Troubleshooting the 604 (41TE)

by David Skora

Over the years, it's become obvious that the existing troubleshooting procedures won't solve all of its electrical problems. This article will help you troubleshoot the difficult problems on 2003-and-later Caravans with the 41TE transmission. These vehicles now use the PCM to control the transmission.

Before you dig into the computer system, always start with the basic checks for connections, grounds, and so on.

- The battery must be fully charged; 12.45 minimum rest voltage.
- Some tests require testing with live voltage.
- Some tests require you check the current flow in a circuit.
- Improper testing could damage the vehicle or your meter.

To begin troubleshooting, identify which area the problem falls into.

Type 1: These are codes related to the PCM. There are no TCM codes, and you can't access the TCM data.

Type 2: These codes indicate an electrical problem with an input sensor, including speed sensors, gear position, pressure switches, temperature and the TPS.

Type 3: These codes indicate an electrical problem with a solenoid.

Type 4: These codes indicate an incorrect gear ratio, CVI numbers are incorrect, or the TCC is slipping.

CAUTION: These procedures require an excellent understanding of Ohm's Law, that you have a lab scope, DVOM or ammeter, and know how to use it. Current tests require that your amp probe or ammeter have a current rating of at least 10 amps. Improper testing or procedures could damage the vehicle or your meter, or could cause personal harm.

Type 1 Problems: TCM and TCM Communications

These problems include no codes, no communication, or TCM codes P0604, P0605, P0613, P1652, P1687, P1694 or P1793.

If you can't communicate with the TCM:

- Erase all trouble codes from other modules.
- Check pin 29 of the C1 connector. (Figure 1)
- Check all grounds and *key-on voltage* pins at all PCM connectors.
- Verify that the crank (start) signal at pin 30 of the C1 connector works as described in the *41TE Terminal ID and Voltage* charts. (Figure 1)

If any terminal is out of range, disconnect the PCM and retest all battery and *key-on voltage* circuits at the PCM. If the circuits check out okay with the PCM disconnected, the PCM may be at fault. (Figure 2)

Repair any circuits that are out of range. Then reconnect the PCM. If you still can't communicate with the PCM, try a different scan tool or update your scan tool's software.

There are 2 types of data signals which TCM data can be requested. One is the Programmable Communication (PCI) BUS, which includes data from the PCM. The other signal is called the Serial Communication (SCI) which is dedicated to TCM data. To check for PCI communication, check for varying voltage at pin 38 of the C1 connector. With scan tool connected and engine running, voltage should be between zero and 7 volts. If data stream activity appears to be present, you scan tool or software may not be compatible with the PCM.

To check the SCI data stream, connect a scan tool and have the engine running. The voltage at pin 27 of the C1 connector should toggle between zero and 5 volts (Figure 2). If the circuits don't work as described, the PCM may have a problem. For more information on communication problems, see the 2007 seminar manual.

Type 2 Problems: Input Signals

These problems are input sensor codes, such as TSS, OSS, pressure switches, gear select, crank sensor, TPS and temperature sensor. Test TSS and OSS inputs with a lab scope or AC voltmeter. See the *PCM Connector ID and Voltage* chart for specifications.

TSS and OSS Sensors

To test the sensor's operation, use a lab scope or multimeter to monitor the circuits directly. Use the *PCM Connector ID and Voltage* chart to identify sensor terminals at the PCM (Figure 3).

Use a scan tool to watch the TCM

PCM Black Connector C1 Id & Voltage Chart

Pin	Wire Color	Function	Value	
9	Black/Brown	Ground	Less Than 0.01V	
11	Pink/Grey	Ignition	12V Ign. ON	
18	Black/Dk. Green	Ground	Less Than 0.01V	
29	Orange/Red	Fused B+	12.45V Min at Rest	
30	Yellow	Start	12V Start	0V Ign. On
37	Dr. Green/Yellow	SCI Transmit	0V Toggles 0-5 when scantool cont.	Requests data
38	White/Violet	PCI BUS	Toggles 0-7V cont.	When Data Present

Figure 1

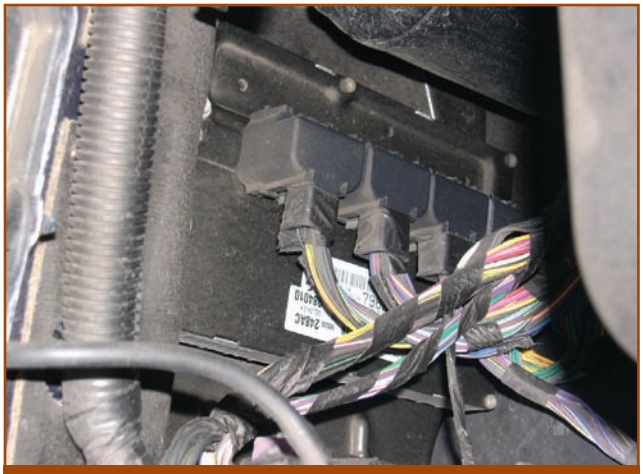

Figure 2

process the signals:

- In Park, the TSS should read close to engine RPM. The OSS should read zero.
- At a stop in drive, both sensors should read zero, even during a stall test. If the TSS reads more than zero RPM, a clutch is slipping or the TSS circuit is generating a false signal because of EMI or a bad ground.
- Operate the vehicle in 3rd gear with lockup on. Both sensors should read right about engine RPM. Accelerate and decelerate the vehicle. Make sure that both sensor signals vary with engine RPM. If not, either a clutch is slipping or the speed sensor needs further testing.

HINT: Bad grounds, connectors, alternator diodes, and EMI can affect speed sensors. If clutches are good and you can't find any external problems, suspect a faulty PCM.

L/R, 2-4 and OD Pressure Switches

To troubleshoot the pressure switch circuits:

- Disconnect the PCM.
- Connect a jumper between pin 29 of the C1 PCM connector and pin 56 and 18 of the C4 PCM connector. The ETAX relay should energize the circuits. (Figure 3)
- Move the gear selector to Drive.
- Connect a voltmeter to the L/R pressure switch terminal at PCM C4 connector. See the *PCM Connector ID and Voltage* chart for the pin number. The voltmeter should display 12V.
- Apply air pressure to the L/R pressure tap. The voltmeter should display 0V.
- Release the air pressure and 12V should reappear.

If the switch circuit tests okay but there's a code for the pressure switch, look for a hydraulic crossleak or a faulty PCM. If the switch fails the test, check the circuits or replace the solenoid pack. Repeat the test for the 2-4 and OD pressure switch circuits. Reconnect the PCM.

HINT: A pressure switch trouble code may be caused by valve body crossleaks. For example, a 2-4 or a L/R pressure switch code; these problems can be caused by a bad solenoid pack, a sticky solenoid switch valve, or a warped valve body.

PCM Green Connector C4 ID & Voltage Chart

Terminal	Wire Color	Application	Values	
1	Yellow/Grey	OD Solenoid	6.5-7.5 Amps	In 3rd & 4th
2	Yellow/Light Blue	UD Solenoid	6.5-7.5 Amps	In 1st-3rd
6	Yellow/Dark Blue	2-4 Solenoid	6.5-7.5 Amps	In 2nd & 4th
10	Dark/White	L/R Solenoid	6.5-7.5 Amps	Commanded On
13 & 14	Black/Light Green	Grounds	Less than 0.01V	
15	Dk. Green Light/Blue	PRNDL	12V in P,OD,L	0V in R,N,D
16	Dk. Green/ Dark/Blue	PRNDL	12V in R,N,OD	12V in P,3/2,L
18	Yellow/Brown	Relay Control	12V ign. ON	
19, 28 & 38	Yellow/Orange	Relay Output	12.45V Min.	Engine Running
22	Dk. Green/Tan	OD psi Switch	12V in 1st/2nd	0V in 3rd& 4th
27	Dk. Green/Grey	PRNDL	12V in R, OD, 3/2, L	0V in P, N
29	Yellow/Tan	L/R psi Switch	12V 2,3,4	0V 1St, Rev
30	Yellow/Dark Green	2-4 psi Switch	0V in 2nd & 4th	12V All Other Gears
32	Dark Green/Brown	Output Speed Sensor	550-600Hz or 3VAC@30mph	
33	Dark Green/ White	Input Speed Sensor	4-6 VAC or 1000Hz @Idle	@9VAC or 3100Hz @ 3000rpm
34	Dark Green/ Violet	Speed Sensor Ground	Less Than 0.01V	
35	Dark Green/ Orange	Trans Temp Sensor	1.8V @ 140'F	
37	Dark Green/ Yellow	PRNDL	12V in 3/2, OD	0V in P, R, N, L

Figure 3

Figure 4

Codes P1775 and/or P1776 may be caused by a warped valve body.

Temperature and TPS Inputs

The PCM should be connected for this test. Use a lab scope or multimeter. Check the temperature sensor voltage at pin 35 or the PCM C4 connector. Locate pin 21 on the PCM C2 connector. See the *PCM Connector ID and Voltage* chart for specifications (Figure 3).

Type 3 Problems: Solenoid Circuits Errors

Solenoid circuit codes P0750, P0755, P0760 and P0765 can be difficult to fix. This is partially because the TCM goes into limp mode by turning the ETAX relay off. Since the solenoid circuits are off, testing is limited and inconclusive. This test is based on a code P0750 for faulty L/R solenoid circuit:

- Make sure the battery is fully charged with a minimum rest voltage of 12.45 volts.
- Disconnect the PCM C4 connector. Connect a jumper wire between B+ and pin 18 or the PCM C4 connector. This should energize the ETAX relay and supply battery voltage to the solenoid circuits (Figure 3).
- Make sure pin 10 at the PCM C4 connector has battery voltage.
- Energize the L/R solenoid circuit from pin 10 through an ammeter, lab scope or jumper wire with an inductive current clamp to monitor current (Figure 4).

As soon as you measure the current, remove the jumper wire. Current flow should be 6.5-7.5 amps. If it's too high or low, look for a problem in the circuit. If the current is correct, suspect a bad PCM.

To verify the other solenoid circuits, repeat the current flow test for the other solenoid circuits at pins 1, 2 or 6 of the PCM C4 connector.

As a final test, cycle the suspect circuit on and off for one second, about 10-12 times. This will heat up the solenoid windings. If the solenoid circuit still reads 6.5-7.5 amps, the circuit and solenoid are good. This indicates that the PCM is likely at fault. Reconnect the PCM when finished.

Type 4 Problems: Gear Ratio Errors

Gear ratio errors are detected by the PCM calculating signals from the input and output sensors. Make sure both sensors are working. See *Type 2 Problems* for testing procedures. If they're working, the clutches are slipping, a hub or shell may be stripped, or the solenoid pack is faulty.

TIP: Code P0944 is usually caused by a clogged filter, warped valve body, or worn pump.

Codes P01770, P1771 or P1772 (CVI Codes) indicate clutch clearance problems. These codes can also be set by faulty speed sensors, crossleaks, wrong stall converter, temperature too high or too low, or a bad PCM.

A TCC slip code maybe caused by a bad converter or pump, or a warped valve body. Test the TCC operation by monitoring the TCC release pressure tap. With TCC applied, TCC release pressure should be less than 10-15 psi (depending on ECCM command).

A TCC slip code maybe caused by a bad converter or pump, or a warped valve body. Test the TCC operation by monitoring the TCC release pressure tap. With TCC applied, TCC release pressure should be 15-60 psi, (depending on ECCM command). With TCC fully applied, release pressure should be below 5 psi.

Once you've verified that all circuits related to the problem or symptom are working properly, the most likely problem is a bad PCM. By performing these tests, you should be able to identify and isolate most electrical problems in any 41TE transaxle.

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