



Set Manoeuvres 2020



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Kenny Ko flying all 40 manoeuvres

'K'		Manoeuvre	Judges Notes
1	1	Pie Dish	<ul style="list-style-type: none"> The helicopter will prescribe remote circuits centred on the contest centreline. The helicopter will fly sideways at constant speed, altitude and attitude with the disk as close as possible to the vertical position. There will be at least 4 complete revolutions, skids in, skids out, nose up or nose-down.
2	1	Stationary Metronomes	<ul style="list-style-type: none"> This manoeuvre consists of a repetitive metronome with 6 arcs. The manoeuvre will be symmetrical about the centre-line and of consistent height, length of traverse and tempo. The manoeuvre may be performed tailboom vertical or horizontal.
3	1	Knife-edge Pirouette	<ul style="list-style-type: none"> The knife edge pirouette should be entered from medium / fast-forward flight Climb at the centre of the field and make a half roll to knife edge Make one and a quarter knife edge piro Exit the piro in the opposite angle of the entry Level the helicopter at the same height as the entry <p>Scores will be generated from accuracy, definition, constant height and good positioning.</p>
4	1	Inverted Nose-in Circuit	<ul style="list-style-type: none"> The helicopter shall be made to move in a remote circle keeping the nose constantly pointing at the centre of the circle. At slow pace (not a pie dish) <p>Judges will look for consistent height, centring and speed.</p>
5	1	Figure 8 Inverted Circuit	<ul style="list-style-type: none"> The 8 should be made up of two circular circuit equal sizes, either side of the centre line (not a lazy 8) At slow pace (not a pie dish)
6	1	Backwards Loop	<ul style="list-style-type: none"> While traveling along the flightline in a backwards direction, the helicopter will perform a single backwards loop. <p>The judges will be looking for a good 'round' loop, positioned on the centre line, and consistent entry and exit points.</p>
7	1	Stationary Fwd/ Bkwd Flips (2)	<ul style="list-style-type: none"> The stationary forward / backward flips will be marked on good positioning on the centre line, accurate height control and smooth rotation of the disk. Not necessarily the lowest altitude.
8	1.5	Figure 8 pie dish	<ul style="list-style-type: none"> The helicopter will prescribe 2 remote circuits as a horizontal figure 8. The crossing point centred on the contest centreline. The helicopter will fly sideways at constant speed. Altitude and attitude with the disk as close as possible to the vertical position. There will be at least 2 complete figure 8s. The manoeuvre may begin skids in, skids out, nose up or nose-down.
9	1.5	Tumbling Loop	<ul style="list-style-type: none"> The helicopter will perform continuous Forward or Backward tumbles while it describes a Forward or Backward Loop in the sky. Minimal 8 tumbles The Loop will be centred, round and the rate of tumbling will be uniform.



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10	1.5  	Inverted Backward Loops	<ul style="list-style-type: none"> Two consecutive inverted backward loops entered from backward inverted flight. <p>The judges will be looking for good 'round' loops, positioned on the centre line, and consistent entry and exit points.</p>
11	1.5 	Sustained Chaos	<ul style="list-style-type: none"> The chaos should be sustained for a minimum of 10 seconds, up to a maximum of 30 seconds. The Manoeuvre will be stationary in front of the pilot and accurately centred. Pirouette rate should be sufficiently high to distinguish clearly the manoeuvre from a piroflip.
12	1.5 	Snake	<ul style="list-style-type: none"> Consist of at least 4 joined circuits along the flight line. Tailboom-horizontal Switching skids-in to skids-out and vice-versa between half circuits. Each half circuit must be clearly presented as a distinct half-circle with the disc close to the vertical.
13	1.5  	Elevator Slapper	<ul style="list-style-type: none"> Rainbow with a half-roll at the mid-point. This manoeuvre will require 6 rainbows to complete The stop points should be consistent in height and of equal distance from the centre-line. Each half-roll shall be positioned at the centre-line with the tail boom vertical.
14	1.5 	Death Spiral	<ul style="list-style-type: none"> The Death Spiral consists of a minimum 50m vertical drop. Elevator Rolls while descending on knife-edge. The vertical path should be on the judges centre-line. Inverted recovery as low as the pilot is comfortable with.
15	1.5  	Travelling Pirouetting Roll / Flip	<ul style="list-style-type: none"> The 2 pirouetting rolls / flips will be executed as a traveling manoeuvre continuously with no hesitation and constant height throughout. The mid-point of the manoeuvre shall be positioned on the centre-line. Inverted recovery should follow immediately after stopping the elevator rolls. Exit should be an inverted tail in hover as low as the pilot is comfortable with.
16	1.5 	Backwards Rolling Circle	<ul style="list-style-type: none"> A horizontal circle performed with backward aileron rolls. <p>The manoeuvre will be centred on the judges eye-line and exhibit good circular shape, accurate positioning with respect to the centre-line and consistent height throughout with a consistent rate of rolling.</p>
17	1.5 	K 1.5 Auto	<p>An autorotation with 1 roll.</p> <ul style="list-style-type: none"> Start with a minimum fall of 25m in autorotation. A 360 degree Aileron Roll. The helicopter path should be as straight as possible. Land as close as possible to a marker positioned 3m in front of the pilot on the field centreline. The manoeuvre will show consistent height loss, uniform forward speed.
18	2 	Forward Rolling Loop	<ul style="list-style-type: none"> The forward rolling loop consists of a loop while performing a minimum of 2 consecutive rolls. <p>The manoeuvre shall have a consistent roll rate with a circular loop centred on the judges eye-line. The judges will be looking for good 'round' loops, positioned on the centre line, and consistent entry and exit points.</p>
19	2 	Singapore Sling	<ul style="list-style-type: none"> Pirouetting Metronome with a stop and reversal of pirouette direction at each arc reversal. The Tailboom position at the point of reversal must be the same at each reversal of pirouette direction. At least 6 arcs are required to complete the manoeuvre. <p>Judges will be looking for consistent stop points, accurate height control and at least 2 complete pirouettes per arc are required.</p>



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20	2 	Backwards Rolling 8	<ul style="list-style-type: none">• A horizontal figure 8 performed with backward aileron rolls.• The lobes of the 8 will be centred on the judges view line and each lobe shall be a clearly defined full circle. <p>The manoeuvre will exhibit accurate positioning and height control with a consistent rate of rolling.</p>
21	2 	Tumbling 8	<ul style="list-style-type: none">• A horizontal figure 8 performed with either forward or backward tumbles.• The lobes of the 8 will begin and end on the judges eye line and each lobe shall be a clearly defined full circle. <p>The manoeuvre will exhibit accurate positioning and constant height throughout with a consistent rate of tumbling and speed of traverse along the 8. Each tumble must exhibit a smooth rotation of the disk with no hesitation at any point.</p>
22	2 	Chaos Loop	<ul style="list-style-type: none">• A vertical circle doing a continuous traveling chaos describing a vertical loop <p>The judges will be looking for an accurate, round, loop made from a traveling chaos. The Chaos pirouette rate should be fast and the more chaos's through the loop the better.</p>
23	2	Jupiter Probe	<p>A Vertical Pirouetting 8 with half-flips.</p> <ul style="list-style-type: none">• The model will execute a pirouetting Vertical 8 with entry skids down along the flight line at the centre of the 8.• On completion of the first half-loop the model will piro-flip and complete the second half of the loop skids-in.• At the centre of the 8 the model will remain skids-out and begin the lower loop of the 8.• At the bottom of the 8 the model will piro-flip to skids in and finish the lower loop, exiting in the same direction as entry.
24	2	Piro Pogo (3 times)	<p>Aggressive bouncing piro manoeuvre with half piro flips at the top.</p> <ul style="list-style-type: none">• Start in a stationary upright pirouetting hover in front of the judges.• The helicopter will perform a 20m pirouetting climb• Followed by a 1/2 piro flip to inverted at the top of the climb, followed immediately by a 20m inverted pirouetting descent returning to the start position.• At the bottom, the helicopter will immediately, perform a 20m inverted pirouetting climb, followed by a 1/2 piro flip to upright at the top of the climb a 20m upright pirouetting descent back to the start position.• The entire sequence is repeated at minimum 3 complete repetitions.• End in a stationary hover <p>The judges are looking for a fast and consistent pirouette speed (at least 1 pirouette per second), consistent reversal points, a seamless flow throughout the manoeuvre without hesitations and fast vertical climbs and descents.</p>
25	2 	K2 Auto*	<p>An autorotation with 1 1/2 rolls ending in a half flip.</p> <ul style="list-style-type: none">• Start with a minimum fall of 25m in autorotation before the next step.• A 360 degree Aileron Roll.• A further half roll to inverted.• The path of the helicopter should follow a straight line to the landing spot.• Ending with a Forward Elevator Flip, which should be as low as the pilot is comfortable with. <p>The manoeuvre will show consistent height loss, uniform forward speed and land as close as possible to a marker positioned 3m in front of the pilot on the field centreline.</p>



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26	2.5 	Pirouetting Waltzer	<p>This manoeuvre is a series of at least 4 tight dynamic Pirouetting Walls of Death smoothly combined with much larger radii arcs of Pirouetting Walls of death to form a circle.</p> <ul style="list-style-type: none"> • The tight walls of death shall be equally spread around the larger. • The tight walls of death shall be no larger than half the larger. • The helicopter must complete one complete circle centred on the judges' eye-line.
27	2.5	Hammock	<p>Pirouetting half-pipes circuit.</p> <ul style="list-style-type: none"> • The model will enter the manoeuvre while continuously pirouetting and pull up to a vertical stall turn. • At the top the direction of pirouetting will reverse and the direction of movement of the model will change to continue the next descent and climb to the next stall turn. • There must be at least 8 peaks around the prescribed horizontal circuit.
28	2.5 	Serpent	<p>A Pirouetting Snake back and forth.</p> <ul style="list-style-type: none"> • A Pirouetting Snake flown as a series of joined half circuits along the flightline with a 180 degree turn-around followed by the same number of joined half circuits in the reverse direction down the flightline. • At least 4 half circuits in each direction <p>All arcs to be the same size, height and speed and the pirouette rate to remain constant. Each half circuit must be clearly presented with the disc close to the vertical.</p>
29	2.5	Typhoon	<p>Rolling Funnel in reverse directions</p> <ul style="list-style-type: none"> • Start from a side-on stationary hover. • Tail stand into a single tail-down rolling funnel with a minimum of 8 rolls. • Tail stand stop at the start position, ½ piro to nose-down. • Reverse the direction of the funnel circuit for a single nose down rolling funnel with a minimum of 8 rolls. • Tail stand stop at the start position, back to stationary hover. • The angle of the boom should be maintained whilst rolling as close to vertical as possible. <p>The shape of the manoeuvre should be a circle with no deviation from this during rolls.</p>
30	2.5	Wheel of Fortune 12	<p>Metronoming Vertical Circle.</p> <ul style="list-style-type: none"> • Start from a nose in, stationary hover followed by a brief stationary elevator metronome (Tic Toc) at the 12 o'clock position, with the nose pointing vertically down and the full rotor disk presented to the pilot and judges. • The helicopter shall then prescribe a complete 12 point vertical clockwise metronoming circle with the helicopter nose always pointing towards the centre of the circle. <p>The judges will be looking for a consistent travel speed around the circle and consistent metronome frequency.</p>
31	2.5	Reversing Sidewinder	<p>Piro metronoming traveling circle with reversals.</p> <ul style="list-style-type: none"> • The entry to the manoeuvre may be from a traveling or fixed pirouetting metronome. • A remote horizontal circle flown at constant height with the helicopter continuously performing pirouetting metronomes • Reversing pirouette direction after a whole metronome. <p>The axis of the pirouetting metronomes must always point towards the centre of the horizontal circle. The pirouette rate should be consistent and have consistent pirouettes in each arc of the metronomes. Ideally there should be 1 pirouette per arc.</p>



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32	2.5 	K 2.5 Auto*	<p>The K2.5 auto is of an autorotational landing with Piro flip, rolls ending in a half flip.</p> <ul style="list-style-type: none"> • Start with a minimum fall of 25m in autorotation. • A Pirouetting Flip • Followed by a 360 degree Aileron Roll. • A further half roll to inverted • The path of the helicopter should follow a straight line to the landing spot. • Ending with a Forward Elevator Flip, which should be as low as the pilot is comfortable with. <p>The manoeuvre will show consistent height loss, uniform forward speed and land as close as possible to a marker positioned 3m in front of the pilot on the field centreline.</p>
33	2.5 	Golden Arches [Enlarged]	<p>This manoeuvre is a triangular circuit of three big M's" comprised of approximately two 10 Metres wide arches per side, each beginning one Metre above ground and reaching 30 Metres at the highest point.</p> <ul style="list-style-type: none"> • Start at the left corner in front of the pilot, with the helicopter tail-in to the flight line. • During the first arch (half "M"), the helicopter must describe one complete pirouette to the top (when vertical). <ul style="list-style-type: none"> ○ A tail reversal at the top. ○ Then one complete pirouette in the opposite direction during the descent. • At the bottom of each arch, a 1 second pause is required then the tail rotation changes again for the next arc. • Complete the 3 M's in a triangular circuit. <p>When done correctly the helicopter will be tail in to the flight line at all three corners in upright position.</p>
34	3 	Hong Kong Twister	<p>Two big vertical circles with rotating, traveling Pirouetting Metronomes (piro tic-tocs)</p> <ul style="list-style-type: none"> • Starting at 12 o'clock in a tail in hover (top of the vertical circle). • Start Pirouetting Metronoming continuously, starting skids away from the pilot. • The model will prescribe a vertical circle in front of the judges. • At each ¼ of the vertical circle the axis of the helicopter should have continuously rotated by exactly 90 degrees with a minimum of 3 pirouetting metronomes per quarter. <ul style="list-style-type: none"> ○ At 3 o'clock the skids should face the centre of the vertical circle. ○ At 6 o'clock the skids should face towards the pilot. ○ At 9 o'clock the skids should face the centre of the vertical circle. ○ At 12 o'clock the skids should face away from the pilot. • After completing the first vertical circle, reverse the direction of the pirouette and start the next vertical circle without stopping travelling • At each ¼ of the vertical circle the axis of the helicopter should have continuously rotated by exactly 90 degrees with a minimum of 3 pirouetting metronomes per quarter. <p>The rotating direction should be opposite to the first vertical circle.</p> <ul style="list-style-type: none"> ○ At 3 o'clock the skids should face away from the centre of the circle. ○ At 6 o'clock the skids should face towards the pilot. ○ At 9 o'clock the skids should face away from the centre of the circle. ○ At 12 o'clock the skids should face away from the pilot. • Finish the manoeuvre in a tail hover at 12 o'clock.



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35	3	Time Machine	<p>A clockwise skids-out Big Ben followed by anticlockwise skids-in Big Ben (Clock).</p> <ul style="list-style-type: none">• Start from a low stationary nose-out hover.• The helicopter will immediately be presented directly in front of the judges' eye-line with its nose vertical.• The helicopter will then be made to rotate yawing clockwise prescribing the 12 points of a clock-face skids out (skids facing away from the pilot and judges),.• Each point defined by a 'tick' of the metronome.• At the 12 o'clock metronome the helicopter will be made to half roll on the spot.• The clock-face will again be described this time anticlockwise as viewed by the Judges, using skids-in metronomes.• Upon reaching 12 o'clock the helicopter will return to a stationary nose-in hover in the same position the manoeuvre began.
36	3	Koob	<p>Pirouetting Wall of Death with 4 vertical Pirouetting Loops with Pirouetting Flips.</p> <ul style="list-style-type: none">• Entering along the flight line, the model will enter a vertical piro-loop with skids-out.• At the top of the loop, the model will half piro-flip to skids-in and then complete the loop.• At the bottom of the loop the model will reverse its piro-direction and then enter the first quarter of a skids-in Piro Wall of Death.• The model will then enter a second piro-loop again with a half piro-flip at the top to skids - out.• At the bottom of this loop the model will again reverse piro-direction and fly the next quarter Piro Wall of Death skids-out.• The manoeuvre will continue in this way to complete a further 2 loops and the remaining piro wall of death to exit the manoeuvre traveling in the same direction and height as entry.
37	3	Rolling Globe Reversal	<p>This manoeuvre is a Rolling Globe with flight direction reversal at the top of each loop and rolling direction reversal at the bottom of each loop.</p> <ul style="list-style-type: none">• Entering at the South Pole.• Start a rolling Loop• Rotating the loop by 45 degrees at the bottom of each loop until an imaginary globe in the sky has been prescribed comprising 5 continuous loops.• The direction of rolling will reverse at every pass at the South Pole.• The direction of flight of the helicopter (nose first, tail first) will reverse at the top of each loop.• Exit from the manoeuvre should be the same as the point of entry, but with the helicopter moving in the opposite direction. <p>Each loop must be round and the manoeuvre must be accurately described.</p>



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38 	3	Timewarp	<p>This manoeuvre may be visualized as performing two traveling 12 point tic-toc's circuit while the model prescribes a figure 8 with the direction of the rudder being reversed half-way through the manoeuvre after the first circuit.</p> <ul style="list-style-type: none">• Start from a side-on hover at the lowest height with which the pilot is comfortable.• Perform a flat horizontal skids-in tic-toc clock circuit with a 12 step clockwise rotating tic-toc to complete a 360 degrees tic-toc pirouette, describing a circle.• At the centre the rudder rotation direction is reversed.• The second circuit is skids out reversed rotation 12 step counter-clockwise rotating tic-toc to complete a 360 degrees tic-toc pirouette, describing the second circle.• Ending in a stationary hover at the starting point facing the same direction at the entry hover. <p>The manoeuvre should be constant height, speed and pirouette rate with the two circuits being equal in size. The Mainshaft axis of the model should always point to the centre of the circuit.</p>
39 	3	Black Hole	<p>Create a rolling "tangent" spiral with rotating flips in the centre.</p> <ul style="list-style-type: none">• Starting in horizontal forward flight, from left or right.• At the centre line (before the judges) begin 4 forwards vertical rolling loops getting smaller (Spiral in).• At least 4 rolls in the outer loop, 3, 2,1 rolls in the subsequent loops• At the centre, start flipping on the spot (e.g. forward flips).• Whilst flipping, rotate the axis 360 degrees with a minimum of 4 flips (e.g. left pirouette).• A short stop in a sideways hover at the centre of the flight line.• Start flipping in the reverse flip direction (e.g. backwards flips).• Whilst flipping, rotate the axis 360 degrees in the opposite rotation with a minimum of 4 flips (e.g. right pirouette).• Ending sideways at the centre of the flight line (no pause required)• Use the flipping momentum to start the backwards spirals• Then begin 4 backwards (tail first) rolling loops getting bigger (Spiral out) with opposite roll direction as the entry. <p>The judges will be looking for round smooth loops, clean transitions, positioning and overall symmetry.</p>
40 	3	Rolling Rainbow Crown	<p>Create the shape of a 5 point star (A pentagram) when seen from above. The star should be around 40m in diameter. The Helicopter should not go flatter than 40 degrees at the star points.</p> <ul style="list-style-type: none">• A stationary hover centred in front of the pilot.• Start the manoeuvre with a tail stand and arc away from the pilot.• Do a tail down rolling rainbow to the next point in the star.• A minimum of 2,5 rolls per arc is required.• Clear stop at the end of each arc, not flatter than 40 degrees.• ½ piro to nose down.• Do a nose down rolling rainbow to the next point in the star.• ½ piro to tail down.• Repeat to complete the star shape.• Finish in a stationary hover. <p>The judges will be looking for the same number of rolls per arc, same arc heights, clean stops, degrees at the endpoints and overall symmetry.</p>