Fokker Dr.I 35″

R/C Scale Model Instructions

CONTACT INFORMATION
Designed by M.K. Bengtson

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

Fokker Dr.I

Thank you for purchasing the Fokker Dr.I model for electric flight.

THE MODEL

Finished Model by Jason Haslam

A semi scale adaptation of the Fokker Dr.I, this model is designed to be easy to build and exciting to fly. The most significant change from scale was that the airfoils were made flat bottomed.

POWER SET UP

The AXI 2217/20 brushless outrunner and 11x6 or 12x6 prop powers the model.

SPECIFICATIONS

More than 230 laser cut parts

Scale:	1/8
Channels:	R/E/A/T
Wingspan:	35"
Wing Area:	415 sq in
Weight:	33 oz
Power System:	AXI 2217/20 brushless outrunner
Prop:	12x6
Wheels:	Balsa & plywood, Neoprene foam tires
Airfoil Type:	Flat-bottomed
Cowl:	Built up balsa and plywood
Spinner:	N/A
Covering:	Litespan, Polyspan
Decals:	Available on website

BUILDING THE MODEL

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.

John Boeck built the Fokker Dr.I prototype.

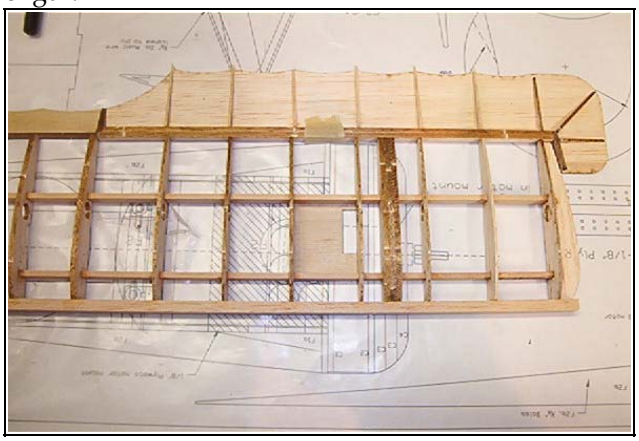
COWLING

Begin construction of the cowl by gluing C1 and C2 to a strip of 1/32″ ply with the grain of the plywood running the short way. After the assembly is secure, trim off the bottom ends of C2 as indicated on the plan. Glue two C3's together with C4 and glue this assembly to the C1/C2 assembly and sand to shape.

WINGS

Wing Construction

Pin down, over the plan, the pre-cut trailing edge plywood, spars and wing tip, gluing as required. Add the leading edge stock. Sand the leading edge stock to be rounded and meet the ribs. The middle wing spars are to be left extending as shown on the plans. The spars serve in the alignment of the middle wings to the fuselage. The bottom wing halves are built with spars connecting them over the plan. Keep them bottom wing in one piece for strength.



Top Wing Construction Detail

The Ailerons are driven by in wing servos. The ailerons are formed from a laser cut sheet of balsa and reinforced with small riblets. IP mounts are built from two balsa side ribs and two inner half ribs, making a slot for the ply IP struts provided.

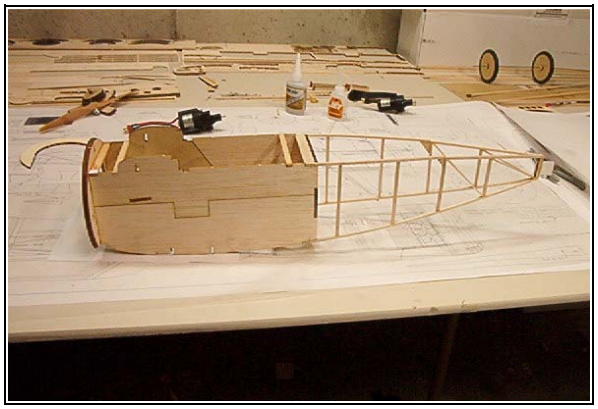
Scalloping is pre-set by the top and bottom ply trailing edge parts supplied.

The Leading Edge of the Aileron

The leading edge of the aileron is rounded over with sandpaper to make the aileron movable with a minimum gap. The trailing edge of the wing in that section is left flat.

FUSELAGE CONSTRUCTION

The fuselage is built as two separate box structures, the front balsa sheet and ply area and the rear built up section, which are then joined over the plan. This system not only keeps each stage simple, but it also helps to ensure a straight fuselage.



Fuselage Construction Detail

Building of the rear of the Fuselage

Begin by building two rear fuselage frames over the plan and allow to dry. Select hard balsa or basswood for the longerons. Join the two frames over the plan with cross braces and the tailskid mount. Check, check and check again that this and ALL other structures remain perfectly straight and square.

Building of the front of the Fuselage

The front half of the fuselage is a box structure made from 1/8″ balsa and plywood. Assemble the balsa sides from the two laser cut pieces. Add the 1/32″ plywood doubler to the inside surfaces. Using the plan as a guide, build the fuselage over the top view adding the sides to the F1 and F3 formers. When secure, remove from plan and add the basswood crosspieces and Former F3a. Add the undercarriage mounts F1C and F1D.

The top deck formers are added and the turtle decking is glued in place.

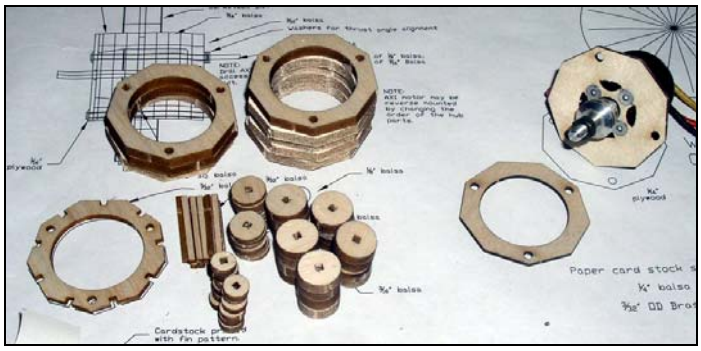
1/16th Balsa sheeting covers the front/top of the fuselage between formers F1 andF2. The area aft of this is dealt with later in this manual.

MOTOR MOUNT/DUMMY ENGINE

Items needed to finish the motor mount:

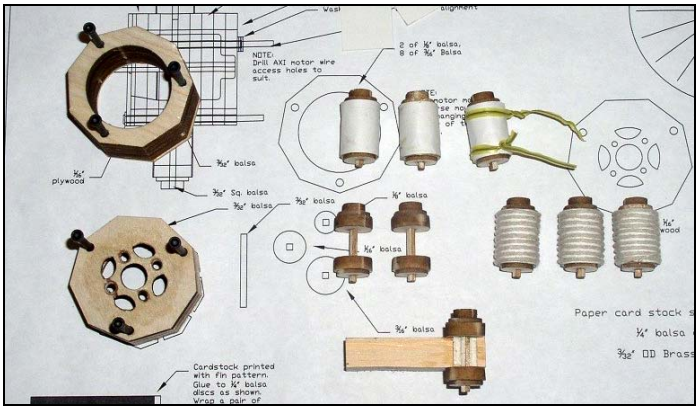
3 – 2-56 x 2″ machine screws
Heavy Card Stock paper
String
1/32″ music wire, for push rods
The motor that will power this model

Find the two 1/16″ plywood motor mounts plates. Compare the mounting pattern on the plate to your motor. Adjust the holes if necessary. Laminate the two plates together. Find the 8 3/16″ balsa motor core pieces. Laminate them together – one section of 5 pieces and another section with 3 pieces. Check the plans for correct order of pieces. Use the 2-56 screws to line up the pieces properly. Laminate the 1/16″ ply pieces to the 3-unit section, with the 1/8″ notched piece between the 5-piece section. Mount your motor inside the core unit. A hole for the three motor wires to exit will need to be fashioned. Find the three different sized circular pieces for the engine cylinders as well as the 3/32″ square balsa center sticks. This builder made a small fixture to glue the pieces square and proper distance apart.

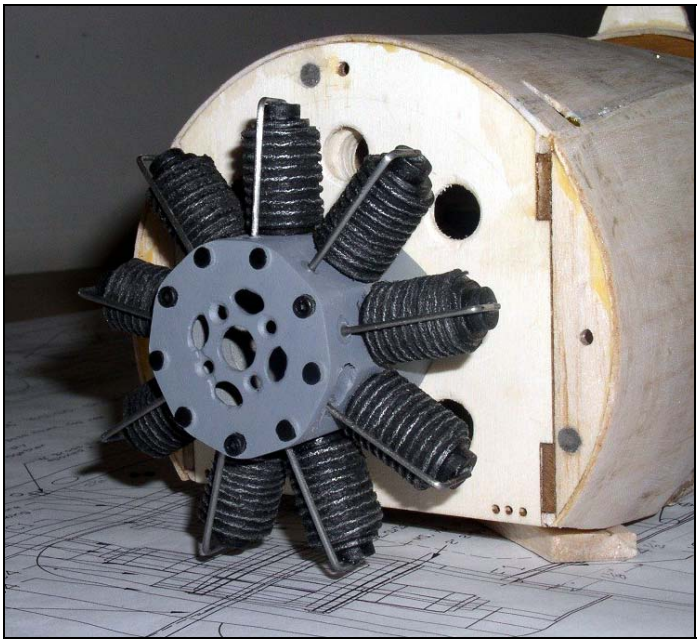


Assemble the 9 cylinder cores. Cut 9 pieces of heavy paper from the pattern in the lower left corner of the plans. Cut the paper so the grain allows the paper to be rolled. This builder pre-rolled the paper around a Sharpie pen. Glue the rolled paper around the cylinder cores. Cut 2 pieces of string about 18″ long, glue one end of the string to the top or bottom of the paper cylinders. Wind both pieces of string around the cylinder. Glue the other

end of the glued string and unwind the unglued string. You have evenly spaced cylinder fins. Paint with dope or polycrylic to fix the string. Repeat for 8 more cylinders. Glue the cylinders onto the motor core using the 1/8″ notched piece for proper spacing.



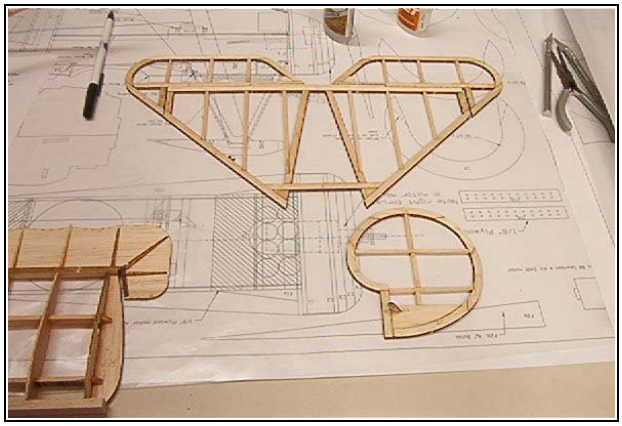
Paint the motor unit and add whatever detail you wish. Add some wire push rods to finish off the unit. Add washers to the top and left screws to get the proper down and right thrust for the motor. There is lots of room behind the cylinders to mount the ESC and nose weights.



TAIL SURFACES

Lay out and glue parts of the tail surfaces on the plans.

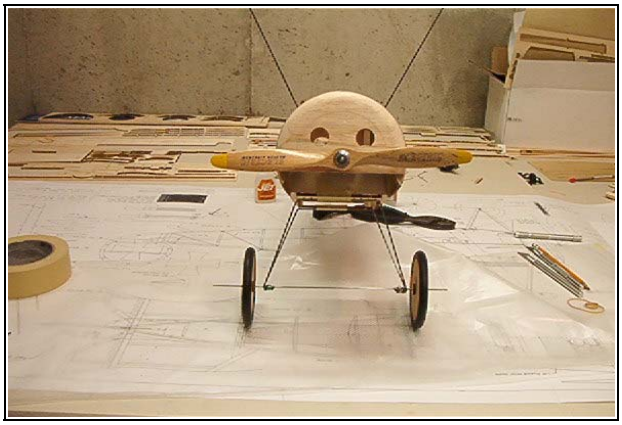
Tail Surfaces w optional horizontal stab center balsa omitted



Don't add the horns or hinge the surfaces until after covering is complete.

LANDING GEAR

Landing Gear Trial Fitting



The landing gear is made from 1/16″ music wire and is attached to plywood cross members in the fuselage using Kevlar thread threaded through holes provided. Use Epoxy or CA to strengthen the joint. Bass wood fairings securely bound to the uprights can add significant strength. It is also possible to fashion a shock-absorbing axle by adding a second axle on top of the one that secures the undercarriage. Secure the floating axle in the center of it's span to the fixed axle with Kevlar thread and epoxy. Rubber bands are applied to both ends of this floating axle where the wheels attach act as shock absorbers. The bands should go around both the fixed and floating axle. Finally attach the wheels to the ends of the floating axle.

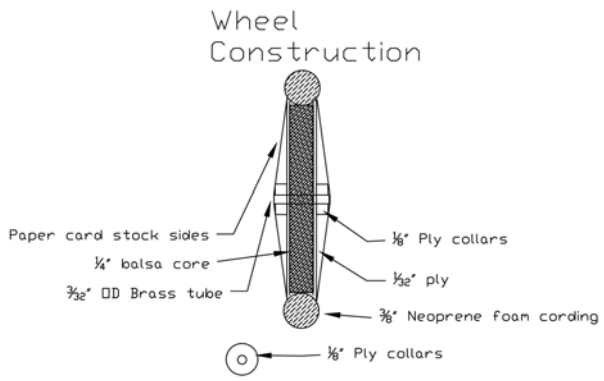
COVERING

Any lightweight covering material can be used. Polyspan with dope or Minwax Polycrylic makes a good choice. Litespan is also popular.

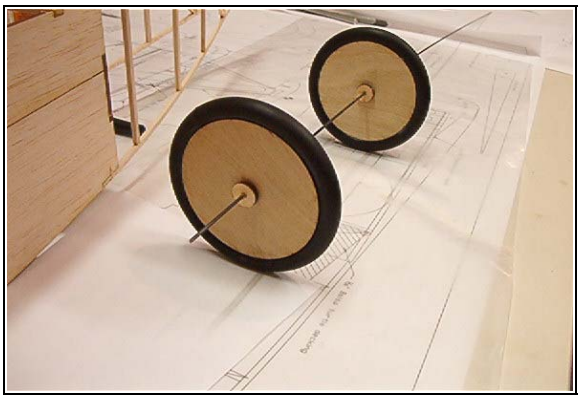
Decal outlines for this model are available on www.aerodromerc.com/decals in Adobe Acrobat pdf format for printing on decal paper. Contact paper used for kitchen shelf lining makes excellent decals. Print out the decal on paper, glue with a glue stick to the paper backing on the shelf paper, cut the decal out with an Exacto knife or micro scissors. Peel off the paper and adhere to your model. Use black material for the crosses and white for the backgrounds.

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.



Wheels



Paper cones are cut out. Use a ballpoint 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 cut out 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.

INSTALLING THE RADIO CONTROL GEAR

Servo Bay

Get the R/C gear fitted at this stage, and also the motor.

Aileron Servos

Aileron servos are mounted in wing and attached with short threaded rods to the ailerons. Use a "Y" wiring harness connector to wire the servos to a single radio connection. If differential aileron throws are desired, rotate each servo horn forward about 20 degrees, while maintaining the neutral position of the aileron. This should counter any adverse aileron yaw.

ASSEMBLY

Dry Fit Model

Wings

The bottom wing is attached to the fuselage through two spars connecting the two halves of the bottom wing. The bottom wing should be attached first, making sure it is aligned properly with the fuselage. The spars are designed to epoxy into the slots in the ply sides. Then add the IP strut to the middle wing (It has a top indicated by a T mark) and epoxy the middle wing to the ply sides using the spars and slots as a guide. Epoxy the bottom of the strut into the bottom wing. At this point, the top wing can be added. The IP strut aids in alignment of the top wing. Again use epoxy to attach the top wing to the IP strut.

The music wire portion of the cabane struts are attached to the laser cut plywood parts. The rear cabane wire halves are inserted into 3/32" dia. Brass tubing that is lashed and epoxied to a 1/8x1/4" bass or spruce cross member which is epoxied into in a pre-cut notch the ply risers. The cabane wires are to be lashed to the CA hardened 1/8" ply cabane struts and CA'ed in place. CA is used to fix the wires in place inside the brass tubing. Kevlar thread or fishing line is preferred for this process. The front and rear music wire sections meet at the top of the cabane structure. This portion of the cabane strut attaches to the top wing. The music wires can be attached either by overlapping them and lashing with thread or have them meet inside a short section of 3/32″ brass tubing.

The top of the fuselage between the middle wings can be finished in several ways:

1) Fashion 1/16th sheeting to cover most of the area using the top of the ply risers as a guide. Fill in gaps with balsa filler.
2) Use 1/4" balsa and sand to shape.
3) Cover with card stock.
4) Fill with blue foam.

The top wing is then epoxied onto the cabane assembly. However, the wing addition process should be done last.

Fitting Tail Surfaces

Attach the elevator to the horizontal stabilizer.
The horizontal stabilizer and elevator are glued onto the fuselage first and then the rudder. The rudder should be securely attached to the fuselage, as the area is relatively small.

Adding Control Horns On the Pushrod Ends

Slip the control horns onto the wire pushrod ends and, with both the servos and the control surfaces centered, glue the horns into their slots. Some prefer to delay adding the rudder until the elevator control horn is secure. Then add the rudder and it's control horn. It makes the job a bit easier.

Fitting the Rigging Wires

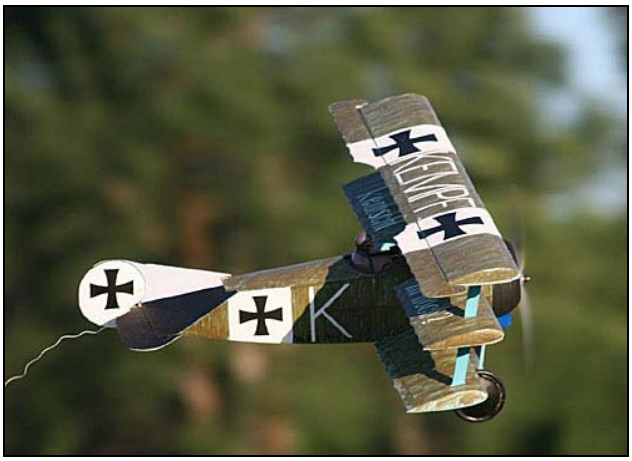
Use strong thread or Kevlar fishing line or elastic beading cording to simulate rigging wires. Use small screws, fishing hook eyes, straight pinheads or small eyelets to attach the lines. These “wires” can add a degree of strength to your model.

Battery hatch

Fashion a battery hatch from 1/32″ plywood.

Balancing the Model

Balance the model at the point shown. It is best to position the battery to do this operation.



FLYING

The model should ROG on grass, pavement or hard surfaces. Use full throttle and full up elevator on takeoff. Once the model is airborne, ease off the elevator to neutral. Let the model gain altitude slowly off the runway. In flight, applying too much up elevator at slow speeds risks 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. Fly the model to a landing, keeping some power so that the airflow over the tail is preserved. Just prior to touchdown, give the model full up elevator to prevent nose over. The model may require coordinated turns using both ailerons and rudder control. This is due to adverse yaw. Halving the aileron down throw will reduce the effect. This can be accomplished by rotating the control arm of the aileron servo forward about 20 degrees.
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.

Here are some excerpts of John Boeck's flight report.
"The Fokker Dawn Patrol was in full force this morning. ROG's look scale and happen in about 20 feet. The model will ROG in short grass without issue. Full up elevator, at full throw, is needed at takeoff to prevent nose over. Climb outs look scale with this power system. Climb rate is good and it turns very quickly. Throws are 1/4" aileron, 1/4" elevator w/ stop to stop on takeoff and rudder stop to stop. The aileron and elevator are set up on dual rates. At these settings I found her to be very easy on me in the air once I figured out the over correction mistakes I was making. It flies at the pace of good run at 3/4 to full throttle."
"Just got back from a second flight in a wind of about 7 mph. It flies pretty well, but needs much more aileron throw to get it to roll. Dual rates or expo's work well for this. I've found short grass provides much more control over pavement during takeoff."

The model also flies well with this power system:
GWS 400C - F, 12x8 GWS HD and uses a 3S 1500 Mah Li-poly battery. The John's model weighs about 30 ounces. Note: John's model used spruce spars. Balsa spars are now recommended. Several ounces of weight are saved and the model retains structural integrity.

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