

1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

1985-92 AUTOMATIC TRANSMISSIONS**Ford A4LD Overhaul****APPLICATION****A4LD APPLICATION**

Model	Axle/Engine	Equipment Type
1985		
Bronco II	4WD/2.9L	Optional
Ranger	2WD/2.3L	Optional
2WD & 4WD/2.8L		Optional
1986		
Aerostar	2WD/2.3L	Optional
2WD/2.8L		Optional
2WD/3.0L		Optional
Bronco II	2WD & 4WD/2.9L	Optional
Ranger	2WD/2.3L	Optional
2WD & 4WD/2.9L		Optional
1987		
Aerostar	2WD/2.3L	Optional
2WD/3.0L		Optional
Bronco II	AWD & 4WD/2.9L	Optional
Mustang	2WD/2.3L	Optional
Ranger	2WD/2.3L	Optional
2WD & 4WD/2.9L		Optional
Thunderbird	2WD/2.3L	Optional
Merkur Scorpio	2WD/2.9L	Standard
1988		
Aerostar	2WD/3.0L	Optional
Bronco II	AWD & 4WD/2.9L	Optional
Mustang	2WD/2.3L	Optional
Ranger	2WD/2.3L	Optional
2WD & 4WD/2.9L		Optional
Thunderbird	2WD/2.3L	Optional
Merkur Scorpio	2WD/2.9L	Standard
1989-90		
Aerostar	2WD/3.0L	Optional
2WD/4.0L		(1) Optional
AWD/4.0L		Standard
Bronco II	2WD & 4WD/2.9L	Optional
Mustang	2WD/2.3L	Optional

1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

Ranger	2WD/2.3L	Optional
2WD & 4WD/2.9L		Optional
2WD & 4WD/4.0L		Optional
Merkur Scorpio	2WD/2.9L	(2) Standard
1991-92		
Aerostar	2WD/3.0L	Optional
2WD/4.0L		(1) Optional
AWD/4.0L		Standard
Explorer	2WD & 4WD/4.0L	Optional
Mustang	2WD/2.3L	Optional
Ranger	2WD/2.3L	Optional
4WD/2.9L		Optional
2WD/3.0L		Optional
2WD & 4WD/4.0L		Optional
(1) Extended length model only.		
(2) 1989 Only		

IDENTIFICATION

The A4LD 4-speed automatic transmission can be identified by the Safety Standard Certification label. Label is located on driver's door lock pillar. Transmission code on label is under TRANS designation. The code for automatic 4-speed transmission is "T".

NOTE: Ford Motor Co. uses the code "T" in certification label for both AOD and A4LD transmissions.

Automatic transmissions are also equipped with service identification tags. See **Fig. 1**. Tag is attached to lower left side extension housing bolt. Top line of tag shows transmission model number and line shift code. Bottom line on tag shows build date code.

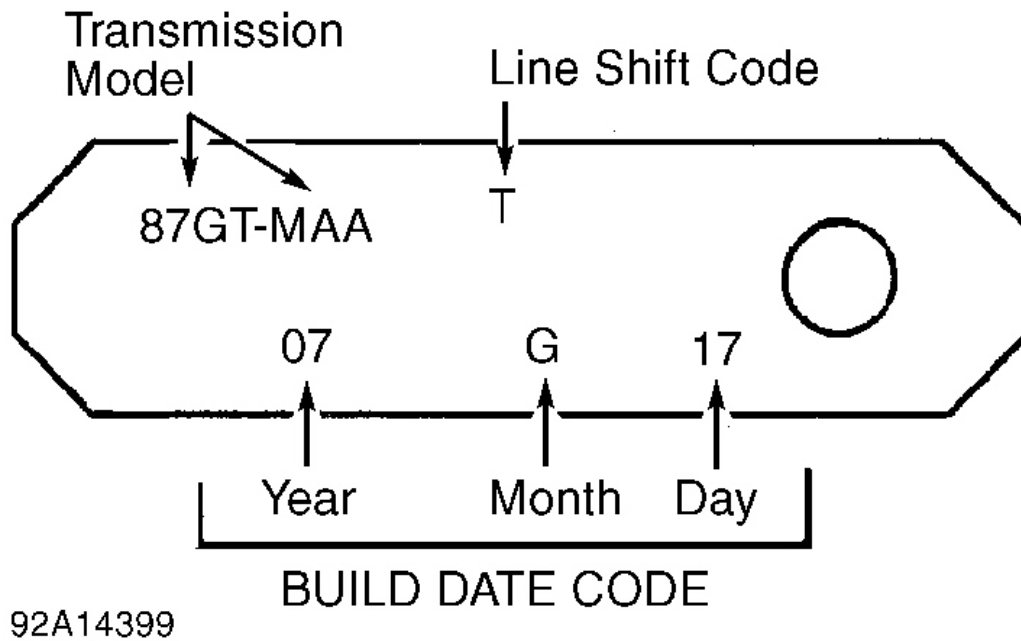


Fig. 1: Service Identification Tag
Courtesy of FORD MOTOR CO.

DESCRIPTION

The A4LD is a 4-speed automatic overdrive transmission with lock-up type torque converter. Transmission consists of torque converter, planetary gear train, 3 multiple disc clutch packs, 3 bands, 2 one-way clutches and a hydraulic control system.

The on-board EEC-IV system controls operation of a converter clutch solenoid to engage or disengage a piston/plate clutch located in the torque converter. Piston/plate clutch locks and unlocks torque converter to provide "solid drive" function when appropriate.

The EEC-IV system also controls operation of a shift solenoid for 3rd-4th gear upshift and downshifts with 4th gear acting as overdrive. Overdrive (4th gear) is engaged or disengaged as necessary to provide for fuel economy, and torque or acceleration conditions.

Manual selection of gears is also provided. Park, Neutral and Reverse function is the same as all other Ford automatic transmissions. If 1st gear is manually selected at speeds above 30 MPH (48 km/h), transmission will downshift to 2nd gear, followed by downshift to 1st gear when speed decreases to 30 MPH (48 km/h). If 2nd gear is manually selected, transmission will remain in 2nd gear regardless of vehicle speed. This is useful for start-up on slippery surfaces or for engine braking on downgrades.

LUBRICATION & ADJUSTMENTS

See appropriate TRANSMISSION SERVICING - A/T article in TRANSMISSION SERVICING.

ON-VEHICLE SERVICE

VALVE BODY

NOTE: Note length and position of valve body bolts for reassembly reference. See Fig. 2.

Removal

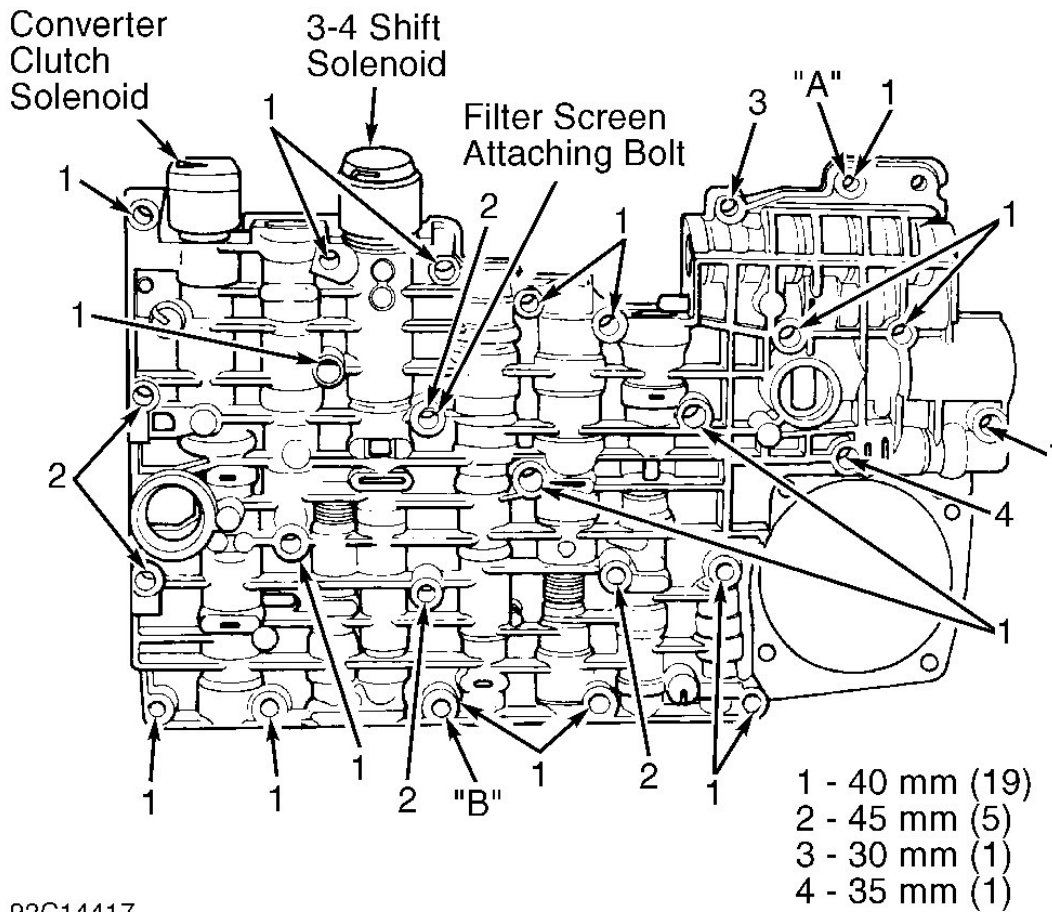
1. Raise and support vehicle. Loosen oil pan bolts and drain fluid. Remove oil pan, filter screen and "O" rings. Remove low-reverse servo cover, piston, spring and gasket. See LOW-REVERSE SERVO under ON-VEHICLE SERVICE. Disconnect 2 wires at converter clutch solenoid and 2 wires at 3-4 shift solenoid. See Fig. 2.

NOTE: Note location of 3-4 shift solenoid inner and outer retainers for reassembly reference.

2. Hold valve body in position and remove control valve body bolts. Remove detent spring from location "A". See Fig. 2. Carefully ease valve body from case while unlocking and detaching selector lever connecting rod ("Z" link). Clean and inspect valve body thoroughly. See CLEANING & INSPECTION.

Installation

1. Attach and lock selector lever connecting rod ("Z" link) to manual valve. Using care not to deform "Z" link, ease valve body into case.
2. Install "A" and "B" bolts finger tight, to locate valve body into case. See Fig. 2. Install remaining bolts finger tight, except filter screen bolt and 3-4 shift solenoid bolts. Ensure proper bolts are installed in their correct location.
3. Tighten valve body bolts, starting from center bolts and working to outer edges. See TORQUE SPECIFICATIONS. Remove bolt "A" and install detent spring to bolt. Reinstall bolt "A" and tighten to specification.
4. Install low reverse servo cover, piston, spring and gasket. Connect solenoid wires.
5. Clean filter screen with solvent and install filter screen and "O" rings. Using a new gasket, install gasket and oil pan. Tighten oil pan bolts to specifications.
6. Add 3 Qts. (2.8L) of transmission fluid and start engine. Add fluid as necessary.



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Fig. 2: Locating Control Valve Body Bolts
Courtesy of FORD MOTOR CO.

LOW-REVERSE SERVO

Removal & Installation

Remove transmission oil pan and filter screen with "O" rings. Remove low-reverse servo bolts. Remove servo cover, gasket, piston and spring. See **Fig. 3**. To install, reverse removal procedure.

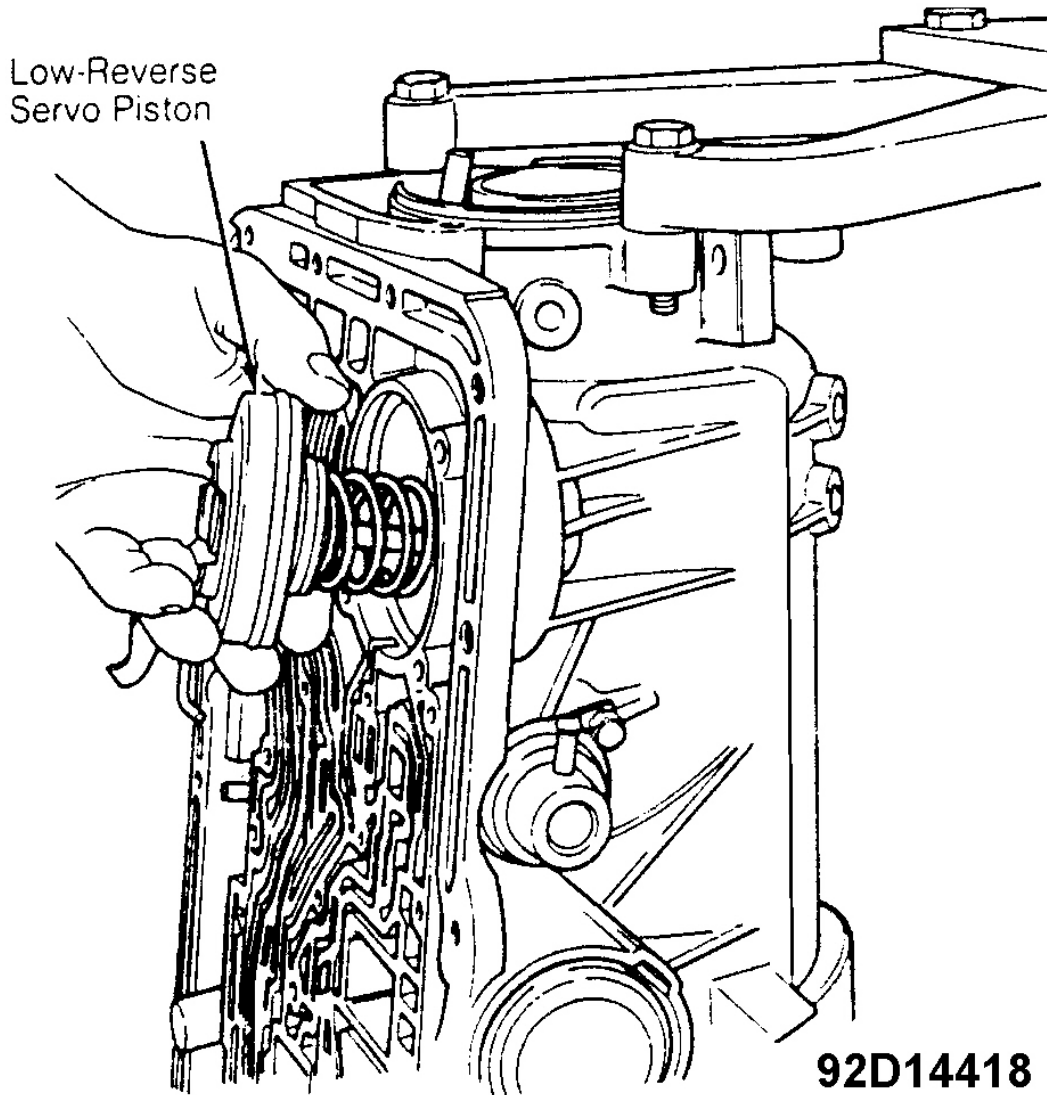


Fig. 3: Removing & Installing Low-Reverse Servo Assembly
Courtesy of FORD MOTOR CO.

EXTENSION HOUSING

Removal

1. Raise and support vehicle. Mark drive shaft rear yoke and pinion flange for reassembly reference. Remove drive shaft. Disconnect speedometer cable from extension housing.
2. Support transmission with transmission jack. Remove rear support bolts. Raise transmission slightly and remove rear support from extension housing. Loosen extension housing bolts and allow transmission fluid to drain.

3. Remove bolts and slide extension housing off output shaft. See appropriate component under **CLEANING & INSPECTION**.

Installation

1. Ensure parking pawl and spring are installed in housing correctly and are preloaded. Install new housing gasket and position extension housing on case.
2. Ensure parking pawl actuating rod is seated in extension housing guide cup bore. Install and tighten bolts. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure.

EXTENSION HOUSING SEAL & BUSHING**Removal**

1. Raise and support vehicle. Mark drive shaft rear yoke and pinion flange for reassembly reference. Remove drive shaft.
2. Using Seal Remover (T71P-7657-A), remove extension housing oil seal. Using Bushing Remover (T77L-7697-E), remove extension housing bushing. See appropriate component under **CLEANING & INSPECTION**.

Installation

1. Using Bushing Installer (T77L-7697-F), install bushing. Using Seal Installer (T74P-77052A), install seal.
2. Apply multipurpose long-life lubricant to seal lip and drive shaft yoke. Align index marks and install drive shaft. Add fluid as necessary

GOVERNOR**Removal**

1. Raise and support vehicle. Remove extension housing. See **EXTENSION HOUSING** under ON-VEHICLE SERVICE. Remove governor body-to-oil collector body bolts. See **Fig. 4**.

NOTE: **Components are not retained once governor body bolts have been removed. It is necessary to hold body and components together while removing and installing governor.**

2. Remove governor body from collector body. Remove governor valve, spring and weight from governor body.

Installation

Reassemble governor body and components. Ensure correct spring is used for model application. Position governor body over oil feed holes of oil collector body. Install bolts and tighten to specifications. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal.

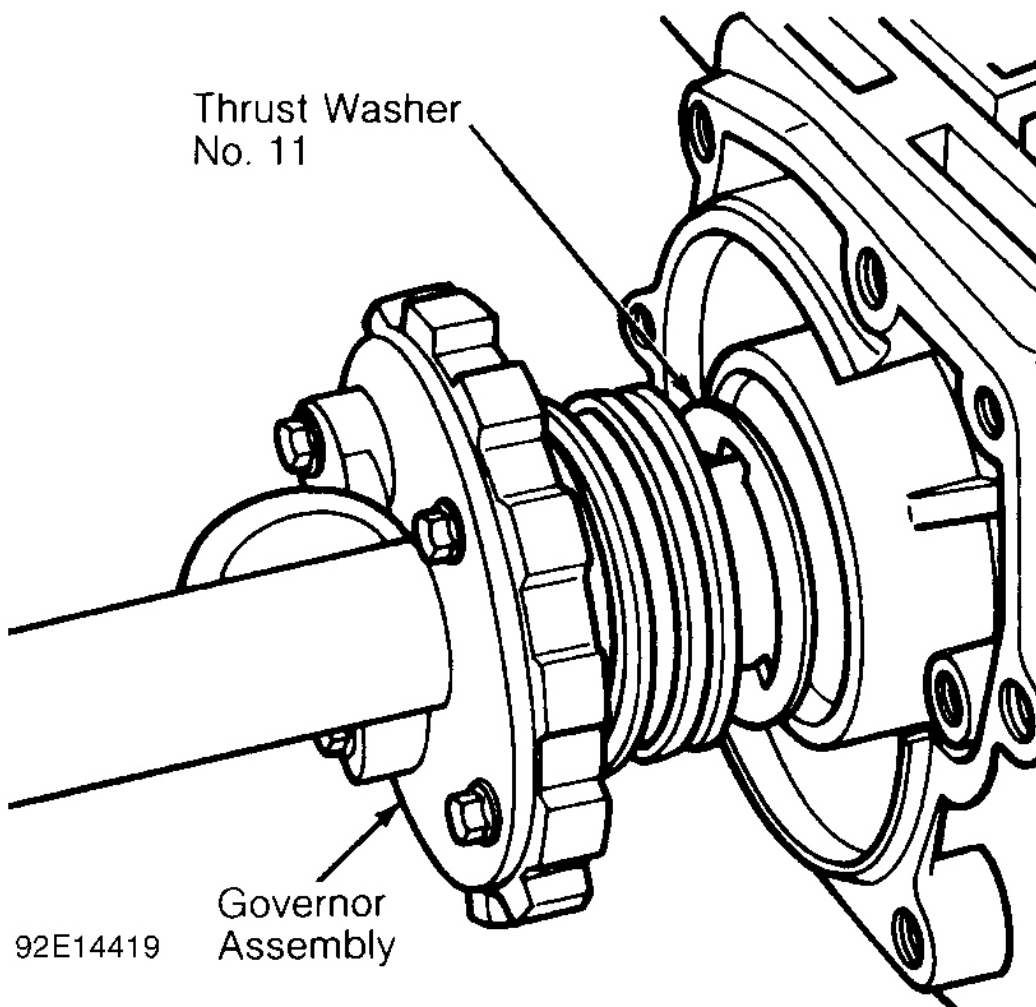


Fig. 4: Removing & Installing Governor Assembly
Courtesy of FORD MOTOR CO.

NEUTRAL SWITCH

WARNING: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in **APPLICATIONS & IDENTIFICATION** before disconnecting battery.

Removal & Installation

Disconnect negative battery cable. Disconnect neutral switch wires from switch. Using Neutral Switch Socket

(T74P-77247-A), remove switch and "O" ring from transmission. To install, reverse removal procedure. Tighten neutral switch to specification. See **TORQUE SPECIFICATIONS**.

VACUUM DIAPHRAGM

Removal & Installation

Remove heat shield (if equipped). Disconnect vacuum hose. Remove bolt and clamp. Remove vacuum diaphragm and control rod from case. To install, reverse removal procedure. Tighten bolt to specification. See **TORQUE SPECIFICATIONS**.

TROUBLE SHOOTING

PRELIMINARY CHECKS

NOTE: When **TROUBLE SHOOTING** symptom indicates computer/computer controlled device failure, refer to appropriate **AUTO TRANS DIAGNOSIS - FORD A4LD** article.

Accelerator Linkage

Ensure accelerator linkage is free from interference and returns to idle when released. Adjust accelerator linkage or dashpot as necessary.

Computer Controls

Ensure all computer control systems are operating properly before diagnosing transmission shifting problems. Refer to appropriate **AUTO TRANS DIAGNOSIS - FORD A4LD** article.

Downshift Linkage

1. Downshift linkage is self-adjusting. With ignition off, press accelerator pedal firmly to the floor, then release.
2. If kickdown function is difficult or not possible, check for interference to throttle cable and/or kickdown cable by floormat or pads.
3. Check for interference in engine compartment by hoses, wiring harnesses, etc. Adjust trim or engine components as required.

Fluid Level

1. Vehicle must be on level surface. Bring vehicle to normal operating temperature. Move shift selector through all positions, allowing enough time for each position to engage.
2. Securely engage shift lever in Park position. Vehicles with 4WD must have 4WD selector in any position other than Neutral. Apply parking brake.
3. Check fluid with dipstick and add as necessary. If fluid is low, leakage is indicated. Locate and repair source of leak.

Manual Shift Cable

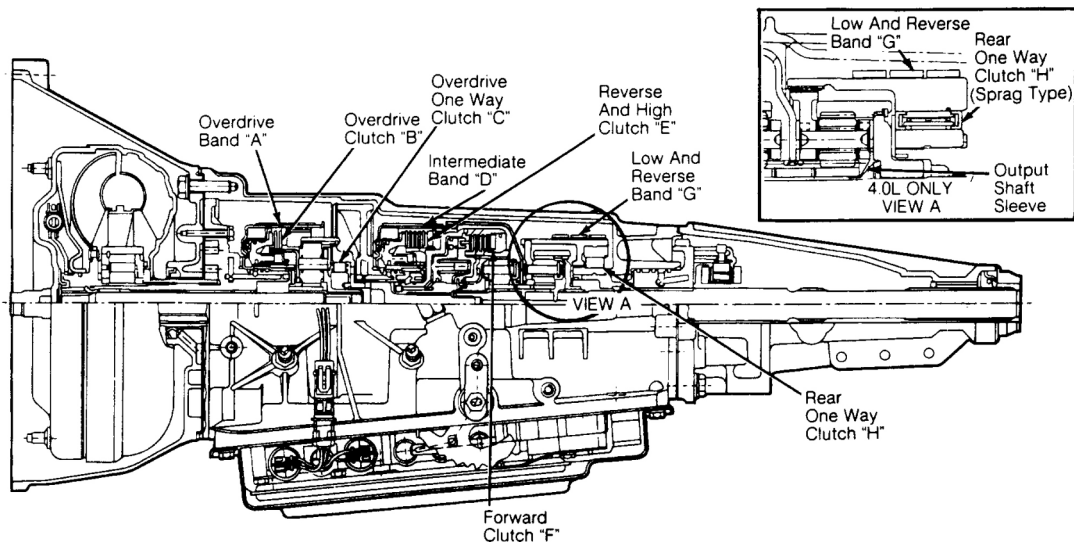
When column or console position is selected, ensure transmission detent position corresponds exactly. Adjust cable or indicator as necessary.

Vacuum Diaphragm

Remove hose from vacuum diaphragm. If transmission fluid is present on vacuum side of diaphragm unit, replace diaphragm unit. For further tests of vacuum diaphragm and engine vacuum supply, see **VACUUM DIAPHRAGM UNIT TEST** and **ENGINE VACUUM SUPPLY TEST** under TESTING.

Clutch & Band Application Chart

The clutch and band application chart can be used with or without Rotunda Automatic Transmission Tester (014-00737) to assist the technician with trouble shooting. See **Fig. 5**.



Gear	Overdrive Band A	Overdrive Clutch B	Overdrive One Way Clutch C	Intermediate Band D	Reverse and High Clutch E	Forward Clutch F	Low and Reverse Band G	One Way Clutch H	Gear Ratio
1 — Manual First Gear (Low)		Applied	Holding			Applied	Applied	Holding	2.47:1
2 — Manual Second Gear		Applied	Holding	Applied		Applied			1.47:1
D — Drive Auto. — 1st Gear		Applied	Holding			Applied		Holding	2.47:1
ⓓ — O/D Auto. — 1st Gear			Holding			Applied		Holding	2.47:1
D — Drive Auto. — 2nd Gear		Applied	Holding	Applied		Applied			1.47:1
ⓓ — O/D Auto. — 2nd Gear			Holding	Applied		Applied			1.47:1
D — Drive Auto. — 3rd Gear		Applied	Holding		Applied	Applied			1.0:1
ⓓ — O/D Auto. — 3rd Gear			Holding		Applied	Applied			1.0:1
ⓓ — Overdrive Automatic Fourth Gear	Applied				Applied	Applied			0.75:1
Reverse		Applied	Holding		Applied		Applied		2.1:1

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Fig. 5: Cross Section of A4LD Transmission with Clutch & Band Application Chart
Courtesy of FORD MOTOR CO.

SYMPTOM CHARTS

NOTE: Many symptoms can be caused by improper fluid level or linkage adjustment or damage. **ALWAYS** do preliminary checks before trouble shooting by symptom. See Fig. 6-Fig. 16 for TROUBLE SHOOTING SYMPTOM CHARTS.

CONDITION	POSSIBLE SOURCE	ACTION
Converter clutch does not engage.	• Converter clutch solenoid is not being energized electrically. Wires to solenoid shorted or an open circuit. • Transmission case connector not seated. • Open or short circuit inside of solenoid. • Malfunctioning engine coolant temperature sensor. • Malfunctioning manifold absolute pressure sensor. • Vacuum line disconnected from the MAP sensor. • Circuit continuity: 3-4 solenoid wire pin 52 should read approximately 20 ohm resistance. • Brake switch malfunction. • Malfunctioning EEC-IV processor. • Converter clutch solenoid is being energized electronically but foreign material on solenoid valve is preventing valve closure. • Converter clutch shuttle valve stuck in unlock position (against plug) or too high a load spring. • Converter clutch shift valve stuck in downshift position. • Torque converter internal malfunction preventing lock-up piston application.	• See appropriate ELECTRONIC CONTROLS article. • Check circuit continuity with Breakout Box T83L-50 EEC-IV and Rotunda Digital Volt-Ohmmeter 007-00002 or equivalent. Check power pin No. 57 (red lead) and 3-4 pin 52 (black lead). • See appropriate ELECTRONIC CONTROLS article. • See appropriate ELECTRONIC CONTROLS article. • Remove transmission oil pan. Remove valve body. Remove solenoid and check operation of solenoid. Clean if necessary. • Remove valve body. Check operation of converter clutch shuttle valve. Remove any contamination. Spring load should be approximately 2.0 lbs. at 0.512 inch. • Remove valve body. Check operation of converter clutch shift valve. Remove any contamination. Be sure valve moves freely. • Remove transmission. Replace converter.

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Fig. 6: A4LD Trouble Shooting Symptom Charts (1 of 11)
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1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

CONDITION	POSSIBLE SOURCE	ACTION
Converter clutch always engaged even at zero road speed. (Symptom: vehicle will move only when the engine is accelerated to a high rpm and transmission selector lever is placed into )	- Converter clutch shift valve stuck in lock position. - Converter clutch shuttle valve stuck in locked position. - Lock-up piston in torque converter will not disengage.	- Remove transmission valve body. Check to see that converter clutch shift valve moves freely. - See appropriate ELECTRONIC CONTROLS article. - Remove valve body. Check converter clutch shuttle valve for ease of movement. - Remove transmission. Replace converter.
Converter clutch will not disengage on coastdown.	- Malfunctioning throttle position sensor (should unlock at closed throttle). - Converter clutch solenoid sticking.	- See appropriate ELECTRONIC CONTROLS article. - Remove valve body. Check operation of solenoid. Replace if required.
Slow initial engagement.	- Improper fluid level. - Damaged or improperly adjusted manual linkage. - Contaminated fluid. - Improper clutch and band application, or low main control pressure.	- Perform fluid level check. - Service or adjust manual linkage. - Perform fluid condition check. - Perform control pressure test.
Rough initial engagement in either forward or reverse.	- Improper fluid level. - High engine idle. - Looseness in the driveshaft. U-joints or engine mounts. - Improper clutch or band application, or oil control pressure. - Sticking or dirty valve body. - Converter clutch not disengaging.	- Perform fluid level check. - See appropriate ELECTRONIC CONTROLS article. - Service as required. - Perform control pressure test. - Clean, service or replace valve body. - Check converter clutch engagement / disengagement.
Harsh engagements — (warm engine).	- Improper fluid level. - Engine curb idle speed too high. - Valve body bolts — loose / too tight. - Valve body dirty / sticking valves.	- Perform fluid level check. - Check engine curb idle speed. - Tighten to specification. - Determine source of contamination. Service as required.

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Fig. 7: A4LD Trouble Shooting Symptom Charts (2 of 11)
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1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

CONDITION	POSSIBLE SOURCE	ACTION
No / delayed forward engagement (reverse OK).	- Improper fluid level. - Manual shift cable misadjusted / damaged. - Low main control pressure (leakage). Forward clutch center support seal rings leaking. - Forward clutch assembly burnt / damaged / leaking. Check ball in cylinder / leaking piston seal rings. - Valve body bolts — loose / too tight. - Valve body dirty / sticking valves. - Transmission filter plugged. - Pump damaged, leaking.	- Perform fluid level check. - Check and adjust or service as required. - Control pressure test, note results. - Perform air pressure test. - Tighten to specification. - Determine source of contamination. Service as required. - Replace filter. - Visually inspect pump gear. Replace pump if necessary.
No / delayed reverse engagement (forward OK).	- Improper fluid level. - Manual shift cable misadjusted / damaged. - Low main control pressure in reverse. - Reverse clutch assembly burnt / worn / leaking check ball in piston / leaking piston seal rings. - Valve body bolts loose / too tight. - Valve body dirty / sticking valves. - Transmission filter plugged. - Pump damaged. - Low / reverse servo piston seal cut / leaking.	- Perform fluid level check. - Check and adjust or service as required. - Control pressure test. - Perform air pressure test. - Tighten to specification. - Determine source of contamination. Service as required. - Replace filter. - Visually inspect pump gears. Replace pump if necessary. - Perform air pressure test. Check and replace piston seal. Check and replace low / reverse band.
No engagement or drive in forward (any position) or reverse.	- Improper fluid level. - Low main control pressure. - Mechanical damage.	- Perform fluid level check. - Control pressure test. - Check splines on turbine, input shaft and overdrive carrier, overdrive one-way clutch, center shaft, forward clutch, forward carrier and output shaft. Replace if necessary.
No engagement / drive in $\odot$ or D (2 and 1 OK).	- Manual shift cable misadjusted. - Rear one-way clutch damaged. - Dirty / contaminated transmission fluid. - Overdrive one-way clutch damage.	- Adjust manual shift cable. - Replace rear one-way clutch. - Clean transmission and valve body. - Repair or replace.
Vehicle creeping in neutral.	Forward clutch failing to disengage.	Clean transmission.
No / delayed reverse engagement and / or no engine braking in manual low (1).	- Improper fluid level. - Shift cable out of adjustment. - Low reverse servo piston seal leaking. - Low reverse band burnt or worn. - Overdrive clutch, overdrive one-way clutch damaged. - Polished, glazed low / reverse band or drum. - Rear one-way clutch damaged.	- Perform fluid level check. - Service or adjust cable. - Check and replace piston seal. - Perform air pressure test. - Replace as required. - Service or replace as required. - Replace.

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Fig. 8: A4LD Trouble Shooting Symptom Charts (3 of 11)
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1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

CONDITION	POSSIBLE SOURCE	ACTION
No engine braking in manual second gear.	- Intermediate band out of adjustment. - Improper band or clutch application, or oil pressure control system. - Intermediate servo leaking. - Overdrive clutch, overdrive one-way clutch damaged. - Glazed band.	- Adjust intermediate band. - Perform control pressure test. - Perform air pressure test of intermediate servo for leakage. Service as required. - Replace as required. - Service or replace as required.
Forward engagement slips / shudders / chatters.	- Improper fluid level. - Manual shift cable misadjusted / damaged. - Low main control pressure. - Valve body bolts loose / too tight. - Valve body dirty / sticking valves. - Forward clutch piston ball check not seating / leaking. - Forward clutch piston seals cut / worn. - Overdrive one-way clutch damaged. - Rear one-way clutch damaged.	- Perform fluid level check. - Check and adjust or service as required. - Control pressure test. - Tighten to specification. - Determine source of contamination. Service as required. - Replace forward clutch piston. Service transmission as required. - Replace seal and service clutch as required. - Replace as required. - Determine cause of condition. Service as required.
Reverse shudder / chatter / slips.	- Improper fluid level. - Low main control pressure in reverse. - Low-reverse servo leaking. - Overdrive and / or rear one-way clutch damaged. - Overdrive and / or rear reverse-high clutch drum bushing damaged. - Overdrive and / or rear reverse-high clutch center support seal rings / ring grooves worn / damaged. - Overdrive and / or rear reverse-high clutch piston seals cut / worn. - Low-reverse servo piston damaged / worn. - Low-reverse band out of adjustment or damaged. - Looseness in the driveshaft, U-joints or engine mounts. - Low / reverse servo piston / seals or bores damaged. - Contamination blockage in cooler lines, in-tank radiator or auxiliary cooler.	- Perform fluid level check. - Control pressure test. - Air pressure test. Visually inspect seal rings and piston bore. - Determine cause of condition. Service as required. - Determine cause of condition. Service as required. - Determine cause of condition. Service as required. - Determine cause of condition. Service as required. - Service as required. - Adjust and inspect low-reverse band. - Service as required. - Perform air pressure test. - Perform transmission fluid cooler flow check.
No drive, slips or chatters in first gear in  D. All other gears normal.	Damaged or worn rear one-way clutch.	Service or replace rear one-way clutch.

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Fig. 9: A4LD Trouble Shooting Symptom Charts (4 of 11)
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1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

CONDITION	POSSIBLE SOURCE	ACTION
No drive, slips or chatters in second gear.	- Intermediate band out of adjustment. - Improper band or clutch application, or control pressure. - Damaged or worn intermediate servo piston and/or internal leaks. - Dirty or sticking valve body. - Polished, glazed intermediate band or drum.	- Adjust intermediate band. - Perform control pressure test. - Perform air pressure test. - Clean, service or replace valve body. - Replace or service as required.
Starts up in 2nd or 3rd.	- Improper band and/or clutch application, or oil pressure control system. - Damaged or worn governor. - Sticking governor. - Valve body loose. - Dirty or sticking valve body. - Cross leaks between valve body and case mating surface.	- Perform control pressure test. - Perform governor pressure test. Replace or service governor; clean screen. - Tighten to specification. - Clean, service or replace valve body. - Service or replace valve body and/or case mating as required.
Shift points incorrect.	- Improper fluid level. - Vacuum line damaged, clogged or leaks. - Improper operation of EGR system. - Improper speedometer gear installed. - Improper clutch or band application, or oil pressure control system. - Damaged or worn governor. - Vacuum diaphragm bent, sticking or leaks. - Dirty or sticking valve body.	- Perform fluid level check. - Perform engine vacuum supply test. - Service or replace as required. - Replace gear. - Perform shift speed test and control pressure test. - Service or replace governor — clean screen. - Service or replace as required. - Clean, service or replace valve body.
All upshifts harsh / delayed or no upshifts.	- Improper fluid level. - Manual shift cable misadjusted / damaged. - Governor sticking. - Main control pressure too high. - Valve body bolts loose / too tight. - Valve body dirty / sticking valves. - Vacuum leak to diaphragm unit. - Vacuum diaphragm bent, sticking, leaks.	- Perform fluid level check. - Check and adjust or service as required. - Perform governor pressure test. Service as required. - Control pressure test. Service as required. - Tighten to specification. - Determine source of contamination. Service as required. - Perform engine vacuum supply test and vacuum diaphragm unit test. Check vacuum lines to diaphragm unit. Service as required. - Check diaphragm unit. Service as required.

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Fig. 10: A4LD Trouble Shooting Symptom Charts (5 of 11)
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1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

CONDITION	POSSIBLE SOURCE	ACTION
Mushy / early all upshifts pile up / upshifts	● Low main control pressure. ● Valve body bolts loose / too tight. ● Valve body or throttle control valve sticking. ● Governor valve sticking. ● Kickdown linkage misadjusted, sticking or damaged.	● Control pressure test. Note results. ● Tighten to specification. ● Determine source of contamination. Service as required. ● Perform governor pressure test. Repair as required. ● Adjust linkage, service as required.
No 1-2 upshift.	● Improper fluid level. ● Kickdown system damaged. ● Manual shift cable misadjusted / damaged. ● Governor valve sticking. ● Intermediate band out of adjustment. ● Vacuum leak to diaphragm unit. ● Vacuum diaphragm bent, sticking, leaks. ● Valve body bolts loose / too tight. ● Valve body dirty / sticking valves. ● Intermediate band and / or servo assembly burnt.	● Perform fluid level check. ● Replace damaged parts. ● Check and adjust or service as required. ● Perform governor pressure test. Service as required. ● Adjust intermediate band. ● Check vacuum lines to diaphragm. Service as required. ● Check diaphragm unit. Service as necessary. ● Tighten to specification. ● Determine source of contamination. Service as required. ● Perform air pressure test.
Rough / harsh / delayed 1-2 upshift.	● Improper fluid level. ● Poor engine performance. ● Kickdown linkage misadjusted. ● Intermediate band out of adjustment. ● Main control pressure too high. ● Governor valve sticking. ● Damaged intermediate servo. ● Engine vacuum leak. ● Valve body bolts loose / too tight. ● Valve body dirty / sticking valves. ● Vacuum leak to diaphragm unit. ● Vacuum diaphragm bent, sticking, leaks.	● Perform fluid level check. ● Tune engine. ● Adjust linkage. ● Adjust intermediate band. ● Control pressure test. Note results. ● Perform governor pressure test. Service as required. ● Perform air pressure test on intermediate servo. ● Check engine vacuum lines. Check vacuum diaphragm unit. Perform engine vacuum supply test and vacuum diaphragm unit test. ● Tighten to specifications. ● Determine source of contamination. Service as required. ● Check vacuum lines to diaphragm unit. Service as required. ● Check diaphragm unit. Service as necessary.

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Fig. 11: A4LD Trouble Shooting Symptom Charts (6 of 11)
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1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

CONDITION	POSSIBLE SOURCE	ACTION
Mush / early / soft / slipping 1-2 upshift.	● Improper fluid level. ● Main regulator or throttle valve stuck. ● Incorrect engine performance. ● Intermediate band out of adjustment. ● Low main control pressure. ● Valve body bolts loose / too tight. ● Valve body dirty / sticking valves. ● Governor valve sticking. ● Damaged intermediate servo or band. ● Polished, glazed intermediate band or drum.	● Perform fluid level check. ● Service as required. ● Tune engine as required. ● Adjust intermediate band. ● Control pressure test. Note results. ● Tighten to specification. ● Determine source of contamination. Service as required. ● Perform governor pressure test. Service as required. ● Perform air pressure test. Service as required. ● Service or replace as required.
No 2-3 upshift.	● Low fluid level. ● Kickdown system damaged. ● Low main control pressure to reverse-high clutch. ● Valve body bolts loose / too tight. ● Valve body dirty / sticking valves. ● Reverse / high clutch assembly burnt / worn.	● Perform fluid level check. ● Replace damaged parts. ● Control pressure test. Note results. ● Tighten to specification. ● Determine source of contamination, then service as required. ● Determine cause of condition. Service as required.
Harsh / delayed 2-3 upshift.	● Incorrect engine performance. ● Engine vacuum leak. ● Kickdown system damaged. ● Damaged or worn intermediate servo release and reverse-high clutch piston check ball. ● Valve body bolts loose / too tight. ● Valve body dirty / sticking valves. ● Vacuum diaphragm bent, sticking, leaks.	● Check engine tune-up. ● Check engine vacuum lines. Check vacuum diaphragm unit. Perform engine vacuum supply test and vacuum diaphragm unit test. Service as necessary. ● Replace damaged parts. ● Air pressure test the intermediate servo. Apply and release the reverse-high clutch piston check ball. Service as required. ● Tighten to specification. ● Determine source of condition. Service as required. ● Check diaphragm. Replace as necessary.
Soft / early / mushy 2-3 upshift.	● Kickdown system damaged. ● Valve body bolts loose / too tight. ● Valve body dirty / sticking valves. ● Vacuum diaphragm or TV control rod bent, sticking, leaks. ● Throttle valve stuck.	● Replace damaged parts. ● Tighten to specification. ● Determine source of contamination. Service as required. ● Check diaphragm and rod. Replace as necessary. ● Service as required.

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Fig. 12: A4LD Trouble Shooting Symptom Charts (7 of 11)
Courtesy of FORD MOTOR CO.

1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

CONDITION	POSSIBLE SOURCE	ACTION
Erratic shifts.	- Poor engine performance. - Vacuum line damaged. - Valve body bolts loose / too tight. - Valve body dirty / sticking valves. - Governor valve stuck. - Output shaft collector body seal rings damaged.	- Check engine tune-up. - Service as required. - Tighten to specification. - Air pressure test, note results. Determine source of contamination. Service as required. - Perform governor pressure test. Service as required. - Service as required.
Shifts 1-3 in  or D.	- Intermediate band out of adjustment. - Damaged intermediate servo and / or internal leaks. - Improper band or clutch application, or oil pressure control system. - Polished glazed band or drum. - Dirty / sticky valve body, or governor. - Governor valve stuck. - Kickdown system out of adjustment.	- Adjust band. - Perform air pressure test. Service front servo and / or internal leaks. - Perform control pressure test. - Service or replace band or drum. - Clean, service or replace valve body or governor. - Perform governor pressure test. Service as required. - Adjust kickdown system.
Engine over-speeds on 2-3 shift.	- Kickdown system damaged. - Improper band or clutch application, or oil pressure control system. - Damaged or worn reverse high clutch and / or intermediate servo piston. - Intermediate servo piston seals cut, leaking. - Dirty or sticking valve body. - Throttle valve stuck. - Damaged vacuum diaphragm.	- Replace damaged parts. - Perform control pressure test. - Perform air pressure test. Service as required. - Replace seals. Check for leaks. - Clean, service or replace valve body. - Service as required. - Replace vacuum diaphragm.
Rough / shudder 3-2 shift at closed throttle in D.	- Incorrect engine idle or performance. - Improper kickdown linkage adjustment. - Improper clutch or band application or oil pressure control system. - Improper governor operation. - Dirty or sticking valve body.	- See appropriate ELECTRONIC CONTROLS article. - Service or adjust kickdown linkage. - Perform control pressure test. - Perform governor pressure test. Service as required. - Clean, service or replace valve body.

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Fig. 13: A4LD Trouble Shooting Symptom Charts (8 of 11)
 Courtesy of FORD MOTOR CO.

1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

CONDITION	POSSIBLE SOURCE	ACTION
No 3-4 upshift.	3-4 shift solenoid is not being energized electrically. Wires shorted or an open circuit. Circuit continuity: 3-4 solenoid wire pin 52 should read approx. 20 ohm resistance. - Trans. case connector and harness connector not seated. - Malfunction of: - EEC IV processor - Vacuum line disconnected from map sensor. - Map sensor. - Throttle position sensor. - Vehicle speed sensor. - Check O.D. band adjustment. - Overdrive servo damaged or leaking. - Polished or glazed overdrive band or drum. - Contaminated or sticking 3-4 shift valve. - Contaminated and sticking 3-4 solenoid.	- See appropriate ELECTRONIC CONTROLS article. - Check circuit continuity with breakout box tool no. T83L-50, and volt ohmmeter. - Check power pin no. 57 (red lead) and 3-4 pin 52 (black lead). - If not seated, check for contamination, clean and reconnect. - See appropriate ELECTRONIC CONTROLS article. - Reset band to 2.0 turns for 2.3, 2.9 and 3.0L or 3.5 turns for 4.0L applications. - Check cover seal and piston assembly — replace if required. - Service or replace. - Clean or replace valve body. Check 3-4 shift valve for freedom of movement. - Clean or replace 3-4 solenoid and filter sleeve assembly.
Slipping 4th gear.	- Check overdrive band adjustment. - Overdrive servo damaged or leaking. - Polished or glazed overdrive band or drum.	- Reset band to 2.0 turns for 2.3, 2.9 and 3.0L, or 3.5 turns for 4.0L applications. - Check cover seal and piston assembly — replace if required. - Service or replace.
Engine stall speed exceeded in $\odot$, D or R.	- Vacuum system. - Low main control pressure.	- Check and service vacuum system. - Control pressure test. Check and clean valve body. Replace valve body gasket. Check or service pump.
Engine stall speed exceeded in R. OK in $\odot$, D, 2 and 1.	- Low/reverse servo/band damaged. - Reverse and high clutch damaged.	- Check engine braking in 1. If not OK, check service or replace if required the low/reverse servo and band. - If low/reverse servo OK, check and repair reverse and high clutch.
Engine stall speed exceeded in $\odot$ or D. OK in R.	Overdrive one-way clutch or rear one-way clutch damaged.	- Check engine stall speeds in 2 and 1. - If OK, repair overdrive or rear one-way clutches. Clean transmission.

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Fig. 14: A4LD Trouble Shooting Symptom Charts (9 of 11)
Courtesy of FORD MOTOR CO.

1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

CONDITION	POSSIBLE SOURCE	ACTION
1-2 upshift is above 64 km/h (40 mph) at moderate acceleration.	• Vacuum system. • Main control pressure. • Governor damaged or worn. • Dirty or sticking valve body.	• Check and service hoses and vacuum diaphragm if required. • Control pressure test. • Perform governor pressure test. Replace or service governor. • Clean, service or replace valve body.
Kickdown shift speeds too early.	• Kickdown system damaged. • Main control pressure. • Governor damaged or worn.	• Replace damaged parts. • Perform control pressure test. • Perform governor pressure test. Replace or service governor.
No kickdown into 2nd gear between 64-100 km/h (40-60 mph) in P or D.	• Kickdown system damaged. • Main control pressure. • Dirty or sticking valve body. • Kickdown cable over adjusted.	• Replace damaged parts. • Perform control pressure test. • Check kickdown valve. Clean or replace valve body. • Adjust kickdown cable.
No shift into 2nd gear with accelerator 3/4 depressed at 40 km/h (25 mph) in P or D.	• Main control pressure. • Governor damaged or worn. • Dirty or sticking valve body.	• Control pressure test. • Check governor. • Clean or replace valve body.
When moving selector from P or D to manual 1, at 86 km/h (55 mph) with accelerator released, no braking felt from downshift to 2nd gear.	• Main control pressure. • Intermediate band out of adjustment. • Overdrive clutch damaged.	• Perform control pressure test. • Adjust band. Check intermediate servo. • Overdrive clutch damaged.
When moving selector from P or D to manual 1, at 86 km/h (55 mph) with accelerator released, shift into 1st gear occurs over 72 km/h (45 mph).	• Main control pressure. • Dirty or sticking valve body. • Governor damaged or worn. • Kickdown linkage misadjusted or stuck.	• Perform control pressure test. • Clean or replace valve body. • Perform governor pressure test. Replace or service governor. • Adjust or repair kickdown linkage.
When moving selector from P or D to manual 1, at 86 km/h (55 mph) with accelerator released, first gear shift occurs under 24 km/h (15 mph).	• Main control pressure. • Dirty or sticking valve body. • Low / reverse servo damaged. • Governor damaged or worn. • Overdrive clutch damaged.	• Perform control pressure test. • Clean or replace valve body. • Check and service as required. • Perform governor pressure test. Replace or service governor. • Repair or replace as required.
No forced downshifts.	• Kickdown cable damaged. • Kickdown cable over adjusted. • Damaged internal kickdown linkage. • Improper clutch or band application, or oil pressure control system. • Dirty or sticking governor. • Dirty or sticking valve body.	• Replace damaged parts. • Adjust kickdown cable. • Service internal kickdown linkage. • Perform control pressure test. • Service or replace governor, clean screen. • Clean, service, or replace valve body.
Engine over-speeds on 3-2 downshift.	• Manual shift cable out of adjustment. • Polished, glazed band or drum. • Dirty or sticking valve body.	• Air pressure test the intermediate servo. Service servo and or seals. • Service or replace as required. • Clean, service or replace valve body.
Shift efforts high.	• Manual shift cable damaged / misadjusted. • Inner manual lever nut loose. • Manual lever retainer pin damaged.	• Check and adjust or service as required. • Tighten nut to specification. • Adjust linkage and install pin.

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Fig. 15: A4LD Trouble Shooting Symptom Charts (10 of 11)
 Courtesy of FORD MOTOR CO.

1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

CONDITION	POSSIBLE SOURCE	ACTION
Transmission overheats.	- Improper fluid level. - Incorrect engine idle, or performance. - Improper clutch or band application, or oil pressure control system. - Restriction in cooler or lines. - Seized converter one-way clutch. - Dirty or sticking valve body.	- Perform fluid level check. - See appropriate ELECTRONIC CONTROLS article. - Perform control pressure test. - Service restriction. - Replace one-way clutch. - Clean, service or replace valve body.
Transmission leaks.	- Case breather vent. - Leakage at gasket, seals, etc.	- Check the vent for free breathing. Repair as required. - Remove all traces of lube on exposed surfaces of transmission. Check the vent for free breathing. Operate transmission at normal temperatures and perform fluid leakage check. Service as required.
Poor vehicle acceleration.	- Poor engine performance. - Torque converter one-way clutch slipping.	- Check engine tune up. - See appropriate ELECTRONIC CONTROLS article. - Replace torque converter.
Transmission noisy — valve resonance. NOTE: Gauges may aggravate any hydraulic resonance. Remove gauge and check for resonance level.	- Improper fluid level. - Manual shift cable out of adjustment. - Improper band or clutch application, or oil pressure control system. - Cooler lines grounding. - Dirty or sticking valve body. - Internal leakage or pump cavitation.	- Perform fluid level check. - Service or adjust cable. - Perform control pressure test. - Free up cooler lines. - Clean, service or replace valve body. - Service as required.
Engine stalls when shifting into forward or reverse.	- Low engine idle. - Broken converter clutch shuttle valve spring.	- Verify that engine idle speeds are set to specifications. - See appropriate ELECTRONIC CONTROLS article. - Replace converter clutch shuttle valve spring.

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Fig. 16: A4LD Trouble Shooting Symptom Charts (11 of 11)
Courtesy of FORD MOTOR CO.

TESTING

After completing **PRELIMINARY CHECKS**, use initial road test to verify malfunction of transmission. Ensure engine is operating properly.

SHIFT SPEED TEST

Road Test

This test will determine if electronics, governor and shift control valves are functioning properly. Converter lock-up is difficult to detect. A vacuum gauge and tachometer should be used to determine lock-up speeds.

1. Check light throttle upshift with transmission in Overdrive (with approximately 10 in. Hg). Transmission should start in 1st gear and shift automatically into and through each gear, then lock converter at predetermined speeds. See appropriate SHIFT SPEEDS table.
2. Converter clutch lock-up only occurs after Overdrive gear is obtained. With transmission in "D", all upshifts are automatic (except for overdrive). With transmission selector in 2nd gear, transmission will only operate in 2nd gear.
3. When travelling over 45 MPH with transmission in 3rd gear, transmission should downshift into 2nd gear when selector lever is manually shifted from "D" to 1st gear. This will determine if governor pressure and shift control valves are functioning properly.
4. When traveling at approximately 45 MPH in Overdrive or "D" and transmission is manually shifted into 1st gear, transmission should shift into 2nd gear. When speed drops below 30 MPH, transmission will downshift into 1st gear.
5. During coastdown from approximately 45 MPH with transmission in Overdrive and throttle closed, as vehicle speed drops, downshift sequence is:
 - Converter Electronically Unlocks (When Accelerator Pedal Is Released)
 - Downshift From Overdrive-To-3rd
 - Downshift From 3rd-To-2nd
 - Downshift From 2nd-To-1st

In-Shop Test

The shift speed test can be performed in-shop to check shift valve operation, governor circuits, shift delay pressures, throttle boost and downshift valve action.

CAUTION: DO NOT exceed 60 MPH speedometer reading.

1. Raise and support vehicle so that rear wheels are clear of floor. Disconnect and plug line to vacuum diaphragm. Connect an adjustable vacuum source to vacuum diaphragm unit.
2. Start vehicle. Apply 18 in. Hg vacuum to vacuum diaphragm unit. Shift transmission into Overdrive position. At minimum throttle position, allow transmission to shift through gears and into converter lock-up.
3. Note shift speeds and compare against appropriate SHIFT SPEEDS table. If shift speeds are not within specifications, proceed to **GOVERNOR PRESSURE TEST** to isolate problem.
4. If shift speeds are within specifications, the 1-2, 2-3, 3-4 and converter clutch shift valves and governor are okay. Shift to Neutral position. Run engine at 1000 RPM for 15 seconds to cool transmission. Proceed to next step.
5. Apply 1-2 in. Hg vacuum to vacuum diaphragm unit. Shift transmission into Overdrive position. Allow

1990 Ford Aerostar**1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul**

transmission to shift from 1-2.

6. If shift speed is within specification, throttle boost and shift delay systems are functioning properly. Shift to Neutral position. Run engine at 1000 RPM for 15 seconds to cool transmission. Proceed to next step.
7. Apply 1-2 in. Hg vacuum to vacuum diaphragm unit. Shift transmission into Overdrive position. Move the kickdown linkage through detent into wide open throttle position. Allow transmission to shift from 1-2. Shift speed should be higher than normal specification.

Shift Speed Vacuum Gauge Readings (Except Mustang)

All minimum throttle shift speeds should occur with 10-15 in. Hg reading. Part throttle 1-2 and 2-3 shift speeds should occur with 1.5-2.0 in. Hg reading. All wide open throttle shift speeds and part throttle 3-2 shift speeds should occur with 1 in. Hg reading. Overdrive 3-4 and 4-3 shifts at minimum throttle or part throttle are electronically controlled.

SHIFT SPEEDS (3.0L AEROSTAR & RANGER W/3.73 AXLE RATIO)

Throttle Position & Drive Range	Shift	MPH
Idle (Closed Throttle)		
OD, D	3-2	8-14
OD, D	2-1	6-11
Minimum Throttle		
OD, D	1-2	9-15
OD, D	2-3	17-25
OD	3-4	35-43
Part Throttle		
OD, D	1-2	26-32
OD, D	2-3	35-41
OD	3-2	26-32
Wide Open Throttle		
OD, D	1-2	40-46
OD, D	2-3	65-71
OD, D	3-2	60-66
OD, D	3-1, 2-1	35-41
Manual Pull-Down (1st)	2-1	32-42

SHIFT SPEEDS (4.0L AEROSTAR W/3.73 AXLE RATIO)

Throttle Position & Drive Range	Shift	MPH
Idle (Closed Throttle)		
OD, D	3-2	11-16
OD, D	2-1	6-11
Minimum Throttle		
OD, D	1-2	11-15
OD, D	2-3	16-22
OD	3-4	37-44

1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

Part Throttle

OD, D	1-2	23-28
OD, D	2-3	36-41
OD	3-2	29-34

Wide Open Throttle

OD, D	1-2	35-39
OD, D	2-3	59-64
OD, D	3-2	55-60
OD, D	3-1, 2-1	27-33

Manual Pull-Down (1st)	2-1	24-33
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SHIFT SPEEDS (EXPLORER W/3.08 AXLE RATIO)

Throttle Position & Drive Range	Shift	MPH
Idle (Closed Throttle)		
OD, D	3-2	14-18
OD, D	2-1	8-12
Minimum Throttle		
OD, D	1-2	13-15
OD, D	2-3	19-24
OD	3-4	34-49
Part Throttle		
OD, D	1-2	33-37
OD, D	2-3	48-52
OD	3-2	41-45
Wide Open Throttle		
OD, D	1-2	40-44
OD, D	2-3	70-75
OD, D	3-2	65-70
OD, D	3-1, 2-1	32-38
Manual Pull-Down (1st)	2-1	30-38

SHIFT SPEEDS (2.3L RANGER W/3.73 AXLE RATIO)

Throttle Position & Drive Range	Shift	MPH
Idle (Closed Throttle)		
OD, D	4-3	16-22
OD, D	3-2	9-15
OD, D	2-1	5-11
Minimum Throttle		
OD, D	1-2	10-15
OD, D	2-3	15-24
OD	3-4	37-45

1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

Part Throttle

OD, D	1-2	28-34
OD, D	2-3	39-45
OD	3-4	60-66
OD	4-3	51-57
OD	3-2	32-38

Wide Open Throttle

OD, D	1-2	33-39
OD, D	2-3	57-63
OD, D	3-2	53-59
OD, D	3-1, 2-1	27-33

Manual Pull-Down (1st)	2-1	26-32
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SHIFT SPEEDS (2.9L RANGER W/3.45 AXLE RATIO)

Throttle Position & Drive Range	Shift	MPH
Idle (Closed Throttle)		
OD, D	3-2	10-17
OD, D	2-1	9-13
Minimum Throttle		
OD, D	1-2	11-17
OD, D	2-3	20-26
OD	3-4	37-47
Part Throttle		
OD, D	1-2	32-38
OD, D	2-3	43-49
OD	3-4	82-90
OD	4-3	87-95
OD	3-2	36-42
Wide Open Throttle		
OD, D	1-2	41-47
OD, D	2-3	67-73
OD, D	3-2	63-69
OD, D	3-1, 2-1	36-42
Manual Pull-Down (1st)	2-1	32-42

SHIFT SPEEDS (4.0L RANGER W/3.08 AXLE RATIO)

Throttle Position & Drive Range	Shift	MPH
Idle (Closed Throttle)		
OD, D	3-2	13-19
OD, D	2-1	7-13
Minimum Throttle		

1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

OD, D	1-2	13-18
OD, D	2-3	19-27
OD	3-4	45-53
Part Throttle		
OD, D	1-2	28-34
OD, D	2-3	43-49
OD	3-2	35-41
Wide Open Throttle		
OD, D	1-2	42-47
OD, D	2-3	71-77
OD, D	3-2	66-72
OD, D	3-1, 2-1	33-39
Manual Pull-Down (1st)	2-1	29-39

Shift Speed Vacuum Gauge Readings (Mustang)

All closed throttle and minimum throttle shift speeds should occur with 10-15 in. Hg reading. Part throttle 4-3 and 3-2 shift speeds should occur with 1.0 in. Hg reading. Converter lock and unlock is hydraulically scheduled but can be electronically overridden.

SHIFT SPEEDS (MUSTANG W/3.73 AXLE RATIO)

Throttle Position & Drive Range	Shift	MPH
Closed Throttle		
OD, D	3-2	9-15
OD, D	2-1	6-12
Minimum Throttle		
OD, D	1-2	10-15
OD, D	2-3	14-21
OD	3-4	30-38
Part Throttle		
OD, D	1-2	25-31
OD, D	2-3	36-42
OD	3-4	59-65
OD	4-3	47-53
OD, D	3-2	29-35
Wide Open Throttle		
OD, D	1-2	32-38
OD, D	2-3	56-62
OD, D	3-2	51-57
OD, D	3-1, 2-1	27-33
Manual Pull-Down (1st)	2-1	25-31

CONVERTER CLUTCH TEST

NOTE: **Ensure engine coolant temperature is above 128°F (53°C) and below 240°F (116°C). Due to the difficulty of feeling converter clutch shift, a tachometer and/or vacuum gauge must be connected to engine.**

1. To check converter for engagement and disengagement, drive vehicle at approximately 50 MPH. While maintaining this speed, lightly tap brake pedal. Engine RPM and vacuum should increase when clutch disengages, with light brake pedal application.
2. Engine RPM will decrease when pedal is released and clutch engages. If converter clutch does not engage or is engaged continuously, see **AUTO TRANS DIAGNOSIS - FORD A4LD** article.

VACUUM DIAPHRAGM UNIT TEST

1. Remove hose from vacuum diaphragm. If transmission fluid is present on vacuum side of diaphragm unit, replace unit. Fluid indicates diaphragm in unit is defective.

NOTE: **If replacing vacuum diaphragm unit, ensure correct replacement is used. Diaphragm units may appear identical, but cannot be interchanged.**

2. Attach a vacuum pump to diaphragm unit. Apply 18 in. Hg of vacuum. If gauge reading holds steady, diaphragm unit is good. If gauge reading drops, diaphragm unit is defective and must be replaced.
3. Remove diaphragm unit from transmission. Apply 18 in. Hg of vacuum. Hold finger over end of unit control rod. When hose is removed, diaphragm unit should push control rod out. Replace as necessary.

ENGINE VACUUM SUPPLY TEST

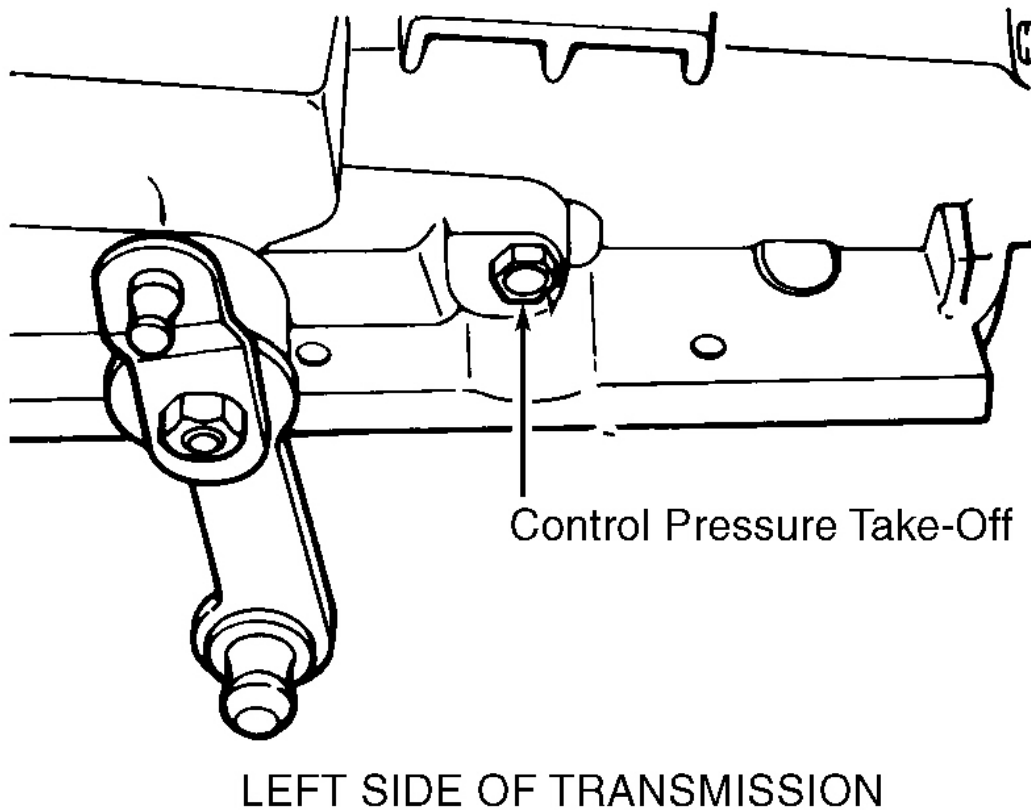
1. Disconnect vacuum line at diaphragm unit. Connect vacuum line to gauge. At idle, engine vacuum must hold steady at an acceptable level for the altitude at which the vehicle is tested.
2. If vacuum reading is low, check for vacuum leaks in vacuum hoses and engine vacuum related components (power brake booster, etc.).
3. If vacuum reading is okay, press the accelerator pedal quickly, then release. Vacuum reading should drop rapidly then recover immediately when pedal is released.
4. If vacuum reading does not change or recover quickly, check supply line for restriction or incorrect connection.

CONTROL PRESSURE TEST**Using Engine Vacuum**

1. If vacuum diaphragm unit is working properly and linkage is adjusted correctly, all shifts should occur within specified road speed limits. See appropriate SHIFT SPEEDS table. If not within specifications or slipping occurs, check engine vacuum supply and vacuum operated units for possible defect.
2. Connect tachometer to engine. Connect vacuum gauge to manifold vacuum line, using "T" fitting at diaphragm unit. Attach pressure gauge to control pressure take-off located on left side of transmission

case. See **Fig. 17**.

3. Apply parking brake firmly. Start engine and ensure idle RPM is correct. If engine idle cannot be brought within limits, check throttle and downshift linkages for binding. Check for vacuum leaks in hoses, tubes and all vacuum components such as power brake booster.
4. With engine at idle, read and record control pressures in all selector positions. Read and record control pressures with vacuum gauge reading at 10 in. Hg and at one in. Hg (wide open throttle). See appropriate **CONTROL PRESSURE SPECIFICATIONS** and **CONTROL PRESSURE TEST RESULTS**.



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Fig. 17: Gauge Hookup for Control Pressure Testing
Courtesy of FORD MOTOR CO.

NOTE: Governor can be checked at same time and in the same manner as control pressure test.

Using Vacuum Pump

1. Disconnect vacuum line from diaphragm unit and attach vacuum pump. See **Fig. 17**. Apply parking and service brakes. Start engine and apply 15 in. Hg of vacuum to diaphragm unit. Read and record control

1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

pressures in all selector positions.

2. Bring engine RPM to 1000. Reduce vacuum to 10 in. Hg. Read and record control pressures in "OD", "D", "2" and "1" selector positions.
3. Reduce vacuum to one in. Hg. Read and record control pressures in "OD", "D", "2", "1" and "R" selector positions. See appropriate CONTROL PRESSURE SPECIFICATIONS table and **CONTROL PRESSURE TEST RESULTS**.

CONTROL PRESSURE SPECIFICATIONS (PSI @ SEA LEVEL)

Drive Range	15 in. Hg & Above	10 in. Hg	WOT Stall Thru Detent
OD, D,2,1	57-78	114-134	205-235
R	67-105	157-177	282-316
P, N	57-78	-	-

CONTROL PRESSURE SPECIFICATIONS (PSI @ 5000 FT.)

Drive Range	15 in. Hg & Above	10 in. Hg	WOT Stall Thru Detent
OD, D,2,1	57-67	90-110	180-210
R	67-77	124-144	247-280
P, N	57-67	-	-

CONTROL PRESSURE TEST RESULTS

Compare recorded control pressures to control pressures listed in table. See appropriate CONTROL PRESSURE SPECIFICATIONS table. If control pressures are outside of specified ranges, use flow chart to determine cause of trouble. See **Fig. 18**.

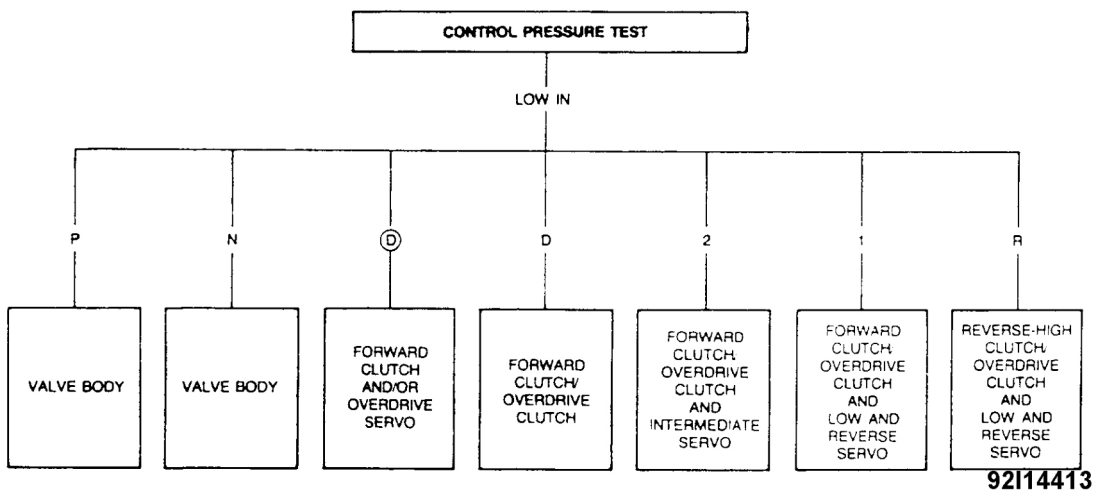
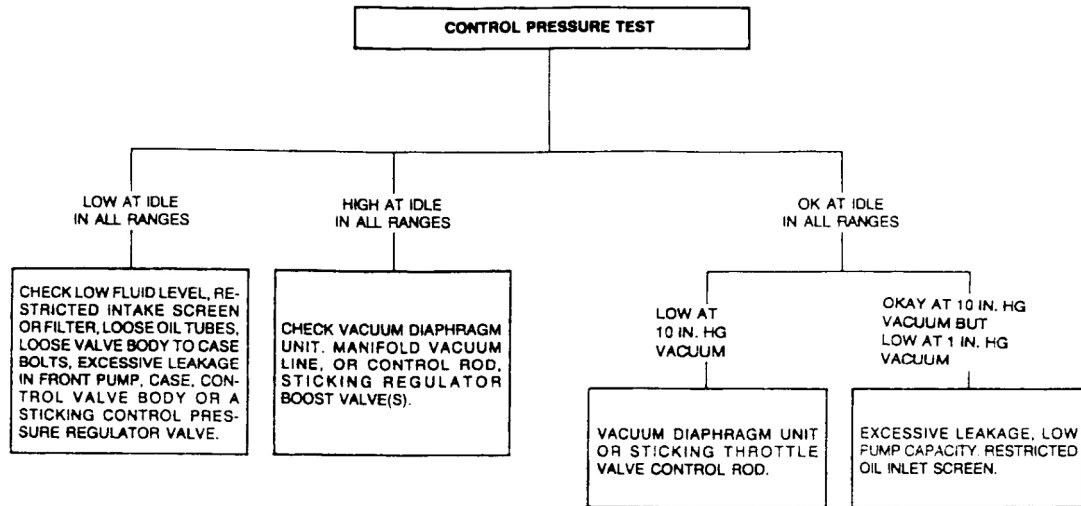


Fig. 18: Control Pressure Test Result Flow Chart

Courtesy of FORD MOTOR CO.

GOVERNOR PRESSURE TEST

1. Raise vehicle until drive wheels clear ground. Disconnect and plug vacuum line to vacuum diaphragm unit. Connect a vacuum pump to vacuum diaphragm unit.

CAUTION: DO NOT exceed 60 MPH speedometer reading. After each test, move selector lever to Neutral position and run engine at 1000 RPM for 15 seconds to cool transmission.

2. Place transmission in "D" position. Apply 10 in. Hg to vacuum diaphragm with no load on engine. Increase speed slowly and watch speedometer. Note speed at which control pressure cut-back occurs.

1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

3. Pressure cut-back should occur between 5-15 MPH. Decrease vacuum to 0-2 in. Hg and repeat test. Control pressure cut-back should occur at 7-20 MPH. Governor is okay if cut-back occurs as specified.
4. If cut-back does not occur as specified, check shift speeds to verify problem is in governor and not due to stuck cut-back valve. See **SHIFT SPEED TEST**. Repair or replace governor as necessary.

STALL SPEED TEST

Testing Precautions

1. Engine coolant and transmission fluid must be at proper levels and operating temperatures. Linkages must be set properly. Hold accelerator down just long enough to get a stable tachometer reading. **DO NOT** floor accelerator for more than 5 seconds.
2. **DO NOT** exceed maximum specified RPM for vehicle. Before shifting into each selector position, run engine in Neutral at 1000 RPM for 15 to 20 seconds to cool transmission. If engine speed exceeds specification, release accelerator immediately, as this is an indication of clutch or band slippage.

Testing Procedure

Connect tachometer to engine. Apply parking and service brakes firmly. Place selector lever in each gear. Press accelerator completely to floor and record tachometer reading in each gear. **DO NOT** exceed 5 second limit. Engine speed should be within specifications. See **STALL SPEED SPECIFICATIONS**.

STALL SPEED SPECIFICATIONS

Application	Engine	Min.-Max. RPM
Mustang	2.3L	2495-2885
Ranger (2WD)	2.3L	2437-2833
Aerostar (2WD)	3.0L (V6)	2720-3165
Ranger (2WD, 4WD)	2.9L (V6)	2781-3288
Aerostar (2WD, AWD)	4.0L (V6)	2550-2950
Explorer (2WD, 4WD)	4.0L (V6)	2550-2950
Ranger (2WD, 4WD)	4.0L (V6)	2550-2950

STALL TEST RESULTS

Low In All Ranges

Poor engine performance. Faulty torque converter stator one-way clutch.

High In All Ranges

General transmission problems are indicated. Perform control pressure tests.

High In "O/D" Only

Forward clutch faulty.

High In "O/D", "D" & "1"

Overdrive one-way clutch or rear one-way clutch faulty.

High In "D", "2" & "1"

Forward clutch or overdrive clutch faulty.

High In "2" Only

Overdrive one-way clutch, intermediate band or servo faulty.

High In "1" Only

Low-reverse band or servo faulty.

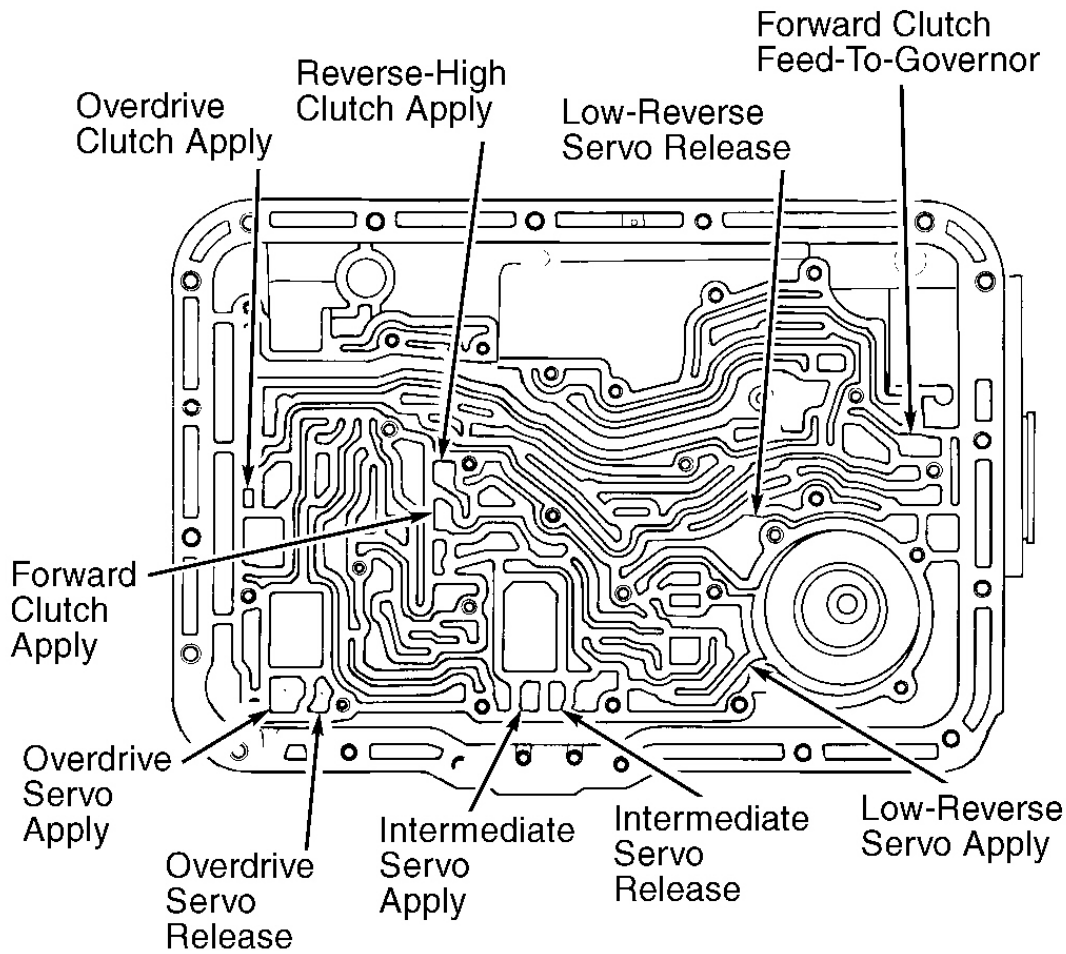
High In "R" Only

Overdrive clutch, overdrive one-way clutch. reverse and high clutch, low-reverse band or servo faulty.

AIR PRESSURE TESTS

A "No Drive" condition can exist, even with correct transmission fluid pressure, due to inoperative clutches or bands. Inoperative units can be located through a series of checks by substituting air pressure for fluid pressure to determine location of malfunction.

To check unit, drain transmission fluid. Remove oil pan, gasket and control valve body. See **VALVE BODY** removal procedure under ON-VEHICLE SERVICE. Using shop air, apply air to indicated points. See **Fig. 19**. Check unit operation as follows.



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Fig. 19: Air Pressure Testing Points
Courtesy of FORD MOTOR CO.

Forward Clutch

Apply air pressure into forward clutch passage. A dull thud can be heard when clutch piston is applied. If no thud is heard, movement of piston can be felt by placing fingertips on input shell.

Governor

Apply air pressure into the forward clutch control pressure-to-governor passage. Listen for sharp clicking or whistling noise indicating governor valve movement.

Overdrive Servo

1. Apply air pressure to overdrive servo apply passage. Operation of servo is indicated by a tightening of

overdrive band around overdrive drum.

2. While continuing to apply air pressure to servo apply passage, apply air pressure to overdrive servo release passage. The overdrive servo should release overdrive band.

Overdrive Clutch

Apply air pressure to overdrive clutch feed passage. A dull thud indicates the overdrive clutch piston has moved to the applied position.

NOTE: If air pressure applied to either clutch passage fails to operate clutch or operates both clutches at once, check fluid passages in case and oil pump. Use air pressure to detect obstructions.

Reverse-High Clutch

Apply air pressure into reverse-high clutch passage. A dull thud can be heard when clutch piston is applied. If no thud is heard, movement of piston can be felt by placing fingertips on clutch drum.

Intermediate Servo

1. Hold air nozzle in intermediate servo apply passage. Operation of servo is indicated by tightening of intermediate band around drum.
2. While continuing to apply air pressure at servo apply passage, apply air pressure to intermediate servo release passage. Intermediate servo should release band against pressure in apply passage.

Low-Reverse Servo

Apply air pressure to low-reverse servo apply passage. Low-reverse band should tighten around drum if servo is operating properly.

TRANSMISSION FLUID COOLER FLOW CHECK

NOTE: Before performing TRANSMISSION FLUID COOLER FLOW CHECK, ensure shift cables and linkages are properly adjusted. Ensure fluid level is correct and control pressures are within specifications. See CONTROL PRESSURE TEST.

1. Remove transmission dipstick from filler tube. Install a funnel into filler tube. Raise and support vehicle. Disconnect transmission cooler return line (upper line) from transmission case fitting.
2. Connect one end of a hose to transmission cooler return line. Install other end of hose into filler tube funnel. With transmission in Neutral position, set idle speed to 1000 RPM.
3. Note fluid flow at funnel. Wait until flow is constant. This indicates air bleeding has been completed. Fluid flow should be free and heavy. If flow is intermittent or light, check flow from transmission fluid output line to determine source of restriction.
4. If transmission output line flow is good, restriction is in cooler. Repair as necessary. If output line flow is poor, check for main oil circuit leakage, oil pump defect or a stuck converter charge relief valve.

TORQUE CONVERTER

TORQUE CONVERTER FLUSHING

Whenever transmission has been disassembled to replace worn or damaged parts or because valve body sticks due to foreign material, converter must be cleaned using a mechanically agitated cleaner, such as Rotunda (014-00028). Under no conditions should converter be cleaned by hand agitation using solvent.

After removing torque converter from cleaning equipment, thoroughly drain remaining solvent from converter hub. Add 2 Qts. (1.9L) of clean transmission fluid to converter and agitate by hand. Thoroughly drain converter hub.

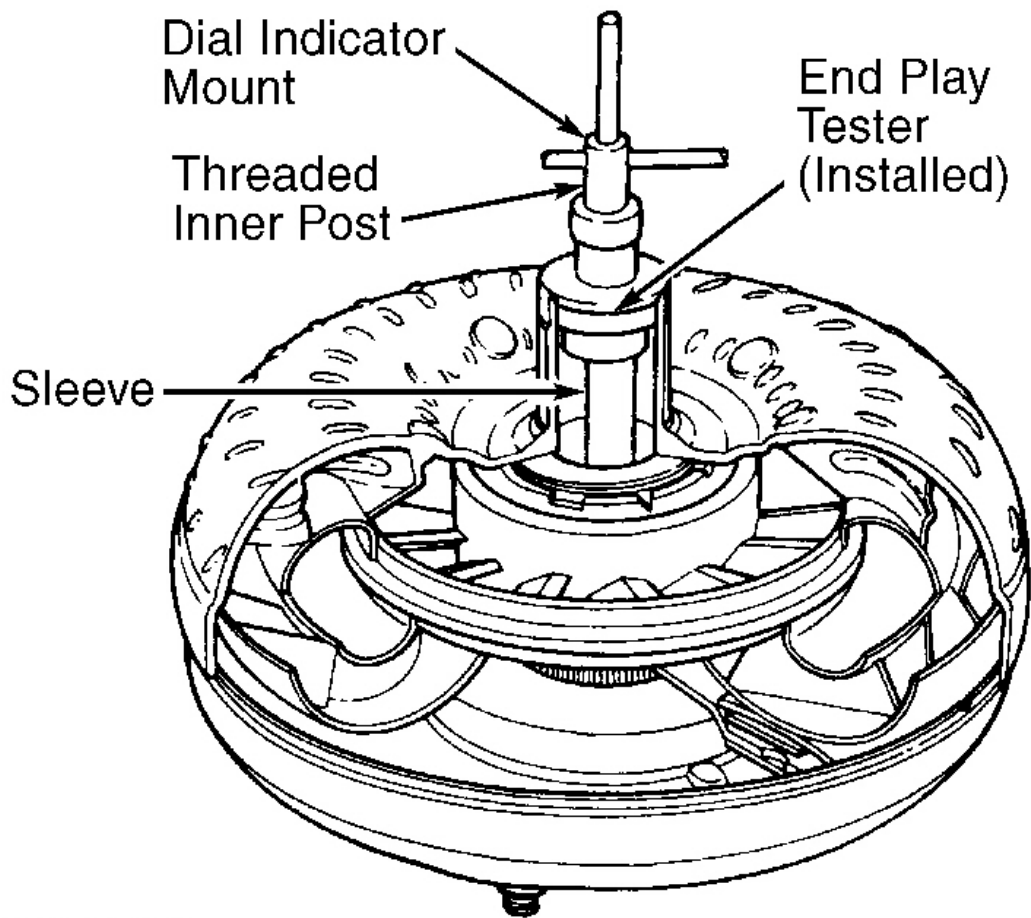
NOTE: **Torque converter is a sealed unit and cannot be disassembled for service. Replace if found to be defective. Perform the following tests to ensure converter is defective before replacing unit.**

LEAK TEST

If torque converter welds indicate leakage, attach Torque Converter Leak Detector (Rotunda 021-00054) to converter and follow detector kit instructions.

TURBINE & STATOR END PLAY CHECK

1. Insert Torque Converter End Play Tester (T80L-7902-A) into converter pump drive hub until it bottoms. Expand sleeve in turbine spline by tightening threaded inner post of tester until it is securely locked into spline. See [Fig. 20](#).
2. Attach dial indicator to tester with dial indicator tip on converter housing. Zero dial face. Lift tester upward as far as it will go and note dial indicator reading.
3. Reading is total end play of turbine and stator. If end play exceeds .023" (.58 mm) on new or rebuilt converter, or .050" (1.27 mm) on used converter, replace torque converter assembly.

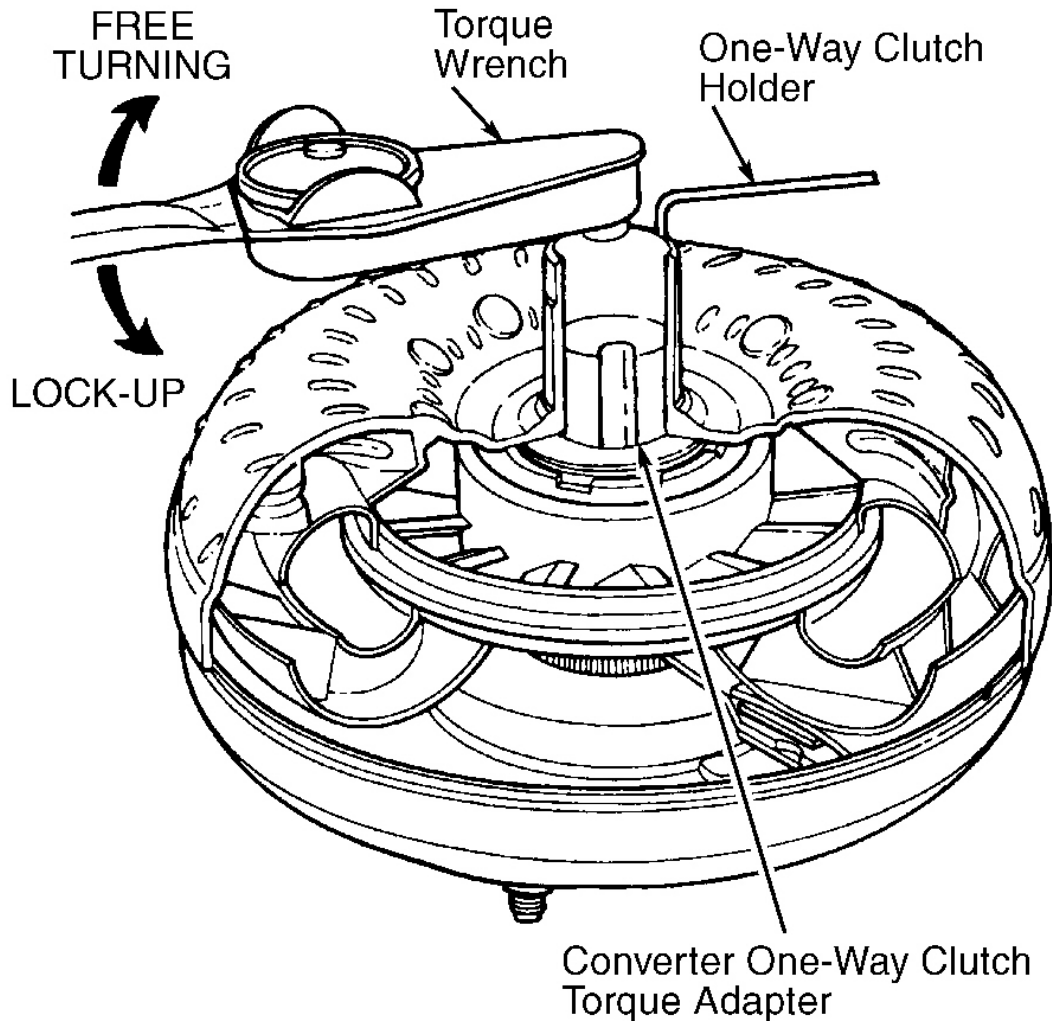


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Fig. 20: Installing Torque Converter End Play Tester
Courtesy of FORD MOTOR CO.

CONVERTER ONE-WAY CLUTCH CHECK

1. Insert one-way Clutch Holder (D84L-7902-A) into one of the grooves in the stator thrust washer. Insert Torque Adapter (T77L-7902-B) into converter impeller hub so as to engage one-way clutch inner race.
2. Attach a torque wrench to torque adapter. With clutch holder held stationary, turn torque wrench counterclockwise. See **Fig. 21**. Converter one-way clutch should lock-up and hold at 10 Ft. Lbs. (14 N.m). One-way clutch should rotate freely in a clockwise direction.
3. Repeat lock-up test in at least 5 different locations around torque converter. If clutch fails to lock-up and hold, replace torque converter.



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Fig. 21: Checking Converter One-Way Clutch
Courtesy of FORD MOTOR CO.

STATOR INTERFERENCE CHECK

Stator-To-Impeller Interference Check

1. Position front pump assembly on bench with spline end of stator shaft pointing upward. Mount converter on pump so splines of one-way clutch inner race engage splines of stator support and impeller hub engages pump drive gear.
2. While holding pump stationary, rotate converter in both directions (clockwise and counterclockwise). Converter should rotate freely without interference. If an interference or scraping condition exists, replace torque converter unit.

REMOVAL & INSTALLATION

See appropriate TRANSMISSION REMOVAL - A/T article in TRANSMISSION SERVICING.

TRANSMISSION DISASSEMBLY

NOTE: Disassembly procedures are listed by main components. Disassemble in order shown. To identify components, see Fig. 22.

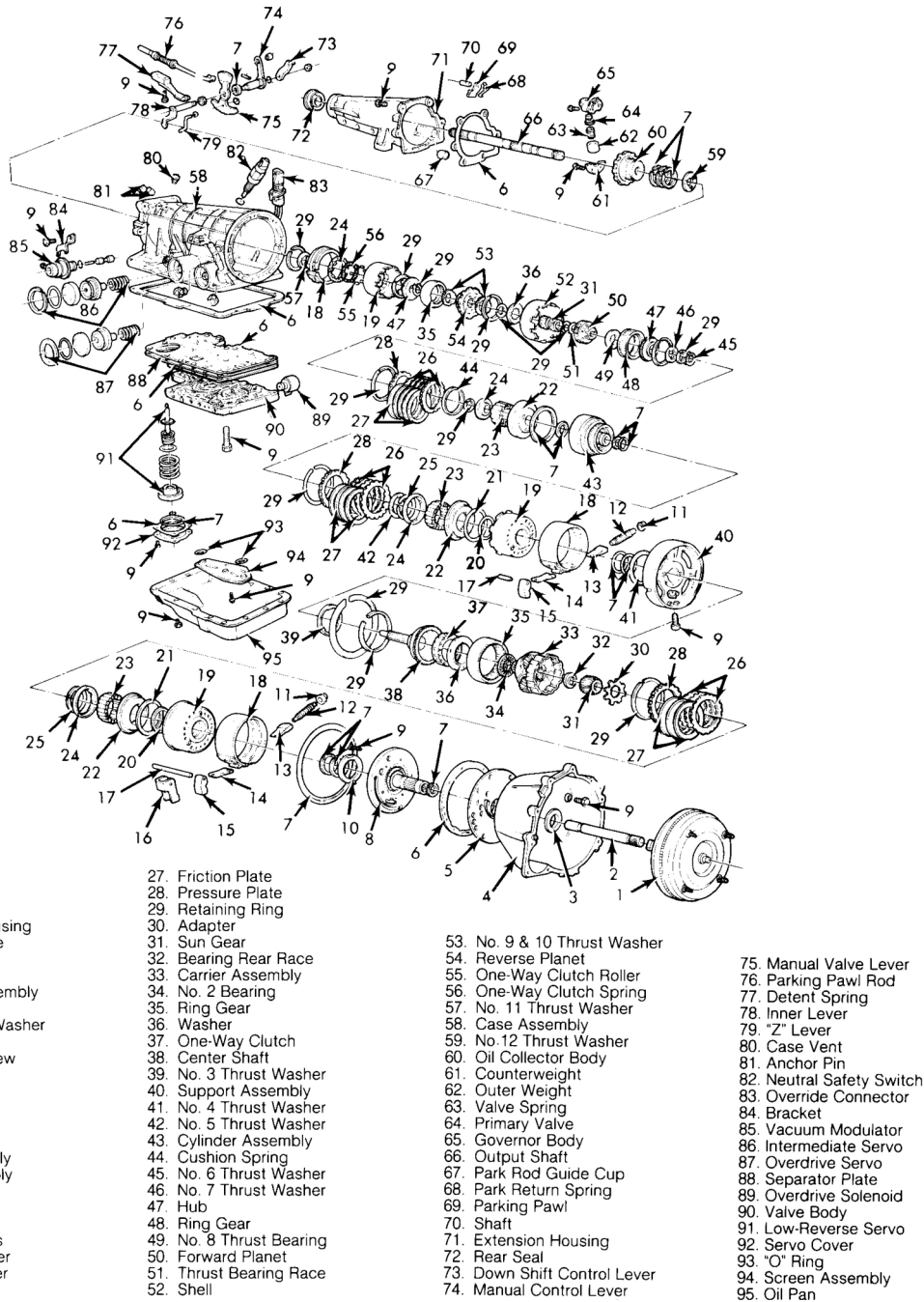


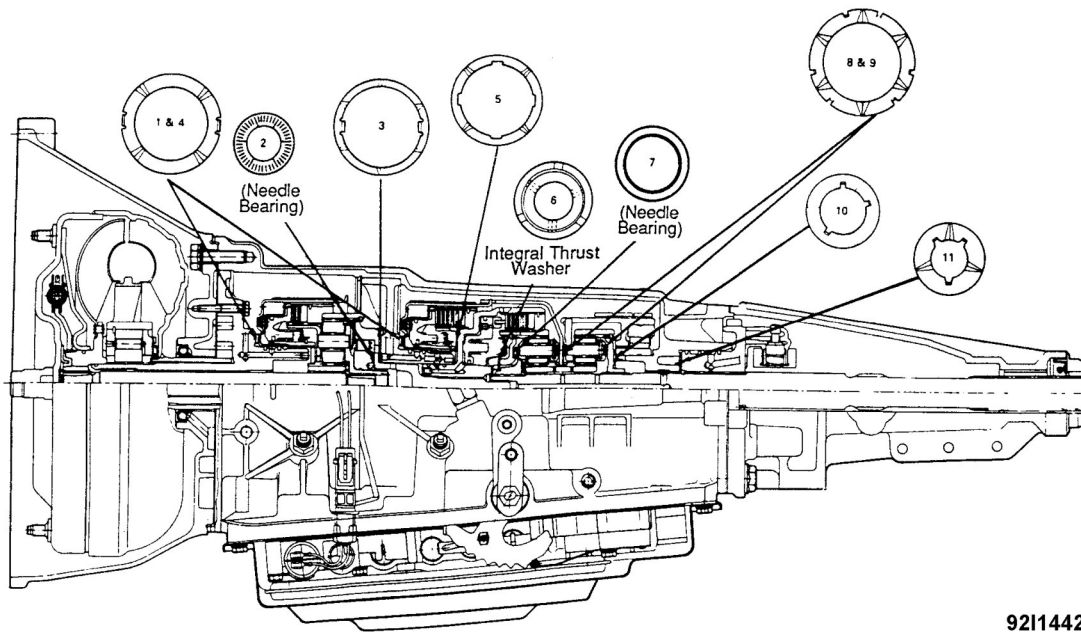
Fig. 22: Exploded View of A4LD Transmission
Courtesy of FORD MOTOR CO.

VALVE BODY, OIL PUMP & GOVERNOR

1. Remove torque converter and input shaft. Input shaft ends are different. Note direction of installation for reassembly reference. Remove oil pan, filter screen and detent spring. Disconnect wires at converter clutch solenoid and 3-4 shift solenoid.

2. Remove valve body bolts. Unlock and remove selector connecting rod "Z" link and ease valve body and gasket from case. Remove 5 mm Allen head bolt retaining center support. Remove extension housing.
3. Remove parking pawl and return spring. Remove governor. Remove converter housing-to-case bolts. Remove converter housing and pump as an assembly. Use a twisting motion to keep clutches in place. Remove gasket and No. 1 thrust washer.
4. Using Seal Remover (T74P-77428-A), remove oil pump seal from converter housing. Remove oil pump from converter housing. Remove steel plate with "O" ring from behind oil seal. See related components under **CLEANING & INSPECTION**.

NOTE: Ensure thrust washers and bearings are not mixed during reassembly. See **Fig. 23**.



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Fig. 23: Locating Thrust Washers & Bearings (4.0L Model is Similar)
Courtesy of FORD MOTOR CO.

OVERDRIVE CLUTCH ASSEMBLY

1. Loosen overdrive band adjuster lock nut and back off adjusting screw. Discard lock nut. Remove anchor and apply struts. Lift out overdrive clutch and band. Tag band as overdrive. Tag anchor or apply end of band for reassembly reference.
2. Lift out overdrive one-way clutch and planetary assembly. Remove center support snap ring from case. Remove overdrive apply lever and shaft. Remove overdrive control bracket from valve body side of case.

NOTE: Mark apply lever and shaft for reassembly to overdrive assembly. Overdrive apply lever shaft is longer than the intermediate apply lever shaft.

3. Remove thrust washer from front of center support. Tag thrust washer for reassembly reference. Remove center support by prying upward, carefully and evenly. Remove and tag thrust washer behind center support. See related components under **CLEANING & INSPECTION**.

REVERSE-HIGH & FORWARD CLUTCH ASSEMBLY

Loosen intermediate band lock nut and back off adjusting screw. Discard lock nut. Remove anchor and apply struts. Remove reverse-high and forward clutch assembly. Remove intermediate band. Tag band as intermediate. Tag anchor or apply end of band for reassembly reference. Remove forward planet gear assembly. Tag thrust washer (or bearing) for reassembly reference. See related components under **CLEANING & INSPECTION**.

LOW-REVERSE ASSEMBLY

1. Remove sun gear shell. Remove large snap ring from reverse planet gear carrier (except 4.0L models). On all models, remove reverse planet assembly. Remove and tag thrust washers from both sides of assembly for reassembly reference.
2. On models with 4.0L engine, remove output shaft sleeve. On all models, remove small output shaft snap ring and remove output shaft ring gear. Remove low-reverse drum and one-way clutch assembly. If not previously removed, remove low-reverse servo. Remove low-reverse band.
3. Remove and tag thrust washer for reassembly reference. On 4.0L models, thrust washer is not removable. On all models, inner race of rear one-way clutch is not removable. Remove intermediate apply lever and shaft. Pull output shaft out from rear of transmission.
4. Remove park gear and collector body as an assembly from rear of case. Remove and tag thrust washer for reassembly reference. Remove vacuum diaphragm retaining bolt. Remove diaphragm and actuator rod. Ensure actuator rod moves freely in bore. Remove throttle valve.
5. Remove intermediate servo cover snap ring. Remove and mark intermediate servo cover, piston and spring. Remove overdrive servo cover snap ring. Remove and mark overdrive cover, piston and spring.

NOTE: **Servo covers are under spring pressure. Use care during snap ring removal. If covers stick, lightly tap cover or side of case. Air pressure may be used, but DO NOT exceed 20 psi (1.4 kg/cm²).**

6. Remove neutral switch with Neutral Switch Socket (T74P-77247-A). Remove kickdown lever nut, lever and "O" ring. Using care not to damage case gasket surface, remove manual linkage centering pin.
7. From inside case, remove 7/8" nut from shift lever. Remove lever, internal kickdown lever, park pawl rod and detent plate assembly. Remove lever shaft seal from case.
8. Depress tab on solenoid wire connector on outside of case. Remove solenoid wire connector. **DO NOT** remove solenoid wire connector unless replacing or degreasing case. See related components under **CLEANING & INSPECTION**.

COMPONENT DISASSEMBLY & REASSEMBLY

FORWARD GEAR TRAIN ASSEMBLY

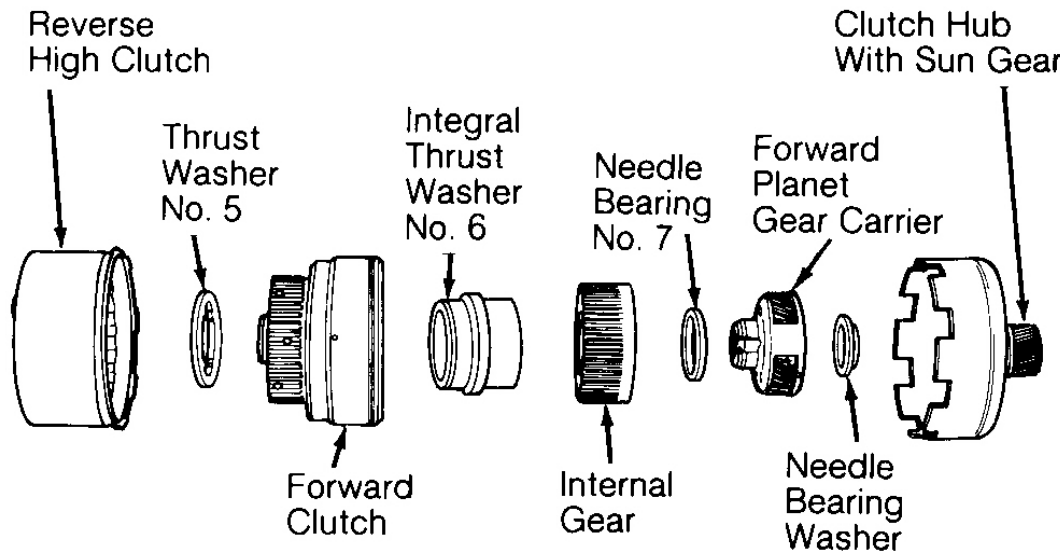
Disassembly

1. Separate clutch hub and sun gear assembly from reverse high clutch and forward clutch assembly. Remove and tag needle bearing washer from forward planet gear carrier. See **Fig. 24**.
2. Remove forward planet assembly from forward clutch. On 4.0L models, remove No. 6 needle bearing from forward clutch. Remove forward clutch thrust washer from internal gear. Tag bearing and thrust washers for reassembly reference.
3. On all other models, remove integral thrust washer from internal gear. Tag thrust washer for reassembly reference. On all models, separate forward planet gear carrier and internal gear. Retain and mark No. 7 needle bearing thrust washer.
4. Separate reverse-high clutch assembly from forward clutch assembly. Remove and tag thrust washer No. 5.

NOTE: If repairing clutches, proceed to appropriate clutch **DISASSEMBLY AND REASSEMBLY** procedure.

Reassembly

To reassemble, reverse disassembly procedure. Ensure needle bearings and thrust washers are installed in their original location.



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Fig. 24: Exploded View of Forward Gear Train Assembly (Standard Type Shown; 4.0L Model is Similar)
Courtesy of FORD MOTOR CO.

REVERSE-HIGH CLUTCH

Disassembly

1. Remove pressure plate retaining ring. Remove pressure plate and clutch pack. Using Spring Compressor (T65L-77515-A), compress clutch springs and remove retaining ring. See **Fig. 25**. Carefully release pressure on springs.

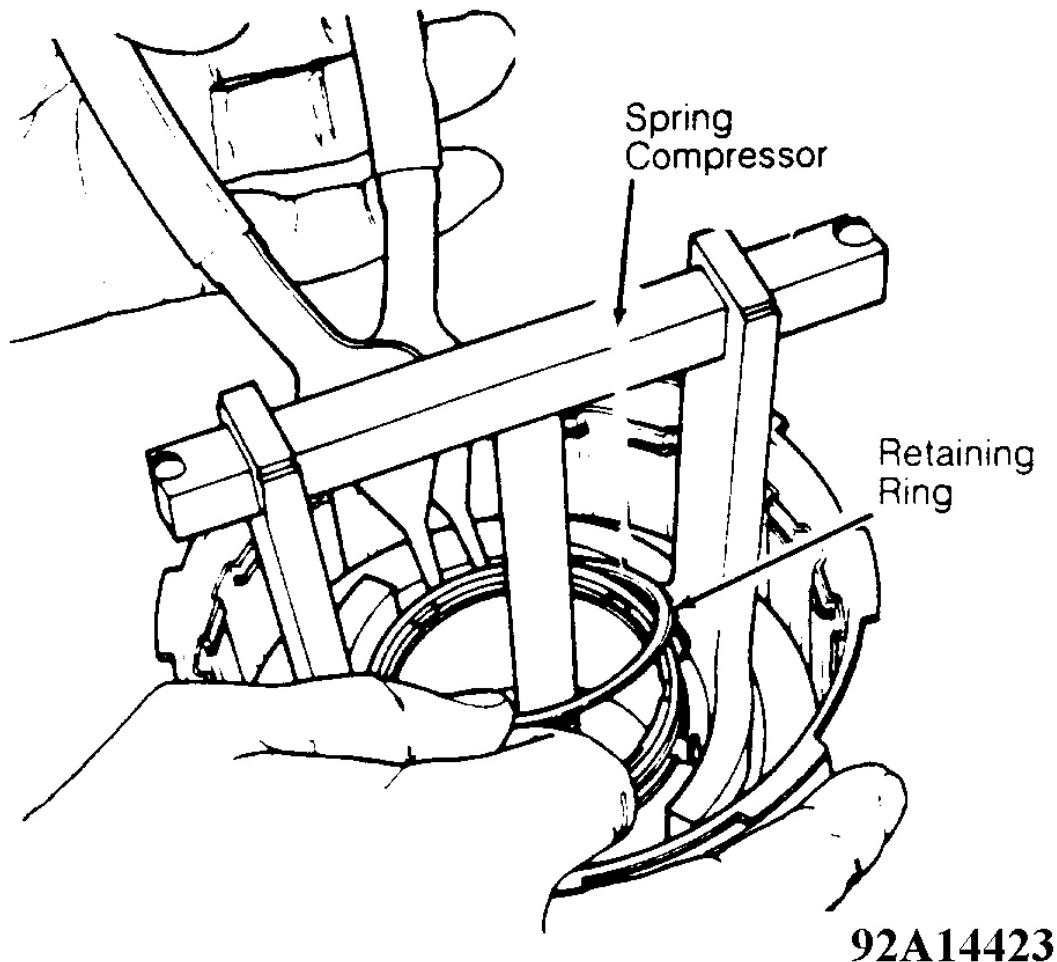


Fig. 25: Compressing Clutch Springs & Removing Retainer
Courtesy of FORD MOTOR CO.

2. Remove spring compressor, spring retainer and clutch springs. Turn clutch body over and carefully force piston out with compressed air. **DO NOT** exceed 20 psi (1.4 kg/cm²). Hold finger over opposite hole. Remove "O" rings from piston and clutch body. See related components under **CLEANING & INSPECTION**.

Reassembly

1. Install new "O" rings on clutch piston. Apply transmission fluid to "O" rings and install clutch piston into body. Install compression springs and spring retainer. Use Spring Compressor (T65L-77515-A) and compress springs. See **Fig. 25**. Install retaining ring. Carefully remove spring compressor.
2. Install a steel plate and then a friction plate. Alternately install remaining discs in clutch pack. See **Fig. 26**. Install pressure plate and secure pack with retaining ring.

NOTE: The number of steel plates and friction plates varies between 4 and 6 of each type.

3. While pushing downward on clutch pack, use a feeler gauge to check clearance between retaining ring and pressure plate. If clearance is not between .051-.079" (1.3-2.0 mm), install a different retaining ring.
4. Retaining rings are available in thicknesses .0539", .0681", .0819" and .0961" (1.37, 1.73, 2.08 and 2.44 mm respectively). When clearance is within specification, install retaining ring.
5. Apply air pressure to hole on back side of clutch assembly. Block opposite hole with finger. Piston must apply under pressure and release when air is removed.

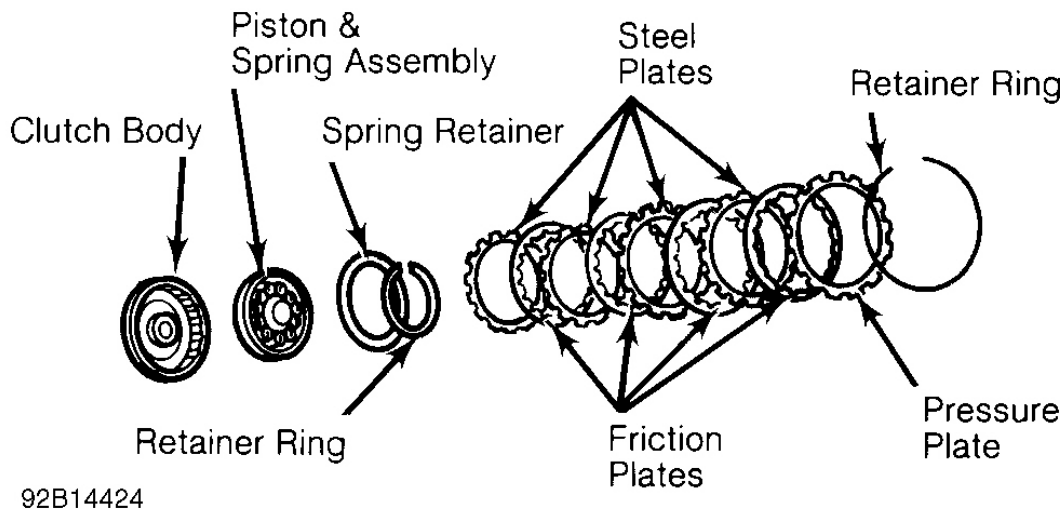
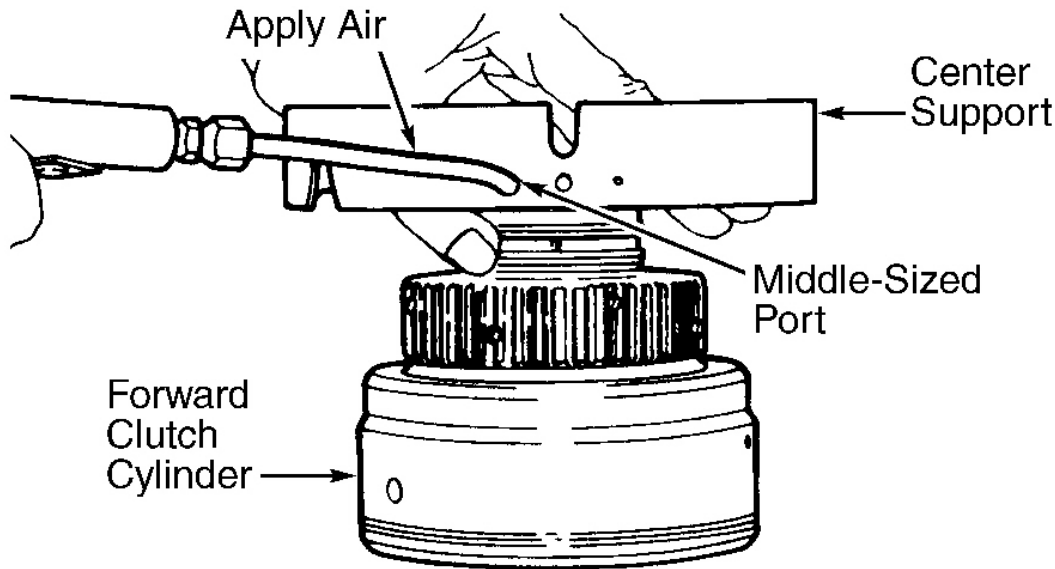


Fig. 26: Exploded View of Reverse-High Clutch
Courtesy of FORD MOTOR CO.

FORWARD CLUTCH

Disassembly

Disassembly of forward clutch is the same as reverse-high clutch with the exception of clutch piston removal. Install center support on forward clutch cylinder. Apply air pressure to left side (middle-sized) port. Piston will be forced out. See **Fig. 27**. See related components under **CLEANING & INSPECTION**.



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Fig. 27: Removing Forward Clutch Piston
Courtesy of FORD MOTOR CO.

Reassembly

1. Reassembly of forward clutch is the same as reverse-high clutch except that a rubber cushion is used over the piston and spring assembly. Ensure cushion is installed between steel clutch plate and piston. See **Fig. 28**.

NOTE: The number of steel plates and friction plates varies between 5 and 6 of each type.

2. The clearance between retaining ring and pressure plate must be .055-.083" (1.4-2.1 mm). Retaining rings are available in thicknesses .0539", .0681", .0819" and .0961" (1.37, 1.73, 2.08 and 2.44 mm).

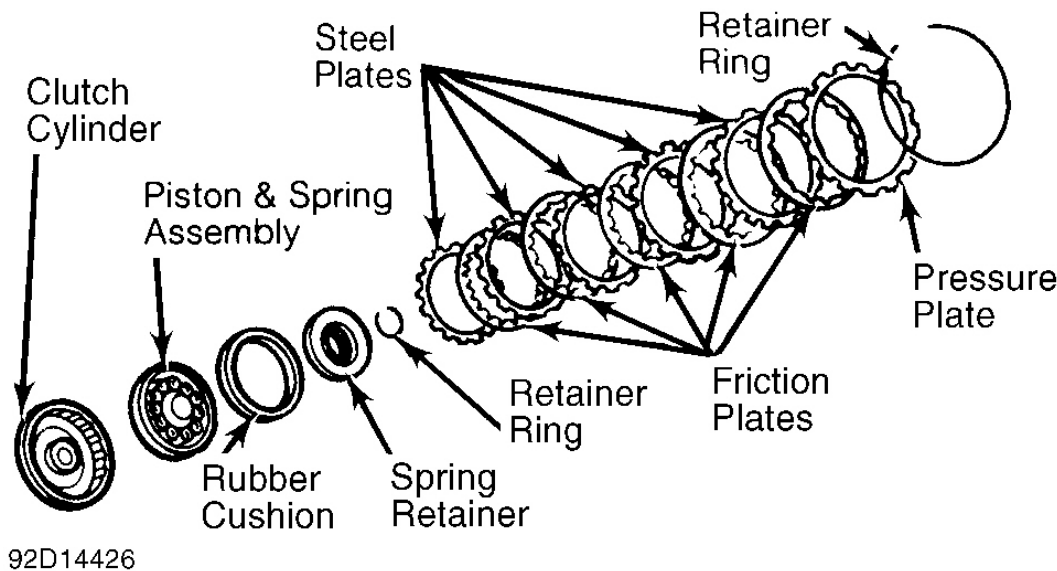


Fig. 28: Exploded View of Forward Clutch Assembly
Courtesy of FORD MOTOR CO.

OVERDRIVE CLUTCH

NOTE: On all models, clutch pack consists of 3 steel plates and 3 friction plates.

Disassembly

Disassembly of overdrive clutch is the same as reverse-high clutch. See **Fig. 29**. See related components under **CLEANING & INSPECTION**.

Reassembly

1. Reassembly of overdrive clutch is the same as reverse-high clutch, except for location of clutch springs during assembly. Ensure clutch springs are installed in 5 groups with 3 springs in each group and a single spring space between groups (5 spaces total).
2. Clearance between retaining ring and pressure plate must be .055-.083" (1.4-2.1 mm). Retaining rings are available in thicknesses .0539", .0681", .0819" and .0961" (1.37, 1.73, 2.08 and 2.44 mm).

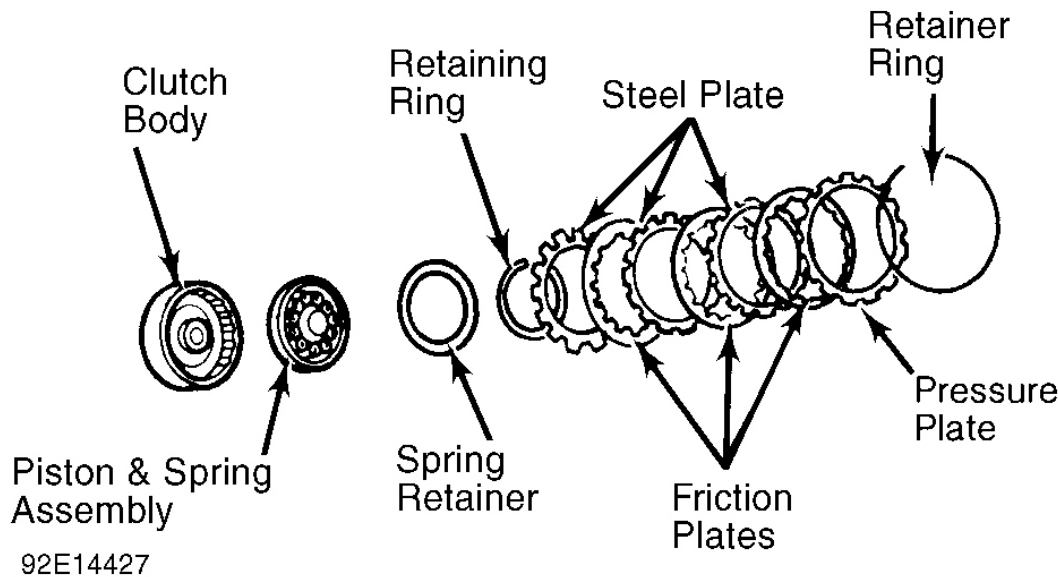


Fig. 29: Exploded View of Overdrive Clutch Assembly
Courtesy of FORD MOTOR CO.

OVERDRIVE ONE-WAY CLUTCH

Disassembly

1. Mark and remove overdrive clutch adapter to ensure reassembly to original position. Remove sun overdrive gear and thrust bearing rear race. Mark thrust bearing race for reassembly reference. See **Fig. 31**.
2. Remove planet carrier and No. 2 needle bearing. Mark No. 2 needle bearing for reassembly. Remove retaining ring from overdrive center shaft and ring gear. Separate ring gear and center shaft.
3. Mark and remove washer. Note position of one-way clutch and remove from center shaft. One-way clutch must be installed properly or damage can occur. See related components under **CLEANING & INSPECTION**.

Reassembly

1. For reassembly, reverse disassembly procedure. Ensure part number on adapter faces sun gear. Ensure No. 2 needle bearing is centered and lip faces toward sun gear.
2. Ensure recessed I.D. of washer faces planet carrier. Ensure one-way clutch flange side faces planet carrier. Ensure one-way clutch rotates in proper direction. See **Fig. 30**.

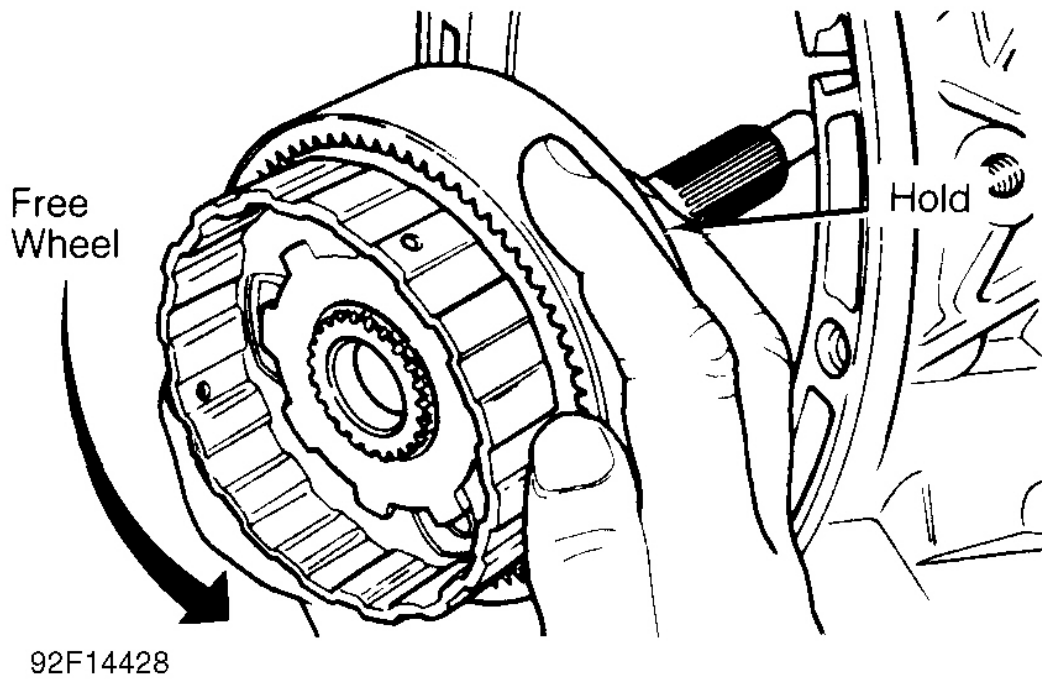


Fig. 30: Overdrive One-Way Clutch Rotation
Courtesy of FORD MOTOR CO.

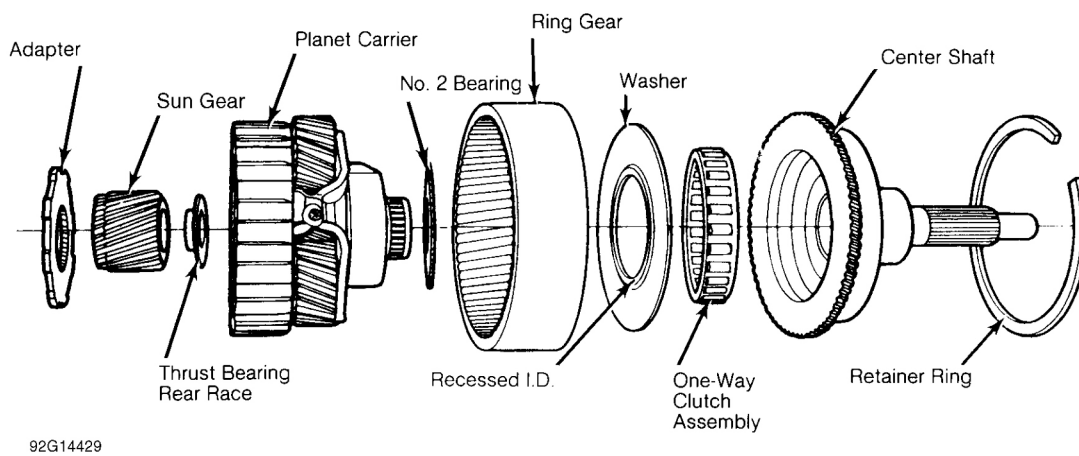


Fig. 31: Exploded View of Overdrive One-Way Clutch
Courtesy of FORD MOTOR CO.

LOW-REVERSE ONE-WAY CLUTCH

Disassembly & Reassembly

1. Using a screwdriver, remove snap ring. Mark and lift out one-way clutch with springs and roller bearings as an assembly. Replace assembly if found defective. See related components under **CLEANING & INSPECTION**.
2. To reassemble, insert one-way clutch with springs. Using a screwdriver, separate springs and install roller bearings one at a time. Install snap ring. Ensure one-way clutch is installed properly as marked during disassembly.

GOVERNOR

Disassembly

1. Remove governor body-to-oil collector body retaining bolts. When these bolts are removed, governor components are no longer secured in position. Care must be taken not to drop governor body and components when bolts are removed.
2. Remove outer weight, spring and primary valve from governor body. See **Fig. 22**. Remove 2 bolts holding counterweight to collector body and remove counterweight. Remove seals from oil collector body and discard. See related components under **CLEANING & INSPECTION**.

Reassembly

Clean and inspect all parts. Replace worn or damaged parts. Without excessive stretching, install new seals on oil collector. Reassemble counterweight, spring and primary valve in governor body. Reassemble governor body and counterweight to oil collector body.

CONTROL VALVE BODY

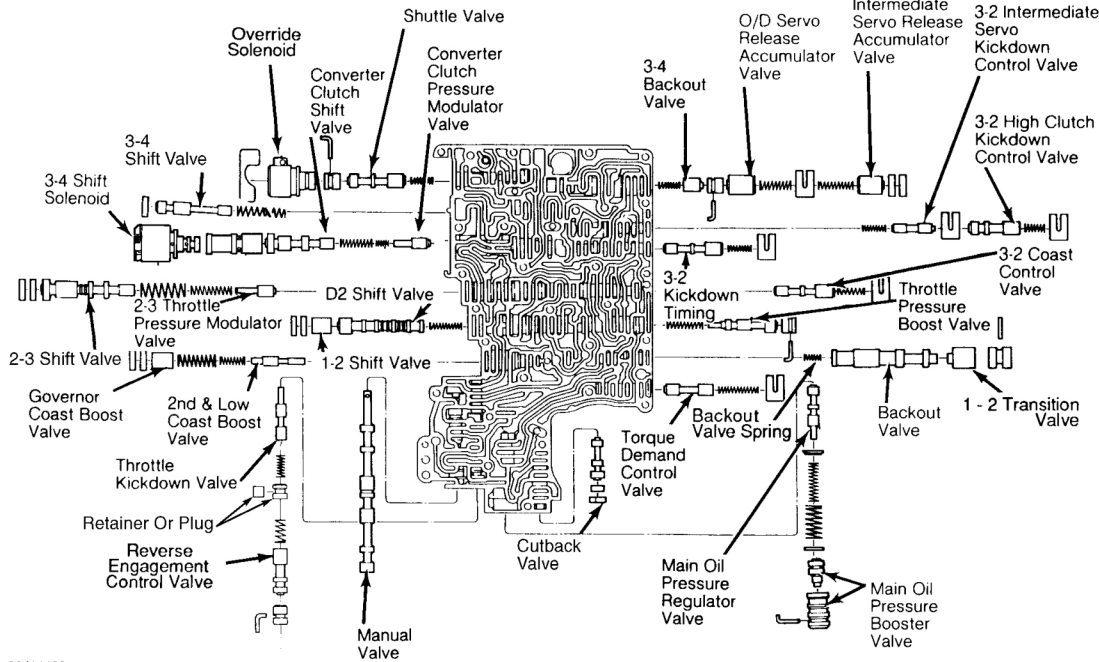
NOTE: During disassembly, place individual parts in order and in relative position for reassembly reference. Tag all springs as they are removed for reassembly reference.

Disassembly

1. Remove 3 Torx bolts and remove separator plate and gasket. Note location and remove check ball, shuttle balls, check valves and relief valves with springs. See **Fig. 33**.
2. Ensure small filter remains with separator plate when plate is removed from valve body. Filter is located in corner of separator plate near converter clutch solenoid connector. Remove retaining plates, dowels, plugs and valves with springs from valve body. See **Fig. 32**. See related components under **CLEANING & INSPECTION**.

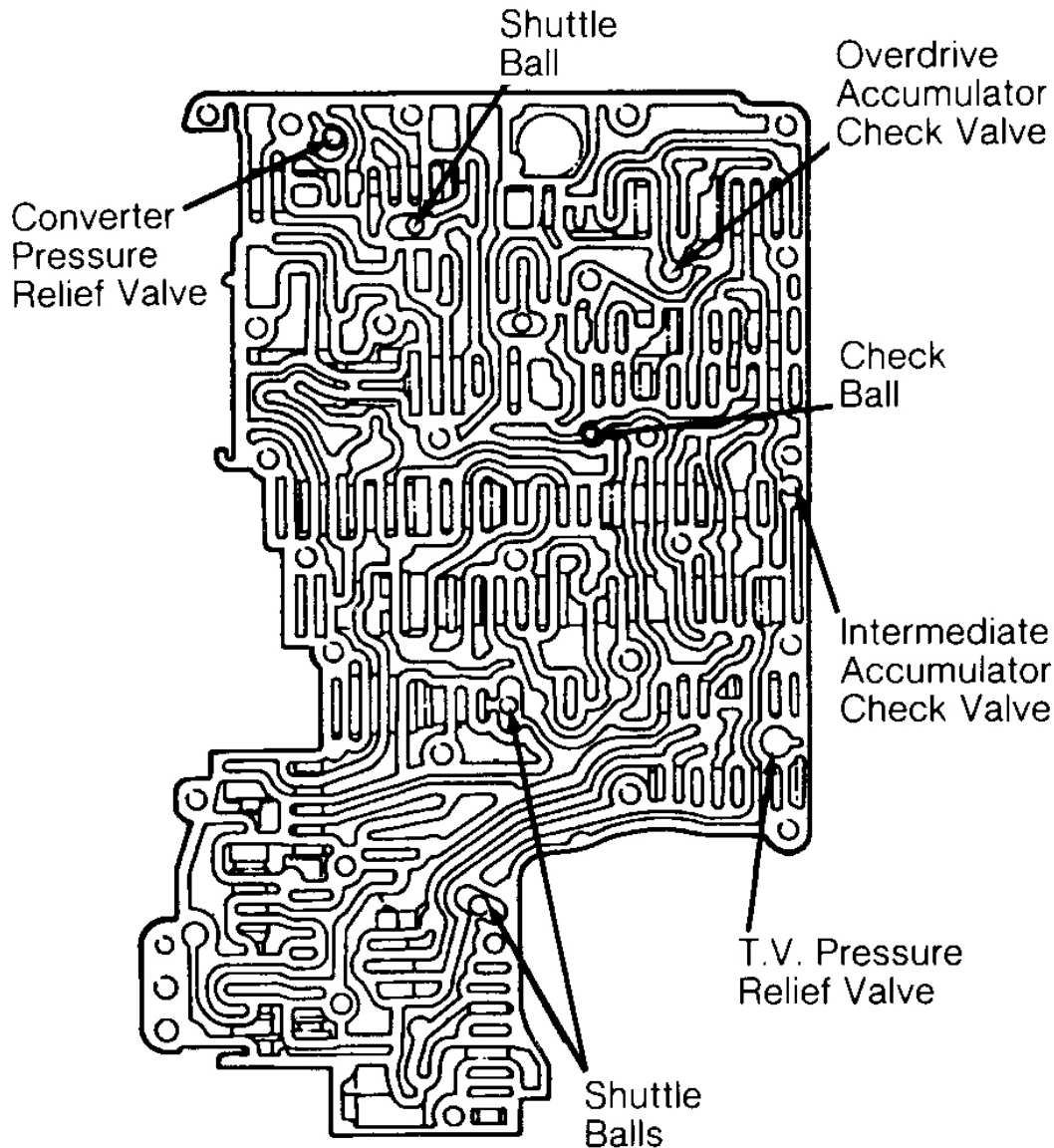
Reassembly

Lubricate all parts with transmission fluid. Install valves, springs, plugs, and pins. See **Fig. 32**. Using new gasket, apply petroleum jelly to keep gasket in place during separator plate reassembly. Install separator plate.



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Fig. 32: Exploded View of Valve Body Assembly
Courtesy of FORD MOTOR CO.



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Fig. 33: Locations of Check Ball, Shuttle Balls & Check Valves
 Courtesy of FORD MOTOR CO.

CLEANING & INSPECTION

CLEANING

Wash all parts in cleaning solvent, except composition clutch plates, bands and synthetic seals. Use scraper or brush for heavy deposits. Rotate bearings by hand in cleaning solvent.

Dry all parts and blow out fluid passages with moisture-free compressed air. Hold bearings while drying to prevent bearing from spinning. **DO NOT** spin dry bearings.

Lubricate clean bearings with transmission fluid and wrap in lint-free cloth until ready to install. Soak new clutch plates and bands in transmission fluid for at least 15 minutes prior to installation.

INSPECTION

Case

Inspect case for cracks and stripped threads. Inspect gasket surfaces for flatness and damage. Check vent and all fluid passages for obstruction or leakage. Inspect case bushing for scoring. Inspect parking linkage for wear or damage.

Control Valve Body

Inspect all springs for distortion. Roll manual valve on flat surface to check for bent condition. Make a point of cleaning and inspecting all fluid passages, especially at check balls, valves and other areas where dirt and debris accumulate. Inspect all valve and plug bores for scores or obstructions. Inspect valves and plugs for burrs or scoring. Polish with crocus cloth, if necessary. **DO NOT** round edges of plugs or valves. All valves and plugs should move freely in bores. Valves and plugs should fall of their own weight into bores.

Extension Housing

Inspect housing for cracks or damage. Inspect bushing and seal bore for scoring and burrs. Using crocus cloth, remove burrs. Inspect drive shaft yoke for scoring and replace it if scoring is found.

Forward Clutch Assembly

Inspect clutch cylinder thrust surfaces, piston, bore and clutch plates for scores or burrs. Minor burrs and scoring may be polished with crocus cloth. Inspect piston check ball for proper seating. Check clutch springs for distortion or cracks. Check clutch plates for flatness and free movement on clutch hub. Check clutch hub thrust surfaces and splines for wear or scoring. Inspect input shaft for damaged or worn splines.

Governor

Inspect spring for distortion. Inspect fluid passages for obstruction. Inspect valve and bore for burrs or scoring. Polish with crocus cloth, if necessary. **DO NOT** round edges of valve. Valves should move freely in bore. Valve should fall of its own weight into bore.

Pinion Carrier

Inspect pins and shafts in planet assemblies for loose fit or complete disengagement. Ensure proper staking of shaft retaining pins before installation of planet assembly. Pins should be no more than .040" (1.0 mm) below surface of carrier. Inspect pinion gears for worn or damaged teeth. Check for free rotation of pinion gears.

Pump

Inspect fluid passages. Inspect mating surfaces of pump body and case for burrs. Inspect gear teeth for burrs. Inspect gear bearing surfaces and pump bushing for scoring. Minor burrs and scoring may be polished with crocus cloth.

One-Way Clutches

Inspect outer and inner races for scoring or damage. Inspect rollers and springs for damage. Inspect roller cage for damaged spring retainers.

Reverse-High and Overdrive Clutches

Inspect drum band surface, bushing and thrust surfaces for scoring. Minor burrs and scoring may be polished with crocus cloth. Inspect clutch piston, bore and inner and outer bearing surfaces for scoring. Inspect clutch plates for flatness and free movement on clutch hub. Check clutch plates for scoring or burrs. Check clutch springs for distortion. Replace as necessary. Inspect clutch cylinder check balls for proper seating.

Servos

Inspect band lining for excessive wear and proper bonding to metal band. Inspect fluid passages for obstructions. Inspect servo and piston bore for cracks, scoring or other damage. Inspect seals and sealing surfaces. Repair or replace as necessary.

Stator Support

Inspect stator support splines for burrs and wear. Inspect oil ring grooves in stator support for nicks or damaged edges. Check front pump support seal and seal rings for damage.

TRANSMISSION REASSEMBLY

NOTE: Lubricate all parts with transmission fluid during reassembly. Thrust washers and gaskets should be held in place with petroleum jelly. See [Fig. 23](#) for location of thrust washers & bearings.

1. Before installing center support into case, install new high clutch seals on support hub. It is necessary to size these seals. Apply liberal amount of petroleum jelly to center support hub and seals.

NOTE: If sizing is not done, the seals may be cut or rolled over when entering intermediate brake drum cavity.

2. Use overdrive brake drum for sizing. Carefully rotate center support while inserting it into drum housing. Observe seals as they enter cavity to ensure that they **DO NOT** roll over or get cut.
3. Ensure center support is seated fully into overdrive drum. Allow assembly to stand for several minutes for seals to seat in grooves. Set aside until required for reassembly.

NOTE: If new output shaft is being installed, ensure correct shaft is used. The shaft for the 4.0L model does not have a lubrication hole.

4. Position No. 11 thrust washer in rear of case. Install collector body in rear of case. Install output shaft. Install governor on collector body. Tighten bolts to specifications. See **TORQUE SPECIFICATIONS**.
5. Position No. 10 thrust washer into case from front. Using Clutch Replacement Guide (T74P-77193-A), install low-reverse brake drum (guide not required on 4.0L models). Install output shaft ring gear and new snap ring. On 4.0L models, install output shaft sleeve. On all models, install No. 9 thrust washer, reverse planet assembly and No. 8 thrust washer.
6. On all models except 4.0L, install snap ring in drum to hold planet assembly. On all models, install low-reverse band as marked at disassembly. Replace piston "O" ring and install low-reverse servo piston assembly to hold band in position. See **Fig. 3**.

CAUTION: DO NOT mix any of the servo piston assemblies or covers as transmission failure may occur.

7. Replace piston "O" ring and install intermediate servo piston assembly. Install piston cover and snap ring. Replace piston "O" ring and install overdrive servo piston assembly. Install piston cover and snap ring.
8. Install intermediate servo apply lever and shaft into case. Install complete forward clutch and reverse-high clutch assemblies. Turn transmission so output shaft points downward. Install intermediate band and apply strut. Install intermediate band anchor strut. Temporarily install input shaft.
9. Check transmission rear end play to determine amount of space between thrust washer surface of overdrive center support and intermediate brake drum. The No. 4 thrust washer is used to obtain end play of .012-.022" (.30-.56 mm). Use steps 10) through 13) for this procedure.
10. Fabricate a depth gauge from an overdrive center support, if available. See **Fig. 34**. Drill a 1/8" (3 mm) hole through thrust washer surface of center support. This will allow a measurement to be taken between thrust surfaces of support and intermediate brake drum.
11. Place Depth Micrometer (D80P-4201-A) over drilled hole. Extend micrometer probe until it is flush with thrust washer surface of fixture and record reading. Install fabricated depth gauge fixture into intermediate brake drum. See **Fig. 35**.

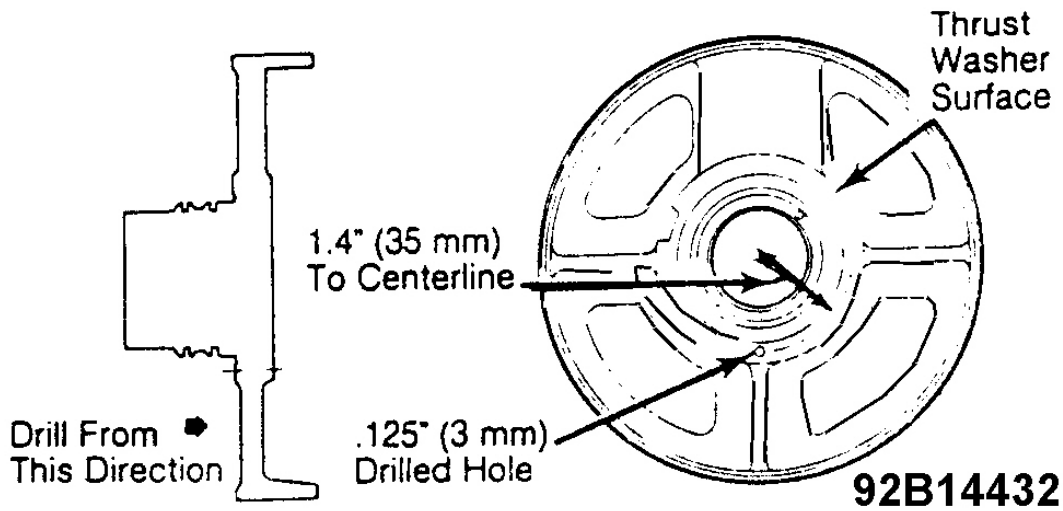


Fig. 34: Fabricated Depth Gauge Fixture
Courtesy of FORD MOTOR CO.

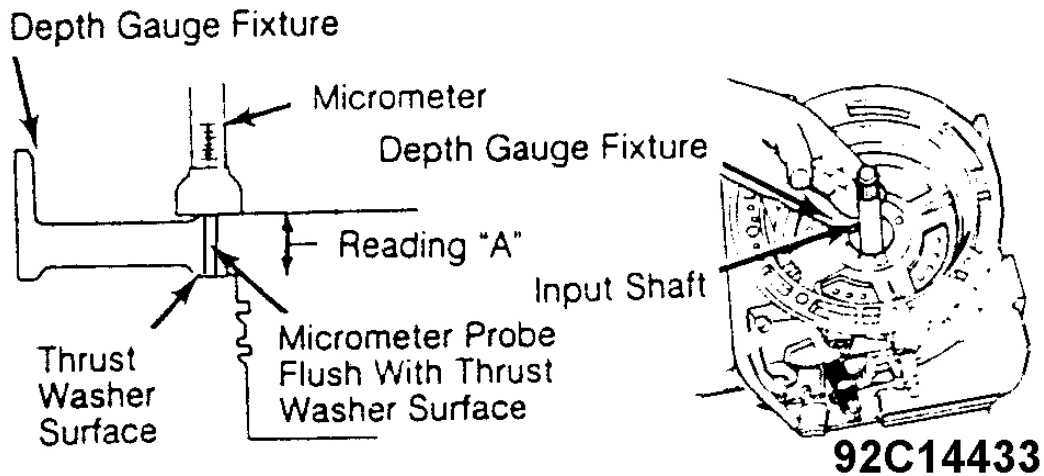


Fig. 35: Measuring Rear End Play
Courtesy of FORD MOTOR CO.

12. Gently wiggle input shaft to allow center support fixture to slide into intermediate brake drum. Ensure it is fully seated. Place depth micrometer over drilled hole. Extend micrometer probe until it bottoms against thrust washer surface. Note reading. Subtract reading obtained in step 11) from this reading.
13. Remove micrometer and measure again 180 degrees from first location. Repeat steps 11) and 12). Average these 2 measurements to obtain final reading. Select thrust washer to obtain correct end play

specification. See **END PLAY SELECTIVE THRUST WASHER**. End play should be .012-.022" (.30-.56 mm).

END PLAY SELECTIVE THRUST WASHER

Average Reading In. (mm)	Thrust Washer Thickness In. (mm)	Thrust Washer Part No.
.057-.064 (1.46-1.65)	.055 (1.4)	89 DT-7D014-HA
.065-.073 (1.66-1.85)	.055 (1.4)	89 DT-7D014-AA
.074-.077 (1.87-1.95)	.063 (1.6)	89 DT-7D014-BA
.078-.081 (1.96-2.05)	.067 (1.7)	89 DT-7D014-CA
.082-.085 (2.06-2.15)	.071 (1.8)	89 DT-7D014-DA
.086-.089 (2.16-2.25)	.075 (1.9)	89 DT-7D014-EA
.090-.093 (2.26-2.35)	.079 (2.0)	89 DT-7D014-FA
.094-.096 (2.36-2.45)	.083 (2.1)	89 DT-7D014-GA
.097-.104 (2.46-2.65)	.087 (2.2)	89 DT-7D014-MA
.105-.112 (2.66-2.84)	.094 (2.4)	89 DT-7D014-JA
.113-.119 (2.86-3.05)	.102 (2.6)	89 DT-7D014-KA
.120-.124 (3.06-3.15)	.110 (2.8)	89 DT-7D014-LA

14. If average reading is outside of specifications, this indicates improper reassembly, missing parts or parts outside of specifications. Correct before continuing reassembly. If within specifications, remove depth gauge, fixture and input shaft. Install selected No. 4 thrust washer on center support and retain with petroleum jelly.
15. Insert input shaft (short splines down), through intermediate brake drum and into splines of forward clutch cylinder. Carefully place center support into case. **DO NOT** seat it into intermediate brake drum. Ensure it is square with case and 5 mm Allen bolt retainer nut aligns with hole in case.
16. **DO NOT** apply any pressure to center support. Gently wiggle input shaft, allowing center support to slide into intermediate brake drum of its own weight. Perform this operation until support is fully seated. Position No. 3 thrust washer on top of center support.
17. Install snap ring to retain center support. Snap ring taper should face front of transmission. Ends of snap ring should be positioned in wide shallow cavity located in the 5 o'clock position. Install 5 mm Allen head bolt that retains center support to case. Two types of snap rings are used. Orient snap ring as shown.

See **Fig. 36**.

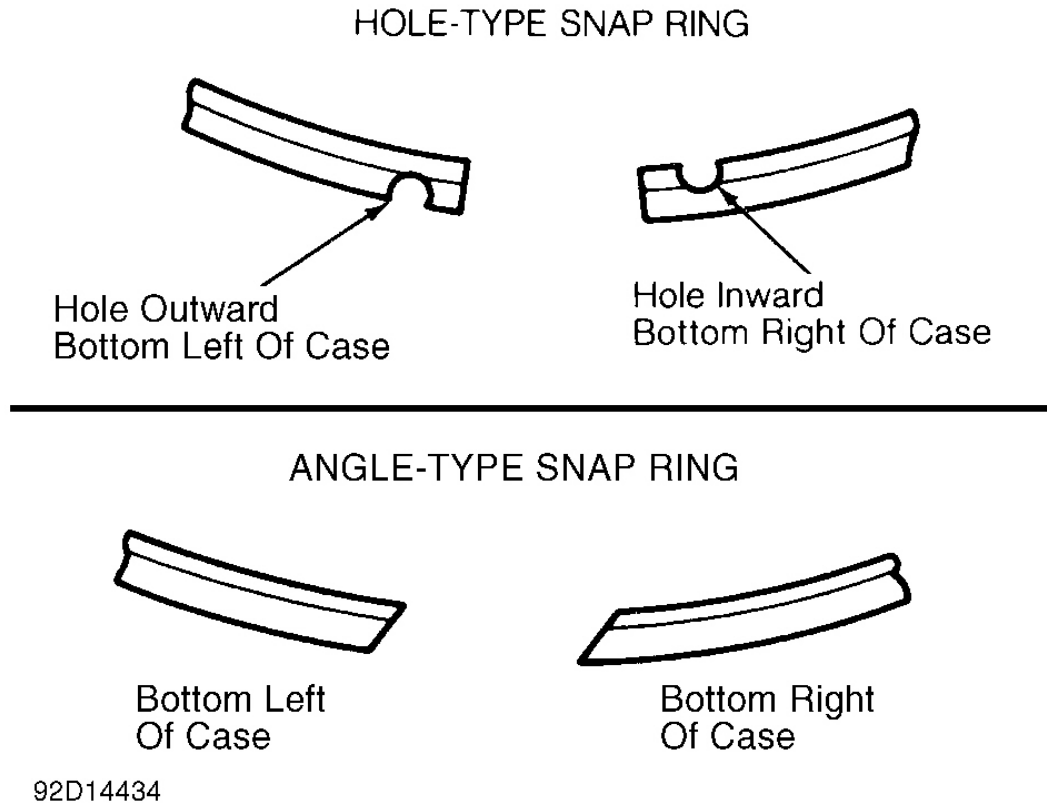


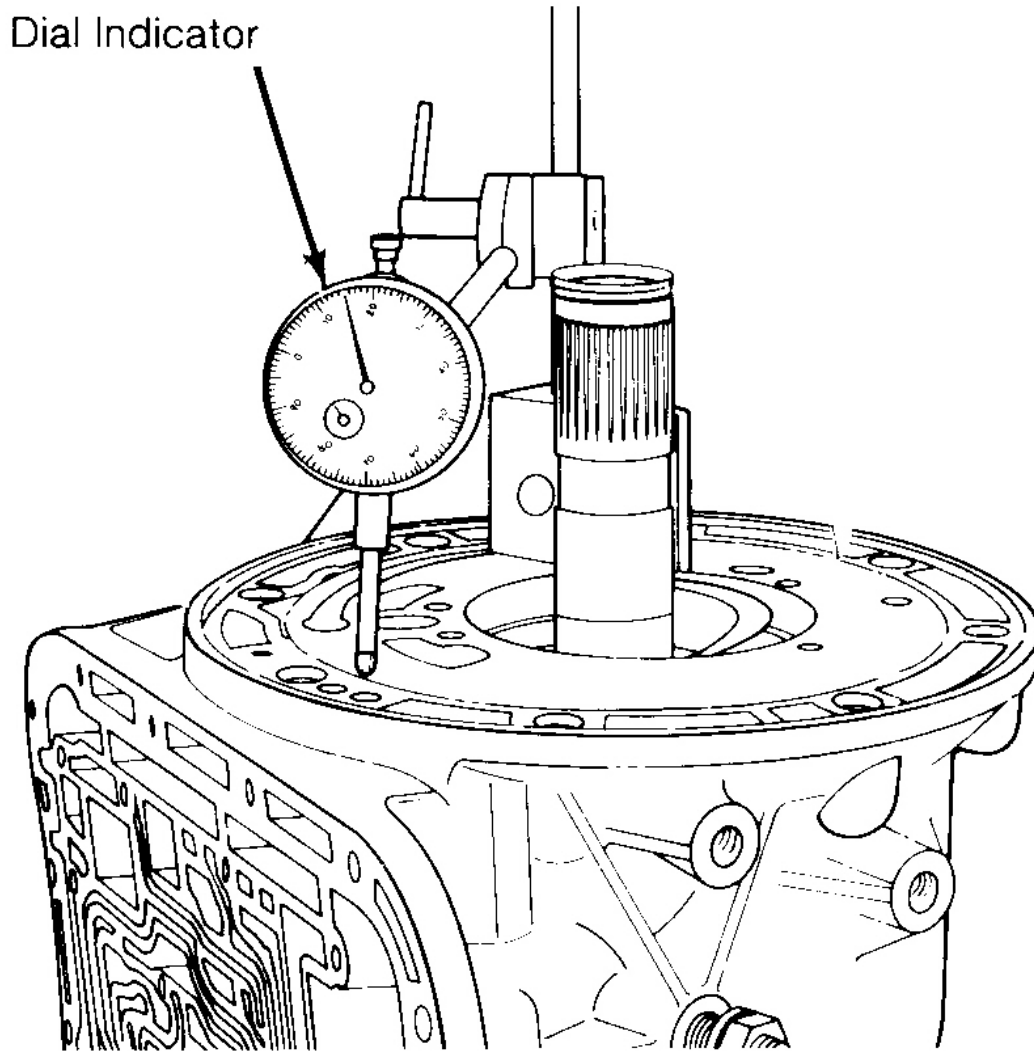
Fig. 36: Installing Center Support Snap Ring
Courtesy of FORD MOTOR CO.

18. Install sun gear and adapter into overdrive planet assembly and one-way clutch. Take care to center needle bearing race inside of planetary assembly. Ensure it stays centered and is positioned with lip upward (toward sun gear).
19. Install overdrive planet assembly and one-way clutch into case. Install overdrive drum assembly. Install overdrive bracket, apply lever and shaft. Install overdrive band (tagged at disassembly), and apply strut. Install anchor strut.
20. Ensure needle bearing race in overdrive planetary assembly is centered and overdrive clutch is fully seated. Place No. 1 selective washer on top of overdrive clutch drum and temporarily install pump assembly (without gasket) into case. Ensure pump assembly is fully seated in case and pump body is below level of case gasket surface.

NOTE: Check for damaged or missing front pump support seal. Replace if necessary.

21. Mount a dial indicator on oil pump with tip resting on transmission housing. See **Fig. 37**. Zero dial

indicator and swing indicator around so plunger contacts oil pump.



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Fig. 37: Checking End Play
Courtesy of FORD MOTOR CO.

22. Record dial indicator reading. Move dial indicator assembly to opposite side of pump (180 degrees). Take another end play reading. Average the 2 readings.
23. End play range is .007-.025" (.18-.64 mm). If end play exceeds limits, replace No. 1 selective thrust washer. See **END PLAY SELECTIVE THRUST WASHER**.
24. After end play check has been completed, remove oil pump and No. 1 selective thrust washer. Mark installed position of oil pump gears in relation to one another and remove.

25. Using Seal Replacer (T78L-77248-AH), install new oil pump seal. Position separator plate on converter housing. Place pump gears into pump housing. The inside edge of small gear has a chamfer on one side. This chamfer must face toward front of transmission.
26. The larger gear has a dimple on one side which must face toward rear of transmission. Position pump assembly onto separator plate and converter housing. Install bolts finger tight.

NOTE: **The rough appearance of pump stator casting is not a flaw. DO NOT replace casting due to this appearance.**

27. To prevent seal leakage, pump gear breakage or bushing failure, align pump in converter housing with Pump Alignment Set (T74P-77103-X). Select smallest I.D. sleeve which will fit completely over pump shaft. Outside diameter of sleeve will center pump in converter housing.
28. Install 5 new Allen bolts. Tighten to specification. See **TORQUE SPECIFICATIONS**. Remove alignment tool. Install input shaft into pump. Install converter into pump gears. Rotate converter to check for free movement. Remove converter and input shaft.
29. Coat converter housing gasket with petroleum jelly and position on converter housing. Install seal ring on converter housing. Position No. 1 selected thrust washer on rear of pump. Align converter housing and pump to transmission case. Install bolts with new "O" rings and tighten to specification.
30. Install new lock nut on OVERDRIVE band adjusting screw. Tighten adjusting screw to 120 INCH lbs. (14 N.m). Back off exactly 2 turns (3 1/2 turns on all 1990-91 4.0L vehicles; these vehicles were equipped with a "double wrap" type OVERDRIVE band). Hold adjusting screw and tighten lock nut to 35-45 ft. lbs. (47-61 N.m). Repeat procedure for INTERMEDIATE band. Air pressure tests may be performed to ensure proper transmission operation. See **AIR PRESSURE TESTS** under TESTING.
31. Install shift lever oil seal using Shift Lever Seal Replacer (T74P-77498-A). Install internal shift linkage, external manual control lever and centering pin. Tighten nut to 30-40 ft. lbs. (41-54 N.m). Install "O" ring, kickdown lever and 13 mm nut. Install Neutral switch using Neutral Switch Socket (T74P-77247-A).
32. Install converter clutch solenoid connector. Install throttle valve, rod, vacuum diaphragm, retaining clamp and bolt. Tighten to specification. Ensure throttle valve moves freely in its bore.
33. Align valve body to separator plate and gasket using tapered punches. Use a small amount of petroleum jelly to hold gasket in place. Install 2 bolts and tighten to 53-71 INCH lbs. (6-8 N.m). Attach and lock "Z" link to manual valve. Carefully ease valve body into case using care not to bend "Z" link. See **Fig. 38**.

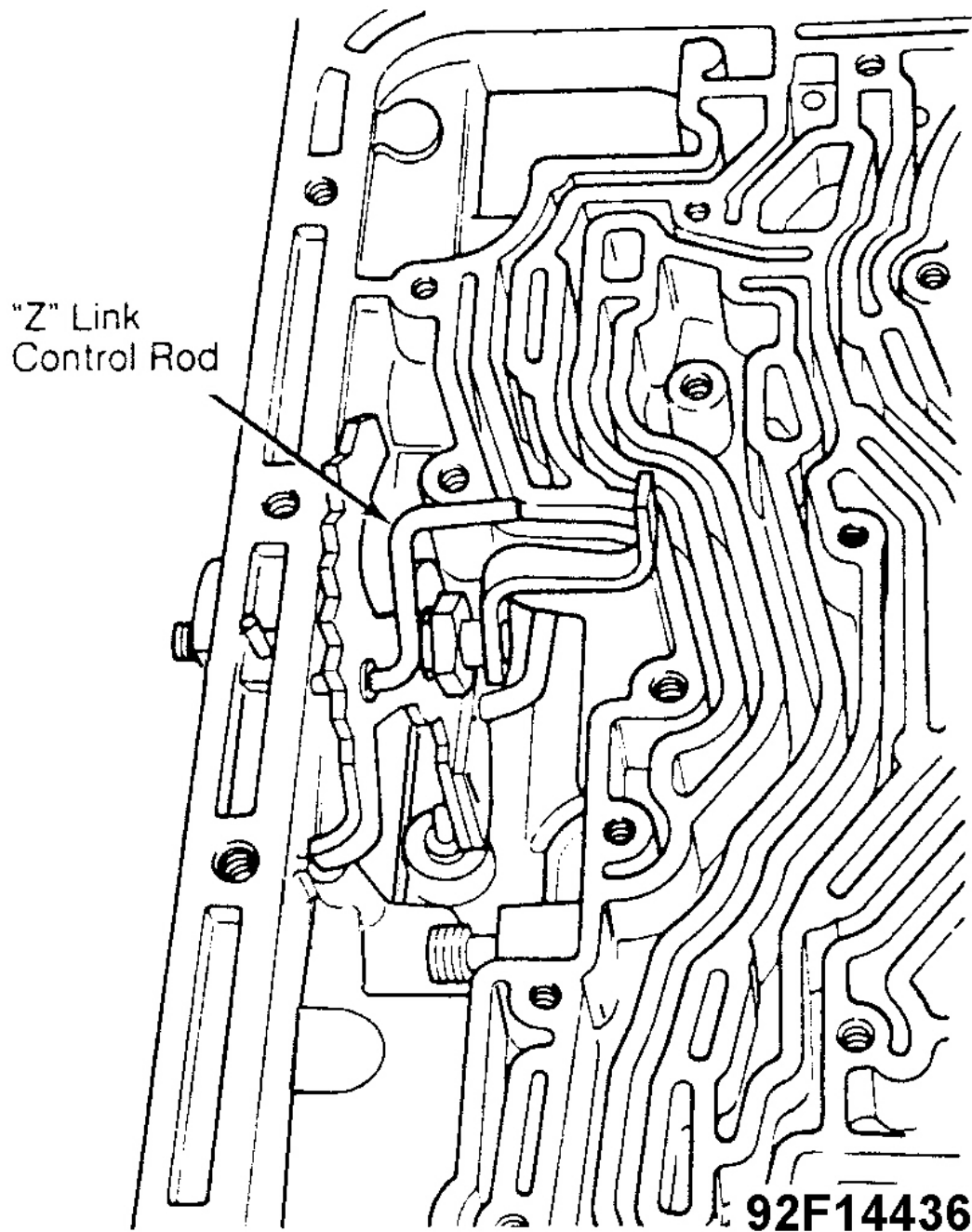
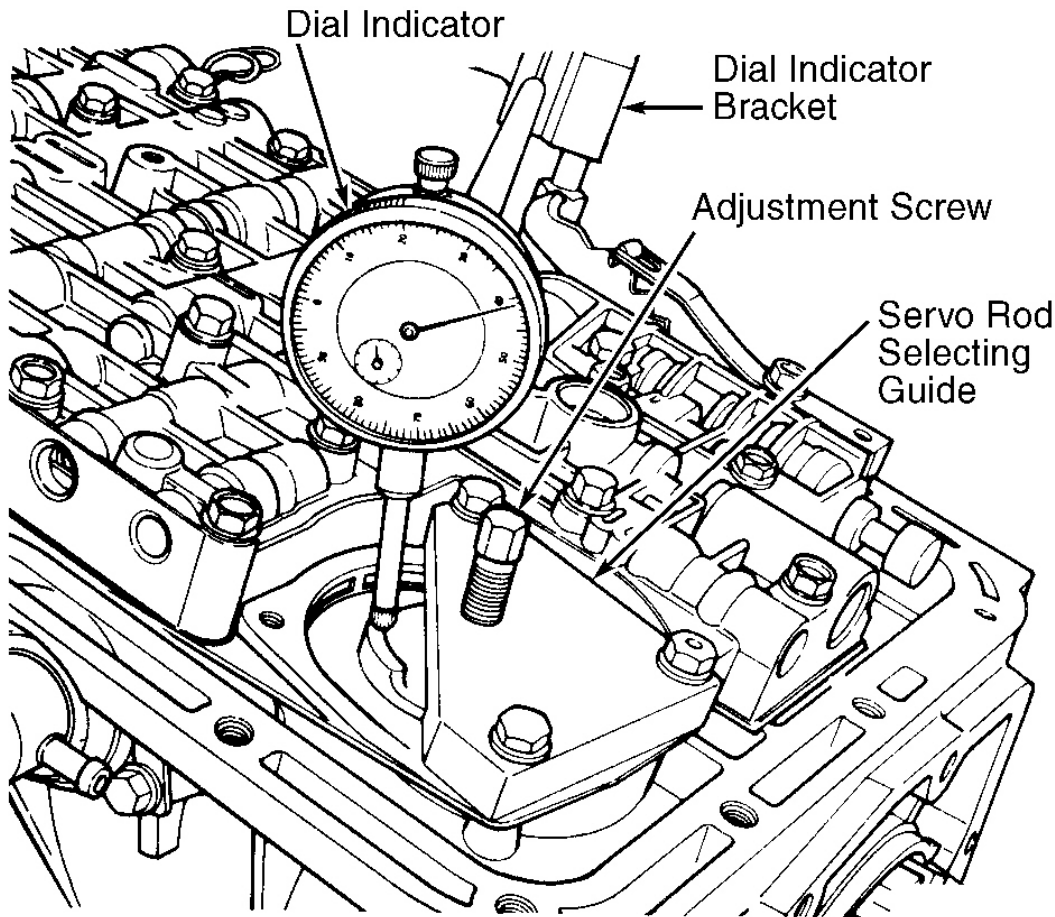


Fig. 38: Connecting Internal Linkage
Courtesy of FORD MOTOR CO.

NOTE: Valve body bolts are of different lengths. Ensure each bolt is installed in its correct location.

34. Install and finger tighten bolts "A" and "B". See **Fig. 2**. Position solenoid retainer onto solenoid. Install and tighten remaining bolts except filter screen bolt. Remove bolt "A" and install detent spring.
35. Connect solenoid wires. Install reverse servo piston assembly into bore along with Servo Check Spring (D4ZZ-70031-A). Ensure piston rod is seated correctly in reverse band apply end. Install Servo Rod Selecting Gauge (T74P-77190-A) with new servo cover gasket. See **Fig. 39**.



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Fig. 39: Selecting Servo Piston & Rod
Courtesy of FORD MOTOR CO.

36. Tighten select guide adjusting screw to 35 INCH lbs. (4 N.m). Install dial indicator onto case. Position indicator tip on one of 3 servo piston pads accessible through cut-out of guide. Zero dial indicator.
37. Back out adjusting screw until servo piston bottoms out on guide. Record distance servo piston moved. Servo piston travel should be .120-.220" (3.05-5.59 mm). See **Fig. 40**.
38. If piston travel is greater than specification, use next longest piston and rod. If less than specification, use next shorter piston and rod. Rods are identified by their number of grooves. Rods with 2 grooves are

shortest in length; rods with no grooves are medium in length; rods with 1 groove are longest.

39. Install selected piston and rod. Recheck piston travel. If correct, remove guide and auxiliary spring. Reinstall servo assembly, accumulator spring, gasket and cover. Install servo cover bolts and tighten to specification.

Piston Travel At 36 INCH lbs. Torque
Must Be .120-.220" (3.05-5.56 mm)

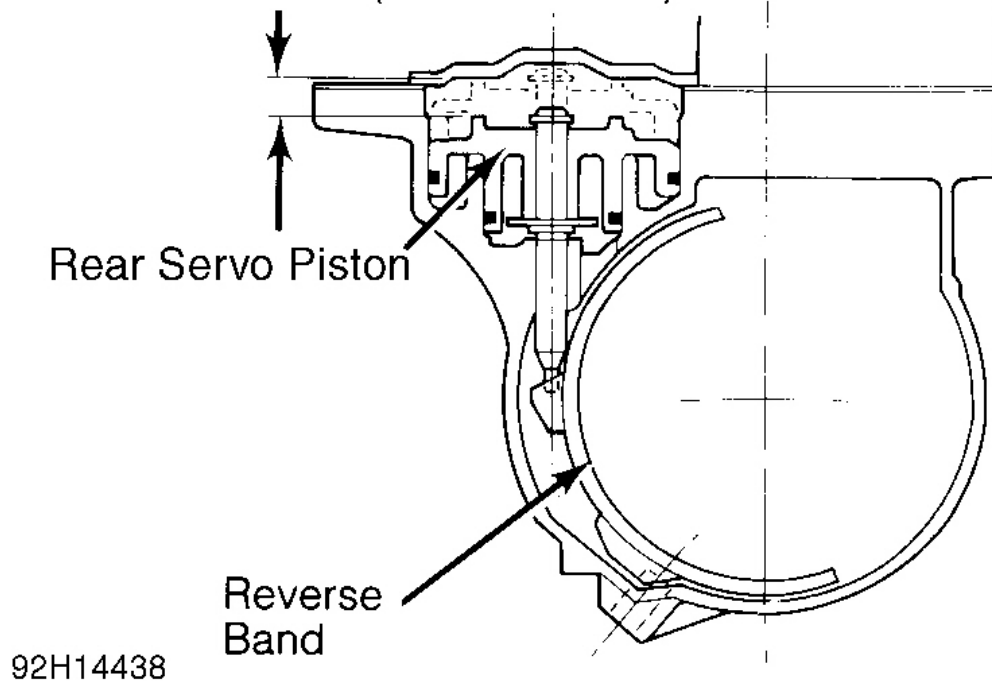


Fig. 40: Measuring Rear Servo Piston Travel
Courtesy of FORD MOTOR CO.

40. Install new "O" rings on filter screen and lube with petroleum jelly. Install filter screen and bolt. Install oil pan with new gasket. Tighten pan bolts to specification in 2 steps. Refer to **TORQUE SPECIFICATIONS**.
41. Install parking pawl and return spring in extension housing and preload. Using new gasket, install extension housing. Ensure operating parking rod is correctly seated in extension guide cup. Install and tighten bolts.
42. Install input shaft and torque converter. Ensure torque converter is properly installed. When installation is correct, measurement between torque converter pilot nose and front face of housing will be .402-.568" (11.12-14.30 mm).

TORQUE SPECIFICATIONS

1990 Ford Aerostar

1985-92 AUTOMATIC TRANSMISSIONS Ford A4LD Overhaul

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Band Adjuster Lock Nut	35-45 (47-61)
Converter Housing Cover (Except 2.3L)	12-16 (16-22)
Converter Housing-To-Case	27-39 (37-53)
Converter-To-Flywheel	20-34 (27-46)
Extension Housing-To-Case	27-39 (37-53)
Manual Lever Inner Nut	30-40 (41-54)
Oil Cooler Line-To-Connector	
Nut	18-23 (24-31)
5/16" Tube Nut	12-18 (16-24)
Transmission-To-Engine	
Except 3.0L Engine	28-38 (38-52)
3.0L Engine	33-44 (45-60)
	INCH Lbs. (N.m)
Center Support-to-Case Bolt	89-115 (10-13)
Converter Housing Cover Bolt (2.3L)	27 (3)
Downshift Lever Outer Nut	89-133 (10-15)
Governor-To-Collector Body Bolt	89-115 (10-13)
Neutral Switch	89-115 (10-13)
Oil Pump-To-Converter Housing	89-115 (10-13)
Reverse Servo Cover Bolt	89-115 (10-13)
Separator Plate Bolt	54-71 (6-8)
Transmission Oil Pan Bolt	98-115 (11-13)
Vacuum Diaphragm Clip Bolt	89-106 (10-12)
Valve Body-to-Case Bolt	71-98 (8-11)