

E34 M5 Throttle Position Sensor (TPS)

- Testing and Replacing

Author: Andrew Hogg

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This document covers how to test the TPS, how it works on the S38B36 engine, and options for a low cost replacement.

Looking at RealOEM for the part number for the TPS (called Throttle Valve Switch), there are two options for the TPS.

1. The first is a Rectangular plug with part # [13621273277](#). This plug is about \$400 new, or a non-OEM version can be found for \$53. This plug was never used on any e34 M5!
2. The second is a round plug with part # [13541710560](#). This plug is \$500 - \$700 and there are no non-OEM versions available. This round plug is listed as EH under the “Supplemental” column, which means an Auto transmission. However, this round plug is on all e34 M5s with the 3.6 engine (all with manual transmission!).

Each switch is covered below.

Note: **The key point of this document is...** that if a car has the round plug, then the connector from the engine harness can be cut and replaced with the connector for the rectangular plug, and then the rectangular TPS used in place of the round one. This will save considerable cost!

Round Switch (The one EVERY e34 M5 Has!)

RealOEM states that this switch was used on the e28 from 11/82 through 12/87, and on the e34 from 4/88 through 4/93. The Bosch part# is 0280120404. This switch, or a similar round switch, can be found (according to RealOEM) ONLY on the e34 M5, and e28 525e (Auto/Euro only) - In both cases RealOEM lists both switches as possibilities. It is NOT found on the other ITB cars, such as the e30M3 and e28M5. And it is not found on any other e28 or e34 other than the two mentioned above.

This round TPS is a basic switch that has two micro switches – one at just off idle and one at WOT. Although there are 6 connectors, only three are used. You can see this when the TPS is detached from its connector and you can see that the connector only has the “top” 3 holes with metal conduits. Looking at the TPS (not the Connector) and at the three connectors at the top, the left one (Pin 1) is earth, top middle (Pin 2) is WOT switch, and right one (Pin 3) is Idle. Looking at Picture #1 below (which shows the TPS rotated 90 degrees counter clockwise from the way you will be looking at it), this would be the pin at 7 o’clock, the pin at 9 o’clock and the pin at 11 o’clock. They work as follows:

1. Closed throttle (Idle): Pins 1 and 3 closed circuit, 1 and 2 open circuit
 - a. The “click” just off idle is Pins 1 & 3 going open
2. At (really just before) WOT, Pins 1 and 2 closed circuit, 1 and 3 open circuit
3. Anywhere in between: Pins 1 and 3 open circuit, Pins 1 and 2 open circuit

One can gather from the above list that this TPS has only 3 states. Idle, WOT and “Somewhere in between”. It differs from the TPS on the S38B38 (Part #13637840383) in that the TPS for that engine actually shows changing resistance values between Idle and WOT. Note that just off Idle there is an audible click. For just before WOT, there is no click.

The ECU uses these three TPS states to decide what engine mapping to use for fuel/air ratios. At Idle it uses a predetermined Idle map and ignores other sensors. At WOT it uses a WOT map and ignores other sensors. In between it uses the MAF, Camshaft and Crankshaft sensor, etc, to decide fuel/air ratio.

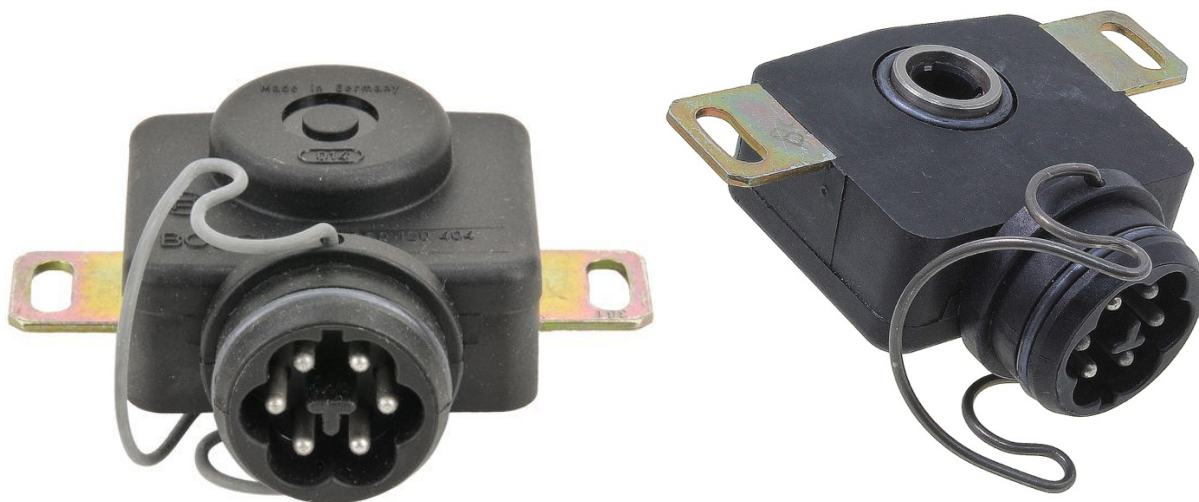
Testing The TPS

To test that this TPS switch is working, use a multimeter set to Ohms, with the range set to 100 Ohms. You cannot use the Continuity mode with the audible tone, as there is too much resistance in the switch for the multimeter to consider this continuous and sound a tone. Do all tests with the ignition off.

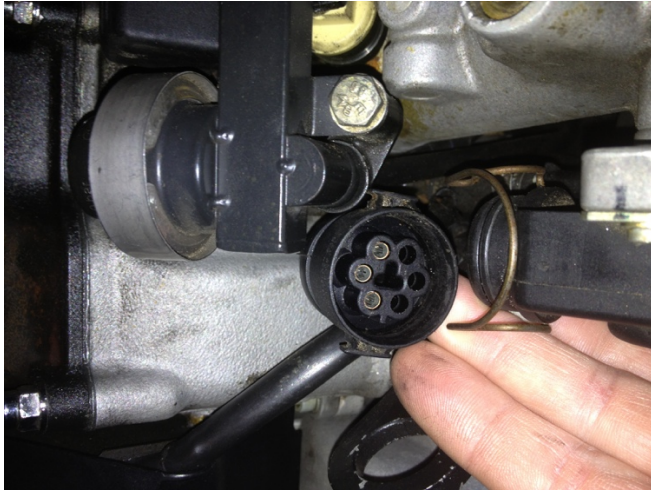
1. Test #1 (Idle): Touch the multimeters wires to Pin #1 and Pin #3. There should be a reading of about 12 Ohms.
2. Test #2 (Off idle): While holding the multimeters wires to Pin #1 and Pin #3 (now showing a few Ohms), have a helper move the throttle just off idle while listening for the click. If there is no click still perform the test. After the click, the multimeter should show infinite Ohms.
3. Test #3 (WOT): Hold the multimeters leads to Pin #1 and Pin #2. At Idle or anywhere up until WOT you should see infinite Ohms. Have your helper move the throttle to full open until it touches the throttle stop screw. Just before it touches the stop, the multimeter should show a few Ohms, meaning the TPS has switched to WOT mode.

If the above tests all work, then your TPS is good and does not need to be replaced. It may still need to be adjusted, but TPS adjustment is not covered in this document.

Picture #1: TPS With 6 Pins



Picture #2: Connector for 6-Pin TPS



Rectangular Switch

RealOEM states that this switch was used on the e30, e28, e34, e24, and e23 from as early as 06/1980 to as late as 01/92. All of these cars except the e30 M3 have a single throttle body and **ONLY** specify this rectangular switch. The e30 M3 and e28 M5, like the e34 M5, also have individual throttle bodies and even they only specify the rectangular switch. As noted above, the e28 525e (Auto/Euro only) is the only other car (other than the e34 M5) that shows both the rectangular and round switch!

This switch works in exactly the same way as the round switch, it just has a different form factor! Cars with the round switch can be adapted to use this TPS if necessary, such as for lower cost (\$60 vs \$400!) or parts availability. The connector for using this rectangular TPS is Part# [12521706096](#) and is still available for about \$5! Noting the simplicity of this TPS switch (see Picture #3 below), one can see that paying \$400 for it is ridiculous, and one could argue that the \$60 Facet version would probably work fine, given this is literally just a switch!

Picture #3: TPS With Three Pins



What About The E34 M5 B38 TPS?

The TPS for the later, Euro-only S38B38 engine was different from both of the TPS mentioned above. Its part# was [13637840383](#). You can see that it was a very different part from the pictures below. This switch was in use from 07/1991 through 08/2008, on cars like the E36 M3, E46 M3, E39 M5, Z3 M, etc. In other words it was used on all the M cars. This acts as a resistance switch, based on what the internals look like, with low resistance at idle and high resistance at WOT. This switch CANNOT be used on the S38B36 engines.

Picture #4: TPS For S38B38 Engine (Euro only)

