

AIRCRAFT ACCIDENT REPORT No. 4/92

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REPORT ON THE INCIDENT TO BRITISH AEROSPACE ATP, G-BMYK 10 MILES NORTH OF COWLY, NEAR OXFORD, ON 11 AUGUST 1991

The incident occurred during the climb to flight level 160 while the aircraft was on a flight from East Midlands Airport to Jersey. The aircraft suffered a significant degradation of performance and experienced propeller icing, accompanied by severe vibration that rendered the electronic flight instruments partially unreadable. The aircraft stalled and this was followed by a severe uncontrollable roll oscillation and the development of a high rate of descent during which the de-icing boots were operated. Control was regained 3,500 feet lower when the aircraft had descended below cloud. The flight continued uneventfully.

The following causal factors were identified:

- (i) The rapid accumulation of glaze ice, which was not evident to the crew, but which produced significant aerodynamic degradation.
- (ii) The difficulty of assessing visually the thickness of ice on the wing leading edges from the flight deck.
- (iii) The BMA standard procedure to use a maximum ITT of 720°C in the climb discouraged the commander from applying power to counteract the loss of performance.
- (iv) Use of the autopilot in the pitch mode during the climb which hampered recovery from the subsequent loss of control.
- (v) The propeller vibration which disguised the onset of the stall.

The following fourteen Safety Recommendations were made during the course of the investigation:

- (i) The CAA require the provision of sufficient wing leading edge illumination to enable reasonable assessment of ice accumulation at night.

- (ii) The CAA require that ATP Maintenance Manual procedures clearly specify the optimum setting for the ice illumination lights and take measures aimed at ensuring that ice illumination lights are correctly adjusted.
- (iii) The CAA take measures to ensure that Maintenance Manuals are updated in line with the aircraft model to which they apply.
- (iv) For UK registered aircraft certificated with approval for flight into known icing conditions, the CAA require a reliable means of actively alerting the flight crew to all conditions where operation of the airframe de-icing system is necessary to maintain safe flight.
- (v) The CAA review the pre-stall warning system on the ATP and its protection and take appropriate action.
- (vi) The CAA use this and other incidents during the summer of 1991 to re-educate the pilot profession of the unexpected onset of glaze ice which can quickly lead to an insidious stall which may be difficult to recognise because it can occur at abnormally high airspeed and before the stall warning system is activated.
- (vii) British Midland Airways ensure that performance data for their climb schedule is published or that the rigidity of the restriction on the use of the engine manufacturer's normal ITT maximum be relaxed.
- (viii) The CAA ask British Aerospace to review the adequacy of the BAe Operations Manual in relation to the speed requirements for flight in all icing conditions.
- (ix) The CAA review company Operations Manuals to ensure that the minimum speeds referred to in the Adverse Weather section concerning "Operations with residual ice" should be applied at all times in icing, when propeller icing is present or performance is being degraded by the possible formation of ice.
- (x) The use of the autopilot in the pitch mode during the climb, when the performance of the aircraft is possibly degraded by the presence of ice, should be avoided.
- (xi) The CAA require mandatory incorporation of means to minimise ATP propeller icing.
- (xii) The CAA, in conjunction with the FAA and NASA conduct a reappraisal of the icing envelopes specified in the JARs, particularly in the area of large droplet sizes and temperatures just below freezing.

- (xiii) The CAA undertake a comprehensive review of the certification requirements for CRT or other intermittently illuminated type displays, with particular attention to:
- a) the vibration levels specified for certification testing, requiring them to be based on the actual aircraft vibration spectrum, measured under adverse conditions, in which such equipment and crew will operate.
 - b) the inclusion in certification testing of the assessment of readability and abnormal effects when the display and/or the observer is vibrated.
 - c) the adequacy of requirements for the readability under difficult viewing conditions of information presented in digital rather than analogue form.
 - d) the necessity of specifying the colour of particular display symbology in order to optimise readability.
- (xiv) The CAA and the recorder manufacturers review the performance of the PV1584 recorder, and its mountings, under high vibration and shock conditions to ensure that it meets the applicable requirements of CAA specification No. 10. (Flight Data Recorder for Aeroplane Accident Investigation).