

Automobile recalls due to serious software faults – examples

International and national standards, such as ISO 26262, based in IEC 61508 principles have now been introduced for the development of safety-related software in road vehicles. A large number of vehicles have had to be recalled for software faults. The list of affected manufacturers includes Cadillac, Ford, General Motors, Honda, Jaguar, Lexus, Nissan, Pontiac, and Toyota. A Google search for “automobile recalls software faults” produces a big response, of which the following are examples. It is to be hoped that new standards will reduce the occurrence of recalls.

Jaguar has recalled nearly 18,000 X-type cars after it discovered a major software fault, which meant drivers might not be able to turn off cruise control. The problem lies with engine management control software developed in-house by Jaguar. The problematic software is only installed on diesel engine X-Types, which were all produced between 2006 and 2010.

Some 17,678 vehicles have been recalled, as a result of the potentially dangerous problem. If the fault occurs, cruise control can only be disabled by turning of the ignition while driving - which would mean a loss of some control and in many cars also disables power steering. Braking or pressing the cancel button will not work. "Jaguar has identified that should an error with certain interfacing systems be detected the cruise control system will be disabled and an error message displayed to the driver on the instrument cluster," the company said in a statement.

Source: Computer World UK, 24 October 2011

The Prius, Toyota's technological flagship, may have a brake problem. Under certain conditions, according to the company, there may be slight interruption in the car's brake response. The fix, says Toyota, is a software update that dealers will download to all of the 133,000 2010 Prius and 14,500 of the similar 2010 Lexus HS250h models on the road. The brake system on these hybrids is complicated and different from what's on conventional cars. The system combines hydraulic brakes with brake regeneration and an anti-lock function.

Under light braking, the calipers don't squeeze the rotors. Instead, the resistance of the electric motors provides the deceleration. This is how the Prius captures the moving car's energy, charges the batteries, and later electrically boosts acceleration. Most hybrids work this way to keep fuel economy numbers high.

Harder braking engages the calipers in a normal fashion. And finally threshold, or maximum braking engages the ABS system to keep the tires from skidding. The computer choreographs the various functions with inputs from several sources like the wheel-speed sensors, battery-charge meter, and brake-pedal stroke.

Toyota says that under certain conditions, like on an especially bumpy or slippery road, there may be brief momentary delay in the brakes response. The car will still stop--we're not talking about brake failure here--but the distance required could increase slightly. The software fix tweaks the software to better deal with those rare conditions. There are no new parts with this recall. The technician will simply hook a laptop to the car and download the new firmware.

Source: Popular Mechanics, 9 Feb 2010

Honda stated that it is also recalling 5626 CR-Z vehicles from the 2011 model year in the United States that are equipped with manual transmissions, to update the software that controls the hybrid electric motor. Under certain circumstances, it is possible, according to the company, "...for the electric motor to rotate in the direction opposite to that selected by the transmission."

Honda also recalled 2.5 million 2005–2010 4-cylinder Accord, 2007–2010 CR-V, and 2005–2008 Element vehicles— 1.5 million in the United States—to update the software that controls their automatic transmissions. According to Honda, "Without the updated software, the automatic transmission secondary shaft bearing in the affected vehicles can be damaged if the transmission is quickly shifted between each of the reverse, neutral and drive positions, as may be done in an attempt to dislodge a vehicle stuck in mud or snow. If the bearing is damaged in this unusual scenario, it can cause the engine to stall or lead to difficulty engaging the parking gear. The update to the vehicle's automatic transmission control module software will ease the transition between gears to reduce the possibility of damage."

Source: IEEE Spectrum 7 Sept 2011