

September 22, 2021

DEFECT INFORMATION REPORT

1. Vehicle Manufacturer Name:

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

Affiliated U.S. Sales Company:

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

Manufacturer of Hybrid Vehicle ECU:

DENSO CORPORATION
1-1, Showa-cho, Kariya-city, Aichi-pref., 448-8661, Japan
Phone: +81-566-25-5511

DENSO TEN Limited
2-28, Goshu-dori 1-chome, Hyogo-ward, Kobe-city, Hyogo-pref., 652-8510, Japan
Phone: +81-78-671-5081
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 / Prius, Prius Prime | 2022 | TMC | June 1, 2021 through August 3, 2021 |

| Applicability | Part Number | Part Name | Component Description |
|---------------------------|---|----------------------------------|-----------------------|
| MY2022 Toyota Prius | 89981-47U30 89981-47U40 89981-47U50 | Computer, Hybrid Vehicle Control | Hybrid Vehicle ECU |
| MY2022 Toyota Prius Prime | 89981-47S90 | | |

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) This issue only affects vehicles equipped with a hybrid vehicle ECU that contains the programming error described in this report. Other Toyota or Lexus vehicles sold in the U.S. are not equipped with those hybrid vehicle ECUs.

3. Total Number of Vehicles Potentially Involved:

8,411

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

100% of the involved vehicles contain a hybrid vehicle ECU with the programming error described in this report. Whether the issue, in each case, will actually lead to a hybrid system shut down while driving at higher speeds depends on whether the driver shifts the transmission such that the shifter position status signal happens to change during an approximately 0.1 millisecond window and the vehicle operating conditions at that time.

5. Description of Problem:

The subject vehicles are equipped with a hybrid vehicle ECU which, among other tasks, validates a signal reporting the transmission shift position by checking that the signal status remains consistent within an approximately 0.1 millisecond window during each check. Due to incorrect programming for this task, the hybrid vehicle ECU can incorrectly determine that this signal is erroneous if the shifter position status happens to change during this approximately 0.1 millisecond window. If this occurs, warning lights will illuminate and the hybrid system will shut down, resulting in loss of the motive power. If the vehicle loses motive power while being driven at a higher speed, there could be an increased risk of a crash.

6. Chronology of Principal Events:

July – August 2021

In early July 2021, Toyota received the first field report alleging warning lights illuminated on a subject vehicle in Japan. The dealer inspected the vehicle and found a DTC indicating hybrid vehicle ECU “Monitoring Processor Unexpected Operation.” The hybrid vehicle ECU from this vehicle was recovered to the supplier for investigation. However, the supplier could not identify any abnormalities with the ECU.

Toyota investigated the freeze frame data collected from this vehicle to better understand the potential vehicle operating conditions around the time that the hybrid vehicle ECU “Monitoring Processor Unexpected Operation” DTC occurred. It was identified that this DTC was set while the vehicle was stationary and just after the vehicle was shifted from Park to Drive. Through freeze frame data and the DTC detection criteria analysis, it was hypothesized that the data indicated an abnormal shift condition may have occurred and the hybrid system shut down could result from that condition.

Toyota searched for and identified other cases of alleging that certain warning lights illuminated and a hybrid system shutdown. These cases involved hybrid system shutdown occurring at lower speeds. Toyota analyzed the available freeze frame data for these cases. Through this search and analysis, Toyota identified that there were some cases in the Japan market where this same condition may have occurred when shifting the vehicle. However, in these cases, the shifting patterns were not limited to D and P (e.g., the patterns included shifting from D to N or D to R).

Based on the general conditions that were observed from the above cases, the supplier began

conducting tests in an attempt to duplicate the DTC, warning lights illumination, and hybrid system shutdown when shifting the vehicle. At this time, the condition could not be duplicated. Toyota determined that additional analysis was needed to help narrow the potential conditions to be investigated.

Toyota began reviewing the portions of the hybrid vehicle ECU logic that could prompt the aforementioned DTC. Based on this review, Toyota identified that a validation check occurs on the transmission shift position signal and that the ECU logic in the subject vehicles would set the aforementioned DTC after this signal fails the validation check only one time. This review also identified that other ECUs (in vehicles other than the subject vehicles) had a different logic for this validation check (i.e., they require this signal to fail the validation check more than one time).

Based on this new information, the supplier continued tests with narrower conditions to attempt to duplicate the failure.

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In early September 2021, the supplier duplicated the failure in simulation testing. Based on the result of the tests, Toyota identified that there is a possibility that the hybrid vehicle ECU could incorrectly determine that transmission shift position signal is erroneous if the shifter position status happens to be changed during an approximate 0.1 millisecond window in which the hybrid vehicle ECU validates that signal. This prompts the aforementioned DTC. It also causes warning lights to illuminate and a hybrid system shutdown to occur, resulting in a loss of motive power.

Based on additional analyses of the investigation information available at this point, it was also identified that the circumstances needed to create this condition could occur when shifting the vehicle from any position, such as shifting from D to B, which is an operation that could be performed by a vehicle operator while driving at higher speeds. Thus, Toyota determined that it is possible that this condition could lead to a loss of motive power while driving at higher speeds.

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

As of September 16, 2021 based on a diligent review of records, Toyota's best engineering

judgment is that there is 1 field report (received on August 24, 2021) and 0 warranty claims 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, dealers will update the hybrid vehicle ECU software to correct the programming in the hybrid vehicle ECU's shift monitoring logic.

Reimbursement Plan for pre-notification remedies:

As the owner notification letters will be mailed out well within the active period of the Toyota New Vehicle Limited Warranty ("Warranty"), all involved vehicle owners for this recall would have been provided a repair at no cost under Toyota's Warranty.

8. Recall Schedule:

Notifications to owners of the affected vehicles will occur by November 20, 2021. 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 September 22, 2021. Copies of dealer communications will be submitted as they are issued.

10. Manufacturer's Campaign Number:

[Interim / Remedy] 21TB07/ 21TA07