



Greased Lightning

There are three types of lightning; sheet lightning and positive and negative fork lightning. Sheet lightning is where there are positive and negative ions in the clouds and these ions discharge actually inside the clouds. The difference between positive and negative lightning is outside the scope of this article, but suffice to say it is known that positive lightning is the more powerful of the two.

A generally asked question is which way does lightning go, cloud to earth or earth to cloud? Well, it goes both ways. Electricity always looks for the easiest path to zero volts, or the path of least resistance. When sufficient potential has accumulated in the cloud a tracer will start from the ground, finding a low resistance path to the cloud, ionising the air as it does so. If you are close to a strike you will hear this as a fizz. This ionised path is of lower resistance to the surrounding air, so when the tracer connects with the cloud the lightning strike goes along the tracer path. The lightning is extremely hot, and the clap of thunder you hear is caused by the air instantly expanding along the lightning strike.

It is known that electro-magnetic waves, including light, travel at about 300,000kms per hour. Sound is a vibration, and travels at a much slower speed. It thus follows that the greater the time between seeing the lightning flash and hearing the thunderclap the further from you is the lightning strike. The rule is 5km for every second between the two events. So, a four second gap between the flash and the bang will tell you the strike was twenty kms away.

It is possible to take precautions against being struck by lightning, but because it is such a powerful force this is not an easy matter. It used to be common practice to place lightning conductors on the side of buildings but those made of iron or steel are useless. There is too much resistance in the metal. The only suitable metals for lightning conducting are gold, silver or pure copper which makes building protection an expensive business. The lightning would rather strike a wet tree where most of the tree's bulk is made up of water. Pure water itself is not a good electrical conductor. It is only when substances, especially salts, are

dissolved in it does it become a good conductor. This is why trees are seen with their trunks split apart from a direct lightning strike.

One precaution taken, especially with flat roofed buildings is to install pure copper strip, 3cms wide and 1/2cm thick around the perimeter of the roof, well connected to earth. When I worked as a civilian for the British Armed Forces, I remember that at one facility there was a munitions store well away from the other buildings and quite exposed. Pure copper strip had been installed as I have just described. One day it got hit by lightning. The copper strip had all but melted away, but it had done its job. The munitions store hadn't blown up.

Personal precautions are really down to common sense. Do not hang around in exposed open countryside or shelter under a tree during a storm. Lightning does not give any warning it is going to occur. Don't do stupid things like flying a kite like the American Ben Franklin did all those years ago. Being inside a car is all right as the car's metal shell creates, what is technically known as, a Faraday Cage, giving those inside protection.

This is why the passengers and crew do not get electrocuted if an aeroplane is struck by lightning.

Try to stay indoors during a storm. The walls and roof of a building are not good electrical conductors, although I do remember of a case where lightning struck the water tank in a house, narrowly missing a sleeping house occupant! Lightning produces an electro-magnetic pulse which can and will destroy electronic equipment, so I disconnect my satellite dish during a storm. The dish head unit may get damaged but the rest of my equipment won't. I have also installed lightning protectors on my telephones. These are readily available from Tesco Lotus etc. Also, remember to disconnect your computer from the telephone network.

The moral of this article? Take a few simple precautions and you too can laugh at the lightning.

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Now we are in the Rainy Season we are again getting used to rain storms, and as we live in the tropics, usually accompanied with Thunder and Lightning. As with most things in nature, the most dangerous can also be the most beautiful. I remember some years ago I was staying at a hotel on the top of the Zuchspitze, the highest mountain in Germany. After dinner we went to the bar, as you do, which had an observation room where there was a panoramic vista of maybe 50kms over the Alps. A thunderstorm was taking place and for over two hours we watched the display of lightning over the mountain ranges. Also, when I was at sea we weathered many storms, and I well remember a very close lightning strike to our ship. The air was then full of the smell of ozone, which smells very much like chlorine, from the ionised sea water where the lightning had struck. Incidentally, it is almost unknown for a ship to be struck by lightning. This is because sea water is a marginally better conductor than the metal hull of a ship, and electricity always goes for the path of least resistance.

What is lightning? Clouds, as we all know, are made up of water vapour. They are driven along by the winds, and as they travel over the sea, they become very dense and change from nice fluffy white clouds to nasty black ones. The earth has a magnetic field, and as the dense clouds pass through this field they collect an electrical static charge. In dry air, electricity requires a potential (voltage) of about 1000 volts to jump a 1mm air gap. Humid air, as occurs in a storm, is a better electrical conductor, but you can imagine how high a voltage is required to jump a gap of 500 metres or more.