Motoring Feature

ANTI-LOCK BRAKES –

GETTING THE BEST OUT OF THEM

Though Your Car May Have ABS Braking, That Doesn't Mean That A Few Easy Driving Techniques Can't Make The System More Effective. Jonathan Crouch Reports

Getting The Best Out Of ABS In Practice

(i) What Happens

Under normal operating conditions, a vehicle equipped with ABS stops by using the conventional braking system. In severe braking conditions, however, the ABS system is automatically activated when any one of the vehicle's wheels approaches a lock condition. The system determines when ABS activation is required through wheel speed sensors and an electronic brake module (EBCM).

The sensors continuously relay information concerning the rotational speed and acceleration of each wheel to the EBCM, which compares these inputs with calibrated values of allowable wheel slip and other pertinent vehicle dynamics information. If and when conditions warrant, the EBCM then signals the ABS system's hydraulic modulator to begin ABS action.

The system modulates pressure to the affected wheel(s) by first isolating the wheel brake from further pressure build-up. This is performed by closing the solenoid bypass valve and energizing an electric motor that closes the displacement cylinder check valve assembly as pressure is released.

(ii) How To Get The Best Out Of The System

Under normal driving conditions, ABS brakes do not operate any differently than conventional brakes. Motorists should operate the brake pedal as they normally would, gently pushing it down while applying steady pressure.

To correctly activate four-wheel ABS, step or push down hard on the brake pedal and hold it. Do not pump the brakes. Just keep your foot pressed firmly on the brake pedal and let the anti-lock brake system work for you. The motorist may feel the brake pedal vibrate, or notice some noise, but this is normal.

Rear wheel (RWAL) ABS systems are activated the same way as four-wheel ABS, by holding the brake pedal down. RWAL systems differ from four-wheel ABS in that the front wheels have conventional disc brake systems. Upon brake application, the motorist may feel the front wheels begin to lockup. If this happens, the motorist should momentarily release and reapply the brakes as necessary in order to avoid wheel lockup.

Unfamiliar users may want to practice an ABS-activated stop just to get a feel for the brake pedal and how the system works. However, they should always ensure that this is done in a safe area, such as a vacant car park clear of any obstacles.

The motorist should remember that in vehicles equipped with ABS, the system is always available, but if the driver does not maintain substantial pressure on the brake pedal, the system will not work properly, if at all.

CAR AND DRIVING

The Dangers Of ABS

Motor manufacturers would like us to believe that anti-lock brakes are the mechanical wonder of the century: perhaps they are. The biggest automakers certainly think so. General Motors, for example, has manufactured more than 12 million systems since 1991.

However, not all the facts support a universally positive view. Take the study performed by the American Insurance Institute for Highway Safety (IIHS). This states that "cars with anti-lock brakes are more likely to be involved in fatal crashes than cars without them."

This sounds alarming until you realise that in most cases, the technology itself is not the problem: it's the people using it. This needs to be taken into account when reading facts and figures about anti-lock braking systems. Injuries and deaths reveal alarming statistics. Even so, according to several industry

studies, ABS systems have also saved more lives in emergency situations than standard braking systems.

The concerns over ABS fall into the following categories:

Because a greater number of more affordable vehicles now come fitted with ABS, more and more inexperienced users are coming onto the roads. These drivers might panic while mashing down on the brake pedal to avoid an accident in emergency situations, and thus propel their vehicle into a potentially dangerous skid, especially under adverse road conditions.

Drivers are still pumping the brakes during sudden stops, or not steering away from obstacles even when the ABS system gives them the ability to do so. Many automatically come off the brake having stamped on it, subconsciously perhaps expecting the wheels to lock up.

Studies have shown that this can dramatically increase the stopping distance of ABS-equipped cars. To counter this, some manufacturers have introduced 'Brake Assist' systems that will ensure maximum braking in an emergency situation, even if a user fractionally relaxes his or her foot having stamped on the brake pedal.

Thanks to a false sense of security brought about by ABS, some people are driving at higher speeds and placing themselves at greater risk of having an accident. Some actually believe that they can travel at almost any speed and have the assurance that their anti-lock brakes will securely stop the vehicle on a dime, and without an accident.

When ABS Helps

ABS will greatly enhance the performance of conventional hydraulic brake systems in several critical areas:

1) ABS systems can provide shorter controlled stopping distances in hazardous conditions, such as on wet and slippery roads. These will certainly be greater than most drivers can achieve without an ABS system, thanks to the optimum braking pressure that can be applied at each wheel.

2) ABS will enhance steerability, allowing the driver to steer the vehicle in the desired direction during braking.

3) Perhaps most importantly, the ABS system enhances vehicle stability by preventing individual wheel lock.

Steerability

Under most driving conditions, ABS provides the driver with improved vehicle steerability in order to get around an object while braking, and provides improved vehicle stability while performing these functions so that the vehicle is less likely to spin out of control.

Stopping Distances

Braking performance is one of the most important contributors to driving safety. There are several hazardous situations in which an ABS system is advantageous. For example:

a vehicle in front of the motorist suddenly stops in heavy traffic

a child or animal runs into the motorist's path or a road obstruction suddenly comes into view, especially at night

All of these situations require a high level of braking performance, especially under adverse road conditions.

When ABS Doesn't Help

The amount to which anti-lock brakes can be effective depends on the road surface. Though Anti-locks can help a driver maintain control when the wheels would otherwise lock during emergency stops, they don't make much difference in stopping distances on dry roads. Why? Because maximum braking is easy to achieve on dry roads with or without anti-locks. Even if the wheels lock, the coefficient of friction between the tires and road surface is still fairly high, so a vehicle stops relatively quickly.

Moreover, on some slippery surfaces, such as roads covered with deep snow or gravel, braking distances can be longer with an ABS system. This is because the wheels keep rolling along the surface of the snow or gravel, rather than locking and ploughing the snow or gravel as the vehicle slides to a stop. The driver would, however, still have the control benefits of the ABS system.

The provision of ABS should make no difference to the amount of space a driver leaves to the car in front. Under good driving conditions, a motorist should follow at least 2 3 seconds behind the vehicle in front of them, a time which should be doubled if weather and/or road conditions are hazardous. These requirements are no different for vehicles equipped with ABS systems.

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