

ExtremeTech

Hack Your Car

THE INDEPENDENT GUIDE TO TECHNOLOGY

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My daughter, Stephanie, is a gearhead. She loves cars. The current object of her affection is a five-speed 1997 Volkswagen GTI VR6 with fat tires, black leather interior, and some subtle modifications to improve its performance and appearance. She hangs out online and in real life with other VW fanatics, and our driveway sometimes fills with cars that are faster, lower, and louder than anything the VW factory might have imagined.

She comes by her obsession honestly, since I suffered the same affliction at her age—and for a couple of decades more. Maybe all the grease, gas, and oil that I absorbed through my skin affected my DNA. Or maybe her infant-through-toddler memories of going to car club events and racetracks made a powerful impression. But the undeniable result is a young woman who eschews automatic transmissions and changes her own oil.

Of course, I still have all my old tools: the big red roll-around tool-chest filled with socket wrenches and such, a couple of floor jacks, some jack stands, a creeper, and an under-car utility light that has burned three generations of Machrones. I also have all my old test and tune-up tools, most of which I built from Heathkits.

HIGH-TECH TOOLS

Dwell tachs, timing lights, and thermal-exhaust gas analyzers are useless on today's cars. The weapon of choice is a laptop computer. Every car built in the last ten years has a multiplicity of microprocessors, starting with the engine management system, through the various safety systems, and even dedicated modules for the driver's seat and the radio. The vehicle has hundreds of sensors, all reporting back to a control module. There's a plug somewhere under the hood or in the dash that connects to the dealer's mul-

tithousand-dollar diagnostic computer. It probes all the controllers, reports their status, and allows a mechanic to adjust things by entering a code or a value in a field rather than by turning a screw.

But where there's a port, there's a way. Automotive-minded hackers have taken up the challenge of deciphering factories' proprietary protocols and codes. They've built connectors that go from the vehicles' jacks to PC ports. They've written software that decodes the messages from the controllers and turns them into on-screen readings of RPM, throttle position, air sensor data, and much more. None of this thrills manufacturers, since they'd rather sell those diagnostic computers and keep them in the hands of factory-trained mechanics. I guess they've never heard of the hacker ethic.

One such hacker is Uwe Ross, the author of Vag-Com, (www.ross-tech.com) a Windows-based diagnostic package for VW and Audi vehicles. As Windows software goes, Vag-Com is kind of rough around the edges. For us, the deciding factor was when the Check Engine light came on. With Vag-Com, you can read out the error code and decide whether the problem is critical or merely advisory. Without a diagnostic tool, you scurry to the nearest dealer or service center to get it analyzed. The problem? A loose gas cap. The bill? \$90. Yep, the system ensures that the gas tank retains pressure for proper emission control and recapture of condensed gasoline fumes. The bill was roughly half the cost of Vag-Com and the adapter cable for my daughter's car, so we ordered one.

We now get on-board diagnostics and the ability to modify some settings and clear error conditions. We also get log files of measurements, whether we're standing still or on the road, in convenient spreadsheet format. We can see individual wheel speeds, outside air temperature, water and oil temperature, airflow into the engine, spark and fuel injection



timing, and much more.

You can find equivalent hardware and software for virtually any post-1995 car. The auto industry has standardized on a format known as OBD II (On-Board Diagnostic systems), which features a combination of generic and proprietary codes. Check out www.autotap.com and www.rinda.com for domestic vehicles; do an online search for your car make and diagnostic software PC, or stop by <http://softwareforcars.com> for a fascinating selection of hardware and software tools, including diagnostics running on Palm and Pocket PC platforms.

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