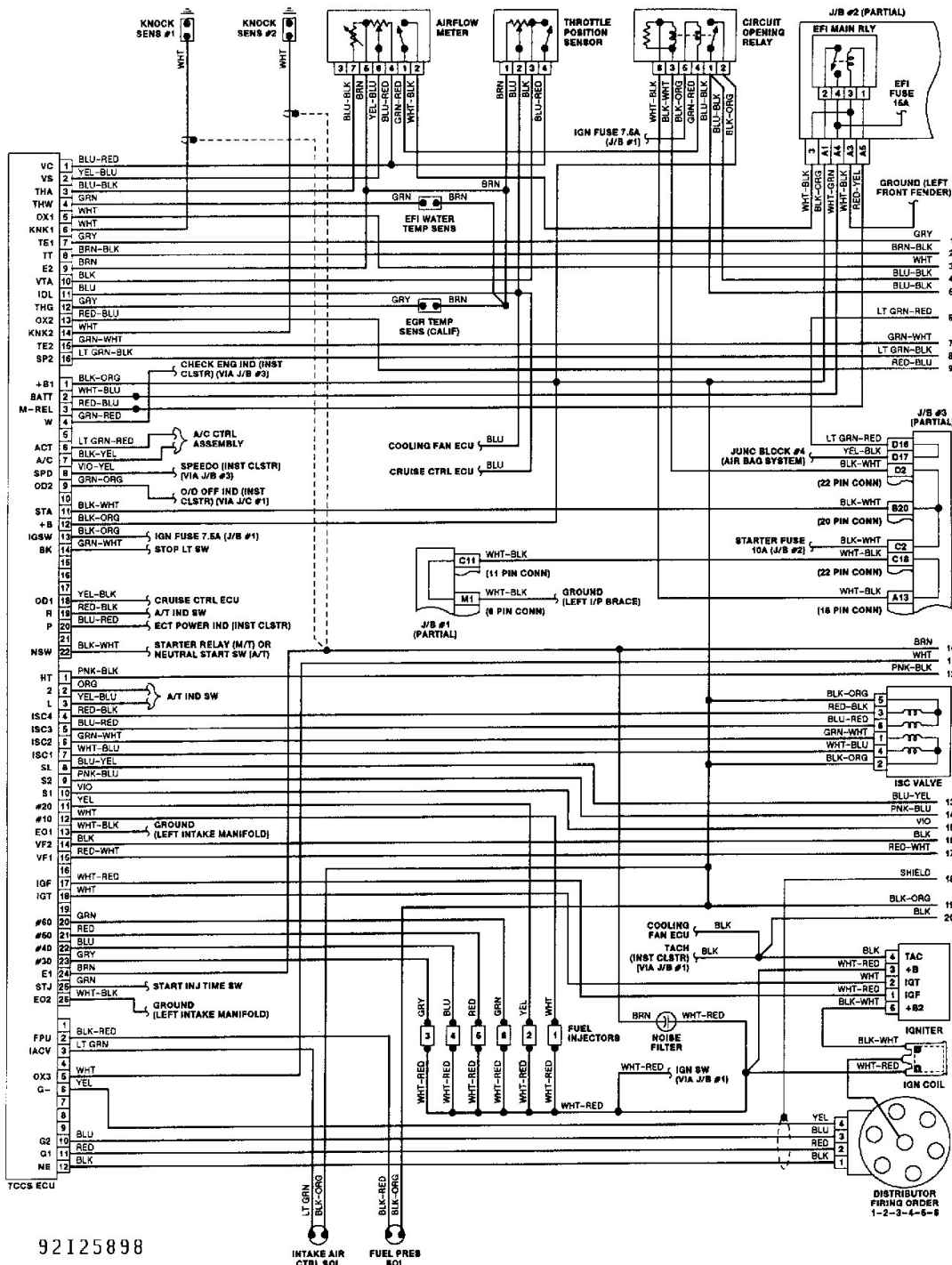


Fig. 90: Transmission Wiring Diagram (1992 ES300 - 1 Of 2)

1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul

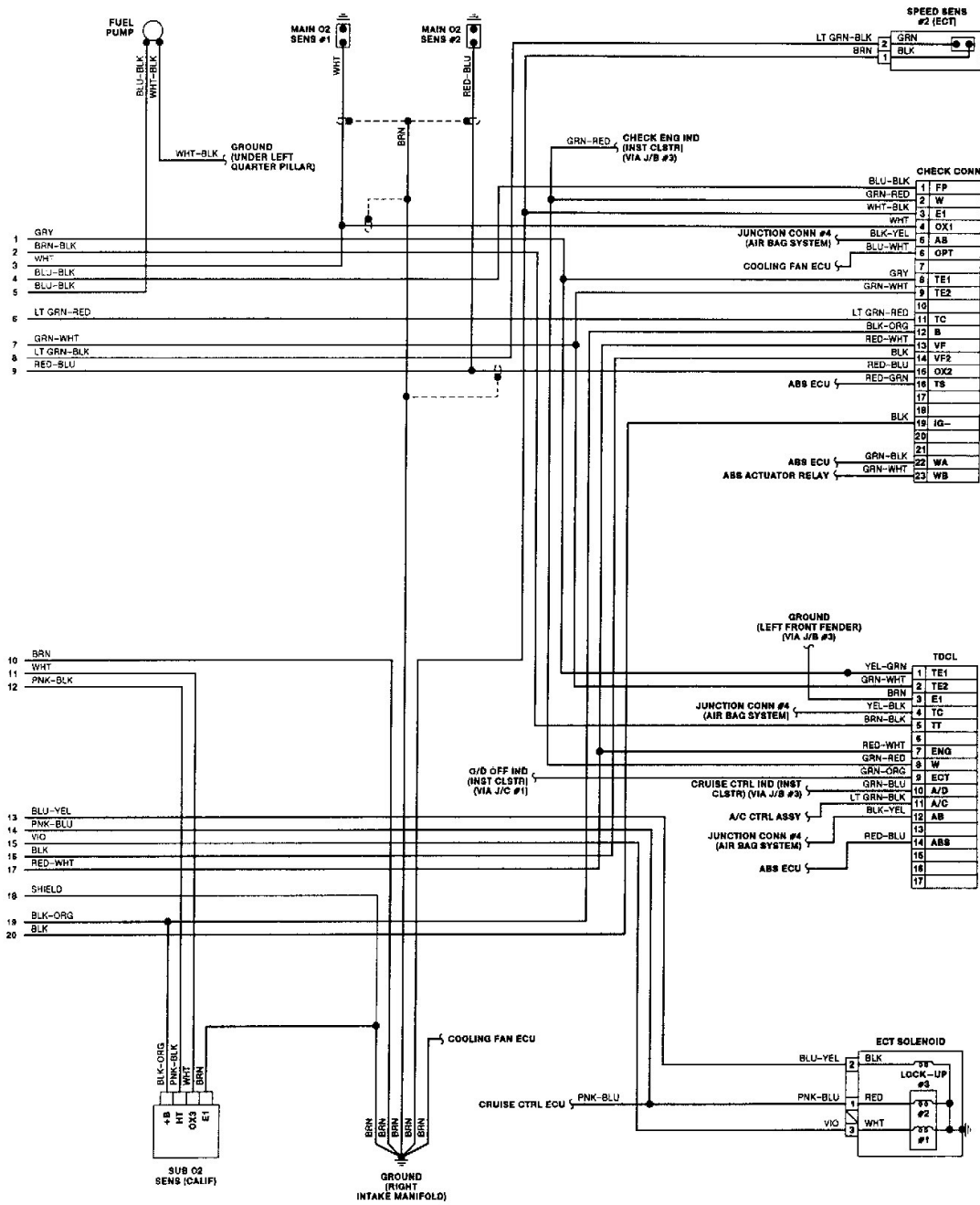


Fig. 91: Transmission Wiring Diagram (1992 ES300 - 2 Of 2)

1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul



Fig. 92: Transmission Wiring Diagram (1993 ES300)

1990 Toyota Camry

1989-94 AUTOMATIC TRANSMISSIONS Toyota A-540E, A-540H & A-541E Overhaul



Fig. 93: Transmission Wiring Diagram (1994 ES300)