**No Diagnostic Trouble Codes (DTCs) Present Symptom Charts**

## Chart 1

- Stalls/Quits: Idle, Acceleration, Cruise, Stall After Start
- Runs Rough
- Misses
- Buck/Jerk
- Hesitation/Stumble
- Surge
- Unique Idle Concerns: Rolling Idle

**Note:** *For some vehicle applications, the engine may stall if left running while refueling. Advise the customer to turn the engine off while refueling to avoid contamination or damage to the evaporative emission (EVAP) system.*

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Check the following parameter identifiers (PIDs):<br>▪ LONGFT1 or LONGFT2 (value between -20 and +20%)<br>▪ VPWR (value between 10.5 and 17.0 volts, and within 0.5 volt of battery voltage) | **LONGFT1 or LONGFT2 value low (-):**<br>Continue diagnosis. Concentrate checks in areas that would cause the engine to run rich.<br>**LONGFT1 or LONGFT2 value high (+):**<br>Continue diagnosis. Concentrate checks in areas that would cause the engine to run lean.<br>**VPWR not between 10.5 and 17.0 volts:**<br>REFER to the Workshop Manual Section 414-00, Charging System, Diagnosis And Testing to continue diagnosis.<br>**VPWR between 10.5 and 17.0 volts, but not within 0.5 volt of battery voltage:**<br>CHECK the B+ voltage to the powertrain control module (PCM) power relay. CHECK the VPWR circuit between the PCM and the PCM power relay. CHECK the PWR GND circuits. |
| Fuel Injection System | For vehicles that run rough at idle check the INJx_F PIDs (the x indicates the injector number) with the ignition ON, engine running. There is 1 INJx_F PID for each engine cylinder. All INJx_F PIDs must indicate NO FAULT. The INJx_F PIDs indicate a fault (an injector circuit concern is indicated).<br>For direct fuel injection system diagnosis, GO to Pinpoint Test DI.<br>For port fuel injection system diagnosis, GO to Pinpoint Test KG. |
| Mass Airflow (MAF) Sensor | GO to Pinpoint Test DC. |
| Manifold Absolute Pressure (MAP) Sensor | GO to Pinpoint Test DM. |
| Secondary Ignition System | GO to Pinpoint Test JB. |
| Fuel Delivery System | GO to Pinpoint Test HC. |

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Exhaust System | GO to Pinpoint Test HF. |
| Positive Crankcase Ventilation (PCV) System | GO to Pinpoint Test HG. |
| Variable Camshaft Timing (VCT) System | GO to Pinpoint Test HK. |
| EVAP System | GO to Pinpoint Test HX. |
| Charging System | REFER to the Workshop Manual Section 414-00, Charging System, Diagnosis And Testing to continue diagnosis. |
| Universal Heated Oxygen Sensor (HO2S) | GO to Pinpoint Test DZ. |
| Automatic Transmission | REFER to the Workshop Manual Section 307-01, Automatic Transmission, Diagnosis By Symptom to continue diagnosis. |
| Base Engine | REFER to the Workshop Manual Section 303-00, Engine System, Diagnosis And Testing to continue diagnosis. |
| Intake Air System | GO to Pinpoint Test HU. |
| Supercharger Bypass Control | GO to Pinpoint Test KJ. |
| Auto Start Stop System | GO to Pinpoint Test AA. |
| Additional Testing | GO to Pinpoint Test Z. |

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Additional Checks:<br>▪ Some vehicles have a TQ_CNTRL PID available. Check this PID to determine if the PCM is reducing torque. The TQ_CNTRL PID may indicate which component or system, if any, is requesting a torque reduction.<br>▪ Correct PCM vehicle identification (VID) block information. Refer to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM) to carry out the Making Changes to the VID Block procedure.<br>▪ Be aware of engine RPM and speed limiting functions of the PCM (look for incorrect high vehicle speed signal from ABS or VSS).<br>▪ Drivelines<br>▪ Manual transmission or clutch<br>▪ Charging system<br>▪ Traction control system (if equipped)<br>▪ A/C system<br>▪ Cruise control system (for surge with cruise control on) | REFER to the applicable Workshop Manual section. |
| Brake Over Accelerator | CHECK for simultaneous brake pedal and accelerator pedal operation inadvertently activating the brake over accelerator feature. CHECK the BRKOVR_ACTION, BRKOVRD_POSS, and DIST_BRKOVRD PIDs for recent simultaneous brake pedal and accelerator pedal operation. ADVISE the customer that simultaneous brake pedal and accelerator pedal operation by the vehicle operator activates the brake over accelerator feature.<br>REFER to Section 1, Powertrain Control Software for additional information. |



## Chart 2

- Starting Concerns: Hard Start/Long Crank/Erratic Start/Erratic Crank

**Note:** *Check the BdyCM CRASH PID status. The CRASH PID status YES indicates a crash event has occurred, and may be the cause of the Hard Start/Long Crank/Erratic Start symptom. If the CRASH PID indicates YES, carry out the BdyCM Electrical Service Function Crash Status Reset to reset the PID status. Verify the Hard Start/Long Crank/Erratic Start symptom still exists before continuing with the following diagnostics.*

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Battery Condition And Current Draw | REFER to the Workshop Manual Section 414-00, Charging System, Diagnosis And Testing to continue diagnosis. |
| Secondary Ignition System | GO to Pinpoint Test JB. |
| Fuel Delivery System | GO to Pinpoint Test HC. |
| Cold Start System | GO to Pinpoint Test AB. |
| Exhaust System | GO to Pinpoint Test HF. |
| Positive Crankcase Ventilation (PCV) System | GO to Pinpoint Test HG. |
| EVAP System | GO to Pinpoint Test HX. |
| Intake Air System | GO to Pinpoint Test HU. |
| Starting System | REFER to the Workshop Manual Section 303-06, Starting System to diagnose the engine cranks slowly symptom. |
| Mass Airflow (MAF) Sensor | GO to Pinpoint Test DC. |
| Additional Testing | GO to Pinpoint Test Z. |



## Chart 3

- Starting Concerns: No Start (Engine Cranks)

**Note:** *An extended crank because of a no start may load the exhaust system with raw fuel, damaging the catalytic converter after the engine starts.*

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Add On Anti-Theft Devices | Visual. CHECK with the customer. |
| | |

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Fuel And Ignition | GO to Pinpoint Test A. |
| Cold Start System | GO to Pinpoint Test AB. |
| Exhaust System Restrictions | GO to Pinpoint Test HF. |
| Base Engine | REFER to the Workshop Manual Section 303-00, Engine System, Diagnosis And Testing to continue diagnosis. |
| Additional Testing | GO to Pinpoint Test Z. |

## Chart 4

- Unique Idle Concerns: Slow Return To Idle

**Note:** *For manual transmission vehicles, a 500 to 1,500 RPM controlled decrease lasting approximately 1 second is present between gear shifts at speed when the clutch pedal is pressed, to prevent driveline shock and enable smooth gear shift transitions. If the engine RPM return to idle exceeds the controlled decrease timing, then continue the slow return to idle diagnostics.*

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Vacuum Leaks, Throttle Body | Visual. |
| Positive Crankcase Ventilation (PCV) System | GO to Pinpoint Test HG. |
| Intake Air System Leaks | GO to Pinpoint Test HU. |

## Chart 5

- Unique Idle Concerns: Fast Idle
- Diesels/Runs On

**Note:** *If the vehicle runs normally with the ignition in the OFF position, check for a damaged ignition switch, an IGN START/RUN or ISP-R circuit short to voltage, or a VPWR circuit short to voltage.*

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| | |

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Base Engine | Check for air leaks, including correct sealing of intake manifold and components or vacuum lines attached to intake air (such as the PCV or EGR valve or vacuum lines). REFER to the Workshop Manual Section 303-00, Engine System, Diagnosis And Testing to continue diagnosis. |
| Cooling System | Verify the engine operates at normal temperature. REFER to the Workshop Manual Section 303-03, Engine Cooling or No Diagnostic Trouble Codes (DTCs) Present Symptom Chart Index, to diagnose any cooling system concerns that are present. |
| Intake Air System Leaks | GO to Pinpoint Test HU. |
| Additional Testing | For the vehicle runs normally with the ignition in the OFF position, GO to Pinpoint Test B. For all others, GO to Pinpoint Test Z. |

## Chart 6

- Unique Idle Concerns: Low/Slow Idle
- Stalls/Quits: Deceleration

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Automatic Transmission (stalls or quits on deceleration) | REFER to the Workshop Manual Section 307-01, Automatic Transmission to diagnose the torque convertor operation concerns. |
| Fuel Delivery System | GO to Pinpoint Test HC. |
| Intake Air System | GO to Pinpoint Test HU. |
| Charging System | REFER to the Workshop Manual Section 414-00, Charging System, Diagnosis And Testing to continue diagnosis. |
| Universal Heated Oxygen Sensor (HO2S) | GO to Pinpoint Test DZ. |
| Base Engine | REFER to the Workshop Manual Section 303-00, Engine System, Diagnosis And Testing to continue diagnosis. |
| Additional Testing | GO to Pinpoint Test Z. |

## Chart 7

- Backfires

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Secondary Ignition | GO to Pinpoint Test JB. |
| Fuel Delivery System | GO to Pinpoint Test HC. |
| Base Engine | REFER to the Workshop Manual Section 303-00, Engine System, Diagnosis And Testing to continue diagnosis. |
| Exhaust System | GO to Pinpoint Test HF. |
| Additional Testing | GO to Pinpoint Test Z. |

## Chart 8

- Lack/Loss of Power

**Note:** *Verify the symptom is reported under normal driving conditions without excessive engine or vehicle load. Also, be aware of the engine RPM and speed limiting functions of the PCM.*

**Note:** *For applications with a KS, a lack of power may result if the engine has developed an abnormal noise. The KS may interpret some abnormal noise as detonation and retard spark timing.*

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Automatic Transmission Fluid | Visual. |
| Air Cleaner Element | Visual. |

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Check the following PIDS:<br>▪ LONGFT1 or LONGFT2 (value between -20 and +20%)<br>▪ IMTV_F (if equipped): For both ignition ON, engine OFF and ignition ON, engine running with the transmission in PARK/NEUTRAL and the engine RPM greater than 3,000 RPM, the PID should indicate NO FAULT in both situations. | **LONGFT1 or LONGFT2 value low (-):**<br>Continue diagnosis. Concentrate checks in areas that would cause the engine to run rich.<br>**LONGFT1 or LONGFT2 value high (+):**<br>Continue diagnosis. Concentrate checks in areas that would cause the engine to run lean.<br>**IMTV_F PID indicates a fault:**<br>GO to Pinpoint Test HU. |
| Fuel Delivery System | GO to Pinpoint Test HC. |
| Secondary Ignition | GO to Pinpoint Test JB. |
| Mass Airflow (MAF) Sensor | GO to Pinpoint Test DC. |
| Exhaust System | GO to Pinpoint Test HF. |
| Variable Camshaft Timing (VCT) System | GO to Pinpoint Test HK. |
| Accelerator Pedal Position (APP) Sensor | GO to Pinpoint Test DK. |
| Base Engine | REFER to the Workshop Manual Section 303-00, Engine System, Diagnosis And Testing to continue diagnosis. |
| Automatic Transmission | REFER to the Workshop Manual Section 307-01, Automatic Transmission, Shift Point Road Test to continue diagnosis. |
| Brake System Drag Or Binding | REFER to the Workshop Manual Section 206-00, Brake System. |
| Turbocharger System | GO to Pinpoint Test HN. |
| Supercharger Bypass Control | GO to Pinpoint Test KJ. |
| Additional Testing | GO to Pinpoint Test Z. |

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Additional Checks:<br>▪ Some vehicles have a TQ_CNTRL PID available. Check this PID to determine if the PCM is reducing torque. The TQ_CNTRL PID may indicate which component or system, if any, is requesting a torque reduction.<br>▪ Customer driving habits<br>▪ Correct PCM vehicle identification (VID) block information. Refer to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM) to carry out the Making Changes to the VID Block procedure.<br>▪ Intake manifold runner control (IMRC) linkage (if equipped)<br>▪ Clutch (M/T)<br>▪ Charging system<br>▪ Engine RPM or speed limiting functions of the PCM (look for incorrect high vehicle speed signal from ABS or VSS) | Visual. REFER to the applicable Workshop Manual section. |
| Brake Over Accelerator | CHECK for simultaneous brake pedal and accelerator pedal operation inadvertently activating the brake over accelerator feature. CHECK the BRKOVR_ACTION, BRKOVRD_POSS, and DIST_BRKOVRD PIDs for recent simultaneous brake pedal and accelerator pedal operation. ADVISE the customer that simultaneous brake pedal and accelerator pedal operation by the vehicle operator activates the brake over accelerator feature.<br>REFER to Section 1, Powertrain Control Software for additional information. |



## Chart 9

- Spark Knock

**Note:** *Carbon build up in the combustion chamber and on the back of valves can be a contributing factor for engine spark knock concerns. Remove carbon deposits prior to any component replacements.*

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| | |

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Cooling System | Verify the engine operates at normal temperature. REFER to the Workshop Manual Section 303-03, Engine Cooling, The Engine Overheats or No Diagnostic Trouble Codes (DTCs) Present Symptom Chart Index to diagnose any cooling system concerns that are present. Verify correct coolant level and coolant concentration. REFER to the Workshop Manual Section 303-03, Engine Cooling, Cooling System Draining, Filling and Bleeding for correct coolant concentrations and fill procedures. |
| Mass Airflow (MAF) Sensor | GO to Pinpoint Test DC. |
| Base Engine | REFER to the Workshop Manual Section 303-00, Engine System, Diagnosis And Testing to continue diagnosis. |
| Fuel Delivery System | GO to Pinpoint Test HC. |
| Secondary Ignition System | GO to Pinpoint Test JB. |
| Positive Crankcase Ventilation (PCV) System | GO to Pinpoint Test HG. |
| Engine Oil Quality | Visual. |
| Additional Testing | GO to Pinpoint Test Z. |



## Chart 10

- Poor Fuel Economy

**Note:** *Driving styles may have a significant influence on fuel economy. Verify the concern before starting an in-depth diagnosis. Refer to the Owners Literature, Calculating Fuel Economy for additional information.*

*If available, use the integrated diagnostic system (IDS) fuel economy test to verify a concern is present. The following external factors may contribute to poor fuel economy:*

- stop and go driving
- incorrect tire pressure and size
- vehicle loads (such as trailer towing)
- extended winter warm-up conditions
- high speed driving

- incorrect axle ratio
- road or weather conditions
- aftermarket add ons
- short run operations
- customer expectations

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Check the following PIDs:<br>▪ LONGFT1 or LONGFT2 (value between -20 and +20%)<br>▪ VPWR (value between 10.5 and 17.0 volts, and within 0.5 volt of battery voltage) | **LONGFT1 or LONGFT2 value low (-):**<br>Continue diagnosis. Concentrate checks in areas that would cause the engine to run rich.<br>**LONGFT1 or LONGFT2 value high (+):**<br>Continue diagnosis. Concentrate checks in areas that would cause the engine to run lean.<br>**VPWR not between 10.5 and 17.0 volts:**<br>REFER to the Workshop Manual Section 414-00, Charging System, Diagnosis And Testing to continue diagnosis.<br>**VPWR between 10.5 and 17.0 volts, but not within 0.5 volt of battery voltage:**<br>CHECK the B+ voltage to the PCM power relay. CHECK the VPWR circuit between the PCM and the PCM power relay. CHECK the PWR GND circuits. |
| Cooling System | Verify the engine operates at normal temperature. REFER to the Workshop Manual Section 303-03, Engine Cooling, Symptom Chart to diagnose any cooling system concerns that are present. |
| Transmission Fluid Level | Visual. |
| Secondary Ignition System | GO to Pinpoint Test JB. |
| Fuel Delivery System | GO to Pinpoint Test HC. |
| Exhaust System | GO to Pinpoint Test HF. |
| Variable Camshaft Timing (VCT) System | GO to Pinpoint Test HK. |
| Automatic Transmission | REFER to the Workshop Manual Section 307-01, Automatic Transmission, Diagnosis By Symptom to continue diagnosis. |
| Positive Crankcase Ventilation (PCV) System | GO to Pinpoint Test HG. |

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Grille Shutter | REFER to the Workshop Manual Section 501-02, Front End Body Panels, to continue diagnosis. |
| Additional Checks | Check for base engine or intake air system concerns. Check for a contaminated MAF sensor. REFER to the applicable Workshop Manual section. Check for correct PCM VID block information. REFER to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM) to CARRY OUT the Making Changes To The VID Block procedure. |
| Auto Start Stop System | GO to Pinpoint Test AA. |
| Additional Testing | GO to Pinpoint Test Z. |

## Chart 11

- Emissions Compliance

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Emissions Related Systems | GO to Pinpoint Test EM. |

## Chart 12

- Warning Indicators: Check Fuel Cap, Malfunction Indicator Lamp (MIL), Power Take Off (PTO), Temperature Warning Indicator Or Gauge (applications with cylinder head temperature [CHT] sensor only), Transmission Control Indicator Lamp (TCIL), Powertrain Malfunction Indicator (Wrench)
- PTO Concerns: Not Working Correctly

**Note:**

- *If the symptom is both a MIL on and exhaust emission test failure, GO directly to Chart 11.*
- *If the engine is a no start, GO directly to Chart 3.*
- *If the engine runs rough at idle, GO directly to Chart 1.*

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Check Fuel Cap | Verify the fuel filler cap is correctly tightened or the capless fuel tank filler pipe is correctly sealed.<br>REFER to the Workshop Manual Section 413-01, Instrumentation, Message Center, And Warning Chimes, to diagnose the check fuel message. |
| | |

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| MIL<br>▪ Always on when the engine is running (no DTCs present)<br>▪ Never on (including during indicator prove out) | REFER to the Workshop Manual Section 413-01, Instrumentation, Message Center, And Warning Chimes, Diagnosis And Testing to continue diagnosis. |
| PTO | GO to Pinpoint Test FB. |
| Temperature Warning Indicator Or Gauge (applications with CHT sensor only) | For an engine that is overheating, REFER to the Workshop Manual Section 303-03, Engine Cooling to diagnose the engine overheating symptom. Be aware that since a PCM DTC is not present, the PCM is not attempting to activate the indicator.<br>For an engine operating at normal temperature, GO to Pinpoint Test DL. |
| TCIL<br>▪ Always on when the engine is running (no DTCs present)<br>▪ Never on | REFER to the Workshop Manual Section 307-05, Automatic Transmission, External Controls. |
| Powertrain Malfunction Indicator (Wrench) | REFER to the Workshop Manual Section 413-01, Instrumentation, Message Center, And Warning Chimes, to diagnose the wrench indicator is never/always on or to diagnose the POWERTRAIN MALFUNCTION warning is inoperative. |
| Additional Testing | GO to Pinpoint Test Z. |



## Chart 13

- Automatic Transmission (A/T) Shift Concerns: Upshift, Downshift, Engagement

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Transmission | REFER to the Workshop Manual Section 307-01, Automatic Transmission, Diagnosis And Testing to continue diagnosis. |
| Additional Tests | GO to Pinpoint Test Z. |

## Chart 14

- Instrumentation: Tachometer Inoperative, Speedometer/Odometer Inoperative, Boost Gauge Indicates Higher Than Normal Boost, Fuel Gauge Inoperative

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Tachometer Inoperative | REFER to the Workshop Manual Section 413-01, Instrumentation, Message Center, And Warning Chimes, to diagnose the incorrect tachometer indication. |
| Speedometer/Odometer Inoperative | REFER to the Workshop Manual Section 413-01, Instrumentation, Message Center, And Warning Chimes, to diagnose the inoperative speedometer/odometer. |
| Boost Gauge | For charge air cooler (CAC) system concerns, GO to Pinpoint Test KP. |
| Fuel Gauge Inoperative | REFER to the Workshop Manual Section 413-01, Instrumentation, Message Center, And Warning Chimes, to diagnose the incorrect fuel gauge indication. |
| Instrumentation | REFER to the Workshop Manual Section 413-01, Instrumentation, Message Center, And Warning Chimes. |

## Chart 15

- Oil System Concerns: High Oil Consumption, Leaks

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Positive Crankcase Ventilation (PCV) System | GO to Pinpoint Test HG. |
| Base Engine | REFER to the Workshop Manual Section 303-00, Engine System, Diagnosis And Testing to continue diagnosis. |
| Additional Checks | Check for external oil leaks and correct oil viscosity. Check the turbocharger system for oil leaks. |

## Chart 16

- Cooling System Concerns: Electric Cooling Fan Does Not Operate (Low, High or Variable Speed), Cooling Fan Clutch Does Not Operate

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Electric Cooling Fan | For Ecosport 1.0L, Expedition, F-150 3.5L GTDI, Ford GT, Navigator, and Transit Connect 1.0L charge air cooler (CAC) cooling fan, GO to Pinpoint Test KF.<br>For Aviator, Corsair, Escape/Kuga, Explorer, Ford GT, and Transit Connect, GO to Pinpoint Test KN.<br>For all others, GO to Pinpoint Test KF. |
| Cooling Fan Clutch | GO to Pinpoint Test HV. |
| Cooling System | REFER to the Workshop Manual Section 303-03, Engine Cooling to diagnose the cooling system concern. |

## Chart 17

- Cooling System Concerns: Electric Cooling Fan Always Runs

**Note:** *This chart is only intended to diagnose an electric cooling fan that always runs with a cool engine and the A/C and defroster off.*

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Cooling Fan | For Aviator, Corsair, Escape/Kuga, Explorer, Ford GT, and Transit Connect, GO to Pinpoint Test KN.<br>For all others, GO to Pinpoint Test KF. |
| Cooling System | REFER to the Workshop Manual Section 303-03, Engine Cooling, The Engine Overheats to diagnose the cooling system concern. |

## Chart 18

- Exhaust System Concerns: Visible Smoke

**Note:** *Black smoke indicates a rich fuel mixture, blue smoke indicates burning oil, and white smoke indicates water in the combustion chamber.*

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Base Engine | REFER to the Workshop Manual Section 303-00, Engine System, Diagnosis And Testing to continue diagnosis. |
| | |

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Fuel Delivery System<br>▪ Black smoke | GO to Pinpoint Test HC. |
| Ignition System<br>▪ Black smoke | GO to Pinpoint Test JB. |
| Positive Crankcase Ventilation (PCV) System<br>▪ Blue smoke | REFER to the Workshop Manual Section 303-00, Engine System for a description of the Oil Consumption Test. |
| Turbocharger System<br>▪ Blue smoke | REFER to the Workshop Manual Section 303-04, Fuel Charging And Controls - Turbocharger for the Oil Consumption Test. |

## Chart 19

- Fuel System Concerns: Odor, Engine Compartment

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| EVAP System | Visual. |
| Fuel Delivery System | Visual. GO to Pinpoint Test HC. |

## Chart 20

- Engine Noise (under hood)

**Note:** *Attempt to identify the source of the noise. If the noise is from a source other than those listed below, refer to No Diagnostic Trouble Codes (DTCs) Present Symptom Chart Index (for noise such as spark knock) or the applicable Workshop Manual section to continue diagnosis.*

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Secondary Ignition System | CHECK for a snap noise that may be due to secondary ignition arcing.<br>CHECK the condition of the spark plug boots. |
| Turbocharger System | REFER to the Workshop Manual Section 303-04, Fuel Charging And Controls - Turbocharger to diagnose the turbocharger noise. |

## Chart 21

- Exhaust System Concerns: Odor (Sulfur or Rotten Egg Smell)

**Note:** *A slight sulfur smell may be normal. Catalysts with less than 8,000-16,000 kilometers (5,000-10,000 miles), either from a new vehicle or new catalyst, are likely to have a sulfur smell due to the highly active state of new catalysts. Installing a new catalyst may actually make the symptom worse.*

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Fuel Delivery System | GO to Pinpoint Test HC. |
| Fuel Source | TALK with the customer. SUGGEST trying a different fuel source. |

## Chart 22

- Starting Concerns: No Crank

| SYSTEM/COMPONENT | REFERENCE (Section 5 Pinpoint Test unless noted) |
|---|---|
| Add On Anti-Theft Devices | Visual. CHECK with the customer. |
| Anti-Theft | REFER to the Workshop Manual Section 419-01, Anti-Theft to diagnose the vehicle does not start symptom. |
| Starting System | REFER to the Workshop Manual Section 303-06, Starting System to diagnose the engine does not crank symptom. |