U.S. Department of Transportation

National Highway Traffic Safety Administration

ODI RESUME

OFFICE OF DEFECTS INVESTIGATION

NHTSA

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Investigation: DP 15-001
Prompted by:
Date Opened: 04/01/2015 **Date Closed:** 06/14/2018
Investigator: Chris Lash **Reviewer:** Jeff Quandt
Approver: Stephen Ridella
Subject: Loss of power steering while driving

MANUFACTURER & PRODUCT INFORMATION

Manufacturer: Ford Motor Company
Products: 2008 - 2011 Ford Escape, Mercury Mariner
Population: 591,749

Problem Description: Allegations of torque sensor faults resulting in loss of power steering assist while driving in vehicles previously remedied under 14V-284.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	43	34	43**
Crashes/Fires:	0	0	0
Injury Incidents:	0	0	0
Fatality Incidents:	0	0	0
Other*:	585	103	585**

***Description of Other:** ODI complaints alleging steering concerns after receiving the recall remedy that do not involve loss of power steering while driving and/or are not related to the torque sensor.

** Total eliminates duplicates received by ODI and manufacturer.

ACTION / SUMMARY INFORMATION

Action: The defect petition has been denied.

Summary:

On May 27, 2014, amended June 2, 2014, Ford Motor Company (Ford) submitted a Defect Information Report (DIR) to NHTSA describing a safety defect that may result in a sudden loss of power steering assist while driving in approximately 746,067 model year (MY) 2008 through 2011 Ford Escape vehicles equipped with electric power assisted steering (NHTSA 14V-284, Ford 14S05). Ford's DIR described the defect condition as "a poor signal to noise ratio [SNR] in the torque sensor" within the Electric Power Assisted Steering (EPAS) system [which] "does not allow the PSCM to determine the driver's steering input." When the system detects this fault condition, it transitions the EPAS system to the fail-safe/manual steering mode. Ford's DIR indicates that loss of power steering assist while driving would require higher steering effort at lower vehicle speeds, which may result in an increased risk of a crash.

Ford's remedy instructs dealers to check the Power Steering Control Module (PSCM) for Diagnostic Trouble Codes (DTCs) to determine the proper repair procedure. If no DTCs are present, dealers are to update the PSCM and instrument cluster module software. The updated PSCM software changes the torque sensor fault strategy so that the SNR condition does not result in a loss of power steering assist while driving. In addition, audible and visual warnings are provided for torque sensor faults. If DTCs indicating faults in the torque sensor, PSCM or Power Steering Motor (motor) are present in the initial recall inspection, the dealer performs the following repairs: 1) replaces the torque sensor for torque sensor faults (DTC B2278); or 2) replaces the steering column for faults related to the PSCM (DTC B1342) or motor (DTC B2277).

Continued in attachment pages

Ford's remedy for 14V-284 is designed to address the safety hazard associated with the torque sensor SNR condition by preventing such faults from resulting in a sudden loss of power steering while driving and without warning. After receiving the recall remedy software update, subsequent failures of the torque sensor related to the SNR condition would not result in sudden loss of power steering assist while driving, but would provide warnings to the driver that EPAS service is required. If the system is not promptly serviced after warning symptoms appear, power assist may not be available upon subsequent key-"ON" at vehicle start-up. Ford does not provide assistance for repairs in this circumstance under the safety recall. Nor does Ford provide assistance for repairs of other EPAS fault conditions (e.g., motor, PSCM) after the recall has been completed.

Information provided by Ford in response to ODI information requests for DP15-001 show that, through the end of 2017, 591,749 vehicles had been remedied under 14V-284, including 12,107 receiving torque sensor replacements (2.0%), 6,532 receiving steering column replacements (1.1%) and 573,110 receiving software updates (96.7%). Figure 1 shows how the torque sensor is accessed for replacement and Figure 2 shows the steering column assembly and major components.

On February 5, 2015, ODI received a petition requesting a hearing "for a Determination of Whether Ford Motor Company ('Ford') reasonably met its obligation to Remedy Recall 14S05 regarding certain 2008-2001 (sic) Model Year Escape and Mariner Vehicles" from an owner of a vehicle that experienced a loss of power steering after receiving the remedy for 14V-284 (VOQ 10670665). ODI has since received two additional petitions requesting public hearings to address Ford's remedy for Recall 14V-284 (VOQs 10787836 and 11080530). These VOQs are summarized in Table 1.

VOQ No.	Vehicle	Remedy Date	VOQ Received	Trouble Code	Component	Repair
10670665	2008 Escape	Aug-2014	Jan-2015	B2277	Motor	Steering column
10787836	2008 Mariner	Nov-2014	Nov-2015	Unknown	Unknown	Unknown
11080530	2010 Escape	Mar-2018	Mar-2018	B1342	PSCM	Steering column

Table 1. VOQ's Requesting Public Hearing Regarding 14V-284 Remedy.

ODI's analysis of complaints by EPAS fault condition and operating mode found a low frequency of torque sensor failures alleging loss of power steering assist while driving. There are numerous EPAS fault conditions that may cause a loss of steering assist or other symptoms in the subject vehicles that either do not involve a loss of steering assist while driving or are unrelated to the defect identified by Ford in 14V-284. For example, two of the VOQs petitioning for public hearings report DTCs associated with PSCM or motor failures, which are not the defect condition addressed by the recall (see Table 1). ODI's analysis did not identify any defect trends in the PSCM, motor or any other EPAS components that warrant further action.

ODI's analysis of severe incidents indicates that the risk of crashes involving serious property damage or injury has significantly decreased in vehicles after the remedy has been performed. ODI has received 15 VOQs alleging crashes in vehicles that had not received the 14V-284 remedy, including 10 alleging injuries and 7 involving severe damage to the vehicle. In contrast, ODI has identified just seven VOQs alleging minor crashes caused by steering performance concerns in vehicles that had been previously remedied under 14V-284, none of which alleged any injuries. In addition, approximately 90 percent of Early Warning Death & Injury Claims reported since 14V-284 was initiated involve vehicles that had not received the subject remedy when the incident occurred (Figure 3).[1] ODI's analysis of crash and injury allegations indicates that Ford's recall remedy appears to have been effective in mitigating the safety

[1] Both the complaints and EWR claims involve unverified allegations of crashes caused by steering performance issues.

hazards associated with loss of power steering assist while driving in the subject vehicles. ODI has not identified any evidence indicating that the SNR condition addressed by 14V-284 has been determined to be a factor in any crash or injury claims after the recall remedy has been completed.

The Petitioner alleges facts that understandably have caused frustration surrounding the repair and operation of her vehicle covered by NHTSA Recall No. 14V-284. However, the issues raised in the petition do not warrant a public hearing because the remedy Ford provided addresses the safety risk posed by loss of power steering assist. That safety risk arises from the unexpected change in steering effort the driver may experience while driving. Since Ford's remedy resolves the safety risk over which NHTSA has legal authority, NHTSA has decided not to hold a hearing on whether Ford has reasonably met the remedy requirements of the Safety Act.

The official petition denial, as published in the Federal Register, is available in the document file for this defect petition.

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FIGURES

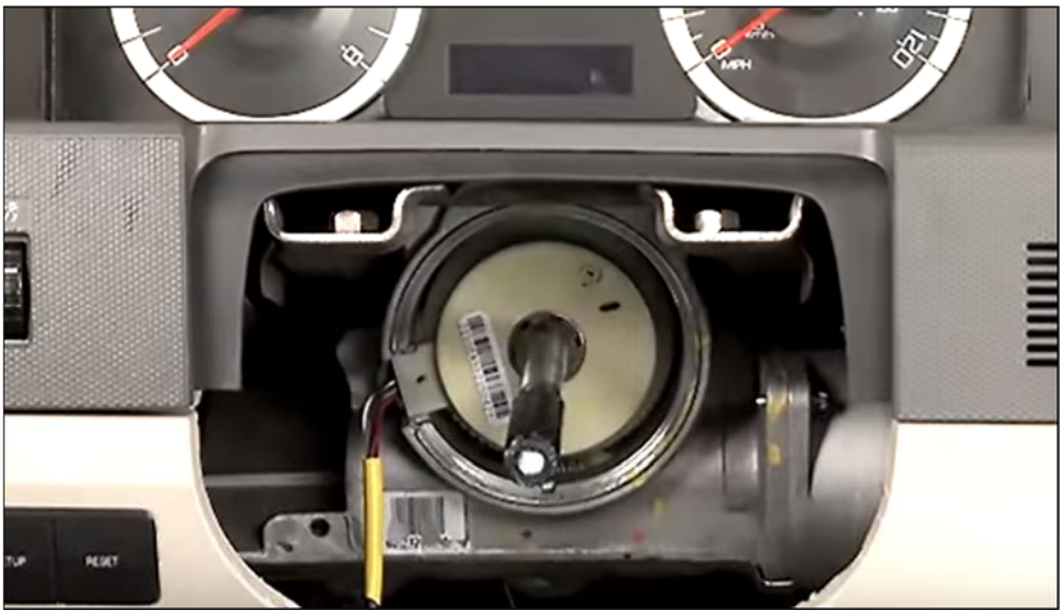


Figure 1. View of torque sensor with steering wheel and upper steering column removed.

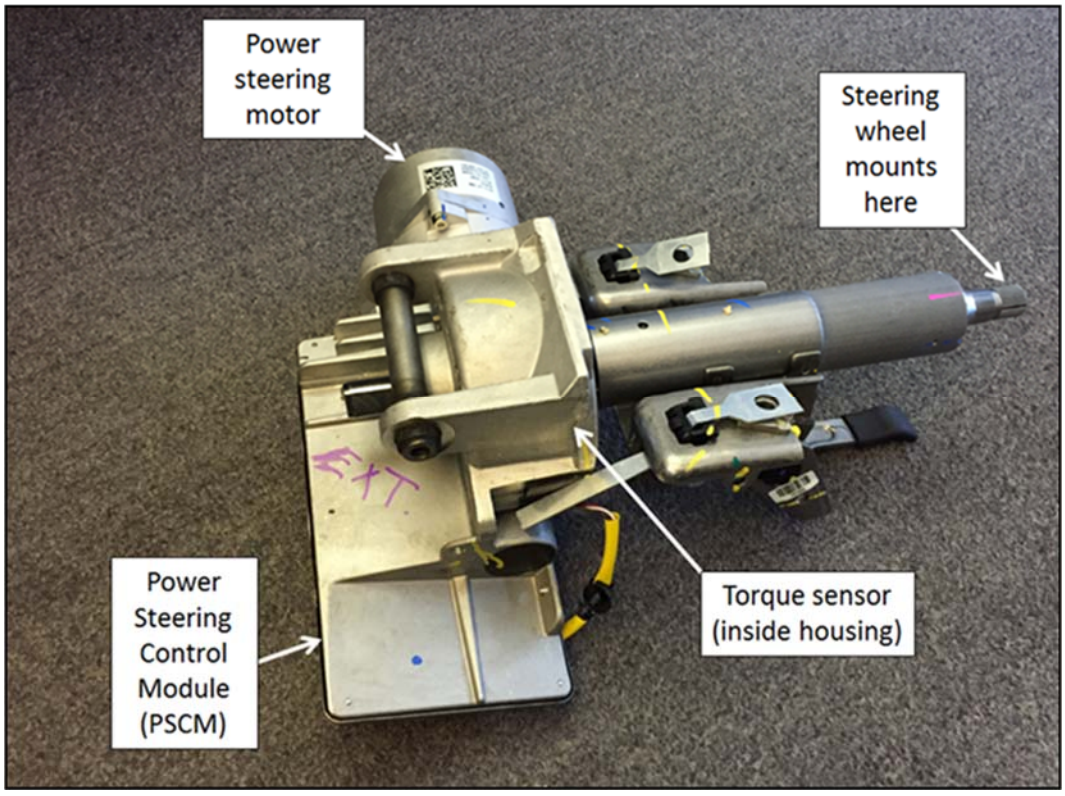


Figure 2. Steering column assembly and major components.

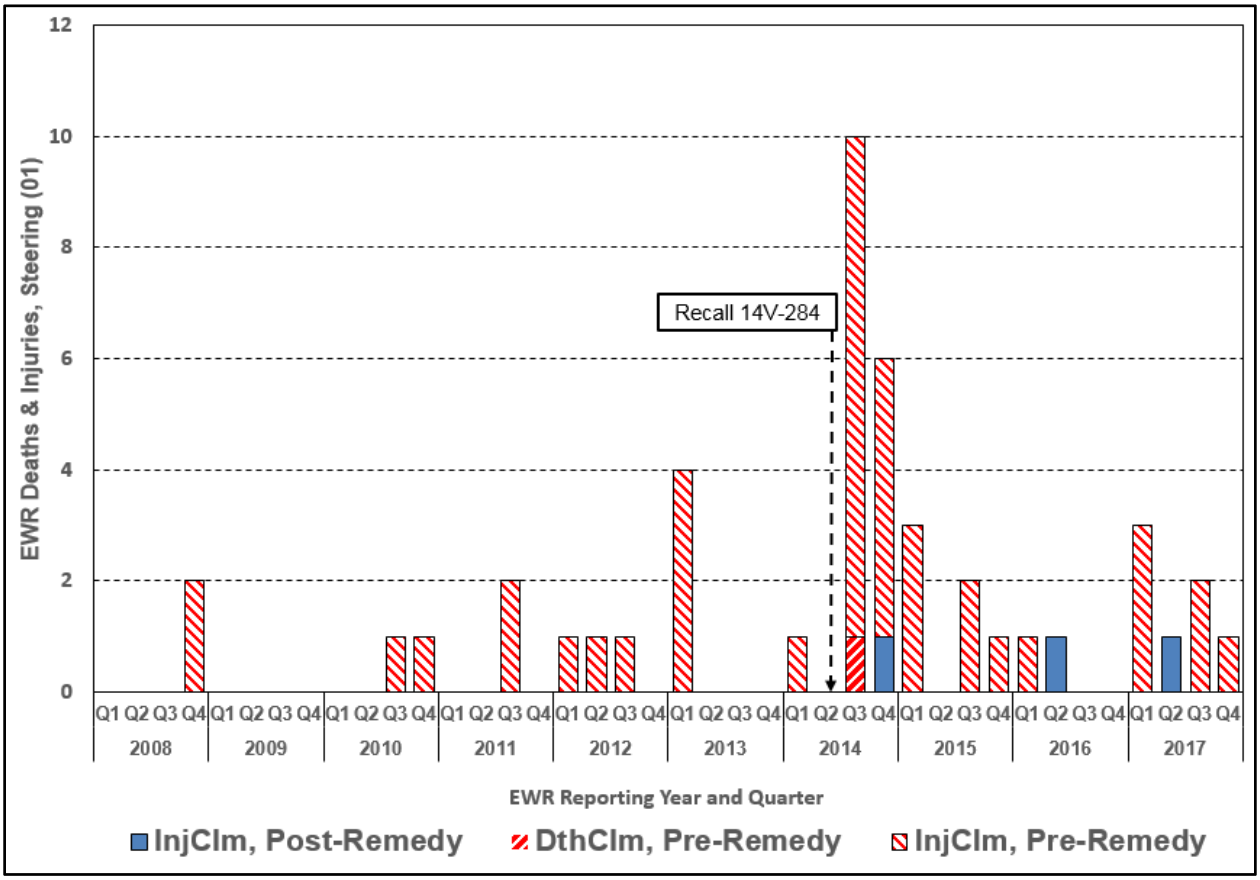


Figure 3. 2008-2011 Ford Escape and Mercury Mariner EWR Death & Injury Claims with Component Code = "01 - Steering," by Reporting Quarter and 14V-284 Remedy Completion Status.

VOQs: The following VOQs are associated with the closing resume for DP15-001.

VOQ's alleging loss of assist while driving and a diagnosed torque sensor fault:

11051412, 11044934, 11022694, 10969571, 10968655, 10965909, 10956312, 10955650, 10955244, 10955164, 10954575, 10954429, 10945682, 10943843, 10938892, 10937084, 10925161, 10919191, 10917392, 10903304, 10854824, 10851649, 10851033, 10825728, 10825038, 10824561, 10824144, 10823814, 10821243, 10819519, 10818229, 10817107, 10808769, 10789489, 10762185, 10711840, 10692126, 10672099, 10667744, 10659818, 10659444, 10654960, 10641729

Other VOQ's alleging steering system faults or symptoms after receiving the 14V-284 reprogramming remedy. These include allegations of symptoms with no loss of power assist (e.g., steering wheel vibration, power steering malfunction message), reports consistent with a temporary reduction of assist that do not involve a component fault (e.g., reduced assist due to low battery voltage), reports of no assist at start-up, and reports in which the facts indicate loss of assist caused by EPAS faults unrelated to the torque sensor defect condition addressed by 14V-284:

11057297, 11057063, 11056533, 11056154, 11055858, 11055483, 11055466, 11055414, 11055212, 11054958, 11054947, 11054757, 11054420, 11054406, 11053904, 11053835, 11053739, 11053372, 11052746, 11052607, 11052445, 11052438, 11052255, 11051734, 11051580, 11051384, 11051234, 11051185, 11048604, 11048584, 11048352, 11048228, 11048194, 11047895, 11047800, 11047583, 11047189, 11046926, 11046477, 11046303, 11046082, 11045898, 11045780, 11045748, 11045683, 11045588, 11045557, 11045545, 11045459, 11044871, 11044683, 11044543, 11044264, 11043846, 11043459, 11043397, 11041991, 11041893, 11041832, 11041337, 11040921, 11040872, 11039392, 11039381, 11035602, 11035574, 11035532, 11035469, 11035091, 11034500, 11034394, 11034288, 11034206, 11034203, 11034018, 11033323, 11032904, 11032670, 11032644, 11032160, 11031576, 11031383, 11030772, 11030646, 11030027, 11029957, 11029905, 11029904, 11025098, 11024642, 11024013, 11023944, 11021503, 11021445, 11019837, 11018853, 11016486, 11015959, 11015752, 11014601, 11005095, 11003435, 11001840, 11001426, 10995499, 10994422, 10993703, 10992927, 10992775, 10992428, 10992414, 10991652, 10991397, 10986064, 10984859, 10984841, 10983731, 10980869, 10980278, 10979549, 10978751, 10971786, 10971182, 10971067, 10970969, 10970788, 10970497, 10969581, 10969543, 10969387, 10969386, 10969230, 10969215, 10968158, 10968021, 10967684, 10967577, 10967277, 10967046, 10966684, 10966455, 10960294, 10960258, 10960013, 10959781, 10959518, 10959181, 10958938, 10958489, 10957932, 10957843, 10957773, 10957100, 10956830, 10956478, 10956466, 10955613, 10955078, 10954998, 10954311, 10953968, 10953950, 10953820, 10953709, 10950316, 10950299, 10950228, 10950017, 10949788, 10949665, 10948983, 10948948, 10948907, 10948872, 10948645, 10948561, 10947670, 10947500, 10947448, 10947237, 10946976, 10946245, 10945789, 10945787, 10945707, 10945507, 10945153, 10944531, 10944374, 10944340, 10943922, 10943836, 10940305, 10939923, 10939654, 10939622, 10938491, 10938440, 10938316, 10937948, 10937857, 10937303, 10937282, 10937203, 10936718, 10936680, 10936678, 10936538, 10936438, 10936328, 10936211, 10936158, 10935880, 10935601, 10935461, 10935352, 10934794, 10930317, 10930063, 10929862, 10929662, 10928935, 10928463, 10928195, 10928100, 10928059, 10927679, 10926999, 10926751, 10926724, 10926606, 10926075, 10926031, 10925988, 10925368, 10925104, 10924955, 10924802, 10924618, 10924274, 10924181, 10924135, 10923997, 10923960, 10919786, 10919373, 10918932, 10918900, 10918745, 10918432, 10917552, 10916179, 10916106, 10914421, 10914158, 10913907, 10913857, 10913743, 10911321, 10910758, 10910064, 10909599, 10907600, 10905906, 10904718, 10903527, 10903367, 10899601, 10896519, 10896131, 10895100, 10892291, 10889091, 10888413, 10887904, 10885989, 10884185, 10877010, 10875305, 10874929, 10873736, 10873184, 10872339, 10872091, 10871755, 10870270, 10863984, 10863830, 10863819, 10862526, 10862267, 10861328, 10860896, 10860878, 10860738, 10860353, 10860218,

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