

ElectroMagnetic compatibility and immunity.

Airbus, Wi-Fi and GSM: a protective Faraday Cage and an inverted Faraday Cage.

[Next-up organisation](#) 02 06 2009

The Airbus A330 and many other aeroplanes have a cabin and a layer of aluminium alloy (duralumin Au4G) that functions as a protective Faraday cage. However this also acts as an inverted Faraday cage by trapping and accumulating all the internal emissions from the artificial HF and LF electromagnetic fields generated by the equipment and gadgets used by passengers, in particular the ones with wireless connections.

It's significant that [the micro-relay antennas and GSM servers](#) installed in the plane do not have to be activated for the intensity of the HF electromagnetic fields to escalate (the same is true for trains). In fact it has been observed that passengers using their laptops hardly ever turn off the wi-fi function during flight.

In consequence, in certain exceptional conditions might not the threshold of electromagnetic security be suddenly surpassed and safety jeopardised by glitches in the electronic command systems, particularly in exceptional weather conditions (which it is impossible to test for).

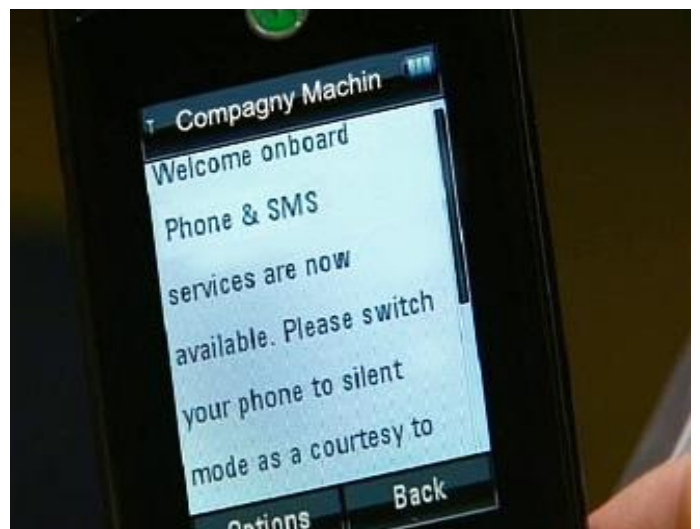
There is nothing unusual about a plane being struck by lightning, but since it is not connected to the earth the electrical discharge, which can momentarily reach millions of volts, only passes through the body of the plane, causing some disturbance but not any damage serious enough to put the plane in danger.



In order to reduce their mass the new generation of planes are built of composite materials such as that used in the Boeing 787 Dreamliner. In order to maintain the Faraday cage principle, which is fundamental, designers include in a sandwich of composites a special layer of mesh that matches in theory $\frac{1}{4}$ of the value of the wavelength, but which in practice has a high safety coefficient capable of cancelling out any interference from VHF radio frequencies (GHz).

However, the zero risk does not exist, in spite of the assurances from the experts regarding the certification of the GSM phone systems installed on board and [the press communiqué\(Fr\) on the Airbus A340](#) which specifies: ". . . As for all new certification procedures, certain difficulties had to be overcome. In particular, it was necessary to prove to the certifying authority that the installation and the activation of the system, combined with the use of mobile phones in the plane, did not disturb the systems that are essential to controlling flight."

Unfortunately the hazards of a glitch in the onboard electronics can become extremely serious.



It is amazing that Airbus and other aeroplane companies have not, in spite of an alert issued worldwide on 15 October 2008 following an incident on the A330-300 of the Qantas flight QF72, paid any attention to the remarks of Cyrille Comar (president of the AdaCore company), who markets test software for checking the integrity of the key software for the on-board computers made by Northrop Grumman Corp that are used in the Airbus A330-300.

"It should be said that accidents of this kind are very rare. The key software has been certified DO-178B, it's a procedure I know well and it includes the best current practices. But you can never give a 100% guarantee of reliability," he explains.

[\[Le Journal du Net: details of the glitch that for two minutes caused the sudden loss of altitude on the Airbus A330-Fr\].](#)



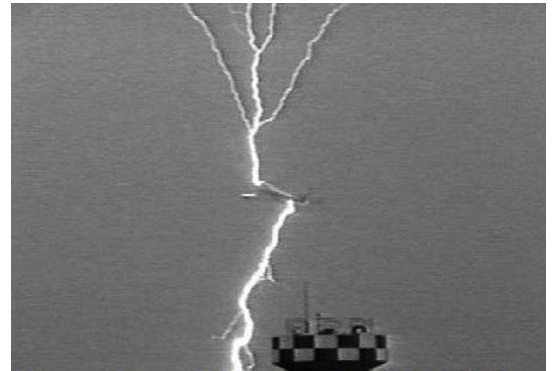
Evacuation of passengers from [Qantas QF72](#)

Among the list of exceptional events to be considered is a lightning strike on a plane. Though not in itself serious, in view of these warning incidents might it not now have a more damaging effect, and even be amplified not only by the accumulation of electrosmog generated by the wireless equipment used by the passengers, but also by the micro-antennas and GSM servers on the plane, which are connected with the outside world?

The worst scenario? When there is a flash of lightning, might there not be a sudden energy burst from a powerful HF signal from these antennas and servers that spreads instantly throughout the plane to all the functioning laptops and mobile phones?

We know after all that there is no effective protection against the overload caused by lightning and that the greater part of it is discharged via the circuit breaker arcs.

Thus it is entirely possible that for a short moment the safety threshold protecting the on-board electronics would be completely surpassed.



For those who do not really understand the notion of electromagnetic compatibility and the impact on electronics we advise watching an explanatory extract of a report by France 5 TV: "[China – USA, a war without limits](#)" (Fr - HD video)

Please note: We do not intend to imply any connection whatever with the tragedy of the Airbus A330 of flight AF447.

Lin Chung-bin, former defence Minister of Taiwan: *«...I asked the leaders of the Pentagon why you don't say that they have generated their electromagnetic pulses in the conventional way and they said, "We don't want them to know that we know. Electromagnetic pulses generated in the conventional way cause fewer problems, are easier to use and more practical."*

