

## OPERATION

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The Powertrain Control Module (PCM) receives input signals from various switches and sensors. When the ignition key is inserted and rotated to the ACC or Run/Start position, its physical position is determined by the TIPM via a CAN message from the Wireless Ignition Node (WIN). The TIPM then powers up the ACC and Run/Start circuits with battery voltage. Power to these circuits wakes up the PCM accordingly. When the key is rotated to the START (crank) position the TIPM transmits the key position via the CAN C bus to the PCM. Based on inputs it receives, the PCM adjusts and controls fuel injector pulse width, idle speed, ignition spark advance, ignition coil dwell, EVAP canister purge, [cooling fan](#), and air conditioning.

### PCM SENSOR INPUTS

- A/C Request AND A/C Select Signal via CAN C bus
- ASD relay voltage sense 11. Trans (EATX) relay voltage sense
- Alternator B+ Sense Signal
- Battery voltage
- Brake Switch Inputs 1 AND 2
- Camshaft Position Sensor
- Crankshaft Position Sensor
- EGR position sensor signal 3. Transmission Pressure Switches
- Engine Coolant Temperature Sensor
- ERS (electronic range select) Up AND Down Input
- EVAP Purge Solenoid Sense
- Ignition Run/Start hard wire feed from TIPM
- Ignition ACC hard wire feed from TIPM
- Ignition START via CAN C from TIPM
- Intake Air Temperature Sensor
- CAN-C
- ESIM Vacuum Switch
- Manifold Absolute Pressure (MAP) Sensor
- Knock Sensors
- Oil Pressure
- Oil Temperature Switch
- Oxygen Sensors Signals
- Pedal Value Sensors #1 AND #2
- Speed Control MUX Inputs #1 AND #2
- SRV position sensor signal (if equipped)
- Starter Signal
- Throttle Position Sensors #1 AND #2

- Transmission Input Turbine Speed Sensor Signal
- Transmission Intermediate Turbine Speed Sensor Signal (62TE only)
- Transmission Output Turbine Speed Sensor Signal
- Transmission Temperature Sensor 9. Gear Position (PRNDL) Switch inputs
- Variable Line Pressure sensor signal
- Vehicle Speed via CAN C bus from ABS module

**ENGINE IDLE SPEED**

The PCM adjusts engine idle speed through the electronic throttle bodies based on the following inputs:

- Air Conditioning Signal
- Battery Voltage
- Coolant Temperature
- Engine Speed (Crankshaft Position Sensor)
- Engine Run Time
- Manifold Absolute Pressure
- Mass Airflow Sensor
- Throttle position Sensors and Pedal Value Sensors
- Vehicle distance (Speed)

**FUEL INJECTOR PULSE WIDTH**

The PCM adjusts fuel injector pulse width (air-fuel ratio) based on the following inputs:

- Battery Voltage
- Coolant Temperature
- Intake Air Temperature
- Exhaust Gas Content (Oxygen Sensor)
- Engine Speed (Crankshaft Position Sensor)
- Manifold Absolute Pressure
- Mass Airflow Sensor
- Throttle Position Sensors and Pedal Value Sensors

**IGNITION TIMING**

The PCM adjusts ignition timing based on the following inputs:

- Coolant Temperature
- Intake Air Temperature
- Engine Speed (Crankshaft Position Sensor)
- Manifold Absolute Pressure

- Mass Airflow Sensor
- Throttle Position Sensors and Pedal Value Sensors

**PCM SENSOR OUTPUTS**

- ASD Relay
- Air Conditioning Clutch Relay
- Alternator Field Control
- CAN-C for Inter Module Communication AND Data Link Connector
- Electronic Throttle Control (ETC) motor
- Purge Solenoid
- O2 Heater Control Outputs
- Fuel Injectors
- Fuel Pump Relay
- Ignition Coils
- SRV actuator (if equipped)
- Transmission Solenoids
- Transmission (EATX) relay
- Two Fan Relays via CAN C bus message to TIPM

**5 VOLT SUPPLY**

There are two independent regulated 5 volt circuits in this vehicle. A primary and a secondary (auxiliary) 5V supply that feeds various sensors AND devices.

**PRIMARY CIRCUITS**

- Crankshaft Position Sensor
- Throttle Position Sensors #1 AND #2
- Pedal Value Sensor #1

**SECONDARY CIRCUITS**

- Camshaft Position Sensor
- EGR position feedback sensor
- MAP sensor
- Pedal Value Sensor #2
- SRV position feedback sensor
- Variable Line Pressure Sensor

**PCM GROUND**

Grounds are provided through multiple pins of the PCM connector. There are 3 engine power grounds and 2 transmission power grounds.

The power grounds are used to control the ground side relays, solenoids, ignition coils or injectors. The signal grounds are used for any input that uses sensor return for ground.

The PCM case is shielded to prevent RFI and EMI. The PCM and case is grounded through the mounting screws AND bracket to the chassis ground.

Internally all grounds are connected together, however there is noise suppression on the sensor grounds.