Der Jet Model
De Havilland
DH-100 Vampire

www.derjetmodel.com

De Havilland Vampire
Assembly Instructions

GENERAL DISCUSSION

The Der Jet De Havilland Vampire is a 1:5 scale model for the serious scale jet pilot. This size model can be powered by 8-12 kg thrust turbines, with the smaller turbines providing very good scale performance as the Vampire has a large wing that provides plenty of lift for aerobatic flying.
The cockpit included in the Der Jet Vampire kit will greatly enhance the appearance of this model along with details such as panel lines, rivets, and full gear doors.

The size of this model does provide the modeler with many options on equipment selection and layout, these decisions are to be made by the modeler. During the servo selection process keep in mind this is a large jet model with an empty weight approaching 14 kg, or 30 pounds. Care must be used in the layout of equipment as the Vampire is a very short nosed design, attaining the proper center of gravity will require some amount of nose weight. Much of the required nose weight can be reduced with the proper selection of equipment and location, heavy items such as the receiver and turbine batteries can be located forward in the fuselage. The prototype required 1.5 kg's in the forward bay to attain proper balance, it is up to the builder as to what required equipment you size to fit this area, otherwise dead nose weight, or any combination of both will be required.
The selection of turbine can also effect the C.G. balance, it was for this reason the a lightweight turbine is recommended for lively scale performance, the light weight and smaller size of this turbine allows it to be located well forward in the fuselage, reducing the ballast required.
The use of quality digital servos for the flight controls is strongly recommended, with the following table representing those utilized in the prototype with good success.

SERVOS REQUIRED

Surface	Qty.	Servo
Elevator	1	JR DS8711
Ailerons	2	JR DS8411
Rudders	2	JR DS3421
Flaps	4	JR DS821
Air Brakes	2	JR DS821
Retracts	1	Owner preference
Brakes	1	Owner preference
Brakes	1	Owner preference

The De Havilland Vampire will require many servo extension leads as the flight control servos are located throughout the aircraft close to the control surfaces. The selection of these leads are based on the ability to unplug each as the aircraft is disassembled for transportation.

SERVO EXTENSIONS REQUIRED

Surface	Qty.	Length	
Elevator	1	80cm - 30"	In tailboom
	1	100cm - 36"	In fuselage
Rudder	2	80cm -30"	In tailboom
	2	100cm - 36"	In fuselage
	1	"Y" connect	
Aileron	2	25cm - 9"	In wing panel
	2	50cm - 18"	In fuselage
	1	"Y" connect	
Flaps	2	"Y" connect	Each side
Outer	2	80cm-30"	In fuselage
Inner	2	50cm-18"	In fuselage
AirBrake	2	80cm - 30"	In fuselage

The landing gear doors on a De Havilland Vampire remain open in the down position, this allows the option of a gear sequencer or a pneumatic micro-switch setup, a gear sequencer was used on the prototype.

MATERIAL PACKAGES

(3) air tanks
(2) main gear door air cylinder mounts
(4) quick connects
(12) T fittings
(2) air fill valves
(6) wheel door cover offset hinges
(36) screws for offset hinges
(3) air cylinders for gear doors

(1) UAT
(1) air tubing set
(1) pair fuel tank set
(1) T-fuel fitting
(1) 2' fuel tubing

(2) main gear strut cover attach brackets
(4) air brake butterfly hinges
(18) aluminum servo mount
(12) pivot and round hinges
(1) nose gear cover link rod
(12) screw M4x30mm
(4) rudder servo mounts
(9) control horns
(11) pushrods

NOSE GEAR INSTALLATION

Mount the retract unit with the nose gear cover link rod secured by front bolts. The air line to must be connected to the fitting on top side of air cylinder prior to installing nose gear retract. *Note 8mm x 18mm x 55mm spacer plates located under nose gear retract unit for proper spacing on earlier kits.*

Assure adequate clearance between nose gear cover link rods, nose gear strut and fuselage to allow nose gear to fully lock in down position. It may be necessary to sand some clearance to the fuselage door lip to assure full travel of the nose gear strut to the lock position. *If your model does not have adequate clearance you will need the 8mm thick spacers under the retract unit.*

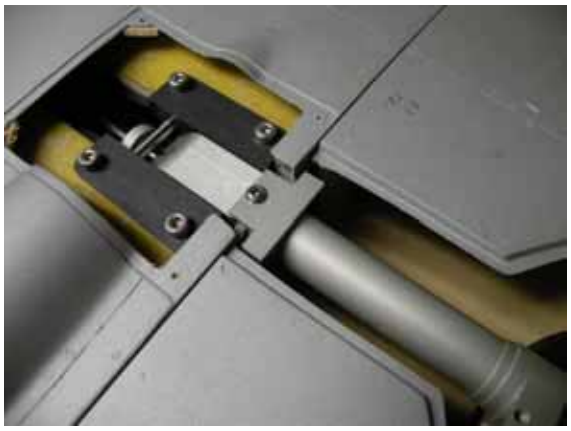
The nose gear door is installed with the supplied offset hinges. Pockets are located on the gear door itself for properly locating the offset hinges. Locate the screw holes as required to assure a flush fit of the door when closed. Assure adequate hinge clearance to fully open the door to clear the nose gear strut and tire, adjust as necessary.

Install the nose gear door air cylinder after the nose gear door is hinged in place. Proper location of the air cylinder is determined by running the air cylinder to the extended position assuring to door is adequately open far enough to clear nose gear strut and wheel as the gear retracts. Also assure enough air cylinder travel is available to fully close the nose gear door. Once the location is determined the air cylinder base can be epoxied in place. *Note this early kit requires a spacer under the air cylinder as well as the retract unit.*

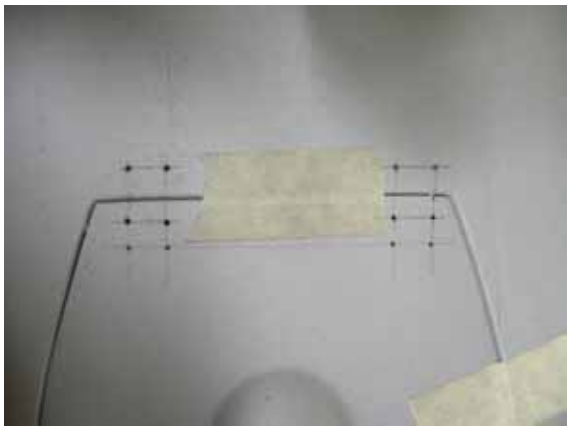
Drill (2) holes 63mm from back edge of the nose gear front cover for attachment to the nose gear cover link rods. Install the supplied fiberglass bracket to the door for installation of the cover closer spring. Locate the nose gear front cover spring tab and epoxy between the link rods.

The nose gear front cover is installed with the cover link rods, adjusting the rods for proper alignment in the closed position. The spring is installed to pull the door back in to position when the door is closed.
Install the rudder servo in the servo tray located aft the nose gear wheel well former. Steering is via cables attached to the nose gear steering arms. The steering arm screws should be removed and reinstalled with threadlocker and tightened securely prior to installing the steering cables.

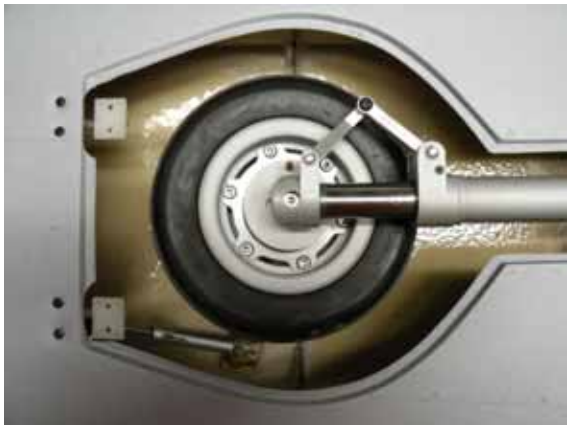
MAIN GEAR INSTALLATION



Install the main gear retract assembly to the fuselage with supplied M4x30mm screws, air lines must be fitted to the retract cylinder prior to installing the retract unit as they are not accessable later. The strut cover upper mounting bracket is to be installed at this time, use of thread lock on this screw recommended at this time.



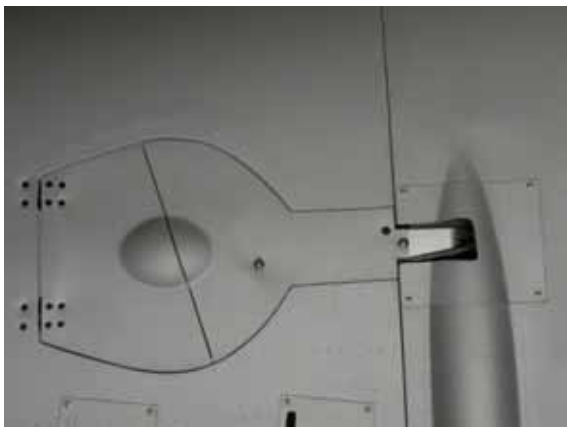
Layout main gear door hinges with the doors taped in proper location. Drill all holes then and install hinges. This will assure a quality fit of the doors to the wing pocket. The front hinge must be installed as far forward as allowed to properly fit the main gear air cylinder later.



The main gear door air cylinder is installed on the front hinge and best located prior to final install of the gear doors. Care must be used to assure a compete 90 degree open position and slightly beyond close position travel range to assure the air cylinder applies closed pressure in flight to keep the door tight against the wing skin pocket. The base mount of the air cylinder is to be angled forward to clear the tire in the retracted position. Fit the wings to the fuselage and retract the landing gear to assure proper clearance between the tire and the door air cylinder.

Scuff the inner fiberglass surface and epoxy the air cylinder mount in position.

Plywood shims may be required to obtain a flush fit of the door to the wing skin. Make from scrap material if required and sand the thickness to obtain a flush fit by trial and error when screwing the gear door in place.



At this time locate the gear strut cover in the door pocket, measure location of lower attach screw and drill hole for mounting screw. Attach the door with the lower mounting screw. Position the gear door in the pocket and drill and tap the upper strut mounting bracket and secure the strut cover at the top end. Scrap plywood shims will be required to assure proper fitting of the door to the wing skin. Once properly fitted secure the screws with threadlocker.

Remove the wheels from the main gear at this time for final setup of gear. The axles will need flats ground on them for contact by the retaining screw. While the wheels are off remove the wheel half retaining screws and apply threadlocker then tighten these screws in a circular pattern to assure a tight grip on the tire.

The brake components are shown for illustration purposes to aide in reassembly. The double sided brake pad is on the far left, then the brake disk, the single sided brake pad, and the brake caliber on the right.

This is the complete brake assembly, the double sided brake pad is located against the wheel and the single sided brake pad is assembled with the pad against the steel disk, and the side without the pad against the brake caliber. Care is to be used during assembly to properly align the brake disk slots with the wheel screws for anti-rotation. Use thread locker on the axle retaining set screws during final installation of the wheel and axle to the main gear struts, be careful to properly align the axle flats.

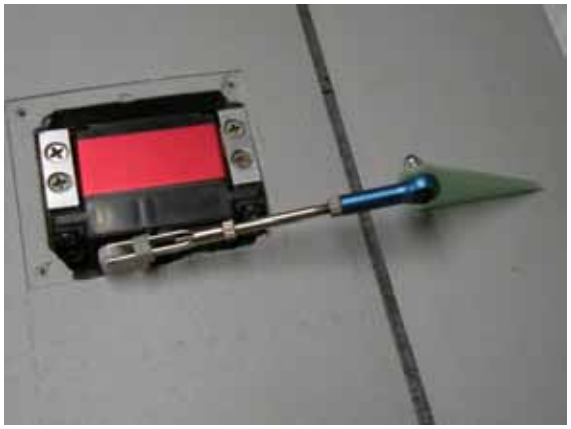
The final installation of all air lines should be done at this time. The four provided air line connectors are for the outer wing panel air lines to the main gear door air cylinders.

All air lines from the wings can be routed through the front spar former lightening hole and routed along the wing leading edge fillet to air valves to be located in the nose section. The two air tanks for the landing gear system are to be located in the holes of the front formers along either side of the nose gear well. The brake air tank can be installed just ahead of the fuel tanks after they are installed. Location of the air valves will determine final air line routing.

CONTROL SURFACE SERVO INSTALLATION

ELEVATOR

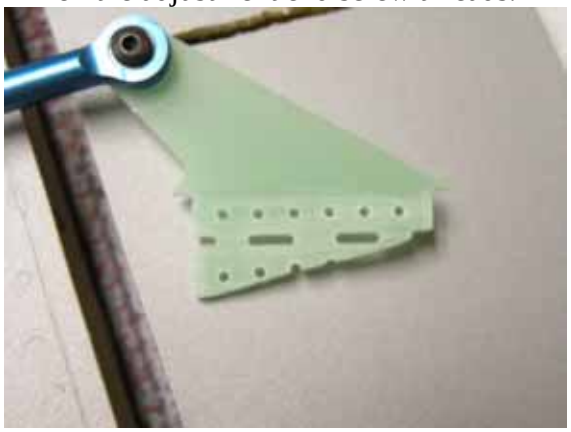
We will use the elevator servo installation as typical of all flight control installations. Start the servo installation with the elevator, prepare the workbench by laying down a towel to protect the painted surface of the horizontal stabilizer. Set the stabilizer upside down on the workbench and remove the servo hatch



This is the a photo of the final installation of the elevator servo, control horn, and control linkage, with the servo hatch removed to show installation details.

Prepare the servo for installation by mounting the servo on the supplied aluminum angle brackets with M3x8mm bolts. (Use of a JR8611 or equivalent servo is recommended for the elevator servo). Center the servo with the radio unit and install the servo arm. The servo is now ready to be mounted in the stabilizer with the servo arm located forward. Pre-drill the mounting screw holes with a 1.6mm diameter drill (or 1/16" diameter drill) and secure servo in place. Route the servo wire out the left tip rib of the stabilizer.

Prepare the control horn for installation by pre-adjusting the linkage by tightening the rod end tight on the strut, center the quick link on the adjustment end screw threads.

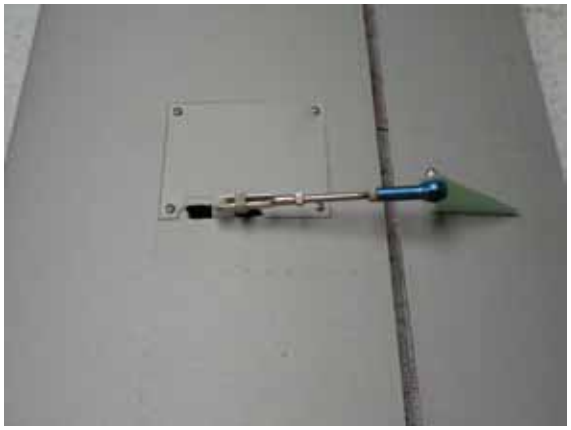


The pivot hole will need to be drilled out for the M3 linkage screw with a 3mm dia. drill bit, a 1/8" dia. drill bit can be used to provide clearance for the M3 screw. Assemble the linkage to the control horn. Rough sand the lower area of the control horn to improve epoxy adhesion.

Now the location of the control horn slot can be marked on the elevator by attaching the quick link to the servo control arm. Make sure the servo is centered prior to marking the location. The slot should be cut just wide enough for the control horn fit, use

care not to cut through and damage the upper surface of the control surface. Fit the control horn in to the slot, trimming the lower edge on the control horn until a flush fit is attained.

Prepare the area to epoxy the control horn in position by protecting the area with packing tape. Leave minimal area between the slot and the tape to allow a small epoxy fillet to be formed between the control horn and the control surface skin. Apply epoxy by filling the slot with epoxy prior to inserting the control horn, the object is to epoxy the control horn to both the top and bottom surface. A thickening agent such as cut fibers will improve the strength of the bond.



Once the epoxy is dry complete the installation by re-attaching the control linkage to the control horn. Trim the hatch to clear the control arm and linkage, then install the hatch in place with the screws that were removed in the initial step.

AILERONS

The aileron servos are installed in a similar manner, use of JR 8411 servos or equivalent are recommended. The servo leads are to routed to the wheel well, along the front spar forward of the wheel to be secured along with the gear door air cylinder air lines.

Note the control horn for the aileron will again need to be trimmed to attain a flush fit.

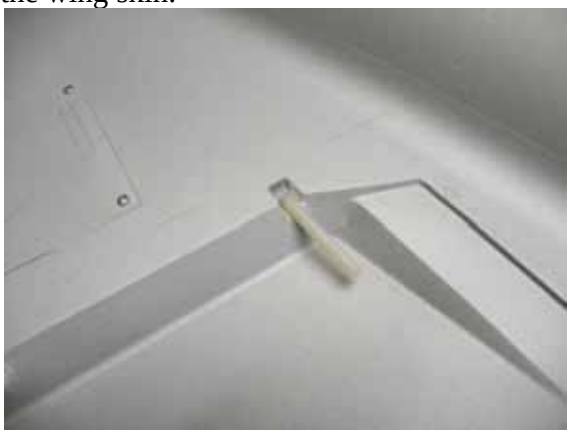
FLAPS

Begin the flap installation by preparing the wing and center section for the servo lead routing. A 20mm diameter hole is to be cut in the wing panel center section 20mm behind the rear wing stub spar, the forward hole for the aileron servo lead is 45mm behind the front wing stub spar.

The mating servo lead routing holes should be cut in to the wing center section rib at this time.

INNER FLAP

The flap servos recommended are JR821 or equivalent, (4) are required. Start the inner flap installation by hinging the flap to the wing. Locate (2) round pivot hinges and position in flap. Test fit the flap to the wing pocket, adjust the depth of the hinge pockets as required to attain a flush fit of the flap to the wing skin.



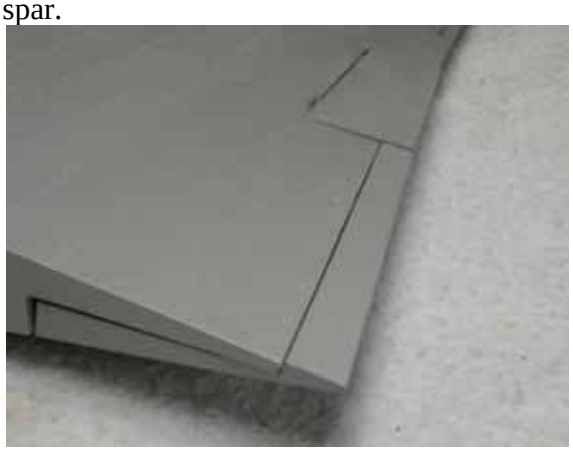
The flap surface fit is very good out of the molds, but the depth of the hinge pocket will be required to be adjusted to attain this flush fit with the hinges installed. Lubricate the hinge pins prior to installation. The hinges can be epoxied in place to the wing and flap at the same time. Carefully position the flap in the pocket as the epoxy cures to assure bind free movement of the flap.

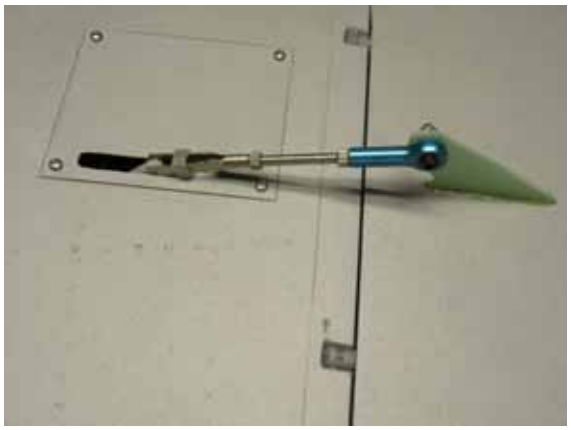
The servo installation is similar to the elevator installation process, again use care to assure the control horn is epoxied in place to both the upper and lower surfaces, trim control horn as required to assure a flush fit.

OUTER FLAP

The outer flap will also require careful trimming of the hinge pockets to assure a flush fit of the flap to the wing skin surface. This surface also has the issue of alignment of the top surface of the wing at the trailing edge. This must be aligned as the flap

hinges are epoxied in to position, this is very critical for the appearance of the model as this fit is visible when the model is viewed on the ground. The servo lead is routed through the hole located behind the rear stub spar.





Final appearance of the installed outer flap servo and control linkage, again care must be used to epoxy the control horn to both the upper and lower surface of the flap.

DIVE BRAKE

The dive brake will require (2) JR821 servos or equivalent for operation. The servo is located close enough to the wing panel center rib so no servo extension is required. Begin installation by locating the air brake butterfly flat hinges and re-fitting the air brake in position on the wing panel with the hinges. It is important to adjust the hinge slots as required to obtain a good flush fit of the air brake to the wing panel skin, pay particular attention to the fit on the top surfaces as this is the most observed area of the aircraft at rest. Once a satisfactory fit is made, lubricate the hinge pins and epoxy the hinges in place to both the wing panel and air brake, use care to maintain accurate alignment as the epoxy cures.

Fit the air brake servo with the aluminum angle mount brackets, center the servo and install the servo arm, then install the servo in place in the wing with the servo leads routed through the hole located behind of the rear stub spar.

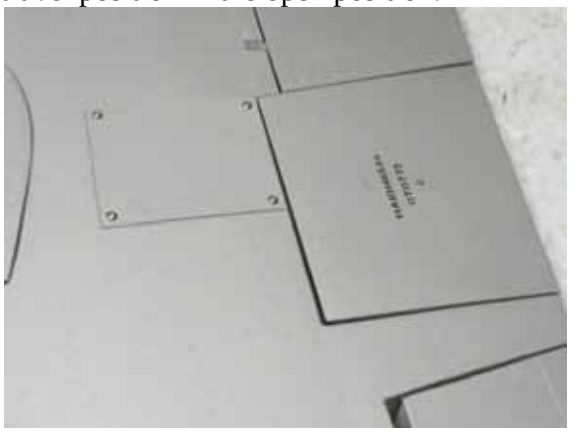
Locate the air brake control horn and drill out for the 3mm dia. linkage bolt. Scuff sand the lower section to improve epoxy adhesion.

A slot is cut on the inside of the air brake slightly off center in the tunnel for the control horn, care must be taken to not damage the out skin of the air brake when

milling this slot. Epoxy the control horn in place, note the linkage hole must remain below the surface to allow insertion of the 3M linkage retaining bolt.

A clearance slot for the control linkage is also cut at this time, it must extend forward and up the wall to provide vertical travel as the servo arm rotates.

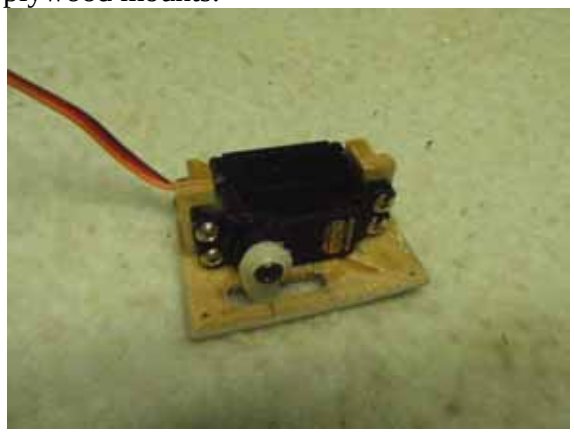
Adjust the air brake for 70 degrees open travel position in the open position.



Install the servo cover hatch, note The air brake control linkage is a hidden linkage.

RUDDER

The rudder installation is similar to the previous control surfaces however the smaller recommended JR3421 servos are required to fit in the limited space of the fin. The servo is installed on the hatch cover with the use of the included servo mounting plywood mounts.

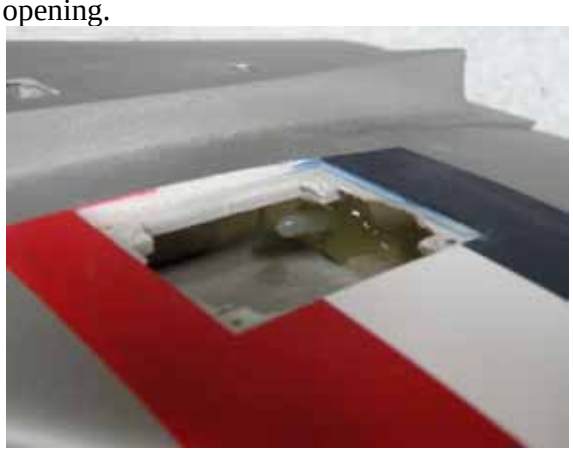


Remove the servo hatch from the fin and locate the rudder servo wood mounts. Locate the servo on the hatch cover and position the servo mounts to the servo, epoxy the wood servo mounts in place. The servo arm slot should be marked for location with the servo trial fitted in place, remove the servo and then cut the slot in the hatch cover. Reinstall the servo, again centering the servo and install the servo arm.

An 80cm (30") servo extension is to be installed in the tailboom prior to servo installation. This is best done by holding the tailboom vertical, rudder end down, and inserting the servo extension from the boom attach end. Keep the servo extension straight, and be patient, it will make it all the way to the fin. The left tailboom will require (2) 30" servo extensions, be pulled in at this time, (1) for rudder, (1) for elevator. Pull the extension up to the hatch opening

and plug in the rudder servo.

Locate and epoxy the (2) round pivot hinges in place in the pre-drilled rudder holes, the pivot pin position must be located in the center of the round leading edge to attain proper rudder movement, this is a center point hinged surface, again lubricate the hinge pins prior to installation.
Once the rudder hinges are in place the rudder can be installed on the fin by carefully aligning the rudder in the fin pocket. The use of thickened epoxy is required to assure proper bonding of the hinge to the rudder post. Additional epoxy can be applied to fillet the lower rudder hinge through the servo access hatch opening.



. Now the servo and hatch cover can be installed in the fin with the original screws. The rudder control horn and linkage is installed in a similar fashion as the elevator linkage was installed.

TURBINE INSTALLATION

The turbine mounts can be spaced according to your selection of turbines. Shallow slots are provided to allow for small diameter turbines in the 89mm to 93mm diameter size, for larger diameter turbines a set of deeper slots are provided. Epoxy the mounts in place after trial fitting your turbine to assure proper spacing.

Install the turbine forward on the motor mounts as the provided tailpipe is sufficiently long to allow, in this case, for the turbine starter motor to protrude in to the inlet ducts. This will keep the weight of the turbine as far forward as possible to aide in center of gravity issues when balancing the model. In this installation a 24mm spacing is provided between the turbine exhaust cone and the tailpipe opening. For larger turbine installations the top section of the rear spar former may be temporarily removed to install the turbine, this section of the rear spar former is to be reinstalled prior to flight operations, it is only intended to aide in dropping in the turbine. It is not necessary to remove this former section for installation of smaller size turbines such as the one shown.

The tailpipe should be inset 5mm from the fuselage opening to improve the flow of cool air surrounding the hot metal of the tailpipe.

Secure the tailpipe with the provided straps to the aft spar former with wood screws, bend the straps as necessary to properly center the tailpipe to the turbine. Note the tailpipe straps are stainless steel, the use of a sharp drill bit will be necessary to drill through this metal strap.

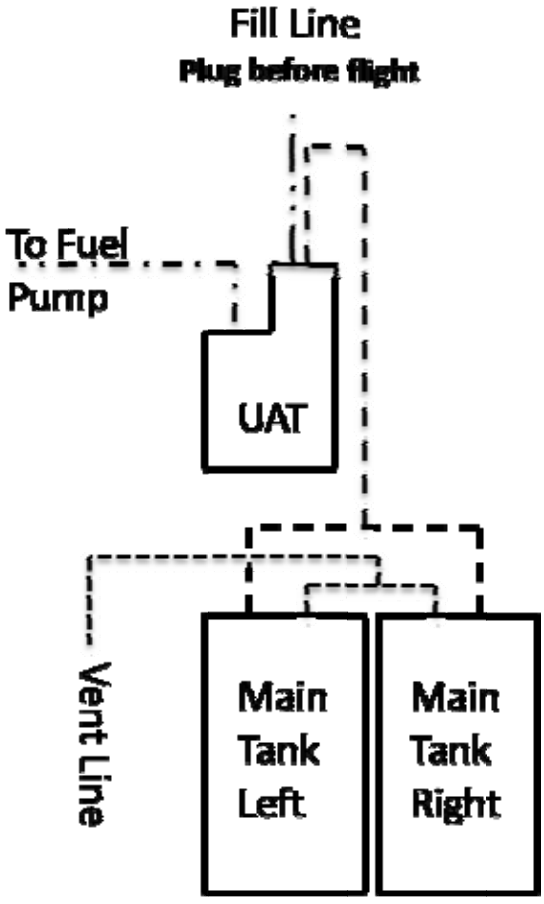
COCKPIT & CANOPY

Install the cockpit pit by positioning forward until the instrument panel is forward ahead of the windshield so the top of the instrument panel is hidden, some trimming of the plastic cockpit pit may be required in the area of the windshield frame to position correctly. The cockpit pit is then secured with a small sheet metal screw along the cockpit rails to maintain the forward position of the cockpit.

The canopy frame is secured to the hatch with small sheet metal screws. Carefully align the canopy in position and secure with small screws from underneath through the hatch and in to the canopy frame rails. The use of small epoxy daps will assure the canopy remains secure. The design of the canopy and hatch are such to allow the builder to make a sliding canopy should he desire.

FUEL TANKS

Begin by assembling two fuel tank stopper setups, each containing a fuel vent tube bent to reach the top of the tanks, and a fuel pickup line. Secure the fuel tubing to the brass tubes with safety wire. The fuel tank stopper opening diameter will have to be adjusted to allow the fuel stoppers to fit. The two main tanks fit under the inlets from the canopy hatch opening, it is a tight fit to slip them in to position. The UAT can be installed vertically above the main tanks with Velcro straps securing it to the front face of the inlet ductwork.



Fuel system setup is to "Y" the main tank pickup lines to the one of the two fittings on the UAT. The vent lines of the two main tanks can be connected with a T fitting and vented to the outside. The 2nd fitting off the

UAT is for the fill line, it is very important that once filled this line sealed with an air tight plug to allow proper draw from the main tanks to the UAT. The turbine pump line is connected to the UAT bag fuel pickup.

RECEIVER & ECU TRAYS

This area behind the cockpit is a great place for the final install of air system servos and valves, a receiver tray installed ahead of the fuel tanks allow a double height of floors to increase mounting of all systems.
The receiver tray can be installed directly behind the nose gear steering servo to provide a seat for the receiver, ECU battery, and the servos and air valves. This plate must be removed for installation and removal of the main fuel tanks. The retract, gear door, and brake servo/valve sets are mounted under this board.

The ECU tray is to be installed behind the inlet under the main hatch. this tray allows for installation of turbine systems, i.e. fuel and gas valves, ECU. This aft tray is a good choice for mounting the air fill valves for the brakes and retracts as it allows topping off the air with removal of the rear top hatch only.

A single solenoid brake valve will fit alongside the cockpit pit and the fuselage if mounted tight to the fuselage side.

The landing gear retract servo and valve and a double solenoid valve for gear doors was mounted behind the nose gear steering servo. Note the mounts must be installed to allow removal to maintain clearance for removal of the main fuel tanks.

The area behind the cockpit provides for convenient installation of the receiver and ECU battery on the receiver tray board. The receiver battery on the prototype is an A123 2cell 2300 mah battery secured with Velcro between the gun ports and the air tanks.

FINAL ASSEMBLY

Begin final assembly by securing the horizontal stabilizer to the tail booms with the supplied screws, be sure to plug in the elevator servo leads to the servo extension. The tail boom assembly is then slid in to position on the fuselage section, again plug in the servo extension leads for the two rudder servos and the elevator servo. Four set screws located underneath will secure the tail booms in place using a 2mm hex allen wrench, use care not to back out set screws too far or they will come out of the mounts and will be difficult to get back in place.

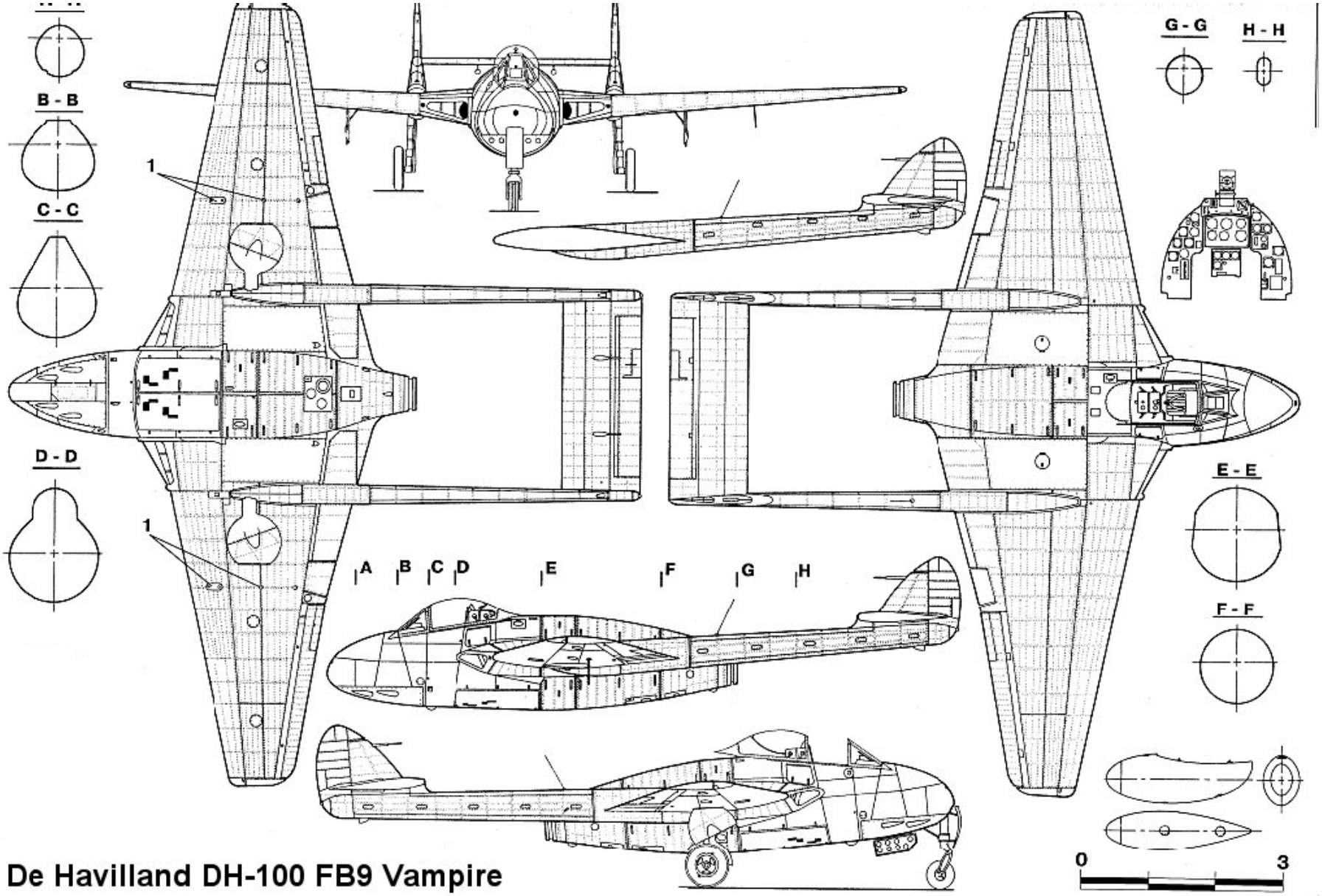
The outer wing panels can now be installed connecting the aileron servo lead, outer flap servo lead, air brake servo lead, and the two main gear door air cylinder hoses. The spars are slid in to the slots and are also secured with (4) set screws per side with a 2mm hex allen wrench, again use care not to back these set screws too far out as reinstallation is difficult.

FLIGHT SETUP

The basic aircraft is now together, final setup and balance work can begin. Set the Center of Gravity between 12 mm to 20 mm behind the back edge of the forward spar. The UAT should be full of fuel and the landing gear extended when checking the CG. The use of nose weight will be required to attain proper center of gravity, approximately 1.5 kg.'s was required on the prototype. For scale flying the forward CG is recommended.
The following recommended control throws have been found to provide scale type flight handling.

Ailerons	+/- 10m at tip	15% expo
Elevator -		
low rate	+/- 10mm at tip	10% expo
High rate	+/- 12mm at tip	15% expo
Rudder	+/-25 mm at tip	10% expo
Flap	45 degrees	
Air Brake	70 degrees	

The use of flaps on takeoff are not required or recommended as the Vampire has ample wing area for smooth takeoffs. Landings with 40% flaps are very nice with this aircraft, the use of 100% flaps will result in a steep approach angle and it is suggested the pilot carry power all the way through touchdown when full flaps are used. No elevator trim mixing has been found necessary when the flaps are extended, they will slow the model and maintain trim, albeit at a reduced speed.
A mix of Aileron to Rudder is suggested to counteract adverse yaw tendency with aileron application. The rudder should be set to 2 mm deflection in the direction of aileron application at full aileron deflection. The Vampire does exhibit roll coupling with rudder application in knife edge flight, it has been found a 10% opposite aileron mix with application of rudder is required.



De Havilland DH-100 FB9 Vampire