

October 4, 2017

DEFECT INFORMATION REPORT

1. Vehicle Manufacturer Name:

Toyota Motor Corporation [“TMC”]
1, Toyota-cho, Toyota-shi, Aichi 471-8571, Japan

Affiliated U.S. Sales Company:

Toyota Motor Sales, USA, Inc. [“TMS”]
19001 South Western Avenue, Torrance, CA 90501

Manufacturer of the Hybrid Vehicle Transaxle Assembly:

Toyota Motor Kyushu, Inc.
1 Kamiariki, Miyawaka City, Fukuoka, 823-0015, Japan
Telephone: +81-949-32-5151

Country of Origin: Japan

2. Identification of Involved Vehicles and Affected Components:

Based on production records, we have determined the involved vehicle population as in the table below.

Make/Car Line	Model Year	Manufacturer	Production Period
Lexus / HS250h	2010	TMC	January 29, 2009 through September 8, 2010

Applicability	Part Number	Part Name	Component Description
MY2010 Lexus HS250h	30900-75020	Hybrid Vehicle Transaxle Assembly	HV Transaxle

- (1) Although the involved vehicles are within the above production period range, not all vehicles in this range were sold in the U.S.
- (2) The affected vehicle production period is from the start of production until the final vehicle which contains a hybrid transaxle assembly produced prior to a crimping machine change as discussed below.
- (3) Other Toyota or Lexus hybrid vehicles sold in the U.S. use a different hybrid transaxle assembly design, or a hybrid transaxle assembly containing a holding plate crimped by a different machine. Other vehicles sold in the U.S. are not equipped with a hybrid vehicle transaxle assembly.

3. Total Number of Vehicles Potentially Involved:

18,130

4. Percentage of Vehicles Estimated to Actually Contain the Defect:

Unknown. Toyota is unable to provide an estimate of the percentage of vehicles to actually contain the defect. Whether the manufacturing issue in this case will lead to a hybrid system shutdown, creating an unreasonable risk to safety depends on each vehicle's operating conditions over time and the actual crimping dimensions achieved at the time of manufacturing (which are not recorded as a part of the manufacturing process).

5. Description of Problem:

The subject vehicles are equipped with a hybrid vehicle transaxle assembly which contains Motor Generator 1 (MG1) for generating electrical power and starting the engine and Motor Generator 2 (MG2) for driving the vehicle. Due to insufficient crimping of a plate which holds the magnets on the MG1 motor shaft, the inner bore of the plate could wear, causing irregular movement around the motor shaft. In this condition, the plate could contact the electric motor coil and lead to a short circuit, illuminating warning lights and warning messages. In most cases, the vehicle will enter a fail-safe mode, resulting in reduced motive power and allowing the vehicle to be driven safely for a limited distance. Under rare conditions, the hybrid system could shut down, resulting in the loss of motive power (but not power steering and braking assist). Loss of motive power while driving at higher speeds could increase the risk of a crash.

6. Chronology of Principal Events:

February 2012 - July 2013

In February 2012, Toyota received a field technical report from the Japan market indicating that a Toyota SAI vehicle (a vehicle sold in Japan substantially similar vehicle to the Lexus HS250h), used as a taxi, allegedly experienced illumination of multiple warning lights and a subsequent

loss of motive power after driving a limited distance. The hybrid vehicle transaxle assembly, which includes Motor Generator 1 (MG1) for generating electrical power and starting the engine, was recovered and investigated. The investigation found wear at the bore of a plate which is crimped around the motor shaft in MG1 to hold the magnets and also evidence of contact between the motor coil and the worn plate. No other abnormalities were found in the other transaxle components. Toyota reviewed the production history for the transaxle assembly of this vehicle and found no evidence of abnormalities during the manufacturing process. Additionally, while the crimp machine had been changed in the production process in October 2010, there were no observed differences at this time in random crimping inspections of parts made before and after this change.

Toyota attempted to replicate the phenomenon considering the operating conditions of commercial-use vehicles, which experience high engine start frequency, but was unsuccessful. However, based on the February report, Toyota theorized that the crimping, which secures the plate to the motor shaft, could loosen due to the high frequency of input load to the MG1 for taxi-use vehicles and could wear the bore of the plate, causing irregular movement around the motor shaft. In this condition, the plate could contact the motor coil and lead to a short circuit. If this were to occur, the vehicle would enter a fail-safe mode, which reduces motive power but still allows the vehicle to be safely driven for limited distances. The hybrid ECU would detect the malfunction, store a diagnostic trouble code (DTC), and illuminate warning lights and warning messages.

During this period, in August 2012, Toyota also received a field technical report from the U.S. market indicating an illumination of warning lights and alleged loss of motive power where the customer was able to transition the vehicle to the side of the road safely. Toyota investigated the recovered hybrid vehicle transaxle assembly and observed damage in the MG1 that was similar to the first case from the Japan market. The available information at this time indicated that the vehicles experiencing this condition would enter fail-safe mode.

August 2013 - March 2016

Toyota sporadically received additional reports and attempted to replicate the phenomena through micro-vibration testing, endurance testing using an aged part, and thermal cycling testing. Because the phenomena mainly occurred on commercial-use vehicles, such as taxis, Toyota recovered hybrid vehicle transaxle assemblies and vehicle operation history data from the field to identify the difference in operation between non-commercial and commercial-use vehicles. As the thermal loads and input loads in commercial-use vehicles were significantly higher, Toyota conducted replication testing using elevated temperatures, well above normal operating conditions, and was able to duplicate the phenomena. However, at this time, there was no evidence that vehicles did not enter a fail-safe mode as designed when the issue occurred.

April 2016 - Mid September 2017

As Toyota received additional field information, Toyota noticed that there were no cases for vehicles equipped with a transaxle assembly manufactured after the October 2010 crimping machine change. Therefore, Toyota initiated a new investigation, focusing on the difference before and after the crimping machine change. Parts recovery from before and after the crimping machine change showed that several units produced before the crimping machine change had plates that were slightly loose. Further investigation of the crimping conditions

revealed slight differences in the crimp shape (i.e., lesser depth and width). It was also found that plates crimped before the machine change could be rotated by the torque applied to the plate during normal vehicle operation, but those after the machine change could not.

In addition to the above, Toyota analyzed the vehicle operation history data retrieved from cases occurring in the field in its continued quality investigation into the applied loads during vehicle operation. During this analysis, Toyota noticed one case in the Japan market which indicated that the system potentially shut-down instead of entering the fail-safe mode when the failure occurred. In this one case, the customer did not allege that the vehicle experienced a sudden loss of motive power. However, further analysis of this case indicated that the vehicle had no change of speed when the accelerator pedal was applied after the failure occurred, which suggested that the system did not enter fail-safe mode.

Toyota immediately began an investigation and replication testing to see if there was any previously unknown mechanism which could result in vehicle shut-down instead of entering fail-safe mode. As a result, it was determined that in rare conditions (where the battery state of charge is less than 80% and brakes are applied within 0.8 seconds after the abnormal voltage from the short circuit is detected), the hybrid system could shut down, rather than enter the fail-safe mode, resulting in the loss of motive power.

September 28, 2017

Based on the results of the above investigation, Toyota decided to conduct a voluntary safety recall campaign.

As of September 23, 2017, based on a diligent review of records, Toyota's best engineering judgement is that there are one Toyota Field Technical Report and 127 warranty claims (including 109 unverified claims) that have been received from U.S. sources that relate to, or may relate to, the hybrid vehicle transaxle failure caused by insufficient crimping of the plate in the MG1, and which were considered in the decision to submit this report.

7. Description of Corrective Repair Action:

All known owners of the involved vehicles will be notified by first class mail to return their vehicles to a Lexus dealer. Lexus dealers will replace the hybrid vehicle transaxle assembly with a new one.

Reimbursement Plan for pre-notification remedies

The owner letter will instruct vehicle owners who have paid to have this condition remedied prior to this campaign to seek reimbursement pursuant to Lexus's General Reimbursement Plan.

8. Recall Schedule:

Notifications to owners of the affected vehicles will occur by November 27, 2017. A copy of the draft owner notification letter will be submitted as soon as available.

9. Distributor/Dealer Notification Schedule:

Notifications to distributors/dealers were sent on October 3, 2017. Copies of dealer communications will be submitted as they are issued.

10. Manufacturer's Campaign Number:

HLE