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Autonomous Emergency Braking (AEB)

The life-saving technology that should be standard fit in the UK

For further information and additional content, see www.thatcham.org/car-safety

What is Autonomous Emergency Braking? (AEB)

Autonomous Emergency Braking or AEB is a highly effective vehicle safety technology which monitors the traffic conditions ahead and automatically brakes the car if the driver fails to respond to an emergency situation. AEB is seen by experts as important a development as the seatbelt, but rather than protecting the occupant in the event of a crash, it aims to prevent the crash happening in the first place.

How can AEB benefit the UK driver?

AEB has a significant role to play in preventing a wide range of collisions. It can address both minor and major collisions and consequently associated injuries, costs and inconvenience. It will also contribute to the addressing of the whiplash epidemic that the UK insurance industry is experiencing and ultimately costing the motoring public in increased premiums. If the crash is prevented then so is any ensuing whiplash claim.

Is AEB called anything else?

Unfortunately yes. Different vehicle manufacturers use a myriad of different terms and marque specific trade names to describe what are all effectively AEB systems. Some alternative system names include;

City Safety – Volvo

City Brake Active System – Honda

Active City Stop – Ford

City Emergency Braking – Volkswagen

How does AEB work?

AEB systems use camera, lidar or radar sensors to monitor their environment and detect potential threats. Complex algorithms analyse sensor data to identify collision partners and in conjunction with vehicle motion data determine their relative position, speed and hence collision threat. If a critical situation is identified and the driver fails to react appropriately the AEB system can automatically apply the brakes to avoid the crash altogether or lessen the impact.

At what speeds does AEB work?

The speed range over which an AEB system operates is dependent on the type and complexity of sensor used. Improved performance can be achieved by combining multiple sensor types together in 'fusion' to complement one another for instance camera and radar together.

Low speed - Three-quarters of all collisions occur at speeds less than 20mph in so called 'City' driving environments. This is where AEB systems using the cost efficient lidar sensor are very effective, typically avoiding crashes at speeds up to 12-15mph and mitigating those up to 25mph. Relevant crashes include those that occur at junctions roundabouts and in stop start low speed traffic typically with one car running into the back of another.

Higher speed - More complex, but expensive radar sensors build on the low speed capability with the potential to avoid collisions with stationary and moving vehicles across at higher speeds. Teaming radar and camera sensors in “fusion” offers the potential to also address pedestrian and other vulnerable road user crashes. The camera complements the radar’s ranging ability by enabling object detection and classification and so adds to the overall performance capabilities of these systems. AEB sensing technologies are developing rapidly enabling an ever increasing ability to avoid crashes.

Is Forward Collision Warning (FCW) the same as AEB

No, FCW systems detect potential obstacles in the path of the vehicle and alert the driver with a warning. They can also support the driver by boosting the braking input as necessary to help avoid the crash and offer proven benefits in avoiding some crash types. However FCW systems do not brake the vehicle automatically, the driver must take action and apply the brakes in response to the warning. In many situations especially at low speeds there is not enough time for warning systems to be effective hence these are typically beneficial in higher speed traffic.

Is this the car taking over from the driver?

AEB systems are not designed to replace the driver whose responsibility it is to remain in control at all times. However with 90% of all crashes due to driver error there are inevitably times where the driver requires support to prevent a collision.

Will the drivers just rely on AEB and not bother to brake?

No, AEB systems intervene at the very last second and braking is deliberately harsh and uncomfortable to prevent what is known as driver adaptation.

If my car brakes suddenly because of my AEB system, will the car behind run into the back of me?

The AEB system cannot brake the car any more sharply than a human could in the same emergency situation. Automatic braking illuminates the brake lights as normal so alerting the following driver as usual. If the driver is following at a safe distance there will be time enough for him to react as normal.

Can AEB systems also detect pedestrians and cyclists?

Increasingly new systems are able to detect pedestrians, cyclists and large animals. This is particularly important in addressing the 400 pedestrian deaths on UK roads annually.

What evidence is there that these systems work effectively in the real world?

There is a wealth of international data available indicating the effectiveness of AEB and associated reduction in crashes and injuries.

One of the most recent studies was [issued by Euro NCAP and Australia NCAP in 2015](#) and showed that AEB reduced real world rear end crashes by 38%.

Thatcham produced a further study in 2015 using insurance claims data to demonstrate how the Volkswagen Golf with its standard fitment of AEB had seen a 45% reduction in third party injury claims compared to similar vehicles over a 12month period.

Does AEB work in all weathers and visibilities?

Thatcham has evaluated numerous AEB systems (radar, lidar and camera) and found that the systems operate in wet road conditions. Only heavy snow can affect the performance of some sensors but such conditions are rare.

Radar and lidar sensors function regardless of lighting conditions. Camera based systems however do need adequate lighting, However the majority of systems can work at exceptionally low lighting by boosting the gain applied to the signal – as per your mobile phone.

The ability to recognise pedestrians in the dark is challenging, however the vast majority of pedestrian collisions occur in urban areas where street lighting provides sufficient illumination for camera systems to remain effective.

How much does it cost for AEB?

The price to the consumer is entirely dependent on the vehicle manufacturer and their pricing strategy. Many vehicles have AEB fitted as standard (see Thatcham AEB fitment ratings), however where available as an optional extra it is often bundled in with other Advanced Driver Assistance Systems. The cost for optional AEB is on £1,300 on average, but can be as low as £180 for a simple “City” system.

Can AEB be fitted to my existing car?

No. AEB systems cannot be retro-fitted. When you choose your next car, check Thatcham’s website www.thatcham.org/stopthecrash to see if AEB is fitted as standard, or available as an optional extra.

Will AEB systems make my car more expensive to repair if I run into something?

Camera and lidar sensors are generally mounted behind the windscreen therefore they are well protected. Lidar sensors typically clip onto the windscreen and can be easily removed and refitted during windscreen replacement, whilst camera sensor assemblies are often bolted to the vehicle body. Repairs to the screen do not appear to affect the system performance.

There is some risk associated with radar sensors which are usually fitted at the front of the vehicle in more vulnerable positions, but we are already seeing evidence of manufacturers considering the protecting of the radar sensor by moving its location, or clever mounting to reduce the risk.

What are the KSI (Killed or Seriously Injured) savings that could be achieved by AEB?

Based on current fitment rates, Thatcham’s forecasts indicate that AEB has the potential to save 1,100 lives and 122,860 casualties over the 10 year period from 2015-2025.

Which cars currently have the system fitted as standard?

Some manufacturers such as Volvo, Mazda and Volkswagen offer systems as standard. However, almost all manufacturers have AEB systems available as optional extras. Thatcham provide a guide to fitment on their website at www.thatcham.org/stopthecrash

What proportion of the car parc currently has an AEB system available?

Thatcham's analysis shows that 41% of new vehicles currently on sale have some kind of AEB system available (January 2016) although only 17% of this is as standard fit. Of vehicles currently on the road the figure is currently around 2% but growing daily.

What else do I need to know?

The benefits of AEB have already been recognised by the British insurance industry and therefore cars with standard fit AEB already qualify for a reduction in vehicle insurance grouping of up to 5 groups. This can translate to a potential premium reduction to the policy holder in the region of 10%.

Thatcham as a key member of the European vehicle safety organisation, Euro NCAP, devised the AEB testing protocol which is used both by Euro NCAP and the British insurance industry to evaluate the effectiveness of individual AEB systems.

It is now extremely difficult for any vehicle to achieve the full 5 stars unless it has an AEB system or other active safety system fitted.

From 2016 Euro NCAP will begin to evaluate the capability of a vehicles' AEB system to detect and avoid pedestrians and from 2018 this will go further to include cyclists.

Facts & Stats

- Cars are safer now than they have ever been. Overall road deaths in Britain are down from nearly 3,500 in 2000 to less than 1,800 today. This despite the fact that over the same period mileage accumulated has risen from 290bn to 311bn. (source : DfT)
- Based on current fitment rates AEB has the potential to save 1,100 lives and over 120,000 casualties across the next 10yrs.
- If all cars in the UK were fitted with AEB, up to 100,000 rear end crashes could be avoided every year.
- Research shows that 75% of all collisions occur at speeds less than 20mph – AEB has the potential to prevent the vast majority of these.
- Of the top 10 best-selling new car models in the UK (Jan 2016), only 1 – the VW Golf - has AEB as 100% standard fit and insurance figures shown a 45% reduction in 3rd party personal claim injury costs on this vehicle.
- AEB is available on 41% of all new cars on sale in Britain; 17% of which is standard fit.
- The overall costs to the UK of an average 'injury' crash are in the region of £90,000. This includes the costs of emergency services, medical bills, congestion, damage to road infrastructure, lost output and insurance costs.