BVM PNP VIPER

1/9M

GO FLY GOLD

Length: 74" (1880mm), Wing Span: 73.7" (1872mm)

Weight: 22Lbs (10kg) Dry

Fuel Capacity: 2.5L

Smoke Capacity: .60L

CONSTRUCTION AND OPERATING MANUAL

Version 1.4

December 2023

Vne 175 MPH **Limit Thrust to 23Lbs**

Equipped with HV Servos and should not be operated below 7.2 volts

BVM

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

UNPACKING

If the box is damaged on the outside, take photos. Damage claims must be filed within 7 days.
Use a sharp knife or razor blade to cut the clear tape away that would allow the box top to be lifted free. Notice that the inner box is protected with 1/8" plywood.
If the carrier is present when you except the product and if there is obvious external damage to the box, note such on the acceptance paperwork and have she or him make appropriate notes on their paperwork.

NOTE FOR INTRODUCTION

This manual reflects procedures necessary to get an early prototype model ready for flight. You may see that your production Viper Jet has some of these procedures accomplished at the factory. NOTE: The Viper Jet requires both Metric and S.A.E. Hex drivers. Check BVM website for updates and addendums to this manual.

INTRODUCTION

Thank you for purchasing the BVM PNP Viper Jet. This model represents the latest in manufacturing technology and completion for the R/C jet enthusiast. The factory has expertly crafted and thoroughly inspected all aspects of the model. Only a small amount of work is required to complete the assembly of your Viper Jet.

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 review the entire manual to become familiar with the processes and procedures before you begin to assemble your aircraft.

DISCLAIMER

BVM 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 and a “Turbine Waiver” 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 incompatible components or alter this product in any way outside of the instructions provided here. The BVM Viper Jet has been designed and flight tested with 80-100N class engines. Damage to the aircraft may result from exceeding this thrust limitation (23 lbs).

BVM Products

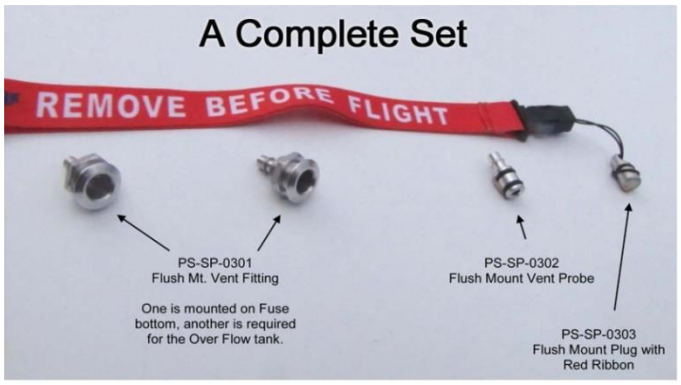
Received with the Instruction Package that is sent from BVM

- ☐ Assembly and Operating Manual Package

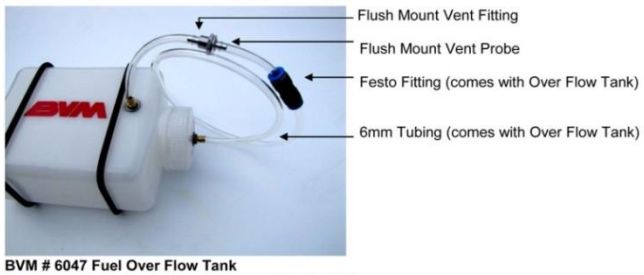
Recommended Accessories

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

- ☐ #2 x 7/16 SSSH (Servo Screws) (BVM # 2865)
- ☐ #2 x 3/16 Button Head SMS Package (BVM # 5625)
- ☐ BVM UAT (BVM# 6044)
- ☐ (2) 7.4v Batteries 3000 mAh Magnum Ion (# VU-7304EXB-EC3)
- ☐ BVM Over Flow Tank (BVM # 6037)
- ☐ Flush Mount Vent Fitting (# PS-SP-0301)
  (For Over Flow Tank)
- ☐ Flush Mount Vent Plug (# PS-SP-0302)
  (For Over Flow Tank)

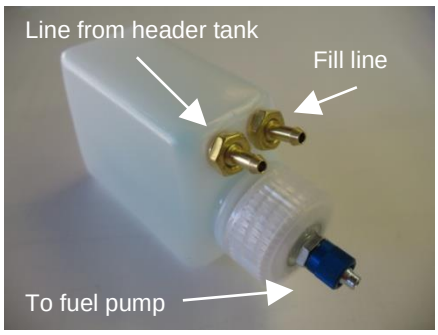


A **Smoke System** will require a complete second set of the parts.



BVM # 6047 Fuel Over Flow Tank
Can be used with Flush Mount fittings or Standard fittings.

BVM Ultimate Air Trap



Velcro Package

Required Tools

A combination of Metric and SAE hex socket and drivers along with a small standard and Phillips head drivers will be necessary.

List of Adhesives/Lubricants/Heat Shield+
Available at BVMjets.com

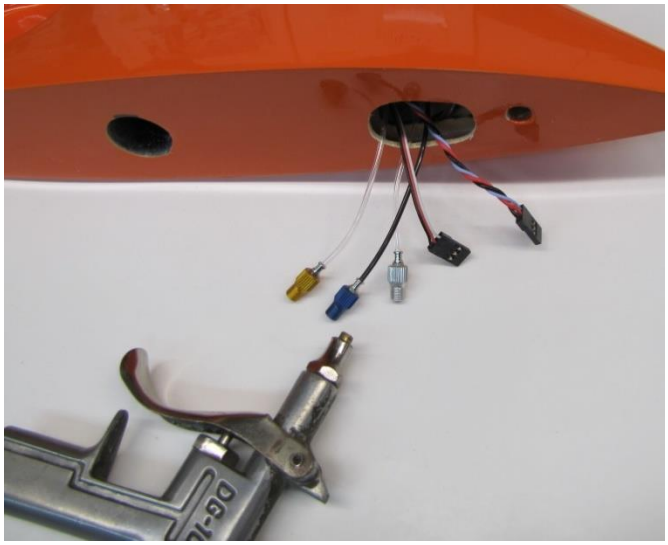
☐	BVM Aeropoxy	(BVM # 9566)
☐	BVM QT Poxy	(BVM # 9580)
☐	Slo-Zap	(# PT20)
☐	Pacer Z-42	(#PT42)
☐	Super O-Lube	(BVM #5779)
☐	BVM Thin Lube for “O” Rings	(BVM # 1945)
☐	Axle Super Lube	(BVM # 5784)
☐	BVM Dry Lube	(BVM # 1947)
☐	BVM Collar Tool	(# PA-SR-0095)
☐	BVM Heatshield	(# PA-MA-1940)

WING AND MAIN GEAR

NOTE: Some of these procedures are not imperative when the model is new out of box. However, you may find it necessary to perform them later as the model accumulates flights and age.

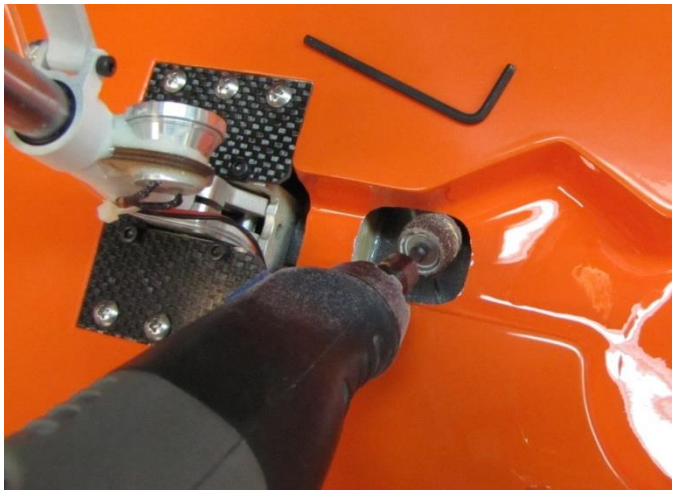
Accomplishing them now will get you familiar with the systems and extend the service life of the product.

NOTE: The retract mechanism can be easily operated with a compressed air source and a trigger valve as shown. 50-60psi is sufficient.



Air Connector Identification
GOLD = Gear Down
BLUE = Gear Up
SILVER = Wheel Brakes

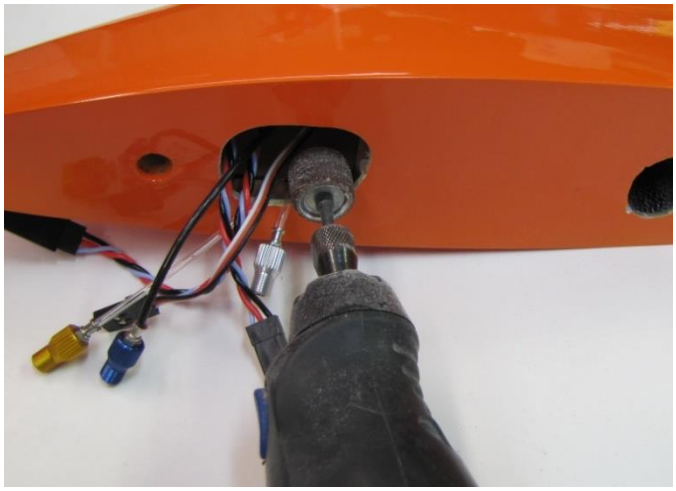
- The main wheels should have a very slight amount of "tow-in" about 1/2° to 1°. Sight from the wing bottom, relative to the wing root.



If the factory setting is a bit too much, use a 2.5mm Hex wrench to loosen the strut in the aluminum pivot block in the retract unit. Set the tow-in as desired then securely tighten the screw.
Use a Dremel drum sander to enlarge the clearance in the strut well to accept the landing light.

- The opening in the wing root can be opened up a bit using a Dremel drum sander.

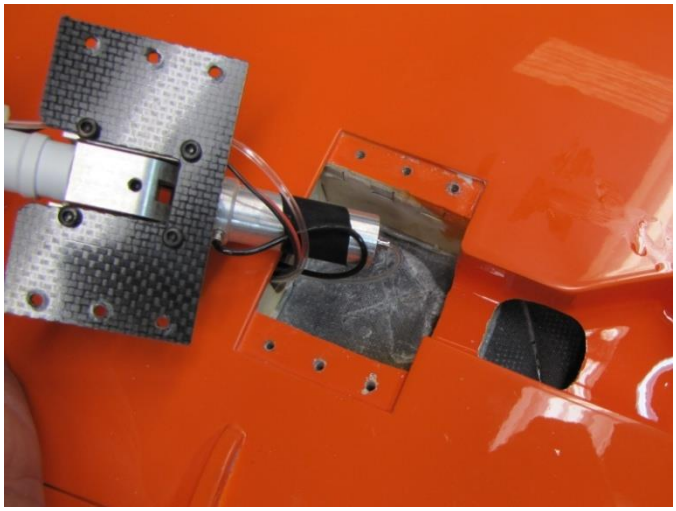
Be very careful to hold the tubes and wire out of harm's way. This is a convenient item.



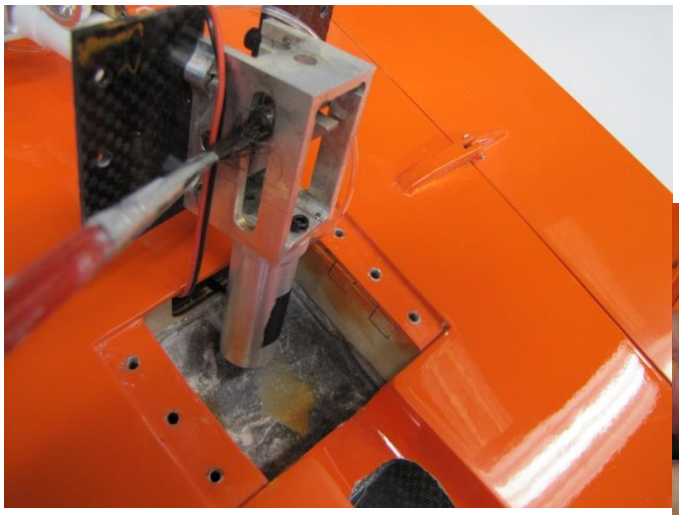
SERVICING AND LUBRICATING THE MAIN GEAR RETRACT SYSTEM

INCLUDING AXLE BEARINGS AND "O"RING BRAKES.

- Remove the 6 Phillips Head wood screws that retain the retract unit and lift it out of the pocket.



- The metal-to-metal sliding and rotating parts can receive the perfect lubricant for ease of operation and long-term use. Use a small brush to apply BVM "Dry Lube" #1947 to these parts.



- Use a 2.5mm Hex Wrench to remove the wheel, brake hub, and axle.

- Apply a thin wipe of BVM Super "O" Lube to the "O"Ring and to the inside surface of the wheel rim.

NOTE: The amount of lube does affect the braking action.

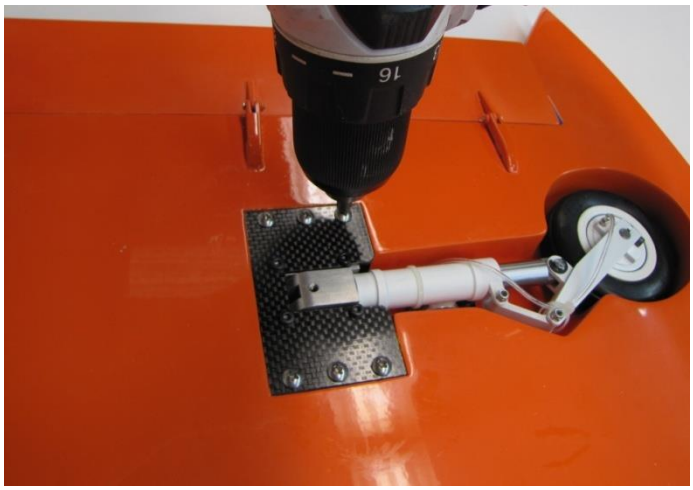
SPECIAL NOTE: DO NOT apply any other type of lubricant to any "O" Ring except Parker Super "O" Lube (BVM #5779) and BVM Thin O'Ring Lube (BVM #1945).

NOTE: To connect threaded air fitting at wing fuse joint - rotate the female fittings only - (Gold/Blue/Silver) to avoid a kink inside wing.

- Inject a small amount of axle Super Lube (BVM#5784) into the wheel bushing and onto the axle. Note the thin Teflon washers and reinstall them as if they were factory placed.

- Reassemble everything, making sure the clear brake tubing is on the aft side of strut. Securely tighten the axle retaining bolt with a 2.5mm Hex Wrench.

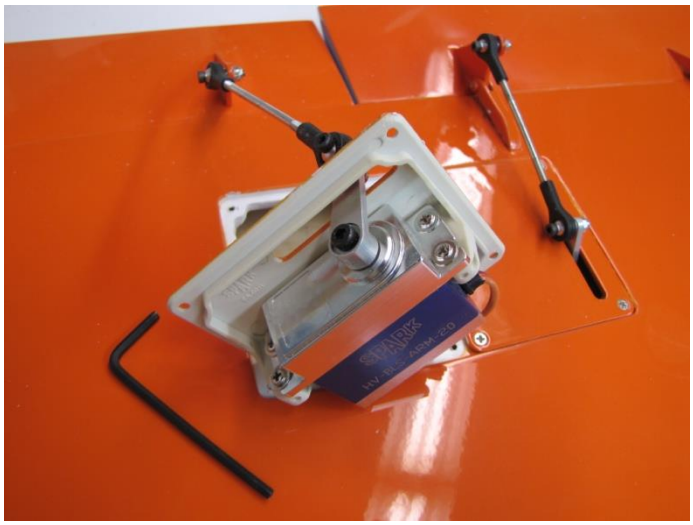
- A variable speed electric drill with a Phillips head driver is handy to remove and reinstall the (6) screws that hold the retract unit in place.



WING SERVOS

All the servos in the model are the Spark all metal case brushless motor #20.

They are securely mounted to the injection molded cover plates. A 2.5mm hex wrench secures the metal drive arm to the servo output shaft.



- You can use a 2.0mm hex wrench to check the security of the nylon/aluminum ball/socket linkages.

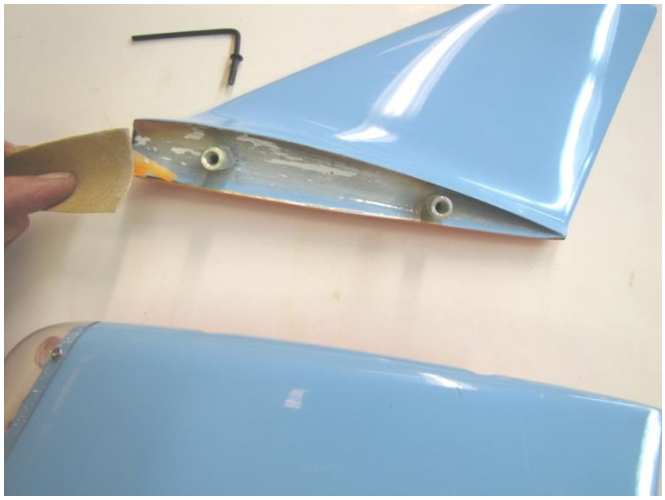
- The nylon/aluminum ball/socket linkages can receive a bit of BVM Dry Lube (BVM #1947) applied to the mating parts.

- Do this for all similar linkages on the model.

WINGLET ATTACHMENT

NOTE: The model can be flown with or without the Winglets - pilot's choice.

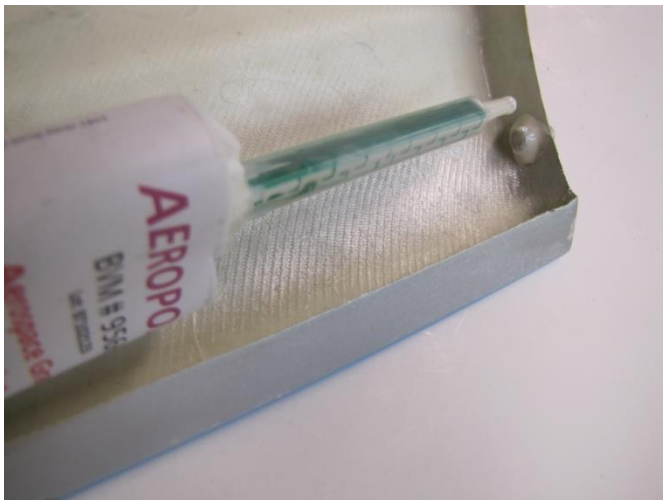
The Winglets plug into the outboard end of the wings by inserting the pegs into the two aluminum sleeves. A 2MM Hex wrench is used to insert and secure the flat head bolt.



If the bolt does not easily thread into the peg, it may be necessary to sand away paint or a putty droplet to allow a perfect fit. Here a piece of #180 grit sandpaper is used.

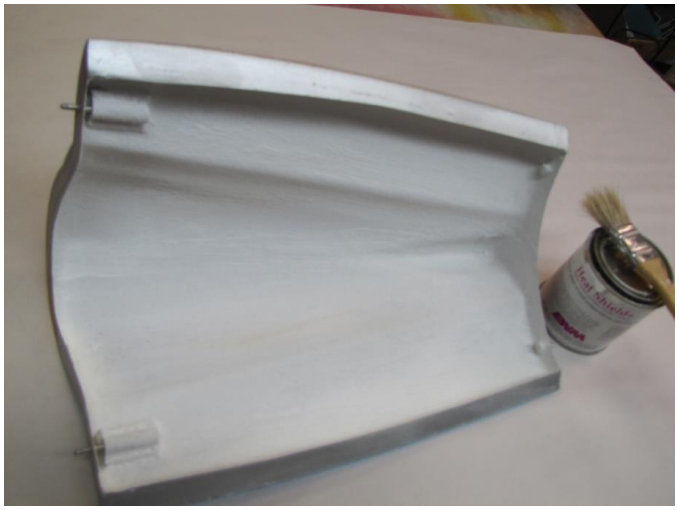
HATCH WORK

- Apply BVM Aeropoxy to the internal junction of the engine access hatch pins and the fiberglass flange.



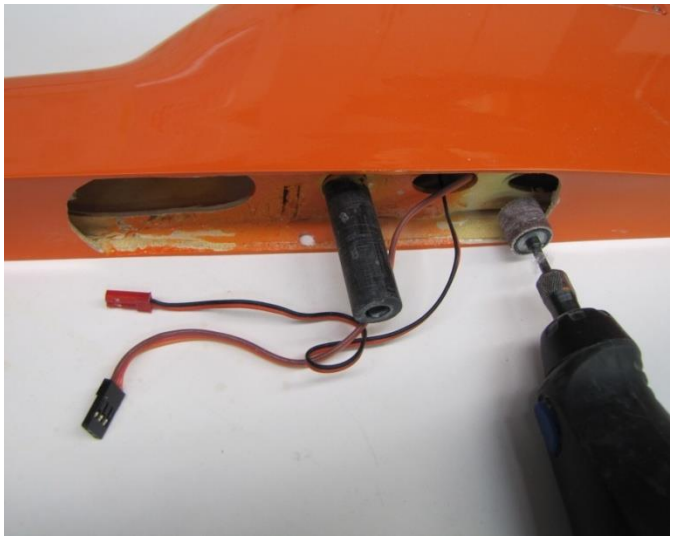
- Accomplish the same for the pins at the forward end of the canopy hatch frame.

- To reduce any effect of residual heat after engine shut down, apply 2 coats of BVM Heatshield (BVM#1940) to the inside surface of the engine compartment cowl. Clean up flanges with a detergent (like Windex) and paper towels.



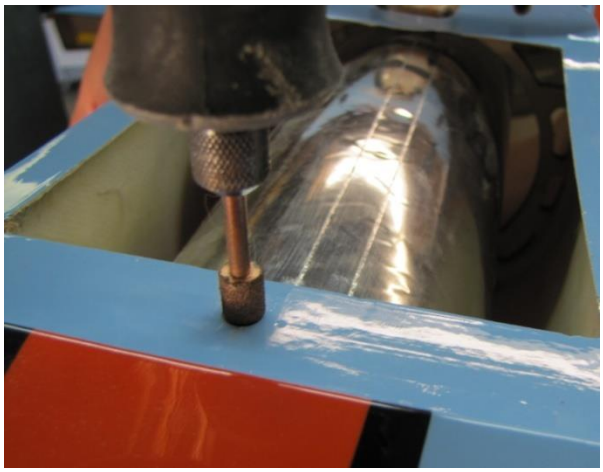
FIN

- Use a Dremel drum sander to radius corners of fin base opening as shown. The same tool can be used to open the hole in the plywood rib. This will help the fin attachment when stuffing the electrical connectors inside.



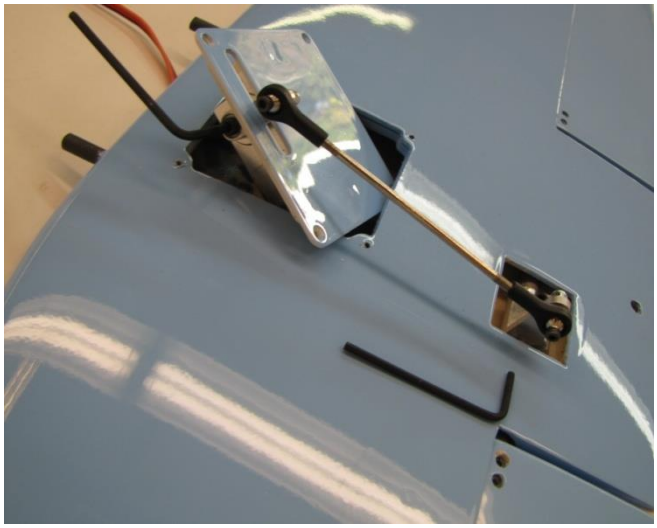
- As previously shown, apply BVM Dry Lube (BVM #1947) to the linkage ball/socket joints.

- Use a small countersink tool to chamfer the hole that receives the aft fin/stab mounting bolt.



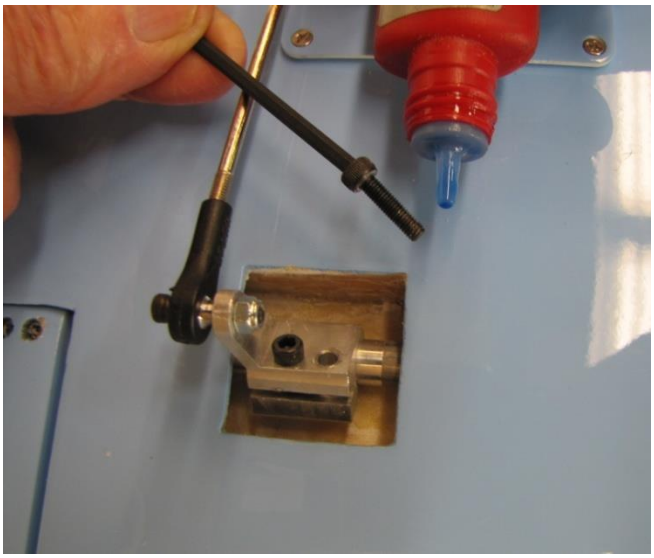
STABILIZER AND ELEVATORS

These procedures allow you to become familiar with the assembly and check the factory workers' attention to these important details.



- Use a small Phillips driver to gain access to the Spark 20 elevator servo. Check security of all screws that mount the servo and control arm (2.5mm Hex).

- A 2mm Hex wrench fits the control rod bolts.



- Make sure that this aluminum clamp is secure. Apply a drop of Z-42 (Blue Thread Locker) and tighten the screws.

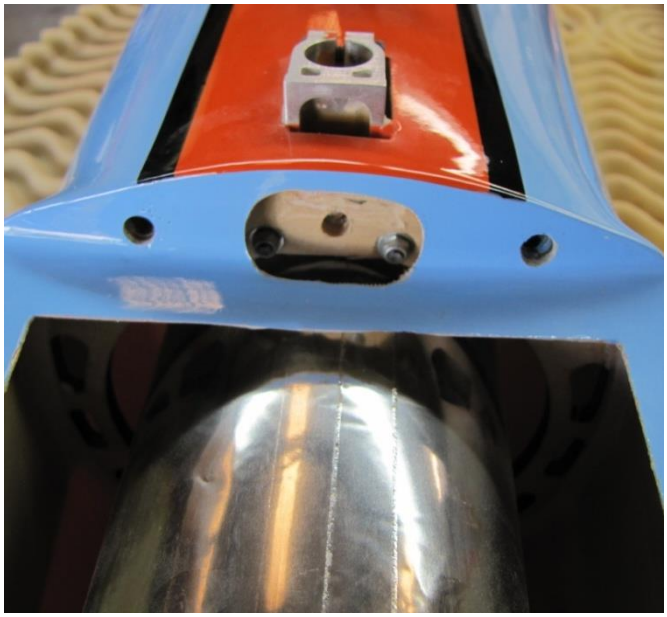
- Remove the 2 set screws in each elevator, apply a drop of Z-42 then insert and tighten in both elevators.

NOTE: BVM checked the temperature inside the space between the servo mounting plate and outer tailpipe shield. It was accurately measured to be 10°F above ambient with the engine running. There is no need for extra heat shielding.

STAB AND FIN MOUNTING

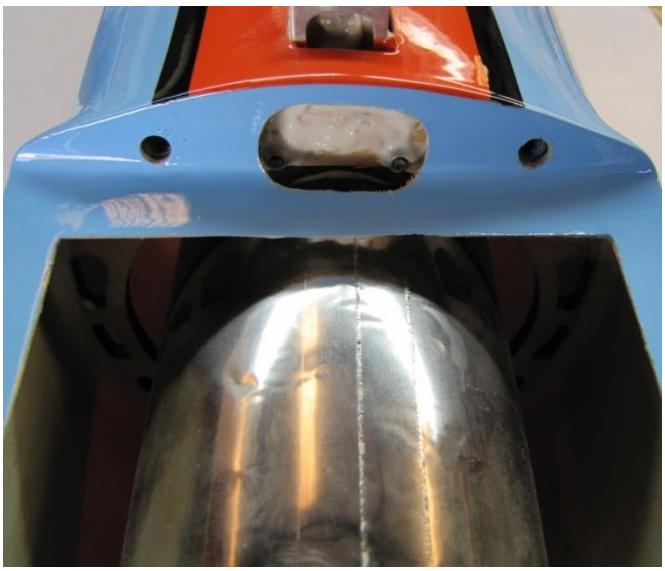
NOTE: A few early models may need this procedure.

Later models have a carbon fiber plate installed on the aft side of the plywood bulkhead shown.



- Use Dremel rotary tools to open this area in the fiberglass flange as shown and a 1/4" drill bit to make the hole between the bolts so that the Aeropoxy will reach the aluminum fin mounting bracket.

- Inject Aeropoxy into the hole and forward onto the aluminum bracket then cover the nuts and washers as shown.



ENGINE INSTALLATION AND OPERATION

The BVM Viper Jet was introduced to the market in June 2017. It is lighter in weight than earlier Jet Legend offerings and intended to be an easy to assemble, medium performance model with many small items such as access to components considered in the new product.

It is best powered with an 80-100 Newton size turbine. With this power, it is very aerobatic and limited to 175 mph.

Installing a more powerful engine could overstress the airframe, increase fuel consumption, weight, and increase landing speed.

Operation of a turbine powered model requires that the pilot/owner assume an extra level of responsibility.

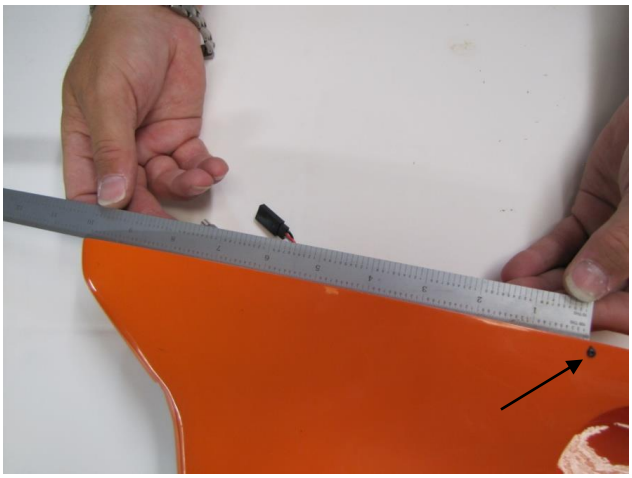
For operation in the U.S.A., an AMA Turbine Waiver is required. See AMA http://www.modelaircraft.org/.

CENTER OF GRAVITY

NOTE: The Center of Gravity symbol on the fuselage side may be incorrect on some early models.
The location shown here is correct and flight tested many times. This is a safe Center of Gravity location.

Use a 1/16" drill bit located as shown 9.5" aft of the L.E. of the wing strake. Drill 1/16" holes in the bottom of both wings.
Insert a small button head screw for easy reference.

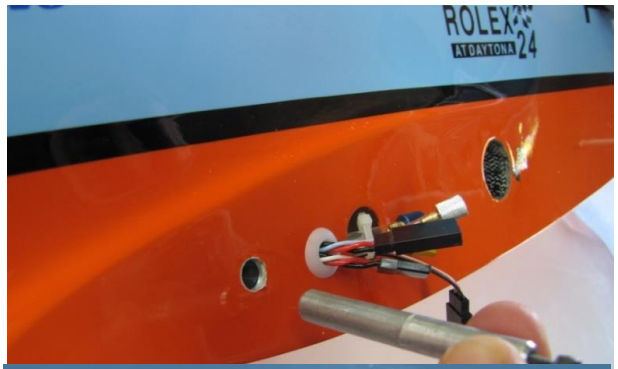
NOTE: Position of ECU and Receiver batteries allow fine adjustments to obtain proper Center of Gravity.



WING ATTACHMENT

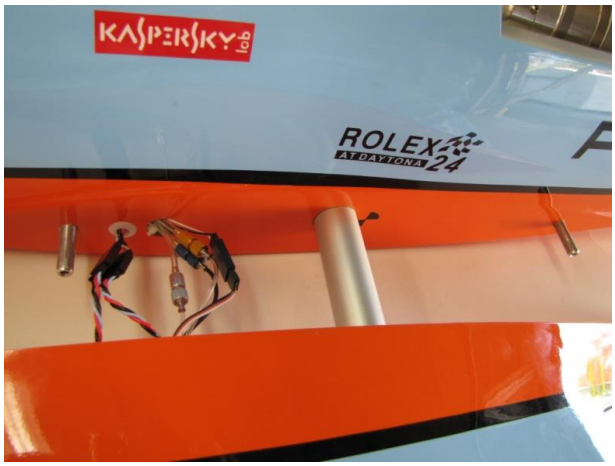
- There are 4 identical aluminum pegs tapped for 3mm bolts into both ends. There are (6) 3mm X 13mm S.H.C.S. The 2 extra bolts are for spare parts.

There are 3mm bolts inserted and glued into the aluminum receiving tubes, two at forward wing fuse fairing and two at rear.



- Hand thread the aluminum pegs into these (4) receptacles. Remove the bolts on outboard ends.
- Insert the 24mm diameter aluminum tube into the receiving fiber tube in the fuse. There should be about 7-1/8" extended outboard of each side of the fuse wing fairing. Use a black marking pen to identify the intersection with the fuse side.

- Make the (4) electrical connections. Note that they can only be plugged into the proper receptacles by physical design.



- Hand twist the Silver, Gold, and Blue threaded couples together. Turn only the ends that can swivel to avoid kinking the tubing on the female end.

- Use a 3mm Hex driver to secure wing to the fuse pegs, (2) forward and (2) aft.

The bolts are 3mm X 13mm S.H.C.S.

FLAPS - A plywood Flap Gauge is provided. Position it on top of the wing adjacent to the fuse joint.

30° Take Off Flaps

50° Landing Flaps

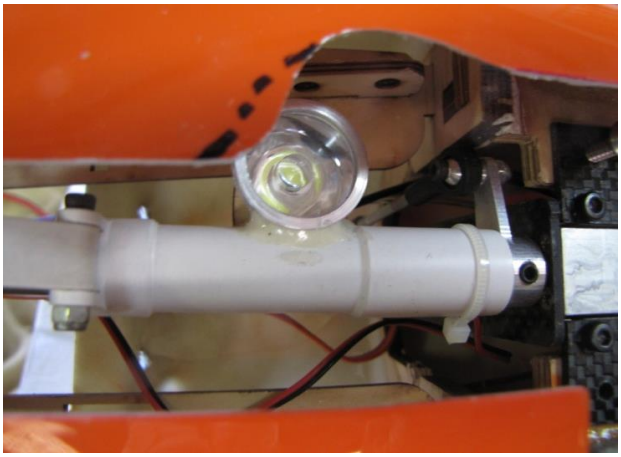
NOSE GEAR ACCESS

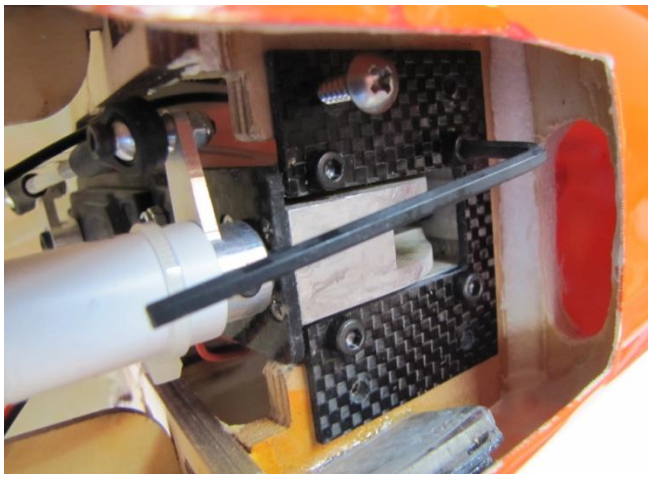
The nose gear, its steering servo, strut wheel, and landing light come installed and ready to fly. If there is a need to repair or replace the unit, the following photos and text will be helpful.

View of nose gear in fuse

Fully Retracted In Transit Fully Extended

It may be necessary to further trim the clearance in the fuse for the landing light, Use a Dremel Drum Sander.





- To remove the nose gear first remove the (4) socket head bolts. Use a 2.5mm hex wrench. Then remove the (4) Phillips head wood screws.

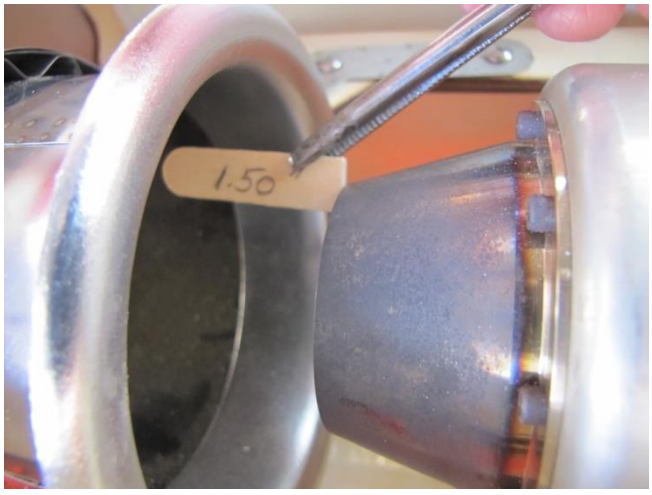
The pneumatic and electrical will follow. Once they are disconnected the retract unit can be serviced or replaced.

NOTE: Apply BVM Dry Lube (BVM#1947) to all mating parts before reinstalling the nose gear system.

NOTE: Before removing the nose gear unit, check the routing of the pneumatic and electrical wires relative to the side of the fuse so they can be reinstalled as originally placed. You can use your cellphone camera to document.

ENGINE MOUNTING

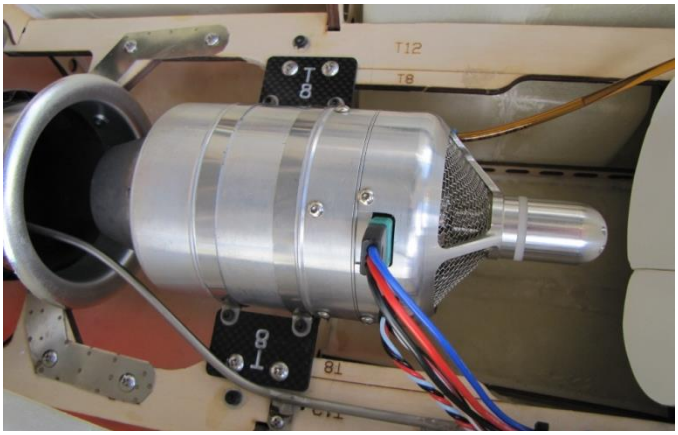
The fore/aft location of the T-8 (80 Newton engine) is established using a 1.5" long stick. The aft end of the engine exhaust nozzle should be about 1.5" forward of the forward end of the steel tailpipe.



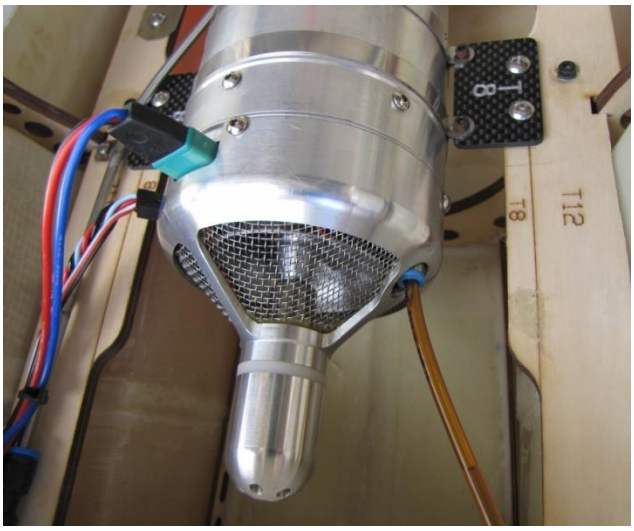
NOTE: This will apply to most engines in this power range. Check your engine manual.

NOTE: The engine shown is a prototype of the Spark T-8.

The Carbon Fiber mounting plates allow the engine to be secured to the plywood rails. #4 self-tap Philips head wood screws are used.

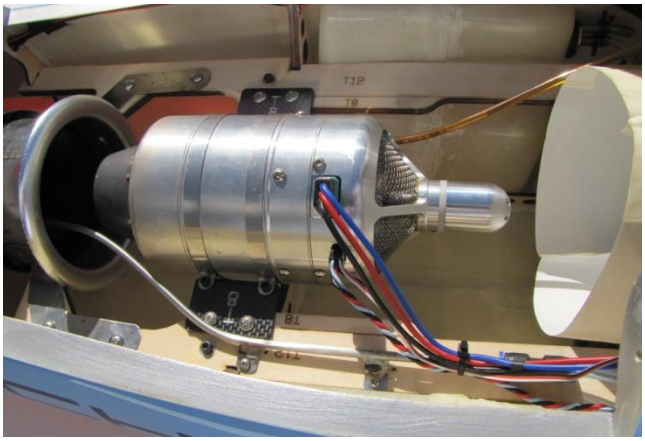


This shows the correct orientation of the electrical and fuel-in lines.



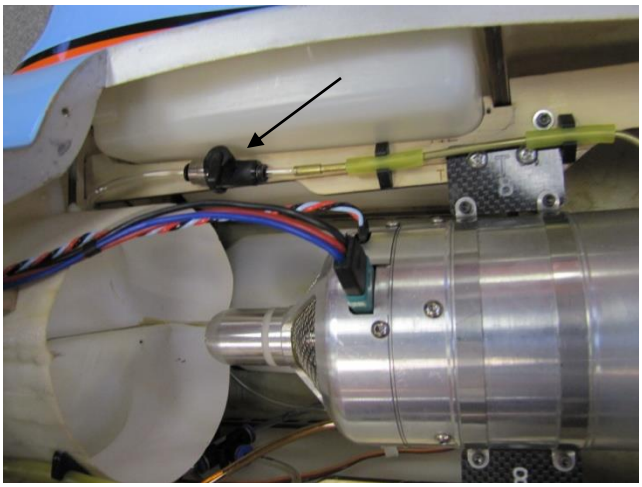
SMOKE TUBE MOUNTING

- Locate the smoke tube as shown. It may be necessary to hand bend the tube to get it into the tailpipe. Sight from the rear to see that the tube favors the right side of the tailpipe.



SMOKE SYSTEM ON/OFF VALVE

NOTE: It is good practice to make the first few flights without the smoke system operating.



FUEL TANKS

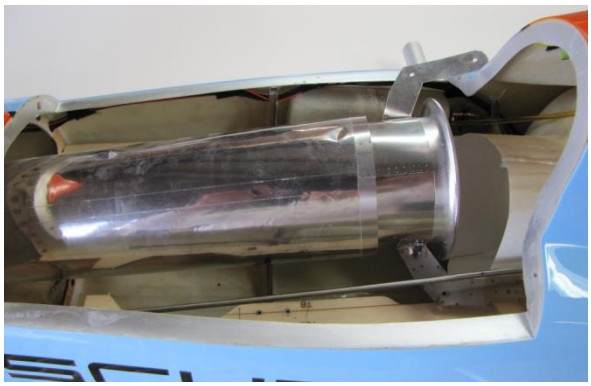
They are left and right saddle fuel tanks. To gain access to them, the engine and plywood mounting rails must be removed.

SMOKE TANK

It is located below the engine.

TAILPIPE AND ITS' INLET LIP

The double walled stainless steel tailpipe comes installed. To gain access to the ventral fin mounting in the fuselage, remove the screws and pull the tailpipe forward and up.



To pull the tailpipe further forward or to completely remove it through the aft fuse opening the inlet lip must be removed. The stainless-steel mounting straps can be carefully bent around the pipe to pull it completely out of the fuse to the rear.

Some tailpipe lips are attached with very small Phillips head screws. To replace them use 4-40 X 3/16" S.H.C.S. with flat washers and 4-40 hex nuts. Apply a drop of thread locker.

FORWARD BATTERY TRAY

(OPTIONAL INSTALLATION)

These plywood trays allow forward placement of 2 receiver batteries, engine ECU battery, and an optional location for electric pumps. This is necessary for a proper Center of Gravity with a minimum if any ballast added.

View of bottom side of battery tray

View of top side of tray and pump mount. A Zap or resin finish is applied for better adhesion of Velcro strips. Apply finish to both sides of the pump mount.

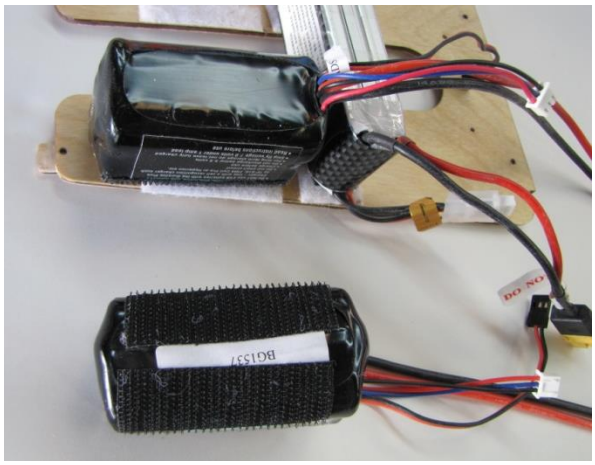
NOTE: Sand top of plywood with #320 before and after applying finish.

See also: Forward Battery Tray later in this manual. The parts in your model will be one or the other.

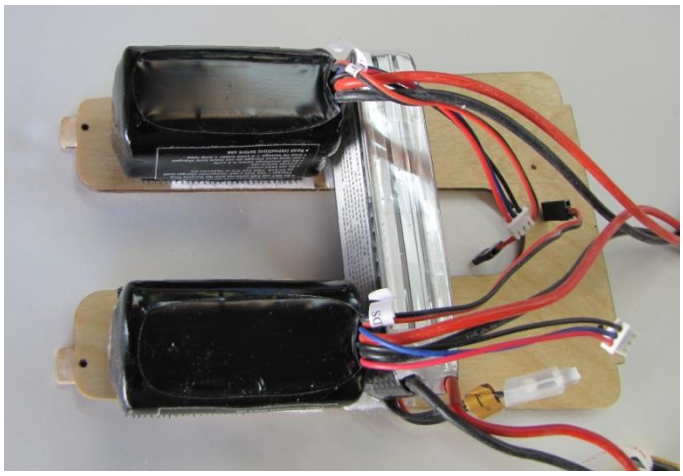
Receiver batteries require (2) 1/2" X 2" Velcro and ECU battery is retained by (2) 1" X 1-3/4" Velcro.

Apply matching Velcro to bottom of batteries.

Receiver batteries shown here are Duralite EXB 3000mAh 7.4 Volts.

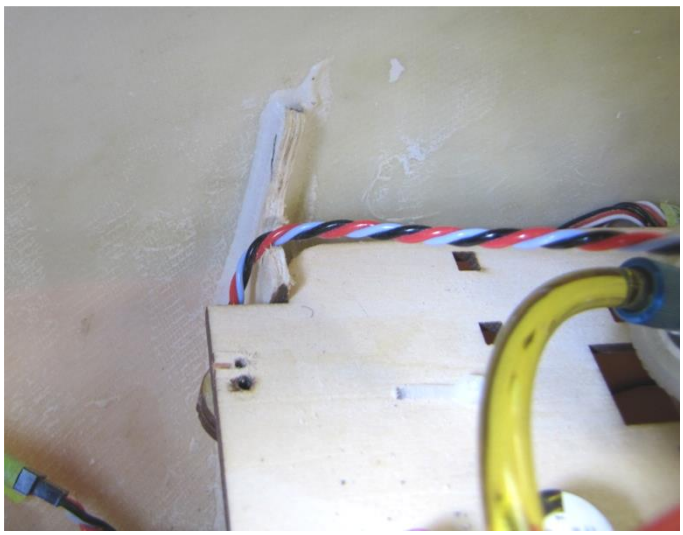


Batteries shown attached to the tray. The battery on the right side must be close to fuse skin to allow nose gear steering servo to clear upon retraction. The third battery is the engine ECU power source.



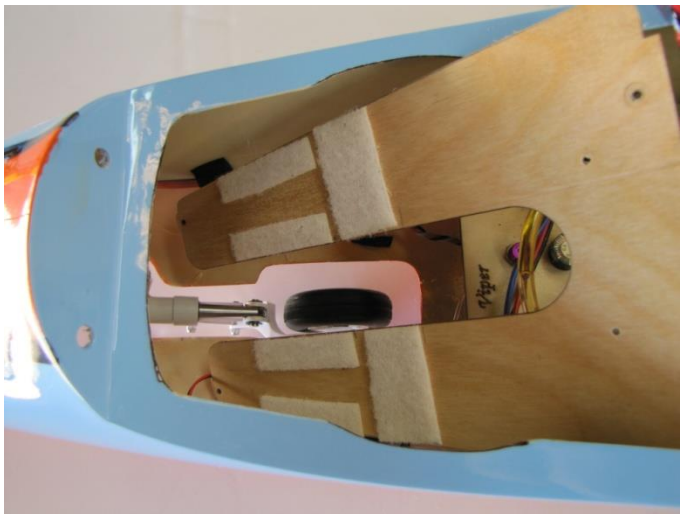
OPTIONAL INSTALLATION
(CONTINUED)

The smoke pump power wires must be routed as shown. Make a notch in the plywood bulkhead if necessary.

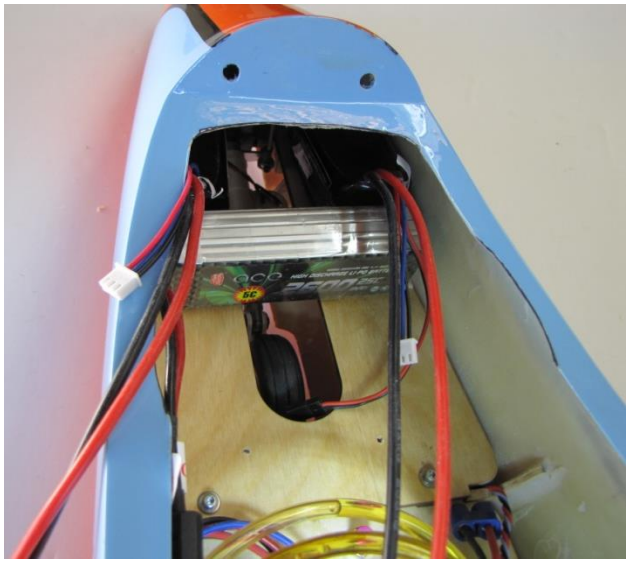


Use a Dremel drum sander to make arches in fuse side and forward flanges to allow easier insertion of the tray and batteries.

NOTE: The batteries are removed to allow tray installation.



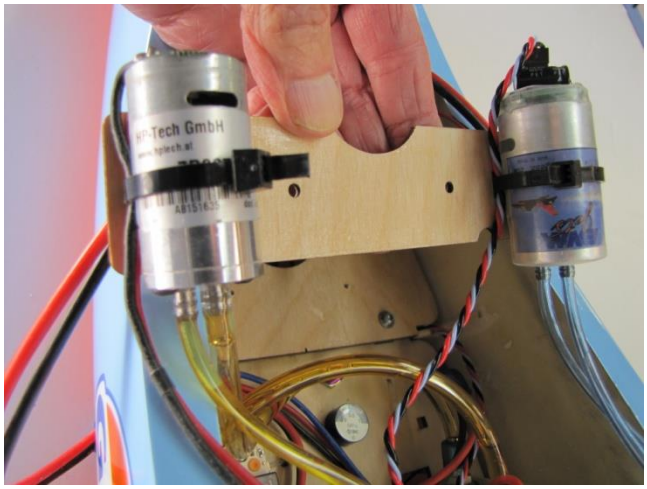
Batteries shown installed and tray is secured with (2) #4 wood screws and washers.



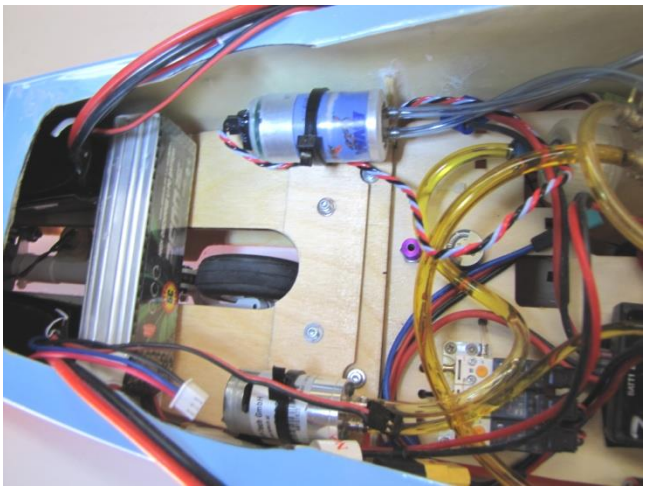
ECU AND SMOKE PUMP TRAY

OPTIONAL INSTALLATION

The pumps are held securely to the pump tray with 8" tie wraps.



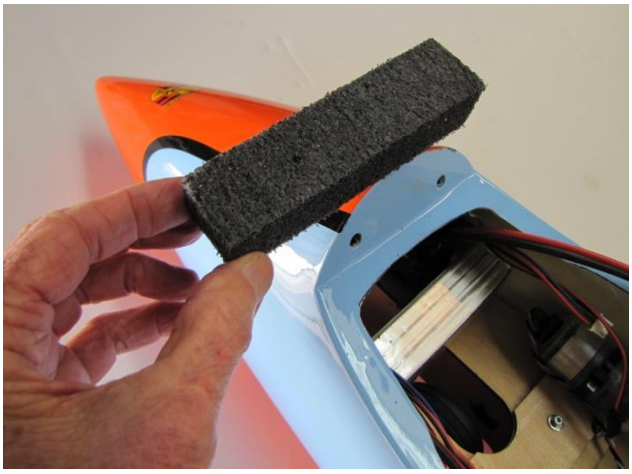
NOTE: The smoke tank is located below the engine.

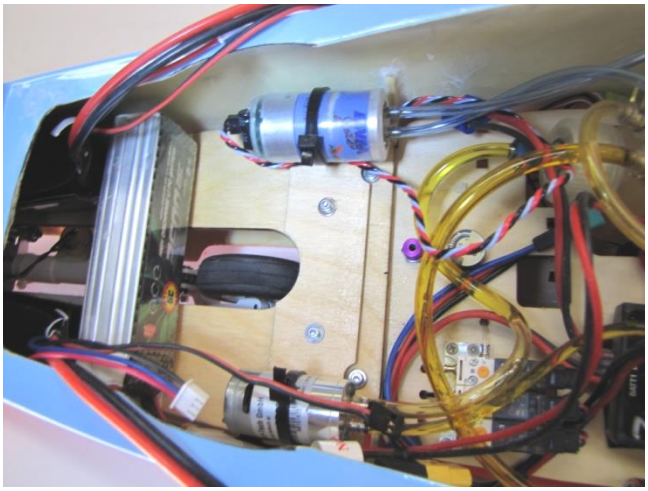


The pump tray is held in place with (2) #4 S.M.S. and washers. Socket head screws are best.

Note that E.C.U. battery must allow clearance for nose wheel to fully retract.

A 1" X 1" X 4.5" piece of dense packaging foam is placed on top of the receiver batteries about where it is shown here.



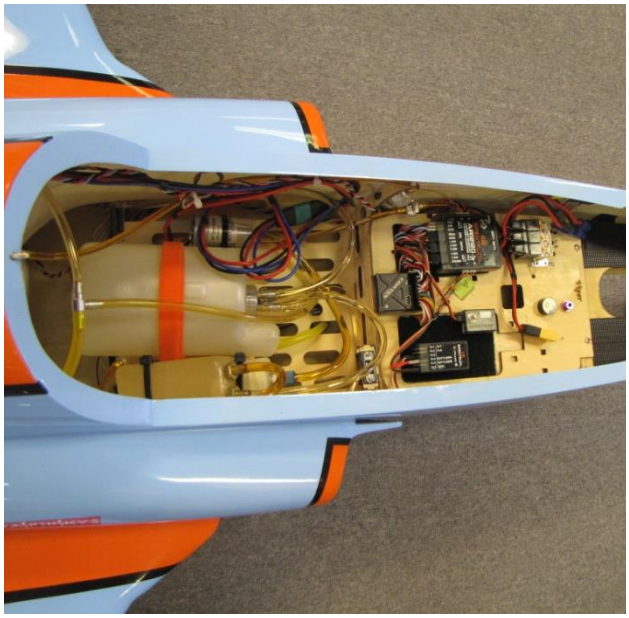


Here it is shown tucked away.

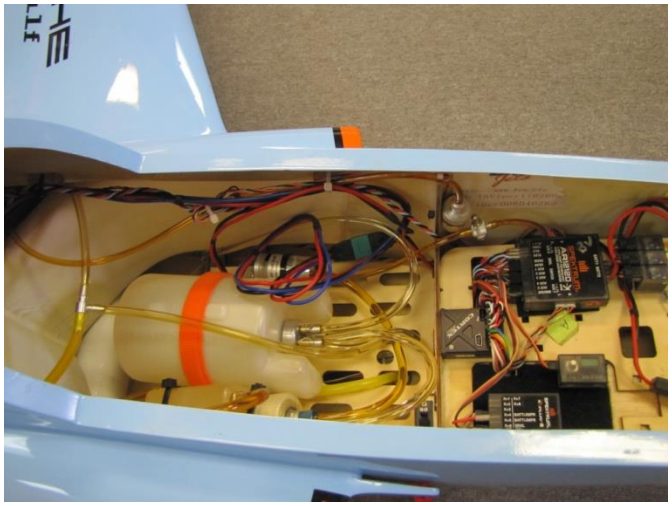
NOTE: For standard LiPo 4 cell batteries, this foam retainer will vary in dimensions.

FORWARD FUSELAGE DETAILS

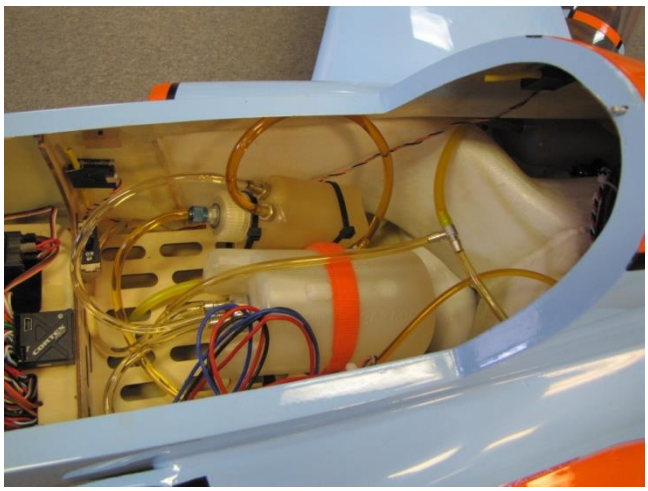
NOTE: Use these photos as a guide for placement and organizing your brand of R/C equipment.



This is an overall view of the forward fuselage. See also alternate version a few pages back in this manual.

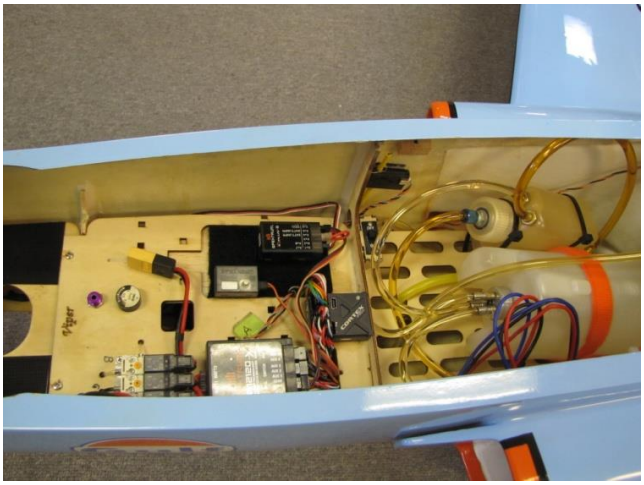


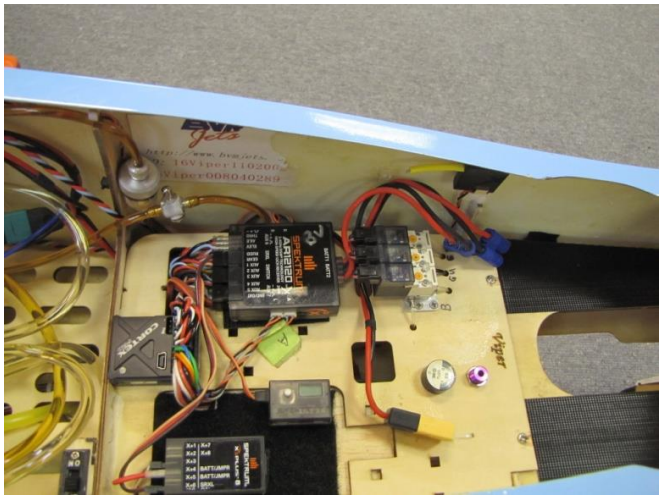
View of left side aft 1/3rd of forward fuse. See Header Tank with orange Velcro strap, fuel pump, fuel tubing, and fuel filter mounted vertical.



View of right side. See Ultimate Air Trap, remote receivers, and fuel tubing.

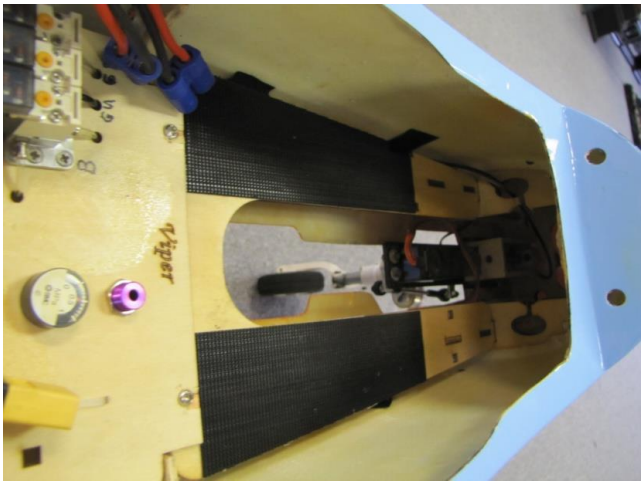
View of right side of mid forward fuse. See optional channel expander, flight logger, mini air pressure gauge, air fill valve, and Cortex Gyro.





View of left side of mid forward fuse section. See receiver (12 channel), remote receiver, pneumatic solenoid valves. Label these valves "Brakes", "Gear Up", "Gear Down".

View of forward section. See Velcro on plywood deck.



NOTE: Apply a Zap or epoxy finish to the plywood before pressing Velcro into position.

Batteries Installed

CONTROL TRAVELS

Control	High Rate	Expo
Elevator (Measured at the Root)	Up 1.0” Down 0.75”	Up 25% Down 25%
Aileron (Measured at the Tip)	Up 0.6” Down 0.6”	30% / 30%
Rudder (Measured at the base)	L/R 1.3”	20% / 20%
Flaps **(Measured at Fuse root)**	TO Position 1”	Landing Position 2.3”
Crow (Ailerons) **(Measured at Tip)** In landing mode with landing flaps	Up 0.3"	

NOTE:
Crow Set-Up: Positioning the Ailerons (up) with landing Flaps down. This adds stall protection during the approach.

NOTE: The BVM Demo plane is set up using the above Expo percentages. Positive values are used on Spektrum and JR radios, Futaba uses negative.

CENTER OF GRAVITY
Refer to Page 15

Connecting RX wires

The wires are labeled from the factory. If you are using the DX18, the program is available from BVM. Follow the chart below to connect the servos.

DX18 Connection Chart					
RX Port	Throttle	Aileron	Elevator	Gear	
Surface	Throttle	Right Ail (Ail 2)	Elevator	LFL	
RX Port	Rudder	Aux1	Aux2	Aux3	
Surface	Rudder	Left Ail	RFL	Gear	
RX Port	Aux4	Aux5	X+1	X+2	
	Steering	Brakes	Smoke	Gyro	
RX Port	X+3				
Surface	Lights				

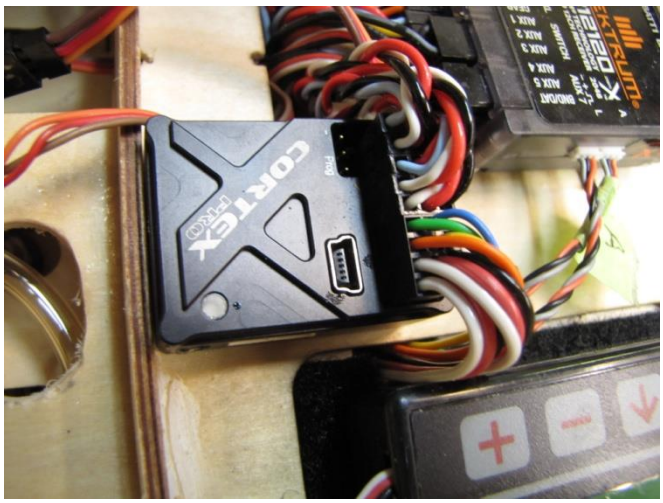
DX18 and DX18QQ Transmitter File

The BVM Demo models are set up on Spektrum DX18 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 directions of all flight controls before each flight.

Switch/Lever/Trimmer	**Channel**	**Output**
Switch A	Aux3/Gear	Landing Gear
Switch B	X+3/Lights	Down is Off
Switch C	Flight Rates	Up is High
Switch D	Flaps	(0) Up is Normal flight (1)Mid is Flaps Take-Off (2)Down is Landing Flaps
Switch E	Aux5/Brakes	(0) Brakes Off (1)Anti Lock (2)Full Brake
Switch F	X+1/Smoke	(0) Off (1)On Low (2)On High
Switch G	X+2/Gyro	(0) Off (1)Normal Flight (2)High Landing

NOTE: LIGHTS - The LED labeled wire plugs into a selected channel to operate the light system.



NOTE: The BVM factory demo model flew without Gyro assistance. If you opt to install a Gyro, be sure to check for proper control surface corrections. Have the Gyro activated by a 3-position switch on your transmitter. Make the first take-off with the Gyro off until a safe altitude is attained.

First Flight Profile

Make the first flight with the gyro "OFF".

Flight Time – There is 9+ minutes of fuel on board.

The BVM demo model's transmitter timer was set for 7 min for a "Top Gun" routine. On the first flight, land a few minutes early to check fuel consumption. Adjust the flight timer accordingly.

Taxi Test/Engine Run Up

A taxi test should include a radio range check with the engine running at various power levels. Check that the wheel brakes are adequate, and the stopping action is without skidding or pulling left or right. Be sure to shake the aircraft and push fore and aft with the engine at half power, this will help remove any trapped air bubbles in the fuel system.

Takeoff- Set the flaps at take off position

Begin the takeoff roll by slowly advancing the throttle. Maintain runway center while holding about 1/2 stick up elevator; the Viper Jet will rotate when it reaches flying speed, then relax the up elevator a bit for a smooth climb. If there is a cross wind, hold a small amount of aileron into the wind, be prepared with opposite rudder.

Trim

Your radio should be set up to remember trim settings for each flap setting. So, at a medium speed, trim the model in the clean configuration, then at take-off flaps with gear down, then with landing flaps and gear down.

Practice Approaches

Save several minutes at the end of your first flight to practice approaches and go arounds. It is beneficial to become familiar with the low-speed handling of the aircraft.

Landing

Landing is like most jets, slow the model early in the landing pattern with full flaps and landing gear down and throttle set to 1/4 power on. Reduce the power to idle when model is ready to touchdown. The Viper Jet does not stall easily, it is best to land nose high, touching the main wheels first. The majority of the first flight should be spent trimming and practicing for the first landing. Save the aerobatics and air show stuff for later flights.

RX Battery Consumption

The average flight using the lights the entire flight consumes about 400 mAh. We recommend 3 flights and recharge. Use this data to calculate how many flights you can achieve from your system. The use of the smoke pump will consume more mAh per flight. (2) 3000 mAh batteries are the **minimum** BVM recommends.

BVM is synonymous with “Success Jets.” It is very important to us that you are successful with our products. This extensive manual reflects our sincerity. As always, your comments and suggestions on BVM products are appreciated.

Pilot’s Notes: