

Tomahawk Hawk 100

1:3.5 Scale

PNP



Length: 3.7m, Wing Span 2.85m with Missile Rails

Weight: 63lbs Dry

Fuel Capacity: 5.0L

CONSTRUCTION AND OPERATION MANUAL

Version 1 April 2023

Vne: Speed to Never Exceed= 170 MPH
Engine 180 to 300

Equipped with HV Servos and should not be operated below 7.4 volts

This is a LTMA Aircraft

BVM

3481 State Road 419 • Winter Springs, FL 32708 USA
tel. 407-327-6333 • fax. 407-327-5020

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Introduction

Thank you for purchasing the Tomahawk Hawk 100 PNP Only a small amount of work is required to complete the assembly of your Hawk 100.

This manual contains instructions for safety, operation and maintenance. It is essential to read and follow all of the instructions and warnings in the manual. Please read the entire manual to become familiar with the processes and procedures before you begin to assemble your aircraft.

Disclaimer

Bob Violett Models Inc. assumes no liability for the operation and use of these products. The owner and operator of these products should have the necessary experience and exercise common sense. Said owner and operator must have a valid Academy of Model Aeronautics license with a Current Turbine Waiver as well as his or hers LTMA certification required for operation in the U.S.A.

This is a sophisticated jet model aircraft. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this product in a safe and responsible manner could result in injury or damage to the product or other property.

Notice: Do not use with incompatible components or alter this product in any way outside of the instructions provided by BVM, Inc. The Tomahawk Hawk100 has been designed and flight tested around 180 to 300N class engines.

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BVM Products

Received with the Instruction Package that is sent from BVM

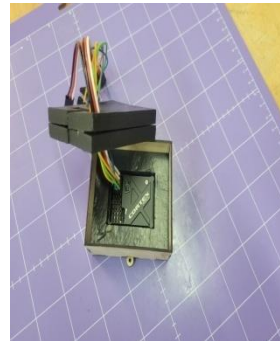
Hawk 100 Assembly and Operation Manual

Recommended Accessories

Available at BVMJets.com

You may have some of these products in your shop, but if not, refer to this list.

- Spektrum AR20400T 20ch PowerSafe Receiver
- Demon Aero Cortex Pro Gyro
- 3 x 7.4v Batteries 5000 mAh each.
- 180-300N engine of your choice.
- War birds Pilot 1/3.5 scale Pilot 22"
- BVM Gyro Isolation Mount
- ECU Battery of your liking
- HD switch for the Retract controller



List of Adhesives/Lubricants

Available at BVMJets.com

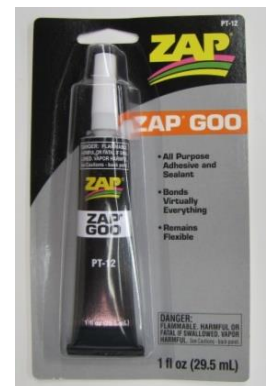
- BVM Qt Poxy
- Zap-A-Gap
- Pacer Z-42
- Axle Super Lube

PA-SR-0042

PT-02

PT-42

BVM #5784



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Required Tools Available from BVM

- 3mm long driver
- Metric Allen wrench set
- 9/64" Long Ball Driver
- Philips Screw Driver set



Unpacking

Carefully remove items from the box. Open each package and inspect for shipping damage. After reading this entire manual, get familiar with the major kit components.

Note: Damaged parts must be reported to BVM within 7 days of receiving your kit.

Become familiar with the work completed at the factory. It is important that you inspect and approve this work now. It is much easier to make changes before the fuselage is assembled.

NOTE: The plastic bubble wrap that protects the parts during delivery can be used on the work bench to protect.

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Joining the Aft Fuse to the Forward Fuse 6 Pin System

Remove all 6 pins from the rear half of the fuse. As well as the 2 screws that pass through the fuse at the inlet side. (You will use a 2.5mm wrench for the duct screws). Using Z-42 Loctite apply a small drop to each screw and thread back into the rear half first. A 9/64th Ball wrench will be needed to complete this step

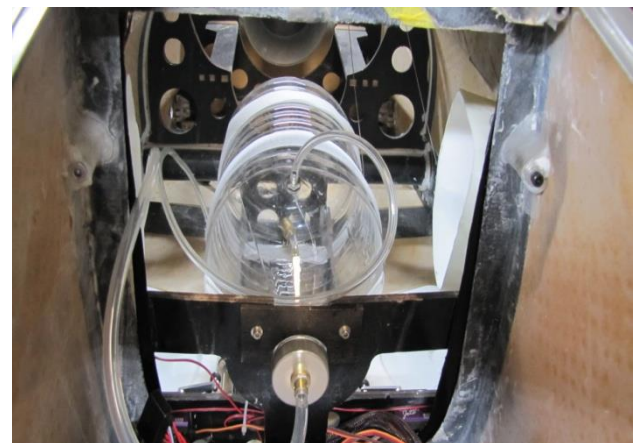


Your joining pins will look like this once you have them installed. You are now ready to slide the 2 halves together.



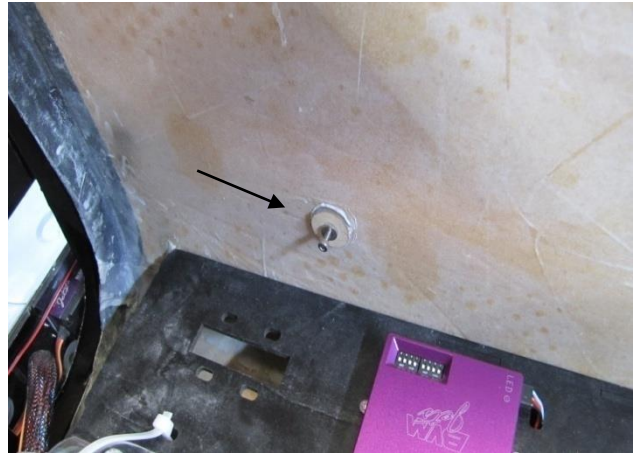
Once the 2 halves are together repeat the same process as you did for installing the pins into the rear half. A small drop of Z-42 will secure the bolts into the pins. Then install the 2 front duct screws. use a small amount of Z-42 on these as well.

Note: The fuse is a tight fit and will squeeze a small amount when joining the 2 halves.



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This picture shows the Front duct screw. There is one on both sides.



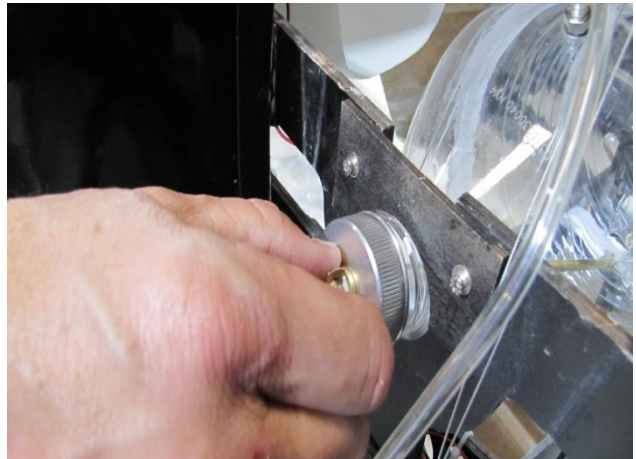
There are 3 sets of servo connections to join. You must be sure that the colors on the wires match the corresponding connector. This completes joining of the 2 halves.



Fuel system Check

The fuel system is very simple and easy to access. Unscrew the Aluminum cap and pull the assembly out. At this point you will be able to Safety wire the clunk tubing to the cap and the Clunk.

The BVM demo Hawk uses all stock tubing supplied with the Aircraft.



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Option for the Fuel System

BVM decided to use a length of Brass tubing between our Cap and Clunk. This was the only mod we made to the system



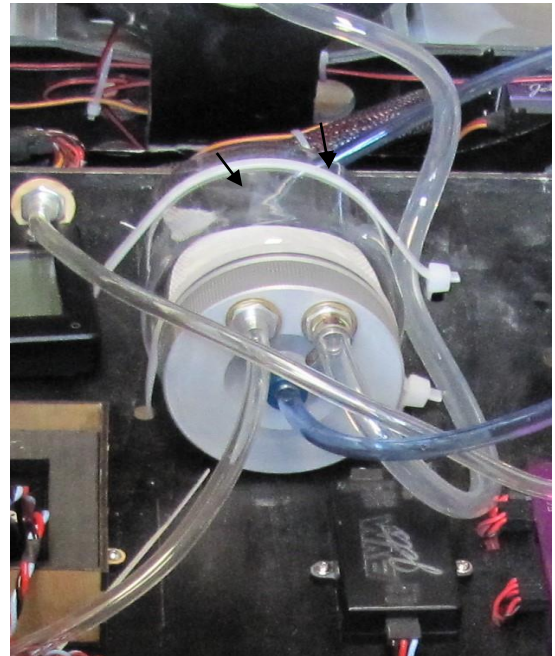
UAT

Secure your tubing to your UAT with Safety Wire or your favorite method. There are 2 connections that will be secured. The 2 top fittings will be the only 2. The middle connection uses a Screw type connection.

Note: The Demo Hawk uses the UAT provided.

You Must Hold This Tank Vertical during the initial run up to purge the air from the Bag. Failure to do this will leave air trapped in the bag.

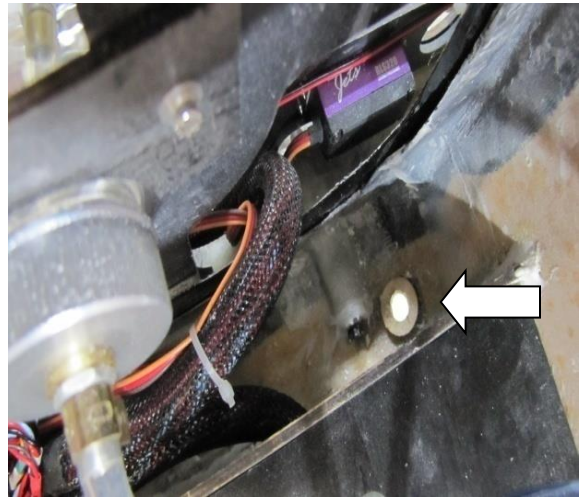
Check out the link below to see our first run up of the Hawk. <https://youtu.be/28Nm8QCeryw>



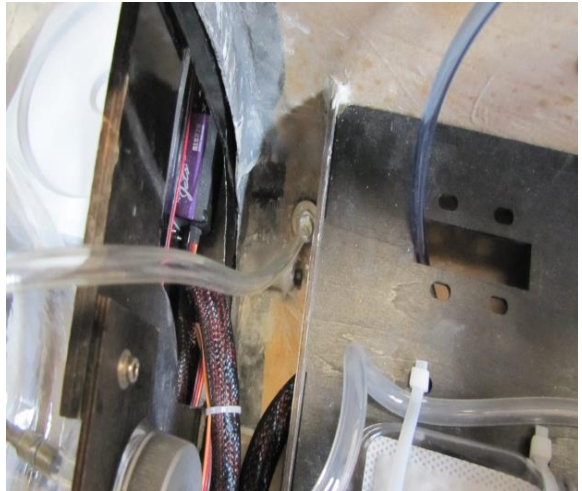
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Mounting the Vent

The BVM Hawk has the vent mounted on the fuse just behind the equipment tray. Your Hawk will come with wood spacer that will get glued into the fuse. After gluing in place drill a hole through the fuse and install the Overflow fitting.

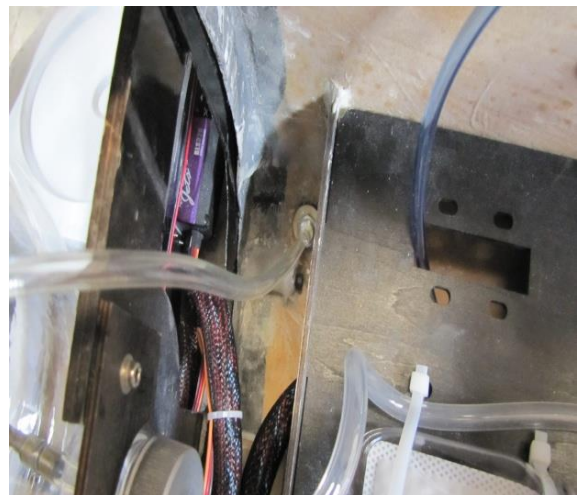


Once the hole is made you can finish mounting the Overflow fitting and connect the tubing. There is a small nut that holds the overflow fitting in place. A small drop of Z-42 will help keep this secure.



Fuel Valve Fitting

The Hawk comes with a quick fuel filling valve system. You can mount this anywhere that is convenient. BVM mounted theirs in the Engine bay in the corner of the hatch.

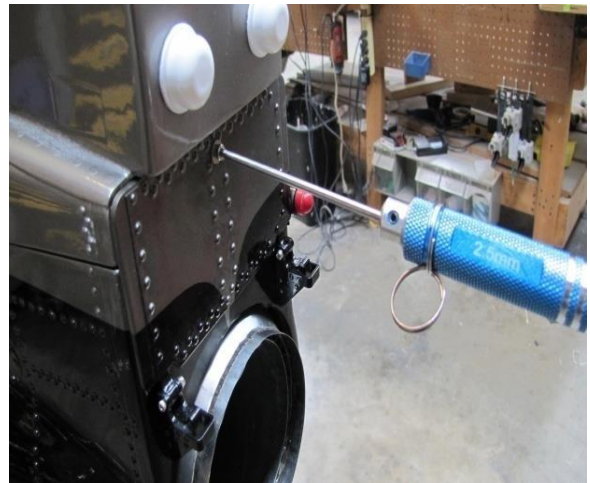


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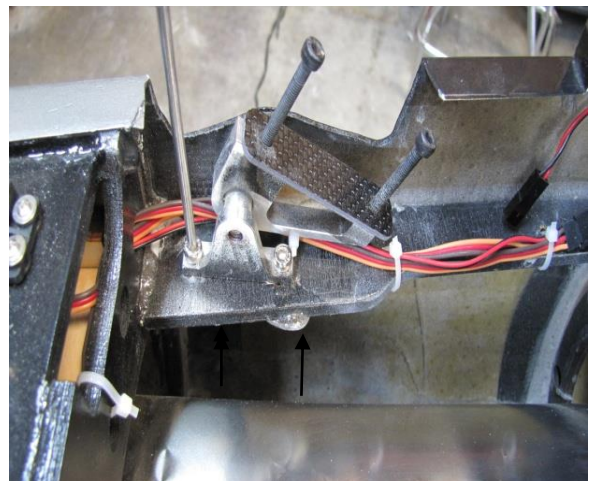
Mounting The Stabilator

Remove the single 3mm bolt from the rear fuse. This will allow removal of the Top Cap that covers the Stab mechanism. You will need a 2.5mm wrench to complete this step.

.NOTE: There is a single LED wire under the Top Cap.



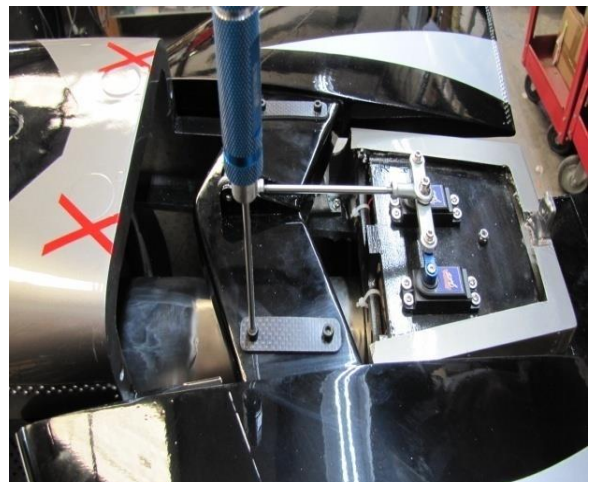
After the Top Cap is removed you will access to the Mounting Brackets. There are 4 bolts, 2 on each side that hold the Bracket in place. Remove one at a time and apply Z-42 Loctite to each bolt and re assemble. You will need a 3mm wrench to complete this step. .



You can now mount the Stabilator to the brackets. Remove the 4 Bolts and Carbon Doubler that will hold the Stabilator in place. Apply a small dab of Z-42 Loctite to each bolt. The Carbon Doubler sits on top of the Stabilator.

Your Stabilator is now mounted to the Aircraft

Note: Check these periodically for tightness

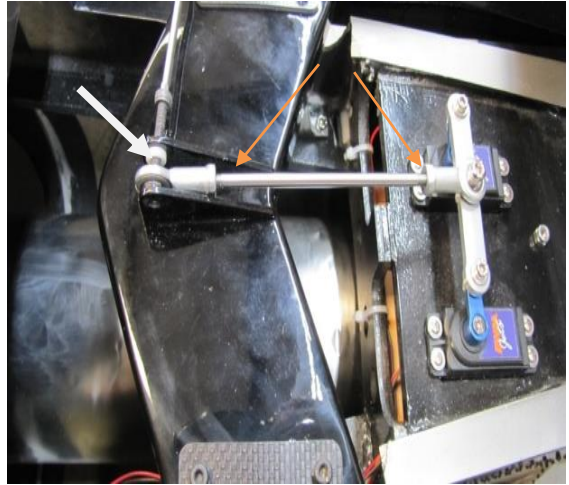


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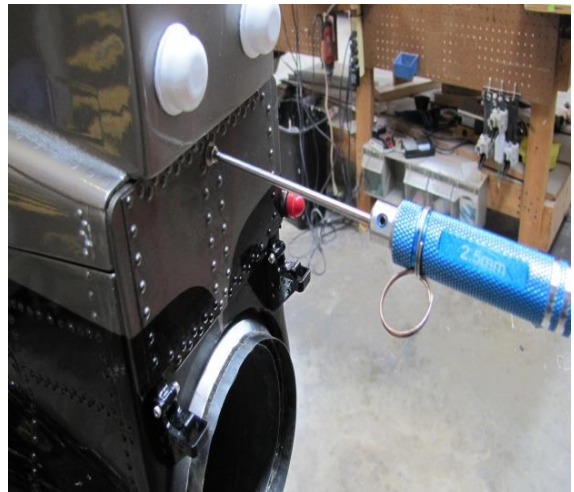
Stabilator linkage

The Stab linkage is very straight forward. You have a 4mm bolt passing through the Stab Arm with a washer on either side of the Ball Link to center the Link and a 4mm Lock Nut on the outside. You will need a 3mm wrench and a Nut Driver for this step.

Note: Once you have your linkage adjusted a small amount of wicking Loctite should be used. The Orange arrows point to where this goes.



Re Install the Top Cap and hook up the Led wire to complete this step. Your Stabilator mounting is now done and you are ready to move to the next step.

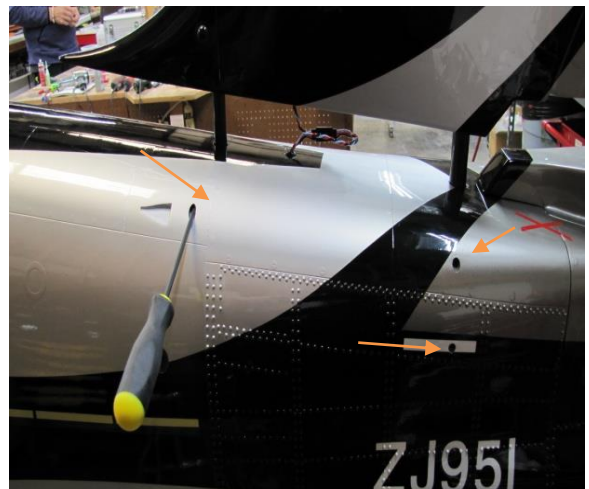


Mounting The Vertical Fin

The Vertical Fin has 1 Servo wire connection and 2 clamping brackets. There are a total of 3 bolts you need to tighten to secure it in place.

The Orange arrows point at the access holes.

NOTE: You can apply some BVM Dry Lube on the carbon tubes to ease installation.



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Ventral Fin Mounting

Remove the bottom Hatch; this has 4 screws holding it in place.



The Ventral fins are secured by 3 self tapping screws per side.

Once done re install the bottom hatch cover.



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Turbine Mounting

The BVM Demo Hawk uses a T-22 Turbine with 49lbs of thrust. On our demo model we had to make spacers to fit between the rails. You may or may not have to do this.

Center your engine L/R and Up and Down in the Tail pipe. BVM recommends that you follow your specific Turbine Manufactures mounting instructions.

On our Demo model the Turbine tail cone sits 1 inch from the start of the Tail Pipe not the start of the Bell mouth



Fuel Pump and ECU Mounting

There are 2 spots on the board to mount your Fuel pump one on the left and one on the right. We used the left side. However there is plenty of room in the Aircraft and you can mount the pump to what is convenient for you. .

Like your fuel Pump you can mount your ECU where it's easiest for you. Our T-22 has the ECU in the Engine so you will not see it in the picture.



Wing Preparations

Aileron linkage covers

The wing has a fair amount of Scale covers and will take a little time to get them on. This procedure will be for the left and right wing.

The Aileron Covers are held to the wing with 4 small self tapping screws. You will need a small Philips screw driver for this step. There are 2 screws per side on each cover. There is also a trailing cover that is glued onto the Aileron.



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This is the small trailing cover for the Aileron Linkage. Using tape and a pencil mark the location of the cover. Then cut out the area where you will apply the glue.



Use a small drill bit to make some anchor holes in the Aileron as well as the cover itself. Using QT-Poxy secure the cover to the Aileron.



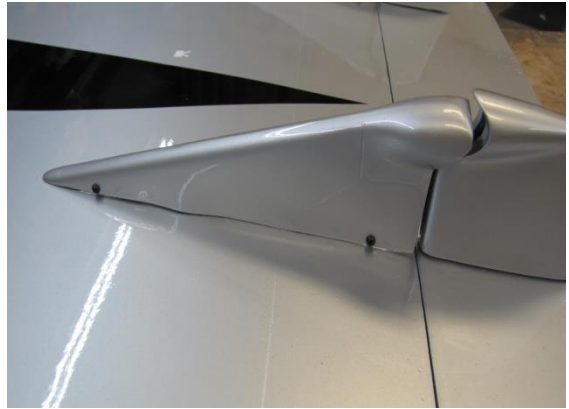
One side completed and ready to move to the Flap Hinge covers. The other wing will be the same steps.



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Mounting the Flap Fairings

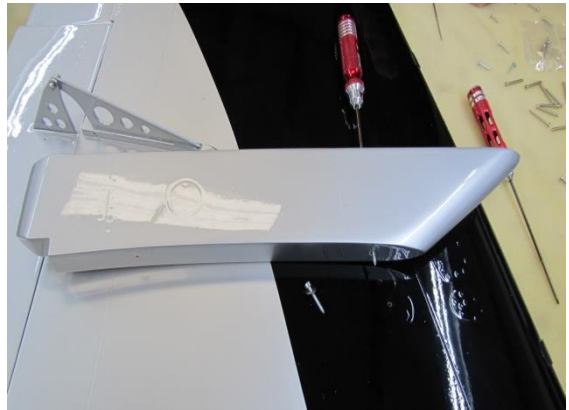
The Flap Fairing attach with small screws into wooden blocks in 4 places. 2 on the inside and 2 on the outside of each fairing. This is the same for both sides.



Mounting the Pylons

The pylons do have a specific left and right side to them. The pylons are attached to the bottom of the wing in the marked location. They are held to the bottom of the wing with 2 self tapping screws in each Pylon.

Note: The screws to mount the Drop tanks face the wing tip.



Mounting the Missile Rails

The Missile rails are held to the tip of the wing with 2 self tapping screws in each rail.



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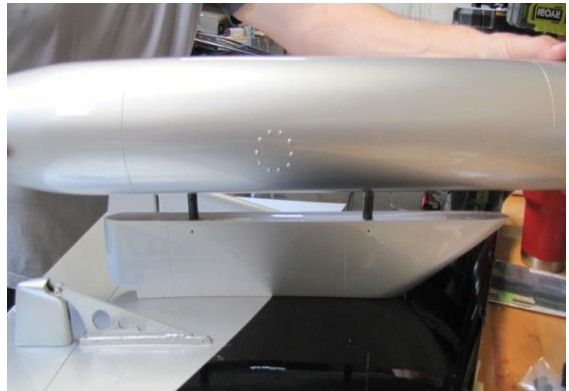
Mounting the Missiles

The Missiles are held to the Rail with 2 self tapping screws in each missile



Mounting the Drop Tanks

The Drop Tanks are held to the Pylons with 2 self tapping screws per tank. The Carbon rods are inserted into the Pylons and the screw passes through from the side.



Mounting the wings and Servo wires

The wing is held to the fuse with the Main wing tube and clamping brackets. The clamping Brackets are at the leading edge and trailing edge of the wing. A 9/64 Ball driver is used to tighten the clamps. There is also a servo connection block that joins all the wires.



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Center of Gravity

12.2 to 12.7 inches aft of the leading edge of the wing at the wing root. The BVM demo model is flying at 12.7". This CG was done with the UAT full. We didn't add any weight to our demo model to achieve proper CG.



NOTE: Ruler is for reference only

Stabilator Neutral Point

The neutral point falls directly on the split of the fuse.



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Electric Gear and Brake Controller

The retract controller is set from the factory and should require no changing. The Gear controller does need to be turned off between flights for it to work properly. BVM recommends The use of a switch to turn it On and OFF between flights

Note: The Gear motors are sensed and requires that all gear be hooked up for the doors to work properly. The doors on the Hawk remain open when the gear is down.



The Gear and Brakes runs on a 2 cell Lipo 8.4V.

Light Module Box

The light control module comes pre set and requires no programming

Light Control Box

The Light control box (small black box next to the Purple light Module box) has 2 wires going to the RX. One of them is to control the Nav lights and the other is for the Landing Lights. These need to be in 2 different channels. We used a mix with our Gear channel to control this function. The landing lights will not work if the main Nav lights are not on.

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Control Surface Deflections and Expo Settings

Control	High Rate	Expo	Medium Rate	Expo	Low Rate	Expo
Stabilator (measured at the L.E at the Fuse side.)	Up 1.5" Down 1.2"	Up 20% Down 15%	UP 1.2" Down 1"	Up 15% Down 10%	" "	
Flap (measured at Flap Aileron Joint)	"TO .50" LND 3.1"					
Aileron (measured at the Flap Joint)	U/D 1.7"	20%	U/D 1.2"	15%		
Rudder (measured at the Base)	L/R 2.8"	15%	"			

Connecting RX wires

The wires are labeled from the factory. If you are using the IX20, the program is available from BVM. Follow the chart below to connect the servos.

Spektrum 20 Channel Receiver Hook Up								
RX Port	Throttle	Aileron	Elevator	Rudder	Gear	Aux1	Aux2	
Control	Throttle	Right Ail	Right Elev	Rudder	Left Flap	Left Ail	Right Flap	
RX Port	Aux3	Aux4	Aux5	Aux6	Aux7	X+1	X+2	
Control	Gear	Left Elev	Brakes	Nose Steerin g	Gyro	LED	Land Light	

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IX20 and Transmitter File

The BVM Demo models are setup on Spektrum IX20 transmitters. The file, if requested, has all the mixes, rates, expos, and settings done for you. Setting the sub trim and travel adjustment must be accomplished by the modeler for the specific aircraft.

Important!!! Check the direction of all flight controls before each flight.

Switch/Lever/Trimmer	Channel	Output
Switch A	(Aux 3) /Gear/ Landing Light Control (X+2), Timer Start	Landing Gear,(0) is Down and LL On (1) Is Gear Up LL Off, Timer Start
Switch B	X+1/Channel 13 Nav Lights	Lights, Down is off, Middle is Nav only Up is all On
Switch D2	Control Rates EL, Ail	Up (0) is High (1) is low
Switch D	Flight Modes Flap System and Gyro Control	Up/ Normal flight (Low gyro) Mid / Take Off Flaps (Mid Gyro) Down / Landing Flaps (High Gyro)
LTT	Steering Trim (Aux 6)	Left is Left Right is Right
Switch E	Wheel Brakes	(0) Is Off (2) is On
		Up (0) is High
Switch G	Gyro Mastr On/Off (Aux7)	(0) is Off (2) Is On

Gyro Sense

Augment the instructions that accompany the Gyro your choice with these safe operating guidelines.

While still in your shop, check that the control surfaces move in accordance with the transmitter stick commands with the gyro "OFF". Now, check that the gyro corrective action is in the proper direction on all 3 axes. Check with the gyro selected to the low rate and high rate condition. Move the models nose to the left, as if you were sitting in the cockpit, and the rudder should correct with a movement to the right. Check also the correct gyro action in the roll and pitch axes.

It is BVM's practice for a first "gyro assisted flight", to take-off with the transmitter 3 position gyro assigned switch in the "OFF" position. Climb to a safe altitude and trim the model for the various flight configurations and speed. Then, at a medium speed, turn the gyro "ON" to the "Low Rate" position and check the trims and gyro for correct sensing and flight stability. If anything is not right, immediately select the "OFF" position with the transmitter 3 position switch. You may even brief your "caller" to do so if you prefer.

If all is good in the "Low Rate (gain)", you can try the "High Rate" operation. Fine adjustment of the "Low Rate" and "High Rate" percentages can be dialed in after a few flights in various wind conditions.

We generally utilize the "High Rate" selection for landing, especially if the wind is a bit gusty. As is always good practice in aviation; "err on the safe side".

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Takeoff

Begin the takeoff roll by slowly advancing the throttle. The Hawk 100 will lift off with very little up elevator. If there is a crosswind, hold a small amount of aileron into the wind and apply opposite rudder as required.

Trim

Once in the air, establish a medium cruise speed to set the trims. The aircraft should fly straight and level when "hands off"

Slow Flight Testing

To best prepare for the practice approaches, first climb to a safe altitude and trim the model for all flap settings and landing gear extended. Execute nose high power-on approaches. As soon as the nose falls through, add full power and establish level flight again.

Note if a wing (right or left) drops. That wing might be heavier than the other.

Save all of the aerobatic stuff for future flights. Get the approaches and landings accomplished first and gain confidence in the Hawk 100.

Properly set-up, the Hawk executes take-offs and landings with ease.

Practice Approaches

A few minutes of the first flight, should be devoted to practice approaches and go-around's. It is beneficial to become familiar with the low speed handling of the aircraft before the first landing.

Landing

Landing the Hawk 100 is like most jets, "power on" during the approach. It is best to land slightly nose high, touching on the main wheels first, then retard the throttle to idle and apply the wheel brakes.

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Pilot's Notes: