Troubleshooting the 604 (41TE)

by Dave Skora

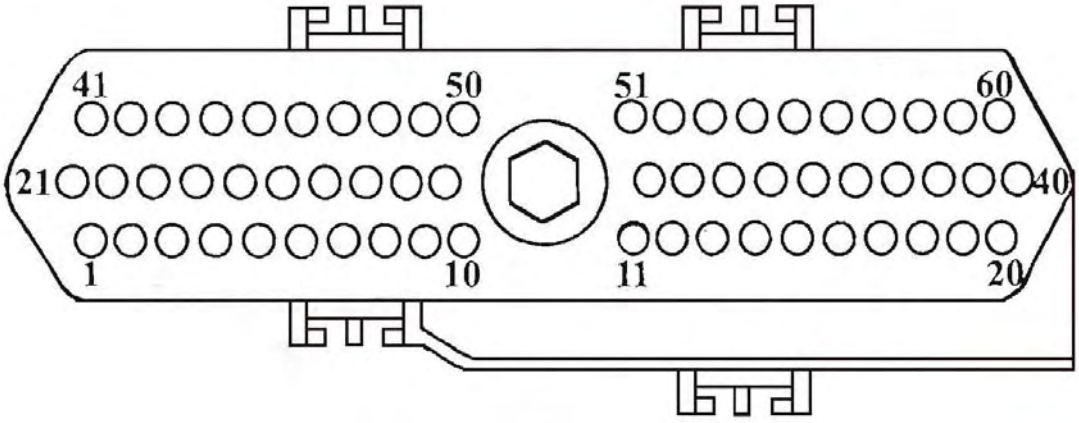


Figure 1

CAUTION: Before beginning any type of electrical system diagnosis, you should have an excellent understanding of Ohm's Law.

Among the more common calls to the ATRA HelpLine are problems with the Chrysler 604 (41TE) transaxle. In this article, we're going to look at the procedures necessary to troubleshoot most of the electrical problems that show up on this unit.

While these units and systems are all virtually the same, there are some differences in the specific computer terminal configurations from vehicle to vehicle. We've included a chart of terminal assignments for 1989–99 Caravans, and the signals you should expect at each terminal. We'll use that chart for the explanations and procedures we're covering.

Keep in mind that, while the procedures for other vehicles will be similar, you should always check your shop manual for the specific terminal assignments for the vehicle you're working on.

Before you begin any electrical or computer system diagnosis:

- Always start with the basic checks for connections, grounds, etc.
- Make sure the battery is in good condition and fully charged (12.45 minimum resting voltage).

CAUTION: Before beginning any type of electrical system diagnosis, you should have an excellent understanding of Ohm's Law. You'll need a lab scope, DVOM and an ammeter, and you should know how to use them. Current tests require your ammeter or current clamp to have a minimum current rating of 10 amps.

There are four common types of electrical or computer problems that you're likely to run into on these units. So the first step in any diagnosis is to identify which type of problem you're dealing with:

Type 1: Conditions suggest a problem with the TCM:

- There are codes that indicate a TCM problem.
- There are no codes.
- You can't communicate with the TCM.

Type 2: Codes indicate an electrical problem with a TCM input.
Type 3: Codes indicate an electrical problem with a TCM output.
Type 4: A code indicates an incorrect gear ratio:

- Clutch Volume Index (CVI) numbers are incorrect.
- Clutch is slipping.

Type 1 Problems (TCM and TCM Communications)

These problems include no codes, no communication, or TCM codes 11–17, 19, 20 and 45.

If you can't communicate with the TCM, try erasing any trouble codes from all other modules.

Check terminal 56, all grounds and terminals 8 and 11 using the *1989-99 Caravan (41TE) Terminal ID and Voltage Chart* (figures 1 and 2).

A real balancing act

The new Sonnax® Oversized Pressure Regulator Valve for the 4T40-E & 4T45-E can save you up to $350 in valve body replacement costs.

COMPLAINT

Low/high line pressure

SECONDARY COMPLAINTS

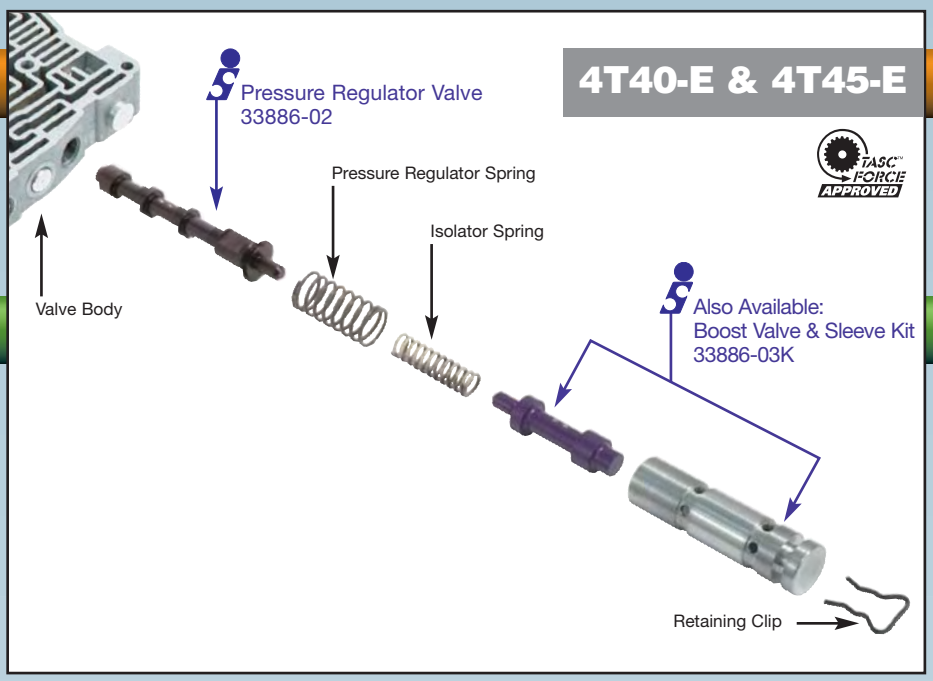
• Squawk/shudder on 2-3 shift • Hydraulic buzz • Soft/harsh shifts

CAUSE

Continuous oscillation of the pressure regulator valve causes valve body bore wear, which results in line pressure irregularities and valve instability.

CORRECTION

The oversized Sonnax valve allows a worn pressure regulator bore to be restored to OE specifications. The anodized valve has extended spools to provide more stability and prevent wear.



NEW!

Oversized Pressure Regulator Valve

33886-02
1 Oversized Pressure Regulator Valve

TOOL REQUIRED

33886-TL2
1 Reamer
1 Reamer Jig
1 Drill Bit

Continuous oscillation of the pressure regulator valve wears the valve body bore and can affect the balance line circuit, preventing the valve from stroking to reduce line pressure and feed the converter/lube circuits. Severe wear at other circuits can allow line pressure to leak to exhaust or to the decrease port, causing a lack of pump inlet control, shift problems and burned clutches and bands. The Sonnax Oversized Pressure Regulator Valve is made from hard-coat anodized aluminum to resist wear and has an additional spool with flats to provide increased stability for the valve and prevent line pressure leakage. The oversized valve allows you to refurbish the worn bore and works in both early and late OEM applications.

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1989–99 Caravan (41TE) Terminal ID and Voltage Chart

Terminal	Years	Wire Colors	Application	Values	
1	1989–95	Red/Black	PRNDL	12 V in P, OD, L	0 V in R, N, D
	1996–99	Lt Green/Black	PRNDL	12 V in P, R, 3/2	0 V in N, OD, L
2	All	Tan/Black	PRNDL	12 V in OD	0 V in P, R, N, D, L
3	1989–95	Violet	Neutral Switch	12 V in R, OD	0 V in P, N, D, L
	1996–99	Violet	PRNDL	12 V in R, N, OD	0 V in P, 3/2, L
4	All	White/Black	CCD–	Data Stream Signals	
5	1989–95	Black/Violet	CCD+	Data Stream Signals	
6	1989–95	Brown/Blue	Engine RPM	1.0 VAC at Idle	2.0 VAC at 2000 RPM
	1996–99	Gray/Black	Engine RPM	1.0 VAC at Idle	2.0 VAC at 2000 RPM
7	1996–99	Pink	SCI	Data Stream Signals	
8	1989–95	Yellow	Starter Relay	12 V Start	0 V Ignition On
	1996–99	Yellow/Red	Starter Relay	12 V Start	0 V Ignition On
9	All	Black/Lt Green	O/D Pressure Switch	12 V Off	0 V in 3rd & 4th
10	1996–99	Yellow/Dk Green	Torque Management	7–10 V Ignition On	
11	1989–95	Dk Blue	Ignition On	Ignition Feed	
	1996–99	Red/White	Ignition On	Ignition Feed	
12	All	Orange/Dk Blue	TPS	0.5–1.2 V at Idle	4.0–4.5 V at WOT
13	1989–95	Dk Blue/Red	TSS & OSS Ground	Less than 0.10 V	
	1996–99	Dk Blue/Black	TSS & OSS Ground	Less than 0.10 V	
14	All	Lt Green/White	OSS Signal	550–600 Hz or 3 VAC at 30 MPH	
15	All	Lt Green	ETAX Relay Control	12 V Ignition On	0V Limp
16	All	Red	Switched ETAX	12.45 V Min Engine Running	
17	All	Red	Switched ETAX	12.45 V Min Engine Running	
19	1989–95	White/Dk Blue	2–4 Solenoid Control	6.5–7.5 Amps 100% On	
	1996–99	White	2–4 Solenoid Control	6.5–7.5 Amps 100% On	
20	All	Lt Blue	L/R Solenoid Control	6.5–7.5 Amps 100% On	
41	1989–95	Black/Yellow	Neutral Switch	N/A	
	1996–99	Brown/White	PRNDL	12V in R, OD, 3/2, L	0V in P, N
42	1989–95	Violet/White	PRNDL	12V in R, N, OD, D	0V in P, L
	1996–99	Violet/White	PRNDL	12V in OD, 3/2	0V in P, R, N, L
43	1989–95	Black/Violet	CCD+	Data Stream Signals	
	1996–99	Violet/Brown	CCD+	Data Stream Signals	
44	1989–95	White/Black	CCD–	Data Stream Signals	
45	1989-95	Gray/Black	Engine RPM		
46	1996–99	Pink/Lt Blue	SCI Receive		
47	All	Yellow/Black	2–4 Pressure Switch	12 V Off	0 V in 2nd & 4th
49	All	N/A	OD Cancel Switch	12 V Allowed	0 V Canceled
50	All	Dark Green	L/R Pressure Switch	12 V Off	0 V in 1st & Rev.
51	All	Black/Lt Blue	TPS & Sensor Grounds	Less than 0.10V	
52	All	Red/Black	TSS Signal	0.7–1.0 VAC or 1000 Hz at Idle	
				2.6–3.5 VAC or 3100 Hz at 3000 RPM	
53	All	Black/Yellow	Sensor Ground	Less than 0.10 V	
54	1989–95	Black/Yellow	Sensor Ground	Less than 0.10 V	
	1996–99	Violet/Lt Green	Thermistor	1.8 V at 140ºF	
56	1989–95	Red/White	Battery	12.45 V Min at Rest	
	1996–99	Red/Dk Blue	Battery	12.45 V Min at Rest	
57	1989–95	Red Brown	TCM Ground	Less than 0.10 V	
	1996–99	Black/Red	TCM Ground	Less than 0.10 V	
58	1989–95	Red/Brown	TCM Ground	Less than 0.10 V	
	1996–on	White/Orange	VSS Output	0–5 V Digital Signal	
59	1989–95	Pink/Yellow	UD Solenoid	6.5–7.5 Amps 100% On	
	1996–99	Pink	UD Solenoid	6.5–7.5 Amps 100% On	
60	All	Brown	OD Solenoid	6.5–7.5 Amps 100% On	

Figure 2

If any terminal is out of specs, disconnect the TCM and retest terminals 56, 8 and 11. If voltages are good at these circuits with the TCM disconnected, the TCM may be the problem.

- Test and repair any circuits that indicate a problem.
- Reconnect the TCM.

If you still can't communicate with the TCM, you may need to try a different scan tool or software.

To check for CCD communication between modules, check for varying voltage between CCD communication terminals:

- 1989–95: terminals 43 (+) and 4 (–)
- 1996-on: terminals 5 (+) and 44 (–)

With the engine running, voltage should be between 2.3 and 2.5DCV. If there seems to be data stream activity, your scan tool or software may not be compatible with the TCM.

Another method to check for communication problems is to access other modules in the vehicle and determine what data is being received and what isn't. An example would be the instrument panel data stream displaying engine RPM but not VSS. This would indicate a TCM communication problem.

Type 2 Problems (TCM Inputs)

These problems are TCM input codes, such as TSS, OSS, pressure switches, gear select, crank sensor, TPS and temperature sensor (after 1995).

TSS and OSS Sensors — To test the sensor's operation, use a scope or multimeter to monitor the circuits directly. Use the *1989-99 Caravan (41TE) Terminal ID and Voltage Chart* to identify sensor terminals at the TCM.

Use a scan tool to watch the TCM 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 develops a signal, a clutch is slipping or the TSS circuit is generating a false signal caused by EMI (Electromagnetic Interference) or a bad ground.

Now operate the vehicle in third gear, in lockup. Both sensors should read the same RPM as the engine. Accelerate and decelerate: Make sure both sensor signals change with engine RPM. If not, either a clutch is slipping or the speed sensor needs further testing.

Diagnostic Tip: Bad grounds, connections, alternator diodes and EMI can affect speed sensors. If the clutches are good and there are no external problems, the TCM may be bad.

L/R, 2–4 and OD Pressure Switches — To troubleshoot the pressure switch circuits:

- Disconnect the TCM.
- Connect a jumper between terminal 56 and 15. The ETAX relay should power the circuits.
- With the engine off, move the gear selector to drive.
- Connect a voltmeter to the L/R 1989-99 Caravan (41TE) Terminal ID and Voltage Chart for the terminal number. Your voltmeter should display 12 volts.
- 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 and the pressure switch code returns, look for a crossleak or the TCM may be bad. If the switch is bad, check the circuits or replace the solenoid pack.

Repeat the test for the 2–4 and OD pressure switch circuits. Reconnect the TCM.

Diagnostic Tip: A pressure switch trouble code may be caused by valve body crossleaks. Common examples are 2–4 or L/R pressure switch codes, which can indicate a bad solenoid pack, a sticky solenoid switch valve, or a warped valve body.

Engine RPM, Temperature and TPS Inputs — Locate the engine RPM signal input at TCM terminal 45. The TCM should be connected for this test. Use a lab scope or multimeter to check for a 0–5 volt pulsing signal.

On 1996-on models, check the temperature sensor voltage at terminal 54. Locate terminal 12 for the TPS signal. See the *1989-99 Caravan (41TE) Terminal ID and Voltage Chart* for specifications.

Type 3 Problems

Solenoid Circuit Errors — Solenoid circuit codes 41–44 can be difficult to fix. This is partly because the TCM goes into limp mode by turning the ETAX relay off. Since the solenoid circuits are off, testing is limited and inconclusive. Here's how to test for code 41, indicating a faulty L/R solenoid circuit:

- Make sure the battery is fully charged with a minimum rest voltage of 12.45 volts.
- Disconnect the TCM.
- Connect a jumper wire between terminals 56 and 15. This should energize the ETAX relay and supply battery voltage to the solenoid circuits. On some models you may have to turn the ignition switch on. You now have control over the entire solenoid circuit (minus the TCM).
- Make sure terminal 20 at the TCM connector has battery voltage.
- Ground the L/R solenoid circuit at terminal 20 through an ammeter, lab scope or jumper wire with an inductive current clamp to monitor current (figure 3).

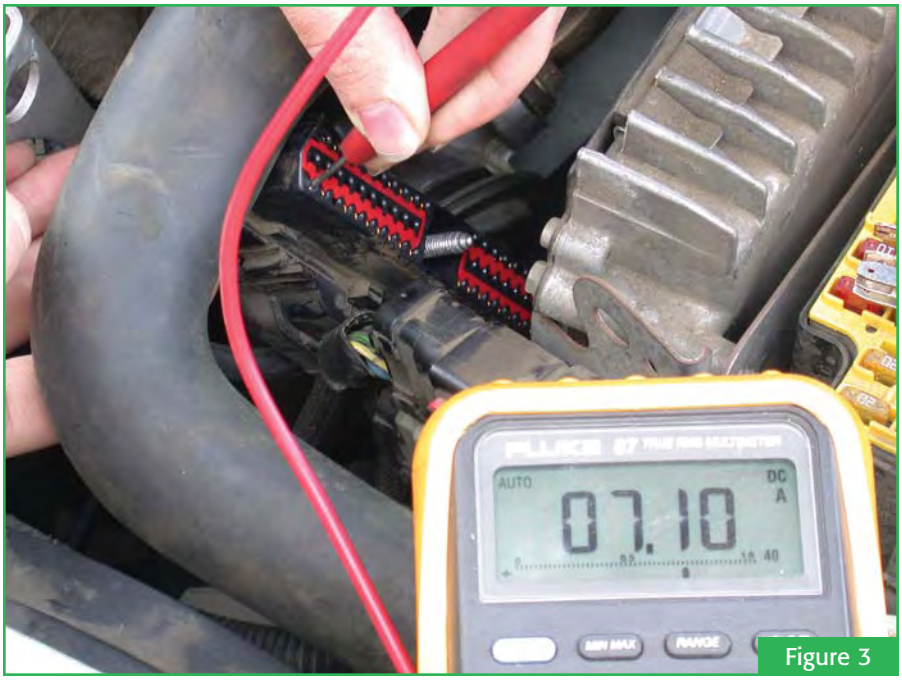

Figure 3

As soon as you measure the current flow, remove the jumper wire; you should have 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 TCM.

To verify the circuit, repeat the current flow test for the other three solenoids circuits at terminals 19, 59 and 60. As a final test, cycle the suspect circuits on for one second and then off, 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, so the TCM is likely the problem. Reconnect the TCM when finished.

VSS Output Signal (96-on) — Use a scan tool to check for VSS data in the PCM and IPC, or check for a frequency signal at terminal 58. With the drive wheels turning at 12 MPH, the VSS signal should be about 2.5 Hz. With the drive wheels turning at 40 MPH, the signal should be about 800 Hz.

Type 4 Problems

Gear Ratio Problems — The TCM detects gear ratio errors by calculating signals from the input and output speed sensors. Make sure both sensors are working. See Type 2 Problems in this article. If they are working, the clutches are slipping, a hub or shell maybe stripped or the solenoid pack is bad.

A few points to remember about gear ratio problems:

- Code 35 (Lost Pump Prime) is usually caused by a clogged filter, warped valve body or worn pump.
- Codes 37 (Solenoid Switch Valve Stuck in the Lockup Position) or 47 (Solenoid Switch Valve Stuck in the Low/Reverse Position) may also be caused by a warped valve body.
- Codes 60–63 (CVI codes) indicate clutch clearance problems. These codes can also set by faulty speed sensors, cross-leaks, wrong stall converter, an accumulator problem, temperature too high or too low, or a bad TCM.
- These transaxles use an Electrically Modulated Converter Clutch (EMCC). An EMCC slip code may be caused by a bad converter, a pump problem, or a warped valve body. Test EMCC operation by monitoring the EMCC release pressure tap. With EMCC partially applied, release pressure should be between 15–60 PSI; with the EMCC 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 TCM. By performing these tests, you should be able to identify and isolate most electrical problems in any 41TE transaxle.

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