VCTRC

3GX

Box content :

3GX gyro

Recever wiring leads

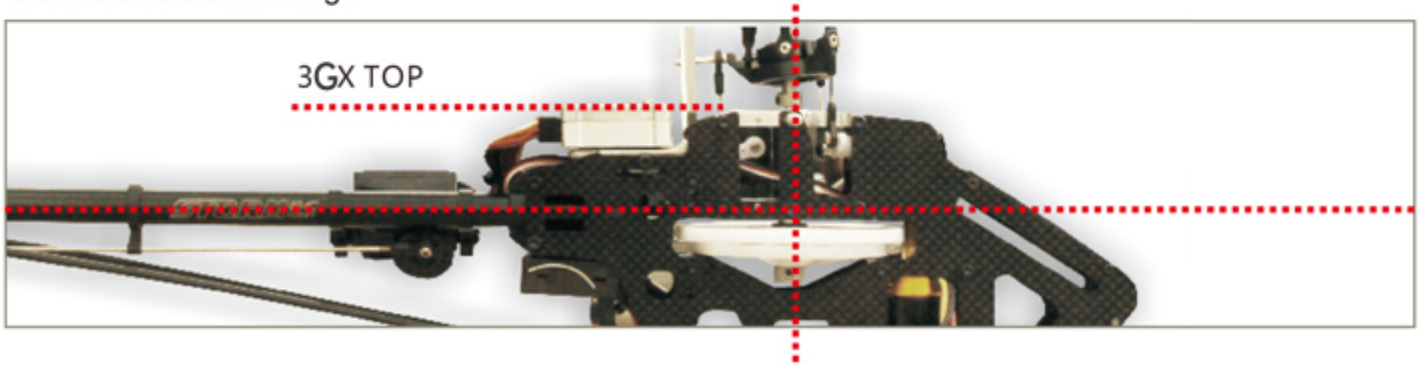
Gyropads

Adjustment tool

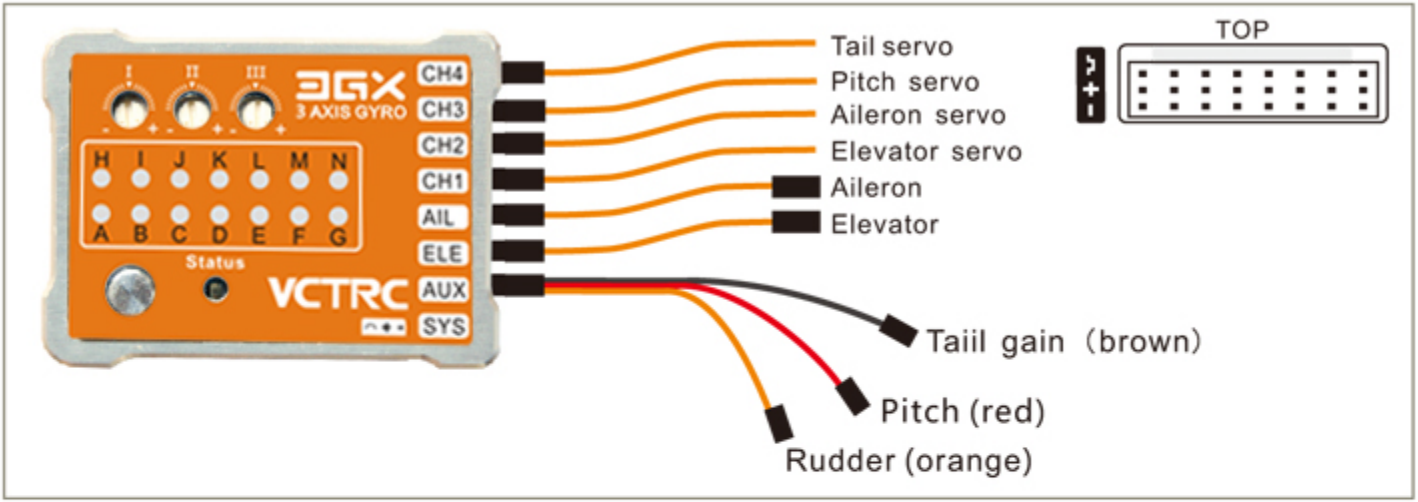
MOUNTING AND CONNECTION

Now it's time to fly your helicopter with 3GX, After powering up the receiver, wait until the 3GX has initialized completely.

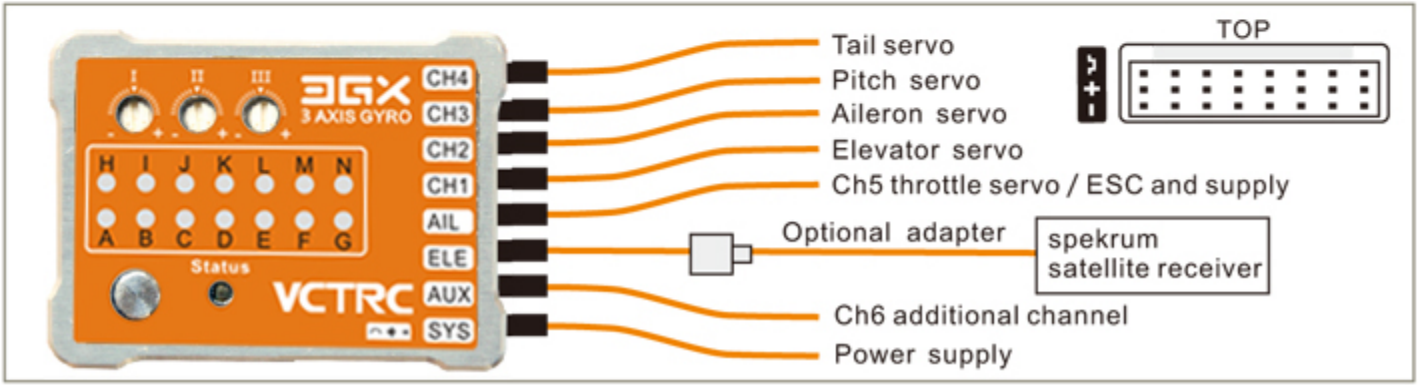
This is indicated by a short move of the swashplate servos and the Status-LED lighting steady blue or purple. It is unnecessary to have the helicopter horizontal, but important not to move it during the whole initialization. In case of wind catching the blades, you can even lay it on the side to avoid shacking.



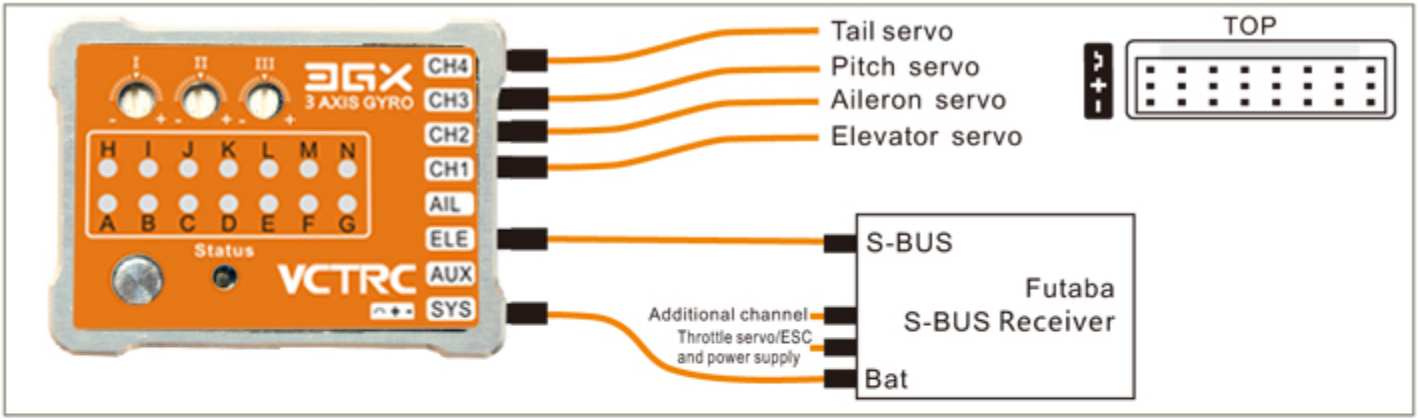
Connection of a standard receiver:



Connection of a spektrum statellite receiver



Connection of other single line receiver with additinal servos connectors



Preparing a transmitter for flybarless

1. First create a new model in your radio's model memory. When using the 3GX gyro you have to disable any mixing functions for the swashplate or tail. Each function should be assigned to just one receiver channel.
2. Never enable your radio's E-CCPM mixing function: this will be done by the 3GX Gyro, Always set your radio's swash mixer to M-CCPM (mechanical mixing 90 degree) which is often called, H1' or,1 servo' mixing.
3. Be sure that all trims and sub trims are disabled.
4. all servo travel are 100% (increasing or decreasing the servo travel for aileron, elevator and rudder can later adjust the maximum control rates).
5. Do not adjust the pitch curve at the moment. For the setup procedures, it has to be set as a straight line from -100% to +100% (or 0 to 100% depending on radio brand).

Note:

If you use a motor controller with BEC, please disconnect the motor for security reasons to avoid the possibility of unintentional motor start up!

Operation Mode:

Menu LED :
Amount of tail gain
A =0%~b7=100%

Setup button :

To enter setup menu push down several seconds until LED A is steady on.
To enter parameters menu push shortly until A is flashing.

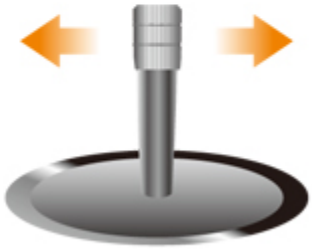
Status led :

Tail gyro mode:off
Flashing blue or blue--Heading lock mode
Purple--Normal Rate mode

Menu selection:

Menu LEDs :
steady on=setup menu
Flashing=parameter menu

Button :
Press shortly for next menu point



Status-led :

• off	purple	red flashing	red	blue flashing	blue

Selection by tail stick input or aileron / elevator / pitch stick within menus as needed.

FUNCTION SET UP PROCESS

Enter the FUNCTION SET UP function process: Press the "SET UP button", then the status LED A start flash, please release the SET UP button when the" status LED A " stops flashing and lights up steady, and now the FUNCTION set up process is ready for A function.
Leave the FUNCTION SET UP process: To leave the FUNCTION SET UP process that you have to skip through all function points by pressing the "SET UP button" several times, after pushing the "SET UP button" at function point " N " you will exit the setup menu and the system is ready for operation again, None of the LEDs A - N are glowing anymore.
If there is no stick or button input for 4 minutes, while being in the setup process, the 3GX will exit the set up menu automatically. (This will not happen during setup points E , H and J to give you enough time to adjust the mechanical setup of your helicopter).

: gyro type set up

There are two types of Gyro can be choose, the RED status LED is the standard alone-tail gyro function, and the BLUE status LED is the 3 axial gyro function. Just need you to set up the function according your flight model.

RED	Standard alone-tail gyro
BLUE	3 axial gyro

B:the mounting direction of gyro

The 3GX unit can be mounted in nearly all possible orientations. The only restriction is that the plug connectors have to point in or against lying direction.
At setup menu point A, you have to choose whether the 3GX is mounted horizontally (printed surface 90 degrees to the main shaft) or vertically (printed surface in parallel with the main shaft).
The color of the Status-LED shows the currently selected orientation:

RED	Vertical (on the side)
BLUE	Horizontal (flat)

C: Swashplate servo frequency SET UP

Status LED C is for selecting the servo frequency of your swashplate servos.
If you do not know what maximum pulse rate tolerated by your servos, please select not more than 50Hz driving frequency. A higher driving frequency can lead to failure of the servos!
Analog Servos usually tolerate only 50Hz, some types up to 65Hz. Digital servos allow usually higher frequencies, but this has to be verified in the servo data sheet. You may need to check with the manufacturer of the servos.

Off	50Hz
Purple	65Hz
Red	120Hz
Blue	200Hz

D : Tail servo center position pulse length

Status LED D is for you to select the tail servo's center position pulse. The color of the Status-LED shows the currently selected servo center position pulse:

Purple	760us
Red	960us
Blue	1520us

E : Tail servo frequency

Status LED E is for selecting the servo frequency of your tail servos, please set up the tail servo's frequency By moving the tail stick repeatedly in one direction you can choose the desired tail servo frequency.(show as below Fig.) then the tail servo should be ready at the center point after your selected the desired tail servo frequency.

Next attach a servo horn to the tail servo in such a way that the tail linkage rod forms at 90 degree angle to the servo horn (or as close as possible) and then adjust the linkage rod as described in the manual for your helicopter. For most helicopters the tail pitch slider should be centered and the tail rotor blades will then have some positive pitch to compensate for the torque of the main rotor.

Note: This menu item will not be left automatically after 4 minutes, so you have plenty of time to adjust the mechanical setup.

By moving the tail stick repeatedly in one direction you can choose the desired tail servo frequency.

Off	50Hz
Purple	165Hz
Red	270Hz
Blue	333Hz

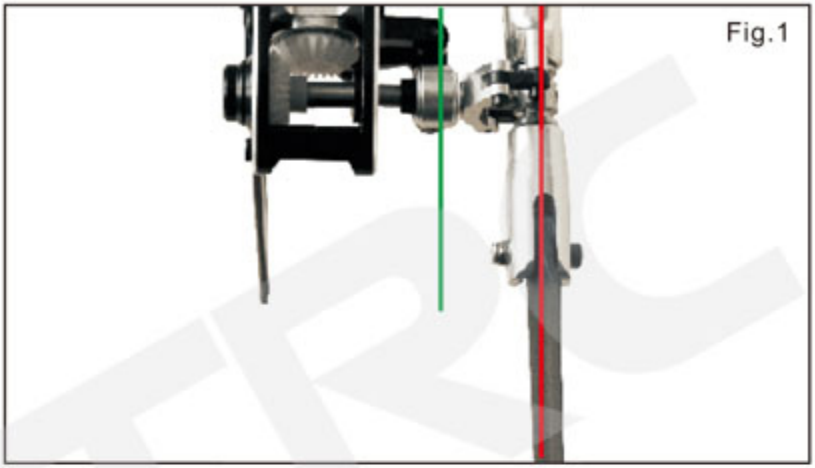


Fig.1

F : Setting the Tail rotor endpoint

The status LED F is for you to adjust the best possible servo throw for your tail rotor. This best throw is determined by the maximum possible control travel of the tail mechanism or based on the maximum allowed angle of attack of the tail rotor blades, that will not lead to an aerodynamic stall of these blades. Such stalls can cause very bad stopping behavior.
To adjust the limits, move the tail stick in one direction until the servo reaches the maximum end point without any binding or stall and release the tail stick. The further you move the tail stick the quicker the servo will steer into the given direction. If you move the servo too far you can steer the stick to the opposite direction and move the pitch slider a short way back.
Once you adjusted the maximum endpoint don't move the tail stick anymore and wait for the Status-LED to flash and then light steady red or blue, depending on the adjusted direction.

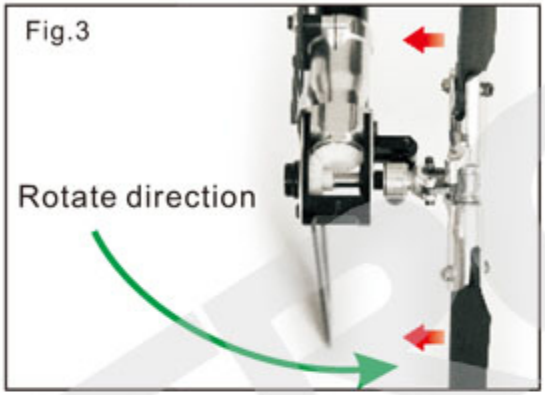
Now you have saved the servo limit for one direction.
Then adjust the servo limit for the other direction. Drive the tail pitch slider by using the tail stick to the other maximum endpoint and then release the tail stick. After a short moment, the color of the Status-LED should start flashing followed by lightning steady purple, (mix of red and blue) indicating that the servo endpoint adjustment is complete.

Fig.2

G:Setting the Tail sensor direction

Here you have to check if the 3GX's tail gyro does compensate into the right direction. The gyro always tries to steer in the opposite direction of the rotation that is applied to the helicopter.If you move the helicopter by hand around its vertical axis, the gyro must actuate a tail servo movement to compensate this rotation. If for example you move the nose of the helicopter to the right, the gyro has to steer left the same way as you would steer left with the rudder stick.
Once again repeat the test as described above. The 3GX should now correct in the right way:

Red	Normal
Blue	Reversed



H : Adjusting the swashplate servo centering

When entering status LED H process, all swashplate servos are running to their zero position (1520 µs) what we call reference position here the Status-LED is off.
This reference position is used to mount the servo horns on the servos so that they form as much as possible at 90 degrees angle to the linkage rod. Usually this will not work out perfectly depending on the servo's gear train and the servo horn, therefore you can adjust electronically every single servo in the next steps. Later, you can come back anytime to the reference position (when the Status-LED is off) for checking the mechanical setup.
If you move the tail stick to a single direction once, you can select one servo and change its center position by moving the elevator stick back and forth. Every color of the Status-LED is corresponding to a specific servo channel that is indicating its selection by a short up and down move.If you move the tail stick once again in the same direction as before you can

Off	Swashplate servos at reference position
Purple	CH1 elevator servo center adjust
Red	CH2 aileron servos center adjust
Blue	CH3 pitch servo center adjust

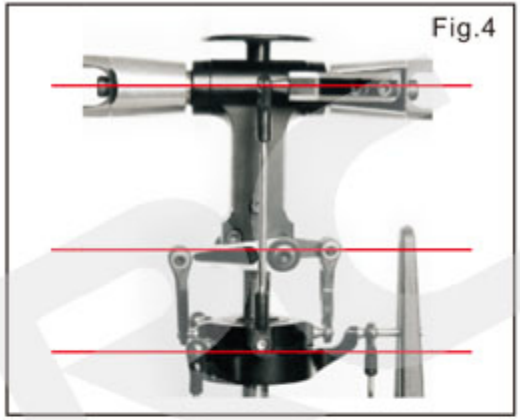


Fig.4

| : Swashplate mixer and Setting the swashplate servo directions

The color and state of the Status-LED shows the currently selected mixing type:

Off	Mechanically
Purple	90°
Red	120°
Blue	140°

At Setting the swashplate servo directions , you adjust the correct swashplate servo directions. To facilitate this setup, you don't need to adjust every servo by its own, but just try the 4 possible combinations.

Move the pitch stick and check if the swashplate moves horizontally up and down. The direction itself is not yet important. If one or more servos are not running in the right direction, just choose another combination by giving a short rudder input. Repeat this rudder input until all servos are running in the same direction.
Check now, if your control directions of aileron, elevator and pitch are correct. If this is not the case, you have to use the servo reverse feature of your transmitter to reverse the appropriate control function.

J : Teaching the cyclic pitch geometry

At this J setup process, you have to check the 3GX the available cyclic pitch range.
First don't touch any stick on your transmitter when entering setup J function. Orientate one of the rotor blades so that it is parallel to the tail boom. Then attach a pitch gauge to this rotor blade. The swashplate should be in the neutral position and the blades should have 0 degrees of pitch, otherwise repeat the swashplate servo centering at setup H .
Now move the aileron stick until the rotor blade has an exact 6 degrees of cyclic pitch and then release the stick. If you moved the swashplate too far you can steer the stick to the opposite direction and reduce the pitch. Also by moving the tail stick to one direction you can delete the adjustment and reset the swashplate back to 0 degrees.
When reaching 6 degrees, the Status-LED should light blue. This indicates that your helicopter's rotor head geometry is perfect for the use with a flybarless system. Otherwise, if the Status-LED's color is red or purple or even if the Status-LED is off, this indicates that your helicopter's geometry is not optimal for flybarless usage. Correct this by using shorter servo horns, shorter linkage balls on the inner swashplatering or longer blade grip link levers.

K : Adjusting the collective pitch range

At setup STATUS LED you adjust the maximum desired negative and positive collective pitch. Move the pitch stick all the way up and stay there. Now you can increase or decrease the maximum amount of pitch using the tail stick.

When you adjusted the desired maximum pitch angle, move the pitch stick all the way down and again increase or decrease the pitch to the minimum desired value using the tail stick.

Don't use any pitch curves in your transmitter while doing these adjustments. Later on for the flights, you can adjust your pitch curves as you like and are used to.

L :Adjusting the cyclic swashplate limit

For adjust the cyclic swashplate limit as following way:
Carefully move the sticks for aileron, elevator and pitch to all maximum end points and watch out if the swashplate, the linkage rods or servos are binding somewhere or even getting not more driven.
By moving the rudder stick to the left or right, you can increase or decrease the aileron and elevator throw limiter.Always try to achieve the maximum possible cyclic throw. The higher the swashplate deflection is set the greater it will be in flight. This will achieve the maximum possible rotation rate of the helicopter without sacrificing the gyro control loop.
If afterwards any modifications are done to one of the other setup menu points which affect servo adjustments (function setup H , J and K) the cyclic swashplate adjustment has to be redone.

M: Setting the swashplate sensor directions

At setup the M function, you can check if the sensors for aileron and elevator are working in correct direction. This can be directly verified in this function set up : If you roll or tilt the helicopter by hand the swashplate has to steer against this movement.
When tilting the helicopter forward the swashplate has to move backwards, when tilting the helicopter to the back, the swashplate has to compensate forward. Same thing applies to the roll axis, when you roll the helicopter to the left the swashplate has to steer right and vice versa. Basically the swashplate has to remain horizontal while banking the helicopter.If this is not correct, you can reverse the sensor directions by moving the tail stick in one direction. For confirmation you will see that the Status-LED changes color. Repeat this step until both

sensors are correcting in the correct direction.There are four possible displays for control to choose from, one will be correct:

	Elevator	Reversed
Off	Reversed	Reversed
Purple	Reversed	Normal
Red	Normal	Reversed
Blue	Normal	Normal

N : Setting the spinning optimization direction

When entering setup function LED N the swashplate will tilt forwards or backwards depending on your helicopter's setup (servos, linkages,...) this resulting tilt will correspond into a specific compass heading.

Now grab your helicopter at the rotor head and rotate it on the vertical (yaw) axis by hand. The swashplate must continue to maintain the same compass heading The initial direction (forward or backward) is irrelevant.

If the noted swashplate tilt opposes the rotation of the helicopter and rotates against the direction of the model the pirouette optimization should be invert. This can be done by moving the tail stick in one direction. For confirmation the color of the Status-LED on the 3GX will change:

Red	Normal
Blue	Reversed

PARAMETER SET UP PROCESS

When the "3GX" gyro is ready, hold down the set up button until the Menu LED next to point A lashes quickly and then release the button. This is how to enter the parameter set up process. To switch to the parameter set up, just press shortly the set up button once again. After the last function set up pressing the button one time more exits the parameter menu and the 3GX is ready for light again. Status-LED will indicate the tail gyro mode and the LEDs A - N are off.

Never attempt to Fly when the 3GX gyro is in only one function menu set up ! In this condition the control system and sometimes the stick inputs are deactivated!

A : Swashplate cyclic center adjustment

The Swashplate cyclic center adjustment in the parameters menu gives you the possibility to easily adjust your servo centers on the lying field as for instance your helicopter is wobbling during pirouettes or when it doesn't climb out straight on quick pitch inputs.

Contrary to centering every single servo in the setup function H , here you are able to directly adjust aileron and elevator without taking care about the single servos. However, the collective pitch cannot be adjusted here.

At parameter set up A , just move the aileron or elevator stick to the desired direction until the swashplate is adjusted correctly. The further you move the stick the faster the servos will move. By moving the tail stick to one direction you can delete the recent adjustment and bring the swashplate back to the original position.

Never use the trim functions of your remote control!

The 3GX gyro will see trim as a control command and not as servo trim.

B : Control behavior

At parameter B you can choose between different control behaviors for your helicopter. This includes the maximum rotation rate of the helicopter as well as how sensitive the 3GX gyro will react to stick inputs for aileron, elevator and rudder around the stick center.

Off	User defined
Purple	Normal
Red flashing	Sport
Red	Professional
Blue flashing	Extreme
Blue	Transmitter

C : Swashplate - pitching up compensation

While in fast forward light apply jerky collective pitch inputs to test this function. The helicopter should mainly remain in its horizontal path during climbing and descending. If the nose of the helicopter is pitching up and down heavily l, increase the value at parameter set up C to compensate for this effect. But, if the value is too high the helicopter might feel sluggish and lazy. Try to find the lowest suitable setting.

The currently selected value is indicated by the Status-LED color and state:

Off	User defined
Purple	Very low
Red flashing	low
Red	Normal
Blue flashing	High
Blue	Very High

D : Tail Heading Lock gain

At parameter set up D the Heading Lock gain for the tail can be adjusted:
This Heading Lock gain decides how steady the gyro will pirouette or hold. Begin with a Heading Lock gain set to low or very low and ind out the highest possible tail gain in your transmitter. Then you can start to increase the Heading Lock gain: If the heading lock gain is too slow , pirouettes will be inconsistent during fast forward flight or in crosswind conditions.
If the heading lock gain is too high, the tail will bounce back slowly after stop maneuvers and feel imprecise during reversals. It is also possible that the tail will oscillate gently while hovering or lying around.
Move the tail stick into one direction until the Status-LED lights in the desired color:

Off	User defined
Purple	Very low
Red flashing	low
Red	Normal
Blue flashing	High
Blue	Very High

Function setup menu list (Function menu LED is steady on):

	Status-LED	Off	Purple	Red	Blue
A	Gyro type set up			Tail gyro	3 axial gyro
B	3GX Mounting orientation			Vertica (upright)	Horizontal (flat)
C	Swashplate servo - frequency	50Hz	65Hz	120Hz	200Hz
D	Tail servo-center position pulse length		960us	760us	1520us
E	Tail servo-frequency	50Hz	165Hz	270Hz	333Hz
F	Tail servo-rotor endpoints	Tail stick - move to right endpoint and wait / left endpoint and wait			
G	Tail-sensor direction			Normal	Reversed
H	Swashplate-servo centering	Reference position	Ch1 center position	Ch2 center position	Ch3 center position
I	Swashplate-mixer and servo directions	Mechanical	90°	120°	140°
J	Swashplate-cyclic pitch geometry	Aileron stick – adjust 6° cyclic pitch on the roll axis (blades bound with fuselage)			
K	Collective pitch range	Collective stick on max and min position and use tail stick to adjust desired pitch			
L	Swaxhplate-cyclic limit	Move aileron, elevator and pitch sticks – adjust max limits with tail stick			
M	Swaxhplate-sensor directions	Normal,Normal	Reversed,Reversed	Reversed,Normal	Normal,Reversed
N	Pirouette optimization direction			Normal	Reversed

Parameter setup process (Menu LED is blinking quickly) :

	Status-LED	Off	Purple	Red flashing	Red	Blue flashing	Blue
A	Swashplate - cyclic center adjustment	Aileron and elevator stick – reset with tail stick					
B	Control behavior	User defined	Normal	Sport	Professional	Extreme	Transmitter
C	Swashplate - pitching up behavior	User defined	Very low	low	Normal	High	Very High
D	Tail - Heading Lock gain	User defined	Very low	low	Normal	High	Very High