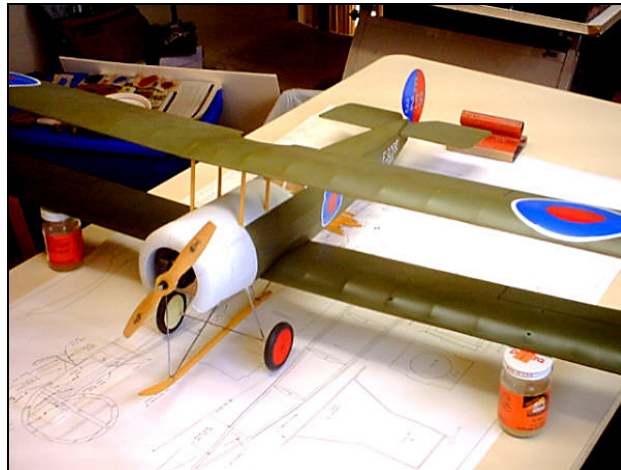


# AVRO 504 36"

## R/C Scale Model Instructions



### CONTACT INFORMATION

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Manufactured and Distributed by:

**Bengtson Company**

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# AVRO 504

Thank you for purchasing the AVRO 504 model for electric flight.

## THE MODEL

A semi scale adaptation of the AVRO 504, this model is designed to be easy to build and exciting to fly.

## R/C GEAR

A three function mini receiver and three micro servos are all that are required.

## Specifications

More than 150 laser cut parts

Scale:	1/10 <sup>th</sup>
Channels:	R/E/T
Wingspan:	36"
Wing Area:	345 sq in
Weight:	23 Oz.
Power System:	6V S400 motor geared 2.33:1 Mini-Olympus gearbox, 8 600 AE NICAD cells, APC 8x6E prop
Prop:	APC2x6B
Air Foil Type:	Flat bottomed
Cowl:	Built up balsa and plywood
Spinner:	N/A
Wheels:	Balsa, plywood, Neoprene foam tires Paper card wheel cones
Covering:	Oracover, Solite or Polyspan covering
Decals:	Available on website

## BUILDING THE MODEL

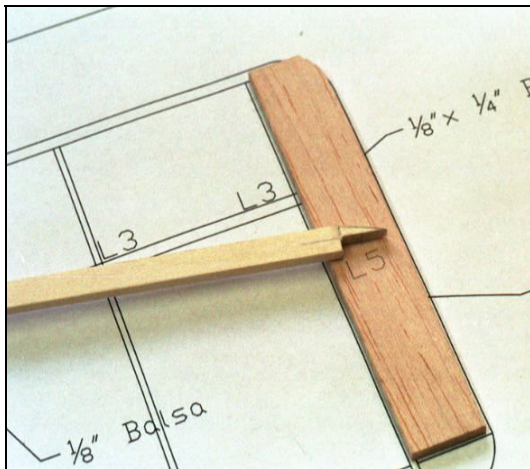
### BEFORE STARTING

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.

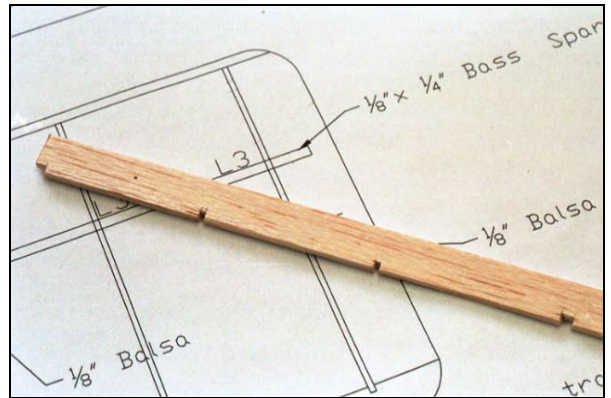
Larry Nagel built the AVRO 504 prototype.

### THE WINGS

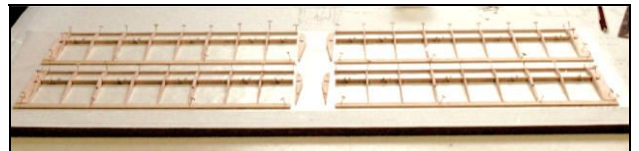
The spars are basswood and are notched at the end to fit over the sheet wing tips.



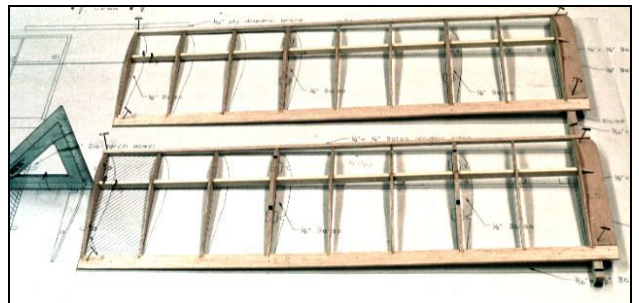
The trailing edges are cut from sheet stock and are notched to accept the ribs.



Start building the wings by gluing the leading edges, spars and trailing edges to the wing tips over the plan. Place some key ribs temporarily to get everything evenly spaced.

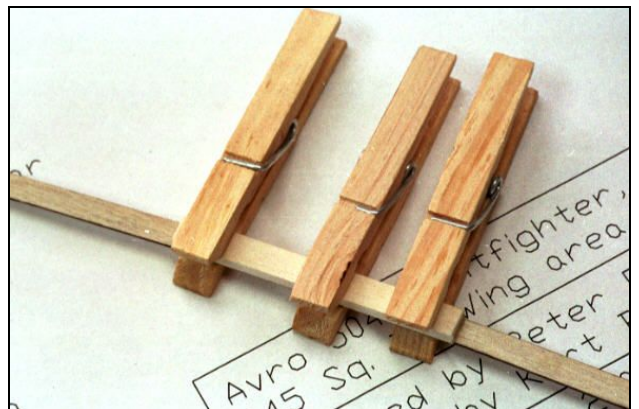


Glue in all of the ribs with the exception of the root ribs.



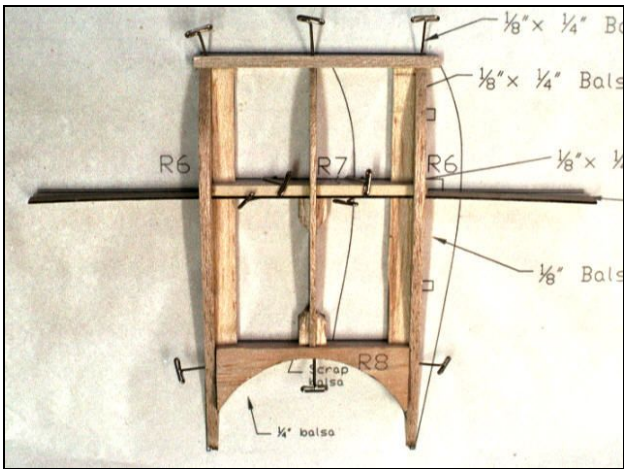
To attach the root ribs, block up the wing tips to the proper dihedral angle and then glued the root ribs to the wing making sure they were vertical to the building board.

Then built the top wing center section. Start by gluing the dihedral brace to the center section spar.

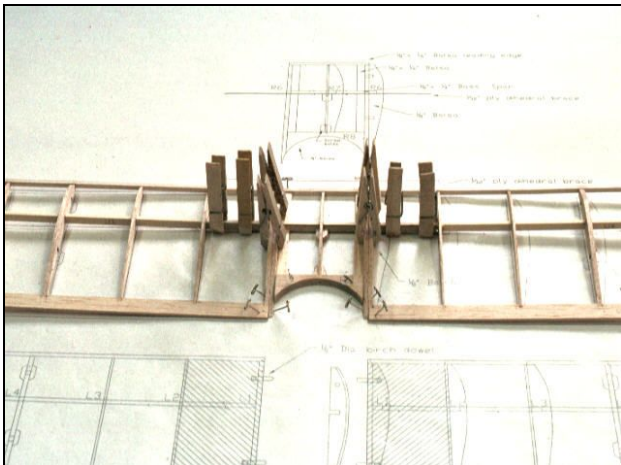


Assemble the center section over the plan.

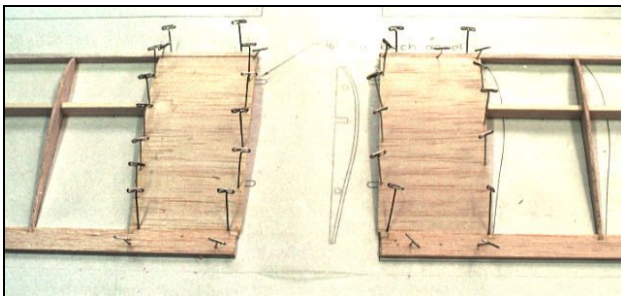




Next attach the upper wing panels to the center section. Block up the wing tips to the proper dihedral angle for this operation.

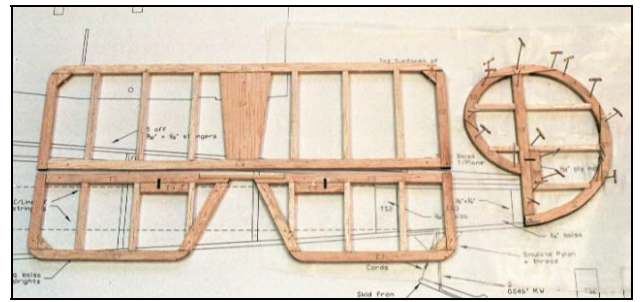


Glue the sheeting to the inner bays of the bottom wings and the wings are done.



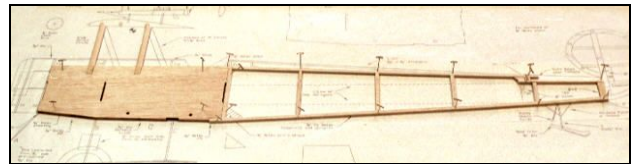
### TAIL FEATHERS

Build the empennage directly over the plans. Since most of the parts are laser cut, only a few more sticks are needed.

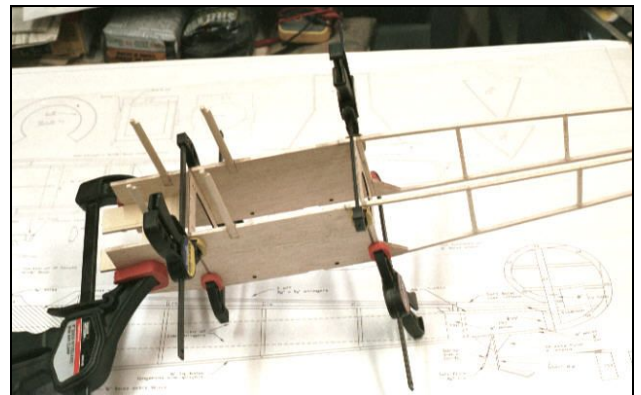


### FUSELAGE CONSTRUCTION

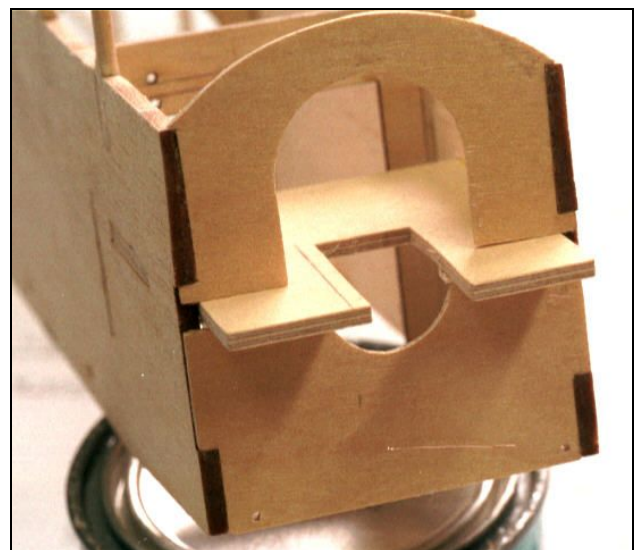
Here's a shot of the beginning of the fuselage. Both sides are simply built up over the plan. Carve and sand the cabane struts to a streamline shape before gluing them to the sheeting.



Then glue the front of the fuselage halves together using formers F2 and F3 and the motor mount. The formers and motor mount have tongues that fit into slots in the sheet sides. That holds everything square.

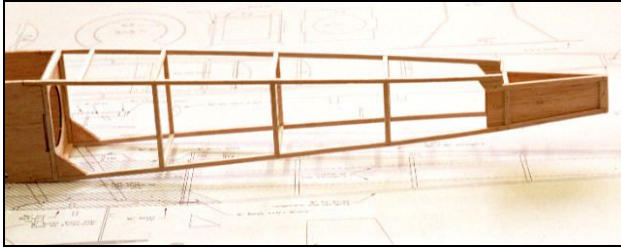


Now glue on the firewall. It is in two pieces that fit above and below the motor mount.

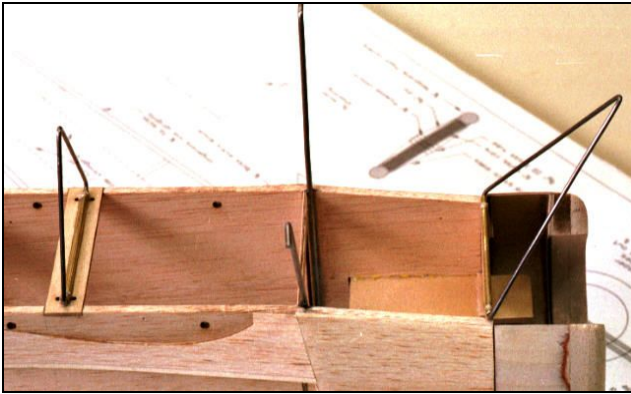




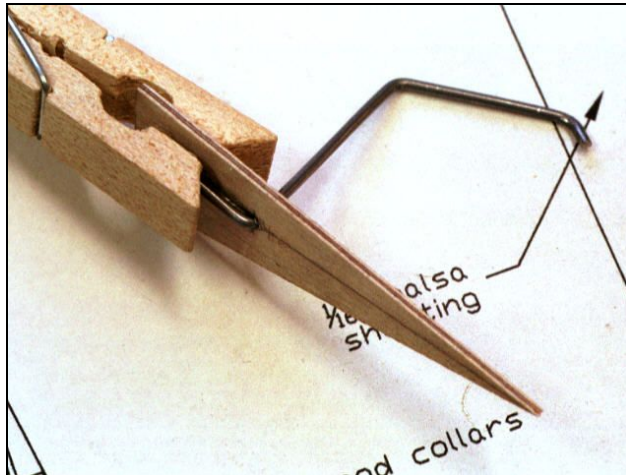
Glue the rear of the fuselage together and added the cross pieces.



Bend all of the wire bits that form the undercarriage struts, tail skid and front skid. Most of them are simple two-dimensional bends. The tailskid is the only one that is three-dimensional.



Here is the tailskid epoxied to a plywood plate that will eventually be glued to the bottom-rear of the fuselage.



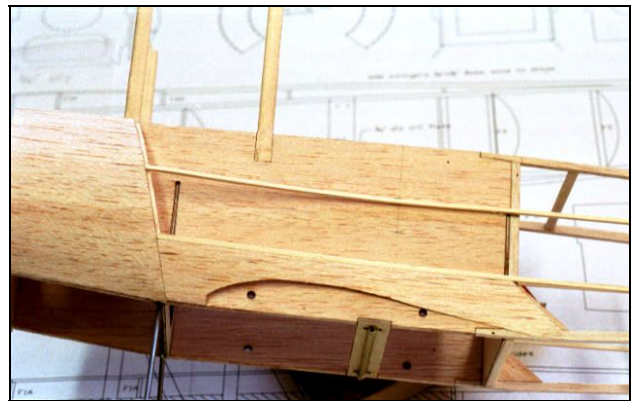
Here the side formers are glued to the front of the fuselage.



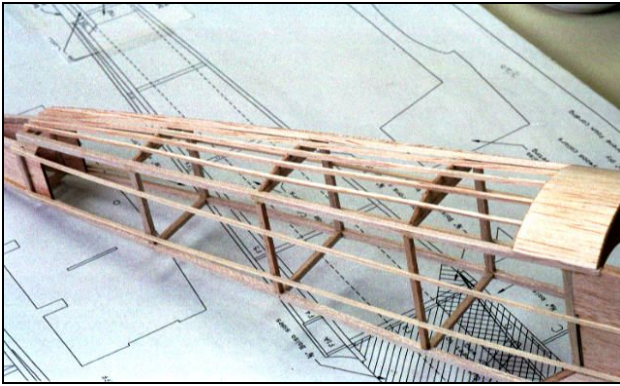
Next glue the cowl cheek sheeting to the side formers.



Glue the bass wood side stringers to the fuselage; then attach the sheeting that fairs the cowling and wing into the fuselage.



Next, the turtle deck formers are glued to the fuselage cross pieces. Then glue the sheeting on aft of the cockpit and next glued on the turtle deck stringers.

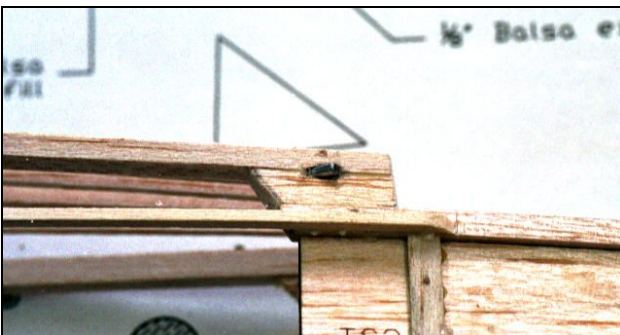


This photo also shows how the side stringers run all the way to the leading edge of the horizontal stab.

These are the elevator exit guides. Glue a piece of 1/16" balsa to the side stringers at the scale exit location and then drill some holes at an angle and inserted aluminum tubing. File the tubing flush with the fuselage sides.



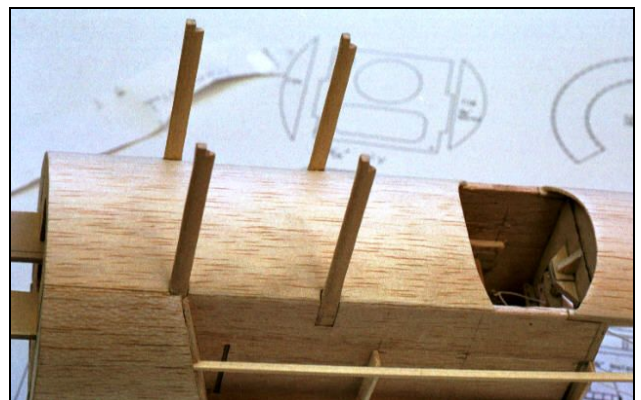
This is the rudder exit guide at the scale location with aluminum tubing inserted at an angle.



Here is another shot of the elevator exit guides. This is zoomed out a little to give a better perspective.

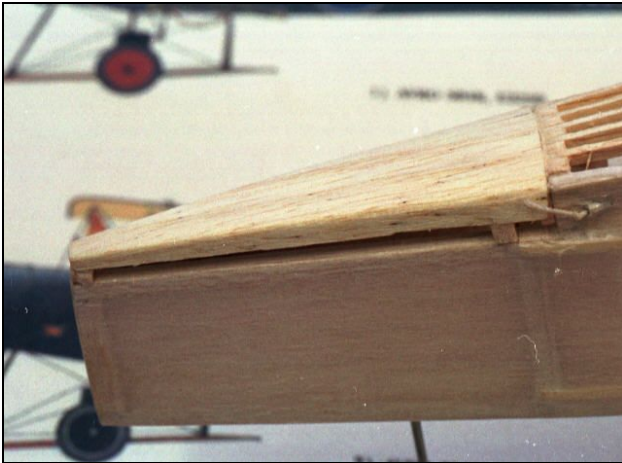


Here is the sheeting applied to the top, forward portion of the fuselage. It was shaped to the cockpit opening after being applied to the sheeting.

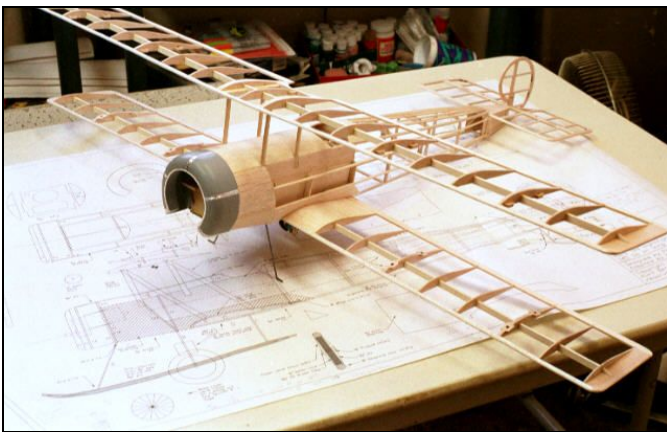


Here is the fairing over the tail plane. It is a piece of balsa sanded to shape with 1/8" spacers under it. The spacers will be removed when the horizontal stab is installed.



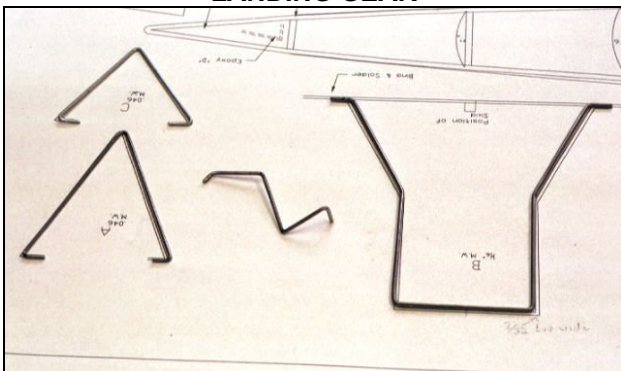


Dry fitted and looking like an airplane!

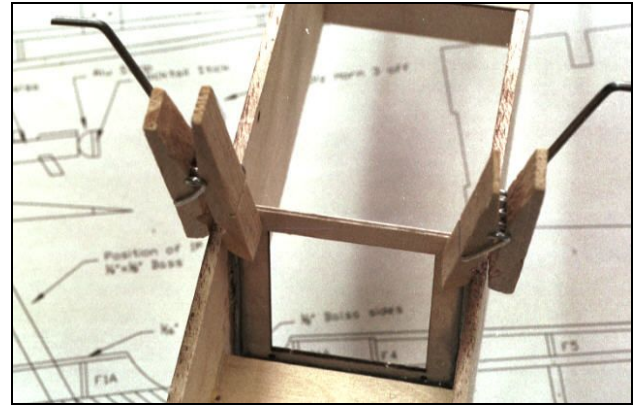


It's time to finish off the undercarriage. As shown before, the main struts have already been attached to the fuselage. Now the axle has to be soldered to the struts. Start by thoroughly cleaning the wire with 400/600-grit paper and then wiping them down with alcohol. If you don't get all of the oxidation off the wires, the solder will not stick. It will just ball up. Then wrap the joint with copper wire as shown.

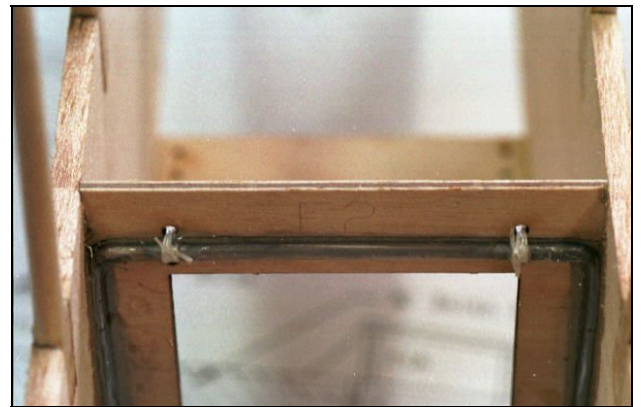
### LANDING GEAR



The undercarriage struts are then epoxied to the front of former F2.

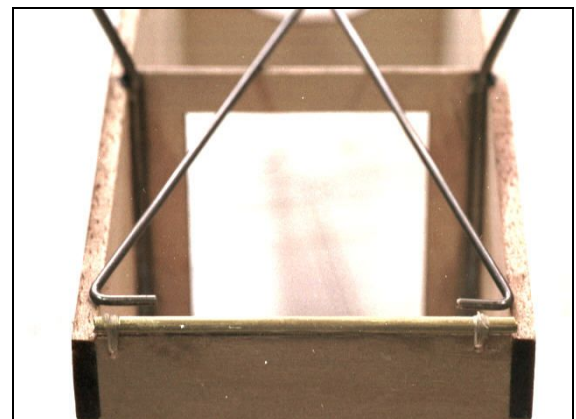


Thread and CA can be used to secure the UC struts to the top of F2. Kind of a belt and suspenders approach.

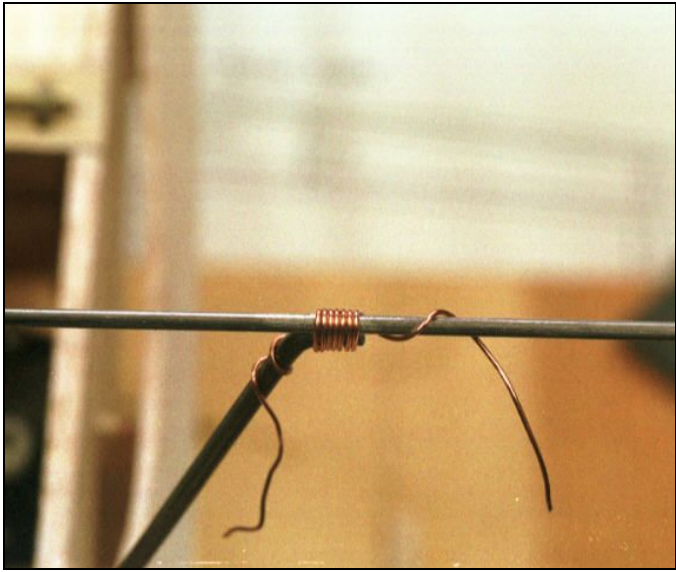


For the front skid strut mountings, epoxy brass tubes to the bottoms of the firewall and F3. These can also receive the thread and CA treatment. The skid struts simply plug into the ends of the tubes. This makes the skid removable for grass field operation if necessary.

This is the front skid strut.



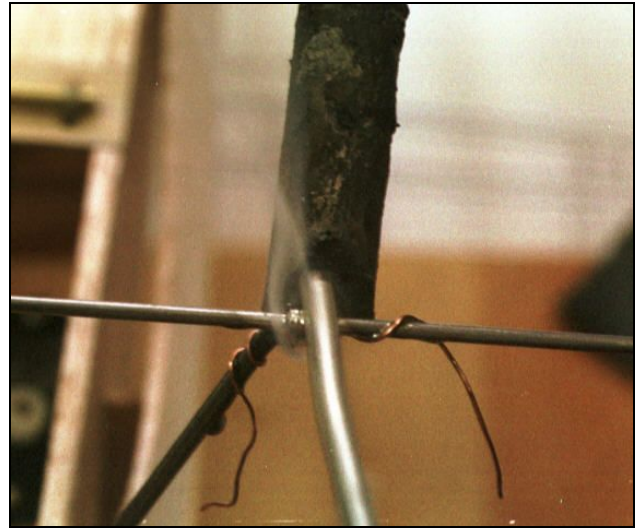
The rear skid strut was not attached to former F3, but to a ply cross piece between F2 and F3.



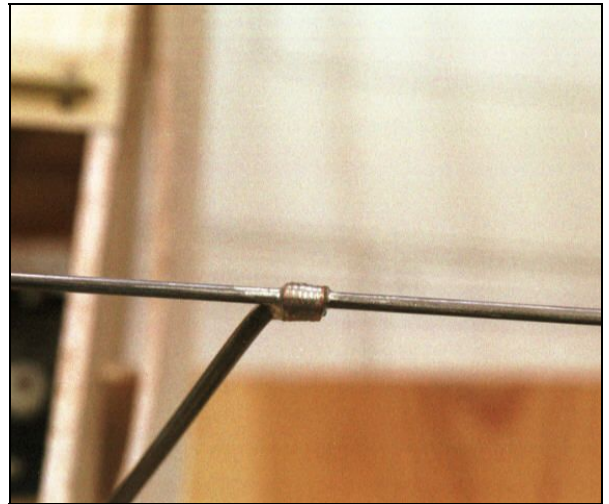
Next, apply some soldering flux to the joint. The flux cleans the joint even further when it is heated with the soldering iron. There are two types of flux. One is a resin used on electrical circuits and the other is an acid flux used on plumbing and other metals. Resin flux is used here.



Now apply the solder. The important thing here is to place the tip of the soldering iron on the joint, heating it to the point where it will melt the solder. The solder is applied to the joint, not the soldering iron tip. If solder is melted with the soldering iron tip a cold joint will result that will eventually fracture. It is necessary to use an iron with enough power to heat the joint to the solder melting temperature. In this case an 80-watt iron is being used.



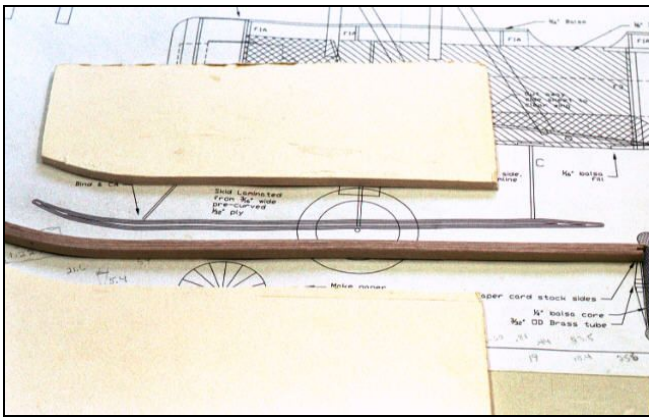
Next trim the excess copper wire and clean off the residual flux. This is the end product. Note that the spiral on the copper wire is still visible. This is all the solder you need for a strong joint. If any more solder is globed on it will only add weight.



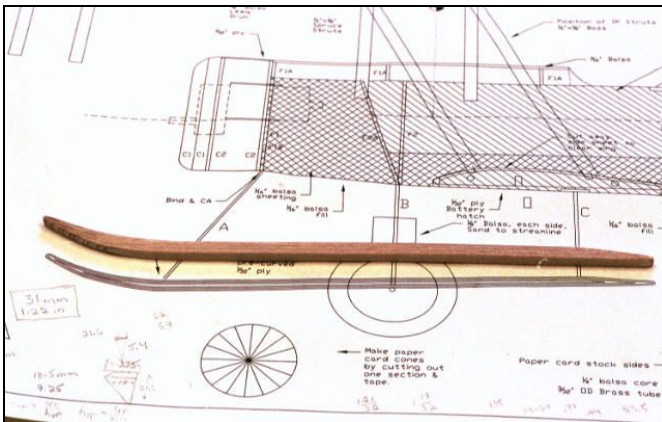
It's time to put wheels on the axle of the AVRO. The basic wheels are made up of a central balsa disk and two peripheral plywood disks that are assembled over a brass tube hub. Then apply neoprene cord for the tire.

Here is the form for the undercarriage skid. It is laminated using eight strips of 3/16" wide by 1/32" thick plywood. The laminations were done by sandwiching them between two pieces of foam board cut to the desired curve.

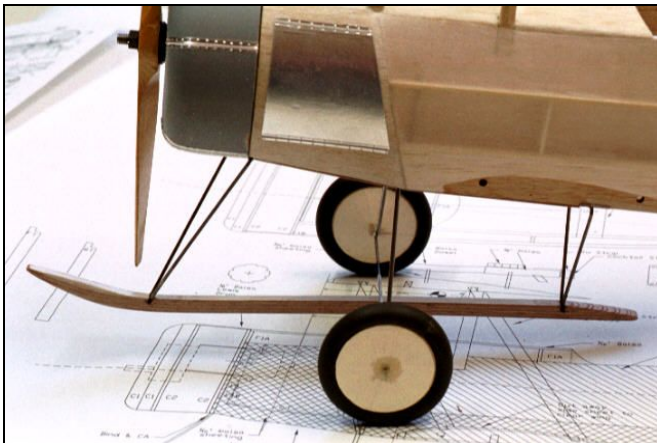




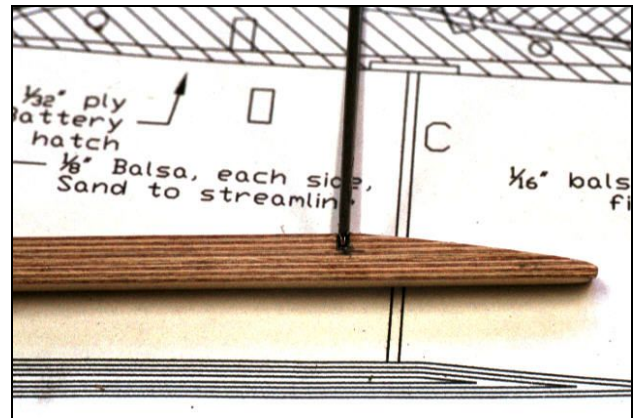
This is the skid in its final form after a little scroll saw and sandpaper work.



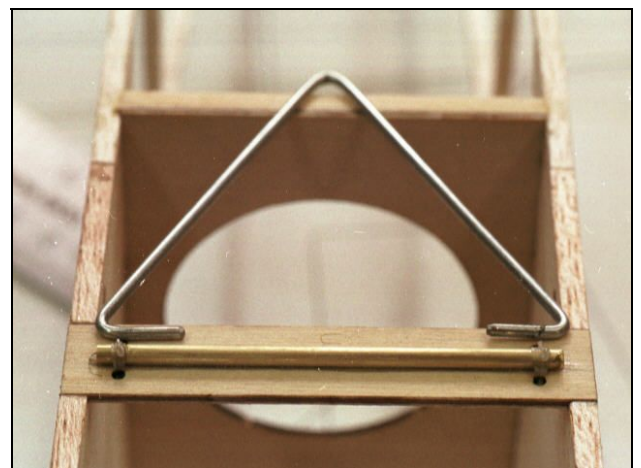
Noticed that the skid was mounted under the axle. That is the scale position. Peter Rake likes to mount them above the axle to avoid any potential ground handling problems.



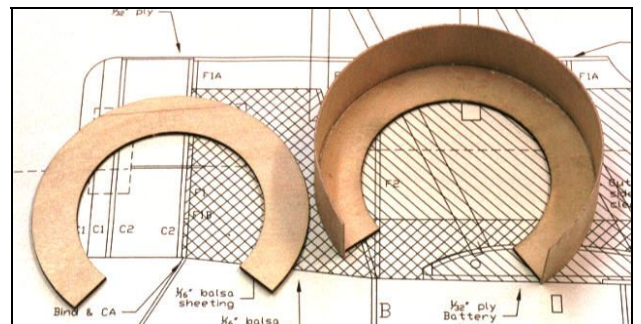
This is how the struts are attached to the skid. Grooves were cut and the skid epoxied with the struts into the grooves.



### COWL



Start the engine cowling by first using CA to attach some 1/32 ply around one of two identical ply formers.

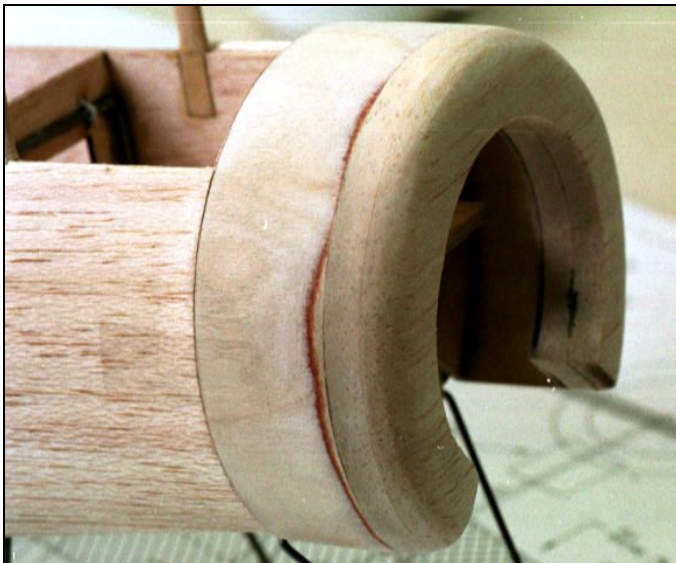


After gluing the other ply former to the other end of the cowl, glue two 1/4" pieces of balsa to the front of the cowl. Later sand the balsa to give the cowl its curved shape.





Here is the engine cowling sanded to shape.



This photo shows how the skid struts mount.

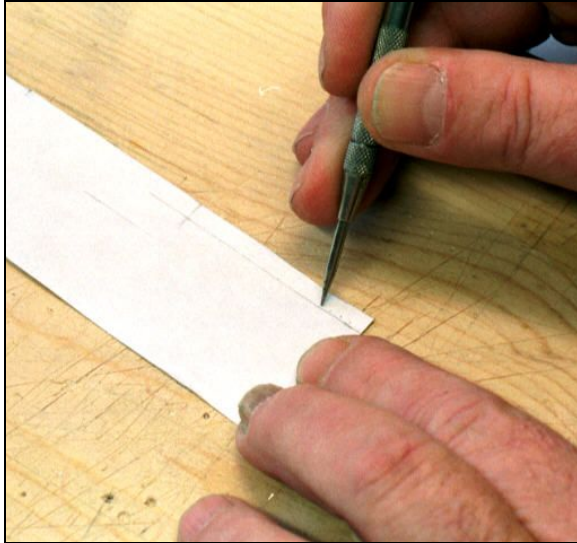
One distinctive feature of the AVRO 504 was that the cowling was assembled from four pieces that were riveted together. Here is a photo of the full size cowling and this attempt to mimic it.



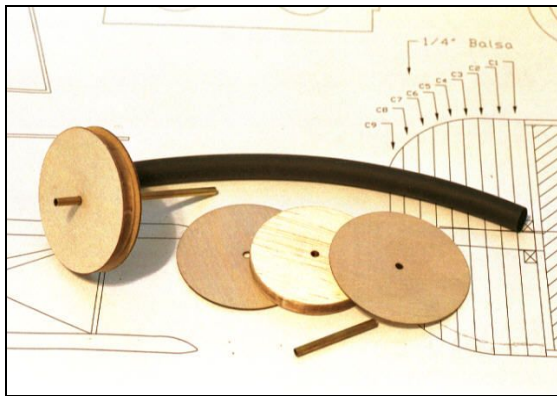
This was accomplished by first gluing a string to the cowl to simulate the ridge in the joint.



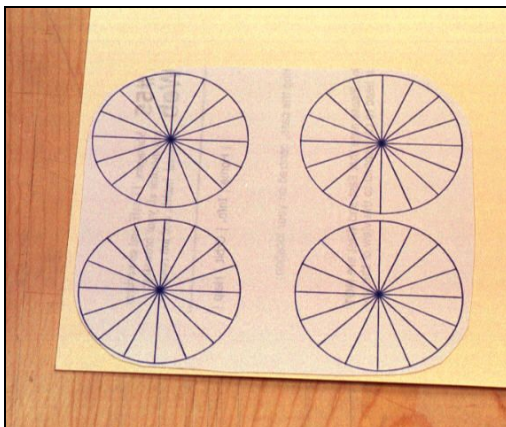
Then mark the size of strip needed on the back of a piece of aluminum ducting tape. Press two rows of rivets in from the backside with a dull awl. Cut out the strip, remove the backing paper and press it down over the string. This will all be painted battleship gray when painting time comes.



**WHEELS**



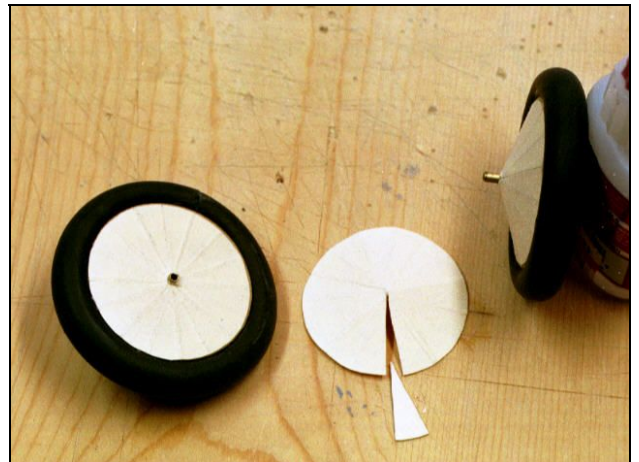
The wheel covers are from card stock. In this case a manila file folder. The pattern can be printed directly on the card stock or plotted onto paper and then applied to the card stock with a glue stick.



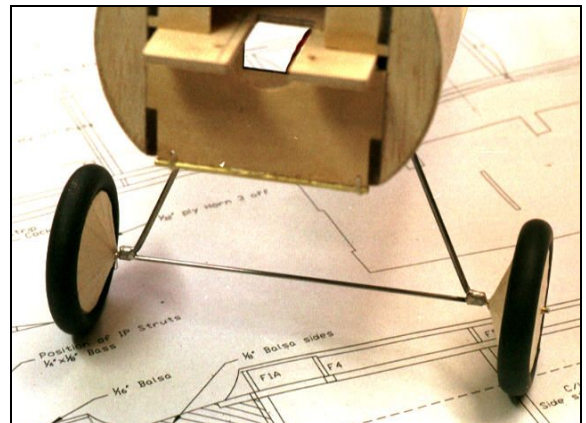
The next step is to go over the spokes rather heavily with a ballpoint pen. This leaves an impression on the other side of the cover that looks like spokes covered with fabric. Very effective.



Most of the photos and 3-views the prototype builder, Larry has seen of this aeroplane, show the inside of the wheel to be cone shaped and the outside to be flat. This is the way Larry did this model. On the outside of the wheel, simply glue the cover flat against the plywood disk. On the inside, cut out one spoke section and close the gap forming a cone. Secured this with tape.



Trim the hubs and axles to the proper lengths. The result is a very convincing set of WWI wheels.



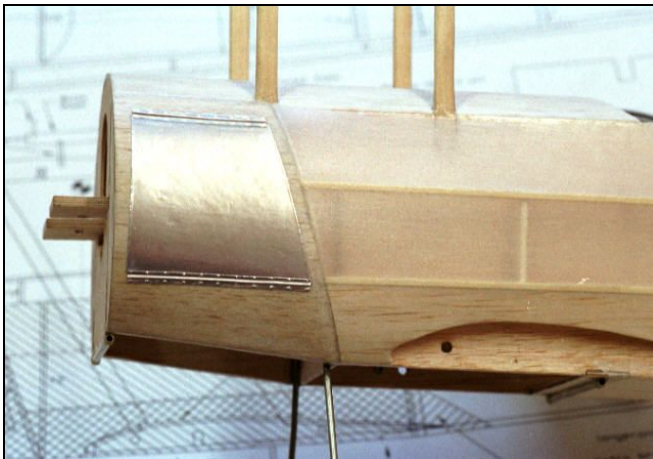
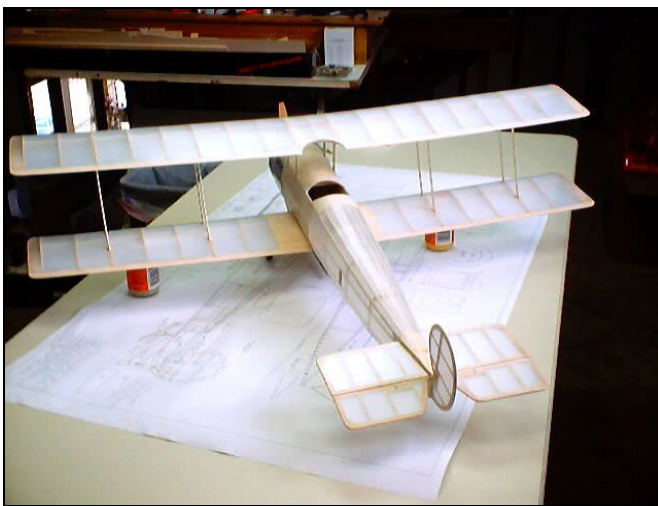


## COVERING

Here's a front quartering view.



A rear view.



The covering is Polyspan attached with SIG Stix-it and sealed with two coats of Minwax Polycrylic.

### HATCHES

These are the equipment and battery hatches on the bottom of the fuselage. The plan shows the opening in front of the UC struts is to be filled with 1/16" balsa. However, the

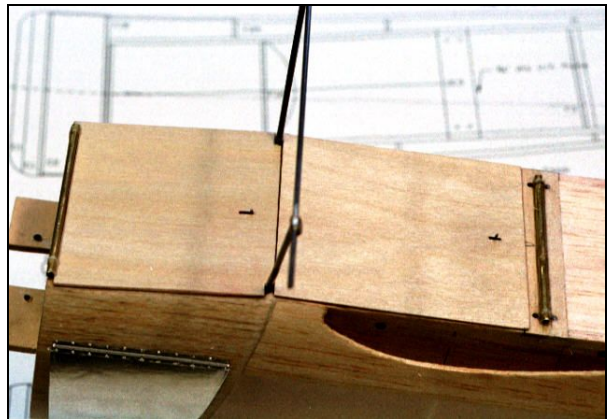
prototype builder, Larry needed access in this area for the gearbox since he is using a mini-Olympus. So two hatches were made, one in front of the struts for GB access and one behind the struts, per plan, for radio gear access. The batteries will be a whole lot easier to get to from the front hatch.

The hatches are held in front with pins made from toothpicks that go into holes in their respective bulkheads. The aft portion of the hatches is held in place with latches made from music wire and aluminum tubing. A balsa frames was made to keep the hatches aligned.

Here are the hatches open.



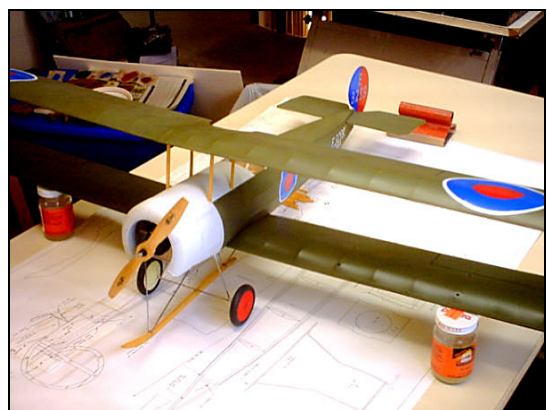
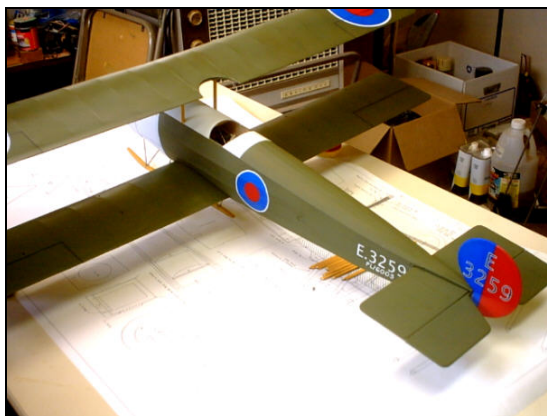
Here they are in the closed position.



Again, dry assembled and ready for painting.

### FINISHING





## FLYING

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.

The tail surfaces should not need excessive throws. 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:

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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 Bengtson Company  
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