



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

ODI RESUME

Investigation: EA 12-006
Prompted by: PE12-002
Date Opened: 06/14/2012
Investigator: Michael Lee
Approver: Frank Borris
Subject: Power Window Master Switch Fire

Date Closed: 02/12/2013
Reviewer: Scott Yon

MANUFACTURER & PRODUCT INFORMATION

Manufacturer: TOYOTA MOTOR CORPORATION
Products: Certain 2007-2009 Toyota models built from 9/2006 to 12/2008
Population: 1,424,747

Problem Description: The switches in the power window master switch (PWMS) assembly located in the armrest of the driver's door may overheat, possibly resulting in a fire.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	58	319	377
Crashes/Fires:	58	319	377
Injury Incidents:	2	13	15
Number of Injuries:	2	13	15
Fatality Incidents:	0	0	0
Other*:	0	251	251

*Description of Other: Warranty claims that involved PWMS overheating or fire

ACTION / SUMMARY INFORMATION

Action: Close this Engineering Analysis (Recall No. 12V-491).

Summary:

On October 10, 2012, Toyota initiated a safety recall of approximately 2.5 million U.S. vehicles involving the following models and model years: 2007-2009 Camry and Camry Hybrid, 2009 Corolla and Corolla Matrix, 2008 Highlander and Highlander Hybrid, 2007-2009 RAV4, 2008-2009 Scion xB and xD, 2008-2009 Sequoia, 2007-2008 Tundra, 2007-2008 Yaris, and 2009 Pontiac Vibe. See NHTSA recall number 12V-491 for more details, including the affected vehicle manufacture dates for each vehicle model. Note that only early-production 2009 model year vehicles are included in the recall. Toyota and GM dealers will inspect the power window master switch (PWMS) assemblies and apply a specialized grease that inhibits heat build-up. The circuit board in the PWMS may be replaced with a new one if "notchy" or sticking feeling is observed during the inspection.

The failure report summary above shows counts for the vehicles identified at the start of this Engineering Analysis, specifically the approximately 1.4 million vehicles that share an identical PWMS assembly design including, model year 2007-2009 Camry, Camry Hybrid, RAV4, and Yaris built from September 2006 through August 2008, as well as all 2008 Highlander Hybrid. Toyota subsequently identified approximately one million additional vehicles that have a slightly different PWMS design but contain the same defect condition. Note that the totals for complaints and fires shown above may include duplicative reports (between ODI and manufacturer reports).

This Engineering Analysis is closed. See attached report for additional information.

The ODI reports cited above can be viewed at www-odi.nhtsa.dot.gov/complaints under the following identification numbers: 10323848, 10360414, 10392622, 10394453, 10411328, 10429983, 10436663, 10446699, 10447416,

10447417, 10447419, 10447444, 10447515, 10447845, 10447947, 10449270, 10450133, 10450568, 10450606, 10450641, 10451821, 10455540, 10455614, 10456353, 10456438, 10457854, 10457955, 10459730, 10460166, 10460691, 10461220, 10462140, 10462200, 10462247, 10462404, 10462705, 10462761, 10464451, 10464769, 10465421, 10466279, 10466667, 10468126, 10468265, 10475230, 10470313, 10470684, 10471551, 10471824, 10472336, 10472910, 10473753, 10473967, 10473969, 10476921, 10477469, 10478563 and 10478657.

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Additional Information

ODI is aware of 377 incidents¹ of fire (as defined in 49 CFR § 579.4) originating from the power window master switch (PWMS) assembly within the Engineering Analysis (EA) subject vehicle population of approximately 1.4 million vehicles. In the majority of the incidents, the PWMS sustained heat damage that required replacement of only the PWMS component itself. Other incidents required replacement of the entire driver door. In at least six instances, the vehicle was completely destroyed by fire. ODI is aware of 15 injuries associated with the reported fire incidents, including burns to the hand or finger.

The PWMS assembly is located in the armrest of the driver's door. The PWMS assembly controls all of the power windows in the vehicle. Most of recalled vehicles have four power windows, which are controlled by different switches within the PWMS assembly. The PWMS receives power to its electrical circuits when the vehicle ignition is turned on. Almost all reported fires occurred during vehicle operation.

The switches in the PWMS assembly were built on three production lines using different processes for applying the grease to lubricate the internal components. From September 2006 to June 2008, one production line used a less precise, "squeeze" type grease application method. The other two production lines used a more precise, "spray" method. Almost all of the failed switches analyzed were built on the production line that used the squeeze method between September 2006 and June 2008. In addition, there was a significant increase in warranty claims relating to the PWMS during the time the squeeze method of grease application was used. Accordingly, the scope of vehicles recalled includes affected model year 2007-2009 vehicles built from September 2006 through mid-December 2008. Rather than cutting off the recalled vehicles at June 2008 (the last date of switch production using the squeeze method of grease application), Toyota has recalled a broader scope of vehicles to increase the likelihood that all defective switches are covered by the recall action.

In its October 10, 2012 Part 573 Defect and Information Report (Part 573 Report), Toyota states that if the grease is not applied properly to the switches within the PWMS assembly, the grease may carbonize. According to Toyota, if this happens, the grease will lose its lubricating properties, and an electrical contact point may wear, resulting in a "notchy" or sticking feeling during switch operation. Toyota states this may result in the switch becoming inoperative. Further, Toyota alleges that its parts-return analysis showed significant evidence of the presence of silicone and ester in the failed samples but that neither chemical was used during the manufacture of the PWMS. (For more details on Toyota's analysis, see Toyota's Part 573 Report to NHTSA.) Toyota claims that if vehicle owners disassembled the PWMS assembly and/or applied "cleaning lubricants" containing silicone or ester to repair a notchy or sticky switch, this could cause the PWMS to overheat, melt or smoke, and potentially lead to a fire.

¹ This figure includes all ODI reports through December 15, 2012 and all Toyota reports through October 10, 2012. This figure may also include some duplicative reports between ODI and Toyota reports.

To evaluate Toyota's assertions, NHTSA conducted a telephone survey of a sample of subject vehicle owners that experienced a fire. A majority of the owners surveyed did not experience any problems with the operation of the PWMS, such as "notchiness" or sticking, prior to the fire incident, while the remaining owners stated the PWMS worked intermittently or not at all prior to the incident. Those owners who experienced a PWMS problem prior to the fire incident did not report attempting to remedy or repair the PWMS problems on their own, for instance, by disassembling switches and/or spraying lubricants on the switches. NHTSA also analyzed several failed switches and found no evidence of any silicone, ester or other contaminants in the switches. Further, the grease found in the subject switches ODI analyzed, both failed and good switches, was determined to be the same (i.e., no difference was found between grease in the failed and the un-failed switches). Accordingly, ODI does not believe that the fires were caused by consumers spraying lubricants in their switches, as Toyota alleges.