

Revision 4

Aviation Events

12 April 2012

### General

Civil Aviation Authority advisory circulars (ACs) contain information about standards, practices, and procedures that the Director has found to be an **Acceptable Means of Compliance** (AMC) with the associated rule.

Consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices, or procedures are found to be acceptable they will be added to the appropriate AC.

### Purpose

The AC describes an acceptable means of compliance with sections of Rule Part 91 on aviation events, for organisers and others responsible for the safe conduct of an Aviation Event.

### Related Rules

This AC relates specifically to Civil Aviation Rule Part 91 – *General Operating and Flight Rules*.

### Change Notice

Revision 4 provides more detail for the following:

- The requirements for non-aerobatic display pilots
- The appropriate ground training in non-aerobatic display flying, display manoeuvres, the civil aviation rules relevant to display flying, and the human factors aspects of display flying
- The appropriate flight training in non-aerobatic display manoeuvres and if manoeuvres are to be carried out below 500 feet then a minimum height should be specified by a Part 149 aviation recreation organisation authorised person.

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## Table of Contents

<b>1. General Information.....</b>	<b>3</b>
1.1. Terminology.....	3
1.2. Rule exceptions for Aviation Events.....	3
1.3. Aviation event authorisation requirements.....	4
1.4. Exemptions .....	6
<b>2. Aviation Event Personnel and Planning .....</b>	<b>7</b>
2.1. Event Organiser .....	7
2.2. Flying Display Director .....	7
2.3. Assistant Flying Display Director .....	8
2.4. Flying Display Committee .....	8
2.5. Flight Crew .....	9
2.6. Site Assessment and Local Authority/Community Consultation.....	9
2.7. Risk Assessment.....	10
<b>3. Flying Display and Site Management.....</b>	<b>11</b>
3.1. Spectator Enclosure, Car Parking and Public Address Systems.....	11
3.2. Parking and Ground Manoeuvring of Aircraft.....	12
3.3. Display Lines .....	12
3.4. Display Minimum Heights .....	14
3.5. Weather Minima.....	15
3.6. Radio Communications .....	15
3.7. Special Effects .....	16
3.8. Display Briefing .....	16
3.9. Display Pilot Approval.....	16
3.10. Non-display Aircraft Movements.....	17
3.11. Flying Display with Mixed Events (Model aircraft, balloons, parachutes) .....	18
3.12. Military Participation .....	18
3.13. Air Races and Rallies .....	19
<b>Appendix A — Aviation Event Planning Guide .....</b>	<b>20</b>
<b>Appendix B — Risk Assessment Guide .....</b>	<b>22</b>
<b>Appendix C — Display Lines and Flight Display Areas .....</b>	<b>24</b>
<b>Appendix D — Display Briefing .....</b>	<b>25</b>
<b>Appendix E — Display Pilot Certification Form .....</b>	<b>27</b>

## 1. General Information

### 1.1. Terminology

In this AC the following terms are used:

**Aerobatic flight** means—

- (1) an intentional manoeuvre in which the aircraft is in sustained inverted flight or is rolled from upright to inverted or from inverted to upright position; or
- (2) manoeuvres such as rolls, loops, spins, upward vertical flight culminating in a stall turn, hammerhead or whip stall, or a combination of such manoeuvres.

*Note: Steeply banked, level, climbing, or descending turns necessary during manoeuvres between aerobatic or flypast displays are not considered aerobatic manoeuvres.*

**Aircraft parking area** means a park for aircraft to which the public has **no** access.

**Aviation event** means an event to be conducted below the minimum safe heights prescribed under Part 91 that is –

- (1) an air show or practice for an air show; or
- (2) an air race or practice for an air race; or
- (3) an aerobatic competition; or
- (4) aerobatic training or practice.

**Delegated Part 149 Organisation** means a holder of an aviation recreation organisation certificate issued by the Director under the Act and Part 149..

**Display area** means the area beyond the display line over which display aircraft operate.

*(This area will vary in size depending on the performance of display aircraft and the numbers of aircraft in any formation).*

**Display line** is a line that marks the closest a display aircraft can approach the spectator line.

**Height**, in relation to aviation event minima, means the vertical distance between the surface of the display area and the display aircraft.

**Spectator line** means the forward edge of the area intended for spectators and any car parking area to which the public has access during an Aviation Event.

**Static aircraft park** means a park for aircraft to which the public has access.

### 1.2. Rule exceptions for Aviation Events

- 1.2.1. Part 91 provides exceptions from the normal operating flight rules for aircraft that are being operated at an aviation event. These are as follows:

- 1.2.1.1. **Operating on and in the vicinity of an aerodrome.** Under rule 91.223(b), a pilot-in-command of an aircraft operating at an aviation event in accordance with rule 91.703 is not required to comply with the requirements relating to performing a left-hand or right-hand aerodrome traffic circuit as specified in the rule, or, unless otherwise authorised or instructed by ATC, any special aerodrome traffic rules prescribed in Part 93..
- 1.2.1.2. **Aircraft speed.** Rule 91.237(a) restricts aircraft speed to not more than 250 Kts below 10,000 feet AMSL. However, this restriction does not apply to aircraft being operated as part of an aviation event in accordance with rule 91.703.
- 1.2.1.3. **Minimum height for VFR flight.** Rule 91.311 requires the pilot-in-command of an aircraft over any area other than a congested area of a city, town or settlement, or over any open air assembly of persons, to fly at a height of not less than 500 feet above the surface. However, this rule provides an exception from the 500 foot minimum height requirement when the aircraft is being operated at an aviation event in accordance with rule 91.703.
- 1.2.1.4. **Aerobatic Flight Rule 91.701(a).** Rule 91.701(a) prohibits aerobatic flight over, or within a horizontal distance of 600 metres, of a congested area of a city, town, settlement, an open air assembly of persons, or within controlled airspace unless approved by ATC. However, rule 91.701(e) allows a pilot to operate an aircraft within a horizontal distance of 600 metres from spectators at an aviation event if the pilot is participating in that event in accordance with rule 91.703.
- 1.2.1.5. **Aerobatic Flight Rule 91.701(b) & (c).** Rules 91.701(b) & (c) prohibit aerobatic flight below a height of 3000 feet unless the pilot holds an aerobatic rating issued under Part 61. With the appropriate rating, the lower limit is 1500 feet. Rule 91.701(c)(2) allows aerobatic flight below a height of 1500 feet and down to the height specified in the pilot's aerobatic rating provided that pilot is participating in an aviation event.
- 1.2.2. The rule exceptions mentioned above ***are not applicable outside the aviation event area, nor between non participating aircraft and participating aircraft at the aviation event.***

### 1.3. Aviation event authorisation requirements

- 1.3.1. Rule 91.703(a) prohibits a person from conducting an aviation event or a person operating an aircraft in an aviation event unless the event organiser holds an aviation event authorisation issued by the Director. Under rule 91.703(e) an aviation event authorisation is not required for an aviation event at which not more than 500 people are attending, or there are no more than 3 participating aircraft, or the aircraft are in one formation.
- 1.3.2. The organiser of an aviation event that requires an authorisation from the Director must apply to the Director on form CAA24091/03 at least 90 days prior to the start of the aviation event. Alternatively, an application can be made to a delegated Part 149 Organisation. In order to allow ample time for processing an application, it is recommended that the organiser should apply for the

authorisation at least 180 days prior to the aviation event where an event involves airspace restrictions, applications for exemptions or other special requirements that may require additional supporting approvals.

If, due to the density of air traffic or specialised aviation event activities such as military aerobatics, the use of restricted airspace is believed to be necessary an application for airspace use must accompany the request for an aviation event. The application for airspace must be made to the CAA Aeronautical Services Unit on form CAA 24071/01. A restricted area (or military operating area if the activity is military) may be designated for an aviation event after consideration of the justification and its affect on adjacent airspace. Processing of restricted airspace applications by the CAA are a chargeable activity.

Notification of aviation events to the CAA Aeronautical Services Unit within 90 days will allow the promulgation of an AIP Supplement, detailing procedures for the event and warning pilots of the activity in a timely manner not possible with NOTAM. Applications for an AIP Supplement do not incur a charge and there is no specific form to complete.

- 1.3.3. Details of the proposed programme, which are not available at the time of application, should be completed and submitted to the Director at least 30 days prior to the aviation event.
- 1.3.4. **Events without authorisation.** The organiser of an aviation event that does not require an authorisation should still conduct the event in accordance with the recommendations contained in this AC. For example, there may be potential airspace conflicts that require the issue of an AIP Supplement to alert other airspace users. The organiser should seek the advice of the CAA or a delegated Part 149 Organisation if there is any doubt about safety issues or the application of this AC.
- 1.3.5. **Military aircraft participation.** Military aircraft participating at an aviation event will be controlled by a military display director who will assume responsibility for the airspace during any military aircraft display. It is the organiser's responsibility to ensure adequate allocation of display time and the required amount of airspace. The Civil Aviation Rules (CAR) governing aerobatic flight and minimum heights are not applicable to aircraft operated by the New Zealand Defence Force.
- 1.3.6. **Foreign pilot licence holders.** A display pilot holding a current pilot licence of another State flying a New Zealand registered aircraft will require a NZCAA issued certificate of validation. The Director may include foreign type ratings on the certificate of validation.  
  
For more information on this, refer to the NZCAA website for Part 61 - *Pilot Licences and Ratings*, supporting AC 61 ACs, the Recognition of Overseas Flight Crew Licences and Ratings and the special provisions made under the Trans Tasman Mutual Recognition Act for the recognition of Australian pilot licences and ratings in New Zealand.
- 1.3.7. An organiser should make provision for verification of pilot licences, ratings and any flying display routines in their planning document or exposition.
- 1.3.8. **Airshow Practice.** The Rule exceptions specified in section 1.2 are applicable to any practice for an aviation event. Authority to conduct any practice for an aviation event is issued by the Director or a delegated Part 149 organisation on

the same basis as an application to hold an aviation event. If the practice is held prior to, and at the same site as an aviation event, practice days should be included with the application for the aviation event. If the practice is not at the same time or is at a different location to a planned aviation event, the application process is the same as for an aviation event.

- 1.3.9. **Aerobic Training or Practice.** The rule exceptions specified in section 1.2 are applicable to any training or practice for an aviation event. Authorisation from either the Director or a delegated Part 149 organisation is necessary for aerobic training or practice below a height of 1500 feet.
- 1.3.10. All separation requirements from other aircraft, distances from persons on the ground, and minimum heights apply when the training or practice takes place over an aerodrome. Any aerobic training area that is not over an aerodrome should be selected so as to minimise nuisance and risk to persons on the ground. The consent of affected landowners, consultation with local residents, Police and local authorities may be required for a nominated aerobic practice area.
- 1.3.11. **Aerobic Competition.** The rule exceptions specified in section 1.2 are applicable to aerobic competitions. Authorisation from either the Director or a delegated Part 149 organisation is necessary for aerobic competition below a height of 1500 feet.
- 1.3.12. Some aerobic competitions held under international rules may require a higher minimum than that listed in this AC. In such cases, rules specifying separation from spectators, congested areas, and open assemblies of people remain applicable.

#### 1.4. Exemptions

- 1.4.1. Some display aircraft may not be able to comply with the prescribed airworthiness and operating requirements when participating in an aviation event. In such cases the operator of the aircraft can apply to the Director for an exemption from the particular rule requirement. An application for an exemption should be submitted as soon as possible. An applicant for an exemption needs to provide sufficient information for the exemption request to be assessed against the relevant criteria in section 37 of the Civil Aviation Act (1990) and for the Director to be satisfied that the relief being sought will not create a significant risk to safety.
- 1.4.2. As a guide, the granting of an exemption under section 37 of the Civil Aviation Act is based on the following prescribed criteria:
  - (a) the requirement has been substantially complied with and that further compliance is unnecessary; or
  - (b) the action taken or provision made in respect of the matter to which the requirement relates is as effective or more effective than the actual compliance with the requirement; or
  - (c) the prescribed requirements are clearly unreasonable or inappropriate in the particular case; or
  - (d) events have occurred that make the prescribed requirements unnecessary or inappropriate in the particular case; and

(e) that the risk to safety will not be significantly increased by the granting of the exemption.

- 1.4.3. The display line distances from the spectator line specified in this AC should be considered as minimum distances based on the standards used by other States and an analysis of aircraft accident debris patterns.
- 1.4.4. Reductions to display line distances or other minimum distances detailed in this AC are not subject to exemptions under the Act. Where the aviation event organiser wishes to apply a lesser display line distance (or other significant variation from this AC), they would need to demonstrate to the Director that an equivalent level of safety would be achieved in order to be issued with an aviation event authorisation.
- 1.4.5. Any lowering of the minimum heights specified in the rules (and other deviations from the rules) is subject to the exemption process if a variation is sought.

## **2. Aviation Event Personnel and Planning**

### **2.1. Event Organiser**

- 2.1.1. One of the prerequisites under rule 91.703 for the issue of an aviation event authorisation is the identification of an organiser.
- 2.1.2. The organiser will co-ordinate planning, supervision of safety, site evaluation, community consultation and risk assessment. Some particular aspects of an Aviation Event (such as air traffic services, provision of emergency services, and supervision of the flying display) should be allocated to people with the appropriate experience, qualifications and licences.
- 2.1.3. The size, complexity and scope of the aviation event will dictate the number of suitable support personnel the organiser will need. For smaller events a suitably experienced pilot could assume responsibility for several functions such as being organiser and flying display director.

### **2.2. Flying Display Director**

- 2.2.1. The flying display director is responsible for —
  - supervision of compliance with civil aviation rules,
  - safe conduct of the flying display,
  - general flying discipline,
  - ensuring display routines are approved,
  - ensuring minimum heights and display lines are observed, and
  - any modifications to the flying program caused by weather, aircraft unserviceability or other factors.

At larger events disciplinary methods may need to be included in the aviation event plan or exposition document.

- 2.2.2. It follows that the flying display director should have suitable aviation experience and knowledge depending on the size and complexity of the aviation event. The flying display director should provide the organiser and the flying display committee with aviation advice and specialist guidance relevant to the planning and safe conduct of an aviation event.
- 2.2.3. It is strongly recommended that the flying display director **should not** be a participating pilot in the air show.
- 2.2.4. The flying display director should ensure that adequate communications are established between all agencies associated with the air show, such as emergency services, police, special effects, ground activities, spectator security and flying display participants.
- 2.2.5. Secondary communications links (land line/cell phone etc) or secondary radio frequencies should be available for essential control or use in emergencies.

### 2.3. Assistant Flying Display Director

- 2.3.1. At larger, more complex aviation events that may involve pyrotechnics, special effects, simultaneous air and ground events, or multiple radio frequencies and communications, an assistant flying display director should be appointed. It is recommended the assistant flying display director work alongside and provide safety surveillance support to the flying display director during the airshow. The assistant flying display director may need to have safety observers if the size or layout of the aviation event precludes adequate coverage by the flying display director.

### 2.4. Flying Display Committee

- 2.4.1. At larger aviation events the organiser may require assistance with planning and conduct of the event. In this case the organiser may appoint a group of suitably qualified and experienced pilots to act as the flying display committee chaired by the flying display director.
- 2.4.2. Early in the planning of an aviation event, the organiser should delegate specific responsibility for some of the activities such as aircraft parking, spectator control and car parking to flying display committee members. These members should establish a pattern of communication through the flying display director (or assistant flying display director) or to the organiser.
- 2.4.3. During the airshow some members of the flying display committee with mobile communication equipment should act as safety observers. Hazardous, or potentially hazardous conditions should be communicated to the flying display director (or assistant flying display director) or to the organiser as appropriate.
- 2.4.4. **Safety Observers and Safety Spotters.** The nature of the aviation event will dictate the type of safety observation required. Factors to consider when deploying safety observers include whether or not the airspace has been restricted, the presence of ATC, the performance of the aircraft, and proximity of other aviation activity. It is essential that communications are adequate to enable any safety observers or spotters to react appropriately to situations as they arise.

- 2.4.5. The structure of control and communication suggested in this section is intended to be broad so that an aviation event organiser can produce a safety management plan that best suits the nature and size of that particular aviation event.

## **2.5. Flight Crew**

- 2.5.1. All participating civil pilots must hold a current licence or validation, and rating for the type of aircraft they will be flying.
- 2.5.2. Parachutists and pilots of microlight aircraft, gliders, and hang gliders participating in the aviation event must hold an appropriate pilot certificate of competence issued by an appropriate aviation recreation organisation certificated under Part 149 for the administration and control of that particular activity.
- 2.5.3. The minimum standards for a display pilot's recent experience, display experience, and skills required for formation flight, aircraft handling displays, and aerobatic routines need to be set at an early stage in the planning of an aviation event. These standards are normally set by the organiser and flying display director, through the flying display committee.
- 2.5.4. Display pilots with licences from foreign States and flying a New Zealand registered aircraft will need to have a current New Zealand certificate of validation of their foreign licence (or in the case of holders of current Australian licences register their licence with the NZCAA under the TTMRA).
- 2.5.5. In addition any foreign display approval or type rating will need validation in New Zealand by an appropriate Part 141 or 149 organisation or the Director.

## **2.6. Site Assessment and Local Authority/Community Consultation**

- 2.6.1. Where the aviation event is planned at an aerodrome, the aerodrome owner/operator should ensure that any conditions of operation imposed by any local authority are not infringed.
- 2.6.2. Consultation between the organiser, local aerodrome users, and the aerodrome owner/operator should evaluate any disruption, changes to safety procedures and location of hazards.
- 2.6.3. Procedures to enable local aircraft operators to continue limited operations may be appropriate. Special procedures may be able to be developed to separate aviation event aircraft from other non-event operations.
- 2.6.4. If an aviation event is planned away from an aerodrome, whether over land or water, the proposed display area will need careful evaluation to identify any hazards, presence of livestock, and other activity that may be disturbed. Availability of landing sites in close proximity for use in emergency should also be considered and documented in the aviation event plan.
- 2.6.5. As a guide, the following factors should be considered when evaluating a site for an aviation event.
- Suitability of aerodrome surfaces for the operation of display aircraft, their maintenance and replenishment;
  - If the display is not over an aerodrome, then a suitable aerodrome should be located nearby for display aircraft to use, or for emergency landing if required;

- Identification of obstructions in the vicinity of the site with regard to the type of aircraft to be displayed;
- Proximity of any congested areas of a city, town or settlement, or open air assembly of persons to the display area, noting that rule 91.311 minimums apply to such areas;
- Some areas, such as roadways or unoccupied land may become an “open air assembly of persons” when an aviation event occurs. Such areas may need control or closure to avoid infringing the display area. A suitable display area will enable the display pilot to achieve a smooth entry or departure from the display area and comply with safety height minima over any congested area or outdoor assembly of persons located near the display area;
- Proximity of livestock, other aerodromes, controlled airspace, parachute drop zones, heliports, paragliding sites, and danger or restricted areas;
- Location and marking of display lines in relation to the proposed spectator enclosure. The dimensions of the display area will depend on the display speed of the participating aircraft, number of aircraft in a formation, and the type of manoeuvres to be conducted. Manoeuvres lateral to the display line will require a wider flight display area to maintain distance from the spectators.
- Ease of access for emergency vehicles;
- Consultation with police, local Council and emergency services for support and to evaluate requirements for emergencies, spectator control and road traffic control;
- Consultation with ATC for airspace needs and provision of ATC services if required. The CAA may require that Air Traffic Services be provided when considering the number of movements and the safety of air transport operations associated with the aviation event in that particular area.

## 2.7. Risk Assessment

- 2.7.1. Risk to people and property is present at any aviation event. An organiser should make him/herself familiar with other legislation, outside of the Civil Aviation Act, which may be relevant to conducting an aviation event. Legal advice prior to the commencement of planning for such events may be appropriate.
- 2.7.2. As part of the planning of an aviation event it is necessary to identify, evaluate and remove hazards (or at least minimise hazards) as far as practicable. The responsibility of implementing and monitoring risk removal and risk mitigating steps falls to the organiser, flying display director and flying display committee. They should therefore all be involved in the risk assessment of the aviation event.
- 2.7.3. Risk assessment for an aviation event is subjective and based on the personal experience and qualifications of the assessor(s). In the aviation environment, quality information is more readily available than most other risk model environments. The use of aircraft accident and incident reports, as well as procedures from other States on conducting aviation event are useful as guides for risk assessment. The display lines listed in this AC are based on these

assessment criteria and should be viewed as being minimums for a display being parallel to, or away from (but not towards) the spectator line.

- 2.7.4. The assessor(s) should be aware that in the event of any accident or incident the risk assessment might be challenged. Part of risk mitigation involves having an emergency plan. The most common risks include people becoming ill in the spectator area, and a vehicle fire in the car parking area. A catastrophic aircraft accident is less common. A risk assessment guide is attached in Appendix B.
- 2.7.5. **Emergency Plan.** An emergency plan forms part of the risk mitigation plan at an aviation event.
- 2.7.6. The organiser and flying display director should publish an emergency plan for use by emergency services (police, rescue/fire services, ambulance and helicopter rescue services) as applicable. This plan should include a grid map of the area, communication procedures, and who will assume responsibility for certain emergency tasks. For example ATC will generally assume control of aviation emergencies, the police for traffic and crowd emergencies and the ambulance staff for first aid.
- 2.7.7. At larger aviation events, the police will generally assume overall control and have the power to co-opt support from other services such as a helicopter for medivac cases.

### 3. Flying Display and Site Management

#### 3.1. Spectator Enclosure, Car Parking and Public Address Systems

- 3.1.1. The organiser should position public enclosures and any car parking areas behind the spectator line. Any area to which the public has access should never be closer to the display line than the planned spectator line. Any public aircraft parking area accessible to spectators should be considered in the same way as car parking.
- 3.1.2. If there is no practical means of parking cars and aircraft behind the spectator line then CAA approval could be considered for such parking inside the display line or display area provided the organiser does not permit any public access to these areas for the duration of any flying display.
- 3.1.3. The ideal spectator enclosure and public parking area is situated on one side of the display area thus giving maximum manoeuvring space for the display aircraft.
- 3.1.4. If a secondary spectator area occurs or is planned on the opposite side of the display area to the primary spectator area, then care must be taken to ensure that the display area provides sufficient space for all the planned flying display manoeuvres. This includes formations of aircraft and aerobatic routines being conducted such that the primary spectator and secondary spectator display lines are not infringed. (See Appendix C for display lines and flying display area diagram).
- 3.1.5. A public address system which is audible along the entire length of the spectator line is essential at large aviation events and should be sufficiently powerful to allow the passage of important messages to the public from the police, the flying

display director or the organiser. It is recommended that prescribed messages covering essential information for major emergencies be available.

- 3.1.6. The spectator area may have trade sites, tents and spectator grandstands erected. Display aircraft are prohibited from flying over the spectator area, except during ingress and egress and not below a height of 1000 feet.
- 3.1.7. If the spectator area is close to a runway used by air transport operators, the side clearances and maximum obstruction heights specified under Part 139 and ACs relevant to Part 139 need consideration. As a guide, there should be no obstruction above ground level within 45 metres of a runway centre line and then on a 1 : 5 slope to a height of 20 metres for day VFR operations. A runway certified for use under instrument flight conditions will have more restrictive obstruction criteria. Trade activities such as tethered advertising balloons need to be clear of the obstruction profile.

### **3.2. Parking and Ground Manoeuvring of Aircraft**

- 3.2.1. Aircraft taking part in an aviation event should be segregated from both the public aircraft park and any static aircraft park. If a display aircraft is to be used from either the public aircraft park or the static aircraft park it must be towed to a safe area where spectator access is prohibited, prior to engine start.
- 3.2.2. No part of any taxiing aircraft, including a helicopter during hover taxi, should be closer than 15 metres to any public or spectator enclosure.
- 3.2.3. Spectators should not be allowed closer than 15 metres to any fuelling area or vent.
- 3.2.4. The minimum distance between the spectator line and the centre of any runway being used for take-off and landing should be;
  - (a) for aircraft with a normal take-off or landing speed less than 100 knots, 60m or 10m from the edge of the runway strip, whichever is greater, or
  - (b) for aircraft with a normal take-off or landing speed of 100 knots or more, 75 m or 10 m from the edge of the runway strip, whichever is greater.
- 3.2.5. Some aircraft configurations, engine power and manoeuvring capability may need greater distances from spectator areas in order to preserve public safety.
- 3.2.6. It is strongly recommended that the flying display director keep the active runway clear at all times during a display. This is to allow a display pilot the ability to land immediately in the event of any malfunction or emergency.
- 3.2.7. Aircraft holding on the ground for the next or subsequent display, should be briefed to hold clear of the active runway during any overhead display routine.

### **3.3. Display Lines**

- 3.3.1. Display lines must be clearly identifiable to the display pilot. A runway edge, fence line, whitewashed line, or row of "dayglo" yellow panels are suitable means of marking a display line.

3.3.2. If the display area is not over an aerodrome, or is over water, the display lines will need to be clearly defined. They may be a natural geographic feature such as a shore line or embankment.

3.3.3. Minimum display line distances are as follows:

Table 3.3 Display Line Distances

Display speed	Flypast	Aerobatics
Low energy*	75 metres	150 metres
100 – 250 Kts	150 metres	220 metres
Above 250 Kts	220 metres	220 metres

\* Low Energy is defined as having a mass of less than 2300 Kgs and a maximum TAS of 100Kts. This category is designed to cover most light aircraft, helicopters and aircraft of a vintage, homebuilt or historic nature while carrying out such activities as “crazy flying”, dropping of articles, and underslung load demonstrations.

*Note: Rule 91.703 requires a minimum display height of 100 feet except for helicopter or agricultural operations. For certain displays such as ‘crazy clown’ flying and other aircraft using low energy’, the organiser of the event will need to apply to the Director for an exemption, prior to the event, if the proposed operation is below 100 feet. The organiser of such an event will also need to provide the Director with sufficient information to show that an equivalent level of safety can be achieved and that spectator safety is not compromised. See section 1.4 for further information on exemptions from Rules.*

3.3.4. Pilots must plan their flying routine so that the display will not infringe the display line. Pilots also need to allow for any towards-the-spectator wind component or any towards-the-spectator velocity during positioning.

3.3.5. In the case of formations, the aircraft closest to the spectator line must not infringe the display line and the display area must allow for the whole formation including all manoeuvres.

3.3.6. There are a maximum of three display distances which are designed to reduce the number of possible display lines to a minimum whilst providing for adequate spectator safety.

3.3.7. Display aircraft are not permitted to overfly the spectator enclosure or visitor parking areas, except on ingress to or egress from their displays, and then not below a height of 1000 feet.

3.3.8. Aircraft carrying parachutists may overfly visitor parking areas and the spectator areas during positioning to drop but not below 2000 feet above the surface.

3.3.9. The display lines are based on a display parallel to or away from the spectator enclosure. Any display that has a velocity component towards the spectator enclosure will compromise spectator safety and therefore must be completed at a safe distance beyond the applicable display line.

- 3.3.10. Any display that commences from the runway should have the departure manoeuvre away from the spectator enclosure.
- 3.3.11. A maximum recommended level speed is 600KIAS or Mach 0.9 whichever is less and may need to be further reduced during manoeuvres. This limitation is to avoid inadvertent sonic boom. Rule 91.805 restricts the operation of an aircraft to not above Mach 0.92 unless approval has been given by the Director.

### **3.4. Display Minimum Heights**

- 3.4.1. Pilots flying aerobatic manoeuvres at an aviation event require an aerobatic rating issued under Part 61 for aerobatic manoeuvres below a height of 3000 feet (above the surface) and down to a height of 1500 feet (above the surface). They will also need to hold a display approval to a lower minimum height from an approved Part 149 organisation for aerobatic manoeuvres below 1500 feet (above the surface) to participate in an aviation event.
- 3.4.2. The minimum height for an aircraft handling display at an aviation event will be that given by the event organiser in the display approval for that individual pilot. Under rule 91.703, this minimum height may not be below a height of 100 feet above the surface except for helicopter and agricultural operations.
- 3.4.3. Some low energy displays, such as vintage aircraft and “crazy clown” acts, will require an exemption from the Director to operate at a height lower than 100 feet.. RNZAC and the New Zealand Aerobatic Club have their own display limitations which are higher than those listed in this AC.
- 3.4.4. Pilots performing aircraft handling displays that do not include aerobatic manoeuvres should have completed appropriate ground training in display flying that included instruction on flying display manoeuvres, civil aviation rules relevant to display flying and the human factors aspects of display flying by attendance at an RNZAF or an approved Part 149 organisation display flying course.
- 3.4.5. Pilots performing aircraft handling displays that do not include aerobatic manoeuvres should have completed appropriate flight training in display manoeuvres and if manoeuvres are to be carried out below 500 feet AGL then a minimum height should be specified by an approved Part 149 organisation authorised person.
- 3.4.6. Pilots participating in air race or airfield attack display activities should hold an aviation event scenario approval for that particular activity from an approved Part 149 organisation.
- 3.4.7. The organiser/flying display director should have procedures in place to ensure that all display pilots are suitably qualified and have the necessary recent experience for their proposed display (See Appendix “E” Display Pilot Certification Form).
- 3.4.8. Prior to setting the height limitations for an aviation event, the flying display director should review the minimum heights and limitations of the relevant rule Parts (101, 103, 104, 105, 106) when considering activities involving microlights, gyrogliders, kites, rockets, model aircraft, gliders, parachutes, and hang gliders. (Under Part 103 the minimum height for a microlight aircraft is 200 feet above the surface).

- 3.4.9. The following minimum heights are recommended for other events:
- (a) 100 feet above the surface — flour bag bombing competition, air race finish line and straight and level flypast.
  - (b) 500 feet above the surface — streamer cutting, balloon bursting and for complete recovery from inverted flight or other aerobatic manoeuvre.
- 3.4.10. Following the completion of an aerobatic manoeuvre, the pilot may descend to the approved flypast height.
- 3.4.11. These minimum heights or other minima listed in this AC are applicable only within the area of an aviation event.
- 3.4.12. Aircraft operating to, or from an area as part of an aviation event are subject to the normal rules whilst outside the area. For example, participating aircraft in an air race may only descend to a height of 100 feet above the surface, or operate in close proximity to other aircraft, if they have approval to participate in the aviation event and the other aircraft are part of a briefed event.

### **3.5. Weather Minima**

- 3.5.1. The weather minima for an aviation event will depend on the type of activity, display aircraft operating characteristics, whether single or multiple aircraft are involved, and the nature of formations.
- 3.5.2. The flying display director is to establish what weather minima is to apply to the various aviation activities being conducted at the aviation event.
- 3.5.3. As a guide, the display cloud base should be at least 500 – 1000 feet above the height required for vertical display manoeuvres. This depends on the aircraft performance and whether single aircraft or formations are involved.
- 3.5.4. For horizontal manoeuvres, the cloud base should be at least 500 feet above the display height.
- 3.5.5. A suggested minimum horizontal visibility of 5 km should enable the flying display director to keep display aircraft in sight. However, this distance should be varied depending on the performance, and numbers, of display aircraft.
- 3.5.6. The wind may also be a limiting factor for parachute operations, some light aircraft and model aircraft displays, and some helicopter operations.

### **3.6. Radio Communications**

- 3.6.1. Generally, the flying display director will require two way radio communications with display aircraft and essential services.
- 3.6.2. It is strongly recommended that during any flying display a discrete or quiet frequency be allocated for display aircraft only.
- 3.6.3. For larger events or where non - display aircraft radio communication could affect the control of the aviation event, a discrete frequency for display aircraft only may be necessary. All aircraft movement information, display time variations and other radio communication not associated with the control of aircraft participating in the aviation event display, should be on another frequency.

- 3.6.4. At larger aviation events there may be a need for direct radio communications with police, rescue fire and ambulance services.
- 3.6.5. A link to the public address system may be required to allow information to be broadcast to the public.

### **3.7. Special Effects**

- 3.7.1. Explosives, smoke, groundbursts and other special effects must be controlled by a special effects co-ordinator who is a competent person appointed by the organiser.
- 3.7.2. The flying display director must establish with the ground effects person the danger hemispheres for explosive devices, the “no fly over” and “no taxi” areas.
- 3.7.3. The flying display director must also ensure that all pilots are thoroughly briefed as to applicable times, danger heights and no fly over areas, when the special effects are in place or armed.
- 3.7.4. Communication between the special effects co-ordinator and flying display director should be established prior to and during the special effects display.
- 3.7.5. Certain special effects, such as rockets, are controlled under Part 101 and may need special approval to be operated at an aerodrome or in conjunction with an aviation event.

### **3.8. Display Briefing**

- 3.8.1. A thorough and formal briefing is an essential part of any aviation event irrespective of the size or simplicity of the event. No pilot should fly in an aviation event without having received a briefing from the flying display director (or the assistant flying display director or other nominated person). A list of relevant briefing points is attached in Appendix D.
- 3.8.2. A complete written briefing should be sent in advance to all participating pilots, special effects personnel, other display personnel and if applicable, any local operators who may be affected by the aviation event.
- 3.8.3. A formal verbal briefing should be given each day of the aviation event, including any practice days. Weather minima, alternate airports, restricted area boundaries, and any display changes need to be notified at the daily briefing.
- 3.8.4. Any display pilot who does not operate from the venue of the aviation event or is unable to attend the formal briefing should be formally briefed by the person responsible for pilot briefing by telephone or radio prior to any display.

### **3.9. Display Pilot Approval**

- 3.9.1. The organiser or flying display director should establish procedures to verify that every display pilot is holding a current licence, or validation, and ratings appropriate to their intended display.
- 3.9.2. If every display pilot completes a display pilot certification form, regardless of whether the display is a single flypast, a formation flypast, or an aerobatic routine, then the organiser or flying display director will have a means of monitoring recent experience and licence validity. It is recommended that every display pilot completes the display pilot certification form in Appendix E to this AC. It is also

recommended that the organiser or flying display director should receive display pilot certification forms at least one week prior to the event to allow sufficient time for the review of each pilot's recent experience, licence validity and details of intended display.

- 3.9.3. Under rule 91.703, passengers must not be carried on any display flight or practice display flight.
- 3.9.4. Only those crew members essential for the safe operation of the aircraft should be carried on a display flight or practice for a display flight.
- 3.9.5. Given that it is not possible to simulate all aspects of some Air Race or Airfield Attack display activities outside an actual airshow environment, scenario training may be carried out during an airshow or airshow practice providing that the aircraft has dual flight controls, the pilot giving instruction is an approved Part 149 organisation authorised person, and the flight instruction is part of a recognised training programme being conducted by an approved Part 149 organisation.
- 3.9.6. The organiser should also consider having third party insurance details included on the display pilot certification form. These details may include display limits on the aircraft, the display pilot and the venue.
- 3.9.7. **Air Transport Aircraft Flypast.** An aircraft being operated under Part 121, 125, or 135 may be approved by the event organiser for a flypast but must not be carrying fare paying passengers.

### 3.10. Non-display Aircraft Movements

- 3.10.1. Aircraft not involved in the display flying program must not be operated in the same air space as the air show. If scheduled flights, other aircraft movements, or emergency flights are required, then the flying display must be suspended for the period of that flight and display aircraft held clear of the non-display aircraft route.
- 3.10.2. Prescribed arrival and departure routes at the aerodrome, which are clear of the display area, could facilitate the safe arrival and departure of aircraft while the aviation event is in progress. Helicopters, for example, might be permitted to operate clear of the display area and from fixed bases clear of the display area. Co-ordination of procedures and formal briefing of display pilots and pilots of non-display aircraft is an essential part of such an arrangement.
- 3.10.3. Air traffic control (ATC) is not usually exercised during the flying display. However, if ATC is present, then the flying display director should ensure that the Air Traffic Service is appropriately authorised under a Part 172 air traffic service certificate.
- 3.10.4. If ATC is not present, then any non-display aircraft movement will use unattended aerodrome procedures and the flying display director must suspend any flying display during that movement.
- 3.10.5. An AIP Supplement should be used prior to the aviation event to inform all non-display aircraft of the relevant procedures that are to be observed in the vicinity of the event.

- 3.10.6. Any passengers moving to or from an aircraft should be escorted between the public area and the aircraft by the pilot of the aircraft or an aviation event official. The escorting of passengers in this manner should occur throughout the period of the airshow as well as immediately before and after the airshow when passenger movements may be high.

### **3.11. Flying Display with Mixed Events (Model aircraft, balloons, parachutes)**

- 3.11.1. The operation of model aircraft, unmanned balloons, kites, rockets, gyrogliders and parasails is conducted under Part 101, microlight aircraft under Part 103, gliders under Part 104, parachutes under Part 105, and hang gliders under Part 106.
- 3.11.2. An organiser of an aviation event who plans to involve any of the aviation activities specified in paragraph 3.11.1, will need to review the capability and limitations of each activity and provide the necessary briefing and control for these activities during the event.
- 3.11.3. In most cases the particular rule Part activity under Parts 101, 103, 104, 105, or 106 is supported by a national organisation that is certificated under Part 149 for the conduct and maintenance of standards for the activity. Consultation between the organiser/flying display director and the applicable Part 149 certificated aviation recreation organisation will provide information on the capability and relevant limitations for that aviation activity.
- 3.11.4. The organiser and flying display director will need to take into consideration any limitations that these rules specify, as well as any relief from the rules that are applicable to activities associated with an aviation event.
- 3.11.5. All display pilots should be briefed on the limitations of other aviation groups that are participating in the same airshow.
- 3.11.6. Display activities that have a ground component, such as a mock ground battle, a parade of military vehicles, or dropping of cars/caravans will require two way radio contact with the flying display director. This is particularly so if there is any activity on, or near, the active runway.

### **3.12. Military Participation**

- 3.12.1. The rules governing aviation events and aerobatic flight are not applicable to aircraft operated by the New Zealand Defence Force. Such aircraft, when operating at an aviation event, will be controlled by a military display director who will assume control of the allocated airspace for the period of the military aircraft display.
- 3.12.2. The aviation event organiser will have allocated time in the flying program for the military aircraft display. The flying display director will ensure the military display director and the military display pilots attend the display briefing each day or are provided with a written copy of the briefing, as well as verbal updates if the pilots are not based at the aviation event aerodrome/location.
- 3.12.3. Generally, the military display director will not agree to any civil aircraft being operated in the same airspace at the same time as military display aircraft.

### **3.13. Air Races and Rallies**

- 3.13.1. The nature of air races and rallies is such that they generally plan to fly to a particular destination which, while en-route, may pass through airspace used by others who are not participants in the activity. The normal rules of the air apply to such flights and the exceptions that are applicable to an aviation event do not apply.
- 3.13.2. An air race or rally should only be conducted after all available weather information has been reviewed and considered. Consideration should also be given to the experience levels of the participants. An AIP Supplement notifying other airspace users of the air race or rally will also be necessary, requiring a minimum of 90 days notice to the CAA Aeronautical Services Unit.
- 3.13.3. A written and verbal brief should be provided by the organiser to all participating pilots to emphasise the applicable weather minima, location of alternate destinations, airspace requirements and communications with ATC.
- 3.13.4. In the case of gliding rallies and/or competitions, the organiser will arrange airspace allocation with the CAA through the Aeronautical Services Unit. The organiser will also co-ordinate with ATC for the provision for communication and AIP Supplement advice to other airspace users.
- 3.13.5. If the air race or rally plans to finish at a particular venue with defined dimensions of airspace and time, then the organiser may apply to the CAA or a delegated Part 149 organisation for an aviation event authorisation. The rule provisions for an aviation event are then applicable within the airspace designated by application to the CAA Aeronautical Services Unit for that race or rally.

## Appendix A — Aviation Event Planning Guide

1. Refer to civil aviation rule 91.703 – Aviation Events.
2. The Director, or a delegated Part 149 organisation authorisation is required if the aviation event involves:
  - (i) more than 500 people; or
  - (ii) more than three participating aircraft: or
  - (iii) more than one formation of aircraft.

Even if the Director's authorisation is not required, the recommendations in this AC should be applied. If in doubt, consult with the CAA or a delegated Part 149 Organisation.

3. An aviation event needs an organiser, a flying display director, and a flying display committee. The size of an event will dictate the numbers of persons in this committee.
4. If an authorisation is required then apply to the Director, or delegated Part 149 organisation at least 90 days prior to the event. Apply earlier if exemptions or special consideration is required. If restricted airspace is required then apply to the CAA Aeronautical Service Unit at least 90 days prior to the event.
5. When planning an aviation event consider what aviation activities will be conducted under the various rules. For example —

*Part 101 - Model aircraft, unmanned balloons, kites, rockets, gyrogliders and parasails,*

*Part 103 - Microlight aircraft,*

*Part 104 – Gliders,*

*Part 105 – Parachutes,*

*Part 106 - Hang gliders.*

6. Other pre-event tasks may include site assessment and consultation with local airspace users, local community, emergency services and police. Consideration should be given to spectator area safety, car parking, visiting aircraft parking, display area obstructions, marking of display lines, requirement for ATC, and public address system.

Air transport operations using large aeroplanes operating under Part 121 to carry spectators to or from the event may require a certificated aerodrome.

For larger aviation events, consider preparing an exposition document that covers all aspects of the applicable rules, management structure, display lines, display heights, display briefing, competence of participants, conduct of special effects, and any exemptions that are required.

7. Formulate an event risk assessment and produce an emergency plan.
8. Consult with air show participants to ensure that display routines, display approvals, and recent experience will be current for the event. The location and safety of special effects/pyrotechnics needs careful consideration and planning. They may also require special approvals. Military aircraft or military display involvement also requires thorough consultation with the New Zealand Defence Force.

9. Written briefings need to be sent to all participants including military participants, special effects, and crews of display aircraft.
10. A complete check of communications and emergency procedures needs to be carried out prior to the display day. A practice day can be used to check all facilities and emergency services communications.

A post-event report on the conduct of the aviation event can be of value to the organiser for planning future events, as well as to the CAA. The report should include recommendations that identify what improvements could be made to the event, the civil aviation rules, or the AC to enhance safety.

## Appendix B — Risk Assessment Guide

This risk assessment guide is one of many ways of assessing risk. All aviation events present hazards that may cause harm to people. For this reason an aviation event organiser should identify hazards and remove or minimise them. This process may also require the assistance of the flying display director and the flying display committee.

1. Avoid making the assessment system too complicated. The following is a suggested method of assessing risk. Risk can be defined as:

$$\textit{Severity of the hazard} \times \textit{likelihood of the occurrence}$$

2. There are 5 steps to risk assessment:

- (a) Identify the activities associated with the event that have hazards and where the hazards occur.
- (b) Identify those at risk and how they may be harmed.
- (c) Identify existing precautions.
  - (i) Evaluate the risks. (This will involve a combination of the likelihood and severity of the identified risk).
  - (ii) Decide what further mitigation may be required.

3. The **severity** of a hazard may be assessed under the following headings and points allocated.

Trivial	Minor Injury	Serious Injury	Single Fatality	Multiple Fatality
1	2	3	4	5

4. The **likelihood** of the hazard occurring may be assessed against the following headings and points allocated.

Improbable	Possible	Quite Possible	Likely	Highly Likely
1	2	3	4	5

5. A suggested matrix to evaluate risk rating is as follows.

<b>Hazard</b>	<b>Severity</b>	<b>Likelihood</b>	<b>Rating</b>	<b>Mitigation</b>	<b>Mitigation Factor</b>	<b>Final Rating</b>
Aircraft accident involving spectators	<b>5</b>	<b>3</b>	<b>15</b>	Strict adherence to display lines, briefings.	Reduces likelihood to <b>1</b> .	<b>5</b>
Fire in car parking or spectator area	<b>3</b>	<b>3</b>	<b>9</b>	Provision of mobile fire fighting and first aid equipment	Severity reduced to <b>2</b> .	<b>6</b>

This matrix does not assume or infer a risk level. However, it does provide guidance as to the factors to be considered.

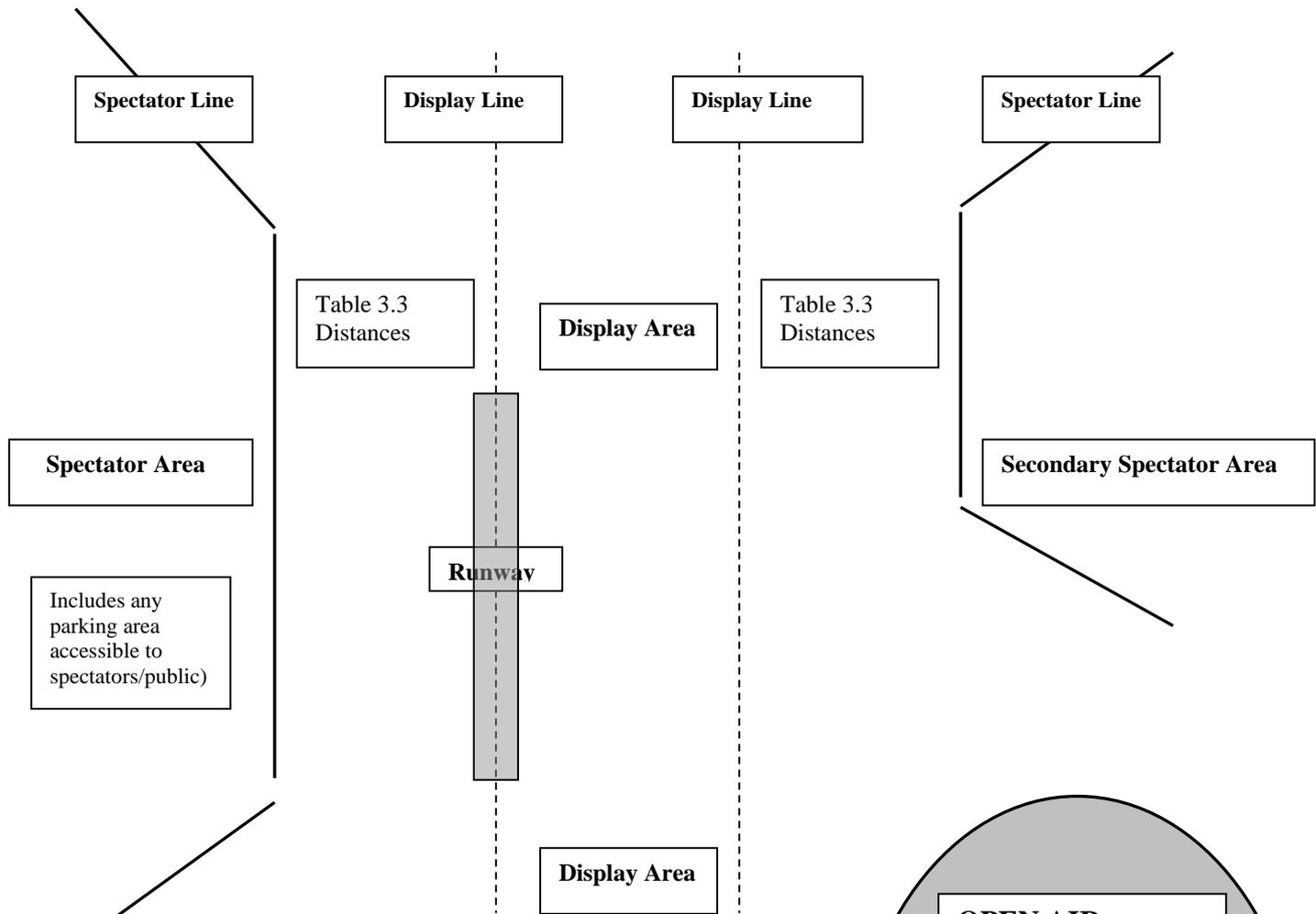
A final rating of less than 6 indicates a low risk, between 6 and 15 a medium risk, and above 15 a high risk factor. High risk factors should be deemed unacceptable. Mitigation action should be taken whenever possible even when the risk is low.

6. At an aviation event hazards vary from the risks of an aircraft accident involving spectator casualties, to a vehicle fire in the car parking area, to a spectator requiring first aid treatment. The methods of mitigating the various risks will also vary from ensuring a thorough briefing of all display participants, ensuring adherence to display lines, to provision of first aid facilities for spectators and good spectator communication facilities.

A good emergency plan will provide a common document for use by the aviation event management and the providers of police, ambulance, fire, and spectator security.

7. Compliance with a civil aviation rule does not in itself ensure safety when viewed in combination with spectators, supporting events, and restricted or concentrated areas of activity which are normally not part of the aviation environment to which the public have access or involvement.

### Appendix C — Display Lines and Flight Display Areas



**OPEN AIR ASSEMBLY OR CONGESTED AREA**

Restrictive height and distance limitations apply to this area.

**See 1.2.1.3 and 1.2.1.4 and 1.2.1.5**

**Note 1:** Display area width will need to accommodate turning circle requirements and/or formation width of aircraft requiring most amount of airspace plus an allowance to ensure display aircraft are parallel to display line in front of spectator line.

**Note 2:** Ideal situation is spectator area on one side of the display line only, which allows unrestricted display area width.

## Appendix D — Display Briefing

### Written briefing

The flying display director is responsible for sending a written briefing to all participants in advance of the aviation event. As a guide the following items should be included -

- (a) place, date, time and duration of the flying display and place/time of the daily formal briefing:
- (b) map of the display location, showing site layout, spectator enclosures, car parking, display lines and any adjacent restricted areas or congested area:
- (c) air traffic facilities available, arrival and departure procedures, radio frequencies, procedures during the airshow, local diversion airfields, and any local flying restrictions:
- (d) flying display weather minima and flying display minima:
- (e) display routine rehearsal, current flight experience, display approval requirements:
- (f) display lines and display minimum heights to be strictly observed and only practised manoeuvres including bad weather “flat routines” to be flown:
- (g) only essential flight crew to be carried in display:
- (h) display pilot certification applies to ALL pilots irrespective of routine or display complexity:
- (i) procedures for other events such as parachuting, glider flights and pyrotechnics or special effects:
- (j) procedures for any program cancellation, or variation:
- (k) aircraft parking and fuelling facilities:
- (l) arrangements for visiting aircraft and local pleasure or scenic flights:
- (m) emergency plan and emergency services:
- (n) contact details of organiser and flying display director.

### Verbal briefing

The flying display director is responsible to ensure that all participating pilots, military display director, special effects personnel, and any ground display personnel receive a verbal briefing prior to the flying display on each day of the event.

The CAA, or delegated Part 149 organisation authorisation for the aviation event, together with any conditions, exemptions or other variations must be available at the briefing.

Non-participating pilots who wish to operate during the period of the air show must also receive a verbal briefing to confirm or vary established procedures and separation from the display flying. Pilots of aircraft not operating from the display venue will should receive telephone or radio briefings.

The following items should be included in the verbal briefing:

- (a) time check (UTC or local time):

- (b) attendance check, and verify pilot certification forms are completed by **ALL** display pilots:
- (c) weather briefing provided for the display area and conditions at alternate airfields are made available to pilots throughout the event:
- (d) brief revision of contents of written brief, with particular emphasis on display lines and height minima, adherence to display routines, and no unrehearsed manoeuvres:
- (e) suitable forced landing and abandonment areas:
- (f) specific briefing on other activities such as gliding demonstrations, parachuting, model aircraft display, special effects hazard zones and danger hemispheres:
- (g) handling of emergencies and emergency plan as it would affect the flying display.  
Possible use of a single codeword to stop the flying display:
- (h) ground handling and fuelling procedures:
- (i) any questions or clarification requests:
- (j) contact details for the flying display director (or Assistant) during the period of the display programme.

## Appendix E — Display Pilot Certification Form

EXAMPLE ONLY

### DISPLAY PILOT CERTIFICATION FORM

All participating pilots should complete and sign a display pilot certification form prior to any display or practice for a display unless the practice is for the purpose of gaining a display approval to specific minima under the control of an appropriate Rule 141/149 approved organisation. **All pilots will need to complete this form irrespective of the type of display, single flypast or aerobatic routine, or formation.**

- a. Full Name.....
- b. Pilot Licence Number..... [PPL, CPL, ATPL] [AEROPLANE/HELICOPTER]Circle
- c. Medical Expiry Date.....

Non New Zealand Pilot Licence Holders (Australian pilot licence holder/type rating valid in NZ)

- d. Nationality of pilot licence/aviation certificate.....
- e. NZCAA validation certificate number and date.....
- f. Type rating approved for (list).....
- g. NZ type rating approved by(CAA/ASL/ Part 141/149 organisation).....name

#### All Display Pilots

#### DELETE NON APPLICABLE ITEMS

- h. Display Aircraft type(s).....
- i. Display Aircraft Owner/Company/Syndicate.....
- j. Public Liability Insurance Covered by.....

#### If **NON AEROBATIC DISPLAY**

- k. Display Flying Ground Course **YES/NO** Date.....Organisation:.....
- l. Display Flying Flight Instruction carried out **YES/NO** Date.....Instructor:.....
- Low Level Display Authorisation limit:.....ft AGL

#### OR

- m. Display Authorisation valid until .....(Date)
- n. Display Authorisation issued by .....(Organisation)
- o. Name of Display Approver .....(Print Name)
- Low Level Display Authorisation limit .....(ft AGL)

#### OR

- p. Aviation Event Scenario Approval **YES/NO Air Race/Airfield Attack** issued on.....(date)
- q. Aviation Event Scenario Approval issued by .....(Organisation)
- Low Level Display Authorisation limit .....(ft AGL)

#### If **AEROBATIC AND/OR FORMATION DISPLAY**

Aerobatic Rating **YES/NO**

Low Level Display Authorisation limit. Aerobatics .....AGL; Low Pass.....(ft AGL)

r. Display Authorisation valid until .....(Date)

s. Display Authorisation issued by .....(Organisation)

t. Name of Display Approver .....(Print Name)

I certify that within the last 90 days I have covered the recency requirements of my licence, display authorisation (if applicable), including displays and display practice flown, and that my pilots licence will be valid during the display dates.

Signature.....

Date.....