



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

ODI RESUME

Investigation: PE 13-018
Date Opened: 05/22/2013
Investigator: Steve Mchenry
Approver: Frank Borris
Subject: Reduced power during hard acceleration
Date Closed: 04/07/2014
Reviewer: Steve Mchenry

MANUFACTURER & PRODUCT INFORMATION

Manufacturer: Ford Motor Company
Products: 2011 - 2013 Ford F150 with 3.5L GTDI engine
Population: 359,771
Problem Description: Complainants allege sudden reductions in engine power during hard accelerations, after extended driving in wet/humid conditions.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	525	3,731	4,120
Crashes/Fires:	0	0	0
Injury Incidents:	0	0	0
Fatality Incidents:	0	0	0
Other*:	0	18,978	18,978

*Description of Other: Warranty claims that may be related to the alleged defect

ACTION / SUMMARY INFORMATION

Action: This Preliminary Evaluation is closed.

Summary:

On May 22, 2013, the Office of Defects Investigation (ODI) opened PE13-018 to investigate 95 complaints alleging incidents of reduced engine power during hard accelerations in model year (MY) 2011 through 2013 Ford F-150 trucks. ODI was aware of three technical service bulletins (TSBs) issued by Ford for a condition that was related to moisture accumulation in the Charge Air Cooler (CAC) for the turbochargers. A Preliminary Evaluation was opened to gather information to assess whether the subject vehicles contain a safety related defect.

The subject vehicles are powered by Ford's 3.5L EcoBoost engine which uses twin turbochargers to obtain a balance of fuel economy and engine power based on the driver's demand. When the driver requests more power from the engine, as in accelerating to pass, merge, ascend hills or haul a load the two turbochargers will spin up compressing the air which is then used to increase the power created by the combustion in the engine. The compressed air, which gains heat by the compression process, is passed through a Charge Air Cooler (CAC) which is designed to lower the temperature of the air in order to make the combustion process even more efficient (Figures 1 and 2).

In response to ODI's Information Request letter, Ford indicated that a misfire condition could occur after steady-speed operation under significantly humid and rainy conditions. Ford's analysis found that under those conditions, condensation could form and accumulate on the inside of the CAC tubes which could then be ingested into the engine during particularly hard acceleration near wide-open throttle. An engine misfire of up to three cylinders could occur if the amount of condensed water released from the CAC exceeded the engine's operating threshold for water ingestion. Ford noted that due to regulations set by the EPA, the powertrain software would disable up to two of the misfiring cylinders for no more than 30 seconds and until the driver tips out the throttle in order to protect the catalytic converter from damage.

Ford's testing of this condition on the subject vehicles showed that a vehicle experiencing such a condition would continue to maintain its speed as well as accelerate, albeit at a lower rate than expected by the driver. Similar results were obtained in testing done by NHTSA's Vehicle Research and Testing Center in East Liberty, Ohio (Figure 6). In an ongoing process to address the problem Ford issued a series of TSBs where a deflector shield was installed onto the CAC (Figures 3, 4 and 5). In January 2014 Ford indicated that its data shows that the TSBs have been effective in resolving the problem, that for the MY 2013 vehicles their remedy is 100% effective and the latest TSBs for MY 2011 – 2012 are 95% effective.

The 525 complaints to ODI and the total 4,120 unique VIN complaints listed in the Failure Report are incidents of alleged reduced power or driveability symptoms and not all are necessarily related to the condition created by water ingestion. Reduced power conditions can occur for a variety of reasons including faults with ignition coils, spark plugs, a catalytic converter, the throttle body, turbocharger, fuel pump/filter, powertrain control module (hardware or software) or transmission shifting problems. Ford also noted that in a large number of warranty claims on the subject vehicles, the CAC was replaced or a TSB procedure was performed when the symptoms exhibited were inconsistent with a CAC water ingestion related issue.

Given these circumstances, further use of the agency resources in this matter does not appear to be warranted. Accordingly, this investigation is closed. The closing of this investigation does not constitute a finding by NHTSA that a safety-related defect does not exist. The agency will continue to monitor complaints and other information relating to the alleged defect and take further action in the future if warranted.

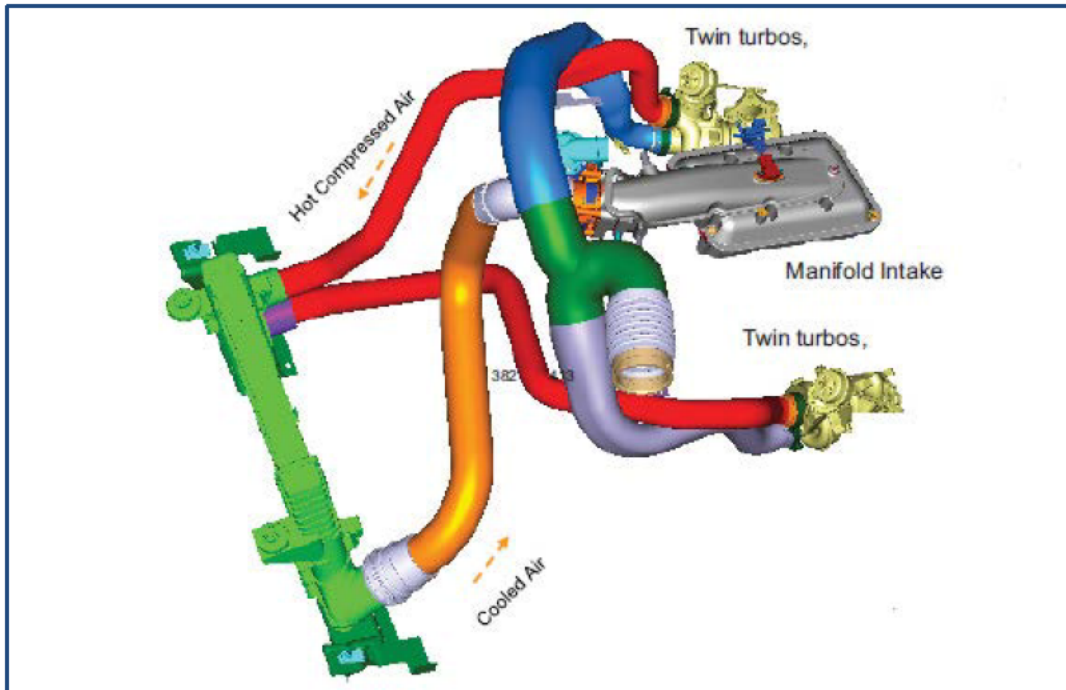


Figure 1. (CAC in green, front of vehicle to the left) Shows flow of hotter compressed air from turbos through the CAC to be cooled and then passing into the intake manifold for use in combustion.

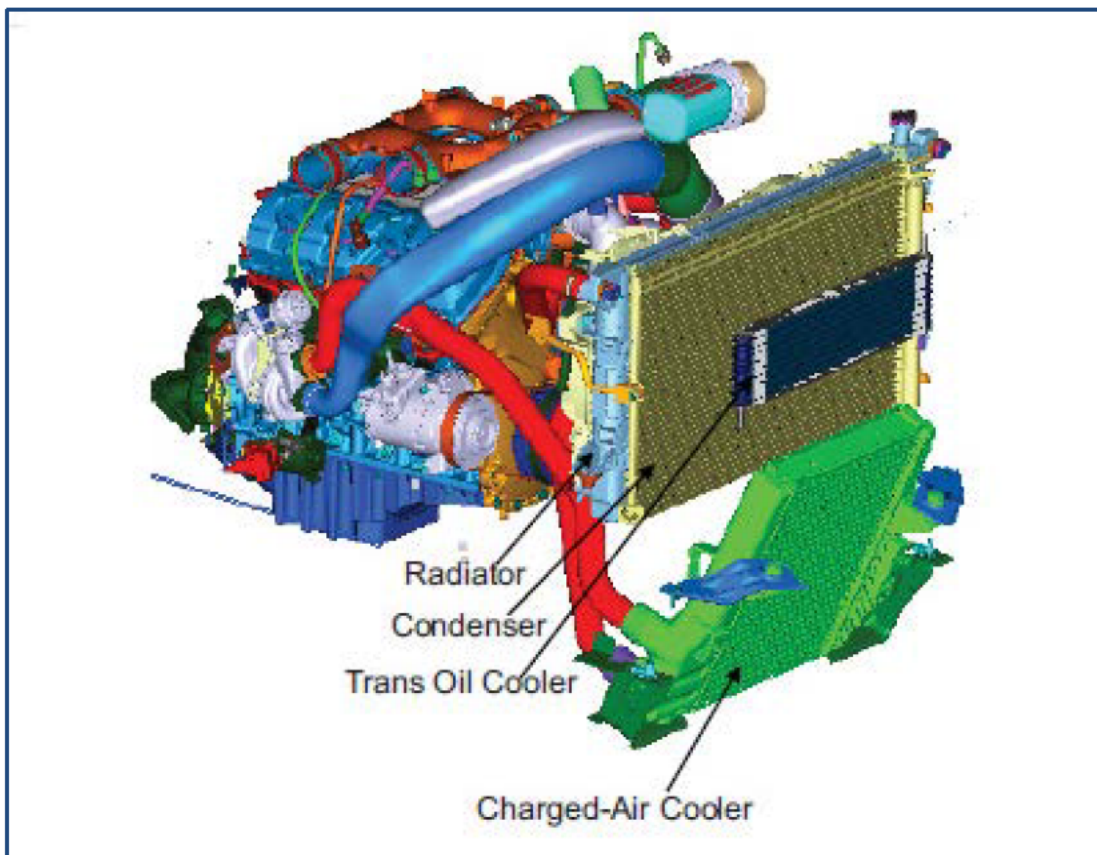


Figure 2. (Front of the truck facing to the right) Shows placement of the CAC relative to the radiator and the engine.

TSB ID	Issue Date	Model Years addressed
12-2-10	February 2012	2011 – 2102
12-6-4	June 2012	2011 – 2012
12-10-19	November 2012	2011 – 2012
13-3-3	March 2013	2011 – 2012
13-8-1	August 2013	2011 – 2012
12-11-15	November 2012	2013
14-00-17	January 2014	2013-2014

Figure 3. Table of Technical Service Bulletins related to the CAC issue.

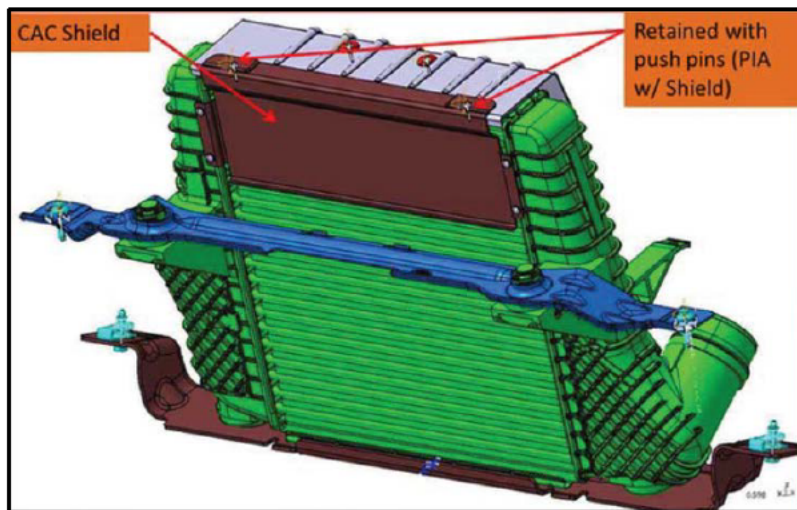


Figure 4. Placement of the upper deflector from TSBs 12-6-4, 12-10-19 and 13-3-3

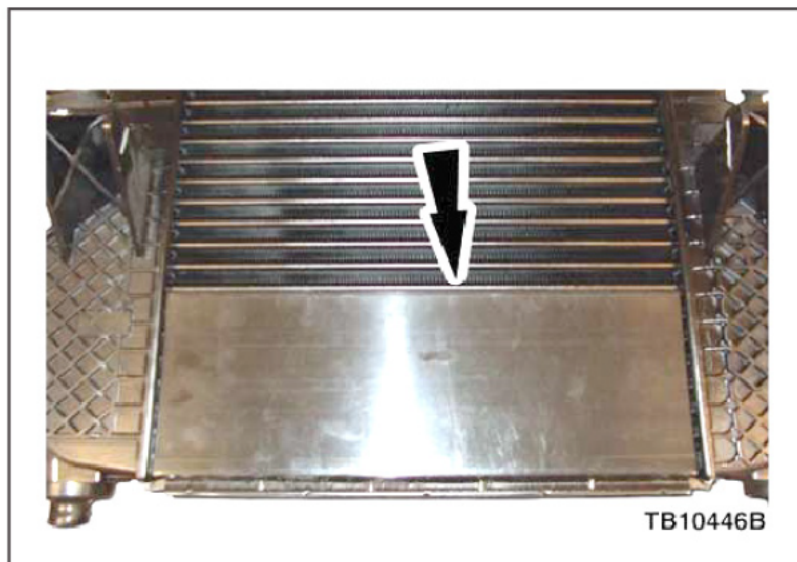


Figure 5. Excerpt from TSB 13-8-1: A more efficient bottom deflector is installed (the top deflector, if installed from a previous TSB, is removed).

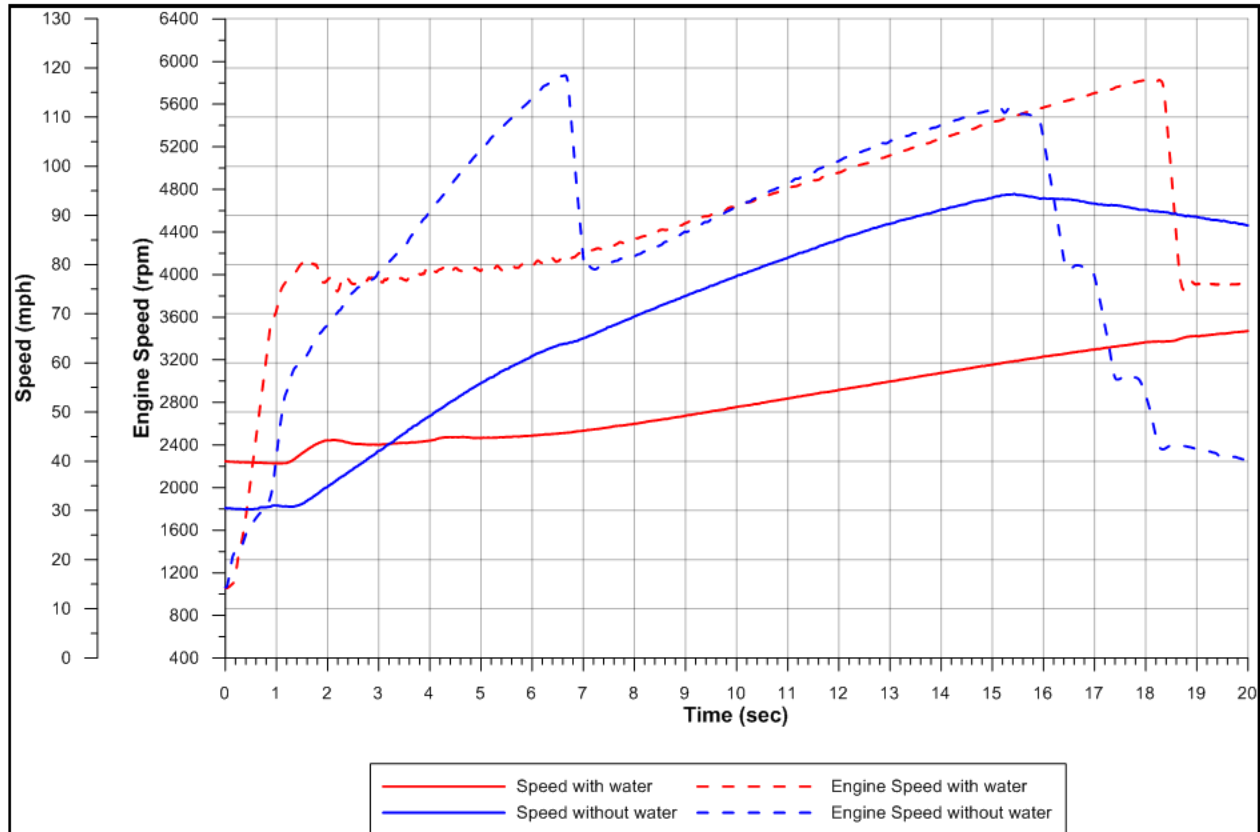


Figure 6. Test data from the VRTC showing the effect on vehicle speed and engine speed during a sixth gear to second gear downshift such as is typical during the types of acceleration for passing or merging.

VOQs associated with this closing resume:

10568421, 10568106, 10567884, 10567792, 10567723, 10567707, 10567446, 10567311, 10567096, 10566754, 10566704, 10566556, 10566301, 10565500, 10565254, 10565067, 10564594, 10564201, 10564178, 10564040, 10564007, 10563925, 10563680, 10563523, 10563377, 10563297, 10563112, 10563035, 10562781, 10562652, 10562550, 10562325, 10561602, 10561558, 10561498, 10561484, 10561230, 10560597, 10560528, 10560516, 10560014, 10559762, 10559582, 10559545, 10559481, 10558407, 10558361, 10558238, 10558145, 10558141, 10558012, 10557985, 10557825, 10557698, 10557668, 10557637, 10557408, 10557365, 10557178, 10557017, 10556924, 10556652, 10556453, 10556352, 10556301, 10556258, 10556176, 10556141, 10555748, 10555429, 10555414, 10555361, 10555234, 10555212, 10554954, 10554886, 10554605, 10554601, 10554586, 10554377, 10553897, 10553866, 10553747, 10553647, 10553599, 10553548, 10552968, 10552911, 10552477, 10552060, 10551384, 10551351, 10550959, 10550672, 10550611, 10550597, 10550478, 10550393, 10550308, 10550299, 10550256, 10550062, 10549406, 10549363, 10548753, 10548624, 10548581, 10548456, 10548380, 10548184, 10548125, 10548119, 10547728, 10547703, 10547509, 10547461, 10547457, 10547447, 10547411, 10547171, 10547154, 10547061, 10546737, 10546652, 10546524, 10546405, 10546343, 10546335, 10546187, 10546158, 10546153, 10546149, 10545749, 10545492, 10545361, 10545325, 10545314, 10545262, 10545222, 10545077, 10544960, 10544951, 10544886, 10544799, 10544518, 10544498, 10544130, 10543390, 10543037, 10543030, 10542671, 10542527, 10542422, 10542378, 10542172, 10541849, 10538494, 10538460, 10538110, 10538061, 10538057, 10537815, 10537578, 10537267, 10536994, 10536804, 10536787, 10536733, 10536586, 10536243, 10536202, 10535986, 10535974, 10535967, 10535953, 10535877, 10535770, 10535753, 10535651, 10535526,

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