



Scale Flying Guidelines 2012

All flying manoeuvres must be judged bearing in mind the performance of the full size prototype. The aim of the scale flight schedule is to recreate the flight characteristics and realism of the full-size aircraft. Judges must not therefore confuse scale contests with aerobatics contests

The errors mentioned under each manoeuvre cannot be an exhaustive list of all possible faults. They are intended to show the sort of mistakes that are likely during that manoeuvre. These errors examine each manoeuvre from three aspects:

1. The shape, size and technical requirements of the intended manoeuvre.
2. The positioning of the manoeuvre relative to the judges position or other datum.
3. The scale realism achieved relative to the subject aircraft.

It remains the responsibility of the judges to decide upon the importance of each error and deduct marks accordingly, always taking into account the characteristics of the full size aircraft.

Each manoeuvre must be announced prior to commencement and called on commencement by the word "NOW". All flying manoeuvres must be announced upon completion by the word "FINISHED".

The flying judges will be seated alongside the landing area in a line parallel with the wind direction. This axis will be referred to as the "judges' line". The Contest/Flight Line Director will be responsible for the measuring of wind direction. If, in the opinion of the Contest/Flight Line Director, the wind direction continually deviates more than 30° from the judges' line, the judges' line will be adjusted accordingly.

Unless there is a conflict with safety, the pilot should at all times be permitted to choose the direction of take-off and landing to allow for unexpected changes in wind direction. This provision will also apply to manoeuvre 6.3.7.M (Touch-and-Go) since this consists of both a landing and take-off.

Apart from the manoeuvres mentioned above, all manoeuvres must be performed parallel with the judges' line such that if any part of the manoeuvre is performed behind the judges' line it will score ZERO.

In the interests of safety, any manoeuvres overflying a designated area behind the judges' line laid out for the protection of spectators, officials and other competitors or helpers, will score ZERO.

The height and positioning of individual manoeuvres should be proportional to that expected in a full size display typical to each prototype. Unless specified otherwise, manoeuvres that are carried out in a horizontal plane (eg Straight Flight, Figure Eight, Triangular Circuit) should commence on a flight path that is about 60° elevation to the judges. Manoeuvres such as the Descending Circle and Spin should start at a higher elevation. Judges should down mark manoeuvres as too high, too low, too far away, or too close if they consider the positioning to be so.

After each flight, the Flight Judges will record any non-standard event that causes downgrading or loss of flight points. If for any reason the mark awarded is corrected

or changed, the change must be initialled by the judge. The Chief Flight Judge will review all flight score sheets for completeness and fairness and justification of any zero scores. As examples: missed manoeuvres, manoeuvres flown out of order, out of flight time, flying behind the "Judges' Line", or crash landing. The Chief Flight Judge must then sign the score sheets before they are sent for processing.

Model aircraft should at all times fly in the same manner as the prototype. The following notes describe an average aeroplane; judges should use their own personal judgement to decide on an appropriate flight style for the prototype submitted and mark the flight accordingly. Competitors may submit a description of the prototype flight characteristics (originated by a competent authority), which should be used to judge the flight.

Take Off

The model aircraft should slowly accelerate from rest, leaving the ground after an appropriate ground run. The take-off run should be straight, and transition to flight should be smooth.

Errors

The take-off should be penalised if: the ground run is too short, too long or assisted, the tail or nose wheel does not leave the ground before the main wheels, the wing drops or the run is curved

Note: That a swing may occur as the tail wheel leaves the ground; this is normal and should not be penalised unless it is excessive.

Initial Climb

The model aircraft should smoothly rotate to a climbing attitude, and commence a gentle straight or curved climb. The climb should be smooth and appropriate to the prototype.

Errors

The climb should be penalised if: too steep, too shallow, too highly banked, wing drop or wing rock occurs or nose attitude is too high or too low.

Note: That a high bank steep spiral climb is normal for a Pitts but that a Bleriot should hardly leave ground effect.

Realism in Flight

The model aircraft should mirror the flight characteristics of the prototype in speed, flight attitude, stability and balance. The model aircraft may fly in a straight line or turn in either or both directions. Turns should display an appropriate amount of bank. The flight should be smooth and continuous, especially the transitions between take-off, climb, cruise, descent and landing approach. Due allowance must be made for the prevailing wind conditions.

Errors

Realism in flight should be penalised if: the model aircraft flies too slowly or too fast, the nose attitude is too high or too low, the model aircraft stalls, or shows an erratic flight path, has persistent wing drop or wing rock, flies an out of balance turn or pitches harshly on engine failure. A stall or wing drop may occur if the model aircraft hits turbulence or its own slipstream. If the recovery to stable flight is smooth, this should not be penalised. A grossly out of balance turn, left turn with right bank for instance, or a flat turn should be penalised.

Realism in Flight covers the entire flight performance including the way in which the model aircraft flies between manoeuvres.

Judges will allot points for Realism within the following aspects, always keeping in mind the likely characteristics of the full size subject:

Engine sound (realistic tone & tuning) K = 4

“Tone” relates to the character of the sound by comparison with the full size at all throttle settings.

“Tuning” is the smoothness of operation of the engine at all throttle settings.

The marks for engine sound should therefore be split equally between these two aspects.

Speed of the model aircraft K = 9

This should be a subjective assessment of the scale speed of the model aircraft, based on the speed of the full size aircraft (as indicated on the score sheet and documentation) judged as if it were performing a public flying display. Model aircraft invariably fly faster than scale speed and marks should be deducted accordingly. For example, a model aircraft that appears to be flying at twice scale speed should score no more than half marks, a model aircraft flying at three times scale speed, or faster, should score zero.

Smoothness of flight..... K = 9

The model aircraft should be well trimmed and show no signs of instability. Judges should assess the smoothness of control taking into account the prevailing weather conditions. They should also judge the attitude of the model aircraft in flight, i.e. any nose-up or nose-down tendency.

Realism in flight aspects shall be discussed by all flight judges after completion of the flight in consultation with any claim for non-aerobatic eligibility made on the Competitor’s Declaration form (Annex 6C.1). The judges should attempt to arrive at an agreed score for this item.

Some original prototypes would have little or no aerobatic capability. These are aircraft designed with limited manoeuvrability where the original prototypes of which were restricted by the manufacturer or licensing government agency. Examples are touring aircraft, passenger and cargo aircraft and heavy military transports and bombers. The optional manoeuvres are included under 6.3.7. to cater for such subjects. These aircraft should still be considered for high marks in this section if the performance of the original prototype genuinely limits them to such manoeuvres. Conversely, if aircraft with greater manoeuvrability and performance choose these options when the original prototype would be capable of much more, then low marks should be awarded in this section.

NOTES:

1. For any model aircraft that flies a manoeuvre with two or more wheels down, where the prototype actually featured retractable landing gear, the score shall be reduced by two points on that manoeuvre. If one wheel is down, the score shall be reduced by one point. If one or more wheels are only sagging during the manoeuvre, the score shall be reduced with one half or one point depending on the seriousness of the sagging.
2. If the pilot of the prototype is visible from the front or from the side during flight, a dummy pilot of scale size and shape shall be equally visible during flight in the model aircraft. If such a pilot is not fitted, the total flight score shall be reduced by 10%.

Transition to Descent

The model aircraft’s flight path should smoothly change between cruise and descent. The change may be abrupt, after an engine failure, or prolonged as the power slowly reduces. The direction of flight may or may not change.

Errors

The transition should be penalised if: the model aircraft stalls as the engine fails, wing drop or wing rock occurs or an excessive pitch change is apparent.

Descent and Landing Approach

The descent should be smooth, continuous and stable. It may be straight or curved. The angle of descent should be consistent with that of the prototype either engine on or engine off. As the model aircraft nears the ground, it should adopt a landing attitude consistent with that of the prototype. Allowance must be made for prevailing wind conditions.

Errors

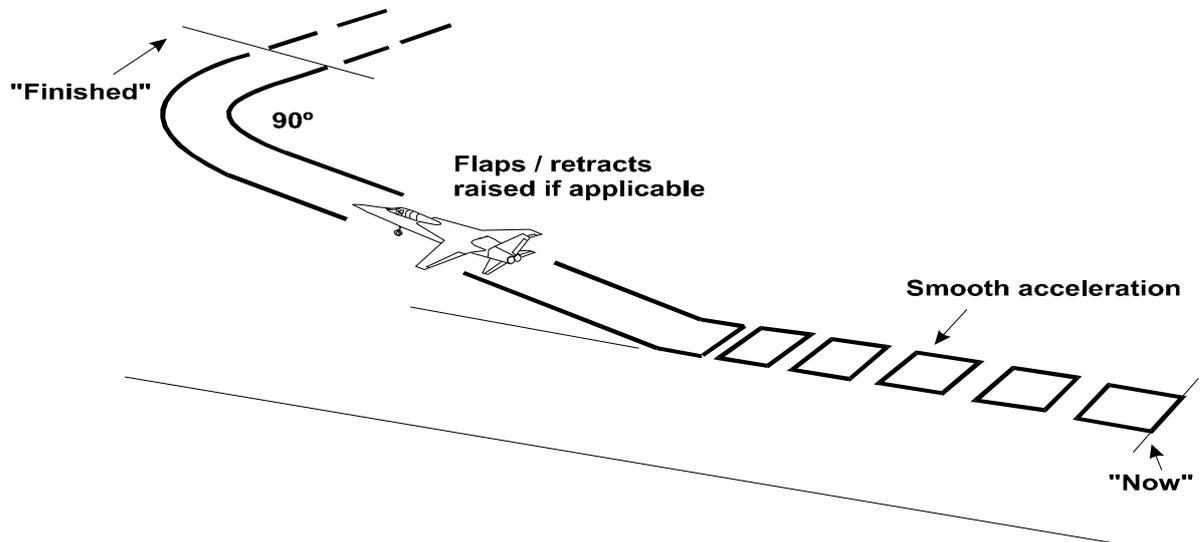
The descent and landing approach should be penalised if: the model aircraft stalls, drops or rocks the wings, shows too steep a glide or does not change to a landing attitude.

Note: That the glide angle may change significantly with engine on or off.

1. Take-Off

The model aircraft should stand still on the ground with the engine running without being held by the pilot or mechanic and then take-off into wind, or as required by the competitor to make best use of the take-off distance available (jet subjects). If the model aircraft is touched after the competitor calls "Now" the take-off will score zero. The take-off should be straight and the model aircraft should smoothly accelerate to a realistic speed, and then lift gently from the ground and climb at an angle consistent with that of the prototype. The take-off is completed after the model aircraft has turned 90 degrees.

If the prototype used flaps for take-off, then the model aircraft should also, but this may be subject to the competitor's judgement taking into account the wind strength. Any flapless take-off due to wind must be nominated to the judges before take-off. Flaps should be raised during the climb-out after take-off. If applicable, the landing gear should be retracted during the climb-out.

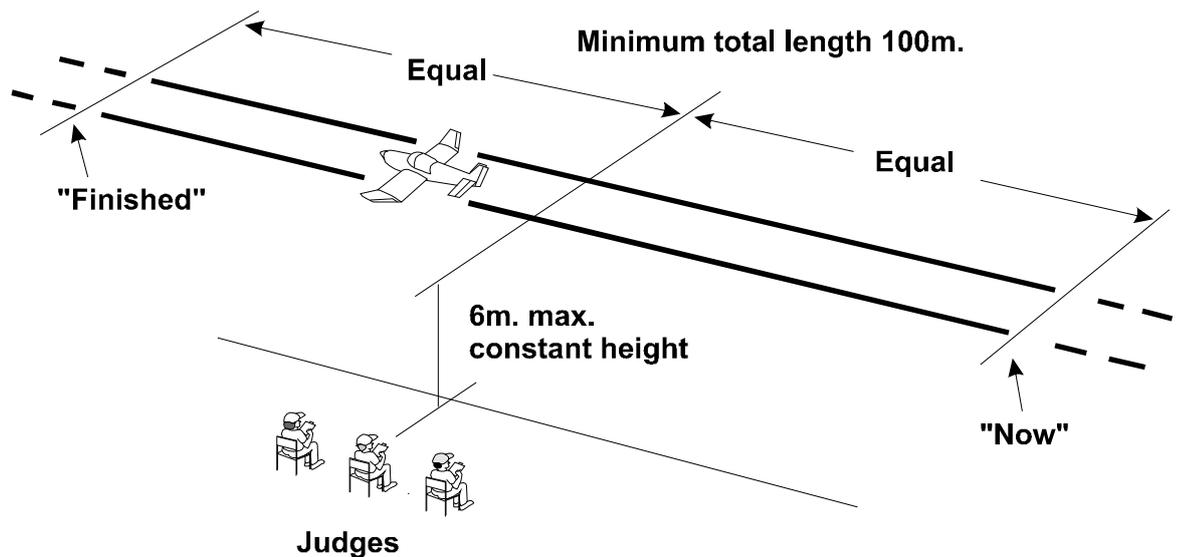


Errors:

1. Model aircraft touched after calling "Now" (zero marks).
2. Swings on Take-off (a slight swing with other than a tricycle undercarriage is acceptable as the aircraft tail is raised).
3. Take-off run too long or too short.
4. Unrealistic speed /too rapid acceleration.
5. Inappropriate attitude at lift-off for undercarriage configuration.
6. Not a smooth lift-off.
7. Climb rate wrong (too steep or too shallow).
8. Nose attitude wrong during climb (nose too high or too low).
9. Flaps not used if applicable.
10. Wheels not raised if applicable.
11. Significant wing drop.
12. Climb-out track not same as take-off run.
13. Unrealistic rate of turn onto crosswind leg.
14. Crosswind track not 90° to climb out track.

2. Flight in a Straight Line at Constant Height (Maximum 6 m)

Model aircraft approaches in straight flight at a constant height not exceeding 6 metres for a minimum distance of 100 metres, then climbs away. This is in effect a low flypast.

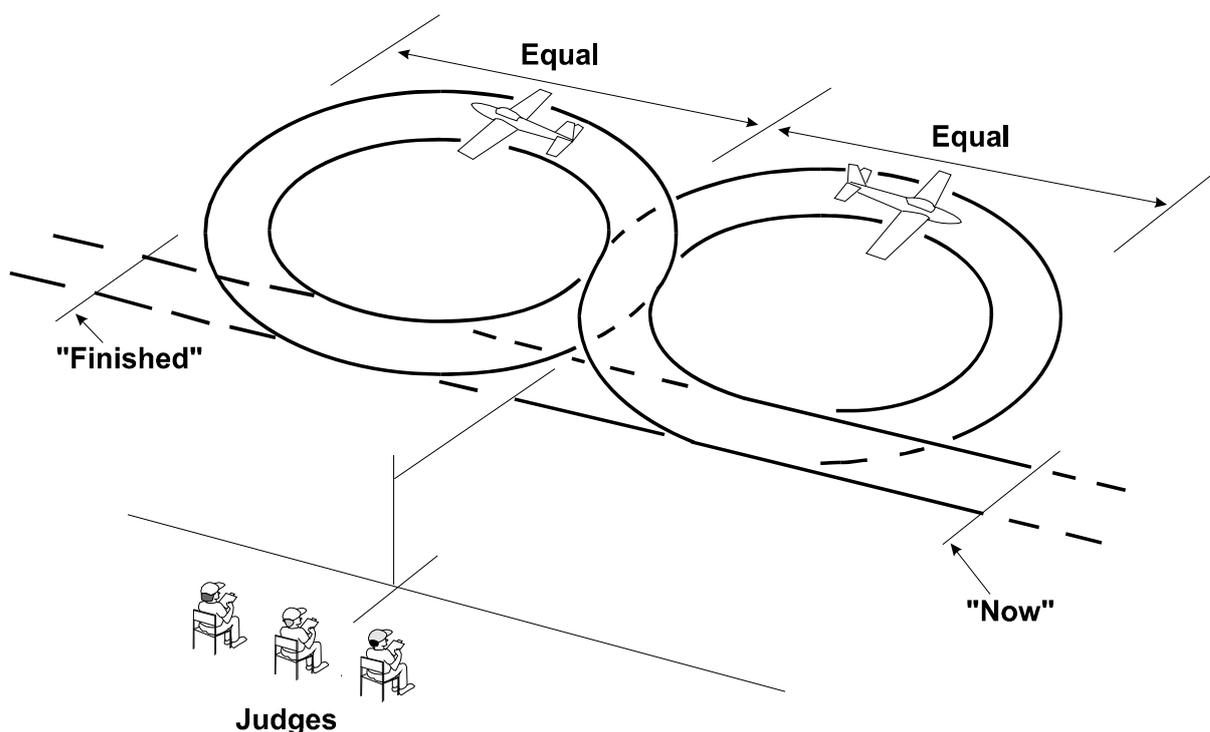


1. straight course (slight corrections acceptable with light aircraft).
2. constant height.
3. 6 metres or below.
4. pass over the landing area.
5. centred on judges' position.
6. parallel with the judges' line.
7. not too short distance (too long is not an error).
8. Model aircraft flight path steady.
9. not too far away/too close/too high/too low.

3 Figure Eight

The model aircraft approaches in straight and level flight on a line parallel with the judges' line, and then a one-quarter circle turn is made in a direction away from the judges' line. This is followed by a 360-degree turn in the opposite direction, followed by a 270-degree turn in the first direction, completing the manoeuvre on the original approach line.

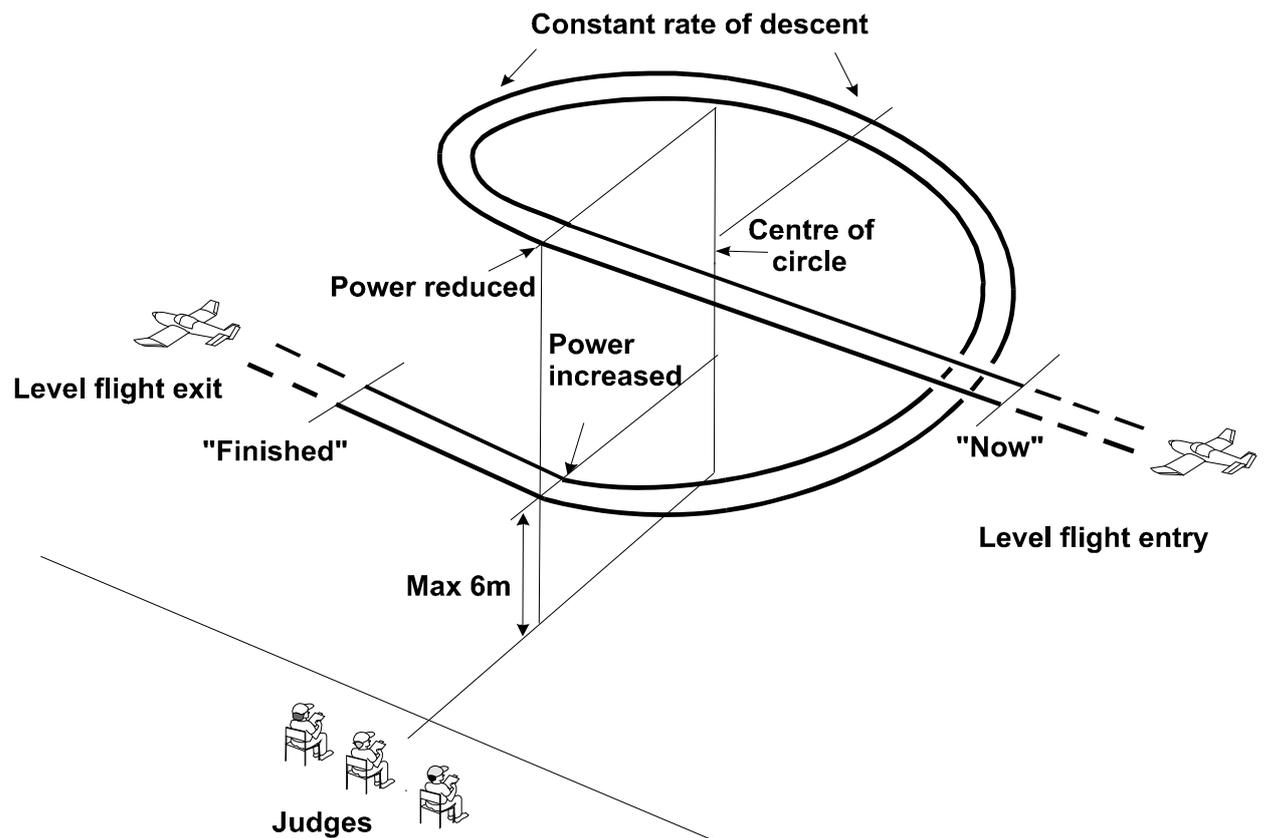
The intersection (mid point) of the manoeuvre shall be on a line that is at right angles to the direction of entry and passes through the centre of the judges' line.



1. Entry into first circle at right angles to original flight path.
2. Circles equal size.
3. Circular shape
4. Constant height
5. Intersection centred on judges' position.
6. Entry and exit paths on same line.
7. Entry and exit paths parallel with judges' line.
8. Overall size of manoeuvre realistic for prototype.
9. Model aircraft flight path smooth and steady.
10. Not too far away/too close/too high/too low.

4 360° Descending Circle at Constant Low Throttle Setting:

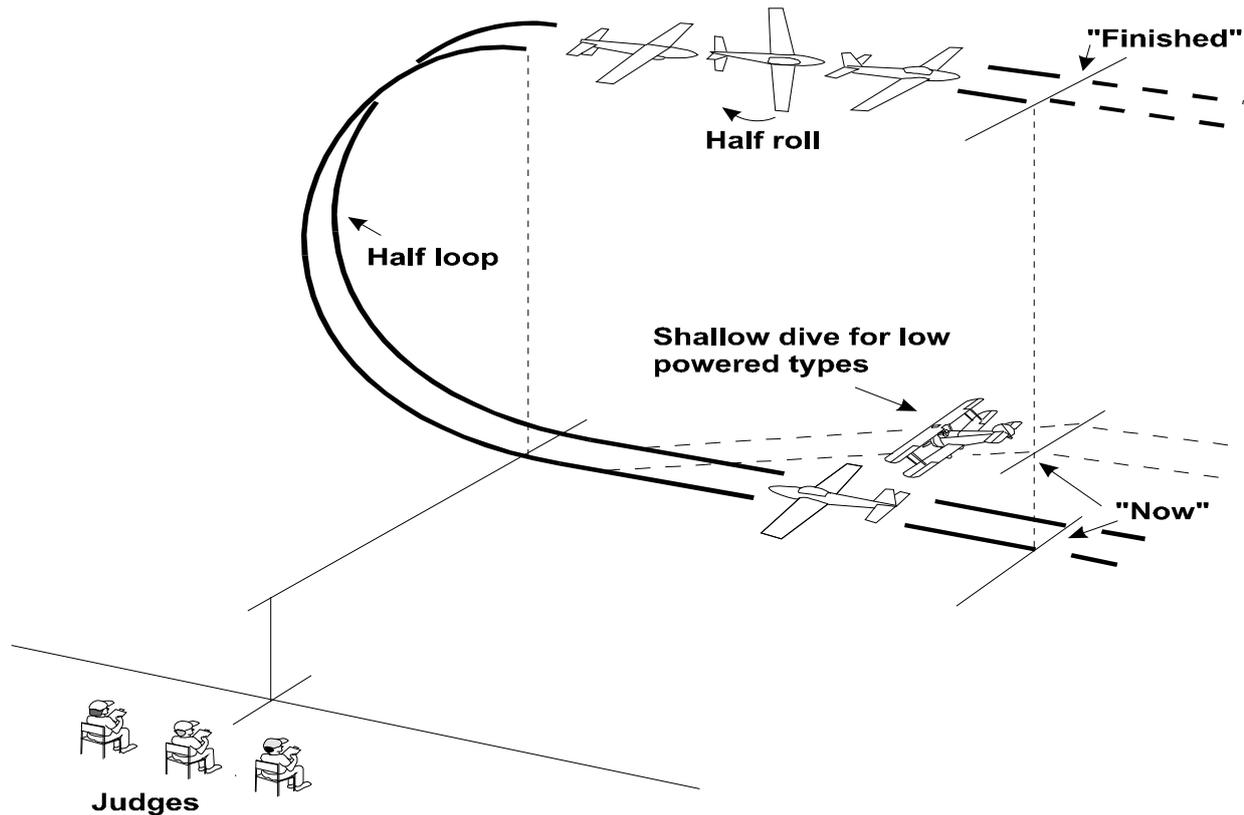
Commencing from straight and level flight, the model aircraft performs a gentle 360° descending circle over the landing area, in a direction away from the judges, at a constant low throttle setting. The manoeuvre terminates at a maximum height of 6 metres, resuming straight and level flight on the same path.



1. Rate of descent constant.
2. Descent not too steep.
3. Throttle setting constant and low.
4. Circle shape.
5. significant loss of height.
6. Model aircraft descend to 6 metres or below.
7. Circle centred on judges' position.
8. Entry and exit paths parallel with the judges' line.
9. Start and finish called in straight and level flight.
10. not too far away, too close.

5 Immelmann Turn:

From a straight and level flight the model aircraft pulls up into the first half of a circular loop (commensurate with the performance of the subject type), and when inverted, performs a half roll before resuming straight and level flight on the opposite track. Low powered aircraft types would be expected to commence the manoeuvre by executing a shallow dive at full throttle in order to pick up the necessary speed.

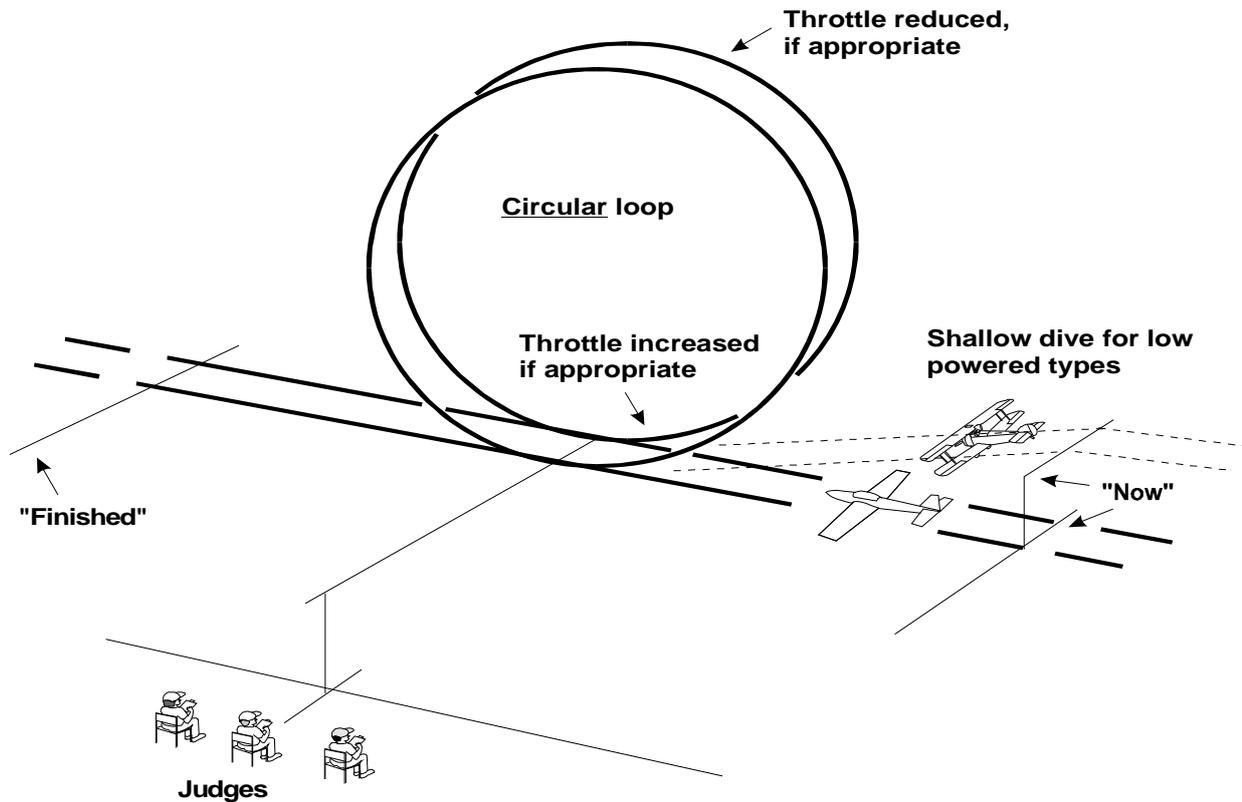


1. Track of the half loop vertical.
2. Half loop centred on judges' position.
3. Half loop is sufficiently semicircular.
4. Roll not too early or too late.
5. No excessive height loss in the roll.
6. no veering off track during the roll.
7. resume straight and level flight on the opposite track to entry.
8. Manoeuvre flown parallel with judges' line.
9. Size of manoeuvre and speed in manner of the prototype.
10. not too far away/too close/too high/too low.

6 Loop:

From straight flight, the model aircraft pulls up into a circular loop and resumes straight and level flight on the same heading as the entry. The throttle may be reduced at the top of the loop as appropriate to type, and opened if necessary when normal flight is resumed. Low powered aircraft types would be expected to execute a shallow dive at full throttle in order to pick up speed before commencing the loop.

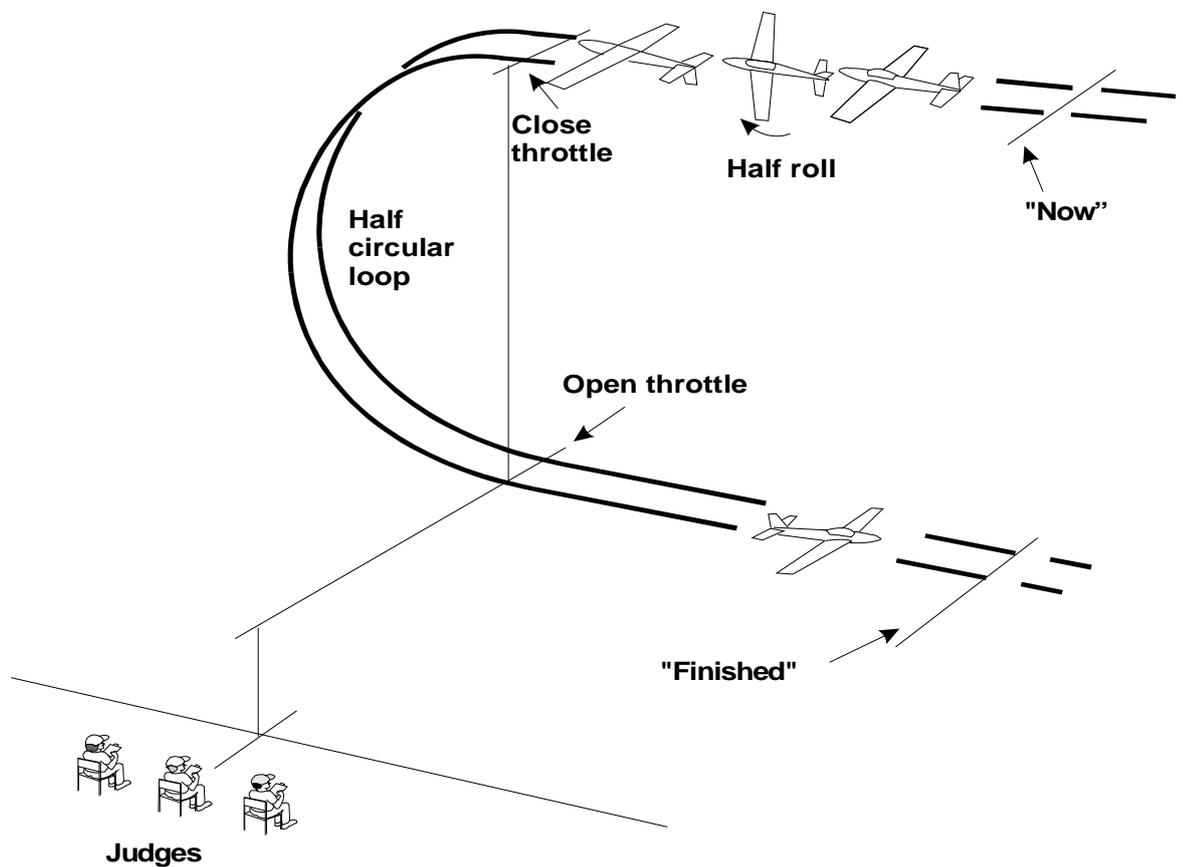
Note: Whilst the loop is intended to be a circular manoeuvre, the ability of a low powered aircraft to achieve a perfect circle will be significantly less than that of a jet or high powered aerobatics machine. A slightly elongated loop by the former would therefore expect to score as well as a perfect circle achieved by the latter, but a grossly misshapen circle would be significantly down marked. This also applies to other options involving looping manoeuvres.



1. Track of loop vertical
2. Loop sufficiently circular, commensurate with the subject type.
3. appropriate use of throttle.
4. Size and speed of Loop in manner of prototype.
5. centred on judges' position.
6. resume straight and level flight on same track and height as entry.
7. Manoeuvre flown parallel with judges' line.

7 Split S (Reversal):

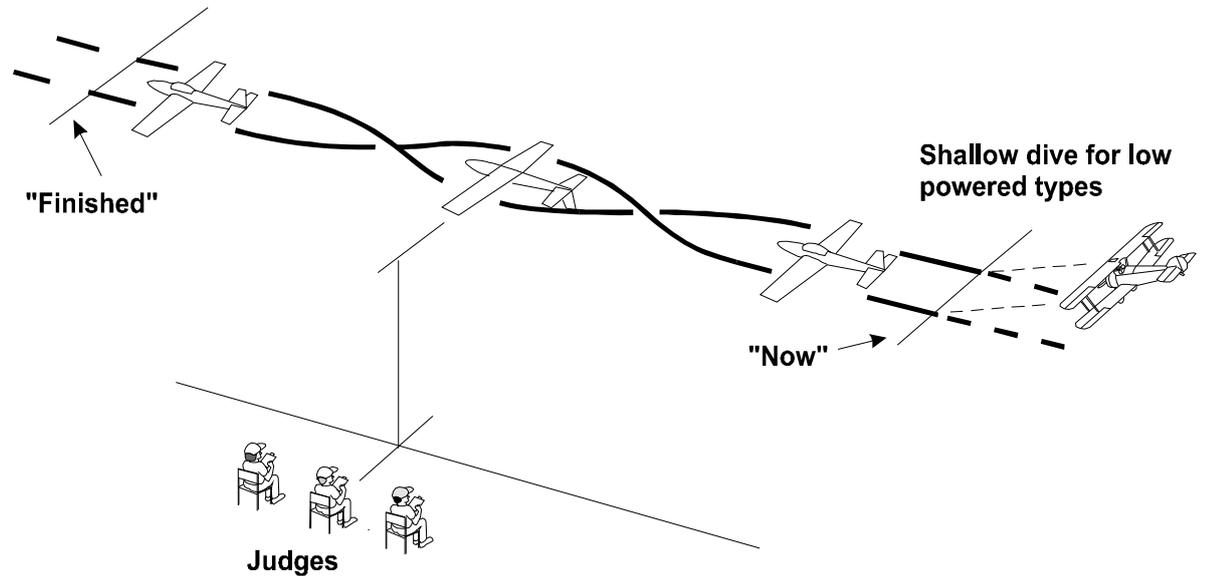
From straight flight, the model aircraft performs a half roll and when inverted performs half of a circular inside loop (commensurate with the performance of subject type), and resumes straight and level flight on a flight path opposite to that of the entry. The throttle should be closed at the inverted position, as appropriate to type, and opened when normal flight is resumed.



1. Model aircraft maintains track during half roll.
2. Model aircraft inverted not too long or too short.
3. appropriate use of throttle.
4. Track of half loop on line or vertical.
5. Half loop is sufficiently semicircular.
6. Not too fast or too tight a half loop.
7. Resume straight and level flight on opposite track to entry.
8. Half loop centred on judges' position.
9. Manoeuvre flown parallel with the judges' line.
10. Not too far away/too close/too high/too low.

8 Roll:

From straight and level flight, the model aircraft rolls at a constant rate through one complete rotation and resumes straight and level flight on the same track. Low powered aircraft would be expected to execute a shallow dive at full throttle before the manoeuvre. Competitors should nominate any special type of roll that will be performed, eg Slow, Barrel, Snap.



1. Rate of roll is constant.
2. Style of roll is typical to prototype.
3. Roll centred on judges' position.
4. Entry and exit at same heights.
5. Entry and exit at same speeds.
6. Entry and exit tracks and line of roll parallel with judges' line.
7. resume straight and level flight on same track as entry.
8. Style of roll as nominated.
9. appropriate use of throttle.
10. Not too far away/too close/too high/too low.

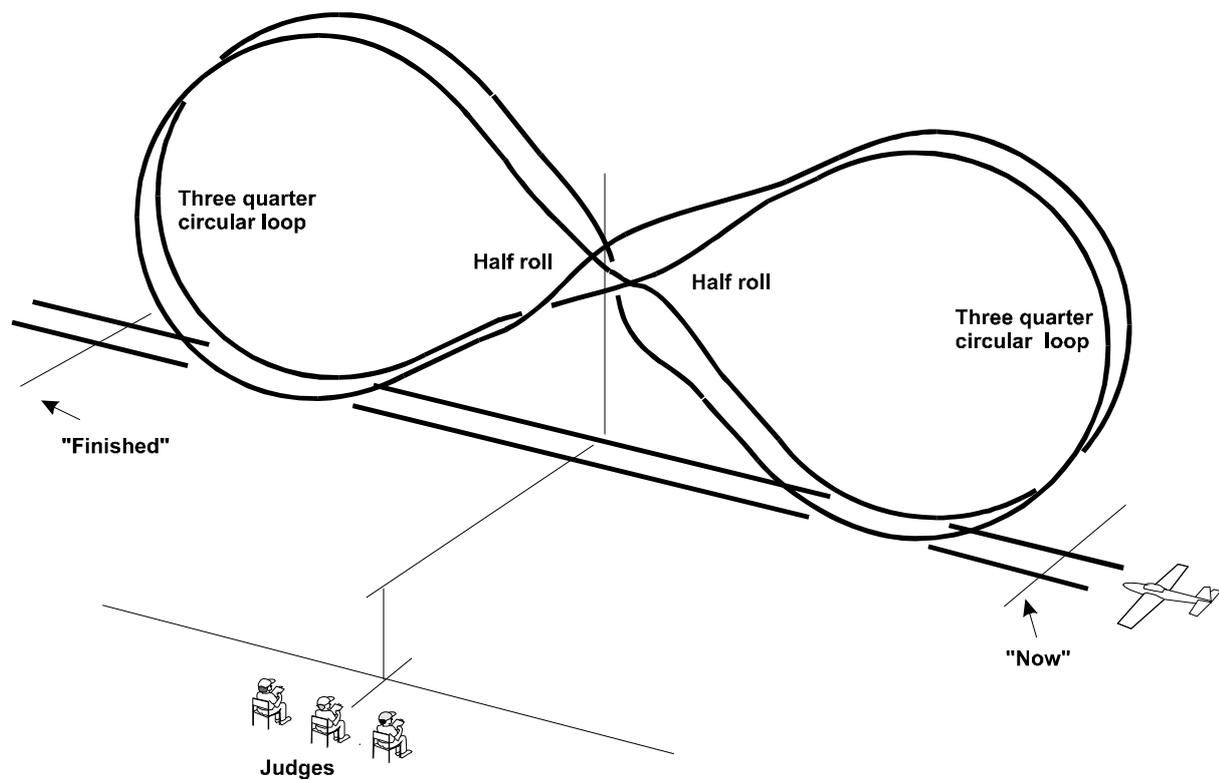
9 (Half) Cuban Eight:

Model aircraft pulls up into a circular inside loop until 45° nose down. The 45° inverted flight is held until a half roll when abeam the judges, 45° upright then held until entry height is achieved when a similar circular inside loop is flown to repeat the manoeuvre in the opposite direction. Straight and level recovery is to be at the same height as the original entry. Throttle may be closed at the top of each loop, as appropriate to subject type, and reopened during each descent. A low powered aircraft would be expected to execute a shallow dive at full throttle in order to pick up speed before commencing the manoeuvre.

Included in this manoeuvre are the following deviations based on the primary Cuban Eight:

“Half Cuban Eight”

After the first 45 degree dive, the model pulls out level at the entry height.

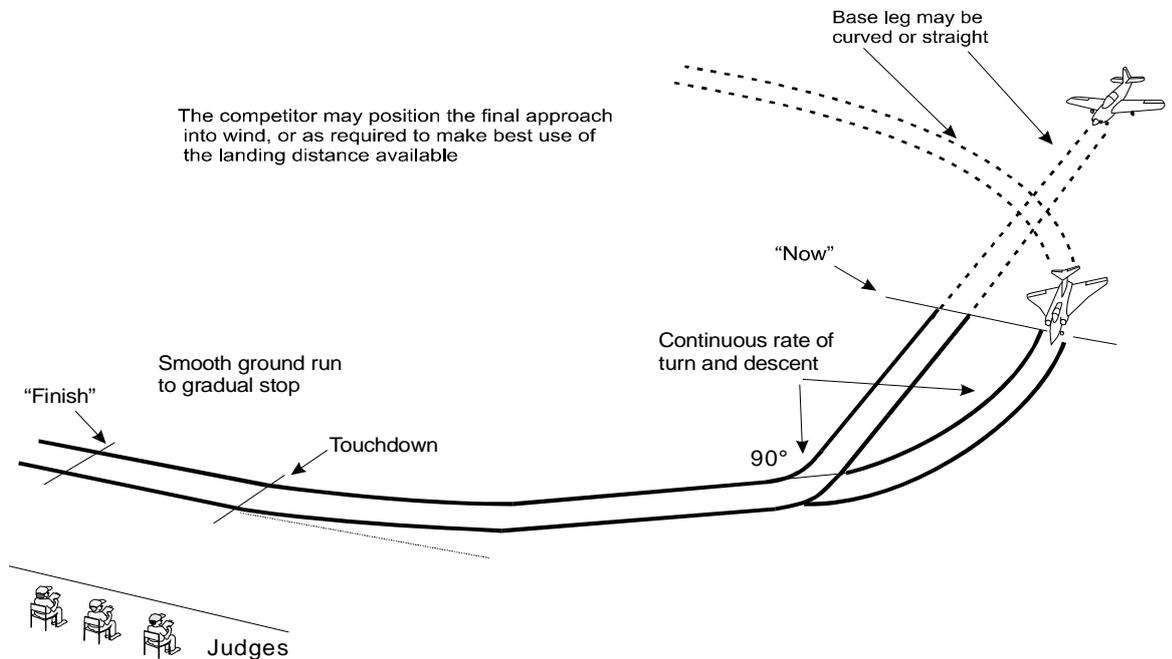


1. Manoeuvre performed in a constant vertical plane that is parallel with the judges' line.
2. Loops are circular.
3. Loops are the same size.
4. Half rolls are centred on the judges' position.
5. 45° descent paths achieved.
6. Model aircraft exits manoeuvre at same height as entry.
7. Model aircraft resumes straight and level flight on same track as entry.
8. Appropriate use of throttle.
9. Size and speed of loops in manner of prototype.
10. not too far away/too close/too high/too low.

10 Approach and Landing

The manoeuvre commences by descending from base leg (in the same way as the Touch and Go). Prior to this point the model aircraft may complete any form of appropriate circuit to achieve a landing configuration. This may be a full rectangular or oval pattern, or a join directly onto the downwind or base legs. The Approach and Landing may be orientated into wind, or as required by the competitor to make best use of the landing distance available (eg jet subjects).

The base leg may be either straight or curved as required by the pilot. From the start position the model aircraft completes the turn through 90 degrees onto final approach. The model aircraft should round out smoothly, adopting the attitude applicable to the specific type and touch down without bouncing before smoothly rolling to a stop. An aircraft with conventional landing gear will make a three-point landing or will land on the main wheels and then gently lower the tail, as appropriate to the prototype, the prevailing wind conditions, or the surface of the landing area. An aircraft with tricycle landing gear will land on the main wheels first and then gently lower the nose wheel.



Errors:

1. Manoeuvre does not commence on base leg.
2. Turn onto final approach not constant rate or not 90°.
3. Descent from base leg not smooth and continuous.
4. Model aircraft does not achieve correct landing approach prior to touchdown.
5. Model aircraft does not round out smoothly.
6. Model aircraft bounces.
7. Drops a wing during landing.
8. Touches wing tip on ground.
9. Does not come to a gradual and smooth stop after landing.
10. Does not adopt landing attitude appropriate to subject type.
11. Model aircraft runs erratically or turns after landing.
12. Model aircraft noses over (note 30% penalty if only nose-down - zero if it over-turns).

Note: A crash landing scores zero points, but if the model aircraft makes a good landing and then stops nose down towards the end of the landing run, then the landing marks that would have been otherwise awarded should be reduced by 30%.

If the nose down situation is solely the result of the model aircraft running off the prepared area, because this is too short for the particular wind direction, the above down marking will not apply.

Model aircraft with retractable landing gears, landing with one or more gears retracted should have the landing points reduced by 30%.

All landings ending with the model aircraft on its back will be considered a crash landing.