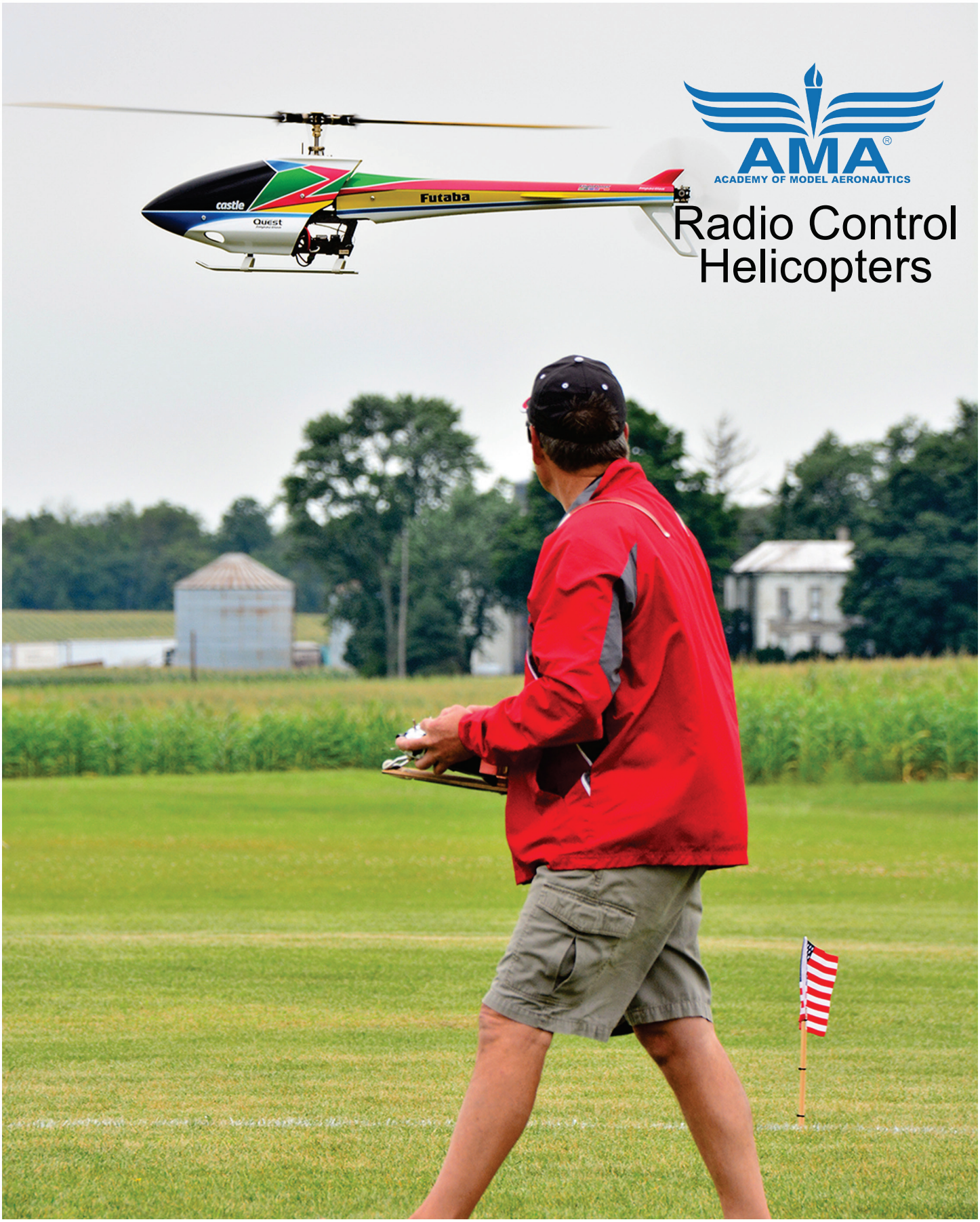


AMA®
ACADEMY OF MODEL AERONAUTICS

Radio Control Helicopters

RULES GOVERNING MODEL AVIATION COMPETITION IN THE UNITED STATES

Amendment Listing

Amendment Topic	Publication Date	Description
Original Issue	1/1/2015	Publication of Competition Regulations

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FOR EVENTS 431, 432, 433, 518

1.

All AMA and FCC regulations governing the contestant, his equipment and model helicopter shall apply to this event, except as noted herein. Safety consideration of spectators, event personnel and participants shall be of primary importance.

2. Definition

A helicopter is a heavier-than-air model that derives all its lift and horizontal propulsion from a power-driven rotor system(s) rotating about a nominally vertical axis (or axes). Fixed horizontal supporting surfaces up to four (4) percent of the swept area of the lifting rotor(s) are permitted. A fixed or controllable horizontal stabilizer up to two (2) percent of the swept area of the lifting rotor(s) is permitted. Ground effect machines (hovercraft), convertiplanes, or aircraft that hover by means of propeller slipstream(s) deflected downward are not considered to be helicopters.

3. Prefabrication

A helicopter that is assembled by the builder from prefabricated parts and in which the builder installs the equipment is permitted.

4. Characteristics (excluding Event 518)

4.1. Area

Maximum swept area of the lifting rotor(s) is 250 square decimeters (26.02 square feet). Count only once any area of superposition, except coaxial helicopters whose rotors are farther than one (1) rotor radius apart, in which case, count the total area of both rotors.

4.2. Weight

Maximum of six (6) kilograms (13.22 pounds) without fuel and batteries.

4.3. Motor

Maximum total swept volume is:

4.3.1.

Two-stroke glow motor(s); 15 cubic centimeters (0.91 cubic inches). Four-stroke motor(s); 20 cubic centimeters (1.21 cubic inches).

4.3.2.

Two-stroke gasoline motor(s); 25 cubic centimeters (1.5 cubic inches).

4.3.3.

Electric motor(s); maximum 42 volts with no load and one battery change after hovering maneuvers. A maximum of two minutes shall be allowed for a battery change and will not be charged against flight time.

4.3.4.

It is recommended that noise level be monitored. The maximum noise level should be 96 decibels (dB) measured at three (3) meters from the center line of the model when the helicopter is in stationary hover at one and one-half (1-1/2) meters over concrete or macadam. If the model is hovered over bare ground or short grass, the level should be 94 db. The measurement should be taken at a height of one and one-half (1-1/2) meters and at a 90-degree angle to the flight path. Additionally, this should be on the exhaust side and slightly downwind from the exhaust point. The contestant should be notified if the model fails the test, although, at this point, there shall be no penalty imposed.

4.4. Gyro

An electronic rate gyro may be used on the yaw axis only.

5. General

5.1.

All helicopters shall be subject to safety inspection at the discretion of the contest director.

5.2.

Any helicopter judged unsafe or not flyable due to a crash may be re-inspected prior to use.

5.3.

Dangerous flying or unsportsmanlike behavior shall be grounds for disqualification.

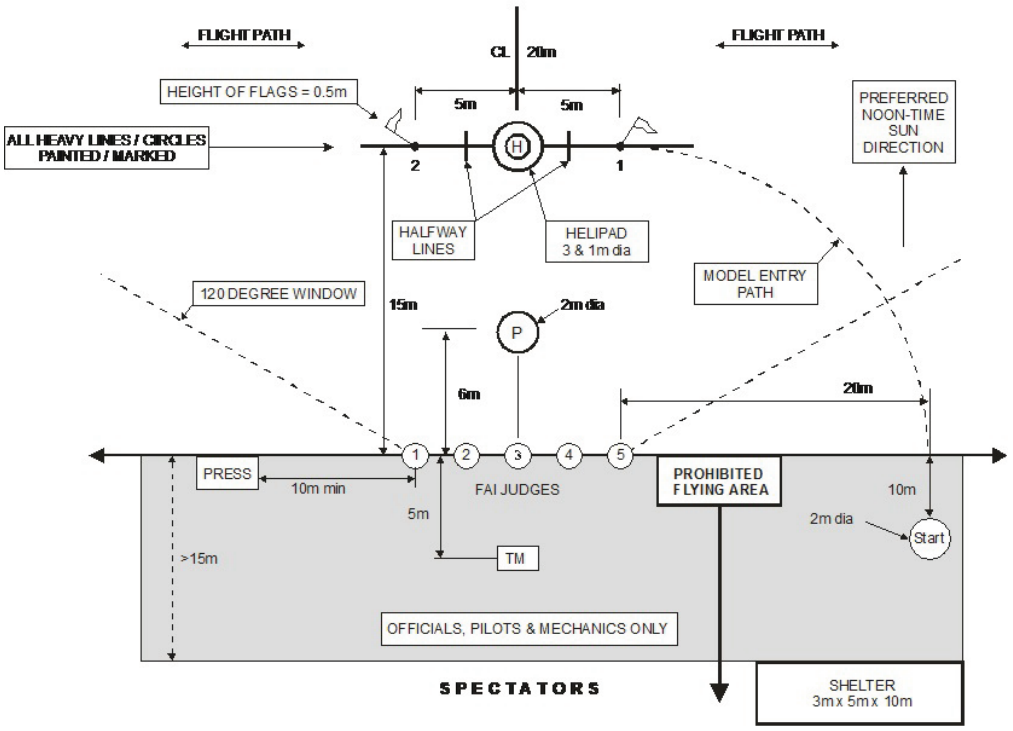
5.4.

All helicopters will have the contestant's AMA number affixed, which may be located at the contestant's discretion.

6. Contest Area Layout

Figure 1 shows the layout of the contest area.

FIGURE 5.4.A - F3C CONTEST AREA LAYOUT



6.1.

One (1) meter = three and one-fourth (3-1/4) feet.

7. Number of Models

The number of helicopters eligible for entry is two (2). The contestant may change helicopters prior to signaling the start of the first maneuver.

8. Helpers

Each contestant may have only one (1) mechanic/caller. The helper may not act as coach; they may only announce the start and finish of each maneuver.

9. Number of Flights

Each contestant is entitled to three (3) official flights. Additional flights may be flown when time permits.

10. Official Flight

There is an official flight when the pilot is officially called, whatever the result. The flight may be repeated at the contest director's discretion when for any unforeseen reason outside the control of the contestant; the helicopter fails to make a start, such as:

10.1.

The takeoff cannot be made within the allowed time limit due to safety reasons.

10.2.

The contestant can prove that takeoff was hindered by interference from outside.

10.3.

Judging was impossible for reasons outside the control of the contestant (helicopter engine or radio failure is not considered outside the control of the contestant).

In such cases, takeoff may be repeated immediately after the attempt, or after reporting to the CD during the same round, or with the approval of the CD after the round is completed.

11. Marking

Each maneuver may be awarded marks between zero (0) and 10 (including half (1/2) points) by each judge. Any maneuver not completed shall be scored zero (0).

12. Prohibited Area

There shall be an official that can observe any flight over the prohibited area (see Figure 1). An audible or visual signal shall be given to indicate such over flight. When a pilot is signaled as having overflown this area, any flight maneuvers remaining are scored zero (0) and the model must be landed as soon as possible. If the over flight occurred during a maneuver, then that maneuver shall be scored zero (0). Scores awarded to the point of the over flight shall remain. Note that the prohibited area extends to infinity.

13. No Score

Other than overflying the prohibited area, all maneuvers shall be scored. If an infringement has been made, the scores will be deleted on all cards. There shall be no score given when:

13.1.

The contestant flies a helicopter that has been flown in the same contest by another contestant.

13.2.

The contestant flies a helicopter that does not comply with the general characteristics of a radio controlled helicopter.

13.3.

The contestant does not start the helicopter in the prescribed sequence.

13.4.

The contestant does not turn the transmitter in to the impound or operate his transmitter during a round without permission.

13.5.

The contestant does not release the helicopter at the prescribed takeoff point or requires the assistance of more than one (1) helper.

13.6.

The contestant gets the transmitter from the impound before the first call and without permission.

13.7.

The contestant switches on the transmitter before the second call (start engine and adjust helicopter).

13.8.

The contestant's helicopter exceeds eye level during the preparation period.

14. Classification

The classification for a single round is determined by normalizing the raw scores against the highest score for that round. Normalized score = raw score/high score for round X 1,000 (two (2) decimal places, i.e., XXX.XX.

14.1.

The scores for a round must be clearly posted as soon as possible after the completion of the round.

14.2.

It is recommended that raw scores be posted as soon as possible during each round.

14.3.

The final classification will be determined by the sum of all flights, except the lowest one which is cancelled. If only one (1) flight has been made, then the final classification will be obtained by this single flight. In the

case of a tie within the first three (3) places, the final classification shall be determined by a fly off that should occur within one (1) hour of the normal finishing time of the contest. In the event that a fly off is not possible due to conditions outside of the contestant's and organizer's control, for example, weather, then the final classification shall be determined by the ranking of the canceled scores. In the event of only a single flight or a tie still exists after using the canceled score, then the tie will stand.

15. Judging

It is recommended that a panel of five (5) judges be appointed for each round. The final score of each flight is obtained after discarding the highest and lowest marks for each maneuver. When less than five (5) judges are used, the marks given by all judges shall be used. The minimum number of judges to be used is three (3).

It is highly recommended that the judges are given a 20-minute break every two (2) hours. The organizer should take this into account when scheduling flights and notification of the break point should be made known to the judges and contestants.

16. Class Advancement

At their first contest, a contestant may enter any one (1) class at his option. Once committed to a class, the contestant will only be allowed to move to a higher skill class (except as noted in 16.6. and 16.7.). This move will occur in one of two ways: (1) voluntary, (2) mandatory.

16.1.

Contestants may promote themselves voluntarily to a higher skill class at any time. Once they have made the move, they may not change back to a lower skill class, except as noted in 16.6. and 16.7.

16.2.

A contestant will be mandatorily advanced through all AMA classes by the accumulation of points. In each class, a contestant will receive points according to the finishing place in every contest in which he competes. Contestants finishing third or lower will receive one (1) point for each contestant they beat. The second place winner will receive two (2) points for each contestant they beat. The first place winner will receive three (3) points for every contestant they beat. No more than 40 points shall be earned from any single contest. The points received will be determined from the contest director's report and recorded in the contestant's cumulative record.

16.3.

Contestants will automatically advance to the next class when they have accumulated the following points:

Sportsman: 90 points

Advanced: 120 points

Advancement will occur at the end of the calendar year. There is no mandatory advancement for Expert Class.

16.4.

There is no time limit for obtaining advancement points. The advancement points continue to accumulate from year to year until, if ever, the advancement goal is reached.

16.5.

When a contestant enters a new class, he begins with zero (0) points.

16.6. Exception

A contestant may compete in a higher class at a contest if his class is not offered without committing to a permanent move to a higher class. He may not fly in a lower class than his current rating. When a contestant competes in a higher class as provided for in this rule, he will still accumulate points as though he had entered his own class.

16.7. Exception

A contestant may be reclassified to a lower class if he has written joint approval from a CD, district Contest Board member and an AMA District Vice President.

17. Organization of the Contest

17.1. Preparation Time

17.1.1. General

A contestant must be called at least five (5) minutes before he is required to enter the start box. A start box two (2) meters in diameter will be provided away from the flight line, spectators, contestants, and models. When the timekeeper, with the permission of the Flight line Director, gives the signal to start the engine, the contestant is given five (5) minutes to start the engine and make last minute adjustments. The contestant may continue with preparation beyond the five (5)-minute period; however, when this occurs, the flight time will automatically begin when the preparation time ends.

17.1.2. Sportsman

The contestant cannot hover the model in the start box and must carry the helicopter from the start box to the central helipad. Class I contestants can make last minute adjustments at the central helipad. If the engine stops before the contestant has signaled the start of the first maneuver, it may be restarted. The contestant must return to the start box for a restart. The flight time begins when the contestant announces the start of the first maneuver or when the five (5) minute preparation time expires.

17.1.3. Advanced and Expert

The contestant must complete the preparation and adjustments while the model is still in the start box. The helicopter may only be hovered in the start box up to eye level without practicing any maneuvers. The model must be flown from the start box to the central helipad. The flight time begins when the model leaves the start box with the permission of the judges or when the five (5) minute preparation time expires. The contestant is not allowed to touch the model after leaving the start box.

17.2. Flight Time

17.2.1. Sportsman

Eight (8) minutes.

17.2.2. Advanced

Eight (8) minutes.

17.2.3. Expert

Nine (9) minutes.

18. Performance of Maneuvers

18.1.

A new score sheet is issued for each contestant for each round. It is recommended that only the pilot number and not his name appear on the score sheet.

18.2.

The maneuvers are executed in the order described. Every maneuver executed out of order shall be scored zero (0).

18.3.

No takeoff or landing is allowed if it is not explicitly indicated in the description of the maneuver except as provided for in 28.5.2. If such happens, the next maneuver will be scored zero (0).

18.4.

The maneuvers should be performed in a smooth flowing sequence.

18.5.

Flying maneuvers shall be flown parallel to the flightline.

18.6.

The name of each maneuver and its start and finish must be announced by the pilot or his helper. Unannounced maneuvers will not be scored. The contestant may make only one (1) attempt to execute each maneuver during a flight. No practice attempt is allowed.

18.7.

If the flight time expires before a maneuver is completed, that maneuver and any remaining will be scored zero (0), and the pilot is required to land as soon as possible. An audible or visual signal will be given to the pilot if the flight time expires.

19. Schedule of Maneuvers

19.1. Sportsman

19.1.1.
Figure M

19.1.2.
Half Ellipse

19.1.3.
Inverted Triangle

19.1.4.
Straight Flight Out, Procedure Turn, Straight Flight Back

19.1.5.
Stall Turn

19.1.6.
Loop

19.1.7.
Roll

19.1.8.
Landing Approach to Eye Level Hover

19.2. Advanced

19.2.1.
Figure M

19.2.2.
Circle with 360-Degree Pirouette

19.2.3.
Inverted Triangle

19.2.4.
Loop with Full Roll

19.2.5.
Slow Roll

19.2.6.
Pushover with ½ Roll Down

19.2.7.
Pullback with ½ Loop

19.2.8.
180-Degree Translational Landing

19.3. Expert

19.3.1.
Figure M

19.3.2.
Vertical Circle with 360-Degree Pirouette

19.3.3.
Inverted Triangle

19.3.4.
Cuban Eight

19.3.5.
Double Rolling Stall Turn with Loop

19.3.6.
Cobra Roll with ½ Rolls

19.3.7.
Stall with Pullback Recovery

19.3.8.
180-Degree Autorotation

19.4.

FAI F3C shall be governed solely by the rule in the FAI Sporting Code.

JUDGING GUIDE AND MANEUVER DESCRIPTIONS

20. Purpose
To furnish an accurate description of helicopter maneuvers and their judging criteria as reference for use in developing a uniformly high standard of judging. This also should serve as a guide for the contestant to understand scoring criteria.

21. Principles
Judging a helicopter maneuver should be based upon the perfection with which the helicopter executes the maneuver as described. The main principles used to judge the degree of perfection are: Precision of the maneuver, smoothness and gracefulness of the maneuver, and positioning of the maneuver.

22. Consistent Judging
The most important aspect of consistent judging is for each judge to establish his standard and then maintain that standard throughout the contest. It is advisable for the contest director or organizer to hold a conference prior to the start to discuss judging and make the standards as uniform as possible. This can be affected by using practice flights in which all judges score privately. After each flight, the defects in each maneuver should be discussed by all judges and agreement reached about the severity of the defects. Once the contest is started, the individual judge should not alter his standard under any influence.

23. Accurate Judging
Of equal importance to consistency is accuracy in judging. Being consistent, either high or low, is not good enough if the scores awarded are not a fair reflection of the maneuver performed.

24. Final Mark
The final mark will be between zero (0) and ten (10) to include one-half points.

25. Perfect Marks

Flawless maneuvers are rarely observed in competition, but every flawless maneuver should be awarded a 10.

26. Downgrades

Variations noted should be downgraded; the more serious the error, the greater the downgrade. The judge must keep in mind the overall maneuver in order not to over penalize any given element of the maneuver.

27. Wind Correction

All maneuvers are required to be wind corrected so that the shape of the maneuver is preserved.

28. Terms

The following terms are used to describe maneuvers and are used in the downgrading guidelines. The intent is to identify specifically what is expected whenever the term is used.

28.1. Takeoff

The helicopter should rise smoothly from the helipad with a vertical ascent to the altitude described, without movement, either horizontally or about the yaw axis.

28.2. Stop

All stops must remain stationary for not less than two (2) seconds. Stops of less than two (2) seconds should be more severely downgraded than poor stops that meet the two (2) second criteria.

28.3. Horizontal Hovering Line

The helicopter moves from one (1) point to another with constant altitude, speed, and heading. The helicopter also must stay in the vertical plane between the two (2) points it is traversing. All lines should be flown at a consistent pace, both individually and as a whole for the maneuver.

28.4. Pirouettes

The helicopter rotates slowly and at a constant pace through 360 degrees. The helicopter does not move either horizontally or vertically.

28.5. Landing

The helicopter should descend smoothly and vertically to the helipad, without movement, horizontally or about the yaw axis. The helicopter should land smoothly, with no more than a very short hesitation between the vertical descent and the landing.

28.5.1.

If the helicopter lands with the skids completely outside the helipad, a severe downgrade should be made. A perfect mark can be awarded only if the landing is centered in the helipad.

28.5.2.

When the helicopter does not land in the center of the helipad and the next maneuver requires a takeoff, it may be hovered to the center of the helipad prior to the beginning of the next maneuver without penalty. The helicopter may not be touched and any hover involved must not exceed one (1) foot in altitude.

28.6. Pilot Position

For Classes I, II, III shall be fixed to a 2-meter circle which is 9 meters from the center of the central helipad, directly in line with the center judge. If the pilot moves from the fixed position from the beginning to the end of the flight, a severe downgrade shall be imposed.

28.7. Helicopter Attitude

During hovering maneuvers, the actual attitude of the helicopter is primarily influenced by the wind direction and strength and is not a consideration in scoring.

28.8. Hover Positioning.

Generally, this is a vertical placement of the helicopter over a reference point (e.g., flag) described in the maneuver. The reference point on the helicopter is the rotor shaft.

28.9. Maneuver Position

All flight maneuvers must be flown within the judging window. This area is approximately 60 degrees vertically and 90 degrees horizontally from the central helipad. Any maneuver flown partially outside this window should be severely downgraded. Any maneuver flown entirely outside this window should receive a mark of zero (0).

28.9.1.

All flight maneuvers are started or centered at a specific position, generally the “mid-line.” Maneuvers flown out of position should be downgraded according to the misplacement. Judges who are not positioned on the “midline” must be careful not to perceive positioning errors due to their slightly angled view.

28.9.2.

Flying so far out, so close in, or so high as to make evaluation of a maneuver difficult should be severely downgraded.

28.10. Hovering Altitude

The skids or undercarriage of the helicopter should be approximately at the height of two (2m) meters. The judge should consider all the elements to be flown at eye level as a group. Because the two (2m) meter height is considered a safety requirement, a more severe downgrade should generally be given for being low as opposed to high.

28.11. Entry and Exit Lines.

All flight maneuvers are started and ended by a horizontal line that is parallel to the horizon and the flight line. Entry and exit lines must be no shorter than described for a particular maneuver. Lines longer than required should not be downgraded so long as the entry and exit lines are reasonable and of approximately the same length. The actual attitude of the helicopter need not be level. It is the flight path that is being scored.

28.12. Smoothness

During all parts of flying maneuvers, the helicopter must maintain smooth flight which is free of wobbles, bobbles, oscillations, and segmentations.

29. Description of Maneuvers

Following each description is a Downgrading Guide. Many elements have been described in detail previously and that guideline should be used for scoring. The list is in general order of importance.

29.1. Sportsman

Take offs and landings are in the one (1m) circle with minor downgrade if skids are touching the lines.

29.1.1. Figure M

Model is positioned tail in to the pilot, takes off vertically and climbs to a 2-meter altitude, pauses, moves sideways in either direction to the flag, pauses, climbs vertically 2 meters, pauses, descends gradually as the model moves to the central helipad to a height of 2 meters, pauses, climbs 2 meters while ascending to the opposite flag, pauses, descends vertically 2 meters, pauses, moves sideways back to the central helipad, pauses, and lands vertically on the central helipad.

Downgrading Guide:

1. Take Off

2. Horizontal hovering lines (2)

3. Vertical hovering lines (2)

4. Diagonal hovering Lines (2)

5. Stops

6. Constant altitude

7. Constant speed

8. Constant Heading

9. Landing

29.1.2. Half Ellipse

Model takes off vertically and climbs to a 2-meter altitude, pauses, and moves sideways to either flag, pauses, climbs while moving sideways, performing a half ellipse with center over the central helipad an additional 2 meters high the descends to the opposite flag, pauses, moves sideways back to the central helipad, pauses, and lands vertically on the central helipad.

Downgrading Guide:

1. Takeoff

2. Horizontal lines (2)

3. Elliptical shape

4. Constant altitude

5. Constant speed

6. Constant heading

7. Landing

29.1.3. Inverted Triangle

Model takes off vertically and climbs to a 2-meter altitude, pauses, climbs 2 meters minimum while moving diagonally sideways in either direction to the flag, pauses, turns 90 degrees nose toward the central helipad, pauses, flies across the central helipad to the opposite flag, pauses, turns 90 degrees nose out, pauses, descends

to original altitude while moving sideways back to the central helipad, pauses, and lands vertically on the central helipad.

Downgrading Guide:

1. Takeoff
2. Diagonal lines (2)
3. Pirouettes (2)
4. Horizontal line
5. Landing
6. Constant heading
7. Constant speed
8. Constant altitude

29.1.4. Straight Flight Out, Procedure Turn, Straight Flight Back

Maintaining constant altitude, the model flies straight and level past the midline, executes a 90-degree turn away from the judges and then an immediate 270-degree turn in the opposite direction, and flies straight in the opposite direction down the original line of flight.

Downgrading Guide:

1. Flight path not parallel to flightline
2. Turn not 90 degrees
3. Turn not 270 degrees
4. Constant altitude
5. Entry and exit not on same line
6. Positioning

29.1.5. Stall Turn

Model flies straight and level past the centerline for ten (10) meters minimum, then climbs vertically with a smoothly rounded curve of 90 degrees. When the vertical climb stops, the model rotates 180 degrees in yaw so that the nose points straight downward. While diving, the model follows the same path as the beginning of the

maneuver. The start and finish of the pull up should be on the midline and the vertical line is offset in the direction of flight.

Downgrading Guide:

1. Entry line
2. Climb and descent paths different
3. End of climb not vertical
4. Rotation is before or after the end of climb
5. Positioning

29.1.6. Loop

Model flies straight and level minimum 10 meters, then performs an inside loop centered on the midline, flies level at original altitude for 10 meters minimum to exit.

Downgrading Guide:

1. Entry line
2. Loop not round
3. Exit attitude same as entry altitude
4. Positioning

29.1.7. Roll

Model performs a 360-degree axial roll centered on the midline. Model should be inverted directly in front of the pilot.

Downgrading Guide:

1. Entry line
2. Model inverted at midline
3. Roll is more or less than 360 degrees
4. Heading change during roll
5. Altitude changes during roll
6. Exit line

29.1.8. Landing Approach to Eye Level Hover

Beginning at a minimum altitude of ten (10) meters, the model will descend in a straight line parallel to the flight line, maintaining a constant rate of descent to an eye level hover over the three (3)-meter central helipad, turns 90 degrees to tail in, and hovers for two (2) seconds.

Downgrading Guide:

1. Entry line
2. Descent is not smooth or at a constant rate
3. Model is not stationary over central heli pad.

29.2. Advanced

Take offs and landings are in the one (1m) meter circle

29.2.1. Figure M

Model is positioned tail in to the pilot. Model takes off vertically and climbs to 2 meters, pauses, turns 90 degrees toward either flag, pauses, flies backward to the flag, pauses, turns 90 degrees nose out, pauses, climbs 4 meters, pauses, turns 90 degrees nose toward the central helipad, pauses, moves forward descending 4 meters to the central helipad, pauses, climbs 4 meters while ascending to the opposite flag, pauses, turns 90 degrees nose out, pauses, descends vertically 4 meters, pauses, turns 90 degrees away from the central helipad, pauses, flies backward to the central helipad, pauses, turns 90 degrees out, pauses, descends vertically to land on the central helipad.

Downgrading Guide:

1. Take off
2. Horizontal lines (2)
3. Vertical lines (2)
4. Diagonal lines (2)
5. Pirouettes (4)
6. Landing

29.2.2. Vertical Circle with ½ Pirouette

Model takes off vertically and climbs to 2 meters, pauses, turns 90 degrees in either direction, pauses, starts forward while performing a climbing ½ vertical circle of 5 meter diameter, pauses, performs a 180-degree pirouette, pauses, flies forward while performing a descending ½ vertical circle, pauses, turns 90 degrees nose out, pauses, and descends vertically to land on the central helipad.

Downgrading Guide:

1. Take off
2. Pirouettes (3)
3. Half circles (2)
4. Landing
5. Constant heading
6. Constant speed
7. Constant altitude

29.2.3. Inverted Triangle

Model takes off vertically and climbs to 2 meters, pauses, turns 90 degrees toward either flag, pauses, flies forward while climbing 4 meters to the flag, pauses, turns 180 degrees nose toward the central helipad, pauses, flies across the central helipad to the opposite flag, pauses, turns 180 degrees nose toward the central helipad, pauses, flies forward while descending 4 meters to the central helipad, pauses, turns 90 degrees nose out, pauses, and descends vertically to land on the central helipad.

Downgrading Guide:

1. Take off
2. Diagonal lines (2)
3. Horizontal line (1)
4. Pirouettes (4)
5. Landing
6. Constant heading
7. Constant speed

8. Constant altitude

29.2.4. Loop with Full Roll

Model enters from 10 meter minimum level flight, beginning at the midline, performs an inside half loop, hesitates, performs a full roll, inverted to inverted, hesitates, performs another half inside loop, performs 10 meter minimum level flight to exit.

Downgrading Guide:

1. Entry line
2. Model performs more or less than ½ loop up
3. Roll is more or less than 360 degrees
4. Roll changes heading
5. Roll changes altitude
6. Model performs more or less than ½ loop down
7. Exit line

29.2.5. Slow Roll

Model performs one complete roll, 4 second minimum, centered on the midline.

Downgrading Guide:

1. Entry line
2. Roll is more or less than 360 degrees
3. Roll is less than 4 seconds
4. Roll changes heading
5. Roll changes altitude
6. Exit line

29.2.6. Pushover with ½ Roll Down

Model enters with a 10 meter minimum level flight, performs a ¼ loop to vertical, centered on the midline, pushes into a ½ forward flip, the first ¼ ascending , the second ¼ descending, performs a ½ roll then a ¼ loop to exit into 10 meter minimum level flight.

Downgrading Guide:

1. Entry line

2. Climb is not centered

3. Climb is not vertical

4. Flip is more or less than 180 degrees

5. Roll is more or less than 180 degrees

6. Entry and exit loops not same radius

7. Climb and descent oaths are different

8. Exit line

29.2.7. Pullback with ½ loop

Model enters from 10 meter minimum level flight, pulls vertical, stops, and performs a backwards ½ loop, stops, descends vertically, pulls to level flight at original altitude.

Downgrading Guide:

1. Entry line

2. Climb is not vertical

3. ½ loop is not round

4. ½ loop is not centered

5. Stop at back half of loop is different altitude than stop at the start of loop

6. Descent is not vertical

7. Entry and exit loop radii are different

8. Exit line

29.2.8. 180-Degree Translational Landing

Model establishes descent and the maneuver begins as the model crosses the center line. From a minimum height of 30 meters, model executes a constant radius, constant rate of descent 180 degree turn to land on the central helipad. If the skids are completely inside the central helipad, a maximum of ten (10) points can be earned. If the skids are touching the one (1) meter circle of the central helipad, a maximum of nine (9) points can be earned. If the model lands inside the three (3) circle, a maximum of

eight (8) points can be earned. If the skids are on or outside the three (3) meter circle, a maximum of six (6) points can be earned.

Downgrading Guide:

1. Entry line
2. Descent is not constant rate
3. Turn rate is not constant
4. Straight segments
5. Landing is not smooth
6. Models hovers more than briefly before landing
7. Landing is not on the central helipad

29.3. Expert

Take offs and landings are from the one (1m)-meter circle

29.3.1. Figure M

Model is positioned side to the pilot on the central helipad. Model takes off and climbs vertically to 2 meters, pauses, backs to the flag, pauses, rises vertically 4 meters while performing a 180 pirouette, pauses, descends backward 4 meters to the central helipad, pauses, performs a 360-degree pirouette, pauses, climbs backward 4 meters to the opposite flag, pauses, descends vertically 2 meters, pauses, performs a 180 pirouette, pauses, descends 2 meters, pauses, flies backwards to the central helipad, pauses, descends vertically to land on the central helipad.

Downgrading Guide:

1. Take off
2. Horizontal lines (2)
3. Vertical lines (2)
4. Diagonal lines (2)
5. Pirouettes
6. Constant heading
7. Constant speed

8. Constant altitude

9. Climb and rotation speeds are not constant.

10. Landing

29.3.2. Circle with 360-Degree Pirouette

Model takes off vertically and climbs to 2 meters, pauses, moves backward and performs a climbing ½ vertical circle to a height of 5 meters, pauses, performs a 360-degree pirouette, pauses, moves forward and performs a descending ½ circle to the central helipad, pauses, descends vertically to land on the central helipad.

Downgrading Guide:

1. Take off

2. ½ circles are not round

3. Pirouette is more or less than 360 degrees

4. Model is not stationary during pirouette

5. Constant speed

6. Constant heading

7. Landing

29.3.3. Inverted Triangle

Model takes off vertically and climbs to 2 meters, pauses, climbs while traveling diagonally backward 5 meters to the flag, pauses, does a traveling 360-degree pirouette over the central helipad to the opposite flag, pauses, descends diagonally backwards to the central helipad, pauses, descends vertically to land on the central helipad.

Downgrading Guide:

1. Take off

2. Diagonal lines (2)

3. Horizontal line (1)

4. Pirouette rate is not constant and model is not positioned correctly at 90-degree points

5. Constant altitude

6. Constant speed

7. Constant heading

8. Landing

29.3.4. Cuban Eight

Maneuver begins at the midline with 10 minimum level flight. Model performs a 5/8 loop, a ½ roll to upright, another 5/8 loop, a ½ roll to upright pulls to level flight for 10M minimum, and exits at the entry altitude.

Downgrading Guide:

1. Entry line

2. Loops are not same size

3. Rolls are not centered on the down legs

4. Rolls are more or less than 180 degrees

5. Positioning

6. Exit line

29.3.5. Double Rolling Stall Turn with Loop

Model enters with a 10M minimum straight and level segment and performs a ¼ loop to vertical, performs a ½ roll, then a 180-degree stall turn to nose down. Model descends vertically and performs 1 ½ loops with the bottom at entry altitude and top the same height as the 1st stall turn. Model goes vertical to same height as 1st stall turn, performs a 180 stall turn, ½ roll down, then ¼ loop to exit at original entry altitude.

Downgrading Guide:

1. Entry line

2. Climbs are not vertical

3. Loop is not round

4. Tops of climb and top of loop are not all same height

5. Rolls are more or less than 180 degrees

6. Maneuver is not centered on the midline

7. Exit line

29.3.6. Cobra Roll with ½ rolls

The model flies straight and level for ten (10) meters then climbs in a smoothly rounded curve of 45 degrees. The model flies straight for a minimum of five (5) meters, does a ½ roll to inverted, and continues straight for an additional five (5) meters minimum. At the midline, the model executes a sharp 90 degree inside loop, flies straight for five (5) meters minimum, does a ½ roll to upright, continues straight for five (5) meters minimum, recovers smoothly to level flight, and flies straight and level for ten (10) meters.

Downgrading Guide:

1. Entry line
2. Climb and descent are not 45 degrees to horizontal
3. Rolls are more or less than 180 degrees
4. Pull at top is more or less than 90 degrees
5. Maneuver is not centered on the midline
6. Exit line

29.3.7. Stall with Pullback Recovery

Model flies straight and level for ten (10) meters then climbs in a smoothly rounded curve of 90 degrees. When the model is vertical, it executes a ½ forward flip while traveling backwards and maintaining altitude until the model points vertically nose downward. While diving, the model executes in a smoothly rounded curve of 90 degrees and flies straight and level at the same altitude as the entry.

Downgrading Guide:

1. Entry line
2. Climb and descent are not vertical
3. Flip does not maintain altitude
4. Models moves in or out during flip
5. Entry and exit loops are not same radius
6. Exit line

29.3.8. 180 Autorotation

Model flies at a minimum altitude of twenty (20) meters with a speed less than required for stationary flight. The engine must be at idle or stopped before the model crosses the midline and begins a 180-degree turn to land on the central helipad. Maneuver begins at the midline. If the skids are inside the central helipad, a maximum of ten (10) points can be earned. If the skids are touching the circle of the central helipad but the main shaft is inside the circle, a maximum of nine (9) points can be earned. If the skids are outside the central helipad, a maximum of eight (8) points can be earned. If the skids are on the 3M circle but the main shaft is inside the circle, a maximum of seven (7) points can be earned. If the main shaft is on or outside the 3M circle and max of six (6) points can be earned.

Downgrading Guide:

1. Entry line

2. Model made a hard landing

3. Model landed while it still had forward speed

4. Model did not perform an exact 180-degree turn

5. Model did not maintain a constant rate of descent during 180-degree turn

6. Model did not maintain a constant turning rate during 180-degree turn

7. Flight path was stretched to reach helipad or circle

8. If motor was used to assist in landing, score will be zero

RADIO CONTROL HELICOPTER SCALE FOR EVENT 518.

1. General

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

2. Safety

Safety consideration of spectators, event personnel and participants shall be of primary importance. All models shall be subject to a safety inspection at the discretion of the contest director. A model judged to be un-flyable due to a crash

must be re-inspected prior to reuse. Dangerous flying or poor sportsmanship shall be grounds for disqualification. All maneuvers shall be flown in front of the dead line which extends to infinity. At no time shall the helicopter come between the pilot and the judges! Violation of these rules will be grounds for disqualification!

3. Model Requirements

There shall be no limitation on the types of equipment that can be fitted to the helicopter with exception of metal main or tail rotor blades. Each contestant shall be permitted one (1) model entry.

4. Builder of Model Rule

The builder and flier of the model helicopter shall be one and the same person. There are no team entries.

4.1.

The contest director shall make every reasonable effort to assure himself that each contestant "constructed" the model used in competition. "Constructed" shall be interpreted as the action required to complete a model with no more fabrication than the usual helicopter kit.

4.2.

Helicopter kits containing a large amount of prefabrication are permissible as long as the contestant completes all of the final assembly.

4.3.

The contestant must be the original owner and the one who prepared the helicopter for flight, regardless of the scope of the work required to finish the helicopter.

4.4.

The contestant will include in a declaration statement that he/she completed the final assembly of the subject aircraft, including and not limited to: preparing the fuselage for the mechanics, building of the mechanics, installing the radio equipment, and test flying the aircraft. The contestant shall also list which items or construction steps that he/she did not complete or fabricate.

5. Proof of Scale

Contestants shall present the following materials with the helicopter for static judging:

5.1.

A published three-view or more drawings.

5.2.

Pictures, published or otherwise, pertaining to color, markings, and details.

6. Static Judging

Static judging is to be done at the flying site when possible. The model shall be placed on an elevated or rotating table.

6.1.

The judges shall be allowed to approach the model but may not touch it.

6.2.

The contestant shall be the only person to move the model and/or open any panels or doors for the judges to inspect.

6.3.

The contestant shall have up to 5 minutes to show the judges any special features which appear on his model such as lights, or other working detail.

7. Static Scoring

Total 3 judges, maximum 300 points per judge gives a total 900 possible points for static. Entries shall be judged on the following items with the maximum point values listed next to each.

7.1.

Fuselage (Maximum 50 points).

7.2.

Cockpit (Maximum 50 points).

7.3.

Landing Gear (Maximum 50 points).

7.4.

Rotor Systems:

7.4.1.

Tail rotor (Maximum 10 points).

7.4.2.

Main rotor (*Maximum 40 points).

*Helicopters using a main rotor system that features a flybar to enhance flight stability will receive a maximum of fifteen (15) points unless their system replicates the full size helicopter.

7.5.

Craftsmanship (Maximum 50 points).

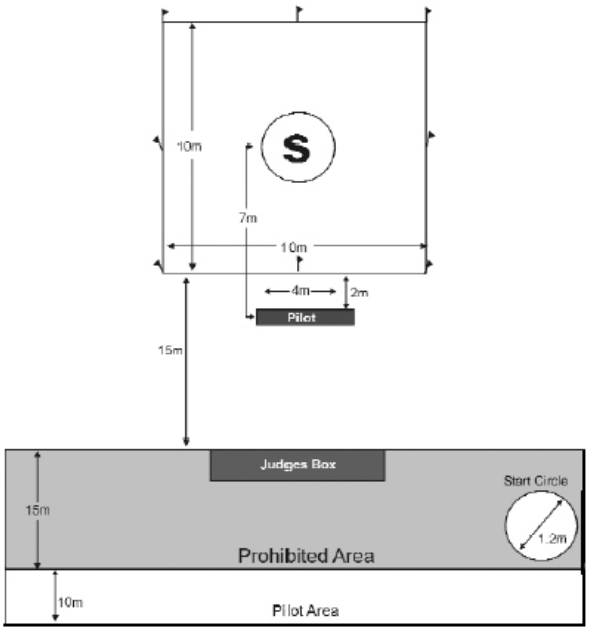
7.6.

Finish & Markings (Maximum 50 points).

8. Flight Guidelines

The contest layout area will be the same used for AMA events 431, 432, and 433 with the pilot located behind a line seven (7) meters from the center of the scale (S) helipad. See Figure 1.

Figure 1. (Not to Scale)



8.1.

The scale (S) helipad shall be a 1.2-meter circle, and all flights shall commence and end at the (S) helipad.

8.2.

The pilot shall stand behind a line seven (7) meters from the center of the scale (S) helipad. The pilot shall stand in this position during the entire flight.

8.3.

Each contestant is allowed 3 minutes in which to start their model, transport it to the scale (S) helipad, and test hover or perform adjustments as required. The contestant shall wait until the preceding competitor has completed their flight and shut down their model prior to starting and beginning the start time interval. Test hovering shall be done from the scale (S) helipad. The helicopter may only be hovered up to eye level, without practicing maneuvers, and the model must not be rotated beyond 90 degrees left or right relative to the pilot. If the contestant is not ready after the 3 minute start time interval, they are allowed to complete their adjustments; however, their flight time will have started at the end of the 3 minute interval.

8.4.

All models shall be carried from the start circle to the scale (S) helipad. Models shall not be flown from the helipad to the pit area.

8.5.

Once the contestant or his caller has announced the start of his flight, he is not allowed to make any adjustments to the helicopter. Engine restarts after the flight has commenced are not allowed.

8.6.

The maneuvers shall be flown in proper sequence and away from the spectators. The maximum flying time is six (6) minutes beginning when the first maneuver is announced.

8.7.

A flight shall be considered an official attempt once the contestant or his caller has indicated the flight has begun. All contestants must have at least two (2) official attempts to have their static score counted.

8.8.

All contestants shall be permitted to fly as many equal rounds as time allows or as directed by the contest director.

8.9.

Contestants shall fly the same equipment that which was static judged. Should part of the aircraft be damaged so as to be replaced, that portion of the helicopter shall be re-judged.

9. Scale Flight Plan

9.1.

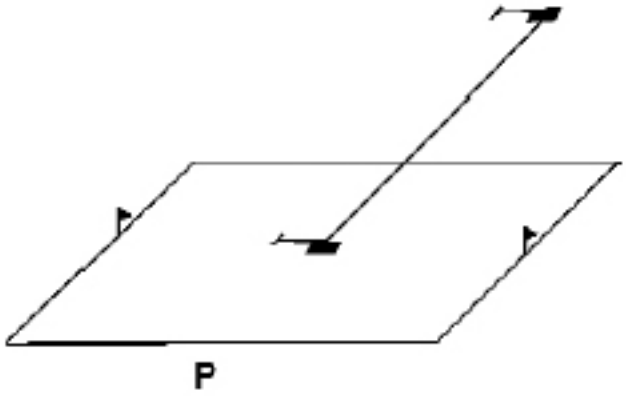
Ten (10)-Second Hover with Clearing Turns (Maximum 15 points).

9.2.

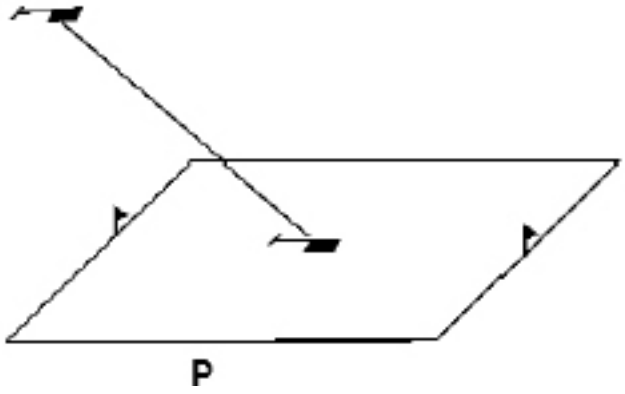
45-degree Climb Out to a minimum of eight (8) meters. (Maximum 5 points).

9.3. Translational Landing

Minimum altitude of eight (8) meters the helicopter will begin a translational straight-line descent or autorotation to a soft landing on the helipad. (Maximum 10 points).



*Autorotation Option: Should a contestant wish to end his flight with a autorotation maneuver he may substitute it for the Translational Landing for a possible fifteen (15) point bonus. (Maximum 25 points).



9.4.

Scale Freestyle (Maximum 70 points).

9.5. Auto Rotation Option

Should a contestant wish to end his/her freestyle flight with an auto rotation maneuver to the scale helipad, he/she may do so for a potential bonus of up to 15 points.

10. Multi-Blade/Flybarless Bonus

Helicopters flying with a multi-bladed or flybarless rotor head that is "scale to their particular machine" will receive a fifty (50) point bonus added to each round's score. "Scale to their particular machine" shall be interpreted as a rotor head that matches the number of blades and flybar arrangement (if any) fitted to the full scale prototype.

11. Flight Scoring

Each rounds flight score shall be the sum of the scores from the three judges. Maximum 100 points per judge totals 300 possible points per flying round plus any Autorotation and/or Multi-Blade/Flybarless Bonuses.

12. Official Score

The final score shall be the sum of the best two flight scores plus the static score. Maximum 1500 possible points (1630 with flying bonuses). In the unlikely event of a tie, the tie breaker shall be the highest single flying round score between the tied contestants.

SCALE HELICOPTER JUDGE'S GUIDE

13. Static Judging Guidelines

13.1. Fuselage

Outline compared to three-views and documentation, panel lines, and rivets. Must provide documentation for maximum score. (Maximum 50 points.)

13.2. Cockpit

Seats, belts, controls, instruments, consoles, map pockets, flooring, interior paint, etc. Match documentation for maximum score. (Maximum 50 points - Automatic zero for no cockpit.)

13.3. Landing Gear

Scale-like landing gear (skids or retracts). Match documentation for maximum score. (Maximum 50 points.)

13.4. Rotor Systems

13.4.1.
Tail rotor systems including blades. Match documentation for maximum score. (Maximum 10 points.)

13.4.2.
Main rotor system including blades. Match documentation for maximum score. (*Maximum 40 points.)

*Helicopters using a main rotor system that features a flybar to enhance flight stability will receive a maximum of fifteen (15) points unless their system replicates the full-size helicopter.

13.5. Craftsmanship

Items added or modifications made to enhance the scale appearance of the helicopter. These items may be handmade, or obtained separately and could include; lighting systems, aerials and antennas, non-skid surfaces, latches, handles, opening doors and hatches, interior detail, tie downs, etc. Match documentation for maximum score. (Maximum 50 points.)

13.6. Finish and Markings

Painting and nomenclature. Paint scheme should reflect actual paint used. Nomenclature could include registration numbers or maintenance and armament markings. Match documentation for maximum score (Maximum 50 points).

14. Flight Judging Guidelines

14.1. 10-Second Hover with Clearing Turns

Lift off smoothly with the tail towards the pilot and hover stationary at eye level over the pad for a minimum of ten (10) seconds followed by a 90-degree Clearing Turn either to the left or right, hover for five (5) seconds, followed by a 180-degree turn in the opposite direction, hover for five (5) seconds. Subtract points for; incorrect hover altitude, hovering less than the minimum time, non-completion of clearing turns, erratic movements. (Maximum 15 points.)

14.2. 45-Degree Climb Out

Following the final Clearing Turn the model shall perform a 45-degree Climb Out to a minimum of 8 meters. The pilot should perform the Climb Out so that the Judges have a good view of the model's angle of climb and altitude. Subtract points for; wrong degree of climb out, wrong altitude, erratic movements. (Maximum 5 points.)

14.3. Scale Freestyle

Scale Freestyle flight shall commence at the scale (S) helipad. The main objective is to demonstrate the flight capabilities & functions of the actual full-size helicopter, and all maneuvers should replicate the type of helicopter being flown. The pilot shall provide each judge with a description of his maneuvers. The flight duration shall be a minimum of two (2) minutes, not to exceed four (4) minutes. Scoring will be based on smoothness, precision, realistic speed, and judges' impression of the overall presentation. Subtract for erratic movements, non-scale maneuvers, non-scale speed, falling outside time constraints. The judges will award 50 points for technical merit in performing the maneuvers and 20 points for artistic merit for presenting a sequence of maneuvers which flows nicely and makes for a pleasing demonstration of the models performance (Maximum 70 points).

14.4. Translational Landing

Following the Climb Out and at a minimum altitude of eight (8) meters the helicopter will begin a translational straight-line descent to a soft landing on the helipad. Maximum score is achieved when the touchdown is preceded by a minimum duration/altitude hover. Subtract for incorrect starting altitude, erratic movements, rough landing, or missing the helipad. (Maximum 10 points.)

Should a contestant wish to end his/her flight with an auto rotation for a possible 15-point bonus, his/her caller must alert the judges to his intentions prior to starting the auto rotation. The maneuver must be performed from a minimum starting height of 8 meters and the engine must be switched off at the start of the maneuver. The engine may be left running if the entrant desires but for a reduced score. Lose marks for incorrect starting altitude, erratic descent, rough landing or missing the helipad.

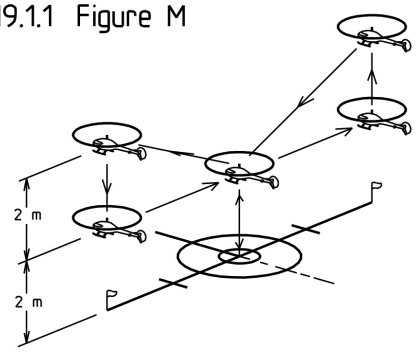
Maximum engine off bonus 15 points. Maximum engine running bonus 5 points. The bonus is in addition to the Freestyle score.

15. Multi-Blade/Flybarless Bonus

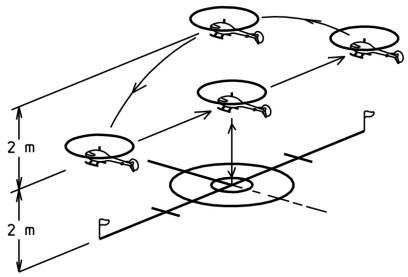
Helicopters flying with a multi-bladed or flybarless rotor head that is "scale to their particular machine" will receive a fifty (50)-point bonus added to each round's score. "Scale to their particular machine" shall be interpreted as a rotor head that matches the number of blades and flybar arrangement (if any) fitted to the full scale prototype.

RC Helicopter Sportsman Diagram

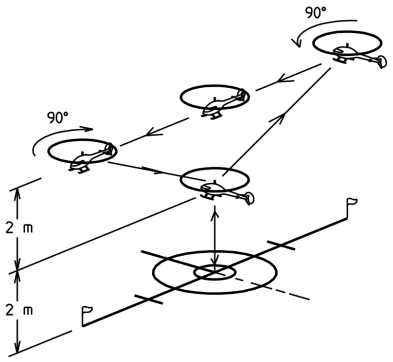
19.1.1 Figure M



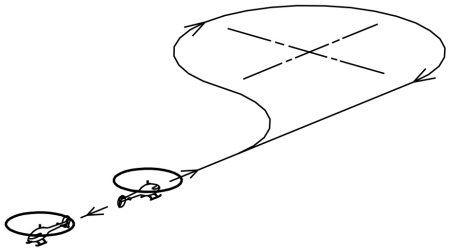
19.1.2 Half Ellipse



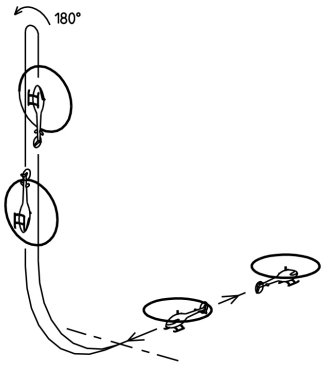
19.1.3 Inverted Triangle



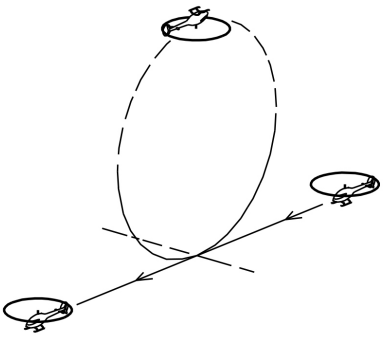
19.1.4 Procedure Turn



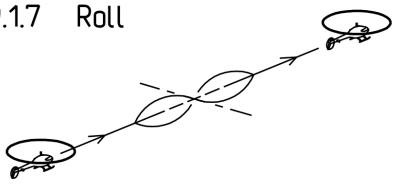
19.1.5 Stall Turn



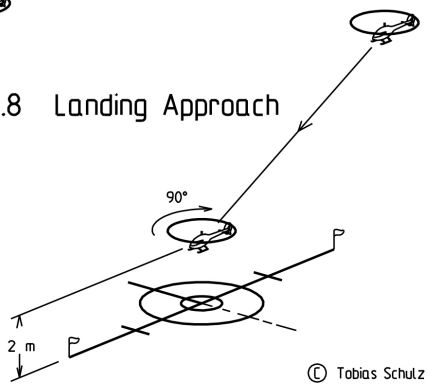
19.1.6 Loop



19.1.7 Roll

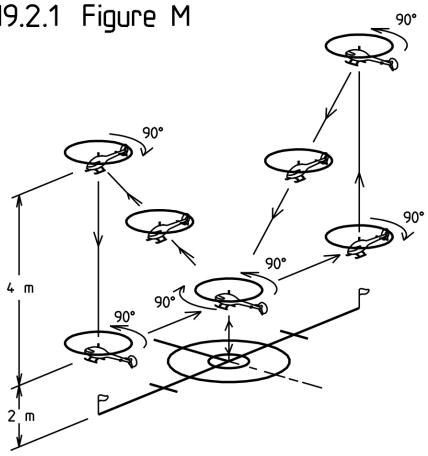


19.1.8 Landing Approach

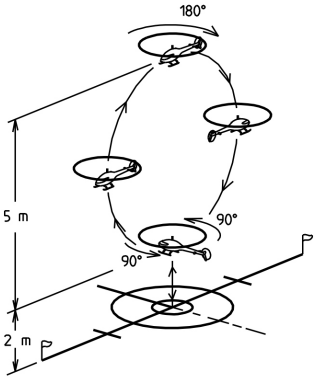


RC Helicopter Advanced Diagram

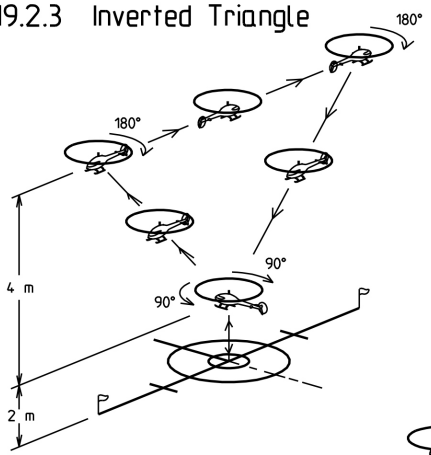
19.2.1 Figure M



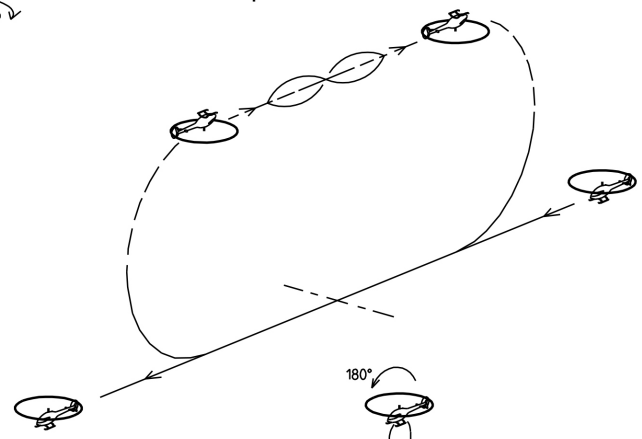
19.2.2 Vertical Circle



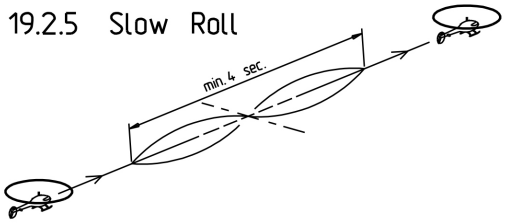
19.2.3 Inverted Triangle



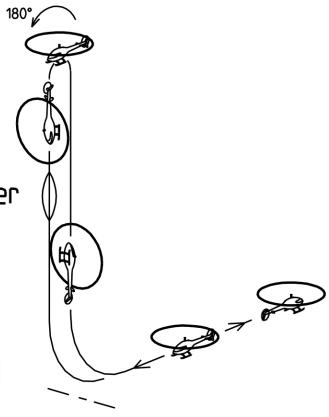
19.2.4 Loop with full Roll



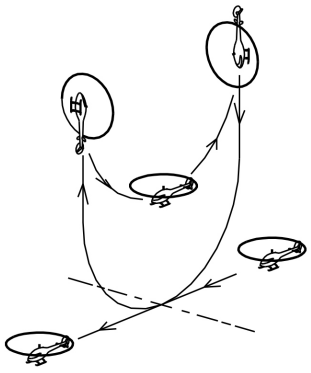
19.2.5 Slow Roll



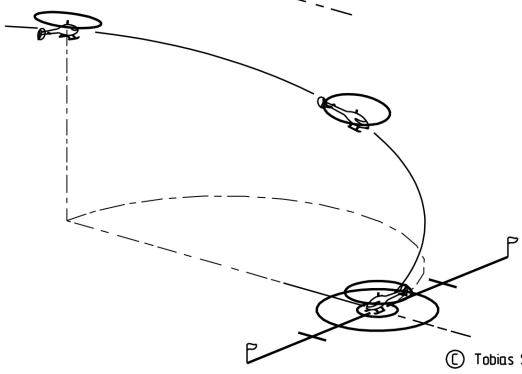
19.2.6 Pushover



19.2.7 Pullback with half Loop

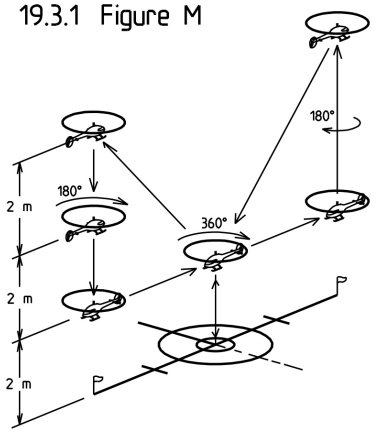


19.2.8 180° Landing

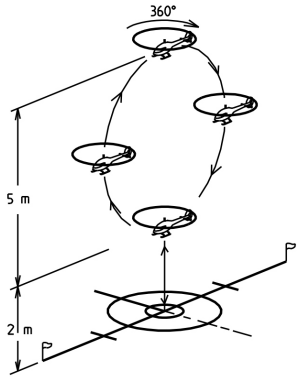


RC Helicopter Expert Diagram

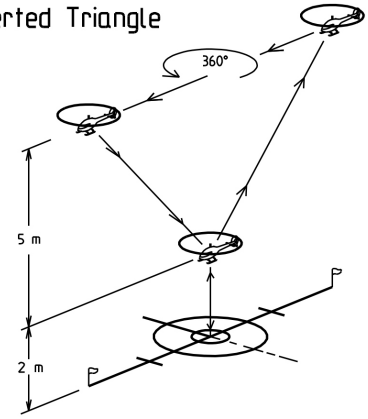
19.3.1 Figure M



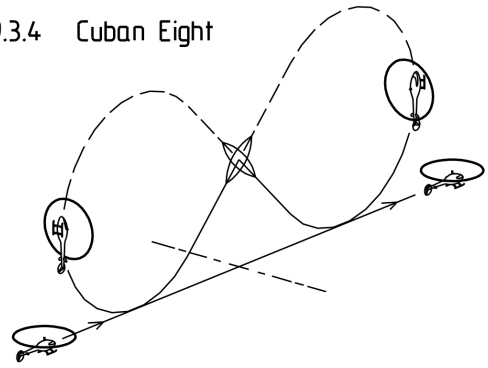
19.3.2 Circle with 360° Pirouette



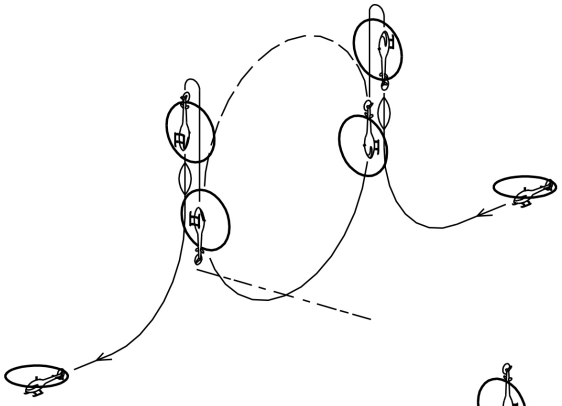
19.3.3 Inverted Triangle



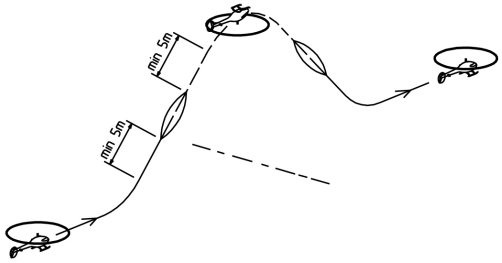
19.3.4 Cuban Eight



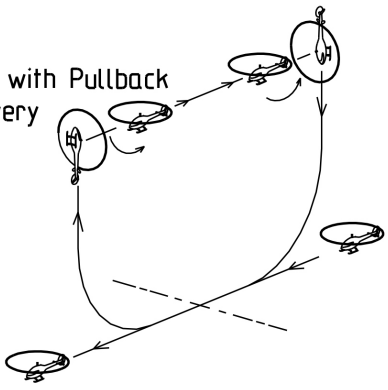
19.3.5 Double Rolling Stall Turn with Loop



19.3.6 Cobra Roll



19.3.7 Stall with Pullback Recovery



19.3.8 180° Autorotation

