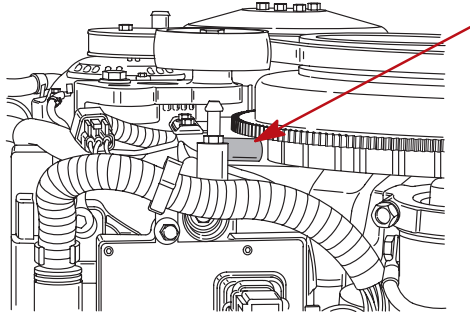


Crank Position Sensor

Model Year 2000 – Senses 24 teeth located on flywheel under ring gear.

Model Year 2001 and Newer – Senses 54 teeth located on flywheel under ring gear. Supplies the ECM with crank position information and engine speed. If sensor should fail, the engine will stop running.

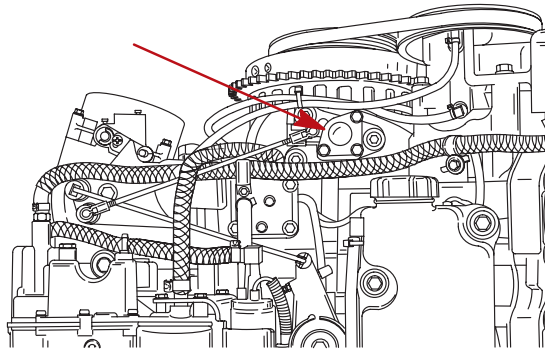


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Crank Position Sensor Specifications	
Air Gap	0.635 mm – 1.01 mm (0.025 in. – 0.040 in.)
Resistance Between 2 pins of Crank Position Sensor Connector	300 - 340 Ω

Throttle Position Sensor (TPS)

The TPS transmits throttle angle information to the ECM which varies the injector pulse width accordingly. Should the sensor fail, the dash mounted CHECK ENGINE light will light and the warning horn will sound. RPM will be reduced by the ECM. TPS settings are not adjustable. TPS settings can be monitored with the Digital Diagnostic Terminal through the ECM. Voltage change should be smooth from idle to wide open throttle. If voltage change is erratic, TPS is defective.



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Model Year 2000 Throttle Position Sensor Specifications	
Idle	4.0 – 4.7 VDC
Wide Open Throttle	0.4 – 1.3 VDC

Model Year 2001 and Newer Throttle Position Sensor Specifications	
Idle	0.4 – 1.3 VDC
Wide Open Throttle	4.0 – 4.7 VDC

Throttle Position Sensor (TPS) Troubleshooting

If the throttle position sensors are out of the intended operating range when the engine is started, the Electronic Control Module (ECM) will sense that the Throttle Position Sensor (TPS) has failed. The warning horn will sound, check engine light will illuminate, DDT will indicate failed TPS and the engine will go into RPM reduction. When the engine is started, the throttle arm on the engine must be against the throttle stop screw.

- Check throttle cable adjustment. The throttle stop screw on the throttle arm must be against the throttle stop on the cylinder block when the engine is started. Pre-load the throttle cable barrel 1 or 2 turns if necessary.
- Verify driver is not pushing on throttle (if foot throttle is used) or advancing the throttle only on the control box.
- Check throttle cam to roller adjustment. If the roller is not down in the pocket/valley area on the cam, there is a tendency for the roller to ride up or down on the cam which causes the TPS link arm to push/pull on the TPS lever resulting changing values.
- Heat or pressure test the TPS.

HEAT TEST

With engine at idle, heat the TPS (with a hot air gun) below the electrical connection until **warm** to the touch. Watch for any one or a combination of the following symptoms:

- RPM change
- Check engine light illumination
- Momentary warning horn signal
- TPS voltage value change (1/2 volt) on DDT

NOTE: Excessive heat will damage TPS.

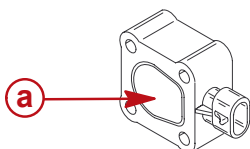
PRESSURE TEST

IMPORTANT: When testing TPS voltage, do not move the drive mechanism (rotor/wiper).

1. Connect DDT and rotate the key to the "ON" position.
2. Set DDT to read TPS voltage and expand the screen to show Now/Min/Max.

NOTE: Test accuracy is improved when TPS is at its lowest voltage reading (this may be idle or WOT depending on model year).

3. Clear the minimum/maximum values on the DDT – press the **0** button.
4. Watch the DDT readings while pressing below the electrical connection point on the TPS cover.



a - Press on cover below electrical connection

5. Voltage reading should change:
 - Less than a couple of digits (i.e. 1.90 v to 1.92 v)

NOTE: Version 5.0 cartridge gives 3 decimal point (millivolts) accuracy if below 1 volt.

- Less than 10 millivolts (i.e. 0.293 v to 0.285 v)
6. Replace any TPS that fails either test.