

2000 Chevrolet Tracker

2000 AUTOMATIC TRANSMISSIONS Aisin Warner AW03-72LE & AW03-73LE Overhaul

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APPLICATION

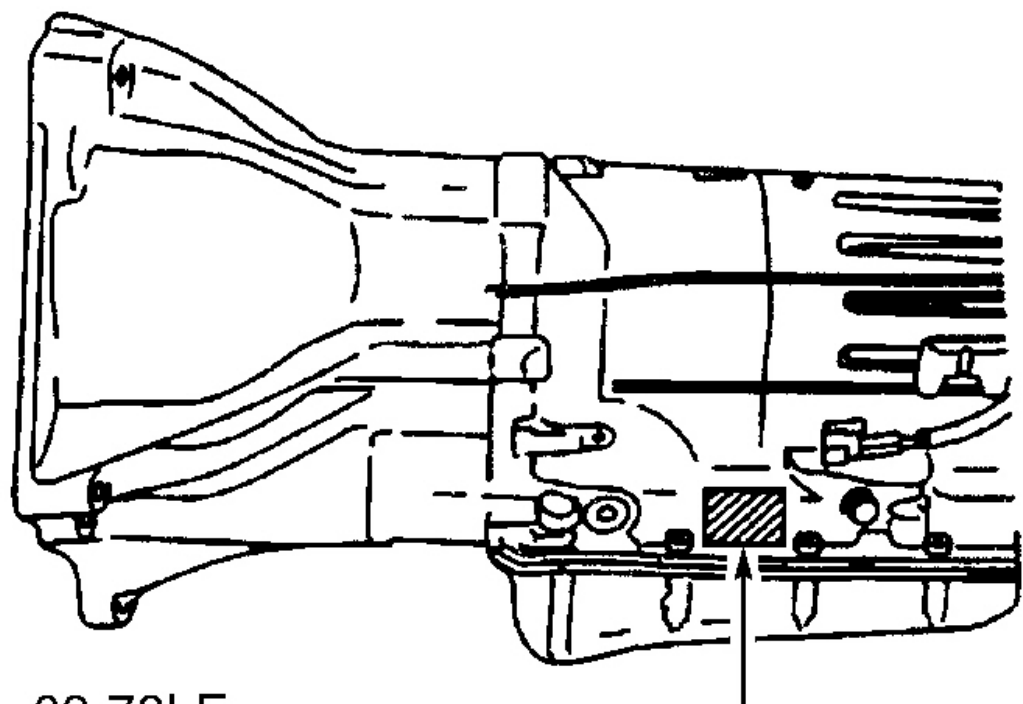
CAUTION: Vehicle is equipped with a Supplemental Restraint System (SRS). When servicing vehicle, use care to avoid accidental air bag deployment. SRS-related components are located in steering column, center console, instrument panel and lower panel on instrument panel. **DO NOT** use electrical test equipment on these circuits. It may be necessary to deactivate SRS before servicing components. See **AIR BAG DEACTIVATION PROCEDURES** article in **GENERAL INFORMATION**.

AUTOMATIC TRANSMISSION APPLICATIONS

Application	Transmission Model (RPO Code)
Chevrolet Tracker	AW03-72LE (M41)
Kia Sportage	AW03-72LE
Suzuki Grand Vitara & Vitara	
2WD	AW03-72LE
4WD	AW03-73LE

IDENTIFICATION

Transmission is identified by transmission identification number. Transmission identification number is located on left side of transmission near oil pan. See **Fig. 1** . Transmission identification number contains transmission type, production year, production month and serial number.



03-72LE

4-Speed

Identification Number

96 A 900001

Sequential Number

Assembly Month

Model Year

G96I30435

Fig. 1: Locating Transmission Identification Number
Courtesy of SUZUKI OF AMERICA CORP.

GEAR RATIOS

TRANSMISSION GEAR RATIOS

Gear Range	Gear Ratio

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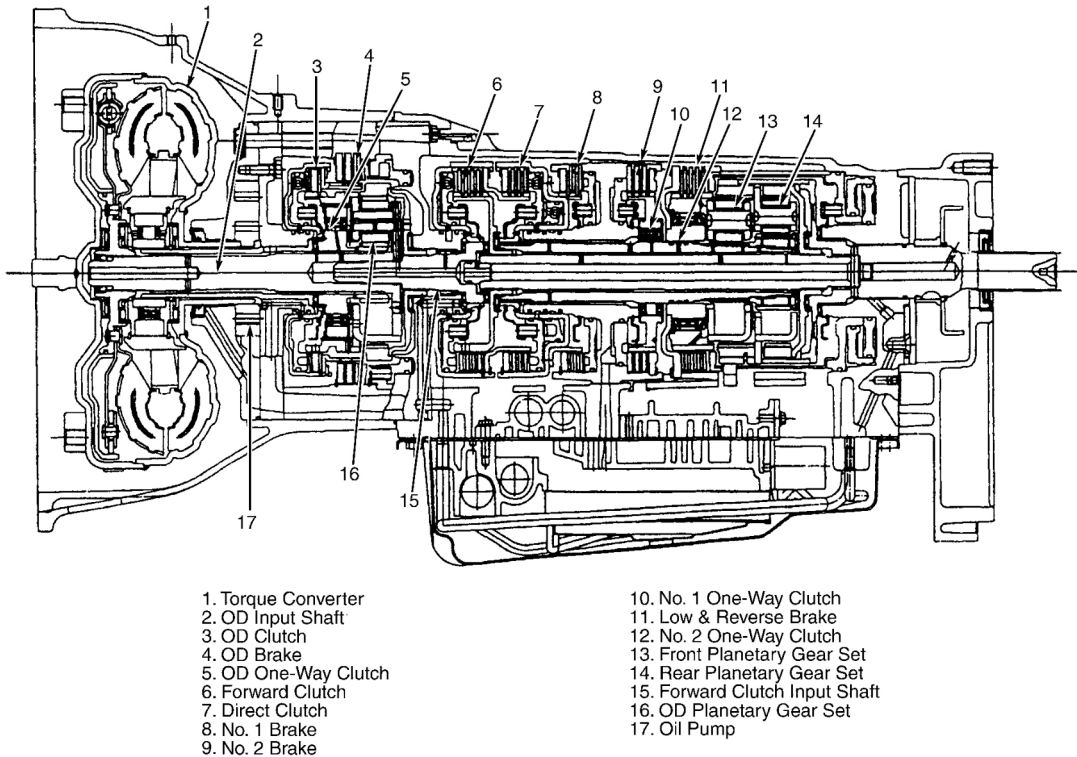
Grand Vitara	
1st	2.452:1
2nd	1.452:1
3rd	1.000:1
4th (OD)	0.689:1
Reverse	2.212:1
Sportage & Vitara	
1st	2.826:1
2nd	1.493:1
3rd	1.000:1
4th (OD)	⁽¹⁾ 0.730:1
Reverse	2.703:1
Tracker	⁽²⁾
⁽¹⁾ On 2.0L Vitara, 4th gear ratio is 0.689:1.	
⁽²⁾ Information is not available from manufacturer.	

DESCRIPTION & OPERATION

Transmission consists of a lock-up torque converter, oil pump, valve body assembly, 3 clutch assemblies, 3 planetary gear sets, 4 clutch style brakes and 3 one-way clutches. See **Fig. 2**.

The AW03-72LE and AW03-73LE 4-speed OD transmissions are electronically controlled. Transmission shifting and torque converter clutch lock-up are controlled by either a Powertrain Control Module (PCM) or a Transmission Control Module (TCM) depending on model, 2 shift solenoids and a lock-up solenoid. For electronic diagnosis, see appropriate ELECTRONIC CONTROLS article.

The control module receives information from various input devices and uses this information to control torque converter lock-up solenoid and shift solenoids No. 1 and 2 on transmission valve body. Solenoids are responsible for transmission shifting and torque converter clutch lock-up. A mode switch is mounted on console and is used to change shift program from ECONOMY to POWER.



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Fig. 2: Identifying Transmission Components
Courtesy of SUZUKI OF AMERICA CORP.

LUBRICATION

For additional information, see appropriate AUTOMATIC TRANSMISSION SERVICING article in TRANSMISSION SERVICING.

RECOMMENDED FLUID

All models use Dexron III.

FLUID CAPACITIES

The following transmission refill capacities are approximate. Correct fluid level should always be determined by marks on dipstick, rather than amount of fluid added. DO NOT overfill. See **TRANSMISSION FLUID CAPACITIES** table.

TRANSMISSION FLUID CAPACITIES

Application	Refill - Qts. (L)	Dry-Fill - Qts. (L)
Grand Vitara & Vitara 2.0L	2.6 (2.5)	7.5 (7.1)
Sportage	2.6 (2.5)	7.1 (6.7)

Tracker & Vitará 1.6L

2.6 (2.5)

7.3 (6.9)

ON-VEHICLE SERVICE

The following components can be serviced without transaxle removal:

- Shift Solenoid Valves
- TCC Solenoid Valve
- Transmission Range Switch
- Valve Body Assembly
- Vehicle Speed Sensor

For service information on listed components, see appropriate component under **REMOVAL & INSTALLATION**.

TROUBLE SHOOTING

PRELIMINARY INSPECTION

1. Before testing, ensure engine and transmission are at normal operating temperature, fluid level is correct and selector lever, throttle cable and idle speed are adjusted correctly. Battery must be fully charged for accurate testing.
2. To aid in transmission fault diagnosis, determine if fault is hydraulic, electronic or a combination of both. Electronic control transmissions are capable of storing self-diagnostic codes. To determine if a fault is electrical, retrieve any stored Diagnostic Trouble Codes (DTC). See appropriate ELECTRONIC CONTROLS article for electronic diagnosis.

SYMPTOM DIAGNOSIS

No Movement In Any Gear Position

Possible cause: low fluid level, worn or seized oil pump, sticking regulator valve, clogged oil strainer, broken planetary gear set, worn oil pump bushing, defective torque converter or manual valve.

Torque Converter Clutch Lock-Up Does Not Occur

Possible cause: TCC control valve or clutch solenoid sticking, or defective torque converter.

Poor 1st Gear Performance Or Slipping In "D" Or "2" Position

Possible cause: leaking forward clutch due to OD case sealing ring failure, slipping OD clutch, or defective 1-2 shift valve.

Slipping In "L" Position

Possible cause: leaking forward clutch due to OD case sealing ring failure, slipping low and reverse brake or

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defective low and reverse brake piston "O" ring.

Slipping In "R" Position

Possible cause: leaking direct clutch due to center support sealing ring failure or worn direct clutch.

Poor Or Slipping 1-2 Shift

Possible cause: leaking overdrive clutch due to OD case sealing ring failure, sticking regulator valve, defective No. 2 brake, broken No. 2 brake piston or "O" ring, sticking 1-2 shift valve, sticking shift solenoid No. 2, defective No. 1 brake or sticking coast modulator valve.

Poor Or Slipping 2-3 Shift

Possible cause: leaking overdrive clutch due to OD case sealing ring failure, worn direct clutch bushing, defective direct clutch, sticking 2-3 shift valve, sticking shift solenoid No. 1 or clogged direct clutch piston check ball.

Poor Acceleration Or Surging In "D" Position

Possible cause: stuck regulator valve, leaking forward clutch due to OD case sealing ring failure, or defective forward clutch.

Poor Or Slipping 3-4 Shift

Possible cause: defective OD brake and/or clutch, sticking 3-4 shift valve or sticking shift solenoid No. 2.

Poor Or Slipping Start In "R" Position

Possible cause: leaking direct clutch due to worn or broken center support oil seal ring, or worn direct clutch.

Excessive Shock On 1-2 Shift

Possible cause: sticking regulator valve, defective one-way clutch, defective accumulator or No. 2 brake piston.

Excessive Shock On 2-3 Shift

Possible cause: sticking regulator valve, or defective accumulator or direct clutch piston.

Excessive Shock On 3-4 Shift

Possible cause: sticking regulator valve.

Abnormal Noise in "P" Or "N" Position

Possible cause: low fluid level or worn oil pump.

CLUTCH & BRAKE APPLICATION

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CLUTCH & BRAKE APPLICATION

Selector Lever Position	Elements In Use
"D" (Drive)	
1st Gear	Forward Clutch, No. 2 One-Way Clutch, OD Clutch & OD One-Way Clutch
2nd Gear	Forward Clutch, No. 1 One-Way Clutch, No. 2 Brake, OD Clutch & OD One-Way Clutch
3rd Gear	Forward Clutch, No. 2 Brake, OD Clutch, OD One-Way Clutch & Direct Clutch
4th gear (OD)	Forward Clutch, No. 2 Brake, OD Brake & Direct Clutch
"2" (Intermediate)	
1st Gear	Forward Clutch, No. 2 One-Way Clutch, OD Clutch & OD One-Way Clutch
2nd Gear	Forward Clutch, No. 1 Brake, No. 2 Brake, OD Clutch & OD One-Way Clutch
"L" (1st Gear)	Forward Clutch, Low & Reverse Brake, OD Clutch & OD One-Way Clutch
"R" (Reverse)	Low & Reverse Brake, OD Clutch, OD One-Way Clutch & Direct Clutch
"N" (Neutral)	OD Clutch & OD One-Way Clutch
"P" (Park)	OD Clutch & OD One-Way Clutch

PERFORMANCE TESTS

NOTE: For electronic diagnosis and component testing, see appropriate **ELECTRONIC CONTROLS** article.

TIME LAG TEST

1. Engine and transmission must be at normal operating temperature. Start engine and allow to idle with A/C off. Apply service and parking brakes. Block all 4 wheels. Using a stopwatch, measure amount of time until engagement shock is felt when selector lever is moved from "N" to "D" position.
2. Allow one minute interval after selector lever is moved back to "N" position between tests. Perform time measurements 2 more times and calculate average value. Average time should be less than 1.2 seconds. Repeat test procedure to test time lag when selector lever is moved from "N" to "R" position. On Kia, time lag should be less than 1.2 seconds. On all other models, time lag should be less than 1.5 seconds.

Time Lag Test Results

If test results are not within specification, check all items listed for applicable symptom.

- **"N" To "D" Position Time Lag Is Greater Than Specified**

Low line pressure, worn forward clutch or improper OD one-way clutch operation.

- **"N" To "R" Position Time Lag Is Greater Than Specified**

Low line pressure, worn direct clutch or slipping low and reverse brake.

ROAD TEST

"D" Position Test

1. Engine and transmission must be at normal operating temperature. Place selector lever in "D" position. Accelerate vehicle gradually. Ensure all upshifts and downshifts occur at specified speeds. See **SHIFT SPEED SPECIFICATIONS** .
2. Ensure TCC lock-up occurs at appropriate speeds. See **LOCK-UP SPEED SPECIFICATIONS** . Lightly depress accelerator pedal. If excessive increase in engine RPM is present, TCC lock-up will not occur.
3. Check for shock and slippage at all upshifts. Check for abnormal noise and vibration. While driving in "D", "2" and "L" positions, ensure 2-1, 3-2 and 4-3 downshifts occur at specified speed. Check for shock and slippage at downshifts. If test results are not within specification, see **"D" POSITION TEST RESULTS** .

"D" Position Test Results

If test results are not within specification, check all items listed for applicable symptom.

- **No 1-2 Upshift**

Stuck 1-2 shift valve or stuck shift solenoid No. 2.

- **No 2-3 Upshift**

Stuck 2-3 shift valve or stuck shift solenoid No. 1.

- **No 3-4 Upshift**

Stuck 3-4 shift valve or stuck shift solenoids No. 1 or 2.

- **Incorrect Shift Point**

Check for misadjusted throttle cable or stuck shift valves.

"2" Position Test

Place selector lever in "2" position. Accelerate vehicle and verify 1-2 upshift is obtained at specified throttle positions. See **SHIFT SPEED SPECIFICATIONS** . While driving vehicle in 2nd gear, release accelerator and check engine braking effect. If engine braking is not present, No. 1 brake is faulty.

"L" Position Test

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Place selector lever in "L" position. Accelerate vehicle, verify no upshift occurs to 2nd gear. Check engine braking effect when accelerator is released. If engine braking is not present, low and reverse brake is defective.

"R" Position Test

Place selector lever in "R" position. Accelerate vehicle and check for transmission slippage.

"P" Position Test

Stop vehicle on incline. Place selector lever in "P" position and release parking brake. Ensure parking lock pawl prevents vehicle from moving.

SHIFT SPEED SPECIFICATIONS**SHIFT SPEED SPECIFICATIONS (GRAND VITARA) ⁽¹⁾**

Application	Full Throttle MPH	Closed Throttle MPH
Power Mode		
1st-2nd	34	10
2nd-3rd	64	19
3rd-4th	99	28
4th-3rd	93	24
3rd-2nd	56	15
2nd-1st	25	4
Normal Mode		
1st-2nd	34	7
2nd-3rd	64	16
3rd-4th	99	24
4th-3rd	93	22
3rd-2nd	56	13
2nd-1st	25	4
(1) All tests are performed with selector lever in "D" position.		

SHIFT SPEED SPECIFICATIONS (SPORTAGE) ⁽¹⁾

Application	Full Throttle MPH	Closed Throttle MPH
Power Mode		
1st-2nd	34	9
2nd-3rd	61	19
3rd-4th	93	27
4th-3rd	84	24
3rd-2nd	56	14
2nd-1st	23	7
Economy Mode		

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1st-2nd	32	9
2nd-3rd	60	15
3rd-4th	88	28
4th-3rd	84	25
3rd-2nd	50	15
2nd-1st	22	8

(1) All tests are performed with selector lever in "D" position.

SHIFT SPEED SPECIFICATIONS (TRACKER) ⁽¹⁾

Application	Full Throttle MPH	Closed Throttle MPH
Power Mode		
1st-2nd	31	11
2nd-3rd	59	23
3rd-4th	83	30
4th-3rd	75	22
3rd-2nd	53	18
2nd-1st	26	4

Normal Mode		
1st-2nd	28	10
2nd-3rd	52	20
3rd-4th	75	28
4th-3rd	70	22
3rd-2nd	46	18
2nd-1st	24	4

(1) All tests are performed with selector lever in "D" position.

SHIFT SPEED SPECIFICATIONS (VITARA - 1.6L) ⁽¹⁾

Application	Full Throttle MPH	Closed Throttle MPH
Power Mode		
1st-2nd	30	11
2nd-3rd	58	23
3rd-4th	94	30
4th-3rd	77	25
3rd-2nd	53	18
2nd-1st	26	4

Normal Mode		
1st-2nd	28	9
2nd-3rd	52	20
3rd-4th	85	28
4th-3rd	77	22

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3rd-2nd	46	18
2nd-1st	24	4
(1) All tests are performed with selector lever in "D" position.		

SHIFT SPEED SPECIFICATIONS (VITARA - 2.0L) ⁽¹⁾

Application	Full Throttle MPH	Closed Throttle MPH
Power Mode		
1st-2nd	31	11
2nd-3rd	61	21
3rd-4th	N/A	31
4th-3rd	84	27
3rd-2nd	52	16
2nd-1st	29	5
Normal Mode		
1st-2nd	31	7
2nd-3rd	61	17
3rd-4th	91	27
4th-3rd	84	24
3rd-2nd	52	15
2nd-1st	29	5
(1) All tests are performed with selector lever in "D" position.		

LOCK-UP SPEED SPECIFICATIONS**LOCK-UP SPEED SPECIFICATIONS (GRAND VITARA/VITARA & TRACKER) ⁽¹⁾**

Application	MPH
Torque Converter Clutch Engaged	
3rd	29
4th	36
Torque Converter Clutch Disengaged	
3rd	23
4th	32
(1) Selector lever in "D" position and throttle angle at 5 percent.	

LOCK-UP SPEED SPECIFICATIONS (SPORTAGE) ⁽¹⁾

Application	MPH
Torque Converter Clutch Engaged	
3rd	(2)
OD	47

Torque Converter Clutch Disengaged (4th)

39

- (1) Selector Lever in "D" position and throttle angle at 5 percent.
- (2) Lock-up does not occur in 3rd gear.

STALL SPEED TEST

CAUTION: DO NOT maintain stall speed RPM for more than 5 seconds. Ensure there is at least a one minute pause at idle between tests.

1. Ensure engine and transmission are at normal operating temperature. Check fluid level and add if necessary. Connect tachometer. Apply parking brake and block all 4 wheels.
2. Start engine, apply brakes and place selector lever in "D" position. Depress accelerator to full throttle and note maximum RPM obtained. Repeat test in "L" and "R" positions. Stall speed should be 2300-2600 RPM for Grand Vitara, Tracker and Vitara 1.6L, and 2000-2300 RPM for Sportage and Vitara 2.0L models.

Stall Speed Test Results

If test results are not within specification, check all items listed for applicable symptom.

- **Stall Speed Is Same In All Positions, But Less Than Specified**

Insufficient engine output or defective torque converter.

- **Stall Speed High In "D" & "R" Positions**

Low line pressure, slipping OD clutch, or defective OD one-way clutch.

- **Stall Speed High In "D" Position**

Low line pressure, slipping forward or OD clutch, defective OD one-way clutch or defective No. 2 one-way clutch.

- **Stall Speed High In "D" (HOLD) Position**

Low line pressure, slipping No. 1 brake or slipping No. 2 brake.

- **Stall Speed High In "L" Position**

Low line pressure or slipping low and reverse brake.

- **Stall Speed High In "R" Position**

Low line pressure, slipping direct clutch, OD clutch, low and reverse brake or defective OD one-way clutch.

HYDRAULIC PRESSURE TESTS

Line Pressure Test

1. Ensure engine and transmission are at normal operating temperature. Check fluid level and add if necessary. Connect appropriate pressure gauge to line pressure test port on transmission with a 90 degree fitting to clear exhaust. See **Fig. 3**.
2. Connect tachometer. Block all 4 wheels and fully apply parking brake. Start engine and idle.

CAUTION: DO NOT maintain stall speed RPM for more than 5 seconds. Ensure there is at least a one minute pause at idle between tests.

3. Apply service brake and place selector lever in "D" position. Check line pressure at idle and record pressure reading. Increase RPM to stall speed and record line pressure reading.
4. Repeat test procedure in "L" and "R" positions. Compare all readings to specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS**. If line pressures are not as specified, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING**.

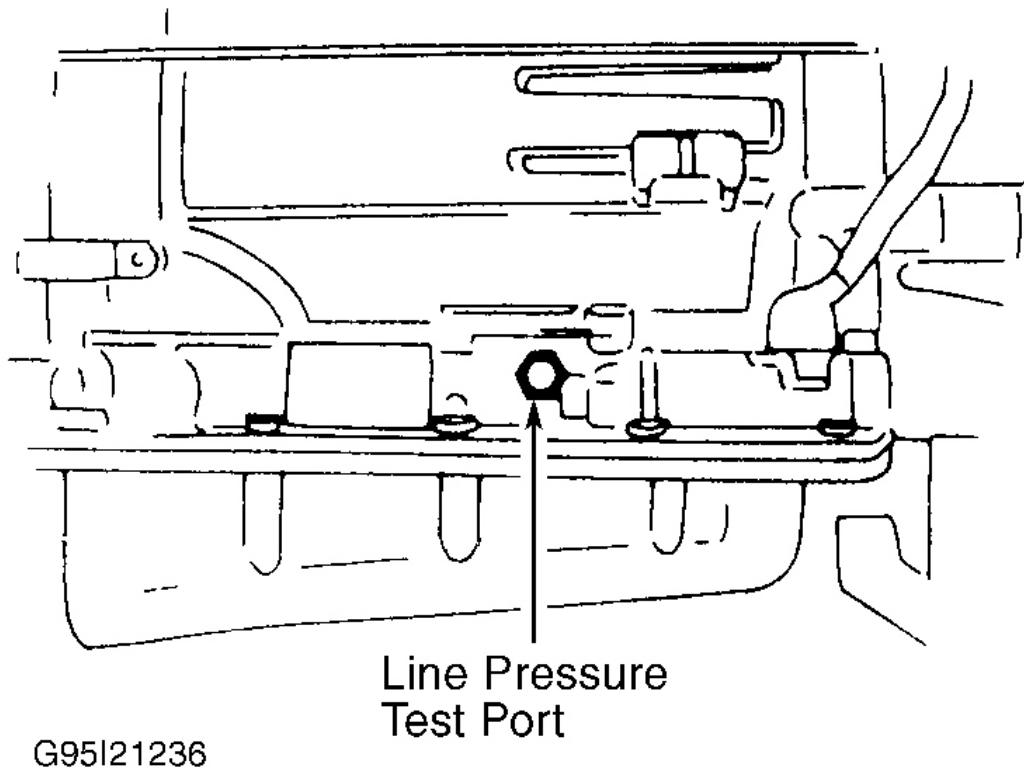


Fig. 3: Identifying Transmission Hydraulic Pressure Test Port

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Courtesy of SUZUKI OF AMERICA CORP.

HYDRAULIC PRESSURE TEST SPECIFICATIONS

HYDRAULIC PRESSURE TEST SPECIFICATIONS (GRAND VITARA)

Engine RPM	"D" & "L" Positions - psi (kg/cm ²)	"R" Position - psi (kg/cm ²)
Idle Speed	53-58 (3.7-4.1)	73-81 (5.1-5.7)
Stall Speed	159-181 (11.2-12.7)	206-242 (14.5-17.0)

HYDRAULIC PRESSURE TEST SPECIFICATIONS (SPORTAGE & TRACKER)

Engine RPM	"D" & "L" Positions - psi (kg/cm ²)	"R" Position - psi (kg/cm ²)
Idle Speed	53-58 (3.7-4.1)	79-86 (5.6-6.0)
Stall Speed	136-156 (9.6-11.0)	188-233 (13.2-16.4)

HYDRAULIC PRESSURE TEST SPECIFICATIONS (VITARA)

Engine RPM	"D" & "L" Positions - psi (kg/cm ²)	"R" Position - psi (kg/cm ²)
Idle Speed	53-58 (3.7-4.1)	79-86 (5.6-6.0)
Stall Speed	146-168 (10.3-11.8)	203-239 (14.3-16.8)

HYDRAULIC PRESSURE TEST TROUBLE SHOOTING

If hydraulic pressure test results are not within specification, check all items listed for applicable symptom.

- **Line Pressure High In All Tests**

Sticking regulator valve, throttle valve or throttle cable out of adjustment.

- **Line Pressure Low In All Tests**

Worn oil pump, sticking regulator valve, throttle valve, leaking OD clutch hydraulic circuit, or throttle cable out of adjustment.

- **Line Pressure Low In "D" Position Test Only**

Defective forward or OD clutch or fluid leak in "D" position circuit.

- **Line Pressure Low In "R" Position Only**

Defective direct clutch, OD clutch, reverse brake or fluid leak in "R" position circuit.

COMPONENT TESTS

TORQUE CONVERTER

Replace torque converter if any of the following conditions exist: oil pump damage, metal particles found in oil cooler and cooler pipes, leaks in hub weld area, pilot cup damage or poor fit in crankshaft, hub damage or scoring, internal stator damage or engine coolant contamination.

REMOVAL & INSTALLATION

SHIFT SOLENOID VALVES & TCC SOLENOID VALVE

1. Remove transmission dipstick. Raise and support vehicle. Remove transmission drain plug and drain ATF. Reinstall drain plug and tighten to specification. See **TORQUE SPECIFICATIONS**.
2. Remove exhaust pipe bracket. On 4WD models, disconnect front drive shaft from front differential.
3. Remove oil pan. Note location of oil tubes. See **Fig. 5**. Using screwdrivers, carefully pry at both ends of oil tubes and remove oil tubes. Remove appropriate solenoid. To install, reverse removal procedure using NEW gasket and "O" ring. Tighten all bolts to specification. See **TORQUE SPECIFICATIONS**.

TRANSMISSION

See appropriate AUTOMATIC TRANSMISSION REMOVAL article in TRANSMISSION SERVICING.

TRANSMISSION RANGE SWITCH

NOTE: Transmission Range (TR) switch may also be known as PNP switch.

For TR switch adjustment, see appropriate AUTOMATIC TRANSMISSION SERVICING article in TRANSMISSION SERVICING.

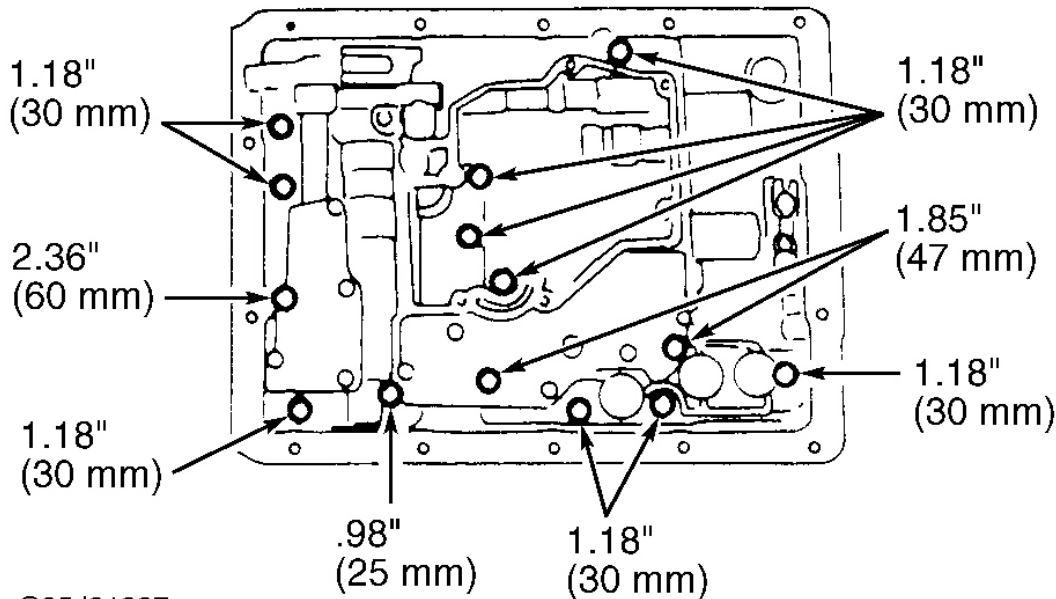
VALVE BODY ASSEMBLY

Removal

Remove drain plug and drain ATF. Remove oil pan and gasket. Remove magnets from oil pan. Note location of oil tubes. See **Fig. 5**. Using screwdrivers, carefully pry at both ends of oil tubes and remove oil tubes. Disconnect solenoid wiring. Remove oil strainer (filter) and gasket. Remove valve body assembly retaining bolts. Note bolt location and length. See **Fig. 4**. Slightly lower valve body assembly. Disconnect throttle cable from valve assembly cam. Remove valve body assembly.

Installation

1. To install, reverse removal procedure. Ensure manual valve lever in transmission case aligns with manual valve of valve body assembly. Connect throttle cable to cam.
2. Install valve body assembly and loosely install bolts in correct positions. See **Fig. 4**. Tighten valve body bolts to specification starting with innermost bolts and working outward. See **TORQUE SPECIFICATIONS**. Install oil tubes in proper order. See **Fig. 5**. Install oil strainer and tighten to specification. Ensure magnets are installed in oil pan. Install oil pan and tighten to specification. Fill transmission with ATF to proper level. See **FLUID CAPACITIES** under LUBRICATION.



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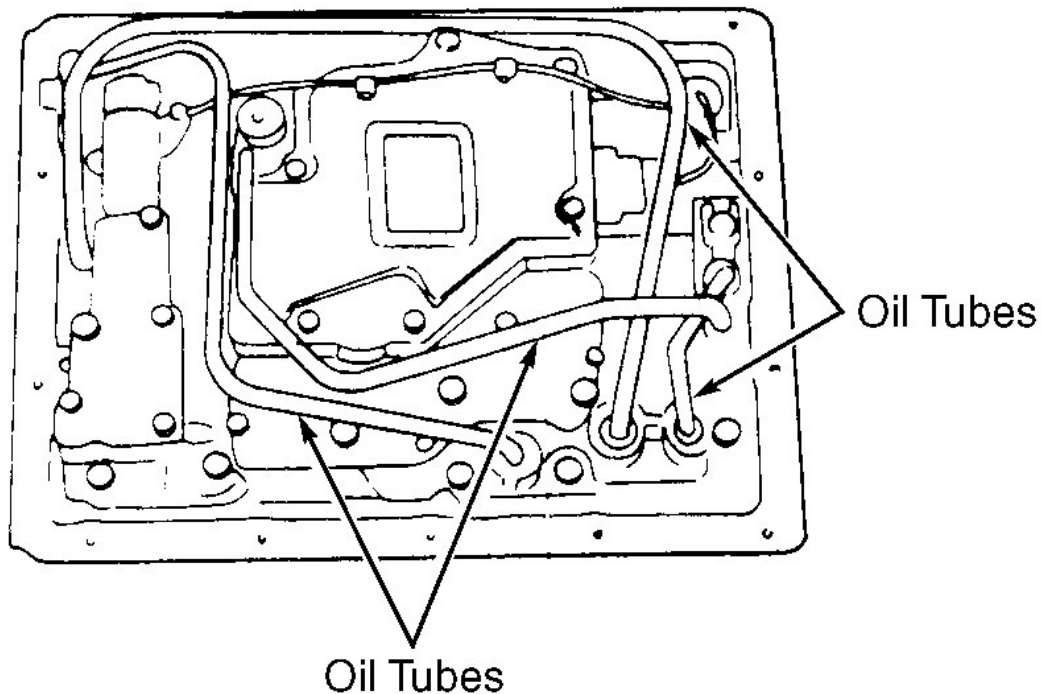
Fig. 4: Identifying Valve Body Bolt Length & Locations
Courtesy of SUZUKI OF AMERICA CORP.

VEHICLE SPEED SENSOR

Remove bolt and vehicle speed sensor. To install, reverse removal procedure and tighten bolt to specification. See **TORQUE SPECIFICATIONS**.

TRANSMISSION DISASSEMBLY

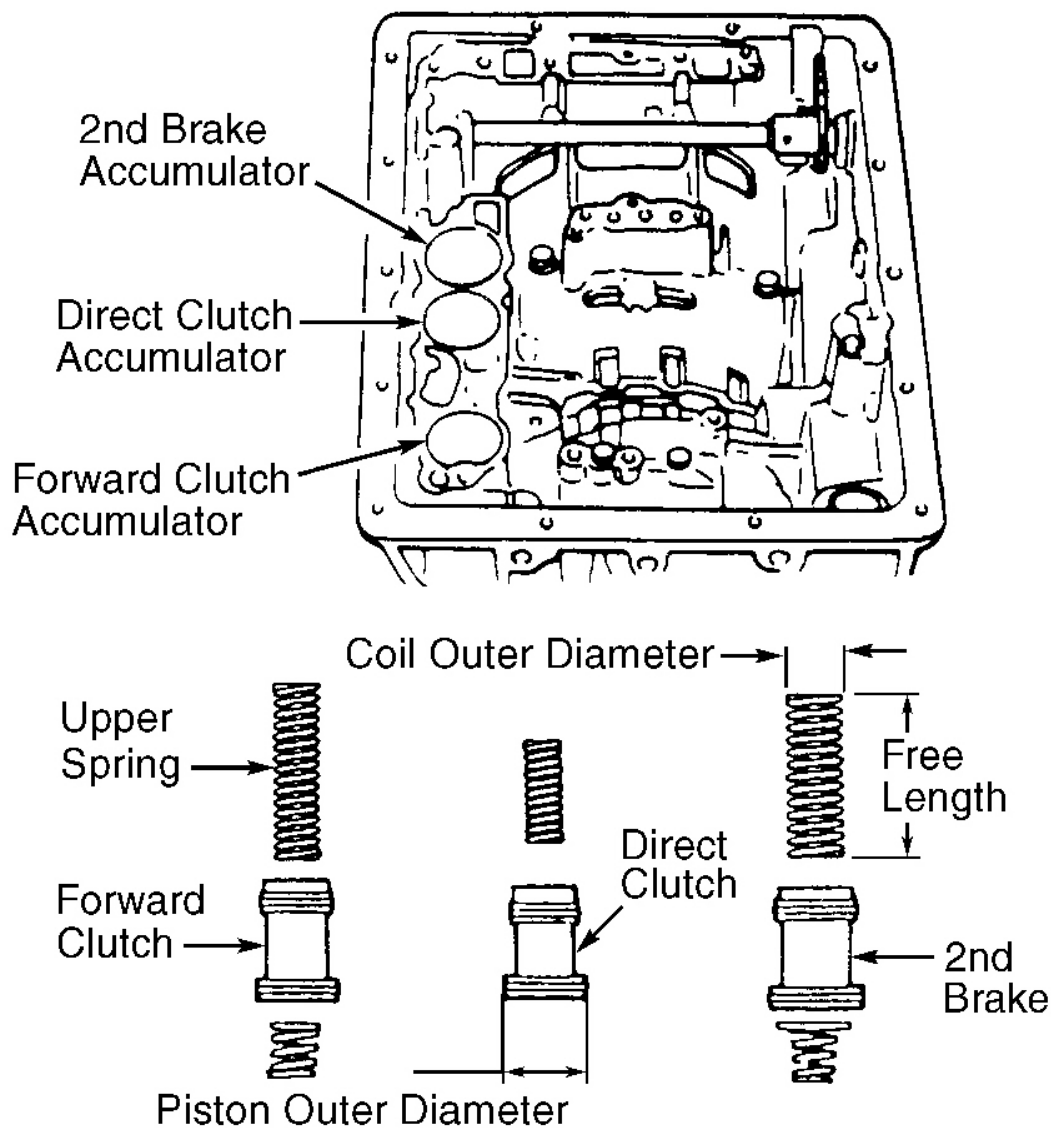
1. Remove torque converter. Remove oil filler tube and dipstick. On 4WD models, remove transfer case-to-transmission adapter. On 2WD models, remove extension housing. On all models, remove vent hose. Remove snap ring from output shaft and remove vehicle speed sensor rotor.
2. Remove manual valve lever from manual valve shaft. Remove lock plate from Transmission Range (TR) switch. Remove TR switch. Remove oil pump bolts. Using appropriate 2-jaw puller, remove oil pump from transmission case. Remove bearing and race from rear of oil pump. Remove torque converter housing bolts. Note length and bolt location. While holding OD input shaft, remove torque converter housing. Remove "O" ring from transmission case.
3. Remove oil pan and gasket. Remove magnets from oil pan. Inspect magnets and pan for metal particles. Remove oil tubes by carefully prying both ends of tube with screwdriver. See **Fig. 5**. Remove solenoid wiring harness from transmission case. Remove oil strainer (filter) and gasket.



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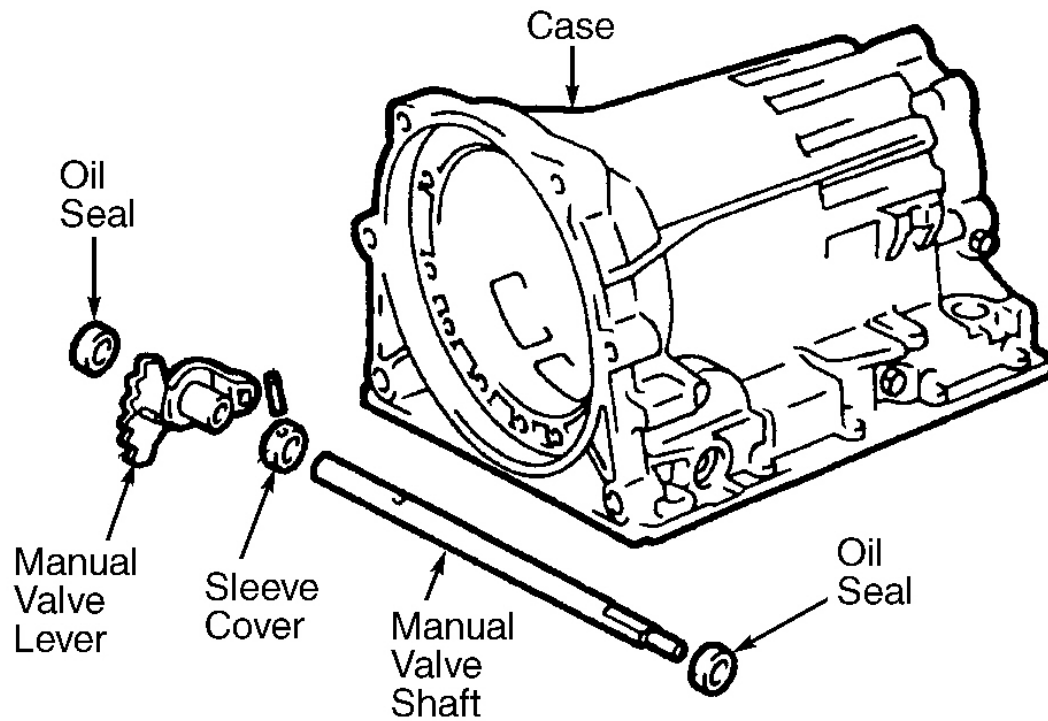
Fig. 5: Identifying Oil Tube Locations
 Courtesy of SUZUKI OF AMERICA CORP.

4. Remove valve body assembly retaining bolts, start with outermost bolts and work inward. Lift valve body and disconnect throttle cable from throttle cam. Remove valve body assembly.
5. Remove throttle cable and "O" ring. Place a clean shop cloth over accumulator pistons. Apply compressed air to oil passages of transmission case to remove accumulator pistons and springs. Oil passages are at base of accumulator bores. Note spring and piston locations. See **Fig. 6**.
6. Remove parking lock rod bracket and rod. Remove parking lock pawl, pivot pin and spring. If manual valve shaft requires removal, use a hammer and chisel to cut spacer and slide spacer toward lever to obtain clearance to shaft pin. Drive out roll pin. Remove shaft and spacer. Remove oil seals. See **Fig. 7**.
7. Position transmission case with front of case facing upward. Push input shaft and drum toward rear of transmission case to ensure OD direct clutch remains fully seated. Using calipers and appropriate straightedge, measure distance between top of case and OD direct clutch drum. See **Fig. 8**.
8. Record measurement for reassembly reference. Remove OD planetary gear with OD direct clutch and OD one-way clutch from OD case. See **Fig. 9**. Note location of thrust washer and race on clutch assembly. Hold both sides of OD case and remove from transmission case. Note location of bearing and race.
9. Ensure forward clutch remains fully seated in transmission case. Using calipers and appropriate straightedge measure distance between top of case and forward clutch drum. See **Fig. 10**. Record measurement for reassembly reference.



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Fig. 6: Identifying Accumulator Pistons & Springs
Courtesy of SUZUKI OF AMERICA CORP.



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Fig. 7: Exploded View Of Manual Shaft Lever & Shaft
Courtesy of KIA MOTORS AMERICA, INC.

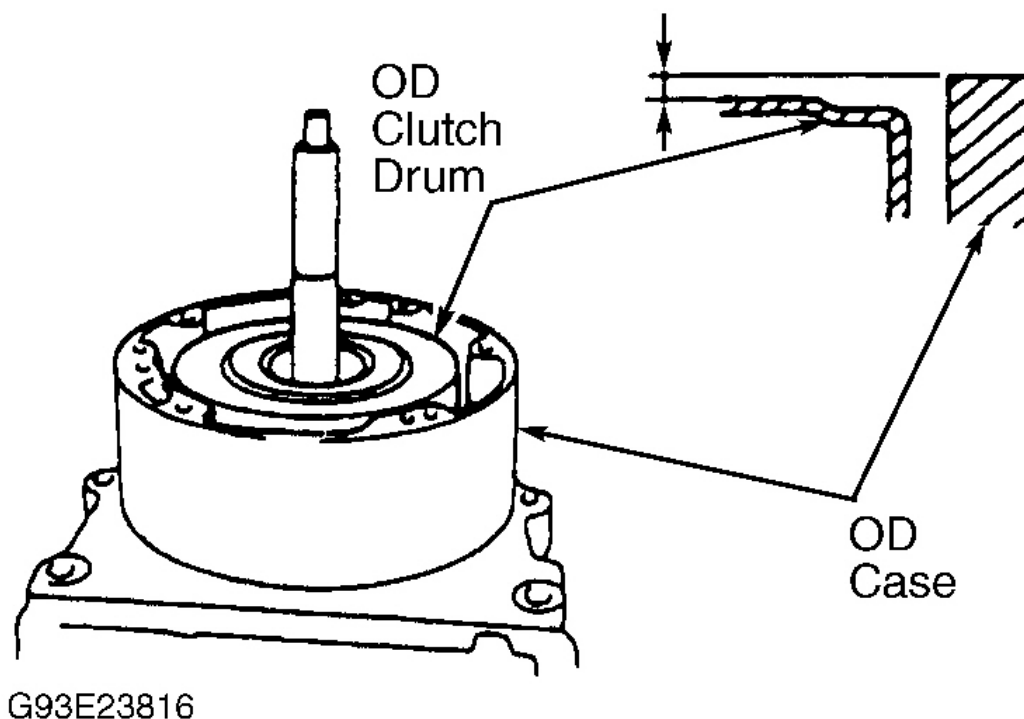
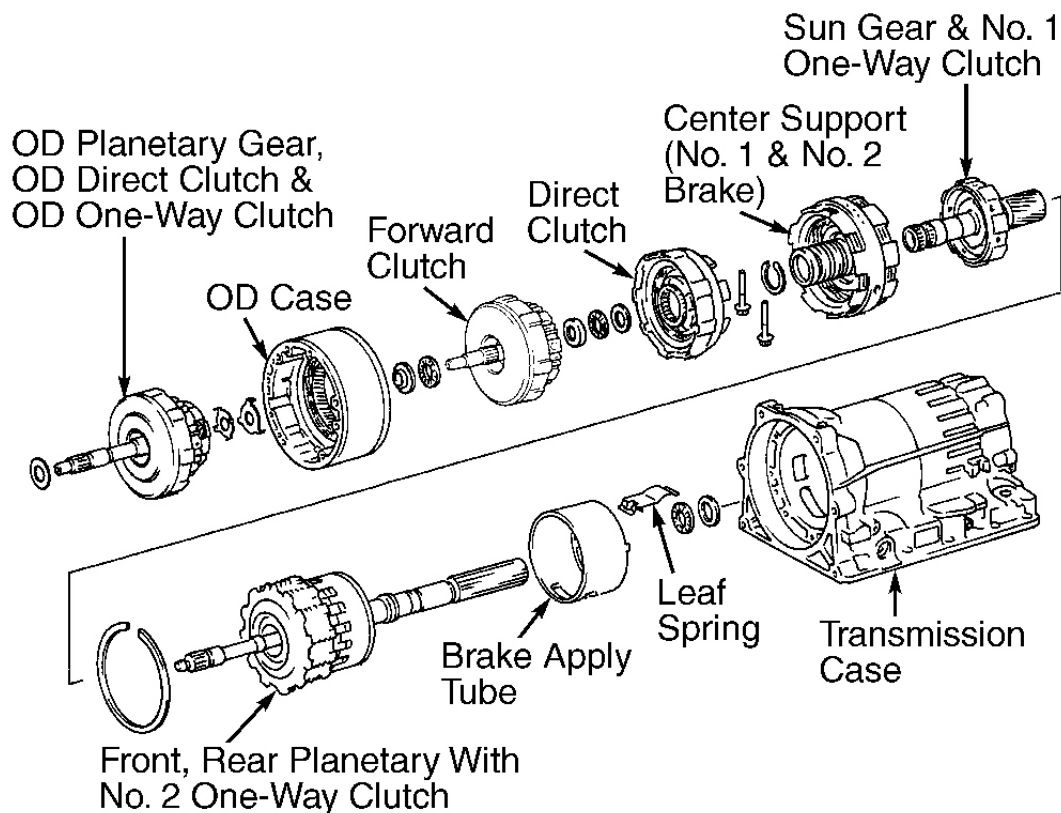


Fig. 8: Measuring OD Direct Clutch Drum-To-OD Case Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 9: Identifying Transmission Case Internal Components
Courtesy of MAZDA MOTORS CORP.

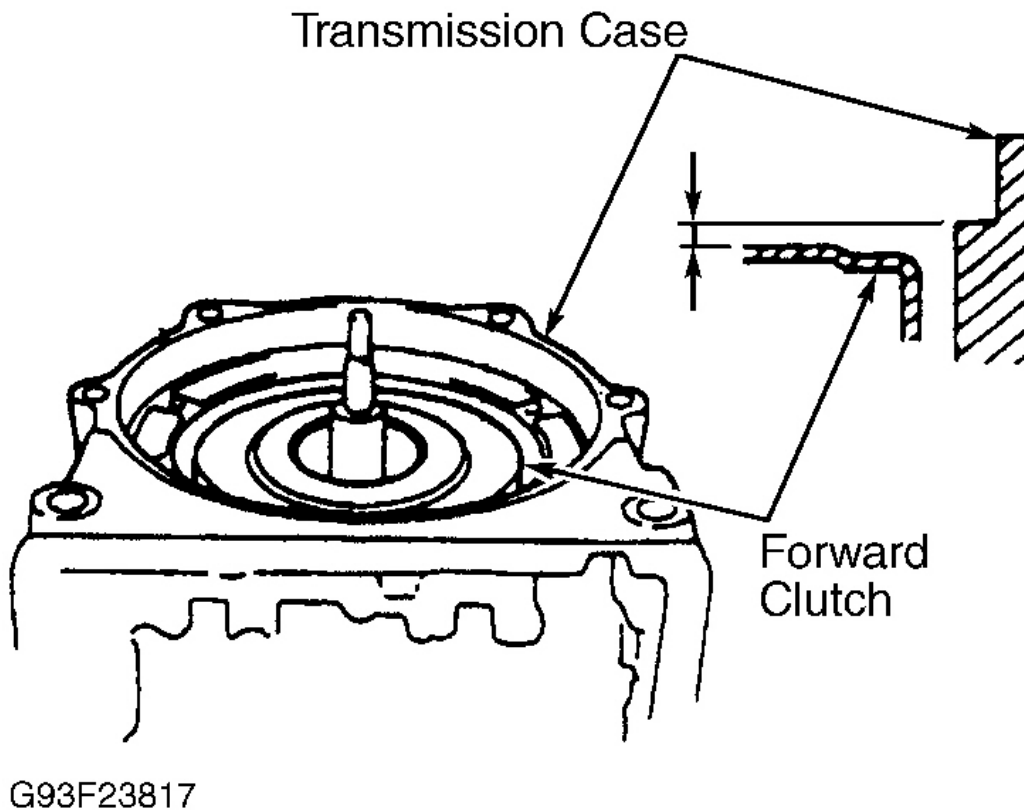
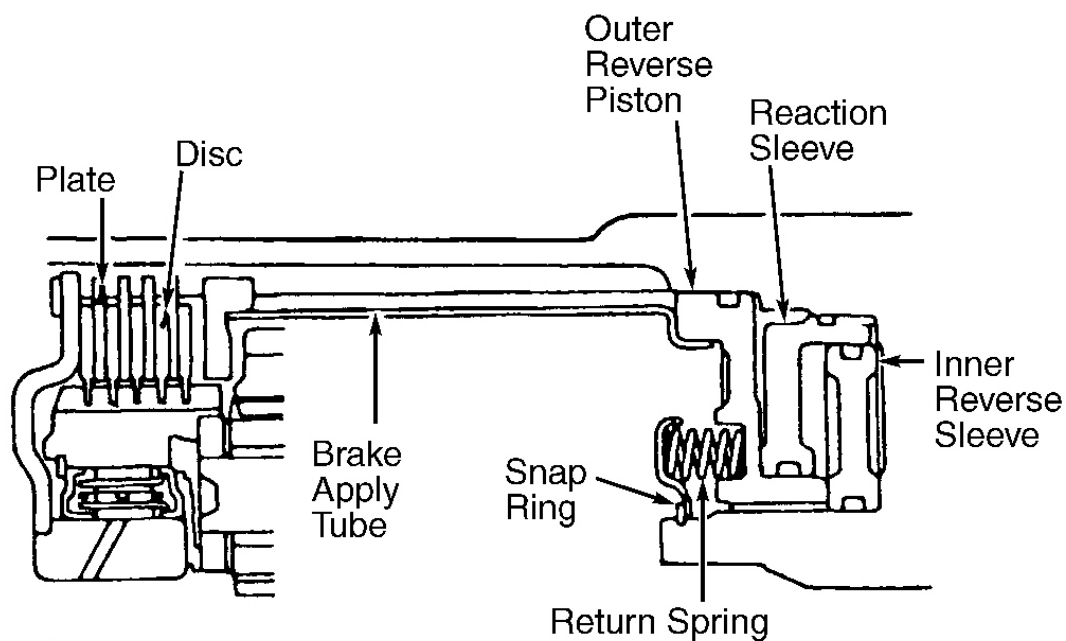


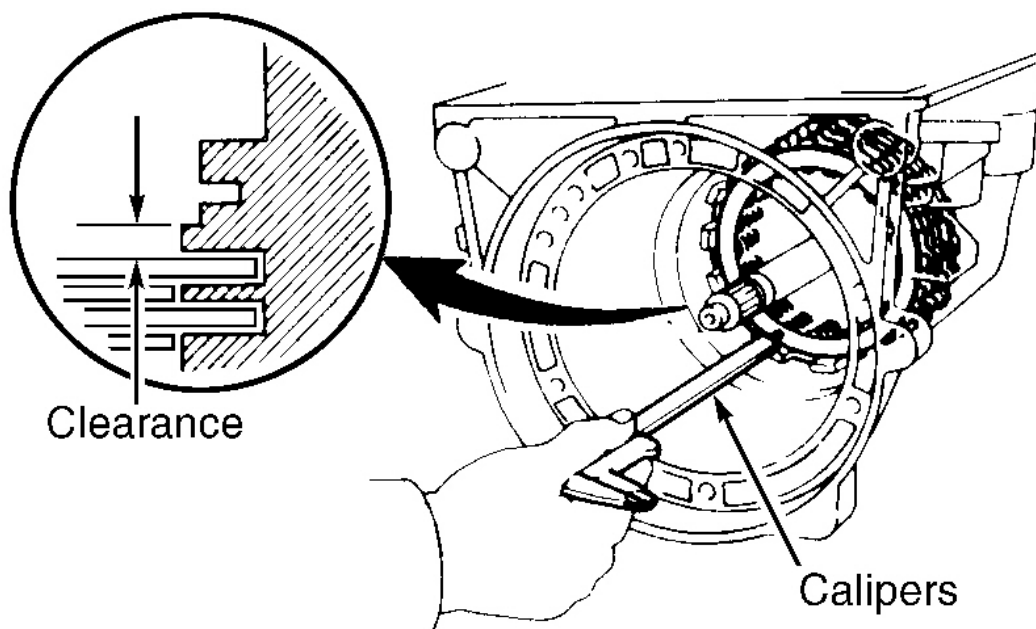
Fig. 10: Measuring Forward Clutch Drum-To-Transmission Case Clearance
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. Remove forward clutch assembly from transmission case. Note location of bearings and race. Remove direct clutch assembly from transmission case. See **Fig. 9** . Remove center support-to-case retaining bolts. Bolts are located on valve body side of case.
11. Remove center support, sun gear and No. 1 one-way clutch from transmission case. Note direction of bearing race on end of sun gear. Using a flat-blade screwdriver, remove front planetary gear snap ring. Remove front and rear planetary gear assemblies, No. 2 one-way clutch and output shaft.
12. Remove brake apply tube from transmission case. Remove brake applying cover. See **Fig. 13** . Remove race from transmission case.
13. Using appropriate spring compressor, compress low and reverse brake return spring. Remove snap ring. Remove piston return spring. Hold outer reverse piston with hand, apply compressed air to appropriate oil supply port in case and remove outer reverse piston. See **Fig. 14** . Gradually lift reaction sleeve out of transmission case. Lift inner reverse piston out of transmission case. See **Fig. 11** .



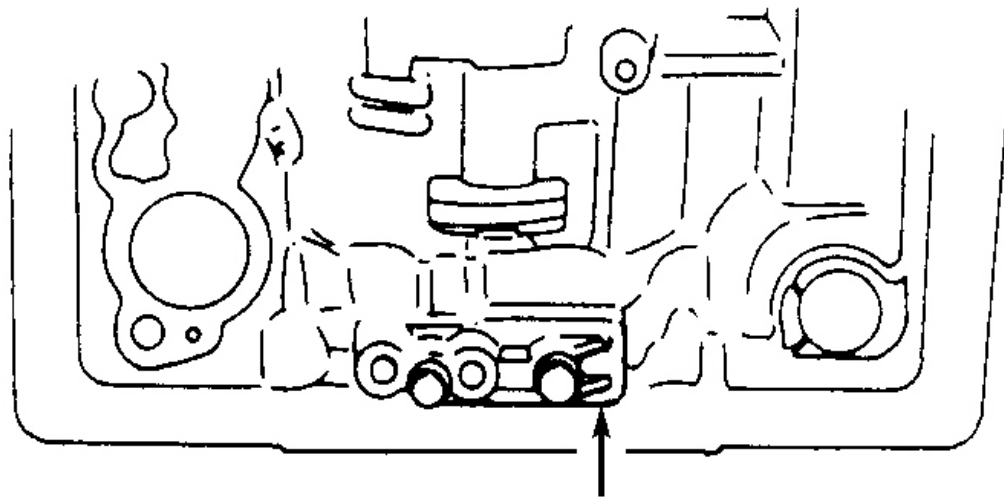
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Fig. 11: Locating Low & Reverse Brake Components
Courtesy of KIA MOTORS AMERICA, INC.



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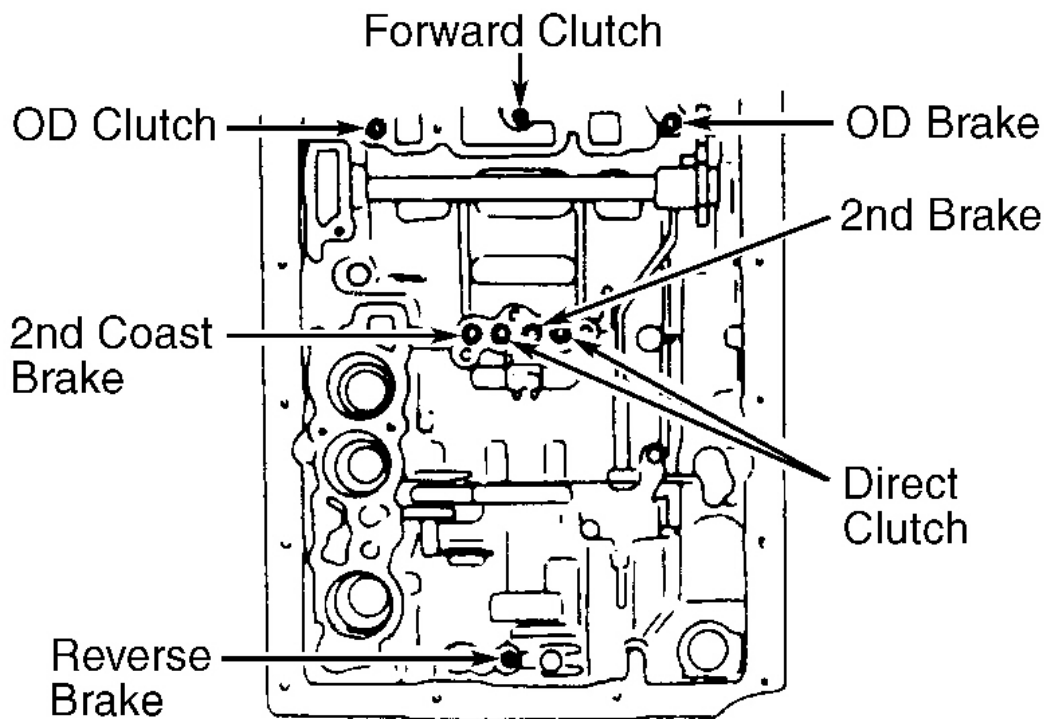
Fig. 12: Measuring Reverse Brake Pack Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



Brake Applying Cover

G95A21253

Fig. 13: Locating Brake Applying Cover
Courtesy of SUZUKI OF AMERICA CORP.



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Fig. 14: Identifying Oil Supply Ports

Courtesy of SUZUKI OF AMERICA CORP.

COMPONENT DISASSEMBLY & REASSEMBLY

OIL PUMP

Disassembly

Place oil pump assembly on torque converter. Remove sealing rings from stator shaft. Remove stator shaft from oil pump housing. Using a felt tip marker, place reference mark on drive and driven gears and remove from pump housing. Remove oil pump body "O" ring. See **Fig. 15**. If oil seal requires replacement, pry seal from housing with a screwdriver.

Inspection

NOTE: Oil pump measurements must be taken with pump installed on torque converter.

Clean all components in solvent. Dry with compressed air. Inspect all components for damage or wear. Inspect

oil pump housing and stator shaft bushings. If pump bushings are worn or damaged, oil pump housing or stator shaft must be replaced. Measure driven gear-to-housing clearance and gear tip clearance. Using a feeler gauge and straightedge, measure gear side clearance between pump housing face and top of gears. See **Fig. 16** . Ensure all measurements are within specification. See **OIL PUMP SPECIFICATIONS** table. Replace necessary components to obtain correct clearances.

OIL PUMP SPECIFICATIONS

Application	Standard - In. (mm)	Maximum - In. (mm)
Gear-To-Housing	.0028-.0059 (.07-.15)	.0118 (.30)
Gear Tip Clearance	.0043-.0055 (.11-.14)	.0118 (.30)
Gear Side Clearance	.0008-.0019 (.02-.05)	.0039 (.10)

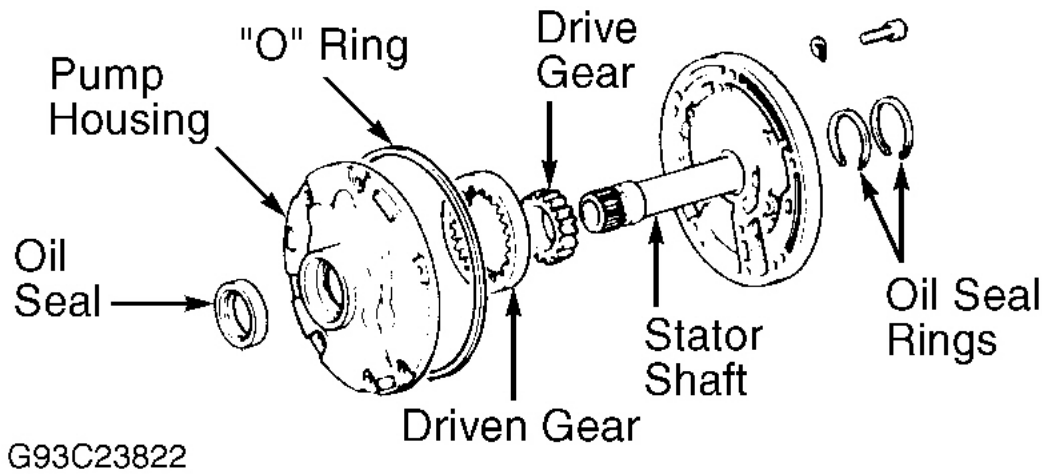


Fig. 15: Exploded View Of Oil Pump Assembly
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

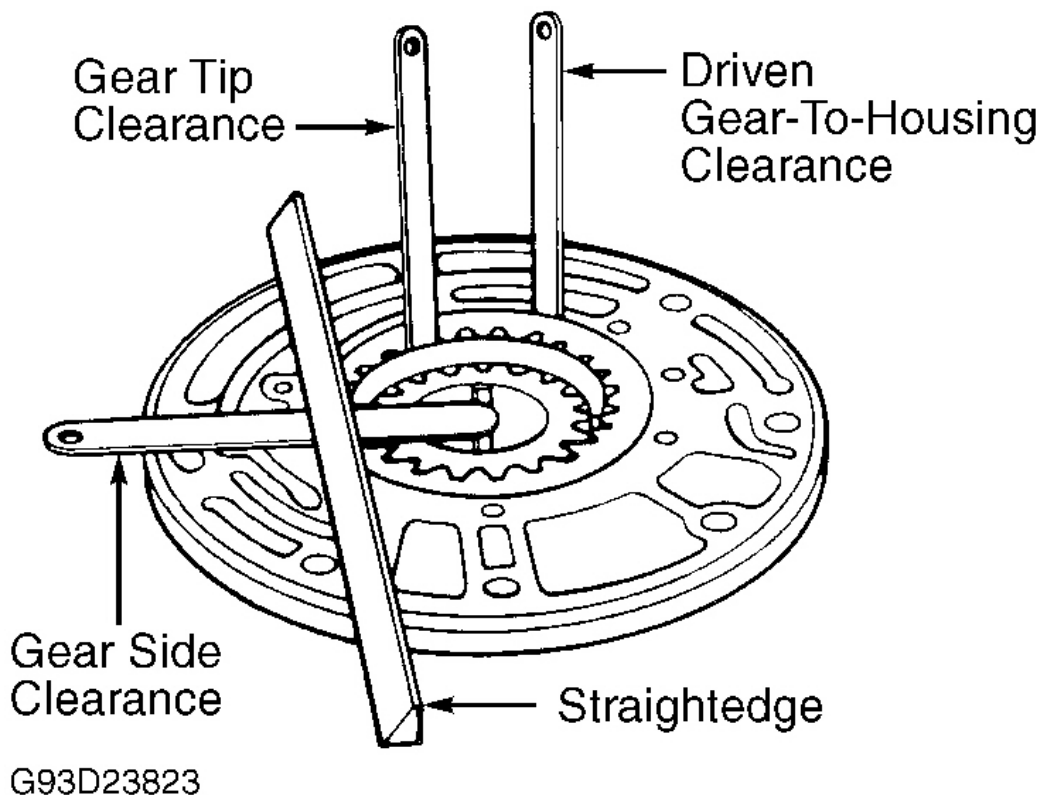


Fig. 16: Measuring Oil Pump Gear Clearances
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

1. Coat NEW oil seal with ATF and install flush with oil pump housing. Place oil pump housing on torque converter. Coat all components with ATF. Align reference marks on driven and drive gears during installation. Align bolt holes and place stator shaft onto pump housing. Install but do not tighten attaching bolts. Install oil pump aligning tool around outside of pump assembly to align pump housing and stator shaft. See **Fig. 17**.
2. Tighten oil pump bolts to specification. See **TORQUE SPECIFICATIONS**. Remove aligning tool. Install oil sealing rings. DO NOT spread ring ends more than necessary for installation. Ensure sealing rings move smoothly after installation. Ensure oil pump gears rotate smoothly. Lubricate and install "O" ring on oil pump assembly.

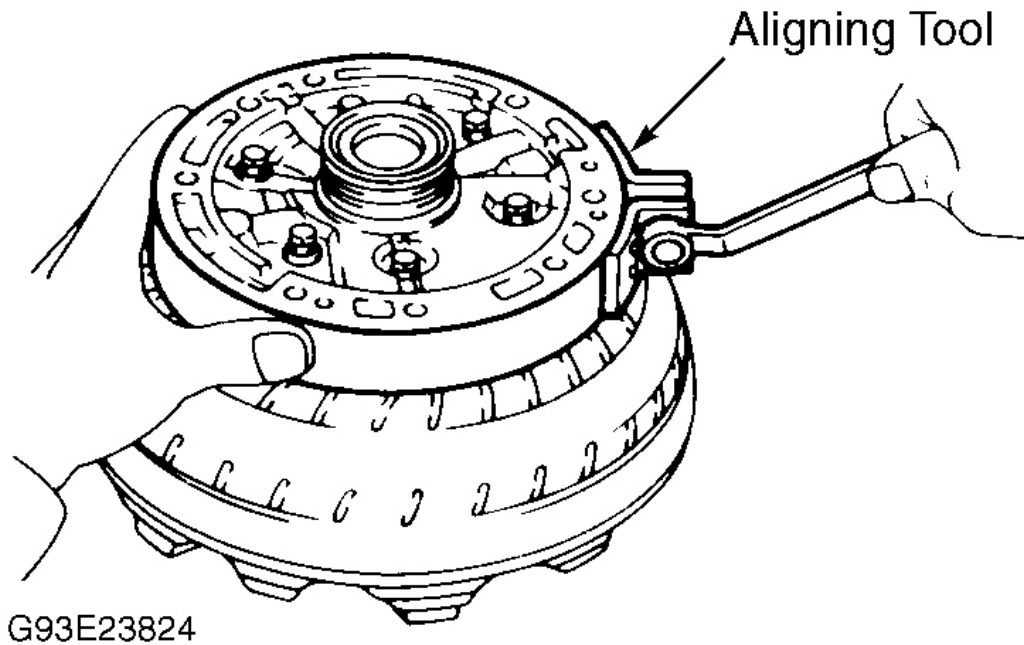


Fig. 17: Aligning Oil Pump Housing & Stator Shaft
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

OD PLANETARY GEAR SET, OD DIRECT CLUTCH & OD ONE-WAY CLUTCH

Disassembly

1. Hold OD direct clutch drum and turn input shaft. Input shaft should turn clockwise and lock when turned counterclockwise. See **Fig. 18**. Remove OD direct clutch drum from OD planetary gear set. Remove thrust bearing and race from planetary gear. See **Fig. 19**. Place OD direct clutch assembly on oil pump assembly. Using a dial indicator, measure OD direct clutch piston stroke, while applying 57-114 psi (4-8 kg/cm²) to oil pump port. See **Fig. 20**.
2. Piston stroke should be .058-.090" (1.47-2.28 mm). If dial indicator reading is not within specified range, inspect discs for wear or damage. Remove OD direct clutch assembly from oil pump assembly. Remove OD brake hub snap ring and hub. Remove snap ring, disc, retainer plate and cushion plate.
3. Using appropriate spring compressor, compress piston return spring and remove snap ring. Remove piston return spring. Install OD direct clutch drum on oil pump assembly. Hold OD direct clutch piston and apply compressed air to oil pump port to remove OD direct clutch piston. See **Fig. 21**. Remove "O" rings from piston.
4. Remove snap ring and OD one-way clutch assembly from OD planetary gear set. Disassemble one-way clutch. See **Fig. 19**. Note direction of one-way clutch installation. Remove thrust washer and bearing.

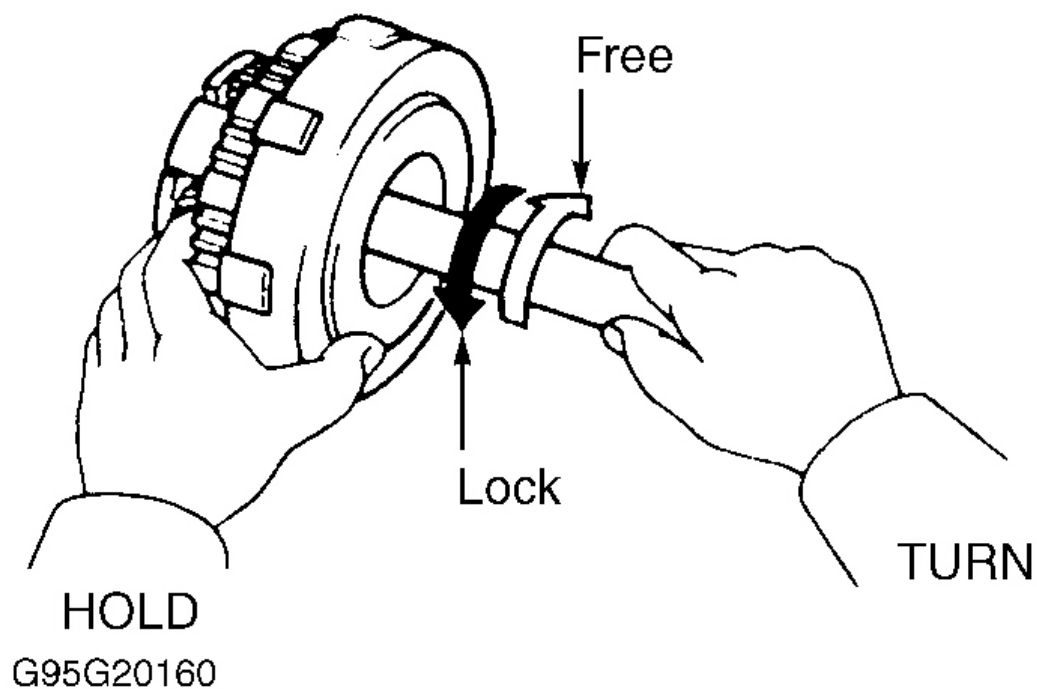
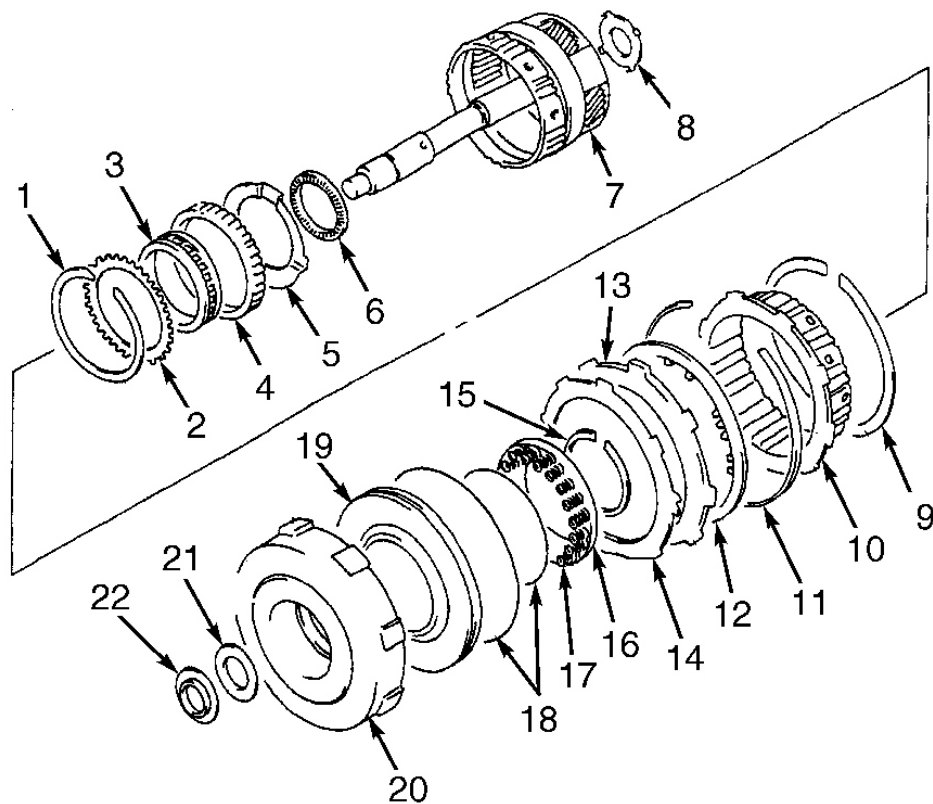


Fig. 18: Checking OD One-Way Clutch Operation
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



- | | |
|---------------------------------|-----------------------------|
| 1. Snap Ring | 12. Clutch Disc |
| 2. OD One-Way Clutch Retainer | 13. Retainer Plate |
| 3. OD One-Way Clutch | 14. Cushion Plate |
| 4. OD One-Way Clutch Outer Race | 15. Shaft Snap Ring |
| 5. Thrust Washer | 16. Return Spring Retainer |
| 6. Thrust Bearing | 17. Return Spring |
| 7. OD Planetary Gear Set | 18. "O" Rings |
| 8. Thrust Washer | 19. OD Direct Clutch Piston |
| 9. Snap Ring | 20. OD Direct Clutch Drum |
| 10. OD Brake Hub | 21. Thrust Bearing Race |
| 11. Snap Ring | 22. Thrust Bearing |

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Fig. 19: Exploded View Of OD Planetary Gear Set, OD Direct Clutch & OD One-Way Clutch
 Courtesy of KIA MOTORS AMERICA, INC.

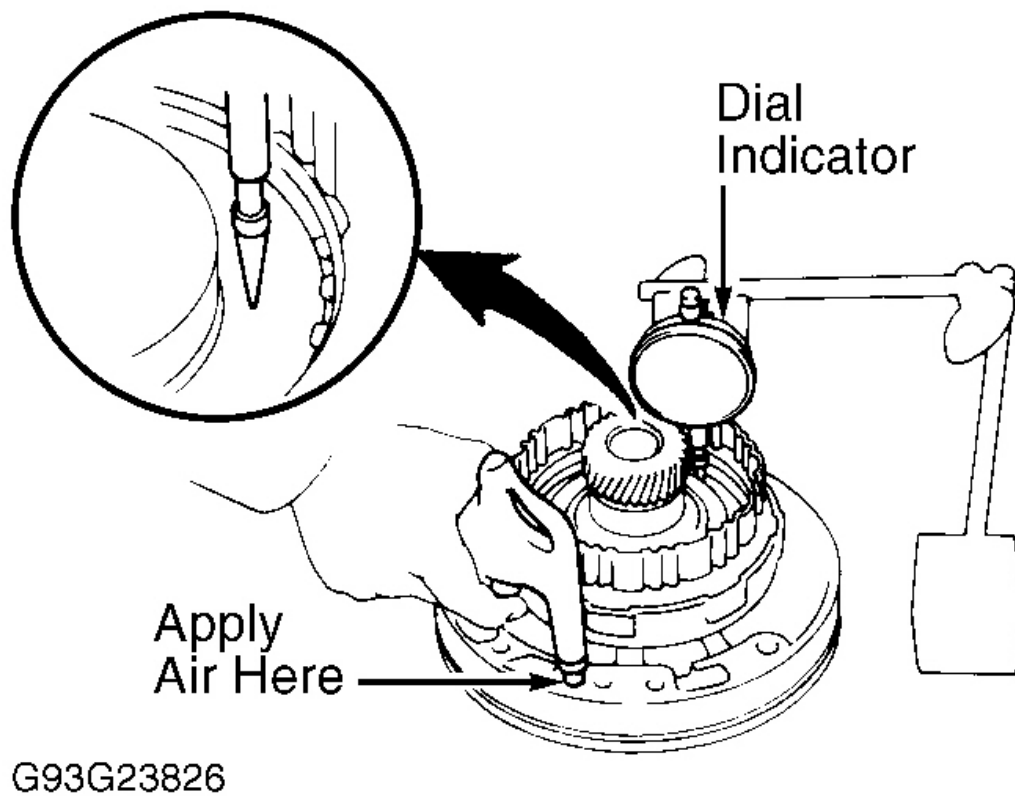
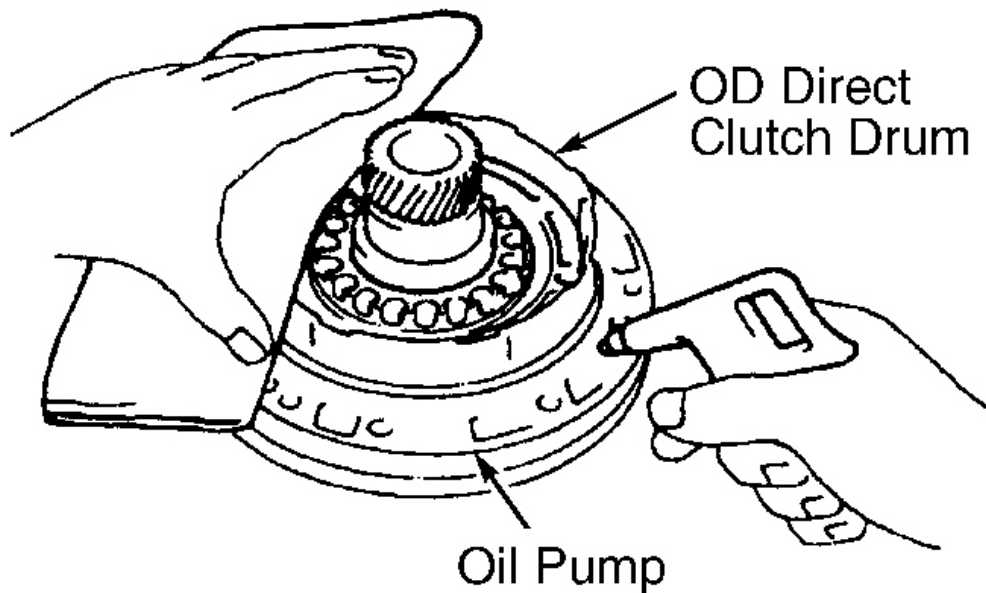


Fig. 20: Measuring OD Direct Clutch Piston Stroke
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 21: Removing OD Direct Clutch Piston
 Courtesy of KIA MOTORS AMERICA, INC.

Inspection

1. Inspect disc and flange for flaking or burnt areas, replace as necessary. Inspect piston return springs for wear, damage and collapsed coils. Clean all components (except disc) with solvent. Dry with compressed air. Ensure check ball is free in OD direct clutch piston. Apply compressed air to check ball area. Ensure check ball does not allow air to bleed through piston.
2. Using calipers, measure free length of each piston return spring. Standard free length on Vitara 2.0L is .635" (16.1 mm) and on all other models standard free length is .594" (15.1 mm). If measurement is not as specified, replace return springs.

Reassembly

CAUTION: Clutch discs should be soaked in ATF for 15 minutes prior to installation. Lubricate all parts with ATF. Coat thrust bearings and races with petroleum jelly.

1. Install thrust bearing into OD planetary gear set. Install thrust washer with grooved side facing upward and install OD one-way clutch into outer race with flange side of OD one-way clutch facing upward. See **Fig. 22** . Install retainer and snap ring onto OD one-way clutch.
2. Coat NEW "O" rings with ATF and install on OD direct clutch piston. Carefully press OD direct clutch

piston into OD direct clutch drum. Using spring compressor, compress piston return spring and install snap ring. Ensure end gap of snap ring is not aligned with spring seat claw. See **Fig. 24** .

3. Install OD direct cushion plate. See **Fig. 23** . Install retainer plate, clutch disc and snap ring. Install OD brake hub and snap ring. Ensure end gap of snap ring is not aligned with notch in OD direct clutch drum. See **Fig. 24** .
4. Recheck piston stroke of OD direct clutch. If piston stroke is less than specified, check for incorrect reassembly of components. Install race and thrust bearing on OD planetary gear set. Install OD direct clutch assembly onto OD planetary gear set.
5. Check one-way clutch operation. Hold OD direct clutch drum and rotate input shaft. Input shaft should rotate freely in clockwise direction and lock in counterclockwise direction. See **Fig. 18** .

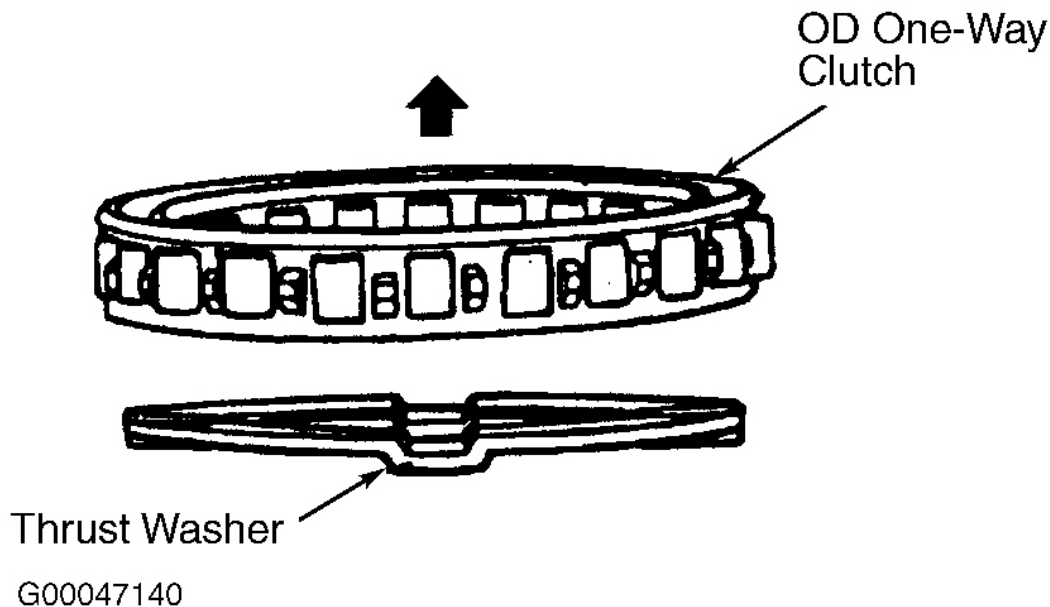


Fig. 22: Locating OD One-Way Clutch & Thrust Washer
 Courtesy of SUZUKI OF AMERICA CORP.

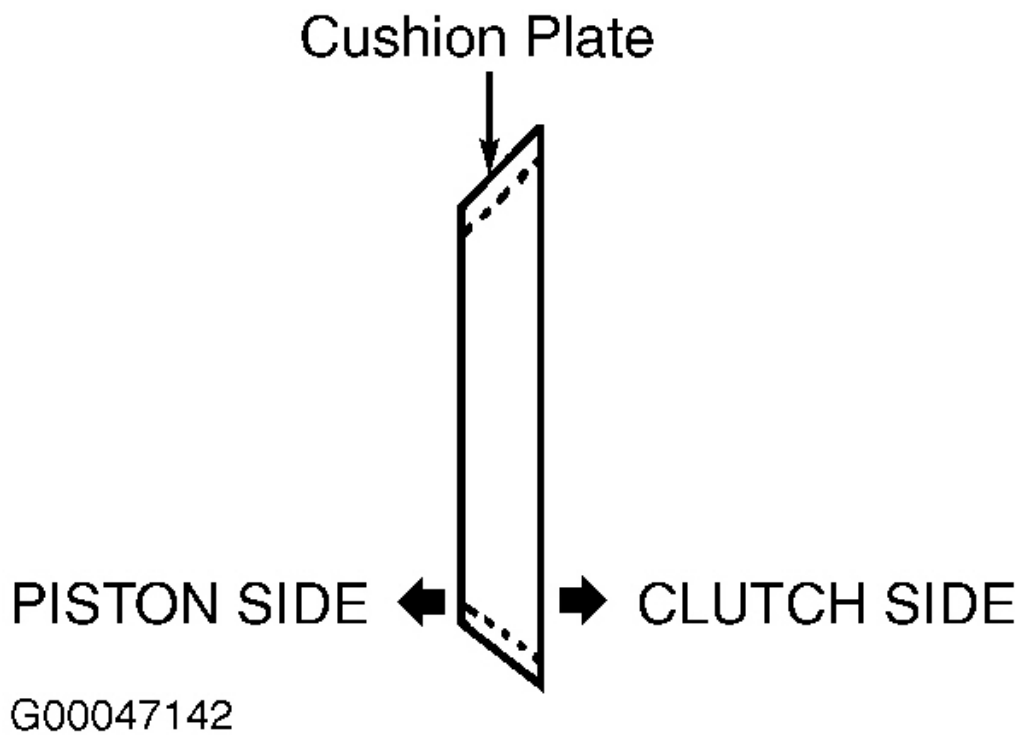
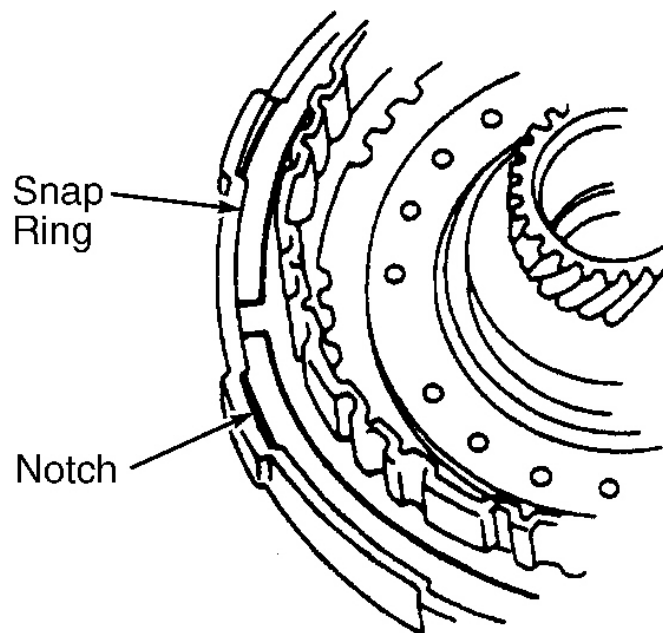
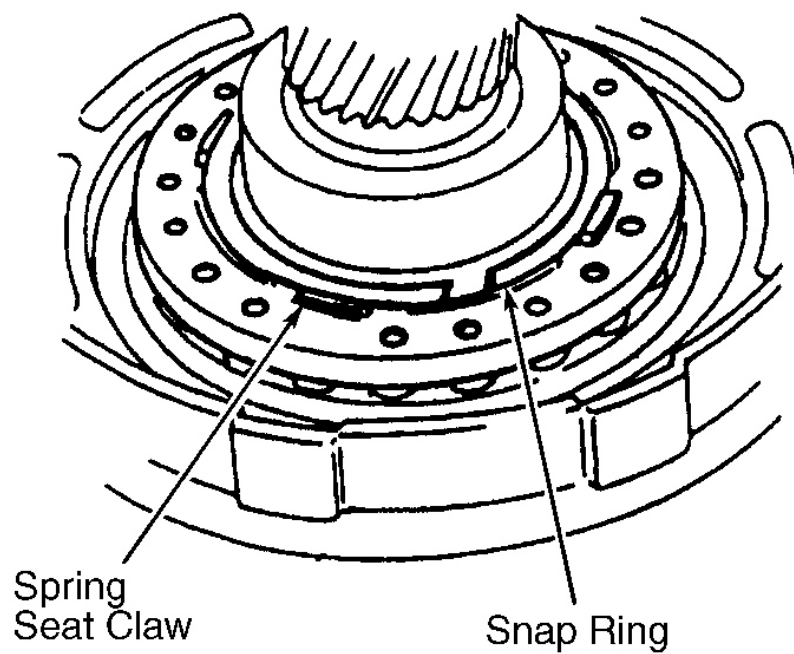


Fig. 23: Identifying Clutch Cushion Plate
Courtesy of SUZUKI OF AMERICA CORP.



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Fig. 24: Locating OD Direct Clutch Snap Rings
Courtesy of SUZUKI OF AMERICA CORP.

OVERDRIVE BRAKE

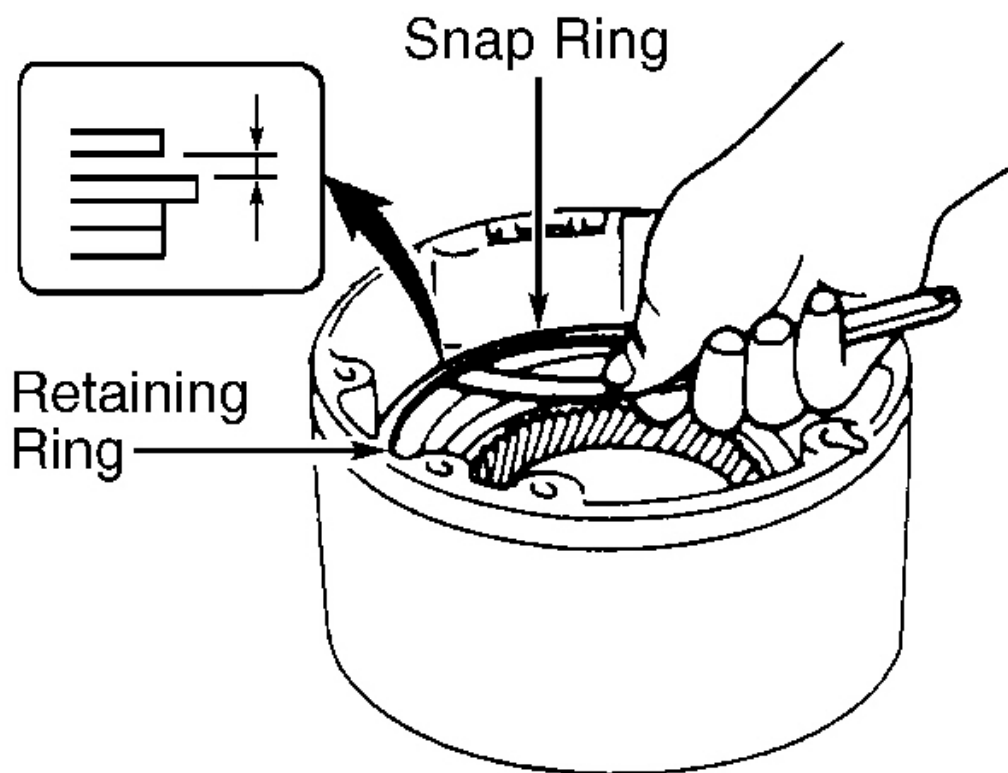
Disassembly

NOTE: Note component direction prior to removal.

1. Prior to disassembly, check OD brake clutch pack clearance. Using a feeler gauge, measure clearance between snap ring and flange. See **Fig. 25** . See **OVERDRIVE BRAKE CLEARANCE SPECIFICATIONS** table. If clearance is not as specified, inspect discs. Remove snap ring from OD case. Remove flange, discs, plates and cushion plate. Note location and number of components. See **Fig. 26** .
2. Remove OD planetary ring gear, thrust bearing and races from OD case. Remove snap ring, spring seat and piston return spring. Remove OD brake piston by applying air pressure to OD case. Remove oil seal rings from case and "O" rings from piston.

OVERDRIVE BRAKE CLEARANCE SPECIFICATIONS

Application	Clearance - In. (mm)
Grand Vitara	.016-.054 (.40-1.38)
Sportage & Tracker	.014-.075 (.36-1.91)
Vitara	.022-.054 (.56-1.38)



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Fig. 25: Measuring OD Brake Clutch Pack Clearance
Courtesy of SUZUKI OF AMERICA CORP.

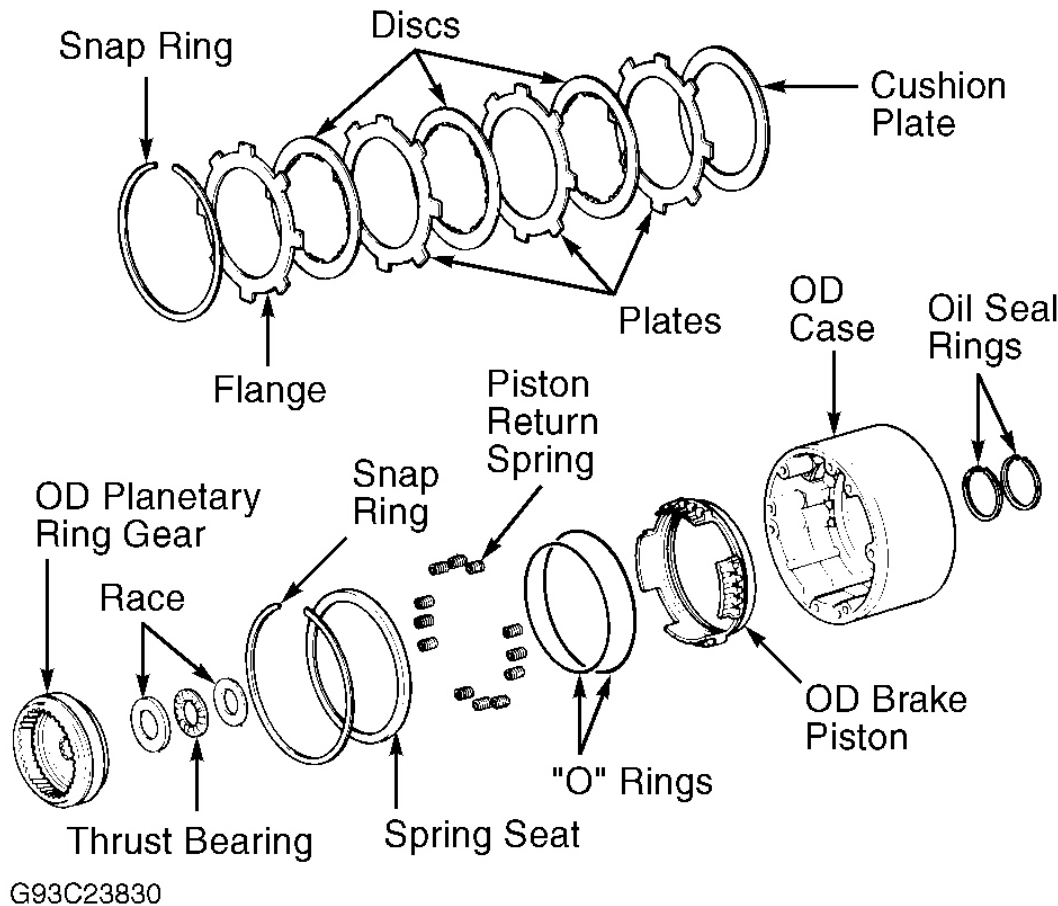


Fig. 26: Exploded View Of OD Brake Components
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

1. Clean all components (except discs) with solvent. Dry with compressed air. Inspect flange, plates and discs for flaking or burnt areas, replace as necessary.
2. Using calipers, measure free length of piston return springs. See **OVERDRIVE BRAKE PISTON RETURN SPRING SPECIFICATIONS** table. Replace return springs that do not measure as specified.

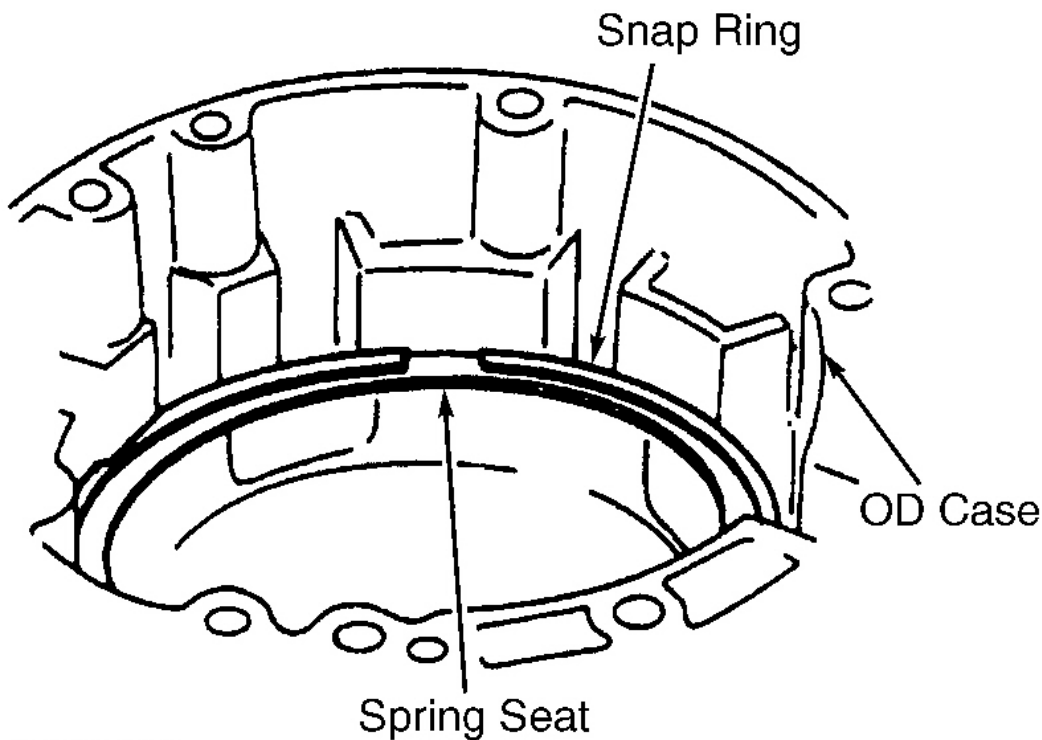
OVERDRIVE BRAKE PISTON RETURN SPRING SPECIFICATIONS

Application	Free Length - In. (mm)
Grand Vitara, Sportage, Tracker & Vitara	.594 (15.10)
Vitara 2.0L	.635 (16.12)

Reassembly

CAUTION: Clutch discs should be soaked in ATF for 15 minutes prior to installation. Lubricate all parts with ATF. Coat thrust bearings and races with petroleum jelly.

1. Lubricate and install oil sealing rings on OD case. Ensure rings rotate smoothly after installation. Install NEW "O" rings on OD brake piston. Using hand pressure, carefully install brake piston into OD case with cup side upward.
2. Install piston return springs. See **Fig. 26** . Install spring seat and snap ring. Ensure end gap of snap ring is not aligned with notch in OD case. Ensure snap ring is fully seated in groove of OD case. See **Fig. 27** .
3. Install rear bearing race, thrust bearing and front bearing race on OD planetary ring gear. Install OD planetary ring gear assembly into OD case.
4. Install cushion plate into OD case. See **Fig. 23** . Install plates and discs in appropriate order. Install flange with flat surface facing down. Install snap ring.
5. Ensure end gap of snap ring is not aligned with notch in OD case. Recheck OD brake piston stroke or clearance. If measurement is not as specified, check for incorrect reassembly of components.



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Fig. 27: Locating OD Brake Piston Spring Seat & Snap Ring
Courtesy of SUZUKI OF AMERICA CORP.

FORWARD CLUTCH

Disassembly

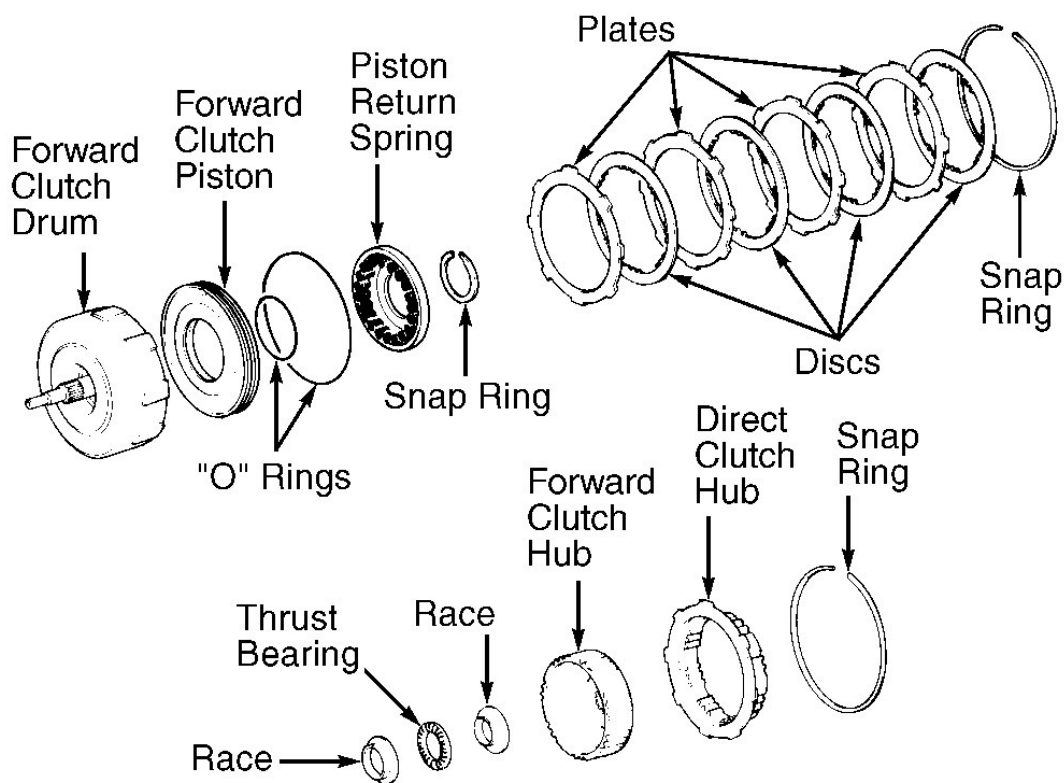
NOTE: **Note component direction prior to removal.**

1. Remove snap ring from forward clutch drum. Remove direct clutch hub and forward clutch hub. Remove thrust bearing and races from forward clutch drum. Reinstall direct clutch hub and snap ring. See **Fig. 28**.
2. Place forward clutch assembly onto OD case. Check forward clutch piston stroke. Using a dial indicator, measure forward clutch piston stroke while applying 57-114 psi (4-8 kg/cm²) to OD case oil hole. See **Fig. 29**. Piston stroke should be .055-.088" (1.40-2.24 mm). If piston stroke is not as specified, inspect discs. Remove snap ring and direct clutch hub.

CAUTION: DO NOT apply excessive pressure to plate section of piston return spring. Piston return spring may be damaged.

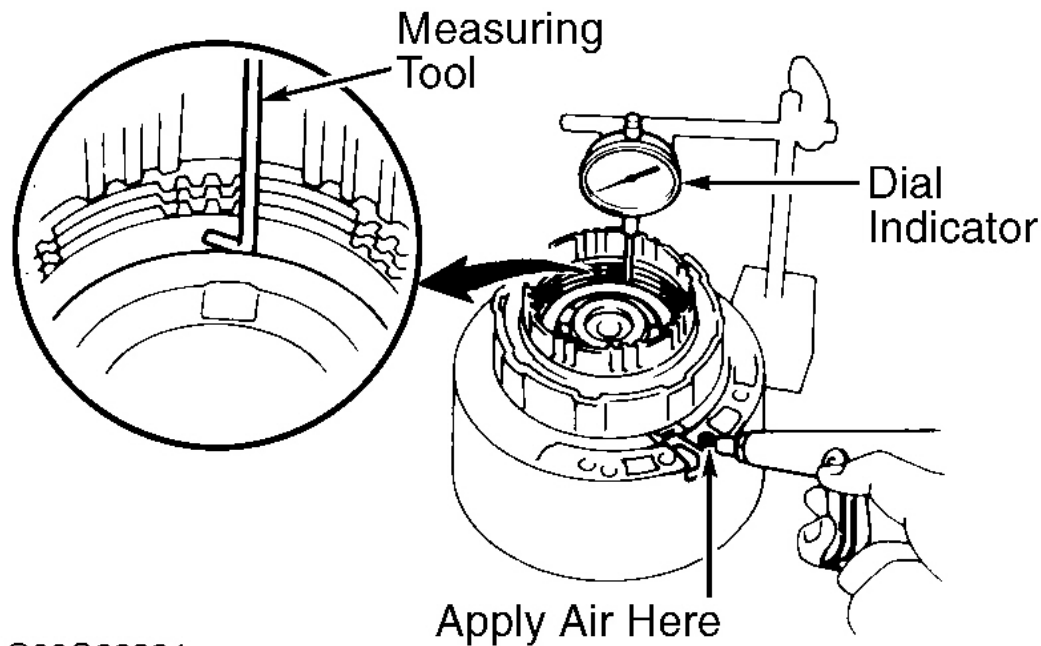
3. Remove forward clutch snap ring, discs and plates. Note location and number of components. Using appropriate spring compressor, compress piston return spring.

Remove snap ring and piston return spring. Place forward clutch drum on OD case. Carefully apply air pressure to case oil hole to remove forward clutch piston. See **Fig. 29**. Remove "O" rings from clutch piston.



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Fig. 28: Exploded View Of Forward Clutch Components
 Courtesy of SUZUKI OF AMERICA CORP.



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Fig. 29: Measuring Forward Clutch Piston Stroke
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

1. Clean all components (except discs) with solvent. Dry with compressed air. Inspect plates and discs for flaking or burnt areas, replace as necessary.
2. Ensure check ball is free in clutch piston. Apply air pressure to check ball area. Ensure check ball does not allow air to bleed through piston.
3. Using calipers, measure free length of piston return springs. Standard return spring free length is .594" (15.10 mm). Replace return springs that do not measure as specified.

Reassembly

CAUTION: Clutch discs should be soaked in ATF for 15 minutes prior to installation. Lubricate all parts with ATF. Coat thrust bearings and races with petroleum jelly.

1. Lubricate and install NEW "O" rings on forward clutch piston. Carefully install forward clutch piston into forward clutch drum. Install piston return spring. Using a spring compressor and appropriate press, compress return spring and install snap ring. Ensure end gap of snap ring is not aligned with claw area of spring seat.
2. Install plates, discs and forward clutch snap ring in appropriate order. See **Fig. 28** . Ensure end gap of

snap ring is not aligned with cutout portion of forward clutch drum. Install bearing races and thrust bearing. See **Fig. 48** .

3. Install forward clutch hub. Install direct clutch hub and snap ring. Recheck forward clutch piston stroke. If piston stroke is less than specified, check for incorrect reassembly of components. Ensure end gap of snap ring is not aligned with cutout portion of clutch drum.

DIRECT CLUTCH

Disassembly

NOTE: Note component direction prior to removal.

1. Prior to disassembly, place direct clutch drum onto center support. Using a dial indicator and compressed air, measure direct clutch piston stroke while applying 57-114 psi (4-8 kg/cm²) to OD case oil hole. See **Fig. 30** . See **DIRECT CLUTCH PISTON STROKE SPECIFICATIONS** table. If piston stroke is not as specified, inspect discs. Remove direct clutch from center support.

DIRECT CLUTCH PISTON STROKE SPECIFICATIONS

Application	Clearance - In. (mm)
Grand Vitara	.036-.078 (.91-1.99)
Sportage	.040-.089 (1.01-2.25)
Tracker	.008-.069 (.20-1.75)
Vitara	.042-.084 (1.06-2.14)

2. Remove snap ring, flange, discs and plates. See **Fig. 31** . Note location and number of components. Using spring compressor, compress piston return spring and remove snap ring. Remove piston return springs.
3. Place direct clutch drum on center support. Hold direct clutch piston with hand, and apply compressed air to center support to remove direct clutch piston. Apply compressed air to specified hole in center support to remove inner and outer direct clutch piston. See **Fig. 30** . Remove "O" rings from piston(s).

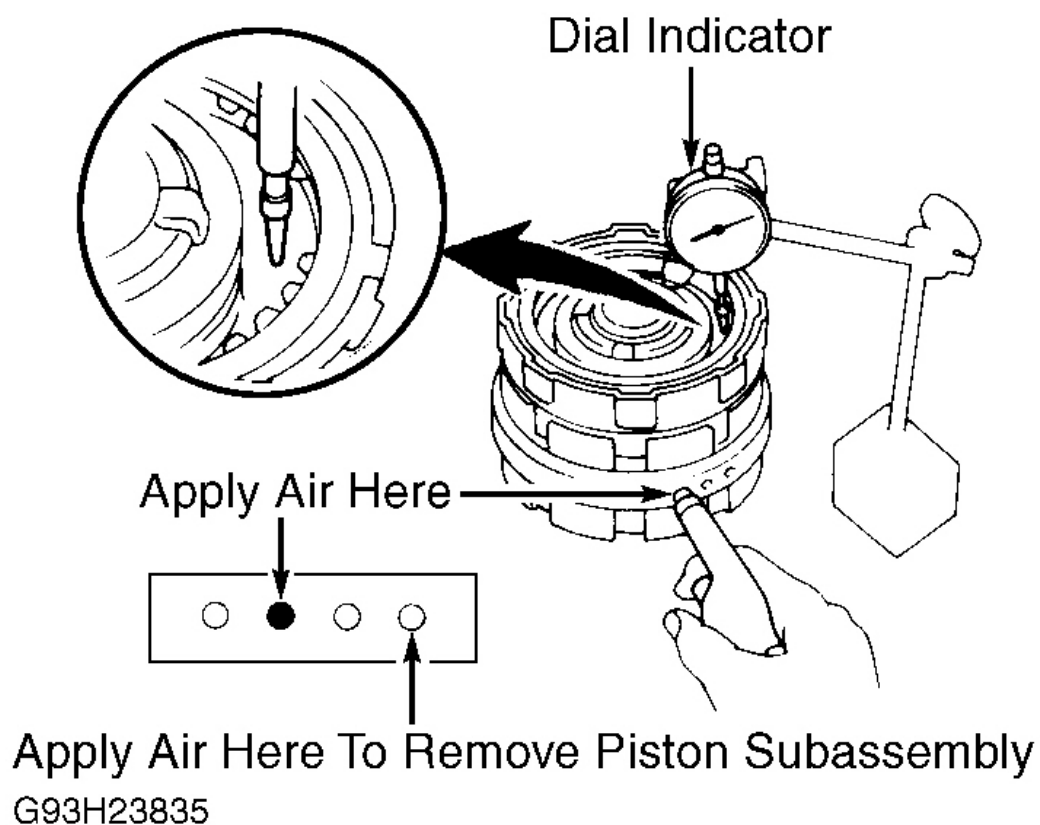
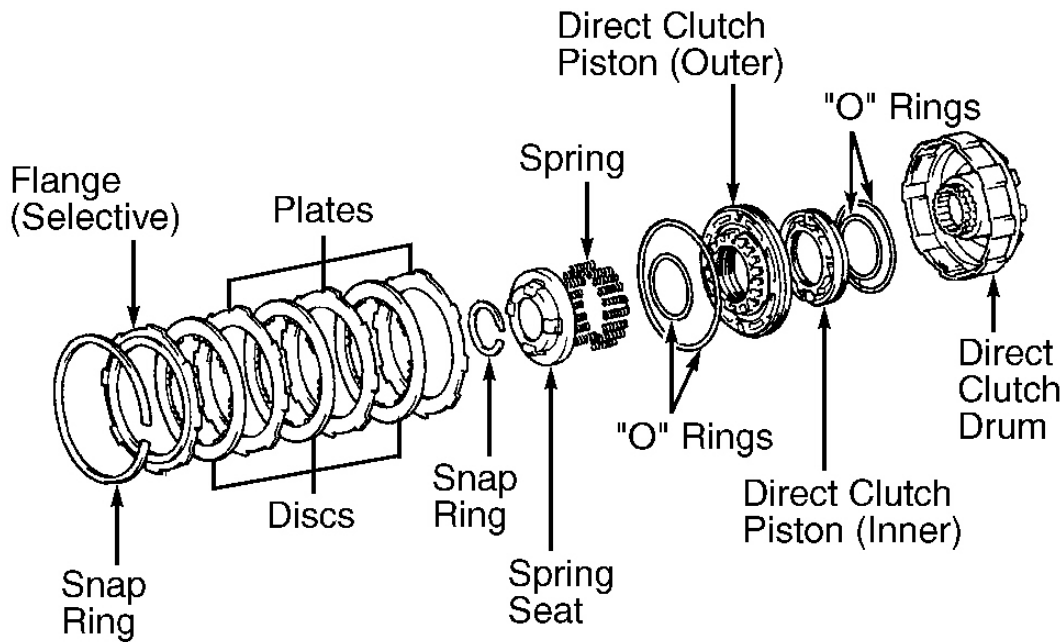


Fig. 30: Measuring Direct Clutch Piston Stroke & Removing Piston Subassembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 31: Exploded View Of Direct Clutch Components
Courtesy of SUZUKI OF AMERICA CORP.

Inspection

1. Clean all components (except discs) with solvent. Dry with compressed air. Inspect plates and discs for flaking or burnt areas, replace as necessary.
2. Ensure check ball is free in clutch piston. Apply air pressure to check ball area. Ensure check ball does not allow air to bleed through piston.
3. Using calipers, measure free length of piston return springs. Standard return spring free length is .596" (15.13 mm). Replace return springs that do not measure as specified.

Reassembly

CAUTION: Clutch discs should be soaked in ATF for 15 minutes prior to installation. Lubricate all parts with ATF.

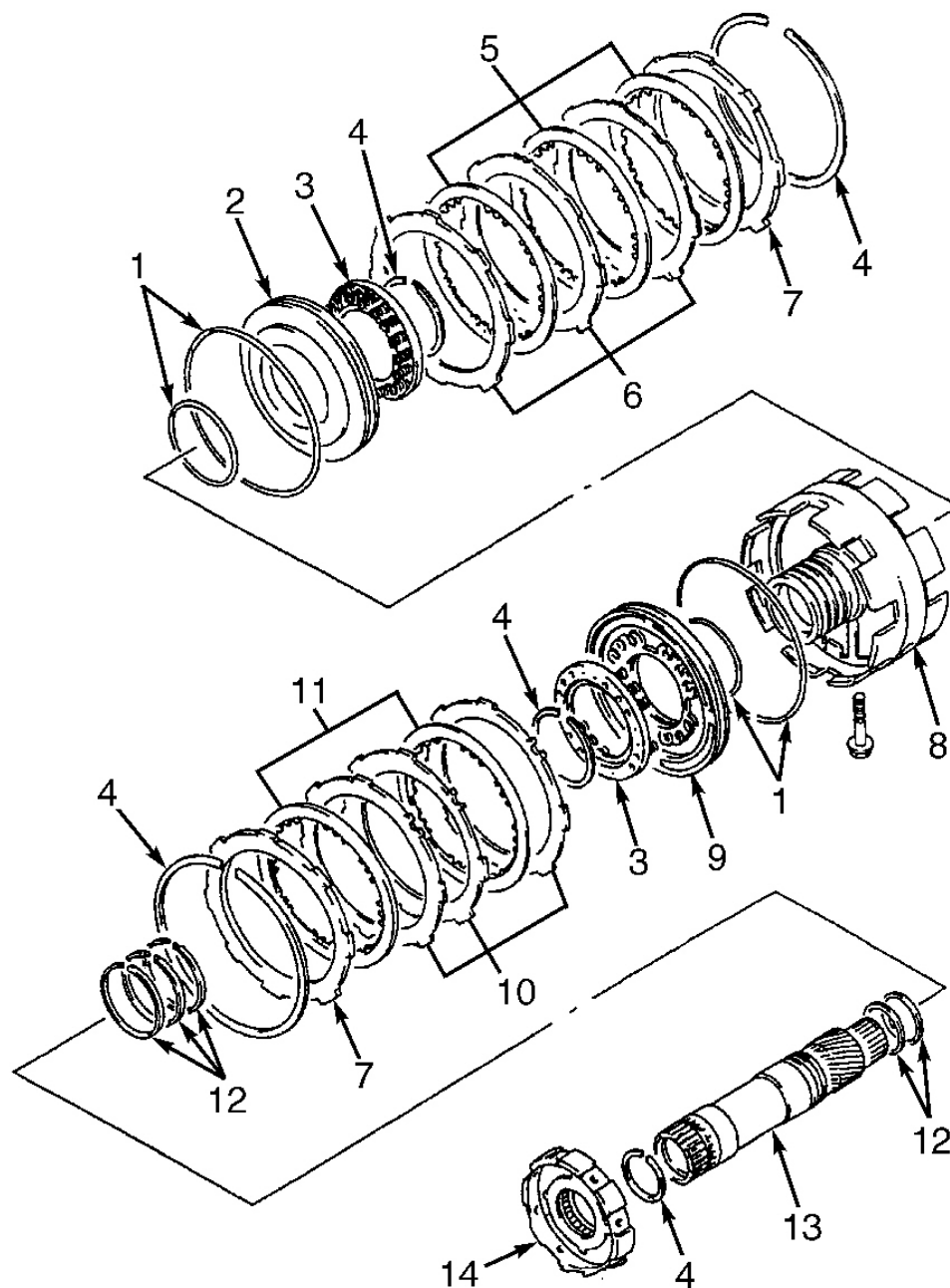
1. Lubricate and install NEW "O" rings on inner and outer direct clutch pistons. Install inner piston into direct clutch drum. Install outer piston into direct clutch drum. Using a spring compressor and press, install piston return spring and snap ring. Ensure end gap of snap ring is not aligned with claw area of piston return spring seat.
2. Install plates and discs in appropriate order. See **Fig. 31** . Install flange with flat surface facing down. Install snap ring. Ensure end gap of snap ring is not aligned with cutout portion of direct clutch drum.

Recheck direct clutch piston stroke. See **DIRECT CLUTCH PISTON STROKE SPECIFICATIONS**. If piston stroke is less than specified, check for incorrect reassembly of components. If direct clutch piston stroke is not within specifications, replace flange. Flange is available in 3 thicknesses .142" (3.60 mm), .150" (3.80 mm) and .157" (4.00 mm).

CENTER SUPPORT ASSEMBLY

Disassembly

1. Remove snap ring from end of sun gear shaft. See **Fig. 32**. Remove No. 2 brake hub assembly and No. 1 one-way clutch from center support. Repeat procedure used in direct clutch disassembly to check No. 1 brake piston stroke. See **Fig. 33**. On Grand Vitara/Vitara, piston stroke should be .039-.047" (1.0-1.2 mm) and .025-.068" (.64-1.73 mm) for all other models. If piston stroke is not as specified, inspect discs.
2. Remove No. 1 brake clutch snap ring from front of center support. Remove flange, discs and plates. See **Fig. 32**. Using spring compressor, compress piston return spring. Remove snap ring. Remove piston return spring.
3. Hold No. 1 brake piston and apply air pressure to specified center support oil hole to remove No. 1 brake piston. See **Fig. 33**. Remove "O" rings and oil sealing rings. Turn center support over.
4. Check No. 2 brake piston stroke. Repeat test procedure used previously for checking piston stroke on No. 1 brake piston. See **Fig. 34**. Piston stroke should be .040-.089" (1.02-2.26 mm). If piston stroke is not as specified, inspect discs. Remove No. 2 brake clutch snap ring, flange, discs and plates. Note location and number of components. See **Fig. 32**.
5. Using spring compressor, compress piston return spring. Remove snap ring. Remove piston return spring. Hold No. 2 brake piston and apply air pressure to specified center support oil hole to remove No. 2 brake piston. See **Fig. 34**. Remove "O" rings.
6. Hold No. 1 one-way clutch and rotate sun gear shaft. Sun gear shaft should rotate freely in counterclockwise direction and lock in clockwise direction. See **Fig. 35**. If component does not operate as described, one-way clutch requires replacement. Loosen staked part of rear side retainer. Remove No. 1 one-way clutch and 2 retainers from outer race. See **Fig. 36**. Using a pin punch and hammer, remove front side retainer. Remove oil sealing rings from sun gear shaft.



1. "O" Rings
2. No. 2 Brake Piston
3. Return Spring
4. Snap Ring
5. No. 2 Brake Clutch Discs
6. No. 2 Brake Clutch Plates
7. Flange
8. Center Support

9. No. 1 Brake Piston
10. No. 1 Brake Clutch Plates
11. No. 1 Brake Clutch Plates
12. Seal Rings
13. Sun Gear Shaft
14. No. 2 Brake Hub Assembly
& No. 1 One-Way Clutch

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Fig. 32: Exploded View Of Center Support Components
Courtesy of SUZUKI OF AMERICA CORP.

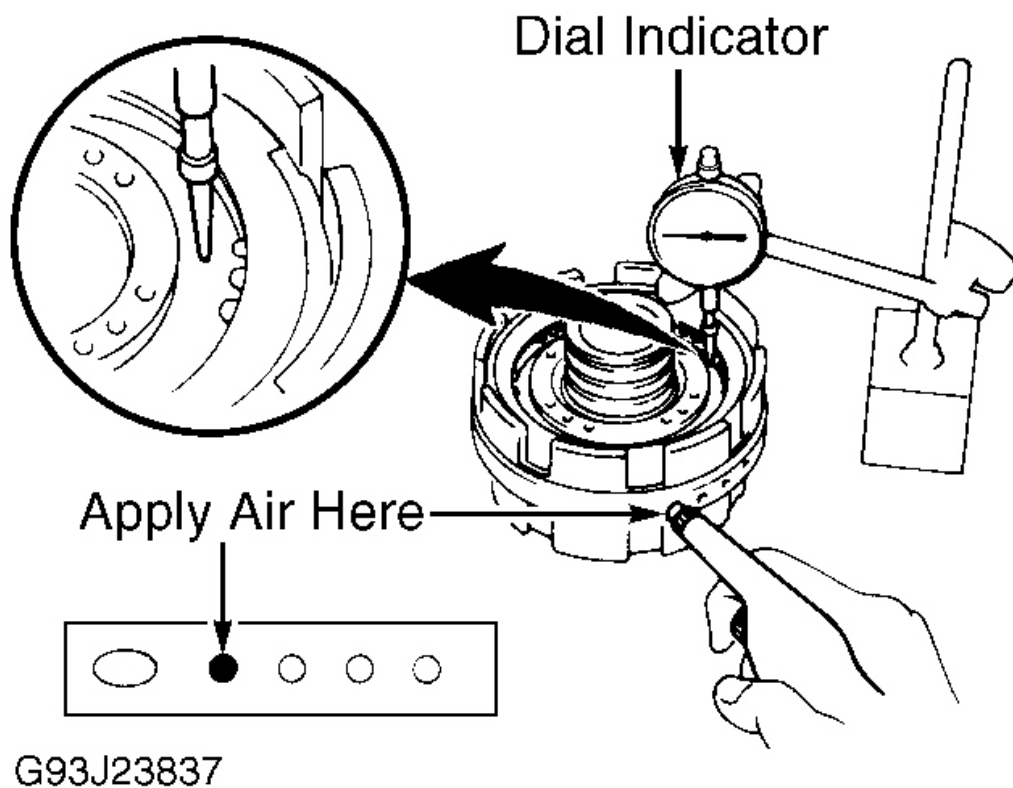


Fig. 33: Measuring No. 1 Brake Piston Stroke
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

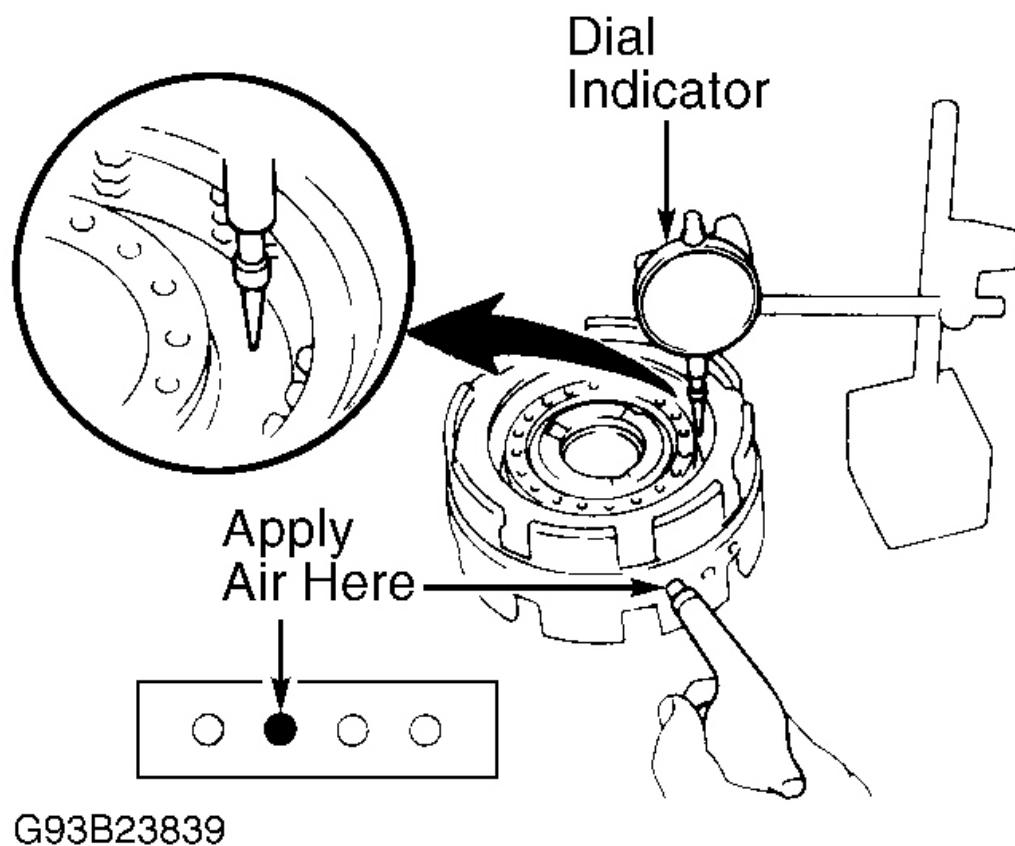


Fig. 34: Measuring No. 2 Brake Piston Stroke

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

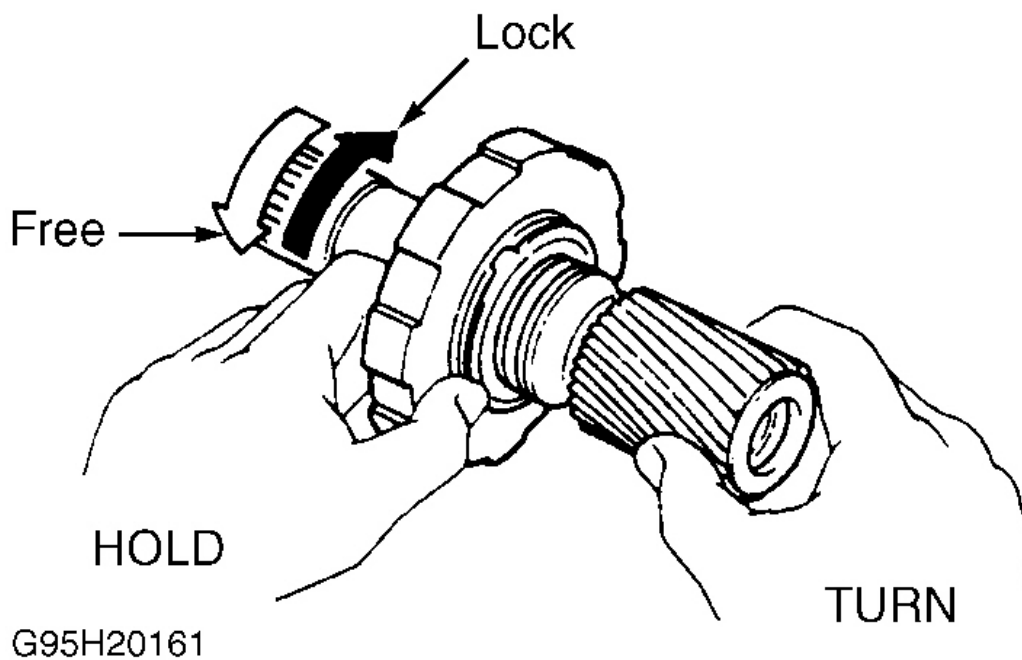


Fig. 35: Checking No. 1 One-Way Clutch Operation
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

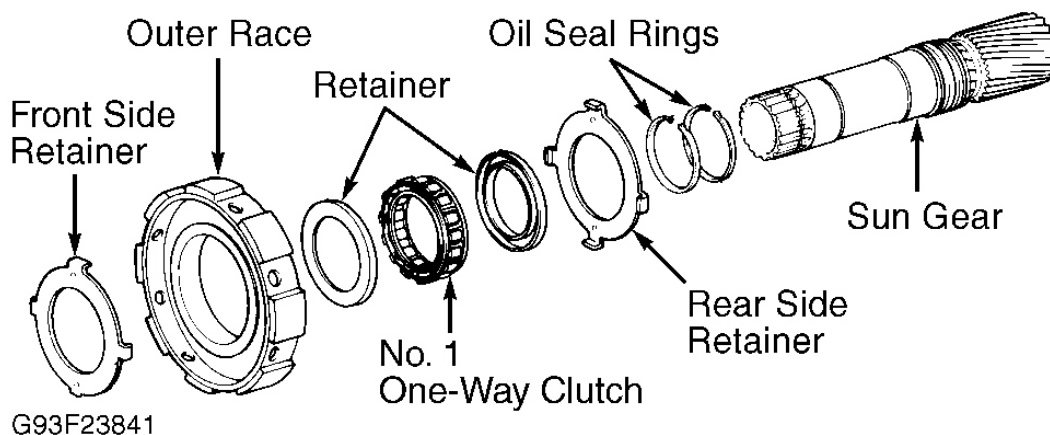


Fig. 36: Exploded View Of Planetary Sun Gear Shaft & No. 1 One-Way Clutch
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

Clean all components (except discs) with solvent. Dry with compressed air. Inspect plates and discs for flaking or burnt areas, replace as necessary. Using calipers, measure free length of piston return springs. Standard free length is .635" (16.12 mm). Replace return springs that do not measure as specified.

Reassembly

CAUTION: Clutch discs should be soaked in ATF for 15 minutes prior to installation. Lubricate all parts with ATF.

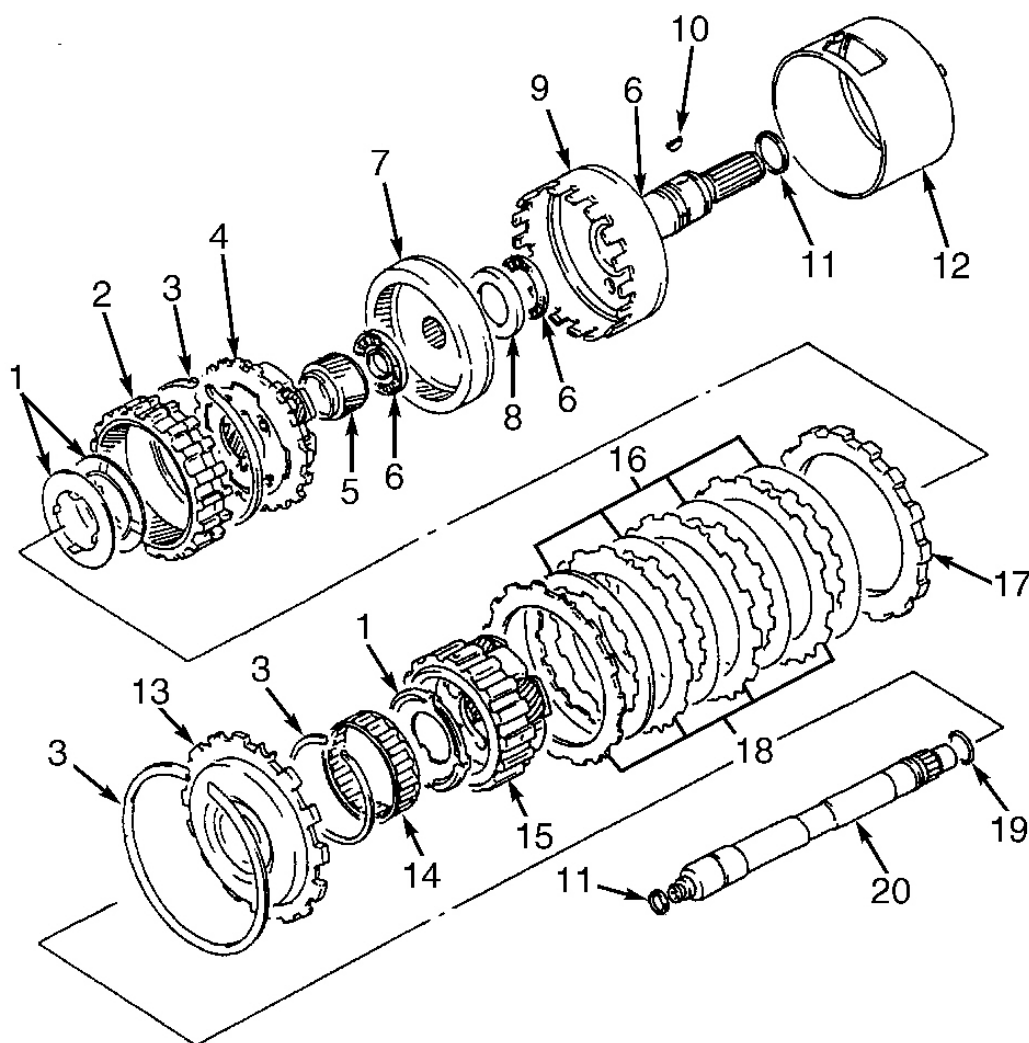
1. Lubricate "O" rings with ATF. To reassemble, reverse disassembly procedure. Ensure end gap of snap ring does not align with claw area of either piston return spring. Install plates and discs in appropriate order. See **Fig. 32** .
2. Install No. 1 brake flange and No. 2 brake flange with chamfered edge facing clutch discs. Install snap rings. Ensure ends of snap rings do not align with notches in center support.
3. Recheck piston stroke of No. 1 brake and No. 2 brake. See **Fig. 33** and **Fig. 34** . If piston stroke is not as specified, check for incorrect reassembly of components. Reassemble sun gear shaft and No. 1 one-way clutch. See **Fig. 36** . While turning one-way clutch, install sun gear shaft assembly into center support. Install snap ring on end of sun gear shaft.

REAR PLANETARY GEAR & OUTPUT SHAFT**Disassembly**

1. Remove front planetary gear assembly from output shaft assembly. See **Fig. 37** . Remove thrust washer from rear planetary gear. Remove low and reverse brake backing plate, clutch discs and plates. Remove low and reverse brake reaction plate from front planetary gear. Remove No. 2 one-way clutch and thrust washer.

CAUTION: Note direction of wide machined surface on rear planetary sun gear before removing. See Fig. 38 .

2. Remove front planetary ring gear, thrust bearing and rear planetary race. See **Fig. 39** . Remove rear planetary thrust washer, rear planetary gear and rear planetary sun gear. Remove snap ring from intermediate shaft, then remove rear planetary ring gear and thrust bearing and race.



- | | |
|------------------------------|--------------------------------------|
| 1. Thrust Washer | 12. Brake Apply Tube |
| 2. Front Planetary Ring Gear | 13. Low/Reverse Brake Reaction Plate |
| 3. Snap Ring | 14. No. 2 One-Way Clutch |
| 4. Rear Planetary Gear | 15. Front Planetary Gear |
| 5. Rear Planetary Sun Gear | 16. Low/Reverse Brake Discs |
| 6. Thrust Bearing | 17. Low/Reverse Brake Backing Plate |
| 7. Rear Planetary Ring Gear | 18. Low/Reverse Brake Plates |
| 8. Bearing Race | 19. Snap Ring |
| 9. Output Shaft Assembly | 20. Intermediate Shaft |
| 10. Key | |
| 11. Seal Ring | |

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Fig. 37: Exploded View Of Planetary Gears & Output Shaft Components
Courtesy of SUZUKI OF AMERICA CORP.

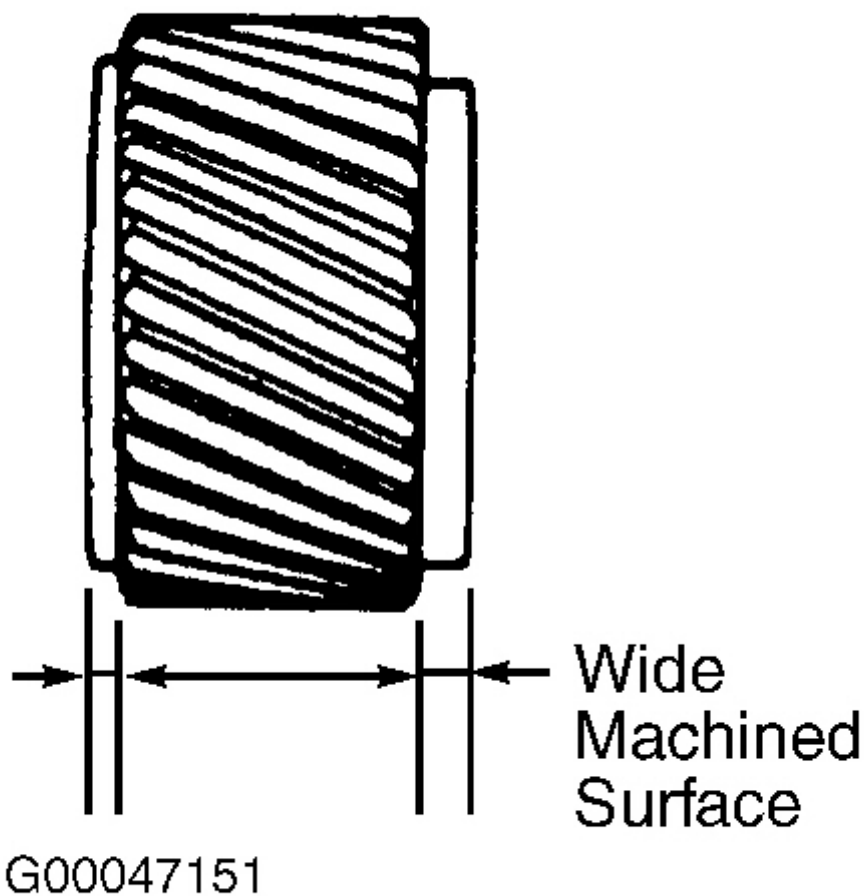
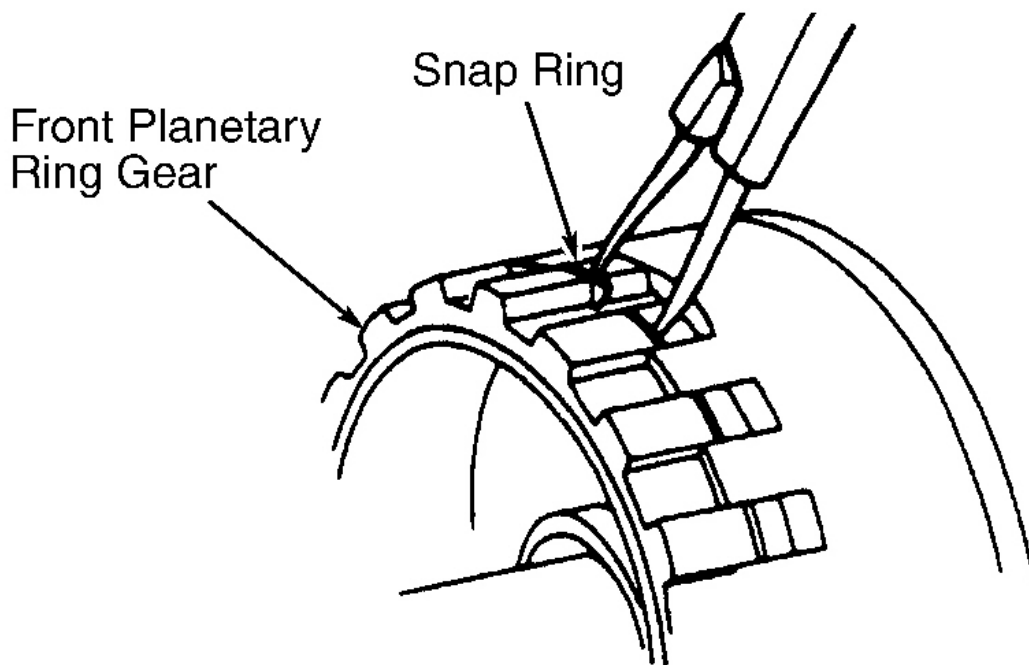


Fig. 38: Identifying Wide Machined Surface Of Rear Planetary Sun Gear
Courtesy of SUZUKI OF AMERICA CORP.



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Fig. 39: Removing & Installing Planetary Ring Gear Snap Ring
Courtesy of SUZUKI OF AMERICA CORP.

Inspection

Clean all components (except discs) with solvent. Dry with compressed air. Inspect all components for wear or damage. Ensure intermediate shaft oil holes are open. Inspect plates and discs for flaking or burnt areas, replace as necessary.

Reassembly

CAUTION: Clutch discs should be soaked in ATF for 15 minutes prior to installation. Lubricate all parts with ATF.

1. Lubricate all parts with ATF. Install thrust bearing race and rear planetary ring gear onto intermediate shaft, then install snap ring. See **Fig. 37**. Install thrust bearing and rear planetary sun gear onto intermediate shaft with wide machined surface in direction noted during disassembly. Install seal ring onto intermediate shaft.
2. Install rear planetary gear onto intermediate shaft. Install front planetary ring gear and snap ring. See **Fig. 39**. Install thrust washer onto rear planetary gear, ensure lugs on thrust washer engage holes in rear planetary gear. Install thrust washer onto front planetary gear.

3. Install one-way clutch and snap ring into front planetary gear. See **Fig. 40** . Install reverse brake reaction plate. Check operation of No. 2 one-way clutch. See **Fig. 41** .
4. Install reverse brake plates and reverse brake discs starting with reverse brake plate. See **Fig. 37** . Install reverse brake backing plate and thrust washer. Install front planetary gear assembly into output shaft assembly.

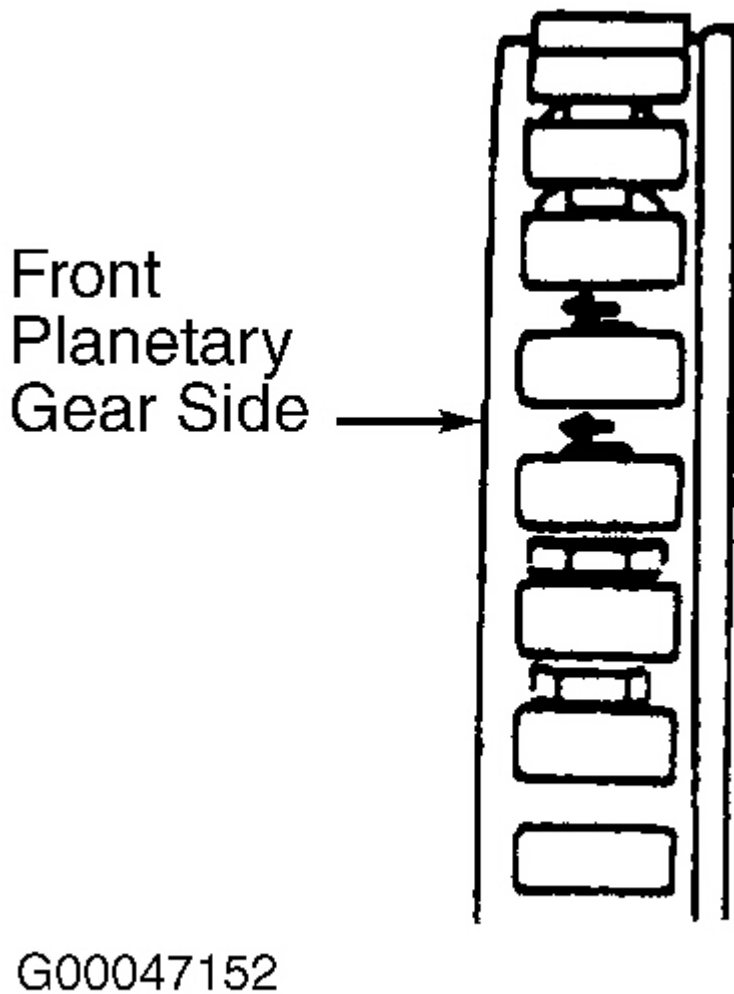


Fig. 40: Installing No. 2 One-Way Clutch
Courtesy of SUZUKI OF AMERICA CORP.

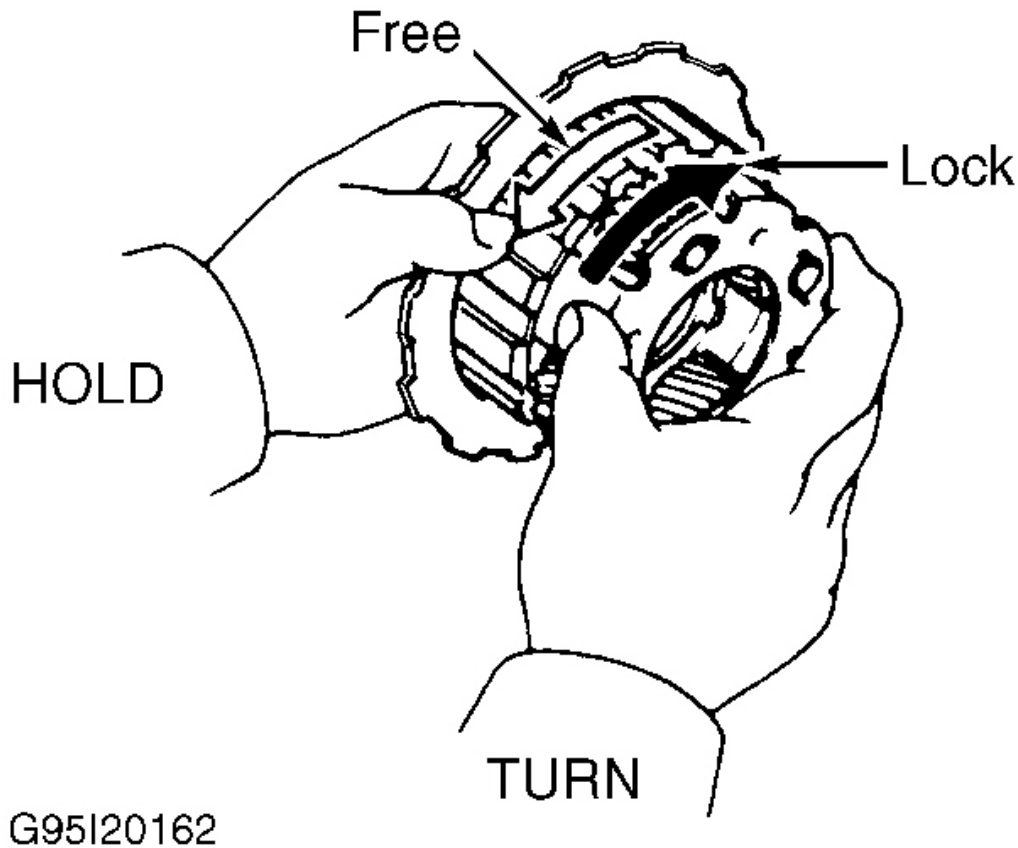


Fig. 41: Checking No. 2 One-Way Clutch Operation
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

LOW & REVERSE BRAKE PISTON ASSEMBLY & TRANSMISSION CASE

Disassembly

1. Using appropriate spring compressor, compress piston return springs and remove snap ring. Remove spring retainer and return springs. See **Fig. 11** . Position transmission case with front facing upward.
2. Place shop towels under case to prevent piston damage. Apply air pressure to case passages to remove reverse brake outer piston, reaction sleeve and reverse brake inner piston. See **Fig. 14** . It may be necessary to use long hooks to remove sleeve and inner piston. Using a screwdriver, pry manual valve shaft seals from case if replacement is required.

Inspection

Clean all parts in solvent. Dry with compressed air. Inspect pistons and sleeve for scoring, wear or damage.

Check return springs for cracked or broken coils. Replace damaged components as necessary.

Reassembly

Install manual valve shaft seals if removed. Lubricate and install all NEW "O" rings. To complete reassembly, reverse disassembly procedure.

VALVE BODY ASSEMBLY

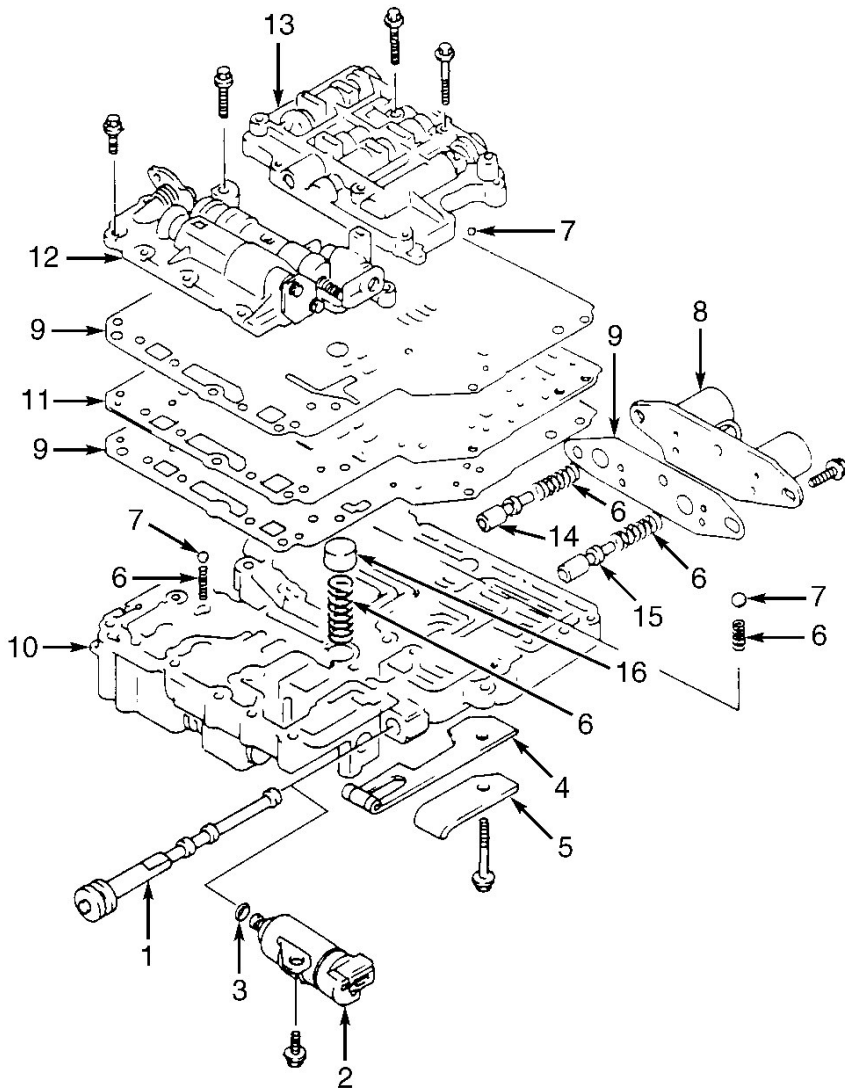
CAUTION: All valve body components must be installed in original location. Lay all components in sequence during removal for reassembly reference.

Disassembly

CAUTION: DO NOT allow plate to separate from lower valve body during removal or check balls, pins and retainers may fall out.

NOTE: Refer to illustrations for valve body disassembly and assembly. See Fig. 42 -Fig. 47 .

Remove detent spring, detent spring cover and manual valve from control valve assembly. Remove 9 bolts from front and rear upper valve bodies. Note bolt length and location. Remove 6 bolts from lower valve body. See Fig. 42 . Separate lower valve body and gasket from plate and upper valve bodies.



- | | |
|---------------------------------|--|
| 1. Manual Valve | 9. Gasket |
| 2. No. 3 Solenoid (TCC) | 10. Lower Valve Body Assembly |
| 3. "O" Ring | 11. Plate |
| 4. Detent Spring | 12. Front Upper Valve Body |
| 5. Plate | 13. Rear Upper Valve Body |
| 6. Spring | 14. Intermediate Coast Modulator Valve |
| 7. Ball | 15. Low Coast Modulator Valve |
| 8. No. 1 & No. 2 Shift Solenoid | 16. By-Pass Valve |

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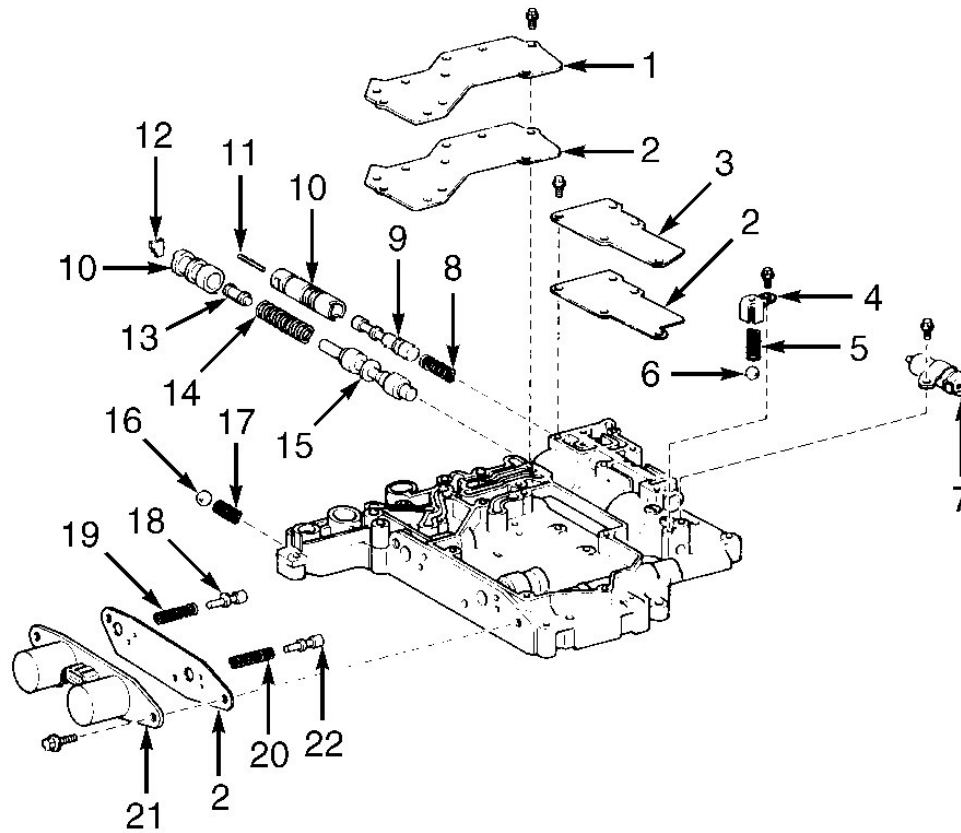
Fig. 42: Exploded View Of Valve Body Assembly
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Inspection

2000 Chevrolet Tracker

2000 AUTOMATIC TRANSMISSIONS Aisin Warner AW03-72LE & AW03-73LE Overhaul

1. Remove gasket from lower valve body. Note check ball, pin, spring and retainer location. Hold plate to lower valve body to ensure check balls do not fall out. Remove plate and gasket and note check ball, pin and retainer locations on upper valve bodies. Clean all parts in solvent. Dry with compressed air. Ensure all valve body passages are clear.
2. Inspect valves for scoring or roughness. Ensure valves slide freely in bores. Inspect valve springs for damage, squareness and collapsed coils. Measure spring free length and outer diameter. Replace spring if not within specification. See **VALVE BODY SPRING SPECIFICATIONS** .



- | | |
|-----------------------------|----------------------------------|
| 1. Valve Body Cover (Rear) | 12. Retainer |
| 2. Gasket | 13. Plunger |
| 3. Valve Body Cover (Front) | 14. Spring No. 1 |
| 4. Pressure Relief Valve | 15. Primary Regulator Valve |
| 5. Spring No. 5 | 16. Cooler Return Check Ball |
| 6. Check Ball | 17. Spring No. 6 |
| 7. No. 3 Solenoid (TCC) | 18. Intermediate Modulator Valve |
| 8. Spring No. 4 | 19. Spring No. 3 |
| 9. Lock-Up Relay Valve | 20. Spring No. 2 |
| 10. Sleeve | 21. No. 1 & No. 2 Shift Solenoid |
| 11. Pin | 22. Low Coast Modulator Valve |

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Fig. 43: Exploded View Of Lower Valve Body
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

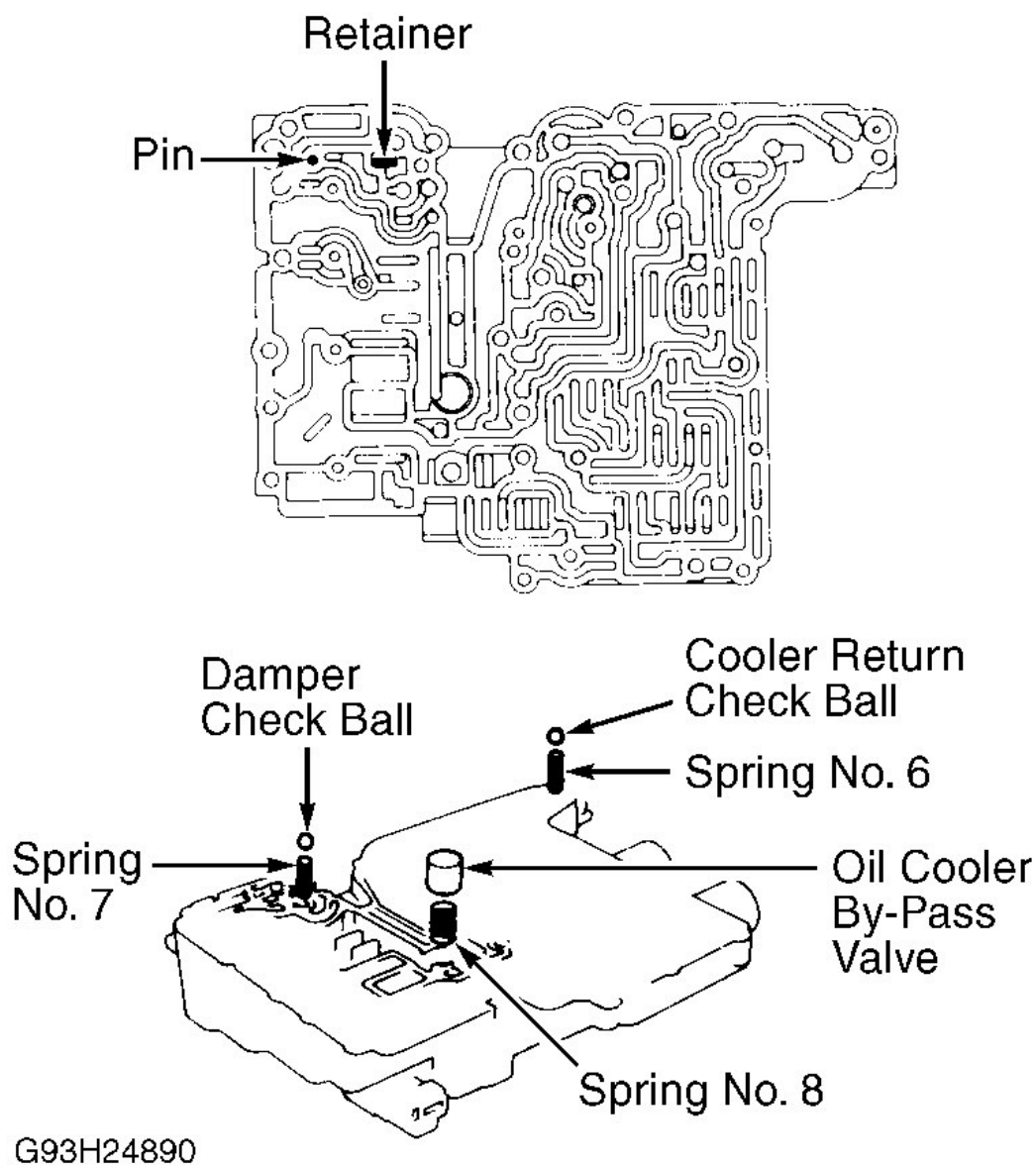
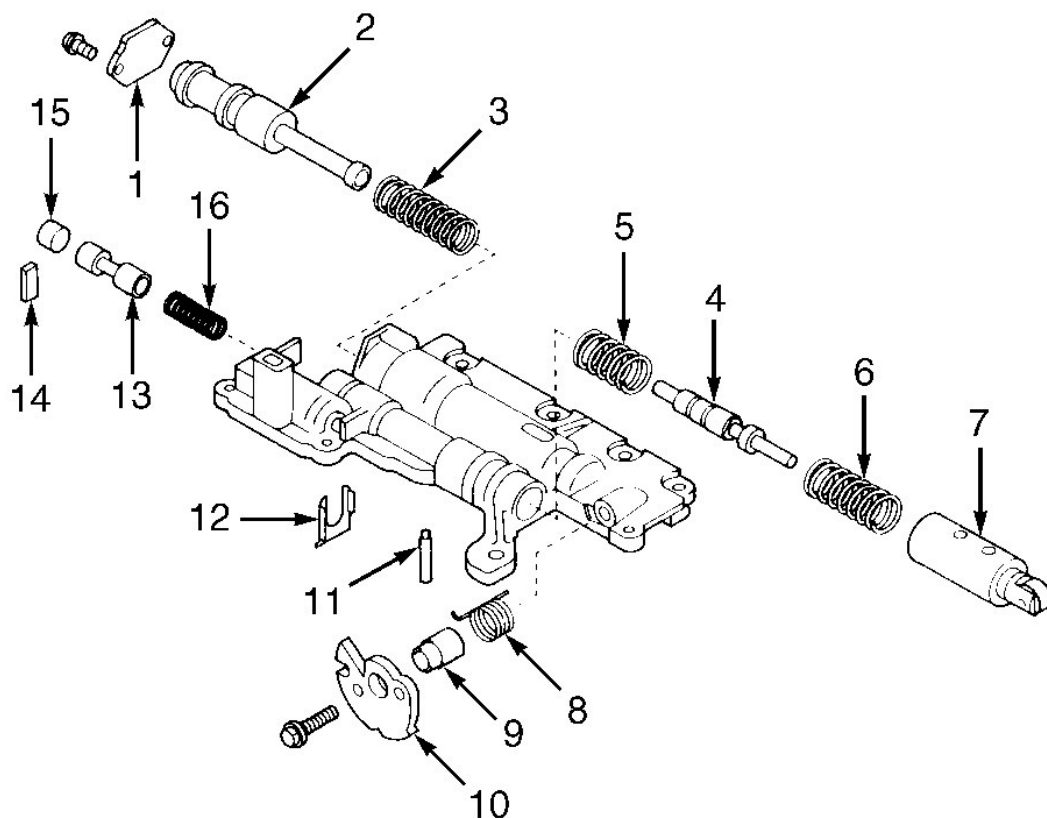


Fig. 44: Identifying Lower Valve Body Check Ball Pin, Spring & Retainer Locations
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

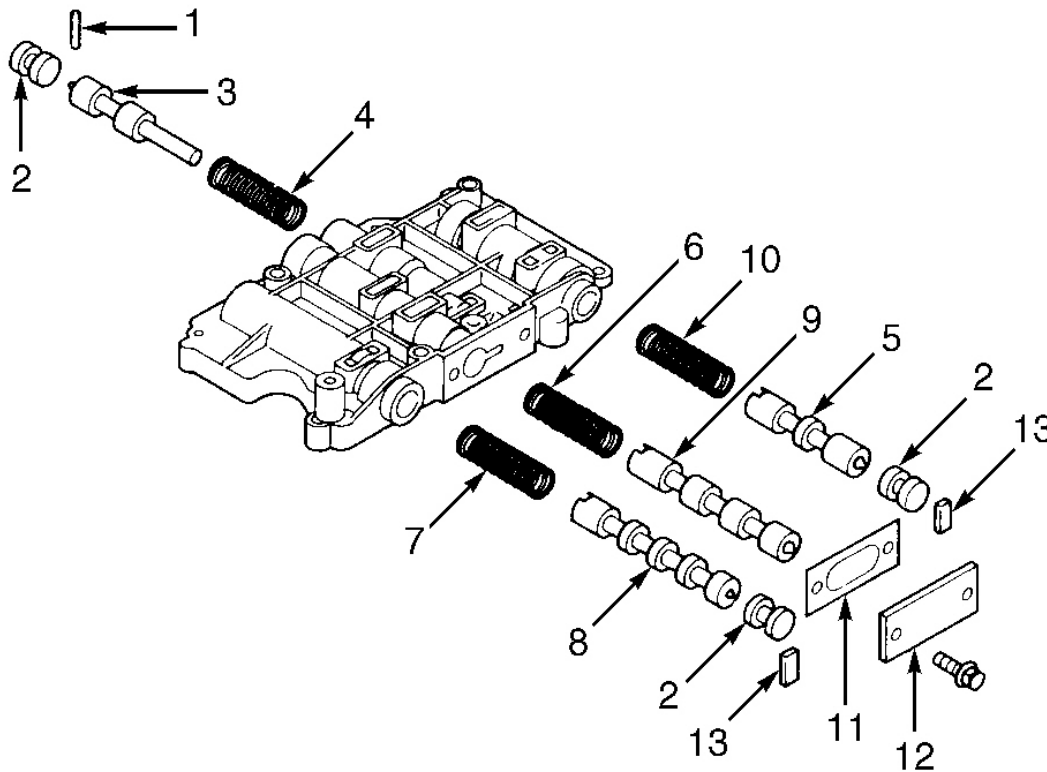


1. Cover
2. Secondary Regulator Valve
3. Spring No. 1
4. Throttle Valve
5. Spring No. 2
6. Spring No. 3
7. Downshift Plug
8. Spring

9. Sleeve
10. Cam
11. Pin
12. Retainer
13. Cut Back Valve
14. Valve Retainer
15. Plug
16. Spring No. 4

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Fig. 45: Exploded View Of Front Upper Valve Body
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



1. Pin
2. Plug
3. Rear Clutch
Sequence Valve
4. Spring No. 4
5. 3-4 Shift Valve
6. Spring No. 3

7. Spring No. 2
8. 2-3 Shift Valve
9. 1-2 Shift Valve
10. Spring No. 1
11. Gasket
12. Cover
13. Retainer

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Fig. 46: Exploded View Of Rear Upper Valve Body
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

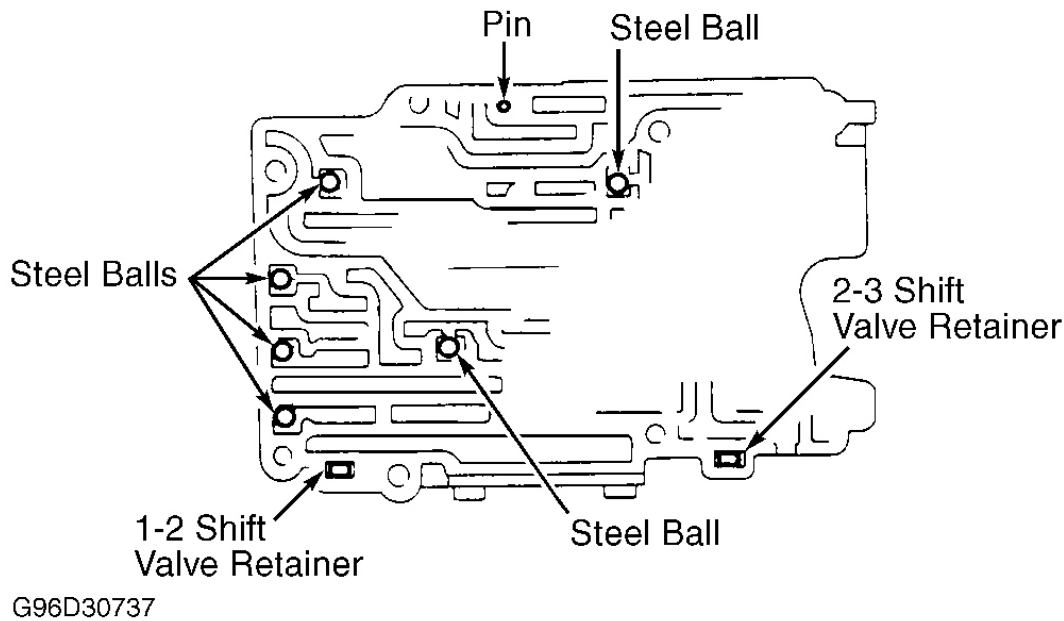


Fig. 47: Identifying Rear Upper Valve Body Check Ball Pin & Retainer Locations
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Reassembly

1. Position new gasket on upper rear valve body. Place lower valve body with separator plate and gaskets on top of upper rear valve body.
2. Install and finger tighten 3 bolts. Turn assembly over and install 4 bolts in upper rear valve body. Place assembly on top of upper front valve body. Install and finger tighten 3 bolts. Turn assembly over and install 5 bolts. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

VALVE BODY SPRING SPECIFICATIONS

LOWER VALVE BODY SPRING SPECIFICATIONS (GRAND VITARA/VITARA) ⁽¹⁾

Spring No.	Diameter - In. (mm)	Free Length - In. (mm)
1	.536 (13.62)	1.980 (50.28)
2	.394 (10.00)	1.395 (35.43)
3	(2)	(3)
4	.449 (11.40)	1.283 (32.60)
5	.517 (13.13)	1.265 (32.14)
6	.437 (11.10)	1.265 (32.13)
7	.195 (4.95)	.787 (20.00)
8	.544 (13.82)	1.138 (28.90)

2000 Chevrolet Tracker

2000 AUTOMATIC TRANSMISSIONS Aisin Warner AW03-72LE & AW03-73LE Overhaul

(1) See **Fig. 43** and **Fig. 44** .

(2) Spring diameter is .394 (10.00) on Grand Vitara and .356 (9.04) on Vitara.

(3) Spring free length is 1.008 (25.60) on Grand Vitara and 1.073 (27.26) on Vitara.

LOWER VALVE BODY SPRING SPECIFICATIONS (SPORTAGE & TRACKER) ⁽¹⁾

Spring No.	Diameter - In. (mm)	Free Length - In. (mm)
1	.677 (17.20)	2.216 (56.29)
2	.394 (10.01)	1.667 (42.34)
3	.394 (10.01)	1.395 (35.42)
4	.445 (11.30)	1.362 (34.59)
5	.517 (13.13)	1.501 (38.13)
6	.437 (11.10)	1.265 (32.13)
7	.195 (4.95)	.787 (20.00)
8	.544 (13.82)	1.312 (33.32)

(1) See **Fig. 43** and **Fig. 44** .

FRONT UPPER VALVE BODY SPRING SPECIFICATIONS ⁽¹⁾

Spring No.	Diameter - In. (mm)	Free Length - In. (mm)
1	.686 (17.42)	2.804 (71.22)
2	⁽²⁾ .338 (8.59)	.757 (19.23)
3	.429 (10.90)	1.557 (39.55)
4	.270 (6.86)	.906 (23.01)

(1) See **Fig. 45** .

(2) On Grand Vitara/Vitara, spring diameter is .282" (7.16 mm).

REAR UPPER VALVE BODY SPRING SPECIFICATIONS ⁽¹⁾

Spring No.	Diameter - In. (mm)	Free Length - In. (mm)
1-3	.350 (8.90)	1.147 (29.15)
4	.362 (9.20)	1.478 (37.55)

(1) See **Fig. 46** .

TRANSMISSION REASSEMBLY

NOTE: For bearing race and thrust bearing locations. See **Fig. 48** .

CAUTION: Lubricate all components with ATF. Clutch discs should be soaked in ATF for 15 minutes prior to installation. Coat thrust bearings and races with petroleum jelly. Ensure ends of snap rings are not aligned with cutout area

of case.

1. Position transmission case with front facing upward. Assemble low and reverse brake inner piston, reaction sleeve and outer piston. See **Fig. 11** . Press assembled pistons into case with hand pressure. Using appropriate spring compressor, install piston return spring onto outer piston. Install snap ring.
2. Install output shaft bearing and race. See **Fig. 48** . Install brake apply tube into transmission case, aligning locking tab with cutout on valve body side of transmission case. Ensure 4 lugs on underside of brake apply tube fit inside of low and reverse brake piston and leaf spring is properly installed. See **Fig. 49** .
3. Remove low and reverse brake reaction plate from planetary gear assembly. See **Fig. 37** . Align notched lugs of low and reverse brake plates and low and reverse brake backing plate. Install planetary gear assembly into transmission case with notched lugs align with cutout in transmission case. See **Fig. 50** . Measure low and reverse brake clutch pack clearance. See **Fig. 12** . Ensure low and reverse brake clearance is within specification. See **LOW & REVERSE BRAKE CLEARANCE SPECIFICATIONS** table. Install low and reverse brake reaction plate and snap ring.

LOW & REVERSE BRAKE CLEARANCE SPECIFICATIONS

Application	Clearance - In. (mm)
Grand Vitara	.024-.103 (.61-2.64)
Sportage & Tracker	.029-.098 (.74-2.49)
Vitara	
1.6L	.022-.090 (.56-2.29)
2.0L	.024-.103 (.61-2.64)

4. Ensure lugs of brake discs and plates in center support are securely in grooves. Hold direct clutch snap ring of planetary sun gear and install center support by aligning oil and bolt holes of center support and transmission case. Install bolts in center support and tighten evenly to specification. See **TORQUE SPECIFICATIONS** . Install direct clutch assembly while rotating to align with center support.
5. If fully installed, splined center of clutch will be even with end of sun gear shaft. Install bearing race, thrust bearing and front bearing race over splined end of intermediate shaft. Install thrust bearing and bearing race on forward clutch. Install forward clutch. Rotate while pushing downward on forward clutch to mesh splines of forward clutch with flukes of direct clutch hub.
6. Using calipers and appropriate straightedge, measure distance between top of case and forward clutch drum. See **Fig. 10** . Distance should be equal to measurement recorded during disassembly. If distance is less than recorded measurement, remove forward clutch assembly and then reinstall again.
7. Install OD case with cutout area of OD case aligned with cutout in transmission case. See **Fig. 51** . Install thrust washer on OD case and OD planetary gear. Ensure washer lugs align with holes in OD case and planetary gear assembly. Install bearing race on OD planetary gear assembly.

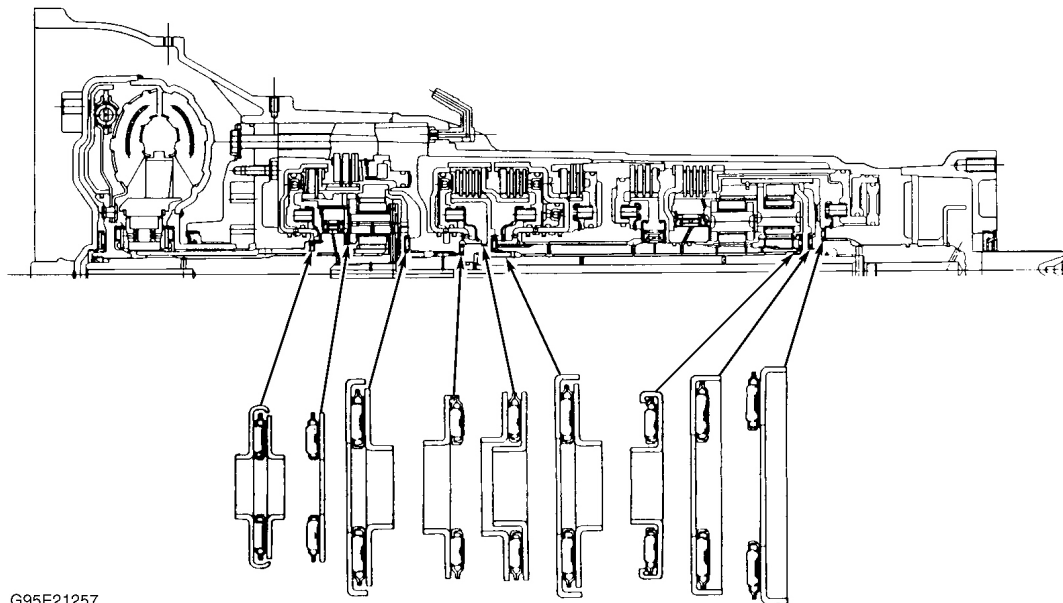


Fig. 48: Identifying Bearing Race & Thrust Bearing Locations
Courtesy of SUZUKI OF AMERICA CORP.

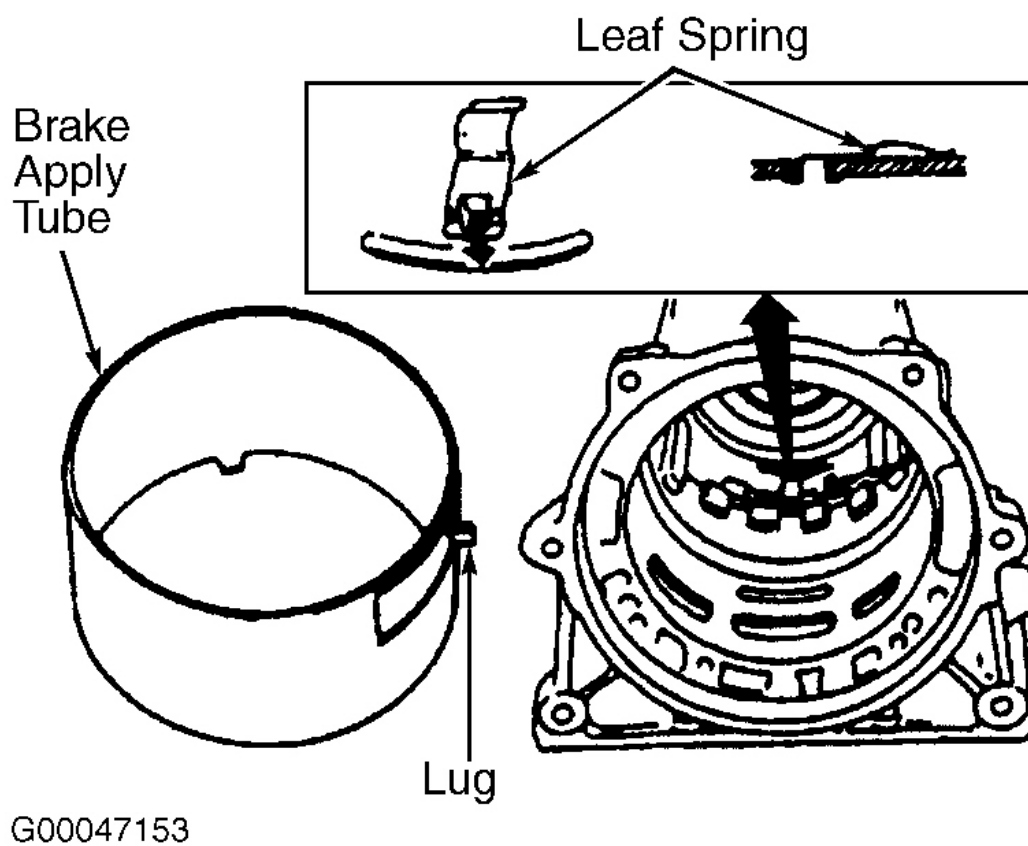


Fig. 49: Installing Brake Apply Tube & Leaf Spring
Courtesy of SUZUKI OF AMERICA CORP.

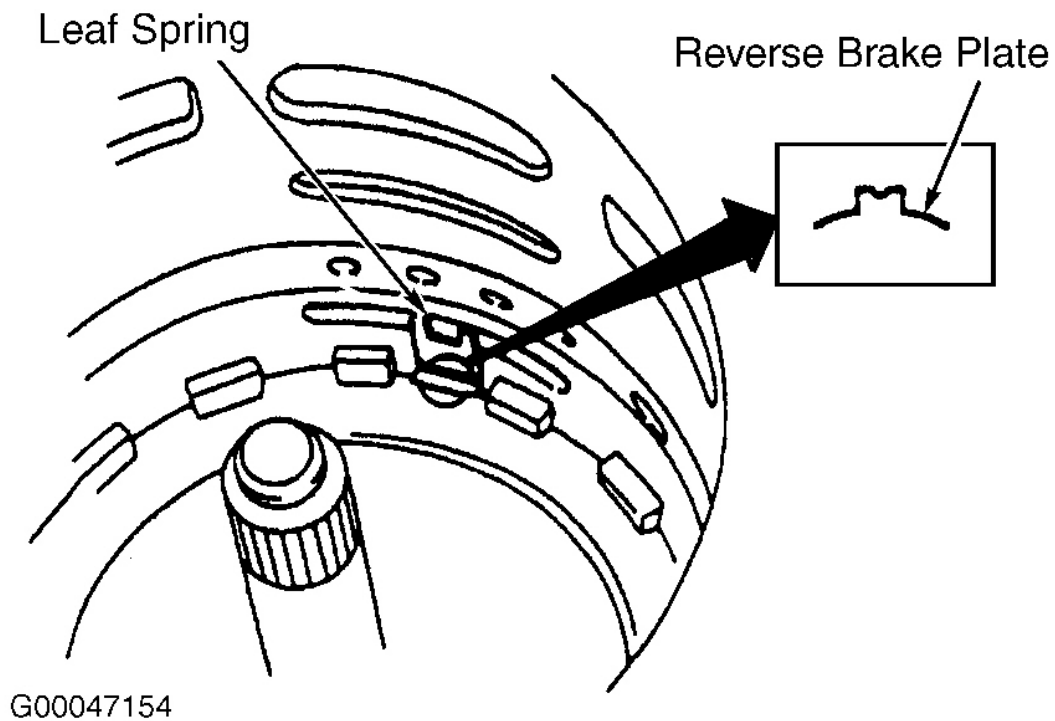


Fig. 50: Installing Planetary Gear Assembly
Courtesy of SUZUKI OF AMERICA CORP.

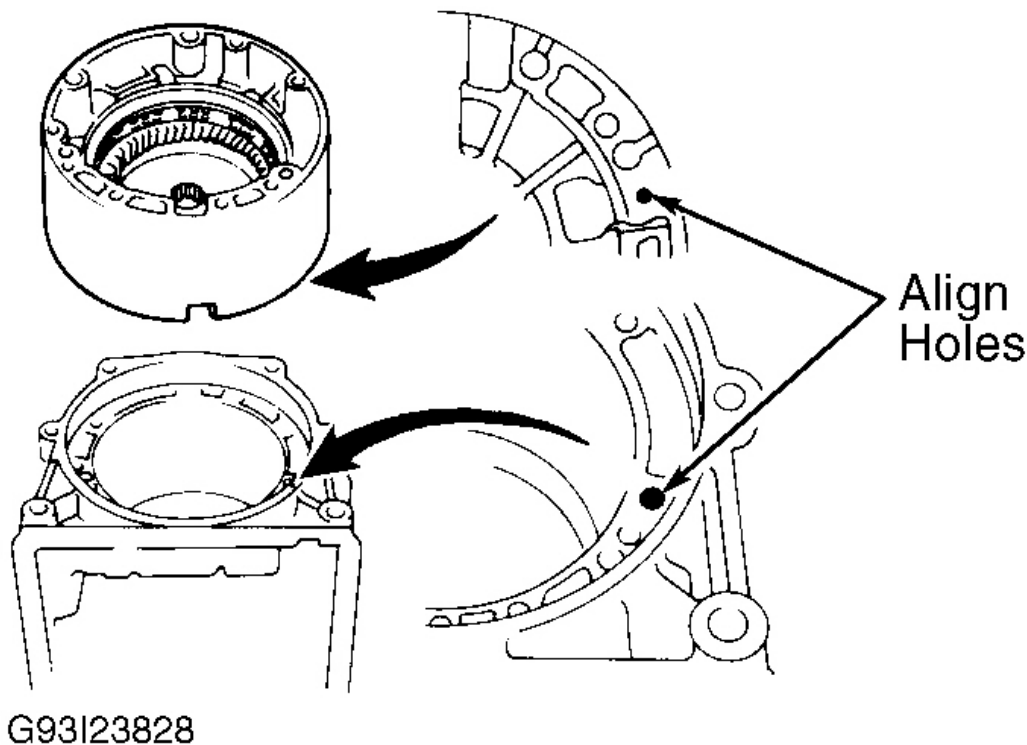


Fig. 51: Aligning OD Case & Transmission Case Oil Holes
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. Install OD planetary gear assembly with OD direct clutch and OD one-way clutch. Rotate and push OD planetary gear to mesh splines with flukes of discs. Ensure thrust washer does not fall during installation. Using calipers and appropriate straightedge, measure distance between top of case and OD clutch drum. See **Fig. 8** . Distance should be equal to measurement recorded during disassembly.
9. Install "O" ring on OD case. Install torque converter housing onto transmission case. Install bolts and tighten to specification. See **TORQUE SPECIFICATIONS** . Install thrust bearing onto rear of oil pump. Ensure oil seal rings and "O" ring are installed on oil pump.
10. Install oil pump into transmission case. Ensure thrust bearing does not fall off oil pump. Coat oil pump retaining bolts below bolt heads with thread sealer. Install bolts and tighten to specification. Ensure input shaft turns freely. Using a dial indicator, check output shaft end play. Position dial indicator against end of output shaft. End play should be .012-.035" (.30-.90 mm).
11. Apply air pressure to specified oil passages to check appropriate operating components. See **Fig. 14** . Component application should be heard while applying air. Install NEW oil seals in transmission case. Lubricate oil seal lips prior to installation. Install NEW spacer on manual valve lever. Install manual valve shaft into case and through manual valve lever. Install NEW pin with slot at right angle to shaft. See **Fig. 7** .
12. Align spacer hole to hollow area of lever. Stake spacer to lever. Ensure manual valve shaft turns

smoothly. Install parking lock pawl, pivot pin and spring into transmission case. Install lock rod on manual valve lever and install parking lock pawl. Install parking pawl bracket onto transmission case. Ensure collar on control rod is toward front of transmission. Tighten bracket bolts to specification. See **TORQUE SPECIFICATIONS** .

13. Check operation of park lock pawl. Ensure output shaft is locked when manual valve lever is in Park. Determine proper accumulator piston locations. See **Fig. 6** . Ensure accumulator piston is proper diameter. See **ACCUMULATOR PISTON DIAMETER** table. Determine proper spring free length and outer diameter for accumulator piston application. See appropriate ACCUMULATOR SPRING SPECIFICATIONS table.

ACCUMULATOR PISTON DIAMETER ⁽¹⁾

Application	Diameter - In. (mm)
Forward & Direct Clutch	1.252-1.254 (31.80-31.85)
No. 2 Brake	1.370-1.372 (34.80-34.85)
(1) See illustration for accumulator piston locations. See Fig. 6 .	

ACCUMULATOR SPRING SPECIFICATIONS (GRAND VITARA)⁽¹⁾

Application	Free Length - In. (mm)
Forward Clutch Spring	
Upper	2.546 (64.68)
Lower	N/A
No. 2 Brake Spring	
Upper	2.135 (58.80)
Lower	1.383 (35.13)
Direct Clutch Spring	
Upper	1.715 (43.56)
Lower	1.213 (30.80)
(1) See illustration for accumulator piston locations. See Fig. 6 .	

ACCUMULATOR SPRING SPECIFICATIONS (SPORTAGE & TRACKER)⁽¹⁾

Application	Free Length - In. (mm)
Forward Clutch Spring	
Upper	2.251 (57.18)
Lower	1.161 (29.49)
No. 2 Brake Spring	
Upper	2.172 (55.18)
Lower	1.383 (35.13)
Direct Clutch Spring	⁽²⁾ 2.172 (55.18)

- (1) See illustration for accumulator piston locations. See **Fig. 6** .
- (2) On Tracker, free length is 1.667" (42.35 mm).

ACCUMULATOR SPRING SPECIFICATIONS (VITARA)⁽¹⁾

Application	Free Length - In. (mm)
Forward Clutch Spring	
Upper	2.546 (64.68)
Lower	N/A
No. 2 Brake Spring	
Upper	2.172 (55.18)
Lower	1.383 (35.13)
Direct Clutch Spring	
Upper	
1.6L	2.410 (61.21)
2.0L	2.355 (59.82)
Lower	N/A
(1) See illustration for accumulator piston locations. See Fig. 6 .	

14. Install accumulator pistons and springs. Ensure accumulator pistons are pressed fully into bore. Install NEW "O" rings on throttle cable fitting. Install throttle cable. Align manual valve with pin on manual valve lever. Connect throttle cable to cam. Install valve body assembly and valve body bolts in proper position. See **Fig. 4** . Tighten valve body bolts to specification. See **TORQUE SPECIFICATIONS** .
15. Install gasket and oil strainer. Tighten bolts to specification. Using a plastic hammer, install oil tubes. See **Fig. 5** . DO NOT bend or damage oil tubes. Install magnets in oil pan. Ensure magnets do not interfere with oil tubes. Install NEW oil pan gasket to transmission case. Align gasket with transmission case. Install oil pan bolts and tighten to specification.
16. Install speed sensor rotor and snap ring. Install extension housing with NEW gasket. Install extension housing bolts and tighten to specification. See **TORQUE SPECIFICATIONS** .
17. Fully turn manual valve shaft forward and return 2 notches. Install TR switch on manual valve shaft and temporarily tighten adjusting bolt. Install lock washer and set nut. Torque set nut to 35 INCH lbs. (4 N.m). Bend over at least 2 washer tabs.
18. With Neutral reference line and cut-out on TR switch aligned, tighten switch retaining bolt to 44 INCH lbs. (5 N.m).
19. Install control shaft lever with spring washer and nut. Tighten nut to 115 INCH lbs. (13 N.m). Install wire harness and throttle cable clamp. Install torque converter. Ensure torque converter is installed correctly. Using a straightedge and calipers, measure torque converter depth. See **TORQUE CONVERTER INSTALLED DEPTH SPECIFICATIONS** table. See **Fig. 52** .

TORQUE CONVERTER INSTALLED DEPTH SPECIFICATIONS

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2000 Chevrolet Tracker

2000 AUTOMATIC TRANSMISSIONS Aisin Warner AW03-72LE & AW03-73LE Overhaul

Application	(1) Distance - In. (mm)
Grand Vitarā	.685 (17.40)
Sportage & Tracker	.669 (17.00)
Vitarā	
1.6L	.846 (21.50)
2.0L	.681 (17.30)
(1) See Fig. 52 .	

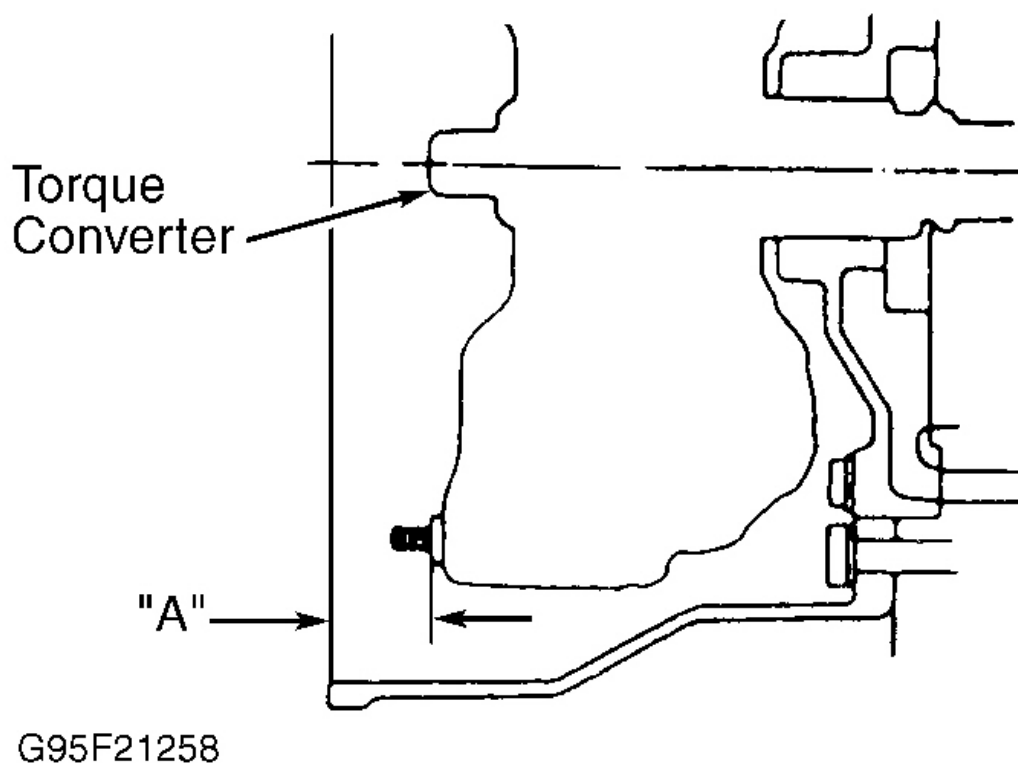


Fig. 52: Measuring Torque Converter Installed Depth
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)

2000 Chevrolet Tracker

2000 AUTOMATIC TRANSMISSIONS Aisin Warner AW03-72LE & AW03-73LE Overhaul

Center Support-To-Case Bolt	19 (26)
Cooler Union Nut	26 (35)
Drain Plug	17 (23)
Extension Housing-To-Case Bolt	
1.6L	26 (35)
2.0L & 2.5L	31 (42)
Front Drive Shaft Bolts and Nuts (4WD Models)	37 (50)
Oil Pump-To-Case Bolt	16 (22)
Torque Converter-To-Drive Plate Bolt	
Grand Vitara, Tracker & Vitara	48 (65)
Sportage	20 (27)
Transmission Case-To-Converter Housing Bolt	
10-mm	25 (34)
12-mm	42 (57)
Transmission Mounting Bolt	37 (50)
INCH Lbs. (N.m)	
Control Shaft Lever Bolt	115 (13)
Lock Pawl Bracket Bolt	66 (7.5)
Oil Pan Bolt	40 (4.5)
Oil Pump Housing Bolt	80 (9)
Oil Strainer Bolt	49 (5.5)
Park/Neutral Position Switch	
Shift Shaft Set Nut	35 (4)
Shift Switch Lock Bolt	44 (5)
Shift Solenoid Bolt	89 (10)
TCC Solenoid Valve Bolt	44 (5)
Throttle Cam Bolt	71 (8)
Upper Valve Body-To-Lower Valve Body Bolt	49 (5.5)
Valve Body Assembly-To-Case Bolt	89 (10)

TRANSMISSION SPECIFICATIONS**TRANSMISSION SPECIFICATIONS**

Application	In. (mm)
Oil Pump	
Gear Side Clearance	
Standard	.0028-.0059 (.070-.150)
Maximum	.0118 (.300)
Gear Tip Clearance	
Standard	.0043-.0055 (.110-.140)
Maximum	.0118 (.300)

2000 Chevrolet Tracker

2000 AUTOMATIC TRANSMISSIONS Aisin Warner AW03-72LE & AW03-73LE Overhaul

Gear-To-Housing Clearance	
Standard	.0008-.0019 (.020-.050)
Maximum	.0039 (.10)
OD Brake Snap Ring-To-Flange Clearance	
Grand Vitara	.016-.054 (.40-1.38)
Sportage & Tracker	.014-.075 (.36-1.91)
Vitara	.022-.054 (.56-1.38)
Output Shaft End Play	.012-.035 (.30-.89)
Piston Stroke	
Forward Clutch	.055-.088 (1.40-2.24)
OD Direct Clutch	.058-.090 (1.47-2.28)
No. 1 Brake	
Grand Vitara/Vitara	.039-.047 (1.00-1.20)
Except Grand Vitara/Vitara	.025-.068 (.64-1.73)
No. 2 Brake	.040-.089 (1.02-2.26)
Direct Clutch	.008-.069 (.20-1.75)
Grand Vitara	.036-.078 (.91-1.99)
Sportage & Tracker	.008-.069 (.20-1.75)
Vitara	.042-.084 (1.06-2.14)
Reverse Brake Pack Clearance	
Grand Vitara	.024-.103 (.61-2.64)
Sportage & Tracker	.029-.098 (.74-2.49)
Vitara	
1.6L	.088-.090 (.56-2.29)
2.0L	.024-.103 (.61-2.64)
Torque Converter Depth	
Grand Vitara	.685 (17.40)
Sportage & Tracker	.669 (17.00)
Vitara	
1.6L	.846 (21.50)
2.0L	.681 (17.30)