

### Special Testing Procedures

The special tests are designed to aid the technician in diagnosing the hydraulic and mechanical portion of the transaxle.

#### Engine Idle Speed Check

Refer to Powertrain Control/Emissions Diagnosis Manual for the engine idle speed adjustment procedure.

#### Line Pressure Test

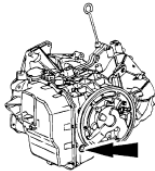
The line pressure test verifies that the line pressure is within specifications.

**⚠ CAUTION: Perform line pressure test before performing stall speed test. If line pressure is low at stall, do not carry out stall speed test or further transaxle damage will occur. Do not maintain WOT in any gear range for more than five seconds.**

**⚠ CAUTION: Transmission tester must be removed from the transaxle and the vehicle harness connected to verify these pressures.**

1. Connect pressure gauge to line pressure tap.

#### Line Pressure Tap



2. Start engine and check line pressures. Refer to Line Pressure Chart 401 to determine if line pressure is within specifications.
3. If line pressure is not within specifications, perform on - board diagnostics and pinpoint test, air pressure check and repair main control system or pump as required.

#### LINE PRESSURE CHART

Line Pressure	Idle		Stall	
	bar	psi	bar	psi
PARK, NEUTRAL	4,41 - 5,24	64 - 76	-	-
REVERSE	4,41 - 5,24	64 - 76	17,86 - 20,27	259 - 294
DRIVE	3,24 - 3,72	47 - 54	11,58 - 12,69	168 - 184

SECOND	3,24 - 3,72	47 - 54	11,58 - 12,69	168 - 184
FIRST	3,24 - 3,72	47 - 54	11,58 - 12,69	168 - 184

### Line Pressure Diagnosis

If the line pressure is low at idle in all ranges check the following items:

- ◆ Low fluid level
- ◆ Restricted inlet filter
- ◆ Loose main body
- ◆ Solenoid body or accumulator body to case bolts
- ◆ Excessive leakage in pump
- ◆ Case
- ◆ Control bodies
- ◆ Sticking main regulator valve or damaged inlet tube seal on inlet filter
- ◆ Damaged gaskets or separator plate

If the line pressure is high at idle in all ranges then check the following items:

- ◆ Main regular valve
- ◆ Solenoid body and wiring harness
- ◆ Run Quick test referred to in electrical diagnosis in this section

### Stall Speed Test

The stall speed test checks the operation of the following items:

- ◆ Torque converter one - way clutch
- ◆ Forward clutch
- ◆ Low/reverse one - way clutch
- ◆ Reverse clutch
- ◆ Forward one - way clutch
- ◆ Engine performance

**⚠ WARNING: APPLY THE SERVICE AND PARKING BRAKES FIRMLY WHILE CARRYING OUT EACH STALL TEST. FAILURE TO SET BRAKES MAY RESULT IN DEATH OR BODILY INJURY.**

**⚠ CAUTION: Carry out line pressure test before performing stall test. If line pressure is low at stall, do not carry out stall test or further transaxle damage will occur.**

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

1. Connect a tachometer to the engine.

**⚠ CAUTION: Do not maintain wide open throttle (WOT) in any gear range for more than five seconds.**

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

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2. Press accelerator pedal to floor (WOT) in each range. Record rpm reached in each range. Stall speeds should be in appropriate range.

### STALL SPEED CHART

ENGINE	rpm
2.5L	2383 - 2805

After testing DRIVE (D) and REVERSE (R), move transaxle range selector lever to NEUTRAL (N) and run engine for about 15 seconds to allow torque converter to cool before testing next range.

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

### STALL SPEED DIAGNOSIS CHART (HIGH SPEED)

Range	Possible Source
	Forward Clutch
D, 2, 1	Forward One - Way Clutch
	Low One - Way Clutch
R	Reverse Clutch
	Low/Reverse Clutch

### Air Pressure Tests

A no - drive condition can exist even with correct transmission fluid pressure because of inoperative clutches or bands. Refer to the Clutch/Band Application Chart No. 601 to determine the appropriate elements. A clutch concern may be located by substituting air pressure for oil pressure to determine the location of the malfunction.

For example when the transaxle range selector lever is in a forward gear range (D, 2, 1) a no - drive condition may be caused by an inoperative forward clutch.

### Test Procedures

Carry out the following procedures:

1. Drain the transaxle. Remove main control cover.
2. Remove the main control as an assembly with the solenoid body assembly.
3. The inoperative clutches may be located by applying air pressure into the appropriate clutch port. Refer to Air Pressure Test Port Locations in this Section.

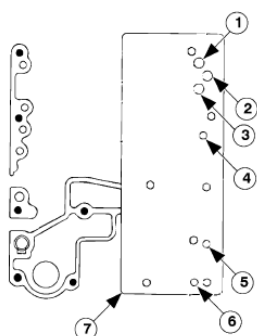
4. Install Transmission Test Plate 307-301 using six bolts.

**⚠ CAUTION:** The coast clutch circuit should not be applied unless air pressure is maintained in the forward clutch circuit. Failure to do so may result in the coast clutch piston coming out of the forward clutch piston.

**NOTE:** Refer to Clutch/Band Application Chart No. 601.

5. Apply air pressure 2,75 bar (40 psi) to the appropriate clutch port (refer to Air Pressure Test Port Locations diagram). A dull thud may be heard, or movement felt when the clutch piston is applied. If clutch seals or check balls are leaking, a hissing may be heard.

**Air Pressure Test Port Locations**



GD1892-A

Item	Part Number	Description
1	-	Reverse clutch test port
2	-	Forward clutch test port
3	-	Direct clutch test port
4	-	Low/reverse clutch test port
5	-	Servo release test port
6	-	Servo apply test port
7	307-301	Transmission test plate

**Air Pressure Test Results**

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

If air pressure applied to the clutch passages fails to operate a clutch, or operates clutches simultaneously, inspect the fluid passages in the case.

If air pressure applied to the accumulator fails to operate an accumulator, remove and inspect case passages and piston.



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## Transmission Fluid Cooler

**⚠ CAUTION:** Whenever a transaxle has been disassembled to replace worn or damaged parts or because the valve body sticks from foreign material, the torque converter and transmission fluid cooler must be cleaned by using Torque Converter/Oil Cooler Cleaner 014-00028 or equivalent. Under no circumstances should an attempt be made to clean converters by hand agitation with solvent.

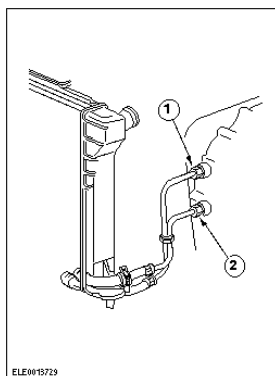
When internal wear or damage has occurred in the transaxle, metal particles, clutch plate material, or band material may have been carried into the torque converter and transmission fluid cooler. These contaminants are a major cause of recurring transaxle concerns and must be removed from the system before the transaxle is returned for repair.

### Transmission Fluid Cooler Flow Test

**NOTE:** The transaxle linkage adjustment, fluid level and line pressure must be within specification before performing this test. Refer to Section 307-05 for transaxle linkage adjustment procedure. For transmission fluid level checking procedures, refer to the procedures in this Section. Refer to Check Fluid Level and Condition in this Section. For transaxle line pressure testing procedure, refer to the procedure in this Section. Refer to Line Pressure Test in this Section.

1. Remove fluid level indicator from fluid filler tube.
2. Place funnel in fluid filler tube.
3. Raise vehicle on hoist and position suitable safety stands under vehicle.
4. Remove cooler return line (rear fitting) from fitting on transaxle case.
5. Connect one end of a hose to the cooler return line and route the other end of the hose up to a point where it can be inserted into the funnel at the fluid filler tube.
6. Remove safety stands and lower vehicle. Insert end of hose into funnel.
7. Start engine and run at idle with transaxle in NEUTRAL range.
8. When fluid flowing from hose is all liquid, an adequate amount of fluid should be observed. Approximately 1.0 liter (1.0 quart) of liquid delivered in 15 seconds. If adequate flow is observed, test is completed.
9. If flow is not adequate, stop engine. Disconnect hose from cooler return line and connect it to converter-out line (front fitting) on case.
10. Repeat Steps 7 and 8. If flow is now liberal, carry out back flushing and cleaning procedures in Cleaning and Inspection; refer to diagnosis of transaxle fluid cooler. For additional information, refer to [Section 307-02](#). If flow is still not liberal, repair the pump or converter.

### Transmission Fluid Cooler Tubes



Item	Part Number	Description
1	-	Out
2	-	In

#### Transaxle Cooler Backflushing/Cleaning

1. Conduct backflushing with Torque Converter Cleaner 014 00028 or equivalent. Test the equipment to make sure that a vigorous fluid flow is present before proceeding. Replace the system filter if flow is weak or contaminated.
2. To aid in connecting the cleaner to the transaxle steel cooler lines, connect two additional rubber hoses to the transaxle end of the steel transaxle cooler lines:
  - ◆ Connect the cleaner tank pressure line to the steel transaxle cooler return line (longest line).
  - ◆ Connect a tank return hose to the steel transaxle cooler pressure line (shorter line). Place the outlet end of this hose in the solvent tank reservoir.
3. Turn on the solvent pump and allow the solvent to circulate a minimum of five minutes (cycling the switch on and off will help dislodge contaminants in the cooler system).
4. Switch off the solvent pump and disconnect the solvent pressure hose from the transaxle cooler return line.
5. Use compressed air to blow out the cooler(s) and lines (blow air into the transaxle cooler return line) until all solvent is removed.
6. Remove the rubber return hose from the remaining steel cooling line.

#### Transaxle Fluid Cooler Tube Replacement

When fluid leakage is found at the transmission fluid cooler, the transmission fluid cooler must be replaced. For additional information, refer to [Section 307-02](#).

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

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

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





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## Diagnosis By Symptom

The Diagnosis by Symptom charts give the technician diagnostic information, direction and possible components of concern, using a symptom as a starting point.

The Diagnosis by Symptom charts are divided into two categories: electrical routines, indicated by 200 series numbers, and hydraulic/mechanical routines, indicated by 300 series numbers. The electrical routines list the possible electrical components that could cause or contribute to the symptom described. The hydraulic/mechanical routines list the possible hydraulic or mechanical components that could cause or contribute to the symptom described.

### Diagnosis by Symptom Chart Directions

The powertrain control module (PCM) has a learned adaptive strategy to electronically control the transaxle which will automatically adjust the shift feel to the driver's demands. For the first few hundred miles (160 km) of operation, the transaxle may experience abrupt shifts. This is normal operation.

If the battery has been disconnected for any reason for a period of approximately 20 minutes, the shift tables will reset and will need to be relearned. Upshifting is controlled by the PCM. The PCM receives inputs from various engine and vehicle sensors along with driver demands to control shift scheduling, shift feel, and torque converter clutch operation.

1. Use the index and select the symptom/concern that best describes the condition.
2. Turn to the routine indicated in the index.
3. Always begin diagnosis of a symptom by using the following:
  - ◆ preliminary inspections
  - ◆ verification of condition
  - ◆ fluid level check
  - ◆ other test procedures as directed
4. Begin with the electrical routine if indicated. Follow the reference or action required statements. Always carry out the On - Board Diagnostic Tests as required. Never skip steps. Repair as required. If the concern is still present after electrical diagnosis, proceed to the hydraulic/mechanical routine listed.

**NOTE:** Not all concerns and conditions with electrical components will set a diagnostic trouble code (DTC). Be aware that components listed may still be the cause. Verify correct function of those components prior to proceeding to the hydraulic/mechanical routine listed.

5. The hydraulic/mechanical routines list possible hydraulic or mechanical components that could cause the concern. These components are listed in the removal sequence and by most likely." All components listed must be inspected to verify correct servicing is carried out.

Diagnosis by Symptom Index

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<b>Title</b>	<b>Routines Electrical*</b>	<b>Routines Hydraulic/Mechanical</b>
Engagement Concerns		
No Forward Only	201	301
No Reverse Only	202	302
Harsh Reverse or Forward	203	303
Delayed/Soft Reverse or Forward	205	305
No Forward and No Reverse	207	307
Shift Concerns		
Some or All Shifts Missing	210	310
Shift Timing - Early/Late	211	311
Timing - Erratic/Hunting	212	312
Feel - Soft/Slipping	213	313
Feel - Harsh	214	314
No 1st Gear, Engages in Higher Gear (D" Position)	215	315
No Manual 1st Gear (1st in D", OK)	216	316
Torque Converter Operation Concerns		
No Apply	240	340
Always Applied/May Stall Engine	241	341
Other Shift Concerns		
Shift Lever Effort High	251	351
External Leaks	252	352
Poor Vehicle Performance	253	353
Noise/Vibration - Forward/Reverse	254	354
Engine will Not Crank	255	355
No PARK Range	256	356
Transaxle Overheating	257	357
No Engine Braking in Manual first Position	258	358
No Engine Braking in DRIVE (TCS ON) or Manual 2nd Position	259	359
Vehicle Movement with Gear Selector in the N" Position	262	362
Reference: Clutch/Band Application		601

\* Carry out electrical routine first.

**Diagnostic Routines**

ENGAGEMENT CONCERN: NO FORWARD ONLY

201 - ELECTRICAL ROUTINE	
Possible Component	Reference/Action
No Electrical Concerns	

ENGAGEMENT CONCERN: NO FORWARD ONLY

301 - HYDRAULIC/MECHANICAL ROUTINE	
Possible Component	Reference/Action
Internal or External Shift Linkages	
- Damaged, out of adjustment, misassembled	- Inspect and repair as required. Verify linkage adjustment. Refer to Section 307-05. After Repairing linkage, verify that the transmission range (TR) sensor is correctly adjusted. Refer to Removal and Installation procedure in this Section.
Pump Assembly	
- Bolts out of torque specification	- Adjust bolts to specification.
- Gaskets damaged	- Inspect for damage. Install new as necessary.
- Porosity/crossleaks or ball plug missing or leaking, or a plugged hole	- Inspect for porosity and leaks. Install new as necessary.
- Pump support seal ring, No 3 or No 4, damaged	- Inspect for damage. Repair as necessary.
Main Controls	
- Bolts out of torque specification	- Adjust bolts to specification.
- Gaskets damaged or leaking	- Inspect for damage. Repair as necessary.
- Pressure tap plate/gasket damaged or leaking	- Inspect for damage. Repair as necessary.
- Separator plates damaged	- Inspect for damage. Repair as necessary.
- Hydraulic passages damaged	- Inspect for damage. Repair as necessary.
- Main regulator valve stuck, damaged or misassembled	- Inspect for damage. Repair as necessary.
- Forward accumulator leaking	- Inspect for damage. Repair as necessary.
Forward Clutch and Coast Clutch Assembly	
- Seals or pistons damaged	- Carry out Air Pressure Test. Inspect for damage. Repair as necessary.
- Forward clutch return spring damaged.	- Inspect for damage. Repair as necessary.
- Ball check valve damaged.	- Inspect for mislocation, poor seating, damage. Install a new piston as necessary.
- Friction elements severely damaged or worn	- Check for abnormal wear, damage. Repair as necessary.
- Forward/coast/direct clutch cylinder damaged, leaking, misassembled or binding	- Inspect for damage. Repair as necessary.
- Cylinder to hub weld broken or splines damaged	- Inspect for damage. Repair as necessary.
- Low OWC assembly, worn, damaged, misassembled	- Inspect for damage. Repair as necessary.