

# **Competition Regulations**

## **2011-2012**

### **Rules Governing Model Aviation Competition in the United States**

# **Control Line & Radio Control Fixed Wing Scale**

#### **Amendment Listing**

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Page SC-3	1/7/2011	Fixed typographical errors in 2.8-3.

# Scale

## SCALE GENERAL

**NOTE:** For FAI events see the FAI Sporting Code.

(The FAI Sporting Code may be obtained from AMA Headquarters upon request. (When FAI events are flown at AMA sanctioned contests the common practice is to only use the basic model specifications and related items such as timing procedures, from the FAI rules. Contest management and procedures usually follow the basic rule structure found in the General sections and specific category sections of the AMA Competition Regulations book.)

**1. Applicability:** The rules in this section not specifically stated as being for certain events will apply to all Scale events unless an exemption from them is stated in the rules for an individual event.

**2. General:** A contestant may make only one entry in each scale event, unless more are specifically allowed by the event rules. An AMA Scale event consists of two parts—Static Judging and Flight Judging. Although the criteria for judging differs between the various classes of scale models, the official score invariably includes both static and flight scores. The following is a listing of the scale model classes recognized for AMA competition.

### CLASS

509 CL Sport Scale  
511 RC Sportsman Sport Scale  
512 RC Expert Sport Scale  
513 RC Sportsman/Expert Combined  
515 RC Designer Scale  
517 RC Sport Scale Soaring  
520 RC Fun Scale  
521 CL Profile  
522 RC Team Scale  
523 RC Open Scale  
524 CL Designer Scale  
526 CL Fun Scale  
527 CL Team Scale

\*All RC Scale Classes must comply with pertinent FCC rules and regulations, in addition to AMA rules. A contestant may only be listed once in a list of winners in each event and may only receive one award in each event.

**3. Safety Declaration:** At all sanctioned contests, each contestant shall sign an AMA Flight Safety Declaration, attesting to the fact that he or she has previously and is now capable of at least confidently performing in RC Designer, Team, Sport and Fun Scale, a takeoff, a Figure Eight as described in the Scale Flight Judging Guide and a realistic landing within a designated area; in CL Fun, Profile and Sport Scale an unassisted takeoff, two (2) laps of level flight and a normal landing within the designated flying circle; in Scale Sailplane competition, a towed or hand-launch, a Figure 8 and a realistic landing within a designated area. Furthermore, the contestant in all Scale events shall also sign a declaration that any and all aircraft he uses in said competition have been successfully test flown prior to the start of competition, including all of the above maneuvers in applicable events, and are therefore qualified to be flown in the contest, and in the presence of fellow contestants, contest officials, and all others who may be in the flight area during competition.

**4. Scale Builder–Flier Rule:** The builder and flier of a Scale model shall be one and the same person (except in team scale). There shall be no team entries except in the case of RC Event #522. The Contest Director will make every reasonable effort to assure himself that each flier has completely constructed the model(s) he uses in competition, including the covering, where used, with construct to be interpreted as the action required to complete a model with no more prefabrication than the usual kit. Kits containing large amount of prefabrication are permissible as long as the final assembly of the parts and covering and/or painting are done by the builder. Models which are completely prefabricated and require only a few minutes of unskilled effort for their completion shall be excluded from competition except as noted in individual events.

**4.1:** Note: The RC Open Scale and the RC and CL Fun Scale events allow use of a prefabricated model or one built by someone else.

**5. Special Events:** The CD may schedule special events restricted to scale models of specific classifications. (Examples: Event limited to

certain engine sizes. Event for multi-engined only. Event for aircraft that flew in World War I. Event for civilian airplanes of a certain time period. Event for quarter scale models, Combined Sportsman–Expert event.) The exact qualification for entry in special events must be clearly outlined in the AMA sanction application and in all pre-contest announcements and publicity.

**6. Profile Fuselages:** Profile fuselages are permitted in all scale events unless the rules for the particular event specifically state that they are not allowed. The scale judges will apply appropriate downgrading of scores for the non-scale fuselage cross section of the profile fuselage and for the appearance except in event 521 CL Profile Scale and event 526 CL Fun Scale.”

**7. Minimum Flight Score:** All scale entries are required to attempt flight in order to be eligible to place in the competition. A static score alone is not sufficient to qualify. A score of at least one (1) point awarded for flight is the minimum acceptable score. In application of this rule, any model that has become airborne from a takeoff or hand launch will be considered to have achieved at least one (1) flight point, except in the CL Scale events, where five (5) laps are required and Free Flight events which have minimum flight times for an official flight. Points gained in a taxi maneuver prior to the takeoff run or those that may be awarded for the takeoff run itself during which the model does not become airborne do not count toward satisfying this minimum score requirement. “Airborne” will be held to mean to entirely leave the ground or the hand of the launcher.

**8. Pyrotechnics:** Scale Operations involving pyrotechnics (including, but not limited to, rockets, explosive bombs dropped from models, smoke bombs, all explosive gases and any ground mounted device launching a projectile) are not permitted in Scale competition.

## **CONTROL LINE SPORT SCALE**

*For event 509.*

**1. General:** All AMA regulations (see sections titled Sanctioned Competitions, Records, Selection of Champions, General, Control Line General and Scale General) shall be applicable, except as specified below.

**2. Safety Requirements:** Consideration of safety for spectators, contestants and officials are of the utmost importance in this event. The following safety provisions must be observed.

**2.1:** All models must pass a general safety inspection by the Contest Director or his representatives before flying.

**2.2:** Dangerous flying of any sort or poor sportsmanship of any kind shall be grounds for disqualification of the contestant involved.

**2.3:** All planes entered must have a rounded prop spinners or some sort of safety cover on the end of the propeller shaft (such as a rounded “acorn nut”).

**2.4:** Knife-edged wings are not allowed.

**2.5:** Models shall weigh no more than 20 pounds ready for flight, except for fuel.

**2.6:** Maximum total displacement of the engine(s) will not exceed 1.25 cubic inches. Electric motors of any size may be used to power the model. Fifty percent of the actual displacement of four (4) cycle engines shall be used for determining maximum displacements allowed, line sizes, and pull test requirements.

**2.7:** Metal propellers are not allowed for flying.

**2.8:** CL Sport Scale will use the same line diameters, line lengths and pull tests specified in the CL Scale Flying table. The General CL Regulations also apply.

**2.9:** The line sizes, line lengths, and pull test are designed for a model flying no more than 60 mph. Any contestant entering a model with a speed exceeding 60 mph shall provide the Event Director with documentation specifying the line diameter, line length, and pull test to be used to ensure the model meets the same standards of safety established for slower models.

**3. Control Line(s):** The length of the control line(s) measured from the center point of the grip part of the control handle (device) to the fore and aft center line of the model shall be as specified in the CL Flying line size and pull test table. Models weighing 1.5 pounds or less must use a minimum line length of 52’-6” unless the total engine displacement is less than .100 cubic inches, or the displacement of each engine of a multi-engine model is less than .0504 cubic inch. In such cases, minimum line length may be 35 feet.

**3.1:** The minimum wire diameter of the control line(s) depends upon the number and type of the lines which bear equal load, as well

as the weight of the model, as per the accompanying table.

**3.2:** All control lines bearing any part of the models pull in flight must meet the minimum diameter requirements as specified in this section. Auxiliary lines which do not bear any part of the model's pull in flight (i.e., not connected to the bell crank) and are used solely to actuate components such as landing gear, flaps, etc., may be of any diameter.

**4. Pull Test:** will be applied before each flight using the loads specified in the accompanying table.

This table assumes a maximum model speed of 60 mph. Models should not fly faster than 60 mph. Those that do should use larger lines to ensure safety.

\*Engine size restrictions apply for lines less than 52.5 feet. See Section 3.

The following table lists lap times for various lengths for models flying at 60mph. Shorter lap times indicate the model is flying faster than

carrying aircraft. Only prototype aircraft that actually made flights can be selected as subjects for competitive modeling. "Penguin" ground trainer types not meant to leave the ground, proposed designs, mockups, and actually constructed functional aircraft that were never test flown cannot be used. The Contest Director may disqualify any entry which, in his opinion is not a bonnafide scale model.

Enlargement of wing and tail area, changes in dihedral angles, changes in landing gear placement, simplification of structure, etc., are permitted, but with appropriate deductions during scale judging. Extreme deviations from

scale dimensions, particularly those which noticeably alter the resemblance of the model to its prototype, will be heavily penalized. Models which only simulate scale appearance by component shapes resembling a prototype aircraft, but whose basic design bears no relationship to it, are not permitted. The preceding sentence does not necessarily rule out profile fuselages unless other parts of the model are also non-scale. The scale judges will apply appropriate downgrading of scores for the non-

CL Flying Scale							
Model Weight (lb)	Required Line Length	Single Strand			Multi-Strand		Pull Test
		1 Line	2 Lines	3 Lines	2 Lines	3 Lines	
0 – 1.50	35' - 70'*	.010"	.008"	.008"	.012"	.008"	10G
1.51 – 2.50	52.5' - 70'	.012"	.010"	.008"	.012"	.008"	6G
2.51 – 4.00	52.5' - 70'	.014"	.012"	.010"	.012"	.012"	
4.01 – 8.00	52.5' - 70'	.020"	.016"	.012"	.018"	.015"	
8.01 – 12.00	65' – 70'	.022"	.018"	.014"	.021"	.015"	5G
12.01 – 16.00	65' – 70'	.026"	.022"	.016"	.024"	.018"	
16.01 – 20.00	65' – 70'	.028"	.024"	.018"	.027"	.021"	

60mph.

scale fuselage cross section of the profile fuselage and for the appearance.

The engine must be equipped with a muffler or silencer to limit noise output. Ducted fan installations and electric motors are exempted from the muffler requirements. If the pilot is visible in flight in the prototype aircraft then a man-shaped dummy pilot of scale size and width must be visible in the model during flight. The dummy pilot figure will not be scored or considered in any way during Scale Judging. If the contestant wishes, he may present his model for Scale Judging without the pilot figure in place, and no downgrading will be done by the judges if he does so. The contestant will be allowed only one entry in CL Sport Scale. At any

Line Length	Seconds/lap at 60 mph	Seconds for 4 laps at 60 mph
35'	2.50	10.00
42'	3.00	12.00
52.5'	3.75	15.00
60'	4.29	17.16
65'	4.61	18.44
70'	5.00	20.00

**5. Model Requirements:** A scale model shall be a replica (copy) of a heavier-than-air, man-

one contest, this entry may not also be entered in CL Designer, Profile or Fun Scale, although separate models may be entered by the same contestant in these events.”

**6. Proof of Scale:** To prove that the model resembles a particular prototype, some proof of scale material is required.

**6.1:** Proof of Scale is the responsibility of the contestant.

**6.2:** To be eligible for Accuracy of Outline points, one (1) of the following must be provided by the contestant:

**Either: a.** A three (or more) view drawing (line, tone or color). The three-view scale drawings must be from a reliable source such as the aircraft manufacturer, model or aviation magazines, books, etc. Commercially available three-view drawings are acceptable. Plans of non-flying solid or replica models, either kit or magazine, are acceptable.

Homemade or non-published drawings, corrected three-views, or drawings of flying models are not acceptable unless approved in advance by an authoritative source such as the AMA Technical Director, a Scale Contest Board member, the manufacturer or builder, or other competent authority. Suitable photos, historical background, and supporting data must accompany the drawings submitted for approval to permit verification.

**Or: b.** A selection of photos of the aircraft modeled, sufficient to show the outlines of the aircraft in side view, front view and plan view. The photographs need not be taken from directly overhead or at exactly 90 degree angles to the side or front of the outlines, but can be pictures taken from oblique angles which allow the judge to interpret the outlines.

**Or: c.** A plastic model of the type available commercially, unmodified and unpainted may be used. The use of a three (or more) view drawing, plastic model as proof or photos as described above for proof of accuracy of outline will only count as one (1) page of the Sport Scale documentation as outlined in paragraph 4.5. below. The contestant may furnish a three (or more) view, set of photos or an unpainted, unmodified plastic model—or any combination of these items—for Accuracy of Outline judging if he desires, but he is not required to furnish all or any two (2) of them. No downgrading of the Accuracy of Outline Score will be done by the judges if only one of the above listed items (a, b, or c) is provided and not either of the others.

**6.3:** To be eligible for Finish, Color, and Markings points, some proof of the color scheme used on the model is required. It is not the intent of the documentation rules to limit the choice of scale subjects only to those aircraft for which a large amount of data is easily available or penalize the use of rare color or markings schemes. In many cases it is not possible for the builder to provide enough photos of the same plane to cover all aspects of the color and markings. In these cases no downgrading will be done for lack of proof of the “other” side, or bottom, etc. or for use of written proof of color in lieu of color photos or drawings. This can be:

**Either: a.** Photo or photos.

**Or: b.** Some other pictorial representation, such as a magazine or other published color painting or drawing.

**Or: c.** A detailed written description of the color scheme and/or markings from a reliable source.

**Or: d.** Notes and diagrams of markings on black-and-white three-view. (“Profile” and similar types of color paintings in three-view form can be used for both proof of Accuracy of Outline and Finish, Color and Markings.) The contestant may provide a photos, pictorial, written, or three-view notes on color and markings—or any combination of these items—for Finish, Color, and Markings, but he is not required to furnish all or any two (2) of them. No downgrading of the Finish, Color, and Markings score will be done by the judges if only one of the above listed items (a, b, c, or d) is provided and not either of the others.

**6.4:** If no proof of Accuracy of Outline accompanies the model, no points can be awarded for Accuracy of Outline. If no proof of Finish, Color, and Markings accompany the model, no points can be awarded for Finish, Color, and Markings. Points for Craftsmanship and Flight may still be awarded, even if one or both of the requirements for proof of Accuracy of Outline and Finish, Color, and Markings are not complied with.

**6.5:** To facilitate rapid judging, Sport Scale documentary presentations are limited to no more than eight (8) pages (one (1) side) sized 8-1/2" x 11" or an equivalent area of some other arrangement. “To facilitate rapid judging, up to three (3) sets of the same three-view used as documentation may be provided by the contestant and will only count as one (1) page in the documentation presentation.” Three-views larger than 8-1/2" x 11" or more than one (1)

page are permitted and will also count as one (1) page of the eight (8) allowed for documentation.

## 7. Static Judging:

**7.1:** Static judging shall be done at a distance of 15 feet from the model. It is recommended that two (2) lines 15 feet apart be established. The model is then placed behind one (1) line with no portion allowed to intrude into the 15 foot space. The judges will remain behind the other line during the judging. The owner of the model or a contest official, at the discretion of the modeler, other than the judges, will then rotate or move the model to positions requested by the judges in order to see all views of the model. The model may be placed on a table if desired. It is recommended that the AMA approved CL Sport Scale score sheet be used for judging.

**7.2:** The judges will not pick up or examine the models closely before or during the judging. This rule is not intended to prevent display of the entries before or after judging for the benefit of spectators. The models may be displayed on the contest flight line, in a scale cage or whatever other area the Contest Director wishes to designate.

**7.3:** Cockpit and cabin interiors, even if partially visible from the judging distance, are not to be considered in scoring the model. All other visible features will be considered.

**7.4:** Subjects having un-cowled radial engines or configurations whose shape do not provide sufficient space such as the Spitfire, P-63, etc., or nose or cowling sizes dictated by the scale to which the model has been built, which do not lend themselves to any practical method of completely concealing a standard type model engine, will not be downgraded in scale judging, when, of necessity, part of the engine must be exposed or non-scale openings are made for engine cooling. In the case of the required muffler installation, no scoring penalty of any kind will be applied by the judges, either for a protruding or fully exposed muffler or for the hole in the cowl or fuselage necessary for attachment of the muffler or silencer to the engine.

**7.5:** No changes shall be made between judging and flying which alter the scale appearance of the model except as noted below.

**a.** A flying propeller of any diameter may be substituted for a scale propeller for flight.

**b.** The propeller spinner used in flying must be the same size, shape and color as the one presented for scale judging except that it may

have a different number of cutouts appropriate for the flying prop. The nose of the flying spinner may be rounded to comply with the safety regulations.

**c.** Models of seaplanes or flying boats are permitted to use non-scale devices or dollies for takeoff in the absence of suitable water conditions. If dollies are used they must not be attached to the model in flight. Deviations from scale through the inclusion of permanently mounted, recessed wheels, skids, plug-in removable landing gear or similar devices, if neatly and inconspicuously executed will not be penalized in the scoring of Accuracy of Outline points.

**d.** If bombs, rockets, drop tanks, etc., are to be dropped or released, they must be in place at the time of judging. The bombs or other armament in place at scale judging may be replaced during flying if the replacements are the same size, shape and color as those submitted for scale judging.

**e.** Removable lead out guides may be employed. They may be removed for static judging and reinstalled prior to flight.

**f.** Sharp pitot tubes projecting from the wing or fuselage will be removed before flight as a safety consideration. No downgrade will be made in the flight realism score.”

**8. Static Scoring:** 100 points maximum may be earned as follows:

Category	Points
Accuracy of Outline (General Impression)	Maximum 40 pts.
Craftsmanship	Maximum 30 pts.
Finish, Color & Markings	Maximum 30 pts.

## 9. CL Contest Procedure—Flight:

**9.1:** It is suggested that scale judging take place before official flights. If this is not possible or desirable, the CD may hold part of all of the official flying before scale judging. Any damage caused to the model by flying before scale judging will be disregarded and not counted against the contestant. There is no maximum limitation of the number of official flights allowed during the time scheduled for the event, but a minimum of three (3) rounds should be scheduled. It is recommended that the AMA approved CL Sport Scale score sheet be used for judging.

**9.2:** Any flight which has progressed beyond takeoff and level flight will be called an attempt. A flight of less than five (5) laps continuously airborne, with at least one engine

running, may be counted as an official flight at the contestant's discretion. Any flight which has progressed beyond five (5) laps airborne with at least one (1) engine running will automatically be considered an official flight.

**9.3:** After a contestant has been notified that a flight area is available, he shall be given three (3) minutes in which to get his model airborne. Time starts when the contestant begins cranking the engine. In case of multiengine models, two (2) minutes for each additional engine shall be given in which to get the model airborne. An attempt will be charged to the contestant if he fails to get his model airborne within the time limit.

**9.4:** Time limit for each flight is 10 minutes inclusive of starting engine(s). In the case of multiengine subjects, total flight time shall be 10 minutes plus two (2) minutes for each engine over one (1). If model is contacted by the pilot or helper at any time during flight from the point of calling the first maneuver, "starting/takeoff, etc.," to the completion of an official flight, the maneuver called or performed immediately preceding the contact will receive a zero (0) score. Such contact more than once within an official flight will result in a zero (0) for the flight.

**9.5:** Each maneuver must be announced prior to commencement and called on commencement by the word "NOW" (or its equivalent). Completion of each maneuver must be announced by the word "FINISHED" (or its equivalent). Failing to do so, loud and clear, will result in the loss of marks for that maneuver.

**9.6:** Between the end of one maneuver and the start of the next one, the competitor must fly the model a minimum of two laps. Less than two laps between the end of one maneuver and the start of the next one will result in zero points for the subsequent maneuver.

**10. CL Flight Plan:** The CL flight plan shall consist of 10 maneuvers and/or scale operation, four (4) obligatory and six (6) optional as follows:

1. Takeoff.
2. 10 Airborne Laps.
3. Option.
4. Option.
5. Option.
6. Option.
7. Option.
8. Option.
9. Landing.
10. Realism in Flight.

**10.1:** Each of the 10 Airborne Laps completed will be awarded one (1) point, for a maximum of 10 points. (Example: four (4) laps will be awarded four (4) points.) Other options may, if the contestant desires, be performed during the 10 laps, or the laps may be flown separately from the optional maneuvers.

**10.2:** Options may be any maneuver listed in the rule book under AMA or FAI CL Scale rules, or any scale operation (retract gear, flaps, bomb drop, crop dusting, etc.) typical of the aircraft modeled but not to include climb or dive. They must be listed on the judging form before flying.

**10.3:** Touch-and-Go (maneuver) and Retract Gear (scale operation) shall be counted as two (2) options on the Flight Plan, replacing two (2) other maneuvers or scale operations.

**11. CL Flight Scoring:** Maximum total flight score is 100 points.

**11.1:** All maneuvers and scale operations (except Touch-and-Go and Retract Gear) are to be scored from zero (0) to 10 points.

**11.2:** Touch-and Go and Retract Gear, which each count as two (2) options, are scored from (0) zero to 20 points.

**11.3:** Except for Airborne Laps (which will be awarded one (1) point for each successfully completed lap), no maneuver or scale operation will receive an automatic maximum score. All will be judged and scored in relation to their scale-like qualities.

**11.4:** Multiengine score will be based on the approximate percentage of time the full number of engines were running during the flight. If the model is equipped with diverse types, or widely diverse sizes of similar power plants (e.g., gas and electric, or all gas with two (2) large (.40) and two (2) very small (.010)) the contestant must demonstrate to the judges that all power plant units are contributing significantly to the models performance before points are awarded under this option. The judges and contestant will agree on the method of demonstration before the contestants first attempt at making an official flight.

**11.5:** Realism in Flight score will be based on the attitude of the model in flight, scale speed in relation to the scale size and power of the model, the scale options performed on the prototype (flaps, retracts, etc.) that are performed on the model, and ground maneuvers except proto taxi. The overall smoothness of the

performance of all of the above will also be considered.

**12. CL Official Score:** “The official score shall be the total static points (100 maximum) and the average of the two (2) best flight scores (100 maximum). To break a tie, the best single flight will be added to the static score. If this does not break the tie, add the average of the three (3) best flights to the static score. If this does not break the tie then add the average of the four (4) best flight scores to the static score. If only two (2) rounds are flown then the official score will be the total of the static points (100 maximum) and the best single flight score (100 maximum). To break a tie if only two rounds are flown, Add the average of both flights to the static score”

### **CONTROL LINE DESIGNER SCALE**

#### ***For event 524.***

Rules are identical to Event 509 except as below:

- 1. Eligibility:** Only those models that are the original design of the contestant are eligible for entry in this event. Models that are built from kits or commercially available plans, modifications from kits or plans, or scaled commercial plans, are not eligible.
- 2.** Craftsmanship judging will be done at zero distance.
- 3.** Judging the model’s cockpit and/or interior details will be given consideration under Item 10 (Color and Markings) of the CL Sport Scale Score Sheet.
- 4.** The contestant will be allowed only one entry in CL Designer Scale. At any one contest, this entry may not also be entered in CL Sport, Profile or Fun Scale, although separate models may be entered by the same contestant in these events.”

### **CONTROL LINE PROFILE SCALE**

#### ***For event 521.***

The event rules are identical to 509, Control Line Sport Scale, with the following exceptions.

Event 521 Profile Scale is exempted from the dummy pilot requirements, (CL sport scale event 509 paragraph 5. Model requirements.) Event 521 Profile Scale is exempted from the retract rule, requiring flying with wheels up if the prototype had retractable landing gear. Control Line Scale flight judging guide. Realism in flight, (paragraph 4.2.e.)

There are two division of CL Profile Scale. Division #1 is for the novice contestant only.

This is purely an ENTRY LEVEL division for CL scale competition. Division #2 is open to any contestant with previous CL scale competition experience.

**1. Model Requirements:** The profile fuselage and/or engine nacelles are not to exceed one (1) inch in width except for a simulated cowl(s) which may be up to 1-1/2 inches in total width. The engine must be equipped with a muffler or silencer to limit noise output. Ducted fan installations and electric motors are exempted from the muffler requirements. The contestant will be allowed only one (1) entry in CL Profile Scale. At any one contest, this entry may not also be entered in CL Sport and/or Precision Scale, although separate models may be entered by the same contestant in these events.

**2. Design and static Judging Guidelines:** To maintain the scale wing and tail span, the leading and trailing edges of the wing should be extended to the center line of the body, without changing the overall wing span of the model. Since the flaps and ailerons are part of the wing they should remain scale size and shape. If the airplane had a wing fillet, the fillet should remain scale size and shape and be located at the profile body. In a like manner, if the plane modeled (like a P-51 for example) has a leading edge extension or other similar feature, the feature will be of a scale size and be located at the profile body. The Horizontal Stabilizer and or Elevator should be done in a similar manner as the wing. Reducing the model's overall wing and tail span the same amount the fuselage was reduced to create the profile, is cause for loss of static points.

### **CONTROL LINE, FUN SCALE**

#### ***For event 526.***

The intent of Fun Scale is to provide a CL Scale event, which is, and is to remain, simple in concept. It minimizes the static judging and emphasizes the flying segment.

**1. Eligibility:** The contest is open to modeler-built or factory-built CL Scale models. The event rules are identical to event 509, Control Line Sport Scale, except for static judging. General rule 4 (builder - flier) will not apply in this event. With advance notice, the event may be conducted in different classes based on skill or age level, i.e., Open, Entry, Junior, Senior, etc.

**2. Static Judging:** The static scale outline score will be a graduated zero (0) to five (5) points to contestants who show proof that a full-scale aircraft of this type did/does exist. An additional scores of a graduated zero (0) to (5) points will be awarded if proof is shown as to replicating a color/markings scheme of the original full-scale aircraft. A single sheet (three-view drawing, photo, profile, painting, plastic kit box, etc.) is sufficient. Contestant-prepared drawings or a photo of the model itself are not acceptable. If no proof of existence or color/markings is shown, no static points will be awarded. However, it will be up to the Contest Director and/or Event Director to determine if the Scale model is indeed a replica of a full-scale aircraft for contest eligibility.

**3. Flying:** All rules as per CL Sport Scale (event 509).

**4. Scoring:** The official score shall be the total of static points (10 maximum) and the single best flight score (100 maximum) for a total of 110 points.

**5. Model Requirements:** The contestant will be allowed only one entry in CL Fun Scale. At any one contest, this entry may not also be entered in CL Designer, Sport, or Profile Scale, although separate models may be entered by the same contestant in these events.”

## **CONTROL LINE TEAM SCALE**

*For event 527.*

Team Scale All the same rules as 509 except that pilot and the builder must be present.

## **CONTROL LINE SCALE FLIGHT JUDGING GUIDE**

**1. Purpose:** To furnish guidelines for judging flight maneuvers and scale operations of control line models in accordance with the AMA Official Model Aircraft Competition Regulations. This guide is intended to:

- a. Inform a contestant of how the flight will be judged.
- b. Provide the flight judges with a method of judging the flying in both mandatory and optional maneuvers and scale operations.
- c. Supplement the descriptions found in the AMA Competitions Regulations.

**2. Principles:** The principles of judging a scale model should be based on how well the model simulates the flight performance of the full-scale

counterpart. Each maneuver and scale operation be signaled to the judges at the beginning and end of the maneuver or operation.

**2.1: Judges.** The number of judges and the method of determining the flight plan score will be as specified in the AMA rules.

**2.2: Criteria Judging.** The criteria to be used in judging the maneuvers and/or scale operations may be divided into three categories: precision, presentation and realism.

**2.2.1: Precision.** Judging begins when the start of the maneuver or scale operation is called and continues until completion is called.

a. Path corrections of the model after beginning the maneuver shall be a cause for the deduction of points due to lack of precision.

b. The start and finish of most maneuvers should be level flight. In the case of models of light aircraft, in which the power available on the full-scale aircraft would prevent vertical maneuvers to begin from level flight such as a loop, a dive may proceed the maneuver if this was the procedure used by the full-scale aircraft. The contestant must prove that the prototype was so designed.

**2.2.2: Presentation.** To achieve perfection, all flight maneuvers should be presented in a manner such that they can be easily judged. All maneuvers, as far as possible, should be downwind of the judges. For example, a loop should be conducted on the opposite side of the circle from the judges. Barring wind changes, judges should be in the right position at all times. For safety reasons, prior to the flight the judges and contestant should agree to the drop point of droppable stores.

**2.2.3: Realism.** Awarding points for realism during the flight maneuvers is probably the most difficult and controversial aspects of judging scale models. It is most important that only flight maneuvers that were capable of being accomplished by the prototype be performed. For example, most light aircraft are not capable of inverted flight. To eliminate discord at the contest, it is recommended that, prior to flight, any maneuver of scale operation not listed in the rule book should be cleared by the judges. The contestant should be prepared to explain any such maneuver or operation and, if necessary, supply documentation that such was within the capabilities of the aircraft. The transition from ground to air and vice versa during takeoff and landing should be smooth. Many of the so-called “average” landings by CL models would result in bent or collapsed landing gear on full scale aircraft.

**3. Accurate and Consistent Judging:** The most important aspect of consistent judging is for each judge to have established standards and maintain them throughout the meet.

**3.1: Pilot's Meeting.** Prior to the beginning of any flights, a brief meeting between the judges and contestants should be conducted. In this meeting the following items should be covered:

- a. The manner in which contestants will be called to the flight circle.
- b. Contest flying hours. (Include lunch break.)
- c. Any interpretations of rules that may not be clear to the contestants.
- d. Methods of signaling for maneuvers or scale operations.
- e. Pit operations (pull tests and line checks).
- f. Explain how scores will be tabulated.

**3.2: Preflight Meeting.** A brief meeting between the flight judges and the contestant should be held prior to each flight to discuss the flight plan for the flight. In this meeting the contestant should define:

- a. The sequence of the flight maneuvers and scale operations (flight plan).
- b. The signals to be used to announce flight maneuvers and scale operations.
- c. Which side of the circle the dropable stores will be released.
- d. Any other information that the contestant wishes the judges to know about the flight.

**4. Judging the Flight:** In addition to the mandatory flight maneuvers, a contestant must perform a number of options, each of which must be a maneuver/scale operation that was typical of the prototype aircraft. A variety of scale operations and maneuvers are described in this section of the guide; however, a contestant may select an operation or maneuver of choice. Should this be the case, the contestant should submit a written description of the maneuver or operation to the judges prior to flight time. As in the case of all options, the contestant should be prepared to prove that this choice was typical of the prototype aircraft. A judge should not wait until a maneuver is completed before trying to assign a grade. Judges should assume that a contestant is going to perform a perfect maneuver/scale operation and should, therefore, start with a grade of 10 points. Any faults that are observed should be the cause of points

deducted. In downgrading the score for an individual maneuver/scale operation, a judge should consider the number of defects and the number of times any one defect occurs. While a minor defect may result in the loss of less than a full point, a major defect could be cause for the loss of more points.

**4.1: Multiengines** (Option). Full points are awarded as per the AMA rules for the event entered.

**4.2: Realism in Flight.** The model will be judged for realism against the full-scale prototype from which it was modeled, both during normal level flight and during the maneuvers (including takeoff, taxi, and landing). The judges will be looking for:

- a. The scale speed compared with the prototype (a jet or high-performance fighter should fly fast; a Piper Cub should fly slowly).
- b. The attitude in flight (i.e., any nose-up/nose-down tendency).
- c. The smoothness of control.
- d. The smoothness of engine power changes.

e. Any model which flies with wheels down while the prototype actually featured a retractable landing gear will have the score reduced except Profile Scale models.

**4.3: Takeoff** (Mandatory). The model must stand still on the ground with engine(s) running and without being held by a helper. As the throttle is advanced, the model should roll smoothly at an increasing realistic speed along the ground, then rise smoothly into the air, followed by a gradual climb to and smooth leveling off at a normal height. The type and length of takeoff run and the angle of climb should correspond to the prototype.

**a. Airplane Equipped with a Tail Wheel.** The pilot should, shortly after starting the takeoff roll, raise the tail wheel off of the ground. At the end of the takeoff roll, the pilot should slowly lift the nose of the airplane to make a gentle liftoff.

**b. Airplane Equipped with a Nose Wheel.** The pilot should leave the nose wheel on the ground throughout the takeoff roll. At the end of the takeoff roll, the pilot should slowly lift the nose of the airplane to make a gentle liftoff.

**c. \*Light Aircraft** (Piper, Cessna, etc.)—A light plane or low-performance airplane should use 1/2 to 3/4 of the circle for the ground roll.

**d. \*Heavy Aircraft** (Airliner or Cargo

Type)—Heavy aircraft should use 3/4 or more of the full circle for the ground roll. Climb should be shallower than normal.

**e. \*High-performance Aircraft** (Fighter or Jet)—A high-performance airplane should make the takeoff roll using 3/4 or the entire circle. Climb should be steeper than normal.

*\*Note: Distances for takeoff are suggested and may differ based on local site conditions and scale of the model.*

**f. Airplane Equipped with Retractable Landing Gear.** The landing gear should be retracted right after liftoff and at the beginning of the climb out.

**4.4: Level Flight** (Mandatory). Immediately after takeoff, the contestant performs ten level laps. The airplane should be flown as level as possible. Judging is one point for each completed lap up to ten laps, regardless of the quality of level flight. However, the quality of level flight should affect the score for Realism in Flight. Other options that involve level flight may, if allowed by the AMA rules, be performed during the ten laps.

**4.5: Retract and Extend Landing Gear** (Option). Retraction of the landing gear should commence immediately after takeoff. For a retractable landing gear, the model should be slowed down before extending the landing gear. Landing gear extension should be initiated just before landing. The speed of landing gear operation and its action should approximate the full-scale prototype. Points will be deducted if:

**a.** One or more landing gears fail to retract or extend (includes tail wheel, if this was retracted on prototype).

**b.** Landing gear sequence is of the “snap up” action.

**c.** Landing gear action is grossly different from prototype.

**d.** Landing gear extends, or partially extends, during high positive “g” maneuvers.

**e.** One or more landing gear leg(s) collapse during landing.

**4.6: Extend and Retract Wing Flaps** (Option). A contestant should use wing flaps for takeoff if flaps were normally used for takeoff by the prototype; points shall be deducted if flaps are not used on the model in this case. If flaps were not normally used for takeoff by the prototype, no points shall be deducted if flaps are not used on the model. (Light aircraft do not normally use flaps for takeoff. Fighters, bombers, and heavy aircraft do use flaps for takeoff.) Flaps must be used for landing. With

this option, wing flaps should also be used during a touch-and-go. However, for full points to be awarded, a separate demonstration should be made during which flaps are lowered and at least one lap completed before flaps are raised. The lowering and raising of flaps must be performed as an independent (non-proportional to throttle control) function to obtain maximum points. Also, to be eligible for full points, the model should reduce speed before flaps are lowered.

**4.7: Bomb(s), Torpedo, Fuel Tank(s) or Stores Drop** (Option). If bomb(s), torpedo, fuel tank(s) or stores are carried internally, bomb bay doors should open, objects should drop, and doors should close for maximum score. Bomb bay doors may be operated separately from dropping of bombs or stores if the prototype was used for recon photo missions by taking photos through the bomb bay opening. If bomb(s), torpedo, fuel tank(s) or stores are carried externally, they must be fitted in the same positions and in the same manner as the prototype and be the same size and shape as those presented for static judging. Bombs drop in a flight mode; tanks tumble when released.

**4.8: Inside Loop** (Option). One inside loop should be performed. The model should start from a normal flight level at shoulder height and perform a smooth, round loop, resuming normal level flight at the same point and at the same height as the entry. (See paragraph 2.2.1.)

**4.9: Inverted Flight** (Option). This flight maneuver is for models of aircraft that were designed for inverted flight. Aerobatic aircraft and fighters usually qualify for this maneuver. The model should make three smooth, stable laps in an inverted position at normal flight level height. Height should remain constant for optimum points.

**4.10: Wingover** (Option). From normal level flight, the model should make a near-vertical climb, pass over the pilot’s head, dive and then resume normal flight level. The line of flight during the wingover should bisect the ground circle. One wing-over is required.

**4.11: Figure Eight** (Option). This flight maneuver is for models of aircraft that were designed for inverted flight. Aerobatic aircraft and fighters usually qualify for this maneuver. From normal flight level the model should enter the figure eight at the intersection point of the two circles— first flying an inside loop followed by an outside loop and finally resuming normal flight level as the entry. The circles should be

round, of equal size and the intersection must be at the same point as the entry and exit. The bottoms of the circles should be at the same height. One horizontal figure eight is required.

**4.12: Revolve or Move Turrets** (Option). The operation shall be conducted through four cycles.

**4.13: Touch-and-Go** (Option). The purpose of touch-and-go landings with full-scale aircraft is to teach pilots how to land and take off. The landing is not complete until the airplane is rolling on all wheels and is under complete ground control by the pilot (steerable tail wheel or nose wheel operating). The model should land normally and take off again without coming to a stop. Precision and smoothness of landing and takeoff will be judged. Flaps should be used if applicable to the prototype. A tail wheel-type airplane should have the tail wheel on the ground and rolling prior to takeoff. A nose wheel-type airplane should have the nose wheel on the ground and rolling prior to takeoff.

**4.14: Other Scale Operations/Flight Maneuvers Not Listed.** A contestant may elect to perform a scale operation or an optional flight maneuver of choice, provided it is within the capabilities of the prototype aircraft. Such a maneuver should be explained to the judges before flight. A short description of the maneuver may be requested by the flight judges.

**4.14.1: Agricultural Spraying or Dusting** (Option). This scale operation is for models of aircraft used for crop spraying or dusting only. The contestant should be prepared to document that the prototype aircraft was used for this purpose. Since the manner in which this operation was performed by the full-scale aircraft may differ according to aircraft type and/or the crop being covered, the contestant should describe to the judges the intended presentation. Generally, the aircraft will make a low pass, visible perform the spraying or dusting mission for at least one lap, pull up abruptly to a safe altitude and then level off.

**4.14.2: High Flight** (Option). The model must be flown at a minimum angle of 30 degrees to the ground during three complete consecutive laps. To be eligible for top points, the control lines should not come below 45 degrees. Lower points should be awarded for flight between 30 and 45 degrees and no points if the lines drop below 30 degrees.

**4.14.3: Parachute Drop** (Option). The drop or ejection should be in the manner of the prototype. For example, cargo should be dropped from a hatch or bomb bays. A man

should be dropped via door, hatch or by exiting from the cockpit of the aircraft. But, a single-seat aircraft cannot drop its pilot. If the prototype used a parachute in landing, the contestant may demonstrate this.

**4.15: Landing** (Mandatory). An aircraft may make a three-point landing or may touch the main wheels first and gently lower the tail wheel or nose wheel as speed decreases. The model should touch down smoothly with no bouncing, and then roll to a complete stop without intervention by the helper. For a retractable landing gear, the model should be slowed down before extending the landing gear.

**4.16: Taxi** (Option). The taxi demonstration shall be executed only after the flight. The model must land with the engine(s) running, come to a complete stop without being held by a helper and must taxi for a minimum of one lap at a realistic speed and in a realistic manner. The model must then slow down to a complete stop, preferably at the same point as the commencement of the operation, without intervention by the helper.

**4.17: Engine Control** (Option). This option requires the contestant to demonstrate dependable, scale-like engine control throughout the entire official flight. All engines must operate through the entire flight and during the taxi lap if this option is called for. If the engine or any engine of a multiengine model stops prematurely at any time during the flight, zero points will be awarded. The contestant must also demonstrate engine(s) shutoff at the end of the flight to qualify for maximum points. Full points are awarded as AMA description.

## **RADIO CONTROL SPORT SCALE (SPORTSMAN AND EXPERT)**

*For events 511, 512, 513.*

**1. General:** All pertinent FCC regulations and AMA regulations (see sections titled Sanctioned Competitions, Records, Selection of Champions, General, and Scale General) shall be applicable, except as specified below.

**2. Safety Requirements:** Consideration of safety for spectators, contestants, and officials are of the utmost importance in this event. Noncompliance with the following safety provisions is cause for disqualification.

**2.1:** All models must pass a general safety inspection by the Contest Director or his representatives before flying.

**2.2:** In RC, any flying over a controlled spectator area will be cause for immediate disqualification of the flight.

**2.3:** Dangerous flying of any sort, or poor sportsmanship of any kind, shall be grounds for disqualification of the contestant involved.

**2.4:** All planes entered must have rounded prop spinners or some sort of safety cover on the end of the propeller shaft (such as a rounded "acorn nut").

**2.5:** Knife-edged wings are not allowed.

**2.6:** Metal propellers are not allowed for flying.

### **3. Outdoor Events:**

**3.1:** There are no restrictions as to types of power plants that may be used in RC Sport Scale models that are flown outdoors.

Reciprocating internal combustion engines (including two-stroke, four-stroke, glow, gas, CO<sub>2</sub>, compressed air), electric motors, and turbojet engines are allowed.

**3.2:** Turbojet engines up to a maximum of forty-five (45) lbs. thrust, as determined by manufacturer's specifications, may be used, subject to any current AMA safety waivers in effect at the time of the competition.

**3.3:** With the exception of electric motors and turbines, the engine(s) must be equipped with an effective muffler or silencer to limit noise output. A tuned pipe is considered a muffler.

**3.4:** RC Sport Scale models that are flown outdoors shall weigh no more than 55 pounds, ready for flight, including fuel.

Exceptions to this rule shall include the following:

**a.** Turbine powered model aircraft are allowed to a maximum weight of 75 pounds, ready to fly, including fuel.

**b.** Propeller powered model aircraft are allowed to a maximum weight of 100 pounds, ready to fly, with fuel.

These exceptions are allowed subject to the restrictions and added requirements, for both aircraft and pilots, which are found within the official AMA 520A, 520B and 520C documents governing Large Model Aircraft. If the event rules to be used vary from those stated in the Competition Regulations for RC Sport Scale event #512, prior permission must be obtained for the rules in order for the model types stated above to compete in the event.

### **4. Indoor Events:**

**4.1:** RC Sport Scale models that are flown indoors must be powered with electric, CO<sub>2</sub>, or compressed air motor(s). No other type of power plant is permissible for indoor flying.

**4.2:** RC Sport Scale models that are flown indoors shall weigh no more than 12 ounces ready for flight, including fuel or batteries.

**4.3:** Maximum wing loading of the model, ready for flight, shall not exceed 6 ounces per square foot.

**4.4:** Due to wide variations in the size and shape of indoor flying sites, the Contest Director has authority to adjust sections 4.2. and 4.3. as needed to fit the contest flying site and local conditions. In all cases, any deviation from these rulebook specifications must be noted in all pre-contest announcements and literature well in advance of the event.

**4.5:** Because of the size restrictions that indoor flying naturally imposes on the flight of a model, the Contest Director has authority to adjust any of the maneuver descriptions in the "Radio Control Scale Flight Judging Guide" to fit the size of his facility. For example, the Judging Guides says that the Fly- Past should be flown between 10 - 20 feet altitude for at least 5 seconds. At many indoor flying facilities that would be impossible. In all cases, any deviation from the Judging Guide maneuver descriptions must be noted in all pre-contest announcements and literature well in advance of the event.

**5. Model Requirements:** A scale model shall be a replica (copy) of a heavier-than-air, man-carrying fixed wing aircraft. Only prototype aircraft that actually made flights can be selected as subjects for competitive modeling. "Penguin" ground trainer types not meant to leave the ground, proposed designs, mockups, and actually constructed functional aircraft that were never test flown cannot be used. The Contest Director may disqualify any entry which, in his opinion is not a bona fide scale model. Enlargement of wing and tail area, changes in dihedral angles, changes in landing gear placement, simplification of structure, etc., are permitted, but with appropriate deductions during scale judging. Extreme deviations from scale dimensions, particularly those which noticeably alter the resemblance of the model to its prototype, will be heavily penalized. Models which only simulate scale appearance by component shapes resembling a prototype aircraft, but whose basic design bears no relationship to it, are not permitted. The

preceding sentence does not necessarily rule out profile fuselages unless other parts of the model are also non-scale. The scale judges will apply appropriate downgrading of scores for the non-scale fuselage cross-section of the profile fuselage and for the appearance. If the pilot is visible in flight in the prototype aircraft then a man-shaped dummy pilot of scale size and width must be visible in the model during flight. The dummy pilot figure will not be scored or considered in any way during Scale Judging. If the contestant wishes, he may present his model for Scale Judging without the pilot figure in place, and no downgrading will be done by the judges if he does so. The contestant will be allowed only one (1) entry in RC Sport Scale. At any one (1) contest, this entry may not also be entered in RC Fun Scale, Designer Scale, or Team Scale, although separate models may be entered by the same contestant in these events.

**6. Proof of Scale:** To prove that the model resembles a particular prototype, some proof of scale material is required.

**6.1:** Proof of Scale is the responsibility of the contestant.

**6.2:** To be eligible for Accuracy of Outline points, one (1) of the following must be provided by the contestant:

**Either: a.** A three-view drawing (line, tone or color). Drawings with more than three (3) views are also acceptable. The three-view scale drawings must be from a reliable source such as the aircraft manufacturer, model or aviation magazines, books, etc. Commercially available three-view drawings are acceptable. Plans of non-flying solid or replica models, either kit or magazine, are acceptable. Homemade or non-published drawings, corrected three-views, or drawings of flying models are not acceptable unless approved in advance by an authoritative source such as the AMA Technical Director, a Scale Contest Board member, the manufacturer or builder, or other competent authority. Suitable photos, historical background, and supporting data must accompany the drawings submitted for approval to permit verification.

**Or: b.** A selection of photos of the aircraft modeled, sufficient to show the outlines of the aircraft in side view, front view and plan view. The photographs need not be taken from directly overhead or at exactly 90 degree angles to the side or front of the outlines, but can be pictures taken from oblique angles which allow the judge to interpret the outlines.

**Or: c.** A plastic model of the type available commercially, unmodified and unpainted may be used. The use of a plastic model as proof of Accuracy of Outline will require the deletion of two (2) 8-1/2" x 11" pages or their equivalent as provided for in paragraph 4.5, below.

The contestant may furnish a three-view, set of photos or an unpainted, unmodified plastic model—or any combination of these items—for Accuracy of Outline judging if he desires, but he is not required to furnish all or any two (2) of them. No downgrading of the Accuracy of Outline Score will be done by the judges if only one of the above listed items (a, b or c) is provided and not either of the others.

**6.3:** To be eligible for Finish, Color, and Markings points, some proof of the color scheme used on the model is required. This can be:

**Either: a.** Photo or photos.

**Or: b.** Some other pictorial representation, such as a magazine or other published color painting or drawing.

**Or: c.** A detailed written description of the color scheme and/or markings from a reliable source.

**Or: d.** Notes and diagrams of markings on black-and-white three-view. ("Profile" and similar types of color paintings in three-view form can be used for both proof of Accuracy of Outline and Finish, Color, and Markings.) The contestant may provide a photo(s), pictorial, written or three-view notes on color and markings or any combination of these items—for Finish, Color, and Markings, but he is not required to furnish all or any two (2) of them. No downgrading of the Finish, Color, and Markings score will be done by the judges if only one of the above listed items (a, b, c, or d) is provided and not either of the others.

**6.4:** If no proof of Accuracy of Outline accompanies the model, no points can be awarded for Accuracy of Outline. If no proof of Finish, Color, and Markings accompany the model, no points can be awarded for Finish, Color, and Markings. Points for Craftsmanship and Flight may still be awarded, even if one or both of the requirements for proof of Accuracy of Outline and Finish, Color and Markings are not complied with. It is not the intent of the documentation rules to limit the choice of scale subjects only to those aircraft for which a large amount of data is easily available or penalize the use of rare color or markings schemes. In many cases it is not possible for the builder to provide

enough photos of the same plane to cover all aspects of color or markings. In these cases no downgrading will be made for lack of proof of the "other" side, or bottom, etc. or use of written proof of color in lieu of color photos or drawings.

**6.5:** To facilitate rapid judging, Sport Scale documentary presentations are limited to no more than eight (8) pages (one (1) side) sized 8-1/2" x 11" or an equivalent area of some other arrangement. "To facilitate rapid judging, up to three (3) sets of the same three-view used as documentation may be provided by the contestant and will only count as one (1) page in the documentation presentation." Three-views larger than 8-1/2" x 11" or more than one (1) page are permitted and will also count as one (1) page of the eight (8) allowed for documentation.

## **7. Static Judging:**

**7.1:** Static judging shall be done at a distance of 15 feet from the model. It is recommended that two (2) lines 15 feet apart be established. The model is then placed behind one (1) line with no portion allowed to intrude into the 15-foot space. The judges will remain behind the other line during the judging. The owner of the model or a contest official, at the discretion of the modeler, other than the judges, will then rotate or move the model to positions requested by the judges in order to see all views of the model. The model may be placed on a table if desired.

**7.2:** The judges will not pick up or examine the models closely before or during the judging. This rule is not intended to prevent display of the entries before or after judging for the benefit of spectators. The models may be displayed on the contest flight line, in a scale cage or whatever other area the Contest Director wishes to designate.

**7.3:** Cockpit and cabin interiors, even if partially visible from the judging distance, are not to be considered in scoring the model. All other visible features will be considered.

**7.4:** Subjects having uncowed radial engines or configurations whose shape does not provide sufficient space such as the Spitfire, P-63, etc., or nose or cowling sizes dictated by the scale to which the model has been built, which do not lend themselves to any practical method of completely concealing a standard type model engine, will not be downgraded in scale judging, when, of necessity, part of the engine must be exposed or non-scale openings are made for engine cooling. In the case of the required

muffler installation, no scoring penalty of any kind will be applied by the judges, either for a protruding or fully exposed muffler or for the hole in the cowl or fuselage necessary for attachment of the muffler or silencer to the engine.

**7.5:** No changes shall be made between judging and flying which alter the scale appearance of the model except as noted below.

**a.** A flying propeller of any diameter and color may be substituted for a scale propeller for flight.

**b.** The propeller spinner used in flying must be a similar size, shape and color as the one presented for scale judging except that it may have a different number of cutouts appropriate for the flying prop. The nose of the flying spinner may be rounded to comply with the safety regulations. The flying spinner must be presented to the judges during static judging. If the flying spinner varies significantly from the static spinner, the model must be static judged with the flying spinner installed on the model.

**c.** A radio antenna of any type may be added.

**d.** Models of seaplanes or flying boats are permitted to use non-scale devices or dollies for takeoff in the absence of suitable water conditions. If dollies are used they must not be attached to the model in flight. Deviations from scale through the inclusion of permanently mounted, recessed wheels, skids, plug-in removable landing gear or similar devices, if neatly and inconspicuously executed will not be penalized in the scoring of Accuracy of Outline points.

**e.** If bombs, rockets, drop tanks, etc., are to be dropped or released, they must be in place at the time of judging. The bombs or other armament in place at scale judging may be replaced during flying if the replacements are the same size, shape, and color as those submitted for scale judging. Static judges will make note on the static judging sheet of all observed droppable stores in place on the model at the time of static judging.

**f.** Sharp pitot tubes projecting from the wing or fuselage will be removed before flight as a safety consideration. No downgrade will be made to the flight realism score.

**g.** Where a model is equipped with a tailskid and the takeoff surface is paved, a tailwheel may be added, for flying only, to assist ground controllability. This wheel may not be added where a grass takeoff surface is available to the contestant to use if he chooses.

**8. Static Scoring:** 100 points maximum may be earned as follows:

Category	Points
Accuracy of Outline (General Impression)	Maximum 40
Craftsmanship	Maximum 30
Finish, Color and Markings	Maximum 30

**9. Flight:**

**9.1:** It is suggested that Scale Judging take place before official flights. If this is not possible or desirable, the Contest Director may hold part or all of the official flying before Scale Judging. Any damage caused to the model by flying before Scale Judging will be disregarded and not counted against the contestant. There is no maximum limitation of the number of official flights allowed during the time scheduled for the event, but a minimum of three (3) rounds should be scheduled.

**9.2:** All flights shall be ROG unless the Contest Director certifies that ground conditions do not allow this, in which case hand launch may be used. Model configuration and ground conditions may also make hand launches impractical. Where site conditions and flight line safety can still provide for takeoff and landing despite poor ground or wind conditions, the landing and takeoff may become optional in score for flight schedule and other maneuver options selected as their replacement prior to flight. The CD may also certify this option for tail skid aircraft (such as WW- 1) or any aircraft prior to a contest for a variety of known site conditions or limitations. When used, each added replacement maneuver will be allowed one extra minute for total allowed flight time. The CD will specify right hand or left hand pattern, whichever carries maneuvers away from the spectator area. Such maneuvers as the procedure turn, figure eight and landing approach pattern will thereupon be flown to the left or to the right of the path of straight flight out.

**9.3:** Time limit for each flight is 12 minutes inclusive of starting engine(s).

**9.4:** A flight is considered official when an attempt is made, whatever the result. There is an attempt when:

1. The model becomes airborne.
2. The model fails to commence the takeoff maneuver within the 12 minutes allowed for each flight.
3. Personal contact is made with the model after it has become airborne.

**9.4. 1:** An official flight is considered complete when any of the following occur:

- a. The time limit expires.
- b. Personal contact is made with the model for the second time after the model has been released for takeoff during an official flight.
- c. The pilot has called "Flight Complete/Finished."

**d.** Landing maneuver is complete if not followed by another maneuver in the flight plan.

**e.** Disqualification for any reason.

**9.5:** Once airborne, no person, other than the pilot, shall operate the transmitter controls. Operation by anyone else shall require disqualification of the entire flight.

**10. RC Flight Plan:** The RC flight plan shall consist of 10 maneuvers and/or scale operations, five (5) mandatory and five (5) optional. The mandatory items are unassisted ROG, figure eight, fly past, landing, and realism in flight. The mandatory and optional maneuvers may be performed in any sequence, but must follow the flight plan presented to the flight judges. Any maneuver and/or scale operation may be selected for scoring only once during any single official flight.

**10.1:** Options may be any maneuvers listed in the Scale Judging Guide or any Scale Operations (retract gear, flaps, bomb drops, crop dusting, etc.) typical of the aircraft modeled. No more than three (3) Scale Operations may be selected, not including the multiengine option, if used. Maneuvers and Scale Operations must be listed on the judging form before flying. The contestant may be asked to prove that his selection of maneuvers and operations have actually been performed by his prototype aircraft.

**10.2:** Touch-and-Go (maneuver) shall be counted as two (2) options on the flight plan, replacing two (2) other maneuvers or scale operations.

**10.3:** At the option of the CD, the contestants may be requested to demonstrate on the ground any Scale Operation that may be difficult to see in flight (i.e., retract gear speed, flaps, lights, etc.). The contestant may elect to demonstrate them even if the CD is not requiring a demonstration. These options need not to be demonstrated again in flight during a flyby (although the contestant may elect to do so if desired), but must be used in flight in the same manner as the prototype.

**10.4:** The contestant may select different options in succeeding flight rounds, at

his choice. Different options must be cleared as “prototypical” by the CD.

**10.5:** Any scale maneuver and/or scale operation not capable of being performed by the pilot in the subject aircraft during taxi or flight is not an eligible option.

**11. RC Flight Scoring:** Maximum total flight score is 100 points.

**11.1:** All maneuvers and scale operations (except Touch-and-Go) are to be scored from zero (0) to 10 points to the nearest half point.

**11.2:** Touch-and-Go, which counts as two (2) options, is scored from zero (0) to 20 points.

**11.3:** No maneuver or scale operation will receive an automatic maximum score. All will be judged in relation to their scale-like qualities.

**11.4:** In the event one (1) or more engines of a multiengine model fails during flight, the multiengine score will be based on the contestant’s ability to continue flight and according to the multiengine option description. The contestant will continue to receive flight points for each maneuver or operation completed.

**11.5:** Each flight should be judged by at least two (2) judges, with their scores averaged to give a final score for the flight. It is suggested that each maneuver be scored immediately after it is performed. Judges shall score maneuvers individually and without any consultation between them. There should be enough judges available to establish a rotational procedure which will average out variations in judging.

**12. RC Sport Scale Classes:** RC Sport Scale events shall be divided into three (3) classes requiring different competitive experience. They shall be referred to as Sportsman, Expert, and Designer classes.

**12.1:** A contestant may enter the Expert class at his own option, but once entered in this class he may not again compete in the Sportsman class. A contestant must enter the Expert class if he has accumulated 30 advancement points. Advancement points are awarded as follows: Each contestant in any AMA Class A or higher rated Sport Scale or Designer Scale contest receives one (1) advancement point for each other contestant he places ahead of.

**Examples:**

1. A person enters a contest of 15 entries and places fifth. He receives 10

advancement points. He enters a contest of two (2) entries and is second. He receives no advancement points. He enters a contest of 25 entries and wins. He scores 24 advancement points. His total is now 34, and he must enter Expert from now on.

2. A person enters the National Championships and places sixth out of 57 contestants. He receives 51 advancement points and must enter Expert from now on.

**12.2:** All other contestants may enter the Sportsman class.

**12.3:** The Contest Director may hold a combined Sportsman–Expert class event if he so states on the contest sanction application and in all pre-contest publicity.

**12.4:** Contestants shall be responsible for keeping a record of advancement points earned. Record cards are available from AMA Headquarters.

**13. Official Score:** “The official score shall be the total static points (100 maximum) and the average of the two (2) best flight scores (100 maximum). To break a tie, the best single flight will be added to the static score. If this does not break the tie, add the average of the three (3) best flights to the static score. If this does not break the tie then add the average of the four (4) best flight scores to the static score. If only two (2) rounds are flown then the official score will be the total of the static points (100 maximum) and the best single flight score (100maximum). To break a tie if only two rounds are flown, Add the average of both flights to the static score”

**RADIO CONTROL DESIGNER SCALE**

**For event 515.**

The rules for this event are identical to Expert Sport Scale, event 512, except as noted below.

**1. Eligibility:** Only those models that are the original design of the contestant are eligible for this event. Models that are built from kits or commercially available construction plans, modifications from kits or plans, or scaled commercial plans, are not eligible.

2. Craftsmanship judging will be done at zero distance.

**RADIO CONTROL FUN SCALE**

**For event 520.**

The intent of Fun Scale is to provide an RC scale event which is, and is to remain, simple in concept. There are two divisions of RC Fun

Scale. Division #1 is for the novice contestant only. This is purely an ENTRY LEVEL division for RC scale competition. Division #2 is open to any contestant with previous RC scale competition experience.

**1. Eligibility:** The contest is open to modeler-built or factory-built RC scale models. There are no minimum size, weight, or power limits. The maximum weight and displacement limits are the same as for RC Sport scale, General. rule 4 (builder–flier) will not apply in this event. With advance notice, the event may be conducted in different classes based on skill or age level, i.e., Open, Entry, Junior, Senior, etc.

**2. Static Judging:** Static score will be zero (0) or five (5). Five (5) static points will be awarded to contestants who show proof that a full size aircraft of this type, and in this general paint/markings scheme, did exist. A single sheet (plastic kit box, photo, profile painting, etc.) is sufficient proof, if other written documentation of color is provided for black and white photo. Contestant-prepared drawings of a photo of the model itself is not acceptable. If no proof of existence is shown, no static points will be awarded.

**3. Flying:** All rules as per RC Sport Scale (event 512) except contestant may use only one mechanical option for scoring.

**4. Scoring:** Contestant's score shall be the average of his best two (2) flight plus the five (5) static points if earned.

#### **RADIO CONTROL TEAM SCALE**

*For event 522.*

The rules for this event are identical to Expert Sport Scale, event 512, except as noted below;

**1. Eligibility:** The team will consist of the builder of the model and the pilot-flier.

**2.** The model's construction may also be a team effort, i.e. the pilot/flier may be involved in the building. **3.** The builder of the model must be listed as one of the team and must be present.

#### **RADIO CONTROL OPEN SCALE**

*For event 523*

The rules for this event are identical to Expert Sport Scale, Event 512, except as noted below:

**1. Eligibility:** This event is open to any modeler built, purchased built or factory built RC Scale

model. There is no "builder of the model" that must be present to participate.

**2.** With advance notice, the event may be conducted in different classes based on skill or age level, i.e., Open-Expert, Open-Novice, Open-Junior, Open-Senior etc.

#### **RADIO CONTROL SCALE FLIGHT JUDGING GUIDE**

**1. Purpose:** To furnish uniform guidelines for executing and judging flight maneuvers and scale operations of model aircraft, which are within the capabilities of their full scale counterparts, and will be performed during the flight presentation of the RC Scale events held in accordance with the *AMA Official Model Aircraft Regulations*.

The guide is intended to inform a contestant what is expected from his flight presentation in addition to providing the flight judges with a uniform method of rating the flying performance of an entrant's model in both the mandatory and optional maneuvers and scale operations that make up the flight presentation.

**2. Principles:** The principles of flying or judging a scale model at a contest held in accordance with AMA rules should be based on the perfection with which the model simulates the flight performance of its full scale counterpart. It is recognized, however, that while the contestant is able to go to some length to research the flying characteristics and capabilities of the aircraft he modeled, the same cannot be done by the judges. They may be confronted by many models of aircraft with which they are unfamiliar. It should, however, be obvious to all concerned into what basic category the model should be placed, i.e. maneuverable fighter or sedate transport. Since flight realism is a major factor in the award of points, judges with full-scale flight experience are desirable. This may not always be possible and at many contests the same judges may be required to judge both pattern and scale flying events. If such is the case, it is recommended that prior to the contest date, the judges should meet and discuss the differences in judging scale versus pattern modes as outlined in this guide and the *AMA Pattern Judges Guide*.

The criteria to be used in judging the flight of scale models may be divided into three (3) categories, Precision, Presentation, and Realism as follows.

**2.1. Precision.** When the contestant announces a maneuver, the judge should form a mental picture of the flight path to be followed by the model. The size of the maneuver will be dependent on the type of aircraft modeled and will be discussed under Realism. Judging begins at the time the contestant announces, usually with words such as “beginning now,” and continues until, in the judge’s mind, the maneuver is complete. Course corrections, not called for in the description of the individual maneuver, but which are obvious to correct deviations in the path of the model after beginning the maneuver, shall be a cause for the deduction of points due to lack of precision. Smooth and unobtrusive corrections during a maneuver to counter wind drift should not be a cause for loss of points if they are executed in a manner typical of the prototype aircraft.

A contestant should note that in order for a judge to obtain some reference for the maneuver being executed, the start and finish of the majority of maneuvers should be level flight. In the case of models of light aircraft, in which insufficient power would prevent vertical maneuvers to begin from level flight (loop, Immelmann, etc.), a dive may precede the maneuver. No points shall be deducted if a contestant announces his intention to build up speed in a dive prior to the start of a maneuver. At the start and finish of all maneuvers the wings of the model should be level.

**2.2: Presentation.** To achieve perfection, all flight maneuvers should be presented in a manner such that they can be easily judged. The optimum location of the maneuver relative to the judges will vary according to the type of maneuver executed. For example, maneuvers with horizontal symmetry (Cuban Eight, loop, roll, etc.) should have their midpoint or center immediately in front of the judges. Some maneuvers, however, are best performed offset to the right or left of the judges to present a clear view of the model as it performs, say, a stall turn or a wingover. It goes without saying that the contestant should locate himself near the judges so that they all obtain similar views of the flight presentation.

In addition to presenting the maneuvers for maximum visibility, the longitudinal distance from the judges should not be excessive. Generally the contestant should strive to center a flight maneuver at a horizontal distance no greater than 300 feet from himself. It should be noted that, in the descriptions of individual maneuvers, some are required to be flown down

the center of the runway. However, for safety when a narrow runway is used, the Contest Director may specify the far edge of the runway as the line over which these maneuvers should be flown. Judges should downgrade a contestant whom they suspect is trying to cover up poor flying ability by a performance made at an excessive distance. The actual distance at which an individual contestant chooses to perform his maneuvers should take into account the altitude of the model when at its highest point in the maneuver. High altitudes, close to the transmitter, that force the judges to look up at more than a 45 degree angle, should be avoided. Aside from the discomfort endured by a judge who is forced to look in a vertical or near vertical direction, the perfection of the maneuver cannot be properly assessed from such an angle. No bonus points will be awarded for a low altitude presentation, but points will almost certainly be deducted for excessively high presentations. Contestants should bear in mind that the judges spend many hours on the flight line, and a painful neck, caused by looking overhead at maneuvers, will almost automatically result in downgrading.

Another point that the contestants should bear in mind is to avoid crossing the sun with the model during a maneuver, if at all possible. Even a zero (0) score is completely justified if, in the judge’s opinion, the maneuver could have been placed elsewhere.

**2.3: Realism.** Awarding points for realism during the flight maneuvers is probably the most difficult and controversial aspect of judging scale models. The presentation of a realistic flight by a contestant should be given some attention prior to the contest. Most important is to only perform flight maneuvers that were capable of being performed by the prototype aircraft. For example, three (3) axial rolls performed by a model of a B-29 may well be spectacular, but it should receive a zero (0) score for being outside the capabilities of the aircraft. To eliminate discord on the flight line, it is recommended that, prior to flight, any maneuver or scale operation not listed in the rule book should be cleared by the CD. The contestant should be prepared to explain any such maneuver or operation and, if necessary, supply documentation that such were indeed within the capabilities of the aircraft.

The size of the aerobatic maneuvers performed by a contestant should reflect the capabilities to the aircraft modeled. For example, it would be expected that a loop performed by a

J-3 Cub would be smaller in diameter than one performed by a P-51 Mustang if both were modeled to the same scale. The speed at which such maneuvers are performed should also reflect the capabilities of the prototype. Consideration should also be given to throttle position during aerobatics. In many of full-scale prop driven aircraft, power must be reduced at the point of maximum altitude in a vertical maneuver before entry into the descent portion. Execution of such maneuvers by a model at a constant full throttle, which should be obvious by the sound of the engine, should be grounds for a reduction in score.

The size of a maneuver will also be influenced by the physical size of the model. Models scaled at one (1) inch = one (1) foot would be expected to perform aerobatic maneuvers such smaller in overall size than a similar model scaled at, say, three (3) inches = one (1) foot. Consideration should be given in all aerobatic maneuvers to the forces that would be exerted on the full scale counterpart. Exceedingly small or tight maneuvers with unnecessarily high rates of roll, pitch or yaw do not simulate the performance of the majority of full-scale aircraft and should be downgraded accordingly.

Finally, the contestant should acknowledge that the smoothness or gracefulness of the flight presentation will have a large impact on its realism. Sudden jerks and attendant changes in heading should be avoided unless the contestant is willing to prove that such motions were characteristic of the prototype when it performed that maneuver. These motions would represent high "g" forces, perhaps exceeding the full scale tolerances, and the judges are justified in downgrading for them unless they can be shown to be typical of the full-scale aircraft's performance. Similarly, the transition from ground to air and vice versa during takeoff and landing should be smooth. The judge should consider himself to be a passenger in the model and assess these maneuvers in terms of the effect they would have on his well being. Many of the so called "average" landings by RC models would result in collapsed landing gear in a full scale aircraft or, at the very least, severe bodily discomfort to any passengers.

**3. Accurate and Consistent Judging:** The most important aspect of consistent judging is for each judge to establish his own standards and maintain them throughout the meet. It is recommended that the Contest Director or Chief

Judge should hold a meeting prior to the day of the contest to discuss with all the flight judges the rules for the event. Any standards of judging or interpretations of rules presented to the judges which differ from or are additional to guidelines or rules presented in the Competition Regulations book should also be presented to the contestants in a pilots meeting. It is also advisable that, in order to make the judging standards as uniform as possible, a non-contestant should perform a judges' practice flight immediately prior to the first official contest flight. All judges should score this flight simultaneously and privately. After the flight, the defects in each maneuver should be discussed, and an agreement should be reached on the severity of the defects and the appropriate number of points that should have been deducted. When this is done, and the contest has begun, individual judges should strive to maintain a uniform standard of judging for all contestants.

As is stated in the rules, a contestant who flies over a controlled spectator area will be disqualified (receive a zero (0) score) for that flight. Such spectator areas must be clearly defined by the CD in a briefing prior to the start of the flying portion of contest. It is also recommended that a "foul line" should be established, which can be the edge of the active runway, nearest to the flier, extended to infinity in either direction. Any flying over this foul line should be grounds for a zero (0) score in the maneuver in which it occurs. The judges should all agree on such an occurrence, and if a separate person is used as the flight timer it is recommended that he or she be assigned the task of determining when a model crosses the foul line or passes over a controlled spectator area. Unanimity in awarding zeros for unsafe flying practices should always be reached. Nothing can cause more unrest among contestants than a zero (0) and a seven (7) score for the same maneuver. The responsibility for disqualification of a contestant who persists in flying in an unsafe manner rests with the CD.

**4. Judging Individual Scale Operations and Flight Maneuvers:** In addition to the obligatory flight maneuvers, a contestant must perform several options which may be any scale operation or maneuver that was typical of the prototype aircraft. A variety of scale operations and maneuvers are described in this section of the guide; however, a contestant may select an operation or maneuver of his own choice. Should

this be the case, a written description should be submitted to the chief judge prior to flight time. The Chief Judge can then inform all judges how this option will be performed and judged. As in the case of all options, the contestant should be prepared to prove that his choice was typical of the prototype aircraft.

A judge should not wait until a maneuver is completed before trying to assign a grade based on overall impression. Judges should assume that a contestant is going to perform a perfect maneuver and should therefore start with a grade of 10 points. As the maneuver is executed, any faults that are observed should be the cause of a lesser number of points to be awarded. Full marks should only be given when a maneuver is ideally positioned and no faults are observed. This is not a common occurrence.

In downgrading the score for an individual maneuver, or a scale operation, a judge should consider the number of defects, the severity of the defects, and the number of times any one defect occurs. For example, a single change in heading during takeoff would be considered one defect, while two (2) or three (3) distinct turns would be considered two (2) or three (3) defects. In a case where more than 10 defects are observed it is not possible to downgrade one (1) point per defect or we might have several negative scores. While a minor defect may result in the loss of less than a full point, a major defect could be the cause for the loss of four (4) points. Unless a maneuver is missed or is totally unrecognizable, a zero (0) score should not be given.

#### **4.1: Description of Scale Operations.**

##### **4.1.1: Multi-engine.**

To obtain maximum points the engines should be of equal displacement unless the engines of the prototype differ in size or type. In this case, the model engines should differ in a similar proportion. Extreme variation from scale engine sizes should be heavily penalized. Proof of scale engine sizes shall lie with the contestant. For maximum points all engines must be running at takeoff and continue throughout the flight with throttle operation being demonstrated at least during the approach and land. There should be no requirement to perform additional fly-pasts to exhibit multiengine operations unless the competitor wishes to demonstrate differential throttle operation and which may be claimed as a separate option. In any case of loss of an engine during flight, safe flying practices should take precedence over trying to remain airborne merely to score points.

**Errors:** Engine or engines stop during flight. Throttle operation not demonstrated in the approach and landing. Multiengine model has engines which differ in size in a ratio not typical of the prototype.

##### **4.1.2: Retract and Extended Gear.**

Retraction should commence during the takeoff maneuver when the model establishes a positive rate of climb. Gear extension should be initiated during the downwind leg of a traffic pattern. The speed of gear operation and its action should approximate that of the prototype. For example, "snap action" gear should be downgraded, but the model should not be expected to duplicate the cycle time of the prototype. Similarly, if on the prototype the gear folded inward (towards the aircraft center line), points would be deducted if on the model the gear folded outward. Models of aircraft with retractable tail wheels should be downgraded if the tail wheel of the model does not retract. If the judges cannot observe the gear retraction sequence due to the attitude of the model at takeoff, they may request that the gear be cycled during a fly-past.

**Errors:** One (1) or more gear leg fails to retract or extend (includes tail wheels if these were retractable on prototype). Gear sequence is less than two (2) seconds. Gear action is grossly different from prototype. Gear extends or partially extends during high positive "g" maneuvers. One (1) or more gear legs collapse during landing due to a cause other than a hard landing.

**4.1.3: Flap Operation.** A contestant may elect to use flaps for takeoff, but no points shall be deducted if they are not used. Flaps should be used during maneuvering if this was a feature of the prototype. Flaps must be used for landing if they are claimed as an option. For maximum points flaps should be lowered on the final crosswind leg of a traffic pattern. Flaps should also be used during a touch-and-go or overshoot and points should be deducted from both the flap option and the maneuver if the contestant fails to use them. There should be no loss in points if the judges fail to observe the flaps in motion during flights. If, however, they are small in size and difficult to observe in a lowered position, the judges may request that they be lowered in a taxi maneuver prior to takeoff or that they remain lowered in a taxi maneuver after landing. For maximum points the flap action should resemble the prototype, i.e., split flap, fowler flaps, etc. Only if it is agreed by the judges that the wind strength is too great to justify flaps during a

landing should a fly-past be required to demonstrate flap operation.

**Errors:** Failure to operate flaps when required. Flap operation is grossly different from prototype. Model exhibits violent trim change during flap operation.

**4.1.4: Bomb Drop.** Bombs should be carried in the same manner as the prototype. For bombs carried internally, bomb bay doors should open, bombs should drop and doors should close for maximum score. If bombs are carried externally they should be securely attached with no noticeable oscillation in the slipstream. For maximum score the model should perform a bomb run in the manner of the prototype. Unusual bombing techniques may be used if the contestant can verify them with written documentation. With the exception of napalm types, bombs should not tumble end-over-end after release. A contestant is permitted to substitute a different bomb or bombs for the flight presentation than was displayed on the model during static judging provided that the size and shape is similar. When the bomb drop option is selected, the bombing run is a demanded part of the option and may not be claimed as a separate or additional option.

**Errors:** Bombs are not carried in the manner of the prototype. Bomb doors are grossly different in operation from prototype. Bomb(s) drop immediately upon opening of doors. Bomb drop not preceded by a bomb run. Finned bombs tumble erratically after release. Externally mounted bomb(s) wobble(s) in slipstream during flight prior to release.

**4.1.5: Torpedo Drop.** For maximum points a torpedo drop should be performed as a part of a torpedo run at a low altitude. Actual altitude of the model at release would depend on its scale, but it should be low enough to enable the torpedo to strike the ground in a relatively flat attitude. Release should be performed with the model in a level attitude and may be followed by a rapid climb which may include a turn. The actual procedure to be followed should be announced to the judges prior to performing the operation.

**Errors:** Model is too high at release. Release is not preceded by a straight run. After release model performs unannounced maneuvers.

**4.1.6. Tank Drop.** A fuel tank capable of being jettisoned should be carried in the manner of the prototype. The drop should be performed with the model in level flight in clear view of the judges.

**Errors:** Tank not securely attached to model, has visible oscillation in slipstream prior to release. Tank does not fall clearly away from model at release. Model not in level flight at release.

**4.1.7: Parachute Drop.** A parachute drop or ejection should be performed in the manner of the prototype. Cargo should be dropped via doors, hatch, bomb bay, or from wing mounts. A man or men should be dropped via doors, hatch (if the aircraft was so equipped), or by inverting the model. A single seat aircraft must not drop its pilot. A braking parachute may be deployed on landing if this was a feature of the prototype.

**Errors:** Parachute does not open. Parachute does not fall clear of aircraft. Braking parachute rotates after deployment and tangles its rigging lines. Parachute is emitted from the aircraft in a manner not typical of the prototype.

**4.1.8: Agricultural Spraying or Dusting.** This scale operation is for models of aircraft used for crop spraying or dusting only. The contestant should be prepared to document that the prototype aircraft was used for this purpose. Since the manner in which this operation was performed by full scale aircraft may differ according to aircraft type and/or crop being covered, the contestant should describe to the judges his intended presentation. Generally the aircraft will make a low pass down the runway centerline and visibly perform its spraying or dusting mission on command by the contestant. An emergency dump of the hopper contents may be performed and may be accompanied by a rapid climb to simulate avoidance of an obstacle. The maneuver should begin and end on the same heading and with the wings level.

**Errors:** Model does not release visible spraying/dusting material. Maneuver is not presented in full view of the judges. Model follows erratic course during the operation. Model changes heading during operation.

**4.1.9: Other Optional Demonstration.** A contestant may elect to perform a scale operation of his own choice that was typical of the prototype. Any such operation must be cleared by the Contest Director and explained to the judges before flight.

**4.2: Description of Mandatory Maneuvers.** Following is a list of the mandatory maneuvers that must be performed in the RC Sport Scale and Giant Scale events.

**4.2.1: Takeoff.** The model should remain still or near still (according to whether

the prototype had brakes) on the runway with the engine running after release by contestant or a helper or after a taxi maneuver. Takeoff should be into the wind and should begin with a straight ground run followed by a gentle liftoff with a climb angle consistent with that of the prototype. Takeoff is completed when the model is approximately 10 feet from the ground. For maximum points any scale operation that was required by the prototype to perform its normal takeoff should be used by the model.

**Errors:** Model is held by pilot or helper after advancing the throttle to takeoff power. Model swings on takeoff run (a slight swing should not be the cause of loss of points on light aircraft types with conventional (tail wheel) gear if it is corrected promptly). Model becomes airborne too soon. Takeoff run is too long. Model jumps off ground. Model climbs too steeply after takeoff. Model drops a wing badly during takeoff (should not be confused with aileron correction for crosswind). In the interest of safety, a takeoff may be aborted and restarted with a seven (7) point or 70% of maximum score on the first retry (and 70% for each subsequent retry) rather than given an automatic zero (0). For example, the maximum score that could be given would be seven (7) points after the first abort and first retry, the second retry after another abort is five (5) points (70% of 7), the third retry is 3.5 points (70% of 5), etc. The contestant is still on the clock for each retry.

**4.2.2: Figure Eight.** The model approaches in straight and level flight on a line parallel to the spectators, then a 90-degree turn is made in a direction away from the spectators, followed by a 360-degree turn in the opposite direction, followed by a 270-degree turn in the first direction, completing the maneuver directly over the center of the landing circle on the original approach line. The intersection (midpoint) of the maneuver shall be on a line which is at a right angle to the direction of entry and passes through the center of the landing circle.

**Errors:** Entry not made parallel with spectator line. Rate of turn not constant in any half circle. Model does not maintain constant altitude. Model does not complete 270-degree turn at point where first 90-degree turn was started. Finish not on the same heading as entry. Model does not begin and end in level flight.

**4.2.3: Fly-Past.** The model shall fly straight along a path parallel to the runway that is over the far edge, the edge away from the

spectators, at an altitude of between 10 and 20 feet. The model shall be flown at the fly-past altitude for at least five (5) seconds. The midpoint of the maneuver should be opposite the judges. If a very wide runway is used, such as may be the case at an airport or military air base, the CD may specify a path other than the far edge of the runway (e.g., center line) over which the maneuver shall be flown.

**Errors:** Straight and level flight at a constant altitude is not maintained during the minimum time required for the maneuver. *Note: Allowance should be made for slower types of light aircraft which should not be downgraded for slight corrections in gusty wind conditions. Altitude is not between 10 and 20 feet. The maneuver is offset to the right or left of the judges.*

**4.2.4: Landing.** The landing maneuver begins either when the model commences to flare at the end of a traffic pattern or, if no traffic pattern is performed, when the model is at altitude of about 10 feet. There shall be no requirement to touch down in a marked circle, but for maximum points, the model should land approximately opposite the judges. An aircraft with conventional gear (i.e., with tail wheel) may make a three-point landing or may touch the main wheels first and gently lower the tail wheel as the speed decreases. An aircraft with a tricycle gear should land on the main gear first and gently lower the nose wheel during the roll out. Due to the non-scale shortness of many landing strips used for contests, it is not always possible for the model to come to a complete stop before it runs out of prepared strip. In all cases the landing maneuver is complete before the end of the prepared surface. Nose-overs caused by entry into unprepared ground are to be disregarded; quality and control of the landing forming the judging criteria. For this waiver to be effected, the model must make initial contact in the first half of the prepared strip. Emergency landing may be called by the contestant or his helper when a true emergency occurs during flight. A score will be awarded on the survivability of the aircraft and pilot. A perfect emergency landing can earn a score of ten (10). If the model lands on its back, zero (0) points will be awarded.

**Errors:** Model does not flare or does not flare smoothly (gallops in pitch axis). Model bounces at touchdown. Model noticeably drops a wing during landing. Model touches a wingtip on the runway. Tricycle gear model does not touch its main wheels first. Model runs erratically after

touchdown. Model collapses a gear leg on landing. *Note: If a model runs uncontrollably over the foul line after the touchdown a zero (0) landing score should be given.*

**4.2.5: Realism in Flight.** The realism score shall be awarded in proportion to how well the model simulates the complete flight, stability, takeoff, landing, and taxiing characteristics of the prototype aircraft. The model should also be judged for its realistic attitude in flight, smoothness of control in yaw, pitch and roll axes, and for use of throttle in aerobatic maneuvers. The model should be flown at speeds that best simulate prototypical maneuvers and overall flight. The model should not be flown excessively fast where it may result in unrealistic high bank angle attitudes and high g loads for typical turns, or excessively slow that results in unrealistic flat or shallow angle turns. The model should not show signs of instability which may be characterized by an erratic flight path. Any model of an aircraft with retractable gear that executes the complete flight presentation with its wheels down shall be downgraded for realism. It is the competitor's option to choose any flight maneuver as long as the prototype aircraft was capable of performing those maneuvers. Full flight performance capabilities need not be performed. No downgrade will be given for choice of maneuvers.

**Errors:** Model does not fly in a realistic manner. Attitude in flight is unrealistic. Model does not fly smoothly. Engine(s) not throttled back in maneuvers that would normally require less than full power. Models of aircraft that featured retractable landing gear are flown with their wheels down.

**4.3: Description of Optional Maneuvers.** Following is a list of commonly seen flight maneuvers which, together with the itemized Scale Operations in section 4.1, should be given first consideration for the selection of the options in the flight path demonstration. A contestant is not, however, limited to the maneuvers in this list and may select any maneuver of his own choosing. A contestant may also deviate from the descriptions of the maneuvers in the following list if the prototype aircraft performed the maneuver in a different manner. In either of these cases, the contestant should be prepared, if asked, to supply appropriate documentation to the Contest Director or the CD's designee that shows how the full-scale aircraft performed the maneuver. Additional fly-past maneuvers, such as a "fast fly-past" or "slow fly-past," are discouraged

because of their similarity to the mandatory fly-past (4.2.4) unless the speed, either very fast or very slow, was a remarkable feature of the prototype aircraft and the contestant wishes to demonstrate that it is also a feature of the model.

**4.3.1: Taxi.** The model shall taxi in accordance with the sketch below to the starting point for the takeoff.

**a.** Models with two-wheel landing gear and tail skid or unsteerable tail wheel, or other gear configurations not allowing steering will taxi forward into the wind a distance of at least 50 feet, slow down to a near stop or stop, and then become airborne in a realistic manner.

**b.** Models with two-wheel landing gear and steerable tail wheel will taxi forward into the wind, or downwind if the contestant prefers, a distance of at least 50 feet, using "S" turn visibility taxiing procedure, slow down to a near stop or stop (depending on whether or not the prototype was equipped with brakes) and then become airborne in a realistic manner.

**c.** Models with steerable tricycle landing gear will taxi downwind at least 50 feet, stop, turn at least 120 degrees into the wind and become airborne in a realistic manner. After landing, the model shall perform a taxi maneuver as follows:

**d.** After landing, model shall perform a taxi maneuver as follows:

**1.** After landing, model will slow to a near stop or stop and then taxi forward in a realistic manner for a distance of at least 50 feet (see 4.3.1 (a)).

**2.** After landing, model shall return in a realistic manner to the starting area and stop (see 4.3.1 (b and c)).

**Errors:** Model does not stand still unassisted before commencing to taxi. Model does not follow the prescribed course. Model does not halt before taking off if prototype had brakes. Model taxis too fast. Model does not taxi in the manner of the prototype.

**4.3.2: Straight Flight Out.** If this maneuver is chosen as an option, it must be followed by a Procedure Turn (4.3.3) and a Straight Flight Back (4.3.4). The model must be brought exactly over the center of the runway and/or center of the landing circle and flown in an absolutely straight path parallel to the flight line for a distance of approximately 300 feet before starting the Procedure Turn (distance does not have to be accurate; pilot will determine completion of 300 feet).

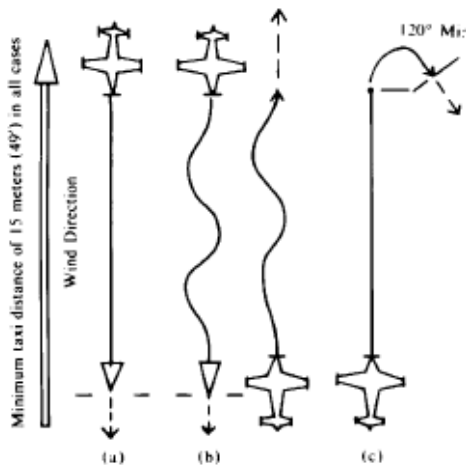
**Errors:** Model does not fly over center of runway and/or landing circle. Plane deviates

to the left or right. Does not hold a constant altitude. Gallops in elevation.

**4.3.3: Procedure Turn.** After the straight flight, the model must turn exactly 90 degrees to the left or right, whichever will take the plane away from the spectator line (direction to be specified by the CD), then exactly 270 degrees to the right (or left) and cross over the point where the first turn commenced.

**Errors:** Left turn not 90 degrees. Right turn not 270 degrees. Changes in altitude during turn. Turns not smooth and circular. Does not head back over exact outgoing path.

*Note: If a contestant wishes to perform this maneuver without preceding it with a Straight Flight Out, it should commence as the model, heading on a line parallel to the runway, begins the 90 degrees turn at a point immediately opposite the judges or over the center of the landing circle (if used)*



**4.3.4: Straight Flight Back.** If this maneuver is chosen as an option, it must be preceded by a Straight Flight Out and a Procedure Turn (4.3.2 and 4.3.3). The model should fly back toward the circle along the same line as the outgoing path and pass exactly over the circle. If no circle is used the maneuver should terminate when the model passes in front of the judges on a path over the center of the runway.

**Errors:** Turns or wiggles during straight flight. Change in altitude. Gallops in pitch, yaw or roll. Flight not along original path. Does not pass over the circle (or center of runway immediately in front of judges).

**4.3.5: Inside Loop.** From straight flight, the model pulls up into a smooth round

loop and resumes straight and level flight on the same heading as the entry. The throttle should be cut back at the top of the loop and opened when normal flight is resumed. A light aircraft type would be expected to execute a shallow dive at full throttle in order to pick up speed before commencing the loop.

**Errors:** Wings are not level throughout the maneuver. Loop is not round or is executed endwise. Throttle is not cut back at the top of the loop and opened when normal flight is resumed. Model of light aircraft type does not execute shallow dive to pick up speed before commencing the loop.

**4.3.6: Outside Loop.** Starting in level flight, the model noses down to perform a smooth round outside loop which is completed when the model regains its starting altitude and exits in level flight on the same heading as the entry. The throttle should be closed at the beginning of the maneuver and should be opened after completion of the first half of the loop when the model is inverted and is at a point closest to the ground.

**Errors:** Maneuver does not begin and end in level flight. Exit altitude is not the same as entry altitude. Model does not begin and end on the same heading. Loop is not round. Wings do not remain level during maneuver. Throttle not closed during first half of maneuver.

**4.3.7: Immelmann Turn.** From a straight and level flight, the model performs the first half of a loop and when inverted performs a half roll and resumes straight and level flight on the opposite heading. Light aircraft types would be expected to commence the maneuver by executing a shallow dive at full throttle in order to pick up the necessary speed.

**Errors:** Wings are not level during half loop. Model does not resume straight and level flight on the correct heading.

**4.3.8: Stall Turn.** The model starts in level flight, noses up to the near vertical attitude, at which point the throttle is closed and the model yaws through 180 degrees, then dives and finally recovers straight and level flight on a heading in the opposite direction to the entry. The contestant should specify whether the turn shall be to the left or right.

**Errors:** Model does not assume the correct attitude. Throttle is not closed. Model turns in wrong direction. Model does not exit from the maneuver on the correct heading.

**4.3.9: Wingover.** Model starts in level flight and noses up to a near vertical attitude at which time it is flown through a 180 degrees arc

using rudder to end up on a near vertical dive. Throttle should be closed at this point and the model pulls out of the dive at the same altitude as the entry and on a parallel path, but on a 180 degrees opposite heading.

**Errors:** Model not level at start. Model rolls left or right during pull up. Model tucks under a wing during 180 degrees turn. Throttle not closed during dive. Return path not parallel to entry. Recovery not at same altitude as entry. Model does not fly straight and level to complete the maneuver.

**4.3.10: Split-S (Reversal).** From a straight flight, the model performs a half roll and when inverted performs the second half of a loop and resumes straight and level flight on a heading opposite that of the entry. The throttle should be closed at the inverted position and opened when normal flight is resumed.

**Errors:** Model changes heading during half roll. Wings are not level during half loop. Throttle is not used. Model does not exit from maneuver on the exact opposite heading to entry.

**4.3.11: Roll.** From straight and level flight, the model rolls at a constant rate through one (1) complete rotation and resumes straight and level flight on the same heading. Light aircraft types would be expected to execute a shallow dive at full throttle before the maneuver. The contestant should nominate what type of roll he will perform, i.e., Axial, Slow, Barrel, Snap or Hesitation.

**Errors:** Rate of roll is not constant. Deviation in heading during and after the roll. Loss or gain in height.

**4.3.12: Snap Roll–Inside.** Model begins in level flight and as the nose is pulled up to the point where the wing will stall, rudder is applied to roll the model in the desired direction. The nose of the model should break the line of flight in a direction towards the pilot's cockpit, indicating that a stall has occurred. While most models will roll faster in a snap roll than in an aileron-induced roll, roll rate should not be a factor in judging. The roll should stop precisely when the model is again upright and the maneuver should be completed in straight and level flight. Snap rolls may be performed vertically or on a 45 degree climbing or diving flight path, but such maneuvers should always begin and end in straight and level flight.

**Errors:** Model does not begin and end in straight and level flight. Wing does not stall during roll. Roll is not terminated precisely after 360-degree rotation. Model does not exit from the maneuver on the same heading as the entry.

**4.3.13: Snap Roll–Outside.** This maneuver should be performed in a similar manner to the inside snap roll except that, as the break occurs, the nose of the model moves away from the direction of the pilot's cockpit indicating that a stall was induced by the application of down elevator control.

**Errors:** Same as inside snap roll.

**4.3.14: Barrel Roll.** There are three (3) types of barrel roll: Air Force, Navy, and civil aviation type. Since this maneuver is most likely to be performed by a model of a civilian aircraft, only the civil aviation barrel roll is described. The model should begin with a shallow dive to pick up speed, the nose should then pull up and the model begins what appears to be a climbing turn. Continued application of ailerons in the turn will roll the model which, when inverted, may be as much as 90 degrees off its original heading. No down elevator is applied in the inverted position so the nose will fall as both turn and roll continue till the model returns to the upright position at the same altitude and on the same heading as the entry. The barrel roll orbit should be big and fat like a beer barrel.

**Errors:** Roll rate is not constant. Model does not finish maneuver on same heading and/or altitude as entry. Maneuver is not centered in front of the judges.

**4.3.15: One (1) Lap Pylon or Speed Run Demonstration.** Models performing this maneuver must be model of pylon racers or long distance race aircraft. Models of aircraft which raced over a closed course (pylon racers) shall perform one (1) lap of a simulated triangular race course. One (1) leg of this shall be parallel to the runway. Models of long distance race aircraft may make a single high speed pass parallel to the runway (at a distance consistent with safety considerations).

**Errors:** Model does not fly straight and level during the designated straight legs of the maneuver. Model does not make a pass parallel to the runway. Models of pylon racers do not perform turns in the manner of race aircraft (model yaws noticeably when banked, model gains or loses excessive altitude in turns).

**4.3.16: Spin:** The number of turns to be performed shall be noted on the judges' scoresheets. The contestant may choose any whole number. The contestant may choose any whole number. The entry shall be from straight and level flight parallel to the runway. Power shall be reduced and the model should remain on heading in a slightly nose high attitude until it stalls and commences to spin. The model should

autorotate through the prescribed number of turns and recover on the same heading at a lower altitude. The rate at which the model rotates in the spin will depend on its size and type but judges should be alert to observe models which are performing a spiral dive rather than a true spin.

**Errors:** Entry not from level flight parallel to runway. Does not perform the prescribed number of turns. If the number of turns performed is greater or less than the prescribed number by more than one (1) complete turn, a zero (0) score should be given. Does not recover on same heading as entry. Wings not level during recovery. A spiral dive rather than a true spin shall be scored zero (0).

**4.3.17: Cuban Eight.** The model pulls up into an inside loop and after completing half the loop, heads inverted downwards at 45 degrees, does a half roll followed by another half inside loop to the inverted downwards 45 degrees heading, does another half roll and pulls out into straight flight at the same altitude as then entry and on the same heading.

A light aircraft type would be expected to execute a shallow dive at full throttle in order to pick up speed before commencing the maneuver. Throttle should be closed at the top of each loop and reopened during each descent.

**Errors:** Maneuver is not performed in a constant vertical plane or is executed endwise. Loops are of unequal diameter. Half rolls are not executed at the correct point in the maneuver. Model does not exit from the maneuver at the same height as entry.

**4.3.18: Touch-and-Go** This maneuver shall count as two (2) options. After a smooth and gradual descent on a straight line path into the wind, the model "aircraft then lands and takes off again into the wind without coming to a halt. The main wheels must roll on the ground for a minimum of 15 ft. Flaps will be used if applicable. Conventional gear models with a tail wheel or skid do not have to touch the tail wheel or skid. Models with a nose gear should touch all gear onto the ground."

**Errors:** "Approach during landing is too steep. Violent changes in pitch, yaw or roll during approach or climb out. Model bounces on landing. Model fails to stay on ground for 15 ft. changes in heading during the take off run, versus landing approach. Both main wheels must roll on the ground for 15 ft.

**4.3.19: Overshoot.** The model makes a landing approach at low throttle to below 10 feet

altitude without touching down, followed by a climb out at full throttle to resume level flight. Model should commence by flying a final crosswind leg followed by a turn onto a normal landing approach at low throttle, using flaps if applicable, until it reaches a point over the center of the runway at a point immediately opposite the judges at a height of 10 feet or less. At this point full throttle is applied, and the model climbs straight ahead to resume level flight.

**Errors:** Model does not commence maneuver with the correct landing approach. Model must be descending until full throttle is applied, and particular attention should be paid to the timing and altitude when throttle is opened. Model does not use flaps (if applicable). Model does not climb away smoothly. Landing gear is not retracted on climb out (if applicable).

**4.3.20: Sideslip.** The model maintains the same heading while dropping first one wing and then the other while yawing at least 20 degrees in each direction. The transition from left to right slip should be smooth. If performed on landing approach, a sideslip in one (1) direction only is required and a marked loss of altitude should be apparent.

**Errors:** Model changes its heading as each slip is performed. Yaw is less than 20 degrees. When performed during the landing approach, no loss in altitude is apparent. Maneuver is not performed smoothly.

**4.3.21: Flight in a Triangular Circuit.** This maneuver may only be selected for non-aerobatic aircraft. The model approaches upwind (parallel to the flight line) in a straight and level flight to a point above the center of the circle (if used) or opposite the judges, and turns away from the flight line (say left) through 60 degrees and flies straight and level for approximately 300 feet, turns left through 120 degrees and flies a further 300 feet, again turns left through 120 degrees and flies a further 300 feet to a position over the circle center (the starting point) which completes an equilateral triangle. The model then leaves the maneuver through a final left turn through 60 degrees and resumes straight and level flight on the same heading as the entry. Note that the direction of the turn will be reversed for wind in the opposite direction.

**Errors:** Maneuver is not commenced and terminated at the correct point. Model changes altitude during maneuver. Legs are noticeably too long or too short. Legs are not straight. Correction for wind drift is not properly made. Rate of turn at corners is not constant.

**4.3.22: Flight in a Rectangular Circuit.** This maneuver may only be selected for non-aerobatic aircraft. The model approaches upwind in a straight and level flight to a point above the center of the circle (if used) or opposite the judges, and continues for approximately 150 feet at which point it turns away from the flight line (say left) through 90 degrees, flies straight and level for approximately 300 feet, turns left through 90 degrees, flies a further 150 feet, turns left through 90 degrees and flies back towards the flight line for a further 300 feet to end the maneuver over the circle center (the starting point). A further left turn, which must be made to avoid flying over the flight line, is not assessed as a part of the maneuver. Note: That the direction of the turns will be reversed for wind in the opposite direction.

**Errors:** Same as for Flight in a Triangular Circuit.

**4.3.23: Flight in a Straight Line with One Engine Throttled.** This option is, of course, for multiengine models only. The model approaches into the wind in straight and level flight at a constant altitude with one (1) engine throttled for a minimum distance of 300 feet, after which the throttled engine is opened up and the model resumes normal flight.

**Errors:** Model does not maintain straight flight. Model is unstable. Models lose undue altitude. Engine is not opened up again after demonstration.

**4.3.24: Traffic Pattern Approach to Landing.** The model begins on an upwind heading directly over the center line of the runway. After passing in front of the judges it should continue, straight and level. For approximately 100 – 200 feet before making a 90-degree turn away from the flight line onto the first crosswind leg. A second 90-degree turn begins a downwind leg with the model flying at a constant altitude and again passing in front of the judges. A third 90-degree turn toward the flight line begins the second crosswind leg during which the model may begin its descent. A fourth 90-degree turn into the wind should line the model up with the runway center line, and straight descending flights should continue to the point of touchdown. The maneuver is considered completed when the model begins to flare prior to landing.

**Errors:** Any change in altitude during the first crosswind and downwind legs. Deviation from a straight and level path on any leg. Excessive use of the throttle during the final

approach. Note: Where applicable, wheels should be lowered on the downwind leg and flaps on the second crosswind leg.

**4.3.25: Spot Landing.** If the main gear of the model makes its first contact with the ground within a 100-foot diameter circle, the judges shall award points equal to those awarded for the landing. All judges must agree on whether or not the model did touch down within the circle.

**4.3.26: Slow Speed Inspection Pass.** This maneuver includes the described transition periods on a common heading and elevation to enter and exit slow flight. The model shall transition smoothly into and out of a high lift and high drag aerodynamic configuration using the applicable features of the aircraft. As a minimum, this maneuver must include the use of fully deployed flaps as the model is progressively brought to its slow flyby speed. This will be along a straight and level path parallel and over the far edge of the runway from the spectators (or as otherwise specified by the CD), at an elevation of between 20 and 40 feet for a minimum of five (5) seconds. This slow midpoint period of the maneuver should be opposite the judges. The model's flying speed during the Slow Speed Inspection Pass should be remarkably slower than the mandatory fly-past\*, to the extent that the apparent stall speed has been effectively reduced by use of flaps and other applicable features. The model will often require some low level power to "drag" it through this high drag period.

The model will then slowly transition out of this high lift and high drag profile while speed is again increased. This transition should not include immediate lifting of flaps prior to increasing speed, which could otherwise stall the model. Immediate flap retraction may be a direct indication to the judges that the model was not sufficiently slowed to optimally demonstrate the Slow Speed Inspection Pass. This high drag slow maneuver performed along a near level path requires skill in power management, judgment of model speed versus stall, and coordination of all applicable scale operations to transition accordingly.

\*When electing this maneuver it must immediately follow the mandatory Fly-Past.

**Errors:** A smooth, straight and level flight at a constant altitude is not provided to transition into, during, and out of the Slow Speed Inspection Pass. It is not stable or on the same heading. *Note: Allowances shall be made for corrections in gusty wind conditions. Altitude is*

*not between 20 and 40 feet. The maneuver is offset to the left or right of the judges. The 5 second slow speed portion is not remarkably slower than the mandatory Fly-Past. All applicable high lift or high drag features such as flaps and retracts were not deployed. If flaps were not deployed, the maneuver will score a zero.*

**4.3.27: Chandelle.** This maneuver is an exaggerated climbing turn in which the airplane changes direction through 180 degrees. The model may begin with a shallow dive to pick up speed, the nose should then pull up and the model begins a climbing turn proceeding away from the flight line. The maximum climb and bank occur at approximately the midpoint during the change in direction. The maximum bank angle may only be 45 to 60 degrees for non-aerobatic aircraft and up to 90 degrees for fully aerobatic aircraft. Entry speed should be sufficient to prevent visible slipping or skidding and maintain the same turn rate throughout the maneuver. The degree of bank angle and rate of climb are constantly changing as the speed continues to decline through the maneuver. As the 180 degree point is reached in the turn where the aircraft is traveling in the opposite direction from which it entered, the wings are brought level for the maneuver completion. At this time, the aircraft would be flying at reduced speed compared to entry.

**Errors:** The same turn rate is not maintained. The model slips or skids. The model does not provide a notable climb rate. The model does not finish with wings level on a heading opposite to that entered.

**4.3.28: Any Other Flight Maneuver.** A contestant may perform any flight maneuver of his own choice provided that it is within the capabilities of the prototype aircraft. Such a maneuver should be cleared by the Contest Director prior to flight time and, if necessary, a short description of the maneuver may be requested by the CD for use by the flight judges.

**4.3.29: 360 Degree Descending Circle at a constant low throttle setting.** Commencing from straight and level flight, the model aircraft performs a gentle 360 degree descending circle in a direction away from the judges at a constant low throttle setting. The maneuver terminates at a height between 10 and 20 feet resuming straight and level flight on the same path.

**Errors:** Rate of descent not constant. Descent too steep. Throttle not constant or low enough. Circle misshapen. No significant loss of height. Descent not to a level of 10 or 20 feet.

Circle not centered on judges' position. Entry and exit paths not parallel with judges line. Too far away or too close.

**4.3.30: Lazy Eight.** The model aircraft approaches in straight and level flight on a line parallel with the judges' line. After passing the judges' position, a smooth climbing turn is started away from the judges. At the apex of the turn, the bank should be at least 60 degrees. The nose of the model aircraft then lowers and the bank comes off at the same rate as it went on. The turn is continued beyond 180 degrees to cross in front of the judges with wings level before intercepting and turning on to the reciprocal of the original approach track. This completes half of the figure, which is then repeated in the opposite direction to give the full symmetrical maneuver about the judges' position. Intercepting the original approach track parallel with the judges' line completes the maneuver. A low powered aircraft would be expected to execute a shallow dive at full throttle in order to pick up speed before starting the maneuver. This maneuver is essentially two wingovers in opposite directions and should be capable of being flown by most aircraft.

**Errors:** Entry and exit paths not parallel with judges' line. Insufficient climb achieved. Insufficient bank achieved. Climb and descent angles not equal throughout maneuver. Arcs misshapen. Maneuver not symmetrical about judges' position. Start and finish positions not as indicated. Overall size of maneuver not realistic for prototype. Model aircraft flight path not smooth and steady. Too far away/too close/too high/too low.

**4.3.31: Derry Turn.** The model approaches at a high speed in straight and level flight on a parallel line with the judges' line. The model then makes a steep bank (in excess of 60 degrees) one-quarter-circle turn in a direction away from the judges without losing height. When centered in front of the judges, the model makes a half roll in the same rolling direction as the entry, again directly followed by a steep one-quarter-circle turn in the opposite direction, and then flies off straight and level on a line parallel with that of the entry maneuver.

**Errors:** Entry not parallel with judges' line. Maneuver not centered in front of judges. The rolling maneuver in front of judges not axial on a line directly away from judges. The roll in center is not in the same roll direction as the entry to the maneuver. Any hesitation between the end of the first quarter turn, the roll and/or the start of the second turn. Exit not parallel

with entry. Significant height difference during maneuver. The maneuver misshapen (as seen as part of a figure eight). Maneuver is too low or too high to be easily judged.

## **RADIO CONTROL SPORT SCALE SOARING**

*For event 517.*

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

**2. Definition:** As per RC Sport Scale (events 511, 512, 513), except the event is for scale sailplanes only. Deviation from scale through the inclusion of spoilers, flaps, dive brakes, or other flight control devices (not including thermal-sensing devices which are permitted) which were not used on the prototype will be appropriately downgraded. The maximum weight ready to launch, including ballast, shall not exceed 55 pounds.

**3. Builder–Flier:** The builder/flier can be, in the case of a highly prefabricated or factory-built glider, the original owner and the one who made it ready to fly, regardless of the scope of the work required to finish the airplane.

**4. Proof of Scale:** RC Sport Scale section 4 applies.

**4.1:** The contestant will include in the declaration a statement as to whether or not the prototype was intended for aerobatics. Flight judges will refer to this in their allowance of up to two (2) or three (3) scale operations. The ability to perform a loop does not necessarily mean that the prototype was designed to perform them. Contestant discretion must apply here, and judges are instructed to accept the contestant’s statement.

**4.2:** As part of his declaration, the entrant shall specify whether the model was designer-built from factory drawings, built from plans, built from a kit, or bought built covered Almost-Ready-to-Fly (ARF). It will be the responsibility of the pilot to provide verification, and describe scope of work and prefab parts supplied.

**5. Static Judging:** RC Sport Scale section 5 applies with the following additions.

**5.1:** A protective skid(s) and/or tow hook may be added after static judging is complete. No downgrade shall be given in the case of a permanently mounted tow hook.

**6. Static Scoring:** 30 points maximum may be earned as follows:

<b>Category</b>	<b>Points</b>
Accuracy of Outline (General Impression)	Maximum 10
Finish, Color, and Markings	Maximum 10
Craftsmanship	Maximum 10

After static judging is complete, calculate bonus points as follows: multiply score by 2 for designer built, multiply by 1.7 if plans-built, multiply by 1.1 if kit-built, and multiply by .9 if an ARF.

### **7. Flight.**

**7.1:** Scale judging shall take place before official flying, with static scores to be released at the complete of the entire first round of flying. However, in order for a contestant to receive his/her static score, his/her model must make at least one (1) official flight attempt. If a contestant does not make at least one (1) official flight attempt during the contest, his/her static score shall be zero (0).

**7.2:** Launch shall be by winch or aero-tow, high-start. or hand-tow. Organizer-provided winches shall have a line length at 300 meters (984 feet) between launch point and ground based point. All contestants provided launch equipment can have any length line not exceeding 300 meters between launch point and ground based point. Weight limit for winch shall be 25 pounds. In the case of Aero tow launch, it shall be the responsibility of the pilot to arrange for a tug if his Sailplane is over 30 pounds, or verify that an event-supplied tug is adequate. Two launches per round will be allowed except for aero-tow, if a pilot requires them to complete his flight maneuvers. In the case of two launches, a given maneuver will be judged only once, the first time it is performed.

**7.3:** Time limit for each flight is 15 minutes from time of call to completion of landing maneuver.

**7.4: Official Flight.** A flight shall be considered official when the aircraft is released from hand tow, winch, or hi-start or other special release launch techniques. If mechanical failure of the hi-start, winch, occurs the flight will be called an “attempt,” with the pilot being able to go to the end of the flight order to make a second

attempt at an official flight. A maximum of three (3) attempts per flight will be permitted.

**8. RC Flight Plan:** The RC Flight Plan shall consist of 10 maneuvers and/or scale operations, three (3) mandatory and seven (7) optional. The mandatory items are:

- a. Three-hundred-sixty-degree thermal turns.
- b. Landing.
- c. Realism in flight.

The mandatory and optional maneuvers may be performed in any sequence, but must follow the contestants flight plan presented to the judges.

**8.1:** Options may be many maneuvers listed in the Sailplane Section of the Scale Judging Guide or any scale operations (spoilers, flap, etc.) typical of the aircraft modeled. No more than three (3) scale operations may be selected per flight by non-aerobatic sailplanes, or two (2) scale operations for aerobatic designs. Maneuvers and/or scale operations must be listed on the contestant's flight plan, which will be submitted to the flight judges before flying. The contestant may be asked to prove that his selected maneuver and/or operations have actually been performed by the prototype aircraft type.

**8.2:** At the option of the CD, the contestants may be requested to demonstrate on the ground, any scale operation that may be difficult to see in flight (i.e., flaps, spoilers, etc.). The contestant may elect to demonstrate them even if the CD does not require a demonstration. These scale operations will be demonstrated after the contestant's time has started and need not be demonstrated again in flight during a special declared pass for the judges (though the contestant may elect to do so) but must be used in flight in the same manner as the prototype.

**8.3:** The contestant may select different options in succeeding flight rounds, at his choice. Different options may be cleared as "prototypical" by the Contest Director.

**9. Flight Scoring:** Maximum total flight score is 100 points. Final flight score is arrived at by averaging a contestant's best two (2) flights. Any number of rounds may be flown but CD must indicate before the start of flying what the intended number of rounds will be. Only the two (2) highest flight scores shall be counted, except in cases of ties.

**9.1:** All maneuvers and scale operations are to be scored from zero (0) to 10 points, each.

**9.2:** No maneuver or scale operation will receive an automatic maximum score. All will be judged in relation to their scale-like qualities.

**9.3:** Each flight should be judged by at least two (2) judges, with their scores averaged to give final score for the flight. It is suggested that each maneuver be scored immediately after it is performed. Judges shall score each maneuver individually, and without any consultation between them. There should be enough judges available to establish a rotational procedure which will average out variations in judging.

**10. Official Score:** The official score shall be the total of static points (30) time multiplier maximum) and the average of the best two (2) flight scores. If only two (2) rounds are flown, then the official score will be the total of static points and the single best flight score.

To break a tie, the best single flight will be added to the static score. If this does not break the tie, add the average of the best three (3) flights to the static score. If this does not break the tie, add the average of the best four (4) flights to the static score.

## **RADIO CONTROL FLIGHT JUDGING GUIDE—SOARING SECTION**

*For event 517.*

### **1. Mandatory Maneuvers:**

**1.1: Three Hundred Sixty Degree Thermal Turns.** Beginning from any attitude or altitude, with the entire maneuver visible to all flight judges, the model shall perform two (2) consecutive 360-degree turns, either to the right or to the left. Turn direction shall be pilot's choice. Pilot should attempt to keep both circles concentric. Upon completion of the second turn, model shall resume its original heading.

**Errors:** Model does not complete two (2) full 360-degree turns. Model flies past the 360-degree point of the second turn. Model dives or stalls. Model does not keep two (2) circles reasonably concentric. (Note that slight downwind drift is permissible without downgrade, though both circles should be the same size in diameter.) Model does not leave the second turn on the same heading at which it entered the first turn. Slight loss or gain in altitude during the maneuver shall not be cause for downgrade. This is to allow for flight through lift or sink conditions.

**1.2: Landing.** Final approach shall be a part of the landing task. Maneuver shall begin when the model has completed its turn onto final approach, as announced by the contestant, and shall be considered to be complete when model comes to rest.

Model shall maintain an “on course” attitude toward the landing area until touchdown. Upon touchdown, model shall slide or roll forward to a gradual stop. It is suggested that the actual landing and the final approach be scored on an equal basis by the judges (i.e., a “perfect approach and an upside down landing earning five (5) total points. Approach—five (5) + landing—five (5) total points for landing maneuver.)

**Errors:** Model dives, stalls, or severely changes attitude during final approach. Model bounces or stops abruptly on touchdown. Model drops a wing too soon after touchdown without appropriate rollout. After dropping a wing, model ground loops. Model turns upside down. Model shedding parts during this maneuver shall be cause for a zero (0) total landing score.

**1.3: Realism in Flight.** The realism score shall be awarded in proportion to how well the model simulates the complete flight, stability, airspeed, landing, and rollout characteristics of the prototype aircraft. The model should also be judged for its attitude in flight and smoothness of control in yaw, pitch, and roll axis. The model should not show signs of instability which may be characterized by an erratic flight path. Any model of an aircraft with retractable gear that executes the complete flight presentation with its wheel(s) down shall be downgraded for realism. Upon completion of a flight, judges should discuss its realism to attempt to arrive at a unanimously agreed upon score.

**Errors:** Model does not fly at scale-like speed. Attitude in flight is unrealistic. Model does not fly smoothly. Models of aircraft that featured retractable landing gear are flown with their wheel(s) down or do not show wheel(s) extended during landing maneuver.

**2. Optional Flight Maneuvers:** For event 517.

**2.1: Climb to Release.** From hand tow, winch, or hi-start launch, the model will directly ascend to release altitude and fly smoothly off of the towline.

**Errors:** Model weaves from side to side on tow. Model’s nose dips or rises in a sudden or erratic manner. Model “zooms” excessively upon release. Winch pulsing causes model to “stutter” on tow.

**2.2: Optional Maneuvers.** Any maneuver described in the RC Scale Flight Judging Guide or Any Other Flight Maneuver (4.3.27.) may be selected in the contestant’s flight plan provided that such maneuvers are within the capabilities of the prototype aircraft. (Examples of optional maneuvers available to aerobatic sailplanes could be Inside Loop, Immelmann Turn, etc., and for non-aerobatic types, Straight Flight Out, Procedure Turn, Straight Flight Back, Flight in a Rectangular Circuit, etc., though neither type shall be restricted to only these specific maneuvers)

**2.3:** In all flight judging, the following shall be taken into consideration:

**2.3.1:** Downwind drift of non-powered aircraft due to wind conditions during maneuvers.

**2.3.2:** Slight gain or loss of altitude in lift or sink conditions during maneuvers.

**2.3.3:** Moderate dive of model prior to entering any maneuver which requires a nose-up entry (i.e., Inside Loop, Stall Turn, etc.).

**2.3.4:** Appropriate loss of altitude in extended length maneuvers (i.e., Straight Flight Out, Procedure Turn, Straight Flight Back, Flight in a Triangular Circuit, etc.).

**2.3.5:** Moderate nose-down attitude to maintain flight speed and penetration ability.

**2.3.6:** A sailplane’s lack of throttle, engine, or power, in any reference to same during the performance of maneuvers selected from the Scale Judging Guide.

**3. Scale Operations:** For event 517.

**3.1: Dump able Water Ballast.** From any attitude or altitude which will allow all flight judges to have full view of the entire performance, model shall proceed to release water ballast in visually the same manner as its prototype. This option must have the approval of the CD before the start of the contest.

**Errors:** Water is released at other than the specified time in the contestant’s flight plan. Release does not occur. Release is not visible to the judges. Release causes the wetting of other contestants, judges, models, or pre-specified equipment (complaints must be confirmed by the judges).

**3.2: Other Optional Demonstration.** Any Optional Demonstration described in the RC Scale Flight Judging Guide or Other Optional Demonstration (4.1.9.) may be selected in the contestant’s flight plan, provided such operations were within the capabilities of the prototype aircraft.

**3.2.1:** Judges will make appropriate allowances for conditions applicable to sailplanes, (i.e., Retract and Extend Gear having only a single leg, etc.).