

2000 AUTOMATIC TRANSMISSIONS

Suzuki ECC 3-Speed Overhaul

APPLICATION

AUTOMATIC TRANSAXLE APPLICATIONS

Application	Transaxle Model (RPO Code)
Metro & Firefly (Canadian)	ECC (M60)
Suzuki Swift	ECC

IDENTIFICATION

Vehicle Identification Number (VIN) is used for correct application of component parts and assemblies. VIN location is at top left of instrument panel. Transaxle identification tag is attached to side of transaxle case.

GEAR RATIOS

TRANSAXLE GEAR RATIOS

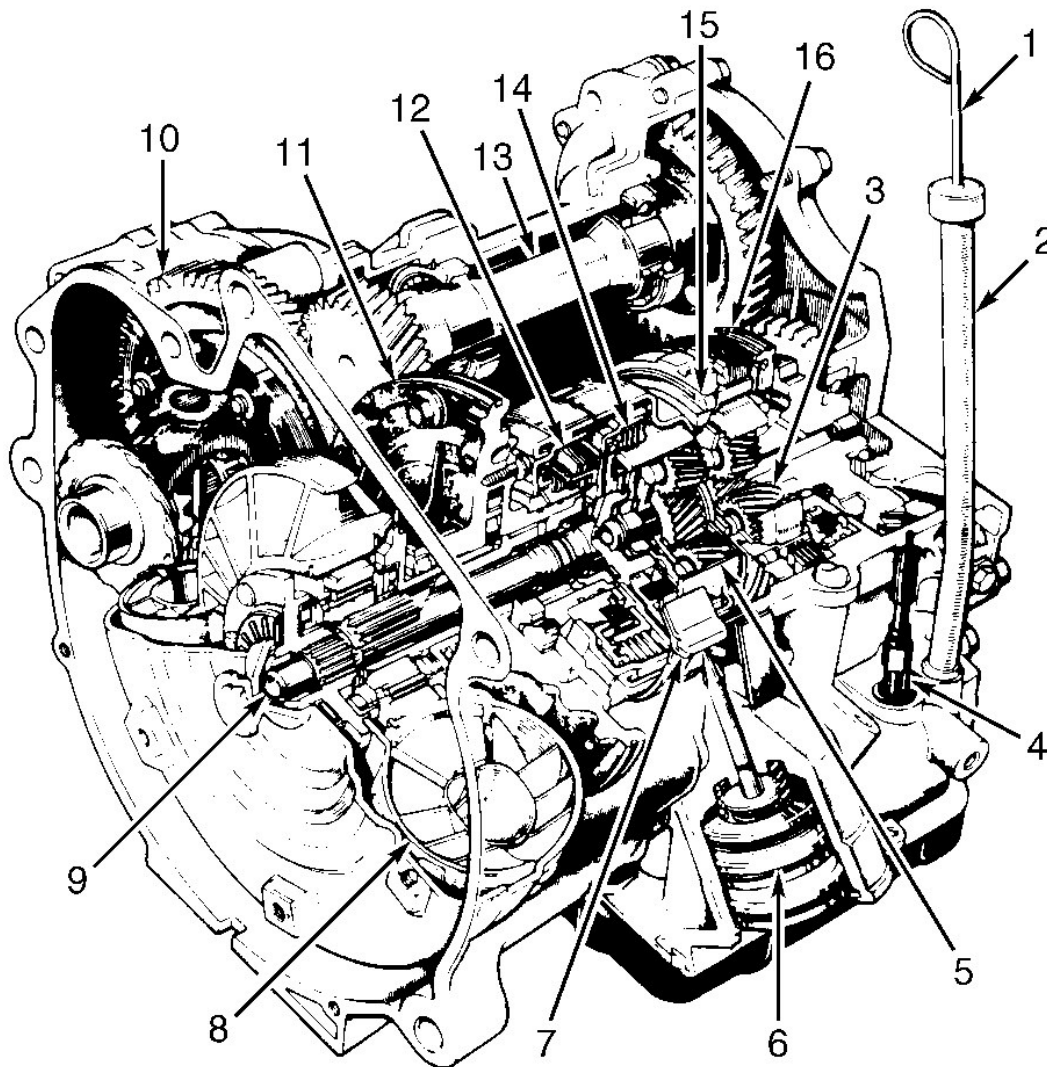
Gear Range	Gear Ratio
1st	2.810:1
2nd	1.549:1
3rd	1.000:1
Reverse	2.296:1

DESCRIPTION & OPERATION

NOTE: For electronic diagnosis information, see appropriate **ELECTRONIC CONTROLS** article.

Unit is a 3-speed electronically controlled automatic transaxle with a hydraulic torque converter, countershaft and differential. The transaxle features 2 planetary gears, 2 disc clutches, one band brake, one disc brake and one one-way clutch. See **Fig. 1**.

Transaxle is equipped with shift and key interlock systems. Shift interlock system prevents selector lever movement from "P" position unless brake pedal is depressed and accelerator is in idle position. In case of a malfunction, selector lever can be released by depressing button on rear of shifter console. Key interlock system prevents ignition key from being removed from ignition lock assembly unless selector lever is in "P" position.



- | | |
|-------------------------------|-----------------------|
| 1. Oil Level Gauge | 9. Input Shaft |
| 2. Oil Filler Tube | 10. Differential |
| 3. Rear Planetary Gear | 11. Oil Pump |
| 4. Oil Pressure Control Cable | 12. Direct Clutch |
| 5. Front Planetary Gear | 13. Countershaft |
| 6. 2nd Brake Piston Cover | 14. Forward Clutch |
| 7. 2nd Brake Band | 15. One-Way Clutch |
| 8. Torque Converter | 16. 1st-Reverse Brake |

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Fig. 1: Cross-Sectional View Of Automatic Transaxle
 Courtesy of SUZUKI OF AMERICA CORP.

LUBRICATION

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

RECOMMENDED FLUID

Manufacturer recommends Dexron-II ATF.

FLUID CAPACITIES

TRANSAXLE FLUID CAPACITIES

Drain & Refill - Qts. (L)	(1) Dry Fill - Qts. (L)
1.6 (1.5)	5.2 (4.9)
(1) Includes torque converter.	

ON-VEHICLE SERVICE

The following components can be serviced on the vehicle:

- Throttle Valve Cable
- Valve Body Assembly
- Drive Axles
- Oil Pan & Oil Strainer
- Transmission Range Switch

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

TROUBLE SHOOTING

PRELIMINARY INSPECTION

Troubles occurring with electronically controlled transaxles can be caused by engine, electronic control system or transaxle. It is necessary to isolate these 3 areas before proceeding with trouble shooting.

SYMPTOM DIAGNOSIS

Harsh Engagement In Forward Gears

Check fluid level, T.V. cable adjustment, shift cable adjustment, valve body, accumulators and fluid pressure.

Slips In 1st Gear

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Check fluid level, T.V. cable adjustment, shift cable adjustment, valve body, accumulators, forward clutch, one-way clutch and fluid pressure.

No Upshift From 1st Gear

Check T.V. cable adjustment, valve body, intermediate servo, 2nd brake band and fluid pressure.

Slipping Or Rough 1-2 Upshift

Check fluid level, T.V. cable adjustment, valve body, intermediate servo, 2nd brake band, torque converter, forward clutch and fluid pressure.

No 2-3 Shift Or 2-3 Shift Slipping

Check fluid level, T.V. cable, valve body, intermediate servo, 2nd brake band, torque converter, direct clutch and fluid pressure.

High Or Low Shift Points

Check fluid level, T.V. cable, valve body, torque converter, forward clutch, direct clutch and fluid pressure.

No Downshift At Part Throttle Or Delayed Downshift

Check T.V. cable adjustment, valve body, intermediate servo, 2nd brake band, 1st and reverse brake and one-way clutch.

No Engine Braking Or No 3-2-1 Manual Downshift

Check shift cable, valve body, intermediate servo, 2nd brake band, 1st and reverse brake and one-way clutch.

No Reverse Or Slips In Reverse

Check fluid level, shift cable adjustment, valve body, direct clutch and fluid pressure.

Vehicle Does Not Move In Any Gear

Check fluid level, shift cable, parking lock pawl, torque converter, valve body and fluid pressure.

CLUTCH & BAND APPLICATIONS

CLUTCH & BAND APPLICATIONS

Selector Lever Position	Elements In Use
"D" (Drive)	
1st Gear	Forward Clutch & One-Way Clutch
2nd Gear	Forward Clutch & 2nd Brake
3rd Gear	Forward Clutch & Direct Clutch

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"2" (Second)	
1st Gear	Forward Clutch & One-Way Clutch
2nd Gear	Forward Clutch & 2nd Brake
"L" (Low)	
1st Gear	Forward Clutch, 1st & Reverse Brake, & One-Way Clutch
2nd Gear ⁽¹⁾	Forward Clutch & 2nd Brake
"R" (Reverse)	Direct Clutch & 1st & Reverse Brake
"N" (Neutral)	No Elements In Use
"P" (Park)	1st & Reverse Brake
(1) In operation only when "L" range is selected and vehicle is moving more than 34 MPH.	

PERFORMANCE TESTS

ROAD TEST

CAUTION: Two persons (driver and technician) are suggested during road test. Ensure transaxle is at normal operating temperature. Road test should be conducted to properly diagnose condition of automatic transaxle. All shifts should be smooth, responsive and with no slippage or engine runaway. Slippage or engine runaway in any gear usually indicates clutch or band problems.

"D" Range Test

1. Shift into "D" range. Hold accelerator pedal constantly at fully closed throttle position. Check 1-2 and 2-3 upshift points. See appropriate SHIFT SPEEDS table. Stop vehicle. If no 1-2 upshift occurs, 1-2 shift valve, 2nd brake solenoid, PCM or circuit is defective. If no 2-3 upshift occurs, 2-3 shift valve, direct clutch solenoid, PCM or circuit is defective.
2. Operate vehicle at 15 MPH. Release accelerator completely. After 1-2 seconds, depress accelerator pedal fully. Check if downshift occurs from 2-1. Operate vehicle at 47 MPH. Release accelerator completely. After 1-2 seconds, depress accelerator pedal fully. Check if 3-2 downshift occurs. If no 2-1 or 3-2 downshift occurs, throttle position sensor, PCM or circuit is defective.

SHIFT SPEEDS (METRO & FIREFLY (CANADIAN))

Application & Shift	MPH
"D" Range	
Fully Closed Throttle	
1-2	11
2-3	19
3-2	9
2-1	9

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Wide Open Throttle	
1-2	38
2-3	70
3-2	60
2-1	25
"2" Range	
Fully Closed Throttle	
1-2	11
2-1	9
Wide Open Throttle	
1-2	38
2-1	25
"L" Range	
Fully Closed Throttle 2-1	36
Wide Open Throttle 2-1	36

SHIFT SPEEDS (SWIFT)

Application & Shift	MPH
"D" Range	
Fully Closed Throttle	
1-2	11
2-3	19
3-2	9
2-1	9
Wide Open Throttle	
1-2	40
2-3	73
3-2	70
2-1	36
"2" Range	
Fully Closed Throttle	
1-2	11
2-1	9
Wide Open Throttle	
1-2	40
2-1	36
"L" Range	
Fully Closed Throttle 2-1	36
Wide Open Throttle 2-1	36

TIME LAG TEST

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Test Precautions

Perform test at normal fluid operating temperature of 158-176°F (70-80°C). Allow one minute between tests to cool transaxle. Perform 3 measurements and take average value.

Test Procedure

Fully apply parking brake and check idling speed (with A/C off). Idle speed should be 600-800 RPM. Move selector lever from "P" to "R" position. Using stopwatch, measure time lag from moving shifting lever until shock is felt. In same manner, measure time lag of "R" to "D" shift. See **TIME LAG TEST SPECIFICATIONS** table.

TIME LAG TEST SPECIFICATIONS

Selector Lever Position	Approximate Time
"P" To "R"	1.4 Seconds
"R" To "D"	1.0 Second

Time Lag Test Results

If "P" to "R" time lag is longer than specified, line pressure is too low, direct clutch is worn and/or 1st and reverse brake is worn. If "R" to "D" time lag is longer than specified, line pressure is too low, forward clutch is worn and/or one-way clutch is faulty.

TORQUE CONVERTER

Stall Speed Test

CAUTION: DO NOT run engine continuously at stall speed for more than 5 seconds. Oil temperature may increase excessively high.

1. Object of test is to check overall performance of transaxle and engine by measuring stall speeds in "D" and "R" ranges. Perform test at normal operating temperature.
2. Connect engine tachometer. Apply parking brake. Block front and rear wheels. Start engine. Depress brake pedal.
3. Shift into "D" range. Fully depress accelerator pedal. Immediately note engine RPM. DO NOT perform test for more than 5 seconds. Stall speed should be 2300-2800 RPM. Perform same test in "R" range.
4. If stall speed is same for both ranges, but less than specified RPM, engine output may be insufficient or torque converter is defective.
5. If stall speed is same for both ranges, but greater than specified RPM, line pressure may be too low.
6. If stall speed in "D" range is greater than specifications, forward clutch may be slipping or one-way clutch is defective.
7. If stall speed in "R" range is greater than specifications, direct clutch is slipping or 1st and reverse brake is slipping.

HYDRAULIC PRESSURE TESTS

NOTE: Perform line pressure test when transmission fluid is at normal operating temperature. Ensure transaxle is not leaking. DO NOT run engine continuously at stall speed for more than 5 seconds.

1. With engine off, remove plug and connect oil pressure gauge to plug hole. See **Fig. 2**. Apply parking brake and block wheels. Start engine.
2. Apply brake and shift into "D" range. Depress accelerator. Note pressure readings at idle and stall speeds. Repeat test in "R" range. Compare pressure readings to those listed in **LINE PRESSURE SPECIFICATIONS** table.
3. Low pressure in both ranges indicates accelerator cable and/or T.V. cable may be out of adjustment, defective regulator valve, defective oil pump or defective valve body throttle valve.
4. High pressure in both ranges indicates accelerator cable and/or T.V. cable may be out of adjustment, defective regulator valve, or defective valve body throttle valve.
5. Low pressure in "D" range indicates "D" range oil circuit is leaking pressure or defective forward clutch. Low pressure in "R" range indicates "R" range oil circuit leaking pressure, defective direct clutch, or defective 1st and reverse brake. Reinstall plug and tighten to 80 INCH lbs. (9 N.m).

LINE PRESSURE SPECIFICATIONS

Application	Pressure - psi (kg/cm ²)
"D" Range	
Idle Speed ⁽¹⁾	40-65 (2.6-4.6)
Stall Speed ⁽²⁾	94-121 (6.6-8.5)
"R" Range	
Idle Speed ⁽¹⁾	94-128 (6.6-9.0)
Stall Speed ⁽²⁾	Over 189 (Over 13.3)
(1) 750 RPM.	
(2) 2300-2800 RPM.	

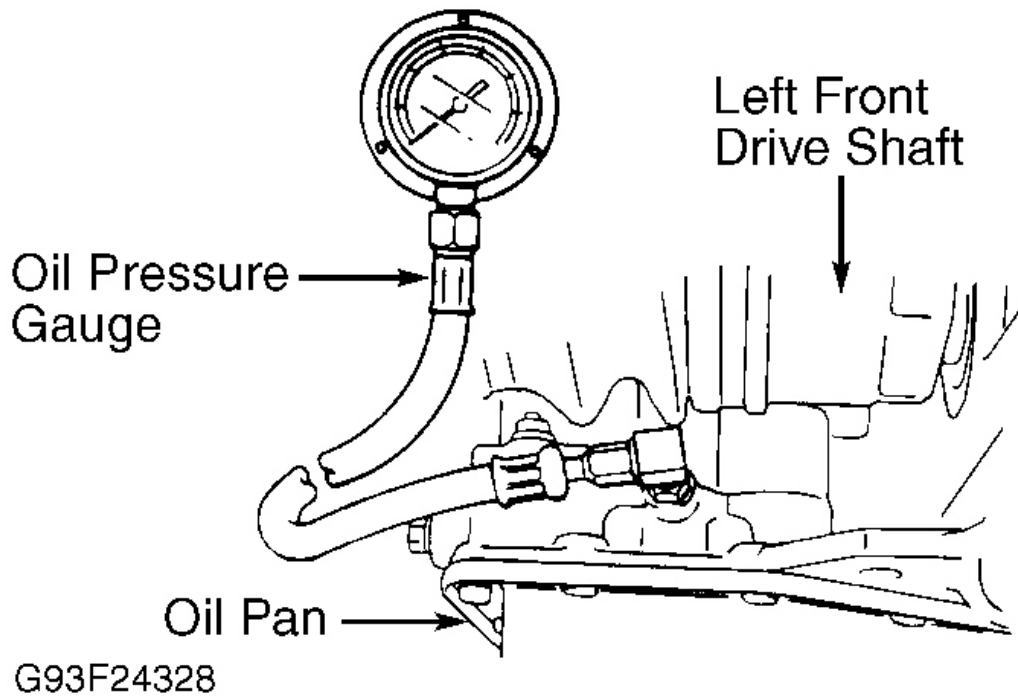


Fig. 2: Checking Line Pressure
Courtesy of SUZUKI OF AMERICA CORP.

ENGINE BRAKE TEST

1. While driving in "D" range, 3rd gear, shift down to "2" range and check engine braking effect. If there is no engine braking effect, 2nd brake is defective.
2. While driving in "D" range, 3rd gear, shift down to "L" range and check engine braking effect. If there is no engine braking effect, 1st and reverse brake is defective.

COMPONENT TESTS

TORQUE CONVERTER

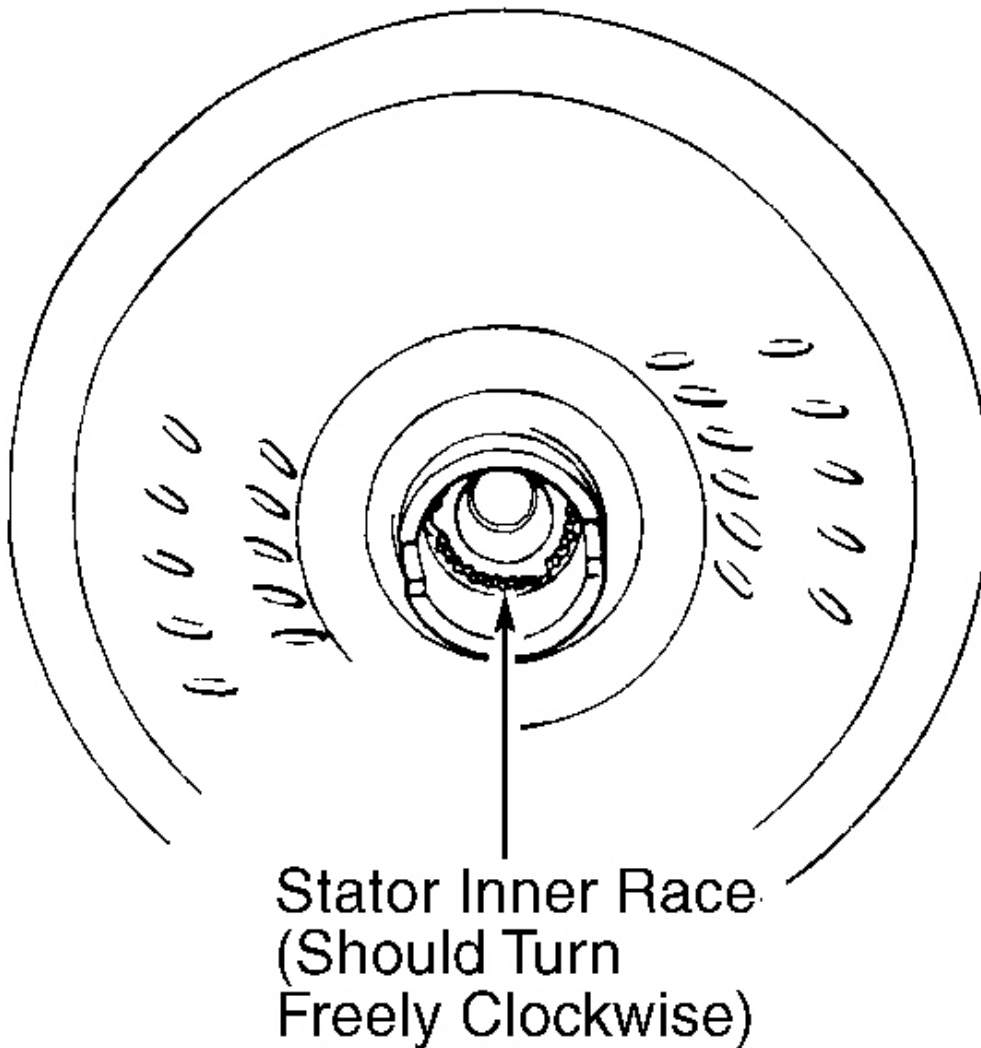
NOTE: The torque converter is a sealed unit and must be serviced as a complete unit. Torque converter and transaxle cooler must be thoroughly cleaned and flushed if transaxle is contaminated.

Stator Roller Clutch Test

1. Check stator roller clutch by inserting a finger into splined inner race of roller clutch and turning race in

both directions. See **Fig. 3**.

2. Inner race should turn freely clockwise and resist turning counterclockwise. Ensure torque converter flange is horizontal for proper checking.



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Fig. 3: Checking Stator Roller Clutch
Courtesy of SUZUKI OF AMERICA CORP.

REMOVAL & INSTALLATION

DRIVE AXLES

NOTE: See appropriate article in **DRIVE AXLES**.

OIL PAN & OIL STRAINER

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

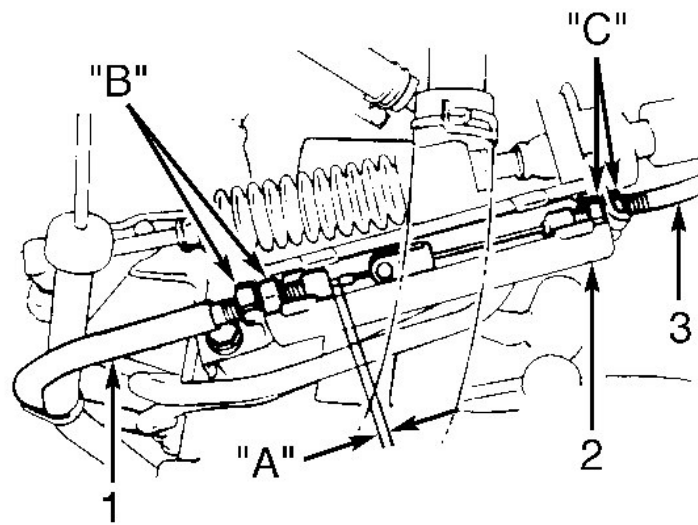
THROTTLE VALVE CABLE**Removal**

1. Remove cable cover. Remove T.V. cable from accelerator cable. Drain transmission fluid. Remove oil pan.
2. Remove cable from throttle valve cam. Remove cable from transaxle case.

NOTE: **T.V. cable can be disconnected from throttle valve cam without removal of 2nd brake solenoid.**

Installation

1. To install, reverse removal procedure. After connecting cable to accelerator cable, check and adjust cable free play. See **Fig. 4**.
2. With cable cover removed, adjust clearance "A" to specification by turning adjusting nuts "B". Adjusting nuts "C" can be used for adjustment (if necessary). Clearance is .040" (1.00 mm). On all models, tighten adjusting nuts and install cable cover.



1. Oil Pressure Control Cable
2. Cable Cover
3. Accelerator Cable

- "A" - Clearance
 "B" - Adjusting Nuts
 "C" - Adjusting Nuts

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Fig. 4: Adjusting Throttle Valve Pressure Control Cable
 Courtesy of SUZUKI OF AMERICA CORP.

TRANSMISSION RANGE SWITCH

Removal

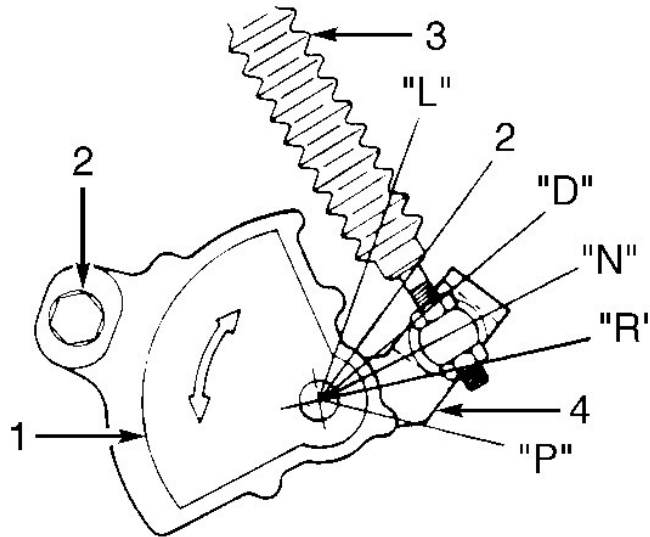
Disconnect harness connector. Remove mounting bolt and remove TR switch from transaxle. TR switch is not serviceable and must be replaced if faulty.

Installation

1. Place selector lever in "N" position. Using a flat-blade screwdriver, rotate TR switch joint full clockwise ("P" position). A "click" sound should be heard each time a gear position is selected. Next, rotate TR switch joint counterclockwise 3 clicks to obtain "N" position. See **Fig. 5**.
2. Install TR switch on manual shift shaft. Tighten TR switch mounting bolt to 10-17 ft. lbs. (14-23 N.m). Install harness connector. Check for proper installation. Apply parking brake and block vehicle wheels. Check the following:
 - With selector lever in "P" position, turn ignition switch to START position. Engine should start.
 - With selector lever in "N" position, turn ignition switch to START position. Engine should start.
 - With selector lever shifted from "N" to "L" and back to "N" position, turn ignition switch to

START position. Engine should start.

- Shift selector lever from "N" to "P" position. Check starter for operation.
- Ensure starter and ignition switch operate in "P" and "N" position.
- Without starting engine, turn ignition switch to ON position and shift selector lever to "R" position. Ensure back-up lights illuminate.



1. Transmission Range Switch
2. Bolt

3. Select Cable
4. Manual Shift Lever

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Fig. 5: Adjusting Transmission Range Switch
Courtesy of SUZUKI OF AMERICA CORP.

TRANSAXLE

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

VALVE BODY

Removal

1. Disconnect negative battery cable. Raise and support vehicle. Remove pan and drain fluid. Remove harness connectors from shift solenoids. Using screwdriver, gently pry off fluid pipes.
2. Disconnect T.V. cable from cam. Remove screen (filter). Remove valve body retaining bolts and remove valve body. If necessary, forward clutch and 2nd brake accumulators may be removed.

Installation

To install, reverse removal procedure. Install bolts in correct location. See **Fig. 6**. Tighten bolts in specified pattern. See **Fig. 7**. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**. Fill transaxle with appropriate fluid to proper level. See **LUBRICATION**.

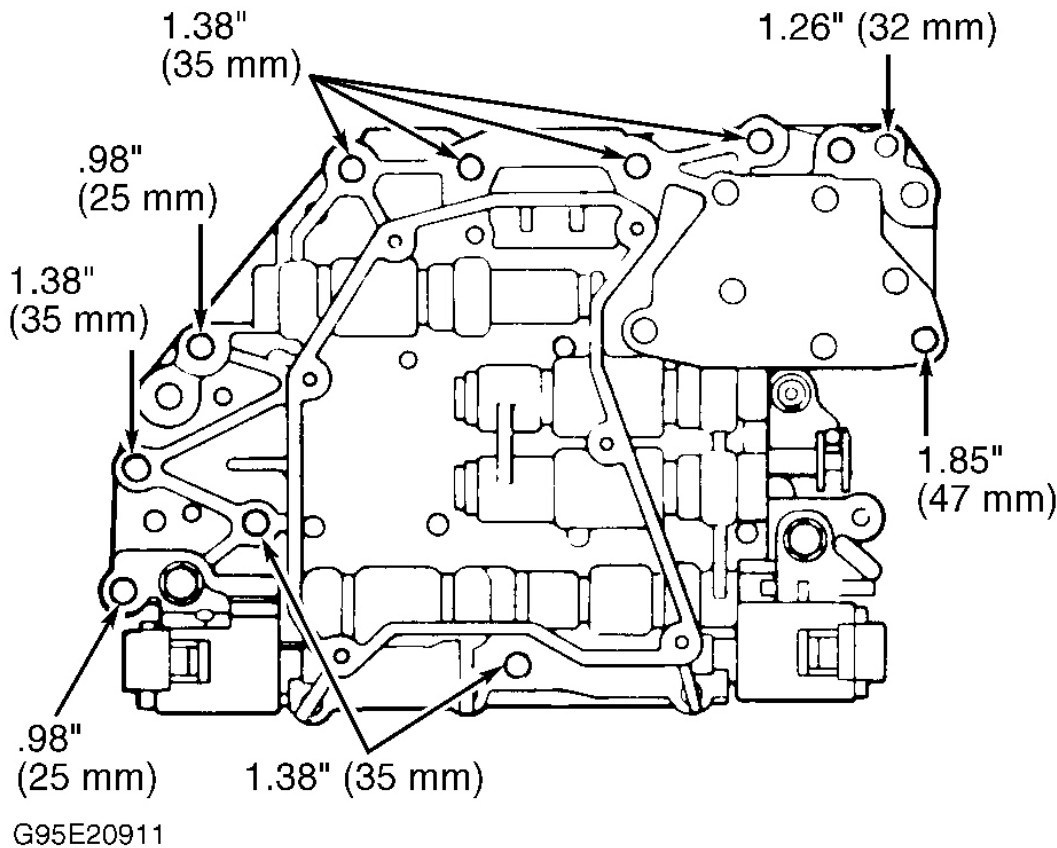
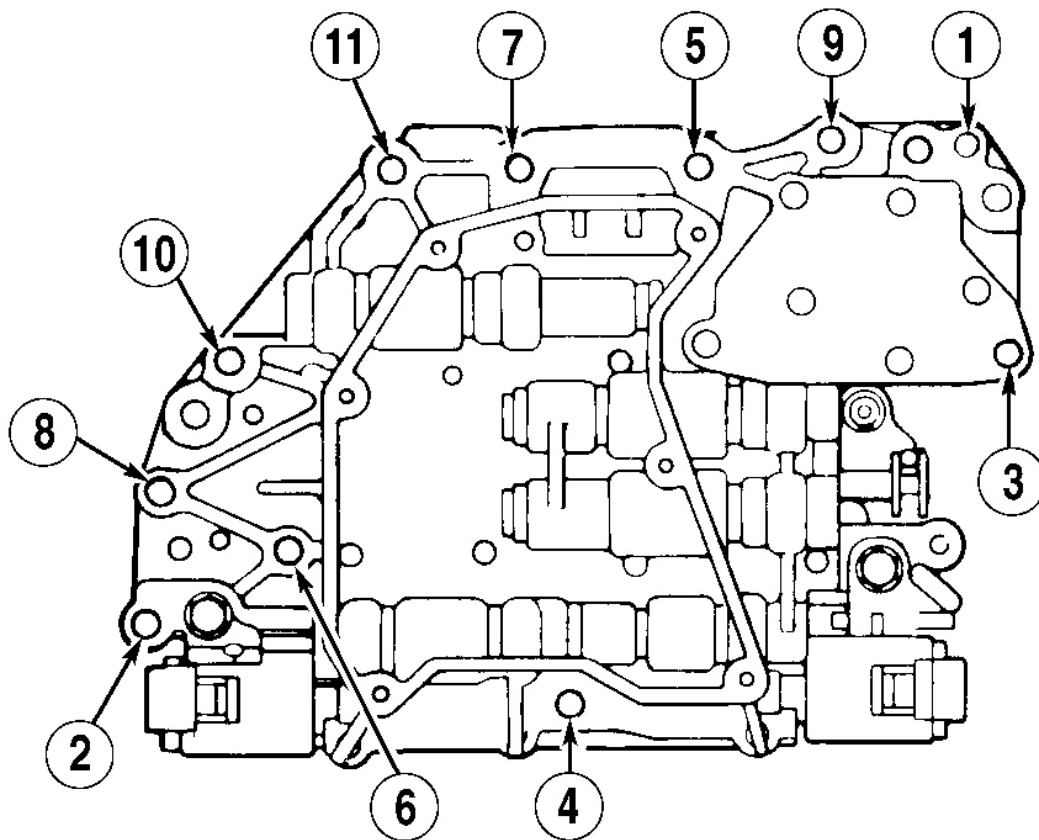


Fig. 6: Identifying Valve Body Bolts
Courtesy of SUZUKI OF AMERICA CORP.



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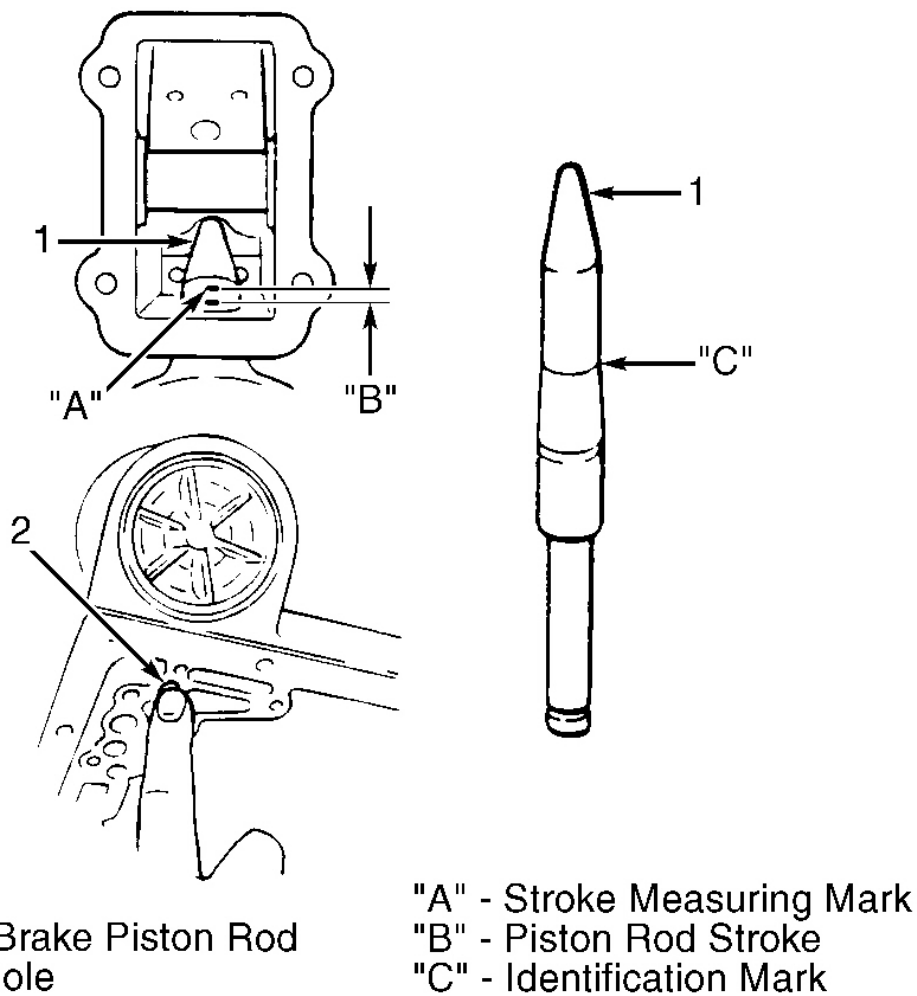
Fig. 7: Valve Body Bolt Tightening Sequence
Courtesy of SUZUKI OF AMERICA, CORP.

TRANSMISSION DISASSEMBLY

NOTE: Thoroughly clean transaxle exterior prior to disassembly. Use special care in handling aluminum components. **DO NOT** turn transaxle case over when removing oil pan. Turning transaxle will contaminate valve body with material from bottom of oil pan.

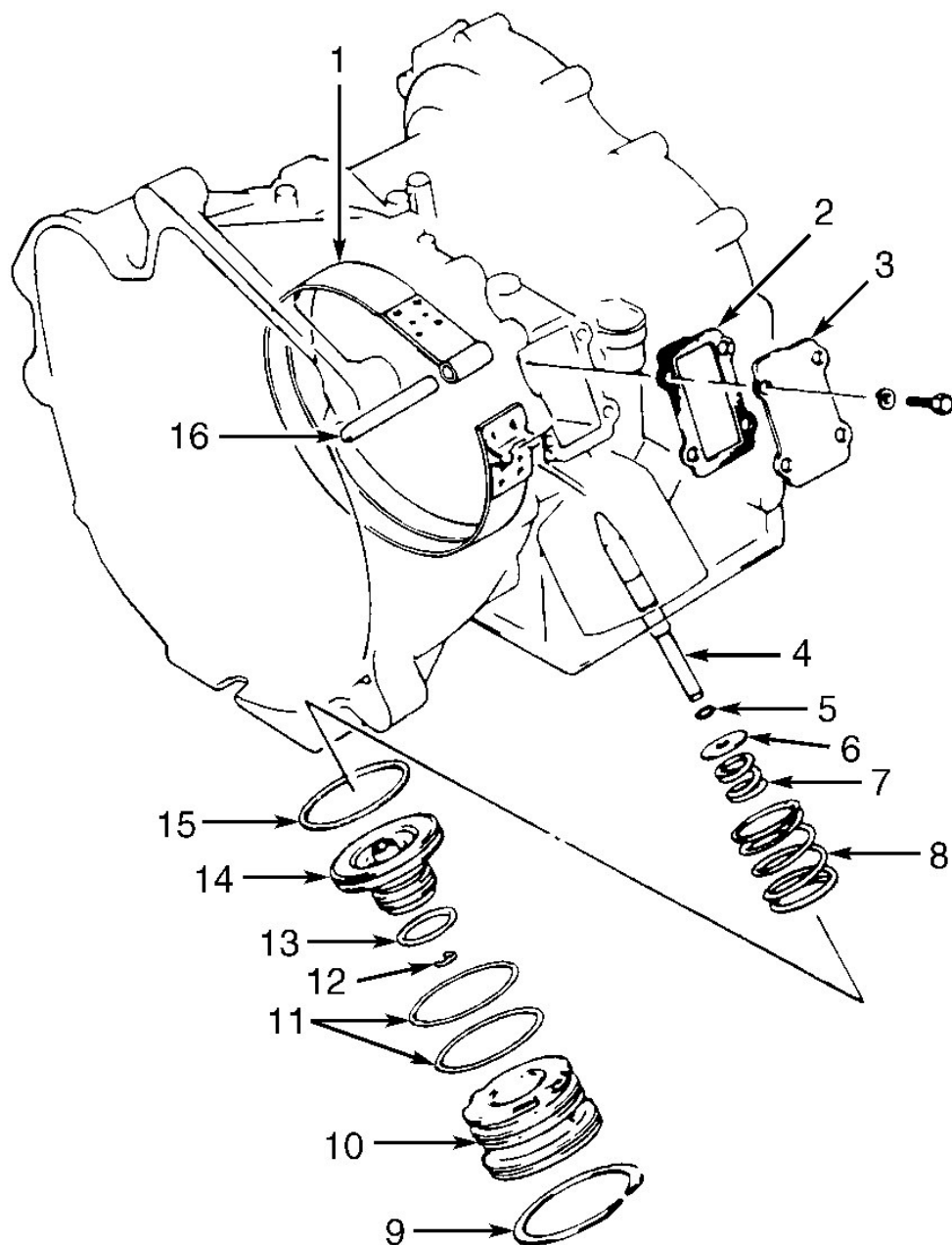
1. Remove torque converter. Remove engine mounting LH bracket. Remove oil level gauge and oil filler tube. Remove speedometer driven gear. Remove vehicle speed sensor. Remove PNP switch. Drain transmission fluid. Remove oil pan and gasket.
2. Remove direct clutch and 2nd brake solenoid connectors. Using a screwdriver, carefully pry 2 oil tubes from lower valve body. Remove cable from throttle valve cam. Remove oil strainer (filter). Remove 11 lower valve body bolts. Remove valve body assembly. Ensure manual valve does not drop when removing valve body.

3. Apply 15 psi (1 kg/cm²) of compressed air to apply hole (beside accumulator piston bore), and remove accumulator pistons into a shop towel. Remove pistons and springs. Remove 2nd brake band cover and gasket.
4. Check 2nd brake piston stroke. Scribe mark on piston rod. Apply compressed air into oil hole. Measure 2nd brake piston rod stroke. See **Fig. 8**. Piston stroke should be .060-.120" (1.52-3.05 mm). If piston stroke exceeds specification, inspect brake during disassembly.
5. Remove 2nd brake piston. Using valve spring compressor tool, push in piston cover. Remove snap ring. Remove 2nd brake piston cover and piston. See **Fig. 9**.



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Fig. 8: Measuring 2nd Brake Piston Rod Stroke
Courtesy of SUZUKI OF AMERICA CORP.



- | | |
|-------------------------------|---------------------------|
| 1. Second Brake Band | 9. Piston Cover Snap Ring |
| 2. Cover Gasket | 10. Piston Cover |
| 3. Cover | 11. Cover Seal ("O" Ring) |
| 4. Second Brake Piston Rod | 12. Retainer ("E" Ring) |
| 5. Piston Rod Seal ("O" Ring) | 13. Seal Ring |
| 6. Washer | 14. Second Brake Piston |
| 7. Brake Rod Spring | 15. Piston Seal |
| 8. Piston Spring | 16. Pin |

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Fig. 9: Exploded View Of 2nd Brake Piston
Courtesy of SUZUKI OF AMERICA CORP.

6. Remove solenoid wire hold plate nut. Remove 2 wire harness clamps on transaxle. Remove solenoid wire. Remove 6 oil pump bolts. Using 2 slide hammers, remove oil pump. Ensure 2nd brake piston and piston rod have been removed prior to oil pump removal to prevent damage of 2nd brake band.
7. Remove transaxle case housing while tapping lightly with a plastic hammer. Remove 2nd brake band pin. Remove direct and forward clutch together while holding input shaft. DO NOT lose ring gear race and bearing, which may sometimes stick to input shaft.
8. Remove direct clutch from input shaft. Remove 2nd brake band. Remove front planetary ring gear and bearing. Remove front planetary gear. Remove planetary sun gear and front planetary gear bearing.
9. Carefully remove one-way clutch snap ring. Remove one-way clutch and rear planetary gear. Remove rear planetary ring gear, ring gear bearing and washers.
10. Check 1st and reverse brake clearance. Measure clearance between snap ring and flange. Clearance should be .023-.075" (.58-1.91 mm). See **Fig. 10**. If clearance exceeds specification, inspect 1st and reverse brake discs and plates.
11. Remove 2 snap rings, 1st and reverse brake flange, discs, plates and damper. Remove differential gear. Remove 10 bolts and 2 nuts from rear cover. Remove rear cover by lightly tapping with a plastic hammer.
12. Unstake reduction driven gear lock nut. Place manual control lever in "P" position to lock output shaft. Carefully loosen nut so as not to damage reduction gear or parking lock pawl. Remove reduction gear.
13. Drive out countershaft with a plastic hammer. Drive out output shaft by pushing outer race of internal output shaft bearing. To prevent damage, DO NOT hit output shaft or shaft end.
14. Remove parking lock pawl shaft and spring. Remove parking lock pawl and sleeve. Remove detent spring and manual shift shaft. Push down return spring and remove snap ring. Remove return spring. Apply compressed air into case passage to remove 1st and reverse brake piston. Passage is beside clutch, in middle of case. If piston does not pop out with compressed air, use needle-nose pliers to remove.

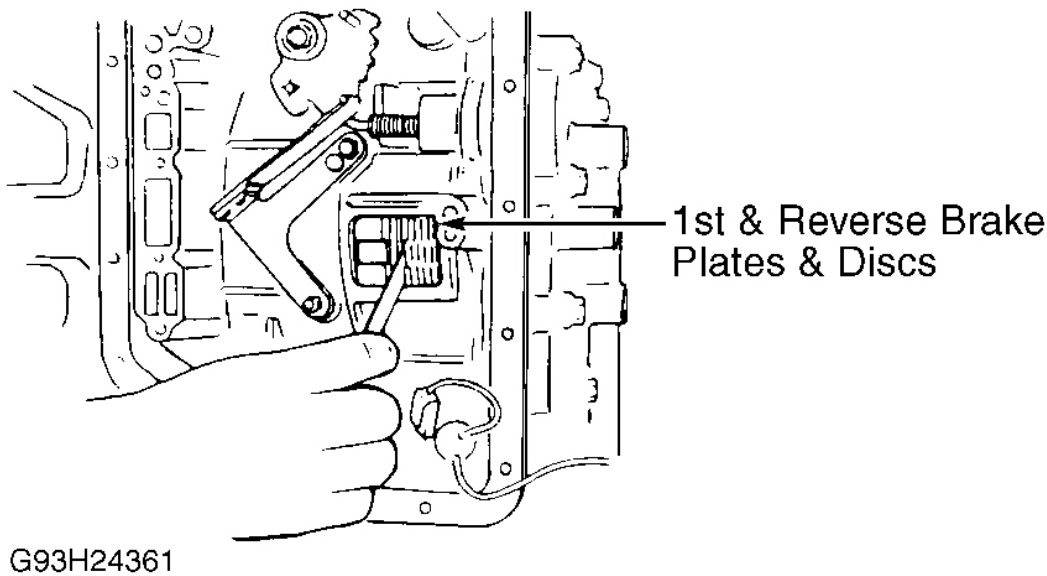


Fig. 10: Measuring 1st & Reverse Brake Clearance
Courtesy of SUZUKI OF AMERICA CORP.

COMPONENT DISASSEMBLY & REASSEMBLY

NOTE: Clean all parts with cleaning solvent and air dry. **DO NOT** use wiping cloths or rags to clean or dry parts. Soak new clutch discs and brake band in ATF for 2 hours or more before assembly. Apply ATF to sliding, rolling and thrust surfaces of all components. Replace all gaskets and "O" rings. Apply ATF to all "O" rings except oil pump cover seal. Replace oil seals that are removed. Apply grease to oil seal lips. Check each part for proper operation after installation.

OIL PUMP

Disassembly

Remove 2 oil pump cover seal rings. Remove oil pump cover seal. Remove 11 oil pump cover bolts. Remove cover. See **Fig. 11**. Remove torque converter hub seal.

Inspection

1. Check pump body oil seal for wear, damage or cracks. Replace oil seal (if necessary). Apply grease to oil seal lip when installing.
2. Check driven gear-to-pump body clearance. Push driven gear against pump body. Measure clearance between driven gear and pump body. See **Fig. 12**. Replace driven gear if clearance is not within specification. See **OIL PUMP CLEARANCE SPECIFICATIONS** table.

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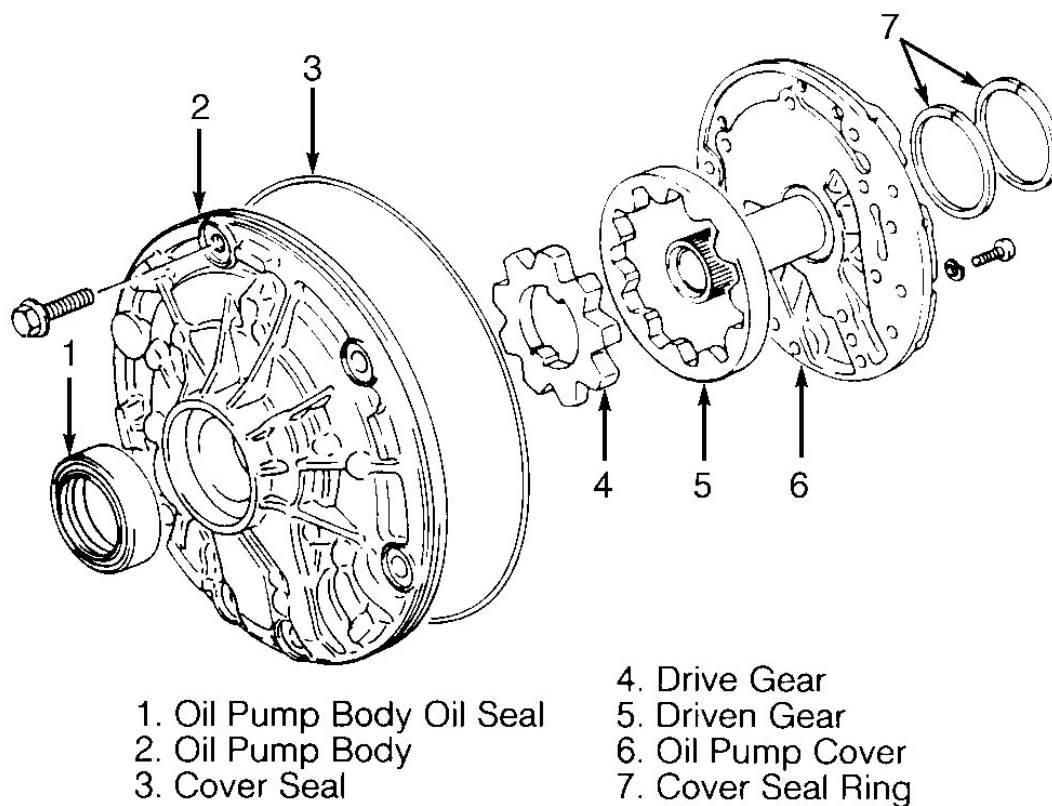
3. Measure tip clearance between both gears and crescent shaped part of pump body. See **Fig. 13**. Replace drive or driven gear if not within specification.
4. Using feeler gauge and straightedge, measure side clearance between drive and driven gears and pump body. See **Fig. 14**. Replace drive or driven gear if not within specification.

OIL PUMP CLEARANCE SPECIFICATIONS

Application	Thickness - In. (mm)
Driven Gear-To-Pump Body Clearance	
Standard	.0028-.0059 (.071-.150)
Maximum	.012 (.31)
Gear-To-Crescent Clearance	
Standard	.0043-.0055 (.109-.140)
Maximum	.012 (.31)
Gear Side Clearance	
Standard	.0008-.0020 (.020-.051)
Maximum	.0039 (.100)

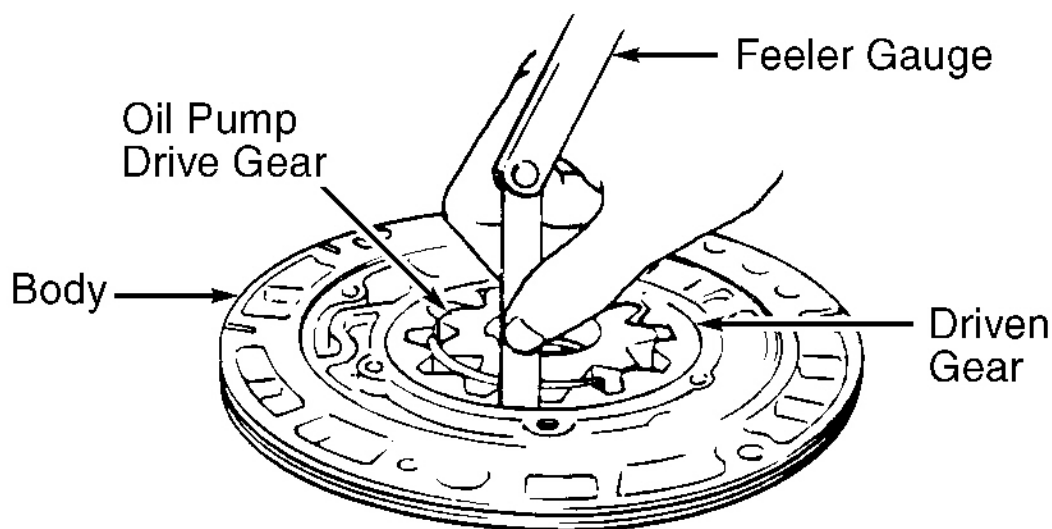
Reassembly

1. Install pump body oil seal. Apply grease to oil seal lip. Coat driven and drive gears with ATF. Install gears to pump body. Install pump cover to pump body. Tighten 11 pump cover bolts to 72-102 INCH lbs. (8.1-11.5 N.m).
2. Apply ATF to oil pump bushings and 2 seal rings. Install 2 oil pump cover seal rings. Apply grease to oil pump cover seal ("O" ring) and install. Check drive gear for smooth rotation.



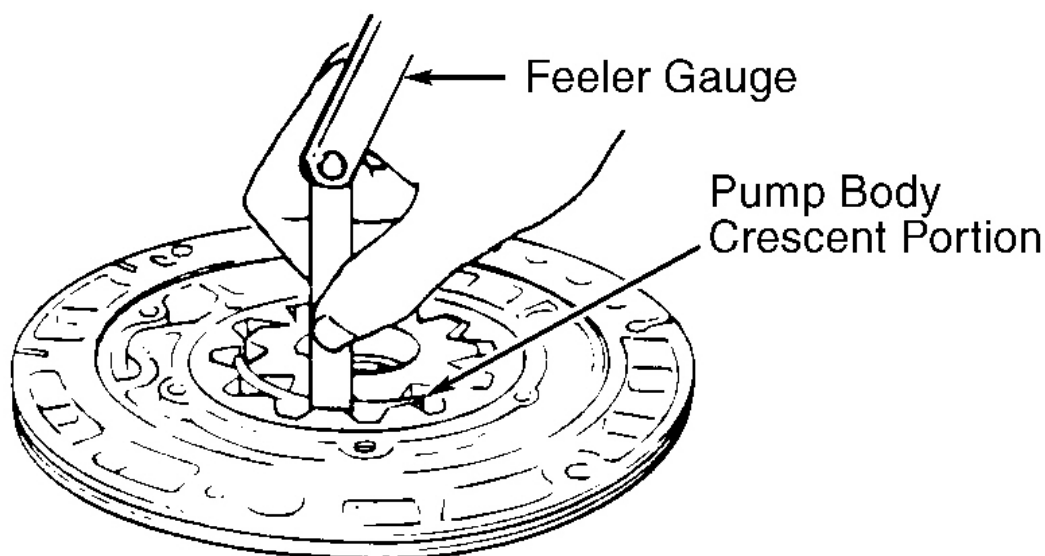
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Fig. 11: Exploded View Of Oil Pump
Courtesy of SUZUKI OF AMERICA CORP.



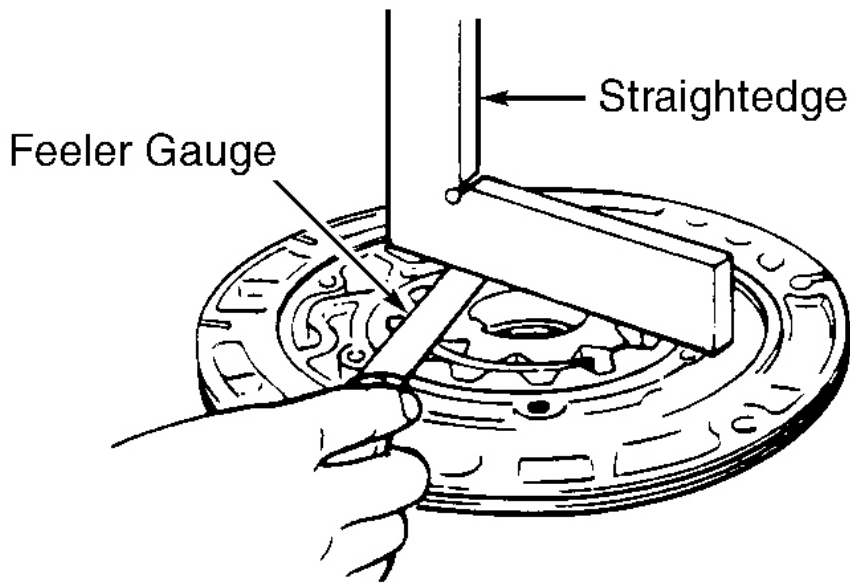
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Fig. 12: Checking Oil Pump Driven Gear Clearance
Courtesy of SUZUKI OF AMERICA CORP.



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Fig. 13: Checking Oil Pump Tip Clearance
Courtesy of SUZUKI OF AMERICA CORP.



NOTE: Press down on straightedge while measuring.

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Fig. 14: Checking Oil Pump Gear Side Clearance
Courtesy of SUZUKI OF AMERICA CORP.

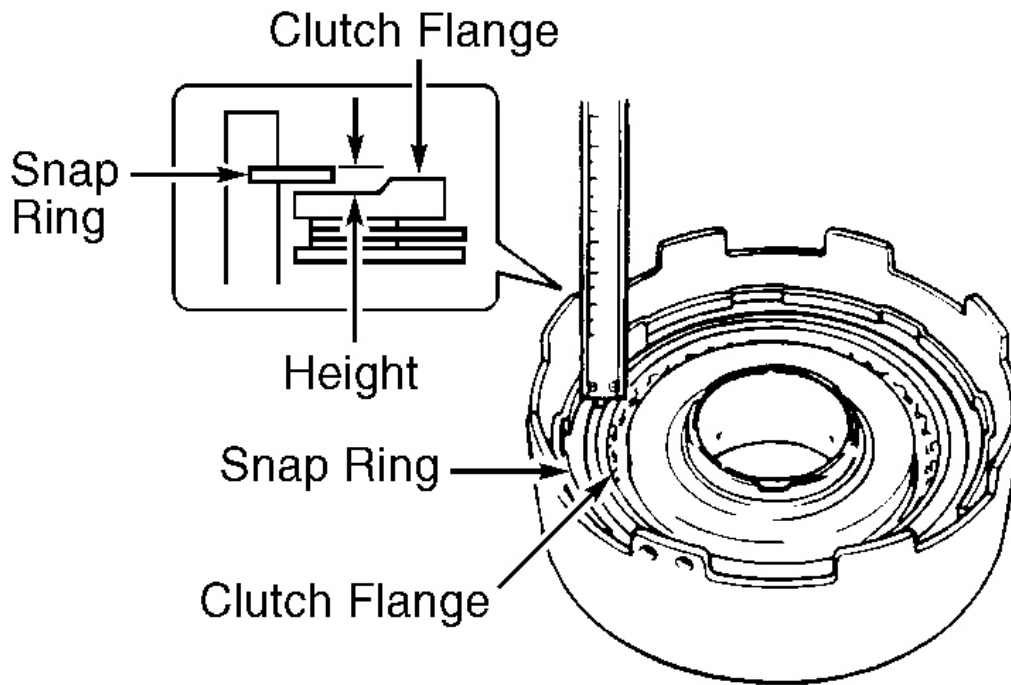
DIRECT CLUTCH

Disassembly

1. Measure height between snap ring and clutch flange. See **Fig. 15**. Clearance should be .098-.120" (2.49-3.05 mm). If clearance is not within specification, inspect clutch discs or plates. Replace as needed.
2. Remove clutch plate snap ring. Remove clutch flange, discs and plates. Using appropriate spring compressor, compress piston return springs and remove snap ring. See **Fig. 16**. Excessive compression may cause spring seat to become distorted.
3. Remove spring seat and return spring. Apply compressed air through clutch drum oil hole to remove piston. Remove inner seal from clutch drum and outer seal from piston.

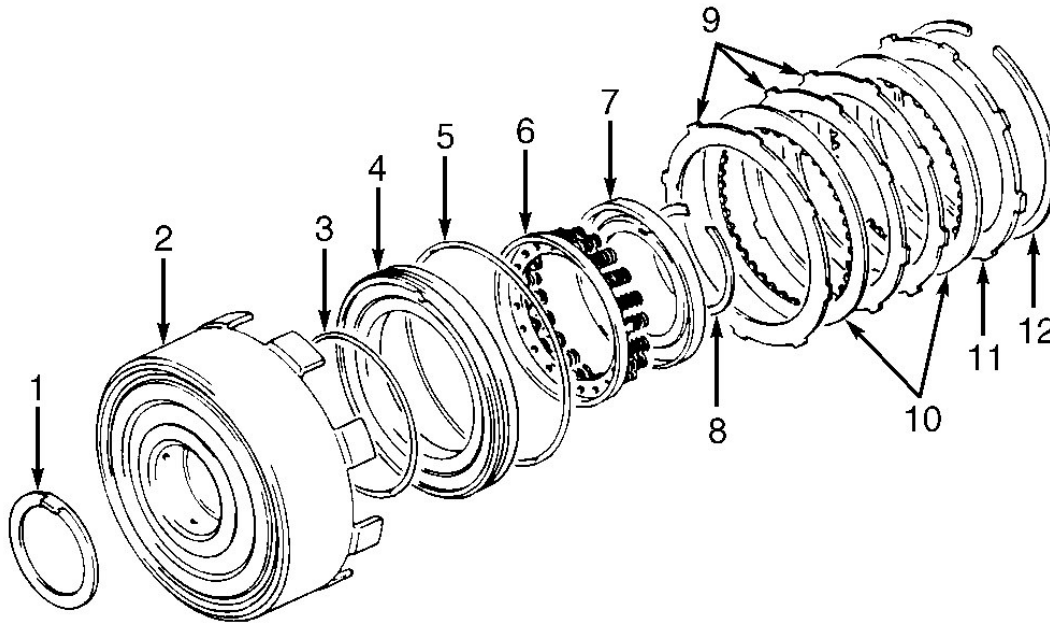
Inspection

Clean all parts with ATF. Dry all parts with compressed air. Ensure check ball is free in piston. Apply low pressure air to small hole in piston to check for air leakage around piston valve. If faulty, replace piston. Inspect discs and plates for wear or burnt areas.



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Fig. 15: Measuring Direct Clutch Clearance
Courtesy of SUZUKI OF AMERICA CORP.



1. Direct Clutch Washer
2. Direct Clutch Drum
3. Inner Seal
4. Direct Clutch Piston
5. Outer Seal
6. Return Spring Assembly

7. Return Spring Seat
8. Spring Seat Snap Ring
9. Clutch Plate
10. Clutch Disc
11. Clutch Flange
12. Clutch Plate Snap Ring

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Fig. 16: Exploded View Of Direct Clutch
 Courtesy of SUZUKI OF AMERICA CORP.

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

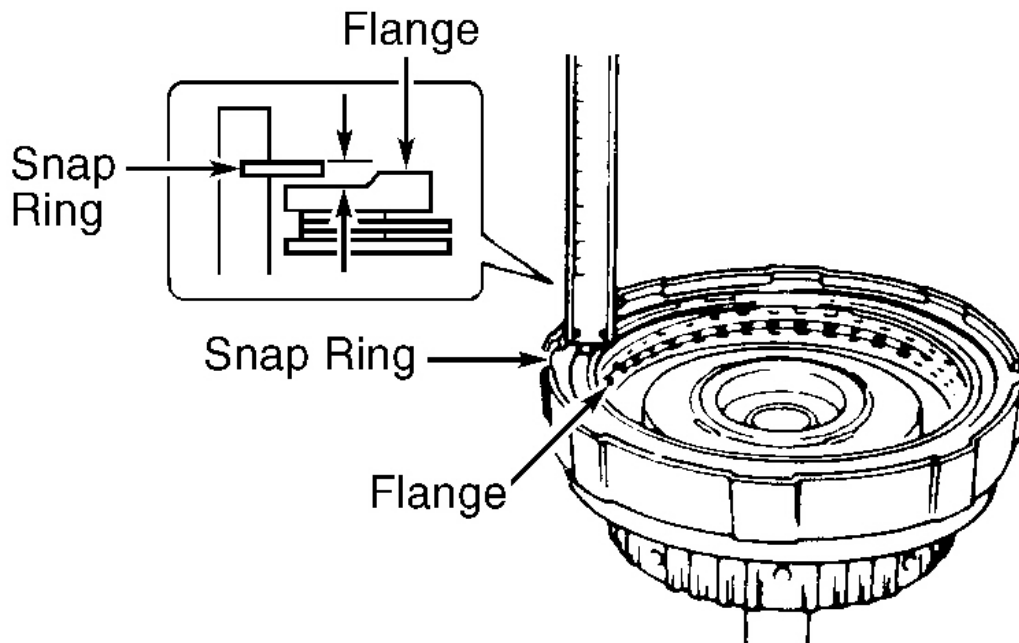
Reassembly

1. Apply ATF to new inner seal and install in clutch drum. Apply ATF to new outer seal and install on piston. Carefully install piston into clutch drum.
2. Install clutch return spring and seat. Compress return springs using spring compressor and an arbor press. Install snap ring. Ensure snap ring is securely fitted in 4 projections of spring seat.
3. Install in order: plate, disc, plate, plate, disc and flange. Install clutch plate snap ring. Measure height between snap ring and clutch flange. See **Fig. 15**. Clearance should be .098-.120" (2.49-3.05 mm). If height is not within specification, replace flange. Flange is available in 2 thicknesses: .118" (3.00 mm) and .133" (3.38 mm). Check piston for proper movement by applying low compressed air through oil hole in clutch drum.

FORWARD CLUTCH

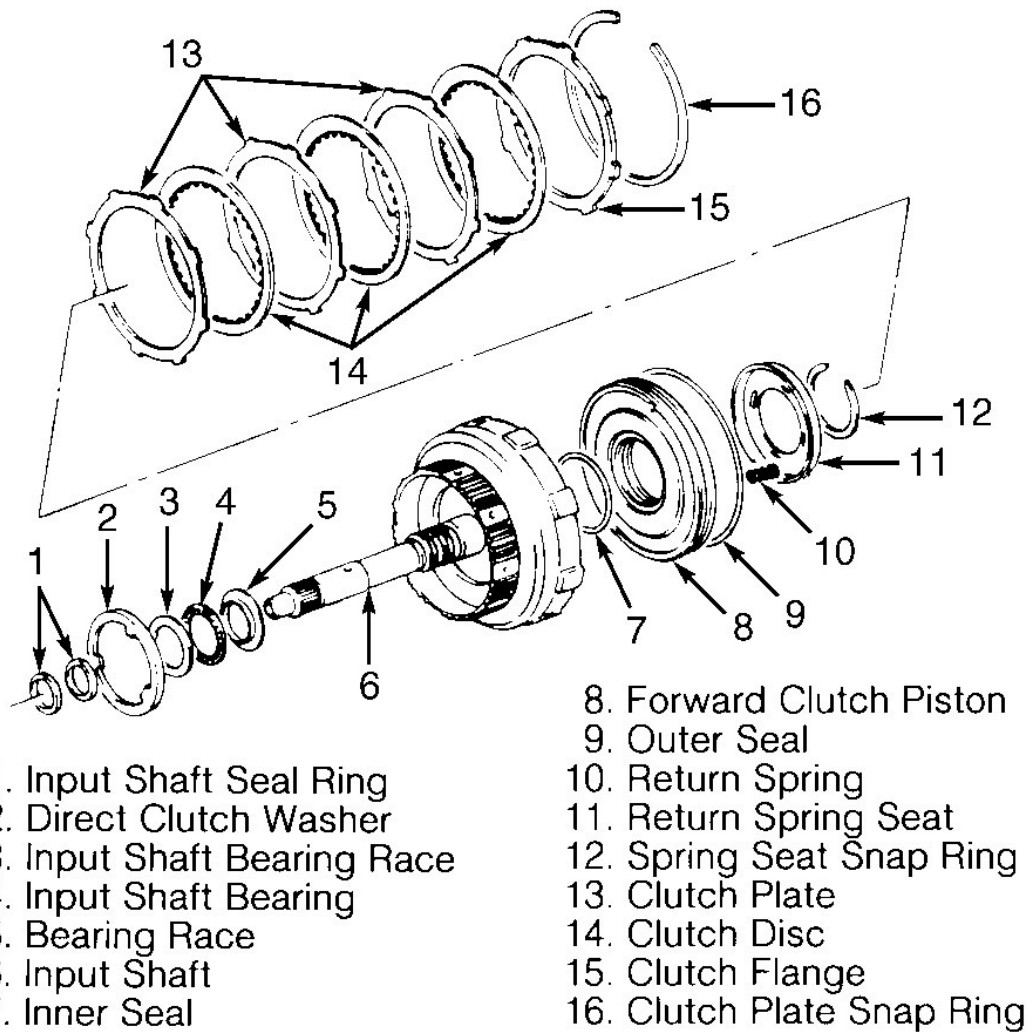
Disassembly

1. Measure height between snap ring and clutch flange. See **Fig. 17**. Standard clearance should be .079-.106" (2.01-2.69 mm). If clearance is not within specification, inspect clutch discs or plates. Replace as needed.
2. Remove clutch plate snap ring. Remove clutch flange, discs and plates. See **Fig. 18**. Using appropriate spring compressor, compress piston return springs and remove snap ring. Excessive compression may cause spring seat to become distorted.



G95F20912

Fig. 17: Measuring Forward Clutch Clearance
Courtesy of SUZUKI OF AMERICA CORP.



G93E24491

Fig. 18: Exploded View Of Forward Clutch
 Courtesy of SUZUKI OF AMERICA CORP.

3. Remove spring seat and return spring. Apply compressed air through input shaft oil hole to remove piston. Remove inner and outer seals from piston.

Inspection

Clean all parts with ATF. Dry all parts with compressed air. Ensure check ball is free in piston. Apply low pressure air to small hole in piston to check for air leakage around piston valve. If faulty, replace piston. Inspect discs and plates for wear or burnt areas.

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

reassembly.**Reassembly**

1. Apply ATF to new inner and outer seals. Install inner and outer seals to clutch piston. Carefully install piston into input shaft drum.
2. Install piston return springs and seat. Compress return springs using spring compressor and an arbor press. Install snap ring. Ensure snap ring is securely fitted in 4 projections of spring seat.
3. Install in order: plate, disc, plate, disc, plate, disc and flange. Install clutch plate snap ring. Measure height between snap ring and clutch flange. Clearance should be .079-.106" (2.01-2.69 mm). If height is not within specification, replace flange. Flange is available in 2 thicknesses: .118" (3.00 mm) and .133" (3.38 mm). Check piston for proper movement by applying compressed air through oil hole in input shaft.

VALVE BODY**Disassembly**

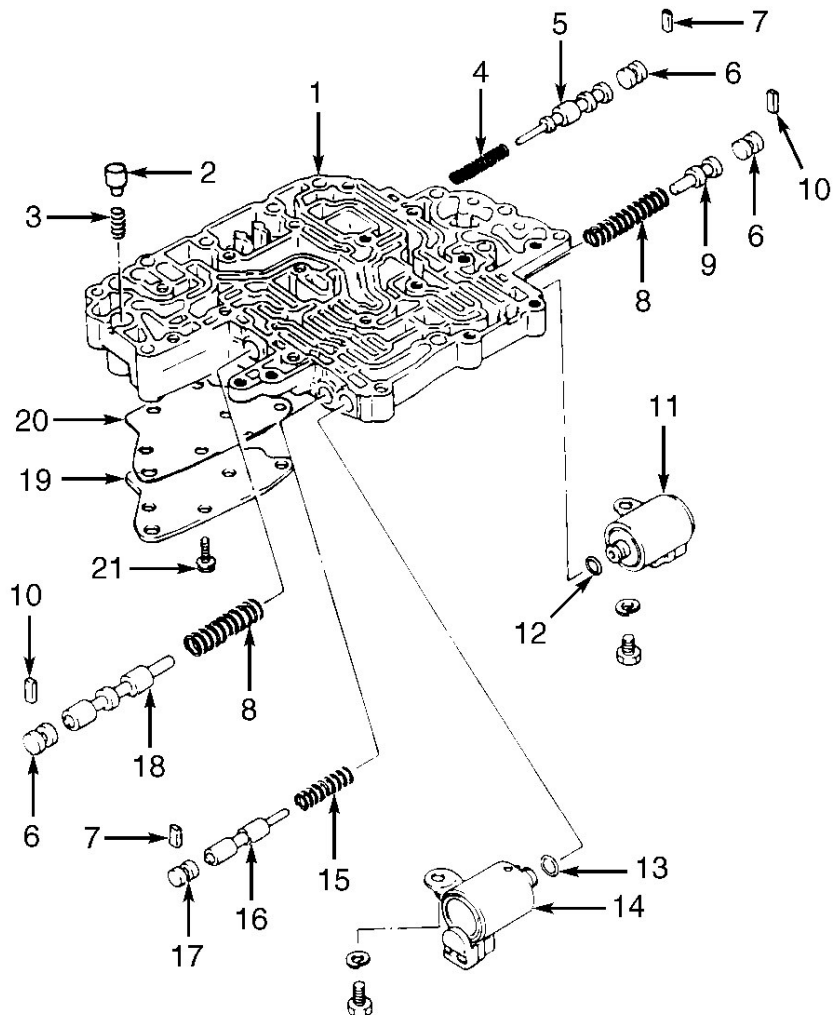
1. Remove lower valve body cover bolts. Remove lower valve body cover and gasket. Remove direct clutch and 2nd brake solenoids from valve body. See **Fig. 19**.
2. Remove 16 bolts from upper valve body. Carefully remove upper valve body from lower valve body. DO NOT allow 4 steel check balls to drop out. Remove valve body gaskets. See **Fig. 20**.
3. All valve body components must be installed in original location. Lay all components out in sequence during removal for reassembly reference. Note valve diameter and check ball location. See **Fig. 21**.

Inspection

1. Clean all parts with ATF. Clean all fluid passages and holes. Using compressed air, ensure passages or holes are clear.
2. Inspect valves for scoring or roughness. Inspect valve springs for damage, squareness, rust and collapsed coils. Replace spring if necessary. Valve body springs must be arranged with corresponding valve.

Reassembly

1. Coat all components with ATF. To reassemble, reverse removal procedure. Note special procedures listed.
2. Install 4 steel check balls in upper valve body. See **Fig. 21**. Replace all gaskets with same type as old gaskets. When installing each valve to valve body, ensure parts are installed in correct direction.
3. When reassembling upper valve body, install same number of throttle valve rings as were removed.
4. Install lower valve body cover and gasket. Tighten lower valve body cover bolts to 35 INCH lbs. (4 N.m). Install throttle valve cam assembly. Tighten throttle valve cam bolt to 35 INCH lbs. (4 N.m).
5. Install upper valve body to lower valve body. Install 2 reamer bolts finger tight. Install upper valve body bolts and tighten to 53 INCH lbs. (6 N.m). See **Fig. 22**.



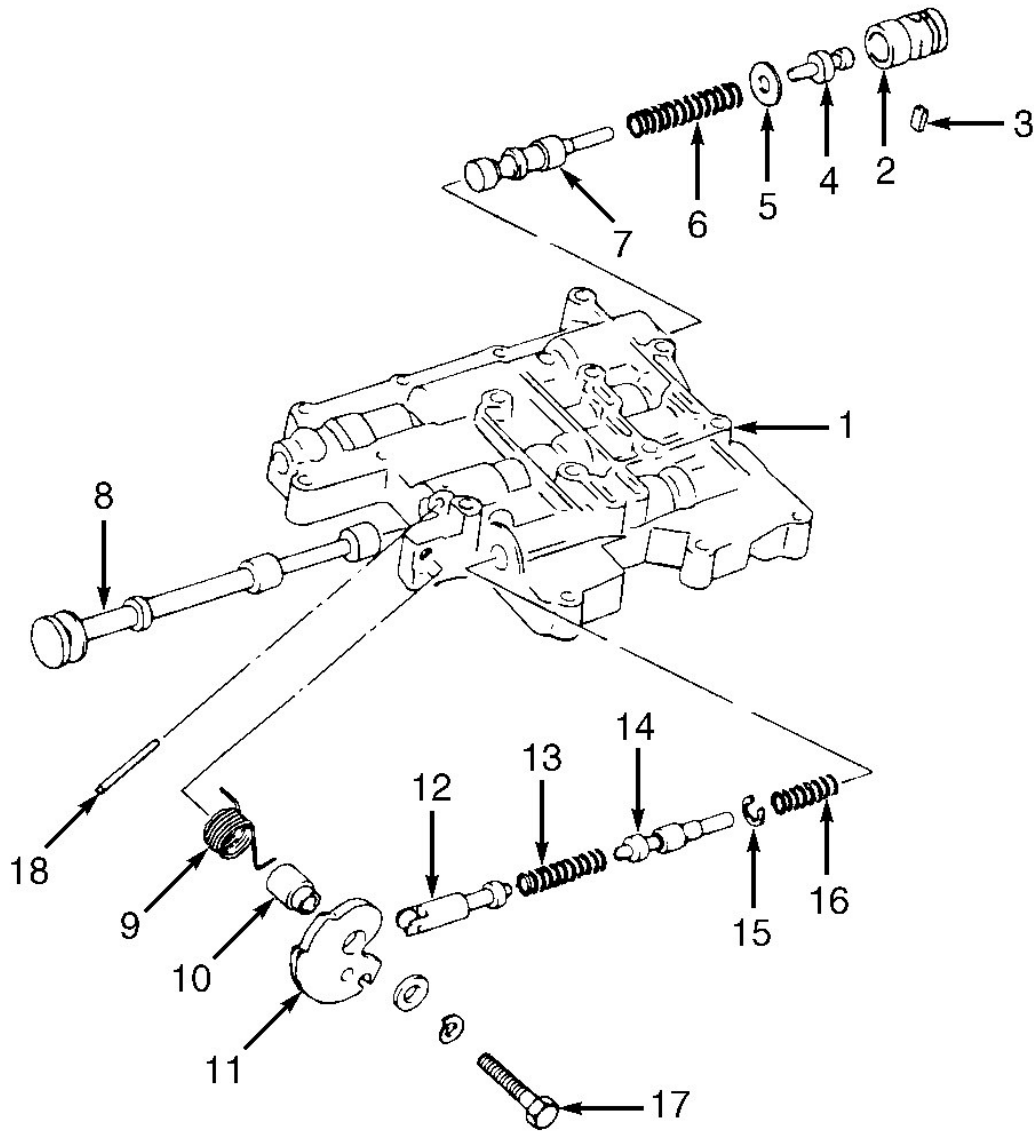
- | | |
|------------------------------|---------------------------------------|
| 1. Lower Valve Body | 11. Direct Clutch Solenoid |
| 2. Cooler By-Pass Valve | 12. Seal |
| 3. Spring | 13. Seal |
| 4. Spring | 14. 2nd Band Solenoid |
| 5. Secondary Regulator Valve | 15. Spring |
| 6. Plug | 16. B ₂ Control Valve |
| 7. No. 1 Key (Medium) | 17. B ₂ Control Valve Plug |
| 8. Spring | 18. 1-2 Shift Valve |
| 9. 2-3 Shift Valve | 19. Lower Valve Body Cover |
| 10. No. 2 Key (Long) | 20. Gasket |
| | 21. Lower Valve Body Bolt |

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Fig. 19: Exploded View Of Lower Valve Body
 Courtesy of SUZUKI OF AMERICA CORP.

2000 Chevrolet Metro

2000 AUTOMATIC TRANSMISSIONS Suzuki ECC 3-Speed Overhaul



- | | |
|----------------------------|-----------------------------|
| 1. Upper Valve Body | 10. Throttle Valve |
| 2. Pressure Regulator | Cam Spring |
| 3. No. 1 Key (Short) | 11. Throttle Valve Cam |
| 4. Primary Regulator | 12. Downshift Plug |
| Valve Plunger | 13. Spring |
| 5. Plate Washer | 14. Throttle Valve |
| 6. Spring | 15. Throttle Valve Ring(s) |
| 7. Primary Regulator Valve | 16. Spring |
| 8. Manual Valve | 17. Throttle Valve Cam Bolt |
| 9. Throttle Valve Spring | 18. Neutral Drain Nozzle |

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Fig. 20: Exploded View Of Upper Valve Body
Courtesy of SUZUKI OF AMERICA CORP.

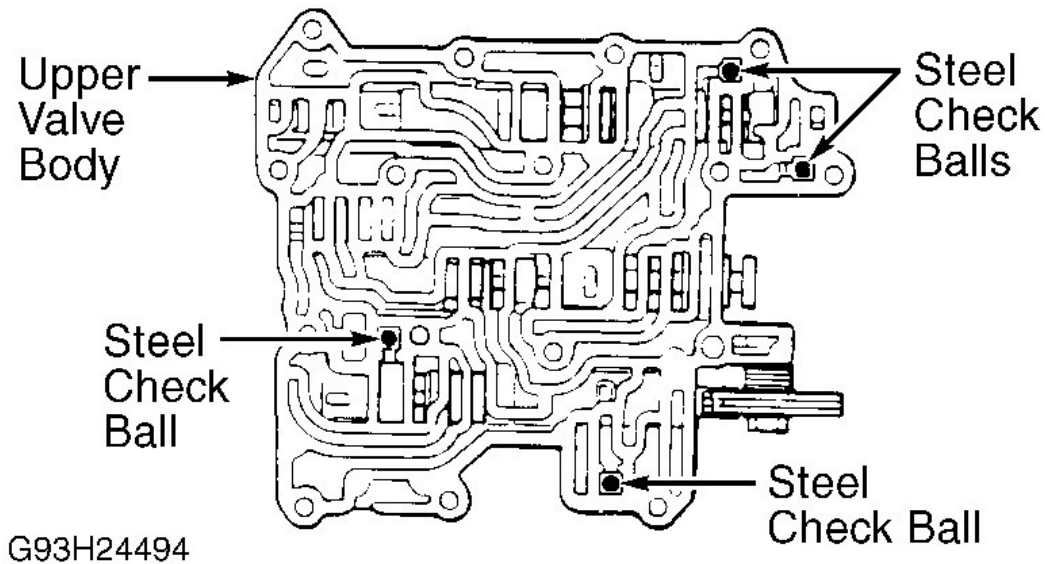
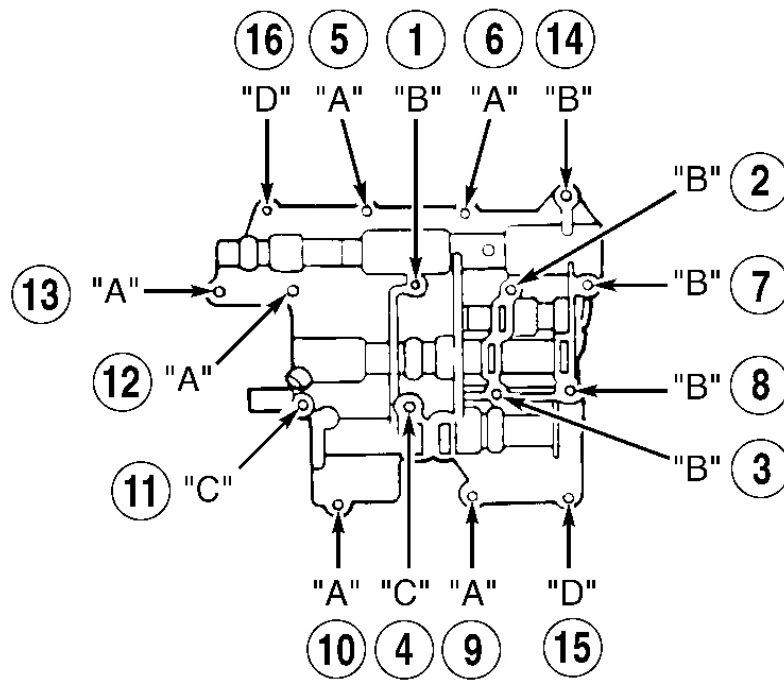


Fig. 21: Installing Valve Body Steel Check Balls
Courtesy of SUZUKI OF AMERICA CORP.



Bolt	Length	Bolt Head Shape	Pieces
A	1.16" (29.5 mm)	Deep Recess	6
B	1.49" (38 mm)	Deep Recess	6
C	1.73" (44 mm)	Deep Recess	2
D	Reamer Bolt	Normal Recess	2

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Fig. 22: Installing Upper Valve Body Bolts
 Courtesy of SUZUKI OF AMERICA CORP.

COUNTERSHAFT & OUTPUT SHAFT

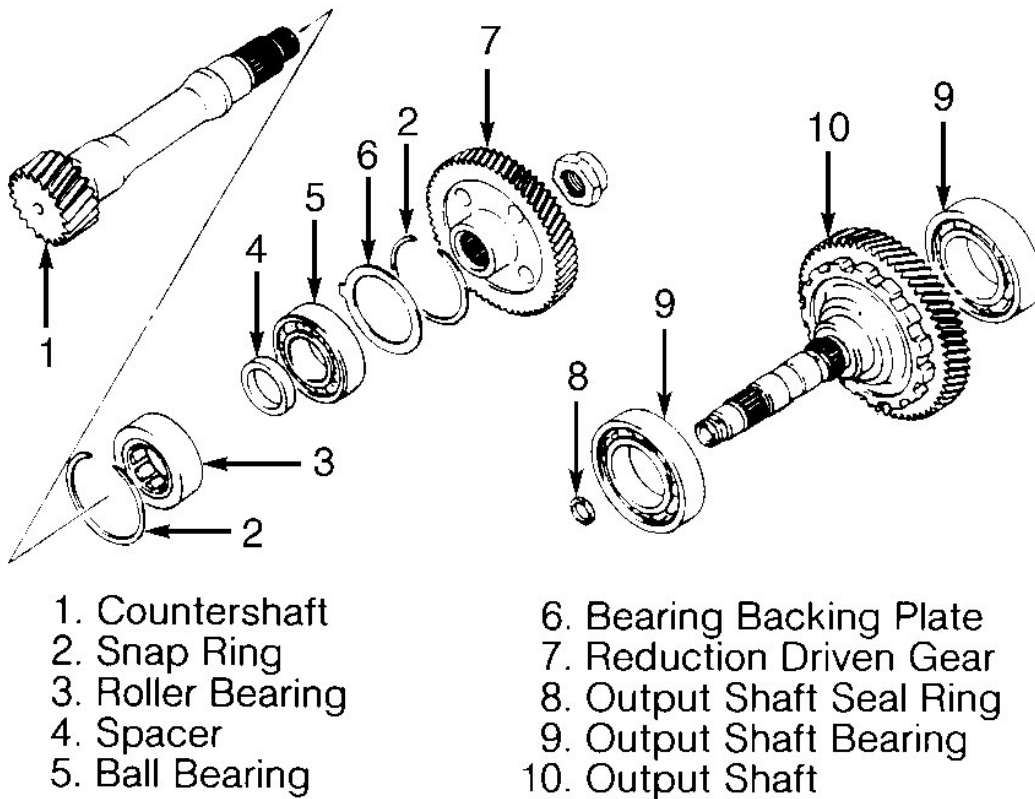
Disassembly

1. Note order of components during disassembly procedure for reassembly reference. Remove countershaft snap ring. Remove backing plate (rear cover side). Using appropriate bearing remover, remove front and rear countershaft bearings. See **Fig. 23**.

2. Support output shaft with soft-jawed vise. Using bearing puller, remove output bearing (cover side). Hold bearing (inside) with bearing puller, and remove output shaft with a press.

Reassembly

1. Install countershaft roller bearing into case. Use small side of bearing installer attachment to install countershaft roller bearing. Install snap ring. Install countershaft spacer to case. Install countershaft ball bearing to case. Install bearing backing plate and snap ring.
2. Install output shaft inside bearing. Support output shaft at parking lock gear. Press in output shaft cover side bearing.



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Fig. 23: Exploded View Of Countershaft & Output Shaft (Typical)
Courtesy of SUZUKI OF AMERICA CORP.

DIFFERENTIAL

Disassembly

1. Using appropriate bearing puller, remove differential left-side bearing. Support differential case with soft-

jawed vise and remove 8 bolts. Remove final gear. Drive out differential right-side bearing.

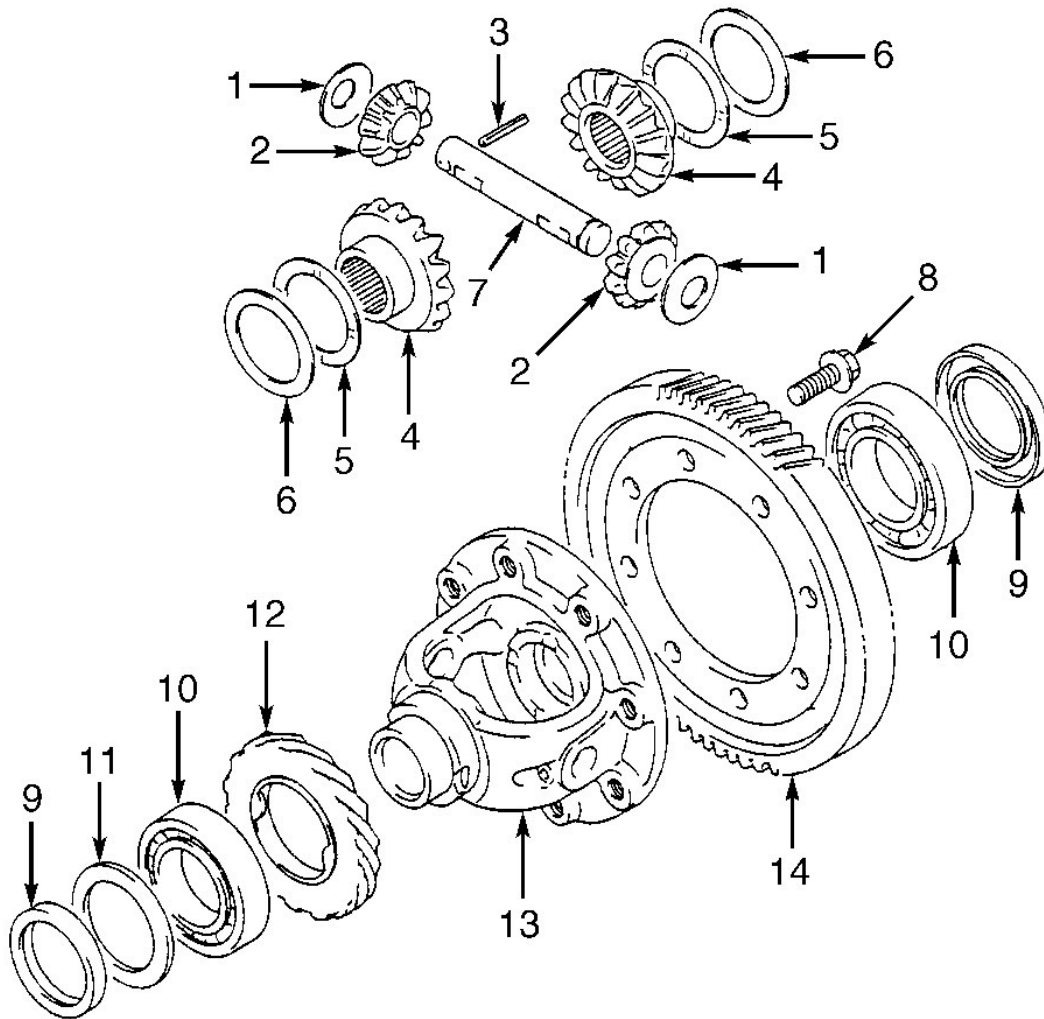
2. Remove speedometer drive gear. Remove side pinion shaft spring pin. Remove the side pinion shaft, 2 differential pinions, 2 side pinion washers, 2 differential gears and 2 side gear washers. See **Fig. 24**.

Inspection

Clean all parts with ATF. Use compressed air to dry all parts. Check bearings and gears for wear or damage.

Reassembly

1. Assemble differential case. Install side gear washers on differential gears. Install side pinion washers to differential pinions. Install side pinion shaft. Align lock pin holes with differential case.
2. Measure left-side differential gear thrust play by using 2 screwdrivers to move gear up and down. Read movement of dial indicator. Measure right-side differential gear thrust play by moving gear up and down by hand. Thrust play should be .002-.013" (.05-.33 mm). Select thrust washers to obtain correct thrust play. Thrust washer thicknesses are available from .035" (.89 mm) to .047" (1.19 mm) in .002" (.05 mm) increments. Install thrust washers and side gears in case. If possible, install same size thrust washers on both sides. Recheck thrust play.
3. Drive in spring pin from right side until flush with differential case surface. Press in differential left-side bearing.
4. Install speedometer drive gear. Support differential so left-side bearing is floating. Press in differential right-side bearing using bearing installer and copper hammer.
5. Hold differential with soft-jawed vise. Install final gear. Place offset side of final gear flange toward differential case. Tighten final gear bolts to 65 ft. lbs. (90 N.m). DO NOT substitute final gear bolts.



1. Side Pinion Washer
2. Differential Pinion
3. Spring Pin
4. Differential Gear
5. Washer
6. Side Gear Washer
7. Pinion Shaft

8. Final Gear Bolt
9. Differential Side Oil Seal
10. Differential Side Bearing
11. Side Bearing Shim
12. Speedometer Drive Gear
13. Differential Case
14. Final Gear

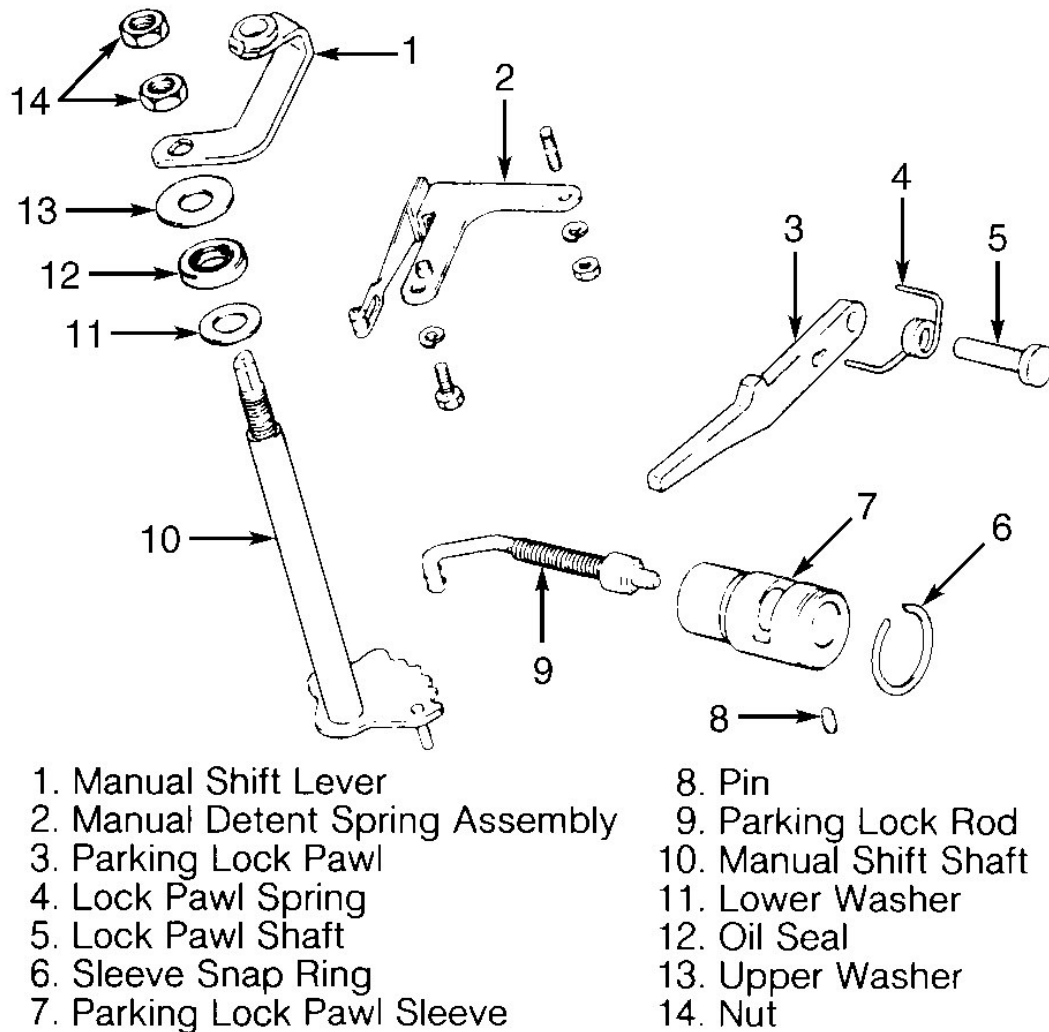
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Fig. 24: Exploded View Of Differential Gear
 Courtesy of SUZUKI OF AMERICA CORP.

TRANSMISSION 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 subassembly containing that bushing. Check thrust bearings and races for wear or damage. Use petroleum jelly to hold parts in place. Replace parts as necessary. Soak clutch plates in ATF for at least 2 hours prior to installation.

1. Place 2nd brake piston spring in transaxle case. Apply ATF to piston rod, seal and seal ring. Insert 2nd brake piston into case. Apply ATF to 2 cover seals. Install piston cover. Using valve spring compressor, push down piston cover and install snap ring. See **Fig. 9**.
2. Install lower washer and parking lock rod on manual shift shaft. See **Fig. 25**. Carefully install manual shift shaft into transmission case. Install manual detent spring. Tighten manual detent spring bolt and nut to 106 INCH lbs. (12 N.m). Install shift shaft upper washer and manual shift lever to manual shift shaft. Tighten shift shaft lower nut first, then tighten upper nut to 24 ft. lbs. (33 N.m). Check manual shift shaft for smooth rotation.



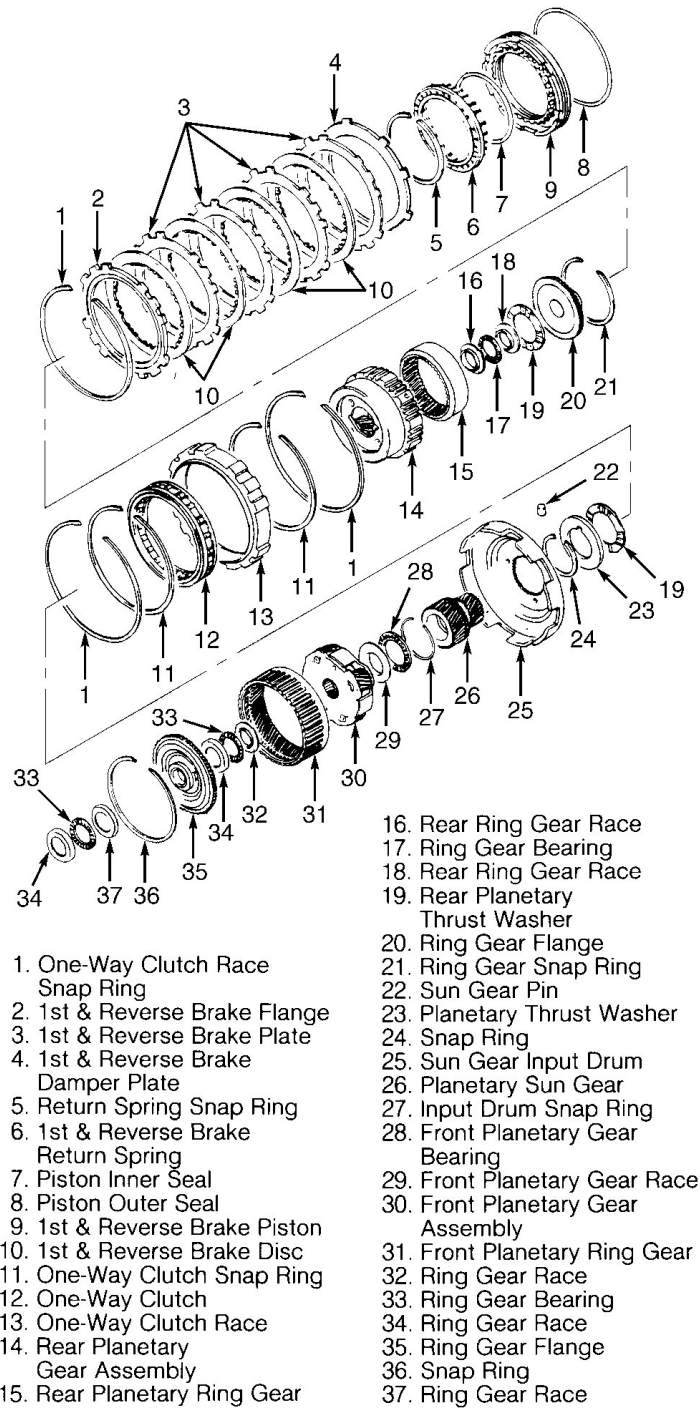
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Fig. 25: Exploded View Of Manual Shift Shaft & Parking Lock Pawl
Courtesy of SUZUKI OF AMERICA CORP.

3. Install restrictor pin and snap ring to parking lock pawl sleeve. Install assembly into case. Shift manual shift lever to a position other than "P". Install parking lock pawl. Install lock pawl shaft and lock pawl spring. Ensure parking lock pawl moves smoothly when manual shift lever is activated.
4. Apply ATF to 1st and reverse brake piston inner and outer seals. Install new seals on piston. Carefully insert 1st and reverse piston with spring holes facing upward. Place return spring on piston. Push down on return spring and install snap ring. See **Fig. 26**.
5. Install countershaft. Ensure countershaft spacer is installed in correct position. DO NOT use excessive force when hammering shaft into position.
6. Shift manual shift lever to position other than "P". Using bearing installer, install output shaft. Shift

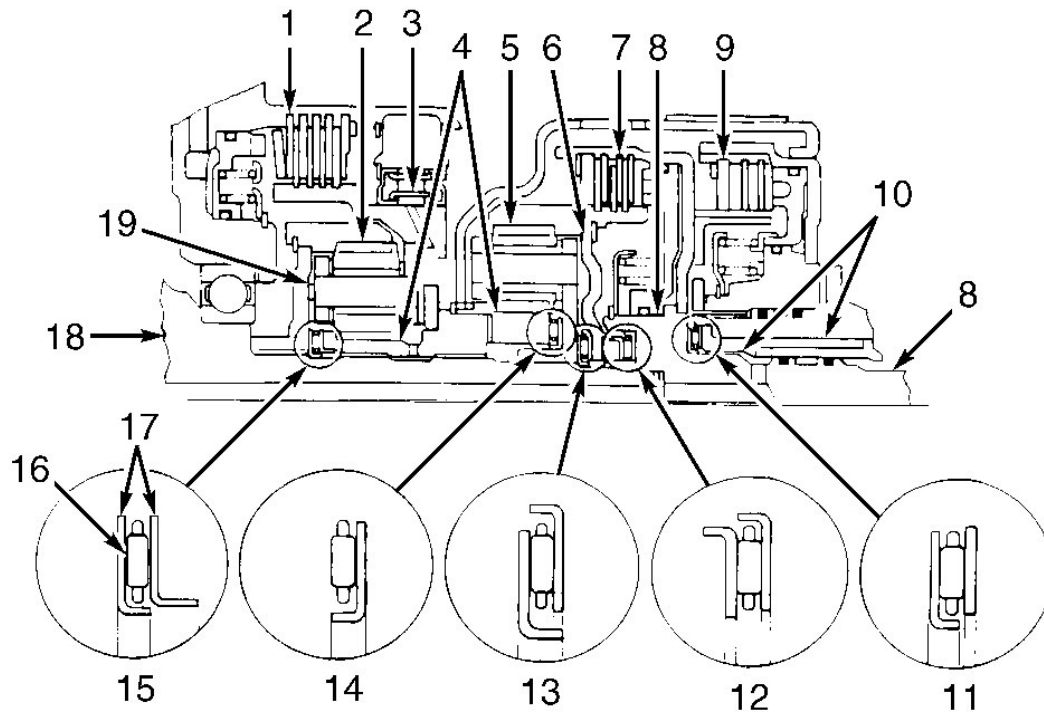
manual shift lever to "P" position so output shaft is locked and cannot turn. Install reduction driven gear on countershaft. Tighten driven gear nut to 108 ft. lbs. (150 N.m). Stake driven gear nut in 2 places.

7. Install transaxle rear cover gasket. Install rear cover. Ensure output shaft bearing enters rear cover bearing hole smoothly. Install 10 bolts and 2 nuts. Tighten rear cover bolts to 12-17 ft. lbs. (16-23 N.m). Tighten rear cover nuts to 8-11 ft. lbs. (11-15 N.m). Ensure shafts rotate smoothly.
8. Push output shaft against rear cover side. Fit 4 projections of output shaft installer to 4 notches in case. To prevent damage to shaft, DO NOT hit output shaft directly.
9. Line up final gear and countershaft gear teeth. Carefully drive in differential by applying pressure to side bearing inner race using bearing installer.
10. Install 1st and reverse brake damper plate on return spring with convex side facing upward. Install in order: plate, disc, plate, disc, plate, disc, plate and disc. Install flange with flat area facing inward. Install snap ring. Measure 1st and reverse brake clutch clearance. Measure clearance between snap ring and flange. See **Fig. 10**. Standard clearance should be .023-.075" (.58-1.91 mm). Check 1st and reverse brake piston operation by applying compressed air into oil hole. Confirm 1st and reverse brake piston moves smoothly.
11. Align ring gear and output shaft spline and insert rear planetary ring gear. See **Fig. 26**. Install rear planetary ring gear races and bearing. Ensure ring gear races are installed in proper positions and directions. See **Fig. 27**.
12. Temporarily assemble one-way clutch and rear planetary gear. Check one-way clutch operation. Clutch and gear should rotate freely in arrow direction "A" and lock in the opposite direction. See **Fig. 28**. Remove one-way clutch.



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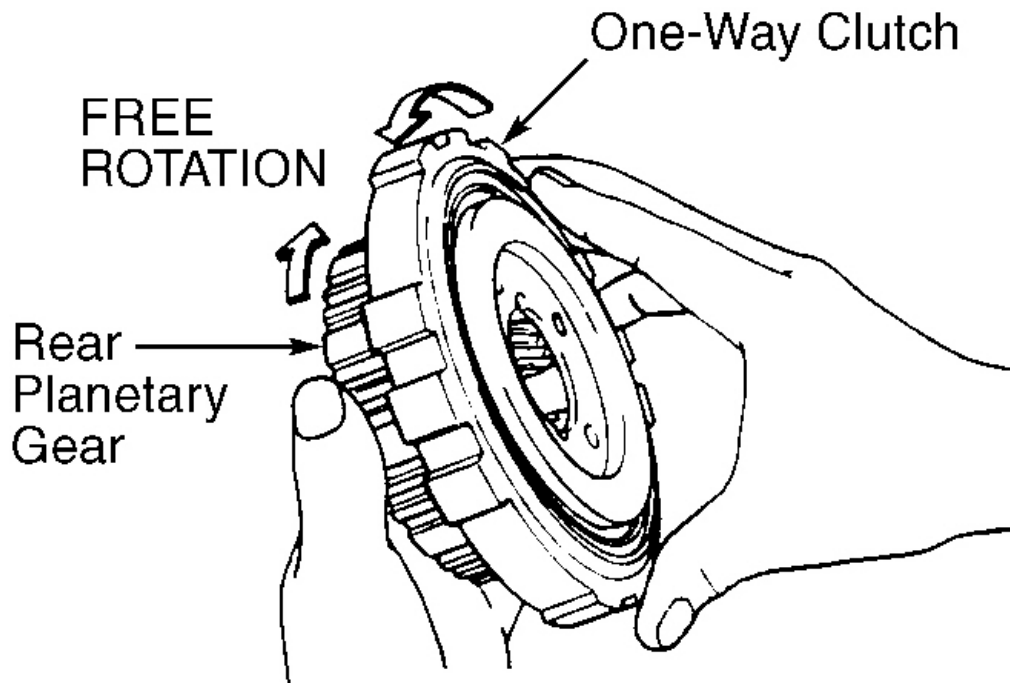
Fig. 26: Exploded View Of 1st & Reverse Brake & Planetary Gears
 Courtesy of SUZUKI OF AMERICA CORP.



- | | |
|-------------------------|--------------------------|
| 1. 1st & Reverse Brake | 12. Ring Gear |
| 2. Rear Planetary Gear | Races & Bearing |
| 3. One-Way Clutch | 13. Ring Gear |
| 4. Sun Gear | Races & Bearing |
| 5. Front Planetary Gear | 14. Front Planetary Gear |
| 6. Ring Gear Flange | Race & Bearing |
| 7. Forward Clutch | 15. Rear Ring Gear |
| 8. Input Shaft | Races & Bearing |
| 9. Direct Clutch | 16. Bearing |
| 10. Oil Pump | 17. Race |
| 11. Input Shaft | 18. Output Shaft |
| Bearing & Races | 19. Ring Gear Flange |

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Fig. 27: Identifying Bearing & Race Locations
 Courtesy of SUZUKI OF AMERICA CORP.



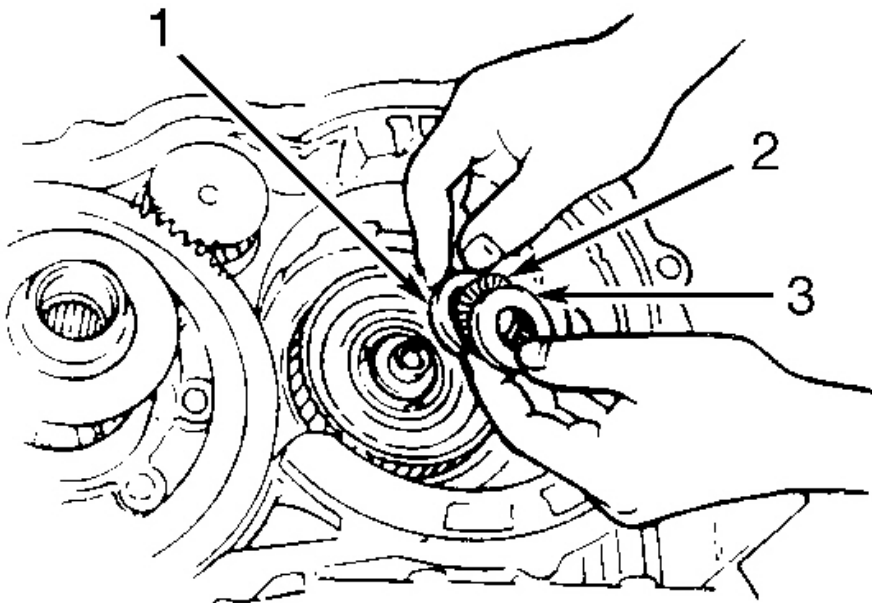
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Fig. 28: Checking Free Rotation Of One-Way Clutch
Courtesy of SUZUKI OF AMERICA CORP.

13. Apply grease to rear planetary thrust washers. Install thrust washers on front and rear faces of rear planetary gear. Ensure washer lugs match slots in planetary gear.
14. Align 1st and reverse brake discs and install rear planetary gear. Check thrust washers and races for proper installation. Move rear planetary gear up and down lightly by hand. Listen for a "click" sound which indicates proper installation.
15. Install one-way clutch race snap ring into groove of transaxle case. Place one-way clutch on rear planetary gear. While turning planetary gear clockwise, insert one-way clutch. Confirm planetary gear turns clockwise and locks counterclockwise.
16. Install one-way clutch race snap ring. Ensure snap ring end-gap is between lugs. Install sun gear pin and thrust washer on sun gear. Ensure pin is in thrust washer notch. Push in sun gear while engaging with rear planetary gear. DO NOT damage bushing inside sun gear. Check thrust washers for proper installation. Lightly move sun gear up and down. Listen for a click sound which indicates proper installation.
17. Install front planetary gear bearing and race to sun gear. See **Fig. 27**. Install front planetary gear while turning gear back and forth. Check bearing and race for proper installation. Move planetary gear up and down lightly with finger. If planetary gear makes a clicking sound, bearing and race are properly installed.
18. Install ring gear bearing and races on front planetary gear. See **Fig. 27**. Install front planetary ring gear.

Check bearing and race for proper installation. Move ring gear up and down lightly with finger. If ring gear makes a clicking sound, bearing and race are properly installed.

19. Install 2nd brake band. DO NOT bend or damage. Check output shaft seal ring for wear or damage. Apply grease to direct clutch washer. Install direct clutch washer on direct clutch with washer grooves facing upward. Align washer protrusions to direct clutch drum groove.
20. Align direct clutch discs and install direct clutch on input shaft. Check direct clutch for proper installation. Move direct clutch up and down lightly by hand. Listen for a click sound which indicates proper installation. Install ring gear races and bearing. See **Fig. 29**.



1. Ring Gear Race (O.D.: 1.41" (35.8 mm)

2. Bearing

3. Ring Gear Race (O.D.: 1.49" (37.9 mm)

Apply Grease

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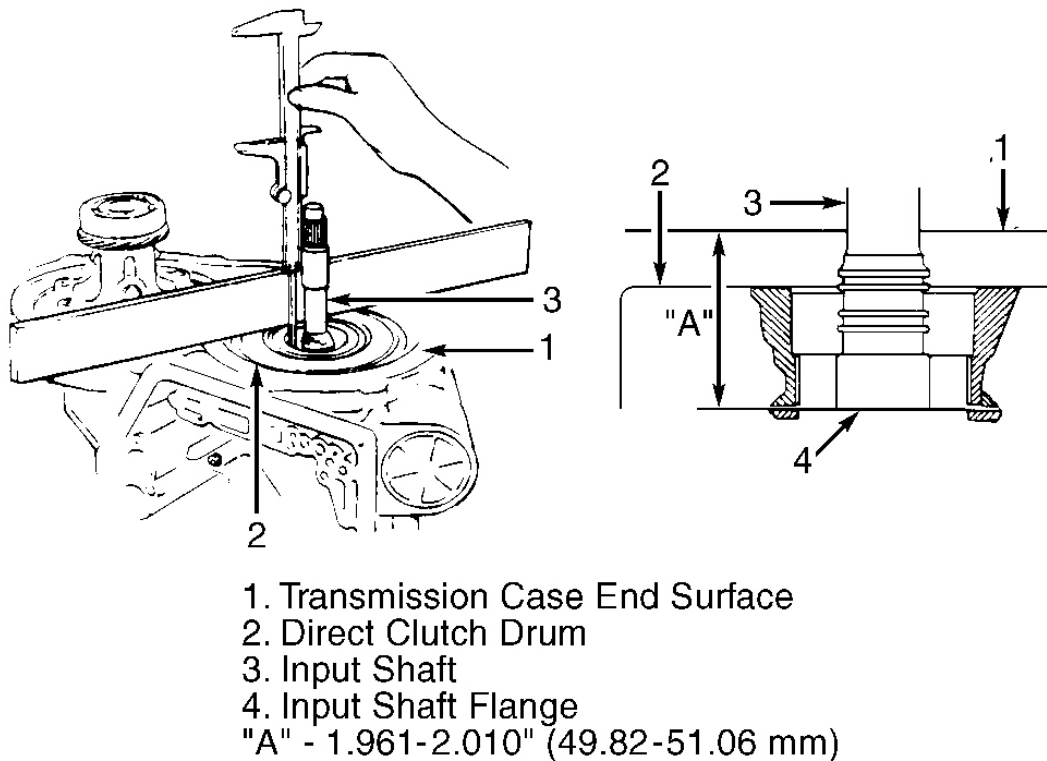
Fig. 29: Installing Ring Gear Bearing

Courtesy of SUZUKI OF AMERICA CORP.

21. While rotating input shaft and direct clutch, insert into case. Align forward clutch discs and install forward clutch. Check input shaft for proper installation. Move input shaft up and down lightly by hand.

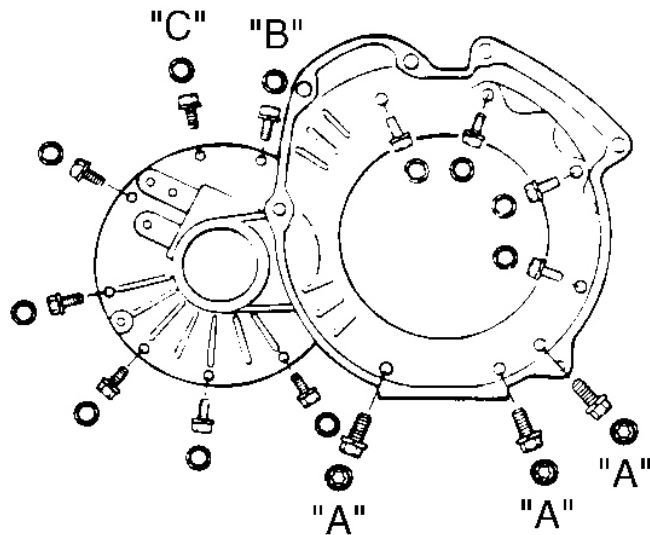
If input shaft makes a clicking sound, shaft is installed properly.

22. Place straightedge on transaxle case end surface and measure distance "A" by using vernier caliper. See **Fig. 30**. Distance "A" should be 1.961-2.010" (49.82-51.06 mm). To obtain distance "A", subtract width of straightedge from vernier reading. If distance "A" is within specification, component parts are installed properly. If distance "A" is not within specification, remove input shaft and direct clutch. Reinstall properly.
23. Align hole in 2nd brake band with case pin hole and insert 2nd brake band pin. Carefully install transaxle case housing and new case gasket. See **Fig. 31**. Install case housing bolts and tighten to 12-17 ft. lbs. (16-23 N.m). DO NOT apply thread locking compound to case housing bolts.
24. Measure input shaft seated position. See **Fig. 32**. Distance "A" should be 7.416-7.477" (188.37-189.92 mm).



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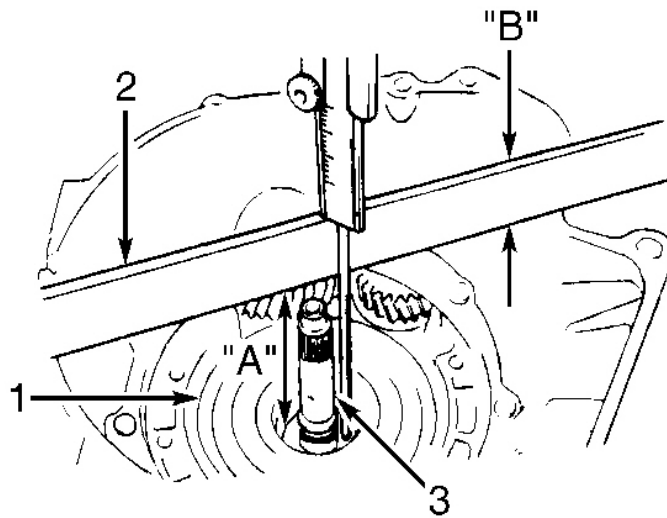
Fig. 30: Measuring Distance Between Case End Surface & Input Shaft Flange
 Courtesy of SUZUKI OF AMERICA CORP.



- "A" - Bolt With Star-Shaped Recess In Head
(Apply Sealant Suzuki Bond No. 1215 To The Thread)
- "B" - Install Clamp For Wiring Harness
- "C" - Install Clamp For Select Cable

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Fig. 31: Installing Case Housing Bolts
Courtesy of SUZUKI OF AMERICA CORP.



1. Direct Clutch
2. Straightedge
3. Input Shaft

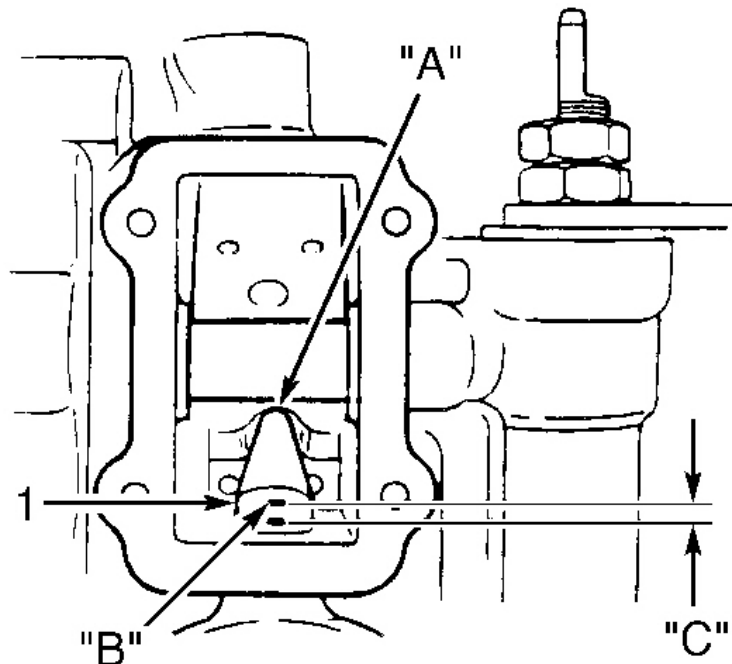
"A" - Input Shaft Seating Position
 "B" - Straightedge Width

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Fig. 32: Measuring Input Shaft Seating Position
 Courtesy of SUZUKI OF AMERICA CORP.

25. Install input shaft bearing race and bearing on shaft. Install other input shaft bearing race on oil pump. Ensure seal rings installed in oil pump cover flange are in good condition and lubricated with ATF. Input shaft thrust play is adjusted with oil pump bearing race.
26. Install direct clutch washer flange into notch of oil pump body. Install new oil pump cover seal to oil pump. Align oil pump bolt hole with bolt hole and gently push oil pump into case. Ensure direct clutch washer does not fall. Ensure smooth rotation of input shaft. Gradually tighten 6 oil pump bolts to 14-20 ft. lbs. (18-27 N.m).
27. Measure input shaft thrust play. Input shaft thrust play should be .012-.035" (.30-.89 mm). If thrust play is incorrect remove oil pump and replace input shaft bearing race on oil pump side. Oil pump races are available in thicknesses of .031" (.79 mm) and .055" (1.40 mm). Ensure input shaft rotates smoothly.
28. Install wire harness to case. Check 2nd brake band for proper installation. Ensure 2nd brake piston rod end is aligned with center of recess in brake band. See **Fig. 33**. If rod end contacts outside of brake band recess, pull up 2nd brake band by inserting thin wire in brake band fitting to align band recess with rod end properly. Check 2nd brake piston stroke. See step 4 under TRANSMISSION DISASSEMBLY. See **Fig. 8**. Install 2nd brake band cover with new gasket. Tighten 2nd brake band cover bolts to 66-78 INCH lbs. (7.5-8.8 N.m).
29. Install oil pressure control cable in case. Install accumulator springs and pistons. Align manual valve with pin on manual shift lever. Ensure manual shift lever pin is between 2 flanges at end of manual shift valve. Lower valve body into position. Install 11 bolts in lower valve body. See **Fig. 34**. Tighten 3 reamer

(positioning) bolts "C" and "D". Tighten all lower valve body bolts to 72-102 INCH lbs. (8.1-11.5 N.m).



1. Piston Rod

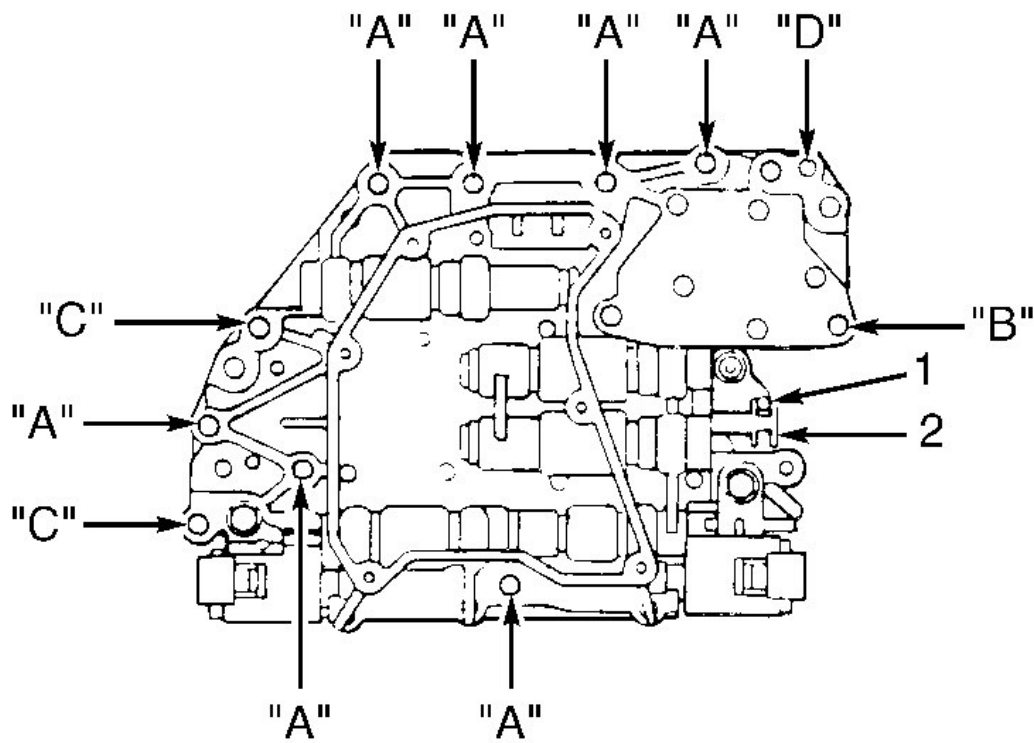
"A" - Recess Of Brake Band

"B" - Stroke Measuring Mark

"C" - Piston Rod Stroke

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Fig. 33: Checking 2nd Brake Band Alignment
Courtesy of SUZUKI OF AMERICA CORP.



1. Pin

2. Manual Valve

"A" - Bolt 1.38" (35 mm) - 7 Pieces

"B" - Bolt 1.85" (47 mm) - 1 Piece

"C" - Reamer Bolt 1.00" (25 mm) - 2 Pieces

"D" - Reamer Bolt 1.26" (32 mm) - 1 Piece

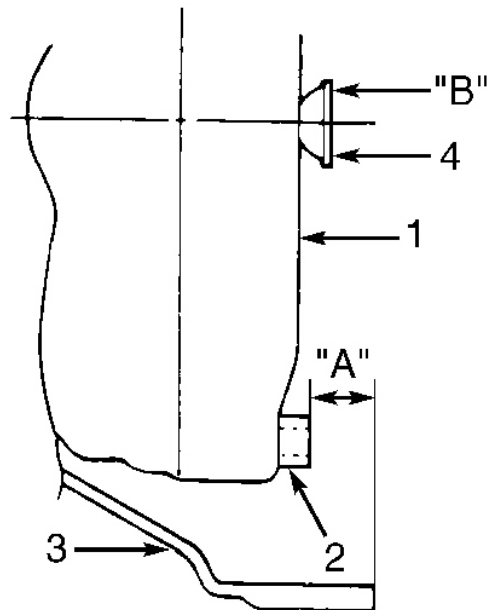
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Fig. 34: Installing Valve Body Bolts

Courtesy of SUZUKI OF AMERICA CORP.

30. Install oil pressure control cable on throttle valve cam. Using plastic hammer, tap in 2 oil tubes to valve body. DO NOT deform oil tubes. Install direct clutch and 2nd brake solenoid wires. Install oil strainer and solenoid wire clamp. Tighten oil strainer bolts to 44-53 INCH lbs. (5-6 N.m).
31. Install magnet in oil pan under oil strainer. Install oil pan bolts. Tighten 15 oil pan bolts to 36-48 INCH lbs. (4.1-5.4 N.m). Tighten oil pan drain plug to 14-17 ft. lbs. (19-23 N.m).
32. Install oil inlet and outlet pipes. Tighten union bolts to 15-17 ft. lbs. (20-23 N.m). Clamp pipes with oil pipe plate through rubber tubes. Tighten 8-mm plate bolts to 89-144 INCH lbs. (10.1-16.3 N.m). Tighten 6-mm plate bolt to 36-60 INCH lbs. (4.1-6.8 N.m).

33. Insert oil filler tube in case to flange. Tighten oil filler tube bolt to 36-60 INCH lbs. (4.1-6.8 N.m). Install engine mounting LH bracket. Tighten bolts to 37-43 ft. lbs. (50-60 N.m).
34. Carefully install torque converter to input shaft. Ensure distance "A" is within specification. See **Fig. 35**. Check torque converter for smooth rotation. Apply grease around cup at center of torque converter.



1. Torque Converter
2. Flange Nut
3. Transmission Case Housing
4. Cup

"A" - More Than
.84" (21.4 mm)
"B" - Apply Grease

G93H24510

Fig. 35: Installing Torque Converter
Courtesy of SUZUKI OF AMERICA CORP.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Differential Final Gear Bolt	59-66 (80-89)
Drain Plug	14-17 (19-23)
Drive Plate-To-Converter Bolt	13-14 (18-19)
LH Engine Mount Bracket	37-43 (50-60)
Oil Pipe Union Bolt	15-17 (20-23)

2000 Chevrolet Metro**2000 AUTOMATIC TRANSMISSIONS Suzuki ECC 3-Speed Overhaul**

Oil Pump Bolt	13-20 (18-27)
Rear Cover Bolt	12-17 (16-23)
Rear Cover Nut	8-11 (11-15)
Reduction Driven Gear Nut	80-108 (110-150)
Selector Housing Nut	8-12 (10-16)
Selector Lever Shaft Nut	13-16 (18-22)
Shift Shaft Nut	20-24 (27-33)
Transmission Case Housing Bolts	12-17 (16-23)
Transmission Range Switch Bolt	10-17 (13-23)
INCH Lbs. (N.m)	
Lower Valve Body Bolt	72-102 (8.1-11.5)
Lower Valve Body Cover Bolt	36-48 (4.1-5.4)
Manual Detent Spring Bolt & Nut	72-102 (8.1-11.5)
Oil Cooler Hose Clamp	12 (1.5)
Oil Filler Tube Bolt	36-60 (4.1-6.8)
Oil Pan Bolt	36-48 (4.1-5.4)
Oil Pipe Plate Bolt	
6-mm Bolt	36-60 (4.1-6.8)
8-mm Bolt	89-144 (10.1-16.3)
Oil Pump Cover Bolt	72-102 (8.1-11.5)
Oil Strainer Bolt	44-53 (5-6)
Shift Solenoid Bolt	66-78 (7.5-8.8)
Speed Sensor Bolt	66-78 (7.5-8.8)
Throttle Valve Cam Bolt	54-78 (6.1-8.8)
Transmission Case Plug	54-78 (6.1-8.8)
Upper Valve Body Bolt	44-53 (5-6)
2nd Brake Band Cover Bolt	66-78 (7.5-8.8)

TRANSAXLE SPECIFICATIONS**TRANSAXLE SPECIFICATIONS**

Application	In. (mm)
Clutch Pack Clearance	
Direct Clutch	.098-.120 (2.49-3.05)
Forward Clutch	.079-.106 (2.01-2.69)
1st & Reverse Brake	.023-.075 (.58-1.91)
Differential Gear Thrust Play	.002-.013 (.05-.33)
Input Shaft Thrust Play	.012-.035 (.30-.89)
2nd Brake Piston Rod Stroke	.060-.120 (1.52-3.05)