

**TO:** ALL SALES FORCE

**#:** BDTECB102

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**SUBJECT:** Incorrect "Tap-Testing" leading to ECM/PCM mis-diagnosis.

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Intermittent engine operation. This type of problem is one of the most difficult to diagnose. This type of problem could be heat-related, or vibration-related. Quite often, these types of problems can be difficult to reproduce in a shop or during a test-drive, and that is what makes the problem difficult to diagnose. It is important to fully understand the nature of the problem from the vehicle owners' point of view, as they seem to know when the problem most often occurs, and under which circumstances.

Due to the nature of some engine control module types, some automotive service technicians have found that by subjecting the ECM/PCM to harsh vibration or shock, they can reproduce an intermittent stumble while the engine is running. If an ECM/PCM fails this test, some technicians assume that the control module is defective and must be replaced or repaired. This may not be true.

In the past, some electronic control modules were manufactured with Integrated Circuit (IC) chips that were designed to be mounted to the circuit board using a process known as "through-hole" mounting. These types of IC's have pins (or "leads") that extend from the IC body and are designed to pass through holes drilled in the circuit board. The pins are then soldered to the circuit board traces that surround the holes in the board. This design type is fairly durable, but presents one specific problem. Due to the pins passing through the circuit board, if more than one circuit board is necessary, space limitations may require that a second circuit board is used and it must be mounted separately, above, or below the main circuit board. A new technology was developed to save space and allow multiple levels of traces to be incorporated on one circuit board.

This technology is known as Surface Mount Technology (SMT). The IC's used in SMT applications do not have pins that extend from the body, rather, a set of leads are used that are set on IC body pads. The circuit board has no holes drilled for pins to pass through. The IC is set onto its location, where the circuit board traces line up with the pads of the IC. Solder is then flowed around the IC leads creating an electrical connection between the IC and the circuit board. This technology allows a denser circuit board design, but it comes at the cost of a greater potential for a "cold-solder" problem to arise in a harsh environment...such as that of an ECM/PCM in a vehicle.

A cold-solder problem may occur on both types of circuit board design, both through-hole and SMT. A cold-solder problem occurs when a component that is mounted to the circuit board by a soldered connection either breaks away from the connection, or a hairline crack or fracture occurs within the soldered joint. This condition may cause an intermittent electrical connection that may break or re-connect depending on any stress, heat, or current that may be applied to the circuit in question. The Tap-Test is a method of testing for any intermittent electrical connections such as those described above, however, it must be done properly.

It must be remembered that an ECM/PCM is a fragile and delicate component. It must not be exposed to harsh shock or vibration. The correct method for Tap-Testing is to tap the case or housing of the ECM/PCM with the fingertips only. Solid tools, a fist, or an open (heavy) hand should not be used for Tap-Testing as these methods subject the ECM/PCM to higher forces than it is designed to endure. Use of these methods may cause the case or housing of the ECM/PCM to distort or flex, thus causing the circuit board that is mounted to them to do the same. This may lead to a failure in the circuit board or any components that are mounted to the board.

Under these circumstances, the ECM/PCM may fail immediately, or worse, may cause a failure that will not surface until a later date, causing a customer come-back. Too much force on the unit may also cause it to reset, causing the engine to stall, as well as possibly illuminating the Malfunction Indicator Lamp or Service Engine Soon lamp. It must also be noted that the ECM/PCM should be Tap-Tested only on the top of the case or housing, as Tap-Testing on the bottom of the case may cause a momentary short-circuit, possibly leading to a damaged ECM/PCM.

**REMEMBER:**

1. Tap-Test the ECM/PCM only with your fingertips. Never use tools.
2. Make sure the intermittent problem is not as a result of loose ECM/PCM connections at the vehicle wiring harness.
3. Always tap the ECM/PCM on the top of the case to prevent possible short circuits. (The top of the case is the side where you would find the PROM access cover or service sticker/label affixed).