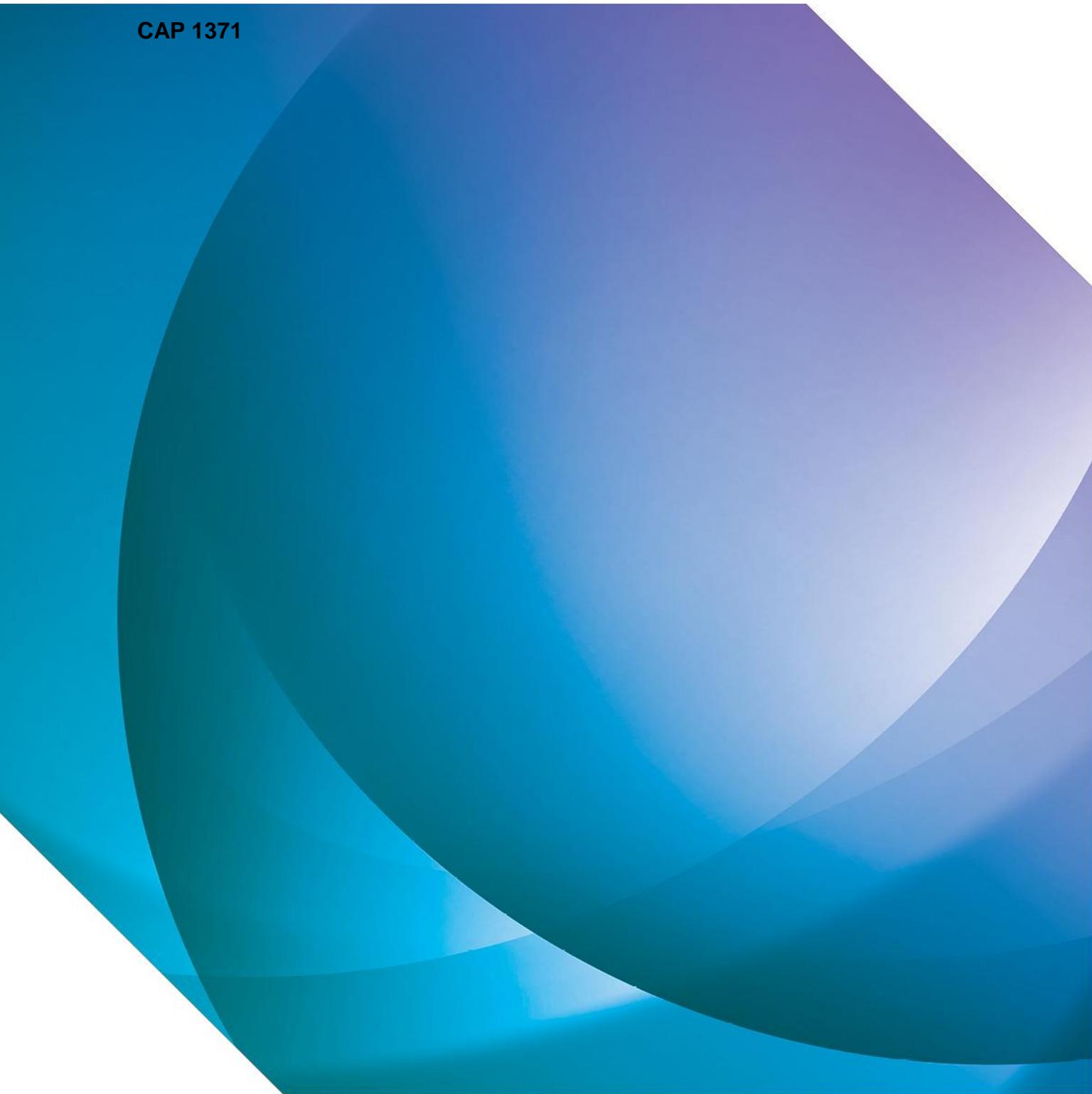


UK Civil Air Display Review: Actions that impact on UK civil air displays in 2016

CAP 1371



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Chapter 1

Introduction

- 1.1 The Civil Aviation Authority is the UK's specialist aviation regulator. Our purpose is to minimise the risks associated with aviation, and our primary concern is the safety of the public, whether in the air or on the ground. Protecting the public is at the heart of everything the CAA does and it is constantly working to enhance aviation safety standards.
- 1.2 Up until the tragic accident at Shoreham last summer, the UK had an excellent record of protecting the public through safe air displays, and the approach used in the UK is emulated in many countries around the world. The accident at Shoreham last summer was the first of its kind – no members of the public have lost their lives as a result of an air display in the UK since 1952, which made this accident all the more shocking.
- 1.3 The Shoreham accident remains the subject of ongoing Air Accidents Investigation Branch (AAIB) and Sussex Police investigations and so it is not appropriate to speculate on the cause. However, the CAA took a number of immediate steps, which related to the aircraft type involved and other ex-military jet aircraft but also included identifying enhanced risk assessment criteria for all future air displays.
- 1.4 The CAA frequently reviews all aspects of aviation safety, including safety at air displays. Our publication *Flying displays and special events: A guide to safety and administrative arrangements*¹ has been updated many times since it was first published in 1973. The publication was extensively updated and rewritten in 2015 before the display season started.
- 1.5 But it is of course absolutely right that the CAA should now identify any opportunities for further improvements to public safety and has therefore established a further review to evaluate the current guidance, processes and regulations relating to UK civil air displays. The aim is to assess whether it is possible to minimise further the risks associated with civil air displays in the UK.
- 1.6 Last year we said that we would publish the review's final report early in 2016 and we still intend to do that. However, it has become apparent that

¹ www.caa.co.uk/CAP403

there are a number of enhancements that the CAA, air show organisers, and others should carry out before the start of the 2016 air display season.

- 1.7 Accordingly, the CAA is publishing this action report. It is based on the same three core themes as the [progress report](#): air display location, air display aircraft and air display people. The actions detailed in this report will give all those involved in the coming air display season and advance notice of our intentions as we seek to enhance the safety provisions for UK air displays.
- 1.8 The restrictions the CAA put in place after the accident at Shoreham will remain until the AAIB publish its final report into the accident, at which point the CAA will review them based on the AAIB's recommendations.
- 1.9 The full terms of reference for the review are at Annex A of this report and full details of the review, including the governance structure, are on the CAA website at <http://www.caa.co.uk/Safety-initiatives-and-resources/Safety-projects/Airshow-review/Terms-of-reference/>.
- 1.10 In October 2015 the CAA published a brief progress report on the review. That report set out the progress made and explained the next steps that the CAA would be taking. A copy of that report can also be found by following the web link above.

Summary

- 1.11 Under the Air Navigation Order 2009, the organisers of any flying display must obtain permission from the CAA. The CAA considers a number of issues before granting such permission, including details of the location and safety arrangements, information about the proposed display itself and proof of the competence of the Flying Display Director (FDD) and of display pilots.
- 1.12 To increase the safety of the public and further mitigate risks identified in the review, the CAA is either introducing additional requirements or formalising existing requirements covering:
- the planning documentation that must be submitted to the CAA as part of a request for permission;
 - the competence and attitudes of FDDs;
 - the experience, skill and health of display pilots;
 - the role of Display Authorisation Evaluators (DAEs).

- 1.13 Unless otherwise stated, these changes will take effect in time for the 2016 display season.

Chapter 2

Air display locations

- 2.1 More than 300 civil air shows take place across the UK each year. They take place in all parts of the country and in a diverse range of locations. They vary in size from very large international events to small local events. The geography of each display site and the surrounding area is unique.
- 2.2 It is the responsibility of those organising an air display to identify the risks that the air display may pose, consider how those risks can be managed and mitigated, and then inform those who may be affected by the air display.
- 2.3 There are two key organising roles. The event organiser has overall responsibility for the event safety arrangements, and the Flying Display Director (FDD) has responsibility for the air display safety arrangements.
- 2.4 They must already consider a wide range of risks, including potential obstacles and hazards in and around the display arena. The CAA's publication [*Flying Displays and Special Events: a guide to safety and administrative arrangements*](#) sets out factors that must currently be considered when assessing the suitability of a venue and potential risks. These are:
- the location and positioning of spectator enclosures and car parks;
 - for over land displays, the suitability of the surfaces used by aircraft for take-off, landing and taxiing;
 - the take-off and landing distances available and required;
 - any obstructions in the area;
 - the proximity of congested areas as well as sensitive or restricted areas;
 - the presence of livestock or wildlife conservation areas;
 - the proximity of controlled airspace and other locations where other aircraft may be flying; and

- the availability of clear entry and exit routes for emergency service vehicles suitable to the size of air display.

2.5 The event organiser and FDD must also:

- decide on the area that risk assessment should cover. This will depend on the size of the air display they wish to hold, the aircraft flying and the complexity of the proposed display; and
- consider whether the time of day the display is being held requires any additional risk management and mitigation measures by them.

2.6 These fundamental responsibilities will remain unchanged.

2.7 Following the accident at Shoreham, we introduced three additional risk assessment criteria for all future air displays. These were the proximity of major roads, congested areas and other nearby infrastructure, such as railway lines. This meant that display organisers were expected to identify within their risk assessments how they proposed to manage and mitigate any risks arising from these sources. This resulted in a number of changes being made to air displays held after the Shoreham Airshow.

2.8 We propose to retain and formalise these additional risk criteria, and require event organisers and FDDs to submit their risk assessments to the CAA. We are developing a risk assessment template that will assist event organisers and FDDs. This will be published no later than the end of February 2016.

Action 1: The CAA will specify, for all future air displays the risk assessment criteria that it requires event organisers and Flying Display Directors must use in planning and preparing for air displays of all sizes.

2.9 Our publication [*Flying Displays and Special Events: a guide to safety and administrative arrangements*](#) also details what liaison the event organiser and FDD are expected to have with the relevant local authority or authorities for the location of their air show, the police and the emergency services, including the Maritime and Coastguard Agency and Royal National Lifeboat Institution for offshore display sites.

- 2.10 The publication also sets out when the local Safety Advisory Group² should first be notified, so that local authorities and emergency services can start initial planning and provide early guidance to the event organiser and FDD. The event emergency plan is expected to comply with Local Authorities existing major incident plans and the Civil Contingencies Act 2004³.
- 2.11 The planning and discussions between the event organiser, FDD and these other authorities are designed to inform the creation of a safety plan for the air display. We will also formalise this process.

Action 2: In their application for permission to hold an air display an event organiser and/or FDD must provide their enhanced risk assessment and full details of how they propose to mitigate any risks they have identified. They must set out in their safety plan evidence of engagement with other authorities.

- 2.12 The safety plan should be comprehensive and include details of how the event organiser and/or FDD will inform emergency services arriving at the scene of accident of any potential or known safety risks and residual hazards related to the incident, such as pyrotechnic devices that may be fitted on the aircraft.
- 2.13 A safety plan must also include details of engagement with Highways England, local highways authorities and rail network operators where appropriate. For example, the event organiser and FDD may need to work with the local authority, emergency services, highways authorities and others to:
- consider whether any roads or railway lines should be closed at any point during the display;
 - discuss whether any Temporary Traffic Orders⁴ should be put in place during the air display;

² www.hse.gov.uk/event-safety/safety-advisory-groups.htm

³ www.legislation.gov.uk/ukpga/2004/36/contents

⁴ www.gov.uk/government/uploads/system/uploads/attachment_data/file/2665/annex-a.pdf

- decide whether alternatives routes can be provided for members of the general public who wish to avoid passing directly by the air display location; and
- ensure that there is adequate information provided to the general public, both in advance and during the air show.

2.14 The event organiser and FDD will also be expected to identify any areas surrounding the air display site (including offshore and onshore areas of water) where the general public may gather, and detail how the risks of any such gathering will be mitigated or managed.

2.15 This may require engagement with the owners or controllers of land near a display site where the general public may or are known to gather. The event organiser may need to make the owners or controllers of such land aware of their responsibilities if they encourage the general public to use their land. This should also help raise public understanding that the safest viewing point is always within designated spectator areas provided by the organiser.

Action 3: An event organiser must provide the CAA with written detail of how they, with input from the FDD, will communicate with the public about areas where they may be at greater risk.

2.16 The CAA will give permission for an air display only where we are satisfied that risks have been properly identified and will be mitigated sufficiently to deliver an acceptable level of safety.

Chapter 3

Air display people

- 3.1 As stated above, to hold an air display, an FDD must obtain permission in writing from the CAA. One of the things the CAA seeks to establish before issuing such permission is whether the applicant has the right attitudes and behaviours to fulfil such a role i.e whether the applicant is 'fit' to carry out the role. This is in keeping with similar consideration of an individual's attitude and behaviour in other parts of the aviation safety framework.
- 3.2 FDDs must provide the CAA with a clear statement about their knowledge, experience, competence, skill, history, physical fitness and mental fitness.
- 3.3 All pilots that take part in a flying display must hold a display authorisation (DA) from the CAA. To obtain a DA, the pilot must have sufficient flying experience on the type of aircraft they would fly in a display, and pass a flying test. These tests are conducted by Display Authorisation Evaluators (DAEs).
- 3.4 Through the review, the CAA has identified some opportunities to strengthen the way that the competence, experience and suitability of FDDs, display pilots and DAEs are assessed. In the medium term, this will include the introduction of a new accreditation scheme for FDDs.

Flying Display Directors (FDDs)

- 3.5 FDDs have a central role in the planning of air displays, and thus in ensuring their safety. As set out above, before granting an FDD permission to conduct an air display the CAA needs to establish as far as possible if the applicant has the right attitudes and behaviours, as well as experience, to fulfil such a role.

Action 4: The CAA will formalise its procedures to ensuring whether, in its opinion, an applicant has the right attitudes and behaviours to fulfil the role of an FDD.

- 3.6 The exact details of this are being considered, but it is likely that FDDs will be required to declare whether they:
- have had any previous applications rejected;
 - have had an aviation licence revoked or suspended;
 - are facing or have been convicted of any offences which could call into question their probity and/or suggest that they have an inappropriate attitude to risk;
 - have a history of or are currently experiencing any physical or mental health problems, which may affect their ability to perform the role of the FDD;
 - have a history of or are currently experiencing any serious behavioural problems, such as drugs or alcohol dependency, which would suggest they are not fit to hold this position; and
 - have had reason to be interviewed about a matter of concern to the CAA or any other aviation regulator.
- 3.7 This list is not exhaustive and will remain under review.
- 3.8 The CAA will also develop similar procedures for display pilots and DAEs.

Action 5: The CAA will accredit FDDs to meet a defined level of competence.

- 3.9 The work to develop the new accreditation scheme is not yet complete but the intention is to introduce this on a phased basis, starting with accreditation of those FDDs responsible for the air shows with seven or more 'items' participating.
- 3.10 For 2016 the CAA will expect FDDs wishing to organise air shows with seven or more 'items' to attend the pre-season seminar that the British Air Display Association and Military Aviation Authority jointly organise where further information and briefing will be offered.
- 3.11 FDDs will be required to renew their accreditation on a regular basis.

- 3.12 The CAA is currently developing the detailed approach to this accreditation, which is likely to include a final test, and will publish the outcome in due course.

The FDDs' briefing

- 3.13 All FDDs are required to hold a briefing with those flying in the display on the day of the show. This can be in person or by telephone, and follows the comprehensive written briefing covering the arrangements for the flying programme that is circulated in advance to all participants. During the course of a display, an FDD may require any pilot to abort their display for safety reasons.

Action 6: At least one day before an air show any pilots intending to fly aerobatic sequences that flow directly from one manoeuvre into the next must notify the FDD of the series of linked manoeuvres that they intend to perform. If the information is not provided, the FDD must not allow the pilot to fly at the air show.

- 3.14 This action reflects the central safety role the FDD plays. Notification will enable the FDD to identify early if a display item is going to plan so that any necessary steps can be taken to mitigate risks. The notification to the FDD must also include measures the pilot would take if they needed to diverge from their intended display. At all times the pilot remains responsible for the safe conduct of their own display flight.

Flying display pilots

Medical standards

- 3.15 The CAA must be satisfied that all pilots, including display pilots, are medically fit to fly in accordance with their licence. The current medical requirement is that the pilot should hold a medical certificate or declaration appropriate to the licence privileges to be exercised. Some pilot licences may be validated by a countersigned declaration or medical certificate from a pilot's NHS General Practitioner (GP) while others require a certificate from an Aeromedical Examiner (AME).

- 3.16 The majority of display pilots hold a UK or EU licence supported by an AME assessment/medical, but the CAA is aware that a very small number of display pilots may be flying on a licence based on a GP assessment.

Action 7: With effect from 1 April 2016, a display authorisation will only remain valid for pilots of aircraft registered in the UK or abroad who hold an EU medical certificate issued by an AME.

- 3.17 We will also introduce a medical certification process for air display pilots based on the type of aircraft being flown, the manoeuvres the pilot intends to fly in displays and the risks consequent on these two factors. This risk-based approach include whether specific assurances are required to address the increased physiological strain associated with flying under high levels of G-force, particularly during aerobatic manoeuvres.

Minimum hours

- 3.18 The CAA's publication [*Flying Displays and Special Events: a guide to safety and administrative arrangement*](#) currently states that applicants for a DA to fly fixed wing aircraft should hold at least 200 hours total flying time, of which a minimum of 100 hours should be in the capacity of pilot in command (P1). This is suggested as the minimum hours required for a DA to be granted for simple routines to be flown in simple aircraft (Category A). Though we are confident this remains sufficient for category A⁵ aircraft, we believe that a higher level of relevant experience is important for pilots carrying out displays in more complex or high-performance aircraft.

Action 8: The minimum relevant hours required for a pilot to obtain a DA for complex or high-performance aircraft will be increased.

- 3.19 We are currently finalising the requirements, but our proposals are that:
- all pilots requesting a DA for aircraft with 800 HP or greater, 2730 kg mass or greater, jet powered or helicopter should have a minimum of 500 hours total time, of which 300 hours should be P1; and

⁵ See Annex C for more details on aircraft categories

- all pilots requesting a DA for other types of aircraft will continue to be required to have a minimum of 200 hours total time, of which 100 hours should be P1.
- 3.20 Relevant hours can include, for example, flying, practising aerobatic or other manoeuvres that might be flown at an air display. It will be for the DAE to consider the number of hours on the type of aircraft that the pilot wishes to fly before granting a DA.
- 3.21 The final requirements will be set out in our next report, including the date from which these requirements will be effective.

Supervision of newly appointed display pilots and revalidation

- 3.22 The relationship between a display pilot and their DAE is very important, especially in the first few years of display flying. Pilots work closely with their DAE to achieve the required standards to fly at displays, and it is the DAE's decision as to when the pilot has reached the standard necessary. The DAE then provides a written recommendation and justification to the CAA that the DA should be issued. The CAA will consider the recommendation and justification before issuing a DA.
- 3.23 Once a DA is issued, it is currently recommended that a display pilot should continue to work very closely with their DAE. The same DAE currently revalidates the pilot after six months and then after 13 months. To ensure there is strengthened continuity in the relationship between a display pilot and DAE, we will increase the frequency with which the DAE who issued the initial validation will be required to revalidate the pilot:
- After six months, as is currently required;
 - Again after a further six months, this is a new requirement; and
 - Again after a further 13 months.
- 3.24 After the first two years, the CAA will now require a pilot holding a DA to be revalidated by a different DAE, selected by the CAA. Our intention is to ensure that no display pilot has the same DAE conducting the revalidation for more than two consecutive years.

Action 9: The CAA will strengthen the display pilot's initial validation process by introducing an additional revalidation after the first six months and require that no display pilot has the same DAE conducting the revalidation for more than two consecutive years.

Currency

- 3.25 'Currency' is the word to describe the recent flying experience of a pilot on a specific type of aircraft. Under existing rules to remain 'current' a pilot must have completed a minimum of three full display sequences or practices within the preceding 90 days. At least one of those must be in the specific type of aircraft to be flown at air displays.
- 3.26 We will revise this so that pilots flying more complex aircraft and carrying out more complex manoeuvres are required to have greater currency on type than those flying less complex aircraft.
- 3.27 The final requirements will be set out in our next report, including the date from which these requirements will be effective.

Action 10: The CAA will publish new currency (flying experience) rules for display pilots that match better the time spent display flying to the type of display being flown.

Aircraft category renewal

- 3.28 Currently, the DA renewal process allows pilots who are authorised to fly displays in multiple categories of aircraft to renew their authorisation as a whole. The CAA believes this process should be enhanced, in particular for those performing displays above standard level aerobatics⁶.
- 3.29 From the 2016 flying display season onwards aircraft will be divided into six categories for renewal purposes:
- Jet powered aircraft,
 - Turboprop,
 - Multi-engine piston (MEP),
 - Single-engine piston (SEP),
 - Helicopters, and

⁶ These are set out on page 58 of the CAA's publication Flying displays and special events: A guide to safety and administrative arrangements www.caa.co.uk/CAP403

- Others.

Action 11: A display pilots authorised to perform above standard level aerobatics and in more than one aircraft category will be required to renew their display authorisation in each category.

- 3.30 If a pilot flies more than one type of aircraft in any category, the CAA will specify the aircraft within that category that the pilot must use when being evaluated for renewal by the DAE. The CAA will notify the DAE which aircraft this is.

DAEs

- 3.31 There are currently 70 active DAEs who are appointed by the CAA to evaluate display pilots and recommend to the CAA that a DA is issued. DAEs themselves must meet specific criteria to be appointed.
- 3.32 The CAA's publication [*Flying Displays and Special Events: a guide to safety and administrative arrangement*](#) sets out the general criteria that an individual must meet to be nominated to be a DAE. These are that the individual must:
- have received a written recommendation from either the CAA or an organisation associated with a particular display discipline. The sponsor must have personal knowledge of the individual's work, standards and integrity;
 - hold a valid pilot's licence with normally a minimum of 1000 hours as pilot-in-command or equivalent experience acceptable to the CAA;
 - have normally held a DA for at least three years, and;
 - normally be an active display pilot.
- 3.33 Appointments as a DAE are for a fixed-term period, which for all current DAEs expires on 31 March 2016. The CAA will put those DAEs who wish to continue to practise in this role through a refined selection process. This will focus on ensuring that a DAE remains competent, has an appropriate attitude and demonstrates appropriate behaviours.

Action 12: The CAA will strengthen the criteria for the nomination, appointment, induction and documentation for DAEs. These criteria will be in effect for all appointments from 31 March 2016 onwards, including reappointments.

Action 13: The CAA will enhance the frequency and intensity of its oversight of DAEs to ensure that they are fulfilling their responsibilities to a satisfactory standard.

- 3.34 The frequency with which a DAE may be audited will be determined by reference to the risks generated by their evaluation activity. Accordingly, the CAA will take into account the number of pilots with whom the DAE has a mentoring relationship, the experience of those pilots, the aircraft they fly and any other information the CAA holds about the individual.

Action 14: The CAA will assist DAEs to maintain their own competency and continuing professional development by organising an annual DAE seminar.

- 3.35 The CAA's annual seminar will be in addition to the twice-yearly events jointly organised by the British Air Display Association (BADA)⁷ and Military Aviation Authority (MAA), which DAEs can attend.
- 3.36 The CAA will expect all DAEs to attend a CAA seminar at least once every three years. Given the substantial changes in regulations this year, all DAEs are expected to attend the Pre-Season Air Display Conference on 10 and 11 February 2016. Notification of this has already been sent to all DAEs.
- 3.37 Evidence of a refusal or reluctance to attend will be taken into account in assessing whether a DAE remains fit to carry out the responsibilities of the role.

⁷ www.bada-uk.com/

DAEs and display content

- 3.38 An issue that has been much debated is whether civil air display pilots should be required to have their specific display sequence pre-approved or not, and whether this would be appropriate for non-aerobatic displays, tail chases and formation flying.
- 3.39 The CAA wishes to strike a balance between ensuring that a sequence of manoeuvres has been well rehearsed and ensuring that a pilot is safe to adapt to changing conditions. At all times the pilot should understand when and where decisions must be made, take safe decisions and be able to respond to unexpected events.

Action 15: To obtain a display authorisation, pilots must be able to prove that they can plan and perform a series of linked manoeuvres.

- 3.40 In order to do this the display pilot will have to brief their DAE on what manoeuvres they intend to perform and how those manoeuvres will be linked. The pilot will be required to identify clearly potential risks and state how they would mitigate those risks.
- 3.41 The pilot will then be required to demonstrate the series of practised manoeuvres and link them safely.
- 3.42 To assess whether the pilot can safely vary the order in which the practised manoeuvres are flown, the DAE will then tell the pilot to demonstrate an alternate combination.
- 3.43 The DAE will then determine whether or not to recommend to the CAA that a display authorisation is granted.
- 3.44 The same process will be required for all revalidations and as the pilot moves from standard to intermediate to advanced to unlimited display aerobatic levels.

CAA staff

- 3.45 Some CAA members of staff have had a close involvement with air shows on a professional and/or personal basis. Some are display pilots and some have previously been involved in the organising of shows. In other areas of aviation the CAA has taken steps to separate regulation from service provision, for example in our medical work⁸ and Instrument Flight

⁸ www.caa.co.uk/News/CAP1214--Consultation-on-the-Future-Structure-of-the-CAA-s-Medical-Department

Procedures work⁹. In the same way, it is right to ensure there is a clear boundary between the CAA's role as the regulator of air shows and our oversight of the people working directly in the sector and CAA members of staff's participation in organising air displays.

Action 16: With immediate effect, no member of CAA staff will be permitted to act as an FDD or sit on a Flying Control Committee, or to act as a DAE. CAA Flight Standard Officers will oversee flying displays and the DAE system.

- 3.46 We are considering whether these restrictions should remain in place after a member of staff leaves the CAA and, if so, for how long.
- 3.47 CAA staff will still be permitted to fly in air displays, and to attend as spectators.

⁹ www.caa.co.uk/Commercial-industry/Airports/Safety/Instrument-flight-procedures/Instrument-flight-procedures

Chapter 4

Notification to the CAA

- 4.1 The CAA currently requires the FDD to apply for permission to hold a flying display at least 28 days prior to the event. Because of the additional documentation that the CAA will now review, from the 2016 flying display season the CAA is increasing the minimum notification period to 42 days for air display with seven or more 'items' participating.
- 4.2 This may mean that where a display is taking place at a licensed aerodrome that the discussions between the event organiser, the FDD and the aerodrome licensee should start earlier than the currently advised 60 days. Similarly notification to the CAA's airspace regulation team - which is currently required 42 days before the event - may also need to be sent earlier.
- 4.3 Applications for a Restricted Area (Temporary) (RA(T)) will still be required 90 days prior to the air display.

Chapter 5

Ongoing work

Permitted manoeuvres

- 5.1 Following the accident at the Shoreham Airshow, the CAA restricted the Hawker Hunter aircraft and other ex-military jet aircraft from performing certain manoeuvres at over-land air displays and limited such aircraft to flypasts. This only affects aircraft on the civil register, and not military registered aircraft.
- 5.2 These restrictions will continue to remain in place until further notice.

Airworthiness aspects

- 5.3 The Air Accidents Investigation Branch (AAIB) published its second Special Bulletin on 21 December 2015¹⁰ that dealt with issues regarding the airworthiness of the Hawker Hunter that crashed at the Shoreham Airshow. We continue to work closely with the AAIB and have been considering broader issues regarding the airworthiness of ex-military aircraft that are on the civil register and that may perform at air displays. We will set out any recommendations on this in our next report. The current focus of our work is:
- reviewing the criteria and requirements for the acceptance of ex-military onto the civil register, taking into account the level of support that was required to enable the Vulcan to join the civil register;
 - requiring maintenance schedules for ex-military aircraft on the civil register to be provided to the CAA to harmonise and improve the standard of these documents;
 - conducting a review of all ex-military aircraft on the civil register that are required to have ejector seats fitted and active to ensure that they are necessary and appropriately maintained;

¹⁰ www.gov.uk/government/news/aaib-special-bulletin-s42015-hawker-hunter-t7-g-bxfi-update

- establishing continued and continuing airworthiness boards for different types or classes of aircraft to facilitate regular exchange of airworthiness information about type- or class-specific best practice; and
- working more closely with the Military Aviation Authority (MAA) and Ministry of Defence (MoD) to enhance the CAA's understanding of the significance of revision levels of key UK military publications.

Formation flying

- 5.4 The CAA continues to consider the additional risks that formation flying may pose and whether the current and enhanced measures we are bringing in are sufficient to manage and mitigate the risks to the general public of formation flying. We will set out our findings in our next report.

Night flying at air displays

- 5.5 The event organiser and FDD must consider the time of day, including night displays, that the display is being held and whether this requires any additional risk management and mitigation measures by them. Night displays are becoming more popular. The CAA will consider whether specific guidance about night displays is necessary. We will discuss this further in our next report.

Crowd lines at air displays

- 5.6 We stated earlier in this report that we expect the event organiser and FDD to identify any areas surrounding the air display site where the general public may be at greater risk, including areas of water, and state how the risk will be mitigated or managed.
- 5.7 As part of this review, we are also considering how far paying spectators should be set back from the display, and examining whether to restrict manoeuvres that result in the aircraft pointing directly towards the crowd line. This work is ongoing and we will say more in our next report.

Risk assessment template

- 5.8 As stated on page 7, our next report will also include a risk assessment template for event organisers and FDDs to use in planning and preparing for their displays.

Causes and impact of human error

- 5.9 Reduced awareness and management of the inherent risks of pilot error in air display flying may be a contributory factor in display-related accidents. Improving and maintaining knowledge and awareness of these risks through, for example, enhancement of the DA/DAE mentoring system and 'continuing professional development' items at CAA/MAA/industry seminars are likely to be effective ways of reducing the impact of human factor risks.
- 5.10 We are considering how best to integrate the delivery of such enhancements into the system as a whole in the longer term. We know that this year the issue will be covered at the pre-flying season symposium jointly organised by the MAA and BADA.

Weather minima

- 5.11 The CAA's publication [*Flying displays and special events: A guide to safety and administrative arrangements*](#) sets out recommended weather minima for flying displays. The minima vary according to the type of aircraft being flown and the type of display being carried out.
- 5.12 We are considering whether these minima should to be altered and we will say more in our next report.

Appendix A

CAA UK Civil Air Display Review terms of reference

Introduction

Following the tragic accident at the Shoreham Air Show on Saturday 22 August 2015 that resulted in the loss of life of eleven members of the public, and which left the pilot critically ill in hospital (as of 4 September 2015), the UK's Civil Aviation Authority (CAA) is reviewing the arrangements for public flying displays in the UK.

The CAA's guidance [*Flying Displays and Special Events: A Guide to Safety and Administrative Arrangements*](#) (CAP 403) was reviewed and updated earlier this year. The CAA believes however that it is right to go further and to carry out a comprehensive review to ensure that proportionate, risk-based measures are in place to reassure the public, the aviation community and the CAA Board that all is being done to ensure public air displays in the UK operate to the very highest safety standards and that air shows remain safe.

The Military Aviation Authority (MAA) will support this review and ensure that any lessons for military air displays are read across into military regulations¹¹, which were also reviewed and updated in parallel with the earlier CAA work.

The review is supported by UK Department for Transport Ministers.

The review Sponsor will be Mark Swan, the CAA's Group Director for Safety and Airspace Regulation (SARG). An independent, external panel of experts – the Independent Challenge Panel – chaired by Geoffrey Podger CB, will oversee the review and critically challenge the CAA's recommendations.

¹¹ www.gov.uk/government/publications/regulatory-article-ra-2335-flying-displays-and-special-events

Scope of the review

The review will evaluate existing civil guidance on flying displays and special events, and the danger they may pose to the public. To do this the review will consider the following issues:

- the competency and experience of pilots flying at air displays;
- the attitudes of pilots and organisations to safety standards;
- the skill levels pilots flying at air displays must have to perform different aerobatic manoeuvres;
- the physiological challenges of, and medical fitness to perform aerobatic, high performance and display flying;
- the age, condition and performance, as well as the regulatory framework that governs aircraft used at air displays;
- the range of permitted manoeuvres, in particular for high performance or vintage jet aircraft;
- the content of the air display; and
- location and characteristics of the air display venue, including displays not over a recognised aerodrome, coastal locations, and the surrounding area/infrastructure.

Other issues may arise during the course of the review.

The review will also consider what lessons can be learnt from any other air display incidents both in the UK and other countries, as well as how other countries authorise air displays. It will also consider any forthcoming European legislation that may impact on this activity. The review will consider the CAA's internal procedures for assessing and approving flying displays and participants, the relationship that the CAA has with display organisers, such as the BADA as well as others present at air shows also responsible for public safety, such as the Health and Safety Executive and emergency services.

Emerging information from the Air Accidents Investigation Branch (AAIB) will be considered promptly by the review which will identify any further actions that it determines to be immediately necessary to protect the public in relation to air displays.

Independent Challenge Panel

The review will have an Independent Challenge Panel. The panel's Chair is independent of the CAA and the aviation display community but has knowledge of public safety issues. Membership of the Challenge Panel includes a consumer/public representative as well as representatives from the flying display community and the MAA. The CAA will provide support to the Challenge Panel.

The Panel's role is to provide constructive challenge to the thinking of the review. It will advise on the efficacy and applicability of any recommendations that might result from the review for both the general public and the flying display community, as well as provide guidance on the priority of any recommendations. The panel will ensure that any proposals meet the overarching objective of the project to ensure that all is being done to ensure public air displays in the UK operate to the very highest levels and safety standards and that air shows remain safe.

The Panel is free to comment publicly on the work that has been carried out by the CAA. This may mean communicating with the aviation industry, the media, the CAA and others as appropriate.

Engagement

The review will engage fully with the air display community, including organisers and pilots, as well, where feasible those who attend or are in the vicinity of air displays.

Governance

The review is overseen by a Steering Board, chaired by Mark Swan, Group Director Safety and Airspace Regulation Group (SARG).

There is a Project Board, chaired by Tony Rapson, Head of the General Aviation Unit (GAU). The Project Board will guide and direct the project to a successful

conclusion in terms of timeliness and meeting objectives. Tony Rapson is responsible for reporting direct to the Steering Board.

The work of the Project Board will be informed by Working Groups. The Project Board, with the agreement of the Steering Group, will decide on the number and make-up of the Working Groups as the review progresses.

The Project Board will:

- manage the review's relationship with stakeholders, including the public, and the broader aviation community;
- ensure that recommendations are fit for purpose and then, beyond the final report, consider how to ensure they are fully implemented; and
- ensure that the project has the resources it needs to be successful.

Philip Clarke, Manager, Safety Policy, Intelligence, Strategy and Policy Team (ISP), the Safety and Airspace Regulation Group, is the Review Business Manager.

Dan McCafferty is the Review Project Manager.

Challenge to the CAA's work will be carried out by an Independent Challenge Panel, as detailed above.

Monthly updates will be provided to the CAA Board and to the Department of Transport (DfT). The European Aviation Safety Authority (EASA) will also be kept informed of the progress of the review as it progresses.

Membership of the governance groups

Steering Board members are:	
Mark Swan	Chair
Tony Rapson	Chair, Project Board
Philip Clarke	Review Business Manager
David Oastler	Consumer Policy Group (CPG) and Review Deputy

	Business Manager
Padhraic Kelleher	SARG ISP
Mark Shortman	GAU and AAIB Advisor
Sarah Doherty	Deputy Head of AA Policy Programmes Team (PPT)
Rear Admiral Paul Chivers	MAA
Dan McCafferty	Project Manager

Others colleagues, for example, from the CAA's Legal Team and Communications team, may be co-opted onto the Steering Board at the request of the Steering Board Chair as the Review dictates.

The Steering Board will be quorate with four members attending, including the Chair or his nominated deputy, and at least one non-SARG member.

Project Board members are:	
Tony Rapson	Chair, Project Board (with Padhraic Kelleher as deputy)
Philip Clarke	Review Business Manager
David Oastler	CPG and Review Deputy Business Manager
Mark Shortman	GAU and AAIB Advisor
John Romain	Aircraft Restoration Co.
Ed Bellamy	GAU
Dom Marino	PPT
Stuart Mitchell	CAA Medical Department
Matthew Bennett	CAA Legal Team
Sqn. Ldr. Rich Thornton	MAA (to November 2015)
Lt. Com. Marc Cornford	MAA (from December 2015)
Mike Alcock	DfT
Dan McCafferty	Project Manager

Chairs of Working Groups as required.

Others colleagues, for example, from the CAA's Communications team, may be co-opted onto the Project Board at the request of the Project Board Chair as the review dictates.

The Project Board will be quorate with five members attending, including the Chair or his nominated deputy, and at least one non-SARG member.

Independent Challenge Panel members are:	
Geoffrey Podger CB	Chair
John Turner	BADA
Keith Richards	Chair, CAA Consumer Panel
AVM Gary Waterfall CBE	MAA and Ministry of Defence
Barbara Cooper	Kent County Council
As required at the Independent Challenge Panel:	
Philip Clarke	Review Business Manager
David Oastler	CPG and Review Deputy Business Manager
Dan McCafferty	Project Manager

Working Groups

The Working Groups, in line with but not limited to the tasks set out in paragraphs 6 and 9 above, will be asked to go back to first principles and:

- Assess the adequacy of the current provisions to aircraft in scope of the review;
- Assess the adequacy of current provisions to pilots in scope of the review;
- Assess the safety objective of each provision;

- Assess the impact location may have on an air display
- Assess whether this safety objective remains sufficient in the light of the Shoreham and other disasters;
- Assess whether there is additional evidence to amend the provision;
- Make recommendations to the Project Board for changing current provisions, with an indication of the likely impact, both on public safety and the aviation community.

Meeting frequency

The Steering Board will meet monthly throughout the life of the review, and the Project Board will be updated weekly and meet as necessary for the same period. Frequency of meetings after publication of the final report will be assessed at the time.

The Independent Challenge Panel will meet three or four times during the course of the Review. It will meet on its own to form its own views on the interim and final reports, and then with the Chairs of the Steering and Project Boards to challenge the findings, conclusions and recommendations of the CAA. The Chair of the Independent Challenge Panel may ask or be invited to address the CAA Board.

Resources

The review will be fully resourced by the CAA except where people resources are provided by the MAA and DfT. Reasonable travel costs of non-CAA staff will be covered by the CAA. The CAA will cover the cost of Independent Challenge Panel.

Timescale

The review will produce an interim report by the end of October and its final report early in the New Year.

Appendix B

Independent Challenge Panel: members and biographies

Chair: Geoffrey Podger CB

Geoffrey has successfully held four public sector Chief Executive posts in public health and regulatory sectors, namely Chief Executive of the UK's Health and Safety Executive, the European Food Safety Agency, the UK's Food Standards Agency and most recently Acting Chief Executive of WorkSafe New Zealand. He has extensive experience of internal and external communication, risk-based regulation policy and enforcement. Geoffrey has also had major involvement in public health and protection issues both through 15 years working at the Department of Health.

Geoffrey is currently Senior Visiting Research Fellow, Kings Centre for Risk Management; Executive Director of @Risk Ltd; Board Member of the Institute of Employment Studies; and Honorary Vice-President of the Chartered Institute for Environmental Health and of the Institute of Occupational Safety and Health, Honorary Fellow of the International Institute of Risk and Safety Management and President of the Society of Industrial Emergency Officers.

Member: Keith Richards

Keith is Chair of the CAA's Consumer Panel. The Panel has internal independence from the CAA and acts as a 'critical friend', scrutinising and challenging all of the CAA's work.

Keith is a barrister, arbitrator and commercial mediator. He has served as an independent member and non-exec director on regulatory bodies in a variety of sectors and specialises in professional / industry self-regulation, consumer rights, and alternative redress. Keith is Chair of The Disabled Persons Transport Advisory Committee (DPTAC), the statutory body advising Ministers at the DfT, and previously served for nine years as the Chair of its International Working Group covering Aviation and Maritime. He was Head of Business and Professional Development and Consumer Affairs at the travel industry body, ABTA, and was a Member of the

Confederation of British Industry (CBI) Consumer Affairs Panel serving as its Deputy Chair for a while. For many years he served as Senior Campaigns Lawyer at Which?, and as legal editor of the journal Consumer Policy Review.

Member: Barbara Cooper

Barbara Cooper is Corporate Director for Growth, Environment and Transport at Kent County Council. Barbara's role includes responsibility for the planning, delivery and performance of front line services. These services include economic development, highways, waste, planning, environment, emergency planning, community safety, trading standards, arts and sports. Her immediate priorities have included working with central government and regional and local partners on options for mitigating the impact of Operation Stack on the economy and communities of Kent and shaping a 20 year infrastructure framework for Kent and Medway.

Barbara has worked in local government for over 20 years and has managed a wide range of services in the London boroughs of Kingston upon Thames, Croydon and Bromley and in Portsmouth City Council and Swale Borough Council. She has been involved in many large scale events including Trafalgar 200 in 2005, DDay 60 and the Volvo yacht race.

Member: Air Vice-Marshal Gary M Waterfall CBE RAF

Air Vice-Marshal Gary Waterfall joined the Royal Air Force in 1985 as a direct entrant. He served the majority of his flying career with the Harrier Force as a Qualified Weapons Instructor, both in Germany and in the UK. He flew operationally from both land and sea bases in support of Operations MEGALLAN II, DENY FLIGHT and WARDEN, and displayed the Harrier in 1996, before joining the Royal Air Force Aerobatic Team, The Red Arrows, for the 1997-1999 seasons. He commanded 41(Reserve) Squadron, responsible for the Operational Test and Evaluation of Jaguar, Tornado GR4, Tornado F3, and Harrier GR7/9. In September 2009, he assumed command of Joint Force Harrier Force and Royal Air Force Cottesmore, until closure of the Unit and disbandment of Joint Force Harrier after the 2010 Strategic Defence and Security Review.

Promoted to Air Commodore in 2011 and to Air-Vice Marshal in 2014, Air Vice-Marshal Gary Waterfall is now Air Officer Commanding No 1 Group.

Air Vice-Marshal Gary Waterfall is also President of 2248 (Rutland) Air Training Corps, and Chairman of the Harrier Force Association.

Member: John Turner FRAeS

John is current Chair of the British Air Display Association. He flew the Phantom F4 on No 92 Squadron at RAF Wildenrath, Germany, before becoming a flight commander, instructing on Hawk at No 4 Flying Training School RAF Valley, Anglesey. He was awarded a 'Queens Commendation for Valuable Services in the Air' for safely landing a Hawk which suffered engine failure just after take-off at night in 1984.

On leaving the RAF John worked, until his retirement in 2010, for BAE Systems as Tornado ADV Project Pilot, becoming Eurofighter Project Pilot in 1992. John moved to the Nimrod MRA4 programme, initially as Project Pilot and then as Chief Test Pilot Nimrod & Strategic Aircraft with responsibility for the flight test of all BAE Systems' large aircraft. In 2005 John was appointed BAE Systems Director Flight Operations, becoming responsible for UK test and demonstration flying and military flying training and airfield operations at Brough, Warton and Woodford and the governance of all flying activities conducted worldwide by or on behalf of all sectors of BAE Systems. Between trials work John captained ATP and BAe146 passenger flights and displayed BAE Systems heritage aircraft, a 1920s deHavilland Cirrus Moth, a 1930s Blackburn B2, and a 1940s Avro C19 (Anson) and other vintage aircraft owned by the Shuttleworth Collection.

As well as his wide experience of displaying different aircraft types, John has been a Flying Control Committee member at many UK air shows including Farnborough. John is a Fellow of the Royal Aeronautical Society and a member of its Flight Test Group, a member of the A|D|S Flight Operations Committee, covering the roles of Flying Display Director and Non-Executive Director for Farnborough International Ltd and a Liveryman of the Honourable Company of Air Pilots, covering the role of Director of Aviation Affairs. He joined the committee of the British Air Display Association in 2013, becoming chairman in February 2014.

Appendix C

Categories of aircraft, and some examples of different category aircraft

Category		Examples	
Single-engined piston aeroplanes	A	Less than 200 hp	Tiger Moth
	B	Between 200 and 600 hp	Yak 52
	C	Exceeding 600 hp	Spitfire
Multi-engined piston aeroplanes	D	Less than 300 hp total	
	E	Between 300 and 600 hp total	Islander
	F	Single pilot exceeding 600 hp total, specified by type	
	Z	Multi-crew exceeding 600 hp total, specified by type	
Jet powered aeroplanes	G	Single jet aeroplanes specified by type	Hawker Hunter
	H	Multi jet aeroplanes specified by type	Meteor
Turboprop powered aeroplanes	I	Single turbo-prop aeroplanes specified by type	
	J	Multi turbo-prop aeroplanes specified by type	
Helicopters and gyroplanes	L	Helicopters specified by type	Westland Wasp
	M	Gyroplanes specified by type	
Gliders, hang gliders and paragliders	N	Gliders of all types	
	O	Hang gliders of all types	
	Y	Paragliders of all types	

Microlight aeroplanes	T	Microlight aeroplanes of all types with weight shift control	
	U	Microlight aeroplanes of all types with three axis control	
	V	Microlight aeroplanes of all types with hybrid control	
Powered parachutes, powered paragliders and powered hang gliders	W1	All types of Trike Unit powered parachutes	
	W2	All types of foot launched powered paragliders	
	W3	All types of foot launched powered hang gliders	

Appendix D

UK civil air displays: commonly used terms and abbreviations

Definitions of commonly used terms	
Flying display	Any flying activity deliberately performed for the purpose of providing an exhibition or entertainment at an advertised event open to the public.
Special event	Any flying activity during which aircraft may not necessarily comply with the Rules of the Air and normal air traffic control rules and which requires consideration of one or more of the following: <ul style="list-style-type: none"> ▪ the issue of special procedures; ▪ the level of an 'air traffic service' to be provided; ▪ the establishment of Restriction of Flying Regulations.
Crowd line	The forward edge of the areas intended for spectators and any car park to which the public has access during a Flying Display.
Display line	A line defining the closest a display aircraft should approach the crowd line.
Event organiser	The organiser of an event which includes a flying display.
Flying Display Director	The person responsible to the CAA for the safe conduct of a flying display.

Display item	A single aircraft, or formation of aircraft, flying as one display 'act'.
Display pilot	A pilot who holds a display authorisation or exemption, issued by their appropriate national authority, which allows the pilot to take part in a flying display.
Spectator	A person attending a flying display and remaining in the areas set aside by the organiser for the public.
Display Authorisation	A national document detailing the types or groups of aircraft in which a pilot is authorised to display, together with any limitations and other specific endorsements.
Display Authorisation Evaluator	A CAA authorised person qualified to conduct examinations and tests for the award of the display authorisation.
Skill levels for authorisation of aerobatic displays	The skill levels used on display authorisations are standard, intermediate, advanced and unlimited.
Pleasure flights	Any passenger flight starting from, or arriving at, the display site purely for the purpose of commercial air transport pleasure flying.
Static aircraft park	A park for aircraft to which the public has access at all times.
Aircraft parking area	A park for aircraft to which the public has no access during the period of the display.
Car parks	Car parks to which the public has access during the flying display and as such are considered the same as the spectator area.

List of common abbreviations	
AAIB	Air Accident Investigation Branch
AME	Aeromedical Examiner
ANO	Air Navigation Order
BADA	British Air Display Association
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
DA	Display Authorisation
DAE	Display Authorisation Evaluator
DfT	Department of Transport
EASA	European Aviation Safety Agency
EO	Event organiser
EU	European Union
FCC	Flight Control Committee
FD	Flying Display
FDD	Flying Display Director
GA	General Aviation
GP	General Practitioner
HE	Highways England
HP	Horse Power
HSE	Health and Safety Executive
LA	Local Authority
MAA	Military Aviation Authority
MCA	Maritime and Coastguard Agency
MEP	Multi-engine Piston
MoD	Ministry of Defence
NAA/s	National Aviation Authority/Authorities
P1	Pilot in Command
RA(T)	Restricted Area (Temporary)
SAG	Safety Advisory Group
SEP	Single-engine Piston