

Future aircraft ‘Black Boxes’ will stream data to earth in real time

16 September, 2009 11:14:00 [Michael Cosgrove](#)



Flight recorder. Photo: Olli-Jukka Paloneva (CC)

An exclusive interview with the leading developers of continuous data-streaming flight data recorders.

The AF447 disaster and its inconclusive aftermath have once again highlighted how crucial the contents of the "black box" flight data recorder, or FDR, are in analysing the cause of accidents. The plane crashed into the Atlantic in an area where the ocean's depth is around 6000 meters. That meant that the FDR's have not yet been found. If that remains the case the causes of that accident may never be known.

A Canadian company, [AeroMechanical Services](#), has developed an updated version of the FDR. This new generation of FDR continuously streams flight data to ground-based reception facilities in real-time, and the system may soon make black box searches in aircraft crash zones a thing of the past.

The company has begun in-flight service testing of its FDR with several airlines.

The current generation of flight data recorders, which are heavily protected in case of accident, record up to 88 flight parameters such as speed, flight patterns and position, as well as data related to the plane's various systems including computers, hydraulics, engines and flaps. The data is recorded and stored in real time, but it is not transmitted to the ground. This means that the data they contain can only be accessed and analysed when the plane lands or if it crashes. FDR's are fitted to almost all large modern aircraft and are mandatory on airliners.

There have been several instances of FDR's never being found and many others where they were so badly damaged that the data they contained was wholly or partially unusable, considerably reducing the chances of finding out why the accident happened.

That's where data-stream FDR's, also known as 'Smart Boxes' or 'Live Boxes' come in. They send all their data to the ground in real-time, so even in the event of an accident all the data sent by the plane is received up to the moment the plane crashes or the FDR's are disabled for another reason.

Any investigation into an accident could thus instantly begin analysing the data sent. That would considerably reduce the time taken to identify the causes of an accident and that would mean that airlines and the aviation industry would be able to react more quickly in order to take the necessary steps to avoid similar accidents in the future.

If a continuous data-stream FDR had been in use on AF447 when it crashed, all the data sent by the plane would have been received up to the moment the plane hit the water or it could not transmit for another reason. That would have made the search for the FDR unnecessary, and French aviation authorities would most likely already know exactly what caused the crash.

Both airlines and pilots have called for them to be developed but the technical problems involving the transmission of so much data at once have proved to be insurmountable up until recently.

Bill Tempany, AeroMechanical Services Chairman, told *Flesh and Blood* today that the new FDR being tested, called AFIRS, for Automated Flight Information Reporting System, has so far done very well in tests.

"Our ground tests were very successful" he said "so we now have AFIRS installed for testing on aircraft belonging to three airlines. Those tests have gone well too."

One of the biggest challenges faced by the system's developers has been to find a way of sending large amounts, or 'packets,' of data in real-time and from every corner of the globe. Current satellite systems cannot handle that much information at once.

AFIRS uses Iridium satellite communications, which have the advantage of covering every part of the globe. They too can only handle a limited bandwidth, thus they cannot handle large amounts of data, but AFIRS contains new data compression technology designed to reduce the size of data packets and fit them into the available bandwidth.

This is the system which is being tested, and Tempany explained how its real-time features are used.

"We don't just receive and store the data. In fact there's more than just data because we work with Flightscape, which is a flight-simulator software system. That software is able to reproduce the exact conditions of the flight in visual terms, including what's happening on the dials in the cockpit."

Another feature of the new generation of FDR's is its real-time use to help aircraft and their crew if necessary. An airline knows instantly if anything happening to one of its planes needs to be brought to their attention

“We are able to react with a plane in real-time” explains Tempany. “If necessary, we can speak to the pilot or send him text messages in order to resolve problems and keep him informed of what’s happening on the plane.”

All the information received by AFIRS can also be used to improve maintenance quality and reduce its cost because it instantly reveals any anomaly in the plane’s systems and thus makes trouble-shooting more efficient.

Tempany explains that “It’s more than just a flight recorder; it’s a service to airlines too. It will help reduce airline costs in many ways, both in the air and on the ground. By providing precise details of so many flight parameters to them, airlines will be able to react to situations more quickly and develop more efficient operating methods.”

In a related development, Airbus recently announced that it was exploring the possibility of using continuous data-streaming FDR’s in the wake of the AF447 disaster, but Tempany could not confirm that his company was in contact with the airline.

Airbus representatives in France and England were not available for comment, although one employee denied to Flesh and Stone that they were in contact with any developers, contradicting the official Airbus statement by its chairman Thomas Enders which said it was discussing the system with “..our partners and suppliers.”

Airlines all over the world will be following and analysing the results of the tests on the AFIRS system closely, and Tempany sounded optimistic, saying “This system, in financial terms, will be amortized by airlines much more quickly than existing versions, and it will offer more benefits.”

If those tests are successful, the nature of the technology used in Flight Data Recorders is likely to change almost overnight and searches for them in the event of accidents may soon become a thing of the past.