Ford P0171 & P0174 Lean Codes

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A Ford P0171 is a LEAN code for cylinder bank 1, and P0174 is a LEAN code for cylinder bank 2. These codes commonly occur on many Ford vehicles, and are set when the powertrain control module (PCM) sees the air/fuel mixture is running too lean (too much air, not enough fuel).

When the Check Engine Light comes on, either one of these codes, or both, may be found when a code reader or scan tool is plugged into the vehicle diagnostic connector. IF the vehicle is driven long enough, typically both codes will be set.

A P0171 lean code for bank 1 is the cylinder bank on the RIGHT (passenger) side of the engine on Ford vehicles with a V6 or V8 engine and rear-wheel drive.

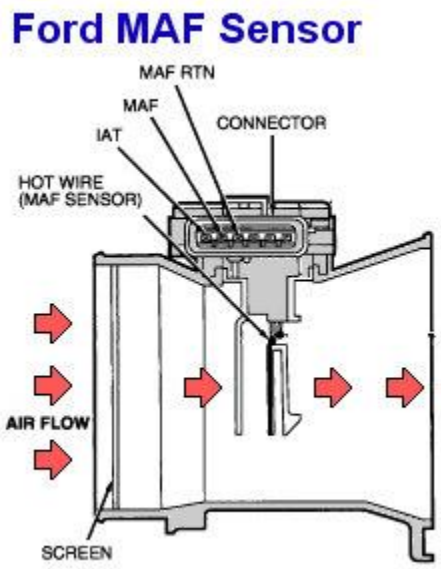
A P0174 lean code for bank 2 is the cylinder bank on the LEFT (driver) side of the engine on Ford vehicles with a transverse-mounted V6 engine and front-wheel drive. This code is not set on four cylinder engines (no bank 2).

WHAT A LEAN CODE MEANS

A lean fuel condition may exist if the engine is sucking in too much air and/or the fuel system is not delivering enough fuel. If bad enough, a lean fuel condition may cause lean misfire, a rough idle, hesitation or stumble when accelerating, and/or poor engine performance.

Unmetered air can enter the engine through a vacuum leak, a dirty airflow sensor that is not reading airflow accurately, an EGR valve is not closing and is leaking exhaust into the intake manifold, an EGR valve that is allowing too much flow (because the EGR differential pressure sensor that monitors EGR flow is faulty and is under-reporting EGR flow).

If the problem is not enough fuel, the underling cause may be a weak fuel pump, restricted fuel filter, leaky fuel pressure regulator or dirty fuel injectors.



A dirty MAF sensor can set a lean code.
Cleaning or replacing the sensor should make the code go away.

COMMON CAUSE: A DIRTY MAF SENSOR

One of the most common causes of Ford P0171 and P0174 lean codes is a dirty mass airflow (MAF) sensor. The MAF sensor is located in the air inlet tube just ahead of the throttle body. The MAF sensor should be protected from outside dust and debris by the air filter, but sometimes the air filter doesn't fit real tight inside the housing and allows unfiltered air into the engine. Dirt can stick to the MAF sensor wire and form a coating that slows the response of the sensor to changes in airflow. The MAF sensor can also be contaminated by fuel vapors that back up through the intake manifold and throttle body when the engine is shut off. The vapors can leave a waxy coating on the sensor wire. This causes the MAF sensor to under report airflow, which in turn misleads the powertrain control module (PCM) so it doesn't add enough fuel to maintain a properly

balanced air/fuel ratio. As a result, the engine runs lean and sets a P0171 and/or P0174 code (see Ford TSB 98-23-10 for details).

One way to diagnose a dirty MAF sensor is to hook up a scan tool, choose the PID data menu and look at fuel trim values while the engine is running. If the MAF sensor is dirty, the fuel trim at idle will probably be close to normal (plus or minus 3 to 5 range), but as engine speed increases up to 2500 RPM, you will see the fuel trim value go positive (5 or higher).

If the MAF is dirty, the fix is easy enough: just clean or replace the MAF sensor. In many instances, the MAF sensor can be successfully cleaned by spraying the sensor element with electronics cleaner. Do not use any other type of cleaner as this may damage the sensor.

Disconnect the air inlet tube just ahead of the sensor, and then spray the electronics cleaner through the screen at the wire element in the center of the little MAF sensor. Let the cleaner soak in for several minutes, then give it another shot of cleaner. Let it sit another five minutes, then reconnect the air inlet tubing and start the engine.

If the lean codes keep coming back, the MAF sensor may have to be replaced if the engine does not have a vacuum leak or fuel delivery problem.

ANOTHER COMMON CAUSE: VACUUM LEAKS

Another common cause of Ford P0171 and P0174 lean codes is an engine vacuum leak. Vacuum leaks can occur anywhere in the intake plumbing downstream of the throttle body (throttle body gasket, intake manifold gaskets or vacuum hose connections to the intake manifold)

You can use a scan tool to diagnose a vacuum leak. Plug in your tool, sart the engine and choose the PID data menu. Look at the fuel trim values at idle. If there is a vacuum leak, the fuel trims will be positive (probably 5 or higher). Now rev the engine to 2500 RPM. If the cause is a vacuum leak, the leak will have less effect at higher engine speed and load, and you should see the fuel trim values drop back closer to normal (closer to zero, plus or minus 3 or 4).

Ford TSB 04-17-4 details procedures for checking fuel trim and looking for vacuum leaks.

On 3.8L Fords with a split-plenum intake manifold, the port gaskets and isolator bolt assemblies for the upper plenum can deteriorate over time and leak air, often as a result of oil being sucked into the intake manifold through the PCV system. Also the vacuum hose that connects the fuel pressure regulator to the intake manifold can swell and leak vacuum where the hose connects to the manifold. Ford TSB 03-16-1 says the fix involves several steps: remove the upper manifold plenum and replace the original gaskets and bolts with revised ones, replace the front valve cover with a revised valve cover that reduces the amount of oil vapor sucked into the PCV system, inspect and replace the fuel pressure regulator hose, and finally, reflash the PCM so it is less sensitive to lean fuel conditions.

ANOTHER POSSIBILITY: LOW FUEL VOLUME DELIVERY

Lean codes can also be set if the engine is not getting enough fuel. The underlying cause might be a weak fuel pump, low voltage to the fuel pump (which prevents the fuel pump from spinning fast enough to deliver normal fuel flow), a restricted fuel filter, or possibly a leaky fuel pressure regulator. See Diagnose Fuel Pump for more information on how to troubleshoot fuel delivery problems.

You can also use a scan tool to diagnose fuel delivery problems that may be causing a lean code. Hook up your scan tool, go to the PID data menu and look at the fuel pressure PID. If fuel pressure is less than specifications, there is probably a problem in the fuel pump or fuel pump wiring circuit.

Next, look at the fuel trim values while the engine is running. At idle, the fuel trim may be normal to slightly positive. If your engine has a fuel delivery problem, the fuel trim values will become more positive as engine speed and load increase. No change in fuel trim values would tell you the engine is getting enough fuel and that low fuel volume is NOT the cause of your lean code.

Dirty fuel injectors can have the same effect as a weak fuel pump. They may flow enough fuel at idle and low speed to keep up with engine demand, but at higher engine speeds and loads, they may not spray enough fuel to maintain the proper air/fuel ratio. The effect on fuel trim would be the same as a weak fuel pump - close to normal at idle but going more positive (indicating a lean fuel mixture) as engine speed and load increase.

The fix for dirty fuel injectors is to clean the injectors. Fuel tank additives can be slow or ineffective if the injectors are really dirty, so it may be necessary to have the injector professionally cleaned.

IT ALSO COULD BE: A BAD DPFE SENSOR

Ford p0171 AND p0174 lean codes can also be set by a bad EGR differential pressure sensor. These sensors have a very high failure rate once a vehicle has more than about 60,000 miles on the odometer or is more than five or six years old.

The DPFE sensor is mounted on the engine, and is attached with two rubber hoses to the tube that routes exhaust gas to the EGR valve. The original equipment sensor has an rectangular aluminum housing about three inches long. Corrosion inside the sensor reduces its sensitivity to EGR flow, causing it to under-report EGR flow. The PCM responds by increasing EGR flow, which may keep the EGR valve open longer than usual creating a lean condition in the engine. Thus, a bad sensor may set a P0401 code (insufficient EGR flow), or it may not set an EGR code but a P0171 and/or P0174 lean code instead.

The cause of the P0401 code in most cases turns out to be a bad DPFE sensor, not an EGR valve problem or an EGR valve that is plugged up with carbon (though this can also set a P0401 code). An aftermarket replacement DPFE sensor costs less than $50 and usually gets rid of not only the P0401 code, but also the P0171 and P0174 codes, too.

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