

Mini-HowTo - Blade CX/2 Swashplate Leveling

By *klondikes*

Original thread can be found at <http://www.rcgroups.com/forums/showthread.php?t=642401>

If you have read many of these Multi Rotor Helis threads here at RC Groups you have heard about leveling the swashplate. It is critical for being able to attain hands-free hover and, for a beginner, it is necessary for stable handling. Once you get used to flying a helicopter you will use the tx to control this and, as long as it is close, an experienced pilot will have no problem. However, for beginners or those like me that just thrive on the perfect set-up, here is my low-down on leveling the swashplate. Leveling the swashplate is also needed if you move the pushrod to a different hole on the servo arm. You will notice that the pushrods on my CX2 are moved out to the second hole on the servo arm.

Before leveling the swashplate, be absolutely sure that the lower main rotor hub is installed on the outer shaft correctly. The upper screws must be lined up with the holes in the outer shaft. If the lower main rotor hub is not installed correctly the swashplate will be difficult or impossible to level.

First, be sure your servo arm and the servo pushrod are at 90° (perpendicular) to each other when the servo is at center. This is necessary because the linear distance of the circular motion of the servo arm decreases as it moves away from perpendicular. Starting at perpendicular makes the linear motion of the pushrod be relatively the same in both directions of movement of the servo arm. This means balanced movement in both directions. If this is not correct on your BCX/2, you need to change the position of the servo arm on the servo shaft.



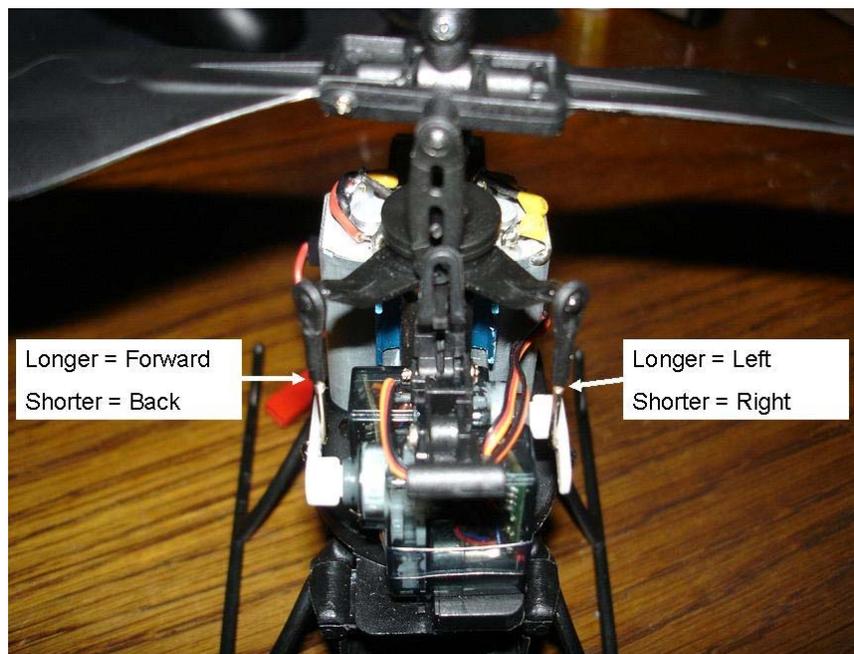
To do this have the tx on with the trim controls centered (do this first and wait for the red light on the tx) and the heli powered up (do this only after the tx has a red light and then wait for the solid green light on the 4-in-1). Leave the cyclic control (right control on tx for most US style tx's) at center. Remove the screw securing the servo arm to the servo. Pull the arm off of the splined servo shaft and rotate the arm so it meshes with the splines when you slide it back on but is also nearest to 90° in relation to the pushrod. Push the arm all the way onto the servo shaft and put the screw back in to secure it. Disconnect power to the heli and then turn the tx off (in this order,

always). See the first picture below for detail on this perpendicularity between the servo arm and the pushrod.

The next steps are to actually do the swashplate leveling. The real question is what to be level in relation to. The answer is not the floor or your landing skids. The answer is to have the swashplate level in relation to the rotational plane of the main rotor blades. You can eyeball swashplate level to get it close if you want, but hovering the heli as instructed below will tell you what adjustments to the pushrods are really needed to get the swashplate level.

Put your heli back together completely, turn on the tx (wait for red light) then power up the cx/2 and wait for the solid green LED, and prepare to hover. Because the swashplate is probably not going to be level, be prepared to use the cyclic control to hold the hover. This is best performed where there is lots of room to avoid hitting anything. Get the heli up in hover and keep it at least 18 inches off the floor and away from any other obstacles or walls that can interfere with the rotor wash and generate instability. Once you get the heli up, use the trim controls to counteract forward or sideways movement of the heli when the cyclic stick is at neutral (center). If a trim control reaches the end of its adjustment, this is OK. When the heli is trimmed as best as it can be even if one or both trims are maxed out, land the heli. Keep the trim controls where they are on the tx. These will direct you on how to adjust the pushrods. Disconnect power to the heli and turn the tx off (in that order, always). If the trims are centered and the heli hovered with no forward or sideways movement, your swashplate is level. If the the trims are not centered then you need to adjust the pushrods.

To adjust the pushrods, remove the tail and canopy from the CX/2. Look from the rear of the heli at the pushrods and compare to the second picture below. The left one controls forward/back movement (elevator) and the right one controls left/right movement (aileron).



See the instructions below to know how to adjust the pushrods based on the trim setting currently on your tx. If either trim is centered, no adjustment is needed to the corresponding pushrod.

Forward/back (elevator) pushrod adjustment

If the elevator trim is set toward forward - the elevator pushrod needs to be lengthened. This will cause the cyclic to pitch in the forward direction meaning the trim will have to be moved back

toward center to counteract this longer pushrod. The pushrod can only be adjusted in 1/2 turn increments and still re-attach to the swashplate. The closer the trim is to center, the fewer 1/2 increment turns need to be made to the pushrod to correct it. To lengthen the pushrod, disconnect it from the swashplate balljoint and unscrew it. You should not go more than 1 full turn on any adjustment. After making the adjustment reconnect the pushrod to the swashplate balljoint.

If the elevator trim is set toward rearward - the elevator pushrod needs to be shortened. This will cause the cyclic to pitch in the rear (back) direction meaning the trim will have to be moved forward toward center to counteract this shorter pushrod. The pushrod can only be adjusted in 1/2 turn increments and still re-attach to the swashplate. The closer the trim is to center, the fewer 1/2 increment turns need to be made to the pushrod to correct it. To shorten the pushrod, disconnect it from the swashplate balljoint and screw it in. You should not go more than 1 full turn on any adjustment. After making the adjustment reconnect the pushrod to the swashplate balljoint.

Left/right (aileron) pushrod adjustment

If the aileron trim is set toward the left - the aileron pushrod needs to be lengthened. This will cause the cyclic to pitch in the left direction meaning the trim will have to be moved to the right toward center to counteract this longer pushrod. The pushrod can only be adjusted in 1/2 turn increments and still re-attach to the swashplate. The closer the trim is to center, the fewer 1/2 increment turns need to be made to the pushrod to correct it. To lengthen the pushrod, disconnect it from the swashplate balljoint and unscrew it. You should not go more than 1 full turn on any adjustment. After making the adjustment reconnect the pushrod to the swashplate balljoint.

If the aileron trim is set toward right - the aileron pushrod needs to be shortened. This will cause the cyclic to pitch in the right direction meaning the trim will have to be moved to the left toward center to counteract this shorter pushrod. The pushrod can only be adjusted in 1/2 turn increments and still re-attach to the swashplate. The closer the trim is to center, the fewer 1/2 increment turns need to be made to the pushrod to correct it. To shorten the pushrod, disconnect it from the swashplate balljoint and screw it in. You should not go more than 1 full turn on any adjustment. After making the adjustment reconnect the pushrod to the swashplate balljoint.

Now you can put your heli back together and power everything up in the correct order (tx - red light - LiPo - green light). Hover the heli and trim it out as you did before. If the trims are centered, you are done and the swashplate is level. If either trim is not centered repeat the adjustment to the appropriate pushrod as detailed above. Eventually you will get the trims where they are centered when the heli hovers.

I failed to mention - before leveling the swashplate be absolutely sure that your lower main rotor hub is installed on the outer shaft correctly with the upper screws lined up with the holes in the outer shaft. If the lower main rotor hub is not lined up correctly leveling the swashplate will be difficult or impossible.