

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL

AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

APPLICATION

APPLICATION & LABOR TIMES

Vehicle Application	Labor Times ⁽¹⁾ R & I	Labor Times ⁽²⁾ Overhaul	Trans. Model
Miata			
1990-93	4.9	8.6	N4A-HL
1994	4.9	8.6	NC4A-EL
MPV (1989-94 w/2.6L)	3.9	8.6	N4A-HL
RX7 (1989-91)	3.4	8.6	N4A-EL
929 (1988-91)	3.3	9.1	N4A-EL

(1) Removal and installation of transmission from vehicle chassis.

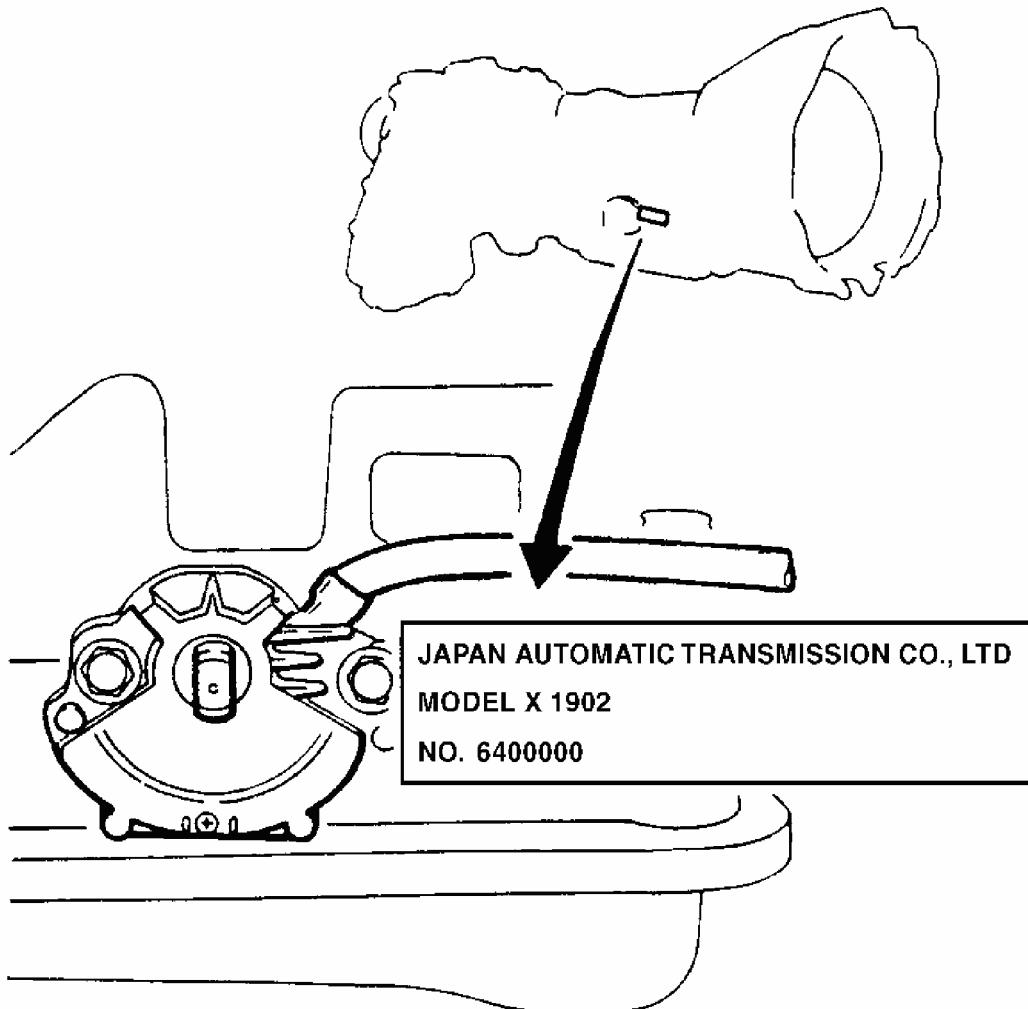
(2) On bench overhaul for transmission. DOES NOT include removal and installation.

IDENTIFICATION

This transmission is manufactured by Japan Automatic Transmission Company (JATCO). Transmission model may be identified by a stamped metal plate attached to right side or top of transmission case. Plate lists model code on second line and serial number on bottom line. See Fig. 1.

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Fig. 1: Locating Service Identification Tag
Courtesy of MAZDA MOTORS CORP.

DESCRIPTION

N4A-HL and N4A-EL components may vary. All are 4-speed overdrive units, controlled either hydraulically or electrically. These units have 3-element lock-up torque converters and 3 planetary gear sets. N4A-EL uses a computer to select shift patterns (standard or power) depending upon accelerator position. Shift pattern programs are set in lock-up control unit according to vehicle speed and throttle position. See 2 and 3.

LUBRICATION & ADJUSTMENTS

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AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

See the appropriate TRANSMISSION SERVICING article. Refer to the following menu:

- For 1991 models, see [**TRANSMISSION SERVICING - A/T**](#).
- For 1992 models, see [**TRANSMISSION SERVICING - A/T**](#).

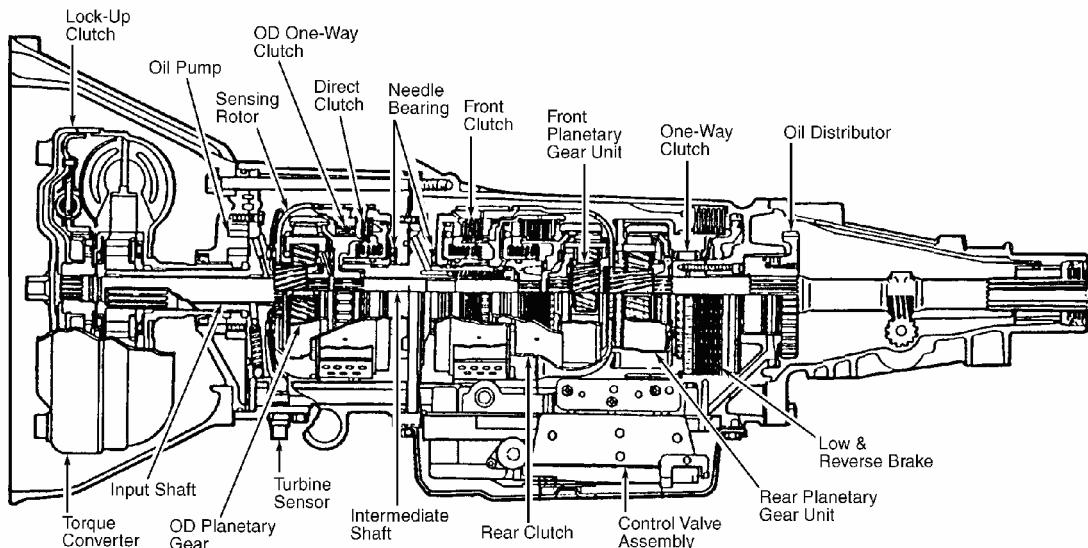
ON-VEHICLE SERVICE

See the appropriate TRANSMISSION SERVICING article:

- For 1991 models, see [**TRANSMISSION SERVICING - A/T**](#) article.
- For 1992 models, see [**TRANSMISSION SERVICING - A/T**](#) article.

TROUBLESHOOTING

For electronic control system troubleshooting, refer to the [**AUTO TRANS DIAGNOSIS - N4A-EL/HL & NC4A-EL**](#) article in this section.



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Fig. 2: Internal View Of Transmission (N4A-EL)
Courtesy of MAZDA MOTORS CORP.

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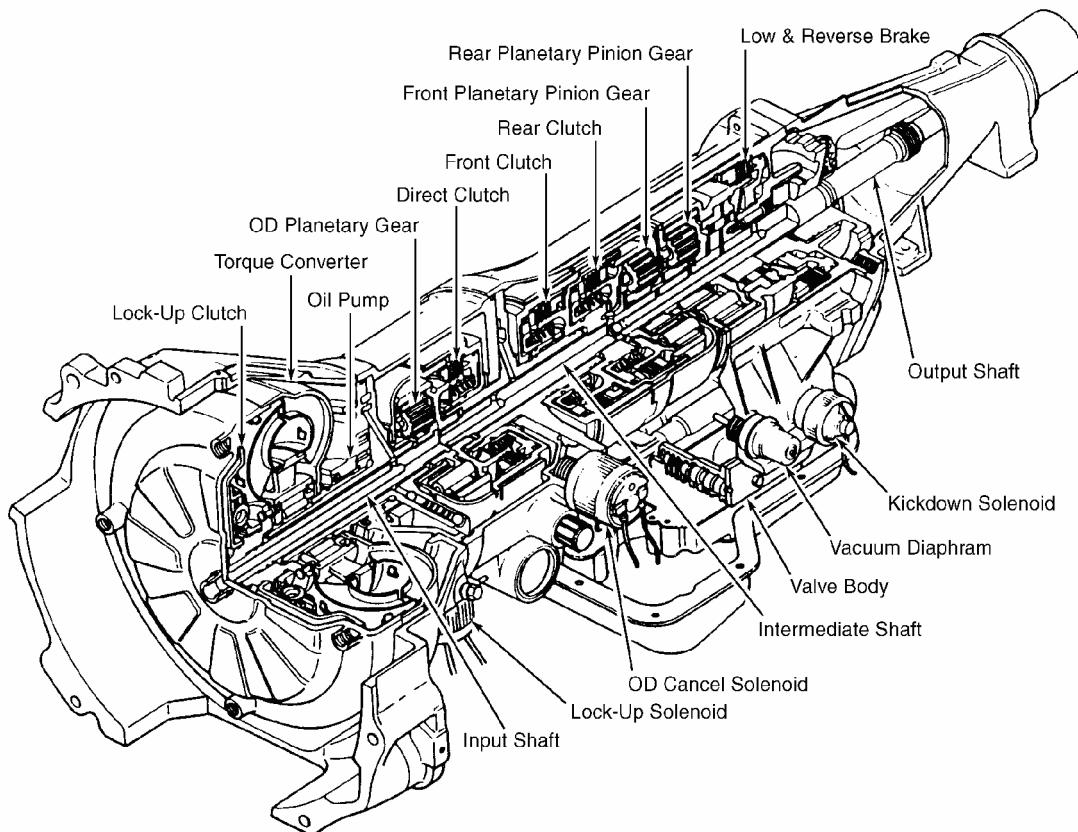


Fig. 3: Internal View Of Transmission (N4A-HL)
Courtesy of MAZDA MOTORS CORP.

TESTING

See the **AUTO TRANS DIAGNOSIS - N4A-EL/HL & NC4A-EL** article in this section. For clutch and band operation, refer to **CLUTCH & BAND APPLICATIONS**.

CLUTCH & BAND APPLICATIONS

CLUTCH & BAND APPLICATIONS (N4A-HL)

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

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	Clutch & Forward Clutch
Overdrive	Overdrive Band, High-Reverse (Front) Clutch & Forward Clutch
"2" (Intermediate)	
2nd Gear	Direct Clutch, Brake Band & Forward Clutch
"L" (Low)	
1st Gear	Direct Clutch, Forward Clutch & Low & Reverse Brake
2nd Gear	Direct Clutch, Brake Band & Forward Clutch
"R" (Reverse)	Direct Clutch, High-Reverse (Front) Clutch & Low & Reverse Brake
"N" Or "P" (Neutral Or Park)	All Clutches & Bands Released Or Ineffective

OPERATION OF COMPONENTS

Range	Gear position	D/C	OD Brk.		OD OWC	R/C	F/C	2nd Brk.		L & R Brk.	OWC	Solenoid valve		
			Appl.	Rel.				Appl.	Rel.			1-2	2-3	3-4
P	—	○	⊗	○						○		○	○	○
R	—	○	⊗	○	○					○	○			○
N	Below 15 km/h	○	⊗	○								○	○	○
	Above 17 km/h	○	⊗	○										○
D	1st	○	⊗	○	○	○					○	○	○	○
	2nd	○	⊗	○	○	○			○			○	○	○
	3rd	○	⊗	○	○	○	○	○	⊗	○				○
	OD	○				○	○	○	⊗	○				
S	1st	○	⊗	○	○	○					○	○	○	○
	2nd	○	⊗	○	○	○			○			○	○	○
	3rd	○	⊗	○	○	○	○	○	⊗	○				○
L	1st	○	⊗	○	○	○					○	○	○	○
	2nd	○	⊗	○	○	○		○				○	○	○

⊗ Indicates operation, although band remains deactivated due to large amount of release pressure.

The lock-up control solenoid valve operates only during lock-up.

The 3-2 control solenoid valve operates momentarily during 3-2 downshift.

The OD one-way clutch operates momentarily during an OD-3 downshift.

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Fig. 4: Band Application Chart (N4A-EL)
Courtesy of MAZDA MOTORS CORP.

REMOVAL & INSTALLATION

See the appropriate TRANSMISSION REMOVAL & INSTALLATION - A/T article in this section.

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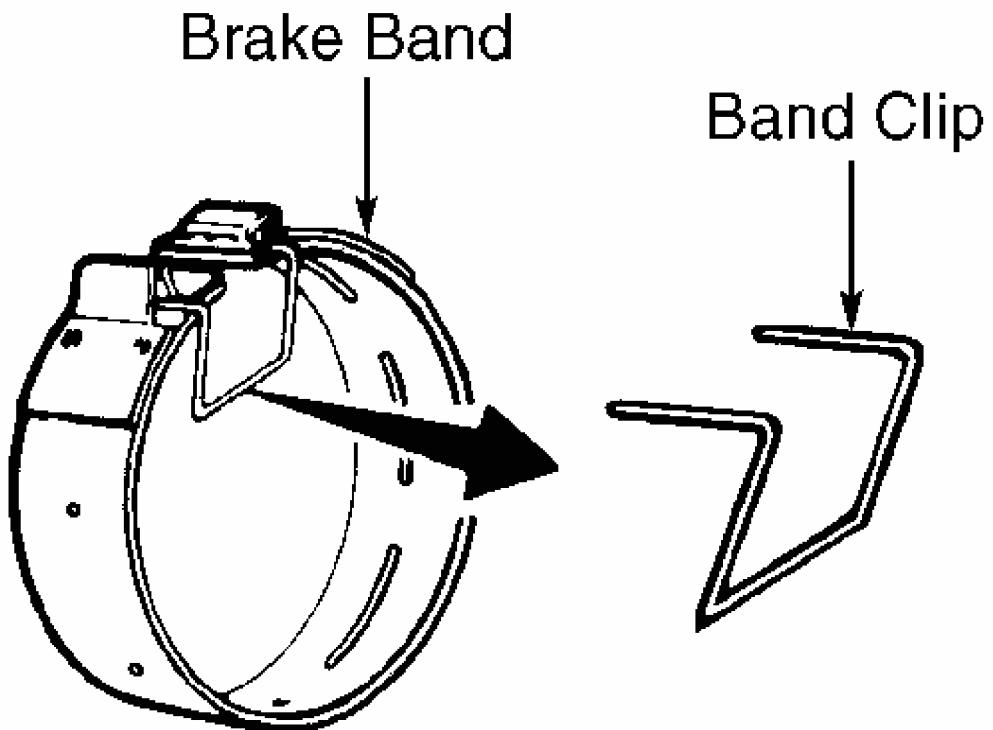
- For 1991 models, see [**TRANSMISSION REMOVAL & INSTALLATION - A/T**](#) .
- For 1992 models, see [**TRANSMISSION REMOVAL & INSTALLATION - A/T**](#) .

TRANSMISSION DISASSEMBLY

1. Remove transmission and place on work stand. Remove torque converter. Remove governor tube, kickdown solenoid, vacuum diaphragm (with rod), oil pressure switch, OD cancel solenoid and lock-up control solenoid. Match mark converter housing-to-OD case and OD case-to-main case positions.
2. Remove converter housing. Remove OD case assembly. Remove oil pan. Note location of valve body attaching bolts during removal. Remove bolts and valve body assembly. **DO NOT** drop manual valve.
3. Remove OD band servo cover. Loosen piston stem lock nut, and tighten piston stem to apply band. Repeat procedure for 2nd band servo. Remove OD case assembly from main case. Mark direction of input shaft and remove from OD case. Transmission model N4A-EL input shaft cannot be removed at this time. Mark direction of intermediate shaft and remove.
4. Screw in 2 slide hammer type pullers into oil pump. Remove oil pump. Loosen OD band servo piston stem. Remove OD planetary gear and direct clutch as an assembly. Remove bearing, race, thrust washer, brake band and strut. Clip brake band to retain. See [**Fig. 5**](#) .

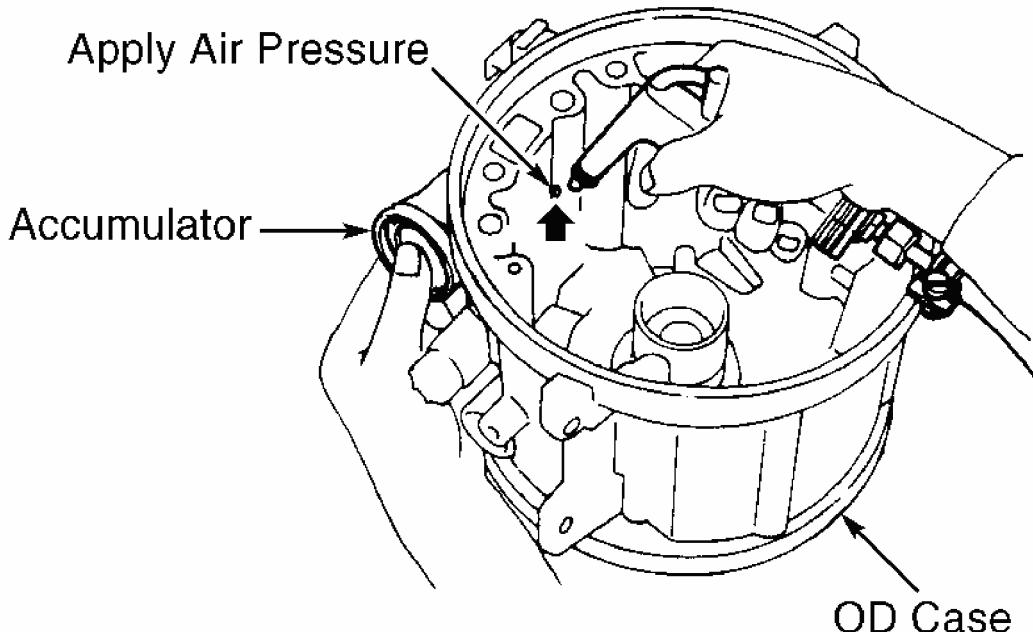
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Fig. 5: Retaining Brake Band
Courtesy of MAZDA MOTORS CORP.



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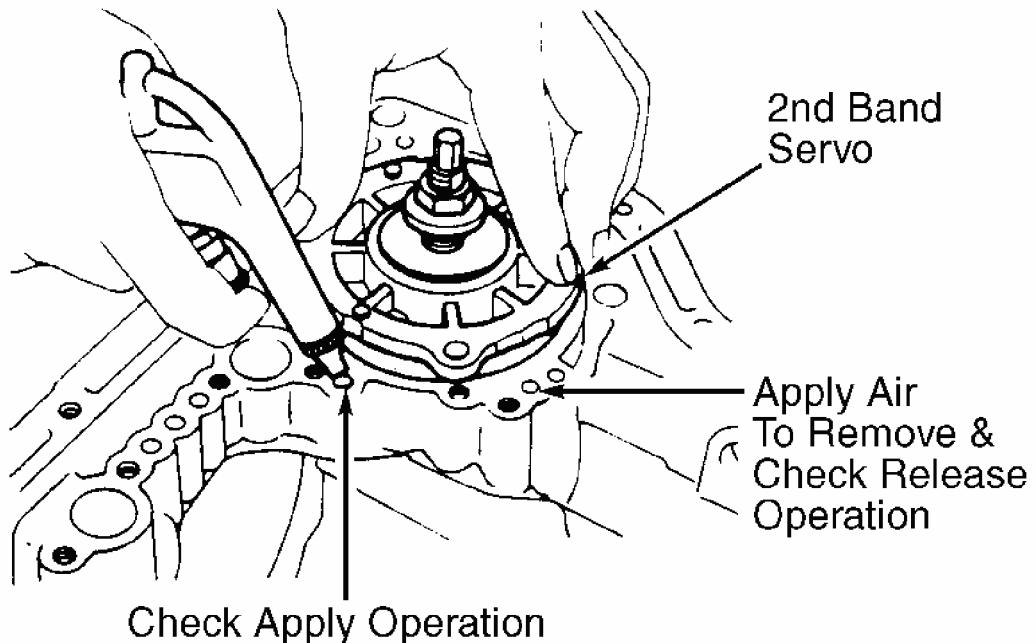
Fig. 6: Removing Accumulator Assembly

Courtesy of MAZDA MOTORS CORP.

5. Lightly tap servo retainer and remove OD servo assembly. Match mark OD case to drum support. Remove bolts retaining drum support to OD case. Remove gaskets. Remove speedometer pinion from extension housing.
6. Loosen 2nd brake band servo piston stem, and remove strut. Remove brake band. Clip brake band to retain. See [Fig. 5](#). Remove front clutch, rear clutch, rear clutch hub, front planetary pinion carrier, connecting shell and sun gear as an assembly. Remove bolts retaining 2nd brake band servo. Remove servo assembly. See [Fig. 7](#).
7. Check one-way clutch for proper operation. See [Fig. 28](#). Remove extension housing; **DO NOT** lose parking pawl components. See [Fig. 29](#). Remove rear planetary carrier snap ring. Remove rear planetary carrier. Remove output shaft snap ring. Remove connecting drum with internal gear.

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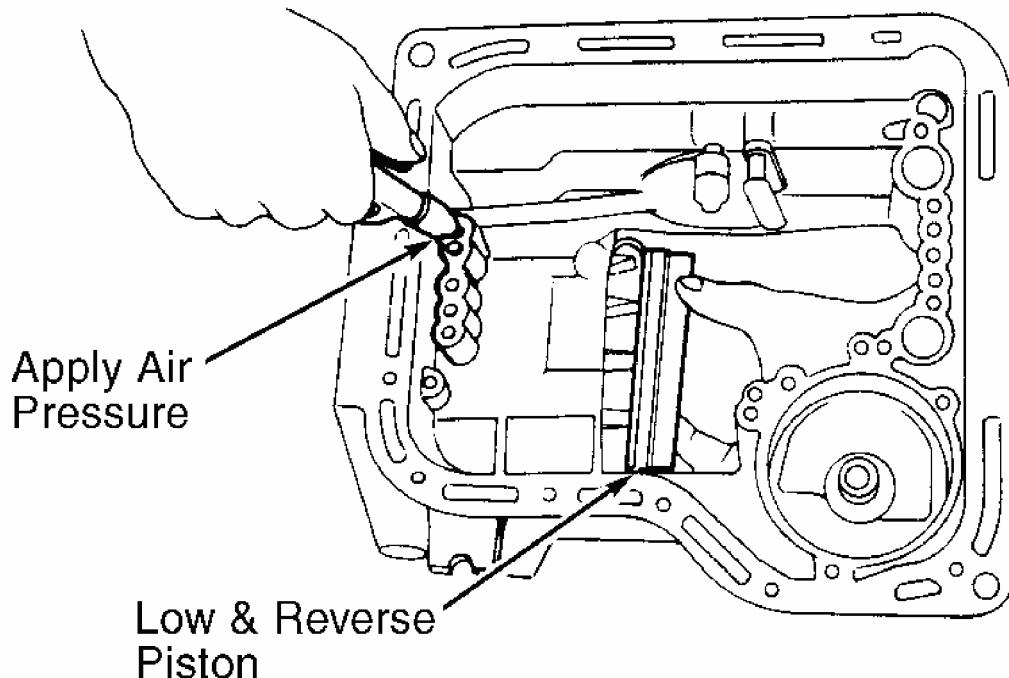
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Fig. 7: Removing 2nd Brake Band Servo Assembly
Courtesy of MAZDA MOTORS CORP.

8. Pry out one end of low and reverse brake snap ring. Remove snap ring by rotating end of snap ring counterclockwise. Remove low and reverse clutch pack.
9. Remove output shaft. Remove governor assembly from main case. Transmission model N4A-EL does not have a governor on output shaft.
10. Remove thrust washer and bearing from rear of transmission. Remove one-way clutch bolts. Remove one-way clutch inner race, thrust washer, return spring and thrust ring. Apply air to oil passage to remove low and reverse brake piston. See **Fig. 8**.

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Fig. 8: Removing Low & Reverse Brake Piston
Courtesy of MAZDA MOTOR CORP.

TORQUE CONVERTER

INSPECTION & CLEANING

Torque converter is a sealed unit and cannot be disassembled for service. If hub of converter is scored or if metal particles are found in transmission fluid, replace converter assembly. Flush inside with solvent and ATF.

COMPONENT DISASSEMBLY & REASSEMBLY

OIL PUMP

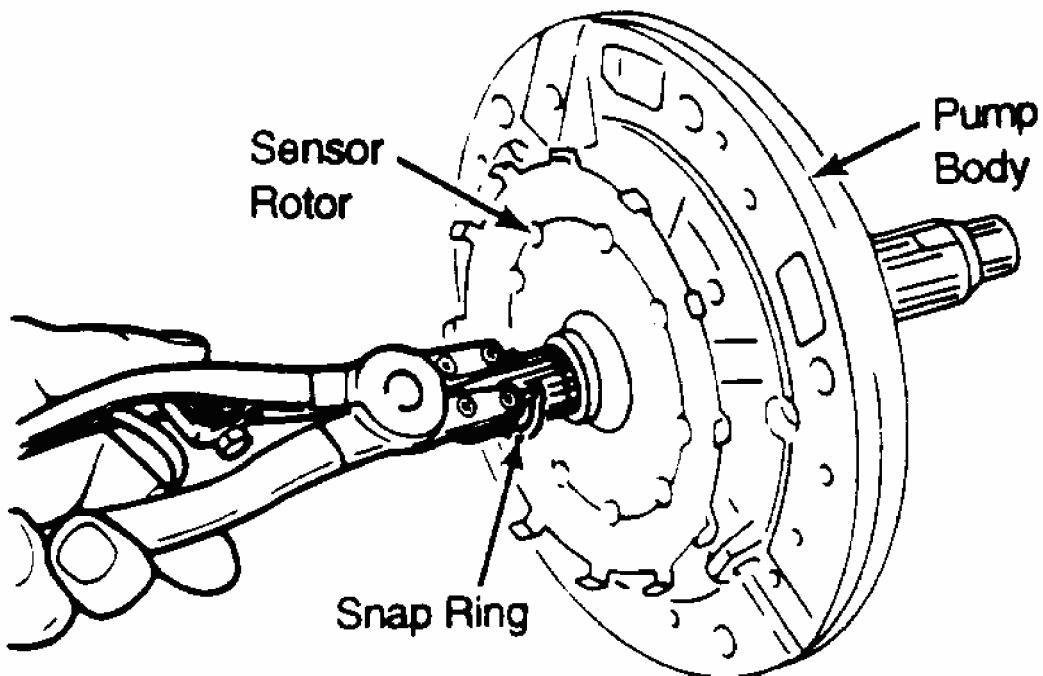
Disassembly & Reassembly

On N4A-EL, remove snap ring from input shaft, and remove sensing rotor and input shaft. See **Fig. 9**. On all transmissions, remove oil pump bolts and separate pump cover and pump

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housing. Match mark oil pump gears with appropriate marker. **DO NOT** use a punch. Remove roll pin and remove lock-up control valve components (if necessary). To reassemble, reverse disassembly procedure.



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Fig. 9: Removing Sensor Rotor (N4A-EL)
Courtesy of MAZDA MOTORS CORP.

Inspection

Measure outer gear-to-crescent clearance. Measure outer gear-to-housing clearance. Using a straightedge and feeler gauge, measure clearance between gears and pump cover. Measure lock-up control valve spring free length. Replace components if not within specification. See the **OIL PUMP SPECIFICATIONS** table.

OIL PUMP SPECIFICATIONS

Application	In. (mm)
Outer Gear-To-Crescent Clearance	
Standard	.006-.008 (.14-.20)
Limit	.010 (.25)

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Outer Gear-To-Housing Clearance

Standard	.002-.008 (.05-.20)
Limit	.010 (.25)
Oil Pump Gear-To-Cover Clearance	
Standard	.001-.002 (.02-.04)
Limit	.003 (.07)
Lock-up Control Valve Spring Free Length	
Miata & MPV	.984 (25.00)
RX7 & 929	1.012 (25.70)

OD CASE & DRUM SUPPORT

Disassembly

1. Match mark OD case to drum support. Remove bolts retaining drum support to OD case. Remove drum support from OD case. Using a punch, remove OD cancel valve roll pin. Tap pin out from side opposite contacting face. Remove OD cancel valve and spring. On N4A-HL transmission, ensure cancel valve spring free length is .906" (23.00 mm).
2. On all transmissions, remove accumulator snap ring. Apply compressed air to oil passage and remove accumulator plug, piston and spring. See [Fig. 6](#). Ensure accumulator spring free length is about 1.560" (39.70 mm) on N4A-HL and 1.590" (40.40 mm) on N4A-EL.

Inspection

Check the OD drum support bushing and ring groove for signs of wear. Measure clearance between seal ring and groove. Refer to the **DRUM SUPPORT RING-TO-GROOVE CLEARANCE** table. Replace ring if not within specification. Check OD cancel valve. Ensure it moves freely in bore.

DRUM SUPPORT RING-TO-GROOVE CLEARANCE

Clearance	In. (mm)
Standard	.0016-.0063 (.040-.160)
Service Limit	.0157 (.400)

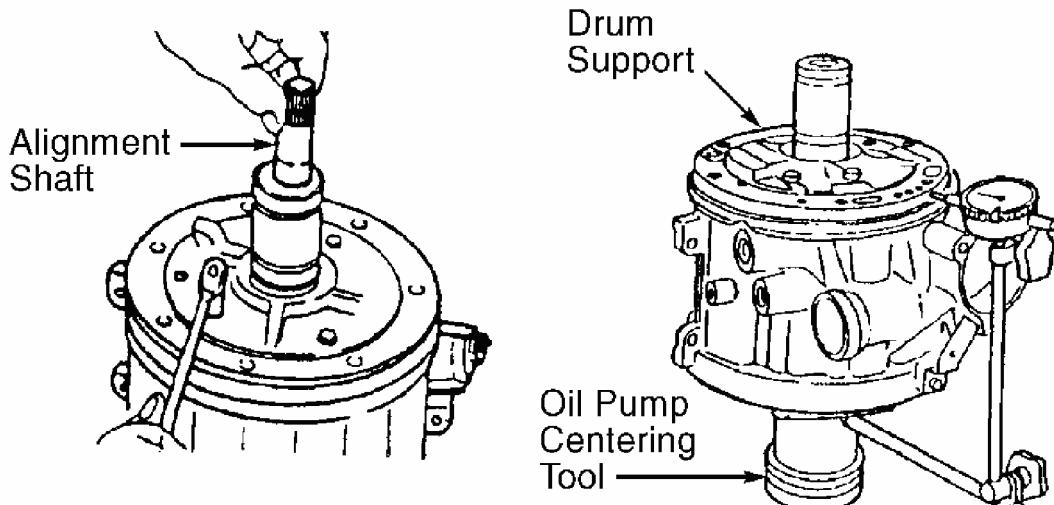
Reassembly

1. Install OD cancel valve and spring (if equipped). Install new roll pin. Install lubrication plug. Install oil pump assembly onto Centering Shaft (49 S019 003 or 49 S019 0A0). Mount OD case, gasket and drum support on oil pump.
2. Ensure OD case assembly is inserted properly into oil pump. Loosen drum support bolts

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(if tightened). Insert Alignment Shaft (49 S019 002 or 49 S019 0A0), tapered edge first, completely through drum support. Install Oil Pump Centering Pins (49S 019 004). Recheck alignment, and tighten drum support bolts. See **Fig. 10**.



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Fig. 10: Aligning Drum Support
Courtesy of MAZDA MOTORS CORP.

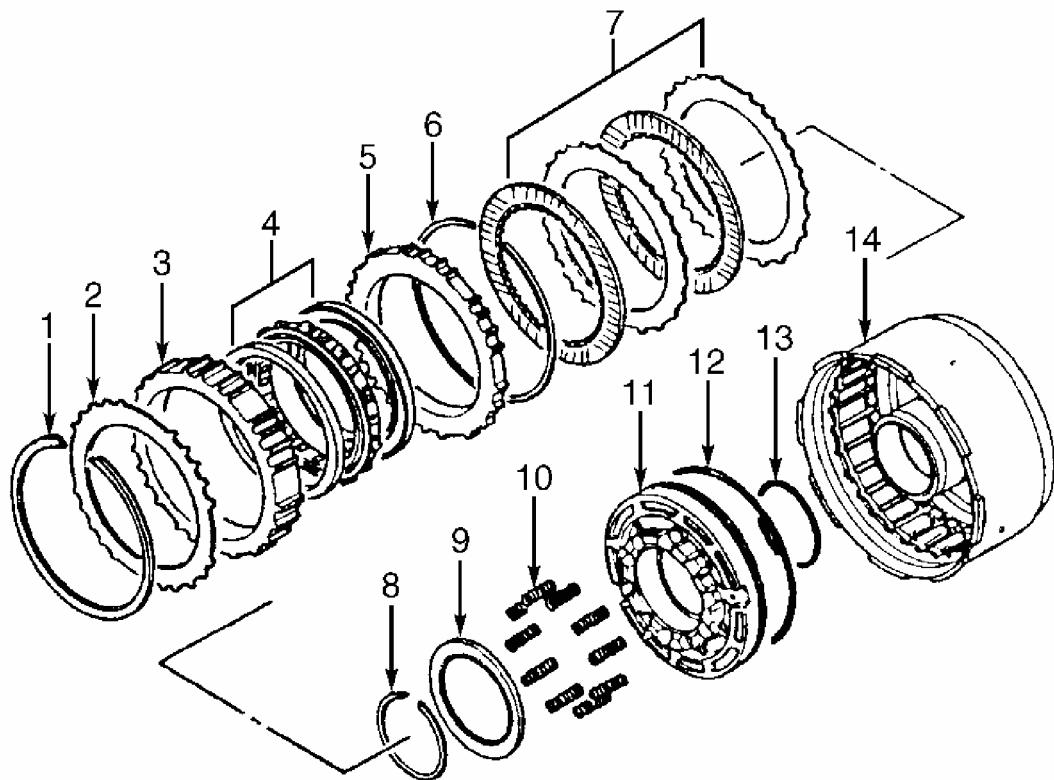
DIRECT CLUTCH

Disassembly

On Miata, RX7 and 929, remove snap ring, side plate, one-way clutch assembly and retaining plate. See **Fig. 11**. Compress spring retainer and remove snap ring. Remove spring retainer and springs. Mount direct clutch drum on drum support. Apply air pressure to remove piston. See **Fig. 13**.

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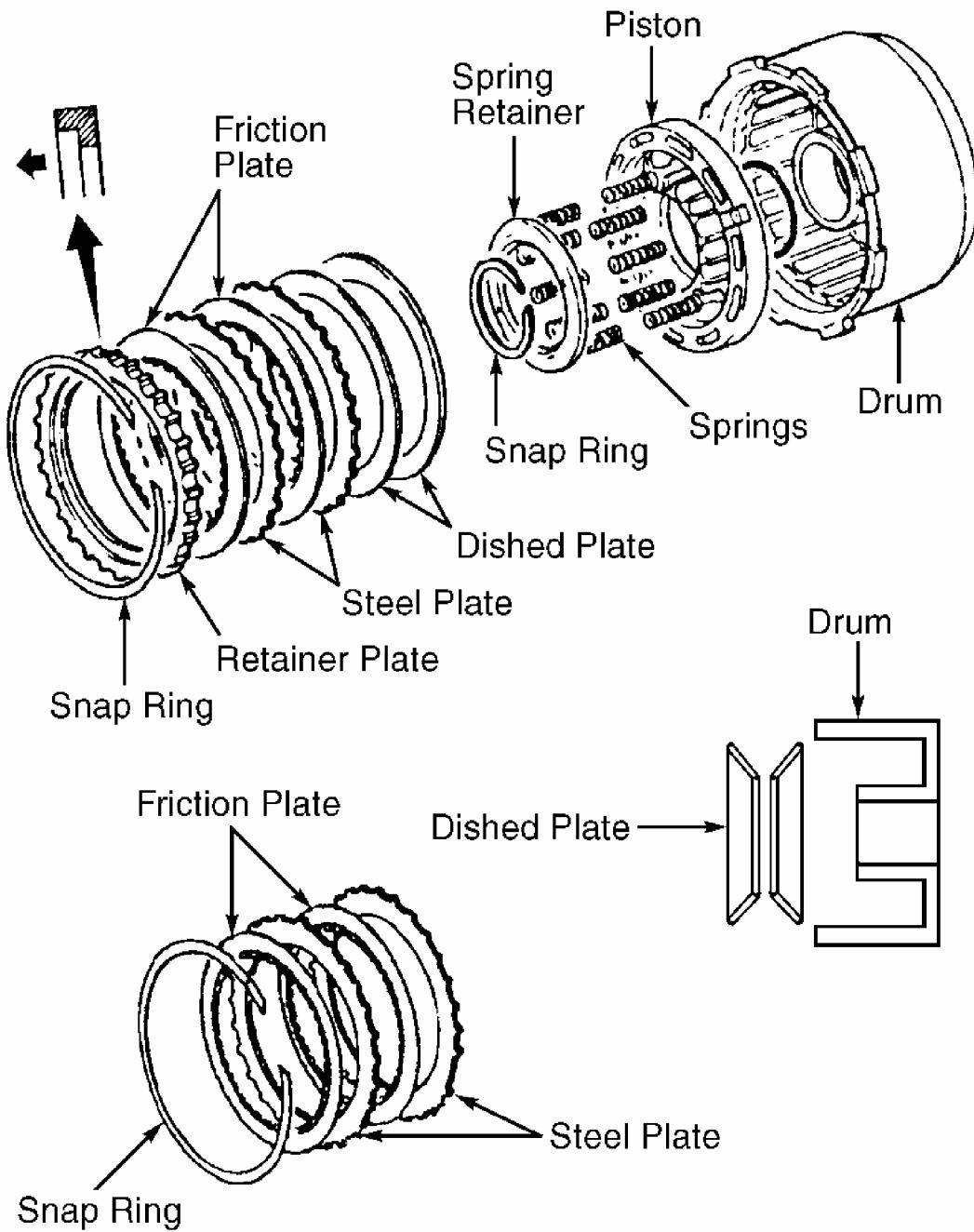
- | | |
|---------------------------------|------------------------|
| 1. Snap Ring | 8. Snap Ring |
| 2. Side Plate | 9. Spring Retainer |
| 3. Outer Race | 10. Spring |
| 4. One-Way Clutch | 11. Piston |
| 5. Retaining Plate | 12. Seal Ring |
| 6. Snap Ring | 13. "O" Ring |
| 7. Drive Plates & Driven Plates | 14. Direct Clutch Drum |

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Fig. 11: Exploded View Of Direct Clutch (Miata, RX7 & 929)
Courtesy of MAZDA MOTORS CORP.

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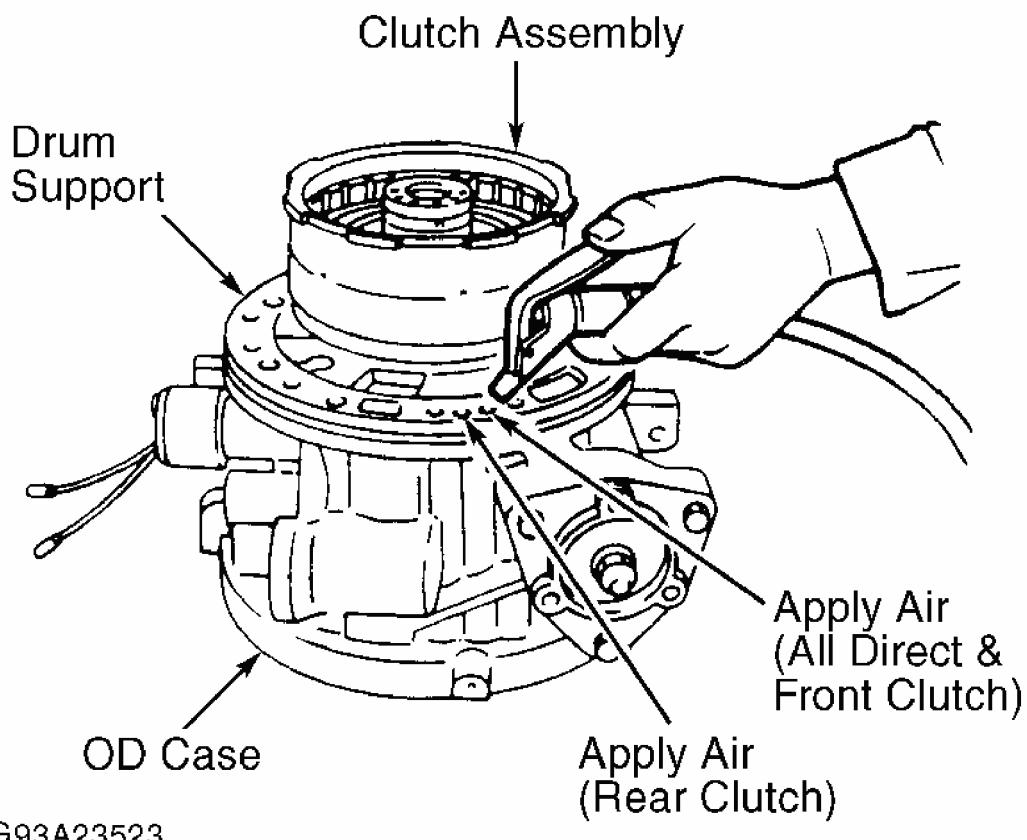
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Fig. 12: Exploded View Of Direct Clutch (B2200, B2600 & MPV)
Courtesy of MAZDA MOTORS CORP.

Check splined grooves on steel plates and drum. Ensure spring free length is 1.20" (30.5 mm). Ensure ball in piston moves freely. Check facing of friction plates. Check clearance between snap ring and retainer plate or snap ring and side plate. Replace components as necessary. See **RETAINER PLATE-TO-SNAP RING CLEARANCE SPECIFICATIONS** table under CLUTCH SPECIFICATIONS. Check drive plate thickness. See **DRIVE PLATE SPECIFICATIONS** table under CLUTCH SPECIFICATIONS.



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Fig. 13: Removing Piston & Checking Clutch Assemblies
Courtesy of MAZDA MOTORS CORP.

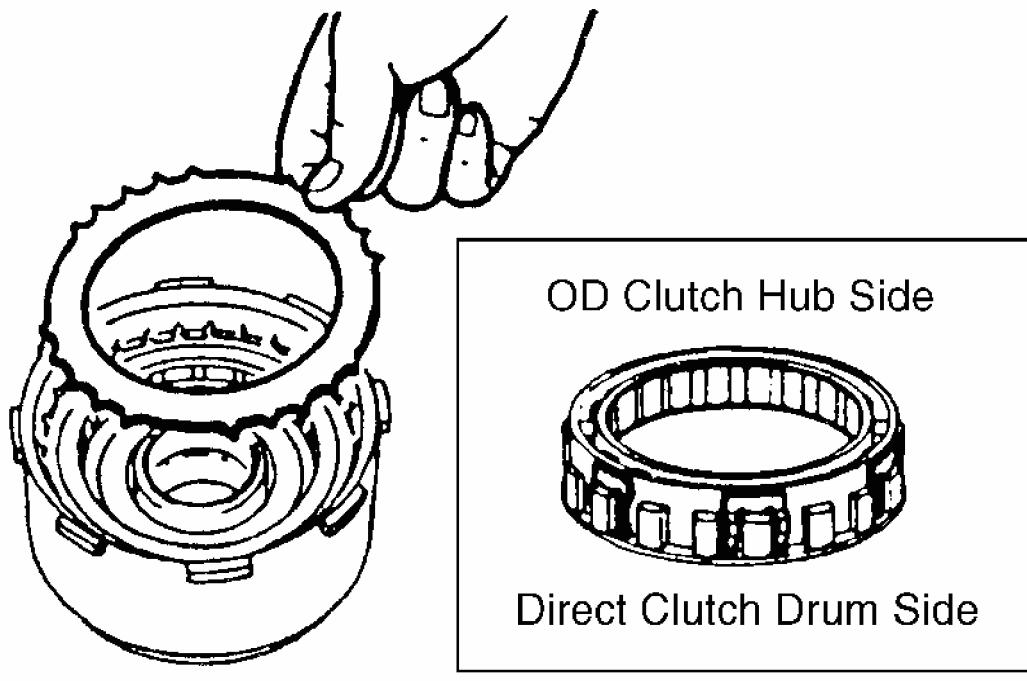
Reassembly

To reassemble, reverse disassembly procedure. Align toothless portion of steel plate with lubrication hole on side of drum. Miata, RX7 and 929 models use one-way clutch in direct clutch assembly. In these units, after installing clutches and snap ring, install retaining plate, one-way clutch outer race, one-way clutch, side plate and snap ring. See 11 and 14. Check

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operation of clutch by applying air pressure after reassembly. See Fig. 13.



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Fig. 14: Installing One-Way Clutch (Miata, RX7 & 929)
Courtesy of MAZDA MOTOR CORP.

CLUTCH SPECIFICATIONS

RETAINER PLATE-TO-SNAP RING CLEARANCE SPECIFICATIONS

Application	In. (mm)
Direct Clutch	
RX7 & 929 Maximum Clearance	.008 (.20)
All Others	.063-.071 (1.60-1.80)
Front Clutch	.035-.043 (.90-1.10)
Rear Clutch	
MPV, B2200, B2600, Miata, RX7 & 929	.031-.039 (.80-1.00)
Low & Reverse Clutch	.031-.041 (.80-1.05)

DRIVE PLATE SPECIFICATIONS

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Application	Thickness In. (mm)
Direct, Front & Rear	.055-.063 (1.40-1.60)
Low & Reverse	.071-.080 (1.80-2.05)

FRONT CLUTCH

Disassembly & Reassembly

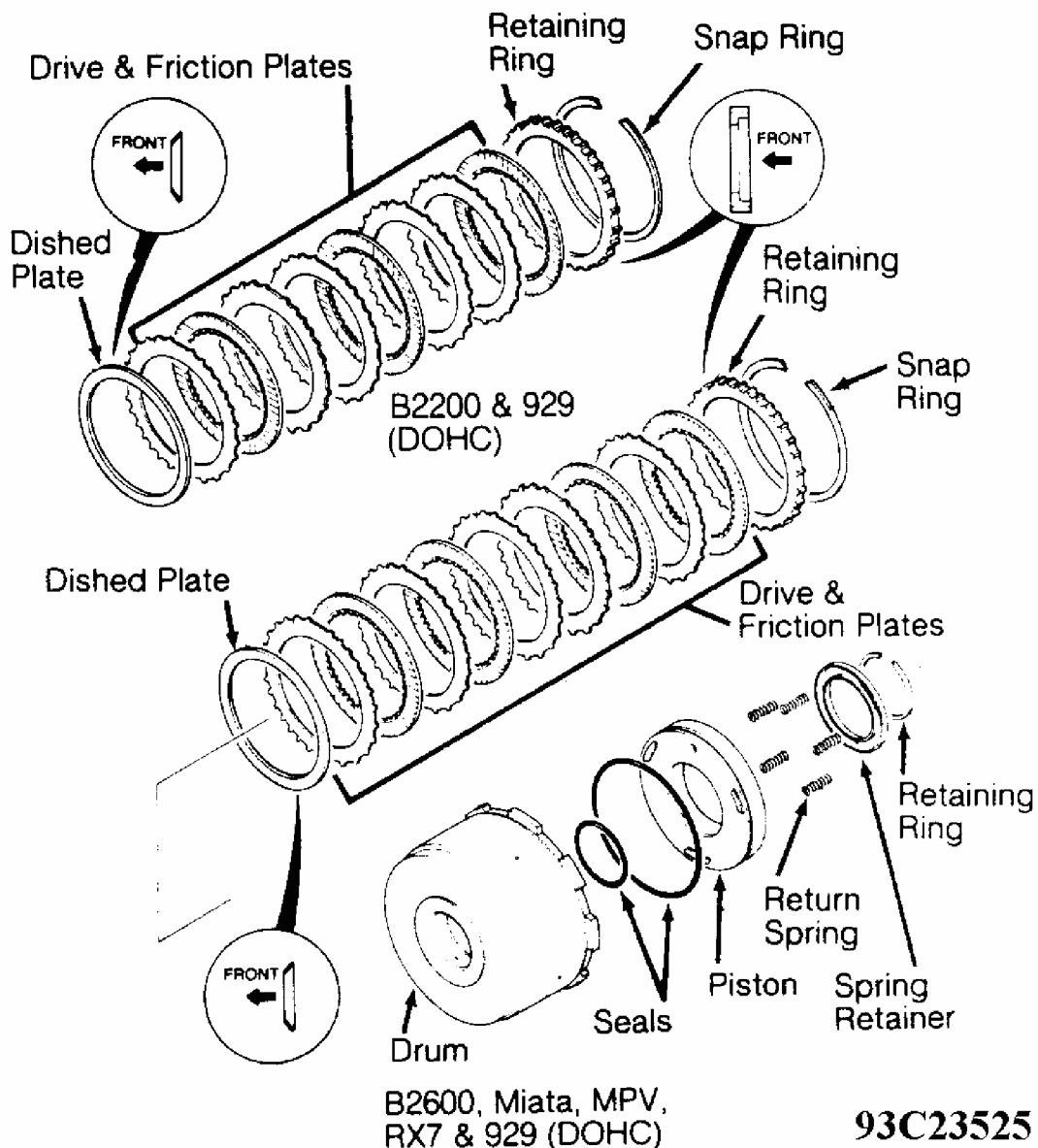
Disassembly and reassembly procedure is the same as direct clutch. See **DIRECT CLUTCH** . Number of components and layout will vary. See **Fig. 15** . Check operation of clutch after reassembly. See **Fig. 13** .

Inspection

Check splined grooves on steel plates and drum. Ensure spring free length is 1.20" (30.5 mm). Ensure ball in piston moves freely. Check facing of friction plates. Check clearance between the snap ring and the retainer plate. Replace components as necessary. Refer to the **RETAINER PLATE-TO-SNAP RING CLEARANCE SPECIFICATIONS** table under CLUTCH SPECIFICATIONS. Check the drive plate thickness. Refer to the **DRIVE PLATE SPECIFICATIONS** table under CLUTCH SPECIFICATIONS.

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Fig. 15: Exploded View Of Front Clutch
Courtesy of MAZDA MOTOR CORP.

REAR CLUTCH

Disassembly & Reassembly

Disassembly and reassembly procedure is the same as direct clutch. See **DIRECT CLUTCH**. The number of components will vary. See **Fig. 16**. Check operation of clutch after reassembly.

See Fig. 13.

Inspection

Check splined grooves on steel plates and drum. Ensure spring free length is 1.20" (30.5 mm). Make sure the ball in the piston moves freely. Check facing of friction plates. Check clearance between snap ring and retainer plate. Replace components as necessary. Refer to the **RETAINER PLATE-TO-SNAP RING CLEARANCE SPECIFICATIONS** table under CLUTCH SPECIFICATIONS. Check the drive plate thickness. Refer to the **DRIVE PLATE SPECIFICATIONS** table under CLUTCH SPECIFICATIONS.

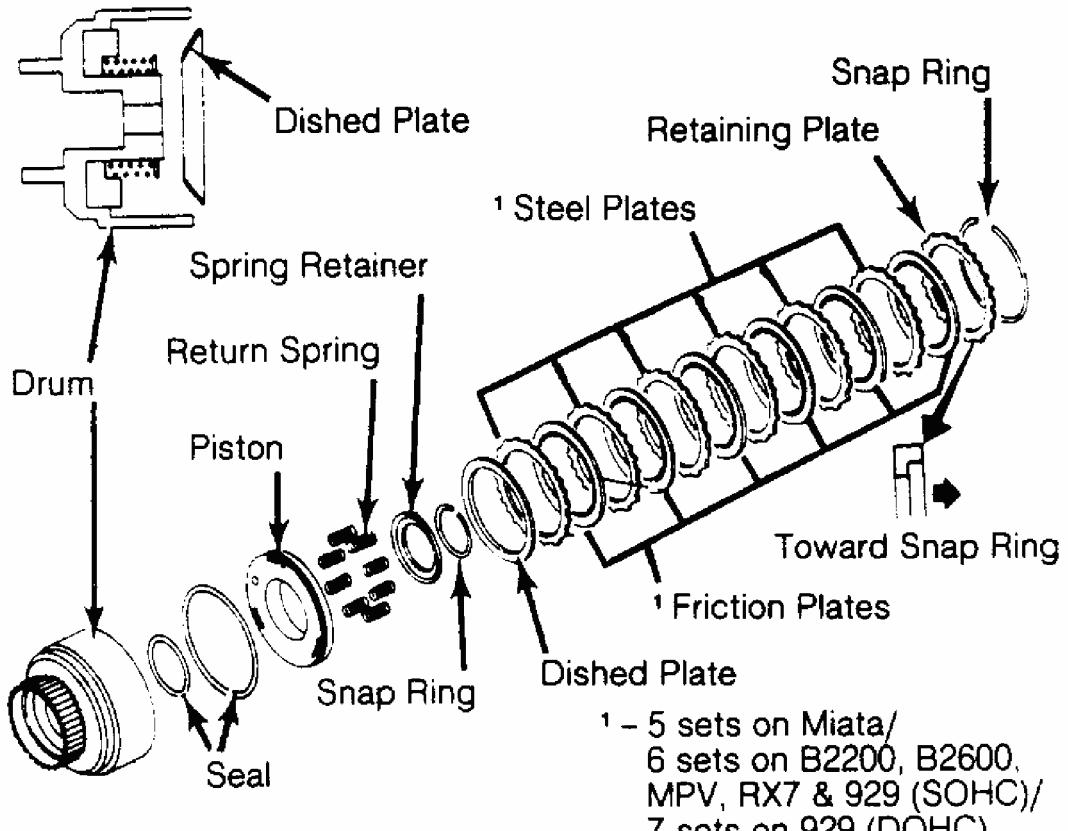


Fig. 16: Exploded View Of Rear Clutch
Courtesy of MAZDA MOTORS CORP.

LOW & REVERSE BRAKE

Disassembly & Reassembly

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Refer to procedures under **TRANSMISSION DISASSEMBLY** and **TRANSMISSION REASSEMBLY**.

2ND BAND SERVO

Disassembly & Reassembly

With servo assembly removed from main case, apply air to oil passage in side of body to remove piston. Remove and replace "O" rings. Install NEW "O" rings, and push piston into body. See [Fig. 17](#).

Inspection

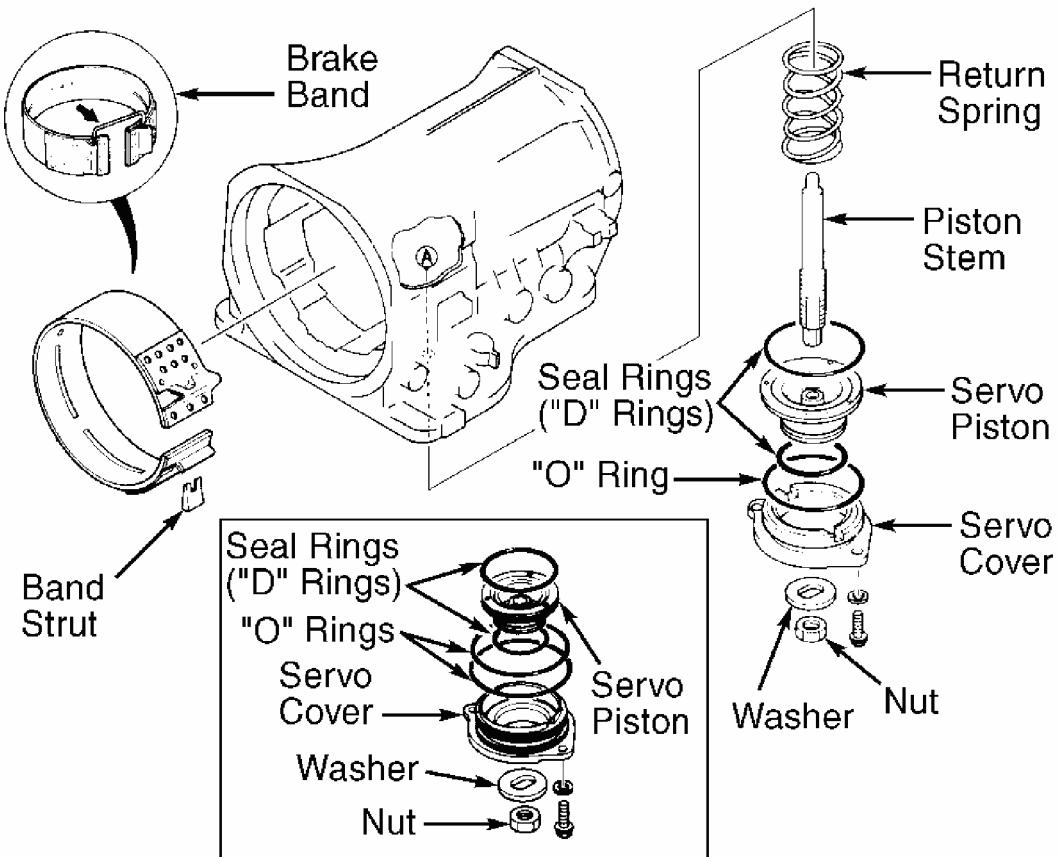
Check piston stem for wear or damage. Check piston for scoring or damage. Check free length of return spring. Refer to the **2ND BAND RETURN SPRING SPECIFICATIONS** table.

2ND BAND RETURN SPRING SPECIFICATIONS

Application	Spring Length In. (mm)
Miata	1.457 (37.00)
RX7	1.840 (46.70)
929	
DOHC	1.421 (36.10)
SOHC	1.457 (37.00)

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Fig. 17: Exploded View Of 2nd Brake Band Servo
Courtesy of MAZDA MOTORS CORP.

OD BRAKE BAND

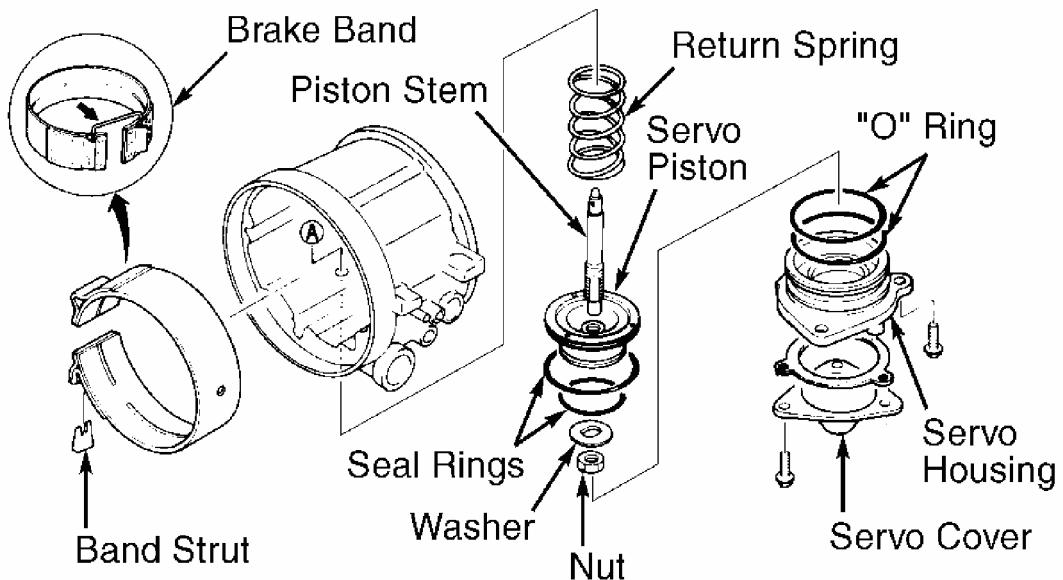
Disassembly & Reassembly

Disassembly and reassembly procedure for OD brake band is similar to 2nd band clutch. See **Fig. 18**. Check spring free length. Refer to the **OD BRAKE BAND SERVO & ACCUMULATOR SPRING SPECIFICATIONS** table. Test OD servo operation by applying air pressure to pressure port. See **Fig. 19**.

NOTE: MPV does not use return spring in OD brake band assembly.

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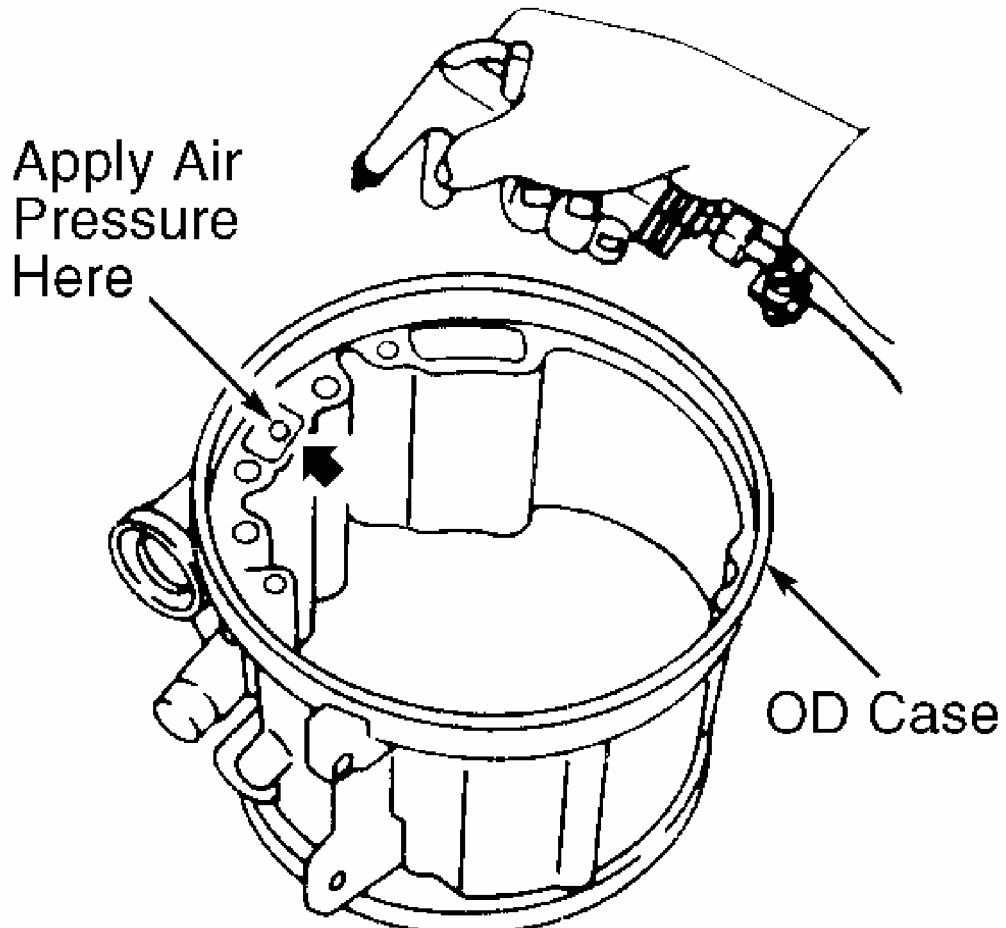


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Fig. 18: Exploded View Of OD Band Servo
Courtesy of MAZDA MOTORS CORP.

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Fig. 19: Checking OD Servo Operation
Courtesy of MAZDA MOTORS CORP.

OD BRAKE BAND SERVO & ACCUMULATOR SPRING SPECIFICATIONS

Application	Spring Length In. (mm)
Accumulator Spring	
Except RX7 & 929	1.563 (39.70)
RX7 & 929	1.590 (40.40)
OD Brake Band Servo Spring	
B2600, RX7 & 929	1.890 (48.00)

Miata

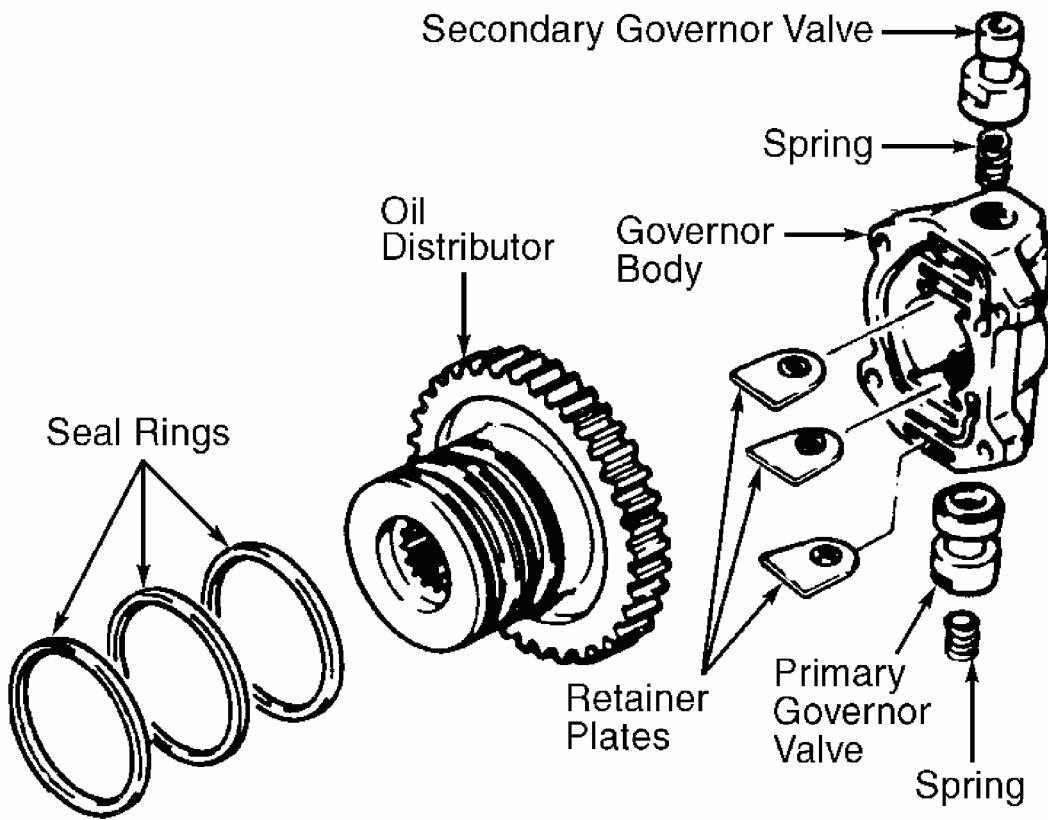
1.850 (47.00)

GOVERNOR ASSEMBLY (N4A-HL)

CAUTION: DO NOT mix valves and springs.

Disassembly & Reassembly

Remove attaching bolts, and separate governor from oil distributor. See **Fig. 20**. Transmission model N4A-EL does not use a governor on oil distributor. Remove secondary valve retainer plate. Remove secondary valve and spring. Remove primary valve retainer plate. Remove primary spring and valve. Remove remaining retainer plate. To reassemble, reverse disassembly procedure.



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Fig. 20: Exploded View Of Governor Assembly (NA4-HL)

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

Courtesy of MAZDA MOTORS CORP.

Inspection

Check valves and bore for scoring. Check free length of springs. Measure clearance between seal ring and groove. Refer to the **GOVERNOR SPECIFICATIONS** table. With governor reassembled, apply less than 71 psi (5 kg/cm^2) to oil passage between seal rings for no more than 5 seconds. Valve should move slightly, and a vibrating sound should be heard.

GOVERNOR SPECIFICATIONS

Application	In. (mm)
Spring Free Length	
Primary	.858 (21.80)
Secondary	
B2200 (F2 EGI) & MPV	.992 (25.20)
Miata	1.05 (26.70)
Seal Ring-To-Groove Clearance	.0016-.0063 (.040-.160)

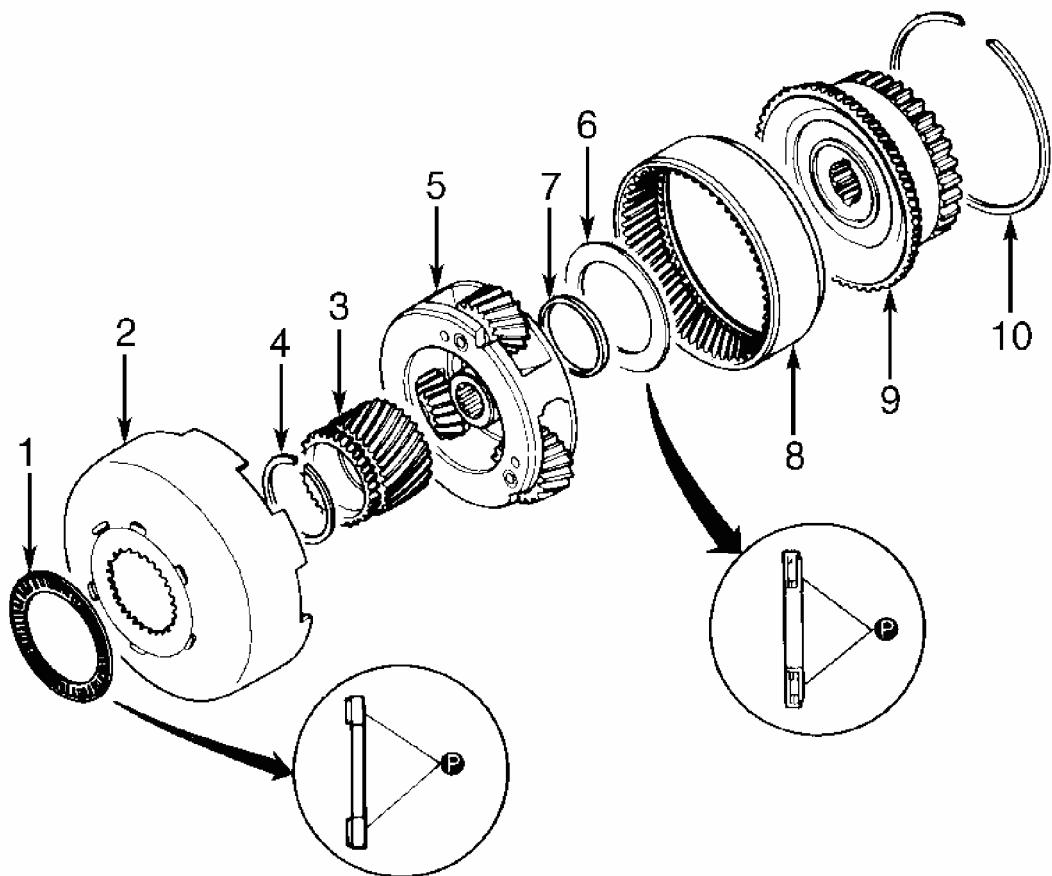
OD PLANETARY GEAR

Disassembly, Inspection & Reassembly

Disassemble in numbered sequence. See **Fig. 21**. To reassemble, reverse numbered sequence. Check clearance between pinion gear washer and planetary carrier housing. See **PLANETARY GEAR SPECIFICATIONS** table. Ensure sun gear is installed in proper direction. See **Fig. 24**.

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL



- | | |
|----------------------|-------------------|
| 1. Bearing | 6. Bearing & Race |
| 2. Connecting Shell | 7. Seal Sleeve |
| 3. Sun Gear | 8. Internal Gear |
| 4. Snap Ring | 9. OD Clutch Hub |
| 5. Planetary Carrier | 10. Snap Ring |

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Fig. 21: Exploded View Of OD Planetary Gear
Courtesy of MAZDA MOTORS CORP.

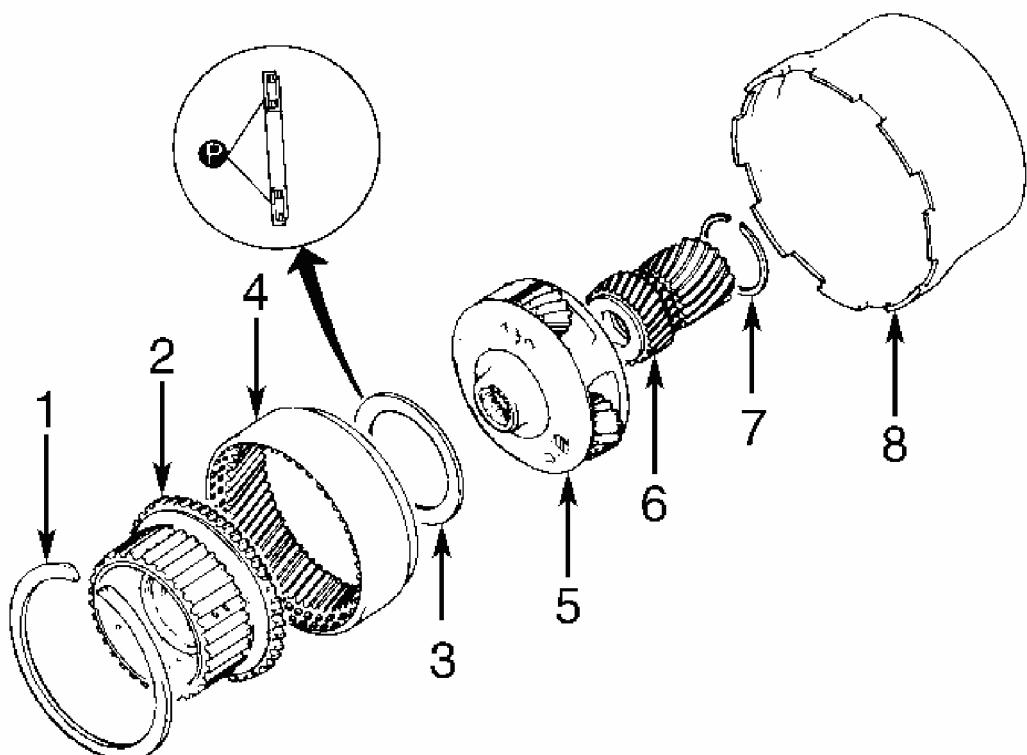
PLANETARY GEAR SPECIFICATIONS

Application	In. (mm)
Pinion Gear Washer-To-Housing Clearance	
Standard	.008-.028 (.20-.70)
Service Limit	.0315 (.800)

FRONT PLANETARY GEAR

Disassembly, Inspection & Reassembly

To disassemble front planetary gear, refer to the appropriate illustration for exploded view of front planetary gear. See [Fig. 22](#) or [Fig. 23](#). To reassemble, reverse disassembly. Check clearance between the pinion gear washer and the planetary carrier housing. Refer to the **PLANETARY GEAR SPECIFICATIONS** table. Ensure sun gear is installed in proper direction. See [Fig. 24](#).



- | | |
|----------------------|----------------------|
| 1. Snap Ring | 5. Planetary Carrier |
| 2. Clutch Hub (Rear) | 6. Sun Gear |
| 3. Bearing & Race | 7. Snap Ring |
| 4. Internal Gear | 8. Connecting Shell |

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

Fig. 22: Exploded View Of Front Planetary Gear (B2200, B2600 & Miata)
Courtesy of MAZDA MOTORS CORP.

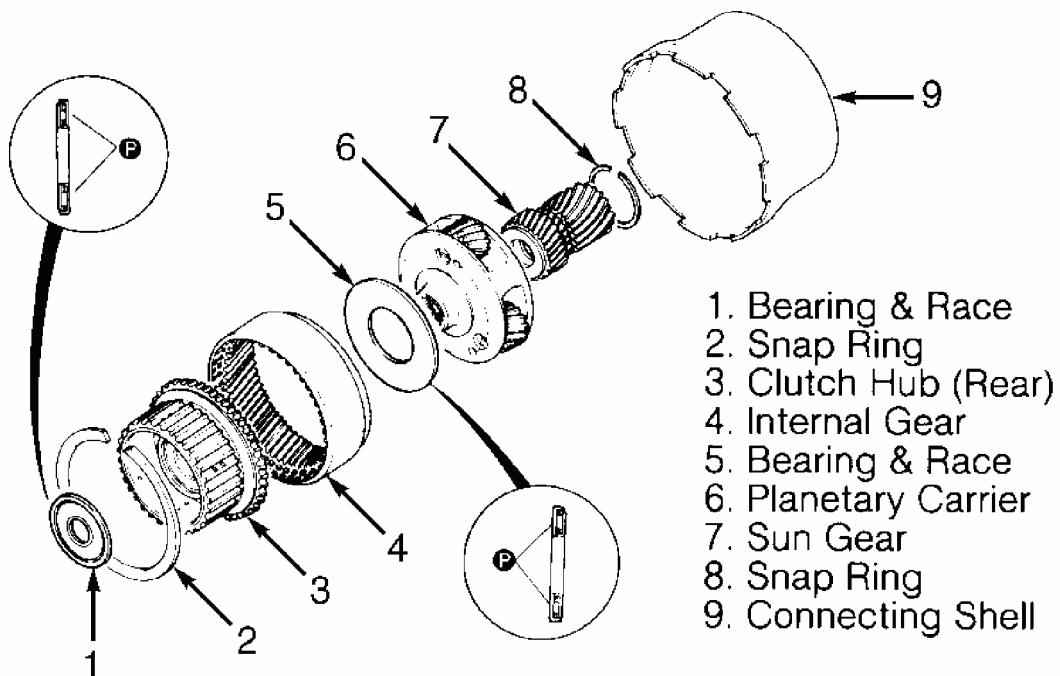


Fig. 23: Exploded View Of Front Planetary Gear (MPV, RX7 & 929)
Courtesy of MAZDA MOTORS CORP.

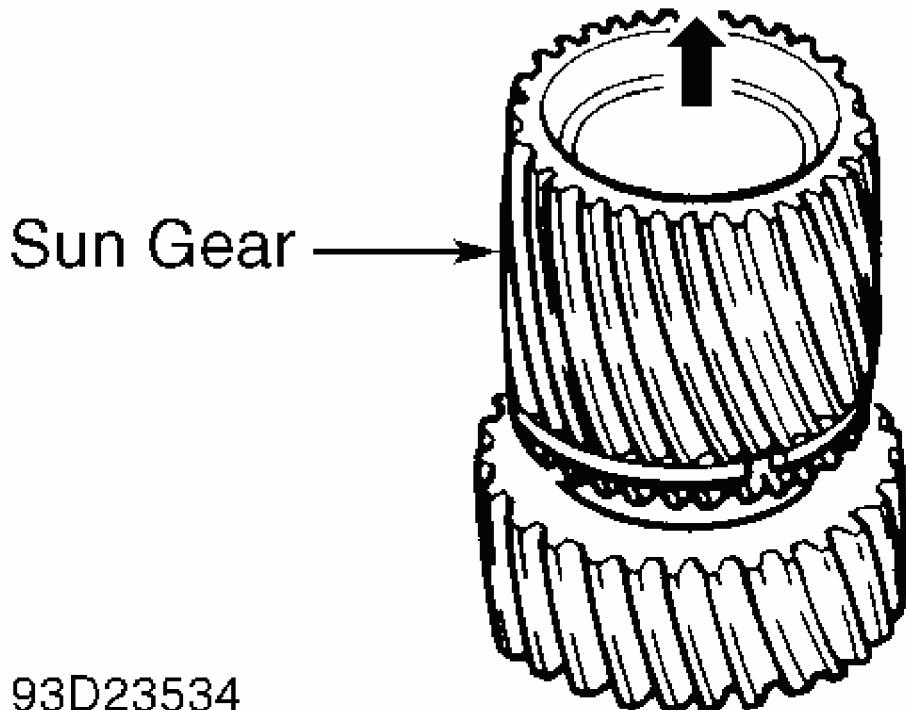


Fig. 24: Installing Front Planetary Sun Gear
Courtesy of MAZDA MOTORS CORP.

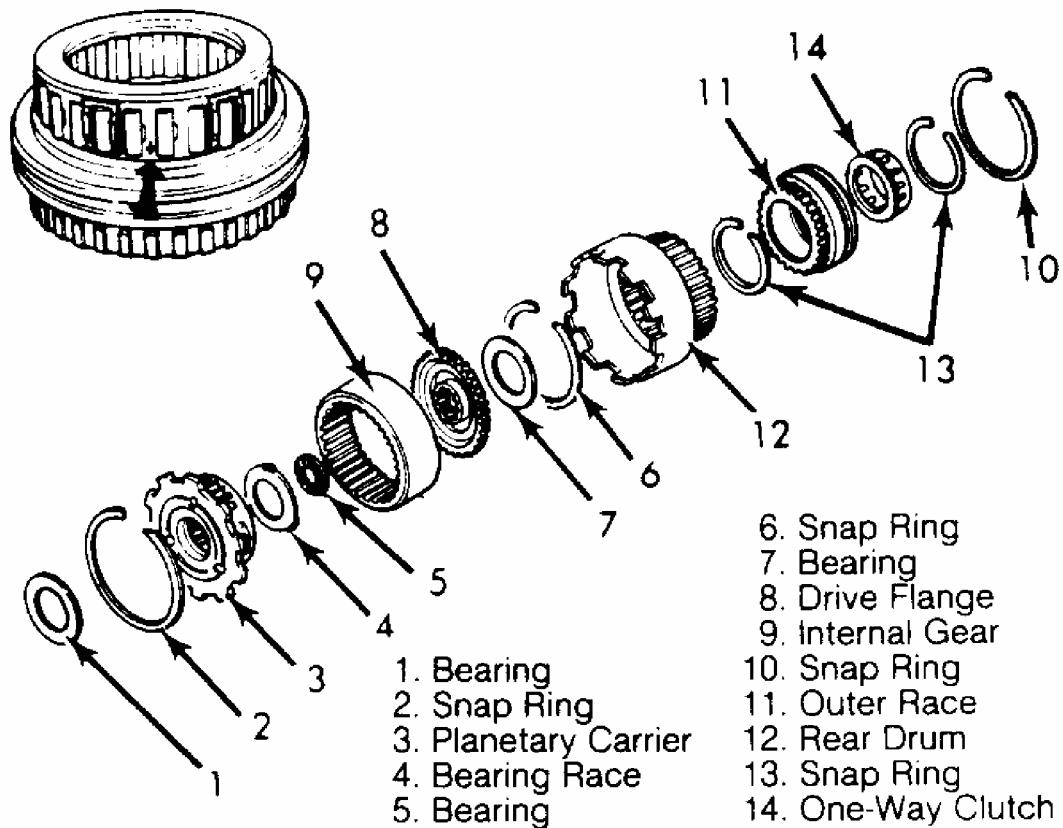
REAR PLANETARY GEAR

Disassembly, Inspection & Reassembly

To disassemble, refer to illustration for exploded view of rear planetary assembly. See [Fig. 25](#). To reassemble, reverse disassembly. Check rotation and wear of one-way clutch. Ensure arrow on one-way clutch is inserted toward front of outer race. See [Fig. 26](#) or [Fig. 27](#). Ensure one-way clutch rotates smoothly in one direction only. See [Fig. 28](#). Check installation of one-way clutch if it does not function as described.

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL



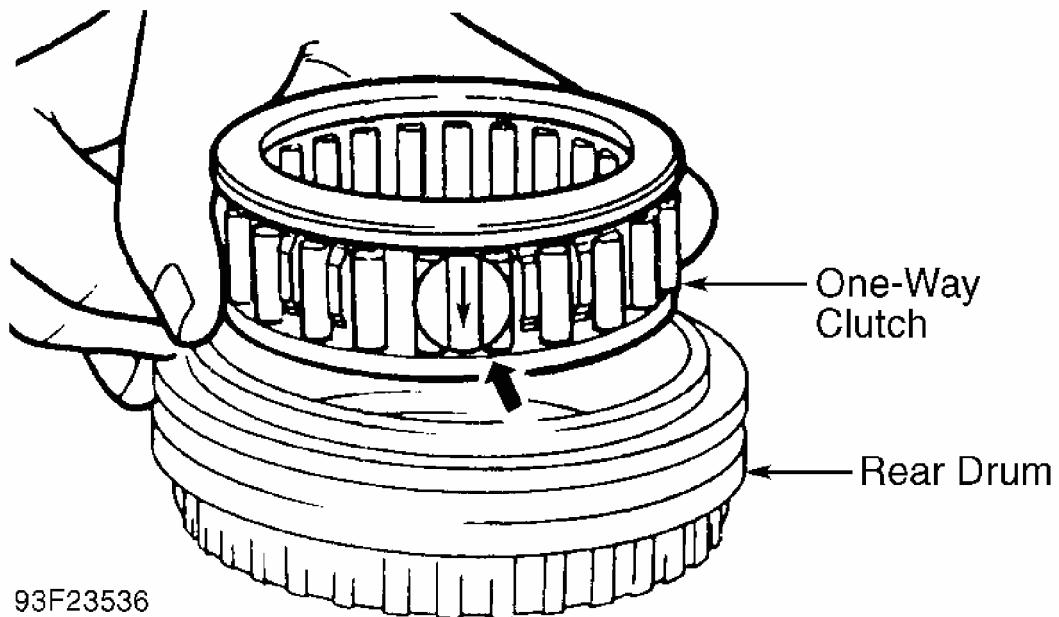
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Fig. 25: Exploded View Of Rear Planetary Gear

Courtesy of MAZDA MOTORS CORP.

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

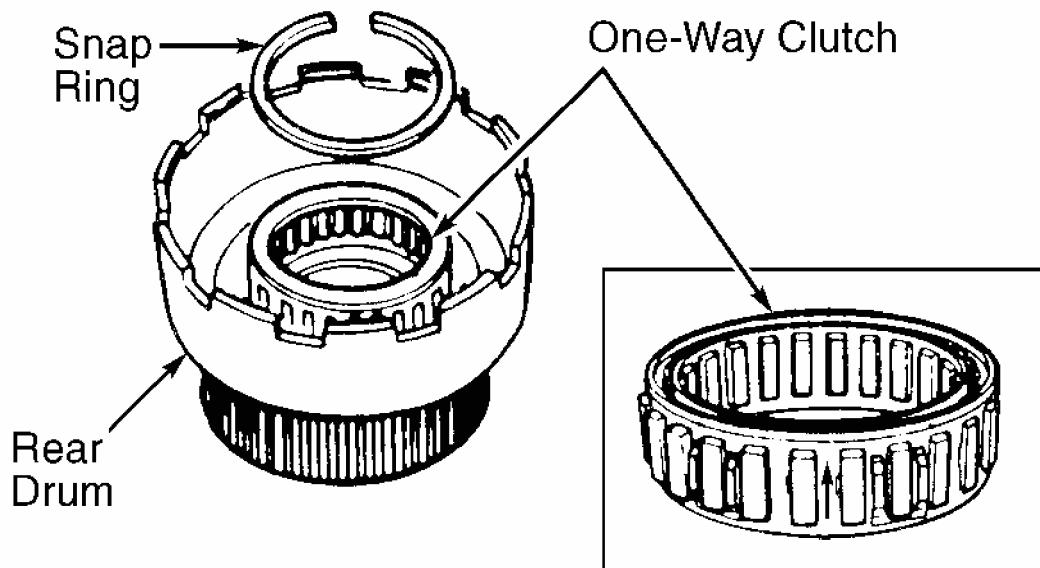


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Fig. 26: OD One-Way Clutch In Rear Drum (B2200, B2600, Miata & MPV)
Courtesy of MAZDA MOTORS CORP.

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

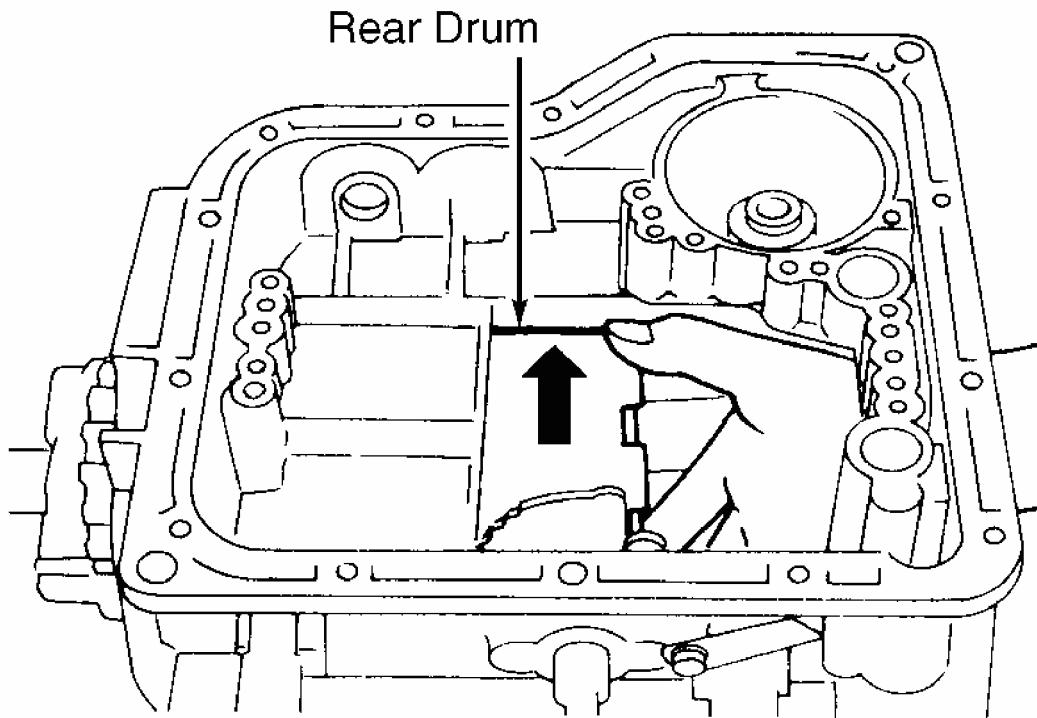


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Fig. 27: Installing OD One-Way Clutch In Rear Drum (RX7 & 929)
Courtesy of MAZDA MOTORS CORP.

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL



LOCKED COUNTERCLOCKWISE
FREE CLOCKWISE

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Fig. 28: Checking Operation Of OD One-Way Clutch
Courtesy of MAZDA MOTORS CORP.

EXTENSION HOUSING

Disassembly & Reassembly

Refer to illustration for exploded view of extension housing. See **Fig. 29**.

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

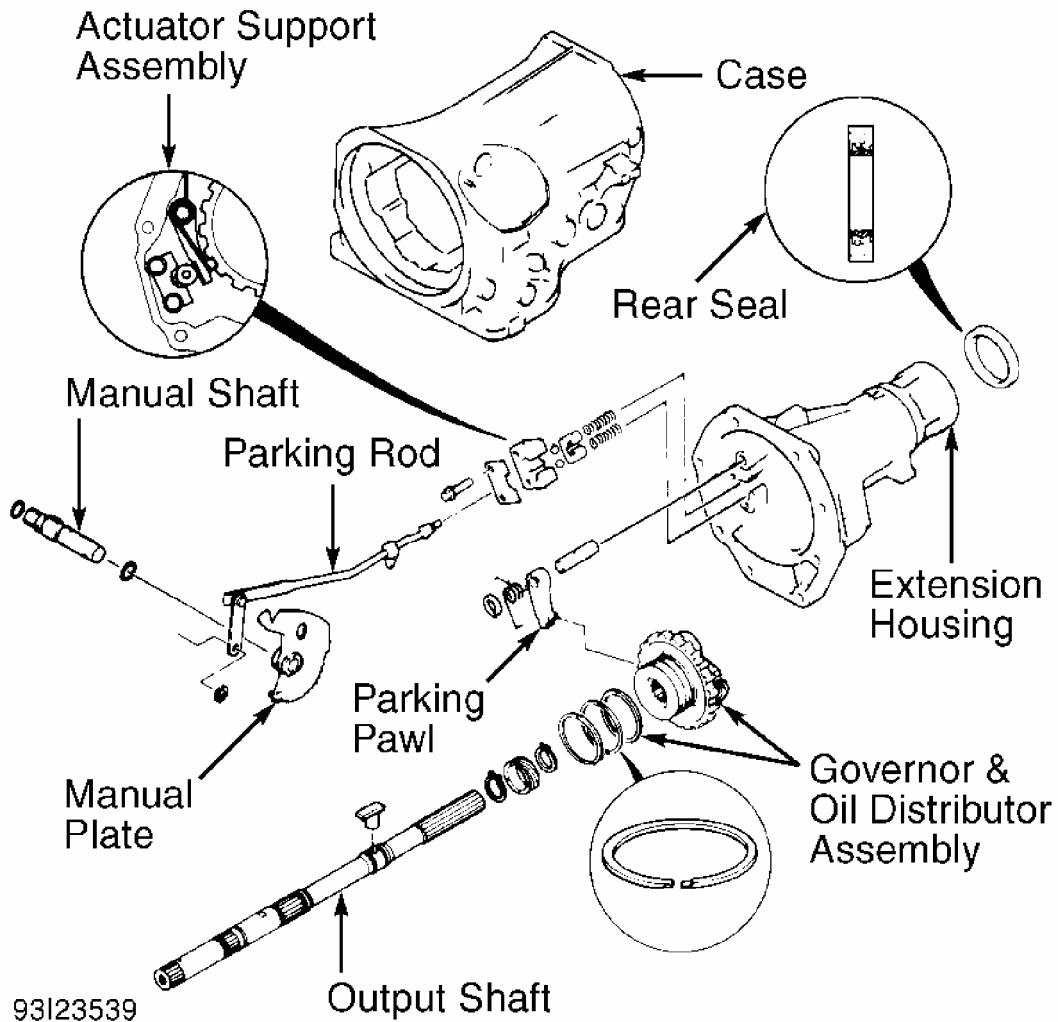


Fig. 29: Exploded View Of Extension Housing
Courtesy of MAZDA MOTORS CORP.

VALVE BODY ASSEMBLY

NOTE: Valve body contains precision components. Place the removed components in order of removal to ensure reassembly to their original locations and positions. See Fig. 30 -Fig. 35 . See ORIFICE CHECK VALVE SPECIFICATIONS tables for size and location of orifices. See Fig. 30 and Fig. 31 .

ORIFICE CHECK VALVE SPECIFICATIONS (N4A-EL) (MD121) ⁽¹⁾

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

Application	In. (mm)
RX7	
"A"	.071 (1.80)
"B"	.087 (2.20)
"C"	.059 (1.50)
"D"	.047 (1.20)
"E"	.039 (1.00)
"F"	None
929	
"A"	
DOHC Engine	.079 (2.00)
SOHC Engine	.071 (1.80)
"B"	.089 (2.50)
"C"	.059 (1.50)
"D"	
DOHC Engine	.043 (1.10)
SOHC Engine	.039 (1.00)
"E"	.039 (1.00)
"F"	.087 (2.20)

(1) See [Fig. 30](#) for check valve location.

ORIFICE CHECK VALVE SPECIFICATIONS (N4A-HL) (MD121)⁽¹⁾

Application	In. (mm)
MPV With G6 Engine	
"A"	.079 (2.00)
"B"	.059 (1.50)
"C"	.067 (1.70)
"D"	.087 (2.20)
"E"	.079 (2.00)
Miata	
"A"	.079 (2.00)
"B"	.059 (1.50)
"C"	.043 (1.10)
"D"	None
"E"	.071 (1.80)

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

(1) See **Fig. 31** for check valve location.

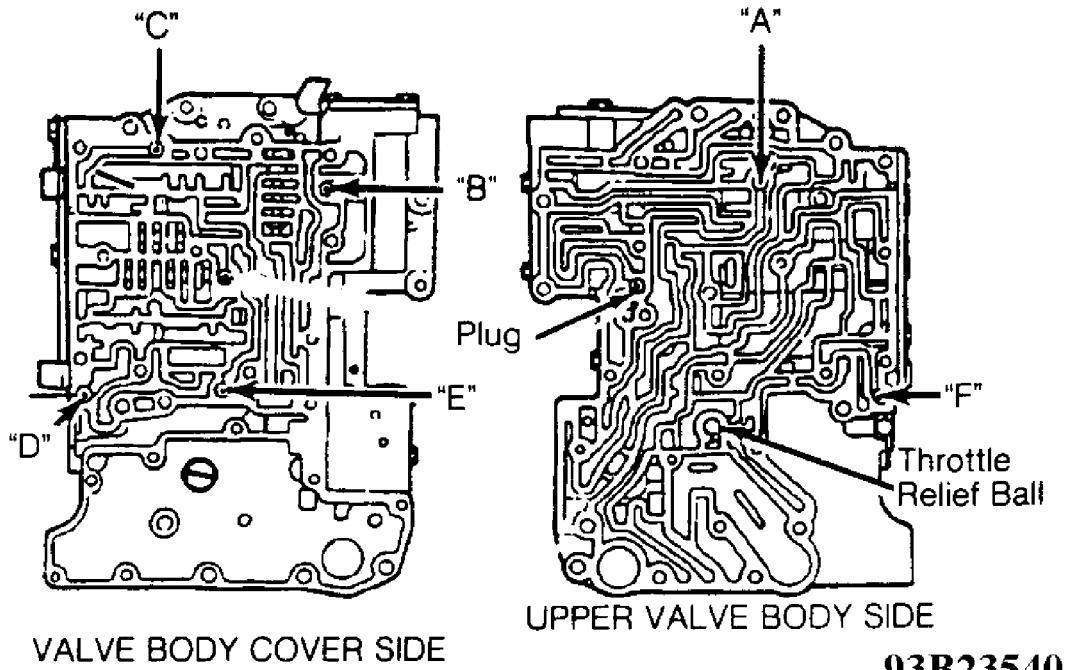
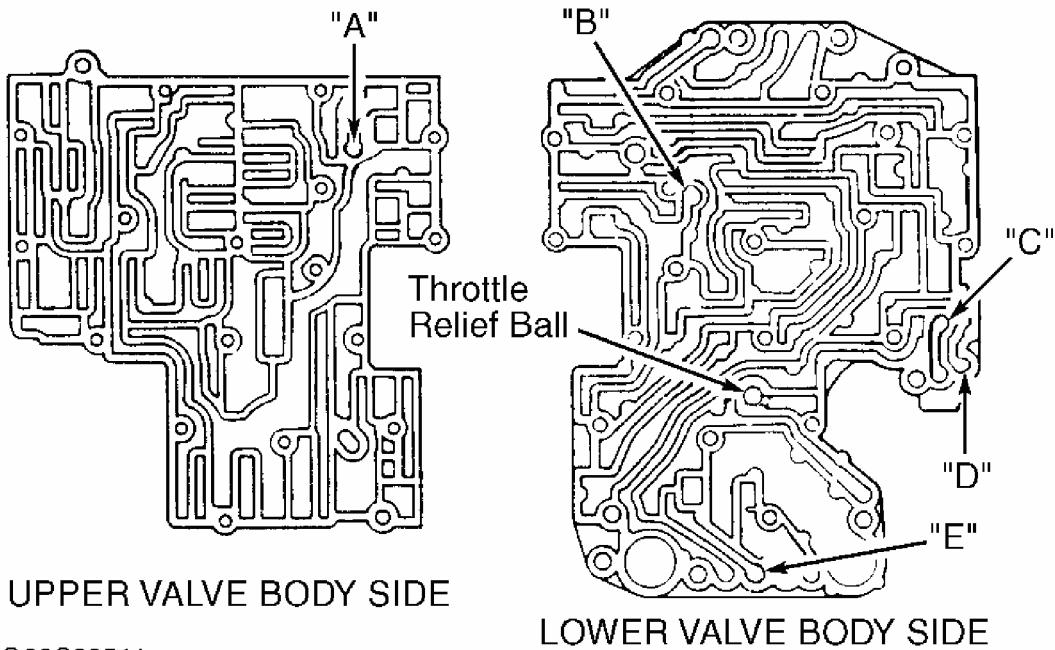


Fig. 30: Locating Orifice Check Valves (N4A-EL)
Courtesy of MAZDA MOTORS CORP.

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL



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Fig. 31: Locating Orifice Check Valves (N4A-HL)

Courtesy of MAZDA MOTORS CORP.

Disassembly & Reassembly

1. Remove oil strainer. Remove bolts retaining upper body, lower body and separator plate together. Remove upper body. Remove separator plate. Note location of check valves, springs and relief balls (valves). See [Fig. 30](#) -[Fig. 34](#).
2. Remove side plates and parts. See [Fig. 32](#), [Fig. 33](#) or [Fig. 34](#). To reassemble, reverse disassembly procedure. Ensure springs are installed in proper position. Tighten the upper-to-lower valve body retaining bolts to specifications in sequence. See [Fig. 35](#). Refer to the **VALVE BODY SPRING SPECIFICATIONS** table.

VALVE BODY SPRING SPECIFICATIONS

Application	Free Length In. (mm)
Downshift Valve (N4A-HL)	.866 (22.00)
Orifice Check Valve	.610 (15.49)
Pressure Modifier Valve	
Miata & MPV	.610 (15.50)

1991 Mazda MX-5 Miata

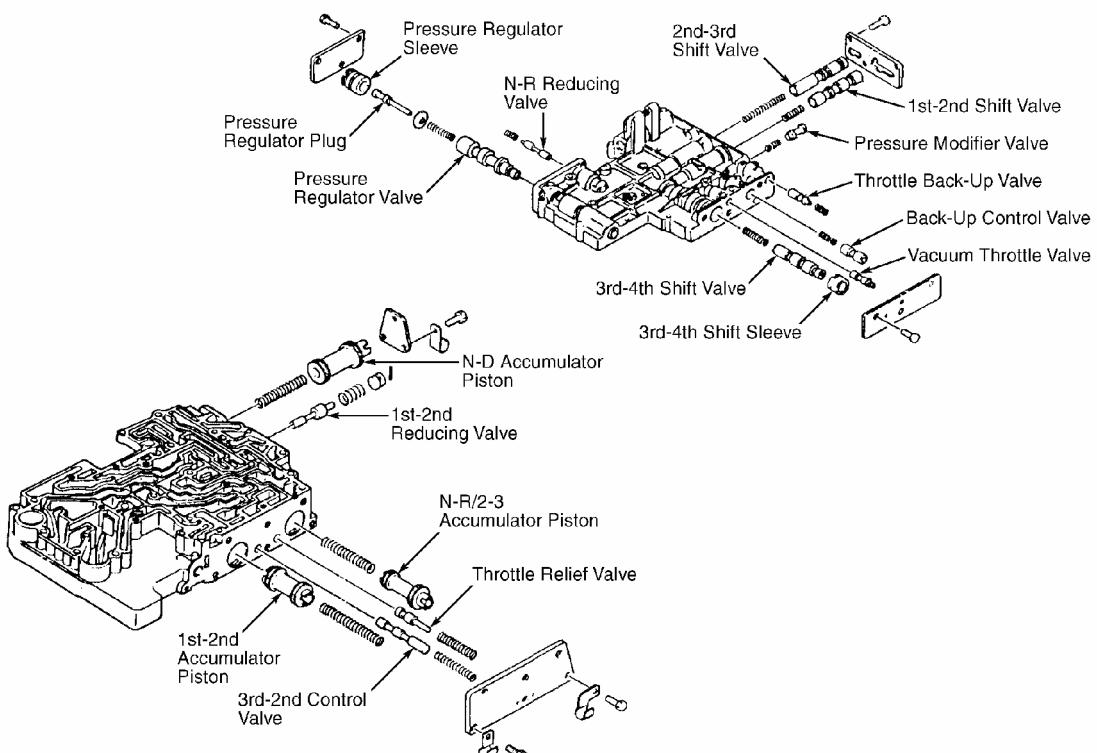
AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

RX7 & 929	.780 (19.80)
Pressure Regulator Valve	1.693 (43.00)
Second Lock Valve (N4A-HL)	1.319 (33.50)
Throttle Back-Up Valve	
Miata	1.417 (36.00)
MPV With G6 Engine	1.173 (29.80)
RX7	.780 (19.80)
929	
DOHC	.599 (15.22)
SOHC	.720 (18.30)
Throttle Relief Check Valve	
RX7 & 929 SOHC	.984 (25.00)
All Others	1.055 (26.80)
N-D Accumulator Valve	
RX7	1.709 (43.40)
929	
DOHC	1.709 (43.40)
SOHC	2.512 (63.80)
N-R Reducing Valve (RX7 & 929)	.571 (14.50)
Back-Up Control Valve (RX7 & 929)	.839 (21.30)
N-R/2-3 Accumulator Valve	
RX7	2.984 (75.80)
929	
DOHC	3.500 (89.00)
SOHC	3.248 (82.50)
1-2 Accumulator Valve	
RX7	2.465 (62.60)
929	
DOHC	2.465 (62.60)
SOHC	2.440 (60.00)
1-2 Reducing Valve	
RX7	.768 (19.50)
929	
DOHC	.768 (19.50)
SOHC	.787 (20.00)
1-2 Shift Valve	

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

Miata	1.059 (26.90)
MPV	1.102 (28.00)
RX7 & 929	1.039 (26.40)
2-3 Shift Valve	
Miata	1.614 (41.00)
MPV With G6 Engine	1.654 (42.00)
RX7 & 929	1.969 (50.00)
3-2 Timing Valve	
Miata	.913 (23.20)
MPV	.815 (20.70)
RX7 & 929	1.555 (39.50)
3-4 Shift Valve	
Miata & MPV With G6 Engine	1.193 (30.30)
RX7 & 929	1.583 (40.20)

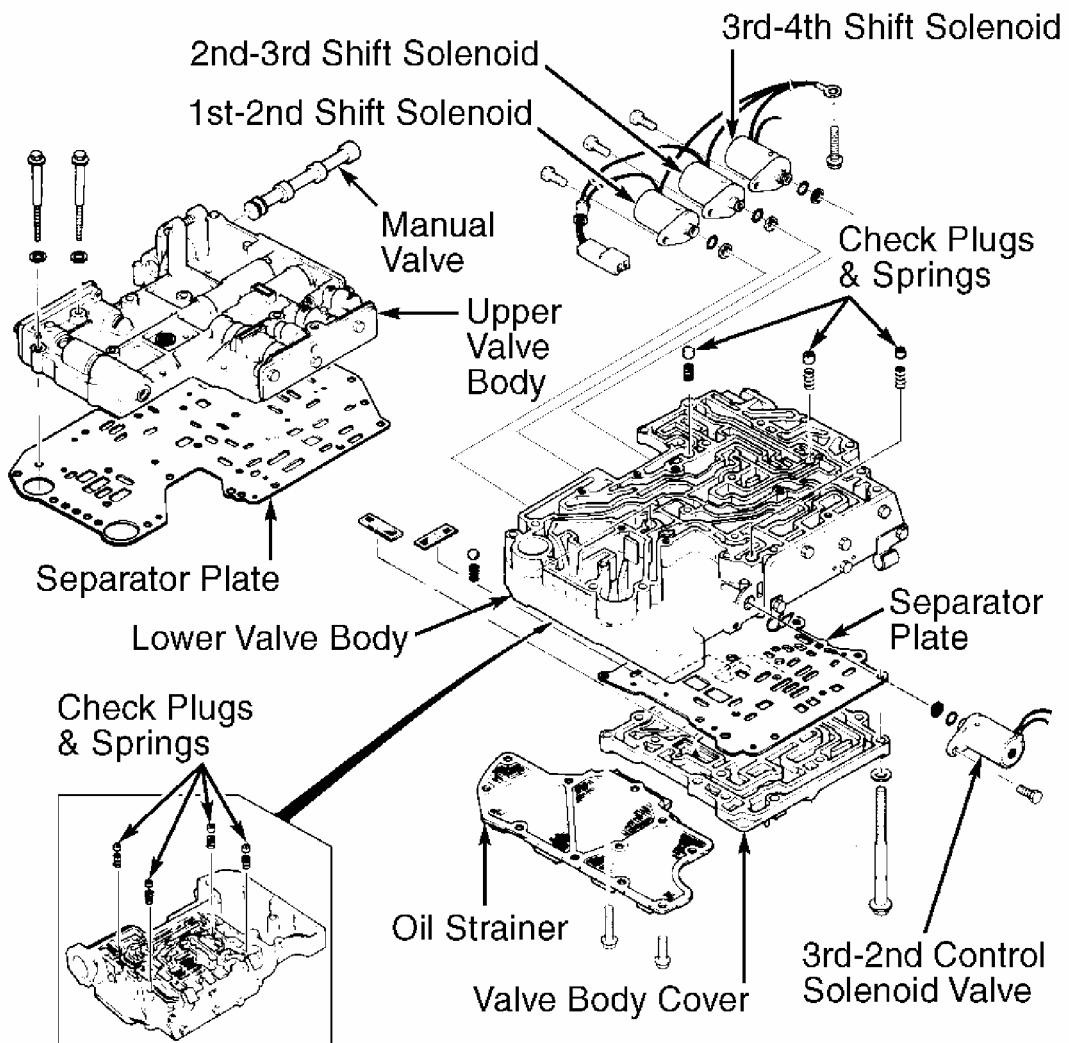


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Fig. 32: Exploded View Of Valve Body & Solenoid Assembly (N4A-HL)
Courtesy of MAZDA MOTORS CORP.

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

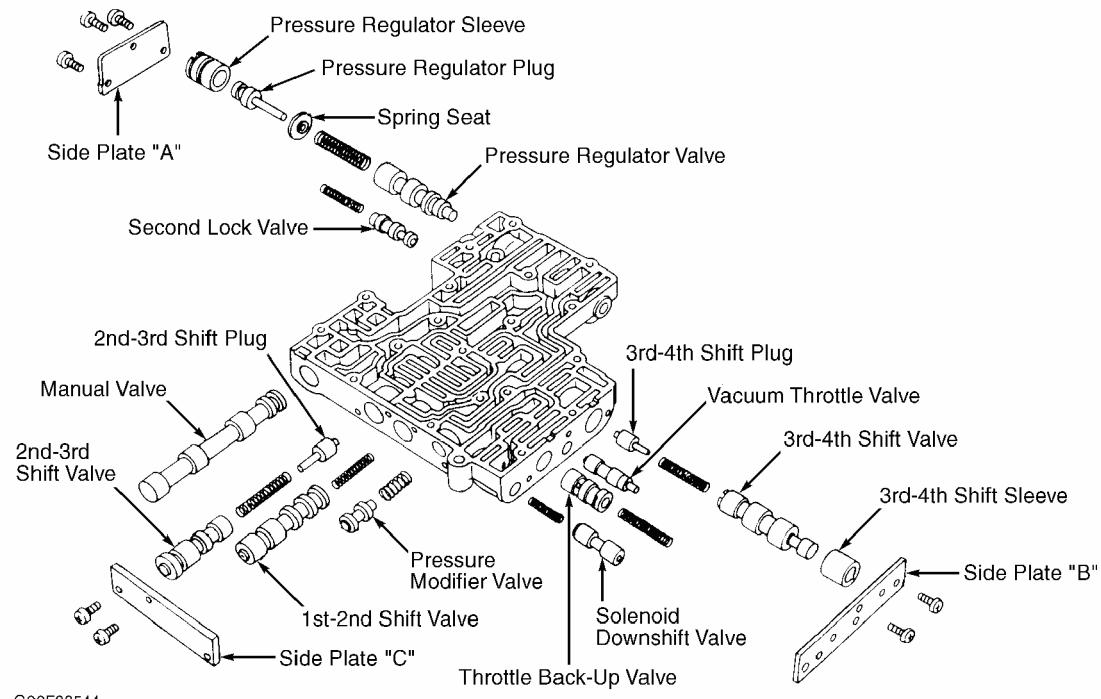


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Fig. 33: Exploded View Of Lower Valve Body (N4A-EL)
Courtesy of MAZDA MOTORS CORP.

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

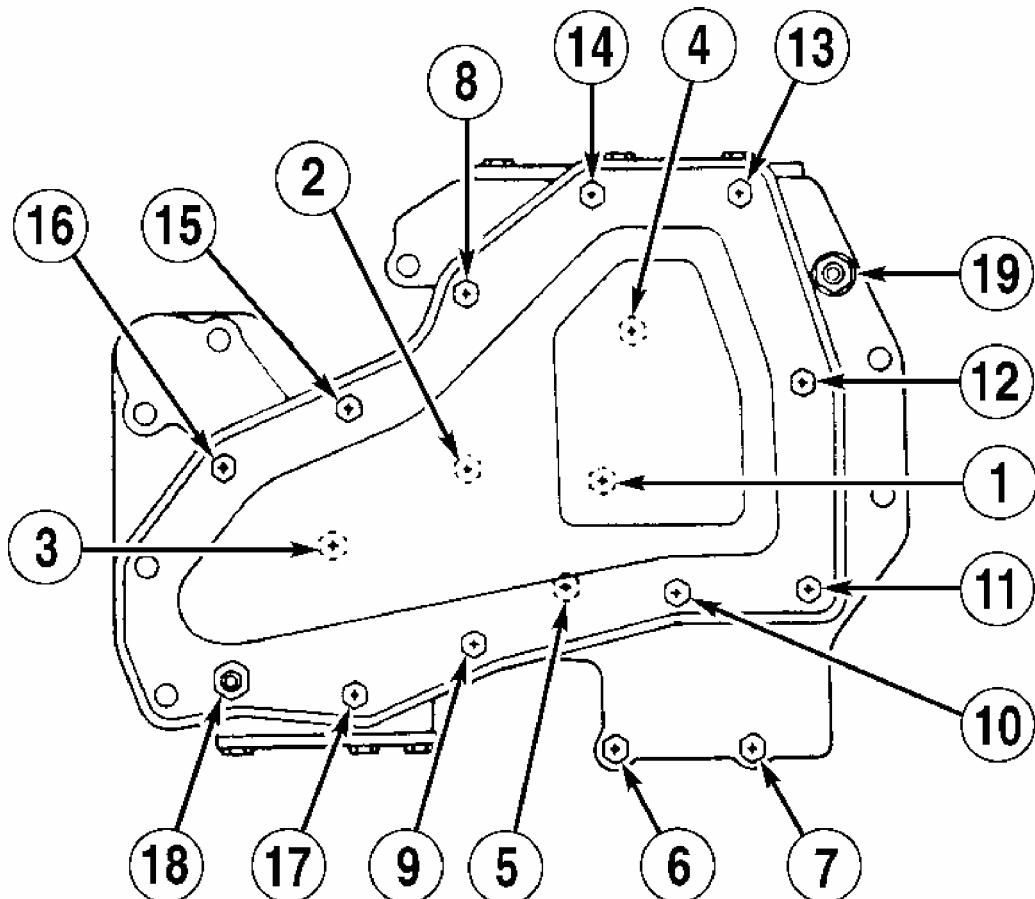


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Fig. 34: Exploded View Of Valve Body (N4A-EL)
Courtesy of MAZDA MOTORS CORP.

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AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL



1 Through 7 = 22-35 INCH Lbs. (2.5-4.0 N.m)

8 Through 17 = 26-35 INCH Lbs. (2.9-4.0 N.m)

18 & 19 = 43-61 INCH Lbs. (4.9-7.0 N.m)

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Fig. 35: Valve Body Tightening Sequence & Specification
Courtesy of MAZDA MOTORS CORP.

TRANSMISSION REASSEMBLY

1. Replace "O" rings and seals before reassembly. Lubricate components with ATF during reassembly. Use petroleum jelly to hold components in place (if necessary). Install manual plate and parking rod assembly (if removed). See 29 or 36. Note location of bearing, race and thrust washers. See 37 or 38.

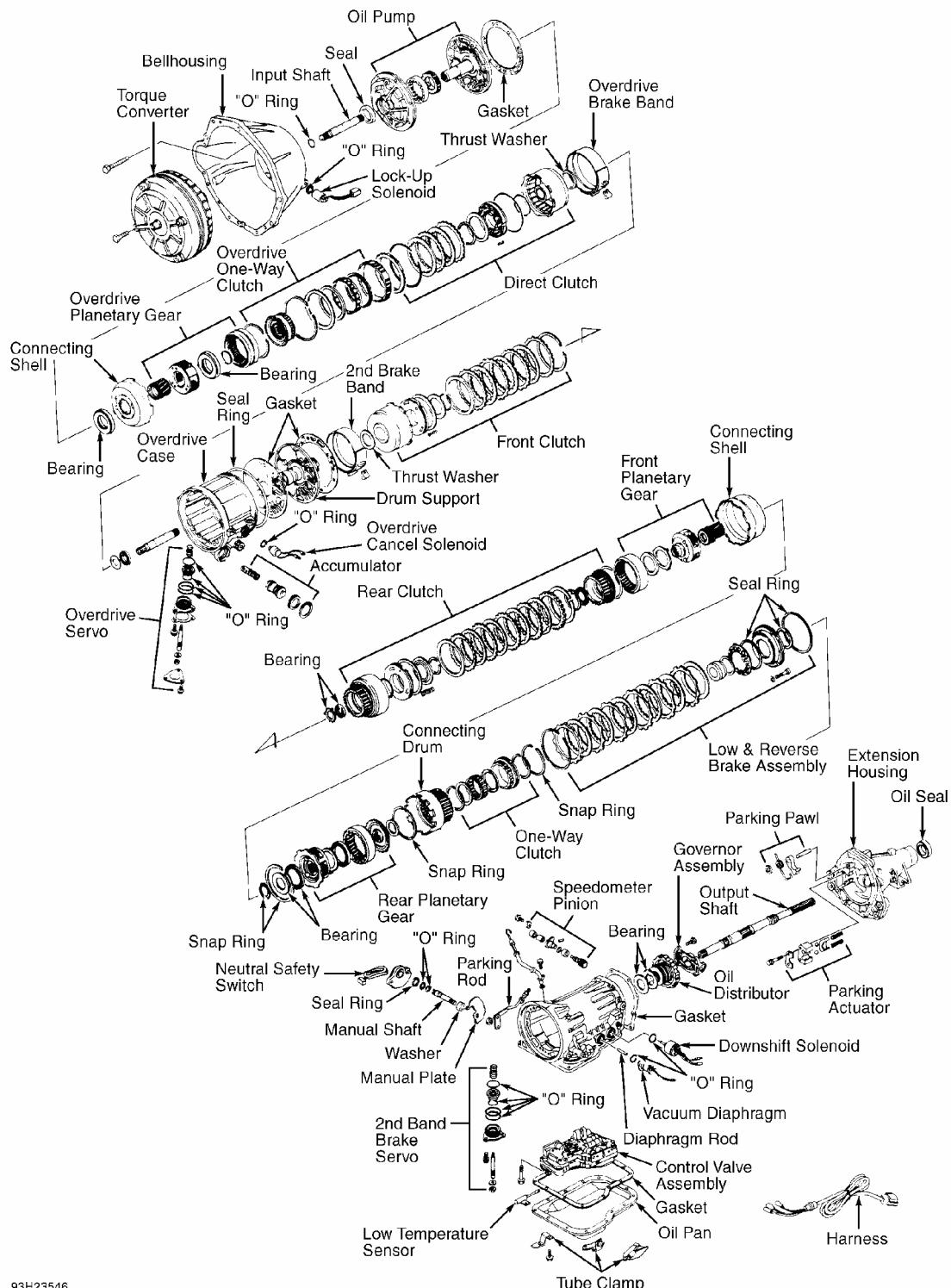
1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

2. Lubricate and install low and reverse piston into main case. See [Fig. 39](#). Low and reverse piston return spring free length should be .232-.244" (5.90-6.20 mm). See [Fig. 40](#). Install piston return spring, thrust washer and one-way clutch inner race. Ensure return spring is centered on race, and tighten bolts to specifications. See [TORQUE SPECIFICATIONS](#).
3. Install low and reverse clutch pack with steel plate first. Alternate between friction and steel plates, followed by retaining plate and snap ring. With low and reverse brake assembled, measure clearance between snap ring and retaining plate with feeler gauge. See [RETAINER PLATE-TO-SNAP RING CLEARANCE SPECIFICATIONS](#) table under CLUTCH SPECIFICATIONS. Retaining plate is available in different thicknesses.

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

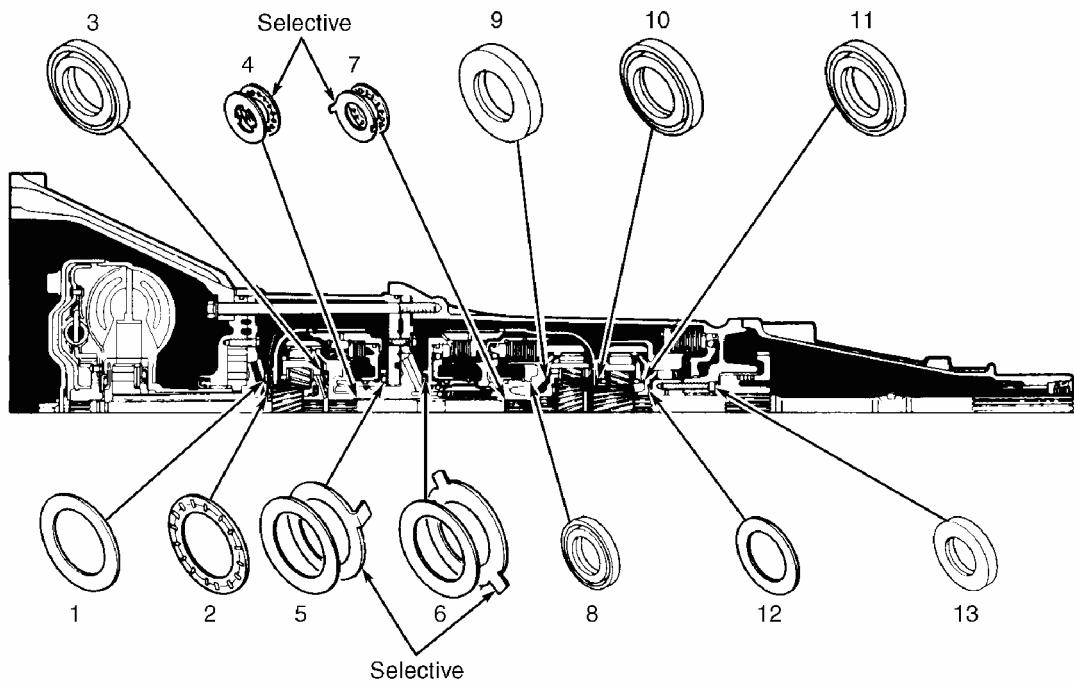


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Fig. 36: Exploded View Of Transmission
Courtesy of MAZDA MOTORS CORP.

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL



OUTER DIAMETER

Application (Location)	In. (mm)
1, 2, 3, 9, 10, & 11 Bearing	2.756 (70.00)
5 Bearing	2.756 (70.00)
Race	2.756 (70.00)
4 & 7 Bearing	1.378 (35.00)
Race	1.299 (33.00)
6 Bearing	2.756 (70.00)
Race	2.992 (76.0)
8, 12 & 13 Bearing	2.087 (53.00)

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Fig. 37: Identifying Bearing & Race Locations (N4A-EL) Refer to the following table.
Courtesy of Mazda Motors Corp.

OUTER DIAMETER DIMENSIONS FOR 37:

Application (Location) (1)	In. (mm)
1 & 2 Bearing	2.756 (70.00)
3, 5, 9, 10 & 11	

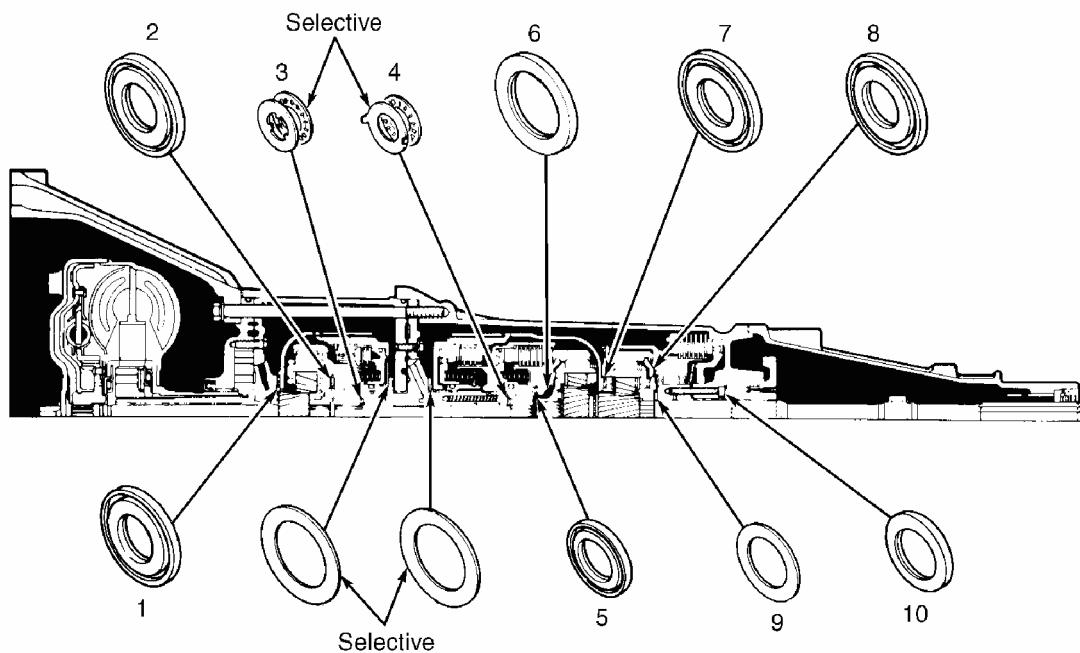
1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

Bearing	2.756 (70.00)
Race	2.756 (70.00)
4 & 7	
Bearing	1.378 (35.00)
Race	1.299 (33.00)
6	
Bearing	2.756 (70.00)
Race	2.756 (70.00)
8 & 13	
Bearing	2.087 (53.00)
Race	2.028 (51.50)
12 Bearing	1.850 (47.00)
(1) See Fig. 37 .	

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL



OUTER DIAMETER

Application (Location)	In. (mm)
1, "2, 6, 7 & 8 Bearing	2.756 (70.00)
3 & 4 Bearing	1.378 (35.00)
Race	1.299 (33.00)
5 & 10 Bearing	2.087 (53.00)
9 Bearing	1.850 (47.00)

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Fig. 38: Thrust Washer, Bearing & Race Location (N4A-HL) Refer to the following table. Courtesy of Mazda Motors Corp.

OUTER DIAMETER FOR 38:

Application (Location) (1)	In. (mm)
1, 2, 6, 7 & 8	
Bearing	2.756 (70.00)
Race	2.756 (70.00)
3 & 4	
Bearing	1.378 (35.00)
Race	1.299 (33.00)

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

5 & 10

Bearing	2.087 (53.00)
Race	2.028 (51.50)
9 Bearing	1.850 (47.00)

(1) See Fig. 38.

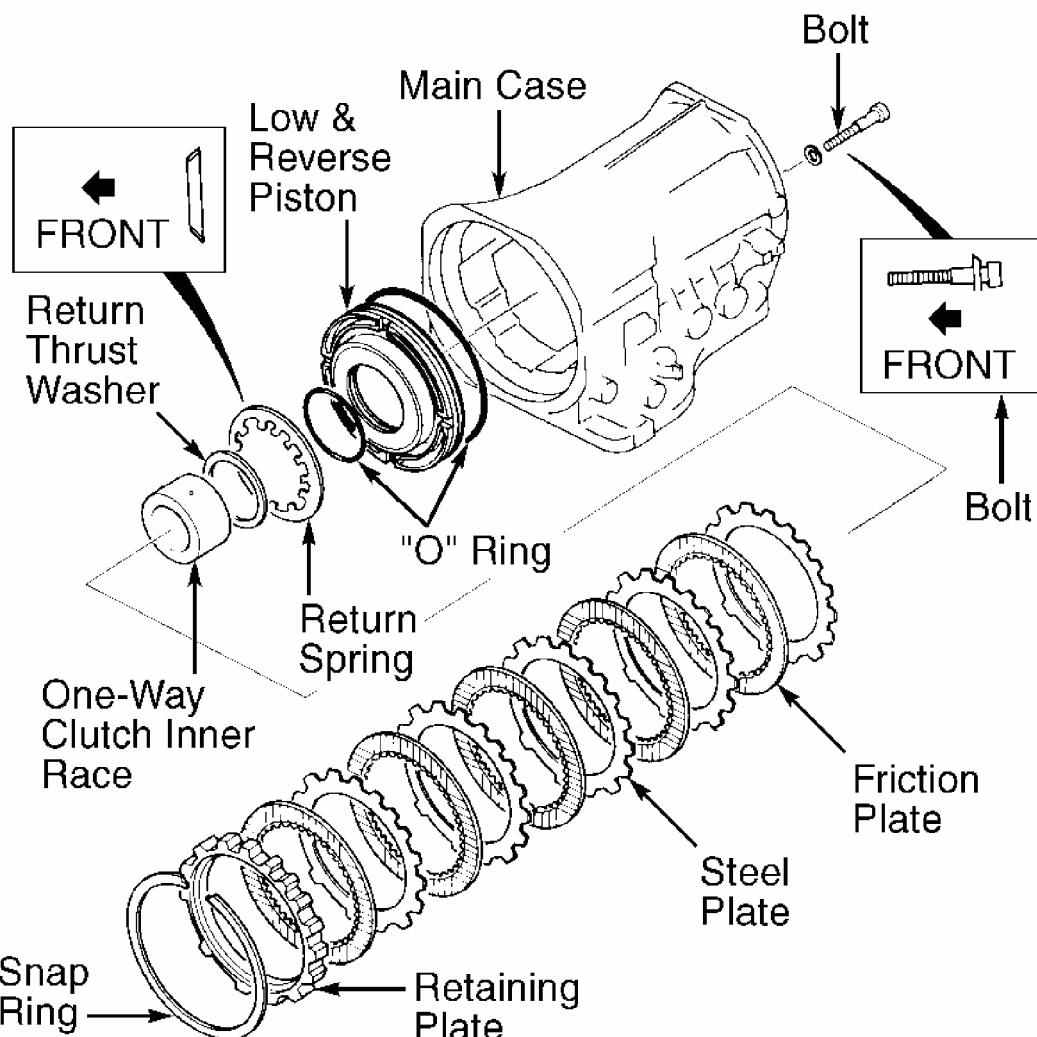
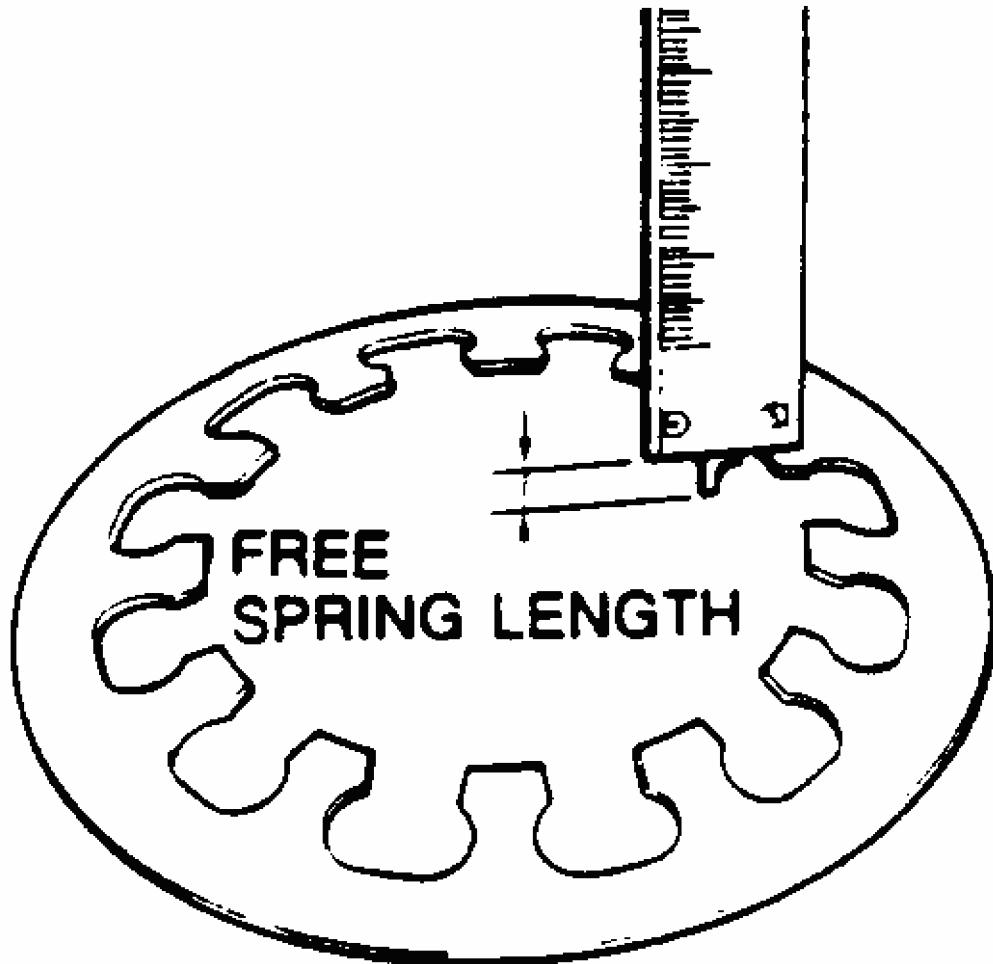


Fig. 39: Low & Reverse Brake Assembly
Courtesy of MAZDA MOTORS CORP.



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Fig. 40: Checking Low & Reverse Return Spring Free Length
Courtesy of MAZDA MOTORS CORP.

4. Check operation of assembled low and reverse brake by applying air pressure to oil passage. See [Fig. 8](#). Install bearing in rear of transmission. Install oil distributor with governor assembly and bearing race. Insert output shaft. N4A-EL does not use governor on oil distributor.
5. Install connecting drum, internal gear and rear planetary pinion carrier as an assembly. Install the snap ring onto the output shaft. Check governor operation by applying air

1991 Mazda MX-5 Miata

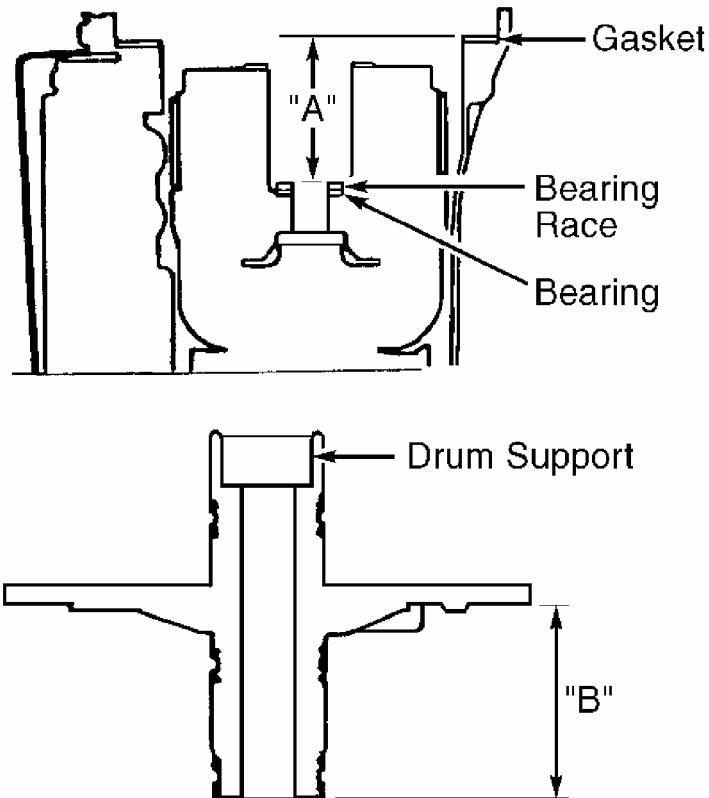
AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

pressure to oil passage. See **Fig. 46**.

6. Install extension housing, and ensure output shaft locks with manual lever in "P". Install speedometer pinion assembly. Install rear clutch assembly on top of front clutch assembly. Install rear clutch hub and front planetary pinion carrier in rear clutch assembly.
7. Install connecting shell and sun gear from top of front planetary pinion carrier. Install clutch and front carrier as an assembly in transmission. Ensure bearings and/or thrust washers are installed in correct position.
8. Place transmission on work stand with extension housing downward. To check and adjust total rear clutch end play, insert drum support bearing and race on rear clutch. Install a new drum support gasket in transmission. Measure and record distance "A". Measure and record distance "B" of drum support. See **Fig. 41**.
9. Subtract distance "B" from distance "A" and record difference. Subtract .004" (.10 mm) from this difference to obtain total end play. Total end play should be .010-.020" (.25-.50 mm). If not within specifications, select different size bearing race.

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL



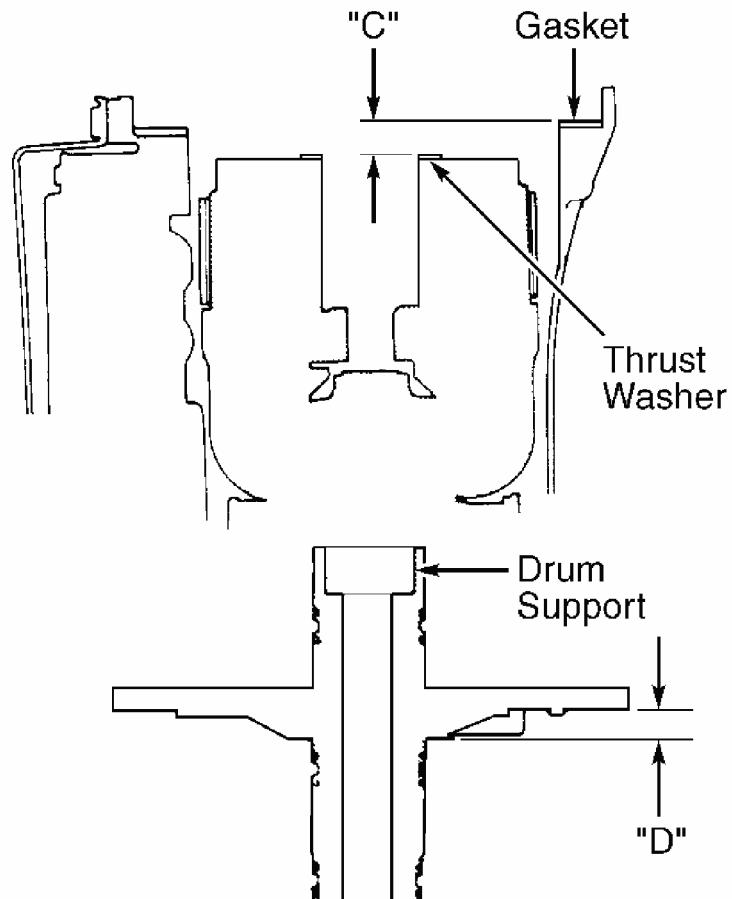
Formula: "A" - "B" - .0039" (.1 mm) = Rear Clutch Total End Play

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Fig. 41: Measuring Rear Clutch (Distance "A" & "B")
Courtesy of MAZDA MOTORS CORP.

1991 Mazda MX-5 Miata

AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL



Formula: "C" - "D" - .0039" (.1 mm) = Front Clutch Total End Play

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Fig. 42: Measuring Front Clutch (Distance "C" & "D")
Courtesy of MAZDA MOTORS CORP.

10. With correct total rear clutch end play set, check and adjust total front clutch end play. Install thrust washer on front clutch. Ensure drum support gasket is in place. Measure and record distances "C" and "D". See **Fig. 42**.
11. Subtract distance "D" from distance "C" and record difference. Subtract .004" (.10 mm) from this difference to obtain total front clutch end play. Total front clutch end play must be .020-.031" (.50-.80 mm). If not within specification, select different size thrust washer.
12. Install 2nd brake band, strut and band servo. Tighten 2nd brake servo adjusting screw lightly. Install and center drum support on OD case. See **OD CASE & DRUM SUPPORT** under COMPONENT DISASSEMBLY & REASSEMBLY. Install gasket on

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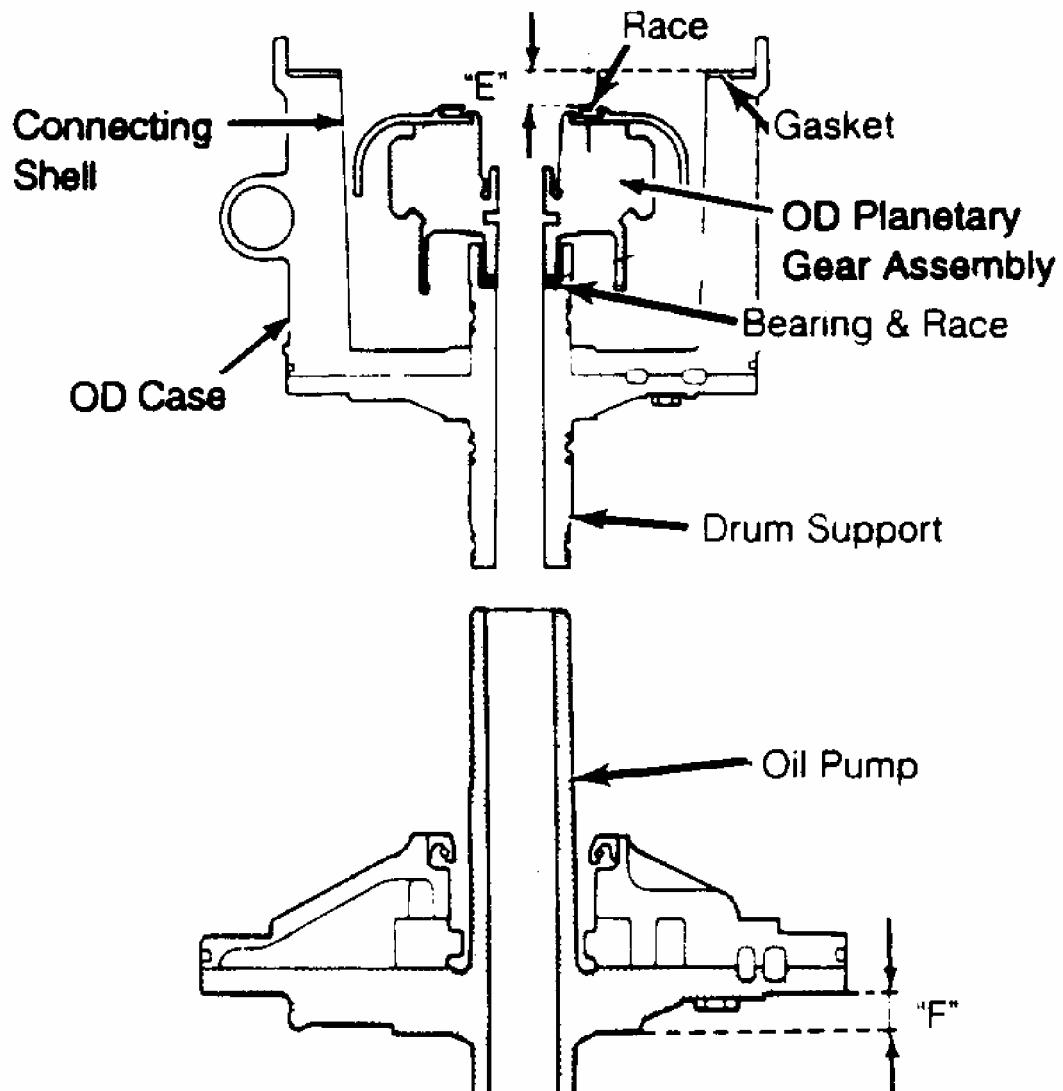
AUTO TRANS OVERHAUL - N4A-EL, N4A-HL & NC4A-EL AUTOMATIC TRANSMISSIONS Mazda N4A-EL N4A-EL & NC4A-EL

transmission case.

13. Align matching marks on OD case and transmission case, and install OD case. Temporarily install 2 bolts to hold OD case in place. To check and adjust OD planetary gear total end play, position OD case upward.
14. Install bearing and race. Install planetary carrier, sun gear and connecting shell as an assembly. **DO NOT** install direct clutch at this time. Install bearing and race on connecting shell. Measure and record distances "E" and "F". See [Fig. 43](#). On N4A-EL, install sensing rotor before measuring distance "E". See [Fig. 44](#). Install a new oil pump gasket on OD case.
15. Subtract distance "F" from "E" and record difference. Subtract .004" (.10 mm) from difference. Standard OD total end play should be .010-.020" (.25-.50 mm). If not within specifications, replace bearing race installed in drum support. See 43 and 44.

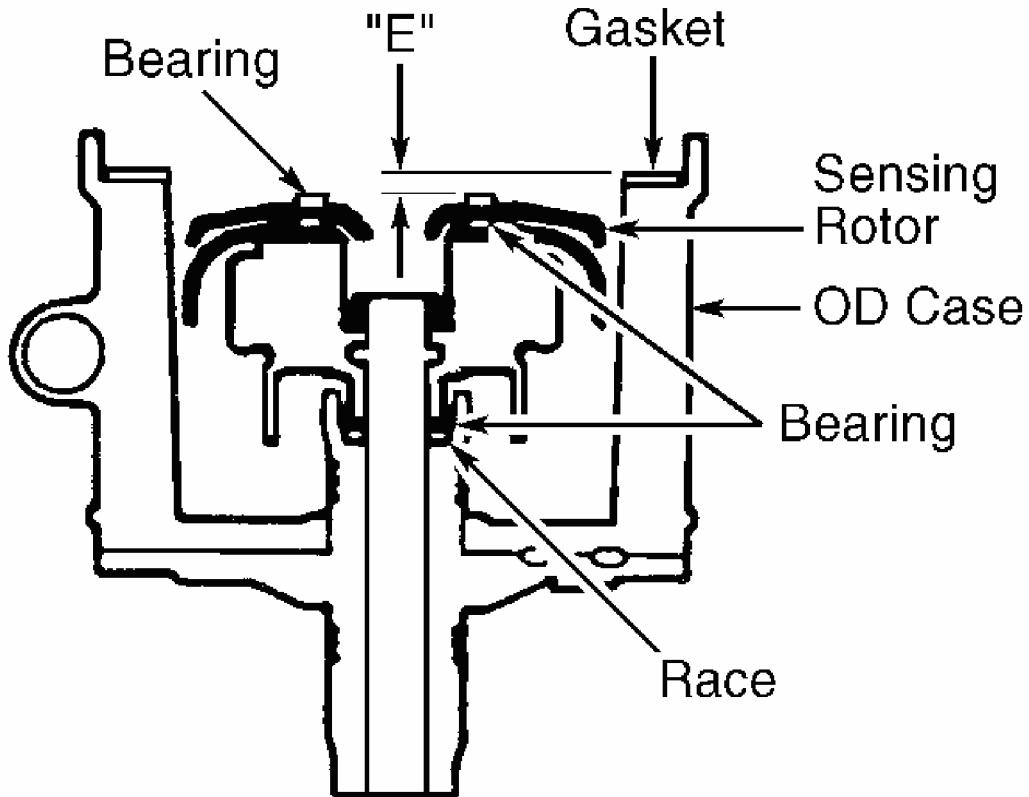
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Fig. 43: Measuring Distance "E" (N4A-HL) & "F"
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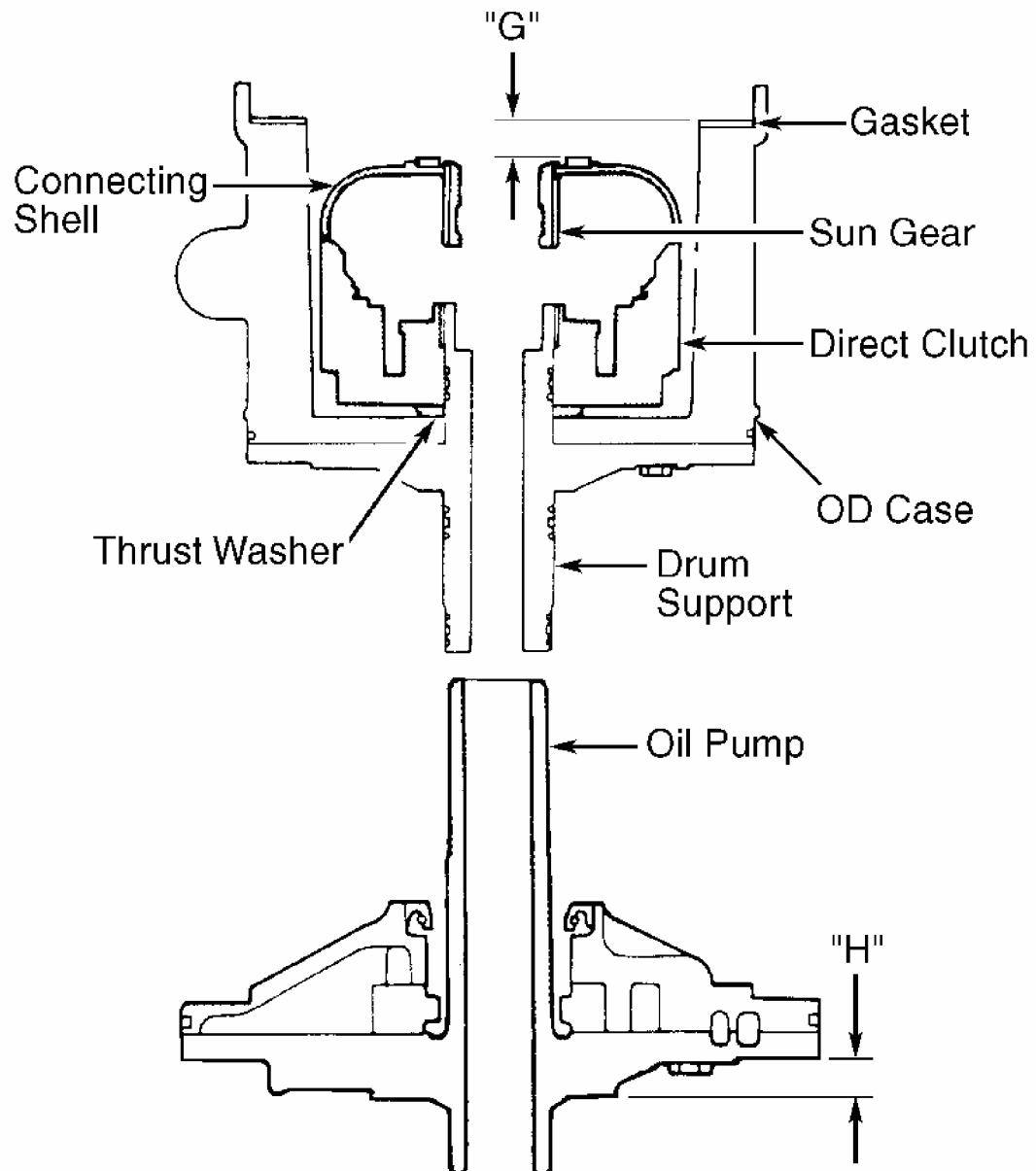
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Fig. 44: Measuring Distance "E" (N4A-EL)
Courtesy of MAZDA MOTORS CORP.

16. When OD total end play is within specification, remove components from OD case. Check and adjust direct clutch end play by installing thrust washer in OD case. Install direct clutch, sun gear, connecting shell, bearing and race. On N4A-EL, install sensing rotor. See **Fig. 44**. **DO NOT** install planetary pinion carrier.
17. On all transmissions, measure and record distances "G" and "H". See **Fig. 45**. Subtract distance "H" from "G" and record difference. Subtract .004" (.10 mm) from this difference. Standard direct clutch total end play should be .020-.031" (.50-.80 mm). If not within specification, select different size thrust washer.

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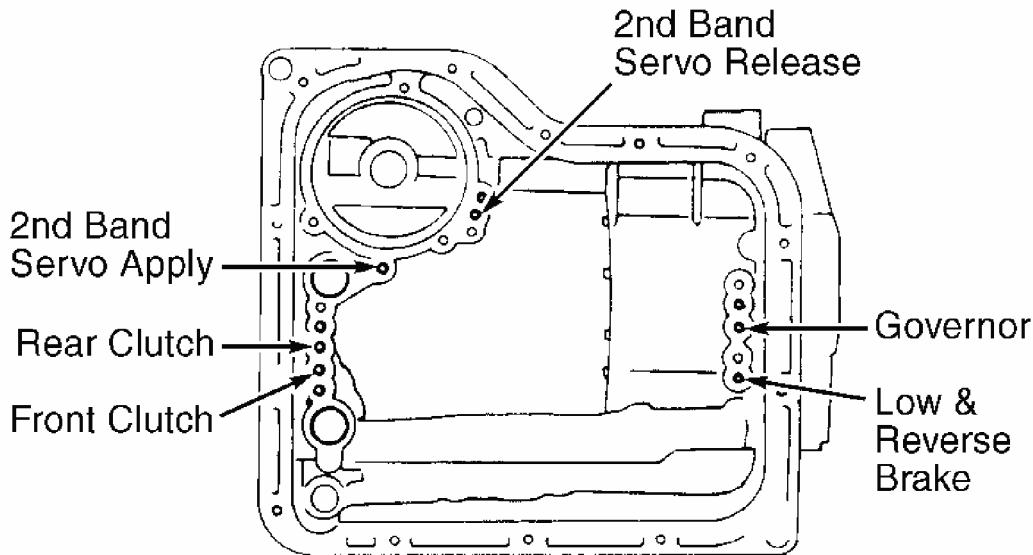
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Fig. 45: Measuring Distances "G" & "H"

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Fig. 46: Air Checking Locations
Courtesy of MAZDA MOTORS CORP.

18. Install intermediate shaft. Install intermediate shaft with long splines to front. Install OD brake servo assembly. Install OD brake band and strut. Install bearing and race, thrust washer and OD direct clutch assembly.
19. Tighten servo piston stem to hold direct clutch in place. Remove 2 bolts holding OD case to transmission. Align matching marks, and install oil pump assembly. Install input shaft. On N4A-EL, install input shaft through oil pump. Install bearing, sensing rotor and snap ring. Install oil pump and input shaft as a unit on OD housing. Ensure input shaft is installed in proper direction noted during disassembly.
20. On all transmissions, apply sealant to bolt flanges and bellhousing-to-OD case mating surface. Install "O" rings between converter housing and oil pump (if equipped). Align match marks and install converter housing. Tighten RETAINING bolts to specifications. Loosen OD servo piston stem lock nut and make adjustments according to the **OD & 2ND BRAKE BAND ADJUSTMENT SPECIFICATIONS** table. Tighten the lock nut.
21. Using Gauge (49 G032 355), measure depth "N" of vacuum throttle valve. See 47 and 48. Determine correct length of vacuum diaphragm rod. See **VACUUM DIAPHRAGM ROD** table. Install vacuum diaphragm rod, "O" ring and vacuum diaphragm in transmission case. See **Fig. 48**.

OD & 2ND BRAKE BAND ADJUSTMENT SPECIFICATIONS

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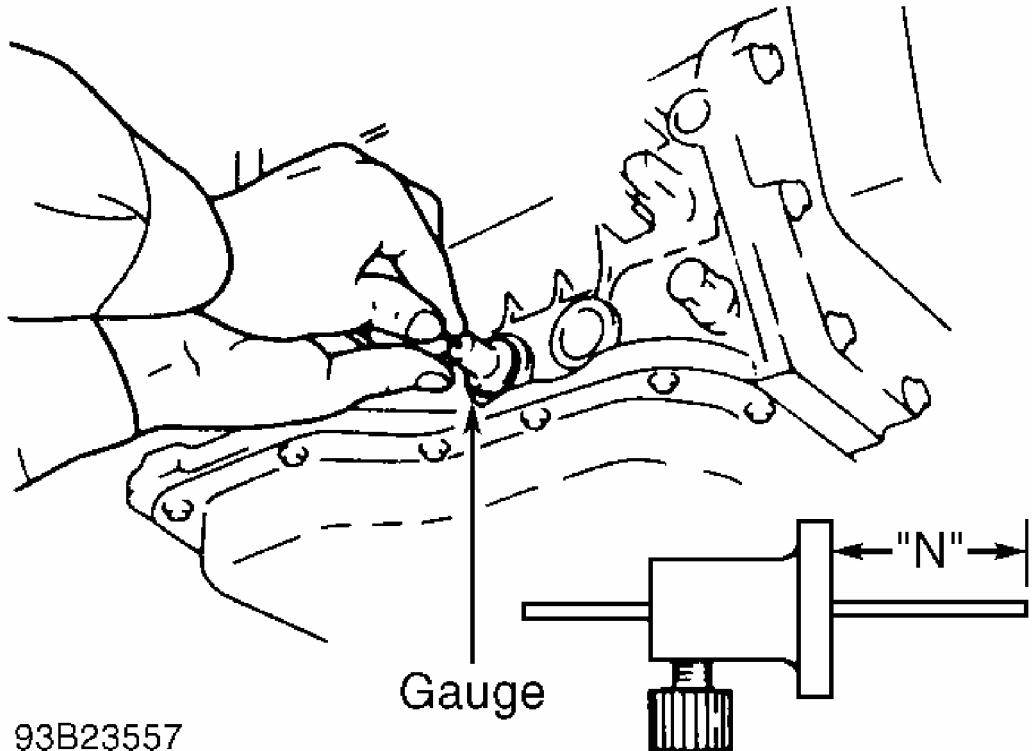
Application	Specification
Except RX7 & 929	
OD Stem Torque	60-86 INCH Lbs. (7-10 N.m)
Back Off Turns	2
2nd Stem Torque	102-128 INCH Lbs. (12-15 N.m)
Back Off Turns	3
RX7 & 929	
OD Stem Torque	102-120 INCH Lbs. (12-14 N.m)
Back Off Turns	2
2nd Stem Torque	102-128 INCH Lbs. (12-15 N.m)
Back Off Turns	2 1/2

VACUUM DIAPHRAGM ROD

Measured Depth "N" In. (mm)	Install Rod In. (mm)
Less Than 1.010 (25.65)	1.14 (29.00)
1.010-1.019 (25.65-25.90)	1.16 (29.50)
1.020-1.039 (25.91-26.40)	1.17 (29.75)
1.040-1.049 (26.41-26.65)	1.18 (30.00)
1.050-1.069 (26.66-27.15)	1.20 (30.50)
More Than 1.069 (27.16)	1.22 (31.00)

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Fig. 47: Measuring Vacuum Throttle Valve Depth
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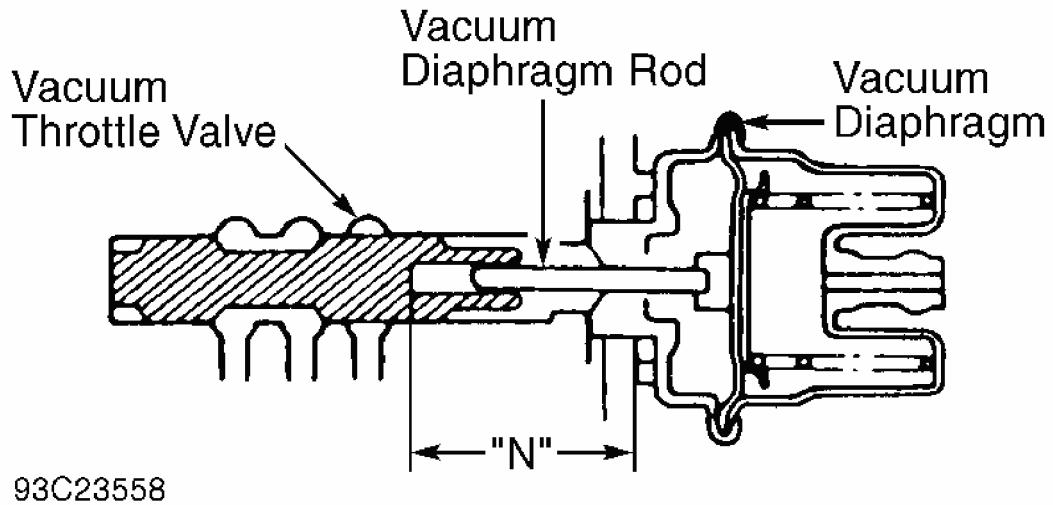


Fig. 48: Installing Vacuum Diaphragm
Courtesy of MAZDA MOTORS CORP.

22. Air check the components to ensure proper operation. See [Fig. 46](#). Install valve body assembly and tighten to specifications. On N4A-EL, install the solenoid valve electrical connector in the transmission case. Install new oil pan gasket and oil pan. Tighten to specifications. See [TORQUE SPECIFICATIONS](#). Install OD band servo cover.
23. To complete reassembly, reverse disassembly procedure. Ensure torque converter is completely seated.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Band Piston Stem Lock Nut	11-29 (15-39)
Extension Housing-To-Transmission Bolt	15-18 (20-24)
Governor Tube	11-13 (15-18)
Manual Shaft Lock Nut	22-29 (30-39)
Oil Cooler Pipe-To-Case	17-26 (23-35)
One-Way Clutch-To-Transmission	9-13 (12-18)
Torque Converter Housing-To-Transmission Bolt	
Miata, MPV & Pickup	43-51 (58-69)

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All Others	33-40 (45-54)
	INCH Lbs. (N.m)
Drum Support-To-Overdrive Case	61-78 (6.9-8.8)
Governor Body-To-Oil Distributor	43-61 (4.9-6.9)
Line Pressure Test Plugs	43-86 (4.9-9.7)
Lower-To-Upper Valve Body	(1)
Neutral Safety Switch-To-Transmission Case	43-61 (4.9-6.9)
OD Servo Case	43-61 (4.9-6.9)
Oil Pan-To-Transmission Case	48-65 (5.9-7.4)
Oil Screen-To-Valve Body	26-35 (3.0-3.9)
Valve Body-To-Transmission Case	48-65 (5.4-7.4)
2nd Servo-To-Transmission Case	60-78 (6.9-8.8)

(1) See **Fig. 35**.