Odds 'N' Ends

Vapour Locks

From time to time, we hear of vapour lock in the fuel system where the gas does not reach the carburetor but we seldom if ever hear of the vapour lock in the braking system. It exists.

When a driver places his foot on the brake pedal the pressure that he exerts actuates a piston in the brake master cylinder. This displaces a column of brake fluid to the slave cylinders on each of the four wheels. The pistons in these cylinders are operated by the movement of the fluid, that causes the brake shoes or the disc pads to be forced against the drums or the discs with the result that the vehicle slows down.

This system is simple and highly efficient. But it can go wrong. It is important that every driver should know how and why. His very life could one day, depend on his knowledge.

There is of course, the possibility of mechanical failure. This can, to a very large extent, be guarded against but a careful inspection of all components in the brake system.

A greater problem arises, however, in the case of the brake fluid, the condition of which is in every way as important as that of the mechanical parts of the system. Consider, for example, the possible consequences if this fluid vapourized at a critical moment under severe braking conditions.

Suppose it did not respond properly at low temperatures, or what the effect could be if the fluid were to cause internal corrosion of brake components or attack rubber seals and hoses. These things could happen.

This is why brake fluid is one of the most vital components of any vehicle. An engine oil or anti-freeze of poor quality might put the engine at risk, but not the driver or passengers A sub standard brake fluid can result in a fatal accident.

By far, the most important demanded of a brake fluids that it should be able to operate successfully at the high temperatures generated by the brakes during retardation. Brakes operate by friction and friction produces heat. Under exceptional conditions, discs and drums have been known to get red hot, and since the fluids is in close proximity to the heat source, it too can reach a very high temperatures. The amount of heat generated in the braking systems has greatly increased in the past few years and may well continue to increase. This has happened for reveal reasons;

1 - The higher speeds of which the modern vehicles are capable .
2 - The greater load on brakes resulting from the wider use of campers and trailers.
3 - Improvements in brake lining materials which dissipates the heat more readily.
4 - More restricted cooling airflow arising from the adoption of lower radiator levels, wider/lower profile tires and the fitting of spoilers and special wheels or wheel trims.
5 - The use of automatic transmissions which afford less engine braking.
6 - The ever increasing use of the efficient disc brake system.

For all these reasons, it has become increasingly important for a brake fluid to be capable of withstanding any tendency to boil or to vapourize as a result of the heat generated due to braking. Should vaporizing occur, the result would be at best, a 'spongy' pedal or at worst, complete lost of brakes with the pedal going fully to the floor without any prior warning at all. This can happen simply because vapour (i.e. gas) is compressible whereas fluid is not. All the movement of the pedal and of the master cylinder piston, can be taken up in the compressing the vapour without any of the effort being transmitted to the brakes themselves. . . Not good.

This phenomenon is known as "Vapour Lock." The vaporization of only a very small amount of fluid, perhaps .05ml. is all that may be needed to override the 10 to 20 ml. Pumping capacity of most passenger car master cylinders.

In most cases of vapour lock which have been studied, full braking efficiency has been restored once the system has cooled down and the vapour again condensed into a fluid. This effect might lead a prudent motorist to stop on encountering the first symptoms of vapour lock in order "to allow the brakes to cool down." But, in these circumstances, another factor needs to be taken into account. By stopping, the driver will have denied his brakes the benefits of the cooling airflow and so, for a time, the fluid will continue to absorb heat at, if anything, an even greater rate than before. This phenomenon is known as "Heat soak."

By stopping, the driver is undoubtedly doing the right thing. However, a stop of only a few minutes may do more harm than good. He should wait at least a quarter of an hour, and preferably longer in order to ensure that his brakes have fully restored.

Not only may vapour lock occur solely as a result of the generation of friction induced heat in the system, there is another important factor. This is the capacity of the conventional brake fluids, based on glycol and glycol esters to absorb water from the atmosphere, known as hygroscopicity and it results in lowering the temperature at which vapour lock in the brakes occurs.

Extensive tests have shown that the vapour lock point of a typical high quality fluid when new, is around 230 degrees C. This will drop over 12 month in service to approximately 165 degrees C. After two years, will be as low as 140 degrees C.

This is because of absorption of moisture, largely through the rubber hoses in the system which are slightly permeable. It is because of this progressive and unavoidable lowering of the vapour lock potential in service that many manufacturers recommend a change of brake fluid every 12 months. Time, not distance covered, is the significant factor here. Water will be absorbed by the fluid at a similar rate whether the car is in use or not. Even a brand new car, straight out of the dealer's showroom can contain sub-standard brake fluid as some months have passed since it was manufactured and the brake system charge with fluid. Foreign built cars may have undertaken long sea voyages can be particularly prone to this fault.

Although we seldom if ever hear of this vapourizing problem, it is more widespread than is realized. The chances of the police or others that are investigating the condition of the braking system after an accident and finding the symptoms of vapour lock without specialized equipment are remote because normal braking conditions will automatically restore themselves within twenty minutes or so of the accident occurring. During this time, the vapour has condensed back into a fluid as the brake components cool off. Brake fluid that is more than one year old is potentially dangerous in any car. It always carries with it the seeds of a sudden and complete brake failure and a driver's first experience with vapour lock could well be his last. The small cost of an annual change of fluid may be the best investment that a driver can ever make.

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** Claims are that the average women would rather have beauty than brains, because the average man can see better than he can think.