Road safety factsheet:
Electronic braking systems

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Brake assist

Brake Assist (BA) is a technology that ensures that the maximum pressure is applied by the brakes to stop a vehicle in an emergency situation. Some manufacturers also refer to the same system as Emergency Brake Assist (EBA).

How does it work?

When a driver makes an emergency stop the brake pedal must be pressed. The more pressure applied to the brake pedal, the greater the pressure through the braking system, which is amplified and provided to the brake. In some cases, a driver might fail to respond to a hazard up ahead as well as possible and fail to depress the brake pedal fully, meaning that the full pressure of the braking system is not being applied to the wheels.

Brake Assist detects how quickly the pedal is depressed to judge whether the driver wanted to perform an emergency-braking manoeuvre. If it concludes that the situation is an emergency and the pedal isn't depressed fully, it will increase the hydraulic pressure in the braking system to make up the gap. If the driver avoids the danger and removes or reduces the force on the pedal, the system will also reduce its involvement.

Brake assist and your vehicle

Brake Assist is based on the anti-lock braking system (ABS) technology of a vehicle and will not be found on a vehicle without ABS. It should not change how drivers respond to an emergency – drivers should still brake as hard as required.

It is safest to avoid finding yourself in an emergency situation where you are required to make an emergency stop. The best way of doing this is to ensure there is at least a two second gap between yourself and the vehicle in-front, and to drive at a speed suitable for the conditions.

Autonomous emergency braking[1, 2]

Autonomous emergency braking (AEB) is more advanced than brake assist, applying the brakes automatically without driver input if it deems that the vehicle is deemed to be about to crash. Although this system is typically designed to prevent rear-end shunts, some advanced emergency braking systems can detect pedestrians and cyclists, too.

How does it work?

The vehicle is fitted with laser and radar systems, which detect objects ahead and how far away they are, combining this with information on the speed and trajectory of the car, which determines whether or not an emergency situation is developing. Some cars are also fitted with a camera, and advanced systems can even distinguish between pedestrians and cyclists and non-moving objects such as bollards.

Once a potential collision is detected, the system generally tries to avoid impact by warning the driver that action may be needed. If no action is taken, the system will apply the brakes. Some systems apply full braking force, but some apply it gradually, aiming to reduce the speed at which the collision takes place.

There are different types of autonomous emergency braking systems, which work at different speeds. Some systems only work at lower speeds below 25mph, whereas some work at speeds up to 50mph and a few at motorway speeds.

These systems improve safety by helping to avoid collisions by identifying emergency situations and warning the driver. Although the system may not always be able to bring the vehicle to a halt, it can reduce the severity of crashes that cannot be avoided by reducing the impact speed of the collision.

Anti-lock braking systems

Anti-lock braking systems (ABS) are a form of electronic braking which was invented to help a driver control a vehicle under heavy braking by preventing the wheels from locking up.

How does it work?

During the braking process, there is a chance that the wheels stop rotating before the car comes to a halt. This process is known as 'locking up' and means that the braking force on the wheel is not being transferred efficiently to stop the vehicle because the tyre is sliding on the road. If the wheel locks up, it takes longer to stop because

[1] Car Advice (2014) 'Braking assistance technology explained: ABS, EBD, BA and autonomous emergency braking' http://www.caradvice.com.au/281461/braking-assistance-technology-explained-abs-ebd-ba-and-autonomous-emergency-braking/ - accessed July 2023

[2] What Car? (2015) 'Autonomous emergency braking explained' https://www.whatcar.com/news/autonomous-emergency-braking-explained/ - accessed July 2023

there is reduced grip between the car and the road, which in turn leads to an increased chance of losing control of the vehicle and skidding.

Electric sensors on vehicles equipped with ABS monitor the speed of the wheel as it rotates and detect if it is about to lock up under braking. When this happens the brakes are automatically released and then rapidly reapplied. This process occurs several times to prevent a skid and to ensure that a vehicle can be steered by the driver to avoid a collision.

In vehicles not equipped with ABS the best method to regain control of the vehicle is to 'pump' the brakes by taking your foot off the pedal and reapplying it, known as ‘threshold braking’. This allows the tyres to regain traction upon the road, rather than skid over the surface of it.

The main benefit of ABS is the control that a driver has over the vehicle's steering. In an emergency, the driver of a vehicle equipped with ABS will have a better chance of steering around the obstacle due to the reduced risk of skidding.

What to do in an emergency situation

If your vehicle is equipped with ABS, in an emergency situation, firmly press the brake pedal and keep your foot hard on the brake. It is likely that you will feel feedback from the ABS on the brake pedal in the form of vibration or pulsation. This can be an unfamiliar and may be an uncomfortable experience, but it is proof that the ABS is working as it should be.Care should always be taken to avoid any rash steering manoeuvres that would increase the severity of any collision.

Although ABS ensures that the minimum stopping distance is achieved, it is still important to drive at a safe speed for the conditions and leave a gap of at least 2 seconds between yourself and the vehicle in front to reduce the chances of needing to make use of the ABS.

Electronic Stability Control

Electronic Stability Control (ESC) is a crash avoidance technology which has been fitted as standard on all new cars since 2014.Electronic Stability Control (ESC) is a further evolution of electronic braking technology such as ABS. It is designed to detect the beginning of a slide and small amounts of braking can be applied automatically to individual wheels to regain stability.

How does it work?

There are many situations where a vehicle could lose grip with the road, for example, entering a corner too fast, losing control of the vehicle due to an inappropriate driving speed for the conditions, and after steering sharply to avoid an unexpected obstacle. Electronic stability control works by monitoring the position of the steering wheel and comparing it with the direction that the car is heading.If a loss of stability is detected, the system then restores the stability and control of the vehicle, by reducing the engine power to slow the car down, and braking individual wheels to rotate the car to face the direction intended by the driver.