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SCAN TOOLS AND ENGINE PERFORMANCE DIAGNOSIS

Figure 88-1 A funnel is one way to visualize the diagnostic process. The purpose is to narrow the possible causes of a concern until the root cause is determined and corrected.

Figure 88-2 Step #1 is to verify the customer concern or problem. If the problem cannot be verified, then the repair cannot be verified.

Figure 88-3 A form that the customer should fill out if there is a driveablilty concern to help the service technician more quickly find the root cause.


ENGINE PERFORMANCE DIAGNOSIS WORKSHEET

Figure 88-4 This is what was found when removing an air filter from a vehicle that had a lack-of-power concern. Obviously the nuts were deposited by squirrels or some other animal, blocking a lot of the airflow into the engine.

TECH TIP

"Original Equipment" Is Not a Four-Letter Word

To many service technicians, an original-equipment part is considered to be only marginal and to get the really "good stuff" an aftermarket (renewal market) part has to be purchased. However, many problems can be traced to the use of an aftermarket part that has failed early in its service life. Technicians who work at dealerships usually begin their diagnosis with an aftermarket part identified during a visual inspection. It has been their experience that simply replacing the aftermarket part with the factory original-equipment (OE) part often solves the problem.

Original equipment parts are *required* to pass quality and durability standards and tests at a level not required of aftermarket parts. The technician should be aware that the presence of a new part does not necessarily mean that the part is good.

Figure 88-5 Using a bright light makes seeing where the smoke is coming from easier. In this case, smoke was added to the intake manifold with the inlet blocked with a yellow plastic cap and smoke was seen escaping past a gasket at the idle air control.

TECH TIP

Smoke Machine Testing

Vacuum (air) leaks can cause a variety of driveability problems and are often difficult to locate. One good method is to use a machine that generates a stream of smoke. Connecting the outlet of the **smoke machine** to the hose that was removed from the vacuum brake booster allows smoke to enter the intake manifold. Any vacuum leaks will be spotted by observing smoke coming out of the leak. ● **SEE FIGURE 88–5.**

Figure 88-6 A spark tester connected to a spark plug wire or coil output. A typical spark tester will only fire if at least 25,000 volts is available from the coil, making a spark tester a very useful tool. Do not use one that just lights when a spark is present, because they do not require more than about 2,000 volts to light.

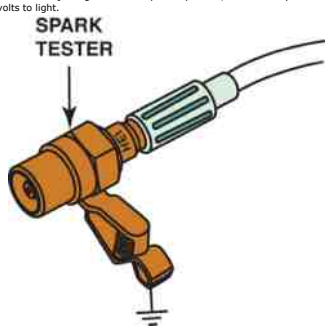

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Figure 88-7 Step 3 in the diagnostic process is to retrieve any stored diagnostic trouble codes.

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Figure 88-8 After checking for stored diagnostic trouble codes (DTCs), the wise technician checks service information for any technical service bulletins that may relate to the vehicle being serviced.

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Figure 88-9 Looking carefully at the scan tool data is very helpful in locating the source of a problem.

Figure 88-10 Step 8 is very important. Be sure that the customer's concern has been corrected.

Figure 88-11 A TECH 2 scan tool is the factory scan tool used on General Motors vehicles.

Figure 88-12 Some scan tools use pocket PCs which make it very convenient to use.

TECH TIP

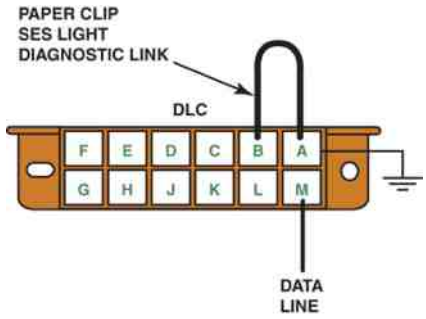
One Test Is Worth 1,000 "Expert" Opinions

Whenever any vehicle has an engine performance or driveability concern, certain people always say:

"Sounds like it's a bad injector."
"I'll bet you it's a bad computer."
"I had a problem just like yours yesterday and it was a bad EGR valve."

Regardless of the skills and talents of those people, it is still more accurate to perform tests on the vehicle than to rely on feelings or opinions of others who have not even seen the vehicle. Even your own opinion should not sway your thinking. Follow a plan, perform tests, and the test results will lead to the root cause.

Figure 88-13 To retrieve flash codes from an OBD-I General Motors vehicle, without a scan tool, connect terminals A and B with the ignition on–engine off. The M terminal is used to retrieve data from the sensors to a scan tool.



TECH TIP

Do Not Lie to a Scan Tool!

Because computer calibration may vary from year to year, using the incorrect year for the vehicle while using a scan tool can cause the data retrieved to be incorrect or inaccurate.

Figure 88-14 A Ford OBD-I self-test connector. The location of this connector can vary with model and year of vehicle.

TECH TIP

Put a Wire in the Attic and a Light in the Basement!

Retrieving DTCs from a Ford using low-cost test equipment is easier when you remember the following: "*Put a wire in the attic and a light in the basement.*"

After warming the engine to operating temperature, perform these simple steps:

1. Locate the data link connector (DLC) under the hood. Connect a jumper wire from the single-wire pigtail called the self-test input to terminal #2 at the top (attic) of the connector.
2. To read DTCs, connect a standard 12-volt test light (not a self-powered continuity light) to the positive battery terminal and the lower (basement) terminal (#4) of the DLC. ● **SEE FIGURE 88-15.** Turn the ignition to on (engine off). The DTCs will be displayed by means of the flashes of the test light.

To clear stored Ford DTCs, simply disconnect the jumper wire from the self-test input while the codes are being flashed. This interruption is the signal to the computer to clear any stored DTCs.

Figure 88-15 To retrieve Ford DTCs using a test light and a jumper wire, turn the ignition switch on (engine off) and make the connections shown. The test light will blink out the diagnostic trouble codes.

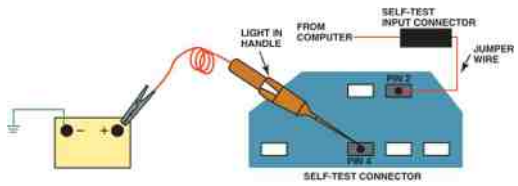


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Figure 88-16 A typical OBD-II data link connector (DLC). The location varies with make and model and may even be covered, but a tool is not needed to gain access. Check service information for the exact location if needed.

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Figure 88-17 The first step in the reprogramming procedure is to determine the current software installed using a scan tool. Not all scan tools can be used. In most cases using the factory scan tool is needed for reprogramming unless the scan tool is equipped to handle reprogramming.

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Figure 88-18 Follow the on-screen instructions.

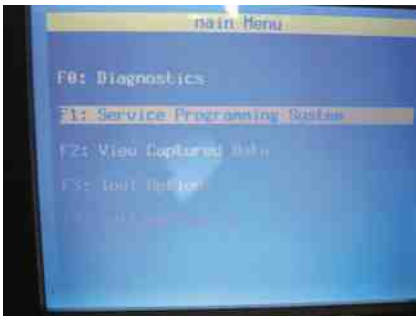

Figure 88-19 An Internet connection is usually needed to perform updates although some vehicle manufacturers use CDs which are updated regularly at a cost to the shop.

Figure 88-20 Connecting cables and a computer to perform off-board programming.

Figure 88-21 The J2534 pass-through reprogramming system does not need a scan tool to reflash the PCM on most 2004 and newer vehicles.

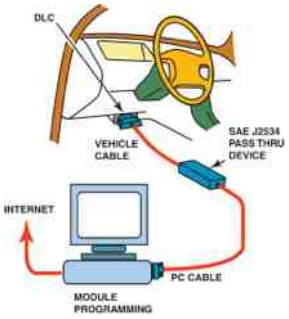

Figure 88-22 A typical J2534 universal reprogrammer that uses the J2534 standards.

TECH TIP

The Brake Pedal Trick

If the vehicle manufacturer recommends that battery power be disconnected, first disconnect the negative battery cable and then depress the brake pedal. Because the brake lights are connected to battery power, depressing the brake pedal causes all of the capacitors in the electrical system and computer(s) to discharge through the brake lights.

TECH TIP

Drive the Light Out

If working on a vehicle that is subject to state emission testing, it is best to not clear codes. When diagnostic trouble codes are cleared, all of the monitors have to be rerun and this can be a time consuming job. Instead of clearing the code, simply drive the vehicle until the PCM clears the code. This will likely take less time compared to trying to drive the vehicle under varying conditions to run all of the monitors.