



Evaluating Risk for the Aspiring Display Pilot

Airshows often provide the stimulus for people to learn to fly. Later, having achieved that objective, a few pilots are further motivated to take up display flying themselves. However, before displaying at a public airshow, pilots are required to have demonstrated their competence to hold a CAA Display Authorisation in their chosen discipline. That legal requirement applies to anything from the demonstration fly-past to unlimited aerobatics and any other aerial act one could expect to see at an airshow. This article is principally intended to take a step back from there and look at the safety implications a pilot should consider on the path to official evaluation or even just for personal skill development.

By definition air display flying is intended for easy viewing by spectators and that usually necessitates manoeuvring at a reasonably low level and proximity to the spectators. How one safely graduates to the necessary skills level for that is very important – often, initially with very little guidance seemingly available.

The perception of the majority of the general public, and many enthusiastic pilots too for that matter, is that air display flying is about ‘thrills and spills’ with acts of ‘derring- do’ and for the most part ‘getting away with it’. That’s great; it keeps them interested in aviation and happy to support this exciting entertainment. However, when aspiring display pilots share that same perception – and they often do - then, some words of caution are appropriate.

I believe that It’s an important duty for all air display participants, to not only constantly identify their own risk but to also help fellow and especially new display pilots on those occasions when their confidence and adrenalin exceeds their wisdom and ability – most of us have been there! In practice this would maybe entail a discussion and analysis of their performance and identifying where it might be a little marginal – not an easy concept to get over sometimes when there are no official units to measure degrees of risk. I’d like to attempt to introduce one to illustrate the necessity for the concept of an appropriate margin for error at the heart of display flying. In some sports they use the 10^{ths} scale – it’s easy to use and understand. Simply put, 1/10th would represent a very low level of risk and 10/10^{ths} is the point of disaster. As an example, applied to aerobatic sequence construction, a low level loop might be 9/10^{ths} where a Cuban eight at the same base level would be a safer 7/10^{ths} – understanding why is an important part of the apprenticeship. And so a similar analysis goes on throughout the whole programme to assess risk to allow a carefully considered margin for error.

In display flying there are 5 principle areas to evaluate risk, each one of which can have many variables and they are mostly inter-dependent. Together they make up the total risk equation. My list would include, at the very least, the following: -

1. The pilot – experience, recent practice level, performance consistency, health and mental attitude. As with any exacting task requiring coordination of mind and body you will never perform your best – especially under pressure - without being in good shape and having experienced recent meaningful practice.
2. The aeroplane – type and performance and energy management implications. This will dictate the makeup of your whole show which is to demonstrate the aeroplane, fully understanding, but never ever exceeding its capability or your own.

3. The programme – the presentation and positioning, the content and design of the sequence to be flown, the various base heights and gate speeds. This is the key to a really professional display. Much thought and advanced planning is required here – then to be fully practiced and tested before introducing it at a public show. The public display scene is no place for the ad lib show - which inevitably leads to impulsive manoeuvres and has caused very many accidents. That applies equally to an LAA Strut fly in as well as the big show – flypast demonstration or aerobatics.
4. Outside factors – the display area, organisational stresses, wind and weather. Airshows can take place under widely varying conditions of weather and difficult display areas - all of which may require practiced flexibility, accordingly built into the planned programme. On those occasions when a safe performance is clearly compromised, saving it for another day is the best decision.
5. The positioning flight to and from the venue – If you're on the programme with an anxious organiser expecting you, the pressure to get there and then get home afterwards in marginal weather can be very powerful. This can undoubtedly be the most hazardous part of the event and needs fine judgment to go or not.

For all the apparent complexity it isn't difficult to make a risk assessment, individually and collectively, of all these interconnecting factors, using the 10th scale to identify any weaknesses. It isn't an exact science but it provides a common language for identifying the principle areas of risk and those parts of the programme which need closer attention.

In many 'dangerous' sports it's not unusual to accept a risk of 9/10^{ths} plus, to be competitive - in motor racing for instance, where the consequences of misjudgement usually means no more than bent metal and expense. Conversely, display flying is not so forgiving and must therefore demand a more sensible margin for error throughout the whole performance. It could be something as simple as a perverse wind threatening crowd line separation when the pilot could easily have allowed a safety margin and then smoothly flown to the desired line rather than risk a high speed stall attempting to avoid conflict. It's good practice therefore that any air display shouldn't have any part in it that doesn't allow an appropriate margin for error or the unexpected. Importantly, this doesn't imply any loss of spectacle – just the opposite in fact - a 9/10^{ths} plus performance doesn't look professional to anybody, indeed can give an impression of recklessness.

Over the years there have been many display pilots who have consistently performed legendary air displays, from the lowest base heights, without mishap. They may not have consciously applied units but they will all have gone through the risk equation as if they had. Guided by their assessment and experience, they developed the flexibility to amend the programme, its presentation and base heights, as necessary – or saved it for another day! Maybe this developed as a survival instinct after 'getting away with it' a few times! Others haven't been so lucky – others yet to come may be just as vulnerable but hopefully the message in this article may help.

The apprenticeship for a fledgling display pilot can be a lonely business – it needn't be! In just about every so called dangerous sport or profession, I can think of, there's an established culture of novice support. An excellent training foundation in sport aerobatics can be found in aerobatic competition (as organized by the British Aerobatic Association in the UK) which provides essential discipline in safely flying a set programme accurately. Many of our best

display pilots developed their skills through this route. Support is also available through the Historic Aircraft Association which was founded to further the safe flying of historic aircraft in the UK.

Guidance can also be found through some of the volunteers that make up the CAA's team of Display Evaluators who can advise on specific display disciplines and are often happy to help with a coaching function in the lead up to actual official evaluation for the granting of a CAA Display Authorisation. Further advice can be found in the CAA guide to Civil Air Displays – document 743. And in the CAA guide to Flying Displays and Special Events – CAP403. All these documents are available on line.

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