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Moving past the black box to track flights

FARNBOROUGH, ENGLAND

Failed hunts to recover data recorders lead to real-time tracking tools

BY NICOLA CLARK

In the year since the fatal, still-unexplained crash of a French airliner over the mid-Atlantic, interest has intensified in technologies to enhance the tracking of aircraft over remote areas and enable real-time transmission of the information contained in a plane's "black box" flight recorders.

Until recently, the main obstacle has been not technological but financial — the high cost of transmitting so much data from so many planes, nonstop.

But the failure to locate the wreckage of Air France Flight 447 — which disappeared on June 1, 2009, en route to Paris from Rio de Janeiro with 228 passengers and crew members on board — has prompted a number of initiatives involving manufacturers and regulators to devise new systems. Several companies also are actively marketing products to stream black-box and other aircraft data using satellites and the Internet, but selectively, so as to reduce the expensive bandwidth required.

"The momentum for a real-time solution is significant and ramping up," said Dale Sparks, chief technology officer of Star Navigation, a start-up based in Toronto that has patented what it calls a "next-generation black box" and recently signed a technology-sharing agreement with Astrium, the space and satellite division of European Aeronautic Defense & Space. Mr. Sparks said the company's system could detect the earliest signs of potential problems while an aircraft was still in flight and automatically transmit an alert to staff members on the ground via an e-mail or text message.

Matt Bradley, vice president of business development at AeroMechanical Services, or AMS, based in Calgary, Canada, said the Air France crash "has clearly increased awareness of the vulnerability" of aircraft that fly over oceans or remote areas, including polar ice caps.

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Aerospace firms seek real-time flight monitoring

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''The thought that an aircraft could go missing for six hours without air traffic control on either side of the Atlantic noticing — the public was clearly shocked by that,'' Mr. Bradley said.

AMS teamed up last year with L-3 Communications, the largest maker of flight recorders, to promote its system, which uses the global Iridium satellite network to send in-flight data to ground stations. The company said its technology was currently installed on more than 200 planes with 25 different operators, including airlines, business jet and military customers.

Both Star and AMS have come to this year's Farnborough International Airshow, one of the world's largest aviation bazaars, to exhibit their wares, which have been in development for nearly a decade. With a number of air accident investigators and safety experts now urging that some form of in-flight data transmission be mandated internationally, these companies and others are positioning themselves for a potentially lucrative market.

''People absolutely smell money here,'' said William R. Voss, president of the Flight Safety Foundation in Alexandria, Virginia. ''This is not rocket science.''

The hardware itself sells for around $50,000 to $70,000 per plane, compared with $10,000 to $20,000 for a conventional black box. But for airlines, he noted, ''the real cost is not the system but the phone bill.''

The sheer volume of data contained in a plane's two black boxes — the flight data recorder, which contains 25 hours of information on the plane's position, speed, altitude and heading; and the cockpit voice recorder, which contains the final two hours of cockpit audio — requires enormous amounts of bandwidth to transmit. The cost to send that data via satellite can be $3 to $5 a minute.

For major airlines with hundreds of planes in their fleets, real-time streaming of flight data from takeoff to landing would cost in the hundreds of millions of dollars annually, some industry executives estimate.

''Cost was an issue if the original plan was to download as much information as possible,'' said Mr. Sparks of Star Navigation.

But providers are seeking to reduce the expense by allowing the airline to define which information they wish to monitor and how frequently they want it transmitted during a flight. Both the AMS and Star Navigation systems are programmed to automatically switch to live streaming after an incident or anomaly is detected during flight, and pilots can also activate it manually.

''It just needs to be able to sit as a sentinel waiting for these alerts and to be able to transmit the data when it's needed,'' said Mr. Bradley of AMS. ''You only pay when data are transmitted.''

Air accident experts say access to real-time flight data could have gone a long way toward solving the mystery of what happened to Flight 447, an Airbus A330 that went down in heavy thunderstorms more than 600 miles, or 970 kilometers, off northern Brazil. French investigators have scoured roughly 1,200 square miles, or 3,100 square kilometers, of seabed — at a cost of nearly $40 million — but the black boxes and the bulk of the wreckage have never been found.

Without the flight recorders, investigators have said it may never be possible to determine the definitive cause of the disaster. So far, the main source of information about what happened is a series of maintenance messages sent using the plane's Aircraft Communications Addressing and Reporting System, or Acars, a digital link used for sending simple text messages via radio or satellite.

But Acars does not have the bandwidth needed for sending flight data or cockpit audio files.

''Clearly it's a good idea to have more data than we did in the Air France case,'' said Mr. Voss of the Flight Safety Foundation. ''These technologies hold real promise. The caution will be to keep the requirements realistic.''

The European Commission and the International Civil Aviation Organization have each established task forces to study in-flight streaming technologies alongside other ideas for improving recovery of black boxes from a crash, including enhancing the power and battery life of the boxes' audio beacons, or ''pingers,'' and flight recorders that eject on impact with water and float on the surface.

The European project, known as Optimi, is conducting trials of in-flight data streaming over several zones across the North and South Atlantic Oceans this summer on several planes operated by Airbus, Air France and Air Europa. Results of those tests will be included in a set of recommendations the group plans to submit to the E.U. transport commissioner, Siim Kallas, by the end of this year.

The I.C.A.O., an arm of the United Nations, also plans to issue its own recommendations in the autumn.

Airlines, meanwhile, are cautious about absorbing significant new costs to address the very rare cases when a plane's black boxes cannot be found. According to the International Air Transport Association, there have been only 11 cases in the past 35 years where flight data recorders were never recovered.

''Individual airlines are struggling for their financial survival right now,'' said Mr. Bradley of AMS, making investments in technology that is not currently required ''a secondary concern.''

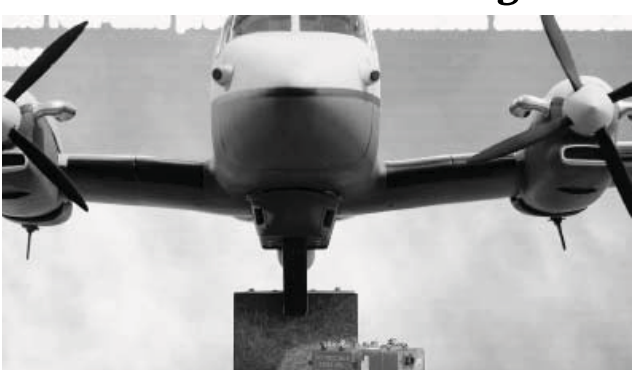
That is especially so in parts of the world where aircraft often are not even equipped with the most basic safety equipment. ''If you had a dollar to spend on safety in certain developing countries, this would be the last thing you'd spend it on,'' said Mr. Voss.

Bruce Coffey, president of L-3's aviation recorders division, said the early adopters tended to be smaller carriers and business-jet operators that faced less of an initial investment than major airlines with large fleets.

But carriers that now use data-streaming say they are convinced the technology will win more converts over time.

''There have been many quantum leaps in aviation safety over the years, and this stands out to be the next one,'' said Paul Sterbenz, vice president of strategic development at North American Airlines, which operates charter services for the U.S. military and other government agencies. North American, based in Jamaica, New York, installed AMS's data-streaming system on its fleet of 10 Boeing 757 and 767 jets in 2008.

''I believe it will eventually become standard,'' he said.



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An L-3 flight data recorder at the Farnborough International Airshow on Wednesday. L-3 uses satellites to send data to the ground.

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Inventor of black box dies

An Australian scientist credited with inventing the flight data recorder to help investigate aircraft accidents has died at the age of 85, military officials said Wednesday, Reuters reported from Canberra.

David Warren, a research scientist at the Aeronautical Research Laboratories in Melbourne, came up with the idea of a crash- and fire-proof machine to record the crew's voices and instrument readings after helping to investigate the mysterious crash of the world's first jet airliner, the Comet, in 1953.

Mr. Warren designed and built a prototype in 1956, but it took five years before the value and practicality of his invention was realized.