DTCs and You

You have got to love abbreviations. What is a DTC?

Better yet, what is a CEL, a SES, or an MIL?

DTC: diagnostic trouble code
CEL: check engine light
SES: service engine soon light
MIL: malfunction indicator light

All four abbreviations mean the same, there is some kind of a problem under the hood. But, how much of a concern should the glowing red light (GRL?) be to you? and, how do you retrieve the trouble code and determine its meaning?

As is the case with most things related to the Doge/ Cummins Turbo Diesel truck, our membership group has "been there and done that." Therefore the following is a collection of articles that I've arranged in a sequence for the best understanding.

- Issue 51: Author Sam Memmolo gives us background information on DTCs.
- Issue 55: Author Joe Donnelly discusses DTCs for '98.5 to 2007 vehicles.
- Issue 64: Editor Robbert Patton gives the audience an update eon DTCs for the '07.5 and newer 6.7-liter engine.
- Issue 66: Author John Holmes tells us about the most common DTCs that dealership technicians encounter. This article also has a discussion about the severity, or lack thereof, of DTCs.

"DTCs and You," I am hopeful this collection of articles will shed some light (pun intended_ on the subject. Seriously, tell your fellow Turbo Diesel owners about your new found understanding of codes and about the TDR magazine.

WHAT DOES THE CODE MEAN?
Decoding your warning light!

Recently the TDR's editor called me and asked me to explain the trouble code quandry that many of us will face as we drive computer controlled vehicles. The call was prompted by an owner that had purchased a 2003 Dodge Shop Manual but was bewildered by the omission of the diagnostic trouble codes from the book. As a benchmark I consulted a '99 manual and was only able to see the code numbers and their meanings. A call to a Dodge contact revealed that the purchase of an additional 2003 Powertrain book (at 1300 pages) would be necessary to access the codes, their meanings, probalby cause, and action descriptives. Wow, that book would be another $40. Worth it? At 1300 pages the book offers troubleshooting tests to help the technician trace the cause of the diagnostic trouble code. This information was not available in the 10 pages of codes in the old '99 book. So the question goes back to the truck's owner, "How much do you want to know?"

I'll try and help you sort through the DTC dilemma. But, first let's take a quick trip back in time before there were electronic engine and powertrain management systems. From the automobile's beginning the internal combustion engine was fueled with a mixture of air and fuel.

With stricter environmental legislation (circa late '70s), the manufacturers realized that mechanical engine fuel and spark controls were not reliable or durable enough to maintain the optimal 14.7:1 air fuel ratio, dubbed by engineers as stoichiometric. This 14.7:1 air fuel mixture is critical for proper operation of the catalyst in gasoline-fueled engines.

With the advances in microprocessor reliability, manufacturers decided that using electronics to control fuel distribution and spark timing would provide more efficient engine operation over a longer period of time, and thereby lower tailpipe emissions and provide better fuel economy as well as increased performance.

While electronic ignition provided a hotter, longer duration ignition spark at the plugs, it also dramatically reduced the need for periodic maintenance. Replacing points every 12 thousand miles or so became ancient history in a matter of a few years.

The early computer systems were basic, with very little intelligence, and provided little or no diagnostic functions. In 1981, GM introduced its first fully controlled system with diagnostic trouble codes. This was the GM or Computer Command Control system.

To alert the operator and the technician to a possible malfunction, a light on the instrument panel would illuminate. The first diagnostic trouble codes (DTCs) were now in place. The light initially read "Check Engine." That was confusing, so now many read "Service Engine Soon." This can still be misleading, because the light can illuminate when there is a transmission problem, a suspension problem, and even A/C and heater malfunctions.

The trade calls these "malfunction indicator lights" (MIL). Most '95 and later vehicles are controlled by the second generation computer systems called "on-board diagnostics II," or OBD-II.

There are many codes in use now as compared to just a handful in the early systems. OBD-II systems have much greater diagnostic ability, and can even track misfires down to an individual cylinder.

With this background information out of the way, let me suggest how the diagnostic trouble codes are of benefit to the "average Joe." First, just getting a scan tool and retrieving DTCs has never fixed a problem. Even if you have a reference manual that explains what the numerical codes mean, that is simply not enough to fix a car or truck. If it were, we would all be in much better shape.

If you experience a MIL illumination and/or a message in the driver information panel, the first step is to perform a good visual inspection. Step two would be to retrieve the trouble code using a scan tool. Once you have the code and get the definition, you are now ready to start troubleshooting.

Let's take this example: you are driving along and everything is normal. Then the dreaded MIL illuminates. You determine that the oil is fine, the coolant is okay, no belts or hoses broken, and no obvious signs of a major vacuum leak or any other problem.

You get the scan tool out and it tells you the code number. You look in the service manual, and the code refers to a defective exhaust gas recirculation (EGR) circuit.

Some would think that you could just replace the EGR valve, and bingo, the problem is solved. Not so easy!

The EGR or exhaust gas recirculation system is composed of several components: The EGR valve, the vacuum or electric source that supplies the energy to open and close (modulate) the valve, and the controls that allow the electricity or vacuum to flow to the valve. Some systems even have EGR sensors.

Not yet convinced that it is a complicated system? Add to all of the above the circuit in the microprocessor, the wiring and connections, the physical plugging up or carboning up of the EGR gas passages, and you have a treat in store when it comes to diagnosing the problem.

In order to properly diagnose and repair a problem signaled by the MIL's illumination, you will also need a diagnostic flow chart.

These diagnostic charts take you through a regimen of tests specific to the code. Step by step it directs you through a procedure that should bring you to a diagnosis and pinpoint the problem. Then you can effectively perform the repairs needed.

Diagnostic charts will not fix every problem, but they will teach you a tremendous amount about how that particular circuit works, and the possibilities of component failure.

So, the only way to accurately and professionally diagnose and repair the malfunction, without shot-gunning it with expensive components (which often cannot be returned to the parts house or the dealer), is to have a decent scan tool with the capability to interface with your particular application, and the appropriate manual with the diagnostic flow charts.

You may also need some additional equipment, such as a good digital multimeter, a hand operated vacuum pump, and even a heat gun.

From the scenario I have presented using an automotive EGR problem as an example you can see that the answer to "How much do you want to know?" is as unique as each Turbo Diesel owner. The factory manuals are available (see Issue 50, page 51, and www.techauthority.com). The code number is easy to retrieve using the on-off-on-off-on technique that was described on page 10. There are affordable, good scanners available from Auto X-Ray and Actron. These devices are suitable for the do-it-yourselfer and work well. If you understand the system, follow the charts, and use a little common sense, you should be able to keep things humming yourself, and avoid the costly trips to the dealer.

Purchasing these tools, manuals, and electronic devices is not inexpensive, but when a club or a few owners get together and pool their resources, the cost becomes manageable. If you opt for an independent repair shop, be sure to question them as to what types of equipment and information systems they have in-house that apply to your vehicle. If they are not able to make you feel warm and fuzzy, be sure to check alternative shops.

Here are a few more tips.

The emission system warranty on most new vehicles (gasoline or diesel) is 80,000 miles. You should read your Owner's Manual and emission warranty information to see just exactly what is covered. You will be very surprised!

The other thing to keep in mind is to either fix the problem or have the problem fixed at the first indication, before the problem becomes into a big deal. I promise you, if you drive it with the light on, you are asking for trouble.

Happy Motoring!
Sam Memmolo
TDR Writer

CODES, CAUSES AND CONCERNS

I got together with Dario Scafidi, one of Carson Dodge's top diesel technicians, to try to outline the most common codes (out of the *hundreds* of them) that he and the other techs see frequently. The next question was whether it should be of concern to the owner or if you should not worry about it. One of the interesting things I ran into, from the technicians that had worked in other states, was how the frequency and type of code varies with different parts of the country. That makes sense because there can't be much greater contrast in environments than there is between our high desert location in Nevada and our Hill Country location in Texas. Altitude, temperature swings, humidity, fuel formulas, etc., all impact the vehicle's operation.

In general, if the check engine light is blinking, shut it down and get it directly to your dealer before doing further damage. If it stays on steady, better check it out and see if there's cause for concern. If it goes out after about five restarts, that generally indicates no reason for concern. (However, the code will still be stored in the PCM/ECM.)

The codes can (sort of) be deciphered as follows: P = Powertrain; B = Body; C = Chassis. On the second digit, it's either 0 = Standard or 1 = Manufacturer specific. Generally, the third digit breaks down this way: 1 =

Emissions management; 2 = Injector circuit; 3 = Ignition; 4 = Auxiliary emissions; 5 = Vehicle speed and idle control; 6 = Computer and output circuit; 7 = Transmission.

The ones Dario highlighted on the 6.7-liter engines are:

P1451- Diesel Particulate Filter System Performance (emissions – re-clean needed – maybe replace DPF)

P2000 - NOx Absorber Efficiency Below Threshold – Bank 1 (emissions - O2 sensors);

P2002 - Diesel Particulate Filter Efficiency Below Threshold (emissions);

P200C - Diesel Particulate Filter Over Temperature – Bank 1 (emissions);

P200E - Catalyst System Over Temperature – Bank 1 (emissions);

P2463 - Diesel Particulate Filter – Soot Accumulation (DPF full, possible regeneration or replacement).

As you can see, these all pertain to the emissions system and they should be checked right away to avoid expensive repairs or replacements. The other serious 6.7-liter code often seen is: P2262 – Turbocharger Boost Pressure Not Detected – Mechanical (flash, turbo clean or replacement).

Moving backward to the ’03-‘07 Third Generation, 5.9-liter, common rail diesels:

P0148 – Fuel Delivery Error (restriction – fuel filter, transfer pump, injectors);

P0191 – Fuel Rail Pressure Sensor Circuit Performance (flash);

P0201 through P0206 – Fuel Injector 1 through 6 Circuit/ Open (engine miss – electrical, valve cover gasket);

P0301 through P0306 – Cylinder 1 through 6 Misfire – (engine miss – mechanical);

P0606 – Internal Control Processor (PCM failure – this one can also apply to the 6.7L);

P0341 – Camshaft Position Sensor Performance – Bank 1 Sensor 1 (sensor, ECM, wiring or even a cam shaft).

The above items are important to get fixed, but P0514 – Battery Temperature Sensor Performance is a just a nuisance (flash). A flash will also take care of P0111 – Intake Air Temperature Sensor 1 Performance.

An aftermarket performance box can set these: P0335 and P0336 – Crankshaft Position Sensor Circuit and Performance (no fix – light will eventually go out).

Some units like to set P0513 – Invalid Skim Key (vehicle runs fine).

Watch out for P0628 – Low Voltage Detected at Lift Pump (generally means the pump is going out – sometimes shows up on the 24-valves too).

Again, trotting backwards to the ’98.5-’02 Second Generation 24-valve engines:

P0216 – Injection Pump Timing Failure (bad news – may mean replacement – check transfer pump VOLUME, not pressure – fuel gauge can help prevent this);

P0234 – Turbo Boost Limit Exceeded (usually occurs with the use of a “boost elbow” on the turbo that comes with a power enhancement package – you’ll have to live with it or go back to stock).

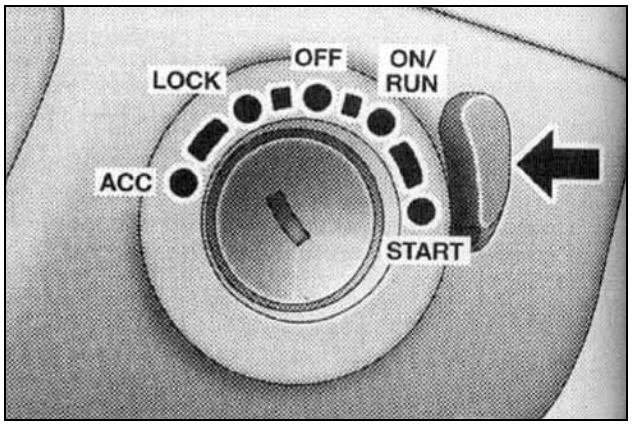
In the dealership, the technicians use a DRB III for trucks up through 2005. They use a StarScan, StarMobile or the new Witech for trucks 2006 and newer. These devices are specific Chrysler diagnostic tools and are pricey. Today the average owner can buy an aftermarket scan tool for a very reasonable price, although it won’t beas sophisticated as those mentioned above. One example is the ScanGauge II that I wrote about in Issue 61, on page 88. However, that one does a whole bunch of things more than read and clear codes. Companies that make units of varying sophistication and pricing levels are: AutoXray; Actron; Equus Products, CarMD (check the Internet); and if you drop by Harbor Freight Tools you’ll discover it’s a good source for similar items. Any of the tool peddlers like Snap-on, Mac, Cornwell or Matco will also have similar types of scanners. Put this in your next letter to Santa.

John Holmes
TDR Writer

Editor’s note: John’s article on diagnostic trouble codes (DTCs) goes hand-in-hand with my article on DTCs in Issue 64, pages 46-49. In that article I listed the codes that are applicable for the 6.7-liter engine: how to retrieve the codes; how serious the code may be to you; and make it go away.

As a refresher, here is a reprint from Issue 64 on how to retrieve the DTCs.

> ***What is an owner to do when you get the check engine light (CEL)/aka malfunction indicator light (MIL), or electronic throttle control (ETC) illumination on your dash? Better yet, what is the used truck owner, 10 years down the road, going to do? Can you say “black electrical tape?”***
>
> ***No, black electrical tape is not the answer. The answer is to find out what the dang-blasted DTC number is and look up its meaning. Then, make an informed decision about whether you will “drive thru” the diagnostic glitch or whether trouble looms on the horizon.***
>
> ***First, how do you retrieve the code? Internet myth has it that the codes cannot be brought-up on the ’07.5 and newer trucks (some say since ’06). On the flip-side, internet research will show you how to pull up the codes on a photobucket video.***
>
> ***I’ll save you the time finding the photobucket video. The technique is the same as it has been since 1994. (I think it is that long ago.) Here is a diagram from your owner’s Manual so that we’re using the same words.***



Using Dodge's vernacular, here is the method:

- **Insert key**
- **Move it from Lock to Off, pause**
- **Move to On/Run**
- **Back to Off**
- **Move to On/Run**
- **Back to Off**
- **Move to On/Run and stop**

The three movements from Off to On/Run should be done in less than, say, 5-seconds.

Read the codes where the truck's odometer shows total miles (not trip miles). Make note of the code(s) and continue your research as you look up the codes and their meanings.

The underlying question that neither John nor I have answered: "How serious is the code to the continuation of a trip to the convenience store or a cross-country journey?" The cop-out answer, "Mr. Turbo Diesel owner, it depends on the code and the nature of the problem." We do not know the answer.

My conclusion from Issue 64 remains the same…

What have we learned?

- In the future DTCs will continue in greater numbers and scope.
- You can retrieve DTCs using the "key trick."
- You have the codes listed in this magazine. Copy and carry them with you.
- You have a judgment decision to make should you encounter a DTC.
- If your problem is minor and does not reoccur the MIL light will turn off (foiur drive cycles) and the code will be cleared from OBD memory (40 drive cycles).

Editor's Update and Final Thoughts

If you flipped to this text (as directed in the discussion about DTCs on page 53) you can see that I do not have any further updates about 5.9-liter or 6.7-liter engine derate or damage implications to share with you. Author Holmes and technician Scafidi presented a good article on what codes are most common. Collectively we're still looking for the answer(s) to how serious a code can be to the further operation of your truck. Today's conclusion is the same as it was in Issue 64: Each DTC has a unique meaning and each owner has to make a judgment call based on their situation, mechanical aptitude and tolerance for repair.

Robert Patton
TDR Staff

FUTURE ECM COMPLEXITY AND CURRENT DIAGNOSTIC TROUBLE CODES

In Issue 63's "Blowin' in the Wind" column there were quotes from the trade publication Transportation Topics that discussed future diesel emissions regulations. Titled "Ex-EPA Official Sees No New Rules on Diesel Exhaust Emissions After 2010," the article was examined for its meaning to the TDR audience. At the end of the quoted material from Transportation Topics I concluded the following: "In trying to interpret what the 'No New Rules' headline might actually mean for the 6.7-liter engine, I called one of my contacts at Cummins. What I took away from the phone exchange is the confident declaration that the engine is 'very well positioned.' The emissions from the 6.7-liter engine are on par with gasoline engines—and the emissions horizon for gasoline is stable. Reassuring. Nevertheless, the current notice of proposed rule (NPR) making has a deadline of 2013. The 2013 rules will have Dodge and Cummins further continuing modifications to meet on-board diagnostics (OBD) requirements. The bottomline…more sensors and greater ECM complexity as more engine parameters are monitored, controlled and reported through OBD read-outs. No rest for the weary."

Do you need further evidence of the greater ECM complexity and more items being monitored and reported?

Well you did not have to look any further than the summary of the latest technical service bulletin (TSB) 18-013-08 Revision A which was released in December and applies to all 6.7-liter engines produced prior to November 27, 2008. The summary was in Issue 63 on pages 38 and 39.

Did you miss the correlation of further diagnostics and the implementation of modifications on the 6.7-liter engine?

I'll save you from searching through your TDR library. Here is the text:

"Owners should also note that with the revised software of TSB 18-013-08 Revision A, a number of improvements have been made to the engine diagnostics. Performing this service bulletin completely will enable these diagnostic improvements.

- Improved Fuel Level Sensor diagnostics in the ECM.
- Improvement to the single diagnostic DTC P0148 – Fuel Delivery Error. This DTC is now addressed by the following two DTC diagnostics:

  P1011 – Fuel Pump Delivery Pressure Too Low

  P1012 – Fuel Pump Delivery Pressure Too High

- Creation of three new DTC's to address the inlet air temperature sensor separate from the ambient air temperature sensor. The new DTC's are:

  P1191 – Inlet Air Temperature Sensor Rationality/ Performance. This DTC enhances the current DTC P0071 – Inlet air Temp Sensor Rationality/ Ambient Air Temperature Sensor Performance

  P1192 – Inlet Air Temperature Sensor Too Low. This DTC enhances the current DTC P0072 – Inlet Air Temp Sensor Voltage Too Low

  P1193 – Inlet Air Temperature Sensor Too High. This DTC enhances the current DTC P0073 – Inlet Air Temp Sensor Voltage Too High

- New ECM and CCN software that together will improve the customer understanding of the exhaust aftertreatment system messages that can be displayed on the overhead Electronic Vehicle Information Center (EVIC).

- Creation of a new DTC to address VGT actuator calibration event failures separate from other VGT actuator communication faults for P0046. The new DTC is: P003A – Turbocharger Boost Control Module Position Exceeded Learning Limit."

6.7-Liter DTC Code Retrieval

Okay, we have laid the ground work for your understanding of the engine and exhaust aftertreatment's current and future complexity.

What is an owner to do when you get the check engine light (CEL)/aka malfunction indicator light (MIL), or electronic throttle control (ETC) illumination on your dash? Better yet, what is the used truck owner, 10 years down the road, going to do? Can you say "black electrical tape?"

No, black electrical tape is not the answer. The answer is to find out what the dang-blasted DTC number is and look up its meaning. Then, make an informed decision about whether you will "drive thru" the diagnostic glitch or whether trouble looms on the horizon.

First, how do you retrieve the code? Internet myth has it that the codes cannot be brought-up on the '07.5 and newer trucks (some say since '06). On the flip-side, internet research will show you how to pull up the codes on a photobucket video.

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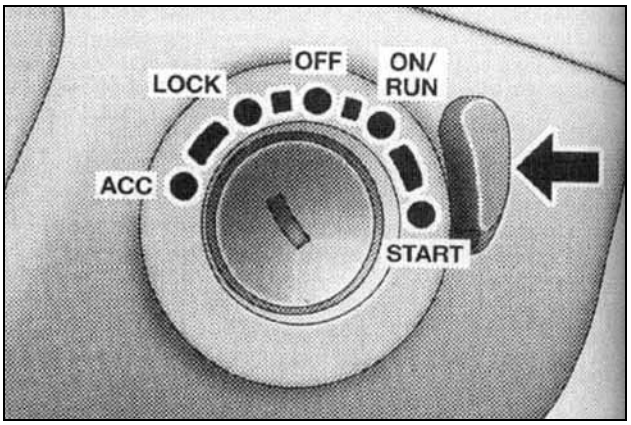

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- **Move to On/Run**
- **Back to Off**
- **Move to On/Run and stop**

The three movements from Off to On/Run should be done in less than, say, 5-seconds.

Read the codes where the truck's odometer shows total miles (not trip miles). Make note of the code(s) and continue your research with the TDR magazine in-hand.

What Do the Codes Mean

With apologies in advance to Chuck Berry ("No Particular Place to Go")

Ridin' along in my diesel truck
A code comes up, I'm outta luck.

What does it mean, well I don't know
Hoping the truck it doesn't slow.

I'll check it out when I get home
With no particular place to go.

So, now I'm home and the computer is logged on to www.tdr1.com. My thanks to "Kilo" who posted the 6.7-liter engine code numbers and descriptions last October. The table:

P0016-Crankshaft/camshaft Timing Misalignment - Bank 1, Sensor 1

P0031-O2 Sensor 1/1 Heater Circuit Low

P0037-O2 Sensor 1/2 Heater Circuit Low

P003a-Turbocharger Boost Control Module Position Exceeded Learning Limit

P0046-Turbocharger Boost Control Circuit Performance

P0049-Turbocharger Turbine Overspeed

P006e-Turbocharger Boost Control Module Supply Voltage Circuit Low

P006f-Turbocharger Boost Control Supply Voltage Circuit High

P0071-Inlet Air Temp Sensor Rationality - ECM

P0071-ambient Air Temperature Sensor Performance (tipm)
P0072-inlet Air Temp Sensor Voltage Too Low - Ecm
P0072-ambient Air Temperature Sensor Circuit Low (tipm)
P0073-inlet Air Temp Sensor Voltage Too High - Ecm
P0073-ambient Air Temperature Sensor Circuit High (tipm)
P007c-charge Air Cooler Temperature Sensor Circuit Low
P007d-charge Air Cooler Temperature Sensor Circuit High
P007e-charge Air Cooler Temperature Sensor Circuit Intermittent/erratic
P0087-fuel Rail Pressure Too Low
P0088-fuel Rail Pressure Too High
P00af-turbocharger Boost Control Module Performance
P0101-mass Air Flow Sensor “a” Circuit Performance
P0102-mass Air Flow Sensor “a” Circuit Low
P0103-mass Air Flow Sensor “a” Circuit High
P0106-manifold Absolute Pressure Sensor Performance
P0107-manifold Absolute Pressure Sensor Circuit Low
P0108-manifold Absolute Pressure Sensor Circuit High
P0111-intake Air Temperature Sensor 1 Performance
P0112-intake Air Temperature Sensor Circuit Low
P0113-intake Air Temperature Sensor 1 Circuit High
P0116-engine Coolant Temperature Sensor Performance
P0117-engine Coolant Temperature Sensor Circuit Low
P0118-engine Coolant Temperature Sensor Circuit High
P0128-thermostat Rationality
P0131-o2 Sensor 1/1 Circuit Low
P0135-o2 Sensor 1/1 Heater Performance
P0137-o2 Sensor 1/2 Circuit Low
P0141-o2 Sensor 1/2 Heater Performance
P0148-fuel Delivery Error
P0169-water In Fuel Detected For Too Long
P0191-fuel Rail Pressure Sensor Circuit Performance
P0192-fuel Pressure Sensor Low
P0193-fuel Pressure Sensor High
P0201-fuel Injector 1 Circuit/open
P0202-fuel Injector 2 Circuit/open
P0203-fuel Injector 3 Circuit/open
P0204-fuel Injector 4 Circuit/open
P0205-fuel Injector 5 Circuit/open
P0206-fuel Injector 6 Circuit/open
P0217-coolant Temperature Too High
P0219-engine Overspeed
P0251-injection Pump Fuel Valve Feedback
P0300-multiple Cylinder Misfire
P0335-crankshaft Position Sensor Circuit
P0336-crankshaft Position Sensor Performance
P0340-camshaft Position Sensor Circuit - Bank 1 Sensor 1
P0341-camshaft Position Sensor Performance - Bank 1 Sensor 1
P0381-wait To Start Lamp Inoperative
P0400-egr System Flow Malfunction
P0401-egr System Performance
P0402-egr Flow Excessive Detected
P0403-egr Control Circuit/open
P0404-egr Position Sensor Performance Diesel
P0405-egr Position Sensor Circuit Low
P040b-exhaust Gas Recirculation
Temperature Sensor 1 Circuit Performance
P040c-exhaust Gas Recirculation Temperature Sensor 1 Circuit Low
P040d-exhaust Gas Recirculation Temperature Sensor 1 Circuit High
P0420-catalyst Efficiency Bank 1
P042e-exhaust Gas Recirculation Control Stuck Open
P0461-fuel Level Sensor 1 Performance
P0462-fuel Level Sensor 1 Circuit Low
P0463-fuel Level Sensor 1 Circuit High
P0471- Exhaust Pressure Sensor 1 Performance
P0472- Exhaust Pressure Sensor 1 Low
P0473- Exhaust Pressure Sensor 1 High
P0480-cooling Fan 1 Control Circuit/open
P0483-cooling Fan Speed
P0487-egr Airflow Throttle Control Circuit A Open
P0488-egr Airflow Throttle Control Circuit Performance
P0489-egr Control Circuit Low
P0501-vehicle Speed Sensor 1 Performance
P0505-engine Speed At Idle - Data Erratic, Intermittent Or Incorrect
P0513-invalid Skim Key
P0514-battery Temperature Sensor Performance
P0516-battery Temperature Sensor Circuit Low
P0517-battery Temperature Sensor Circuit High
P051b-crankcase Pressure Sensor Circuit Range/ performance
P051c-crankcase Pressure Sensor Circuit Low
P051d-crankcase Pressure Sensor Circuit High
P0521-engine Oil Pressure Sensor Performance
P0524-engine Oil Pressure Too Low
P0532-a/c Pressure Sensor Circuit Low
P0533-a/c Pressure Sensor Circuit High
P0541-intake Air Heater Control Circuit 1 Low
P0542-intake Air Heater Control Circuit 1 High
P0545-exhaust Gas Temperature Sensor Circuit Low - Bank 1 Sensor 1
P0546-exhaust Gas Temperature Sensor Circuit High - Bank 1 Sensor 1
P0562-battery Voltage Low
P0563-battery Voltage High
P0571-brake Switch 1 Performance
P0572-brake Switch 1 Stuck On
P0573-brake Switch 1 Stuck Off
P0580-speed Control Switch 1 Circuit Low
P0581-speed Control Switch 1 Circuit High
P0585-speed Control Switch 1/2 Correlation
P0592-speed Control Switch 2 Circuit Low
P0593-speed Control Switch 2 Circuit High
P0601-internal Memory Checksum Invalid
P0604-internal Control Module Ram
P0606-internal Control Processor
P0607 Ecu Internal Performance
P061a-etc Level 2 Torque Performance
P061c-etc Level 2 Rpm Performance
P0622-generator Field Control Circuit/open
P0628-fuel Pump Control Circuit Low
P0629-fuel Pump Control Circuit High
P062c-etc Level 2 Mph Performance
P0630-vin Not Programmed In Pcm
P0633-skim Secret Key Not Stored In Pcm
P063c-generator Voltage Sense Low
P063d-generator Voltage Sense High
P0642-sensor Reference Voltage 1 Circuit Low
P0643-sensor Reference Voltage 1 Circuit High
P0646-a/c Control Circuit Low
P0647-a/c Control Circuit High
P0652-sensor Reference Voltage 2 Low

P0653-sensor Reference Voltage 2 High
P065a-generator System Performance
P0698-sensor Reference Voltage 3 Circuit Low
P0699-sensor Reference Voltage 3 Circuit High
P06a4-sensor Reference Voltage 4 Circuit Low
P06a5-sensor Reference Voltage 4 Circuit High
P0700-transmission Control System (mil Request)
P0850-park/neutral Switch Performance
P1011 - Fuel Pump Delivery Pressure Too Low
P1012 - Fuel Pump Delivery Pressure Too High
P1191 - Inlet Air Temperature Sensor Rational/ performance
P1192 - Inlet Air Temperature Sensor Low
P1193 - Inlet Air Temperature Sensor High
P113c-o2 Sensor Power Supply Circuit Performance
P125a-power Enable Control Circuit Low
P125b-power Enable Control Circuit High
P1272-a/c Clutch Control Circuit 2 Low (tipm)
P1273-a/c Clutch Control Circuit 2 High (tipm)
P1274-a/c Clutch Control Circuit 2 Open (tipm)
P1275-a/c Clutch Control Circuit 2 Overcurrent (tipm)
P1277-starter Control Circuit 2 Low (tipm)
P1278-starter Control Circuit 2 High (tipm)
P1279-starter Control Circuit 2 Open (tipm)
P127a-starter Control Circuit 2 Overcurrent (tipm)
P127c-fuel Pump Control Circuit 2 Low (tipm)
P127d-fuel Pump Control Circuit 2 High (tipm)
P127e-fuel Pump Control Circuit 2 Open (tipm)
P127f-fuel Pump Control Circuit 2 Overcurrent (tipm)
P141a-exhaust Gas Temperature Sensor 1 And 2 Signals Swapped
P144e-egr Cooler Bypass Status Line Circuit Low
P144f-egr Cooler Bypass Status Line Circuit High
P1451-diesel Particulate Filter System Performance
P1484-catalyst Overheat Detection
P1506-crankcase Depression Regulator Valve Performance
P1507-crankcase Filter Restriction
P1508-crankcase Filter Restriction - Replace Filter
P2000-nox Absorber Efficiency Below Threshold - Bank 1
P2002-diesel Particulate Filter Efficiency Below Threshold
P200c-diesel Particulate Filter Over Temperature - Bank 1
P200e-catalyst System Over Temperature - Bank 1
P2032-exhaust Gas Temperature Sensor Circuit Low - Bank 1 Sensor 2
P2033-exhaust Gas Temperature Sensor Circuit High - Bank 1 Sensor 2
P2080-exhaust Gas Temp Sensor Circuit Performance - Bank 1 Sensor 1
P2084-exhaust Gas Temp Sensor Circuit Performance - Bank 1 Sensor 2
P2121-accelerator Pedal Position Sensor 1 Performance
P2122-accelerator Pedal Position Sensor 1 Circuit Low
P2123-accelerator Pedal Position Sensor 1 Circuit High
P2127-accelerator Pedal Position Sensor 2 Circuit Low
P2128-accelerator Pedal Position Sensor 2 Circuit High
P2141-egr Airflow Throttle Control Circuit Low
P2142-egr Airflow Throttle Control Circuit High
P2227-barometeric Pressure Sensor Rationality
P2228-barometric Pressure Circuit Low
P2229-barometric Pressure Circuit High
P2262-turbocharger Boost Pressure Not Detected - Mechanical
P2266-water In Fuel Sensor Circuit Low
P2267-water In Fuel Sensor Circuit High
P2269-water In Fuel Condition
P2299-brake Pedal Position / Accelerator Pedal Position Incompatible
P242b-exhaust Gas Temp Sensor Circuit Performance - Bank 1 Sensor 3
P242c-exhaust Gas Temperature Sensor Circuit Low - Bank 1 Sensor 3
P242d-exhaust Gas Temperature Sensor Circuit High - Bank 1 Sensor 3
P242f-diesel Particulate Filter Restriction - Ash Accumulation
P244a-diesel Particulate Filter Differential Pressure Too Low
P244d-exhaust Temperature Too High For Particulate Filter Regeneration - Bank 1
P2453-diesel Particulate Filter Pressure Sensor A Circuit Performance
P2454-diesel Particulate Filter Pressure Sensor A Circuit Low
P2455-diesel Particulate Filter Pressure Sensor A Circuit High
P2457-exhaust Gas Recirculation Cooling System Performance
P245a-egr Cooler Bypass Control Circuit Open
P245c-egr Cooler Bypass Control Circuit Low
P245d-egr Cooler Bypass Control Circuit High
P2463-diesel Particulate Filter - Soot Accumulation
P2503-charging System Output Low
P2504-charging System Output High
P2509-ecm/pcm Power Input Signal Intermittent
P254c-pto Speed Selector Sensor Circuit Low
P254d-pto Speed Selector Sensor Circuit High
P2579-turbocharger Speed Sensor Circuit Performance
P2580-turbocharger Speed Sensor Circuit Low
P2609-intake Air Heater System Performance
P268c-cylinder 1 Injector Data Incompatible
P268d-cylinder 2 Injector Data Incompatible
P268e-cylinder 3 Injector Data Incompatible
P268f-cylinder 4 Injector Data Incompatible
P2690-cylinder 5 Injector Data Incompatible
P2691-cylinder 6 Injector Data Incompatible
P2a00-o2 Sensor 1/1 Circuit Performance
P2a01-o2 Sensor 1/2 Circuit Performance

What is Next?

Okay, it is decision time. Let's say you've noted a "P0116 – Engine Coolant Temperature Sensor Performance," or P0071 – Inlet Air Temp Sensor Rationality – ECM." Are you going to "drive thru" the diagnostic glitch and feel comfortable that you'll not be stranded in Boondocks, New Mexico?

Were it my truck I would continue onward. But, as you can see by the different code definitions, there are some that will require your immediate attention. For that matter, the above P0116 and P0071 example that I would drive-thru may cause you too much alarm. If left unattended I've no doubt that the malfunction(s) will have other cause/effect consequences. But, driving thru a DTC and the malfunction

indicator light (MIL) or electronic throttle control (ETC) is not something that has an easy yes or no answer. Ultimately it is your judgment call.

For help with that judgment call I looked up both the MIL and ETC meanings in my Owner's Manual. Unfortunately, the text is just as vague as my judgment call response.

"If this light comes on and remains on while driving, it suggests a potential engine control problem and the need for system service.

"Although your vehicle will usually be drivable and not need towing, see your dealer for service as soon as possible.

"CAUTION!
"Prolonged driving with the MIL on could cause damage to the engine control system. It also could affect fuel economy and drivability."

The Seriousity of the EVIC

Say what? Yes, "seriousity," I have made up a new entry in the Webster Dictionary. And EVIC was defined earlier as an acronym for the overhead electronic vehicle information center (EVIC).

If you will look back at Issue 63, pages 38-39, you will find TSB 18-013-08 Revision A dated 12/04/08 which describes a reflash for '07 - '09 DH/D1 (that's Dodge-speak for 2500/3500 pickup) trucks.

If you will look at our summary of TSB 18-001-09 you will see that there is another reflash program for the 6.7-liter engine that is used in '07 - '09 DC/DM (Dodge-speak for 3500/4500/5500 Cab and Chassis) trucks.

These twoTSB revisions use the overhead EVIC to warn the owner of "Do Not Pass Go/Do Not Collect $200" messages that will disable the engine due to emissions related problems. For examples of these messages, see the sidebar that we are reprinting from Issue 62.

All vehicles built after March 2008, or those fully updated per TSBs 18-013-08 and 18-001-09, have the software for the new messages that will appear on the EVIC should there be emissions problems.

The EVIC display of an impending engine problem is serious news and owners should take *immediate* corrective action at a Dodge dealership.

Make It Go Away

Will your DTC simply go away? Sure, that's what black electrical tape is used for. Seriously, look back at TDR Issue 61, page 88, and John Holmes' write-up on an inexpensive scan tool/monitor system. Purchase the Scan Gauge and clear the fault. It will work on automobiles too. Go to your local mechanic and clear the fault. Go to the auto parts store and clear the fault… Clear the fault, but does it reappear? Time for a trip to the Dodge dealership?

Will the DTC go away on its own? Perhaps. A look at the industry-wide guidelines for on board diagnostics (OBD) reveals that it takes four drive cycles of non-malfunction to turn off the MIL light, 40 cycles and the code is cleared from the OBD memory.

Did it go away?

Conclusion

What have we learned?

- In the future DTCs will continue in greater numbers and scope.
- You can retrieve DTCs using the "key trick."
- You have the codes listed in this magazine. Copy and carry them with you.
- You have a judgment decision to make should you encounter a DTC.
- If your problem is minor and does not reoccur the MIL light will turn off and the code will be cleared from OBD memory.

Robert Patton
TDR Staff

Notes on exhaust system regeneration:
The ECM continuously monitors the level of particulates (soot) and other substances in the exhaust aftertreatment system. As needed, the ECM triggers a regeneration to remove them. This is completely transparent to the driver. There are no indicators on the instrument cluster or EVIC, and there is no difference in sound or feel of the engine. In other words, when things are operating as normal, as they do for the majority of owners, you will not know that a regeneration is needed or in-process.

In rare cases, typically due to difficult drive cycles, a regeneration may not be possible. In those cases, you may see a message on the overhead console (EVIC) regarding the aftertreatment system, stating either 'CATALYST FULL' or 'EXHAUST SYSTEM REGENERATION REQUIRED NOW', depending on the level of software. As long as the percent-full message is less than 100%, the system can complete a regeneration if you change your drive cycle to allow it to happen. The most effective drive cycle for regeneration is highway cruise. Some trucks, depending on the level of software, will display 'REGENERATION IN PROCESS' if your drive cycle has changed such that regeneration has been started. Note that this message will occur only after the system has gotten full enough to display the 'EXHAUST SYSTEM REGENERATION REQUIRED NOW', meaning you will not see it on every regeneration.

A visit to your dealer is necessary only if a message regarding the exhaust aftertreatment system reading 'SEE DEALER' or 'SERVICE REQD' is displayed on the EVIC. In that case, getting the truck to the dealer sooner, rather than later, may prevent further damage to the system.

OBD-II DIAGNOSTIC TROUBLE CODES FOR 1998-UP TURBO DIESELS

In TDR Issue 51, Sam Memmolo referred to these codes (page 91) as did John Holmes (page 107). John noted that you can't pull up the codes on your odometer with 2006 Turbo Diesels (Issue 52, page 42), although you can do so on earlier Turbo Diesels.

Here are the commonly used On-Board Diagnostic II Trouble Codes. They can be accessed on electronic odometers by cycling the key on-off-on-off-on.

P0112 – Intake Air Temperature Sensor Voltage Low
P0113 – Intake Air Temperature Sensor Voltage High
P0117 – ECT Sensor Voltage Too Low
P0118 – ECT Sensor Voltage Too High
P0121 – Accelerator Pedal Position Sensor Signal Volts Do Not Agree w/Idle Validation Signal
P0122 – Accelerator Pedal Position Sensor Signal Voltage Too Low
P0123 – Accelerator Pedal Position Sensor Signal Voltage Too High
P0125 – Engine Is Cold Too Long
P0168 – Decreased Engine Performance Due To High Injection Pump Fuel Temperature
P0177 – Water In Fuel Sensor Voltage Too Low
P0181 – Fuel Injection Pump Failure
P0215 – Fuel Injection Pump Control Circuit
P0216 – Fuel Injection Pump Timing Failure
P0217 – Decreased Engine Performance Due To Engine Overheating Condition
P0219 – Camshaft Position Sensor Overspeed Signal
P0222 – Idle Validation Signals Both Low
P0223 – Idle Validation Signals Both High (Above 5 Volts)
P0230 – Transfer pump Circuit Out Of Range
P0232 – Fuel Shut-Off Voltage Too High
P0234 – Turbo Boost Limit Exceeded
P0236 – MAP Sensor Too High Too Long
P0237 – MAP Sensor Voltage Too Low
P0238 – MAP Sensor Voltage Too High
P0251 – Fuel Injection Pump Mechanical Failure Fuel Valve Feedback Circuit
P0253 – Fuel Injection Pump Fuel Valve Open Circuit
P0254 – Fuel Injection Pump Fuel Valve Current Too High
P0300 – Multiple Cylinder Misfire
P0301 – Misfire Detected, Cylinder No. 1
P0302 – Misfire Detected, Cylinder No. 2
P0303 – Misfire Detected, Cylinder No. 3
P0304 – Misfire Detected, Cylinder No. 4
P0305 – Misfire Detected, Cylinder No. 5
P0306 – Misfire Detected, Cylinder No. 6
P0320 – No RPM Signal To PCM
P0336 – Crankshaft Position Sensor Signal
P0341 – Camshaft Position Sensor Signal
P0370 – Fuel Injection Pump Speed/Position Sensor Signal Lost
P0380 – Intake Air Heater Relay No. 1 Control Circuit
P0381 – Wait To Start Lamp Inoperative
P0382 – Intake Air Heater Relay No. 2 Control Circuit
P0387 – Crankshaft Position Sensor Supply Voltage Too Low
P0388 – Crankshaft Position Sensor Supply Voltage Too High
P0400 – Exhaust Gas Recirculation (EGR) Flow Malfunction
P0460 – Fuel Level Unit No Change Over Miles
P0462 – Fuel Level Sending unit Volts Too Low
P0463 – Fuel Level Sending unit Volts Too High
P0500 – No Vehicle Speed Sensor Signal
P0522 – Oil Pressure Voltage Too Low
P0523 – Oil Pressure Voltage Too High
P0524 – Oil Pressure Too Low
P0545 – A/C Clutch Relay Circuit
P0562 – Charging System Voltage Too Low
P0563 – Charging System Voltage Too Low
P0601 – PCM Internal Controller Failure
P0622 – Alternator Field Improper Switching
P0712 – Trans Temp Sensor Voltage Too Low
P0713 – Trans Temp Sensor Voltage Too High
P0720 – Low Output Speed Sensor RPM Above 15 MPH
P0743 – TCC Solenoid/Trans Relay Circuits
P0748 – Governor Pressure Sol/Control Trans Relay Circuits
P0751 – OD Switch Pressed (Lo) For More Than 5 Minutes
P0753 – Trans 3–4 Shift Sol/Trans Relay Circuits
P1283 – Idle Select Signal Invalid
P1284 – Fuel Injection Pump Battery Voltage Out Of Range
P1285 – Fuel Injection Pump Controller Always On
P1286 – Accelerator Pedal Position Sensor Supply Voltage Too High
P1287 – Fuel Injection Pump Controller Supply Voltage Low
P1291 – No Temperature Rise Seen From Intake Air Heaters
P1295 – Accelerator Pedal Position Sensor Supply Voltage Too Low
P1388 – Auto Shutdown (ASD) Relay Control Circuit
P1389 – No Auto Shutdown (ASD) Relay Output Voltage At PCM
P1475 – Aux. 5 Volt Output Too High
P1488 – Aux. 5 Volt Output Too Low
P1492 – Battery Temperature Sensor Voltage Too High
P1493 – Battery Temperature Sensor Voltage Too Low
P1594 – Charging System Voltage Too High
P1595 – Speed Control Solenoid Circuits
P1597 – Speed Control Switch Always Low
P1682 – Charging System Voltage Too Low
P1683 – Speed Control Power Relay Or Speed Control 12 Volt Driver Circuit
P1688 – Internal Fuel Injection Pump Controller Failure
P1689 – No Communication Between ECM & Injection Pump Module
P1690 – Fuel injection pump CKP Sensor Does Not Agree With ECM CKP Sensor
P1691 – Fuel Injection Pump Controller Calibration Failure
P1693 – DTC Detected In ECM Or PCM
P1694 – No CCD Messages Received From ECM
P1698 – No CCD Messages Received From PCM
P1740 – TCC Or OD Solenoid Performance
P1756 – Governor Pressure Not Equal To Target At 15–20 PSI
P1757 – Governor Pressure Above 3 PSI When Request Is 0 PSI
P1762 – Governor Pressure Sensor Offset Improper Voltage
P1763 – Governor Pressure Sensor Voltage Too High
P1764 – Governor Pressure Sensor Voltage Too Low
P1765 – Trans 12 Volt Supply Relay Control Circuit
P1899 – PNP Switch Failure

Joe Donnelly
TDR Writer