Midge

Suggested Instruction

	Required Component to complete model	Veneered wing	Glassed wing
1.	1mm or 1.5mm (1/16") ply for wing sheer web	X	Provided
2.	Hard balsa to form wing joiner assembly	X	Provided
3.	Wing joiner and tube for wing joiner	X	Provided
4.	6mm (¼") Hard Balsa for wing root (Provided)	Provided	
5.	3mm incident pegs for main wing or 3mm rear joiner and tube	X	X
6.	3mm Depron Foam wing root template	X	X
7.	5mm (3/16") balsa for Tail plane and Rudder and rudder post	X	X
8.	Tailplane joiner and incident piano wire and tube	X	X
9.	Clevises / 2mm threaded control rods / Push rod for Tail plane / Small bore snake and thin piano wire to suit for rudder control.	X	X
10.	Diamond tape or similar for aileron hinge	X	n/a
11.	Control Horns	Provided	
12.	Fuselage ply servo mount	Provided	
13.	Hinges for rudder (Mylar hinge used on prototype)	Provided	
14.	Optional 1.5mm Ply or plastic card for radio plate is required		
15.	Optional Epoxy + Micro balloons for facing wing trailing edge and aileron leading edge		
16.	Wing servo recess cups and covers	Provided	

RADIO: Servos: Elevator / Rudder (HiTech 65MG)
Ailerons (Ripmax SD150)
Receiver
Battery (1500mAh) 2/3rd NiMH or similar
Battery Switch
(Above radio spec used on Prototypes)

Wing Preparation

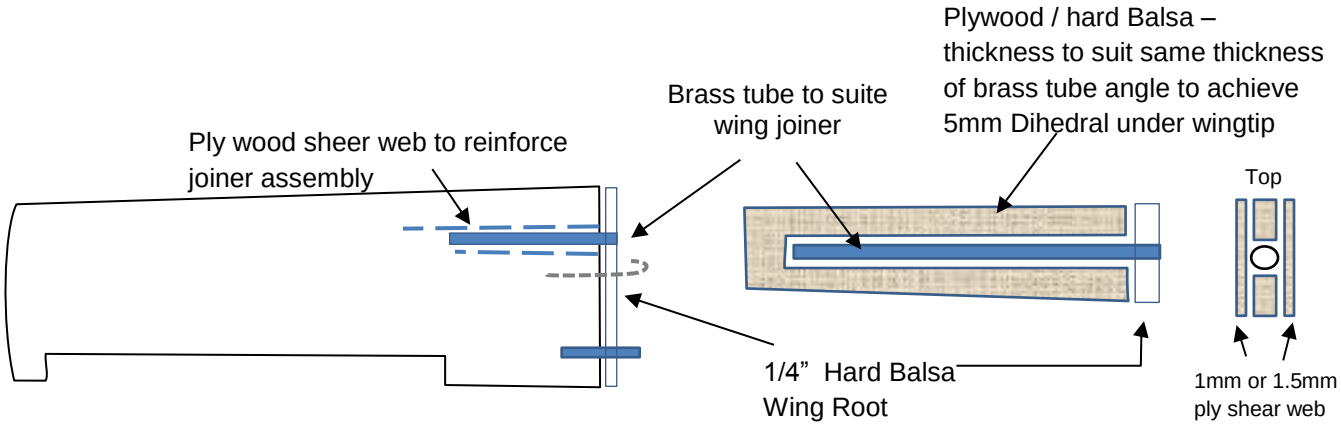
When you receive your wings, they will be either wood veneered foam panels or glassed foam panels.

Wood veneered wings:

Aileron will have been cut out and the recess holes for the servos will have been already cut.

To complete wing the following will need to be completed:

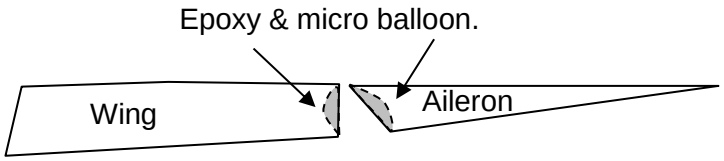
Wing Joiner Installation.



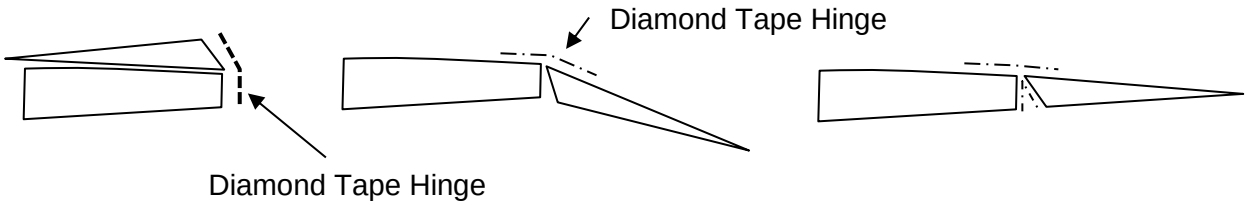
1. Apply 1/4 balsa reinforcement to wing root (provided). – you will need to allow Main wing joiner tube and rear locating joiner / peg to pass through. Additionally you will need to install a wire hook in the

wing that passes through the fuselage sides so a rubber bands can be used to keep wings together during use and allow for dismantling.

2. Slightly hollow out the Face the mating surfaces of Trailing Edge of the wing and Leading Edge of Aileron and fill with Epoxy and micro balloons. Alternatively, you could face with thin balsa, ply or glass cloth.



3. Apply wood leading edge and tip (Wood veneered wings only).
4. Cover wings (wood veneered) with chosen covering material.
5. Once the model has been completed, the Ailerons should be attached using Diamond tape or similar using top hinge technique.



Glassed Wings:

The glassed wings are vacuum bagged with a number of layers of glass cloth and epoxy resin. Some filling may be required to smooth minor imperfections and the whole wing prepared with wet 600 grade wet and dry paper to prepare for painting.

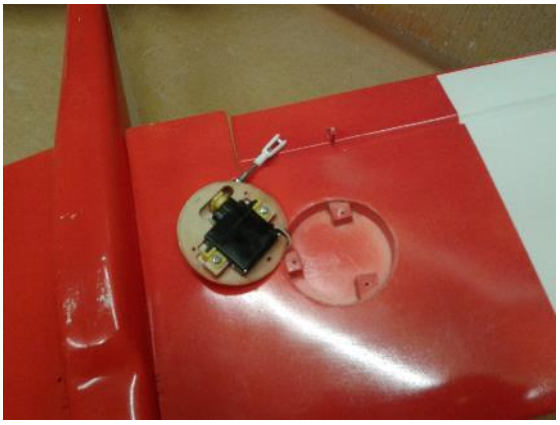
The Wing joiners will have already been installed and the 6mm balsa wing root will also be attached and covered. Hinge material has also been laid up within the structure and ailerons cut and the hinge has been eased to allow free movement of the Aileron. If the hinge material has split slightly, then this should not propagate along the hinge line due to the Biased direction of the material weave. If this has happened, then once painted a strip of diamond tape along the hinge line will reinforce the area and seal the gap.

Servo recesses have also been cut and the servo wire conduit also cut.

All Wings:

The plastic servo recess covers should be glued in place with epoxy and trimmed flush with the wing surface once cured. You will also need to note where the wire outlet needs to be in the servo bay and cut accordingly to allow the servo wire to pass through without sharp edges.

1. Install Aileron Servos. And attach control horn to aileron. The original models mounted the servo directly to the ply reinforced cover, alternatively, servos can be mounted inside the servo recess.



6. Cover servo recess with suitable cover. Either epoxy sheet or plastic card or moulded fairing. The moulded fairing provided should be reinforced with a 1.5mm plywood disc epoxied into place.

TailPlane

1. The Tailplane is designed to be removed for transport if required.

2. Fabricate the Tailplane in 5mm Balsa as per the plan/drawing. First you will need to cut out the tail parts and glue together to make two separate tail halves. Next Mark the location of the front (Main) joiner / pivot tube position – this is marked on the plan. Cut a slot at 90 degree to the root chord along the tail half to accommodate your chosen tube through which, the tail joiner will slide. Glue the tube in place with 5 min epoxy, ensuring it remains flat and aligned correctly, I tend to sandwich the tube between two thin pieces of balsa so that the top and bottom can be sanded when the tail is sanded to shape. (See photo).

3. Once this is set, slide the tail joiner/pivot into place and also slide the tail crank over the joiner. This will allow you to accurately mark the position of the pivot through the tail actuator crank and into the tail tube (see photo). This will allow the rear tube / actuator joiner to be aligned in the tailplane accurately. Cut the slot out of the tail for the rear actuator joiner tube and then glue the rear joiner tube in place and let it cure. Repeat for the second tailplane. Make sure that the tubes in both tailplane halve align correctly Once this is complete face the root end of the tailplane halves with 1.5mm ply or as I have used, a coffee stirring stick.

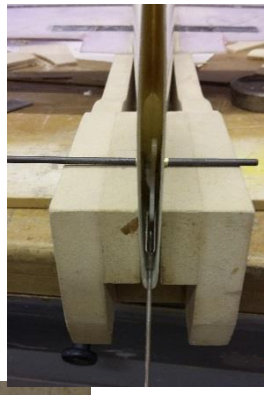
4. Once the joiner tubes have been installed, the tailplane will need to be sanded into a symmetrical aerodynamic shape (aerofoil shape) and trimmed to size.

Fuselage

The Epoxy glass fuselage will need the following tasks to complete.

1. Some filling minor imperfections in the gel coat and fuselage join may be required and rubbing down with 600 grade wet and dry paper in readiness for paint finish.

Tailplane mounting.



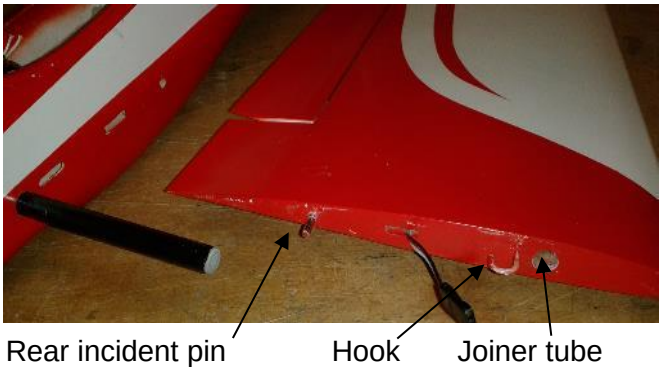
1. Drill the hole in the fin to match tailplane main pivot joiner. Slide the tailplane actuator crank onto the tube pivot and use this to mark the curved slot that will need to be cut to allow the rear actuator joiner to pass through the fin and crank once installed inside the fuselage. Ensure that the centre point of the curved slot aligns with the correct neutral tail plane position marked on the plan. Only cut enough of a slot to allow the maximum movement of the tailplane plus an extra 2mm to allow for trim adjustment.

2. Install tail plane bell crank. This is best if the bell crank rotates around brass tubing to suit the tailplane joiner. Make the elevator pushrod which should have 2mm wire with a metal clevis soldered to the end that connects to the bell crank. (This will stop the clevis coming loose during use). Ensure at this time that the servo end of the pushrod is longer than required so it can be cut back to the correct length once the decision is made where the elevator servo will be placed.

3. Install the tailplane joiners. Pivot (Forward Joiner) which should pass through the pivot of the tail actuator crank which will be inside the fin. This allows for the tail plane to rotate around the crank pivot axis. The locating / activator joiner (rear Joiner) should pass through the fin and the opposite end of the actuator crank to the pushrod and allow for free movement within the recommended range of movement. Manually moving of the pushrod should provide a secure and slop free tailplane movement.

Wing Fuselage Mounting

1. Using the depron wing root template, which should match your wing fittings and holes, mark and drill the holes and ensure these are at the correct alignment angle as stated on the plan and install brass / aluminium joiner tubes to match main wing joiners.



2. Drill the rear main wing locator to match wing rear locator peg or 3mm rear wing joiner/tube.
Using the wing template, mark where the holes need to go into the fuselage. Ensure you attain the required incident of main wing (+1.5 Degrees) compared to the 0 Degree incidence of the tailplane.

Do not permanently glue these in place yet.

Assemble the wings on to the fuselage to check correct angle and location, trim as necessary then glue the tubes into place. You will need to ensure that the tail and wings align correctly both in incidence and also that all surfaces are level and at the correct angles to one another.

Rudder Control:

3. Install a micro snake outer for rudder control if one is to be fitted inside the fuselage, and align where the rudder horn will be installed on the rudder. This should exit above the tail plane axis. Small gauge piano wire should be use inside the snake for rudder control. Alternatively, a closed loop system could be used. The supplied control horns will allow for either control system.

4. Once this has been done and everything works correctly and there is no excess movement in the rudder snake outer (this needs to be glued to the inside of fuselage to prevent it from flexing unnecessarily. A mix of Epoxy and micro balloons of cotton flax works well to adhere the snake to the inside of the fuselage at intervals towards the fin. I use about 4 spots of glue evenly spaced to adhere the snake to the fuselage.

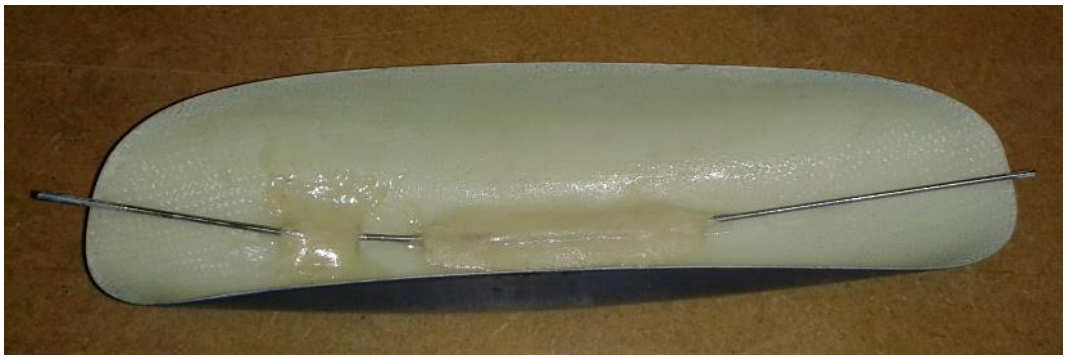
5. Create and install a balsa rudder post using epoxy. Ensure that this does not interfere with the movement of the tailplane crank.

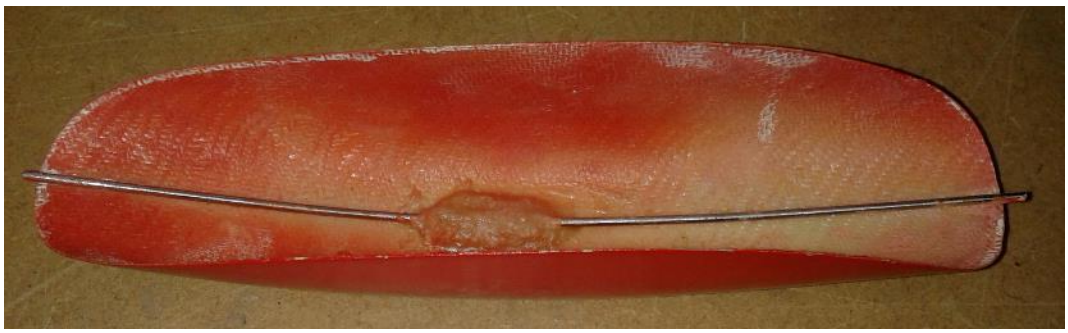
6. Cut and shape the rudder from Balsa to match plan drawing / fuselage.

7. The rudder will need to be covered with your chosen covering material. (Solar film, Epoxy glass etc) following which, install the chose rudder control horn to match the position of the control snake or wire.

Canopy

8. Canopy, Use small gauge piano wire and epoxy in the centre to allow the wire to flex to allow it to be insert under the lip at the front and rear. Of the cockpit.





You may have to put a groove in the cockpit lip or hole for the wire to pass through. See radio installation photos below.

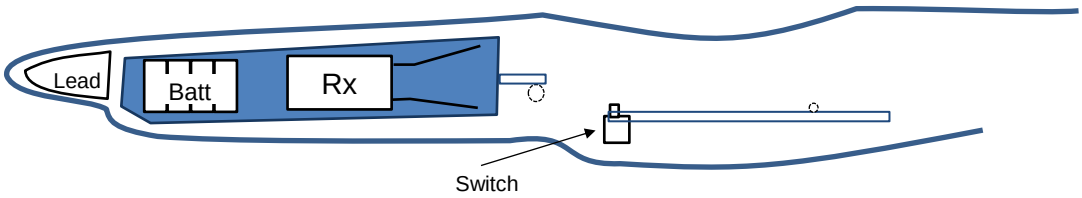
To put the canopy on, slide one end of the wire under the front or rear of the fuselage canopy access hole whilst keeping the canopy at a slight angle. Once the other end of the canopy wire is able to slide into the fuselage push the canopy into place and slide the opposite way to sit correctly over the access hole.

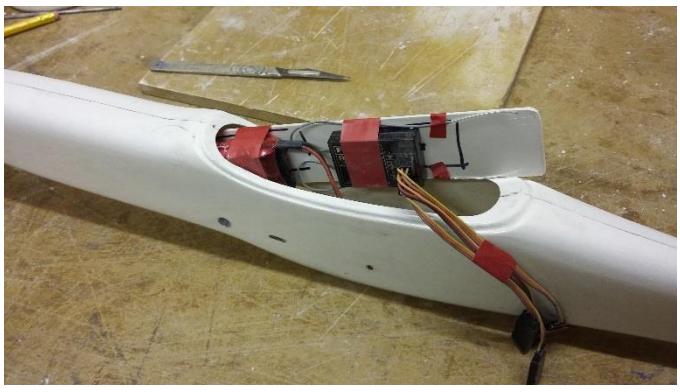
RADIO Gear Installation

9. Install the supplied fuselage ply servo mount for Elevator and Rudder servos into the fuselage to best suit the centre of gravity and available space. The groove in the top of the servo mount allows for the location to be aligned with the rear wing joiner. Elevator behind the rear wing joiner tube and rudder servo between the two main wing joiners.



10. The Battery and receiver can be installed directly in front of the wing inside the fuselage, but installation is easier and more practical by fastening them onto a ply or plastic card plate that slides into the front of the fuselage in front of the main wing joiner. This will keep the installation neat and tidy and help with the removal of the gear if necessary. A small plywood plate can be screwed into place over the main wing joiner hold the radio plate secure if necessary.



Balancing

11. To balance the model after covering / painting and with the gear installed, Lead can be cut and put into the extreme nose of the fuselage. Assemble the model and use a small plastic bag taped to the front of the fuselage nose where you want the lead to be and add weight until the desired balance is achieved.

12. The way I make my nose weight is carry out the above to estimate the amount of lead required. I then make a mould from slightly damp sand by pressing the nose of the fuselage (wrapped in Cling Film) into the sand to form the shape of the nose and remove the fuselage.
    Melt and pour lead into this sand mould and wait until fully cool before extracting the lead and filing the rough surface to fit inside the nose perfectly.

    WARNING: Melting lead is particularly dangerous and should not be attempted unless you have all the necessary equipment, heat source and protective clothing and also should be done outside.
    DO NOT pour lead into the fuselage, it will cause a fire and ruin your fuselage, and probably burn you severely.

    Alternatively you can add small amounts of lead into the nose until you get the balance right. For fine tuning, further lead can be added and taped to the battery plate so this can be removed later if required.

Control Set Up

13. Check and set up the controls as per the plan.

    Flaps can be programmed into the aileron if desired but I would suggest no more than a few degrees either flap (Lift setting) or reflex (Speed setting) depending on what you want. Please note you will also need some elevator compensation for any +/- flap settings used.

    Up going ailerons can also be used as a type of CROW / BUTTERFLY braking for landing, operated from the Throttle control of your transmitter. This control is best if proportional control is available rather than using a switch.

    Up aileron “CROW” movement to approximately 10 to 15 Degrees, which should be just enough to get the model to sink in a flat attitude with Elevator compensation. Please note that you will still require further up going aileron movement with aileron input to maintain roll control during braking. And please, do not try to input too much movement as this may stall your servo. Stay within the servo range of movement. The exact amount of required crow brake -vs- aileron movement can only be attained through trial and error.

    On the prototypes, I have also trialled using Flap during landing. This did slow the model down for landing, but at slower speed the model became slightly unstable in roll with the model wallowing around during the slow approach. By deploying flap, this does increase the angle of attack (AoA / Alpha) of the wing and may induce a premature tip stall and I was always concerned that this may happen when least expecting it. I also had to ensure that the flap was cancelled prior to landing so as not to damage the controls or aileron servos.

    I currently a proportional Up Aileron – Crow movement if required for landing in high lift conditions but it does speed up the model.

Flying:

Check C of G is correct.

Check all controls for correct operation, direction and range of movement.

Pitch and role controls are lively on full so these should be kept on the lower rate setting until you have become used to the model. I fly mine on lower rates most of the time, only increasing roll rate when I want to lose count of the rolls I have performed (its quick).

The model can be flown in light conditions but will have to be flown appropriately. However, the model will come alive, so to speak, in moderate to high winds with no need for additional ballast and it can reward you with a good turn of speed.

Stalls should be straight and benign in nature if gradually induced. All expected manoeuvre are achievable although outside loops (from the top) can sometimes be lacking due to the light weight nature of the model and the associated lack of inertia to complete the loop. However, entering the multiple outside loops from inverted flight at the bottom of the manoeuvre will be rewarding.

Hope you have a great time with the model.

See you on the slopes.