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REPORT

Ongoing NHTSA Research on Unintended Acceleration & Event Data Recorder (EDR) Readings

The National Highway Traffic Safety Administration (NHTSA) is currently conducting research exploring all possible causes of unintended acceleration, including electronic vehicle controls, mechanical failure, human error, and interference with accelerator systems. NHTSA has enlisted the expertise of researchers and engineers from the prestigious National Academy of Sciences and NASA for a pair of studies that seek to get to the bottom of unintended acceleration. In the meantime, NHTSA continues to review complaints from vehicle owners, analyze Early Warning Reporting (EWR) data submitted by manufacturers, and conduct field inspections for possible indications of additional defects.

Unintended Acceleration

“Unintended acceleration” is a broad term that encompasses many types of acceleration incidents, such as stuck throttles, trapped accelerator pedals, unwanted throttle opening, or various kinds of engine or vehicle surges. In the last 25 years, NHTSA has conducted 109 defect investigations and influenced 34 recalls involving unintended acceleration. In total, there have been 174 recalls related to unintended acceleration involving 14.4 million vehicles.

At NHTSA’s urging, Toyota Motor Corp recently conducted safety recalls involving more than seven million vehicles due to two vehicle defects that could lead to incidents of unintended acceleration: pedal entrapment and sticking accelerator pedals. While NHTSA has identified these mechanical safety defects as definitive causes of some unintended acceleration incidents in Toyota vehicles, NHTSA is continuing to work with NASA to identify other possible causes. Separately, NHTSA and the National Academy of Sciences are also conducting a broad review of unintended acceleration and its possible causes across the automotive industry.

Toyota Vehicles & Unintended Acceleration: NHTSA’s work with NASA

In a series of congressional hearings on the Toyota recalls and unintended acceleration, members of Congress indicated a need to conduct additional research into the possible role of electronics systems and electromagnetic interference in alleged incidents of unintended acceleration. NHTSA has brought in NASA engineers and experts in areas such as electromagnetic compatibility to study whether the electronic throttle control systems (ETCS) used in Toyota vehicles are susceptible to malfunctioning and can cause

unintended acceleration. There are more than a dozen experts from NASA assisting NHTSA with several courses of research:

- NHTSA and NASA are conducting vehicle tests at the Chrysler Group LLC Test Facility in Auburn Hills, Michigan to determine whether electromagnetic interference (EMI) may play a role in causing unintended acceleration. As part of the research, vehicles are bombarded with electro-magnetic radiation at varying strengths within specially-built chambers to determine whether this can produce unintended acceleration.
- NASA software experts in California are doing a thorough examination of ETCS software in Toyota vehicles, looking for any flaws or vulnerabilities that can result in unintended acceleration.
- At the Goddard Space Flight Center in Maryland, NASA hardware and systems engineers are rigorously examining and testing mechanical components of Toyota vehicles, and are generating test scenarios that could result in unwanted throttle opening.
- NHTSA is conducting tests on Toyota vehicles at its Vehicle Research and Test Center (VRTC) in Ohio to assess their braking, acceleration, and other capabilities and then looking at data from their electronic systems. This involves evaluating vehicles on a test track and in a laboratory environment.
- Finally, NHTSA and NASA are also conducting testing at the Vehicle Research and Test Center on Toyota vehicles to confirm if any test scenarios can actually result in unintended acceleration in vehicles operated in real-world conditions.

An Industry-Wide Look at Unintended Acceleration: National Academy of Sciences

In addition to NHTSA's work with NASA on unintended acceleration in Toyota vehicles, the agency has also enlisted the prestigious National Academy of Sciences to examine the broad subject of unintended acceleration and electronic vehicle controls across the entire automotive industry. An independent panel of scientific experts at the National Academy of Sciences will review industry and government efforts to identify possible sources of unintended acceleration, including electronic vehicle controls, human error, mechanical failure and interference with accelerator systems. In addition, the panel will make recommendations to NHTSA on how its rulemaking, research and defect investigation activities may help ensure the safety of electronic control systems in motor vehicles.

Event Data Recorders (EDRs)

As part of NHTSA's efforts to get to the bottom of unintended acceleration in Toyota vehicles, the agency has conducted 58 field inspections this year of vehicles in which unintended acceleration incidents are alleged to have occurred. In each inspection, NHTSA ascertained the underlying facts of the incident, examined the vehicle, and reviewed data stored in the event data recorders (EDRs).

In early April 2010, NHTSA obtained ten EDR readers from Toyota in order to allow agency investigators to obtain images of data stored in the EDRs in Toyota vehicles. Previously, Toyota had sole possession and access to its EDR readers. NHTSA's Office of Defects Investigation and its Special Crash Investigations unit both assigned employees to learn how to use the devices in order to conduct field inspections. NHTSA selected vehicles for inspection where: there was an allegation of unintended acceleration

or the possibility of unintended acceleration based on preliminary incident information; the vehicle was still available with the EDR intact; the vehicle contained an EDR with pre-crash data; and the owner of the vehicle was willing to allow NHTSA to read the EDR. It is also important to note that most Toyota models manufactured before 2007 were not equipped with EDRs capable of storing pre-crash data.

The limited research completed so far has not led to the identification of safety defects other than sticking gas pedals or pedal entrapment, but NHTSA and NASA are continuing to study whether there are potential electronic or software defects in these vehicles.

Of the 58 cases studied, thirty-five recorders showed that no brake was applied. Fourteen cases involved partial braking: nine cases where brakes were applied late in the crash sequence; three involving early braking; and two involving mid-event braking. One incident involved a case of pedal entrapment. Another showed that both the brake and the gas pedal were depressed. In one case the recorder only contained information related to a separate incident and in another, NHTSA is still working to resolve inconclusive data from an EDR. In five cases, the EDR was not triggered at all.

At this early point in its investigation, NHTSA officials have drawn no conclusions about additional causes of unintended acceleration in Toyotas beyond the two defects already known – pedal entrapment and sticking gas pedals.

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