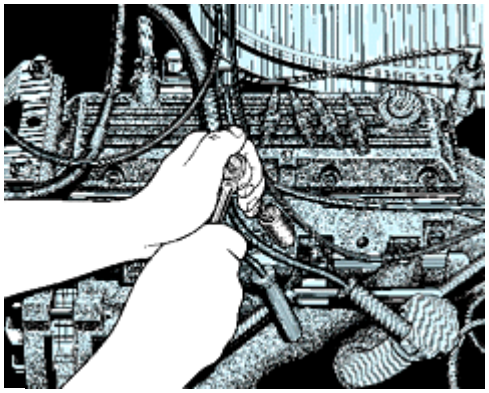
SMOOTHING OUT A LUMPY IDLE

BY KEN JURAN
Published on: March 1, 1997



CLICK TO ENLARGE

Fearful pedestrians glare at you as they pass in front of your bumper at crosswalks. Out of embarrassment, you try to ignore them by glancing around nonchalantly, stroking your hair as you look in the rearview mirror or tuning the radio. Meanwhile, the size of your right thigh is growing to Dan Jansen proportions from the force being applied to the brake pedal. Your engine's idle speed is surging up and down, creating crescendos that would make Pavarotti proud: WAAAAaaaah, WAAAAaaaah, WAAAAaaaah! It's all you can do to keep your maniacal car from lurching forward into a lawsuit.

There are a number of generic steps you can take to see what's ailing your wheels. And if there ever was a time to step back and remember the basics, this is it.

Pop quiz: What is an internal-combustion engine?

It's basically little more than an air pump. The more air that gets in, the faster the engine runs. And airflow controls idle. By allowing a certain volume of air to bypass the closed throttle plate(s), idle rpm can be maintained at a healthy level. Even to accelerate, we don't "step on the gas," we "step on the air" by opening the throttle plate farther. Fuel is added a nanosecond later, in response to the greater intake airflow.

Check your intake tract

If your engine uses a remotely mounted air filter in an air box, inspect everything from there back to the throttle plate(s). At the air box, check all hose connections and make sure the clamps are tight. Replace the air filter if it's so dirty that light from a 100-watt bulb doesn't pass through the element. Make sure the new one seats properly in the air box and that the cover sits flush and clamps down evenly. Follow the intake tract toward the throttle plate, tightening all the clamps as you go. If there's an inline mass airflow meter in the tract, take extra care to examine its connections for leaks.

Big, convoluted rubber tubing-style intake tracts are susceptible to developing cracks between the convolutes on the underside of the tube. They're generally not visible unless you remove one end of the tube and bend it back to get a good look below. If the engine controls measure airflow by means of a manifold absolute pressure (MAP) sensor, this type of leak shouldn't affect idle quality. But the hole still needs to be sealed, or else dirt and debris will find its way in. If the engine uses an airflow sensor, this type of leak tends to audibly reveal itself when the engine torques forward on its mounts and opens wide the convolute crack.

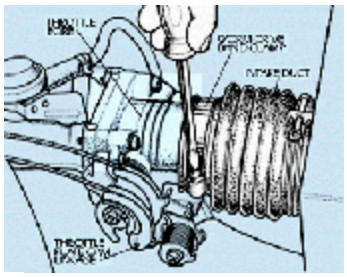
Then the engine gets an unmetered gulp of air and revs up on its own. The idle speed control may try to catch the speed burst by closing down the bypass channel. Then, when the engine returns to its normal position and the convolute crack closes, the idle speed is too low. In response, the idle controls may open up the channel again to raise the idle. This scenario can turn into a cycling condition that produces a lumpy, rolling idle.

If you don't mind getting your engine bay a little messy, another quick way to go about checking for intake tract and runner leaks is to simply spray carburetor cleaner around connections and the intake manifold while the engine is running. If you get an rpm change when you spray, it means the vapors are getting in somehow. So you have to play spy to find the leak. Don't spray near the distributor--if you have one--because there's a chance the solvent will ignite and leave you minus your eyebrows and nose hair.

Keep your bore clean

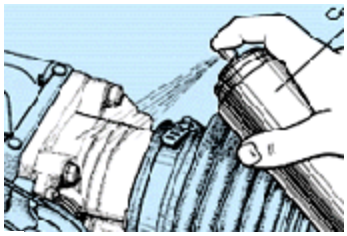
When you get to the last clamp at the throttle bore, unscrew it and remove the intake tract. Take a look inside the bore with a flashlight. If the muck is so thick that it's a wonder the throttle plate can move at all, you've found a major cause of your lumpy idle. In addition to the idle air-bypass channel, a small amount of air must be able to pass around the throttle plate itself. When blowby vapors from the PCV system sludge up the bore over time, the idle air-bypass function is seriously affected.

Steal an old toothbrush from your kids (so your wife doesn't blow a gasket) and pick up some noncaustic fuel-injection intake cleaner at an auto parts store. With the engine off, spray some cleaner in the bore and start scrubbing with the toothbrush. Pay particular attention to the circumferential area where the



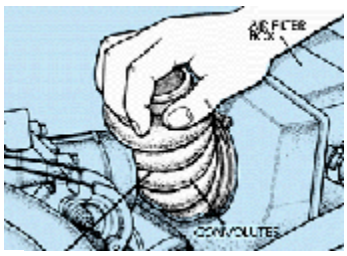
CLICK TO ENLARGE

Make sure all the clamps sealing the intake duct are tight.



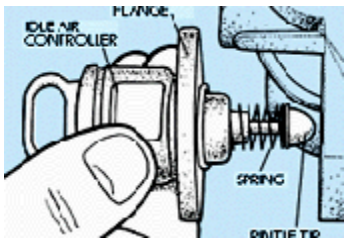
CLICK TO ENLARGE

Pull back the intake duct to check for hidden cracks underneath.



CLICK TO ENLARGE

Spray carb cleaner around the throttle bore to find air leaks.



CLICK TO ENLARGE

Pull the idle speed controller out of its bore to inspect the pintle tip, spring and air channel.

throttle plate sits when closed. Also clean both sides of the plate and its edges.

If the externally mounted idle air-bypass valve is easily removed and its channel easily accessed, try to get cleaner to pass through the channel into the bore. Be sure to clean the valve's pintle tip, too.

Wash down the residue

With the bore and channel clean, stick the intake tract back on and start the engine. If the engine doesn't use an airflow meter, you can pull the tract off with the engine running and spray some more cleaner in the bore to wash down the residue. Goose the throttle a couple of times. Then tighten the clamp and let the motor idle so that the engine-management system can relearn the parameters necessary for increased throttle plate air bypass.

If your engine does use an airflow meter, it'll probably stall when you pull the intake tract off the bore. Get it started again and just pull the end of the rubber tract back a bit with one or two fingers to spray some more cleaner down in the bore. The engine will stumble for a second, but that's okay. Whatever you do, don't spray the cleaner into the tract before the airflow meter. You'll kill the meter.

Single- and dual-point injection throttle bodies typically don't sludge up much because they're up top on the engine and PCV vapors flow in below them. However, if the plate(s) looks really dirty, it's okay to hit it with some cleaner. Just be careful not to drown the fuel injector sitting directly above the plate.

Assuming no one has ever played with the base idle settings (the screw may be sealed) and there's nothing wrong with the powertrain control module's programming (the malfunction indicator lamp has never illuminated), that covers the basic idle controls. Unless the manufacturer has issued a software update, today's engine-management systems are smart enough to take it from here and continue to provide a smooth, carefree idle until the next time that throttle bore has janitorial needs.

Loaded to the hilt

When you consider the number of belt-driven accessories hanging off the typical engine today, in addition to all the mechanical and electrical loads, it's a wonder the pistons can continue pumping at all. That's why some vehicles today have 120-amp alternators and 140-amp fuses.

In rainy, cold weather at night, your alternator is working overtime to make enough amperage to power everything. Problem is, it's also trying to stop the engine from turning. Here's where your idle speed control really shines. As soon as alternator output drops to a certain level, the voltage regulator does its thing and the engine-management system sees the need for increased idle rpm to keep charging-system voltage between 13 1/2 and 15 volts.

If a signal gets lost through a short or an open circuit or an intermittent connection, however, you're likely to get a lumpy or just plain low idle. Here's

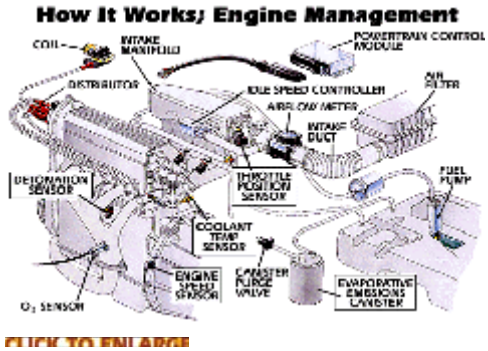
where you really need the specific service manual and wiring diagrams for the vehicle, because there are too many variations in form and function to discuss these systems in general terms. Some simple things you can do, however, include visually checking for corroded--and even burned--connections at the alternator and battery terminals. Eyeball the condition of all the fusible links around the battery, and check for fouled spark plugs. Make sure the accessory belt(s) is tight and unfrayed.

Every time the a/c compressor kicks in at idle, engine speed would drop a couple hundred rpm were it not for the idle speed controls keeping things at an even keel. Here again, intermittent connections and a faulty pressure switch or two could cause the climate control to cycle in and out. A low or contaminated refrigerant charge might do the same thing.

Sometimes there's a pressure switch monitoring your power steering system, especially on 4-cylinder engines. During a tight parking-lot maneuver, when power-steering pressure skyrockets, the engine controls take the reins and bump open the idle speed control motor so your engine doesn't stall or bog down to the point of misfiring. A bad connection or leak at the switch would affect this system and possibly lead to a hunting idle. Periodic power-steering-system flushes go a long way toward preventing clogged switches and orifices.

An engine with high mileage that's tired and worn out may not pull a healthy vacuum of 18 to 20 in. Hg at idle (closed throttle plate) anymore. That means the MAP sensor will always read the engine as under load (low vacuum) and--just doing its job--inform the powertrain computer to add more fuel. When the oxygen sensor picks up the rich mixture in the exhaust stream, it will call for a leaner mixture. Common strategy is to open the idle air-bypass valve to let some more air in. But an engine that's just on the borderline of wheezing may intermittently "loosen up," leading to a roller coaster idle. It may have trouble breathing when cold, but once warm-with expanded piston rings, gaskets and the like--show a perfectly healthy intake vacuum.

What it all boils down to is that there's a whole lot more than just a carburetor's throttle stop screw controlling your engine's idle speed these days. Simply understanding the system, however, is half the battle toward finding and fixing the offending troublemaker.



An automotive computerized engine-management system works like any computer as it controls idle speed. The central processing unit relies on various inputs to calculate necessary outputs. On modern motors, however, the inputs to the processor, or powertrain control module (PCM), are called sensors. The outputs are called actuators. And the PCM is programmed to control the actuators under any condition that the sensors deem necessary.

Key sensory inputs of most engine-management systems include engine speed, coolant temperature, crankshaft position, intake airflow, manifold vacuum, throttle position and exhaust oxygen content. Many systems go further, factoring in such inputs as camshaft position, barometric pressure, intake air temperature, detonation detection, EGR valve position, misfire detection, engine-oil temperature, power-steering pressure, air-conditioning pressures, gear-lever position, vehicle speed, automatic-transmission-fluid temperature, catalytic converter efficiency, system voltage and others.

Key actuators on many systems include the fuel injectors, idle speed control motor, EGR valve, evaporative canister purge, ignition coil timing and dwell (saturation time), torque converter clutch, smog pump diverter valve, cooling fan, alternator output and fuel pump.--K.J.

Links referenced within this article

Find this article at:
http://www.popularmechanics.com/automotive/how_to_central/powertrain_drivetrain/1272271.html