PFALZ DR 1 42″ 1/8 Scale

R/C Scale Model Instructions

Designed by M.K. Bengtson
Prototype by Vern Hunt

Manufactured and Distributed by:

Bengtson Company
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www.aerodromerc.com

Pfalz Dr 1 1/8th scale

Thank you for buying the AerodromeRC Pfalz Dr 1 42″ laser cut short kit for electric flight.

MODEL SPECIFICATIONS

Over 435 Laser Cut Parts

Scale: 1/8th
Prop: 12x8
Channels: R/E/A/T
Wheels: Balsa, plywood, Neoprene foam cord tires, Brass tube hub with Paper card wheel cones
Airfoil Type: flat bottomed
Wing Area: 421 sq in
Wing Span: 42″
Cowl: laser cut balsa
Weight: 35 oz. ready to fly
Power System: AXI 2217/20 brushless outrunner
Designer: M.K. Bengtson
Prototype Builder: Vernon Hunt

BUILDING THE MODEL

Before Starting

A note about the photos. The photos were taken of from other builds and the parts supplied may look slightly different from them. However, the concepts illustrated are the same.

The Pfalz Dr1 prototype was built by Vern Hunt.

WINGS

Wing Construction

Top Wing

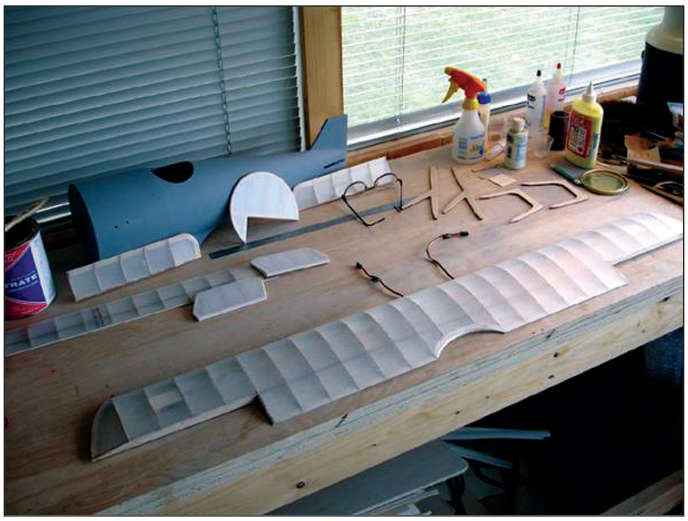
The spars in the model are 1/8″ diameter carbon rod. Slide the ribs on the spars of the top wing and align on the plan. Insert the brass or aluminum tubing for the IP and cabane struts in the 1/8″ lite ply mounts and glue under the spars. Lay the 1/16″ plywood trailing edge on the plan and glue the ribs in place. Glue the 1/8″ scrap balsa reinforcements on the IP strut ribs. Glue the wing tips flat on the building board. The leading edge is also 1/8″ carbon rod or alternatively 1/8″ diameter wooden dowel. Remove the wing from the building board and sand to shape.

Construction of the ailerons should be straightforward. Pin down the lower part of the TE, add the aileron control horn mount, then glue the ribs and the leading edge in place. The aileron wing tips need to be sanded down in order to fit into the TE. Finally, add the top part of the TE and sand the aileron to shape. The leading edge should be sanded slanted so that the hinge axis will be at the bottom. Otherwise, you will get a gap at the wing tip when the aileron moves up.

Be sure not to glue the control horns into place, do it only after covering. Also, hinge the ailerons only then.

Bottom Wing

Construction of the bottom wing is similar to the top wing with only one spar and thinner 1/32″ plywood trailing edges. The leading edge is 3/32″ diameter carbon rod or alternatively wooden dowel. The center rib section is designed for accurate alignment of the lower wing to the fuselage and has a tab that fits into a slot in the bottom keel of the fuselage. The adjacent rib bays in this region are sheeted at the top with 1/32″ plywood. Be sure to use the correct ribs B1 and B2 for this area and make double sure the ribs are glued in vertically. The undercarriage mount LG2 is also inserted and glued in place.



Middle Wing

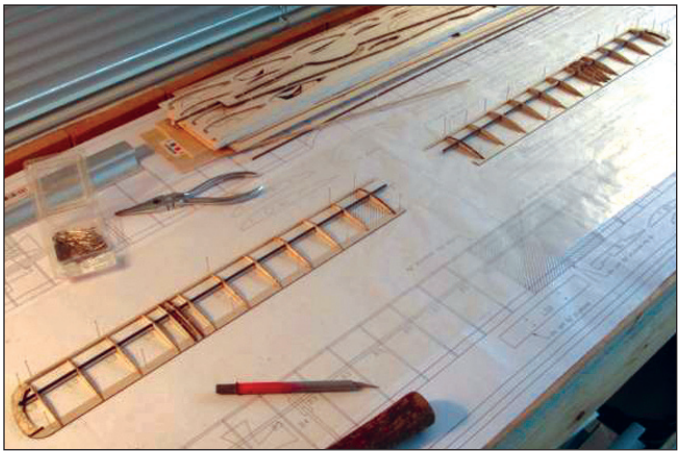
The middle wing is built in two pieces with a single 3/32″ carbon rod spar. These wings will take the aileron servos; ply hatches for the servo mountings are provided. The root region is sheeted with 1/32″ plywood on the top. The leading edge is 3/32″ diameter carbon rod or alternatively wooden dowel.

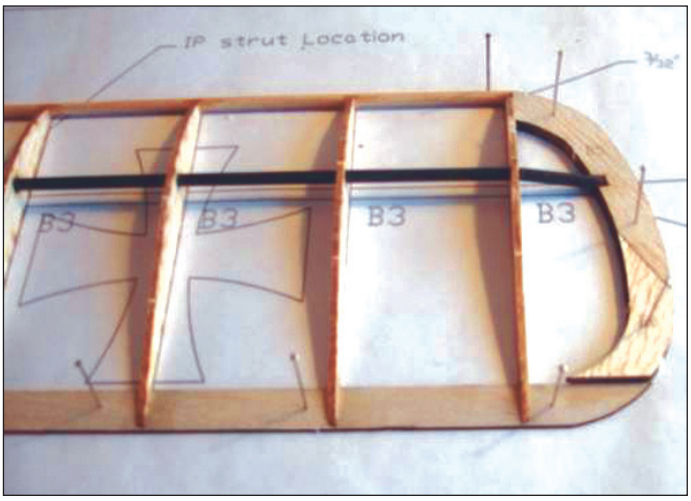
FUSELAGE CONSTRUCTION

The fuselage is of former and keel construction with lateral ply assemblies that serve to determine the cabane attachment points and undercarriage attachment points. The

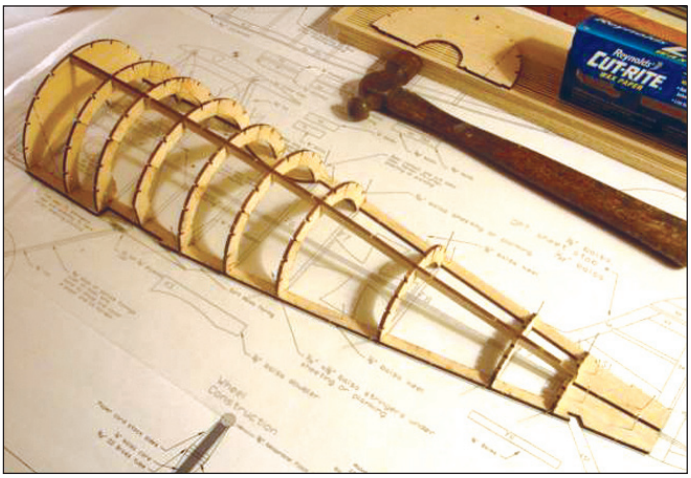
firewall serves as a motor mount. Begin by assembling the top and bottom keels on the plan.

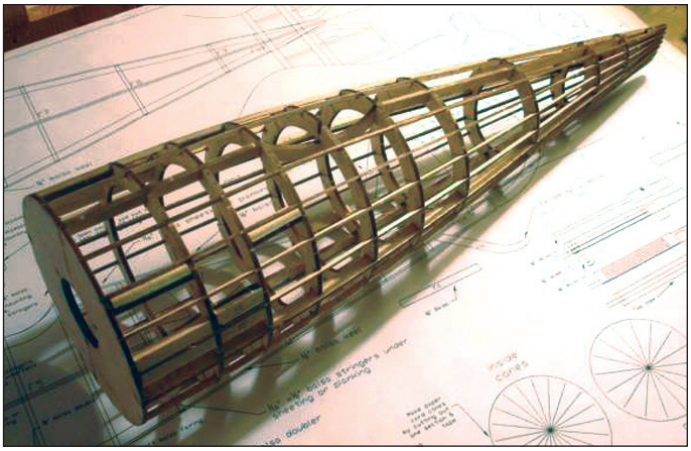
The fuselage is built on the side view of the plan. Pin down the four keel parts and add the formers F1 and F10. Glue the side keel to the formers, then slide the remaining formers onto the this keel. Make sure all formers are correctly aligned and vertical. Remove the assembly from the building board and glue the 1/16″ plywood former against





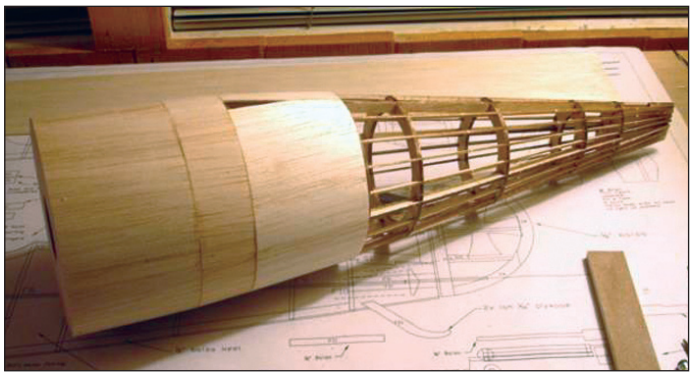
F1 on the inside of the fuselage. Then add the other halves of the formers F1 and F10 and again add the side keel. Use the side keel and the opposing former attachment locations to align and glue the formers. Now attach the stringers in a balanced fashion to avoid distorting the fuselage. In this way the fuselage is straight and strong. It serves as a structure to attach the balsa sheeting. At this point, the plywood mounts for the cabane struts and the landing gear must be assembled with brass or aluminum tubing and inserted. Sand them to fit flush with the formers. Use bass or spruce to form the front undercarriage mounts on the firewall as shown on the plan. Add the horizontal stabilizer supports F11 between F10 and the end of the fuselage.

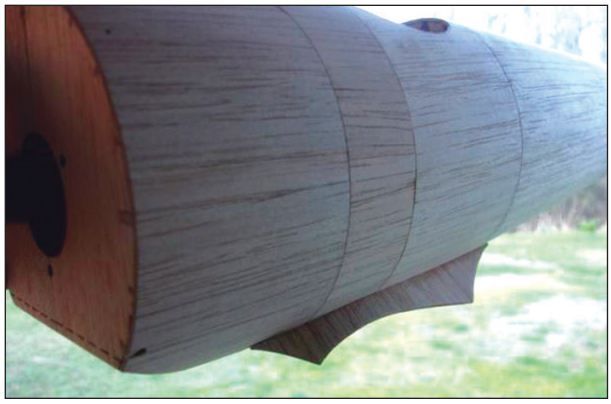




Vern sheeted with 1/16″ balsa when asked if he made patterns Vern replied: "Yes, I did make card stock patterns. Its the only way to get a perfect fit. Even with patterns I had to make a few adjustments before gluing. The first 2/3 of the fuse I did not wet the balsa. It just flexed perfectly. The last pieces I did soak for awhile in water to get the bend... plus I taped them on to let the balsa dry to shape. Then final adjustment and glue."

Vern did a wonderful job on the fillets. He says: "The fillets were based on the balsa substructure pictured. The filler I used is Hobbico HobbyLite Filler. The secret is to build it up slowly using my fillet forming fingers. Thumb for big radius' and so on (don't put too much on at once) And put it on carefully. Try not to get it past the normal blend at the fuse. The more that the filler gets past the blend line the better the chance of hitting the balsa while sanding the filler (that's a no no). To sand I used a cut-off piece of neoprene tire material with some 220 grit sandpaper wrapped around it. Using good light shadows to carefully





and slowly take off just enough to create the fillet. Don't sand thinking the radius of the rolled up sandpaper will do it automatically. You have to make the fillet radius using your eye.

To make the middle wing fairings setup all the wings to make sure the incidence is correct."

Make up the tailskid by laminating the two laser cut sections together. Soak with thin CA to harden this part.

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.

COWLING

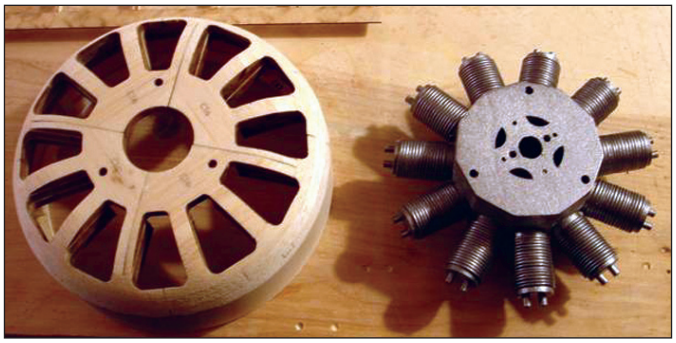
The cowling is of built up construction using laminations of

laser cut 1/4″ balsa sections. Each cross section is supplied in halves with a breakaway alignment tab. When glued to in place sand the excess balsa down so that a nice smooth cowl is achieved. The laser cutting on the outside edge usually represents the correct shape so sand to that point and stop. Use make a cardboard template from the plan as a guide for sanding the front section of the balsa into shape. The cowl should now be sealed, sanded and primed until no wood grain is left showing. Baby (Talcum) powder in clear dope makes an excellent balsa sealer. Talcum powder mixed in white glue makes excellent filler for gaps or gouges. Sand down after it dries.

The cowling is designed to be removable for access to the dummy motor and electric motor. The cowl is removed and attached by placing long 4-40 or 2-56 screws in three locations passing through the cowl and mating with blind nuts mounted to the fuselage firewall. When removing the cowl, the dummy motor also comes off the firewall. Alternatively, the dummy motor can be permanently glued to the cowl. Then both come off when the screws are loosened.

TAIL SURFACES

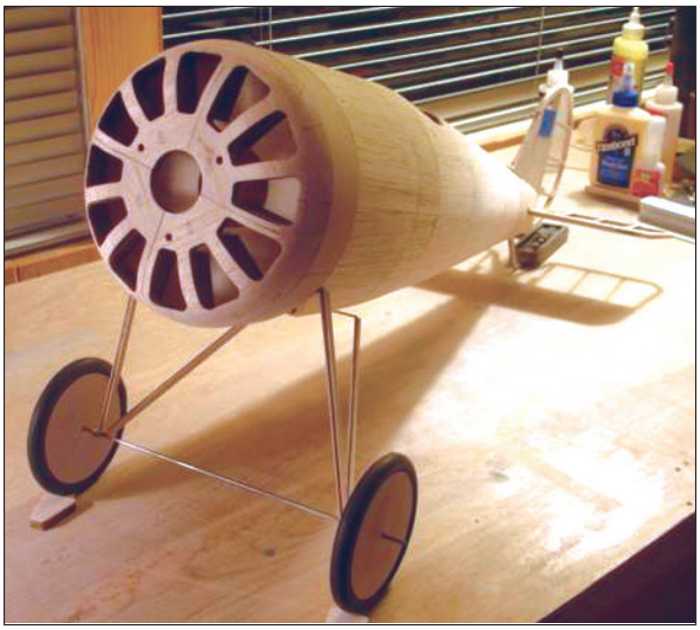
Lay out and glue parts of the tail surfaces on the plans.



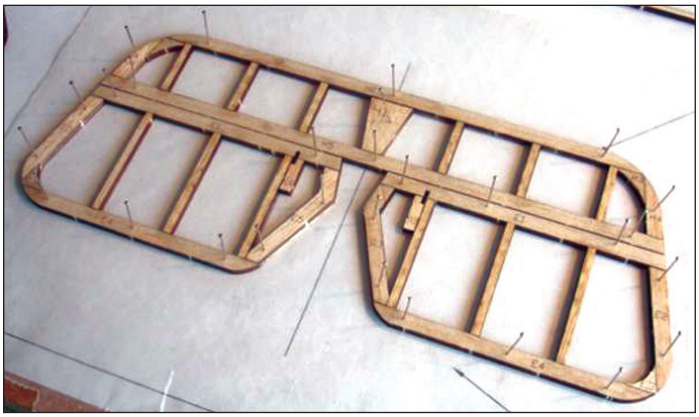
The vertical and horizontal stabilizers can optionally be sheeted with 1/32th balsa. Sand the tail parts, rounding off all edges. Don't add the horns or hinge the surfaces until after covering is complete.

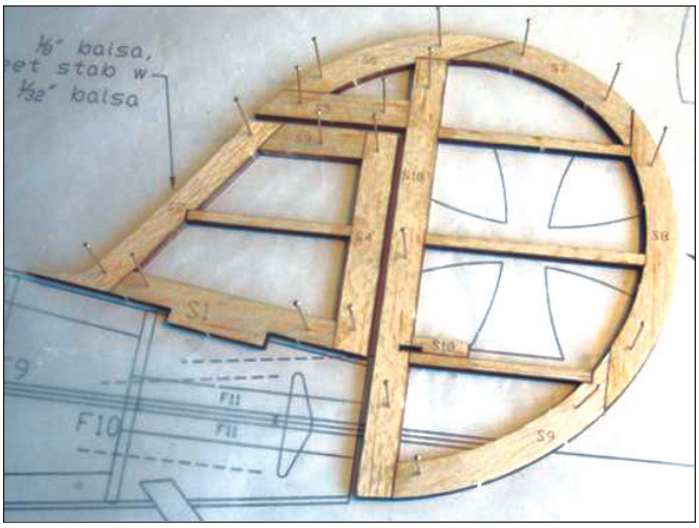
LANDING GEAR

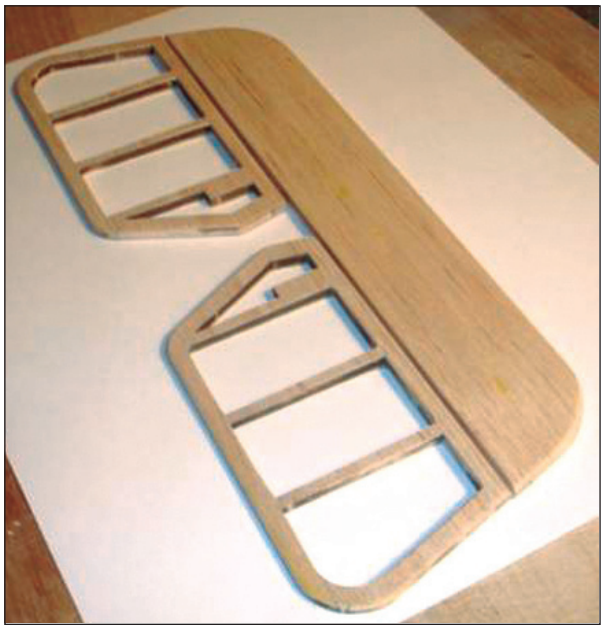
The landing gear is made from 3/32″ music wire and inserted into the locating holes in the hardwood mounting

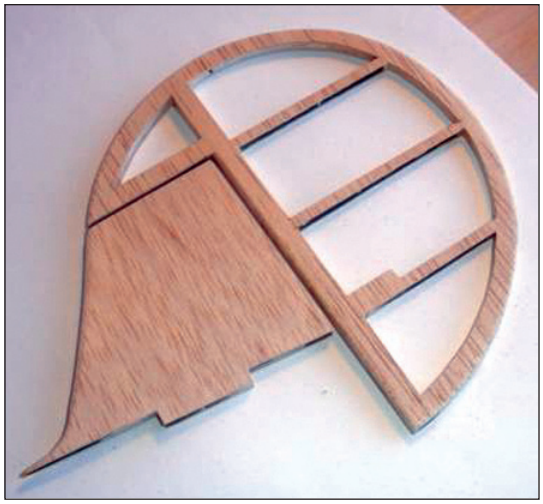


points inside the fuselage and on the bottom of the lower wing with saddle clamps. Bass wood fairings securely bound to the uprights can add significant strength. Cut the wire according to the layout on the plan. The front is in two sections to make the fabrication easier and more accurate. Bind the axle to the uprights with copper or brass wire and solder. A good alternative is to use Kevlar thread instead of







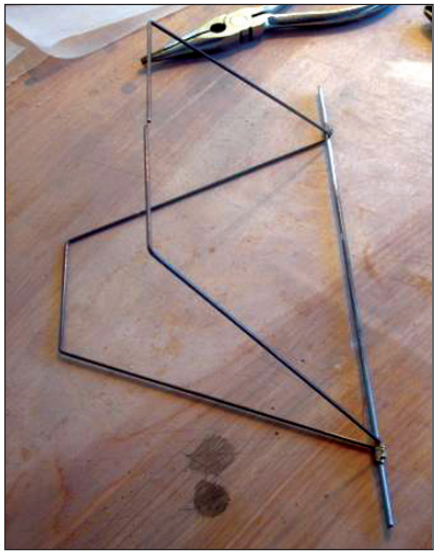


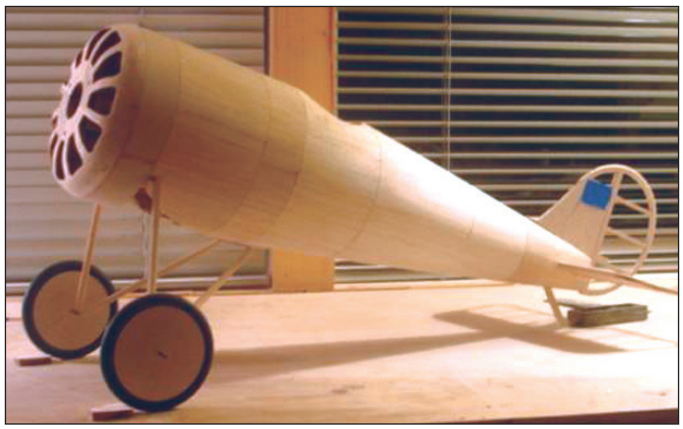
the binding wire and epoxy the axle in place with it.

DUMMY MOTOR

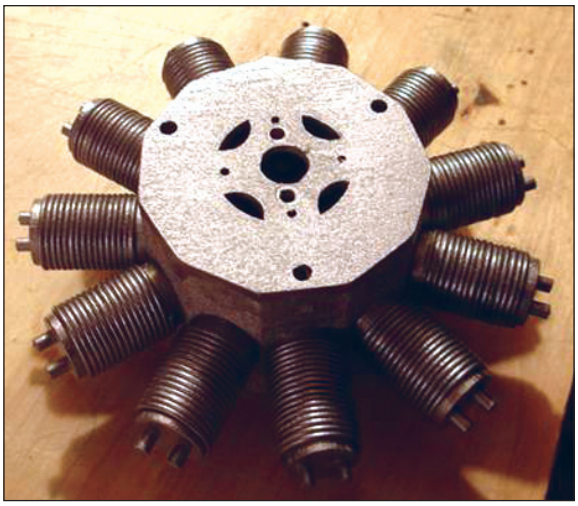
A dummy Siemens Schuckert rotary engine is provided in the kit. This is an important piece of the model as it is used to mount (and hide) the AXI outrunner that will power the plane.

The design is similar to others used in AerodromeRC models. It consists of a number of laser cut balsa and ply rings glued together to form the crankcase. The AXI outrunner





bolts to the front ply rings and the whole assembly gets bolted to the model's firewall. The dummy cylinders are constructed of a couple of laser cut balsa disks with some card stock wrapped around them. Cooling fins are simulated by heavy thread that is glued on.



The fabrication of the engine starts with laminating the two front 1/16″ ply pieces together. A 1/8″ lite ply piece then gets glued to the inside face of the front ply lamination. The mounting holes for the AXI outrunner need to be drilled out to 3 mm diameter (about .120″) so this was done at this time.

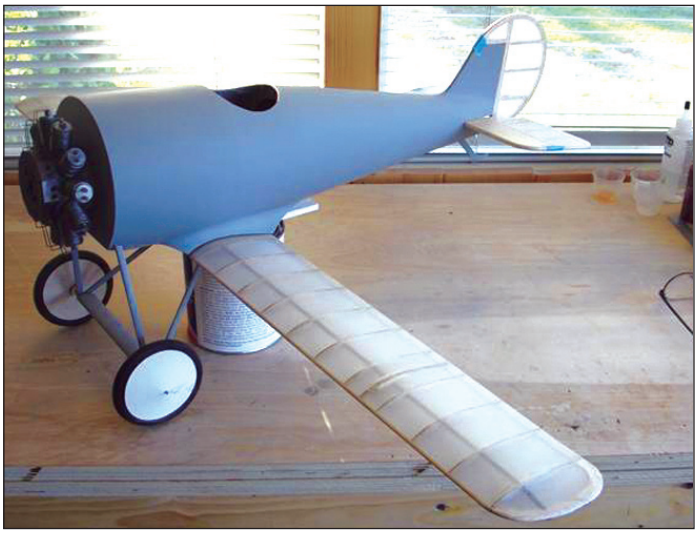
The AXI outrunner sometimes has a large C clip on the front face that holds the shaft in place. The center hole in the ply mounting plate may need to be enlarged to clear this, otherwise the motor might not lay flush against the mount. The thing to look out for is that the AXI outrunner mounts against the mounting plate with no interference problem.

The crankcase stack consists of two sections, the front of 3 pieces of 1/4″ balsa, the rear of 5 pieces of 1/4″ balsa. Use a couple of pieces of 5/32″ brass tube in two of the three mounting bolt holes as guides in order to get the pieces to line up properly. The two sections are joined together using a piece of laser cut 1/8″ balsa as a separator. This 1/8″ balsa piece has notches in it to serve as locater pins for the dummy cylinders. Each dummy cylinder is built on a piece of laser cut 1/8″ square stock to serve as an indexing pin and to reinforce the glue joint to the crankcase. Wrap the cylinders with card stock printed from the decal file. Use the double thread method to attach thin "cooling fins" to the cylinders. This method uses twin wraps of thread wound around the cylinder and CA glued only at the top and bottom. After the thread is set, carefully remove one thread and then CA glue the remaining thread in place. Once the balsa sections are glued together the front ply piece is glued in place and the crankcase is sanded smooth. Assemble and paint. Use aluminium paint followed buy a light coat of thinned black to simulate an oily finish.

When mounting the AXI outrunner in the crankcase you will need to carve a relief passage in the crankcase to allow the motor wires to pass freely back to the rear of the mount without rubbing against the rotating can.

DOWN AND RIGHT THRUST

Use the 1/32″ donut shaped spacers MS or washers on the screws attaching motor to the motor mount to add the down and right thrust. There should be enough clearance



inside the dummy motor to allow the motor to rotate freely.

IP AND CABANE STRUTS

The IP struts are included in the kit and are fashioned from laser cut 1/16″ plywood. Laminate in pairs eliminating warps. The cabane strut assemblies are made from 1/32″ music wire sheathed in a sandwich of 1/32″ plywood. The core section is in pieces to form a channel for the wire. Cut the wire as shown on the plan. Laminating the ply layers around the wire insures a strong and straight cabane as-

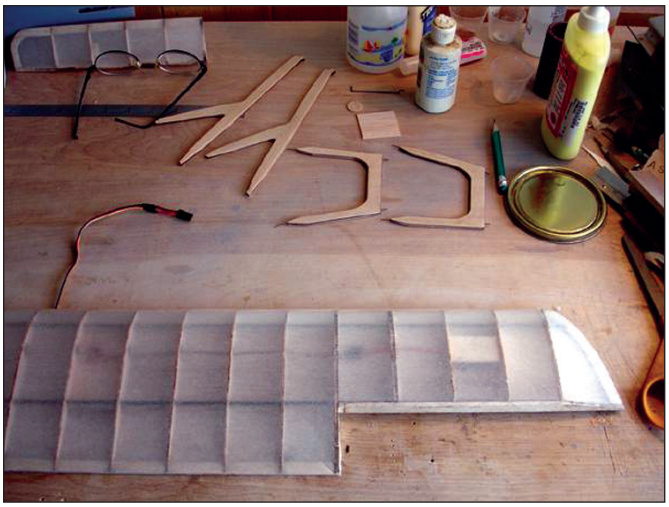
sembly. The exact angle of the end wire is not important as the wire will bend to the correct angle during assembly of the model.

COVERING

Vern used Silkspan to cover the entire model but Polyspan or Litespan are also great choices.

Cut stencils (files are available from www.aerodromerc.com at no charge) and paint the lozenge with a brush or airbrush. I

The fuselage can simply be given a few coats of Tamiya gloss aluminum dulled down.



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 his 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.

ASSEMBLY

Attach the cabanes to the fuselage. The exact alignment is not critical as the top wing will center itself with the other two using the IP struts. Attach the bottom wing and then

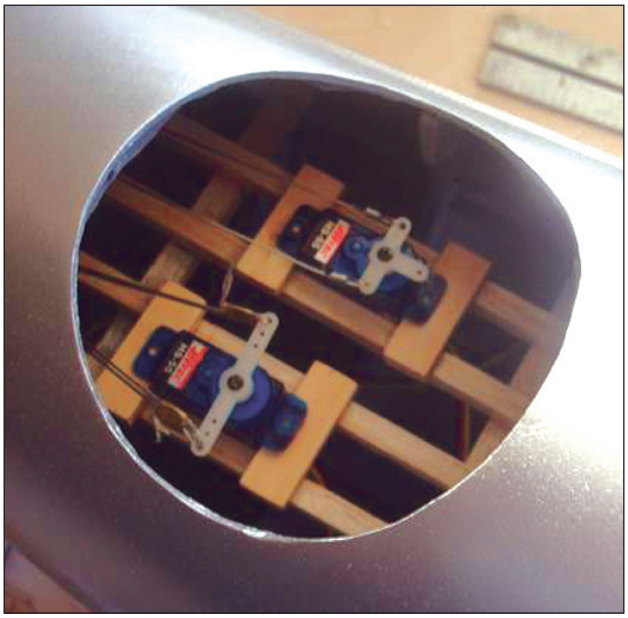
middle wing with the IP struts in place. A 1/4″ foam board template spacer may be useful to assure that the top wing is in the correct incidence and position. Use the side view on the plan as a guide for it's shape.

After the finishing, hinge all control surfaces and control horns. The horizontal stabilizer must be attached to the fuselage before hinging the elevator. You might prefer not to glue the control horns in place, so you can move them slightly to adjust minor differences in the length of your control cables or pushrods.

Install all the servos now and attach the pushrods or control cables

FITTING RIGGING

Use strong thread or Kevlar fishing line or elastic beading cording to simulate rigging wires. Use small screws, fish-



ing hook eyes, straight pinheads or small eyelets to attach the lines. These "wires" can add a degree of strength to your model.

Dummy machine guns and pilot figure is included. Follow the instructions on the plan for their construction.

BALANCING THE MODEL

Balance the model at the point shown. Vern did not need any balancing Lead but some may be needed in the nose of the fuselage.

The model should ROG on grass, pavement or hard surfaces. The model may require coordinated turns using both ailerons and rudder control. This is due to adverse yaw.

Halving the aileron down throw may reduce the yaw. This effect can be accomplished by rotating the control arm of the aileron servo forward about 20 degrees.

Let the model gain altitude slowly off the runway. 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. The most important details for proper flight operations are:

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

FLIGHT REPORT

Here are some excerpts of Vern's maiden flight.

"This model is fantastic. I can't believe how good it looks with the guns. I was able to get the guns finished in a week. The're still not as fancy as I hoped, but they really set the model off. The pictures tell the story. I was able to do a quick test flight on Saturday, and as you can see it's still in one piece. My son was at a friends house and not here for pictures. I was sorta glad cause the nerves were bad enough without having more people on scene. It balanced perfectly without any extra lead in the nose. Total weight ready to fly is 38 ozs. Plenty of power with the geared Mega motor. I only flew a couple of circuits to see how the handling was before I landed to make sure I didn't make any mistakes while shaking. I'm very pleased with this little beauty, and recommend it to anyone who wants a distinctive WW1 model in there hanger."

CONTACT INFORMATION

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