



Engine Damage on 2011-2016 Ford 5.0L DOHC Engines

The AERA Technical Committee offers the following information on engine damage in 2011-2016 Ford 5.0L DOHC engines. It has been reported that performance enhancing re-programing may alter continued engine performance.

Some 2011 F-150 and 2011-2012 Mustang vehicles equipped with 5.0L engine may have unauthorized modifications to the powertrain hardware and/or calibration which may result in exceeding component design limits. Such modifications could cause damage to the powertrain and/or void the factory or extended powertrain warranty.

Remind customers that the original 5.0L calibrations adjust fuel and spark settings for maximum performance with production hardware, while protecting the engine over a wide range of operating conditions. This includes a knock sensor calibration enabling optimized performance based on fuel grade usage it was designed for. Adding aftermarket hardware and altering calibrations risk damage to the engine if not done properly by qualified technicians.

Unauthorized calibration modifications may or may not be detectable using standard tools Integrated Diagnostic System (IDS), Portable Diagnostic Software (PDS), NGS+ VCM.

Changes can be made to the calibration and flashed to the powertrain control module (PCM) through the on-board diagnostics (OBD) port. Physical modifications to the hardware may or may not be present. If aftermarket power increasing modifications are suspected, care should be taken to record and store the following items: Permanent diagnostic trouble codes (DTCs), pending DTCs, freeze frame data, mode 6 and mode 9 data. The data should be printed and attached to the repair order for later reference.

The DTCs, freeze frame data, mode 6 and 9 data can be obtained by using the IDS, PDS or NGS+VCM under tool box selection. The powertrain tab will provide the OBD test modes tab and mode 6 and 9 data selection after the vehicle has been identified.

Attempting to increase the engine output via recalibrating the PCM may result in poor drivability, DTCs, or component failures.



A partial list of calibration induced component failures is given below:

Excessive Cylinder Pressure & Temperature

- Piston damage
- Spark over-advanced (knock-induced damage)
- Insufficient enrichment
- Catalyst damage

Increased RPM Limit/Overspeed

Piston damage

- Connecting rod damage
- Oil pump damage
- Catalyst damage
- Clutch damage

Knock Sensor Calibration Changes

- Piston and/or ring damage due to improper knock control

Hardware Modifications:

The following list contains items that are frequently modified in an effort to increase the engines torque/power output. Modifying these items may, or may not improve the performance, but can lead to drivability issues, DTCs and possibly component failures:

- Air induction system (air box, air filter, zip tube)
- Super chargers
- Nitrous oxide Systems
- Throttle bodies
- Exhaust air path/system

Review Engine Damage:

Common failures associated with unauthorized modifications have included:

- DTCs present indicating cylinder misfires (P0300 - P0308)
- Cylinder/piston damage resulting in a misfire, low compression, noise
- Unusual Clutch wear/damage
- Piston damage - light knock (See Figure 1)
- Piston damage - heavy knock (See Figure 2)

**Piston Damage Due to Excessive Cylinder Temperature
Producing a Light Knocking Noise**



Figure 1.

**Extensive Piston Damage Due to Continued Excessive
Combustion Temperature, Produces Heavy Kock Noise**



Figure 2.

It is important for the customer to realize the failures shown above in Figure 2 will reoccur on subsequent engine builds unless the root cause is determined and the corrected.