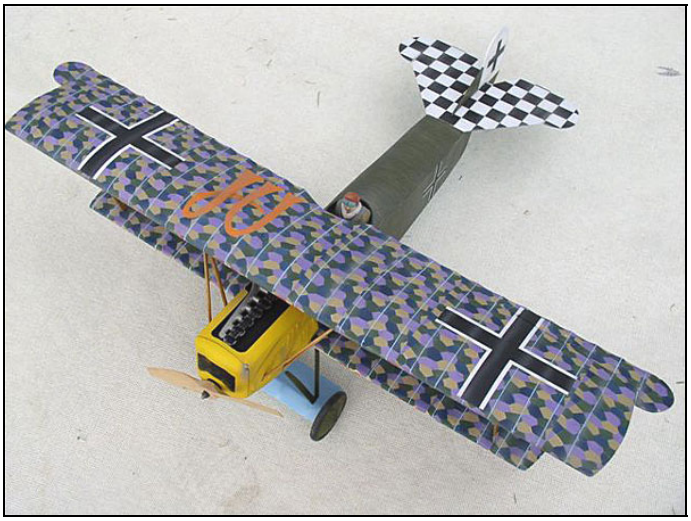
FOKKER DVII

R/C Scale Model Instructions



Fokker DVII by Bert Ayers

CONTACT INFORMATION

The Fokker DVII was designed by M.K. Bengtson

Manufactured and Distributed by:
Bengtson Company
e-mail: sales@aerodromerc.com
Web Site: www.aerodromerc.com

Fokker DVII

Thank you for purchasing the Fokker DVII model for electric flight. A semi scale adaptation of the Fokker DVII, this model is designed to be easy to build and exciting to fly.

POWER SET UP

The Speed 400 motor powers the model and the Mini-Olympus 2.33: 1 gearbox and a 10x6 APC prop. Battery power pack can be 8x 600maH Nicads or an equivalent weight Nimh

SPECIFICATIONS

More than 200 laser cut parts

Scale:	~1/9
Channels:	R/E/A/T or R/E/T
Wingspan:	36"
Wing Area:	318 sq in
Weight:	25 oz ready to fly
Power System:	Speed 400, Mini-Olympus 2.33:1 gearbox
Prop:	10x6
Wheels:	Balsa & plywood, Neoprene foam tires
Airfoil Type:	Flat bottomed, nearly scale shape
Cowl:	Built up balsa
Spinner:	**N/A/**
Decals:	Available on website

BEFORE STARTING

A note about the photos: The photos were taken of a prototype and the parts supplied may look slightly different from them. However, the concepts illustrated are the same. Rodd Perrin built the prototype.

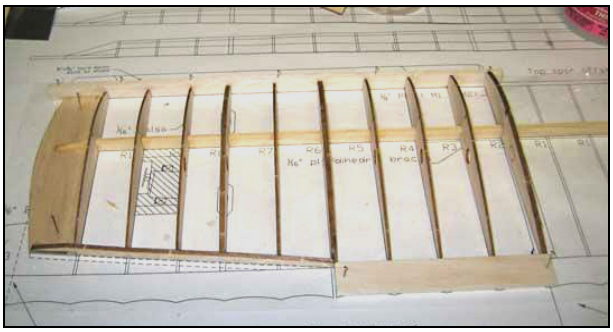
WINGS

The DVII had an unusual wing profile looking from the nose of the aircraft. The wing ribs tapered in height towards the tip and had the top of the wing level (the bottom of the wing curved up to give an apparent dihedral). The model's top wing has the correct taper in the height of the ribs with the top of the wing being straight and the bottom tapering up at the tips.
Similar to the bottom wing, the top wing is made from two panels with a center section.

The trailing edges can be sanded down versions of the templates supplied in the kit. Alternately, use ¾″ trailing edge stock and use the templates as a guide to sand the scallops in the back edge. A piece of sandpaper wrapped around a suitable cylinder or bottle makes the perfect sanding tool. This method saves a lot on sanding time.

Top Wing

The top wing can be virtually built up before any glue need to be applied.



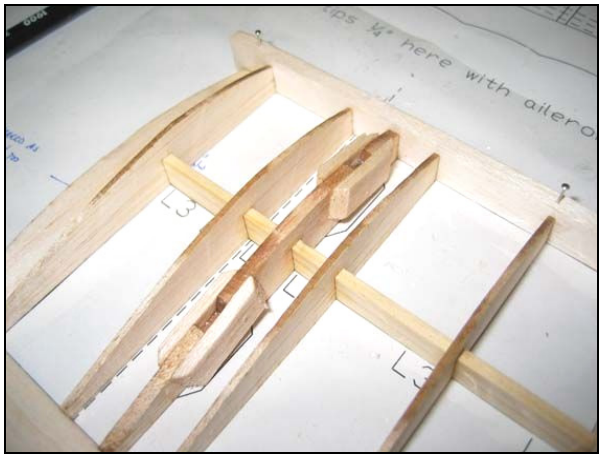
The Left Top Wing

The plans show the parts for both the R/E and R/E/A version of the top wing (more dihedral in the rudder / elevator version and different ribs for where the ailerons are situated).

The ailerons for the DVII are only on the top wing and are relatively simple to make.

A pre-cut wing tip, leading edge spar and ribs make the job easy.

The Left Aileron

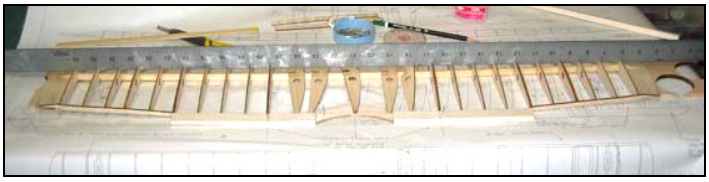


Wing IP Strut Attachment Point Detail

The wing IP struts are recessed into slots in the upper portion of 1/8″ ribs. Some scrap 1/8″ balsa sanded to match the rib profile reinforces these slots.

With the right and left wing panels finished, it is time to join the two via the center section.

Before joining the panels, a quick check with the steel ruler to make sure everything is aligned. Sighting down the line of the top spar (1/16 x 1/8 bass) with the steel ruler inserted in the hole for the top spar

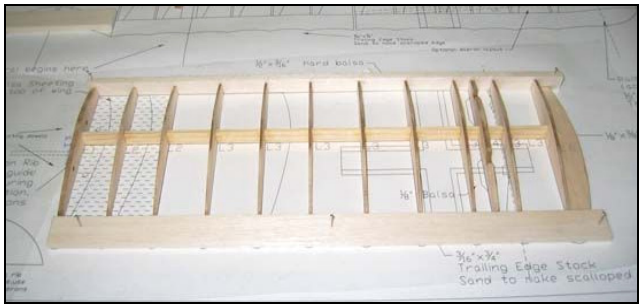


Check Top Spar

Sighting Down the Line of the Top Spar.

The aileron joins the wing at an angle to the trailing edge. This means that the aileron servo, which needs to be at right angles to the direction of aileron movement, also needs to be at an angle to avoid binding, etc.

Lower Wings

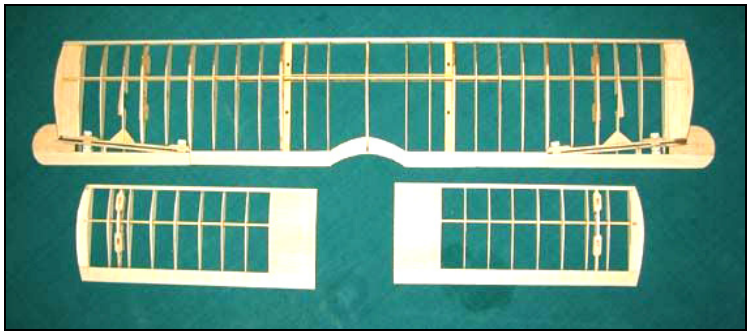


The Lower Wing

Lower Wing Sheeting

The inner two rib bays are top sheeted with 1/16″ balsa.

The final sanding will remove the spar extends beyond the end of the rib (so does the sheeting for that matter!).

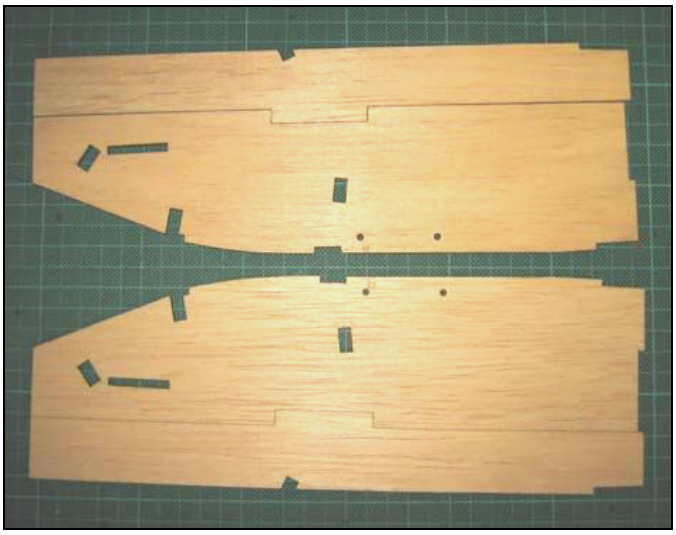


Wings Completed

Fuselage

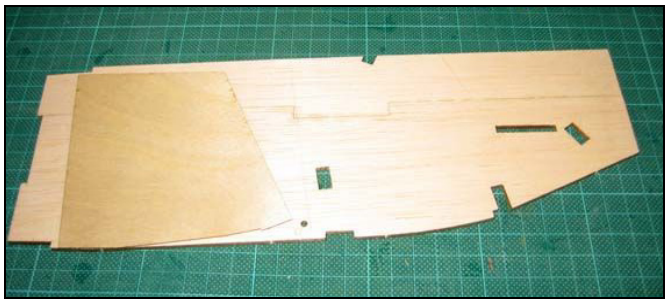
The fuselage is a 1/8th balsa forward section with a built up tail area. This produces a fuselage that is both light and strong and is easy to make straight.

The 1/8th section is made from two pieces of balsa. They are keyed to ensure that the fuselage sides are assembled correctly. This is especially important as the cabane strut cut outs are already in the fuselage side.



Forward Fuselage Pre-glue

Make sure you allow them to dry thoroughly before moving them from the building board. A light sanding done at this stage will get rid of any joint line. A1/32″ ply doubler is next placed over the middle section of the fuselage.



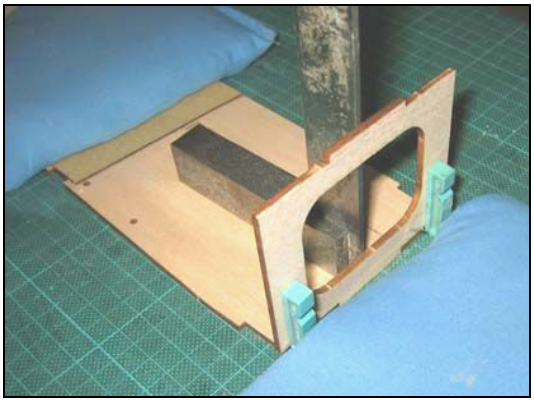
1/32″ Ply Doubler

The plans show where this should go, but it can be put in the wrong spot if care is not taken.

At this stage a left and right side are made, so mark each side appropriately before committing any glue to the model.

Use light pencil lines to mark where the doubler needed to go to make sure that glue is not spread everywhere. After waiting for the glue to tack, weight both sides down with lead shot bags (and some plastic wrap to make sure they don't stick together) for the glue to dry.

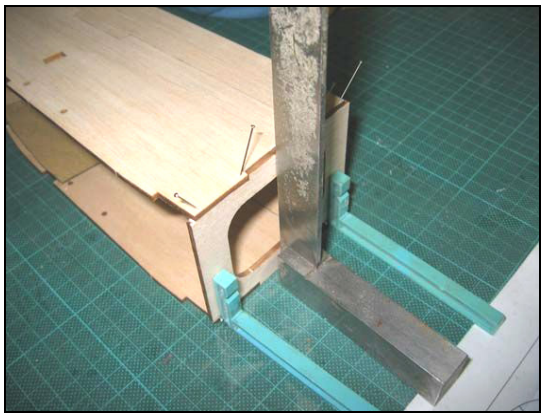
Once the fuselage sides are dry, the formers can be attached to one side.



Rear Former is Being Glued to One Side

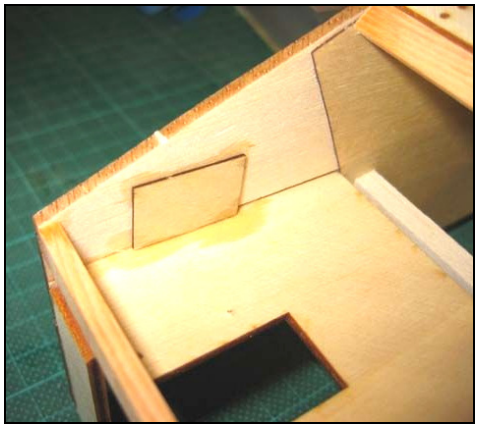
Similarly, the front former is glued to the right side.

Note Rodd's extensive use of weights and squares to make sure everything is aligned nicely

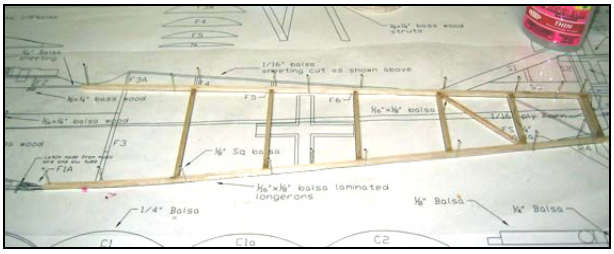


Once the glue is nice and dry, the two sides are brought together.

Add the 1/32″ ply cabane strut mounting reinforcements inside the fuselage.



1/32″ Plywood Cabane Strut Mounting Reinforcements

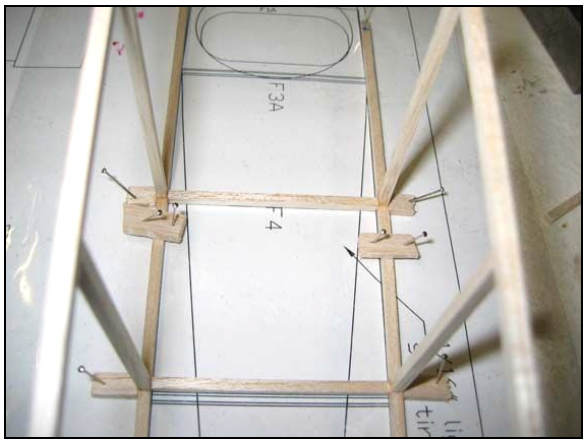


Rear Fuselage Construction Detail

The rear fuselage is made from 1/8th square balsa sticks.

The DVII should have the longerons made from hard balsa (but not bullet proof balsa!).

The first side is built over the plan, with the second side being built over the top of it to give two identical sides. Bits of covering backing prevent the sides sticking.

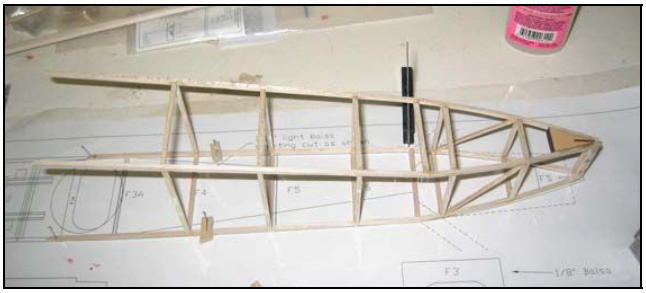


Scrap Balsa to Hold the 1/8th Square Flat to the Building Board

Rodd used some scrap balsa to hold the 1/8th square flat to the building board so he did not have to pin through the longerons and weaken them.

With each side aligned to the plan, the cross members can start to be glued into place.

When cutting the cross members, cut two at a time so they will be identical. This way they are both right.



Rear Fuselage

The block of balsa at the tail is for the landing skid.

Add a small bit if 1/8th square balsa, suitably tapered to fit between the two end posts of the fuselage, to make the rear joint nice and firm.

As there is a major change in taper in the rear fuselage just under the tailplane, small cuts were made into the inside of the longerons where the change in taper is located. Bits of 1/8th square balsa supports the joint.

Motor Mount

Insert the motor mount before the front of the model becomes too stiff to allow it to be popped into place. The motor mount is pre-cut for a S400 Mini-Olympus with some side thrust also built in. Make sure it goes in to give right thrust. The part has marked which way goes up.

The motor mount has two wings on each side, which fit into corresponding slots in the fuselage.

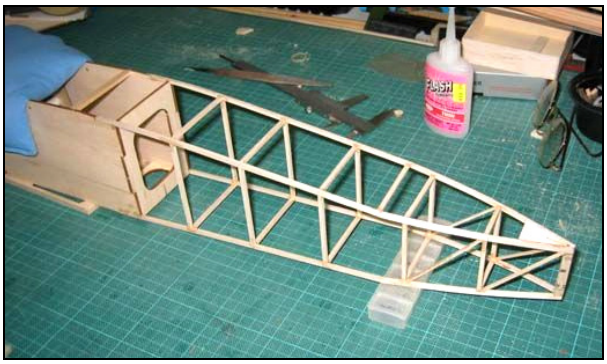
The cowl support cross member is glued into place after the motor mount is installed.

With the front fuselage essentially complete and the rear fuselage complete, it is now time to bring the two together.

At this stage, do not add any of the upper formers to the front fuselage to make it easier to set things up flat.

The front fuselage is weighted down to the building board and the rear fuselage aligned into the slots.

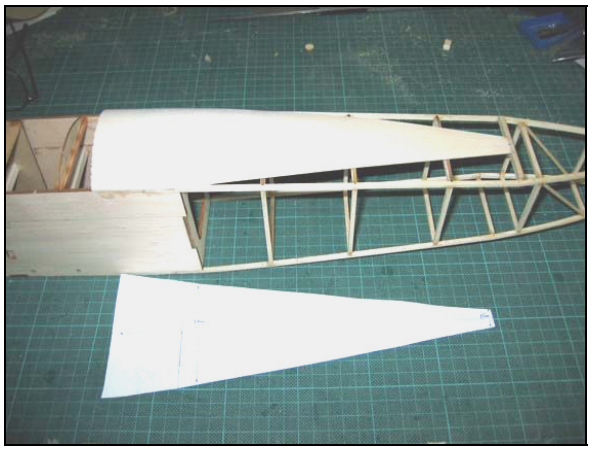
Unlike some British aircraft, the DVII does not have a straight top longeron. Bits from around the workshop are used to prop up the rear fuselage to get the right changes in slope. Check that the structure is square.



Rear Fuselage Detail

TIP: Put little marks along the centerline of formers, etc which will significantly help the joining process.

The secret to a straight fuselage is to hold one end firmly while allowing the other end to 'float' a little. This ensures that the parts do fit into place without having to be forced to fit.
The top fuselage formers were glued into place and also down the rear fuselage to support the turtle deck.
Rodd used paper to make up a template to avoid wasting balsa.
The template was made slightly over long, with one end 15mm wide and the other expanding to 86mm where the rear fuselage former was located. Any overhang was sanded off when the turtledeck was glued to the fuselage.



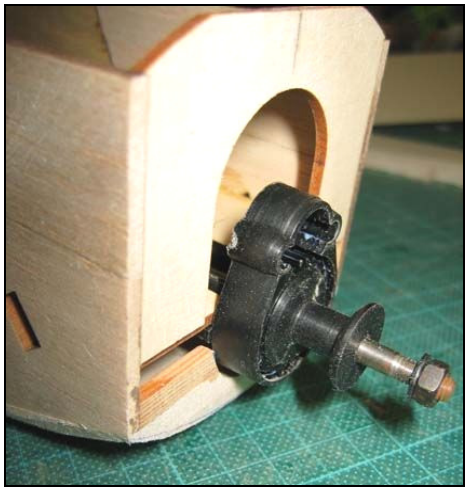
Fuselage Template

The cowl needs to be constructed next.

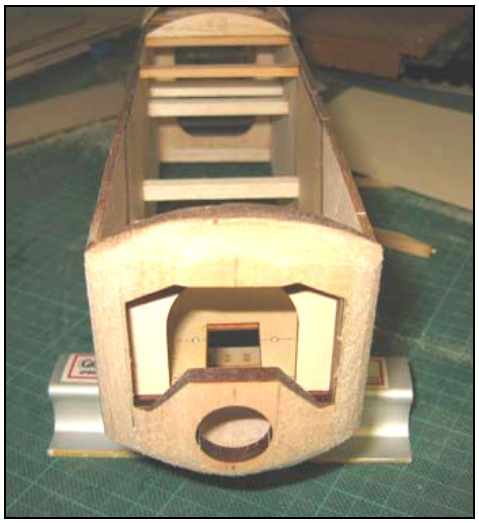
The cowl is made from three pieces of balsa – two 1/4″ and one 1/8″ The thin one goes in the middle.

The gearbox must sit down on the motor mounting plate, so relieve the front brace a little and gouge out a small grove in the nose hatch.

Gearbox Detail



Gearbox in place

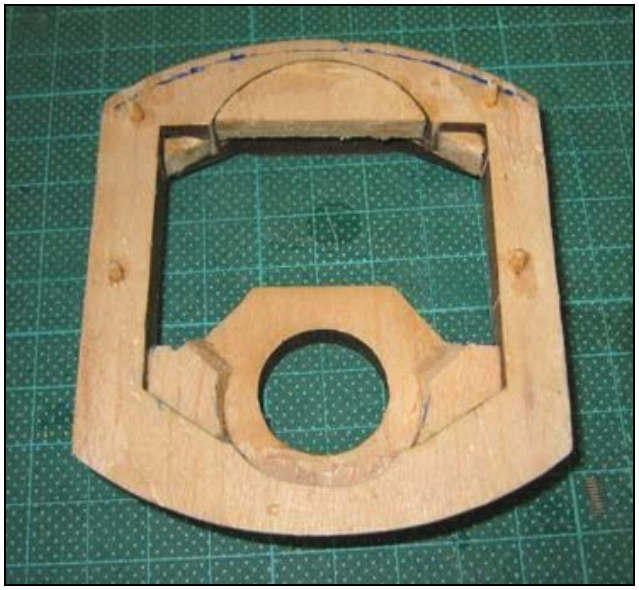


Cowl

The radiator was then tack glued into place on the nose and roughly sanded to shape to match the DVII drawings. Looking from the top, the radiator should have a shape approximately like a flat bottom 'v'.

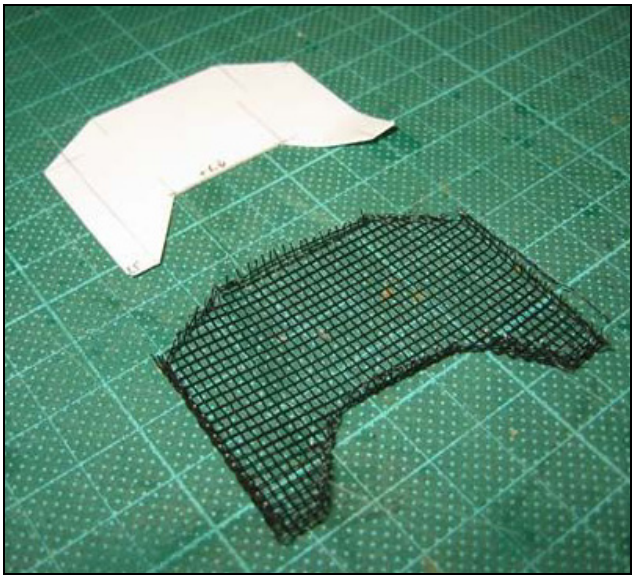
Rough-Sanded Nose from the Side

To provide a little support, Rodd glued some scrap balsa into the thinned areas for additional support.



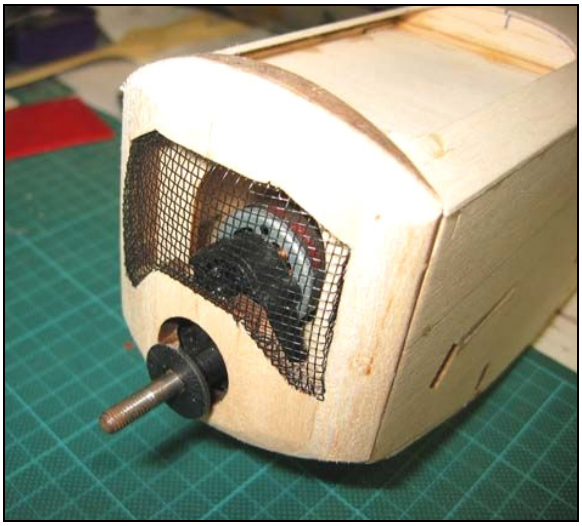
Back of Cowl,
Note: C1 was incorrectly placed upside down.

Rodd made his cowl removable, although this is not absolutely necessary, it does make servicing the motor easier. Paired Neo magnets make excellent attachment holds for this application.



Radiator Mesh Template Detail

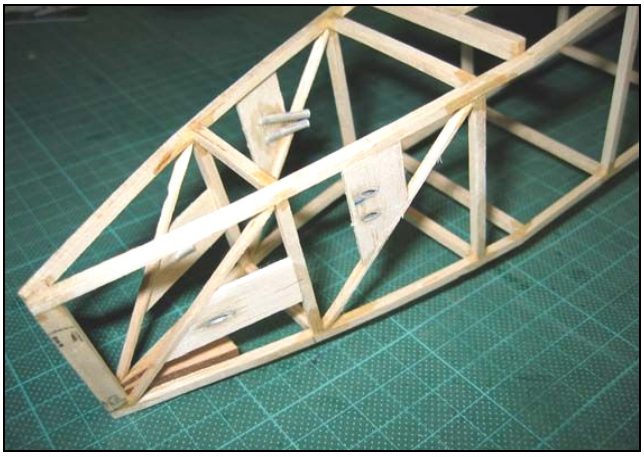
For the mesh covering the front of the radiator, this is shown on the plans as some wire-door screen.
To help with the fitting process, Rodd cut a template for the hole in the front from some scrap cardboard



Radiator Mesh Detail

A bit of mesh was cut roughly 3 – 5mm oversize and then bent around the former to give a rough shape.

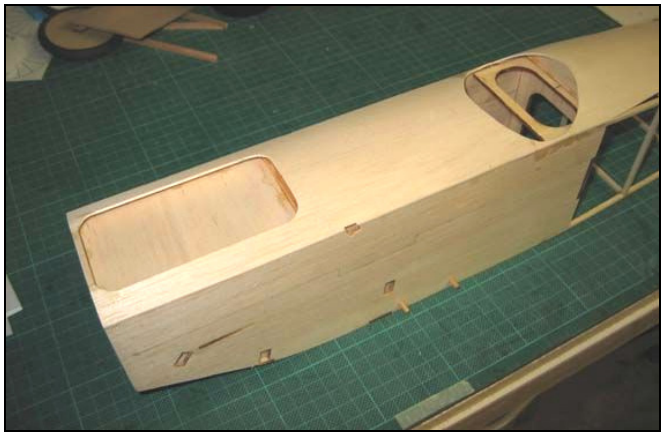
Rodd used pull-pull controls for the tail feathers, so he added some supports for the wires where they exit the fuselage. He supported the wires using some light balsa at the exit points with the wires routed through small aluminum tubes to stop them eating through the fuselage every time they moved.



Tubes Mounted and Sanded / Filed Flush with the Surface

The pair of tubes is for the elevator while the single tube is for the rudder. Make sure to rough up the surface of the tubes before you CA them in otherwise they will pull out.

The tubes have been bent roughly into position, with the final angles of the tubes having to wait until the servos and wires in are in place.

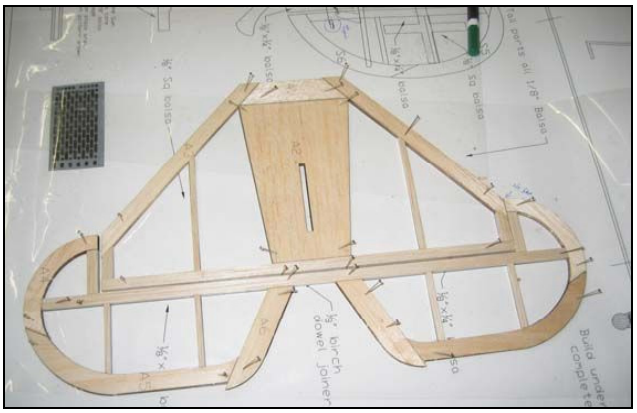


Front of Fuselage

The engine sits on another bit of 1/16″ sheet that is slightly lowered (to roughly the top of the fuselage sides). Of course, this must be fitted before you add the top sheeting.

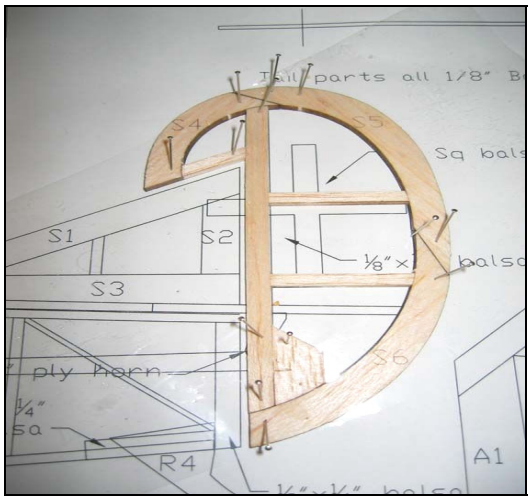
Tail Surfaces

These structures are built from supplied laser cut parts and a bit of builder supplied strip stock.

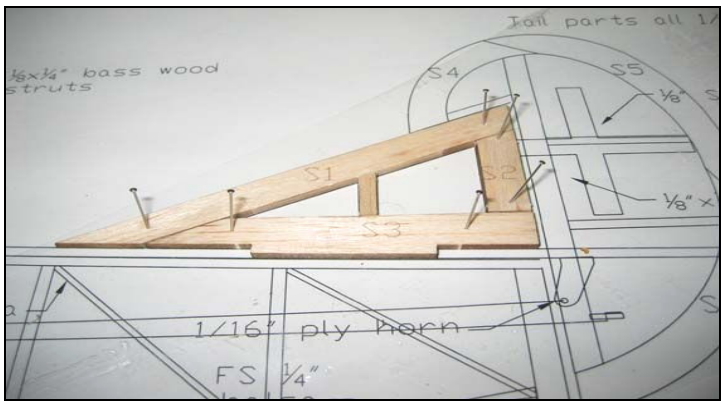


Horizontal Stabilizer and Elevator

Use slightly harder balsa for the trailing edge of the horizontal stabilizer as this would act as a bit of a spar.



Rudder



Vertical Stabilizer

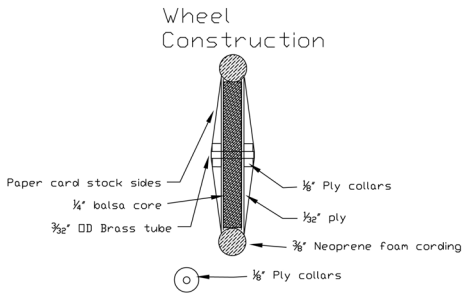
The rudder is mostly from the laser cut sheet, again with strip wood supplied by the builder.

WHEELS

Gluing the ply sides on the 3/8″ balsa core makes the basis for the wheels. Use the brass hub for alignment. Epoxy the hubs in place and add a sufficient amount of epoxy around the base of the hub to reinforce the connection of the hub to the ply. Plywood reinforcing hubs are provided that are to slip over the brass tubing as shown. Next, CA glue the neoprene cording together to from a "tire". Use thin CA sparingly as the CA bonds very aggressively to the rubber. Press the CA wetted ends together for an instant bond. The best way to align the ends is to glue them while they are in place on the wheel. Then attach the tires to the wheels and CA in place. A thin bead of CA around the rim makes for a secure tire.

Paper cones are cut out. Use a ball point pen to score each line on the back to make an impression of "spokes" It is helpful to do this operation on a paper tablet so that the pen makes a good crease. Fold the paper along the crease lines to exaggerate the raised lines. One of the sections forming a wedge is cut out. Make cuts to the center of the circle along a pair of the spokes. Close the paper cutout to form a cone and tape the joint inside the cone.

The inside cones may now be attached to the wheels. The outside cones may be attached at this point if wheel collars are to be used. Alternatively, after installing the wheels on the landing gear, a washer may be soldered to hold the wheel in place and then the cone is attached. This method makes a very nice scale appearance.



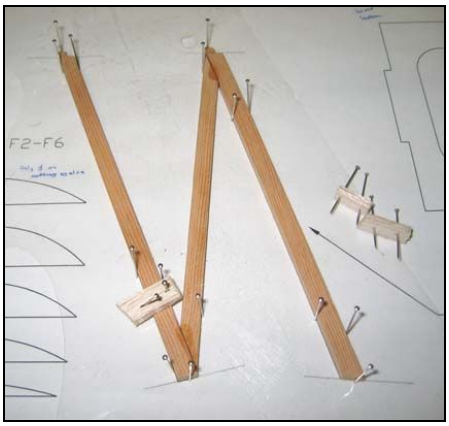
Completed Wheel

The wing struts are made from ¼ x 1/8 spruce / bass / etc.

Cut out the three sections accurately to the plans and then glued them together over the plans.

Make sure that both struts are the same.

After everything is aligned, these need to be sanded into roughly an airfoil shape.



IP Strut Construction Detail

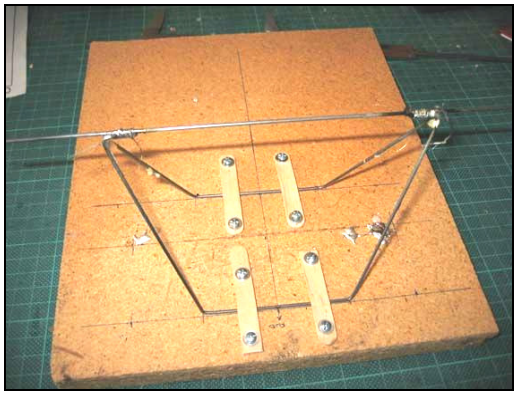
The cabanes are added during assembly. The bottom wings are attached first, without the landing gear. The top wings are then attached using the IP struts. This usually puts the top wing pretty close to the correct alignment. An alignment jig made from foam board holds the top wing in alignment. The jig is a ~ rectangular piece to fit between the top of the fuse and bottom of the wing. It is taken directly from the side view. The deviation from rectangular is due to the top wing's incidence. Then length of the cabanes is then adjusted to fit the model. Each part is sanded and matched in length to the opposite part. Epoxy the parts in place.

The undercarriage is made from three bits of 1/16″ wire to the shapes shown on the plan.

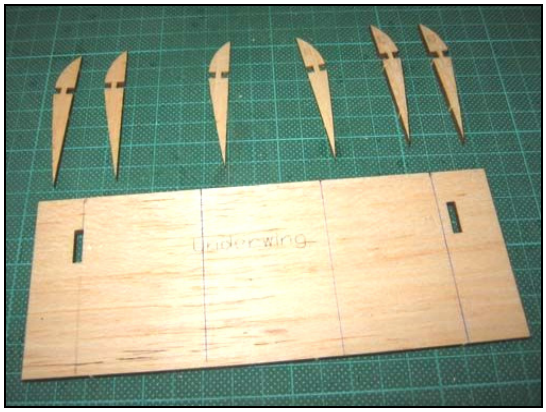
With a bit of planning and some careful measuring, it is not too hard to get some symmetrically bent bits of wire ready to be soldered together.

To help with the soldering, Rodd made an undercarriage-soldering jig.

By measuring from the plans the spacing and alignment of the various bits, the undercarriage is clamped to the jig and the joints cleaned with the wire bush on the Dremel. With the joints nice and shiny, a bit of wire binds the joints. Solder using plenty of heat. Alternate method: lash the parts together with Kevlar thread and CA glue. Finish the job with epoxy.



Undercarriage Construction Jig



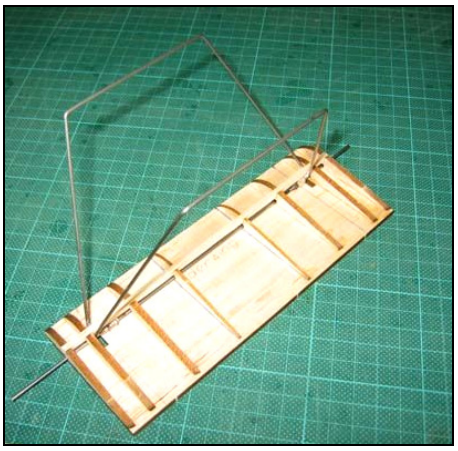
Undercarriage Wing Parts

A very prominent feature of the DVII was the undercarriage wing.

The plan designed the wing to be built over the wire undercarriage, so there are slots in the bottom of the ribs to allow the axle to pass through. The top slots are for a

1/8″ square spar. The bottom of the wing is 1/8″ balsa.

Here are the basic undercarriage wing parts. Alignment lines for the ribs have been marked on the bottom plate.



Completed Undercarriage Ready for Sanding and Covering

INSTALLING THE RADIO CONTROL GEAR

Aileron Servos

Aileron servos are mounted in wing and attached with short threaded rods to the ailerons. Note: Use a "Y" wiring harness connector to wire the servos to a single radio connection.

Battery Tray

After all the above has been placed, mount the battery tray made from 1/8″ balsa and use the battery position to balance the model as shown on the plan.

ASSEMBLY

With the model flat on the bench, use the locating dowels to assist with aligning the bottom wing panels to the fuselage and epoxy in place. The cabane and interplane struts are added next followed by the top wing. The alignment of the top wing is to be checked but mainly pre-determined by these structures.

Fitting the Tail Surfaces

Glue on the tail surfaces next making sure that they are straight and true. There is a slot in the horizontal stabilizer for the tab on the vertical stabilizer. If pushrod style controls are used, cut and bend the rods first with the control horns dry fitted in place. Then when the servos are centered, glue the horns in place.

Model in the Bones

COVERING

Almost any lightweight-covering medium will be fine, but avoid anything that is likely to warp the structure. Although paint should be kept to a minimum in order to save weight, normal hobby enamels will take well to Litespan.

If you intend to add extra detail to your model, be very careful not to overdo things. A little detail can very quickly add a lot of weight.

Downloadable decal outlines are on-line at http://www.aerodromerc.com/decals.htm

The model should ROG on pavement or hard surfaces. On grass, the model may require hand launching. Be careful that your hand or fingers do not catch on the lower rigging. Launch firmly and level. While the tail surfaces are small, they should not need excessive throws. Let the model gain altitude slowly off the runway. Applying too much up elevator at slow speeds asks for a stall. Make your turns gently as tight turns risk tip stalling in any model. Don't expect the elevator to make the model climb. Think of the elevator as a device to change the attitude of the model. The wing and airspeed ultimately make the model climb. Often down elevator applied at stalling can avoid a major crash. The most important details for proper flight operations are:

1. CG location. Tail-heavy models never fly well or at all.
2. Down and right thrust
3. Straight and non-warped wings.

CONTACT INFORMATION

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