This page contains information on learning to fly remotely controlled helicopters.

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| **Learning Tips**  Basic hovering steps:   |  |  | | --- | --- | | bullet | [Learn Cyclic Control](http://www.rchelicopterweb.com/LearningToFly/LearningElements/Cyclic.htm). Your instructor is controlling the rudder and the collective pitch/throttle. | | bullet | [Learn Collective Pitch/throttle and Rudder](http://www.rchelicopterweb.com/LearningToFly/LearningElements/CollectiveAndRudder.htm). Your instructor will control the cyclic so that you can focus on collective. | | bullet | [Learning to Control Both Sticks](http://www.rchelicopterweb.com/LearningToFly/LearningElements/AllControls.htm). Hey, you are hovering! | | bullet | [The hovering "M"](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TheHoveringM.htm). This is your first mastering of controlled hovering. | | bullet | [Landing and takeoff](http://www.rchelicopterweb.com/LearningToFly/LearningElements/LandingAndTakeoff.htm). You can do it all yourself now. Yes, this includes taking off your training gear. | | bullet | [Tail in the wind](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TailInTheWind.htm). This is no problem with nowadays gyro's. | | bullet | [Sideways wind](http://www.rchelicopterweb.com/LearningToFly/LearningElements/SidewaysWind.htm). You are getting close to mastering the hover. | | bullet | [Hovering solo](http://www.rchelicopterweb.com/LearningToFly/LearningElements/HoveringSolo.htm). There goes the buddy lead, your instructor can no longer take over control. | | bullet | [Tail-in circle](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TailInCircle.htm). You really mastered hovering a helicopter!. | | bullet | Practice the steps above in moderate wind.  **You mastered the basic hovering skills.** |   Advanced hovering steps:http://www.rchelicopterweb.com/images/tweety1b.gif   |  |  | | --- | --- | | bullet | [Flat tail-in figure of eight](http://www.rchelicopterweb.com/LearningToFly/LearningElements/FlatTailinFiguraOfEight.htm) with slight nose rotation. First steps in letting go of the tail. | | bullet | [Climb and descend](http://www.rchelicopterweb.com/LearningToFly/LearningElements/ClimbAndDescend.htm). Now you get used to the heli climbing considerably (5m). | | bullet | [Flat figure of eight with the nose following flight direction](http://www.rchelicopterweb.com/LearningToFly/LearningElements/FlatFigureOfEightNoseFollowsFlightDirection.htm) (5m). | | bullet | [Fast sideways with semi stall turn](http://www.rchelicopterweb.com/LearningToFly/LearningElements/FastSidewaysWithSemiStallTurn.htm) | | bullet | [Vertical Top hat](http://www.rchelicopterweb.com/LearningToFly/LearningElements/VerticalTopHat.htm). | | bullet | [Large circle (50m)](http://www.rchelicopterweb.com/LearningToFly/LearningElements/LargeCircle.htm). | | bullet | [Large square (50m)](http://www.rchelicopterweb.com/LearningToFly/LearningElements/LargeSquare.htm). | | bullet | [Round figure of eight with nose following flight direction](http://www.rchelicopterweb.com/LearningToFly/LearningElements/RoundFigureOfEight.htm). | | bullet | [Remote circles](http://www.rchelicopterweb.com/LearningToFly/LearningElements/RemoteCircles.htm). | | bullet | [Nose-in hover](http://www.rchelicopterweb.com/LearningToFly/LearningElements/NoseInHover.htm). | | bullet | [Nose-in landing and takeoff](http://www.rchelicopterweb.com/LearningToFly/LearningElements/NoseInLanding.htm). | | bullet | Practice the steps above in moderate wind.  **You mastered the hovering skills.** |   First slow and low "acrobatics" http://www.rchelicopterweb.com/images/skydiver_falling_md_clr.gif   |  |  |  | | --- | --- | --- | | bullet | [Takeoff and approach to a height of 20m](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TakeoffAndApproach20m.htm). | | | bullet | [Slow pirouettes](http://www.rchelicopterweb.com/LearningToFly/LearningElements/SlowPirouette.htm). | | | bullet | [Stall turns](http://www.rchelicopterweb.com/LearningToFly/LearningElements/StallTurns.htm). | | | bullet | Remote tail-in circles. | | | bullet | Remote nose-in circles. | | | bullet | Remote sideways figure of eight. | | | bullet | [Learning to Fly Backwards](http://www.rchelicopterweb.com/LearningToFly/LearningElements/BackwardsFlight.htm). | | | bullet | Hovering vertical square. | | | bullet | Pirouetting vertical square. | | | bullet | Pirouetting remote circle. | | | bullet | [Backwards circle](http://www.rchelicopterweb.com/LearningToFly/LearningElements/BackwardsCircle.htm). | | | bullet | Backwards remote circle. | | | bullet | [Backwards figure of eight](http://www.rchelicopterweb.com/LearningToFly/LearningElements/BackwardsFigureOfEight.htm). | | | bullet | 540 Stall Turns (tail and nose). | | | bullet | Dual direction stall turn. | | | bullet | Backwards stall turn. | | | bullet | Sideways stall turn. | | | bullet | Practice the steps above in moderate wind.  **You mastered the basic flying skills.** | | | First fast and high "aerobatics"   |  |  | | --- | --- | | bullet | High and fast flying. | | bullet | Fast figure of eight. | | bullet | [Learning the Loop](http://www.rchelicopterweb.com/LearningToFly/LearningElements/Loop.htm). | | bullet | Learning the Roll. | | bullet | [Knife Edge Pirouette](http://www.rchelicopterweb.com/LearningToFly/LearningElements/KnifeEdgePyro.htm). | | bullet | The ripper. | | bullet | [Auto Rotation landing](http://www.rchelicopterweb.com/LearningToFly/LearningElements/AutoRotation.htm). **You mastered the flying skills and the elementary aerobatics.**  First steps in 3D flighthttp://www.rchelicopterweb.com/images/space_boy_beside_rocket_md_clr.gif   |  |  | | --- | --- | | bullet | [High Flips (sideways, forwards and backwards)](http://www.rchelicopterweb.com/LearningToFly/LearningElements/HighFlips.htm). | | bullet | [Inverted Hover (high altitude)](http://www.rchelicopterweb.com/LearningToFly/LearningElements/InvertedHover.htm). | | bullet | Inverted Pirouette (high altitude). | | bullet | [Inverted low hover](http://www.rchelicopterweb.com/LearningToFly/LearningElements/LowInvertedHover.htm). | | bullet | Inverted low pirouette | | bullet | Low flips (sideways, forwards and backwards). | | bullet | Death spiral. | | bullet | Pumping low pirouette. | | bullet | [Tail stand launch](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TailStandLaunch.htm). | | bullet | Backwards rolls. | | bullet | Inverted pirouetting remote circle. | | bullet | Inverted pirouetting figure of eight. | | bullet | Noise-in funnel. | | bullet | Tail-in funnel. | | bullet | High piro flips. | | bullet | Inverted nose-in funnel. | | bullet | Inverted tail-in funnel. | | bullet | Low piro flips. | | bullet | Tumbling circuits. | | bullet | High sustained chaos. | | bullet | Low sustained chaos. | | bullet | Pirouetting loop. | | bullet | Pirouetting autorotation. | | bullet | Rolling autorotation. | | bullet | Rolling loop. **You mastered good 3D aerobatics. For a nice description of moves look at:** [**http://www.rchelicopter.co.uk/moves.htm#**](http://www.rchelicopter.co.uk/moves.htm) | | | | | bullet | | First steps in 3D flighthttp://www.rchelicopterweb.com/images/space_boy_beside_rocket_md_clr.gif |   Important prerequisites or tips in order to learn to fly model helicopters fast, safe and without crashing every week:     |  |  | | --- | --- | | bullet | **Have an experienced flyer help you**: Setting up a helicopter for the first time is not easy. It is very unlikely that you will setup the heli correctly by yourself. A helicopter that has been setup properly flies much better and is more predictable! Furthermore, he may give you additional hints and tips on learning and he may point you at certain mistakes you make, which may be very helpful. Finding a good instructor is the most valuable investment in your helicopter hobby. | | bullet | **Set goals**: If you set actual realistic goals, you have a target to focus on. This will help you to learn faster, and it will motivate you to practice. Furthermore, once a target is reached, it will motivate you and give you confidence. Just flying around will not learn you to fly soon. | | bullet | **Take small steps**: Always take very small steps on the learning curve. If you take a big step, you may succeed, or you may crash. If you crash, you may be de-motivated, it will cost you money, it will make you less confident, you are grounded for some time and the worst it is dangerous! Make sure that you learn a step thoroughly and in all directions before you take the next step. If you don't do this you may seem to make fast progress at first, but you will run into problems later on. In the end you will learn faster if you take small steps because you know the basics well and you will fly instead of repair. | | bullet | **Don't skip steps:** There are of course numerous ways to learn to fly a remotely controlled helicopter. However, if you follow the steps that I have listed below, you will learn fast and with a minimum chance of crashing. The steps are chosen such that you always have learned the necessary steps before taking a new step. Furthermore, they are chosen such that you will be able to recover from the mishap that you will likely make in the new maneuver or step you are trying to learn. | | bullet | **Have an escape ready**: If you try to learn a new step, think about what can or likely will go wrong. Think about what the escape is to recover from that potential problem you will encounter. Next also practice that escape so that you are sure you are capable of performing the escape, and that you get used to it so that you indeed automatically use it if something goes wrong. | | bullet | **Use a proper RC Heli flight simulator**: Having a proper simulator which can be controlled by your Tx is invaluable. It allows you to get acquainted to controlling a model helicopter and learn the needed reflexes. Note that this helps a lot! However, also note that flying a real helicopter is still very different from flying one on a simulator. Besides the obvious restrictions of simulation there is always the stress factor in real life which is missing in the simulator. In real life it takes a bit longer to repair the heli, and it is a bit more expensive.  I have tried numerous simulators, and I believe that [Reflex](http://www.reflex-sim.de/) is the best. It looks Great, and it flies very realistic. Not one of the other simulators is getting close (except [CSM](http://ourworld.compuserve.com/homepages/csm_ltd/sim.htm) which looks awful). I know that [RealFlight](http://www.realflight.com/) is very popular since it looks good, but it does not fly realistic at all. Note that I have tried many more, but they can't compete with Reflex. |   Ok, if you follow the steps below, you **will have explicit goals**, you **will take small steps**, you **won't miss essential steps** and I have **listed the escapes** for you. |

**Steps to take**

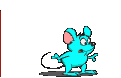
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| bullet | Preflight steps:   |  |  | | --- | --- | | bullet | Buy a good bottle of wine for your instructor, he deserves it :-) | | bullet | Learn about the basic theory of helicopter aerodynamics (see aerodynamics links on my [Heli Links](http://www.rchelicopterweb.com/HeliLinks.htm) page) . This will help you to understand what is going on. Your instructor can learn you about the controls and their interactions and the influence of wind on the model etc. Learn about when a helicopter stalls etc, this is very different from a plane! | | bullet | Have your helicopter checked over thoroughly by your instructor for safety. | | bullet | Use your simulator to train your reflexes required for hovering the helicopter. | | bullet | Have your helicopter setup by an instructor for learning. Yes, an heli setup for an advanced 3D pilot flies very different from one setup for the initial learning steps. | | bullet | Setup a buddy lead between your Tx and the Tx of the instructor and make sure that both transmitters are setup properly. | | bullet | Learn about the safety procedures on RC helicopter flight and the specific safety procedures at the field you are going to fly. | |

Raptor 30 on the buddy lead with the training gear attached.

Caliber 30 on the buddy lead with the training gear attached.

Above you can see the learning process on the buddy lead in action. Both transmitters are connected, and the instructor is ready to take over at any time. Note also the essential wide training gears on this Raptor 30 and the Caliber 30.

This is the result after one day practice :-)



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| bullet | Basic hovering steps:   |  |  | | --- | --- | | bullet | [Learn Cyclic Control](http://www.rchelicopterweb.com/LearningToFly/LearningElements/Cyclic.htm). Your instructor is controlling the rudder and the collective pitch/throttle. | | bullet | [Learn Collective Pitch/throttle and Rudder](http://www.rchelicopterweb.com/LearningToFly/LearningElements/CollectiveAndRudder.htm). Your instructor will control the cyclic so that you can focus on collective. | | bullet | [Learning to Control Both Sticks](http://www.rchelicopterweb.com/LearningToFly/LearningElements/AllControls.htm). Hey, you are hovering! | | bullet | [The hovering "M"](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TheHoveringM.htm). This is your first mastering of controlled hovering. | | bullet | [Landing and takeoff](http://www.rchelicopterweb.com/LearningToFly/LearningElements/LandingAndTakeoff.htm). You can do it all yourself now. Yes, this includes taking off your training gear. | | bullet | [Tail in the wind](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TailInTheWind.htm). This is no problem with nowadays gyro's. | | bullet | [Sideways wind](http://www.rchelicopterweb.com/LearningToFly/LearningElements/SidewaysWind.htm). You are getting close to mastering the hover. | | bullet | [Hovering solo](http://www.rchelicopterweb.com/LearningToFly/LearningElements/HoveringSolo.htm). There goes the buddy lead, your instructor can no longer take over control. | | bullet | [Tail-in circle](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TailInCircle.htm). You really mastered hovering a helicopter!. | | bullet | Practice the steps above in moderate wind.  **You mastered the basic hovering skills.** | |

**Learning Cyclic Control:**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: You are very motivated to learn to fly an RC helicopter. Your helicopter is set up properly and checked by your instructor. There is little to no wind.

**Escape**: your instructor is your escape. Make sure that he knows when you get in to trouble. An experienced instructor will actually know when you are in trouble before you have noticed (or admitted) it yourself :-)

**Step 1**) Make sure that you have your training gear connected properly.

**Step 2**) Your instructor will check the heli controls, he will spool it up and check the controls with a spooled up heli. If all is well, he will test fly the heli to ensure that everything is operating as expected. Yes, this is thrilling, you have just witnessed your helicopter actually fly.

The first test flight. You can see the first test take of [here](http://www.rchelicopterweb.com/FilmGallery/FirstTakeOff.wmv).

**Step 3**) Your instructor will demonstrate what a sliding heli is. Using your training gear it will be possible to slowly land the helicopter while it still has significant forward, backward or sideways speed. This should give you confidence to not panic, and always slowly decrease collective whenever you loose control. In the first flights your instructor will control the pitch though.

**Step 4**) Position the heli with the nose in the wind. Position yourself 5m behind the heli, and 1m to the left of it. Mentally rehearse what you are going to do (try to make the heli stay put at one position). Rehearse what the controls and their interactions are going to be.

**Step 5**) Now you are in control of the cyclic and your instructor will lift the heli to a save height of 0.1m. Exercise only very small control inputs. While trying to make the heli stay put, the landing gear will now and then touch the ground, but this will be no problem. Once you can control the heli so it stays in one place, it will no longer touch the ground. Your instructor will lift the heli to a height of 1m. This will need a bit of time to get used to. Yes, you are flying a helicopter!

**Step 6**) Practice to move the helicopter sideways 1m, stop in a hover, and come back again. Practice this in both directions. You will develop proper feel for controlling the cyclic.

**Step 7**) Practice to move the helicopter forwards 1m, stop in a hover, and come back again.

You just learned the basic controls on the right stick.

**Next steps**: [Learning Collective Control and Rudder](http://www.rchelicopterweb.com/LearningToFly/LearningElements/CollectiveAndRudder.htm).

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**Learning Collective and Rudder Control:**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: You can control the cyclic properly, you are still motivated :-). There is little to no wind. Make sure that the pitch range is  between +9 and 1 or 2 degrees positive!

**Escape**: In the first steps the major escape is not to panic! Your instructor will take care of everything except the pitch and rudder. Make sure that he knows when you get in to trouble. An experienced instructor will actually know when you are in trouble before you have noticed (or admitted) it yourself :-)

**Step 1**) Position the heli with the nose in the wind. Position yourself 5m behind the heli, and 1m to the left of it. Mentally rehearse what you are going to do (try to gently lift the heli 10cm of the ground and put it down again). Rehearse what the controls and their interactions are going to be. Remember, never, never, NEVER slam the pitch down in panic. Your instructor can not save your heli if you do that!

**Step 2**) Lift the heli slowly of the ground up to 10cm. Hold the pitch control for a couple of seconds and see what happens (very little :-)). Slowly decrease pitch and set it down again. You will get confident in your instructor in keeping the heli at one spot. You did not touch the rudder did you? Try to be very precise on the stick so that you do not touch the rudder. They heli will not stay at one height due to the wind effects.

**Step 3**) Lift the heli slowly to an height of 1m. Get comfortable with this height, and practice to set it down slowly and gently. Try to learn to keep the heli at a constant height of 1m. If you feel uncomfortable landing the heli, let the instructor land the helicopter until you are ready for it.

**Step 4**) Lift the heli to a height of 1m. Keep it steady. Now slowly rotate the nose of the heli left, back again, right, and back again. The maximum rotation is about 20 degrees. Get comfortable in controlling the rudder.

**Step 5**) Lift the heli slowly to an height of 1m. How do a controlled ascent to 2m, back to 1m etc. Practice to get a very controlled height.

**Step 6**) Lift the heli to a height of 1m. Your instructor will move the heli sideways, forwards and backwards (1m). Try to keep the heli at a constant height of 1m.

**Step 7**) Same as above, now the instructor moves the heli in all directions up to a distance of 5m.

You just learned the basic control of the pitch/throttle and the rudder.

**Learning to Control Both Sticks:**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: Your Heli is still in one piece after practicing both sticks individually. There is little to no wind. Make sure that the pitch range is still between +9 and 1 or 2 degrees positive!

**Escape**: Your instructor is your escape. Make sure that he knows when you get in to trouble. An experienced instructor will actually know when you are in trouble before you have noticed (or admitted) it yourself :-)

**Step 1**) Position the heli with the nose in the wind. Position yourself 5m behind the heli, and 1m to the left of it. Mentally rehearse what you are going to do (try to make the heli stay put at one position at a minimal height of 1m). Rehearse what the controls and their interactions are going to be.

**Step 2**) Be prepared for the heli to drift to the left (with a right hand rotating main rotor). It will do that! Promptly lift the heli to a height of 1m. Don't try to control the cyclic until it is of the ground! Don't hover below 1m, make sure that the liftoff is swiftly. Catch the left drift of the heli. Practice until the heli stays put at one place and you are in full control.

Video's of some attempts to control the hover: [Video1](http://www.rchelicopterweb.com/FilmGallery/LearningToHover1.wmv), [Video2](http://www.rchelicopterweb.com/FilmGallery/LearningToHover2.wmv).

**Step 3)** Practice a gentle descent from 1m and a gentle touchdown. Practice this until you can land the heli with little to no sideways movement and a gentle descent. From here on, you always try to land the heli as if there is no training gear attached (gently with no sideways movement).

**Step 4**) Practice to move the helicopter sideways 1m, stop in a hover, and come back again. Practice this in both directions. Take care of the control interaction, be aware of the wind effects. You will develop proper feel for controlling the cyclic and the pitch combination. Extend this slowly to a sideways movement of 5m.

**Step 5**) Practice to move the helicopter forwards 1m, stop in a hover, and come back again. Extend this slowly to a forward and backward movement of 5m. Take care of the control interaction, be aware of the wind effects. Practice this until you can make forward, backward and sideways movement at a constant height.

**Step 6**) Lift the heli to a height of 1m. Keep it steady. Now slowly rotate the nose of the heli left, back again, right, and back again. The maximum rotation is about 20 degrees. Get comfortable in controlling the rudder and keeping the heli at one spot with an constant altitude.

You have just managed the first hovering steps.

**Next steps**: [The Hovering "M"](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TheHoveringM.htm).

**The Hovering "M":**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

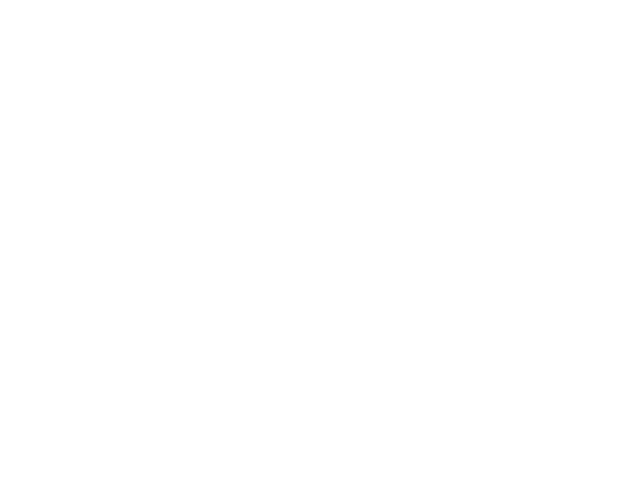
**Prerequisites**: You can properly hover the helicopter and make it stay put at a height of 1m. There is little to no wind. Make sure that the pitch range is still between +9 and 1 or 2 degrees positive!

**Escape**: Your instructor is your escape. Make sure that he knows when you get in to trouble. An experienced instructor will actually know when you are in trouble before you have noticed (or admitted) it yourself :-)

**Step 1**) Position the heli with the nose in the wind. Position yourself 5m behind the heli, and 1m to the left of it. Mentally rehearse what you are going to do (try diagonal movements and finally make the "M" maneuver at a constant height of 1m). Rehearse what the controls and their interactions are going to be.

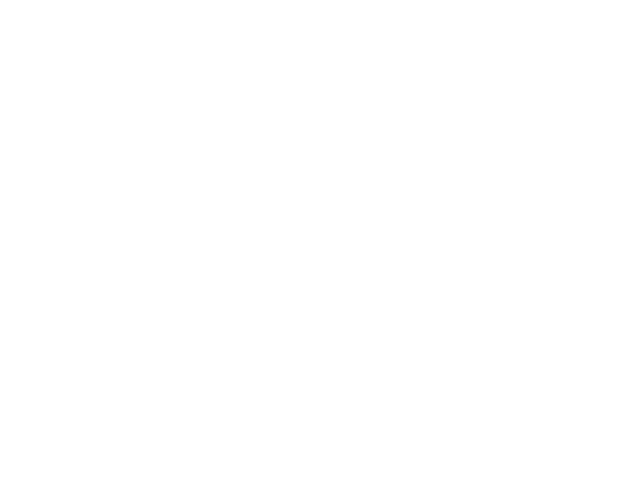
**Step 2**) Bring the helicopter in a stable hover. Move the heli 5m to the right of you and make it stop. From this point, move the heli 5 m forwards and make it stop. You are looking at the heli with a familiar angle, just a bit further away. Make sure you can hold it there in a stable hover.

**Step 3**) Diagonally move the heli backwards and to the left until it is again in front of you (5m in front of you, 1m to the right). Practice this triangle until you feel comfortable.



**Step 4**) Now we are going to practice the left-hand side. Again, start in front of you. Move the helicopter 5m to the left and make it stop (near left corner). Move the helicopter 5m forward and get it in a stable hover. Diagonally move the heli backwards and to the right until it is again in front of you (5m in front of you, 1m to the right). Practice this triangle until you feel comfortable.

**Step 5**) Now repeat the steps above, but this time you extend the diagonal sections. So you are going to move the heli diagonally from the far right corner directly to the near left corner. From here move the heli to the far left corner, and then diagonally to the near right corner. From here to the far right corner etc. Always hover at the corners first so that errors do not get accumulated.

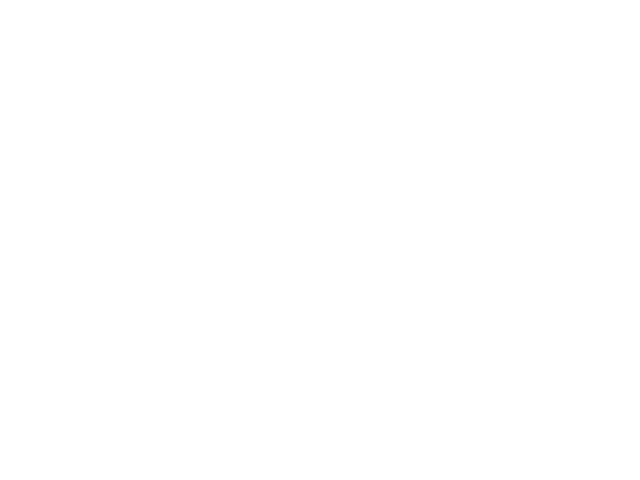


**Step 6**) Now we are going to practice the triangle in the other direction. Start with the helicopter in front of you move diagonally to the far right corner, back again to the near right corner and back again in front of you.  Also practice this on the left hand side, with the diagonal movement away from you to the far left corner.

**Step 7**) Extend the diagonal movements. Start in front of you, move the heli to the near right corner, from here move the heli to the far left corner and back to the near left corner. From there move it in one diagonal to the far right corner and back to the near right corner.

**Step 8**) Lift the heli in front of you (you know what I mean with in front of you :-)). Move the heli to the far right corner. From there move it diagonally back in front of you, but now at a distance of 7.5M in front of you (half way or middle point of the "M"). From that position move the heli to the far left corner and back to the middle point.

**Step 9**) Connect the exercises above until you make a nice "M" with stopping at each corner. Practice the "M" in both directions. Now reduce the stop time until you have a nice and smooth continuous "M". Practice them in both directions.



You managed an essential hovering skill that will help you through your future leaning steps.

**Landing and Takeoff:**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: You can make nice continuous "M" figures with a controlled and stable speed and constant altitude of 1m in both directions. You can control drifting the heli in all directions. There is little to no wind. Make sure that the pitch range is still between +9 and 1 or 2 degrees positive!

**Escape**: In case of trouble, push the pitch stick forward! Your heli will start to climb away from the problem. Your instructor will take over while it is climbing and recover from the problem. Make sure that he knows when you get in to trouble. An experienced instructor will actually know when you are in trouble before you have noticed (or admitted) it yourself :-)

**Step 1**) Position the heli with the nose in the wind. Position yourself 5m behind the heli, and 1m to the left of it. Mentally rehearse what you are going to do (try to make the heli land as if there is no training gear). Rehearse what the controls and their interactions are going to be.

**Step 2**) Lift the heli to a height of 1m. Now land the heli with absolute no sideways movement. Furthermore, the landing should be very soft. Notice that without a training gear the heli tips over very easy, and a rough landing will break the landing gear.

**Step 3)** Put a marker in front of you and practice perfect landings with no sideways movement and a very gentle descent over and over again on top of the marker. Having the "landing gear square" over the marker is good enough. Don't focus on the landing gear or the marker, try to look at the overall picture.

**Step 4)** Move the heli to the far right corner, and practice a gentle and stable landing.

**Step 5)** Move the heli to the far left corner, and practice a gentle and stable landing.

**Step 6**) Take off the training gear. Yes, I know it feels like you are not ready yet, but you are. The longer the training gear stays on, the more difficult it will be to remove it. Furthermore, you might be using the training gear for deducting the attitude of the heli. This is not a good thing, as it is not going to be there in the future :-)

A Raptor 30 with the training gear still attached.

**Step 7**) Lift of the heli promptly to a height of 1m. Don't touch the cyclic before the heli is actually airborne!. Get comfortable hovering the heli without the training gear. If you control the cyclic before the heli is actually airborne, the heli is likely to tip over.

**Step 8**) Move the heli sideways 5m, stop, and back again in both directions. You now get used to the controls of the heli without the training gear. Move the heli forwards 5m, stop, and back again. You now get used to the controls of the heli in the forward direction without the training gear.

**Step 9**) Descent the heli to 0,1m and back again to 1m. Get comfortable of the semi landing of your heli without the landing gear. Now you are going to do your first actual landing without the training gear. Rehearse your escape first! Now while landing the heli, keep reminding yourself to push the left stick if you are not comfortable. Don't land the heli if it moves sideways, abort the landing in that case. Remind yourself that you can do this since you can make a perfect landing with the training gear attached.

**Step 9**) Congratulations, you did your first landing without a training gear! Lift the heli to a height of 1m and land the heli. Keep practicing this until you can swiftly and confidently land your heli.

**Step 10**) Practice to land the heli at the far right and the near right corners. Keep practicing this until you can swiftly and confidently land your heli. Now practice both the far left and the near left corners.

**Step 11**) Practice a perfect landing in front of you "on top" of the marker. Landing within 0.3m is good enough for now.

You managed to takeoff, hover, move around and land your heli safely. Give yourself a big compliment, a lot of people did not get this far!

**Next steps**: [Tail in the Wind](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TailInTheWind.htm).

**Tail in the Wind:**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: There is a gentle wind. Change the pitch range between +9 and -2 degrees! The gyro is setup properly!

**Escape**: Your instructor is your escape. Make sure that he knows when you get in to trouble. An experienced instructor will actually know when you are in trouble before you have noticed (or admitted) it yourself :-)

**Step 1**) This is an easy one with nowadays gyro's. Rehearse what the wind effects on the tail will be in the hover in relation with the pitch control. Put the heli in front of you with the nose in the wind. Lift of the heli and practice a comfortable hover and landing with the give wind. Make sure you get used to the changed pitch range! The landings should be precise and comfortable with the new pitch range and the wind.

**Step 2**) Put the heli in front of you, but this time with the tail in the wind. Lift of the heli and practice a comfortable hover and landing with the tail in the wind.

**Step 3**) Practice moving the heli to the near right and near left corners and hover at those corners. Practice to hover the heli at the far right and far left corners.

**Step 4**) Practice the hovering "M" in both directions with the tail in the wind.

**Step 5**) Hover the heli in front of you, and rotate the nose to the left, back again, to the right and back again. The rotation of the nose should not exceed 20 degrees or so.

You managed an essential hovering skill with some wind. This must make you feel comfortable, as you are really getting to mastering the hover.

**Next steps**: [Sideways Wind](http://www.rchelicopterweb.com/LearningToFly/LearningElements/SidewaysWind.htm).

**Learning Sideways Wind:**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: There is a gentle wind. The pitch range between +9 and -2 degrees! The gyro is setup properly!

**Escape**: Your instructor is your escape. Make sure that he knows when you get in to trouble. An experienced instructor will actually know when you are in trouble before you have noticed (or admitted) it yourself :-) Furthermore, there is an escape if the heli keeps drifting. Just rotate the tail towards you and in the wind. You are then just hovering with the tail in the wind which you already mastered.

**Step 1**) This is an easy one with nowadays gyro's. Rehearse what the wind effects on the tail will be in the hover in relation with the pitch control. Rehearse what the sideways wind will do with the attitude of the heli in a hover. Put the heli in front of you with the nose in the wind. Lift of the heli and practice a comfortable hover and landing with the give wind. Get used to the wind of today.

**Step 2**) Put the heli in front of you, but this time with the wind coming in at the left side of the heli (with right hand rotating main blades). If your heli is rotating counter clockwise, you should start with the wind on the right side of the heli. Rehearse what the wind is going to do, and what you are going to do to counter the wind effect. Be aware of the effects of the wind on your pitch.

Here is a small video of a student trying to catch the sideways [drift of the heli](http://www.rchelicopterweb.com/FilmGallery/HeliDriftingToTheLeft.wmv).

**Step 3**) Promptly lift the heli to a height of 1m, and try to catch the drift. If you don't succeed, your instructor will take over. Don't let the heli drop below 1m. Practice this until you can make the heli stay put in one position at one altitude. Note that you can always rotate the tail towards you and in the wind if the heli keeps drifting. You are then again hovering with the tail in the wind which you already mastered.

**Step 4**) Slowly land the heli without any sideways movement. The left skid is likely going to touch the ground first, this is absolutely no issue! Practice this until you can comfortably takeoff and land the heli with the sideways wind.

**Step 5**) Now position the heli in front of you with the tail towards you, but with the wind coming in at the right side of the heli (clockwise rotation of main blades). Rehearse what will happen. The heli will tilt much more now. Practice Step 3 and Step 4 with the wind coming from the right.

Following the steps above you will learn to handle sideways wind without a problem. You are really getting close to being able to fully hover the heli.

**Next steps**: [Hovering Solo](http://www.rchelicopterweb.com/LearningToFly/LearningElements/HoveringSolo.htm).

**Hovering Solo:**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: There is little to no wind. You mastered all hovering and landing skills.

**Escape**: To be honest, it is just you :-) There is no real escape for hovering now. But then again, you don't need it because you actually mastered to hover. There is nothing new except no buddy lead :-)

**Step 1**) Position the heli with the nose in the wind. Your instructor will stand next to you to give confidence and useful (vocal) help if necessary. Lift of the heli and hover it in front of you. Practice until you feel comfortable. Land the heli in a precise and gentle way.

**Step 2**) Practice all the [Hovering "M"](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TheHoveringM.htm) steps.

**Step 3**) Practice the [Tail in the Wind](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TailInTheWind.htm) steps.

**Step 4**) Practice the [Sideways Wind](http://www.rchelicopterweb.com/LearningToFly/LearningElements/SidewaysWind.htm) steps.

**Step 5**) Your instructor will let you alone, he will put the nice bottle of wine he finally got from you in his car :-)

**Step 6**) Practice Step 2 to Step 4 while you are completely on your own.

Hey you really mastered the basic skills to hover a helicopter. How does that feel? Think about what you have learned since you started!

From here on there won't be a buddy lead to fix your problems, so better have those escapes ready and practiced! Note of course that whenever you feel uncomfortable, that you can always try something with the buddy lead again.

**Next steps**: [Tail in Circle](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TailInCircle.htm).

**Tail-in Circle:**

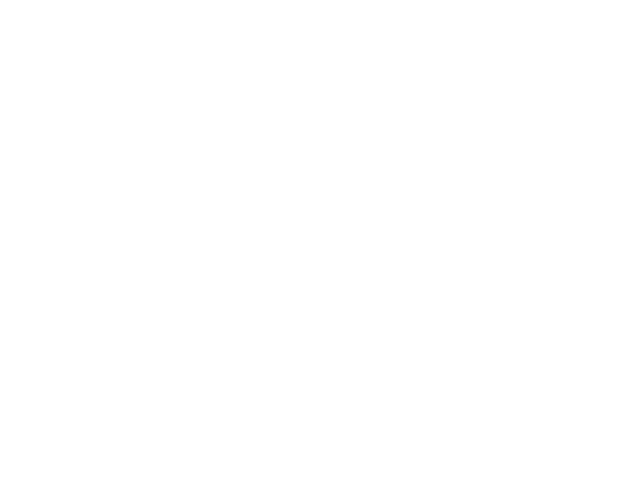
**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: There is a gentle to wind. You mastered all solo hovering and landing skills.

**Escape**: Just let the heli drift to a position with the tail pointing towards you and the tail in wind position if you get in trouble. You mastered this.

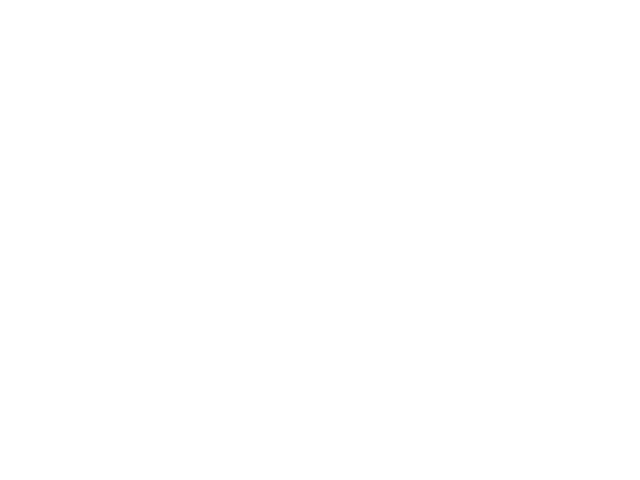
**Step 1**) Put the heli in front of you and hover for a second so you get used to the wind. Rotate the the nose 20 degrees to the left and hover for some time like that. Rotate the nose 20 degrees to the right and hover for some time like that. This way you get comfortable again with the wind on the side of the heli.

**Step 2**) Position the heli with the tail in the wind, and put it in a stable hover. Now let the heli make the first 90 degrees of a counter clockwise tail in circle with a radius of 5m (with clockwise rotating main blades). The heli is hovering with the wind coming in on the left side of the heli. Slowly let the heli move back again to the starting position (90 degrees clockwise) until the wind is on the tail again.



**Step 3**) Position the heli with the tail in the wind, and put it in a stable hover. Now let the heli make the first 90 degrees of a clockwise tail in circle with a radius of 5m (with clockwise rotating main blades). The heli is hovering with the wind coming in on the right side of the heli. Slowly let the heli move back again to the starting position (90 degrees clockwise) until the wind is on the tail again. Note that the heli will need to bank a bit more now, get comfortable with this banking angle.

**Step 4**) Position the heli with the tail in the wind, and put it in a stable hover. Now let the heli make the first 180 degrees of a counter clockwise tail in circle with a radius of 5m (with clockwise rotating main blades). The heli is hovering with the nose in the wind. Slowly let the heli move back again to the starting position (180 degrees clockwise) until the wind is on the tail again.



**Step 5**) Position the heli with the tail in the wind, and put it in a stable hover. Now let the heli make the first 180 degrees of a clockwise tail in circle with a radius of 5m (with clockwise rotating main blades). The heli is hovering with the nose in the wind. Slowly let the heli move back again to the starting position (180 degrees clockwise) until the wind is on the tail again.

**Step 6**) Just put the steps above together, and you are doing a tail-in circle!

**Step 7**) Increase the radius of the circle to e.g. 10m. Practice the circles in both directions until they are circular with a constant speed and a constant height. Work up the speed of the circles so that a complete circle with a radius of 10 takes about 8 seconds or so on both directions.

You should give yourself a big applause, you really mastered hovering a helicopter. Not just hovering, you really mastered good hovering skills with a gentle wind. A lot of people have never gotten this far :-)

**Next steps**: Get in Control of that Wind and master actual flying around

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Advanced hovering steps:http://www.rchelicopterweb.com/images/tweety1b.gif   |  |  | | --- | --- | | bullet | [Flat tail-in figure of eight](http://www.rchelicopterweb.com/LearningToFly/LearningElements/FlatTailinFiguraOfEight.htm) with slight nose rotation. First steps in letting go of the tail. | | bullet | [Climb and descend](http://www.rchelicopterweb.com/LearningToFly/LearningElements/ClimbAndDescend.htm). Now you get used to the heli climbing considerably (5m). | | bullet | [Flat figure of eight with the nose following flight direction](http://www.rchelicopterweb.com/LearningToFly/LearningElements/FlatFigureOfEightNoseFollowsFlightDirection.htm) (5m). | | bullet | [Fast sideways with semi stall turn](http://www.rchelicopterweb.com/LearningToFly/LearningElements/FastSidewaysWithSemiStallTurn.htm) | | bullet | [Vertical Top hat](http://www.rchelicopterweb.com/LearningToFly/LearningElements/VerticalTopHat.htm). | | bullet | [Large circle (50m)](http://www.rchelicopterweb.com/LearningToFly/LearningElements/LargeCircle.htm). | | bullet | [Large square (50m)](http://www.rchelicopterweb.com/LearningToFly/LearningElements/LargeSquare.htm). | | bullet | [Round figure of eight with nose following flight direction](http://www.rchelicopterweb.com/LearningToFly/LearningElements/RoundFigureOfEight.htm). | | bullet | [Remote circles](http://www.rchelicopterweb.com/LearningToFly/LearningElements/RemoteCircles.htm). | | bullet | [Nose-in hover](http://www.rchelicopterweb.com/LearningToFly/LearningElements/NoseInHover.htm). | | bullet | [Nose-in landing and takeoff](http://www.rchelicopterweb.com/LearningToFly/LearningElements/NoseInLanding.htm). | | bullet | Practice the steps above in moderate wind.  **You mastered the hovering skills.** | |

**Flat Figure of Eight:**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: There is little wind. You mastered all basic hovering steps and landing skills with modest wind.

**Escape**: Whenever you get into trouble, just rotate the heck rotor towards you. From this known position you can resolve the problem (get the heli in a stable hover). You can do tail-in circles, so which ever direction it moves, just rotating the tale towards you should get you out of trouble.

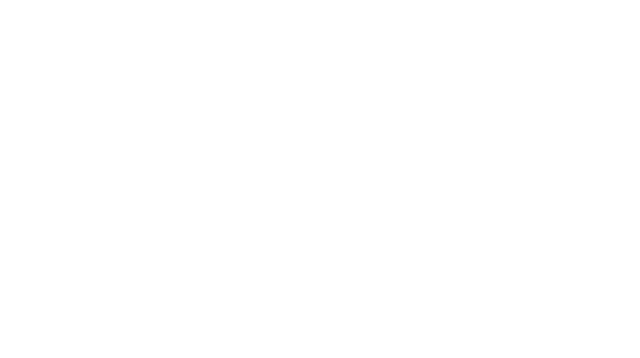
**Step 1**) Put the heli in front of you and hover for a second so you get used to the wind. Rotate the the nose 20 degrees to the left and hover for some time like that. Rotate the nose 20 degrees to the right and hover for some time like that. This way you get comfortable again with the wind on the side of the heli.

**Step 2**) Position the heli with the nose in the wind, and put it in a stable hover. Move the helicopter 10m to the left of you and let it hover for a second. Now move the helicopter 10m to the right of you and led it hover for a second, and back to the left again. Practice this until you can maintain a proper slow controlled speed at a constant attitude and altitude.

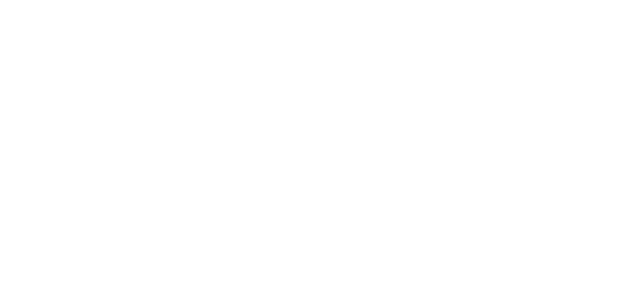
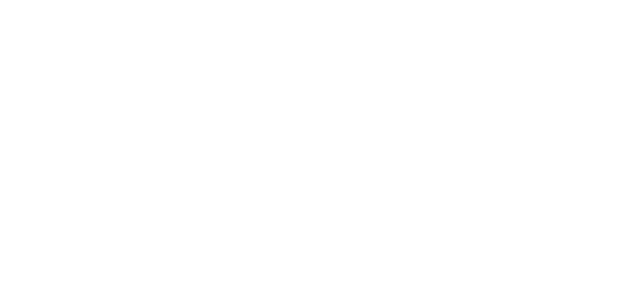
**Step 3**) Now we are going to remove the two brief hovers. Move the helicopter 10m to the left, while slowing down its lateral speed (at the 8m position) continue banking the helicopter such that it starts to move to the right again. Once it starts to move to the right again, make sure you control the speed (reduce the banking angle). Obviously practice this at the right side as well. Practice this until the helicopter is swinging to the left and right in a very controlled fashion (constant speed, constant attitude and altitude).

**Step 4**) Until now we are moving the heli left and right in a straight line. We are now going to add some forward and backward movement to "open up" the figure of eight. Practice the hovering "M" for a minute until you are comfortable with controlling a diagonal movement again. Move the helicopter left and right in a straight line again (step 3). Now just before you reach the right most position, nick the helicopter a bit such that it starts to move slightly diagonally (very slow in the forward direction). Bank the helicopter to the left until it starts to move diagonally to the left (and slightly forward). Now put in some back cyclic such that it gently moves to the position right in front of you again. Stop it in front of you, and hover it for some seconds. When comfortable with the right-hand side also practice the left-hand side.

**Step 5**) Connect the left and right-hand side. Make sure that the left and right hand diagonals are straight and cross one another at a controlled point in front of you. Practice this until you can make a very controlled flat figure of eight.

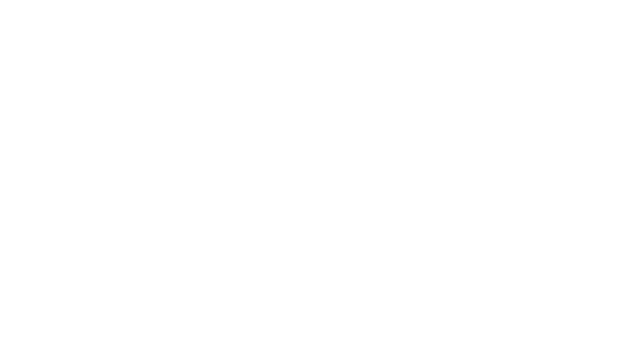


**Step 6**) Now we are going to practice to rotate the nose a bit. Start with a straight line left and right movement again (step 2). Once the Heli starts to move to the left from the right most position, slowly rotate the most of the left for e.g. 20 degrees. The important thing here is the word: "**after**". Don't rotate the nose while the heli is stationary! When the heli is moving to the left you have to nick it a bit so that it does not come towards you. As soon as the heli is moving to the left again it becomes much more stable. Just before you reach the left most point, rotate the nose back straight into the wind again. Stop the sideways movement again, and move the helicopter to the right. After it starts to move to the right, rotate the nose to the right for e.g. 20 degrees and put in a little forward cyclic. You can practice to rotate the nose a little further (up till 45 degrees) when **and if** the heli is moving to the left and right in a straight line (don't let problems cumulate).



**Step 7**) Open up the eight again. Now we are going to add step 4 to step 6. Practice this until you are making a very controlled (constant speed and constant altitude) flat figure of eight with the nose slightly following the direction of flight (45 degrees).

**Step 8**) Stretch the rotation. Now we are step by step going to increase the rotation for both left and right hand to 90 degrees. Notice that you should slowly sneak up to this angle in between the right and left most positions. Practice this until you are making a very controlled (constant speed and constant altitude) flat figure of eight with the nose slightly following the direction of flight (90 degrees while the helicopter is in front of you). Practice this such that the rotation of the helicopter is smooth and controlled.



You mastered the Flat Figure of Eight! It is your first step in controlled circuits, it really starts to look like you are actually flying the helicopter!

**Climb and Descend:**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: You can confidently fly the heli in a flat figure of eight. You have managed to rotate your heli to a 90 degree position in both directions in the middle of the flat figure of eight (you are looking fully at the left and right hand sides of the heli while it flies in front of you). Your engine is running very reliable! Note that an engine quitting while hovering at 5m is likely going to kill your heli.

**Escape**: When in trouble, rotate the tail so that it points straight towards you. Put in a little forward cyclic such that it gently flies away from you. Now lower the collective to bring the heli to a normal hover position. Stop any motion and land the helicopter. And now recap what has happened :-)

**Step 1**) Hover the heli in front of you at a height of 1m. Now let the heli climb to a height of 5m. Hover it there for some time, and gently bring the heli back to a safe altitude of 1m. Make sure that it is at least 5 to 10m in front of you all the time! This ensures that your vertical viewing angle to the heli remains less than 45 degrees. Not obeying this rule may result in the heli coming back at you, flying over you which would result in your first unplanned noise-in flight :-) Also be aware to slowly descend the heli. If a helicopter descends fast in a true vertical fashion, you may get in to trouble. In this case you are going to fly in your own down wash which may significantly decrease your lift. Note that this is especially problematic if there is no wind. Practice the ascend and descend until you are comfortable hovering a bit higher and you have a nice and controlled vertical speed.

**Step 2**) Now hover the heli in front of you and again climb out to e.g 5m. While doing this however, also move the heli forward 5m. This gives you a nice and controlled 45 degrees climb out. Stop any motion and hover for a second. Next descend again, but again with forward motion such that the descend is again at an angle of 45 degrees. Stop any motion, and gently fly backwards towards you for 10m and repeat the above. You are now flying nice vertical symmetrical triangles.

**Step 3**) Hover the heli in front of you. Now gently rotate the nose to the left e.g. 45 degrees to start with. Hover the heli at one spot while looking at it at an angle of 45 degrees. Gently rotate it back, and practice the right hand side. Slowly work on this until you can hover the heli comfortably completely sideways in both left and right. Note that you should already be familiar with this orientation in the flat figure of eight, the only new thing is that it is hovering instead of flying.

**Step 4**) Now hover the heli in front of you with the nose rotated 90 degrees to the left. Now you are going to perform the triangle again, the only difference is that you are looking at the side of the heli. At the low far end of the triangle, make a slow turn as you did in the flat figure of eight. When the heli is again in front of you, make the same triangle on the right side. Repeat this figure until you feel comfortable.

You managed to do a controlled ascend and descend in normal and sideways orientation and on top of that, you managed to do sideways hovers!

**Next steps**: [Flat figure of eight with the nose following flight direction](http://www.rchelicopterweb.com/LearningToFly/LearningElements/FlatFigureOfEightNoseFollowsFlightDirection.htm).

**Flat figure of eight with the nose following flight direction**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

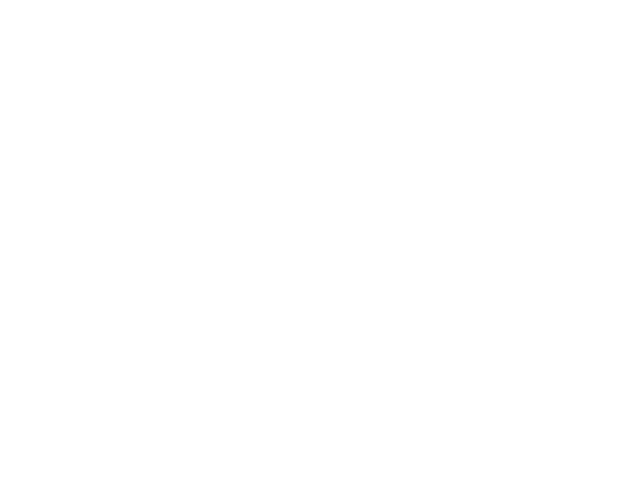
**Prerequisites**: You can confidently fly the heli in a flat figure of eight. You have managed to rotate your heli to a 90 degree position in both directions in the middle of the flat figure of eight (you are looking fully at the left and right hand sides of the heli while it flies in front of you). You managed your Climb and Descend both ways while looking at the side of your heli.

**Escape**: When in trouble, rotate the tail so that it points straight towards you and try to stop any motion. If at any point you are getting close to the ground at high speed, push in some collective to make the heli climb, next rotate the tail towards you and stop any motion. Note that in this escape the heli might climb considerably, but you are already familiar with hovering the heli at some altitude.

**Step 1**) Fly the normal flat figure of eight to get comfortable again.

**Step 2**) Now while at the right hand side turn, slowly rotate the nose a bit more to the left. Work up this angle until the nose is following the flight direction on the right hand side of the flat figure of eight. Note that you should only rotate the nose any further if you feel comfortable. Furthermore, make sure that the heli keeps on moving, don't let it stop moving in one of the turns. Be careful to prepare yourself at every single turn on how to stop the turn (putting in the proper cyclic command to remove the banking angle). You know that your are going to have a slight glimpse of your nose at every turn! So keep telling your self in every left hand turn: "Push right cyclic to remove bank" and "right rudder to get the tail back".

**Step 3**)Once comfortable with step 2, work on your left hand side until you are actually flying a flat figure of eight with the nose following the direction of flight.



Man, you are really getting somewhere :-)

**Next steps**: [Fast Sideways with Semi Stall Turn](http://www.rchelicopterweb.com/LearningToFly/LearningElements/FastSidewaysWithSemiStallTurn.htm)

**Fast Sideways with Semi Stall Turn**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: You can confidently fly the heli in a flat figure of eight with the nose following the direction of flight. You managed your Climb and Descend both ways while looking at the side of your heli. Your engine is running very reliable! Note that an engine quitting while hovering at 5m or flying fast at 2m is likely going to kill your heli.

**Escape**: When in trouble, rotate the tail so that it points straight towards you and try to stop any motion. If at any point you are getting close to the ground at high speed, first pull the cyclic and push in some collective to make the heli climb, next rotate the tail towards you and stop any motion. Note that in this escape the heli might climb considerably, but you are already familiar with hovering the heli at some altitude.

**Step 1**) Start flying the flat figure of eight with the nose following the direction of flight to get comfortable again.

**Step 2**) Now we are going to increase the forward speed on the "straights" a bit and let the speed of the heli decay by means of a gently climb in the left and right curves. This means we are going to control the nick a bit more to gain speed without loosing height. You must already work on removing the speed e.g. 2m before you reach the point of the curve by means of a bit back cyclic which will also make the heli climb a bit, but that should be no problem to you. Again, slowly work up to a bit more speed until you need a maximum climb angle of 45 degrees to get rid of you speed in both curves. Make sure that you always stay in control of the speed of the heli!

This starts to look like fancy flying.

**Vertical Top Hat**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: You can confidently fly the heli in a flat figure of eight with the nose following the direction of flight. You managed your Climb and Descend both ways while looking at the side of your heli. Your engine is running very reliable! Note that an engine quitting while hovering at 5m or flying fast at 2m is likely going to kill your heli.

**Escape**: When in trouble, rotate the tail so that it points straight towards you. Put in a little forward cyclic such that it gently flies away from you. Now lower the collective to bring the heli to a normal hover position. Stop any motion and land the helicopter. And now recap what has happened :-)

**Step 1**) This is an easy one, we are just practicing this to get you more comfortable with altitude changes to get ready for the real work later on. You already practiced this in the [Climb and Descend](http://www.rchelicopterweb.com/LearningToFly/LearningElements/ClimbAndDescend.htm) exercise. Position the heli in front of you with the nose in the wind. Now start with vertical climb out to a height of 5m, hover for a second, and slowly descend back to a height of 1m again. This should get you comfortable again. Make sure that the heli does not come back at you.

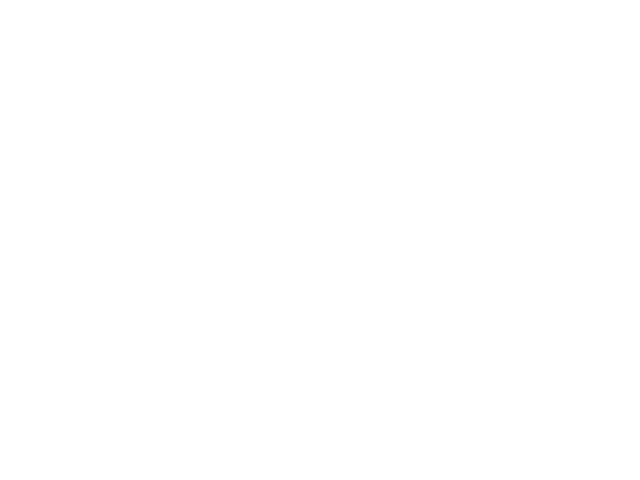
**Step 2**) While hovering the heli at a height of 5m in front of you, you slowly move the heli forward 5m and hover again before descending the heli. Now close the vertical rectangle by moving the heli backwards towards you at low altitude. Get yourself comfortable with this move.

**Step 3**) Now we are going to do the vertical rectangle in the opposite direction. This means that the heli is going to fly backwards towards you at a height of 5m. The danger here is that you do not properly stop the heli 5 m in front of you (at a height of 5m). If this happens, you are in trouble. The rescue here is to swiftly push in some forward cyclic and get it moving forward. You are then safe again.

**Step 4**) Hover the heli in front of you and rotate it fully sideways, and get comfortable again with the sideways hover.

**Step 5**) Lift the heli to a height of 5m while in this orientation. Hover for some time at this orientation at 5m. Get comfortable with this and descend the heli again.

**Step 6**) Perform step 5, but now you move the heli forward (to the left of you) for 5m and hover again. Descend the heli, and let it fly backwards again towards you and repeat.



**Step 7**) Now practice step 6, but now in the reverse direction. Again, take care of the problem mentioned in step 3. The escape is the same. Make sure that you practice this at both sides!

Note that the figure you have been performing is not the complete top hat, it is just a vertical square, but it is good enough for now. This should get you way more comfortable at properly controlling the heli at somewhat more height.

**Next steps**: [Large Circle](http://www.rchelicopterweb.com/LearningToFly/LearningElements/LargeCircle.htm).

**Large Circle**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

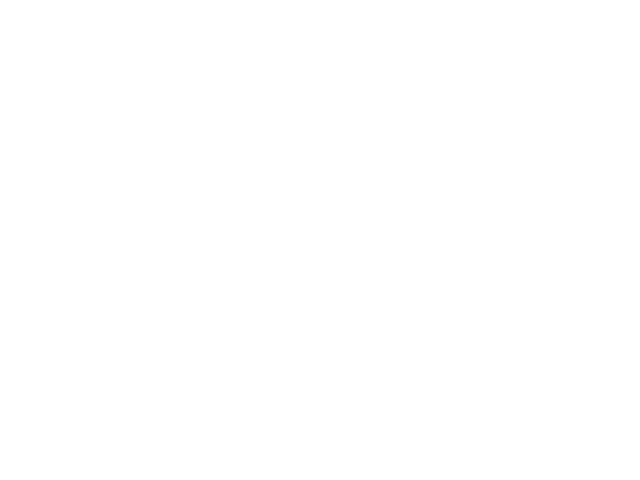
**Prerequisites**: You can confidently fly the heli in a flat figure of eight with the nose following the direction of flight. You managed your Climb and Descend both ways while looking at the side of your heli. There is little to no wind.

**Escape**: When in trouble, rotate the tail so that it points straight towards you. Stop any motion and bring the heli to a normal hover position. And now recap what has happened :-)

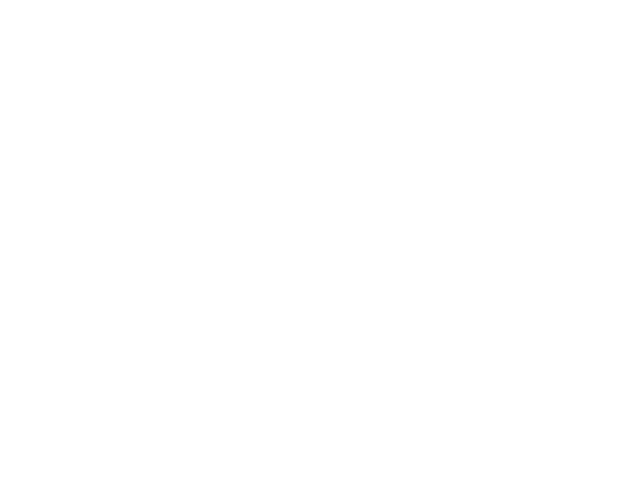
**Step 1**) This is an easy one, you just start with hovering the heli 5m on the left of you with the wind coming from the right. Now you slowly move the heli to the left such that it is hovering at 10m on the left of you. This all at a height of 1m. Get used to hovering the heli a bit further away while you are looking at its side.

**Step 2**) Now get the heli to slowly move forward, and while it does, slowly rotate the tail such that you keep looking at the side of the heli. Continue until the heli is pointing with its nose into the wind and stop. Be careful that the heli does not come too close. In the start position of this move, the heli is banked to the right into the wind to make it stay put. Once it rotates with its nose into the wind, the same banking angle will obviously accelerate the heli towards you. So during this move you have to slowly let go of the banking angle, and introduce some forward cyclic to maintain speed (slow). Get yourself comfortable with this move and practice to maintain a constant speed and a constant radius.

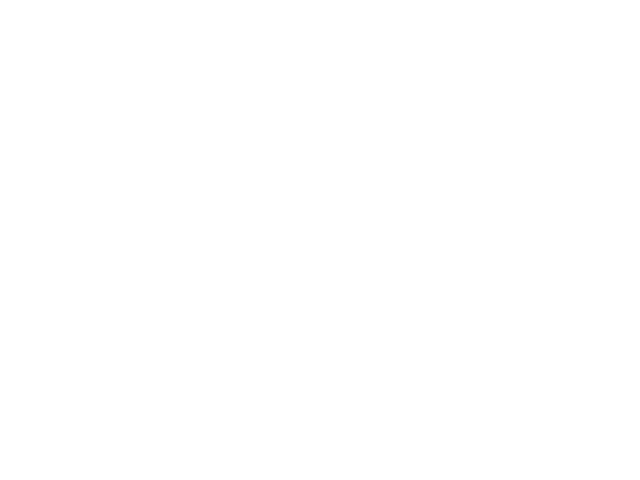
Although the pictures below shows a pilot in one position, obviously the pilot slowly rotates around his own axis.



**Step 3**) In Step 2 you started with the "easy" quadrant because the tail wants to weathervane in the right direction and it is likely that the heli will move a bit close to you instead of away from you. Now we are simply moving on to the other quadrants. The next quadrant starts with hovering the heli with the tail in the wind (you have done that, it is no problem). Now move on exactly like in Step 2. However, be careful since the heli will now tend to move away from you in the end position of this quadrant. So during the move increase the banking angle to the right and introduce some forward cyclic to keep it moving slowly. The tail still wants to weathervane in the right direction.



**Step 4**) Now you guess what Step 4 will be :-) Same as above, but now the tail has to fight the wind since it now wants to weathervane in the wrong direction. Now it again wants to move a bit closer at the end of the move, counter this with a bit banking correction.



**Step 5**) Now the last quadrant is easy, think about what will happen, and counter the wind forces such that the arc will be at constant altitude, constant speed, constant radius and the nose is nicely following the flight path.

**Step 6**) Ok, you practiced all the ingredients, now simply put them together. At first you may stop at all 4 "end points" if you wish to reposition, but I don't think that it will be necessary. Practice this until you can do a nice and round circle at constant speed, altitude and with the nose following the flight path.

**Step 7**) Now practice the previous steps, but now in the other direction. The escape is obviously the same, but take care that you convince yourself to swing the tail in the right direction in case of trouble. Make sure that you practice until you can do both sides comfortably and equally well.

**Step 8**) Did I mention Large Circles? I guess I did, so lets make them large. There is little to say about this. Just gently increase the radius, but give yourself the time to get used to the larger distance. Work this up until you have a radius of e.g. 25m. While doing this, make sure that you also slowly increase the height of the heli slowly to e.g. 2m as you increase the diameter. This gives you a bit more room for errors, and you are still looking at the heli at a comfortable angle. Now make sure you can do this in a nice and full controlled manner in both directions.

**Large Square**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

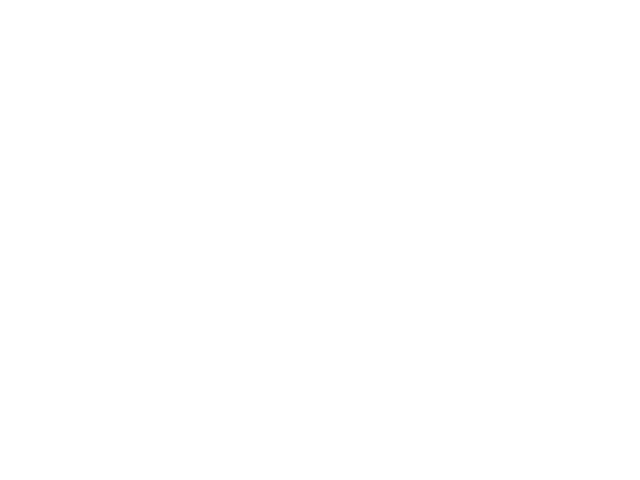
**Prerequisites**: You managed to do the large circles comfortably in both directions. There is little to no wind.

**Escape**: When in trouble, rotate the tail so that it points straight towards you. Stop any motion and bring the heli to a normal hover position. And now recap what has happened :-)

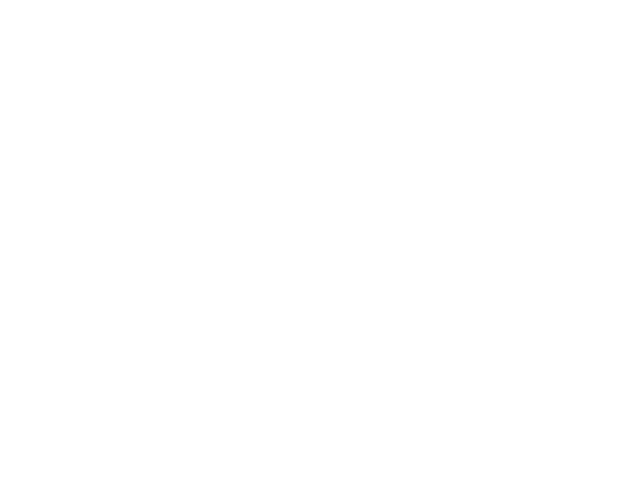
**Step 1**) Ok, just start doing some intermediate circles (e.g. 15m radius) in both directions to get you comfortable again. You will see that doing large squares is not that difficult if you can do large circles comfortably.

**Step 2**) Now pick for reference lines for yourself (or use some marks on the ground). These will mark where the "flat spots" will become visible  in your circles. Now practice until you can fly nice circles over your marks or reference lines.

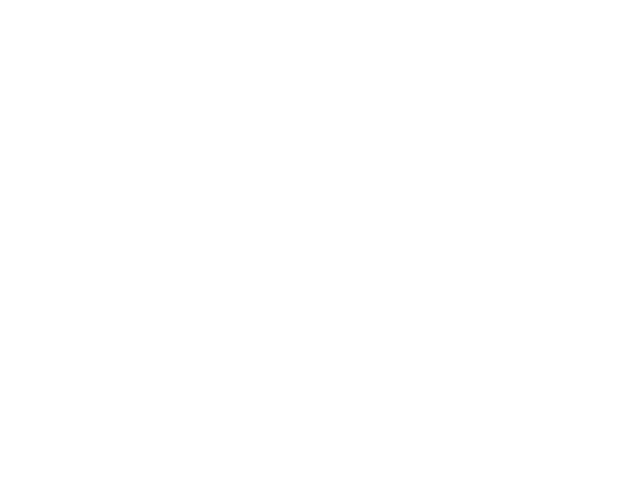
Although the pictures below shows a pilot in one position, obviously the pilot slowly rotates around his own axis.



**Step 3**) Now we are going to add small straight parts to our "circle". The only new thing is that you are going to manage your banking angle more explicitly now. You obviously already managed to deal with the wind coming from all directions. The other difference is that the distance in the "corners" will be a bit larger than what you are used to, so therefore we start with the intermediate sized circles of 15m. Now start with the right hand side circle. Just before you approach the left marker you slightly bank the heli to the left to introduce a short straight line of e.g. 2m after which you bank to the right again to get back on your "circle". Just start with one marker per circle only. When you feel comfortable, you add the second marker (opposite to the first one). Again when comfortable, you add the other two, and you are flying a very rounded square.



**Step 4**) Now we are slowly extending the straight lines, and making the curves a bit more tight. Slowly work yourself up to this. Be careful, because the tighter the curve becomes, the more you will be looking at the nose at the end of the curve. So have your escape ready!



**Step 5**) Now that is good, you are flying a nice square at a height of 1m with constant speed and you are always in full control. So, it is time to the usual direction change. So practice all the steps above again, but now for the other direction. Make sure that you can fly them both fully controlled before you move on.

**Step 6**) You are flying a nice squares, this is good! Now lets make them Large Squares as promised. Again slowly work yourself up to flying large squares. While doing this, also slowly increase the altitude to e.g. 3m to buy you some room for error and maintain a proper viewing angle. Be careful as the distance between you and the helicopter becomes quite large in the corners.

Man, you really managed to fly very controlled and large circuits. This is a big achievement and an important step up to the next figure.

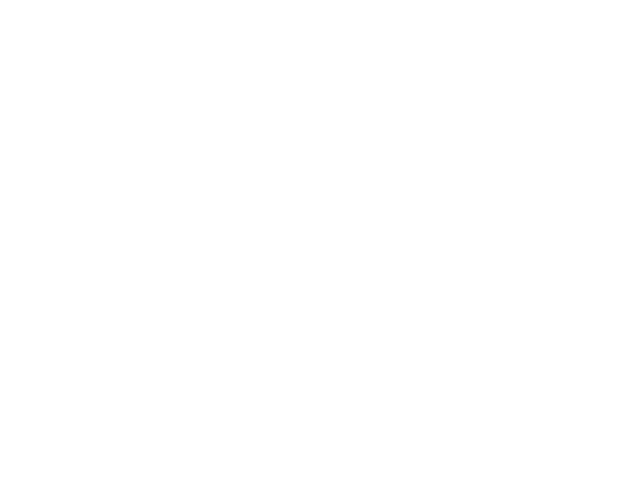
**Next steps**: [Round Figure of Eight with the Nose Following the Direction of Flight](http://www.rchelicopterweb.com/LearningToFly/LearningElements/RoundFigureOfEight.htm).

**Learning a Round Figure of Eight:**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: You can do the large remote squares (with the pilot in the center). This guarantees that you fly the helicopter controlled in all directions, and that you have mastered the tail control properly. There is little to no wind.

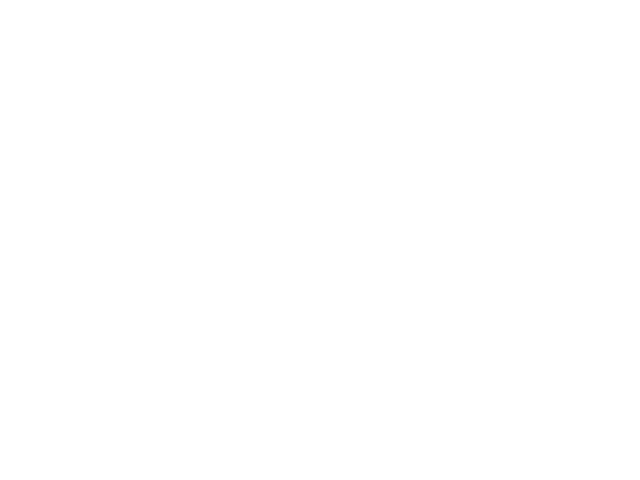
**Escape**: Actually we are going to start from the [Flat figure of eight with the nose following flight direction](http://www.rchelicopterweb.com/LearningToFly/LearningElements/FlatFigureOfEightNoseFollowsFlightDirection.htm) (see first picture below). The escape their was to rotate the tail back to you when you got into trouble. This is still an option here, however, the more open the figure of eight becomes (the more nose-in the heli comes as shown in the following pictures), the more time it takes to rotate the tail back to you. The best option then is to push both sticks forward, and fly away until you are looking at the tail again, and then solve the problem.



**Step 1**) Start doing the Flat figure of eight again with the nose following the direction of flight to get you comfortable again to look at the side of the heli. Now slow down the speed of the heli to approximately 5km/h and practice exact and precise control of the heli. Ensure that the width of the total figure is about 10m. This ensures that the heli stays close so that you can very accurately see what is happening, and  react on it.

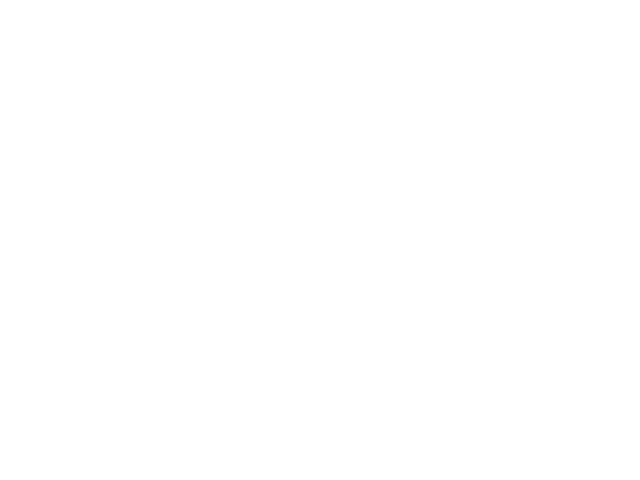
**Step 2**) Now slow down the heli when it is in front of you (from both directions) and let it briefly come to a hold, and resume the figure again. Do this until you feel comfortable hovering the heli in front of you while you are looking at the side of the heli. The escape here is to rotate the tail towards you in case you get into trouble. You should not proceed to the next steps unless you can comfortably hover the heli sideways.

**Step 3**) Go and fly the Flat figure of eight again with the nose following the direction of flight. Do this in a controlled fashion i.e. slow speed e.g. 5km/h at constant altitude of e.g. 2m. This gives you some room for error, and enforces you to really control the heli, and fly the heli instead of the heli flying you. Make sure that the whole figure is symmetric. Now you can slowly "open up" the figure of eight as is shown in the figure below.



Do not be tempted to move further too fast! Only open up the figure of eight after you can perfectly control the current figure of eight.

**Step 4**) Slowly open up the figure of eight until you are flying two nice circles that are connected as is shown in the figure below. Be aware that the escape of rotating the tail back to you is not necessarily the best thing to do when you get into trouble right in front of you with the nose almost pointing at you. An alternative escape is to push both sticks forward so that the heli starts to fly forwards and climbs away. This way you will also start to look at the tail again so you are comfortable at solving the problem. Always be aware where the sun is, so that you don't fly the helicopter into the sun!



**Step 5**) Now that you can perfectly fly the small figure of eight, we are going to increase the radius of the "two circles". Again, slowly increase the radius, and give yourself time to get used to seeing and controlling the heli from a somewhat larger distance. While doing this, you also have to increase the speed of the helicopter a bit, that makes it quite a bit easier. Practice until you can fly the perfect figure of eight where the "circles" have a diameter of 25m to 50m and the speed is something like 10km/h.

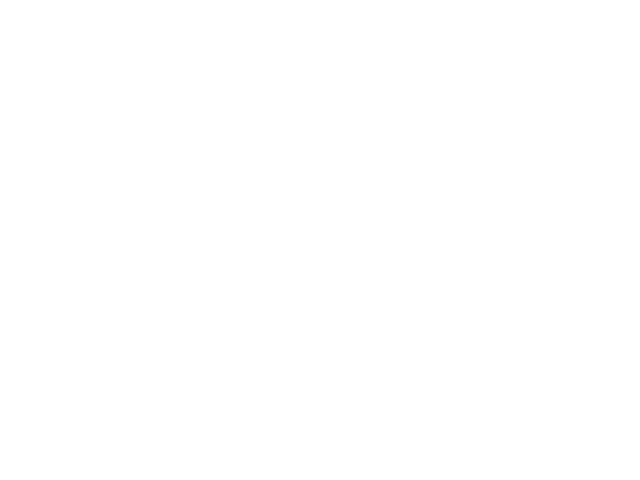
Following the steps above you will learn you the round figure of eight without a problem. This may look trivial, but it is not. Flying the figure above in a good controlled way really requires a lot of skill which will help you a lot in the future. If you are not convinced that you are really getting somewhere, then just ask a "seem to be good flyer" to do the figure. Most likely he will have difficulty with the figure (which is not good!).

**Learning Remote Circles:**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

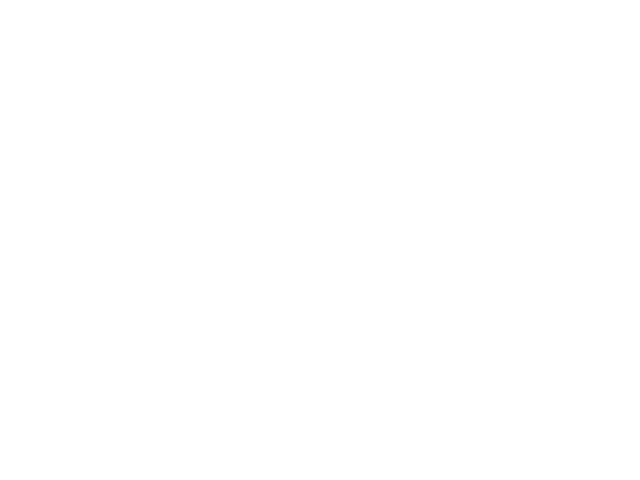
**Prerequisites**: Of course you can perfectly do the Large [Round Figure of Eight](http://www.rchelicopterweb.com/LearningToFly/LearningElements/RoundFigureOfEight.htm). This is really essential. Again little or no wind is preferred.

**Escape**: The escape is exactly the same as with learning the Large Round Figure of Eight. Actually we are going to start from that figure (see first picture below). The escape their was to push both sticks forward, and fly away until you are looking at the tail again, and then solve the problem. That is exactly what we are going to use here. Actually there is only one critical part of this figure (IF you can do the Large Round Figure of Eight), and that is when the heli is going to cross over (nose-in for a second) in front of you (see picture below).

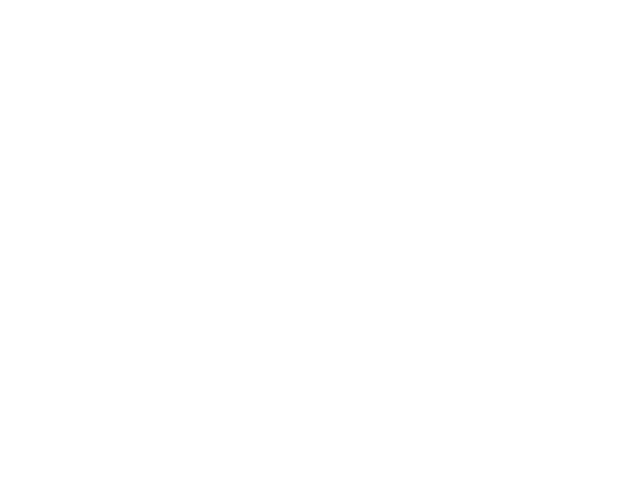
  
**Step 1**) Start with practicing the Large Remote Figure of Eight again until you feel comfortable again.

**Step 2**) Now during the left hand circle (right half of the figure), keep on telling to yourself how to stop the circle: Roll Right, Roll Right, ROLL RIGHT. Do the opposite in the right hand circle (left half of the figure). Now practice the escape, by pushing both sticks forward when the heli is close to the crossover point right in front of you, and get used to solving that situation.

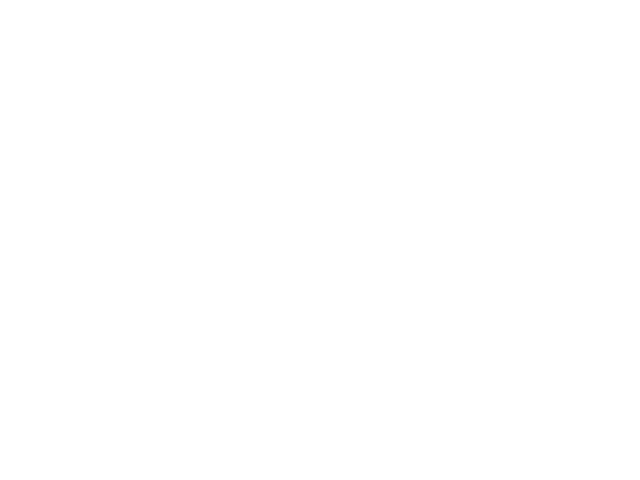
**Step 3**) Now we start with doing the left hand circle (right half of the figure) as this is the easier one for helicopters that have a right hand rotating main rotor (Raptor), since less tilt in the helicopter is required during the circle. For left hand rotating main rotors (e.g. Vario) you should start with the other circle. Now take a deep breath, as it is going to happen. Remember to talk to yourself how to stop the circle: Roll Right, Roll Right, ROLL RIGHT.  
  
Now, when you are flying the right half of the figure of eight, and it is going well (no real corrections required), then go for it, keep all the controls steady while the heli starts to point its nose at you, don't do anything. The heli will keep on making the same circle. Man, you have just flown your first remote circle!

  
If you get into trouble, you know how to stop the circle: Roll Right, and your escape is to push both sticks forward to climb away until you start to look at the tail again, and solve the problem.

**Step 4**) Keep practicing this until you feel comfortable, then try the other circle. Again, talk to yourself on how to stop the circle: Roll Left, Roll Left, ROLL LEFT. The escape is of course exactly the same.



**Step 5**) Now all you have to do is to move the circle right in front of you. This is in principle nothing new, but still give yourself some time to get used to it as it will feel differently. It is important that you practice the circles in front of you in **both directions!**



Following the steps above you will learn you the Remote Circles without a problem. Man, you are really starting to step out of the hovering world to enter the world of real helicopter flying. You have set a big step, since you did touch upon the problem of looking at the nose of your machine. That is exactly what your next step is about, before you can really say that you can truly hover the helicopter.

**Next steps**: [Nose-in hover](http://www.rchelicopterweb.com/LearningToFly/LearningElements/NoseInHover.htm).

**Learning the Nose-in Hover:**

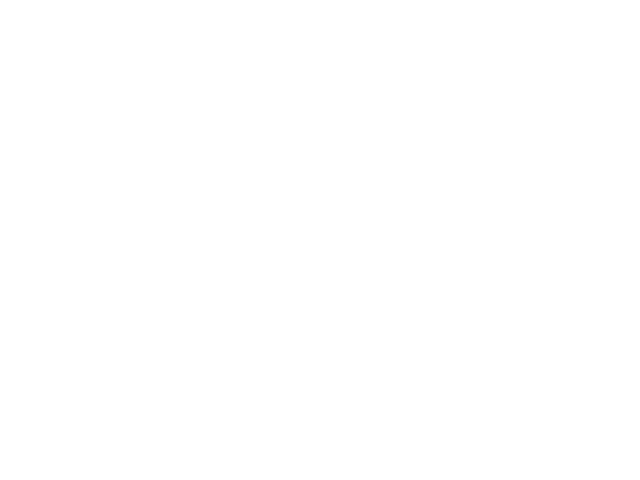
**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: You can do perfect large figures of eight with the nose following the direction of flight and you can do remote circles.

**Escape**: The escape is to push both sticks forward to give collective pitch and to nick the heli a bit forward to climb out in a forward flight. The escape of rotating the tail towards you is going to take too long.

**Step 1**) Practice a number of perfect large figures of eight. Practice a number of remote circles. Of course you realize that you have actually been flying quite a lot of nose-in lately. This should give you confidence. Yes, I know that hovering nose-in is considered a nightmare, but believe me, if you really mastered the previous steps, this one is not going to be as difficult as you think.

**Step 2**) Fly the large figure of eight slowly at a height of at least 2m. This means that you really have to control the model. Now if you feel comfortable, bring the helicopter to a stop exactly at the crossover point of the figure of eight. The heli is now pointing towards you (noise-in). Immediately after it has stopped push in a bit nick to make the helicopter move forward again and complete the figure of eight. Do this while entering from both directions!   
  
Always try to think as if you are in the helicopter, so think about which way the helicopter itself should move or roll. This is difficult in the beginning, but it will pay off later. It looks appealing to base learning to fly nose-in on tricks, but that way you will not progress later on.

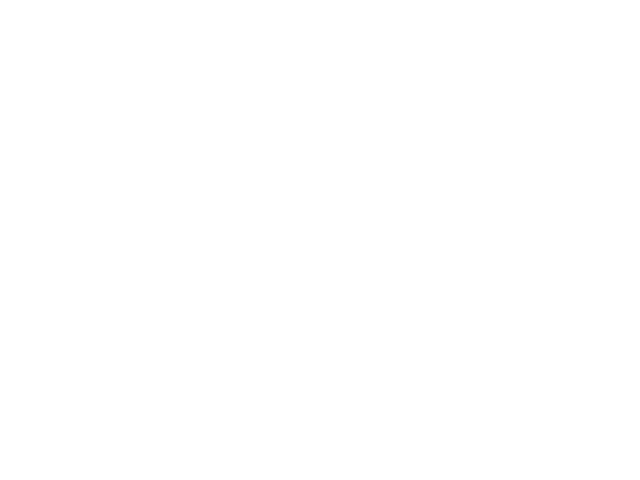


**Step 3**) Now repeat step 2, but let the heli stop at the crossover point for 1 second (count). Keep doing this until you feel comfortable. Now slowly increase the time the heli is stationary in the nose-in hover until you can hover it nose-in for e.g. 20 seconds. This is a good bases. If you can hover it nose-in for 20 seconds, then you can also hover it nose-in for 10 minutes :-)   
  
Remember to practice the escape, push both sticks forward so that the heli starts to fly again, and climb away from terra firma. This way you may fly over the top of your head, but that is no problem, since you will then shortly start to look at the tail again :-) Of course you should try to avoid flying over the top of your head! Try to simply complete the figure of eight, and fly some of them until you heartbeat has come down again.

This is what it should look like. Eeehhh, aren't those skids the wrong side up??

**Step 4**) Once the heli is hovering in front of you (at least 10m away from you), slowly try to backup the heli for 5m (it flies away from you). Bring it to a stop again, and make it slowly fly back again until it is again 10m in front of you. This means that you are actually "flying" the heli nose-in! Remember and practice the escape.

**Step 5**) Again hover the heli in front of you (nose-in, 10m away from you). Now slowly move the helicopter 2m to the left and bring it to a stop. Make sure that you control the speed. Next, bring it back again in front of you. Do this for both sides. Now once you feel comfortably, slowly increase the left and right distances to e.g. 5m.

  
  
This means that you can control the "T" while flying nose-in. This is a big achievement!

**Step 6**) Position the heli in front of you (nose-in). Now slowly rotate the tail left or right for about 30 degrees, and keep it steady. Do this for both sides. Keep practicing this until you can comfortably hover the heli nose-in with a slight rotation left and right.  
  
An important point it that you should not hover nose-in too long, do some normal hovering in between. Otherwise you actually may loose some of the skills of normal hovering! So do some normal hovering, and then some nose-in hovering etc.

Following the steps above you will learn to fly nose-in without a problem. Note that you can not consider yourself to be the nose-in champ yet. Be aware that you do not yet have the skills to solve a problem when you enter nose-in unexpectedly. So still be very careful in your flight exercises, and make sure that you never enter a nose-in hover by accident. If you do, remember the escape, push both sticks and fly away.

**Next steps**: [Nose-in Landing and Takeoff](http://www.rchelicopterweb.com/LearningToFly/LearningElements/NoseInLanding.htm).

**Learning the Nose-in Landing and Takeoff:**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

**Prerequisites**: You can hover nose-in, and fly the "T" nose-in. You can keep the helicopter very still while hovering nose-in

**Escape**: Just push in collective and you should be able to recover in a nose-in hover. Another option is to also put in some nick to make it climb and fly away. From there on you should be able to fix the problem.

**Step 1**) Actually, if you can truly hover nose-in, then landing the heli should not be a problem. The only thing you have to overcome is your stress. So of course you can hover the heli nose-in and keep it very still. Now slowly reduce the pitch and make the heli sink in a very controlled way to a height of e.g 1m. Hover it at that height for a couple of seconds, then climb back to a height of 2m. Keep on lowering the lowest level until you are hovering nose-in at a height of 0.5m.

**Step 2**) Now take a deep breath, and slowly reduce the height of the helicopter until it touches down. Once you touch the ground, swiftly reduce the collective so that the heli is pushed to the ground and does not tip over. Do not touch the cyclic once you touched the ground!. Man, give yourself a big applause, you made it to actually land nose-in.

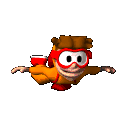
**Step 3**) Now, the heli is on the ground with a nose-in attitude. Hmm, looking very intriguing right. You feel like picking it up right, DON't. Walk to the heli, rotate it by hand such that it is again tail in, and take-off again. Now keep on doing this (nose-in landings) until you feel very comfortable at them.

**Step 4**) Now it is time to start taking-off nose-in. Take a deep breath, and spool up the heli. Now once it gets light on the skids, take yet another deep breath, and swiftly push the collective to take-off. Do not touch the cyclic until you actually are off the ground, or you will tip it over! Once of the ground, climb swiftly to a height of 1 to 2m, and regain control of the nose-in hover. Keep on practicing this until you can comfortably take-off nose-in.

**Step 5**) Now put the heli on the ground and rotate it 30 degrees from true nose-in and take-off. Practise this from both sides again until you feel comfortable.

Following the steps above you will learn to land and takeoff nose-in without a problem. If you truly mastered this exercise, you are really getting into helicopter flight. A lot of people did never make it this far. The proper nose-in flight is typically a big problem for most helicopter pilots.

**Next steps**: Get in Control of that Wind and master all the previous exercises with some wind.

First slow and low "acrobatics" 

|  |  |
| --- | --- |
| bullet | [Takeoff and approach to a height of 20m](http://www.rchelicopterweb.com/LearningToFly/LearningElements/TakeoffAndApproach20m.htm). |
| bullet | [Slow pirouettes](http://www.rchelicopterweb.com/LearningToFly/LearningElements/SlowPirouette.htm). |
| bullet | [Stall turns](http://www.rchelicopterweb.com/LearningToFly/LearningElements/StallTurns.htm). |
| bullet | Remote tail-in circles. |
| bullet | Remote nose-in circles. |
| bullet | Remote sideways figure of eight. |
| bullet | [Learning to Fly Backwards](http://www.rchelicopterweb.com/LearningToFly/LearningElements/BackwardsFlight.htm). |
| bullet | Hovering vertical square. |
| bullet | Pirouetting vertical square. |
| bullet | Pirouetting remote circle. |
| bullet | [Backwards circle](http://www.rchelicopterweb.com/LearningToFly/LearningElements/BackwardsCircle.htm). |
| bullet | Backwards remote circle. |
| bullet | [Backwards figure of eight](http://www.rchelicopterweb.com/LearningToFly/LearningElements/BackwardsFigureOfEight.htm). |
| bullet | 540 Stall Turns (tail and nose). |
| bullet | Dual direction stall turn. |
| bullet | Backwards stall turn. |
| bullet | Sideways stall turn. |
| bullet | Practice the steps above in moderate wind.  **You mastered the basic flying skills.** |

**Takeoff and approach to a height of 20m**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step**.

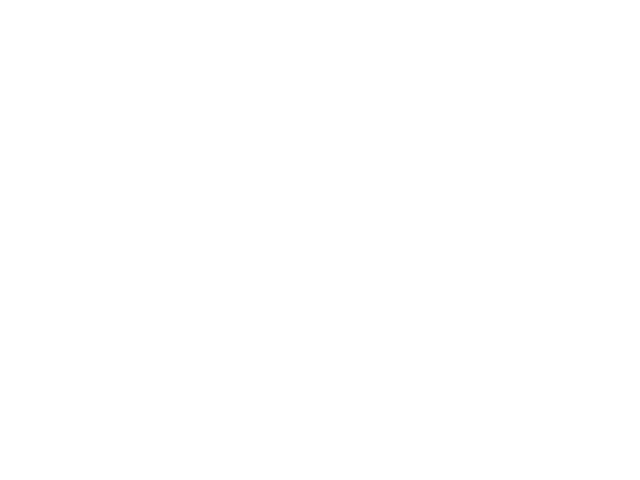
**Prerequisites**: you can hover nose-in. This includes moving around nose-in and doing a nose-in landing.

**Escape**: When in trouble, rotate the tail so that it points straight towards you. Stop any movement and lower the collective to bring the heli to a normal hover position. Land the helicopter and now recap what has happened :-) Make sure that the heli does not fly too far away in this exercise, so don't push in forward cyclic if not necessary.

**Step 1**) Actually this is just an exercise to get used to some more height which you might encounter in future steps (by accident :-)). We are actually going to perform very similar steps as in [Climb and Descend](http://www.rchelicopterweb.com/LearningToFly/LearningElements/ClimbAndDescend.htm). The only difference is that we are going to extend the height and distance. So just start with hovering the heli in front of you at a height of 1m. Now let the heli climb to a height of 5m. Hover it there for some time, and gently bring the heli back to a safe altitude of 1m. Make sure that it is at least 5 to 10m in front of you all the time! This ensures that your vertical viewing angle to the heli remains less than 45 degrees. Not obeying this rule may result in the heli coming back at you, flying over you which would result in an unplanned noise-in flight :-) Also be aware to slowly descend the heli. If a helicopter descends fast in a true vertical fashion, you may get into trouble. In this case you are going to fly in your own down wash which may significantly decrease your lift. Note that this is especially problematic if there is no wind. Practice the ascend and descend until you are comfortable hovering a bit higher and you have a nice and controlled vertical speed.

**Step 2**) Now hover the heli in front of you and again climb out to e.g 5m. While doing this however, also move the heli forward 5m. This gives you a nice and controlled 45 degrees climb out. Stop any motion and hover for a second. Next descend again, but again with forward motion such that the descend is again at an angle of 45 degrees. Stop any motion, and gently fly backwards towards you for 10m and repeat the above. You are now flying nice vertical symmetrical triangles. Now extend the triangle to a height of 20m. Slowly work yourself up to this height.

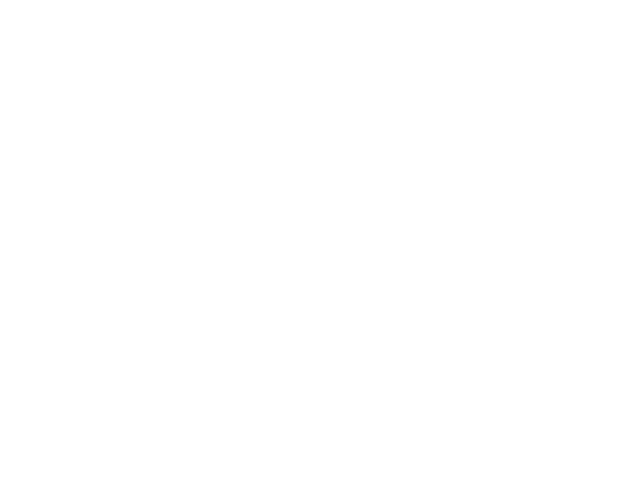
**Step 3**) Hover the heli 20m to the right of you and 20m in front of you. Now gently rotate the nose 90 degrees to the left. Hover the heli at one spot while looking at the side of the heli. Now practice the same triangle to a height of 20m from right to left.



**Step 4**) Repeat step3, but now from left to right.

**Step 5**) Now start further from the right so that helicopter descends right in front of you from the right.

**Step 6**) Now slowly change the angle at which the heli is approaching you until the descends are actually towards you. Practice this until you are making a 45 degrees descend from a height of 20m towards you from a complete nose-in direction. Be careful, and slowly work up to this!



**Step 6**) Now start from the left hand side and again work your self up until you do a full nose-in 45 degrees descend from a height of 20m.

You managed to do a controlled ascend and descend from any direction!

**Learning Backwards Flight:**

**For all steps, make sure you practice until you are confident in a step before you move on to the next step.**

**Prerequisites**: You can hover properly, both normal and nose-in and you can fly forward without a problem. You will get into trouble if you can not hover nose-in! The tail gyro is setup properly.

**Escape**: Push both stick forward, your heli will stop flying backwards and will climb out and start to fly forwards again. Since that is one of your capabilities, you are out of trouble. Make sure that you control the backward speed, it should be slow.

**Step 1**) Position the heli with the heck rotor towards you with the nose in the wind at a position 15m in front of you. Then fly backwards slowly and stop in front of you (minimum distance of 5m should be kept between you and the heli). This provides you with the first experience of flying backwards.  
  
**Step 2**) Position the heli 5m to the left and 5m in front of you with the nose to the left (again, the nose in the wind). Now let it fly backwards towards you and make it stop as soon as it is in front of you. This will make you confident in flying the heli towards you from the left.

**Step 3**) Increase backward "flights" to 15m or so. Now you are really flying backwards.  
  
**Step 4**) Position the Heli nose in in front of you (5m distance) with the nose in the wind. Now fly backwards away from you. Start with 5m, and work up to 15m or so. This makes you confident with the heli flying away from you (backwards).  
  
**Step 5**) Position the heli in front of you (5m) with the nose to the left (nose in the wind). Now mentally make the switch as if you are flying almost nose-in. Now fly the heli backwards 5m and stop (it is moving to the right of you). All with the nose in the wind. Practice this until you are confident in flying it backwards for a distance 15m.  
  
**Step 6**) Now you have to put it all together. You start 15m from the left of you with the helicopter facing to the left (in the wind). Next you will fly the helicopter backwards until it is positioned 15m to the right of you. Actually there is nothing new, all the basics are practiced and mastered properly right? The only new element is that you mentally have to switch from normal control to nose-in control while it is in front of you. But hey, you are capable of flying nose-in, so that should not be a problem.

**Step 7**) Once you mastered the above, you must start from step 2 again and learn all the steps from the right to the left.

**Step 8**) Once mastered straight backwards flight with the nose in the wind you must go back to step 1 and learn all the steps with the tail in the wind. If you have a proper gyro and if it is set up right, that should not pose any real problem.

Following the steps above you have learned backwards flight without a problem.

**Next steps**: [Backwards Circle](http://www.rchelicopterweb.com/LearningToFly/LearningElements/BackwardsCircle.htm).

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