Radio Control Aerobatic Helicopters 2022-2023

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
Major rules update	1/1/2022	Sections 4, 6, 13, 16, 17, 19, 28, 29

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FOR EVENTS 431, 432, 433

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

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 6.5 kilograms (14.33) lbs. with fuel and/or 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 51 volts with no load.

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 three axis flight control system may be used. The use of pre-programmed flight maneuvers is forbidden. The use of automatic position (latitude and longitude) locking devices and altitude locking devices, whether with external references or not, are forbidden.

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.

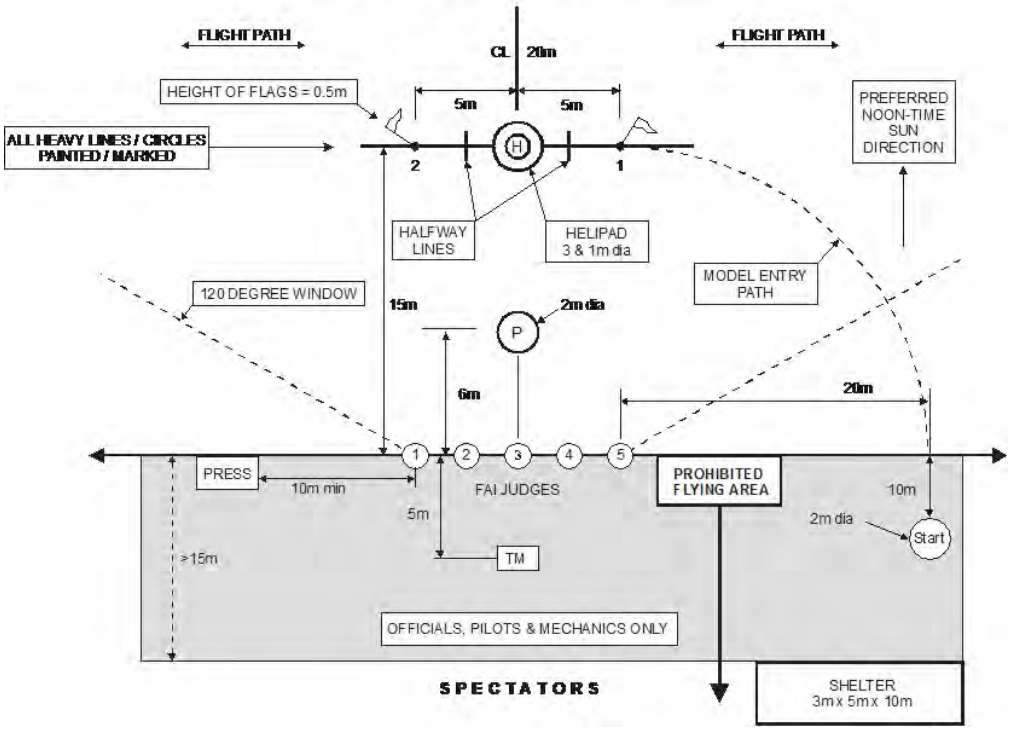
5.4.

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 ten (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 operates his transmitter during a round without permission.

13.4.

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

13.5.

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

13.6.

The contestant's helicopter exceeds 2.5 meters or turns more than 180 degrees 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 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.

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.

16.2.

Intentionally left blank.

16.3.

Intentionally left blank.

16.4.

Intentionally left blank.

16.5.

Intentionally left blank.

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. Sportsman 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 two (2) meters 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. 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

Basic maneuvers, loop, roll, stall turn, simple combinations. Basic hover orientations, no nose in. NO traveling pirouettes.

19.1.1. Triangle

19.1.2. Diamond

19.1.3. Roll

19.1.4. Loop

19.1.5. Stall Turn

19.1.6. Oval

19.1.7. Vertical Candle with Half Roll Down

19.1.8. Translational landing

19.2. Advanced

All hover orientations, intro to traveling pirouettes, side on take offs. More complex combination maneuvers. Autorotation

19.2.1. Vortex

19.2.2. Diamond

19.2.3. Two Point Roll

19.2.4. Double Candle with 540 Stall Turns

19.2.5.

UX

19.2.6.

Oval with Full Roll

19.2.7.

Half Rolls with Traveling Flip

19.2.8.

Vertical Eight with Half Rolls

19.2.9.

180 Autorotation

19.3. Expert

F3C P Schedule :

The Expert descriptions and rules are reprinted from the 2022-2023 FAI F3C rulebook

19.3.1. P1. VORTEX

19.3.2. P2. DIAMOND 4

19.3.3. P3. DOUBLE CANDLE WITH DESCENDING FLIP

19.3.4. P4. LOOP WITH 540° TAIL TURNS

19.3.5. P5. UX WITH PUSHED FLIPS

19.3.6. P6. OVAL WITH HALF ROLLS AND FLIP

19.3.7. P7. OPPOSITE HALF AND FULL INVERTED ROLL

19.3.8. P8. .INVERTED UMBRELLA

19.3.9. P9. 180° AUTOROTATION

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 throughout the required number of 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 Sportsman, Advanced, and Expert, the pilot position shall be within a 2-meter circle which is 9 meters from the center of the central

helipad, directly in line with the center judge. The pilot may move within the circle without penalty.

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 60 degrees horizontally on either side of 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 (1) meter circle with minor downgrade if skids are touching the lines and a major downgrade if on or outside the 3-meter circle line.

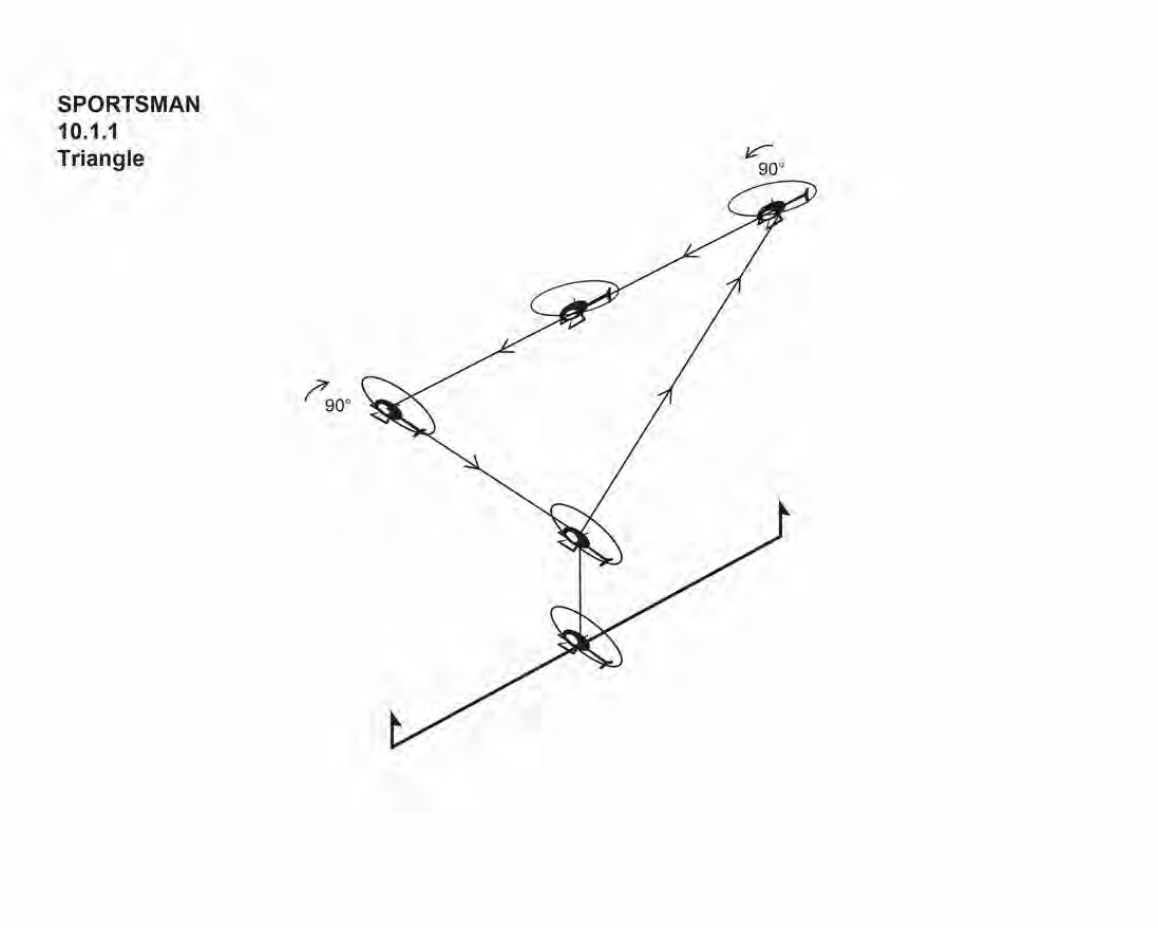
29.1.1. Triangle

Model is placed tail in on the central heli pad. Model takes off vertically to a height of two (2) meters, pauses two (2) seconds, flies sideways either direction while climbing 4 additional meters to the flag. After a two (2) second pause, the model performs a 90-degree pirouette nose toward the central heli pad, pauses two (2) seconds, flies forward over the central heli pad to the opposite flag. After a two (2) second pause, model performs a 90-degree pirouette to tail in, pauses two (2) seconds, the descends sideways back to the central heli pad at two (2) meters, pauses two (2) seconds, and descends vertically to land on the central heli pad.

Downgrading Guide:

1. Take Off
2. Horizontal hovering Line (1)
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. Diamond

Model takes off vertically to a height of two (2) meters. After a two (2) second pause, the model performs a 90-degree pirouette, either direction, pauses two (2) seconds, goes forward while climbing two (2) meters to the flag, pauses two (2) seconds, performs a 180-degree pirouette to nose toward the central heli pad, pauses two (2) seconds, then flies forward while climbing an additional two (2) meters to over the central heli pad. After a two (2) second pause the model descends two (2) meters to the opposite flag, pauses two (2) seconds, performs a 180-degree pirouette to nose toward the central heli pad, pauses two (2) seconds, the descends two (2) meters to over the central heli pad, pauses two (2) seconds, performs a 90-degree pirouette to tail in, pauses two (2) seconds, then descends vertically to land on the central heli pad.

Downgrading Guide:

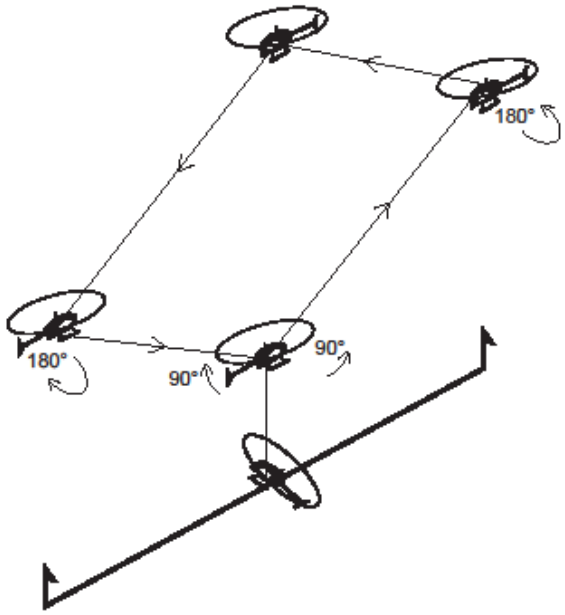
1. Take Off

2. Diagonal hovering Lines (4)

3. Pirouettes (4)

4. Landing

10.1.2
Diamond



29.1.3. Roll

Model flies straight and level for at least 10 meters and performs a roll with the model inverted on the midline. After completing the roll, model performs a 10 meter straight and level segment to exit.

Downgrading Guide:

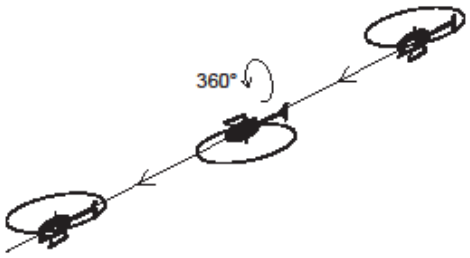
1. Flight path parallel to flightline

2. Roll not centered and inverted at the midline

3. Constant altitude

4. Roll is more or less than 360 degrees

10.1.3
Roll



29.1.4. Loop

Model flies straight and level for at least 10 meters and performs a vertical circle. Circle starts at the midline. Model flies straight and level at least 10 meters at the same altitude to exit.

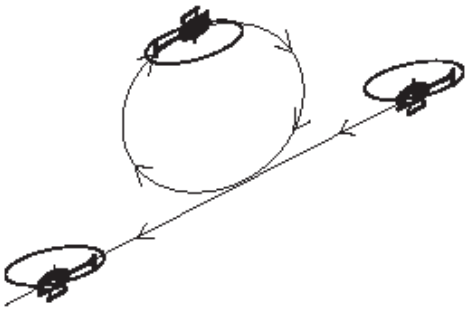
Downgrading Guide:

1. Flight path not parallel to flightline

2. Entry and exit not level and at same altitude

3. Loop not circular

10.1.4
Loop



29.1.5. Stall Turn

Model flies straight and level for at least 10 meters. At the midline, the model performs a quarter loop and ascends vertically. As the model stops, it performs a 180-degree stall turn to nose down, descends vertically, and performs a quarter loop matching the first quarter loop to at least 10 meters of level flight at the same altitude and heading as the entry.

Downgrading Guide:

1. Entry line

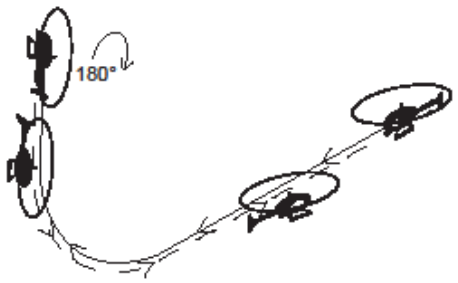
2. Climb and descent paths different

3. End of climb not vertical

4. Rotation is before or after the end of climb

5. Positioning

10.1.5
Stall Turn



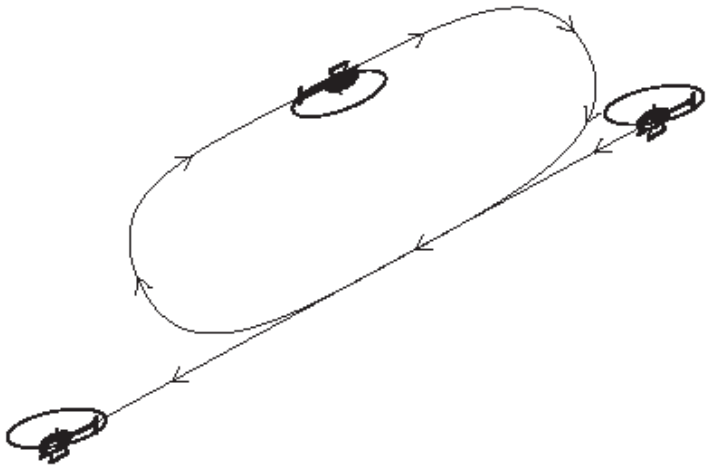
29.1.6. Oval

Model flies straight and level at least 10 meters past the midline, performs a half loop, flies inverted for at least 20 meters, performs a half loop to level fight at the same altitude as the entry and exits past the midline.

Downgrading Guide:

1. Flightpath not parallel to flightline
2. Half loops not circular
3. Inverted flight less than 20 meters
4. Entry and exit not level and at same altitude

10.1.6
Oval



29.1.7. Vertical Candle with half roll down

Model flies straight and level for at least 10 meters and performs a quarter loop to climb vertically on the midline. As the model stops, it performs a half-pulled flip to nose down, performs a half roll in either direction, pulls a quarter loop, and flies straight and level for at least 10 meters at the same altitude as the entry.

Downgrading Guide:

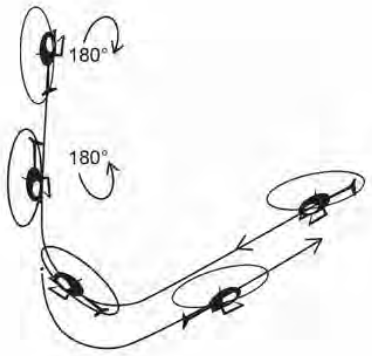
1. Flight path not parallel to flightline

2. Vertical line not on the midline

3. Half roll is more or less than 180 degrees

4. Entry and exit not at the same altitude

10.1.7
Vertical Candle
With Half Roll Down



29.1.8. Translational landing

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 a two (2) meter hover over the central helipad, turn 90 degrees to tail in, hover for two (2) seconds, and descend vertically to land on the central heli pad.

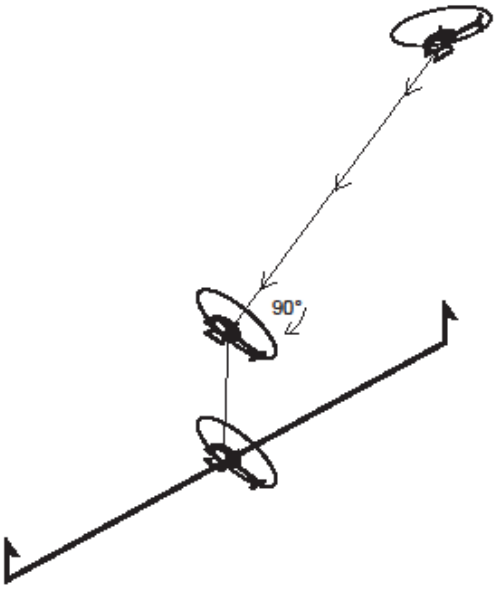
Downgrading Guide:

1. Entry line

2. Descent is not smooth or at a constant rate

3. Model is not stationary over central heli pad.

10.1.8
Translational
Landing



29.2. Advanced

29.2.1. Vortex

Model is placed side on onto the central helipad. Model takes off vertically to two (2) meters, pauses for two (2) seconds, and makes a backwards ascending one fourth circle of radius five (5) meters to the flag, pauses for two (2) seconds, flies across over the central helipad to the opposite flag while performing a 360-degree traveling pirouette either direction, pauses for two (2) seconds, performs a backwards descending one fourth circle to the central helipad, pauses for two (2) seconds, and descends vertically to land on the central helipad.

Downgrading Guide:

1. Take off

2. Quarter circles not round

3. Traveling pirouette not constant rotation speed

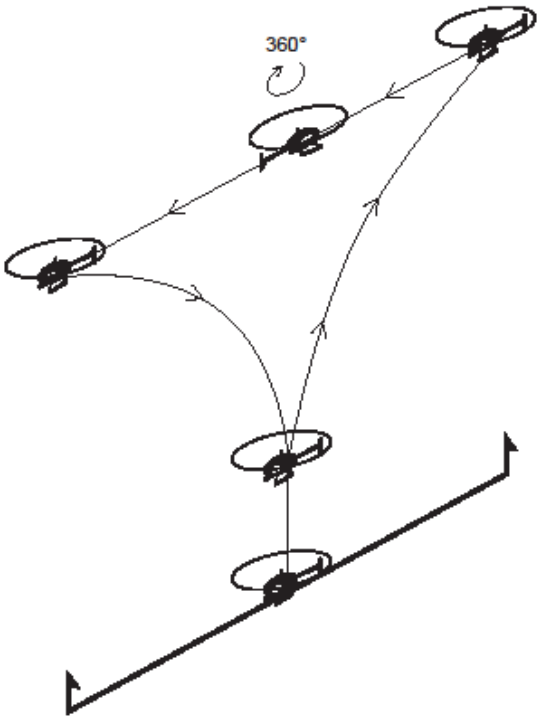
4. Traveling pirouette not constant speed over the ground

5. Model not traveling backward at the midline

6. Landing

ADVANCED

10.2.1
Vortex



29.2.2. Diamond

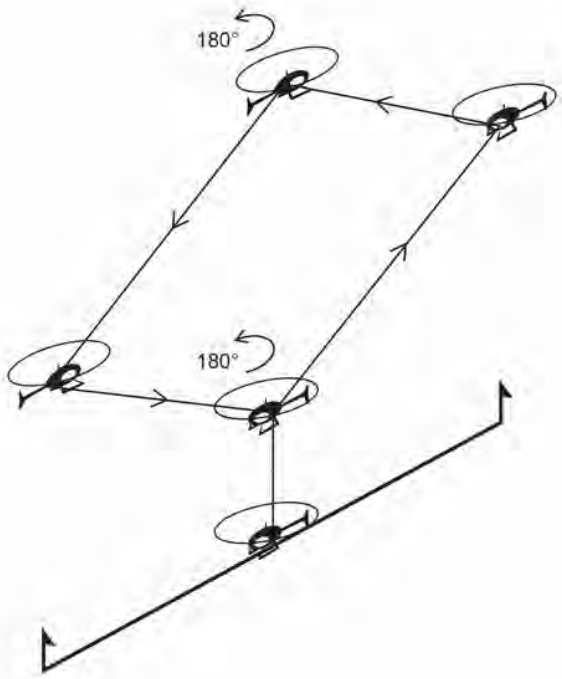
Model takes off vertically to two (2) meters, pauses for two (2) seconds, flies backward while ascending 2 ½ meters to the flag, pauses for two (2) seconds, flies forward while ascending 2 ½ meters to over the central helipad, pauses for two (2) seconds, performs a 180-degree pirouette in either direction, pauses for two (2) seconds, flies backward while descending two and one half (2 ½) meters to the flag, pauses for two (2) seconds, flies forward while descending 2 ½ meters to the central helipad, pauses for two

(2) seconds, performs a 180 degree pirouette, pauses for two (2) seconds, then descends to land on the central helipad.

Downgrading Guide:

1. Take off
2. Diagonal lines (4)
3. Half pirouettes (2)
4. Landing

10.2.2
Diamond



29.2.3. Two Point Roll

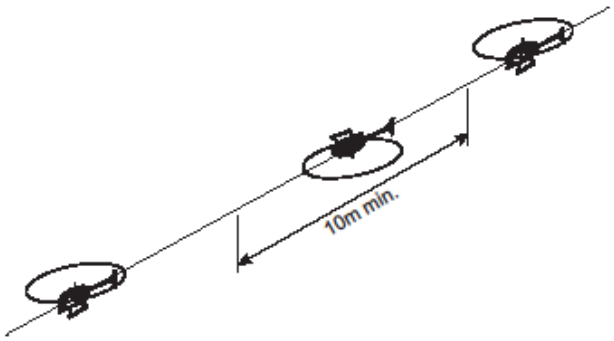
Models flies a minimum of 10 meters straight and level rolls 180 degrees, flies inverted for a minimum of 10 meters centered on the

midline, rolls 180 degrees in the same direction as the first roll, flies a minimum of 10 meters straight and level to exit.

Downgrading Guide:

1. Flight path not parallel to flightline
2. Model should be centered and inverted at the midline
3. Constant altitude

10.2.3
Two-Point Roll



29.2.4. Double Candle with 540 degree Stall Turns

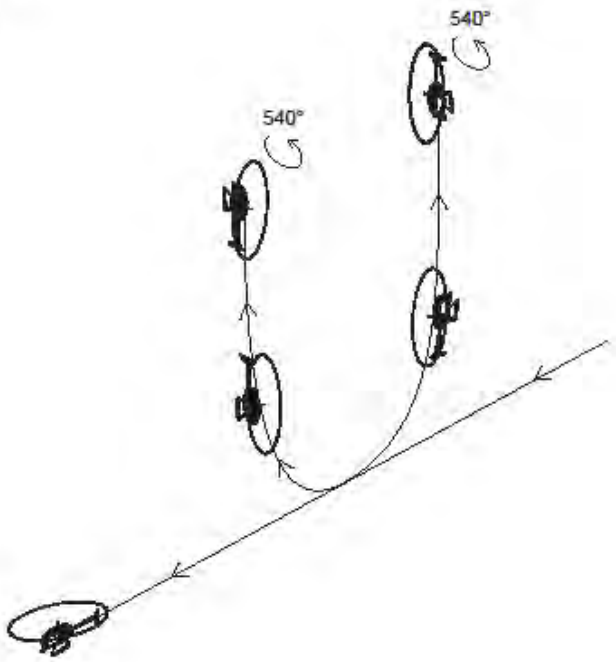
Model flies straight and level for a minimum of 10 meters, on the midline performs a quarter loop then travels vertically until it stops. Model executes a 540 degree stall turn either direction, descends vertically, does a one half loop along the path of the initial pull centered on the midline, travels vertically until the model stops at the same altitude as the first, performs a 540 degree

stall turn in either direction, descends vertically, performs a one fourth loop to the initial altitude, flies straight and level for a minimum of 10 meters to exit. All loops should have the same radius.

Downgrading Guide:

1. Flight path not parallel to flightline.
2. Pull to vertical not on the midline.
3. Stall turns not at same altitude.
4. Entry and exit not at the same altitude

10.2.4
Double Candle
With 540° Stall Turns



29.2.5. UX

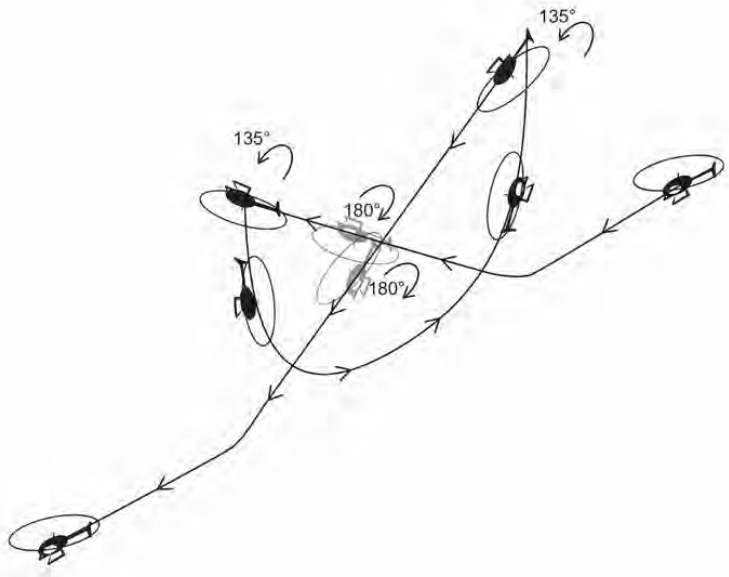
Model flies straight and level for a minimum of 10 meters and pulls up into a 45° ascent with a centered half roll. Once the model

has come to a stop, it performs a 135° pulled flip, performs a centered 'U', and ascends vertically until it stops, performs a 135° pulled flip, performs a 45° descent with a centered half roll. Model pulls into horizontal straight and level flight for a minimum of 10m. Note: The bottom of the 'U' and the rolls must be centered on the midline.

Downgrading Guide:

1. Flight path not parallel to flightline.
2. Diagonal lines not 45 degrees
3. Flips more or less than 135 degrees
4. Tops of the U not at the same height.
5. Entry and exit not at the same altitude

10.2.5
UX



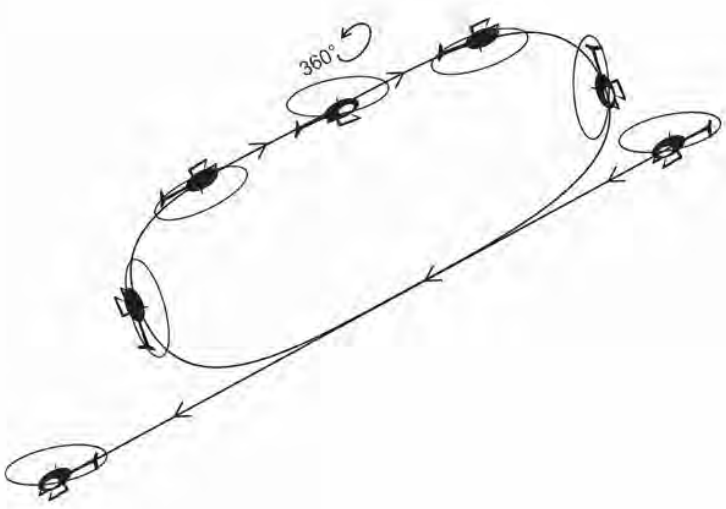
29.2.6. Oval with Full Roll

Model flies straight and level for 10 meter minimum, 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. Model is upright at the midline.

Downgrading Guide:

1. Flight path not parallel to flightline
2. Half loops not round
3. Roll more or less than 360 degrees
4. Roll not upright at the midline
5. Entry and exit not at the same altitude

10.2.6
Oval With
Full Roll



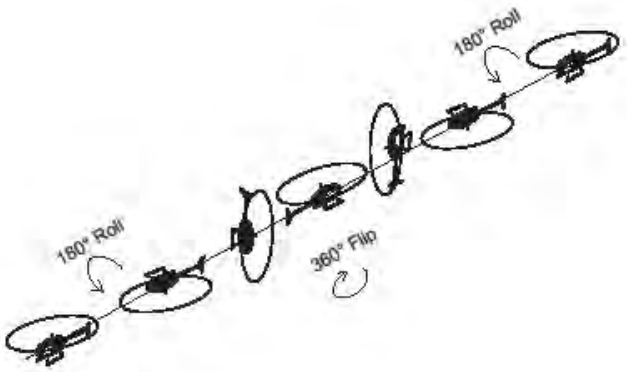
29.2.7. Half Rolls with Traveling Flip

Model flies straight and level for a minimum of 10 meters, performs a half roll, either direction, to inverted, performs a traveling pushed flip, performs a half roll in either direction to upright, flies straight and level for a minimum of 10 meters. The model should be upright traveling backwards at the midline.

Downgrading Guide:

1. Flight path not parallel to flightline
2. Half rolls more or less than 180 degrees
3. Model not traveling backward at the midline
4. Entry and exit not at the same altitude

10.2.7
Half Rolls With
Traveling Flip



29.2.8. Vertical Eight with Half Rolls

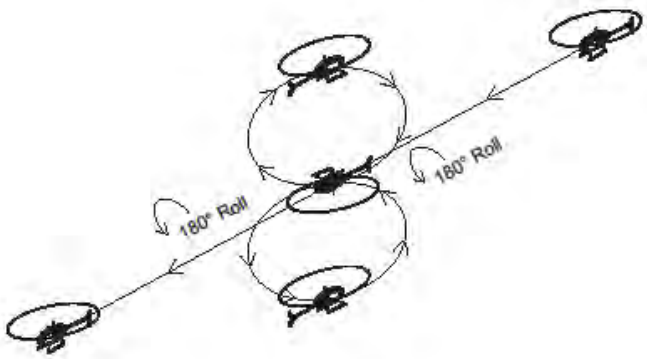
Model flies straight and level for a minimum of 10 meters, performs a half roll in either direction and flies inverted, straight and level for a minimum of one (1) second. Model flies then an outside loop upwards, followed by a inside loop downwards, flies inverted, straight and level for a minimum of one (1) second at the same altitude as when entering the figure, performs a half roll in either direction and flies straight and level for a minimum of 10 meters. Loops should be centered on the midline.

Note 1: Both inverted flights at beginning and ending of the figure must be of identical length measured in distance, the duration must be in minimum one second. Note 2: The half rolls may be executed in any direction. Both loops must have the same radius.

Downgrading Guide:

1. Flight path not parallel to flightline
2. Half rolls more or less than 180 degrees
3. Loops not round and the same size
4. Entry and exit not at the same altitude

10.2.8
Vertical Eight
With Half Roll



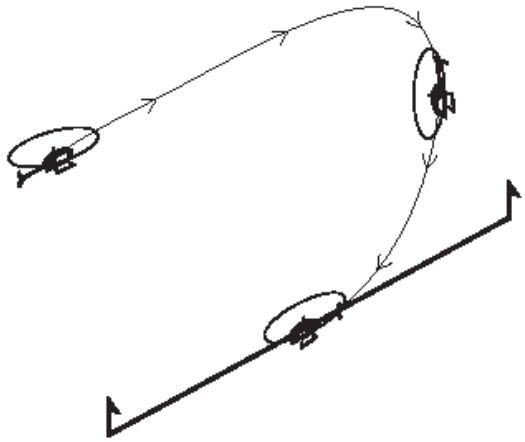
29.2.9. 180 Degree Autorotation

Model flies straight and level for 10 meters minimum at a minimum of 20 meters altitude. Motor is off (or at idle) as the model crosses the midline. Model performs a 180-degree descending turn to land on the central helipad. Rate of descent should be constant and rate of turn should be constant.

Downgrading Guide:

1. Motor not dead or at idle at midline
2. Rate of turn not constant to touchdown
3. Rate of descent not constant
4. Model hovers more than briefly
5. Model is translated from place it should land.

10.2.9
180°Autorotation



29.3. Expert

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

P1: Vortex (UU)
K=1.5
MA takes off vertically from the helipad and ascends to 2 m and hovers for a minimum of 2 seconds, ascends flying backwards describing the upper left (right) quarter of a circle with 5 m radius while simultaneously performing a 180° pirouette in any direction and stops over flag 1 (2), hovers for a minimum of 2 seconds and then hovers to the other flag 2 (1) while simultaneously performing two 180° pirouettes that are in opposite direction, stops and hovers over the flag 2 (1) for at least 2 seconds, descends forward describing the upper right (left) quarter of a circle with 5 m radius while simultaneously performing a 180° pirouette in any direction, stops over the center line for at least 2 seconds, descends and lands into the helipad.

P2: Diamond 4 (UU)

K=1.5
MA takes off vertically from the helipad and ascends to 2 m while performing simultaneously a 90° pirouette in any direction. It hovers there for at least 2 seconds, ascends 2.5 m in a straight line to any flag while performing a 180° pirouette in any direction and stops for at least 2 seconds. MA ascends 2.5 m in a straight line to 7 m above the center line while performing a 180° pirouette in any direction and stops for at least 2 seconds. MA descends 2.5 m in a straight line to the second flag while performing a 180° pirouette in any direction and stops for at least 2 seconds. MA descends 2.5 m in a straight line to 2 m above the center line while performing a 180° pirouette in any direction and stops for at least 2 seconds. MA descends and lands into the helipad while simultaneously performing a 90° pirouette in opposite direction of the first pirouette.

P3: Double candle with descending flip (DD)
K=1.0
MA flies straight and level for a minimum of 10 m and pulls up into a vertical ascent. After a nose up stop MA flies backwards vertically for 2m minimum performs a half pulled travelling flip, descends vertically for a minimum of 2m, performs a centered half loop and ascends vertically. After a nose up stop MA flies backwards vertically for 2m minimum, performs a half pulled travelling flip, descends vertically for 2m minimum and then pulls into horizontal straight and level flight for a minimum of 10m. Note 1: The 2 flips must be made at the same altitude. Note 2: The bottom of the half loop must be at the same altitude as when entering the figure.

P4: Loop with 540° Tail Turns (UU)
K=1.0
MA flies straight and level for a minimum of 10 m and performs 1 ¼ loop starting from the center line. When reaching half of the height of the former loop MA performs a 540° tail turn in any direction followed by a half loop in opposite direction. When reaching again half of the height of the first loop MA performs a second 540° tail turn in any direction. After MA pulls with quarter loop into horizontal straight and level flight for a minimum of 10 m at the same altitude as when entering the figure. Note: The tail turns must be executed exactly at half the height of the loop with the MA being precisely vertical.

P5: UX with Pushed Flips (DD)
K=1.0
MA flies straight and level for a minimum of 10 m and pulls up into a 45° ascent with a centered half roll in any direction. Once the MA has come to a stop, MA performs a 225° pushed flip, performs a centered 'U', stops, performs a 225° pushed flip, performs a 45° descent with a centered half roll in any direction. MA pulls into horizontal straight and level flight for a minimum of 10 m. Note 1: The bottom of the 'U' and the rolls must be centered. Note 2: The bottom of the 'U' must be at the same altitude as when entering the figure.

P6: Oval with ½ Rolls and Flip (UU)
K=1.0
MA flies straight and level for a minimum of 10 m and pulls up into a half loop followed by a half roll in any direction, followed by a travelling 360° centered pulled flip and followed by a second half roll in any direction. MA then performs a half positive loop and pulls into horizontal straight and level flight for a minimum of 10 m at the same altitude as when entering the figure. Class F3C, Annex 5D – maneuver Descriptions & Diagrams SC4_Vol_F3_Helicopters_22 Effective 1st January 2022 Page 17 Note 1: If there is a straight line before the first half roll, there must be the same straight line after the second half roll. Note 2: If there is a straight line after the first half roll, there must be the same straight line before the second half roll.

P7: Opposite half and full inverted rolls (DD)
K=1.0
MA flies straight and level for a minimum of 10m and performs a half roll in either direction, flies inverted for a minimum of 1 second, performs a full centered inverted roll in the opposite direction, flies inverted for a minimum of 1 second, performs a half roll in the same direction as the first half roll. MA flies straight and level flight for a minimum of 10m. Note 1: The middle of the maneuver must be centered. Note 2: There is one point deduction per inverted flight section that does not last in minimum 1 second.

P8: Inverted Umbrella (UU)
K=1.0
MA flies straight and level for a minimum of 10 m and pulls up into a vertical ascent at center line. After a nose up stop MA performs a half backward loop. After MA stops it performs a centered 'U'. After a nose up stop MA performs a second half backward loop. After a nose down stop MA descends forward vertically on center line followed by a quarter loop and exit after a 10 m straight line at the same altitude as when entering the figure. Note 1: The quarter loops at the entrance and the exit of the figure and the half loop of the centered 'U' must have the same radius. Note 2: The two half backward loops must be of equal size and must have half radius than the half loop of the centered 'U'. Note 3: The bottom of the 'U' must be at the same altitude as when entering the figure.

P9: 180° Autorotation (DU)
K=1.0
MA flies straight and level for a minimum of 10 m at a minimum altitude of 20 m. Maneuver begins when model aircraft crosses an imaginary plane that extends vertically upward from a line drawn from the center judge out through the helipad. MA must be in the autorotation state when it cuts this plane, the engine must be off (or at idle) at this point and the MA must be descending. The 180° turn must start at this point and the turning and descending rate must be constant from this point to a point just before touchdown on the helipad. The flight path of the MA must appear as a semi-circle when viewed from above, starting at the vertical

plane and ending at a line drawn from the center judge through the helipad. The MA's flight path must never be parallel to the ground or judge's line. Scoring criteria for landing: See ANNEX 5E Paragraph 5E.6.11.

RC Helicopter Sportsman Diagram

RC Helicopter Advanced Diagram

RC Helicopter Expert Diagram

FIGURE 5D-P: F3C MANOEUVRE SCHEDULE P SC4_Vol_F3_Helicopters_22 Page 20 Effective 1st January 2022