

1990-94 AUTOMATIC TRANSMISSIONS**Mitsubishi V4AW2 Overhaul****APPLICATION****APPLICATION & LABOR TIMES**

Vehicle Application	Trans. Model
Montero 3.0L	V4AW2

IDENTIFICATION

Transmission model number is stamped on Vehicle Information Code Plate attached to the firewall in engine compartment. See **Fig. 1** .

DESCRIPTION

Transmission has 4 forward speeds (4th is overdrive) and reverse. Gearshifts are determined by engine load, selector lever position, throttle valve position and output shaft speed. Components include a governor, torque converter, forward clutch, direct clutch, overdrive (OD) clutch, planetary gears and transfer case. See **Fig. 2** . For transfer case overhaul information, see appropriate article in AXLE SHAFTS & TRANSFER CASES section.

An Overdrive (OD) switch is mounted on the shift lever. When OD switch is depressed to ON position, transmission will shift into 4th gear when shift lever is in "D" position, and OD OFF light on instrument panel will go off. When OD switch is released to OFF position, transmission will shift into 3rd gear, and OD OFF light on instrument panel will illuminate.

A pattern select switch (if equipped) is located near shift lever on center console. Pattern select switch contains a POWER (PWR) and a HOLD operating position. When pattern select switch is depressed (PWR position), transmission upshifts and downshifts will occur at a higher vehicle speed than with switch released. An indicator light on instrument panel indicates pattern select switch is in PWR (on) position.

Transmission is equipped with a shift lock and key interlock system. Shift lock system prevents shift lever from being moved from Park unless brake pedal is depressed. Key interlock system prevents ignition key from being moved from ACC to LOCK position on ignition switch unless shift lever is in Park.

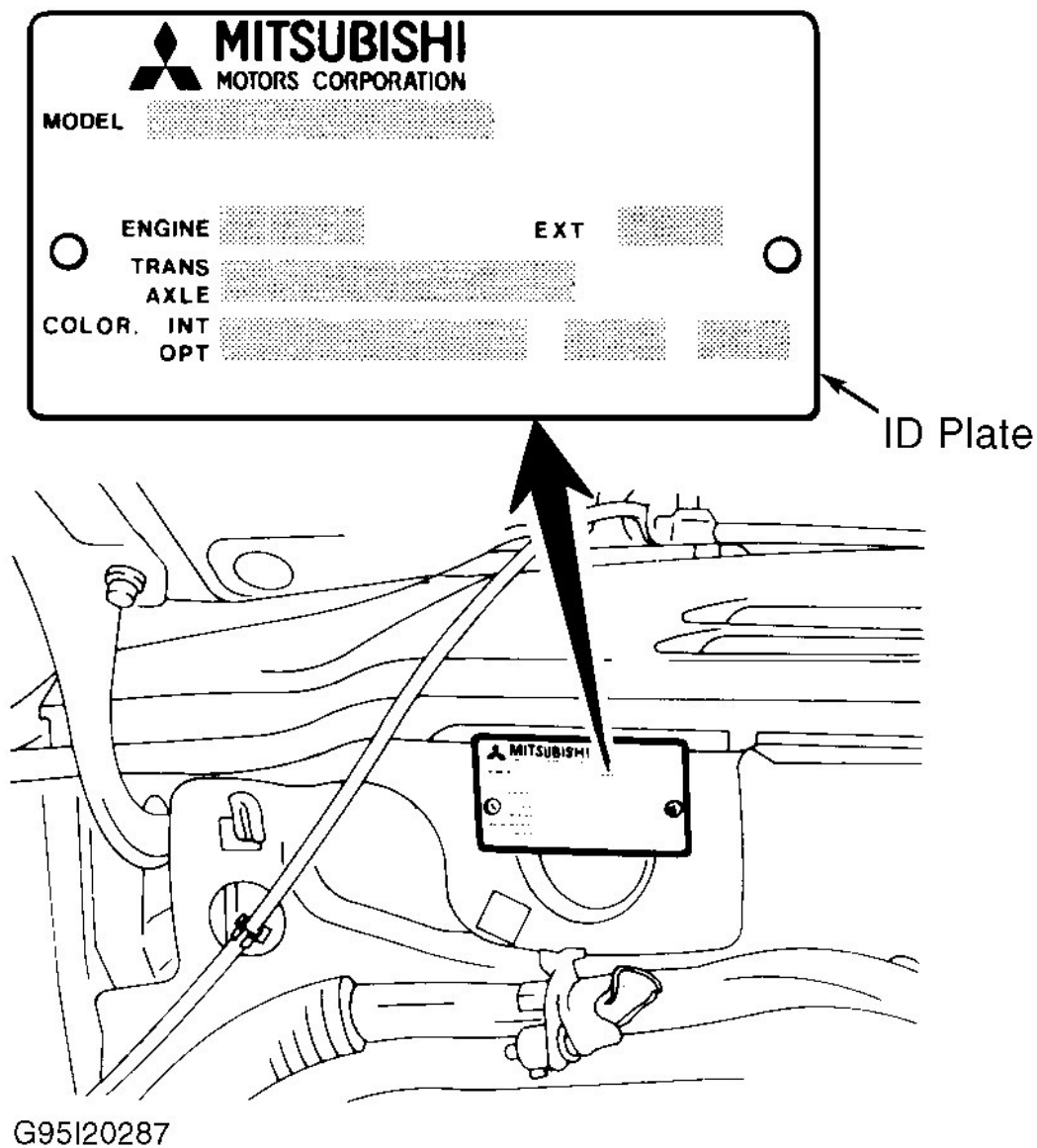
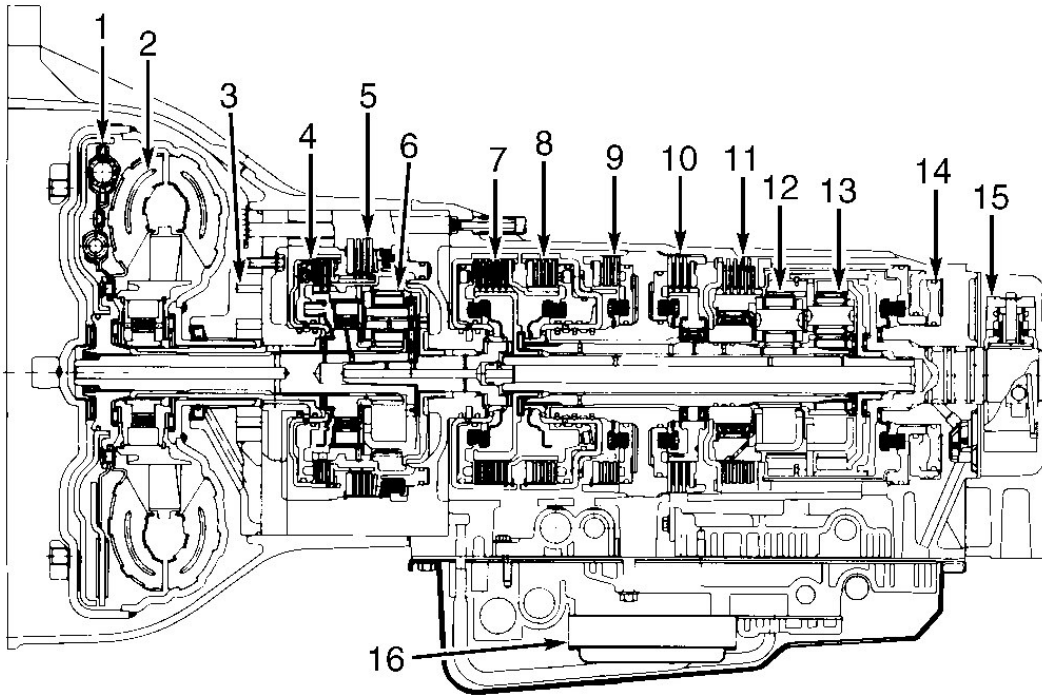


Fig. 1: Locating Vehicle Identification Code Plate
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



- | | |
|----------------------------|----------------------------|
| 1. Torque Converter Clutch | 9. No. 1 Brake |
| 2. Torque Converter | 10. No. 2 Brake |
| 3. Oil Pump | 11. No. 3 Brake |
| 4. OD Clutch | 12. Front Planetary Gear |
| 5. OD Brake | 13. Rear Planetary Gear |
| 6. OD Planetary Gear | 14. No. 3 Brake Piston |
| 7. Forward Clutch | 15. Governor |
| 8. Direct Clutch | 16. Control Valve Assembly |

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Fig. 2: Identifying Transmission Component Locations
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

LUBRICATION

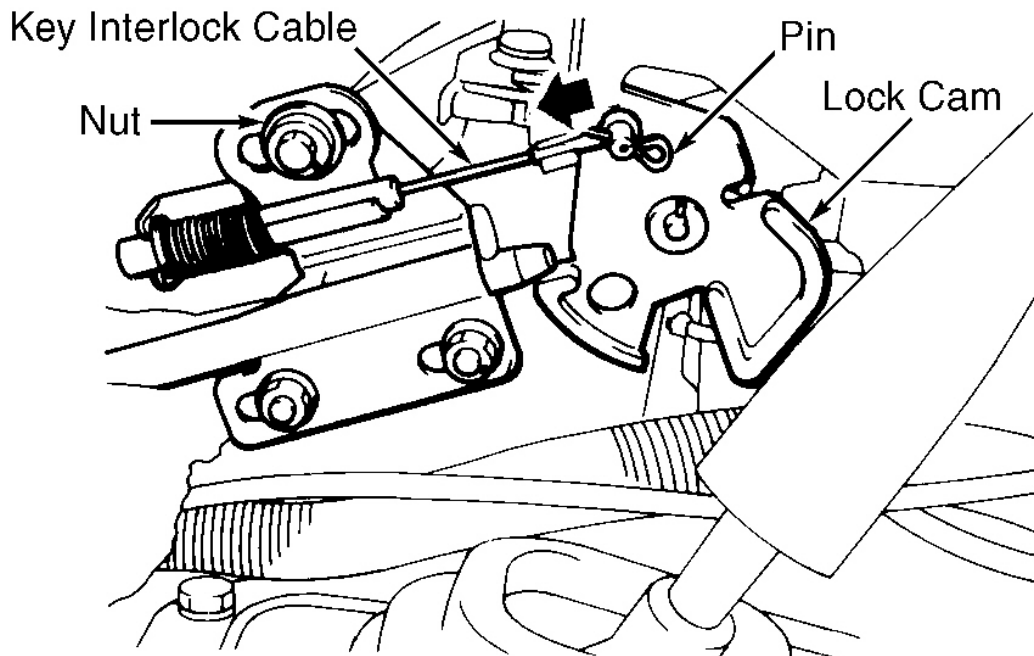
See the appropriate TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANS SERVICING section.

ADJUSTMENTS

KEY INTERLOCK CABLE

Remove front console assembly. Move selector lever to Park. Turn ignition switch to LOCK position. Loosen

nut securing key interlock cable. See **Fig. 3** . Gently push lock cam until pin stops in direction of arrow, then tighten nut to 106 INCH lbs. (12 N.m) to secure cable. Install front console assembly.



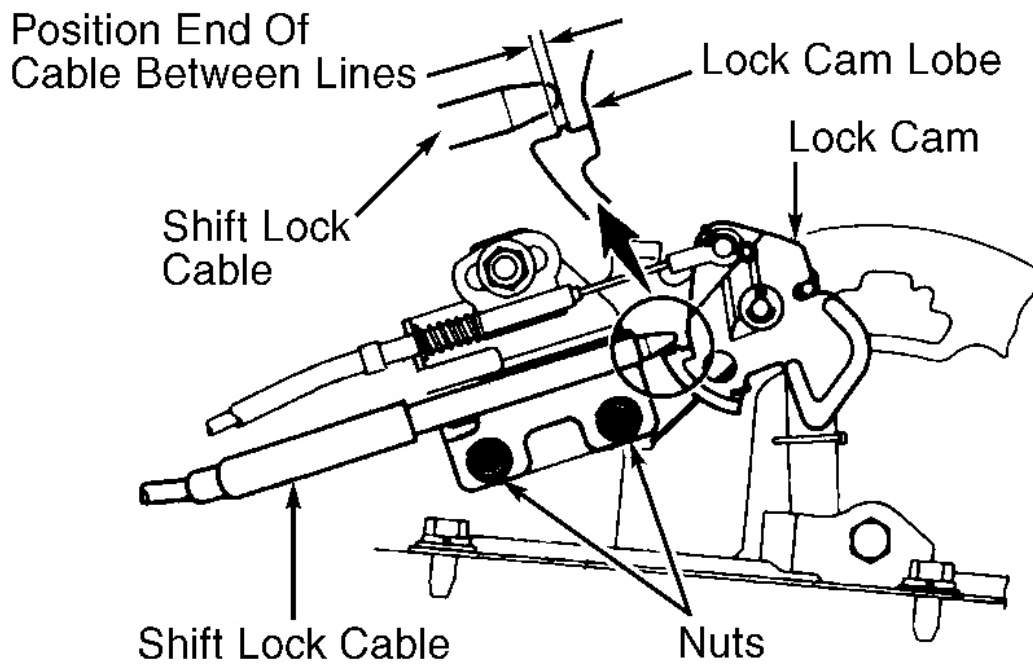
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Fig. 3: Adjusting Key Interlock Cable

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

SHIFT LOCK CABLE

Remove front console assembly. Move selector lever to Park. Loosen nuts securing shift lock cable. See **Fig. 4** . Adjust shift lock cable so end of cable (Red mark) sits between lobe of lock cam, then tighten nut to 44 INCH lbs. (5 N.m) to secure cable. Install front console assembly.



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Fig. 4: Adjusting Shift Lock Cable

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

NEUTRAL SAFETY SWITCH ADJUSTMENT

See the appropriate TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANS SERVICING section.

SHIFT LINKAGE ADJUSTMENT

For shift linkage adjustment, see the appropriate TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANS SERVICING section.

THROTTLE CABLE ADJUSTMENT

For throttle cable adjustment, see the appropriate TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANS SERVICING section.

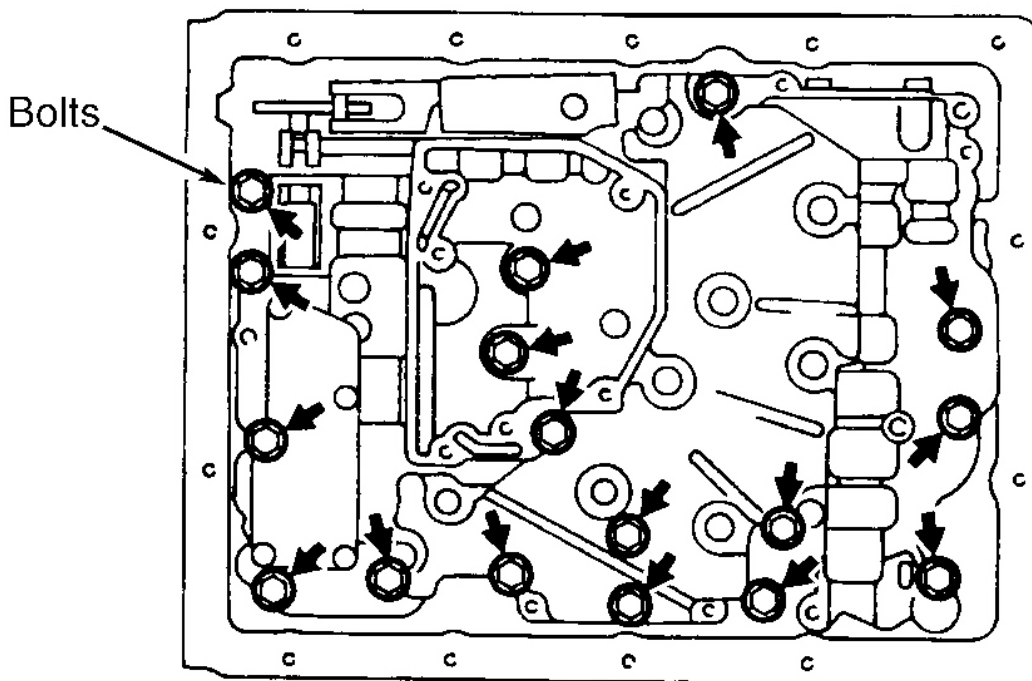
ON-VEHICLE SERVICE**CONTROL VALVE ASSEMBLY R & I**

Removal

1. Remove drain plug and drain ATF. Remove oil pan and gasket. Remove magnets from oil pan. Note location of oil tubes. Using screwdrivers, pry at both ends of oil tubes and remove oil tubes.
2. Remove oil strainer and gasket. Remove control valve assembly retaining bolts. See **Fig. 5** . Note bolt location and length for installation reference. Slightly lower control valve assembly and disconnect throttle cable from throttle cam. Remove control valve assembly.

Installation

To install, reverse removal procedure. Ensure manual shift lever in transmission case aligns with manual valve of control valve assembly. Connect throttle cable to throttle cam. Tighten control valve assembly bolts to 89 INCH lbs. (10 N.m). Tighten oil pan bolts to 40 INCH lbs. (4.5 N.m). Fill transmission with ATF to proper fluid level.

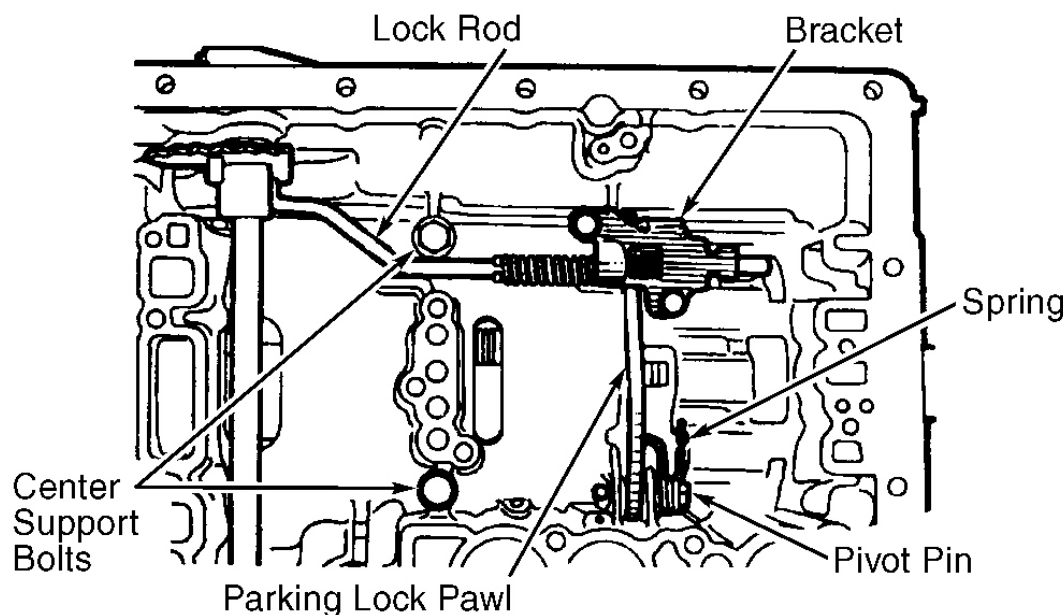


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Fig. 5: Identifying Control Valve Assembly Bolt Locations
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

PARKING LOCK PAWL R & I**Removal & Installation**

1. Remove control valve assembly. Remove parking lock pawl bolts and bracket. Remove parking pawl torsion spring. Pull out pivot pin and remove parking lock pawl. Remove parking lock rod from manual valve lever. See **Fig. 6**.
2. To install, reverse removal procedures. Prior to installing parking lock pawl bracket bolts, push lock rod forward. Finger tighten bolts and ensure parking lock pawl operates smoothly. Tighten bracket bolts to 65 INCH lbs. (7.4 N.m).



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Fig. 6: Removing Parking Lock Pawl Components
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REAR OIL SEAL R & I

Removal & Installation

1. Raise and support vehicle. Place reference marks on drive shaft and companion flange. Remove drive shaft. Clean seal surrounding areas. Using appropriate seal remover, remove oil seal from extension housing. Note direction of seal installation.
2. Using appropriate seal installer, install seal in extension housing until seal bottoms. To complete installation, reverse removal procedure. Fill transmission to proper level.

TROUBLE SHOOTING

SYMPTOM DIAGNOSIS

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Preliminary Checks

Ensure fluid level is correct. Inspect and adjust throttle cable, shift linkage and neutral safety switch (if necessary). Check engine idle speed and adjust as necessary.

Fluid Discolored or Smells Burnt

Fluid contaminated, damaged torque converter or transmission assembly.

No Movement In Any Gear Position

Manual shift linkage or cable out of adjustment. Faulty valve body, primary regulator valve, parking lock pawl or torque converter. Damaged or broken converter drive plate or restricted oil filter.

Selector Lever Position Incorrect

Manual shift linkage or cable out of adjustment. Faulty manual valve and lever.

Harsh Engagement Into Any Forward Gear Position

Throttle cable out of adjustment. Faulty valve body, primary regulator valve, accumulator pistons or transmission assembly.

Delayed Upshifts Or Downshifts From OD-3 Or 3-2, Then Back To

OD

Throttle cable or cam faulty or out of adjustment. Faulty governor, OD solenoid valve or valve body.

Slips On Upshift, Or Slips Or Shudders On Acceleration

Manual shift linkage, cable or throttle cable out of adjustment. Faulty valve body, OD solenoid valve or transmission assembly.

Drag Or Binding On Upshifts

Manual shift linkage or cable out of adjustment. Faulty valve body or transmission assembly.

Lock-Up Does Not Occur

Faulty valve body, OD solenoid valve, torque converter or transmission assembly.

Harsh Downshift

Throttle cable or cam faulty or out of adjustment. Faulty accumulator pistons, valve body or transmission assembly.

No Downshift When Coasting

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Faulty governor, valve body, OD switch or OD solenoid valve.

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

Throttle cable out of adjustment. Faulty governor, valve body or OD solenoid valve.

No Engine Braking In 2nd Or "L" Position

Faulty valve body, OD solenoid valve or transmission assembly.

Vehicle Does Not Hold In "P" Position

Manual shift linkage or cable out of adjustment. Faulty parking lock pawl and spring.

CLUTCH & BAND APPLICATION

Selector Lever Position	Elements In Use
"D" (Drive)	
First Gear	Forward Clutch, No. 2 One-Way Clutch, OD Clutch & OD One-Way Clutch
Second Gear	Forward Clutch, No. 1 One-Way Clutch No. 2 Brake, OD Clutch & OD One-Way Clutch
Third Gear	Direct Clutch, Forward Clutch, No. 2 Brake, OD Clutch & OD One-Way Clutch
OD (Fourth Gear)	Direct Clutch, Forward Clutch, No. 2 Brake & OD Brake
"2" (Intermediate)	
First Gear	Forward Clutch, No. 2 One-Way Clutch OD Clutch & OD One-Way Clutch
Second Gear	Forward Clutch, No. 1 Brake, No. 2 Brake No. 1 One-Way Clutch, OD Clutch & OD One-Way Clutch
"1" (Low)	
First Gear	Forward Clutch, No. 3 Brake, No. 2 One-Way Clutch, OD Clutch & OD One Way Clutch
"R" (Reverse)	Direct Clutch, No. 3 Brake, OD Clutch & OD One-Way Clutch

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"N" (Neutral)	OD Clutch & OD One-Way Clutch
"P" (Park)	No. 3 Brake & OD Clutch

PERFORMANCE TESTS

ROAD TEST

NOTE: Perform road test to ensure transmission shift points are at specified speeds. See **Fig. 7** . Broken lines in shift point chart indicates downshifts, and solid lines indicate upshifts.

"D" Position Test

1. Engine and transmission must be at normal operating temperature. Shift transmission into "D" position with OD switch in ON position. Ensure transfer case is in 2H (2WD-High) position. Depress accelerator pedal to full throttle. Ensure all upshifts and downshifts occur at specified points. See **Fig. 7** .
2. Ensure lock-up occurs at appropriate speeds. Lightly depress accelerator pedal. If excessive increase in engine RPM exists, lock-up did not occur.

NOTE: A 3-OD upshift will not occur with a throttle valve opening greater than 86 percent or if coolant temperature is below 122°F (50°C). A OD-3 kickdown is always possible with throttle valve opening of 86 percent or greater. Lock-up does not occur at coolant temperatures below 158°F (70°C).

3. Check for shock and slippage during all upshifts. Drive vehicle in 3rd and OD. Check for abnormal noise and vibration. While driving in OD, "D", 3rd and 2nd gear, ensure kickdown speeds in 2-1, 3-2 and OD-3 are within specification. Check for shock and slippage during kickdown.

"D" Position Test Results

- No 1-2 Upshift: Defective governor or stuck 1-2 shift valve.
- No 2-3 Upshift: Defective governor or stuck 2-3 shift valve.
- No 3-OD Upshift With Throttle Opening Less Than 86 Percent: Stuck 3-OD shift valve. If shift point is not within specification, check for misadjusted throttle cable or defective throttle valve, governor, OD switch or solenoid valve.
- Lock-Up Does Not Occur: Stuck OD solenoid valve.
- Excessive Shock & Slippage: High line pressure, defective accumulator or check balls. Abnormal noise and vibration may be caused by unbalance in drive shaft, differential, tires or torque converter.

"2" Position Test

Shift transmission to "2" position. With accelerator pedal held at full throttle, check for proper 1-2 upshift at specified throttle positions. See **Fig. 7** . While driving vehicle in 2nd gear, release accelerator and check engine braking effect. If engine braking does not exist, No. 1 brake is defective.

"L" Position Test

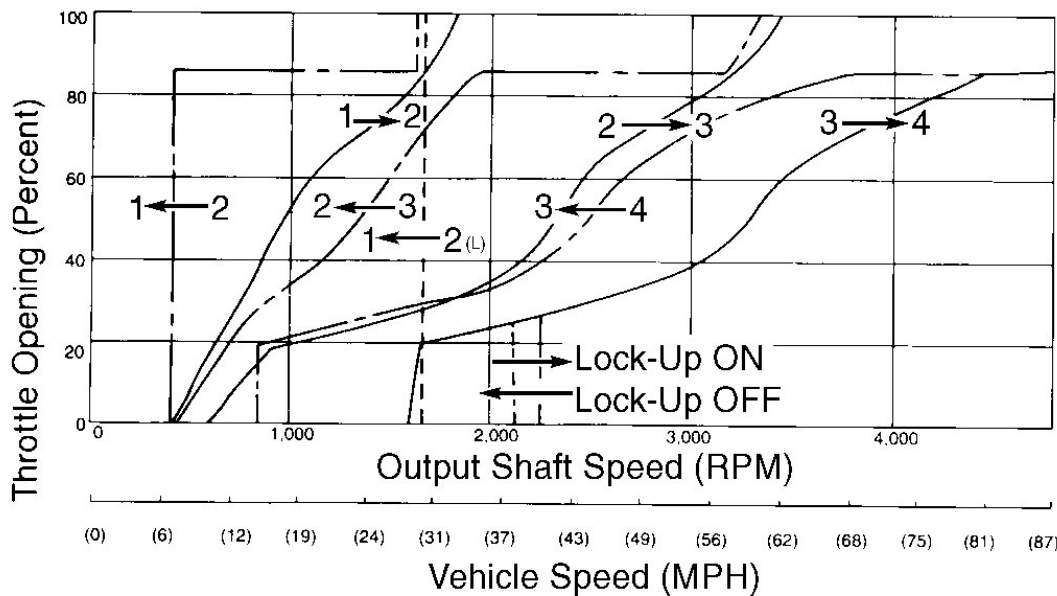
While driving vehicle in "L" position, check for failure to upshift to 2nd gear. Check engine braking effect when accelerator is released. If engine braking does not exist, No. 3 brake is defective.

"R" Position Test

Shift vehicle to "R" position. Accelerate vehicle and check for transmission slippage.

"P" Position Test

Stop vehicle on incline of 5 degrees or steeper. Shift vehicle to "P" position and release parking brake. Ensure parking lock pawl prevents vehicle from moving.



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Fig. 7: Identifying Transmission Shift Points

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

STALL SPEED TEST

Procedure

1. Operate engine and transmission at normal operating temperature. Connect tachometer to vehicle and ensure it is visible to driver. Apply parking brake and block front wheels.

CAUTION: DO NOT maintain stall speed RPM for more than 5 seconds. If performing more than one stall speed test, operate engine at about

1000 RPM in Neutral for 2 minutes to cool transmission fluid before performing next test.

2. Start engine, apply brakes and place transmission in "D" position. Depress accelerator to full throttle and note maximum RPM obtained. Repeat test in "R" position. Stall speed should be 2100-2400 RPM.

Stall Speed Test Results

- Stall Speed Is Same In Both Positions, But Less Than Specified: Engine output may be insufficient or defective stator one-way clutch.

NOTE: If stall speed RPM is greater than 600 RPM lower than specification, torque converter may be faulty.

- Stall Speed High In "D" Position: Low line pressure, slipping forward clutch or defective No. 2 or OD one-way clutch.
- Stall Speed High In "R" Position: Low line pressure, direct clutch slipping, No. 3 brake slipping or defective OD one-way clutch.
- Stall Speed High In Both Positions: Low line pressure, improper fluid level or defective OD one-way clutch.

HYDRAULIC PRESSURE TESTS

NOTE: Hydraulic pressure tests should be performed with transmission fluid at normal operating temperature of 158-176°F (70-80°C).

Line Pressure Test

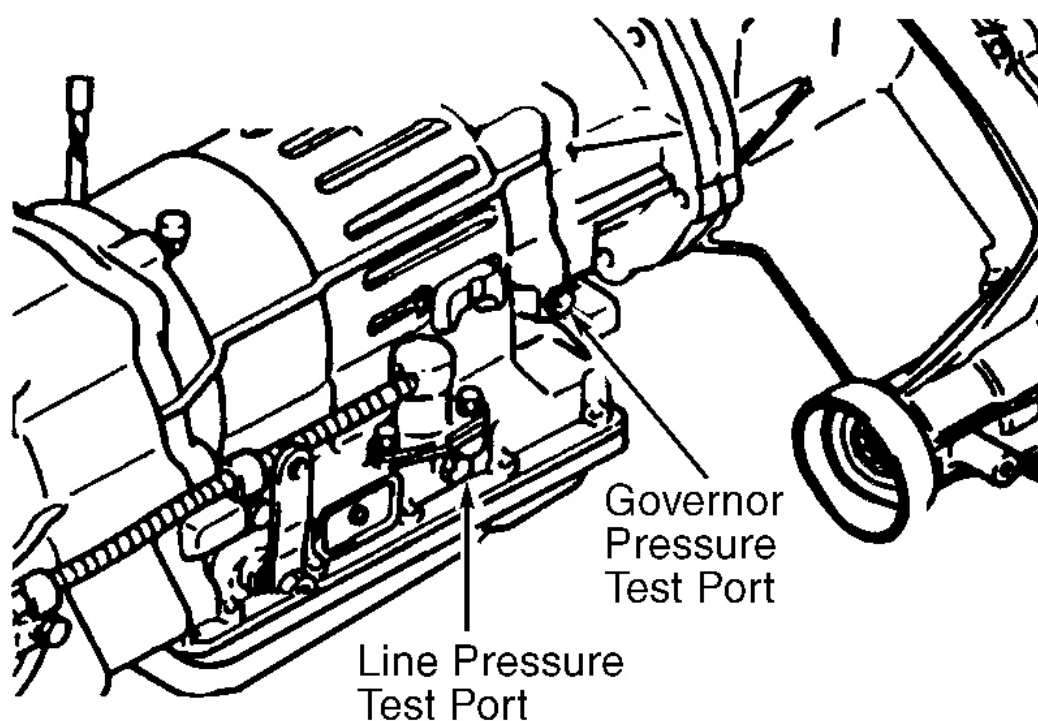
1. Ensure transmission fluid is at normal operating temperature. Connect pressure gauge to line pressure test port on transmission. See **Fig. 8**.
2. Connect tachometer to vehicle and ensure it is visible to driver. Block all 4 wheels and fully apply parking brake. Start engine and ensure idle speed is adjusted to specification.
3. Apply service brake and shift transmission to "D" position. Check line pressure at idle and record pressure reading. Accelerate vehicle to stall speed and record line pressure reading.
4. Repeat test procedure in "R" position. If line pressures are not as specified, check throttle cable adjustment. Adjust the throttle cable (if necessary), and repeat test the procedure and record pressure readings. Compare all readings to specification. Refer to the **LINE PRESSURE SPECIFICATIONS** table.

LINE PRESSURE SPECIFICATIONS

Engine Speed	"D" Position psi (kPa)	"R" Position psi (kPa)
Idle Speed	75-87 (520-600)	115-132 (790-910)
Stall Speed	160-189 (1100-1300)	232-290 (1600-2000)

Line Pressure Test Results

- Line Pressure High In Both Positions: Defective regulator valve or throttle valve, or throttle cable out of adjustment.
- Line Pressure Low In Both Positions: Defective oil pump, regulator valve, throttle valve or OD clutch, or throttle cable out of adjustment.
- Line Pressure Low In "D" Position Only: Defective forward clutch, OD clutch or fluid leak in "D" position circuit.
- Line Pressure Low In "R" Position Only: Defective direct clutch, OD clutch, No. 3 brake or fluid leak in "R" position circuit.



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Fig. 8: Identifying Transmission Hydraulic Pressure Test Ports
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Governor Pressure Test

1. Connect the pressure gauge to the governor pressure test port on the side of transmission. See **Fig. 8** . Start engine and release parking brake. With transmission in "D" position, slowly depress accelerator and check governor pressure at specified speed. Refer to the **GOVERNOR PRESSURE SPECIFICATIONS** table.

CAUTION: Road test vehicle or use chassis dynamometer to check governor

pressures exceeding minimum vehicle speed specification.

2. If governor pressures are incorrect, possible causes are: incorrect line pressure, fluid leakage in governor pressure circuit or defective governor.

GOVERNOR PRESSURE SPECIFICATIONS

Vehicle Speed MPH	Output Shaft RPM	Pressure psi (kPa)
17	1000	20-25 (140-170)
35	2000	36-42 (250-290)
56	3200	59-68 (410-470)

COMPONENT & SYSTEM TESTING

A/T FLUID TEMPERATURE SWITCH

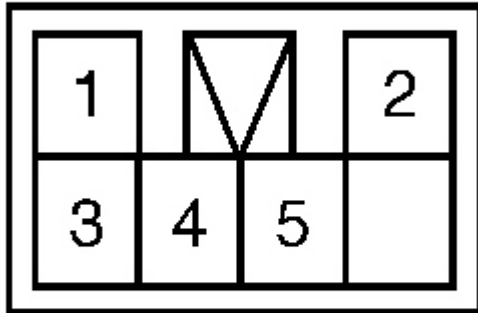
1. Remove fluid temperature switch, located to rear of neutral safety switch. Immerse switch in container of ATF up to top threaded portion of switch. Using a DVOM, check continuity between switch terminals. Continuity should not exist when fluid temperature is 257°F (125°C) or less.
2. When fluid is heated to 289-304°F (143-151°C), continuity should exist. Replace switch if necessary. Apply thread sealant to fluid temperature switch threads and install in transmission.

OVERDRIVE SOLENOID VALVE

Normal condition exists when ohmmeter indicates continuity between terminal and ground. Ensure operating noise (click) is heard when ignition switch is turned to ON position.

OVERDRIVE SWITCH

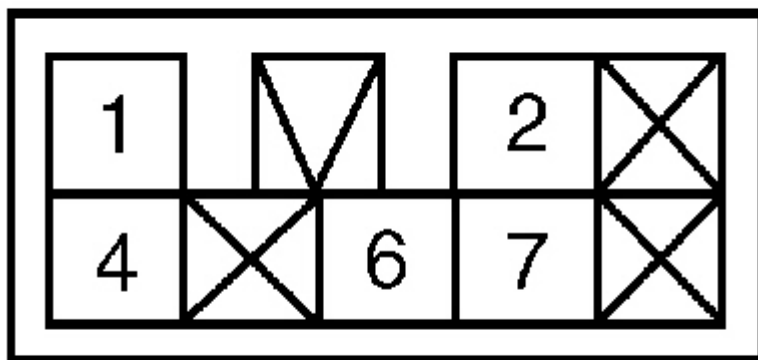
Using a screwdriver, remove overdrive switch from selector lever, located below selector lever button. Using a DVOM, check continuity between overdrive switch terminals No. 3 and 5 with switch in ON position. Continuity should exist. With switch in OFF position, check continuity between terminals No. 3 and 4. Continuity should exist. If continuity is not as specified, replace switch. See **Fig. 9**.



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Fig. 9: Identifying Overdrive Switch Terminals**Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.****PATTERN SELECT SWITCH (1994 MODELS)**

Using a screwdriver, remove pattern select switch from console. Switch is located at rear of selector lever, to right of emergency brake handle. Using a DVOM, check continuity between pattern select switch terminals No. 1 and 2, with switch in HOLD position. Continuity should exist. With switch in POWER position, check continuity between terminals No. 1 and 6. Continuity should exist. If continuity is not as specified, replace switch. See **Fig. 10**.



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Fig. 10: Identifying Pattern Select Switch Terminals
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

KEY INTERLOCK SYSTEM

1. With ignition switch in LOCK position and brake pedal depressed, ensure selector lever cannot be moved from Park to any other position. Ensure selector lever button cannot be pushed. With ignition switch in ACC position, brake pedal depressed and selector lever button pushed, ensure selector lever can be moved from Park position to any other position. Ensure selector lever moves smoothly.
2. Ensure ignition key cannot be turned to LOCK position at all selector lever positions other than Park. Ensure ignition key turns smoothly to LOCK position when selector lever is set to Park and selector lever button is released. If key interlock system is not as specified, adjust key interlock cable. See **KEY INTERLOCK CABLE** under ADJUSTMENT.

SHIFT LOCK SYSTEM

1. With ignition switch in ACC position, brake pedal released and selector lever button pushed, ensure selector lever cannot be moved from Park to any other position. With ignition switch in ACC position, brake pedal depressed and selector lever button pushed, ensure selector lever can be moved from Park position to any other position.
2. With selector lever in Reverse, ignition switch in ACC position, brake pedal released and selector button pushed, ensure selector lever can be moved from Reverse to Park position. If shift lock system is not as specified, adjust shift lock cable. Refer to **SHIFT LOCK CABLE** under ADJUSTMENTS.

REMOVAL & INSTALLATION

TRANSMISSION ASSEMBLY

For transmission removal and installation procedure, see appropriate AUTOMATIC TRANSMISSION REMOVAL article in TRANSMISSION SERVICING section.

TRANSFER CASE

For transfer case removal and installation, see appropriate TRANSFER CASE article in the TRANSFER CASES section.

TORQUE CONVERTER

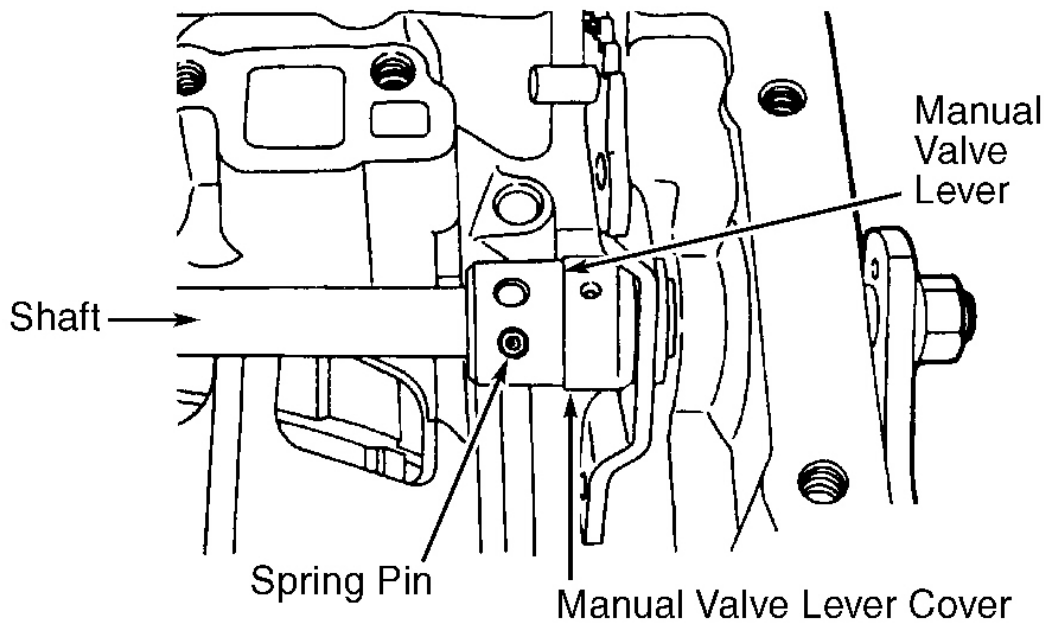
CAUTION: Torque converter is a welded assembly and is not serviceable. If a malfunction occurs or torque converter becomes contaminated with foreign material, it **MUST** be replaced. Torque converter cannot be flushed or repaired.

NOTE: For torque converter stall speed test, see **STALL SPEED TEST** under **PERFORMANCE TESTS**.

TRANSMISSION DISASSEMBLY

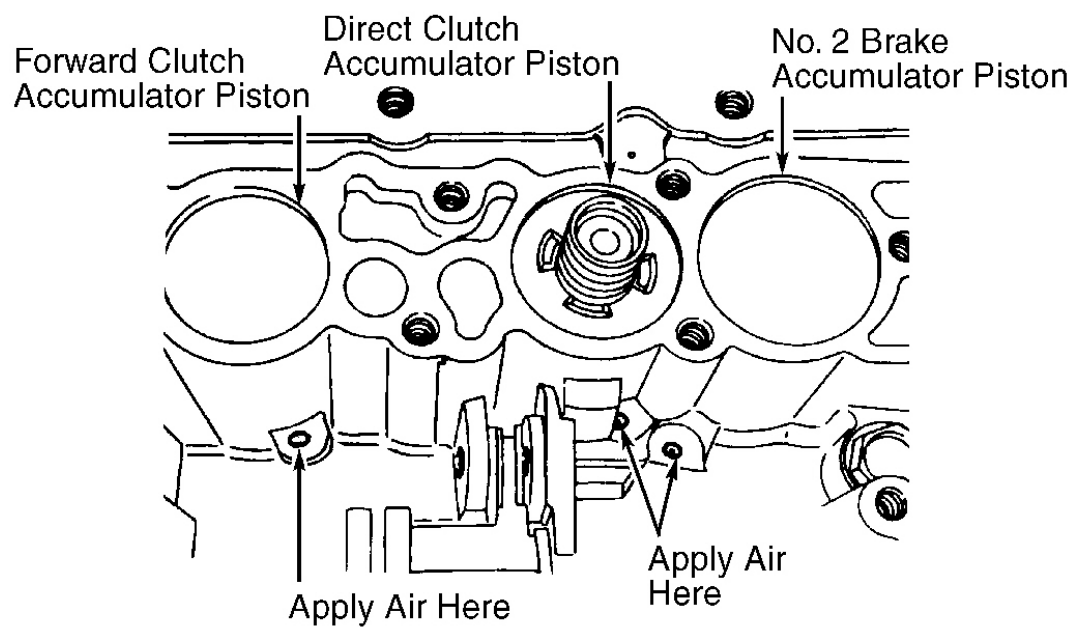
1. Ensure transmission case is clean of dirt and grease prior to disassembly. Remove wire harness clamp and throttle cable from converter housing. Remove control shaft lever. Remove OD solenoid valve and neutral safety switch. Remove transfer case. See appropriate article in the TRANSFER CASES section. Remove torque converter.
2. Remove oil pump bolts. Using appropriate puller, remove oil pump assembly from transmission case. Remove converter housing bolts. Note length and location of bolts. While holding input shaft, remove converter housing. Remove extension housing and gasket. Note bolt length and location. Remove oil supply tube (if equipped). Remove transfer adapter (if equipped).
3. Remove snap ring, speedometer drive gear, lock ball and remaining snap ring from output shaft. Remove staked area on lock plate. Remove governor lock plate bolt. Using a screwdriver, lift retaining clip from hole in output shaft. Remove governor from output shaft. Remove oil pan bolts, oil pan and gasket. Inspect pan for metal or brass particles. Remove oil tubes by prying both ends of tube with screwdrivers. Remove oil strainer and gasket.
4. Remove control valve assembly. See **CONTROL VALVE ASSEMBLY** under ON-VEHICLE SERVICE. Raise control valve assembly slowly and remove throttle cable from throttle cam. Push throttle cable adapter with nut driver to disconnect throttle cable from case.
5. Remove parking lock pawl. See **PARKING LOCK PAWL** under ON-VEHICLE SERVICE. Using a screwdriver, move manual valve lever cover outward. Drive out spring pin, and then remove shaft and manual valve lever. See **Fig. 11** . Remove oil seal from manual valve shaft (if necessary).
6. Place shop cloth over accumulator pistons. Using compressed air, remove accumulator pistons and springs from transmission case. See **Fig. 12** . Note location of springs and pistons for reassembly reference.
7. Remove input shaft, OD planetary gear and OD clutch as an assembly from transmission case. Remove OD case, forward clutch and direct clutch. Remove 2 center support bolts. See **Fig. 6** . Remove center support and sun gear as an assembly.

8. Remove snap ring securing planetary assembly in transmission case. Remove intermediate shaft, clutch plates and planetary assembly from transmission case. Remove output shaft from transmission case. Remove No. 3 brake apply tube. Remove output shaft thrust bearing race No. 19 and thrust bearing No. 18 from transmission case.
9. Using calipers, measure pack clearance of No. 3 brake between disc and transmission case. Pack clearance should be .024-.1049" (.61-2.640 mm). If clearance is not as specified, inspect brake discs. Remove 3 phillips-head rear cover screws, rear cover and gasket. Remove case filter. See **Fig. 13**.
10. Remove No. 3 brake pack and pressure plate. Using appropriate spring compressor, compress No. 3 brake return spring assembly. Remove snap ring. Remove spring assembly. Apply compressed air to appropriate transmission case oil hole, and remove No. 3 brake pistons and sleeve. See **Fig. 14**. Measure inside diameter of transmission case rear bushing. Replace transmission case if bushing diameter exceeds 1.504" (38.19 mm).



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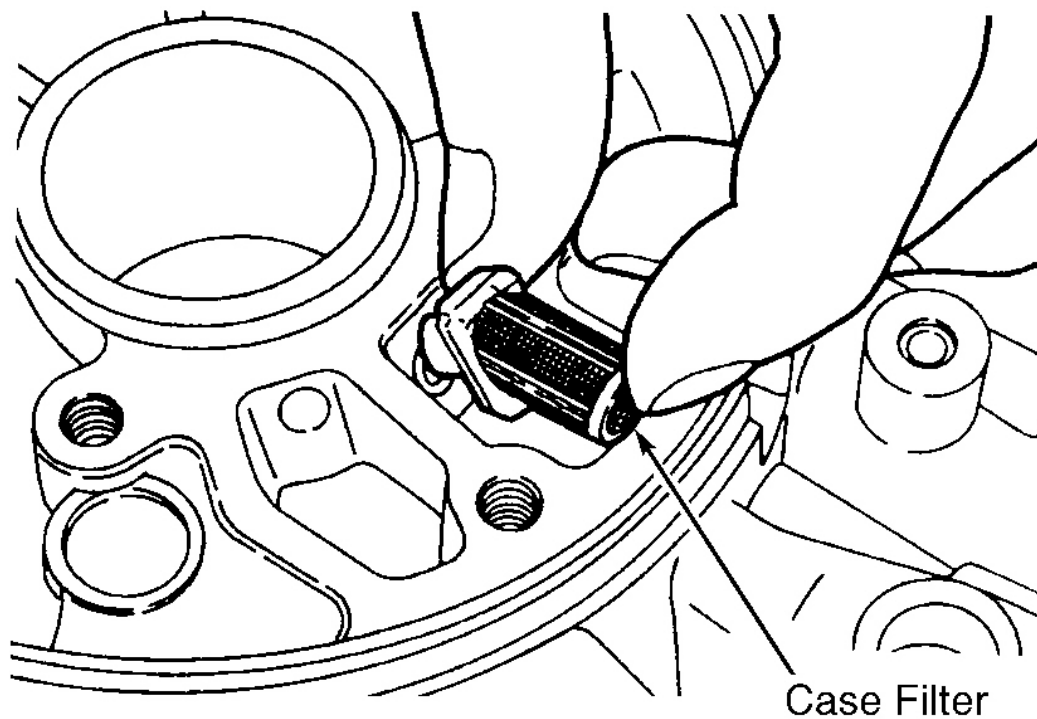
Fig. 11: Removing Manual Shaft & Lever
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



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Fig. 12: Removing Accumulator Pistons

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



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Fig. 13: Removing Case Filter

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

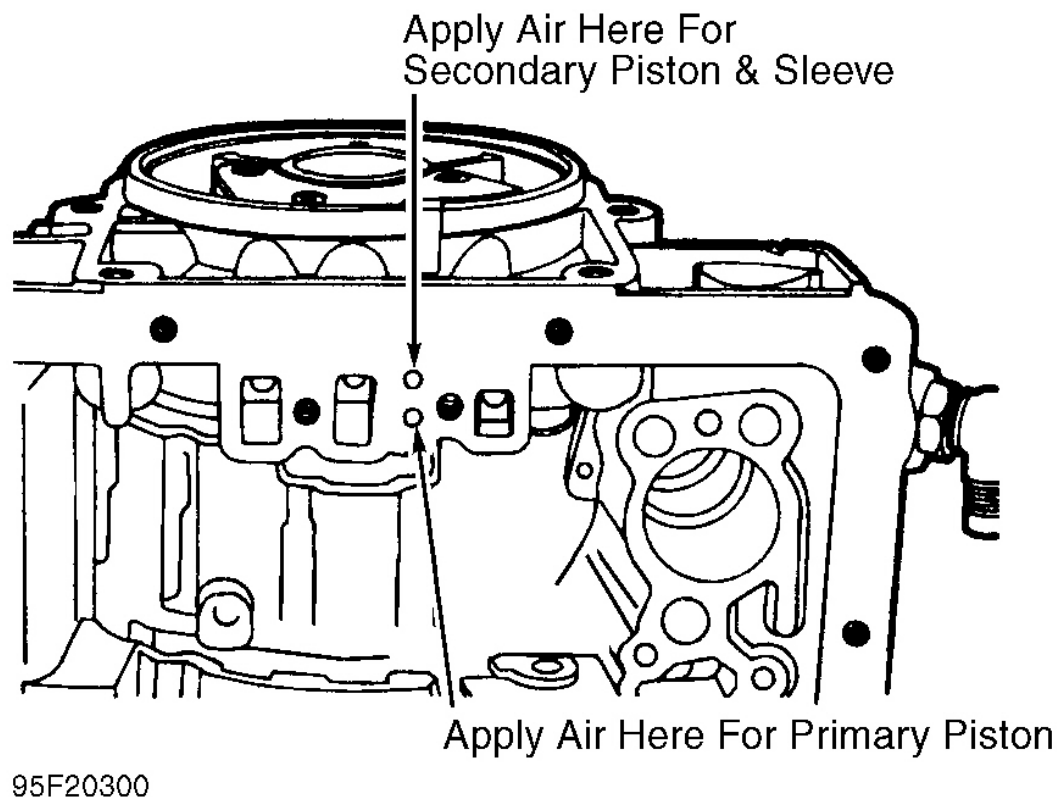


Fig. 14: Removing No. 3 Brake Pistons & Sleeve

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

COMPONENT DISASSEMBLY & REASSEMBLY

OIL PUMP

Disassembly

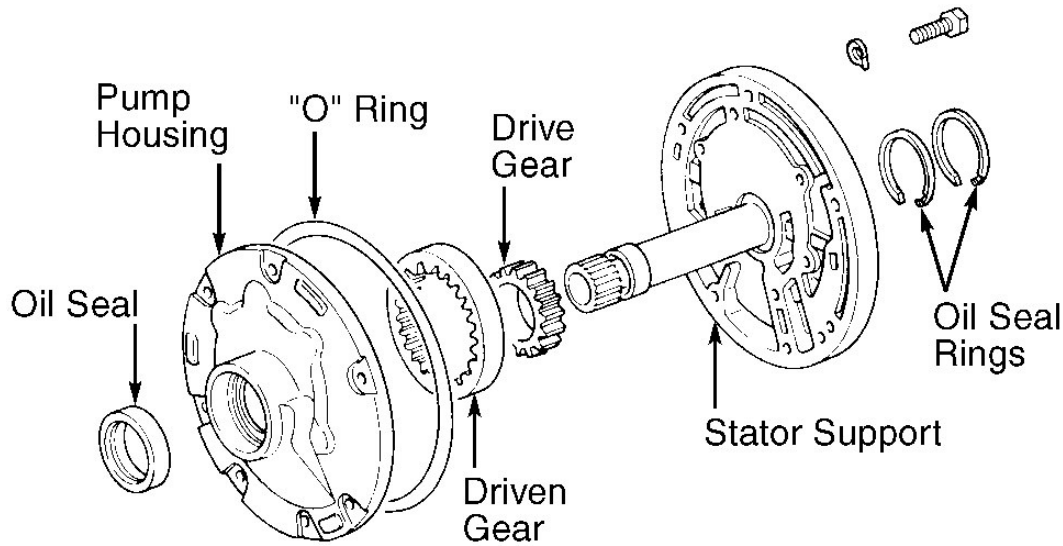
Remove "O" ring from oil pump housing. Remove stator support bolts. Remove stator support from oil pump housing. Place reference marks on drive and driven gears for reassembly reference. Remove gears. Remove seal rings from stator support. Pry oil seal from oil pump housing. See **Fig. 15**.

Inspection

Clean all components in solvent. Dry with compressed air. Inspect all components for damage or wear. Using feeler gauge and straightedge, measure side gear clearance between pump housing face and top of gears. See **Fig. 16**. Clearance should be .0008-.0020" (.020-.050 mm), with a limit of .004" (.10 mm). If clearance is not as specified, replace components as necessary.

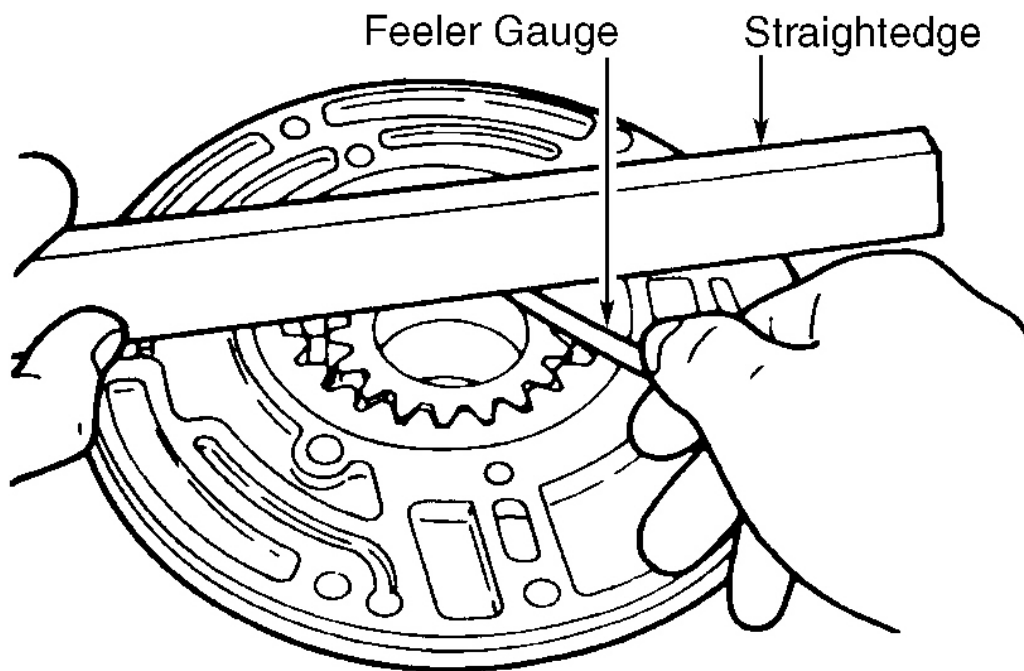
Reassembly

1. Coat all components with ATF. Align reference marks on drive and driven gears during reassembly. Install stator support on oil pump housing and align bolt holes. Install but do not tighten stator support bolts.
2. Install Oil Pump Aligning Tool (MD998335) around outside of oil pump housing to align pump housing and stator support. See **Fig. 17** . Tighten stator support bolts to 53-71 INCH lbs. (6-8 N.m). Remove aligning tool. Install seal rings. **DO NOT** spread seal ring ends more than necessary for installation. Ensure seal rings move smoothly after installation. Ensure oil pump drive gear rotates smoothly. Lubricate and install "O" ring on oil pump housing.



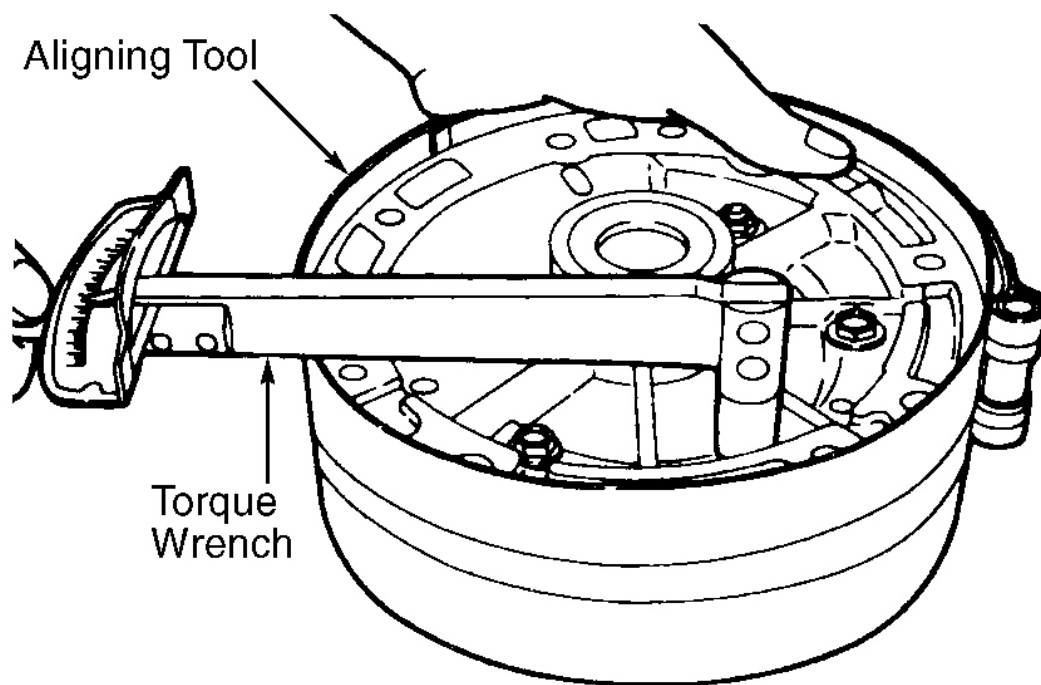
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Fig. 15: Exploded View Of Oil Pump Assembly
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



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Fig. 16: Measuring Oil Pump Side Gear Clearance
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



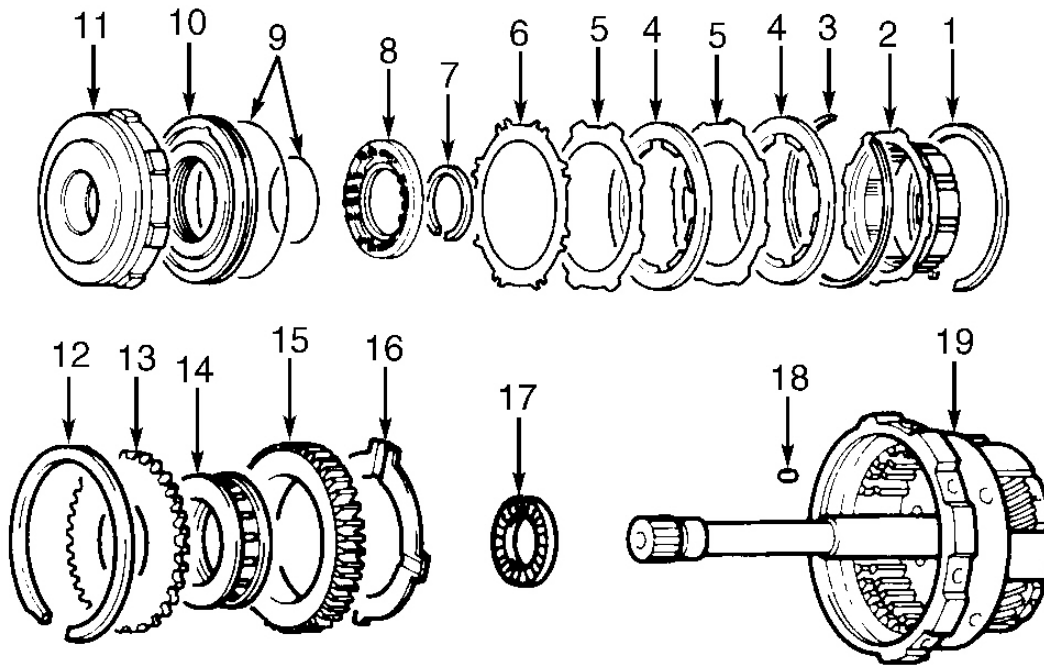
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Fig. 17: Aligning Oil Pump Housing & Stator Support
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

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

Disassembly

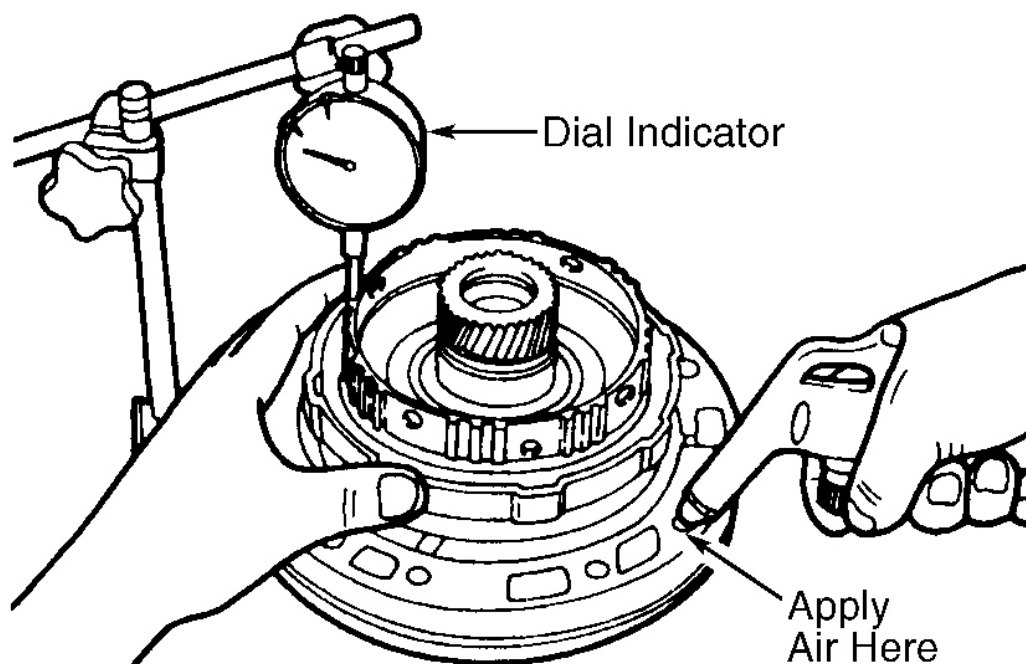
1. Remove OD clutch drum from OD planetary gear. Remove No. 3 thrust bearing from planetary gear. See **Fig. 18** . Place OD clutch assembly on oil pump assembly. Using a dial indicator, measure OD clutch piston stroke, while applying 57-114 psi (4-8 kg/cm²) to oil pump port. See **Fig. 19** .
2. Piston stroke should be .076-.104" (1.92-2.64 mm). If dial indicator reading is not within specified range, inspect discs for wear or damage. Remove OD clutch assembly from oil pump assembly. Remove OD brake hub snap ring and hub. Remove snap ring, discs, clutch plates and cushion plate.
3. Using appropriate spring compressor and press, compress return spring assembly and remove small snap ring. Remove return spring assembly. Install OD clutch drum on oil pump assembly. Hold OD clutch piston and apply compressed air to oil pump to remove OD clutch piston. See **Fig. 19** . Remove 2 "O" rings from piston.
4. Remove snap ring, one-way clutch assembly and thrust washer. Disassemble one-way clutch. Remove retainer from one-way clutch. Remove one-way clutch from outer race. See **Fig. 18** . Note direction of one-way clutch installation. Using a magnet, remove 4 pinion shaft plugs. **DO NOT** lose plugs.



- | | |
|---------------------------|-------------------------------|
| 1. Snap Ring No. 1 | 11. OD Clutch Drum |
| 2. OD Brake Hub | 12. Snap Ring No. 3 |
| 3. Snap Ring No. 2 | 13. One-Way Clutch Retainer |
| 4. Disc | 14. One-Way Clutch Assembly |
| 5. Plate | 15. One-Way Clutch Outer Race |
| 6. Cushion Plate | 16. Thrust Washer |
| 7. Small Snap Ring | 17. Thrust Bearing No. 3 |
| 8. Return Spring Assembly | 18. Pinion Shaft Plugs (4) |
| 9. "O" Ring | 19. OD Planetary Gear |
| 10. OD Clutch Piston | |

95J20304

Fig. 18: Exploded View Of OD Planetary Gear, OD Clutch & OD One-Way Clutch
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



95A20305

Fig. 19: Measuring OD Clutch Piston Stroke

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Inspection

Inspect discs and clutch plates for flaking or burnt areas. If disc lining is peeling or discolored, replace discs. Inspect 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 clutch piston. Apply compressed air to check ball area. Ensure check ball does not allow air to bleed through piston.

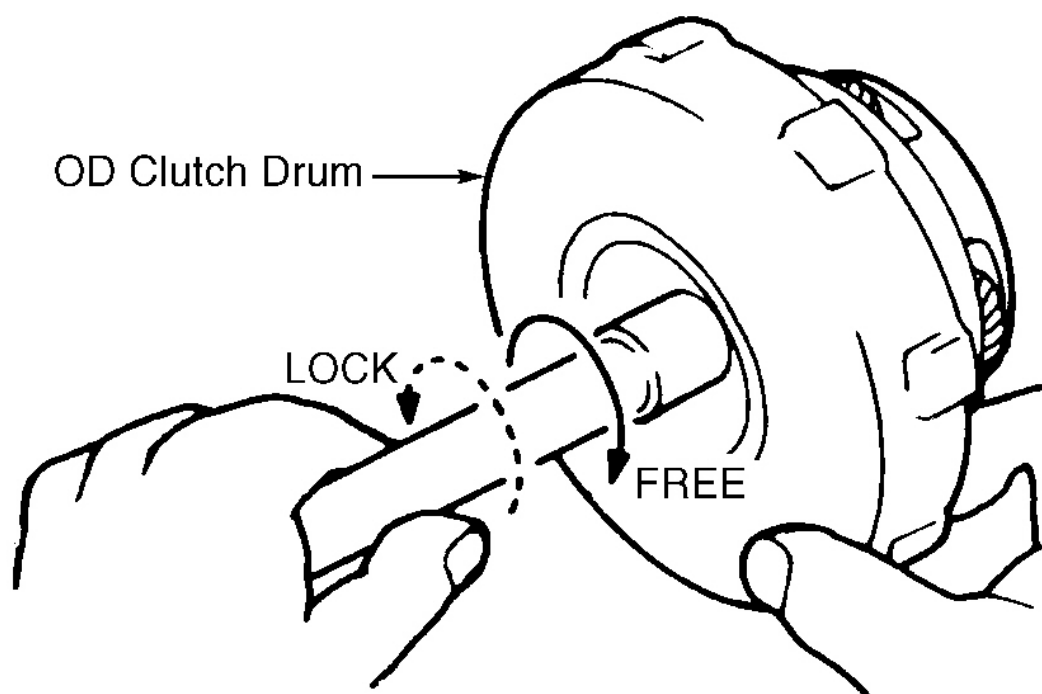
CAUTION: Clutch discs should be soaked in ATF for at least 2 hours prior to installation. Lubricate all parts with ATF. Coat thrust bearings and races with petroleum jelly.

Reassembly

1. Install 4 pinion shaft plugs in planetary gear holes. Install thrust washer to OD planetary gear with grooved side facing upward. Install one-way clutch in outer race with open end of retainer facing upward. Install retainer on one-way clutch. Install one-way clutch assembly. Install snap ring.
2. Coat NEW "O" rings with ATF and install on OD clutch piston. Using appropriate spring compressor and hand pressure, carefully press OD clutch piston into clutch drum. Using spring compressor, compress

return spring assembly and install snap ring. Ensure end gap of snap ring is not aligned with spring seat claw.

3. Install cushion plate. Install clutch plates with rounded edge facing upward. Install clutch discs and snap ring. Ensure end gap of snap ring is not aligned with cutout portion of clutch drum. Install OD brake hub and snap ring. Ensure end gap of snap ring is not aligned with cutout portion of drum.
4. Recheck piston stroke of OD clutch. If piston stroke is less than specified, check for incorrect reassembly of components. Install thrust bearing No. 3 on OD planetary gear. Install OD clutch assembly on OD planetary gear.
5. Rotate and push OD planetary gear to mesh splines of planetary gear with flukes of discs. Check one-way clutch operation. Hold OD clutch drum and rotate input shaft. Input shaft should rotate freely in clockwise direction and lock in counterclockwise direction. See **Fig. 20**.



95B20306

Fig. 20: Checking OD One-Way Clutch Operation
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

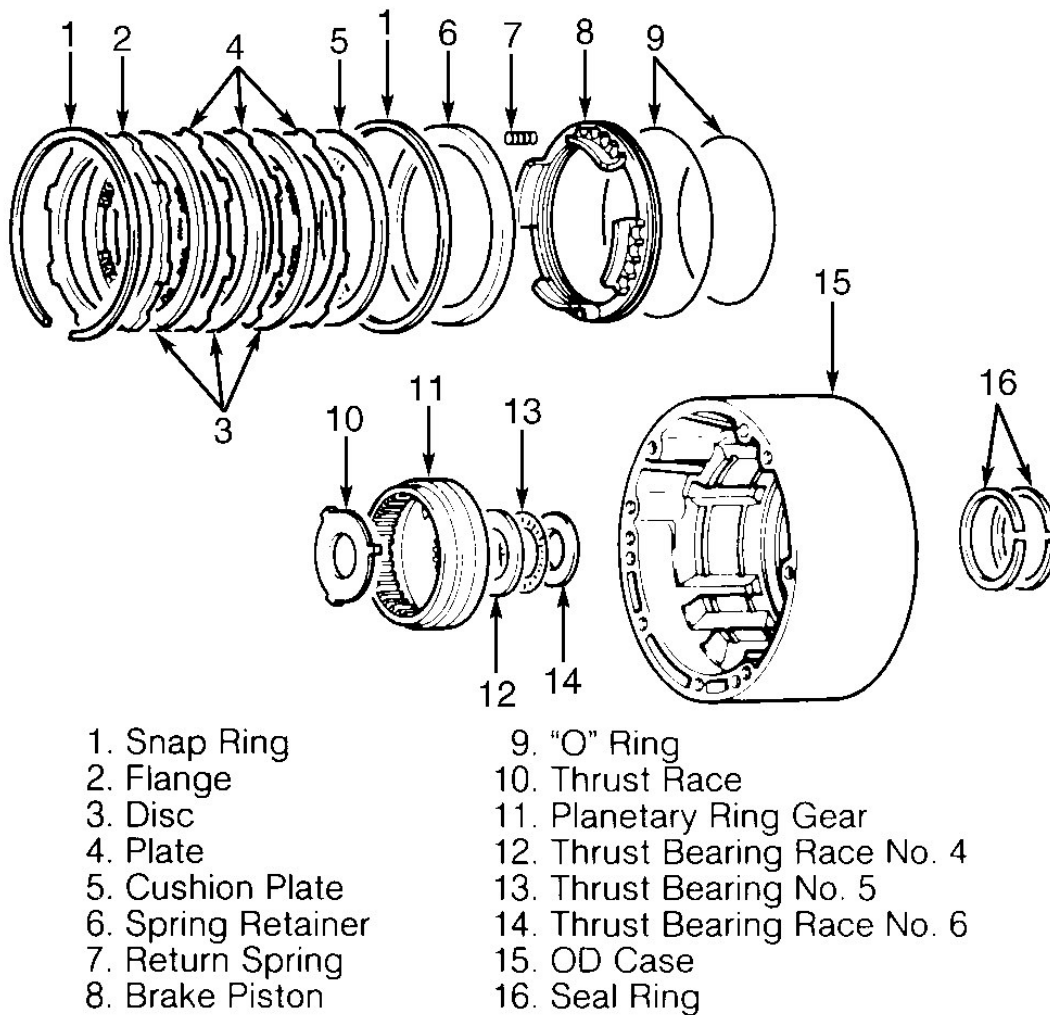
OVERDRIVE BRAKE

Disassembly

1. Prior to disassembly, check OD brake clearance. Using a feeler gauge, measure clearance between snap ring and flange. Standard clearance should be .026-.087" (.65-2.21 mm). Remove snap ring from OD

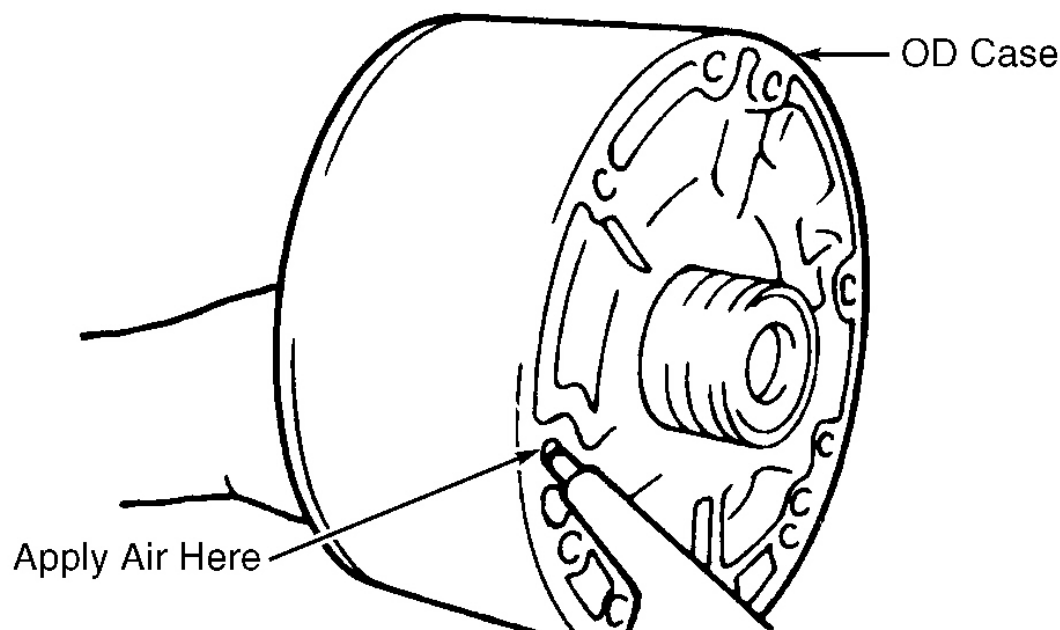
case. Remove flange, discs, plates and cushion plate. Note location and number of components.

2. Remove OD planetary ring gear, thrust bearing and races from OD case. Remove snap ring, spring retainer and return springs. See **Fig. 21** . Remove brake piston by applying air pressure to OD case. See **Fig. 22** . Remove oil seal rings from OD case and "O" rings from piston.



95C20307

Fig. 21: Exploded View Of OD Brake Components
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



95D20308

Fig. 22: Removing OD Brake Piston

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Inspection

Clean all components (except discs) with solvent. Dry with compressed air. Inspect flange, discs and plates for flaking or burnt areas. If disc lining is peeling or discolored, replace discs as necessary. Inspect return springs for wear, damage and collapsed coils.

CAUTION: Clutch discs should be soaked in ATF for at least 2 hours prior to installation. Lubricate all parts with ATF. Coat thrust bearing and races with petroleum jelly.

Reassembly

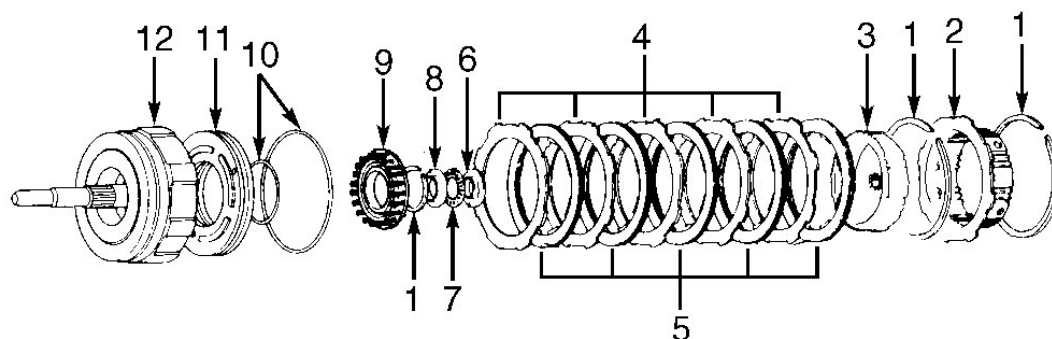
1. Lubricate and install oil seal rings on OD case. Ensure rings rotate smoothly after installation. Install NEW "O" rings on brake piston. Using hand pressure, carefully install brake piston into OD case.
2. Install return springs into OD case. Install spring retainer and snap ring. Ensure end gap of snap ring is not aligned with cutout portion of OD case. Ensure snap ring is inserted in its groove.
3. Install No. 6 bearing race, No. 5 thrust bearing and No. 4 bearing race on OD planetary ring gear. Install OD planetary ring gear assembly into OD case.
4. Install cushion plate into OD case with rounded side inward. Install discs and plates in appropriate order. Install flange with rounded edge facing upward. Install snap ring. Ensure end gap of snap ring is not

aligned with cutout portion of OD case. Recheck OD brake clearance. If measurement is not as specified, check for incorrect reassembly of components.

FORWARD CLUTCH

Disassembly

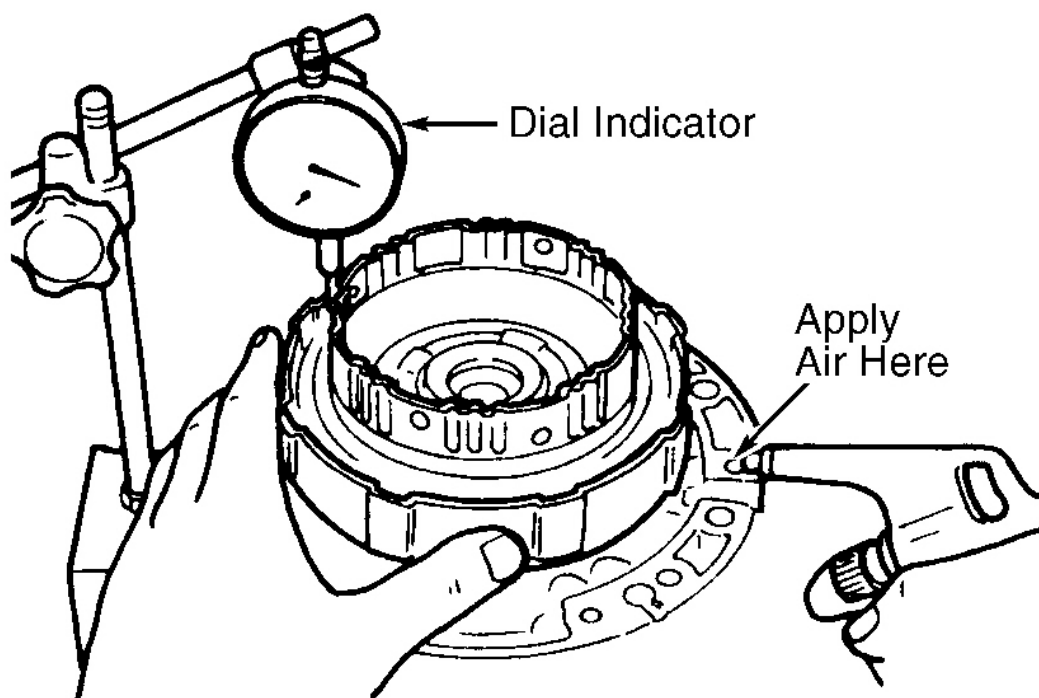
1. Prior to disassembly, check forward clutch piston stroke. Install forward clutch assembly to OD case. Remove snap ring. Remove direct and forward clutch hubs. Remove thrust bearing and races from clutch drum, noting component direction prior to removal. See **Fig. 23**.
2. Check forward clutch piston stroke. Install direct clutch hub and snap ring. Install forward clutch drum on OD case. 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. 24**. Piston stroke should be .056-.115" (1.43-2.93 mm). If piston stroke is not as specified, inspect discs. Remove snap ring and direct clutch hub.
3. Remove snap ring, discs and plates. Note location and number of components. Using appropriate spring compressor and press, compress return spring assembly. Remove snap ring and return spring assembly. Place clutch drum on OD case. Carefully apply air pressure to case oil hole to remove piston. See **Fig. 24**. Remove "O" rings from clutch piston.



- | | |
|-------------------------------|------------------------------|
| 1. Snap Ring | 7. Thrust Bearing No. 10 |
| 2. Direct Clutch Hub | 8. Thrust Bearing Race No. 9 |
| 3. Forward Clutch Hub | 9. Return Spring Assembly |
| 4. Plate | 10. "O" Ring |
| 5. Disc | 11. Forward Clutch Piston |
| 6. Thrust Bearing Race No. 11 | 12. Forward Clutch Drum |

95E20309

Fig. 23: Exploded View Of Forward Clutch Components
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



95H20310

Fig. 24: Measuring Forward Clutch Piston Stroke
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Inspection

1. Clean all components (except discs) with solvent. Dry with compressed air. Inspect plates and discs for flaking or burnt areas. If disc lining is peeling or discolored, replace discs 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. Inspect return spring assembly for wear, damage and collapsed coils. Replace worn or damaged components.

CAUTION: Clutch discs should be soaked in ATF for at least 2 hours prior to installation. Lubricate all parts with ATF. Coat thrust bearing and races with petroleum jelly.

Reassembly

1. Lubricate and install NEW "O" rings onto clutch piston. Using appropriate spring compressor and hand pressure, carefully install forward clutch piston into clutch drum. Install return spring assembly. Using spring compressor and appropriate press, compress return spring assembly and install snap ring. Ensure end gap of snap ring is not aligned with claw area on spring seat.

2. Install plates, discs and snap ring in appropriate order. See **Fig. 23** . Ensure end gap of snap ring is not aligned with cutout portion of forward clutch drum. Install direct clutch hub and snap ring. Recheck forward clutch piston stroke.
3. If piston stroke is less than specified, check for incorrect reassembly of components. If piston stroke is greater than specified, select a new plate. Remove snap ring and direct clutch hub. Install No. 9 and No. 11 bearing races and No. 10 thrust bearing into forward clutch drum with flat surface of races facing away from clutch drum.
4. Rotate and push forward clutch hub to mesh splines of forward clutch hub with flukes of discs. Install forward clutch hub into forward clutch drum. Install direct clutch hub and snap ring. Ensure end gap of snap ring is not aligned with cutout portion of clutch drum.

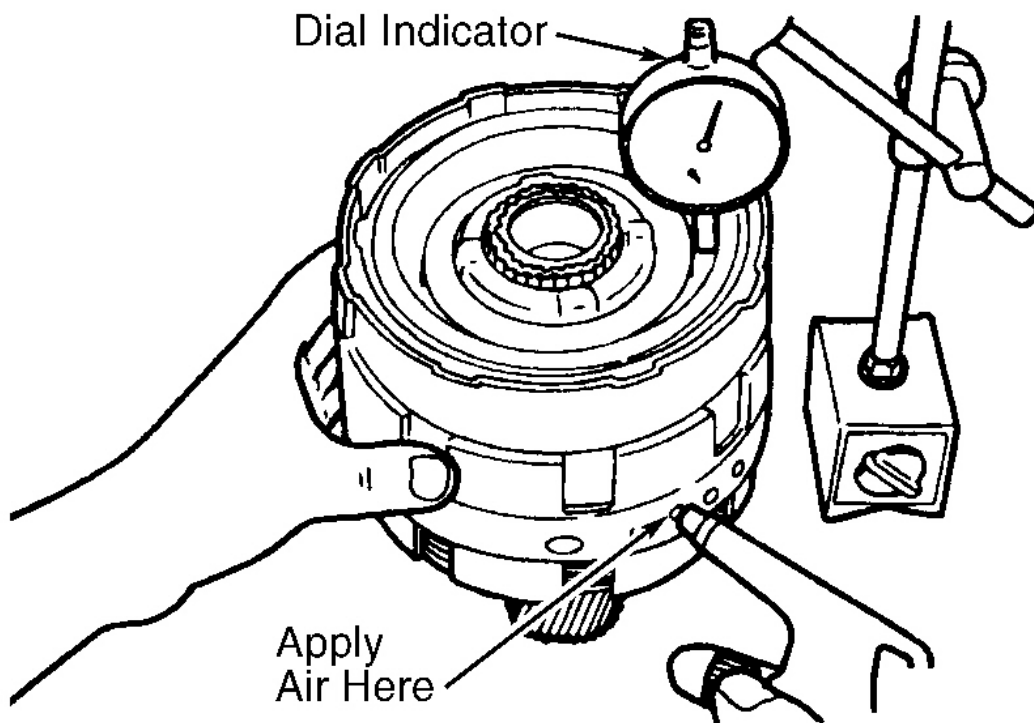
DIRECT CLUTCH

Disassembly

1. Prior to disassembly, place direct clutch drum on center support. Using a dial indicator and compressed air, measure direct clutch piston stroke while applying 57-114 psi (4-8 kg/cm²) to center support oil hole. See **Fig. 25** . Piston stroke should be .036-.078" (.91-1.99 mm). If piston stroke is not as specified, inspect discs. Remove direct clutch from center support.
2. Remove snap ring, flange, discs and plates. Note location and number of components. Using appropriate spring compressor and press, compress return spring assembly and remove snap ring. Remove return spring assembly.
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. See **Fig. 25** . Remove "O" rings from piston.

Inspection

1. Clean all components (except discs) with solvent. Dry with compressed air. Inspect plates and discs for flaking or burnt areas. If disc lining is peeling or discolored, replace discs 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. Inspect return springs for wear, damage and collapsed coils. Replace worn or damaged components.



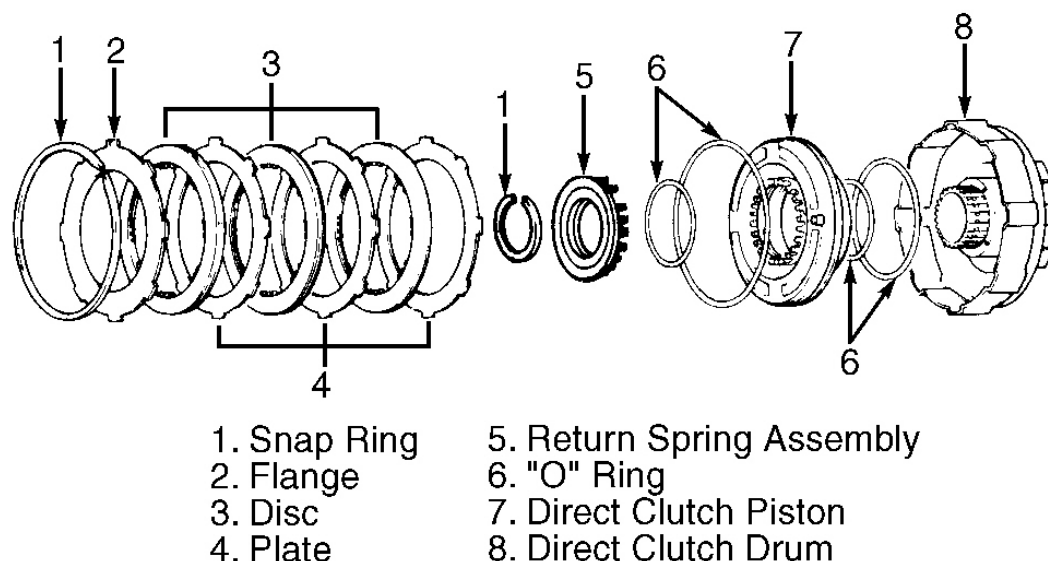
95I20311

Fig. 25: Measuring Direct Clutch Piston Stroke
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CAUTION: Clutch discs should be soaked in ATF for at least 2 hours prior to installation. Lubricate all parts with ATF.

Reassembly

1. Lubricate and install NEW "O" rings on clutch piston. Using spring compressor and hand pressure, carefully install direct clutch piston into clutch drum. Using spring compressor and press, install return spring assembly and snap ring. Ensure end gap of snap ring is not aligned with spring seat claw.
2. Install plates, discs and snap ring in appropriate order. See **Fig. 26** . Install flange with flat end 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. If piston stroke is less than specified, check for incorrect reassembly of components.



95J20312

Fig. 26: Exploded View Of Direct Clutch Components
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

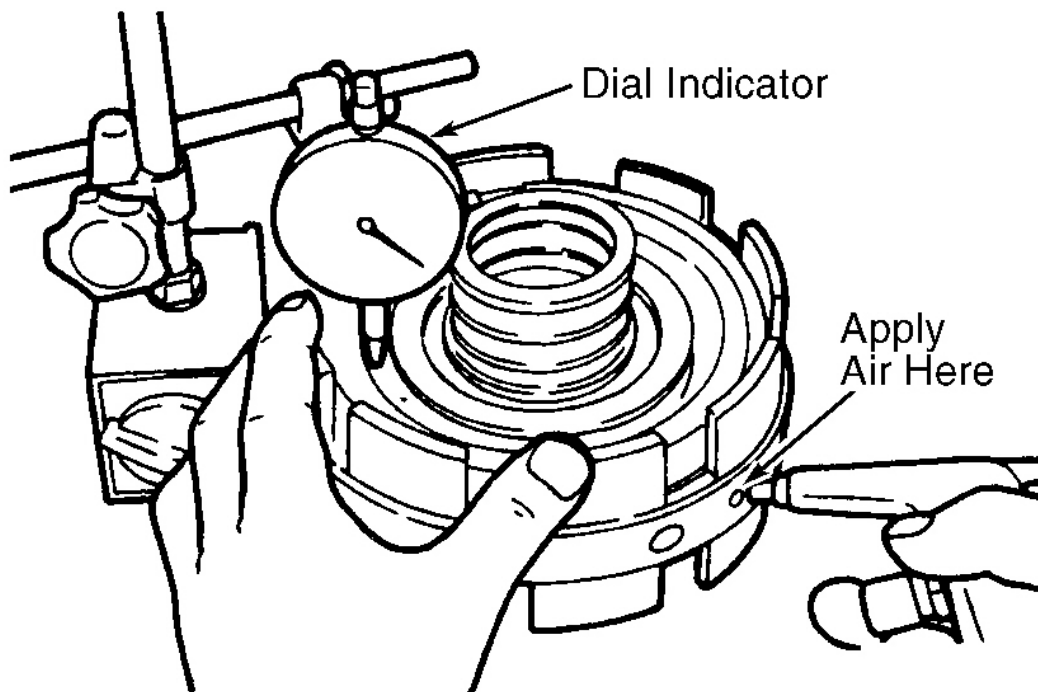
CENTER SUPPORT ASSEMBLY

Disassembly

1. Remove snap ring from end of sun gear shaft. Remove planetary sun gear with No. 1 one-way clutch from center support. Repeat procedure used in direct clutch disassembly to check No. 1 brake piston stroke. Piston stroke should be .031-.068" (.78-1.73 mm). If piston stroke is not as specified, inspect discs. See **Fig. 27**.
2. Remove snap ring from front of center support. Remove flange, discs and plates. See **Fig. 28**. Using appropriate spring compressor and press, compress return spring assembly. Remove snap ring. Remove return spring assembly.
3. Hold No. 1 brake piston and apply air pressure to center support oil hole to remove No. 1 brake piston. See **Fig. 27**. Remove "O" rings and oil seal 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. 29**. Piston stroke should be .040-.089" (1.01-2.25 mm). If piston stroke is not as specified, inspect discs. Remove rear snap ring, flange, discs and plates. Note location and number of components. See **Fig. 28**.
5. Using appropriate spring compressor and press, compress return spring assembly. Remove snap ring. Remove return spring assembly. Hold No. 2 brake piston and apply air pressure to center support oil hole to remove No. 2 brake piston. See **Fig. 29**. Remove "O" rings.
6. Hold No. 1 one-way clutch and rotate planetary sun gear. Sun gear should rotate freely in counterclockwise direction and lock in clockwise direction. See **Fig. 30**. If component does not test 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. 28** . Using a pin punch and hammer, remove front side retainer. Remove oil seal rings from sun gear.

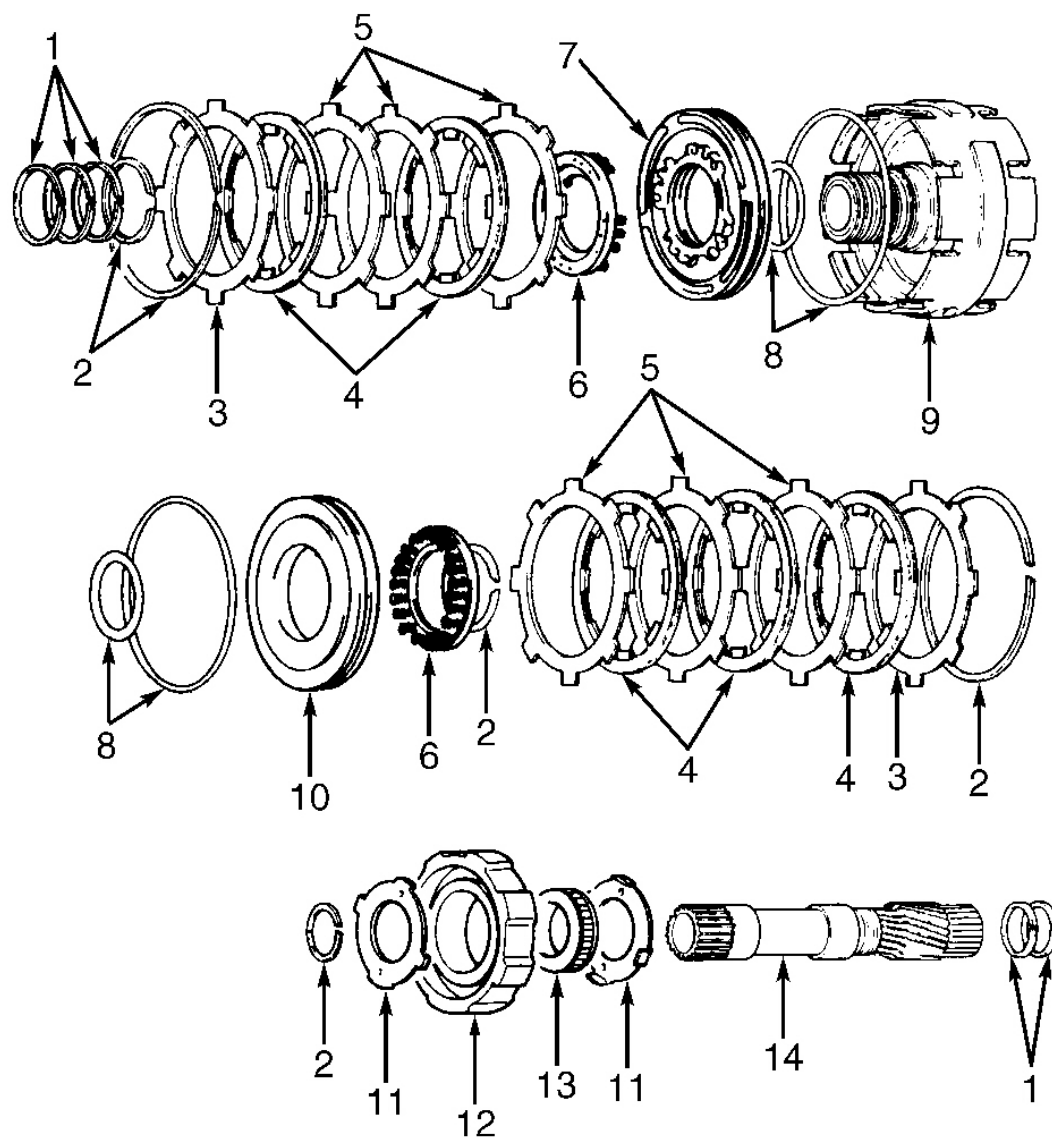
7. Remove thrust washers from front planetary gear. See **Fig. 31** . Hold one-way clutch inner race and rotate planetary gear. Planetary gear should rotate freely in counterclockwise direction and lock in clockwise direction. See **Fig. 32** . Remove one-way clutch inner race. Remove retaining ring, one-way clutch and nylon thrust washer. See **Fig. 31** .



95A20313

Fig. 27: Measuring No. 1 Brake Piston Stroke

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



1. Seal Rings

2. Snap Ring

3. Flange

4. Disc

5. Plate

6. Return Spring Assembly

7. No. 1 Brake Piston

8. "O" Ring

9. Center Support

10. No. 2 Brake Piston

11. Retainer

12. Outer Race

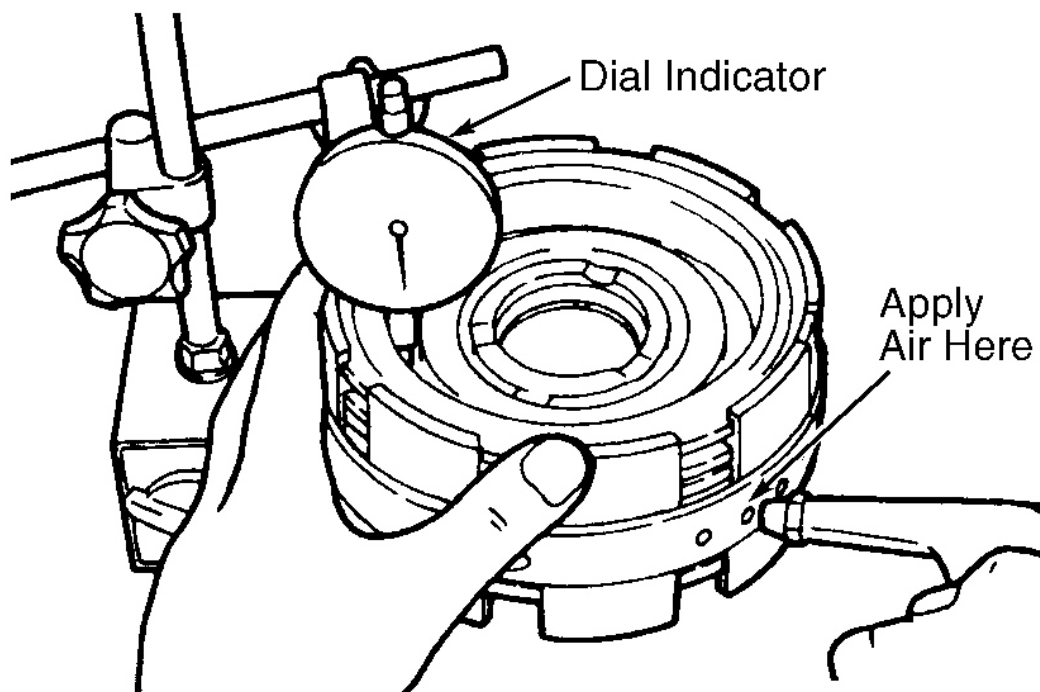
13. No. 1 One-Way Clutch

14. Planetary Sun Gear

95B20314

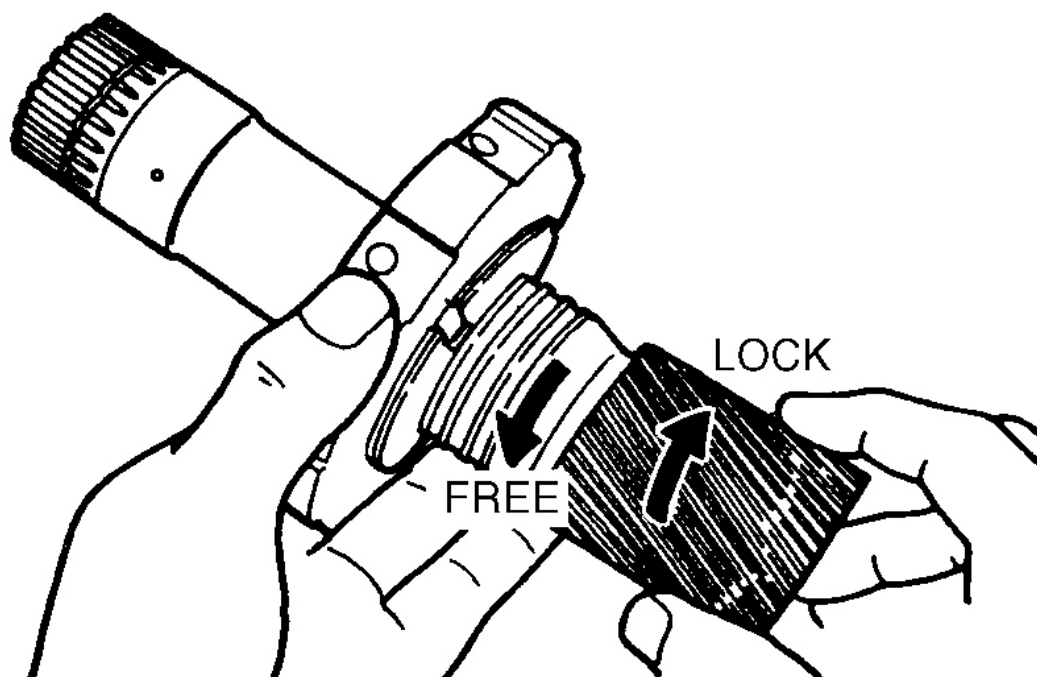
Fig. 28: Exploded View Of Center Support Assembly Components

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



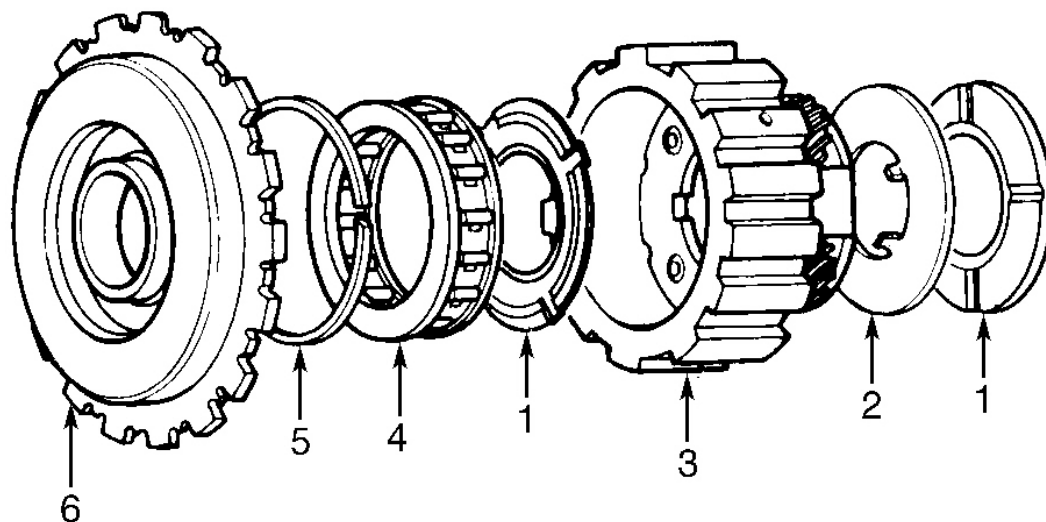
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Fig. 29: Measuring No. 2 Brake Piston Stroke
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



95D20316

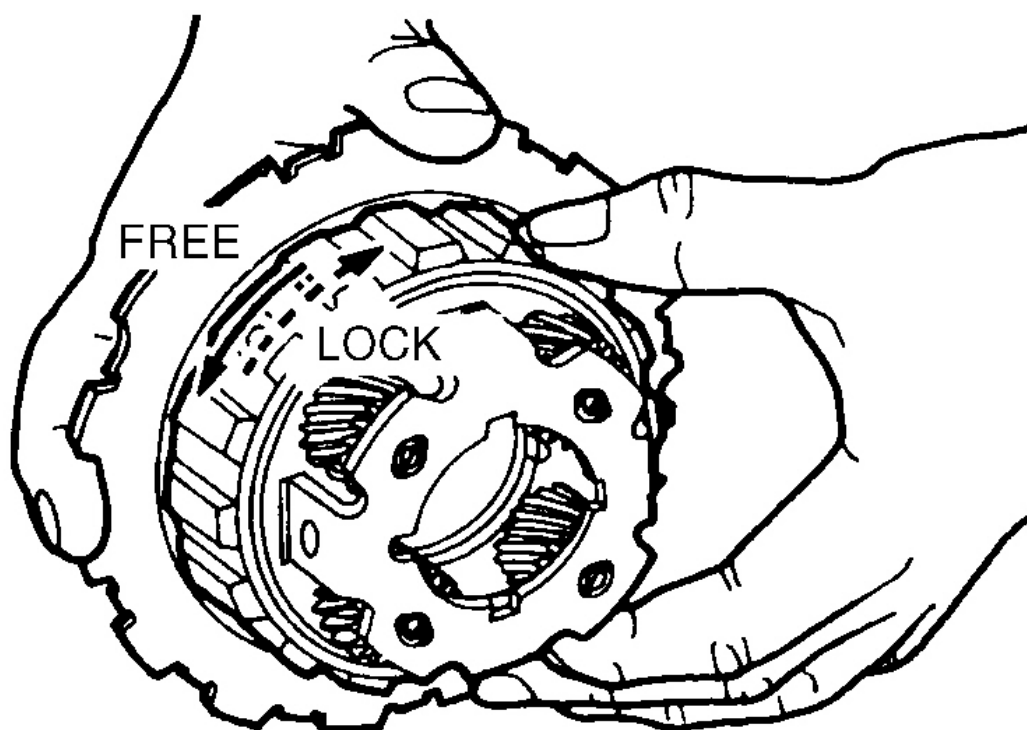
Fig. 30: Checking No. 1 One-Way Clutch Operation
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



- | | |
|--------------------------|------------------------------|
| 1. Thrust Washer (Nylon) | 4. No. 2 One-Way Clutch |
| 2. Thrust Washer (Steel) | 5. Retaining Ring |
| 3. Front Planetary Gear | 6. One-Way Clutch Inner Race |

95E20317

Fig. 31: Exploded View Of Front Planetary Gear & No. 2 One-Way Clutch
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



95F20318

Fig. 32: Checking No. 2 One-Way Clutch Operation
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

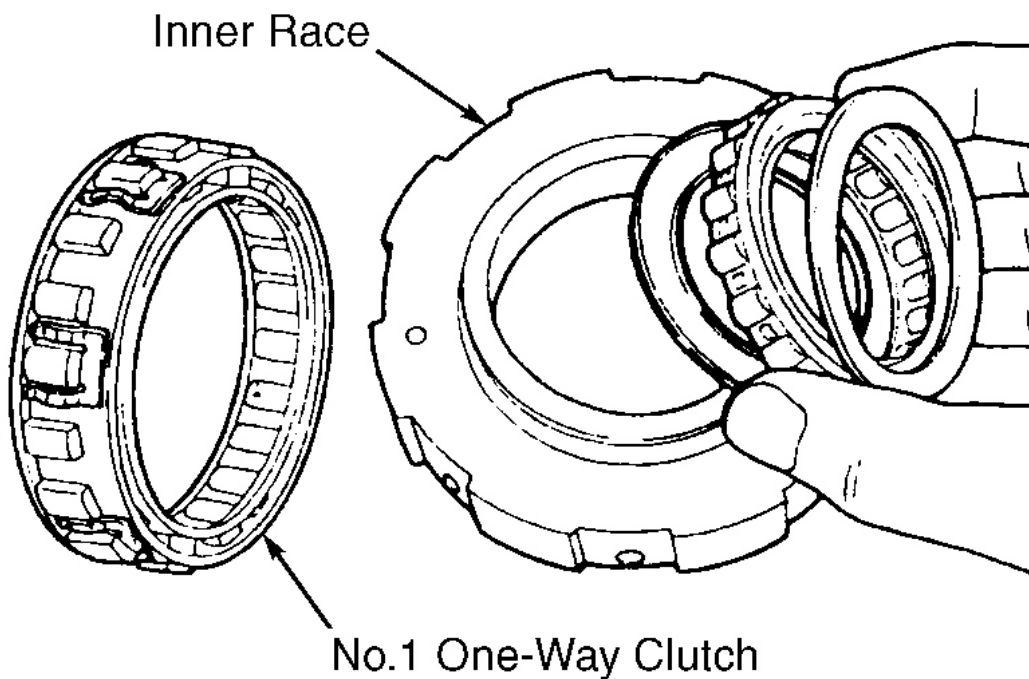
Inspection

1. Clean all components (except discs) with solvent. Dry with compressed air. Inspect plates and discs for flaking or burnt areas. If disc lining is peeling or discolored, replace disc as necessary. Inspect return springs for wear, damage or collapsed coils.
2. Measure inside diameter of center support bushing. Maximum inside diameter is 1.435" (36.46 mm). If inside diameter is greater than specified, replace center support. Measure inside diameter of planetary sun gear bushings. Maximum inside diameter is .850" (21.58 mm). If inside diameter is greater than specified, replace planetary sun gear.
3. Using a feeler gauge, measure clearance between planetary pinion gear and planetary gear case. Standard clearance is .008-.020" (.20-.50 mm). If clearance is not as specified, replace planetary gear assembly.

CAUTION: Clutch discs should be soaked in ATF for at least 2 hours prior to installation. Lubricate all parts with ATF.

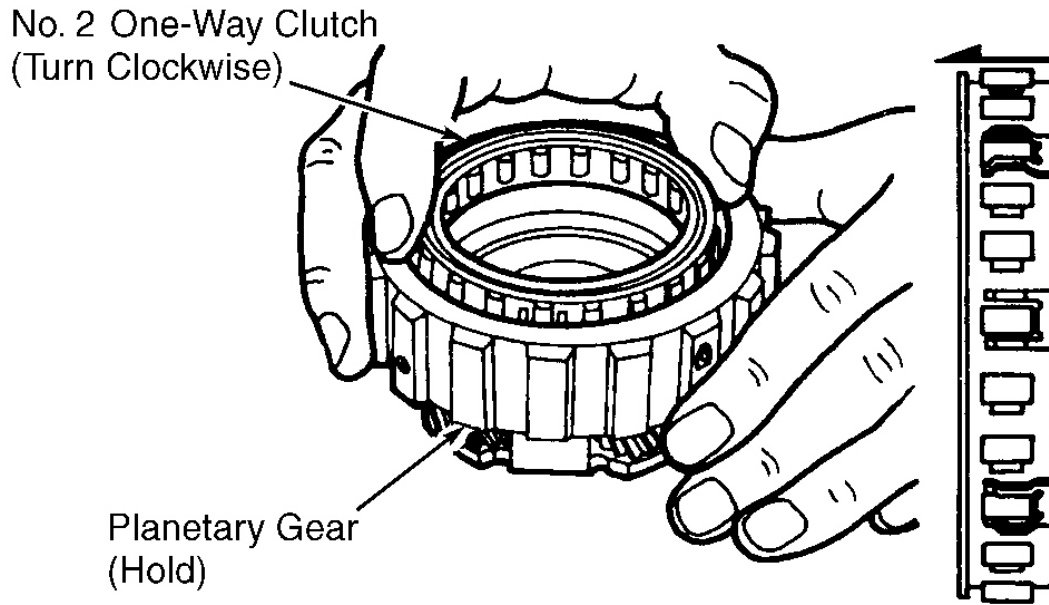
Reassembly

1. Lubricate "O" rings with ATF. To reassemble, reverse disassembly procedure. Ensure end gap of snap ring does not align with claw area on spring seat of piston return spring. Install plates and discs in appropriate order. See **Fig. 28**.
2. Install No. 1 brake flange with rounded side facing down. Install No. 2 brake flange with flat side facing down. Install all snap rings. Ensure ends of snap rings do not align with cutout areas of center support.
3. Recheck No. 1 and No. 2 brake piston stroke. See **Fig. 27** and **Fig. 29**. If piston stroke is not as specified, check for incorrect reassembly of components. Reassemble sun gear and No. 1 one-way clutch. Ensure No. 1 one-way clutch is installed into outer race with spring cage facing forward. See **Fig. 33**. While turning one-way clutch, install sun gear into center support. Install snap ring on end of sun gear. Ensure sun gear rotates in counterclockwise direction only.
4. Reassemble front planetary gear and No. 2 one-way clutch. See **Fig. 31**. Ensure thrust washer for No. 2 one-way clutch is installed with oil groove facing up. Ensure No. 2 one-way clutch is installed correctly into front planetary gear. See **Fig. 34**. Ensure front planetary gear rotates in counterclockwise direction only.



95G20319

Fig. 33: Installing No. 1 One-Way Clutch
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



95J20320

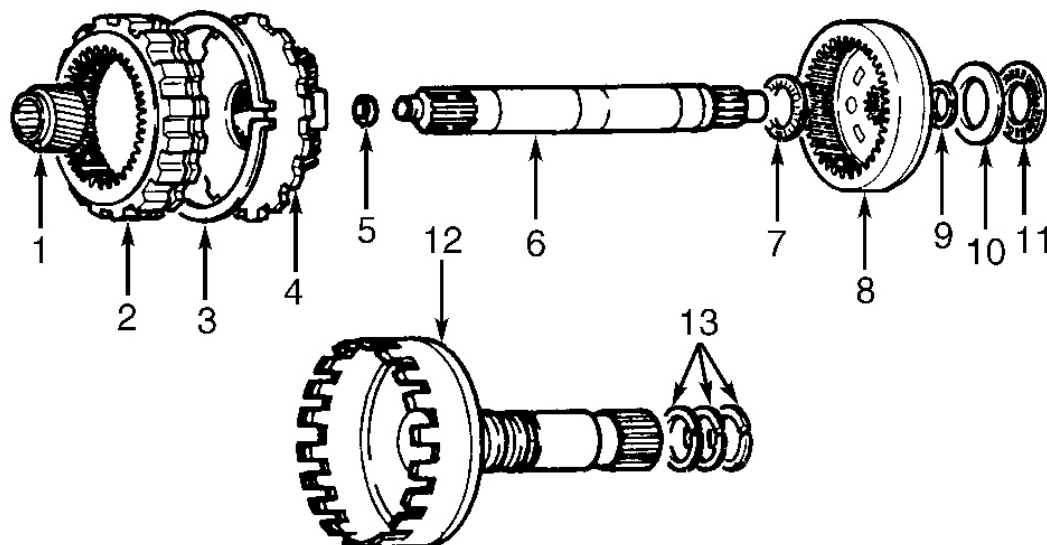
Fig. 34: Installing No. 2 One-Way Clutch

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REAR PLANETARY GEAR & OUTPUT SHAFT

Disassembly

1. Compress snap ring and remove front planetary ring gear. Remove snap ring from ring gear. Remove rear planetary gear from output shaft. Remove bearing and race. Remove rear planetary sun gear.
2. Remove rear planetary gear from rear planetary ring gear. Remove split ring. Remove rear planetary ring gear. Remove bearing from ring gear. Remove "O" ring from intermediate shaft. Remove 3 oil seal rings from output shaft. See **Fig. 35** .



- | | |
|------------------------------|--------------------------------|
| 1. Planetary Sun Gear | 8. Rear Planetary Ring Gear |
| 2. Front Planetary Ring Gear | 9. Split Ring |
| 3. Retaining Ring | 10. Thrust Bearing Race No. 16 |
| 4. Rear Planetary Gear | 11. Thrust Bearing No. 17 |
| 5. "O" Ring | 12. Output Shaft Assembly |
| 6. Intermediate Shaft | 13. Seal Rings |
| 7. Thrust Bearing No. 15 | |

95A20321

Fig. 35: Exploded View Of Rear Planetary Gear & Output Shaft
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Inspection

1. Clean all components with solvent. Dry with compressed air. Inspect all components for wear or damage. Measure inside diameter of output shaft bushing. Maximum inside diameter is .7117" (18.076 mm). If inside diameter is greater than specified, replace output shaft.
2. Using a feeler gauge, measure clearance between rear planetary carrier pinion gear and carrier case. Standard clearance should be .008-.020" (.20-.50 mm). If clearance is not as specified, inspect rear planetary carrier thrust washer. If necessary, replace rear planetary carrier assembly.

Reassembly

1. Lubricate oil seal rings with ATF. Install oil seal rings on output shaft. Ensure rings rotate smoothly after installation. Lubricate and install NEW "O" ring on intermediate shaft. Ensure ring rotates smoothly. Apply petroleum jelly to thrust bearing No. 15 and install bearing on intermediate shaft with flat surface away from shaft.

2. Install rear planetary ring gear on intermediate shaft. Install split ring. Install rear planetary gear to planetary ring gear. Install rear planetary sun gear. Apply petroleum jelly to thrust bearing No. 17 and bearing race No. 16, and install on rear planetary ring gear. Install rear planetary gear assembly to output shaft. Install front planetary ring gear. See **Fig. 35** . Ensure snap ring is installed in groove of output shaft. Align snap ring end with wide cutout portion of output shaft.

NO. 3 BRAKE PISTON

Disassembly

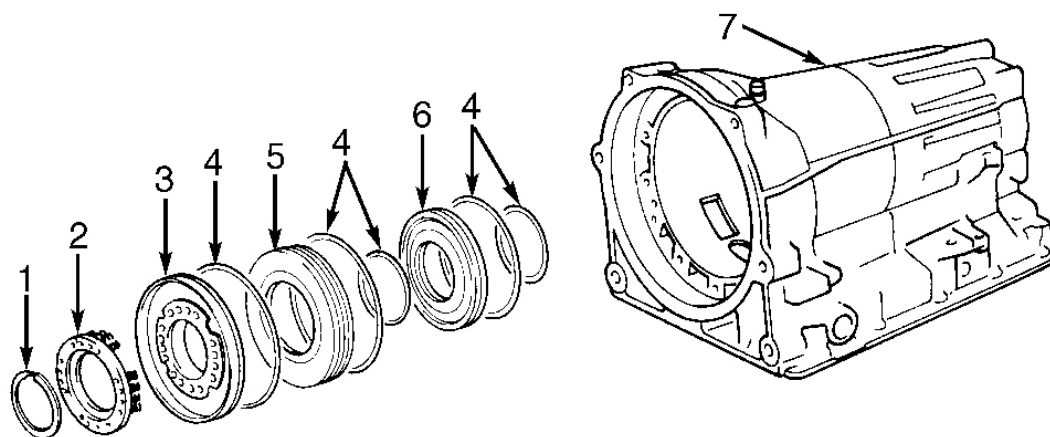
1. Using appropriate spring compressor, compress return spring assembly and remove snap ring. Remove return spring assembly. See **Fig. 36** . Position transmission with front opening facing upward.
2. Place shop towels under case to prevent piston damage. Apply air pressure to case passages to remove No. 3 brake primary piston, reaction sleeve and No. 3 brake secondary piston. See **Fig. 14** . It may be necessary to use long hooks to remove sleeve and secondary piston. Using screwdriver, pry manual valve lever shaft seals from case if replacement is required.

Inspection

Clean all parts (except discs) in solvent. Dry with compressed air. Inspect pistons and sleeve for scoring, wear or damage. Check return spring assembly for cracked or broken coils. If disc lining is peeled or discolored, replace discs as necessary. Replace damaged components as necessary.

Reassembly

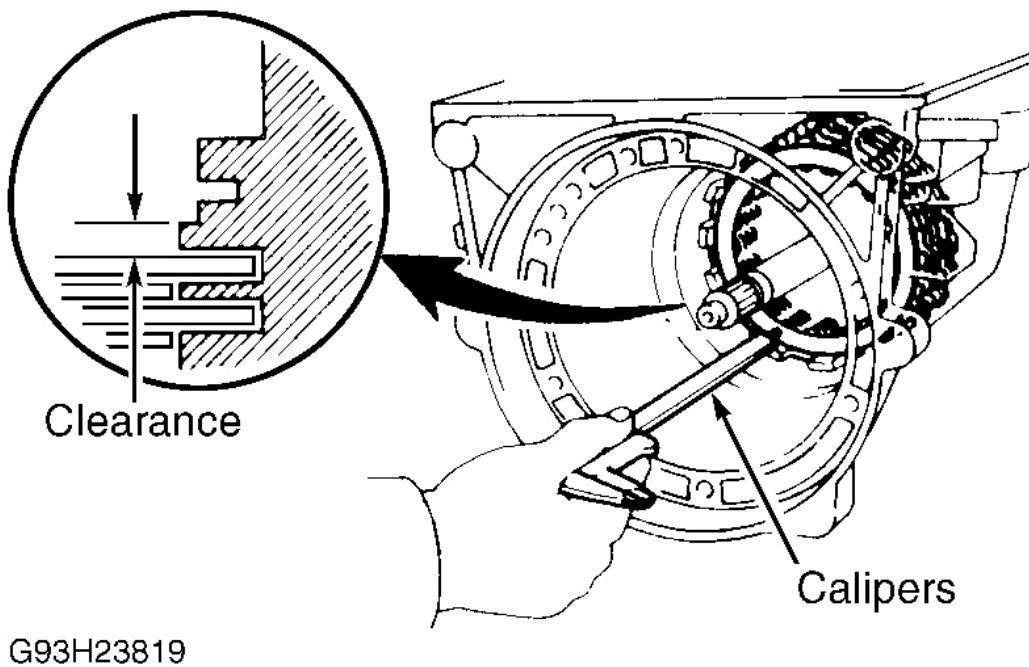
1. Using appropriate installer, install manual valve lever shaft seals if removed. Lubricate and install all NEW "O" rings. Thin "O" ring goes on outside of reaction sleeve. Soak discs in ATF for 2 hours prior to installation. Install No. 3 brake discs and plates.
2. Using calipers, measure pack clearance of No. 3 brake between disc and transmission case. See **Fig. 37** . Pack clearance should be .024-.1039" (.61-2.640 mm). If clearance is not as specified, inspect disc installation. If disc installation is okay, check pressure plate thickness and replace as necessary.
3. Check No. 3 brake operation. See **Fig. 14** . Measure inside diameter of transmission case rear bushing. Replace transmission case if bushing diameter exceeds 1.504" (38.19 mm).



- | | |
|-------------------------------|---------------------------------|
| 1. Snap Ring | 5. Reaction Sleeve |
| 2. Return Spring Assembly | 6. No. 3 Brake Secondary Piston |
| 3. No. 3 Brake Primary Piston | 7. Transmission Case |
| 4. "O" Ring | |

95B20322

Fig. 36: Exploded View Of No. 3 Brake Components
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



G93H23819

Fig. 37: Measuring No. 3 Brake Pack Clearance

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

CONTROL VALVE ASSEMBLY

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

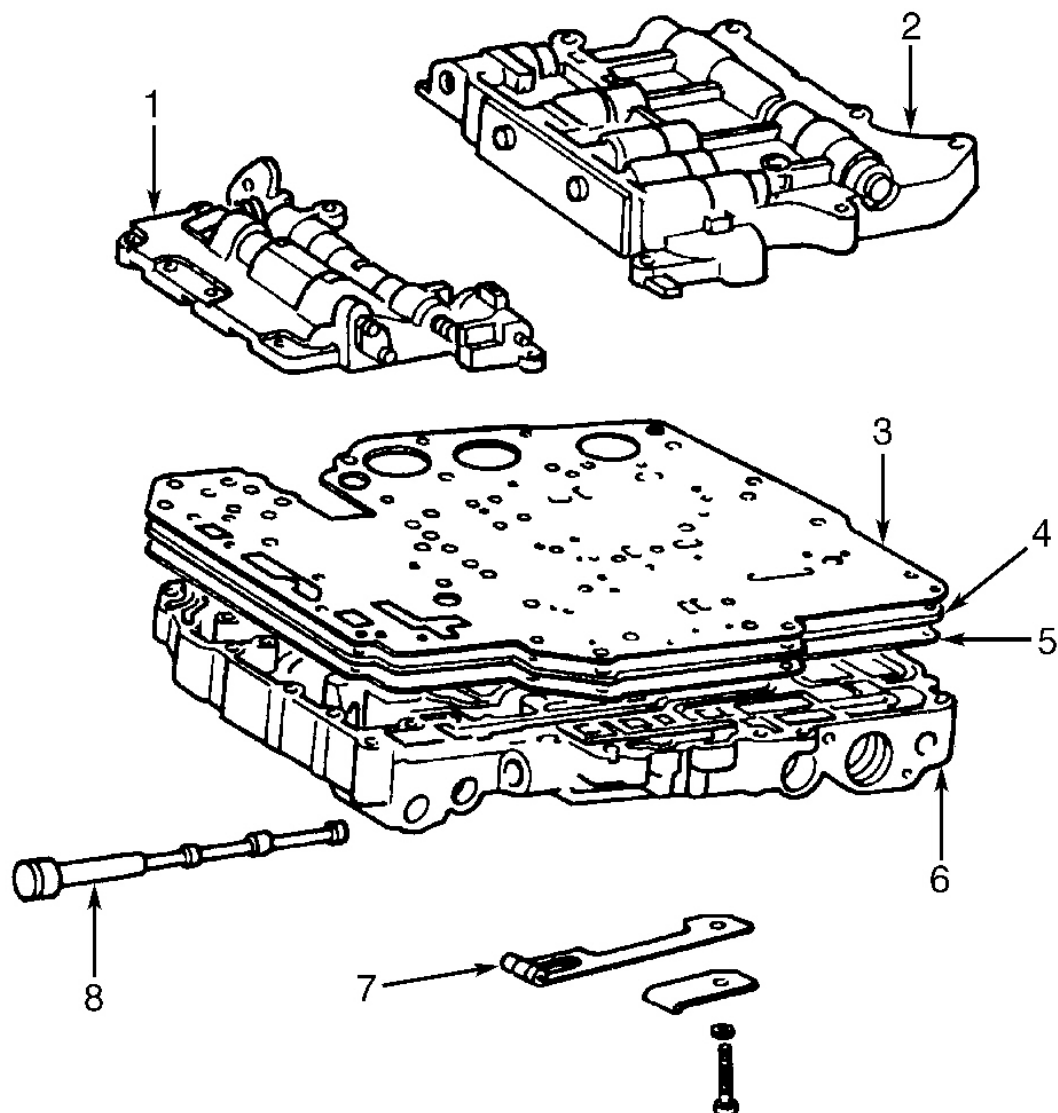
Disassembly

Remove detent spring and manual valve. See **Fig. 38** . Remove 3 lower valve body bolts securing front upper valve body. See **Fig. 39** . Invert control valve assembly and remove 5 bolts securing front upper valve body. See **Fig. 40** . Remove front upper valve body. Remove 5 rear upper valve body bolts. See **Fig. 41** . Invert control valve assembly and remove 3 bolts securing rear upper valve body. See **Fig. 42** . Remove rear upper valve body. Remove valve body gasket, separator plate and lower valve body gasket. See **Fig. 38** . **DO NOT** drop check valve and ball.

Reassembly

1. Install and align NEW valve body gasket on rear upper valve body. Ensure NEW gasket matches old gasket. Install lower valve body with separator plate and lower valve body gasket on rear upper valve body. Install and loosely tighten 3 lower valve body bolts. Length of bolt "A" is 2.047" (52.00 mm). Length of bolt "B" is 1.102" (28.00 mm). See **Fig. 42** .

2. Turn control valve assembly over. Ensure gasket is aligned. Install and tighten 5 rear upper valve body bolts. See **Fig. 41** . Length of bolt "A" is 1.378" (35.00 mm). Length of bolt "B" is 1.102" (28.00 mm). Install front upper valve body onto lower valve body. Install 3 lower valve body bolts to secure front upper valve body. Length of bolt "A" is .866" (22.00 mm). Length of bolt "B" is 1.102" (28.00 mm). Length of bolt "C" is 2.047" (52.00 mm). See **Fig. 39** .
3. Install 5 front upper valve body bolts. Length of bolt "A" is .709" (18.00 mm). Length of bolt "B" is .866" (22.00 mm). See **Fig. 40** . Ensure gaskets are properly aligned. Tighten front and rear upper valve body bolts to 48 INCH lbs. (5.4 N.m). Turn control valve assembly over and tighten lower valve body bolts to same specification. Insert manual valve into valve body. Install detent spring and bolt.

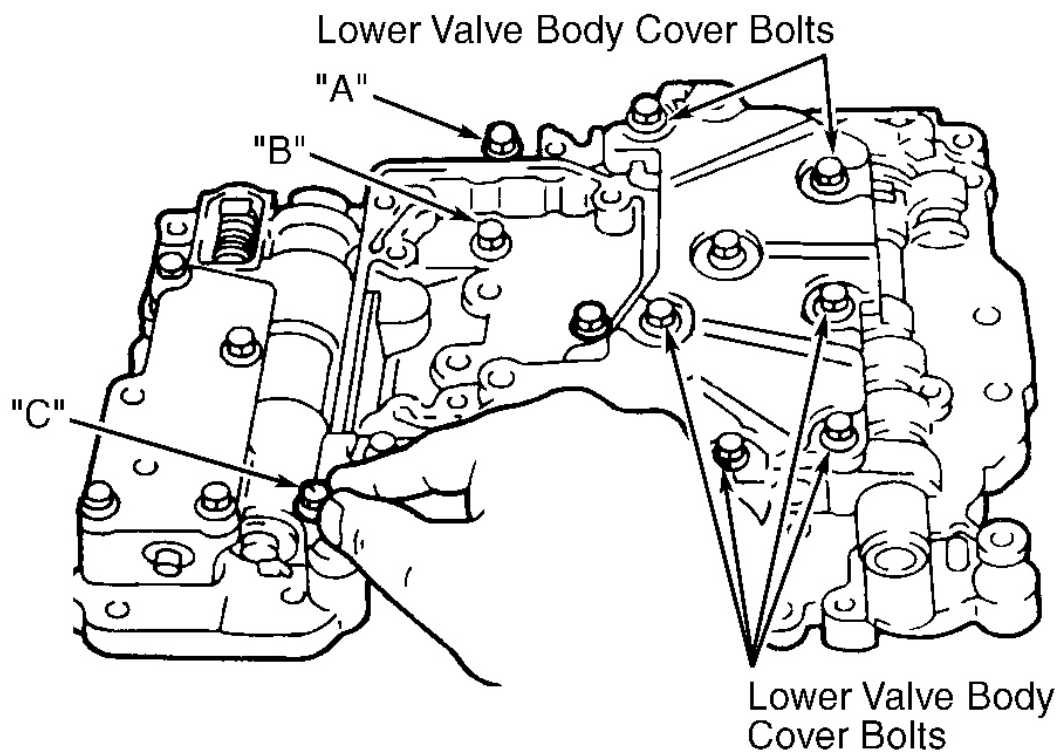


- 1. Front Upper Valve Body
- 2. Rear Upper Valve Body
- 3. Valve Body Gasket
- 4. Separator Plate

- 5. Lower Valve Body Gasket
- 6. Lower Valve Body
- 7. Detent Spring
- 8. Manual Valve

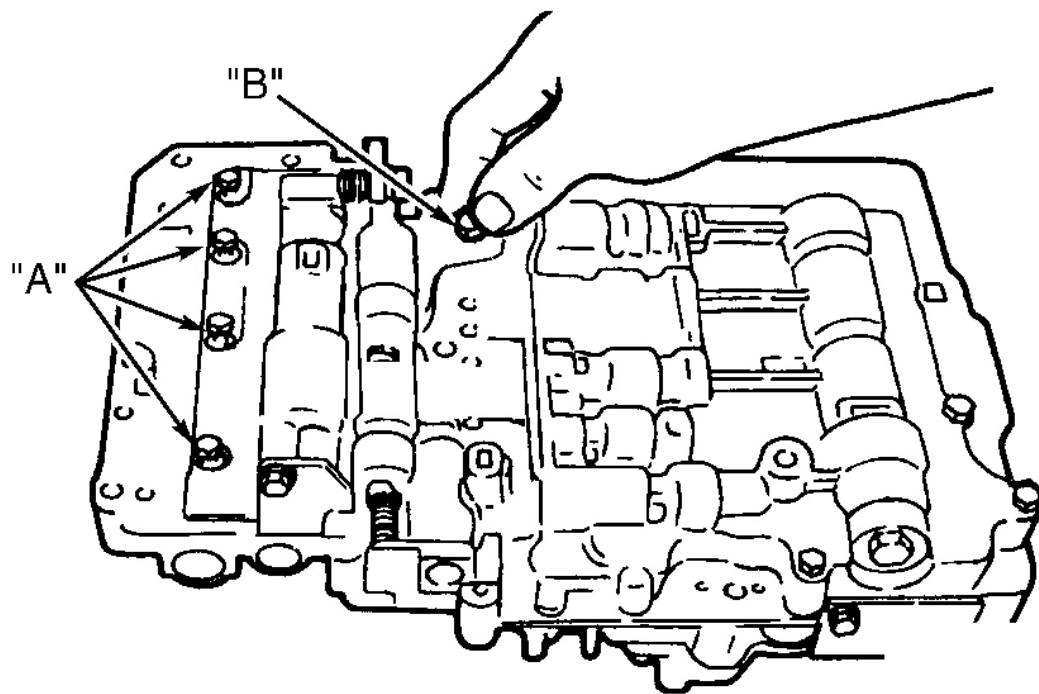
95C20323

Fig. 38: Exploded View Of Control Valve Assembly
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



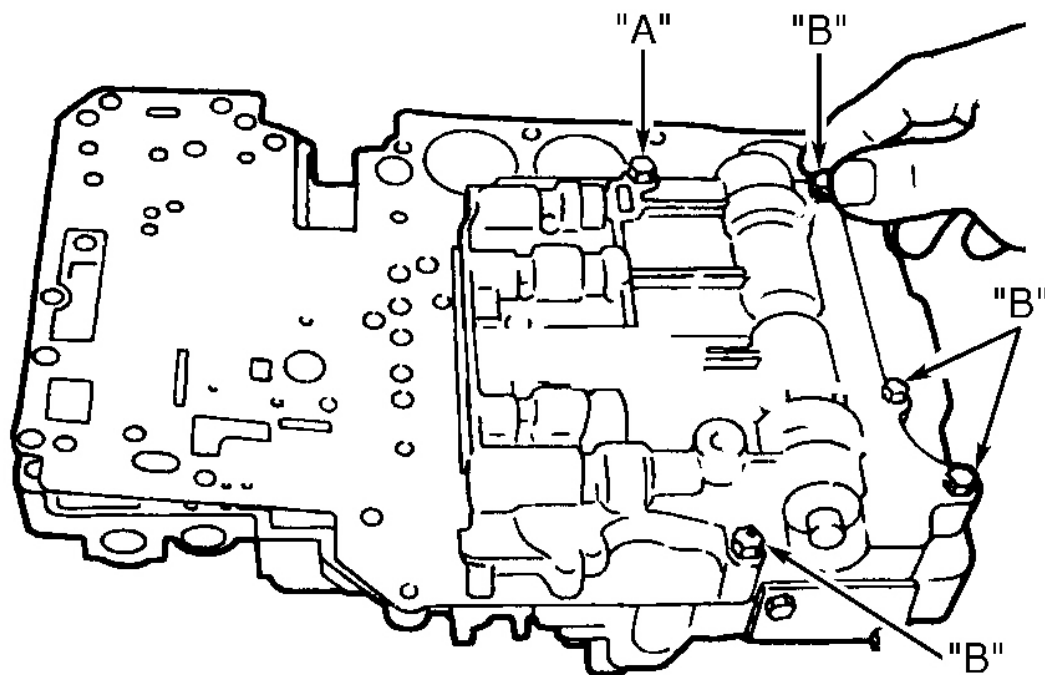
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Fig. 39: Identifying Lower Valve Body-To-Front Upper Valve Body Bolts
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



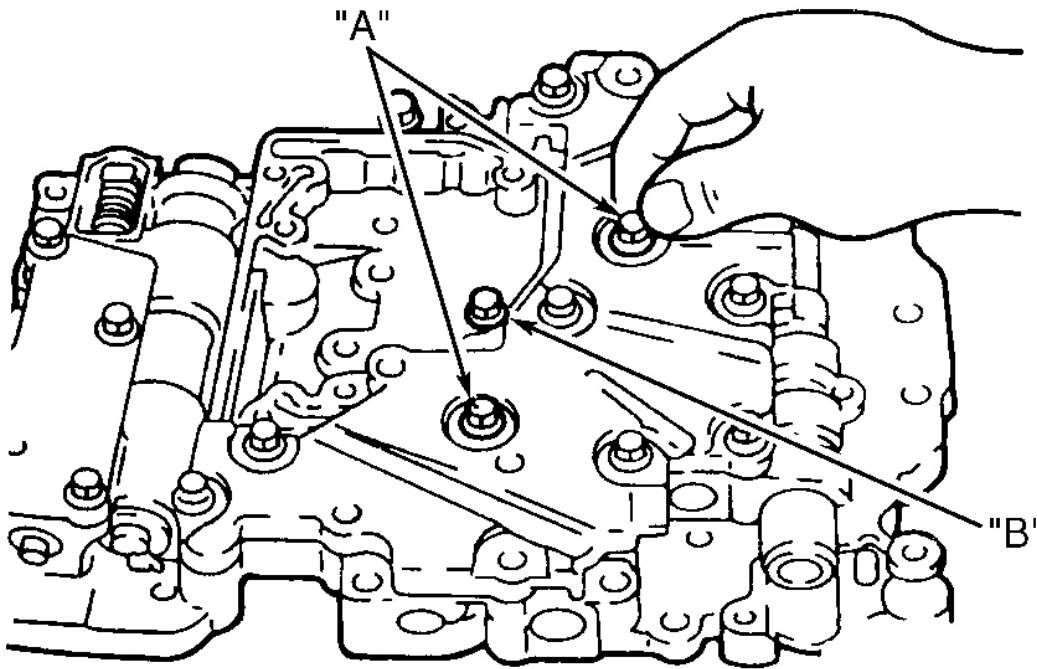
95E20325

Fig. 40: Identifying Front Upper Valve Body Bolts
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



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Fig. 41: Identifying Rear Upper Valve Body Bolts
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



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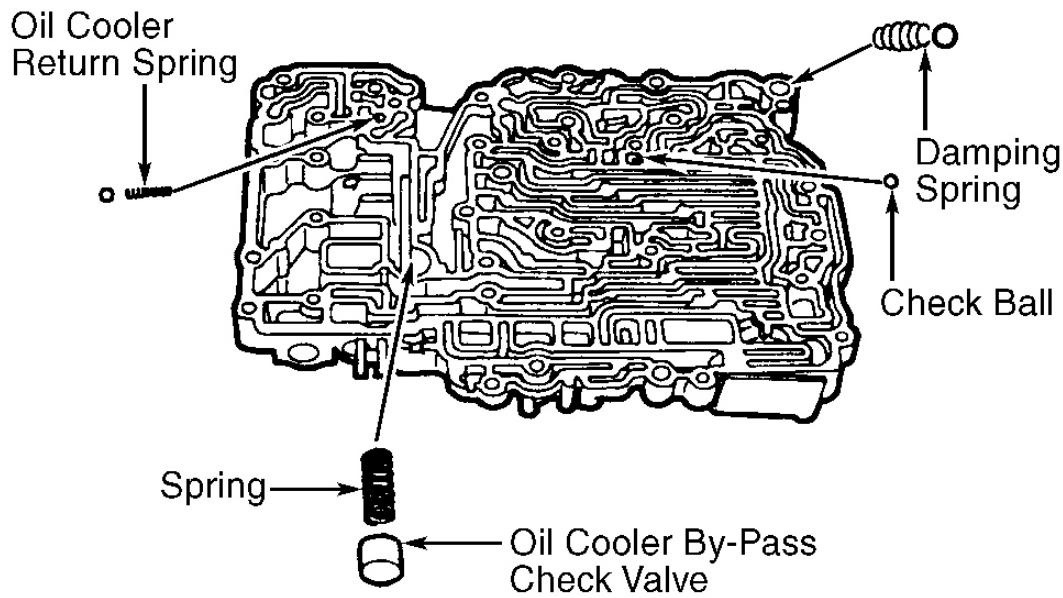
Fig. 42: Identifying Lower Valve Body-To-Rear Upper Valve Body Bolts
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

LOWER VALVE BODY

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

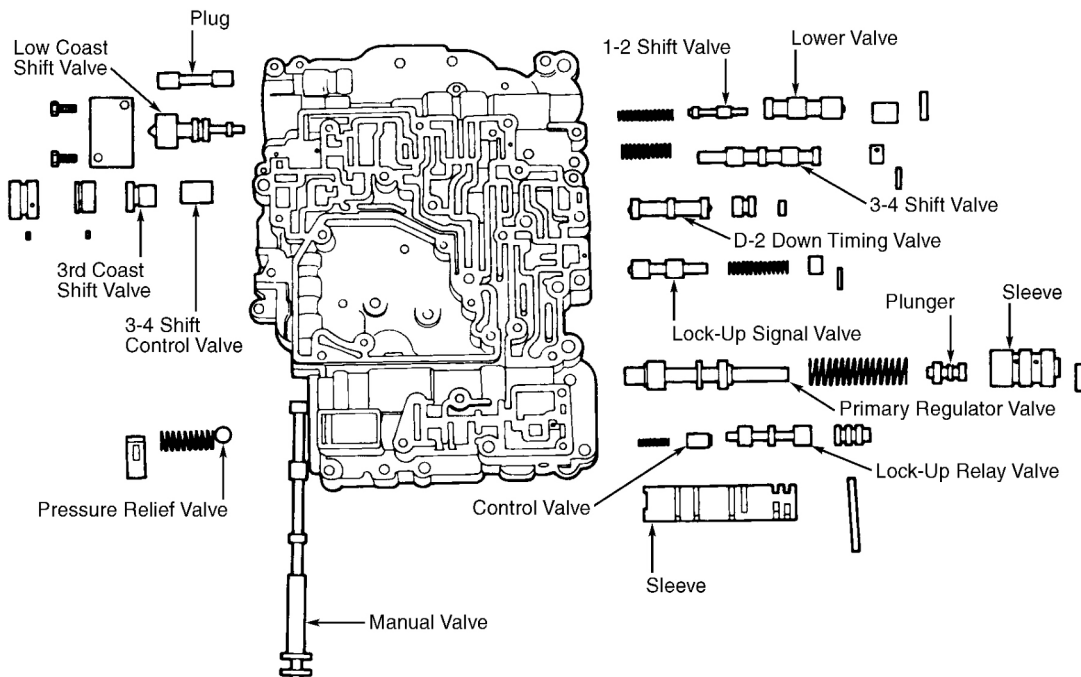
Disassembly

1. Remove upper valve bodies from lower valve body. See CONTROL VALVE ASSEMBLY. Remove check balls, damping check ball and spring, oil cooler return check ball and spring, oil cooler bypass check valve and spring. See **Fig. 43** . Remove 6 lower valve body cover bolts. See **Fig. 39** . Remove cover, gaskets and plate.
2. Remove 4 check balls, noting location and diameter for reassembly reference. Push inward on sleeves or plugs to remove all pins and retainers. Note location of pins and retainers. Retainers may be removed using a magnet. Remove all springs and valves. See **Fig. 44** .



95H20328

Fig. 43: Identifying Check Ball, Spring & Valve Locations
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



95I20329

Fig. 44: Exploded View Of Lower Valve Body Components
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Inspection

Clean all parts in solvent. Dry with compressed air. Ensure all valve body passages are clear. 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 the **LOWER VALVE BODY SPRING SPECIFICATIONS** table.

LOWER VALVE BODY SPRING SPECIFICATIONS ⁽¹⁾

Valve Spring	Diameter In. (mm)	Free Length In. (mm)
Damping	.196 (4.97)	.787 (20.00)
Lock-Up Relay	.205 (5.20)	.728 (18.50)
Lock-Up Signal	.382 (9.70)	1.811 (46.00)
Oil Cooler By-Pass	.543 (13.80)	1.138 (28.90)
Pressure Relief	.517 (13.14)	1.265 (32.14)
Primary Regulator	.670 (17.02)	2.346 (59.59)
1-2 Shift	.298 (7.56)	1.363 (34.62)
3-4 Shift	.417 (10.60)	1.385 (35.18)

(1) For spring locations, See **Fig. 43** and **Fig. 44** .

Reassembly

Coat all components with ATF. To reassemble, reverse disassembly procedure. Ensure primary regulator valve plunger is fully recessed in sleeve. Ensure valves slide freely in bores. Ensure retainers, pins and check balls are located in correct locations. See **Fig. 45** and **Fig. 46** . Install plate, cover and NEW gaskets. Ensure all holes in gaskets and components are aligned.

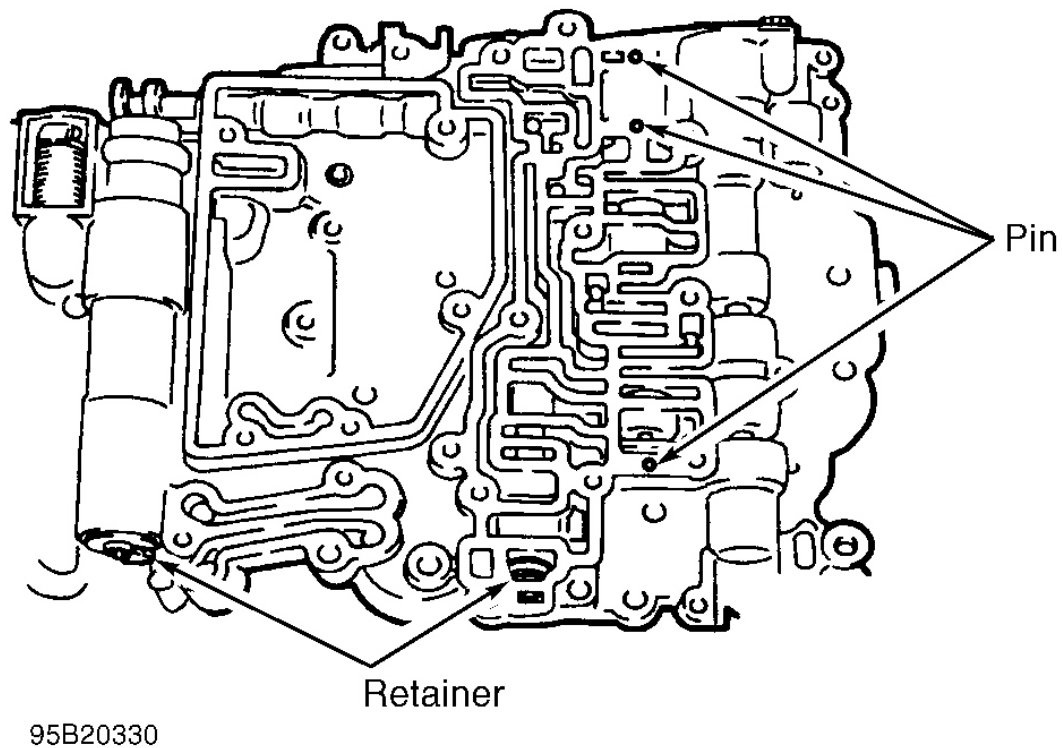
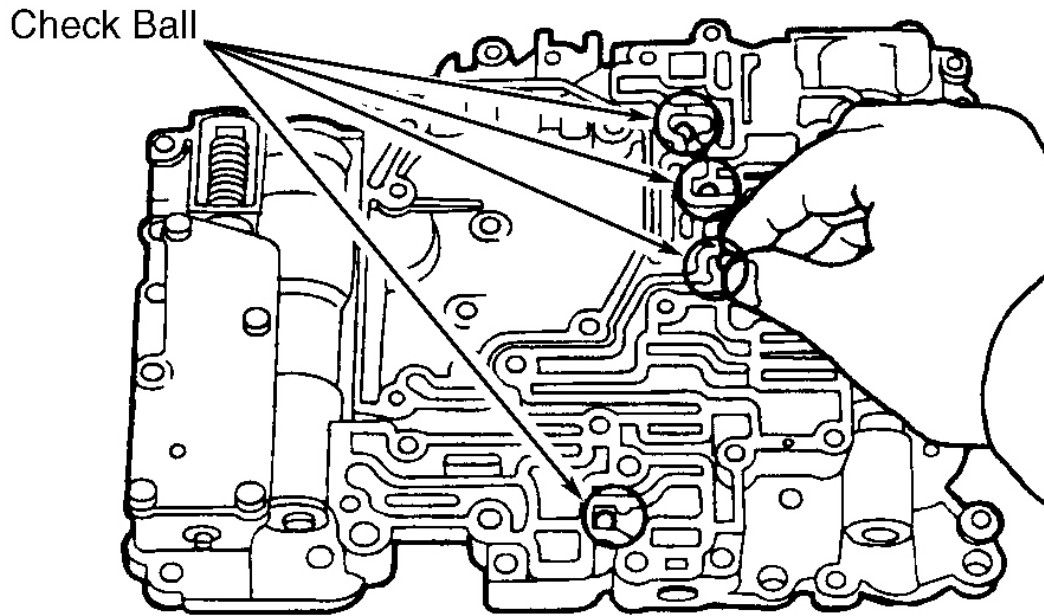


Fig. 45: Locating Lower Valve Body Retainers & Pins
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



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Fig. 46: Locating Lower Valve Body Check Balls

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

FRONT UPPER VALVE BODY

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

Disassembly

Remove valve body components. When removing secondary regulator valve, use care as valve is spring loaded. See **Fig. 47**.

Inspection

Clean all parts in solvent. Dry with compressed air. Ensure all valve body passages are clear. Inspect valves for scoring or roughness. Ensure valves slide freely in bores. Inspect valve springs for damage, squareness and collapsed coils. Measure valve spring free length and outer diameter. Replace spring if not within specification. See FRONT UPPER VALVE BODY SPRING SPECIFICATIONS table.

FRONT UPPER VALVE BODY SPRING SPECIFICATIONS ⁽¹⁾

Valve Spring	Diameter In. (mm)	Free Length In. (mm)

1990 Mitsubishi Montero

1990-94 AUTOMATIC TRANSMISSIONS Mitsubishi V4AW2 Overhaul

Kickdown	.426 (10.83)	1.565 (39.76)
Secondary Regulator	.686 (17.43)	2.806 (71.27)
Throttle	.338 (8.58)	.864 (21.94)

(1) For spring locations, See **Fig. 47** .

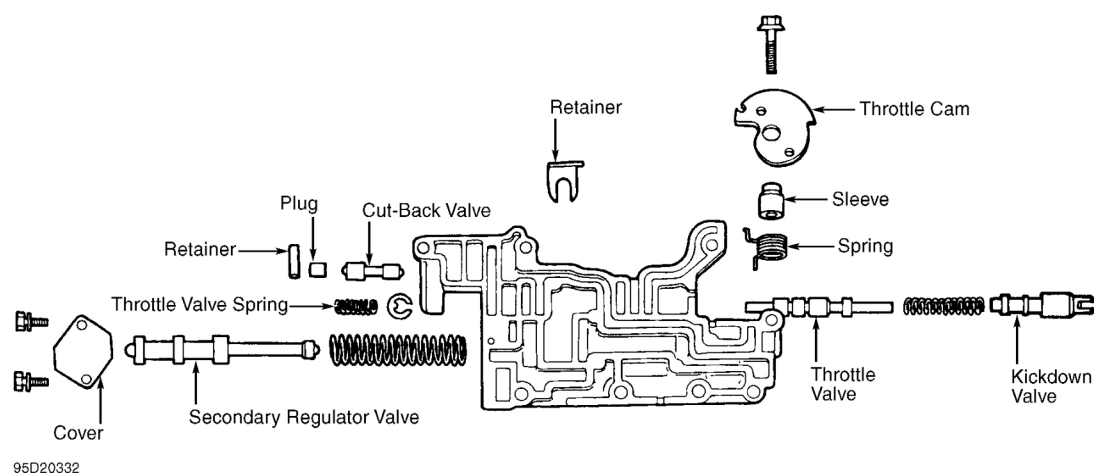


Fig. 47: Exploded View Of Front Upper Valve Body
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

Reassembly

1. Coat all components with ATF. To reassemble, reverse disassembly procedure. Ensure valves slide freely in bores. Ensure spring engages with hole of throttle cam. Ensure throttle cam rotates smoothly through full stroke.
2. Coat cut-back valve retainer with petroleum jelly prior to installation. Tighten throttle cam bolt to 65 INCH lbs. (7.4 N.m). Tighten secondary regulator valve body cover bolts to 48 INCH lbs. (5.4 N.m).

REAR UPPER VALVE BODY

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

Disassembly

Note location of rubber and steel check balls. Remove check balls and valve body components. See **Fig. 48** and **Fig. 49** .

Inspection

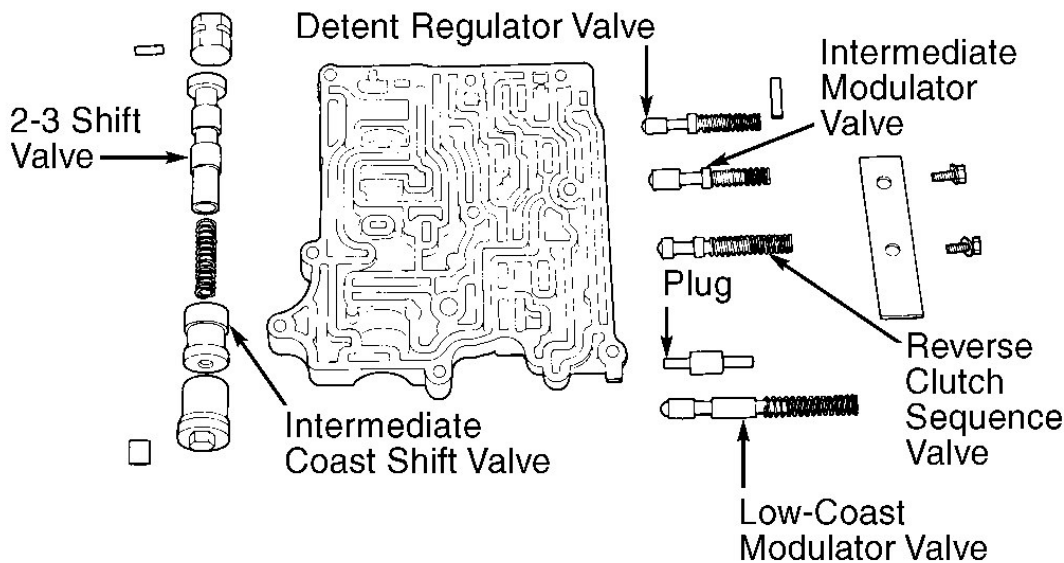
1. Clean all parts in solvent. Dry with compressed air. Ensure all valve body passages are clear. Inspect valves for scoring or roughness.

2. 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 with specification. See the **REAR UPPER VALVE BODY SPRING SPECIFICATIONS** table.

REAR UPPER VALVE BODY SPRING SPECIFICATIONS ⁽¹⁾

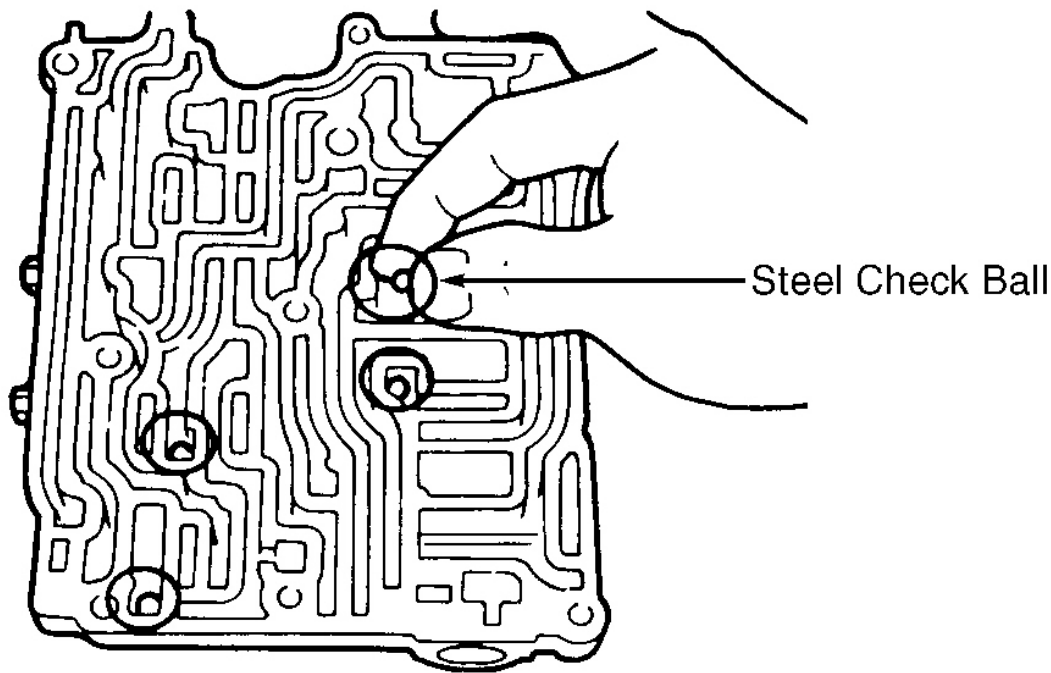
Valve Spring	Diameter In. (mm)	Free Length In. (mm)
Detent Regulator	.348 (8.85)	1.236 (31.39)
Intermediate Modulator	.346 (8.80)	1.395 (35.43)
Low Coast Modulator	.364 (9.24)	1.667 (42.35)
Reverse Clutch Sequence	.362 (9.20)	1.478 (37.55)
2-3 Shift	.353 (8.96)	1.382 (35.10)

(1) For spring location, See **Fig. 48** .



95E20333

Fig. 48: Exploded View Of Rear Upper Valve Body
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.



95F20334

Fig. 49: Locating Rear Upper Valve Body Check Balls
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

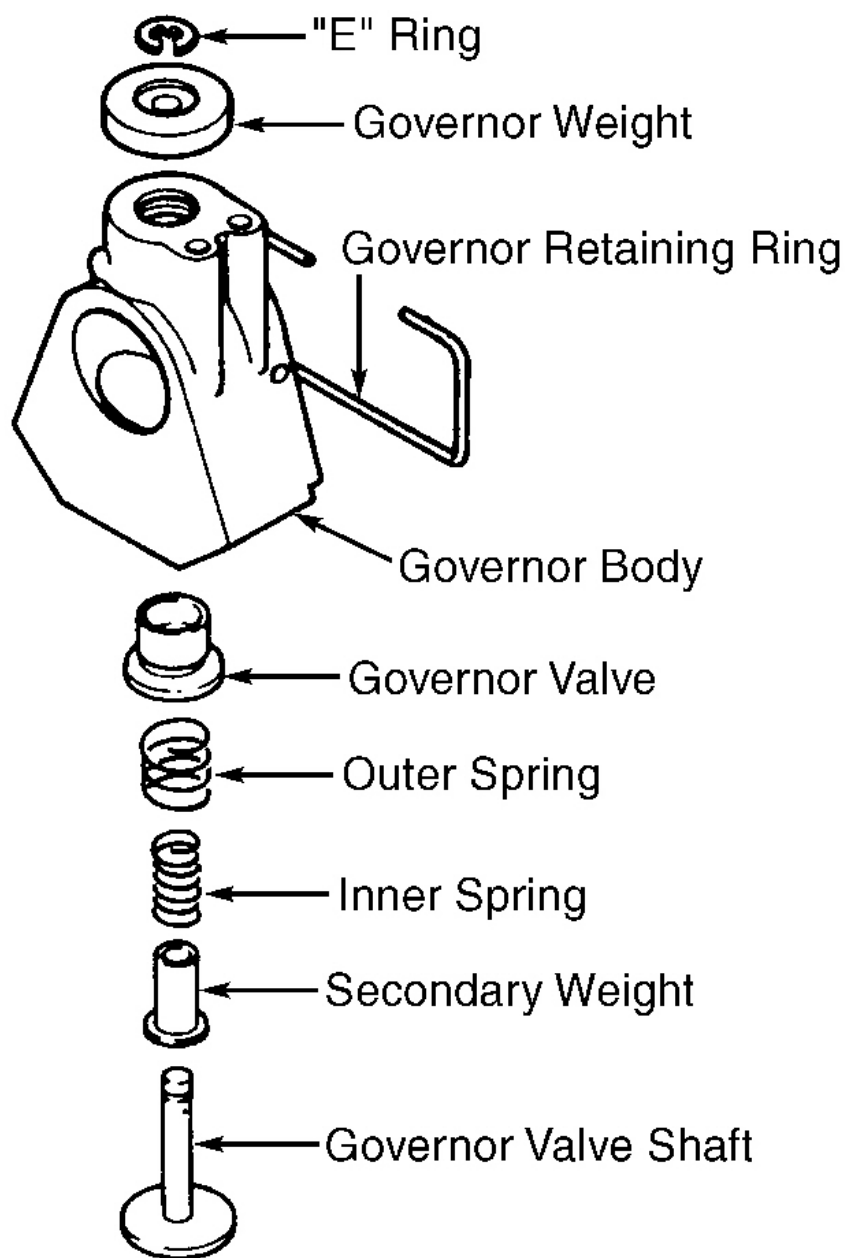
Reassembly

Coat all components with ATF. To reassemble, reverse disassembly procedure. Ensure valves slide freely in bores. Ensure retainer fully covers detent regulator valve spring. Install rear upper valve body cover bolts and tighten to 48 INCH lbs. (5.4 N.m). Install check balls and retainers in proper locations. See **Fig. 48** and **Fig. 49**.

GOVERNOR ASSEMBLY

Disassembly & Reassembly

Remove retaining ring (if necessary). Push downward on governor valve shaft. Remove "E" ring and remove governor components. See **Fig. 50**. Inspect all parts for wear and damage. Insert valve shaft into body. Ensure valve slides smoothly. Check oil passage for restrictions. To reassemble, reverse disassembly procedure. Ensure "E" ring is fully seated.



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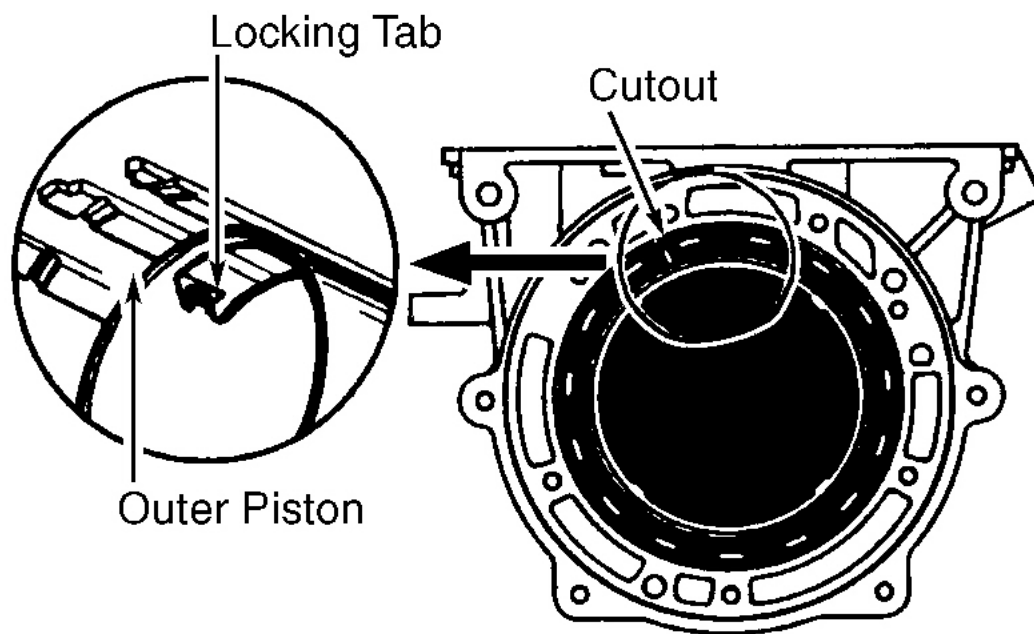
Fig. 50: Exploded View Of Governor Assembly
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

TRANSMISSION REASSEMBLY

NOTE: For bearing race and thrust bearing locations and installation direction, See Fig. 57 .

CAUTION: Lubricate all components with ATF. Clutch disc should be soaked in ATF for 2 hours 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 No. 3 brake secondary piston, reaction sleeve and primary piston. Press assembled pistons into case with hand pressure. Using appropriate spring compressor, install return spring assembly on primary piston. Install snap ring. Ensure No. 3 brake piston moves smoothly when compressed air is applied. See Fig. 14 .
2. Install bearing race No. 19. Install output shaft thrust bearing No. 18 into case. Install brake apply tube into transmission case, aligning locking tab with cutout in valve body side of transmission case. Ensure lips of tube end are completely inserted onto outer piston. See Fig. 51 . Install rear planetary gear and output shaft into case.



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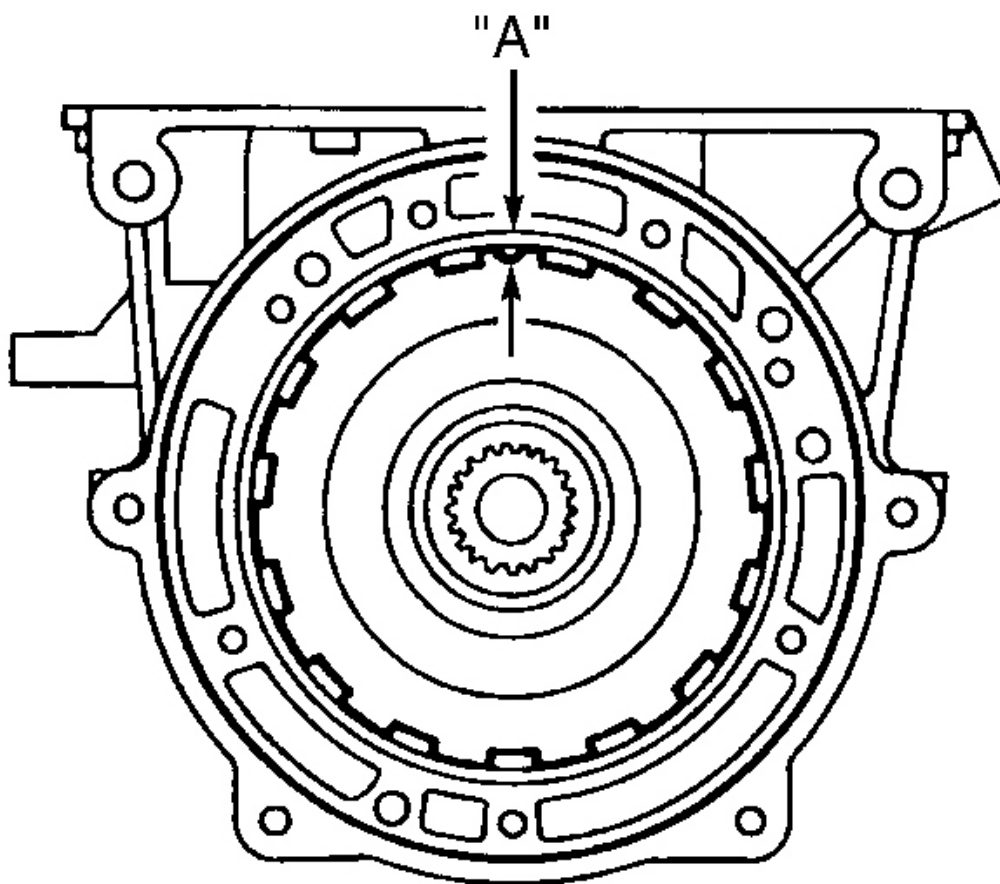
Fig. 51: Installing Brake Apply Tube

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

3. Install pressure plate, with flat surface facing forward. Install discs and plates, starting with a disc and

alternating each component. Measure No. 3 brake clutch pack clearance. See **Fig. 37** . Clearance should be .024-.104" (.61-2.64 mm).

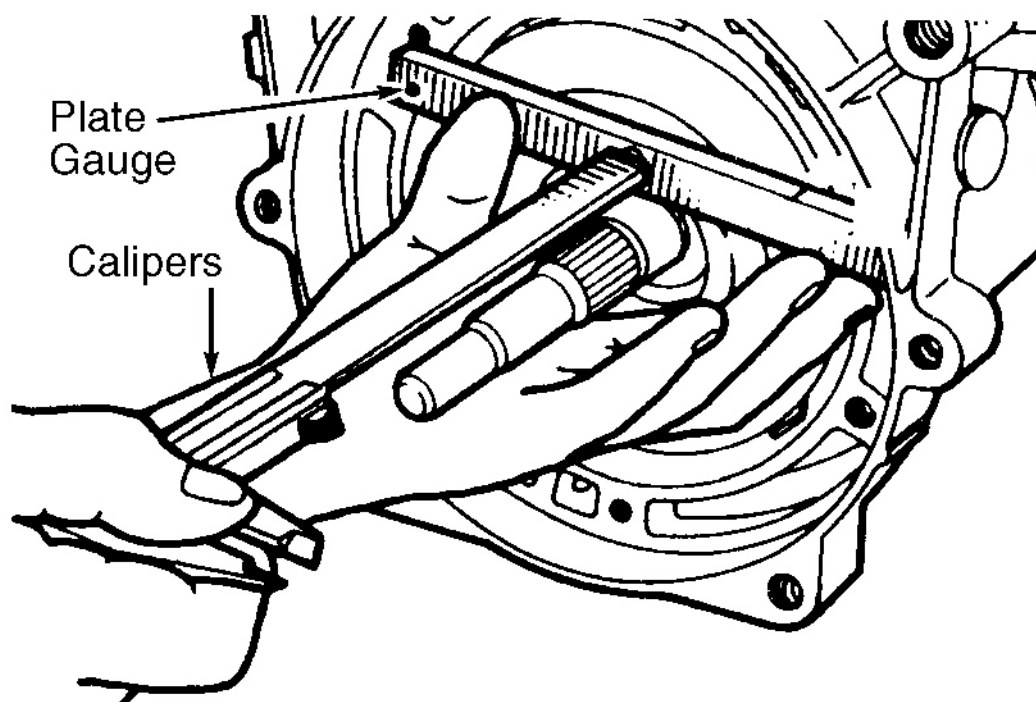
4. Remove one-way clutch inner race from planetary gear assembly. Install front planetary gear. Mesh splines of planetary gear with flukes of discs by rotating and pushing planetary gear. Position one-way clutch inner race with notched tooth "A" toward valve body side of case. See **Fig. 52** . Push plate into place. Install snap ring. Ensure snap ring is fully seated.
5. Align oil hole and bolt hole of center support toward valve body side. Align center support bolt holes with case holes and install. Install bolts with wave washers. Tighten bolt on accumulator piston side first to 18 ft. lbs. (25 N.m). Install direct clutch assembly while rotating to align with center support.



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Fig. 52: Positioning One-Way Clutch Inner Race
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

6. If fully installed, splined center of clutch will be even with end of sun gear shaft. Install bearing race No. 12, thrust bearing No. 13 and bearing race No. 14 over splined end of forward clutch. Install thrust bearing No. 4 on forward clutch. See **Fig. 57** . Install forward clutch. Rotate and push forward clutch to mesh splines of front clutch with flukes of discs.
7. Using calipers and Clutch Drum Thrust Plate Gauge (MD998217), measure distance between top of case and forward clutch drum. Measured value minus thickness of plate gauge equals forward clutch installation height. See **Fig. 53** . Distance should be .059" (1.5 mm). If distance is not as specified, check installation of previously installed components. Install thrust bearing No. 8 and bearing race No. 7 to forward clutch. Install Guide Rods (MD998412) finger tight in front case bolt holes.



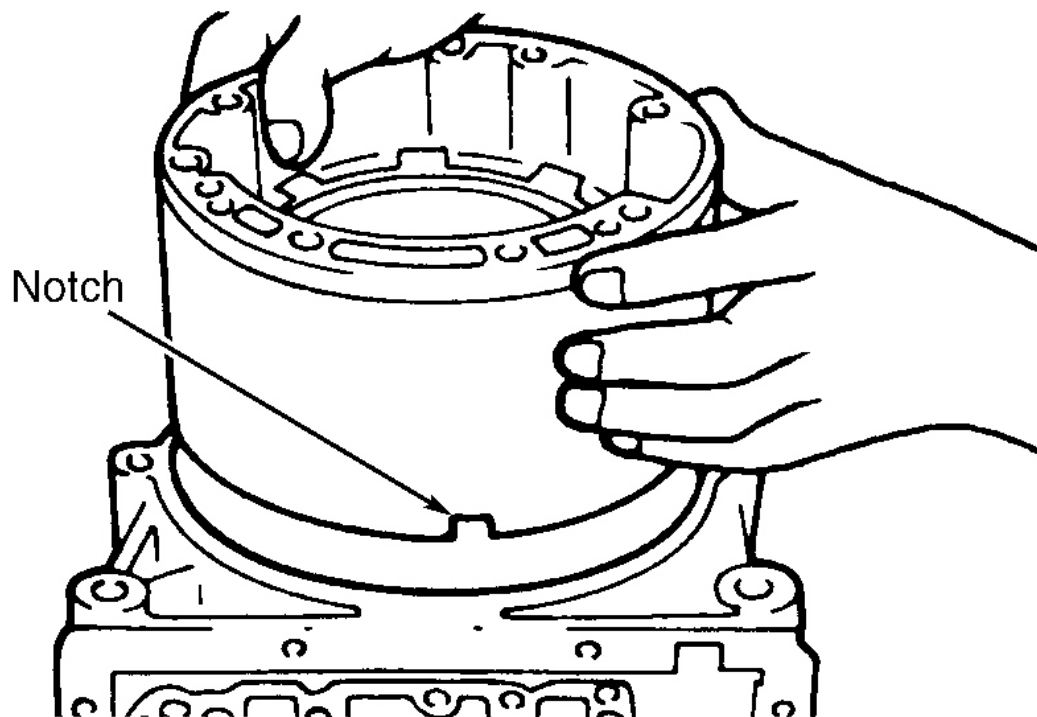
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Fig. 53: Measuring Forward Clutch Installed Height

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

8. Install OD case over guide pins with notch area toward valve body side of case. See **Fig. 54** . Install thrust washer on OD case and OD planetary gear. Ensure washer lugs align with holes in OD case and planetary gear assembly.
9. Install OD planetary gear assembly with OD clutch and 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 Clutch Drum Thrust Plate Gauge (MD998217), measure distance between top of case and OD clutch drum. Measured value minus thickness of plate gauge equals OD clutch installation height. See **Fig. 55** . Distance should be .08" (2.0 mm). If distance is not as specified, check installation of

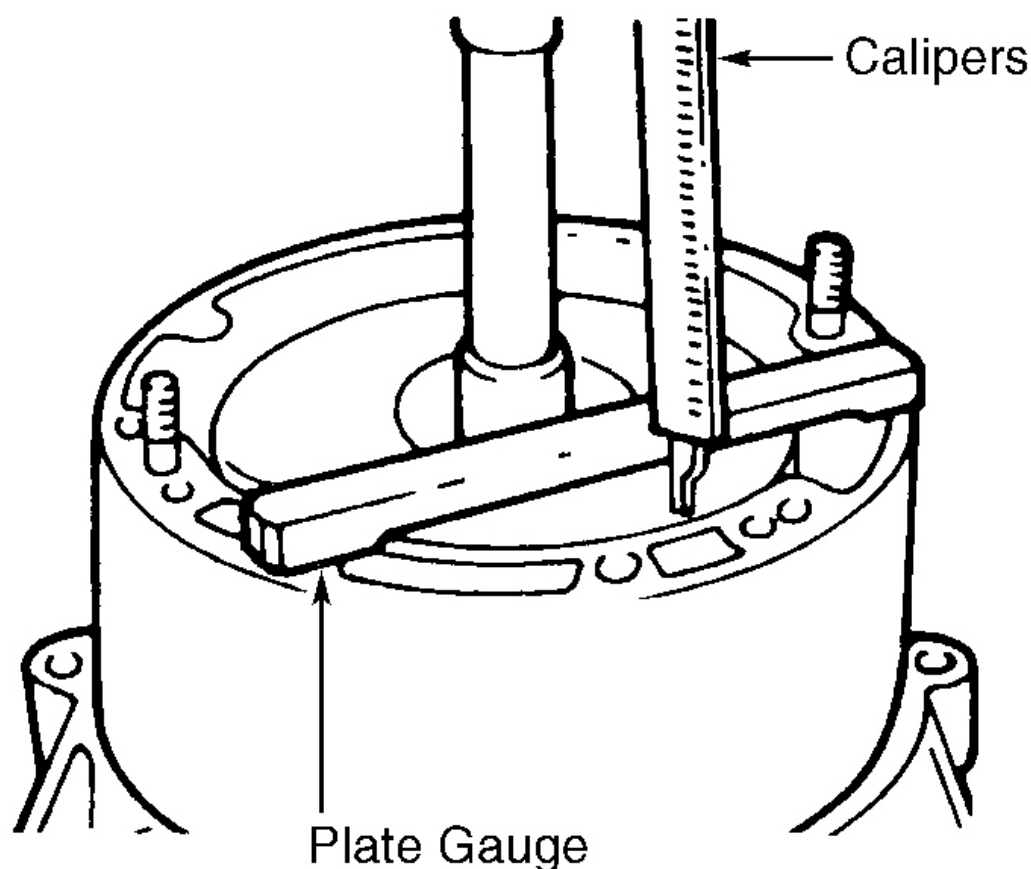
previously installed components.



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Fig. 54: Installing OD Case

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

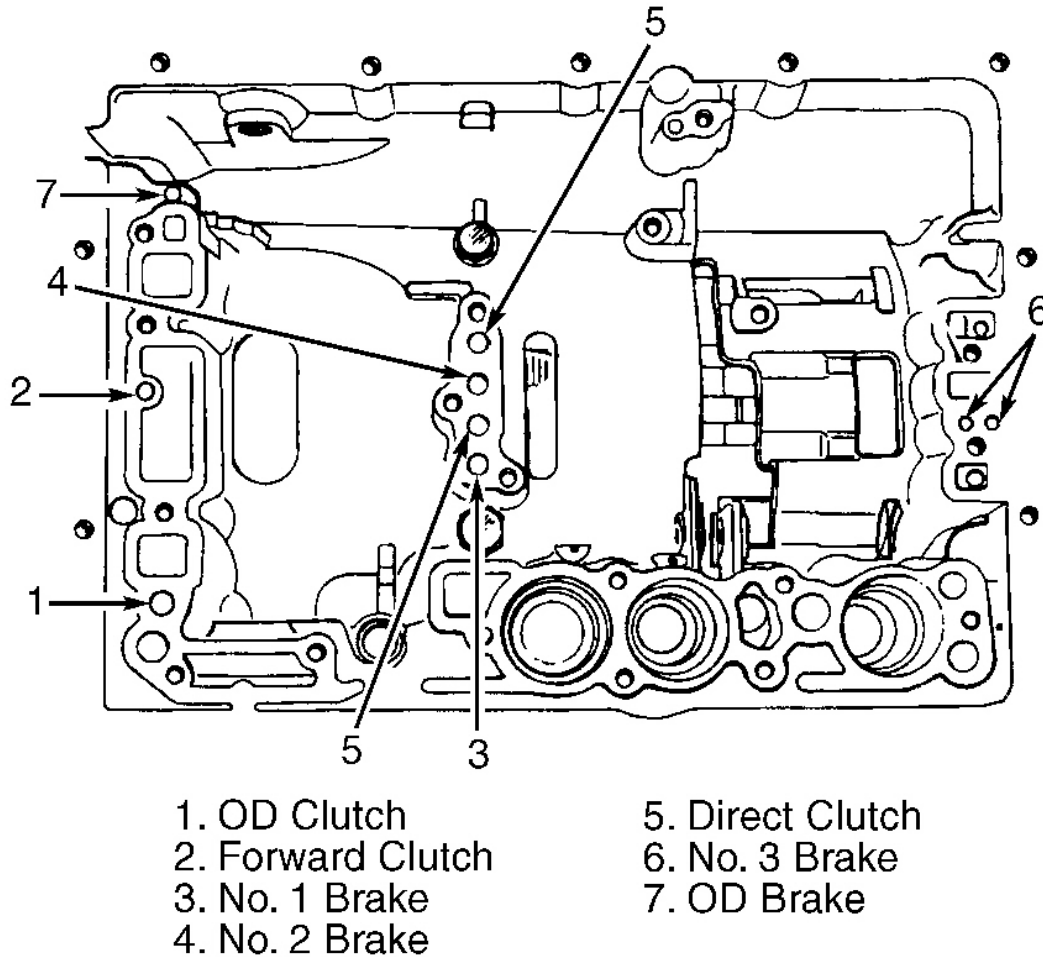


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Fig. 55: Measuring OD Clutch Installed Height**Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.**

10. Install "O" ring on OD case. Install converter housing to transmission case. Tighten 10-mm bolts to 25 ft. lbs. (34 N.m) and 12 mm bolts to 42 ft. lbs. (57 N.m). Install bearing race No. 2 on input shaft. Install thrust bearing No. 1 on rear of oil pump. Ensure oil seal rings and "O" ring are installed on oil pump.
11. Install oil pump over guide studs and into transmission case. Ensure thrust bearing does not fall off oil pump. Coat oil pump retaining bolts below bolt heads with Loctite (242). Remove guide studs. Install bolts and tighten to 16 ft. lbs. (21 N.m). Ensure input shaft turns freely. Using a dial indicator, check input shaft end play. Position dial indicator against end of input shaft. End play should be .012-.035" (.30-.90 mm).
12. Apply air pressure to specific oil passage to check appropriate operating components. See **Fig. 56** . 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 lever shaft into case and through manual valve lever. Install NEW spring pin with slot at right angle

to shaft.



95E20341

Fig. 56: Checking Component Piston Operation

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

13. Align spacer hole to hollow area of lever. Stake spacer to lever. Ensure manual valve lever shaft turns smoothly. Install parking lock pawl, pivot pin and spring in case. Install lock rod on manual valve lever and install parking lock pawl. Install parking pawl bracket on case. Ensure collar on control rod is toward front of transmission. Tighten bracket bolts to 65 INCH lbs. (7.4 N.m).
14. Check operation of parking lock pawl. Ensure output shaft is locked when manual valve lever is in "P" position. Determine proper accumulator piston locations. See **Fig. 12**. Ensure accumulator pistons are correct diameter. See **ACCUMULATOR PISTON DIAMETER** table. Determine proper spring free length and outer diameter for accumulator piston application. See **ACCUMULATOR SPRING SPECIFICATIONS** table.

ACCUMULATOR PISTON DIAMETER ⁽¹⁾

Application	In. (mm)
Forward & Direct Clutch	1.252 (31.80)
No. 2 Brake	1.370 (34.80)

(1) For accumulator piston locations, See **Fig. 12** .

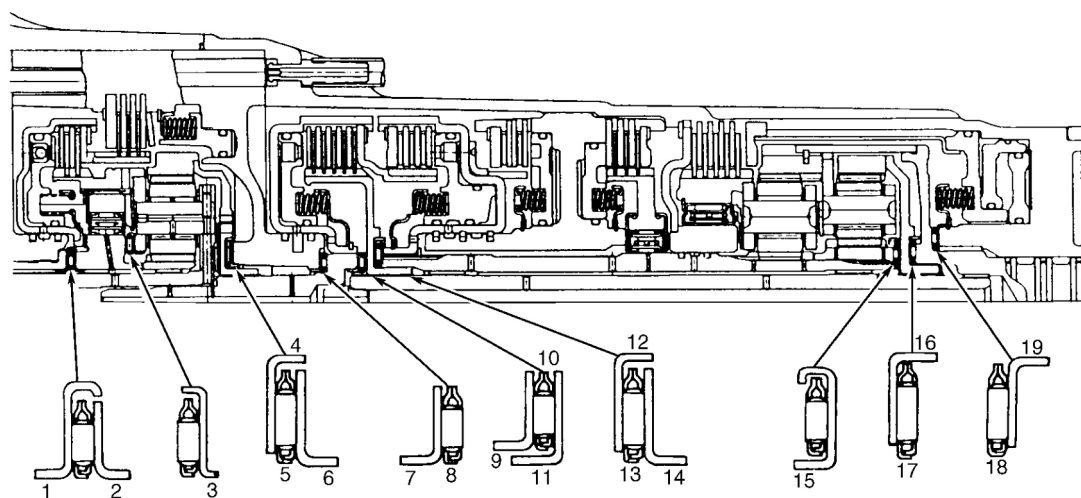
ACCUMULATOR SPRING SPECIFICATIONS ⁽¹⁾

Application	Diameter In. (mm)	Free Length In. (mm)
Direct Clutch		
Large Spring	.610 (15.50)	1.181 (30.00)
Small Spring	.563 (14.30)	1.715 (43.56)
Forward Clutch		
Large Spring	.689 (17.50)	2.252 (57.20)
Small Spring	.500 (12.70)	1.157 (29.40)
No. 2 Brake		
Large Spring	.881 (22.39)	2.172 (55.18)
Small Spring	.636 (16.16)	1.383 (35.13)

(1) For accumulator spring locations, See **Fig. 12** .

15. 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 control valve assembly and tighten bolts to 89 INCH lbs. (10 N.m). See **Fig. 5** .
16. Install gasket and oil strainer. Tighten bolts to 48 INCH lbs. (5.4 N.m). Using a plastic hammer, install oil tubes. Do not bend or damage oil tubes. Install magnets in oil pan. Ensure magnets do not interfere with oil tubes. Install NEW gasket to transmission case. Align cut part of gasket and transmission case. Install oil pan and bolts and tighten to 39 INCH lbs. (4.4 N.m).
17. Lift governor retaining clip with screwdriver. Slide governor onto output shaft. Install retaining clip into hole on output shaft. Install lock plate and bolt. Tighten bolt to 35 INCH lbs. (3.9 N.m). Stake lock plate in place.
18. Install snap ring, lock ball, speedometer drive gear and retaining snap rings. Install overdrive solenoid. Tighten bolts to 115 INCH lbs. (13 N.m). Insert neutral safety switch on manual valve lever shaft and temporarily tighten adjusting bolt. Install grommet and NEW lock washer. Install and tighten nut to 35 INCH lbs. (3.9 N.m). Align neutral safety switch basic line and switch groove. Tighten adjusting bolt to 48 INCH lbs. (5.4 N.m). Bend over at least 2 washer tabs.
19. Install control shaft lever with spring washer and nut. Tighten nut to 61 INCH lbs. (6.9 N.m). Install wire

harness and throttle cable clamp. Install torque converter. Ensure torque converter is installed correctly.



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Fig. 57: Identifying Bearing Race & Thrust Bearing Locations
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Center Support-To-Case Bolt	18 (25)
Converter-To-Drive Plate Bolt	20 (27)
Oil Pump-To-Case Bolt	15 (21)
Transmission Case-To-Converter Housing Bolt	
10-mm	25 (34)
12-mm	42 (57)
INCH Lbs. (N.m)	
Control Shaft Lever Bolt	61 (6.9)
Governor Lock Plate Bolt	35 (3.9)
Hydraulic Test Plug	65 (7.4)
Lock Pawl Bracket Bolt	65 (7.4)
Neutral Safety Switch	
Adjusting Bolt	48 (5.4)
Mounting Nut	35 (3.9)
Oil Pan Bolt	39 (4.4)
Oil Pump Housing Bolt	65 (7.4)
Oil Strainer Bolt	48 (5.4)
Overdrive Solenoid Bolt	115 (13)

1990 Mitsubishi Montero

1990-94 AUTOMATIC TRANSMISSIONS Mitsubishi V4AW2 Overhaul

Throttle Cam Bolt	65 (7.4)
Upper Valve Body-To-Lower Valve Body Bolt	48 (5.4)
Valve Assembly-To-Case Bolt	89 (10)

TRANSMISSION SPECIFICATIONS

TRANSMISSION SPECIFICATIONS

Application	In. (mm)
Center Support Bushing Inside Diameter	1.435 (36.46)
Direct Clutch Piston Stroke	.036-.78 (.91-1.99)
Extension Housing Bushing Inside Diameter	1.563 (39.71)
Forward Clutch Piston Stroke	.059-.115 (1.43-2.92)
Input Shaft End Play	.012-.035 (.30-.90)
No. 1 Brake Piston Stroke	.032-.068 (.80-1.73)
No. 2 Brake Piston Stroke	.040-.089 (1.01-2.25)
No. 3 Brake Pack Clearance	.024-.104 (.61-2.64)
OD Brake Piston Stroke	.026-.087 (.65-2.21)
OD Brake Snap Ring-To-Flange Standard Clearance	.026-.087 (.065-2.21)
OD Clutch Piston Stroke	.076-.104 (1.92-2.64)
OD Clutch Drum Bushing Inside Diameter	.911 (23.14)
OD Planetary Gear Bushing Inside Diameter	.444 (11.27)
Oil Pump Side Gear Clearance	.0008-.0020 (.020-.050)
Output Shaft Bushing Inside Diameter	.712 (18.08)
Planetary Pinion Gear Clearance	.008-.020 (.20-.50)

WIRING DIAGRAMS

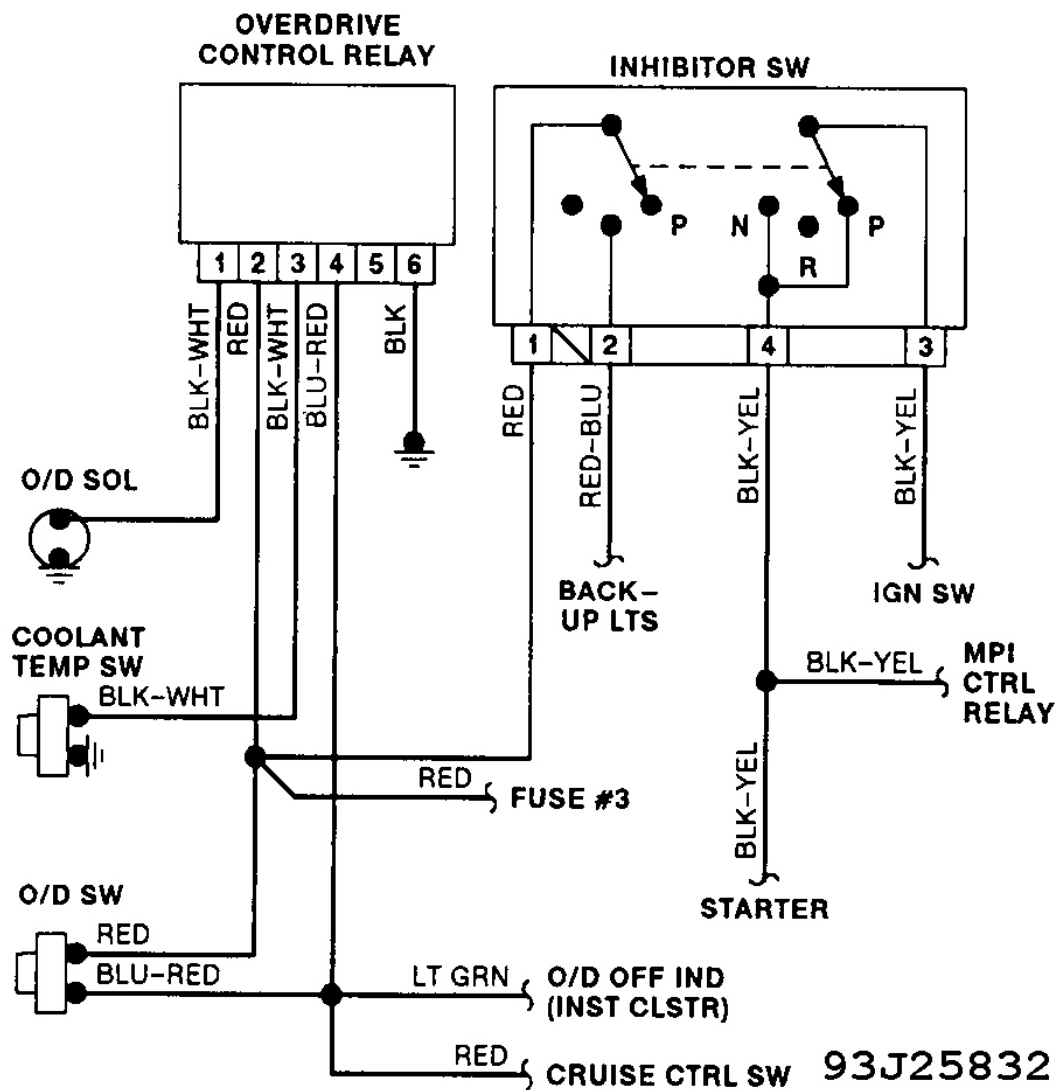


Fig. 58: V4AW2 Wiring Diagram (Montero - 1990-91)

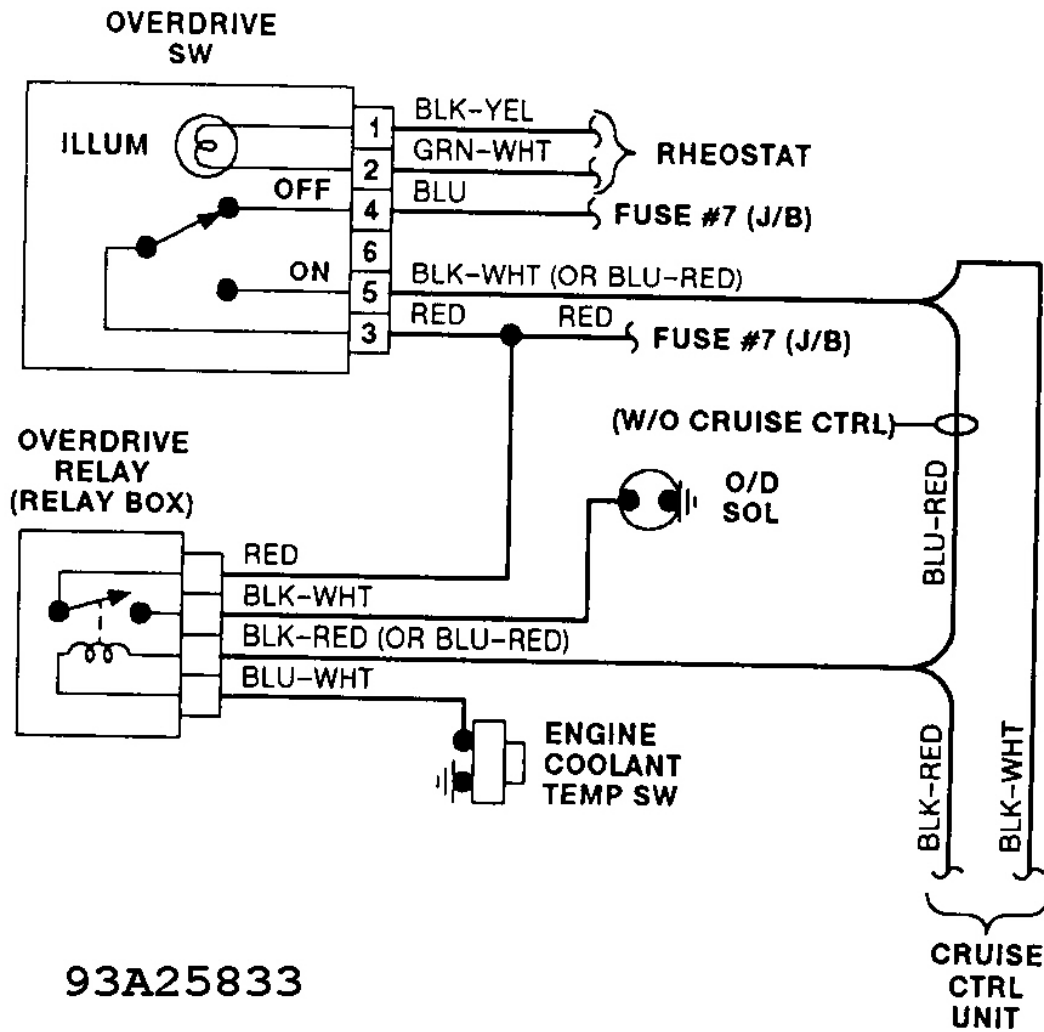


Fig. 59: V4AW2 Wiring Diagram (Montero - 1992)

1990 Mitsubishi Montero

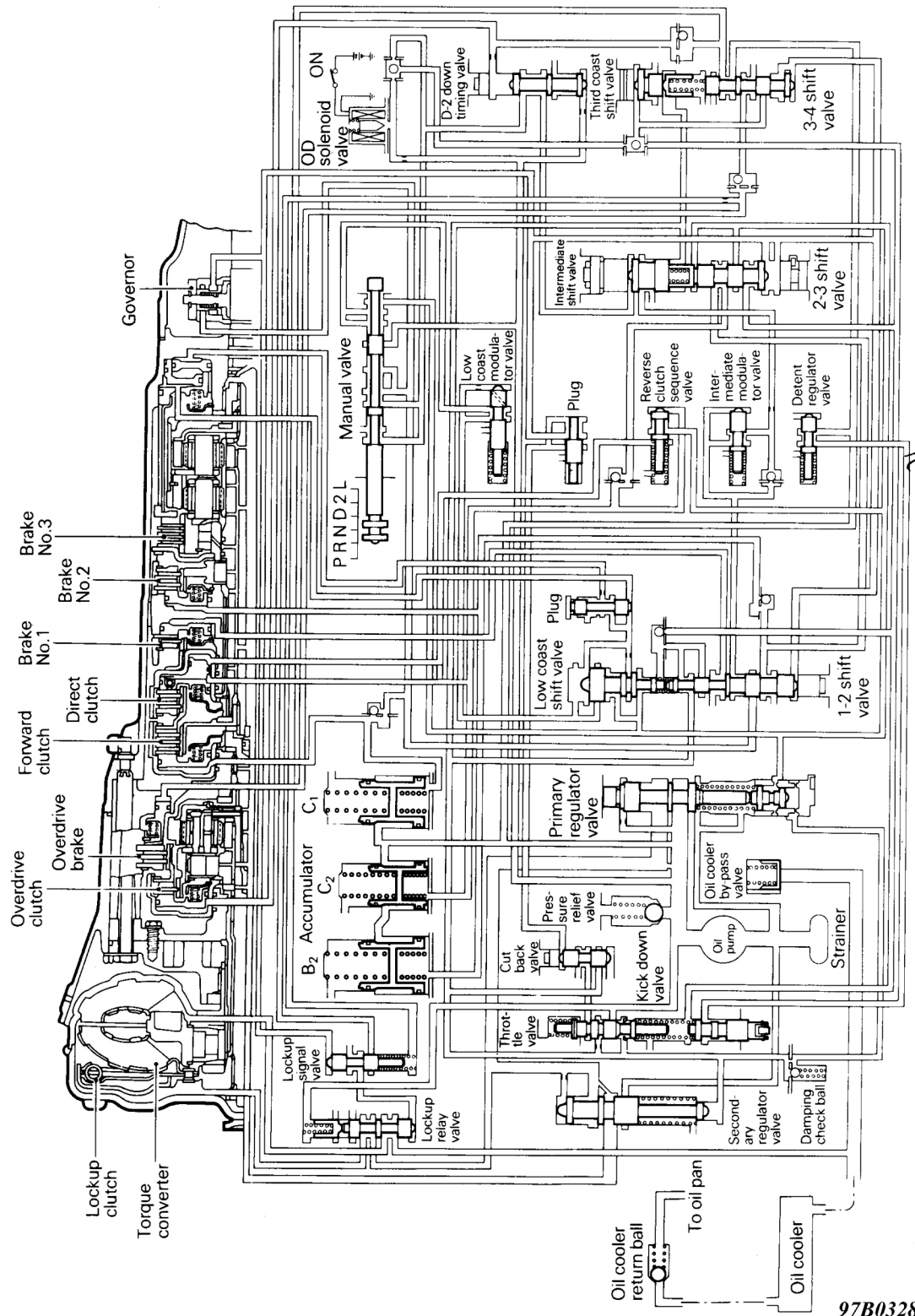
1990-94 AUTOMATIC TRANSMISSIONS Mitsubishi V4AW2 Overhaul



Fig. 60: V4AW2 Wiring Diagram (Montero - 1993-92)

OIL CIRCUIT DIAGRAM

OIL CIRCUIT DIAGRAMS Mitsubishi V4AW2



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Fig. 61: Oil Circuit Diagram (Mitsubishi V4AW2)