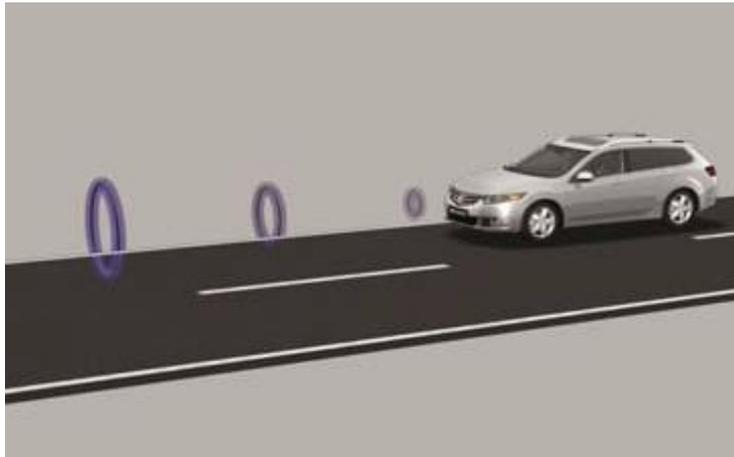




Reward 2010

Honda Collision Mitigation Brake System



Honda's Collision Mitigation Brake System (CMBS) is a radar-based autonomous emergency braking system. At speeds above 15km/h, moving and stationary vehicles are detected along a path some 100m ahead of the vehicle. When the system senses that the car is likely to hit one of these obstacles, a three stage process is initiated. In the first, typically around 3 seconds before impact, the driver is alerted by visual and audible warnings. In the second stage, when the system senses that a collision is still likely (typically some 2 seconds before impact), three sharp tugs are given on the seat belt and the car automatically starts to apply some braking. Finally, when a collision is unavoidable, CMBS tightens the front seat occupants' seatbelts (using reversible tensioners different from the pyrotechnic devices used during the collision itself) and applies a high level of braking force. This braking can be supplemented by the driver up to the maximum that the car is capable of.

All of the actions taken by CMBS are reversible: if an accident is averted (for example, if the vehicle moves out of the way at the last moment), the tension is removed from the seatbelts and the visual and audible warnings stop.

What is the safety benefit?

CMBS is a system designed to help prevent rear-end collisions with vehicles which are stationary or travelling in the same direction. Several studies have shown that driver distraction or inattentiveness is a factor in the great majority of rear end accidents. The system is aimed at alerting the driver to an imminent rear end collision both at low speeds, typical of urban driving, and at higher speeds typical of rural roads and highways. In such accidents, the most common sorts of injuries are to the cervical spine, the soft tissue of the thorax and to the knees. By studying accident statistics in Germany and extending the figures to the broader European community, Honda estimates that, if all cars were fitted with CMBS, around 19,000 accidents could be avoided and some 153,000 mitigated every year.

How has the system been assessed?

Two main types of track tests were done by Honda to establish the effectiveness of CMBS, both of them simulations of typical real world situations. To establish proper functionality of the system, a test driver drove towards targets, both moving and stationary, to determine whether or not the system reacted as intended: audible and visual warnings issued at the times needed, haptic warning by the seatbelt, followed by emergency braking. To determine the driver response to these warnings, volunteers were deliberately distracted while following a dummy vehicle which suddenly braked. The volunteers were not aware that this dummy vehicle could be safely pulled out of harm's way before a collision occurred. Volunteers could be used only once each in order to ensure that they did not anticipate the critical situation. By combining the results of the functionality and efficacy tests, Honda was able to ensure and estimate the effectiveness of the system in real-life situations.

What are the limitations?

CMBS is not switched on by default at the start of each journey. CMBS can be switched on and off by the driver by means of a dashboard mounted button. CMBS will remain active as long as the button is in the 'on' position.

CMBS relies on radar detection of the obstacles in front and is constrained by anything which limits its ability to detect, such as dirt, mud or snow covering the radar sensor. In such circumstances, the on-board monitoring system would notify the driver of impaired radar detectability.

CMBS was one of the first autonomous emergency braking systems to be developed and uses a single radar sensor which, in normal circumstances, will detect all vehicles from a small motorcycle upwards. Bicycles are usually not detected. Conversely, the system may sometimes detect metallic objects which pose no threat. More recently, multiple sensor systems are being applied by industry to overcome such issues. However, Honda has carefully balanced the sensitivity of CMBS to maximise its effectiveness when needed and to minimise irritation to the driver when it is not needed.



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