



Advisory Circular

Subject: Sequential Listings of Aerobatic Manoeuvres and Weather Conditions

Issuing Office: General Aviation

Activity Area: Qualifying

AC No.: 623-001

File No.: A5812-14-2U

Issue No.: 01

RDIMS No.: 2152248-V4

Effective Date: 2007-02-22

TABLE OF CONTENTS

1.0 INTRODUCTION..... 2

1.1 Purpose 2

1.2 Applicability 2

1.3 Description of Changes..... 2

2.0 REFERENCES AND REQUIREMENTS 2

2.1 Reference Documents 2

2.2 Cancelled Documents 2

2.3 Definitions and Abbreviations 2

3.0 BACKGROUND..... 2

4.0 ACTION 3

5.0 CONTACT OFFICE 5

APPENDIX A – SAMPLE OF AN UNACCEPTABLE SEQUENTIAL LISTING 6

APPENDIX B – SAMPLE OF AN ACCEPTABLE SEQUENTIAL LISTING 7

APPENDIX C – SAMPLE OF AN ACCEPTABLE SEQUENTIAL LISTING 9

1.0 INTRODUCTION

This Advisory Circular (AC) is provided for information and guidance purposes. It may describe an example of an acceptable means, but not the only means of demonstrating compliance with regulations and standards. This AC on its own does not change, create, amend or permit deviations from regulatory requirements nor does it establish minimum standards.

1.1 Purpose

The purpose of this Advisory Circular is to clarify the meaning and intent of the 623 air show standards as they apply to Sequential Listings of Aerobatic Manoeuvres to be performed [623.02(3)(c)] and Weather Conditions (623.08) to ensure a unified national interpretation and application.

1.2 Applicability

This document is applicable to all Transport Canada Civil Aviation (TCCA) employees, to individuals and organizations when applying for a Special Flight Operations Certificate – Air Show or when they are operating under the conditions of a Special Flight Operations Certificate – Air Show issued pursuant to paragraph 603.02 of the Canadian Aviation Regulations. This information is also available to the aviation industry for information purposes.

1.3 Description of Changes

Not Applicable.

2.0 REFERENCES AND REQUIREMENTS

2.1 Reference Documents

It is intended that the following reference materials be used in conjunction with this document:

- (1) Part VI Subpart 3 of the *Canadian Aviation Regulation (CAR)—Special Flight Operations*; and
- (2) Standard 623—*Special Flight Operations, Division I, Special Aviation Events, Chapter One, Air Shows*.

2.2 Cancelled Documents

Not applicable.

2.3 Definitions and Abbreviations

Not applicable.

3.0 BACKGROUND

- (1) During the legal editing of Standards 623, Division I, Special Aviation Events, Chapter One – Air Shows, the wording of Section 623.08 Weather Conditions was amended. The amended wording no longer makes specific reference to “low ceiling programs” or the need to have them approved and has caused confusion along with many varying interpretations. Industry representatives who participate in air shows across the country have indicated that an official interpretation is required to eliminate confusing contradictory interpretations.
- (2) The purpose of having performers submit sequential listings of their manoeuvres has a dual purpose. Firstly, it allows the Flight Operations Director (aka air boss) and the inspector tasked with preparing the special flight operations certificate for an air show to ensure the proposed manoeuvres meet all the conditions of section 623.07 Minimum Safety Distances and Altitudes of the standards and the air show site is laid out accordingly.

- (3) Secondly, and probably most important, it allows the Flight Operations Director to plan in advance for various possible weather conditions, by knowing the weather minimum for a performer's sequence in advance and eliminating the need of performer to improvise under pressure of "the show must go on".
- (4) Under the previous version of Standards 623 as quoted below, it was very clear that "low show" programs were required in weather limits below 1500-foot ceilings.

Quote

b) the minimum ceiling may be reduced to 1000 feet above ground provided the visibility is 3 miles or greater and:

- (i) safety is not be compromised;
- (ii) a low ceiling program is approved in advance;
- (iii) the low ceiling program must be briefed. AD HOC scheduling is prohibited.

End Quote

- (5) It was not the intent of the latest amendment to 623.08(1) Weather Conditions as quoted below, to eliminate this requirement.

Quote

623.08(1) Weather Conditions

Pursuant to section 603.08 of the CARs, the minimum weather conditions under which an aircraft may be operated, at an air show, are as follows:

(a) subject to paragraph (d), a minimum ceiling of 1,000 feet AGL and a ground visibility of three miles, as specified in the special flight operations certificate issued for the air show;

(b) any flight demonstration, whether aerobatic or not, is conducted clear of cloud and no lower than the minima specified in the special flight operations certificate issued for the air show;

(c) an aerobatic demonstration carried out by an aircraft in weather conditions that are at the minima referred to in paragraph (a) above, is limited to:

- (i) air show aerobatic manoeuvres conducted by Category III aircraft, within a flying display area having a maximum diameter of 2 statute miles (SM) centred on the air show central control, as indicated on the site diagram submitted with the application; and
- (ii) air show aerobatic manoeuvres that have been identified in the application submitted in accordance with section 623.02; and

(d) the Special Flight Operations Certificate issued in respect of the air show may specify a higher ceiling minimum and a higher visibility minimum where justified by the presence of surrounding terrain or other local conditions.

End Quote

4.0 ACTION

- (1) The following interpretation is to be used in processing an application for the conduct of a Special Aviation Event – Air Show.
- (2) Paragraph 623.08(a) states the absolute minimum weather conditions under which flying can take place at an air show and paragraph 623.08(b) imposes the requirement for the aircraft to remain clear of cloud.

- (3) This means that the lowest ceiling minima that will appear in a Special Flight Operations Certificate issued for an air show will be 1000 feet AGL.
- (4) But it also means that any of the flying demonstrations outlined in the flight program submitted by an applicant and that has been approved by Transport Canada that require **more** than a 1000 foot ceiling **cannot** take place.
- (5) To help further clarify, it means that unless the ceiling exceeds the minimum approved for any demonstration, it cannot take place. An example of this situation could be a non-aerobatic helicopter demonstration that has been approved to a minimum altitude of 1500 feet cannot be carried out in a ceiling condition of 1400 feet.
- (6) Subparagraph 623.08(c)(ii) further limits air show manoeuvres to those identified in the application in accordance with Paragraph 623.02(3)(c) as quoted below.

Quote

623.02(3) Issuance of a Special Flight Operations Certificate - Special Aviation Event

The following information is submitted to the appropriate Transport Canada Regional General Aviation office in support of the application submitted under subsection (1) no later than ten (10) working days prior to the date of the proposed air show to allow sufficient time to process the application:

(c) for each aerobatic performer, a sequential listing of all manoeuvres to be flown by the performer, including:

- (i) the distance of each manoeuvre from spectator areas, including, where applicable, the point of entry into and recovery from each manoeuvre,
- (ii) the point of entry to, and departure from, the flying display area, where applicable,
- (iii) the directions of flight relative to the spectator areas,
- (iv) the location of water drops, pyrotechnics, helicopter rappelling and similar operations relative to the spectator areas,
- (v) the maximum and minimum speeds for the entire performance, and
- (vi) the minimum altitudes for each manoeuvre to be performed;

End Quote

- (7) The meaning of “sequential listing of all manoeuvres to be flown by the performer” is a complete list of manoeuvres that the performer **plans** to fly in his or her sequence at the air show. It does not mean a performer must put his or her life in jeopardy or the lives of the spectators if a manoeuvre must be aborted. The intent of this section of the standards is to ensure that all aspects of the event have been pre-planned and that an applicant and a performer can review an air show site to ensure all the manoeuvres can be safely performed at an air show site. There have been situations where a performer has arrived at an air show site only to find that his/her routine must be modified for it to be performed. This can be for numerous reasons, e.g. length of the crowd line or proximity of secondary spectator areas or built-up areas to the flying display area. In these situations, it is an indication of poor pre-planning by both the applicant and the performer. Each applicant is required to prepare a site diagram with the placement and size of the flying display area outlined, thus each applicant and each performer should be able to determine well in advance if it is possible to perform his or her sequence at the air show site without modifications. This being said, it is not the intent of paragraph 623.02(3)(c) to mean that due to unforeseen circumstances and where safety will not be jeopardized, that a sequence cannot be altered for example, by modifying a point of entry to or point of departure from a flying display area.

- (8) A “sequential listing of all manoeuvres to be flown by the performer” further means that if a performer wants to perform a sequence of manoeuvres in low ceiling conditions, the “sequential listing of all manoeuvres to be flown by the performer” submitted in accordance with 623.02(3)(c) must clearly indicate what those manoeuvres are and that they can be performed with the ceiling available at the air show site. This may be accomplished in varying ways. A performer whose normal complete sequence requires, for example, a ceiling of 1800 feet, can submit more than one listing, sometimes referred to as high show, low show and flat show listings in which he or she lists manoeuvres that can be performed in varying ceiling conditions. Another alternative that is acceptable is for the performer to simply identify in a footnote in the submission, the vertical manoeuvres that will be eliminated from their normal sequence in various low ceiling situations.
- (9) A sample of an unacceptable method of submitting Sequential Listing of Aerobatic Manoeuvres to be flown is contained in Appendix A and two examples of acceptable methods are contained in Appendix B and C.

5.0 CONTACT OFFICE

For more information please contact:

Special Flight Operations (AARRD)

Phone: 613-990-1033
Facsimile: 613-990-6215
E-mail: harperw@tc.gc.ca

Suggestions for amendment to this document are invited and should be submitted via the Transport Canada Civil Aviation Issues Reporting System (CAIRS) at the following Internet address:

<http://www.tc.gc.ca/CivilAviation/QualityAssurance/QA/cairs.htm>

or by e-mail at: CAIRS_NCR@tc.gc.ca

Manzur Huq
Director General Aviation

APPENDIX A – SAMPLE OF AN UNACCEPTABLE SEQUENTIAL LISTING

(1) Upside Down World of Flight Manoeuvres Package

1. 1/2 Roll on Takeoff
2. Hammerhead with Rolls up and down
3. 1/4 Square Loop up
4. 1/4 Clover Leaf with multiple Rolls away from crowd
5. Loop
6. 1/2 Cuban Eight (rev. and normal)
7. Double Aileron Roll
8. Eight-Sided Loop (Stop Sign Loop)
9. 4 Point Roll
10. Cuban Eight
11. Knife-Edge Pass
12. 16 Point Roll
13. Tail Slide
14. Inverted Pass
15. Inverted Ribbon Cut Second Level List

- (2) The above example is unacceptable, as other than the listing of manoeuvres, it has none of the information required in paragraph 623.02(3)(c) of the standards

APPENDIX B – SAMPLE OF AN ACCEPTABLE SEQUENTIAL LISTING

(1) Upside Down World of Flight - Sequential Listing of Aerobatic Manoeuvres to be Flown

General

- (1) Direction of flight will be parallel to crowd line with no aerobatic manoeuvres toward spectators.
- (2) All distances will be appropriate to aircraft speed and category as defined in the Standards 623, Special Aviation Events, Division I, Chapter One Air Shows.
- (3) The minimum distance that manoeuvres will be from spectators is 500 feet.
- (4) Repositioning turns will be done in accordance with subsection 623.07(8) Repositioning Turns and sub-paragraph 623.07(14)(b)(vi) Air show Manoeuvres toward the Primary Spectator Area - Flight Manoeuvres requiring no special assessment.
- (5) The speeds for my performance will be a maximum indicated airspeed of 156 knots and a minimum of 0 knots.
- (6) The altitudes will be a maximum of 1500 feet above ground level and a minimum of surface, as per my Statement of Aerobatic Competency.
- (7) Duration not to exceed 13 minutes

Manoeuvres – High and Low Show

1. ½ Roll on Takeoff to inverted pass with a negative push to a 45 degree upline and 2 ½ rolls
2. Repositioning Turn
3. Hammerhead with ¼ roll up and ¼ roll down
4. ½ square loop up with 1 ½ rolls on downline
5. Repositioning turn
6. Tailslide with negative recovery
7. Reverse ½ Cuban with 2 rolls
8. Stop sign loop
9. ½ Cuban
10. Double Aileron roll
11. Hammerhead
12. Loop
13. ½ Cuban with 2 of a 4 point roll
14. 4 Point roll
15. Cuban eight
16. Hammerhead
17. Repositioning turn
18. Knife-edge pass
19. Repositioning turn
20. 16 Point roll
21. Repositioning turn

22. Set up for inverted ribbon cut

23. Inverted ribbon cut

With a ceiling of 1500 feet or more this manoeuvre package will be flown as shown.

With a ceiling between 1100 feet and 1400 feet, figure #6 (Tailslide) will be omitted.

Due to weather, wind, safety considerations and the size of the aerobatic box, manoeuvres may have minor sequential changes and or be omitted entirely.

Flat Show Manoeuvres

1. ½ roll on takeoff to inverted pass with negative push to a 45 degree upline and 2 ½ rolls
2. Repositioning turn
3. Double aileron rolls
4. ½ Cuban with 2 of a 4 point roll
5. 4 point roll
6. Cuban eight
7. ½ Square loop up with 1 ½ rolls
8. Repositioning turn
9. Knife-edge pass
10. Repositioning turn
11. 16 point roll
12. Repositioning turn and set up for inverted ribbon cut
13. Inverted ribbon cut

Flat manoeuvres package will be flown if ceiling is at a minimum of 1000 feet above ground level.

APPENDIX C – SAMPLE OF AN ACCEPTABLE SEQUENTIAL LISTING

(1) **Aerobatic Routine for John Doe**

	Manoeuvres	Minimum Distance from Spectators	Direction to show line	Min Altitude	Min/Max Speed
1	Roll on the T/O	500	Parallel	100	120/150
2	Vertical Roll	500	Center of stage	1500	150/225
3	Cuban 8	500	Parallel	1200	150/225
4	Hammerhead Turn	500	End of Box	1200	0/225
5	Loop	500	Parallel	1500	160/225
6	1/2 Reverse Cuban 8	500	Parallel	1400	140/225
7	1/2 Reverse Cuban 8	500	Parallel	1400	140/225
8	4 Point Roll	500	Parallel	250	150/170
9	Hammerhead Turn	500	Parallel	1200	0/225
10	8 Point Roll	500	Parallel	400	150/170
11	Climbing Turn	500	End of Box	1500	160/225
12	Loop - Snap Combo	500	Center of stage	1700	160/225
13	360 Degree Turn	500	Center of stage	250	150/225
14	Aileron Rolls	500	Parallel	250	140/180
15	Photo pass	500	Banana Turn	75	150/225

NOTE:

In low ceiling conditions manoeuvres # 2, 3, 4, 5, 6, 7, 9, 11, and 12 will be either modified or deleted as needed for the existing ceiling conditions