

•		CL DIVE	BOMBIN	CL DIVE BOMBING AND STRAFING	TRAFING			
	-			Required Min	imum Diamet	Required Minimum Diameter of Each Line		
	M ex			Single Strand	_	Multi-Strand	Strand	•
(cu. in.)	Weight	Required Line Length	1 Line	2 Lines	3 Lines	2 Lines	3 Lines	Test
.15—.400	4 lbs.	59'9"-60'3"	.018"	.016"	1	.015"	1	1 66
.4014599	4 lbs.	59'9''-60'3''	.020"	.018"	ı	.018"	1	106

9 Official Flight. Three (3) attempts will be permitted toward two (2) official flights. An official flight is expected for a standard flight is expected for a spin and the pilot charged if ariphane has competed seven (7) laps and the pilot estignals for a sorting pass. Note: Once the pilot has signaled for a sorting pass, Note: Once the next time the airplant sorting pass he target area; whether or not he dives and attacks the passes over the target area; whether or not he dives and attacks the

targets.

An attempt will be charged if the pilot fails to start engine in three minutes time from signal from the judge. Two additional minutes will be allowed for each additional engine. An attempt will also be charged if pilot waves off flight before signaling for a

Scoring. Target balloon nearest the barrier pole is worth ten (10) points, the next is worth eight(8) points, then 6-4 and 2. Note: See field layout diagram.
 I. To qualify for bonus points planes must:

 A. Represent a combat type military plane of some country and

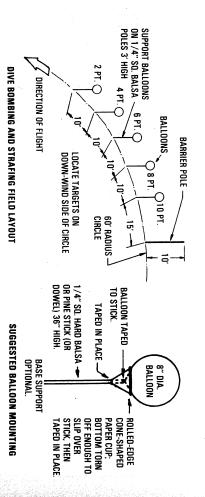
B. Break at least one target balloon according to the rules and comply with the rules of the "flight" paragraph.

10.2. Bonus points are to be awarded on the basis of realism of the airplane and workmanship displayed by the builder.

10.3. Multi-engine airplanes will receive five (5) additional bonus points for each additional engine. No points to be awarded for the first engine. All engines of a multi-engine plane must be running until the completion of the sooring bases. No passes will be permitted unless all engines are running. Pilots are not required by the first flat of the process. running until the completion be permitted unless all engines to make all five scoring passes.

Airplane Scale
Airplane Semi-Scale Bonus Breakdown: **Poor** 50 5 **Good** 75 20 Excellent 100 30

Note: Semi-scale includes full-bodied and profile types. 10.4 Final score equals speed in mph times sum of balloons broken plus bonus. Example: 40 mph X. 12 (6.4 & 2 balloons) plus 20.—500 points. Note: Bonus points are tentatively awarded before flight: I flight additions would result in a zero score.



AMA CLUBS ARE INSURED. IS YOURS?

27. RC PATTERN

1. Applicability. All pertinent AMA regulations (see sections titled Sanctioned Competition, Records, Selection of National Champions, and General) shall be applicable, except as specified

2. Objective. To control by radio a model airplane so that various planned maneuvers may be accomplished. The criterion is the quality of performance, not the mechanism of control. Recompetition shall be based on the excellence of performance of the model's maneuvers compared to similar maneuvers performed by a full size plane. Maneuvers shall be judged according to the AMA Radio Control Judges Guide.

Licensing Requirements. All radio equipment and operation must conform to the regulations of the F.C.C. AMA membership card and F.C.C. license of each enrant shall be checked a every sanctioned meet.

4. Model Aircraft Requirements.

4.1. Engine(s). Models shall be of the reciprocating internal combustion engine-powered type. Total displacement of the engine(s) shall not exceed 6.102 cubic inch (10 cs). Sixty percent the actual piston displacement (volume swept by the piston) of four of stroke cycle engines shall be taken for determining maximum displacement allowed.

4.2. Weight. No model may weigh more than 15 lbs. gross, ready

4.3. Controls. There shall be no radio equipment or aircraft control function limitations in any pattern class. Radio equipment is only limited by F.C.C. regulations.

4.4. Number of Airplanes. Two airplanes may be entered by a contestant and are to be number "\" and "\". The contestant may choose to enter either plane at the beginning of the meet and shall continue to use such plane unless, and until, said plane shall be damaged to the extent that it cannot be readily repaired. Contestant may then, upon approval of the Contest Director, substitute the second plane for the balance of the meet without penalty. Once this has been done, the contestant may not re-submit the first plane later in the same contest.

4.1. Substitution of basic components of the two entered aircraft, i.e., wing(s), tustage, or tail surfaces, will be considered one time. In this connection, each basic, detachable component of each aircraft must be marked as "\" and "\". Substitution rule does not apply to radio and engine.

events. 4.5. The Builder of the Model Rule shall not apply to the pattern

4.6. Identification. All models shall be identified by the contestant's AMA license number permanently affixed to the upper side of the right-hand lifting surface or to each side of the fiselage or vertical stabilizer. Height of the numberals must be at least one method in the stroke and width shall be such to enable ready recognition. It is suggested that the letter N be placed in front of the license number when the number is affixed to the side of the fisselage or vertical trabilizer. uselage or vertical stabilizer 4.6. Identification.

Safety Requirements. Considerations of safety for spectators, contest personnel, and other contestants are of the utmost importance in the event, and the following safety provisions must be observed.

5.1. All models must pass a general safety inspection by the Event Director or his representatives before they are allowed to

compete.

3.2 If any part of a maneuver is performed over a controlled speciator area the contestant shall receive a zero score for that maneuver. Continued flying over controlled speciator areas by any one contestant shall result in disqualification of the contestant by the Event Director.

5.3. Dangerous flying of any sort, or poor sportsmanship of any id, shall be grounds for disqualification of the contestant

5.4. Pilots shall remain near the judges while flying, and in particular shall stay off the runway and/or landing area during maneuvers which call be flying for taking off or landing with the center of the runway and/or landing circle.

5.5. All planes entered must have rounded prop spinners, or some sort of safety cover on end of propeller shaft (such as a rounded acommut"), Radius of point shall not be less than 1/s inch.

5.6. Knife-edge wings are not allowed.

6.1. Except as noted in the FAI RC Aerobatics section, all rules for the AMA pattern classes shall apply to the FAI pattern class.
6.2. In Classes C and D there shall be a sub-division into Novice and Expert. The methods of determining and controlling the Novice/Expert division are explained elsewhere.
6.3. The Contest Director and/or the sponsors of a sanctioned meet shall determine which of the classes will be flown, and such

information must accompany all advance notices pertaining to the contest. Competitors must also be advised prior to start of contest of any planned deviations from standard AMA rules pertaining to the events they have entered. Organizers of a contest may use either Class C or Class D for the top competition category, or, if time and planning permits, both classes may be used.

may enter any one pattern class at his own option. Once committed to a certain class, the will be allowed to move only to a higher skilled class in subsequent contests for the remainder of that particular year. However, if a flyer completes a calendar year of competition without even once placing first, second, or third at a sanctioned event in the class he is committed to, he may if he so chooses, start the new calender year in the next lower skill class. This does not apply to a flyer who has reached his class by winning three contests in the next lower skill class.

1.1. Contestants shall advance through the classes as follows: 7. Contestant Classification. Except as noted below, a contestant

After placing first, second, or third in three sanctioned ontests, in which he must fly in his chosen class (except in the case where the contestant's skill class is not being flown), he will be automatically advanced to the next higher class, i.e., from Class C or D. Novice or from Class C or D. Royer, or D. Novice or from Class C or D. Royer, there is not time limit for accumulating to Class C or D. Expert. There is not time limit for accumulating the three place wins required for advancement.

7.1.1. Contestants qualified for Class C Novice or Expert are also qualified for Class D. Novice or Expert.

7.2. The Contest Director of each AMA sanctioned RC meet having Class A, B, C/N, C/E, D/N, or D/E events is responsible for upkeep of the classification system. He must require that only all have valid F.C.C. licenses. As soon as the first, second, and brird place winners in each class are determined, the Contest Director shall fill out the appropriate spaces on the backs of their membership cards, indicating the date and the class won. He will also affix his verifying signature.

Number of Flights. There shall be no limit on the number of flights (other than that imposed by time available). Contest officials shall make every reasonable effort to insure that all contestants receive equal opportunity to fly

Official Flight. A flight is considered official if two maneuvers, other than takeoff and landing, have been judged. An attempted maneuver yielding zero points is still considered "judged."

10. Time Limits.

10.1. A Class A contestant is allotted a total of eight (8) minutes.

10.2. A Class B contestant is allotted a total of era (10) minutes.

10.3. A Class C contestant (Novice or Expert) is allotted a total

of ten (10) minutes.

10.4. A Class D contestant (Novice or Expert) is allotted a total

of ten (10) minutes.

10.5. In all AMA classes the contestant must have his engine started and commence his flight within the first two minutes after his time has been started. When he fails to commence within the first two minutes and is so informed by the timer, he must immediately clear the area for the next contestant.

10.5.1. No engine restarts are allowed after the wheels leave the ground on takeoff. Restarting is permitted within the first two minutes, but only if prior to takeoff.

10.6. In Class D the contestant must have his engine started and commence his flight within 3 minutes. When he fails to start takeoff within 3 minutes, and is so informed by the timer, he must 10.6.1. No engine restarts after the wheels leave the ground on takeoff. Restarting is permitted within the 3 minute starting time, provided wheels have not left ground.

11. Point System.

zero to ten basis. , B, and C maneuvers shall be judged and scored on basis. Flight score is the sum of the individual

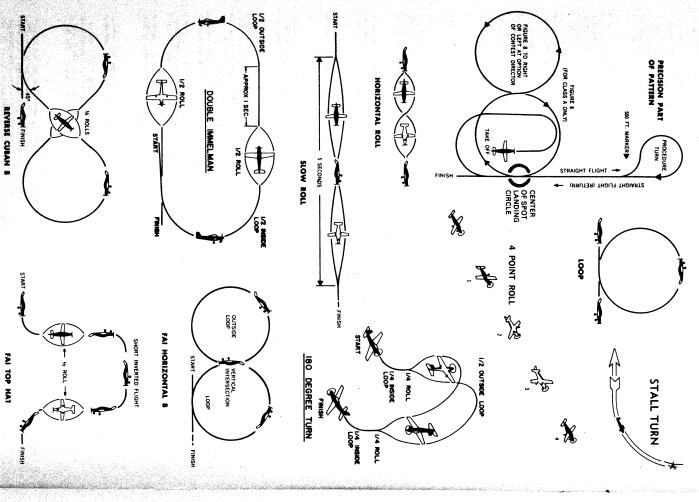
naneuver scores.

11.2. Class D maneuvers shall also be judged and scored on a zero to ten basis. However, each maneuver score shall be multiplied by a "K" factor (See FAI maneuver descriptions). Flight score is the sum of the extended scores for each maneuver, after the K

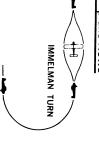
12. Determining the Winner.

12. It The highest score for the total of the two best flights in 12.I. The highest score for the total of the two best flights in Class A, B, or C shall be the winner. Maneuver points from repeat flights may not be added to earlier flights, Each flight is complete in itself. In case of ties, the third best flight scores of the contestance concerned shall be used to determine the higher place (if only two

AMA RC PATTERN MANEUVERS



Model Airplane News Maneuver Drawings Courtesy of



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

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 content facilities. 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,

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.
- 2. Straight Flight Out
 3. Procedure Turn
 4. Straight Flight Back
- 7. Immelman Turn 8. Three Inside Loops 9. Stall Turn
- raffic Pattern Approach

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.

- Touch and Go Three A xial Rolls

- 4. Three Inside Loops
 5. Four Point Roll
 6. Three Turn Spin
 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).

- Fouch and Go
- 3. Three Horizontal Rolls
 4. Three Inside Loops
 5. Four Point Roll
 6. Figure M
- Horizontal Eight Double Immelman
- Three Outside Loops Reverse Cuban Eight
- egree Turn
- 13. Top Hat
 14. Three Turn Spin
 15. Landing
- 17. Class D Pattern. The Class D Pattern shall be the current FAI Pattern as described elsewhere in this publication.

RIGHT OR LEFT PATTERN AT OPTION OF CONTEST DIRECTOR ¥NO TRAFFIC PATTERN
APPROACH TO
LANDING

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. All RC contestants shall be set up in "pits" at spot assigned by Event Director, so they will be under his immediate

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 immediate 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 single Flight List held by Event Director or his representative. This its shall include all classes and frequencies. Contestant shall have his name on List only once at 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 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, etc.
18.4.2. No. 1 man shall have 3 minutes (4 minutes if FA1 Pattern is being used) from completion of preceding flight in which to release model for the start of his flight. False starts are permitted within the 3 or 4 minute limit. Falling to start flight within this limit, contestant must timnediately remove his plane and equipment to the pits. It shall be responsibility of Event Director or his representative to notify consistent of the responsibility of Event Director or his representative to notify contestant of start and end of 3 or 4 minute

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 the sto completed, the No. 4 man becomes No. 3 and the sto 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 Eyent 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 conompatible frequencies are on fight 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 can be supposed for the property of the someone else.

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 performed. Judges shall score maneuvers individually and without consultation between them. There should be enough judges available to establish a rotational procedure which will average out 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.

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.

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AMA RC PATTERN JUDGES GUIDE

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

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 perfection with which the model simulates full scale aircraft performance. The main criteria for perfection in an individual maneuver can be classified as follows:

1. Precision 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 me tin 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 of much smaller or larger dimensions 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 the maneuver 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 intended course of the maneuver real followed. The well polished pilot will use it to announce "Maneuver completed," while the less competent pilot will often skip it in hopes that the judge will not a basence of a definite execution of the maneuver of the more than the judge in the polished pilot will use it to amounce "Maneuver completed," while the less competent pilot will often skip it in sopes that the judge will not notice that he deviated with respect to his entry heading. The absence of a well defined the search of a well defined the search of a well defined straight and level exit therefore should also result in downgradin

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 judges should be located near 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

Positioning of maneuvers involves more than mere distance. Positioning of maneuvers involves more than 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 define the best view to present to the judge. "End on" or "canted" 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 with altitudes that would not force the judge to look up at more 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 downgrading is almost an automatic reaction after a judge has been on the runway a few hours. He usually has a tired next from looking at some maneuvers 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 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 altitudes such that the line of sight to the model will seldom exceed a 45° elevation angle. These criteria place an upper limit of about 300 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° angle and a safe altitude and would be more clearly visible to the judge than at 300 feet distance. The competitor who performs loops in the 200 ft. region is therefore allowing the judge to evaluate them 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 downight uncomfortable if not "blacked out" due to the high "g" forces. Exceedingly small or tight maneuvers with unnecessarily high rates of foll, pitch or yaw do not simulate full scale performance and they should be downgraded accordingly.

d. Smoothness and Gracefulness. These two factors are interrelated with size of the maneuver and therefore again are related to normal flying speed of the model. Yarious 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, but for example, the judge might imagine the airplane as a DC-8 in which he is a passenger. Many of the so-called "average" landings by RC models, in this equivalent situation, would result in shearing 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 aerobatic airplanes and therefore have no actual experience with the "g" forces in such performance, particular in violent maneuvers such as a snap roll or spin. However, by comparison, 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 radius defining a perfect circle, It cannot be made up of a series of straight flight increments with sudden angular jetts placed between. Such sudden jetts 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 speciators 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 a gereement 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 unsafely slould 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 spectators at a safe altitude". Obeying such safety regulations is just one more of the many pressures associated with venues are contested and the more extended that the contested and who overcomes all

pressures is more expert than one who does not

D. Judging Individual Maneuvers. The schedule or 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

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 he use of competition aircraft without positive means of directional control on the ground, a taxi demonstration will not be scored on quality. However, if it is not performed, the takeoff maneuver will automatically lose five (s) 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 controlled turn of at least 90 degrees, and come to a complete stop. If there are strong winds, the CD may allow substitution of an 'S' turn, which will serve to demonstrate ground control while avoiding the unnecessary risk of upsetting the model. A fiver not performing this demonstration will automatically lose five (3) 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. If the engine stops after Takeoff is announced, the Takeoff soore 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. Flot shall call "takeoff" (or "maneuver") complete" 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 released.

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. Gallops 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 flown 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.

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 1. Left turn not 270°
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. Change in altitude.

3. Gallops 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 and at the instant the plane crosses over the circle, the model starts into a horizontal, upright figure 8. The figure shall be perpendicular to the straight flight, and flown away from the spectators, i.e., the base of the 8 is over the circle and the first turn is made to left or right, depending on spectator location. 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 hos smooth or round.
3. First half circle has gallops in pitch, roll or yaw.
4. First half circle has gallops in pitch, roll or yaw.
5. thm 7. Same as 2 thm 4 for second full circle at same cross-over point as finish of first half circle.
9. thru 11. Same as 2 thm 4 for third thalf circle.
12. Does not finish of same heading as entry.
13. Does not finish directly over circle.
14. Does not finish directly over circle.
15. Does not finish of same altitude as entry.
15. Does not finish of same altitude as entry.

the degree of excellence.

A common problem in judging is to score the first flights too high and then find there is no margin left to reward a superb flight. When in doubt give the lower score. Remember that perfection is not a relative thing. Perfection is that maneuver in which you see absolutely no flaws. It is not a common occurrence.

In the following section, a description of each maneuver is given and then a number of reasons for downgrading are listed. The maneuver should be downgraded according to (1) the number of the feets 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 taxis portion of the touch and go would be considered two or three distinct turns would be considered one defect while two or three distinct turns would be considered one of these can be repetitive. It will not be possible to downgrade one point for each defects it will not be possible to downgrade one point for each defect of 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 put it down to 6 as should a combination of three or four minor defects. Any dement in poor positioning should be decided at the start of the maneuver and also fed into the final score for the 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 ¼ 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

2. Callogs in pitch, yaw or roll during approach.
3. Gallogs in pitch, yaw or roll during approach.
3. Model impaires 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".

Three Axial Rolls. The model enters from a straight and level flight and rolls on its axis to the right or left until three complete colls 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 not level at the start of the rolls.

2. The path traced out by the model is not a straight line (i.e., the plane does barrel rolls or suffers changes in heading).

3. Roll rate not uniform throughout three rolls.

4. Pauses between 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 do exactly three rolls.

8. Plane does not do exactly three rolls.

9. Plane fails to do level flight at end of rolls. 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. Gallops in pitch, roll or yaw during climb.
13. Changes in heading during climb.
14. Dropping a wingtip.
15. Model is too far away to be seen clearly at any time during the maneuver.

Immelman 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 deviates left or right during half-loop.

3. Half-loop not completed exactly above point of commercement 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 level flight.

7. Model heading does not finish exactly opposite the direction of series.

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

A During the first loop:
A. During the first loop:
I. Loop not round and smooth.
E. Entry not level.
J. Loop deviates left or right.
Finish of loop not at same altitude as en

- Model pauses before start of second loop.
 During tite second loop:
- During the second loop:
 Not on same heading as first loop.
 Not the same circular path as first loop.

3. Loop deviates left or right.

4. Finish of loop not at same altitude as entry.
5. Model pauses before start of third loop.
C. During the third loop:
I. Not on same heading as first loop.
2. Not on same eircular path as first loop.
3. Loop deviates left or right.
4. Recovery not at same heading as entry.
5. Recovery not at same altitude as entry.
6. Recovery not level.
Note: Loops must appear rounded and superimposed to the Note: Loops must appear rounded and superimposed to the ground-observer even in the presence of the wind.

Stall Turn. The model starts from straight and level flight and noses up to a vertical position, yaws through 180°, then dives along a parallel path and finishes the maneuer with the plane level at the same altitude as the entry. The Stall Turn may be downgraded

. Model not level at start

Does not become exactly vertical.
 Turns left or right during pull-up.
 Does not yaw tightly through 180°.
 Return path more than two wing spans from entry path.
 Return path not parallel to entry path.
 Return path not parallel to entry path.
 Maneuver not finished at same altitude as entry.
 Plane pot level at finish of maneuver.
 Plane not level at finish of maneuver.
 Model does not fly straight and level to complete maneuver.

Three Turn Spin. The plane establishes a heading by flying straight and level, pulls up into a stall and commences the spin through one, two, three turns and recovers to level flight on the same heading as the initial flight direction. The judge must watch carefully to be sure this is a spin and not a vertical roll or a spiral dive. In the spin, some part of the plane always interesters an imaginary vertical line along the path of descent. In the spiral dive, the plane circles around, but outside of, the imaginary vertical line. The spin may be downgraded because:

I. Initial heading is not level.

2. Commencement of first spin is sloppy or uncertain.

3. Does not do exactly three turns. Less than two or more than four turns shall be sorred zero.

4. Does not recover on same heading as initial heading.

5. If any of the three turns are spiral dives rather than spins, the score is zero.

score is zero.

6. Rate of rotation in spin is excessively rapid.

7. Does not finish level.

8. Does not fly straight and level for 50 feet.

Four Point Roll. From a straight and level upright flight path, the model is rolled 90 degrees and holds this attitude, with wings in a vertical position, long enough for it to be clearly defined. The model is then rolled another 90 degrees, in the same direction of rotation, and holds the inverted attitude long enough for it to be clearly defined. This is followed by another 90 degree roll in the same direction, bringing the ship to another knife edge position. Following a similar pause in the roll, the ship is finally rolled another 90 degrees to upright and level flight. The maneuver may be downgrated for the following reasons:

1. Model not level at start of roll.
2. The path traced by the model is not a straight line. (The plane does barret roll segments or suffers changes in heading.)
3. Sudden corrections in heading between roll segments.
4. The axis of the fusedage veers out at too much of an angle to the flight path.

5. Plane 6. Plane ane does not pause long enough between each segment of changes altitude during roll.

7. Wings are not exactly vertical at ¼ and ¾ positions.
8. Plane fails to do level flight at end of roll.

Reverse Cuban Eight. Plane commences in straight and level flight, pulls up into a 43 degree climb, half rolls to inverted and proceedes to inside loop until it is again climbing at a 43 degree angle. Plane them does another half roll to inverted that should cross the flight path of the first half roll, then again proceedes to inside loop until it has reached straight and level flight on the same heading and altitude as the beginning. Maneuver shall be downgraded for the collection.

Emry is not straight and level.
 First roll not on 3d degree line.
 Loop not round or de degree line.
 Seemal roll not on 45 degree line.
 Middle of second roll does not cross middle point of first roll.

Stew Roll. Model commences from straight and level flight and then rolls slowly at a uniform rate through one complete rotation. The approximate time of the roll to be five seconds. Note: No developed for slight overtime. Downgrading shall result for any of the following reasons:

1. Model not level at entry.

2. Plane deviates from a straight line during roll.

3. Roll rate not uniform.

Plane does not roll through exactly one revolution.
Plane changes altitude during roll.
Plane changes heading.
Roll rate is too rapid resulting in much less than five seconds elapsed during roll.

8. Plane is not level at finish of roll.9. Plane fails to do level flight at end of maneuver.

Top Hat. Model starts in straight level flight, pulls up into vertical climb and makes a half roll, then levels out inverted on the same heading as entry. After short inverted flight, model dives vertically performs a half roll and finally recovers in straight level upright flight on same heading and height as entry. The Top Hat should be downgraded it:

ownig taccul.

I. Model does not start level.

2. Model does not go exactly vertical before starting roll.

3. Roll does not stop at exactly 180° from entry.

4. Model does not stop at exactly 180° from entry.

4. Model does not elimb vertically for a brief period after completing roll.

5. Model does not go on an exactly horizontal inverted position after teveling out.

6. Model does not fly inverted for the same distance as the vertical climb and roll.

7. Model does not dive vertically briefly before starting half roll.

8. Second half roll not started at the same altitude as that where the first half roll was completed.

9. Second half oll not completed at same altitude as that where first roll started in the same altitude as that pleting second half roll.

10. Model does not dive vertically for a brief period after completing second half roll.

11. Model does not dive vertically for a brief period after completing second half roll.

12. Model deviates left or right of the entry path at any point in the manequer.

does not recover at same altitude and heading

12

FAI Horizontal Eight. The plane commences flying straight and level, pulls up into ¾ of an inside loop, does one full inverted loop starting from straight down, then ¼ of an inside loop finishing in straight and level flight. The Horizontal Eight may be downgraded because:

1. Entry not level.
2. First loop not round.
3. Plane deviates left or right during first loop.
3. Plane not vertical at start of second loop.
4. Plane not vertical at start of second loop.
5. Second loop not the same diameter as first loop.
6. Second loop not round.
7. Second loop pot eviates left or right.
8. Does not finish or same heading as entry.
9. Does not finish at same altitude as entry.
10. Does not finish at same altitude as entry.

Double Immelman. Model commences in straight and level flight, pulls up into half an inside loop followed by a half roll to upright, outside loop followed by half a roll to upright, recovering in straight and level flight on the same heading and at the same altitude as the entry. Maneuver shall be downgraded for the fol-

96499

Entry not straight and level.

First half loop not round.

First half loop not round.

Model deviates left or right during half loop.

Model deviates left or right above starting point.

Half loop not completed exactly above starting point.

Half roll does not start immediately after half loop.

Roll is not on a straight line and on 180 degree heading.

from entry.

Plane goes immediately into outside loop upon comple

tion of half roll.

8. Plane holds straight flight too long before going to out-

side loop.
Half outside loop not round or same size as first half loop.
Model deviates left or right during half loop.
Half loop not completed exactly below starting point.
Final half roll does not start immediately after half outside

Final half roll longer or shorter than first half roll.
 Model does not finish on same heading and at same altitude

as entry.

15. Plane fails to do straight and level flight at end of maneuver.

Three Outside Loops. The model commences the outside loop flying straight and level, then noses down into three outside loops and recovers flying straight and level on the same heading and altitude as the entry. The outside loops are downgraded in the same manner as the inside loops.

180 Degree Turn. The plane starts in straight and level flight, pulls up into a vertical climb, rolls 90 degrees, performs half of an outside loop, rolls 90 degrees in the opposite direction to the first quarter roll, and pulls out at the same altitude but with a 180 degree heading change. The maneuver may be downgraded for the following reasons:

Entry is not straight and level.
Pull up is not to exact vertical climb.
Roll is more or less than 90 degrees.
Path of roll is not straight vertical line.
Half outside loop deviates left or right.

points!

5. Model climbs during approach.

Note: Since the Traffic Pattern Approach is not required in Class: C. the Landing Perfection maneuver must be called out following completion of the Three Turn Spin. When the contestant has his plane lined up and on heading for the final approach, and not less than six (6) feet off the ground, he must amounce the start of the Landing maneuver. From this point on, the Landing will be

4. Attempts to break out of pattern to go around again. Zero

Landing Perfection. At the conclusion of the final approach leg, the model continues to descend at a gradual rate and lands on the heading used in the final approach leg. After landing, the model must roll in a straight line and come to a complete stop. The landing should be downgraded if:

1. Approach during landing is too steep.
2. Gallops in pitch, you or roll during approach.
3. Model impacts or thuds onto ground due to lack of flare-out.
4. Model bounces on landing.
5. Model turns left or right while rolling to a stop. Turns neccessary to avoid running off the runway may be excused if wind direction and spot location are adverse. However, this inteniency applies only if the model lands in the spot and should not be employed in cases where the flyer accidentally lands near the edge of the runway outside the spot.
5. Model rolls too far away to accurately judge.
6. Model pitches over and makes ground contact with nose or wingin.

9. Maneuver not finished at same altitude as entry.
10. Plane not level at finish of maneuver.

Traffic Pattern Approach. The rectangular approach is commenced with the model flying into the wind over the center of the runway and/or landing circle, a turn of 90°, a cross-wind leg, a second turn of 90°, a down-wind teg, a third turn of 90°, a cross-wind leg, a fourth turn of 90° and straight flight toward the point of touch down. The maneuver is finished just prior to the point of touchdown (six foot altitude)

Figure M. The model starts in straight and level flight, pulls up to a vertical attitude, performs a stall turn (left or right) through 180°, then makes ½ an inverted loop pulling up again to vertical flight, performs a second stall turn in a direction opposite to the first stall turn and then recovers on the same altitude and heading as the "M". First and second stall turns are to be opposite as seen from the ground. (The airplane tiself actually turns in the same direction both times.) If both turns are in the same direction, as seen from the ground, the score is zero. The maneuver shall be down-graded for the following reasons:

1. Model not level at start.
2. Does not become vertical.
3. Turns self or right during pull up.
4. Turn radius at top of stalls is larger than two wingspans.
5. Turns at top of stalls are less than 180°.
6. Diving paths are not parallel to climbing paths.
7. Bottom of inverted portion is at different altitude than entry.
8. Turning point of second stall turn is at different altitude from the first turn. 6. Half loop is not smooth and round.
7. Second 90 degree roll path is not straight vertical line.
8. Pull out to level flight is sudden or jerky.
9. Pull out is not to same altitude and 180 degrees opposite heading to entry.
10. Plane fails to perform straight and level flight at end of

wingtip.

9. If model flips over on its back or cartwheels on wings—0

points.

10. For a tract gear airplane, any gear-up landing shall be scored zero.

11. Failure of retract gear during landing and before plane completely stops shall result in zero landing score.

It is recommended that the descent start at the beginning of the downwind leg. However, wind or airplane conditions may dictate otherwise. Descent should therefore be judged only on smoothness and consistency, not on where it actually starts.

Note: The contest director will amounce whether the turns should be left or right. The rectangular approach may be

downgraded because:

1. Legs of rectangle are not straight and perpendicular to each

other.
2. The 90° turns are not smooth, precise, or sharp.
3. Gallops in pitch, yaw or roll during the approach

Spot Landing, Landing within the 100 foot circle results in automatic awarding of the same number of points obtained in landing perfection. All judges should show agreement on their some sheets (Not on the amount of score, just whether or not a spot landing was accomplished) and in the event of disagreement, a majority vote by the judges should dictate.

Conclusion of Flight. The official flight is finished at the moment the plane stops at the end of its landing roll. At this point the contestant announces "flight complete" and mmediately taxies, by plane off the runway to whatever area the Contest Director designates. If landing was deadstick, pliot on helper shall retrieve plane as soon as permitted by official in charge of flight line.

RC FREQUENCIES AND FLAGS

The AMA has designated certain colors to be used in the form of a streamer or pennant (flag) as a means of indicating what frequency a transmitter is assigned. It is recommended that 27 MHz flags be triangular. Transmitter antennas in the 50-54 MHz and 72-76 MHz bands will show two flags, each in the form of ribbons approximately 1" × 16"; one ribbon indicates the band while the other ribbon indicates the exact frequency.

The four frequencies indicated by asterisks (*) in the 72-76 MHz band are for model aircraft use only.

27 MHz Band

26.995—Brown 27.045—Yellow 50-54 MHz Super-Het 27.095—Orange 27.145—Red 27.195—Green 27.255—Blue

50-54 MHz Super-Regen 53.50-Black & Green Ribbons

53.20—Black & Red Ribbons 53.10—Black & Brown Ribbons

53.30—Black & Orange Ribbons 53.40—Black & Yellow Ribbons

51.20—Black & Light Blue 52.04 Black & Violet Ribbons

72-76 MHz Band

72.08*—White & Brown Ribbons
72.16—White & Blue Ribbons
72.24*—White & Red Ribbons 72.32—White & Violet Ribbons
72.40°—White & Orange Ribbons
72.96—White & Yellow Ribbons

b) If, before 50 laps of an eliminating race or semi-final have been flown, only one team remains in the running and flying alone, the race will be declared void and considered as an attempt for the

which has been granted an attempt is allowed

 Definition of an Official Flight. Every participation considered as an attempt or which has not been disqualification is an official flight. n in a race, not subjected to

Team Qualification and Classificat

 Each competing team must to
 climinating race to qualify for the

듅 semi-finals, at least one s, but it may

participate in two
b) The nine teams which register the nine best times during the
eliminating races will qualify for the semi-finals. In case of a tie,
the second heat results will decide the semi-final teams. If a further
tie occurs, another heat will be run to decide the semi-final teams.
c) When more than three teams tie after the eliminating races,
new eliminating races will take place, opposing the teams two to
two or three it ree until one of those teams is qualified. In that case,
departure will be made by an individual draw,
do not the semi-finals will not require more races.
This system for the elimination of ties will only be enforced if
more than nine teams qualify. Ties within the nine selected teams
for the semi-finals will not require more races.
e) The three teams having registered the three best times during
the semi-finals qualify for the final race.
f) in case of a ite among the semi-finals; the regulations (b), (c) and (d) will be applied, the number mine
their greduced to three.
g) The competing teams which have participated in the final race
will be placed at the head of the classification, only taking into
account the times of flights during the final, after re-checking tank
capacity and the general characteristics of the models. Other team
classifications will be made according to the time registered during
the elimination of the classification of the classification.

11. International Team Classification. International classification is established by adding the best results achieved during the climinating races by each of the three teams of each nation.

12. Jury and Timekeepers.

a) The organizers must appoint a panel of at least three F.A.I.

a) The organizers must appoint a dother limited international
judges, who shall for W/Ch and other limited international
competitions be of different nationalities and have at least one
language in common. They will be selected from a list of persons
approved by National Aeroclubs for their proficiency and will form

timekeepers, equipped with stop-watches registering at the second, with a time limit of a minimum of 15 minutes

leasi I/10th second, with a time limit of a minimum of 15 minutes will be altotted to each team.

c) These two timekexpers will be assisted by two lap-counters charged with registering the number of laps flown by the team that they control and aslos to warm the timekexpers at exactly which time the model has finished the number of laps required in that heat.

d) The time retained is the average of the registered time, made up to the next upper 1/10 second.

centimeters

square centimeters 0.1550 square inches square centimeters 0.001076 square feet

Вy

feet 929.0 ... square centimeters

decimeters

kilometers 0.53996 nautical miles

0.6214 miles 1000 meters 3281 feet 25.40 millimeters 0.3048 meters 0.1 meters 0.01 meters 0.3937 inches

square square square square

inches

square square

inches 6.452 .. square centimeters feet 0.09290 square meters feet 144 square inches

0.006944 square feet 645.2 .. square millimeters 6. 452/10 ... square meters 10.76 square

square square

meters

inches inches

meters 3.281 feet mfles 5280 feet meters 39.37 inches

miles 0.86898

nautical miles

square yards 9 square feet square millimeters 0.00155 square inches

yards

meters 1.196 square yards

feet

miles 1609 meters

kilometers kilometers

a) The team-race jury is responsible for observing the conduct of a) The team-race jury is responsible for observing the conduct of each team during a heat. Teams will be informed of any offense by visual indicators. After a maximum of three offenses a team will be

eliminated from a heat.

b) Warning and cancellation are notified to each team by means
b) Warning and cancellation are notified to each team by means
of three colored lights: Green light, first warning (first offense) r
Amber light, second warning (renewal of the first offense or a new
one); Red light, elimination (renewal of previous offense or a new

14. Warnings—Eliminations: At each warning the chief judge shall notify the team manager concerned so that, in turn, he may compete reason of the warning to the mechanic. In the event of any serious breach of the rules, the jury may eliminate the team from

A TEAM SHALL BE WARNED:

a) If a pilot interferes with or obstructs another pilot either by his conduct in the circle or by a maneuver of his model preventing another model from flying or landing normally.

b) If a pilot, instead of walking around in the center, stands in

the same place or walks backwards.

c) If a pilot does not have the controlling hand in contact with the middle of his chest (except when overtaking, starting and landing, when an exception of two laps is allowed).

d) If a pilot applies physical effort to increase the speed of his model during the official flight.
e) If the height level of the flight prescribed by the rules is exceeded.

f) If, during the start of the race or during the pit stops, the control handle, the lines and the model are not on the ground and/or the center line of the model is misde the flight circle.
g) If, after refuelling, the mechanic starts his model ahead of the line which marks this starting position.
h) For any other flagrant breach of the rules.

A TEAM SHALL BE ELIMINATED FROM A HEAT:

i) If the pilot steps outside the 3 m (9'10") circle before the mechanic has taken hold of the landing model.

j) If the mechanic steps into the flight circle with both feet.
k) If the mechanic retrieves his model by any device.
l) If overtaking is done by passing but of the slower model.
l) If overtaking is other by passing under the slower model.
m) If the pilot whose model is to be vertaken carries out any maneuver to impede the overtaking competitor.
n) If a member of the team or the model causes a collision.
o) If jettisoning occurs or if the model is not in the condition as stated in 4. (a) to (1).
p) If the model flies more than two laps with the engine stopped.
d) If the model is recovered with the engine running or prior to touchdown with the engine stopped.
f) If, after its models have been processed, the competing team has modified its models have been processed, the competing team has modified its model(s) by changing the characteristics or specifications imposed by the rules this may lead to the application of penalties as stated in chapter 5 of the Sporting Code, Section I.

FAI RC AEROBATICS (CLASS D AMA RC AEROBATICS)

Rules 1 through 12 and the FAI General Rules do not necessarily apply when FAI Fattern is flown as a Class D event in AMA contests—they are batically world championship regulations. They may, however, be used if it is advertised that the event is to be run in accordance with these FAI regulations rather than the AMA pattern rules. For either AMA Class D or FAI events, the FAI stream rules. For either AMA Class D or FAI events, the FAI stream rules.

I. Definition of a Radio Controlled Aerobatic Power Model. Model airplane in which lift is generated by aerodynamic forces acting on surfaces remaining fixed during flight (except for control surfaces) and which performs maneuvers controlled by the pilot on the ground using radio control connection

2. Prefabrication of the Model. Permitted: a plane which is assembled by the builder from prefabricated parts and in which the builder installs the equipment. Not permitted: models which are completely prefabricated and require only few minutes of unskilled effort for their completion or complete ready-to-fly models which have been built by a person other than the pilot.

3. General Characteristics of Radio Controlled Aerobatic Power Models. Maximum surface area: 150 dm² (2325 sq. in.). Maximum total weight: 5 kg. (11.023 lbs.). Minimum loading: 12 gr/dm² (395 oz. per sq. ft.). Maximum loading: 75 gr/dm² (24.51 oz. per sq. ft.). Maximum loading: 10 gm² (51.51 cz. per sq. ft.). The engine(s) must be fitted with effective silencers.

the competition. 4. Number of Helpers. Each pilot is permitted one helper during

5. Number of Flights. The competitor has the right to three official

6. Definition of an Attempt. There is an attempt when:
a) The pilot announces the start of the take-off maneuver.
b) The model fails to commence the take-off maneuver within the 3 minutes allowed to the competitor.

c) If the engine stops after the pilot has announced the start of takeoff and before the model is airborne, it may be restarted (within the 3-minute period). However, no points will be awarded for the subsequent take-off maneuver.

Number of Attempts. Each competitor is entitled to one attempt

for each official flight.

N.B. An attempt can be repeated at the judges' discretion cuben, for any unforseen reason outside the control of competitor or organizers, the model fails to make a start.

8. Definition of an Official Flight. There is an official flight when an attempt is made whatever the result. Note: When jettisoning occurs

9. Marking. Each maneuver may be awarded marks between 0 and 10 by each of the judges during the flight. These marks are multiplied by a coefficient which varies with the difficulty of the maneuver. Any maneuver not completed shall be scored zero. The maneuvers must be performed in a plane and at a height which will allow them to be seen clearly by the judges. The non-observance of official at each circle to miciate by a visual and audible signal, if the search circle to miciate by a visual and suffice signal, if and when the model passes over the spectators. If this happens and when the model passes over the spectators. If this happens maneuver. The official must keep a record of all disqualified maneuvers. The judges shall score all the maneuvers. If an infringement has been made, the scores will be deleted on all cards.

CONVERSION FACTORS

ii). Classification. The final classification will be determined by the aggregate sum of three flights. The marks allocated by the judges will be multiplied by their appropriate coefficient, and added to gether. In case of a tie for the first place, the final result will be of the normal finishing time of the contest. No attempts are permitted. The results of a fly-off shall count only for the establishment of a title (such as World Champion) and any prizes

Judging (for World Championships)

a) The organizers must appoint a pard of at least 3 judges for seaf flight. The judges shall preferably be of different nationality and be elected from a list of persons who are apposed by the equivalent system may be used provided that each judge will score employed at a World Championship must be stated in advance by the organizers and must have prior approval by the CIAM or Other Bureau.

b) There shall be training fishers of a sund of a the control of the ciam of th

b) There shall be training flights for judges with a briefing before and after to be held-immediately before every W/C.

12 Organization for Radio Controlled Aerobatic Contests, All transmitters to be used during the confest must be checked and placed in a compound kept under observation. During the contest, a

Steward must be in control of the transmitter compound and will issue the transmitter to the competitor only when his name is called for him to stand by to make his flight. As soon as the attempt has the Steward at the transmitter compound.

All unauthorized transmistion during the contest will result in automatic disqualification of the offender from the entire contest, and render him liable to further penalties.

During the time the flight maneuvers are being carried out, the meter (98.4 ft.) landing circle and under direct supervision of the course steward.

The order of starting of the various countries and the

The order of starting of the various countries and the competitors will be established by means of a draw before the start of the contest.

The organizer must provide a radio monitor for the purpose of detecting possible interference. Competitors must be called at least 5 minutes before they required to occupy the starting area.

The organizer must provide a radio monitor for the purpose

13. Schedule of Maneuvers for Radio-Controlled Aerobatic Power Models. The maneuvers must be executed during an uninterrupted flight in the order in which they are listed and the competitor must will not execute.

The name and start of each maneuver must be announced by the pilot or his assistant. Unannounced maneuvers will not be scored. It is recommended that the end of each maneuvers will not be scored. It is a factorized that the end of each maneuver also be announced. In the landing maneuver need not be announced but must be executed in an uninterrupted manner.

The competitor may make only one attempt to execute each figure during any one flight.

The pilot has ten manutes in which to start his engine and complete the program of maneuvers.

One engine must be running during execution of the maneuvers 13.1 to 13.13.

13.1 Take-off. The model must stand still on the ground with the engine running without being held by the pilot or mechanic and must then take off into wind. The taxi-run should be straight and the model should lift gently from the ground and climb at a gradual angle. The take-off is completed when the model is turned out of point for each of the following reasons:

1. Model does not stand still when released.
2. Changes in heading during the run.
3. Jumping from the ground.
4. Retouching the ground after becoming airborne.
5. Too steep a climb angle.
6. Gallops in elevation during climb.
7. Changes in heading during climb.
8. Provening a wine tim.
8. Though the ground of the properties of the ground of the ground of the ground after becoming airborne.
8. Too steep a climb angle.
9. Changes in heading during climb.
9. Changes in heading during climb.
9. Provening a wine tim.

13.2. Figure M. The model starts in straight and level flight, pulls pto a vertical attitude, performs a stall turn (left or right) through 180 deg. then makes half an inverted toop pulling up again to vertical flight, performs a second stall turn in a direction opposite to the first stall turn and then recovers on the same altitude and heading as the entry. When viewed from the side, the model creates the letter 'M.' The maneuver should be down-graded for the

the reasons:
following reasons:

1. Model not level at start.

2. not become vertical

Does not become vertical.

Turns left or right during pull-up.

Turns at top of stall is is larger than two wing spans.

Turns at top of stall are less than 180 degrees.

Diving paths are not parallel to climbing paths.

Bottom of inverted position is at different altitude than

Turning point of second stall turn is at different tude from the first turn.

Maneuver not finished at same altitude as entry.

Model not level at finish of maneuver.

Model slides tall first.

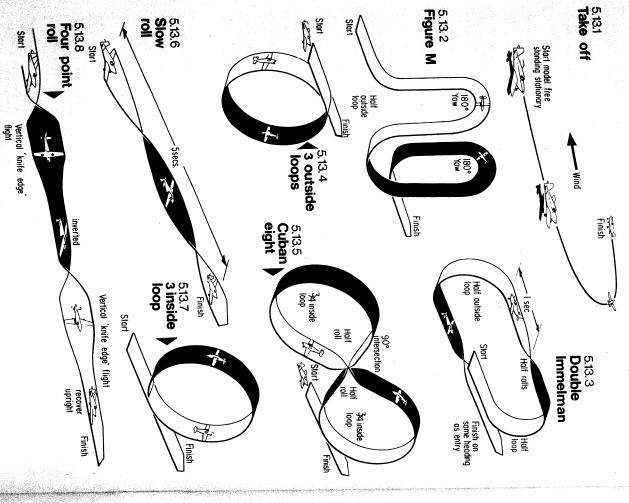
If second stall turn is in the wrong direction second. alti-

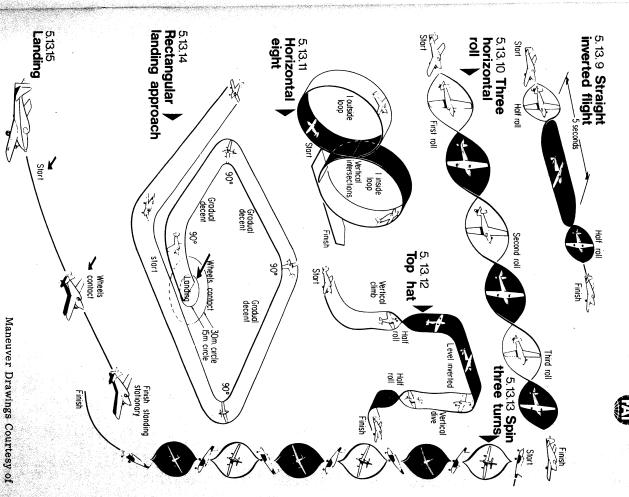
13.3 Double Immelman. Model starts in level flights, pulls up into a half loop, followed by half a roll, flies straight and level for approximately one second, then makes half an outside loop, followed by half a roll, recovering in straight and level flight. The maneuver should be down-graded for any of the following reasons:

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 flies longer than one second upright before commencing half outside loop.
7. Model deviates left or right during half outside loop.
8. Half outside loop not completed at same altitude as entry.
9. Half outside loop not completed at exactly below points. Second stall turn is in the wrong direction, score zero.

K=15

60





RADIO CONTROL MODELS & ELECTRONICS

- of commencement.

 10. Model does not commence half-roll immediately at bottom of half-loop, tom of half-roll.

 11. Model travels farther during second half roll than it did in first half-roll.

 12. Model does not finish in level flight.
- Model does not finish on same heading and altitude as entry.

 K = 10

13.4 Inverted Loops. The model commences the inverted loop flying straight and level, then noses down into three inverted loops and recovers flying straight and level on the same heading and altitude as the entry. The first loop may be down-graded because:

1. Entry not level.

2. Loop not round.

3. Loop deviates left or right.
4. Finish of loop not at same altitude as entry.
5. Recovery not on same heading as entry.
The second loop may be down-graded because:
1. Not on same heading as first loop.
2. Not the same diameter as first loop.
2. Not the same diameter as first loop.
3. Loop deviates left or right.
4. Finish of loop not at same altitude as entry.
The third loop may be down-graded because:
1. Not on same heading as first loop.
2. Not the same diameter as first loop.
2. Not the same diameter as first loop.
3. Loop deviates left or right.
4. Recovery not at same altitude as entry.
5. Recovery not level.
Note: Loops must appear round and super-imposed to the Note: Loops must appear round and super-imposed to the ground observer even in the presence of the wind.

K= 15

13.5 Cuban Eight—Savoy Knot. The plane commences flying straight and level, pulls up into an inside loop and continues until heading downward at 45 degrees, does half-roll followed by another inside loop to 45 degrees, does half-roll followed by straight and level recovery at same altitude of entry. The Cuban Eight may be down-graded because:

 Entry not level.

- 2. Loop not round.
 3. Loop deviates left or right.
 4. Roll not 45 degree line.
 5. Second loop not same diameter as first loop.
 6. Second loop not as same altitude as first loop.
 7. Second roll not on 45 degree line.
 9. Does not finish level.
 10. Does not finish on same heading as entry.
 11. Does not finish at same altitude as entry.

K = 10

13.6 Slow Roll. Model commences from straight and level flight and then rolls slowly at a uniform rate through one complete rotation. The approximate time of the roll to be five seconds. Down-grading shall result for any of the following reasons:

1. Model not level at entry.

2. Model deviates from a straight line during roll.

3. Roll rate not uniform.

- Model does not roll through exactly one revolution.
 Model changes altitude during roll.
 Model changes hading.
 Model changes to resulting in much less
 Roll rate is too rapid resulting in much less much less than five
- seconds.

 8. Model is not level at finish of roll

K = 15

13.7 Inside Loops. The model starts the Loops 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 first loop may be down-graded and level recovery to finish.

- 1. Entry not level.
 2. Loop part round.
 3. Loop deviated left or right.
 4. Finish of loop not at same altitude as entry.
 4. Finish of loop not at same altitude as entry.
 5. Loops displayed endwise rather than with a view of the circular path.
 The second loop may be down-graded because:
 1. Not on same heading as first loop.
 2. Not the same diameter as first loop.
 3. Loop deviates left or right.
 4. Finish of loop not at same altitude as entry.
 The third loop may be down-graded because:
 1. Not on same heading as first loop.
 2. Not the same claimeter as first loop.
 3. Loop deviates left or right.
 4. Recovery not at same altitude as entry.
 5. Recovery not as same altitude as entry.
 6. Recovery not level.
 Note: Loops must suppear round and super-imposed to the Note: Loops must suppear round and super-imposed to the ground observer even in the presence of the wind.

 K=10
- 13.8. Four Point Roll. The model starts in straight and level flight, does one quarter of a horizontal roll till wings are vertical, then hesitates. It then continues with a second quarter roll to inverted, hesitates, does another quarter roll, hesitates and finally does a quarter roll to upright and level flight at same altitude and heading.

as entry. The approximate time of the maneuver shall be 5 secs. The maneuver will be down-graded for the following reasons:

1. Not level during entry.

2. Rolls more or less than 90 degrees and does not hesitate with wings vertical:

3. Does not provide ample hesitation.

4. Wings not horizontal at end of second quarter of rolls.

5. Repeat 2,3 and 4 above for remaining third and fourth quarter rolls.

- 6. quarter rolls. . Model changes altitude or heading during roll. K = 15
- 13.9Inverted Straight Flight. The model starts the maneuver level and upright, makes a half-roll to inverted, flies straight and level inverted for a minimum of five seconds and recovers with a half-roll to the upright position. The Inverted Straight Flight may be downgraded because:

 1. Not level at entry.

 2. Model denages attitude or heading.

 3. Model changes attitude or heading.

 4. Model flies inverted for less than five seconds.

 K=10

13.10. Rolls. Model commerces from straight and level flight then rolls at a uniform rate through three complete rotations and finishes in straight flight, all on the original heading; the time of the three rolls to be approximately five seconds. Down-grading shall result from any of the following reason:

1. Model not level at entry.

2. Model deviates from straight line during rolls.

3. Roll rate not uniform.

4. Model does not roll through exactly three revolutions.

5. Model changes altitude during rolls.

6. Model changes altitude during rolls.

7. Roll rate is extremely rapid so that rolls are completed in less than three seconds.

- less than three seconds.

 8. Model is not level at the finish of the rolls. K = 15

13.11. Horizontal Eight. The plane commences flying straight and level, pulls up into three-quarters of an inside loop, does one full inverted loop starting from straight down, then one-quarter of an inside loop finishing in straight and level flight. The Horizontal Eight may be down-graded because:

1. Entry not level.

2. First loop not round.

3. Plane deviates left or right during first loop.

4. Plane not vertical at start of second loop.

5. Second loop not the same diameter as first loop.

6. Second loop the same diameter as first loop.

7. Second loop deriates left or right.

8. Does not finish or same heading as entry.

9. Does not finish at same altitude as entry.

10. Does not finish at same altitude as entry.

13.12. Top Hat. Model starts in straight and level flight, pulls up into vertical climb and makes a half roll, then levels out inverted mot the same heading as entry. After a short inverted flight, model dives vertically, performs a half roll and finally recovers in straight level upright flight on the same heading and height as entry. The Top Hat should be down-graded if:

- 1. Model does not sear level.
 2. Model does not so vertical before starting roll.
 3. Roll does not stop at exactly 180 degrees from entry.
 4. Model does not climb vertically for a brief period after completing roll.
 5. Rodel does not go to an exactly horizontal inverted successive search consider the control of the roll.

 5. Model does not sear level.

- Model does not go to an exactly horizontal inverted position after the quarter loop.

 6. Model does not fly inverted for the same distance as the vertical climb and roll.

 7. Model does not dive vertically briefly here.

 8. Second half roll.
- where the fi 9. Second hal where first 10. Model doe half roll not completed irst roll started. half roll not started at the same altitude as that he first half roll was completed. at same altitude as that
- completing second nair rou.

 Model deviates left or right of the entry path at any point in does not dive vertically for a brief period after ting second half roll.

Ξ

12. the maneuver.
Model does n not recover at same altitude and heading as **K=15**

13.13. Spin—Three Turns. The model establishes a heading direction by flying straight and level, pulls up mio a stall and commences the spin through one, two, three turns and recovers to level flight on the same heading as the initial flight direction. The judge must watch carefully to be sure this is a spin and not a vertical roll or a spiral dive. The Spin may be down-graded bevertical roll or a spiral dive. The Spin may be down-graded be-

- Initial heading is not level.

 Commencement of first spin is sloppy or uncertain.

 Commencement of first spin is sloppy or uncertain.

 Does not do exactly three turns. Less than two or more than four turns should be scored zero.

 Does not finish ore.

 If any of the three turns are spiral dives rather than spins the score is zero.

 K = 10

13.14. Rectangular Approach. The Rectangular Approach is commenced with the model flying into the wind above the landing circle, a left turn of 90 degrees, a crosswind left, as account left turn of 90 degrees, a down-wing leg, a third left turn of 90 degrees and straight flight towards the point of touch down. The maneuver is finished just prior to the point of touch down. Note. The contest manager may change the left turn if he wishes. The Kectangular approach may be down-graded

13.15. Landing. The model flares smoothly to touch the ground with no bouncing nor change in heading and rolls to a stop.
K = 15 when landing is in 15 m (49°2') diameter circle.
K = 10 when landing is in 30 m (89°5') diameter circle.
K = 5 when landing is outside 30 m (89°5') diameter circle.
The landing should be down-graded because:
I. Model impacts ground due to lack of flare-out.
2. Model bounces on landing.
3. One wing low.
4. Model deviates left or right while rolling to a stop.
5. If the model ends on its nose or back—zero points.

- 1. Legs of rectangle are not straight.
 2. The 90 degrees turns are not smooth or precise.
 3. Gallops in elevation.
 4. Attempts to break out of pattern or go around.
 5. The straight of the s

FAI RC **AEROBATICS JUDGES' GUIDE**

Purpose. The purpose of the FAI RC Judges' Guide is to furnish an accurate description of each maneuver and to provide a reference for use in developing a uniformly high standard of judging.

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

- Precision of the maneuver.

 Positioning or display of the maneuver.

 Size or dimensions of the maneuver.
- Smoothness or gracefulness of the maneuver, of these requirements must be met in order for a maneuver to

Precision. At the maneuver, the judge

anticipated It will recision. At the instant the contestant amounces his next maneuver, the indge should form an image of the course the model airplane should follow.

The judge should adjust his image if the first portion of the maneuver clearly demonstrates that the contestant intends to do maneuver of much smaller or larger dimensions than the judge anticinated. dimensions than the judge

It will be noted that forming on image of the forthcoming maneuver is based on using the straight and level entry as a reference. The absence of a definite entry into a maneuver 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 or evaluation of how well the intended course of the maneuver was followed. The pilot will use it to amounce "maneuver completed". The absence of a well defined straight and level exit should also result in downgrading.

Positioning, To achieve perfection, the competitor must position his maneuvers in such a way that they can be easily judged. The first consideration on position is longitudinal distance from the that hey obtain identical views of the maneuver. The competitor should center his aerobatic maneuvers in such a way that they can obtain identical views of the maneuver. The competitor should center his aerobatic maneuvers in such a way that they can distance from the competitor. All the judges should be located near The competitor should center his aerobatic maneuvers at an average distance of less than 100 meters (228 feet) from himself. The judge should observe if the competitor is trying to hide his Positioning of maneuvers involves more than distance. They should also be presented in a relative direction which displays the which have circular symmetry (such as Loops, Immelmans, Cuban a plane perpendicular to the line of sight to the model:

"End on" or "canted" presentation of the circular maneuvers begins and Horizontal eights) should execute their circular path in "End on" or "canted" presentation of the circular maneuvers begins and the "tracking" of while no special bonus is justified for exceptionally low attitude, excessively high altitude is cause for downgrading. Most onsecutive loops.

While no special bonus is justified for exceptionally low attitude, excessively high altitudes and close to above the transmitter in a verecuted at high altitudes and close to on above the transmitter in a very that they force the judge to look up at more than about 45 degree angle. If maneuvers are well affectly overhead.

Size of Maneuvers. The established criteria places an upper limit of about 100 meters 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 100 meters of horizontal distance is a maximum value and not really the optimum. For example, on miside loop of 30 meters (98) diameter at 45 meter (148)

longitudinal distance would stay within the 45 degree angle and a safe altitude and would be more clearly visible to the judge than at 100 meters distance. The competitor who performs loops in the 45 more critically and he should suffer no downgrading for positioning. On the other hand, a 30 meters distance should be down-graded.

The optimum size of maneuvers is governed to some extent I the size and normal flying speed of the model. Exceedingly small tight maneuvers with unnecessarily high rates of roll, pitch or ya do not simulate full scale performance, and they should downgraded accordingly. ই

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 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 a full scale aircraft.

A 10 meters (33) diameter loop at 80 km/h (50 m, ph.) results in most full scale aerobatic aircraft.

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 roll rate from start to finish. A perfect loop must have a constant roll rate from start to finish. A perfect loop must have a constant redus defining a perfect set of the made up of a series of straight flight increments with sudden angular perks placed between. Such sudden jerks represent high 'g' forces well in excess of full scale tolerances and should be downgraded.

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 contest. It is advisable to the start in order to discuss judging and make the standards so uniform as possible. This is effected by means of practice flights which all judges score simultaneously and privately. After these flights, the defects in each maneuver should be discussed by all judges and agreement reached about the severity of defects. Once the contest is started, the individual judge should not after his standard 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. The definition of unsafe areas should be absolutely unambiguous.

in doubt, give the lower

Judging Individual Maneuvers. When in doubt, give the low score, Perfection is not a common occurrence.

A description of each maneuver is given, and then a number reasons for downgrading are listed. The maneuver should towngraded according to:

1) the number of defects observed.
2) the severity of the individual defect occurs.
3) the number of times any one defect occurs.
4) the positioning of the maneuver.
5) the size of the maneuver.
5) the size of the maneuver.
6) the size of the maneuver.
7) the size of the maneuver.
7) the size of the maneuver.
8) the size of the maneuver.
8) the size of the maneuver.
9) the size of the maneuver is well of many maneuvers there are more than ten possible kinds of a soor of 10 should be given only if the maneuver is well of the maneuver in the size of the