FLIGHT TEST: SUPPORTING THE INVESTIGATION OF FACTORS AFFECTING LOSS OF CONTROL OF LIGHT AIRCRAFT

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ABSTRACT
A quarter of all fatal General Aviation accidents in the UK during the period 1980 to 2006 involved Loss of Control (LoC) in Visual Meteorological Conditions (VMC). LoC has consistently appeared in accident statistics over this period, but at apparently different rates for different aircraft types. This raises two important questions - why do these LoC events happen and why is there a difference between aircraft types?

One case in point is that of the Cessna 150 /152 and over the 27-year period analysed, the Cessna 150 falls approximately on the average for fatal accidents in the UK GA fleet, whereas the Cessna 152 exhibits a lower accident rate. Brunel Flight Safety Laboratory, in conjunction with the UK General Aviation Safety Council, undertook to try and understand why this is so. The key design differences in relation to performance and handling qualities were researched using available published material and informal interviews with type-experienced students, pilots and flying instructors.

A flight test programme was conducted using examples of both aircraft types to gather additional research data, to assess and compare the apparent performance and handling qualities (both qualitatively and quantitatively).

Flight tests were performed at three different CG conditions relevant to the key design differences, concentrating upon apparent longitudinal (static and dynamic) stability and control characteristics, stall and low-speed handling characteristics, and cockpit ergonomics / pilot workload. In all tests, normal (unmodified) flying club aircraft were used, in most cases with a 2-man (TP+FTE) crew. Data was recorded manually on test cards and automatically using a low-cost, commercially available, portable FDR.

Proven theory was used to estimate static margins and pilot stick forces and gradients in the region of the stall, the pre-cursor to an LoC event.

The paper will cover the execution of these flight tests within a university environment (preparation, pre and post-test analysis, construction of Cooper-Harper tasks) and the use of low-cost, automated flight data recording. It will also discuss the team's lessons learned, initial findings and the ongoing research into aircraft, pilot and environmental causal factors involving LoC incidents within the light aircraft community. On completion, it is hoped that this research programme will contribute to improving operational safety and provide supporting ideas to make future light aircraft 'LoC-proof'.