

### 1998 ENGINE PERFORMANCE General Motors Corp. - Trouble Shooting - No Codes - 5.7L

## INTRODUCTION

Before diagnosing symptoms or intermittent faults, perform ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in TESTS W/CODES article. Use this article to diagnose driveability problems when a current trouble code is not present.

Symptom checks are intended to direct the technician to malfunctioning component(s) so that further diagnosis may be performed. A symptom should lead to further testing of specific components or systems, or verification of adjustment specifications.

Use intermittent test procedures to locate intermittent driveability problems that do not occur when the vehicle is being tested. These problems may cause a noticeable driveability problem or cause the Malfunction Indicator Light (MIL) to illuminate on some vehicles.

It is also possible that certain driveability concerns have been rectified by the manufacturer through substitution of a revised PROM or Powertrain Control Module (PCM). Check with manufacturer for latest information on updated PROMs and PCMs.

**NOTE:** For specific testing procedures, see **SYSTEM/COMPONENT TESTS** article. To verify specifications, see **ADJUSTMENTS** or **SPECIFICATIONS** articles.

## SYMPTOMS

Before proceeding with any symptom diagnosis, perform all steps under PRELIMINARY CHECKS.

### PRELIMINARY CHECKS

- Verify the on-vehicle diagnostics are working by performing ON-BOARD DIAGNOSTIC (OBD) SYSTEM CHECK in BASIC TESTING article.
- Ensure PCM grounds are clean, tight, and properly located.
- Check vacuum hoses for splits, kinks, leaks, restrictions, and proper connections. Ensure vacuum hoses are correctly routed as shown on Vehicle Emission Control Information label.
- Check for air leaks at all intake manifold sealing surfaces.
- Check ignition wires for cracking, hardness, proper routing and carbon tracking.
- Check wiring for proper connections and routing, pinches, burns, cuts or other damage.
- Ensure PCM and MIL are functioning properly.
- Ensure there are no diagnostic trouble codes stored, or only intermittent codes are present.
- Ensure fuel control system is operating properly. See BASIC TESTING article.
- Perform fuel system pressure test in BASIC TESTING article.

- Perform a careful visual inspection of all systems.

After all checks have been performed, verify customer complaint and locate correct symptom. Check items indicated under that symptom. Not all items listed under each symptom apply to all models and systems. These procedures will normally recommend testing of a specific system or component, such as EGR, ignition, TCC, etc. See SYSTEM/COMPONENT TESTS article for test procedures.

**NOTE: If PCM displays data but engine fails to start, proceed to ENGINE CRANKS BUT DOES NOT RUN in BASIC TESTING article.**

## **SYMPTOM DIAGNOSIS**

Symptom checks should not be used unless symptom occurs while vehicle is being tested. To reduce diagnostic time, ensure steps in BASIC DIAGNOSTIC PROCEDURE and TESTS W/CODES articles were performed before diagnosing a symptom. Symptoms available for diagnosis include:

- Hard Start
- Hesitation, Sag Or Stumble
- Vehicle Surges Or Chuggles
- Lack Of Power, Sluggish Or Spongy
- Engine Backfires
- Cuts Out, Misses
- Rough, Unstable Or Incorrect Idle, Stalling
- Poor Fuel Economy
- Engine Dieseling/Run-On
- Detonation/Spark Knock
- Excessive Exhaust Emissions Or Odors

## **HARD START**

### **Symptom Definition**

Engine cranks okay, but does not start for a long time. Engine eventually starts, and may die immediately or run okay.

### **Possible Cause & Correction**

Check the following items:

- Check fuel pump relay by connecting test light between fuel pump relay connector ignition feed circuit and ground. Turn ignition on. Light should illuminate for 2 seconds. If light does not illuminate for 2 seconds, see RELAYS under MODULES, RELAYS & SOLENOIDS in SYSTEM/COMPONENT TESTS article. For location of fuel pump test connector, see COMPONENT LOCATIONS in SYSTEM/COMPONENT TESTS article. Check for blown injector fuse.

- Check for poor quality or water contaminated fuel.
- Visually inspect injector fuse(s).
- Check for a binding or sticking TP sensor, or high TP sensor voltage with throttle closed.
- Check EGR operation.
- Check for a leaking injector.
- Ensure resistance of engine coolant sensor circuit and engine coolant sensor is within specification. See SENSOR RANGE CHARTS article.
- Check for proper spark output using Spark Tester (J-26794).
- Check for shorts by spraying plug wires with a fine mist of water.
- Remove spark plugs and check for wet plugs, cracks, improper gap, burned electrodes or heavy carbon deposits.
- Check fuel pressure.
- Check for loose ignition coil ground. Also check ignition coil fuse.
- Check for faulty in-tank fuel pump check valve (if equipped). A faulty in-tank fuel pump check valve will allow fuel to drain back to tank after engine is stopped. To check this condition, turn ignition off, disconnect fuel pressure line at fuel rail and remove filler cap. Using a radiator pressure tester, apply 15 psi (1.0 kg/cm<sup>2</sup>) pressure. If pressure holds for 60 seconds, check valve is okay.
- Ensure the installed PROM and/or PCM is correct for that particular vehicle. Check with dealer for latest application information.
- Check for restricted exhaust system.
- Check Idle Air Control (IAC) system. Check for vacuum leak at high idle. Check for binding of throttle blade or linkage. Check for foreign material in IAC bore of throttle body. Check for proper connection of IAC valve electrical connector. Check for failure of A/C compressor or relay.
- Check MAP or MAF sensor.
- Inspect crankshaft sensor clearance and resistance. Check harmonic balancer interrupter rings for bent or missing vanes.
- Check if crankcase ventilation valve is stuck open.
- Check basic engine mechanical problems (i.e., compression, valves).
- Check distributor vent system (if equipped).

## **HESITATION, SAG OR STUMBLE**

### **Symptom Definition**

Momentary lack of response when accelerator is pushed down. Condition occurs at all vehicle speeds or usually occurs when taking off from a stop. If severe enough, may cause engine to stall.

### **Possible Cause & Correction**

Check the following items:

- Visually check vacuum hoses for splits, kinks and proper connections as shown on Vehicle Emission

Control Information label.

- Check ignition wires for cracking, hardness and proper connections at both distributor cap and spark plugs.
- Check wires for pinches, cuts and proper connections.
- Check fuel pressure.
- Check for poor quality or water contaminated fuel.
- Check for fouled spark plugs.
- Ensure the installed PROM and/or PCM is correct for that particular vehicle. Check with dealer for latest application information.
- Check for a binding or sticking TP sensor. Voltage should increase steadily as throttle is moved toward Wide Open Throttle (WOT).
- Ensure PCM-controlled idle speed is correct.
- Check EGR operation.
- Check engine cooling system thermostat for proper operation and heat range.
- Check ignition control system ground circuit.
- Check canister purge system for proper operation.
- Check charging system output. Repair charging system if voltage is less than 9 or more than 17 volts.
- Check fuel injectors. Perform INJECTOR BALANCE TEST in SYSTEM/COMPONENT TESTS article.
- Check injector harness locations. Ensure injectors are connected to correct injector/cylinder according to firing order.
- Check heated oxygen sensor ground (corroded threads in exhaust manifold).
- Check for air leaks between MAF sensor and throttle body.
- Check air induction system for restrictions.
- Check for intake valve deposits.
- Check MAP or MAF sensor.
- Check distributor vent system (if equipped).

## **VEHICLE SURGES OR CHUGGLES**

### **Symptom Definition**

Engine power varies under steady throttle or cruise. Vehicle speeds up and slows down without changing position of accelerator pedal.

### **Possible Cause & Correction**

Check the following items:

- Visually check vacuum hoses for splits, kinks and proper connections as shown on Vehicle Emission Control Information label.
- Ensure Transaxle Range (TR) switch is properly adjusted.

- Check for intermittent open or short to ground in Torque Converter Clutch (TCC) circuit.
- Check canister purge system for proper operation.
- Check ignition control system for proper operation.
- Check EGR system for proper operation.
- Ensure the installed PROM and/or PCM is correct for that particular vehicle. Check with dealer for latest application information.
- Check for adequate ignition voltage output using Spark Tester (J-26792).
- Check oxygen sensor for contamination. This will cause a false high voltage signal to PCM. PCM will respond by leaning air/fuel ratio.
- Check in-line fuel filter, and replace if dirty or clogged.
- Check fuel pressure while condition exists.
- Check for poor quality or water contaminated fuel.
- Remove spark plugs and check for wet plugs, cracks, improper gap, burned electrodes or heavy carbon deposits. Also, check condition of distributor cap, rotor and spark plug wires.
- Check charging system output. Repair charging system if voltage is less than 9 volts or more than 17 volts.
- Check A/C for excessive charge.
- Check for restricted exhaust system.
- Check injector harness locations. Ensure injectors are connected to correct injector/cylinder according to firing order.
- Ensure driver understands operation of TCC and A/C. See owner's manual.
- Check speedometer calibration.
- Check for rich or lean conditions. Drive vehicle at speed when complaint occurs.
- Check for plugged injectors. Perform INJECTOR BALANCE TEST in SYSTEM/COMPONENT TESTS article.
- Ensure PCM grounds are clean and tight.
- Check for excessive use of additives in fuel.
- Check distributor vent system (if equipped).

## **LACK OF POWER, SLUGGISH OR SPONGY**

### **Symptom Definition**

Engine delivers less power than expected. Little or no increase in speed when accelerator is pushed down.

### **Possible Cause & Correction**

Check following items:

- Ensure air filter and fuel filter are not plugged. Replace if necessary. Check for incorrect fuel pressure. Also check for contaminated fuel.

- Check shift solenoid system and TCC system for proper operation.
- Check knock sensor system for excessive retard.
- Check ignition control system for proper operation.
- Ensure EGR valve is not open all the time.
- Check exhaust system for restrictions, such as a damaged or collapsed pipe, muffler or catalytic converter.
- Check charging system output. Repair charging system if voltage is less than 9 volts or more than 17 volts.
- Check for A/C clutch cutout at wide open throttle.
- Check MAP sensor.
- Using Spark Tester (J-26792), check for available secondary voltage.
- Check air induction system for restrictions.
- Check engine valve timing and compression.
- Ensure the installed PROM and/or PCM is correct for that particular vehicle. Check with dealer for latest application information.
- Check PCM grounds for clean, tight connections.
- Check for incorrect or worn camshaft.
- Check for excessive fuel additives.
- Check for binding accelerator cable.
- Check distributor vent system (if equipped).
- Check engine supercharger (if equipped).
- Check if engine is operating in power management mode (if equipped).
- Check boost control system components and connections (if equipped).

## **ENGINE BACKFIRES**

### **Symptom Definition**

Fuel ignites in intake manifold or in exhaust system, making a loud popping noise.

### **Possible Cause & Correction**

Check following items:

- Check for proper valve timing.
- Check for engine vacuum leaks and/or engine not tuned to specifications.
- Check secondary air injection system.
- Check EGR valve for leaking base gasket or valve hanging open.
- Check engine for sticking or leaking valves.
- Check for fuel or water in vacuum hose to MAP sensor. Also check for restricted hose.

- Check fuel injectors. Perform INJECTOR BALANCE TEST in SYSTEM/COMPONENT TESTS article.
- Check fuel system. Perform BASIC FUEL SYSTEM CHECKS in BASIC TESTING article.
- Using Spark Tester (J-26792), check available output voltage of ignition coil.
- Check for crossfire between spark plugs, distributor cap and spark plug wires.
- Remove spark plugs and check for wet plugs, cracks, improper gap, burned electrodes or heavy carbon deposits. Also, check condition of distributor cap, rotor and spark plug wires.
- Check for an intermittent ignition system problem.
- Check intake and exhaust manifold passages for casting flash.
- Check distributor vent system (if equipped).
- Check harmonic balancer interrupter rings for missing, broken or bent vanes.

## **CUTS OUT, MISSES**

### **Symptom Definition**

Cuts out or misses is a steady pulsation or jerking that follows engine speed and is usually more pronounced as engine load increases. Exhaust may have a steady spitting sound at idle or low speed. Perform a careful visual inspection as described in BASIC TESTING article.

### **Possible Cause & Correction**

Check following items:

- Check ignition wires for short or faulty insulation.
- Check distributor cap (if equipped) for moisture, dust or cracks. Spray spark plug wires with a fine mist of water to check for shorts.
- Using Spark Tester (J-26792), check for available secondary voltage.
- Check ignition system for faulty grounds.
- Ensure ignition control wiring harness is not routed too close to wiring which may cause induced voltage signals.
- Check ignition coil connections.
- Remove spark plugs and check for correct heat range, wear, cracks, wetness, improper gap or heavy deposits.
- Check for poor quality or water contaminated fuel.
- Check for improper fuel pressure. Check for restricted fuel filter.
- Check for plugged injectors. See INJECTOR BALANCE TEST in SYSTEM/COMPONENT TESTS article.
- Check PCM for proper ground circuits. Check for internal PCM intermittents.
- Check for bent push rods, broken valve springs or worn camshaft lobes.
- Check for EGR valve sticking open.
- Check TP sensor for sticking and binding. Check for correct TP sensor voltage. See THROTTLE

POSITION (TP) SENSOR in SPECIFICATIONS article.

- Check for proper crankshaft position sensor resistance.
- Check for restricted exhaust system.
- Check injector drivers by disconnecting all injector harness connectors and connecting a 6-volt test light to each injector's harness terminal. Light should blink while cranking.
- Check engine compression. Check for incorrect valve timing.
- Check intake and exhaust manifold passages for casting flash.
- Check distributor vent system (if equipped).

## **ROUGH, UNSTABLE OR INCORRECT IDLE, STALLING**

### **Symptom Definition**

Engine runs unevenly at idle. If severe enough, vehicle will shake. Idle may vary in RPM. Either problem may cause stalling. Engine idles at incorrect RPM.

### **Possible Cause & Correction**

Check following items:

- Ensure throttle linkage and/or TP sensor is not sticking or binding. Ensure throttle bore is free of foreign material.
- Check for vacuum leaks.
- Check engine idle speed (both base idle and PCM idle).
- Check Idle Air Control (IAC) system. Check for vacuum leak or high idle. Check for water contaminated fuel, correct fuel pressure or a restricted injector. Check for foreign material in IAC bore of throttle body. Check for proper connection of IAC valve electrical connector. Check for failure of A/C compressor or relay.
- Check for proper operation of EGR system.
- Check Transaxle Range (TR) switch circuit. Ensure TR switch is properly adjusted.
- Check power steering pressure switch operation.
- Check charging system output. Repair charging system if voltage is less than 9 volts or more than 17 volts.
- Check for fuel in pressure regulator vacuum hose. If fuel is present, replace regulator.
- Check evaporative emission control system.
- Check for proper spark plug gap, and check engine compression.
- Check PCM grounds for clean and tight connections.
- Check A/C signal to PCM. If problem exists only when A/C is on, check A/C system operation and pressures.
- Check for broken motor mounts.
- Ensure the installed PROM and/or PCM is correct for that particular vehicle. Check with dealer for latest application information.



- Check MAP or MAF sensor for proper operation.
- Check oxygen sensor operation. Check for silicone contamination or incorrect RTV sealant.
- Check for excessive fuel additives.
- Check for shorted or open injector windings.
- Check for leaking injectors. Perform INJECTOR BALANCE TEST in SYSTEM/COMPONENT TESTS article.
- Check injector harness locations. Ensure injectors are connected to correct injector/cylinder according to firing order.
- If rough idle only occurs when engine is hot, check crankcase ventilation valve operation. Check for manifold vacuum at inlet end of crankcase vent tube assembly with engine idling.
- Check ignition system. Check for moisture, dust, cracks, burns, etc. Check for shorts by spraying spark plug wires with a fine water mist. Check ignition wires for shorts and faulty insulation.
- Check to see if condition is caused by engine running either rich or lean.
- Check air injection system.
- Check for worn camshaft or weak valve springs.
- Check engine coolant temperature sensor for proper temperature-to-resistance values.
- Check distributor vent system (if equipped).
- Check exhaust system for restrictions, such as a damaged or collapsed pipe, muffler or catalytic converter.

## **POOR FUEL ECONOMY**

### **Symptom Definition**

Fuel economy, as measured by an actual road test, is noticeably lower than expected. Fuel economy is noticeably lower than was on this vehicle at one time.

### **Possible Cause & Correction**

Check the following items:

- Visually check vacuum hoses for splits, kinks and proper connections as shown on Vehicle Emission Control Information label.
- Check for dirty or clogged air filter.
- Check coolant level. Check engine cooling system thermostat for proper heat range and operation.
- Check engine coolant sensor for shift in calibration. See SENSOR RANGE CHARTS article.
- Check A/C for "full time" operation.
- Ensure initial ignition timing is properly set, and check for proper operation of ignition control and knock sensor systems.
- Check TCC for proper operation.
- Check air intake system and crankcase for air leaks.

- Check exhaust system for restrictions, such as a damaged or collapsed pipe, muffler or catalytic converter.
- Check oxygen sensor for silicone or lead contamination.
- Remove spark plugs and check for wet plugs, cracks, improper gap, burned electrodes or heavy carbon deposits.
- Ensure speedometer is properly calibrated.
- Check fuel pressure.
- Check EGR valve for proper operation.
- Check boost control system (if equipped).
- Check engine compression.
- Check for dragging brakes.
- Check distributor vent system (if equipped).
- Check for correct tire pressure. Check with operator to see if vehicle is operated under excessive acceleration or is heavily loaded.

## **ENGINE DIESELING/RUN-ON**

### **Symptom Definition**

Engine continues to run after ignition is turned off but runs very rough. If engine runs smoothly, check ignition switch.

### **Possible Cause & Correction**

Check the following items:

- Check for binding throttle linkage.
- Check for leaking injectors. Perform INJECTOR BALANCE TEST in SYSTEM/COMPONENT TESTS article.
- Check Idle Air Control (IAC) system. Check for vacuum leak or high idle. Check for water contaminated fuel, correct fuel pressure or a restricted injector. Check for foreign material in IAC bore of throttle body. Check for proper connection of IAC valve electrical connector. Check for faulty crankcase ventilation valve. Check for failure of A/C compressor or relay.
- Check engine for overheating.
- Check for excessive use of fuel additives.

## **DETONATION/SPARK KNOCK**

### **Symptom Definition**

A mild to severe ping, usually worse under acceleration. The engine makes sharp metallic knocks that change with amount of acceleration.

## **Possible Cause & Correction**

Check the following items:

- Check for obvious overheating problems.
- Check TP sensor adjustment and operation.
- Check fuel pressure.
- Check knock sensor system for no retard.
- Check EGR system for not opening.
- Check TCC system operation, applying too soon.
- Remove carbon from engine with top engine cleaner.
- If excessive carbon exists in combustion chamber, check for excessive oil burning due to leaking valve guide seals.
- Check for incorrect basic engine parts such as camshaft, cylinder heads and pistons.
- Ensure the installed PROM and/or PCM is correct for that particular vehicle. Check with dealer for latest application information.
- Check engine coolant sensor for shift in calibration. See SENSOR RANGE CHARTS article.
- Check for rich or lean running conditions.
- Check spark plugs for proper application and heat range.
- Check engine compression.
- Check Transaxle Range (TR) switch. Ensure scan tool indicates proper gear selection with gear in proper position.
- Check distributor vent system (if equipped).
- Check for contaminated or poor quality fuel. Check vehicle operation using a higher octane fuel.

## **EXCESSIVE EXHAUST EMISSIONS OR ODORS**

### **Symptom Definition**

Vehicle fails emission test. Vehicle may also have excessive rotten egg smell (hydrogen sulfide) being emitted from tail pipe. Excessive odors DO NOT necessarily indicate exhaust emissions are high.

### **Possible Cause & Correction**

Check the following items:

- Check for lead contamination of catalytic converter. Look for removal/tampering at restrictor in fuel filler neck.
- Check coolant level. Check cooling system thermostat for proper operation and application.
- Check cooling fan for proper operation.
- If emission test shows excessive carbon monoxide (CO) and hydrocarbons (HC) emissions and vehicle is also emitting excessive odor, check all systems and components that could cause engine to run rich.

- Ensure the installed PROM is correct for that particular vehicle. Check with dealer for latest application information.
- If emission test shows excessive oxides of nitrogen (NOx) emissions, check all systems and components that could cause engine to run lean or to run too hot. Check EGR system or for an inoperative cooling fan.
- Ensure fuel filler cap is properly installed.
- Check fuel pressure.
- Perform INJECTOR BALANCE TEST in SYSTEM/COMPONENT TESTS article.
- Check EVAP fuel canister for fuel loading.
- Check spark plugs, plug wires and ignition components.
- Check for plugged or stuck crankcase ventilation valve. Check for fuel in crankcase.
- Check for vacuum leaks.
- Check for excessive carbon build-up. Remove with top engine cleaner.
- Check EGR valve for not opening.
- Check injector harness locations. Ensure injectors are connected to correct injector/cylinder according to firing order.
- Check distributor vent system (if equipped).
- Check for use of excessive fuel additives.

## INTERMITTENTS

**CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before section disconnecting battery.**

### INTERMITTENT PROBLEM DIAGNOSIS

Intermittent fault testing requires duplicating circuit or component failure to identify fault. These procedures may lead to computer setting a diagnostic trouble code which may help in diagnosis.

If problem vehicle does not produce diagnostic trouble codes, monitor voltage or resistance values using a scan tool or DVOM while attempting to reproduce conditions causing the intermittent fault. A status change on scan tool or DVOM indicates a fault has been located.

Use scan tool or DVOM to pinpoint faults. When monitoring voltage, ensure ignition is in ON position or engine is running. When monitoring resistance, ensure ignition is in OFF position or negative battery cable is disconnected. A status change on scan tool or DVOM while performing TEST PROCEDURES indicates area of fault.

### TEST PROCEDURES

#### Intermittent Simulation

To reproduce the conditions causing intermittent fault, use the following methods:

- Lightly vibrate component.
- Heat component.
- Wiggle or bend wiring harness.
- Spray component with water.
- Remove/apply vacuum source.

Monitor circuit/component voltage or resistance while simulating intermittent. If engine is running, monitor for diagnostic trouble codes. Use test results to identify a faulty component or circuit.

## **INTERMITTENT TROUBLE SHOOTING**

### **Intermittent Symptom Definition**

Malfunction Indicator Light (MIL) illuminates but does not remain on. A stored diagnostic trouble code may or may not exist.

### **Possible Cause & Correction**

To track down possible causes of an intermittent MIL, check the following items:

- Check for poor mating of one connector to another. Terminals may not be fully seated. Check for improperly formed or damaged terminals. Check wire to terminal connections.
- Check for poor connection from ignition coil to ground or arcing at spark plug wires or plugs.
- Check for intermittent short to ground on data or UART circuits of Data Link Connector (DLC) or in Malfunction Indicator Light (MIL) circuit. See WIRING DIAGRAMS article.
- Check for poor connections in PCM ground terminals.
- Check for loss of diagnostic trouble code memory. To check code memory on fuel injected models, disconnect MAP or TP sensor and run engine at idle until MIL comes on. MAP or TP sensor code should be stored and retained in memory when ignition is turned off. If code is not stored, PCM is faulty.
- Check for electrical system interference caused by a defective relay, or an PCM-driven solenoid or switch which may cause sharp electrical surge. This type of problem will normally occur when faulty component is operated.
- Check for aftermarket parts which may not have been produced to manufacturer's specifications.
- Check for any open diodes in A/C or engine wiring.
- Check for improper installation of electrical accessories such as auxiliary lights or 2-way radios.
- Ensure ignition control wires are kept away from spark plug wires, distributor wires, distributor housing, ignition coil and generator. Ensure ground wire from PCM to distributor or ignition control module is connected to a good ground.