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ABOUT FLASH REPROGRAMMING PCMs

Would you believe flash reprogrammable PCMs have been in vehicles for over a decade? The first such application was the 1990 Geo Storm. Why a humdrum car like the Storm would be the first to receive a flash reprogrammable computer system is unknown. You'd think GM would have chosen a more high profile vehicle like a Cadillac or Corvette to usher in the new technology. But they didn't. The choice probably had more to do with production scheduling and new model introductions than profile or image. GM knew OBD II was coming and that it would require a new generation of PCMs that were faster, more capable and able to be programmed electronically.

Up to this point, Program Read Only Memory (PROM) chips held all of the PCMs vital calibration information and operating instructions. GM pioneered the replaceable PROM chip as a way of programming a limited number of basic PCMs to fit a wide range of GM makes and models. A replaceable PROM chip also meant the PCM could be "retuned" if necessary to correct certain kinds of emission or drivability problems. It also meant that if a bug was later discovered in the original factory programming, it could be corrected in the field by simply replacing the original PROM with an updated corrected PROM (a tactic GM has successfully used over the years to fix many factory flaws). Performance enthusiasts also liked replaceable PROMs because the chip could be replaced with one that provided more spark advance, fuel enrichment, a higher rev limit, etc., to squeeze more power out of the engine.

But replaceable PROMS had a serious drawback: there were too many of them! Every model year and every running change meant another PROM had to be created. Every field fix or recall for an emissions or drivability problem created more part numbers to keep track of. We're talking thousands of different PROMS. The General Motors PROM Identification manual that OTC used to provide with their Monitor scan tool and Pathfinder software contained over 362 pages of GM PROM numbers!

Enter the flash reprogrammable EEPROM (Electronically Erasable Program Read Only Memory) chip. PCMs built with EEPROM chips can be reprogrammed in a matter of minutes without having to remove the PCM or replace a single chip. It's all done digitally with the proper access codes and input data.

Following the Geo Storm, GM began phasing in PCMs with flash reprogrammable chips in a variety of cars and trucks. By 1995, most GM models had the flash reprogrammable PCMs. Ford and Chrysler were also doing the same thing as OBD II arrived on all cars and light trucks in model year 1996. Today, almost all PCMs have reprogramming capabilities so changes and upgrades can be made if needed. That's over 100 million vehicles that have been built since 1996.

WHY REPROGRAM?

As we said earlier, PCMs may need to be reprogrammed for several reasons. One is to fix factory bugs. Every time Bill gates rushes yet another version of Windows to market to perpetuate the Microsoft revenue stream, it always turns out to have bugs and security holes that were somehow missed but must be fixed by downloading and installing the latest Windows "service pack." It is a never ending cycle of upgrades and patches. Fortunately, it isn't that bad yet with automotive PCMs, but it has become a crutch for automakers who rush products to market that aren't quite ready. This philosophy of "build it now and fix it later" creates a lot of unnecessary recalls, but at least it gives technicians a way to fix factory mistakes without having to replace any parts.

A reflash may also be required if the factory settings for the OBD II self-diagnostics turns out to be overly sensitive -- especially after a few years of operation. The same goes for drivability. What works fine in a brand new car many not work so great after 50,000 or 100,000 miles or real world driving. Changing the fuel enrichment curve, spark timing or some emission control function slightly may be necessary to eliminate a hesitation, spark knock or other condition that develops over time.

For example, on certain GM vehicles the Check Engine light comes on and sets a code P1406 that indicates a fault in the position of the exhaust gas recirculation (EGR) valve. Cleaning or replacing the EGR valve and clearing the code does not fix the vehicle because the code usually returns. The real problem is the OBD II

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programming in the PCM. When the PCM commands the EGR valve to open to check its operation, it isn't allowing enough time for the valve to respond. A brand new valve takes only about 50 milliseconds to open but an older valve may take up to 350 milliseconds or longer -- which isn't long enough to cause a real NOX emissions failure but is long enough to trip a fault code. The fix in this instance is to reflash the PCM with new instructions that allow more time for the EGR valve to respond.

Another example is a rich code that may appear on some late model GM vehicles. The problem here is that the original OBD II self-diagnostic programming doesn't allow enough leeway for changes in intake vacuum that occur as the engine ages. After 60,000 miles, intake vacuum isn't as high as in a new engine, causing the engine to run rich. The cure is to flash reprogram the PCM to compensate for the drop in vacuum.

When vehicle manufacturers calibrate the onboard diagnostics to meet federal emission standards, they have to draw the line somewhere as to what operating conditions might cause emissions to exceed federal limits 1.5 times. That's the threshold where a fault code must be set and the Check Engine light must come on. It doesn't mean emissions really are over the limit, but it is possible based on laboratory dyno testing and field experience. Depending on the application, the vehicle manufacturer may even set the limit a little lower just to be safe because the last thing any OEM wants is an expensive emissions recall.

Unfortunately, vehicle manufacturers don't always tell us their diagnostic strategies or even their operating strategies for their computerized engine control systems. Some service manuals include a fair amount of system background information but others provide almost nothing beyond a basic diagnostic flow chart. Maybe the engineers who design this stuff think technicians only need flow charts and assembly instructions to fix vehicles today. But it often takes a much deeper understanding of the system operating logic to figure out what's setting a particular code -- especially when the cause isn't obvious.

The best advice when confronted with a troublesome code that keeps coming back or seems to set for no apparent reason is to check for any Technical Service Bulletins (TSBs) that may have been published. Changes are it might be a programming issue that requires a reflash to fix.

Vehicle manufacturer TSBs can be found on their technical websites (see http://www.iatn.net/nastf/oematrix.pdf for a list of OEM technical websites), or aftermarket repair information websites such as www.Alldata.com.

Something else to keep in mind with respect to all late models flash reprogrammable PCMs: if you replace the PCM for any reason, the replacement unit must be reflashed before it will start the engine! If the PCM is not programmed, it's just a dumb box like a PC without an operating system.

Some remanufacturers who supply reconditioned PCMs now flash program PCMs for specific vehicle applications. But to do this, they need three critical pieces of information: the vehicle identification number (VIN), the type of transmission (manual or automatic) and the emissions type (federal certification or California).

NOT JUST DEALERS ANYMORE

Until recently, car dealers were the only ones who had access to the tools and software needed to reflash PCMs. Thanks to the passing of Senate Bill 1146 in September 2000, vehicles manufacturers must now make this technology available to independent repair shops at reasonable cost.

Starting in 2004, flash reprogramming procedures must also conform to SAE J2534 standards which allow the use of aftermarket scan tools or similar pass-through devices that anyone can purchase and use.

Reflashing PCMs requires three things: a scan tool or pass-through reprogramming device that is J2534 compliant, a Windows 98 or higher PC with a modem and internet access for downloading the flash software from the vehicle manufacturer's website, and a subscription to the manufacturer's database so you can access the software. Other items that are needed include a cable to connect the PC to the scan tool or J2534 pass-through device, and a cable to connect the scan tool or J2534 pass-through device to the OBD II connector on the vehicle.

For GM applications, you need a Tech 2 scan tool or Vetronix Mastertech.

For Ford applications, you need a Ford New Generation Star (NGS) scan tool.

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For Chrysler applications, you need a Diagnostic and Reprogramming Tool (DART). Chrysler dealers use the Mopar Diagnostic System (MDS2) and DRB III scan tool.

For import applications, you need whatever factory scan tool the dealer uses, an aftermarket scan tool with reflash capabilities for that vehicle, or a J2534 pass-through device that will work on the vehicle.

NOTE: AutoTap does NOT allow PCM reprogramming at this time. But you can use your AutoTap Scanner after a PCM has been reflashed to verify the system is functioning correctly (no codes or other problems).

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