ABS - Anti-lock Braking System Explained

The following item is obviously well away from ‘classics’, but it’s something that all drivers should be aware of.

ABS brakes what an invention?? Stops the car on a sixpence you cannot hit anything, it’s a life saver. It does not matter how fast you drive, it will look after you.

If you believe that you are barking up the wrong tree, my fellow car enthusiast.

What is ABS??? It is a means of stopping the wheels on a car from locking under braking, why do we want that? I hear.

All the time the wheels, or should say tyres, are in contact with the road, and not sliding or skidding, the better the control of the car. So, one of the main safety features is that, under extreme braking, steering the vehicle is still possible. Avoidance of an obstacle is still possible under extreme braking, with perhaps a novice or a less proficient driver, or an emergency stop can be carried out with the necessary brake pedal pumping skills of perhaps a rally driver.

How???
Well, there is a computer (had to be somewhere) which is located under the bonnet somewhere, and these days with the modern cars it is attached to what they call a modulator block or control valve chest, which has all the four brake pipe circuits going through it, (that is, the pipes that carry the brake fluid to each wheel) the valve in the chest or block are controlled by the computer, and can be switched on and off, which stops any more fluid going to that particular brake, and also releases the pressure within that line. There is a pressure pump that pumps brake fluid to the chest and it can also replenish the pressure in the brake line.

So, we can switch pressured brake off and on to the brake lines, which then can control the wheels and increase and decrease the braking on individual wheels. All we have to do is monitor the speed of the wheels. If all four wheels are doing the same speed then no control is needed, but if one wheel is rotating more slowly than the other three, then it can be assumed that the wheel is beginning to lock or has locked. This then has to be unlocked to keep grip with the road.

This is where electronics come in. On each wheel there is a sensor which picks up a signal as the wheel is turning, which the computer monitors and check all wheels against each other, the speed will vary of coarse, but it is the difference in speed it wants know. When the brake pedal is depressed, the computer is activated for brake mode, if one or more of the wheels start to slow down then the computer activates the corresponding valve to release pressure, and when the wheel speeds up, it will allow the brake pressure back to where it was, until it starts to stop again, this whole process takes milli-seconds.

Now, what should the driver do?
Don’t drive too fast, that’s the answer, not if he or she has to do an emergency stop???? Well, they should be seated comfortably, and perhaps with both hands on the steering wheel, the left foot perhaps on the clutch pedal, but the right foot hard on the brake pedal, and when I say hard, as hard as possible, until a vibration is felt on the pedal, this is the abs working. Now, no extra pressure will do anything more, but the pressure should be maintained until the manoeuvre is finished. Take no notice of the vibration, that is the most important thing to remember is that it’s supposed to do that and it means you are stopping as fast as you possibly can. While this going on the advantage is, that you can steer away from the obstacle, and not skid out of control.

But!!!!!!!!!!!!!!!!!!
To every fairy tale there is a ‘wicked witch’, and that on wet or dry roads, everything is fine, and the system works well, if not exceptionally well, the but is in snow and ice. We will take ice first, well proper ice, that is a road below freezing after a hard nights frost, and then it rains !!!!! You are on your own, nothing will help you. You are in the lap of the gods, and don’t blame the car or the abs. Two tons of 2, or 4 wheel drive metal will not stop on ice. Take to green stuff at the side of the road if possible and pray.

Now snow?
This is very much different if it is laying snow, or even thick slush on the road. The abs system is a disadvantage, because if the wheels start to skid, a build up of a wedge of snow or slush builds up in front of each tyre. Under locking conditions this then helps to slow the vehicle down, and braking efficiency is increased quite dramatically compared with the abs system, which keeps on allowing the wheels to roll over this wedge, as the wheel begins to lock, so making braking very much more a lengthy process. This, even at comparatively low speeds, can give the driver a sense that the brakes don’t work at all and that is scary.

So in snow, either be very careful and give extra room between you and the car in front, or if you are brave and confident, take the abs relay, or fuse out and disable the system in those conditions, (many high performance cars especially the German ones have a switch on the dashboard that switch off the abs because of the reasons explained). I always advocate in snow conditions to try the brakes skid the car, or try and stop quick when its safe, just to see what happens and to know how slippery the conditions are, because not all snow and ice are the same.

I hope this has been helpful. Please be careful out there is no substitute for care and it’s better to be late than dead on time.

Jim Litchfield,
Motor Engineer. Ret’d.