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FlyhtStream taps black box data in-flight

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AeroMechanical Services (AMS) and Iridium have developed a solution that can monitor aircraft emergencies in near real-time, as opposed to searching for the Flight Data Recorder (FDR) after the event in order to determine what caused an aircraft to crash. ***Sharon Gill*** reports ...

With AMS providing data and voice communications services for the aviation industry with its Automated Flight Information Reporting System (afirs™), and Iridium operating the world's largest commercial satellite network, the two companies have demonstrated the ability to capture and continuously stream in-flight position and performance data from an aircraft's flight data recorder (FDR).

Using an operating mode of afirs known as FlyhtStream™, the solution combines onboard smart electronics technology, a satellite constellation with full global reach - including over the Poles, and secure Internet-based data delivery to end users.

Should an abnormal event occur during an aircraft's flight, the system triggers an alert and begins streaming data via Iridium to designated recipients, including airline executives and ground support crews, aircraft and engine manufacturers, air traffic control, and search and rescue.

The system has been trialled in-flight over the Atlantic Ocean and other areas globally, and afirs already is being used by more than thirty passenger-service airlines and business aviation customers as an economical solution to monitor in-flight aircraft performance from anywhere in the world.

While FDRs accumulate a detailed record of hundreds of in-flight operating parameters, their primary function is to provide flight history for post-event investigation - assuming the FDR can be located and recovered.

FlyhtStream can be used to analyse, diagnose and resolve in-flight problems as they occur, potentially preventing an aircraft crash rather than merely recording it. But should the worst come to the worst, FlyhtStream would eliminate the need to search for - and perhaps fail to locate - a downed aircraft and its FDR.

Two cases in point are:

- **South African Airways Flight 295** (the Helderberg), which crashed into the Indian Ocean near Mauritius in November 1987, after incorrectly reporting its location to Mauritian air traffic control. In the deepest successful salvage operation ever conducted, one of the FDRs was recovered, which enabled investigators to conclude that a fire in the cargo hold caused the crash, although they were unable to determine what caused the fire in the first place.

- **Air France Flight 447**, which crashed into the Atlantic Ocean in June 2009 en route between Rio de Janeiro and Paris; the FDR and much of the wreckage has never been recovered, and investigators still do not know what caused the aircraft to crash. The loss of Air France 447 drove home the need to improve in-flight tracking and air traffic management of aircraft flying transoceanic routes and over remote land areas.

Afirs does not replace black box technology; it monitors aircraft sensor data - capturing, recording and analysing pre-selected criteria where performance deviations signal the need for maintenance. High priority data is relayed to users on the ground; lower priority data is saved for downloading after the aircraft has landed.

FlyhtStream actually uses the FDR capabilities and can be programmed to automatically trigger an alert and begin streaming data if an abnormal operating condition is detected. The data-streaming capability, including the continuous transmission of an aircraft's GPS coordinates, can also be triggered by the pilot or remotely by ground crew.

A major issue, as the New York Times points out, is the sheer volume of data to be transmitted. Despite data compression, this requires enormous chunks of bandwidth. At a cost of between $3 and $5 per minute, continuous real-time data streaming would add hundreds of millions of dollars a year to the airlines' operating costs.

To reduce this cost, airlines may define which in-flight data they wish to receive, and the system can be programmed to transmit routine data messages at specified intervals.

Iridium provides afirs users with global coverage: its 66 low-earth orbiting satellites circle above Earth on polar orbits, intersecting over the North and South poles. Iridium's constellation offers the only reliable and continuous two-way communications link with aircraft flying over the Polar Regions, transoceanic routes and remote land areas.

Furthermore, Iridium is designing and building its next-generation satellite constellation, Iridium NEXT, with launches scheduled to begin in 2015 and full replacement of the current constellation planned for 2017. Amongst other improvements, Iridium NEXT will deliver faster data speeds.