

U.S. POSTAGE
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Wash., D.C.
Permit No. 2374
Non-Profit Org.

OFFICIAL AMA SAFETY CODE

GENERAL

1. I will not fly my model aircraft in competition or in the presence of spectators until it has been proven to be airworthy by having been previously successfully flight tested.
2. I will not fly my model higher than approximately 400 feet within 5 miles of an airport, without permission of the airport operator. I will give right of way to, and avoid flying in the proximity of, full scale aircraft. Where necessary an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full scale aircraft.
3. Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless, and/or dangerous manner.

RADIO CONTROL

1. I will have completed a successful radio equipment ground range check before the first flight of a new or repaired model.
2. I will not fly my model aircraft in the presence of spectators until I become a qualified flyer, unless assisted by an experienced helper.
3. I will perform my initial turn after takeoff away from the pit, spectator, and parking areas, and I will not thereafter perform maneuvers, flights of any sort, or landing approaches over a pit, spectator, or parking area.

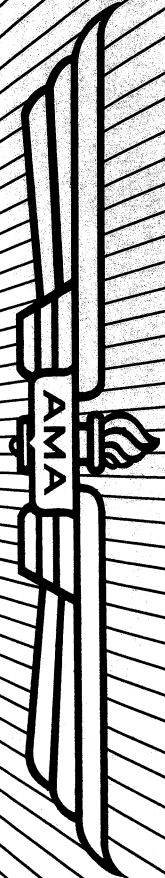
FREE FLIGHT

1. I will not launch my model aircraft unless at least 100 feet downwind of spectators and automobile parking.
2. I will not fly my model unless the launch area is clear of all persons except my mechanic and officials.
3. I will employ the use of an adequate device in flight to extinguish any fuses on the model after it has completed its function.

CONTROL LINE

1. I will subject my complete control line system (including safety thong, where applicable) to an inspection and pull test prior to flying.
2. I will assure that my flying area is safely clear of all utility wires on poles.
3. I will assure that my flying area is safely clear of all non-essential participants and spectators before permitting my engine to be started.

27.145 SHOULD BE RED
27.145 SHOULD BE YELLOW
ERROR, PAGE 39



1973 Official Model Aircraft Regulations



Governing Sporting Model Aviation in America
Issued by the Contest Boards of the

ACADEMY OF MODEL AERONAUTICS

Under the Franchise of

NATIONAL AERONAUTIC ASSOCIATION

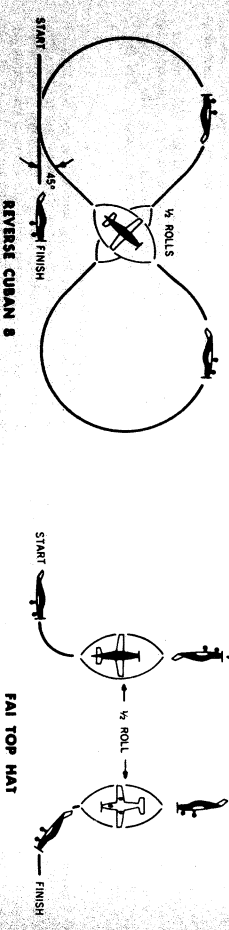
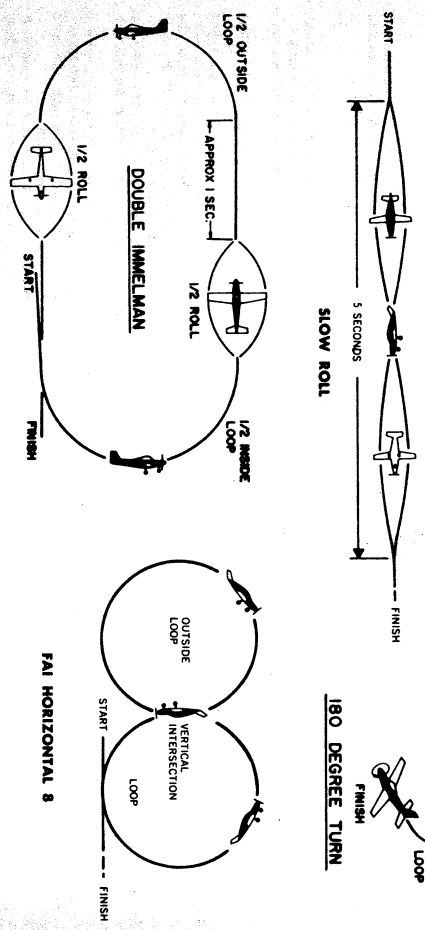
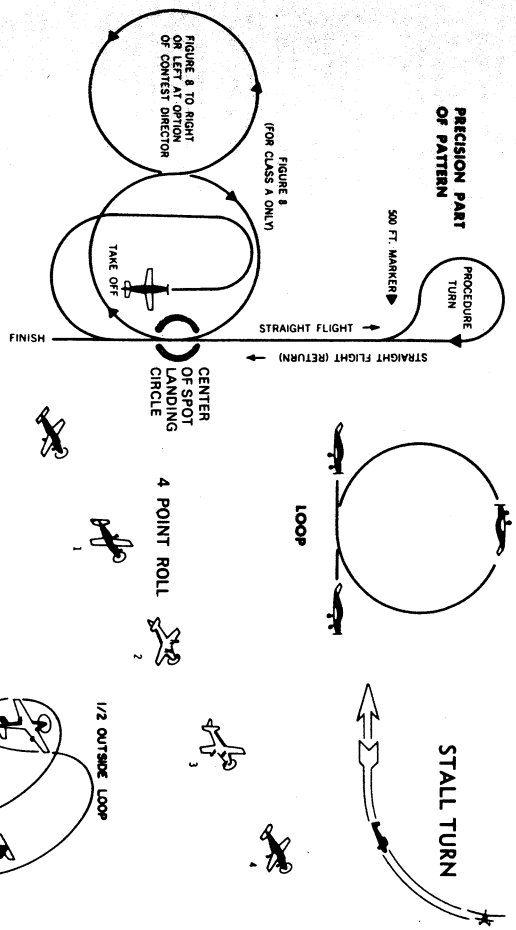
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FEDERATION AERONAUTIQUE INTERNATIONALE

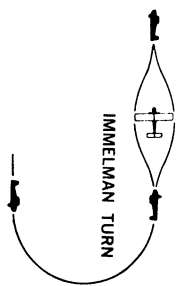


75¢

AMA RC PATTERN MANEUVERS



Maneuver Drawings Courtesy of Model Airplane News



flights have been scored during the normal contest time, the highest single flight score of the contestants concerned shall determine the higher place). There is no minimum number of flights which must be scored.

12.2. Determining the winner in Class D shall be the same as for Classes A, B, and C except the total of the best three flights shall be used. Unless otherwise designated by the CD, ties will be broken by a single flyoff which must take place within an hour of the normal contest finishing time.

13. **Flight Pattern.** The contestant must fly his entire flight according to the established Flight Pattern for his particular class and in the sequence listed. Maneuvers performed out of order will not be judged.

13.1. Contestant (or his helper) may not touch his plane after it has become airborne until completion of flight; i.e., he may not land plane between maneuvers in order to make adjustments to engine, trim, etc.

13.2. The contestant must call out each maneuver before he attempts to perform it. Call out shall be made just prior to execution. Also, the flyer shall use the straight flight time at the end of each maneuver to announce, "maneuver complete."

14. Class A Pattern Maneuvers.

1. Takeoff
2. Straight Flight Out
3. Procedure Turn
4. Straight Flight Back
5. Figure Eight
6. Three Rolls*
7. Immelman Turn
8. Three Inside Loops
9. Stall Turn
10. Traffic Pattern Approach
11. Landing Perfection
12. Spot Landing

*Rolls may be Axial or Barrel. Judges are to assume Axial if Barrel is not specified by contestant.

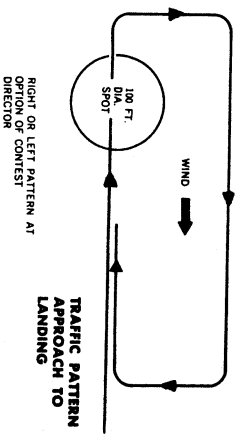
15. Class B Pattern Maneuvers.

1. Takeoff
2. Touch and Go
3. Three Axial Rolls
4. Three Inside Loops
5. Four Point Roll
6. Three Rolls
7. FAI Horizontal Eight
8. Cuban Eight
9. Three Outside Loops
10. Traffic Pattern Approach
11. Landing Perfection
12. Spot Landing

16. Class C Pattern Maneuvers (Novice and Expert).

1. Takeoff
2. Touch and Go
3. Three Horizontal Rolls
4. Three Inside Loops
5. Four Point Roll
6. Figure M
7. Horizontal Eight
8. Double Immelman
9. Three Outside Loops
10. Reverse Cuban Eight
11. Slow Roll
12. 180 Degree Turn
13. Top Hat
14. Three Turn Spin
15. Landing
16. Spot.

17. Class D Pattern. The Class D Pattern shall be the current FAI Pattern as described elsewhere in this publication.



18. **Suggested Field Procedure.** The procedures listed below are suggestions to Contest Directors for operation of an RC Pattern event; and may be altered to fit local conditions.

18.1. FAI Contestants shall be set up in "pits" at spot assigned by Event Director, so they will be under his immediate control.

18.2. There will be no testing of transmitters or receivers during the flying period. Transmitters may be impounded at discretion of Event Director. Any person causing interference will suffer moderate disqualification. The Event Director will provide a monitor receiver to check for interference.

18.3. The flight order shall be determined by position of contestants' signatures on a flight List held by Event Director or his representative. This list shall include all classes and any one time; names may be moved to bottom of List on request, but trading of positions with other contestants is not allowed. When a contest is to be continued on a following day, the flight List shall carry over from day to day.

18.4. Event Director shall carry out following procedure:
18.4.1. Numbers 1, 2 and 3 on Flight List shall be on flight line with their models, equipment, and one helper if desired. No 1 is contestant flying or ready to fly. No 2 is next man to fly. No 3 is release model) from completion of preceding flight in which to start flight. No 4 man becomes No. 3 and shall be requested to move his model and equipment onto the flight line. If he is not on hand to do so, he shall be dropped from the Flight List, and the List advanced to fill his place. The Event Director or his representatives shall be responsible for notifying contestants when they are to move to ready box or flight line.

18.4.3. Numbers 4, 5, and 6 on the Flight List shall have their planes and equipment in a ready box located near the flight line. As soon as a flight is completed, the No. 4 man becomes No. 3 and shall be requested to move his model and equipment onto the flight line. If he is not on hand to do so, he shall be dropped from the Flight List, and the List advanced to fill his place. The Event Director or his representatives shall be responsible for notifying contestants when they are to move to ready box or flight line.

18.5. When technically possible and when judges and space are available, it is strongly recommended that two or more flights be flown simultaneously, under the following conditions:
18.5.1. Separate takeoff and landing areas sufficiently spaced cross wind from each other to minimize engine noise and flight path interference.

18.5.2. Contestants flying simultaneously shall carefully check receiver and transmitter operation before takeoff, to be sure no interference between them is possible.

18.5.3. Contestants flying simultaneously must be no more than three positions apart on the Flight List. Event Director or representative shall, where possible, select contestants at top of Flight List so that contestants flying on compatible frequencies are on flight line together.

18.5.4. Should a contestant oppose flying simultaneously with someone else, he may cancel his turn and re-sign at the bottom of the Flight List.

18.6. Officials. An Event Director, a Dispatcher-Recorder and Judges are the essential officials for an RC Event. If possible, the Dispatcher-Recorder should have at least two helpers.

18.7. Each flight should be judged by at least two judges, with their scores averaged to give final score for the flight. It is suggested that each maneuver be scored immediately after it is completed, between them. There should be enough judges available to establish a rotational procedure which will average out variations in judging.

19. **Description of Maneuvers.** A detailed description of each maneuver specified in the above patterns will be found in the AMA RC Pattern Judges Guide, or the FAI RC Aerobatics Rules.

AMA RC PATTERN JUDGES GUIDE

A. Purpose. The purpose of the AMA RC Judges Guide is to furnish an accurate description of each maneuver listed in the three Pattern Even classes, and to provide a reference for use in developing a uniformly high standard of judging in all AMA sanctioned contests.

Study of this guide by the competitor will help him learn exactly what is expected, while study by the judges will help them decide precisely how well the competitor comes up to these expectations.

B. Principles. The principles of judging an RC model should be based on the performance with which the model simulates full scale aircraft performance. The main criteria for perfection in an individual maneuver can be classified as follows:

1. Positioning of the maneuver.
 2. Positioning or display of the maneuver.
 3. Size or dimensions of the maneuver.
 4. Smoothness or gracefulness of the maneuver.
- All of these requirements must be met in order for a maneuver to be rated perfect. They are discussed below.

a. Precision. At the instant the contestant announces his next maneuver, the judge should form an image of the course the airplane should follow during the performance of the maneuver. The precision of the maneuver will then be based on how well the model tracks through this imaginary course.

Competitors will read this statement and exclaim, "How am I to know what the judge imagines is a perfect course?" The answer to this is that once the model has locked in on the straight and level entry portion of a maneuver the only real disparity that can exist between the judge's and the competitor's image is the size of the maneuver. The judge will have some preconceived ideas about optimum size as discussed in a later section. However, the judge should modify his image if the first portion of the maneuver clearly demonstrates that the contestant intends to do a maneuver of much smaller or larger dimension than the judge first imagined.

It will be noted that forming an image of the forthcoming maneuver is based on using the straight and level entry as a reference. If the contestant fails to go through this portion of an image before the start of the maneuver, the absence of a definite entry into a maneuver therefore increases the difficulty of judging its precision and competitors will recognize this as justification for downgrading.

The straight and level exit from a maneuver is one of the more valuable portions of the maneuver in evaluating how well the inherent skills of the maneuver was followed. The well-polished pilot will be sure to make the maneuver completed, while the less competent pilot will fall short in hopes that the judge will not notice that the departed with respect to entry heading. The absence of a well defined straight and level exit therefore should also result in downgrading.

b. Positioning. To achieve perfection, the competitor must position his maneuvers in a way that they can be easily judged. The first consideration on position is longitudinal distance from the competitor. It goes without saying that the judge should be located near the competitor so that they obtain identical views of the maneuver. The competitor should center his aerobatic maneuvers at an average distance of less than 300 feet from himself. In short, the judge should be unmerciful if he gets the impression that the competitor is trying to hide his defects by flying at a great distance.

Positioning of maneuvers involves more than mere distance. They should also be presented in a relative direction which displays the most difficult aspects of the maneuver. Specifically, maneuvers which have circular symmetry (such as Loops, Immelmans, Cuban Eights, and FAI Horizontal Eights) should have the "holes" in their circular path clearly visible, preferably in a plane exactly perpendicular to the line of sight to the model. The same applies to the Square Eight.

The diagrams used to describe these circular maneuvers in the official rule book depict the best view to present to the judge. "End on" or "sawed" presentation of these should result in downgrading since it increases the difficulty of judging the symmetry of figure 8's and the "tracking" of consecutive loops.

While no special bonus is justified for exceptionally low altitude, excessively high altitude is cause for downgrading. Most maneuvers can be done at less than 300 feet longitudinal distance than about a 45 degree angle. If maneuvers are done at high altitudes and close to or above the transmitter in a way that they force the judge to look up vertically or near vertically, they should be downgraded. The main reason for this is that most maneuvers cannot possibly be properly oriented when performed directly overhead. However, a comment to competitors is in order here. This downgrading is almost an automatic reaction after a judge has been on the runway a few hours. He usually has a tired neck from looking at some maneuver which must be followed overhead, and he is prone to be severe if he is forced to look there unnecessarily.

By the same token, most judges will refuse to even look at the remainder of a maneuver after an aircraft crosses the sun often unnecessarily. There are also some places where the sun often

cannot be avoided and the judge should follow through to the best of his ability. But he is completely justified in scoring zero if in his opinion the maneuver could have been placed elsewhere.

c. Size of Maneuvers. In the previous section it was pointed out that most maneuvers could be safely done at an average distance no greater than 300 feet from the competitor and judges, and at a 45 degree elevation angle. These criteria place an upper limit of about 350 feet for the total vertical size of a maneuver. Most competitors and judges will recognize this as more than ample. It should also be recognized that 300 feet of horizontal distance is a maximum value and not really the optimum. For example, an inside loop of 100 feet diameter at 150 feet longitudinal distance would stay within the 45 degree angle and a safe altitude and would be more clearly visible to the judge than at 300 feet distance. The competitor who performs loops more critically and he should suffer no downgrading for positioning. On the other hand, a 100 ft. diameter loop at 300 ft. distance might be downgraded.

The optimum size of maneuvers is related to some extent on the size and normal flying speed of the model. For example, loops of 20 to 30 feet diameter done by a 2 ft. wingspan airplane would not necessarily look poor or out of scale. However, 20 or 30 ft. diameter loops by a 50 mph multi job give the impression that an imaginary pilot in full scale simulation would be downright uncomfortable if not "blacked out" due to the high "g" forces. Exceedingly small or tight maneuvers will unnecessarily high rates of roll, pitch or yaw do not simulate full scale performance and they should be downgraded accordingly.

d. Smoothness and Gracefulness. These two factors are inter-related with size of the maneuver and therefore again are related to normal flying speed of the model. Various judges and competitors will have different opinions of what actually constitutes smoothness and gracefulness. The most general definition must again be related to full scale simulation and the effects of the maneuver on an imaginary pilot or passenger in the plane. On a touch-and-go or landing, for example, the judge might imagine the airplane as a landing gear on wheels. Many of the so-called "average" landings by RC models, in this equivalent situation, would result in steering off of the landing gears and a total loss of the airline company's profits and equipment.

It is recognized that few RC judges have ever been passengers in full scale aircraft. The "g" forces in a takeoff maneuver are not to be compared with the "g" forces in a takeoff maneuver. To violate maneuver rules, such as a snap roll or spin, however, is to violate maneuver rules. A 30 ft. diameter loop at 50 mph results in about 10 g's, which is close to or excess of the design limits of most full scale aerobatic aircraft. Clearly, such tight maneuvers are not scale-like.

The matter of smoothness is basically related to scale-like appearance. For example, a perfect set of consecutive rolls should have a constant roll rate from start to finish. A perfect loop must have a constant radius defining a perfect circle. It cannot be made up of a series of straight flight increments with sudden angular jerks placed between. Such sudden jerks represent high "g" forces well in excess of full scale tolerances and maneuvers should be downgraded for this.

C. Accurate and Consistent Judging. The most important aspect of consistent judging is for each judge to establish his standards and then maintain that standard throughout the meet. It is advisable for the contest director or chief judge to hold a briefing prior to the start of the meet in order to make the standards as uniform as possible. This is done best by means of a practice flight which all judges score simultaneously and privately. After the flight, the defects in each maneuver should be discussed by all judges and a semblance of agreement reached about the severity of defects. Once this is done, however, and the contest is started, the individual judge should not alter his standards under any influence. The contest director should clearly define areas in which it is considered unsafe for competitors to perform, such as above spectators or over buildings, etc. It is highly recommended that the judges agree to register zero points for maneuvers done in these areas. Furthermore, for consistency, judges should exchange a quick nod of agreement to issue zeros immediately following an "over the crowd" maneuver. Nothing can cause more unrest among contestants than a zero and seven score of the same maneuver!

The responsibility for disqualifying pilots who persist in flying unsafe areas should be assigned to the judges by the C.D. The definition of unsafe areas should be absolutely unambiguous. For example, it should be stated that "maneuvers performed over the spectator area will be scored zero" and not that "maneuvers can be performed over the spectators at a safe altitude." Obeying such safety regulations is just one more of the many pressures associated with winning a competition, and the man who overcomes all pressures is more expert than one who does not.

D. Judging Individual Maneuvers. The schedule of maneuvers to be performed is described in the RC Pattern Rules. Each maneuver is to be judged individually on a basis of 0 to 10 points according to

the degree of excellence.

A common problem in judging is to score the first flights too high. When in doubt, give the lower score. Remember that perfection is not a relative term. Perfection is that maneuver in which you see absolutely no flaws. It is not a common occurrence, and then a number of years of downgrading are listed. The defects observed: (2) the severity of the individual defects; and (3) the number of times any one defect occurs.

For example, a small single change in heading during the taxi portion of the touch and go would be considered one defect while two or three distinct turns would be considered two or three defects. It will be noted that for many maneuvers there are more than ten possible kinds of defects and that some of these can be repetitive. It will not be possible to downgrade one point for each defect or indeed we would have many negative scores. A score of 10 should be given only if the maneuver is well positioned and no defects are observed. One or two minor defects should result in downgrading to at least an 8 while one severe defect should put it down to 6 as should a combination of three or four minor defects. Any element in poor positioning should be decided at the start of the maneuver and also fed into the final score for the maneuver.

E. Description of Maneuvers.
Note: Precision ground handling of "Proto Taxi" maneuvers at the beginning and end of each flight is not required. However, in the interest of safety and conserving realism, a certain amount of ground control is considered desirable.
In order to discourage the use of competition aircraft without positive means of directional control on the ground, a taxi demonstration is now required as part of the takeoff maneuver. The taxi demonstration will be scored on quality. However, if it is not performed, the takeoff maneuver will automatically lose five (5) points. In other words, if a contestant fails to perform the taxi demonstration and then makes a takeoff worth 5 points or less, his takeoff score will be zero.

Taxi Demonstration. Prior to takeoff, the plane must be taxied from the Starting Box a distance of approximately 10 feet, including a control turn of at least 90 degrees, and come to a complete stop. If there are strong winds, the CD may allow a substitution of an "S" turn, which will serve to demonstrate ground control while avoiding the unnecessary risk of upsetting the model. A flyer not performing this demonstration will automatically lose five (5) takeoff points.
If the engine stops during Taxi Demonstration, the flyer will automatically lose five (5) Takeoff points. The Taxi Demonstration will not be considered finished until the contestant announces the Takeoff score is zero. Engine may be restarted, and flight continued, if still within the two minute starting period.

Takeoff. The model must start from a standstill following the taxi demonstration. Model shall accelerate gradually and the takeoff run shall be in a straight line. Plane shall lift off gently and climb at a gradual angle, continuing in its straight flight path until at least six feet off the ground. Pilot shall call "takeoff" ("maneuver") when model has gained at least six feet of altitude and is still climbing out in a straight flight path.
The takeoff should be downgraded for the following reasons (in addition to loss of 5 points for no taxi demonstration):

1. Pushing or assisting the model when run.
2. Changes in heading during the takeoff run.
3. "Jumping" from the ground.
4. Retouching the ground after becoming airborne.
5. Too steep a climb angle.
6. Gallups in pitch, roll or yaw during climb.
7. Changes in heading during climb.
8. Dropping a wingtip.

Straight Flight Out. The model must be brought exactly over the center of runway and/or landing circle and down in an absolutely straight path into the wind for a distance of approximately 300 feet before starting the Procedure Turn. (Distance does not have to be accurate; however, judges may specify start of turn if they wish).
Straight flight may be downgraded because:

1. Does not fly over center of runway and/or landing circle.
2. Plane deviates left or right.
3. Does not hold constant altitude.
4. Turns before permission is given by judge.
5. Gallons in elevation.

Procedure Turn. After the straight flight, the model must turn exactly 90° to the left or right, whichever will take the plane away from the spectator line (direction to be specified by the Contest Director). Then exactly 270° to the right (or left) and cross over the point where the first turn commenced. The turn may be downgraded because:

1. Left turn not 90°.
2. Right turn not 270°.
3. Changes in altitude during turn.
4. Turns not smooth and circular.
5. Does not head back over exact outgoing path.

Straight Flight Back. The model should fly back toward the circle along the same line as the outgoing path and pass exactly over the circle. The Straight Flight Back may be downgraded because:

1. Turns or wiggles during straight flight.
2. Changes in altitude.
3. Gallons in pitch, yaw or roll.
4. Flight not along original path.
5. Does not pass over circle.

Figure Eight. (Class A only). Directly after the Straight Flight Back into the instant the plane crosses over the circle, the model starts into the first loop, figure 8. The figure shall be performed to the start of the second turn, and down away from the spectators to the base of the 8 or the end of the second turn. A maneuver is made to left or right, depending on "Figure Eight" maneuver is finished on same heading as its entry. The Figure Eight should be downgraded for the following:

1. Entry not directly over the circle.
2. First half circle not smooth or round.
3. First half circle changes altitudes in pitch, roll or yaw.
4. First half circle changes altitudes.
5. Turn 7. Same as 7 thru 4 for second full circle.
6. Model does not complete second full circle at same cross-over point as finish of first half circle.
7. Turn 11. Same as 2 thru 4 for third half circle.
8. Does not finish on same heading as entry.
9. Does not finish directly over circle.
10. Does not finish at same altitude as entry.
11. Does not fly by straight and level to complete maneuver.

Touch and Go. After a smooth and gradual descent on a straight line path into the wind, the model lands and slows down to taxi speed (approximately 1/4 the normal flight speed) but must not stop. Following this the model must accelerate and take off on the same heading as the entry. The maneuver may be downgraded for the following:

1. Approach during landing is too steep.
2. Gallons in pitch, yaw or roll during approach.
3. Model impacts or thuds onto ground due to lack of flare-out.
4. Model bounces on landing.
5. Model deviates left or right while rolling on ground.
6. Model fails to slow down to distinct taxi or "unairborne" condition.
7. Model stops on ground.
8. Changes in heading during the takeoff run.
9. "Jumping" from the ground.
10. Retouching the ground after becoming airborne.
11. Too steep a climb angle.
12. Gallons in pitch, roll or yaw during climb.
13. Dropping a wingtip.
14. Changes in heading during climb.
15. Model is too far away to be seen clearly at any time during the maneuver.

Three Axis Rolls. The model enters from a straight and level flight and rolls on its axis to the right or left until three complete rolls are performed. The recovery must be on the same heading and altitude as the entry. The consecutive roll maneuver should be downgraded for the following:

1. Model deviates left or right at the start of the rolls.
2. The plane does not roll on the axis of the rolls.
3. The plane does not roll on the axis of the rolls.
4. Puses between rolls throughout three rolls.
5. Sudden changes in heading between rolls.
6. The axis of the fuselage veers out at an angle to the flight path.
7. Plane changes altitude during rolls.
8. Plane does not roll exactly three rolls.
9. Plane is not level at end of rolls.
10. Plane fails to do level flight at end of rolls.

Immelmans Turn. The model starts the Immelman flying straight and level, pulls up into half loop followed by a half roll and finishes flying straight and level exactly 180° from the heading at entry. The Immelman may be downgraded because:

1. Model not level at start.
2. Model deviates left or right during half-loop.
3. Half-loop not completed exactly above point of commencement of half-loop.
4. Half roll does not commence immediately after half loop.
5. Plane deviates from a straight line during roll.
6. Model does not finish in level flight.
7. Model heading does not finish exactly opposite the direction of entry.

Three Inside Loops. The model starts the maneuver flying straight and level, then pulls up into a smooth, round loop, followed by a second and third loop in exactly the same path with a straight and level recovery to finish. The maneuver may be downgraded because:

1. During the first loop:
2. Loop not round and smooth.
3. Loop deviates left or right.
4. Finish of loop not at same altitude as entry.