Er9x heli setup using the template

In this tutorial I will be using the template to setup an HK450TT pro helicopter. If you have never setup a helicopter before go watch the Finless Bob video series on http://www.helifreak.com. His information is great and will teach you all of the basics and some of the whys of how to setup your helicopter. You should read the Er9x manual before you start. You should also have your heli already built. At least far enough to begin plugging in servos so you can test directions and throws. As of this writing I am running Er9x version 322. Make sure you have at least that version or some things may not work as expected.

So let's get right into it. Through this process either use a receiver battery to power your heli receiver or unplug the motor, so you don't accidentally start the motor and injure yourself (Can you tell I know from experience?). Start by turning on your 9x. Find an empty memory slot and go to the templates menu (10/10). Scroll down to "heli setup" and long press the menu button. You will hear a beep if your sound is on. Now press exit and go to the heli menu(3/10). I will briefly describe what options you have here. Swash type refers to how your swash plate is layed out. The HK450 has a 120 degree swash. So it is set to 120. 120X is the same with the servos moved 90 degrees around the main shaft. Also there is 140 for a 140 degree swash. And finally 90 for a 90 degree swash. Collective determines where to take your collective input from. For now leave it on CH11. Swash ring is like limits for your swash servos. You will get to this later. The three directions at the bottom are for reversing the various cyclic directions.

Now go to the mixer menu (5/10). The first 3 should be 100% CYCx. The CYCx inputs are your ccpm controls. CYC1 is the for/aft cyclic servo control. CYC2 and CYC3 are the roll cyclic controls. If your channels are plugged into the receiver differently, meaning throttle is not on channel 3 or similar then change them now. It might be easiest to use eepe to change the channel order. Main blade pitch is controlled from CH11. Right now on CH11 add a new mixer and set it as follows:

R	100%THR	Switch(ELE) c7	

This will allow you to have your pitch at zero while you are setting the servo arms level without needing to have the throttle stick at zero. What this mixer says is if the ELE switch is flipped, down on the transmitter, use curve 7. Curve 7 is all zeros and so the pitch will remain at zero no matter where the throttle stick is set.

Next let's check the control directions. The cyclic will have a lot of throw so keep the sticks near center or you may strip a servo when it binds. To help with this set the "Swash Ring" setting to 50. This is in the heli menu(3/10). Now put the sticks on the 9x near center and power up the heli, remember the warning about the motor. If you are setting it up for the first time keep the servo horns off of the servos when plugging in the battery. Flip the ELE switch down on the 9x to keep the pitch at zero. The first servo to work on is the fore/aft cyclic servo. You need to put the servo arm on and check that the servo arm moves up when you push up on the elevator stick. If it moves down then it is reversed. Use the limits menu (6/10) to reverse the servo. Mine was fine and didn't need to be reversed. Next let's check the right side roll servo. Right as though you were the pilot of the heli. On my heli this is CYC2. It should move up when you push the stick to the left. On my heli I had to invert this channel. I did this in the limits menu (6/10). Once you have that one moving the right direction the last is the left roll servo. It should move opposite of the right one when you move the AIL stick for roll. So moving the AIL stick left/right the left servo will move up while the right servo moves down. Check that the fore aft cyclic works as expected. The roll servos will move down while the fore/aft servo moves up. All of your cyclic directions should now be correct. With the exception of pitch which we will get to later. Right now if your servo horns are not level go to menu (6/10) and level them with the subtrims. Also check that the main blades are at zero pitch before moving on.

Ok the main blades are at zero pitch and the cyclic servos are moving the correct directions. Now we can set up the proper amount of blade pitch. Remember pitch is controlled by CH11. Unless of course you changed it in the heli menu (3/10). Looking at CH11 there are 3 mixes there, one for each flight mode (ID0, ID1, ID2). Currently they are all at 100%. Change the 3 of them to 50%. This way we will not bind the servos so easily. With the throttle stick near zero switch the ELE switch up. Remember we did this so the pitch would be stuck at zero. Also switch the flight mode to ID1. This way we can check the full range of pitch from full negative to full positive. Now move the throttle stick up slowly and check for binding as you do. It shouldn't bind but your setup might be different than mine. All 3 servos should be moving the swash up when you increase pitch, or move the throttle stick up. If it is not reverse it in the heli menu(3/10). That would be setting "COL direction," for collective direction. My heli needed to be reversed. Use a pitch guage to check the pitch. You will probably see 8 to 10 degrees at full stick. Try full negative and see what you get there. If your blades were at zero you should have about the same pitch positive as negative. Ideally you will want you pitch to be about 10 degrees. If it is not already there change the CH11 mixer percentages until it is. Remember you should be in mode ID1 so adjust with that mixer. Then copy that value to the other 2 once you have it right. Now you can remove the mixer we added to keep the pitch at zero. You don't want to enable that by accident while flying. Remember it was in channel 11 and was the one using switch ELE.

Now to set up throttle hold. This is most easily done in Eepe, however you can still program it directly into the radio. There is a template called "Sticky T-cut," this is the one you want to apply. Go ahead and do that. A new mixer line should have appeared "R -100% MAX Switch(SWC)." This mixer line needs to be on your throttle channel. If it is not move it there now. Also CH14 should have some new mixes. Find the one that is "R -100% MAX Switch(SWB)," and change the switch assignment to SWA. Now go to the switches tab (or menu (8/10)) and change CswitchA to be AND - SWB – ID0. With this setup you must be in mode ID0 with the throttle at zero for the hold to disengage. Without adding this extra switch, if you were in mode ID1 or ID2 then turning off the throttle hold and moving the throttle stick to zero would result in you motor suddenly, and probably unexpectedly, going to full power.

Next is gyro and tail servo setup. For the most part you will follow Finless Bob's video to set this up. Setting up your gyro gain channel can be done a couple of different ways. The first way uses one of the pots to control the gain and a switch to change between heading and rate modes. This way is good for testing and getting the setting you should be at for your gyro. Simply fly the heli and make small corrections with the pot to move the gain up and down. Once you have a setting you like then switch the 9x home screen to show values and read yours from there. The channels start with the upper left number being channel 1 and going to the right. The second line starts with channel 5 and goes to the right. The mixer setup will look like this:

50%	P2	Switch(GEA)	Offset(100%)
-50%	P2	Switch(!GEA)	Offset(100%)

The next way is to use the mixer percentages. That would look like this:

R 52%	FULL	Switch(!GEA)
R -45%	FULL	Switch(GEA)

The mixer percentages would then need to be set to the proper values for your setup. One is HH and the other is rate mode. The third way is similar to the second but uses the channel endpoints. The mixer line is simply:

100%	FULL	Switch(GEA)

Then in the limits menu (6/10) set the channel endpoints as your gains. This is like what Finless Bob talks about in his videos. Also I think it uses less eeprom memory than the other 2 and might be slighty

quicker for overall latency.

Almost last. Remember setting the swash ring to 50. The swash ring is like limits for your cyclic servos. It will control the maximum amount of movement you can get from your cyclic. You will probably need to fly your heli to know what maximum is for you. So make sure none of the servos bind when moving the cyclic in any direction. If they do lower the swash ring value a bit. Then you can set up dual rates and expo as required for the rudder, Aileron(roll), and elevator(fore/aft).

Finally we can discuss the curves. The pitch curves are 4, 5, and 6. You probably don't need to adjust these at all. But that is where they are should you want to. Curve 4 is for mode ID0 so you will notice it does not go to full negative. It does go a little negative and since you watched Bob's videos you will understand why this is. Curve 5 is for mode ID1, and curve 6 is for mode ID2. Those curves are the same and go from full negative to full positive. The throttle curves are a little different and will need to be tweaked for your motor and setup. Curve 1 is for mode ID0 and you will note it starts at -100. Again this is so the motor does not run. Curve 2 and 3 are for modes ID1, and ID2. Those do not go all the way to zero since you still need power to fly inverted. I have my heli setup for a head speed of about 2500 RPM. I used an RPM meter to measure this with the heli securely attached to a heavy saw horse. Then I ran the heli checking the rpm at various points on the pitch curve, so the RPM would be constant throughout the entire pitch range. There is not really good information about what head RPM you should run. I have found that at 2000 RPM I start to lose tail control because the tail blades are not spinning fast enough. At 3000 RPM you start to wonder about the quality of the Chinese parts and if it will stay together.

I hope this helps with setting up your helicopter. Keep in mind that this tutorial set up a Trex 450 clone. If your heli is different you will need to adjust some things as appropriate. And remember to fly safe.