Hey, how tough can it be? Just turn the screw and you're done, right?

There's a lot more to learn about setting idle mixture than just turning a couple of screws and slamming the hood closed. You might be surprised at how much better your street-driven engine will run with a properly adjusted idle mixture. The idle circuit is a crucial component to overall street engine operation and properly adjusting the idle mixture goes a long way toward improving throttle response, fuel mileage, and emissions.

Now that we've impressed upon you the importance of setting idle mixture, take a moment to read the sidebar so you have a better understanding of how the idle circuit works. Before we get started, it's best to do the actual tuning outside, because the engine will be idling for an extended period of time. Never work on a running engine inside a closed garage unless the exhaust is properly routed outside with exhaust hoses. You will also need a couple of small, straight screwdrivers; a low-rpm tachometer; and a vacuum gauge. Make sure the transmission is in Park if it's an automatic or Neutral if it's a manual. Block one tire, or set the parking brake so the car won't roll.

To begin, make sure the engine is up to operating temperature and the choke is completely off. A cold engine requires more fuel than a fully warmed engine even if the choke is off. Remove the air cleaner and connect the tach to the engine. Typically, one lead connects to the negative side of the coil, and the other hooks to a suitable ground. Connect the vacuum gauge so it reads manifold vacuum.

Remember that working around the engine is plenty dangerous and can chew up fingers, catch cords from the tach or timing light, and generally cause havoc if you're not careful. Always work slowly and thoughtfully when tuning a running engine. Rushing to the hospital for stitches takes all the fun out of working on cars.

Before you fire up the engine, slowly turn each idle-mixture screw in until it gently bottoms out and count the number of turns it takes. Do this for each idle-mixture screw and then return them to their original positions. If all the idle-mixture screws are not adjusted the same, do that now. Remember to always adjust both screws the same amount. This will help balance the idle mixture and allow the engine to run as smoothly as possible. If the carburetor is new to the engine, start at 1½-turns out (counterclockwise) from full in.

Now start the engine and set the idle speed to around 850 rpm with the idle-speed screw. If your engine has a big cam and must idle at a higher speed, that's OK. Note the reading on the vacuum gauge. Next, turn one idle-

mixture screw in ½-turn and note the change on the vacuum gauge. If the vacuum reading increases say, from 14 inches to 14-½ inches move around to the other side of the carburetor and turn that mixture screw in ½-turn as well. Again, note the vacuum gauge reading; if the gauge continues to climb, then adjust each idle-mixture screw in another ½-turn. On most carburetors, turning the mixture screw in (clockwise) leans the mixture, while counterclockwise (out) enriches the mixture.

Initially, if the engine stumbles or the vacuum drops when turning the mixture screw in, turn both screws out about a ½-turn and evaluate the results. The goal of adjusting the idle-mixture screws is to achieve the highest possible idle vacuum at a set idle speed. If the idle speed increases after you adjust the idle-mixture screws (which is likely), be sure to adjust the idle speed back to the base speed. This is important because a higher idle speed will increase the vacuum reading. Maintaining a standard idle speed will make it easier to evaluate changes to the idle-mixture screws.

The best way to accurately set idle mixture is to use an emission-test machine to read hydrocarbon (HC) and carbon monoxide (CO) levels. As you move the idle-mixture screws, you'll see some very dramatic changes in HC and CO readings. The ideal idle-mixture setting will minimize both the HC and CO. HC readings are expressed in parts per million (ppm) while CO is given as a percentage. One fact that is generally overlooked is that CO can be equated to air/fuel ratio. For example, 0.01 percent CO is equivalent to 14.7:1 air/fuel and 0.38 percent is equivalent to a 13:1 air/fuel ratio.

Most four-barrel carburetors use two screws to set the idle mixture. Some recent Holley and all Demon carburetors use four idle-mixture adjustment points. The idle-mixture procedure is exactly the same for these carburetors except that now you are balancing four adjustment points instead of two. Again, a big key to establishing the ideal idle mixture is an accurate balance of all four of these mixture adjustments.

This procedure also works for engines with lumpy camshafts. One potential pitfall is that big cams often idle at vacuum levels below 8 inches. These engines also require large throttle openings to allow air in for the engine to idle. This uncovers the idle transfer slot, which can cause off-idle stumble problems. The only way to spot this problem is to remove the carburetor and see if the throttle blades uncover more than 0.040 inch of the idle transfer slot (you can use a spark-plug-gap wire gauge to measure this). If too much of the slot is uncovered, the best fix is to drill a 1/16-inch hole in the leading-edge side of the throttle blade and, if necessary, increase the size by 1/32-inch increments. This will allow more air past the throttle blades, which will allow closing the throttle blade slightly so the transfer slot is only barely

exposed by the throttle blade. Be careful not to drill these holes too large or the throttle blades will need to be fully closed to generate the proper idle speed. Unfortunately, this can also create an off-idle flat spot.

Fine-tuning the carb in this manner will improve part-throttle operation and should eliminate that annoying off-idle stumble. As you can see, there’s much more to setting idle mixture properly than just turning a couple of screws. Spending a little more time to set your idle mixture properly will result in superior part-throttle performance. A simple step like this can make a big difference in how much fun you have behind the wheel.