



# Sports Pattern Manoeuvres

A comprehensive description of the manoeuvres, with diagrams.

If you've ever thought of having a go at aerobatics, we'd like to hear from you!

The VPA has made it really easy for you to see what it's like to have a go in competition, by running a number of "Sports Pattern" events (previously known as Sporty 40) each year around Melbourne.



They are designed to appeal to the average club flyer that has their Bronze Wings, and to improve their skills quickly and have FUN!

A low-cost 'stick' type model or a low wing sports model in the photo above is an excellent choice for this event, and many trainer-type models are quite capable of all the manoeuvres. The event is designed for low cost, with maximum fun!

Any kind of fixed-wing model is OK. Most newcomers seem to get the best results by using a simple model with a 40-ish size engine to join in on the fun, but we allow models with motors up to 1.60 size.

Sports Pattern is open to anyone who has never been given a grading by the APA or Scale Aerobatics SIG's, meaning entrants will be quite new to aerobatic competition.

There are no entry fees, and you can enter on the day, but it's much appreciated if you phone a few days before the day of the event to let us know you'll be coming.

If you'd like to have a go, or just want to learn more, call either of the people listed below for 'when, where & how' info. We can also send you a complimentary laminated call-card.

Henry Hutchinson (a/h) 5987 1811  
email: [h.hutch@optusnet.com.au](mailto:h.hutch@optusnet.com.au)

Graham Scott (Phone & fax) 9737 1707  
email: [graham\\_scott@optusnet.com.au](mailto:graham_scott@optusnet.com.au)

[www.f3a.org.au](http://www.f3a.org.au)

Your first competition is a buzz that is long remembered, and you'll wonder why you didn't do it sooner!

Most people say they learn more in one day by flying in a competition than they would in months of individual practice. These pages explain how to get started, showing you how to fly the manoeuvres, and maximize your fun!

In the beginning...

Start by practising straight and level lines parallel to the runway. At first, fly lines about 100 to 150 metres out, at about 40 to 50 metres up. Then fly lines about 40 metres out, and at about 30 to 40 metres in altitude. **Get used to the two different 'lines of flight'... one close, the other further out & higher.** Get your mates to tell you whether you're 'on line' or not.

When you're happy with your lines, do a manoeuvre directly in front of you, firstly on the further-higher line and later, on the lower-closer line. The idea is to get so used to maintaining straight & level lines, and positioning your model correctly in front of you, that it becomes 'second nature'. Then you'll be able to concentrate much better on the manoeuvres themselves.

When you feel you're ready to start practicing all the manoeuvres in order, one after the other, remember that some of them will require you to fly at some distance away from the runway... **NEVER EVER** fly at such a low height that if the motor quits, you risk not being able to glide safely back to the runway.

Always obey Rule #1, which is... HAVE FUN! And that means flying safely and not risking losing your model!

Remember that if you fly behind the judges' line (behind you) the manoeuvre you are trying to do must be scored zero. The judges may ask a pilot to land immediately if they believe he/she is not able to fly safely... not fun!

All manoeuvres start and end with a straight and level line of flight, parallel to the runway, of at least 30 metres. This includes for example, the spin entry and exit lines. All the manoeuvres should be centered in front of you. The further off-centre you fly the model, the higher the downgrade will be (meaning you'll get a lower score!).

The required straight line of flight will usually be parallel to the runway. The CD (Competition Director) may need to alter this for safety reasons such as wind direction, etc. but it's nearly always... parallel to the runway.

Sports Pattern manoeuvres will be judged primarily on precision (accuracy) and gracefulness and smoothness; also, the positioning of the model and flying straight & level entry-exit lines are very important to your scores.

For manoeuvres that are in the vertical plane (such as loops) the correct 'line of flight' is about 100 to 150 metres out, but for Sports Pattern manoeuvres 1, 2, 3, 10 and 11, they are on a line of flight only about 40 metres out from the pilot. These are all horizontal-plane manoeuvres where your model will spend some time a long way away from you, so you need to start close. This also enables the judges to better determine whether your entry/exit lines are indeed on the same line of flight!

How a Sports Pattern competition flight commences...

Take off into the wind, climb to a safe height, do a procedure turn to a downwind line of flight and do a trim-pass to the downwind end; turn-around (1/2 Cuban 8 is good) & do another free trim pass to the upwind end; turn-around again to what should now be a straight and level downwind entry line of flight, parallel to the runway, and 30 to 40 metres out!

For manoeuvres 1, 2, 3, 10 & 11 only, begin by establishing a fairly close entry- exit line of flight about 30 to 40 metres out, perhaps still over the far edge of the runway, because you're going to fly out, not up!

The "vertical" manoeuvres 4, 5, 6, 7, 8, & 9 will look (and score!) much better if flown starting from further out, on a line of flight about 100 to 150 metres out from the pilot, and with a bit higher base-line.

**SOME TIPS:** After completing each manoeuvre, go far enough (especially if going upwind) to give yourself enough room to turn around (anyway you like) or you may not have enough room for your next straight & level entry line.

**NEVER EVER** fly so low or far away that if the motor quits, you risk not being able to glide safely back to the runway.

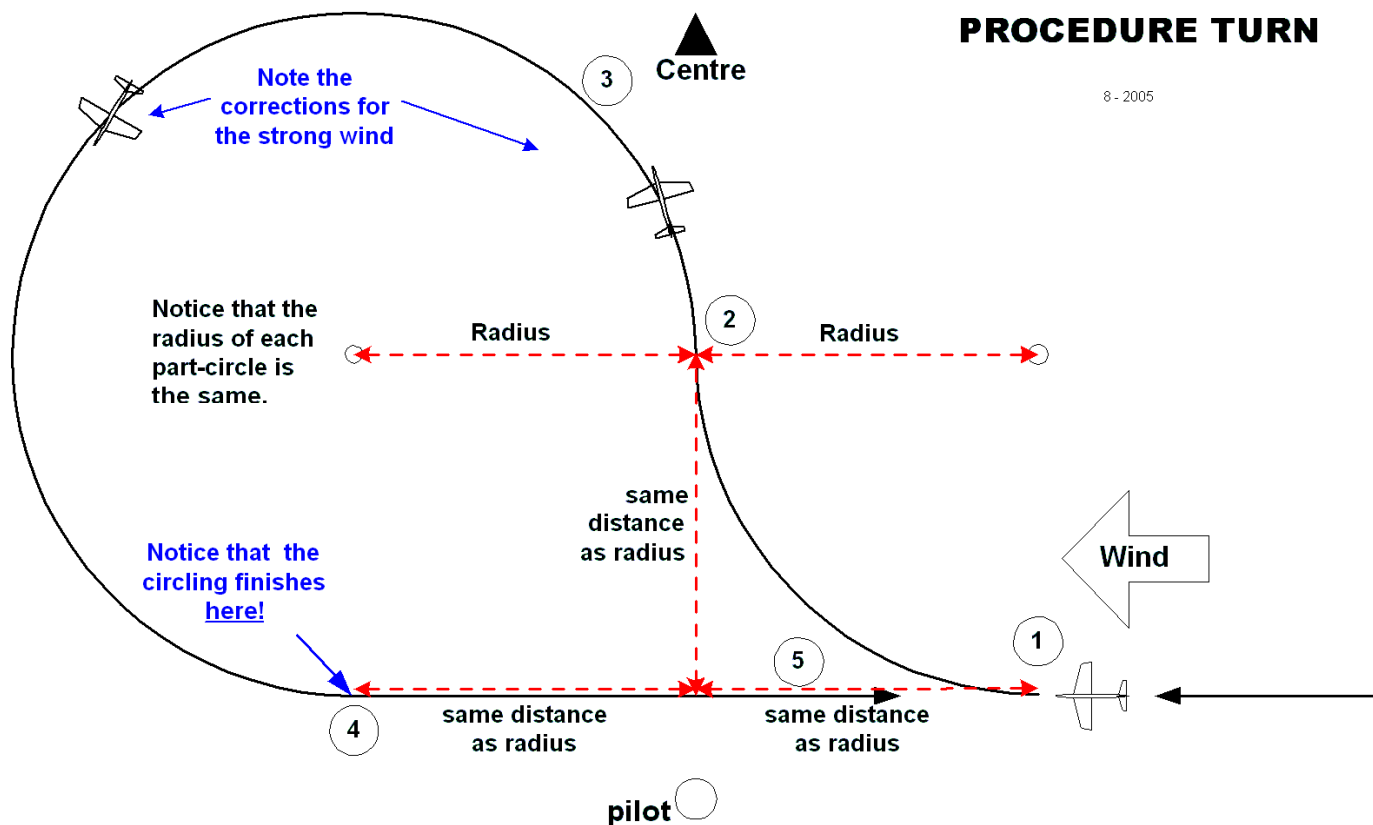
- 1 Downwind starting close Procedure Turn From your entry line of flight, turn outward at one radius distance before centre and circle 90° outwards, then immediately 270° the other way, finishing back on the entry line of flight, heading upwind. Maintain the same height and radii. Because the manoeuvre begins at one radius before the centreline, you should be looking directly at the model's tail-end as it reaches the centreline in front of you. The circling should finish at one radius distance from the centreline on the other side to that which you started and you should be flying your exit line on the same path as your entry line.

- 2 Downwind starting close  
Outward Figure of Eight All radii the same. Start at a point which is one radius distance before the centreline, and circle 90° outwards to the cross-over, then circle 360° the other way to the cross-over again, then circle 270° the other way to finish on the same path and direction as your entry line.
- 3 Upwind starting close  
Inward Figure of Eight Start circling 270° outwards at one radius past centre, to come towards yourself at the cross-over / centreline, then circle 360° the other way back to the cross-over, then 90° the other way, to finish on the same path and direction as your entry line.
- 4 Downwind starting further out  
Cuban Eight Cross-over/rolls are centred in front of you, & part-loops to be the same size. On your straight and level entry line of flight, fly past centre, 3/4 loop to a 45° straight downline, 1/2 roll at centre, continue the 45° straight downline; 3/4 loop again to a 45° straight downline, 1/2 roll at the centre again, continue the 45° straight downline, then part-loop (with same radius as the other part-loops) out onto your exit line of flight, on the same path and direction as your entry line.
- A tip: to get the shape right, the cross-over/rolls need to be a lot higher up in altitude than you think! If you look at the shape, it's a big **X** with part-loops on each end, with a half roll at the junction of each of the 45 degree downlines. You should be able to think... "I'm flying a straight line... roll... I'm flying a straight line..." on each part of the 45 degree downlines, either side of the roll. It takes about 3 seconds to think these words, and helps you make the lines long enough, and equal in length.
- 5 Upwind starting further out  
Immelman Turn From your entry line of flight, begin a half-loop at the centre, in front of you. When at the top, half-roll & fly a straight and level exit line for about 30 meters. A tip... if you half-roll just before the end of the half-loop, gravity will help finish the loop, and you'll come out level. A small downgrade, but much better than a roller-coaster exit line because you did too much of a loop! Remember there is a much bigger downgrade if you don't do the ½ roll immediately as the ½ loop is finished (there should not be any straight line at all between the end of the half-loop and the beginning of the ½ roll).
- 6 Upwind starting further out  
Two Inside Loops Start at the centre. To overcome the effect of gravity & to keep the loops round and the same size, adjust the elevator as required. When you're just past vertical while going up, ease off a bit, and tighten after you're vertical, going down. Stretch through the bottom into any headwind, & tighten when downwind at the top of the loops. Make sure the loops don't 'corkscrew' in or outwards.
- 7 Downwind starting further out  
Two Consecutive Rolls Starts & ends with straight & level lines. Fly safely: flying higher is quite OK. A moderate roll-rate that is smooth and graceful is much better than rolling fast and jerky. You should be at the centre when you reach the end of the first roll. Exit straight and level.
- 8 Upwind starting further out  
Two Turn Spin Enter straight & level, slow down early to arrive at the centreline with motor idling. Hold increasing elevator as the model slows, to maintain the level line of flight. Keep the wings level. The model's fuselage should stay parallel with the runway, arriving at the centreline with an ever-increasing nose-high attitude. Remember... the model must stall, so that the nose then drops even though full up elevator is being held in. As the stall occurs, add and also hold full rudder to start the spin, and only then the ailerons. Some models spin OK without ailerons. Experiment!
- To avoid the model stalling and starting to spin one way, but you put in control for the other way, (maybe because you weren't quick enough to see which way it was going) try this... arrive at the centreline, idling, nose high, and just before the model stalls, slide the rudder over in the direction you want the spin to go, which will force the stall to start that way.
- Don't use aileron at the stall entry, or you'll do a wing-over or even a snap-entry, and get a zero for the Spin Manoeuvre. Time the release of the sticks so that the model stops spinning at exactly two spins. The model is then flown vertically down for about 30 metres so the judges can see that the wings are straight. Then do a smooth, graceful 1/4 loop to a straight & level exit line of flight for 30 meters.
- 9 Downwind starting further out  
Inverted Flight Starts & ends with straight & level lines. Half roll, and fly about 5 seconds of inverted flight, then half roll either way back to upright. Counting the seconds to the centreline and then 'uncounting' the seconds, is an effective way to keep the manoeuvre centred.
- 10 Upwind starting close  
Rectangular Landing Approach (circuit) This should look similar to a full-size aircraft landing circuit. It's not a take-off circuit, so start by passing over the strip quite high. Any climbing during ANY part of the rectangular circuit will result in a lower score. All turns should be the same radius. Reduce power on the downwind leg, reduce height on the crosswind & final legs. ALWAYS allow for dead sticks: **NEVER** fly in such a position or height that you couldn't glide safely back to the strip. Don't fly your model low or too far downwind if it's windy!

11 Upwind starting close

Landing Model should maintain a straight line of descent, flare, hold off, and settle onto the main wheels without bouncing. If the model is a trike, the nose wheel should touch down only as the model slows. If it's a tail dragger, the tail wheel may touch at the same time as the main gear, but never before. Model rolls to a halt, still facing forward in the line of flight. To avoid a low or even zero score, remember commonsense safety issues... DO NOT taxi toward, or steer the model so it faces toward anyone, especially any timid judges! DO NOT collapse the antenna or turn off your transmitter until the model is restrained!

To achieve the perfect manoeuvre is exceedingly difficult!  
**The winner will be the one who makes the least mistakes!**



1. The Procedure Turn.

When you are first learning to fly, the Procedure Turn is great for learning how to turn back again from each end of a long straight line of flight that passes over the runway. It helps you to learn where the runway is!

HOWEVER, in Sports Pattern competitions, it's positioning is quite different. You do the manoeuvre centred directly in front of you. This helps you to learn many other things!

Note that the manoeuvre can only be done correctly if you maintain constant radii for the entire manoeuvre.

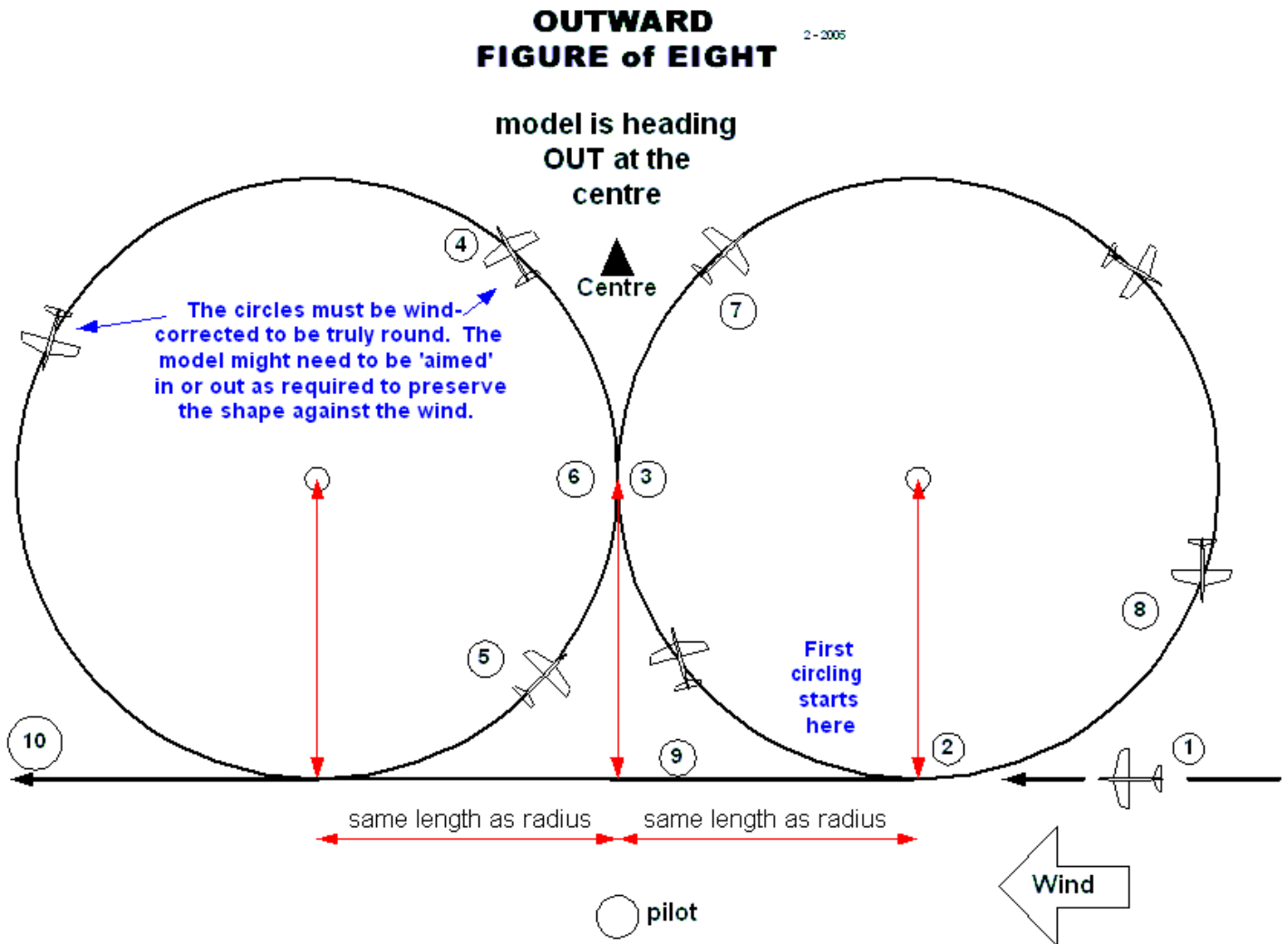
HOW TO.

The model is flown downwind on a straight & level entry line of flight, parallel to the runway, only about 30 or 40 metres out from the pilot, and at about 30 to 50 metres up. The model should be at 45 to 50 degrees up in elevation from the pilot. At a chosen distance (1) before reaching the centreline (which sets the radii for the whole manoeuvre) bank the wings to turn outwards of constant radius until it has completed a quarter of a circle. At this point (2), the model will be directly in front of the pilot, who will be looking straight down the model's fuselage from the tail-end.

1. Bank the wings immediately the other way, and maintain the same radius (3) as the first quarter-circle.
2. The turn is maintained for a total of 270 degrees, or three-quarters of a circle. Adjust wing-banking as required to allow for the wind, to achieve a circular path.
3. Note where this circle finishes (4)... the same distance from the centre-line, as the first quarter-circle started.
4. The model is flown out (5) on the same heading, and at the same height, as the entry line
5. During the manoeuvre, smoothly adjust the wings' angle of bank if required, to keep the circles rounded.

## DOWNGRADES...

1. Changes in altitude
2. Changes in radius during any part-circle
3. All radii not the same
4. Entry and exit lines not parallel to the runway
5. Gross changes in the model's speed
6. Flown too far away, making it difficult for the judges to determine the positioning of the model, especially the entry and exit lines coinciding



## 2. The Outward Figure Eight.

Starts off similar to the procedure turn.

## HOW TO...

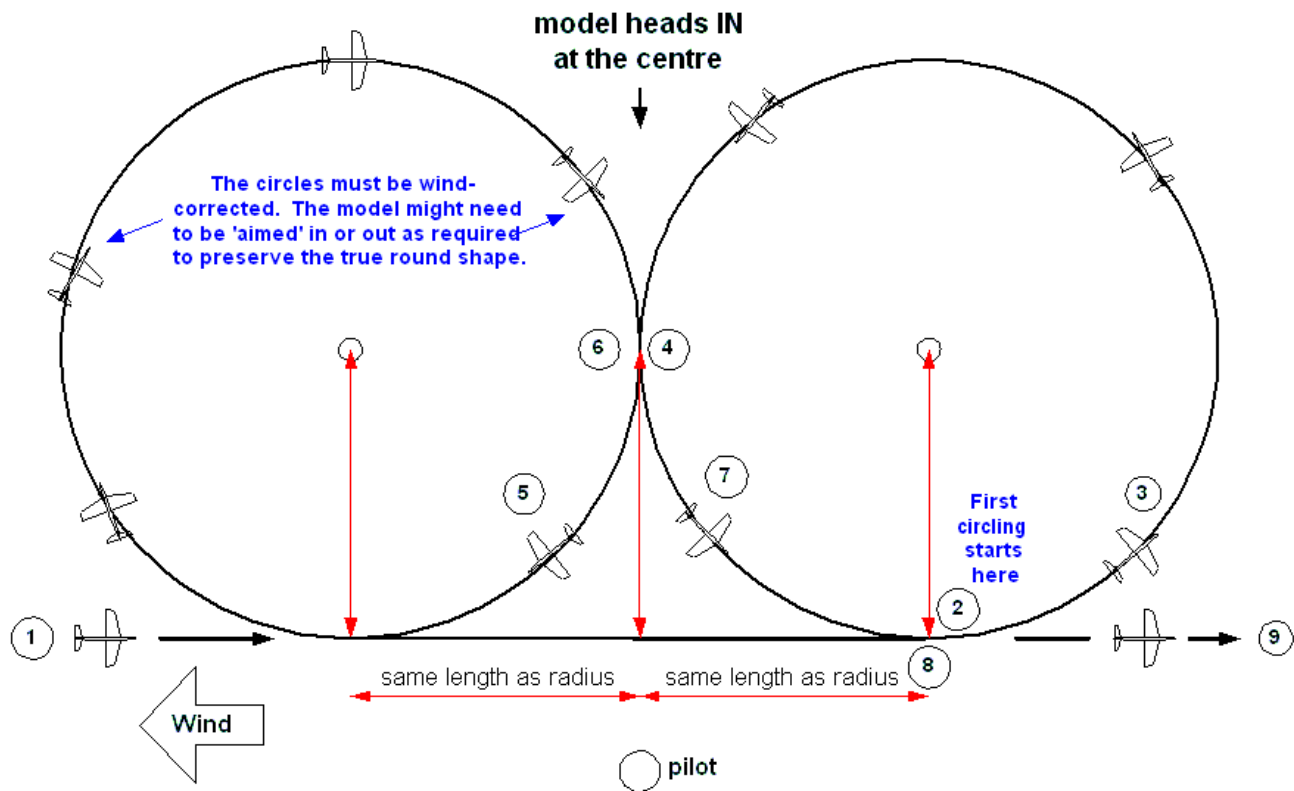
1. The model is flown downwind on a straight & level entry line of flight (1) only about 30 to 40 metres out from the pilot, and at about 30 to 50 metres up. The model should be at 45 to 50 degrees up in elevation from the pilot. At a chosen distance before reaching the centreline (2), which will set the radii for the whole manoeuvre, the model begins a turn outwards of constant radius until it has completed a quarter of a circle (90 degrees). At this point (3), the model will be directly in front of the pilot, who will be looking straight down the model's fuselage from the tail end.
2. At (3) the model is turned the other way (4), and maintains (5) for a complete circle (360 degrees) the same radius as the first quarter-circle.
3. At the completion of this circle (6) the model is turned the other way, at the same place (3) where it completed the first quarter-circle.
4. The model is flown (7) for three-quarters of a circle (270 degrees) (8), at the same radius, until it is again at position (2) where it exits the circle at the same place as the first circle started (2), and is flown on a straight and level exit line (9) to position (10). The manoeuvre is not finished until the model passes position (10) During the manoeuvre, adjust the wings' angle of bank if required, to keep the circles truly round.

## DOWNGRADES...

1. All circle radii not the same. Shape should be wind-corrected: 'stretching' upwind, 'tightening' downwind
2. Circles not fully completed, and the manoeuvre becomes a horizontal plane Cuban Eight with straight lines forming a shallow X, instead of being correctly... two circles touching at the centreline
3. Positions (1) and (4) not at the same place
4. Changes in altitude
5. Positions (4) to (5) not parallel to the runway
6. Positions (2) and (3) not in front of the pilot

## INWARD FIGURE of EIGHT

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### 3. The Inward Figure Eight

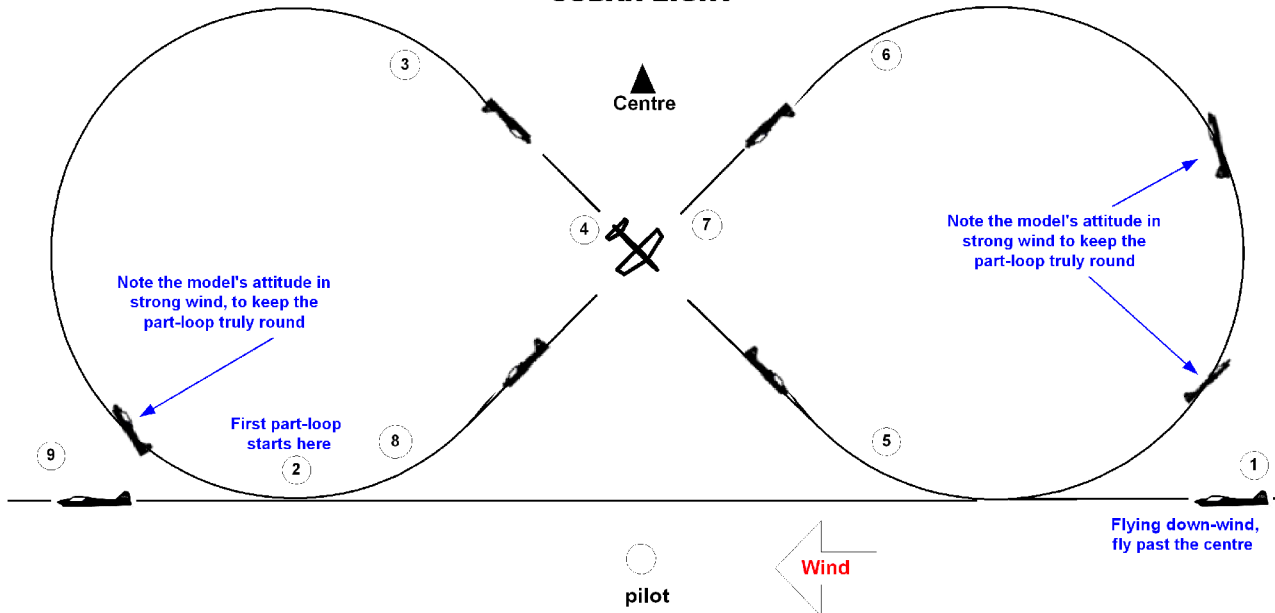
#### HOW TO...

1. The model is flown upwind on a straight & level entry line of flight (1), parallel to the runway, about 30 to 40 metres out from the pilot, and at about 30 to 50 metres up. After passing the centreline, at a chosen distance (2) (which will set the radii for the entire manoeuvre), the model begins a turn outwards (3) of constant radius until it has completed three-quarters of a circle (270 degrees). At this point (4) the model will be directly in front of (and heading towards) the pilot, who will be looking straight down the model's fuselage at its' nose.
2. At position (4) the model is banked the other way (5) and completes a full circle (360 Degrees)
3. At the position (6) the model will again be directly in front of (and heading towards) the pilot, who will be looking straight down the model's fuselage at its' nose. The wing is then banked the other way and the model is flown (7) for a quarter of a circle (90 degrees).
4. At (8) the model finishes the quarter-circle, and flies a straight and level exit line of 30 metres to (9).
5. During the manoeuvre, adjust the wings' angle of bank if required, to keep the circles truly round.

## DOWNGRADES...

1. Circles not fully completed, and the manoeuvre becomes a horizontal plane Cuban Eight with straight lines forming a shallow X, instead of being correctly... two circles touching at the centreline
2. All circle radii not the same (when circles or loops are not round, caused by visible abrupt changes of radius, the circle or loop is said to be 'segmented')
3. Positions (2) and (5) not at the same place
4. Changes in altitude
5. Positions (1) to (6) not parallel to the runway
6. Positions (3) and (4) not in front of the pilot

## CUBAN EIGHT



### 4. The Cuban Eight

#### HOW TO...

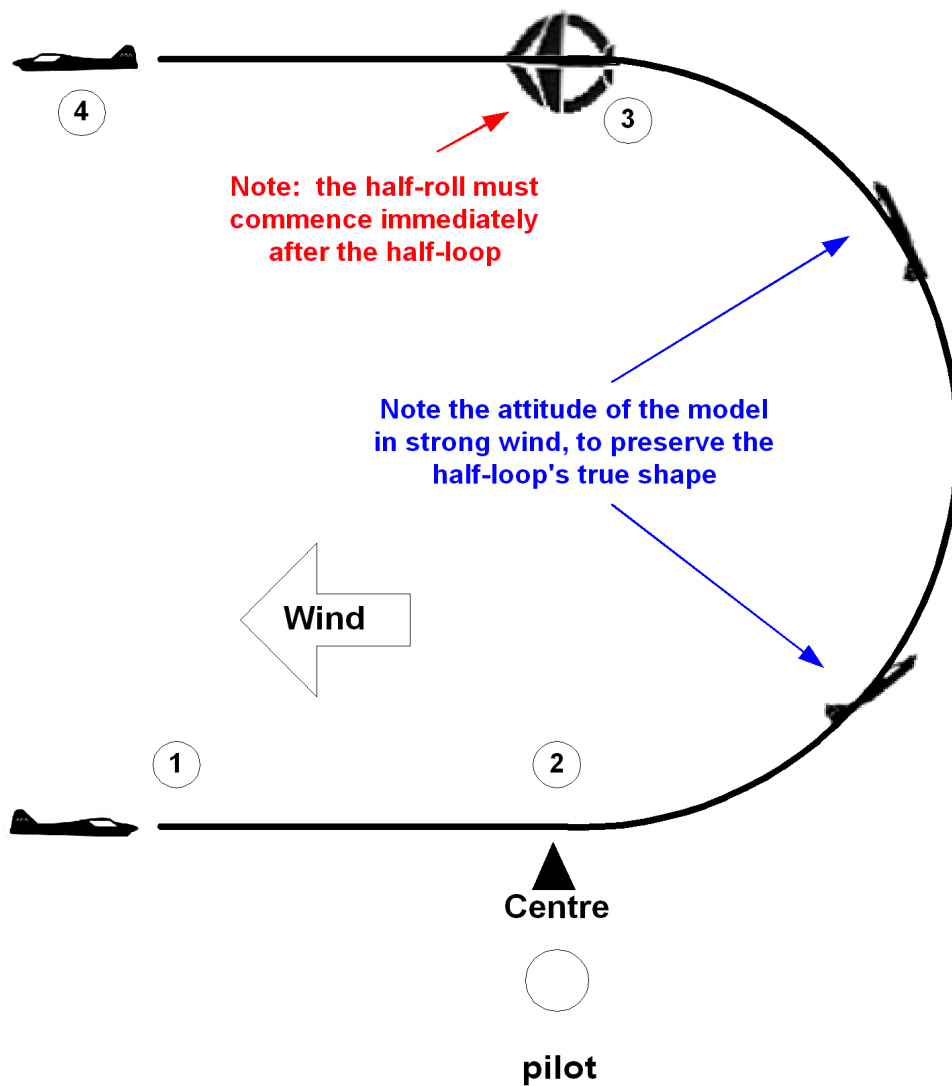
1. This manoeuvre needs to be flown further out at about 100 to 150 metres so that its' shape, which is in the vertical plane, is easier to judge. You will need to climb quite high during the loops to give enough room for the 45-degree downlines with half rolls. Begin at (1) with a 30-metre straight and level entry line, and keep flying past the centreline to (2).
2. Fly at maximum speed at (2) applying just enough elevator to begin a graceful loop. To allow for the effect of gravity during the loops, ease it off if required when the model has just passed the vertical, re-applying just a touch near the top of the loop, until at (3) you might even have to ride a touch of down elevator to maintain a 45 degree inverted downline. The throttle may need to be lowered on the downline.
3. At (4) apply aileron either way for a half roll, then maintain the 45-degree line for the same distance as the first part of the 45-degree downline.
4. At (5) again at full power, add up elevator gently for a graceful second loop, striving for the same height you achieved at the first, while maintaining the same radius as the first part-loop.
5. At (6) you may again reduce power, riding enough down elevator to maintain the 45 degree inverted line.
6. At (7) apply aileron again, either way, for a half roll. Maintain the 45-degree downline.
7. At (8) smoothly add up elevator and throttle, being careful to smoothly steer the model out straight.
8. Fly an exit line of 30 metres to (9).

#### DOWNGRADES...

1. Loop radii not the same
2. 45 degree lines not 45 degrees
3. Gallops in radius during the loops (be gentle on the elevator!)
4. Roller-coaster downlines (jabbing the elevator)
5. Half rolls not in the middle of the downlines
6. The two half rolls have different roll rates
7. Entry or exit lines not parallel to the runway
8. Loops corkscrew in or out, or both
9. Positioning the manoeuvre so close and high that it makes it hard for the judges to view the model (poor old judges with their stiff necks may retaliate with a lower score!)
10. Half rolls not at the centreline (manoeuvre not centred)

Lots of opportunities for errors here!  
The pilot who makes the least mistakes scores the highest!

# Immelman Turn



## 5. The Immelman Turn

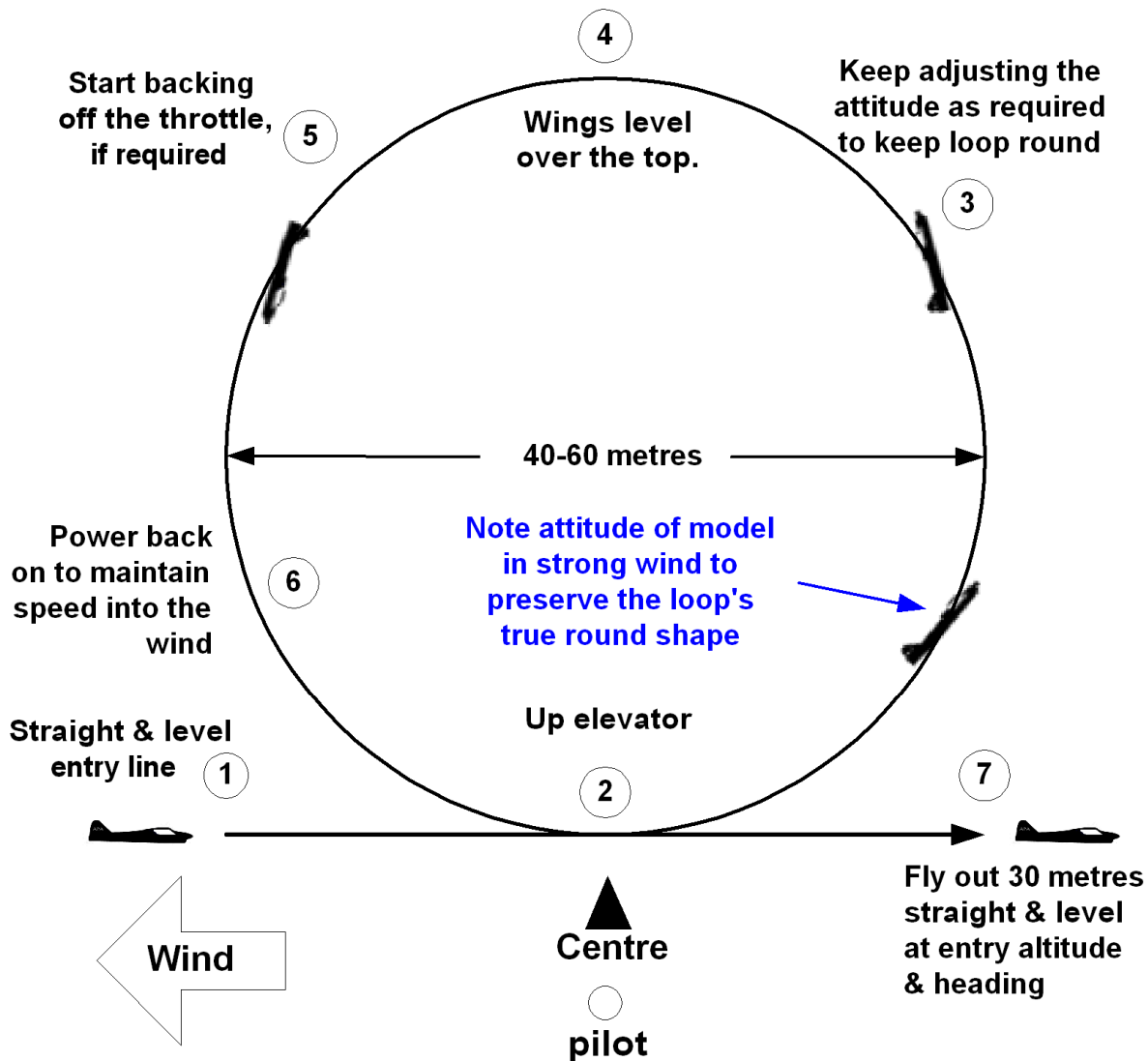
### HOW TO...

1. Because this manoeuvre is in the vertical plane, it is also flown at about 100 to 150 metres out from the pilot. Maintain a straight and level entry line into the wind, parallel to the runway, for at least 30 metres.
2. At (2) at full speed, begin a graceful half loop, squeezing the elevator to start with, backing it off if required when the vertical has been passed (effect of gravity) to keep the loop round.
3. At (3) when the half loop is finishing, apply aileron for a half roll.
4. The manoeuvre finishes after flying a 30-metre exit line.

### DOWNGRADES...

1. Half loop not round
2. Changes in radius during the half loop
3. Entry and exit lines not parallel to the runway
4. Half roll not immediately at the end of the half loop. There is a downgrade of several points for putting in any line at all at the end of the half loop... it may be better to roll a little bit early than late
5. Corkscrewing in or out
6. Manoeuvre not centred in front of the pilot
7. Manoeuvre flown too close, making it difficult to determine if the loop is round or not (and cricking the poor old judges' necks)

# Two Consecutive Inside Loops



## 6. Two Consecutive Inside Loops...

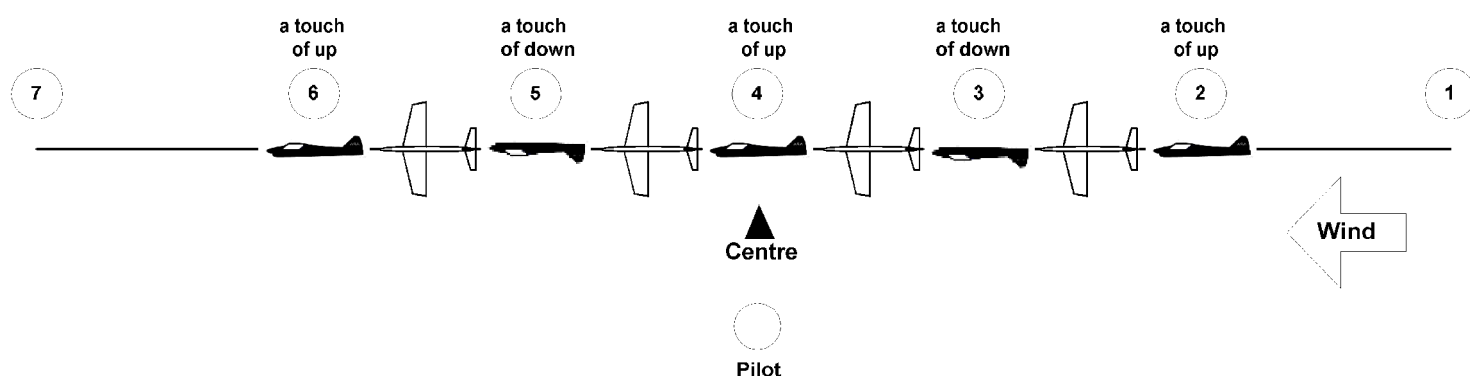
### HOW TO...

1. Because this manoeuvre is in the vertical plane, it needs to be flown on a line about 100 to 150 metres out to determine that the loops are indeed round. Fly high enough so that there is no danger of getting too low for your model's safety. The judges won't deduct much at all (if anything) for flying up a bit, but safe...
2. Enter into the wind at full power, straight (parallel to the runway) and level.
3. At the centreline, squeeze in enough elevator to achieve a graceful loop, making adjustments as required to overcome the effect of gravity. The wings should be level at the top of the loop.
4. On the way down, you may need to back off the power a bit, but remember you still need to do another loop, so don't be any slower at the bottom than the entry line in! Wings should be level at the bottom.
5. Repeat for the second loop.
6. Fly an exit line of at least 30 metres.

### DOWNGRADES...

1. Entry or exit lines not parallel to the runway, or climbing or diving
2. Entry and exit lines at different heights
3. Loops not of the same radius, and therefore not the same size
4. Corkscrewing in or out, or both!
5. Manoeuvre not centred
6. Flown too close to determine that the loops are round or not
7. Visible changes of radius during loops

## Two Consecutive Horizontal Rolls



### 7. Two Consecutive Horizontal Rolls...

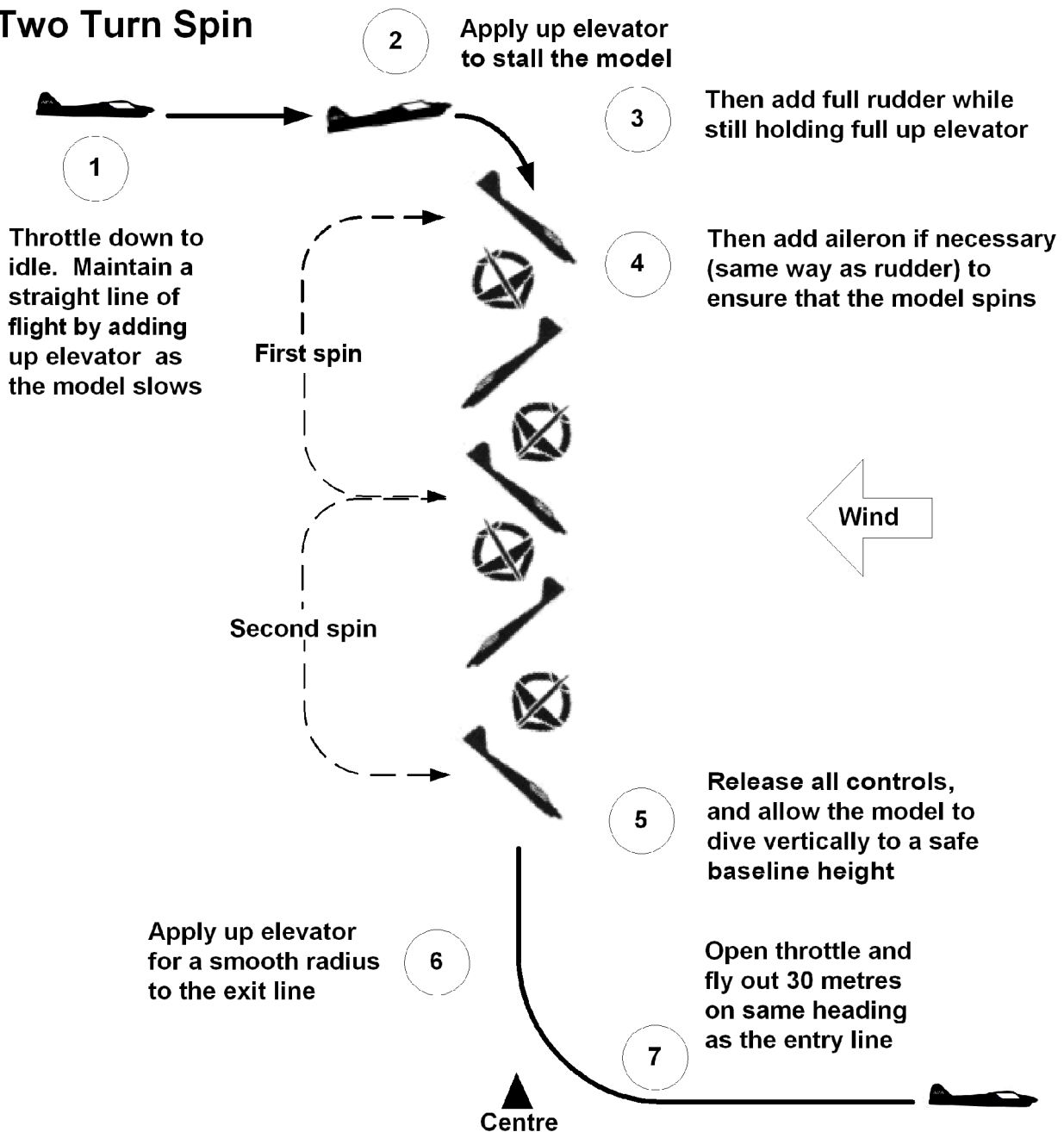
#### HOW TO...

1. Firstly, don't put your model at risk by flying too low! The judges won't deduct anything for flying up a bit, and you don't get extra points by having to abort the manoeuvre after the first roll by flying too low!
2. This manoeuvre can gobble up quite a bit of sky, so give yourself flying-room. Your line of flight should be about 100 to 150 metres out, and maybe 100 metres up (or more) for early attempts.
3. Because you finished the last manoeuvre (the Two Loops) upwind, when you get to the upwind end after that manoeuvre, it's really easy to get blown right back towards the centreline during the turnaround! If it's windy, you might have to fly way, way, way upwind to be able to turn around and get onto a nice straight line in time to be able to get the next manoeuvre centred.
4. The Two Rolls are done downwind, so the wind-speed will add to your model's speed. It's usually better for 'sport models' to fly at a fast airspeed for rolls rather than flying slowly, so expect to use up some sky!
5. Let's say you've finished your turnaround from the Two Loops OK; you're straight and level, and there is at least 100 metres distance to the centreline.
6. From (1) fly a 30-metre entry line. At (2) squeeze just a touch of up elevator, then let it off and start rolling. What you want here is to lift the nose just a degree or three so that after you've done the first part-roll to inverted, the model will be about level again. Maintain aileron to complete two consecutive rolls (either way, so long as they're the same way, with no pauses!) Don't let the aileron off until you have finished two rolls!
7. The nose will want to drop as soon as the wings are not level, so you will need to smoothly push in just a touch of down elevator as the wings pass through inverted at (3) to keep the nose up. Then ease it off.
8. As the model becomes upright again, it should be at the centreline (4). As the wings pass through level, you will need to smoothly squeeze in a touch of up elevator again to keep the nose up.
9. Repeat the process for the second roll.
10. Fly a 30-metre exit line to (7), parallel to the runway.
11. If you roll too fast, the elevator inputs have to become 'jabs', trying to 'keep up with the roll-rate', and the line will look very jumpy. Your model should take about 2 seconds to do one roll with full aileron. There are no manoeuvres in beginner aerobatics that require fast roll rates!
12. If you're thinking of using rudder during the rolls, you should be competing in F3A competitions!
13. If your model always heads for the ground when you're upside down, get an experienced aerobatic flyer to help you with trimming your model. This could easily be worth many points to you, each manoeuvre! The difference between the same model in a well-trimmed state and a badly trimmed state can be amazing.
14. By the way, trimming doesn't just mean using the Tx trim levers! If there's no one at your club who can help you, the Sports Pattern judges are usually able to give you quite a bit of help, before and after the event is run. Or go to a pattern comp. Just ask!

#### DOWNGRADES...

1. Roll rate not constant, and/or pauses in the roll
2. Changes in heading or altitude
3. Manoeuvre not centred
4. Rolls are rushed and jerky, lacking smoothness and gracefulness
5. VERY BIG downgrade for no elevator inputs at all
6. BIGGEST downgrade is for loss of control of the model, don't fly so low or close that you have to 'chicken out' and lose control! If you have to abort the manoeuvre, or even worse... crash, you score a zero!

## Two Turn Spin



### 8. Two Turn Spin

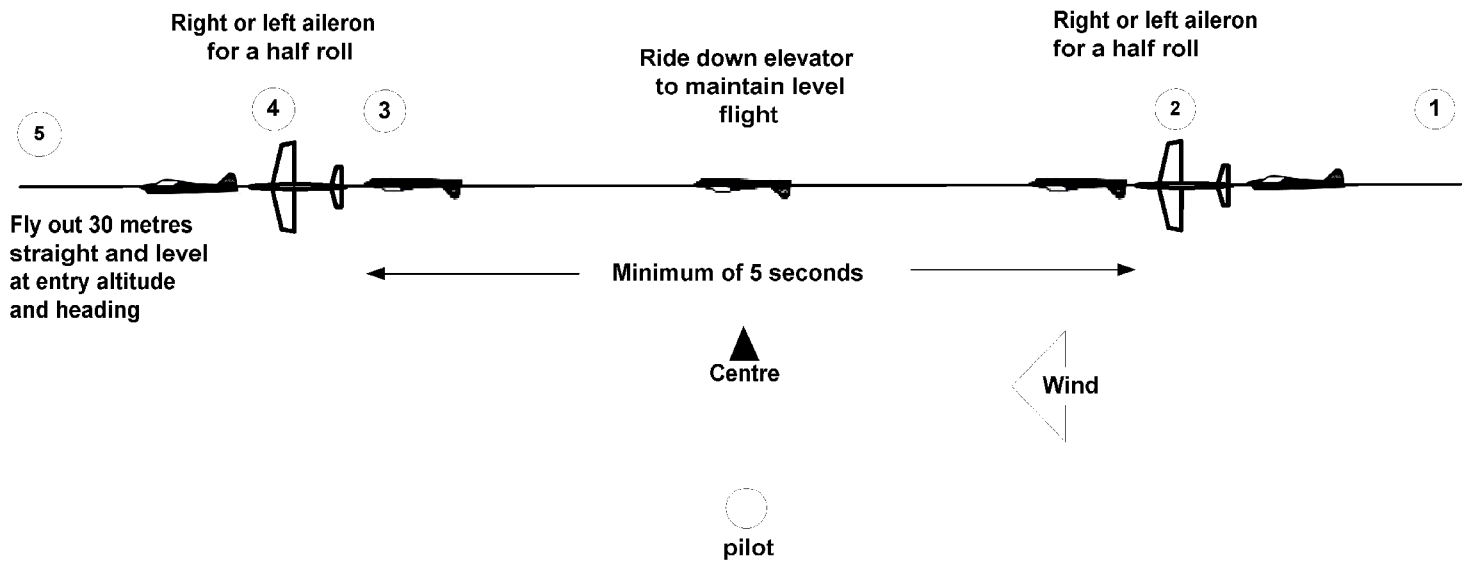
#### HOW TO...

1. Model is flown in on a slowing 30-metre entry line, parallel to the runway. At the centreline, the model should be quite nose-high, and about to stall. The model should still be aimed parallel to the runway.
2. At (2) full elevator is applied and held in, the model stalls, and the nose begins to drop.
3. Immediately add and hold in full rudder in the direction you want the model to spin.
4. Some models spin OK with only full rudder added to the full elevator, and others need aileron also to spin.
5. Just before (5) release the controls and the model will probably continue to turn for a quarter-rotation or so all by itself. You just have to practice, practice... to get to know just when to release the sticks.
6. If you've underdone the turns a little bit, finish with ailerons. If you've overdone them a little bit, use the ailerons to 'unturn' back to two turns. If you've only done one spin, or you've done nearly three, you've scored a zero, but you should still finish the manoeuvre off properly with a nice vertical dive lasting a few seconds, a lovely smooth part-loop, and 30-metre exit line. You never know, the judges might have blinked or something!

#### DOWNGRADES...

1. Wing-over or snap-roll at entry to the spin scores you zero. The cause is using the ailerons too soon.
2. Over or under rotation. One point off for each 15 degrees of error. 90° out = 6 points off. Tough, eh?
3. Entry and exit lines not parallel to the runway.
4. Spiral dive (not stalled) scores zero.
5. Flying too close, making the judges think about their chiropractor instead of your manoeuvre!

## Inverted Flight



### 9. Inverted Flight

#### HOW TO...

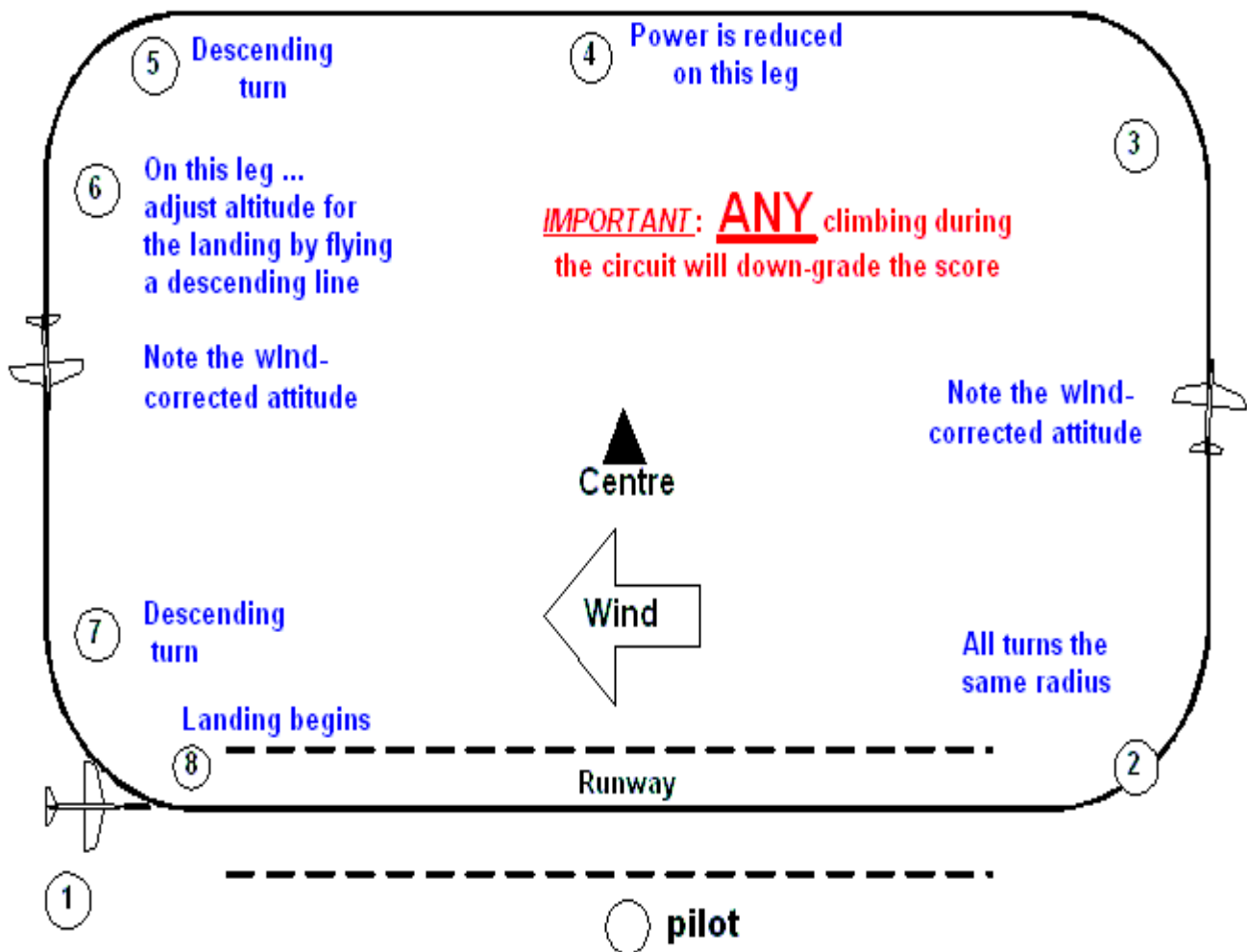
1. **ATTENTION, NOTE WELL !!!** The single biggest point-wasting mistake that newcomers make in this manoeuvre is to not go far enough upwind after the manoeuvre preceding it (the spin). Your model will be travelling fairly fast for about 8 to 10 seconds in this manoeuvre, so it will use up a lot of your line of flight.
2. To get the manoeuvre centred, after the previous manoeuvre the model must be flown upwind far enough to be able to do a turnaround that doesn't finish back on the centreline already! You can see this happen at almost every Sports Pattern event! If it's quite windy, it can take literally twenty times as long to get far enough upwind for a successfully-positioned turnaround than it takes for the downwind end.
3. At (1) your 30-metre entry line begins, parallel to the strip, wings level, not climbing or diving.
4. After your entry line, use aileron at (2) to half-roll to inverted. Ride down elevator to maintain level flight.
5. This is where good model-trim again becomes obvious. A well-trimmed model almost flies itself upright, needing only the slightest trace of up elevator to maintain height. And when it is rolled to inverted, it will feel exactly the same, except the slightest trace of elevator will be down elevator to maintain height.
6. From the end of the half roll (2) to the beginning of the half roll at (3) should take about 5 seconds.
7. At (4) use aileron to half-roll back to upright. It doesn't matter which way you do the rolls.
8. Maintain an exit line for 30 metres.
9. Remember that the inverted section is only about a third of the manoeuvre! Don't forget the entry and exit lines, the rolls, and the positioning.

#### DOWNGRADES...

1. Loss of heading at any stage, especially after the rolls
2. Inverted section not at least 5 seconds
3. Not centred
4. Rolls not exactly half-rolls
5. Roll rates not the same
6. Climbing or descending

# Rectangular Landing Approach

2-2005



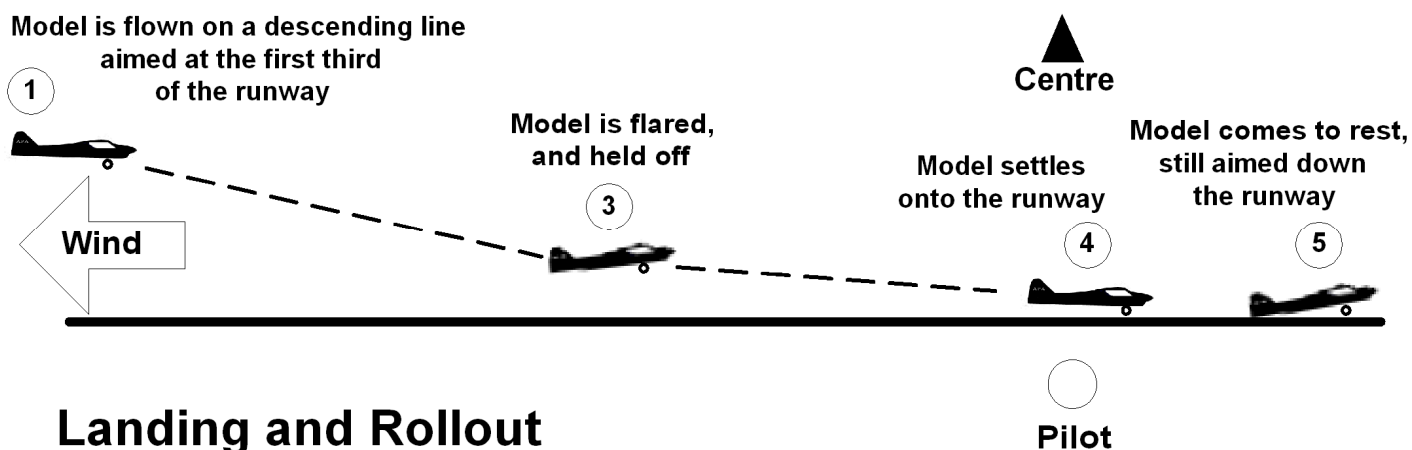
## 10. Rectangular Landing Approach

### HOW TO...

1. The entry height at position (1) must be the same height as at position (4). This is a very simple and straightforward manoeuvre, but very few pilots get good scores, simply because they don't follow the requirements of the manoeuvre! Establish an entry line to position (1) at an altitude chosen by the pilot. From position (1) if the model climbs anywhere at all during the manoeuvre, points are lost according to the severity of the gain in altitude. For example, if the manoeuvre was otherwise flown perfectly, but the pilot chose to pass over the strip at say 10 to 20 metres at position (1) (as is so commonly seen) on the upwind leg, and then the model climbs during the manoeuvre to say 100 metres on the downwind leg at position (4) (usually so they can still land if a dead-stick occurs), then many points would be lost!
2. Position the model so you're looking up at about 50 degrees (but no more than 60 degrees) as it passes in front of you. An entry-line of about 30 metres to position (1) should be flown over the far side of the runway, or even a bit further out (don't fly overhead... remember those poor old judges' stiff necks!) at a height that will be safe for the model for the whole circuit without any need to climb. This may be about 40 to 100 metres up, depending on the size chosen for the circuit, determined largely by how strong the wind is blowing.
3. At (2) (3) (5) and (7) the model makes turns of equal radius. (2) & (3) should be at equal height.
4. Somewhere along (4) on the downwind leg, the power is reduced. Where exactly depends on the individual model's characteristics (heavy/fast, or light/slow etc.). The turn at (5) may be a slightly-descending turn, since it's safer to have the nose down a little during a turn when the power is down.
5. The leg at (6) is the descending leg, where height is reduced sufficiently for a final slightly-descending turn at (7), but leaving enough height for a controlled descending trajectory for landing.
6. **NEVER** fly in such a position that you couldn't land safely if the motor stops. If you realise your entry line at (1) is lower than you had planned, just make the circuit smaller. In any event, you shouldn't need to fly more than about 150 metres away from yourself at any point for this manoeuvre.

## DOWNGRADES...

1. Any climbing at all after the entry line at (1)
2. Turns not of equal radius
3. Respective opposite legs not the same length
4. Deviations in lines



## Landing and Rollout

### 11. The Landing

#### HOW TO...

1. From the final turn, the model is flown on a descending line that is aimed to contact the runway at a point that is about one-third the way up the runway. The model should be flying quite slowly at this time.
2. Ideally, the model should be kept in a flat attitude (1) horizontal with the runway. If there were no power available, the model would keep slowing down in this attitude, making more and more drag, until it stalled. If just a 'click or three' of power is left on during this approach, the descending path shown (2) should be achieved. However with some 'light & slippery' models, just two clicks might let the model fly on forever until the fuel is all gone! Achieving the model's attitude shown, using a tiny amount of power as described, has to score better than a 'simulated dead-stick' style, so it's worth practicing!
3. If it looks like the model is going to land short, add a click or two more power to 'draw' the model a little further along the strip. The model's attitude should not alter at all.
4. If the model looks like it's going to overshoot, then back off the power, and let it slow down some more.
5. When the model is about half a metre above the runway, the 'flare' (3) should be gently started to slow it down more. This means simply adding and maintaining a touch more elevator to lift the nose a 'degree or three', which will cause more drag. Be careful to not add too much though, or you might force a stall...
6. The model is then 'held off', maintaining the slightly nose-high attitude. The model keeps slowing down, losing lift and height, until it is about to touch the runway. Gently releasing the elevator at this time (4) will allow the tail to rise, helping the model to not bounce back into the air when the wheels touch.
7. The power can then be set to idle, and the model is allowed to roll to a stop (5) still parallel with the runway. Turn off the motor. Allow your caller to retrieve the model for you.
8. If you do choose to taxi the model back, don't turn the model towards the pits or people. Instead, turn it outwards, away from everyone, and taxi back parallel with the runway. Steering an unrestrained model at motor running, especially where the model is close, and most especially if those people are nervous judges, is a sure-fire way to score zero for your landing. Remember common sense and safety.
9. Never stop 'controlling' the model until your assistant/caller has the model restrained.

## DOWNGRADES...

1. Landing path not maintained straight in relation to the runway
2. Bouncing at touchdown (usually a result of still too much airspeed)
3. Loss of heading after touchdown, during the roll-out
4. Proper control not being shown (the landing is an 'arrival')
5. Not following commonsense safety issues, especially after coming to a stop

Please note, in some of the HOW TO's, additional issues are discussed other than the basic manoeuvre geometry; such as: where it says don't point your model at people, don't do the two rolls too low, etc.

These words have been included for the benefit of budding aerobatic pilots. They are an accumulation of observations and knowledge from many experienced people. We hope they help you avoid problems, and have more fun.

**Fly for fun, and make it fun for others, too!**

## SPORTS PATTERN MANOEUVRES

Take off into wind. Turn-around to downwind, and trim pass to the downwind end. Turn-around again and trim pass again to the upwind end. Turnaround again to downwind. Stop shaking, and commence maneuvers.

- |    |                                  |   |
|----|----------------------------------|---|
| 1  | Downwind<br>start & finish close | Procedure Turn (in front of you)                              |
| 2  | Downwind<br>start & finish close | Outward Figure of Eight                                       |
| 3  | Upwind<br>start & finish close   | Inward Figure of Eight  |
| 4  | Downwind<br>further out          | Cuban Eight   |
| 5  | Upwind<br>further out            | Immelman Turn   |
| 6  | Upwind<br>further out            | Two Inside Loops  |
| 7  | Downwind<br>further out          | Two Consecutive Rolls   |
| 8  | Upwind<br>further out            | Two-Turn Spin   |
| 9  | Downwind<br>further out          | Inverted Flight   |
| 10 | Upwind<br>start & finish close   | Rectang'r Landing Circuit                                     |
| 11 | Upwind<br>center of strip        | Landing (in front of you)                                     |
| 12 | Stationary<br>model restrained   | Try to smile, grovel to judges,<br>offer bribes, excuses, etc |

*Fly for fun, and make it fun for others, too!*

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## SPORTSMAN

- |    |  | K-Factor |
|----|--|----------|
| 1  | <b>U</b> Take Off Sequence: release, straight take-off & climb-out, 90° turn away        |          |
| 2  | <b>U</b> <b>DOUBLE IMMELMAN, half rolls</b>  | 2        |
| 3  | <b>D</b> <b>SLOW ROLL</b>  | 3        |
| 4  | <b>U</b> <b>TWO CONSECUTIVE LOOPS</b>  | 3        |
| 5  | <b>D</b> <b>TWO CONSECUTIVE ROLLS</b>  | 3        |
| 6  | <b>U</b> <b>TOP HAT with half roll up and down</b>                                       | 3        |
| 7  | <b>D</b> <b>TWO OUTSIDE LOOPS</b>  | 4        |
| 8  | <b>U</b> <b>SQUARE LOOP ON CORNER</b>  | 3        |
| 9  | <b>D</b> <b>INVERTED FLIGHT</b>  | 2        |
| 10 | <b>U</b> <b>STALL TURN, 1/4 roll up and down</b>   | 2        |
| 11 | <b>D</b> <b>CUBAN 8 with half rolls</b>  | 3        |
| 12 | <b>U</b> <b>TWO TURN SPIN</b>  | 2        |
| 13 | <b>U</b> <b>Landing sequence: 90° turn onto runway centerline, landing &amp; rollout</b> |          |

13/2/2011

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K Factor  
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