

**How To Check & Adjust The TPS
On An FD RX-7
Using the Apex-i PFC/Commander**

The Throttle Position Sensor (TPS) is prone to failure if removed and reinstalled many times. It can also become inaccurate after tens of thousands of miles of heat, cold, vibration, and racing (autocrossing, drag racing, road racing, time trials, track schools, etc.). Symptoms that indicate a problem exists with the TPS include the following:

Narrow Range Symptoms

1. Engine cranks normally, but won't start (no combustion)
2. Engine stalls during idle at any temperature
3. Engine stalls upon deceleration
4. Engine idle is rough at any temperature
5. Engine runs rough upon deceleration
6. Poor acceleration from stand-still (less than full throttle)
7. Idle fluctuates, or "hunts"

Full Range Symptoms

1. Engine stalls upon acceleration
2. Poor acceleration
3. Hesitates, or "stumbles" upon acceleration
4. General lack of power

Go through the list of symptoms and check off any that you are experiencing with your FD. If you are experiencing multiple symptoms in both the narrow and full ranges, then one or more other causes may be at fault. To help narrow down the TPS as a root cause, refer to pages 192-195 in section "F" of the Factory Service Manual (FSM). If none of the symptoms exist with other possible causes, then your TPS is likely at fault. It may simply need adjusted. It could also just need cleaned (internally), or in the worst case, it will need replaced.

Checking The TPS

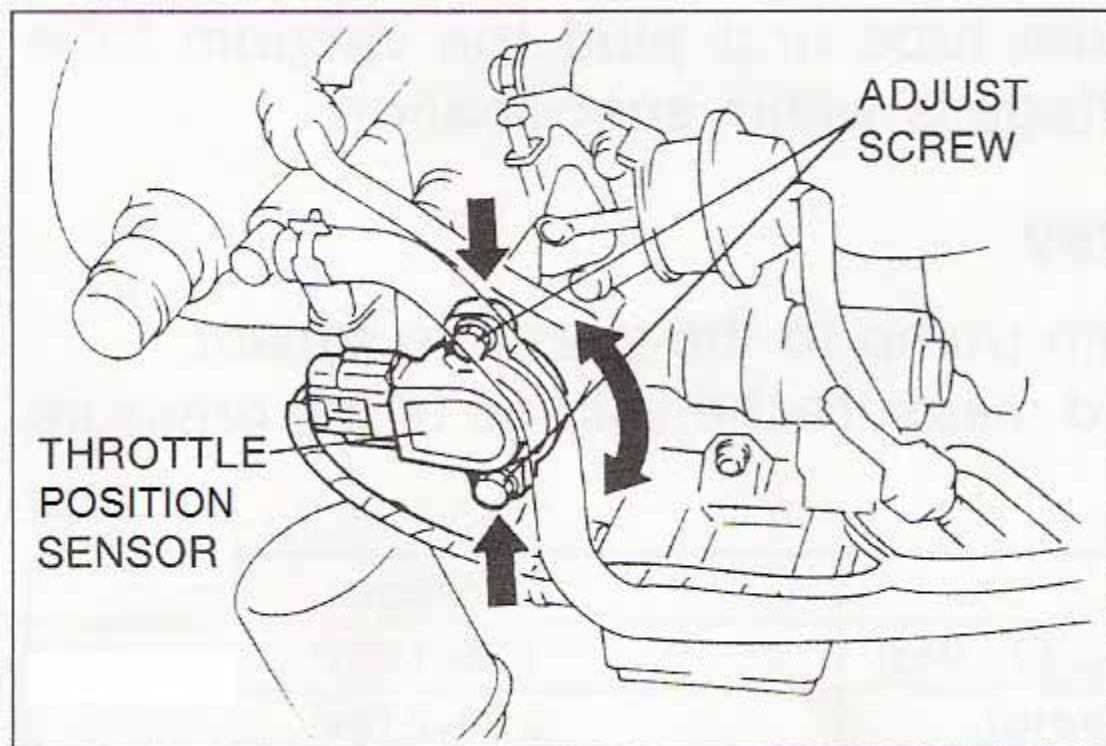
1. Warm up the engine to normal operating temperature and let it idle.
2. Verify the "first idle cam" separates (wax rod disengages double-throttle plates, also called butterfly valves).
3. Turn off the engine.
4. Connect the Commander to the PFC if not already done so.
5. Turn the ignition switch to the "ON" position (do not start engine).
6. Rotate the throttle linkage by hand to verify that the voltage readings on the Commander (VTA1 & VTA2) are within the specification below. You can also use the gas pedal, but verify that the readings change the same. If they don't, go by the throttle linkage. The ranges indicate voltage and space is provided in the table below so that you can enter your actual readings.

Variable (PFC Commander)	Throttle Valve Condition		
	Fully Closed	Closed-to-open	Fully Open
Full Range (VTA1)	0.10-0.70	0.40-4.30	4.20-4.60
Narrow Range (VTA2)	0.75-1.25	1.00-5.00	4.80-5.00

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Adjusting The TPS

1. Warm up the engine to normal operating temperature and let it idle.
2. Verify the “first idle cam” separates (wax rod disengages double-throttle plates, also called butterfly valves).
3. Turn off the engine.
4. Connect the Commander to the PFC if not already done so
5. Turn the ignition switch to the “ON” position (do not start engine).
6. Loosen the two screws using a 7mm socket on a ¼” ratchet, and rotate the TPS to set the correct “fully closed” position voltage. *NOTE: Rotating the TPS counter-clockwise will increase the voltage and conversely, rotating it clockwise will decrease the voltage. Also, try to rotate it on both screws simultaneously, as “pivoting” the TPS will cause only certain voltages to change, making proper adjustment difficult (see *).*



Picture from Mazda Factory Service Manual (FSM)

7. Check the “closed-to-open” position voltage and the “fully open” position voltage. Slowly open the throttle and look for any huge jumps in voltage. This would indicate a problem with the “wiper” inside the TPS. It may just need cleaned.
8. Once the proper voltage is achieved within each specified range, tighten the screws so that the TPS cannot move. The recommended tightening torque is:
1.6-2.4 N/m, or 16-24 kgf/cm, or 140-210 in/lbs, or 11.67-17.5 ft/lbs.
9. If the proper voltages cannot be achieved by rotating/adjusting the TPS, and cleaning it doesn't help, then replace the TPS and repeat the procedure.

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* Imagine if you only loosened either the bottom or the top screw, and then pivoted the TPS. The diagram below illustrates the effect it would have on the various voltages. The yellow and blue areas represent the voltages that would change the most if one or the other screws were loosened and the green areas represent the voltages that would receive a residual change.

TOP SCREW

Variable (PFC Commander)	Throttle Valve Condition		
	Fully Closed	Closed-to-open	Fully Open
Full Range (VTA1)	0.10-0.70	0.40-4.30	4.20-4.60
Narrow Range (VTA2)	0.75-1.25	1.00-5.00	4.80-5.00

BOTTOM SCREW