

# Trainer Banger



## Official Rules

### INTRODUCTION

The Trainer Banger is a trainer-based model aircraft competition sponsored by the Lexington Model Airplane Club (LMAC). This entry level event allows fixed wing radio-controlled model airplane pilots at any skill level to gain experience flying in a scale competition. The event utilizes trainers to reduce the amount of time and money typically invested in a scale competition.

Pilots are judged primarily on their flying ability by standardizing the aircraft while at the same time performing the same sequence of maneuvers. At the end of the competition, participants in the Trainer Banger will be prepared to advance to novice categories in regional qualifiers such as those sponsored by the US Scale Masters and the National Association of Scale Aeronautics (NASA).

The purpose of this document is to define the sequence of maneuvers and the requirements for judging those maneuvers. It is very important to perform all maneuvers within the guidelines of this document as these are the same guidelines the judges will be using for scoring. The maneuvers were selected to reduce aircraft advantages such as larger engine, elliptical wing, etc., and are based on the performance of a full scale high wing aircraft (Cessna type). The pilot's goal is to emulate as closely as possible the flying characteristics of the full-scale counterpart with the flying characteristics of the model.

## BASIC RULE SETUP

### □ General

- Any current AMA member that meets the requirements of this section (Basic Rule Setup) is permitted to participate.
- LMAC membership is not required to participate in the event. (information concerning applications is available at [www.lmacky.org](http://www.lmacky.org))
- Entries and entry fees must be accepted before the final cutoff time on the day of the event.
- One entry per pilot, however a pilot is permitted to fly more than one trainer during the competition in order to continue to compete in the event of a crash or if an aircraft becomes disabled for any reason.
- All AMA approved radios and radio frequencies are approved.

### □ Aircraft

- Aircraft must be a high wing “trainer-style” platform as defined by the manufacturer and/or approved by the contest director (CD).
- Tail draggers and “scale” planes are allowed.
- Low/mid wing “aerobatic” or “sport” planes are not permitted.
- Almost Ready To Fly (ARF), Kits, Scratch Built are all approved.
- Gas, Nitro, and Electric are approved.
- Size Requirement
  - 20-inch wingspan minimum.
  - No maximum wingspan.
  - No minimum or maximum weight.
- Aircraft is NOT required to be in a scale scheme.
- Aircraft must meet ALL the safety requirements by the AMA, LFUCG, and LMAC safety codes.

### □ Roles and Responsibilities

- Contest Director (CD) –
  - Primary responsibility is event organization.
  - Final authority on all decisions and rulings.
- Pit Boss
  - Primary responsibility is safety.
  - Must approve all takeoffs and landings.
- Judges
  - Primary responsibility is to evaluate and score maneuvers.
  - Must be objective and consistent when scoring.
- Score Keeper
  - Primary responsibility is data entry.
  - Must have a general working knowledge of MSOffice.
- Spotter

- Primary responsibility is to assist with pattern awareness.
  - Calls out the next maneuver for the pilot.
  - Communicates with the pilot to avoid other aircraft in the pattern.
  - Must be available to the pilot for the full duration of each flight.
- Pilot
    - Primary responsibility is to ensure his/her aircraft is checked out and safe.
    - Must be able to communicate clearly with the judges and spotter.
    - Must hold a current AMA card or have written proof of current AMA membership.

*Note: One person is permitted to perform more than one role as deemed feasible by the CD.*

#### □ Judging

- Each flight round will be judged by two judges.
- A judge may participate in the competition as a pilot, but each pilot will be judged at least once by each judge outside his/her class as much as possible.
- Ten maneuvers will be judged during each flight round.
- Points will be assessed for each maneuver from 0 being the lowest to 10 being the highest.
  - Maneuvers that are not performed will be assessed a score of “0”.
  - Points may be broken into quarters (ex. 9.25, 9.50, 9.75, 10) at the judge’s discretion.
- Judging occurs between the time the pilot announces “Maneuver Begin/Start” and “Maneuver End/Complete”.
- Pilots MUST announce both “Maneuver Begin/Start” and “Maneuver End/Complete” loudly and clearly.
  - If the judge fails to hear the pilot announce the beginning or end of the maneuver the judge will pick a start/end point based on his/her discretion and shall deduct 1 point for each missed announcement.
- Pilots CANNOT discuss scores with judges until after the flight round is completed by all pilots.
  - Score sheets will be kept out of view until the total flight round by each pilot is complete.
  - Points are awarded and/or subtracted based on judge’s assessment of the maneuver and deviation from the procedures defined in this rule book.

#### □ General Flying

- Judging will be on a total of 3 rounds, scoring only the 2 highest rounds.
- Each pilot is allowed one “scratch” round during the entire competition. The pilot will be moved to the end of the flight line during that round.
- Each round is allotted 10 minutes to perform all maneuvers.
  - Time starts when the judge(s) announce the pattern is clear for the aircraft to taxi into position for takeoff and ends when the pilot announces “maneuver complete” upon landing.
- Any maneuver not accomplished within 10 min will be given a score of “0”.
- Aircraft should be staged and ready within two pilots in front of the flight line.
- All maneuvers will be performed within the current traffic pattern unless otherwise declared by the judge(s).
- All landings and takeoffs must be approved by the pit boss.

#### □ Classes

- Entries will be divided into two classes.
  1. Novice – No previous experience flying in a scale competition not including past Trainer Banger competitions.
  2. Advanced – Previous winners of past Trainer Banger competitions or past experience competing in official scale competitions.
- The CD is the final authority when determining pilot class assignments since this may be based on the number of participants and available awards.

#### □ Maneuvers

- Novice Class maneuvers are required to be flown in the sequence listed below:
  1. Take-Off
  2. Fly Past
  3. Procedure Turn
  4. Figure 8
  5. Descending 360
  6. Overshoot (Missed Approach)
  7. Touch and Go
  8. Slow Speed Inspection Pass
  9. Landing
  10. Realism

- Advanced Class maneuvers are required to be flown in the sequence listed below:
  1. Take-Off
  2. Slow Speed Inspection Pass
  3. Figure 8
  4. Loop
  5. Barrel Roll
  6. Stall Turn
  7. Overshoot (Missed Approach)
  8. Touch and Go
  9. Landing
  10. Realism
  
- Maneuvers performed out of sequence will be scored “0”.
- Pilots may take additional time between each maneuver to get into the pattern and set the proper heading prior to announcing the beginning of the maneuver.
- Communication between the pilot and the judges is encouraged throughout the flight to increase pattern awareness and create a safer event for all competitors.
- Pilots should attempt to communicate with the judges using the same terminology that would be used between a full-scale aircraft and a control tower or FBO.

Rounds

- Each pilot (unless otherwise noted) will complete a total of 3 flight rounds.
- Depending on the number of entries and weather conditions, the first two rounds may be completed on the first day with the 3<sup>rd</sup> completed on the 2<sup>nd</sup> day.
- The CD reserves the right to alter the beginning of the rounds at his/her discretion.
- If the flight rounds cannot be completed for any reason, only the flight rounds that all pilots completed will be scored. In this case, the lowest flight round will not be dropped.

Awards

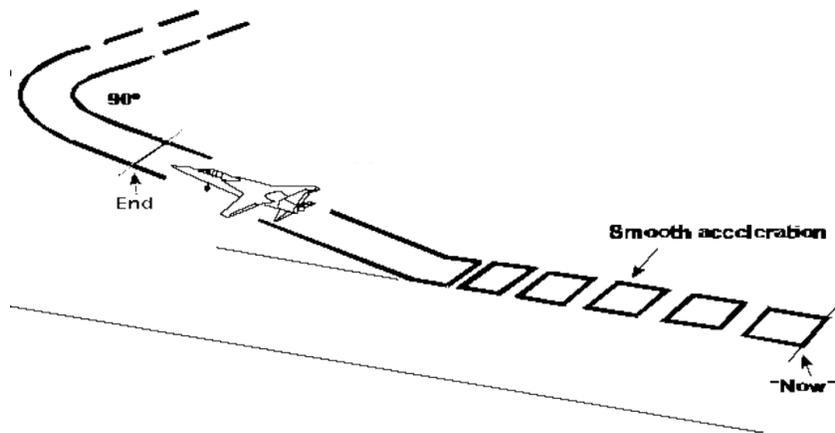
- Awards will be given for first, second, and third place in each class. (depending on the number of entries).
- Special awards will be given with notice from the CD.

## **MANEUVERS**

The maneuver instruction section is designed to explain each maneuver as it will be judged. Judging is inherently subjective; therefore, this document is intended to increase objectivity and reduce subjectivity. Each maneuver instruction is divided into sections. The first section of each instruction is an explanation on how the maneuver should be performed with an illustration. The second section is an explanation of how each maneuver will be judged. The last section is a list of common errors and standard deductions. It is encouraged that pilots practice each maneuver as it is stated in this section several times prior to the day of the event.

## TAKEOFF

After starting the engine, pilots shall request permission to taxi into position on the runway from the judges who will coordinate with the pit boss. After the aircraft has taxied into position and is fully stopped on the center of the runway, the pilot will announce "Maneuver Begin" and will apply power gradually until full power is achieved. Aircraft will maintain the centerline of the runway until liftoff is achieved. Liftoff should consist of the airplane pitching up with the nose wheel leaving the runway first followed by the main gear. A constant rate of climb (between 20 and 30 degrees) is achieved until an altitude of approximately 60 feet when the pilot will call "Maneuver Complete".



### ***What the Judges are looking for:***

- Maneuvers into position on the runway centerline.
- Stops aircraft, calls "Maneuver Begin".
- Applies throttle smoothly.
- Maintains centerline of the runway.
- Smooth rotation.
- Constant climb out.
- Maintains directional control (no heading change).
- Calls "Maneuver Complete" after altitude reaches approximately 60 feet.

### ***Common Errors:***

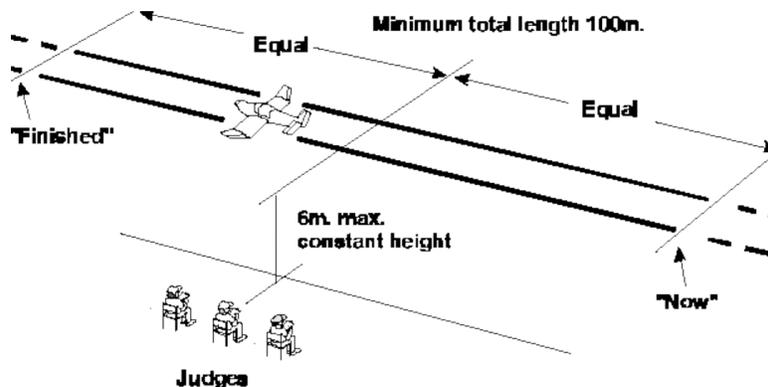
- Pilot forgets to call "Maneuver Begin" and "Maneuver Complete" at appropriate times.
- Takes off in wrong direction.
- Erratic throttle control.
- Doesn't maintain centerline.
- Wing tip contacts the ground.
- Rotates too soon or too late (aircraft balloons).
- Wheels touch runway again after liftoff.

- Changes in climb-out angle and/or heading.
- Calls “Maneuver Complete” too soon (under 60 feet).

## FLY PAST

The model shall fly straight along a path parallel to the runway that is over the far edge, the edge away from the spectators, at an altitude of between 10 and 20 feet. The model shall be flown at the fly-past altitude for at least five (5) seconds. The midpoint of the maneuver should be opposite the judges.

The pilot will start from the far end of the flight line and establish heading, and altitude. Once this occurs, pilot will then state "Maneuver begin". Once the maneuver has begun, a high-speed fly by should have no heading change nor any altitude change. Once the plane has passed the judges, pilot will state, "Maneuver complete".



*Note: Using the centerline of the runway, or runway edge is a good way to help maintain heading.*

### **What the Judges are looking for:**

- Pilot Calls "Maneuver Begin" and "Maneuver Complete" at appropriate times.
- Clear established heading and altitude so the plane flies exactly perpendicular to the judges at show center.
- No change in heading or altitude during the maneuver.
- Max power, no power changes.
- Level wings.
- Immediate correction for wind/thermal changes.

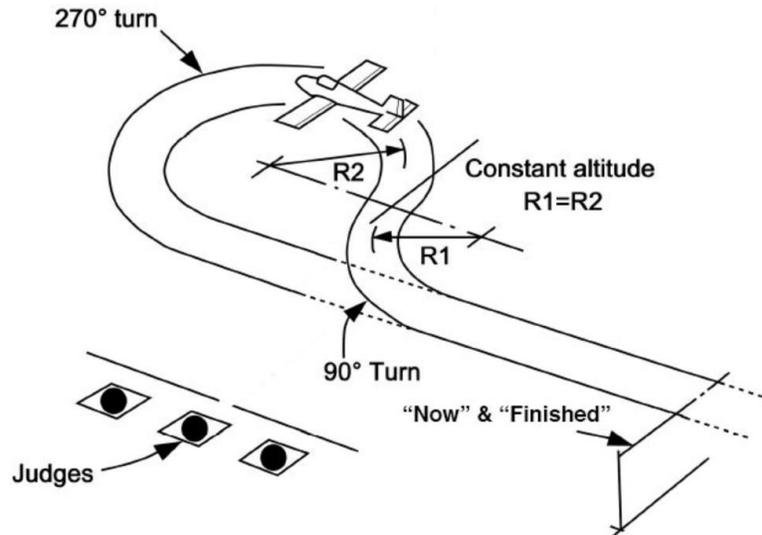
### **Common Errors:**

- Pilot forgets to call "Maneuver Begin" and "Maneuver Complete" at appropriate times.
- Heading or altitude never established.
- Heading and or altitude changes with no correction.
- Power changes.
- Altitude too high or too low.

- Aircraft too close or too far from judges.

## PROCEDURE TURN

Commencing from straight and level flight the model aircraft must turn through  $90^\circ$  in a direction away from the judges and then turn through  $270^\circ$  in the opposite direction, resuming straight and level flight on the opposite heading to that of the entry. The maneuver must be commenced so as to place the point where the model aircraft changes from the  $90^\circ$  turn to the  $270^\circ$  on a line which is at a right angle to the direction of entry and passes through the center of the judges' position.



### ***What the Judges are looking for:***

- Pilot announces "Maneuver Begin" and "Maneuver Complete" at appropriate times.
- Clear established heading and altitude so the plane flies exactly perpendicular to the judges at show center.
- No change in altitude during the maneuver.
- Same radius on the  $90^\circ$  and the  $270^\circ$  turns.
- Transition from  $90^\circ$  and the  $270^\circ$  at a point at show center.

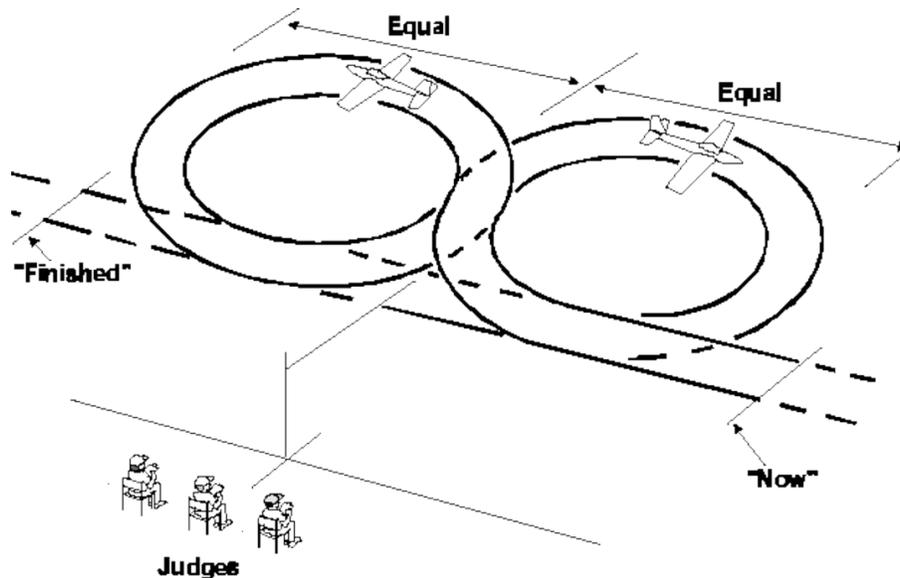
### ***Common Errors:***

- Rate of turn is not constant.
- The model aircraft changes altitude during the maneuver.
- The model aircraft does not resume straight and level flight on the correct heading.
- The model aircraft does not change from  $90^\circ$  to the  $270^\circ$  turn at the correct position.
- The maneuver is too small or too large in reference to the type and scale of the model aircraft.
- The maneuver is too close or too far away to be observed properly.

- The maneuver is too high or too low to be observed properly.

**FIGURE 8**

During this maneuver, the aircraft makes a horizontal “8” over the field. Pilot must demonstrate ability to maintain speed, altitude, and consistency in the turns. This maneuver should start between 50 and 150 feet and should be entered at cruising speed. The aircraft should enter this maneuver as he/she is flying the regular pattern. Before the first turn, the pilot will call, “Maneuver Begin” once altitude and airspeed are established. (1) The first turn should be on the “upwind leg” and the aircraft should turn so it is pointing away from the judges at centerline. (2) The second turn should be gradual and the pilot will perform a perfect circle not changing altitude, airspeed, or radius of circle. Once the aircraft has completed the first circle, (3) the pilot will begin the second part by turning the opposite direction and repeating the circle the second time. Once the pilot is aligned with the runway the same direction (upwind leg), he/she entered the maneuver, pilot will call, “Maneuver Complete”.



***What the Judges are looking for:***

- Pilot announces “Maneuver Begin” and “Maneuver Complete” at appropriate times.
- Establish and hold altitude and airspeed during maneuver.
- No change in radius of each circle.
- Pilot enters both circles of the “8” at the same place (show center).
- Enters and exits on the upwind leg.

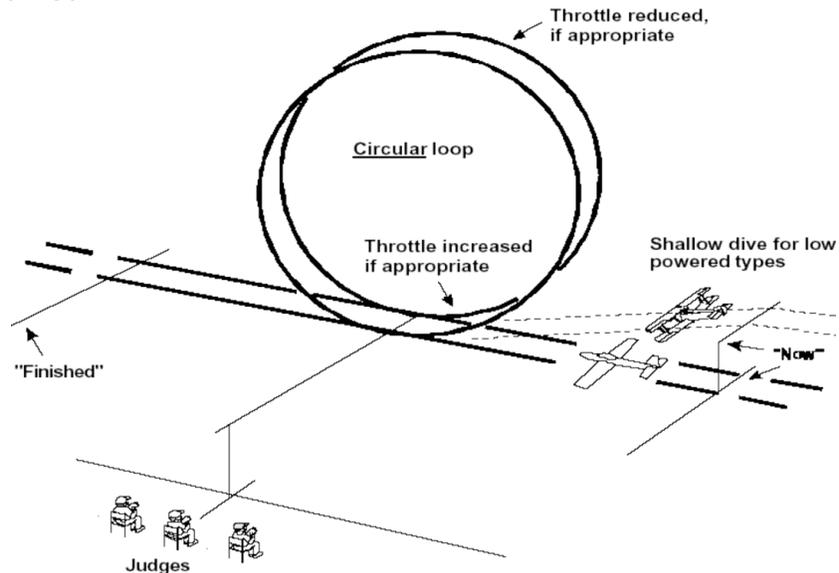
***Common Errors:***

- Pilot forgets to call “Maneuver Begin” and “Maneuver Complete” at appropriate times.
- Altitude, airspeed, and radius changes.

- Maneuver airspeed to fast.

## 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. A shallow dive at full throttle is expected in order to pick up speed before commencing the loop. The throttle shall be reduced at the top of the loop and opened again when normal flight is resumed.



*Note: While the loop is intended to be a circular maneuver, the ability of a trainer to achieve a perfect circle is extremely difficult. A slightly elongated loop is expected, but a grossly misshapen circle would be significantly down marked.*

### **What the Judges are looking for:**

- Pilot announces "Maneuver Begin" and "Maneuver Complete" at appropriate times.
- Reduced throttle at the top of the loop.
- Vertical plane maintained perpendicular to the judges.
- Top and bottom of the loop centered on judges.

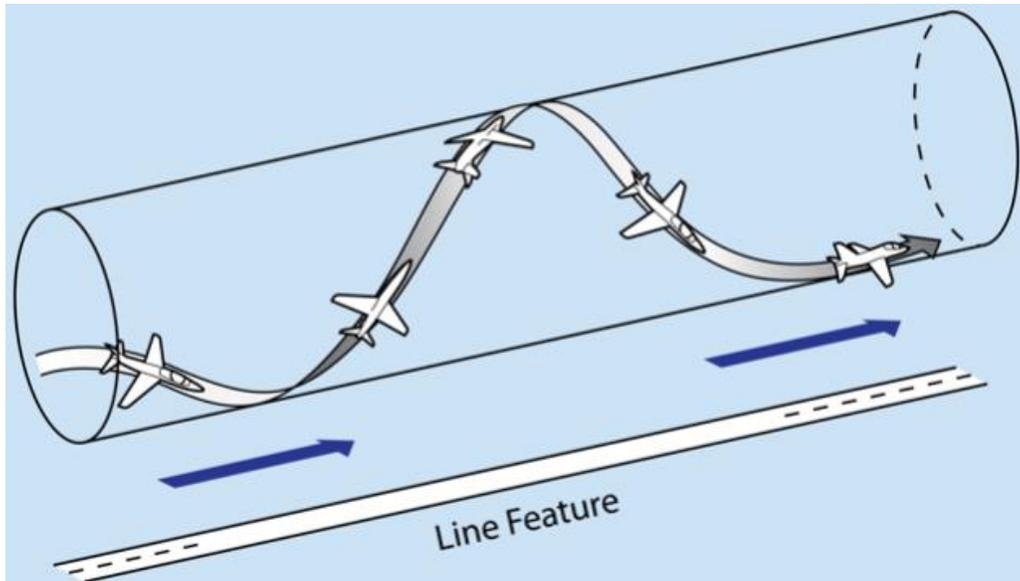
### **Common Errors:**

- Pilot forgets to call "Maneuver Begin" and "Maneuver Complete" at appropriate times.
- Track of loop not vertical.
- Loop not sufficiently circular and/or corkscrewed.
- Inappropriate use of throttle.
- Maneuver not flown parallel with judges' line and/or not centered on judges' position.
- Does not resume straight and level flight on same track and altitude as entry.

- Too far away / too close / too high / too low.

## BARREL ROLL

The model should begin with a shallow dive to pick up speed, the nose should then pull up and the model begins what appears to be a climbing turn. Continued application of ailerons in the turn will roll the model which, when inverted, may be as much as 90 degrees off its original heading. No down elevator is applied in the inverted position so the nose will fall as both turn and roll continue till the model returns to the upright position at the same altitude and on the same heading as the entry. The barrel roll orbit should be big and fat like a beer barrel.



### ***What the Judges are looking for:***

- Pilot announces “Maneuver Begin” and “Maneuver Complete” at appropriate times.
- Shallow dive at full throttle before the maneuver starts.
- Roll at a constant rate.
- One complete rotation.
- Resumes straight and level flight on the same track.

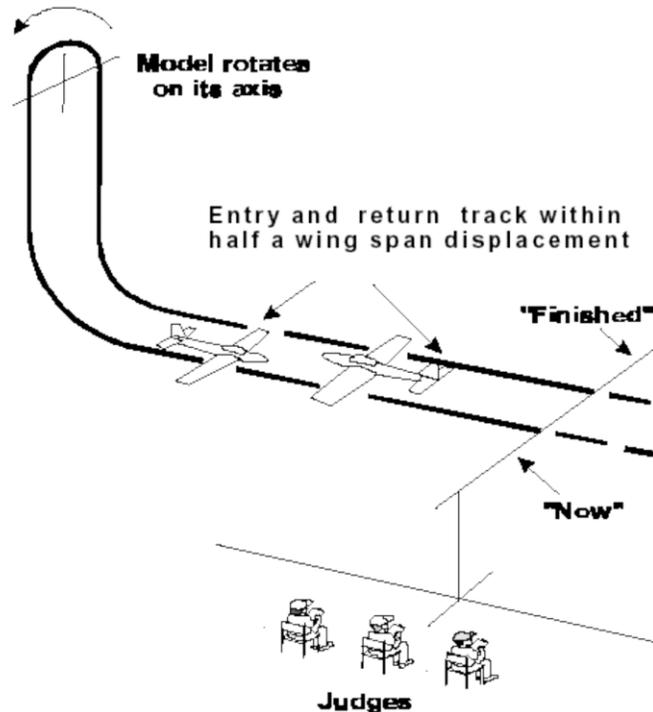
### ***Common Errors:***

- Rate of roll is not constant.
- Entry and exit at different heights and speeds.
- Entry and exit tracks and line of roll not parallel with judges’ line.
- Model does not finish maneuver on same heading and/or altitude as entry.
- Inappropriate use of throttle.
- Too far away / too close / too high / too low.
- Maneuver is not centered in front of the judges.

- Pilot forgets to call “Maneuver Begin” and “Maneuver Complete” at appropriate times.

## STALL TURN

The trainer starts in level flight, noses up to a vertical flight path until it comes to a stop. At which point the model aircraft yaws through 180 degrees, then dives and finally recovers straight and level on a flight path in the opposite direction to the entry. Entry and exit should be at the same height. The competitor shall specify whether the turn shall be to the left or right. Trainers are expected to execute a shallow dive at full throttle in order to pick up the necessary speed before commencing the maneuver.



### ***What the Judges are looking for:***

- Pilot announces "Maneuver Begin" and "Maneuver Complete" at a point centered on the judges.
- Entry and exit at the same altitude.
- Climb and descent near vertical.

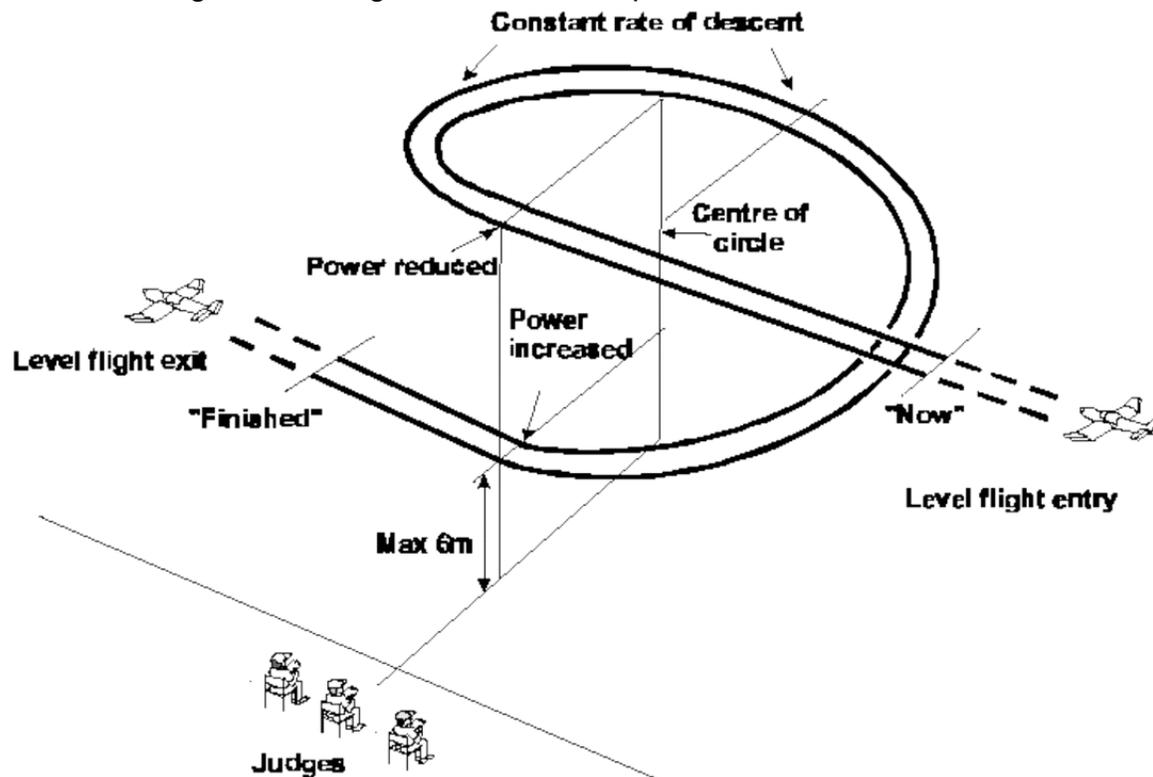
### ***Common Errors:***

- Start and finish not parallel with judges' line.
- Pull up not positioned to give best view to judges.
- Insufficient height gain.
- Model aircraft does not stop.
- Competitor does not specify or achieve nominated left / right turn.
- Entry and exit paths are not at same height.
- Model aircraft does not exit within half span displacement of entry track.
- Entry and exit paths not parallel with the judges' line.

- Too far away / too close / too high / too low.

## DESCENDING 360

During this maneuver, the aircraft makes a shallow 360 degree turn while maintaining a descent. The pilot may establish his/her preferred altitude to enter. Once altitude is established, the pilot will call, "Maneuver Begin". He/she will then reduce power and establish his/her turn and descent rate. Both the radius of turn and descent rate will be maintained and unaltered until the aircraft is in the same direction and point it began the maneuver. The aircraft should be at the exact same location, just at a lower altitude. Pilot will then increase throttle and exit straight out calling, "Maneuver Complete".



### ***What the Judges are looking for:***

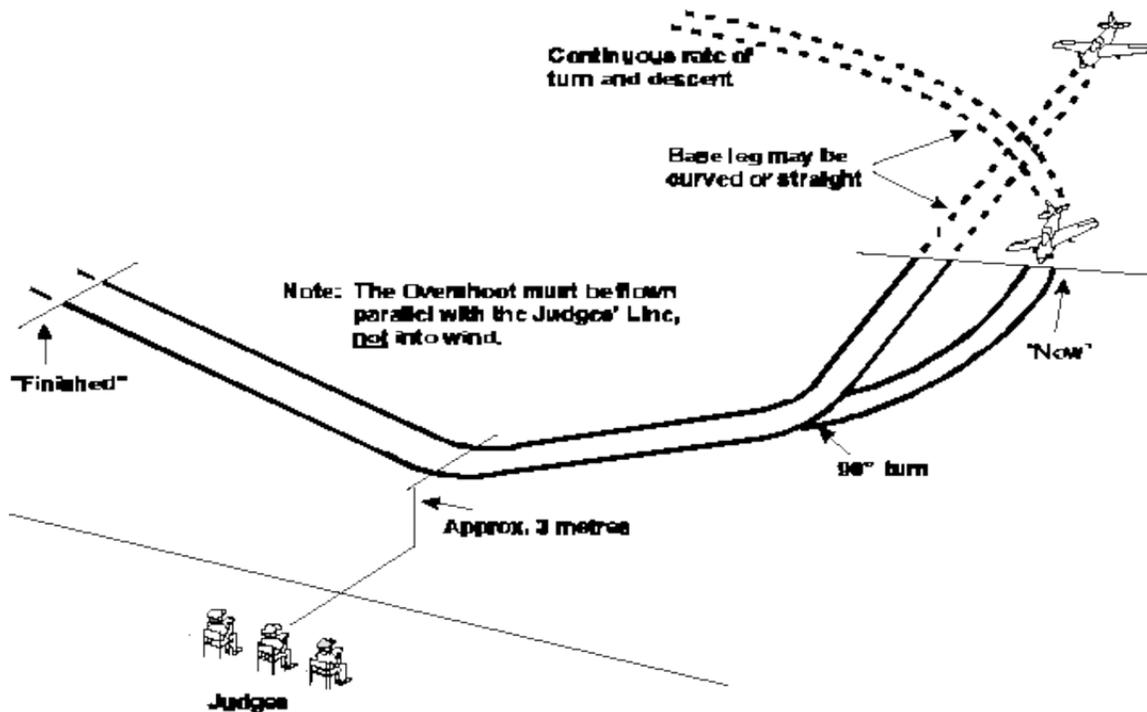
- Pilot announces "Maneuver Begin" and "Maneuver Complete" at appropriate times.
- Pilot enters and exits at show center.
- Radius, airspeed and descent maintain constant until maneuver complete.

### ***Common Errors:***

- Pilot forgets to call "Maneuver Begin" and "Maneuver Complete" at appropriate times.
- Maneuver not performed at show center.
- Pilot exits at a different point then when he/she entered.
- Radius, airspeed, and/or descent changes during maneuver.

## MISSED APPROACH

In this maneuver, the aircraft is set up for landing and must abort for any reason. The pilot must demonstrate controllability throughout the approach and climb out. The pilot will set up for a landing with the centerline of the runway and call, "Maneuver Begin". Just before landing (approx. within 5 feet), he/she will declare "Missed Approach" and gradually increase power to full and establish a normal climb angle and climb out while maintaining runway centerline. Once pilot has established a safe altitude, he/she will call, "Maneuver Complete".



### ***What the Judges are looking for:***

- Pilot announces "Maneuver Begin" and "Maneuver Complete" at appropriate times.
- Pilot establishes correct glide path to landing.
- Pilot announces "missed approach" within 5 feet of touchdown.
- Smooth power transition and climb angle.
- Maintain centerline of the runway.

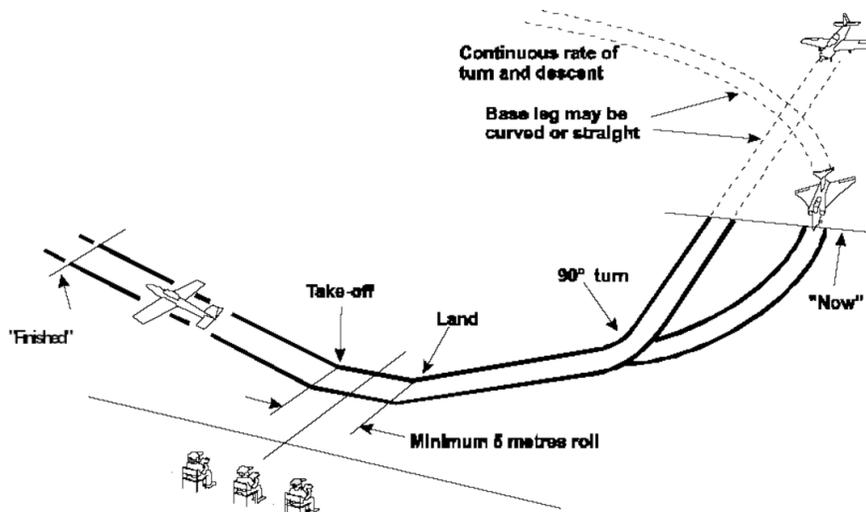
### ***Common Errors:***

- Pilot forgets to call "Maneuver Begin" and "Maneuver Complete" at appropriate times.
- Pilot approaches too fast.
- Aircraft missed approach too high, or aircraft actually touches down.

- Erratic power changes and climb angle.

## TOUCH AND GO

In this maneuver, the aircraft will perform a full landing followed by an immediate takeoff. The pilot will set up for a landing with the centerline of the runway and call, "Maneuver Begin". This should begin just after the turn from the base leg to final approach. A smooth and gradual descent should be performed. This maneuver should be a smooth landing on the centerline of the runway with power cut off at touch down. The aircraft will then roll for approximately 10 feet (on the centerline of the runway) and power will then gradually be applied. Liftoff should consist of the airplane pitching up with the nose wheel leaving the runway first followed by the main gear. A constant rate of climb (between 20 and 30 degrees) is achieved until approximately 60 feet when the pilot will call "Maneuver Complete".



### **What the Judges are looking for:**

- Aircraft maintains constant descent angle to touchdown.
- Good flair with main wheels touching down, no bouncing.
- Aircraft maintains centerline of the runway.
- Applies throttle smoothly.
- Smooth rotation and constant climb out.
- Maintains directional control (no heading change).
- Calls "Maneuver Complete" at approximately 60 feet altitude.

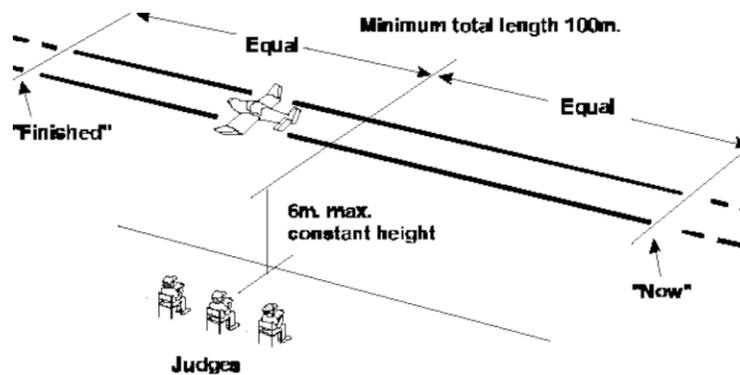
### **Common Errors:**

- Pilot forgets to call "Maneuver Begin" and "Maneuver Complete" at appropriate times.
- Aircraft deviates from descent, climb-out angle, and/or heading.
- Aircraft makes a rough touchdown and/or bounces.
- Aircraft deviates from centerline after touchdown.
- Erratic throttle control.

- Rotates too soon or too late (aircraft balloons).

## SLOW SPEED INSPECTION PASS

The model shall fly straight along a path parallel to the runway that is over the far edge, the edge away from the spectators, at an altitude of between 10 and 20 feet. The model shall be flown at the fly-past altitude for at least five (5) seconds. The midpoint of the maneuver should be opposite the judges. The pilot will start from the far end of the flight line and establish heading, and altitude. Once this occurs, pilot will then state "Maneuver begin". Once the plane has passed the judges, pilot will state, "Maneuver complete".



*Note: Pilot must demonstrate controllability at low airspeed or "slow flight" and must use power changes to correct altitude and speed if need be. Once "slow flight" speed is established, pilot must demonstrate he/she can maintain that speed, heading, and altitude.*

### **What the Judges are looking for:**

- Pilot Calls "Maneuver Begin" and "Maneuver Complete" at appropriate times.
- Clear established heading and altitude so the plane flies perpendicular to the judges at show center.
- No change in heading or altitude during the maneuver
- Slow airspeed, pitch up angle of attack.
- Immediate correction for wind/thermal changes.

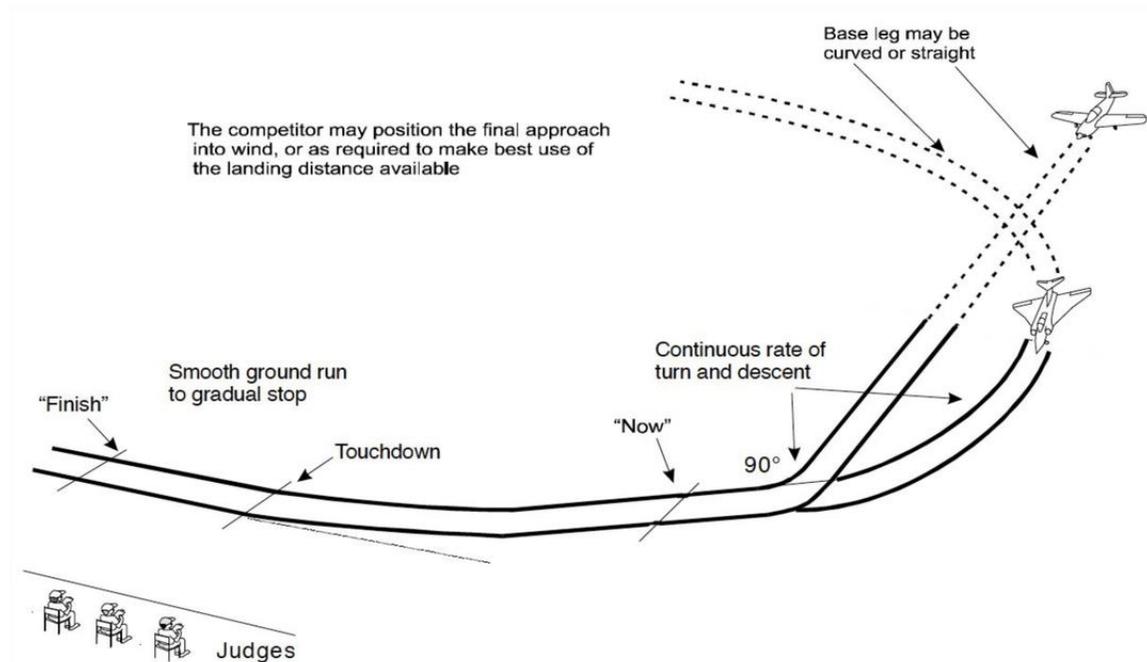
### **Common Errors:**

- Pilot forgets to call "Maneuver Begin" and "Maneuver Complete" at appropriate times.
- Heading or altitude never established.
- Heading and or altitude changes with no correction.
- Pilot fails to correctly call his/her maneuvers.
- Pilot gets the plane too slow or not slow enough.
- Pilot does not keep constant speed throughout the maneuver.

- Altitude too high or too low, or aircraft too close or too far from judges.

## LANDING

This maneuver should be a smooth landing on the centerline of the runway with power cut off at touch down. Pilot will align the aircraft in a landing configuration and call “Maneuver Begin” at around 30 feet altitude. A gradual approach to touchdown should be made with the main wheels touching down first followed by the nose wheel. The aircraft should touch down at the centerline and rollout on the centerline with no deviation. Once the aircraft has slowed down to “taxi” speed, the pilot calls, “Maneuver Complete”.



### **What the Judges are looking for:**

- Pilot Calls “Maneuver Begin” and “Maneuver Complete” at appropriate times.
- Aircraft maintains constant descent angle to touchdown.
- Proper use of rudder to maintain heading and aileron to keep wings level.
- Good flair with main wheels touching down, no bouncing.
- Aircraft maintains centerline of the runway.

### **Common Errors:**

- Pilot forgets to call “Maneuver Begin” and “Maneuver Complete” at appropriate times.
- Aircraft deviates from descent.
- Aircraft makes a rough touchdown and/or bounces.
- Aircraft deviates from centerline after touchdown.

## REALISM

Awarding points for realism during the flight maneuvers is probably the most difficult and controversial aspect of judging scale models. The presentation of a realistic flight by a contestant should be given some attention prior to the contest. Most important is to only perform flight maneuvers that were capable of being performed by the prototype aircraft.

The speed at which such maneuvers are performed should also reflect the capabilities of the prototype. Consideration should also be given to throttle position during maneuvers. In many of full-scale prop driven aircraft, power must be reduced at the point of maximum altitude in a vertical maneuver before entry into the descent portion. Execution of such maneuvers by a model at a constant full throttle, which should be obvious by the sound of the engine, should be grounds for a reduction in score.

The size of a maneuver will also be influenced by the physical size of the model. Consideration should be given in all maneuvers to the forces that would be exerted on the full-scale counterpart. Exceedingly small or tight maneuvers with unnecessarily high rates of roll, pitch or yaw do not simulate the performance of the majority of full-scale aircraft and should be downgraded accordingly.

Finally, the contestant should acknowledge that the smoothness or gracefulness of the flight presentation will have a large impact on its realism. Sudden jerks and attendant changes in heading should be avoided unless the contestant is willing to prove that such motions were characteristic of the prototype when it performed that maneuver. These motions would represent high "g" forces, perhaps exceeding the full-scale tolerances, and the judges are justified in downgrading for them unless they can be shown to be typical of the full-scale aircraft's performance.

Similarly, the transition from ground to air and vice versa during takeoff and landing should be smooth. The judge should consider himself to be a passenger in the model and assess these maneuvers in terms of the effect they would have on his wellbeing. Many of the so called "average" landings by RC models would result in collapsed landing gear in a full-scale aircraft or, at the very least, severe bodily discomfort to any passengers.