DIAGNOSIS AND TESTING (Continued)

Noise/Vibration — Forward/Reverse (Cont'd)

Possible Component	Reference/Action
—Converter components —Fluid level (low) Pump cavitation —Pump Assembly —Engine drive accessories —Cooler Lines grounding out —Flywheel	—Locate source of disturbance and service as required.
For Noises/Vibrations That Change With Vehicle Speed: —Engine Mounts —loose or damaged —Driveline concerns Halfshaft shudder CV Joints Suspension Modifications —Output/Halfshaft Splines worn or damaged	—Locate source of disturbance and service as required.
Other Noises/Vibrations: —Main Controls Valve resonance —Cooler Lines grounding —ABS Brake System —Power Steering Pump	—Locate source of disturbance and service as required. —Refer to Section 06-09 for ABS diagnosis. —Refer to Section 11-02 for Power Steering Pump diagnosis.

TD11441A

Engine Will Not Crank

Possible Component	Reference/Action
255 — ELECTRICAL ROUTINE	
Powertrain Control System —Electrical Inputs/Outputs, Vehicle Wiring Harnesses, Powertrain Control Module (PCM), MLP Sensor	—Run On-Board Diagnostic. —Refer to Powertrain Control/Emissions Diagnosis Manual[20] for diagnosis. Perform Service Manual Pinpoint Test D using the MLP Tester (D89T-70010-A) as outlined. Service as required. Clear codes. Road Test and rerun On-Board Diagnostic.
355 — HYDRAULIC/MECHANICAL ROUTINE	
Shift Linkage/Cable, MLP Sensor —Damaged or misadjusted	—Inspect and service as required. Adjust linkage as outlined. After servicing linkage, verify that the MLP sensor is properly adjusted. Refer to Transaxle, Assembly.

TD11442A

No Park Range

Possible Component	Reference/Action
256 — ELECTRICAL ROUTINE	
No Electrical Concerns	
356 — HYDRAULIC/MECHANICAL ROUTINE	
Shift Linkage —Damaged or misadjusted	—Inspect and service as required. Adjust linkage as outlined. After servicing linkage, verify that the MLP sensor is properly adjusted. Refer to Transaxle, Assembly.
Park Mechanism —Park Brake Pawl, Parking Pawl Return Spring, Park Rod Guide Cup, Parking Pawl Shaft, Parking Pawl Actuating Rod, Manual Lever, Manual Lever Detent Spring—damaged	—Inspect and service as required.

TD11443A

20 Can be purchased as a separate item.

DIAGNOSIS AND TESTING (Continued)

Transmission Overheating

Possible Component	Reference/Action
257 — ELECTRICAL ROUTINE	
Refer to Electrical Routine 240, Converter —No Apply	—Refer to Electrical Routine 240, Converter - No Apply
357 — HYDRAULIC/MECHANICAL ROUTINE	
Fluid —Improper level —Condition	—Adjust fluid to proper level. —Inspect as outlined under Fluid Condition Check.
Cooler Lines —Damaged, blocked or reversed	—Inspect and service as required.
Auxiliary Cooler —Damaged, blocked or restricted, improperly installed	—Inspect and service as required.
Vehicle Concerns Causing Engine Overheating	—Refer to Section 03-03
Main Controls —Bypass Clutch Control Valve and Plunger, Converter Regulator Valve stuck or damaged	—Inspect and service as required.
Converter —No Apply —Seized Converter One-Way Clutch	—See Routine 240/340 —Inspect. Service as required.
Excessive Towing Loads	—Check GVW
Incorrect Idle or Performance	—Refer to Powertrain Control/Emissions Diagnosis Manual[21].
Improper Clutch or Band Application or Oil Pressure Control System	—Inspect. Service as required.

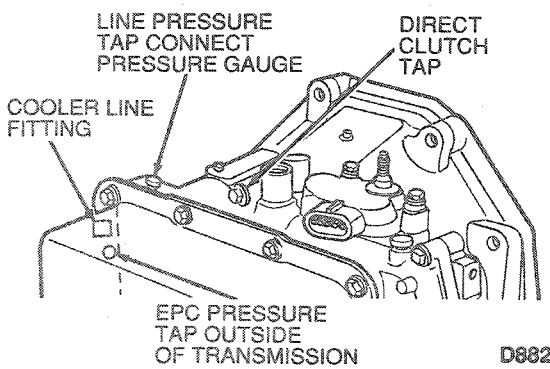
TD11444A

Control Pressure Test

CAUTION: Do not install transmission tester when verifying these pressures.

NOTE: The vehicle harness must be connected to the transaxle to verify these pressures.

1. Refer to Pinpoint Test E.
2. Connect pressure gauge to line pressure tap.



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3. Start engine and check line pressure. Refer to the following chart to determine if line pressure is within specification.
4. If line pressure is not within specification, perform air pressure checks and service main control system.
5. If the line pressure is not within specification after mechanical checks and there are no electrical codes, the Electronic Pressure Control (EPC) solenoid may be mechanically malfunctioning. Connect a pressure gauge to EPC pressure tap. Start engine and check EPC pressure. Refer to chart to determine if EPC pressure is within specification. If pressures are not correct, replace EPC solenoid.

401 — Diagnostic Pressure Chart

Gear	EPC	Line	Direct Clutch
	Pressure at Idle kPa (psi)[1]		
P[2]	276-414 (40-60)[2]	896-1034 (130-150)[2]	—

(Continued)

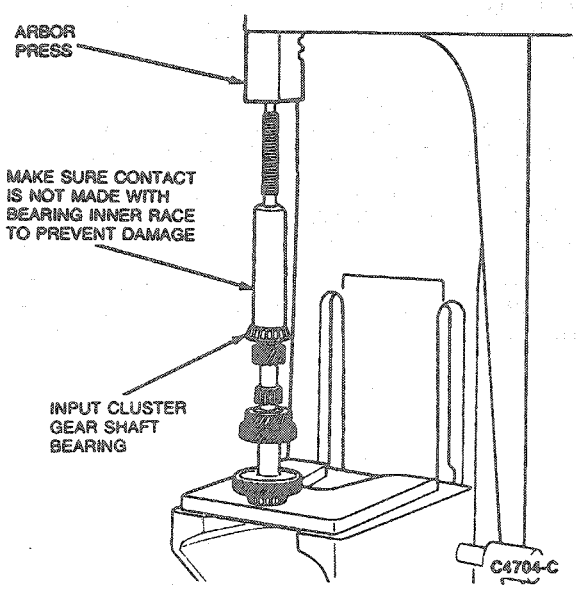
21 Can be purchased as a separate item.

MAJOR SERVICE OPERATIONS (Continued)

Installation

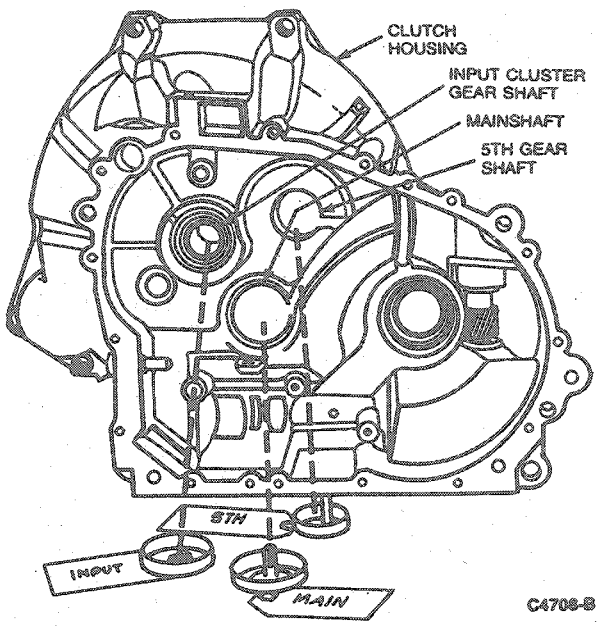
NOTE: Prior to installation of the bearings, thoroughly clean the bearings and inspect their condition. Lightly oil the bearings with Synthetic MERCON ® Multi-Purpose Automatic Transmission Fluid E6AZ-19582-B (ESR-2C163-A2) or equivalent.

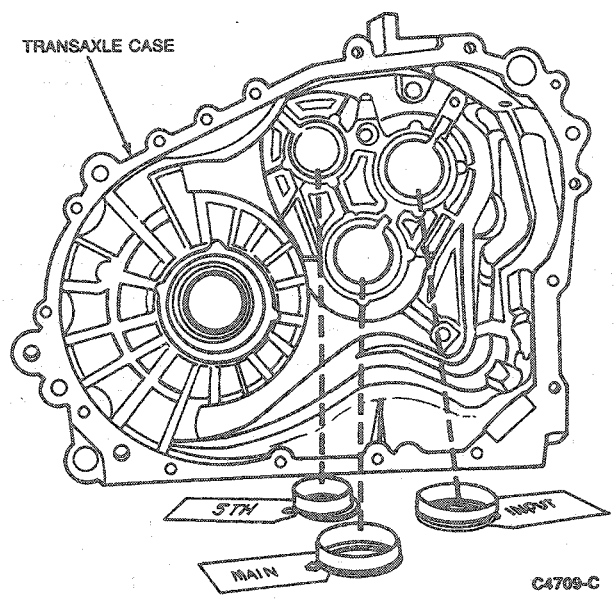
Using Pinion Bearing Cone Remover D79L-4621-A or equivalent and an arbor press, install the bearing on the shaft. Make sure the bearings are pressed on the proper end as labeled during disassembly.



Bearing Cups

The input cluster shaft, the main shaft and the fifth gear driveshaft are supported at each end by tapered roller bearings. The cups supporting the bearings in the case are located as follows: three in the transaxle case and three in the clutch housing.



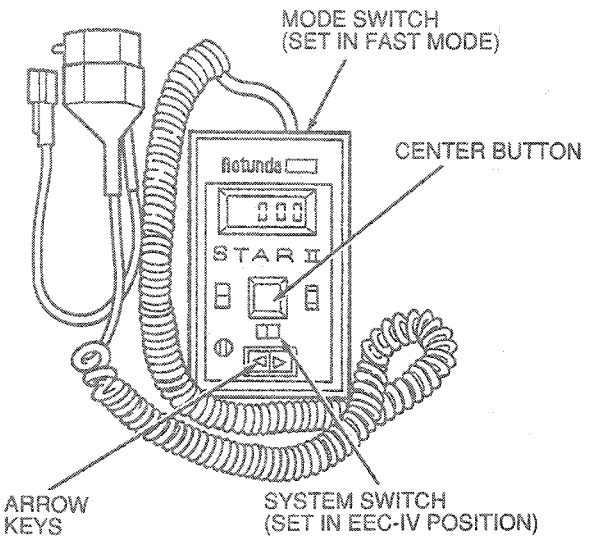


Shims, to preload the tapered roller bearings, are located behind the bearing cups in the transaxle case only. It is important to keep the shim with its matching cup during disassembly. It is equally important to label the bearing cups if they are removed from the case.

After removal of the main shaft bearing and the fifth gear shaft bearing cups from the clutch housing, the funnels can be removed from the bearing cup bores.

DIAGNOSIS AND TESTING (Continued)

Prepare the SUPER STAR II Tester as follows:



D10293-A

- Place system switch in the EEC-IV position.
- Tester in fast mode only (necessary to display three-digit codes).
- Keep tester leads away from any moving parts.
- Deactivate Self-Test by making sure the button in the middle is up. If not, press button once to unlatch.
- Speaker switch on, if desired.
- Turn tester to the ON position.

CAUTION: Do not replace parts based on a code, perform Pinpoint Tests first.

Quick Test 3.0 Key On, Engine Off (KOEO)

Some special considerations for Key On, Engine Off Quick Test include the following:

- The KOEO test provides both "hard" Diagnostic Trouble Codes (DTC's) (present at the time of testing) and continuous memory DTC's.
- Always service the "hard" DTC's first. These are displayed first on the tester.

Performing KOEO Self Test

1. Activate Self-Test by pressing center button on SUPER STAR II Tester (grounding Self-Test Input STI).
2. Turn ignition switch to RUN position.
3. PCM will run Self-Test and then output "hard" DTC's (or Code 111-pass test). "Hard" DTC's are repeated to make it easier to verify sequence. After "hard" DTC's have been repeated (or Code 111 repeated) a single pulse occurs to signal that next set of DTC's will be from continuous test (or Code 111-pass).
4. To display DTC's, unlatch center button and use memory buttons to scroll through codes.

Quick Test 4.0 Continuous Memory Codes (DTC's)

Continuous memory DTC's are from concerns which were detected during normal vehicle operation. These codes are retained for 40 warm up cycles.

After servicing any KOEO or KOER "hard" DTC's and a pass code 111 is received on both, service the continuous memory codes.

Some special considerations for Continuous testing include the following:

- The cause of some Continuous Memory Codes may have been eliminated if KOEO and/or KOER DTC's were serviced. Always re-test and service any DTC's that still remain.
- If DTC's are present, go to the EEC-IV On-Board Diagnostic Diagnostic Trouble Code Description Chart in this Section for service information. Erase DTC's, perform drive cycle, and repeat the Quick Test after completing service on the DTC's.
- If the Continuous test passes (111) and a concern is still present, refer to the Hydraulic/Mechanical charts, Oasis and TSBs for concern diagnostics.

CAUTION: DTC's in continuous memory can be erased by disconnecting the battery or by ungrounding the Self Test Input (STI) while the codes are being displayed during the KOEO Self-Test. This STI is ungrounded by disconnecting the small data link connector or unlatching the Star Tester button. Always write down the DTC's to avoid losing information that can be used to diagnose the customer's complaint.

- Service any non-transmission DTC's first as they can directly affect the operation of the transmission. Repeat the Quick Test and Road Test to verify the correction.

Special Test Modes:

NOTE: The wiggle test may also be entered by "latching" STI; ON, OFF, ON.

1. Wiggle test mode:
   - After all DTC's have been received the wiggle test mode is entered by pressing center button on Star Tester twice. This will unlatch and relatch STI.
   - The wiggle test allows the technician to attempt to re-create an intermittent malfunction. Tap, move and wiggle the suspected sensor and/or wire harness. When a malfunction is detected, the Self Test Output (STO) will be turned on as long as the concern is present. STO ON will cause the SUPER STAR II Tester to sound a continuous tone. The Malfunction Indicator Lamp (MIL) will also illuminate.

DIAGNOSIS AND TESTING (Continued)

2. Output cycling test mode:
   - After all KOEO DTC's have been received, the output test mode is entered. Actuator outputs will turn ON and OFF each time the throttle is depressed to WOT and then returned to closed position.

Quick Test 5.0 Key On Engine Running (KOER)

The Engine Running Self-Test provides "hard" DTC's only.

Some special considerations for Engine Running On-Board Diagnostic include the following:

- After the engine ID code (STO LO flashes), push and release the brake pedal, turn steering wheel one-half turn and release.

  NOTE: For SHO applications, you must also press and release the transmission control switch (TCS).
- If a DTC appears after the KOER test, a malfunction is present. Refer to and look up the DTC on the PCM On-Board Diagnostic Diagnostic Trouble Code Description Chart in this Section for service information.

KOER On-Board Diagnostic:

NOTE: Engine must be warm or DTC 116—ECT out of range will occur.

1. Connect SUPER STAR II Tester (if not already connected) with mode switch set to FAST mode.
2. Start and run engine until engine reaches operating temperature.
3. Turn OFF engine and wait 10 seconds.
4. Activate Self-Test (press center button on SUPER STAR II Tester).
5. Start engine.
   - On-Board Diagnostic begins when the engine ID code is received. (This code consists of the number of cylinders divided by 2 plus an added zero.)

Numbers of Cylinders	Engine ID Code
4	20
6	30
8	40

- After the ID code is entered, the technician must cycle the TCS. Then press and release the service brake pedal to check BOO switch, turn steering wheel one-half turn and release to check PSP switch.
- A single output pulse (10) is sent to signal the technician to quickly press the throttle to wide open and immediately release. SUPER STAR II Tester will display the word DYNAMIC.
- Diagnostic Trouble Codes (DTC's) are then sent.

6. The Engine Running wiggle test is entered automatically upon completion of the KOER Self-Test.

Special Test Mode:

NOTE: The wiggle test may also be entered by "latching" STI; ON, OFF, ON.

1. Wiggle test mode:
   - After all KOER DTC's have been received the wiggle test mode is entered by pressing center button of Star Tester twice. This will unlatch and latch STI.

The wiggle test allows the technician to attempt to re-create an intermittent malfunction. Tap, move and wiggle the suspected sensor and/or wire harness. When a malfunction is detected the STO will be turned on as long as the concern is present. STO ON will cause the STAR Tester to sound a continuous tone. The malfunction indicator lamp (MIL) will also illuminate.

Quick Test 6.0 (Computed Timing Check)

This Quick Test is used to diagnose engine idle concerns only. Any engine concerns or DTC's should be serviced **BEFORE** the transaxle concerns are serviced.

Drive Cycle Test

After performing the Quick Test, use the following Drive Cycle Test for checking AXODE (AX4S) continuous codes:

NOTE: The Drive Cycle Test must be followed exactly.

All Except SHO

1. Record and then erase Quick Test codes.
2. Warm engine to normal operating temperature.
3. Make sure transmission fluid level is correct.
4. With transaxle In OVERDRIVE, moderately accelerate from stop to 80 Km/h (50 mph). This allows the transaxle to shift into fourth gear. Hold speed and throttle opening steady for a minimum of 15 seconds.
5. With transaxle in fourth gear and maintaining steady speed and throttle opening, lightly apply and release brake (to operate stoplamps). Then hold speed and throttle steady for an additional five seconds minimum.
6. Brake to a stop and remain stopped for a minimum of 20 seconds.
7. Repeat Steps 4 through 6 at least five times.
8. Perform Quick Test and record continuous codes.

SHO Only

1. Record and then erase Quick Test codes.
2. Warm engine to normal operating temperature.
3. Make sure transmission fluid level is correct.

DIAGNOSIS AND TESTING (Continued)

4. With transaxle in DRIVE, press TCS (LED lamp should illuminate) and moderately accelerate from stop to 64 Km/h (40 mph). This allows transaxle to shift into third gear. Hold speed and throttle open steady for a minimum of 15 seconds (30 seconds above 4000 ft).
5. Press TCS (LED lamp should turn off) and accelerate from 64 Km/h (40 mph) to 80 Km/h (50 mph). This allows transaxle to shift into fourth gear. Hold speed and throttle position steady for a minimum of 15 seconds.
6. With transaxle in fourth gear and maintaining steady speed and throttle opening, lightly apply and release brake (to operate stoplamps). Then hold speed and throttle steady for an additional five seconds minimum.
7. Brake to a stop and remain stopped for a minimum of 20 seconds.
8. Repeat Steps 4 through 7 at least five times.
9. Perform Quick Test and record continuous codes.

After Self Test

After the Self Test procedures are completed, service all DTC's.

Begin with non-transaxle related DTC's, then service any transaxle related DTC's. Refer to the EEC-IV On-Board Diagnostic Trouble Code Description Chart for information on Condition and Symptoms. This chart will be helpful in referring to the proper manual(s) and to aid in diagnosing internal transaxle concerns and external non-transaxle inputs. The Pinpoint Tests are used in diagnosing electrical concerns of the AXODE (AX4S) transaxle. Make sure that the vehicle wiring harness and the PCM are diagnosed as well. The Powertrain Control/Emissions Diagnosis Manual[23] will aid in diagnosing non-transaxle electronic components. The diagnostic routine hydraulic/mechanical charts will help in diagnosing internal transaxle concerns and external non-transaxle inputs.

NOTE: The vehicle wiring harness, PCM and non-transaxle sensors may affect transaxle operations. Service these concerns first.

Pinpoint Tests

If DTC's are present while performing the On-Board Diagnostic, refer to the EEC-IV On-Board Diagnostic Trouble Code Description Chart for the appropriate service procedure.

NOTE: Prior to entering Pinpoint Tests, refer to any TSBs and Oasis messages for AXODE (AX4S) transaxle concerns.

NOTE: Prior to entering pinpoint tests, the vehicle harness must be checked for continuity and shorts; the PCM must be checked for any concerns. Refer to the Powertrain Control/Emissions Diagnosis Manual[23] for proper procedures.

NOTE: If any non-transaxle DTC's appear, service those codes first. They could affect the electrical operation of the transaxle. Record and erase codes from continuous memory after service has been performed. After servicing any DTC's in the Quick Test, the Quick Test should be repeated.

NOTE: Check PCM wiring harness for proper connections, bent or broken pins, corrosion, loose wires, proper routing, proper seals and their condition. Check the PCM, sensors and actuators for physical damage.

23 Can be purchased as a separate item.

DIAGNOSIS AND TESTING (Continued)

EEC-IV ON-BOARD DIAGNOSTIC TROUBLE CODE DESCRIPTION CHART

THREE DIGIT DTC	COMPONENT	DESCRIPTION	CONDITION	SYMPTOM	ACTION
111	SYSTEM	Pass	No malfunction detected.	Malfunction not detected by PCM.	PC/ED, SM
112 113	IAT IAT	IAT indicates 125°C (254°F) IAT indicates -40°C (-40°F)	Voltage drop across IAT exceeds scale set for temperature 125°C (254°F). Voltage drop across IAT exceeds scale set for temperature -40°C (-40°F).	Incorrect EPC pressure. Either high or low which will result in harsh or soft shifts.	PC/ED
114	IAT	IAT out of on-board diagnostic range	IAT temperature higher or lower than expected during KOEO and KOER.	Rerun on-board diagnostic at normal operating temperature.	PC/ED
116	IAT	ECT out of on-board diagnostic range	ECT temperature higher or lower than expected during KOEO and KOER.	Rerun on-board diagnostic at normal operating temperature.	PC/ED
117	ECT	ECT indicates 125°C (254°F)	ECT temperature higher or lower than expected during KOEO and KOER.	Torque converter clutch will always be off, resulting in low fuel economy.	PC/ED
118	ECT	ECT indicates -40°C (-40°F)			
121	TP	TP voltage high/low for on-board diagnostic.	TP was not in the correct position for on-board diagnostic.	Rerun at appropriate throttle position per application.	PC/ED
122, 123, 124, 125 167	TP TP	TP DTCs	PCM has detected an error. This error may cause a transaxle concern. Refer to the PC/ED Manual for diagnosis.	Harsh engagements, firm shift feel, abnormal shift schedule, torque converter clutch does not engage. Torque converter clutch cycling.	PC/ED
211 212 213	PIP PIP PIP	PIP circuit failure. IDM signal loss. SPOUT circuit open.	Ignition system has a malfunction which may cause a transaxle concern. Refer to the PC/ED Manual for diagnosis.	Engine malfunction, no converter engagement.	PC/ED
157, 158, 159 184, 185	MAF MAF	MAF DTCs	MAF system has a malfunction which may cause a transaxle concern. Refer to PC/ED Manual for diagnosis.	Incorrect shift schedule, high/low EPC pressure. Incorrect converter engagement scheduling. Symptoms similar to a TP failure.	PC/ED
452	VSS	Insufficient input from VSS.	VSS detected a loss of vehicle speed signal during operation.	Harsh engagements, firm shift feel, abnormal shift schedule, unexpected downshift may occur at closed throttle. Torque converter clutch will not engage.	PC/ED
519	PSP	PSP circuit open during KOEO	PSP circuit open.	Failed ON—EPC slightly high, firm engagements, firm shifts, harsh coastdown shifts. Failed OFF—EPC pressure slightly low during increased loading of the vehicle power steering.	PC/ED
521	PSP	PSP not changing state KOER.	Operator did not rotate steering wheel during KOER.	Malfunction detected. Rerun on-board diagnostic and rotate steering wheel.	PC/ED
522	MLP	MLP not in PARK.	On-board diagnostic not run in PARK.	Rerun on-board diagnostic in PARK.	D1
634	MLP	MLP out of range.	Indicated voltage drop across MLP exceeds limits established for each position.	Harsh engagements, firm shift feel. No 3/4 shift.	D1

(Continued)

DIAGNOSIS AND TESTING (Continued)

EEC-IV ON-BOARD DIAGNOSTIC TROUBLE CODE DESCRIPTION CHART (Cont'd)

THREE DIGIT DTC	COMPONENT	DESCRIPTION	CONDITION	SYMPTOM	ACTION
536	BOO	Brake not actuated during on-board diagnostic. BOO switch circuit failed.	Brake not cycled during KOER. Brake ON/OFF circuit failure.	Failed ON or not connected—torque converter clutch will not engage at less than 1/3 throttle. Failed OFF—torque converter clutch will not disengage when brake is applied.	PC/ED
539	ACC	A/C switch error	A/C or Defrost ON condition may result from A/C clutch being ON during on-board diagnostic.	Failed ON—EPC pressure slightly low with A/C OFF. Failed OFF—EPC pressure slightly low with A/C ON.	PC/ED
636	TOT	TOT out of on-board diagnostic range.	Transmission not at operating temperature during on-board diagnostic.	Warm vehicle to normal operating temperature.	B1
637	TOT	-40°C (-40°F) indicated TOT sensor circuit open.	Voltage drop across TOT sensor exceeds scale set for temperature -40°C (-40°F) Voltage drop across TOT sensor exceeds scale set for temperature of 157°C (315°F)	Torque converter clutch and stabilized shift schedule may be enabled sooner after cold start. Harsh or soft shifts.	B1
638	TOT	157°C (315°F) indicated TOT sensor circuit grounded.			
639	TSS	Insufficient input from Transmission Speed Sensor.	PCM detected a loss of TSS signal during operation.	Increased engine rpm on engagements, harsh shifts.	F1
624*	EPC	EPC solenoid circuit failure, shorted circuit or output driver.	Voltage through EPC solenoid is checked and compared to a voltage through solenoid after a time delay. An error will be noted if tolerance is exceeded. KOEO and continuous on-board diagnostic.	Short Circuit—Causes failsafe EPC pressure (maximum capacity). Harsh engagements and shifts. Open Circuit—Causes maximum EPC pressure, harsh engagements and shifts.	E1
625*	EPC	Open PCM output driver.			
621*	SS1	SS1 solenoid circuit failure	Solenoid 1 circuit failed to provide voltage drop across solenoid. Circuit open or shorted or PCM drive failure during on-board diagnostic.	Improper gear selection depending on condition mode and manual lever position. See solenoid ON/OFF chart.	A1
622*	SS2	SS2 solenoid circuit failure	Solenoid 2 circuit fails to provide voltage drop across solenoid. Circuit open or shorted or PCM drive failure during on-board diagnostic.	Improper gear selection depending on condition mode and manual lever position. See solenoid ON/OFF chart.	A1
641*	SS3	SS3 solenoid circuit failure	Solenoid 3 circuit fails to provide voltage drop across solenoid. Circuit open or shorted or PCM drive circuit failure during on-board diagnostic.	Improper gear selection depending on condition mode and manual lever position. See solenoid ON/OFF chart.	A1
645**	SS1, SS2, or internal parts	1st gear failure	No 1st gear	Improper gear selection depending on condition mode and manual lever position: see solenoid ON/OFF chart. Shift errors may also be due to other internal transaxle concerns (e.g., stuck valves, damaged friction material).	A1
646**	SS1, SS2, or internal parts	2nd gear failure	No 2nd gear		
647**	SS1, SS3, or internal parts	3rd gear failure	No 3rd gear		
648**	SS1, SS3, or internal parts	4th gear failure	No 4th gear		
628**	TCC	Torque converter clutch engagement error	The PCM picked up an excessive amount of torque converter clutch slippage when converter was scheduled to be engaged during normal vehicle operation.	Failed OFF—converter never engages. Failed ON—engine runs rough/vehicle shudder, engine stalls in DRIVE (2nd, 3rd or 4th) at low idle speeds.	C1

(Continued)

DIAGNOSIS AND TESTING (Continued)

EEC-IV ON-BOARD DIAGNOSTIC TROUBLE CODE DESCRIPTION CHART (Cont'd)

THREE DIGIT DTC	COMPONENT	DESCRIPTION	CONDITION	SYMPTOM	ACTION
652*	TCC	TCC solenoid circuit failure during on-board diagnostic.	TCC solenoid circuit fails to provide voltage drop across solenoid. Circuit open or shorted or PCM drive failure during on-board diagnostic.	Failed ON—engine runs rough / vehicle shudder, engine stalls in DRIVE (2nd, 3rd or 4th) at low idle speeds. (Short circuit). Failed OFF—converter never engages. (Open circuit).	C1
629*	TCC	Torque converter clutch circuit failure	TCC solenoid circuit fails to provide voltage drop across solenoid. Circuit open or shorted or PCM drive circuit failure during on-board diagnostic.	Failed ON—engine runs rough / vehicle shudder, engine stalls in DRIVE (2nd, 3rd or 4th) at low idle speeds. (Short circuit). Failed OFF—converter never engages. (Open circuit).	C1
629**	TCC	Unscheduled engagement	Torque converter clutch engaged when not scheduled.	Engine runs rough / vehicle shudder, engine stalls in DRIVE (2nd, 3rd or 4th) at low idle speeds.	C1
656**	TCC	Continuous slip ERROR	Excessive variations in slip (engine speed surge) across the torque converter clutch detected.	Engine runs rough / vehicle shudders. You may feel a slight sensation of the engine running rough at road loads (approximately 35-40 mph in 3rd gear, 45-50 mph in 4th gear).	C1
631	TCIL	TCIL circuit failure.	TCIL circuit open or shorted.	Failed ON—Overdrive cancel mode always indicated, no flashing for EPC failure. Failed OFF—Overdrive cancel mode never indicated, no flashing for EPC failure.	PC / ED
632	TCS	TCS not changing state.	TCS not cycled during on-board diagnostic / circuit open or shorted.	Rerun on-board diagnostic and cycle switch. No overdrive cancel when switch is cycled.	PC / ED
998*		Failure Mode Effect Management (FMEM) failure.	Failure detected in one or more critical inputs.	PCM enables alternate functions. Check for other DTCs.	PC / ED

*Output circuit check, generated only be electrical symptoms.

**May also be generated by some other non-electric transmission hardware system.

PC / ED—Powertrain Control / Emissions Diagnosis Manual (Can be purchased as a separate item.)

SM—Service Manual A1, B1, C1, D1, E1, F1—Pinpoint tests in this manual.

TD8100A

Rotunda Transmission Tester

Use Rotunda Transmission Tester 007-00085 or equivalent to diagnose electronically controlled transaxles. The following instructions outline the set-up and use of this tester in the pinpoint tests for the AXODE (AX4S).

Tester Jacks

1. **VPWR Pin Jacks (red):** VPWR test points for solenoid circuits.
2. **Solenoid (TCC, EPC) Signal Line Pin Jacks (black):** Signal line test points for solenoid circuits.
3. **BAT+ (red) and BAT- (black) Pin Jacks:** Battery reference points when measuring circuits for shorts.
4. **TOT Pin Jacks:** Test points for TOT sensor.
5. **TSS Pin Jacks:** Test points for TSS sensor.

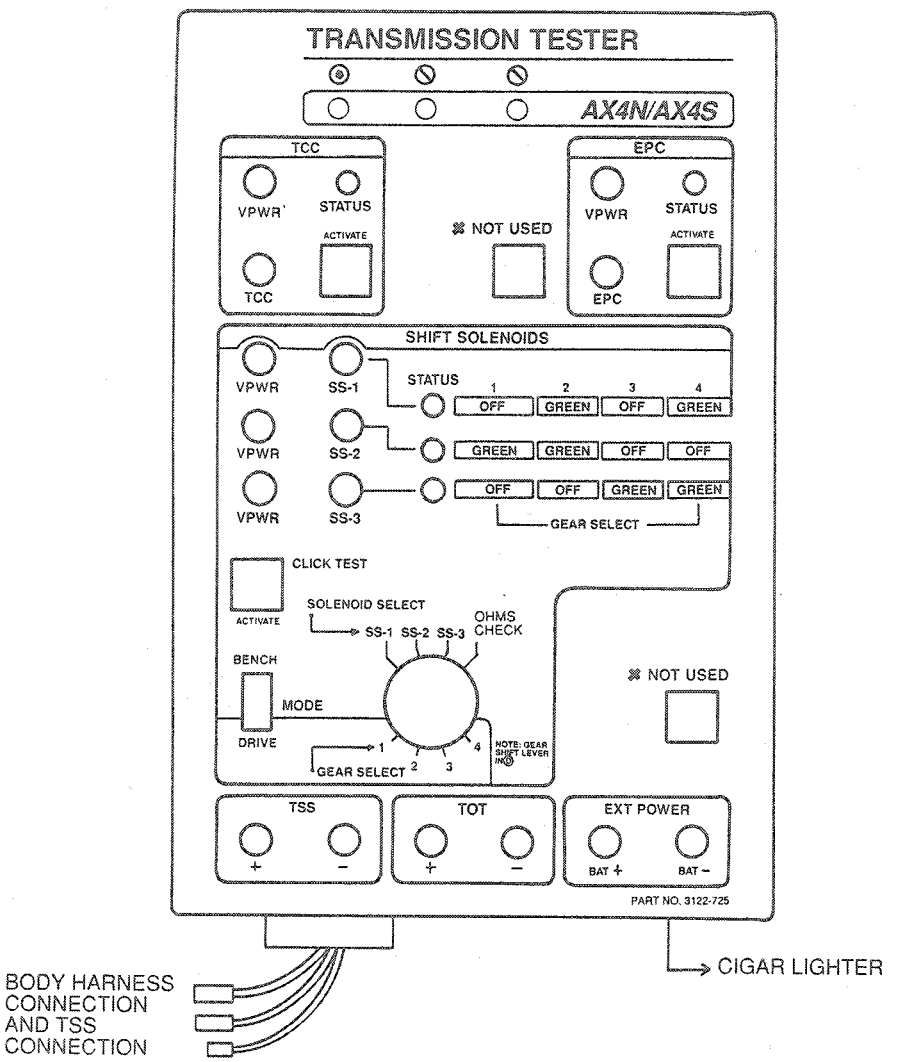
Tester LEDs and Controls

1. **Overlay and Cable Correctly Installed LEDs:** Only LEDs with ◎ symbol and cable correctly match.
2. **Status LEDs:** LED "OFF" when not activated by tester (solenoid not activated, open circuit or signal line short to ground). LED "GREEN" when activated by tester and current draw is correct. LED "RED" when activated by tester and current draw is excessive (short to Battery Positive Voltage (B+)). All LEDs light orange during Self-Test.

DIAGNOSIS AND TESTING (Continued)

3. **Solenoid Activate Buttons:** Energize respective solenoids during click testing and activate selected circuits during DRIVE mode testing.
4. **Bench/Drive Switch:** Selects operating mode, either BENCH or DRIVE.
5. **Solenoid Select/Gear Select Switch:** Has three functions.
   In BENCH MODE: acts as shift solenoid selector for click testing. In DRIVE MODE: acts as forward gear selector in place of vehicle's PCM controlled shifting. Hydraulic safety mechanisms and overrides are built into the transaxle.
   In OHMS CHECK: allows you to measure ohms.

AXODE (AX4S) Overlay



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DIAGNOSIS AND TESTING (Continued)

Transmission Tester Instructions

Using the Transmission Tester

The Rotunda Transmission Tester 007-00085 or equivalent allows a technician to operate the electrical portion of the transaxle independent of the vehicle electronics which allows the technician to determine specific transaxle concerns. The Transmission Tester usage is divided into five steps:

1. Preliminary Testing and Diagnosis
2. Installing the Transmission Tester
3. Static Testing - Engine OFF
4. Dynamic Testing - Engine Running
5. Removing the Transmission Tester and Clearing Diagnostic Trouble Codes (DTCs)

Preliminary Testing and Diagnosis

Before any diagnostic testing is done on a vehicle, some preliminary checks must be performed, as follows. Be sure to note findings, especially any DTC's found, for future reference.

- Check transaxle fluid level and condition.
- Check for add-on items (phones, computers, CB radio, etc).
- Visually inspect wiring harness and connectors.
- Check for vehicle modifications.
- Verify the shift linkage is properly adjusted.
- Verify customer concern.
  - — Upshift, Downshift, Coasting, Engagement, Noise / Vibration
- Vehicle must be at normal operating temperature.
- Perform vehicle On-Board Diagnostic.
- Record all DTC's.
- Service all non-transaxle codes.

Installing the Transmission Tester (Set-Up Procedures)

Installing the transmission tester at the transaxle connector allows separation of the vehicle electronics from transaxle electronics. Disconnecting normal vehicle electronics will set additional DTC's and cause firm shifts. (Disconnecting the transaxle connector defaults transaxle to maximum line pressure).

NOTE: During tester usage, additional DTC's may be set. Therefore, it is important that all codes are erased after servicing the codes. To verify elimination of all codes rerun On-Board Diagnostic.

NOTE: The following manuals should be available to assist in diagnosis of electronically controlled transaxles:

- Powertrain Control / Emissions Diagnosis Manual[24].
- Transmission Tester Manual (provided with tester).

CAUTION: Do not attempt to pry off transaxle connector with a screwdriver. This will damage the connector and could result in transaxle concerns. If you have transmission heat shields, remove them first. Always install heat shields after servicing transaxle.

1. Disconnect vehicle wiring harness at transaxle connector.
2. Turn tester solenoid select switch to the OHMS CHECK position.

   CAUTION: Route interface cables away from any heat sources.
3. Install appropriate overlay onto tester. Connect appropriate interface cable to transmission tester and then to appropriate transaxle connectors.

   CAUTION: Route gauge line away from any heat sources.
4. Install line pressure gauge into line pressure tap on transaxle. Refer to Diagnostic Pressure Chart (Routine 401).
5. Plug transmission tester power supply plug into cigar lighter. At this time, all LEDs should illuminate for a short period and then turn off. This is the tester internal circuit check.
6. Set Bench / Drive switch to BENCH mode.

Static Testing - Engine Off

Static testing procedures allow for shop testing of the transaxle in vehicle or on the bench. Completion of these tests prove out transaxle electronics.

CAUTION: For resistance checks, ensure the tester solenoid select switch is set to the OHMS CHECK position or damage to ohmmeter may result.

Resistance / Continuity Tests

- Refer to the proper Pinpoint Test to be performed based on the DTC's displayed.
- Using Rotunda Digital Volt / Ohmmeter 014-00407 or equivalent and the transmission tester, perform the Pinpoint Tests as indicated based on the DTC's which were displayed.
- Service as indicated by the Pinpoint Tests. Always retest and road test vehicle after any service.

24 Can be purchased as a separate item.

DIAGNOSIS AND TESTING (Continued)

Transaxle Solenoids and Sensors Resistance Tests

- EPC Solenoid
  - — Set ohmmeter to 100-200 ohm range.
  - — Connect positive lead of ohmmeter to the VPWR jack.
  - — Connect negative lead of ohmmeter to the EPC jack.
  - — Record resistance.
  - — Refer to the following charts for values.
  - — If out of specification, perform Pinpoint Test E.

Solenoid	Solenoid Resistance (Ohms)
SS-1	15-25
SS-2	15-25
SS-3	15-25
TCC	0.98-1.6
EPC	3.23-5.5

- Solenoids (SS-1, SS-2, SS-3, TCC)
  - — Set ohmmeter to 100-200 ohm range.
  - — Connect positive lead of ohmmeter to the appropriate VPWR jack for solenoid being tested.
  - — Connect negative lead of ohmmeter to the appropriate solenoid (SS-1, SS-2, SS-3, TCC) jack.
  - — Record resistance.
  - — Refer to the following chart for values.
  - — If out of specification, perform Pinpoint Test A (SS-1, SS-2, SS-3); Perform Pinpoint Test C (TCC).

Solenoid	Solenoid Resistance (Ohms)
SS-1	15-25
SS-2	15-25
SS-3	15-25
TCC	0.98-1.6
EPC	3.23-5.5

- Transmission Oil Temperature (TOT)
  - — Set ohmmeter to 1000 ohm range.
  - — Connect ohmmeter positive lead to +TOT jack.
  - — Connect ohmmeter negative lead to -TOT jack.
  - — Record resistance. Resistance will vary with temperature.
  - — Refer to the following chart for values.
  - — If out of specification, perform Pinpoint Test B.

Temperature		Resistance
°C	°F	Ohms (K)
0-20	32-68	100K-37K
21-40	69-104	37K-16K
41-70	105-158	16K-5K
71-90	159-194	5K-2.7K
91-110	195-230	2.7K-1.5K
110-130	231-266	1.5K-0.8K

- Transmission Speed Sensor (TSS) - AXODE (AX4S)
  - — Set ohmmeter to 1000 ohm range.
  - — Connect positive lead of ohmmeter to +TSS jack.
  - — Connect negative lead of ohmmeter to -TSS jack.
  - — Record resistance.
  - — TSS should be between 100-200 ohms.
  - — If out of specification, perform Pinpoint Test F.

Short to Ground and Solenoid Voltage Tests

NOTE: LED will turn GREEN when solenoid activates and turn OFF when deactivated. LED will turn RED if an activated solenoid / harness is shorted to B+. LED will turn OFF if an activated solenoid / harness is shorted to ground or no continuity (open circuit).

1. Set tester Bench / Drive switch to BENCH mode.
2. Set voltmeter to 20 volt DC range.

   NOTE: TCC solenoid click may or may not be heard.
3. Connect voltmeter positive lead to solenoid signal+(VPWR). Connect voltmeter negative lead to solenoid negative. Depress the appropriate switch.
4. The LED should illuminate, voltage should change and an audible click may be heard. If LED does not illuminate, a short to ground condition exists.
5. Observe and record values.

Dynamic Testing - Engine ON

Dynamic testing is the final step in the transmission tester usage. It allows the transaxle to be proven out electronically and hydraulically.

Transaxle Solenoid Cycling and Drive Test

Preliminary Set Up:

1. Set Bench / Drive switch to DRIVE mode.
2. Rotate tester gear select switch to first gear position.
3. Place vehicle in PARK.
4. Start vehicle.

DIAGNOSIS AND TESTING (Continued)

EPC Solenoid

CAUTION: Do not attempt to hold the EPC switch depressed (minimum line pressure) and stall the transaxle (holding the vehicle with the brake while depressing the throttle with the transaxle in gear) or transaxle damage will result.

5. Observe line pressure. Record value. Line pressure should go to maximum value. If not, refer to Hydraulic / Mechanical Diagnosis and Pinpoint Test E concerning EPC solenoid.
6. Depress EPC switch. Line pressure should drop to a minimum value. Record value. If not, refer to Hydraulic / Mechanical Diagnosis and Pinpoint Test E concerning EPC solenoids.

Engagements

7. Verify that Bench / Drive switch is in DRIVE mode and gear select switch is in first gear position.
8. Depress EPC switch. Line pressure should drop to idle pressure. While holding EPC switch down, shift vehicle from PARK to REVERSE. Does vehicle shift into REVERSE? Shift vehicle from REVERSE to DRIVE. Does vehicle shift into DRIVE? RELEASE the EPC switch, pressure should return to maximum. Repeat engagements. With the EPC switch released, engagements should be **firm**.

Upshift / Downshift

NOTE: Upshifts and downshifts will be **firm** during this procedure.

NOTE: Pressure gauges may be removed from vehicle for these tests.

NOTE: Tests should be performed on the road. If performed on a hoist, the technician may not feel all shifts when engaged.

LEDs will turn GREEN when solenoids are activated and turn OFF when deactivated. Refer to the tester overlay for the proper status / shift sequence of the shift solenoids during upshifts and downshifts.

9. Shift vehicle into Overdrive (O/D) and accelerate to 24 km / h (15 mph). Select second gear by rotating gear select switch to second gear.
   - Did vehicle upshift to second gear?
   - Did appropriate shift solenoids activate / deactivate?
10. Accelerate to 40 km / h (25 mph) and select third gear.
    - Did vehicle upshift to third gear?
    - Did appropriate shift solenoids activate / deactivate?
11. Accelerate to 56-72 km / h (35-45 mph) and select fourth gear.
    - Did vehicle upshift to fourth gear?
    - Did appropriate shift solenoids activate / deactivate?
12. Reverse order to downshift.
    - Does vehicle downshift from fourth to third, third to second and second to first?
    - Did appropriate shift solenoids activate / deactivate?

Torque Converter Engagement

NOTE: Test should be performed on the road. If performed on a hoist, the technician may not feel all shifts when engaged.

CAUTION: Do not depress TCC switch with transaxle in gear and vehicle at a stop. Damage to torque converter clutch may result.

13. Accelerate and shift vehicle into third gear. Hold speed steady and depress the TCC switch.
    - Does converter engage?
    - Does engine rpm drop?
    - Did TCC solenoid activate?

Transmission Speed Sensor Function Check

NOTE: This test may be performed on the hoist or on the road.

14. Set voltmeter to 20 volts AC. Connect voltmeter positive lead to (+) TSS jack. Connect voltmeter negative lead to (-) TSS jack. Slowly accelerate vehicle and monitor voltmeter.
    - Does voltage increase with vehicle speed?

Removing the Transmission Tester and Clearing DTC's

CAUTION: Do not attempt to pry off connectors with a screwdriver. This will damage the connectors and could result in a transaxle concern.

1. Disconnect transmission tester from transaxle connector.
2. Install vehicle wiring harness connector. Verify connection by pulling up on the harness.
3. Install all heat shields that were previously removed.
4. Disconnect transmission tester power lead from cigar lighter.
5. Erase all DTC's using procedures in the Powertrain Control / Emissions Diagnosis Manual[25] (unlatch center button of Star Tester while DTC's are being displayed during KOEO).
6. Rerun On-Board Diagnostics to receive a pass code (111).
7. Verify that the customer concern has been eliminated.

Electrical Diagnosis

Use the following pinpoint tests to diagnose transaxle electrical concerns.

25 Can be purchased as a separate item.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST A: DIAGNOSTIC TROUBLE CODES: 621, 622 AND 641 SOLENOID CIRCUIT FAILURES; 645, 646, 647 and 648 INCORRECT GEAR RATIO OBTAINED

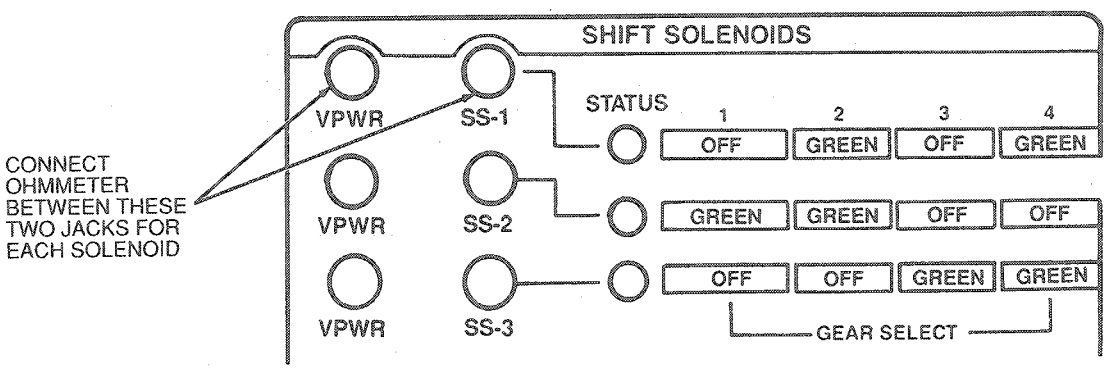
TEST STEP		RESULT ▶	ACTION TO TAKE
A1	AXODE (AX4S) ELECTRONIC DIAGNOSTICS		
	• The following items must be checked before proceeding: — Check the PCM assembly for proper function. (On-Board Diagnostics) — Check vehicle wiring harness for continuity and shorts to ground. — Make sure all connectors are engaged properly. — Make sure all terminals in connectors are properly seated. — Check all connectors for damage, corrosion, water, bent pins and missing or damaged seals. • **Have items been checked?**	Yes ▶ No ▶	GO to A2. PERFORM checks.
A2	CHECK HARNESS CONNECTIONS		
	• Check that vehicle harness connector is fully engaged on transaxle connector. • Check that transaxle harness connector terminals are fully engaged in connector. • **Are harness/terminals fully engaged?**	Yes ▶ No ▶	GO to A3. SERVICE as required.
A3	TRANSAXLE FUNCTIONAL TEST		
	CAUTION: Do not pry connector. Pull vehicle harness connector. • Disconnect vehicle harness at transaxle. • Install Rotunda Transmission Tester (007-00085) or equivalent to transaxle connector. • Using tests outlined under Transmission Tester Instructions: — Perform Solenoid Function Tests outlined under Tester Instructions. NOTE: LED will turn GREEN when solenoid activates and turn OFF when deactivated. LED will turn RED if an activated solenoid/harness is shorted to B+. LED will remain OFF if an activated solenoid/harness is shorted to ground or no continuity (open circuit). — **Do the solenoids (LED) activate (LED GREEN)?**	Yes ▶ No ▶	GO to A4. GO to A5.
A4	TRANSAXLE DRIVE TEST		
	• Perform Drive Test as outlined under Transmission Tester Instructions. • **Does the vehicle upshift when commanded by the tester?**	Yes ▶ No ▶	REFER to the Powertrain Control/Emissions Diagnosis Manual[26] to DIAGNOSE PCM or vehicle harness concerns. ERASE all codes and perform Drive Cycle Test as outlined in this Section. RERUN On-Board Diagnostics. If DTC's are still present, REFER to Hydraulic/Mechanical Diagnosis charts under Diagnosis By Symptom. GO to A5.

26 Can be purchased as a separate item.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST A: DIAGNOSTIC TROUBLE CODES: 621, 622 AND 641 SOLENOID CIRCUIT FAILURES; 645, 646, 647 and 648 INCORRECT GEAR RATIO OBTAINED (Continued)

TEST STEP		RESULT	ACTION TO TAKE
A5	CHECK RESISTANCE OF SOLENOID/HARNESS		
	NOTE: Refer to the AXODE (AX4S) Transmission Tester for Terminal Locations. ● Bench/Drive switch in BENCH mode. ● Rotate solenoid select switch to OHMS CHECK position. ● Connect ohmmeter negative lead to SS-1 jack and positive lead to VPWR jack on tester. This is to test SS-1. ● Record resistance. ● Resistance should be 15-25 ohms. ● Connect ohmmeter negative lead to SS-2 jack and positive lead to VPWR jack on tester. This is to test SS-2. ● Record resistance. ● Resistance should be 15-25 ohms. ● Connect ohmmeter negative lead to SS-3 jack and positive lead to VPWR jack on tester. This is to test SS-3. ● Resistance should be 15-25 ohms. ● **Is resistance for all solenoids 15-25 ohms?**	Yes ▶ No ▶	GO to A6. Out of specification may be caused by internal harness or solenoid concerns. GO to A7.



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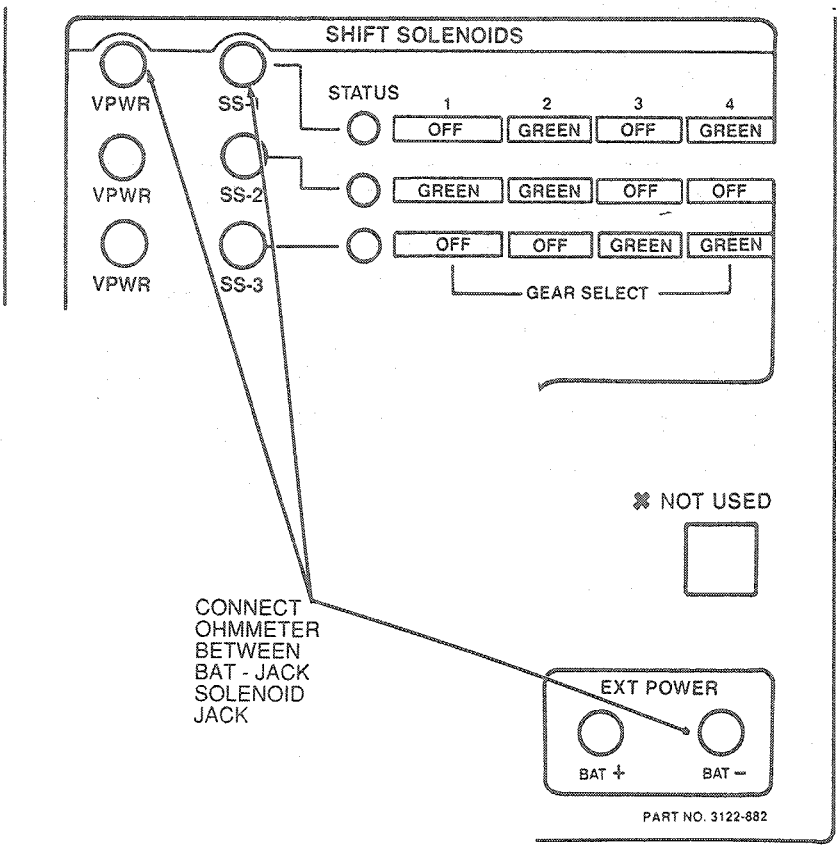
DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST A: DIAGNOSTIC TROUBLE CODES: 621, 622 AND 641 SOLENOID CIRCUIT FAILURES; 645, 646, 647 and 648 INCORRECT GEAR RATIO OBTAINED (Continued)

TEST STEP		RESULT	ACTION TO TAKE
A6	CHECK SOLENOID/HARNESS FOR SHORT TO GROUND		
	• Check each solenoid for continuity between BAT- jack (engine ground) and appropriate jack with an ohmmeter or other low current tester (less than 200 milliamps):	Yes ▶	GO to A7.
		No ▶	GO to Hydraulic/Mechanical Diagnosis as outlined.

Solenoid	Tester Jack
SS-1	SS-1/VPWR
SS-2	SS-2/VPWR
SS-3	SS-3/VPWR

- Connection should show infinite resistance (no continuity).
- **Is there continuity?**



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A7	AXODE (AX4S) INTERNAL ELECTRONIC DIAGNOSTICS		
	• Drain transaxle fluid. • Remove transaxle side pan. • Check that internal harness connectors are fully engaged on the shift solenoids. • Check that internal harness connector terminals are fully seated in the connectors. • Inspect connectors for damage. • **Are connectors OK?**	Yes ▶ No ▶	GO to A8. SERVICE as required.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST A: DIAGNOSTIC TROUBLE CODES: 621, 622 AND 641 SOLENOID CIRCUIT FAILURES; 645, 646, 647 and 648 INCORRECT GEAR RATIO OBTAINED (Continued)

TEST STEP		RESULT	ACTION TO TAKE
A8	CHECK INTERNAL AXODE (AX4S) HARNESS (CONTINUITY)		
	• Disconnect the internal harness from the solenoid assemblies. **CAUTION: Do not probe into connector terminals, as this will cause a loss of spring tension and possible failure.** • For SS-1, connect positive lead from an ohmmeter to tester jack SS-1 and negative lead at the Orange wire of the SS-1 wire connector. • Record resistance. • **Is resistance less than 0.5 ohm?** • For SS-2, connect positive lead from an ohmmeter to tester jack SS-2 negaive lead at the Pink wire of the SS-2 wire connector. • Record resistance. • **Is resistance less than 0.5 ohm?** • For SS-3, connect positive lead from an ohmmeter to tester SS-3 jack and negative lead at the Yellow wire of the SS-3 wire connector. • Record resistance. • **Is resistance less than 0.5 ohm?** • For SS-1, SS-2, and SS-3 VPWR, connect the positive lead from an ohmmeter to the appropriate lead for VPWR and negative lead to the Red wire for SS-1 VPWR, Red wire for SS-2 VPWR or Red wire for SS-3 VPWR. • Record resistance. • **Is resistance less than 0.5 ohm?**	Yes ▶ No ▶	GO to **A9.** REPLACE internal harness. GO to **A10.**
A9	CHECK INTERNAL AXODE (AX4S) HARNESS (SHORTS TO GROUND)		
	• Check for continuity between BAT- jack (engine ground) and appropriate wire with an ohmmeter or other low current tester (less than 200 milliamps). • Connection should show infinite resistance (no continuity). • **Is there continuity?**	Yes ▶ No ▶	REPLACE internal harness. GO to **A10.** GO to **A10.**
A10	CHECK SOLENOID RESISTANCE AT SOLENOID		
	• Check solenoid resistance by connecting an ohmmeter at the terminals of the solenoid assembly. • Measure and record resistance for each solenoid. (SS-1, SS-2, SS-3) • **Is resistance between 15-25 ohms?**	Yes ▶ No ▶	GO to **A11.** REPLACE shift solenoid.

Solenoid	Signal	VPWR
SS-1	Orange	Red
SS-2	Pink	Red
SS-3	Yellow	Red

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST A: DIAGNOSTIC TROUBLE CODES: 621, 622 AND 641 SOLENOID CIRCUIT FAILURES; 645, 646, 647 and 648 INCORRECT GEAR RATIO OBTAINED (Continued)

TEST STEP		RESULT ▶	ACTION TO TAKE
A11	CHECK SOLENOID FOR SHORT TO GROUND		
	• Check for continuity between engine ground and appropriate shift solenoid terminal with ohmmeter or other low current tester (less than 200 milliamps).	Yes ▶	REPLACE shift solenoid.
		No ▶	GO to Hydraulic / Mechanical Diagnosis as outlined.

Solenoid	Terminals As Marked On Solenoid
SS-1	+/-
SS-2	+/-
SS-3	+/-

• Connection should show infinite resistance (no continuity).
• **Is there continuity?**

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PINPOINT TEST B: DIAGNOSTIC TROUBLE CODES: 636, 637 and 638 TOT HIGHER/LOWER THAN EXPECTED

TEST STEP		RESULT ▶	ACTION TO TAKE
B1	AXODE (AX4S) ELECTRONIC DIAGNOSTICS		
	NOTE: Transaxle must be at operating temperature.	Yes ▶	GO to B2.
	• The following items must be checked before proceeding: — Check the PCM for proper function (On-Board Diagnostics). — Check vehicle wiring harness for continuity and shorts to ground. — Make sure all connectors are engaged properly. — Make sure all terminals in connectors are properly seated. — Check all connectors for damage, corrosion, water, bent pins and missing or damaged seals. • **Have items been checked?**	No ▶	PERFORM checks.
B2	CHECK HARNESS CONNECTIONS		
	• Check that vehicle harness connector is fully engaged on transaxle connector. • Check that vehicle harness connector terminals are fully engaged in connector. • **Are the harness / terminals fully engaged?**	Yes ▶	GO to B3.
		No ▶	SERVICE as required.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: DIAGNOSTIC TROUBLE CODES: 636, 637 and 638 TOT HIGHER/LOWER THAN EXPECTED (Continued)

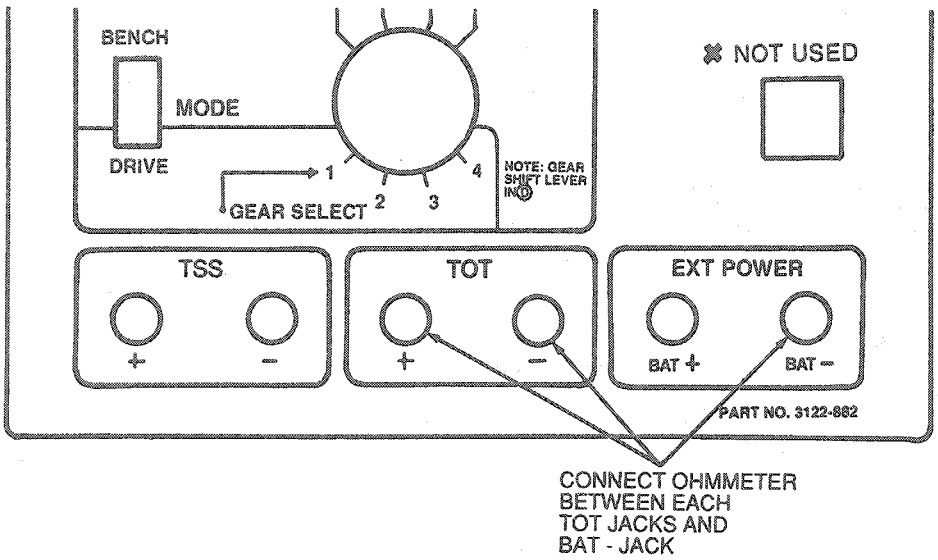
TEST STEP		RESULT ▶	ACTION TO TAKE
B3	CHECK RESISTANCE OF TOT SENSOR		
	NOTE: Be sure tester solenoid select switch is in the OHMS CHECK position or damage to ohmmeter may result. • Vehicle at normal operating temperature. • Disconnect vehicle harness at transaxle. **CAUTION: Do not pry on connector. Pull vehicle harness connector.** • Install Rotunda Transmission tester 007-00085 or equivalent to transaxle connector. • Set Bench/Drive switch to BENCH mode. • Rotate solenoid select switch to OHMS CHECK mode. • Connect ohmmeter negative lead to -TOT jack and positive lead to +TOT jack. • Perform tests 1 and 2. NOTE: While performing Tests 1 and 2 observe resistances. Code 637 is set if resistance value exceeds 869K ohms (OPEN circuit). Code 638 is set if resistance value falls below 597 ohms (SHORT circuit). • Test 1 • Record resistance. • Resistance should be approximately in the following ranges: **TRANSMISSION FLUID TEMPERATURE** • Test 2 • Check for intermittent short or open. • If resistance was between 0.8K and 100K ohms, perform following test. If transaxle is cold, run transaxle to heat it up. If transaxle is warm, allow transaxle to cool. Check TOT sensor resistance again. Compare resistance with initial resistance. Resistance should decrease if transaxle was heated and should increase if transaxle was allowed to cool. If correct change in resistance occurs, REPEAT On-Board Diagnostics. • **Is resistance in range?**	Yes ▶ No ▶	GO to B4. GO to B5.

°C	°F	Resistance (Ohms)
0-20	32-58	100K-37K
21-40	59-104	37K-16K
41-70	105-158	16K-5K
71-90	159-194	5K-2.7K
91-110	195-230	2.7K-1.5K
111-130	231-266	1.5K-0.8K

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: DIAGNOSTIC TROUBLE CODES: 636, 637 and 638 TOT HIGHER/LOWER THAN EXPECTED (Continued)

TEST STEP		RESULT	ACTION TO TAKE
B4	CHECK TOT SENSOR/HARNESS FOR SHORT TO GROUND		
	• Check for continuity between BAT- jack (engine ground) and appropriate jack (-TOT and +TOT) with ohmmeter or other low current tester (less than 200 milliamps). • Connection should show infinite resistance (no continuity). • **Is there continuity?**	Yes ▶ No ▶	GO to **B5.** REPEAT Self-Test. If DTC is still present, REFER to the Powertrain Control/Emissions Diagnosis Manual[27] for PCM and vehicle harness diagnosis.



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B5	AXODE (AX4S) INTERNAL ELECTRONIC DIAGNOSTICS		
	• Drain transaxle fluid. • Remove transaxle side pan. • Check that internal harness connector is fully engaged on the TOT sensor. • Check that internal harness connector terminals are fully seated in the connector. • Inspect the connector for damage. • **Is everything in good condition?**	Yes ▶ No ▶	GO to **B6.** SERVICE as required.
B6	CHECK INTERNAL AXODE (AX4S) HARNESS (CONTINUITY)		
	• Disconnect internal harness from TOT sensor. **CAUTION: Do not probe into the connector terminals.** • Connect positive lead from an ohmmeter to tester +TOT jack and negative lead at Black wire of TOT sensor connector. • Record resistance. Resistance should be less than 0.5 ohm. • Connect positive lead from ohmmeter to tester -TOT jack and negative lead to the White wire of the TOT wire connector. • Record resistance. Resistance should be less than 0.5 ohm. • **Is each resistance less than 0.5 ohm?**	Yes ▶ No ▶	GO to **B7.** REPLACE internal harness. GO to **B8.**

27 Can be purchased as a separate item.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST B: DIAGNOSTIC TROUBLE CODES: 636, 637 and 638 TOT HIGHER/LOWER THAN EXPECTED (Continued)

TEST STEP	RESULT	ACTION TO TAKE
B7 CHECK INTERNAL AXODE (AX4S) HARNESS (SHORTS TO GROUND) ● Check for continuity between BAT- jack (engine ground) and appropriate wire (+TOT and -TOT) with ohmmeter or other low current tester (less than 200 milliamps). ● Connection should show infinite resistance (no continuity). ● **Is there continuity?**	Yes ▶ No ▶	REPLACE internal harness. GO to **B8.** GO to **B8.**
B8 CHECK TOT SENSOR RESISTANCE ● Check sensor resistance by connecting an ohmmeter at terminals of TOT sensor assembly. ● Record resistance. ● Resistance should be in range of temperature of vehicle. ● Resistance should be approximately in the following ranges: ● **Is resistance in range?**	Yes ▶ No ▶	GO to **B9.** REPLACE TOT sensor.
B9 CHECK TOT SENSOR FOR SHORT TO GROUND ● Check for continuity between BAT- jack (engine ground) and appropriate terminal on TOT with ohmmeter or other low current tester (less than 200 milliamps). ● Connection should show infinite resistance (no continuity). ● **Is there continuity?**	Yes ▶ No ▶	REPLACE TOT sensor. RERUN Self-Test. If DTC is still present, REFER to Powertrain Control/Emissions Diagnosis Manual[28] to diagnose vehicle harness or PCM concerns.

Sensor	Wire From Top Connector
TOT+	Black
TOT-	White

TRANSMISSION FLUID TEMPERATURE

°C	°F	Resistance (Ohms)
0-20	32-56	100K-37K
21-40	59-104	37K-16K
41-70	105-158	16K-5K
71-90	159-194	5K-2.7K
91-110	195-230	2.7K-1.5K
111-130	231-266	1.5K-0.8K

Sensor	Terminal
TOT	+/-

TD10346B

28 Can be purchased as a separate item.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST C: DIAGNOSTIC TROUBLE CODES 628 TORQUE CONVERTER ERROR DETECTED, 652 TORQUE CONVERTER CLUTCH CIRCUIT FAILURE AND 656 CONTINUOUS SLIP ERROR DETECTED

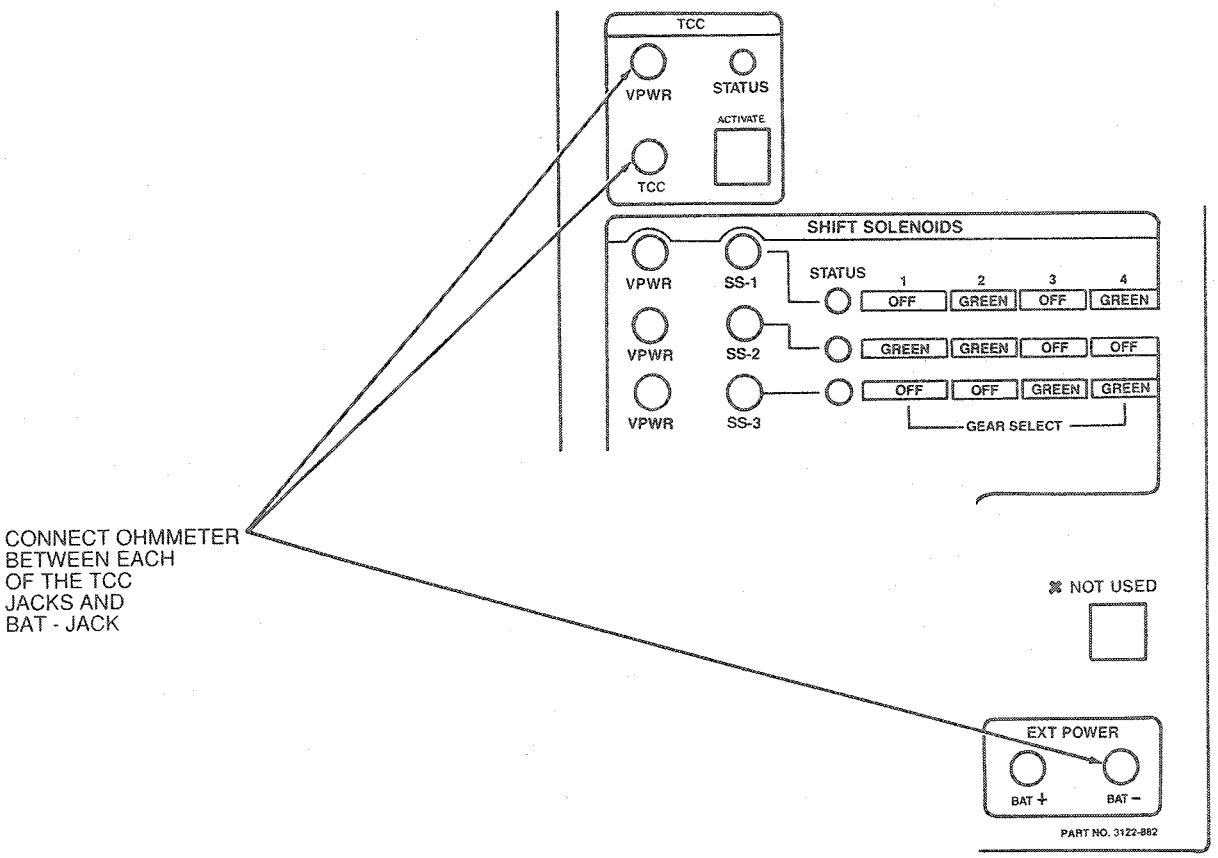
TEST STEP		RESULT	ACTION TO TAKE
C1	AXODE (AX4S) ELECTRONIC DIAGNOSTICS		
	• The following items must be checked before proceeding: — Check the PCM for proper function (On-Board Diagnostics). — Check vehicle wiring harness for continuity and shorts to ground. — Make sure all connectors are engaged properly. — Make sure all terminals in connectors are properly seated. — Check all connectors for damage, corrosion, water, bent pins and missing or damaged seals. • **Have items been checked?**	Yes ▶ No ▶	GO to C2. PERFORM checks.
C2	CHECK HARNESS CONNECTIONS		
	• Check that vehicle harness connector is fully engaged on transaxle connector. • Check that vehicle harness connector terminals are fully engaged in connector. • **Are connector/terminals fully engaged?**	Yes ▶ No ▶	GO to C3. SERVICE as required.
C3	TRANSAXLE FUNCTIONAL TEST		
	• Disconnect vehicle harness at transaxle. **CAUTION: Do not pry connector. Pull vehicle harness connector.** • Install tester to transaxle connector. • Using tests outlined under Transmission Tester Instructions. — Perform TCC Solenoid Function Test as outlined. NOTE: LED will turn GREEN when solenoid activates and turns OFF when deactivated. LED will turn RED if an activated solenoid/harness is shorted to B+. LED will remain OFF if an activated solenoid/harness is shorted to ground or no continuity (open circuit). • **Does TCC (LED GREEN) activate when tester switch is depressed?**	Yes ▶ No ▶	GO to C4. GO to C5.
C4	TRANSAXLE DRIVE TEST		
	• Perform Transaxle Drive Test as outlined. • While in second gear depress the TCC switch. • **Does TCC activate (LED GREEN)? Does engine rpm drop?**	Yes ▶ No ▶	REFER to Powertrain Control/Emissions Diagnosis Manual[29] to diagnose PCM and vehicle harness concerns. GO to C5.
C5	CHECK RESISTANCE OF SOLENOID/HARNESS		
	NOTE: Refer to AXODE (AX4S) Transmission Tester for terminal locations. • Set Bench/Drive switch to BENCH mode. • Rotate gear select switch to OHMS CHECK mode. • Connect ohmmeter negative lead to TCC jack and positive lead to VPWR jack on tester. This is to test TCC. • Record resistance. Resistance should be between 0.98-1.6 ohms. • **Is the resistance within specifications?**	Yes ▶ No ▶	GO to C6. Internal harness or solenoid may be damaged. GO to C7.

29 Can be purchased as a separate item.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST C: DIAGNOSTIC TROUBLE CODES 628 TORQUE CONVERTER ERROR DETECTED, 652 TORQUE CONVERTER CLUTCH CIRCUIT FAILURE AND 656 CONTINUOUS SLIP ERROR DETECTED (Continued)

TEST STEP		RESULT	ACTION TO TAKE
C6	CHECK SOLENOID / HARNESS FOR SHORT TO GROUND		
	• Check for continuity between BAT- jack (engine ground) and appropriate jack with an ohmmeter or other low current tester (less than 200 milliamps). Solenoid: TCC — Tester Jack: TCC VPWR • Connection should show infinite resistance (no continuity). • **Is there continuity?**	Yes No	GO to C7. REFER to Hydraulic / Mechanical Diagnosis as outlined to diagnose torque converter clutch concerns.



D10370-B

C7	AXODE (AX4S) INTERNAL ELECTRONIC DIAGNOSTICS		
	• Drain transaxle fluid. • Remove transaxle side pan. • Check that the internal harness connector is fully engaged on the TCC solenoid assembly. • Check that the internal harness connector terminals are fully seated in the connector. • Inspect the connector for damage. • **Are the connector / terminals in good condition?**	Yes No	GO to C8. SERVICE as required.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST C: DIAGNOSTIC TROUBLE CODES 628 TORQUE CONVERTER ERROR DETECTED, 652 TORQUE CONVERTER CLUTCH CIRCUIT FAILURE AND 656 CONTINUOUS SLIP ERROR DETECTED (Continued)

TEST STEP		RESULT	ACTION TO TAKE
C8	CHECK INTERNAL AXODE (AX4S) HARNESS (CONTINUITY)		
	• Disconnect the internal harness from the solenoid assembly. (TCC wire connector). **CAUTION: Do not probe into connector terminals.** • Connect positive lead from an ohmmeter to tester TCC jack and the negative lead at the Brown wire at the TCC connector. • Record resistance. Resistance should be less than 0.5 ohm. • Next, connect the positive lead from an ohmmeter to the tester VPWR jack and the negative lead to the Green wire of the TCC connector. • Record resistance. • **Is each resistance less than 0.5 ohm?**	Yes ▶ No ▶	GO to **C9.** REPLACE internal harness. GO to **C10.**
C9	CHECK INTERNAL AXODE (AX4S) HARNESS (SHORTS TO GROUND)		
	• Check for continuity between BAT- jack (engine ground) and the appropriate wire with an ohmmeter or other low current tester (less than 200 milliamps). • Connection should not show continuity (infinite). • **Is there continuity?**	Yes ▶ No ▶	REPLACE internal harness. GO to **C10.** GO to **C10.**
C10	CHECK SOLENOID RESISTANCE		
	• Check solenoid resistance by connecting an ohmmeter to the terminals of the TCC solenoid. • Record resistance. • Resistance should be between 0.98-1.6 ohms. • **Is resistance within specifications?**	Yes ▶ No ▶	GO to **C11.** REPLACE TCC solenoid.
C11	CHECK SOLENOID FOR SHORT TO GROUND		
	• Check for continuity between BAT- jack (engine ground) and each solenoid terminal on the TCC with an ohmmeter or other low current tester (less than 200 milliamps). • Connection should show infinite resistance (no continuity). • **Is there continuity?**	Yes ▶ No ▶	REPLACE TCC solenoid. REFER to Hydraulic / Mechanical Diagnosis as outlined.

Solenoid	Wire
TCC	Brown Green

Solenoid	Terminal
TCC	+/-

TD10347B

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST D: DIAGNOSTIC TROUBLE CODES: 522 MLP NOT INDICATING PARK FOR TEST; 634 MLP VOLTAGE HIGHER/LOWER THAN EXPECTED

TEST STEP		RESULT	ACTION TO TAKE
D1	AXODE (AX4S) ELECTRONIC DIAGNOSTICS		
	• The following items must be checked before proceeding: — Check the PCM for proper function (On-Board Diagnostics). — Check vehicle wiring harness for continuity and shorts to ground. — Make sure all connectors are engaged properly. — Make sure all terminals in connectors are properly seated. — Check all connectors for damage, corrosion, water, bent pins and missing or damaged seals. • **Have items been checked?**	Yes No	GO to D2. PERFORM checks.
D2	CHECK HARNESS CONNECTIONS		
	• Check that vehicle harness connector is fully engaged on transaxle manual lever position (MLP) sensor connector. • Check that vehicle harness connector terminals are fully engaged in connector. • **Are connector/terminals fully engaged?**	Yes No	GO to D3. SERVICE as required.
D3	ADJUST MANUAL LEVER POSITION (MLP) SENSOR		
	• Apply the parking brake. • Place transaxle in NEUTRAL. • Verify manual lever position using Gear Position Sensor Adjuster Tool T91P-70010-A. • **Is sensor adjusted correctly?**	Yes No	GO to D4. ADJUST sensor as outlined under Transaxle Assembly and REPEAT Self-Test.
D4	CHECK OPERATION OF MANUAL LEVER POSITION SENSOR		
	• Disconnect vehicle harness from MLP sensor. **CAUTION: Do not pry connector. Compress lever and pull out on connector.** • Insert Manual Lever Position Sensor Tester D89T-70010-A or equivalent into the MLP sensor. • Plug ohmmeter into MLP tester. • Using procedures on tester, verify sensor functions in all positions. — Check continuity and resistance in all positions. NOTE: For AXODE (AX4S) the second gear position on the tester has the same resistance as the AXODE (AX4S) in DRIVE (second gear SHO only).	Yes No	REFER to Powertrain Control/Emissions Diagnosis Manual[30] for diagnosis of PCM and vehicle wiring harness. REPLACE MLP sensor and RERUN Self-Test.

Transaxle Shift Position	Resistance (Ohms) Minimum	Maximum
P	3770	4607
R	1304	1593
N	660	807
OD	361	442
2/D	190	232
1	78	95

• **Is the MLP sensor within specifications?**

TD10292B

30 Can be purchased as a separate item.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST E: DIAGNOSTIC TROUBLE CODES: 624 AND 625 EPC CIRCUIT FAILURES

TEST STEP		RESULT ▶	ACTION TO TAKE
E1	AXODE (AX4S) ELECTRONIC DIAGNOSTICS		
	• The following items must be checked before proceeding: — Check the PCM for proper function (On-Board Diagnostics). — Check vehicle wiring harness for continuity and shorts to ground. — Make sure all connectors are engaged properly. — Make sure all terminals in connectors are properly seated. — Check all connectors for damage, corrosion, water, bent pins and missing or damaged seals. • **Have items been checked?**	Yes ▶ No ▶	GO to E2. PERFORM checks.
E2	CHECK HARNESS CONNECTIONS		
	• Check that vehicle harness connector is fully engaged on transaxle connector. • Check that vehicle harness connector terminals are fully engaged in connector. • **Are connectors / terminals fully engaged?**	Yes ▶ No ▶	GO to E3. SERVICE as required.
E3	TRANSAXLE FUNCTIONAL TEST		
	• Disconnect vehicle harness at transaxle connector. **CAUTION: Do not attempt to pry connector. Pull vehicle harness connector.** • Install line pressure gauge at line tap on case. • Install Rotunda Transmission Tester 007-00085 or equivalent to transaxle connector. • Set Bench / Drive switch to DRIVE mode. • Rotate gear selector switch to first gear position. • Using tests outlined under Tester instructions, perform EPC Functional Test. NOTE: LED will turn GREEN when solenoid activates and turn OFF when deactivated. LED will turn RED if activated solenoid / harness is shorted to B+. LED will remain OFF if an activated solenoid / harness is shorted to ground or no continuity (open circuit). • **Does EPC (LED) activate when EPC switch is depressed?** • Observe line pressure on gauge while depressing the EPC switch (engine must be running). • **Does line pressure drop?**	Yes ▶ No ▶	REFER to Powertrain Control / Emissions Diagnosis Manual[31] to diagnose PCM or vehicle harness. GO to E4.
E4	CHECK RESISTANCE OF SOLENOID / HARNESS		
	• Set Bench / Drive switch to BENCH mode. • Rotate gear select switch to OHMS CHECK position. • Connect ohmmeter negative lead to EPC jack and positive lead to VPWR jack on tester. This is to test EPC solenoid and harness. • Record resistance. • **Is resistance between 3.23-5.5 ohms?**	Yes ▶ No ▶	GO to E5. Internal harness or solenoid may be damaged. GO to E6.

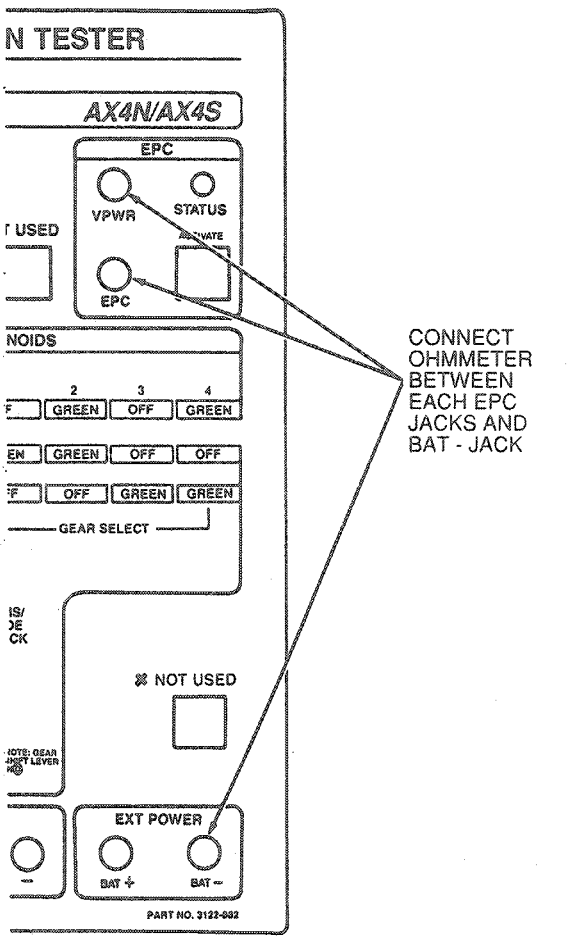
31 Can be purchased as a separate item.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST E: DIAGNOSTIC TROUBLE CODES: 624 AND 625 EPC CIRCUIT FAILURES (Continued)

TEST STEP		RESULT	ACTION TO TAKE
E5	CHECK SOLENOID / HARNESS FOR SHORT TO GROUND		
	• Check for continuity between BAT- jack (engine ground) and appropriate jack with an ohmmeter or other low current tester (less than 200 milliamps).	Yes ▶ No ▶	GO to E6. REFER to Hydraulic / Mechanical Diagnosis charts as outlined.

Solenoid	Tester Jack
EPC	EPC VPWR



D10371-B

- Connection should show infinite resistance (no continuity).
- **Is there continuity?**

E6	AXODE (AX4S) INTERNAL ELECTRONIC DIAGNOSTICS		
	• Drain transaxle fluid. • Remove transaxle side pan. • Check that the internal harness connector is fully engaged on the EPC solenoid assembly. • Check that internal harness connector terminals are fully seated in the connector. • Inspect the connector for damage. • **Is everything engaged and in good condition?**	Yes ▶ No ▶	GO to E7. SERVICE as required.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST E: DIAGNOSTIC TROUBLE CODES: 624 AND 625 EPC CIRCUIT FAILURES (Continued)

TEST STEP		RESULT	ACTION TO TAKE
E7	CHECK INTERNAL AXODE (AX4S) HARNESS (CONTINUITY) • Disconnect internal harness from the EPC solenoid assembly. • Connect the positive lead from ohmmeter to the tester EPC jack and the negative lead at the Blue wire at the EPC connector. • Record resistance. Should be less than 0.5 ohm. • Connect the positive lead from an ohmmeter to the tester VPWR jack and the negative lead at the Green wire at the EPC connector. • Record resistance. • **Is each resistance less than 0.5 ohm?**	Yes No	GO to E8. REPLACE internal harness. GO to E9.
E8	CHECK INTERNAL AXODE (AX4S) HARNESS (SHORTS TO GROUND) • Check for continuity between BAT- jack (engine ground) and the appropriate wire with an ohmmeter or other low current tester (less than 200 milliamps). Solenoid: EPC — Wire: Green - Blue+ • Connection should show infinite resistance (no continuity). • **Is there continuity?**	Yes No	REPLACE internal harness. GO to E9. GO to E9.
E9	CHECK SOLENOID RESISTANCE • Check solenoid resistance by connecting an ohmmeter at the EPC terminals of the solenoid assembly. • Record resistance. • **Is resistance between 3.23 - 5.5 ohms?**	Yes No	GO to E10. REPLACE EPC solenoid.
E10	CHECK SOLENOID FOR SHORT TO GROUND • Check for continuity between BAT- jack (engine ground) and each EPC terminal with ohmmeter or other low current tester (less than 200 milliamps). Solenoid: EPC — Terminal: +/- • Connection should show infinite resistance (no continuity). • **Is there continuity?**	Yes No	REPLACE EPC solenoid. REFER to Hydraulic / Mechanical Diagnosis charts as outlined.

TD10348B

PINPOINT TEST F: DIAGNOSTIC TROUBLE CODE: 639 INSUFFICIENT INPUT FOR TRANSMISSION SPEED SENSOR

TEST STEP		RESULT	ACTION TO TAKE
F1	AXODE (AX4S) ELECTRONIC DIAGNOSTICS • The following items must be checked before proceeding: — Check the PCM for proper function (On-Board Diagnostics). — Check the vehicle wiring harness for continuity and shorts to ground. — Make sure all connectors are engaged properly. — Make sure all terminals in connectors are properly seated. — Check all connectors for damage, corrosion, water, bent pins and missing or damaged seals. • **Have items been checked?**	Yes No	GO to F2. PERFORM checks.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST F: DIAGNOSTIC TROUBLE CODE: 639 INSUFFICIENT INPUT FOR TRANSMISSION SPEED SENSOR (Continued)

TEST STEP		RESULT	ACTION TO TAKE
F2	CHECK HARNESS CONNECTIONS		
	• Check that vehicle harness connector is fully engaged on transaxle TSS connector. • Check that vehicle harness connector terminals are fully engaged in connector. • **Are connectors/terminals fully engaged?**	Yes No	GO to F3. SERVICE as required.
F3	TRANSAXLE FUNCTIONAL TEST		
	• Disconnect vehicle harness at TSS sensor. **CAUTION: Do not pry on the connector. Pull vehicle harness connector.** • Connect Rotunda Transmission Tester 007-00085 or equivalent onto TSS sensor. • Connect voltmeter positive lead to +TSS and negative lead to -TSS. Set voltmeter to AC. • Perform TSS Function Test. Monitor voltmeter. • **Does voltage increase with an increase in vehicle speed?**	Yes No	REFER to the Powertrain Control/Emissions Diagnosis Manual[32] to diagnose vehicle harness or PCM concerns. GO to F4.
F4	CHECK RESISTANCE OF TRANSMISSION SPEED SENSOR (TSS)		
	NOTE: Refer to Transmission Tester for terminal locations. • Connect ohmmeter negative lead to +TSS jack and positive lead to -TSS jack on tester. This is to test TSS sensor. • Record resistance. • **Is resistance between 100-200 ohms?**	Yes No	GO to F5. REPLACE sensor. RERUN TSS Function Test.

32 Can be purchased as a separate item.

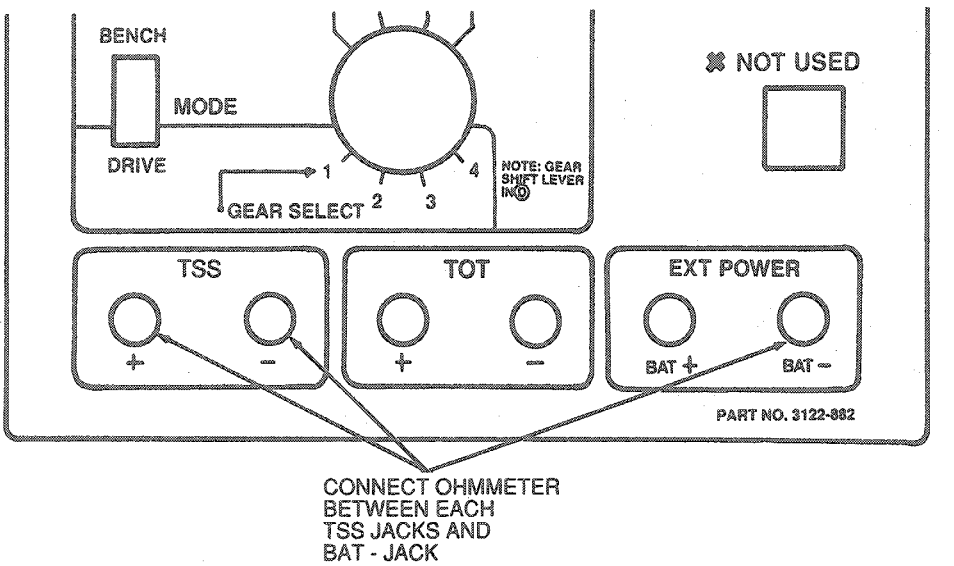
DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST F: DIAGNOSTIC TROUBLE CODE: 639 INSUFFICIENT INPUT FOR TRANSMISSION SPEED SENSOR (Continued)

TEST STEP		RESULT	ACTION TO TAKE
F5	CHECK SENSOR FOR SHORT TO GROUND		
	• Check for continuity between BAT- jack (engine ground) and appropriate jack with an ohmmeter or other low current tester (less than 200 milliamps).	No ▶	REPLACE TSS sensor. RERUN TSS Function Test.
		Yes ▶	GO to F6.

Sensor	Tester Jack
TSS	+TSS -TSS

• Connection should show infinite resistance (no continuity),
• **Is there continuity?**

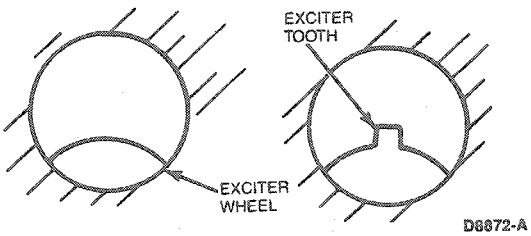


D10372-B

F6	CHECK TSS MAGNETISM		
	• Remove TSS from transaxle. • Place TSS against a metal surface to which a magnet would stick. The TSS should be magnetized and stick to metal surface. • **Does TSS stick?**	Yes ▶	GO to F7.
		No ▶	REPLACE TSS. RERUN TSS Function Test.

DIAGNOSIS AND TESTING (Continued)

PINPOINT TEST F: DIAGNOSTIC TROUBLE CODE: 639 INSUFFICIENT INPUT FOR TRANSMISSION SPEED SENSOR (Continued)

TEST STEP		RESULT	ACTION TO TAKE
F7	CHECK EXCITER WHEEL		
	• Remove transmission speed sensor. • With remote starter switch start and stop engine until a tooth of the exciter wheel is visible through the TSS hole. NOTE: Ensure a tooth is visible. The exciter wheel will always be visible through the TSS hole.  D8672-A • Measure the depth of the exciter wheel tooth from the outer edge of the chain cover. Distance should not exceed 20.62mm (0.81 inch). MARK tooth with a marker and REPEAT for all four teeth. • **Is depth within specifications?**	Yes No	REPLACE TSS. RERUN TSS Function Test. SERVICE or REPLACE exciter wheel as required. RERUN TSS Function Test.

TD10349B

Shift Point Road Test

This test verifies that shift control valves are operating properly.

1. Bring engine and transaxle up to normal operating temperature.
2. Operate vehicle with transaxle selector in ⓓ range.
3. Apply minimum throttle pressure and observe upshift speeds and speed at which torque converter clutch applies.
4. Stop vehicle and move transaxle selector to D range. Repeat Step 3. Transaxle will make all upshifts except 3-4 and torque converter clutch apply should occur above 46 km/h (27 mph).
5. Depress accelerator pedal to floor, wide open throttle (WOT). Transaxle should shift from third to second, or third to first depending on vehicle speed, and torque converter clutch should release.
6. With vehicle speed above 48 km/h (30 mph), move transaxle selector from D range to 1 range (LOW) and remove foot from accelerator pedal. Transaxle should immediately downshift to second gear. When vehicle speed drops below 32 km/h (20 mph), transaxle should downshift into first gear.
7. If transaxle fails to upshift and/or downshift as outlined, refer to Quick Test.

Transaxle Fluid Level Check

CAUTION: Vehicles should not be driven if fluid level is below DO NOT DRIVE hole.

Transaxle—Operating Temperature

The automatic transaxle fluid level can only be established at an operating temperature of 66°C-77°C (150°F-170°F) (dipstick is hot to the touch). The operating temperature may be obtained by driving 24-32km (15-20 miles) of city-type driving with the outside temperature above 10°C (50°F).

Transaxle—Room Temperature

NOTE: The AXODE (AX4S) transaxle cannot have fluid level established at room temperature.

Fluid level can only be checked at room temperature 21°C-35°C (70°F-95°F) (dipstick cool to the touch) to verify that the level is above the DO NOT DRIVE mark. If fluid level is below, then add only enough Synthetic MERCON® Multi-Purpose Automatic Transmission Fluid E6AZ-19582-B (ESR-M2C163-A2) or equivalent to bring the level above the DO NOT DRIVE mark. Operating temperature must be obtained as outlined to establish correct fluid level if any fluid is added during room temperature check.

Dipstick Reading

The fluid level on the dipstick should be within the cross-hatched area at operating temperature. The fluid level on the dipstick should read above the DO NOT DRIVE mark (bottom hole on dipstick) at room temperature.

Check the fluid as follows:

DIAGNOSIS AND TESTING (Continued)

1. With the transaxle in PARK, engine at idle rpm, foot brakes applied and vehicle on level surface, move the transaxle selector lever through each range, allowing time in each range to engage transaxle. Return to PARK, applying parking brake fully and block the wheels. Do not turn off the engine during the fluid level check.
2. Clean all dirt from the transaxle fluid dipstick cap before removing the dipstick from the filler tube.
3. Pull the dipstick out of the tube, wipe it clean and push it all the way back into the tube. Ensure it is fully seated.
4. Pull the dipstick out of the filler tube again and check the fluid level.

   NOTE: The fluid level indication on the dipstick will be different at operating temperature and room temperature. For the correct fluid level reading on the dipstick, follow the appropriate instructions stated previously.

   CAUTION: If vehicle has been operated for an extended period at high speed, or in city traffic in hot weather, or vehicle is being used to tow a trailer, the fluid must cool approximately 30 minutes after engine has been turned off for an accurate reading to be obtained.

   CAUTION: Use of a fluid other than specified could result in transaxle malfunction and/or failure.

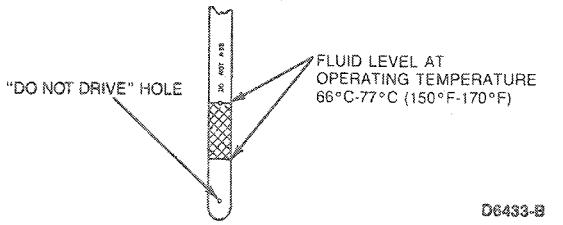
   If necessary, add enough fluid through the filler tube to raise the level to the correct height.

   CAUTION: Do not overfill the transaxle. This will result in foaming, loss of fluid through the vent and possible transaxle malfunction. If overfill occurs, excess fluid must be removed.
5. Install the dipstick, making sure it is fully seated in the tube.

   Overfill can cause the fluid to foam and spill out through the vent, resulting in a transaxle malfunction.

   Underfill can result in transaxle loss of engagement or slipping. This condition is most evident in cold weather or when the vehicle is parked or being driven on a hill.

   If the transaxle fluid level is checked when the fluid is at room temperature, the dipstick could be misread to indicate that fluid should be added. If fluid is added at this time, an overfill condition could result when the fluid reaches operating temperatures of 66°C-77°C (150°F-170°F) (dipstick hot to touch).



Transaxle Fluid Condition Check

1. Perform Transaxle Fluid Level Check as outlined.
2. Observe color and odor of fluid. It should be red, not brown or black. Odor can sometimes indicate an overheating condition or clutch disc or band failure.
3. Use an absorbent white facial tissue to wipe dipstick. Examine stain for evidence of solids (specks of any kind) and for coolant signs (gum or varnish on dipstick).

   If specks are present in the oil or there is evidence of coolant, the transaxle oil pan must be removed for further inspection. If fluid contamination or transaxle failure is confirmed by further evidence of coolant or excessive solids in the oil pan, the transaxle must be disassembled and completely cleaned and serviced. This includes cleaning the torque converter and transaxle cooling system. It would be a waste of time to perform any further checks before cleaning and servicing the transaxle. During disassembly and assembly, all overhaul checks and adjustments of clearances and end play must be made. After the transaxle has been serviced, all diagnosis tests and adjustments listed in the Diagnosis and Testing charts must be completed to ensure that the condition has been corrected.

High or Low Fluid Level

A fluid level that is too high will cause the fluid to become aerated. Aerated fluid will cause low control pressure and the aerated fluid may be forced out the vent.

A fluid level that is too low can affect the operation of the transaxle. Low level may indicate fluid leaks that could cause transaxle damage.

Transaxle Fluid Leakage Checks

Check the vehicle speed sensor (VSS) and speedometer cable connection at the transaxle. Replace the rubber seal if necessary.

Leakage at the oil pan gasket often can be stopped by tightening the attaching bolts to specification. If necessary, replace the gasket.

Check the speedometer gear cover seal.

Check the chain cover-to-case gasket.

DIAGNOSIS AND TESTING (Continued)

Check the bulkhead connectors to chain cover. Replace bulkhead assembly, if necessary.

Check the fluid filler tube connection at the transaxle case. If leakage is found here, install a new grommet.

CAUTION: Do not try to stop the oil leak by increasing the torque beyond specification. This may cause damage to the case threads.

Check the fluid lines and fittings between the transaxle and the cooler in the radiator tank for looseness, wear, or damage. If leakage cannot be stopped by tightening a fluid line tube nut, replace the damaged parts. Refer to Oil Cooler and Steel Lines. When oil is found to be leaking between the case and the cooler line fitting, tighten the fitting to maximum specification. If the leak continues, replace the cooler line fitting and tighten to specification. The same procedure should be followed for oil leaks between the radiator cooler and cooler line fittings.

Check the engine coolant in the radiator. If transaxle fluid is present in the coolant, the cooler in the radiator is probably leaking.

The cooler can be further checked for leaks by disconnecting the lines from the cooler fittings and applying 345-517 kPa (50-75 psi) air pressure to the fittings. Remove the radiator cap to relieve the pressure buildup at the exterior of the oil cooler tank. If the cooler is leaking and/or will not hold pressure, the cooler must be replaced.

If leakage is found at either the throttle control cable grommet or the manual lever shaft, replace either or both seals.

Oil-soluble aniline or fluorescent dyes premixed at the rate of 2.5ml (1/2 teaspoon) of dye powder to 0.23L (1/2 pint) of transmission fluid have proven helpful in locating the source of fluid leakage. Such dyes may be used to determine whether an engine oil or transmission fluid leak is present, or if the fluid in the oil cooler leaks into the engine coolant system. A black light must be used with the fluorescent dye solution.

Check the power steering gear system. The power steering gear system is positioned over the rear of the transaxle and is filled with transmission fluid. Leaks from the power steering gear may pool on the transaxle before dripping onto the ground, thus giving the appearance of a transaxle fluid leak.

Inspect both components carefully before disassembling either. If the power steering system is found to be leaking, refer to Section 11-02. After an engine oil filter change, some residual oil may blow back on the transaxle giving the appearance of transaxle fluid leakage. The area should be cleaned and checked after running the engine.

Oil Cooler Tube Leakage

When fluid leakage is found at the oil cooler, the cooler must be replaced. Refer to Section 03-03.

When one or more of the fluid cooler steel tubes must be replaced, each replacement tube must be fabricated from the same size steel tubing as the original line.

Using the old tube as a guide, bend the new tube as required. Add the necessary fittings and install the tube.

After the fittings have been tightened, add fluid as needed and check for fluid leaks.

Fluid Leakage in Converter Area

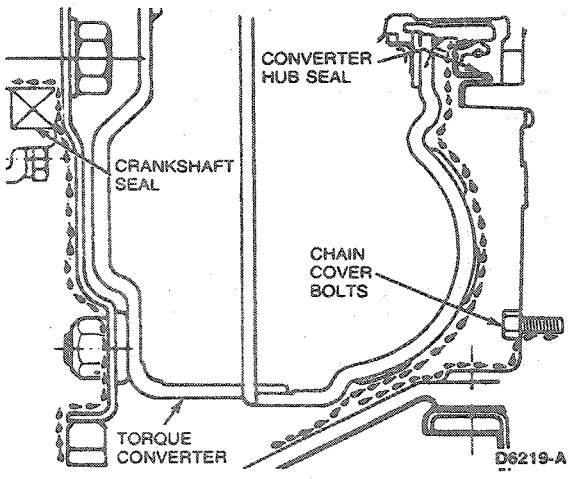
In diagnosing and correcting fluid leaks in the converter area, use the following procedures to locate the exact source of the leakage. Leakage at the front of transaxle, as evidenced by fluid around the converter housing, may have several sources. By careful observation, it is possible in many instances to pinpoint the source of the leak before removing the transaxle from the vehicle. The paths which the fluid can take to reach the bottom of the converter housing are as follows:

1. Fluid leaking by the converter hub seal lip will tend to move along the drive hub and onto the back of the impeller housing. Except in the case of a total seal failure, fluid leakage by the lip of the seal will be deposited on the inside of the converter housing only, near the outside diameter of the housing.
2. Fluid leakage by the outside diameter of the converter hub seal and the case will follow the same path which the leaks by the inside diameter of the seal follow.
3. Fluid leakage from the converter-to-flywheel stud weld will appear at OD of converter on back face of flywheel and in the converter housing only near the flywheel. If a converter-to-flywheel stud leak is suspected, remove converter and pressure check as outlined.
4. Engine oil leaks are sometimes improperly diagnosed as transaxle front pump seal leaks. The following areas of possible leakage should also be checked to determine if engine oil leakage is causing the concern.
   a. Leakage at the rocker arm cover may allow oil to flow over the converter housing or seep down between the converter housing and cylinder block causing oil to be present in or at the bottom of the converter housing.
   b. Oil gallery plug leaks will allow oil to flow down the rear face of the block to the converter housing.
   c. Leakage at the crankshaft seal will work back to the flywheel and then into the converter housing.

DIAGNOSIS AND TESTING (Continued)

5. The following procedures should be used to determine the cause of the leakage before service is made.
   a. Remove the transaxle dipstick and note the color of the fluid. Original factory fill fluid is dyed red to aid in determining if leakage is from the engine or transaxle. Unless a considerable amount of makeup fluid has been added or the fluid has been changed, the red color should assist in pinpointing the leak.
   b. Remove the converter housing cover. Clean off any fluid from the top and bottom of the converter housing, front of the transaxle case and rear face of the engine and oil pan. Clean the converter area by washing with a suitable nonflammable solvent and blow dry with compressed air.
   c. Wash out converter housing and the front of the flywheel. The converter housing may be washed out using cleaning solvent and a squirt-type oil can. Blow all washer areas dry with compressed air.
   d. Start and run the engine until the transaxle reaches its normal operating temperature. Observe the back of the block and top of the converter housing for evidence of fluid leakage. Raise the vehicle on a hoist. Refer to Section 00-02. Run the engine at fast idle, then at engine idle, occasionally shifting to the DRIVE and REVERSE ranges to increase pressure within the transaxle.

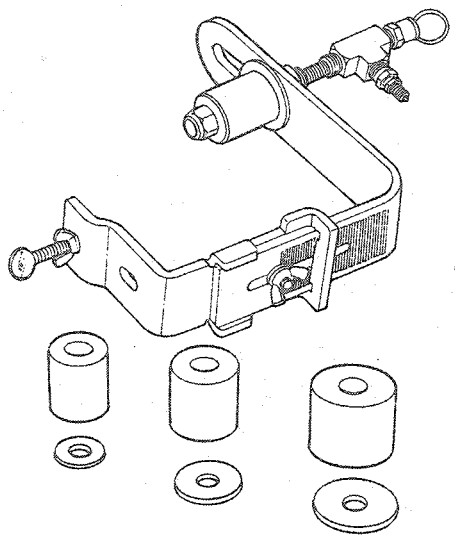
      Observe the front of the flywheel, back of the block (in as far as possible) and inside the converter housing and front of the transaxle case. Run the engine until fluid leakage is evident and the source of leakage can be determined.



Converter Leakage Check

If welds on the torque converter indicate leakage, remove the converter and make the following check.

Assemble Rotunda Torque Converter Leak Test Kit 021-00054 or equivalent to the converter. Test the converter for leaks, following the directions supplied with the Kit.



ROTUNDA TORQUE CONVERTER LEAK TEST KIT 021-00054 D6790-A

NOTE: Prior to performing the following test procedure, the PCM Quick Test should be completed and ALL service codes corrected.

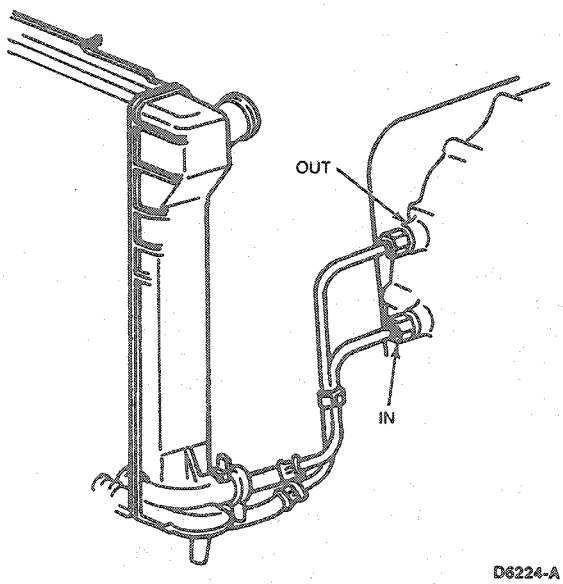
Transaxle Fluid Cooler Flow Test

NOTE: The transaxle linkage adjustment, fluid level and control pressure must be within specification before performing this test. Refer to Section 07-05 for transaxle linkage adjustment.

1. Remove dipstick from filler tube.
2. Place funnel in filler tube.
3. Raise vehicle on a hoist. Refer to Section 00-02.
4. Remove cooler return line (lower fitting) from fitting on transaxle case.
5. Connect a hose to cooler return line. Insert other end of hose into funnel in dipstick tube.
6. Start engine and set idle at 1000 rpm with transaxle in NEUTRAL range.
7. Observe fluid flow at funnel. When fluid flow is solid, the flow should be approximately 0.9 liter (1 qt) in 15-30 seconds.
8. If the flow is not liberal, stop engine. Disconnect hose from cooler return line and connect it to converter-out line fitting (upper fitting) on transaxle case.

DIAGNOSIS AND TESTING (Continued)

9. Repeat Steps 6 and 7. If flow is now liberal, refer to Section 03-03 for Diagnosis of transaxle fluid cooler. If flow is still not liberal, refer to Diagnosis for the following items:
   - Low pump capacity
   - Main circuit system leakage
   - Stuck converter drain valve or converter regulator valve



Stall Test

The stall test checks the operation of the following items:

- Converter one-way clutch
- Forward clutch
- Low one-way clutch
- Reverse clutch
- Low-intermediate band
- Engine performance

NOTE: The stall test should only be performed with the engine and transaxle at normal operating temperatures.

WARNING: APPLY THE SERVICE AND PARKING BRAKES FIRMLY WHILE PERFORMING EACH STALL TEST.

1. Connect tachometer to engine.
2. After testing each of the following ranges (Ⓟ, D, 1, R), move selector lever to N (NEUTRAL) and run engine for about 15 seconds to allow converter to cool before testing next range.

   CAUTION: Do not maintain WOT in any gear range for more than five seconds.

   Press accelerator pedal to floor (WOT) in each range. Record rpm reached in each range. Stall speed should be 1881-2211 rpm (3.0L), 2849-3252 rpm (3.2L) SHO, 1791-2097 rpm (3.8L), and 2225-2602 rpm (3.8L) police.

   CAUTION: If engine rpm recorded by tachometer exceeds maximum specified rpm, release accelerator pedal immediately. Clutch or band slippage is indicated.

   If the stall speeds were too high, refer to the following Stall Speed Chart. If the stall speeds were too low, first check engine tune-up. If engine is OK, remove torque converter and check torque converter reactor one-way clutch for slippage.

STALL SPEED HIGH (SLIP)

Range	Possible Source
Ⓟ, D, 1	• Forward Clutch • Low / Intermediate One-Way Clutch • Low / Intermediate Band or Servo
R	• Forward Clutch • Low / Intermediate One-Way Clutch • Reverse Clutch

Air Pressure Checks

A NO DRIVE condition can exist, even with correct transaxle fluid pressure, because of inoperative clutches or bands. An erratic shift can be located through a series of checks by substituting air pressure for fluid pressure to determine the location of the malfunction.

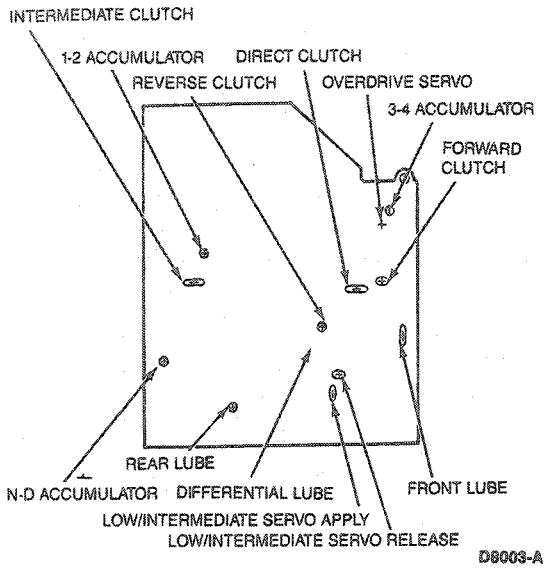
When the selector lever is in a forward gear range (Ⓟ, D, 1), a NO DRIVE condition may be caused by an inoperative forward clutch, low one-way or low / intermediate band. No manual low (1) coast could be caused by an inoperative direct clutch or direct one-way clutch.

Failure to drive in R (REVERSE) could be caused by a malfunction of the reverse clutch, forward clutch or low / intermediate one-way clutch.

1. Drain transaxle fluid and remove oil pan.
2. Remove main control cover. Then remove oil pump and main control assembly.
3. Install air pressure test plate with main control assembly-to-chain cover gasket.

DIAGNOSIS AND TESTING (Continued)

4. The inoperative clutches or bands can be located by introducing air pressure into the various test plate passages as follows:



Forward Clutch

Apply air pressure to forward clutch test port. A dull thud can be heard, or movement of piston felt when clutch piston is applied. If clutch seal(s) is leaking, a hissing sound will be heard.

Overdrive Servo

Apply air pressure to overdrive servo apply test port. Operation of servo is indicated by a tightening of overdrive band around overdrive drum. Because of the cushioning effect of the servo release spring, application of band may not be heard or felt. The servo should hold air pressure without leakage and a dull thud should be heard when air pressure is removed, allowing servo piston to return to release position.

Direct Clutch

Apply air pressure to direct clutch test port. A dull thud can be heard, or movement of piston felt on case as clutch piston is applied. If clutch seal(s) is leaking, a hissing sound will be heard.

Intermediate Clutch

Apply air pressure to intermediate clutch test port. A dull thud can be heard, or movement of piston can be felt on case, as clutch piston is applied. If clutch seal(s) is leaking, a hissing sound will be heard.

Low-Intermediate Servo

Apply air pressure at low-intermediate servo feed test port. The low-intermediate band should tighten around sun gear of rear planetary gearset. Because of the cushioning effect of the servo release spring, application of band may not be heard or felt.

The servo should hold air pressure without leakage and a dull thud should be heard when air pressure is removed, allowing servo piston to return to release position. Apply air pressure to low-intermediate servo release test port while continuing to pressurize the test port. Servo piston should return to the release position. The band should loosen and a dull thud should be heard. Release the feed test port. The release test port should hold pressure without leakage. Any leakage or failure of piston movement requires servo service.

Lube and Rear Lube

Apply air pressure to lube and rear lube test ports. These passages can only be checked for blockage. If either passage holds air pressure, remove service tool plate and check for an obstruction or damage.

1-2, 3-4, and N-D Accumulators

Apply air pressure to each accumulator feed port. Accumulator should apply. Because of the cushioning effect of the accumulator release spring, application of accumulator may not be felt or heard. The accumulator should hold air pressure without leakage and a dull thud should be heard when air pressure is removed, allowing accumulator to return to release position.

Test Results

If the servos do not operate, disassemble, clean and inspect them to locate the source of the trouble.

If air pressure applied to the clutch passages fails to operate a clutch, or operates clutches simultaneously, remove and with air pressure, check the fluid passages in the chain cover, driven sprocket support and clutches to detect obstructions.

If air pressure applied to the accumulator passages fails to operate an accumulator, remove, and with air pressure, check the fluid passages in the chain cover to detect obstructions.

Stator to Impeller Interference Check

Refer to Cleaning and Inspection.

Converter and Oil Cooler

Refer to Cleaning and Inspection.

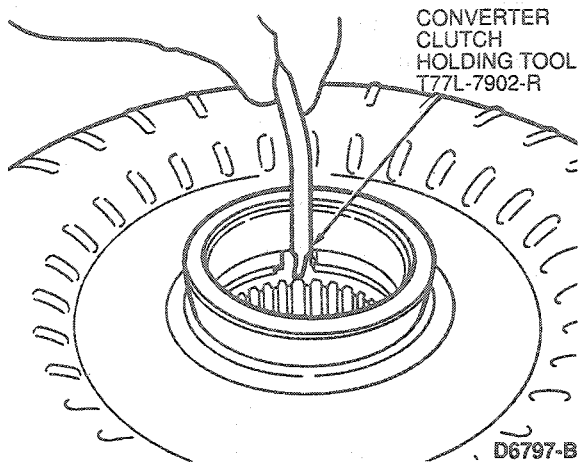
Torque Converter Reactor One-Way Clutch Check

Tools Required:

- Converter Clutch Torquing Tool T76L-7902-C
- Converter Clutch Holding Tool T77L-7902-R

DIAGNOSIS AND TESTING (Continued)

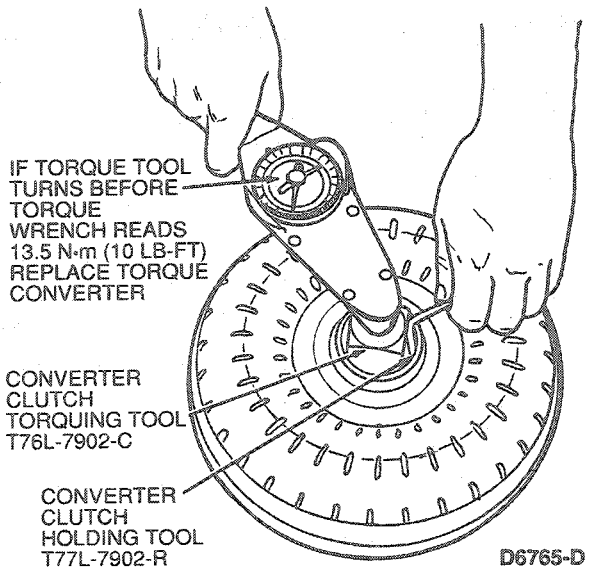
1. Position Converter Clutch Holding Tool T77L-7902-R in thrust washer slot.



2. While holding wire in position, install Converter Clutch Torquing Tool T76L-7902-C in reactor spline.

   Continue holding wire and turn torquing tool counterclockwise with a torque wrench.

   If torquing tool begins to turn before torque wrench reads 13.5 N·m (10 lb-ft), replace converter.

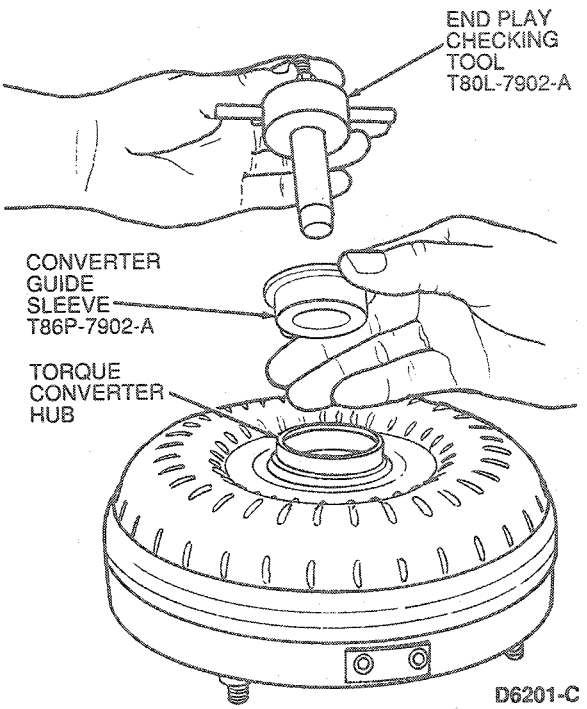


Torque Converter End Play Check

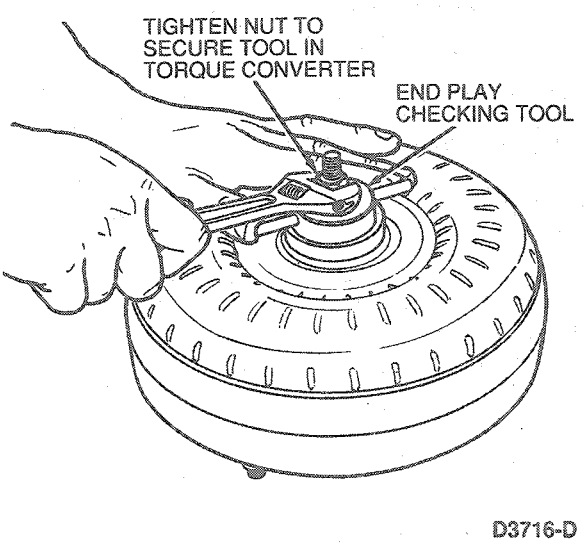
Tools Required:

- End Play Checking Tool T80L-7902-A
- Converter Guide Sleeve T86P-7902-A
- Dial Indicator with Bracketry TOOL-4201-C

1. Position End Play Checking Tool T80L-7902-A and Converter Guide Sleeve T86P-7902-A in torque converter hub.



2. Tighten nut on end play checking tool.

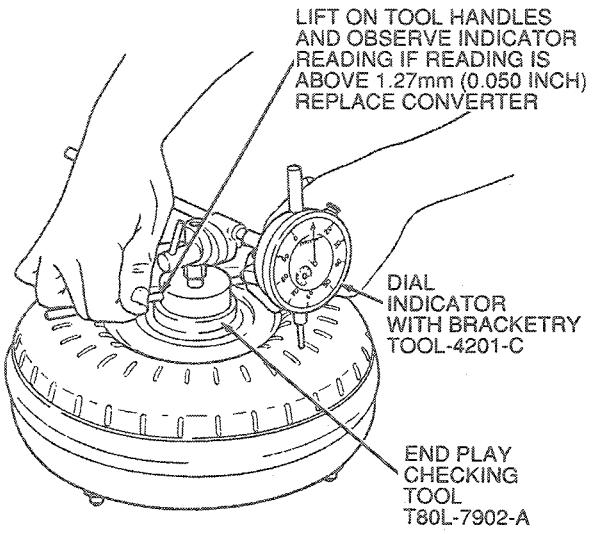


3. Mount Dial Indicator with Bracketry TOOL-4201-C or equivalent on end play checking tool.

   With stylus contacting converter shell and with indicator at zero, lift on checking tool handles.

DIAGNOSIS AND TESTING (Continued)

If indicator reading is above 1.27mm (0.05 inch), replace the converter.



REMOVAL

Transaxle Fluid Drain and Refill

Normal maintenance and lubrication requirements do not necessitate periodic automatic transaxle fluid changes. If a major service, such as a clutch band, bearing, etc., is required in the transaxle, it will have to be removed for service. **At this time the converter, transaxle cooler and cooler lines must be thoroughly flushed to remove any dirt.**

When used under continuous or severe conditions the transaxle and torque converter should be drained and refilled with fluid as specified.

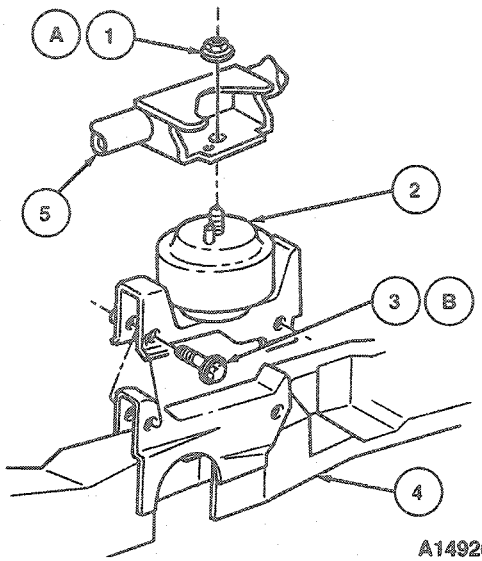
CAUTION: Use of a fluid other than specified could result in transaxle malfunction and/or failure.

Refer to Vehicle Certification Label affixed to left front door lock face panel or door pillar for transaxle code.

When filling a dry transaxle and converter, refer to Specifications for capacity. Check the fluid level.

Procedures for drain and refill, due to in-vehicle service operation, are as follows:

1. Disconnect battery ground cable.
2. Remove battery and battery tray.
3. Secure supply hoses, vacuum lines and wiring away from pump and valve body cover.
4. Remove shift lever.
5. Remove splash shield cover from ABS if equipped.
6. Remove brake reservoir hose from ABS and cap ends to prevent contamination, if equipped.
7. Install engine support equipment as outlined under Transaxle Removal.
8. Remove LH transaxle mount.

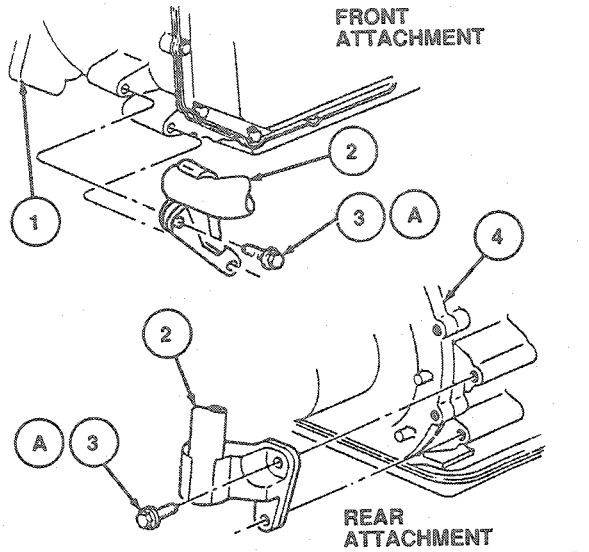


Item	Part Number	Description
1A	N800937-S102	Nut
2	6F063(LH)	Engine Mount Assy
3B	N804749-S100	Bolt (2 Req'd)
4	—	Frame
5	6F065	Support Assy
A		Tighten to 74-102 N·m (55-75 Lb-Ft)
B		Tighten to 81-116 N·m (60-85 Lb-Ft)

TA14926C

9. Remove transaxle side pan upper retaining bolts.
10. Raise vehicle on hoist. Refer to Section 00-02.
11. Remove LH front wheel and tire assembly.
12. Remove inner fender cover and position out of way.
13. Remove rear transaxle mount bolt.
14. Loosen two LH subframe retaining bolts.
15. Remove two engine support mount bolts.
16. Remove four bolts retaining LH engine support and remove support.

REMOVAL (Continued)



A9707-C

Item	Part Number	Description
1	—	Transaxle
2	6F065	Support Assy
3A	N605922-S102	Bolt (2 Req'd)
4	07002	Transaxle
A		Tighten to 54-75 N·m (40-55 Lb-Ft)

TA9707C

17. Position drain pan and remove remaining transaxle side pan bolts and remove pan.
18. Install a new gasket.
19. Carefully install side pan.
20. Loosely install two upper pan bolts.
21. Verify proper gasket position.
22. Install remaining pan bolts and tighten to 14-16 N·m (10-12 lb-ft).
23. Install LH engine mounts and supports. Refer to Transaxle Removal and Installation.
24. Tighten two LH subframe retaining bolts to specification.
25. Install inner fender cover.
26. Install LH wheel and tire assembly.
27. Remove support from engine and transaxle assembly and lower vehicle.
28. Install radiator sight shield.
29. Remove engine support equipment.
30. Install brake reservoir hose.
31. Position supply hoses, vacuum lines and wiring in position.
32. Install manual lever position sensor.
33. Install remote air cleaner.
34. Install battery tray and battery.
35. Raise vehicle on a hoist or jackstands. Refer to Section 00-02.
36. Place a drain pan under transaxle.
37. Loosen lower pan retaining bolts and drain fluid from transaxle.
38. When fluid has drained to level of pan flange, remove rest of pan bolts working from the RH side and allow it to drop and drain slowly.
39. When all fluid has drained from transaxle, remove and thoroughly clean pan. Discard gasket.
40. Remove and replace filter.
41. Place a new gasket on pan and install pan on transaxle.
42. Remove oil cooler return line at cooler and place a suitable hose on oil return line to divert fluid into drain pan.
43. Lower vehicle.
44. Overfill transaxle with 11.36 litres (12 qts) of specified transmission fluid.
45. Start vehicle and run for four minutes.
46. Shut OFF engine.
47. Raise vehicle.
48. Reconnect cooler line.
49. Add 2.36 litres (2.5 qts) of specified transmission fluid.
50. Start engine and bring up to operating temperature. Check transaxle fluid and add as necessary.

Transaxle

Tools Required:

- CV Joint Puller T86P-3514-A1
- CV Joint Puller Extension T86P-3514-A2
- Cooler Line Disconnect Tool T86P-77265-AH
- Impact Slide Hammer D79P-100-A
- Engine Lifting Eyes D81L-6001-D
- Three Bar Engine Support D88L-6000-A
- Engine Lifting Bracket D89L-6001-A
- Rotunda Subframe Removal Kit 014-00751

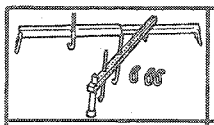
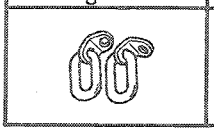
Removal

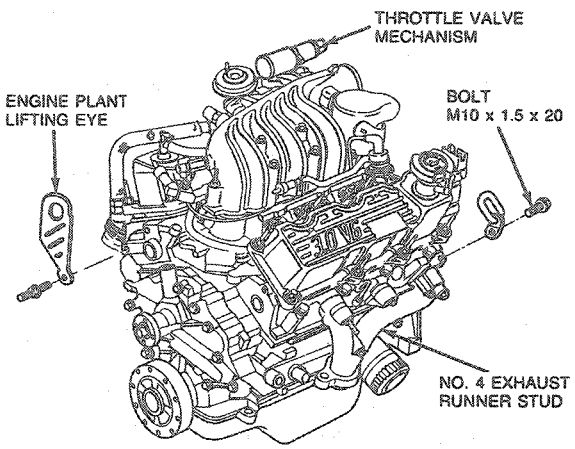
Before beginning the Removal procedure, perform the following preliminary Steps:

1. Position the vehicle on a hoist. Refer to Section 00-02.
2. Place a drain pan under transaxle.
3. Loosen lower pan retaining bolts and drain fluid from transaxle.
4. When fluid has drained to level of pan flange, remove rest of pan bolts working from the RH side and allow it to drop and drain slowly.

REMOVAL (Continued)

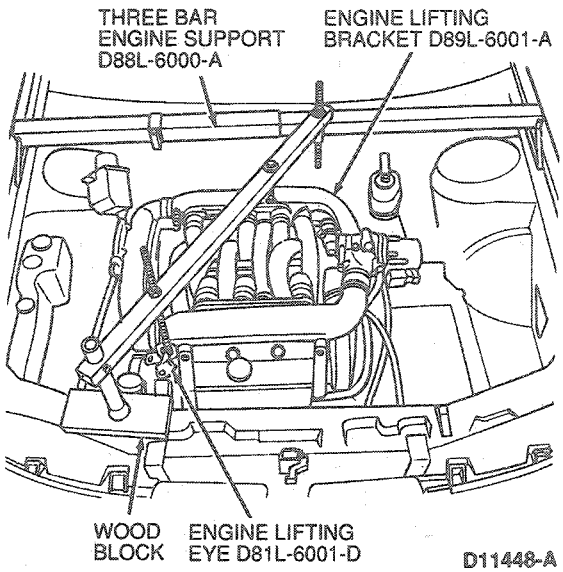
5. When fluid has drained completely reinstall pan bolts.
6. Remove air cleaner assembly, hoses and tubes.
7. Disconnect battery and remove battery.
8. Remove battery tray.
9. Disconnect electrical connectors from engine.
10. Remove bolt retaining main wiring harness bracket.
11. Remove shift lever.
12. On 3.0L install Engine Lifting Eye D81L-6001-D or equivalent to LH rear cylinder with a bolt, M10 x 1.5 x 2.0. The engine plant lifting eye should still be on RH front cylinder. If not, install a second lifting eye as described.

	D88L-6000-A	THREE BAR ENGINE SUPPORT
	D81L-6001-D	ENGINE LIFTING EYES



A9887-E

13. On 3.2L SHO remove bracket on back of engine that retains wiring harness and coolant line and attach Engine Lifting Bracket D89L-6001-A or equivalent and Engine Lifting Eyes D81L-6001-D or equivalent to generator bracket.

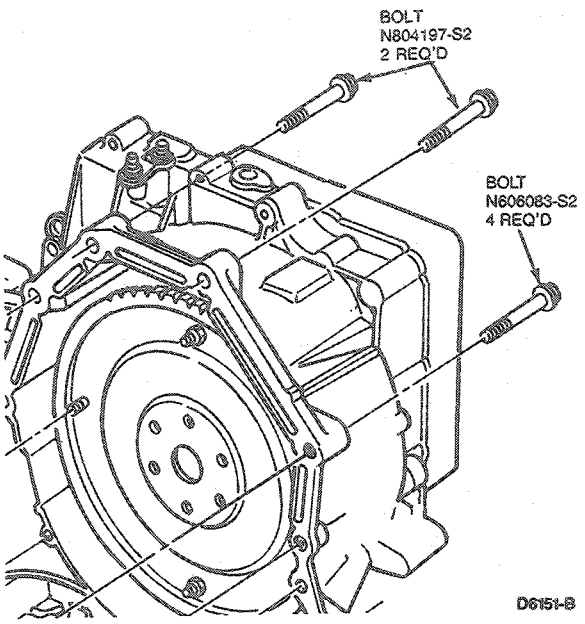


D11448-A

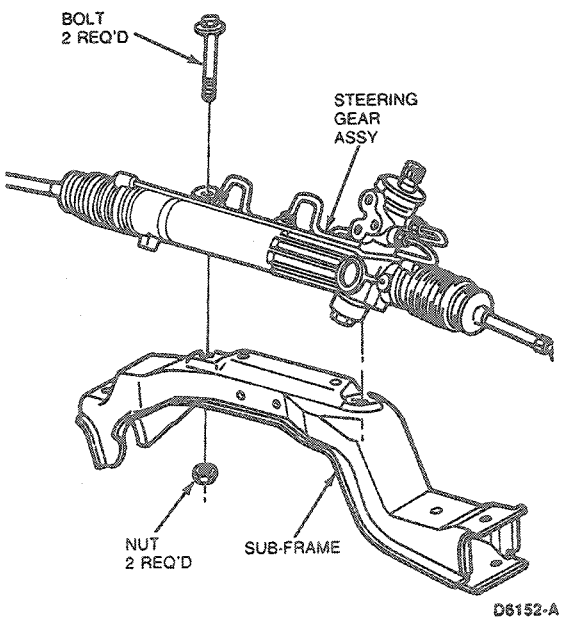
14. On 3.8L install Engine Lifting Eyes to LH front exhaust manifold stud and RH rear exhaust manifold stud.
15. Position Three Bar Engine Support D88L-6000-A or equivalent.
16. Secure wiring harness out of way.
17. Remove radiator sight shield.
18. Position Three Bar Engine Support D88L-6000-A or equivalent.
19. Remove dipstick.
20. Disconnect power steering pump pressure and return line bracket.
21. Remove four 15mm torque converter housing bolts from top of transaxle.
22. Raise vehicle on hoist. Refer to Section 00-02.

REMOVAL (Continued)

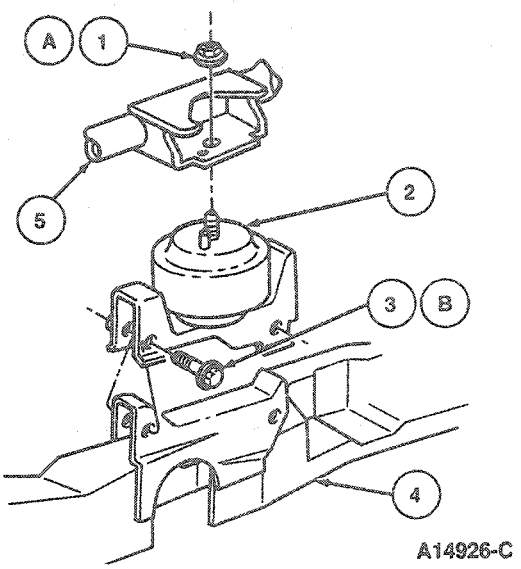
23. Remove front wheel and tire assemblies.



24. Disconnect LH and RH outer tie rod ends.
25. Disconnect brake line support brackets.
26. Remove retaining bolts from front stabilizer bar assembly.
27. Disconnect RH lower arm assembly.
28. Disconnect LH lower arm assembly.
29. Remove retaining nuts from steering gear assembly.



30. Disconnect Heated Oxygen Sensor (HO2S) 9F472.
31. Remove front exhaust pipe, converter assembly and mounting bracket. Refer to Section 09-00.
32. Remove two 15mm bolts from engine mount.

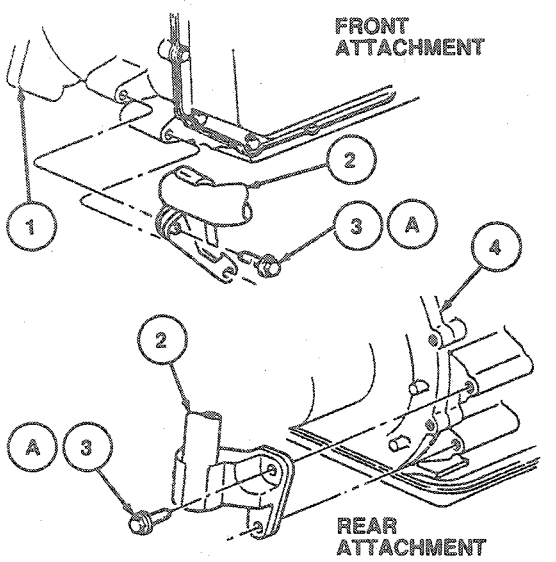


Item	Part Number	Description
1A	N800937-S102	Nut
2	6F063(LH)	Engine Mount Assy
3B	N804749-S100	Bolt (2 Req'd)
4	—	Frame
5	6F065	Support Assy
A		Tighten to 74-102 N·m (55-75 Lb-Ft)
B		Tighten to 81-116 N·m (60-85 Lb-Ft)

TA14926C

33. Remove four 15mm bolts from LH engine support and remove support.

REMOVAL (Continued)



A9707-C

Item	Part Number	Description
1	—	Transaxle
2	6F065	Support Assy
3A	N605922-S102	Bolt (2 Req'd)
4	07002	Transaxle

(Continued)

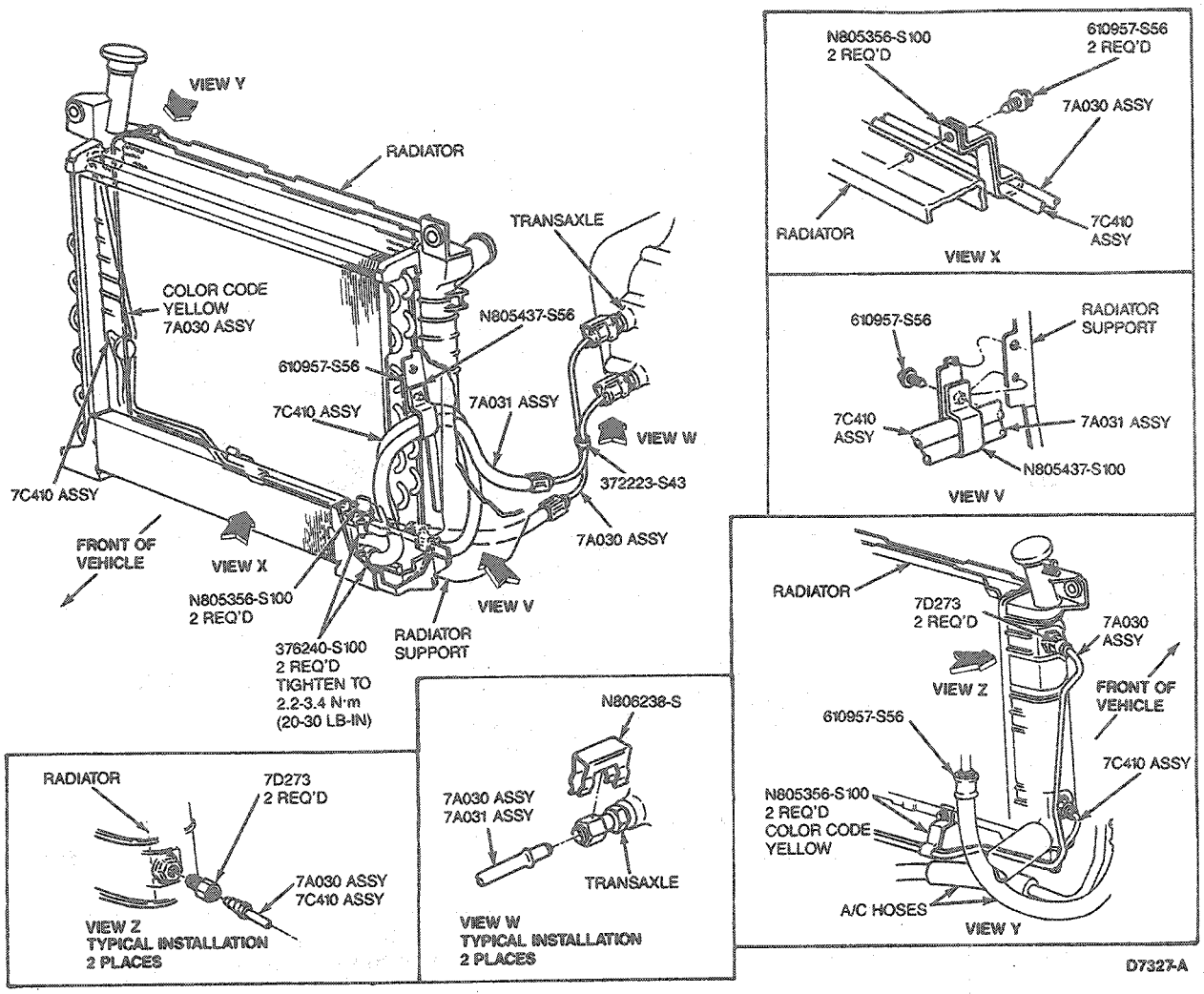
Item	Part Number	Description
A		Tighten to 54-75 N·m (40-55 Lb-Ft)

TA9707C

34. Position Rotunda Subframe Removal Kit 014-00751 or equivalent.
35. Remove power steering gear from subframe, and secure to rear of engine compartment.
36. Remove subframe-to-body retaining bolts and lower subframe.
37. Remove 8mm bolt from dust cover.
38. Remove two starter retaining bolts and position starter out of the way.
39. Remove the dust cover.
40. Rotate engine with 1/2-inch drive ratchet and 7/8-inch deep well socket on crankshaft pulley bolt to align torque converter bolts with starter drive hole. Then, remove four 15mm torque converter-to-flywheel retaining nuts.
41. Remove transaxle cooler line fitting retaining clips.
42. Disconnect transaxle cooler lines using Cooler Line Disconnect Tool T86P-77265-AH.

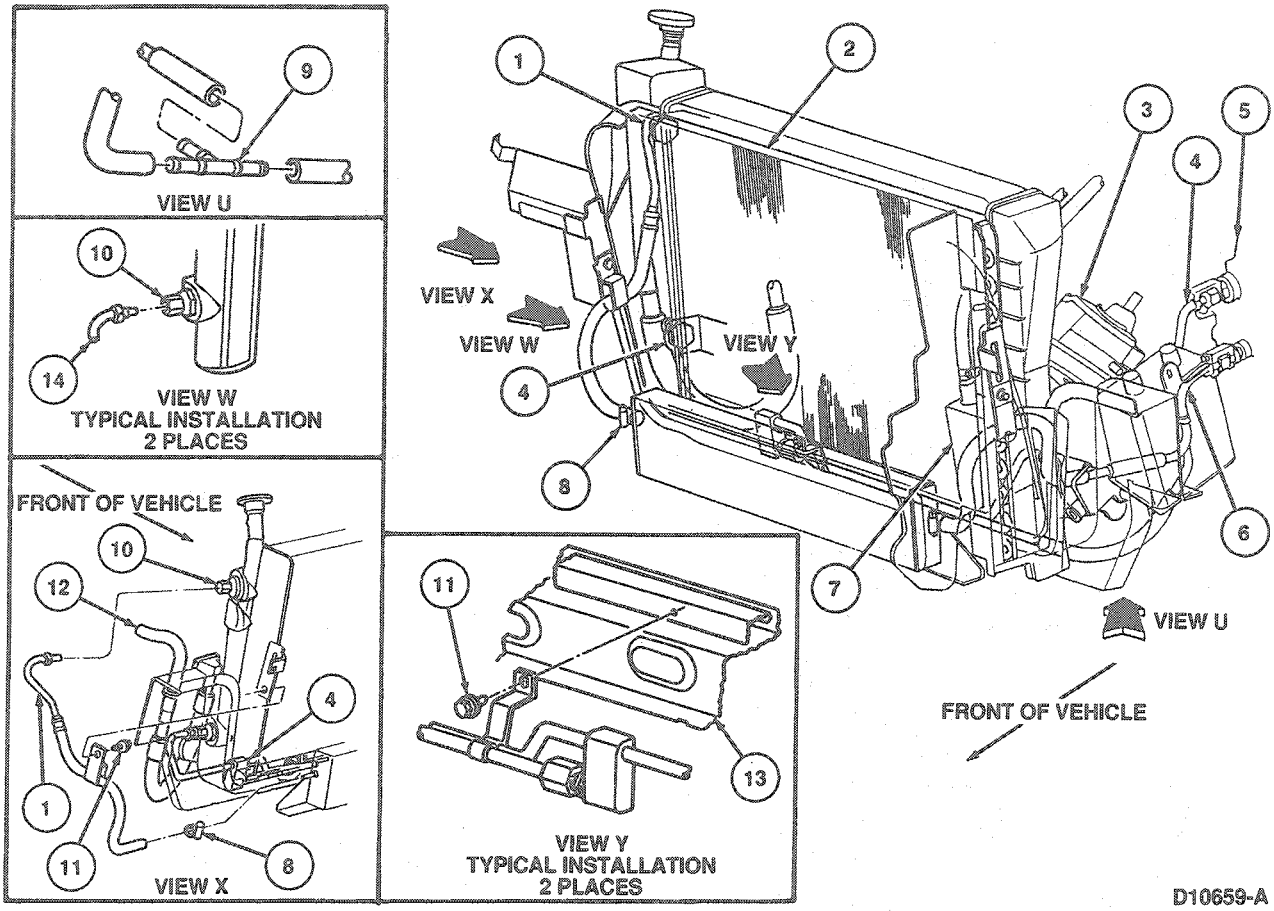
REMOVAL (Continued)

All Except SHO



REMOVAL (Continued)

3.2L SHO



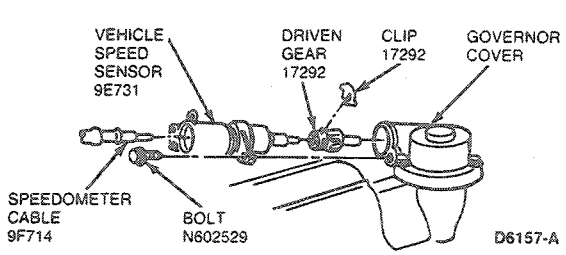
Item	Part Number	Description
1	7C410	Cooler Outlet Assy
2	—	Air Conditioning Condenser
3	9C735	Speed Control Servo
4	7A030	Oil Cooler Inlet Tube Assy
5	—	Transaxle
6	7A031	Oil Cooler Outlet Assy
7	—	Power Steering

Item	Part Number	Description
8	376240	Clamp (2 Req'd)
9	7N485	T-Fitting
10	7D273	Oil Cooler Tube Connector
11	N610957-S56	Screw (2 Req'd)
12	—	Air Conditioning Line
13	—	Body
14	—	Typical Oil Line Connection

(Continued)

TD10659A

43. Remove engine-to-transaxle retaining bolts.
44. Remove speedometer sensor heat shield.
    NOTE: Vehicles with electronic instrument clusters do not use a speedometer cable.
45. Remove vehicle speed sensor (VSS)(9E731) from transaxle.



REMOVAL (Continued)

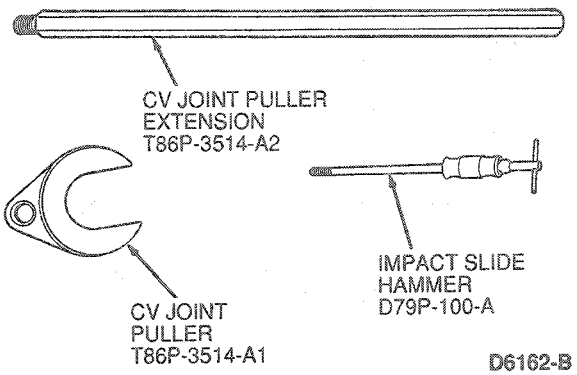
46. Position transaxle jack.

    CAUTION: Make sure puller does not contact transmission speed sensor or damage will result.

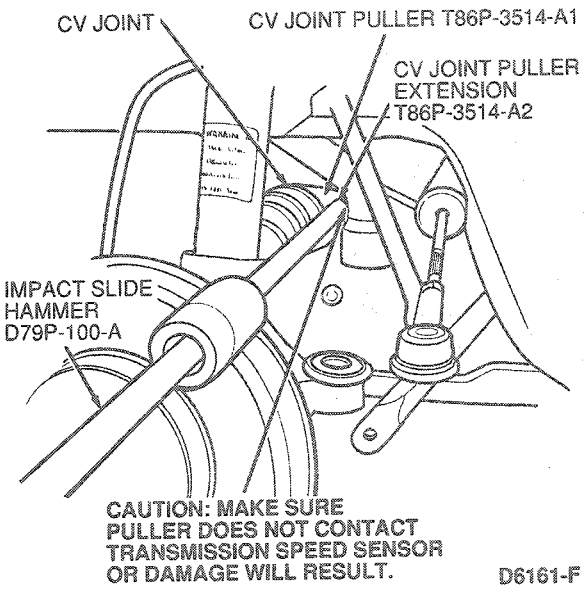
    CAUTION: Do not pry against case.

47. Remove halfshafts as follows:

    - Screw Extension T86P-3514-A2 into CV Joint Puller T86P-3514-A1 and install Impact Slide Hammer D79P-100-A or equivalent into extension.



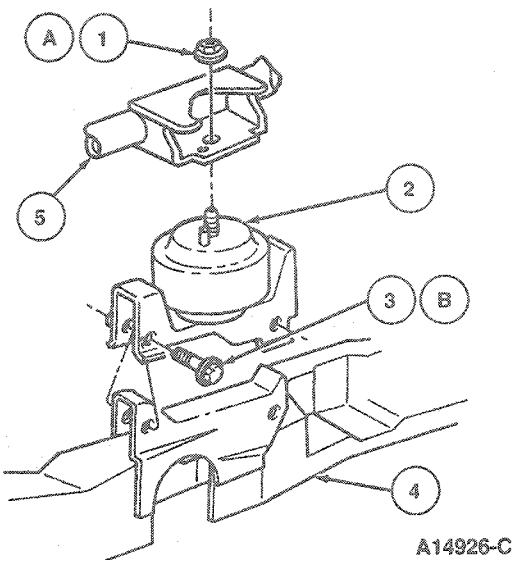
    - Position puller behind CV joint and remove joint.
    - Install shipping plugs.



48. Remove the last two 15mm torque converter housing bolts.
49. Separate transaxle from engine and carefully lower transaxle out of vehicle.

Oil Pump and Main Control Assembly

1. Disconnect battery ground cable.
2. Remove battery and battery tray.
3. Secure supply hoses, vacuum lines and wiring away from pump and valve body cover.
4. Remove shift lever.
5. Remove splash shield cover from ABS if equipped.
6. Remove brake reservoir hose from ABS and cap ends to prevent contamination, if equipped.
7. Install engine support equipment as outlined under transaxle removal.
8. Remove LH transaxle mount.

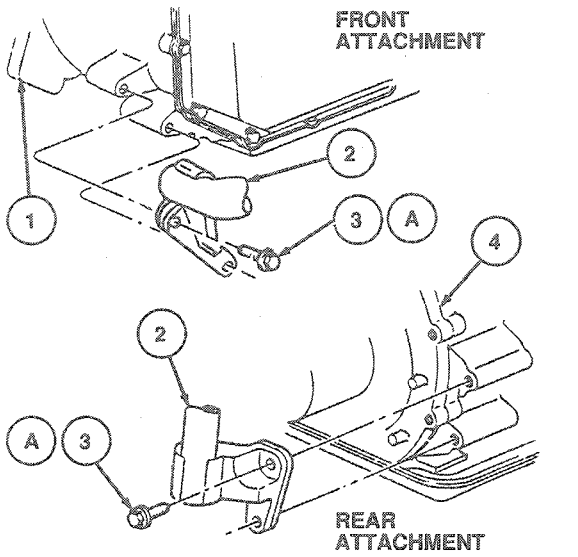


Item	Part Number	Description
1A	N800937-S102	Nut
2	6F063(LH)	Engine Mount Assy
3B	N804749-S100	Bolt (2 Req'd)
4	—	Frame
5	6F065	Support Assy
A		Tighten to 74-102 N·m (55-75 Lb-Ft)
B		Tighten to 81-116 N·m (60-85 Lb-Ft)

TA14926C

9. Remove transaxle side pan upper retaining bolts.
10. Raise vehicle on hoist. Refer to Section 00-02.
11. Remove LH front wheel and tire assembly.
12. Remove inner fender cover and position out of way.
13. Remove rear transaxle mount bolt.
14. Loosen two LH subframe retaining bolts.
15. Remove two engine support mount bolts.
16. Remove four bolts retaining LH engine support and remove support.

REMOVAL (Continued)



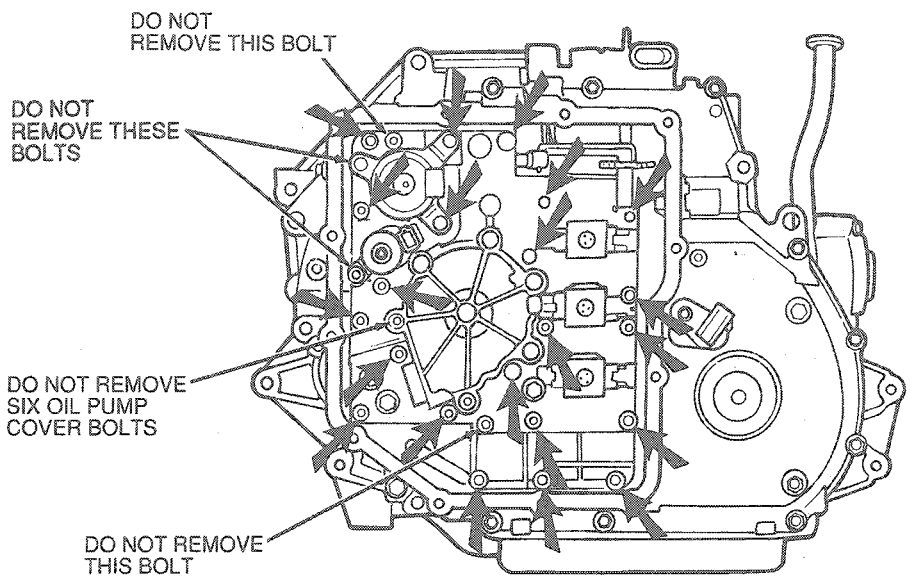
A9707-C

Item	Part Number	Description
1	—	Transaxle
2	6F065	Support Assy
3A	N605922-S102	Bolt (2 Req'd)
4	07002	Transaxle
A		Tighten to 54-75 N·m (40-55 Lb-Ft)

TA9707C

17. Position drain pan and remove remaining transaxle side pan bolts and remove pan.
18. Using a screwdriver, position manual shift shaft in the park position.
19. Disconnect upper bulkhead connector wiring retainer clip from valve body.
20. Disconnect electrical connectors.

    CAUTION: Do not remove oil pump cover bolts.
21. Remove valve body retaining bolts, disengage linkage and remove valve body.



D8071-C

DISASSEMBLY AND ASSEMBLY

Transaxle Disassembly

Tools Required:

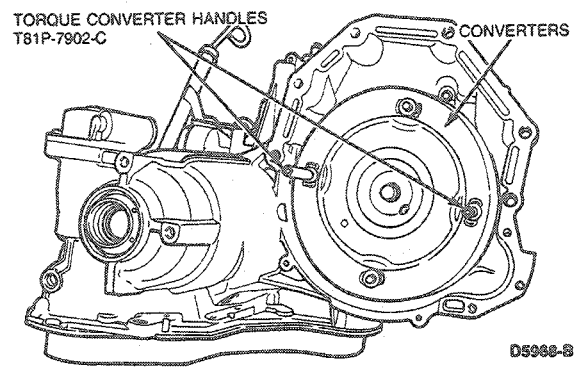
- Impact Slide Hammer T50T-100-A
- Bench Mounted Holding Fixture T57L-500-B
- Impact Slide Hammer T59L-100-B
- O-Ring Remover T71P-19703-C
- Front Cover Seal Remover T74P-6700-A
- Torque Converter Handles T81P-7902-C
- Lube Tube Remover T86P-70001-A
- Stator and Driven Sprocket Bearing Replacer T86P-70043-A
- Front Clutch Loading Tool T86P-70389-A
- Bearing Race Puller T88T-7120-A
- Step Plate Adapter D80L-630-3
- Locknut Pin Remover D81P-3504-N

DISASSEMBLY AND ASSEMBLY (Continued)

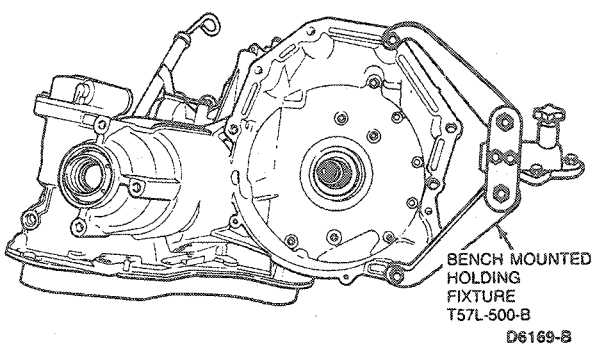
Disassembly

CAUTION: The torque converter is heavy. Be careful not to drop it.

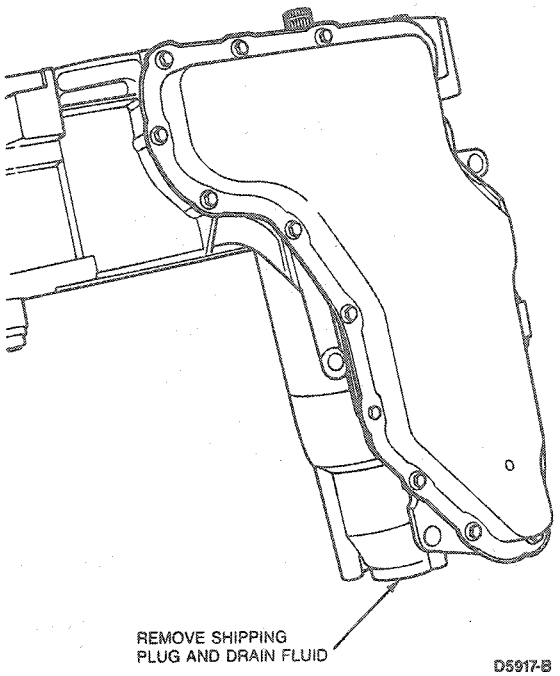
1. Install Torque Converter Handles T81P-7902-C. Remove converter from transaxle.



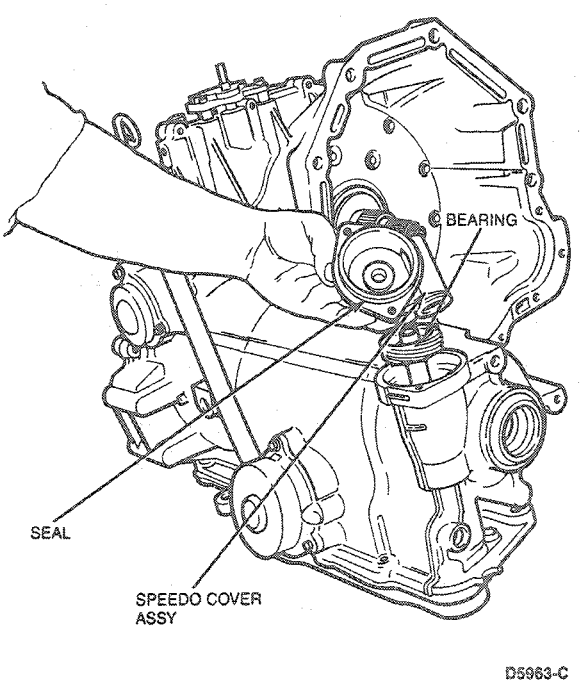
2. Mount transaxle in Bench Mounted Holding Fixture T57L-500-B.



3. Turn transaxle in vertical position. Remove shipping plugs and drain fluid.



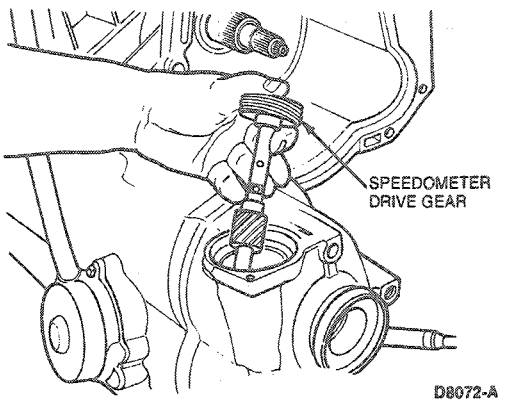
4. Return transaxle to horizontal position.
5. Remove two 8mm speedometer cover bolts, cover and seal. Discard seal. A new one must be installed during assembly.



NOTE: Bearing sits on top of speedometer gear.

DISASSEMBLY AND ASSEMBLY (Continued)

6. Lift speedometer drive gear assembly and bearing out of case.

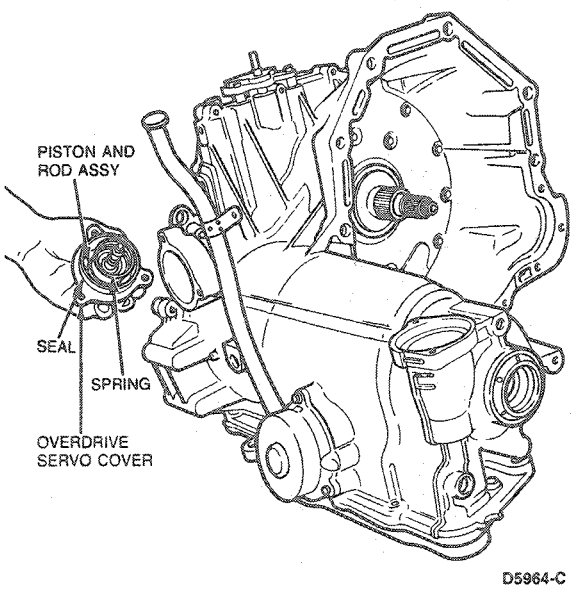


NOTE: Piston assembly and spring may remain in cover.

CAUTION: The servo cover is under spring tension. Care must be taken when removing.

NOTE: Discard O-ring seal on cover.

7. Remove three 8mm overdrive servo cover bolts, cover, piston assembly and spring.

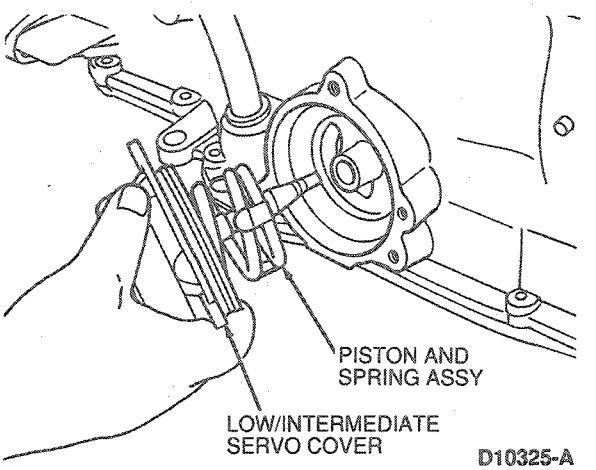


CAUTION: The servo cover is under spring tension. Care must be taken when removing.

8. Remove three 8mm low-intermediate servo cover bolts, cover, piston assembly and spring assembly.

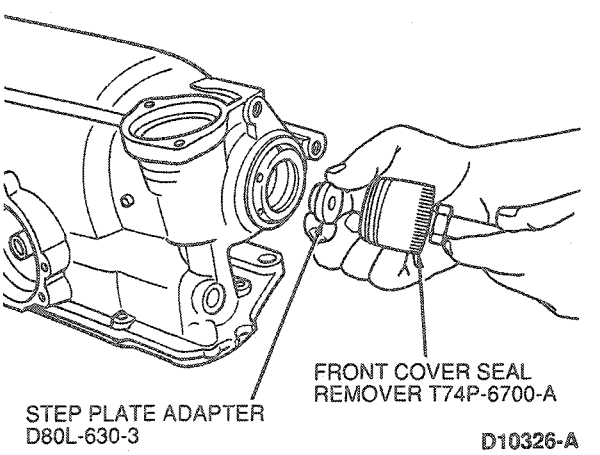
NOTE: Piston assembly and spring may remain in cover.

9. Remove and discard gasket.



NOTE: Output shaft seal is a two-piece construction, outer metal protector and inner rubber seal.

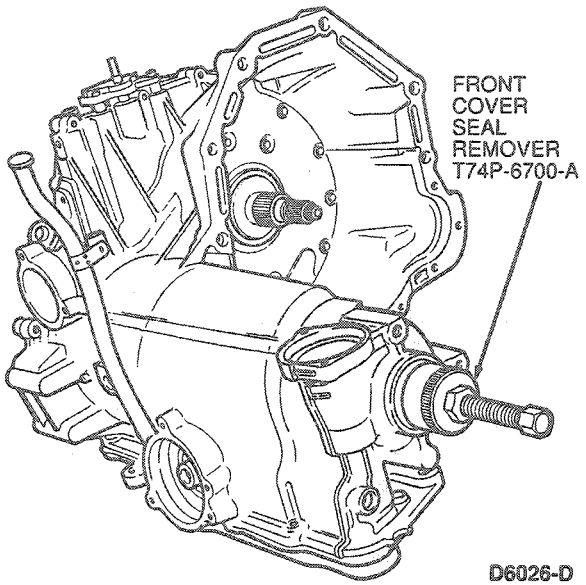
10. Inspect RH output shaft seal and replace if damaged. Remove as follows:
    a. Install Step Plate Adapter D80L-630-3 or equivalent into output shaft opening. Use grease to hold tool in place.

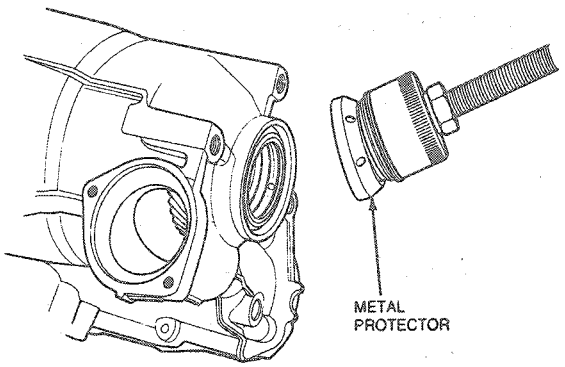


    b. Screw Front Cover Seal Remover T74P-6700-A, into metal seal protector.

DISASSEMBLY AND ASSEMBLY (Continued)

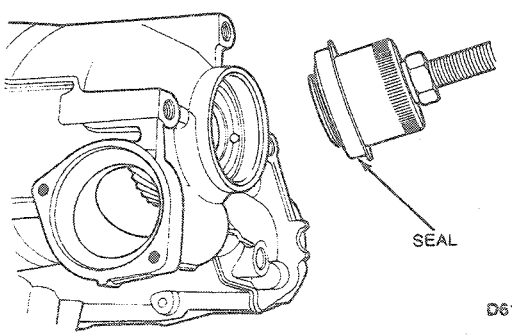
c. Tighten screw on end of tool until metal seal protector is removed.



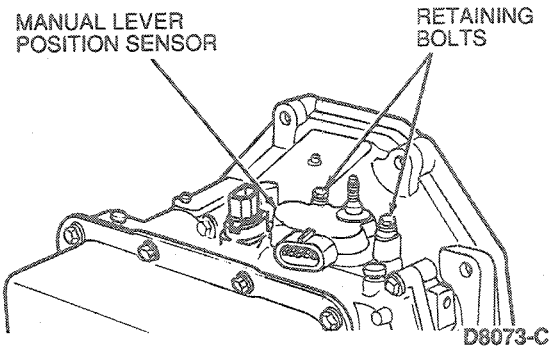


d. Remove metal seal protector from tool, and install tool into seal.

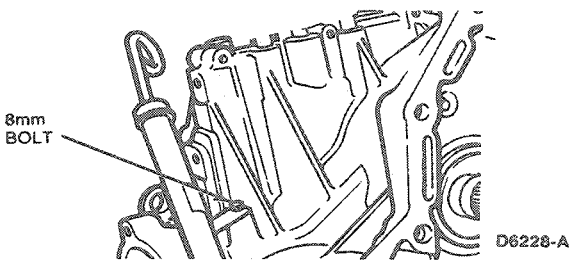
e. Tighten screw on the end of tool until seal is removed.



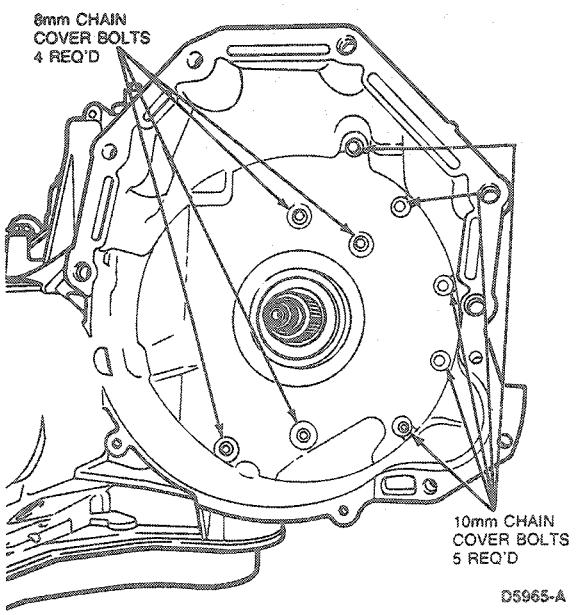
11. Remove two 8mm MLP sensor retaining bolts and remove switch.



12. Remove one 8mm filler tube retaining bolt and pull tube from case.

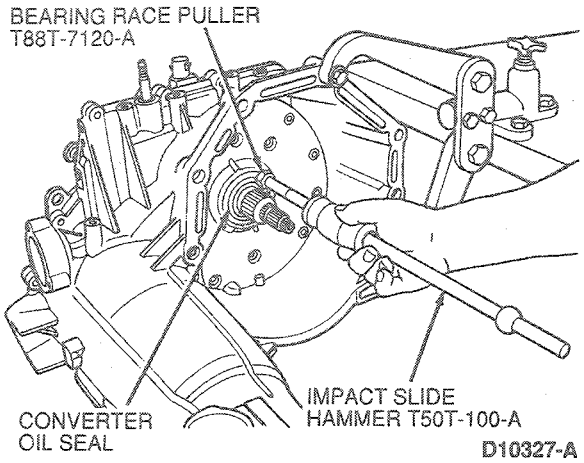


13. Remove five 10mm and four 8mm chain cover bolts from inside torque converter housing.

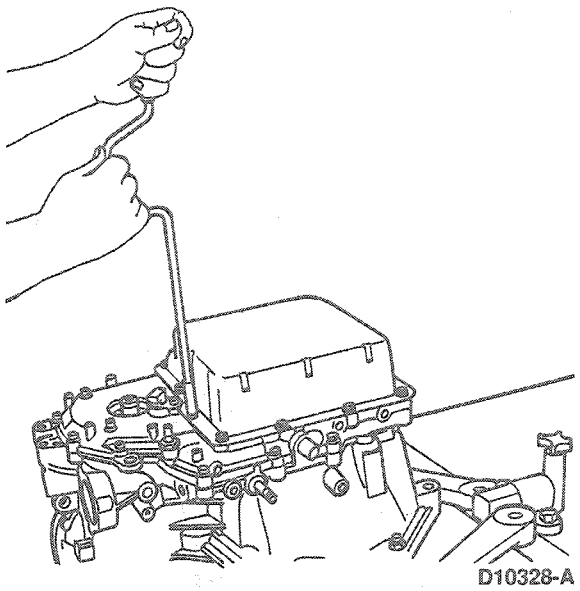


DISASSEMBLY AND ASSEMBLY (Continued)

14. Remove converter oil seal using Bearing Race Puller T88T-7120-A and Impact Slide Hammer T50T-100-A.

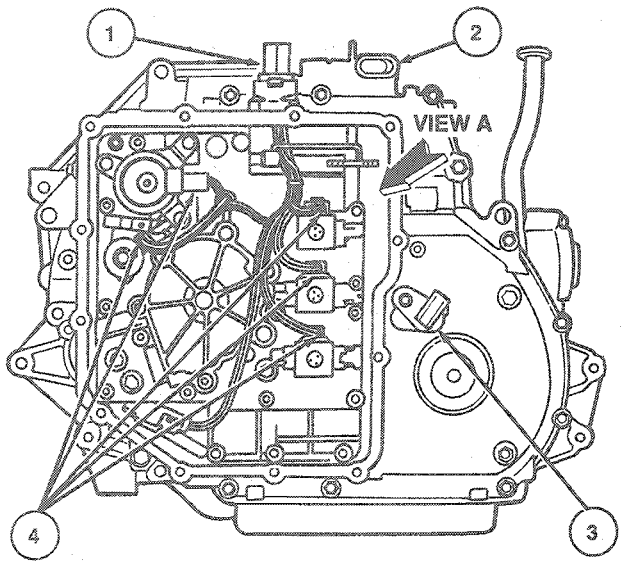


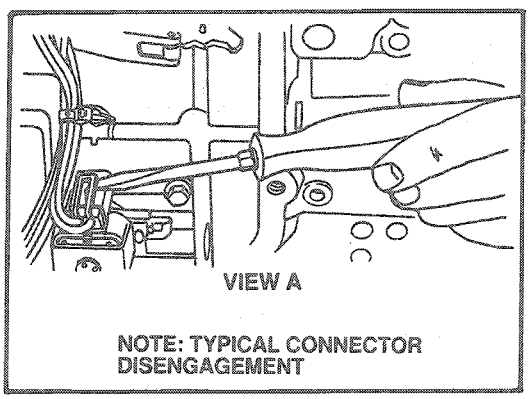
15. Rotate transaxle to vertical position.
16. Remove 12 10mm pump and valve body cover (upper reservoir) bolts. Remove cover and discard gasket.



17. Disconnect electrical connectors from Transmission Oil Temperature (TOT) and solenoids. Remove wire retaining clip from separator plate.

CAUTION: Use both hands. Do not pull on wires.





D8074-C

Item	Part Number	Description
1	—	Connector
2	—	Neutral Safety Switch Assy
3	7M101	Transmission Speed Sensor
4	—	Electrical Connectors

TD8074C