

BlackWidow Flybarless System Manual

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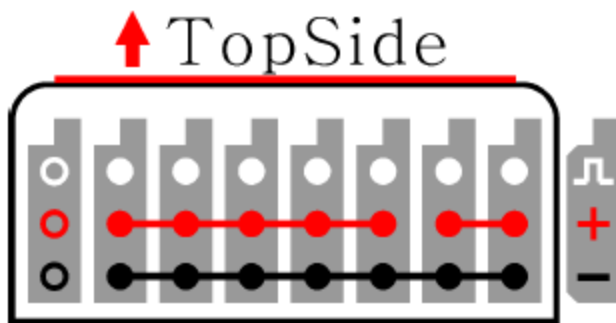
Setup Guide

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BlackWidow System Overview

The BlackWidow is a 3 axis gyro stabilization system capable of performing full 3D while still keeping the helicopters aileron, elevator and rudder attitude stable. The BlackWidow contains options for 3 different receiver types (Sbus, DSM7, and PWM). The BlackWidow also uses a standard pin out configuration where the ground pins are at the bottom and the data pin is to the top of the unit.



Power Supply

The BlackWidow FBL system supports High Voltage (HV) servos with a voltage range of 4.1V~9V. The tail servo, swash plate servos, and the USB have 3 separate power supply Circuits to allow HV servos and normal servos to work together. The swash plate servos (ServoLeft, ServoCenter, and ServoRight) are powered off of the Ail, Ele ports. Both of these ports can utilize 5A of current individually or 10A current combined for the swash plate servos. The tail servo is powered by the Rudd port which supports up to 5A of current.

The USB port will not power the servos, therefore you must apply a separate power source for the servos to move while programming.

Transmitter Setup

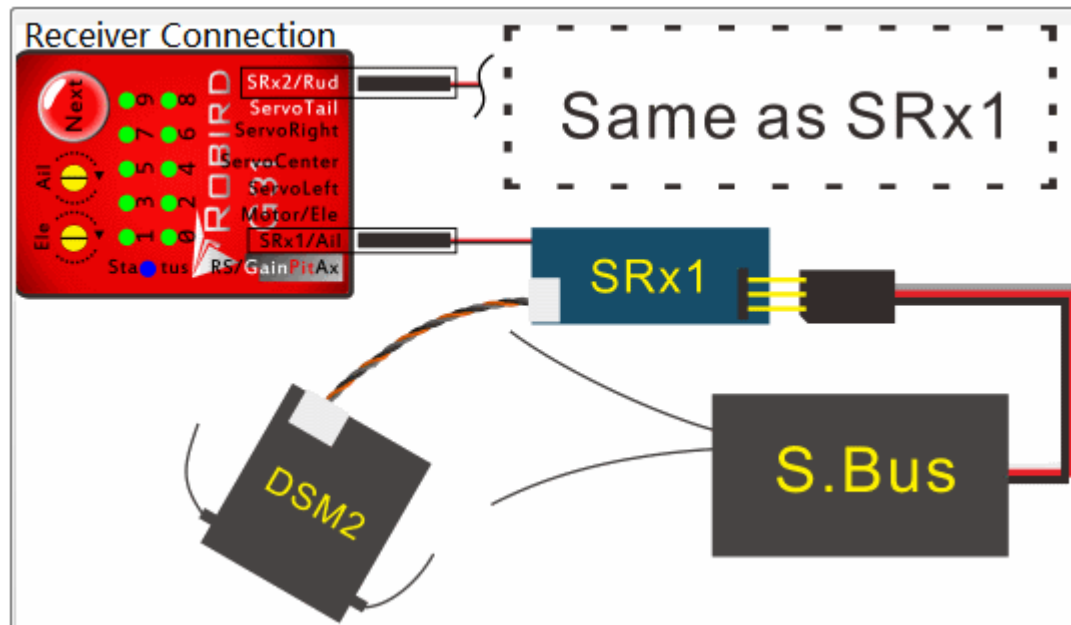
The first thing you will want to do is setup your radio. Set your swash plate type to **SINGLE SERVO 90 degrees.** This is the same setting you use when you connect to your flight simulator. Next you will want to make sure that the sub trims and that all trims are set to **Zero.** The BlackWidow will handle the 120 degree CCPM mixing.

BlackWidow to Receiver Connection.

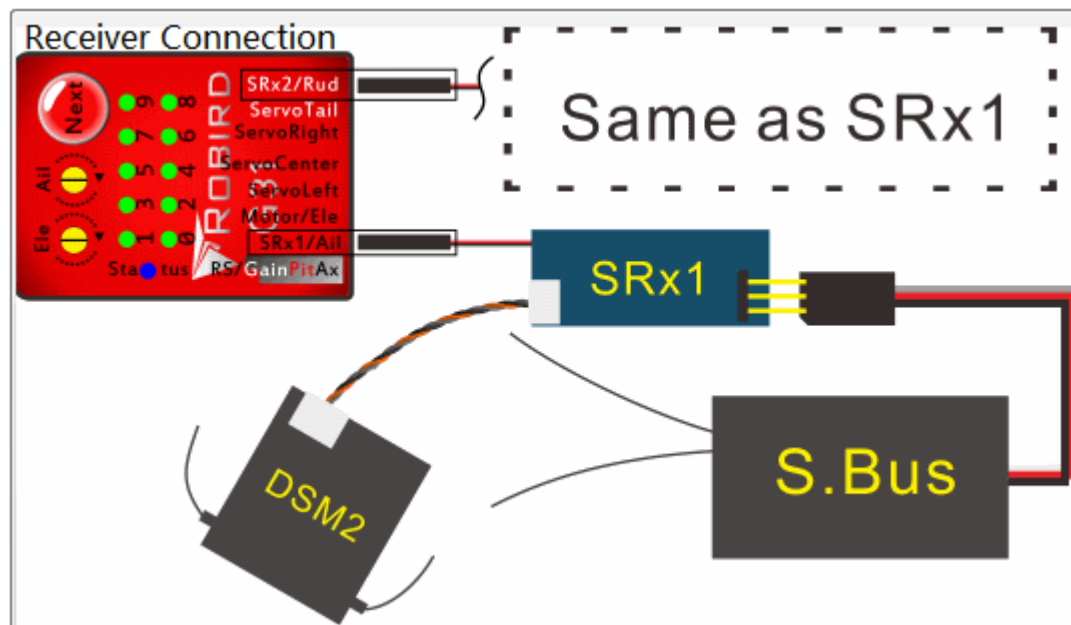
Next will depend on your radio but you will want to connect the wires from your receiver to the BlackWidow as follows. The BlackWidow supports several kinds of ***Single Line*** receivers with the use of the **SRx** connector accessory.

Use whichever is most suited to your system.

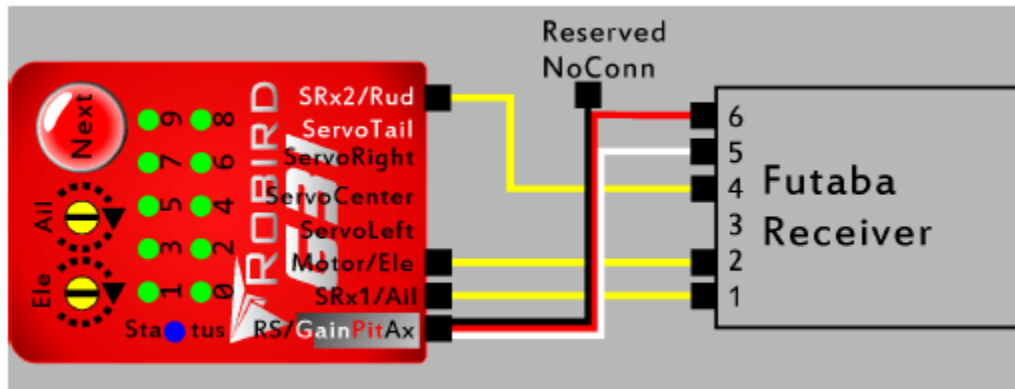
Sbus type system



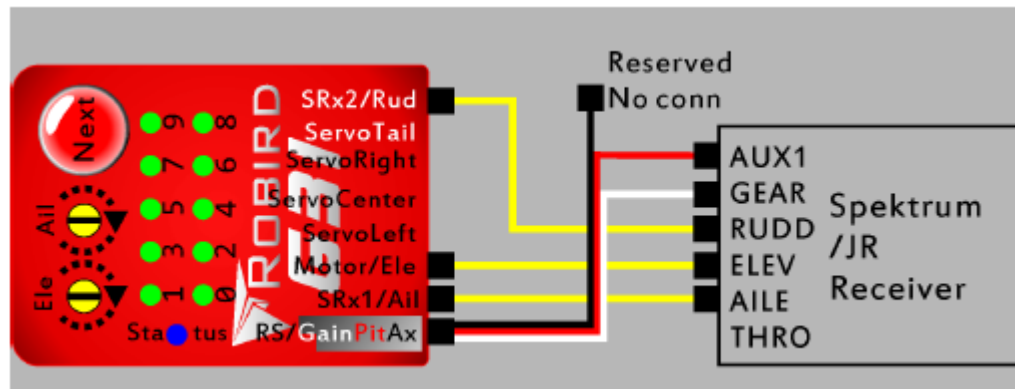
DSM7 type system.



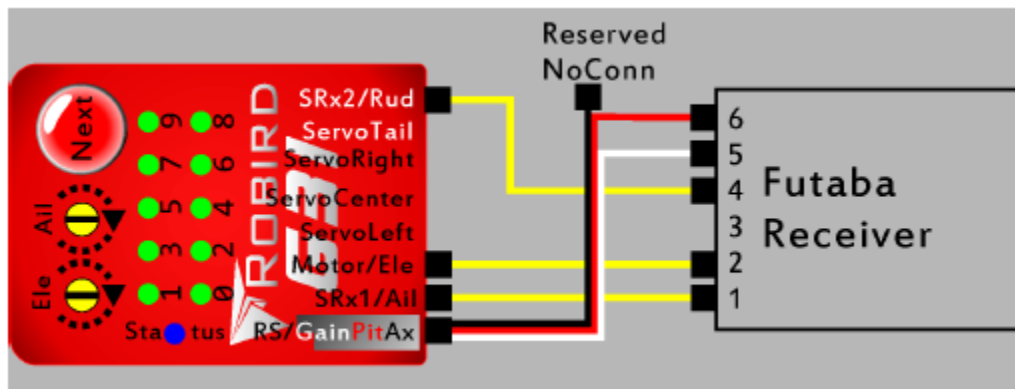
Futaba Receiver.



Spektrum/JR Receiver.



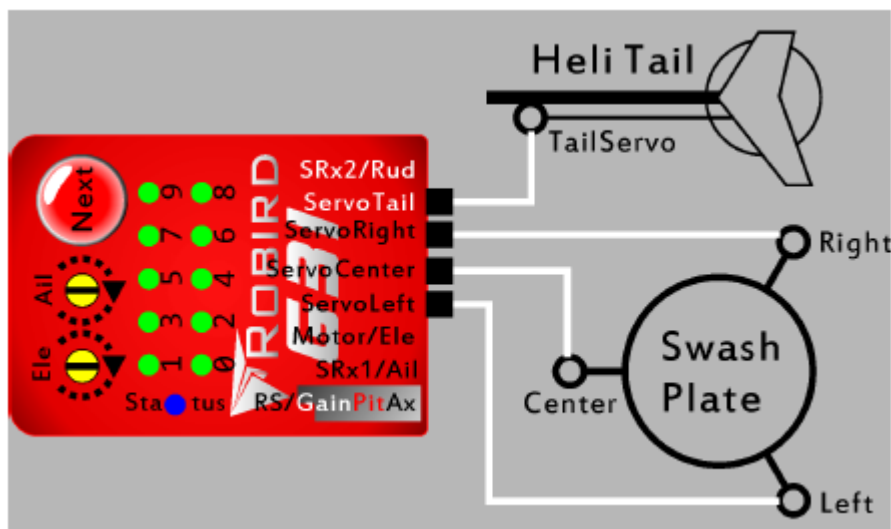
PWM style system.



Connection Table.

Flybarless system	Futaba Receiver	JR/Spektrum Receiver
Ail	1	AILE
Ele	2	ELEV
Rud	4	RUDD
Gain	5	GEAR
Pit	6	AUX1
Ax	N/A	N/A

Connection to servos.



Note - At this point if you are using an ESC with an internal BEC you will want to disconnect 2 of the wires going to the motor.....

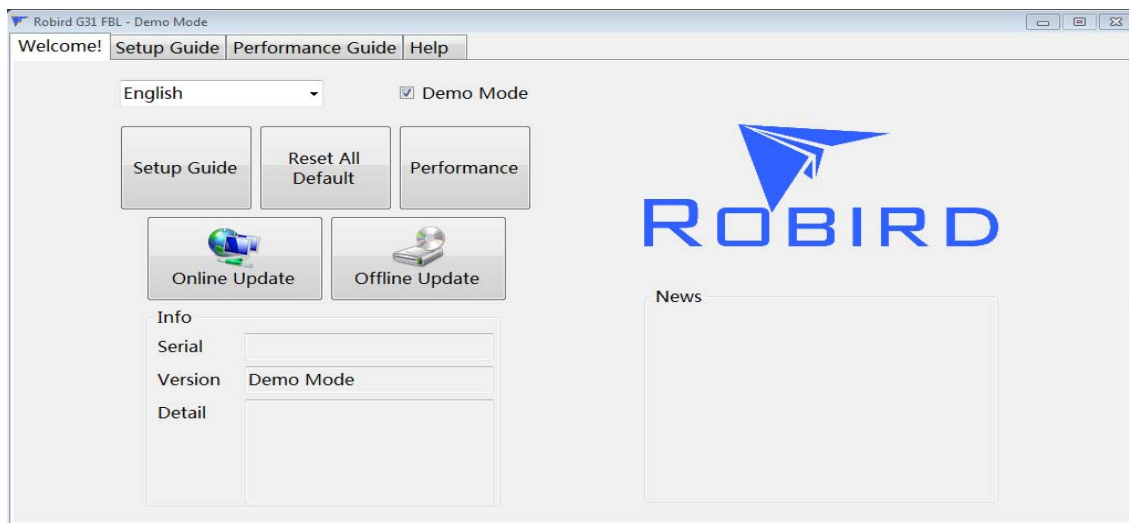
Setup using Pc Software.

The setup of the BlackWidow is going to be done in two phases. The first phase will be with the head off, and the second phase will be with the head on. Items you will need will be a pitch gauge and a swash levelling tool. It is also nice to have something attached to the head in which you can slide a rod through as a reference while adjusting the pitch settings.

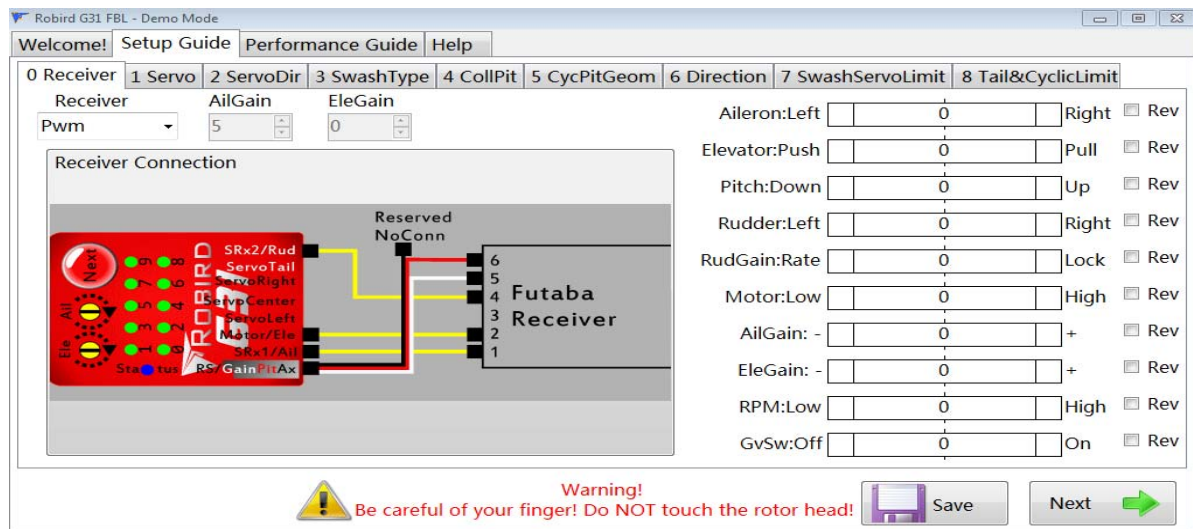
It is important to make sure that your servo arms are not on when you first turn on your system as not to bind any of the servos. Doing so may cause

damage the servo itself. Once they initialize the install your servo horns and continue to the next step.

Connect your USB cable to the PC and then to the BlackWidow. Then with the head removed, apply power to your electronics. Allow a few seconds for your BlackWidow to Initialize. Launch the R31 setup software. You will see the INFO box populate with your current serial number, version and details about your BlackWidow.



Click on the box that says setup guide. On the receiver tab select the receiver type that best matches your system.



Note on earlier software revisions you had to click Save before moving on the next screen. This is still a good practice.

Next select the tab that says 1 Servo. Here is where you are going to make adjustments to level your swash.

Servo Tab

Robird G31 FBL - Demo Mode

Welcome! Setup Guide Performance Guide Help

0 Receiver 1 Servo 2 ServoDir 3 SwashType 4 CollPit 5 CycPitGeom 6 Direction 7 SwashServoLimit 8 Tail&CyclicLimit

Swash Plate Servo
1.5ms@333Hz

LeftNeutral CenterNeutral RightNeutral
0 0 0

Select swash plate servo type.
Fix the servo arms. Servo arm should be perpendicular to it's linkage rod.
Adjust the length of swash plate linkage rods, make a 0 degree of main blade and swash plate as horizontal as possible.

Tail Servo
1.5ms@333Hz

0 TailNeutral

Select tail servo type.
Fix the servo arm. Servo arm should be perpendicular to tail linkage rod.
Adjust the length of tail linkage rod to make a 10° angle between two tail rotor blades for struggling to the main rotor torque. Simply center the tail rotor pitch slider is also OK

Motor ESC/Throttle
1.5ms@333Hz

0 MotorNeutral

Select throttle servo (or ESC signal) type.

Warning! Be careful of your finger! Do NOT touch the rotor head!

Previous Save Next

Select the servo speed

Swash Plate Servo
1.5ms@333Hz

Tail Servo
1.5ms@333Hz

Motor ESC/Throttle
1.5ms@333Hz

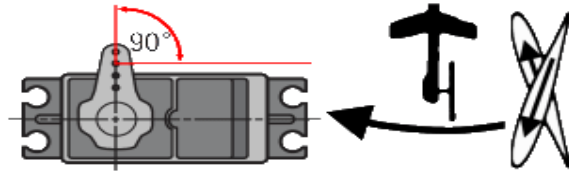
The Servos that come with the super combo kit should be as follows. The Motor ESC/Throttle would be for a nitro helicopter.

Now set your pitch stick to the Neutral position and using a swash levelling tool, level your swash.

LeftNeutral CenterNeutr: RightNeutral
0 0 0

Select swash plate servo type.
Fix the servo arms. Servo arm should be perpendicular to it's linkage rod.
Adjust the length of swash plate linkage rods, make a 0 degree of main blade and swash plate as horizontal as possible.

0 TailNeutral



Select tail servo type.
Fix the servo arm. Servo arm should be perpendicular to tail linkage rod.
Adjust the length of tail linkage rod to make a 10° angle between two tail rotor blades for struggling to the main rotor torque. Simply center the tail rotor pitch slider is also OK

By clicking on the up/down arrows you will move your servo arms up or down. Set the servo Neutral Point so that the arms are 90deg to the servo. If all your linkage rods are the same length adjust the servos so that the swash is perfectly level. **It has been reported by some of the team pilots, that if you do these steps then power the system down and back up and go through this process a second time, the system seems more locked in.**

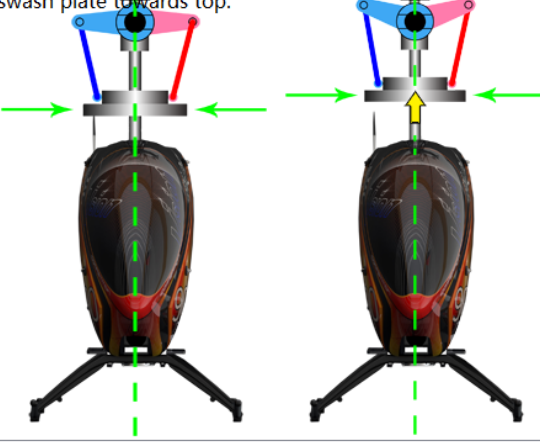
Select Save and then click Next.

ServoDir Tab

Welcome! Setup Guide Performance Guide Help

0 Receiver 1 Servo 2 ServoDir 3 SwashType 4 CollPit 5 CycPitGeom 6 Direction 7 SwashServoLimit 8 Tail&CyclicLimit

Check each swash plate servo movement direction!
Make swash plate towards top.





☐ Left Reverse

☒ Center Reverse

☒ Right Reverse

← Previous

 **Warning!**
Be careful of your finger! Do NOT touch the rotor head!

 Save

Next →

On this step you will select your servo direction. You will have to select save then disconnect the cable from the BlackWidow unit to verify if the servos are moving the correct direction. You will come back to this section several times until the swash is moving in the proper directions. Once moving in the proper direction click on Save and then Next.

Phase 2

From this step on you will want to put the rotor head on and the main blades.

SwashType Tab.

Welcome! Setup Guide Performance Guide Help

0 Receiver 1 Servo 2 ServoDir 3 SwashType 4 CollPit 5 CycPitGeom 6 Direction 7 SwashServoLimit 8 Tail&CyclicLimit

☐ Center Servo at Front

Select your swash type and center swash servo location.
The swash plate would towards ahead if selected correctly.

Left Right

Center

Y120

Left Right

Center

Y135

Left Right

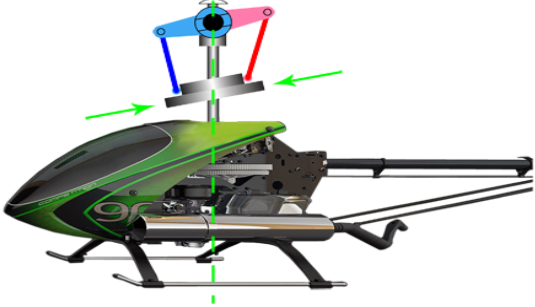
Center

Y140

Left Right

Center

T90



Warning! Be careful of your finger! Do NOT touch the rotor head!

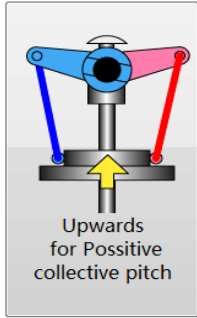
Previous Save Next

Select Y120 button. Click Save and then Next. Choose whether your Center servo is in the front or the back by placing a check mark in the box.

CollPit Tab

Welcome! Setup Guide Performance Guide Help

0 Receiver 1 Servo 2 ServoDir 3 SwashType 4 CollPit 5 CycPitGeom 6 Direction 7 SwashServoLimit 8 Tail&CyclicLimit



Upwards for Positive collective pitch

(1) Move the [Pitch] stick all the Way UP.
Adjust the vertical slider on right to make the main rotor blade at +12° collective pitch.
Click the button on left side if the angle is negative.

(1) Move the [Pitch] stick all the Way DOWN.
Adjust the vertical slider on right to make the main rotor blade at -12° collective pitch.
Click the button on left side if the angle is positive.

12°

12°

Servo arm too short

100.0 %

Servo arm too long

100.0 %

Warning! Be careful of your finger! Do NOT touch the rotor head!

Previous Save Next

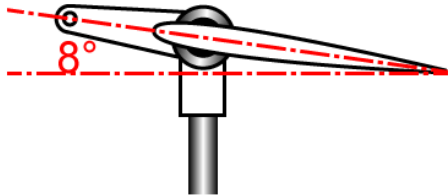
Place the main blades so that they are running the length of the helicopter. Move your collective pitch control to its full up position. Use your pitch gauge to determine how much pitch the system has. Click on the Up or Down arrows as needed to adjust the pitch of the blade until you have 12 degrees of positive pitch. Then move the collective pitch control to its full

negative position and use the **Up** or **Down** arrows as needed to until you get 12 degrees of negative pitch. You will probably have to go back and forth a couple of times to lock both positive and negative pitch evenly.

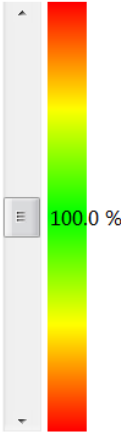
CycPitGeom Tab



[Welcome!](#) [Setup Guide](#) [Performance Guide](#) [Help](#)

0 Receiver 1 Servo 2 ServoDir 3 SwashType 4 CollPit 5 CycPitGeom 6 Direction 7 SwashServoLimit 8 Tail&CyclicLimit



Move the bar, teach G31 how much servo movement would make the cyclic pitch is 8°.
Flybarless system need to know the transmission ratio between servo and main blade.



[← Previous](#)  **Warning!** Be careful of your finger! Do NOT touch the rotor head!  Save [Next →](#)

This step teaches the BlackWidow how much servo movement is required to achieve 8 degrees of pitch. With the blades running the length of the helicopter and the pitch gauge on the blade, move either the up or down arrow until your pitch gauge reads 8 degrees of pitch. Once you are at 8 degrees click on Save and then Next.

Direction Tab

Welcome!

Setup Guide

Performance Guide

Help

0 Receiver

1 Servo

2 ServoDir

3 SwashType

4 CollPit

5 CycPitGeom

6 Direction

7 SwashServoLimit

8 Tail&CyclicLimit

☒ Top Wire Back

☐ Top Wire Ahead

☐ Left Wire Back


☐ Left Wire Ahead


☐ Right Wire Back

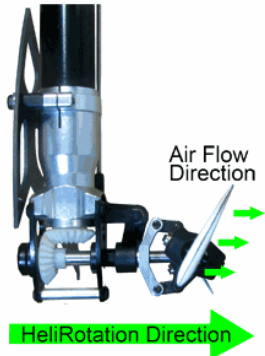
☐ Right Wire Ahead

☐ Bottom Wire Back

☐ Bottom Wire Ahead







☐ Tail Servo Reverse

 Previous

 **Warning!**
Be careful of your finger! Do NOT touch the rotor head!

 Save

Next 

Click on the radio button that best matches how your BlackWidow is mounted on the helicopter. You may have to unplug the cable from the BlackWidow unit to verify the direction of the tail blades. Use the diagram on the screen as your guide. If it is NOT moving in the proper direction put a check in the Tail Servo Reverse box. While verifying this step you will also want to verify that the stick inputs for the tail are also setup correctly.

Once verified that everything is moving the way it should click on Save and Next.

SwashServoLimit Tab

Welcome! Setup Guide Performance Guide Help

0 Receiver 1 Servo 2 ServoDir 3 SwashType 4 CollPit 5 CycPitGeom 6 Direction 7 SwashServoLimit 8 Tail&CyclicLimit

Move the [Rudder] stick on your transmitter, check mechanical interference.
To preventing mechanical interference, please setup the upward and downward movement limitation for swash servos separately by adjust the sliders on right side.
The goal of this setting is only to preventing mechanical interference, and it has nothing to do with pitch, also needless to make the swash plate horizontal.
This values should be set as great as possible for a wide servo movement range.

Set

Left Center Right

100.0 % 100.0 % 100.0 %

100.0 % 100.0 % 100.0 %

Warning! Be careful of your finger! Do NOT touch the rotor head!

Previous Save Next

Here is where you set your swash movement limits so that there is no mechanical binding. If binding occurs use the sliders or arrows to limit the movement of the swash servos so that there is no mechanical interference. Once done click on Save and Next.

Tail&CyclicLimit Tab

Welcome! Setup Guide Performance Guide Help

0 Receiver 1 Servo 2 ServoDir 3 SwashType 4 CollPit 5 CycPitGeom 6 Direction 7 SwashServoLimit 8 Tail&CyclicLimit

100.0 % 100.0 %

Left Right

Move the [Rudder] stick on your transmitter, check mechanical interference.
To preventing mechanical interference, please adjust the sliders on right side.
This values should be set as great as possible for a wide servo movement range.

Rect 0

Setup the limit of cyclic pitch. It is recommended to adjust as much throw as possible.

Warning! Be careful of your finger! Do NOT touch the rotor head!

Previous Save Finish

This is where you set your range of movement for your tail so that there is no binding. Use the slider to increase as needed for the left and right limits. On the right side of the screen you can reduce the amount of movement

going to your cyclic by adjusting the sliders. It is defaulted to be max value but you may or may not have to decrease these values. As you decrease the slider's you will notice the circle getting smaller. Once you are satisfied that there is no binding click SAVE and then Finish.

At this point you will want to cycle the power to your helicopter and do a verification check of your pitch limits (12 degrees Pos/neg), double check your servo directions. Tilt the helicopter forward to verify that the swash is moving in the opposite direction of where you are tilting it... *Forward, backwards, side to side and the tail direction. Once satisfied the mechanical setup is good you are ready for your first test hover.

1 Connecting single-line receivers

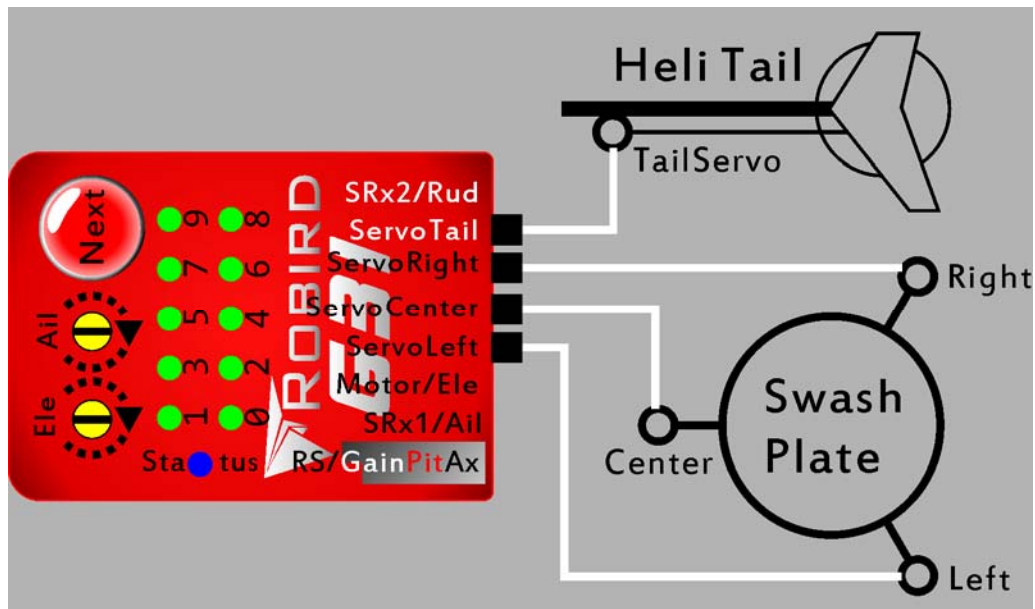
The BLACKWIDOW can connect to different kinds of single-line receivers.

While using single-line receivers, the SRx connector accessory is needed and is provided in the box.

While using DSM2 receiver, the free 3 pin port on SRx can be connect to [Rud] port on BLACKWIDOW as power supply for tail servo.

Both SRx1 and SRx2 port are equal to each other. Therefore both SRx ports can be used at same time. The use of 2 single-line receiver can provide better reliability and redundancy.

Servo connection



[ServoLeft, ServoCenter, ServoRight] each connect to [Left, Center, Right] 3 swash plate servos. ServoTail connect to tail servo.

Attention! Left and Right must be in the correct position,, otherwise pirouette will not be stable!

2 Power supply

The BlackWidow Fbl system self supports HV(High voltage), being the voltage within 4.1V~9V is supported.

The tail servo, swash plate servo and USB have 3 separate power supply circuits, So that HV servos and normal servos can be used together.

The swash plate servos [ServoLeft, ServoCenter, ServoRight] are powered by [Ail, Ele] such 2 ports, each port can afford 5A current, 2 ports can afford 10A for swash plate servos in total.

The tail servo is powered by Rudd port, which can afford 5A current.

The USB port will NOT power the servos, so that if you only connected USB, the servos won't move. For the same reason, if you only power up the Rudd port, the swash plate servos won't move either.


3 Transmitter setup

The Swash plate type should be set to a single servo or H1 mode with no swash servos mixing.

This is the same mode used while using a simulator. The swash plate mixing is done by BlackWidow FBL system. Also do not use subtrims or stick trims on the transmitter as this will be done during the setup of the Blackwidow.

4 Configuring the BLACKWIDOW by Transmitter

Setup Menu

Press and hold the  button down until the menu LED next to menu point 0 starts to flash. Continue holding until the LED stops flashing and becomes solid.

If you release the button while it is still flashing you will be in the

Adjustment Menu

Press the [Next] button briefly to move through the menu selection points. After pushing the button at the last menu point you will exit the **Setup Menu** and the system is ready for operation again.

By moving the sticks to the left or right, you can select the different options within each menu point. The [Status LED] shows current setting of selected menu point. If you don't want to change the setting of a menu point, just leave it without moving the sticks on transmitter. The [Rudd], [Ail] and [Ele] stick may be used in different menu points.

See Table below for Menu definitions.

Status LED figure example		Black No light
Red Steady on	Blue Steady on	Purple Steady on
Red Flashing	Blue Flashing	Purple Flashing

4.1 Setup menu overview (Menu LEDs steady on)

LED	Function	Operate	Status LED				
0	Receiver Type	Hold [Next] pressed	PWM	S.Bus	DSM2	Custom	
1	Servo Type (Swash-Tail)	[Rudder]	Custom	Digital-Digital	Digital-760us	Analog-Digital	Analog-760us
2	Swash servo neutral position	[Rudder] [Elevator]	Neutral	Center	Left	Right	
3	Swash servo direction (Center-Left Right)	[Rudder]	Custom	Normal-Normal	Normal-Reverse	Reverse-Normal	Reverse-Reverse
4	Center servo location Positive pitch direction	[Rudder]	Back-Up	Back-Down	Front-Up	Front-Down	
5	Positive/Negative collective pitch geometry Cyclic pitch	[Pitch] [Rudder] Click [Next]	[Pitch]@Bottom ColPit = -12°	Invalid:[Pitch] stick not in max/min pos		[Pitch]@Top ColPit = +12° CyclicPitch = 8°	

	geometry			
6	Horizontal/Vertical mount	[Rudder]	Horizontal	Vertical
7	Ail, Ele, Rud	[Rudder]	Aileron = Normal	Aileron = Reverse
	Operate direction	Click [Next]	Elevator = Normal	Elevator = Reverse
			Rudder = Normal	Rudder = Reverse
8	Swash limit Tail limit	[Rudder] [Elevator] NoOp 3s	[Rudder] adjust \pm tail limit	[Elevator] adjust \pm swash plate limit
9	CycPitch Limit	[Rudder]	[Rudder] adjust cyclic pitch range.	

4.2 Adjust menu overview(Menu LEDs flashing)

LED	Function	Operate	Status LED				
0	Swash plate calibration	[Aileron] [Elevator] [Rudder]	0 collective pitch	Positive collective pitch	Negative collective pitch		
1	Ail/Ele rate	[Rudder]	Custom	Low	Mid-Low	Mid-High	High
2	Rudd rate	[Rudder]	Custom	Low	Mid-Low	Mid-High	High
3	Pit->Tail	[Rudder]	Custom	Low	Mid-Low	Mid-High	High

DO NOT connect motor at this time! Disconnect the motor for safety reasons to avoid the possibility of unintentional motor start up!

5 Setup menu(Menu LEDs steady on)


LED 0 Receiver Type

Menu LED 0(Green) would be steady on. Status LED(Red/Blue) shows selected receiver type.

The BLACKWIDOW supports different kinds of single-line receivers (satellite receivers). If you are using a single-line receiver, you must first select the receiver type in this menu point due to the different signal protocols.

If you are not using a single-line receiver then select PWM, Standard receiver type. The receiver and transmitter will be used during the rest of the setup and configuration.



Hold  button for longer than 2 seconds to change the receiver type.

Status-LED	Receiver Type
Black-Off	PWM, Standard receiver
Flashing Red	S.Bus: R6203SB...
Purple	DSM2: EA101...
Flashing Purple	Custom, User defined by PC software



Click  to move to the next menu item.

Use PC software can assign receiver channel for the gain of Ele/Ail axis, so you can control the gain by transmitter.

LED 1 Servo Type

Menu LED 1(Green) would be steady on. Status LED(Red/Blue) shows selected servo type.

Move the [Rudder] stick to change the setting.

Status-LED	Swash plate servo type	Tail servo type
Black-Off	Custom, User defined by PC software	
Red	Digital	Digital
Blue	Digital	760us
Flashing Red	Analog	Digital
Flashing Blue	Analog	760us



Click  to move to the next menu item

To set the frequency and neutral pulse width in greater detail you will need to use the PC Software.

LED 2 Swash Servo Neutral Position

This step should be done prior to installing the head using a swash leveling tool.

Menu LED 2(Green) will be on steady while the Status LED(Red/Blue/Purple) shows which swash servo you are adjusting.

This menu point is designed for servo arm setup and neutral offset adjustment.

When entering setup menu point 2 connect all swash plate servos as described previously. They will now move to their mechanical zero position when the Status-LED is off(black). This state is designed for servo arm placement.

Set the pitch stick at 0 *center stick* then install the servo arm onto the servo with the push rod at a 90 deg angle to the servo arm. After installing the servo arms, select the servo you want to adjust or return to mechanical zero state by [Rudder] stick. The servo selected will jump once to indicate which servo you are adjusting. Using a swash leveling tool you can change its center position of each servo up or down by moving the [Elevator stick

back and forth] to achieve a perfectly level swash plate..

Status-LED	Function
Black-Off	Swashplate servos at neutral position
Red	Center servo
Blue	Left servo
Purple	Right servo



Click  to move to the next menu Item.

LED 3 Swashplate Servo Direction

Menu LED 3(Green) will be on steady while the status LED(Red/Blue) shows direction of swash plate servos.

Here is where you change the servo direction so that when you move the collective stick up, all of the servos move in the UP direction. Select the swash plate servo direction by moving the [RUDDER] stick to cycle through each one of the 4 choices. If none of these combinations work correctly you will need to correct the servo direction on the radio and repeat this step. You will also want to make sure that when you move the aileron stick right the swash tilts right, and the same for elevator stick moving the swash forward and or backwards properly.

Status-LED	Center servo direction	Left servo direction	Right servo direction
Black-Off	Custom, User defined by PC software		
Red	Reverse	Normal	Reverse
Blue	Reverse	Reverse	Normal
Flashing Red	Normal	Normal	Reverse
Flashing Blue	Normal	Reverse	Normal



Click  to move to the next menu Item

LED 4 Center servo location& Positive pitch direction

Menu LED 4(Green) will be on steady while, Status LED(Red/Blue) shows current setting. If you are using non-120° (T90°, Y135°, Y140°) swash plate, please setup your swash mixing by using the PC software.

The BLACKWIDOW needs to know where is the Center-Swash-Servo, helicopter nose side or the helicopter tail side. The BLACKWIDOW also needs to know how to move the swash plate so that collective pitch moves in the correct direction, up or down

Status-LED	Center servo location	Swashplate direction for positive pitch
Red	Back	Up
Blue	Back	Down
Flashing Red	Front	Up
Flashing Blue	Front	Down



Click  to move to the next menu Item.

At this point you will want to install the rotor head.

LED 5 Swashplate geometry calibration (Positive/Negative collective pitch geometry, cyclic pitch geometry)

Menu LED 5(Green) will be on steady while the Status LED(Red/Blue) shows current setting step.

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

To measure the pitch angle, a pitch gauge is needed in this menu point.

Move the [Pitch] stick all the way down and stay there. Now you can increase or decrease the minimum amount of pitch using the [Rudder] stick. Set the negative collective pitch to -12° .

Do NOT click [Next] for now.

When you adjusted the minimum pitch angle, move the [Pitch] stick all the way up and again. Now you can increase or decrease the maximum amount of pitch using the [Rudder] stick. Set the positive collective pitch to $+12^{\circ}$.

When you adjusted BOTH the minimum and maximum pitch angle, click



Click  to enter next step within this menu point.

The swash plate will tilt to one side

Move [Rudder] stick to increase or decrease the reference cyclic pitch angel, set it to 8° .

Always set the cyclic pitch to 8° at this time! This setup does not affect the maximum rotation rate of the helicopter but is only there to show the BLACKWIDOW the actual mechanical cyclic geometry. The BLACKWIDOW needs to know how much movement it takes to achieve 8° cyclic pitch.

Status-LED	Function
Black-Off	Invalid, the [Pitch] stick is not at minimum/maximum position
Red	Calibrating negative collective pitch, [Pitch] stick at bottom
Blue	Calibrating positive collective pitch, [Pitch] stick at top
Purple	Calibrating cyclic pitch



Click to enter the next menu Item.

LED 6 Horizontal/Vertical mount orientation

Menu LED 6(Green) will be on steady, while the Status LED(Red/Blue) shows current mounting orientation.

The BLACKWIDOW unit can be mounted in nearly all possible orientations. The only restriction is that the plug connectors have to point in or against flying direction. You can choose whether the BLACKWIDOW unit is mounted horizontally (printed surface 90 degrees to the main shaft, flat) or vertically (printed surface in parallel with the main shaft, mount on the side board).

Status-LED	Function
Red	// Mount <u>horizontal</u> (Flat)
Blue	⊥ Mount vertical (On the side board)




Click to enter the next menu Item.

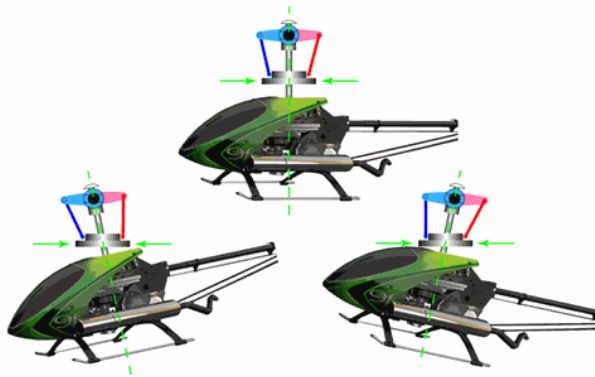
LED 7 Operate direction (Aileron, Elevator and Tail)

Menu LED 7(Green) will be on steady while the Status LED(Red/Blue) shows current step.

Step 1: Roll the helicopter left and right by hand, the swash plate has to move against this movement. If this is not correct, you can reverse it by moving the [Rudder] stick.



Click  briefly to enter next step.



Step

p

2: *Step1, roll left right*

Tilt the helicopter nose up and nose down by hand, the swash plate has to move against this movement. If this is not correct, you can reverse it by moving the [Rudder] stick.

Click

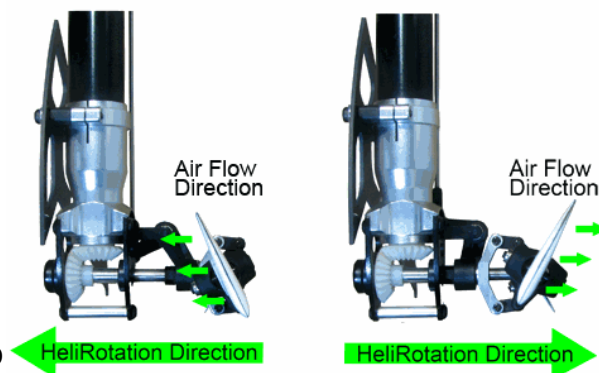


briefly to

Step2, tilt up down

enter next step.

Step 3: Rotate the helicopter clockwise and counter clockwise by hand, the tail rotor has to steer against this movement. In other words, if your nose moves left you are going to want to leading edge of the tail blade to cut to the left so that it brings the tail back into position. If this is not correct, you can reverse it by moving the [Rudder] stick.




Step3, rotate clockwise CCW

See table on next page.

Function	Normal	Reverse
Check and set Aileron Sensor direction	Red	Flashing Red
Check and set Elevator Sensor direction	Blue	Flashing Blue
Check and set Tail Servo direction	Purple	Flashing Purple

Long hold of the  can return previous step.

After confirming that everything is moving in the correct direction,

click  to move to the next menu Item.

LED 8 Servo(Swash and Tail) end point

Menu LED 8(Green) will be on steady and the Status LED(Red/Blue) shows whether end point is big enough.

To adjust the limits, move the [Rudder] stick or [Elevator] stick in one direction until the tail servo or swash plate servos reach their maximum endpoint without any binding and release the tail stick for a few seconds. If you move the servo too far you can move the stick the opposite direction to move it back. If the setting is valid, the servos will return neutral and Status-LED turns Blue; If the travel range is too narrow, the servos will shake and the Status-LED turns Red. Setup the other side limit of servos in same way.

Use the [Elevator] stick to setup the swash plate servos and use the [Rudder] stick to setup the tail servo.

Click  briefly would leave current menu point and go to next one.

LED 9 Cyclic pitch limit

Menu LED 9(Green) will be on steady while the status Status LED has no light.

This menu point is designed to adjust the maximum possible tilting of the swashplate for aileron and elevator. The deflection will be limited in a circular path similar to a cyclic ring function.

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, you can adjust the aileron and elevator throw range. 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.

This is the last one in [Setup Menu]. Click [Next] briefly would leave current menu point and return [Fly State].

6 Adjustment Menu - (Menu LEDs flashing)


Led 0 Swashplate cyclic center adjustment

To get a more accurate setup with this step remove the head and use the swash plate tool.

Menu LED 0(Green) will be flashing while the Status LED(Red/Blue) shows current step.


This menu point gives you the possibility to easily adjust your servo centers on the flying field. For example if your helicopter is wobbling during pirouettes or when it doesn't climb out straight on quick pitch inputs.

The cyclic center at zero collective pitch, positive pitch and negative pitch can be setup separately. So there are **3 steps**: 0 pitch, positive pitch and negative pitch.

Clicking  briefly will enter next step.

By moving the [Aileron] and [Elevator] stick, you can adjust the center of cyclic. At first step, 0 collective pitch, the center of collective pitch can also be adjusted by [Rudder] stick.

Status-LED	Function
Black-Off	Cyclic center at 0 collective pitch
Red	Cyclic center at Positive collective pitch
Blue	Cyclic center at Negative collective pitch

After all 3 step, click  button briefly would leave current menu point and go to next one.

LED 1 Max roll(Ail and Ele) rate

Menu LED 1(Green) will be flashing while the Status LED(Red/Blue) shows current setting.

The maximum rotation rate of aileron and elevator can be changed by this menu point. Select choice by move [Rudder] stick.

Status-LED	Max roll(Ail and Ele) rate
Black-Off	Custom, User defined by PC software
Red	Low-210°/s
Blue	Mid Low-240°/s
Flashing Red	Mid High-270°/s
Flashing Blue	High-300°/s



Click  to move to the next menu Item.

LED 2 Max yaw rate

Menu LED 2(Green) will be flashing while the Status LED(Red/Blue) shows current setting.

The maximum rotation rate of the rudder (Max pirouette rate) can be changed by this menu point. Select choice by move [Rudder] stick.

Status-LED	Max yaw rate
Black-Off	Custom, User defined by PC software
Red	Low-450°/s
Blue	Mid Low-540°/s
Flashing Red	Mid High-720°/s
Flashing Blue	High-900°/s



Click  to move to the next menu Item.

LED 3 Tail – torque precompensation (RevoMIX)

Menu LED 3(Green) will be flashing while the Status LED(Red/Blue) shows current setting.


The advantage of always knowing the pitch and cyclic load on the flybarless system, allows the BLACKWIDOW to pre-compensate for the torque variations on the tail before any noticeable deviation. This method of torque pre compensation (RevoMIX) relieves the tail control loop and improves the tail performance especially when using BLACKWIDOW on helicopters with insufficient tail authority and/or extreme motor torque (well powered electric helicopters).

To see the compensation direction, you can move the collective pitch, roll and elevator control stick at any time. With active feed forward the tail rotor has to produce a deflection which must counteract the rotor torque. If you pitch in positive or negative direction, or move aileron or elevator control, a deflection will be added to the tail rotor which must always act against the torque of the main rotor.

Status-LED	Tail – torque <u>precompensation (RevoMIX)</u>
Black-Off	Custom, User defined by PC software
Red	Low-45
Blue	Mid Low-55
Flashing Red	Mid High-64
Flashing Blue	High-72

This is the last one in [Adjust Menu].



Click  to leave current menu point and return a flight ready state.

It is a good practice to cycle the power after going through these steps so that the BlackWidow has a fresh reboot.

Firmware update

Online

Press [Online Update] button in Welcome Page, then wait it finish.

Offline

1. Press the " Off line update" button.
2. Select the firmware file.
3. Wait 10 seconds until "All finished." displayed.

There is no danger while update process, even the USB line disconnected , just update once again.

The PC software can be run directly on Vista or Win7 OS, setup-less and driverless. If you are using old Win XP, you may need to download the falling 2 update package of your windows from MS site:

Microsoft Visual C++ 2008 SP1 Redistributable Package (x86)

<http://www.microsoft.com/download/en/details.aspx?id=5582>

Microsoft .NET Framework 2.0 Service Pack 2

<http://www.microsoft.com/download/en/details.aspx?id=1639>

***NOTE- most of the Team Pilots had to back down the pots on top of the unit to the 11 O'clock position otherwise there was a wobble when hovering. ***

Tail gain is set through the radio as you would any normal tail gyro. The BlackWidow is a little more sensitive to vibrations so make sure that you balance your main blades and in some cases the tail blades need to be balanced. For optimum performance you may wish to balance your rotor head itself before installing it.

Software updates are released periodically. Check www.ChaosLounge.net for information on the latest software and or firmware updates.

SAFETY

Never operate the helicopter while under the influence of Alcohol or other Intoxicants as this could cause property damage, severe bodily injury, or even Death.

Inspect your helicopter prior to each flight and repair or replace any worn components.

RCAerodyne is not responsible for improper use of this product. By using this product the user takes full responsibility for their actions, equipment and any liability it may incur.