

# Making Sense

The table below list the sensors by name, the engine types it is found on, the class of sensor it is, mounting characteristics, and very briefly what it does. It is intended as a quick reference only. For more detailed information read the related article(s).

**WARNING! Over torque of NPT threaded sensors can cause major engine damage.** NPT, National Pipe Thread, is a tapered threading used for plumbing. Sensors with this thread can crack block and manifold mounting ports if over tightened. Do not treat this like a regular bolt. NPT sensors will normally “go tight” between 33% and 66% of the threaded area.

| Long name                  | Short name | Engine      | Type           | Mount                   | Ground? | Operation   | Notes        |
|----------------------------|------------|-------------|----------------|-------------------------|---------|---|--------------|
| Idle Air Control           | IAC        | V6 ,<br>4C3 | Stepper motor  | Threaded w/ gasket      | No      | Stepper rotates screw valve.  | 1            |
| Idle Air Control           | IAC        | 4C7         | Stepper motor  | 2 Torx Screws w/ O ring | No      | Stepper rotates screw valve.  | 1            |
| Throttle Position Sensor   | TPS        | All         | Rheostat       | 2 Screws                | No      | Voltage Divider. Output voltage increases with throttle angle.                              | 7, 12        |
| Engine Coolant, ECM        | ECT        | All         | NTC Thermistor | NPT                     | No      | Resistance lowers with Temp. Used to measure coolant temp                                   | 2, 3, 12, 13 |
| Fan Switch                 |            | V6,<br>4C3  | Thermo Switch  | NPT                     | Yes     | Switch closes path to ground at 235F (Single speed)   | 2,11         |
| Oil sender                 |            | All         | Multi          | NPT                     | Yes     | Closes fuel pump switch above 4 PSI. Variable resistance to ground for Gauge.               | 2            |
| Temp Gauge/Alert           |            | All         | Multi          | NPT                     | Yes     | Alert light on at 265F. Resistance to ground for gauge.                                     | 2            |
| Air Charge Temp            | ACT        | V6          | NTC Thermistor | NPT                     | No      | Measure air temp in filter can.   | 2, 3, 4, 12  |
| Manifold Air Temp          | MAT        | 4C7         | NTC Thermistor | NPT                     | No      | Measure air temp in intake manifold.  | 2, 3, 4, 12  |
| Oxygen Sensor              | O2         | All         | Air Battery    | Threaded w/ gasket      | Yes     | Generates Voltage according to amount of O2 in exhaust gas.                                 | 6, 12        |
| Manifold Absolute Pressure | MAP        | All         | Barometric     | Snaps onto bracket      | No      | Manifold pressure/vacuum produces variable voltage  | 8, 12        |
| Crank Position             | CPS        | 4C7         | Magnetic       | Under Coil Pack         | No      | Notches in crank wheel generate pulses.   | 10           |
| Distributor Pickup         |            | V6,<br>4C3  | Magnetic       | Screws                  | No      | Generates pulses as distributor "lobes" pass.   | 9            |
| Primary Ignition Module    | PIM        | All         | Amp/Driver     | Varies by type          | No      | Provides ignition coil drive current and amplification for the crank or distributor pickup. | 5            |

| <b>Engine Codes</b>  |  |
|--|--|
| 4C3  | VIN R motor, 2.5l, 151CID, 300 TBI, HEI distributor ignition   |
| 4C7  | VIN R motor, 2.5l, 151CID, 700 TBI, DIS distributorless ignition   |
| V6   | VIN 9 motor, 2.8l, 173CID, MPEFI, HEI distributor ignition   |
| <b>Ground?</b>   |  |
| Yes  | Open loop sensor that requires ground path via sensor shell and engine block. Open loop sensors are susceptible to errors and failures caused by bad engine ground straps. |
| No   | Closed loop sensor with all connections directly to ECM. The sensor element is electrically isolated from the sensor shell.  |
| In this case open and closed loop refers only to the sensor current path and has nothing to do with ECM modes. |  |

### Notes:

1. These are electrically pretty much the same. The difference is mostly in the method of mounting.
2. Don't use Teflon thread sealing tape on grounded shell NPT sensors. It will likely interfere with getting a good electrical connection through the threads.
3. ECM coolant, MAT, and ACT, use the same value NTC thermistor internally. The test table, in another article, applies to all of them. (An NTC Thermistor is a temperature sensitive resistor that drops in resistance as temperature rises.)
4. MAT and ACT are essentially the same sensor with different names based on location of the sensor. ACT sensors often tend to use epoxy-coated thermistors while MAT is not coated. Sensors without the coating are a little faster responding than coated ones. This is rather important for MAT where it can see 20+F temperature changes in a couple seconds. An ACT sensor, because of its location in the air cleaner of the V6 can be a little slower and still function correctly. Uncoated sensors will always have a plastic guard cage.
5. The PIM on distributor motors is normally screwed to the distributor. The PIM on DIS motors is sandwiched in between the coils and the aluminum mounting plate. The crank position sensor is under the DIS mounting plate.
6. Always check engine grounds whenever there is a problem with the O2 sensor. This sensor generates only 1VDC max. Grounding problems can cause the ECM to read the wrong voltage.
7. The TPS is a mechanical sensor and is subject to wear contamination and breakage. The TPS is the only sensor in Fiero with moving parts.
8. This sensor measures pressure with a solid-state transducer. The top or bottom of this sensor may have vent holes. Do not allow solvents to enter the vent holes as you could ruin the transducer.
9. Lobes, vanes, flaps, whatever favorite name for them is...
10. No. You can't convert a distributor motor to DIS or the other way around. The crank isn't the only issue.
11. Early model 4 cylinder applications may use a 2 speed fan. According to GM schematics this fan has 2 senders. One sender is a single switch that activates at 235F. The other sender has 2 switches that activate at 221F and 246F. The low speed will activate when the 221 or the 235 contacts close or when the air conditioning is on. High speed will activate only when the 241 contacts close.
12. All repairs to the wiring of this sensor MUST be soldered and water proofed. Corrosion of improperly repaired joints will result in bogus ECM errors.
13. The original round connector ECT sensor used by the ECM in early Fiero and other GM cars is no longer available. The new sensor requires a new connector. This connector is included with Borg Warner packages but will need to be purchased separately with many others.