Trouble Shooter

Karl Seyfert

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Throttle cables are a thing of the past, as are problems caused by misadjusted or binding cables. Today's customer complaints of reduced engine performance are more likely to be electronic in origin.

Pedal Power

I am working on a 2007 Pontiac G6 that came in with an illuminated Check Engine light and "Reduced Engine Power" displayed on the radio. I used my scanner to retrieve a DTC P2138 stored in memory. After following the appropriate diagnostic flowchart, I replaced the accelerator pedal position (APP) sensor assembly. The MIL did not come back on during a test drive, but a few days later the vehicle was back with the same stored DTC. The customer mentioned that it had been raining immediately before the MIL came back on and the engine lost power.

This time I performed a pedal sweep test to monitor signal voltage from both sensors at the APP sensor. Sensor A swept from .29 to 4.87 volts at WOT. Sensor B swept from .20 to 2.03 at WOT. I checked the reference voltage to both sensors and the reading on both circuits was 5.0 volts. I also checked the circuit resistance on all six wires running between the APP sensor and the PCM connector. All showed resistance of .03 ohm or less. I wiggle-tested the same circuits while monitoring resistance and found no change. Finally, I checked all circuits for shorts to ground and found none. The diagnostic flowchart now suggests PCM replacement, but I'm leery about replacing it after talking with a couple of GM techs. Can you suggest anything else I should try before I order a PCM?

Tim Morrissey
Albuquerque, NM

Photo courtesy GM Corp.

The only physical connection between the accelerator pedal and the throttle plate inside the throttle housing (shown) on late-model vehicles are the wires in the wiring harness that run between them and the PCM. Anything that disrupts the flow of information between these two important parts demands immediate attention.

Thanks for your question, Tim. It sounds like you've been pretty thorough in your troubleshooting approach so far. And after your experience with the APP sensor replacement, I can understand why you'd be reluctant to add a PCM to the list of replaced parts. As someone wiser than me once said, "The first rule of troubleshooting is, it's never the PCM."

I'd venture to guess that most if not all of your customers with late-model vehicles are completely unaware of the fact that they no longer control their vehicles via a throttle cable connecting the accelerator pedal to the throttle plate. Even the recent media coverage of "unintended acceleration" has done little to raise consumer understanding of electronically controlled throttles. All most motorists care about is that the car goes faster when they press down on the pedal and slows down when they reduce pedal pressure. It's only when it fails to do those basic things that they give it another thought. That and a glowing MIL are what brought

your customer to your shop door.

Because there's no longer a direct, physical connection between the accelerator pedal and the throttle blade, circuit redundancy and other safeguards must be built into the system. This is why there are two sensors, not one, in the APP sensor assembly. The PCM constantly compares the voltage signals from these sensors, as well as feedback from the motors in the throttle assembly, to make sure everything is working normally. When it detects anything that it perceives to be a problem, available engine power is reduced for safety reasons and the MIL is illuminated to alert the driver to the problem.

Electronic throttle systems on GM and other vehicles are extremely well-designed, as indeed they must be. Consequently, APP sensor codes are almost always due to wiring problems. Corroded or loose harness terminals inside the few connectors necessary to link all of the components together are the most likely cause.

GM has issued a technical service bulletin, No. 07-06-04-019D, which addresses the exact symptoms your customer has experienced, including the moisture element. The bulletin covers your customer's G6, as well as the following other GM vehicles:

2005-11 GM Passenger Cars and Light Duty Trucks (including Saturn)

2005-09 HUMMER H2

2006-10 HUMMER H3

2005-09 Saab 9-7X

GM states that some customers may comment on an intermittent malfunction indicator lamp being illuminated with a message or an indicator that displays Reduced Engine Power (bingo!). The technician may observe DTC P2138 - Accelerator Pedal Position (APP) Sensor 1-2 Correlation set as Current or in History.

This condition may be caused by water intrusion into the instrument panel (IP)-to-body harness connector, which carries the APP sensor signals to the PCM. This water intrusion results in a voltage difference between APP Sensor 1 and APP Sensor 2 that exceeds a predetermined value for more than a calibrated period of time, setting P2138.

GM also goes on to state that any aftermarket equipment that's attached where it shouldn't be also can generate DTC P2138 and/or other DTCs. Verify that aftermarket equipment is not electrically connected to any of the APP sensor signal or low-reference circuits or to any other ECM/PCM 5V reference or low-reference circuits.

Your testing has already confirmed the health of the 5V reference to both APP sensors, so the next step is to locate the IP-to-body harness connector, which may be located in or around the left-side kick panel area or inside the IP. On your customer's vehicle, the connector is labeled in service information as C206, and is located above the left front kick panel.

Inspect the IP-to-body harness connector terminals for corrosion and debris. If you find any, inspect for a water leak in the area. Some examples of potential water leaks are: A-pillar seals, sunroof drain lines (if so equipped) and windshield/cowl sealing. If the source of the leak is not immediately apparent, use a water hose to direct a steady stream of water to the area from the outside of the vehicle.

Repair the source of the leak, as well as any vehicle corrosion that may have occurred. Finally, replace any damaged harness connector terminals, then verify the proper operation of the APP sensor and electronic throttle system. M

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Or fax to (216) 651-3016.
Please include your work number.

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In the plug-and-play world we live in, it's reassuring to learn there still are some parts that can be *repaired* rather than simply replaced. Saving time and money makes it even better.

Clutch Player

I'm working on a 2008 Toyota FJ Cruiser with a six-speed manual transmission. The truck has about 90,000 miles on it. The customer brought it in because the clutch is grabbing unpredictably when engaged and it's difficult to modulate the friction point. There's also a rattling noise when the transmission is in Neutral with the engine running and the clutch engaged (foot off the pedal). The clutch and pressure plate have previously been replaced, and not that many miles ago. The clutch doesn't slip when it's engaged but it's gotten very difficult to get a smooth takeoff from a stop in its present condition.

Mark Masterson
Boise, ID

It sounds like something is preventing the smooth engagement and release of the clutch mechanism. This may be caused by contamination of the clutch friction surfaces with transmission lubricant or engine oil. But a much more likely cause of the problem is a damaged clutch release bearing guide, also referred to by some as a *quill*. You'll need to remove the transmission to give the area a careful inspection and assess the damage.

Performance Development Manufacturing

Rough clutch operation may be caused by a damaged release bearing guide sleeve (also colloquially referred to as the *quill*). This demonstration bellhousing fragment (with substantial quill damage) illustrates how a thin stainless-steel sleeve can be installed to return the transmission to service without additional parts replacement.

Once you have the transmission on the bench, examine the release bearing guide for ridges, grooves or anything else that would prevent the release bearing from moving smoothly in and out as it engages and disengages the clutch disc. If the damage is especially bad, the release bearing itself may also have begun to come apart. Worse yet, it may have completely disintegrated, making it impossible to disengage the clutch.

Even a small amount of wear or damage in this area can cause the clutch to jerk or chatter as it's engaged. The customer may also complain that the pedal feels rough or notchy, or that it feels like it's sticking as it's depressed or released. Besides making the clutch pedal difficult to operate, these problems also can lead to premature clutch disc and/or release bearing failures. As extra, unwanted clearance develops between the guide and release bearing, the release bearing and fork may rattle when the clutch is released. This accounts for the rattling noise your customer was complaining about.

It may be difficult to determine the actual cause of the damage. Some say the clutch release bearing fork may be placing a side load on the release bearing as it moves in and out on the release bearing guide surface. Over time, this may lead to wear on the guide's aluminum surface. After all, the aluminum is much softer than the hardened steel inner diameter of the release bearing. The condition may be aggravated by keeping the clutch disengaged in traffic for long periods, rather than shifting to Neutral and waiting to shift back into gear. Regardless of the cause, the damage is real.

On many older transmission designs, the clutch release bearing guide served a dual function as the input shaft's front bearing retainer. If the clutch release bearing guide surface became damaged, repair consisted of installing a

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new front bearing retainer. On some transmissions, the bellhousing and front bearing retainer have been combined into a single aluminum housing. So when the release bearing guide surface becomes damaged, it's time for a new bellhousing. In probably the worst-case scenario, the clutch release bearing guide may be a part of the entire transmission case. So a damaged release bearing guide means the customer springs either for a complete transmission or, at the very least, a new case. None of these sound like very good options, do they?

The great thing about the automotive aftermarket is that you'll often find products that address a specific problem or deficiency in an OE design. The solution often is more durable and long-lasting than the original design. It can be (and often is) less expensive, too, which is icing on the cake.

One example of such a product that addresses the problem at hand is the Transmission Sleeve Kit (TSK) manufactured by Performance Development Manufacturing (*www.pdmtsk.com*). The kit consists of a precision-machined 303 stainless-steel sleeve, setscrews and hex wrench, oversized release bearing, high temperature grease and a notification sticker.

Perhaps you're familiar with a similar product designed to cover the damaged sealing area on a harmonic balancer. The concept is the same but the potential savings seem much greater. TSKs are available for a number of vehicles, including your customer's FJ Cruiser. The company does not sell the kits directly, but markets through distributors. More information is available on the website.

Installation of the stainless-steel sleeve is straightforward. Depending on how badly damaged the original clutch release bearing guide surface has gotten, you may need to spend a little time dressing it with a file. Even sleeves that look pretty far gone can apparently be salvaged. The replacement sleeve slides over the original and must sit square before its setscrews are tightened.

The new release bearing has a slightly oversized inside diameter, to match the kit's stainless-steel replacement sleeve. A standard-size release bearing won't fit, which is why a notification sticker is included. The sticker includes information about the modification and the proper replacement release bearing to use. Placing the notification sticker under the hood alerts any other technician who may need to work on the clutch or transmission in the future.

The rest of the job is routine. There should be a marked improvement in clutch operation, which should last a good, long time. If the transmission ever needs to be disassembled in the future, the stainless-steel sleeve can be easily removed and reinstalled.

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