

Black Boxes Point to Pilot Error

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(WSJ) The pilots of an Air France jet that crashed into the Atlantic Ocean two years ago apparently became distracted with faulty airspeed indicators and failed to properly deal with other vital systems, including adjusting engine thrust, according to people familiar with preliminary findings from the plane's recorders.

The final moments inside the cockpit of the twin-engine Airbus A330, these people said, indicate the pilots seemingly were confused by alarms they received from various automated flight-control systems as the plane passed through some turbulence typical on the route from Rio de Janeiro to Paris. They also faced unexpectedly heavy icing at 35,000 feet. Such icing is renowned for making airspeed-indicators and other external sensors unreliable.

Ultimately, despite the fact that primary cockpit displays functioned normally, the crew failed to follow standard procedures to maintain or increase thrust and keep the aircraft's nose level, while trouble-shooting and waiting for the airspeed sensors and related functions to return to normal, according to these people.

Slated to be disclosed by investigators on Friday, the sequence of events captured on the recorders is expected to highlight that the jet slowed dangerously shortly after the autopilot disconnected. The pilots almost immediately faced the beginning of what became a series of automation failures or disconnects related to problems with the plane's airspeed sensors, these people said.

The crew methodically tried to respond to the warnings, according to people familiar with the probe, but apparently had difficulty sorting out the warning messages, chimes and other cues while also keeping close track of essential displays showing engine power and aircraft trajectory.

Spokesmen for Air France, a unit of Air France-KLM, and Airbus, a unit of European Aeronautic Defence & Space Co., have declined to comment on any details of the investigation. Airbus last week, however, issued a bulletin reassuring airlines that the preliminary readout of the recorders hasn't prompted any "immediate recommendation" regarding the safety of the global A330 fleet. French investigators, who gave the green light for that statement, also have said their preliminary findings don't highlight any major system failures or malfunctions that could have caused the fatal dive.

The Air France pilots were never trained to handle precisely such an emergency, according to safety experts and a previous report by France's Bureau d'Enquetes et d'Analyses, which is heading up the investigation. All 228 people aboard Flight 447 died in the accident.

The senior captain, Marc Dubois, appears to have been on a routine rest break in the cabin when the fatal chain of events started, according to safety experts familiar with the details, but the cockpit-voice recorder suggests he may have rushed back to the cockpit to join the other two Flight 447 pilots.

Though Friday's announcement won't provide final conclusions or specific causes, investigators believe Air France didn't train its pilots to cope with such automation problems in conjunction with a high-altitude aerodynamic stall, an emergency when the wings lose lift and the plane quickly becomes uncontrollable. Since the crash, Airbus and a number carriers, including Air France, have emphasized such training.

According to a report issued by French investigators in November 2009, Airbus identified 32 instances involving similar model jetliners between 2003 and 2009 in which external speed

probes, known as pitot tubes, suffered ice buildup at high altitude and caused "erroneous air speed indications." Over the years, the same models also suffered numerous failures of external temperature-sensors because of icing. Both issues were known to Air France.

Most of the incidents with speed sensors involved probes similar to those on the A330 that crashed. Many were on Air France planes, according to the BEA report.

Friday's update follows sniping between senior officials of Air France and Airbus, usually close corporate allies, who in this case have tried to shift the blame for the accident to each other.

Air France began addressing problems with its pitot tubes almost a year before the crash. Amid several incidents in which air crews lost speed indication at high altitude during 2008, Air France reported the icing problems to Airbus. The two companies discussed solutions and Airbus talked to its supplier.

In April 2009, roughly 45 days before the crash, Airbus proposed that Air France swap out its pitot tubes for a different model believed to be less prone to icing, according to the BEA report. Air France began the work on April 27, 2009, and it received the first batch of new pitot tubes six days before the crash. The plane that crashed hadn't yet received the new equipment.

According to the 2009 report published by investigators after the crash, experts examined 13 other incidents of airspeed-sensor malfunctions on Airbus widebody jets at cruise altitudes. During most of those global incidents—none of which resulted in a crash—both the autopilots and automated engine-thrust systems disconnected on their own, and it took many of the flight crews up to a minute to manually adjust engine thrust.

The earlier report found that pilots in nine of those 13 events received warnings of an impending stall. And in a finding that may have particular relevance to the upcoming update, accident investigators in 2009 also concluded that when airspeed-sensor malfunctions kick off automated thrust controls, "the absence of appropriate manual adjustments" to engines "can present a risk" of a mismatch between power settings and the jet's orientation in the air.

Investigators began focusing on pitot problems from the start, because Flight 447's automated maintenance system broadcast 21 separate messages related to such malfunctions during roughly the last four minutes of the fatal flight. But the final report, which may not be released until 2012, also is expected to delve deeper into how European air-safety regulators dealt with persistent reports of pitot-tube icing prior to the crash.

The previous interim report indicated that in late March 2009, less than three months before the crash, European aviation regulators decided that the string of pitot-icing problems on widebody Airbus models wasn't serious enough to require mandatory replacement of pitot tubes.