

Radd's School of Rotary Flight

ECO flying lessons field manual

By Radd,
February 2003



1st Battery is called “ HOLD THE TAIL”

1. **NO TRAINING GEAR!** You must concentrate and be extremely careful. You must be very focused. You are learning the sensitivity and how proportional your controls are to the machine.
2. **CREATE A ONE-FOOT BOX** marked on the floor.(If at any time you leave the box you must NEVER attempt to fly back into the box..You must spin down and manually reset the Helicopter back into place with the tail at towards you).
3. **KEEP THE TAIL PERFECTLY AT 6 O'CLOCK**..If you lose the tail under power more than 5oclock on the right or 7 o'clock on the left you must punish yourself, spindown and reset the tail by hand (This is absolute,no exceptions!!). This is rule number one and the most important basis for these lessons.. Scooting back under power is strictly forbidden and considered failing or cheating.
4. **LISTEN FOR MOTOR GRIND AND SPIN UP VERY VERY SLOWLY**
5. **STAY AT SLOW HEAD SPEED!** At this time you should not be throttling up fast enough to see the tail move. If it does, back off the throttle. spin down and manually move the tail back into place by hand.
6. **SPIN UP; SPIN DOWN 5 TO 6 SIX TIMES..** Your getting aquatinted with your throttle stick **AND THAT'S ALL!!**
7. At 5 to 6 minutes into this battery you may increase head speed slightly. You may begin to feel the tail coming alive and wanting to move to the right. Be ready on the left stick (**RUDDER**)to counter its movement. It MUST stay dead on 6 O'clock..
8. **SPIN UP AND DOWN INCREASING THROTTLE...**Hold the tail solid...As you increase throttle slightly you will notice the Helicopter leaning towards the left..Be ready on the right stick (**ALERON**) to hold the helicopter upright in place in the box and the right skid on the deck...
9. **COMBINE THE INPUT OF BOTH STICKS...**hold the tail at 6 o'clock and keep the helicopter in the box and the right skid on the deck.
10. **SPIN UP AND SPIN DOWN** for the remainder of the pack.

Congratulate yourself if you have been disciplined enough to follow the directions and not pushed the helicopter past each level of steps in order...

BATTERY #2.....Same as Battery # 1

Surprise...Huh!

Ok.....Your In Training....Dont argue with the Drill Sargent.....

Airman ?....You want your wings?

THEN GET DOWN AND GIVE ME 20 MORE!!! (spin up and spin downs)



THESE ARE YOUR EXTREME LIMITS.!! YOU MUST NOT MOVE PAST THEM..!! You must stay within these guide lines. (Hopefully Much Less) If you do move past 7 O'clock or 5 O'clock you must spin down and manually replace the helicopter to center...No Exceptions....This is an Absolute....

Moving beyond these parameters is considered a crash! This is not an intentional tail movement exercise. Again, this is the maximum that a test pilot is allowed to wonder from center (in spin up) before spinning down and manually replacing and straightening the machine in the box.. To receive an +A you should by the end of the second battery be able to hold it dead straight on 6 O'clock through spin up and spin down...

FOCUS...AIRMAN!!!!



Battery 3 (Tilt the Swash)

1. Spin up slow ... **LOW HEAD SPEED!!** Keep the machine way under lift off speed... We are going to test and become aquatinted with the cyclic control or roll right to left. You must keep the head speed low . We don't need a boom strike or want it to dump over on it's side. At a low head speed getting a feel for the cyclic or aileron inputs is quite safe however you must as always stay totally focused.
2. **Low Head Speed**, Keep the tail, Stay in the Box, Keep the Skids on the ground.
3. **Right Stick** With the throttle well under half stick and somewhere around 30 or 35 percent begin to slowly and gently give right aileron towards 3 o'clock. Focus intently on the mast and the tilt of the swash.
4. **Repeat Spin up** and right aileron couple times ..feeling the sticks. Kept the tail, Stay in the Box
5. **Left Stick** Now we are ready familiarizes ourselves with the Left cyclic..Spin up the blades and go to 3o'clock on the stick then back to "0". Then gently and slowly use left aileron towards 9 o'clock. You may need to reduce throttle slightly because of the helicopters inertia to lean that way. Keep the skids flat. Remember no sudden movements especially to the left.. Returning to "0" Practice the 9o'clock movement a few times
6. **Increase Head Speed** Increase the rotor speed while still under lift off speed.Do this in very small adjustments on the throttle. Watch the Mast, the Swash.and Plate, and ofcourse keep the skids on the deck. Continue to become familiar with the sticks and relationship to the helicopter.Tilt the Swash, starting right first and then left next. Keep in mind the helicopter is more sensitive to the left Cyclic than the right.
7. After becoming comfortable with your right and left cyclic, very gently with soft stick inputs test your fore and aft movements. Watch carefully that your skids remain flat on the floor..The helicopter is less stable in the fore and aft cyclic movements. A boom strike or blade strike here would end all your fun here so be very focused.

More info on the lesson..

Keep in mind that the helicopter as it spins up will have tendency let the tail drift to the right and the helicopter itself will drift to the left. Be ready on the sticks to counter both movements. If you are using a Heading Hold Gyro and spin up gracefully enough the gyro will try to hold the tail for you. However even if it does the copter will always want to lean and drift to the left. Another reminder is the helicopter's tendency to tail strike or nose over with fore and aft cyclic. Watch the skids when testing these movements.

You may after you are comfortable move the cyclic controls in smooth stick inputs tilting the swash from right to left .Please do not attempt any circular movements to the swash at this time. We are still becoming aquatinted and you will fly soon enough..

Once again. After you spin down make a mental picture in your mind of stick inputs and how the helicopter reacted to them. It is also wise at this time to ask yourself if the helicopter appeared sound? Did you notice any strange movements? Any sudden jerks or wobbles? Is the swash returning to level after input? As we are becoming aquatinted with the controls we are also checking the integrity and safety of your machine.Give the linkages a once over making sure all the ball joints and control horns etc. are secure and connected well. Give any Red Flags you may be feeling the benefit of the doubt and double check them. As we add more power the last thing we need is something flying off ,becoming loose or breaking.

Battery #4 This battery is called **THROTTLE UP...**(and stay in charge)... Not Idle up!

1. We are going to do the same swash movements as before but at a higher head speed.
2. It is imperative that you apply your total focus to this step....You must keep your skids flat on the deck...this sounds dangerous and difficult especially without training gear but it is very possible. This lessons importance and it's teaching value is crucial You have no baby sitter. You are in charge. You must remain in control and use common sense as well as follow your instincts. You must remain safe...KEEP THE SKIDS FLAT!
3. STAY IN THE BOX...As the heli becomes light on it's skids it will want to fly. You must not let it. You must use your discipline here. This is very very exciting and your adrenaline should be flowing freely. Don't let it cause you to loose your judgment...If the heli drifts both skids outside the box SPIN DOWN....Trust me...Learn to trust yourself!
4. KEEP THE TAIL....The tail should not drift at all. If it does move past 5 or 7 o'clock SHUT IT DOWN!....I would not ask you to do this if it were not important...Please..Either hold the tail in place or spin down...and start again..Do not attempt to scoot it back into place...(This is MOST important)
5. PUNISH YOURSELF...Learning to become a pilot is a maturing process...Most of us know a full size pilot or two. They tend to be intelligent and disciplined people..(Well? Most anyway?) Believe it or not this is a decision and a commitment that is made before the learning process begins..Do you want to fly or crash and give up? Once this disceicion is made it will change you forever and you will be lengths ahead of the crash and smash flyer that usually gives up before he has even begun to fly.. Punishing yourself teaches you to stop and think. Soon the lights turn on in the dark sides of your mind and you begin to absorb what is really going on here...But if your mind hasn't got the time to recover and put your thoughts together and you recklessly pod on in a hurry the learning process is actually retarded and made slower. What is punishing yourself...”YOU MUST STOP PUSHING ON, SPIN DOWN, WALK TO YOUR HELICOPTER, PLACE IT BACK IN THE BOX MANUALLY TAIL TOWARD YOU..
6. EASY DOES IT As the head speed increases so does the sensitivity of the controls..So watch it.. Focuse...any sudden movements can be disastrous. Since you are not at flight speed you are still relatively safe from dumping it over..You must become aquatinted with your controls and you must learn the seriousness of this...and it's proportion from the radio to the helicopter.. As your head speed increases your gyro should become “Alive” and begin to hold the tail..You should feel your rudder control easing up a bit as the gyro beginning doing it's job..
7. PUNISH YOURSELF...earn your wings...and the respect of fellow flyers..this will save you untold amounts of money..Huge amounts of down time as well as a new outlook on the sport itself. STOP AND THINK.....STOP AND LEARN.
8. WATCH THE MAST, SWASH AND PLATE... remember, the mast is the indicator of the helicopters intentions.. It will move before anything else does.
9. STAY IN THE BOX...Do not try to fly back out of a mistake....If you flew (skidded) out of the box that means you made a few mistakes or still have not grasp feel of the controls. If this is the case it stands to reason that you probably cant fly it back into place while reversing your mistakes...Your under power here so use your maturity and punish yourself..
10. STAY ON POWER...towards the end of the pack try to stay on power for 2 or 3 minutes at a time...(unless you need to be punished?)..Before, I have been asking you to keep the spinups short and focused...Now it's time to remain at speed and learn to relax as much as possible and become one with your machine..

You must not let yourself be distracted even for a second at this head speed...You must have tunnel vision and in total contact with your helicopter..As you moves ..It moves...As you think ...It thinks...(tee hee..that's so silly!).. NEVER, EVER NEVER EVER, NENENENEVER EVER TAKE YOUR EYES

5th Battery This battery is called (**“Tilt the swash!”**)

Hey ? I thought we already did that?....

Yes, We've already done that ! But I'm just mean and nasty and want you to do it again! We have practiced tilting the swash awhile back but not at higher head speeds.. And actually we need the practice cause the 6th battery is gonna kick your little hiney.....On the 5th battery we don't want to spin up and down but concentrate on two things for longer blocks of time....(You should have been doing short spin ups before??...except on the end of the 4th battery..have you been cheating yourself?!)..

Ok, So. Spin up to where your skids feel light but not bouncing on the ground...hold the tail, keep the skids on the ground and stay in the box. Bring the throttle back if your heli wants to lift off. At this speed I want you to very very carefully play with the plate and tilt the swash right first and then left and VERY gently fore and aft..COME ON DUDE!...I SAID GENTLY!...stay in control and stay on the ground..STAY IN THE BOX!...If the tail swings, Punish Yourself.. DON'T CHEAT!! At this time with this battery your learning to be focused and at the same time calming down the nerves....

6th Battery.... This battery is called “PUT THE TRAINING GEAR ON!”

Oh, My, Goodness!!....Ah, Yeah!!!...Put them on because your gonna need them...Whooo Hoooo!!

I can see your eyes now!!....”Oh Man, this is what I have been waiting for!”..Well, not quite. But close! And it’s gonna be really cool!...With the extra weight of the training gear it’s going to change the feel of the Heli again so we’re going to have to get aquatinted with the machine again..”BOO, Hissssssss!”..Come on ya whiner.. Your getting close to flyingso quit whimpering...The fun is about to get with it!!

Since the Helicopter is going to be heavier and the controls will be sluggish due to that weight..Guess what?... Yeah, We have to add more power.. More Power, Higher head speed and more adreniline..Your gonna feel and hear the power now ... Yeah Baby!..

Seriously, stay in the box...we’ve got some really cool things coming up and your gonna love them...But remember to use your head..Stop and think..Stop often and feel whats going on..Don’t power on and lift off yet...Come on Please? Whata Ya Say? ..Don’t blow it now!!..

Here’s what we’re going to do..We are going to hold the tail at 6 o’clock, as the helicopter skims light on the gear and while still inside the box we want to turn the tail ever so gently and smoothly to the left...around 8 O’clock..The helicopter should be diagonal slightly and the whole thing should be pointing to the right. NOT SIDE IN COMPLETELY!.. Do not turn the heli more than 8 oclock. You can easily become disorientated. Concentrate and slowly bring it back to 6 o’clock again..Then gently slide the tail back to 8 o’clock and back to center again...The difficulty here is holding the heli in the box while moving the tail sideways...This is truly much easier said than done..After six or seven times of taking it to 8 o’clock you may want to rest and let your motor cool down. Next we will focus on sliding the tail to the opposite side to around 4 o’clock. A rule that we will be following well through Forward flight is to practice your weaknesses...” Fall in love with your weaknesses and your strengths will reward you”. In other words we will be practicing rights sides and left sides equally.

1. Training Gear on.
2. More Power, Higher Head Speed
3. Stay in the Box
4. Turn Tail Left to 8 O’clock and back to 6 O’clock
5. Remember to punish yourself for sloppiness (The Old Box torture)
6. Repeat Tail to 8 O’clock six or seven times
7. Rest
8. Turn Tail to 4 O’clock and back to 6 O’clock
9. Recognise your weaknesses and practice them most.
10. Stay in the BOX!

At this time you will definitely want to spin down and rest a moment...Ask the same old questions..How did the controls feel? Could you move smoothly ? Were you totally in control or was the helicopter. Next we will rotate the swash after spin up. As you begin your spin up and are holding the tail don’t quite get it that light yet and move the swash and mast in a gentle circle. You should see the frame of the helicopter softly look as though it bending in circular motions. You should be able to see the plate move as the saucer is slowly tilting and turning. On the last of the charge to the 6th battery you should spin it out in the box tilting the swash and moving the tail gently....You’ve come along way ...But from here it only gets better...DID YOU CHEAT? There’s still time to be good...Becareful. Be honest. Be focused! We are about to have some real fun so hang on!

We are still working on getting you in touch with your relationship to the controls and the movement of the swash. But. Think about it? How much have you advanced and broken down some walls of fear?... Has your control of the helicopter increased? Do you feel anymore confident? Can you remain calm as the blades are spinning up? At the end of second day and as the 7th battery begins are you the same nervous heli student you were when you started? If you were patient you have indeed come a long long way.

Her comes the **7th Battery** this battery is called the “**THE SCOOTER**”

Why the scooter? Cause that's what I call my son and I just wanted to name it after him. Plus we are going to move the chopper around the floor a little too..BUT! We are going to stay on the floor..Make no mistake we are not ready to fly yet but this going to be exciting enough...nothing for the faint hearted or elderly...(sounds like me?)and if by now you haven't been into the adrenaline cookie jar something's wrong...maybe you should take up bull fighting or something..

This time we are going to get up to maximum ground power on the battery. Just as much throttle as it takes to scoot the heli forward..A couple feet only, and don't try to slide it backward yet because that takes a lot more power and may require a short hop...And I hate hopping so for the first couple times please spin down after scooting forward and drag the heli back into the box by hand (safely? Please)..Keep the tail straight and slide it forward but make sure you feel under control.

1. Maximum ground power
2. Move forward only 2 feet at the most
3. Manually move the chopper back into place..DO NOT FLY BACK!
4. Spin Up several times and inch forward slowly. The Helicopter will want to veer left. Try to keep it straight with right aileron. And never let the tail drift off 6 O'clock. Keep the skids flat. Focus intently..Your muscles should look like little bumps under you skin if you have the right mix of adreniline and head speed.
5. Relax..take a breath ...let the stars in your head slow down a bit
6. Spin Up and slide forward letting the Heli drift to the left a bit. Just a bit..(2 or 3 Feet) Pull it back by hand... To slide you Helicopter Aft usually creates a hop and I hate hops..You've come way too far to hop now...and you'll fly soon enough.
7. Slide to the Right! Pull it Back by hand....Come on! Be patient!!...whats a few batteries...(have you crashed yet?) And it's not like you have that long of a walk anyway...
8. TaKe YoUr BlooD PresSer!

Battery 8 and 9 are both **“Your Batteries”**

You've earned a little R & R If you've done your best not to cheat and stayed in the box when I ask you to (Ha!)....If you feel under control and relaxed and feel you can remain still on the floor for two more batteries before trying anything crazy then these two batteries are all yours...Feel free to buzz around on the floor how you like and in what direction you choose. Tilt the swash, turn the tail, slide around in your favorite direction. Make sure your in control, calm and focused. And enjoy yourself.

On the tenth pack we are going to fly. But take a second and look back at what you have accomplished? Are you still nervous when your helicopter spins up? Is it still the Man killing death trap it once appeared? By now you should not be afraid of the controls as you add throttle. You now know what to expect as it spins up. You know how much power to apply and how much cyclic to add and how sensitive your control are.. You know what to do to hold the heli in place and how to slide it around...And in these last two batteries your fear factor has dropped even more..Are you still excited? Are you still having fun...Are you ready to fly? Take a deep breath and picture it lifting off very gently and in control....That's what's next



Battery #10..... (TIME TO FLY!)

Here's the real deal!....If I completely left this lesson off I know that you could fly now...I am so confident that even if I dropped dead on the heli pad right now you would be fine. And you could fly..And I'll betcha you feel the same. If you have followed the lessons and been honest with your self and not rushed ahead then you are ready and you know it. You can feel it. The beautiful secret that we share and which you now take for granted is that though you've only been at this a few days your not scared anymore. From now on you will look back on the frightened faces of newbies that have been "hopping and hoping" for as long as a month or more and still do not feel the sense of confidence that you do now..Had I not seen that confident stare in the eyes of my flyers many times I could not have the audacity say this is true..But I always see it !.

By now many things about helicopters have changed for you. You understand them much better. Your not afraid of them anymore.You have felt totally in control as well as being very confident in a confined space. Many new flyers with 4 time the experience do not feel the way you do now even in a space the size of a football field. And you have mastered the controls of a helicopter in the space of one square foot!! (Well mastering it maybe pushing it a little?) And, at this moment your probably feeling one of two things...Your either thinking I've been holding you back or you've accidentally bounced off the ground a couple times and your ready to stay up for a while...

It's about this time that I do you a great favor and ask that you once again to STOP AND THINK!! Stop, think and listen to me for one last Battery Pack. Just one more pack and you can be on your way.

For a brief moment think back on all the steps and battery lessons you practiced up to this point..

- 1.You spun up and held the tail
2. You held the tail and tilted the swash
3. You increased the Head speed and maintained control
4. You became light on the skids and moved the tail in both directions
5. You held the tail straight and scooted the Heli in the direction of you choice.
6. You learn to spin down and think. (Most important of all..you disciplined yourself)
7. You stayed within the box..(your sky!)

Here's another way to look at it....(As if you were flying)....

- 1.You lifted off and held the tail in towards you
- 2.By tilting the swash you flew to the left and right
3. By increasing the throttle and head speed you learned how sensitive your throttle and collective is. What it takes to climb out or maintain hover...as well as what the tail is going to do with the increase of power.
4. You learned to make the helicopter's tail stay rock solid. By moving the tail to the right and left on the floor you've learned how to control, keep and move the rudder in the air.
5. By scooting the heli in different directions on the floor you've become aquatinted with the cyclic controls and how they will react in the air.
6. You've learned the fine art of when to becareful and when to back off.

So what does all this sound like? Does it sound like you can fly it without any concern.. Well, not exactly but you are miles ahead of the average beginner. There is just a few things you need to know before hitting the throttle flying around the house and making all your neighbors whoot and holler and pat you on the back.

Here weeee go.....andone more list of the things to practice.

Batttery #10

1. Take that Flyin Machine OUTSIDE!
2. Burn half a pack outside on the pavement. (that's my advice..You'll feel better and a little more calm if you can use just that small bit of patience before the first lift off... You don't have to scoot it around

just get it light on the skids and calm down..In just thirty seconds after windup let your shoulders relax take a deep breath try to relax you hands and fingers...After a minute or two you will be ready to lift off

What is your helicopter going to do?

As soon as your helicopter becomes light on the skids it can only lift off in one of two ways. The first being slowly...If you continue to add very small amounts of throttle until your machine lifts off it will skid and drift on the ground to the left before it becomes airborne..You may even run out of space if you throttle up slowly enough..The second being of course throttling up quickly. If you find that after the helicopter is light on the skids and you punch up the throttle quickly to bring it off the ground you will see the helicopter raise and pitch severely left due to the rotation of the main blades. You must immediately give right aileron to counter act and then back off the aileron to 0 or mid stick again to avoid flying off to your right. So which way is best? Sounds simple to say somewhere in-between. The truth is, after you lift off a hundred times or so You will naturally compensate for the Yaw and Roll even before your fully spun up.. What does that mean? If you know for one hundred percent certainty that the heli is going to pitch or roll to the left on lift off then it makes great sense to be ready on the sticks to counter that movement with right aileron. As you practice lifting off you will notice that as you add throttle It becomes quite natural to add right aileron and tilt the swash to the right at the same time causing a gentle and graceful lift off straight up. At the same time after all my yelling you should already be holding the tail dead on 6 O'clock or I'm going to give up and go back to work for my Uncle Louie at his Hamburger stand and forget I ever knew you...

So...DRIFT LEFT AND COMPINSATE RIGHT...simple huh? Remember..the helicopter will upon lift off ...(DRIFT LEFT ...SO BE READY TO COMPINSATE WITH RIGHT AILERON..)

3. FREAK OUT!! No matter how much we have prepared for this, when your helicopter lifts off for the very first time and you see it...You Will Freak Out!...That Special magic of flight always amazes..And why shouldn't it? That's what We've been working so hard all this time for..As it lifts off And you see those skids rise off the cement you can't help but be shocked and filled with excitement.. And being the mean old kill joy it's my job to keep the machine in one piece..So.. Yeah you guessed it!! My rule here is to set it right back down..I know, we all want to say and tell our friends about the first time flying and how it stayed up for ever. But,Even if you were in perfect control and calm I still ask my new flyers to set the bird down right away after the first time it becomes airborne...Usually after they do they don't say a single word...They simply stare at me for a second...Then they shrug their shoulders trying not to blow their cool image by screaming and face the heli once more. Why do I ask you to come out of the candy store when your soooooo hungry? Because in this first flight You can actually focus so intently on the machine you can actually forget how close you really are to other objects such as telephone poles,cars,people and even the ground...
4. DO NOT TAKE YOUR EYES OFF THE COPTER!...Strange as it seems after setting it back down after the first time in the air new pilots often want to share the adrenaline. By turning to their friends and screaming....Yeah , screaming!...something like...(#\$\$^&*) or (@#\$\$^&*)...But,Keep your focus...Keep your eyes on the machine!
5. SO! NOW YOUR FLYING!! What's going to happen now?..Usually again..Two things continually happen. First being, most new flyers leave the box and start flying and drifting all over the place...But! "you didn't tell me about any flying box?"...Yeah, that's true but It wouldn't have done any good anyway !!. What should I say ?? 6 foot box?... 8 foot box?..Neither.. The best thing to do is set some parameters in your own head as to how far big and wide is "YOUR BOX".. This is one of the hardest teaching and learning steps.. Most new flyers will tell you and totally believe they were incontroll as the Helicopter tilted and jiggled and danced like a hoola dancer around the parking lot.. But in most cases they are Extremely Turned On! Happy to the point of Hystriahia and lacking all judgement!.What is to be done with students at this point? I have found that there is only two things I have found effective in stopping them. The first being to slug them swiftly in the back of the neck with a lead pipe wrapped in leather, or, Screaming continually to be reasonable.. Suppose your one of the sane and unusual test pilots that doesn't loose his mind as the rotors go higher and higher...Why would I ask him to set the helicopter back down even if he is in control?...Because this is your last day of training and you are still suppose to be learning... Isn't that right? My logic for asking the unreasonable request is that you stay in control. Remember I have been teaching you to control and not how to recover... You must remain in control. You must not let the helicopter control you! This includes flying as well as scooting on the ground...When the machine lifts off it should be

right where you want it to be and to stay right where you tell it to stay....The only way to over come this sloppiness is the beaware of this before it happens...When it comes off the ground..Make it stay put...Make it be obedient...Hover in control...FOCUS!!! Set it down often and think...and re-think once again!...

6. STAY IN YOUR AREA!..use the same control and discipline and punishment as when you were staying in that old chalk box on the floor. You might laugh, but If I let new flyers go they will be wobbling tilting and flying all over the place...Over the cars, missing the trees and scaring the crap out of the guy scattering his French fries and milkshake all over the parking lot.. And .. all the while thinking they were just hovering and not in forward flight...so..ok... OK!...Keep it in a ten foot space...How's that? TEN FOOT SQUARE!!!
7. KEEP IT SHORT
8. KEEP THE TAIL
9. KEEP IT IN YOUR SPACE
10. KEEP IT SAFE.....
11. KEEP IT IN ONE PIECE... Watch the mast, watch the swash, watch the plate....And watch out for me!!!!