RESEARCH BRIEF

Research Request:

Research incidences of insect/wasp infestations in an aircraft's pitot/ static system.

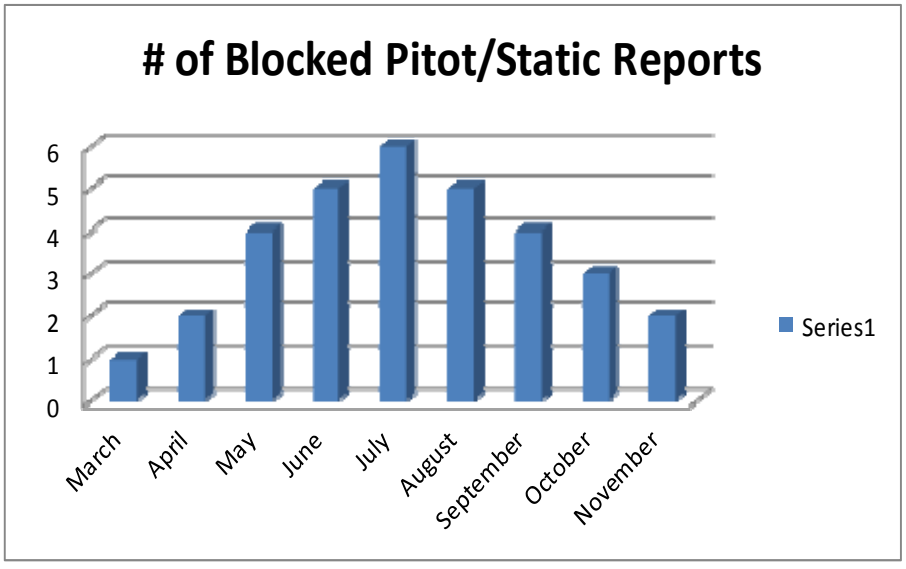
Research Response:

Problem Statement

A blocked pitot static system can cause a variety of erroneous instrument indications affecting safety of flight. As an aircraft sits on a ramp or in a hangar the probability of an insect making a nest in the pitot static system greatly increases over time depending upon climate. Even a thorough aircraft pre-flight may not discover hard to see insect nests created inside a static port or pitot tube.

Incident reports from NTSB, AIDS, & ASRS

From 1983 forward there have been a total of 114 incidents reported to the NTSB, FAA, and NASA which involve insects blocking aircraft systems. Of those 114 reports 32 were related to a blocked pitot static system as a result of an insect. Below is a graph of the findings.



As shown by the graph, the majority of the events were reported during the summer months. Not all reports included the state where the incident occurred; however, of the reports that did include a state a geographic trend could not be determined. The states ranged from CA, OR, TX, NY, NC, MI, MO, NM, UT, CO, FL, AR, AL, PA, & VA.

Mud Dauber

Mud daubers were identified as the culprit in majority of the reported blocked pitot tube events. They are slender wasps whose nests are composed of a series of cylindrical cells resembling an organ pipe. Reports identified no other specific insect species.

The mud daubers' manner and speed of nesting can cause significant issues because of how fast they can build a nest inside of a pitot tube and how hard it can be to identify the tube as blocked during a pre-flight inspection. In the majority of reported events most pilots did not identify a blockage problem with the pitot static system until they were already in the air.

Blocked Pitot Static System Issues in Flight

When the pitot static system is blocked the pilot will receive erroneous flight instrument indications. A blocked pitot tube affects the accuracy of the ASI, but, a blockage of the static port not only affects the ASI, but also causes errors in the altimeter and VSI. If these erroneous readings go undetected it could contribute to an accident as seen in the Birgenair Flight 301 accident (see excerpt below).

> During takeoff roll at 11:42 p.m, the captain, who was one of Birgenairs' most senior pilots, found that his air speed indicator (ASI) was not working properly, but chose not to abort takeoff.[5] The co-pilot's ASI was functional.
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> While the plane was climbing through 4,700 feet (1,400 m), the captain's air-speed indicator read 350 knots (650 km/h). The autopilot, which was taking its air speed information from the same equipment that was providing faulty read-ings to the captain's ASI, increased the pitch-up altitude and reduced power to lower the plane's airspeed. Co-pilot's ASI read 200 knots (370 km/h) and de-creasing, yet the airplane started to give multiple contradictory warnings that it was flying too fast, including rudder ratio, Mach airspeed and overspeed lights and sounds.
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> The autopilot reached the limits of its programming and disengaged. After checking their circuit breakers for the source of the warnings, the crew then re-duced thrust to lower the speed. This immediately triggered the 757's stick-shaker stall alert, warning the confused pilots that the aircraft was flying danger-ously slow, seconds after it was warning them that the speed was too high. The co-pilot and relief pilot both seemed to recognize the approaching stall and tried to tell the captain, but did not intervene directly, possibly out of deference to the

captain's age and experience. The captain then tried to recover from the stall by increasing the plane's thrust to full, but the plane was still in a nose up attitude, preventing the engines from receiving adequate airflow to match the increase in thrust. The left engine stalled and flamed out, which caused the right engine, still at full power, to throw the airplane into a spin. Moments later, the plane inverted.[6] At 11:47 p.m., the Ground Proximity Warning System sounded an audio warning, and eight seconds later the plane crashed into the Atlantic Ocean. All 13 crew members and 176 passengers were killed.

Although the pitot tubes were not discovered during the post-crash investigation the investigators concluded that one of the three pitot tubes was blocked and a mud dauber nest was the likely cause.

Recommendations

Based on the NTSB, FAA Accident/Incident Data, and ASRS reports it is recommended that pitot tube covers and static port plugs are used any time an aircraft is shutdown and parked even if it's only for a couple of hours. In addition to using covers a thorough pre-flight inspections should be conducted. Sometimes a mud dauber nest in the pitot tube can be discovered by identifying dirt around the drain hole.