

CAA Review into AAIB Recommendation 2017-003

Requirement

Following the tragic accident involving Hawker Hunter G-BXFI at the Shoreham air show in 2015, the handling differences between different aircraft types were reviewed.

Accordingly, the following Safety Recommendation was made by AAIB:

Safety Recommendation 2017-003. It is recommended that the Civil Aviation Authority review the grouping of aircraft types in display authorisations to account for handling and performance differences it considers significant.

The CAA response to AAIB 2017-003 was:

The CAA will review the list of different categories of aircraft relevant to a pilot display authorisation, including renewal, and assess the impact of differing handling techniques between each category. This is a complex piece of work and so we will conduct this review, publish our findings and amend our procedures by December 2017.

In response to AAIB Safety Recommendation 2017-003, the CAA has reviewed 22 aircraft categories relevant to pilot display authorisation to consider any differences in handling characteristics. In 21 of the 22 categories, the review confirmed that existing provisions were effective. Additional work was undertaken on Category G, which has now been divided into two sub-categories: straight wing aircraft by type and swept-wing aircraft by type, ensuring that any differing handling characteristics are appropriately characterised.

This report contains a summary of the CAA's findings and concludes the CAA's work on AAIB 2017-003.

Analysis

The CAA has undertaken the following analysis:

The CAA will review the list of different categories of aircraft relevant to a pilot display authorisation, including renewal.

The CAA's category analysis considered a broad range of aircraft types, from light piston engine aircraft to jet training aircraft, helicopters to microlights. Rather than splitting the aircraft by category, the aircraft were split by handling characteristics. The aircraft were therefore considered as follows:

- Fixed wing aircraft of straight wing design
- Fixed wing aircraft of swept wing design
- Rotary Wing Aircraft (helicopters)

- Gyroplane aircraft
- Hang Gliders and Paragliders
- Microlight aeroplanes
- Powered Parachutes, Powered Paragliders and Powered Hang Gliders

Helicopters (Category L), Gyroplanes (Category M), Hang Gliders and Paragliders (Category O and Y), Microlight aeroplanes with weight shift control (Category T and V), Powered Parachutes, Powered Paragliders and Powered Hang Gliders (Category W1, W2 and W3) were considered as part of this review, however as their wing designs do not exist in multiple categories, they are considered to be bespoke and separate in their handling characteristics. Therefore, the main cross category handling¹ difference resulted from whether the aircraft was of straight or swept wing design. As handling characteristics were dependent on wing design, after the analysis was complete, all but one of the 22 different aircraft categories relative to pilot Display Authorisations were considered to be fit for purpose (see table at Appendix A). The one area that was identified as requiring further work was Category G (Jet) aircraft due to it containing types of aircraft that were considerably different in their handling characteristics, namely the differences between straight and swept wing jet aircraft.

Therefore, to reinforce the existing aircraft category list, the CAA GA Unit has now elected to split Category G aircraft into:

- Straight wing jet aircraft, now Category G1, and
- Swept wing jet aircraft, now Category G2

This applies to initial issue of a Display Authorisation, renewal and upgrades. This change will result in pilots that wish to display aircraft both categories now being required to maintain currency in each category rather than be able to remain current on a straight wing jet (Category G1), and also being able to display in a Swept Wing Jet (Category G2) which was previously the case.

The CAA will assess the impact of differing handling techniques between each category.

In parallel with reviewing the different categories of aircraft relevant to a pilot Display Authorisation, the CAA GA Unit considered the impact of differing handling techniques between each category. There are many types of different wing subsets, those normally flown at civil air displays fall into four main categories:

- Straight
- Elliptical
- Swept
- Delta

Currently there are no delta wing aircraft flying on the UK display circuit and elliptical and Straight wing aircraft exhibit similar handling. The analysis therefore compared the differences between the fundamental wing types (straight and swept) in various phases of flight most pertinent to display flying namely: turning, looping, stalling (high Angle of Attack (AoA)) and low speed flight (see Appendix B for details). The review of the performance of the wing design focussed on changes in radii, 'g' exposure times, induced drag, the effect of speed and energy, in addition to slow speed / high AoA flight; all assessed across the spectrum of aircraft categories.

¹ Aircraft types with similar handling characteristics but present in different categories.