ANNEX 7a REV 1
Agenda Item 11.5 h) (1 of 2)
F2 Volume - F2B Manoeuvre Descriptions

x) 4.2.15 Description of Manoeuvres — F2 Subcommittee

4.2.15.3 Take-Off Manoeuvre

c) ~~Climb out~~ **Take-off** and levelling-off segment:

The model aircraft should maintain a constant rate of climb until reaching ~~a height~~ **the base of the flight hemisphere.** ~~of 1.5 metres~~. **The base lies horizontal at a height of 1.5 m above the centre of the flight circle.** The point of changing from climbing flight to level flight should occur exactly over~~head~~ the point of release at the beginning of the **t**ake off ground roll. ~~The change into upright level flight should be smooth and gentle, with no sudden change/s in attitude~~. **The transition into upright level flight should be smooth and gentle with no sudden changes.**

d) **Two** laps of upright level flight segment:

After levelling off**,** the model aircraft should maintain **level flight at the height of the base (+/- 30 cm)** ~~a height of 1.5 metres~~ and should fly 2 complete laps of stable and smooth normal upright flight ~~with no abrupt changes of attitude and without deviations of more than plus/minus 30 cm throughout this segment~~. **without deviation**.

Recommended exit procedure: **C**ontinue normal upright level flight at **the height of the base.** ~~1.5 metres~~

4.2.15.4 Reverse Wingover Manoeuvre

Recommended entry procedure: **F**rom normal upright level flight at **the height of the base.** ~~a height of 1.5 metres.~~

a) Start of manoeuvre:

At the beginning of the first turn from normal upright level flight **at the height of the base, (+/- 30 cm)** into a vertical climb.

b) The first vertical climb and dive segment:

The model aircraft ~~should~~ turn**s** sharply into a vertical climb and should then maintain ~~a~~ **this** ~~"straight line"~~ climb ~~that is~~ at right angles to the **base** ~~ground~~. It should pass over the flyer's head and then ~~change~~ **continue** into a ~~"straight line"~~ dive that is also at right angles to the ~~ground~~ **base, until reaching the second turn, at which point the model aircraft should turn sharply from its dive into inverted level flight at the height of the base, (+/- 30 cm).**

~~This dive should continue until the second turn, which should sharply turn the model aircraft from its dive into normal "straight line" inverted level flight at a height of 1.5 metres~~

c) The inverted horizontal level flight segment:

After recovery from the vertical dive and until the start of the second vertical climb, the model aircraft should fly a segment of steady inverted flight along the base (+/- 30 cm), with no deviations from the established height. The length of this segment, including turns, should be ½ of a lap.

~~After recovery from the first "vertical" dive and until the start of the turn into the second "vertical" climb, the model aircraft should fly a segment of smooth inverted level flight, which is parallel to the ground at a height of 1.5 metres, with no height deviations of more than plus/minus 30 cm, and with no abrupt changes in attitude. The length of this segment, including turns, should be 1/2 a lap.~~

d) The second vertical climb and dive segment:

At the second vertical climb, the model aircraft should turn sharply into a vertical climb and should then maintain a climb that is at right angles to the base. The model aircraft should pass over the flyer's head and then continue into a dive that is also at right angles to the base. At the fourth turn, the model aircraft should turn sharply from its dive into normal level upright flight at the height of the base (+/- 30 cm). The point where the model aircraft starts its recovery turn into normal level upright flight at the end of the completed manoeuvre should be exactly opposite the point where the model aircraft first reached the second vertical climb at the start of the manoeuvre, and at the same height.

~~the model aircraft should turn sharply into a "vertical" climb and should then maintain a "straight line" climb that is at right angles to the ground. The model aircraft should pass over the flyer's head and then change into a "straight line" dive that is also at right angles to the ground. This dive should continue until the fourth turn, which should sharply turn the model aircraft from its dive into normal "straight line" upright level flight at a height of the 1.5 metres, that height to be met within plus/minus 30 cm. The point where the model aircraft starts its recovery turn into normal upright level flight at the end of the whole manoeuvre should be exactly opposite the point where the model aircraft first reached a second "vertical" climb attitude at the start of the complete manoeuvre.~~

Recommended exit procedure: **C**ontinue normal upright level flight at **the height of the base.**~~1.5 metres~~

4.2.15.5 Three Consecutive Inside Loops Manoeuvre

Manoeuvre size: ~~overall : height~~**:** ~~45 degrees line elevation angle~~ **The tops of the loops are tangent to the 45 degree parallel.**

Recommended entry procedure: **The manoeuvre is entered** from normal ~~upright~~ level **upright** flight at **the height of the base.** ~~a height of 1.5 metres.~~

b) The first loop figure:

From normal upright level flight at the height of the base, the model aircraft should fly upwards along a circular flight path until reaching the 45° parallel. At that point, the model aircraft should be inverted. It should continue along its circular flight path downwards until reaching the bottom of the loop at the height of the base (+/- 30 cm), in upright flight. When the model aircraft reaches a vertical attitude for the first time, this has defined the lateral reference for the whole manoeuvre.

~~from normal upright level flight at 1.5 metres plus/minus 30 cm, the model aircraft should fly smoothly upwards along a circular flight path until reaching a height of line elevation angle 45 degrees. At that point the model aircraft should be inverted. Without interruption the model aircraft should continue its circular flight path downwards until passing the bottom of the loop at a height of 1.5 metres plus/minus 30 cm, in upright flight. The whole flight path should be circular and smooth, with no deviations and no flat spots. When the model aircraft reaches a "vertical" attitude for the first time this has defined the lateral reference line for the whole manoeuvre.~~

Recommended exit procedure: **The model aircraft should continue for another ½ loop, recovering inverted and descending to the normal inverted flight level within ½ a lap, remaining inverted at the height of the base**.
~~the model aircraft should continue for another half loop, recovering~~

~~inverted and descending to the normal inverted flight level within ½ a lap, remaining inverted at a height of 1.5 metres)~~

4.2.15.6 Inverted Flight Manoeuvre

Recommended entry procedure: **The manoeuvre is entered** from inverted level flight at **the height of the base.** ~~a height of 1.5 metres.~~

b) 2 laps of inverted flight ~~segment~~:

The model aircraft should maintain 2 complete laps of smooth and stable inverted flight at the height of the base (+/- 30 cm). The model should not deviate from the established flight height.

~~the model aircraft should maintain 2 complete laps of smooth and stable inverted flight at a height of 1.5 metres with no height deviations of more than plus/minus 30 cm, and with no abrupt changes of attitude.~~

Recommended exit procedure: **Continue inverted flight, remaining at the height of the base until entry into the next manoeuvre**. ~~continue inverted flight, remaining at the normal level flight height of 1.5 metres until entry to the next manoeuvre.~~

4.2.15.7 Three Consecutive Outside Loops Manoeuvre

Manoeuvre size: ~~overall : height~~**:** ~~45 degrees line elevation angle~~ **The tops of the loops are tangent to the 45 degree parallel.**

Recommended entry procedure: **F**rom inverted level flight at **the height of the base** ~~a height of 1.5 metres~~.

a.) Start of manoeuvre:

The manoeuvre starts at the height of the base where the model aircraft begins the first loop

~~at the beginning of the first loop, as the model aircraft departs level inverted flight.~~

b) The first loop figure:

From inverted level flight at the height of the base, the model aircraft should fly upwards along a circular path until reaching the 45 degrees parallel. At this point it should be upright. The aircraft should continue its circular flight path downwards until passing the bottom at the height of the base (+/- 30 cm) in inverted flight. The whole flight path should be circular and smooth with no deviations or flat spots. When the model aircraft reaches a vertical attitude for the first time, this has defined the lateral reference for the whole manoeuvre.

~~from level inverted flight at a height of 1.5 metres plus/minus 30 cm, the model aircraft should fly smoothly upwards along a circular flight path until reaching a height of line elevation angle 45 degrees. At that point it should be upright. Without interruption~~ **t**~~he model aircraft should continue its circular flight path downwards until passing the bottom~~

~~height of 1.5 metres plus/minus 30 cm, in inverted flight. The whole flight path should be circular and smooth, with no deviations and no flat spots. When the model aircraft reaches a "vertical" attitude for the first time this has defined the lateral reference line for the whole manoeuvre~~

d) End of manoeuvre:

At the end of the third loop, as the model aircraft ~~passes~~ **reaches the height of the base** ~~a height of 1.5 metres, plus/minus 30 cm~~, in inverted level flight.

Recommended exit procedure: **C**ontinue for another half loop, recovering to upright flight and then descending to the normal upright level height **at the height of the base** ~~of 1.5 metres~~.

4.2.15.8 Two Consecutive Inside Square Loops Manoeuvre

Manoeuvre size:~~, overall~~ : ~~height 45 degrees line elevation angle~~ **The tops of the loops are flown along the 45 degree parallel. W**idth **is** 1/8 of a lap.

Recommended entry procedure: **F**rom normal upright level flight ~~at~~ **along the base.**
~~a height of 1.5 metres.~~

a.) Start of manoeuvre:

The manoeuvre starts at the point where the model aircraft begins its first turn into a vertical climb from normal level upright flight along the base (+/- 30 cm).

~~at the point where the model aircraft begins its first turn into a "vertical" climb from normal upright level flight~~

b) First loop figure - first turn ~~plus~~ **and** ~~"vertical~~ climbing segment:

The model aircraft should turn sharply into, and then maintain a climb that is at right angles to the base.

~~the model aircraft should sharply turn into, and then steadily maintain, a "straight line" climb that is at right angles to the ground.~~

c) First loop figure - second turn ~~plus~~ **and** top ~~"horizontal"~~ segment:

The model aircraft should turn sharply into, and then ~~steadily~~ maintain inverted level flight **along the 45 degree parallel.**

~~at a height of 45 degrees line angle elevation. The level portion of this flight path should be parallel to the ground.~~

d) First loop figure - third turn ~~plus~~ **and** ~~"vertical"~~ diving segment:

The aircraft should turn sharply into, and then maintain, a dive that is at right angles to the base.

~~the model aircraft should sharply turn into, and then steadily maintain, a "straight line" dive that is at right angles to the ground~~

e) First loop figure - fourth turn ~~plus~~ **and** bottom ~~"horizontal"~~ segment:

The first loop is completed when the model aircraft turns sharply into, and then maintains upright level flight along the base (+/- 30 cm). The total length of the bottom segment, including both turns, should be 1/8th of a lap.

~~the model aircraft should sharply turn into, and then steadily maintain upright level flight at a height of 1.5 metres, plus/minus 30 cm, The level portion of the flight path should be parallel to the ground and the total length of the bottom segment, including both turns, should be 1/8th of a lap.~~

g) End of manoeuvre:

The manoeuvre is completed in normal level upright flight along the base at the point where the model aircraft started its 1st turn into a vertical climb at the beginning of the complete manoeuvre.

~~in normal upright level flight at a height of 1.5 metres, plus/minus 30 cm, at the point where the model aircraft started its first turn into a "vertical"climb at the beginning of the complete manoeuvre.~~

Recommended exit procedure: **M**aintain normal upright level flight ~~at~~ **along the base** ~~1.5 metres~~.

4.2.15.9 Two Consecutive Outside Square Loops Manoeuvre

Manoeuvre size: ~~, overall height 45 degrees line elevation angle~~ **The tops of the loops are flown along the 45 degree parallel. W**idth **is** 1/8 of a lap.

Recommended entry procedure: **Use ¾ of a lap to climb to the height of the 45 degree parallel. Proceed along the 45 degree parallel for 1/8th of a lap.** ~~use ¾ of a lap to climb to a height of 45 degree line elevation angle and maintain this height in upright level flight for 1/8 of a lap~~.

a.) Start of manoeuvre:

The manoeuvre starts at the point where the model aircraft begins its first turn into a vertical dive from the 45 degree parallel.

~~at the point where the model aircraft begins its first turn into a "vertical" dive from 45 degree line elevation angle.~~

b) First loop figure - first turn ~~plus~~ **and** ~~"vertical"~~ diving segment:

The model aircraft should turn sharply into, and then maintain a dive that is at right angles to the base. ~~the model aircraft should sharply turn into, and then steadily maintain, a "straight line" dive that is at right angles to the ground.~~

c First loop figure - second turn ~~turn plus~~ **and** bottom ~~"horizontal"~~ segment:

At the height of the base, the model aircraft should turn sharply into, and then maintain inverted level flight along the base (+/- 30 cm) without any deviation. The total length of the bottom segment, including both turns, should be 1/8th of a lap.

~~the model aircraft should turn sharply into, and then maintain smooth and steady inverted level flight at a height of 1.5 metres without deviating by more than plus/minus 30 cm. The level portion of this flight path should be parallel the ground and the total length of the bottom segment, including both turns, should be 1/8th of a lap.~~

d) First loop figure - third turn ~~turn plus~~ **and** ~~"vertical"~~ climbing segment:

The model aircraft should then turn sharply into, and then maintain a climb that is at right angles to the base.

~~the model aircraft should sharply turn into, and then steadily maintain, a "straight line" climb that is at right angles to the ground.~~

cont/…

e) First loop figure - fourth turn ~~turn plus~~ **and** top ~~bottom "horizontal"~~ segment:

The model aircraft should turn sharply into, and then maintain upright level flight along the 45 degree parallel.

~~the model aircraft should sharply turn into, and then steadily maintain upright level flight 45 degree a height of 45 degrees line elevation angle. The level portion of this flight path should be parallel to the ground.~~

g) End of manoeuvre:

The manoeuvre is completed in upright level flight on the 45 degree parallel at the same point where the model aircraft started its first turn at the beginning of the complete manoeuvre.

~~in upright level flight at on a height of 45 degrees line elevation angle, at the same point where the model aircraft started its first turn at the beginning of the complete manoeuvre.~~

Recommended exit procedure: **Maintain upright level flight along the 45 degree parallel for at least 5.0 m after the end of the manoeuvre and then descend to normal upright level flight at the height of the base within approximately ½ a lap**.

~~maintain upright level flight at a height of 45 degrees line elevation angle for at least 5.0 metres after the end of the manoeuvre and then descend to the normal upright level flight (1.5 metres) within approximately 1/2 a lap.~~

4.2.15.10 Two Consecutive Inside Triangular Loops Manoeuvre

Manoeuvre size: ~~overall~~ **The top turn is tangent to the 45 degree parallel and the width is slightly more than 1/8th of a lap.**

~~height 45 degrees line elevation angle; width slightly more than 1/8 th of a lap.~~

Recommended entry procedure: **F**rom normal ~~upright~~ level **upright** flight ~~at~~ **along the base** ~~a height of 1.5 metres~~.

a.) Start of manoeuvre:

The manoeuvre starts when the model aircraft begins its first turn from normal level upright flight along the base (+/- 30 cm).

~~from the point in normal upright level flight where the model aircraft starts its first turn.~~

b) First triangle figure – first turn and climb segment:

The model aircraft should turn sharply into an inverted climb at 30 degrees beyond vertical in relation to the base and maintain this flight path until starting the second turn.

~~the model aircraft should turn sharply into a "straight line" inverted climb and the angle of this flight path should be at 30 degrees beyond vertical in relation to the ground. After completing the turn the model aircraft should maintain this flight path until starting the second turn.~~

c) First triangle figure – second turn and dive segment:

The model aircraft should then turn sharply into an inverted dive at an angle of 30 degrees to vertical. The height reached during this second turn should be equal to the height of the 45 degree parallel. After completing the second turn, the model aircraft should maintain this flight path until starting the third turn.

~~the model aircraft turn sharply into a "straight line" inverted dive and the angle of this flight path should be at 60 degrees (that is: 30 degrees less than vertical in relation to the~~

~~ground). After completing the turn the model aircraft should maintain this flight path until starting the third turn. The height reached during this second turn should not be more or less than a line elevation angle of 45 degrees.~~

d) First triangle figure - third turn ~~plus~~ **and** bottom ~~"horizontal"~~ segment:

The aircraft should then turn sharply into upright level flight along the base (+/- 30 cm).

~~the aircraft should sharply turn into to upright "straight line" level flight at a height of 1.5 metres, plus/minus 30 cm. The length of all 3 sides of this triangular loop (including two turns per side) should be equal, and the bottom segment, including both turns, should be slightly more than 1/8 th of a lap in length.~~

Recommended exit procedure: **C**ontinue normal upright level flight ~~at~~ **along the base.** ~~1.5 metres.~~

4.2.15.11 Two Consecutive Horizontal Eights Manoeuvre

Manoeuvre ~~overall~~: **The tops of the loops are tangent to the 45 degree parallel**.
~~height 45 degrees line elevation angle.~~

Recommended entry procedure: **F**rom normal upright level flight at ~~a~~ **the** height of **the base** ~~1.5 metres~~.

a) Start of manoeuvre:

The manoeuvre starts when the model aircraft passes the intersection point for the first time. Note: When the model aircraft reaches a vertical climbing attitude for the first time, this has defined the intersection point for the whole manoeuvre. (ie. after ¼ of the first loop of the first eight has been flown).

~~when the model aircraft passes the intersection point for the first time. Note: when the model aircraft reaches a "vertical" climbing attitude for the first time this has defined the intersection point for the whole manoeuvre (that is: after 1/4 of the first loop of the first eight has been flown).~~

b) The first eight figure - first inside loop segment:

From normal upright level flight, the model aircraft should fly upwards along a circular flight path to the height of the 45 degree parallel, at which point it should be inverted. The model aircraft should continue its circular flight path downwards until reaching normal level upright flight at the height of the base (+/- 30 cm), at which point it should be upright. The model aircraft should then continue its circular flight path for a further ¼ of a loop until reaching the intersection point. Note: The intersection point first defined by the model aircraft at the beginning of this manoeuvre should be maintained throughout the whole of the manoeuvre. At the time of passing through the intersection point and transitioning to the first outside loop, the model aircraft should be momentarily in a vertical nose-up attitude, but should not visibly travel along a vertical climbing flight path.

~~from normal upright level flight the model aircraft should fly upwards along a circular flight path to a height of line elevation angle 45 degrees, at which point it should be inverted. The model aircraft should continue its circular flight path downwards without interruption until reaching the normal upright level flight at the height of 1.5 metres, plus/minus 30 cm, at which point it should be upright. The model aircraft should then continue, without interruption, its circular flight path for a further 1/4 of a loop until reaching the intersection point. at which point the model aircraft should be momentarily "vertical".~~

~~Note: the intersection point first defined by the model aircraft at the beginning of this manoeuvre should be maintained throughout the whole of the manoeuvre. At the time of passing through the intersection point and transitioning to the first outside loop the model aircraft should be momentarily in a "vertical" nose up attitude but should not visibly travel in a straight line, nor travel along a "vertical"~~ **I** ~~climbing flight path.~~

c) The first eight figure – the outside loop segment (actually 1 complete loop from the intersection point onwards):

After passing through the intersection point, the model aircraft should continue to fly, without interruption, a complete outside loop by flying upwards along a circular flight path to the height of the 45 degree parallel, at which point the model aircraft should be upright. It should then continue its circular flight path downwards until reaching the height of the base (+/- 30 cm) in inverted flight. The model aircraft should then continue its circular flight path for a further ¼ of a loop until reaching the intersection point, where it should be momentarily vertical.

~~after passing through the intersection point the model aircraft should continue, without interruption, to fly a complete outside loop by flying upwards along a circular flight path to a height of 45 degrees line elevation angle, at which point the model aircraft should be upright. The model aircraft should continue its circular flight path downwards, without interruptions, until reaching in inverted flight height of 1.5 metres, plus/minus 30 cm,. at which point it should be inverted. The model aircraft should then continue, without interruption, its circular flight path for a further 1/4 of a loop until reaching the intersection point. at which point it should be momentarily "vertical"~~

e) End of manoeuvre:

The manoeuvre is completed when the model aircraft completes the 2nd eight figure, when passing the intersection point in a vertical climb for the 5th and last time.

~~as the model aircraft completes the second eight figure, when passing the intersection point in a "vertical" climb for the fifth and last time.~~

Recommended exit procedure: **After passing the intersection point for the last time, continue the circular flight path for approximately a further 135 degrees of arc, until levelling out into normal upright level flight at the height of the base.**

~~after passing the intersection point for the last time, continue the circular flight path for approximately a further 135 degrees of arc, then descend from this flight path in a dive of approximately 45 degrees until levelling out into normal upright level flight at 1.5 metres.~~

4.2.15.12 Two Consecutive Horizontal Square Eights Manoeuvre

Manoeuvre size: ~~overall: height 45 degrees line elevation angle.~~ **The top segments of the loops are flown along the 45 degree parallel. Width is ¼ of a lap.**

Recommended entry procedure: **F**rom normal upright level flight at ~~a~~ **the** height of **the base** ~~1.5 metres~~.

a) Start of manoeuvre:

With the model aircraft in normal upright level flight **along the base (+/- 30 cm)**, from the point where the model aircraft starts its first turn upwards into a vertical climb for the first time. Note: when the model aircraft reaches a vertical climbing attitude for the first time, this has defined the intersection line for the whole manoeuvre.

b) The first eight figure – the first climbing turn and vertical climbing segment of the first (inside) square loop:
The model aircraft should turn sharply into a vertical climb, reaching and maintaining a ~~"straight line"~~ flight path that is at right angles to the **base** ~~ground~~.

c) The first eight figure - the second turn and top ~~"horizontal"~~ segment of the first (inside) square loop:
The model aircraft should turn sharply into inverted level flight to reach ~~a~~ **the** height of **the** 45 degrees **parallel** ~~line angle elevation~~ as it becomes inverted. ~~This~~ **The top segment** ~~section~~ **should be flown along the 45 degree parallel** ~~parallel to the ground~~.

d) The first eight figure - the third turn and vertical dive segment of the first (inside) square loop:
The model aircraft should turn sharply into a vertical dive, reaching and maintaining a ~~"straight line"~~ flight path that is at right angles to the **base** ~~ground~~.

e) The first eight figure - the fourth turn and bottom ~~"horizontal"~~ segment of the first (inside) square loop:
The model aircraft should turn sharply into ~~smooth~~ upright level flight and this section should **be flown along the base** ~~parallel to the ground at a height of 1.5 metres~~ **(+/- 30 cm)**. The length of the whole bottom segment, including both turns, should be ~~exactly~~ 1/8th of a lap.

f) The first eight figure - the first climbing turn and vertical climb segment of the second (outside) square loop:
At the end of the previous segment (paragraph e) above), the model aircraft should turn sharply into a vertical climb, reaching and maintaining a ~~"straight line"~~ flight path which is at right angles to the **base** ~~ground~~. This flight path should be in exactly the same position as defined by the model aircraft at the beginning of the manoeuvre (paragraph a) above).

g) The first eight figure - the second turn and top ~~"horizontal"~~ segment of the second (outside) square loop:
The model aircraft should turn sharply into upright level flight to reach **the** ~~a~~ height of **the** 45 degree~~s~~ **parallel** ~~line elevation angle~~ as it becomes level. The top segment should be flown **along the 45 degree parallel.** ~~with the flight path parallel to the ground.~~

h) The first eight figure - the third turn vertical dive segment of the second (outside) square loop:
The model aircraft should turn sharply into a vertical dive, reaching and maintaining a ~~"straight line"~~ flight path that is at right angles to the **base** ~~ground~~.

i) The first eight figure - the fourth turn and bottom ~~"horizontal"~~ segment of the second (outside) square loop:
The model aircraft should turn sharply into inverted ~~smooth~~ level flight, and this section should be **flown along the base** ~~parallel to the ground at a height of 1.5 metres~~ **(+/- 30 cm)**. The length of the whole bottom segment, including both turns, should be ~~exactly~~ 1/8th of a lap.

k) The final turn and last vertical climb exit from manoeuvre segment:
At the end of the second bottom ~~"horizontal"~~ segment of the fourth loop the model aircraft should again turn sharply into a vertical climb, reaching and maintaining a ~~"straight line"~~ flight path which is at right angles to the **base** ~~ground~~. This flight path should be in exactly the same position as defined by the model aircraft at the start of the manoeuvre (paragraphs a) and b) above).

l) End of manoeuvre:
At the end of the last vertical climb segment, before turning into normal upright exit flight **along the 45 degree parallel**. ~~at 45 degrees line angle.~~

Recommended exit procedure: **C**omplete a further 90 degrees turn into ~~"straight line"~~ upright level flight **along the 45 degree parallel** ~~at a height of 45 degrees line angle.~~ Maintain this ~~level~~ flight path ~~parallel to the ground~~ until clear of the left hand side of the left hand loop by approximately 5.0 metres then make a turn into a dive of approximately 45 degrees nose down attitude. Recover into normal upright level flight at **the height of the base** ~~1.5 metres~~

4.2.15.13 Two Consecutive Vertical Eights Manoeuvre

Manoeuvre: ~~size, overall:~~ **Height is** 90 degrees line elevation angle **to the base**.~~; width 1/8th of a lap.~~

Recommended entry procedure: **F**rom normal upright level flight at ~~a~~ **the** height of **the base** ~~1.5 metres~~, fly upward along a circular flight path **to reach the height of the 45 degree parallel**. ~~to a height of line elevation angle 45 degrees~~. At this point the model aircraft should be inverted.

a) Start of manoeuvre:
After the model aircraft has flown the first half of an inside loop, as it passes through the intersection point for the first time. Note: the intersection of the whole manoeuvre is defined when the model aircraft passes through inverted level flight at **the height of the 45 degree parallel** ~~a height of 45 degrees line elevation angle~~ for the first time.

b) The first eight figure - the first (inside loop) segment:
As the model aircraft passes through the intersection point for the first time it should continue to fly a ~~completely~~ circular inside loop ~~with no flat spots or deviations~~. The bottom of this loop should be at ~~a~~ **the** height of **the base** ~~1.5 metres~~ **(+/- 30 cm)**. The loop should be completed by the model aircraft continuing this circular flight path until reaching an inverted attitude at ~~a~~ **the** height of **the** 45 degrees **parallel.** ~~line elevation angle.~~

c) The first eight figure - the second (outside loop) segment:
As it passes through the intersection point the model aircraft should continue ~~without interruption,~~ flying a ~~completely~~ circular outside loop ~~without flat spots or deviations~~. The bottom of this second loop should be at **the height of the 45 degree parallel** ~~a height of 45 degrees line elevation angle~~ and the top should be at 90 degree line elevation **angle**. Note: the flight path of this second loop should touch the intersection point, and this intersection point should be maintained throughout the entire manoeuvre. At the time of passing through the intersection point and then transitioning into the second (outside) loop, the model aircraft should be momentarily in a level inverted flight attitude but should not visibly follow a ~~"straight line"~~ **straight** flight path. Neither should the model aircraft climb nor dive during this momentary period of inverted flight. In addition, the centres of both loops should be positioned on an imaginary line drawn upwards from the **base** ~~ground~~ at right angles.

d) The second eight figure…… first eight figure.

e) End of manoeuvre:
As the model aircraft completes the second eight figure, at the moment when it reaches inverted level flight at **the height of the 45 degree parallel.** ~~a height of 45 degrees line elevation angle.~~

Recommended exit procedure: **C**ontinue for a further half inside loop until the model aircraft is upright at **the height of the base** ~~a height of 1.5 metres~~, and then continue in normal level upright flight. ~~at a height of 1.5 metres.~~

4.2.15.14 Hourglass Manoeuvre

Manoeuvre size: ~~overall~~: **H**eight **is** 90 degrees line elevation angle **to the base. W**idth **is** slightly more than 1/8th of a lap.

Recommended entry procedure: **F**rom normal upright level flight at **the height of the base**. ~~a height of 1.5 metres.~~

a.) Start of manoeuvre:

The manoeuvre starts from the point where the model aircraft starts its first turn from the base (+/- 30 cm) into a climb for the first time.

~~from the point where the model aircraft starts its first turn into a climb for the first time.~~

b) The first turn and inverted climb segment:

The model aircraft should turn sharply into, and then maintain an inverted climb with a flight path angled at approx. 30 degrees past the right angle (relative to the base). The climb should be continued until the model reaches the wingover flight path, positioned at 90 degrees to the centre line axis of the whole manoeuvre, where the model aircraft makes a sharp outside turn to follow this wingover flight path, and the middle point of this flight path should be positioned directly above the centre of the circle.

~~c)~~ ~~The model aircraft should sharply turn into, and then maintain an inverted climb with a "straight line" flight path angled at approximately 30 degrees past right angles (relative to the ground). The climb should be continued until a sharp outside turn that then results in the model aircraft following the Wingover manoeuvre flight path. That Wingover flight path should be positioned at 90 degrees to the centre line axis of the whole manoeuvre and the middle point of this flight path should be positioned directly above the centre of the circle.~~

~~d)~~ **c)** The overhead **and dive** second turn, wingover, and third turn segment:

The length of the overhead segment, including its 2 turns, should be slightly more than 1/8th of a lap. This segment should be followed by a sharp outside turn through approx. 120 degrees into an inverted dive, which is maintained on a flight path angled at approx. 30 degrees to the base.

~~the "straight line" overhead Wingover flight path should be positioned at 90 degrees to the centre line axis of the whole manoeuvre and the mid point of the flight path should be positioned directly over the centre of the circle. The length of this segment, including its two turns, should be slightly more than 1/8 th of a lap. This segment should be finished with a sharp outside turn through approximately 60 degrees into an inverted dive.~~

~~e)~~ ~~d)~~ ~~The inverted dive segment: the model aircraft should turn sharply into, and then maintain, an inverted dive with a "straight line" flight path angled at approximately 60 degrees relative to the ground.~~

~~f)~~ **d)** The intersection:

The intersection of the climb and dive flight paths should be at the height of the 45 degree parallel

~~The intersection: the intersection of the "straight line" climb and the "straight line" dive flight paths should be at a height of 45 degrees line elevation angle.~~

~~g)~~ **e)** The fourth turn and bottom level flight segment:

At the completion of the dive segment, the model aircraft should turn sharply into normal upright level flight at the height of the base (+/- 30 cm). The bottom

segment shall be flown along the base maintaining the established height. The length of this segment, including 2 turns, should be slightly more than 1/8th of a lap

~~the model aircraft should sharply turn into normal upright level flight, plus/minus 30 cm a height of 1.5 metres, The length of this segment, including two turns, should be slightly more than 1/8 th of a lap.~~

~~h)~~ **f)** Symmetry of the complete manoeuvre:

The complete figure should be flown symmetrically in relation to its vertical centre line axis and this centre line axis should be at right angles to the base.

~~The figure should be flown symmetrically in relation to its "vertical centre line axis, and this centre line axis should be at right angles to the. ground.~~

~~i)~~ **g)** End of manoeuvre…the complete manoeuvre.

Recommended exit procedure: **C**ontinue in normal upright level flight **along the base** ~~at 1.5 metres.~~

4.2.15.15 Two Consecutive Overhead Eights Manoeuvre

Manoeuvre size: ~~overall: loop diameters 1/8 th of a lap;~~ **The top of loops shall be directly over the centre of the circle and lowest points of both loops must being tangential to the 45 degree parallel**.

~~at 45 degrees line elevation angle.~~

Recommended entry procedure: **F**rom normal upright level flight the model aircraft should climb in a Wingover flight path to a point directly over the centre of the circle.

a) Start of manoeuvre:
As the model aircraft passes through the overhead point for the first time.

b) ~~Note:~~ The intersection:
The intersection point of the complete manoeuvre should be directly over the centre of the circle and should be maintained throughout this entire manoeuvre.

c) The first ~~complete~~ (inside loop) segment:

From the overhead position, the model aircraft should fly a circular inside loop, returning to the overhead (intersection) point. The right hand bottom of this loop should be at the height of the 45 degree parallel. This loop should be positioned symmetrically on an imaginary line on the face of the flying hemisphere, which is drawn upwards at 90 degrees to the axis of the model aircraft's wingover climb to the intersection point.

~~from the overhead position the model aircraft should fly a completely circular inside loop, returning to the overhead/intersection point. The right hand bottom of this loop should all be a height of 45 degrees line elevation angle. This loop should be positioned symmetrically on an imaginary line on the face of the flying hemisphere which is drawn upwards at 90 degrees to the axis of the model aircraft's Wingover climb to the intersection point.~~

d) The passage through the intersection point and transition into the second (outside) loop segment:
As the model aircraft passes through the intersection/overhead point, it should smoothly transition into the second (outside) loop without flat spots or deviations. At the point of

flying directly above the centre of the circle the model aircraft should be momentarily in a "knife edge" position with a line elevation angle of 90 degrees.

e) The second ~~complete~~ (outside loop) segment:
From the overhead position, the model aircraft should transition smoothly into the 2nd circular (outside) loop, completing this loop when it has again returned to the overhead/ intersection point. The left hand bottom of this loop should be at the height of the 45 degree parallel. This loop should be positioned symmetrically on an imaginary line on the face of the flying hemisphere, which is drawn upwards at 90 degrees to the axis of the model aircraft's wingover climb to the intersection point.
~~from the overhead position the model aircraft should transition smoothly into the second completely circular (outside) loop, completing this loop when it has again returned to the overhead/intersection point. The left hand bottom of this loop should be all at a height of 45 degrees line elevation angle. This loop should be positioned symmetrically on an imaginary line on the face of the flying hemisphere which is drawn upwards at 90 degrees to the axis of the model aircraft's Wingover climb to the intersection point. Those bottoms should also all be positioned symmetrically on an imaginary line on the face of the flying hemisphere which is drawn upwards at 90 degrees to the axis of the model aircraft's climb to the intersection point (paragraph c) above).~~

f) The second eight figure:
The model aircraft should fly the second eight figure exactly as set out in the individual segments above and this second eight figure should be flown **in the same position and of the same size** ~~in exactly the same and should be of exactly the same size~~ as the first eight figure.

Recommended exit procedure: **Continue by completing the 2nd (diving) half of the wingover flight path that was flown to start the manoeuvre. Recover into normal upright level flight at the height of the base.**
~~continue by completing most of the second (diving) half of the wingover flight path that was used to start the manoeuvre. Then recover into normal upright level flight at 1.5 metres.~~

4.2.15.16 Four-leaf Clover Manoeuvre
Manoeuvre: size~~, overall:~~ **H**eight 90 degrees line elevation angle; width ¼ lap. **All loops are to be flown as a true arc without visible deviations from a circular flight path**.

Recommended entry procedure: **U**se ¾ of a lap to climb to a height of 42 degrees line elevation angle **above the base** and maintain this height in upright level flight for 1/8th of a lap. **Fly ¼ of an inside loop to arrive at the point of entry.**

a) Start of manoeuvre:
The manoeuvre starts at the 9 o'clock point of entry into the first loop segment.
~~at the point of entry into the first (inside) loop~~

b) The first ¾ of an inside loop segment: It is a circular arc of 270 degrees.
The top of this first loop should be tangential to the wingover path located at 90 degrees to the centre line axis of the whole manoeuvre. The model aircraft should recover into upright level flight at a height of 42 degrees line elevation angle above the base. This loop should be positioned tangentially to an imaginary vertical line drawn upwards at right angles to the base. The lateral position of this line is determined when the model aircraft reaches a vertical attitude for the first time and this imaginary line then becomes the lateral reference for the whole manoeuvre

~~The first complete (inside) loop figure "complete loop" (above) means a full circular loop of 360 degrees. The top of this first loop should be tangential to the Wingover path located at 90 degrees to the centre line axis of the whole manoeuvre. The model aircraft should recover into upright level flight at a height of 42 degrees line elevation angle. This loop should be positioned tangentially to an imaginary vertical line drawn upwards at right angles from the ground. The lateral position of this line is determined when the model aircraft reaches a vertical attitude for the first time and this imaginary line then becomes the lateral reference for the whole manoeuvre.~~

c) **The upright level flight horizontal segment:**

It begins at the 42 degree elevation point on loop 1. A straight line path is flown from this point to the 42 degree elevation point on loop 2 in upright level flight. The length of this segment should be equal to the diameter of the 1st loop.

~~The upright level flight at 42 degrees line elevation angle segment: at 42 degrees line elevation angle the model aircraft should fly on an upright level flight path The length of this segment should be equal to the diameter of the first loop.~~

d**)** T**he 2nd outside ¾ of a loop segment:**

It is flown as a true arc without visible deviations from a circular flight path. The bottom of this loop should be at the height of the base (+/- 30 cm). This ¾ loop should end with the model aircraft entering a vertical climb along the lateral reference established in loop 1.

~~The second (outside) ¾ of a loop segment: " ¾ of a loop" means a circular arc of 270 degrees. This ¾ loop should be flown as a true arc without visible deviations from a circular flight path and the bottom should be at a height of 1.5 metres, plus/minus 30 cm. This ¾ loop should end with the model aircraft entering a vertical climb whose flight path is the same as the great circle line resulting from flying the first loop.~~

e) The first **vertical** climb segment:

The model aircraft should then climb vertically at right angles to the base. The length of this segment should be equal to the diameter of the first loop.

~~the model aircraft should climb vertically at right angles to ground and the length of this segment should be equal to the diameter of the first loop.~~

f) **The 3rd outside ¾ of a loop segment:**

It should be flown as a true arc without visible deviations from a circular flight path and the bottom should be at the height of the 42 degree line elevation. This ¾ loop should end with the model aircraft recovering to inverted level flight at the height of the 42 degree line elevation angle.

~~The third (outside) ¾ loop segment: this ¾ loop should be flown as a true arc without visible deviations from a circular flight path and the bottom should be at a height of 42 degrees line elevation. This ¾ loop should end with the model aircraft recovering to inverted level flight at a height of 42 degrees line elevation angle.~~

g) **The inverted horizontal flight segment:**

It is flown with the model aircraft following an inverted flight path which is straight from the 42 degree elevation point on loop 3 to the 42 degree elevation point on loop 4. The length of this segment should be equal to the diameter of the 1st loop.

~~The inverted level flight at 42 degrees line elevation angle segment : the model aircraft should follow an inverted flight path is parallel to the ground. The length of this segment should be equal to the diameter of the first loop.~~

h) **The 4th (inside) ¾ of a loop segment:**

It should be flown as a true arc without visible deviations from a circular flight path and the bottom should be at the height of the base (+/- 30 cm). This ¾ loop should

end with the model aircraft entering a vertical climb along the line of lateral reference established in loop 1.

~~The fourth (inside) ¾ loop segment: this ¾ loop should be flown as a true arc without visible deviations from a circular flight path and the bottom should be at a height of 1.5 metres, plus/minus 30 cm. This ¾ loop should end with the model aircraft entering a climb whose flight path is the same as the great circle line resulting from flying the first loop.~~

i) The second climb segment:

The model aircraft should climb vertically at right angles to the base.

~~the model aircraft should climb at right angles ground and the length of this segment should be such that the model aircraft flies through the complete clover leaf figure.~~

j) End of manoeuvre:

The manoeuvre ends at the end of the last vertical climb, as the model aircraft passes through a point above the centre of the circle.

~~at the end of the last climb, as the model aircraft passes through a point above the centre of the circle.~~

Recommended exit procedure: **Continue along the wingover path from the last vertical climb into a vertical dive before recovering into normal upright level flight at the base. Other manoeuvres after the completion of the Clover leaf are permissible.**

~~continue the Wingover path from the last vertical climb (paragraph i) above) into a vertical dive, then recover into normal upright level flight at 1.5 metres. Other manoeuvring after completion of the cloverleaf is permitted.~~

4.2.15.17 Landing Manoeuvre

Recommended entry procedure: **The manoeuvre is entered from normal upright level flight at the height of the base.**

~~from normal upright level flight at a height of 1.5 metres.~~

a) Start of manoeuvre:

As the model aircraft leaves level flight at the height of the base (+/- 30 cm) and with the motor/s and propeller/s stopped.

~~as the model aircraft leaves the height of 1.5 metres, plus/minus 30 cm, and with the motor/s and propeller/s stopped.~~

Note: For the purpose of this rule, the word "stopped" describes a situation where the blades of the propeller(s) are actually at a standstill or are rotating so slowly that the individual blades can clearly be seen by an observer.

b) The descent segment:

The model should fly for 1 full gliding lap with the motor/s and propeller/s stopped. This lap is measured from the start of the descent from the height of the base (+/- 30cm) until the point of touchdown. ~~The rate of descent should remain constant throughout the whole gliding lap, from the moment that the model aircraft leaves the base height until the moment it touches down.~~ **The model should continuously descend from level flight to touchdown with no deviation from a straight flight path. The touch down itself should be smooth and either a "2 point" or a "3 point" touch down shall be judged as equally correct.**

~~the model aircraft should fly for 1 full gliding lap with the motor/s and propeller/s stopped, measured from the start of the descent at the 1.5 metres plus/minus 30 cm height, until the point of touchdown. The rate of descent should remain constant throughout this whole~~

~~gliding lap, from the moment that it leaves the 1.5 metres height until the moment that it touches down. The touch down itself should be smooth and either a "2 point" or a "3 point" touch down shall be judged as being equally correct.~~

c) End of manoeuvre:
The manoeuvre is complete when the model aircraft comes to a complete stop after touching down at the end of the ground roll which is clearly in a forwards direction and in line with its normal flight motion. The length of the ground roll shall not exceed one lap.

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