
How to Test the Throttle Position Sensor (3.0L Mitsubishi Montero)

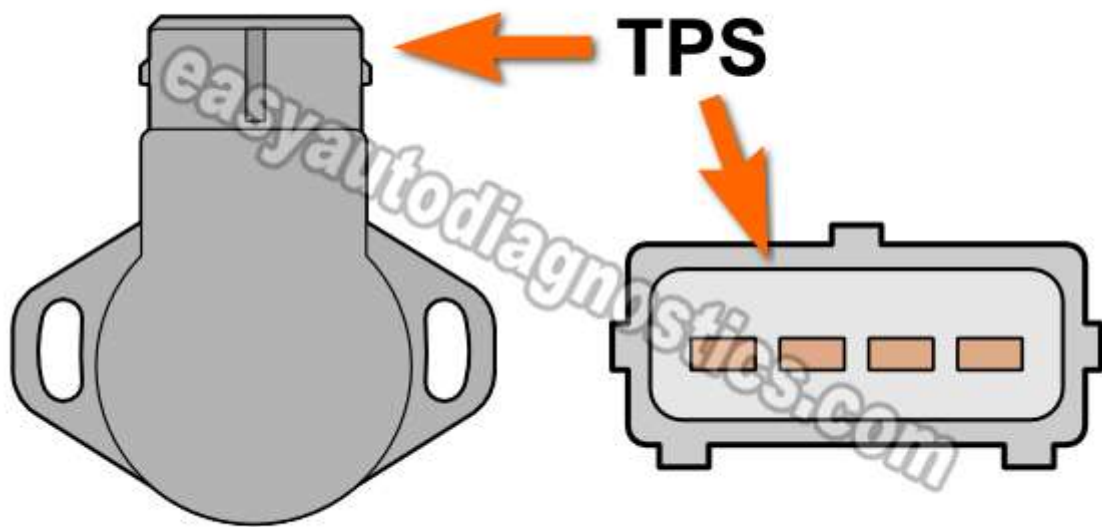
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The throttle position sensor on your 1997 thru' 2001 3.0L Mitsubishi Montero is two sensors in one. By this I mean that the TPS assembly has two parts that perform two specific functions. One part of the TPS assembly is a throttle position sensor. The other part is a closed throttle position switch.

In this tutorial, we're gonna' test the throttle position sensor part of the TPS assembly. This is a pretty simple test that can be easily be done with a multimeter.

The contents of this tutorial at a glance:

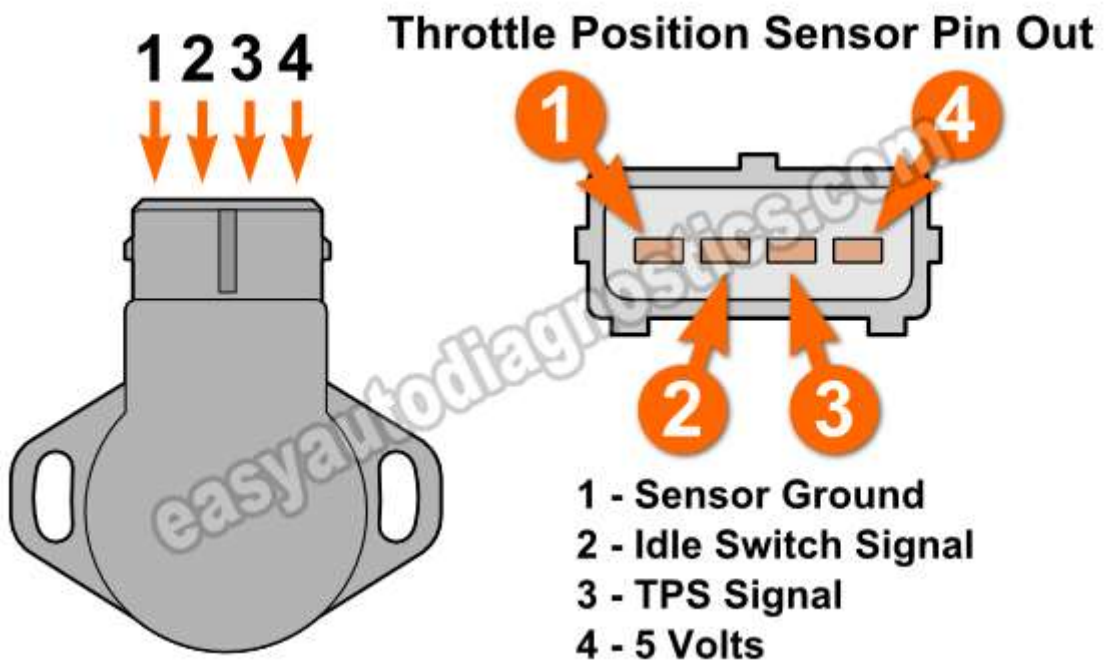
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Symptoms of a Bad Throttle Position Sensor

When the throttle position sensor (TPS) fails, your Montero's PCM will set a diagnostic trouble code. Here's a basic list of symptoms you'll see:

1. Check engine light (CEL) is illuminated on your Montero's instrument panel.
2. A TPS diagnostic trouble code (DTC) stored in the PCM's memory:
 - **P0120:** Throttle Position Sensor Circuit Malfunction.
3. Bad gas mileage.
4. Hard start and/or extended cranking time (after shut off).
5. Black smoke coming out of the tailpipe.
6. Hesitation when accelerating your vehicle down the road.

TEST 1: Testing the Throttle Position Sensor Voltage Signal



The throttle position sensor's job is to report the angle of the throttle plate. In a nutshell, when the throttle plate is closed the TPS reports a low voltage and as it opens the TPS reports a higher voltage.

When the TPS fails, it'll usually just stop reporting the increases/decreases in this throttle angle voltage. The cool thing is that you and I can check this throttle angle voltage signal with a multimeter (no scan tool is needed).

The wire that carries this throttle angle voltage signal to the PCM, and which we'll tap into, is the wire that connects to TPS **pin #3** (in the illustration above).

NOTE: The throttle position sensor has to remain connected to its connector for this test to work (this is where a wire piercing probe comes in handy to get to the signal inside the wire. To see what one looks like, click here: [Wire Piercing Probe Tool](#).)

OK, let's start:

1.1

Place your multimeter in Volts DC mode and with the RED multimeter lead probe the middle wire of the sensor's connector. This is the wire that connects to TPS **pin #3** in the illustration above.

2.2

Ground the BLACK multimeter test lead on the battery negative terminal. Have your helper turn the Key On, but don't start the engine (this will power up the TP sensor).

3.3

Your multimeter should report a voltage between .2 to .9 Volts DC. If your multimeter doesn't, don't worry about it just yet, continue with the other steps.

Part 2

1.4

Now, slowly open the throttle (by hand and from the engine compartment) while you observe the change in voltage numbers on your multimeter.

For this test result to be accurate, you need to open the throttle by hand and not from inside the vehicle.

2.5

As the throttle opens, the voltage numbers will increase. This increase in voltage should be smooth and without any gaps or skips. Once the throttle is wide open, your multimeter should read somewhere between 3.5 to 4.5 Volts DC.

3.6

Now, slowly close the throttle. As the throttle is closing, you should see the voltage decrease smoothly and without any gaps or skips, to the exact same voltage you noticed in step 4.

Part 3

1.7

OK, now you'll need someone to help you lightly tap on the throttle position sensor with the handle of a screw-driver (or something similar, and I want to emphasize the words 'lightly tap') as you slowly open and close the throttle and observe the multimeter.

If the TPS is bad, the tapping will cause the voltage numbers to skip or go blank. If the TPS is OK, the tapping will have no effect on the voltage numbers.

2.8

Repeat step 7 several times to make sure of your multimeter test results.

Let's take a look at your test results:

CASE 1: The voltage increased/decreased as you manually opened/closed the throttle plate. This test result confirms that the TP sensor is OK and not defective.

CASE 2: The voltage DID NOT increase/decrease as you manually opened/closed the throttle plate. This tells you that the throttle position sensor (TPS) on your Montero has a problem.

Before condemning the TPS to the scrap heap, you need to make sure that it's getting both power and ground. To check for power, go to: [TEST 2: Verifying Throttle Position Sensor Has Power](#).

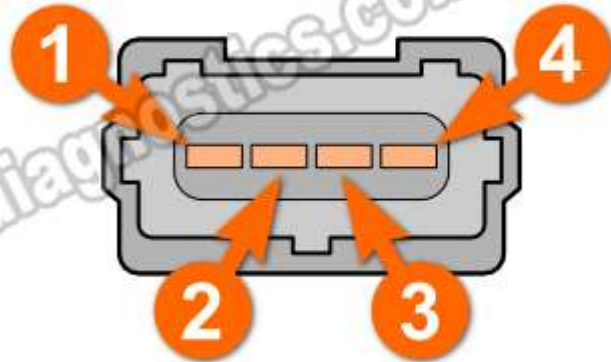
CASE 3: Multimeter DID NOT register any voltage, this test result doesn't condemn the TP sensor as BAD just yet. Why? Because...

... the TP sensor may be missing either power or ground. So the next step is to check that the TP sensor is getting power, go to [TEST 2: Verifying Throttle Position Sensor Has Power](#).

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TEST 2: Verifying Throttle Position Sensor Has Power

TPS Engine Wiring Harness Connector (Front View)



- 1 - Sensor Ground
- 2 - Idle Switch Signal
- 3 - TPS Signal
- 4 - 5 Volts

3.0L Mitsubishi Montero

The throttle position sensor on your 3.0L Montero needs power (and ground) to function. So, in this test step we'll check that the wire that connects to TPS connector **pin #4** has 5 Volts DC with the Key in the On position.

Alright, these are the test steps:

1.1

Place your multimeter's dial in volts DC mode and turn the key on but don't start the engine.

This will power up the TP sensor's connector.

2.2

Check the TPS connector terminal that corresponds to pin #4, of the TPS connector, with the RED multimeter lead.

IMPORTANT Be careful when probing the metal terminal of the TPS connector. Damaging the terminal will require that you replace the connector. Use a back probe or a wire piercing probe instead of probing the front of the connector.

3.3

Connect the BLACK multimeter lead to a good and clean ground point on the engine or directly on the negative (-) battery terminal.

4.4

When you've set up the test, have a helper turn the Key On Engine Off (KOEO).

5.5

Your multimeter should display 4.5 to 5 Volts on its screen. OK, now let's interpret your test results below:

CASE 1: Your multimeter registered 4.5 to 5 Volts. So far so good since this tells you that the throttle position sensor (TPS) is getting power from the powertrain control module (PCM).

The next and last test, is to make sure that the throttle position sensor is getting ground (from the PCM too). For this test, go to: [TEST 3: Verifying Throttle Position Sensor Has Ground](#).

CASE 2: Your multimeter DID NOT register 4.5 to 5 Volts. Double check all of your connections and repeat the test. If your multimeter still doesn't register the 4.5 to 5 Volts DC...

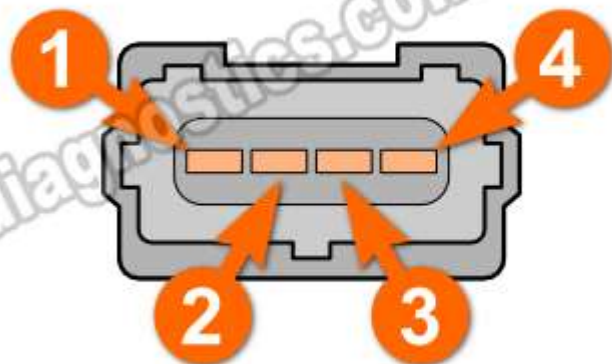
.. then this test result tells you that the TPS itself is not at fault (and thus causing the TPS trouble code). Without power, the TPS can't create a throttle angle voltage signal. Although beyond the scope of this tutorial, your next step is to diagnose and restore this missing power.

TEST 3: Verifying Throttle Position Sensor Has Ground

TPS Engine Wiring Harness Connector (Front View)



- 1 - Sensor Ground
- 2 - Idle Switch Signal
- 3 - TPS Signal
- 4 - 5 Volts



3.0L Mitsubishi Montero

So far, you have confirmed that the TPS is not creating the correct throttle angle voltage signal (based on throttle plate angle) and that it's being fed with 5 volts DC...

... In this last test step we're gonna' see if the TPS is being fed with ground. If ground is present, then based on your previous test results, you can conclude that the TPS itself is bad.

IMPORTANT: The TPS is fed ground directly/internally by your Montero's PCM. Be careful and don't short this wire to battery voltage or you'll fry your Montero's PCM.

OK, here are the test steps:

1.1

Set your multimeter to Volts DC mode.

2.2

Probe the TPS connector wire that connects to the TP sensor's pin #1 with the BLACK multimeter lead. The wire that connects to pin #1 of the connector is the **BLK** wire.

Be careful not to damage the terminal if you probe it on the front of the connector. If possible, you should use a back probe or a wire-piercing probe to check this circuit.

3.3

Now, with the RED multimeter lead, probe the battery positive (+) terminal.

4.4

Turn the Key to its ON position but don't start the engine. This will power up the PCM.

5.5

Your multimeter will display 11 to 12 Volts if the **BLK** wire is feeding the TPS with ground.

CASE 1: Multimeter showed 11 to 12 Volts, this tells you that the throttle position sensor, on your Mitsubishi, is being fed with ground from the PCM.

All three test have confirmed that:

1. The TP sensor is not providing a varying voltage signal when manually opening the throttle plate.
2. The TP sensor is being fed 5 Volts DC.
3. The TP sensor is being fed ground.

Therefore, you can conclude that the throttle position sensor is BAD and needs to be replaced (and that this will solve the TP sensor code lighting up the check engine light).

CASE 2: Multimeter DID NOT show 11 to 12 Volts. Double check that you're testing the correct TP sensor harness terminal wire and repeat the test. If your multimeter still doesn't show the indicated voltage...

...then we can conclude that there's an open in the wire between the TP sensor harness connector and the PCM's harness connector. In the extreme of cases, the PCM has an internal problem (although this is very rare).

Although testing these two conditions are beyond the scope of this article, you have now eliminated the throttle position sensor (TPS) on your 3.0L Mitsubishi as being the cause of the problem and/or the TP sensor diagnostic trouble code (DTC) lighting up the check engine light (CEL).

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Where to Buy Your TP Sensor and Save

Where can you buy the TP sensor for your 3.0L Mitsubishi Montero? You can buy it at your local auto parts store... but it's gonna' cost a whole lot more. I suggest taking a look at the price of the TP sensor in the following links and compare:

Not sure if the above TP sensor fits your particular 3.0L Mitsubishi? Don't worry, once you get to the site, they'll make sure it fits by asking you the particulars of your vehicle. If it doesn't fit, they'll find you the right one.



If this info really saved the day, buy me a beer!