Check Engine Light Troubleshooting Guide

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Your **Check Engine Light** is on, yet your vehicle seems to be running fine. Or, maybe your vehicle isn't running quite the same as before. Maybe you've noticed a drop in fuel economy, or maybe the engine feels a little rough or just doesn't have the zip it once had.

The "Malfunction Indicator Lamp" or "MIL" for short, is on because your vehicle's **OnBoard Diagnostic** (OBD II) system has self-diagnosed a fault that MAY cause your vehicle's emissions to increase. It doesn't necessarily mean your vehicle is polluting or has a serious problem—but it might. So the MIL lamp is on to let you know something is amiss and that the problem needs your attention.

Trouble is, you don't know WHAT the trouble might be. It might be something that could lead to a break-down or cause expensive engine damage, or it might be something minor like a loose gas cap (yes, the onboard diagnostics on 1996 and newer cars can even detect a loose, missing or leaking gas cap!). There's no way to know what the problem is without talking to your vehicle's computer.

How do you do that? By plugging a code reader or scan tool into your vehicles diagnostic connector (which is usually located under the dash near the steering column). These tools can unlock the secrets that have turned on your Check Engine light and tell you the nature of the problem.

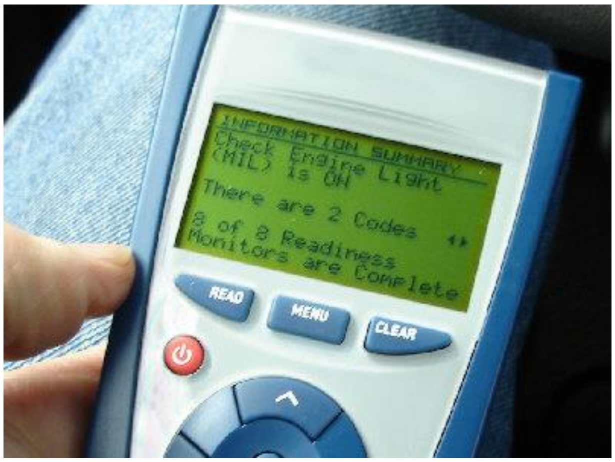
When a fault is detected, the OBD II system records a "**Diagnostic Trouble Code**" (DTC) in the computer's memory. The code number corresponds to a particular type of fault. The code might not tell you which component has failed or why, but it will tell you which emission control system or sensor circuit the fault is in, or that your engine is misfiring or running rich (too much fuel) or lean (not enough fuel).

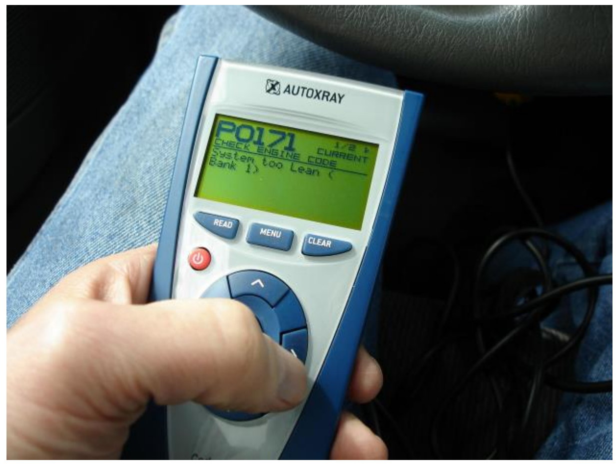
For more information about Trouble Codes go to: https://aa1car.com/trouble-codes/index.htm

For information about choosing & using a Scan tool go to: https://www.aa1car.com/scantoolhelp/

How To Read Trouble Codes

When a basic code reader is plugged into your vehicle's diagnostic connector, it will display any fault codes that are found. The least expensive code readers just give you a number while the better ones also give you the definition of the code, too. The same goes for basic code reader software that's available for PCs, laptops and Smart phone apps. You can read codes and get an idea of what's wrong—and you can even clear the codes from the computer's memory to turn out the MIL lamp (at least temporarily). But a code by itself isn't the whole story.





Take a code P0171 or P0174. These are codes that indicate your engine is running lean. A lean air/fuel mixture can be caused by any number of things, and may cause symptoms such as a rough idle, hesitation or stumble when accelerating, hard starting, a loss of power or an emissions failure.

Ok, so your engine is running lean. Now what?

The next step up the diagnostic ladder is to use a scan tool or PC with software that can actually provide some real diagnostic information beyond basic code numbers. What kind of information are we talking about? **PIDs. Performance Information Data**. This is the meat and potatoes of onboard diagnostics and is the grist that real technicians rely on to diagnose and repair today's vehicles.

The diagnostic connector on your vehicle can provide a wealth of information, such as engine speed, engine load, air flow, ignition timing, coolant temperature, inlet air temperature, throttle position, sensor voltages, what's going on with your engine's fuel management system, the status of various switches and devices, and more. Up to several HUNDRED different PIDS may be available on some cars depending on the make, model year and engine control system, and the capabilities of your particular scantool or scanner software.

Being able to look at all this data allows you to see what's actually going on inside your engine control system. You see what your engine computer sees, and if you know what to look for, you can find the kind of faults that turn on the MIL lamp.

Knowing what's causing your problem gives you the option to either fix the problem yourself or to take it to a professional for repairs. If you choose the latter, you won't be going in blind. You'll be armed with data that can save diagnostic time and hopefully some of your money.

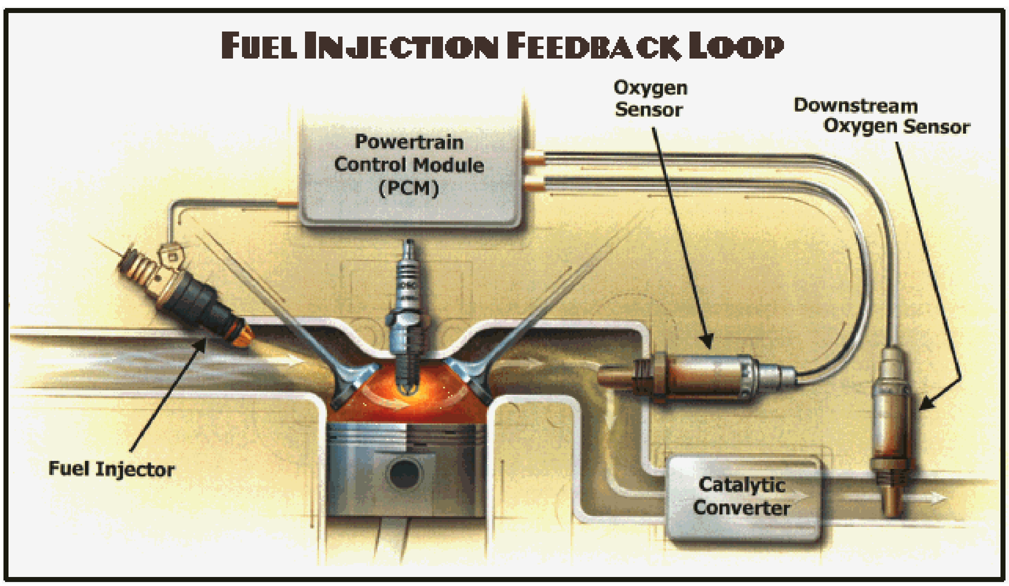
In many instances, the MIL lamp is on because a sensor has failed and needs to be replaced. Some sensors are relatively inexpensive and well within the abilities of a do-it-yourself to replace (most coolant sensors, for example). Some sensors, on the other hand, are quite expensive. A mass airflow sensor might cost a couple hundred dollars or more. You want to be sure of your diagnosis before you replace any parts.

PROBLEM #1: CHECK ENGINE LIGHT ON (Everything else seems to be fine)

First, you need to read out the code(s) that caused the MIL lamp to come on.

Depending on the type of code, your next step would be to look at any PIDs that might shed some light on why the code was set.

For example, say you find an oxygen sensor code (any code from P0130 to P0167). The oxygen sensor is a key sensor because it is part of the fuel feedback control system. The engine computer (called the "Powertrain Control Module" or "PCM") looks at the oxygen sensor signal to see if the engine is running rich or lean. If the engine is running rich (too much fuel), it shortens the control signal to the fuel injectors to reduce the volume of fuel delivered. This adjusts Air/Fuel mixture to the right ratio for optimum fuel economy, performance and emissions.



If the oxygen sensor has crapped out and is not sending a good signal to the PCM, it usually has the effect of making the engine run rich. This wastes fuel and increases emissions. Consequently, the onboard diagnostic system detects the fault, sets a code and turns on the MIL lamp.

Okay, now what?

Now you use the diagnostic power of your scan tool or PC software to look at some important data. You look at the output voltage of the oxygen sensor to see if it is behaving normally. A good oxygen sensor should produce a low voltage signal (0.2 volts or less) when the engine (exhaust, actually) is lean, and a higher voltage signal (0.8 volts or more) when the engine (exhaust) is rich. What's more, the sensor's output voltage should be bouncing up and down as the PCM constantly corrects the Air/Fuel mixture.

The best way to look at this particular signal is to graph it. Graphing the oxygen sensor's output signal makes it easier to see the up and down changes in the voltage (much easier than a simple numeric readout). Some scantools can do this as can some PC software. The key here is using a scantool or software that allows you to display and graph this kind of information in an easy-to-use format.

PC, laptop or tablet software if often better in this respect because the display area on a monitor is much larger than that on a small handheld tool or a Smart phone. Most vehicles today have anywhere from two to as many as six separate oxygen sensors, so you need a lot of real estate to graph that many sensors at the same time.

What's more, sometimes you want to look at several different sensor outputs simultaneously to see how they compare or react to changing engine loads or speeds. You might want to look at a whole list of PIDS while monitoring engine rpm and load. The larger the display area you have to work with, the easier it is to view multiple PIDs. And, with the right software you can display the values as numbers, graphs or customized gauges. Cool, huh?

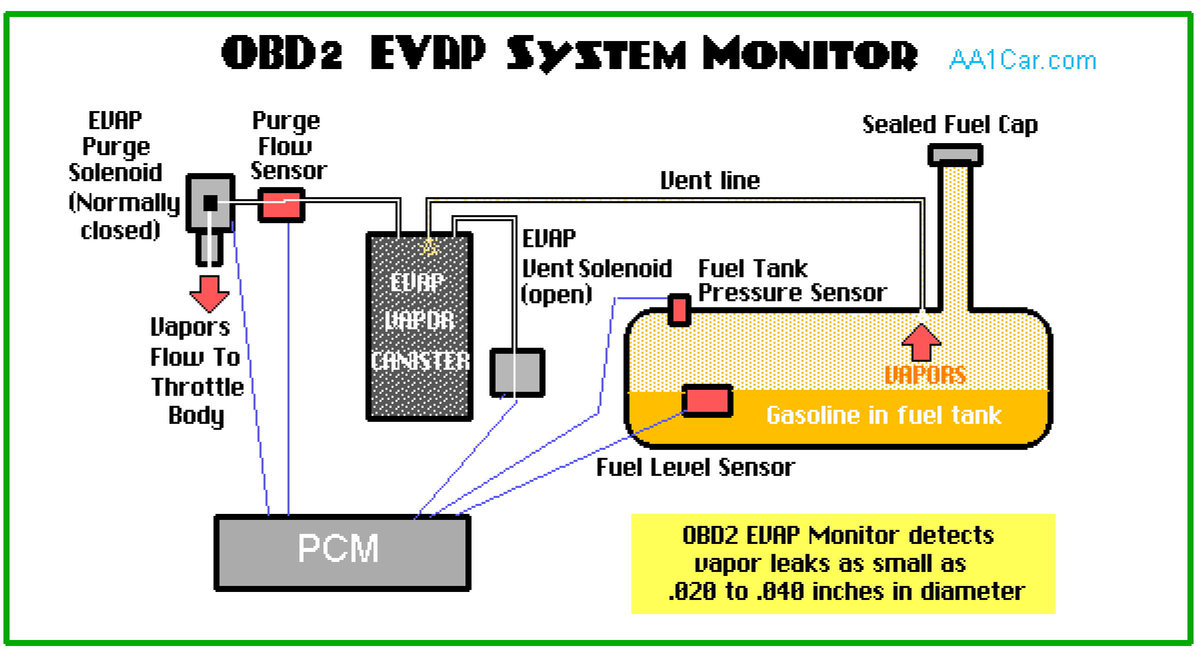
Once the fault has been found, you can now do any additional tests that might be needed to isolate the fault. Often times, a fault in a sensor circuit is a bad connector and not a bad sensor. Simply cleaning the connector may be all that's necessary to bring the sensor back to life.

Other times, you may have to use a simple ohmmeter to check a resistance value, or a voltmeter to check a circuit voltage or ground connection to isolate a fault.

The trick is to NOT jump to conclusions. Make sure you've identified and isolated the fault BEFORE you replace any parts. You'll save yourself a lot of time, money and aggravation if you remember and practice this simple rule.

Example: the Check Engine light is on and you find a code P0445. This is an evaporative emissions control system (EVAP) code indicating a large vapor leak. The fuel system on late model vehicles is sealed so fuel vapors cannot escape into the atmosphere. The EVAP system captures and stores fuel vapors so they can be purged later into the engine and burned. If the onboard diagnostic system detects a leak in the EVAP system, it will set a code and turn on the MIL lamp.

In this case, the code P0445 may be due to nothing more than a loose, missing or leaky gas gap. If you recently filled up your vehicle with fuel, check the gas cap to see if it is tight. If the cap is loose, retighten it and the EVAP code will eventually go away without having to clear the code. This will happen the next time the onboard diagnostic system runs a self-check on the EVAP system. This usually occurs after the vehicle has sit overnight and the fuel tank is between ¼ and ¾ full.



PROBLEM #2: FUEL ECONOMY IS DOWN (Check Engine light may also be on)

Possible causes and codes:

- **P0172 and/or P0175 are rich codes and indicate a general rich air/fuel condition.** The underlying cause may be anything that increases fuel delivery (excessive fuel pressure, a defective fuel pressure regulator or plugged return line, or a leaky injector), decreases airflow (dirty air filter or restricted air intake), or misleads the mass airflow sensor or engine management system into believing the engine is using more air or is under more load than it really is.
- **Misfire codes P030X**, where X indicates the cylinder number that is misfiring.

Misfire codes are bad because they mean a whole cylinder full of air/fuel mixture is wasted every time a cylinder fails to fire. The cause may be a worn or dirty spark plug, a bad plug wire, a weak ignition coil in a distributorless ignition system (DIS) or coil-on-plug (COP) ignition system, or a dirty or dead fuel injector. Misfires can make an engine run rough and reduce horsepower every time it happens. Worse yet, the unburned fuel that passes right through the engine will go into the exhaust. When the fuel reaches the catalytic converter, it will ignite and may cause the converter to overheat and suffer damage. That's why misfires are one of the two leading causes of converter failures (the other is leaky exhaust valves).

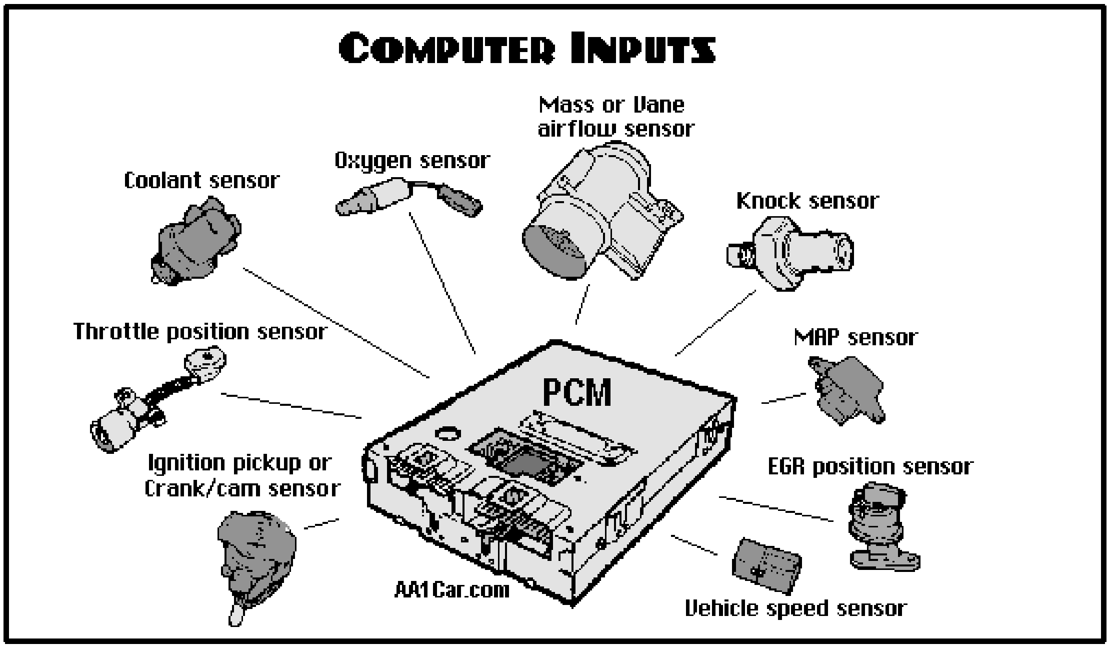
Oxygen sensor codes (P0130 to P0167), or oxygen sensor heater code (P0036 to P0064) indicating a fault with that sensor. If the O2 sensor fails, is usually causes the engine to run rich.

- **P0115 to P0119 indicating a problem with the coolant sensor**. The coolant sensor is also a key sensor in that it tells the engine computer the temperature of the coolant. The engine computer needs this information so it knows when to adjust the fuel mixture and ignition timing (these things change as the engine warms up). If the coolant sensor is faulty and tells the computer the engine is cold (when it really is hot), the fuel mixture will be too rich. Fuel economy will drop like a rock and the engine will pollute.
- **P0100 to P0104 Mass airflow sensor codes**. The mass airflow sensor monitors airflow into the engine. If it is not reading correctly, the air/fuel mixture won't be right. This is an expensive sensor to replace, so in many instances cleaning the sensor wire with aerosol electronics cleaner can return it to normal operation.
- **P0105 to P0109 Manifold Absolute Pressure sensor codes**. The MAP sensor monitors engine load by reacting to changes in intake vacuum. If the sensor reads incorrectly, the computer may think the engine is under more load than it actually is and give it more fuel than it needs.
- **P0070 to P0074 Inlet Air Temperature sensor**. On fuel injected engines that do not use a mass airflow sensor, air flow is estimated by the computer using inputs from this sensor, throttle position and the MAP sensor. If the air temp sensor is reading colder than it should, the computer will give the engine too much fuel.

For help Diagnosing Poor Fuel Economy see:

https://www.aa1car.com/library/poor_fuel_economy.htm

Today's engine management systems are very complex and rely on many different sensor inputs to regulate fuel economy, performance and emissions. The key to solving a fuel economy problem is figuring out which of these inputs is feeding the PCM bad information. Garbage in, garbage out. If the computer receives bad sensor data, it will make the wrong adjustments and waste gas.



PROBLEM #3: YOUR VEHICLE FAILED AN EMISSIONS TEST (or was rejected).

Most states that require emission tests now use a simple Onboard Diagnostics (OBD II) plug-in check instead of a lengthy tailpipe emissions test to verify emissions compliance. The OBD II tests are only used on 1996 and newer vehicles, and may be used in conjunction with a separate tailpipe test in certain situations (the rules vary from state to state).

The OBD II onboard diagnostic system that is used on all 1996 and newer passenger cars and light trucks (as well as a few 1994 and 1995 models) will set a fault code and turn on the MIL lamp if it detects ANY problem that MIGHT cause emissions to exceed federal limits by 1.5 times. Notice we said MIGHT cause emissions to exceed limits. The actual point at which a code is set is determined by the vehicle manufacturer based on extensive dyno testing and how conservative (or liberal) they are with respect to the rules. So in many instances, the MIL lamp may be on even if the vehicle is not really creating a menace to the environment. In fact, in many instances vehicles with a MIL lamp on will easily pass a tailpipe emissions test, even a "loaded mode" test that simulates actual driving conditions on a dyno. But hey, we don't make the rules. Each state makes their own testing rules, and the rules have to conform more or less to what the U.S Environmental Protection Agency requires.

As a rule (pardon the pun), to pass a plug-in OBD II test, a vehicle must:

- Have a functional MIL lamp and diagnostic connector (no tampering or funny business allowed).
- All (with a couple of exceptions) of the OBD II system monitors must have run and been completed before the vehicle is considered "ready" for testing.

The OBD II system runs a number of self-checks (called "monitors") to check the health of the engine management system and emission controls. Some of these tests run every time the engine is started and driven, but others (notably the catalyst and EVAP monitors) only run under certain conditions. Getting the catalyst monitor to run may require driving the vehicle for a number of miles under various speeds and loads. The EVAP monitor won't run unless the vehicle has sit overnight and the fuel tank is between ¼ and ¾ full. It also may not run in extremely hot or extremely cold weather.

Some code readers and most scan tools will show you the status of the OBD II monitors. If the monitor has run, it may say "COMPLETE" or "READY" or "OK."

On OBD II vehicles before model year 2000, the rules may allow one monitor not to have run before the vehicle can be accepted for testing. On some vehicles, there are also "monitor issues" that essentially mean some monitors NEVER run or set (whoops!). So special allowances are made for these vehicles, or they may have to take a regular tailpipe test.

- The MIL lamp must NOT be on (no DTCs in the computer's memory) to pass the test, all monitors must have completed (All Monitors Ready) and the test computer must be able to communicate with your vehicle computer to verify all of the above.

If you failed the emissions test, therefore, you probably had a MIL lamp on and one or more DTCs in your computer. Clearing the codes or resetting the OBD II monitors just before a test won't help you sneak through because the catalyst and EVAP monitors need time to run.

You have to diagnose and repair the fault before the vehicle will pass.

If your vehicle was rejected for testing, it means all of the required OBD II monitors had not completed their self-tests. Drive the vehicle for a few days around town and on the highway, and try again.

If your vehicle failed a tailpipe test (either a simple idle emissions check or a loaded mode test on a dyno), and the Check Engine is NOT on, chances are you have a problem with the OBD II system, a burned out MIL lamp, or a faulty catalytic converter. The converter is essentially an afterburner that cleans up the exhaust after it exits the engine. The OBD II system uses a "downstream" oxygen sensor to monitor the efficiency of the converter, and it should detect a drop in converter efficiency if the converter has been contaminated or is failing (ignition misfiring, leaky exhaust valves and oil burning can all damage the converter).

What you want to look for: Any conditions that might cause ignition misfire, an overly rich or lean fuel condition, or loss of compression. Use your scan tool to look at the oxygen sensor outputs, coolant temperature, airflow, calculated engine load, and inlet air temperature. Look for anything that isn't "normal" (this requires some understanding of these sensors as well as their normal outputs).

For additional info on OBD Emission Testing see https://www.aa1car.com/library/us50326.htm

PROBLEM #4: ENGINE HESITATES, STUMBLES, LACKS NORMAL POWER

Nothing is more humbling than to stomp down on the accelerator pedal to blow past some idiot in the right lane and have your engine stumble and cough. Or, to accelerate from a stop like a drunken sailor stumbling out of a bar.

An engine that hesitates, stumbles or misfires when accelerating or when it is under load is an engine that is either sucking too much air, not getting enough fuel or misfiring. If the Check Engine light comes on, you may find any of the following codes:

- P0171, P0174 Lean fuel condition codes
- P0120 to P0124 Throttle position sensor codes
- P0222 to P0229 Throttle position sensor codes
- P0400 to P0409 EGR related codes

If there are no misfire codes, a common cause of acceleration stumble is a **bad throttle position sensor.** The TPS sensor tells the computer how far the throttle is open. The PCM uses this information to determine how much fuel is needed to maintain the correct air/fuel mixture, and when extra fuel is needed if the throttle suddenly opens wide.

Another common cause is dirty fuel injectors. If varnish deposits have built up in the tips of the injectors, they won't spray as much fuel as they normally do. This creates a lean fuel mixture and conditions that are ripe for stumble and hesitation (also misfire).

Look at short term fuel trim (STFT) and long term fuel trim (LTFT) with you scan tool or scanner software. If the numbers are high, it tells you the engine is running lean and the injectors need cleaning.

Other problems that may contribute to acceleration stumble include vacuum leaks, low fuel pressure, a weak spark (low coil voltage or bad coil(s), retarded ignition timing, and bad gas (water or other contamination).

Look at the following with your scan tool or PC scanner software:

Throttle position, mass airflow, short term fuel trim (STFT) and long term furl trim (LTFT), ignition timing, and fuel pressure (if a PID is available).

TPS sensors typically show the most wear in the idle and just above idle positions, but they may also have dead spots at any point in their range of travel. A good way to spot a faulty TPS sensor is to graph the sensors output while slowly opening the throttle all the way. The graph should look like a relatively smooth ramp, with no suddenly drops or flat spots.

For help diagnosing a Hesitation or Loss of Power problem see

https://www.aa1car.com/library/problem_hesitation.htm

PROBLEM #5: ENGINE CRANKS BUT WON'T START

Definitely not good. Chances are the Check Engine light may not come on, but it if does you may find any of the following codes:

- P0230 to P0233 Fuel pump codes
- P0600 to P0606 PCM related codes
- P0335 to P0339 Crank sensor codes
- P0190 to P0194 Fuel pressure sensor codes
- Might be No Codes in Memory

Okay, so what's causing the no-start? All engines require three things to start and run: spark, fuel and compression. If any one of these isn't there, you aren't going anywhere. Here's a list of possible causes:

- **No spark** due to a bad crank position sensor, a faulty ignition module or PCM, a problem in the ignition circuit (ignition switch, anti-theft system, wiring, etc.), a faulty park/neutral safety switch, a bad ignition coil (only on engines with a single coil ignition), or wet plugs or plug wires (did it rain last night?).

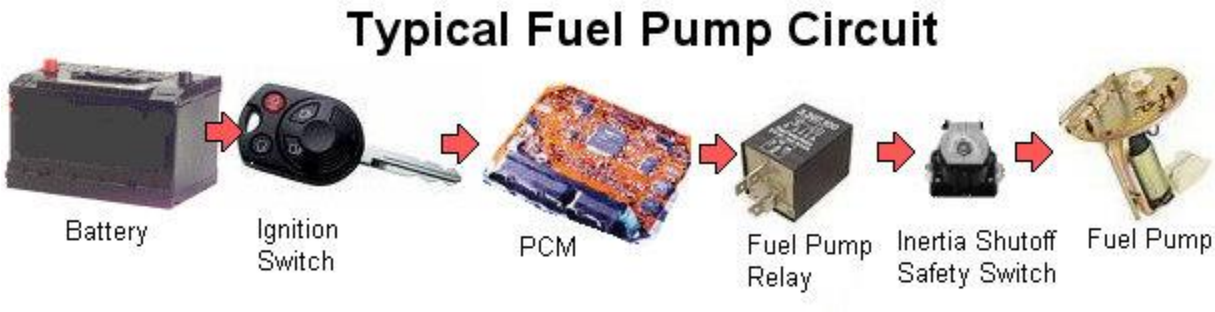
A less common cause is a worn starter that sucks so many amps while cranking the engine that there's not enough juice left to adequately power the ignition system and fuel injectors. Contributing factors might be a weak battery and/or loose or corroded battery cables.

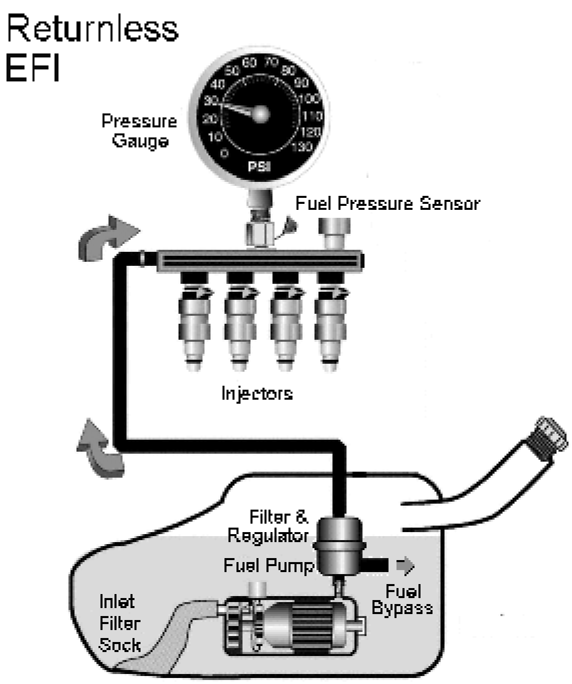
- **No fuel** because of a dead fuel pump, bad fuel pump relay, blown fuel pump fuse, plugged fuel filter or line, or failed PCM injector driver circuit or injector power supply relay. Or, the fuel tank might be empty (don't believe what the gauge is telling you), or the fuel tank might contain contaminated fuel (water or too much alcohol) or the wrong type of fuel (whoops, somebody put in diesel instead of gasoline).
- **No compression** because the timing belt or chain is broken, the timing belt or chain is loose and jumped out of time, or the overhead camshaft has snapped.

Here's a quick way to check for spark IF your engine has individual spark plug wires (this trick doesn't work on engines with coil-on-plug ignition systems). Remove a plug wire, insert a Phillips screwdriver or piece of bare wire into the plug wire boot and place the end near the engine block. If your engine has a coil-on-plug ignition, remove one of the coils, insert a Phillips screwdriver or piece of wire into the coil boot that fits down over the spark plug and place the screwdriver or wire so it is near the engine block.

CAUTION: DO NOT hold the plug wire, screwdriver or coil while cranking the engine unless you want a shocking experience!. If you see a spark when the engine is cranked, it has ignition. The problem is either fuel or compression.

If the engine has an overhead cam with a timing belt, loosen the cover over the timing belt and check the belt. If the belt is okay, the problem is no fuel. Listen for the electric fuel pump in the fuel tank to make a buzzing noise when the ignition is turned on (you may have to open the gas cap to hear it). You won't hear anything if the pump has died.





Diagnostics can now be focused on the fuel pump circuit to determine if the pump, relay or wiring is causing the no start. If the relay has voltage but the pump isn't running, you'll probably have to drop the fuel tank to check the wiring connector at the pump. Oh well, you'll have to drop the tank anyway to replace the pump.

HINT: A fuel tank full of fuel is very heavy—and dangerous (gasoline explodes, remember?). So drain the tank first into an approved container and keep all sources of flame or sparks far, far away from the tank and fuel lines. No smoking. No running anything that makes sparks (electric motors, drills, grinders, etc.). No space heaters or other possible sources of ignition. And don't sue us if you blow yourself up!

If the problem is no spark, anything in the ignition circuit that creates the spark may be at fault. Start by using your scan tool or PC scanner software to look for an rpm signal while cranking the engine. A bad crankshaft position sensor is a common cause of no-starts. The signal from the crank sensor goes to the PCM or ignition module that switches the ignition coil(s) on and off.

If you have an rpm signal, a bad ignition module or PCM may not be switching the coil(s) on an off. Check for voltage at the coils with the key on and while cranking the engine. The voltage should be switching on and off (you can check this with a voltmeter or dwell meter).

In ignition systems with a single coil and distributor, a bad coil or a cracked distributor cap or rotor can prevent the spark plugs from firing. On multi-coil distributorless ignition systems and coil-on-plug systems, one coil failure may cause an engine to misfire, but it usually won't prevent it from starting.

Coil primary and secondary resistance can be checked with an ohm meter. If the reading is out of specifications, replace the coil.

PROBLEM #6: ENGINE STALLS (Check Engine light may or may not be on)

Nothing is more aggravating than an engine that stalls—especially when some jerk behind you lays on the horn like its your fault. Stalls typically occur when the engine is idling or slowing.

If the Check Engine light comes on, you may find any of the following codes:

- P0505 to P0509 idle control circuit codes
- P0335, P0336, P0337, P0338, P0339 crank sensor codes
- P0171, P0174 lean fuel condition codes
- P0400 to P0409 EGR related codes

The engine may be stalling because it isn't getting enough throttle opening. The cause is often a problem in the idle air control system. Other possibilities include a dirty throttle body, Vacuum leak, incorrect ignition timing (retarded), bad gas (water or other contamination), an A/C compressor that is dragging, or an EVAP purge valve that is stuck open and is flooding the engine with fuel vapor.

What to Check: The throttle body hose connections and idle controls, also intake vacuum (check the throttle body, manifold and hose connections for leaks, also the PCV valve and hose, too).

With your scan tool or PC scanner software, look at engine rpm, calculated engine load, mass air flow rate, throttle position angle, short term fuel trim (STFT), and ignition timing for possible clues as to what's going on. On some vehicles, you can also look at the idle control motor duty cycle or position, and/or idle tracking sensor (if the vehicle has one).

In many instances, stalling ends up being an idle control motor at its limit or a failed motor. A vacuum leak can cause this, so don't replace the idle control motor until you've found and fixed the vacuum leak.

PROBLEM #7: CHECK ENGINE LIGHT ON, P0300 RANDOM MISFIRE CODE

What the heck does random misfire mean? **It means your engine is misfiring**, but that the problem is not isolated to one or two cylinders. It is jumping around in a random way from one cylinder to another.

A random misfire P0300 code usually means the air/fuel mixture is running lean. But the cause might be anything from a hard-to-find vacuum leak to dirty fuel injectors, low fuel pressure, a weak ignition coil, bad plug wires or compression problems. Even a dirty MAF sensor can cause a lean code and/or misfire to occur.

First, check intake vacuum with a vacuum gauge. On most vehicles a normal reading is 17 to 21 inches Hg. If the needle is lower, is jumping up and down or steadily drop, you have a problem. Look for possible vacuum leaks by checking vacuum hose connections, the throttle body and manifold, and PVC valve and plumbing.

An EGR valve that is leaking can also act like a vacuum leak and cause a random misfire.

Check fuel pressure with a gauge. If it is not within specifications (refer to a service manual for specifics because fuel pressure is critical for proper engine performance), the problem may be a weak fuel pump, low voltage to the pump (check the relay and wiring), or obstructions in the fuel line (like a plugged filter). A bad fuel pressure relay can also leak pressure and prevent an otherwise good fuel pump from delivering full pressure to the injectors.

Dirty injectors can also restrict fuel delivery and cause a lean fuel condition. Many regular grades of gasoline do not contain adequate levels of detergent to keep the injectors clean. Frequent short trip driving accelerates the buildup of injector deposits. Cleaning the injectors with a good quality fuel tank additive (or having them professionally cleaned) can solve this problem.

Look at short term fuel trim (STFT) and long term fuel trim (LTFT) with you scan tool or scanner software. If the numbers are high, it tells you the engine is running lean.

For more information about Random Misfires go to: https://www.aa1car.com/random-misfire/

PROBLEM #8: A CYLINDER SPECIFIC MISFIRE CODE

A steady misfire, on the other hand, is isolated to a single cylinder and will set a code that indicates the cylinder (Example: a P0302 code would tell you the #2 cylinder is misfiring).

Common causes of a single cylinder misfire include a bad spark plug or ignition fault, a clogged or bad fuel injector, or loss of compression in the cylinder (burned exhaust valve, bent valve or blown head gasket).

For more information about Analyzing Ignition Misfires go to:
https://www.aa1car.com/library/2004/ic100474.htm

PROBLEM #9: OTHER WARNING LIGHT(S) ON (Check Engine light also be on)

Uh oh. This is not good news. Depending on what other warning lights are on, you may have a serious problem.

TEMP WARNING LIGHT ON—Your engine is overheating. Stop driving immediately and turn the engine off. Continuing to drive risks causing expensive engine damage such as a blown head gasket, or cracked or warped cylinder head.

Allow the engine to cool down for several hours before you attempt any further diagnosis. A hot engine can be very dangerous because of steam pressure inside the radiator and coolant reservoir. Do NOT attempt to add coolant until the engine has cooled down and the radiator cap or reservoir cap can be safely opened.

Overheating can be caused by a low coolant level (check the radiator, water pump and hoses for leaks), coolant leaks inside the engine (leaky head gasket or cracks in the head or block), a stuck thermostat, or a cooling fan that isn't working (bad fan clutch, fan motor or fan relay).

For help Troubleshooting Overheating go to: https://www.aa1car.com/library/overheat.htm

OIL LIGHT ON—Oil pressure is dangerously low. Stop driving immediately and turn the engine off. Continuing to drive risks ruining the bearings and camshaft in your engine.

Low oil pressure or loss of oil pressure can be caused by a low oil level in the crankcase, a worn or damaged oil pump, or worn engine bearings. In older high mileage vehicles, it is not uncommon to see the oil warning light flicker at idle because of internal engine wear.

Check the oil level before restarting the engine. If low, check the engine for leaky gaskets and seals, or a loose oil filter. If no leaks are seen, the engine may be burning oil because of worn valve guides, rings and/or cylinders. Add oil to bring the level on the dipstick up to the full mark, then start the engine to see if the light goes out.

If the light does not go out and the engine is making noise (ticking, rattling, clicking, rapping sounds), it may not be getting normal oil pressure—or it may have suffered damage because of the loss of oil pressure. So sad, too bad. You're looking at an overhaul or buying another engine.

For help Low Troubleshooting Oil Pressure go to: https://www.aa1car.com/library/us1097.htm

CHARGING, ALT OR GEN LIGHT ON—Your charging system is not putting out its normal voltage or current. This means one of two things: either the alternator (generator) has died, or the belt that drive it is slipping or has broken.

On vehicles with serpentine belts, losing a belt means you lose everything that the belt drives: the water pump, alternator, power steering pump and A/C compressor. The A/C compressor you can live without, and with sufficient upper body strength you can still steer without the PS pump. But your engine isn't going to stay cool for long without the water pump. So stop, turn the engine off and take a look under the hood to see if the belt is still intact.

If the belt is still on and appears to have normal tension, the alternator has probably crapped out on you. You can probably drive your car a few miles or up to 30 minutes or so on the juice that's left in the battery, but don't count on going to far because without the alternator the battery will run down very quickly. And once voltage drops below a certain level, things will start shutting down (fuel pump, injectors, ignition system, etc.).

The fix? Check the charging system's output at the battery terminals with a volt meter. Normal charging voltage should be about 13.5 to 14.5 volts (it varies some with temperature and load). If you see 12.6 volts or less (which is base voltage for a fully charged battery), you need to have the alternator tested (many parts stores can do this for you).

For help Diagnosing Charging Problems go to: https://www.aa1car.com/library/charging_checks.htm

ABS OR BRAKE LIGHT ON—Whoe Nelly, you may have lost your binders! If the ABS light only is on, your vehicle should still have normal braking (possibly without power assist, though, depending on what type of ABS system it has). But if the brake light is on (with or without the ABS light), it may indicate a serious hydraulic problem in your brake system.

On most vehicles, the brake warning light will come on if a safety switch detects a difference in pressure between the brake circuits when the brakes are applied. This may indicate a leak and loss of pressure in one of the circuits.

On some vehicles, there is also a brake fluid level sensor in the brake fluid reservoir on the master brake cylinder. If the fluid level drops, it may turn on the warning light.

Either way, the first order of business is to stop the vehicle (assuming the brakes still work) and check the fluid level in the master cylinder. The fluid level will drop somewhat as the brake linings wear, but a sudden drop in the level usually means there's a leak in a brake line, hose, caliper or wheel cylinder. Do NOT drive the vehicle until the problem has been diagnosed and repaired. Dragging your foot is not a very effective way of slowing a 4,000 lb. or heavier vehicle.

For more info about Anti-Lock Brakes go to: https://www.aa1car.com/library/abs1.htm

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TURNING THE CHECK ENGINE LAMP OFF

As a rule, the Check Engine Light will remain on as long as a fault persists. If an intermittent fault does not reoccur after three consecutive trips, the MIL lamp will go out but the code will remain in memory. If the fault does not reoccur for 40 trips, the code will be erased.

So how do you turn it off?

The only safe way to clear fault codes and turn the MIL lamp off is to use a scan tool or scanner software.

On many pre-OBD II vehicles, all you had to do was disconnect the battery or pull the PCM fuse to clear the memory and turn the Check Engine light off. If the problem had not been fixed, the Check Engine light would eventually come back on. But this procedure should NOT be used on OBD II cars for the following reason:

WARNING: On many OBD II cars, pulling the PCM fuse or disconnecting the battery may NOT clear the codes—and may cause a loss of important information the PCM needs to function correctly. On some vehicles, loss of power to the PCM may cause it to forget transmission settings, climate control functions and other essential data. This, in turn, may require the use of a scan tool and a special relearning procedure to reset the PCM.

Here's another thought: Are you sure you want to erase the codes? Codes contain important diagnostic information you or somebody else might need to troubleshoot the system. If the codes are cleared, it may take some time for the codes to reset - -which will delay diagnosing and repairing the fault.

The best approach to turning off the light, therefore, is to read out the codes, write them down, then clear the codes with your scan tool or scanner software.

Also note: Clearing fault codes may or may not allow you to pass a plug-in OBD II test. Remember, all the OBD monitors must have run and completed BEFORE you can pass the test. That means you may have to drive you car for a few hours or days to get all of the monitors to complete (especially the EVAP monitor). If a fault still exists, the OBD system will detect it and reset the code. On the other hand, if the fault is no longer present, they you should be able to pass the test.