Competition Rules of the New Zealand Aerobatic Club

Nov 13 2019 (incorporated CIVA FAI Sporting code 6.1. 2019-1)
Changes are highlighted in yellow.

Introduction

The New Zealand Aerobatic Club brings together flying enthusiasts who share a common interest in aerobatic flight, and through the sport of competitive aerobatics seek to demonstrate and/or improve their aerobatic flying abilities.

The purpose of the following Competition Rules is so that all competitors, officials and helpers have a resource of standards that are clearly defined for adherence at aerobatic competitions.

These rules are a living document. Changes that reflect a better understanding, increased safety, and/or greater efficiency are encouraged - any member may suggest to the NZAC committee changes for consideration.

The most up-to-date version of the rules will be those available on the NZAC website, and this will be the version in use at any NZAC aerobatic event.

Table of Contents

1. GLOSSARY OF TERMS

45º Attitude The Zero Lift Axis (ZLA) plus or minus 45º

Advanced The fifth of six categories of aerobatic competition. Advanced competitors fly up to four Programmes: a Known programme which changes each year based on the previous IAC Advanced Known sequence, a Free Known Program using OpenAero NZAC rules, an Unknown Programme, and a Free Unknown Programme using OpenAero NZAC rules.

Aerobatic Box A clearly marked area 1,000 meters square (approximately 3,300') in which all figures of a contest sequence must be flown to avoid penalty points. The upper limit of the box is 3,300' AGL and the lower limit varies from 1,500' to 500' AGL depending on the category (see also "X Axis" and "Y Axis").

AGL Above Ground Level, i.e., the altimeter reading when it has been set to zero feet (QFE) prior to takeoff.

Aileron Roll A rotation around the longitudinal axis of the aircraft, normally controlled by the ailerons. One of two types of rolls as defined by the Aresti Aerobatic Catalogue. Aileron rolls include only two subtypes: "slow rolls" and "hesitation rolls".

Angle-of-Attack The angle at which the wings of an airplane meet the relative airflow. Can be either positive or negative.

Angle-of-Incidence The angle at which the wing is physically mounted to the aircraft's fuselage. If this angle is other than zero, the aircraft fuselage will not appear to be in a vertical attitude when the zero lift axis is flown.

Aresti Aerobatic Catalogue (Condensed) A catalog, notation and scoring system developed by José Luis Aresti of Spain in 1961. The catalogue is used by all FAI member nations to depict competition aerobatic figures in a systematic way. Each figure is assigned to one of nine families and given a unique catalogue number and difficulty factor ("K"). A figure must be listed in the Aresti Aerobatic Catalogue (Condensed) to be legal for competition, except for the 4-Minute Free Program.

Attitude The angle the longitudinal axis of the aircraft makes to the true horizon.

Avalanche Common name given to a full loop with a Family 9 snap roll maneuver centered at the 180 degree point of the loop.

Aviation Event CAA-defined term describing flight conducted below minimum safe heights prescribed under Part 91 that is (1) An airshow or practice for an airshow, (2) An air race or practice for an air race, (3) An aerobatic competition, or (4) aerobatic training
or practice. An event authorization from the Director of CAA is required if there is more than 500 spectators, three aircraft or one formation.

Basic Figure Any figure found in Families 1 through 8 of the Aresti Aerobatic Catalogue.

Bow tie, Half Any of the Sub-Family 1.3.1 to 1.3.8 figures.

Box Active The Aerobatic Box is in operation (although there may or may not be an aircraft actually in the box).

Break A term used interchangeably with program interruption. (See also "Optional Break").

Catalogue Number A way of uniquely identifying each figure in the Aresti Aerobatic Catalogue. The number is in the form of four numerical groups separated by periods and takes the form: FAMILY.SUBFAMILY.ROW.COLUMN.

Category Any of the six competitive skill levels: Primary, Recreational, Sports, Intermediate, Advanced, and Unlimited.

Character of a Figure Defined by the nature of the entry/exit lines (upright or inverted) and by the nature of the internal part loops, i.e., positive or negative angle-of-attack.

CIVA – Commission Internationale de Voltige Aerienne Also known as the FAI International Aerobatics Commission, CIVA is one of several FAI "air sports commissions." CIVA's responsibility is to govern the sport of aerobatic competition for International, Continental, and World Aerobatic Championships.

Complementary Figure Any rotational element from Family 9 of the Aresti Aerobatic Catalogue. Complementary figures must always be combined with a basic figure, i.e., they never stand alone.

Competition, Sanctioned An aerobatic competition sanctioned by NZAC, conducted in accordance with current NZAC rules.

Crabbing The action of a pilot to displace the aircraft heading slightly, while maintaining wings-level flight, to either counteract the effect of wind or to move laterally through the Aerobatic Box. If detected by the judge, a penalty of 1 point for each 5 degrees of crab will be assessed.

Critique Coach A person who, from the ground, gives real-time advice and/or coaching to a practicing pilot, normally by way of VHF radio.

Cuban 8, Half Common name given to a Family 8 figure beginning with a 5/8th loop followed by a one-half slow roll on the 45° line. (See also, "Reverse Cuban 8").

Deadline A line established by the Contest Director to separate the spectator line from
the flight performances.

Direction of Flight Set by the Contest Director, based on the expected winds

aloft. This is either “from left” or “from right” relative to the judge line and defines which Form B or C will be definitive.

Display Line The Aerobatic Box Buffer Zone boundary closest to the spectators.

Double Humpty Bump Any of the figures from Sub-Families 8.8.1 - 8.8.8 consisting of two regular humpty bumps, one going up and the other going down, sharing a common vertical line.

FAI – Fédération Aéronautique Internationale The FAI, based in Lausanne, Switzerland, was founded in 1905 and has about 100 member nations. The FAI is the governing body for all aviation sporting disciplines throughout the world.

Family A group of related figures from the Aresti Aerobatic Catalogue. There are eight Families (1 -8, with Family 4 currently not used) of basic figures and one Family (9) of complementary figures.

Figure Each individual component of an aerobatic sequence, which may contain one or more maneuvers in combination. Figures always start and end with a horizontal line, either upright or inverted.

Flick Roll Another name for a snap roll. This term is primarily used in CIVA competition.

Flight path The trajectory of the airplane’s center of gravity when compared with the true horizon.

Form A The contestant’s scoresheet which includes for each figure: the Aresti Aerobatic Catalogue symbol, number, and K- Factor for each maneuver comprising the figure, as well as the total K- Factor for each figure, the K-factor for Presentation, and the total K-Factor for the entire sequence.

Form B The sequence drawing showing consecutive figures as flown with the official wind direction from the Judges’ right to left.

Form C The sequence drawing showing consecutive figures as flown with the official wind direction from the Judges’ left to right.

Four Minute Free Program A separate, optional trophy event for Unlimited, Advanced and invited pilots who meet certain special requirements. The selection of figures for this program need not be made with reference to the Aresti Aerobatic Catalogue. Other than observing altitude limits, most other contest restrictions are removed. The grading criteria used to evaluate these flights differs from regular grading and is more focused on artistry, versatility and creativity.

Free Programme A sequence of figures designed by the pilot using rules set forth in the NZAC rules for Recreational and Sports category. Free programs are optional for the Recreational and Sports category. Free programs may be reused year-to-year subject to any applicable rule changes.

Free Known Programme. For Intermediate, Advanced and Unlimited category. A sequence of 10 figures designed by the pilot using the 5 known mandatory figures from the previous year CIVA Free Known list plus 5 figures of the pilots choice within the rules using OpenAero NZAC Free Known rules. Free Known figures change each year to force new sequences, variety and challenge.

Free Unknown Programme. A sequence of figures designed by the pilot using rules set forth in the NZAC Rules. Free Unknown programme(s) are mandatory for Intermediate and above categories. Free Unknown Programmes cannot be flown/practiced in the air prior to a judged competition flight.

Goldfish The Common name given to any of the three-quarter loop figures from Sub-Families 7.3.1 to 7.3.4.

Grade The number assigned by each Judge to each figure in a sequence indicating their judgment of the quality of the figure as flown. Grades may range from 10 (perfect) to zero in one-half point increments. Also referred to as a "score".

Hammerhead An American term referring to any of the Family 5 figures. Called a "stall turn" in NZ, Australia, UK.

Heading Compass direction in which an airplane is pointed. In a competition, the aircraft's heading must always be parallel to either the X or Y axes to avoid point deductions.

Hesitation Roll A subtype of aileron roll where rotation is momentarily stopped a set number of times during the roll. Hesitation rolls may be broken into 2, 4, and 8 equal segments and may have a total rotation of 90 degrees to 720 degrees. Also referred to as "point rolls".

Holding Area An area designated for aircraft to hold prior to entering Aerobatic Box.

Horizontal 8 Common name given to any of the figures from sub-families 7.8.1. to 7.8.8. Also called a "lay-down eight."

Horizontal Line The flight path of an aircraft when flown on a constant heading at a constant altitude.

Horizontal S Two consecutively flown 5/8 loops from Sub-Family 7.5.1 - 7.5.8.

Humpty Bump Common name given to any of the figures from sub-families 8.1. to 8.28. Also simply called a "humpty".

IAC – International Aerobatic Club The IAC, a division of the National Aeronautic Association and the Experimental Aircraft Association. It is the sole organization responsible for the administration, management, and promotion of

the sport of aerobatics in the United States under the auspices of the Fédération
Aéronautique Internationale (See FAI).

Immelmann Common name given to a Family 7 figure consisting of an inside half-loop up followed immediately by a half slow roll to upright.

Inside Same as "positive". Used primarily to describe positive looping figures & snap rolls.

Interior Line Any straight line segment, other than the horizontal entry and exit lines, which go to make up a basic Aresti figure.

Intermediate The third of the five categories of aerobatic competition. Intermediate competitors fly up to four programs: a Known programme which changes each year using the previous IAC Intermediate Known sequence, a Free Known Program using OpenAero NZAC rules, an Unknown Program and a Free Unknown based on OpenAero NZAC Free Unknown rules.

Interruption, Program An interruption in the normal, unbroken sequence of flying each figure of a contest program. A program interruption may be intentionally taken by a pilot (e.g., to gain altitude) or unintentionally incurred through pilot error (e.g., turning the wrong way on the x-axis). In all cases, a program interruption will result in penalty points being assessed against the pilot's total score for the flight.

Judge A selected individual who assesses the flight performance of the competitors against the judging criteria and applies a grade.

K-Factor The difficulty factor for each maneuver taken from the Aresti Aerobatic Catalogue, which, when added together, becomes the "K" for a figure. The higher the K-Factor, the more difficult the maneuver and the more potential points to be gained.

Known Compulsory Program A different sequence of figures for each category, Primary through Unlimited, published at the beginning of each contest year.

LLDA Low Level Display Authorisation, issued by a Part 149 Organisation or the NZDF, authorising the holder to fly aerobatic maneuvers below 1500'AGL to the limit shown on the LLDA.

Majority More than one-half of the Judges.

Maneuver Any one of the basic aerobatic movements which may be combined to make a figure (e.g., a half-loop plus a half slow roll are two maneuvers combined to make the Immelmann figure).

Minority One-half or less of the judges.

Multiple Rolls Any linked roll of more than 360° rotation or any two unlinked rolls of any amount of rotation in the same or opposite direction.

Must As used in this rule book, "must" (or "shall") indicates the referenced action is mandatory, not optional.

NAC – National Airsports Control *T*he organization in each FAI-member country which controls airsport competitions in that nation and issues FAI Sports Pilots licences for international events. FlyingNZ is the NAC for New Zealand.

Negative A condition of flight when the wing's angle-of-attack is less than zero. During negative flight the pilot will experience the force of gravity acting opposite of normal, i.e., in a direction from foot to head. Negative flight does not imply any particular attitude of the aircraft relative to the ground and is depicted in Aresti diagrams with a dashed line.

Negative Snap Roll Also called an "outside snap", this figure incurs negative G-forces and the wing is stalled negatively.

Optional Break The optional break allows a pilot to interrupt their flight one time, without penalty, and adjust altitude before continuing the sequence. Only the Contest Jury may authorize use of the optional break. The Jury may also remove the optional break at any time (with due notice to the pilots) if weather conditions improve.

Outside Same as "negative". Used primarily to describe negative looping figures and snap rolls.

Performance Zone The airspace in which a pilot presents an Unlimited 4-Minute Free program to the judges. The term is used because the normal aerobatic box boundaries and X - Y axes do not exist for the 4-Minute Free.

Point Roll See "Hesitation Roll".

Presentation Grade A grade (0-10) given by each judge to indicate how well the pilot presented the sequence within the aerobatic box.

Positive A condition of flight when the wing's angle-of-attack is more than zero. During positive flight, the pilot will experience the force of gravity acting normally, i.e., in a direction from head to foot. Positive flight does not imply any particular attitude of the aircraft relative to the ground and is depicted in Aresti diagrams with a solid line.

Positive Snap Roll Also called an "inside snap", this figure incurs positive G-forces and the wing is stalled positively.

Primary Category The entry level category of aerobatic competition. Primary category competitors fly one sequence, the Primary Known, which does not normally change year to year, twice.

Quarter-Clover A figure (Family 0.1 and 0.2) which may be flown in the Sportsman only.

Recreational Category The second of the six categories in aerobatic competition. Recreational competitors fly three programs: a Known Compulsory program which remains the same each year; either a repeat of the Known program or a Free program of their own design using OpenAero NZAC Free rules; and an optional Unknown programme, being a re-order of the Known programme, that is currently not included in the overall contest score.

Repetition The use of the identical catalogue number from the Aresti Aerobatic Catalogue more than once within the same Free sequence.

Reverse Half Cuban A "Half Cuban 8" flown with the 45° line first followed by the 5/8th loop.

Reversing P-Loop Any of the figures from Sub-Families 8.6.9 - 8.6.16 where the direction of the three quarter loop is reversed after either the first quarter or the first half loop.

Reversing Whole Loop Any of the figures from Sub-Families 7.4.7 - 7.4.14, consisting of a full loop in which either the first or last quarter changes direction.

Rolling Circle Any of the figures from Family 2 which combine aileron rolls with turning flight. Also called a "Rolling Circle" or a Roller."

Safety Check Maneuver Two half rolls is allowed with a pause at inverted, and an optional additional manoeuver, performed in the aerobatic box before commencing the competition sequence, to check the integrity of seat belts and inverted fuel and oil systems and check for foreign objects in the cockpit. It is also used to determine the wind in the box and elevate your G tolerance.

Score See Grade

Sequence A grouping of aerobatic figures which constitutes one flight program, e.g., the Free Program.

Shall As used in this rule book, "shall" (or "must") indicates the referenced action is mandatory, not optional.

Shark's Tooth Common name for any of the figures from Sub-Families 1.2.1 to 1.2.16.

Should As used in this rule book, "should" indicates the referenced action is desirable, but not mandatory, and there is no associated penalty for not performing the
referenced action.

Slow Roll A subtype of aileron roll characterized by continuous rotation ranging from 90 degrees to 720 degrees. "Slow" does not imply a particular rate of rotation which may, in fact, be very fast.

Snap Roll One of two types of rolls as defined by the Aresti Aerobatic Catalogue. Snap rolls may either be “positive” or “negative”.

Spin Any of the spin elements from Family 9.11 or 9.12 combined with any of the basic figures from Family 1 or Family 8 as marked in the Aresti Aerobatic Catalogue with the optional spin symbol.

Split-S Common name given to a Family 7 figure consisting of a half slow roll to inverted followed immediately by an inside half-loop down.

Sports Category The third of the six categories of aerobatic competition. Sports competitors fly three programs: a Known Compulsory program which uses the previous IAC Sportsman sequence, optionally, may either repeat the Known program or fly a Free program of their own design using OpenAero NZAC Free rules. The third programme is the Sports Unknown that is currently not included in the overall contest score.

Spotter A person on the ground responsible for maintaining a watch for any traffic that may encroach upon the Aerobatic Box and immediate surrounding airspace.

Stall Turn The common name given to Family 5 figures.

Tail Slide Any of the Family 6 figures.

Teardrop Common name for the vertical 5/8 loops, Family 8.5.9 thru 8.5.24.

Track The same as flight path.

Unknown Program A sequence of figures provided by the Contest Director for the Recreational through Unlimited categories. Unknown programs may not be practiced by the competitors prior to being flown and must be disseminated at least 12 hours before their flight.

Unlimited The highest level of the six categories of aerobatic competition. Unlimited competitors fly up to four programs: a Known Compulsory program which uses the previous IAC unlimited sequence, a Free Known Program using OpenAero NZAC Free Known rules, an Unknown Program and a Free Unknown based on OpenAero NZAC Free Unknown rules.

Vertical Attitude An aircraft's flight path, in a zero wind condition, which is exactly 90 degrees to the horizon, such that the wings are being held at the correct angle to produce no lift. The aircraft's attitude while in this condition (zero lift) defines the proper judging criterion for vertical attitude. This is also called the zero-lift axis.

Vertical 8 Common name given to any of the figures from Sub-Families 7.8.17 to 7.8.22.

Vertical S Common name given to any of the figures from Sub-Families 7.5.9 to 7.5.10.

X Axis The central axis of the Aerobatic Box oriented perpendicular to the judges' line-of-sight. The direction of figures flown parallel to the X axis is mandated by the Forms B and C.

Y Axis The central axis of the Aerobatic Box oriented parallel to the judges' line-of-sight, also known as Cross Box. The direction of figures flown parallel to the Y axis is at the pilot's option.

Zero Lift Axis See "Vertical Attitude".

2. GENERAL

2.1. Aims of Aerobatic Competition

The prime aim of the NZAC is to give aerobatic enthusiasts the opportunity to develop and display their aerobatic flying abilities in a safe and controlled manner through sporting competition.

At organised competition events, both regionally and nationally, winners shall be established in the various categories of competition.

Competition and training events will also provide the environment for social gathering and the development of enduring friendships amongst fellow aerobatic enthusiasts.
In pursuance of these aims:

- All competitors shall be entitled to fair and equal treatment.
- In the case of any disputes over the interpretation and application of these rules, a competitor shall be entitled to the benefit of reasonable doubt.

2.2. Safety Responsibilities

The safety of competitors, officials, spectators and the public at large is of paramount importance at all times.

All NZAC sanctioned competitions shall have in place a safety plan.

The rules of the NZAC prescribe safety responsibilities for various competition personal, including pilots, which must be adhered to at all times during the competition.

Each competitor has individual responsibility to ensure they are conversant and adhere to the applicable CAA rules in force at the time.

The Contest Director will brief the competitors on local airfield and airspace rules and restrictions that may be in force.

Any violation of NZAC and CAA rules may at any time render the offender liable to exclusion from the contest and/or future NZAC competition. No responsibility will be undertaken by the organisers for any such violation by competitors or others.

The Chief Judge may exclude a pilot who is not flying safely or whose flying might reasonably be judged to be the imminent cause of an unsafe situation.

Any competitor required to interrupt a competition flight due to danger of collision with conflicting air traffic or a bird, should be treated in the same manner as if a mechanical defect had taken place.

2.3. Rule Alignment

The NZAC shall, in-general, use the rules, categories, flight Programmes and judging criteria of the FAI Aerobatics Commission (CIVA - Commission Internationale de Voltige Aérienne).

With due consideration by the NZAC committee, CIVA rules may be updated, modified or omitted to suit local NZ requirements.

Therefore, the source document for NZAC aerobatic competitions will always be the NZAC Rules, unless a direct cross-reference to other rules is made.

2.4. Sanctioning of Events

Any aerobatic competition or practice event being conducted under the guise of the NZAC must be sanctioned by the President of the NZAC, in consultation with one or more committee members.

Sanctioning of aerobatic events organised by club members is encouraged, in order to maintain the public perception of safety and responsibility of aerobatics pilots.

A competition or practice event shall be eligible for official sanctioning if the organiser can demonstrate the event will comply with the rules of the NZCA, including a safety plan and sufficient control of the event by suitably experienced personnel.

The President shall provide a written notification of sanctioning to the event organiser, copied to all committee members, once satisfied the event will comply with NZAC rules of safety and organization.

2.5. Competitions and Practice Events

2.5.1 National Aerobatic Championships

The NZAC National Aerobatic Championships shall be held annually, generally during the better weather months of February or March, at a central location.

The event will be conducted in accordance with the rules of the NZAC and applicable CAA rules.

A Procedures Manual shall be used and made available to all event personnel, based on the template/example in available on the NZAC website.

The organisers shall provide at least three months' notice of the event by means of the club newsletter and website, and provide members with conditions and means of entry.

Entry shall be open to any current financial member of the NZAC.

2.5.2 Regional Competitions

Regional competitions may be held at any time throughout the year.

Organisers must seek approval of the NZAC President for any regional event to be a sanctioned NZAC event, and the event must be conducted in accordance with the rules of the NZAC and applicable CAA rules.

To assist with organisation and approval of regional competitions, a Procedures Manual shall be used and made available to all event personnel, based on the template/example in available on the NZAC website.

Entry shall be open to any current financial member of the NZAC, or non-financial members with the agreement of the NZAC committee.

2.5.3 Practice Events

Aerobatic practice events may be carried at any time throughout the year. In order to ensure safety and discipline of practice events, procedures used during practice at a competition event should be employed. The relevant sections of the Competition Procedures Manual template, available on the NZAC website, shall be used for reference.

Organisers must seek approval of the NZAC President for any practice event to be a sanctioned NZAC event, and the event must be conducted in accordance with the rules of the NZAC and applicable CAA rules.

To promote competition aerobatics and the NZAC, entry shall be open to all pilots, members or otherwise.

3. CATEGORIES AND FLIGHT PROGRAMMES

3.1. CATEGORIES

3.1.1 COMPETITION CATEGORIES

There are six categories in which pilots may compete. The categories are for powered aircraft only, and provide increasing difficulty and complexity of maneuvers, figures and sequences.

The categories are:

- Primary 'P'
- Recreational 'R'
- Sports 'S'
- Intermediate 'I'
- Advanced 'A'
- Unlimited 'U'

3.1.2 Primary and Recreational Category

Primary category is targeted at the aerobatic pilot who is new to aerobatics, competition flying and/or whose aircraft is of limited aerobatic capability. The selected maneuvers limit energy loss but include fundamental aerobatic maneuvers - the loop, roll, spin, and half-cuban.

Recreational category is for pilots whose aircraft may limit their ability to perform at a higher level, or whose confidence and/or capabilities may restrict them from the Sports category. The manoeuvres selected expand on the Primary category to include the stall turn, Immelmann, and humpty-bump. There are no vertical rolls, upward 45 rolls or cross box manoeuvres (except level 180° turns).

For New Zealand competition, the Primary and Recreational Programme 1 (Known) sequences are fixed and do not change year-on-year.

3.1.3 Sports Category

The Sports category expands on the Recreational category with the introduction of the sharks-tooth and gold-fish, with combinations of normal and reverse cubans (including half-cubans). Downward vertical roll of up to a ¼ or ½, and spins of up to 1 ¼ turn may be specified.

The aircraft targeted for the Sports category should not need inverted fuel or oil systems.

The NZAC shall consider the IAC Sportsman Known sequence each year as the basis for the prescribed NZAC Sports Programme 1 Known sequence.

3.1.4 Intermediate, Advanced and Unlimited

Intermediate and above will require inverted fuel and oil systems.

IAC produce Programme 1 Known sequences annually for Intermediate, Advanced and Unlimited. These sequences shall be promulgated unchanged by the NZAC for use in New Zealand events. The CIVA Free Known figures shall be adopted and published on the NZAC website and installed in the OpenAero NZAC rules also for the Free Unknown rules. A Judges unknown programme shall also be flown.

3.2. FLIGHT PROGRAMMES

3.2.1 Competition Programmes

The following competition flights may be scheduled at an aerobatic competition:

- Programme 1: The Known Compulsory Programme
- Programme 2: The Free Programme
- Programme 3: The Unknown Programme
- Programme 4: The Free Unknown Programme
- Programme 5: The 4-Minute Freestyle Programme
- Programme 6: The Aerobatic Dual Sprint race. TBA

Not all categories will fly all the programmes, and during a competition some programmes may be dropped due to time constraints.

3.2.2 PROGRAMMES BY CATEGORY

CATEGORY	PROGRAMME	FLIGHTS
Primary	1	Known Compulsory Programme
	2	Free Programme (Note 1)
Recreational	1	Known Compulsory Programme
	2	Free Programme (Note 2)
	3	Unknown Programme

Sports	1	Known Compulsory Programme
	2	Free Programme (Note 2)
	3	Unknown Programme
Intermediate	1	Known Compulsory Programme
	2	Free Known Programme
	3	Unknown Programme
	4	Free Unknown Programme
Advanced	1	Known Compulsory Programme
	2	Free Known Programme
	3	Unknown Programme
	4	Free Unknown Programme 2
	5	4-Minute Freestyle Programme
Unlimited	1	Known Compulsory Programme
	2	Free Known Programme
	3	Unknown Programme
	4	Free Unknown Programme
	5	4-Minute Freestyle Programme

Note 1 - Competitors flying in the Primary Category must fly the Known Compulsory for Programme 2.
Note 2 - Competitors flying in the Recreational and Sports Categories may elect to either fly the Known Compulsory for Programme 2, or create their own Free Programme sequence.

3.2.3 Programme 1 - The Known Compulsory Programme

Programme 1 will be a qualification flight. Contestants must be able to fly 75% or more of these figures. Contestants who cannot or do not complete 75% or more of the required figures may be disqualified from that category, on the decision of the Chief Judge. This is not to be interpreted to mean that a contestant receiving zeroes for wrong direction of flight will be disqualified.

Additionally, if in the opinion of the CJ or CD, a pilot demonstrates an inability to satisfactorily and safely control their aircraft, he/she will be disqualified from that category.

Programme 1 sequences for all categories will be selected and published by the Contest Director at least three months prior to the beginning of the competition.

The Known Compulsory Programmes will be composed of figures in normal and inverted flight, performed consecutively and continuously observing the prescribed sequence of figures.

The programme must be such as to enable competitors to fly all figures safely in the aircraft available to them, provided that the aircraft meets the requirements of normal technical standards. The figures will be selected from the Aresti System (Condensed), as amended.

3.2.4 Programme 2 – The Free or Free Known Programme

3.2.4.1 Primary Category

For Programme 2, competitors in the Primary category must fly the current Known Programme sequence for their category.

3.2.4.2 Recreational and Sports Categories

Competitors in the Recreational and Sports may design their own Free Programme sequence per the criteria below. Alternatively, Recreational and Sports competitors have the option of re-flying the Known sequence in lieu of their own-design Free for Programme 2.

The construction and submission of the Free Programmes must be made using the current version of OpenAero (NZ Rules). Only those figures available through OpenAero for each category may be used.

The Free Programmes are composed using a maximum number of figures and a maximum sequence K, depending on the category.

The limits in each case are given in the table below:

Category	**Maximum No. of Figures**	**Maximum Sequence K**
Recreational	12	Same as current compulsory
Sports	12	Same as current compulsory

The start and finish of the Free Programme must be carried out in upright, level flight. Competitors may begin and finish their programme at any height between the upper and lower limits given in table 6.4.2.

Repetition of catalogue reference numbers is allowed from Families 1 and 9 only, providing that there is no repetition of the combination figure used (the combined base figure and roll-element).

The character and composition of basic figures must not be changed when combining other figures with them.

In order to achieve versatility in the design of Programme 2, it is a mandatory requirement that competitors shall include the following figures, further limited by those available in OpenAero (NZ Rules). Free sequences not including these figures will not be accepted.

Recreational and Sports Category	
At least one figure from	Family 1
At least one figure from	Family 2.1. – 2.2
At least one figure from	Family 7
At least one figure from	Family 8
At least one figure from	Family 9.1. – 9.4
Only one figure from	Family 9.11 or 9.12

3.2.4.3 Intermediate, Advanced and Unlimited Categories

Sequences for the Free Known Programme will be composed of figures or combinations of figures (a combination being taken as one figure) selected from the Aresti System (Condensed) as follows:

1. Five (5) figures from the Known 'master set' (available on the NZAC website) selected at the CIVA plenary each year for each category, used in any order and at any position in the sequence with their start direction into-wind, down-wind or cross-wind in either direction as desired, with their design unchanged;
2. Plus five (5) Free figures that each competitor must add, in order to design a sequence of ten (10) figures that satisfies regulations below.

3. The selected Known 'master set' must be such as to enable competitors to fly all figures safely in the aircraft available to them, provided that the aircraft meet the requirements of normal technical standards.

4. The selected Known 'master set' must be such as to enable design of sequences that satisfy the non-repetition requirement in note 8 below and versatility requirements in note 9 below.

5. The total difficulty coefficient of all figures in the Free Known sequences shall not exceed the following maximum limits: Unlimited 450K / Advanced 320K / Intermediate 200K.

6. The start and finish of Programme 2 must be carried out in normal or inverted level flight. Competitors may begin and finish their programme at any height between the upper and lower limits for their category.

7. Any figure or combination of figures which is selected must bear the catalogue reference number(s) and the difficulty coefficient(s) (K) stated in the Aresti System (Condensed) as currently amended by CIVA. The numbers and coefficients in the Aresti System (Condensed) will be taken as definitive.

8. In a given sequence, a catalogue reference number may be used only once.

Family	Intermediate	Advanced	Unlimited
1	Not required	At least one figure	
2	At least one from either 2.1.2 to 2.1.3, or 2.2.2 to 2.2.7, or 2.3.2 to 2.3.6, or 2.4.2 to 2.4.8		At least one from either 2.2.3 to 2.2.7, or 2.3.2 to 2.3.6, or 2.4.2 to 2.4.8
5	At least one figure		
6	Not required		At least one figure
7	At least one figure		
8	At least one figure		
9.1 to 9.8	At least one from each sub-family		Not specified

9.9 & 9.10	At least one	At least two, no sub-family specified	At least two from each sub-family
9.11 & 9.12	At least one figure from either		
Opposite Rolls	At least one instance with elements from Families 9.1 to 9.10		

1. In order to achieve versatility in the design of Programme 2, it is a mandatory requirement that sequences include the following figures. Sequences not including these figures will not be accepted:

9. Prior to the competition organisers will advise competitors of the deadline for submitting Free Known sequences. The only format for submission is an OpenAero.seq file. Once submitted, each competitor should confirm that their Free sequence has indeed been received by organisers and checked.

10. Competitors are responsible for ensuring their Free Known sequence is correct, which may be accomplished on OpenAero 'Check sequence'. The Contest Director shall also check the correctness of the submitted Free sequence in the same manner.

11. For spectator enjoyment, photography and critiquing, ideally the Flight sequence, Competitors name, Aircraft Registration and Free Known sequences are printed and/or emailed to all participants at the event for following along during the competition flights.

3.2.5 Programme 3 - The Unknown Programme

The Contest Director or Chief Judge will provide the Unknown sequence to competitors in all categories except Primary.

Each category Unknown sequence will be composed of figures suitable to that particular category. The sequence must satisfy the CD and CJ for safety, and in the higher categories will preferably will be sourced from historical sequences flown elsewhere in the world.

If a sequence is not properly constructed or deemed unsafe by a competitor/s, the Contest Jury shall consider allowing a redesign of the sequence with minimal changes to the original figure selection to address the concern.

The Contest Director shall publish and make available to all competitors the Unknown sequences at least 12 hours before the commencement of each Programme. The minimum time may be waived entirely with the agreement of all pilots in the category.

For spectator enjoyment, photography and critiquing, ideally the Flight sequence, Competitors name, Aircraft Registration and Unknown sequences are printed and/or emailed to all participants at the event for following along during the competition flights.

In-flight training for the Unknown Programmes is not permitted, i.e. no flights shall take place of any nature after the publishing of the Unknown sequences. Competitors violating this regulation will be disqualified.

3.2.6 Programme 4 - The Free Unknown (I/A/U)

The concept of the Free Unknown Programmes is that pilots freely construct an unknown sequence from a selection of submitted figures. Each pilot's sequence is then submitted to the CD/CJ. After checking the sequences for compliance and safety, the CD/CJ will publish the sequences to all pilots, who will then select a sequence they will individually choose to fly in Programme 4. The pilots do not have to fly the same sequence as others, or even their own submitted sequence, but they must choose one of the published sequences.

3.2.6.1 Figure Submission

1. A total of 10 figures shall be submitted, by the pilots (or CD, if insufficient figures are submitted).

Pilots will choose figures from Appendix 5 of these rules. Note - the figures are taken from CIVA Rules and Yak 52/Intermediate shall be substituted for Intermediate / I for NZAC events. The NZAC Rules file on the OpenAero website also contains all of the available figures for each category.

Pilots shall draw lots to determine the order in which figures are submitted. Then each pilot shall submit their figure, drawing the figure (base element and roll elements) on a whiteboard or similar. The pilots continue to submit figures until 10 figures are submitted.

Repetition of any manoeuvre with the same catalogue number is not allowed throughout the nominated figures. There cannot be more than 1 flick roll (Family 9.9 or 9.10) per figure.

Each figure shall have a total "K" factor (base figure plus roll elements) as follows:

Free Unknown K limits		
Category	**Minimum K**	**Maximum K**
Intermediate	12	20
Advanced	15	35
Unlimited	22	No limit

In the nomination of figures there will be a limit on the number of figures selected as follows:

Free Unknown Figures			
Family	**Intermediate**	**Advanced**	**Unlimited**
Family 1.1.6 – 1.1.11			Max of two from columns 3 and 4
Family 1.2.3, 1.2.4	Max of one only from columns 3 and 4	Max of one only from columns 3 and 4	
Family 7.8.1 to 7.8.8	Max of one figure only	Max of one figure only	
Family 8.4.1 – 8.4.4, 8.4.15 – 8.4.18, 8.5.1, 8.5.2, 8.6.1, 8.6.2			A maximum of two from columns 3 and 4
Family 9.9	Min 1, max 2	Min 1, max 4	A maximum of four *
Family 9.10	None	None	A maximum of four * Total of Families 9.9 and 9.10 not to exceed six, at least one of which must be vertically climbing. There will not be more than 1 flick roll (Family 9.9 or 9.10) per figure.
Family 9.11 or 9.12	A maximum of one figure	A maximum of one figure	

Due to the limits on repetition a pilot may not be able to submit their preferred manoeuvre, depending on the lot order. Pilots should be prepared to substitute alternative figures.

3.2.6.2 Sequence Construction

Once ten figures have been submitted the CD/CJ shall confirm the figures to each pilot in the category. Each pilot may construct a sequence, using the submitted figures plus linking figures. Pilots may construct sequences individually or as a joint exercise, at their discretion.

Linking figures are additional figures chosen from the Aresti System (Condensed) as currently amended by CIVA, solely to aid in sequence composition. These additional linking figures may contain repetitions.

At least one linking figure, up to a maximum of four, must be included in each sequence. Sequences will consist of no more than 14 figures.

The K-factors for the linking figure(s) shall be modified so that they share equally

an aggregate of 24K. For example if a single linking figure is used it shall be deemed to have 24K; if two linking figures are used they shall be deemed to have 12K each, and so forth.

In sequence composition, figures may be used starting from one or the other axis. Nevertheless figures with their entry and exit on the same axis must maintain their construction as submitted, i.e. with the exit flight path in the entry direction or with the direction of flight reversed as originally drawn.

Completed sequences must be submitted to the CD/CJ as an OpenAero.seq file. The individual figures and entire sequence can be checked for legality using the 'check sequence' function of OpenAero.

3.2.6.3 Publication and Selection of Free Unknown Programmes

The CD/CJ will determine the deadline for submitting proposed sequences and will publish all checked and submitted sequences to all competitors as soon as possible.

At least 12 hours before the commencement of the Free Unknown Programme each competitor will notify the CD/CJ which of the proposed sequences he/she will fly. The CD/CJ will provide the corresponding score sheets to the judges.

For spectator enjoyment, photography and critiquing, ideally the Flight sequence, Competitors name, Aircraft Registration and Free Unknown sequences are printed and/or emailed to all participants at the event for following along during the competition flights.

In-flight training for the Unknown Programmes is not permitted. Competitors violating this regulation will be disqualified.

3.2.6.4 Time between Programmes **(ADDED)**

CIVA recommends no competitor will fly more than one programme per day,
This is subject to the Jury deciding on exceptions in case the Organiser determines that applying this rule would put at risk completion of a valid contest. In such a case, the Organiser must allow sufficient time between programmes such that no competitor shall be required to fly a Free Unknown Programme less than six hours or a Freestyle Programme less than four hours, after landing from his/her previous programme.
Due to the size of the NZAC events and our previous experience, NZAC recommends the competitors will fly no more than two programmes a day with a reasonable time between programmes. However at the discretion of the CD and/or CJ, a competitor may be allowed to fly additional programmes in a day, or may delay subsequent flights (but not Unknowns) to a following day with the unanimous agreement of other competitors in the same category.

3.2.7 Presentation Scoring

The Presentation grade is based on the judge's overall impression of the sequence with regard to placement of figures for optimum judging, balance within the aerobatic box, and harmony.

The most basic of these elements is the placement of individual figures and the sequence as a whole in relation to the boundaries of the aerobatic box.

The score has a possible range from 10 to 0 in 0.5 increments.

Each category shall have a Presentation K-factor for each flight programme. This shall remain the same for all flight Programmes flown within a category. The category Presentation K-factors are:

Category	**Presentation K**
Primary	*3*
Recreational	6
Sports	10
Intermediate	20
Advanced	30
Unlimited	40

3.2.8 Programme 5 - The 4-Minute Free Programme

This programme is a separate competition and the score will not count toward the overall Champion in any category. This program is open to all competing Advanced and Unlimited pilots. At the discretion and invitation of the CD, selected other pilots of the NZAC may be invited to compete.

Programme 5 will be the last programme flown in the competition. The selection of figures or figure combinations for this programme need not be made with reference to the Aresti System (Condensed); there will be no limitation on the number of figures and the total difficulty coefficient.

The start and finish of Programme 5 may be in normal or inverted flight on a horizontal, ascending or descending path, which must not deviate from the horizontal by more than 45 degrees. Competitors may begin or finish their programme at any height between 500 ft (or the lowest height of their LLDA for aerobatics whichever the higher) and 3300 ft above aerodrome level. Low passes may be made at a height of 100 ft above aerodrome level (or the lowest height of their LLDA for aerobatics whichever the higher).

There will be no submission of forms containing the sequence of figures to the Contest Director.

Smoke may be used at the option of each individual competitor. In case of failure of the smoke system, the competitor will not be entitled to a reflight.

Music may be used at the option of each individual competitor.

a) Competitors may submit an audio track to the organisers, to be played during their performance to the judging panel and over the public address system. This must be provided at least 12 hours before the scheduled flight time in .mp3 or .mp4 format, preferably on a USB memory stick or alternatively by email. The organisers will check the file and certify its acceptance.

b) The default time for starting playback of the audio track will be on the third wing rock at the commencement of the performance. Alternatively the competitor may instruct the organiser in writing when playback of the audio track should commence, if necessary triggered by a command on the radio from the pilot.

c) The organiser must arrange for the audio track to be transmitted to the pilot during the performance, and ensure that the set-up still allows the Chief Judge to transmit safety messages at any time.

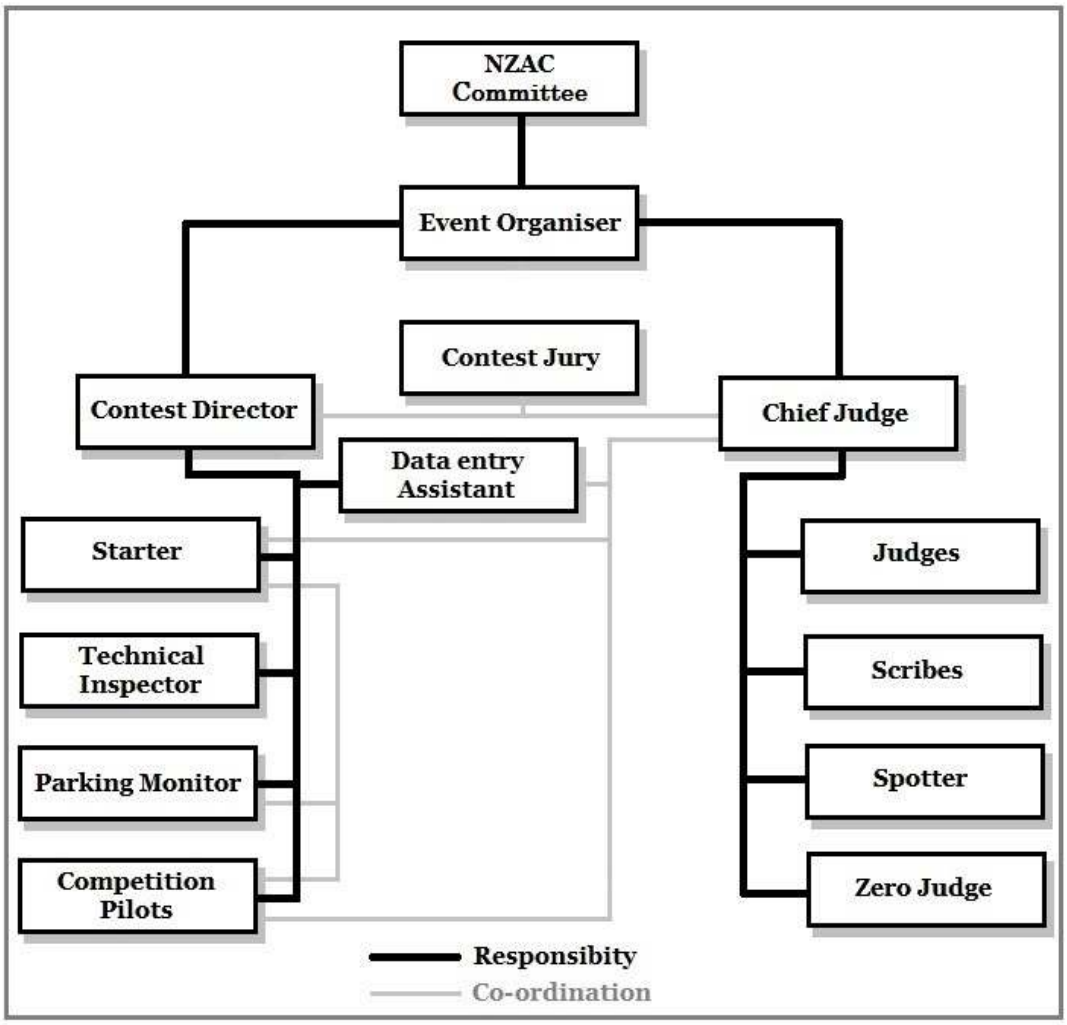
d) In case the audio track fails to be played to the judges or to the pilot for a reason not attributed to the competitor or his/her team, the competitor will be entitled to a reflight, subject to approval by the Jury.

Judging of the 4-minute Free may be carried out by the contest judges, or by another means determined by the CD/CJ, such as by the remaining competitors.
The criterion for judging is contained in the Judging Criteria.
The CIVA 4 Minute Freestyle Form A shall be used for the scoring and the CIVA 4 minute Freestyle judging summary form can be used to tally competitor scores. Copy of these forms can be found in appendix 4.

4. COMPETITION PERSONNEL

4.1. COMPETITION EVENT RESPONSIBILITY STRUCTURE

The responsibility and co-ordination structure of personnel and competitors for competition events shall be as follows:



4.2. Event Personnel

Depending on the size and scale of the planned event, some or all of the following positions may be required. One person may perform more than one role, if needed.

4.2.1. NZAC Committee

The NZAC President and at least one committee member are required to sanction an event, in accordance with 1.4.

4.2.2. Event Organiser

The Event Organiser shall be responsible to co-ordinate the planning, site evaluation, community consultation, risk assessment, CAA and local approvals, NZAC sanctioning and selection of a suitably experienced Contest Director and Chief Judge. Local operators shall be notified and a NOTAM or SUPP be promulgated.

In consultation with the Contest Director, the competition format and range of categories and sequences to be flown shall be chosen and promulgated by way of a Competition Information document and/or using the NZAC website – Events.

4.2.3. Contest Jury.

The Contest Jury is the arbitration body of the competition and decisions made by the Contest Jury are final and not subject to change or further protest. Jury members are to keep the proceedings, discussions, and voting of the Contest Jury strictly confidential.

The Contest Jury is responsible for dealing with protests from contestants and judges in the interpretation of general rules, category rules, and judging criteria.

The Contest Jury shall be selected prior to be commencement of the event by the Contest Director in consultation with the Chief Judge. The contest Jury shall normally consist of the Contest Director, the Chief Judge and at least one other jury member for each category.

Jury members shall be suitably experienced and qualified to objectively consider rule interpretations without bias. Jury members may be any official of the event, competition pilots, or an outsider.

The Contest Director and Chief Judge will appoint alternate jurors when necessary to replace a juror involved in a protest, or when a juror is unable to serve for whatever reason (including a conflict of interest).

4.2.4. Contest Director

Management of the aerobatic competition and on-the-day responsibility for safety rests with the Contest Director.
The Contest Director is responsible for ensuring:

- Compliance with the NZAC event rules and procedures, and applicable CAA Rules;
- The safe conduct of the competition flying and general flying discipline;
- Receiving and vetting of competitor entry forms.
- Correctness of sequences used and/or submitted.
- Appointment of contest officials and Contest Jury
- Positioning and placement of the aerobatic box markers
- Setup of airfield facilities – safety barriers and public safety warnings as required, fueling facilities, parking, emergency equipment, first aid, rest-rooms, and briefing and admin facilities.
- Weather forecasts are obtained
- Competitor and Officials briefings are carried out

- Scores are processed and posted
- Protest received are dealt with as required and appropriate, including use of Contest Jury
- Ensuring minimum heights and spectator separation lines are observed;
- Modifications to the flying program caused by weather or other factors are considered.
- Winners and place getters are announced and awarded.

4.2.5. Data Entry Assistant

The Data Entry Assistant shall assist the Contest Director with the checking and entry of scores into the scoring system.

4.2.6. Starter

Supervision of competitors preparing for flight is the responsibility of the Starter, safety shall be the prime consideration at all times.

The Starter shall ensure each competitor is physically and mentally prepared ten minutes before the estimated start time, in the correct or amended order of flight in consultation with the Chief Judge.

Prior to engine start and release, the Starter will complete the final safety checks and briefing using the Starter Checklist (Appendix 3).

4.2.7. Technical Inspector

The Technical Inspector/s shall have a background in aircraft engineering, and will be responsible for carrying out an inspection of the competition aircraft prior to the commencement of competition flying (or Official Practice).

4.2.8. Parking Monitor

The Parking Monitor shall be responsible for ensuring competition aircraft are correctly parked in a safe or orderly manner throughout the event, to minimise risk to spectators and non-competing aircraft.

4.2.9. Pilots

In exercising the privileges of their license, Pilots have ultimate responsibility for the safety of their flight, and for compliance with CAA rules. Pilots seen to be breaking CAA and/or NZAC rules can be disqualified from further and future competition, and may be subject to CAA enforcement actions.

To be eligible to compete, competition pilots must:

- Hold a current PPL or higher license, issued by NZCAA, or an equivalent foreign license with an approval to operate an aircraft aerobatically in NZ
- Have a current medical
- Have completed an Aerobatic Bi-annual Competency Check within the preceding 24 months

- If operating below 1500’ AGL, hold a current Low Level Display Authorisation (LLDA)
- Complete and submit an entry form in the time allocated
- Pay any entry fees prior to commencement of competition

A pilot wishing to compete who does not hold a current licence, medical, and/or Aerobatic Bi-annual Competency Check may seek approval from the Contest Director to use a Safety Pilot. The Safety Pilot will be PIC for the flight, and therefore must be fully current in all of the above as well as hold a current instructor rating and be type-rated and current on the aircraft type. Safety pilots may only be used in Primary, Recreational and Sports categories. The Safety Pilot cannot offer advice during the competition flight except that which ensures the safety of the flight.

A pilot may compete in more than one category, at the discretion of the Contest Director. However this may only be in a different aircraft type, and only the highest category results will be used for determining competition standings.

Pilots must be prepared to present original, copied or scanned evidence of licencing and currency documentation to the Contest Director prior to competition, as notified in the Event Information. Failure to produce the required documentation may result in denial of entry and flight.

4.2.10. Chief Judge(s)

There may be more than one Chief Judge in an Aerobatic Competition, but only one Chief Judge per category. The Chief Judge for a category should remain the same throughout the competition.

After safety, the Chief Judge’s primary concern should be the accurate and fair judging of the competition flights.

The Chief Judge may:

- Withdraw any Judge for reasons of incompetency.
- Withdraw any contestant for reasons of safety.
- Recommend to the Contest Director the exclusion of any person from the contest for unsportsmanlike conduct.

Chief Judge duties include:

- Contributing to the Pilot Briefing as required by the Contest Director
- Conducting a briefing for all Judge Line personnel
- Managing discipline and access to the Judge Line
- Supervising the Judges, Scribes, Spotter
- Appointing substitutes, with the concurrence of the Contest Director, for any officials who are unable to perform their duties
- Approving substitution of aircraft
- Authorizing changes in the order of competition flights
- Coordinating with the Starter over flight order and release to start

- Communicating with the pilot on the box frequency, particularly in the case of possible traffic conflicts and safety issues by transmitting “Break, Break, Break”
- Advising competitors they may commence their competition sequence by transmitting “(a/c rego) commence when ready”
- Timing of flights, and notifying a competitor when their time is up by transmitting “Time, Time, Time”
- Acting as the Judge, in deciding any zero scores, for maneuvers started behind the dead line
- Perform the duties of a regular Judge, if it is deemed by the Contest Director that the inclusion of the Chief Judge’s scores would enhance the overall judging scores
- Calling judges conferences as required
- Confirming any zero scores and penalties for each flight
- Confirming Form A scoresheets are complete prior to handover to the Contest Director and/or Date Entry Assistant for entering into the scoring system
- Debriefing all judge line personnel if required
- The preparation of Unknown Figures or Sequences in liaison with the Contest Director

In briefing the judge line personnel, the Chief Judge shall confirm the duties and expectations of the various roles, operation of the deadline, criteria for scoring of figures and presentation, clarification of HZ/PZ and numerical zero, and the ‘Low’ and disqualification criteria.

The Chief Judge shall seek to ensure all scoring is consistent and fair throughout the competition, and especially be vigilant to any bias, subconscious drift in Judge scoring methods, or changing of scores through peer influence or pressure.

4.2.11. Judges

The Contest Director, in consultation with the Chief Judge, shall appoint Judges based on known experience, knowledge, attitude and ability.

A Judge may also be a competitor, although not in the category they are judging, so long as this does not unduly affect their ability to safely compete.

Each category shall use the same line-up of judges for each Flight Programme.

Judges are responsible to the Chief Judge for the grading of figures and presentation of a competition sequence flight, in accordance with the Judging Criteria. Judges shall at all times be mindful of the consistent application of the judging criteria throughout a competition and not succumb to bias or drift in their scoring methods.

Judges shall attend any judge briefings and debriefings called by the Chief Judge.

4.2.12. Scribes

The Contest Director and/or Chief Judge shall allocate each Judge a Scribe.
The Scribe is responsible to their Judge for recording the scores and comments as time permits made by their Judge on the competitor's Form A.

The Scribe must ensure the correct Form B or C is used by the Judge that relates to the Form A, sequence and competitor about to be judged.

On completion of the competition flight, the Scribe ensures the Judge gives a presentation score and then passes Form A to the Judge for a review of comments and scores before handing to the Chief Judge.

4.2.13. Spotter

The Contest director shall assign the duties of Spotter to a person who is suitably experienced and confident with the use of a radio, and has knowledge of the local area, airfield circuit and aerobatic box.

The Spotter's duties are to keep a lookout for any aircraft that may create a conflict with competition aircraft, particularly in the aerobatic box. The Spotter must remain vigilant to aircraft approaching from any direction and therefore shall not be distracted from their task by competition flights.

On determining a possible conflicting aircraft, efforts shall be made to contact the aircraft and advice the possibility of conflict with the competition aircraft. Suggested avoidance procedures should be advised. The Spotter is to keep the Chief Judge informed of any potential conflicts or threats so that the Chief Judge can decide to advice the competition pilot of the conflict if deemed necessary, including the use of "Break, Break, Break".

5. COMPETITION ADMINISTRATION

5.1. Entry Process

The Competition Information document shall be promulgated by e-mail and/or the NZAC website a minimum of three months prior to the competition.
The Competition Information document will include the following:

- Venue
- Dates
- Format
- Entry Form
- Entry Fees
- Supplementary Rules, if any

Organisers may issue Supplementary Rules to address any deficiencies of these Regulations or any peculiarities of the contest venue or circumstances. The Supplementary Rules should be published prior to the event.

An example of the Competition Entry Form can be found in Appendix 1.

The Contest Director shall keep a record of all competitors on the Competitor Information Form (Appendix 2). All information boxes must be completed and/or signed-off prior to the competitor flying the first competition (or Official Practice) flight.

5.2. Pilot Eligibility

Pilots are solely responsible to ensure their license, BFR, medical and Aerobatic Bi-annual Competency Check is current. If pilots will be flying aerobatics below 1500' AGL, a current LLDA must be held.

The only exception to the above is if the competing pilot has permission to use a safety pilot, per 4.2.9.

The Contest Director must visually confirm the currency of all documents prior to accepting an entrant to compete. This may be done at the event, or prior by way of scanned copies.

5.3. Aircraft Eligibility

The competitor shall nominate the aircraft type and registration on the entry form. Multiple competitors can use one aircraft.

It is the Pilot's responsibility to ensure the aircraft is fit for purpose. All paperwork shall be current, which must be presented during the technical inspection. No outstanding defects affecting the safety of flight shall be present.

Insurance for third party damage is required to a minimum amount specified for the event by the contest director, ideally $2 million third party liability.

Each aircraft shall have an operable VHF radio that can be used on the nominated event frequencies.

Video recording cameras may be installed on the aircraft and used during all practice and competition flights, subject to the camera installation being secure and the pilot managing the operation of the camera to in a manner to avoid distraction.

5.4. Fees and Expenses

The Event Organiser and/or Contest Director shall set the entry fees for a competition event, such that all overheads of the event are covered.

The Entry Fee must be paid prior to an entrant commencing competition, and the methods of payment shall be set out in the Competition Information document.

All expenses incurred by the operation of competition aircraft, including landing fees, shall be paid by the competing pilot. In the case of local landing fees and expenses, prompt payment should be made to maintain good relationships.

5.5. Accommodation and Meals

Sufficient notice of the event should enable competitors to book suitable accommodation. The Event Organiser may make arrangements for group bookings. Accommodation on the airfield, or camping, may be available, as promulgated in the Event Information document.

Meals and refreshments are the responsibility of the competitors and contest officials, however the Contest Director and/or Event Organiser may arrange on-field catering.
All pilots and officials shall be vigilant to remaining adequately hydrated.

5.5. Cancellation or Postponement

No contest shall be cancelled or postponed unless conditions clearly exist beyond the control of the Contest Director. In such cases, all reasonable notice to known potential participants must be given.

6. COMPETITION OPERATIONS

6.1. Ground Procedures – Preparation

Daily Briefing

Before the beginning of competition flying, on each competition day, a briefing will be held for competitors, officials, judges and the Jury on organisational matters concerning the competition day, on meteorological conditions, etc. The briefing should last no longer than 30 minutes.

The following procedures shall be carried out prior to the commencement of the Aerobatic Competition and/or practice:

- Affected locals and/or the local community shall be advised of the Aerobatic Competition and the anticipated times of flying;
- The local flying community shall be made aware of the event and any precautions suggested by way of a SUPP, NOTAM, and/or notices;
- ATC shall be advised, and permission sought, if the use of controlled airspace shall be required or potentially infringed;
- Local Fire, police and ambulance shall be advised of the Aerobatic Competition commencement by the Event Organiser or Contest Director, including the location of the Aerobatic Box, and contact names and numbers for key personnel;
- The Event Organiser shall be responsible for ensuring Hazard Warning Signs are erected at the earliest opportunity in suitable locations to warn all attendees of the associated hazards;
- A Fire extinguisher shall be in place near the aircraft starting area.
- Each pilot shall have attended the event briefing, or has been individually briefed by the Contest Director before they carry out any official practice or competition flights.

6.2. Aircraft Parking

In order to allow spectators to safely observe the competition aircraft when not being used, a parking area for competition aircraft shall be established, sufficiently clear of the starting/taxi area and fuel pumps. This shall be separated from the spectator area by a high-visibility barrier.

Spectators must be kept within the spectator area and not allowed into the parking area, unless by invitation AND under the direct supervision of a competitor, aircraft owner/operator, or competition official.

The following procedures must be followed throughout the duration of the event, supervised by the Parking Monitor:

- All competition aircraft shall be parked in an orderly manner within the parking area;

- Visiting aircraft shall be parked in an area well clear of competition aircraft, and the pilots of those aircraft shall be solely responsible for their safe parking, starting and taxiing;
- Competition aircraft must ONLY be pushed or towed from the parking area to the starting area, and turned at right angles to the parking area prior to starting;
- There shall be only ONE turning engine in the starting area at a time. Pilots approaching the starting area should hold clear until the starting area is clear;
- Upon arrival, competition aircraft must ONLY be pushed or towed into the Parking Area – there shall be no taxiing into the Parking Area;
- All aircraft shall be carefully moved in and out of hangars (if available), or shall be securely picketed (if required) for overnight parking.

6.3. Technical Inspection

A Technical Inspection shall be conducted on participating aircraft prior to the commencement of Official Practice by the Technical Inspector/s.

This check will ensure:

- All cross country and non-essential equipment is removed from the cockpit.
- Airworthiness documentation is current.
- A third-party insurance certificate (minimum $2m public liability) is sighted.
- The aircraft has no visible defects affecting the safety of aerobatic flight.
- The aircraft appears serviceable for aerobatic flight.

A Technical Inspector cannot inspect his/her own aircraft.

The Technical Inspector shall sign-off each aircraft as satisfactorily inspected on the Competitor Information Form (Appendix 2).

Responsibility for the serviceability remains with the aircraft's maintenance provider and the Owner. The Pilot in Command remains responsible for FOD or loose objects.

Any defects found prior to or during the competition must be rectified prior to continued flight. The Technical Inspector shall be notified of any defects and shall determine the continued inclusion of the aircraft in the event.

Defects encountered in-flight and/or affecting further competition shall be referred to the Chief Judge and Contest Director for penalty waivers and re-scheduled/re-flown flight.

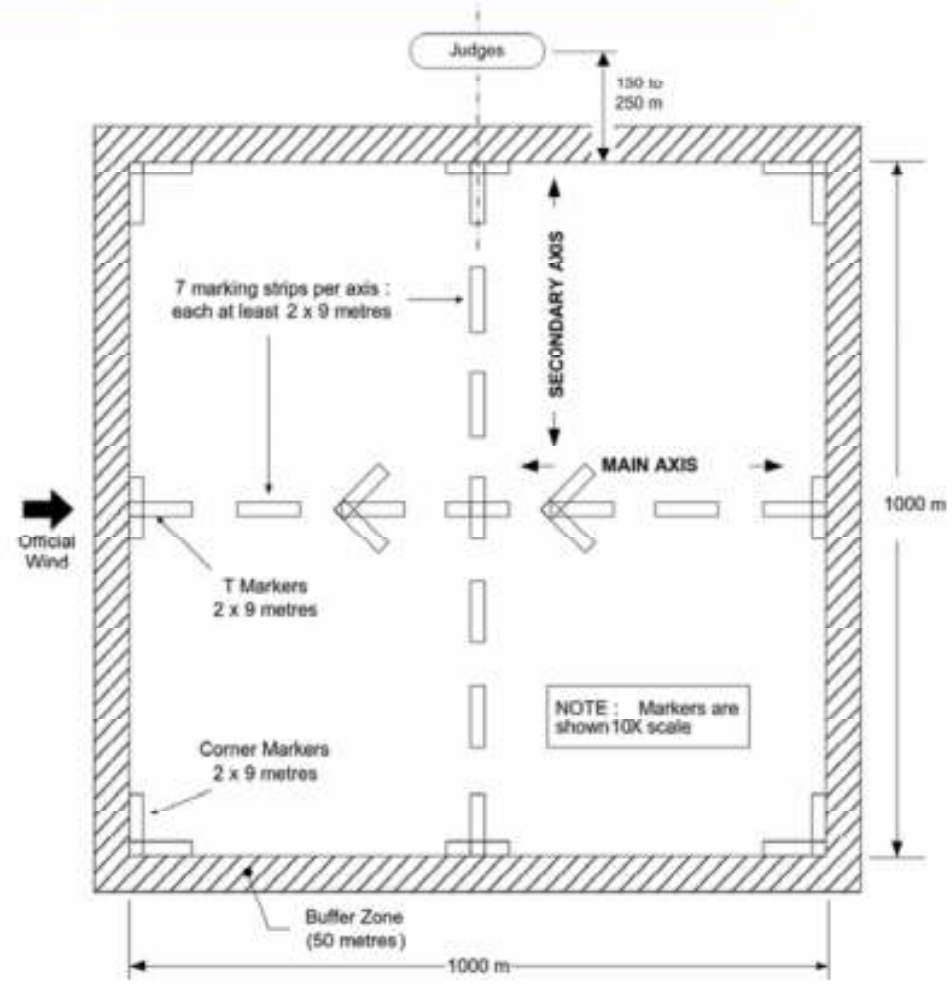
6.4. Aerobatic Box

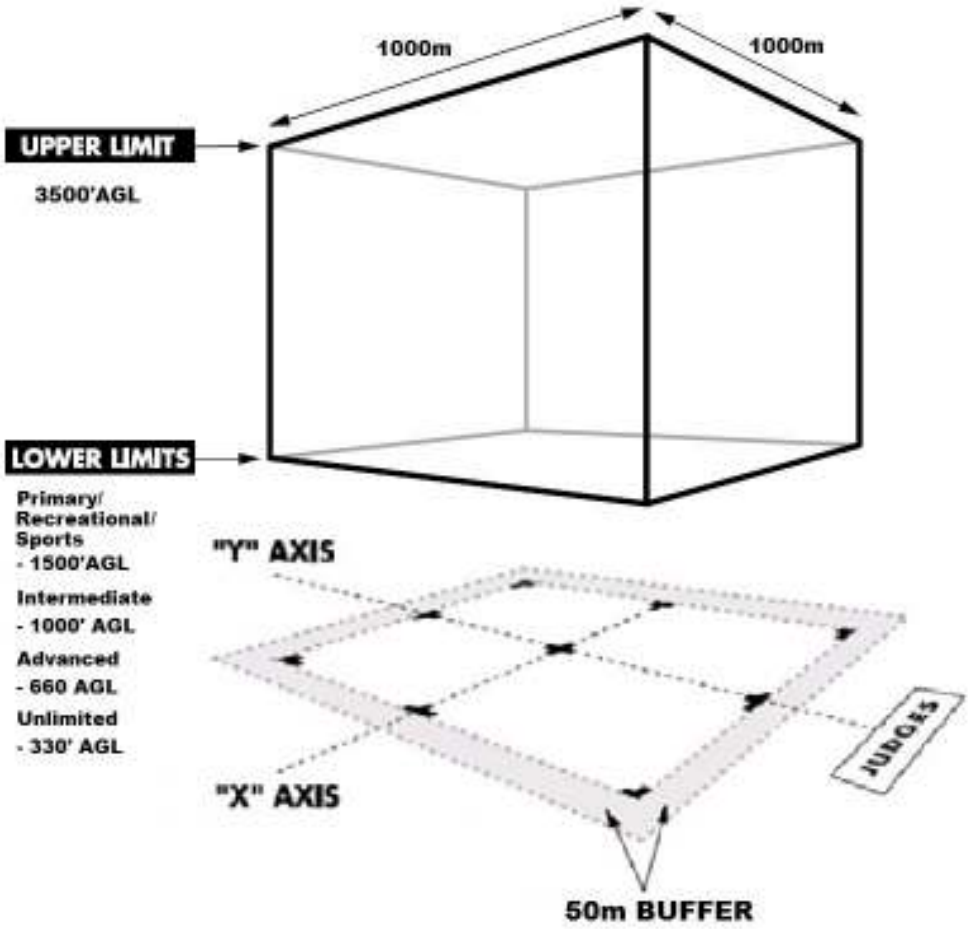
The flight Programmes shall be flown within a clearly marked area of 1,000 meters square, whose central point will be the intersection of the main (X) and secondary (Y) axes.

The Aerobatic Box should be located over, or in close proximity to, a usable runway. However, there shall be no aircraft taking-off or landing on the runway, or operating in that part of the circuit, beneath which the Aerobatic Box Buffer Area is located, whilst an aircraft is performing aerobatics within the Aerobatic Box.

If possible and practical, the box shall be marked on the ground using contrasting markers (white sheets etc.) to mark as many corners, sides and the center as possible.

The latest CIVA International Box markings are shown below, including Box direction markers. Two arrows will be placed near the central point of the main axis. They indicate the specified direction of the main axis pointing into the Official Wind. The Jury will determine any change of the Official Wind Direction (hence main axis) as may be necessary, and ensure that the Organiser amends the orientation of the direction arrows accordingly.
The NZAC organisers shall try to install as many as possible, especially direction markers. Ideally, the marking strips shall be 2 metres x 9 metres.





6.4.1 Judge Location

The Judges will be located between 150 meters and 250 meters from the edge of the box on an extension of the Y axis.

Boundary Judges, if used, are stationed such that there is a 50 meter (164 feet) buffer zone before boundary infringement penalties are noted.

6.4.2 Vertical Limits. The Lower limit shall be the higher of pilot's LLDA, or;

Category	**Upper Limit**	**Lower Limit**	Disqualification Limit
Primary	3500 ft	1500 ft	1300 ft
Recreational	3500 ft	1500 ft	1300 ft
Sportsman	3500 ft	1500 ft	1300 ft
Intermediate	3500 ft	660 ft (200m)	330 ft (100m)
Advanced	3500 ft	660 ft (200m)	330 ft (100m)

Unlimited	3500 ft	330 ft (100m)	165 ft (50m)

6.4.3 Box Positioning

CAA Rule 91.701(a) prohibits aerobatic flight over, or within 600m horizontally 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(c) allows a pilot to operate an aircraft within a horizontal distance of 600m from spectators (subject to appropriate display line clearances – 220m for aerobatic flight) at an aviation event in accordance with 91.703.

Irrespective of the above, it shall be NZAC policy that the location of the Aerobatic Box shall be positioned so that any Buffer Zone boundary is beyond 600m horizontally of a congested area of a city, town, or settlement.

6.4.4 Display Line and Deadline

CAA Rule Part 91-703 and AC91-1 specify recommended distances between spectators and aircraft performing at an Aviation Event. The following distances and designations ensure the minimum compliance with the CAA recommendations.

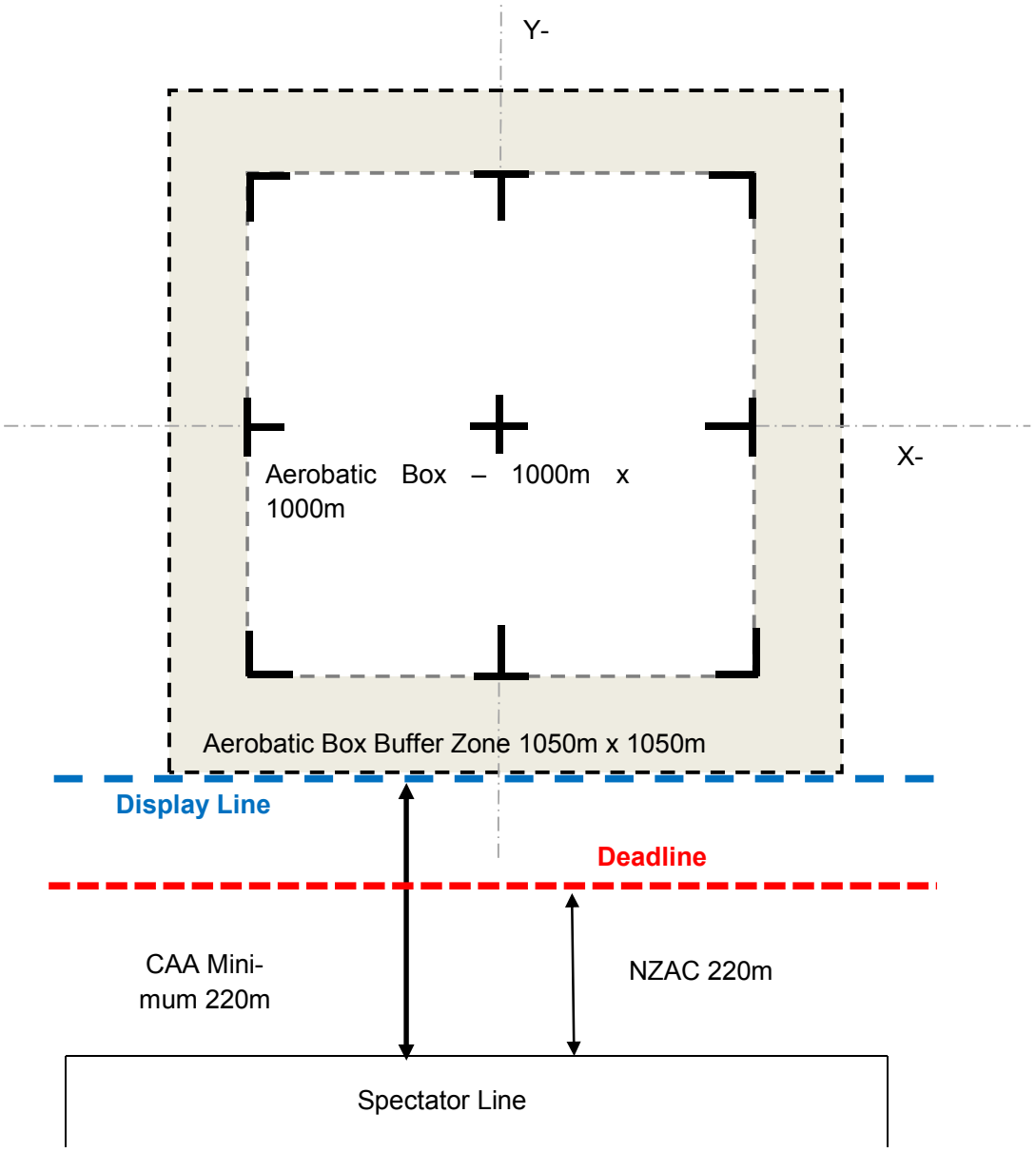
The Display Line for spectator separation purposes is the Aerobatic Box Buffer Zone boundary closest to the Spectator Line, as designated by the Contest Director. At an absolute minimum, the Display Line must be 220m from the designated Spectator Line.

A Deadline may be specified by the Contest Director to further ensure safety of the spectators. If a Deadline exists, it will be a minimum of 220m from the spectator line.

An aircraft seen to be carrying out any part of an aerobatic manoeuvre that will infringe the Deadline will be notified on the box radio frequency “Break, Break, Break” and must immediately cease the manoeuvre and return to level flight. An infringement penalty will apply, per 8.2.

The Display Line and Deadline may be one and the same at some competitions. Any additional distance between them is considered increased buffer and should be employed where possible.

The following diagram represents pictorially the location of the Display Line, Dead Line and Spectator Line to the Aerobatic Box:



6.4.5 Competitor Box responsibilities

The competitor shall be responsible to ensure that they:

- avoid overflying the spectator area, for positioning, ingress and/or egress into the Aerobatic Box, at less than 1000'AGL;
- remain within the Aerobatic Box Buffer Zone while performing aerobatic manoeuvres;
- carry out all aerobatic manoeuvres no closer to the spectator area than the display line.

6.1. Box Active

At any time from when the competition is notified as commencing, the Contest Director or Event Organiser will declare the Aerobatic Box as follows:

- A prominent sign visible to pilots in the vicinity of the parking area shall notify the Box Status throughout the duration of the competition.
- When the sign reads 'Box Active' full NZAC Box procedures are to be used
- When the status is 'Box NOT Active' normal local aerodrome procedures apply and the pilot is solely responsible for their actions

6.2. Practice

The Contest Director shall ensure that CAA approvals and/or NOTAMs (as required) cover practice days as well as the competition event.

All practice in the Aerobatic Box area prior to the notified commencement time of competition, and/or when Aerobatic Box Status is 'Not Active', is outside the auspices of the competition event and is deemed to be private and not the responsibility of the NZAC or Contest Officials. Members are to be cognisant however that their behaviour and airmanship will be associated with the Club and any shortcomings in these areas may be detrimental to the reputation of the Club.

Practice during the competition event can be one of three types:

- Away from Box
- In-Box – Casual
- In-Box – Official

6.6.1 Practice Away from Box

Until the publication of the Unknown Sequences, competitors may practice at any time away from the Aerobatic Box, subject to the following:

- The Starter is advised of intentions prior to the flight
- The flight must be conducted well clear of the Aerobatic Box, designated Holding Area and aerodrome traffic circuit
- Regular radio calls advising location, altitude and intentions are made on the local traffic frequency
- A competitor may practice Away from Box at the conclusion of a competition sequence, subject to notification to the Starter or Chief Judge, but not prior to their competition sequence.

6.6.2 Practice In-Box – Casual

Prior to judged competition flights commencing, or after daily competition flying has been completed, In-Box Casual practice may take place in the Aerobatic Box, subject to the following:

- Box markers are in place (if used).
- A pilot cannot fly in the active Aerobatic Box until the signed Competitor Entry Form/Declaration has been submitted, the aircraft has had a technical inspection and the pilot has received a briefing on box procedures from the Event Organiser or Contest Director. The briefing may be in a group or one-on-one.
- At no time shall there be more than one aircraft in the Aerobatic Box, or the area immediately adjacent to it.
- Competition pilots can use the Aerobatic Box for practice with or without a Critique Coach, but must always with have a Spotter.
- A Spotter with operable radios must be assigned and briefed. The Spotter shall monitor the local traffic frequency and be able to contact the pilot either directly or through the Critique Coach (if used).The Spotter shall look out for local traffic and offer advice of competition aircraft location, possible conflicts and runway in use. Under no circumstances is any implied clearance to be given to any visiting or transiting aircraft. In the event of potential conflict, the aircraft in the Aerobatic Box shall be advised directly or through the critique coach to cease aerobatics and maintain separation.
- A Critique Coach may be used, utilising a radio on the Aerobatic Box frequency to offer advice as required. If a Critique Coach is unavailable or not required, the pilot in the Aerobatic Box shall remain on local traffic frequency. The Critique Coach must remain close enough to the Spotter to be quickly and easily notified by the Spotter of potential conflicts.
- The Spotter and Critique Coach cannot be the same person.
- An Order of Flight list should be maintained, in order to manage fair and reasonable use of limited available box-time.
- Pilots must manage their own entry and exit from the Aerobatic Box, but listen out for any traffic information coming from the Spotter

6.6.3 Practice In-Box – Official

In-Box Official Practice takes place primarily so that all participants in the event become familiar with the competition procedures.

Competitors will fly their Programme 1 or Free Known sequence as though it is a full competition flight, and Judges will score the sequence in the same manner. Scores will be recorded in the scoring system but not used for final results unless weather or other delays result in the actual competition Programme 1 sequences not being completed. The scores from Official Practice will not be posted until it is evident the scores will be needed for the competition to have a fair result. Due to time constraints, Official Practice may be totally omitted.

Official Practice will take place after the initial full Competition Briefing and will therefore operate with full Judge-line, starter and box entry procedures.

6.7. Weather Minima

Aerobatic flights are to be flown only in Visual Meteorological Conditions (VMC). Competition flight will not take place in precipitation.

Note: VMC Criteria for Class G airspace is 5km visibility, 1500m horizontal and 1000ft vertically clear of cloud. Below 3000ft AMSL or 1000ft AGL (whichever is the higher) the VMC criteria are: 5km visibility, clear of cloud and in sight of ground or water. Ref. AIP ENR 1.2.

The minimum prevailing flight visibility, determined with reference to ground features from the midpoint of the box at the maximum height for the competition flight, must be 5 kilometres.

The Maximum surface wind limits:

- Average surface wind speed - 25kts
- Crosswind components - 15 kts
- Tailwind in relation to the main/x- axis 10kts

The Contest Jury may relax the wind limitations stated above in the interests of completing the competition in the time available.

The minimum height of the cloud base is 4500' AGL, which shall be sufficient to permit operations in VMC at the upper limit of the box. If this is not the case then an optional weather break will be made available to competitors – see 6.7.2. It is the PIC's responsibility to ensure VMC is maintained during the flight.

In circumstances where intermittent low cloud is passing through the Aerobatic Box, followed by clear patches of weather, the Contest Director in conjunction with the Chief Judge, may waive the time limit for the completion of the programme, thus allowing a competitor to orbit if so desired, until the Aerobatic Box is clear.

6.7.1 Adverse Weather

If the meteorological conditions do not meet the above requirements or if the visibility decreases below 5km, the Chief Judge will discontinue competition flights.

The Chief Judge will take into account information from competitors who have just finished or discontinued a flight owing to weather conditions which, in the opinion of the pilot, were outside the prescribed limits.

A competitor may discontinue the sequence and call 'Weather Break' if, in the pilot's opinion, the weather conditions do not comply with the competition rules, i.e.:

- horizontal visibility deteriorates to less than 5km
- cloud base in the Aerobatic Box is lower than the prescribed height
- precipitation becomes apparent

The Chief Judge will recommend to the Contest Director a suitable method of recourse for the competitor. Any decision must be fair to all competitors. Recourse may be a re-fly from the break or a total re-fly of the entire sequence. The marking for the re-fly will be continued from the last figure flown clear of adverse weather.

If a competitor discontinues his or her flight without sufficient reason, no repetition flight will be allowed.

6.7.2 Permitted Breaks

If the height of the cloud base is less than 4500' the Chief Judge and/or Contest Director will allow one or more weather breaks to be made. The competitor is thus allowed to readjust height without penalty before re-commencing the sequence.

The absolute minimum height of the cloud base shall be 2500', to ensure aerobatic flight clear of cloud and in sight of the ground. However, it is still the PIC's responsibility to ensure VMC is maintained during the flight.

Even though a weather break may be allowed without penalty, there is no obligation for a pilot to interrupt their flight.

When an interruption occurs along the Y-axis (cross-box), the competitor must resume his/her flight in the same direction of flight in which they broke.

If the cloud base subsequently rises to the minimum specified, the justification for a weather break is removed. The Chief Judge and/or Contest Director will give pilots at least 10 minutes notice that the optional weather break has been rescinded.

6.8 Duration of Flight and Signaling Start and Finish

6.8.1 Time Limits - Primary, Recreational, Sports and Intermediate

A time limit of 15 minutes will apply for all Programmes in Primary, Recreational, Sports and Intermediate Programmes.

This time will deem to start when the competitor acknowledges that they have been cleared into the performance zone via the radio by the Chief Judge. Usually this will occur while the competitor is in the holding area at altitude. The competitor should ensure they are holding close enough and high enough to enable a direct entry to the box without delay.

If the Chief Judge clears a competitor into the box while they are still climbing on departure, the CJ will make an extra time allowance for this.

It is the competitor's responsibility to plan their departure and flight efficiently so as not to delay others and to make maximum use of their box time.

If exceeded, the end of the time limit will be clearly announced to the pilot by "time, time, time" being called over the radio by the Chief Judge. There will be no penalty for exceeding the time limit, but figures flown after that time will not be scored.

6.8.2 Time Limits – Advanced and Unlimited

Programme 1 will have a time limit of 10 minutes maximum from "lift off", (or transiting to the box from the holding area if used) to exit from the box (wing dips at completion of flight).

If exceeded, the end of the time limit will be clearly announced to the pilot by "time, time, time" being called over the radio by the Chief Judge.

There will be no penalty for exceeding the time limit, but figures flown after that time will not be scored.

Programmes 2-4 must be completed within 15 minutes. (Note: "Lift-off" will be defined as the point in time the competitor is visible to the Chief Judge/timers as "off the ground")(Or transiting to the box from the holding area if used).

In Programme 5 (4 min Free) there is a time window of between 3 minutes 30 seconds and four minutes in which to complete the programme, without penalty, after signaling the start of the sequence. The timing starts on the third wing dip at the start and stops on the third wing dip signaling the end. The Chief Judge shall indicate by call or signal the time during which the Judges must watch and mark a programme.

6.8.3 Stoppages

In the event that a pilot takes a permitted weather break, the stop watch will be stopped on the third wing dip at the start of the break and re-started on the third wing dip signaling the beginning of the second part of the broken sequence.

For those competitors who fly the lower axes of the box for the judges, the Chief Judge will suspend timing to allow a reasonable time for the completion of the low-line pass and climb. In the case of a low-performance aircraft an extra time allowance may be made by the Chief Judge.

If a competitor is holding due to passing weather, conflicting air traffic or danger of collision with flocks of birds, his/her time will be extended for an equivalent period.

The CJ shall indicate by call or signal the time during which the Judges must watch and mark a sequence.

6.8.4 Signalling

A competitor must signal the start and finish of each sequence, and any interruption, by distinctly dipping the wing three (3) times immediately one after the other by more than 45°.
For timing purposes the programme is deemed to start on the return of the wings to level after the third wing rock; and is deemed to finish on their return to level after the third of the final wing rocks.

The aircraft may start and/or finish dipping the wing either inside or outside the aerobatic zone. They may be in normal or inverted flight, or a horizontal, climbing or descending path.
The flight path angle may change between the wing rocks. The return of wings to 'level' therefore does not necessarily refer to the aircraft being 'in level flight'.

If the first figure in a programme or the first figure after an interruption begins in inverted flight, the authorized starting procedure is either:

a) a half roll prior to the first wing rock, and all wing rocks performed in inverted flight;

b) a vertical line established from flight in a direction parallel to the starting axis, with the exit in inverted flight; in this case the wing rocks may be performed partly or totally on the vertical line, or after levelling-off in inverted flight.

A horizontal flight path is required at the start of the first figure. This horizontal may be started inside the Aerobatic Box or, provided that it is clearly seen to continue inside, it may be started outside the zone.
Violations of signalling procedures, determined by simple majority of judges, will be penalized **30** points in accordance with paragraph 8.2.8.

6.9 Flight Order

For all categories the order of competition flights for Programme 1 will be determined by lot. Each competitor will draw his or her own lot. Subsequent Programmes will use the official combined standings, in reverse order, to determine the order of flight.

The order for Programme 5 (the Final Freestyle) will also be determined by lot. Each competitor will draw his or her own lot.

The sequence of flights may be altered by the organisers if circumstances require, e.g. when two closely-drawn pilots are to fly the same aircraft. There should be a minimum of two other flights between flights of the shared aircraft. Organisers shall rectify the sequence of flights as soon as is practicable and ensure the altered sequence is communicated to pilots and judges.

6.10 Radio Procedures

Competition pilots and officials are to use good radio etiquette when communicating, including appropriate use of language, knowing that the frequencies in use are public and able to be listened to by others.
Reliability of radio equipment between the contest officials and pilots is a safety critical requirement requiring a professional standard of equipment plus ideally

an elevated antenna and a backup power source and/or backup handheld radio ready.

The Contest Director will nominate the radio frequencies in use. Normally there will be two – the local aerodrome/traffic frequency and the Aerobatic Box frequency. This is normally 128.95 MHz. An alternate frequency shall be predetermined if there excessive distracting chatter on 128.95.

The following officials shall have VHF radios operating during the competition flying:

- Chief Judge
- Contest Director
- Spotter
- Starter

The Spotter shall always be monitoring the local aerodrome/traffic frequency.
The Chief Judge, Contest Director and Starter shall always be monitoring the box frequency.

The Starter and Chief Judge shall maintain plain-language communications to confirm timings and the order of flight.

The pilot shall carry out all normal traffic calls as required by local procedures (unattended or ATC) until in the Holding Area, and upon return from a competition sequence. The use of standard phraseology and procedures will remove ambiguity, ensure a safe and efficient flow of aircraft movements, and maximise box utilisation.

	Location	**Freq**	**Call**	**Response**	**Action**
Pilot shall climb into the holding area and hold / Carry out HASSELL checks / NO aerobatics. On reaching the holding area…					
1	Holding Area	119.10	Pilot "XYZ holding at…"	None	Monitor frequency to hear previous pilot report *"Clear of the Box"*
2	Holding Area	119.10	Pilot *"XYZ [position report] transiting to the Aerobatic Box, changing to Box Frequency"*	None	Transit to Aer-obatic Box
3	Box	128.95	Pilot *"Judges, XYZ entering the Box"*	Judges *"XYZ, Roger, do not commence"*	Pilot readback *"XYZ Do Not Commence",* Enter the box and carry out safety ma-noeuvre

Pilot positions aircraft in starting position, outside of Box, and waits for Chief Judges call to commence. When Chief Judge is ready for commencement…					
4	Box	128.95	Chief Judge *"XYZ, Commence when ready"*	Pilot "*XYZ commencing"*	Pilot commences sequence (wing-wag)
If, for any reason, the Chief Judge wishes to cease the flight…					
5	Box	128.95	Chief Judge *"BREAKBREAK BREAK" – (nature of break)"*	Pilot *"Copy break"*	Pilot stops aerobatic flight and receives information
If, for any reason, the Pilot wishes to break – wing-wag if possible…					
6	Box	128.95	Pilot *"XYZ Weather / Tech Break"*	Chief Judge *"Copy weather / Tech break"*	Pilot advices /receives information
At completion of competition sequence – wing-wag…					
7	Box	Box	Pilot *"XYZ Complete and clearing the Box*"	Chief Judge *"*Roger*"*	Pilot changes to local frequency
Pilot enters local circuit area…					
8	Circuit	Local	Pilot *"XYZ Clear of the Aerobatic Box, [report intentions]…."*	-	Pilots enters circuit with standard calls

6.10.1 Competition Flight Communications Flow-Chart

Note - After take-off, a pilot may omit Item 1 and proceed directly to the Aerobatic Box (and Item 2) if it is clear the Aerobatic Box is vacant.

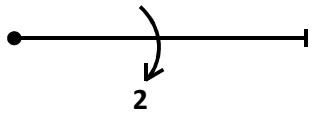
6.11 Safety and Practice Manoeuvres

Before the wing-rocking at the start of each competition flight, it is recommended that all pilots perform safety manoeuvres, selected from below to check seat belts, foreign objects, and inverted fuel and oil systems. The additional manoeuvres may improve G tolerance, and wind or positioning assessment.

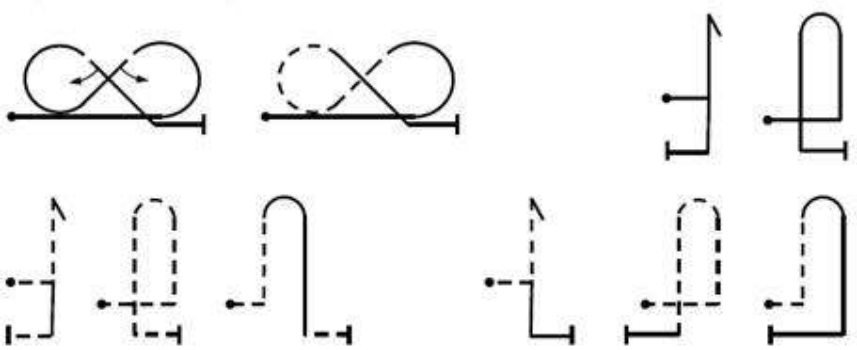
They must be flown inside the Aerobatic Box only (not holding area).

These figures are optional but, if flown, may only be flown once each, continuously on the same axis but in any order.

The maximum number of manoeuvres is two – the aileron (or point) roll plus one additional manoeuvre (optional).



Plus one of the below,



Subject to time available and Contest Director discretion and prior to the actual performance of Programme 1, in addition to the safety manoeuvres above; competitors will be permitted to fly, once, practice figures from their Programme 1 sequence, starting from figure one (1) of their sequence, consecutively up to the first five (5) figures.

Violations of safety and practice manoeuvres will be penalized 30 points in accordance with paragraph 8.2.7.

6.12 Mechanical Defects

The NZAC philosophy shall be to encourage the highest level of safety while assisting all competitors to complete the competition with realistic penalties.

6.12.1 Defects on the Ground

In the event of a competing aircraft becoming unserviceable before the start of a flight, the competitor will notify the Starter and remain with the aircraft until an inspection is done by the Technical inspector. The Contest Director may, on the recommendation of the Technical Inspector, permit the competitor to use another aircraft or the same aircraft following the rectification of the defect.

In the event that a test flight is required and the competitor does not allow a non-competing pilot to fly his/her aircraft for test purposes, a special authorisation will be given to the competitor to fly this test flight under the following conditions:

- The flight will consist of a maximum of three aerobatic figures, as recommended by the Technical Inspector and approved by the Contest Director.
- The flight will be conducted in the Aerobatic Box and observed by the Contest Director and/or Chief Judge

- If the competitor violates these conditions, he may be disqualified.

6.12.2 Defects in Flight

When a competitor has a mechanical defect in flight, (including loose objects in the cockpit) and decides to land, he/she will be required to taxi (if able) to a designated technical area. This area will be off limits to everyone except the competitor, the Technical Inspector and the Contest Director. An engineer will be permitted to enter the area with the concurrence of the Contest Director.
The competitor will be required to remain with his/her aircraft until the arrival of the Contest Director who will release him/her and subsequently permit the aircraft to be worked on and inspected.

To verify the loose objects, damage or malfunction, only the following persons will be permitted to work on the aircraft:

- The competitor,
- A mechanic nominated by the competitor,
- The Technical Inspector, and
- The Contest Director.

When the damage or cause of the malfunction has been found, repairs may be made by the mechanic of the aircraft and other qualified personnel, as recommended by the Technical Inspector.

Any damage will be counted as such provided it is a break or deformation found on the aircraft or engine or their component parts without use of any special device except a magnifying glass.

If the competitor stops his/her competition flight due to technical damage or malfunction beyond the pilot's control, he/she may be allowed to repeat the flight without penalty provided that evidence of the damage can be furnished to the Technical inspector within two hours of landing.

The competitor will not be permitted to repeat his/her flight if the cause of the malfunction or damage is due to the following:

- Incorrect adjustment,
- Caused by dirt attributed to negligence of the competitor, or
- Insufficient or missing safety devices causing a change of settings during the flight.

If it can be ascertained by the Technical Inspector that contaminated fuel or oil was supplied by the organisers, a repetition flight will be permitted.

The Contest Director must, not later than five hours from the landing of the competitor concerned, decide whether or not a repetition flight will be approved. In case of doubt on the basis of the statement by the Technical Inspector, the Contest Director shall decide in favour of the competitor.

In order to avoid any delay in the progress of the contest, the repetition flight will be made at the first available opportunity closest to the original flight order, even if this is prior to the decision of the Contest Director.

The sequence of repetition flights will be determined by the sequence of interruptions of competition flights.

A competitor making a repetition flight must re-fly the entire sequence. Judging and scoring will be continued from the figure during which the technical problem occurred in the interrupted sequence.

If the Technical Inspector finds no technical problem to justify discontinuing the flight, or determines that the technical fault or loose object in the cockpit was under the control of the competitor; the competitor will be awarded an interruption penalty and allowed to re fly the flight. If the program was interrupted during a figure, then the competitor will receive an HZ for that figure.

6.13 Protests

Protests from pilots or judges must be submitted in writing to the Contest Director within 2 hours after the occurrence, decision or publication of results which causes the protest to be made and must be accompanied by a protest fee of $60.00

The Contest Director shall form an appropriate jury of a minimum of 3 people. The hearing shall be conducted as soon as possible after receipt of the protest. The protester is entitled to be present at the hearing and to call witnesses and present evidence.

Decisions taken by the jury are final and must not be changed later. If the protest is upheld then the protest fee will be returned.

6.14 Daily Completion and De-brief

At the conclusion of every competition day, the Event Organiser or Contest Director shall change the Box Status notification as required.

A daily debriefing will be carried out by the Contest Director, attendance by all pilots is compulsory.

- A roll call will be carried out.
- The days flying will be reviewed, with a particular emphasis on safety issues and lessons learnt.
- The plan for next day's flying, including a review of weather predictions, will be discussed.

6.15 Emergency Plan

This Emergency Plan will be used in the event of an incident or emergency during a sanctioned Aerobatic Competition.

There are two principal incidents or emergencies that must be considered:

1. In the air (where a pilot experiences a problem such as control lock or disorientation, or aircraft intrusion into the competition area); and
2. Post impact. These require two responses - Preventative and Post-Impact Emergency.

6.15.1 Preventative

1. The person in radio contact with the pilot (Chief Judge, Critique Coach or Spotter) shall establish from the pilot the nature of the problem and assist with problem solving and suggesting options. This may be enough;
2. Technical or technique assistance may be obtained and offered;
3. If required, emergency services on 111 shall be contacted;
4. If required, the Starters and Spotters will take the fire extinguishers from the flight line and prepare to proceed to the incident or emergency site to provide immediate assistance;
5. If required, at the conclusion of a reportable incident the Contest Director will contact the Civil Aviation Authority on (04) 5609 400.

6.15.2 Post-Impact Emergency

1. The Starters and Spotters will take fire extinguishers from the flight line and proceed to the incident or emergency site to provide immediate assistance;
2. Emergency services shall be immediately contacted on 111;
3. The Contest Director will contact the Civil Aviation Authority on (04) 5609 400.

6.15.3 Other Considerations

No aircraft involved in an accident will be moved without the express consent of the Civil Aviation Authority.

Any incident or accident that occurs during an NZAC Aerobatic Competition that relates to the event, including near misses or airspace infringements, will be reported to the Civil Aviation Authority, whether or not club member aircraft are involved.

Apart from initial notification, and unless otherwise expressly deputised by the Event Organiser, only the Event Organiser or Contest Director is authorised to liaise with the emergency services, CAA or the media.

Additional information and recommendations may be found in the "FAI Guidelines; In the event of a casualty or serious accident at FAI Air Sports."

6.16 Wrap-Up

At the conclusion of the competition event, a team is sent to recover the markers and to ensure they are washed and dried as required.

Any borrowed equipment is returned.

Landowners are visited and thanked.

Sometime after the event, the Event Organiser shall convene a de-brief of the event, to determine the effectiveness of event procedures and future changes required.

CRITERIA FOR JUDGING AEROBATIC FIGURES

7.1 Preface

The following is an expansion and clarification of the general principles for grading aerobatic figures stated in Regulation 8.1. The final grade awarded to a figure has many facets, but the first and most important component in any grade is the geometry of the figure as compared to the true horizon and Aerobatic Box axes. Geometry is derived from two distinctly different entities: flight path and attitude.

7.2 Definitions

There are some words and phrases which are used consistently throughout the text in a very precise sense, and it is as well to define at the start the sense in which each is used:

7.2.1 Angle Of Attack

The angle at which the wings of an aeroplane meet the relative airflow.

7.2.2 Angle Of Incidence

The angle at which the wing is attached to the aeroplane.

7.2.3 Figure

Each individual component of a sequence, which may comprise one or more manoeuvres in combination; it starts and ends with a horizontal line.

4. Manoeuvre

Any one of the basic aerobatic movements, which may be combined to make a figure (e.g. an avalanche is one figure consisting of two manoeuvres - loop and flick roll).

5. Score/Mark/Point

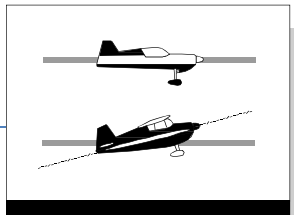
Marks are assigned (from 0 to 10) by judges, and may be devalued by various point values.

The score is calculated by multiplying the judges' marks by the coefficients (K factors) and adding the products.

7.3 Flight Path and Attitude

7.3.1 Flight Path

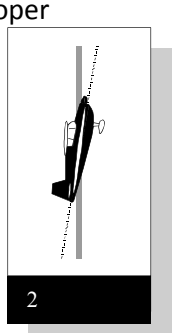
Think of the airplane condensed into a single dot and watch the path



this dot takes through the sky. This is the flight path, or track, of the aircraft's centre of gravity. Judging the flight path consists of comparing the observed path with fixed references such as the horizon or the X and Y axes of the Aerobatic Box. (Figure 1).

7.3.2 Vertical Attitude

Judging vertical lines is based on the attitude of the aircraft and not its flight path. When an aircraft's flight path, in a zero wind condition, is exactly 90 degrees to the horizon, the wings are being held at the correct angle to produce no lift. The aircraft's attitude while in this condition (zero lift) defines the proper judging criterion for vertical attitude. This is called the zero-lift axis.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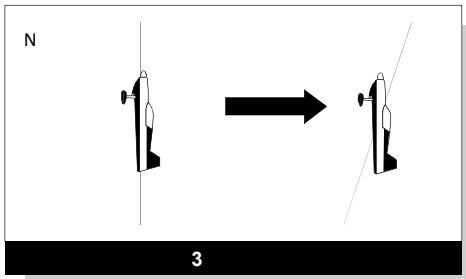
When this zero-lift axis is vertical, the longitudinal axis of some aircraft may not appear to be vertical. (Figure2) The Judge must determine the proper vertical attitude for each aircraft type according to its zero-lift axis. The best opportunity to make this determination is to observe practice flights and note the different aircrafts' vertical attitudes, both up and down.

An aid for judging the perfect vertical (zero-lift) attitude is to observe vertical rolls. During a truly vertical roll, the aircraft's wings will constantly be parallel to the horizon, something which is especially noticeable after 90 degrees of roll.

Be aware that aircraft types whose zero-lift axis does not pass through the tail will make a spiral with the tail during a perfect vertical roll. From the Judges' perspective, this spiral will look as if the tail is shifting off-axis from the zero-lift axis flight path.

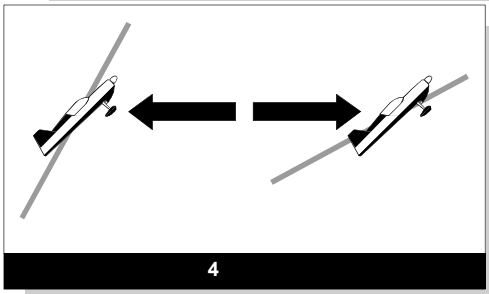
When there is a wind of any kind, the observed flight path will be offset from perpendicular to the horizon by some degree. This wind effect must be completely ignored by the Judge, who must only evaluate the accuracy of the vertical attitude. (Figure 3)
The prescribed deduction is one (1) point per five (5) degrees of deviation from the correct geometry (0.5 points per 2.5 degrees).



3

3. **The 45 Degree Attitude**

This is the vertical attitude plus or minus 45 degrees. In view of the difficulty in judging 45 degree lines accurately, scoring deductions should be applied with care. When flown into the wind, a perfect 45 degree line will appear to be steep while the opposite is true when flown downwind. (Figure 4) As with the vertical attitude, this wind effect must be completely ignored by the Judge who must only evaluate the accuracy of the 45 degree attitude. The prescribed deduction is one (1) point per five (5) degrees of deviation from the correct geometry (0.5 points per 2.5 degrees).


4

7.4 Grading

All transitions from one plane of flight to another should have a reasonable and constant radius. The size of that radius is not a grading criterion and higher grades are not to be given to "square, high-G" corners.

It should be assumed that a competitor is going to fly a perfect figure, so a Judge starts
with a grade of 10. As the figure is performed, the Judge then begins to find faults (if any) with what he or she sees, and starts downgrading as the figure progresses. This system of grading is required by the rules as opposed to waiting until the figure is finished and assigning a grade based on overall impression. The latter causes the judging to be erratic and inconsistent.

Should a competitor fly a figure at a location, inside or outside the performance zone, such that the accuracy of the flight path or attitude cannot reasonably be determined, a downgrade of 2 points should be applied for each element of the figure that cannot be properly assessed.

7.5 Summary

Remember, it is the Judge's job to find fault: be a nit-picker. On the other hand, give a grade of 10 if you see a perfect figure - but if you are really being critical you won't see too many. Don't get in a rut. Guard against confining your grades in too narrow a range. If you watch carefully and grade consistently, you will find yourself giving an occasional 2, 3, or 4 on some sloppy figures that are not quite bad enough for a zero. You will also be giving an occasional 9 or 10 for the superlative figure with which you can find little or no fault. Take care not to grade on an overall impression of a flight. Be ready to award a low grade for a poor figure even if you have been grading other figures flown by that competitor with 8's and 9's.

On the other hand, when you see a competitor barely getting through the figures and you have been giving 4's and 5's, don't be afraid to award a 9 for the almost perfect 90 degree turn that you just saw.

Finally, and most importantly, only grade what you see. If you can't see anything wrong with a figure, don't deduct any points, even if you think there must be something wrong. Always give the competitor the benefit of the doubt.

7.6 Box Axis

Except in the Final 4-minute Freestyle Programme, at the entry and exit of every figure the aircraft longitudinal axis must be exactly aligned with either the X or Y-axis of the Aerobatic Box. Any angular deviations visible to the judge must be downgraded by one point per five degrees.

The X-axis (or main axis) is parallel to the official wind. Any figure with entry and/or exit lines aligned on the X-axis must be flown as drawn on sequence Forms B or C into or away from the official wind; otherwise the figure will be marked with a HZ.

Except for figures from Families 2, 5 and 6: Any line segment within a figure, either straight or looping, drawn on the main axis, must be flown in the direction drawn on sequence Forms B or C (respectively R or L), into or away from the official wind, otherwise the figure will be marked HZ (Figure 5).
The Y-Axis (or secondary axis) is non-directional, i.e. the pilot is free to choose direction on the Y-axis when transiting from the X to the Y-axis.

Any figure with both entry and exit lines aligned on the Y-axis must be drawn with parallel entry and exit lines.

Any figure with both entry and exit lines aligned on the secondary axis must be flown with the exit direction relative to the entry direction as drawn on sequence Forms B or C (Respectively R or L), i.e. in the same or the opposite direction, otherwise the figure will be marked HZ (Figure 5).

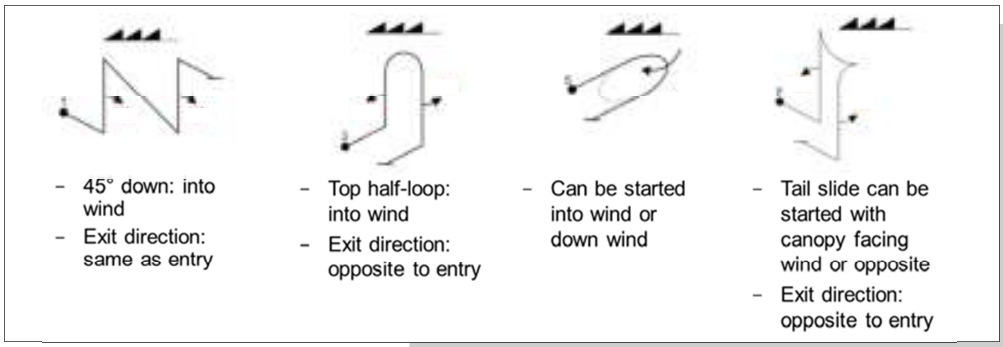


Figure 5

7.7 Wind Correction

There are two kinds of wind correction: correction for figure geometry (shape) and correction for Aerobatic Box positioning.

The competitor is required to make the shape of all loops and part-loops within a figure perfectly round as seen by the judge on the ground. Wind correction is required for loops and part-loops within figures so that the aircraft's flight path describes a constant radius circle or part circle. Remember, the Judge grades for the roundness of the flight path. Any deviation from perfect roundness must result in a reduction of the score for that figure.

The competitor is also required to keep the aircraft within the Aerobatic Box. This becomes more of a problem when a wind is blowing at an angle to the X axis. (Figure 6) The primary method of dealing with cross-box drift is to include a "wind corrector" figure in the sequence. A wind corrector is a figure which places the aircraft onto the Y axis. Because the Y axis is non-directional, the competitor can turn onto the Y axis in the direction which will allow an upwind position change before flying a subsequent figure which returns the aircraft to the X axis.

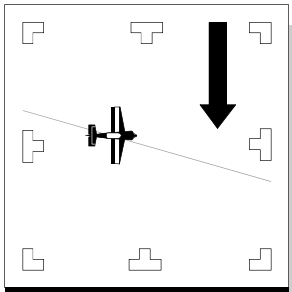


Figure 6

A well designed Free Program will always include at least one, and preferably more, wind corrector figures. Not every Known Compulsory or Unknown Program contains sufficient (or any) wind corrector figures, however, in this case, it is up to the competitor to keep the aircraft within the Aerobatic Box without benefit of a specific Y axis figure to accomplish it.

A common approach is to crab into the wind as done in navigational flight. (See Figure 7) Crabbing means that the aircraft's heading is at an angle to the competition axis (X or Y). The downside to this approach is that if this heading angle can be detected by the Judge, a deduction of one (1) point per five (5) degrees will be given.

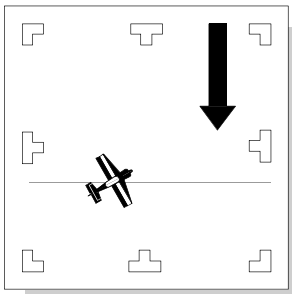


Figure 7

It is possible for the competitor to correct for wind in such a manner that the attitude remains absolutely true to the correct geometry of the figure but the flight path has a sideways component. It goes beyond the scope of this document to provide a tutorial on how this may be accomplished, but what is clear is that if any yaw (heading) deviation or bank angle is visible to the Judge, the score must be reduced at the rate of one (1) point for every five (5) degrees of deviation detected.

Please note, however: even if it is plainly evident that the aircraft has moved laterally within the Aerobatic Box, if the method of that movement cannot be detected by the Judge, no deduction for such correction must be made.

7.8 The Two Basic Components of Aerobatic Construction: Lines and Loops

7.8.1 Lines

All lines are judged in relation to the true horizon and the Aerobatic Box's axes. Horizontal lines are judged on flight path, not attitude. Different aircraft at different airspeeds will employ different attitudes to maintain a horizontal flight path. (Figure 1) While maintaining a horizontal flight path, the aircraft's heading must remain parallel to the X or Y axis. The deduction for deviation in either axis is one (1) point per five (5) degrees from the correct geometry.

All figures begin and end on definite horizontal lines, and both must be present in order to earn a good grade. A competitor who rushes from one figure to another without showing this horizontal and well-recognisable line will be downgraded by one (1) point for each missing line in each figure affected. Therefore, leaving out the line between two figures will downgrade the preceding figure by one (1) point and the following figure by one (1) point. (Figure 8)

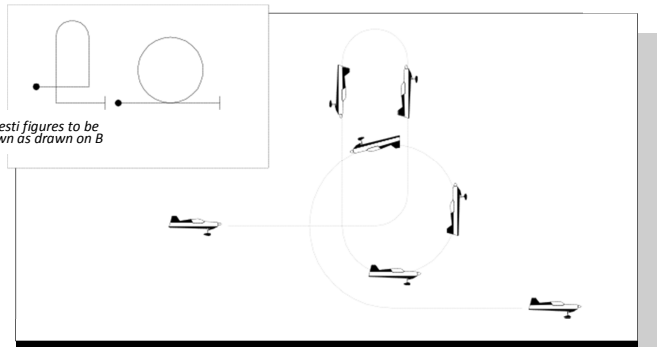
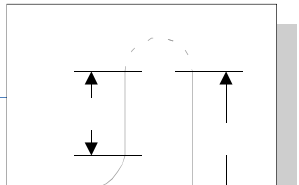


Figure 8

All lines that occur inside a figure have a beginning and an end which



define their length. They are preceded and followed by part-loops. (Figure 9)

With the exception of Family 3 figures and some figures in Family 7, the criterion for the length of lines within a figure states that they do not have to be of equal length. Therefore, it is imperative that the judges become familiar with the specific criterion for the length of lines for each figure. For example, the lines in a "Humpty-bump" do not need to be of equal length, but all four lines in a "Square loop" must be of equal length. (Figure 10)

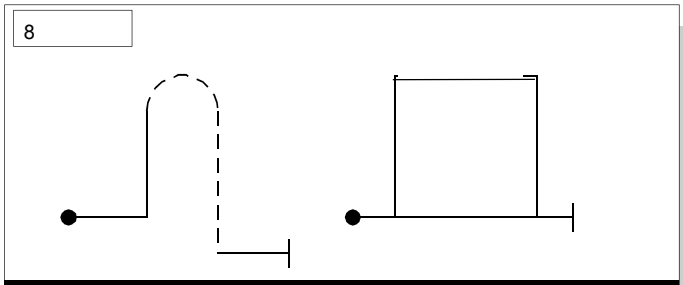


Figure 10

Whenever any kind of roll is placed on an interior line (except when any type of roll follows a spin), the lengths of the two parts of the line before and after the roll must be equal. Judges should take care to judge the symmetry of the length of lines in a figure using only the length of the lines and not by elapsed time taken to fly each segment. This difference in length versus elapsed time is most noticeable in figures where rolls are placed on up-lines. As the aircraft loses airspeed, the time it takes to fly a line after the roll will be greater than the time required to fly the line of the same length before the roll.

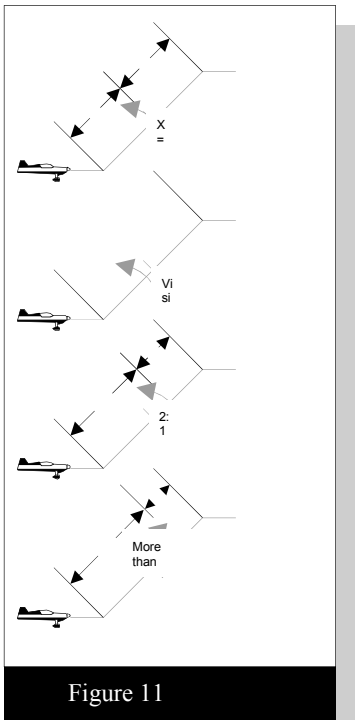
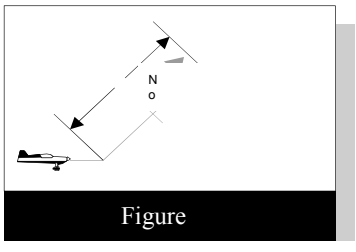


Figure 11

If within a figure two or more lines must be of the same length, an observed variation is penalised by reducing the grade in the following manner (Figures 11 & 12):

1. a visible variation - 1 point deduction;
2. if the lengths vary by 1:2 - 2 point deduction;
3. and so forth up to a 3 point deduction;
4. No line before or after roll, 4 point deduction.



Figure

The basis for judging line length is the first line flown. The absence of one of these lines before OR after a roll has to be penalised by 1 additional point. If there are no lines before AND after the roll, the total penalty is two (2) points only.
Example: The competitor is to fly a 45 degree up-line with a full roll on the line. However, the airplane is returned to level flight immediately after the roll. The deduction is 4 points: 3 points are deducted because the lines are of vastly different length and another 1 point is deducted because of the absence of one of the lines.

All 90 degree and 45 degree lines are preceded by the execution of a part-loop. Since we have in this part-loop a significant angle-of-attack, the aircraft's attitude in the part-loop will differ from its flight path. Therefore, when the aircraft's attitude reaches the desired line after transitioning from the part-loop, this difference between attitude and flight path will be carried on and will be the

same as the angle-of-attack. For this reason, the only criterion for judging in that moment of reaching the desired line is to be the attitude of the aircraft and not its flight path. It would then be very illogical suddenly to change the criterion of judgment from the visible and straight line of attitude to the unrecognizable and curved line of flight path. Therefore, the judging of 90 degree and 45 degree lines can only be based on attitude, not flight path.

7.8.2 Loops and Part Loops

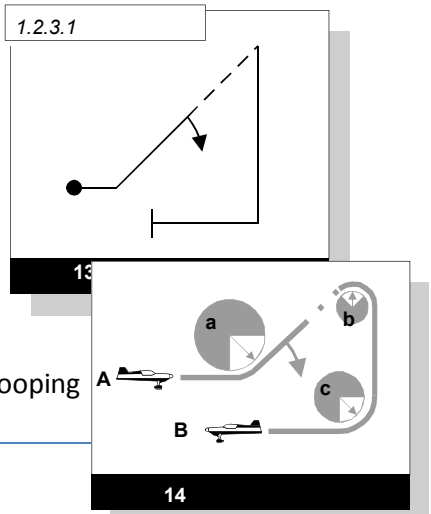
The loop is a figure from Family 7, but part-loops are integral to every other family so it is necessary to define some key elements before considering the other families.

a) A loop must have, by definition, a constant radius. It starts and ends in a well-defined line which, for a complete loop, will be horizontal. For a part-loop, however, such lines may be in any other plane of flight and will be defined by the aircraft's attitude. As the speed changes during execution of a loop or part-loop, the angular velocity around the aircraft's lateral axis also has to change in order to keep the radius constant. Thus, the angular velocity can be an aid for the Judge to gauge the radius - especially when the angular velocity in the higher part-loop is seen to be faster, as this is a clear indication that the radius is smaller. This aid becomes more important when two part-loops are separated by a line between.

b) Part-loops are depicted either as round elements or as 'corner' angles. It should be noted that any 'corner' angle drawn in the pictograms, such as in Figure 12, is always to be flown as a part-loop and must have a smooth, distinct and constant radius.

c) For any one figure having several internal part-loops depicted as round elements, all such part-loops shall have the same radius – with exception for all of Family 8.8 figures (double humpty bumps) for which the radius of the second part loop is not required to match the radius of the first one.

d) The radius of any part-loop depicted as a corner angle is not required to match the radius of any other part-loop in the same figure – with exception for all of Family 3 (combinations of lines) and Family 7.4 (whole loops) figures, which must keep a regular geometrical shape and therefore require all part-loops to have the same radius.



7.9 Aresti System (Condensed) Families

7.9.1 Family 1 - Lines and Angles

Family 1.1 has been fully covered in the preceding section.
Note that the figures in Family 1.2 and 1.3 are NOT performed as drawn in the Catalogue. (Figure 13)

In each of these figures there are three (four in Family 1.3) looping

components: e.g. a one-eighth loop, a three-eighths loop and a quarter loop. Rolls may be performed on the 45 degree line and/or the 90 degree line, with the part-lines before and after the roll being of equal length. The initial horizontal line and the line at the end of the figure may be flown at different altitudes.

Figure 14 shows Family 1.2.1 to 1.2.8 as flown. Radii a, b, and c may all be different and entrance altitude "A" can be different from exit altitude "B".

A

7.9.2 Family 2.1.1, 2.2.1, 2.3.1, 2.4.1 - Turns

Competition turns (Figure 15) are not to be confused with standard coordinated turns. In aerobatic competition, a turn is divided into three parts:

1. establishing the bank using a roll on heading;
2. the turn itself; and
3. a roll back to straight and level flight on heading.

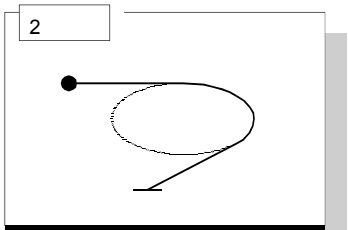


Figure 15

First, the roll to establish the bank. This must be a roll of between 60 and 90 degrees, it must be performed on the entry heading, and the aircraft must maintain a constant horizontal line.

Once the roll is completed and the angle of bank is established, the competitor immediately performs the turn. The turn must maintain the established angle of bank throughout. The aircraft must also maintain horizontal flight. The rate of turn is constant throughout and is NOT wind corrected. Therefore, in wind, a 360 degree turn will not appear as a perfect circle.

As soon as the aircraft is on the exit heading, the competitor performs another roll at a rate equal to the entry roll. Again the aircraft must maintain a constant horizontal line.

7.9.2.1 Downgrades

a. The angle of bank established by the initial rolling manoeuvre must be at least 60 degrees. Anything less is a one (1) point deduction for every five (5) degrees.

b. The angle of bank, once established, must remain constant. Any deviation is a one (1) point deduction for every five (5) degrees of deviation.

c. The rate of roll must be the same for the entry and exit rolls of this figure. Any deviation is a one (1) point deduction.

d. The aircraft must maintain a constant altitude throughout the figure. Any variation would be either one (1) point for every five (5) degrees of change or 1 point for every 100 feet.

e. The rate of turn must remain constant. Any change would be not more than a one (1) point deduction for each change. Note that the rate of turn may appear to change in a strong wind, when it

really isn't changing. The Judge must always keep the wind in mind and give the pilot the benefit of the doubt if there is any question.

f. The aircraft must begin and end on the prescribed heading. Any deviation is a one (1) point deduction for every five (5) degrees of deviation.

7.9.3 Family 2 Other Figures - Rolling Turns

The rolling turn (Figure 16) is a figure that combines a turn of a prescribed amount with a roll or rolls integrated throughout the turn. The term “evenly integrated” means that from start to finish the figure should display a constant rate of turn combined with a constant rate of roll.

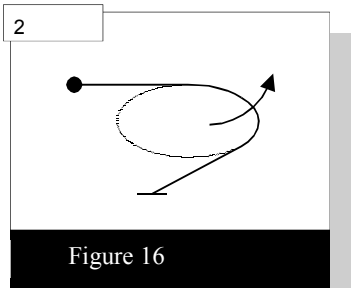
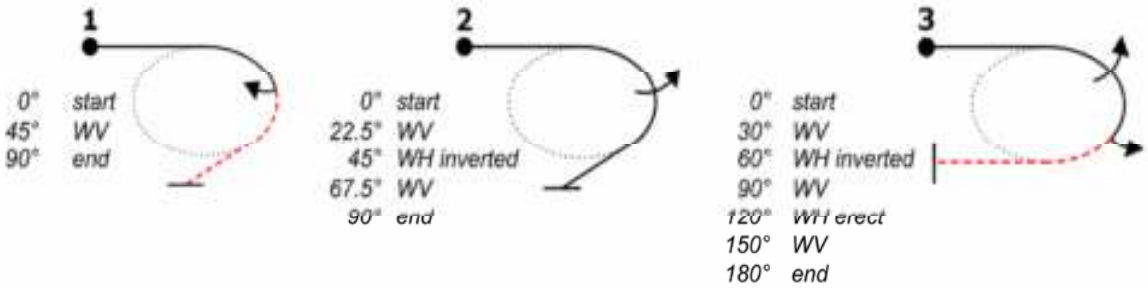


Figure 16

As seen from the ground, rolls in the same direction as the turn are referred to as “rolls in” or "rolling inwards". Rolls in the opposite direction to the turn are described as “rolls out” or "rolling outwards". Or there can be rolls alternating in and out.

Between the start and end of a rolling turn one or more intermediate points occur when the aircraft wings are momentarily either vertical or horizontal. A simple interpretation is that the intermediate points occur at the half, quarter or one-third positions in each 90 degrees of turn.

Examples are shown Figure 17 below.
Here: “WV” = wings vertical, “WH”= wings horizontal



When a rolling turn has rolls of alternating directions, the aircraft must change the direction of roll with the wings level. At this point the roll should reverse direction with only a short pause; a longer pause must be downgraded.

For example, imagine an aircraft performing a 180 degree rolling turn with 1 roll inwards and one roll outwards from upright (Aresti 2.2.6.1):

a) The figure starts in horizontal flight with the wings level and the aircraft longitudinal axis aligned with the prescribed box axis.

b) The pilot simultaneously initiates the turn and commences the roll in the same direction as the turn.

c) The judge should expect the aircraft wings to be vertical or horizontal at precisely each intermediate point in the turn.

d)Throughout the figure the judge should note any detectable variations in the rate of roll, the rate of turn and the horizontal flight path.

e) The roll direction should be reversed from inwards to outwards with only a short pause when the turn angle reaches 90 degrees. The rate of roll before and after the reversal should remain constant.

f) The turn is not wind corrected and for this reason may not follow a circular flight path.

g) The figure ends when the aircraft longitudinal axis reaches alignment with the prescribed box axis, with the flight path horizontal at the moment the wings become level.

7.9.3.1 Downgrades

a) The aircraft must commence the figure with the wings level, in horizontal flight and with the longitudinal axis aligned with the correct box axis. Errors are deducted using one (1) point for every five (5) degrees.

b) Each variation from the required horizontal flight path is deducted using one (1) point for every five (5) degrees upwards or downwards.

c) Each variation in the rate of turn is no more than a one (1) point deduction. Each stoppage of the rate of turn is a deduction of two (2) points.

d) Each variation in the rate of roll is no more than a one (1) point deduction. Each stoppage of the rate of roll is a deduction of two (2) points.

e) At a roll direction reversal there must be only a short pause, with the wings level. A longer pause is no more than a one (1) point deduction. Errors in the roll angle from wings level are deducted using one (1) point for every five (5) degrees.

f) Each time the wings are vertical or horizontal, a deviation between the aircraft axis and the correct amount of turn at this point is a deduction is no more than one (1) point.

g) All rolls in a rolling turn are aileron or slow rolls. If a flick roll is performed, the figure is graded PZ.

h) Performing more or fewer rolls than the catalogue stipulates or incorrectly rolling either inwards or outwards must be graded HZ.

i) The figure is completed when the aircraft stops rolling, or its longitudinal axis reaches the prescribed box axis. Errors when the exit point is reached are penalised as follows:
i) Where the turn angle is less or more than required and/or the flight path is above or below horizontal the deduction is one point per five (5) degrees.
ii) Where continued rolling is seen to bring the wings level after the turn is completed the following deduction should be applied:

- Less than 15 degrees of roll is executed: 1 point
- Between 15 degrees and 30 degrees of roll is executed: 2 points
- Between 30 degrees and 45 degrees of roll is executed: 3 points
- More than 45 degrees of roll is executed: PZ

7.9.4 Family 3 - Combinations of Lines

The transition from level flight to 45 degree lines should be at a constant and reasonable 1/8 looping radius. All lines within the figure should be equal in length. All part-loops in Family 3 shall have the same radius (in Figure 18, radii a = b = c).

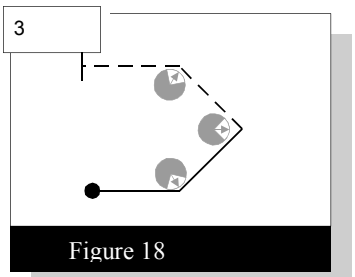


Figure 18

7.9.5 Family 5 - Stall Turns

In its most basic form (Figure 19), the stall turn begins when the aircraft leaves horizontal flight and flies a quarter loop to establish a vertical climb. At the top of the vertical line, the aircraft pivots and establishes a vertical descent, with the figure ending as the aircraft is returned to horizontal flight.

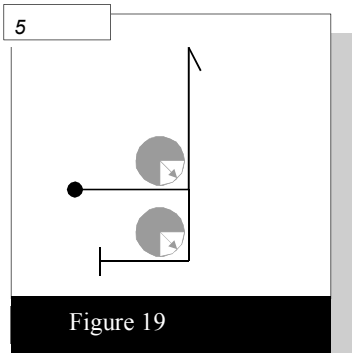


Figure 19

7.9.5.1 Judging Criteria

a) Vertical and 45° attitudes must comply with Section 7.3.2 and 7.3.3. Any deviation will result in a deduction of one (1) point per (5) degrees of error.

b) Any rolls must be centered on their underlying lines (Figure 20). For deductions see 7.8.1.

c) The lines may all be of different lengths.

d) During the vertical climb or vertical descent, the wings must remain parallel to the horizon. There will be a one (1) point deduction per five (5) degrees of deviation of the vertical (yaw) axis from horizontal. This deviation is often referred to as "dragging a wing".

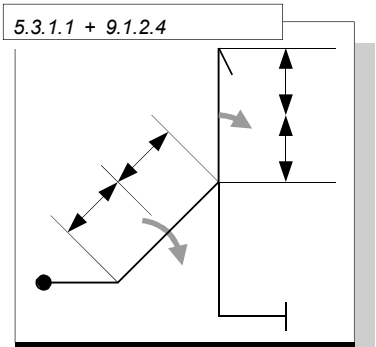


Figure 20

e) As the aircraft nears the point where it would stop climbing, it must pivot in a plane parallel to vertical. Ideally, the aircraft pivots around its centre of gravity.

To avoid a deduction, the aircraft must pivot around an axis point which cannot not be farther away from its centre of gravity than its wingtips (1/2 wing-span, Pivot Point Range from A to B, Figure 20). The down-grade for this deviation (often referred to as "flying over the top") is one (1) point per half wingspan that the point of rotation exceeds the maximum allowed (Pivot Point B, Figure 21).

f) The rate at which the aircraft pivots around its vertical axis is not a judging criterion.

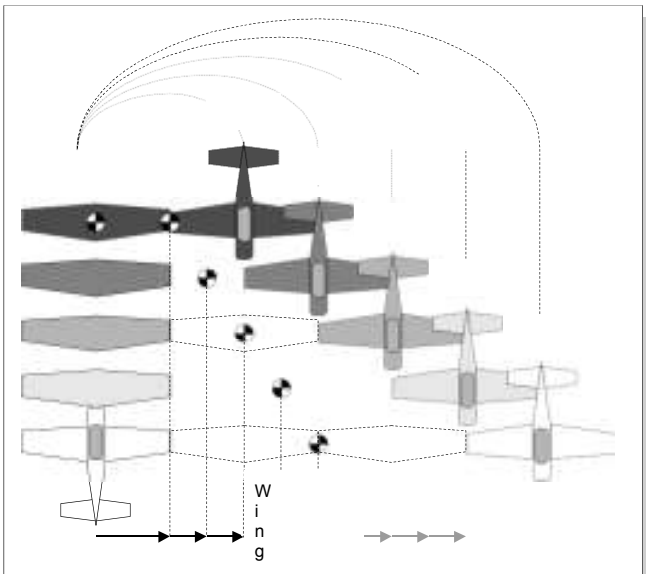


Figure 21

g) The wings must remain in the vertical geometric plane throughout the turnaround, and the aircraft's attitude before and after the turnaround must be absolutely vertical, with no pitch or roll. If there is movement around the roll axis, often referred to as "torqueing" (Figure 22), there is a deduction of one (1) point for each five (5) degrees off axis.

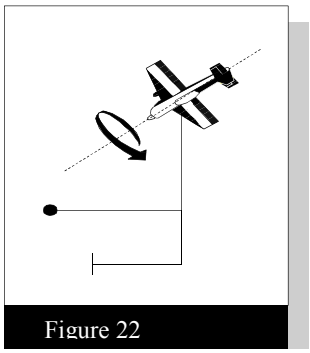


Figure 22

7.9.6 Family 6 – Tail slides

All the criteria of the Hammerhead apply to this figure except, of course, for the manoeuvre at the top of the vertical climb. At the point when the aircraft stops, it must slide backwards by at least a half fuselage length. If there is no slide of at least this length, the grade is PZ. The aircraft must slide in the vertical plane and not with the nose inclined towards the horizon. A slide of this type must be downgraded by the formula of one (1) point for every five (5) degrees of inclination.

Following the slide backwards, the aircraft must then tip over and fall through to a diving position. Often the nose will swing back or "pendulum" past the vertical after falling through. The figure is not to be downgraded for this, nor downgraded if it does not happen. It is a function of the length of the slide and the type of aircraft, and is not to be considered in grading the figure.

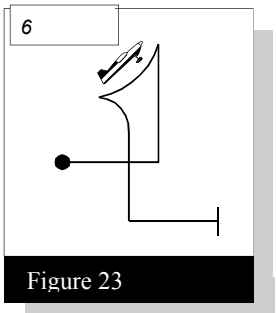


Figure 23

There are two types of tail slides: wheels-down (also called "canopy-up") and wheels up (also called "canopy-down"). The wheels-down tail slide is depicted in the Aresti diagram with a curved solid line at the top of the tail slide symbol. (Figure 22) The wheels-up tail slide is depicted in the Aresti diagram with a curved dashed line at the top of the tail slide symbol. (Figure 24)

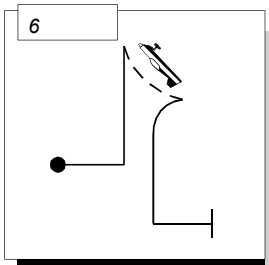
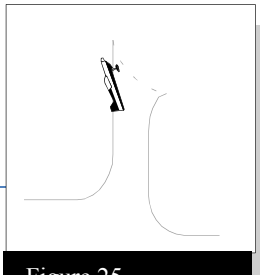


Figure 24

This figure must be watched carefully, as the aircraft can fall the wrong way, which is graded a hard zero (HZ), with the correct direction of flight and the proper aircraft attitude still maintained. Wings should stay level with the horizon throughout and not drop during the slide or the fall through. Watch for the aircraft torqueing off the correct plane of flight, which must be downgraded. Also watch for "cheating" on the vertical line up in the direction of the slide just prior to sliding (Figure 25). Any "cheating" on the up-line will most likely carry over into the backwards slide as well. Because the slide backwards must also be



perfectly vertical, a second deduction would be taken if this deviation from vertical is visible. The entry quarter loop and the exit quarter loop must both have the same radii. The altitude of the entry and exit horizontal lines need not be the same and the figure must not be downgraded if they are different.

When rolls are combined with Family 6 figures, there must be an equal length of line before and after the roll(s). In the vertical down line, the aircraft must attain a vertical attitude and establish a down line before starting the roll(s).

In summary, the aircraft should make a smooth and steady transition up to vertical flight, the wings should stay level in relation to the horizon, and the aircraft should come to a complete stop in this attitude. After sliding backward at least one half fuselage length, it should fall through in the appropriate direction without dropping a wing or the nose moving off axis, and recover on the same plane as that of entry. After completion of this, it should again project the 90 degree down line before transitioning into horizontal flight with a quarter loop of radius equal to the entry quarter loop.

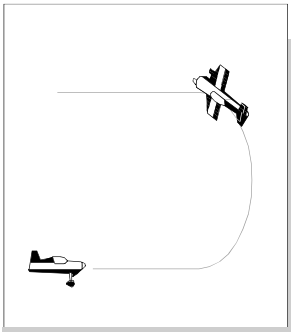
7.9.7 Family 7 - Loops, S's, and Eights

The size of a loop is not a grading criterion. It will vary according to the flight characteristics of the aircraft. A large loop is not graded any higher or lower than a small loop. But any variation to the radius will downgrade these figures.

7.9.8 Family 7.2 - Half-Loops with Rolls

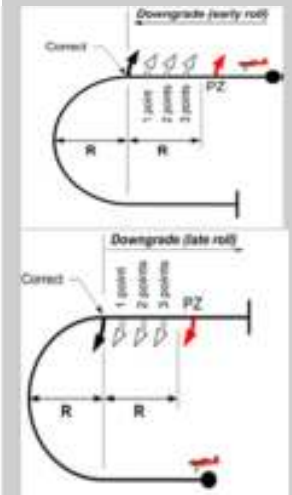
The half-loops in this sub-family must be of a constant radius and wind-corrected to appear as a perfect half circle (see full loops discussion below).

When a half-loop is preceded by a roll or rolls; Should the half-loop begin before the roll is completed, the Judge must downgrade the figure one (1) point for every five (5) degrees of half-loop flown on which the roll was performed.



When a half-loop is preceded by a roll or rolls, the half-loop follows immediately after the rolls without any visible line.
Drawing a line requires a downgrade of:

a) One (1) point for a short but visible line;
b) Two (2) points for a more obvious line of length up to half the looping radius.
c) Three (3) points for a longer line with length up to the full looping radius;
d) Finally, Perception Zero (PZ) when the length of line exceeds the radius of the looping element.



A Half-loop followed by a roll is also flown with no line between the half –loop and roll. Again, drawing a line requires same down-grades as described.

Should the half-loop begin before the roll is completed, the Judge

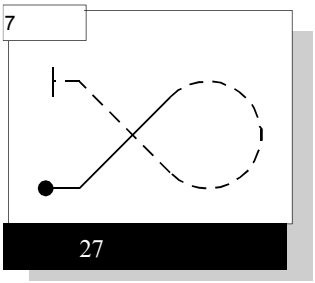
must downgrade the figure one (1) point for every five (5) degrees of half-loop flown on which the roll was performed.

The half-loop followed by a roll is also flown with no line between the half-loop and roll. Again, drawing a line requires a downgrade as above depending on the length of the line drawn. Should the roll begin before the half-loop is completed, the Judge must downgrade the figure one (1) point for every five (5) degrees of half-loop on which the roll was performed. (Figure 26)
The foregoing principles for downgrading unwanted lines between rolls and looping segments must be applied in the same manner when rolls are placed adjacent to looping segments in the following families of figures:

Family 7.4 Reversing whole loops
Family 7.5 Horizontal and vertical S's
Family 7.8 Horizontal and vertical 8's
Family 8.5 Half Cuban eights
Family 8.6 P-loops and reversing P-loops
Family 8.7 Q loops
Family 8.10 Reversing 1¼ loops

7.9.9 Family 7.3 - Three Quarter Loops

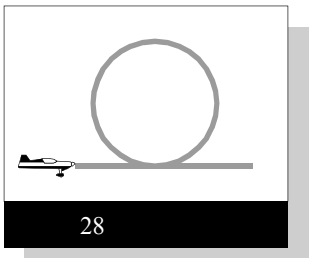
Sometimes referred to as "Goldfish", none of the part-loops in these figures are required to be of the same size. Entry and exit lines are judged with reference to the 45 degree attitude, not flight path. Any rolls on the 45 degree lines must be centered on that line. The lengths of the two 45 degree lines may be different, and the entry and exit altitudes need not correspond to the altitude limits of the loop. (Figure 27)



27

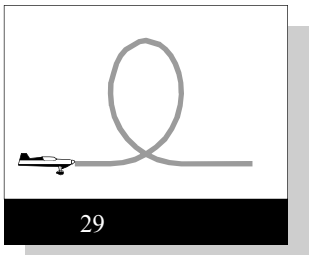
7.9.10 Family 7.4.1 - 7.4.2 - Full Loops

All full loops must appear perfectly round to the Judge. This means that they must be wind corrected to have a constant radius. This wind correction is only with regards to the roundness of the loop and not for the effect of any crosswind on the figure. Therefore, no deduction is given if the finish point is displaced relative to the start point in a direction perpendicular to the plane of the loop. Full loops must also begin and end at the same altitude or they will be downgraded.
(Figure 28)


28

Loops must be flown with no visible crabbing and wings must be level at all times. The one (1) point for every five (5) degrees rule holds for both these cases.

If there is a roll or rolls at the apex of the loop, it must be centered in the loop and flown on the arc of the loop itself. Flying the roll on a line at the apex of the loop is at least a two (2) point downgrade. If the roll is not centered, it must be downgraded one
(1) point for every five (5) degrees of the arc that it is off center.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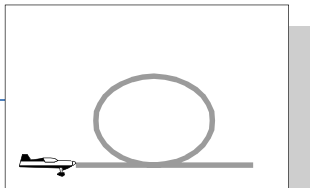
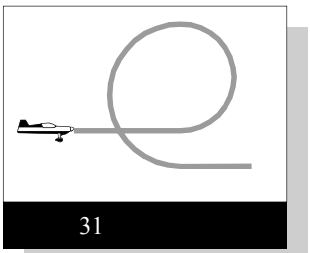
To better quantify deductions for irregularity of the radius of looping



figures, the Judge divides the loop into quadrants. Any variation in the radius from one quadrant to the next can be downgraded a fixed number of points depending on the magnitude of the variation. The goal of each Judge is to develop a reproducible method to judge all loops with the same criteria.

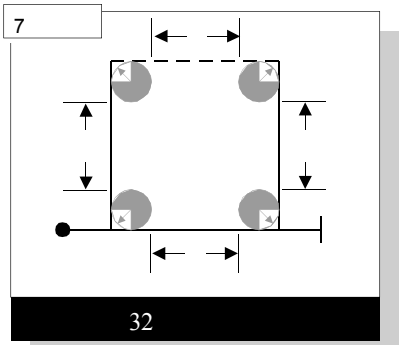
In judging loops, a common error is for the vertical diameter of the loop to be larger than the horizontal diameter. This is often called an "L" shaped loop. (Figure 29) Less common are loops with a horizontal diameter greater than the vertical. This is called an egg-shaped or pumpkin-shaped loop. (Figure 30) Another common error is in varying the radius of the final quadrant performing an "e" shaped loop. (Figure 31)


31

Whatever method is used, standard downgrades should be applied for each of these errors. Additional downgrades should be applied based on the magnitude of variation.

7.9.11 Family 7.4.3 - 7.4.6 - Square, Diamond and Octagonal Loops

Square, Diamond and Octagon loops are flown as hesitation loops with lines of equal length and partial loops with equal radii. All horizontal lines are judged on flight path and vertical and diagonal lines are judged based on aircraft attitude. As such, except in a windless condition, the judge should never expect to see these figures closed. They will always be driven by the wind. Square and Octagon loops are not considered complete until the last horizontal line is drawn equal to the length of the first line of the figure.



32

In Figure 32:

a) Radii a = b = c = d

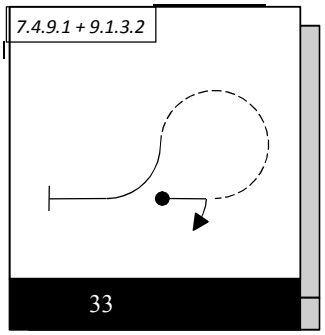
b) Line Length A = B = C = D

c) Figure is not complete until D = A

Where rolls are flown on the Square or Diamond loops, they must be centered on the line.

Aids for judging all hesitation loops are that a good performance will contain changes of angular velocity in all the partial loops, and variations of time taken to draw the length of each interior line, which also varies according to the aircraft's speed. The rhythm of all these partial loops is a help for judging. A frequently seen error in hesitation loops is for the aircraft to overshoot the partial loop and then have to bring the nose back to correct the attitude. This must be downgraded by one (1) point for every five (5) degrees.

7.9.12 Family 7.4.7 - 7.4.14 - Reversing Whole Loops



A reversing whole loop is a loop in which one quarter changes direction. As in half loops, rolling elements may be added on entry and exit lines (Figure 33).

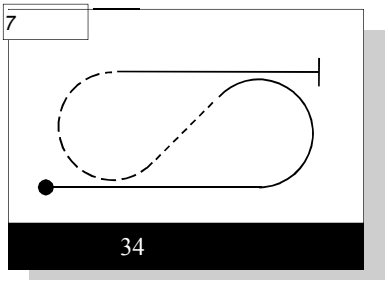
Judging criteria for roundness are the same as for round loops (see 6.9.10): the reversing loop must be wind corrected with all partial loops having the same radii; the figure must begin and end at the same altitude.

The reversing loop must be a continuous looping figure with no line at the point where the pitch direction changes. Adding a line between the two partial loops is at least a two (2) point deduction depending on the length of the line.

Criteria for rolls on entry line and exit line are the same as for half loops (see 7.9.8).

Criteria for rolls at the apex of the loop are the same as for round loops (see 7.9.10).

7.9.13 Family 7.5.1 - 7.5.8 - Horizontal S

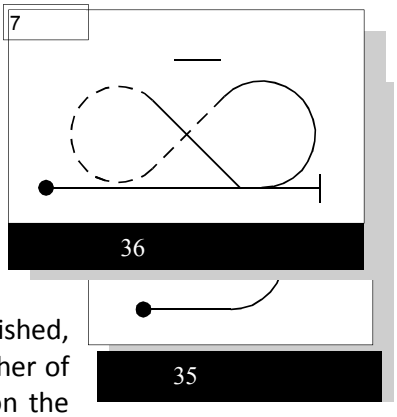


Both 5/8 loops must be of the same size and the line between them flown at exactly 45 degrees attitude. Extremities of the looping segments must be at the same altitude as the entry and exit lines (Figure 34).

Criteria for rolls on entry line and exit line are the same as for half loops (see 6.9.8).

Rolls may be performed on the 45 degree line, with the part-lines before and after the roll being of equal length.

7.9.14 Family 7.5.9 - 7.5.10 - Vertical S's



These figures are accomplished with two joined half-loops flown in opposite directions. (Figure 35) Look for both half-loops to be the same size and perfectly round. The half-loops should be a continuous looping figure when there is no roll between the half- loops. When a roll is performed between the half-loops, there is no line before or after the roll. However, the roll is flown on a horizontal line which begins as soon as the first half-loop is finished. As soon as the roll is finished, the next half-loop must begin immediately. Adding a line at either of these points is at least a two (2) point deduction depending on the length of the line.

7.9.15 Family 7.8.1 - 7.8.8 - Horizontal 8's

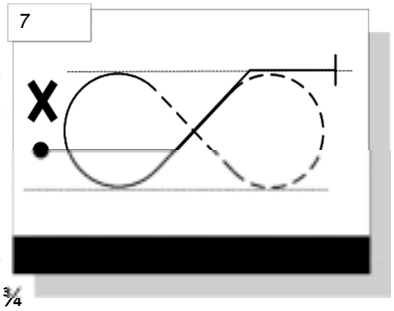
The 5/8 and 3/4 loops must have the same radius, but the radius of the 1/8 loop between 45 degree and horizontal lines is not required to equal the radii of the loops of the Horizontal 8 itself.

A common fault is to fly these part-loops with sharp corners
as drawn in the catalogue symbol. (Figure 36).
This must be downgraded.
The lines between the loops shall be flown at exactly 45 degrees attitude. This means that only if there is no wind will they intersect at the exact midpoint of the 8. If there are rolls of any variety, they will only occur on the 45 degree lines and be positioned so that the lines before and after the roll are of equal length. For deductions see 7.8.1.

The start and finish of the figure and the bottoms (or tops if the figure is reversed) of the two loops must be at the same altitude. However, if there are multiple rolls flown on the last 45 degree line, that line may project above or below the looping portions and exit at a different altitude than the entry altitude of the figure.

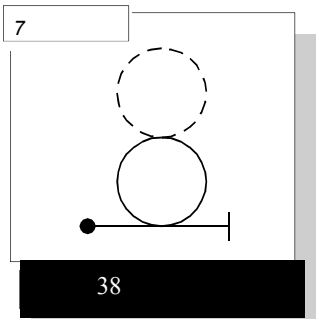
7.9.16 Family 7.8.9 - 7.8.16 - Horizontal Super 8's

Besides possessing the unique characteristic of containing three 45 degree lines on which rolls may potentially be placed, these sub-families should be judged as 7.8.1 to 7.8.8 but with the addition of an extra 45° line.



The two 3/4 loops must have the same radius and occur at the same altitude. The entry and exit 1/8 loops must have a reasonable and constant radius, but are not required to be the same size as either the 3/4 loops or each other. Any rolls placed on any 45 degree line must be centered. The horizontal entry/exit lines must coincide with the top and bottom of the loops, except when the first or last 45 degree lines contain multiple linked, unlinked or opposite rolls, when they may be extended (not shortened) above or below the extreme of the ¾ looping segments. Shortening of a line, as in Figure 37, should be penalised by up to 2 points.

7.9.17 Family 7.8.17 - 7.8.22 - Vertical 8's



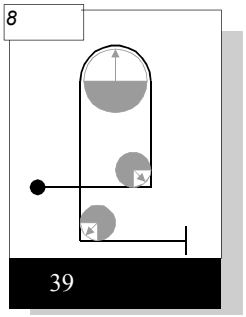
These figures are performed by flying two loops, one above the other. Sub-family 7.8.17-7.8.20 is composed of two loops, both above or both below the entry altitude. Sub-family 7.8.21 - 7.8.22 is composed of one loop above and one loop below the entry altitude. In either case the entry and exit altitudes must be the same.

These figures may be combined with various types of half rolls.

When a roll is performed between the loops, there is no line before or after the roll. However the roll is flown on a horizontal line which begins as soon as the first loop is finished. As soon as the roll is finished, the next loop must begin immediately. Adding a line at either of these points is at least a two (2) points deduction depending on the length of the line. These figures are to be graded using the same criteria as full loops. Additionally, both loops must be of the same size. Unless there is a roll between the loops, they must be directly above one another. (Figure 38)

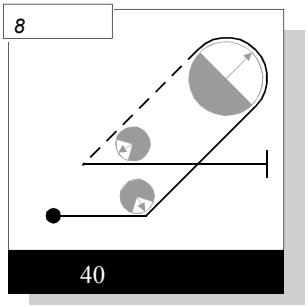
7.9.18 Family 8 - Combinations of Lines, Loops and Rolls

Although some of the figures in this Family appear to be exotic, there are no new judging criteria for these figures. These figures are combinations of horizontal, vertical and 45 degree lines as well as partial loops of varying degrees. The judging criteria for these lines and loops are unchanged. What is left to discuss are the judging criteria for the combinations of these lines and loops.



7.9.19 Family 8.4 - Humpty Bumps

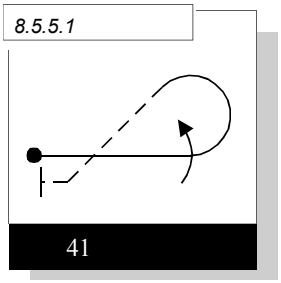
These figures, whether vertical or performed with 45 degree lines, are judged as combination of lines and loops (Figures 39 and 40). In these figures, none of the part-loops are required to have the same radii. These part-loops must still have a constant radius from start to finish. This requires a change in angular velocity during the part-loop.



The lines in these figures may be of different lengths, and therefore the entry and exit altitudes of these figures can be different. Rolls on any of these lines must be centered.

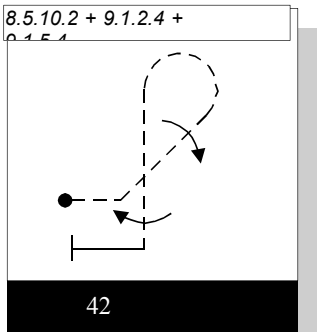
7.9.20 Family 8.5.1 - 8.5.8, 8.6.1 - 8.6.8, 8.7 - Half Cubans, P Loops, Q Loops

In these figures, none of the part-loops are required to have the same radii. The rolls on vertical and 45 degree lines must be centered. Horizontal rolls immediately preceding or following looping segments have the same criteria as in Family 7.2. Angles drawn in the pictograms, such as in Figure 41, are to be flown as part-loops.



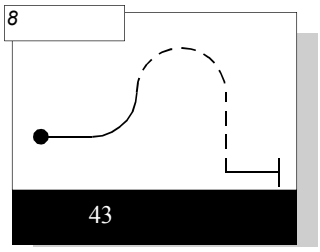
7.9.21 Family 8.5.9 - 8.5.24 - Teardrops

In these figures, none of the part-loops are required to have the same radii. The rolls on vertical and 45 degree lines must be centered. Angles are to be flown as part-loops (Figure 42).



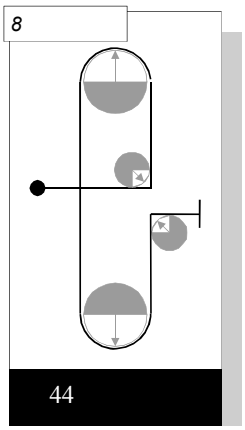
7.9.22 Family 8.6.9 - 8.6.16, 8.10 - Reversing P Loops, Reversing 1¼ Loops

When 1/4, 1/2 or 3/4 loops depicted as round elements join each other in these sub-families, their radii must be equal and there is no line between the loops (Figure 43). A line drawn would be a minimum two (2) point deduction depending on the length of the line. The part-loop depicted as a corner angle shall have a reasonable and constant radius, but is not required to have the same radius as the other part-loops.



7.9.23 Family 8.8 - Double Humpty Bumps

These comprise of three vertical lines and two 180° looping segments (Figure 44).
In view of the markedly different speeds possible during the looping segments, none of the radii (a, b, c, d) have to be equal (but each must be internally constant). There is no requirement either for any relation between the vertical lines length. All other criteria for humpty bumps apply (see 7.9.18).



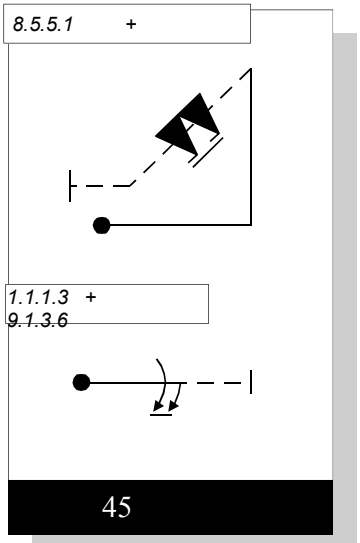
44

7.9.24 Family 9 - Rolls and Spins

Rolls may be performed on horizontal, 45 degree or 90 degree lines; on complete loops; between part-loops; between part-loops and lines; and following spin elements.

They may be 1/4, 1/2, 3/4 or a full 360 degrees in their rotation, up to two consecutive full rolls. Additionally, slow rolls may be flown in combination with turns as prescribed in Family 2 (Rolling Turns).

In all cases, the same criteria apply: the rate of roll must be constant throughout the roll(s). The aircraft should continue to project, during the rolling portion, the prescribed plane and direction of flight.



45

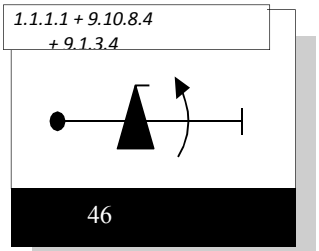
Multiple rolls may be linked, unlinked, or opposite.

When rolls are in continuous rotation, the tips of the symbols are linked by a small line. When flying linked rolls there is no pause between them. (Figure 45)

Unlinked rolls must be of different types, the two types being defined as follows:

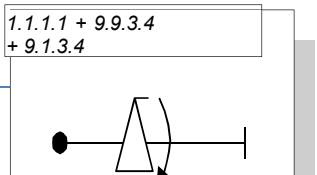
- Aileron rolls (slow rolls and hesitation rolls)
- Snap rolls (positive and negative)
-

With unlinked rolls, no line links the symbols, though their tips are drawn pointing in the same direction (i.e., on the same side of the line). They must have a brief but perceptible pause between them and they are to be flown in the same direction of rotation. (Figure 46)



46

Opposite rolls may be either of the same or different type. In opposite rolls, the tips of the symbols are drawn on opposite sides of the line, indicating they are to be flown in opposite directions of rotation. The pilot may elect to fly the first roll in either direction, but the second roll must be opposite direction to the first. Opposite rolls, including those in rolling turns, should be flown as one



continuous manoeuvre - the brief check between opposite rotations should be minimal. (Figure 47) If the two rolls are of the same type, they must be flown in opposite directions if they are not linked.

Either aileron or snap rolls may follow spin elements (Family 9.11 or 9.12). When a spin and a roll are combined on the same vertical *+ 9.1.3.4 + 9.2.3.4*down line they will always be unlinked; may be flown in either the same or opposite direction, as shown by the position of the tips of the symbols on the Form B or C; and the combination may not exceed two rotational elements. (For example, it would be illegal to combine two opposite direction aileron rolls with a spin element.)

7.9.25 Family 9.1 - Slow Rolls

The penalty for varying the rate of roll is one (1) point per variation. Any stoppage in the slow roll that could result in its being considered a hesitation roll, would hard zero (HZ) the figure.

The finish of the roll must be as crisp and precise as possible. Coming to a slow finish in fact represents a change in the rate of roll and should be penalized accordingly.

The wings must stop precisely after the desired degree of rotation and not go past the stop point and then return. This is referred to as "bumping the point". A deduction of 0.5 point to one (1) point is given depending on the severity of the "bump".

7.9.26 Family 9.2 - 9.8 - Hesitation Rolls

For hesitation rolls, the second digit in the catalogue number indicates the number of points: Family 9.2 is 2-point rolls; Family 9.4 is 4-point rolls; and Family 9.8 is 8-point rolls.

These rolls are judged on the same criteria as the slow roll, only the aircraft stops rotation during the roll for a pre-stated number of times, i.e., 2, 4 or 8. The rate of the roll, when not in pause, must be constant throughout with the aircraft projecting the pre- stated plane and direction of flight.

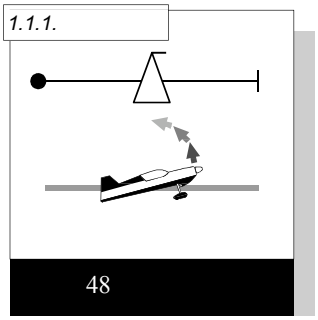
The pauses will be of identical duration. Each pause of a hesitation roll must be clearly recognisable in every case, but it is especially important that in poor visibility or at high height, the competitor pauses long enough to make them recognisable to the Judges. If a pause is not recognisable to a judge, the figure is graded a hard zero (HZ).

Angular errors at each pause are downgraded by comparison to the expected attitude. For instance, an angular error at an intermediate hesitation stop, that is corrected in the next stop, must be downgraded only once; an angular error at an intermediate hesitation stop, followed by the prescribed degrees of rotation (45, 90 or 180 degrees), thus showing a further angular error that is not corrected, must be downgraded twice.

7.9.27 Family 9.9 - Positive Snap Rolls

Snap rolls represent one of the greatest challenges to judges. This is primarily due to two factors:

- the "snapping" characteristics of different types of aircraft are unique can vary considerably and
- In properly executed snap rolls, changes of pitch, yaw and roll rate occur very quickly.



Judges must watch particularly carefully to determine the exact order in which events occur, especially at the initiation of the flick.

The judge must see two things to determine that a flick roll has been correctly initiated: a) the aircraft must display a rapid and clearly visible change of pitch attitude to put the wing close to the stall, and b) autorotation must be initiated by use of the rudder. Note that when a snap roll is initiated the angle-of-attack may be at or close to zero (e.g. in vertical and 45 degree lines) or significantly positive or negative if a looping figure is being flown; the pitch change to achieve critical angle-of-attack may thus be less in some circumstances and cannot be fixed.
However, if both the required pitch change and actual autorotation are not clearly seen, the figure must be given a Perception Zero (PZ).

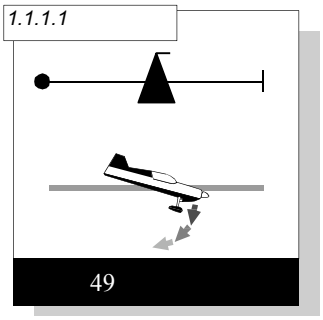
At the start of a positive snap roll, the aircraft must clearly and unambiguously pitch in the nose up / tail down sense, from the pilot's perspective, to put the wings near the critical angle-of attack (Figure 48). If the aircraft pitches in the wrong direction, a Hard Zero (HZ) is given. Either shortly after or simultaneously with the pitch change the aircraft must yaw, initiating a stall of one wing and the rapid onset of autorotation. If the judge considers that a proper flick has not been initiated, then he must give a PZ. Provided the flick initiation criteria are satisfied, any roll that is observed before the autorotation starts must be downgraded by one (1) point per five (5) degrees of roll.

Throughout the snap roll, the roll must be driven primarily by the rudder, and autorotation must be seen to continue. This can best be confirmed by the observed conical motion of the Fuselage longitudinal axis, the largest displacement being at the tail which is furthest from the CoG. This should not be confused with the spiral motion of a tight barrel roll, wherein the centre of gravity of the aeroplane more noticeably follows a spiral flight path. However, the rate of rotation and the angle, relative to the flight path, of the conical fuselage rotation may vary between aircraft types, much as each type of aircraft has different spin characteristics. For all aircraft types, the criteria for stopping the flick roll are the same: autorotation must stop at the desired extent of roll, followed immediately by adoption of the attitude or flight path that conforms to the requirements of the underlying figure. A non-looping flight path that is displaced parallel to that prior to the flick is normal, and should not be downgraded.

Downgrades for errors in the extent of rotation or the following flight path or attitude are penalised at the normal rate of one (1) point per five (5) degrees of error.

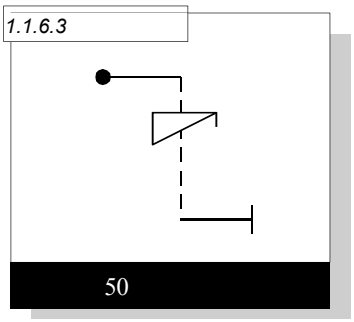
Snap rolls must be observed very carefully to ensure that the rotation is driven throughout by asymmetry in air flow induced by continued rudder application and that the competitor is not "aileroning" the aircraft around its longitudinal axis and thus without the conical fuselage motion. The movement of the aircraft's nose or tail departing the flight path prior to autorotation is a good clue to proper initiation of a flick roll, and conical motion of the tail is indicative that autorotation is continuing. A common error is for the aircraft initially to autorotate but to not stay in autorotation until the end of the figure, the roll becoming driven substantially by application of aileron; in this case a deduction of one (1) point for each five (5) degrees of rotation remaining when the autorotation ceases must be made. If autorotation ends with more than 45 degrees of rotation remaining, even if the roll is completed with aileron, the snap roll is awarded a numerical zero (0.0).

7.9.28 Family 9.10 - Negative Snap Rolls

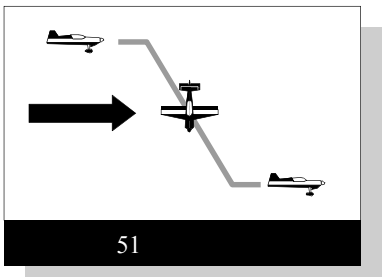


For negative snap rolls, all criteria stated for positive snap rolls apply except, of course, that the aircraft is in a negative rather than positive angle-of-attack during autorotation.
Therefore, in a negative snap roll the nose and tail of the aircraft must initially move in the nose down / tail up sense, from the pilot's perspective, as the angle-of-attack is changed (Figure 49). This direction of motion must be observed very carefully, since it is the defining characteristic that differentiates a negative snap roll from a positive snap roll. As with positive snap rolls, if the nose moves in the wrong direction, it is not a negative snap roll and the figure must be given a Hard Zero (HZ). In all other respects relating to the characteristics of the rotation and errors to be observed, the criteria are the same as for positive snap rolls.

7.9.30 Family 9.11 and 9.12 - Spins



All spins start from horizontal flight (Figure 50). In order to spin, the aircraft must be completely stalled in horizontal, level flight from a clearly visible horizontal line before the stall. When the aircraft stalls, the centre of gravity will drop from wings-level horizontal flight.



It should be noted that an aircraft has forward momentum as the aircraft decelerates through stall speed. This appearance is more pronounced when the figure is performed downwind, and is enhanced when performed into the wind. This change in appearance is not a grading criterion. (Figure 51)

When the aircraft stalls, the nose will fall and at the same time the wing tip will drop in the direction of the spin. Failure to achieve this should be considered a "forced entry" and downgraded one (1) point per five (5) degrees of deviation. During spin entry and in the spin, the flight path is

affected by wind. When the spin is entered with a tailwind, the flight path may suggest that the spin entry was "forced". This change in appearance is not a marking criterion.

After completion of the prescribed number of turns, the aircraft must stop rotating precisely on the pre-stated heading, then a 90 degree down, wings-level attitude must be seen. Grading criteria for the basic figure being flown then resumes. If a roll follows a spin, there should be a brief, but perceptible pause (similar to unlinked rolls) between the spin and the roll. Because there is no vertical line before the spin, there is no criterion to center either a spin element alone or a spin-roll combination on the vertical down line. Be alert for early stopping of the stalled autorotation followed by "aileroning" to the pre-stated heading. In this case, a deduction of one (1) point for every five (5) degrees of "aileroning" must be applied. For example, in a one-turn spin the autorotation is observed to stop after 345 degrees of rotation and the ailerons are used to complete the rotation. The highest score this spin could receive is a 7.0.

No account is to be taken of the pitch attitude of the aircraft during autorotation, as some aircraft spin in a nearly vertical pitch attitude while others spin quite flat in conventional spins. Speed of rotation is also not a judging criterion.

If the aircraft never stalls, it is apparent that it cannot spin, and a PZ must be given. You will see "simulated" spins where barrel rolls or flick rolls are offered as spin entries. In both cases, the flight path will not be downward. In all of these cases, the figure will be given a PZ.

In all spins the grading criteria are:

a. A clean breaking stall in horizontal flight.

b. Fully-stalled autorotation.

c. Stopping on pre-stated heading.

d. Vertical down, wings-level attitude after stopping on heading.

e. A constant, reasonable quarter-loop radius back the horizontal flight.

f. The direction of a spin shall be determined from the roll component.

7.10 Positioning: Optimal Placement of Figures

Even though figures are flown within the performance zone, judges must still consider their positioning in relation to an optimum position where clarity of execution and geometry are at their greatest. This optimum position will vary depending on the aircraft's height and the nature of the figure.

Consistently accurate flying is best assessed when the elevation of the judge's sight line from the horizontal is reasonably constant. This means that when an aircraft is at the greatest height, it should be also at its furthest distance away

from the judging position along the secondary axis. Consequently, when an aircraft is low, then it should be closer to the judges to give the same viewing perspective.

In even the best positioned sequence, however, some variations in the judges' sight line elevation are inevitable. These different viewing angles also affect the optimum position for figures of different kinds. For example, looping shapes and 45-degree climbing or descending lines are much easier to judge accurately if the sight angle in relation to the horizon is small. Conversely, such figures are difficult to assess if flown high up and close to the front of the performance zone.

Further, such fine points as the accuracy of hesitations in an 8-point roll are much easier to judge when the figure is close to the judges and fairly low, rather than over a kilometer away at the rear of the performance zone – let alone outside it.

Consideration of all the parameters in the few short paragraphs of this section will enable a judge to make a clear decision about any figure that is clearly flown in other than its optimum position. Judging of the particular figure will be difficult, and such bad presentation should be reflected in the positioning grade for the sequence. It would be appropriate to deduct between 0.5 and 1 mark for any such misplaced figure, depending on the severity of the difficulty incurred.

7.11 The 4-min Freestyle Programme

7.11.1 Generalities

The Final Freestyle Programme will be judged under five "judging Areas". A grade of up to 10 marks, in increments of 0.5 will be given under each of the five sub-headings. CIVA 4 Minute Freestyle programme Form A 2019 shall be used for scoring, see appendix 4.

Programme 5 is judged on a comparative basis. For that purpose each judge shall set its own average mark standard -- taking into account that near maximum or minimum scores on the first flights would restrict future comparisons for superior or inferior flights.

As marking sheets for each competitor are collected immediately after each performance (see 4.5.2.1),
Judges may utilise a Final Freestyle Summary Sheet to keep a personal record of the marks they award to each competitor in each judging area, to assist them in maintaining a balanced comparative view of all performances throughout the programme.

7.11.2 Assessment of Artistic Impression (160K)

The Artistic Impression of a flight shall be assessed by its fulfilment of the following objectives;

7.11.2.1 Judging Area #1: Programme design and artistic rendition – 80K

A wide-ranging mix of interesting freestyle and traditional or classical manoeuvres is expected, employing a broad variety of flight paths on many axes. Maximum and minimum flight regime speeds should be explored to demonstrate a high level of agility. Dull, uninteresting or apparently unplanned periods should be downgraded. Where possible the use of audio/music and/or smoke to effectively highlight flight paths and figures or individual elements is encouraged.

Each aspect of Judging Area #1 has equal importance:
a) Comprehensive variety of freestyle and classical manoeuvering with high dynamic range.
b) Combinations of traditional elements and fresh or original manoeuvres.
c) Interesting diversity of flight-paths not restricted to classical main / cross box axes.
d) Avoidance of dull or boring periods that might indicate lack of planning.
e) Effective and sympathetic use of smoke and / or any accompanying audio track.

7.11.2.2 Judging Area #2: Integration of flight paths and attitudes – 80K

Throughout the performance the judge should expect to see smooth and flowing integration of each element. All parts of the performance should integrate pleasingly with the preceding and subsequent parts, individual characteristics being harmoniously linked together. A wide variety of upward, downward and level flight paths and attitudes on many axes using straight and curving lines and vectors should be employed to demonstrate individual features to their best advantage.

Each aspect of Judging Area #2 has equal importance:
a) Smooth and flowing execution with good control.
b) Consecutive periods with different characteristics harmoniously linked.
c) Use of many vectors and curving flight paths to present individual features.

7.11.3 Assessment of Technical Control (160K)

The level of technical control exhibited during a flight shall be assessed as follows:

7.11.3.1 Judging Area #3: Technical excellence and dynamic range – 80K

The purpose of each element throughout the performance should be clear – are the pilot's intentions understandable and successfully accomplished? Thorough exploration should be made of high and low speed areas of the flight envelope, including forward and backward flight. Any errors and/or corrections should be minimal and should not disturb the presentation, and there should be no obvious moments where control is perceived to be diminished or temporarily lost.

Each aspect of Judging Area #3 has equal importance:
a) Clarity of intentions and accuracy of presentation through all flight regimes.
b) Exploration of fast and slow speed regimes, forward and backward flight.
c) Freedom from obvious corrections, uncontrolled or unplanned departures.

7.11.3.2 Judging Area #4: Aerodynamic controls and propeller-driven elements 80K

The performance should demonstrate flight using the widest possible range of well controlled positive and negative attitudes or angles of attack. Slow, fast and hesitation rolls should be accurately executed. Variations in the aircraft's three principal axes – yaw, pitch and roll – should be precisely controlled. Normal and unusual flick rolls with a range of differing rotations should be expected. A range of interesting tumbling elements driven principally by well controlled gyroscopic propeller influences should be included.

Each aspect of Judging Area #4 has equal importance:
a) Good use of full range of positive and negative angles of attack.
b) Accurate slow, fast and hesitation rotations, use of yaw, pitch and roll axes.
c) Wide variety of positive and negative flicks and unusual rotations.
d) Interesting range of propeller-driven gyroscopic elements and tumbling.

7.11.4 Assessment of Positioning (80K)

The positioning of the aircraft during a performance shall be assessed as follows:

7.11.4.1 Judging Area #5: Use of the performance zone and allowed time to maximum advantage – 80K

The full width, height and depth of the performance area should be exploited in a well-balanced manner. Each element and transition should be executed at a height, distance and lateral position and orientation for maximum effect and to enable clear assessment of its features. Any wind effects should be imperceptible or hidden. The competitor should make effective use of the time available to display a wide and interesting range of elements and manoeuvres.

Each aspect of Judging Area #5 has equal importance:
a) Imaginative and balanced use of the width, height and depth of the performance area.
b) High and wide elements not too close, low elements not too distant to assess.
c) Manoeuvres and transitions positioned and orientated for best impact.
d) Imperceptible handling of wind effects.
e) Good use of the available time to demonstrate a wide range of manoeuvres.

8. Grading and Scoring

8.1 Evaluation of the Performance

Each programme will be marked by the Judges using a standardised system.

Where the majority decision of the Judges is required, in a case of disagreement about the penalisation of the flight of a competitor, the Chief Judge shall have a casting vote in the event of a tie.

1. Marks for Figures

The Judges will independently assess the quality of each figure and its components as performed in the sequences for Programmes 1, 2, 3 and 4, marking with numbers from 0 to 10, in intervals of 0.5; for Programme 5 the assessment will be in accordance with 7.11. A hard zero (HZ) mark will be awarded if the figure is incorrect or missing, in accordance with Section 8.3.3

The scores will be calculated by multiplying the coefficient (K) for each figure by the mark given to each.

When marking the quality of the performance of individual figures, the Judges have to consider the following general principles:

a. for Programmes 1, 2, 3 and 4, the figure flown must be in accordance with the pre-stated figure and direction of flight in the original sequence;

b. the distinctly recognisable start and finish of each figure with a horizontal line;

c. the geometry of the figures (including shape, radii, angles, plane of flight, direction of flight), which must be in compliance with the prescribed characteristics;

d. that in judging a figure which comprises a combination of manoeuvres, the marking criteria of its various components continue to apply, but the combined manoeuvres are to be taken as a unit;

e. the precision of the performance, for which there are Marking Criteria set out in Section 6;

f. that the length of lines and the size of radii caused by the flying characteristics of an aircraft are not to be taken into account in the marking;

g. that inverted figures are judged by the same criteria as upright figures.

Once horizontal flight path is established at the end of a figure in a sequence, the beginning of the next figure is considered to have occurred. This rule is not to be interpreted to mean that a competitor will incur penalty points for performance zone infringements (see 8.2.3) if the next figure is actually performed inside the

50 m boundary of the performance zone.

If a judge misses seeing a figure, or any part of a figure such that a grade cannot be given with full confidence, the Judge will give a mark of “Average” or “A” to that figure.

2. Calculation of Scores

The calculation of scores for a competitor's programme will be as follows:

For each figure, the raw score is calculated by multiplying the coefficient (K) of the figure by the mark given by the judge.

The marks given by the Judges are processed with the final scores being determined for a programme as a whole.

It shall be a duty of the Contest Director to arrange for the publication of the latest competition results within two hours of the completion of all flying in a programme by category. The marking sheets must be made available to the Competitors of each category, for information and/or checking, before the start of the subsequent programme of that category.

3. Marking of Flight Positioning and Symmetry

Positioning refers to the 3D placement of each figure relative to the performance zone and to the judges.

A positioning mark will be given by each judge.

Depending on the aircraft’s height and the nature of the figures, there is an optimum X and Y axis position for each figure where the requirements of the sequence are satisfied and any geometric errors will be clear to the judge and therefore easy to assess. This position may be central or toward the right or left within the performance zone, and nearer to or further from the judge as dictated by the design of the sequence and the height and performance of the aircraft.

The position of a figure is somewhat or considerably “non-optimal” when it adversely affects the judge’s ability to assess it, is poorly positioned when considered within the
design of the sequence, or its position dictates that subsequent figures will not be flown at optimal positions and may therefore be difficult to assess. Otherwise the position shall be considered satisfactory and no position downgrade is required.

The highest marks will be given if the central point of a competition flight is above the secondary axis and if each figure is optimally positioned laterally and at an appropriate
distance from the judges within the performance zone. The judge’s positioning marks will take into account any imbalance between non-optimally positioned figures to reflect the left-to-right symmetry of the sequence flown by the competitor.

For each figure the judge shall add a reference in the “Pos” column describing the position of the figure if this is observed to have been non-optimal. The shape and

size of the figure and the location of any manoeuvres within it shall be compared to the optimum position of the whole figure when considered within the design of the sequence. Where the position of a figure is somewhat or considerably non-optimal because it is too much to the left or the right or too near or too far away, the following annotations (or their local / national equivalent) shall be used:

Figure placement:		*'Pos' annotation:*
Somewhat:	left of the ideal position:	"L"
	right of the ideal position:	"R"
	too near to the judge:	"N"
	too far from the judge:	"F"
Considerably:	left of the ideal position:	"LL"
	right of the ideal position:	"RR"
	too near to the judge:	"NN"
	too far from the judge:	"FF"

"BEHIND"
Due to change of CIVA rule regarding not automatically marking a figure that a judge perceives starts behind the judges as a Hard Zero, the figure shall now be scored and noted in remarks as "Behind" and at the end of the flight, the CJ shall determine by a simple majority (with the Chief Judge casting a vote as required), if the figure in question was started behind the judges. If the majority holds that the figure was started behind the judges, each judge shall change his/her mark to 'HZ' and all Form A's

At the end of the sequence the annotations in the "Pos" column shall be used by each Judge to determine a sequence positioning downgrade based on these recorded observations. Each single letter is taken as equivalent to a half mark and each double letter equivalent to a full mark downgrade. For example, the figure "Pos" annotations L, R, N, FF, LL and R would combine as a down grade of 4.0 marks.
The Judge is entitled to revise his final positioning mark up or down by a maximum of 1 point if he considers there were other relevant factors which should be taken into account to reduce or increase the downgrade.

The K factor accorded to positioning marks will be as follows

a. Unlimited – Programmes 1, 2, 3 and 4: **40K**

b. Advanced & Yak 52 – Programmes 1, 2, 3 and 4: **30K**

4. Marking of Programme 5

Programme 5 (4-Min Freestyle Programme) will be marked under 3 headings, as in this table. Each of these shall contain sub-headings as detailed in Section 7.11.

Criteria	K-factor
Technical Merit	160
Artistic Impression	160
Positioning	80
Total	**400**

5. Official Video Recording

An official video recording from the Judges' position may be made, depending on availability of resources, to assist the decision making process on any protests regarding the evaluation of a competition flight. The recording shall not be available to competitors or except in conjunction with the Jury's decisions on protests and with their agreement. After the completion of the championships, the recording may be released by the organisers for use in training.

The official recording shall also be available to the Chief Judge and the Judges to assist their discussions on matters of fact.

8.2 Penalty Points Deductible from Total Scores

8.2.1 Time Limits for the Programme 5, the 4 minute Freestyle.

Any deviation, shorter or longer, from the time allowed for Programme 5 (being 4 minutes) will incur **10** penalty points for each second or fractional part of a second of deviation.

Failure of a competitor to precisely signal the start and finish in Programme 5 will result in a penalty of **150** points. To check and decide on this is the responsibility of the Chief Judge, assisted by the time keepers.

8.2.2 Infringement of Height Limits

Category	Upper Limit	Penalty	Lower Limit	Penalty	Disqualification Limit
Primary	3500 ft	5	1500 ft	100	1300 ft
Recreational	3500 ft	5	1500 ft	100	1300 ft
Sports	3500 ft	10	1500 ft	100	1300 ft
Intermediate	3500 ft	30	660 ft (200m)	200	330 ft (100m)
Advanced	3500 ft	30	660 ft (200m)	200	330 ft (100m)
Unlimited	3500 ft	50	330 ft (100m)	250	165 ft (50m)

Infringement of the Disqualification height limit results in disqualification (from the current programme) for causing a dangerous situation. An infringement of the disqualification level must be agreed by a two-thirds majority of judges for the penalty of disqualification.
Infringement of height limits resulting in penalties other than disqualification shall be decided by a simple majority of judges.

Any manoeuvre that looks to be commencing, continuing or finishing behind the designated deadline will be SCORED but noted as BEHIND, & may result in a HZ.

The Contest Director and/or Jury may also disqualify a competitor for serious infringement of NZAC or CAA rules such as operating an aircraft with a known mechanical defect that renders the aircraft un-airworthy, performing manoeuvres prohibited for the aircraft type or that exceed flight-manual limits, reckless flying, abusive behaviour, or unsporting behaviour such as cheating, interference with other competitors or their aircraft, deliberately misleading officials or falsification of documents.

8.2.3 Infringements of the Performance Zone

8.2.3.1 Definitions

When Boundary Judges are used, an infringement is considered to have occurred if the fuselage of the aircraft is seen by the Boundary Judges to have crossed the line being observed, even if this occurs more than once in a single figure.

When an electronic tracking system is operated, an infringement is considered to have occurred if the position of the aircraft is indicated by the system as crossing the limits, even if this occurs more than once in a single figure.

For each infringement of the performance zone in Programmes 1, 2, 3 and 4 by more than 50 meters in the direction of the x-axis and/or the y-axis a pilot will be given penalty points in accordance with the table below; this applies to the operation of either Boundary Judges or an electronic tracking system.

Category	P	R	S	I	A	U
Penalty	5	**5**	**10**	20	20	30

Thereafter, for every figure started beyond 50 meters outside the performance zone, further penalty points will be given, in accordance with the same table.

8.2.4 Dangerous Flying

Competitors found guilty of violating flight regulations and/or causing a dangerous situation will, on the recommendation of the Chief Judge, be **disqualified** by the Contest Director.

8.2.5 Punctuality

A penalty of **200** points will be awarded to a pilot who, without reasonable cause, is not ready when their slot time arrives.

8.2.6 Interruption of a Programme or Addition of Figures

A competitor will be given penalty points, per the table below, if he or she interrupts his or her programme:

a. by dipping the wing three (3) times immediate one after the other;
b. in order to make a change of attitude or direction between two figures (more than 90º);
c. in order to lose or regain height.

Following a programme interruption, the competitor must restart his or her programme with **the figure**:

a. immediately preceding the point of interruption; OR
b. in which the interruption occurred; OR
c. immediately following the point of interruption.

In no case shall a figure that has already received a score (even if zero) prior to a programme interruption be re-scored.

Should the competitor restart his or her programme at any point other than provided for above, the competitor will be given additional penalty points in accordance with the table below.

The addition of a figure to a sequence will also result in penalty points, but all subsequent figures correctly flown (order and direction) will be marked. For example, if the additional figure flown is a repeat of the previous figure, the score for the original figure must be retained, even if zero. Under no circumstances should a competitor be allowed to gain an advantage due to this additional figure.

Interruption or Addition	P	R	S	I	A	U
Penalty	**5**	**5**	**10**	**50**	**100**	**150**

8.2.7 Violations of Safety Manoeuvres

Only the safety maneuvers prescribed may be flown, within the box, prior to a competition flight commencing. A penalty of **30** points (all categories) will be given for each and every figure flown outside the box, or other than the prescribed pre-flight safety maneuvers.

8.2.8 **Violations of Signalling Procedures**

A penalty of 30 points (all categories) will be given in case of violation of (wing wags) signalling procedures set out in Rule 6.8.4.

8.3 Penalties & Devaluations Applicable To Figures in Programmes 1, 2, 3 and 4

It is assumed by a Judge that a contestant is going to fly a perfect figure, therefore he/she starts with the grade of 10 and proceeds to downgrade this mark (a) by fixed values as prescribed herein, and (b) by further values in conformity with the Judging Criteria in Section 7.

8.3.1 Downgrades

The absence of a distinct horizontal start or finish to a figure will reduce the mark by **1** point in each case for each figure affected.

At the initiation or completion of every figure, each deviation from a wings level, horizontal flight path and from a heading parallel to the relevant box axis, will attract a reduction of **0.5 points per 2.5º of deviation**, **1 point per 5º of deviation.**

As there is no "free" space between figures (7.8.1) any reduction applied in accordance with 8.3.1 must also apply as an error at the start of the subsequent figure.

All deviations from the correct geometry (plane of flight, direction of flight, angle of bank), and for deviations from the proper flight path or the proper attitude (as appropriate), the mark will be reduced by **1 point per 5º deviation.**

Over-rotating a roll and rolling the wings back again must be penalised by **1 point per 5º of over-rotation,** even if the correct geometry is resumed afterwards, and no matter how quickly the correction is made. The same provisions apply when, at the end of a loop or part-loop, the aircraft's nose is pitched beyond the desired line and then brought back again.

If within a figure two or more lines have to be of the same length, the basis for judging is the first line flown. Any observed variation must be penalised by reducing the marks in accordance with 7.8.1.

Slow rolls flown in combination with a turn (family 2) or loop (family 7.4.1 – 7.4.2) must be smoothly continuous: i.e. there must not be any change in the rate of roll from beginning to end.

Marking criteria for combinations of rolls with turns and loops will include the even integration of the rolls within the figure. Specific downgrades for rolling turns are noted in 7.9.3.

If the total of downgrades in this section leads to a value lower than the score of 0.5, a valid mark of 0.0 will be given to the figure.

When awarding any kind of zero mark (i.e. numerical 0.0, PZ or HZ), judges must state the reason why the figure was graded zero.

8.3.2 Perception Zero

A grade of "perception zero" (PZ) should be given if the Judge considers that the figure is incorrectly flown in respect of a criterion that is a matter of subjective perception, rather than clearly demonstrable fact.

A PZ must be awarded if and only if:

a) A flick roll never started proper auto-rotation

b) A spin never started proper auto-rotation

c) A rolling turn included a flick roll

d) A tail slide does not move backwards by the required half fuselage amount

e) An excessively long line is shown between looping segment and adjacent roll, or roll and adjacent looping segment

f) More than 45° of roll are flown on the exit line of a rolling turn

The Chief Judge should check that PZ's are applied only to manoeuvres where a perception error has been seen, and that a plausible reason has been given. The CJ has no other input regarding the presence of PZ's; they are subjective decisions made by individual judges and there is no requirement to review or "Confirm" them.

8.3.3 Hard Zero

A grade of "hard zero" (HZ) should be given if the Judge considers that the figure is incorrectly flown in respect of a geometrical error, as listed below, that is clearly verifiable as a matter of fact. A grade of "HZ" will be given to a figure if:

a. any figure is flown which does not conform to the drawing held by the judges for marking purposes (Form 'B' or 'C'). Note - when a figure is added to a sequence 8.2.7 applies;

b. when rolls are superimposed on a turn or loop , the roll is finished but 90º or more of the turn or loop still remains to be flown, or the turn or loop is finished but 90°or more of the roll remains to be flown;

c. when rolls are superimposed on a loop, the roll is finished but 90º or more of the apex still remains to be flown, or the apex is finished but 90°or more of the roll remains to be flown (the apex being the symmetric top or bottom arc defined by the start of the roll);

d. any deviation from the prescribed direction reaches 90º;

e. any other single deviation in geometry/flight path/attitude/rotation reaches 90º;

f. the pre-stated figure or any part of it is omitted;

g. any figure is started behind the Judges; RULE DELETED BY CIVA. JUDGES TO SCORE FIGURE BUT NOTE "BEHIND"

h. any part of the figure was not visible as it was flown in or behind cloud. If the figure was visible to a majority of judges, then the Chief Judge should instruct unsighted judges to revise their mark

from "HZ" to "A".

However, if figures subsequent to the hard zero mark are correct and are flown in the correct direction, they shall be marked in the normal way.

During a repetition flight the figures before the break must all be flown correctly. If a competitor omits or flies such a figure incorrectly, so as to gain an unfair advantage, the grade awarded for that figure during the first flight will be reduced to a "HZ".

Alignment on Hard Zero

When difficulties occur in interpreting the correct application of the "HZ" mark, the Chief Judge may call for a discussion on the spot by the Judges. The official video may be used in these discussions to help determine matters of fact, but not of perception. Such discussions shall not interfere with the subsequent flights. Form A shall be retained until the final decision is made at the next possible break.

The awarding of Confirmed Hard Zero marks is determined by the Chief Judge. When all Form A's (respectively Form R's or L's) have been submitted to the Chief Judge for a flight and difficulties occur in interpreting the correct application of the "HZ" mark, the procedure specified in (CIVA 4.1.1.9) will be used.

Case of Hard Zeros Given By the Majority of Judges:

a) The score sheets go to the scorer unchanged, the Chief Judge having checked the Confirmed Hard Zero (CHZ) box on the score sheet, unless a conference to confirm the facts is demanded by any judge(s). The computer system changes the minority scores to HZ and determines the judges' HZI points as per the Sporting Code document "International Aerobatic Events: Statistical Method for Processing Scores" para.8.4.

Case of Hard Zeros Given By 50% or Less of the Judges:

a) The Chief Judge first determines by means of conferencing whether the Hard Zero is correct or not. If correct, the Chief Judge will check the "CHZ" box on the score sheet; if not he will leave it blank. The judges must not change their score sheets as a result of the discussion. The score sheets will then go to the scoring office and the computer system will then change the incorrect marks and determine judges' HZI points as per the Sporting Code document "International Aerobatic Events: Statistical Method for Processing Scores" para.8.4.

Case of Hard Zeros referred to or determined by the International Jury:

a) The Chief Judge may on occasions, where there is a mixture of scores and Hard Zeros for a figure, not be able to determine the validity of the Hard Zero score(s), due to uncertainty in the Regulations (e.g. paperwork errors). In such instances the Chief Judge shall tick the CHZ box and then refer the matter to the International Jury for clarification and a decision.

b) Where the International Jury determines the Hard Zero mark is correct, those judges who had given numerical marks will have their marks changed to Hard Zero by the President of the International Jury, without prejudice to their Ranking Index.

c) Where the International Jury determines the Hard Zero mark is incorrect, the Hard Zero confirmation will be reversed and those judges who have given Hard Zeros will have their marks changed to an average by the President of the International Jury, without prejudice to their Ranking Index.

When a Judge's Hard Zero vote is over-ruled, upward correction of a Hard Zero will be to a Fitted Value determined by the scoring software.

Errors in recording Hard and Perception Zeros

The Chief Judge will examine the reasons given by the scoring judges for the award of Hard Zeros and Perception Zeros. If a scoring judge has made a mistake and quoted a reason not applicable to the recorded mark, e.g. "HZ: No slide" where the figure is a tail slide, the Chief Judge will instruct the scoring judge to change his mark to PZ. If however the judge has recorded for a tail slide "PZ: Fell the wrong way" then the Chief Judge will instruct the scoring judge to change his mark to HZ. In this way true zeros can all be brought to a common solution, providing correction to the judge and clarity for the pilot.

8.3.4 Mix of Zeros

The scoring system will handle a mix of hard zeros, perception zeros or "A" grades. In order for this to function correctly, the Chief Judge, if necessary after a conference, must fill the Confirmed Hard Zero (CHZ) field on the judging sheets if a hard zero was in fact flown. If review shows the figure to have been correct, the "CHZ" box must be left open.

If during this process the Chief Judge establishes that there is a mix of Hard and Numerical Zeros for the same error, i.e. it is only the extent of the error above 45 degrees that cannot be established, and these combined Zeros are in the majority for this error, the Chief Judge shall instruct those judges with the Numerical Zeros to change their score sheets to hard zeros and sign the sheets accordingly. The Chief Judge will then fill the CHZ field.

Should a judge consider that a figure started behind the judges, the judge shall mark the figure regardless, but add the comment, "Behind" in the Remarks section of the Form A (respectively Form R or L). At the end of each flight, the Chief Judge shall determine by a simple majority (with the Chief Judge casting a vote as required), if the figure in question was started behind the judges. If the majority holds that the figure was started behind the judges, each judge shall change his/her mark to 'HZ' and all Form A's (respectively Form R's or L's) shall be countersigned by the Chief Judge. If the figure is deemed by the majority to have been flown in front of the Judges, the original marks shall be handled as with any other figure.

Appendix 1 - Competition Entry Form

Xxx Aerobatic Competition

Name:……..

Address:. ……..

……

Phone Home:……**Phone work:**…….

Mobile:……..……**Email:** ……..……

I wish to enter in:
Basic/Recreational/Sports/Intermediate/Advanced/Unlimited/Freestyle.

I wish to participate as: a judge/assistant judge/scribe/starter/spotter/helper.

Aircraft registration:……. **Aircraft type:**…….

Total time:……**Aerobatics time:**……**Time on type**……

Time last three months:……..**Aerobatics time last three months:**…….

Please scan and send copies of your; Current pilot licence, Medical, BFR, Aerobatic BFR, LLDA if applicable, and aircraft insurance to the contest director with this application.

In case of Emergency contact:……

Entries close at xxx. Free sequences may be submitted no later than xxx.

I agree to abide by the Rules of the New Zealand Aerobatic Club and accept the decisions of the Contest Director and Chief Judge as final. I understand failure to comply with the Civil Aviation Rules, Rules of the club, failure to pay the annual subscriptions, or contest entry fee, or any unnecessary endangerment, may result in my expulsion from the competition and may result in my expulsion from the club.

Signed……
Date……..

Appendix 2 – Competitor Information Form

#	Name	Category P/R/S/I/A/U	Aircraft Rego	Subs paid	Entry paid	Free submitted	BFR/Aero Bi-Annual	Medical current	LLDA current	Insurance docs	Tech inspection

Appendix 3 - Starter Checklist

STARTER CHECKLIST

This checklist is to assist the Starter to safely and expeditiously start a contestant. It bears in mind the stress on pilots, and includes the "little but easily forgotten" items.

Conversation and intrusion by the Starter is kept to a minimum, so as to affect as little as possible the contestant's mental preparation.

The Starter shall ensure each competitor is physically and mentally prepared ten minutes before the estimated start time, in the correct or amended order of flight in consultation with the Chief Judge.

10-15 minutes prior to start

1. Is the contestant making preparations for flight?
2. Safety pilot needed and ready?
3. Has the pre-flight inspection been completed?

5 minutes prior to start

1. Contestant strapped in, ready for engine start?
2. Safe place to start?
3. Is there anything about the pilot (stress, sickness), or the aircraft, or the weather, that warrants stopping the flight?

Start

1. Is there anything overly wrong with the aircraft? (tied down / not refueled yet / failing to start / obvious problems / fuel caps left off / radio issues)
2. Any loose objects? Where is your Phone, pen and is the stowage compartment secure?
3. Do you have the correct sequence card?
4. Is the pilot stressed, Overheating, or Thirsty?
5. Is the contestant strapped in correctly?
6. Altimeter set to 0?
7. Does the contestant have the correct radio frequencies?
8. Headset ready?
9. Does the contestant know the direction of competition flight?
10. Does the contestant know the holding points and sequence commencement system?
11. Update the pilot on time available and who he is following. Wish him well and a safe flight.
12. Last check of pilot, canopy and aircraft.

Appendix 4, 4minute Freestyle programme scoring forms.

CIVA 4m Freestyle Judging Summary Sheet

Pilot	Technical Merit				Artistic Impression				Position		Personal Comments, Wow Factor *(not for transfer to the Form-A)*
	Flight Envelope	*Controls and Gyro*	*Execution and Clarity*	*Variety of Axes*	*Pleasing Flow*	*Contrast and Grace*	*Figure Orientation*	*Figure Position*	*Flight Symmetry*	*Performance Zone*	
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

Appendix 5 - List of Figures for Free Unknown Programme 4

This section illustrates those figures that may be nominated for the compilation of Free Unknown Programme 4.

Colour Coding

Intermediate

NZ Intermediate figures are the same as Yak 52 figures in CIVA rules. In all the following material, Yak 52 and Y shall be transferable in their entirety with NZ Intermediate figures.

Yak 52 figures are shown throughout in blue and are marked with a blue Y symbol. Textual comments relating to Yak 52 figures are also in blue.

Advanced

In Advanced contests, all the Yak 52 figures may be flown (unless otherwise noted in the text), plus those shown in red and marked with a red A symbol. Textual comments relating to Advanced figures are also in red.

Unlimited

In Unlimited contests, all the Yak 52 and Advanced figures may be flown, plus those shown in black. Unlimited figures are not marked with a symbol. Textual comments relating to Unlimited figures are also in black.

Roll, flick and Spin Combinations

Intermediate and Advanced

Unlinked and opposite rolls are permitted only on straight horizontal lines, with a maximum of 10 stops.

No roll element, neither aileron nor flick roll, may be added after a spin.

Unlimited

Unlinked and opposite rolls are permitted on straight horizontal lines, with a maximum of 10 stops.

On vertical and 45° up lines, opposite aileron rolls may be added as long as neither the total extent of rotation nor the number of stops exceed the limits shown in the table below.

Line Direction	Total Rotation	Stops
Vertical Up	450°	4
45° Up	540°	4
Vertical Down	360°	3

Unlinked and opposite rolls are not permitted on 45° down lines.

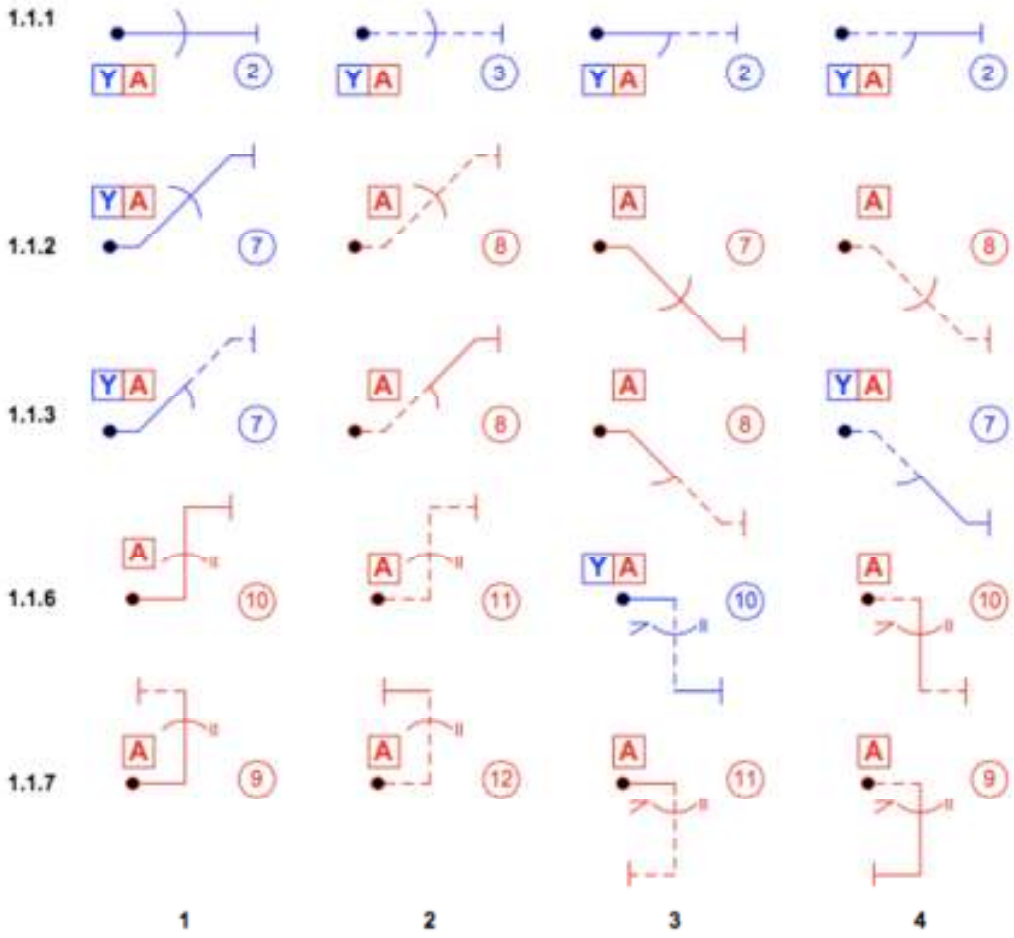
Combinations of aileron roll first, and then flick roll, may be added in Families 1, 7 and 8 on 45° up lines set initially with a positive attitude from a positive looping segment. Flick rolls must be from wings level and have the lower co-efficient. The combined extent of rotation shall not exceed 540° with not more than 3 stops.

An aileron or flick roll element may be added after a spin.

All Categories

Any of the figures illustrated with a 360° optional roll sign may be performed without that roll.

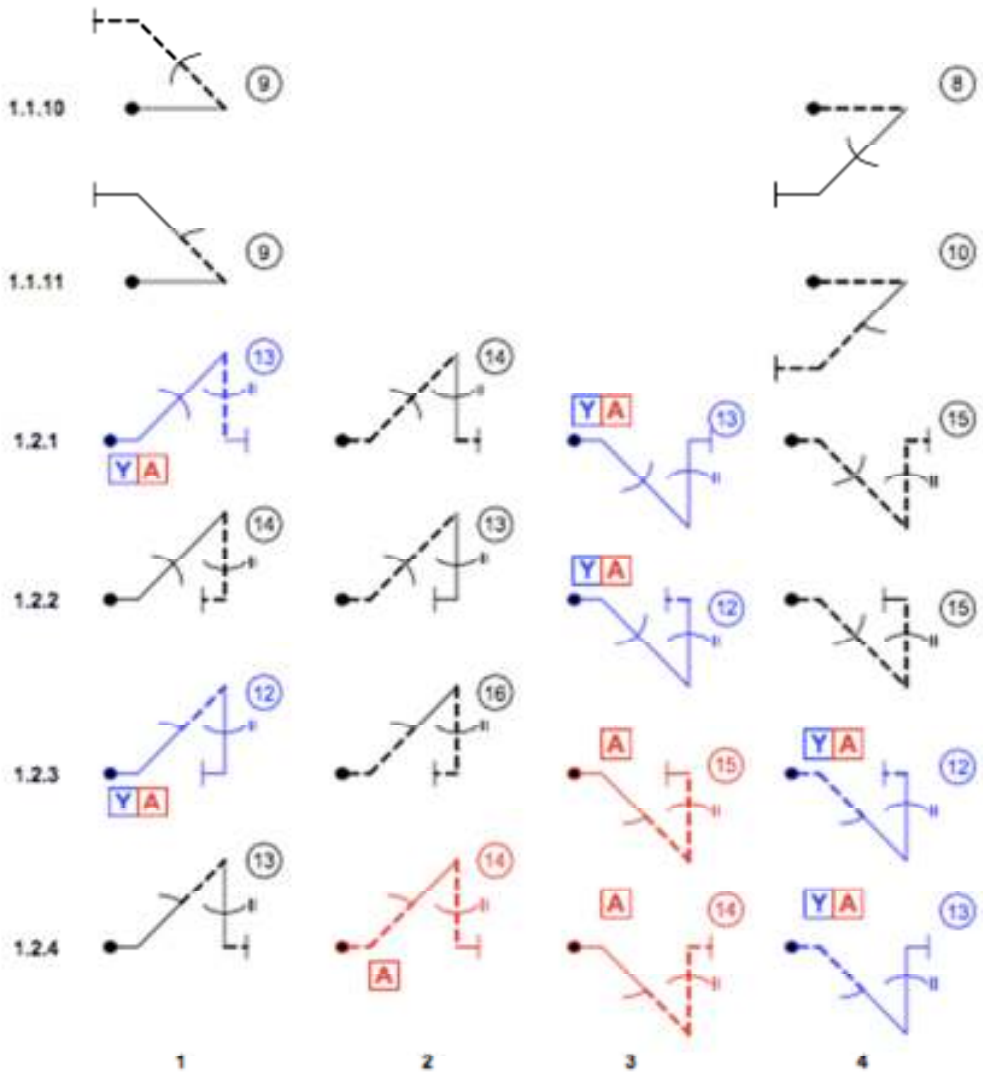
Family 1.1.1 to 1.1.7



A.3.1.1. Yak 52: Figure 1.1.6.3: Spin only.

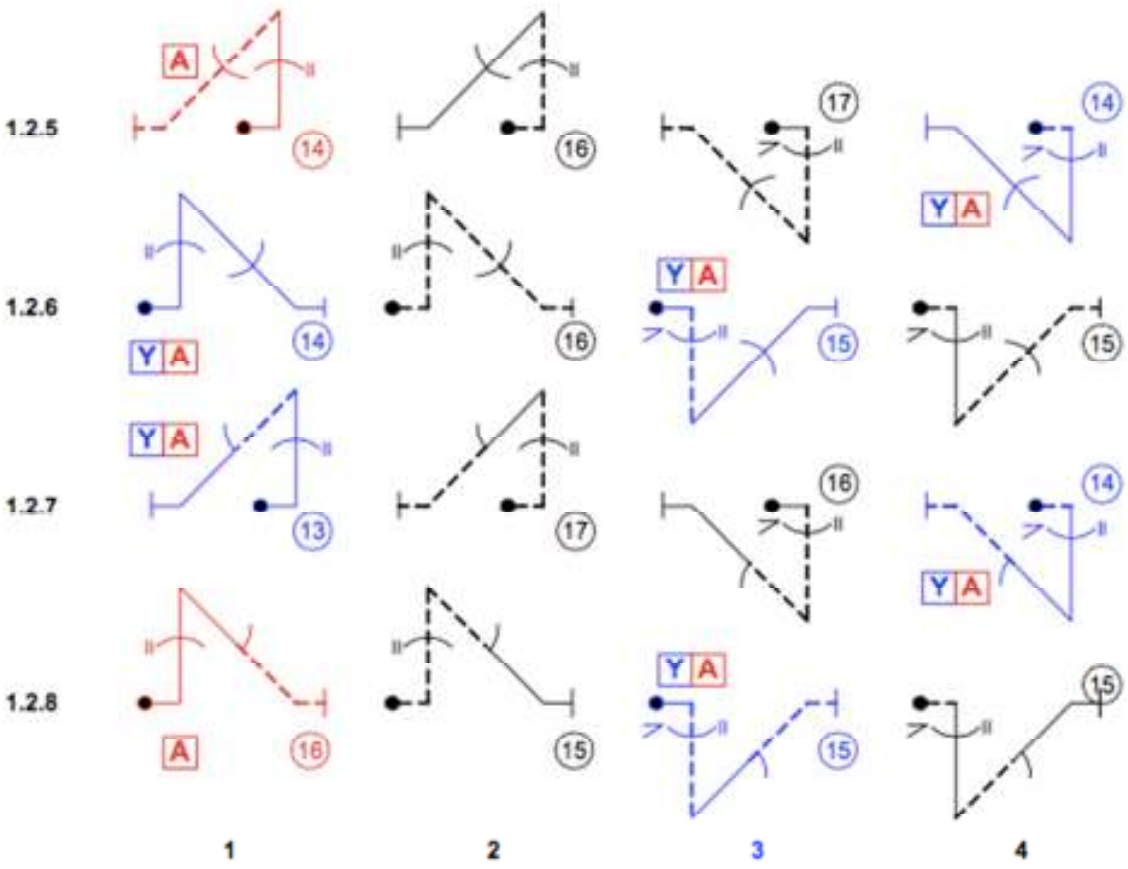
A.3.1.2. Unlimited: Family 1.1.1 used for linking figures only.

Family 1.1.10 to 1.2.4



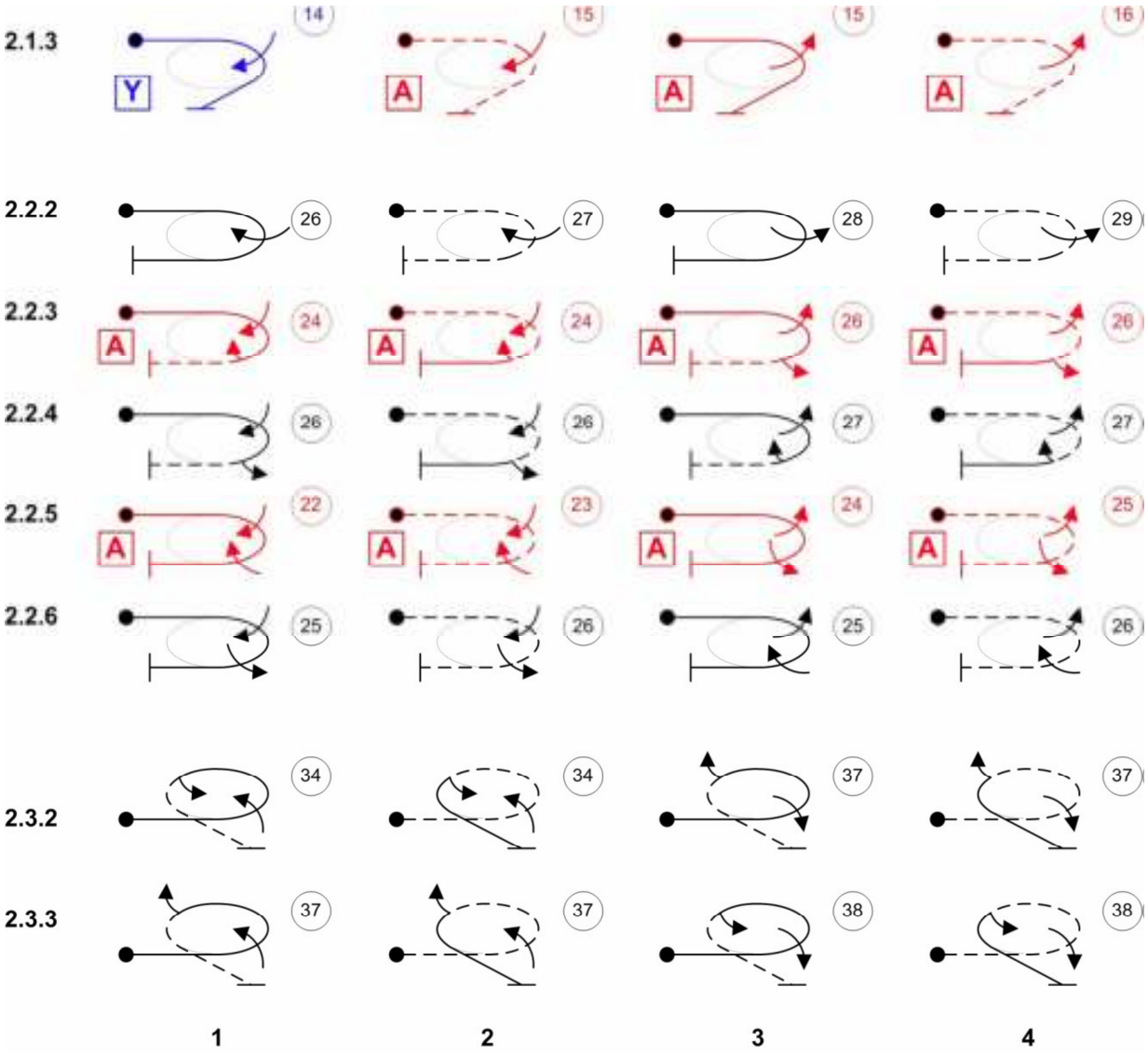
A.4.1.1. Yak 52: Figures 1.2.1.x to 1.2.4.x: No vertical roll elements.

Family 1.2.5 to 1.2.8



A.5.1.1. Yak 52: Columns 3 and 4: No vertical rolling elements. Column 3: Spin only

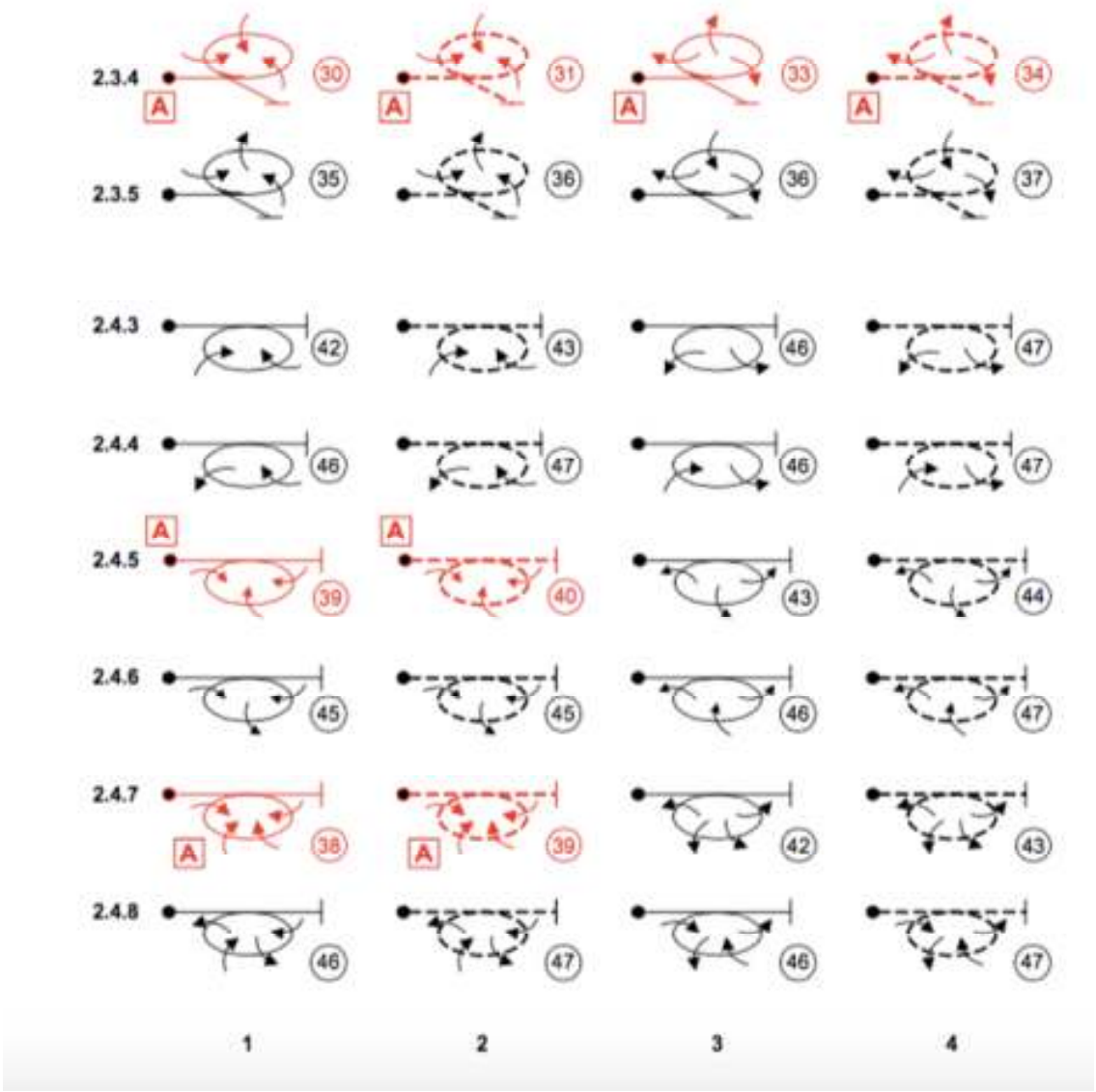
Family 2.1.3 to 2.3.3 Rolling Circles



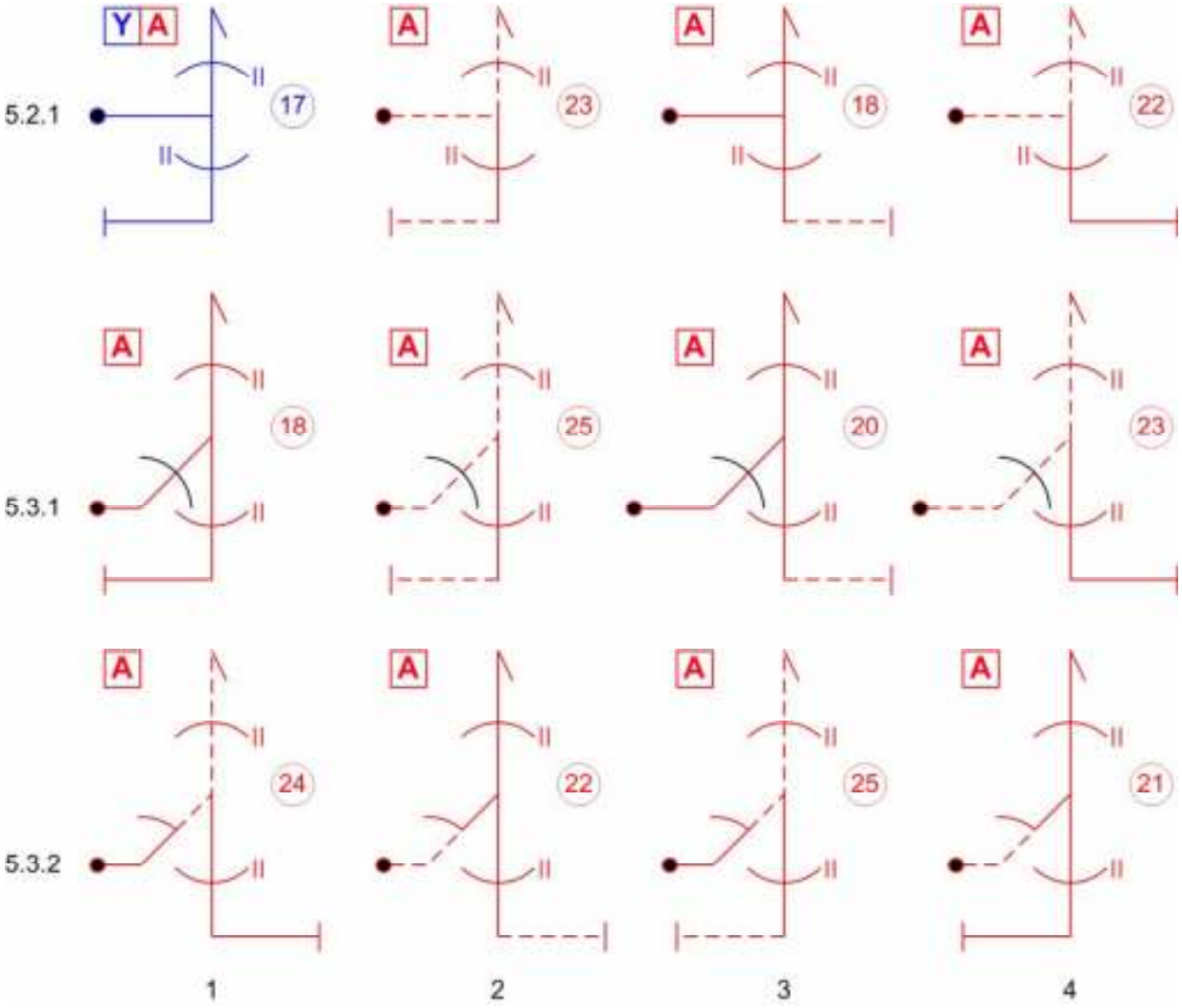
A.6.1.1. Figure 2.1.3.1 : only for Yak 52 (according to minimum K requirement in rule 2.3.1.1).

A.6.1.2. Figures 2.1.3.2 to 2.1.3.4 : not for Unlimited (according to minimum K requirement in rule 2.3.1.1).

Family 2.3.4 to 2.4.8 Rolling Circles



Family 5 Stall turns

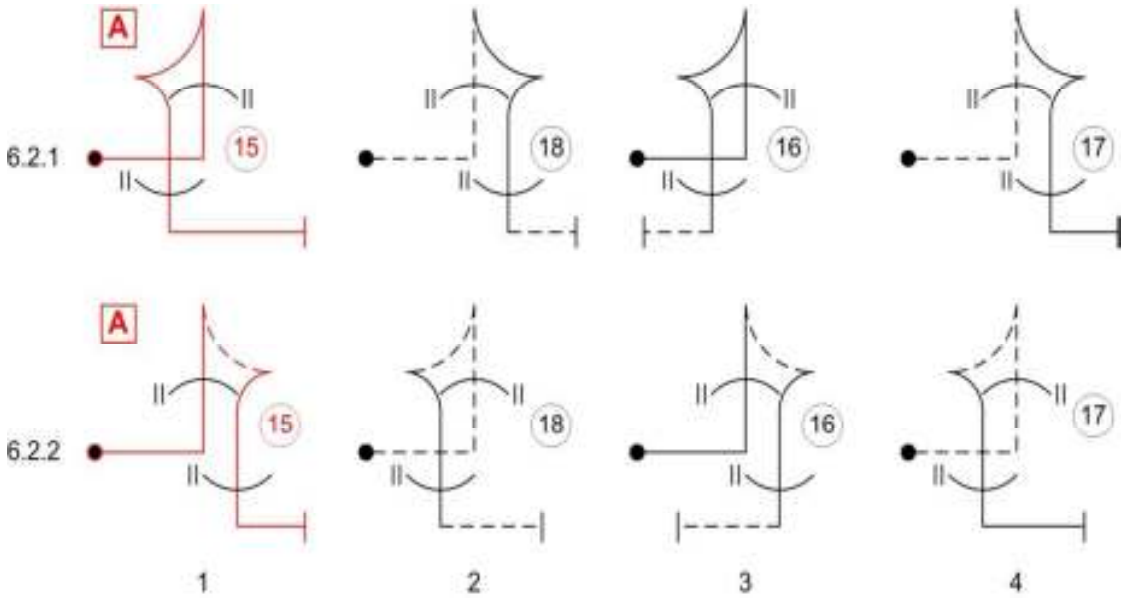


A.8.1.1. All categories: In Family 5, Flick Rolls are not permitted on ascending vertical or 45-degree lines, except in Family 5.2.1.

A.8.1.2. Advanced: Rotations allowed: on all 45-degree lines, limited to 9.1.2.2 or 9.4.2.2; and on ascending vertical lines in Families 5.3.1 and 5.3.2, limited to 9.1.1.1.

A.8.1.3. Unlimited: The combined total for all aileron roll elements on either or both the 45-degree and vertical up lines in Families 5.3.1 and 5.3.2 must not exceed 450° of rotation and 4 stops

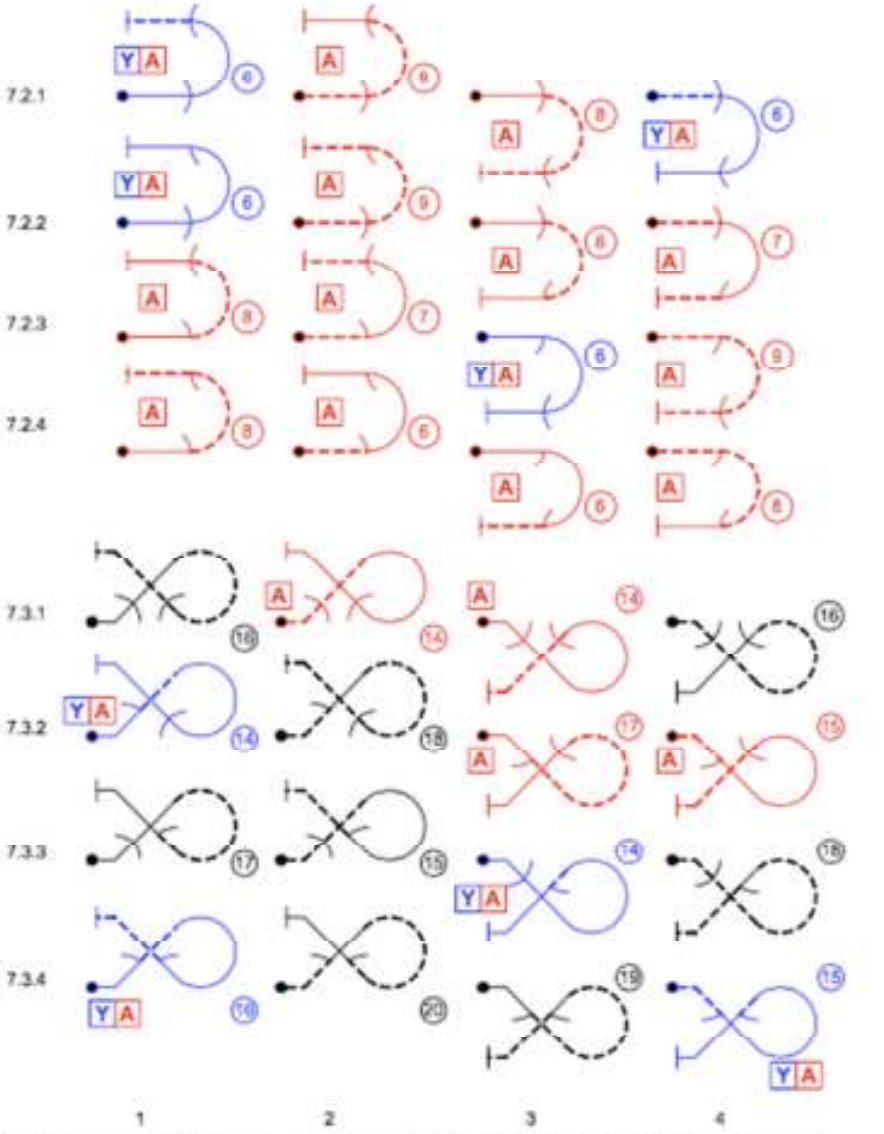
Family 6 Tailslides



A.9.1.1. In Family 6, flick rolls are not permitted on upward vertical lines.

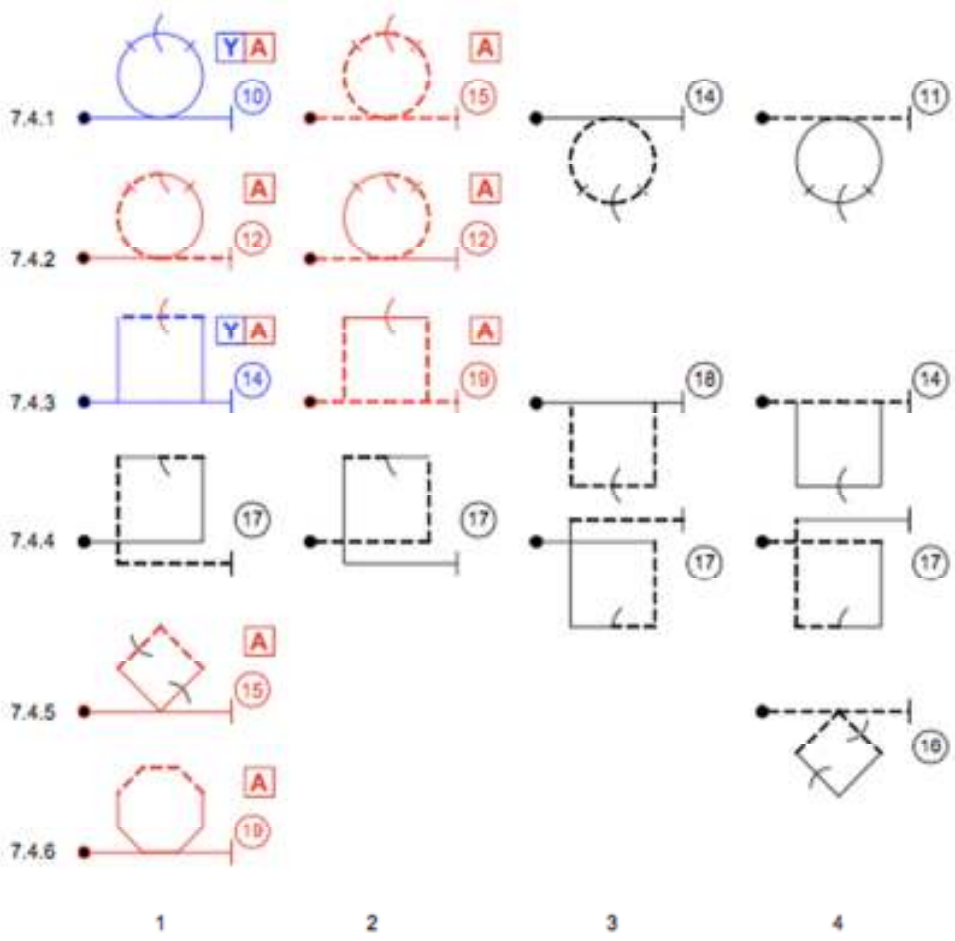
A.9.1.2. Advanced: Rolls are not permitted, neither on the upward nor on the downward lines.

Family 7.2.1 to 7.3.4



A.10.1.1. All Categories: Flick rolls are not permitted on the horizontal entry lines of figures in columns 1 and 2, nor on the horizontal exit lines of figures in columns 3 and 4, of 7.2.1 to 7.2.4.

Family 7.4.1 to 7.4.6

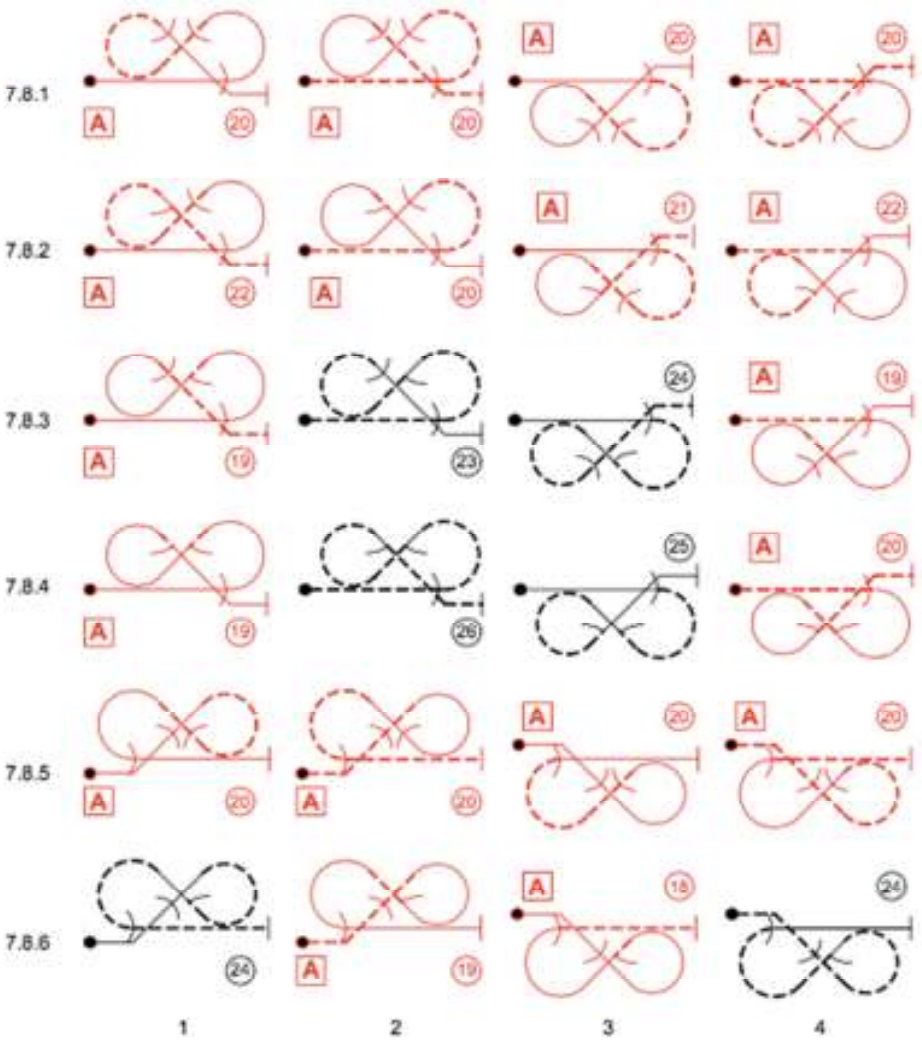


A.11.1.1. Advanced and Yak 52: Maximum 360° roll on 7.4.1.1. Only 9.1.3.4. allowed on 7.4.1.2.

A.11.1.2. Advanced: Opposite or unlinked rolls are not permitted on 7.4.3.1 or 7.4.3.2. No rolls are permitted on 7.4.5.1. Yak 52. No roll on 7.4.3.1.

A.11.1.3. Unlimited: Flick rolls are not permitted in figures in columns 3 and 4 of 7.4.1 to 7.4.4, nor on the lower lines of any figure in 7.4.5. Eight-point rolls (9.8.3.4) are not permitted on 7.4.1.3 or 7.4.1.4.

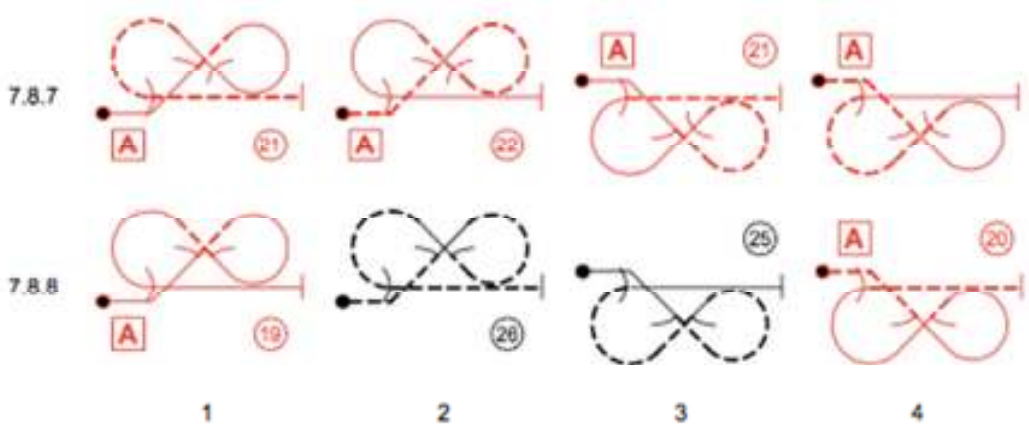
Family 7.8.1 to 7.8.6



A.12.1.1. All Categories: Flick rolls are not permitted on the horizontal entry lines of figures in columns 1 and 2, of 7.8.1 to 7.8.4.

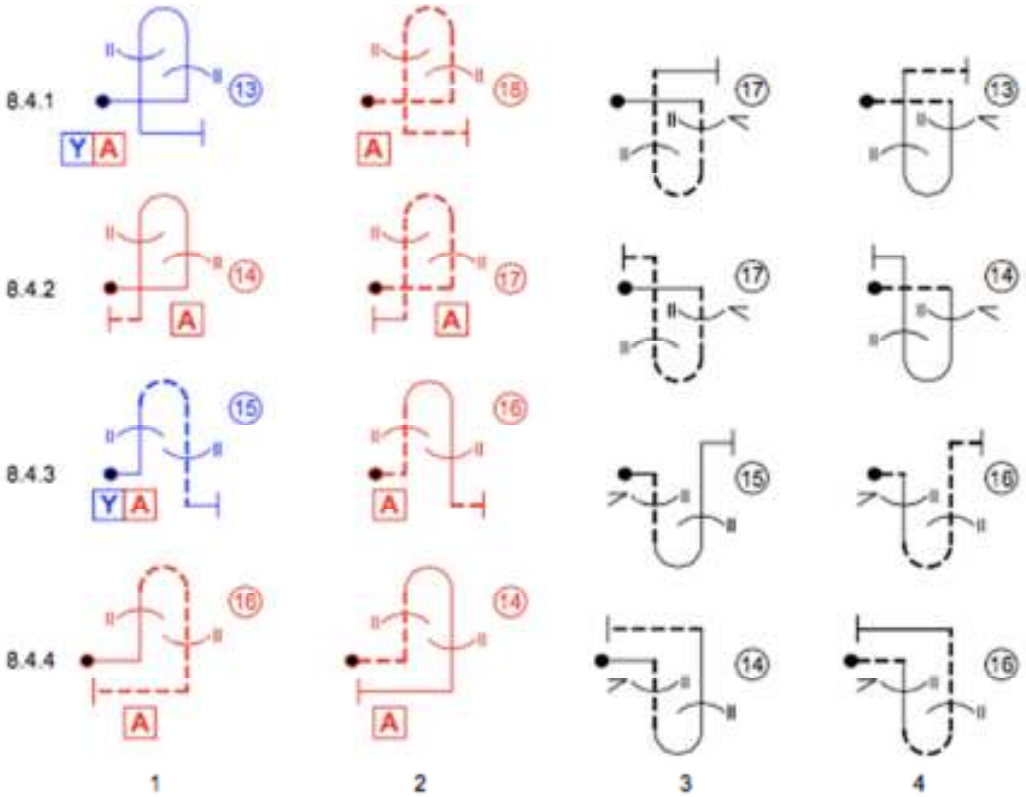
A.12.1.2. All Categories: Flick rolls are not permitted on the horizontal exit lines of figures in columns 1 and 2, of 7.8.5 and 7.8.6.

Family 7.8.7 to 7.8.8

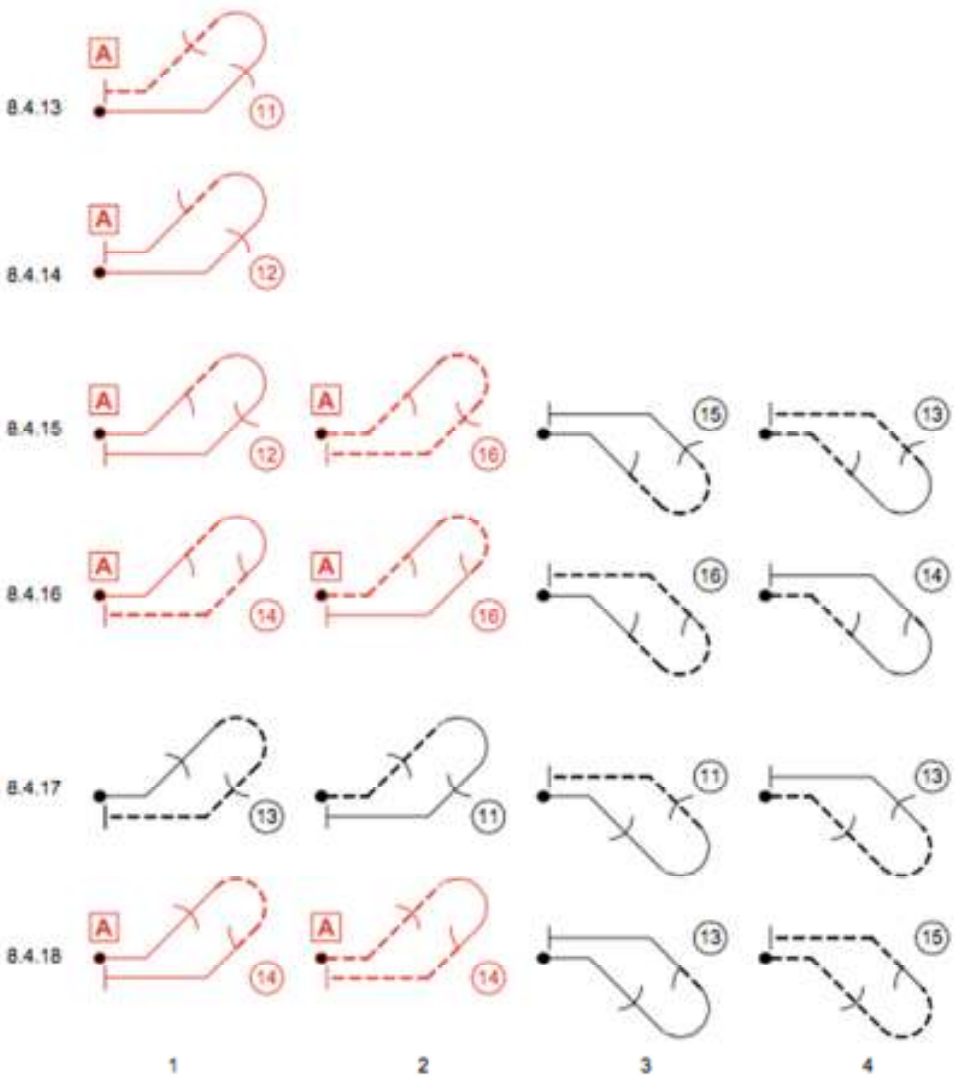


A.13.1.1. All Categories. Flick rolls are not permitted on the horizontal exit lines of figures in columns 1 and 2, of 7.8.7 and 7.8.8.

Family 8.4.1 to 8.4.4



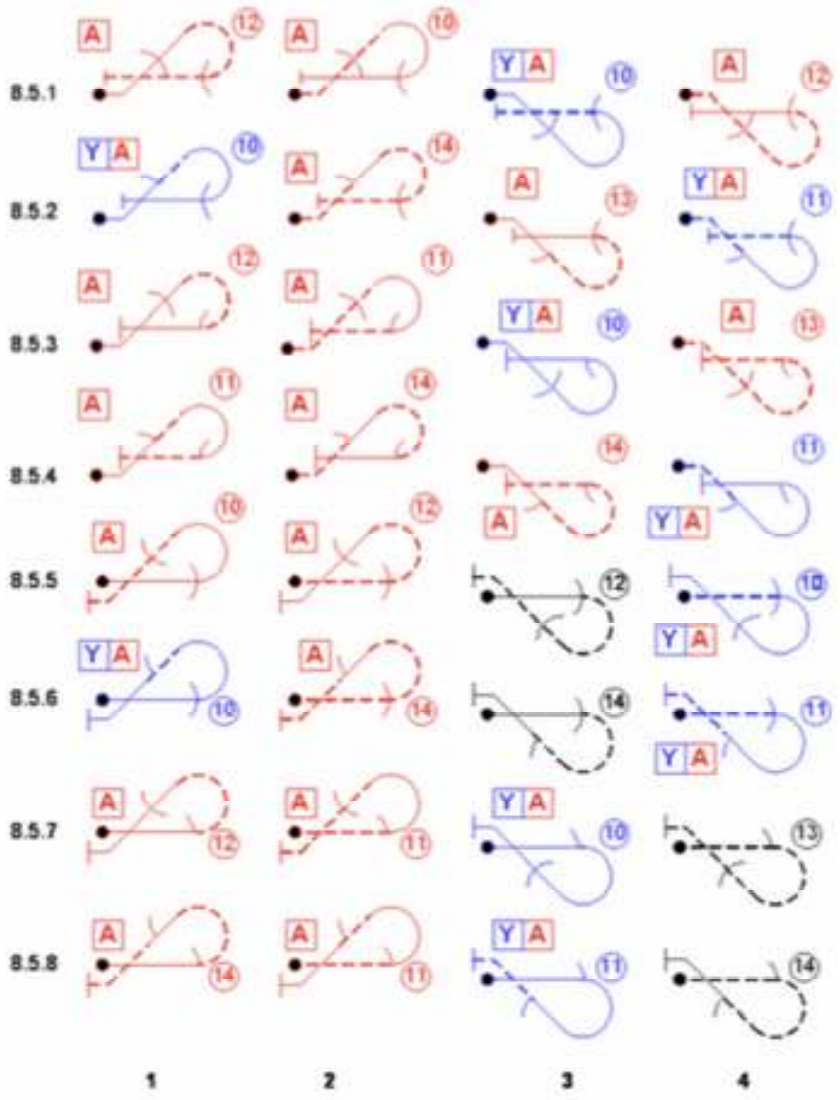
Family 8.4.13 to 8.4.18



A.15.1.1. Advanced: No flick roll permitted on 8.4.13.1 or 8.4.14.1.

A.15.1.2. Advanced: No flick roll permitted on the 45° down line of 8.4.15 to 8.4.18.

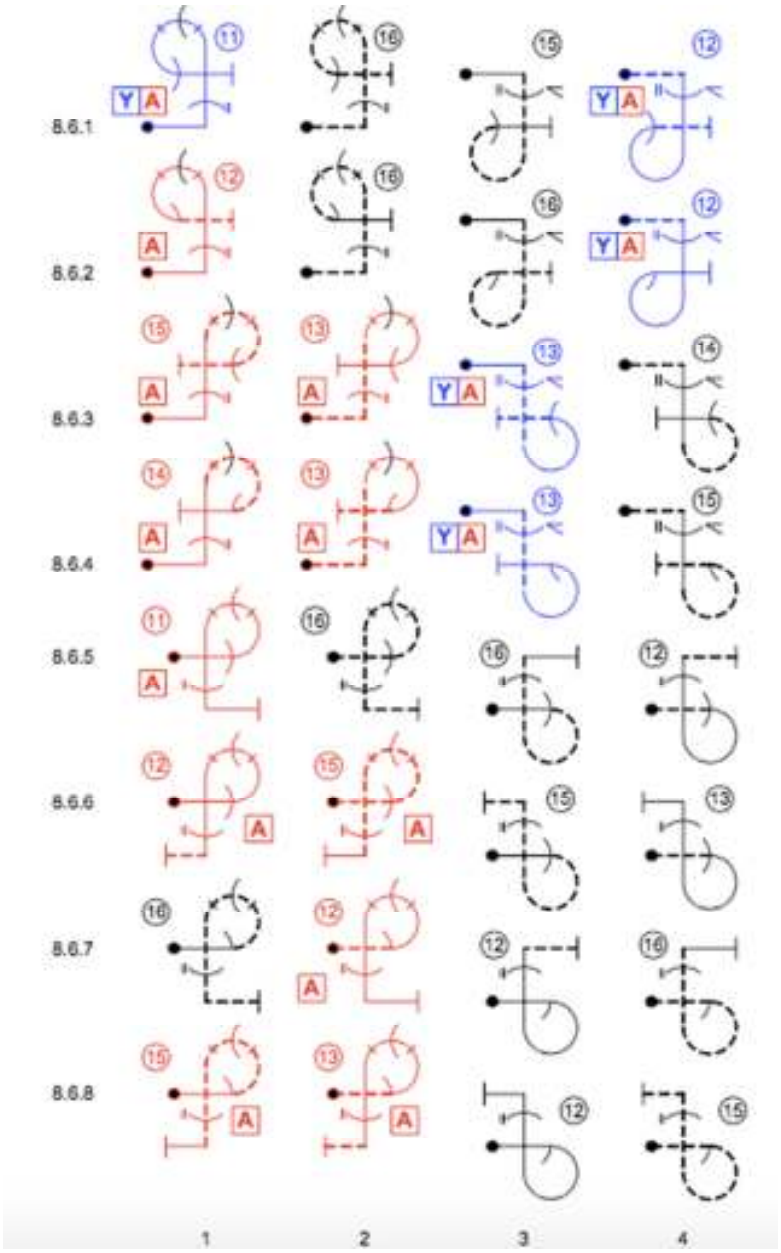
Family 8.5.1 to 8.5.8



A.16.1.1. Advanced: 9.2.4.4 not allowed on 45° line of 8.5.1.4 and 8.5.3.4.

A.16.1.2. All Categories: No flick rolls on horizontal entry / exit lines of any figure from columns 1 or 2.

Family 8.6.1 to 8.6.8



A.17.1.1. Yak 52: No vertical rolls; spin only on 8.6.3.3 and 8.6.4.3.

A.17.1.2. Advanced and Yak 52: From 8.6.1 to 8.6.4: No rolls in tops of ¾ looping segments in columns 1 and 2.

A.17.1.3. Advanced: From 8.6.1 to 8.6.4: Not more than ½ vertical roll up in column 1; no vertical roll up in column 2.

A.17.1.4. Unlimited: From 8.6.1 to 8.6.4: Flick rolls not permitted on the top of figures in columns 1 and 2 when preceded by a vertical roll exceeding 3 stops or more than 360 degrees of rotation.

A.17.1.5. Advanced: From 8.6.5 to 8.6.8: No flick rolls on vertical down lines after a roll in the loop.

A.17.1.6. All Categories: No flick rolls on horizontal entry / exit lines of any figure from columns 1 or 2.

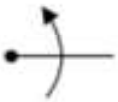
A.17.1.7. Unlimited: From 8.6.5 to 8.6.8: No flick rolls on vertical down lines after a hesitation roll in the loop.

A.17.1.8. Advanced: From 8.6.5 to 8.6.8: Maximum 360° rotation at top of 3/4 loop in columns 1 and 2.

Family 8.8

A.18.1.1. All categories: In Family 8.8, a maximum of one Family 9 element is allowed on any vertical line.

Family 9.1 Continuous Rolls

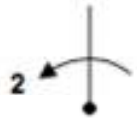
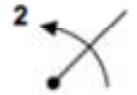
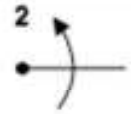
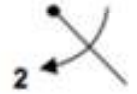
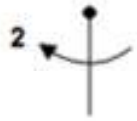
		¼	½	¾	1	1¼	1½	1¾	2
1		6 Y A	8 Y A	10 A	12	14			
2		4	6 Y A	8	10 Y A	11	12		
3		2 Y A	4 Y A	6 A	8 Y A	9	10 Y A	11	12 A
4			4 Y A		8 A		10		
5		2 Y A	4 A	6 A	8				
		1	2	3	4	5	6	7	8

A.18.1.1. Advanced

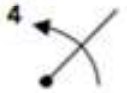
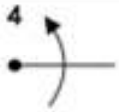
a) No level fly-off after 9.1.1.3.

b) No negative recovery after 9.1.5.3.

Family 9.2 Two-point rolls

					1		1½		2
1					13				
2					11 Y A		14		
3					9 Y A		12 Y A		15 A
4					9 A				
5					9				
		1	2	3	4	5	6	7	8

Family 9.4 Four Point Rolls

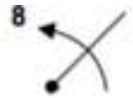
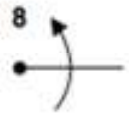
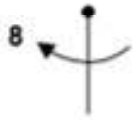
			½	¾	1		1½		2
1			9 A	12	15				
2			7 Y A	10	13 Y A				
3			5 Y A	8 A	11 Y A				
4			5 Y A		11				
5			5 A	8					
		1	2	3	4	5	6	7	8

A.20.1.1. Advanced

a) No level fly-off after 9.4.1.2

b) No inverted recovery after 9.4.5.2.

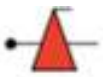
Family 9.8 Eight Point Rolls

		¼	½		1		1½		2
1		7 Y A	11						
2		5	9 Y A						
3		3 Y A	7 Y A		15 A				
4			7						
5		3 Y A	7						
		1	2	3	4	5	6	7	8

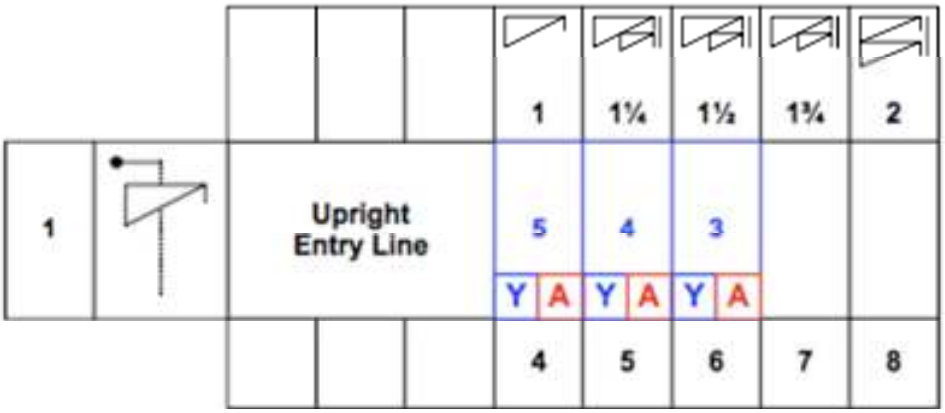
Family 9.9 Positive Flick Rolls

		½	¾	1	1¼	1½	1¾	2
1		15	15	15				
2		13 Y A		13 A				
3		11 Y A		11 Y A		14 A		
4		11 A		11 A		14		
5		11 A	11 A	11				
6		17	17	17				
7		15		15				
8		13		13				
9		13		13				
10		13 A	13	13				
		1	2	3	4	5	6	7	8

Family 9.10 Negative Flick Rolls

			½	¾	1	1¼	1½	1¾	2
1			17	17	17				
2			15		15				
3			13		13		16		
4			13		13				
5			13	13	13				
6			19	19	19				
7			17		17				
8			15		15				
9			15		15				
10			15	15	15				
Mail		1	2	3	4	5	6	7	8

Family 9.11 Upright Spins



Family 9.12 Inverted Spins