OFFICIAL CONTEST RULES

2019

International Aerobatic Club, Inc.

A Division of the
Experimental Aircraft Association and
National Aeronautic Association

P.O. Box 3086
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U.S.A.

CR19 Working Group, Editor

Original Design

Minkus & Associates

This section is intended to be a summary of point deductions for the most commonly seen errors and a quick reference guide to the applicable rules for those deductions. In case of confusion or disagreements, the current edition of the *IAC Official Contest Rules* is definitive. Where Glider rules might differ they are marked with an asterisk. Before judging gliders, refer to the *Glider Judging Quick Reference* for a refresher.

Hard Zero (HZ) 7.3.1 & others

Omitted figure	
Added figure	
Wrong figure	
Wrong direction on X axis (applies to entire figures or any part of a figure drawn on X axis)	
Improper exit direction (same or opposite) relative to entry on a Y-entry / Y-exit figure	
Any deviation from the prescribed entry / exit direction of 90 degrees or more	
Any other single deviation in geometry / flight path / attitude / rotation of 90 degrees or more	
Tail slide less than 1/2 fuselage*	8.5 Family 6
No pause in hesitation roll	8.5 Family 9.2-9.8
No visible nose displacement in snaps	8.5 Family 9.9 - 9.10
No autorotation in spins and snaps	8.5 Family 9.9 - 9.10 & 9.11 - 9.12
Snap roll in rolling turn	8.5 Family 2

Numeric Zero (0.0)

Accumulation of 10 or more points in downgrades

Errors in aircraft attitude or flight path 7.1.3

Deduct one (1) point for every five (5) degrees error (0.5 point for 2.5 degrees) in the following:

Horizontal flight	Judge flight path, not attitude*	8.1.1
Climb or descent	Projected angle from horizontal	7.1.2
Vertical flight	Attitude +/- angle from zero lift axis	8.1.2
45° lines	Attitude +/- angle from zero lift +/- 45° *	8.1.2
Heading	Direction of fuselage	7.1.2
Bank angle	Deviation from wings level (plane of flight)	7.1.2

Unequal radius in part loops 8.4.2

Deduct 0.5 points or more

Omitting a line between figures 7.1.5 & 8.4.1(a)

Deduct two (2) points - one (1) point from each figure

Errors in line lengths within a figure 8.4.1*

Visible Variation	1 point
1:2 variation	2 points
Greater than a 1:2 variation	3 points
No line before and no line after roll	2 points
No line before roll and any line after roll	4 points
Any line before roll and no line after roll	4 points

Added line 8.4.2(d) & (e)

Line between roll and loop or between loop and roll	At least 1 point
Roll integrated with loop flown on a line	At least 2 points

Turns/Rolling turns 8.5 Family 2

Turn or roll rate change	Not more than 1 point
Roll stoppage	1 point
Snapped roll	HZ

Hammerhead pivot 8.5 Family 5

For each ½ wingspan over one ½ wingspan of flyover or slide.	1 point per additional ½ wingspan
Roll and/or pitch during pivot	1 point per 5 degrees

Roll rate changes in Family 9 8.5 Family 9

Roll rate change	1 point each occurrence
Roll stoppage	HZ (Family 9.1 only)

** Glider rules vary. Consult the IAC Official Contest Rules.*

JUDGE'S QUICK REFERENCE - GLIDER

This quick reference guide is intended as a refresher for grading judges at contests incorporating gliders. All judges, Chief Judges, and contest officials should refer to the current *IAC Official Contest Rules* for the complete set of rules governing glider competition. Generally, glider rules are identical to power, but wherever glider rules or criteria do differ, those differences are marked with a glider icon in the margin of the *IAC Official Contest Rules* book. In all cases of confusion or disagreements, the current edition of the *IAC Official Contest Rules* is definitive.

Aerobatic Box 4.11

Upper Limit:	4,000'	AGL for all categories
Lower Limit:		
Sportsman	1,500'	AGL
Intermediate	1,200'	AGL
Advanced	656'	AGL
Unlimited	656'	AGL

Tow and Release 4.22

The glider may release prior to box clearance and thermal, if necessary, to maintain altitude until cleared. After box clearance, glider may execute turns to reposition before beginning the flight program.

Free Programs 6.8

Intermediate gliders may repeat a basic figure (catalog number) if the repeated basic figure is used in combination with different complementary rolls. Advanced and Unlimited gliders may not repeat any catalog numbers *except* for Families 1.1.1.x and 9.1.x.x.

General Grading

HINT

Once you visually acquire a glider inbound to the aerobatic box, do not look away. It is extremely easy to lose visual contact with a glider and once lost, there is no engine noise to guide you back!

Horizontal Flight 8.2

For gliders, "horizontal" flight may be any line of reasonable angle, ascending or descending. The angle of the horizontal line into a figure may be different than the angle of the exit line from the same figure, but in all cases the angle of the line between figures must be constant (i.e., the exit angle of a figure must equal the entry angle of the subsequent figure). Level altitude figures, such as horizontal rolls and turns, may be flown at a constant (usually descending) angle to the horizon. If the angle of the line between figures or within a figure, such as horizontal rolls or turns, is not constant, a deduction for each and every change of angle will be applied.

45 Degree Lines Flown As 30-Degree Lines 8.1.4

45 degree lines are flown and judged as 30 degree lines in glider Sportsman and Intermediate categories, or if a glider is competing in the power Primary category.

Snap Roll 8.4.1(e)

Snap rolls need never be centered on their lines. However, there must be at least a visible line segment both before and after any snap roll.

Slow Rolls 8.4.1(e)

Slow rolls must always be centered on their lines.

Specific Grading Criteria

Wingover 8.5 Family 0.0

Review criteria Chapter 8.

Quarter-Clover 8.5 Family 0.1 - 0.2

Review criteria Chapter 8.

Hammerheads 8.5 Family 5

A small amount of wing slide is common. Wing slide is not an automatic zero and should receive a deduction proportionate to the severity.

Tail Slides 8.5 Family 6

Expect extremely small amounts of tail slide and little or no penduluming after the slide. No deduction as long as the slide is visible.

Rolls 8.5 Family 9

All rolls, including snap rolls, are judged on exactly the same criteria as power rolls.

FOREWORD

The International Aerobatic Club's *Official Contest Rules* were originally written in 1970 and, since that first year, have been continually revised and refined. Each year, the IAC Rules Committee meets to review these rules in their entirety and to incorporate approved changes where necessary. As an IAC member, you are encouraged to submit written rules proposals. Rules proposals may be addressed to the IAC Rules Chairman, or via email to ruleschair@iac.org .

In accordance with the policy of the Board of Directors, the following rules change schedule has been established and members are asked to adhere to this timetable in order to permit an orderly process.

This schedule will be observed each year:

July 1 – *The* ***annual deadline for the Rules Committee to receive proposed contest rules changes*** *for the following contest year. Additional rules proposals resulting from issues arising at the U.S. National Championships contest will be accepted up to one week following the close of that contest. This does not include any submission which solely affects Nationals, Team Selection, and the IAC Policies and Procedures which govern Nationals. All proposals received by the annual deadline will be published for membership comment. Member comments must be received no later than 0700 GMT, October 1st. During this same period, the Rules Committee will meet and submit a report with their recommendations to the Board of Directors. The Board of Directors will consider rules proposal submissions at the Fall IAC Board meeting. Any rule changes and the Known program sequences approved by the Board will take effect on January 1 of the year after they were approved.*

Contest years begin on January 1st. IAC contests are run uniformly for all categories and these regulations apply to all categories from Primary through Unlimited. IAC sanctions all contests held in the United States of America, but encourages those who wish to use these rules anywhere in the world to do so.

The IAC, its officers, directors, agents, servants, employees, and/or membership shall not be liable for any acts or omissions of the individual Chapter holding the contest (or its officials, directors, agents, servants, or employees), and any contest (or related activities) shall be conducted solely at the risk of the sponsoring Chapter.

All Chapter contest activities shall be insured as may be prescribed from time to time by the IAC, or in the absence of such prescription, to insure against all reasonable and probable liability which may result from said activities, as otherwise provided herein.

As a condition of any sanction granted by the IAC for a Chapter contest, and in consideration of the granting thereof, the sponsoring Chapter and/or its officers, directors, agents, servants, employees (or their administrators, heirs, or assigns) agree to forever hold harmless and defend the IAC and/or its officers, directors, agents, servants, or employees from any and all liability of any nature, whether due to negligence or intention, act, or omission.

RECORD OF REVISIONS	
REV. #	DATE
9	1 January 1998
10	1 January 1999
11	1 January 2000
12	1 January 2001
13	1 January 2002
14	1 January 2003
15	1 January 2004
16	1 January 2005
17	1 January 2006
18	1 January 2007
18.1	1 March 2007
19	1 January 2008
20	1 January 2009
21	1 January 2010
21.1	23 February 2010
22	1 January 2011
22.1	10 March 2011
23	1 January 2012
23.1	23 April 2012
24	1 January 2013
24.1	23 April 2013
25	1 January 2014
25.1	15 June 2014
26	1 January 2015
27	1 January 2016
28	1 January 2017
29	1 January 2018
30	1 January 2019

CHAPTER 6 *The Free Program – Design Limits and Documentation*

CHAPTER 7 *Grading and Scoring*

CHAPTER 8 *Criteria for Judging Aerobatic Figures*

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CONVENTIONS USED

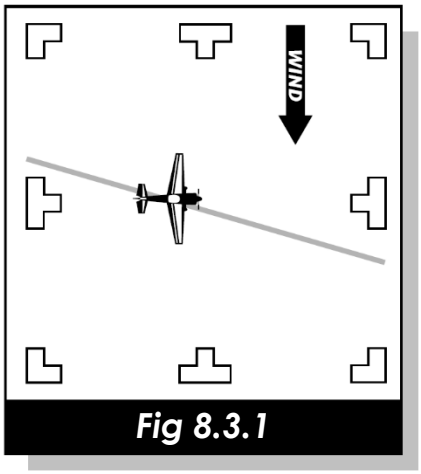


Fig 8.3.1

- *Gray line represents aircraft flight path.*

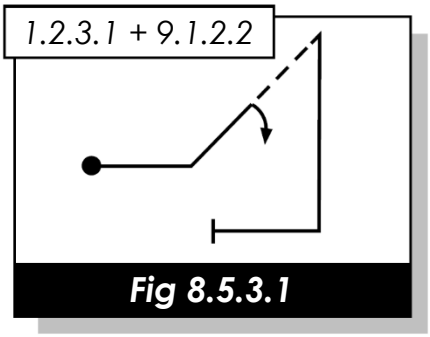


Fig 8.5.3.1

- *Whenever actual figures are used, the Aresti Aerobatic Catalogue number(s) accompany the illustration.*

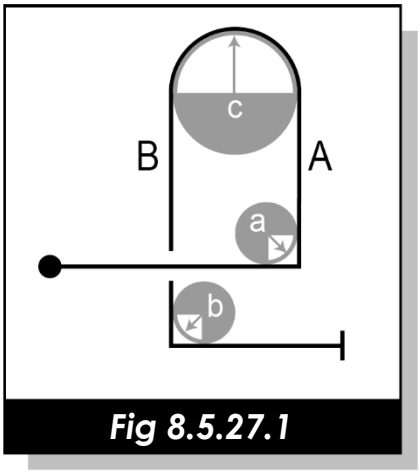


Fig 8.5.27.1

-  *symbol refers to radii of part loops.*
- *Radii references are lower case letters; i.e., a, b, c.*
- *Line references are upper case letters; i.e., A, B, C.*

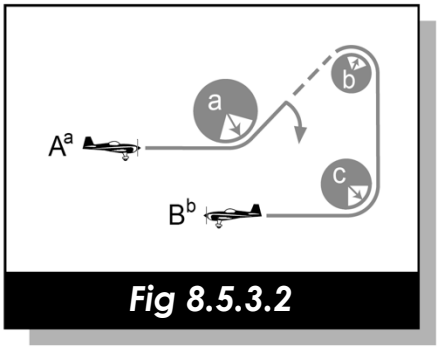


Fig 8.5.3.2

- *Entrance altitude references are A[a]*
- *Exit altitude references are B[b]*

1.1.1.1 + 9.9.3.4

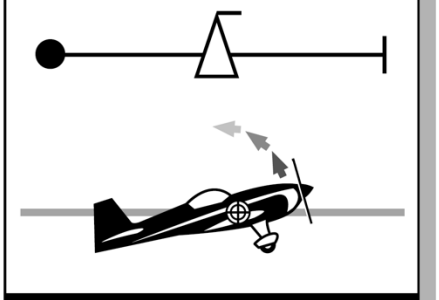


Fig 8.5.35

- *Motion of aircraft is indicated by gradated arrows.*

FIGURE SYMBOLOGY

2 *K-Factor values*

Compulsory Half-Roll

Optional Roll

Optional Vertical Roll

Optional Spin and/or Vertical Rolls

MARGIN SYMBOLOGY

Indicates subject matter unique to gliders.

Important topic to review prior to each contest.

GLOSSARY AND DEFINITIONS

45° Attitude: The zero lift axis plus or minus 45°.

ACRO – Aerobatic Contest Results Organizer: Contest scoring software developed by Exploit Design and approved by CIVA. Used at all international championships as well as the U.S. National Aerobatic Championships and Team selection contest. ACRO is capable of outputting both IAC raw grades and using the Fair Play System (see *FPS*). The software produces detailed judging analysis (see *Rank Index*) and web-ready results.

Advanced: The fourth of the five categories of aerobatic competition. Advanced competitors fly three programs: a Known Compulsory program which changes each year, a Free Program of their own design, and an Unknown Program.

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 and lower altitude limits of the box vary with the category flying *(see 4.11.3)*.

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

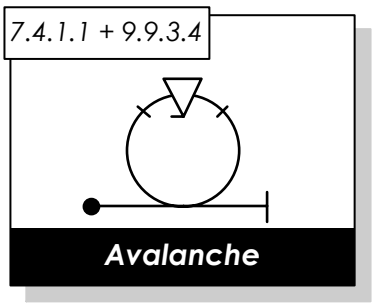
Aileron Roll: One of two types of rolls as defined by the *Aresti Aerobatic Catalogue*. Aileron rolls include only two subtypes: "slow rolls" and "hesitation rolls".

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): Also referred to as the Aresti System, it is a notation and scoring system developed by José Luis Aresti of Spain in 1961. The catalog 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 catalog number and difficulty factor ("K"). With the exception of the Four Minute Freestyle Program, only figures listed in the *Aresti System (Condensed)* are legal for competition.

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



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.

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, Competition: Any of the five competitive skill levels: Primary, Sportsman, Intermediate, Advanced, and Unlimited. Glider competition includes four categories: Sportsman, 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.

Championship, IAC: Any contest sponsored directly by IAC Headquarters, including the U.S. National Aerobatic Championships, U.S. National Glider Aerobatic Championships, etc.

Championships, U. S. National Aerobatic: The contest held annually to determine the "U.S. [_____] Aerobatic Champion" in each category, Sportsman through Unlimited (power only). The Unlimited winner will be designated, "U.S. National Aerobatic Champion".

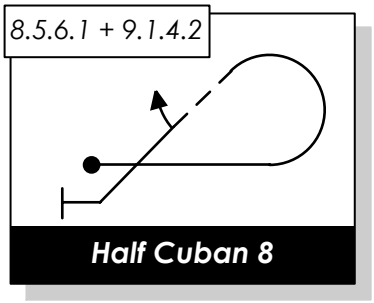
Championships, U.S. National Glider Aerobatic: The contest held annually to determine the "U.S. [_____] Glider Aerobatic Champion" in each glider category, i.e., Sportsman, Intermediate, Advanced and Unlimited. The Unlimited winner in Gliders will also be designated, "U.S. National Glider Aerobatic Champion". This contest may be held as a stand-alone event or in conjunction with one of IAC's other major championships at the discretion of the Board of Directors.

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, but does not extend to U.S. national 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.

Contest, Sanctioned: An aerobatic competition sanctioned by IAC, insured through IAC's approved insurance agent, and conducted in accordance with current IAC rules.

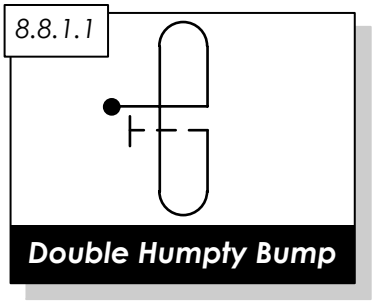
Crabbing: The action of a pilot to displace the aircraft heading slightly, while maintaining wings-level flight, to either counteract the affect of wind or to move laterally through the Aerobatic Box. If detected by the judge, a penalty of 1 point for each 5 degrees of crab will be assessed. *(See also, "Heading" and Fig 8.3.2)*



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 FAA or Contest Director to separate the public from the flight performances.

Direction of Flight: Set by the Chief Judge based on the prevalent winds, this is the "left" or "right" direction relative to the judges which defines which Form, B or C, will be definitive.



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.

EAA – Experimental Aircraft Association: The parent organization of the IAC.

FAI – Fédération Aéronautique Internationale: The FAI, based in Lausanne, Switzerland, was founded in 1905 and has about 100 member nations. The FAI is responsible 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: What an individual pilot does to complete a given Program.

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

Flimsies: Drawings showing the continuity of figures in an aerobatic sequence, i.e., Forms B and C.

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 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 Freestyle Program: A separate contest program that can be optionally scheduled as the final event of a contest based on available time and willing competitors. The Freestyle is only open to Unlimited pilots and Advanced pilots who meet special requirements and has its own winners and separate trophies. The Freestyle is unique in that the selection of figures for this program need not be made with reference to the *Aresti System (Condensed)*. All rules governing the Four Minute Freestyle can be found in Chapter 5.

FPS – Fair Play System: An improved statistical scoring system that updates and replaces the older TBLP statistical scoring system. FPS is a method of calculating scores for an aerobatic competition using a mathematical process to give equal importance to all judges, while replacing anomalous grades with statistically fitted values. The FPS is currently not part of the IAC scoring software, but the FPS algorithms are part of the CIVA scoring software *(See ACRO),* which is used at the IAC's U.S. National Aerobatic Championship and Team Selection contest.

Free Program: A sequence of figures designed by the pilot using rules set forth in the *IAC Official Contest Rules*. Free programs are optional for the powered Sportsman category and mandatory for Intermediate through Unlimited. Free programs may be reused year-to-year subject to any applicable rule changes.

Free Unknown: The Free Unknown program is flown by the Advanced and Unlimited categories in lieu of the regular Unknown at the U.S. National Aerobatic Championships only. Each pilot is free to compose their own Unknown using 10 submitted figures and up to four connecting figures of their own choice.

GAF – Glider Aerobatic Figures: Abbreviated way of referring to the *Aresti Catalogue of Glider Aerobatic Figures*. The GAF is a subset of the full *Aresti Aerobatic Catalogue* and lists only the figures which may be flown by gliders in aerobatic competition.

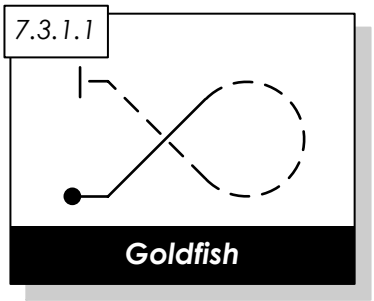
Goldfish: Common name given to any of the three-quarter loop figures from Sub-Families 7.3.1 to 7.3.4.

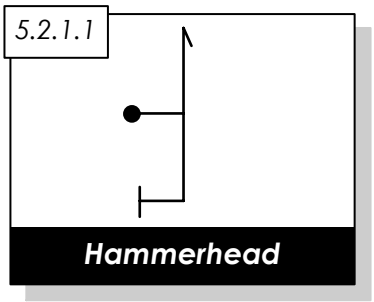
Grade: The number assigned by each Judge to each figure in a sequence indicating their judgment of the quality of the figure as flown. Grades may range from 10 (perfect) to zero in one-half point increments. Also referred to as a "mark."

Hammerhead: Any of the Family 5 figures. Also called a "stall turn".

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 axis 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".





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. In the case of gliders, the horizontal line will not always be of constant altitude.

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

H/C (Hors Concours): A pilot who is not competing for a trophy as the single entrant in a category.

Humpty Bump: Common name given to any of the figures from sub-families 8.4.1. to 8.4.28. Also simply called a "humpty".

IAC – International Aerobatic Club: The IAC, a division of the *National Aeronautic Association* and the *Experimental Aircraft Association,* 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 and snap rolls.

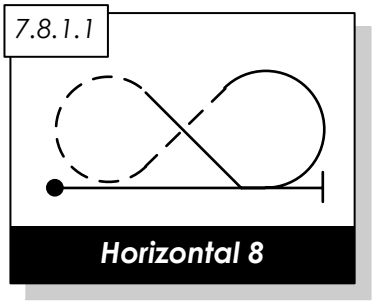
Interior Line: Any straight line segment, other than the horizontal entry and exit lines, which go to make up a basic Aresti figure.

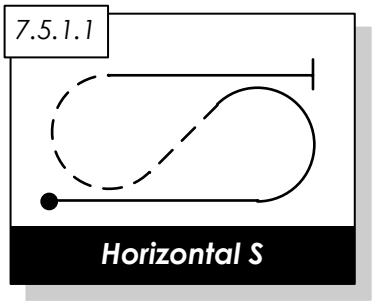
Intermediate: The third of the five categories of aerobatic competition. Intermediate competitors fly three programs: a Known Compulsory program which changes each year, a Free Program of their own design, and an Unknown Program.

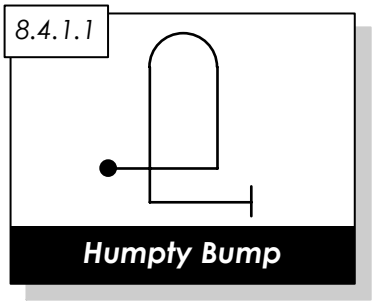
Interruption, Program: An interruption in the normal, unbroken sequence of flying each figure of a contest program. A program interruption may be intentionally taken by a pilot (e.g., to gain altitude) or unintentionally incurred through pilot error (e.g., turning the wrong way on the x-axis). In all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

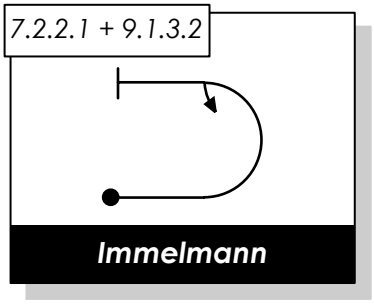
Judges, IAC Approved List of: A list of current and approved Judges maintained by IAC. Only Judges from this list, or another organization approved by the IAC, can be used at IAC sanctioned competitions.

Judges, National: The highest level of IAC Judges. National judges may judge at any IAC contest including the U.S. National Aerobatic and U.S. National Glider Aerobatic Championships.









Judges, Regional: The first level of IAC Judges. Regional judges may judge at any IAC contest except the U.S. National Aerobatic and U.S. National Glider Aerobatic Championships.

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, Sportsman through Unlimited, published at the beginning of each contest year. The first Known Compulsory is a qualification flight. *(See 5.2)*

Lay-down 8: Same as "Horizontal 8".

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).

Mark: Term which can be used synonymously with "Grade."

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.

NAA – National Aeronautic Association: The NAA, based in Washington, D.C., is the representative of the FAI in the United States. It, in turn, delegates specific powers to various sport aviation disciplines in the USA. Authority for aerobatics is delegated to the IAC.

NAC – National Airsports Control: The organization in each FAI-member country which controls airsport competitions in that nation. For example, the National Aeronautic Association (NAA) is the NAC for the United States.

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. (*Fig 8.5.36*)

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 their Four Minute Freestyle program to the judges. The term is used because the normal aerobatic box boundaries and X - Y axis do not exist for the Four Minute Freestyle.

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. *(See 8.6)*

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. *(See Fig 8.5.35)*

Primary: Both the entry level category of aerobatic competition and the category of choice for certain aircraft types which could not otherwise compete at higher levels. The Primary category sequence does not normally change year to year. There is no Primary category in Glider competition.

Program: The possible contest flights at Regional contests, as described in Chapter 5, are the Known (Qualification); Free; Unknown; and Four Minute Freestyle. At the U.S. National Aerobatic Championships only, some pilots may be required to fly either or both a Free Known and Free Unknown program. Descriptions of those two programs may be found in the *IAC Policy and Procedure* manual, Numbers 503 and 504.

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

Rank Index (RI): Produced by the judging analysis module in ACRO, Rank Index assesses how a Judge ranks the pilots in comparison to the rest of the judging panel. Reports produced by ACRO identify anomalies by figure and overall score. If properly utilized, these reports provide excellent feedback

to Judges and are an important tool in judges' education and training. RI's are also used by CIVA to select Judges for FAI Aerobatic Championships.

Relative: As used in reference to judging, any person connected to a competitor by family or marriage. Unless a scarcity of judges demands otherwise, "relative" should also include "significant others."

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

R & C Exam: An abbreviation for the IAC "Judge's Revalidation and Currency Examination" which is used to bring Regional and National Judges up-to-date on changes to the rules. Each judge must pass the R & C Exam annually to be included on the "Approved Judges List" for that contest year.

Reverse Cuban 8, Half: 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 Turn: Any of the figures from Family 2 which combine slow rolls with turning flight. Also referred to as a "Rolling Circle," primarily in CIVA competitions.

Safety Check Maneuver: Two half rolls with a pause at inverted, performed before entering the aerobatic box, to check the integrity of seat belts and inverted fuel and oil systems.

Score, Raw: The result of multiplying a Judge's grade times the "K" of the figure.

Score, Total Raw: The addition of all figure raw scores plus Presentation from the Form A.

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

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

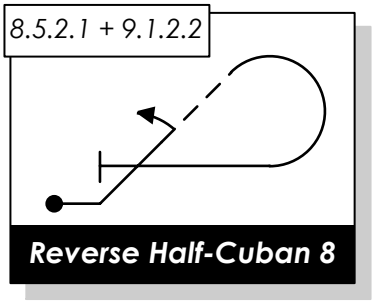
Shark's Tooth: Common name for any of the figures from sub-families 1.2.1 to 1.2.16.

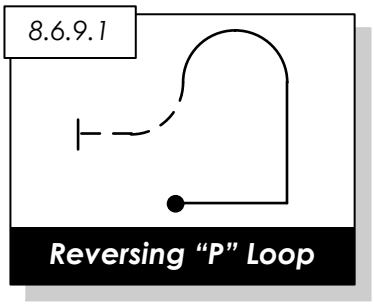
Should: As used in this rule book, "should" indicates the referenced action is desirable, but not mandatory, and there is no associated penalty for not performing the referenced action.

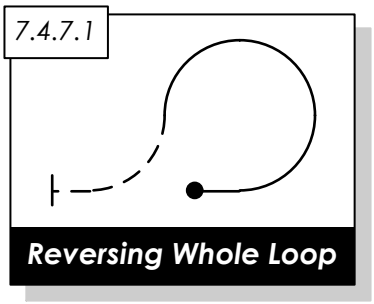
Slow Roll: A subtype of aileron roll characterized by continuous rotation ranging from 90 degrees to 720 degrees. "Slow" does not imply a particular rate of rotation which may, in fact, be very fast.

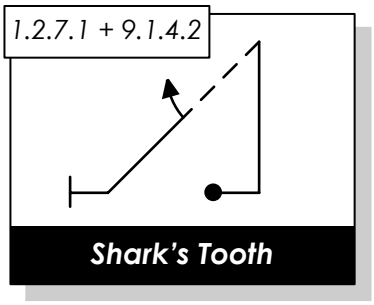
Snap Roll: One of two types of rolls as defined by the *Aresti Aerobatic Catalogue*. Snap rolls may either be "positive" or "negative". Also called "Flick Rolls".

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.

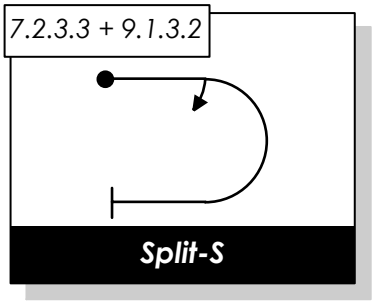








Split-S: Common name given to a Family 7 figure consisting of a half slow roll to inverted followed immediately by an inside half-loop down.



Sportsman: The second of the five categories of aerobatic competition. Sportsman competitors fly two programs: a Known Compulsory program which changes each year and, optionally, may either repeat the Known program or fly a Free program of their own design.

Stall Turn: Another name for a hammerhead. Primarily used in CIVA competition.

Super-Family (SF) Number: A number assigned to each figure in a Free Program to be flown at the U.S. National Aerobatic Championships, where the ACRO scoring program is used. Because the pilots fly different figures and/or numbers of figures, additional information is required so that the figures included in each data group are reasonably similar in type and complexity when analyzed by the Fair Play System (FPS). The sequence drawing programs, *Aresti* and *OpenAero*, automatically generate the SF numbers on demand, but SF numbers may be determined or checked manually by consulting *Appendix C* of the *FAI Sporting Code, Section 6, Part 1.*

Supplementary Rules: These rules are published by Contest Directors to augment the "IAC Official Contest Rules". They describe local conditions and problems and assist in applying IAC rules to a specific contest. They cannot contradict IAC rules except as approved under "waivers".

Tail Slide: Any of the Family 6 figures. *(See Fig 8.5.13 & 8.5.14)*

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 IAC Headquarters to the Contest Director for the Intermediate 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 five categories of aerobatic competition. Unlimited competitors fly three programs: a Known Compulsory program which changes each year, a Free Program of their own design, and an Unknown Program.

Versatility: The minimum Aresti Families which must be included in a pilot's Free Program.

Vertical Attitude: The zero lift axis which is the attitude causing the path of an airplane's center of gravity to travel exactly 90° up or down relative to the true horizon in zero wind.

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.

Waiver, Airspace: A document issued by the Federal Aviation Administration (FAA) that waives certain Federal Aviation Regulations in order to conduct a competition. These are applied for through local FAA Flight Standards District Offices (FSDO's) on FAA Form 7711-2.

Waiver, Rules: A letter from the IAC President relieving the contest from observing certain IAC rules. Such a waiver should be applied for in writing at the time of application for sanction. Waivers are not granted if safety is compromised, but only to solve local problems that are not safety-related.

Warm-up Flight: A competition sequence (Known, Free, or Unknown, as appropriate) flown by a non-competing pilot to allow the judges to "warm-up" their evaluation skills before the first "real" competitor flies. Normally, warm-up flights are only flown at Championship contests.

Wedge: Same as "Shark's Tooth".

Wingover: A pseudo-Aresti figure (Family 0.0) which may be flown in the glider Sportsman, and glider Intermediate categories only. (*Fig 8.5.1*)

Working and Non-Working Hours: These are hours established by the Contest Director in the supplementary rules that officially prescribe the times of day the contest is in operation. The purpose of these hours is to "stop the clock" on the protest period after which this clock may resume the next day.

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. (*Fig 4.11.1*)

Y Axis: The central axis of the Aerobatic Box oriented parallel to the judges' line-of-sight. The direction of figures flown parallel to the Y axis is at the pilot's option. (*Fig 4.11.1*)

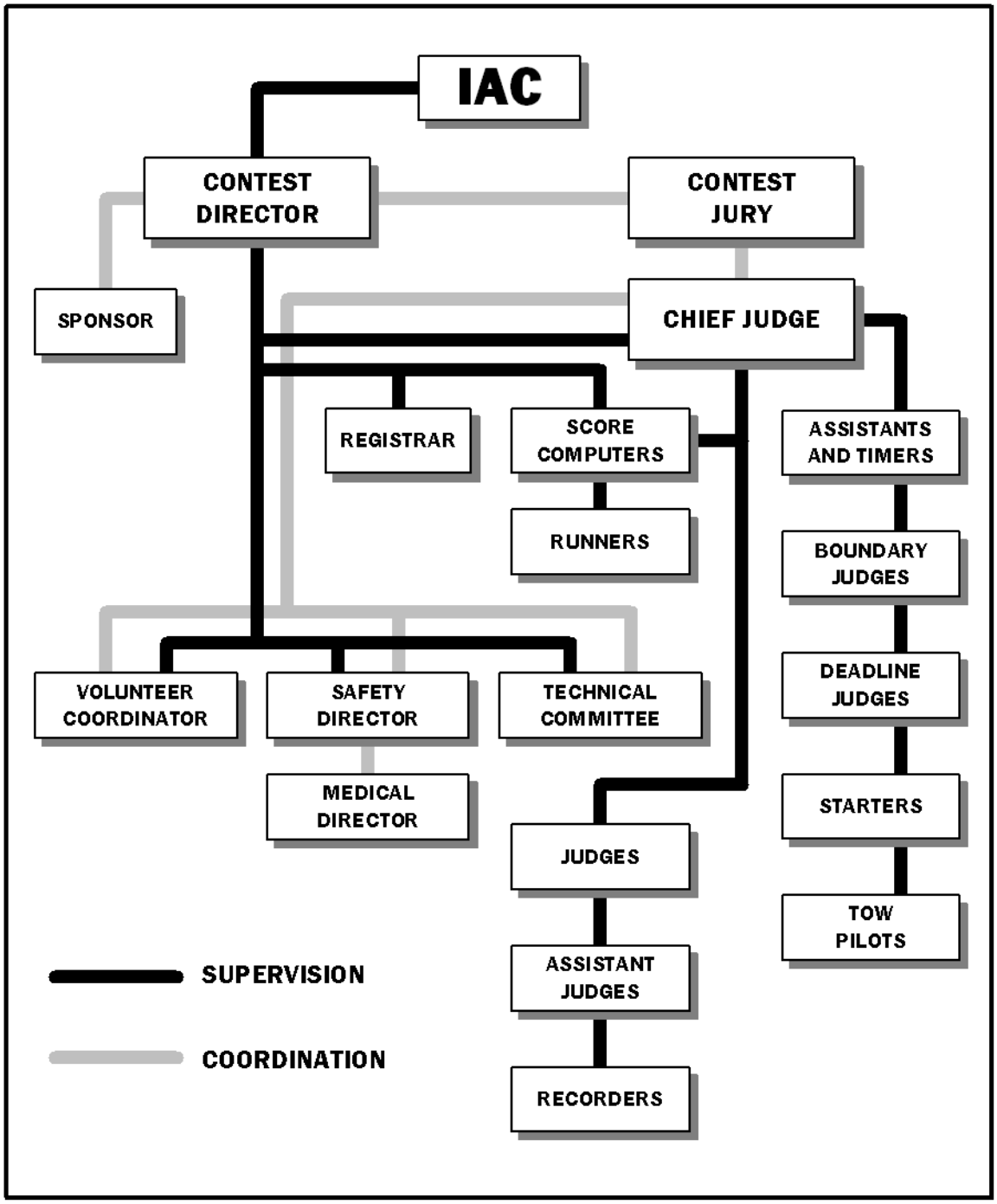
Zero, Hard: The mark used when a Judge perceives that the pilot has failed to meet a relevant criteria for a maneuver that is not simply a matter of point deductions due to poor execution (e.g., flying in the wrong direction on the X axis). Also used by the Chief Judge to indicate zero points as a result of failure to follow certain rules (e.g., starting a figure behind the judging line). When given by a grading judge, the Hard Zero is subject to the majority rule. The Hard Zero is indicated on the scoresheet with the notation, HZ.

Zero Lift Axis: See "Vertical Attitude".

Zero, Numeric: The mark used by a Judge to indicate zero points as a result of an accumulation of errors resulting in downgrades of 10 or more points. The numeric zero is not subject to the majority rule and stands just as any other numerical mark does. The numeric zero is indicated on the scoresheet with the notation, 0.0.

CHAPTER 1 CONTEST JOB DESCRIPTIONS

1.1 TABLE OF ORGANIZATION



1.2 SPONSOR

The sponsor of an aerobatic contest may be an IAC Chapter, a civic organization, a company, or an individual. The sponsor is the party responsible for application to IAC for a contest sanction and all subsequent administrative and financial matters.

1.3 CONTEST DIRECTOR

Safety will, at all times, be the primary consideration of the Contest Director. The Contest Director will act as the general manager of the event and will be responsible for the following:

(a) Conducting the contest in accordance with the *IAC Official Contest Rules* and the provisions of the Airspace Waiver.

(b) Appointing contest officials.

(c) Obtaining airspace waiver.

(d) Securing insurance and notification of IAC.

(e) Obtaining an IAC sanction.

(f) Coordinating with sponsors, airport and FAA officials.

(g) Coordinating with airport and FAA officials for any special takeoff and landing areas and procedures to provide for separation of competition and non-competition aircraft and communicating any such special procedures to all competitors.

(h) Designating and marking of the Aerobatic Box.

(i) Placing field markings.

(j) Making restrooms available.

(k) Setting up public address system, if used.

(l) Closing the field to non-competitors as required.

(m) Ensuring Unknown sequences for the categories competing at the contest are received from IAC HQ and checked for legality in accordance with Chapter 5 and Appendix 3/4.

(n) Receiving protests.

(o) Supervising the Scoring Director and posting of scores.

(p) Appointing the Contest Jury. For IAC Championship Events, refer to 1.4.1 and Appendix 6.

(q) Recommending to the Contest Jury that a competitor be refused entry or disqualified for reasons of safety, or unsportsmanlike conduct. *(See 4.2.2)*

(r) Presenting awards and/or prize money.

(s) Certifying scores. *(See 3.15.2)*

(t) Filing “Official Results and Final Standings” and “Judges Certification List” as required in the “Aerobatic Contest Planning Guide”.

(u) Arranging for qualified towplanes and towpilots.

(v) Arranging for a fire extinguisher to be present on the Starting Line.

1.4 *CONTEST JURY*

The Contest Jury will consist of a chairman and at least four (4) additional members. To insure the ability of the Jury to act in a timely manner when protests are filed, and when volunteer resources allow, the Jury Chairman should not hold additional duties as either the Contest Director or a Chief Judge. Alternates may be appointed to replace a jury member, including the Chairman, when a juror is involved in a protest or otherwise unable to serve because of a conflict of interest or any other reason.

1.4.1

For IAC Championship Events, the IAC Executive Committee must approve the Contest Jury Chairman. The remaining members of the Contest Jury and their duties for IAC Championship Events will be chosen in accordance with Appendix 6.

1.4.2

The Contest Jury is the arbitration body of aerobatic events and shall be responsible for:

(a) Interpreting the general rules, the judging rules, and the general regulations of the contests. The Contest Jury is not authorized to change any rule set forth in these *IAC Official Contest Rules*.

(b) Resolving protests.

(c) Approving modifications to Unknown sequences for the purpose of maintaining safety. Modifications and reasons for modifications will be reported with the contest results.

(d) Refusing entry or disqualifying competitors per the guidelines provided in 4.2.

(e) Determining the reason for a competitor's late arrival and allowing contest participation in accordance with 3.6.2.

(f) If any Jury member determines that the contest is being run in violation of *IAC Official Contest Rules*, he/she will contact the category Chief Judge and advise him/her of the problem. If the problem is not corrected, the Jury member will consult with the remainder of the Jury. The Jury is authorized to stop the contest until the deviation is corrected or resolved. The contest can then proceed with the permission of the Contest Jury.

1.4.3

Decisions made by the Contest Jury are final and not subject to change or further protest. The discussion and votes of individual members of the Contest Jury are to be kept strictly confidential.

1.5 *CHIEF JUDGE*

Safety will be the primary consideration of the Chief Judge at all times. There will be a Chief Judge for each category. A Chief Judge may serve in that capacity in more than one category. The Chief Judge will be responsible for the following:

(a) Supervising Judges, Assistant Judges, Recorders, Boundary Judges, Timers, Runners, Starter, and Deadline Judges.

(b) Conducting, or designating an alternate to conduct, the pilot briefing.

(c) Briefing, or designating an alternate to brief, all Judges, Assistants, Recorders, Boundary Judges, Deadline Judges, and Runners.

(d) Setting the "Official Wind Direction" which determines whether Form B or C will be used for flight programs.

(e) Authorizing changes in the pilot order of flight.

(f) Approving substitution of aircraft.

(g) Providing clearance before any competition aircraft enters the Aerobatic Box.

(h) Disqualifying, with the concurrence of a majority of Judges working that category, a competitor who has demonstrated an inability to safely control the aircraft during any portion of the flight program. *(See 4.2.3)*

(i) Recommending to the Contest Jury that a competitor be disqualified for reasons of unsportsmanlike conduct. *(See 4.2.2)*

(j) Awarding zero (HZ) marks for relevant infractions listed in Rule 7.3.

(k) Calling Judges' conferences when necessary. *(See 7.3.6)*

(l) Assessing penalties for improper program starts, missing roll call, missing order-of-flight on the starting line, boundary infringements, program interruption, and improper program restarts/signaling.

(m) Before allowing a competitor's forms to be removed from the judging line:

  (1) Reviewing the *Chief Judge Penalty Form* for accuracy and providing specific reasons for any Zeroed Flight Program, Disqualification, or Illegal Free penalties.

  (2) Ensuring that each competitor's Free Program Forms A, B, and C, are signed and dated to certify legality. In the case of unsigned forms, or any other irregularity noted in a Free Program, the Chief Judge will check the "Illegal Free Program" box on the *Chief Judge Penalty Form*. The checked box indicates the Free Program must be reviewed by the Contest Jury, who will determine if any penalties apply. *(See Rule 6.16)*

  (3) Directing the Runner, or other responsible party, to deliver directly to the Contest Jury any competitor's forms which have the "Illegal Free Program" box checked on the *Chief Judge Penalty Form.*

(n) Debriefing all Judges and Assistants after all flights are completed.

(o) Removing any Judge for reasons of incompetency.

(p) Serving as a member of the Technical Committee.

(q) If necessary, performing the duties of a grading Judge, except at IAC Championship Events.

(r) Appointing substitutes, with the concurrence of the Contest Director, for any officials who are unable to perform their duties.

(s) Certifying of scores. *(See 3.15.2)*

(t) Certifying Achievement Award applications.

(u) Responsibilities as specified in the contest *Incident Response Plan*.

1.6 *SAFETY DIRECTOR*

The Safety Director will report directly to the Contest Director and is responsible for the following:

(a) Flight safety - assisted by the Chief Judge and Technical Committee.

(b) Preparation and dissemination of the contest *Incident Response Plan* to all responsible parties. A detailed template of the plan is provided as part of the IAC contest package.

(c) Notification of Flight Service concerning NOTAMS.

(d) Ground safety - assisted by the Starter.

(1) Flight Line control.

(2) Crowd control.

(3) Arranging for parking of competition and transient aircraft.

(e) Review of safety items at contest briefings.

(f) Recommending to the Contest Jury that a competitor be disqualified for violating or refusing to follow established contest safety procedures.

1.7 *MEDICAL DIRECTOR*

The Medical Director will work in conjunction with the Safety Director concerning:

(a) Acquisition and placement of emergency equipment.

(b) Securing of medical personnel as required by the FAA waiver, i.e., physician, paramedic, or emergency medical technicians.

(c) Provisions for access and exit of emergency vehicles.

1.8 *VOLUNTEER COORDINATOR*

A Volunteer Coordinator may be appointed at the discretion of the Contest Director and will assist in the smooth function of the contest by obtaining volunteers for all contest positions. This is always done under the direction and with the consent of the Contest Director. The goal of the Volunteer Coordinator is to have obtained consent of volunteers to fill each and every contest position prior to the first pilot briefing. The Volunteer Coordinator will:

(a) Maintain a list of all contest volunteer positions.

(b) Obtain commitments from volunteers to serve in all positions under the guidance of the Contest Director.

(c) Maintain liaison at all times with the Contest Director and Chief Judge.

(d) At registration, finalize all positions and staff the unfilled positions.

(e) Maintain a list of all volunteers for the Contest Director, Chief Judge(s), and other officials as necessary. Additionally, the Volunteer Coordinator will compile a list of names, IAC numbers (if applicable), and number of flights worked in each category for each Judge and Judge Assistant.

(f) Coordinate with Judges, Assistants, Recorders, Boundary Judges, Deadline Judges, and others in preparation for each category change to minimize time loss during changes from one category to the next.

(g) Appointing a substitute Judge should any Judge be unable to complete his or her duties during a flight program. However, the substitute Judge shall only take his or her place on the judging line at the start of the subsequent program. *(See also 7.6.4(c))*

(h) Coordinates with the Scoring Director *(See 1.11)* to ensure each Judge and Judge Assistant working each program of each category are accurately recorded in the IAC scoring program.

1.9 TECHNICAL COMMITTEE

Each contest will have a Technical Committee for the primary purpose of assisting pilots in discovering potential safety hazards in their aircraft. The Technical Committee will consist of the Contest Director, a Chief Judge and the Chief Technical Monitor who is appointed by the Contest Director. Additional Technical Committee members may be appointed by the Contest Director as needed. The Technical Committee will be responsible for the following:

(a) Verifying that the competitor possesses required certificates and aircraft documents. *(See 2.1 and 2.3)*

(b) Determining the validity of a competitor's claim of mechanical defect and whether the failure was beyond the control of the competitor. *(See 4.18)*

(c) Denying further participation of an aircraft with an alleged technical fault until the fault is corrected to the satisfaction of the technical committee.

1.10 REGISTRAR

The Registrar shall be responsible for:

(a) Determining that each competitor is a current member in good standing of IAC, or if not an IAC member, holds a valid FAI Sporting License.

(b) Ensuring each competitor completes all current IAC standard entry forms before accepting them as official entrants.

(c) Obtaining the signature of all competitors on the waiver.

(d) Accepting published entry fees.

(e) Obtaining the required number of each competitor's Free Program Forms A, B, and C, and verifying that all forms have been signed and dated in accordance with 6.14.

(f) Drawing for order of flight.

(g) Issuing as many copies of the order of flight to contest officials as are required.

(h) Providing the Judging Line and Chief Judges with appropriate paperwork.

(i) Making available one copy of each Free Program (Forms A, B, and C) in an area accessible by all competitors. The Free Programs shall be made available in sufficient time to allow for review prior to the start of the first Free Program flight. Competitors shall be responsible for providing the extra copies necessary.

(j) Making available to each competitor flying an Unknown Program, one copy each of Forms A, B, and C at least 12 hours prior to the scheduled start of that Unknown program.

(k) Accepting membership fees for IAC.

(l) Such other duties as requested by Contest Director or the Chief Judge.

1.11 *SCORING DIRECTOR*

The Scoring Director shall be responsible to the Chief Judge and the Contest Director for:

(a) Ensuring the current version of the scoring system is being used.

(b) Understanding and adhering to all instructions and notices supplied by IAC concerning the scoring software.

(c) Prompt and accurate computations of all scores of competition flights.

(d) Accurate recording in the IAC Scoring System of all Chief Judges, Chief Judge Assistants, Grading Judges, and Grading Judge Assistants for each program of each category for the contest.

1.12 *STARTER*

Safety will be the primary consideration of the Starter at all times. The Starter is responsible for:

(a) Ensuring that a fire extinguisher is present on the starting line.

(b) Final briefings, including notifying each competitor of changes to the official direction of wind and challenging each competitor to ensure that his or her parachute and safety belts are properly fastened.

(c) The timely release of each competitor in order to take off at intervals set by the Chief Judge.

(d) In the event of an aircraft malfunction prior to take off, advising the Chief Judge of the change in the order of flight and launching the next competitor.

(e) Meeting aircraft landing after a mechanical abort; advising the competitor to stay with the aircraft and not attempt to fix the fault; and calling the Chief Technical Monitor or Technical Committee Member to investigate. *(See 4.18)*

(f) Duties as specified in the contest *Incident Response Plan*.

1.13 *JUDGES*

Judges are responsible for:

(a) Attending the Judge briefing at the beginning and debriefing at the end of each Program category.

(b) All aspects of grading the figures and presentation of each contest flight.

(c) The performance of their Assistant Judge and Recorder.

(d) Checking and certifying competitor Free programs in accordance with Chapter 6.

1.14 *ASSISTANT JUDGES*

One Assistant Judge is assigned to each Judge. The Assistant is responsible for helping the Judge determine the proper sequence of figures, direction of flight and other duties deemed necessary by the Judge.

1.14.1

One or more Assistant Judges may be assigned to the Chief Judge for the purpose of assuring the correct *Chief Judge Penalty Form (See Appendix 7)* and appropriate Forms A, B and C are ready and in proper order. The Assistants will fill these forms out under the direction of the Chief Judge.

1.14.2

Assistants to the Chief Judge shall have additional responsibilities such as timing of all Four Minute Freestyle flights, traffic safety, radio communications, and such other duties required by the Chief Judge.

1.14.3

To ensure accurate records for the Chief Judge and Assistant participation, the Chief Judge's name and IAC number, along with the name and IAC numbers of the two primary Chief Judge Assistants must be recorded on at least one of the *Chief Judge Penalty Forms* for each program.

1.15 *RECORDERS*

One Recorder is assigned to each Judge to record all grades and such comments as time permits on the competitor's Form A (scoresheet). The Recorder maintains possession of the clipboard with Forms A, B and C in the proper order of flight.

1.15.1

The Recorder hands the next pilot's Form B or C in Free programs to the Judge and Assistant Judge. After the flight is complete, the Recorder ensures the Judge gives a Presentation grade and confirms that every figure has a grade. The Recorder passes Form A to the Judge for a review of the comments and grades before it is released to the runner.

1.16 *BOUNDARY AND DEADLINE JUDGES*

Boundary and Deadline Judges are assigned and located to record and report each infringement of the Aerobatic Box and the Deadline, if one exists. A visual sighting device will be used to determine each aircraft violation of an Aerobatic Box boundary or Deadline.

These Judges are required at each IAC contest unless IAC Headquarters waives their use under a Supplementary Rule request approval *(See 3.5)*. In such cases, protests regarding boundary or deadline penalties will not be accepted. Boundary and Deadline Judges may be called upon to verify their records of infringement in the event a protest is filed.

1.16.1

Boundary Judges are responsible for:

(a) Attending a briefing given by the Chief Judge, or his designee.

(b) Reporting in real-time to the Chief Judge when the aircraft enters the Aerobatic Box buffer zone *(See 4.11)* for the first time at the start of the aerobatic sequence.

(c) Thereafter, reporting in real-time to the Chief Judge, each occurrence of a boundary crossing including which boundary was crossed and whether crossing out of the Box or crossing back in.

(d) Providing all boundary infringement records to the Chief Judge, or his designee, when the flight program is complete.

(e) Notifying the Chief Judge immediately if a non-contest (transient) aircraft is seen entering, or is on a course to enter, the aerobatic box.

1.16.2

Deadline Judges will be briefed by the Chief Judge or designee to monitor each excursion of the aircraft completely across the deadline. Real-time reports will be given as these excursions occur as well as the return back across the deadline.

1.17 *TOWPILOT DUTIES*

The towpilots are responsible for the safe tow of competition gliders to altitude and, when cleared by the Chief Judge, onto a base leg where the glider will release and enter the Aerobatic Box. These pilots will also make reports of turbulence, precipitation, visibility, and ceilings, as requested by the Chief Judge.

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CHAPTER 2 QUALIFICATIONS

2.1 COMPETITOR QUALIFICATIONS

Competitors must be current members of the IAC; or hold a valid FAI Sporting License issued outside the USA; or document that they are current members of an aerobatic organization that has been delegated aerobatic sporting powers by their country's National Airsports Control (NAC). Two examples of qualifying organizations are "Aerobatics Canada" and the "BAeA".

In order to be registered in a contest, each competitor must possess a minimum of a Sport Pilot certificate if flying a qualifying Light-Sport aircraft (LSA), or at least a Recreational Pilot certificate with rating appropriate for the class of aircraft to be flown (power or glider) if flying an aircraft other than a LSA. However, a pilot with a Sport Pilot certificate may fly a non-LSA aircraft in Primary or Sportsman, if accompanied by a Safety Pilot *(See 2.2)* who holds the appropriate certificates and endorsements for the aircraft in question.

With the exception noted below, all competitors, regardless of pilot certificate held, must either be in compliance with the FAA rules for medical certification that are in effect at the time of the competition, or hold a current medical certificate appropriate to the pilot's license from another country or the appropriate form issued by any branch of the U.S. Armed Forces. The appropriate proof of medical certification must be shown to contest officials on request.

A competitor is not required to meet FAA Medical certification rules, if flying with a Safety Pilot who qualifies *(See 2.2)* as the Pilot-In-Command (PIC) in the competitor's make and model aircraft. This paragraph does not remove the requirement for all competitors to hold a valid pilot certificate even if flying with a PIC-qualified Safety Pilot.

Those glider pilots not possessing a valid Medical Certificate from the FAA or its national counterpart must attest to freedom from uncorrected inner ear, nervous, or cardiovascular disorders which render the pilot at risk in flying glider aerobatics and must be willing to submit to examination by the Medical Director.

U.S. Military personnel operating U.S. Military aircraft are exempt from the requirement for a civilian pilot certificate, but must possess appropriate U.S. Military authorization to operate the aircraft. The senior officer in charge of the military personnel attending an IAC competition will confirm with the Contest Director, either verbally or in writing, that all military competitors are appropriately authorized.

2.2 SAFETY PILOTS

The competitor will be the sole occupant of the aircraft during competition flights except in Primary through Intermediate power categories and all glider categories, wherein "safety pilots" are authorized. The Safety Pilot must have aerobatic competition experience and, if flying with a competitor who does not possess a valid FAA medical, or equivalent *(See 2.1)*, must hold all certificates and endorsements to qualify as PIC in the competitor's make and model aircraft. The competitor has the sole responsibility for determining the qualifications of an individual to act as a Safety Pilot in the competitor's make and model aircraft.

Competitors who are also acting as a Safety Pilot in the same category, must fly their Unknown Program before flying as a Safety Pilot for another competitor in the Unknown Program.

2.3 *AIRCRAFT AND EQUIPMENT ENTRANCE REQUIREMENTS*

Compliance with the following aircraft and equipment documentation and safety standards is required for participation in an IAC contest and shall be verified by the Technical Committee. Copies are allowed for the purposes of registration only. However, this does not relieve the competitor from carrying documents required by governing agencies. Technical Inspectors will use the IAC "Technical Inspection Checklist" when performing technical inspections for contest registration. The items listed on the checklist are those required for admittance. The IAC "Technical Inspection Checklist" form is provided as part of the official IAC contest package.

(a) Airworthiness Certificate.

(b) Aircraft Registration Certificate or military serial number designation.

(c) Aircraft operating limitations.

(d) Current aircraft weight and balance.

(e) Copies of entries from Aircraft and Engine Log Books, appropriate to the aircraft's Airworthiness Certificate.

(f) Certificate of Insurance verifying coverage of $1,000,000 property damage and $100,000 single limit bodily injury minimum.

(g) Aircraft must not have obvious physical damage or potential structural problems as would be indicated by wrinkles in metal or fabric coverings or loose structural members.

(h) Complete freedom of movement of the controls is required.

(i) Aircraft must be free of foreign and loose objects.

(j) If the canopy, or door for cabin-type aircraft, is hinged on the forward (leading) edge, it must incorporate a quick-release mechanism to facilitate emergency egress.

(k Dual seat belts with separate attach points and a shoulder harness are mandatory for Advanced (power) and Unlimited (power and glider) categories. Gliders flying in the Advanced category must have a backup seat belt that may share an attach point with the primary seat belt. The same equipment is strongly recommended for Primary, Sportsman, and Intermediate power categories, but is not mandatory except when IAC Technical Monitors deem them necessary for the sequence being flown in these categories.

(l) Hazardous conditions in the engine compartment such as cracked exhaust, fuel leaks, or excessive oil leaks which can be observed through cowl openings and service doors will be brought to the pilot's attention and, if uncorrected, are grounds to deny registration of the aircraft.

(m) Propeller shall not have any apparent physical damage.

(n) The personal parachute or the aircraft's ballistic recovery system, if so equipped, will be in good general condition and will be current in accordance with FAA regulations.

(o) Aircraft Structural Standards - Experimental (Amateur-built and Exhibition): The IAC cannot and does not purport or attempt to regulate or require aircraft structural standards for participation in the sport of aerobatics. Each competitor is solely responsible for insuring that his or her aircraft is structurally and mechanically safe and capable of performing whatever maneuver the competitor intends to fly. The Technical Committee shall promote conformity to FAA standards of construction and maintenance.

(p) Aircraft other than Experimental (Acrobatic): Structural standards for other than experimental aircraft are the responsibility of the controlling government agency. These aircraft must comply with the IAC entrance requirements. Aircraft will not be permitted to fly any maneuvers restricted by the licensing agency.

(q) A radio capable of transmitting and receiving common VHF frequencies.

(r) The use of a helmet is strongly recommended for all competitors and safety pilots, but is not mandatory.

(s) The use of a flight suit and gloves composed of at least a single layer of fire-retardant fabric is strongly recommended for all competitors and safety pilots, but is not mandatory.

(t) If glider categories are not flown at a contest, gliders will be permitted to enter the power categories. A glider may always enter the Primary category, even if glider categories are flown. In this situation, the glider competitor is solely responsible for providing a qualified tow plane and pilot.

Glider competitors flying in power categories will be treated as if they were flying powered aircraft. That is, gliders will fly according to power rules for the category entered, including all three flights (Known, Free, and Unknown, as applicable). Additionally, power Aresti figure K, power category free construction rules, and power category Known and Unknown sequences shall apply. Gliders entered into power categories will be judged using the same criteria as power aircraft except that glider rules regarding level lines and snap roll placement will apply for all categories. The flying and judging of 30 degree lines will apply for the Primary, Sportsman, and Intermediate glider categories. Scores will be compiled and listed in order with the Power competitors.

(u) Motorgliders are allowed to compete in Power or Glider (or both - See 3.8) categories. If competing in a power category, with engine operating in the competition box, motorgliders must comply with all power rules with no exceptions. If competing as a glider, in either a power or glider category, all glider rules must be followed with only one exception: the engine may be used for launch and recovery, but must be shut down from the time the motorglider is cleared into the box until the pilot departs the box to land.

2.4 *CHIEF TECHNICAL MONITOR*

If possible, the Chief Technical Monitor will hold an Airframe and Powerplant Mechanic's license and be familiar with the special operational demands of aerobatic aircraft. If an A & P is not available, the Contest Director may appoint the most qualified person available as Chief Technical Monitor.

2.5 *CHIEF JUDGES*

Chief Judges are appointed by the Contest Director.

(a) Chief Judges will be selected from the current *IAC Approved List of Judges*.

(b) Chief Judges will be current IAC National Judges; however, in the absence of a current IAC National Judge at a Regional Contest, the Contest Director will appoint the most experienced Regional Judge meeting the currency requirements of 2.6.3 as a Chief Judge.

2.6 *JUDGES*

Judges will be selected from the current *IAC Approved List of Judges*, which is maintained at IAC Headquarters and published on the IAC web site. The list specifies both the certification and currency status of each judge in accordance with the requirements set forth in this section.

(a) Judges must be members of IAC to appear on the *IAC Approved List of Judges*.

(b) Only listed Regional, National, and Regional-N (certified National Judges who do not meet the currency requirements of 2.6.3) judges may act as grading judges.

(c) Judges who do not appear on the *IAC Approved List of Judges*, including International (CIVA) Judges and Judges of other aerobatic organizations recognized by IAC, may judge at IAC sanctioned contests, provided: (1) Their judging credentials can be verified by the IAC Judge Certification Chair; and (2) that judge has passed the IAC Revalidation and Currency (R&C) Exam for the current contest year. Because of delays inherent with updating the *IAC Approved List of Judges*, a confirmation e-mail from the IAC Judge Certification Chair will suffice as proof of IAC Judge currency.

(d) Relatives *(See Glossary)* of competitors may not act as grading judges in categories wherein their relatives are competing.

(e) The qualification and selection of judges for IAC Championship events is governed by the procedures outlined in the IAC Policy & Procedure Manual, Section 501.4. In addition to the IAC judges, meeting the criteria of 501.4, IAC members on the official CIVA List of Judges meeting the currency requirements of 2.6(c) and 2.6.3 may also be appointed to judge non-Team Selection flights at IAC Championship events. (See Appendix 6)

(f) A competitor may serve as a Judge only if the competitor can attend every Judges' briefing and debriefing session for the flight program(s) he or she wishes to judge.

2.6.1 *NEW CANDIDATES FOR REGIONAL JUDGE*

To be certified and added to the *IAC Approved List of Judges,* new candidates for Regional Judge must complete a training program consisting of academic and practical elements as described below. Written and oral exams complete the certification process.

Academic Training:

(a) The Regional Judge academic training is composed of two sessions: Session 1 is titled, "Introduction to IAC and the Aresti Language" and covers basic contest administration and operation along with learning the Aresti symbolic language. Session 2 is "Practical Aerobatic Judging" and covers the essence of judging including grading criteria and the rules and responsibilities essential to performing the tasks of a grading judge. Session 1 may be completed either by attending the first day of a 2-day, lecture-based class, or it may be accomplished by completing the online "Introduction to IAC and the Aresti Language" course along with the associated Judge Knowledge quizzes available on the IAC web site. Credit for completion of the online training will be acknowledged by an official IAC

communication. Proof of successfully completing the Session 1 online training must be provided when registering for Session 2 in the classroom.

(b) Classroom training is provided by IAC-Certified instructors hosted by local Chapters. A schedule of training locations and dates may be found on the Judges School Calendar of the IAC web site.

(c) Both academic training sessions described above must be completed within the current or previous contest year. If a candidate completed the academic training prior to the previous contest year, then completion of either Session 2 or attending the "Advanced Aerobatic Judging" course (described in 2.6.2, below) within the current or previous contest year may be used to satisfy this requirement.

(d) Following completion of both Sessions 1 and 2, the *IAC Regional Judge Exam* (available on the IAC web site here) must be taken and passed within the current or previous contest year with a minimum score of 80%.

Practical Training:

(e) The new Regional Judge Candidate must perform the duties of Assistant to a grading Judge (Recording does not suffice) for no less than 40 flights, of which 10 are Advanced or Unlimited category, within the current or previous contest year. The requirement for at least 10 of the 40 flights to be in the Advanced or Unlimited category will be waived for a candidate who has competed in Advanced or Unlimited within the current or previous contest year.

(f) At a chapter practice day, a contest practice day, or as a non-contest activity behind the Judges Line during contest flying, the prospective judge candidate must award grades for a minimum of 3 flights, each flight composed of a minimum of 9 figures, under the supervision and coaching of a current Judge. The supervising Judge shall report the satisfactory accomplishment of this instruction to IAC.

If more than three (3) supervised training flights are accomplished, each additional training flight will reduce the requirements for Assistant Judge experience specified in subparagraph (e) by five (5). For example, completing a total of 5 supervised training flights with a current judge/coach would reduce the minimum number of Assistant Judge flights required to 30, ten of which must be Advanced or Unlimited if the 'recent competitor' waiver of subparagraph (e) above does not apply.

Practical Exam and Certification:

(g) Following successful completion of the requirements delineated in 2.6.1(a) through (f) above, the candidate must request a current National Judge to select another current Judge to jointly administer an oral/written Practical Exam, to be accomplished in person at a time and place mutually agreeable between the candidate and examining Judges. Prior to commencement of the Practical Exam, the candidate must present to the examining judges an official IAC communication stating that all prerequisites were successfully completed.

The examining Judges must use the Practical Exam to ensure the candidate will be able to perform the duties of a Regional Judge. As a minimum, this will be accomplished by reviewing with the candidate all questions marked with incorrect responses on the *Regional Judge Exam*, and testing the candidate's knowledge of the rules and practical ability to apply those rules and judging criteria within a competition scenario.

Upon satisfactory completion of the Practical Exam, the examining Judges will submit, via email or the IAC web site, a report of the exam's result, including the date of the exam and the examining Judges' names and IAC numbers, to the IAC Judges Certification Chairman.

(h) Once all requirements of 2.6.1(a) through (g) have been met, the candidate will be certified as a Regional judge and the IAC official records will be updated accordingly. The newly certified Regional Judge will be added to the *IAC Approved List of Judges* upon completion of the current-year *Revalidation and Currency (R&C) Exam*. However, the *R&C Exam* is not required if the newly certified Judge completed the academic training sessions, *Regional Judge Exam*, and *Practical Exam* within the current contest year.

2.6.2 *NEW CANDIDATES FOR NATIONAL JUDGE*

National Judges may judge at any IAC contest including the U.S. National Aerobatic Championship. They are distinguished from Regional Judges by obtaining an increased amount of academic training and practical experience. Regional Judge candidates for National Judge will be certified after:

Academic Training:

(a) Completing the 1 day, classroom-only "Advanced Aerobatic Judging" seminar, or alternatively, Session 2 of the "Introduction to Aerobatic Judging" course within the current or previous contest year.

(b) Passing the current *IAC National Judge Exam* with a minimum score of 80% within the current or previous contest year.

Practical Training:

(c) Achieving the practical experience described below:

1) Performing as a Regional Judge in at least three (3) contests for no less than 80 flights, within the current or previous two contest years. Twenty five (25) of the flights graded shall be Advanced or Unlimited. This requirement shall be waived If the Regional Judge has competed in the Unlimited or Advanced categories in the current or previous contest year. All of the requirements of this paragraph shall be waived if the Regional Judge has graded 250 flights or more since their certification, as reported by the IAC database.

2) Serving as the Assistant to a Chief Judge for a minimum of ten (10) flights, within the current or previous two contest years.

Practical Exam and Certification:

(d) Following successful completion of the requirements delineated in 2.6.2(a) through (c) above, requesting a current National Judge to select another current National Judge to jointly administer an oral/written Practical Exam, to be accomplished in person at a time and place mutually agreeable between the candidate and examining Judges. Prior to commencement of the Practical Exam, the candidate must present to the examining judges an official IAC communication stating that all prerequisites were successfully completed.

The examining Judges must use the Practical Exam to ensure the candidate will be able to perform the duties of a National Judge. As a minimum, this will be accomplished by reviewing with the candidate all questions marked with incorrect responses on the National

Judge Exam, and testing the candidate's knowledge of the rules and practical ability to apply those rules and judging criteria within a competition scenario.

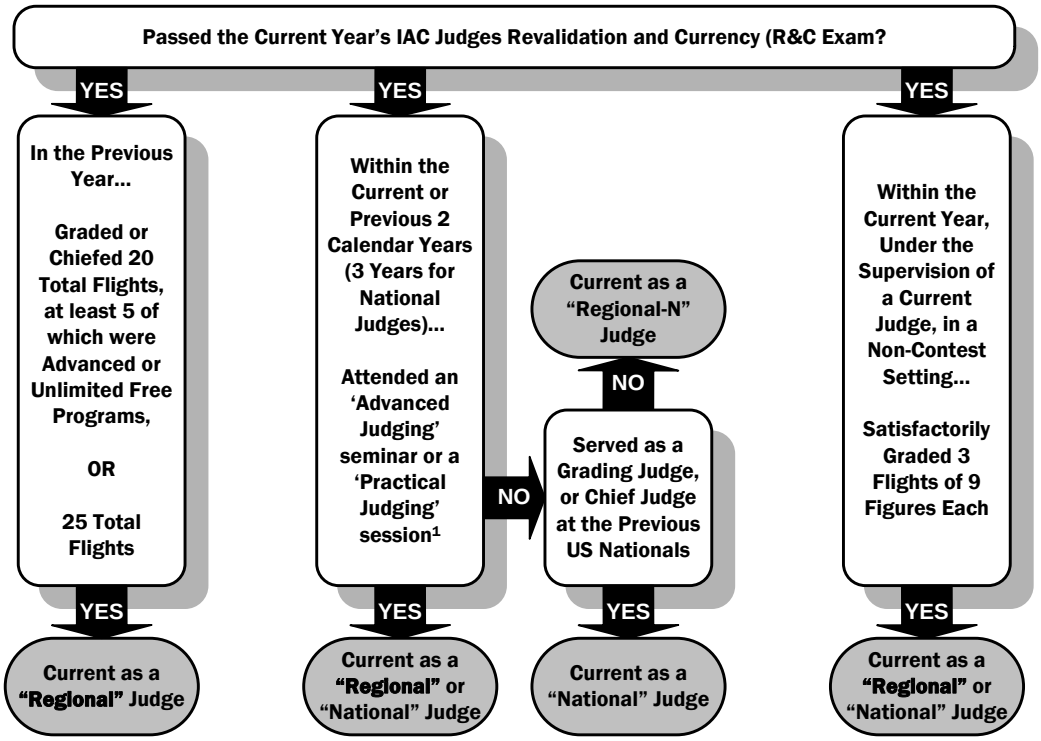
Upon satisfactory completion of the Practical Exam, the examining Judges will submit, via email or the IAC web site, a report of the exam's result, including the date of the exam and the examining Judges' names and IAC numbers, to the IAC Judges Certification Chairman.

(e) Once all requirements of 2.6.2(a) through (d) have been met, the candidate will be certified as a National judge and the IAC official records will be updated accordingly. A newly certified National Judge will be added to the *IAC Approved List of Judges* provided they have also completed the current-year Revalidation and Currency (R&C) Exam.

2.6.3 *CURRENCY REQUIREMENTS FOR REGIONAL AND NATIONAL JUDGES*

The *IAC Approved List of Judges* lists all IAC judges who the IAC Judge Certification Chair has verified meet the currency requirements detailed in paragraphs (a) through (d) below, and as illustrated in the following Figure 2.6.1.

Fig 2.6.1



[1]Note
'Practical Judging' session is Session 2 of the "Introduction to Aerobatic Judging" class.

(a) In order to attain currency and be added to the *IAC Approved List of Judges* for the current contest year, each Judge must pass the current year IAC Revalidation and Currency (R&C) Exam with a minimum score of 80% and have been a grading or Chief Judge for twenty-five (25) flights within the previous calendar year in IAC sanctioned contests. Equally acceptable will be judging twenty (20) flights provided at least 5 flights were Advanced or Unlimited Free Programs.

(b) If a judge did not serve as a grading or Chief judge for the number of flights prescribed in 2.6.3(a), but has attended an approved IAC "Advanced Aerobatic Judging" seminar, or the "recurrency portion" (2nd day) of an approved IAC "Introduction to Aerobatic Judging" seminar within the previous two (2) calendar years, currency may be retained by passing the current year IAC Revalidation and Currency (R&C) Exam.

(c) If a judge did not serve as a grading or Chief judge for the number of flights prescribed in 2.6.3(a), then currency may be regained by:

(1) Attending a sanctioned IAC "Advanced Aerobatic Judging" seminar or,

(2) Attending the "Practical Aerobatic Judging" session of the "Introduction to Aerobatic Judging" training or,

(3) At a chapter practice day, a contest practice day, or as a non-contest activity behind the Judges Line curing contest flying, the non-current Judge must award grades for a minimum of three flights, each flight composed of a minimum of nine figures, under the supervision and coaching of a current Judge. The supervising Jude shall report the satisfactory accomplishment of this requirement to IAC.

(4) The non -current judge must also pass the current year IAC Revalidation and Currency (R&C) Exam in order to be considered current. This may be accomplished before or after the other training outlined in 2.6.3 (c).

(d) In addition, a National Judge will revert to a "Regional-N" Judge currency unless they have either:

(1) Attended an approved IAC "Advanced Aerobatic Judging" seminar or the "recurrency portion" (2nd day) of an approved IAC "Introduction to Aerobatic Judging" seminar within the previous three (3) calendar years; or

(2) Performed as a Judge at the U.S. National Aerobatic Championships in the previous contest year.

(e) A judge retains currency until the publication of the current year IAC *Revalidation and Currency (R&C) Exam*, as long as that judge's name was on the list of qualified judges as of December 31 of the previous year.

2.7 *ASSISTANT JUDGES*

Assistant Judges are not required to be chosen from the current *IAC Approved List of Judges*, but must have the ability to fluently read aerobatic competition sequences, look up *Aresti Aerobatic Catalogue* numbers, and follow the judge's instructions. Additionally, it is preferred that they have:

(a) Attended an approved IAC Judges School; or

(b) Completed the IAC Regional Judge Exam; or

(c) Competition aerobatic experience.

2.8 *RECORDERS*

Recorders are not required to be chosen from the current *IAC Approved List of Judges*. Recorders must have the ability to listen for a Judge's grades and comments and enter them rapidly and clearly on the competitor's scoresheet as instructed by the Judge.

2.9 *BOUNDARY AND DEADLINE JUDGES*

Boundary and Deadline Judges are not required to be chosen from the current *IAC Approved List of Judges*. However, they must:

(a) Have good eyesight.

(b) Read aerobatic sequences well enough to discriminate between the beginning and end of figures.

(c) Follow the Chief Judge's instructions.

(d) Report all boundary infringements via radio to the Chief Judge. *(See 1.16)*

(e) Make a written record of all boundary infringements.

2.10 *APPROVED LIST OF JUDGES*

The IAC Board of Directors has the responsibility for establishing procedures and delegating the authority for maintaining the current IAC Approved List of Judges.

(a) A Judge who is determined by the Board of Directors to have exercised considerable misjudgment or prejudice will receive a reprimand from the Board.

(b) In case a Judge subsequently repeats similar failures, the Board may drop the Judge's classification or remove his or her name from the *IAC Approved List of Judges*.

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CHAPTER 3 ADMINISTRATION OF THE CONTEST

3.1 AIRSPACE WAIVERS

An airspace waiver must be obtained if required by government regulation for all sanctioned contests. The Contest Director will contact the controlling agency well in advance of the contest date. In the United States, this agency is the local FAA Flight Standards District Office (FSDO).

3.2 SANCTIONING BY IAC

3.2.1

All sanctioned contests shall be conducted under the rules as set forth in this manual. Any sanction granted under these rules shall immediately and automatically terminate without notice upon the breach, by contest officials, of any of the rules set forth in this manual. The sanction shall be requested at least thirty (30) days in advance of the contest.

3.2.2

No one may use the name or logo of the IAC, EAA, NAA, or FAI, either directly or indirectly, without sanctioning. Application for sanction will be made with IAC on official forms provided by IAC Headquarters.

3.3 CONTEST INSURANCE

In order to be sanctioned, an aerobatic contest must be covered by an airmeet liability policy that includes the *International Aerobatic Club*, the *Experimental Aircraft Association*, and the *National Aeronautic Association* as named insureds. Written verification of coverage must arrive at IAC Headquarters at least seven (7) days prior to the event. For all information on insurance coverage, the IAC Sanctions Director should be contacted.

3.4 NUMBER OF JUDGES

A minimum of three (3) and a maximum of ten (10) grading judges meeting the currency requirements of 2.6.3 must be used for each category to hold an IAC sanctioned contest. All possible effort should be made to use at least five (5) grading judges for each category. However, there is no requirement to use an odd number of judges.

3.5 SUPPLEMENTARY RULES AND WAIVERS OF RULES

3.5.1

The Contest Director may, within the scope of these rules and with approval by the IAC Contest Sanctioning Committee, issue supplementary rules that clarify organizational details and which deal

with local conditions and problems. Such proposed supplementary rules must be attached to the application for sanction.

3.5.2

No waivers of established rules will be authorized under an official sanction without approval of the IAC Contest Sanctioning Committee. Any requests for waiver of rules should be requested in writing at the time application for sanction is made.

3.5.3

Supplementary rules and approved waivers will be published and made available to competitors.

3.5.4 *TOWPLANES*

The organizers must provide an adequate number of towplanes equipped with two-way radios and capable of safe towing of all gliders registered in the contest. The availability of a back-up towplane is encouraged.

3.6 *REFUSAL OF ENTRY AND LATE ARRIVALS*

3.6.1 *Refusal*

Pilots and aircraft not meeting the requirements of 2.1 and 2.3 will be refused entry.

3.6.2 *Late Arrivals*

A late-arriving competitor shall be allowed entry under the following conditions:

(a) If the competitor arrives before all other competitors competing in his/her category have completed the Known Program, and he/she completes registration, receives a technical inspection and briefing, and is on the line and ready to fly prior to the end of the Known Program.

(b) If the competitor arrives after that competitor's category's Known Program has been completed, but the Contest Jury determines that the late arrival was due to conditions outside the competitor's control. In that case, the Contest Jury has the right to allow a late competitor to fly all flights.

(c) If the competitor's tardiness was within his/her control, as determined by the Contest Jury, the competitor shall be awarded a zero for all completed Flight Programs, but will be allowed to fly the remaining, uncompleted Flight Programs.

At its discretion, the Contest Jury may require the competitor to fly the Known Compulsory as a qualification flight before any other Flight Programs are flown. In that case, if the Known Compulsory in the competitor's category has been completed, the flight will be scored for the competitor's information, but the zero for the flight will stand. The qualification standards of rule 5.2 apply.

3.7 *WITHDRAWAL OF ENTRY*

3.7.1

A competitor may withdraw from a contest at any time. *(See also 3.15.3 and 7.6.4(e))*

3.7.2

If a competitor withdraws prior to the beginning of the first competition flight in his or her category, the entry fee will be returned.

3.8 *COMPETITORS PER CATEGORY*

The minimum number of competitors to comprise a category for official ranking and trophies is two. Competitors will not be allowed to enter more than one category in a contest. However, competitors may also enter a lower category for record only in order to secure an Achievement Award with "Stars", but not in competition for trophies. This does not preclude a competitor from entering a different category at another contest or from entering both a power and a glider category at the same contest.

Should a category have only a single competitor, that pilot may be allowed to compete "Hors Concours (H/C)" Judging and processing of the grades for the H/C pilot will be conducted normally, but that pilot will not be eligible for any medals or trophies. The results will, however, be counted toward eligibility for special awards at the contest (e.g., Grassroots) and point totals for regional or collegiate awards.

3.9 *TROPHIES AND RECOGNITION*

Individual 1st, 2nd and, if three or more competitors flew, 3rd place trophies will be awarded to category winners at all sanctioned contests.

3.9.1

(a) Individual 1st, 2nd and 3rd place medals for each flight (Known, Free, and Unknown) may be awarded at the option of the Contest organizers.

(b) Prize money may be awarded at the discretion of Contest organizers.

3.9.2

The highest ranking first-time power and glider Sportsman competitor will each be recognized with separate awards.

3.9.3

Awards for other special categories, as currently defined and recognized by the IAC, will be presented, as appropriate. Distinct recognition will be given to the Contest Director, Chief Judges, and Grading Judges. Recognition of all volunteers is highly encouraged.

3.10 *CHAPTER TEAM TROPHY*

Chapter Team Trophies may be awarded at all IAC sanctioned contests at the option of the Contest organizers. It will be presented to the IAC Chapter whose top three members, regardless of category, achieve the highest average score. This score will be derived by using the percent of possible points achieved by these three competitors and averaging them. All flight programs flown at the completion of the contest will be counted, with the exception of the Four Minute Freestyle. In the event of a tie, those Chapters' next highest placing competitor's scores will be used. Any perpetual trophy will be retained by the winning chapter for one year.

3.11 *CANCELLATION OR POSTPONEMENT OF THE CONTEST*

No contest shall be canceled 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.

3.12 *ENTRY FEES*

The amount of the entry fee will be determined by the Contest Director and collected by the Registrar.

3.13 *ENTRY AND OTHER FORMS*

3.13.1

By signing the "IAC Official Contest Entry Form", each entrant agrees to comply with and be bound by these rules as revised from time to time.

3.13.2

An entrant must pay the entry fee and submit completed standard IAC forms as follows:

(a) Official Contest Entry Form.

(b) As many copies of Free Program Forms A, B and C as required by the Contest Director.

3.13.3

All competitors must sign the FAA waiver thereby signifying that they understand and will comply with all of its provisions.

3.14 *NON-COMPETITION FLYING*

All flying not directly related to the contest is prohibited after a time designated by the Contest Director. If not otherwise designated, the prohibition begins immediately following the initial contest briefing.

(a) This rule may be waived by the Contest Jury under special circumstances, such as to allow "weather probe" flights or for test flights following repairs made during the contest.

(1) If a test flight is required, the flight will consist of a maximum of three aerobatic figures approved by the Jury;

(2) A member of the Jury will observe the test flight from the ground to ensure compliance.

(b) Once non-competition flying has been prohibited, a competitor may leave the contest site by air only with the approval of the Jury and in a nonaerobatic aircraft. It is the competitor's responsibility to ensure weather conditions will allow return to the contest site in time for the following day's pilot's briefing. The penalties of 4.6.1 will apply, along with possible loss of their position in the order of flight (*See 4.9.4*), for failure to do so.

(c) Any non-competition flight conducted without the approval of the Contest Jury will result in disqualification of the competitor from the contest. *(See 7.6.4(d))*

3.15 *OFFICIAL SCORES AND FINAL STANDINGS*

3.15.1

Contest Officials shall take reasonable action to ensure that provisional scores and standings are posted as soon as possible after a category's Program is complete. The Contest Director and Chief Judge need not sign these provisional scores, but the time of posting must be included on the sheets.

3.15.2

The provisional scores and standings become final when their protest period has expired. *(See 3.16)* The Contest Director and Chief Judge will review the computation of all scores as soon as practicable and certify the scores as official by affixing their signature and date.

3.15.3

Once a pilot has received grades for any contest flight, those grades must be entered into the scoring system and that pilot's scores must never be deleted from the scoring system, even in the case of a disqualification or withdrawal. Disqualification and withdrawals will be handled in accordance with 7.6.4(d) and (e), respectively.

3.16 *PROTESTS*

Any competitor or judge ("Grievant") is eligible to submit a protest to the Contest Jury for consideration and possible action.

3.16.1

The following procedures will be used:

(a) Protests will be submitted in writing on the IAC *Official Protest Form* to the Contest Jury Chairman, either directly or through any member of the Jury. Every protest must refer to the rule(s), policy, or other official document to which it relates.

(b) The protest must be accompanied by a fee of $50.00, which will be returned if the protest is upheld. However, Judges may submit protests for any category in which they are serving as a Judge without a fee.

(c) Protests must be submitted not later than two (2) hours after the occurrence, decision, or publication of results which causes the protest to be made. "Non-working hours", as defined by the contest officials, will not be counted. The Jury can accept a protest after the protest period expires if the Grievant was a volunteer whose commitments prevented submitting the protest within the defined period.

3.16.2

The hearing of the protest will be conducted as follows:

(a) The hearing shall be conducted as soon as possible after the receipt of the protest.

(b) The Grievant(s) is entitled to be present at the hearing and to call witnesses and present evidence. Persons not directly involved with the protest will be excluded from the hearing.

(c) The Jury Chairman will preside over the meetings of the Contest Jury. The Chairman will question each juror about his or her impartiality prior to the hearing and will replace any juror who has a conflict of interest. At least three (3) members of the Jury must be present to hear protests.

(d) Should the protest involve one or more judge's figure grade(s) on the Form A Scoresheet and the protest is upheld, the Jury may take one of three actions:

(1) A numeric grade (0.0 to 10.0) may be changed to an HZ.

(2) An HZ may be changed to a "C" (Conference Average).

Note: If the protest is at the U.S. National Championships with the ACRO scoring system in use, see the IAC *P&P Sections 503.4.6.2 and 503.4.6.3* for the proper handling of confirmed and unconfirmed HZ marks.

(3) A confirmed but unresolvable clerical error (e.g., an unreadable mark) may be changed to a "C" (Conference Average).

A numeric grade (0.0 to 10.0) may never be changed to a different numeric grade, nor may an HZ be changed to a numeric grade.

(e) The Grievant shall be notified in writing of the Contest Jury's decision as soon as possible.

3.16.3

The decision of the Contest Jury is final and may not be protested.

3.16.4

A copy of all protests and Contest Jury decisions must be forwarded to IAC Headquarters with the Official Contest Results.

3.17 *CONTEST RECORDS*

3.17.1

The "Official Results and Final Standings" and the "Judges Certification List" will be filed by the Contest Director with the IAC Sanctions Director as required in the "Aerobatic Contest Planning Guide".

3.17.2

The Contest Director will retain all contest paperwork until Official Results and Final Standings are posted and the protest period has expired *(See 3.16)*. After that time, Forms A can be distributed to competitors. However, the Contest Director will retain the applications for entry into the contest for a period of one year.

3.17.3

A complete copy of all files from the IAC scoring program shall be electronically transmitted to the IAC Sanctions Office after the contest is finished. If physical media must be used to provide the files, the appropriate media shall be supplied by the contest organization.

3.17.4

A copy of the files from the IAC scoring program for any contest will be made available to any participant or official, upon request. A fee of $25 may be charged for the copy of all data.

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CHAPTER 4 CONTEST OPERATION PROCEDURES

4.1 PUBLIC ADDRESS SYSTEM

A public address system is permitted at the contest with these restrictions:

(a) It must not be audible from the judging line. This does not preclude audible music on the judging line during the Four Minute Freestyle program.

(b) No comment shall be made on the quality of figures being performed.

(c) No derogatory remarks about competitors or officials will be allowed.

4.2 DISQUALIFICATION OF COMPETITORS

4.2.1

Any violation of the safety regulations currently in force and under which the contest is held will render the offending competitor subject to disqualification.

4.2.2

A competitor shall be disqualified if it is determined by the Contest Jury that the competitor has violated any of the following regulations or prohibited activities. The Contest Jury will rely and act upon the recommendations of the Contest Director, Chief Judge, Judges, Safety Officer and/or Technical Committee in these matters. To disqualify a competitor who has already flown, refer to 7.6.4(d) for the proper scoring program procedure.

(a) Unsportsmanlike conduct.

(b) Pilot briefing - no competitor may fly without a complete pilot briefing.

(c) Any flight not otherwise approved by the Contest Jury after the initial contest briefing has been completed. *(See 3.14)*

(d) Radios - any use of radios for competition flight other than as briefed by the Chief Judge is prohibited.

(e) Smoke systems - the use of smoke systems during competition flight is prohibited with the exception of the Four Minute Freestyle program.

(f) Parachutes during contest flights - all solo competitors must either wear a parachute or fly an aircraft equipped with a ballistic recovery system (BRS). If competing with a safety pilot, both individuals are required to wear a personal parachute regardless of whether the aircraft is BRS-equipped or not.

(g) Mechanical condition - operation of a competition aircraft with a known mechanical defect that renders the aircraft not airworthy.

(h) Aircraft limitations - performing a maneuver prohibited by the aircraft's Pilot Operating Handbook.

(i) Fuel and oil - in accordance with the current FAA exemption issued to IAC.

(j) Reckless flying - any violation of traffic patterns, unscheduled aerobatic maneuvers, or operation of an aircraft in an unsafe manner or in such a manner that would create an unsafe situation or cast an image of recklessness on the IAC. The competitor shall not be allowed any subsequent flying except for the removal of his aircraft from the contest location.

(k) Alcohol - no alcoholic beverages will be permitted at the contest site during the period of practice and competition flying. Use of these beverages by persons associated with the contest in ANY capacity is strictly prohibited during this period. Violation of this rule could affect future sanction.

(l) Scuba diving - competitors shall not participate in scuba diving within a 24 hour period prior to participation in a contest.

(m) Medical condition - sudden unpredictable deterioration in physical condition which renders further aerobatic flight unsafe shall require immediate cessation of that flight. Preventable physical incapacitation shall be grounds for disqualification for that flight.

(n) Drugs - the use of drugs or alcohol in such a manner that could subject the competitor to a government violation.

(o) Unauthorized presence on the judging line, boundary judging positions, or deadline judging position.

(p) Providing false information on any contest entry forms; knowingly giving materially false information on any matter to any other person; misconduct; harassment or intimidation of officials.

(q) Practicing of any Unknown figure by any participant; however, this does not preclude the flying of any normal competition sequence prior to the Unknown.

(r) Alteration of Free Program forms after a Judge's certification without obtaining recertification, or forging any Judge's signature on any official forms.

(s) Entering a "hot box" without clearance is mandatory disqualification for that flight.

(t) Failure to respond to the recall signal.

(u) Ethics - bribery or attempted bribery of any contest official or another competitor or acceptance of a bribe.

4.2.3

A competitor may also be disqualified from the contest by the Chief Judge, with the concurrence of a majority of the judges working that category, if that competitor has demonstrated an inability to safely control the aircraft during any part of the flight program.

4.3 *TEMPORARY COMPETITOR INCAPACITATION*

4.3.1

In the event of temporary incapacitation before the start of a flight, the pilot will notify the Starter.

4.3.2

Medical evaluation must be performed by the Medical Director before the Contest Jury will consider the possibility of a subsequent or make up flight.

4.3.3

The Jury will rely heavily upon the Medical Director's opinion, which may be supplemented by consultation with medical specialists of the Medical Director's choice.

4.3.4

The Contest Jury will have the final authority to decide whether there will be a repetition or resumption of contest flights by that competitor.

4.4 *SCHEDULE OF FLIGHT PROGRAMS*

4.4.1

The schedule will be determined and published by the Contest Director.

4.4.2

Changes to the schedule of flight programs must be approved by the Contest Jury and posted in sufficient time to notify all personnel affected by the change.

4.4.3

If the planned number of flight programs cannot be flown in the time available, the Contest Director may, with the approval of the Contest Jury, restrict the number of contest flight programs. Equal treatment to all categories is paramount.

4.5 *ORDER OF FLIGHT*

4.5.1

The order in which competitors will fly within each category's flight programs will be determined by the Registrar, or the IAC-approved scoring program.

4.5.2

The order chosen by lot may be modified before publication by the Registrar where conflicts arise from more than one competitor using the same aircraft, or if a competitor has accepted volunteer duties in a category prior to his/her flight that day of the contest.

4.5.3

The order of flight may be altered after the program begins by the Starter or Chief Judge if required by special circumstances.

4.6 *BRIEFING*

This briefing is mandatory for all contest officials and competitors. Notification of time and place will be given in advance.

4.6.1

The briefing will be conducted by the Chief Judge or his representative. The briefing will include in the following order:

(a) Roll call and order of flight.

(1) Pilots must answer roll call in person. Missing roll call will require a special and individual briefing following the regular briefing and will incur penalties for the flight as follows:

$50 Special Briefing Fee

(2) If the special briefing fee has not been paid by the time the competitor flies, the Chief Judge will assess the following penalty points:

Primary	10 points
Sportsman	25 points
Intermediate	50 points
Advanced	75 points
Unlimited	100 points

(3) The Contest Jury has the right to waive penalties if missing roll call was due to circumstances beyond the competitor's control.

(b) Introduction of Judges, Starter, Contest Jury, and other contest officials.

(c) Introduction of FAA officials.

(d) Weather forecast and winds aloft.

(e) Official wind direction for the flight(s) immediately following the briefing. If the official wind direction is subsequently changed by the Chief Judge, pilots will be notified of the change by the Starter during his or her final briefing. *(See 4.9.3 and 4.10.1)*

(f) Description of the Aerobatic Box, judges' location relative to the box, and Deadline if applicable.

(g) Starting procedures.

(1) Location of dead prop area(s), if any.

(2) Taxi, take-off, and holding procedures.

(3) Noise abatement procedures and location of any noise sensitive areas.

(4) Traffic pattern for competitors.

(5) Aborts by competitors on the ground and in the air.

(6) Location of sterile area for mechanical aborts.

(h) Radio procedures and frequencies. Any radio failure, transmit or receive, prior to box entry requires the competitor to remain outside the Aerobatic Box and land as soon as practicable.

(i) Recall signals. Briefing of the recall signal shall include the phrasing that will be used in the event of a recall, and the types of instructions that will be given in the event of a traffic conflict.

(j) Tow and release procedures from towplanes.

(k) Optional safety check maneuver.

(l) Official contest "working hours."

(m) Scheduling flying of low altitude lines and warm-up figures.

(n) Personnel permitted on the judging line.

(o) Review basic responsibilities for all contest participants under the contest's *Incident Response Plan*.

(p) Review of grading criteria for figures and Presentation, as required.

4.7 BRIEFING FOR BOUNDARY AND DEADLINE JUDGES

The Chief Judge or his designee will brief the Boundary and Deadline Judges in sufficient time to allow those personnel to be in position when the flight program is scheduled to begin. This briefing shall include:

(a) Requirement to read Aresti and determine when a figure begins and ends.

(b) Using sighting devices to determine when an aircraft has completely exited the Aerobatic Box buffer zone or completely crossed the FAA Deadline, if required, and when the aircraft has crossed back into the Aerobatic Box buffer zone.

(c) Radio calls to be made as each boundary crossing is observed, whether exiting or entering the Aerobatic Box buffer zone, and by which boundary.

(d) Responsibilities for maintaining a written record of all boundary infringements and for turning in that record to the Chief Judge after the flight program has been completed.

(e) Responsibility to notify the Chief Judge immediately if a non-contest (transient) aircraft is seen entering, or is on a course to enter, the aerobatic box.

4.8 *JUDGES' BRIEFING*

4.8.1

The Judges' briefing may be held at contest headquarters or on the judging line. This briefing is mandatory for all Judges, Assistant Judges, and Recorders.

4.8.2

It will be conducted by the Chief Judge of the category and will include:

(a) Assistant Judge duties.

(b) Recorder duties.

(c) Judge's signals when problems exist.

(d) Duty to clearly and immediately notify the Chief Judge concerning any situation which could compromise safety.

(e) Range of grades.

(f) Criteria for grading individual figures.

(g) Criteria for grading presentation.

(h) Low and high altitude limits and appropriate Form A comments.

(i) Marking Hard and Numeric Zeros.

(j) Conferences.

(k) Average grade for unseen figures.

(l) Debriefing time and place.

(m) All portable communication devices (cell phones, tablets, two-way radios, etc.), other than those in use for official contest purposes, will be turned off or set to silent-ring when on the judging line. No calls, texting, or e-mails shall be initiated or viewed unless on official break, or otherwise authorized by the Chief Judge.

4.9 *STARTING LINE PROCEDURES*

4.9.1

A competitor must be in or at his or her aircraft in sufficient time prior to competitive flight. This ensures that both the pilot and the Contest Starter will have adequate time to perform their pre-flight duties and the contest remains on schedule.

4.9.2

After receiving permission from the Starter, the competitor will bring the aircraft to the starting line where the Starter will check that lap belts, shoulder harness, and parachute are secure.

4.9.3

The Starter will brief the competitor as to the official wind direction, as a final reminder. Only after receiving take-off clearance from the Starter or Runway Flagman will the competitor depart for the competition area.

4.9.4

(a) Failure of the competitor to observe proper starting procedures or to comply with the Starter's instructions subjects the competitor to possible disqualification.

(b) If a competitor misses his starting position according to the category's order of flight, that competitor will be assessed penalty points according to the schedule given in 4.6.1(a)(2), and will be assigned a new starting position by the Chief Judge.

(c) The Contest Jury has the right to remove penalty points if missing order of flight was due to conditions outside the competitor's control. This would be determined at a Contest Jury hearing convened for the purpose of reviewing a protest over any such penalty points imposed.

4.9.5

A fire extinguisher must be readily available on the starting line.

4.10 *OFFICIAL WIND DIRECTION*

4.10.1 *Determines Use of Form B/C*

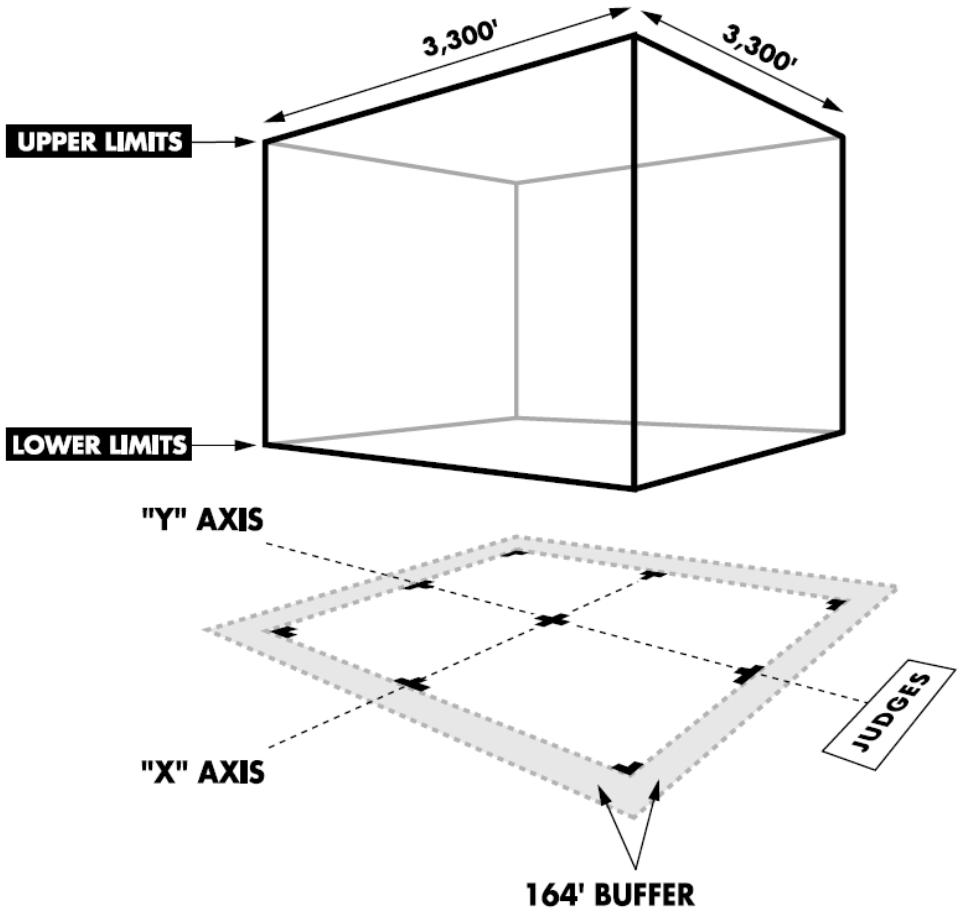
The Official Wind Direction, in relation to the judges (i.e., right to left or left to right), will be determined by the Chief Judge. In turn, the Official Wind Direction determines whether Form B (wind from the right) or C (wind from the left) will be used for judging the flight. If the Official Wind Direction must be changed during the flight program, then a fifteen (15) minute notice must be given to all remaining competitors.

4.11 *AEROBATIC BOX*

4.11.1 *Lateral Boundaries*

The flight program will be flown within a clearly marked area of 1,000 meters (approximately 3,300 feet) square whose central point will be the intersection of the main (X) and secondary (Y) axes. The upper and lower altitude limits vary by the category flying and are shown in 4.11.3, following. The Judges will be located between 150 meters (approximately 500 feet) and 250 meters (approximately 800 feet) from the edge of the box on an extension of the Y axis. A Deadline may or may not be part of a contest's aerobatic box lateral boundaries. If a Deadline exists, it will normally be a minimum of 500 feet from the boundary of the box, but the exact location will be specified by either the special provisions of the FAA waiver, or the Contest Director. Boundary Judges are stationed such that there is a 50 meter (164 feet) buffer zone before boundary infringement penalties are noted. The Aerobatic Box in all sanctioned contests will be over or adjacent to a suitable landing area.

Fig 4.11.1



4.11.2 *Box Axes*

At the start and completion of every figure, the aircraft's longitudinal axis (heading) must be parallel with the relevant (X or Y) axis of the Aerobatic Box. Any angular deviations visible to the judge must result in a grade reduction at a rate of 1 point per 5 degrees of error.

The X axis is parallel to the official wind and the majority of figures in a sequence are flown on the X axis in either an upwind or downwind direction. Any figure with entry and/or exit lines aligned on the X axis must be flown in the direction as depicted on sequence Forms B or C, into or away from the official wind. This includes any internal line segment, whether straight or looping, drawn on the X axis.

The Y axis is perpendicular to the X axis and is non-directional. That is, the pilot is free to choose direction when transiting from the X to the Y axis. When turning back onto the X axis, it is mandatory, however, to continue in the direction shown on the sequence drawing.

For any figure with both entry and exit lines aligned on the Y axis, the exit must be flown in the same or opposite direction relative to the entry, according to how the figure is depicted on the Form B or C held by the judges.

Regardless of the entry and/or exit axes of a figure, any internal line segment, either straight or looping, drawn on the X axis, must be flown in the X axis direction depicted on the Form B or C held by the judges. This rule does not apply to figures from Families 2, 5 and 6.

Refer to 6.13.5 and 7.3.1(d) & (e) for additional details regarding flying and judging the X and Y axes.

4.11.3 *Height Limitations*

POWER HEIGHT LIMITATIONS		
CATEGORY	**UPPER LIMITS**	**LOWER LIMITS**
Primary	**3,500' AGL**	**1,500' AGL**
Sportsman	**3,500' AGL**	**1,500' AGL**
Intermediate	**3,500' AGL**	**1,200' AGL**
Advanced	**3,609' (1100m) AGL**	**656' (200m) AGL**
Unlimited	**3,280' (1000m) AGL**	**328' (100m) AGL**

GLIDER HEIGHT LIMITATIONS		
CATEGORY	**UPPER LIMITS**	**LOWER LIMITS**
Sportsman	**4,000' AGL**	**1,500' AGL**
Intermediate	**4,000' AGL**	**1,200' AGL**
Advanced	**3,937' (1200m) AGL**	**656' (200m) AGL**
Unlimited	**3,937' (1200m) AGL**	**656' (200m) AGL**

4.12 *INFRINGEMENT OF THE DEADLINE*

4.12.1

A Deadline may or may not exist at any given contest site. Safety of the spectators is the primary consideration in establishing a Deadline, which may be designated by the Contest Director, or the FAA in accordance with special provisions of the waiver, if applicable.

4.12.2

Any figure or portion of a figure flown across the Deadline will cause that figure to be given a zero. Applicable boundary infringements will also be applied. All of these penalties are recorded and applied at the Chief Judge's Station.

4.13 *HOT BOX SIGNALS*

4.13.1

It is mandatory that positive control of the Aerobatic Box be maintained at all times. Two-way radio communication shall be the primary means of controlling the Aerobatic Box and issuing a recall order. Positive control means not only providing clearance to enter the box, but also ensuring that primary and secondary methods exist to initiate an emergency recall of a pilot already occupying the box.

4.13.2

All competitors must be able to receive and transmit VHF radio messages on a pre-briefed frequency. Total or partial radio failure will be handled in accordance with 4.13.3, below.

4.13.3

Radio shall be the sole means of controlling entry into the Aerobatic Box. The contest briefing will make clear that radio failure, transmit or receive, prior to box entry requires the competitor to remain outside the Aerobatic Box and land as soon as practicable. Any radio problem will be handled in accordance with section 4.18, Mechanical Defects.

4.14 *RECALL SIGNALS*

4.14.1

The radio operated by the Chief Judge will be the primary recall control and recall will be on the pre-briefed frequency.

4.14.2

Recall procedures shall be described at the pilot's briefing.

4.14.3

[RESERVED]

4.14.4

Competitors should note that recall is the most extreme safety action used in contest aerobatics and demands continuing alertness and immediate response from the competitors for preservation of life and aircraft. Recall, by whatever means, requires a break from the sequence, look around, return to airport and land. There are no exceptions.

4.15 *OPTIONAL SAFETY CHECK MANEUVER*

(a) Competitors have the option of performing two half rolls from upright with a reasonable hesitation at inverted to check safety belts and inverted fuel and oil systems.

(b) The safety check maneuver, if performed, may only be flown in the area designated during the pilots' briefing and only after the competitor has been cleared to approach and enter the aerobatic box by the Chief Judge. Flying the safety check prior to box clearance, or outside the designated area, or performing any aerobatic maneuvers other than two half rolls, will result in an interruption penalty.

4.16 *SIGNALING*

(a) The standardized signal to the Judges is a visible and distinct dipping of the wings. The ideal wing dip signal consists of three (3) wing dips, each with a 45-degree or greater bank angle; however, no penalty shall be given under these rules for deviating from the ideal as long as the signaling intent is clear to the Chief Judge.

(b) The wing dip signaling may be performed on a horizontal, climbing, or descending flight path, either inside or outside the aerobatic box. If the first figure following the wing dips begins in inverted flight, the wing dips must be performed in inverted flight and the competitor must change the flight attitude from upright to inverted only by a half roll prior to the first wing dip.

(c) The Chief Judge is responsible for assessing one additional Program Interruption penalty for each improper or missing wing dip signal required by the following subsections (except in the case of a Chief Judge ordered program interruption). In no case shall the Chief Judge assess more than two interruption penalties per Program Interruption event (one penalty for the actual interruption and not more than one additional penalty for improper signaling).

4.16.1 *Start and End of a Sequence*

(a) Each competitor must signal readiness and intent to start a sequence using the wing dips flown in accordance with 4.16, above.

If the signal to start a sequence is made, and the competitor subsequently does not initiate an aerobatic figure and flies through the box, no penalty shall be incurred. When

the competitor is again ready to start the sequence, a new wing dip signal in accordance with 4.16 shall be made.

(b) The pilot should signal the completion of the program and intent to leave the Aerobatic Box by once again dipping the wings three times. If the program ends in inverted flight, the competitor may execute a half roll to upright prior to performing the wing dips. No penalty shall be incurred if this signal is omitted at the end of the program.

4.16.2 *Explicit Program Interruption and Resumption*

An "explicit" Program Interruption is defined as any interruption to the unbroken flow of a sequence initiated directly by the pilot.

(a) An explicit Program Interruption must be signaled using the wing dips described in 4.16, above. If the program is interrupted in inverted flight, the competitor may execute a half roll to upright prior to performing the wing dips without penalty.

(b) The intent to resume the program after an explicit Program Interruption must be signaled with distinct wing dips flown in accordance with 4.16, above.

(1) The program must be resumed with the figure immediately preceding the point of interruption, the figure in progress at the time of interruption, or the figure immediately following the point of interruption.

(2) If the program is resumed at any other point, one additional Program Interruption penalty shall be assessed.

(c) Judges will resume grading with the first full figure following the original point of interruption.

(d) Should the Program be interrupted on the Y axis, the Program may be resumed in either direction on the Y axis.

(e) The Chief Judge, or the Assistant Chief Judge, will record each interruption and assess the proper penalty. In no case shall the Chief Judge assess more than two penalties per Program Interruption event (one penalty for the actual interruption and not more than one additional penalty for improper resumption of the program).

4.16.3 *Implicit Program Interruption and Resumption*

An "implicit" Program Interruption is defined as:

(a) Using a turn of 90 degrees or more to correct a heading deviation between figures.

(b) Using a one-half slow roll to correct an improper attitude (upright to inverted or vice versa) between figures.

(c) Deliberately climbing or diving between figures or flying any figure in a way such that the obvious intent is to gain or lose altitude or energy. The competitor shall be given the benefit of the doubt when applying this penalty.

(d) Any combination of paragraphs (a), (b), or (c), above.

Meeting one or more of the conditions described in subparagraphs (a) through (c) above, will be interpreted as an implicit interruption and result in an "automatic" interruption penalty from the Chief Judge, whether signaled or not. A wing dip signal to resume the Program following an implicit interruption is not mandatory.

The insertion of either a turn or a one-half slow roll to correct heading or attitude between figures (as in (a) and (b) above) is not an "added figure" and will not result in an automatic HZ for the following figure. *(See 7.3.1(b))*

4.17 *PENALTIES FOR INFRINGEMENT OF ALTITUDE LIMITS, BOUNDARIES, AND INTERRUPTIONS*

PENALTIES – POWER
Table 4.17.1

CATEGORY	*Primary*	*Sportsman*	*Intermediate*	*Advanced*	*Unlimited*
BOUNDARY INFRINGEMENT	*N/A*	*5*	*10*	*20*	*30*
PROGRAM INTERRUPTION	*5*	*5*	*15*	*50*	*90*
LOW ALTITUDE INFRINGEMENT 1 - 200' Low (P-S-I) 1 - 328' Low (ADV) 1 - 164' Low (UNL)	*"0" Entire Program*	*"0" Entire Program*	*60 Points Each Figure*	*120 Points Each Figure*	*150 Points Each Figure*
LOW-LOW ALTITUDE INFRINGEMENT > 200' Low (P-S-I) > 328' Low (ADV) > 164' Low (UNL)	*"0" Entire Program*	*"0" Entire Program*	*"0" Entire Program*	*"0" Entire Program*	*"0" Entire Program*
HIGH ALTITUDE INFRINGEMENT	*5*	*5*	*10*	*25*	*30*

PENALTIES – GLIDER
Table 4.17.2

CATEGORY	*Sportsman*	*Intermediate*	*Advanced*	*Unlimited*
BOUNDARY AND HIGH ALTITUDE INFRINGEMENT	*5*	*10*	*15*	*20*
PROGRAM INTERRUPTION	*5*	*15*	*30*	*70*
LOW ALTITUDE INFRINGEMENT 1 - 200' Low (S-I) 1 - 328' Low (A-U)	*"0" Entire Program*	*60 Points Each Figure*	*70 Points Each Figure*	*100 Points Each Figure*
LOW-LOW ALTITUDE INFRINGEMENT > 200' Low (S-I) > 328' Low (A-U)	*"0" Entire Program*	*"0" Entire Program*	*"0" Entire Program*	*"0" Entire Program*

Note: 328' = 100m

4.17.1

The Primary category is not subject to boundary infringements; however, any part of the sequence flown under 1,500 feet will result in a zero for the entire flight.

4.17.2

In order for penalties to be assessed, infringements of altitude limits must be observed by a majority of the Judges. Judges will direct their Recorders to annotate the Remarks column of the Form A with "LOW" or "LOW-LOW" as determined from Tables 4.17.1 and 4.17.2, above.

4.17.3

Each boundary infringement will be reported via radio to the Chief Judge's Station and recorded by the Boundary Judge as it occurs.

(a) Each figure flown outside the box, including any figures flown before initial entry into the box, will incur a boundary infringement penalty.

(b) A boundary infringement is considered to have occurred if the entire aircraft is seen outside of the sighting device. Only one boundary infringement penalty will be assessed per figure.

4.18 *MECHANICAL DEFECTS*

4.18.1

In the event of mechanical difficulties before the start of a flight, the competitor will notify the Starter and remain with the aircraft until an inspection by the Technical Committee is made.

In the event of a technical fault (including loose objects in the cockpit) occurring during a contest flight, the competitor will break off the flight, land, taxi to the designated sterile area (if able), and wait with their aircraft until the Starter or Technical Committee arrives.

The Chief Judge will permit the competitor to use another aircraft or the same aircraft if repair can be accomplished before the conclusion of the flight program then in progress.

4.18.2

If the Technical Committee is satisfied that the reason for abandoning the flight was due to a technical fault not under the control of the competitor, the competitor will be allowed to repeat the sequence without penalty. This decision cannot be protested. The order of flight will be determined by the Chief Judge. However, the pilot who aborted will fly as soon as possible after the malfunction has been corrected. If the malfunction cannot be corrected by the completion of the flight program, the Chief Judge may allow the pilot to make up the lost flight by flying twice in the next competition program for that category.

Competitors must re-fly the sequence from the beginning, but judging and grading will commence with the figure in which the defect occurred. However, any program interruptions which

occur in the re-flown sequence, whether before or after the first gradable figure, will be penalized in the normal manner.

4.18.3

If the Technical Committee finds no technical problem to justify discontinuing the flight, or determines that the technical fault was under the control of the competitor (e.g., loose objects in the cockpit), the competitor will be awarded an interruption penalty and allowed to finish the flight. If the program was interrupted during a figure, then the competitor will receive an HZ for that figure.

Competitors must re-fly the sequence from the beginning, but judging and grading will commence with the first figure following the point where the sequence was aborted. Any program interruptions which occur in the re-flown sequence, whether before or after the first gradable figure, will be penalized in the normal manner.

4.19 *METEOROLOGICAL CONDITIONS*

4.19.1 *Airspace Waiver*

The minimum weather conditions for aerobatic flight are regulated by the special provisions of the airspace waiver.

4.19.2 *Ceiling*

Weather conditions that allow power competitors to climb to 3,500 ft AGL (4,000 ft AGL in the case of gliders) while maintaining a minimum cloud clearance are the most desirable.

4.19.3 *Wind*

Contest flight will not be conducted if the cross wind component for the active runway exceeds 20 knots or the steady wind velocity at the surface exceeds 25 knots from any direction. The Jury shall use the best data available to determine if contest flights can be safely conducted or not.

4.19.4 *Precipitation*

Flight will not be conducted in discernible precipitation, except at the discretion of the Contest Jury. The Aerobatic Box must be free of precipitation for glider flights.

4.19.5 *Optional Break*

If the conditions of 4.19.2 do not exist, or if the airport field elevation is charted at or above 3,500 feet MSL, the Contest Jury may, after calling for such advice as required, authorize programs to be flown with an optional break (an interruption where no interruption penalty is assessed). Such breaks allow competitors to adjust altitude and reposition, thereby enabling the contest to continue.

When the optional break is authorized by the Contest Jury:

(a) Pilots will be given a minimum of 10 minutes notice before flight that the optional break may be used.

(b) Each pilot may take one break within their program (Known, Free, or Unknown) without penalty.

(c) The Chief Judge will record all interruptions during a pilot's sequence on the *Chief Judge's Penalty Form*, but the first interruption observed will be considered the optional break and not penalized. Any additional interruptions during the sequence will be penalized in the usual manner.

(d) Competitors may not land between parts of the program during an optional break. *(Gliders: See 4.19.6)*

(e) In the event weather conditions improve to meet the requirements of 4.19.2, the Contest Jury may remove the optional break. In that case, a notice that the optional break has been removed will be given to the remaining competitors a minimum of 10 minutes before flight and competitors may no longer take a break without penalty.

4.19.6

In the case of glider flight programs where the height of the cloud base is less than 4,000 feet AGL and more than 2,500 feet AGL, the Contest Jury may allow competitors to fly shortened compulsory programs. The figures to be graded will be announced at a briefing. A Free Program interrupted by low ceilings will be flown in two parts, with the break occurring at a point chosen by the competitor.

4.20 *DETERIORATING WEATHER CONDITIONS*

4.20.1

A competitor may decide not to fly due to deteriorating meteorological conditions. The competitor may refuse at any time, including before takeoff as well as any time in flight.

4.20.2

In such cases, the competitor may hold on the ground, hold in the air, or land. In all circumstances, the competitor must immediately establish communications with the Chief Judge. If airborne, the competitor will communicate directly with the Chief Judge. If on the ground, the competitor will communicate with the Chief Judge via the Starter or other Official designated at the briefing.

4.20.3

Using a simple majority vote, the grading Judges will decide whether or not the competitor had a valid meteorological reason for not flying or not completing the flight.

4.20.4

(a) If the judges accept the competitor's reasons for not flying or discontinuing a sequence in progress, and the competitor is on the ground, the competitor will be allowed to fly or refly the sequence without penalty. The Chief Judge will assign a starting position that allows the competitor to fly again as soon as practicable. The competitor must fly the sequence

from the beginning, but grading will commence with the first figure not flown or completed. For example, if the competitor discontinued the sequence during the vertical portion of a hammerhead, the first graded figure in the reflight will be the hammerhead. However, any program interruptions which occur in the reflown sequence, whether before or after the first gradable figure, will be penalized in the normal manner.

(b) If the judges accept the competitor's reasons for discontinuing the sequence and the competitor has elected to hold in the air, the competitor will be allowed to resume the sequence without penalty. In this case, the competitor may resume the sequence with either the first figure not flown or completed or the last figure completed before the interruption. In either case, grading will commence with the first figure not flown or completed (see example in paragraph (a) above).

(c) If the judges do not accept the competitor's reasons for not flying or discontinuing the sequence, the competitor will be awarded an interruption penalty and allowed to complete the flight. This will be done in accordance with the rules of paragraph (a) or (b) above, depending upon whether the competitor is on the ground or in the air at the time of the judges' decision. If the program was interrupted during a figure, then the competitor will receive an HZ for that figure. Competitors must re-fly the sequence from the beginning, but judging and grading will commence with the first figure following the point where the sequence was aborted. Any program interruptions which occur in the re-flown sequence, whether before or after the first gradable figure, will be penalized in the normal manner.

4.20.5

If a judge is unable to see any part of a figure as a result of clouds or sun angle, that judge will immediately notify the Chief Judge using a prebriefed signal and give a mark of 'A' (Average) for the figure. If the Chief Judge determines that none of the judges were able to grade the figure, the Chief Judge will then immediately notify the pilot by radio and request that a break occur. The pilot will re-enter the box, as conditions permit, and resume the flight with the figure specified by the Chief Judge. The grading of the figures will commence with the figure that could not be graded and the pilot will not be charged with an interruption.

4.21 *PERSONNEL ON THE JUDGING LINE*

4.21.1

The only personnel permitted on the judging line except by specific permission of the Chief Judge are: Contest Director, Chief Judge, Contest Jury, Judges, Assistant Judges, Recorders, Volunteer Coordinator, Starter, and Runners.

4.21.2

Any competitors in the category being judged who appear at the judging line, boundary judging positions or deadline judging position without the Chief Judge's permission will be disqualified from the contest.

4.22 *TOW AND RELEASE PROCEDURES*

(a) The towplane will tow the competitor to the altitude appropriate for that flight (no more than 5,000 feet AGL or less than 2,500 feet AGL). The towplane will then position the glider perpendicular to the X axis (base leg) on the side of the box downwind from the official wind direction. If the glider pilot does not release on the first pass, the towplane will initiate a turn away from the box and, staying as close as possible to the box, re-entry on the base leg as before. The glider pilot must release before the end of the second pass when clearance to release had been given, unless given permission by the Chief Judge to remain on tow.

(b) The pilot may reposition the glider after release and prior to beginning the flight program. If conditions warrant, the glider may release tow prior to being cleared into the aerobatic box by the Chief Judge. In that case, the glider pilot shall advise the Chief Judge of his/her intention to release early and may use thermals to maintain altitude prior to being cleared into the box. In no case will the glider cross the lateral boundaries of the aerobatic box at any altitude prior to clearance into the box from the Chief Judge. Failure to remain clear of the aerobatic box while holding will result in a DQ (see 4.2.2(s)). If sufficient altitude cannot be maintained prior to being cleared into the box, the glider will return to the airport and land. In that case, a reflight will be granted without penalty.

(c) The towplane and glider pilots must monitor the frequency assigned by the Chief Judge at the daily pilot briefing and follow all directions issued by the Chief Judge during the approach to the box. Glider and towplane pilots shall use the appropriate air-to-air signals in the event of radio failure in either aircraft.

(d) In the event of radio failure of either aircraft, or weather conditions that prevent the competitor from entering the box, the glider pilot will disconnect from the towplane and land. The glider pilot must promptly contact the Chief Judge regarding the reason for discontinuing the flight. The procedures of 4.18 (mechanical abort) or 4.20 (weather abort) will then be followed to determine if a reflight will be allowed.

CHAPTER 5 *THE FLIGHT PROGRAMS*

5.1 *COMPETITION FLIGHT PROGRAMS*

A complete contest will consist of the competition flight programs shown in Table 5.1.1 or Table 5.1.2, as appropriate.

POWER COMPETITION FLIGHT PROGRAMS
Table 5.1.1

CATEGORY	KNOWN	FREE	UNKNOWN
Primary			
Sportsman		 (See 5.1.3)	
Intermediate			
Advanced			
Unlimited			

GLIDER COMPETITION FLIGHT PROGRAMS
Table 5.1.2

CATEGORY	KNOWN	FREE	UNKNOWN
Sportsman		 (See 5.1.3)	
Intermediate			
Advanced			
Unlimited			

5.1.1

For Unlimited, and qualified Advanced pilots *(See 5.6.1),* the Four Minute Freestyle program may also be scheduled. This flight program's results will not be included in the scores that determine final standings. It will be treated as a separate trophy flight.

5.1.2

Category flight programs will be conducted in the following order: Known, Free or Unknown, and Four Minute Freestyle (K,F,U,4 or K,U,F,4).

5.1.3

Power and Glider Sportsman competitors have the option to repeat the Known compulsory in lieu of a Free program.

5.1.4

If Contest Directors desire, additional flight programs may be added to those programs listed in Table 5.1.1 and Table 5.1.2.

(a) Additional flight programs contemplated will be included in the proposed supplementary rules submitted to the IAC Sanctions Director.

(b) A second or third Primary flight, or a third Sportsman flight, may be scheduled without request for supplemental rules.

(c) Should a third Sportsman flight be scheduled, the competitors must repeat their second flight program.

5.1.5

The final score will be the sum of all flight programs completed by the competitor, unless a contest is terminated due to weather, time, or any unforeseen reason.

5.1.6

For all categories, in the event of an incomplete contest because of weather or for any other reason, each category will be considered complete based on any flight programs finished in their entirety. All competitors in a category must be given an equal opportunity to fly a particular sequence or that flight program must be canceled and any scoring disregarded.

5.1.7

When there are both powered airplanes and gliders competing in the same contest, the mixing of flight programs shall be done in a manner permitting efficiency of operation without compromising safety. If there is an adequate number of towplanes to permit a continuous flow of gliders into the Aerobatic Box, then the glider flights in a given program should follow one another. If there is not an adequate number of towplanes to permit continuous glider operations, then the Contest Director may schedule the order of flight to interleaf glider and powered aircraft, keeping the same set of Judges. The determination of the order of programs will be done by the Contest Director, giving equal consideration to both power and glider competitors.

5.2 QUALIFICATION FLIGHTS

The first Known compulsory in each category is a qualification flight. If a majority of the Judges in that category votes that a competitor has demonstrated an inability to safely control the aircraft, the competitor will be disqualified from that category. *(See also 4.2.3)*

5.3 THE KNOWN COMPULSORY PROGRAM

Known compulsories for powered aircraft are sequences of figures and figure combinations taken from the *Aresti Aerobatic Catalogue*. Glider aerobatic sequences are composed of figures and figure combinations taken from the *Aresti Catalogue of Glider Aerobatic Figures* (GAF). It is important to note that the GAF often assigns different K-Factors from those in the *Aresti Aerobatic Catalogue*. Not all figures in the *Aresti Aerobatic Catalogue* are in the GAF.

5.3.1 Primary

The Primary sequence is depicted in Appendix 1 and does not normally change year-to-year. *(See 5.7)*

5.3.2 Sportsman Through Unlimited Knowns

Known compulsories for all IAC categories, Power and Glider, are created by the IAC Sequence Development Committee. Each year, these sequences are evaluated by the IAC Board of Directors or its duly elected Executive committee and either adopted as-submitted or returned to the Known Sequence Committee for modification as necessary for use in IAC sanctioned competitions. All approved Knowns are published in Appendix 1 and at www.iac.org/sequences.

5.4 THE FREE PROGRAM

The Free program is the personal expression of each competitor. The pilot designs the Free program using figures from the *Aresti Aerobatic Catalogue* in accordance with Chapter 6 of this manual.

5.5 THE UNKNOWN COMPULSORY PROGRAM

5.5.1

IAC Headquarters will provide Unknown compulsory programs for each category scheduled to be flown to the Contest Director or their designated representative. All Unknowns must be checked for legality prior to the start of the contest and the IAC HQ notified immediately of any issues found.

5.5.2 Allowable Figures

The figures utilized in the design of the Unknowns will be chosen from Appendix 3 for Power and Appendix 4 for Gliders of this manual. No other figures are allowed. For all Unknowns:

(a) There will not be more than 1 snap roll (Family 9.9/9.10) per figure.

(b) Maximum of 1 figure allowed from Family 7.8.1 to 7.8.8 (Horizontal 8's).

(c) Maximum of 1 figure allowed from Family 9.11/9.12 (spins).

5.5.3 *Direction of Flight*

The start of an Unknown program can be upwind or downwind on the X axis or the start can be on the Y axis. A downwind X axis or Y axis entry should be noted on Forms B and C. *(See 6.13.4)*

5.5.4 *Distribution*

The Unknown sequences will be made available to the competitors by the Contest Director no less than twelve (12) hours prior to the time the program is scheduled to be flown. The minimum time may be waived entirely if there is unanimous agreement among all pilots in the affected category. Practice of these sequences is prohibited.

5.5.5 *Protests*

Unknown sequences properly constructed of figures defined in Appendix 3 or 4, as appropriate, and meeting the requirements of Section 5.5, may only be protested for reasons of flight safety. If a sequence is not properly constructed, or is shown by protest to be dangerous, the Contest Jury shall redesign the sequence with minimal changes to the original figure selection as is necessary to remove the construction defect or flight safety concern.

5.5.6 *Unlimited Unknowns*

Unlimited Power:

The Unlimited Power Unknown must have no less than ten (10) nor more than fourteen (14) figures. The maximum K-factor shall not exceed 400. In the selection of figures for the Unlimited Power Unknown, the following limits apply:

(a) Maximum of 6 snap rolls, only 4 of which may be from the same family (9.9 or 9.10).

(b) A minimum of one snap roll must be a vertical climbing maneuver (9.9.1.x, 9.9.6.x, 9.10.1.x, or 9.10.6.x).

Unlimited Glider:

The Unlimited Glider Unknown must have no less than seven (7) nor more than nine (9) figures. The maximum K-factor shall not exceed 190. No single figure combination may exceed 40K.

5.5.7 *Advanced Unknowns*

Advanced Power:

The Advanced Power Unknown must have no less than ten (10) nor more than fourteen (14) figures. The maximum K-factor shall not exceed 275. In the selection of figures for the Advanced Unknown, a minimum of 2, and a maximum of 4 snap rolls are allowed from Family 9.9.

Advanced Glider:

The Advanced Glider Unknown must have no less than seven (7) nor more than nine (9) figures. The maximum K-factor shall not exceed 145K. No single figure combination may exceed 35K.

5.5.8 *Intermediate Unknowns*

Intermediate Power:

The Intermediate Power Unknown must have no less than six (6) nor more than twelve (12) figures, totaling no more than 175K.

Intermediate Glider:

The Intermediate Glider Unknown must have no less than six (6) nor more than nine (9) figures, totaling no more than 130K.

5.6 *THE FOUR MINUTE FREESTYLE TROPHY EVENT*

5.6.1 *Eligibility*

The contest Director may schedule this special trophy event for any Unlimited category competitor, or Advanced category competitors who also hold at least a current ICAS 250-foot Statement of Aerobatic Competency. All Four Minute Freestyle competitors must have completed the scheduled competition flight programs in their respective category.

5.6.2 *Program Composition*

The selection of figures or figure combinations for this program need not be made with reference to the *Aresti Aerobatic Catalogue (Condensed)*; there will be no limitation on the number of figures or difficulty coefficient.

5.6.3 *Use of Forms*

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

5.6.4 *Smoke and Music*

Smoke systems and music may be used at the option of each individual pilot.

5.6.5 *K-Factors*

The total K-Factor for this program will be 400. This program will be graded by each Judge under three performance categories:

(a)	Technical Merit	K = 160
(b)	Artistic Impression	K = 160
(c)	Positioning	K = 80
	Total K	**400**

5.6.6 *Performance Zone*

The Performance Zone for the Four Minute Freestyle may coincide with the Aresti competition aerobatic box or be located in a different location, as long as it is wholly contained within FAA--waivered airspace. The Performance Zone does not have lateral boundaries nor will Boundary Judges be used. However, the floor and ceiling will remain as described in 4.11.3 for the Unlimited category (power/glider, as applicable).

5.6.7 *Start and Finish Attitude and Altitude Limits*

The start and finish of the Four Minute Freestyle program 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. Failure to follow these start/finish criteria will result in an "Improper Wing Dip" penalty *(See 5.6.9(d))*. Competitors may begin or finish their program at any height between the upper and lower limits given in 4.11.3 (power or glider, as applicable).

5.6.8 *Signaling Start and Finish*

(a) The competitor must signal the start and finish of this program by distinctly dipping a wing more than 45 degrees three (3) times, one after the other. Failure of a competitor to observe precisely this rule will result an "Improper Wing Dip" penalty *(See 5.6.9(d))*.

(b) For timing purposes, the program is deemed to start on the return to wings level after the third wing dip; and is deemed to finish on the return to wings level after the third of the final three (3) wing dips. Timing and the assessment of any penalty points is done at the Chief Judge's station.

5.6.9 *Penalties*

Penalties applicable to the Four-Minute Freestyle will be as follows:

(a) Time Limits

For the performance of the program, the time limit will be between 3 minutes 30 seconds and 4 minutes. Any deviation from this limit will incur penalties at the rate of 10 points for each second or fractional part of second over or under the limit.

Examples:

A total time of 3 minutes 29.5 seconds would receive 10 penalty points.

A total time of 4 minutes 1.3 seconds would receive 20 penalty points.

(b) Deadline Violation

Each excursion across the FAA Deadline will be penalized by 300 points.

(c) Altitude Infringements

The Upper and Lower altitude limits given in 4.11.3 for the Unlimited category (power/glider) will be enforced. Pilots judged to be between 1 and 50 meters (power) or between 1 and 100 meters (gliders) below the lower altitude limit (LOW) will be penalized 250 points for each excursion below the prescribed limit. If at any time a pilot descends more than 50 meters (power) or 100 meters (glider) below their Lower altitude limit (LOW-LOW), that pilot will be immediately disqualified and told to land by the Chief Judge. Pilots judged to be above the Upper Limit specified in 4.11.3 for their category (power or glider) will be penalized 50 points for each violation.

(d) Improper Signaling

Failure to strictly adhere to the requirements of 5.6.7 and 5.6.8 will receive an "Improper Wing Dip" penalty of 150 points for each violation.

5.6.10 *Judging Criteria*

Each objective within a major performance area is assigned a K-Factor as shown below. A mark of 10.0 to 0.0, in increments of 0.5, will be given for each objective according to the following criteria:

Technical Merit (160K):

The Technical Merit of a flight shall be judged according to four objectives:

(1) Complete Use of the Flight Envelope - 40K

The pilot is expected to make full use of the flight envelope of the aircraft. This means flying at the full range of air speeds and accelerations permitted. Program time should be divided between high and low speeds, high and low G maneuvers, and both positively and negatively G loaded flight segments. The flight should include the demonstration of controlled flight beyond the stall boundary by use of autorotation or other high angle of attack maneuvers. The judge will deduct points if any of these areas are noticeably under-utilized.

(2) Exploitation of Aerodynamic and Gyroscopic Forces - 40K

The pilot is expected to show movement of the aircraft about all axes using both conventional aerodynamic controls and propeller-generated gyroscopic forces. Higher marks will be given to pilots able to make use of all these effects through a wide range of aircraft attitudes and flight paths. Repeated use of any such forces in the same or similar attitudes should result in lower grades.

(3) Execution of Individual Maneuver Elements - 40K

It should be clear that the maneuvers flown were, in fact, intended and fully under the pilot's control. Higher marks will be given for this objective when individual maneuver elements are started and finished on obviously precise headings and in well-defined attitudes. When, for example, gyroscopic maneuvers are allowed to decay into imprecise, poorly defined autorotation, marks should be deducted for poor execution. Marks should also be deducted if it appears that the pilot has relinquished control of the aircraft at any time.

(4) Wide Variety of Figures Flown on Different Axes and Flight Paths - 40K

Many different figures should be completed in the time available. These should include maneuver elements of many different kinds and should use many different flight paths and axes. Lower marks should be given to a pilot who used only one or two principal axes of flight. However, the use of additional axes within the performance zone must be clear and precise, not giving the appearance of being used by chance. Marks should also be deducted if any particular maneuver element is over-used or continues for an excessive period of time. For example, higher marks would be given in the event of a two-turn flat spin followed by something else, than to a multi-turn spin that simply took up more time.

Artistic Impression (160K):

The Artistic Impression of a flight shall be judged according to four objectives:

(1) The Pleasing and Continuous Flow of Figures - 40K

In a precisely flown sequence, the completion of a figure will be well described when movement about an axis ceases and a particular attitude is briefly held. The start of the next figure or maneuver should then begin without any prolonged period of inactivity caused by the need to reposition the aircraft or reorient the pilot. Marks will be deducted for any obvious period of level flight, or inactivity, required between figures.

(2) Contrasting Periods of Dynamic and Graceful Maneuvers - 40K

In a musical symphony, the listener's mood may be changed by contrasting fast and slow movements. Similarly, in a Four Minute Freestyle program, the judge should be treated to a flight that causes different reactions. While some maneuvers involve very high speeds, sudden attitude changes and rapid rotations, others involve slower speeds or more gentle transitions. Higher marks will be given to a pilot who finds time in his program for showing such differences of mood and pace. Marks should be deducted in this category for a flight that shows no such distinctions.

(3) Presenting Individual Figures in Their Best Orientation - 40K

Figures can give different impressions when seen from different viewpoints. For example, a climbing inverted flat spin looks most impressive when the top surface of the aircraft can be seen. A loop flown in a plane inclined at 45 degrees to the vertical is best appreciated when it is flown on the Y axis. Marks should therefore be deducted if the judge is not shown a figure in its best orientation.

(4) Placing Individual Figures in Their Optimum Position - 40K

Each figure has an optimum position from which it is best viewed. For example, a loop flown overhead does not give the same pleasing geometry as one flown further distant.

Similarly, a figure flown near the upper height limit will cause discomfort when flown at the near edge of the performance zone; a low-level horizontal figure is better seen from close by than far away. Higher marks will therefore be given when individual figures are optimally placed, while judges should deduct marks when it appears that a figure is not well positioned.

Positioning (80K):

Positioning of a flight shall be judged according to two objectives:

(1) *Symmetry - 40K*

Highest marks will be given when the sequence as a whole is balanced evenly to the left and right of the judges' direct line of vision towards the center of the performance zone. Marks should be deducted if, by design or by the influence of the wind, a pilot's program is noticeably biased to left or right. The greater the degree of asymmetry, the greater should be the deduction.

(2) *The Performance Zone - 40K*

Even though a flight might be symmetrical, it may also be spread too far to either side, so that some maneuver elements are flown outside the performance zone. Figures may also be flown on the direct line of vision but very distant. Any part of the flight that is flown so far away that it appears to be outside the zone should be penalized at a rate of 0.5 of a mark for each apparent excursion.

5.7 *THE PRIMARY CATEGORY*

5.7.1

The Primary category is designed as both the entry level into aerobatic competition and as a place for pilots with low performance aircraft, or aircraft with certain restrictions, to successfully compete. Primary competitors may fly only the sequence depicted in Appendix 1, although the sequence may be flown more than once at the discretion of the Contest Director.

5.7.2 *Boundary Infringements*

There will be no boundary infringement penalties assessed for the Primary category.

5.7.3 *Interruptions*

Breaks in the sequence will be penalized by five (5) points each unless subject to other rules relating to free breaks for weather or mechanical problems.

5.7.4 *Presentation*

Although no boundary infringements are assessed in the Primary category, for the best Presentation grade the competitor should place all figures within the limits of the aerobatic box. *(See 8.6)*

5.8 *PRESENTATION COEFFICIENTS*

5.8.1 *Power Programs*

Category Presentation coefficients for Power programs are as follows:

Primary	5 K	
Sportsman	10 K	
Intermediate	15 K	
Advanced	25 K	
Unlimited	40 K	(Known and Unknown)
	40 K	(Free)

5.8.2 *Glider Programs*

Category Presentation coefficients for Glider programs are as follows:

Sportsman	15 K	
Intermediate	15 K	
Advanced	25 K	(Known and Unknown)
	35 K	(Free)
Unlimited	25 K	(Known and Unknown)
	35 K	(Free)

CHAPTER 6 FREE PROGRAM – DESIGN LIMITS AND DOCUMENTATION

6.1 FREE PROGRAMS - GENERAL

The Free Program affords each competitor the opportunity to express his or her personal skills in the design of a sequence as well as demonstrating piloting ability.

6.2 FIGURES AND K-FACTOR LIMITS

POWER FIGURE AND K LIMITS
Table 6.2.1

FREE CATEGORY	MAX # OF FIGURES	MAXIMUM SEQUENCE K	PRESENTATION K-FACTOR	MAXIMUM PROGRAM K
Sportsman	***12***	***Same as current Known***	***10***	***Same as current Known***
Intermediate	***15***	***190***	***15***	***205***
Advanced	***12***	***300***	***25***	***325***
Unlimited	***9***	***420***	***40***	***460***

GLIDER FIGURE AND K LIMITS
Table 6.2.2

FREE CATEGORY	MAX # OF FIGURES	MAXIMUM SEQUENCE K	PRESENTATION K-FACTOR	MAXIMUM PROGRAM K
Sportsman	***No Limit***	***Same as current Known***	***15***	***Same as current Known***
Intermediate	***No Limit***	***140***	***15***	***155***
Advanced	***10***	***175***	***35***	***210***
Unlimited	***10***	***230***	***35***	***265***

Free programs are limited to the maximum number of figures and maximum total Figure K-Factor as shown in Tables 6.2.1 and 6.2.2. The Maximum Figure K is the sum only of figures depicted on the Form B/C and does not include the Presentation K-Factor.

To achieve the maximum allowable K-Factor without compromising a desired Free Program design, power competitors may, at their option, reduce the total K-factor by removing not more than one point from the highest coefficient figure through the use of a “floating point.” Both the original figure coefficient and the reduced value must be shown on the Form A and the initials “F.P.” written in the “Catalogue No.” column of the Form A.

6.2.1 *Glider*

The total Figure K-Factor for Glider Sportsman shall not exceed the total Figure K-Factor of the current Known sequence. The sum of the normal coefficients may be up to 3K greater, but will be reduced to the required value by removing one point from the highest coefficient figures, starting with the highest K-value figure and then each figure in decreasing K-value order until the maximum total Figure K-Factor is achieved. On Form A, the original figure coefficient will be given as well as the reduced value for each figure affected.

The maximum Figure K-Factor for Glider Intermediate shall not exceed 140. The sum of the normal coefficients may be as large as 143, but will be reduced to 140 by removing one point from the highest coefficient figures, starting with the highest K-value figure and then each figure in decreasing K-value order until the maximum total of 140K is achieved. On Form A, the original figure coefficient will be given as well as the reduced value for each figure affected.

The maximum Figure K-Factor for Glider Advanced shall not exceed 175. The sum of the normal coefficients may be as large as 178, but will be reduced to 175 by removing one point from the highest coefficient figures, starting with the highest K-value figure and then each figure in decreasing K-value order until the maximum total of 175K is achieved. On Form A, the original figure coefficient will be given as well as the reduced value for each figure affected.

The maximum Figure K-Factor for Glider Unlimited shall not exceed 230. The sum of the normal coefficients may be as large as 233, but will be reduced to 230 by removing one point from the highest coefficient figures, starting with the highest K-value figure and then each figure in decreasing K-value order until the maximum total of 230K is achieved. On Form A, the original figure coefficient will be given as well as the reduced value for each figure affected.

6.3 *VERSATILITY*

In order to achieve versatility in the Free programs, it is mandatory that competitors include, as a minimum, the following Families from the *Aresti Catalogue*:

6.3.1 *Glider*

Sportsman

At least one figure from: Family 2 (Turns); Family 7 (Loops); and Family 9.1 (Slow Rolls).

Intermediate

At least one figure from: Family 2 (Turns); Family 5 (Hammerheads); Family 7 (Loops); Family 9.1 (Slow Rolls); and Family 9.11 (Upright Spins).

Advanced

From Family 2 (turns and rolling turns), at least one figure. Optionally, a Catalogue 2.1.3.1 may be flown.

At least one figure each from Families 5 through 9

From Family 9 (rolls and spins) at least:

A half slow roll (subfamily 9.1)

At least one hesitation roll (subfamilies 9.2, 9.4 or 9.8) of any extent

Unlimited

Family 2	At least a rolling turn with one full roll
Family 5	At least one figure
Family 6	At least one figure
Family 7	At least one figure
Family 8	At least one figure
Family 9.1	At least 1/2 roll
Family 9.2 thru 9.8	At least one from any subfamily
Family 9.9 and 9.10	At least one from each subfamily

6.3.2 *Power*

Sportsman

Family 7	At least one figure from 7.2.1 thru 7.2.4, or 7.4.1 thru 7.4.6
Family 8	At least one figure
Family 9 Aileron Rolls	At least one from any subfamily 9.1 thru 9.8
Family 9 Spins	At least one from either 9.11 or 9.12

Intermediate

Family 5	At least one figure
Family 7	At least one figure from 7.2.1 thru 7.2.4, or 7.4.1 thru 7.4.6
Family 8	At least one figure
Family 9 Aileron Rolls	At least one from any subfamily 9.1 thru 9.8
Family 9 Snap Rolls	At least one from either 9.9 or 9.10 or alternatively, at least one 9.4.3.4
Family 9 Spins	At least one from either 9.11 or 9.12

Advanced

Family 1	At least one figure
Family 2	At least one from 2.1.2 thru 2.1.3, or 2.2.2 thru 2.2.7, or 2.3.2 thru 2.3.6, or 2.4.2 thru 2.4.8
Family 5	At least one figure
Family 7	At least one figure
Family 8	At least one figure

Family 9 Aileron Rolls	At least one from each subfamily 9.1 thru 9.8
Family 9 Snap Rolls	At least two from either 9.9 or 9.10
Family 9 Spins	At least one from either 9.11 or 9.12

At least one figure must contain opposite rolls from Families 9.1 to 9.10.

Unlimited

Family 1	At least one figure
Family 2	At least one from 2.2.3 thru 2.2.7, or 2.3.2 thru 2.3.6, or 2.4.2 thru 2.4.8
Family 5	At least one figure
Family 6	At least one figure
Family 7	At least one figure
Family 8	At least one figure
Family 9.9 Positive Snap Rolls	At least two
Family 9.10 Negative Snap Rolls	At least two
Family 9 Spins	At least one from either 9.11 or 9.12

At least one figure must contain opposite rolls from Families 9.1 to 9.10.

6.4 START AND FINISH ATTITUDES AND DIRECTION

The start and finish of the Free Program will be carried out in horizontal level flight, either upright or inverted, parallel to the X or Y axis.

In the case of the Glider Sportsman and Intermediate Free Program, the Program must begin and end in level upright flight, while the Glider Advanced and Unlimited Free Program may start in upright or inverted flight but must end in upright flight.

Competitors may design their Free program to start upwind or downwind on the X axis or on the Y axis.

6.5 ALLOWABLE FIGURES

Any figure identified in the *Aresti System Catalogue* may be selected to compose the Free Power program. In addition, the Quarter-Clover *(See Chapter 8, Family 0.1 – 0.2)* may be used in power Sportsman Free programs. Figures 1.1.1.1 and 1.1.1.2 may be used only in conjunction with Family 9 rolls.

Any figure identified in the *Aresti System Catalogue for Glider Aerobatic Figures* (GAF) may be selected to compose the Free Glider program. In addition, the Wingover *(See Chapter 8, Family 0.0)* and Quarter-Clover *(See Chapter 8, Family 0.1 – 0.2)* may be used in Sportsman and Intermediate Glider Free Programs only. Figures 1.1.1.1 and 1.1.1.2 may be used only in conjunction with Family 9 rolls.

6.6 FIGURE DOCUMENTATION

Each figure selected must be listed on Form A, showing the *Aresti Aerobatic Catalogue* number, the correct K-Factor and the correct symbol, whether it is used singly or in combination.

6.7 DEFINITIVE CRITERION

The *Aresti Aerobatic Catalogue* number shown on Form A is the definitive criterion in the event of errors or questions regarding the drawing of symbols on Forms B or C. The catalogue number will also be used to prescribe proper K-Factors. There are two exceptions to this:

(1) The determination of whether rolls that are not linked are flown in the same direction or opposite direction is always based on the appropriate B or C form (depending on direction of flight).

(2) When the Starter, after receiving clearance from the Chief Judge to do so, has released the first pilot in a category's order-of-flight to taxi (or launch in the case of gliders), the Free Program for that category has started, and the Form B or C held by the judges for scoring purposes shall be the definitive criterion for the proper figure and direction to be flown. *(See 7.3.1 (c))*

6.8 REPETITION

Repetition of any *Aresti Aerobatic Catalogue* number is <u>not</u> permitted, except:

(1) Sportsman and Intermediate Power and Glider categories may repeat 1.1.1.x basic figures without limit.

(2) Sportsman and Intermediate Glider categories may repeat basic figures if they are used in combination with different Family 9 complementary figures. For example, it would be legal to include an 8.5.6.1 + 9.1.4.2 and another 8.5.6.1 + 9.4.4.2 in the same Glider Intermediate Free program.

(3) Advanced and Unlimited Glider Free programs may repeat Families 1.1.1.x. and 9.1.x.x without limit.

6.9 TOTAL K-FACTOR OF A COMBINATION FIGURE

To calculate the total K-Factor of a combination figure, simply add the K's of its components. For example, to construct a horizontal slow roll from upright to upright:

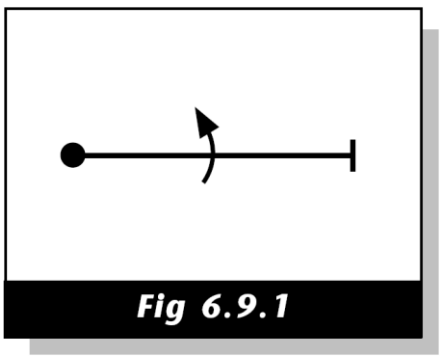


Fig 6.9.1

1.1.1.1	K = 2
+ 9.1.3.4.	K = 8
Total K-Factor	**10**

6.10 DETERMINING THE CORRECT SNAP ROLL CATALOGUE NUMBER

A positive snap roll is easier to perform when initiated from positive loading (angle-of-attack). Similarly, a negative snap roll is easier to perform when initiated from negative loading (angle-of-attack). Therefore, for each type of snap roll, positive (9.9.x.x) or negative (9.10.x.x), in any particular direction of flight, there are two possible K-factors. The correct catalogue number and K-factor for the snap roll to be added to a figure is determined by the loading (positive or negative — *see exceptions described below*) on the aircraft at the point on the figure where the snap roll is initiated. When a snap roll occurs immediately at the end of a looping segment, it carries the loading of that looping segment.

Where a snap roll located on a horizontal, 45°, or looping segment is preceded by a roll of any type, careful consideration must be made of the loading required after the first roll to maintain the desired flightpath between the two rolls. The character of the line (solid or dashed) upon which the snap roll is drawn is not a reliable indicator of the correct snap roll catalogue number in these cases. *(See Fig 6.10.1)*

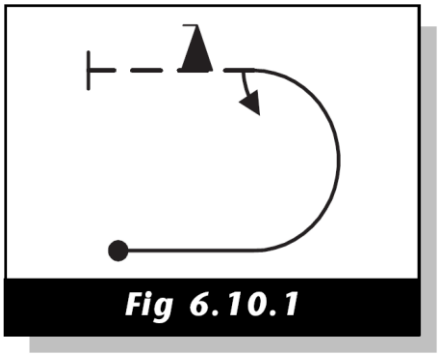


Fig 6.10.1

7.2.1.1.	K = 6
+ 9.1.3.2.	K = 4
+ 9.10.8.2. *	K = 15
Total K-Factor	**25**
**Not a 9.10.3.2.*	*K = 13*

There are two cases where the aircraft's loading is not clearly either positive or negative: zero angle-of-attack flight; and knife-edge flight.

(a) Vertical flight: Although the angle-of-attack is implicitly zero in vertical flight, unless the angle-of-attack is explicitly defined as zero by one of the four cases described below, the character of the vertical line (solid line = positive or dashed line = negative) determines the Catalogue number of the snap. The angle-of-attack (loading) in vertical flight is explicitly defined as zero if the snap roll occurs:

(1) After a vertical aileron or snap roll; or

(2) On the down line after a hammerhead; or

(3) On the down line after a tail slide; or

(4) On the down line after a spin element.

In any of these four cases, the lower of the two possible K-Factors and the associated *Aresti Aerobatic Catalogue* number must be used. *(Fig 6.10.2)*

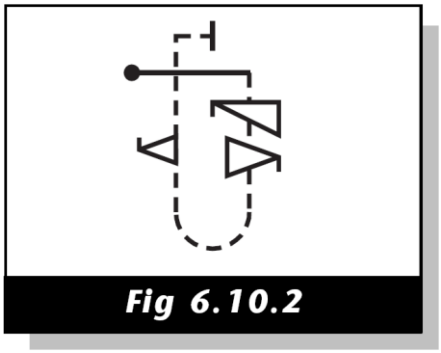


Fig 6.10.2

8.4.2.3.	K = 17
+ 9.11.1.4.	K = 5
+ 9.9.5.4.	K = 11
+ 9.9.6.2.	K = 17
Total K-Factor	**50**

***NOTE**: full inside Snap Roll uses lower K-Factor of 9.9.5.4. (K=11) rather than 9.9.10.4 (K=13), because the angle-of-attack following the spin element is explicitly defined as zero.*

(b) The aircraft is in a 90-degrees of bank, or "knife-edge," attitude: The only way for a snap roll to be initiated from knife-edge flight is for it to be immediately preceded by a roll with a rotation in an odd multiple of 90°. The absolute direction of the first roll is irrelevant for determining the correct catalogue number, only which rudder (top or bottom) the pilot must use to initiate the knife-edge snap roll in the proper direction relative to the first roll. In these cases, sequence designers and certifying judges must exercise extreme care to analyze the roll-snap roll combination to correctly determine the Catalogue number.

In the case of snap rolls initiated from knife-edge, the K-factor accorded to the maneuver shall be determined by whether the snap must be initiated using top rudder or bottom rudder. When top rudder must be used, the lower coefficient shall apply, while the higher coefficient shall apply to snaps that must be initiated with bottom rudder.

The following table and figure provide additional guidance and examples on how to select the proper Catalogue number for a given knife-edge snap.

RUDDER REQUIRED FOR SNAP ROLL FROM KNIFE EDGE
Table 6.10.1

Attitude Preceding Initial Roll	Initial Roll	Positive Snap		Negative Snap	
		Same Direction	Opposite Direction	Same Direction	Opposite Direction
Upright	¼ or 1 ¼	*Bottom Rudder (higher K)*	*Top Rudder (lower K)*	*Top Rudder (lower K)*	*Bottom Rudder (higher K)*
	¾ or 1 ¾	*Top Rudder (lower K)*	*Bottom Rudder (higher K)*	*Bottom Rudder (higher K)*	*Top Rudder (lower K)*
Inverted	¼ or 1 ¼	*Top Rudder (lower K)*	*Bottom Rudder (higher K)*	*Bottom Rudder (higher K)*	*Top Rudder (lower K)*
	¾ or 1 ¾	*Bottom Rudder (higher K)*	*Top Rudder (lower K)*	*Top Rudder (lower K)*	*Bottom Rudder (higher K)*

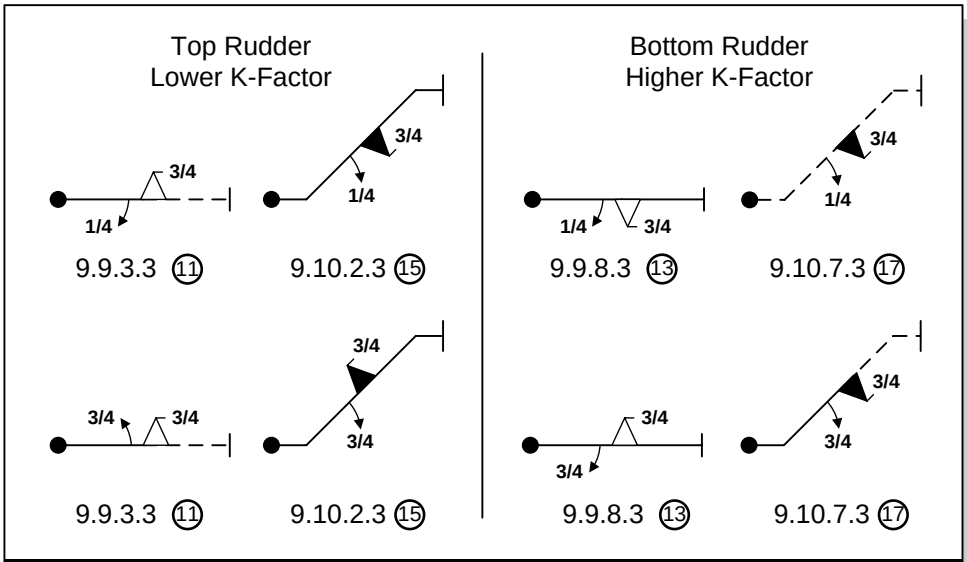


Fig 6.10.3

6.11 CONSTRUCTION OF FIGURES AND K-FACTORS

The method of constructing figures and calculating difficulty coefficients is described in the *Aresti Aerobatic Catalogue* as currently amended by the *FAI International Aerobatics Commission* (CIVA).

6.12 FORM A – THE COMPETITOR'S SCORESHEET

(*See Appendix 7 for an example*)

6.12.1

Competitors will present their Free Programs to the Registrar on standard IAC forms provided by either of the available computer-aided sequence drawing programs or downloaded and printed from IAC.org, in the quantity required by the Contest Director.

6.12.2

Each component *Aresti Aerobatic Catalogue* number, each component K-Factor, and figure symbols must be clearly legible on Form A.

6.12.3

A total K-Factor, derived by addition of the K-Factors for each figure, must be on Form A.

6.12.4

Presentation K-Factor for the category must be shown on Form A. *(See 5.8)*

6.12.5

The symbols drawn on the Form A should be identical to those from the *Aresti Aerobatic Catalogue* with only such changes as are necessary to show proper roll orientation, opposite direction rolls, and entry/exit direction.

6.13 *FORMS B & C (FLIMSIES)*

(*See Appendix 7 for examples*)

6.13.1

Each figure will be drawn on standard IAC Forms B and C (flimsies) showing the sequence of figures to be flown. These are separate forms and should not be printed back-to-back.

6.13.2

Form B will show the continuous sequence of the program as it is flown with the wind blowing from the Judges' right to left.

6.13.3

Form C will show the continuous sequence of the program as it is flown with the wind blowing from the Judges' left to right.

6.13.4

Competitors will use the notation, "Note Y Axis Entry", or "Note Downwind Entry" on their Free Program Forms B and C if they intend to start the sequence in a direction other than into the officially briefed wind on the X axis.

The only other notations allowed on Forms B and C are: "90 degree", "180 degree", "270 degree", or "360 degree" inside a turn. No account will be taken of any other notations and none should appear on the forms, except those described in 6.13.10.

6.13.5

The symbols drawn on Forms B and C should be identical to those from the *Aresti Aerobatic Catalogue*. They may be enlarged and modified as necessary to show left direction as all figures in the catalog are drawn right direction. They may also be modified to show entry from, or exit to, the secondary, or Y, axis. Lines may be extended or shortened to enhance the drawing, however, the burden for easy readability and clarity lies with the competitor.

For figures with both a Y axis entry and Y axis exit, the exit line must be drawn parallel to the entry line and in such a way as to show whether the exit direction the pilot intends to fly will be in the same or opposite direction, relative to the entry. Failing to fly the figure exit as drawn (same or opposite the entry) will result in a hard zero (HZ) for the figure. *(See Fig 6.13.1 and rule 7.3.1(e))*

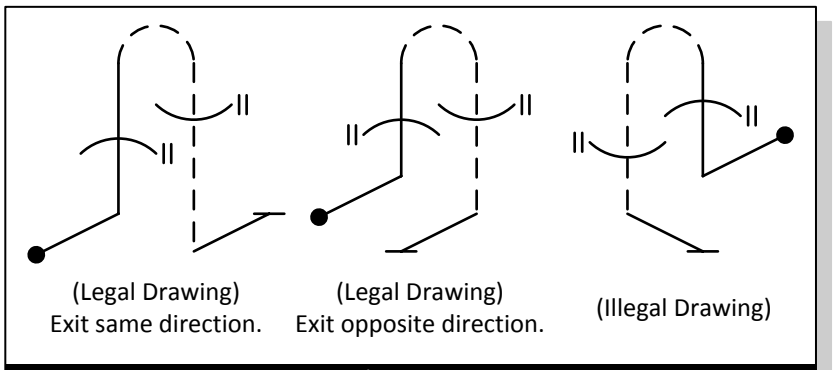


Fig 6.13.1
Depiction of Cross-Box Figure Elements

6.13.6

The character and composition of basic figures must not be changed by added rotational elements (rolls and spins). The direction of rotation of a rotational element(s) is not prescribed. However:

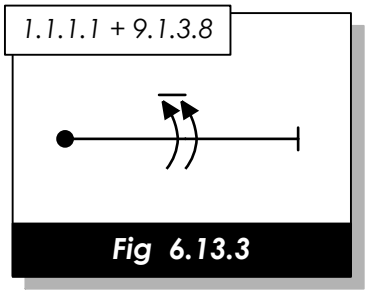


Fig 6.13.3

(a) When rotational elements are in continuous rotation of more than 360 degrees, the tips of the symbols are to be linked by a small line. *(Fig 6.13.3)*

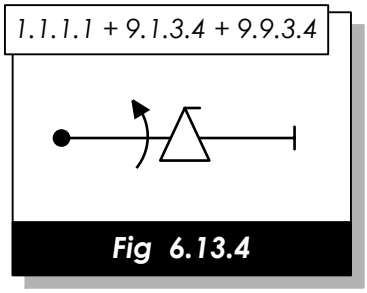


Fig 6.13.4

(b) For unlinked rotational elements in the same direction, no line links the symbols, but their tips must be drawn on the same side of the line where they are placed. *(Fig 6.13.4)*

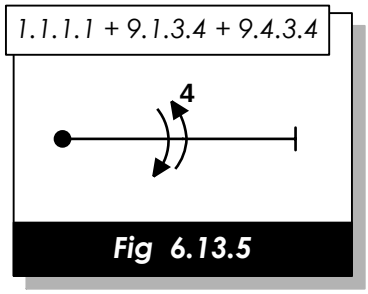


Fig 6.13.5

(c) For opposite rotational elements, the tips of the symbols must be drawn on the opposite side of the line. *(Fig 6.13.5)*

6.13.7

Unlinked rotational elements in the same direction must be of different types. The three types are defined as follows:

(a) Aileron rolls (slow rolls and hesitation rolls)

(b) Snap or flick rolls (positive and negative)

(c) Spins (upright or inverted)

6.13.8

When entering a figure on the Y axis which exits along the X axis, the direction of spin, turn, or roll must result in exiting, after the prescribed degrees of rotation, in the proper direction for entry into the subsequent figure. The proper direction is as prescribed on Forms B and C.

6.13.9

A number, either directly above the small "dot" or inside an open circle that signifies the beginning of the figure, should be placed on Forms B and C to depict the numerical order of the sequence. *(Fig 6.13.6)*

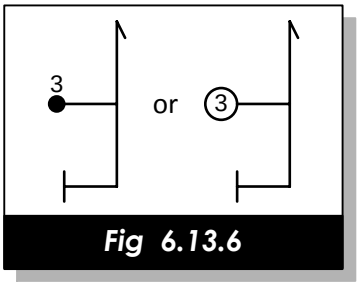


Fig 6.13.6

6.13.10

The competitor should strive to space the drawn symbols on Forms B and C so that the sequence is easily followed. If the symbols can not be spaced on the drawing in such a way that following the sequence of figures is unambiguous, a dotted line or series of tiny circles should be used to lead the judge's eye from the end of one figure to the beginning of the following figure. *(See Fig 9 and 10 on Form B, Appendix 7)*

6.14 *FREE PROGRAM CERTIFICATION*

Prior to a contest, it is the competitor's responsibility to have his or her three (3) Free Program Forms checked for compliance with these rules, signed, and dated by a current Judge who must provide their IAC member number on the Form A. The judge's signature does not have to have been in the current contest year, if there were no rule changes which affected a previously certified Free Program's legality. Competitors arriving without Forms A, B, and C being certified in accordance with these rules

may be refused entry. Such certification does not relieve the competitor of the final responsibility for the legality and legibility of the forms. A competitor who is also a judge may not sign off his or her own Free Program.

6.15 NONCOMPLIANCE

Competitors' Free Program paperwork is considered final when the general Pilot Briefing, or the Free Program Pilot Briefing if a contest has separate flight briefings, begins. Free Programs may not be altered by the competitor after that time.

Should a Free Program be protested or identified as noncompliant (i.e., "illegal") any time after it is final, that Free Program shall be referred to the Contest Jury who will apply the Judges' Checklist for Free Programs *(See 6.16)*. If a noncompliance is verified by the Contest Jury, penalties shall be assessed by the Contest Jury as specified in the applicable subpart(s) of 6.16.

6.16 JUDGE'S CHECKLIST FOR FREE PROGRAMS

The competitor has the sole responsibility for the selection of figures for their Free Program. The Judge checks for legality, readability, and agreement between catalog numbers, K-Factors and drawings. The *Aresti Aerobatic Catalogue* number shown on the Form A is always definitive when checking a Free Program.

The following items comprise a checklist for Judges to use for certifying Free Programs and describes the penalties for noncompliance *(See 6.15)*.

(a) Sequence is drawn on current IAC forms as depicted in Appendix 7 of this rule book.

Penalty: Should a competitor's Free Program become final (See 6.15) with the improper forms, that competitor will be assessed penalty points according to the schedule given in 4.6.1(a)(2).

(b) Total number of figures. It must not exceed that authorized for the category *(Power, Table 6.2.1; Glider, Table 6.2.2).*

Penalty: Any excess figure(s) shall be marked HZ, starting from the last and working backwards until the maximum allowable number of figures is reached.

(c) Versatility. The requirements of 6.3.1 for Gliders and 6.3.2 for Power must be met.

Penalty: Should a versatility element be missing, one figure shall be marked HZ for each missing versatility element, starting with the highest K figure and working backwards.

(d) Repetition. Check figures on Form A for duplicate *Aresti Aerobatic Catalogue* numbers. The repetition of any *Aresti Aerobatic Catalogue* number is not permitted except as provided in 6.8. Also scan Forms B and C for repeated figures. The most likely repetitions occur in Family 9 (Rolls), Family 8 (Combinations), and Family 5 (Hammerheads).

When checking a Free Program for any glider category, refer to 6.8 for special exceptions which apply to gliders only.

Penalty: All subsequent figures that contain an illegal repetition shall be marked HZ. For example, the first figure containing a 9.1.1.1 roll would be graded, but all subsequent figures containing that element would be marked with an HZ.

(e) Illegal construction *(See 6.13.5 and the Aresti Aerobatic Catalogue, Part 1)*.

(1) Where a 1/2 roll symbol appears, only rolls resulting in a 180 degree change in roll attitude can be used, as the character of the basic figure cannot be changed. *(See Aresti Aerobatic Catalogue, Part 1)*

(2) Where the 360 degree roll symbol appears, only 360 degree or 720 degree rotations may be used. It is also the competitor's option to use no roll at all.

(3) Rotations of 1/4, 1/2, 3/4, 1, 1¼, 1½, 1¾ or 2 may appear only on vertical lines where the optional 90 degree roll symbol appears.

(4) Linked rotations must be multiples of the same type of rotation.

(5) Unlinked rolls in the same direction of rotation must be of different types.

(6) Opposite rotations - Multiple rolls may be used more than once in a figure, but no more than one pair of them may be used on a straight or curved line. *(See Aresti Aerobatic Catalogue, Part 1)*

(7) Rolls are drawn with the curvature of slow roll symbols or the 'flag' of snap roll symbols indicating the proper direction of flight.

(8) Partial hesitation rolls must use the notation, AxB, where A is the number of hesitations flown and B is the number of hesitations that would occur in 360° of roll (e.g., a "3 of 2" roll would be annotated as "3x2").

(9) Where a Family 9.1 - 9.10 roll is combined with a Family 9.11 or 9.12 spin element on the same line, the spin must occur first on the line.

(10) Positive/Negative entry snap rolls - In Families 9.9 and 9.10 (snap rolls), the proper *Aresti Aerobatic Catalogue* number for the snap roll is determined by the loading at the point where the snap roll is placed. *(See 6.10 and the Aresti Aerobatic Catalogue, Part 1)*

(11) Entry and exit lines of figures which begin and end on the Y axis must be drawn parallel to one another. *(See 6.13.5)*

Penalty: All illegally constructed figures shall be marked HZ.

(f) On Form A, verify that each *Aresti Aerobatic Catalogue* number is entered correctly, the correct K-Factor has been entered for each component, the total K-Factor for the figure is correct, and the symbol is proper for the figure described by the *Aresti Aerobatic Catalogue* number.

For U.S. National Championships only, verify that Super Family (SF) numbers have been entered for each figure.

If a Floating Point has been used, ensure it was applied to the highest K figure(s) and does not exceed 1 point for power or 3 points for glider. Both the original figure coefficient and the reduced value must be shown on the Form A and the initials "F.P." written in the "Catalogue No." column of the Form A for any affected figures. Refer to 6.2 (power) and 6.2.1 (glider) for the complete set of rules governing the use of Floating Point.

Penalty: Any figures with an incorrect catalog number or K factor shall be marked HZ.

(g) With a calculator, verify the grand total K-Factor for the program is correct and does not exceed the maximum K-Factor allowable for the category (See 6.2).

Penalty: Should the maximum K-Factor be exceeded, figures will be zeroed starting with the last figure and progressing backwards until the total K-Factor (not including the Presentation K) is within allowable limits. Should the Total K-Factor be absent or otherwise incorrect, the K-Factor shall be corrected on Form A and a penalty shall be applied per the schedule in 4.6.1(a)(2).

(h) On Form A, verify the Presentation K-Factor is correct for the category. *(See 5.8)*

Penalty: If the Presentation K-Factor is absent or incorrect, the Presentation grade shall be zeroed.

(i) Place Forms B and C side by side and follow them as you would while grading at a contest. Are they clearly legible and easy to follow? Do the drawings on both forms agree in every important detail and with the catalogue numbers on Form A, e.g., dashed lines, roll symbols, figure numbers, and roll designations?

Penalty: All illegible figures; figures flown which do not agree with the Catalogue number or K-Factor given on the Form A; or figures that cannot be flown as drawn on Form B or C shall be marked HZ.

(j) If all the above items are correct, sign and date each of the three Forms A, B, and C.

Penalty: Should a competitor's Free Program become final *(See 6.15)* with unsigned or undated forms, that competitor will be assessed penalty points according to the schedule given in 4.6.1(a)(2).

(k) Remind the competitor that no changes or alterations can be made to these forms without having them recertified by a current IAC judge. Any changes or alterations void the signatures and render the forms noncompliant. *(See 6.15)*

CHAPTER 7 GRADING AND SCORING

7.1 GRADING OF FIGURES

Each Judge will independently assess the quality of every figure and its components as performed in the sequence, using numbers from 10.0 to 0.0 in increments of 0.5, and two special marks, "HZ" (hard zero) and "A" (Average) described in 7.3 and 7.4 to follow.

A grade of ten (10.0) represents a perfect figure in which the Judge saw no deviations from prescribed criteria. 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.

7.1.1 General Principles

When grading the quality of individual figures, Judges must consider the following general principles:

(a) The geometry of the figures (including shape, radii, angles, plane of flight, direction of flight, heading, and bank angle) must comply with the prescribed criteria.

(b) The precision of the performance compared to the criteria provided in Chapter 8.

(c) The distinctly recognizable start and finish of each figure with a horizontal line.

(d) The figure must be the one depicted on the flimsy appropriate to the official wind direction (Form B or C) and located at its proper place in the sequence.

(e) The grading criteria of each maneuver will apply in a combination figure so that one overall grade for the figure will result.

(f) The length of the lines and the size of the radii caused by the flying characteristics of an aircraft are not to be taken into account in the grading.

(g) All transitions from one plane of flight to another must have a reasonable and constant radius.

(h) Negative figures are graded by the same criteria as positive figures.

(i) When there is any question about exactly what was observed, the benefit of the doubt shall always be given in the competitor's favor.

7.1.2 Downgrades

A reduction of grade will be applied for each deviation from the prescribed criteria for the figure. *(See Chapter 8)* For all deviations from the correct geometry (plane of flight, heading, bank angle), and for deviations from the proper flight path or the proper attitude, the grade will be reduced by 0.5 point per 2.5 degrees of deviation, one (1) point per 5 degrees.

Downgrades are always made for the original error, but not for any corrections, which immediately follow. For example, over-rotating a roll and rolling the wings back again must be penalized for the over-rotation, but not penalized a second time for resuming the correct geometry afterwards.

Another example is when, at the end of a loop or part-loop, the aircraft's pitching stops prior to or beyond the required pitch attitude and is then corrected.

Further, when a downgrade in geometry (pitch, roll, yaw) is observed for one maneuver within a figure, any immediately following maneuver within the same figure is not downgraded a second time for any misaligned entry geometry. Example 1: The first point of a 4-point roll stops at 100° of rotation. The second point stops exactly at 180° of rotation. There must be no downgrade for point number two just because the second quarter roll consisted of 80° of rotation rather than 90°. Example 2: A spin is under-rotated but the following roll stops exactly on heading. The spin would be downgraded for the under-rotation, but there must be no further downgrade of the following roll because it had to be rotated more than its prescribed amount in order to finish on heading.

7.1.3 *Start and End of Figures*

The first figure of a sequence, or sequence restart following an interruption, begins at the moment the aircraft departs from the wings-level, horizontal flight path following the wing dip signal. After the wing dips are complete, the pilot is permitted to reposition either laterally or vertically before the actual start or resumption of a sequence. The pilot is also permitted to abort the start or resumption of a sequence as allowed in 4.16.1(a). Judges must use common sense to decide what is a repositioning maneuver versus the start of an aerobatic figure. However, failure to achieve a wings-level, horizontal flight path with the heading parallel to one of the box axes prior to initiating the first figure following the start/restart will be downgraded at the rate of 0.5 points per 2.5° of angular error. *(See 7.1.2)*

The grading of each subsequent figure begins upon exit of the preceding figure and ends immediately following completion of the last maneuver within the figure being graded. As examples, grading ends for a horizontal roll figure the moment the airplane completes the final roll in the figure, and grading of a tail slide would end following the second 1/4 loop from vertical. The only exceptions to this are in the grading of the exit lines in Aresti Aerobatic Catalogue Families 7.4.3.x thru 7.4.6.x (Square and Octagonal Loops). Any errors observed immediately upon completion of the last maneuver within the figure being graded will be deducted from the just completed figure. *(See 7.1.4)*

7.1.4 *Entry Lines*

The grade for each figure following the first figure of a sequence/sequence restart, includes the line leading into it. *(See* 7.1.3) That line must be in wings level, horizontal flight with the heading aligned with a box axis. Any downgrade for errors observed in this entry line of a figure shall be deducted at the rate of 0.5 point per 2.5° of error.

If any errors observed immediately following the final maneuver of the preceding figure are corrected before departing wings-level, horizontal flight for the subsequent figure, only the preceding figure shall receive the deduction. However, failure to correct such errors shall result in a downgrade to both figures.

7.1.5 *No Line Between Figures*

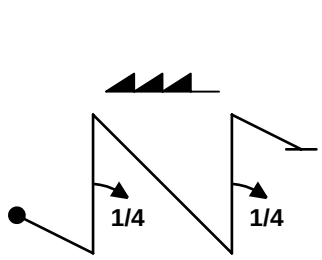
The complete absence of a discernible horizontal flight path between figures will result in the grades being reduced by one (1) point for each figure. *(See Fig 8.4.1)* Note also the special treatment for the exit lines of Catalogue figures 7.4.3 – 7.4.6 (Square and Octagonal loops), as discussed in Section 8.5 of Chapter 8.

7.1.6 *Directionality Within Figures*

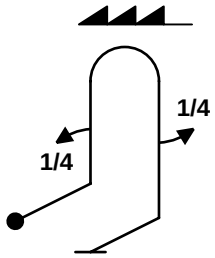
For figures drawn with both a Y axis entry and Y axis exit, the entry line on the Y axis carries no implication of direction of flight on that axis, but the direction of the exit line, relative to the entry line, indicates whether the pilot intends to exit the figure in the same or opposite direction. Failing to fly the figure exit in the direction drawn (same or opposite the entry) will result in a hard zero (HZ) for the figure. *(See Fig 7.1.1 and rule 7.3.1(e))*

When a figure includes internal line segments, straight or looping, drawn on the X axis, those internal line segments must be flown in the direction depicted on the Form B or C held by the judges (See 7.3.1(d)). Failure to do so will result in a hard zero (HZ) for the figure. Note that this directionality rule does not apply to Family 2, 5, or 6.

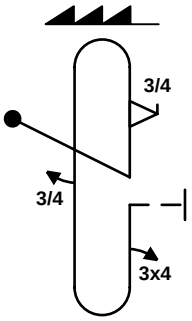
Figure 7.1.1 depicts three examples which illustrate figures with internal line segments which must be flown in the direction shown. The first two examples also illustrate figures with Y-Y entry/exits where the exit direction must be flown in the direction drawn (same or opposite relative to entry).



- 45° down line: upwind
- Exit: direction same as entry



- Top half-loop: upwind
- Exit: direction opposite to entry



- Top half-loop: downwind
- Bottom half-loop: direction is pilot's choice on Y axis
- Exit: Upwind

Fig 7.1.1
Directionality Within Figures

7.1.7 *Glider Aerobatics – Special Considerations*

Basic judging principles are the same in power and glider aerobatics; nevertheless, there are also some important differences. Compared to powered aerobatic airplanes, gliders have more restrictive operating limits in terms of speed as well as load factors. Most gliders have comparatively slow roll rates in aileron rolls as well as snaps and many gliders have nonsymmetrical wing sections resulting in upright and inverted flight characteristics being considerably different. All these factors must be considered in order to grade glider figures and sequences fairly.

7.2 JUDGE'S GRADING SUMMARY

Remember that you, as a Judge, are expected to grade against only one standard and that is perfection. The category level flying, the performance of the aircraft, or the complexity of a figure is not to be considered in formulating your grade.

It is the Judge's job to find fault. Be a nitpicker. On the other hand, give a grade of 10.0 if you see a perfect figure - but if you are really being critical you won't see too many. 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.

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.

7.3 ZEROS

A judge may mark two types of zeros based on the reason for giving the zero:

(a) Hard Zero. Hard zeros *(See 7.3.1)* are given when a Judge perceives that the pilot has failed to meet a relevant criteria for a maneuver that is not simply an instance of point deductions due to poor execution (Examples: not auto rotating a snap roll or flying a figure in the wrong direction on the X axis). The Hard Zero is annotated on the Form A with the mark "HZ" and, when given by a grading judge, the Hard Zero is subject to the majority rule *(See 7.3.3)*. The judge must state the reason for applying the HZ in the Remarks column.

(b) Numeric Zeros. The figure is basically correct, but contains one or more errors that cause the grade to fall to zero by accumulation of downgrading points *(See 7.3.2)*. The numeric zero is annotated on the Form A with the mark "0.0" and is included in the final score calculations as any nonzero mark would be. The judge must summarize the reasons for applying the numeric zero in the Remarks column.

7.3.1 A Hard Zero (HZ) Will Be Given For:

(a) Omitting a figure in the program.

(b) Adding a figure to a program. In this case, a HZ will be given to the figure immediately following the added figure. No interruption penalty will be given for an added figure, if the correct direction-of-flight within the sequence is maintained following the added figure.

In the special case where the added figure is a turn or a half slow roll to correct heading or attitude meeting the definition of an "implicit" interruption *(See 4.16.3)*, no HZ is given, but rather an interruption between figures should be annotated on the Form A and the Chief Judge will mark the interruption penalty on Chief Judge Penalty Form.

(c) Flying a figure which does not conform to the drawing held by the judges for marking purposes (Form 'B' or 'C') including any deviation from the prescribed entry/exit direction of 90 degrees or more, or any other single deviation in geometry / flight path / attitude / rotation of 90 degrees or more. Note: When a figure is added to a sequence, Rule 7.3.1(b) applies.

(d) Flying a figure drawn with an X axis entry, or exit, or both, in the wrong direction on the X axis. This rule also applies to any figure with internal line segments, either straight or looping, depicted on the X axis. Except for figures from Families 2, 5, and 6, any internal X axis line segments of a figure must be flown in the direction depicted on the Form B/C held by the judges. *(See 4.11.2 and Fig 6.13.2)*

(e) Flying the exit line of a figure with both a Y axis entry and exit not in the direction, same or opposite, of the entry as depicted on the Form B/C held by the judges. *(See 4.11.2 and Fig 6.13.1)*

(f) The Judge perceives that the pilot has failed to meet a relevant criteria for a maneuver. Examples: "Did not spin (HZ)", "Did not snap (HZ)", Did not slide (HZ)", "Snap during rolling turn (HZ)"

(g) Any figure started behind the Judges' line as determined by the Chief Judge.

(h) Any figure that is entirely or partially flown behind the deadline as determined by the Deadline Judge.

(i) Any figure interrupted for a technical fault ruled to be invalid by the Contest Jury. *(See 4.18.3)*

(j) Any figure flown as part of a Free Program which is found by the Contest Jury to be illegal. *(See 6.15)*

7.3.2 A Numeric Zero (0.0) Will Be Given For:

(a) Cumulative deductions of ten (10) or more points.

(b) Regardless of the total deductions observed in a figure, if any of the conditions listed in 7.3.1 are observed between figure start and end (See 7.1.3), the mark of Hard Zero (HZ) must take precedence over the numeric zero (0.0).

7.3.3 Majority Hard Zeros

If a majority, defined as more than 50%, of the grading judges, give a mark of HZ for a figure, the minority mark(s) will be changed to HZ by the scoring program. If there is a question about matters-of-fact, the Chief Judge may call a conference prior to surrendering the scoresheets to the Scoring Director. *(See 7.3.6)*.

Example:

Five judges mark: 8.5 – HZ – HZ – HZ – 8.0
The HZs are in the majority and all five marks will be computed as zero

7.3.4 Minority Hard Zeros

A mark of HZ will not stand if given by a minority, defined as equal to or less than 50%, of the grading judges. Any minority HZ(s) will be changed by the scoring program to the average mark given by the majority judges. If there is a question about matters-of-fact, the Chief Judge may call a conference prior to surrendering the scoresheets to the Scoring Director. *(See 7.3.5)*

Examples:

Five judges mark: 8.5 – 7.5 – HZ – HZ – 8.0
The two HZs do not stand and will be computed as (8.5+7.5+8.0)/3 = 8.0

Four judges mark: 6.5 – HZ – 5.5 – 0.0
The HZ does not stand and will be computed as (6.5+5.5+0.0)/3 = 4.0

7.3.5 *Conduct of Judge Conferences*

The Chief Judge may call a conference of judges, or a grading judge may request a conference, whenever there is doubt concerning a matter-of-fact, as indicated by a mix of numeric and HZ marks. Conferences may not be called when the opinion of the judge panel is unanimous, when only matters-of-perception are involved, or there is a mix of zeros and Averages only. Conferences are not mandatory in every case of conflict. If possible, conferences should be held at the next possible break such that the issue may be discussed without any pilot holding in the air or with the engine running on the ground.

The conduct of judge conferences will be as follows:

(a) The Chief Judge shall begin the conference by assembling the panel of judges. To reduce possible confusion, only the grading judge should attend, not the Assistant or Recorder.

(b) The Chief Judge shall inform the judges' panel of the matter-of-fact(s) to be discussed. Under no circumstances will there be any discussion of matters-of-perception. The four possible matters-of-perception are:

(1) Whether or not a snap roll autorotated

(2) Whether or not a spin autorotated

(3) Whether a tail slide slid the required distance

(4) Whether or not a rolling turn contained a snap roll

(c) The Chief Judge shall return the scoresheets (Form A) to their respective judge.

(d) The Chief Judge may assist the grading Judges with ascertaining the facts of the flight, but shall remain a neutral arbiter and will not indicate an opinion regarding the proper mark or any other aspect of a competitor's flight during a flight program and in no way attempt to influence the judges with his or her own opinion.

(e) Following discussion, each judge shall take one of the following actions:

(1) The scoresheet may be left as originally marked.

(2) The original mark may be changed to an HZ. For this option, the judge must cross out the original mark, leaving it legible, and write "HZ" with their initials next to the new mark.

(3) An HZ mark may be changed to a "C" (Conference Average), to signify the grade resulted from a conference discussion of the facts. For this option, the judge must cross out the HZ, leaving it legible, and write "C" with their initials next to the new mark.

No other type of change is allowed.

(f) After any changes are complete, the Chief Judge will collect and review each scoresheet for compliance with the above stated rules prior to releasing the forms to the Scoring Director.

7.4 *AVERAGES*

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 instruct the Recorder to write the letter 'A' in the grade block. The average

mark given by the judges who graded the figure will be computed by the scoring software and used in place of the 'A' in the final score computation.

7.4.1

When both "A's" and HZs appear for a figure, the scoring program will temporarily set aside the "A's" and resolve the HZs in accordance with 7.3.3 and 7.3.4, as if the 'A' marks did not exist. If the HZs hold, all grades are set equal to HZ. If the HZs do not hold, they are raised to the average of the numerical grades. Finally, the remaining 'A' grades are calculated using the original numerical grades and the average grade calculated for the minority HZs.

When one or more 'C' marks appear for a figure following a Judges' Conference *(See 7.3.5)*, the numerical value of the 'C' marks will be computed as the average of the numerical marks, prior to resolving any remaining 'A' and HZ marks.

Examples:

Marks: 8.0 – 7.0 – HZ – A – 7.5
Step 1: The 'A' is set aside and the HZ does not stand.
Step 2: The minority HZ is calculated as the average of (8.0+7.0+7.5)/3 = 7.5
Step 3: The 'A' (Average) is calculated as (8.0+7.0+7.5+7.5)/4 = 7.5

Marks: 5.5 – HZ – HZ – A – A
Step 1: Both A's are set aside. The HZs are in a majority and stand.
Step 2: All five marks are set to HZ.

Marks: 8.5 – 6.5 – 0.0 – C – A
Step 1: The 'A' is set aside.
Step 2: The 'C' (Conference Average) is computed as the average of (8.5+6.5)/3 = 5.0
Step 3: The 'A' is calculated as (8.5+6.5+0.0+5.0)/4 = 5.0

7.5 *PRESENTATION*

A grade for Presentation will be given by each judge after the flight is complete based on the judge's impression of the overall presentation. Refer to Section 8.6 for the complete criteria.

7.6 *SCORE COMPUTING*

7.6.1 *Scores*

The grades for each figure will be multiplied by the K-Factor (Coefficient of Difficulty) to derive a figure score. The total of figure scores when added to the Presentation score will constitute that Judge's total raw score for that flight.

7.6.2 *Penalties*

Infringements of the Aerobatic Box boundaries and altitude limits, interruptions, improper restarts/signaling, and other penalties as applicable to the regular contest flights will be assessed by the Chief Judge or his assistants and recorded on the *Chief Judge's Penalty Form*. *(See Appendix 7)*

Timing errors, improper signaling, deadline violations, and other penalties applicable to the Four Minute Freestyle program will be assessed by the Chief Judge or his assistants and recorded on

the *Chief Judge Penalty Worksheet*, which is found on the *Four Minute Freestyle Program* Form A. *(See Appendix 7)*

7.6.3 *Chief Judge Penalty Form*

The *Chief Judge Penalty Form*, or *Chief Judge Penalty Worksheet* in the case of Four Minute Freestyle programs, will be attached to the Form A's for the flight and delivered to the computing room. Once the forms leave the Chief Judge's station, they may not be changed except under the direction of the Contest Jury.

Should the "Illegal Free Program" box be checked on a *Chief Judge Penalty Form*, the Chief Judge shall direct that competitor's forms to the Contest Jury for review and action. Only after that review is complete and the Contest Jury has determined if additional penalties apply *(See 6.16)*, shall the forms go to the Scoring Director who will then enter the data from those forms into the scoring software.

7.6.4 *Score Computation*

In the computing room:

(a) The computer will calculate the penalty points from the *Chief Judge Penalty Form/Worksheet* and deduct those penalty points from the pilot's total raw score *(See 7.5.1)* to arrive at the competitor's final score.

(b) In the event of an illegal Free program, as verified by the Contest Jury, additional penalty points or deductions as determined by the Contest Jury in accordance with 6.16, will be applied to the total raw score.

(c) The grades of any Judge who was unable to complete grading an entire flight program will be deleted from that flight program.

(d) In the event of a disqualification (DQ), the Scoring Director will enter total penalty points equal to 9999 for the disqualified flight(s).

(e) In the event of a withdrawal, the Scoring Director will assign a grade of zero to all figures and penalties. Those grades will not be discarded but will remain part of the calculations for the category.

(f) In the event that any program is not completed (e.g., not all competitors could fly the program because of weather), the Scoring Director will enter total penalty points equal to 9999 for the competitors that have flown the program.

7.6.5

The Contest Director will make Forms A available for the personal inspection of the competitors as soon as possible after the Scoring Director has no further need of the Form A and Penalty Form. However, these scoresheets must remain under the supervision of the Contest Director or his designee until the expiration of the protest period. *(See 3.16)*

7.6.6

If a computer analysis of judging (RI) is produced, it will not be distributed to the Judges until after the contest is completed.

7.6.7

With the exception given for the U.S. National Aerobatic Championships in the *IAC Policy and Procedures* Manual, only IAC-supplied computer scoring programs will be permitted. The Scoring Director will ensure the current version of the scoring system is being used and is responsible for adhering to the instructions and notices supplied by IAC. *(See 1.11)*

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CHAPTER 8 CRITERIA FOR JUDGING AEROBATIC FIGURES

8.0 PREFACE

The following is an expansion and clarification of the general principles for grading aerobatic figures stated in Chapter 7. 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.

8.1 FLIGHT PATH AND ATTITUDE

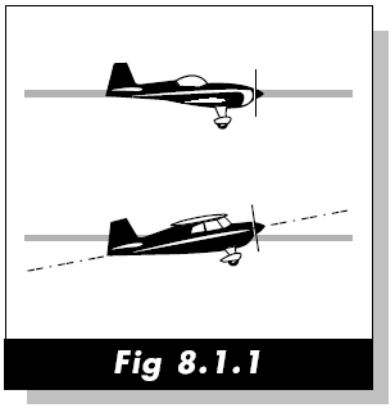


Fig 8.1.1

- *Horizontal Flight is based on flight path, NOT aircraft attitude*

8.1.1 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 center 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. *(See Fig 8.1.1)*

8.1.2 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.

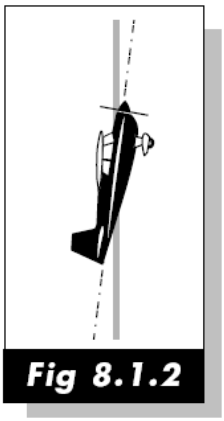


Fig 8.1.2

- *Aircraft may not appear vertical when flying a zero-lift axis.*

(a) When this zero-lift axis is vertical, the longitudinal axis of some aircraft may not appear to be vertical *(Fig 8.1.2)*. 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.

(b) 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.

(c) 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.

d) 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 *(Fig 8.1.3).*

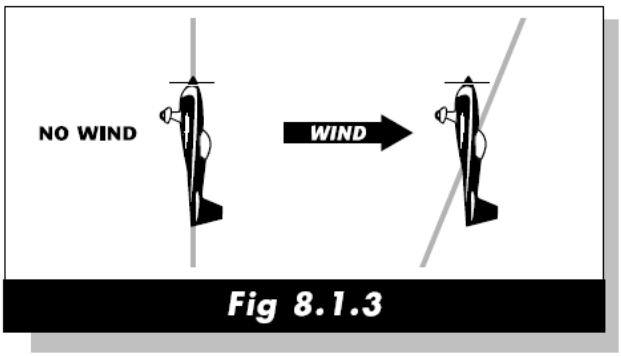


Fig 8.1.3

- *Vertical flight is judged on attitude, NOT flight path. Both aircraft illustrated receive no deduction for vertical flight since they both are flying on their zero-lift axis.*

8.1.3 The 45° Attitude

This is the vertical attitude plus or minus 45 degrees. In view of the difficulty in judging 45 degree lines accurately, scoring deductions must 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 *(Fig 8.1.4)*. 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).

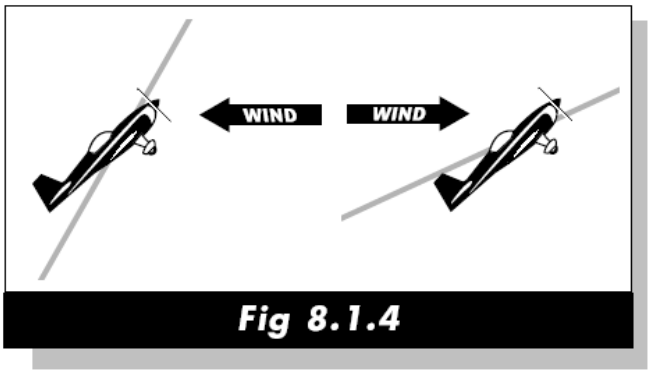


Fig 8.1.4

- *45 degree lines are judged on attitude, NOT flight path. Both aircraft illustrated receive no deduction for 45 degree lines since both are maintaining a 45 degree attitude throughout the length of the lines.*

8.1.4 Use of 30 Degree Attitude Lines

In the case of Glider Sportsman and Glider Intermediate, as well as for gliders competing in the power Primary category, all of the lines discussed in this section as 45 degree lines will be flown and judged as lines that are 60 degrees from the vertical attitude (30 degree lines).

8.2 HORIZONTAL FLIGHT IN GLIDERS

In Glider flights, the lines marking the entry into and exit from a maneuver can be at any "reasonable" angle and need not be the same. "Reasonable" means an attitude angle that is appropriate for the forthcoming maneuver and does not violate the basic form of the figure. For example, if a pilot is about to fly a loop, which requires only a moderate velocity – followed by a Hammerhead with a quarter-roll on the up line, which requires a high velocity - you can expect to see a much steeper attitude on the line marking the loop's exit than on the line marking the entry to the loop. The usual criterion of constancy still applies.

Furthermore, figures which should be flown at a constant altitude in power aerobatics, such as horizontal rolls and turns, may be flown by the gliders at a constant, reasonable angle to the horizon. If the angle changes during the figure, however, a deduction will be applied. For example, if a 360 degree rolling turn is entered and flown with a constant 10 degree descent, no deduction would be made. If the angle changed to 15 degrees during some portion of the turn, however, a one (1) point deduction would be applied.

8.3 WIND CORRECTION

Competitors are required to correct for wind effects on both the appearance of looping lines *(See 8.4.2)* and on positioning within the Aerobatic Box.

Keeping the aircraft within the Aerobatic Box has its biggest challenge when a wind is blowing at an angle to the X axis *(Fig 8.3.1)*. 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.

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. Even 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.

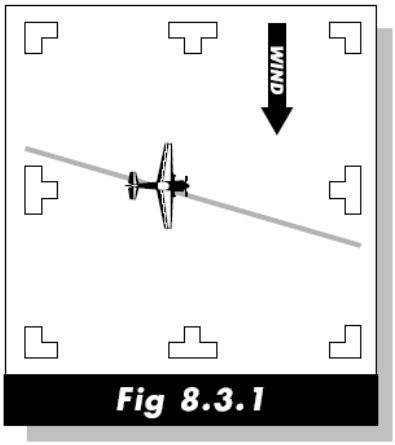


Fig 8.3.1

- *Flight path across Box, as seen from above, with no crabbing. No deduction.*

A common approach is to crab into the wind as done in navigational flight. *(Fig 8.3.2)* Crabbing means that the aircraft's heading is at an angle to the competition axis (X or Y). If this crab angle can be detected by the judge, however, a deduction of one (1) point per five (5) degrees of heading deviation must be given.

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 if any yaw (heading) deviation or bank angle is visible to the Judge, the mark must be reduced at the rate of one (1) point for every five (5) degrees of deviation detected.

Please note: even if it is clearly 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.

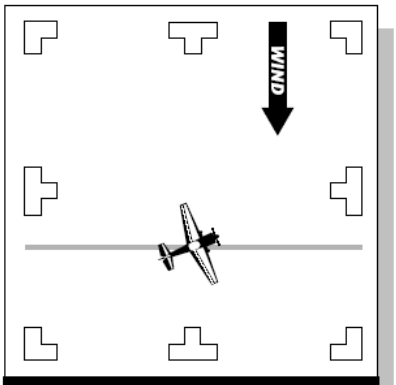


Fig 8.3.2

- *Flight path across Box with wind correction applied (crabbing). If the Judge can see the crabbing, a deduction must be given.*

8.4 THE TWO BASIC COMPONENTS OF AEROBATIC CONSTRUCTION

8.4.1 Straight 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 *(Fig 8.1.1)*. 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.

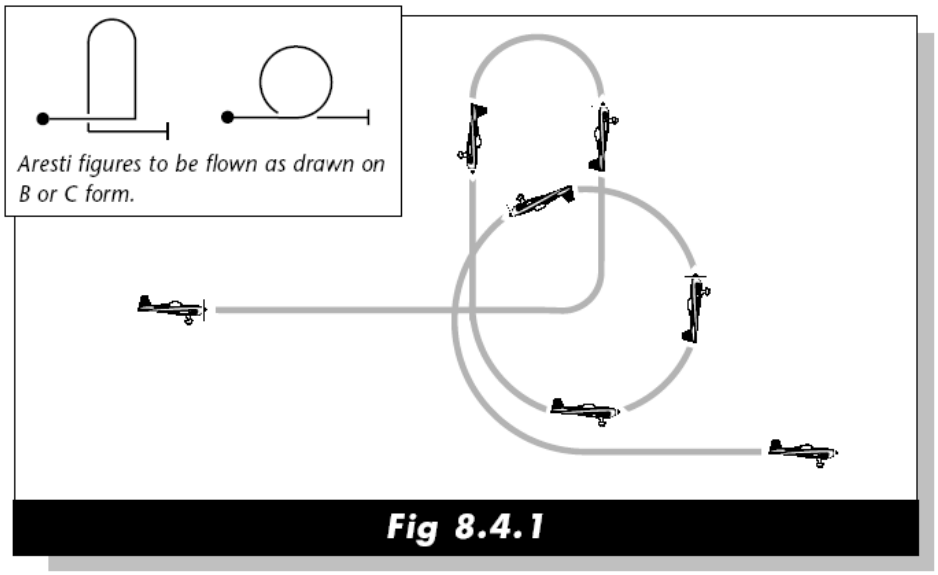


Fig 8.4.1

- *Figures as flown. No line between results in one (1) point deduction given to each figure.*

(a) 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-recognizable 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 *(See Fig 8.4.1 below and also 8.5, Family 7.4.3-7.4.6)*.

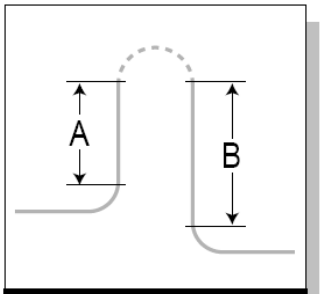


Fig 8.4.2

Length of lines A & B are defined as starting on and ending with part loops.

(b) All lines that occur inside a figure are preceded and followed by part-loops which define their length *(Fig 8.4.2)*.

(c) 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 lengths of the lines in a "Humpty-bump" do not need to be equal, but all four lines in a "Square loop" must be of equal length *(Fig 8.4.3)*.

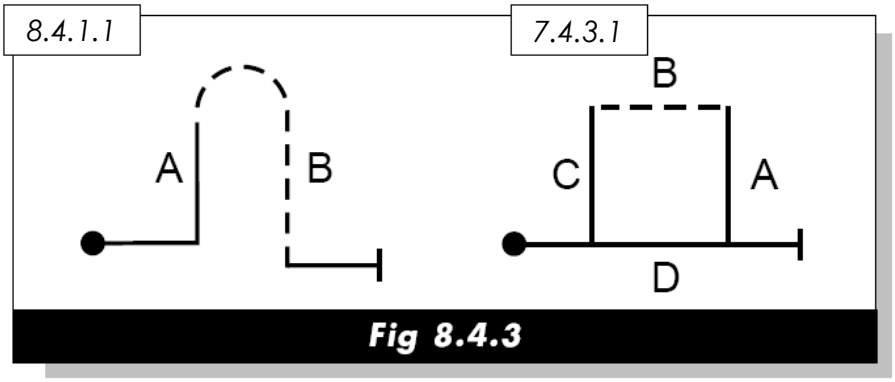


Fig 8.4.3

- *Length A does not need to = B*
- *Length A = B = C = D*

(d) Whenever any kind of roll is placed on an interior line (except when any type of roll follows a spin element and all snap rolls for Gliders), the lengths of the two parts of the line before and after the roll must be equal. Judges must 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 looses 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.

(e) In gliders, the entry airspeeds for positive and negative snap rolls lie in a relatively narrow bracket. The pilot must be free, therefore, to determine the point on the line where the snap roll is initiated. Because of this, no deduction will be made for glider snap rolls not centered on an interior line, but there must be some line before and after the snap roll. This exemption from centering snap rolls for gliders, applies without exception to the judging criteria provided in this chapter for all Aresti figures.

(f) If within a figure, two or more lines, or line segments, must be of the same length, an observed variation is penalized by reducing the grade in the following manner *(Fig 8.4.4)*:

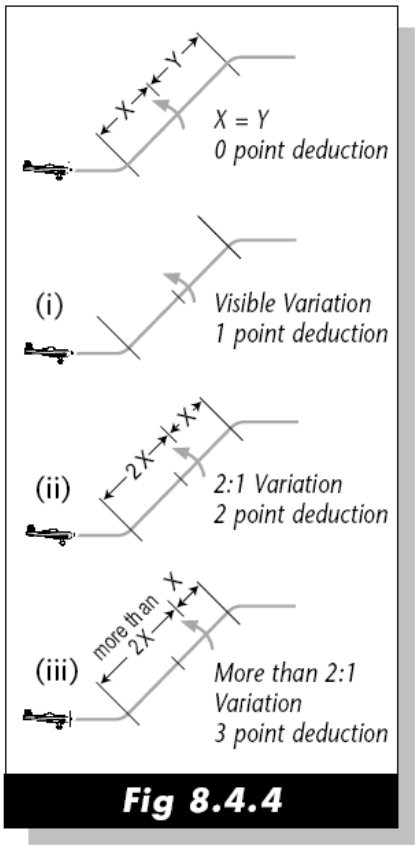


Fig 8.4.4

(i) a visible variation - 1 point deduction;

(ii) if the lengths vary by 1:2 - 2 point deduction;

(iii) greater than a 1:2 variation - 3 point deduction;

(iv) no line before or after - 4 point deduction *(Fig 8.4.5)*.

The basis for judging line length is the first line or line segment flown. The absence of one of these lines before OR after a roll has to be downgraded by 1 additional point (4 points total). If there are no lines before AND after the roll, the total penalty is two (2) points only.

Example: (Fig 8.4.5) 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.

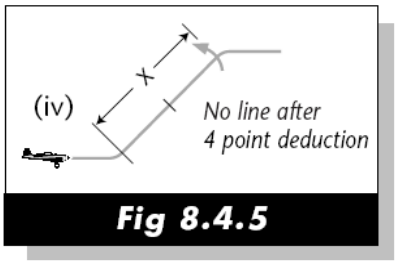


Fig 8.4.5

Note: The examples in Figures 8.4.4 and 8.4.5 illustrate downgrades for errors in line segments before and after a roll, but the same concept applies to lines within Family 3 and Family 7.4.3 - 7.4.6 hesitation loop figures.

(g) 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 to suddenly 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.

8.4.2 *Looping Lines*

Looping lines are integral to every Aresti family except Family 2, so understanding the criteria for judging looping lines, from 1/8th to full loops, is essential to every category of competition.

(a) The ideal looping line is defined by a constant radius flight path, as it appears to the judge. Thus, if there is any wind, the pilot must adjust the actual flight path to achieve the constant radius appearance. As the attitude of the airplane will be constantly changing when flying

a looping line, the judge must evaluate the quality of the looping line by observing the CG trajectory. The beginning and end of a looping line is always defined by a straight line which can be horizontal or a multiple of a 45° attitude. Those lines are judged separately from the looping lines as described in 8.4.1.

(b) There is no explicitly defined criteria for downgrading observed changes in the radius of looping lines. A judge must, therefore, develop a consistent and objective method for grading looping lines. One example would be to deduct 1 point for each just-visible variation in the radius and 2 points for each major deviation from a constant radius. For looping lines of 180° or greater, another example technique is to use the first 1/4 loop segment flown as the basis for evaluating the remainder of the loop. For each remaining looping segment: a visible variation from the first quarter loop results in a 1 point deduction; a 1:2 variation results in a 2 point deduction; and more than a 1:2 variation results in a 3 point deduction. These are but two examples and other methods are equally acceptable, as long as those methods meet the standards of objectivity and consistency of results.

(c) All looping lines must have a smooth, distinct, and constant radius. For example, the Family 1 figure shown in Fig 8.4.6 begins with a quarter loop (a) followed by a vertical line and then another quarter loop (b). As described in 8.4.3, the quarter-loop at the top of the vertical line need not have the same size radius as the quarter-loop at the bottom. However, the top radius must never be flown as a "corner" or very sharp angle *(Fig 8.4.7)*.

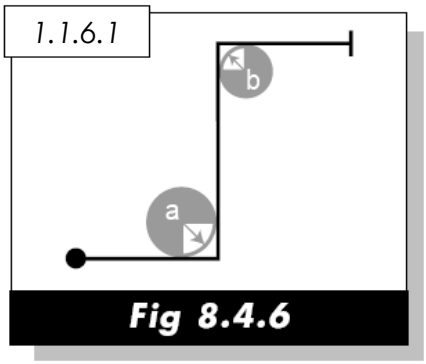


Fig 8.4.6

- Family 1: Radius 'a' need not match radius 'b'.

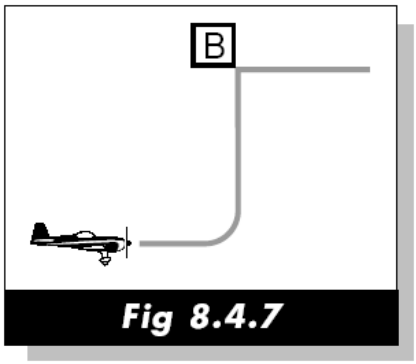


Fig 8.4.7

- Sharp angles, or "corners" B, are NEVER allowed.

(d) When the looping portion of a figure is immediately preceded or followed by one or more rolls (i.e., rolls not centered on a straight line), there must be no visible line between the roll and loop elements. Drawing a line requires a downgrade of at least one (1) point depending on the length of the line drawn. This criterion is not meant to imply that one element (roll or loop) must start before the preceding element is completely finished. A brief hesitation between elements (similar to opposite rolls) must not be downgraded.

(e) Whenever there is a roll or roll combination depicted at the apex of upward going loops, or the nadir of downward going loops, regardless of the extent of the looping line, the roll or roll combination must start and end symmetrically about that point and be integrated into the radius of the loop or part-loop throughout the rolling maneuver. Flying any part of the roll or roll combination on a straight line is at least a two (2) point downgrade. If the roll or roll combination is not centered about the apex/nadir point, the figure must be downgraded one (1) point for every five (5) degrees of arc that the roll or roll combination is off center. The pause between rolls in a roll combination cannot be assumed to occur at the

apex/nadir point, unless the roll combination is comprised of identical degrees of rotation of the same type of roll. The pause between rolls in a roll combination, therefore, cannot be used to judge symmetry of the roll combination.

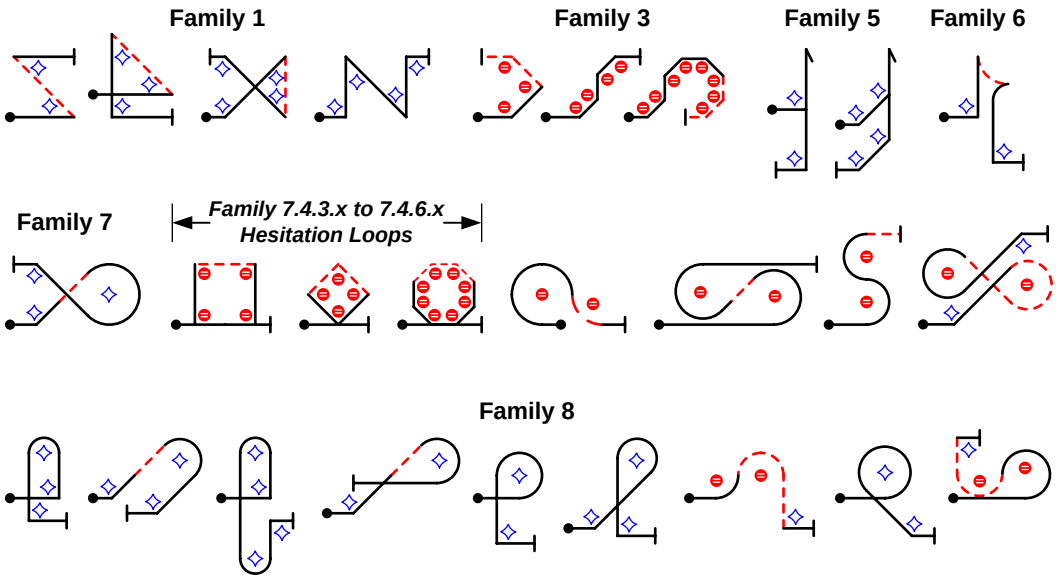
8.4.3 *Comparing Part-Loop Radii*

All looping lines must be flown with a constant radius *(See 8.4.2)*, but for aerobatic figures containing more than one part-loop, there may be an additional requirement for two or more of those radii to be the same size. Whether or not part-loops within a particular figure are required to have identical radii depends on the figure in question. There must be a way, therefore, for both pilots and judges to know when the radii of internal part-loops are required to be equal and when no such requirement exists. How a particular figure is drawn in the Aresti Aerobatic Catalogue is the key. *(See Fig 8.4.8)*

Shown below is a range of examples selected from all of the affected Families. Note the different treatment for Family 3 and the Family 7.4 Hesitation loops.

These corners and looping segments must have a constant and smooth radius, but they do ***not*** need to match any other radius in the same figure.

These corners and looping segments must have a constant and smooth radius that are **identical in size**, or the figure must receive an appropriate downgrade.



Note that the examples above only show some of the affected figures. The principle, however, applies to all figures in the catalogue with more than one part-loop.

Fig 8.4.8: Judging Part-Loop Radii

Round Corners

For any figure having more than one internal part-loop depicted in the catalogue as an actual round, or looping line, element, all such part-loops must have the same radius – with an exception for all of Family 8.8 (Double Humpty Bumps). For those figures, the radius of the second half-loop is not required to match the radius of the first one.

Corner Angles

For any figure having more than one internal part-loop depicted in the catalogue with a hard, or corner, angle, no such part-loop is required to match the radius of any other part-loop depicted in the same figure – **with the exception of** figures which must maintain a set geometric proportion, i.e.,

a) All of Family 3 (Combination of Lines)

b) Family 7.4.3.x to 7.4.6.x (Hesitation Loops)

The information provided in this section for comparison of part-loop radii within a figure shall be applied to all applicable figures. The criteria pertaining to comparing the size of part-loops will generally not be repeated in the individual Aresti Family and Sub-Family discussions which follow.

8.5 *ARESTI AEROBATIC CATALOGUE FAMILIES*

FAMILY 0.0 *Wingover*

Use of the wingover will be allowed only in the Glider Sportsman and Glider Intermediate categories. It is assigned a pseudo Catalogue number of 0.0. and a K-Factor of 8. The Aresti symbol is shown in Figure 8.5.1.

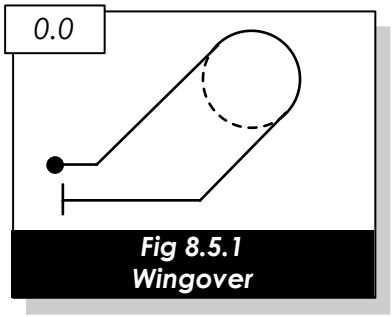


Fig 8.5.1
Wingover

The Wingover begins with a climbing coordinated turn, with the turn begun immediately after the climb is initiated. Climb and turn will be timed so that at the top of the climb, heading is 90 degrees off the original heading, the wings are perpendicular to the horizon, and the longitudinal axis of the aircraft is horizontal. Deductions for errors in heading and attitude at this point must be made according to the "one point per five degree" rule. The second half of the wingover is a continuation of the turn, now on a descending flight path, returning to horizontal flight on the reciprocal of the entry heading *(Fig 8.5.1).* The 180-degree change of heading must be flown at a constant rate of turn and the bank angle must be constantly and smoothly changed throughout the turn, stopping only briefly as the roll direction is reversed at the 90-degree point of turn. Each change in the rate of roll or turn is a deduction of no more than one (1) point. Any complete stoppage of the rate of roll or turn is also a deduction of no more than one (1) point.

FAMILY 0.1 – 0.2 *Quarter-Clover*

Use of the Quarter-Clover will be allowed only in the Sportsman (Power and Glider) and Glider Intermediate categories. It is assigned a pseudo-Catalogue number of Family 0.1 (rolling on the ascending half loop) with a K-Factor of 16, or Family 0.2 (rolling on the descending half loop) with a K-Factor of 13. The Aresti symbols for the Family 0.1 and 0.2 Quarter-Clovers are shown in Figures 8.5.2.1 and 8.5.2.2, respectively.

The quarter-clover is a loop with a quarter roll evenly integrated either within the first half loop up (Family 0.1) or within the second half loop down (Family 0.2). In either case, the exit direction of flight will be 90 degrees to the entry heading.

For the Family 0.1 quarter-clover, the roll must begin simultaneously with the pitch up and continue at a constant rate such that the aircraft reaches the top of the loop inverted with the fuselage horizontal and the longitudinal axis 90 degrees from the start direction. The second half loop down is conventional, like the second half of a 7.4.1.1.

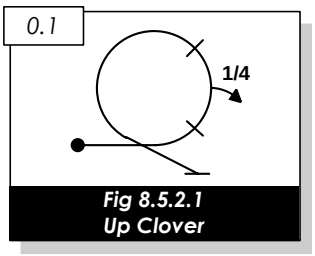


Fig 8.5.2.1
Up Clover

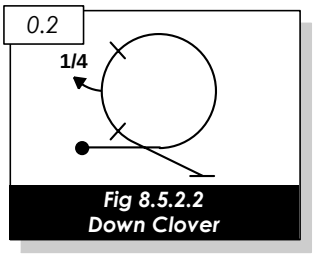


Fig 8.5.2.2
Down Clover

For the Family 0.2 quarter-clover, the first half loop up is like the first half of a 7.4.1.1. Immediately upon completing the first half loop, the aircraft must begin a constant rate quarter roll such as to reach upright, wings-level horizontal flight at the bottom of the second half loop.

The looping segments in both figures must be wind corrected to maintain a constant radius, therefore the start and finish altitudes must also be equal. The penalty for varying the rate of roll in the quarter-clover figure is one (1) point per variation.

FAMILY 1 *Lines and Angles*

Family 1.1.1 to 1.1.11 has been fully covered in the preceding sections on lines and part-loops. Note that except for the figures in row 1.1.1, the remainder of Family 1 is NOT flown as drawn. In the *Aresti Aerobatic Catalogue* any looping line less than 180° is depicted as a hard corner *(Fig 8.5.3.1)*, but must be flown as a smooth radius *(Fig 8.5.3.2)*. 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.

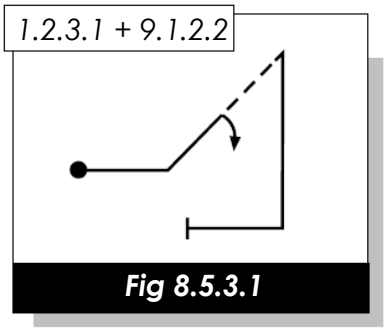


Fig 8.5.3.1

- *Family 1.2.3.1. + 9.1.2.2. as flown. Radii a, b and c may all be different and entrance altitude. "A^a" can be different from exit altitude "B^b".*

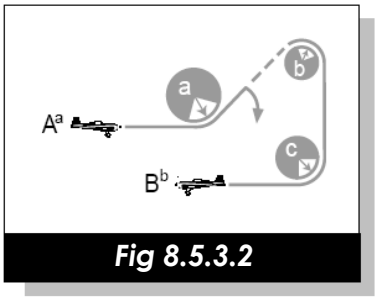


Fig 8.5.3.2

FAMILY 2 *Competition Turns*

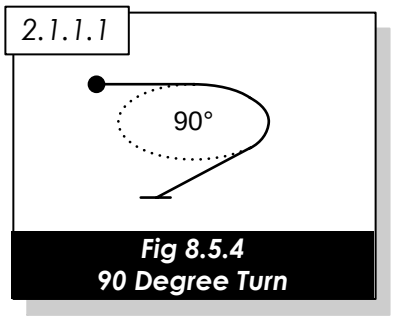


Fig 8.5.4
90 Degree Turn

Competition turns *(Fig 8.5.4)* are not to be confused with standard coordinated turns. In aerobatic competition, a turn is divided into three distinct phases: 1) establishing the bank using a roll on heading; 2) a heading change of 90°, 180°, 270°, or 360°; and 3) a roll back to straight and level flight while maintaining the final heading.

Immediately after the roll to a bank angle of at least 60° is complete, the heading change must begin. Throughout the turn, the established angle of bank, rate of turn, and horizontal flight must be maintained. Turns are NOT wind corrected to have a constant radius. Therefore, in wind, a 360 degree turn will not close over the same point it began.

As soon as the aircraft is on the exit heading, the heading change must stop while maintaining the chosen bank angle, followed immediately by a roll back to wings level using a rate of roll equal to the entry roll.

Negative (inverted) turns have exactly the same judging criteria as positive (upright) turns.

Downgrades:

1. No heading change until the chosen bank angle is established. The Judge must note the bank angle when heading change begins and deduct one (1) point for every five (5) degrees for any bank angle less than 60°. The rate of roll used to establish the bank angle is the pilot's choice, but the judge must make note of the rate for comparison at the completion of the turn (#6 below).
2. Constant angle of bank. After the initial bank angle is set, any change during the turn is one (1) point for every five (5) degrees of deviation.
3. Constant rate of turn. 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. The Judge must always keep the wind in mind and give the pilot the benefit of the doubt if there is any question.
4. Constant altitude throughout the figure. Any variation would be a deduction of either one (1) point for every five (5) degrees of flight path angle off horizontal, or 1 point for every 100 feet. Judges must be very careful to separate an actual altitude gain or loss from an apparent change in altitude as a result of perspective as the airplane's distance from the judge changes during the turn.
5. Exit heading on axis. At the completion of the turn, the heading change must stop on axis (X or Y) while maintaining the chosen bank angle. The judge will note the heading when the turn rate stops and deduct one (1) point for every five (5) degrees for any heading not parallel to the proper exit axis. If the roll to wings level begins prior to stopping the turn rate, deduct one (1) point for every five (5) degrees of roll/turn integration.
6. Bank angle is returned to wings level. The rate of roll to wings level must be identical to the rate of roll used for the entry. Any deviation is a one (1) point deduction.

FAMILY 2 *Rolling Turns*

The majority of Family 2 consists of rolling turns, figures that combine a turn of a prescribed amount with a roll or rolls integrated throughout the turn.

These rolls may be in the same direction as the turn and are called "rolls in" or "rolls to the inside". They can be rolls in the opposite direction of the turn and are called "rolls out" or "rolls to the outside" *(Fig 8.5.5).* Or there can be rolls alternating in and out.

When we say that the rolls are integrated, we are saying that in addition to there being constant rate of turn throughout the figure, there is also a constant rate of roll throughout. Naturally, the one exception to this constant roll rate is the pause when reversing roll directions.

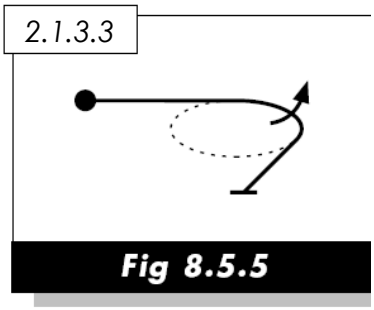


Fig 8.5.5

- *90 degree turn with one roll to the outside.*

To help visualize the execution of this figure and facilitate a way for the Judge to determine a constant roll rate, consider an aircraft performing a 360 degree rolling turn with 4 rolls to the inside from upright (Family 2.4.7.1). First, on the prescribed entry heading, the pilot initiates a turn and simultaneously begins a roll in the same direction as the turn. The judge will expect the aircraft to be inverted at 45, 135, 225, and 315 degrees and to be upright at 90, 180, 270 and 360 degrees. At these interim headings, the Judge will NOT downgrade using the one (1) point for five (5) degrees rule, but will judge changes in the rate of roll, changes in rate of turn, and changes in altitude (see downgrades below). At the end of the figure the aircraft must be wings level and on the prescribed heading.

For a rolling turn with rolls in alternating directions, the aircraft must change direction of roll at a wings-level attitude. Reversing roll direction before or after the wings-level attitude will be penalized by one (1) point per five (5) degrees of bank angle error at reversal. The position of the aircraft in the turn is still only used as an aid to determine if the pilot is varying the rate of roll or turn.

Downgrades:

1. Performing more or fewer rolls than the Catalogue description calls for results in the figure being graded HZ.
2. Rolling in a direction opposite (i.e., rolling to the inside instead of the outside or vice versa) to that depicted in the Catalogue description requires marking the figure HZ. NOTE: If an improper direction of roll is initiated, but reversed to the correct direction before forty-five (45) degrees of roll is exceeded, a deduction of one (1) point for every five (5) degrees of the improper roll shall be made.
3. All rolls in a rolling turn are slow rolls. If a snap roll is observed, the figure must be marked HZ.
4. Each variation in the rate of roll is a deduction of no more than one (1) point.
5. Each complete stoppage of the rate of roll is a deduction of one (1) point.
6. Each variation in the rate of turn is no more than a one (1) point deduction.
7. Variations in altitude are deducted using either one (1) point for every five (5) degrees or 100 feet of altitude.

8. One (1) point for every five (5) degrees that the aircraft is not in level flight when reversing roll direction.
9. One (1) point for every five (5) degrees of roll remaining when the aircraft has reached its exit heading.
10. One (1) point for every five (5) degrees of turn remaining when the aircraft has completed its last roll.

FAMILY 3 *Combinations of Lines*

The transition from level flight to 45 degree lines should be at a constant and reasonable 1/8th looping radius. All lines within the figure must be equal in length and all part-loops must have the same radius. *(Fig 8.5.6)*

- *Radii a = b = c*
- *Length of line A = B*

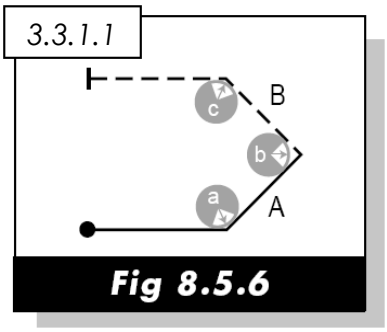


Fig 8.5.6

FAMILY 5 *Hammerheads*

In its most basic form *(See Fig 8.5.8)*, a hammerhead begins with a quarter loop to establish a vertical climb. At the top of the vertical line, the aircraft pivots 180 degrees around the yaw axis and establishes a vertical descent. The figure ends as the aircraft completes a quarter loop back to horizontal flight. Hammerhead figures beginning with Family 5.3.1 add 45-degree entry and exit lines in various combinations *(See Figure 8.5.9 for an example)*. All Family 5 hammerheads may have a roll or rolls on the vertical up and down lines. In addition, Family 5.3.1 through 5.4.4 may have mandatory or optional rolls on the 45-degree entry/exit lines.

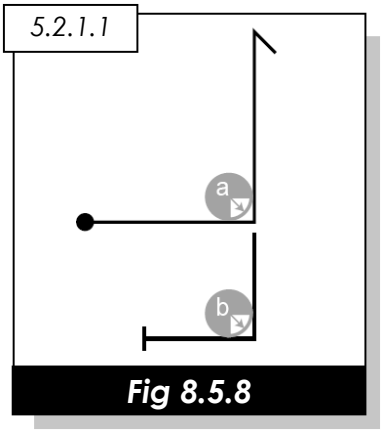


Fig 8.5.8

The judging criteria for all Family 5 hammerheads are:

1. The vertical lines, both up and down, must be flown on the zero-lift axis. *(See 8.1.2)*
2. Any deviation from the vertical or 45-degree attitudes will result in a downgrade of one (1) point per five (5) degrees.
3. Any roll(s) added on either the vertical or 45-degree lines must be positioned so that the line segments before and after the roll are of equal length *(Fig 8.5.10)*. Downgrades for unequal line lengths are given in 8.4.1(f).
4. The vertical up line, vertical down line, and 45-degree entry/exit lines (if present) may all be of different length. Therefore, the altitude of the horizontal lines at the start and finish of the hammerhead may be different.
5. During the vertical climb or vertical descent, the wings must remain parallel to the horizon. There will be a one (1)

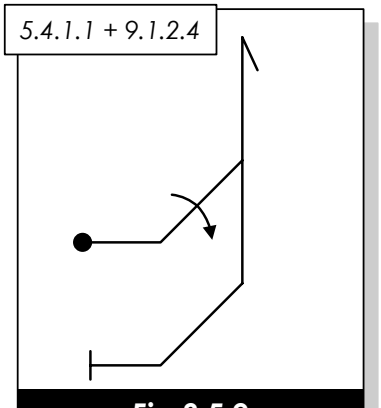


Fig 8.5.9

point deduction per five (5) degrees of deviation of the vertical (yaw) axis from horizontal.

6. As the aircraft nears the point where all vertical motion stops, it must pivot on the yaw axis in a plane parallel to vertical. Ideally, the aircraft would come to a complete stop at the top of the hammerhead and pivot around its stationary center of gravity (CG). This ideal rotation around the CG is nearly impossible to achieve aerodynamically and the criteria therefore allows the actual pivot point to occur anywhere within a circle of one-half wingspan radius centered about the ideal pivot point (Fig 8.5.11(a)). The judge must note the position of the CG when the aircraft starts and stops pivoting and deduct one (1) point for each half wingspan the CG is located outside the circle surrounding the ideal pivot point (Fig 8.5.11(c) and (d)). If the CG remains anywhere within one-half wingspan of the ideal pivot point, no deductions will be made (Fig 8.5.11(b)).

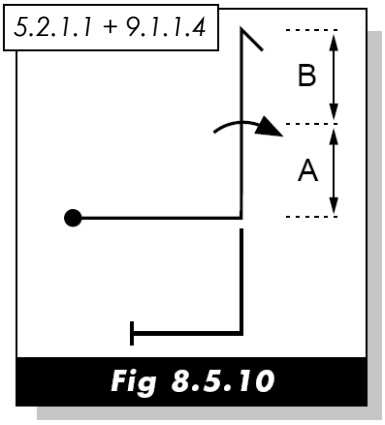


Fig 8.5.10

• *Length of line A = B*

Note that the deduction for any CG pivot error applies only to the yaw axis. Any motion about the pitch or roll axis during the pivot must be downgraded by one (1) point per five (5) degrees of axis rotation.

If the pivot is initiated slightly earlier than ideal (referred to as an "early kick" or "fly-over"), the trajectory of the aircraft's CG will continue up and over the point of rotation *(Fig 8.5.11(c))*. As long as the center of gravity does not move more than 1/2 wingspan away from the ideal rotation point, no deduction is made *(Fig 8.5.11(b))*.

Judges must be careful to deduct only for true fly-over, and not for any apparent fly-over caused by wind drift during the pivot. Wind drift can be separated from fly-over by watching the center of gravity. If the CG does not continue upward by more than 1/2 wingspan after the pivot is initiated, any lateral motion of the CG beyond a half wingspan is the result of wind drift and not fly-over.

Conversely, should the pilot initiate the pivot later than ideal ("late kick"), the aircraft will be seen to have a sideways ("wing slide"). Again, if the amount of error is contained within an area 1/2 wingspan in radius about the ideal pivot point, no deductions must be made. If the circle of acceptable error is exceeded in this case, a deduction of at least one (1) point, or more depending on the severity of the error, shall be assessed *(Fig 8.5.11(d))*.

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

8. 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 extraneous movement. There must be no rotation around the longitudinal or lateral axes. If there is movement around any axis other than the yaw axis, often referred to as "torquing" *(Fig. 8.5.12)*, there is a deduction of one (1) point for each five (5) degrees off axis.


Fig 8.5.12

• *"Torquing" is rotation about the longitudinal axis during a hammerhead pivot.*

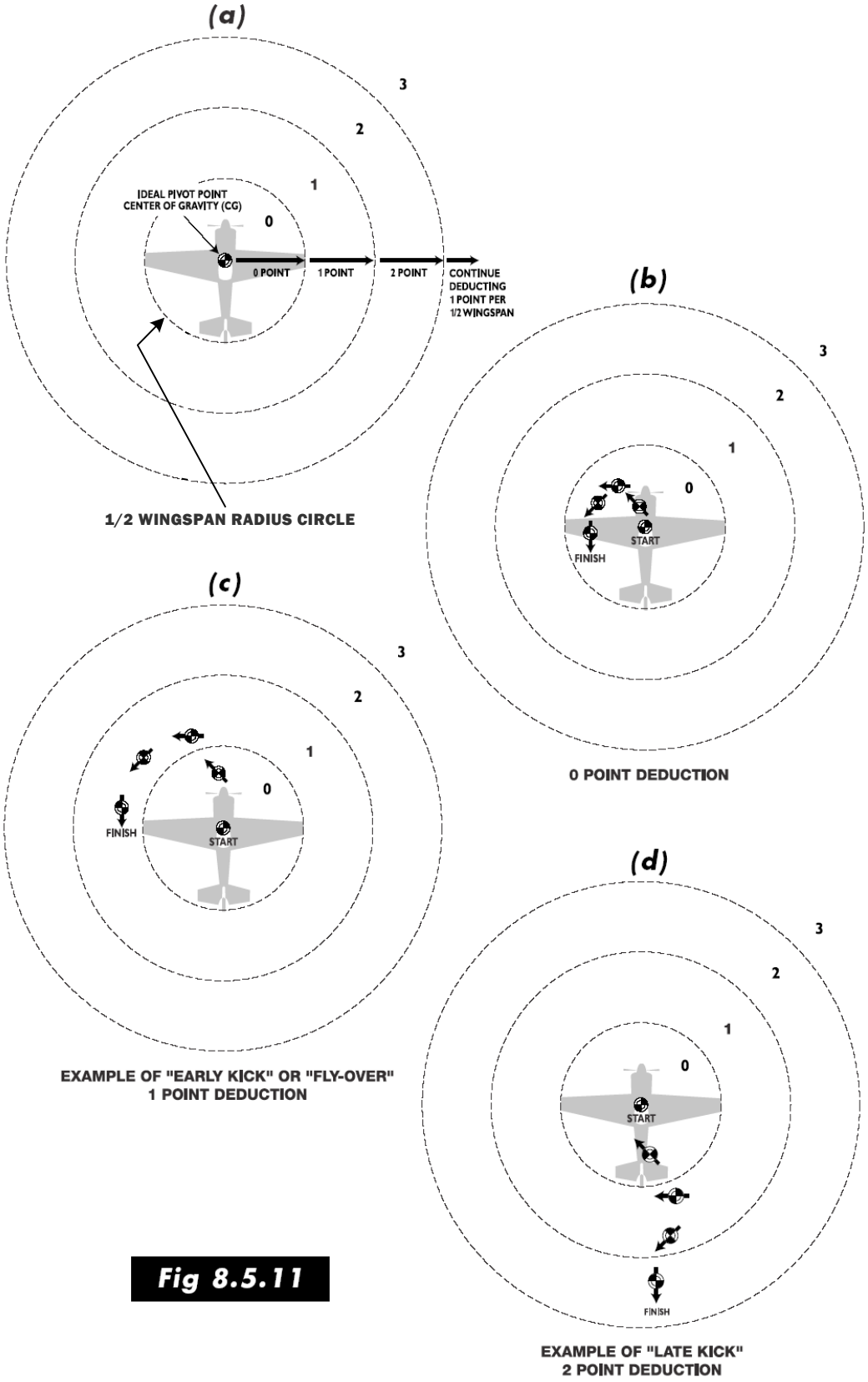

(a)
3
2
1
0
IDEAL PIVOT POINT
CENTER OF GRAVITY (CG)
0 POINT
1 POINT
2 POINT
CONTINUE
DEDUCTING
1 POINT PER
1/2 WINGSPAN
1/2 WINGSPAN RADIUS CIRCLE
(b)
START
FINISH
0 POINT DEDUCTION
(c)
FINISH
START
EXAMPLE OF "EARLY KICK" OR "FLY-OVER"
1 POINT DEDUCTION
(d)
START
FINISH
EXAMPLE OF "LATE KICK"
2 POINT DEDUCTION

Fig 8.5.11

FAMILY 6 *Tail Slides*

All the criteria of the Hammerhead apply to this figure except, of course, for the maneuver at the top of the vertical climb. At the point when the aircraft stops, it must slide backwards a minimum distance of one-half fuselage length. Because of the unique aerodynamics of gliders, a glider is required to slide only a visible amount. If there is insufficient slide for the aircraft type (power or glider), or the aircraft pivots about the tail rather than sliding backwards, the figure must be marked HZ. 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.

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 *(Fig 8.5.13)*. The wheels-up tail slide is depicted in the Aresti diagram with a curved dashed line at the top of the tail slide symbol *(Fig 8.5.14)*.

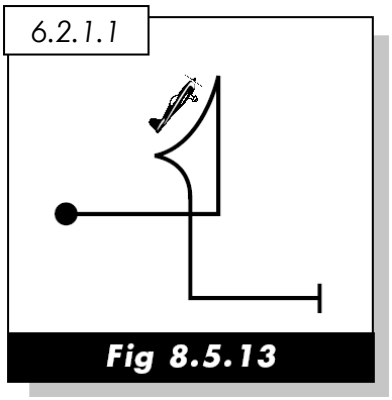


Fig 8.5.13

- *Wheels down tail slide.*

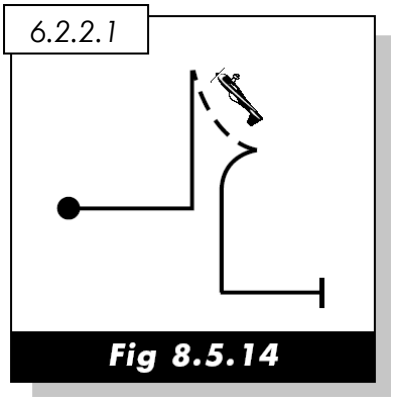


Fig 8.5.14

- *Wheels up tail slide.*

The tail slide must be watched carefully, as the aircraft can fall the wrong way (which is marked as an HZ) with the correct direction of flight and the proper aircraft attitude still maintained. Wings must stay level with the horizon throughout and not drop during the slide or the fall through. Watch for the aircraft torquing 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 *(Fig 8.5.15)*. The standard deduction of one (1) point per five (5) degrees of deviation applies. 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

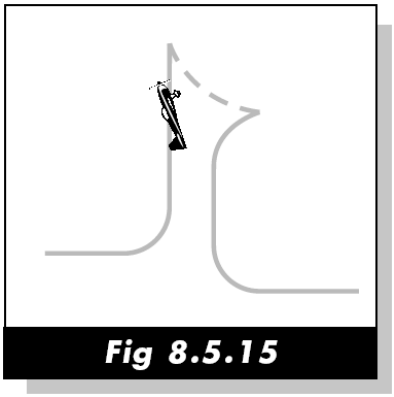


Fig 8.5.15

- *Aircraft "cheating" by changing attitude to favor type of slide desired. Aircraft position just before wheels up tail slide.*

deviation from vertical is visible. 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 downline, the aircraft must attain a vertical attitude and establish a downline before starting the roll(s).

In summary, the aircraft must make a smooth and steady transition up to vertical flight, the wings must stay level in relation to the horizon, and the aircraft must come to a complete stop in this attitude. After sliding vertically backward the required amount, it must 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 must again project the 90 degree down line before transitioning into horizontal flight with a quarter loop.

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 small loop is not graded any higher or lower than a large loop, but any variation to the radius will downgrade these figures.

FAMILY 7.2 *Half-Loops*

The half-loops in this sub-family must be wind-corrected for a constant radius.

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 in accordance with 8.4.2(d). 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. Drawing a line requires a downgrade in accordance with 8.4.2(d). 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 *(Fig 8.5.16).*

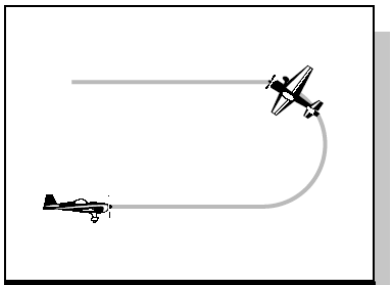


Fig 8.5.16

- *Aircraft rolls 5 degrees early before reaching horizontal flight. Deduction of one point is given.*

FAMILY 7.3 *Three-Quarter Loops*

Sometimes referred to as "Goldfish," it is not required that the lengths of the 45 degree lines bear any strict relation to the diameter of the three quarter loop. That is, 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. Any rolls on the 45 degree lines must be centered on that line *(Fig 8.5.17).*

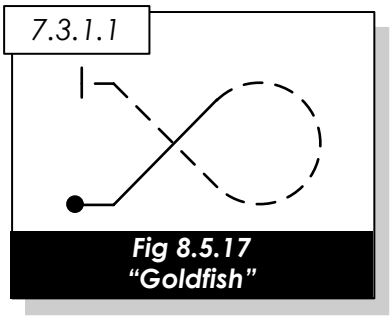


Fig 8.5.17
"Goldfish"

FAMILY 7.4.1 – 7.4.2 *Full Loops*

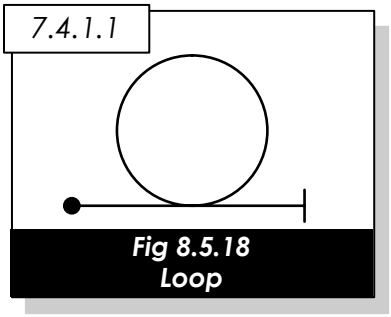


Fig 8.5.18
Loop

All full loops 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 *(Fig 8.5.18).*

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 depicted on the loop, the criteria of 8.4.2(e) apply.

The goal of each Judge is to develop a reproducible method to judge all loops with the same criteria *(See 8.4.2(a) for an example)*. To better quantify deductions for irregularity in the radius of looping figures, it is suggested that the Judge divide the loop into quadrants. Any variation in the radius from one quadrant to the next can then be downgraded a fixed number of points depending on the magnitude of the variation.

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 *(Fig 8.5.19A)*. Less common are loops with a horizontal diameter greater than the vertical. This is called an egg-shaped or pumpkin-shaped loop *(Fig 8.5.19B)*. Another common error is in varying the radius of the final quadrant performing an "e" shaped loop *(Fig 8.5.19C)*. Whatever method is used, standard downgrades must be applied for each of these errors. Additional downgrades must be applied based on the magnitude of variation.

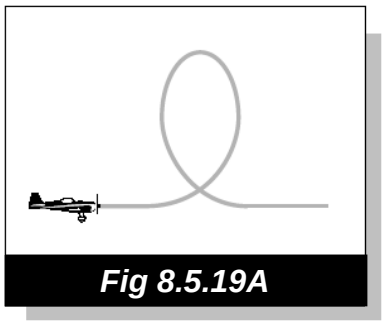


Fig 8.5.19A

- *"L-shaped" loop*

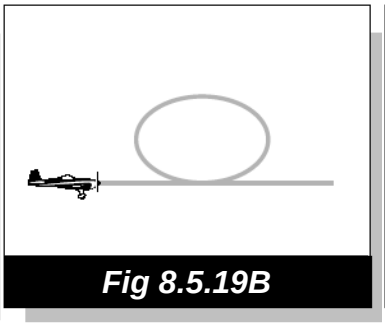


Fig 8.5.19B

- *"Egg-shaped" loop*

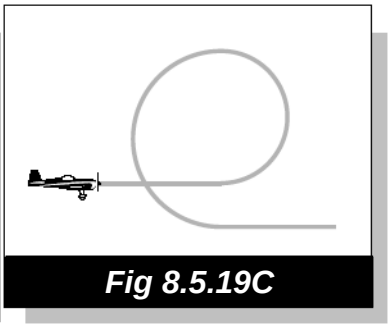


Fig 8.5.19C

- *"e-shaped" loop*

FAMILY 7.4.3 – 7.4.6 *Square, Diamond and Octagonal Loops*

Square, Diamond, and Octagon loops are flown as hesitation loops with all lines of equal length and all part-loops of equal radii. The judge must not fixate on line length only, as a frequently seen error in hesitation loops is for the pilot to allow the size of the part-loops to vary according to airspeed. All horizontal lines are judged on flight path while vertical and diagonal lines are judged on aircraft attitude. As such, except in a windless condition, the judge must never expect to see these figures closed.

The horizontal line following the final radius of Square and Octagon loops is also the exit line and therefore if any final line is seen, regardless of length, the "no line between" downgrade of 8.4.1(a) does not apply, but grading of the line lengths defining Square and Octagon loops must continue until the last horizontal line is drawn equal to the length of the first line of the figure (Fig 8.5.20). Should the subsequent figure begin, or wing dips signaling an Interruption or the end-of-program be observed prior

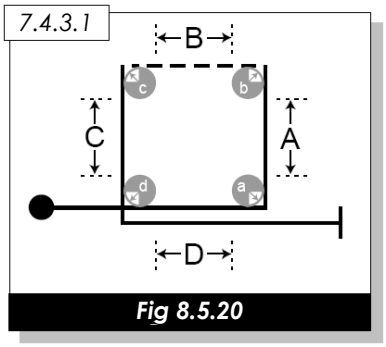


Fig 8.5.20

- *Line length A=B=C=D (length of line C is extended for illustration purposes.)*
- *Grading does not stop until D=A*
- *If D<A, downgrade according to 8.4.1(f)*

to flying the exit line a length equal to the first line of the figure, a deduction for the unequal line length must be given according to the schedule in 8.4.1(f). For example, should the final line of the square or octagonal loop be completely missing, a four (4) point deduction would apply to the loop with a further downgrade of one (1) point on the subsequent figure for a missing horizontal entry line.

Where rolls are flown on the Square or Diamond loops, they must be centered on the line with any centering errors downgraded according to the schedule provided in 8.4.1(f).

FAMILY 7.4.7 – 7.4.14 *Reversing Whole Loops*

Reversing whole loops are loops in which a reversal in direction is made after completing either the first or third quarter *(Fig 8.5.21)*. The loop segments must be flown as a continuous looping figure with no visible line between the loops. Adding a line between the two part-loops is at least a two (2) point deduction, depending on the length of the line. The figure must begin and end at the same altitude.

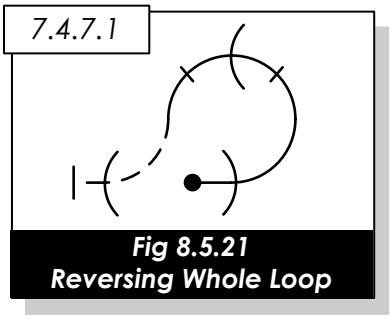


Fig 8.5.21
Reversing Whole Loop

Rolling elements may be added at the entry point, exit point, on the 3/4 loop, or any combination of the three, as indicated. For entry/exit rolls, drawing a line between the roll and the following/preceding loop requires a downgrade in accordance with 8.4.2.(c). For a roll or rolls on the 3/4 loop itself, the criteria of 8.4.2(d) apply.

FAMILY 7.5.1 – 7.5.8 *Horizontal S'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 height as the entry and exit lines.

Any rolling elements added to the entry/exit lines will follow criteria in accordance with 8.4.2.(c). Any rolling elements added to the 45 degree line must be centered on the line with deviations judged according to the criteria in 8.4.1(f).

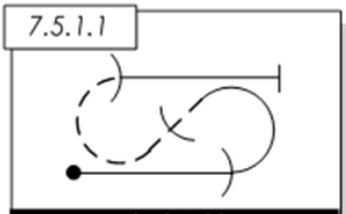


Fig 8.5.22
Horizontal S

FAMILY 7.5.9 – 7.5.10 *Vertical S's*

These figures are accomplished with two joined half-loops flown in opposite directions *(Fig 8.5.23)*. The two half-loops must be flown as 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 the instant the first half-loop is finished. The instant the roll is finished, the next half-loop must begin. Adding a line at either of these points is at least a one (1) point deduction depending on the length of the line.

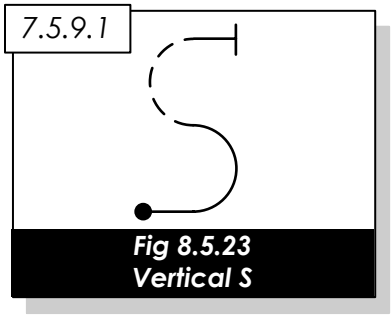


Fig 8.5.23
Vertical S

FAMILY 7.8.1 – 7.8.8 *Horizontal 8's*

Within the Horizontal-8, the ⅝ and ¾ loops must be of the same size and occur at the same altitude. The start and finish of the figure must be at the same altitude, except if, in subfamily 7.8.1 to 7.8.4 there are multiple rolls *(See Glossary)* on the last 45 degree line *(Fig 8.5.24)*, or in subfamily 7.8.5 - 7.8.8 there are multiple rolls on the first 45 degree line. In those special cases, the exit/entry line may be extended (but not shortened) above or below the ¾ looping segment.

Any rolls placed on either 45 degree line must be positioned so that the line segments before and after the roll are of equal length. Refer to 8.4.1(f) for deductions applying to unequal line segments.

For gliders only, the ⅝ and ¾ loops, as well as the start and finish of the figure, are never required to be at the same altitude.

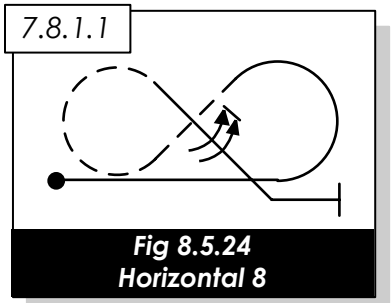


Fig 8.5.24
Horizontal 8

- *Example of a 7.8.1 – 7.8.4 figure with a multiple roll on the last 45 degree line*

FAMILY 7.8.9 – 7.8.16 *Horizontal Super 8's*

These figures possess the unique characteristic of containing three 45 degree lines on which rolls may potentially be placed. Judging criteria for these figures differ for power and glider flight as described below:

Power Criteria:

For power competition, 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 ¾ loops must be the same size and occur at the same altitude. Any rolls placed on any 45° line must be centered.

The solid line in Figure 8.5.25 depicts how the horizontal entry/exit altitudes must coincide with the top and bottom of the loops, with three exceptions: when the first 45°

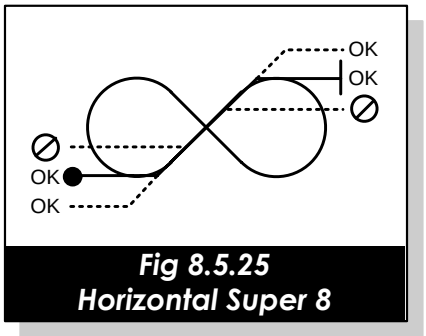


Fig 8.5.25
Horizontal Super 8

line, last 45° line, or both first and last 45° lines contain multiple linked, unlinked, or opposite rolls. In those three cases only, the entry/exit line(s) containing the multiple rolls may be extended (but not shortened) above or below the ¾ looping segments, as illustrated by the dotted lines in the figure marked "OK." Shortening of an entry/exit line should be penalized by up to 2 points.

Glider Criteria:

For glider competition, this family can be thought of as two linked three-quarter loops (subfamilies 7.3.1 -- 7.3.4). Each of the 45 degree lines may be of different lengths, but any rolls, except positive or negative snap rolls *(See 8.4.1(e))*, placed on them must be centered. Due to glider flight mechanics, the two ¾ loops cannot occur at the same height, nor is there any strict relationship between the horizontal entry/exit altitudes and the altitude limits of the two ¾ loops.

FAMILY 7.8.17 – 7.8.22 *Vertical 8's*

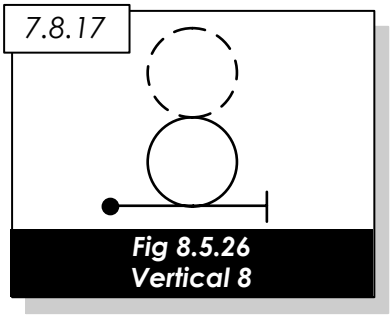


Fig 8.5.26
Vertical 8

These figures are performed by flying two loops, one above the other. Sub-family 7.8.17 to 7.8.20 is composed of two loops, both above or both below the entry altitude. Sub-family 7.8.21 to 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.

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 the instant 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 one (1) point deduction depending on the length of the line. These figures are to be graded using the same criteria as full loops. Unless there is a roll between the loops, properly wind-corrected looping lines will result in the two loops being directly above one another *(Fig 8.5.26)*.

FAMILY 8 *Combinations of Lines, Angles and Loops*

Although some of the figures in this Family appear to be exotic, these figures are simply combinations of horizontal, vertical, and 45 degree lines as well as part-loops of varying degrees.

FAMILY 8.4 *Humpty Bumps*

These figures, whether vertical or performed with 45 degree lines, are judged as combination of lines and part-loops. None of the part-loops are required to have the same radii, though they must still have a constant radius from start to finish. For vertical humpty bumps, this means that the half loop must complete at the same altitude from which it began.

The lines in these figures may be of different lengths. Therefore the entry and exit altitudes need not be the same. Rolls on any of these lines must be centered.

FAMILY 8.5 *5/8th Loops*

FAMILY 8.5.1 – 8.5.8 *Half Cubans*

When the looping portion of the figure is immediately preceded or followed by a roll or rolls, there must be no visible line between the roll and loop elements. Drawing a line requires a downgrade of at least one (1) point depending on the length of the line drawn. This criterion is not meant to imply that one element (roll or loop) must start before the preceding element is completely finished. A brief hesitation between elements (similar to opposite rolls) must not be downgraded. The rolls on 45 degree lines must be centered.

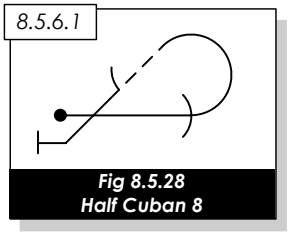


Fig 8.5.28
Half Cuban 8

FAMILY 8.5.9 – 8.5.24 *Vertical 5/8th Loops*

Often referred to as "Teardrops," any rolls on vertical and 45 degree lines must be centered.

FAMILY 8.6 *6/8th Loops*

These figures, commonly referred to as "P Loops" *(Fig 8.5.29.1)* and "Reversing P Loops" *(Fig 8.5.29.2)*, consist of one vertical line and a total of 270° (6/8ths of a full loop) of looping line.

In both subfamilies, rolling elements on the vertical line must be centered. Any roll or rolls depicted on the loop must comply with the criteria of 8.4.2(d). When the looping portion of the figure is immediately preceded or followed by a roll or rolls, there must be no visible line between the roll and loop elements. Drawing a line requires a downgrade of at least one (1) point depending on the length of the line drawn.

In the Reversing P Loops, where the 1/4 and 1/2 loops join, there must be no line between the loops. Drawing a line between the looping segments requires at least a two (2) point deduction depending on the length of the line.

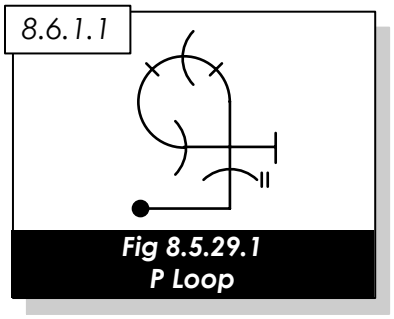


Fig 8.5.29.1
P Loop

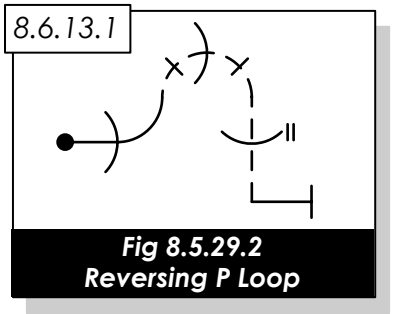


Fig 8.5.29.2
Reversing P Loop

FAMILY 8.7 *7/8th Loops*

Sometimes called "Q Loops", these figures consist of a 7/8th loop with either a 45 degree entry or exit line. Any rolling elements on the 45 degree line must be centered, while any roll or rolls on the 7/8th loop must be judged according to 8.4.2(d). When the looping portion of the figure is immediately preceded or followed by a roll or rolls, there must be no visible line between the roll and loop elements. Drawing a line requires a downgrade of at least one (1) point depending on the length of the line drawn.

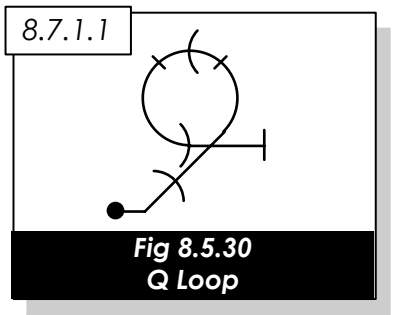


Fig 8.5.30
Q Loop

FAMILY 8.8 *Double Humpty Bumps*

Double Humpty Bumps are comprised of three vertical lines and two 180° looping segments. *(Fig 8.5.31)*

In consideration of the markedly different speeds possible during the looping segments, there is no requirement for any of the radii to be equal (a ≠ b ≠ c ≠ d), but each part-loop must have a constant radius.

There is no relation between the vertical lines length and therefore the figure may begin and end at different altitudes (A + C ≠ B).

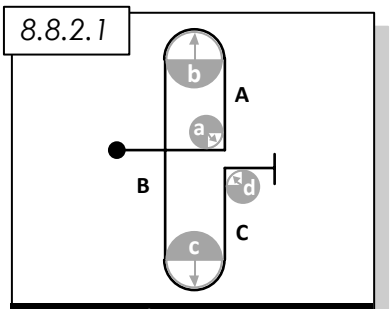


Fig 8.5.31
Double Humpty Bump

FAMILY 8.10 *Reversing 1¼ Loops*

The 3/4 and 1/2 -loops in these figures must be flown as continuous segments with no line between. Drawing a line between the segments would be a minimum two (2) point deduction depending on the length of the line.

There must be no line between any rolling elements on the entry line and the 3/4 loop. Drawing a line requires a downgrade of at least one (1) point depending on the length of the line drawn.

FAMILY 9 *Rolls and Spins*

Rolls (Family 9.1-9.10) 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.

Individually, rolls may have up to a full 720° of rotation. For all rolls in Family 9.1 to 9.10, the same criteria apply: the rate of roll must be constant throughout the roll(s). When executing any slow or hesitation roll (9.1 to 9.8), either the aircraft's CG trajectory (horizontal and looping lines) or attitude of the zero lift axis (45 and vertical lines), must continue, during the rolling portion of the figure, to appear exactly the same as if there had there been no rolling element. When observing a snap roll, the judge must make allowance for the fact that the trajectory of the CG is not strictly constant by the very nature of the autorotation.

Multiple rolls may be linked or unlinked.

(1) If a single roll exceeds 360° in continuous rotation, two roll symbols must be combined by linking their tips by a small line. *(Fig 8.5.32)* Linked rolls are flown as a single roll with no pause.

(2) Unlinked rotations can be in the same or opposite direction depending on their "type." The three types of rolling elements are defined as:

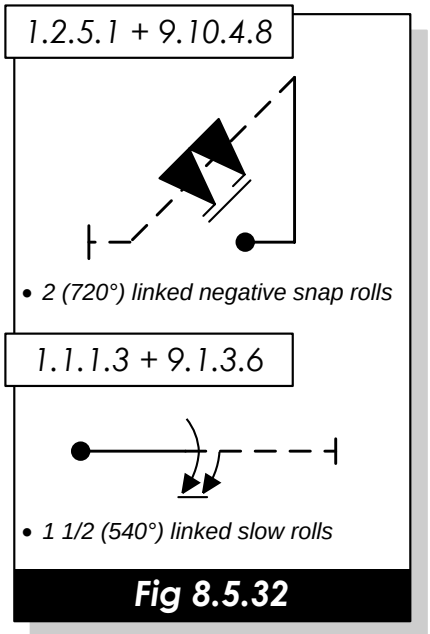


Fig 8.5.32

(i) Aileron rolls (slow rolls and hesitation rolls)

(ii) Snap rolls (positive and negative)

(iii) Spins (upright and inverted)

(3) Rolls to be flown in the same direction of rotation must be of different type. No line links the symbols and their tips are drawn pointing in the same direction (i.e., on the same side of the line). (*Fig 8.5.33*) The two rolls must have a brief pause between them, but not so brief the judge can't see where one roll ended and the next roll began.

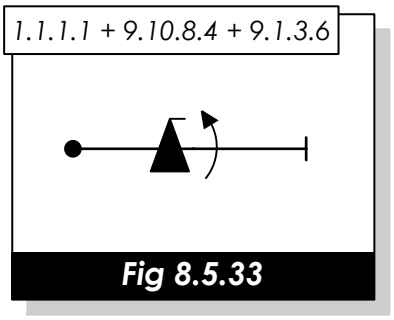


Fig 8.5.33

(4) Opposite direction rolls may be of either the same or different type. In opposite direction 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. *(Fig 8.5.34)*

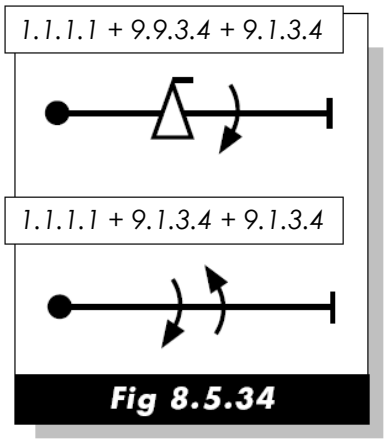


Fig 8.5.34

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 must have a brief pause between them, but long enough that the judge can discern each roll separately. If two unlinked rolls are of the same type, they must be flown in opposite directions.

- *Two Examples of legal opposite rolls*

(5) 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 downline, they will always be unlinked; may be flown either in the same or opposite direction, as shown by the position of the tips of the symbols on the flimsy; 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 *(Figs 8.5.34.1 and 8.5.34.2)*.

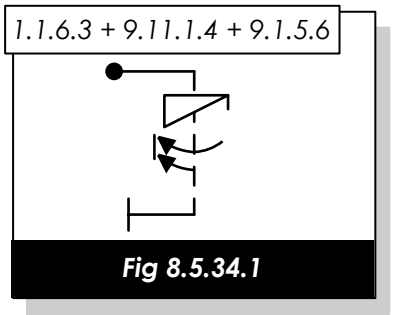


Fig 8.5.34.1

- *Legal – As drawn, spin and roll elements must be flown in opposite direction.*

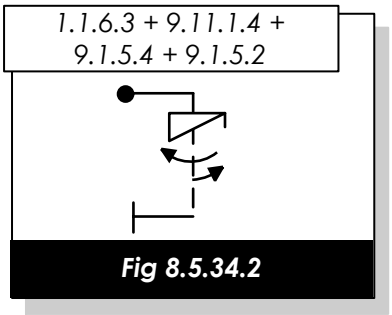


Fig 8.5.34.2

- *Illegal – more than two rotational elements.*

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 it being considered a hesitation roll would result in a grade of HZ for 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 must 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”.

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 are 2-point rolls; Family 9.4 are 4-point rolls; and Family 9.8 are 8-point rolls. When depicted on the Forms A/B/C, partial hesitation rolls will use the notation, AxB, where A is the number of hesitations flown and B is the total number of hesitations that would occur in 360° of roll (e.g., a "3 of 2" roll would be annotated as "3x2").

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. Any error stopping the roll exactly at the cardinal points (each 180°, 90°, or 45° of rotation as appropriate to the roll type) will result in a downgrade of one (1) point per five (5) degrees of error.

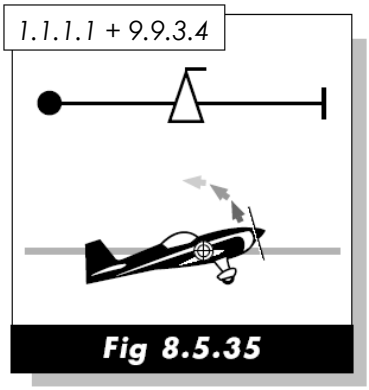
The rate of roll between each point must be constant and the duration of the hesitation at each point must be constant throughout the roll, however, they need not be equal to each other. The pilot may choose any rate of roll to arrive at the first point and the duration of the pause at that first point, but then must match the roll rate and pause duration at each subsequent point. A downgrade of one (1) point will be made for each observed variation in roll rate between points as compared to the initial roll rate chosen, and one (1) point deducted for each pause duration observed not to be the same as the first. Each pause, or point, of a hesitation roll must be clearly recognizable to the Judges. If a pause is not recognizable, the figure is marked HZ.

FAMILY 9.9 *Positive Snap Rolls*

Snap rolls represent one of the greatest challenges to judges, due to two factors: a) the "snapping" characteristics of different types of aircraft can vary considerably; and b), 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 snap.

The judge must see two things to determine that a snap roll has been correctly initiated: 1) the aircraft must display a rapid and clearly visible change of pitch attitude to put the wing close to the stall, and 2) autorotation must be initiated by use of the rudder to induce a clearly visible yaw. Note that when a snap roll is initiated, the AOA 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 AOA will, as a result, vary depending on the figure being flown. However, if both the required pitch change and autorotation are not clearly seen, the figure must be marked as a hard zero (HZ).

At the start of a positive snap roll, the aircraft must clearly and unambiguously pitch in the nose up / tail down sense to put the wings near the critical AOA (*Fig 8.5.35*). If the aircraft pitches in the



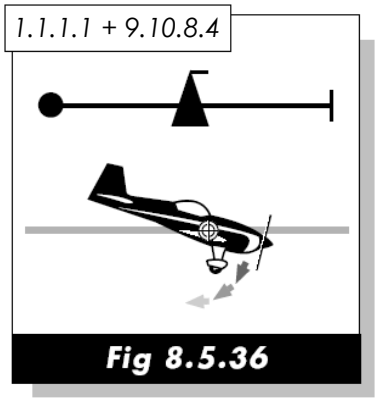
- *Aircraft's nose must break towards the pilot in a positive snap.*

wrong direction, a hard zero (HZ) is given. Either shortly after or simultaneously with the pitch change, the aircraft must be seen to yaw, initiating a stall of one wing and the rapid onset of autorotation. If the judge considers that a proper snap has not been initiated, then he must mark the figure an HZ. Provided the snap 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, 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 longitudinal axis, the largest displacement being at the tail which is furthest from the CG. This should not be confused with the spiral motion of a tight barrel roll, wherein the center of gravity of the airplane more noticeably follows a spiral flight path. However, the rate of rotation and the angle, relative to the flight path, of the conical longitudinal axis 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 snap 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 snap roll may cause a lateral or vertical displacement of the aircraft relative to its original flight path. Such displacements should not be downgraded as long as the displaced flight path remains parallel to the original flight path. Downgrades for errors in the extent of rotation or the following flight path or attitude are penalized at the normal rate of one (1) point per five (5) degrees or error.

Snap rolls must be observed very carefully to ensure that the rotation is driven throughout by asymmetry in lift induced by continued rudder application and that the competitor is not "aileroning" the aircraft around its longitudinal axis and thus without visible 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 snap 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, but less than 90 degrees of rotation remaining, even if the roll is completed with aileron, the figure must be given a numeric zero (0.0). If 90 degrees or more of roll remain, the mark becomes an HZ *(See 7.3.1).*

FAMILY 9.10 *Negative Snap Rolls*



- *Aircraft's nose must break flight path away from the pilot in a negative snap.*

For negative snap rolls, all criteria stated for positive snap rolls apply except that the aircraft is in a negative rather than positive AOA 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 *(Fig 8.5.36)*. 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.

Judges should be aware, however, that nearly all aerobatic gliders have nonsymmetrical wing sections and down elevator authority is more limited than up. Therefore, the negative "snapping" characteristics of a glider may be quite different from positive snaps. As always, the competitor should be given the benefit of the doubt and the judge should pay particular attention to the rate of rotation and conical fuselage motion as clues that the glider has indeed autorotated.

FAMILY 9.11 – 9.12 *Spins*

Spin elements may be placed on a number of Family 1 and Family 8 figures (where so indicated by the optional spin symbol); however, all spins begin from horizontal flight. When the aircraft stalls, the center of gravity will drop from wings-level horizontal flight. It should be noted that an aircraft has forward inertia as the aircraft decelerates through stall speed. This appearance is more visible when the figure is performed downwind, and is less visible when performed into the wind.

When the aircraft stalls, the aircraft must simultaneously move around all three flight axes: (1) the nose will pitch toward the ground; (2) the nose will yaw; and (3), a wing tip will drop. Failure to achieve simultaneous motion about all three axes should be considered a "forced entry" and downgraded one (1) point per five (5) degrees of deviation on each axis. For example, if 10 degrees of pitch and 10 degrees of roll are observed before any motion about the yaw axis is seen, a four (4) point deduction would be made.

During the spin entry and in the spin, the flight path is affected by wind. When the spin is entered downwind, the flight path may suggest that the spin entry was "forced." The change of appearance due to wind direction is not a marking criterion. *(Fig 8.5.38)*

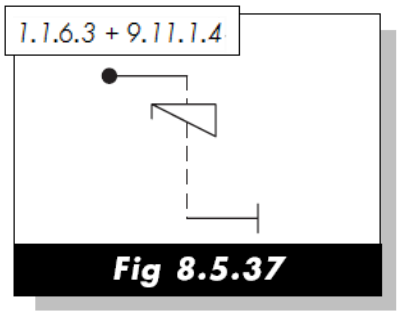


Fig 8.5.37

- *One turn spin figure as drawn.*

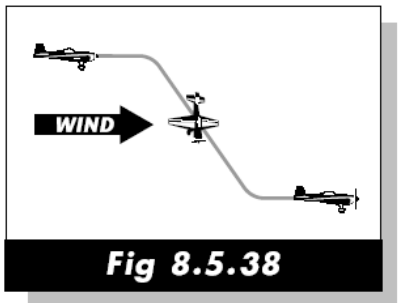


Fig 8.5.38

- *Effect of wind and forward inertia on flight path during one turn spin (effect exaggerated).*

If the aircraft never stalls, it is apparent that it cannot spin, and a hard zero (HZ) must be given. “Simulated” spins where snap rolls or other techniques are offered as spin entries will also be seen. Regardless of the entry technique, if the judge believes the aircraft did not stall prior to spin autorotation, the figure must be given a hard zero (HZ).

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. A constant rate of rotation is also not a judging criterion.

After completion of the prescribed number of turns, the aircraft must stop rotating precisely on either the X or Y axis and in the direction of flight appropriate to the sequence being flown. Be alert for early stopping of the autorotation followed by “aileroning” to the required 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 remaining 15 degrees of rotation. The highest mark this spin could receive is a 7.0.

Following completion of the prescribed rotation, a vertical down line in a wings-level attitude must be seen. It is acceptable for the pilot to achieve this in either of two ways: Immediately after rotation stops, the nose is pitched to the vertical down line and the wings are simultaneously brought to the level attitude; or, the vertical down line and wings-level attitude are achieved as the pilot halts the rotation, such that the prescribed number of turns, vertical down line, and wings-level attitude are all achieved simultaneously. Judges must be careful not to confuse this “blended” recovery with aileroning the final portion of the spin rotation. Grading criteria for the basic figure on which the spin is being flown then resumes.

If a roll follows a spin, there must be a perceptible pause 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.

All spin-roll combinations must be flown with either the spin and roll in the same direction, or in opposite directions, as dictated by the Aresti drawing. When a spin-roll combination is being observed, the judge must watch the spin, especially inverted (negative) spins, very carefully to ascertain the direction of rotation, so that the same or opposite rotation of the combination may be ascertained.

All spins are composed of both a yawing and rolling element. In an upright (positive) spin, both the yaw and roll are in the same direction, and there is little chance for confusion by the judges. However, in an inverted spin, the yaw is in one direction and the roll in the opposite direction. It is the roll

component, however, that the judge must use to determine the direction of rotation for the spin, which is in turn used to determine whether the following roll element is flown in the proper direction, that is, same or opposite.

In all spins the grading criteria are:

1. A clean breaking stall in horizontal flight.
2. Simultaneous departure of all three flight axes (pitch, roll, and yaw) from straight and level flight.
3. Fully-stalled autorotation.
4. Stopping on pre-stated heading.
5. Vertical down, wings-level attitude after stopping on heading.
6. The direction of a spin shall be determined from the roll component.

8.6 *PRESENTATION*

Just as a musical symphony is more than a simple collection of perfectly played notes, an aerobatic sequence must be more than merely flying a set of geometrically precise figures. The very best flights will also exhibit attributes such as the placement of figures for optimum judging, balance within the performance zone, and harmony. In short, the sequence should not just be *flown for* the judges, it should be *presented to* the judges.

8.6.1 *Grading*

The Presentation grade is based on the judge's overall impression of the sequence and has a possible range from 10.0 to 0.0 in 0.5 increments. The exact method used to determine the Presentation grade is left to the individual judge using the guidance provided in the paragraphs below. More important than the particular methodology chosen is the consistent application of that methodology to every pilot flying the program.

8.6.2 *Guidance*

To determine the Presentation grade, the judge must remain alert to elements within the sequence beyond the technical execution of each figure. 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 sequence should be presented in such a manner that it achieves a sense of balance to the right and left of the Y axis. While a Known or Unknown program may limit the pilots' choices, the best presentation is the one which accomplishes the best balance given the sequence being flown. A judge must not make allowances for difficult sequences or wind, but merely judge the final result as presented by each pilot. For example, downgrades must be given to the pilot who misjudges the headwind and flies the majority of the sequence in the downwind end of the box

Some maneuvers can be adequately seen and appreciated by the judges no matter at what distance they are flown from the judging line. Others are best viewed at a greater distance and still others may be more accurately judged up close. The best pilot is the one who plans and flies each sequence in such a manner that every figure is presented at its optimum viewing distance.

Placing a figure for optimum judging not only concerns distance, but also altitude. Compromises in safety can never be tolerated, but within the limits for each category, the best pilot will select combinations of altitudes and distance to present each figure at the best viewing angle for the judges. An example of poor placement which must be downgraded is the pilot who misjudges the crosswind component and flies a significant portion of the sequence either near the front or back edge of the box.

Beyond placement and balance, the best sequences will be harmonious. A flight is harmonious when the individual figures are clearly separated and follow one another at similar intervals in time. While some figures consume more time than others, a superior pilot will choose intervals between figures, and for the internal components of figures, that create a sense of rhythm and conscious pacing. This is a better presentation than one in which the timing between figures is haphazardly flown. A harmonious sequence will flow at a natural pace without very long or very short lines in between figures resulting from poor box management.

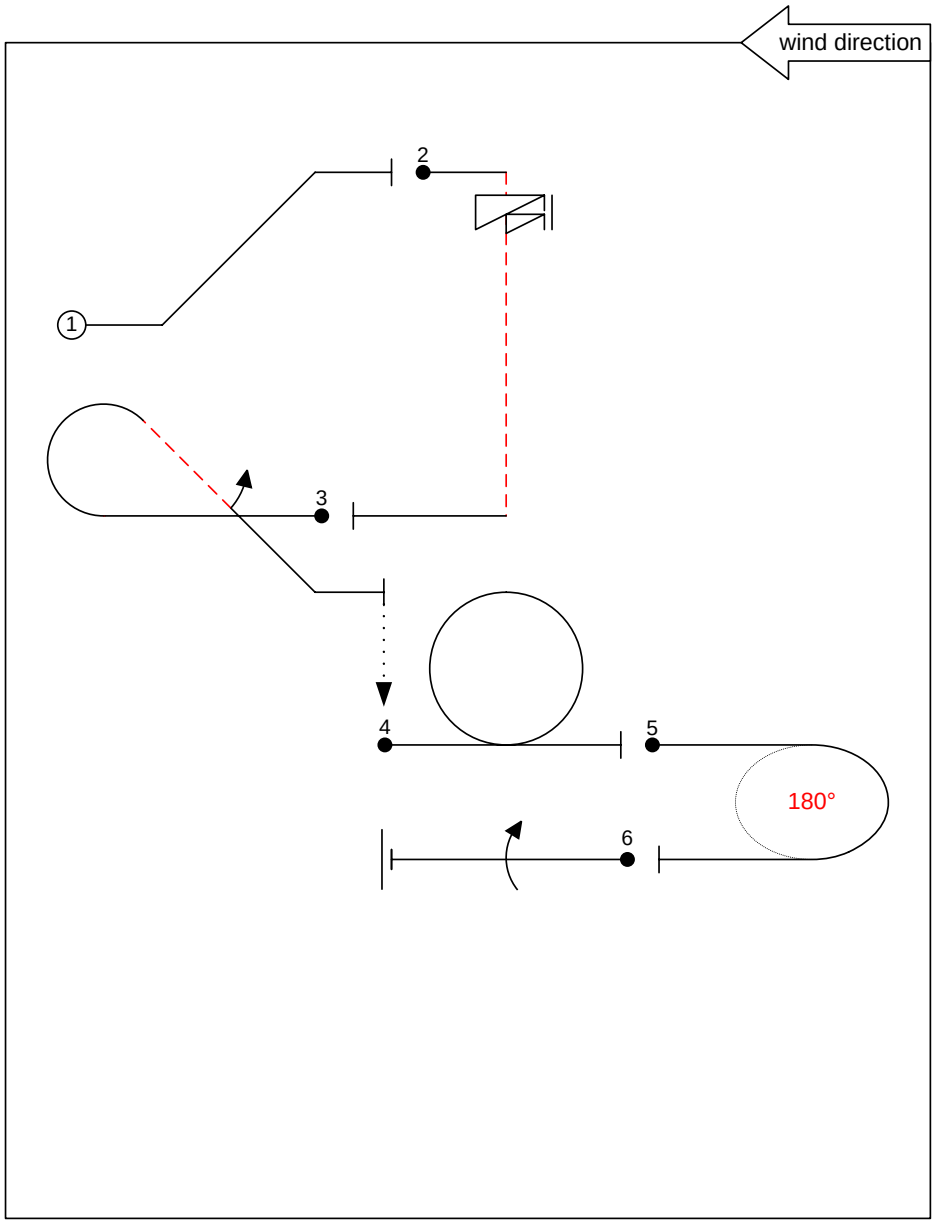
It has been noted that the Presentation grade is "subjective." That is true and it is by design. Many aspects of an aerobatic performance cannot be defined objectively and it is correct to award pilots who present a superior overall sequence and to downgrade those pilots who merely fly precise maneuvers without regard for placement, balance, harmony, and the other subjective attributes that combine to make a visually pleasing performance. The Presentation grade is simply one more tool which the judge can use to separate the top pilot from the second best and on down the rank order.

The judge's decision on a grade for Presentation is not a simple one. The mark must take into account the placement of individual figures, the balance of the sequence taken as a whole, and the harmony of execution. The judge must put as much thought into assigning a Presentation mark as with any figure mark if the differences between the best and worst flights are to be fairly assessed.

APPENDIX 1 — *2019 KNOWN COMPULSORY PROGRAMS*

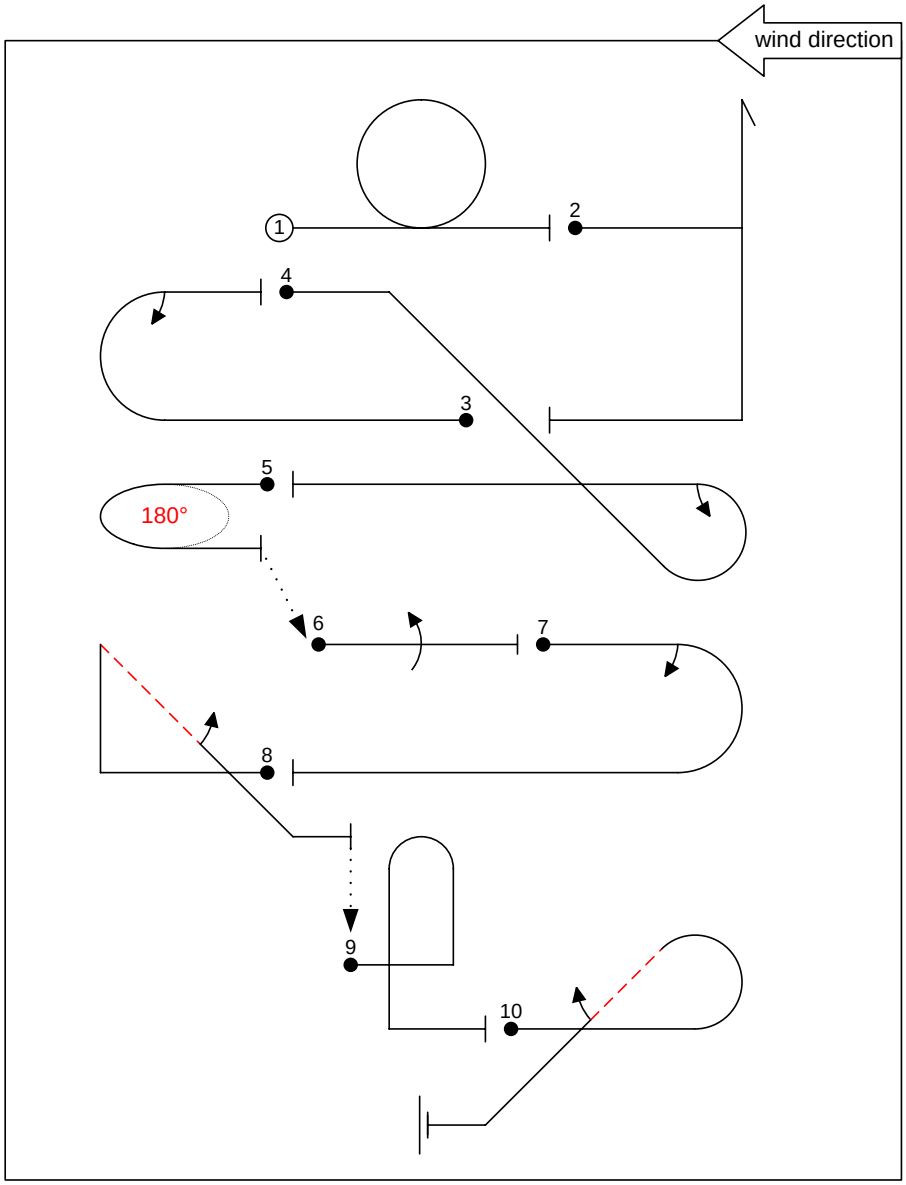
PRIMARY — *POWER*

Fig 1	1.1.2.1	7	7
Fig 2	1.1.6.3 9.11.1.6	10 3	13
Fig 3	8.5.6.1 9.1.4.2	10 4	14
Fig 4	7.4.1.1	10	10
Fig 5	2.2.1.1	4	4
Fig 6	1.1.1.1 9.1.3.4	2 8	10
Total K = 58			



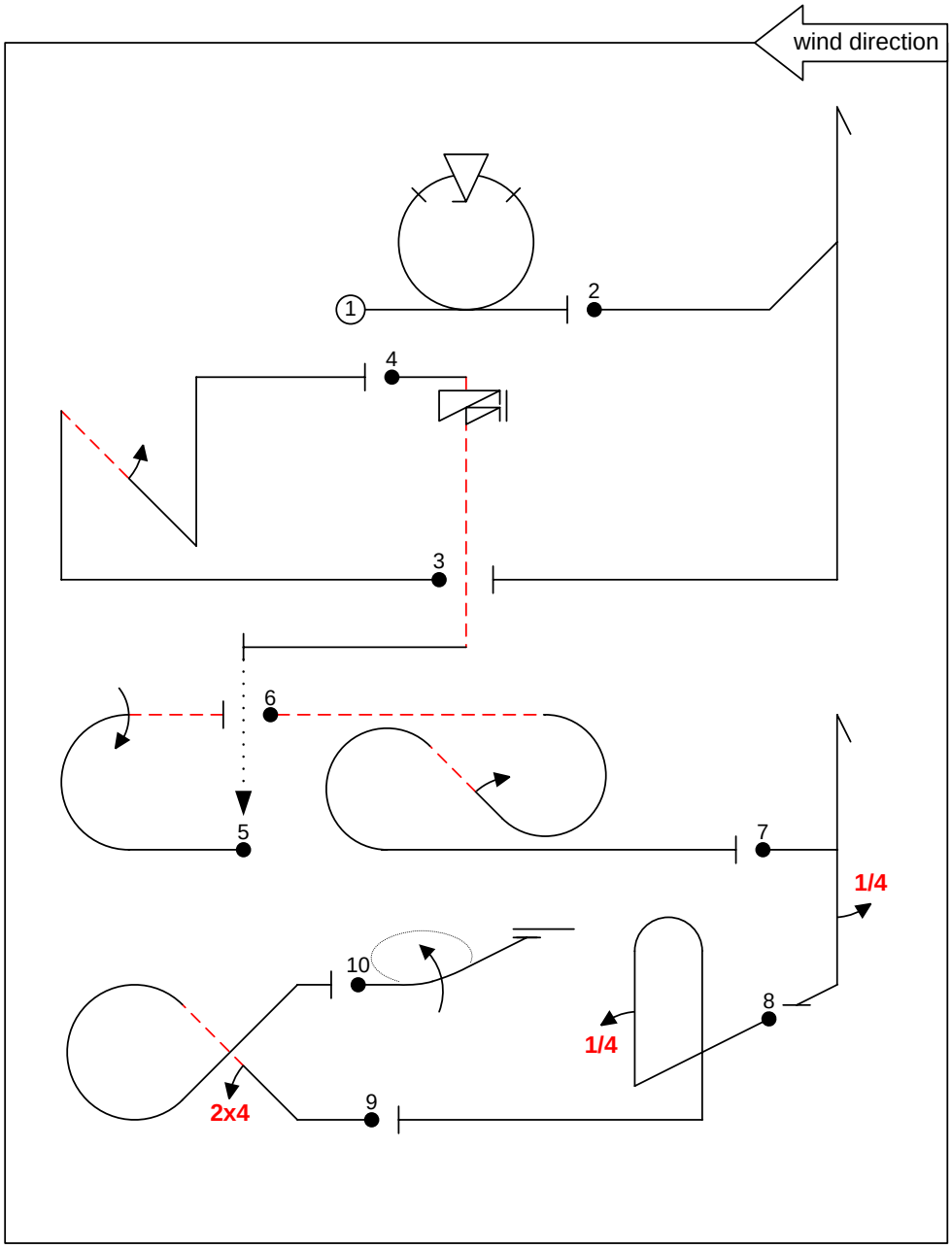
SPORTSMAN *POWER*

Fig 1	7.4.1.1	10	10
Fig 2	5.2.1.1	17	17
Fig 3	7.2.2.1 9.1.3.2	6 4	10
Fig 4	8.5.3.3 9.1.3.2	10 4	14
Fig 5	2.2.1.1	4	4
Fig 6	1.1.1.1 9.1.3.4	2 8	10
Fig 7	7.2.3.3 9.1.3.2	6 4	10
Fig 8	1.2.7.1 9.1.4.2	13 4	17
Fig 9	8.4.1.1	13	13
Fig 10	8.5.6.1 9.1.4.2	10 4	14
Total K = 119			



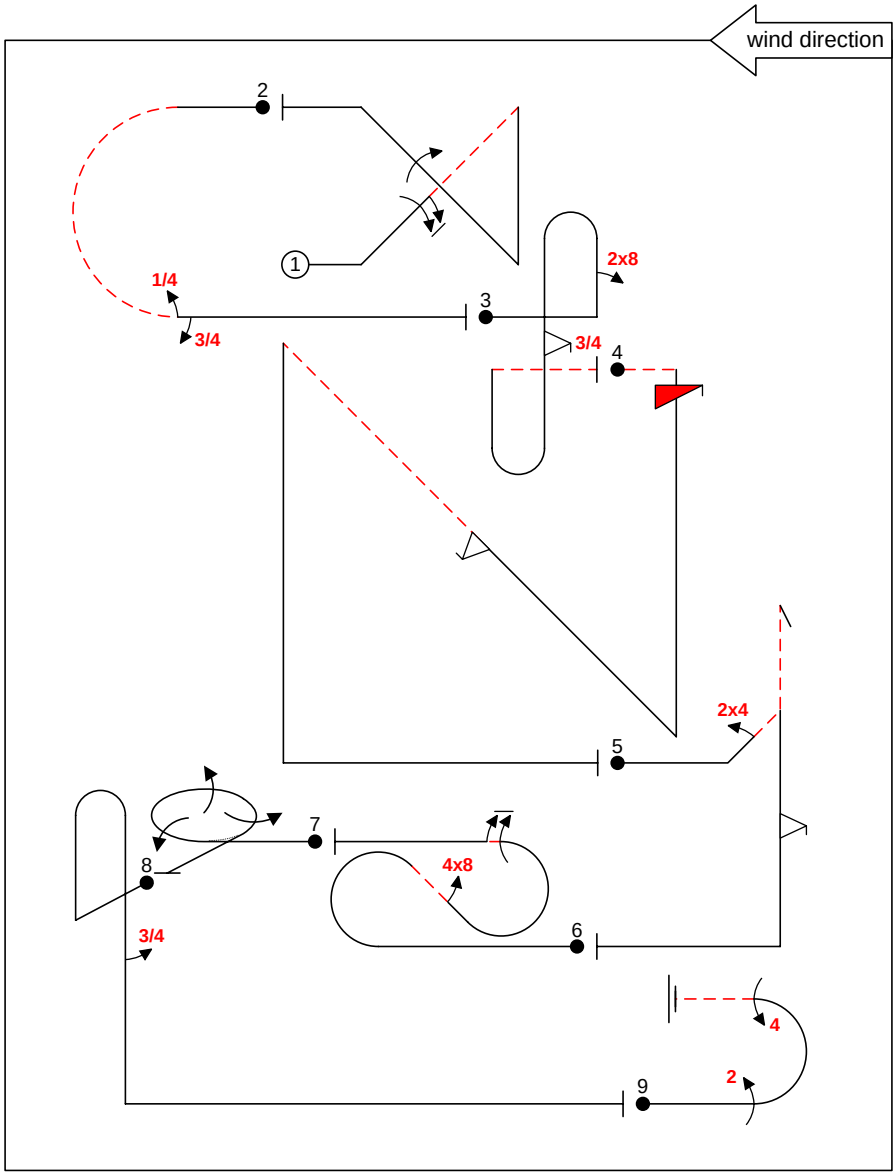
INTERMEDIATE *POWER*

Fig 1	7.4.1.1 9.9.3.4	10 11	21
Fig 2	5.3.1.1	18	18
Fig 3	1.3.12.1 9.1.4.2	21 4	25
Fig 4	1.1.6.3 9.11.1.6	10 3	13
Fig 5	7.2.1.1 9.1.3.4	6 8	14
Fig 6	7.5.2.4 9.1.2.2	15 6	21
Fig 7	5.2.1.1 9.1.5.1	17 2	19
Fig 8	8.4.1.1 9.1.1.1	13 6	19
Fig 9	7.3.2.1 9.4.2.2	14 7	21
Fig 10	2.1.3.1	14	14
Total K = 185			



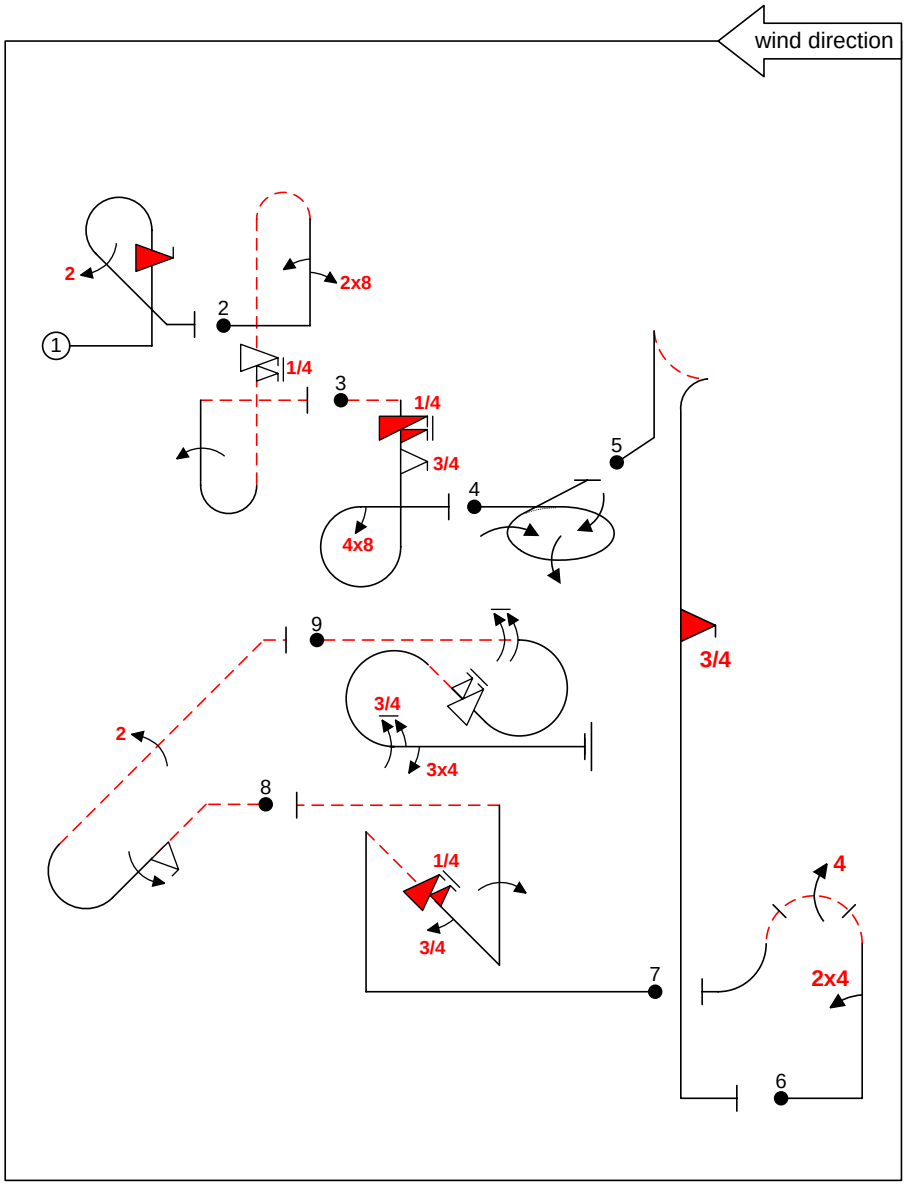
ADVANCED *POWER*

Fig 1	1.3.2.1 9.1.2.6 9.1.2.4	18 12 10	40
Fig 2	7.2.2.3 9.1.3.1 9.1.3.3	8 2 6	16
Fig 3	8.8.1.1 9.8.1.1 9.9.5.3	18 7 11	36
Fig 4	1.3.11.4 9.12.1.4 9.9.2.2	20 7 13	40
Fig 5	5.3.2.1 9.4.2.2 9.9.5.2	24 7 11	42
Fig 6	7.5.7.1 9.8.4.2 9.1.3.6	15 7 10	32
Fig 7	2.3.4.3	33	33
Fig 8	8.4.1.1 9.1.5.3	13 6	19
Fig 9	7.2.1.1 9.2.3.4 9.4.3.4	6 9 11	26
Total K = 284			



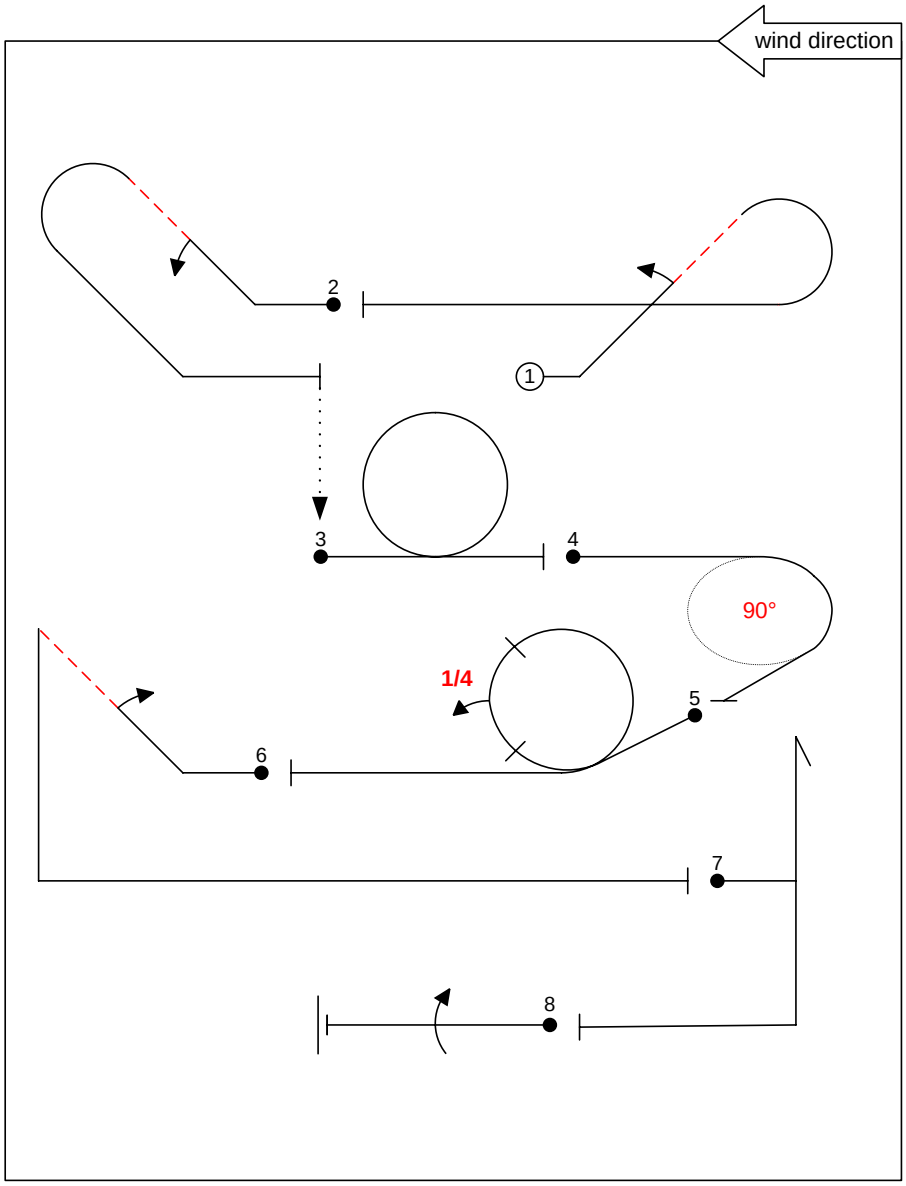
UNLIMITED *POWER*

Fig 1	8.5.17.1 9.10.6.4 9.2.4.4	12 19 9	40
Fig 2	8.8.5.1 9.8.1.1 9.1.1.2 9.9.10.5 9.1.1.4	21 7 8 15 12	63
Fig 3	8.6.2.4 9.12.1.5 9.9.5.3 9.8.3.2	12 6 11 7	36
Fig 4	2.3.5.1	35	35
Fig 5	6.2.2.1 9.10.5.3	15 13	28
Fig 6	8.6.11.1 9.4.1.2 9.4.3.4	13 9 11	33
Fig 7	1.3.11.1 9.10.4.5 9.1.4.3 9.1.1.4	20 15 6 12	53
Fig 8	8.4.15.4 9.9.9.2 9.1.4.4 9.2.2.4	13 13 8 11	45
Fig 9	7.5.2.4 9.1.3.8 9.9.2.6 9.1.3.7 9.4.3.3	15 12 16 11 8	62
Total K = 395			



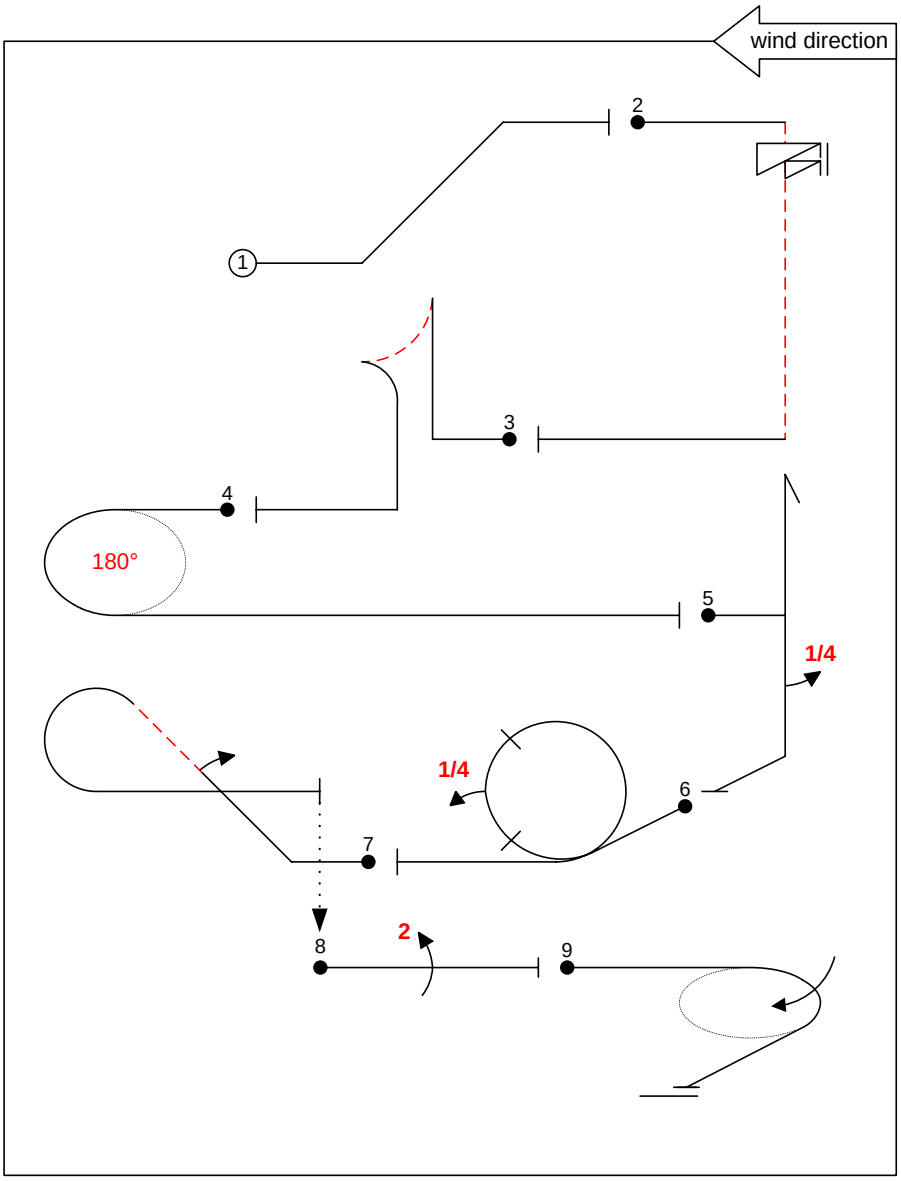
SPORTSMAN *GLIDER*

Fig 1	8.5.2.1 9.1.2.2	10 9	19
Fig 2	8.4.15.1 9.1.2.2	12 9	21
Fig 3	7.4.1.1	10	10
Fig 4	2.1.1.1	3	3
Fig 5	0.1	16	16
Fig 6	1.2.3.1 9.1.2.2	12 9	21
Fig 7	5.2.1.1	17	17
Fig 8	1.1.1.1 9.1.3.4	2 12	14
Total K = 121			



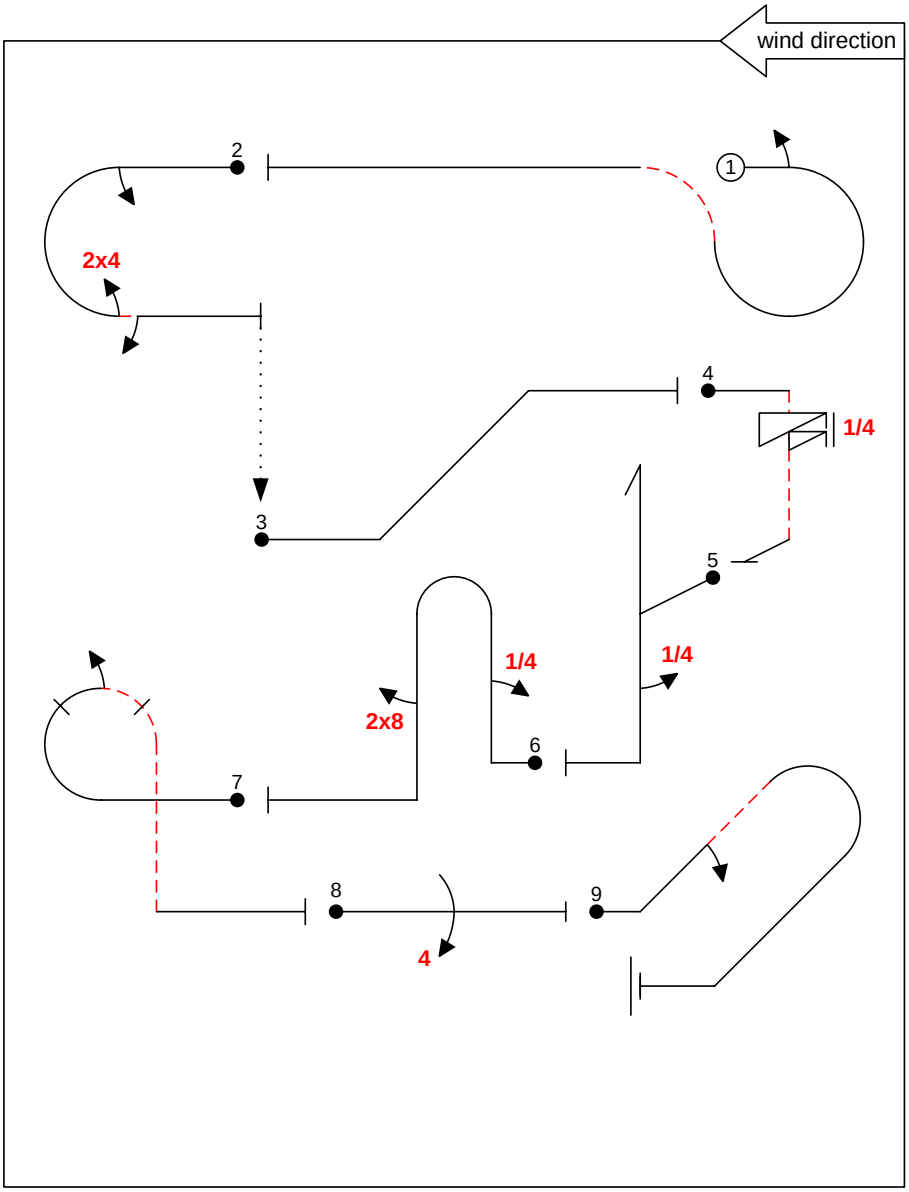
INTERMEDIATE *GLIDER*

Fig 1	1.1.2.1	7	7
Fig 2	1.1.6.3 9.11.1.6	10 7	17
Fig 3	6.2.2.1	17	17
Fig 4	2.2.1.1	4	4
Fig 5	5.2.1.1 9.1.5.1	17 3	20
Fig 6	0.1	16	16
Fig 7	8.5.2.1 9.1.2.2	10 9	19
Fig 8	1.1.1.1 9.2.3.4	2 14	16
Fig 9	2.1.3.1	19	19
Total K = 135			



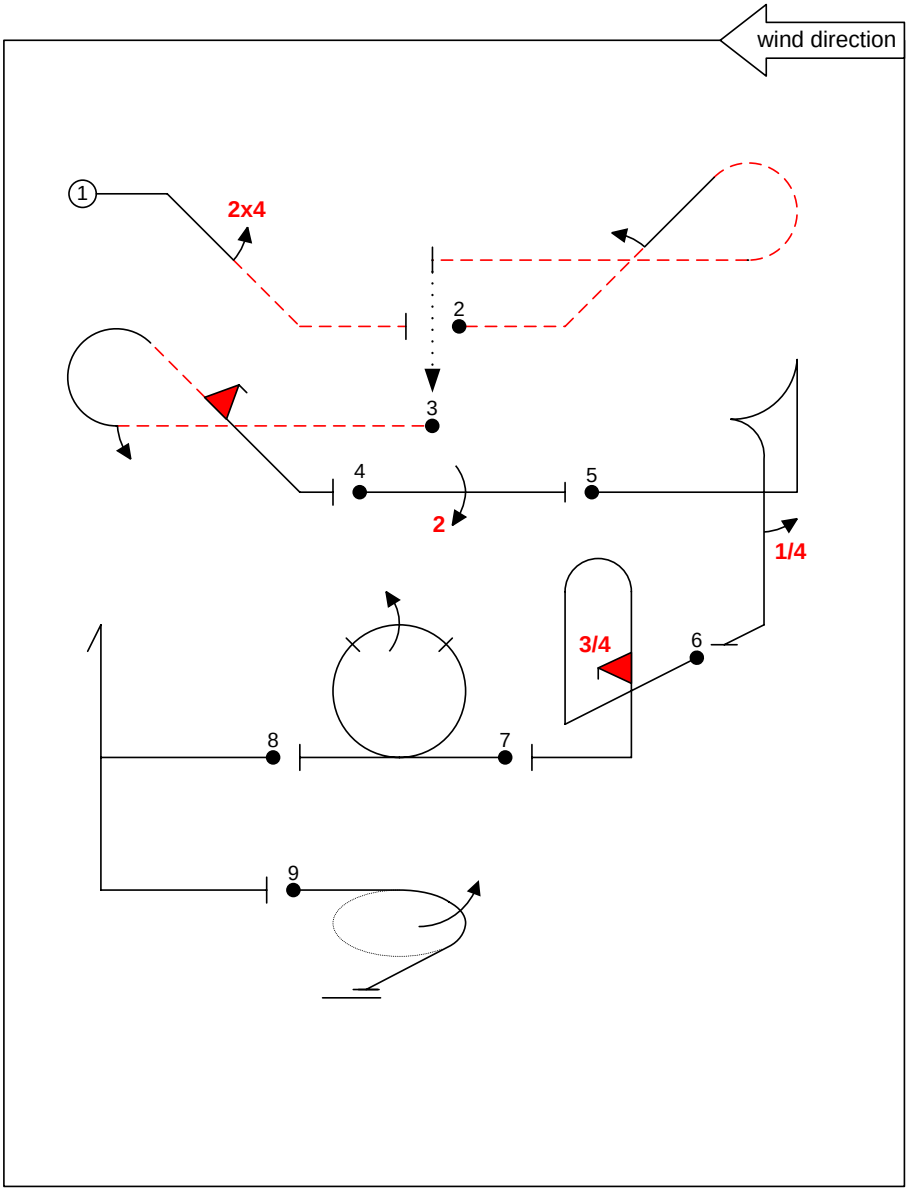
ADVANCED *GLIDER*

Fig 1	7.4.9.3 9.1.3.2	11 6	17
Fig 2	9.1.3.2 9.4.3.2 7.2.3.3 9.1.3.2	6 8 6 6	26
Fig 3	1.1.2.1	7	7
Fig 4	1.1.6.3 9.11.1.5	10 6	16
Fig 5	5.2.1.1 9.1.5.1	17 3	20
Fig 6	8.4.1.1 9.1.1.1 9.8.5.1	13 9 5	27
Fig 7	8.6.22.1 9.1.3.2	13 6	19
Fig 8	1.1.1.1 9.4.3.4	2 17	19
Fig 9	8.4.15.1 9.1.2.2	12 9	21
Total K = 172			



UNLIMITED *GLIDER*

Fig 1	1.1.3.3 9.4.4.2	8 8	16
Fig 2	8.5.2.2 9.1.2.2	14 9	23
Fig 3	8.5.8.2 9.1.3.2 9.10.4.2	11 6 15	32
Fig 4	1.1.1.1 9.2.3.4	2 14	16
Fig 5	6.2.1.1 9.1.5.1	17 3	20
Fig 6	8.4.1.1 9.10.10.3	13 17	30
Fig 7	7.4.1.1 9.1.3.4	10 12	22
Fig 8	5.2.1.1	17	17
Fig 9	2.1.3.3	21	21
Total K = 197			



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APPENDIX 2 — *CALCULATION OF SCORES USING THE FPS METHOD*

All figure grades are subject to random and systematic errors due to the inevitable lack of exactness of judging. The purpose of the Fair Play System (FPS), developed to replace the older TBLP algorithm previously used by both the IAC and CIVA, is to reduce the effect of those errors to a minimum using a mathematical process to give equal importance to all judges, while replacing anomalous grades with statistically fitted values.

FPS is currently not implemented in the IAC scoring software (JaSPer) used for regional contests. The U.S. National Aerobatic Championship and Team Selection contest, however, does use the CIVA scoring software with the FPS algorithms, though the software is capable of outputting both raw grades, such as produced by JaSPer, and grades subject to the FPS processing.

For a discussion of the process and algorithms used by the FPS calculation at U.S. Nationals and all International contests, you may download the document "*CIVA Fair Play System (FPS) Explained*" or refer to the current *FAI Sporting Code, Section 6, Part 1.* Both documents may be obtained without cost from http://www.fai.org/civa-documents.

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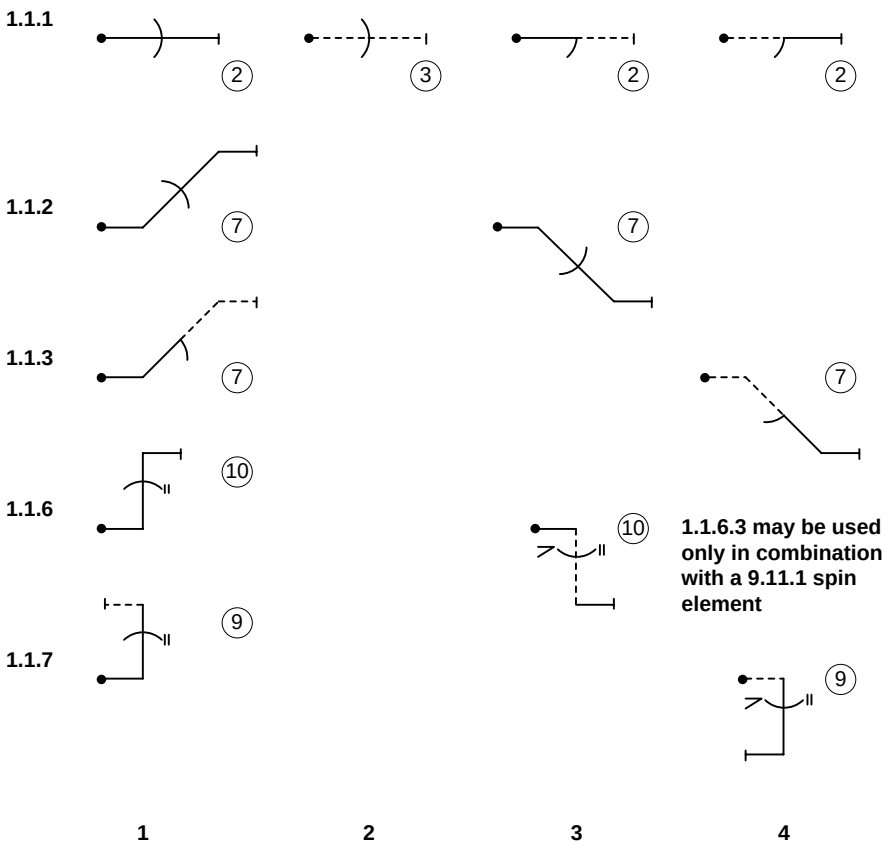
APPENDIX 3 *ALLOWABLE FIGURES FOR POWER UNKNOWNS*

INTERMEDIATE

NOTE FOR ALL FAMILIES: Rolling elements may only be added where indicated. Unlinked and opposite rolls, including rolls following a spin element, are not permitted.

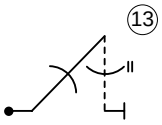
Family 1

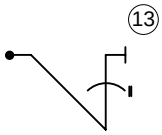


INTERMEDIATE

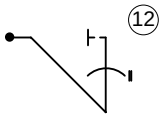
Family 1 (cont'd)

1.2.1

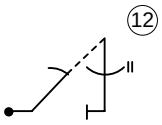


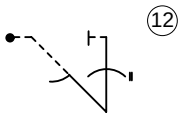


1.2.2

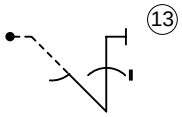


1.2.3

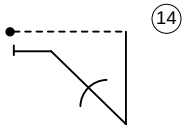




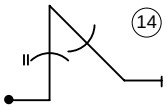
1.2.4

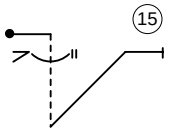


1.2.5

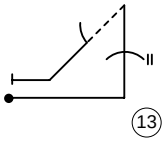


1.2.6

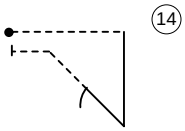




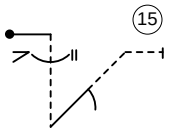
1.2.7



Figures 1.2.6.3 and 1.2.8.3 may be used only in conjunction with a 9.11.1.x spin element



1.2.8

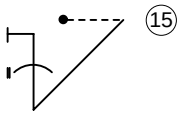


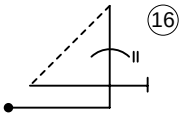
1 **2** **3** **4**

INTERMEDIATE

Family 1 (cont'd)

1.2.10





1.2.13

1.2.14

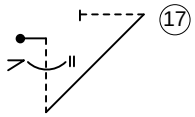
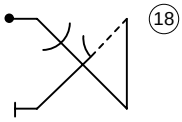
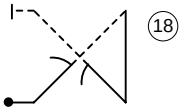


Figure 1.2.14.3 may be used only in conjunction with a 9.11.1.x spin element

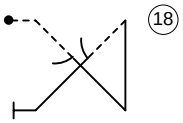
1.3.2

1.3.3





1.3.4

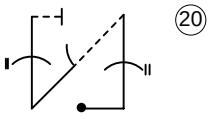


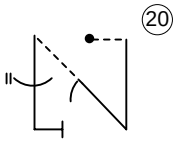
1 **2** **3** **4**

INTERMEDIATE

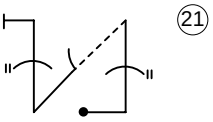
Family 1 (cont'd)

1.3.11

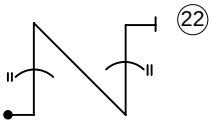


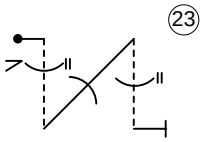


1.3.12

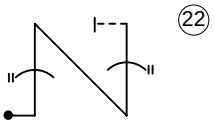


1.3.13



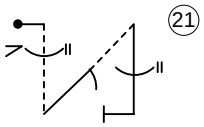


1.3.14



Figures in column 3 may be used only in conjunction with a 9.11.1.x spin element

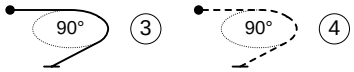
1.3.16

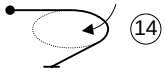


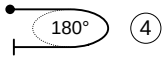
1 **2** **3** **4**

INTERMEDIATE

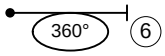
Family 2

2.1.1 

2.1.3 

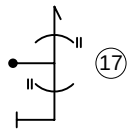
2.2.1 

2.3.1 

2.4.1 

1 **2**

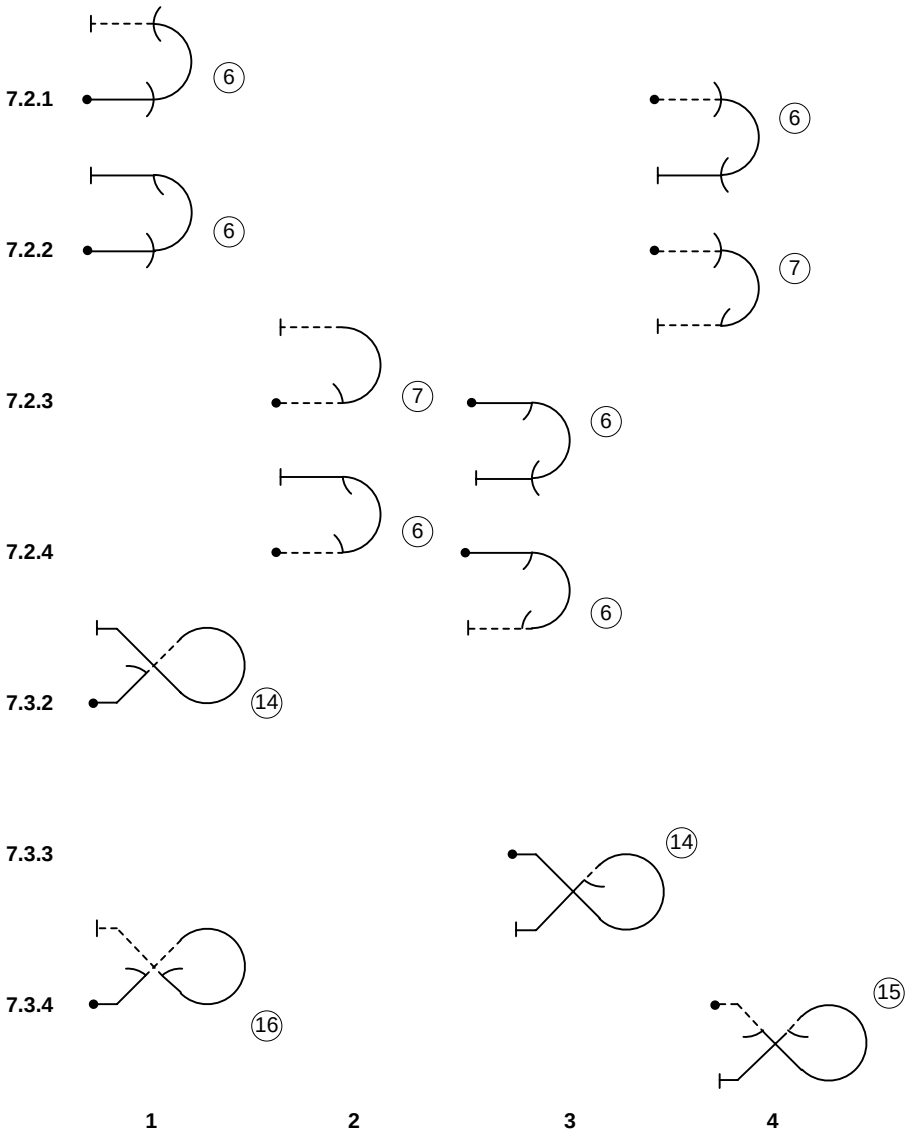
Family 5

5.2.1 

1

INTERMEDIATE

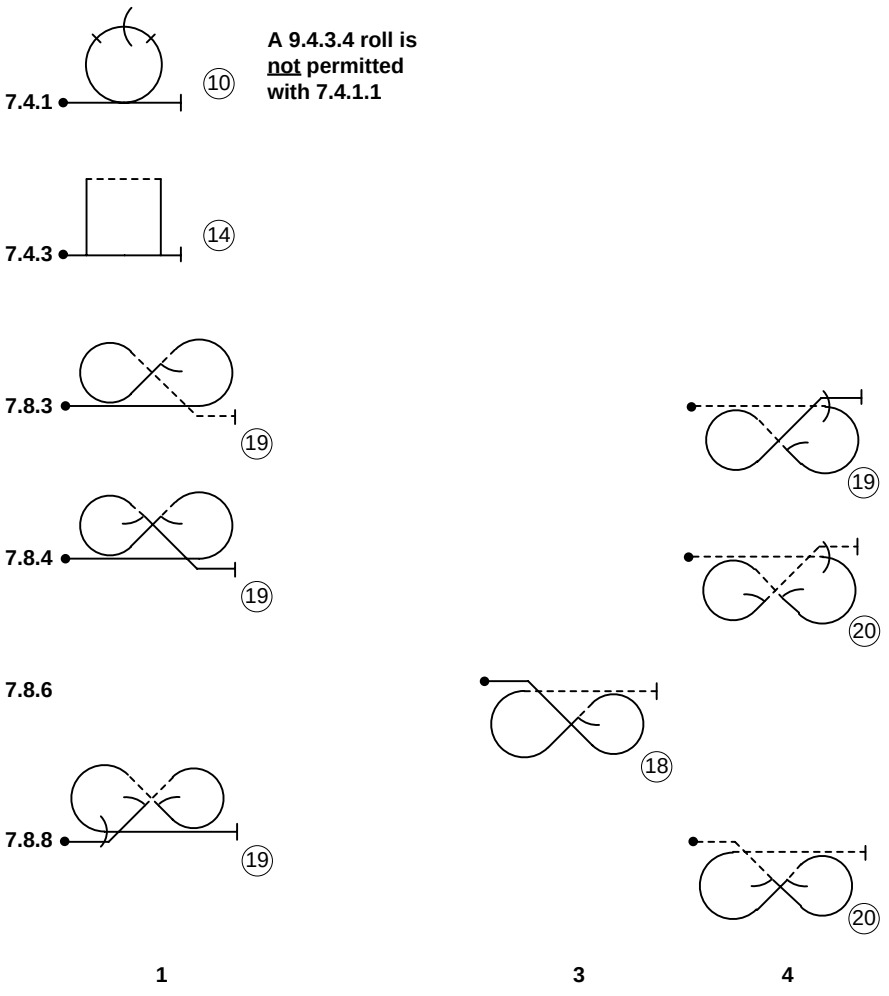
Family 7



(1) No snap rolls 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 for rows 7.2.1 to 7.2.4.

INTERMEDIATE

Family 7 (cont'd)

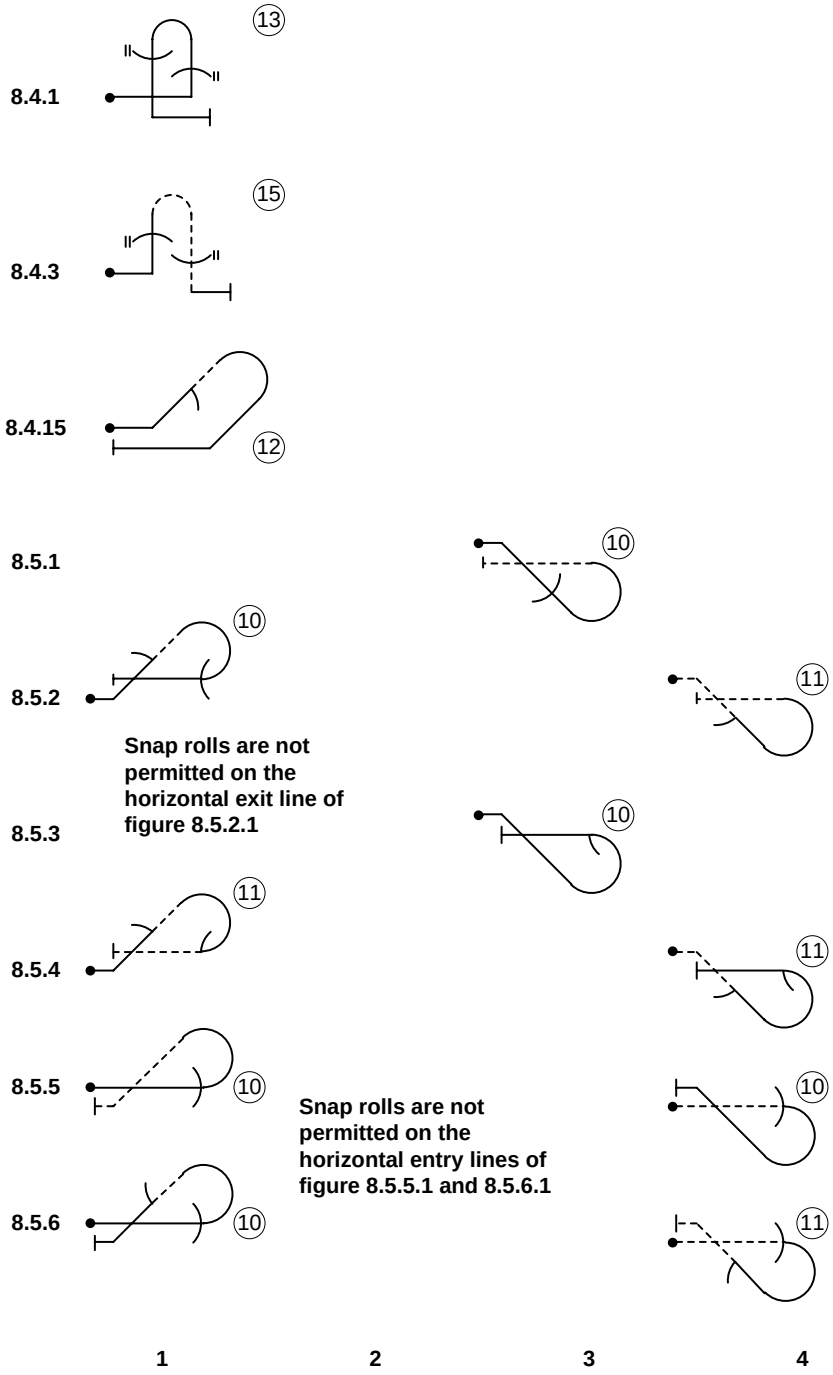


1) Snap rolls not allowed on the exit line of 7.8.8

INTERMEDIATE

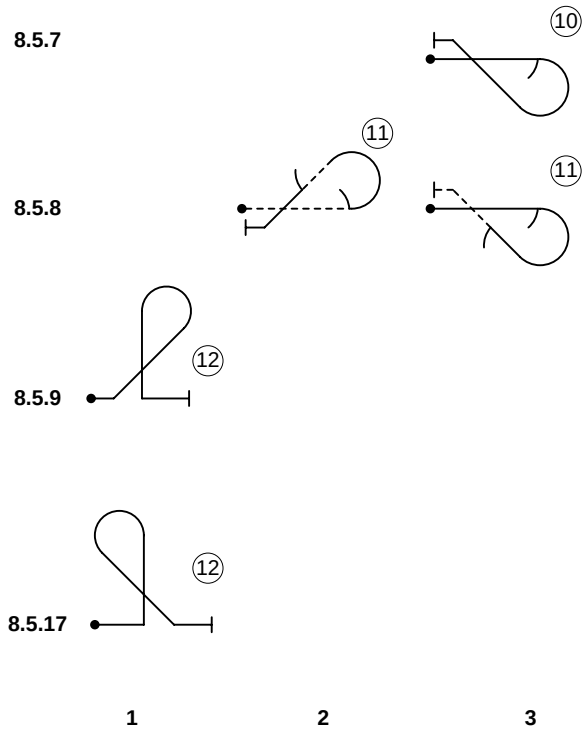
INTERMEDIATE

Family 8



INTERMEDIATE

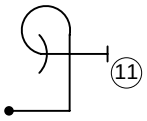
Family 8 (cont'd)



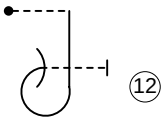
INTERMEDIATE

Family 8 (cont'd)

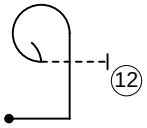
8.6.1

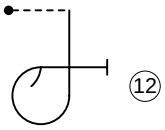


Snap rolls are not permitted on the exit line of figure 8.6.1.1

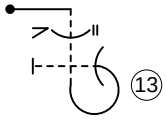


8.6.2



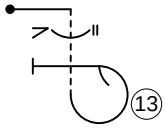


8.6.3

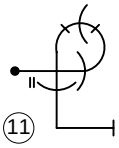


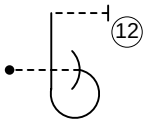
8.6.3.3 and 8.6.4.3 may be used only in combination with a 9.11.1 spin element

8.6.4



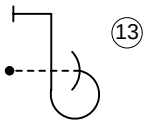
8.6.5





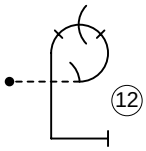
8.6.6

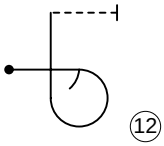
On figure 8.6.5.1, a maximum of one optional rolling element may be added. Snap rolls are not permitted on the entry line and if used, the roll at the top of the loop must be either a 9.1.3.4, 9.2.3.4, or 9.9.3.4.



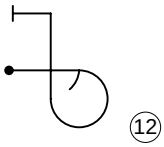
8.6.7

If used, the roll at the top of the loop must be either a 9.1.3.4 or 9.9.3.4.

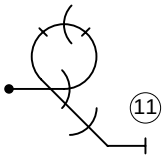




8.6.8



8.7.5

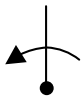


A maximum of one optional rolling element may be added. Snap rolls are not permitted on the entry line nor on the 45° down line. If a roll at the top of the loop is used, it must be a 9.1.3.4, 9.2.3.4, or 9.9.3.4.

1 2 3 4

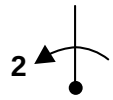
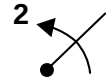
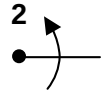
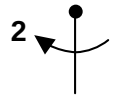
INTERMEDIATE

Family 9

9.1		**¼**	**½**	**¾**	**1**	**1¼**	**1½**	**1¾**	**2**
1		6							
2			6		10				
3			4		8		10		
4			4		8				
5		2	4						
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

INTERMEDIATE

Family 9 (cont'd)

9.2					**1**		**1½**		**2**
1									
2									
3					9				
4					9				
5									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

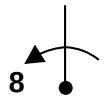
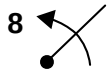
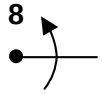
INTERMEDIATE

Family 9 (cont'd)

9.4			½	¾	**1**	1¼	1½	1¾	**2**
1									
2			7						
3			5		11				
4			5						
5									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

INTERMEDIATE

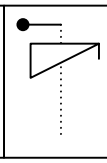
Family 9 (cont'd)

9.8		¼	½	¾	1	1¼	1½	1¾	2
1									
2									
3			7						
4									
5									
		1	2	3	4	5	6	7	8

INTERMEDIATE

Family 9 (cont'd)

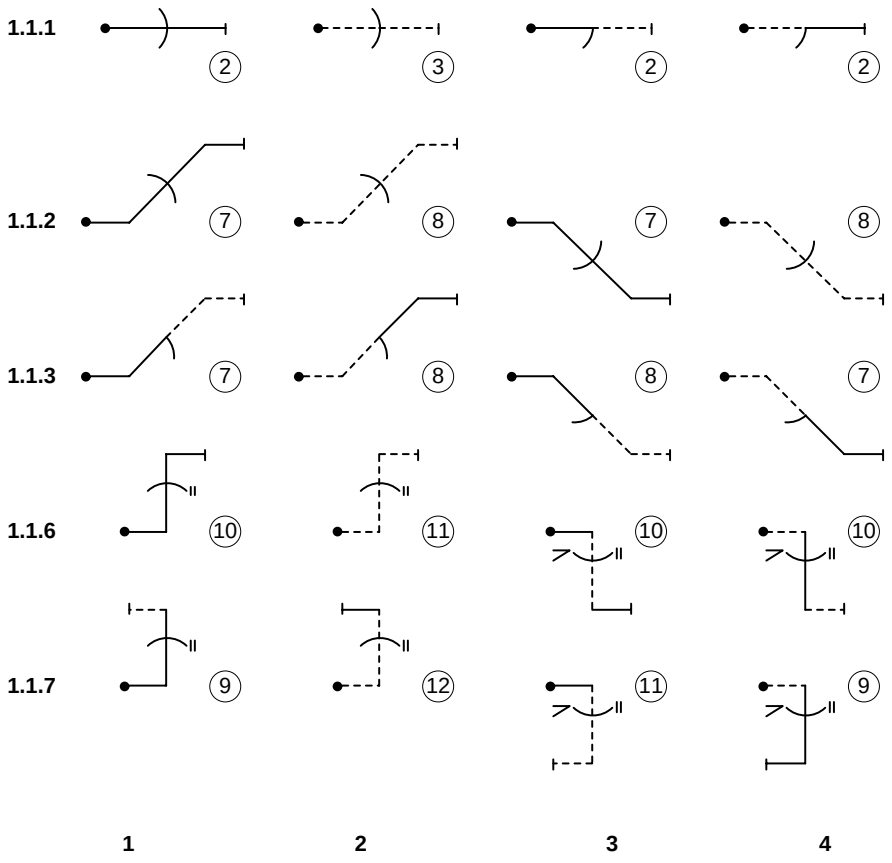
9.9			½	¾	1	1¼	1½	1¾	2
1									
2			13						
3					11				
4									
5									
		1	2	3	4	5	6	7	8

9.11					1	1¼	1½	1¾	2
1		Upright Entry Line			5	4	3		
					4	5	6	7	8

ADVANCED

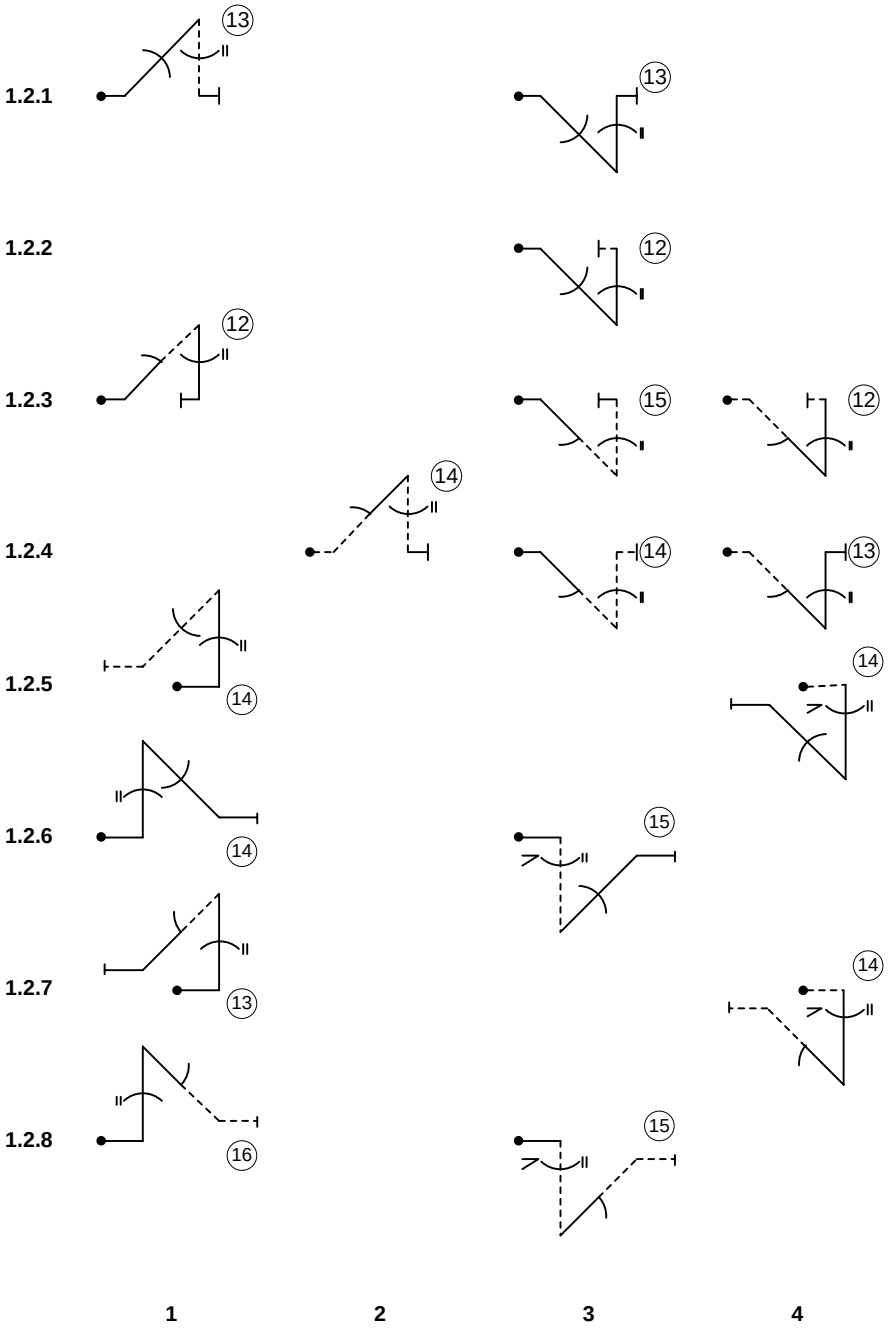
NOTE FOR ALL FAMILIES: Unlinked and opposite rolls are permitted only on straight horizontal lines, with a maximum number of 10 stops. Rolling elements may be added only where indicated, but are never permitted following a spin.

Family 1



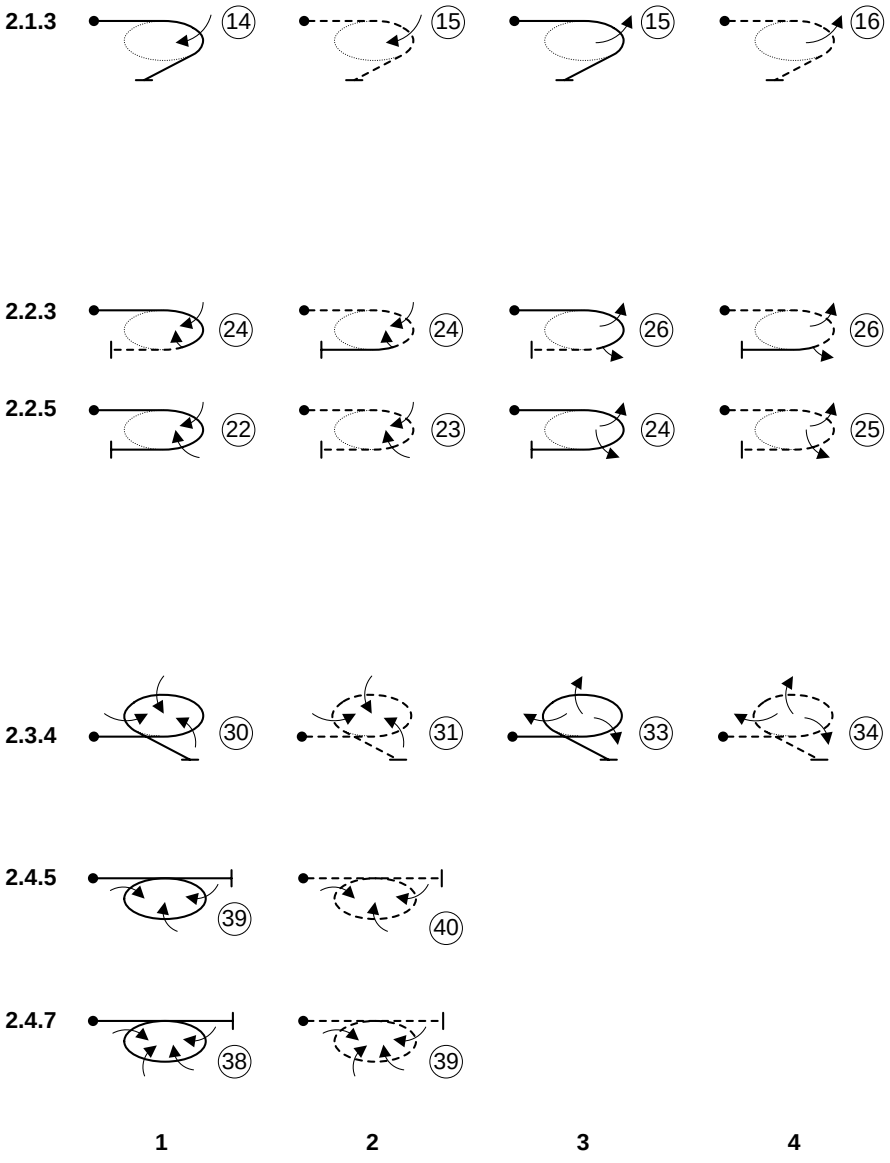
ADVANCED

Family 1 (cont'd)



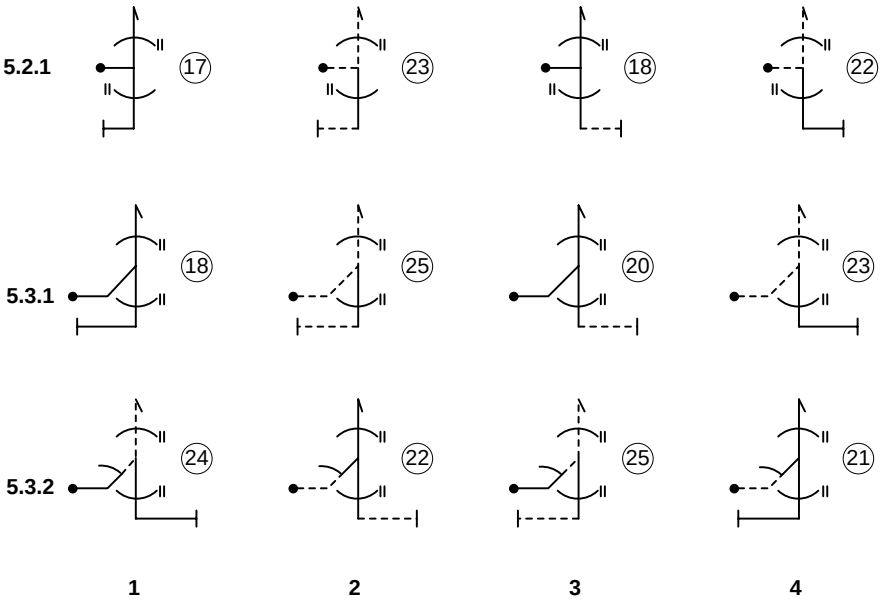
ADVANCED

Family 2



ADVANCED

Family 5



For Families 5.3.1 and 5.3.2:

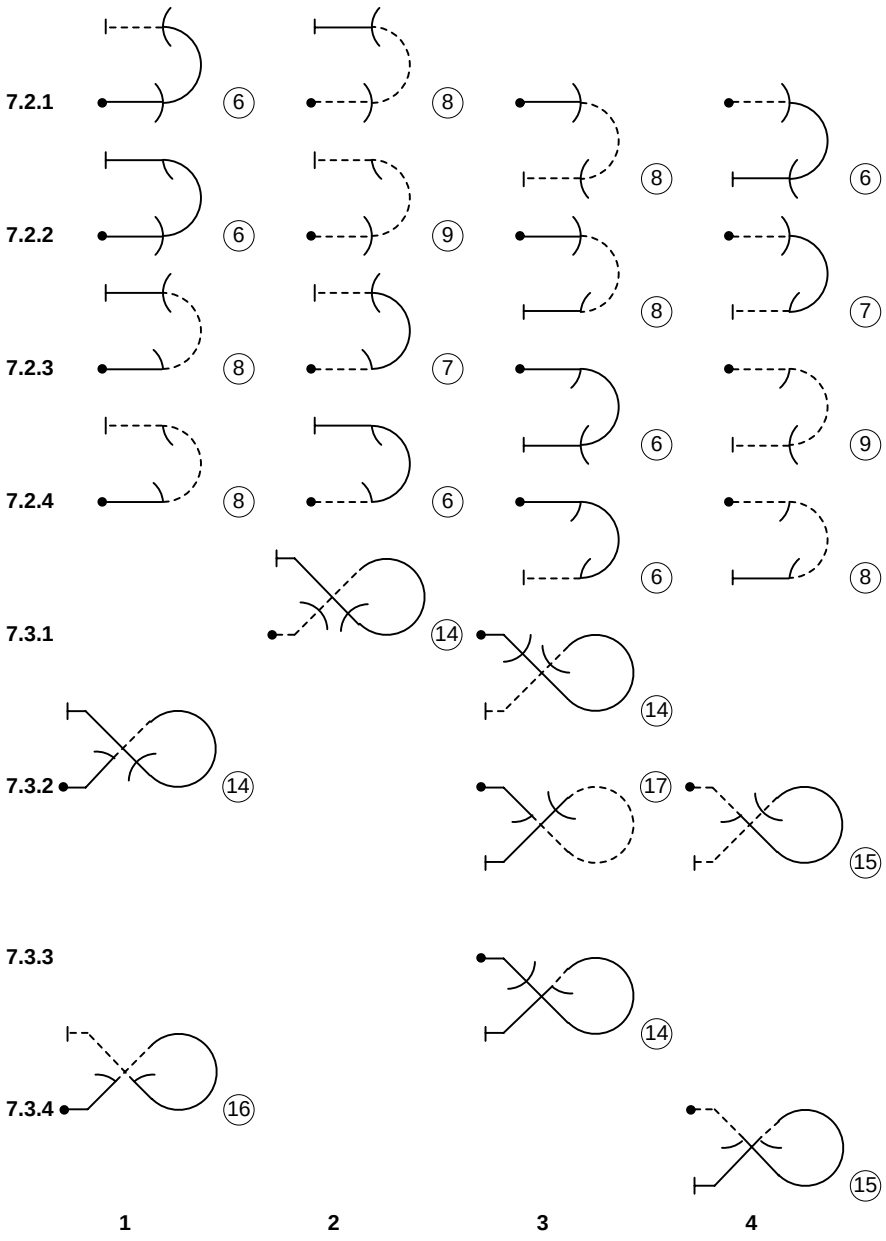
(1) Snap rolls are not permitted on the 45-degree lines.

(2) Maximum of 9.4.2.2 allowed on 45-degree lines.

(3) Maximum of 9.1.1.1 allowed on ascending vertical lines.

ADVANCED

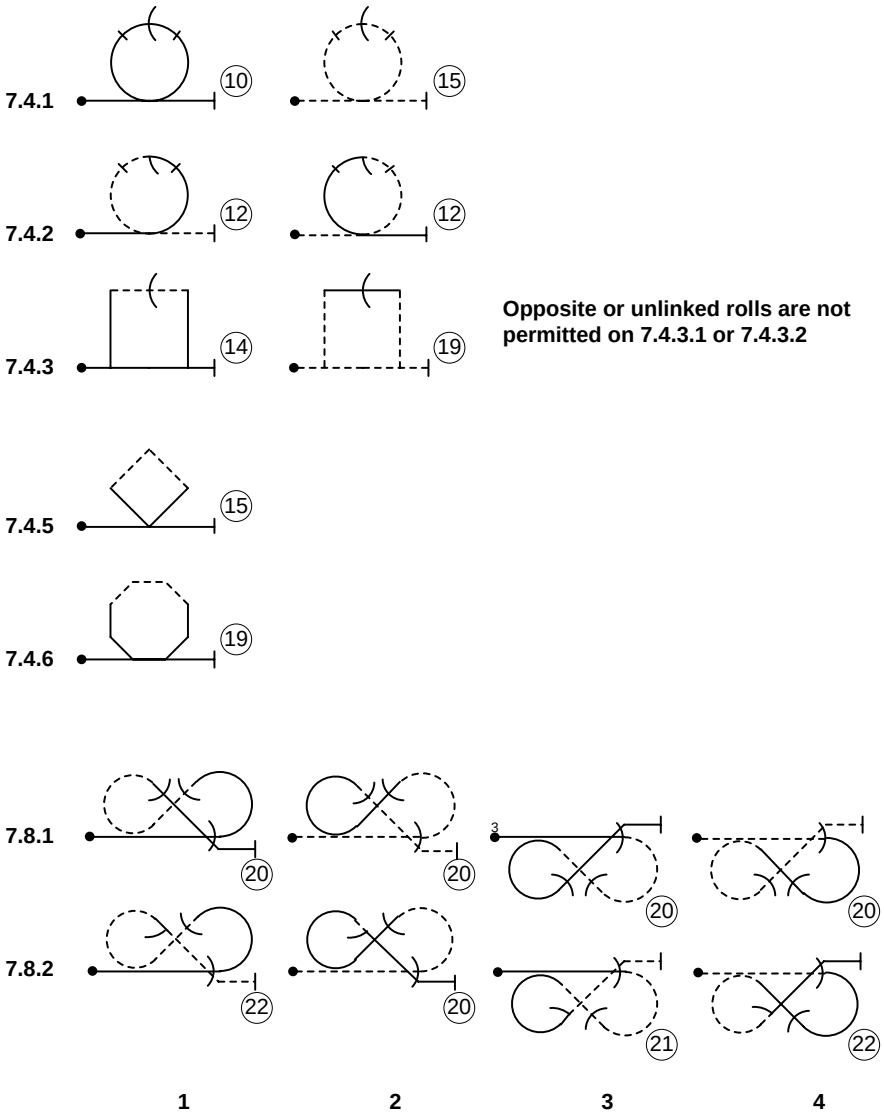
Family 7



(1) No snap rolls 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 rows 7.2.1 to 7.2.4.

ADVANCED

Family 7 (cont'd)



Opposite or unlinked rolls are not permitted on 7.4.3.1 or 7.4.3.2

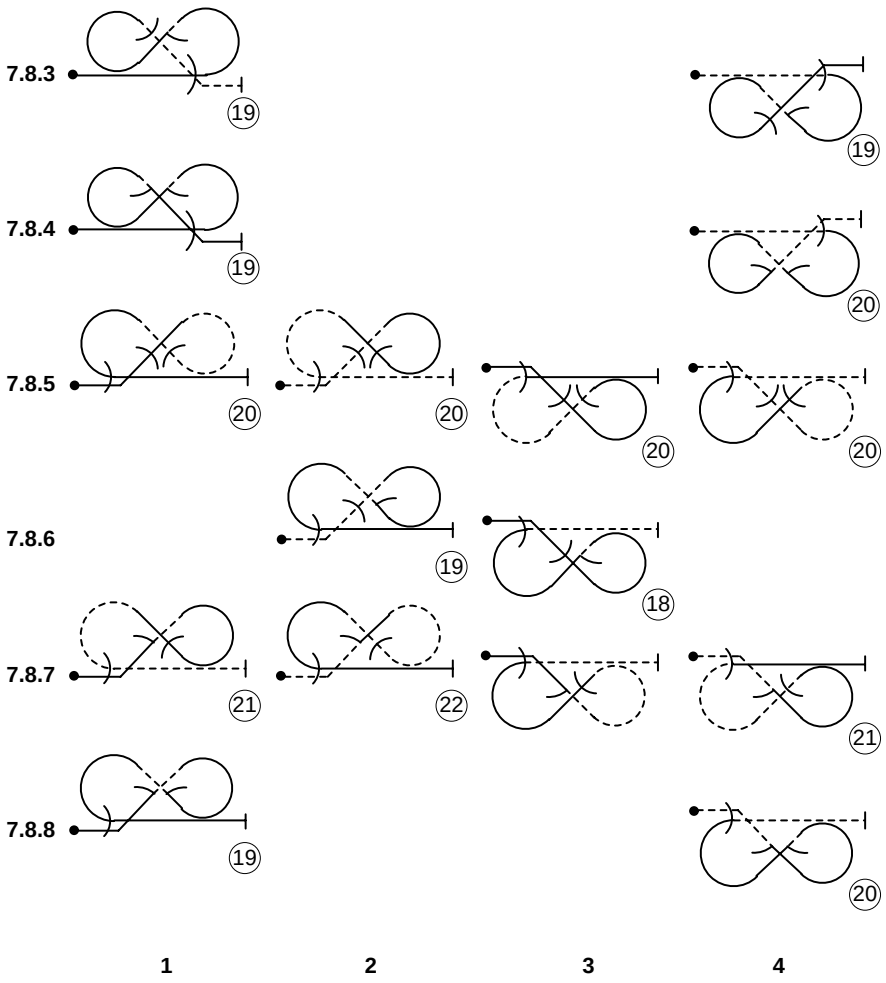
(1) Maximum of 360° of rotation allowed on 7.4.1.1.

(2) Only 9.1.3.4 allowed on 7.4.1.2.

(3) No snap rolls on the horizontal entry lines of figures in columns 1 and 2 of rows 7.8.1 and 7.8.2.

ADVANCED

Family 7 (cont'd)

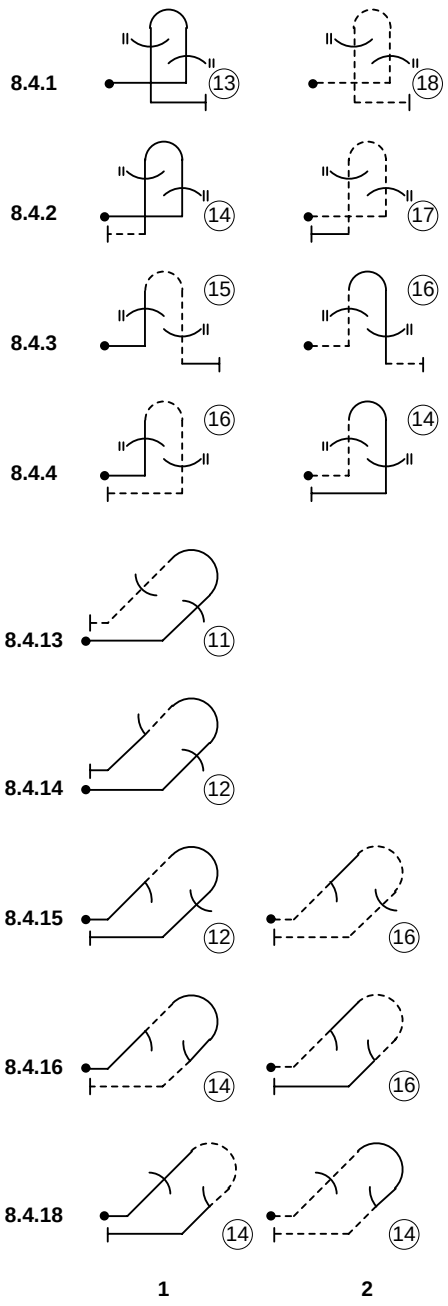


(1) No snap rolls on the horizontal entry lines of figures in columns 1 and 2 of rows 7.8.3 and 7.8.4.

(2) No snap rolls on the horizontal exit lines of figures in columns 1 and 2 of rows 7.8.5 to 7.8.8.

ADVANCED

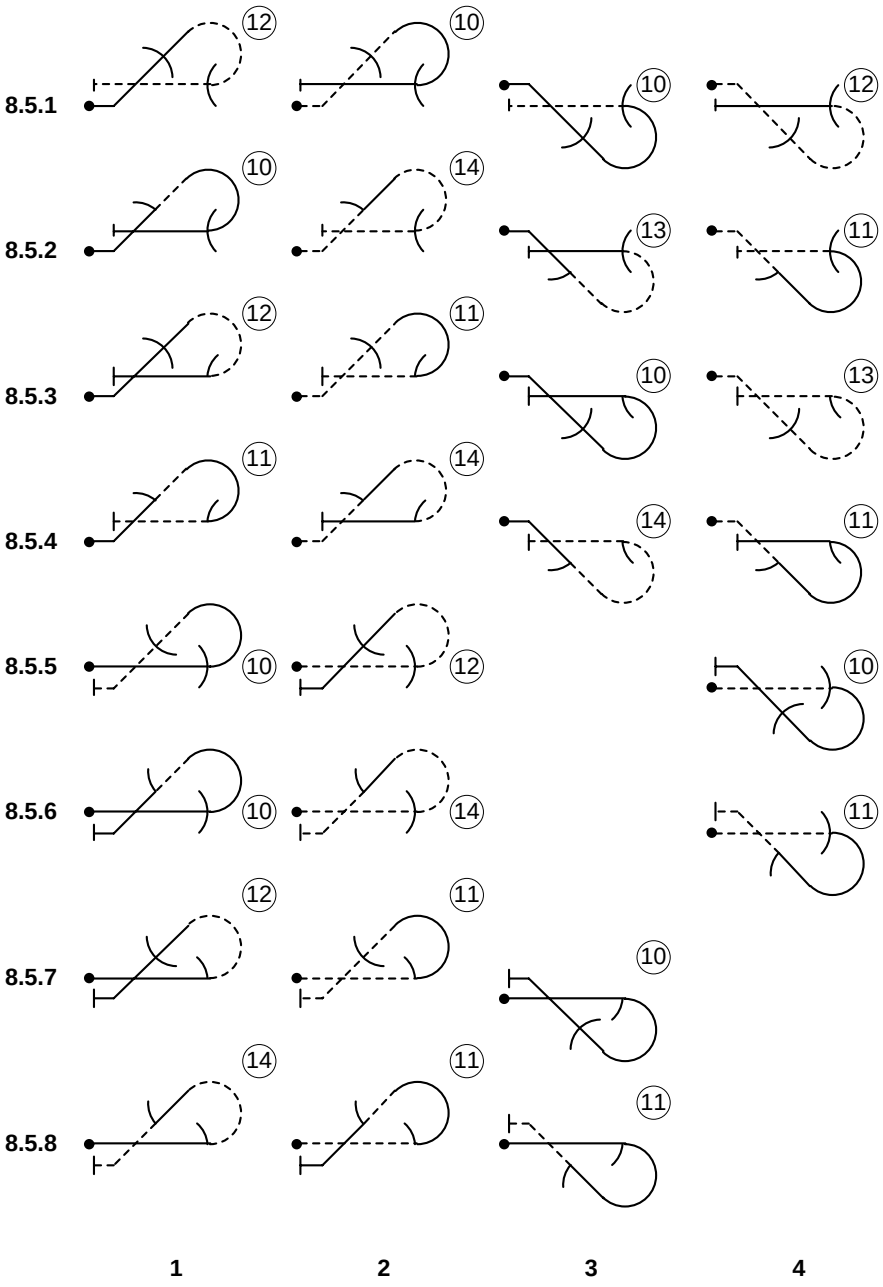
Family 8



(1) No snap rolls permitted on figures 8.4.13.1 and 8.4.14.1, nor on the 45° down line of 8.4.15.1, 8.4.16.1, and 8.4.18.2.

ADVANCED

Family 8 (cont'd)

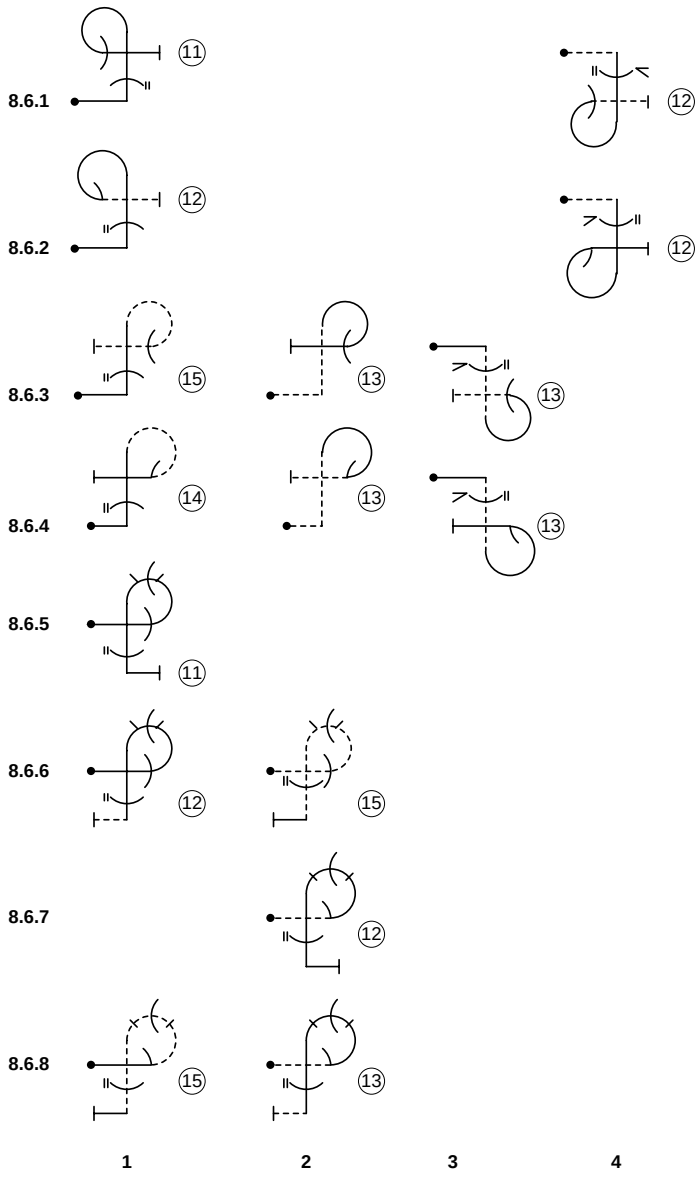


(1) No snap rolls on horizontal entry / exit lines of any figure from columns 1 or 2.

(2) 9.2.4.4 not allowed on 45° line of 8.5.1.4 or 8.5.3.4.

ADVANCED

Family 8 (cont'd)



(1) No flick rolls on horizontal entry / exit lines of any figure from columns 1 or 2.

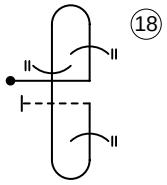
(2) Rows 8.6.1 to 8.6.4, Column 1: Not more than ½ vertical roll up.
Column 2: No vertical rolls up.

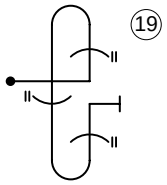
(3) Rows 8.6.5 to 8.6.8: No snap rolls on the vertical down lines after a roll in the loop.

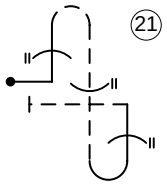
(4) Rows 8.6.5 to 8.6.8, columns 1 and 2: Maximum 360° rotation at top of 3/4 loop.

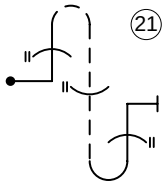
ADVANCED

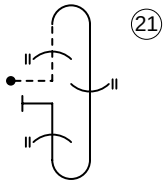
Family 8 (cont'd)

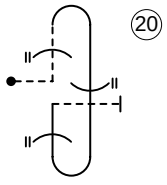
8.8.1 

8.8.2 

8.8.5 

8.8.6 

8.8.7 

8.8.8 

1 **2** **3** **4**

(1) A maximum of one Family 9 element allowed on any vertical line.

ADVANCED

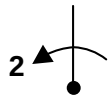
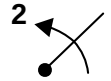
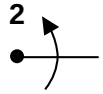
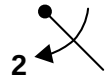
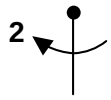
Family 9

9.1		**¼**	**½**	**¾**	**1**	**1¼**	**1½**	**1¾**	**2**
1		6	8	10[1]					
2			6		10				
3		2	4	6	8		10		12
4			4		8				
5		2	4	6[2]					
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

(1) 3/4 roll up may not be followed by level fly-off
(2) 3/4 roll down may not be followed by negative recovery

ADVANCED

Family 9 (cont'd)

9.2					**1**		**1½**		**2**
1									
2					11				
3					9		12		15
4					9				
5									
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

ADVANCED

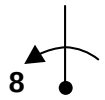
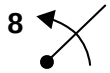
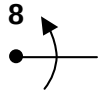
Family 9 (cont'd)

9.4			½	¾	**1**	1¼	1½	1¾	**2**
1			9[1]						
2			7		13				
3			5	8	11				
4			5						
5			5[2]						
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

(1) 2/4 roll up may not be followed by level fly-off
(2) 2/4 roll down may not be followed by negative recovery

ADVANCED

Family 9 (cont'd)

9.8		¼	½	¾	**1**	1¼	1½	1¾	**2**
1		7							
2			9						
3		3	7		15				
4									
5		3							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

ADVANCED

Family 9 (cont'd)

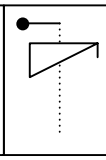
9.9			½	¾	**1**	1¼	1½	1¾	**2**
1									
2			13		13				
3			11		11		14		
4			11		11				
5			11	11					

10			13						
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

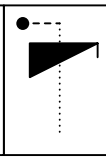
ADVANCED

Family 9 (cont'd)

9.11

				1	1¼	1½	1¾	2
1		**Upright Entry Line**		5	4	3		
				4	**5**	**6**	**7**	**8**

9.12

				1	1¼	1½	1¾	2
1		**Inverted Entry Line**		7	6	5		
				4	**5**	**6**	**7**	**8**

INTENTIONALLY LEFT BLANK

UNLIMITED

NOTE FOR ALL FAMILIES: Unlinked and opposite rolls are permitted only on straight horizontal lines, with a maximum number of 10 stops, except that:

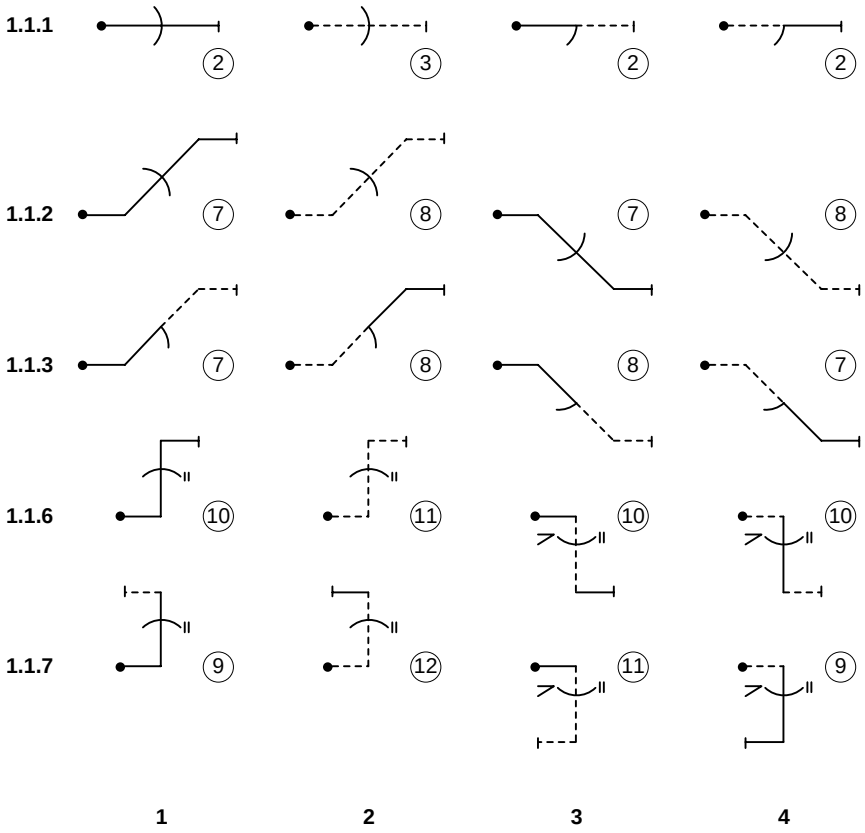
(a) On vertical and 45° up lines, opposite aileron rolls may be added as long as neither the total extent of rotation nor the number of stops exceed the limits shown in the table below.

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

(b) Combinations of aileron roll first, and then snap 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. Only 9.9.2.x or 9.10.2.x snap rolls from wings level are allowed. The combined extent of rotation shall not exceed 540° with not more than 3 stops.

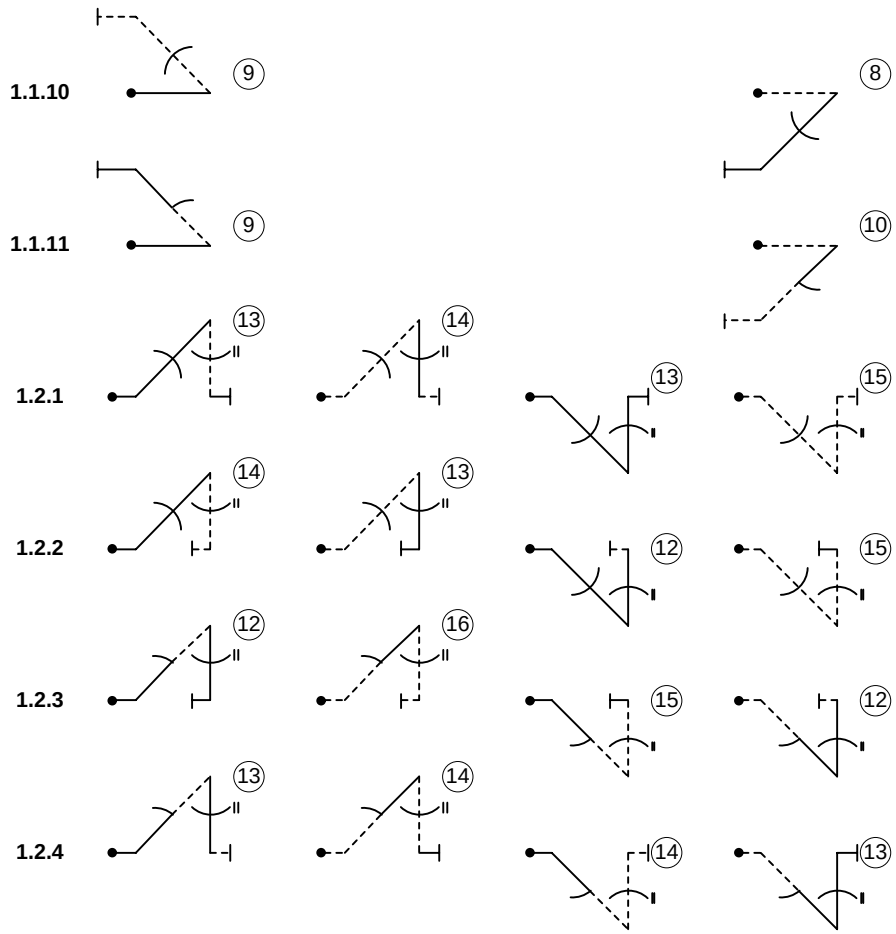
(c) An aileron or snap roll element may be added after a spin.

Family 1



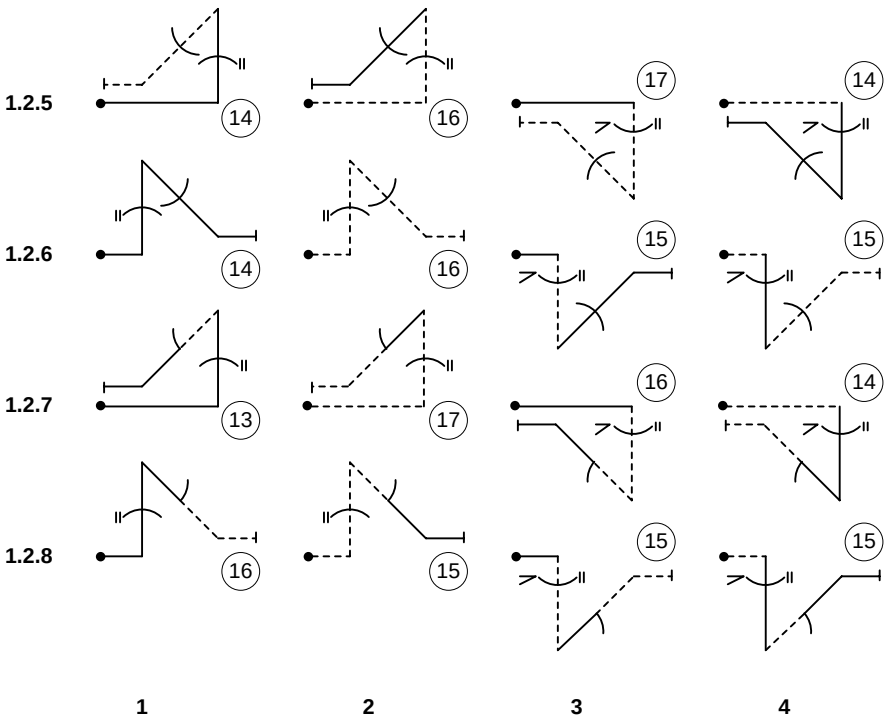
UNLIMITED

Family 1 (cont'd)



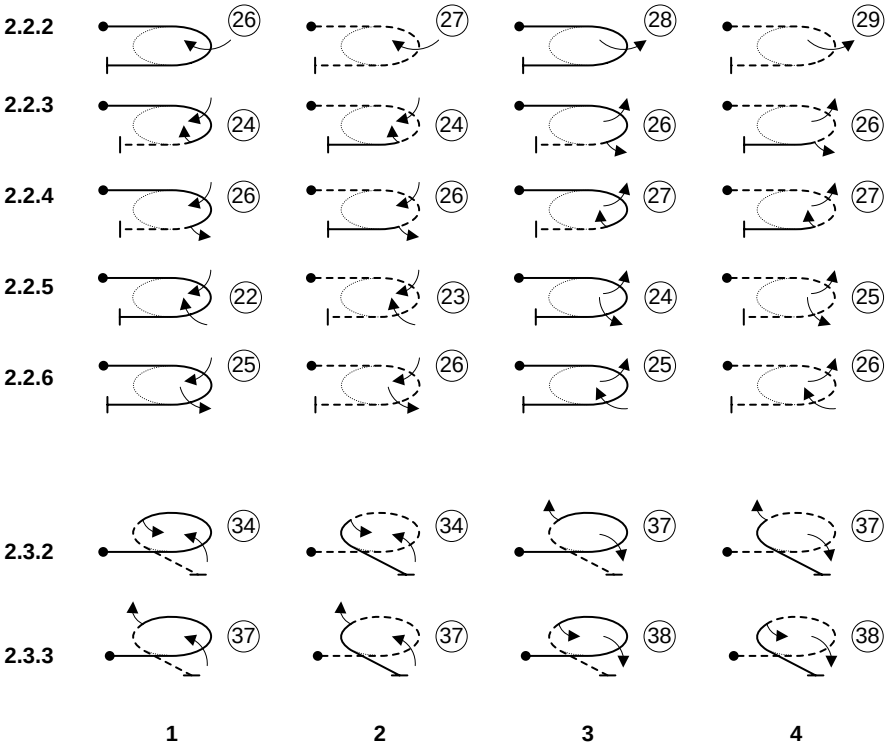
UNLIMITED

Family 1 (cont'd)



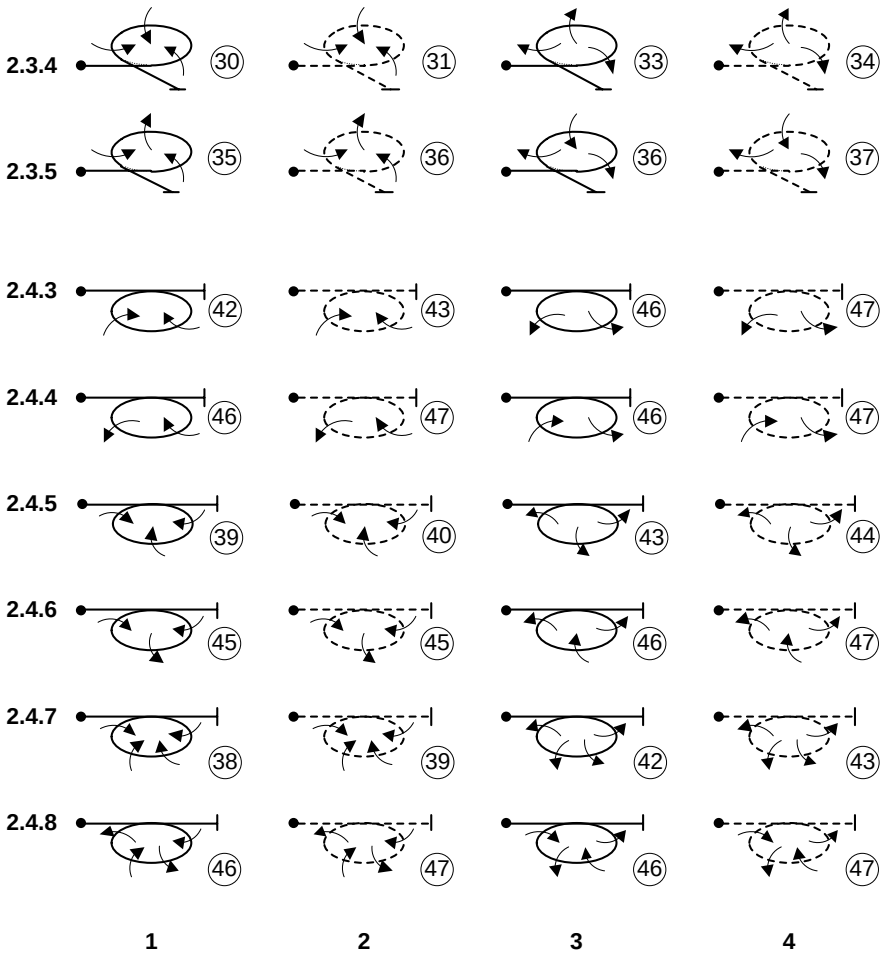
UNLIMITED

Family 2



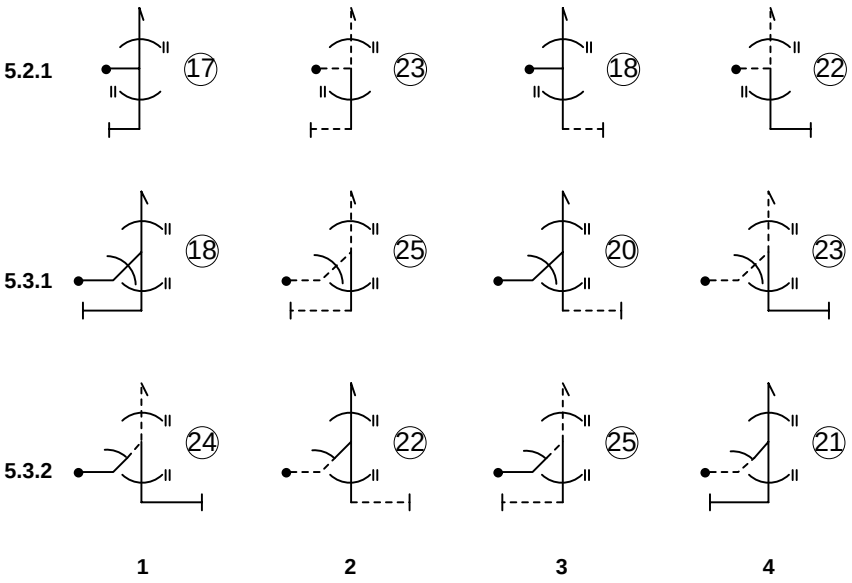
UNLIMITED

Family 2 (cont'd)



UNLIMITED

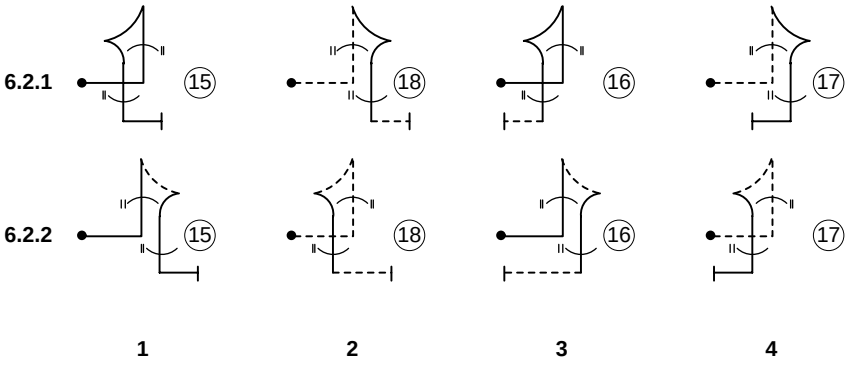
Family 5



(1) Snap rolls not permitted on ascending vertical or 45° lines within Families 5.3.1 and 5.3.2.

(2) The combined total for all aileron roll elements on either or both the 45° and vertical up lines in Families 5.3.1 and 5.3.2 must not exceed 450° of rotation and 4 stops.

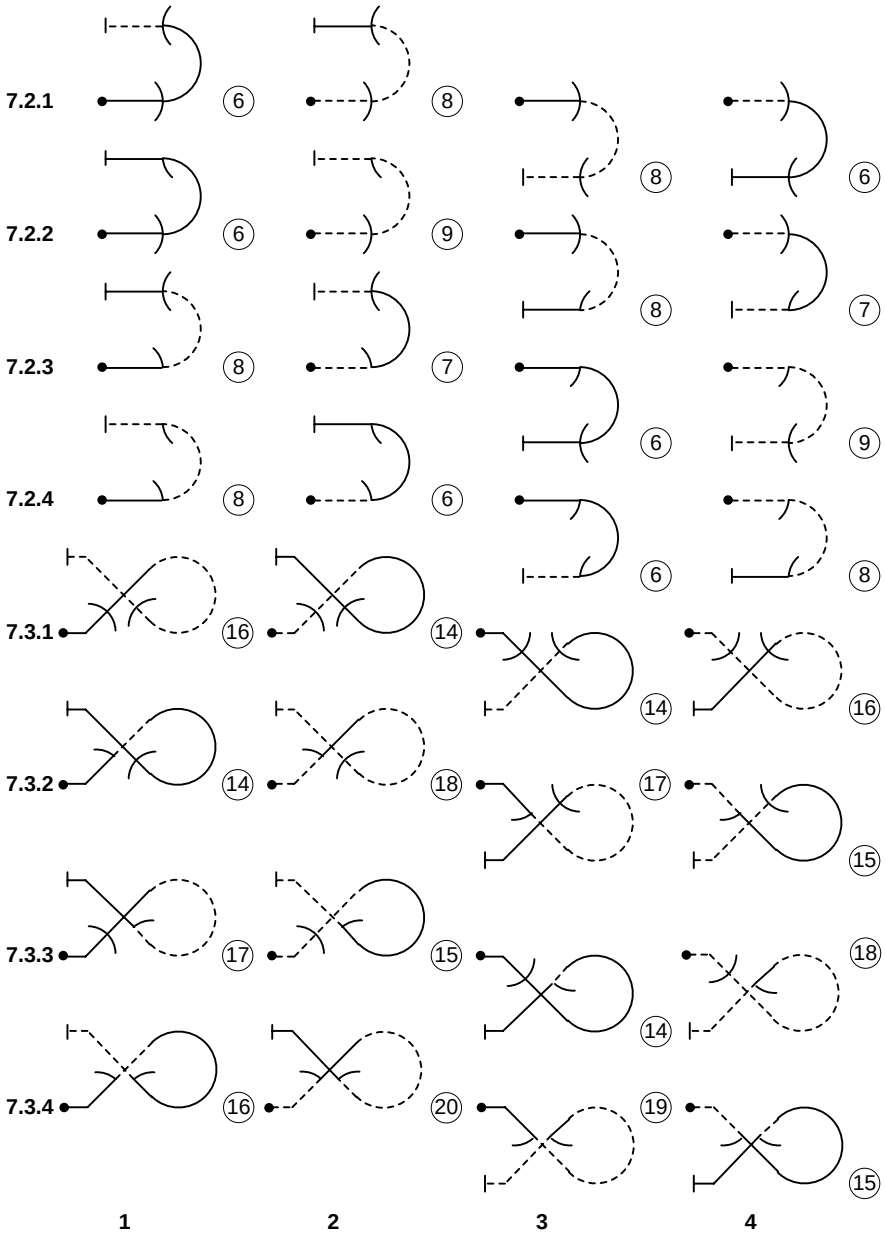
Family 6



(1) No snap rolls on vertical up lines in Family 6.

UNLIMITED

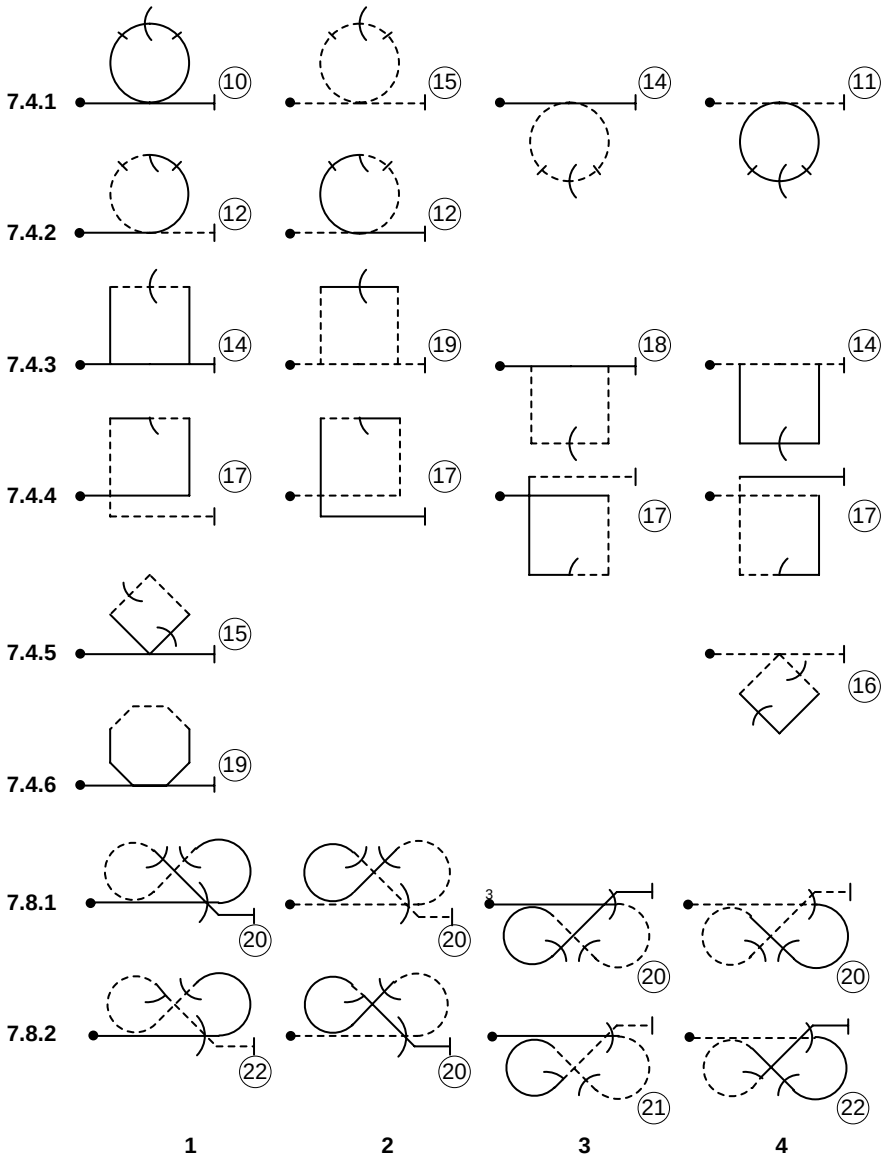
Family 7



(1) No snap rolls on the horizontal entry line of figures in columns 1 and 2, nor on the horizontal exit lines of figures in columns 3 and 4 of rows 7.2.1 to 7.2.4.

UNLIMITED

Family 7 (cont'd)



(1) No snap rolls on figures in columns 3 and 4 on rows 7.4.1 to 7.4.4.

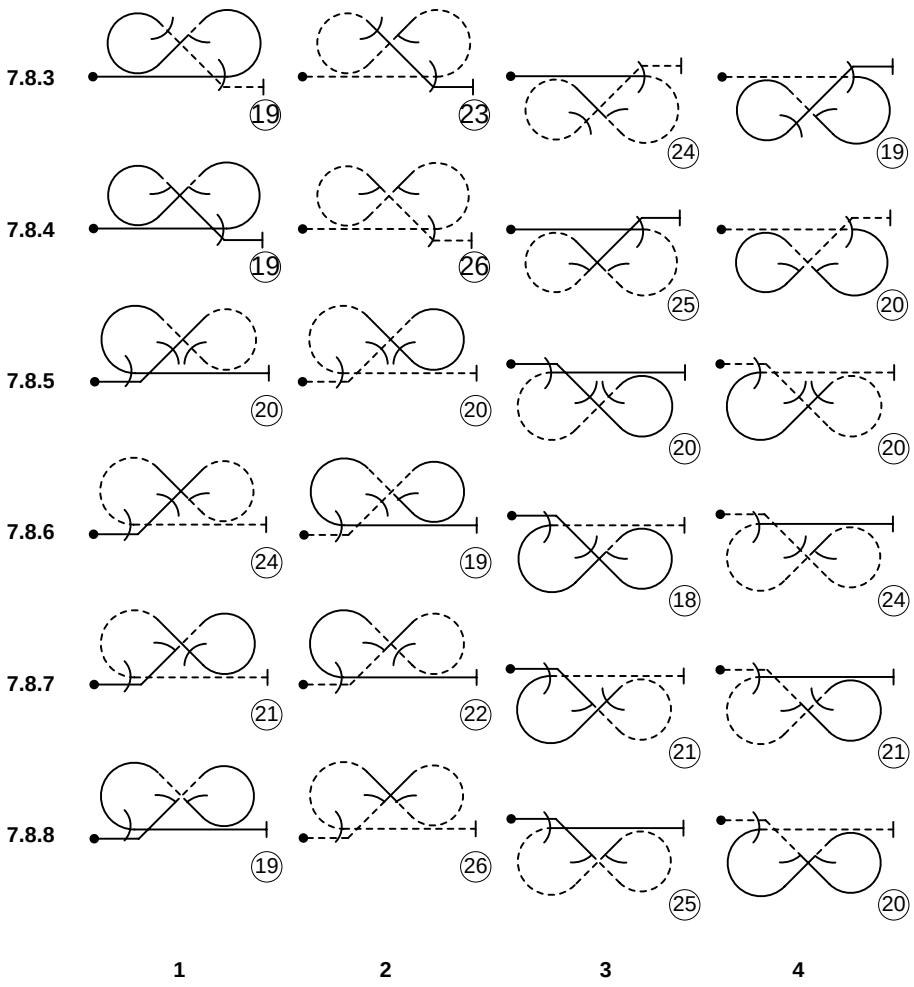
(2) No snap rolls on the lower lines of any figure in row 7.4.5.

(3) No eight-point rolls (9.8.3.4) on 7.4.1.3 or 7.4.1.4.

(4) No snap rolls on the horizontal entry lines in columns 1 and 2 of rows 7.8.1 and 7.8.2.

UNLIMITED

Family 7 (cont'd)

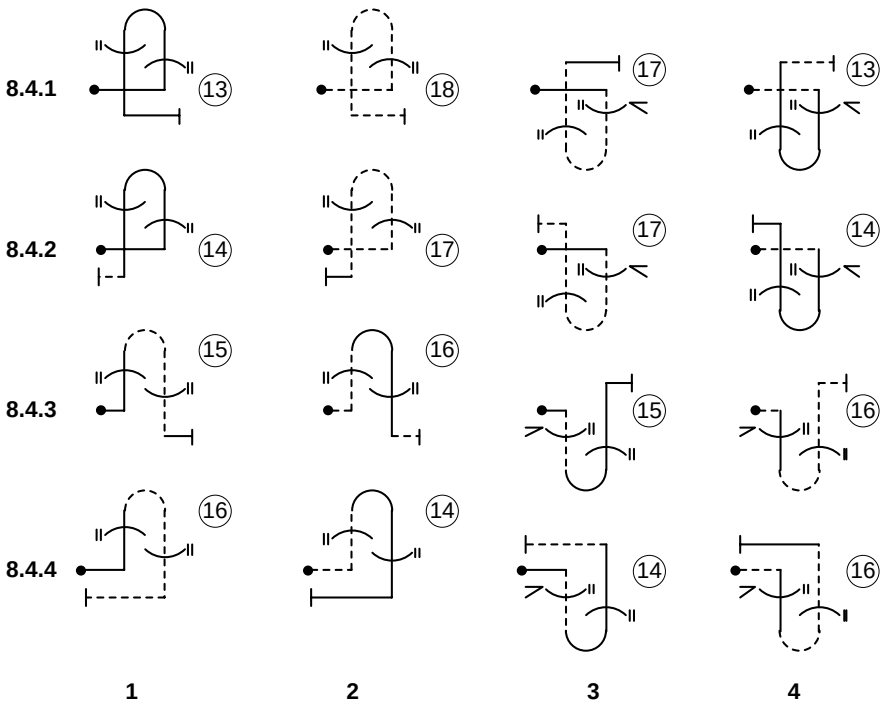


(1) No snap rolls on the horizontal entry lines of figures in columns 1 and 2 of rows 7.8.3 and 7.8.4.

2) No snap rolls on the horizontal exit lines of figures in columns 1 and 2 of rows 7.8.5 to 7.8.8.

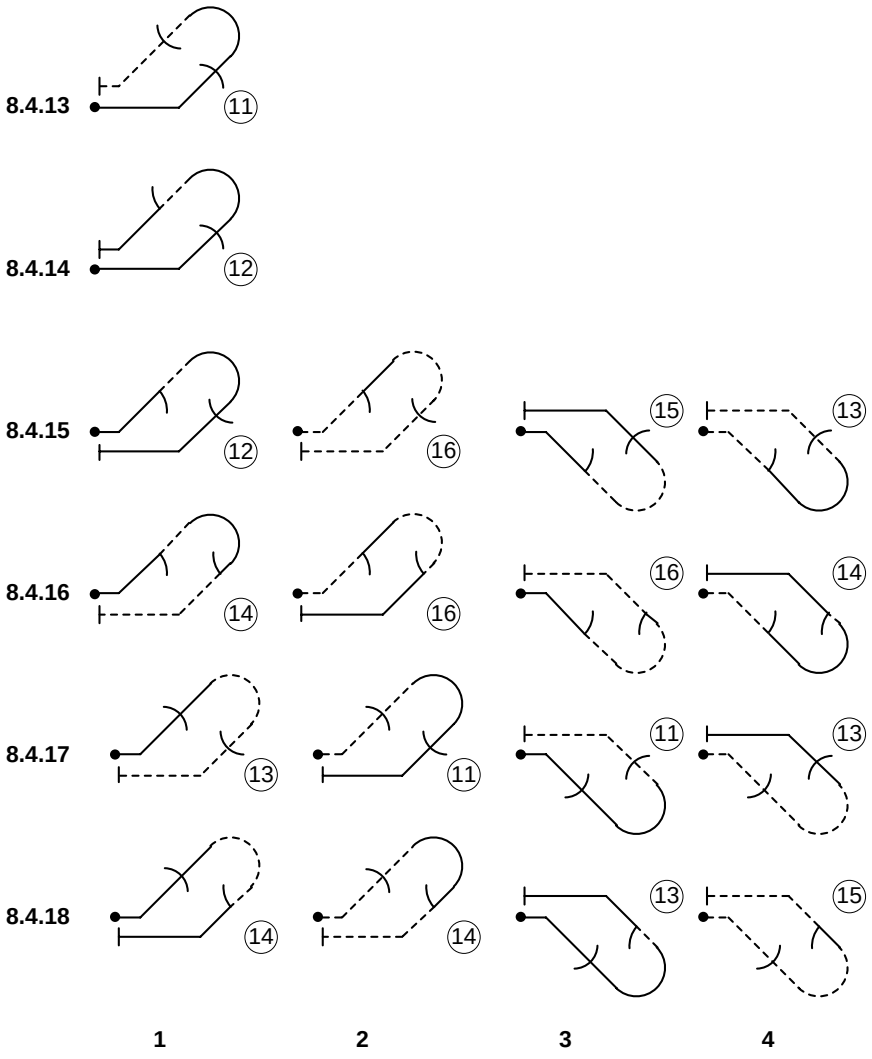
UNLIMITED

Family 8



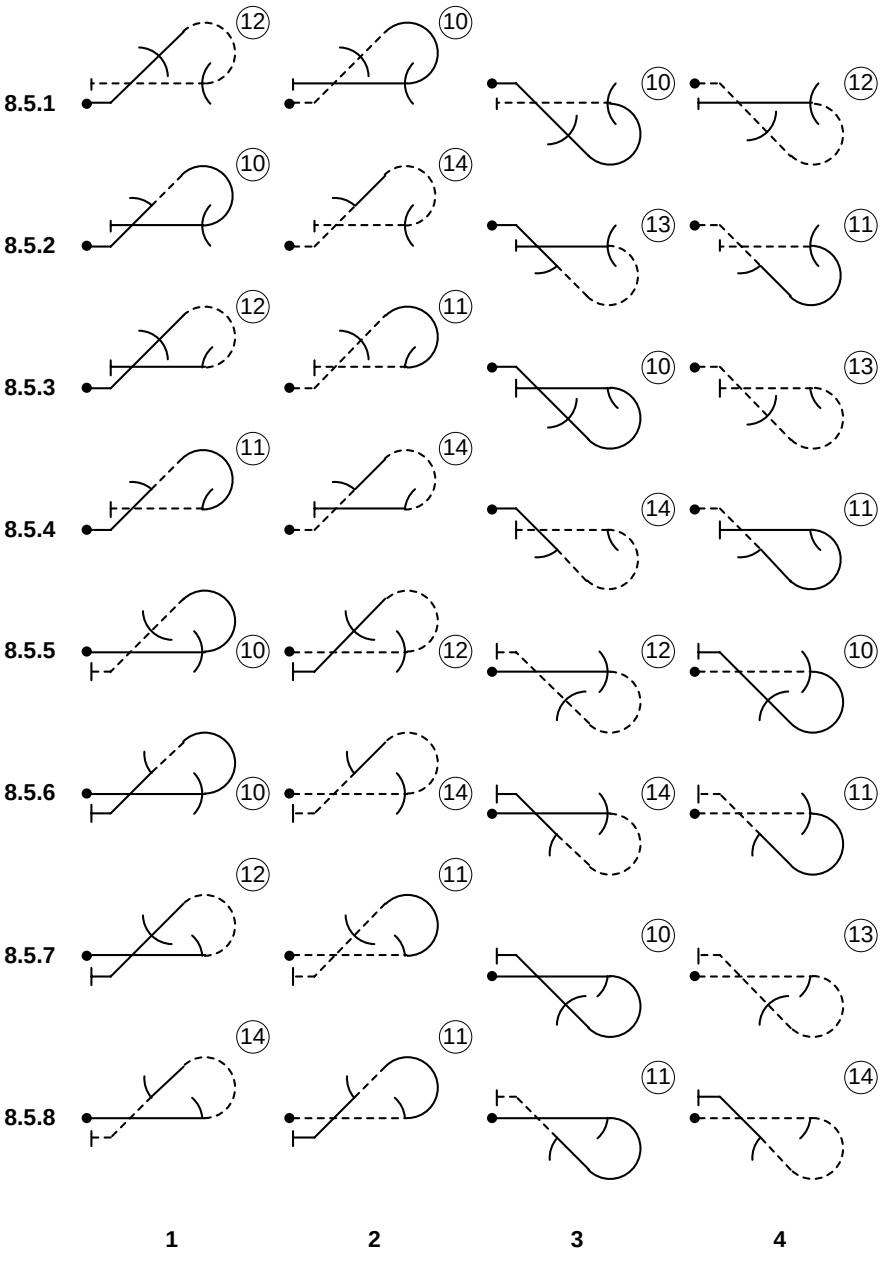
UNLIMITED

Family 8 (cont'd)



UNLIMITED

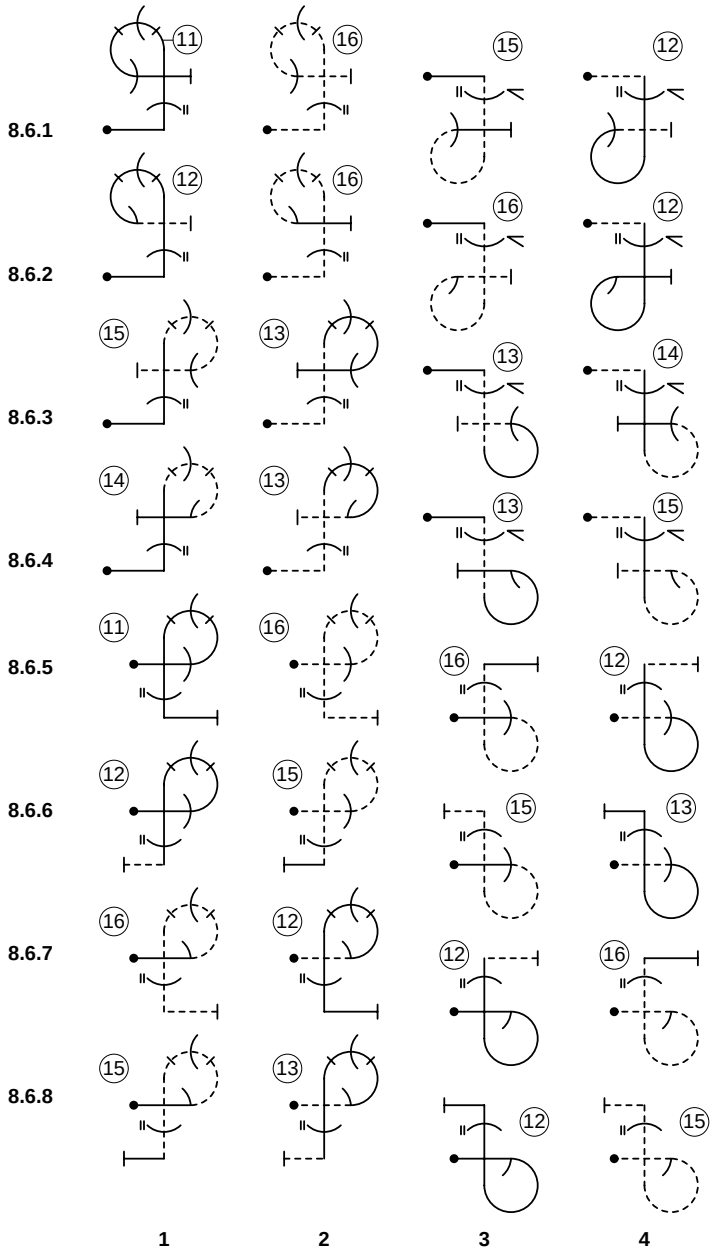
Family 8 (cont'd)



(1) No snap rolls on horizontal entry / exit lines of any figure from columns 1 or 2.

UNLIMITED

Family 8 (cont'd)



(1) No snap rolls on horizontal entry / exit lines of any figure from columns 1 or 2.

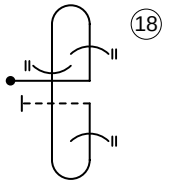
(2) No snap rolls on the top of figures in columns 1 and 2 of rows 8.6.1 to 8.6.4 when preceded by a vertical roll exceeding 3 stops or more than 360 degrees of rotation.

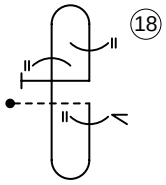
(3) No snap rolls on vertical down lines of figures in columns 1 and 2 of rows 8.6.5 to 8.6.8 after a hesitation roll in the loop.

UNLIMITED

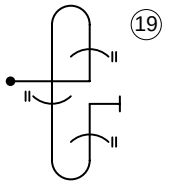
Family 8 (cont'd)

8.8.1

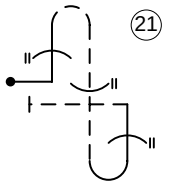




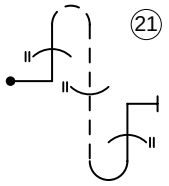
8.8.2

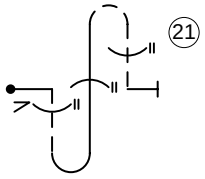


8.8.5

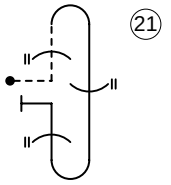


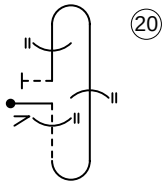
8.8.6



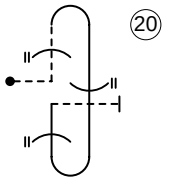


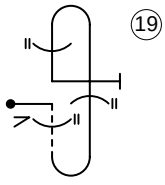
8.8.7





8.8.8



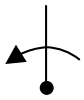


1 **2** **3** **4**

(1) A maximum of one Family 9 element allowed on any vertical line.

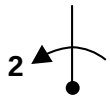
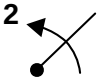
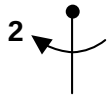
UNLIMITED

Family 9

9.1		**¼**	**½**	**¾**	**1**	**1¼**	**1½**	**1¾**	**2**
1		6	8	10	12	14			
2		4	6	8	10	11	12		
3		2	4	6	8	9	10	11	12
4			4		8		10		
5		2	4	6	8				
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

UNLIMITED

Family 9 (cont'd)

9.2					**1**		**1½**		**2**
1					13				
2					11		14		
3					9		12		15
4					9				
5					9				
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

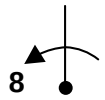
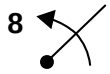
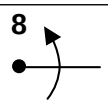
UNLIMITED

Family 9 (cont'd)

9.4			½	¾	**1**	1¼	1½	1¾	**2**
1			9	12	15				
2			7	10	13				
3			5	8	11				
4			5		11				
5			5	8					
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

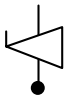
UNLIMITED

Family 9 (cont'd)

9.8		¼	½	¾	**1**	1¼	1½	1¾	**2**
1		7	11						
2		5	9						
3		3	7		15				
4			7						
5		3	7						
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

UNLIMITED

Family 9 (cont'd)

	9.9		½	¾	1	1¼	1½	1¾	2
1			15	15	15				
2			13		13				
3			11		11		14		
4			11		11		14		
5			11	11	11				
6			17	17	17				
7			15		15				
8			13		13				
9			13		13				
10			13	13	13				
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

UNLIMITED

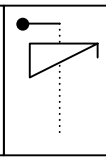
Family 9 (cont'd)

	9.10		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				
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

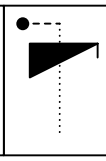
UNLIMITED

Family 9 (cont'd)

9.11

				1	1¼	1½	1¾	2
1		Upright Entry Line		5	4	3		
				4	5	6	7	8

9.12

				1	1¼	1½	1¾	2
1		Inverted Entry Line		7	6	5		
				4	5	6	7	8

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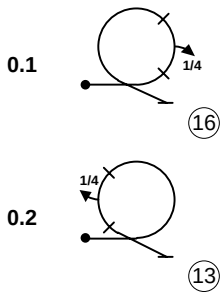
APPENDIX 4 *ALLOWABLE FIGURES FOR GLIDER UNKNOWNS*

INTERMEDIATE

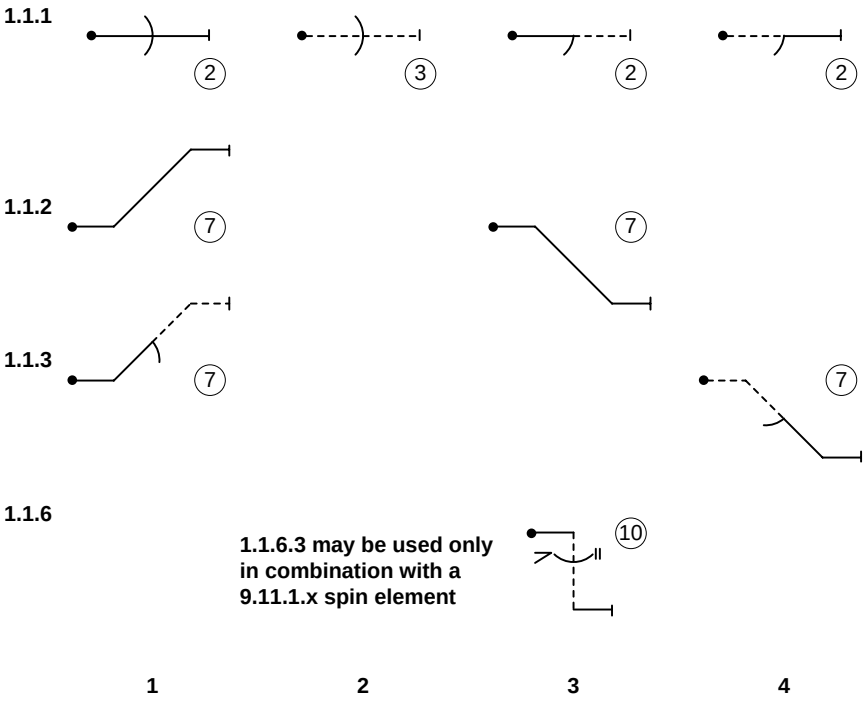
NOTE FOR ALL FAMILIES: Rolling elements may only be added where indicated. Unlinked and opposite rolls, including rolls following a spin element, are not permitted.

Family 0



1

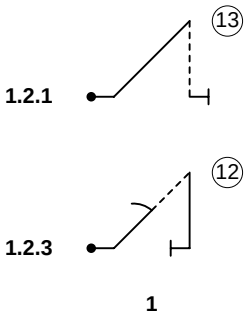
Family 1



1 2 3 4

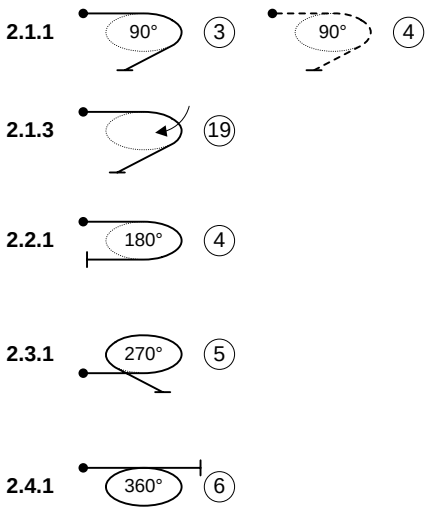
INTERMEDIATE

Family 1 (cont'd)



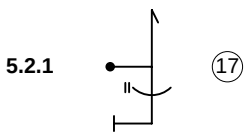
1

Family 2



1 **2**

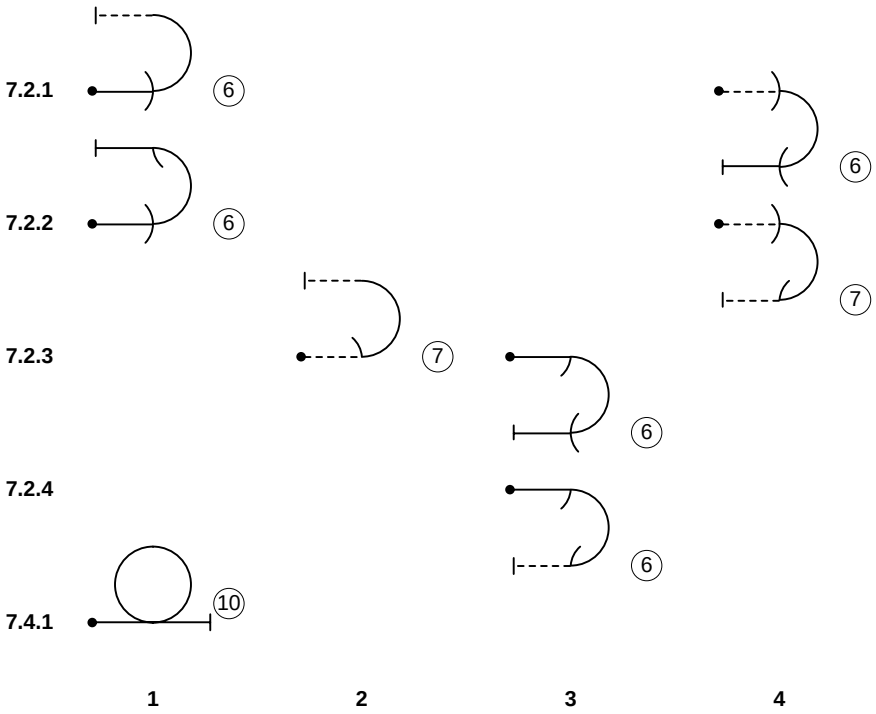
Family 5



1

INTERMEDIATE

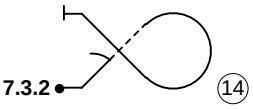
Family 7



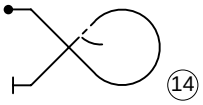
INTERMEDIATE

Family 7 (cont'd)

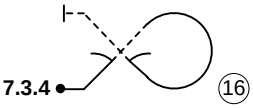
7.3.2

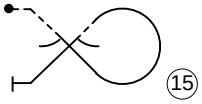


7.3.3

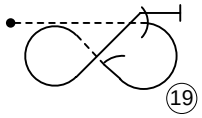


7.3.4

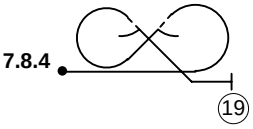


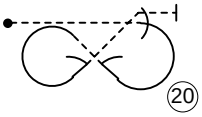


7.8.3

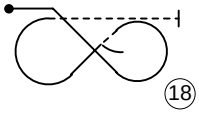


7.8.4

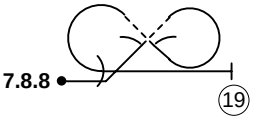


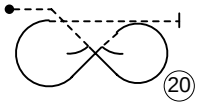


7.8.6



7.8.8





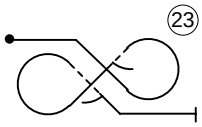
1 **2** **3** **4**

INTERMEDIATE

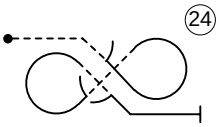
Family 7 (cont'd)

7.8.13

7.8.15



7.8.16

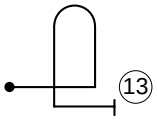


1 **2** **3** **4**

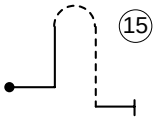
INTERMEDIATE

Family 8

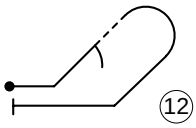
8.4.1



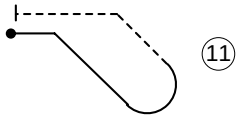
8.4.3



8.4.15



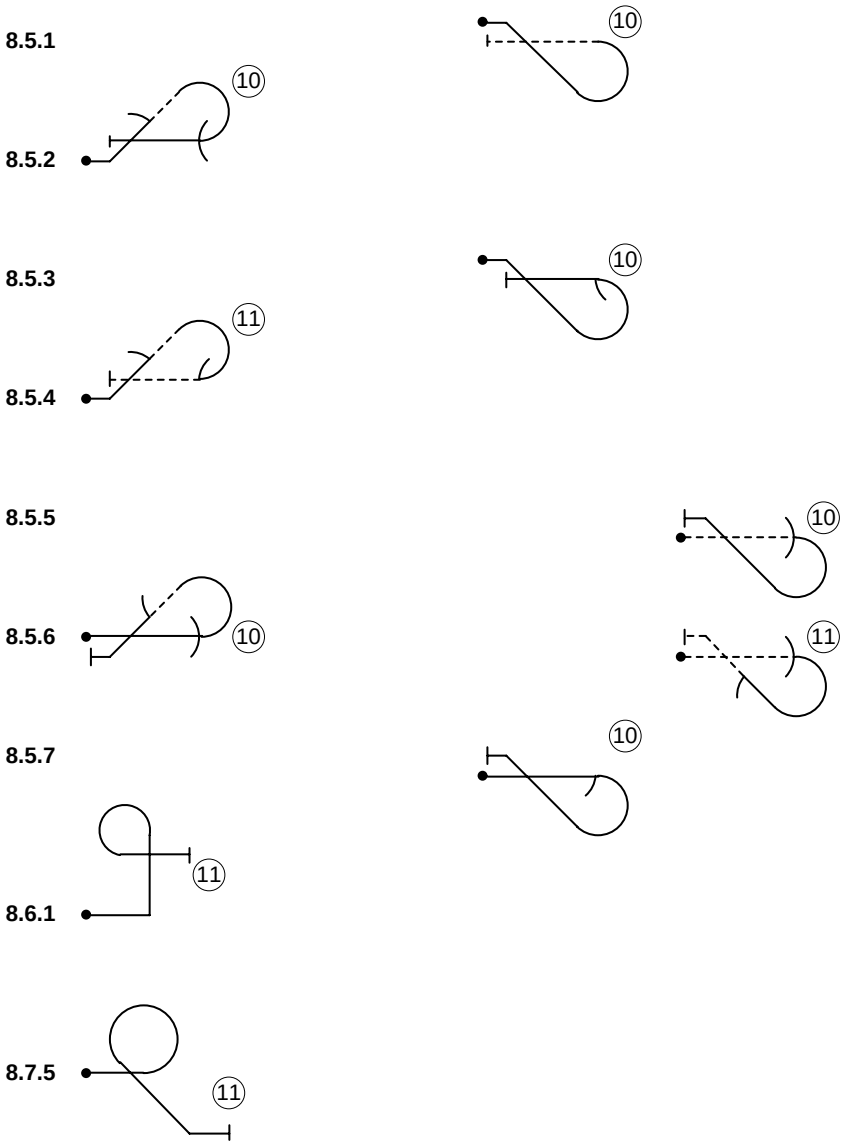
8.4.17



1 **2** **3** **4**

INTERMEDIATE

Family 8 (cont'd)



INTERMEDIATE

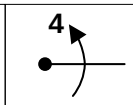
Family 9

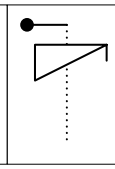
9.1		¼	½	¾	1	1¼	1½	1¾	2
1									
2			9						
3			6		12				
4			6						
5		3							
		1	2	3	4	5	6	7	8

9.2					1		1½		2
3					14				
		1	2	3	4	5	6	7	8

INTERMEDIATE

Family 9 (cont'd)

9.4			½	¾	1	1¼	1½	1¾	2
3			8						
4			8						
		1	2	3	4	5	6	7	8

9.11			 1	 1¼	 1½	 1¾	 2
1			5	6	7		
			4	5	6	7	8

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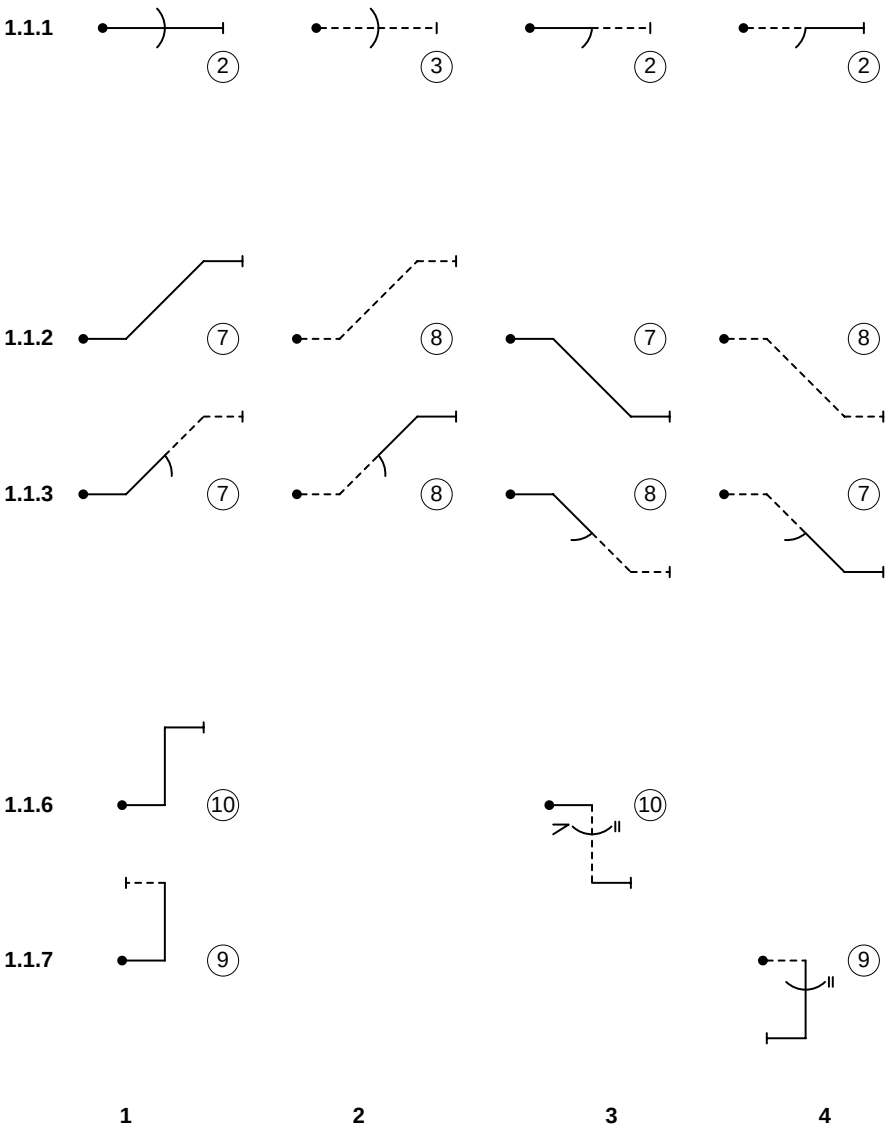
ADVANCED

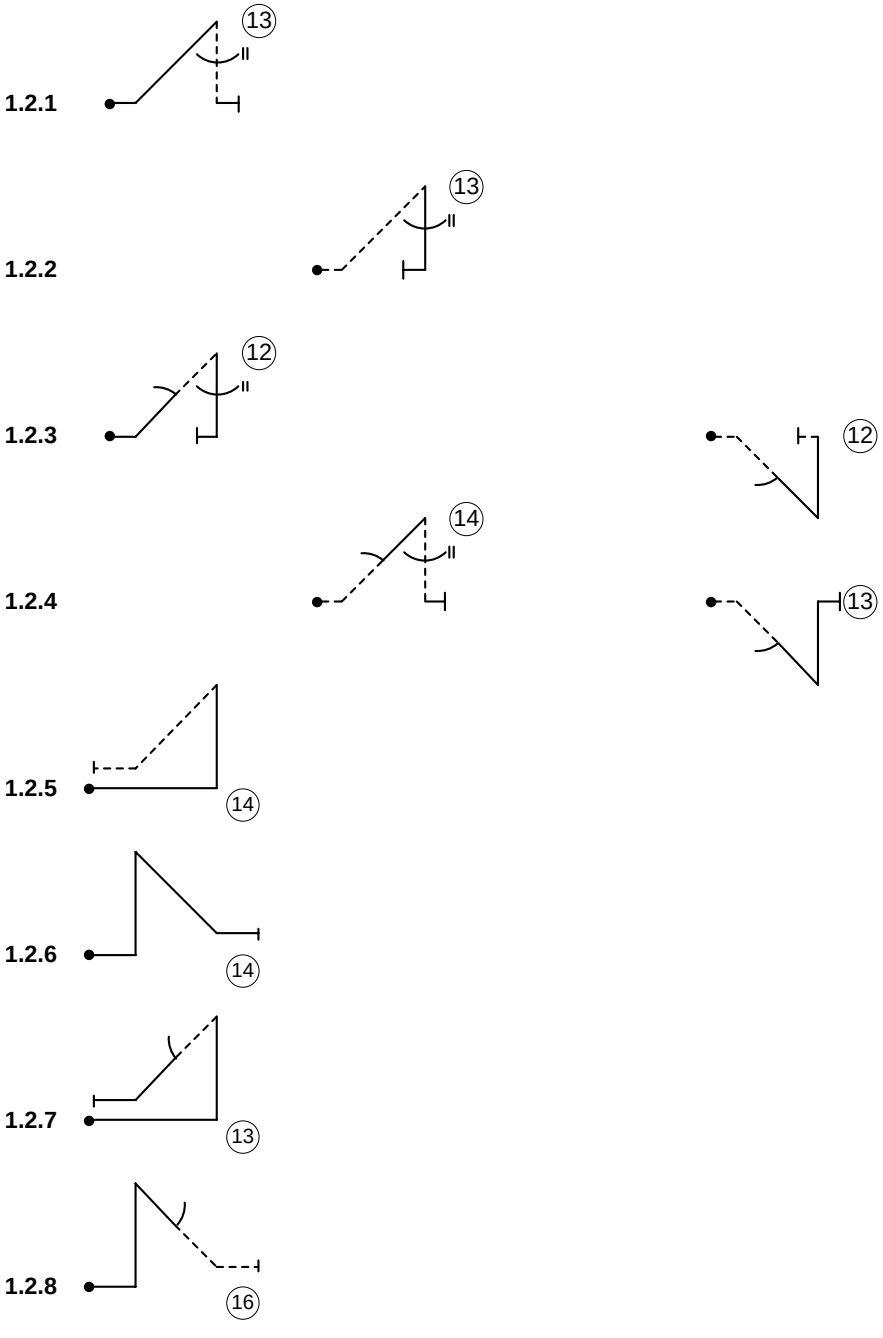
NOTE FOR ALL FAMILIES: Opposite slow or hesitation aileron rolls permitted on straight horizontal lines only.

Family 1



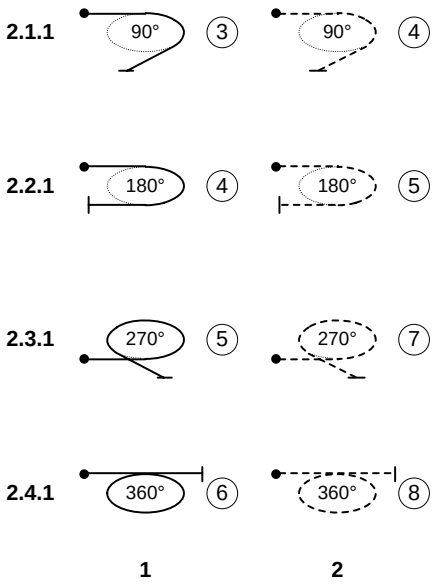
ADVANCED

Family 1 (cont'd)



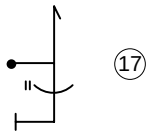
ADVANCED

Family 2



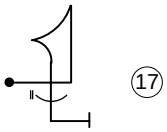
ADVANCED

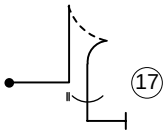
Family 5

5.2.1  (17)

1

Family 6

6.2.1  (17)

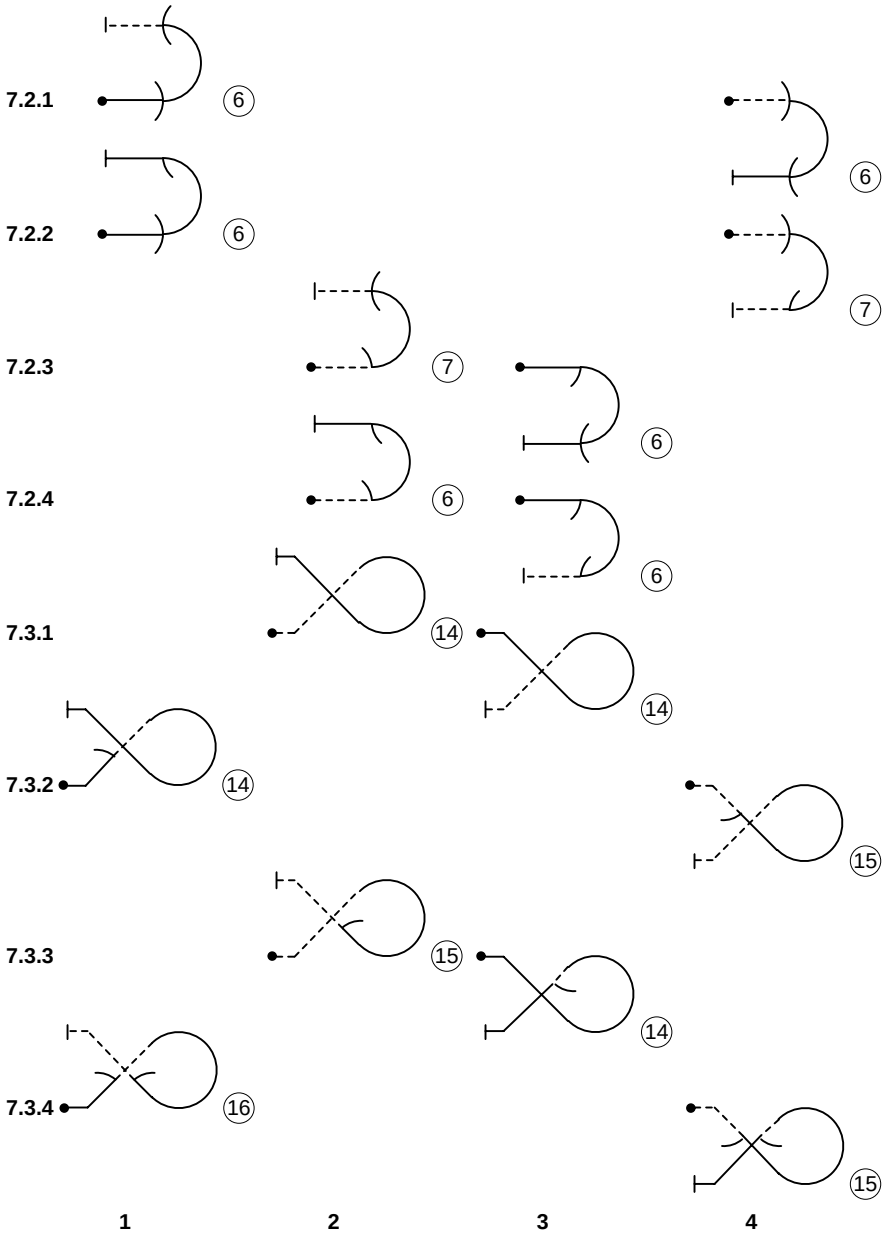
6.2.2  (17)

1

(1) Rolling elements may only be added where indicated on this page.

ADVANCED

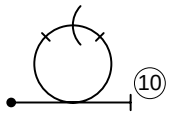
Family 7

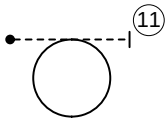


ADVANCED

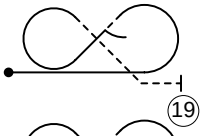
Family 7 (cont'd)

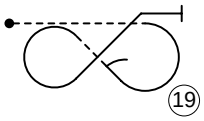
7.4.1



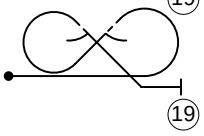


7.8.3

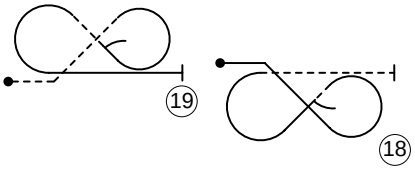




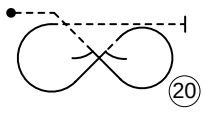
7.8.4



7.8.6



7.8.8

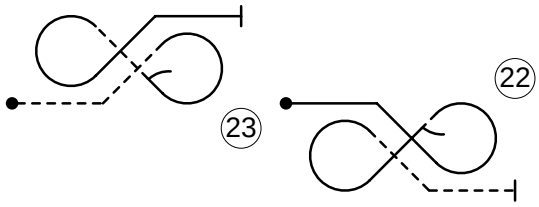


1 **2** **3** **4**

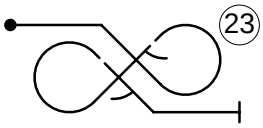
ADVANCED

Family 7 (cont'd)

7.8.11



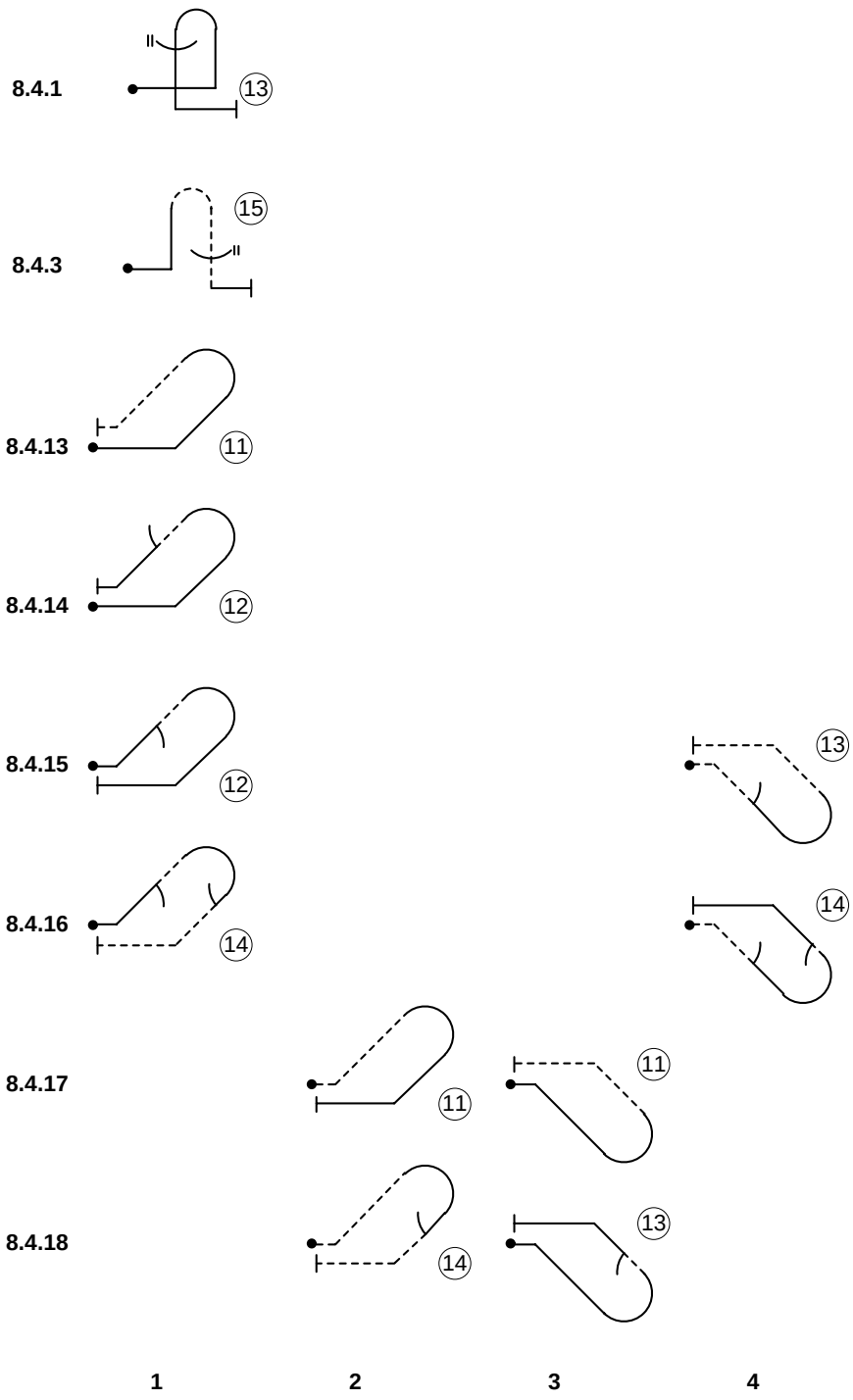
7.8.15



2 **3**

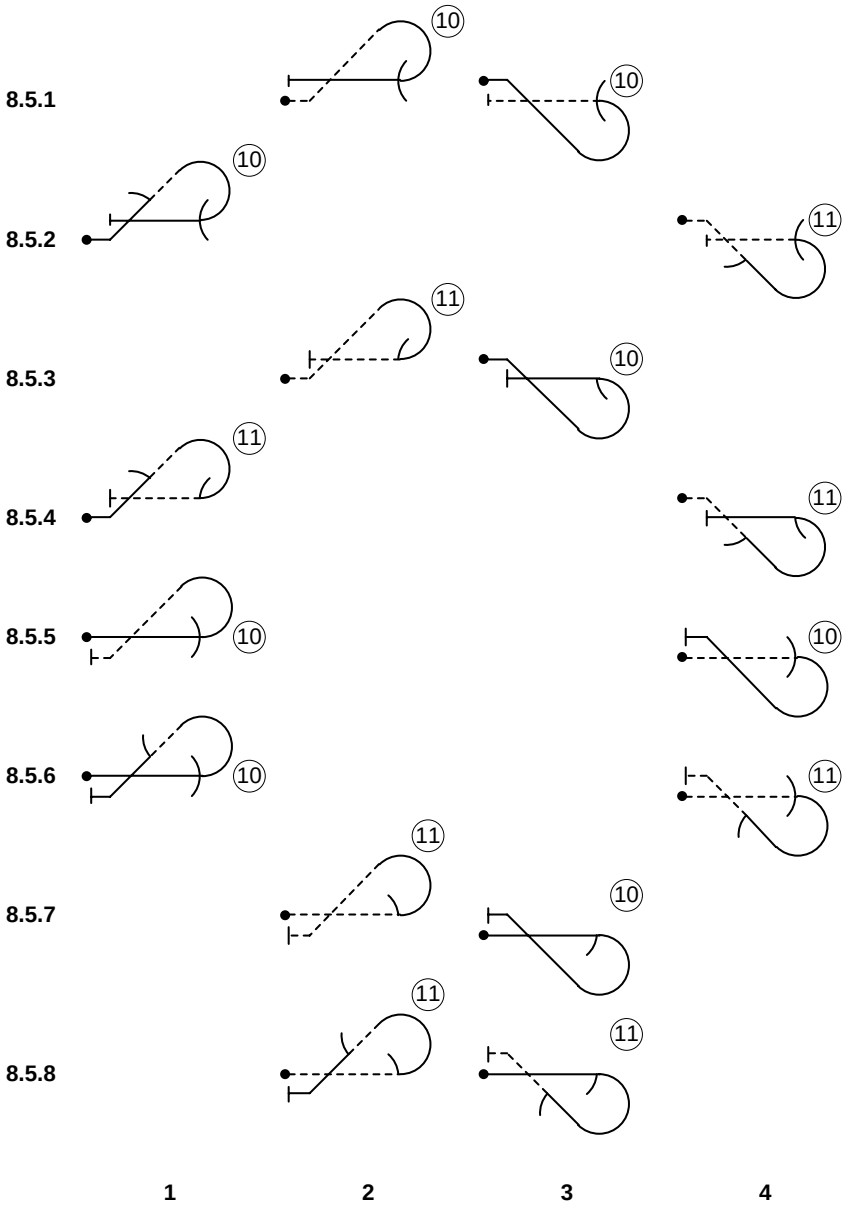
ADVANCED

Family 8



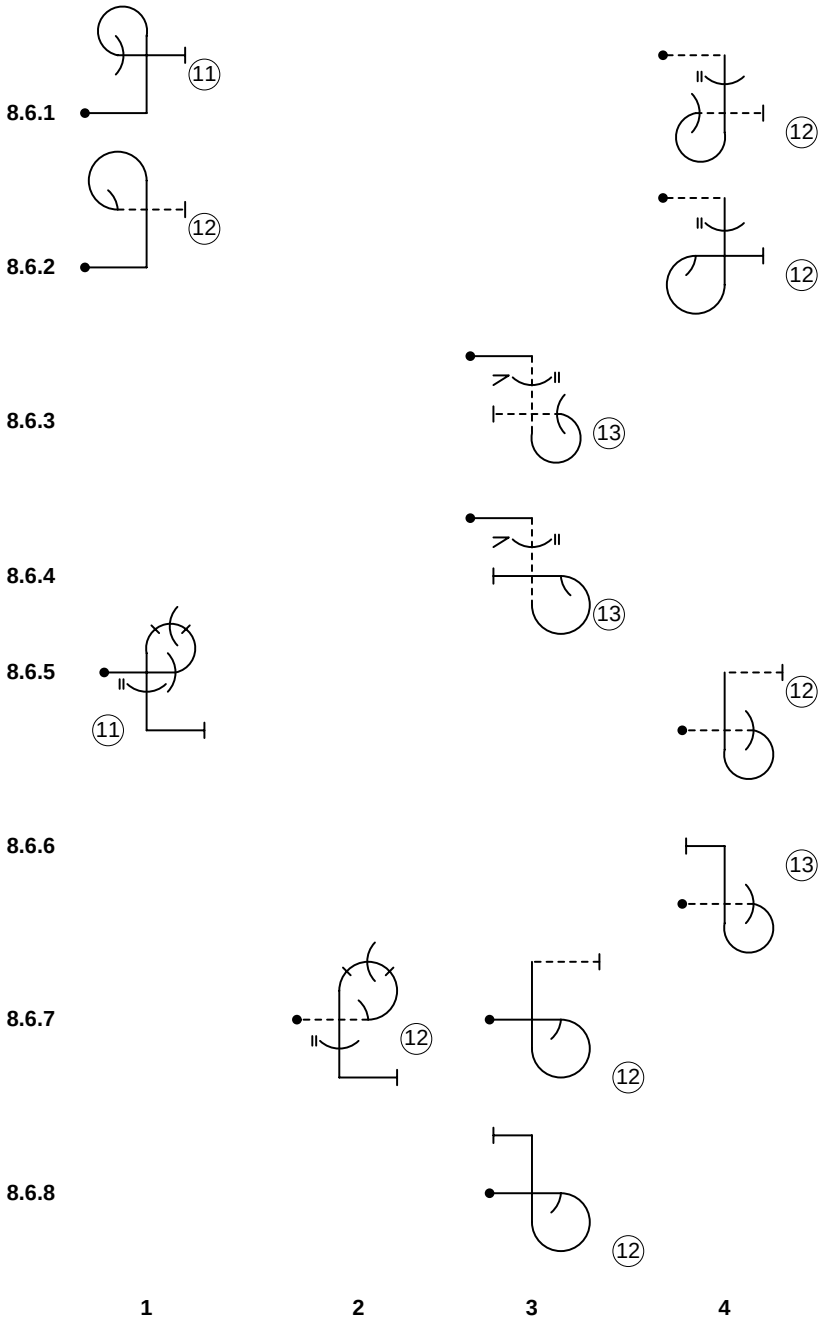
ADVANCED

Family 8 (cont'd)



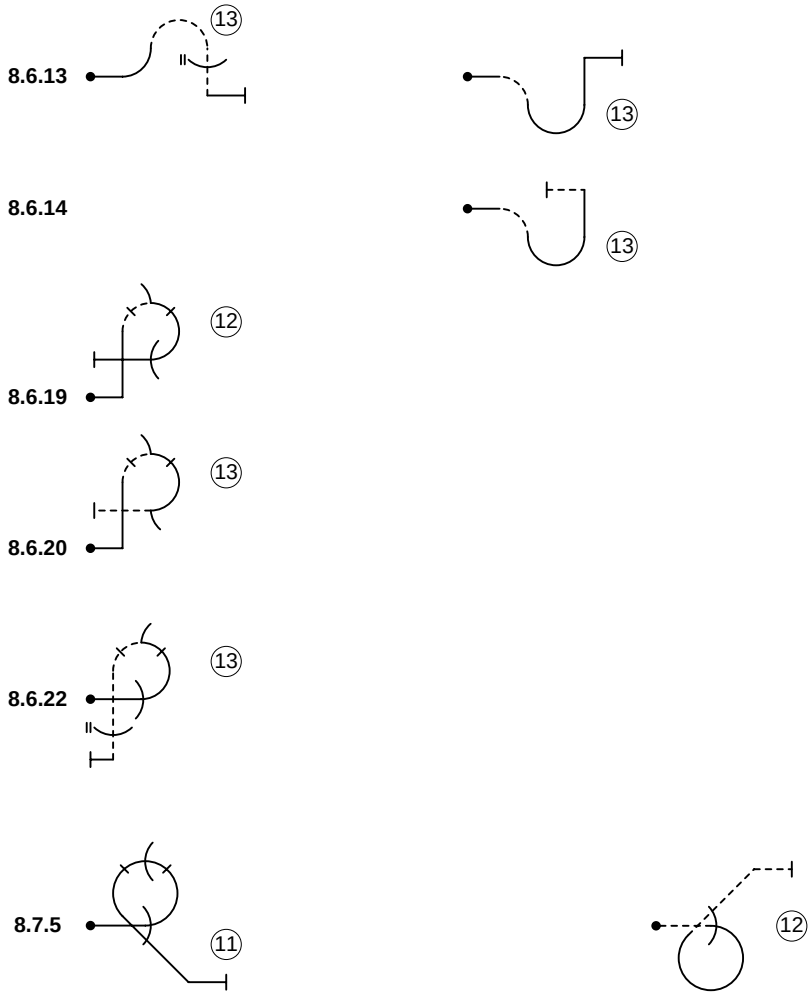
ADVANCED

Family 8 (cont'd)



ADVANCED

Family 8 (cont'd)



ADVANCED

Family 9

9.1		¼	½	¾	1	1¼	1½	1¾	2
1									
2			9						
3			6		12		15		18
4			6						
5		3							
		1	2	3	4	5	6	7	8

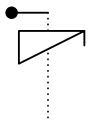
9.2					1		1½		2
3					14				
		1	2	3	4	5	6	7	8

ADVANCED

Family 9 (cont'd)

9.4			½	¾	1	1¼	1½	1¾	2
2			11						
3			8		17				
4			8						
		1	2	3	4	5	6	7	8

9.8		¼	½	¾	1	1¼	1½	1¾	2
3			11						
		1	2	3	4	5	6	7	8

9.11					1	1¼	1½	1¾	2
1		Upright Entry Line			5	6	7		
					4	5	6	7	8

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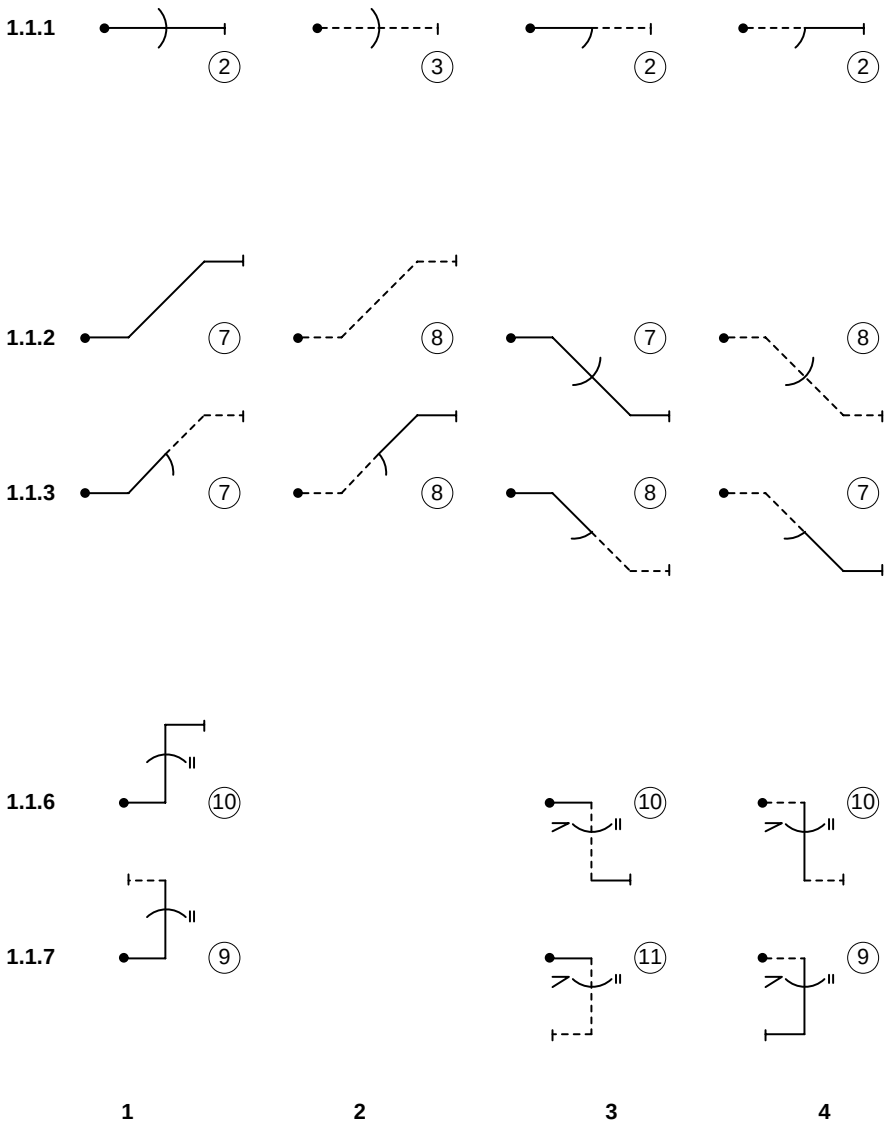
UNLIMITED

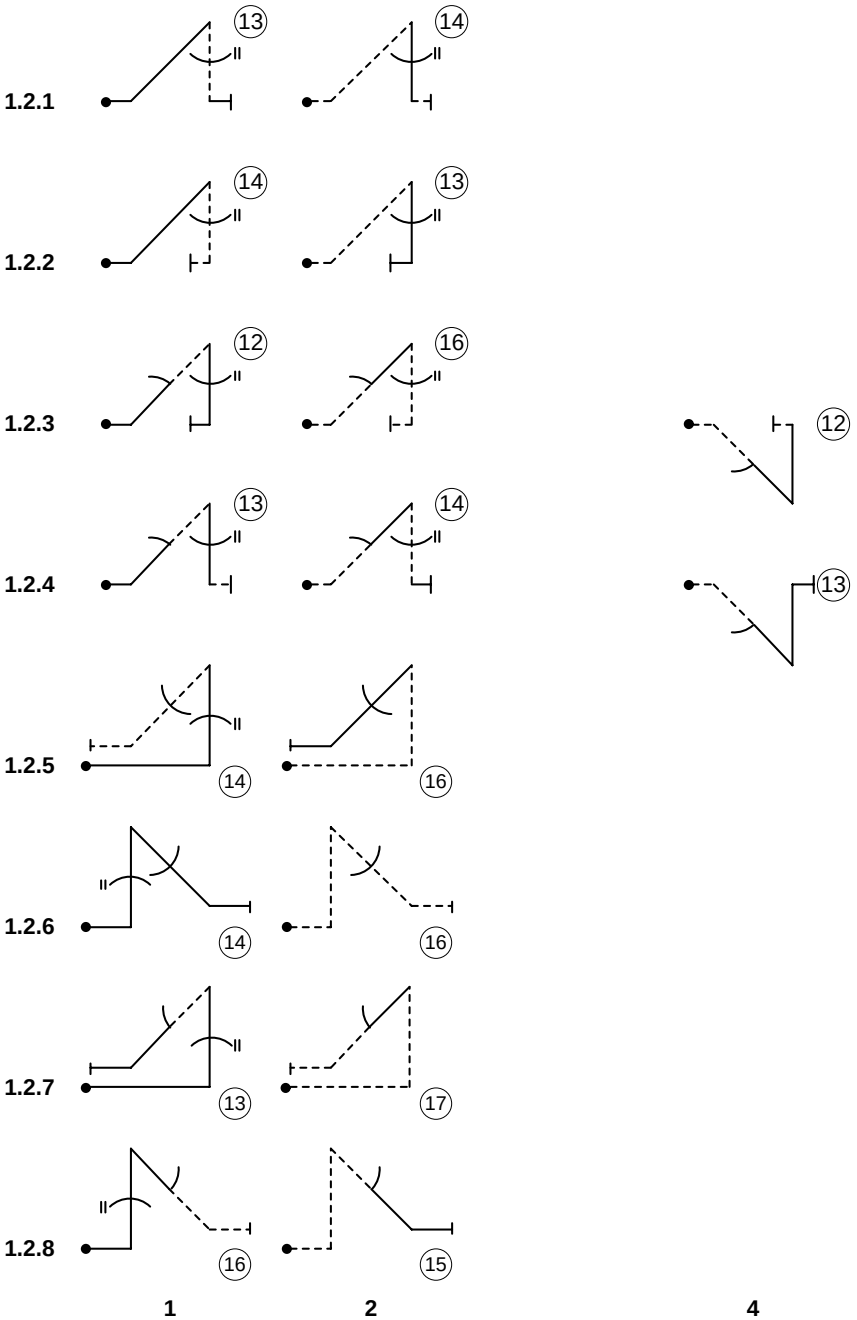
NOTE FOR ALL FAMILIES: Opposite slow or hesitation aileron rolls permitted on straight horizontal lines only.

Family 1



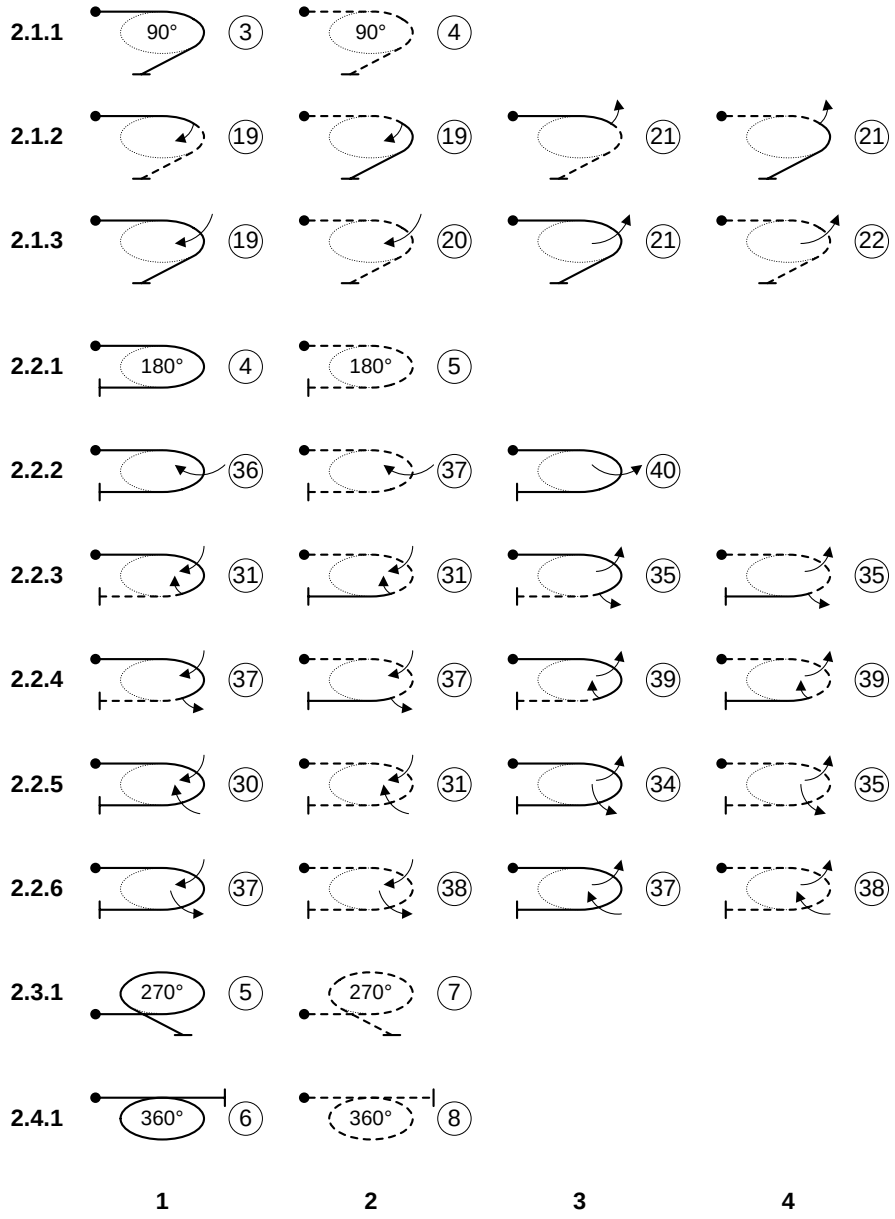
UNLIMITED

Family 1 (cont'd)



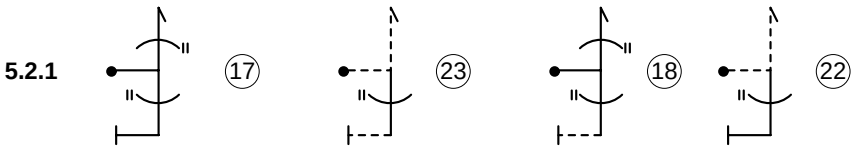
UNLIMITED

Family 2



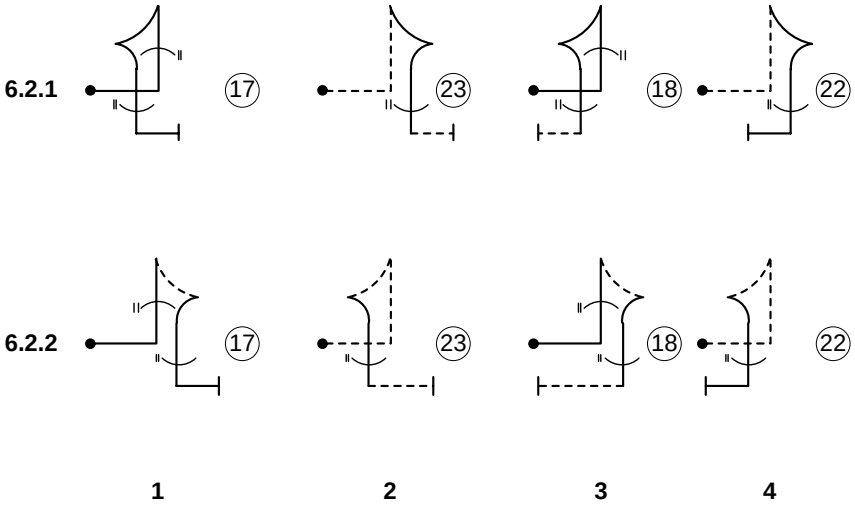
UNLIMITED

Family 5



NOTE: Rolling elements may only be added where indicated.

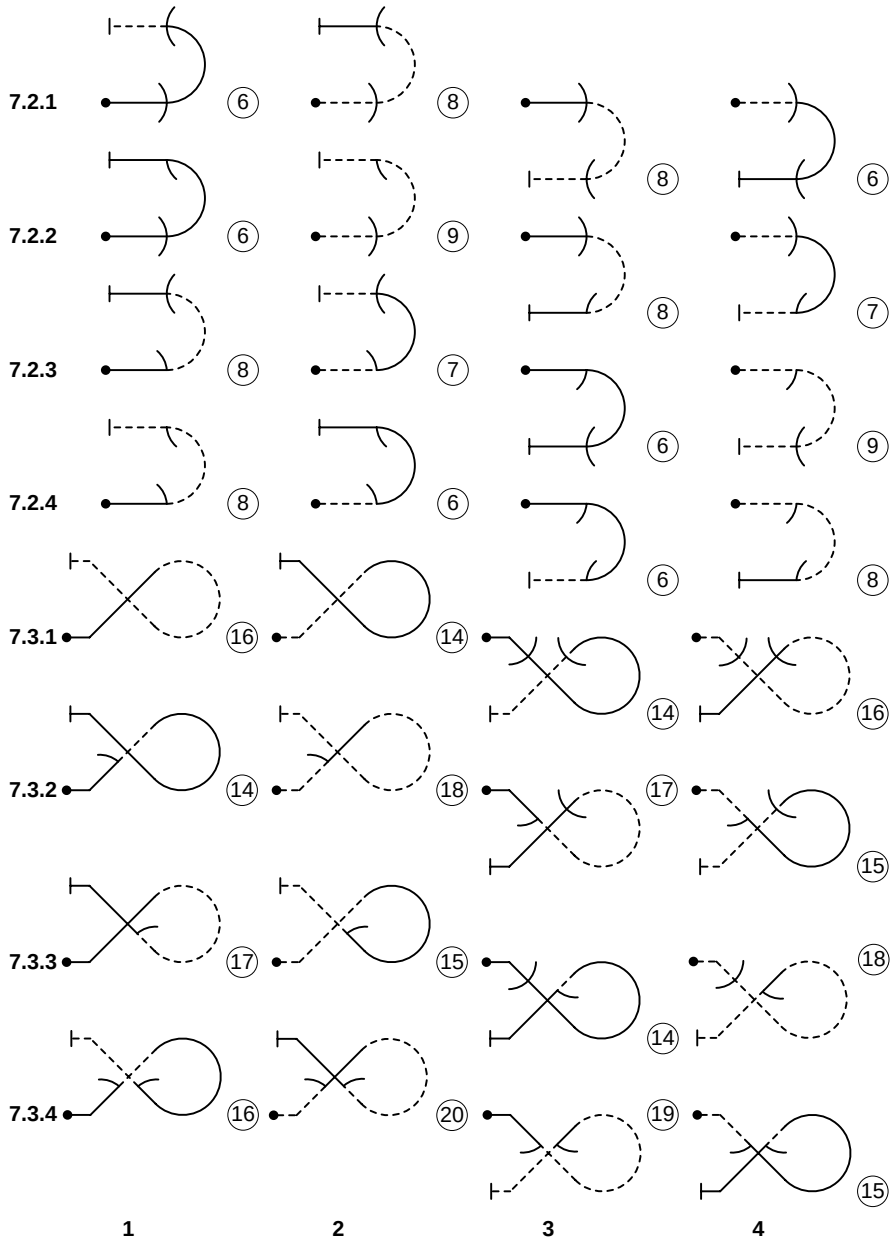
Family 6



NOTE: Rolling elements may only be added where indicated.

UNLIMITED

Family 7

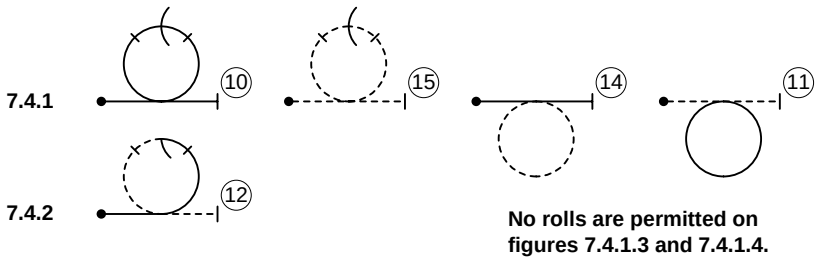


(1) No snap rolls on the horizontal entry lines of figures in columns 1 and 2, nor on the horizontal exit lines of figures in columns 3 and 4 of rows 7.2.1 to 7.2.4.

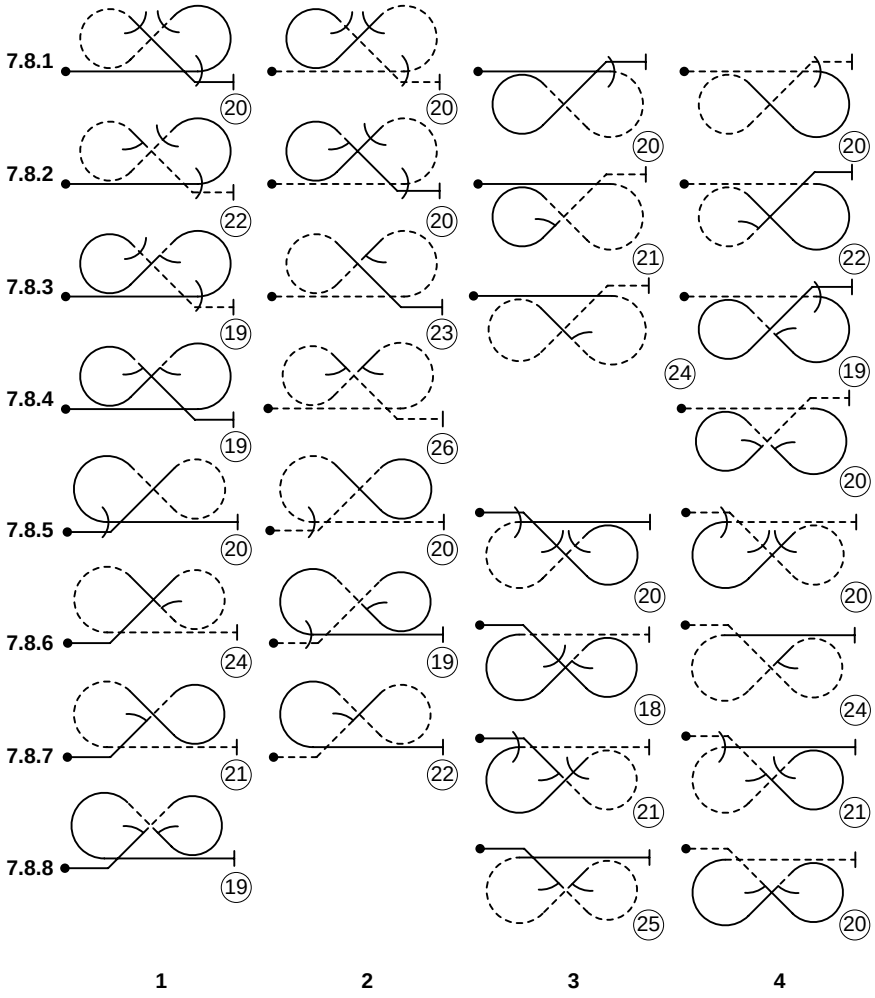
(2) No **positive** half snap rolls on 7.2.2.1 or 7.2.4.2 nor **negative** half snap rolls on 7.2.2.2 or 7.2.4.1.

UNLIMITED

Family 7 (cont'd)



No rolls are permitted on figures 7.4.1.3 and 7.4.1.4.

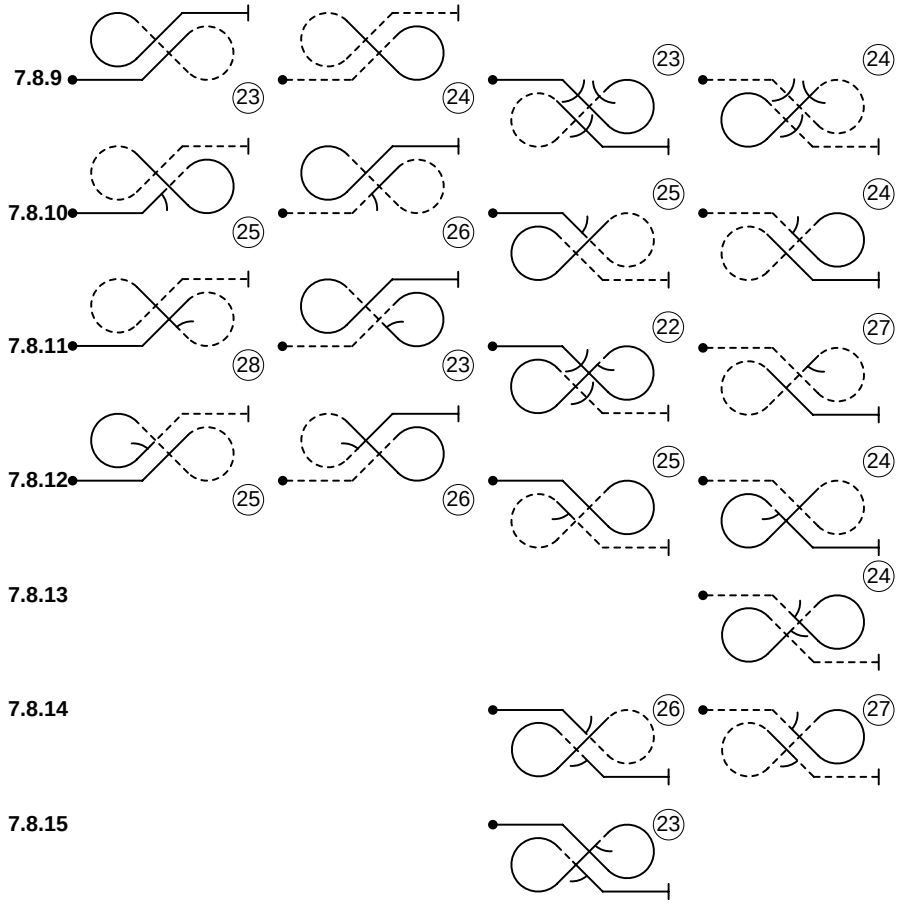


(1) No hesitation rolls in the top of figure 7.4.1.2.

(2) No snap rolls on the horizontal entry lines of figures in columns 1 and 2 of 7.8.1 to 7.8.4 nor on the horizontal exit lines of figures in columns 1 and 2 of 7.8.5 to 7.8.8.

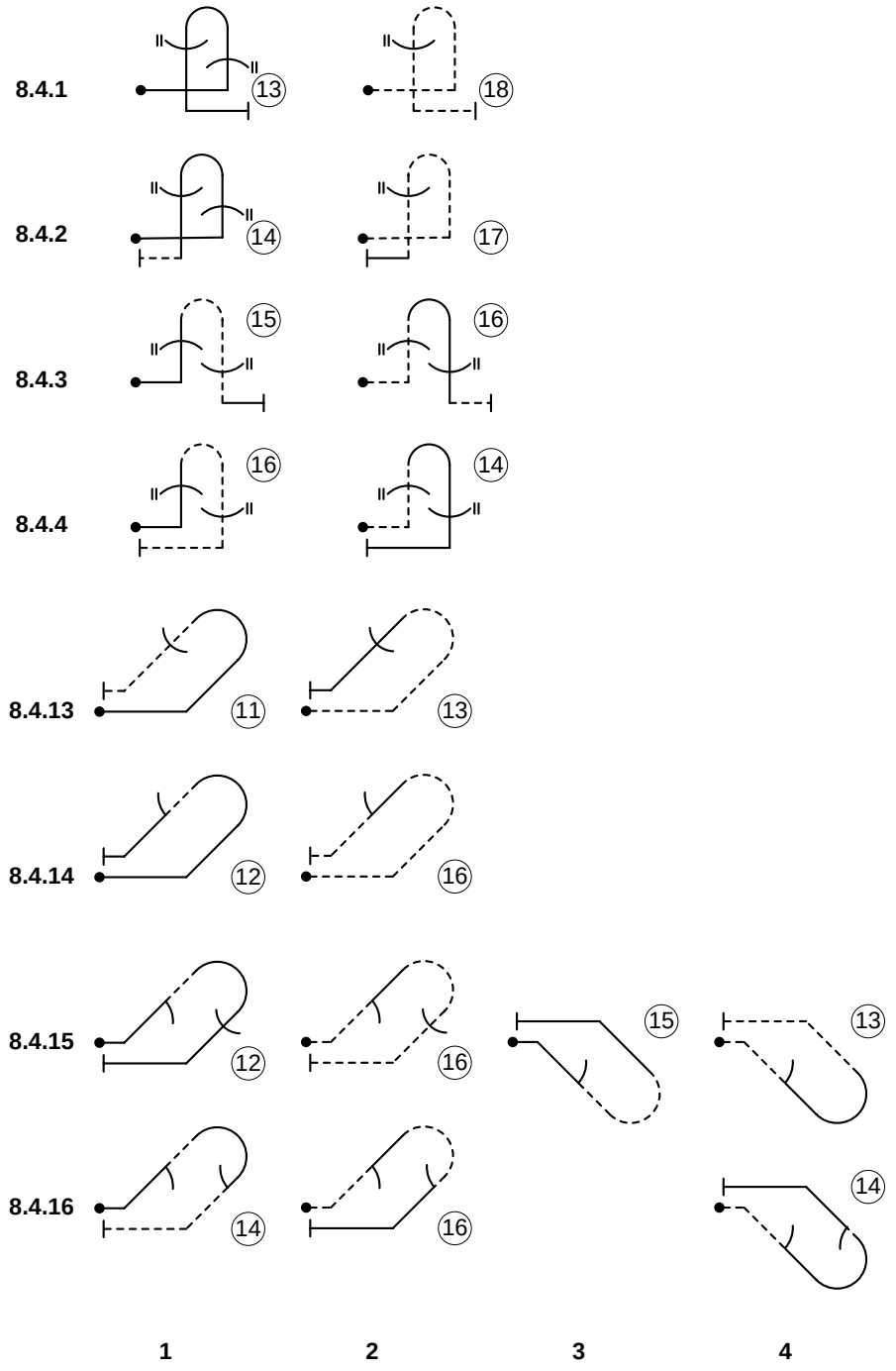
UNLIMITED

Family 7 (cont'd)



UNLIMITED

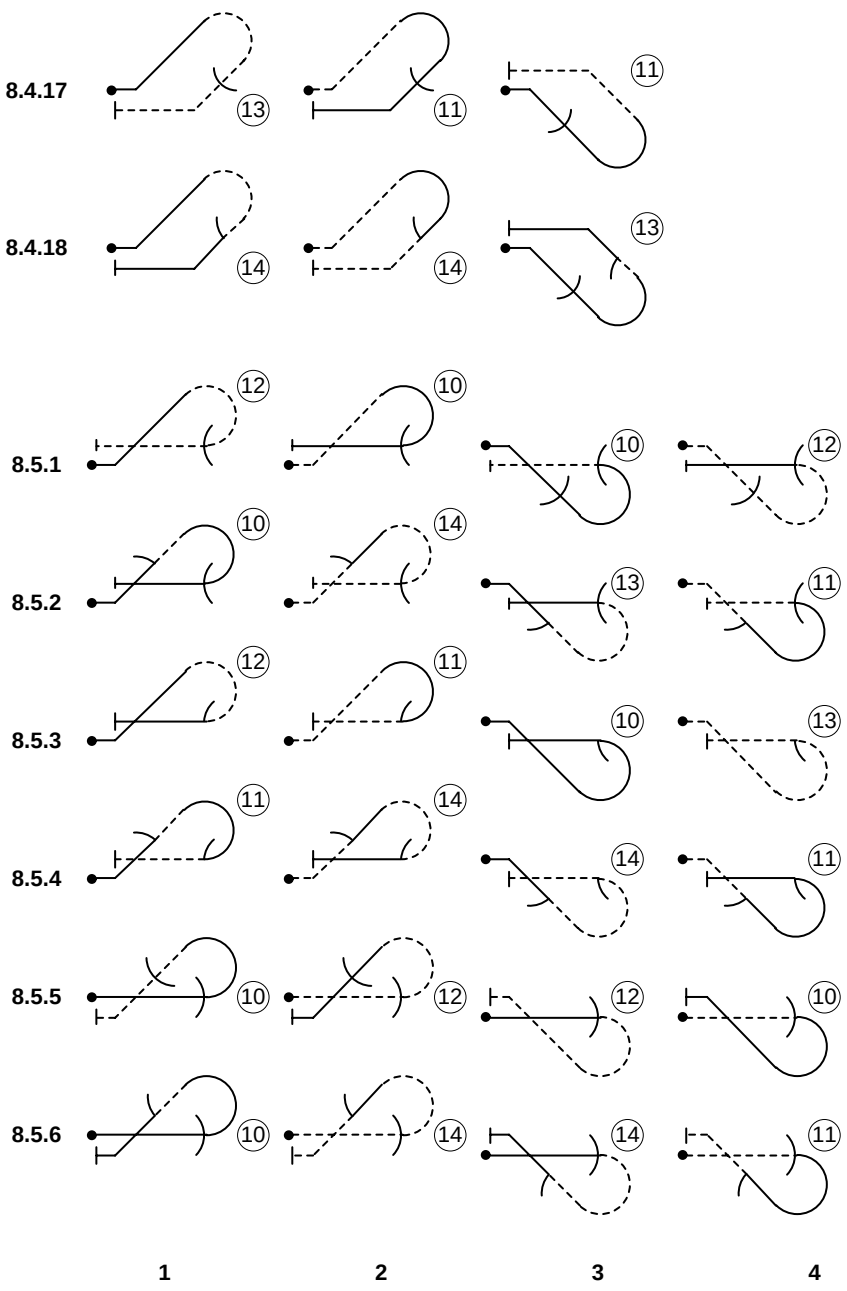
Family 8



(1) No snap rolls on the down lines of figures 8.4.15.2 and 8.4.16.2.

UNLIMITED

Family 8 (cont'd)

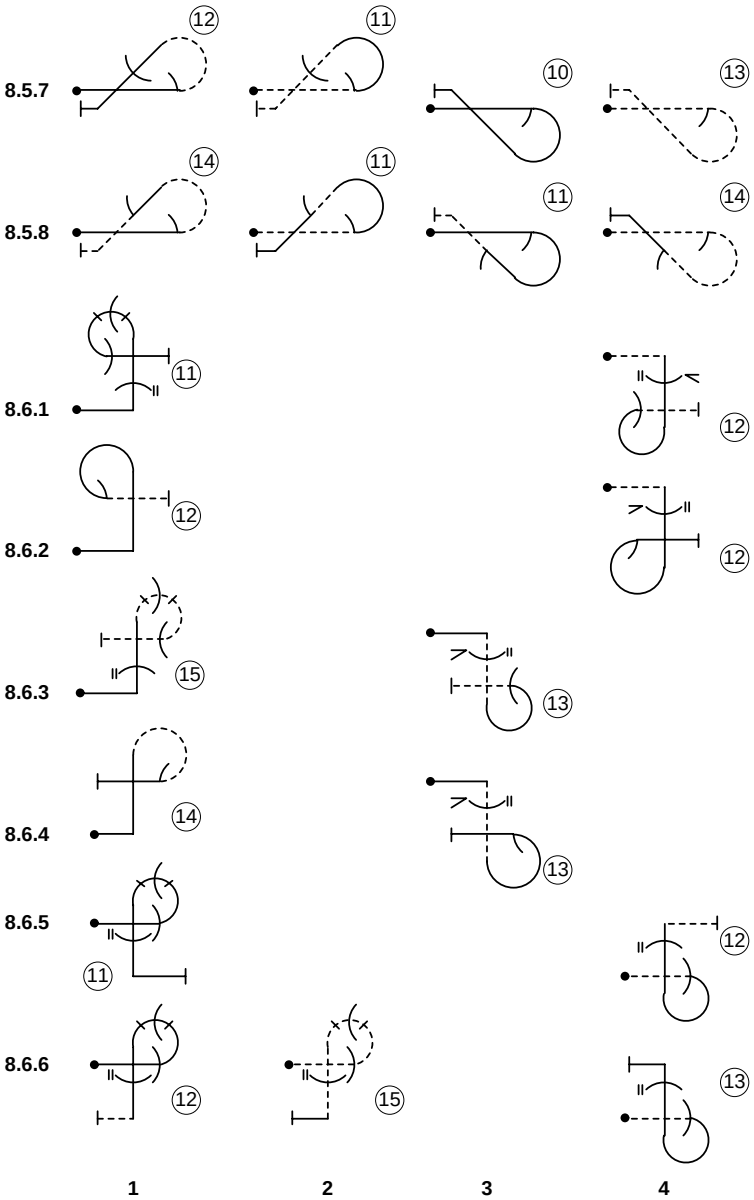


(1) No snap rolls on the down lines of figures 8.4.17.1 and 8.4.18.1.

(2) No snap rolls on the horizontal exit lines of figures in columns 1 and 2 of rows 8.5.1 to 8.5.4, nor on the horizontal entry lines of figures in columns 1 and 2 of rows 8.5.5 and 8.5.6.

UNLIMITED

Family 8 (cont'd)



(1) No snap rolls on the horizontal entry lines of figures in columns 1 and 2 of rows 8.5.7 and 8.5.8.

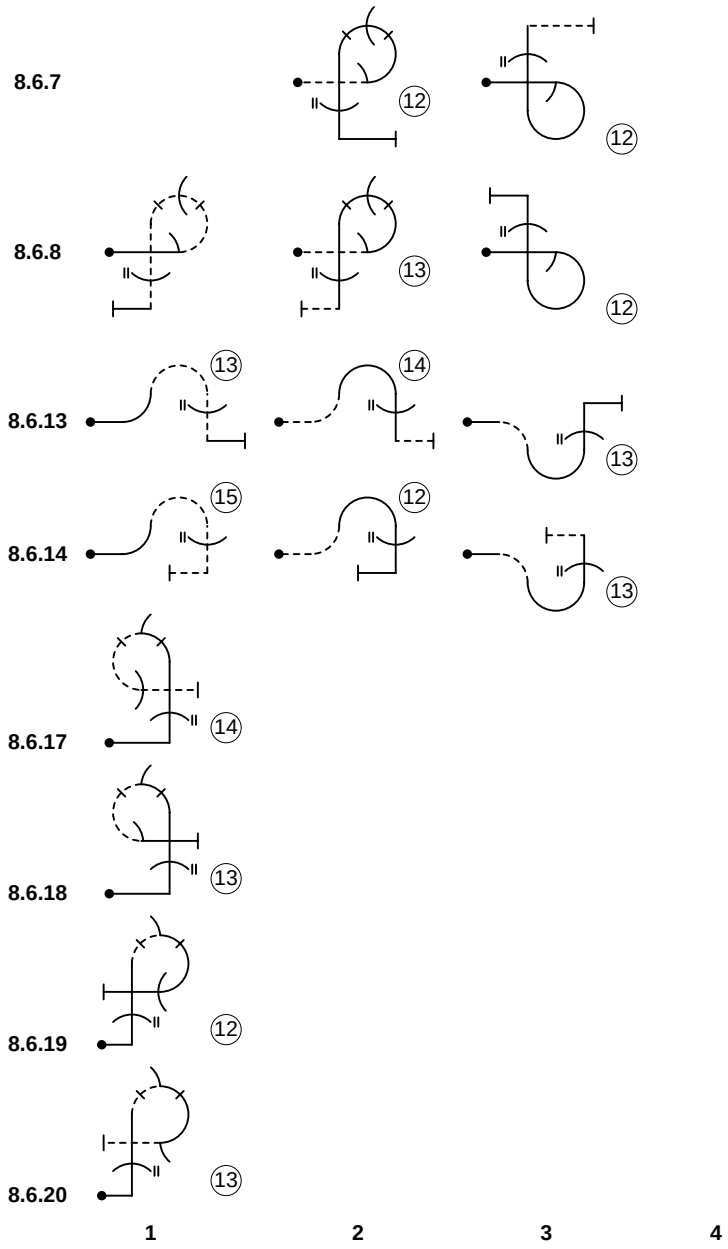
(2) No rolls on top of figures 8.6.1.1 or 8.6.3.1 after a roll on the up line.

(3) No snap rolls on horizontal entry or exit lines of columns 1 and 2 of rows 8.6.1 thru 8.6.6

(4) No snap rolls on vertical down lines of columns 1 and 2 of rows 8.6.5 and 8.6.6 after a hesitation roll in the loop.

UNLIMITED

Family 8 (cont'd)

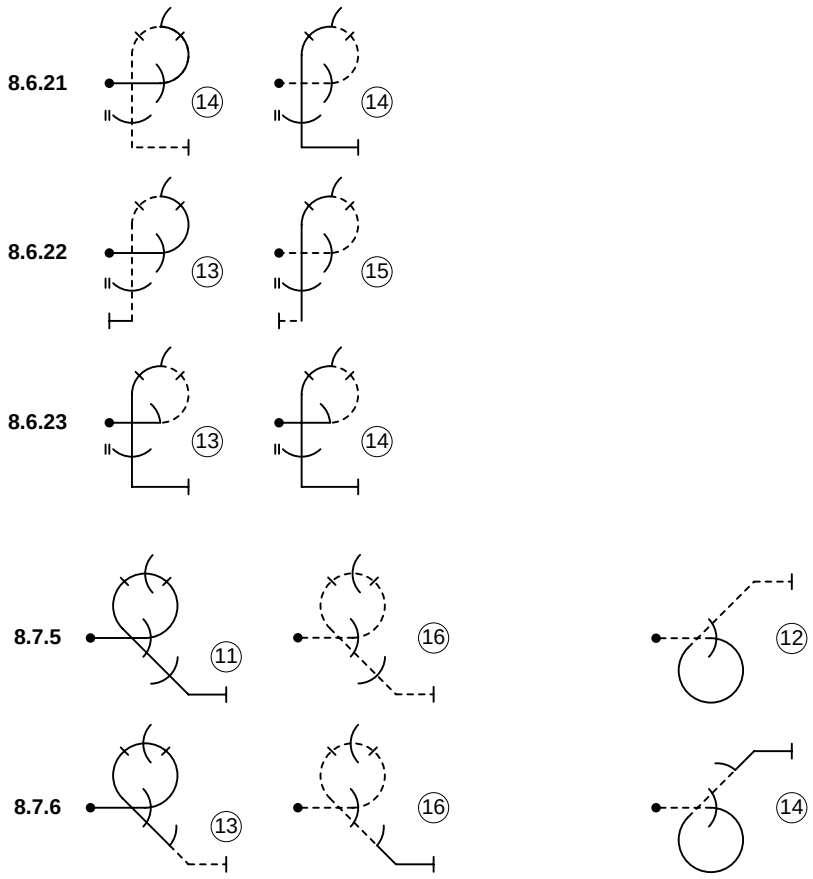


(1) No snap rolls on vertical down lines of columns 1 and 2 of rows 8.6.7 and 8.6.8 after a hesitation roll in the loop.

(2) No snap rolls on horizontal entry lines of figures in columns 1 and 2 of rows 8.6.7 and 8.6.8 nor on the horizontal exit line of figures in rows 8.6.17 thru 8.6.20.

UNLIMITED

Family 8 (cont'd)



(1) No snap rolls on horizontal entry lines of figures on this page.

(2) No hesitation rolls on top of figures 8.7.5.2 and 8.8.6.2.

UNLIMITED

Family 9

9.1		¼	½	¾	1	1¼	1½	1¾	2
1		9							
2			9						
3			6		12		15		18
4			6		12				
5		3	6						
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

9.2					1		1½		2
3	**2** 				14				
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**

UNLIMITED

Family 9 (cont'd)

9.4			½	¾	1	1¼	1½	1¾	2
2			11						
3			8		17				
4			8						
		1	2	3	4	5	6	7	8

9.8		¼	½	¾	1	1¼	1½	1¾	2
3			11						
		1	2	3	4	5	6	7	8

UNLIMITED

Family 9 (cont'd)

9.9			½	¾	1	1¼	1½	1¾	2
2			15						
3			12		16[1]				
4			12		16				
5			12	14	16				
8			15[2]						
10			12	14	16				
		1	2	3	4	5	6	7	8

(1) 9.9.3.4 is only permitted at the apex of upward looping figures.

(2) 9.9.8.2 is only permitted with catalogue numbers 7.2.2.2 and 7.2.4.1.

UNLIMITED

Family 9 (cont'd)

9.10			½	¾	1	1¼	1½	1¾	2
2			18						
3			15						
4			15		19				
5			15	17[1]	19[1]				
8			18[2]						
10			15	17[1]	19[1]				
		1	2	3	4	5	6	7	8

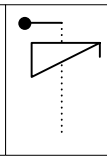
(1) No inverted exit after more than ½ negative snap vertically down.

(2) 9.10.8.2 is only permitted with catalogue numbers 7.2.2.1 and 7.2.4.2.

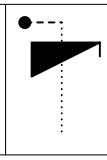
UNLIMITED

Family 9 (cont'd)

9.11

					1	1¼	1½	1¾	2
1			**Upright Entry Line**		5	6	7		
					4	**5**	**6**	**7**	**8**

9.12

					1	1¼	1½	1¾	2
1			**Inverted Entry Line**		7	8	9		
					4	**5**	**6**	**7**	**8**

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APPENDIX 5 ACHIEVEMENT AWARDS PROGRAM

1. PURPOSE

The IAC Aerobatic Achievement Awards program was formulated to promote and advance sport aerobatics. The IAC sanctions many regional aerobatic contests every year, but at the same time realizes that all pilots who fly aerobatics may not wish to enter competition, yet deserve recognition of their own abilities.

The Achievement Awards program provides the mechanism through which competition and non-competition pilots can work to reach the desired level of proficiency, under strictly controlled conditions, and always with an eye on safety. Aerobatic competitions benefit as more people are encouraged to enter; aerobatic education is more widely disseminated; and, aerobatics as a sport will grow as more people learn of the enjoyment, fun, and comradeship that is aerobatics.

These awards are not easy to achieve and a high level of skill is required. They are, however, within the reach of every pilot. When an award is earned, it is truly something of which to be proud.

2. GENERAL RULES

The flight or flights made to obtain this award shall satisfy the definitions of the following rules:

(a) An applicant for an IAC Aerobatic Achievement Award must be a member in good standing of the International Aerobatic Club, Inc.

(b) The awards are international in scope, as is the IAC. All pilots from all countries may achieve the awards as long as they meet the qualifications and requirements of this program.

(c) All "IAC Official Contest Rules" will prevail with the following exceptions:

(1) There will be no maximum altitude except that the figures must be easily seen from the ground with the naked eye.

(2) Technical inspections will not be required.

3. CATEGORY CLASSIFICATIONS

A. **Power** – There are five (5) categories of achievement awards that can be earned in SMOOTH (non-contest environment) and an additional five (5) in STARS (contest environment). A gradual step up in proficiency and skill is required to successfully complete the figures in progressive categories. The power categories are: Primary, Sportsman, Intermediate, Advanced, and Unlimited.

B. **Glider** – There are five (5) categories of achievement awards that can be earned in SMOOTH (non-contest environment) and an additional five (5) in STARS (contest environment). A gradual step up in proficiency and skill is required to successfully complete the figures in progressive categories. The categories for glider are: Primary, Sportsman, Intermediate, Advanced, and Unlimited.

4. *SMOOTH AWARDS*

Awards given in a non-contest environment are referred to as "SMOOTH" awards. Each category (power and glider) has a designated set of figures which must be successfully completed for a SMOOTH award. Primary through Intermediate SMOOTH awards may be earned using either Method A or Method B, described below. Advanced and Unlimited SMOOTH awards may only be earned using Method A.

Rules for obtaining a SMOOTH award which are common to both Method A and Method B are:

(a) Each figure in the Category Figure Lists, Section 7 (Power) or Section 8 (Glider), must be flown and entered on a single application form clearly marked for that category and award.

(b) These figures can be completed in either one flight or on multiple flights on different days, in different aircraft.

(c) Breaking minimum altitude limits for any part of a figure will result in a zero (0) grade for that figure. The minimum limits for power are: Primary and Sportsman = 1500' AGL; Intermediate = 1200' AGL; Advanced = 656' AGL; and Unlimited = 328' AGL. The minimum altitude limits for gliders are: Primary and Sportsman = 1500' AGL; Intermediate = 1200' AGL; Advanced and Unlimited = 656' AGL.

(d) In case the applicant is flying for awards in more than one category, each duplicate figure must be reflown and graded for each category's application.

(e) Aerobatic maneuvers may only be performed in compliance with the civil aviation rules and regulations of the country in which the flight takes place. Waivered airspace may be required.

METHOD A *FLYING THE DESIGNATED FIGURES IN FRONT OF A CURRENT IAC JUDGE*

In addition to items (a) through (e) immediately above, a SMOOTH award being sought under Method A shall adhere to these additional requirements:

(a) The Judge must be on the "IAC Approved Judges List" for either the current or immediately preceding calendar year and must observe the figures from the ground, recording a grade for EACH figure along with the date performed.

(b) Each figure must earn a grade of five (5.0) or higher using Chapter 8 criteria.

(c) There is no overall score or presentation grade as this is not a sequence, nor is a marked performance zone required. Contest practice days are appropriate occasions to earn SMOOTH awards.

(d) The award applicant must be the sole occupant of the aircraft during SMOOTH award flights, except that a "safety pilot" for insurance purposes may be carried during Power Primary and Sportsman flights. Gliders may carry a 'safety pilot" in all categories. The applicant must be the sole operator of the controls when performing the aerobatic figures.

(e) IAC members in good standing flying in locations outside of the United States may earn an Achievement Award by flying figures before a current judge from an aerobatic organization recognized by the FAI and IAC. The application for Award will be processed by the IAC Achievement Awards Chairman following verification of the examining judge's credentials.

(f) The judge must complete the application form using his/her printed name, signature, and IAC number, if applicable.

METHOD B *FLYING THE DESIGNATED FIGURES WITH A GRADING CFI IN THE AIRCRAFT*

Although the numeric grade for an aerobatic maneuver is predicated on what a ground-based judge observes and not on what the pilot sees, a CFI who is a current IAC member and who has also earned an Achievement Award (SMOOTH or STARS) that is at least one category higher than the SMOOTH award being sought, is capable of determining whether a designated figure would earn a qualifying grade from a ground-based judge.

In addition to items (a) through (e) under Section 4 above, a SMOOTH award being sought under Method B shall adhere to these additional requirements:

(a) The Grading CFI must:

(1) Be a current Flight Instructor certificated under the regulations of the licensing country's aviation regulatory agency. For countries outside the United States, the instructor must have competed in at least the Advanced level of competition.

(2) Be a current IAC member.

(3) Possess an IAC Achievement Award (SMOOTH or STARS) that is at least one category higher than the SMOOTH award being sought, as shown in Table A5.1, below.

MINIMUM REQUIRED GRADING CFI AWARD LEVEL
Table A5.1

SMOOTH AWARD SOUGHT	MINIMUM CFI AWARD LEVEL
Primary	***Sportsman***
Sportsman	***Intermediate***
Intermediate	***Advanced***
Advanced	***Method B NOT ALLOWED***
Unlimited	***Method B NOT ALLOWED***

(4) If a MCFI-A, that instructor must possess at least an IAC Achievement Award (Smooth or Stars) in the Intermediate category to grade for a Primary, Sportsman, or Intermediate Smooth award.

(b) The Grading CFI shall not assign a numeric grade to each figure flown, but rather note a grade of "Q" (*Qualifying*) on the award application for each figure which the CFI believes would have received a grade of 5.0 or better from a ground-based judge observing the figure.

(c) Each figure in the appropriate Category Figure List must receive a grade of "Q" to earn the Achievement Award.

(d) In addition to name and IAC member number, the Grading CFI must supply his/her CFI certificate number with expiration date, along with their own achievement award level and type (SMOOTH or STARS) as directed on the application form.

5. *STARS AWARDS*

Awards given in a contest environment are referred to as "STARS" awards. STARS awards must be earned in competition at an IAC sanctioned contest.

(a) A minimum grade of five (5.0) or higher after computer processing must be awarded on each figure and on Presentation for all flights completed in a contest with four or more Judges, except ONE grade on EACH figure and on Presentation may be less than 5.0. In a three judge contest, ALL grades must be 5.0 or higher. The Four Minute Freestyle is not to be included as a flight.

(b) Each applicant desiring a STARS award will complete an application and submit it with payment for the requested awards. Qualifying flights are confirmed by the official posted scores with a * (star) preceding the applicant's score on the IAC website. Send an application to the Achievement Awards Chairman noted on the application.

(c) Contest flights may not be used to qualify for the SMOOTH award.

(d) Intermediate, Advanced and Unlimited must fly at least two flights to qualify for a STARS Award. A contest that is able to fly only one flight for these categories cannot qualify a competitor for a STARS award. All applicants must fly and qualify in all flights available at a contest in their category.

6. *CERTIFICATES AND PATCHES*

(a) A certificate suitable for framing will be issued for each award certified by the Achievement Awards Chairman.

(b) Distinctive patches will be available for purchase by applicant.

(c) A unique ALL-FIVE patch will be awarded free upon earning all five SMOOTH awards (all in either the power or glider category), and a unique ALL-TEN patch will be awarded free to applicants earning all five SMOOTH and all five STARS awards (both awards within the same, that is, power or glider, category). The names of the ALL-TEN recipients for the previous 12 months will be announced each year at the U.S. National Aerobatic Championships by the President of IAC.

(d) A permanent list of all applicants and recipients of both SMOOTH and STARS awards will be maintained by the Achievement Awards Chairman.

(e) Applications for Achievement Awards can be obtained from the Achievement Awards Chairman, from the Registrar at a sanctioned contest, or downloaded from the IAC web site, www.iac.org/legacy/achievement-awards.

7. *CATEGORY FIGURE LISTS - POWER*

PRIMARY

FIGURE DESCRIPTION	ARESTI CATALOGUE #
(1) Spin (one turn)	1.1.6.3 + 9.11.1.4
(2) Loop	7.4.1.1
(3) Slow Roll	1.1.1.1 + 9.1.3.4
(4) 270-deg. Turn	2.3.1.1

SPORTSMAN

FIGURE DESCRIPTION	ARESTI CATALOGUE #
(1) Spin (one turn)	1.1.6.3 + 9.11.1.4
(2) Loop	7.4.1.1
(3) Hammerhead	5.2.1.1
(4) ½ loop up + ½ roll (Immelmann)	7.2.2.1 + 9.1.3.2
(5) Humpty Bump	8.4.1.1
(6) Reverse Half Cuban 8	8.5.2.1 + 9.1.2.2
(7) One-half Cuban 8	8.5.6.1 + 9.1.4.2
(8) Slow Roll	1.1.1.1 + 9.1.3.4

INTERMEDIATE

FIGURE DESCRIPTION	ARESTI CATALOGUE #
(1) Spin (1 ¼ turn)	1.1.6.3 + 9.11.1.5
(2) Hammerhead with ¼ rolls up and down	5.2.1.1 + 9.1.1.1 + 9.1.5.1
(3) Half Cuban 8	8.5.6.1 + 9.1.4.2
(4) Slow Roll on 45° up line	1.1.2.1 + 9.1.2.4
(5) Snap Roll on 45° down line	1.1.2.3 + 9.9.4.4
(6) ½ loop up + ½ roll (Immelmann)	7.2.2.1 + 9.1.3.2
(7) 4 Point Hesitation Roll	1.1.1.1 + 9.4.3.4
(8) Reverse Shark's Tooth	1.2.3.1 + 9.1.2.2
(9) Square Loop	7.4.3.1

ADVANCED

FIGURE DESCRIPTION	ARESTI CATALOGUE #
(1) Inverted spin (one turn)	1.1.7.4 + 9.12.1.4
(2) Loop with Snap Roll	7.4.1.1 + 9.9.3.4
(3) Half Cuban 8, 2 of 4 down	8.5.6.1 + 9.4.4.2
(4) ¾ Snap Roll on vertical line down	1.1.7.4 + 9.9.5.3
(5) Outside Loop	7.4.1.2
(6) Snap Roll on 45° up line	1.1.2.1 + 9.9.2.4
(7) 90-deg. rolling circle, 1 to outside	2.1.3.3
(8) Opposite Half-Rolls	1.1.1.1 + 9.1.3.2 + 9.1.3.2
(9) Cuban 8 (inside-outside)	7.8.1.1
(10) 360° rolling circle, 4 to inside	2.4.7.1
(11) Humpty-Bump, ½ roll up	8.4.1.1 + 9.1.1.2

(12) 8-point Roll	1.1.1.1 + 9.8.3.4

UNLIMITED

FIGURE DESCRIPTION	ARESTI CATALOGUE #
(1) Inverted spin, inverted exit	1.1.6.4 + 9.12.1.4
(2) 4 of 8 point roll from inverted	1.1.1.4 + 9.8.3.2
(3) ¾ Roll on vertical up line	1.1.6.1 + 9.1.1.3
(4) 8-sided Loop	7.4.6.4
(5) Outside Loop	7.4.1.2
(6) Snap Roll on vertical up line	1.1.6.1 + 9.9.1.4
(7) Outside Snap Roll on 45° up line	1.1.2.1 + 9.10.7.4
(8) Hammerhead with inverted entry, ½ Roll up	5.2.1.4 + 9.1.1.2
(9) Tailslide, wheels down	6.2.1.1
(10) Cuban 8, double outside	7.8.3.2 + 9.1.4.2
(11) 360° rolling circle, 4 Rolls, inside/outside	2.4.8.1
(12) Full Roll, ½ Loop, 3 of 2-point Roll	9.1.3.4 + 7.2.2.1 + 9.2.3.6

8. *CATEGORY FIGURE LISTS - GLIDER*

PRIMARY

FIGURE DESCRIPTION	ARESTI CATALOGUE #
(1a) Spin (one turn)	1.1.6.3 + 9.11.1.4
or (1b) Humpty Bump	8.4.1.1
(2) Loop	7.4.1.1
(3) Wingover	0.0

SPORTSMAN

FIGURE DESCRIPTION	ARESTI CATALOGUE #
(1a) Spin (one turn)	1.1.6.3 + 9.11.1.4
or (1b) Humpty Bump	8.4.1.1
(2) Loop	7.4.1.1
(3) Slow Roll	1.1.1.1 + 9.1.3.4
(4) Half Cuban-8	8.5.6.1 + 9.1.4.2
(5) Split-S	7.2.3.3 + 9.1.3.2

INTERMEDIATE

FIGURE DESCRIPTION	ARESTI CATALOGUE #
(1) Spin (1 ¼ turn)	1.1.6.3 + 9.11.1.5
or (1b) Humpty Bump	8.4.3.1
(2) Quarter-Clover	0.1
(3) 2 Point Hesitation Roll	1.1.1.1 + 9.2.3.4
(4) Hammerhead	5.2.1.1
(5) Immelmann	7.2.2.1 + 9.1.3.4

ADVANCED

FIGURE DESCRIPTION	ARESTI CATALOGUE #
(1) Spin (1 ½ turn)	1.1.6.3 + 9.11.1.6
(2) 4 Point Hesitation Roll	1.1.1.1 + 9.4.3.4
(3) Hammerhead, ¼ roll down	5.2.1.1 + 9.1.5.1
(4) 90-degree turn, one roll to inside	2.1.3.1
(5) Tailslide, Canopy Down	6.2.2.1
(6) Goldfish, inverted entry	7.3.1.2

UNLIMITED

FIGURE DESCRIPTION	ARESTI CATALOGUE #
(1) Inverted spin, inverted exit	1.1.6.4 + 9.12.1.4
(2) Reverse Half Cuban	8.5.2.1 + 9.1.2.2
(3) Hammerhead, ¼ roll up, push out	5.2.1.3 + 9.1.1.1
(4) Inside Snap Roll on 45-down line	1.1.2.3 + 9.9.4.4
(5) 90-degree turn, one roll to outside	2.1.3.3
(6) Tailslide, Canopy Up	6.2.1.1
(7) Outside Loop, Down	7.4.1.3
(8) Half-Cuban, outside ½ snap roll	8.5.6.1 + 9.10.4.2

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APPENDIX 6 *CHAMPIONSHIP EVENTS*

IAC Championship Events and Team Selection policies are established by the IAC Board of Directors. These policies are stated in the *IAC Policy and Procedures Manual*, Section 500. The policies establish supplemental rules and regulations for: IAC Championship Events; U.S. National Aerobatic Championships; selection of the U.S. Aerobatic Teams; and Championship Contest Juries. To read the complete text of these policies and procedures, you may link to a PDF copy of the *IAC Policy and Procedure Manual* on the IAC Leadership page (login required) at:

https://www.iac.org/legacy/iac-leadership

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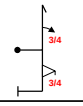
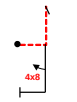
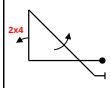
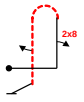
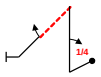
APPENDIX 7 *EXAMPLE FORMS*

FORM A

A — INTERNATIONAL AEROBATIC CLUB SCORESHEET

Contest:	Date:	Category:	Programme:	pilot's number
Hawaiian Tropics Invitational	**1 June 2016**	**Advanced**	**Free**	

No	Symbol	Catalogue No.	K	Total K	Grade	Remarks
1		**8.4.1.1** **9.2.1.4** **9.1.5.4**	**13** **13** **8**	**34**		
2		**5.2.1.1** **9.1.1.3** **9.9.5.3**	**17** **10** **11**	**38**		
3		**1.1.6.1** **9.1.1.2**	**10** **8**	**18**		
4		**8.6.3.3** **9.11.1.4** **9.9.5.2**	**13** **5** **11**	**29**		
5		**5.2.1.4** **9.8.5.2**	**22** **7**	**29**		
6		**1.2.6.1** **9.4.1.2** **9.1.4.4**	**14** **9** **8**	**31**		
7		**8.4.3.1** **9.1.5.2** **9.8.1.1**	**15** **4** **7**	**26**		
8		**1.2.7.1** **9.1.1.1** **9.1.4.2**	**13** **6** **4**	**23**		
9		**7.2.2.1** **9.4.3.4** **9.9.3.6**	**6** **11** **14**	**31**		
10		**7.2.3.3** **9.1.3.4** **9.1.3.2** **9.2.3.4**	**6** **8** **4** **9**	**27**		
11		**2.1.3.1**	**14**	**14**		

Item	K	Score
Presentation	**12**	

FIGURE TOTAL K = 300

INCLUDING PRESENTATION = **312**

Aircraft Type: **Extra 300L**

FREE PROGRAM CHECKED BY:

Signature: Brian K Howard

Printed Name: Brian K Howard

IAC No. 499999

Date: 1 January 2016

Judge Name:

IAC#

Assistant Name:

IAC#

Joe Hotschtick pilot

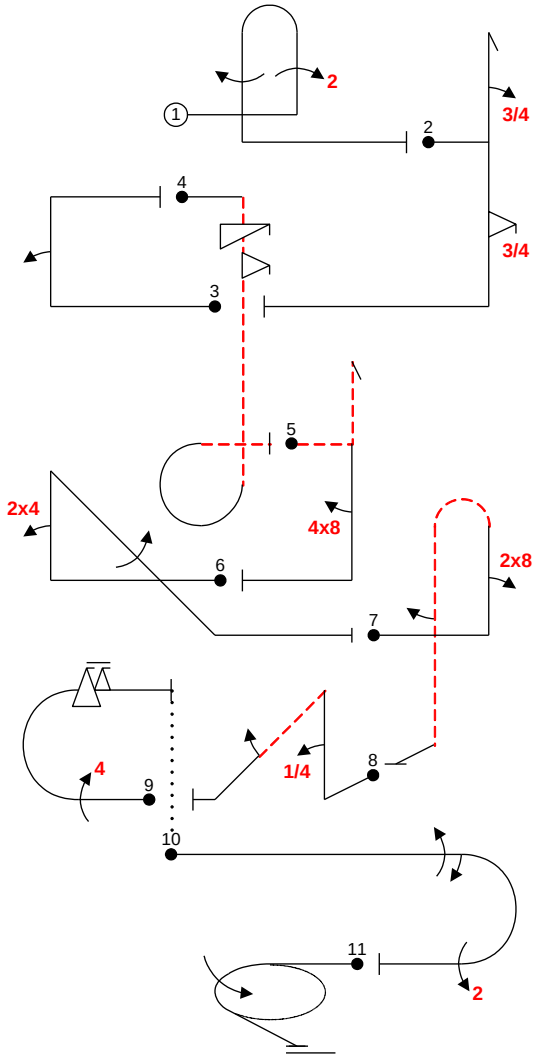
Created Using Aresti 2013™ software. ACCassidy@aol.com

FORM B

B	Contest: Hawaiian Tropics Invitational	Category: Advanced
Date: 1 June 2016	Program: Free	Pilot's No.

Joe Hotschtick
Pilot:

wind direction



Extra 300L
A/C:
1 Jan 2016
(signature/date)
FREE PROGRAM CHECK BY:

Created Using Aresti 2013™ software. ACCassidy@aol.com

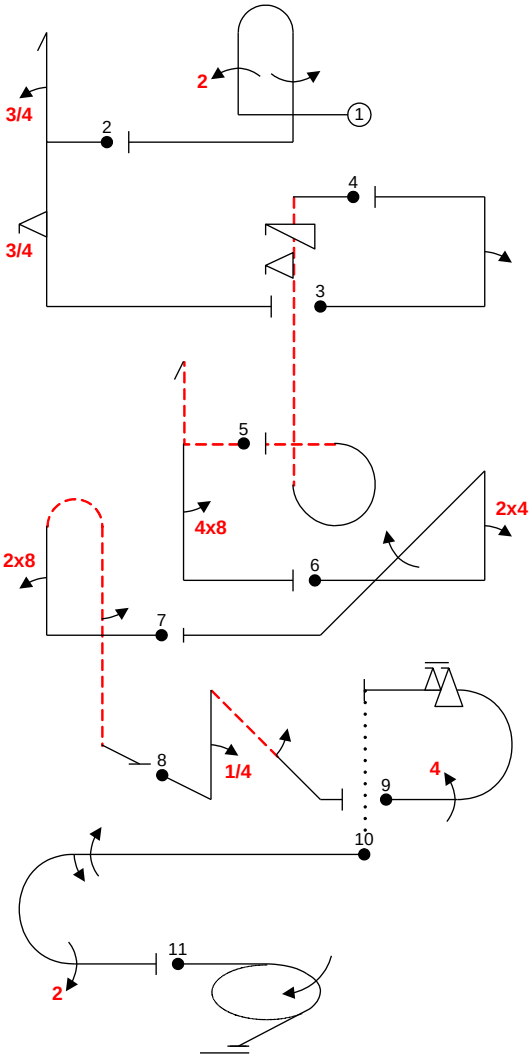
FORM C

C	Contest: Hawaiian Tropics Invitational	Category: Advanced
Date: 1 June 2016	Program: Free	Pilot's No.

Pilot: Joe Hotschtick

A/C: Extra 300L

wind direction



FREE PROGRAM CHECK BY: (signature/date) 1 Jan 2016

Created Using Aresti 2013™ software ACCassidy@aol.com

CHIEF JUDGE PENALTY FORM

CHIEF JUDGE PENALTY FORM

☒ Power ☐ Glider

Pilot's Name: Joe Hotschtick

Category ☐ Primary ☐ Sportsman ☐ Intermediate ☒ Advanced ☐ Unlimited

Flight ☐ Known ☒ Free ☐ Unknown

BOUNDARY PENALTIES

Mark each box corresponding to the call ("Out North, South, East, or West") from the Boundary Judges. Then place a checkmark in the "Boundary Penalty" box for any figure with one or more boundary infringements.

Note that there may be more than one boundary infringement, or more than one "out" call on a single boundary within a figure (mark all that occur). However, there can be ONLY ONE "Boundary Penalty" per figure.

FIGURE PENALTIES

For any of the penalties shown below, place a checkmark in the appropriate box indicating where the infraction occurred.

Note: There may be more than one interruption between figures; however, there can be ONLY ONE "Improper Restart" penalty per figure.

If one or more majority LOW-LOW penalties were marked, also place a checkmark in the "Zero Flight Program" box in the "FLIGHT PENALTIES" area of this form.

Figure	North	South	East	West	Boundary Penalty	Program Interruption	Improper Restart	Majority HIGH	Majority LOW	Majority LOW-LOW
1										
2	\				✓					
3										
4										
5			\		✓					
6										
7										
8										
9		\	\		✓	✓	✓			
10										
11									✓	
12									✓	
13										
14										
15										
TOTAL BOUNDARY & FIGURE PENALTIES					3	1	1		2	Any marks above, check "ZERO Flight Program"

FLIGHT PENALTIES

Improper Program Start	
Missed Briefing/Unsigned Free Program	
Starting Line Penalty	✓
ZERO Flight Program	
Disqualification	
Illegal Free Program (Forward To Jury)	

Chief Judge Comments / Reason for Flight Zero, DQ, or Illegal Free:

Chief Judge's Name	CJ Assistant #1 Name	CJ Assistant #2 Name
B. Howard	S. Smith	J. Jones
IAC# 499999	IAC # 666	IAC # 12345

FOUR MINUTE FREESTYLE FORM A and PENALTY WORKSHEET

FOUR MINUTE FREESTYLE PROGRAM	Flight No.
	Form A
Judge's Name	Judge's IAC Number

TECHNICAL MERIT		**K**	**Grade**
1	Complete Use of the Flight Envelope	**40**	
2	Exploitation of Aerodynamic and Gyroscopic Forces	**40**	
3	Execution of Individual Maneuver Elements	**40**	
4	Wide Variety of Figures Flown on Different Axes and Flight paths	**40**	

ARTISTIC IMPRESSION		**K**	**Grade**
5	The Pleasing and Continuous Flow of Figures	**40**	
6	Contrasting Periods of Dynamic and Graceful Maneuvers	**40**	
7	Presenting Individual Figures in Their Best Orientation	**40**	
8	Placing Individual Figures in Their Optimum Position	**40**	

POSITIONING		**K**	**Grade**
9	Symmetry	**40**	
10	The Performance Zone	**40**	

CHIEF JUDGE PENALTY WORKSHEET

TIMING	Minimum Time = 3:30 Maximum Time = 4:00
Start Time	
End Time	
Duration	**Min:Sec**
	Chief Judge's Name
	Chief Judge's IAC Number

PENALTIES			Penalty Points
Seconds Error		**x 10 =**	
Too High		**x 50 =**	
Too Low		**x 250 =**	
Improper Wing Dip		**x 150 =**	
Deadline Violation		**x 300 =**	
TOTAL PENALTY POINTS			
Disqualified (Low/Dangerous			

Tab 3 – Form 11

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INDEX

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