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Cleaning Throttle Bodies

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You slip behind the wheel for the morning commute. The engine starts easily, runs fine while fast-idling down the driveway and down the street for a few miles, but then stalls. You know instantly when the stall occurs because the air horn in the tractor-trailer rig immediately behind you curdles the fluid in your inner ear's semicircular canals when forward motion fails to proceed at an orderly pace. You restart, your car accelerates with a slight stumble, and when you coast to a stop at a traffic light, it stalls again. The stumble and possible stall problem doesn't go away when the engine is warm, so the common cold-engine poor-running possibilities are scratched from your priority checklist. This is more than annoying and as soon as the weekend arrives, the hood goes up.

Diagnosis: Deposits

All sensor wires are connected. There's no Check Engine light and there are no trouble codes. What do you look for now? A disconnected or damaged vacuum hose? Sure, that's a good bet, because many vacuum hoses can be pinched and damaged where it's really difficult to see. But take the time to check them all, making sure they're not only on tight, but not cracked or burned through due to contact with an exhaust pipe or exhaust gas recirculation tube. Don't be surprised if the last hose you check is the one that's damaged. If all the hoses are intact and on tight, there's another possibility that's just as likely: dirt and gum accumulation in the throttle body.

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Spray-can carb cleaner may be a little too aggressive for safety--dilute it with gasoline to prevent damage to seals and sensors.

Get Dirty

To check for this, you've got to remove the intake air duct between the air cleaner housing and the throttle body. First, disconnect all hoses and unplug any sensor wiring connectors. If there's a chance you could confuse a hose connection or wiring connector, put a piece of masking tape on the hose or connector, another on the hose neck or sensor, and mark each with the same letter.

Next, loosen any clamps, work the duct off the throttle body and set it aside. With the wiring and hoses disconnected, you should not run the engine. Even if it starts and runs, it will log trouble codes, possibly triggering the Check Engine light. Then you'll have to go through a code-clearing procedure--extra work you don't want. Moreover, the computer may have to relearn some driveability trim settings, which may leave you with a marginally running engine for several minutes.

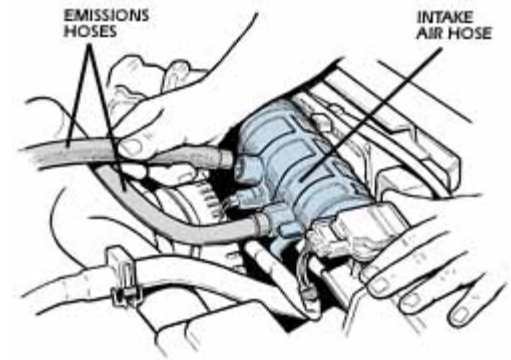
On some vehicles, it's possible to leave hoses and sensors connected and still move the intake air duct safely out of the way. In that case, it would be possible to spray a solvent into the throttle body opening with the engine running. However, there's no great advantage to this and, as you'll see, there are reasons why it's not such a great idea.

Take a good look inside the throttle body using a flashlight. Operate the throttle linkage to open the throttle plate so you can see past the outside surface of the throttle body. If you see a coating of dirt and oily film on the inside wall of the throttle body or the edge of the throttle plate, you've likely found the problem. The coating both upsets and restricts the airflow when the throttle is closed or slightly open.

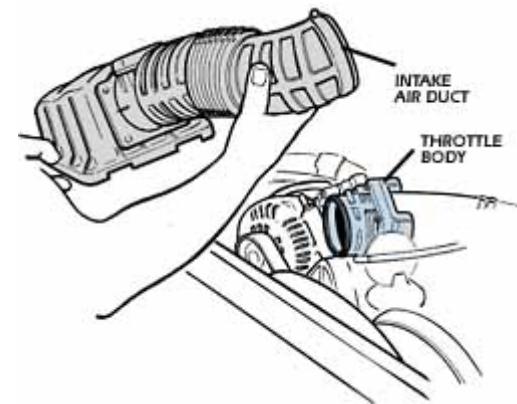
Where do these deposits come from? Some are in airborne dirt that gets through the air filter or past a crack in the intake air duct. So be sure to check the intake air duct for cracks, particularly in the "accordion" area where they're not as obvious. Most deposits, however, are from oil and combustion gases transferred from the positive crankcase ventilation system and pushed forward by normal engine pulsation as the intake valves close and open.

Some throttle body bores have a coating to reduce the buildup, but, in time, bores with protective coats can be affected. There are several ways to clean out the area. The best is with a professional tool called the Intake Snake, which comes with an effective yet safe solvent, and the simplest is with an old worn-out toothbrush with soft bristles and a mild solvent.

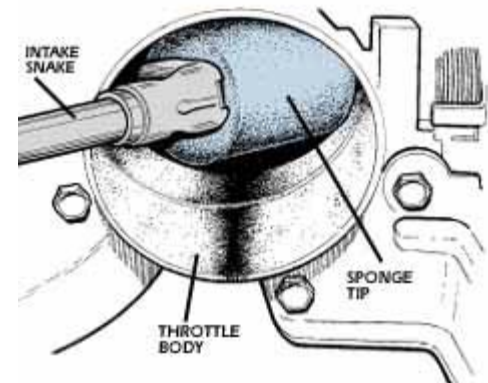
There are three reasons why you have to be careful, both in choice of solvent and in application: First, if the throttle body has a protective coating (as on many Ford products) to reduce the



Remove any hoses or wires on the air duct connecting the throttle body to the air cleaner housing. Mark which hose or wire goes where to avoid confusion later.



Remove the air duct and inspect it carefully for leaks or tears that might permit uncleaned air into the engine.



The Intake Snake is one way to safely clean throttle blades and throttle body castings of deposits.

buildup, a strong solvent and hard brushing will remove it, so you'd have to do the job more often. If you see a warning label on a Ford product, that's why.

Second, there may be a sensor tip projecting into a small opening in the area of the throttle plate, and a strong solvent or hard brushing might damage it. In addition, a sensor O-ring seal may be damaged by a strong solvent.

Third, the throttle plate shaft is sealed at the mounting holes in the throttle body to prevent entry of unmeasured air (which would upset the fuel mixture). A strong solvent (and hard brushing) could damage the seals.

Stronger Than Dirt

Most aerosol carburetor and choke cleaners are pretty strong. Ditto for those aerosol cleaners that can be sprayed into the air intake with the throttle open for combustion-chamber cleaning. These aerosols have to be very strong to clean surfaces without the mechanical advantage of a rubbing brush. A strong solvent can cause deterioration of not only sensor seals, but also throttle shaft seals. Further, you can't see which deposits have been removed and which have not. The aerosol spray will not clean all areas, particularly the back side of the throttle plate.

A tuneup/injector cleaner mixed with gasoline (1:4 or 1:5 ratio) should be safe. You won't be using much, and you can pour the rest into the gas tank after you're done.

Start by cleaning the exterior of the throttle plate, and then hold it open using a wire tied to the throttle linkage so you can clean the inside perimeter of the plate. All you're trying to do with brushing is to loosen all the deposits.

Next, clean the throttle body wall, being careful to work around any electronic sensors, and around the throttle plate shaft holes. When you're done, remove the deposits with solvent and a clean rag.

Because this service is something your vehicle may need every few years, the professional kit (www.intakesnake.com) is a worthwhile investment at under \$60. It includes a container of two cleaning tips (containers of two tips are available separately for under \$15). The "snake" is made of a smooth plastic and won't scratch anything. It's 14 in. long and moderately flexible, so you can reach deep into the throttle body and follow any contours. The tool holds the spongelike work tips that are coated with a hypoallergenic solvent that's also safe for sensors and throttle plate seals. Because the dirty film is held by the work tip, there's little or no wiping needed when you're done. Press a release tab and the dirty tip falls off the tool (into a garbage can).

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HOW IT WORKS:


How A Throttle Body Works

An engine runs primarily on air (about 15 parts by weight, to one of fuel), and the throttle body in a modern fuel-injected engine is the device that controls the airflow through its round opening. When the intake valve for a particular cylinder is open, the air flows through the throttle body, which is mounted on the intake manifold. The airflow continues into the intake manifold, through a chamber, and then through the open intake valve into the cylinder. At the same time the fuel injector sprays in fuel, the incoming air and fuel mix, the intake valve closes and a spark from the plug ignites the mixture. The intake airflow control is provided by the throttle plate, a pivoting plate on a spring-loaded shaft that goes through the center of the throttle body's round opening. The throttle plate is a type of air valve, often called a "butterfly." When your foot is off the gas pedal, the throttle plate springs closed, and only a minimum amount of air, enough for engine idle, goes through a bypass around the throttle plate. One end of the throttle plate shaft also holds the movable contact arm of the throttle position sensor, a variable resistor-type sensor that tells the engine computer whether the vehicle is idling, accelerating or holding a throttle position. On many new engines, the gas pedal is just a variable resistor, sending a signal to the engine computer. The computer controls the throttle plate to produce the desired opening. This is called "drive by wire."

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