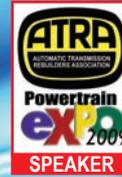


6T70/6T75; The Future is Now

Part 3



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When we left off in the last issue of *GEARS*, we were discussing the 6T70/6T75's inputs and how to diagnose them. In this issue we'll look at the outputs and some diagnostic strategies you can use to help isolate problems with the TEHCM (TCM) and its solenoids.

Outputs

The 6T70/6T75 transaxles use two on/off solenoids, and six PWM VBS-style solenoids (figure 1). The solenoids control which shift occurs *and* how aggressive the shift will be.

Shift solenoid and VBS operation are controlled by the TEHCM (TCM). The TCM regulates the feed voltage to the PWM solenoids to a value between 8.3–9.3 volts. The TCM then regulates the current flow through the solenoids.

The shift solenoids are on/off design, with the TCM controlling the power for the solenoid. The pressure control solenoids are high-side PWM controlled. The TCM is protected against damage from excess current or temperature.

Bosch refers to the solenoids based on their state: Normally Low (NL) or Normally High (NH). Normally High is used to describe a solenoid that allows pressure to travel to the clutch when the solenoid is turned off. Normally Low describes a solenoid that prevents pres-

GEAR	SS1	SS2	PCS 2 (NH)	PCS3 (NH)	PCS4 (NL)	PCS5 (NL)
PARK	ON	ON	OFF	ON	OFF	OFF
REVERSE	ON	OFF	ON	ON	OFF	OFF
NEUTRAL	ON	ON	OFF	ON	OFF	OFF
1 ST ENG BRK	ON	ON	OFF	ON	OFF	ON
1 ST	OFF	ON	OFF	OFF	OFF	ON
2 ND	OFF	ON	OFF	OFF	ON	ON
3 RD	OFF	ON	ON	OFF	OFF	ON
4 TH	OFF	ON	OFF	ON	OFF	ON
5 TH	OFF	ON	ON	ON	OFF	OFF
6 TH	OFF	ON	OFF	ON	ON	OFF

CHART 1

sure from getting to a clutch when the solenoid is turned off.

The solenoids are protected by the filter plate. The filter plate is housed between the valve body and the control solenoid valve assembly (TEHCM), and should be replaced anytime the valve body or control solenoid valve assembly (TEHCM) is replaced or unbolted from each other.

Shift Solenoid Commanded Position

See Chart 1.

A few points to remember:

- The status of the solenoids as displayed by the scan tool (on/off) refers to their condition hydraulically; not electrically as with other transmissions.
- It's normal for the shift solenoids

to make a buzzing noise for up to 10 seconds after you've turned the key off.

- If the control valve body assembly is removed from the case the support seal located in the case must also be replaced.
- Solenoid resistance and current flow can be measured with the TEHCM removed from the vehicle. While this isn't an approved GM test procedure, it may help you diagnose a solenoid electrical problem.

Shift solenoid resistance 20-40 ohms; current flow 0.3-0.6 amps.

PWM VBS solenoid resistance 4-7 ohms, current flow 1.7-3.0 amps.

These values will vary with temperature (figure 2a,b,c,d).

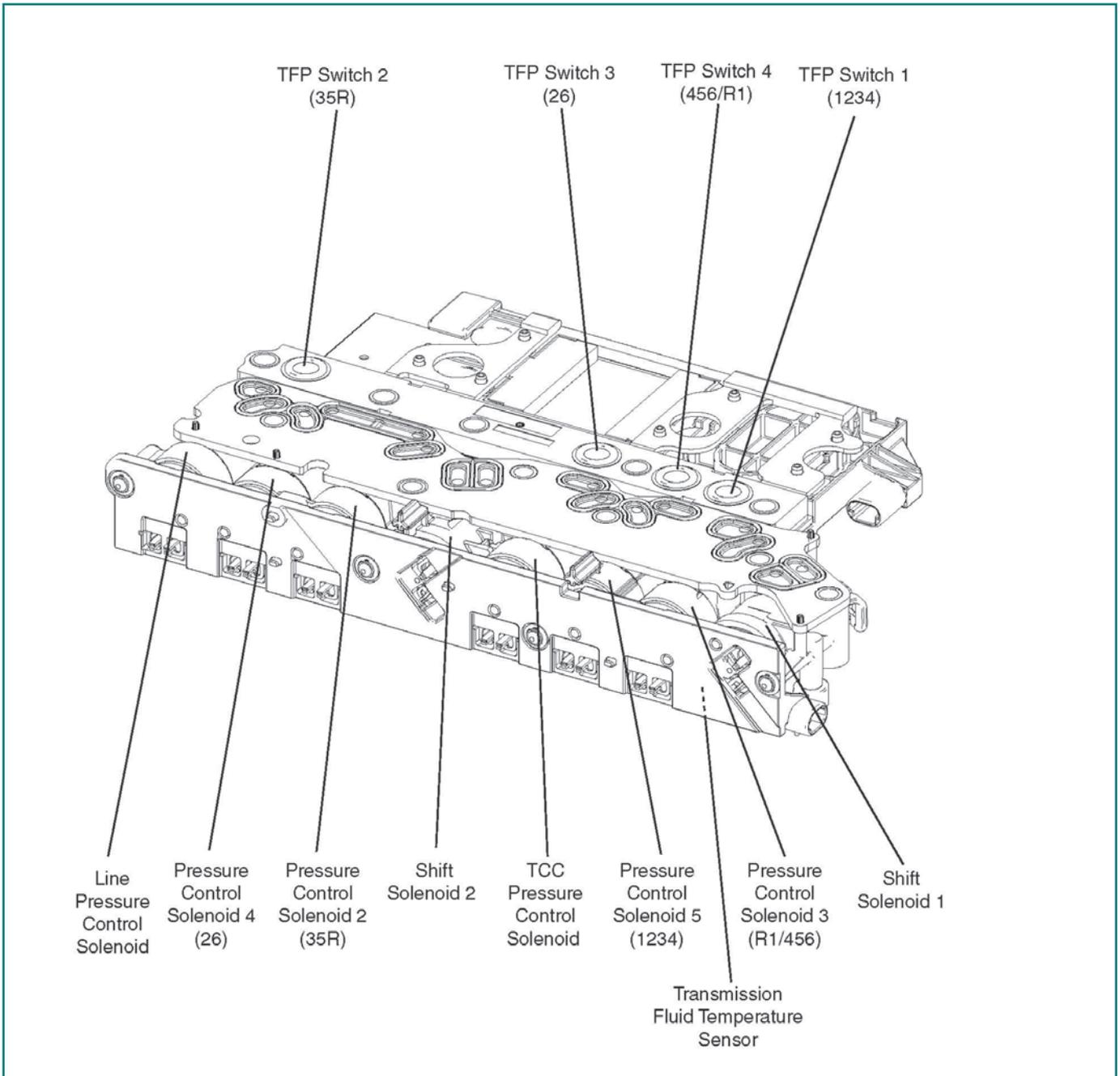


Figure 1

Line Pressure Testing

Like other transmissions, 6T70 and 6T75s have a line pressure port, so you can test line pressure. Like other GM electronically-controlled units, you can measure the line pressure with a gauge and control it with a scan tool. One difference compared to many other GM units is the scan tool will provide the pressure control solenoid command in KPA or PSI rather than amperage.

To conduct a line pressure test:

- Install a gauge in the line pressure test port (figure 3).
- With your scan tool, command

Commanded Pressure Change kPa	Actual Pressure kPa	Actual Pressure PSI
NONE	345-550	50-80
200	690-900	100-130
400	1100-1310	160-190
600	1520-1725	220-250
800	1860-2070	270-300
1000	1860-2070	270-300
1200	1860-2070	270-300

CHART 2

the desired pressure change.

- Compare your commanded

pressure change to the actual pressure shown on your gauge. (See Chart 2.)

Solenoid Cleaning Process

An automated process is available that aids in cleaning debris from the solenoid assembly. Your scan tool will instruct the TCM (TEHCM) to cycle the solenoids while the system is pressurized to clean the solenoids.

The transmission doesn't need to be disassembled to perform the cleaning process. Simply follow the instructions on the scan tool to activate the cleaning program.

Always complete the cleaning process before attempting to diagnose the transmission with the DT-47825-1 tools as described in the next section. If the cleaning process doesn't correct the condition you're working on, use a DT-47825-1 to diagnose the condition.

NOTE: GM powertrain engineers have determined that the solenoid cleaning effectiveness is very high. They recommend that you perform the cleaning process any time you have a solenoid performance-related DTC prior to replacing the TEHCM (TCM).

Diagnostics

Like other GM transmissions, diagnosis is designed around using a quality scan tool. With the 6T70/6T75, the need to access scan data is critical. Unlike other GM transmissions you're accustomed to, the 6T70/6T75 internal electrical components aren't hardwired to the rest of the vehicle via the transmission harness. This means that the diagnostic process has changed considerably.

Diagnosis is divided into two categories: scan diagnostics and test plate/air check diagnostics. A new diagnostic process was developed to help you determine if the problem is related to the TEHCM (TCM) or the valve body. If the TEHCM passes the pressure test, you'll need to replace the valve body.

Solenoid and valve body diagnosis requires these tools:

- A quality scan tool capable of communicating and commanding the TCM and its solenoids.
- Kent Moore tool number DT 47825-1 solenoid test plate and jumper harness DT47825-20 (or equivalent).



Figure 2A

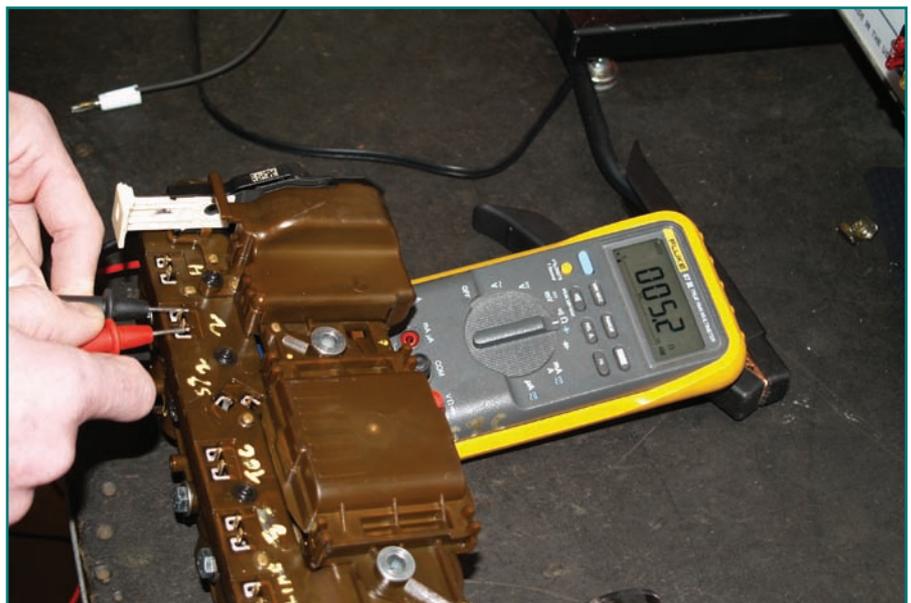


Figure 2B



Figure 2C



Figure 2D

To test the TEHCM and solenoids:

- Remove the control solenoid valve assembly (TEHCM) from the transaxle.
- Install tool DT 47821-1 onto the control solenoid valve assembly (TEHCM); torque the bolts to 5 Nm; 44 lb-in.
- Connect the DT47825 harness to the TEHCM and the transaxle harness.
- Apply regulated shop air (90-100 PSI) to the test plate.
- Connect the scan tool to the vehicle DLC (figure 4).

NOTE: Drain excess fluid from the TEHCM prior to conducting the test. Cover the TEHCM or you will get very wet!

- Using your scan tool, command the solenoid on and off.

You should see air pressure on the gauge and then it should exhaust as the solenoid cycles. If the solenoid is faulty, the gauge pressure won't change as you cycle the solenoid. If you identify a faulty solenoid, replace the complete TEHCM.

If the solenoid checks okay, install the gauge on another solenoid port and command that solenoid on and off with the scan tool to repeat the process. (See Chart 3, and Figure 4.)

When conducting the test, the solenoid pressure shown on the gauge should change as you cycle the solenoid with your scan tool. If the solenoid is faulty, the gauge pressure won't change as you cycle the solenoid. If

you identify a faulty solenoid, replace the complete TEHCM.

The TCM (TEHCM) will normally cycle several of the solenoids on and off to help keep the solenoids and valves free of debris. So this cleaning function (dither) may cause the

gauge to fluctuate when the TCM is cleaning the solenoid you're testing.

Adaptive Learning

The 6T70/75s are fully equipped with several adaptive learning strategies. As with some other GM 6-speed applications, you'll need to erase the adaptive values and perform a Fast Learn prior to operating the vehicle. Clear the adapts and perform a fast

learn procedure if any of these conditions occur:

- You've performed internal transaxle repairs or installed a rebuilt transaxle.
- You replaced the valve body.
- You replaced the control solenoid valve assembly (TEHCM).
- You recalibrated the TCM.
- You've performed internal repairs that could affect shift quality.

Fast learn isn't required if you install a GM new or rebuilt 6T70/6T75. GM fast learns their transmissions before shipping them from the plant.

To perform a fast learn:

- Use a scan tool capable of performing the fast learn procedure.
- Set the park brake.
- TFT 158°-230°F (70°-110°C).
- With your foot on the brake, move the selector in and out of gear three times.
- Use your scan tool to clear any adaptive data that might be stored in the TEHCM.
- Select the fast learn process

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from the scan tool menu.

- Place your foot on the brake pedal.
- Place the transmission in drive and hold the vehicle stationary; the TCM will individually apply the clutches and calculate the clutch volume.
- Place the transmission in reverse with the vehicle stationary; the TCM will individually apply the clutches and calculate the clutch volume.
- Shut the engine off for at least 30 seconds.
- Open and close the door to allow “RAP” to expire or false DTCs may set.

After at least 30 seconds, you can restart the engine and turn your scan tool off. The process is complete.

The fast learn procedure won't run if:

- DTCs are set.
- TFT isn't between 158°-230°F (70°-110°C).
- The brake switch isn't working.
- TP is 0% but engine RPM increases during the test.
- P/N switch is adjusted improperly or isn't working correctly.
- Line pressure control system isn't working properly.

That's all for now. In the next issue we'll take a look at the information available on your scan tool to help you diagnose these units. Until then remember, “Life is like riding a bicycle; you don't fall off until you stop pedaling.”

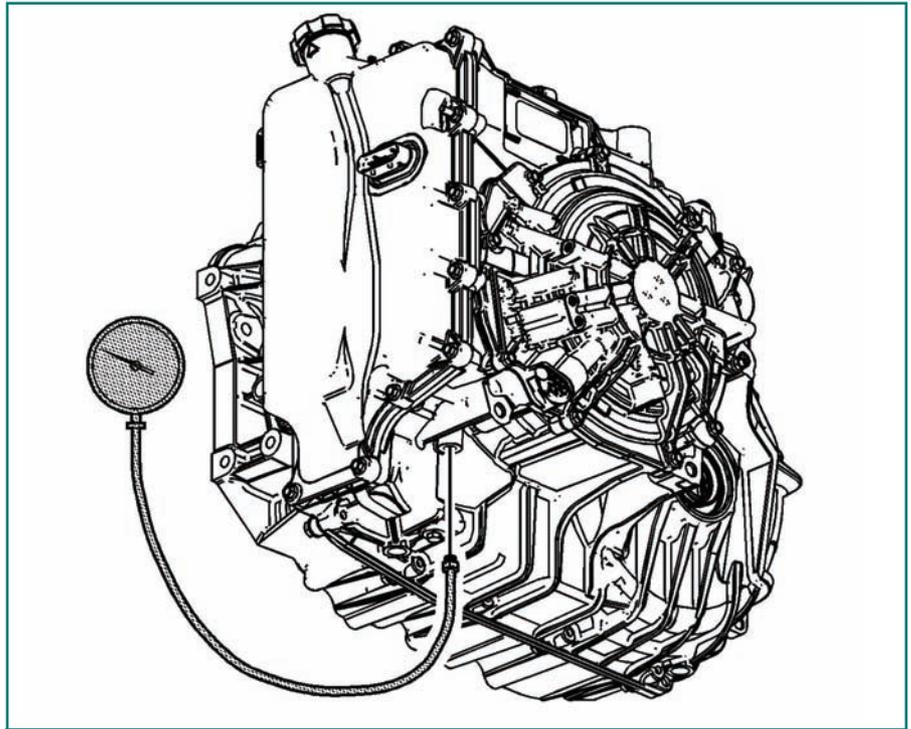


Figure 3

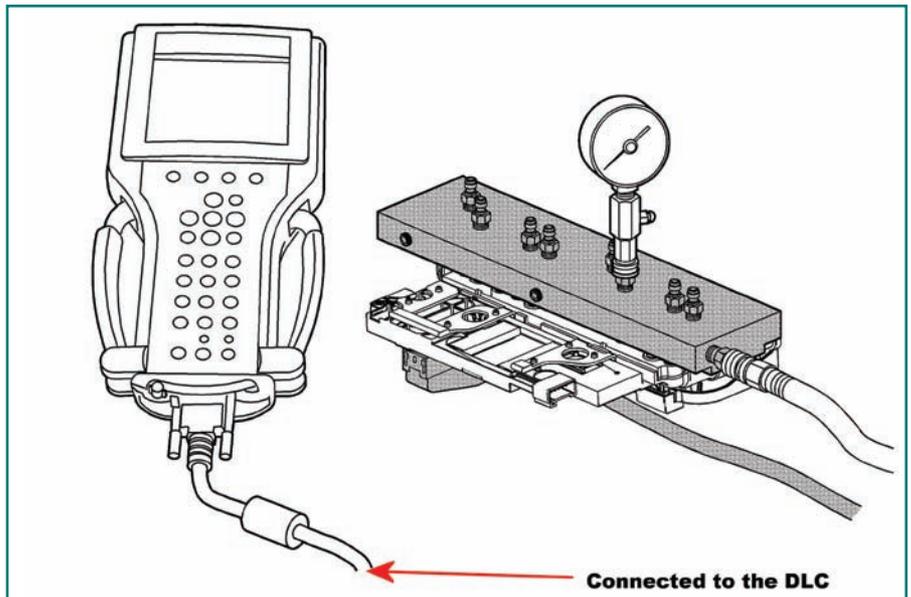
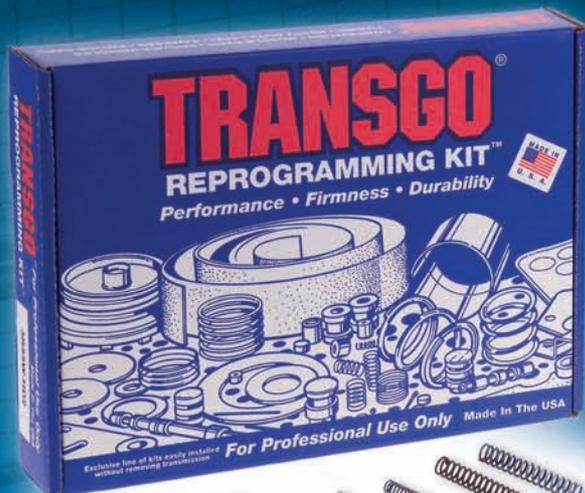


Figure 4

Solenoid	Test Plate Port	Key On, Engine Off (KOEO) Normal State	Commanded State	
Line PC Solenoid 1	G	Full Flow	On: 68-103 kPa (10-15 psi) per commanded amp	
PC Solenoid 2	C	No Flow	On - Full Flow	Off - No Flow
PC Solenoid 3	A	Full Flow	On - Full Flow	Off - No Flow
PC Solenoid 4	B	No Flow	On - Full Flow	Off - No Flow
PC Solenoid 5	F	No Flow	On - Full Flow	Off - No Flow
Shift Solenoid 1	H	Full Flow	Off - No Flow	On - Full Flow
Shift Solenoid 2	D	No Flow	Off - No Flow	On - Full Flow
TCC PC Solenoid	E	No Flow	On - Full Flow	Off - No Flow

CHART 3

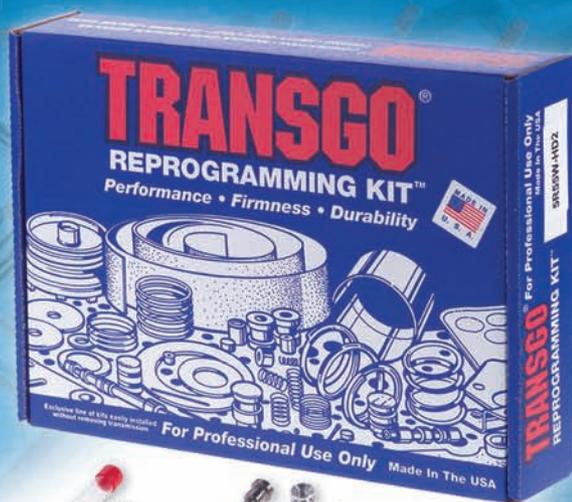


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