

CASA C-101 AVIOJET

CONSTRUCTION MANUAL Version 2.1



SCALE	APPROX 1:13.5
WING SPAN	31 INCHES
WEIGHT	22.5 OZS
WING AREA	170 SQ INS
WING AIRFOIL	SELIG 3021
WING LOADING	19 OZS/SQ FT
FAN	50MM (e.g. Dr Mad Thrust 50mm, XRP-50mm, WeMoTec 50mm)
CELLS	3S – 4S LiPo1000mAh - 1300mAh
POWER required	180W +



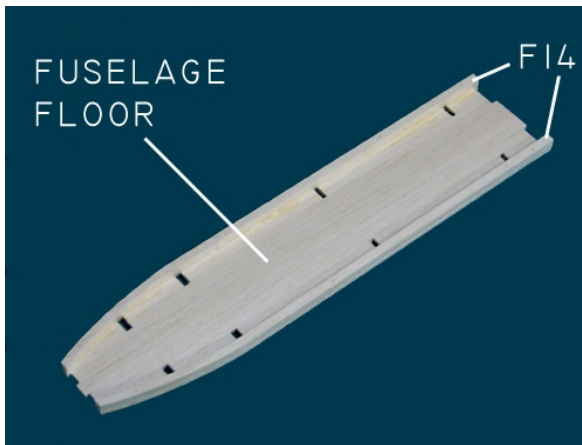
TIMELESS WINGS
FLYING SCALE AVIATION

PRELIMINARY NOTES

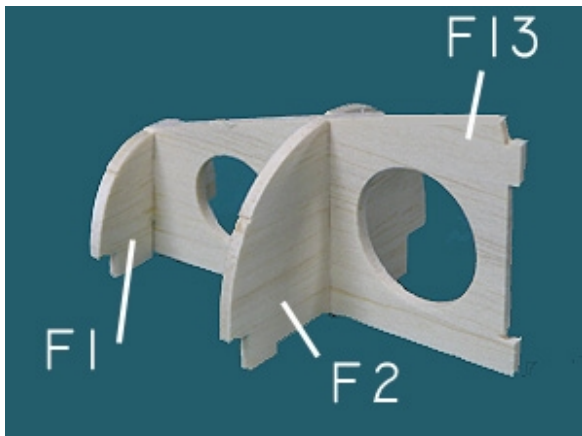
- Before commencing construction, please take the time to mark the part numbers on the CNC-cut balsa and ply sheets, referring to the Parts Location Guide included in this kit. The full-size wing plan is taped together from the three included sheets of A4 paper. The reduced-scale fuselage side view and top view contain full-size drawings of the noseblock, to assist shaping.
- Unless otherwise noted, thin cyanoacrylate glue is the adhesive of choice for construction of this model. Other wood glues such as PVA and Aliphatic Resin are also suitable, but will require a longer drying time.
- This model is optimised around 50mm fans with brushless motors and power input of 180W and up.
- There are very many photographs of the full-size CASA Aviojet on the Internet, and they are an invaluable reference source when building this model. A search using combinations of the keywords “CASA C-101 AVIOJET” will provide a multitude of pictures which will assist both constructing and detailing the model.
- For those desiring further details of the full-size machine, there is a book titled “CASA Aviojet C-101” (ISBN 84-95493-05-5) published in Spain by Reserva Anticipada, S.L., in the Spanish language. This book contains dozens of hitherto unpublished photographs of the Aviojet, making it useful even to non-Spanish-speakers.

FORWARD FUSELAGE CONSTRUCTION

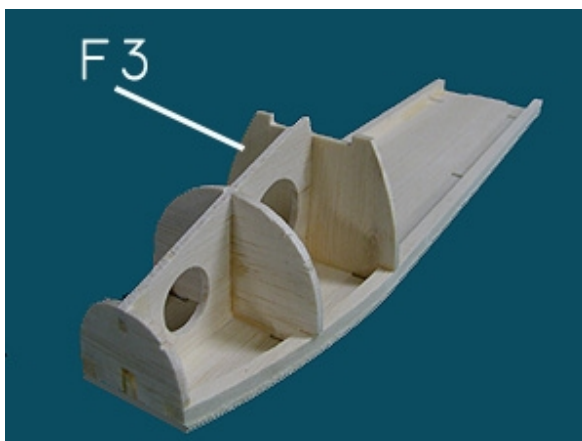
- Glue two F14 FWD LONGERONS on top of FUSELAGE FLOOR.



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- Insert F1 and F2 in place on FUSELAGE FORMER F13.



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- Insert F3 into F13, then glue all formers to the FUSELAGE FLOOR and F13.



- Glue F6A to FRONT of F6.

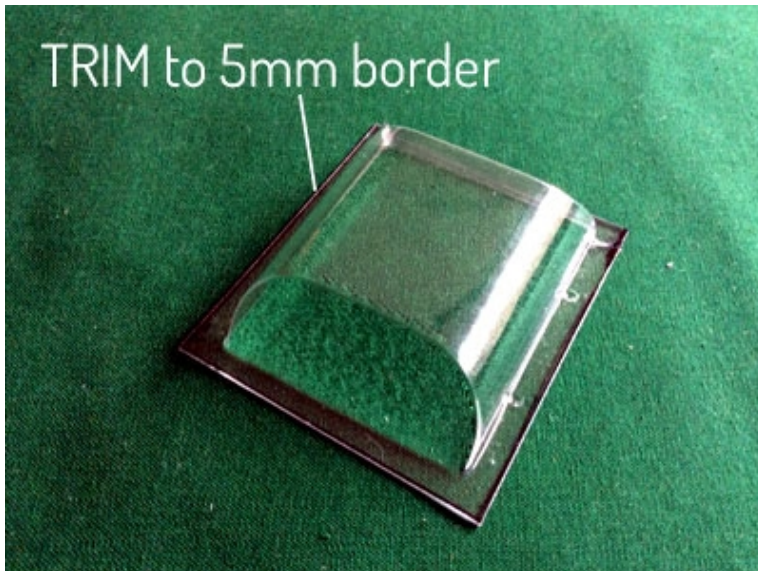


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- Assemble F4, F5, F6 and F15 in place as shown in the photograph below, and when aligned correctly, glue in position.

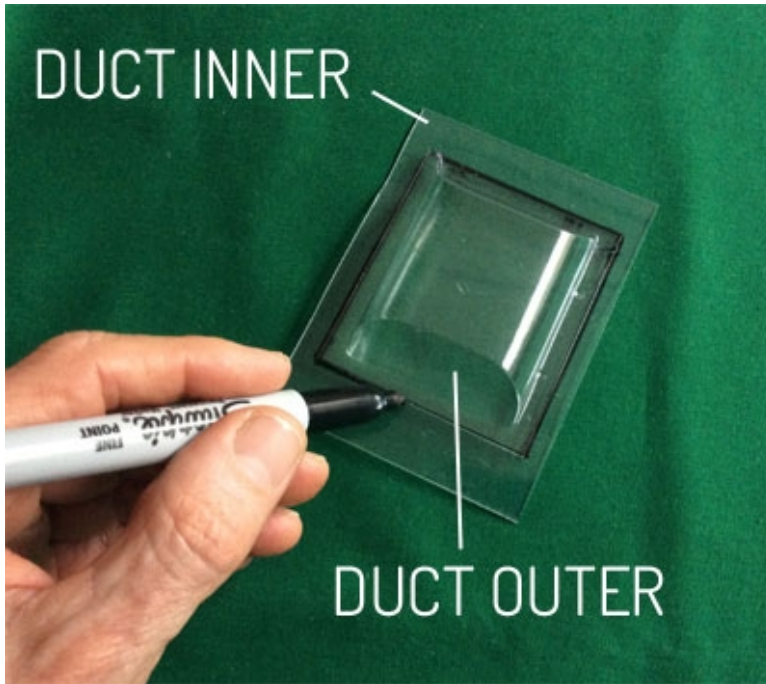


INLET DUCT CONSTRUCTION and INSTALLATION

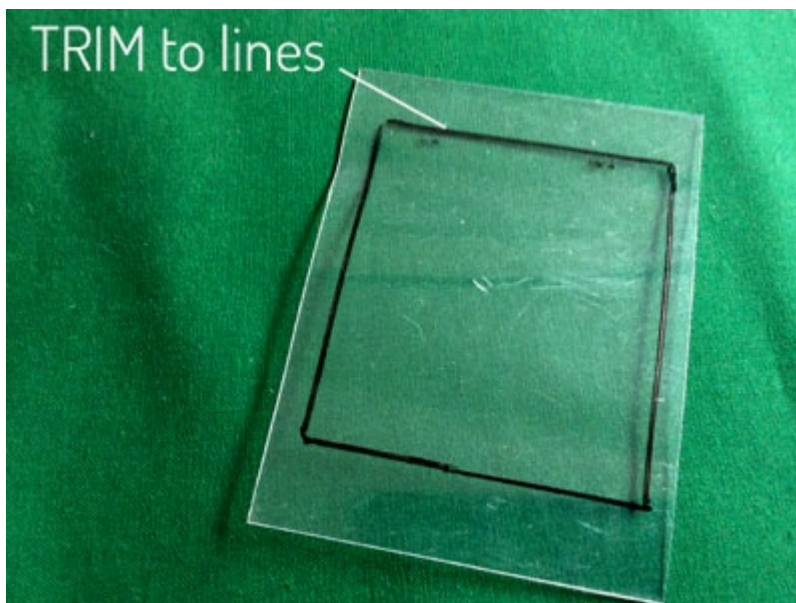
- Using a permanent marker pen, draw a 5mm wide border around all sides of the 2 vac-formed PETG outer duct walls, as shown in the photograph below. Using a sharp blade and a steel rule, trim to the border.



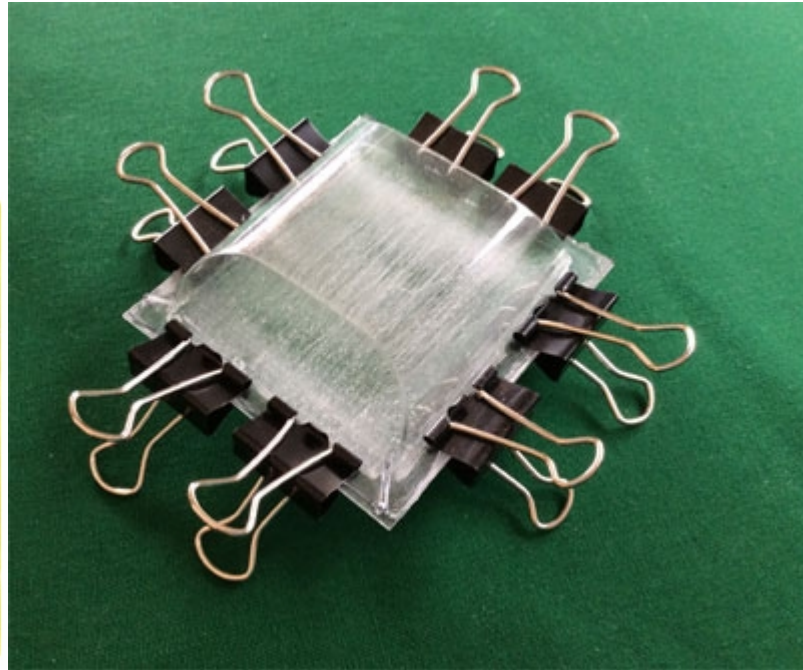
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- Place the trimmed duct outer walls onto the flat 0.5mm PETG sheet which forms the duct inner walls, and trace around the perimeter of the DUCT OUTER onto the DUCT INNER as shown.



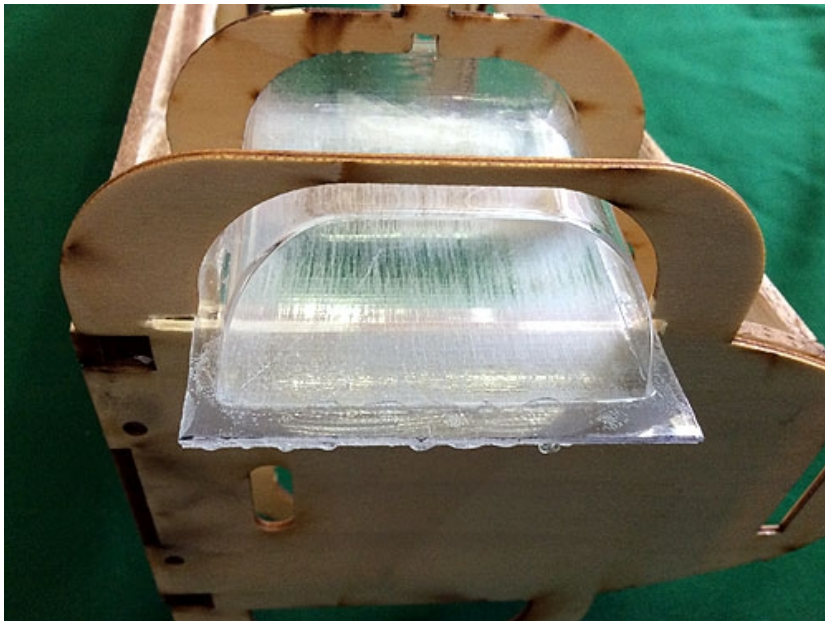
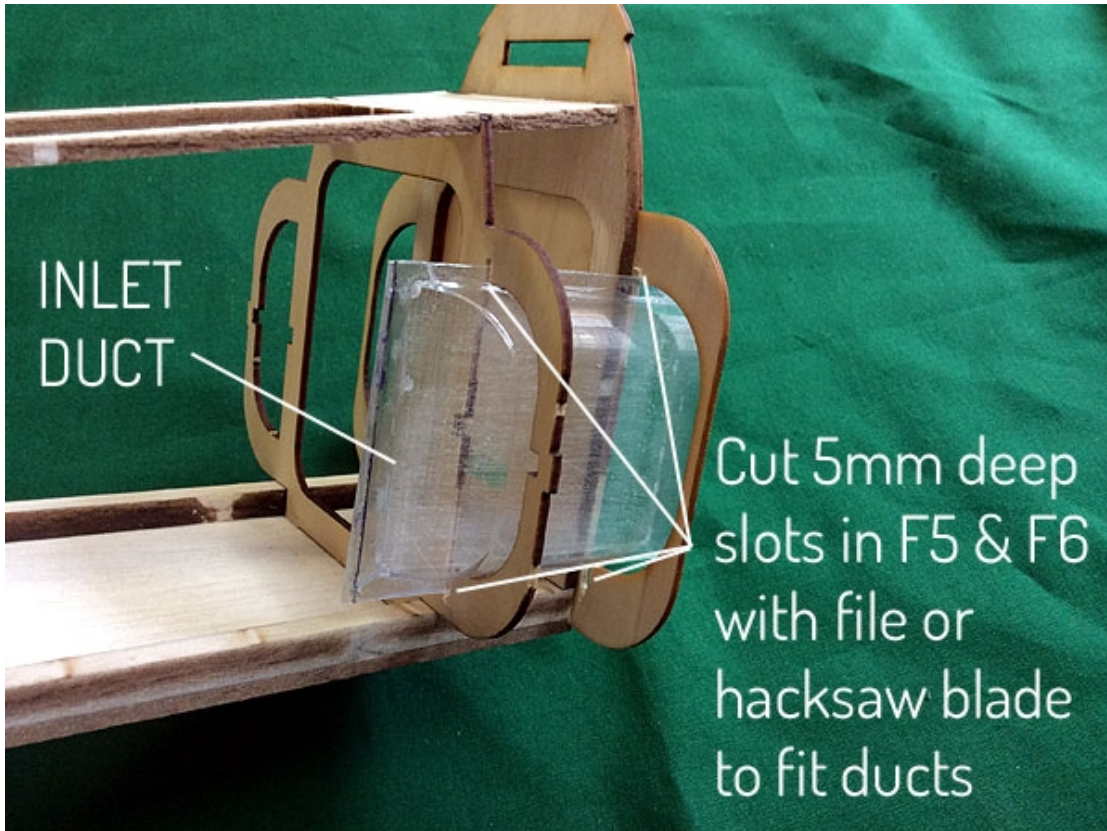
- The resulting rectangle should look like the picture below. Trim to the lines, as before.



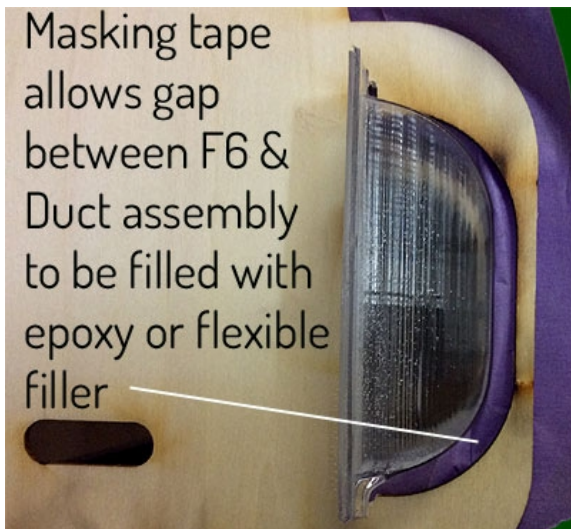
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- Using 80-grit sandpaper, roughen the ducting where the surfaces mate, then glue together with a good quality plastics glue that is designed for PETG. We use and recommend UHU All-Plastics Glue. Use small bulldog clips to hold the parts together while the glue dries.



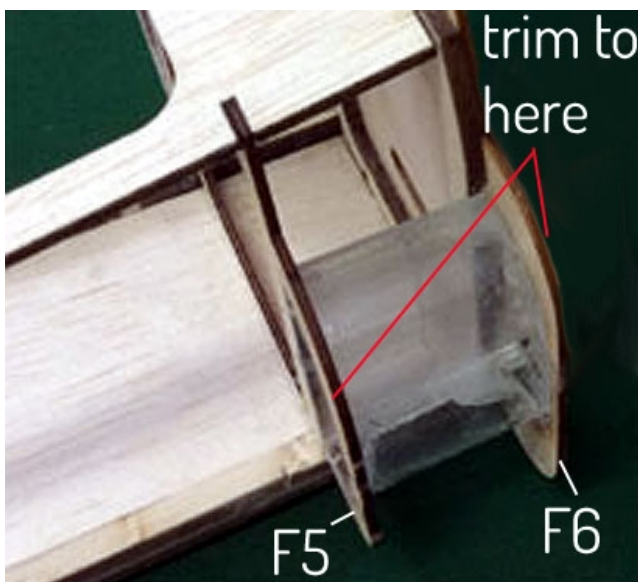
- Using a hacksaw blade or flat file, make vertical slots 5mm long in the inside edge of F5 & F6 to allow the ducting to slide into position, so there is a similar amount protruding front and back. Glue in position with UHU All Plastics glue or similar.
- Note: the inboard edge of the ducting sits flush against F6, the gap around the outboard side of the duct at F6 is filled in the next step.



- Use masking tape to form a "dam" on the front face of F6, then fill the void between the former and the duct with epoxy or flexible filler. Any residual void at the back of F5 may be filled now too.

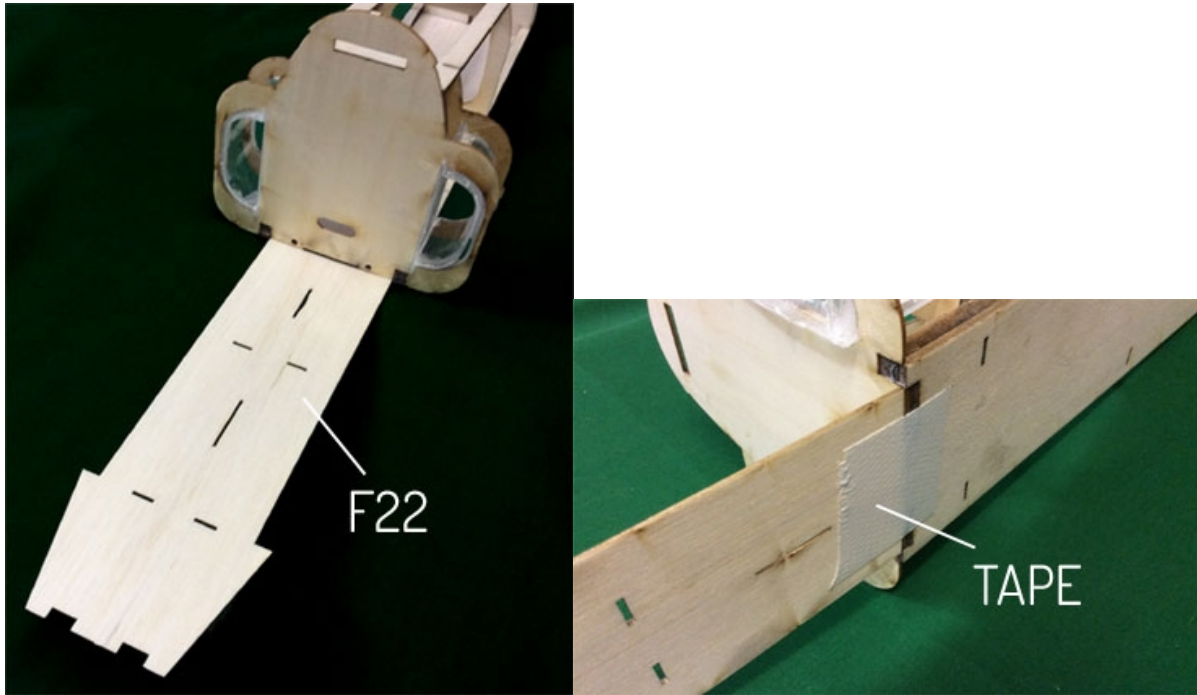


- The ducts are now trimmed so that they are flush with the front of F5, and flush or a few mm protruding from the rear of F6. You may need the following tools:

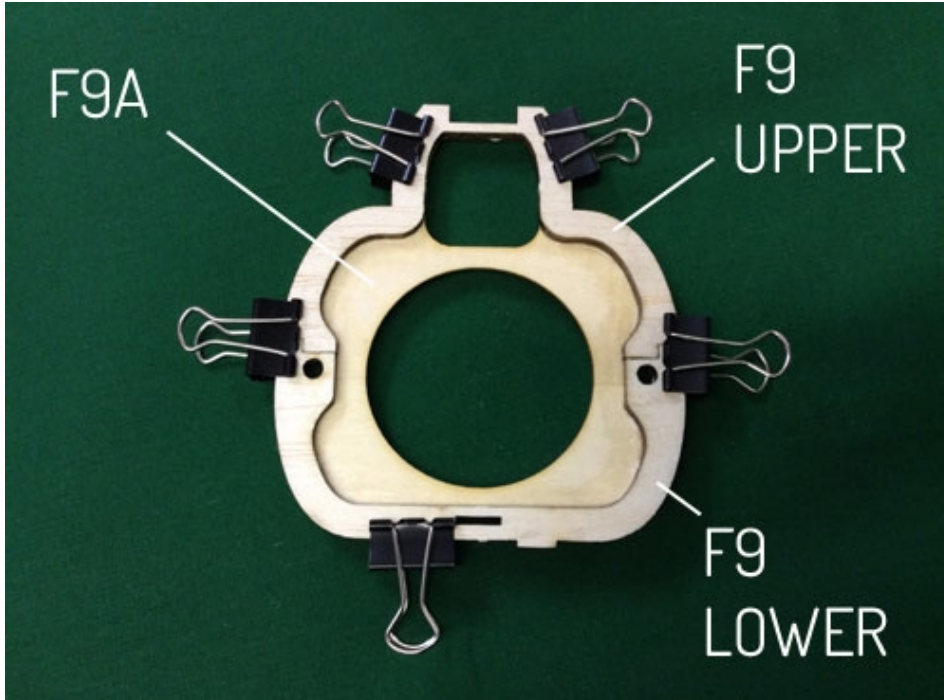


MID-FUSELAGE CONSTRUCTION

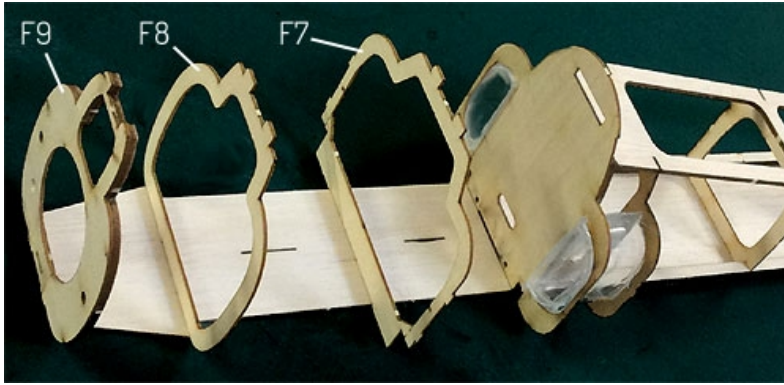
- F22 is temporarily attached centrally to the underside of the Fuselage Floor with tape, as shown in the two photos below. **IMPORTANT - DO NOT GLUE!**



- Laminate F9 as shown – the spring clips are useful holding the assembly in position until the glue dries. The balsa parts go to the front (important!).



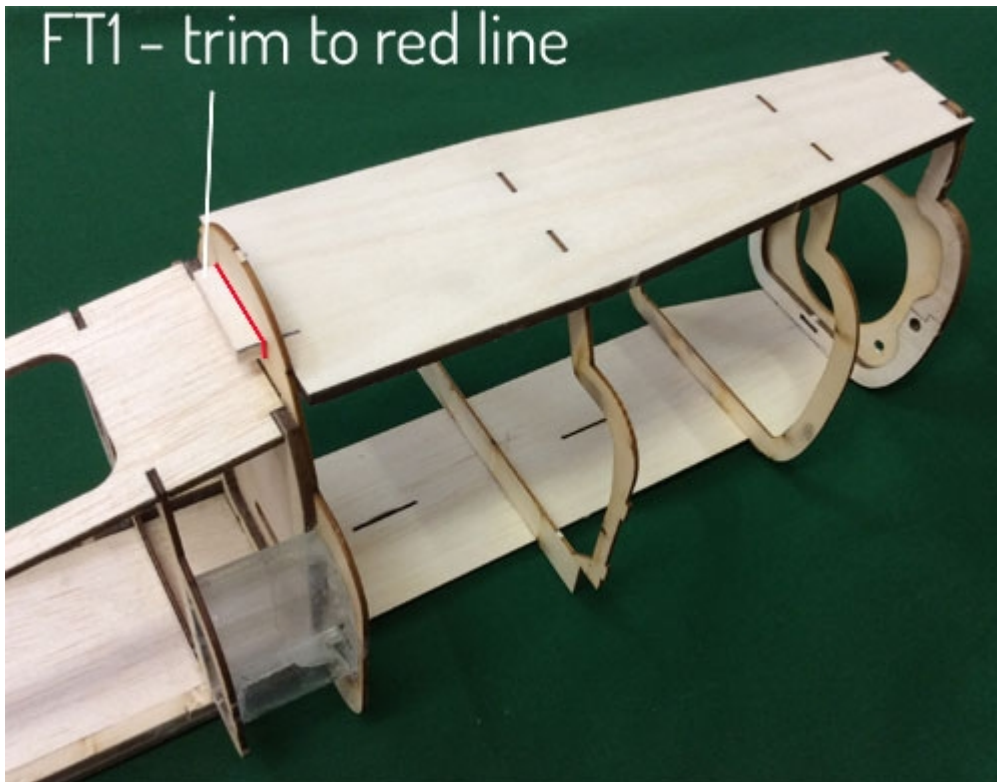
- Place F7, F8 and F9 in position on F22. Do not glue just yet.



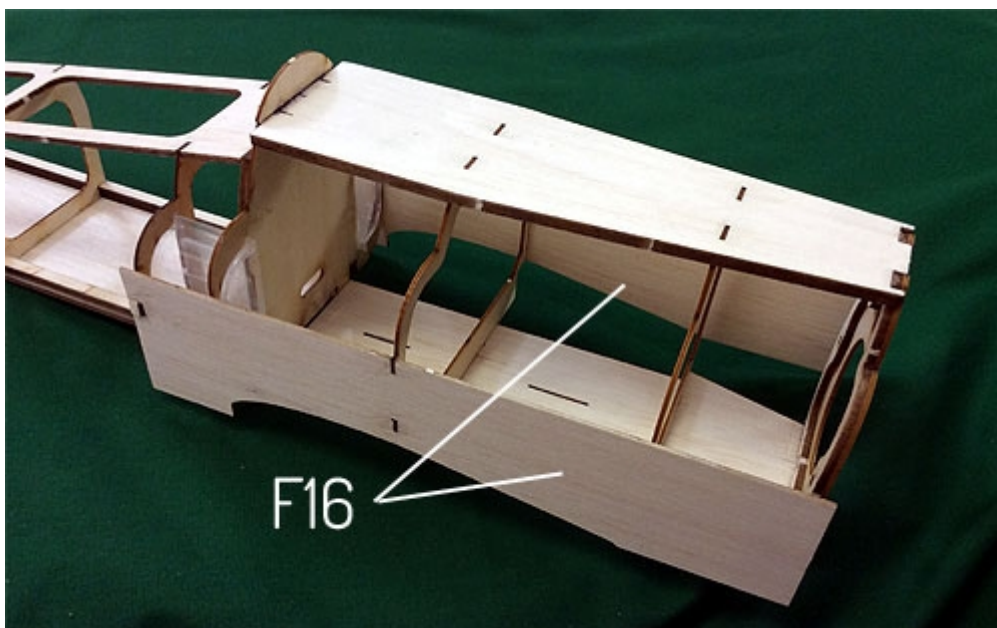
- FT1 needs to be slightly modified before it can be used - a 30mm wide tab needs to be added centrally to the front end - as shown in the before and after pictures below:



- Glue FT1 to top of formers F6, F7, F8 & F9. Trim FT1 to the red line (flush with the front of F6). A small amount of sanding may be necessary to ensure the fit of this part.



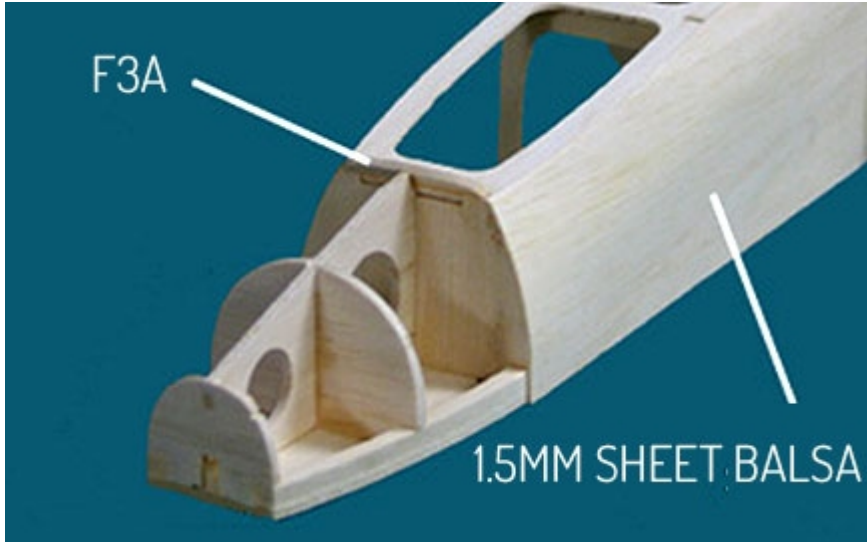
- Glue the two parts F16 to both sides of the fuselage assembly as shown below, only gluing the areas where the flat parts of the formers make contact with the sheet balsa at this stage. Remove from the building board and wrap (curve) both F16 pieces around the formers and glue in position.



- Trim/remove F22 between F6 & F8. The section of F22 between F8 & F9 remains, trimmed flush with the front of F8.
- Laminate the WING BOLT PLATE WB1 from the three pieces, then fit the 4mm blind nut by giving a gentle tap into the hole with a hammer. Glue into place centrally in the front of F8 as shown.



- Turning our attention to the forward fuselage now, sheet between the front of F5 and F3 with 1.5mm balsa, both sides
- Bevel the bottom of F3A, and glue in place.

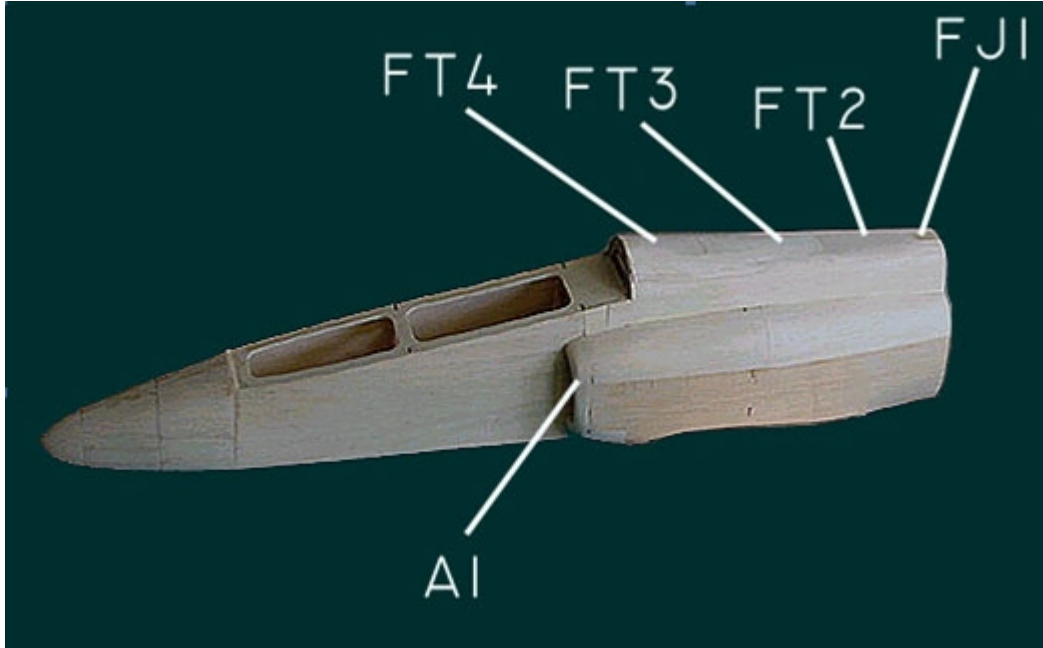


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- Each side of the forward fuselage is now sheeted with 1.5mm balsa. Trace the shape required with a piece of paper first, using a separate piece of balsa between each former. Scrap pieces of balsa glued to the formers will support the sheet during assembly.
 - Fit the NOSEBLOCK, which can now be roughly shaped.



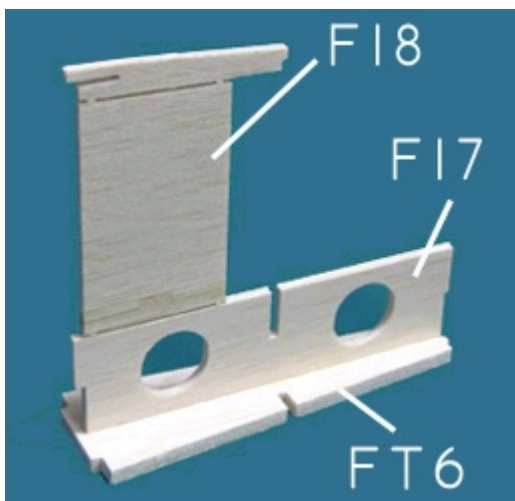
- Study the plan and photos, then fit FUSELAGE TOP DECKING FT2, FT3, and FT4 in position (as well as FJ1 and FJ4), then shape roughly so that the 1.5mm side sheeting can be added. Once this sheeting has been added and trimmed, the AIR INTAKES (AI#1,2,3 & 4) can be laminated (two per side), fitted into position, then shaped. The lower section of F7 is removed to allow for wing positioning.

The fuselage so far should look like below:

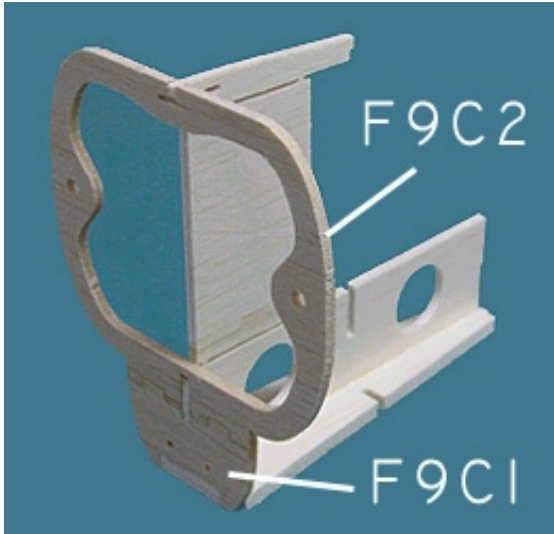


REAR FUSELAGE CONSTRUCTION

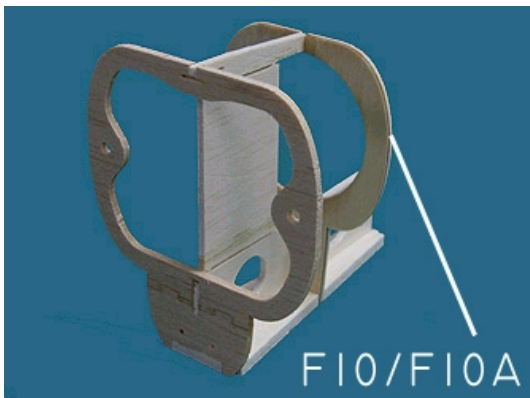
10. Glue F17 to F18, then glue this assembly to FT6 as shown. The rear fuselage is initially assembled with the components upside-down on the building board. Later photos will make this obvious.



- Glue former F9C2 to F9C1, then glue this structure to the front of FT6 and formers F17 and F18 as shown.



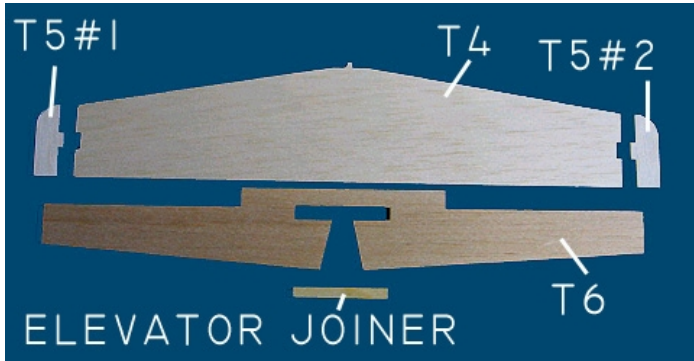
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- Laminate F10 to F10A, then glue in place as shown (ply side may be forward or rearward, it doesn't matter which).



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- Glue F11 in place then F20. Turn up the right way, and it will look like this:



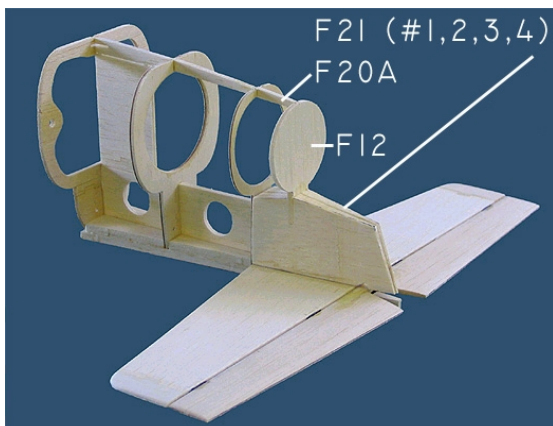
- Identify the parts that will be used in the tailplane/elevator construction (below).
Glue T5#1 and T5#2 to T4, the ELEVATOR JOINER to T6, then cut off the section of T6 forward of the leading edge of the elevator. Sand the whole tailplane/elevator assembly to shape, then hinge, using CA hinges.



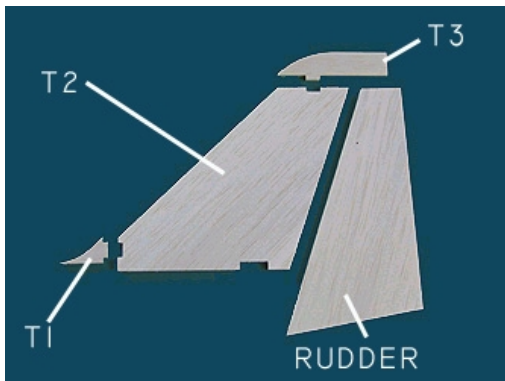
- Referring to the side view on the plans, cut a small section out of FT5 to allow movement of the elevators, then glue the tailplane in place on the lower side of FT5.



- Laminate the four pieces of F21 together, roughly shape, then glue into position as shown. Now glue F12 into position, followed by F20A.



- Identify the parts of the fin and rudder, then glue together. Note that the rudder may be hinged, if a rudder is required (not necessary for normal flight manoeuvres).

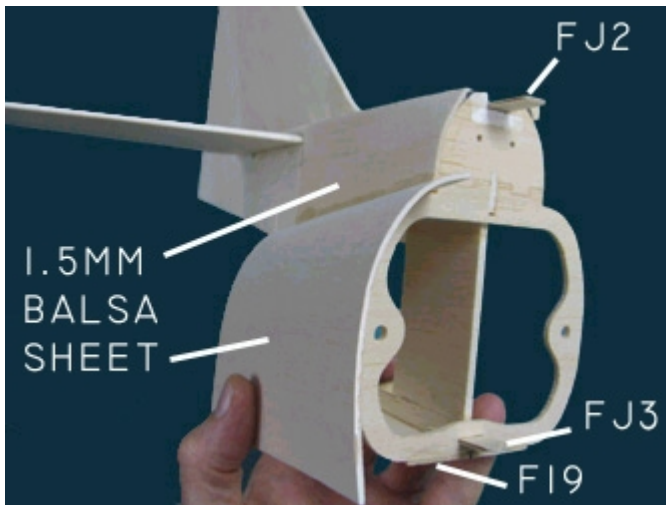


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- The fin/rudder assembly may now be glued in place, so the rear fuselage will look like below:

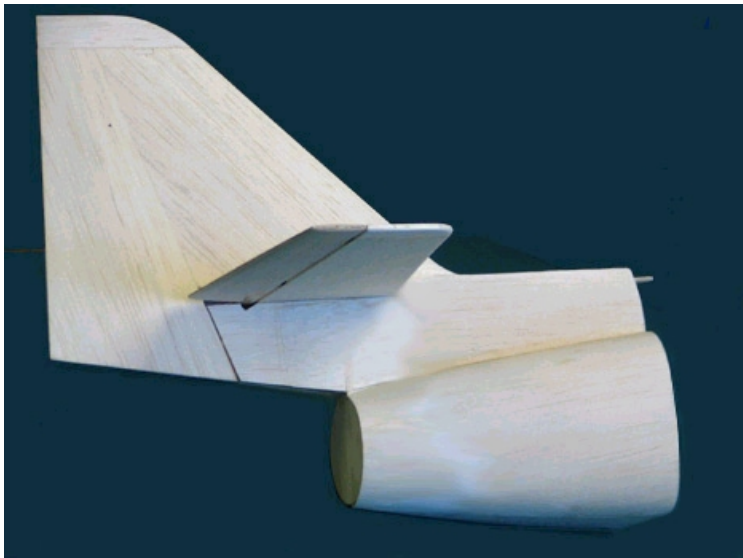


- The elevator pushrod sleeve is now fitted to the holes in the right hand side of the rear fuselage assembly. This is first prepared by using a thicker piece of piano wire threaded through the formers to “drill” through the F21 assembly, leaving a path for the sleeve, which is now glued in place. See the photographs later in this manual showing the installed elevator servo/pushrod for clarification.
- The FUSELAGE TOP DECKING is bevelled to accept the side sheets, the remainder of the 1.5mm balsa sheet is now added, from top to bottom. Scrap pieces of balsa may be cyanoed to adjoining sheets to assist this process. Depending on personal preference, these sheets may done in one piece per side (cut and fluted where necessary to fit) or in several pieces.

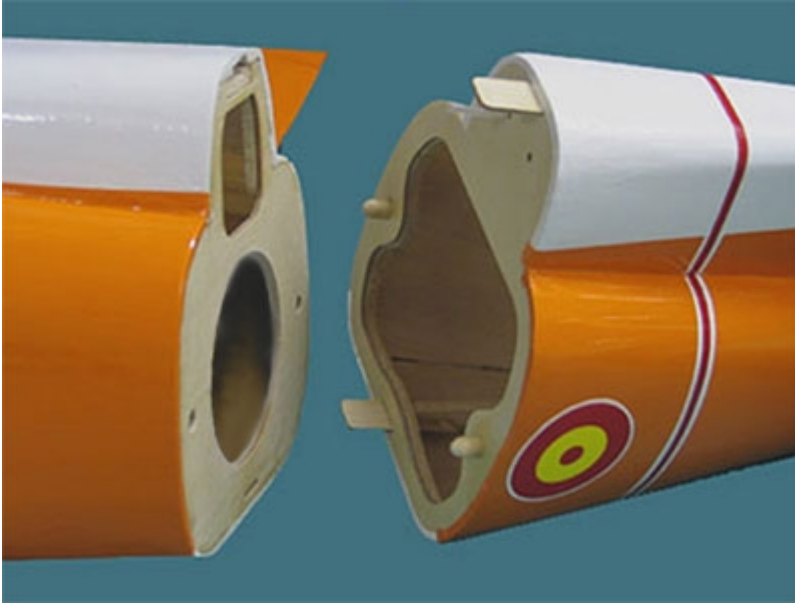
- Glue FUSELAGE JOINERS FJ2 and FJ3 in their respective places as shown in the photographs and on the plans.



- After completing the steps outlined above, the end result looks like this:



- FIN FILLETS (FF) may be added now and shaped. Refer to photos of the full-size to assist.
- Glue TAILPIPE RING TP1 in position at the rear of F12, then glue F9B to the front of the rear fuselage assembly. Note that the slots for the ply FUSELAGE JOINERS may need to be enlarged slightly with a flat file to get a comfortable fit. Ensure that the sleeve for the elevator pushrod is protruding through this former. Fit the 6.5mm LOCATING DOWELS and glue into place. (See assembled and covered photo below for details).

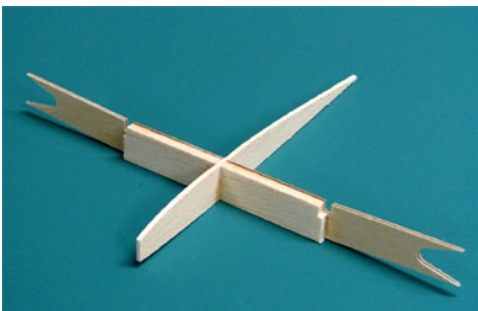


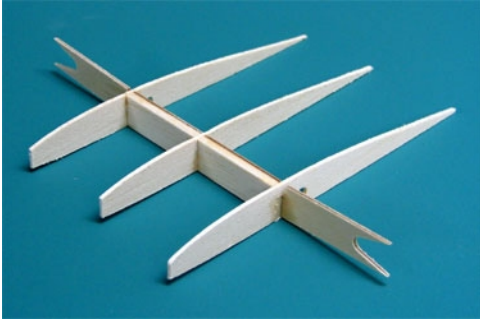
WING CONSTRUCTION

NOTE: Due to the thinness of the wings it is necessary to use sub-micro servos of 8mm maximum thickness - good quality servos such as the Dymond D47 or some of the 8mm digital servos that are now available.

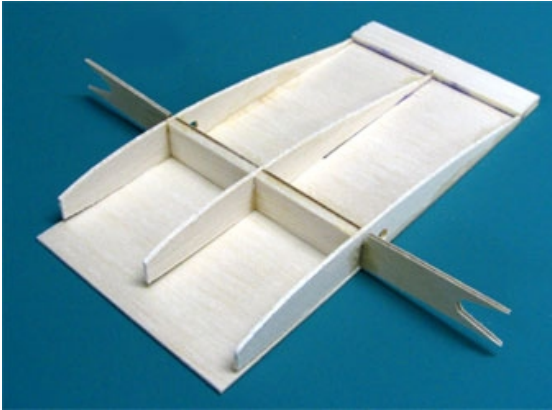
Holes in the ribs for the servo leads have not been cut. These can be done using a sharpened piece of brass tubing before assembly begins or using a Dremel tool after the ribs have been added to the bottom sheet.

- Glue CENTRE-SECTION SPAR (CS1) to the front of DIHEDRAL BRACE (WD1).
- Glue the 3 CENTRE-SECTION RIBS (R1) in place on this assembly, using the plan to confirm squareness.

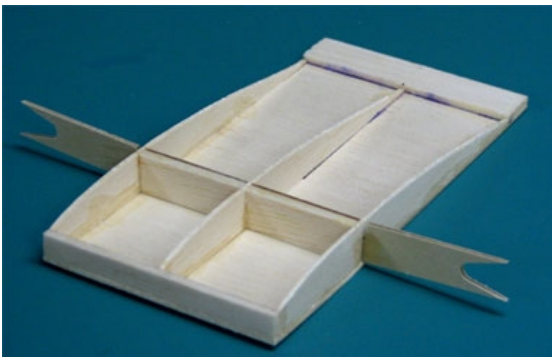




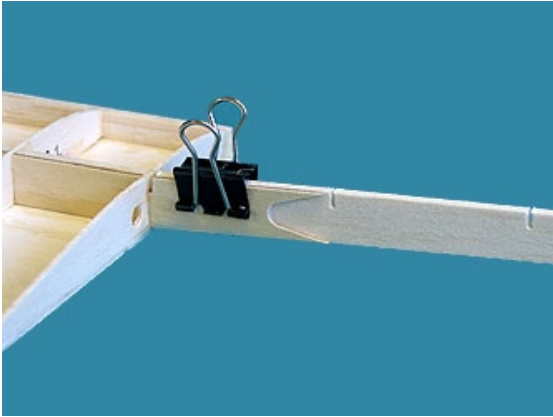
- Cut and join 1.5mm balsa sheet to make the lower centre-section sheeting (make slightly over-size in front to allow for wrapping around LE). Mark out the position of ribs, spar assembly and CENTRE-SECTION TRAILING EDGE (CS2).
- Glue CENTRE-SECTION TRAILING EDGE (CS2) on TOP of the lower centre-section sheeting (the total thickness at the trailing edge before shaping is thus 4.5mm). Align the assemblies as shown below and glue in place, noting that glue is not applied to the section of ribs in front of the spar at this stage.



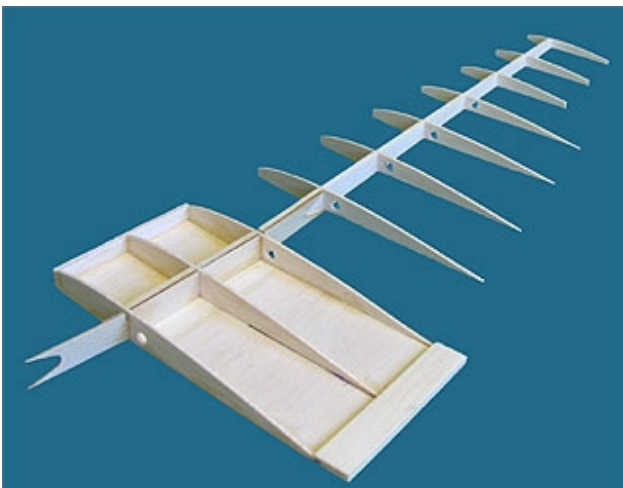
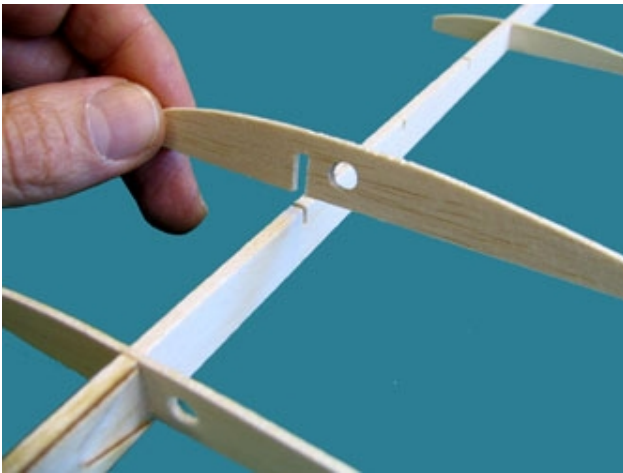
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- Glue CENTRE-SECTION FALSE LEADING EDGE (CS3) in place, then shape to match curvature of ribs. Glue lower centre-section sheeting to forward ribs and CS3, and when dry, trim flush.



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- Join the starboard wing spar to the centre-section using 5-minute epoxy. A small spring clip is useful here to hold the parts in place while drying.



- Slot WING RIBS (W2-W8) on the STARBOARD WING SPAR (S1). DO NOT GLUE at this stage.



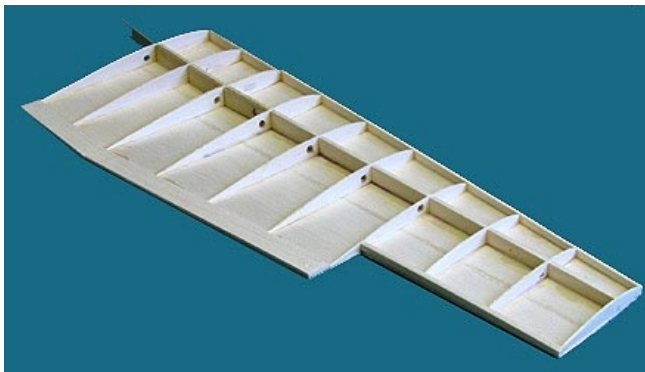
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- Prepare the starboard wing lower surface sheeting in the same manner as the centre-section sheeting, then glue WING TE (RHS) in place on top of the sheeting. Mark out the positions of ribs and spars, then pin to building board.



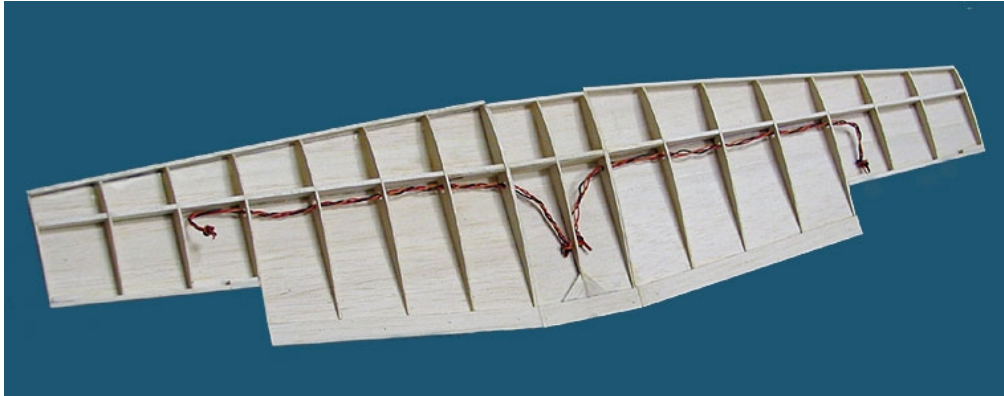
- Glue RIGHT AILERON SPAR (S2) in position. Carefully align the centre section/RHS wing spar/rib assembly over the RHS wing lower sheeting, then glue in place (noting that, once again, the parts of the ribs forward of the spar are not glued at this stage). PVA glue is most suitable for this task.



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- Glue ROOT RIB (R1) in position, followed by the WING FALSE LEADING EDGE (L1). Shape L1 to conform with the rib curvature then glue the lower sheeting to the ribs and L1. When dry, trim flush. The results so far should look like below:



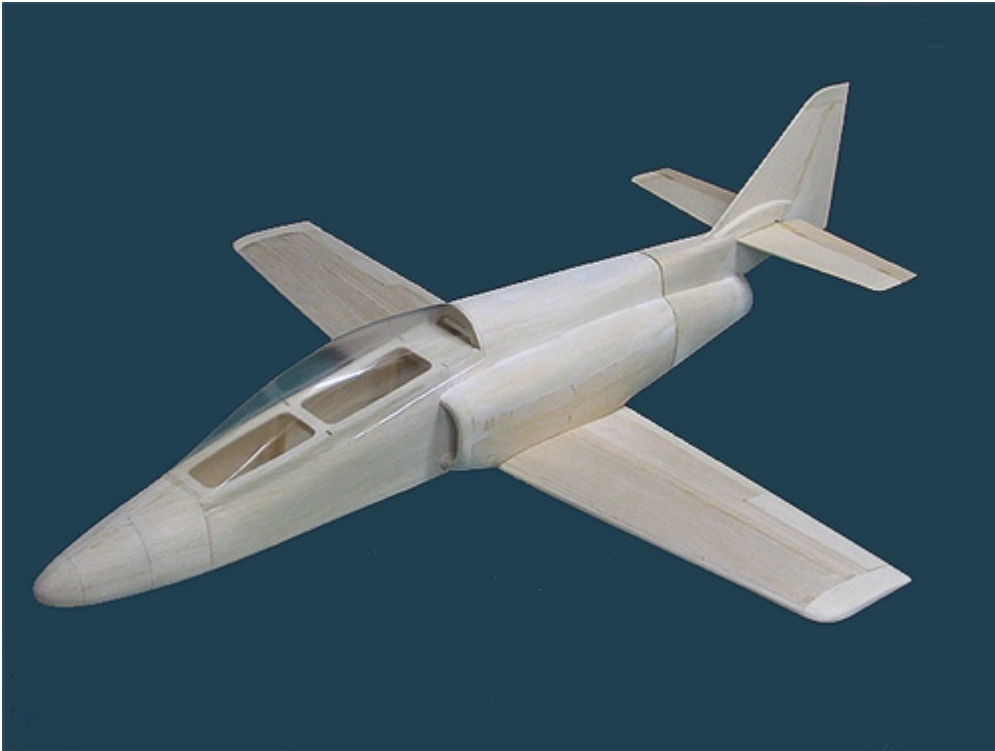
- Build the LHS wing in the same way as the RHS. Add scrap balsa gussets for the middle centre-section rib, as well as for the aileron hinges. Install the aileron servo extension leads.



- Cutouts and structure for the aileron servo mountings are best added now. This varies according to builder preference – see the plans and photo below to see how the prototype was done.



- Sheet the top of the wings and centre-section with 1.5mm balsa, making provision for the aileron extension leads to be routed through the centre-section sheet.
 - Laminate the WING TIPS (WT1) then glue in position, along with CS4 (NOTE: CS4 in the kit is erroneously made from 3mm balsa, instead of 6.5mm balsa, so please laminate with scrap 3mm balsa to give correct thickness) and CS5 (lower surface of the wing). The AILERONS are now temporarily hinged, and the whole wing is shaped and smoothed.
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- Fit the 3mm dowels in the leading edge of the wing and carefully measure the rear of wing to make hole for wing bolt to pass through, then glue CS5 to lower surface of wing.



- Make up the canopy parts from C1, C2, the CANOPY FLOOR and CANOPY, then the major construction is done! Congratulations!

COVERING and FITOUT

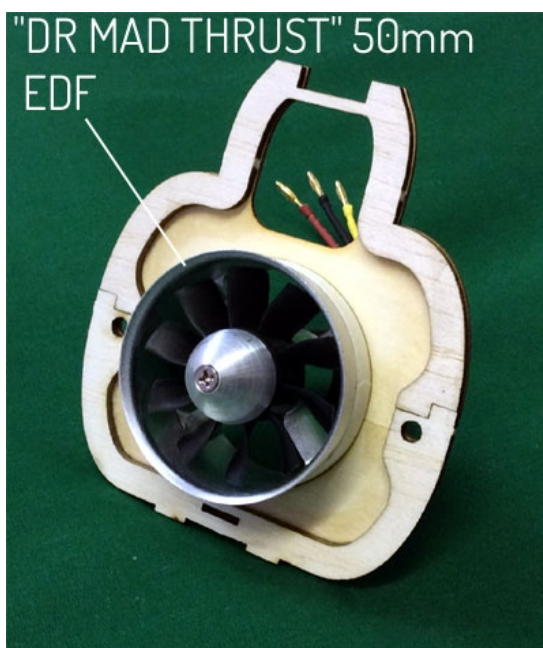
- The prototype model was covered in iron-on film, however 3/4oz glass-cloth with water-based polyurethane or epoxy covering would also be suitable, just be careful about weight. Cut and fit decals as shown in the photos in this manual.
- The canopy is best side-hinged with clear packing tape if the model is film-covered.
- Make sure the control surfaces are securely fitted, with cyano-type hinges or clear tape. Confirm that the control throws are close to that specified on the plans, and that the Centre of Gravity is not behind the position shown on the plans. The model has been flown with a CG ranging from the plans position to approx 6mm forward of the plans position, with very good handling characteristics.
- Cut out the tailpipe opening, and attach the two fuselage halves with self-tapping screws. The model was originally designed for the WeMoTec Micro Fan, which uses a tailpipe opening of around 42mm. This should be opened up to about 46mm for the Mad Thrust 50mm or XRP-50mm fan as they have larger swept areas. It may also be necessary to remove some material around the holes in the rear fuselage formers to take the slightly larger tailpipes on these last two fans.

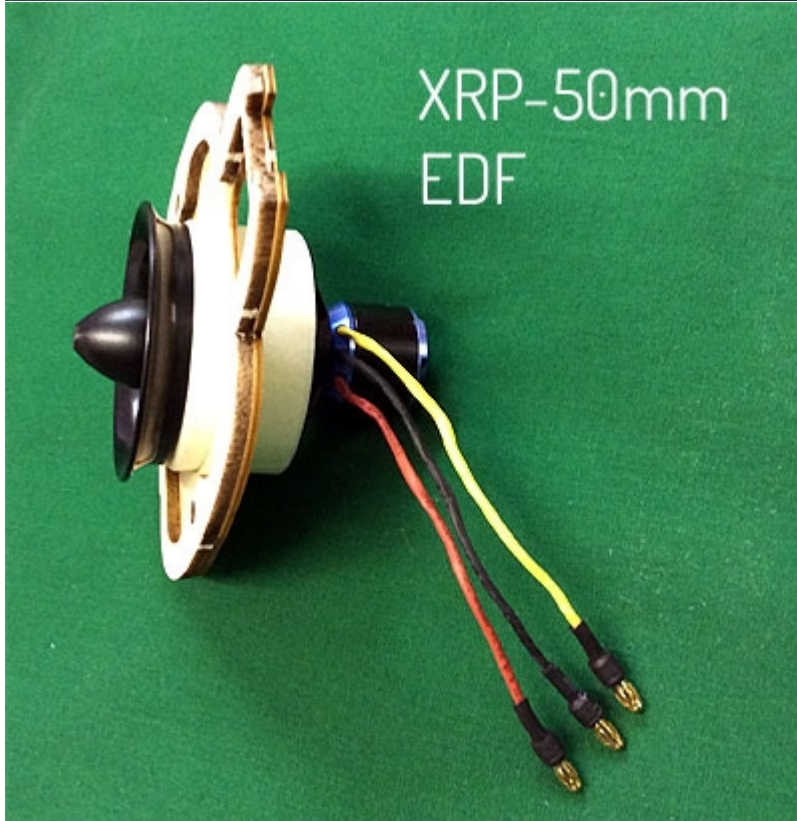


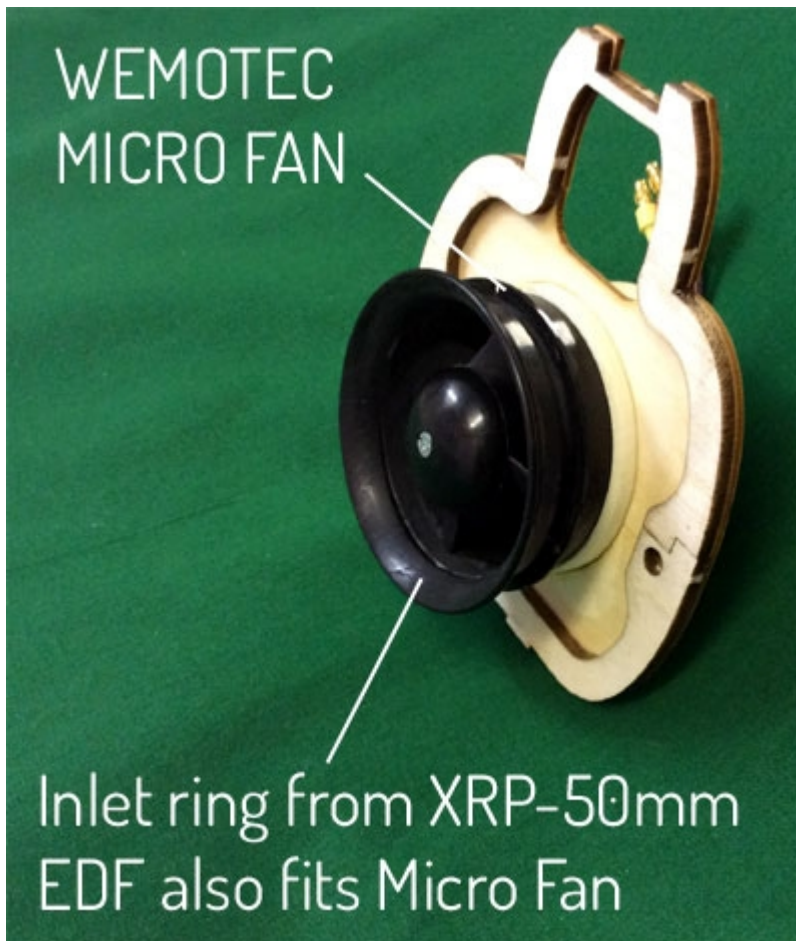
- Exact positioning of the RC gear will depend on size and weight of batteries, receiver, speed controller, etc.
- The fan unit is wrapped around the rear with 24-25mm (1 inch) wide masking tape until it is a snug fit in F9 when inserted from the front. It then needs to be positioned so that the rear of the fan shroud is exactly 18mm behind the rear of F9. This applies to all makes of fan. The shroud outer diameter becomes about 55.5mm after the tape. The tailpipe overlaps 6mm forward from the rear of the fan shroud.

Once in position, the 18mm of fan shroud that protrudes is wrapped with a couple of additional layers of masking tape to form a lip that prevents the fan from moving forward under thrust. The fan is now secured to F9 by cyano or silicon adhesive, and can easily be removed if necessary by cutting the glue away from the tape.

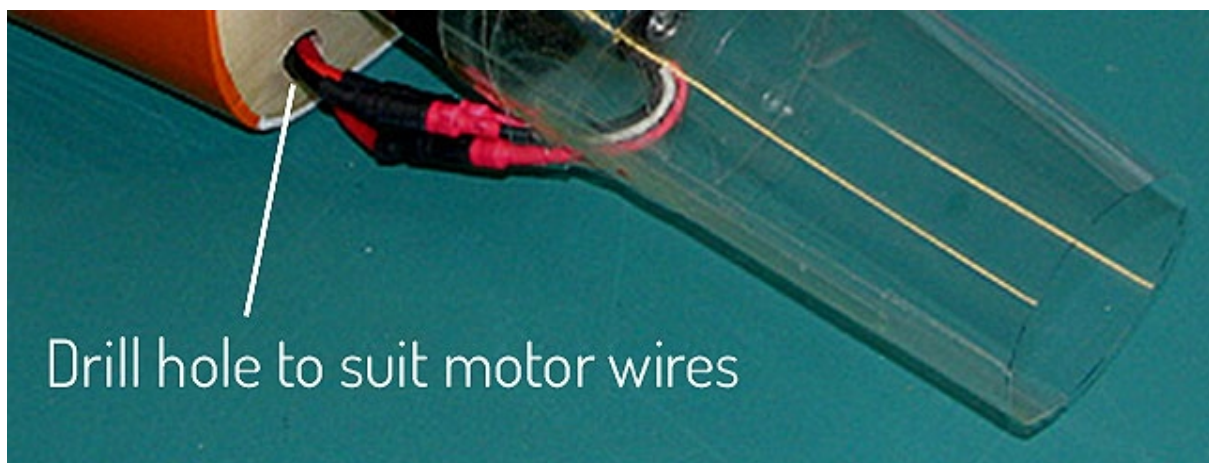
The pictures below show how three different fans fit into the F9 assembly:







- Use the tailpipe template as a guide to cut a paper trial tailpipe. When happy with the shape, cut the actual tailpipe from acetate (provided). The Tailpipe is glued along the seam with cyano, and reinforced by clear packing tape, which is also used to attach it to the fan (or use good quality masking tape). If additional tailpipes are required they can be made from A4 paper and reinforced with packing tape (use template as a guide).
- Cut a hole for the motor leads in F9A.





FLYING

- Carry out a range-check (motor ON and OFF) before flight. If possible, have a helper hand- launch the model for you for the first launch.
- It is important to set the elevator trim for the hand-launch so that the model settles into a good climb attitude without pilot intervention. To this end, set the trailing edge of the elevator about 3mm UP (when measured at the widest point of the elevator). If this trim is not set for take-off, be prepared to feed in a good amount of back-stick immediately after launch.
- Grip the model behind the wing near where the fuselage splits, and with full-power applied take a few steps forward, launching the model in a level or slightly nose-up attitude into the wind. The Aviojet will settle slightly then climb away strongly even with no wind.
- Once at altitude and at cruising speed the nose-up trim applied for the launch will need to be removed.
- For such an apparently bulky model the Aviojet is remarkably quick, even on the baseline power of around 180WATTS IN.
- Aerobatic manoeuvres such as loops and rolls are all easy to perform, just remember to throttle back on the downside of the loops as the aircraft builds up speed very quickly.

- The glide is very good, and landings are easiest performed from a glide approach. Practice makes perfect here. There is no wing drop at the stall if the model has been built straight (there is no washout in the wing, nor is it necessary).
- With its viceless handling, good looks and exhilarating performance, this model of the CASA C-101 Aviojet is sure to bring many hours of flying pleasure. Enjoy!