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InFO

Information for Operators

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http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info

An InFO contains valuable information for operators that should help them meet certain administrative, regulatory, or operational requirements with relatively low urgency or impact on safety.

SUBJECT: High Altitude Icing Conditions

Purpose: This InFO provides guidance and information for pilots and operators regarding icing encounters at high altitudes.

Background: This InFO has been developed in response to NTSB recommendation A-04-34 and supersedes Flight Standards Information Bulletin (FSAT) 04-02.

On June 4, 2002, a McDonnell Douglas MD-82, in cruise flight at flight level 330, experienced a gradual loss of power in both Pratt & Whitney JT8D-219 engines. The right engine was shut down when the exhaust gas temperature reached 600 °C. The airplane experienced activation of the aural stall warning and stick shaker. The pilots disengaged the autopilot and began a descent. At 17,000 feet, the engine was restarted and the flight diverted to the Wichita Mid-Continent Airport, Wichita, KS, and landed without incident.

Discussion:

a. Radar weather images of the area that the airplane was flying in, just before the engines lost power, show weak weather radar echo intensities at 33,000 feet that are consistent with high altitude ice crystals. High altitude ice crystals can affect airplanes with engines that use engine pressure ratio (EPR) power settings (such as the JT8D-219 engines on the MD-82) because they can occasionally adhere to engine inlet pressure probes, partially blocking the opening and causing a false high engine power indication. A similar circumstance that demonstrated the effect of ice blocking the JT8D engine's inlet pressure probes was the January 13, 1982, crash of Air Florida Flight 90, a Boeing 737 that crashed into the Potomac River after taking off from Washington National Airport.

b. Although flight data recorder data from the MD-82 indicated that engine power was increasing just before the engines started to lose power, the loss of airspeed and increase in pitch indicates that engine power was actually decreasing. A note in the MD-80 Flight Crew Operating Manual (FCOM) states that icing of the engine inlet pressure probes may cause the throttles to retard when the auto-throttle is in the EPR limit mode. The National Transportation Safety Board's (NTSB) investigation concluded that because the engine anti-ice system was not activated when the MD-82 entered the icing conditions, the ice crystals were able to adhere to and partially block the inlet air pressure probes, causing the EPR indication to increase until reaching the auto-throttle EPR limit. Meanwhile, engine power and airspeed were actually decreasing and the airplane was pitching up, resulting in a stall condition.

c. The NTSB believes that the pilots should have activated the engine anti-ice system before the airplane began transiting an area that would have had visible moisture present and in which the temperature was less than 6 °C. Also, despite the guidance in the MD-80 FCOM, the pilots failed to recognize indications that the engine inlet probes were accreting ice. The NTSB is concerned that the infrequency with which high altitude ice crystals impact engine operation may result in flightcrews not fully understanding the risk associated with high altitude ice crystals and how they can affect flight operations.

Recommended action: Directors of safety, directors of operations, fractional ownership program managers (as applicable), and flightcrew members of turbine aircraft need to understand, be aware of, and maintain constant vigilance for signs of high altitude icing conditions, for the effect these conditions can have on airplane and engine performance, and the need for the appropriate use of the engine anti-ice system.