

# T&J Models

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## *Monocoupe 90A*



### *Speed and Comfort for the Common Man*

In the late 1920's, Don A. Luscombe's Monocoupe introduced affordable and convenient performance to the light airplane market. Previously, this market was dominated by large, expensive, open-cockpit biplanes. The Monocoupe was compact and offered a closed cabin for comfort and convenience. The reverse curve of the fuselage became one of the signature characteristics of this family of sporty planes. Much lighter and cleaner than other aircraft of the time, the Monocoupes were also popular for racing. The longer and wider Model 90 was introduced in 1930, the A version having a 90hp Lambert R-266 radial engine.

Our Monocoupe is designed for a 30mm outrunner and 3S 3300mAh flight pack. Extensive use of laser cutting and self aligning structure provides a straight and light airframe with operational flaps.

## Construction

All of short kits require some level of modeling and flying experience. We do not recommend them as a first model to build or fly.

## Additional Materials

The following materials are required to complete this short kit (list may not be complete):

- (4) 1/16"x3"x36" Balsa Sheet
- (2) 1/4" Sq.x48" Balsa
- (3+) 1/4" Sq.x36" Balsa
- (2) 1/4"x1/2"x36" Balsa
- (8) 1/8"x 1/4"x36" Spruce or Basswood
- (?) 1/8" Sq.x36" Balsa
- (2) 1/8"x3"x36" Balsa
- (1?) 3/16" x36" Spruce Dowel

### Hardware:

- 2.75" Light Wheels
- Wheel Pant Mounting Hardware
- (20) #2 x 3/8" Wood Screws
- (4) Robart Medium Hinge Points
- 1/16" dia. Music Wire
- 5/32" dia. x 36" Music Wire
- 1/8" dia. x 36" Music Wire

## Initial Preparation

Laminate 4 layers of 1/16" balsa for the stabilizer and fin outlines. The finished laminations should be 1/8" thick.

Laminate 4 layers of 1/16" balsa for the wing tips. The finished laminations should be approximately 1/2" thick at the L.E. and may taper to the T.E.

Laminate two sets of main and rear spar joiners from 1/16" plywood. Mark the location of R3 on the joiners.



Laminate the strut mount doublers to the strut mount F10. Glue a 3/16" diameter magnet into the hole in one of the doublers.

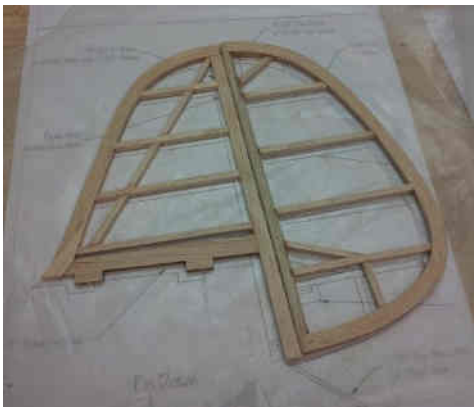
Laminate the two 1/16" plywood FWs together.

## Tail Feathers

The center of the stab and base of the fin are laser cut. Note that the L.E. of the fin is offset to the left to give some right rudder, so make sure the center of the stab is oriented correctly. Frame up the stab and fin over the plans with 1/8" thick stock as shown on the plans. Add 1/32" balsa to the L.E. of the stab and cap strip the structures with 1/32" balsa.



Flip the structures over and cap the other side with 1/32" balsa. The rudder and elevator L.E. dowels can be substituted with rectangular stock for non-scale hinges.



Glue the 1/16" plywood control horn in place. Sand the edges round and temporarily hinge the control surfaces.

### **Wings**

Cut 1/8"x1/4" spruce main spars and rear spars to length. If you have a warped spar, use it for the bottom spar with the warp curving up. Make left and right spar assemblies with the spar joiners glued between the spars. For the right wing, the joiners should be toward the L.E. and for the left wing the joiners should be toward the T.E.



Locate the spar assemblies over the plans. The bottom main spar will be slightly off the board, so just pin it to hold it in position. Use the dihedral gauge to set the angle of R3 and glue in place. Glue the remaining ribs in place using the flap and aileron mounts to space the R6's and R9's. Glue the 1/4" balsa L.E. in place. The 1/8" balsa T.E. is square to the board from R3 to R8, and then angled from R8 to the wing tip.



Add balsa gussets as shown on the plans. Cut and glue vertical grain sheer webs between the top and bottom main spars from R6 to the second R9. Trim the laminated wing tip to fit and glue in place. Glue the top sheeting as shown on the plans. Cap strip the ribs and T.E. with 1/16"x1/8" balsa.



Repeat for the other wing.



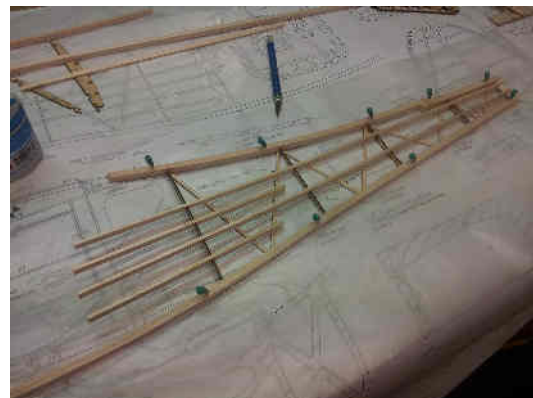
The flap and aileron T.E. are 1/16" basswood. Pin the flap and aileron T.E. in place. Cut 1/16" cap strips and glue to the T.E. For the aileron, prop up the tip at R11 and R12. Glue the 1/8" balsa flap and aileron L.E. in place. Add the flap and aileron ribs, and cap them with 1/16" balsa. Remove the flap and aileron from the board and glue the 1/16" plywood control horns in place with 1/8" ribs on each side.



The flaps are hinged on the bottom with the covering material, and the ailerons are hinged along the top.

### Fuselage

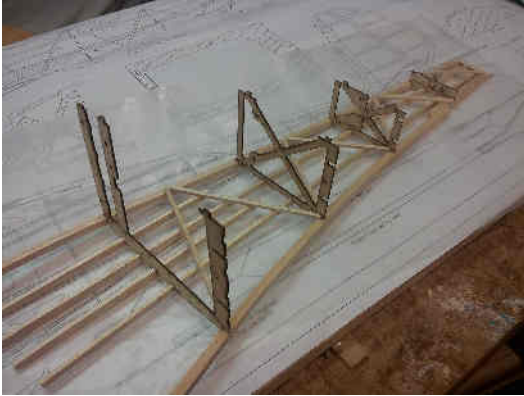
Prepare the top and bottom stringers as shown on the plans. A separate drawing of the right side is included so you can build both sides at once. Using the fuselage angle gauge, pin F5, F6, F7 and F8 over the plans. The formers should angle forward. Glue the 1/4" square and 1/8"x1/4" balsa stringers to the notches in each former leaving them long enough to reach forward of F4. Cut and glue 1/8" square balsa cross bracing as shown on the plans. The cross bracing should butt up to each former and be glued to each stringer it crosses.





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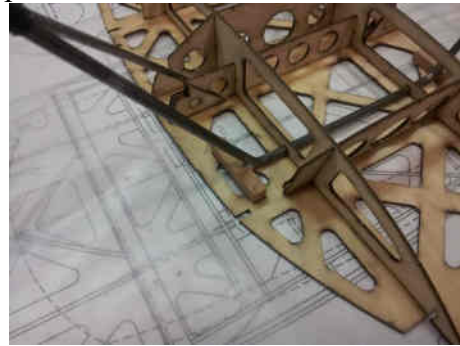
Unpin the structures from the board. Fit the top and bottom F5, F6, F7, F8 pieces to mate the two sides. Align the rear section of the fuselage over the plans and when satisfied, use thin CA at each puzzle joint to make them permanent.



Bend the forward landing gear from 5/32" music wire and the rear gear from 1/8" music wire.



Fit F3 and F4 onto the cabin floor. Fit the F9 assembly and F10 in place on the fuselage floor. Capture the two landing gear wires with the two F11 fuselage keels. Fit the cabin ceiling F3A in place. Making sure each piece is square and fully inserted in its slot, glue the forward fuselage structure together. Fit and glue F1, F1A, F1B, F1C and F2 to the fuselage. Glue the FW assembly in place. Add 1/4" balsa doublers to F3.



Bind the landing gear together with fine wire and solder.

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Assemble the forward spar box making sure it is wide enough to fit both main wing spars. Assemble the rear spar box to F4, again making sure the rear spars will fit. Fit the forward spar box to the cabin ceiling and use the R2's to position it. Use epoxy to glue the forward spar box in place. Glue R1, F4A's, and F5A's in place.

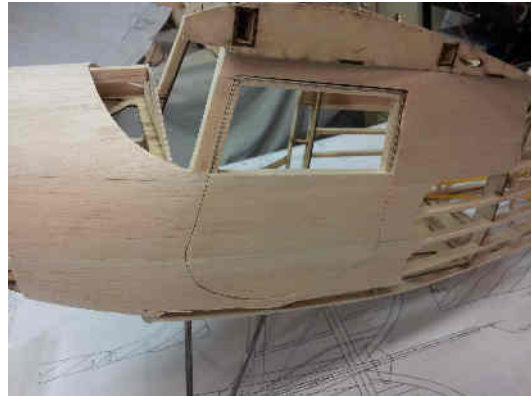
Glue the door frame pieces D1 through D9 in place using 1/64" plywood to space them.



Glue the front and rear fuselage together. The F5A's and F11's key on to F6.



Sheet the forward portion of the fuselage with 1/16" balsa. Glue 1/4" balsa L.E. to the fronts of the R2. Sheet the center of the wing from the forward spar box to the L.E. Add 1/16" balsa cap strips to the tops of the R2's, F4A's, and F5A's.



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Glue SC to front of F1 and sand to shape.



Cut the door free and hinge each with two Robart hinge points.



Glue together and laminate the three cowl rings CR1, CR2, and CR3.

Laminate 8 pairs of C4 from 1/8" balsa. Assemble the cowl structure. Plank the cowl with 1/16" or 3/32" balsa. Glue the cowl rings on the front and sand smooth. Two layers of 1/8" balsa are sanded to shape for the engine crankcase.



A template (7 cylinder, equally spaced) is provided for the cowl blisters. Cowl blisters can be sanded prior to or after gluing in place. The cowl is held in place with three screws through C1 into the firewall.





### Final Assembly

The wing struts are laser cut from 1/16" plywood and are faced on both sides with 1/32" balsa. Bend 1/16" music wire as shown on the plans. Notch the bottom spars between the R9's to clear the Z-bend. Glue the strut mounts in place.



Insert the wings into the fuselage. Temporarily insert the music wire ends into the struts and install to the wing and fuselage. The outboard ends of the struts can be trimmed as necessary. Rough up the music wire bits and apply slow cure epoxy to them. Reassemble the struts making sure the wing is not twisted.



Use balsa or filler to make the fillet around the landing gear and wing struts.

The wing is held in place by a pin or screw inserted through the spar box and spars.

The wheel pants are laminated from 1/8" balsa. The bottom edge of each piece should align around the wheel opening. Sand to shape and install mounting hardware of your choice.

Glue the tail feathers in place.



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Assemble the elevator push rod as shown on the plans and install. Use plastic tubes as guides for the rudder pull-pull cables.

Any iron on covering is suitable. The Prototype is covered with 21<sup>st</sup> Century Painted Fabric. There are plenty of classic color scheme possible. The windshield is cut from clear plastic from the template on the plans.



The prototype is flying with a Scorpion 3020-16 spinning a 12x6 Xoar wooden prop, a Castle Creations Phoenix 45 ESC, and a 3S 3300mAh LiPo pack. Since there are 6 servos, a separate switching BEC is used to power the radio.

The recommended servos are HS-65 for the elevator, rudder, and flaps. The ailerons can be HS-45's or HS65s. Recommended control throws are:

Ailerons: +/- 3/8"  
Flaps: 45 degrees  
Elevator: +/- 3/8"  
Rudder: +/- 1"  
Flap to Elevator Mix: 20% down



### **Flying**

The Monocoupe 90A is not a hard plane to fly but it is not a trainer being a tail dragger. Take offs require rudder input to keep it tracking straight. Once in the air you'll find that it can do basic aerobatics including loops, rolls, and stall turns. The rudder is very effective, and the roll rate is typical for a high wing plane.

The stall is very gentle, and depending on the elevator throws non-existent.

The flaps are not necessary, but add another element of flight to experiment with. Without elevator input, deploying the flaps will cause the 'coupe to nose up, so down elevator is needed to maintain level flight. I have the flaps setup on a flight mode switch with the elevator trim separate for each mode. This allows for quick setup of the elevator compensation for flaps. As you deploy the flaps in the different flight modes, simply add down elevator trim to maintain level flight. When the flaps are retracted, the elevator trim returns to normal flight mode trim setting.

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With the flaps at half or full, flybys are very slow. Just make sure to throttle back up before fully retracting the flaps.

Landings can be performed with or without flaps. I like to keep a little power on all the way to touch down since it seems to help the roll out.



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