# **Bench Testing** the 6L50-6L80-6L90-6T70-6T75 TEHCM



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n past articles, I've spent a lot of time covering the operation of GM's solenoid body/controller, better known as a TEHCM (Transmission Electrical Hydraulic Control Module)

The TEHCM houses the TCM, shift solenoids, PWM solenoids, pressure switches, and temperature sensors for the transmission or transaxle. It's mounted inside the unit, attached to the valve body. The TEHCM communicates with the components outside the transmission or transaxle via the data bus.

Testing the components requires some special tools, including:

- Scan tool
- DT47825-100 solenoid test plate
  Appropriate vehicle interface harness DT47825-20 (6T70-6T75) or DT47825-10 (6L50-6L80-6L90)
- DVOM
- Signal generator, such as Kent Moore J-38522 (EL38522)

Many technicians inquire regarding the procedure to bench test the TEHCM. GM developed a test plate to allow you to conduct static tests of the solenoids. A static test will help you find a solenoid that's stuck open or closed, but it won't show you whether solenoid flow rate is correct at various commanded positions.

You can use the test plate anytime you have the TEHCM removed from the vehicle, such as during a rebuild. You'll need the vehicle to complete this test, because the scan tool still relies on the vehicle data bus for communication with the TEHCM.



Component	Port On	Commanded State	
component	Test Plate	ON	OFF
PC Solenoid 2, 35R	С	Full Pressure to Gauge	No Pressure to Gauge
PC Solenoid 3, R1/456	G	Full Pressure to Gauge	No Pressure to Gauge
PC Solenoid 4, 26	В	Full Pressure to Gauge	No Pressure to Gauge
PC Solenoid 5, 1234	F	Full Pressure to Gauge	No Pressure to Gauge
Shift Solenoid 1	н	Full Pressure to Gauge	No Pressure to Gauge
Shift Solenoid 2	D	Full Pressure to Gauge	No Pressure to Gauge
Line Pressure Control Solenoid	А	Command to Highest Setting, Full Pressure to Gauge	Command to Lowest Setting, Below 620.5 kPa (90 psi) to Gauge
TCC PC Solenoid	E	Full Pressure to Gauge	No Pressure to Gauge
		Figure 2A	

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PC Solenoid 4	В	Full Pressure to Gauge	No Pressure to Gauge
PC Solenoid 5	F	Full Pressure to Gauge	No Pressure to Gauge
Shift Solenoid 1	н	Full Pressure to Gauge	No Pressure to Gauge
Shift Solenoid 2	D	Full Pressure to Gauge	No Pressure to Gauge
TCC PC Solenoid	E	Full Pressure to Gauge	No Pressure to Gauge
Line PC Solenoid	G	Command to Highest Setting, Full Pressure to Gauge	Command to Lowest Setting, Below 620.5 kPa (90 psi) to Gauge
		Figure 2B	

The process is the same for both RWD and FWD 6-speed applications, although the harness interface part numbers will vary with the application. To bench test the TEHCM:

- Remove the TEHCM from the transmission or transaxle.
- Attach the DT47825 test block to the TEHCM using the bolts supplied with the tool. Torque the bolts to 44 lb-in (5 Nm) working from the center out.
- Install the pressure gauge supplied with the tool to the solenoid you want to test.
- Connect the appropriate interface harness between the TEHCM and the vehicle harness.
- Key on, engine off.

- Connect your scan tool to the vehicle, and select output overrides to allow you to cycle the solenoids on and off with your scan tool.
- Attach shop air to the DT47825 test block; adjust to 90-100 PSI (figure 1).
- Cycle the solenoid on and off with your scan tool while monitoring the gauge on the test block.

When you're done testing a solenoid, simply move the pressure gauge to another port on the test block and repeat the procedure until you've tested each solenoid multiple times.

Note: A solenoid timeout feature

will prevent you from operating the solenoids too long. This is designed to prevent damage to the TEHCM.

Refer to the GM diagnostic charts to determine when the gauge should read or not read pressure (figures 2a and 2b). If the TEHCM fails to operate as indicated, you'll need to clean or replace the TEHCM.

NOTE: With the key on, engine off, the TEHCM will normally cycle some of the solenoids on and off; this is part of the software program. This means you may appear to have air flow from some of the test plate ports prior conducting the test. This is normal and it's part of the solenoid cleaning program that the TEHCM conducts.









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1155 N. McKinley Ave., Los Angeles, CA 90059 Tel: 323-758-1302 Fax: 323-758-9999 Toll-Free: 866-EVT-PARTS (388-7278) SE HABLA ESPANOL GM limits bench diagnosis of the solenoids to using the test plate. But you can test solenoid electrical operation with a DVOM, just as you would any other solenoid.

Lay the TEHCM on the bench and inspect the solenoid terminals on the side of the TEHCM for any debris that may be bridging the terminal welds. If you discover any debris, clean it off; it may be causing the problem.

If no debris is present, set your meter to measure Ohms and connect the leads across the solenoid you wish to test. The solenoid resistance should read:

Shift Solenoid (On/Off solenoid) 20-40 ohms (figure 3A).

Shift and Line Pressure Solenoid (PWM solenoid) 3-8 ohms (figure 3B).

You can also check current flow through the solenoids. The manufacturer doesn't recommend this test for PWM solenoids, but it can be done in a safe manner if you limit how long you leave the current flowing through the solenoid.

- Connect one solenoid terminal to a fused voltage supply.
- Using your meter, connect the other solenoid terminal to the voltage supply ground; don't leave the solenoid energized too long.
- Read the amperage on your meter. Normal amperage based at normal solenoid resistances and a measured 12-volt supply should be:

Shift Solenoid (On/Off solenoid) 0.3–0.7 amps at 12 volts (figure 4A). Shift Solenoid (PWM solenoid) 1.5–4.0 amps at 12 volts (figure 4B).

If the resistance or the amperage values are incorrect the solenoid has failed and you'll need to replace the TEHCM.

#### Solenoid Cleaning Process

If you have a solenoid performance DTC or the solenoid fails the air bench test, you should try the solenoid automated cleaning process before replacing the TEHCM. This process takes place when the TEHCM is in the transmission and the transmission is in



Figure 3A: On/off Solenoid resistance: 20-40 ohms



Figure 3B: PWM solenoid resistance: 3-8 ohms

the car.

Solenoid cleaning is an automated process initiated by your scan tool. If your scan tool is equipped, the process will raise engine RPM and raise and lower line pressure while the solenoids are being commanded on and off by the TCM. This process is fully

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automated so once the vehicle is in park and you've selected the feature on the scan tool, it'll cycle all of the solenoids, flushing debris from the solenoids and their circuits.

If the performance DTC resets or the bench test fails, you'll need to replace the TEHCM. If the problems appear to be gone after the cleaning, you can reuse the TEHCM.

#### TEHCM Speed Sensor Testing

You can test the speed sensors in these transmissions and transaxles by supplying a substitute signal to isolate whether the problem is in the sensor or the TEHCM. The sensors feed their signals directly into the TEHCM. A signal generator can simulate the signal from the sensors.

- Connect your signal generator to the speed sensor wiring connector on the TEHCM.
- With your scan tool connected to the vehicle, monitor the ISS and OSS signals on the scan tool.

The signal generator creates an 8-volt square wave and can vary the frequency of the signal. As you change the frequency, the speed indicated on the scan tool should change with it.

If the scan tool speed sensor signal changes as you vary the frequency on the signal generator, the TEHCM is working properly, so the problem is probably the speed sensor itself. If the speed signal isn't present on the scan tool, the problem is likely the TEHCM.

### **Replacing the TEHCM**

If your diagnosis has led you to replace the TEHCM, there are a few things you should keep in mind:

- The TEHCM will require programming to match the vehicle or it won't operate.
- You'll need to perform a Fast Learn procedure to establish the baseline shift adapt values or shift problems will occur.
- You'll need to replace the filter plate; never try to reuse the filter plate.

That's about it for now, so until next time, remember: "Our aspirations are our possibilities."



Figure 4A: On/off Solenoid amperage: 0.3-0.7 amps



Figure 4B: PWM solenoid amperage: 1.5-4.0 amps

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