

Toyota Motor North America, Inc.

Vehicle Safety & Compliance
Liaison Office
Mail Stop: W4-2D
6565 Headquarters Drive
Plano, TX 75024

November 17, 2021

DEFECT INFORMATION REPORT

1. Vehicle Manufacturer Name:

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

Toyota Motor Manufacturing, Kentucky, Inc. [“TMMK”]
1001 Cherry Blossom Way, Georgetown, KY, 40324

Affiliated U.S. Sales Company:

Toyota Motor North America, Inc. [“TMNA”]
6565 Headquarters Drive, Plano, TX 75024

Manufacturer of Vane Cap:

TAIHO KOGYO CO., LTD
3-65, Midorigaoka, Toyota-city, Aichi-pref., 471-0838, Japan
Phone: +81-565-28-2225

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
Toyota / Camry	2018-2019	TMC TMMK	January 16, 2017 through September 13, 2018

Applicability	Part Number	Part Name	Component Description
MY2018-2019 Toyota Camry	29300-25010 29300-F0010	Pump Assy, Vacuum	Vacuum Pump

- Note: (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) Other Toyota or Lexus vehicles sold in the U.S. use a different vacuum pump design, or the same vacuum pump containing a different vane cap material. Toyota or Lexus hybrid vehicles sold in the U.S. are not equipped with a vacuum pump.

3. Total Number of Vehicles Potentially Involved:

227,490

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

100% of the involved vehicles contain a vacuum pump with a vane cap of inappropriate material described in this report. Whether the issue, in each case, will actually lead to a sudden loss of brake assist while driving depends on the driving conditions such as frequent braking and/or long periods of idling.

5. Description of Problem:

The subject vehicles use a specific mechanical vacuum pump and a brake booster to provide power brake assist to the driver. This vacuum pump contains a vane that rotates inside the pump body to supply vacuum to the brake booster. A cap on each end of the vane helps the vane maintain contact with the pump body as it rotates. Due to the material of these caps, the caps may prematurely wear when the vehicle is operated under certain driving conditions such as frequent braking and/or long periods of idling. After sufficient wear, a cap can become stuck between the vane and the pump housing, breaking it, and potentially breaking other components inside and/or connected to the pump. If this occurs, the vacuum pump would no

longer supply vacuum to the brake booster. Continued application of the service brakes thereafter can deplete the amount of brake assist remaining in the brake booster. The driver may observe increased braking effort and an audible and visual warning. While the service brakes remain operational with a broken vane cap, depending on the brake application by the driver, brake performance could be suddenly reduced prior to any warnings. A sudden loss of braking assist while driving could increase the risk of a crash.

6. Chronology of Principal Events:

September 2019 – June 2020

In late September 2019, Toyota received a report from a dealer in the U.S. market on a 2018MY Toyota Camry equipped with a 4-cylinder A25A engine where it was reported that the brake pedal felt hard and the vehicle was difficult to stop. The field report indicated that no DTC was observed, but the vacuum pump gear had seized, and the end of the exhaust camshaft had broken off. Toyota recovered the parts and sent them to the supplier in Japan for further inspection and evaluation. From the part inspection, it was observed that a piece of the vane cap had broken off and was found lodged between the vane and the pump body.

After further evaluation with the supplier, signs of wear were observed on the vane cap at the location where it contacts the vane inside the vacuum pump. (Vane cap wear is not unexpected during normal operation of the vacuum pump over time, as the vane cap moves/slides on the vane while rotating inside the vacuum pump; Toyota specifies maintenance inspection(s) for vacuum pump operation.) Additionally, the supplier reviewed their manufacturing process history and records, and found that there were no manufacturing change points or abnormalities that may have contributed to the premature wear of the vane cap in the field vehicle. The supplier also reviewed sample parts from the same lot number of the affected vane cap and found no abnormalities in the parts.

By December, Toyota had received four additional reports and continued to recover the parts from those vehicles for inspection and evaluation of the vacuum pumps. Toyota continued to sporadically receive additional reports and continued to inspect the recovered parts from the field. After analyzing the additional recovered parts, Toyota identified that the molecular weight of the vane cap was smaller for the recovered parts. Toyota hypothesized that vane caps from the failed parts may degrade due to the thermal loading, resulting in premature wear during operation.

In April, 2020 Toyota began duplication testing on the vacuum pump operation with high temperatures. Toyota was investigating the run time versus wear on the vane cap. By June, the thermal load testing had concluded, and the results of the investigation found that the wear amount on the vane caps did not reach a level that would cause the vane cap to contact the rotor

edge inside the vacuum pump or contact the pump body and cause the vane cap breakage. Toyota was unable to duplicate the condition observed in the parts from the field through this testing. At this time Toyota believed that thermal loading was not a contributing factor to the premature wear of the vane cap.

July 2020- June 2021

In failed vacuum pumps with broken vane caps recovered from the field, Toyota had observed large differences in the wear amounts on the vane caps even for vehicles with similar mileage. As a result, Toyota began preparations to collect vehicle driving history from vehicles in the field. Toyota planned to target customers who had previously experienced a failure of the vacuum pump or had previously experienced a vacuum pump replacement. Unfortunately, due to the lack of availability of the data logging equipment and additional shipping delays, preparation for the activity was unable to be completed until November 2020. Additionally, due to impacts from COVID-19, Toyota was unable to get some customers to come to the dealers during this period or obtain owner consent to track their driving history.

In December 2020, Toyota began the installation of the data logging equipment into customer vehicles to begin gathering vehicle driving history. Based on Toyota's test criteria to understand driving history of these vehicles, it took approximately six months to gather a sufficient amount of driving data necessary for the evaluation. Due to the aforementioned lack of availability of equipment, Toyota could only gather data from a few customer vehicles at a time. Each vehicle had to drive for approximately two months in order to obtain a sufficient amount of driving data for analysis.

In June 2021, the collection of customer driving history was nearly complete, and some initial data had been sent for evaluation. Meanwhile, during a review of other field information, Toyota recognized the broad range of allegations (e.g., noise, warning messages, braking performance issues, pedal feel, etc.) that had been received and that the timing and progression of those indicators was unknown. As a result, Toyota decided to conduct duplication testing to understand the performance of a worn vane cap on a vehicle.

July 2021- October 2021

In July, the driver history data collection had been completed, and the vacuum pumps from those vehicles in the driving study were recovered and sent for evaluation. Toyota began to analyze the data, looking at various driving conditions in an attempt to understand how much load the vacuum pump was experiencing.

Additionally, in July Toyota started to recover parts to conduct the aforementioned duplication testing. After a review of the recovered parts, Toyota determined that none of the parts had enough wear to evaluate a potential failure during testing. As a result, Toyota produced special testing vane caps that had material intentionally removed (machined out) to simulate wear on

the vane caps.

In late October, after reviewing the test results and the recovered vehicle driving history data and data modeling, Toyota observed that the vane caps exhibited a larger amount of wear if the vehicle experienced more frequent braking or long periods of engine idling. Frequent braking and long idling could apply more load on the vane cap than vehicles with less frequent braking or less idling periods, leading to premature wear of the vane cap. After sufficient wear, a cap can become stuck between the vane and the pump housing, breaking it, and potentially breaking other components inside and/or connected to the pump. If this occurs, the vacuum pump would no longer supply vacuum to the brake booster. In addition, broken cap could cause the vane or the connecting portion between the pump rotor and exhaust camshaft to break. Continued application of the brakes could lead to an illumination of warnings, an audible chime, and can deplete the amount of brake assist remaining in the brake booster. Depending on the brake application by the driver, brake performance could be suddenly reduced prior to any warnings. A sudden loss of braking assist while driving could increase the risk of a crash.

November 11, 2021

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

As of October 26, 2021 based on a diligent review of records, Toyota's best engineering judgment is that there is 14 field technical reports (received between October 25, 2019 and October 26, 2021) and 61 unverified warranty claims (received between June 14, 2018 and September 20, 2021) that have been received from U.S. sources that relate or may relate to this condition and which were considered in the decision to submit this report.

7. Description of Corrective Repair Action:

All known owners of the subject vehicles will be notified by first class mail to return their vehicles to a Toyota dealer. For all involved vehicles, Toyota dealers will inspect the vacuum pump and repair or replace it, free of charge to customers.

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 Toyota's General Reimbursement Plan.

8. Recall Schedule:

Notifications to owners of the affected vehicles will occur by January 16, 2022. A copy of the draft owner notification will be submitted as soon as it is available.

9. Distributor/Dealer Notification Schedule:

Notifications to distributors/dealers will be sent on November 17, 2021. Copies of dealer communications will be submitted as they are issued.

10. Manufacturer's Campaign Number:

[Interim / Remedy] 21TB09 / 21TA09