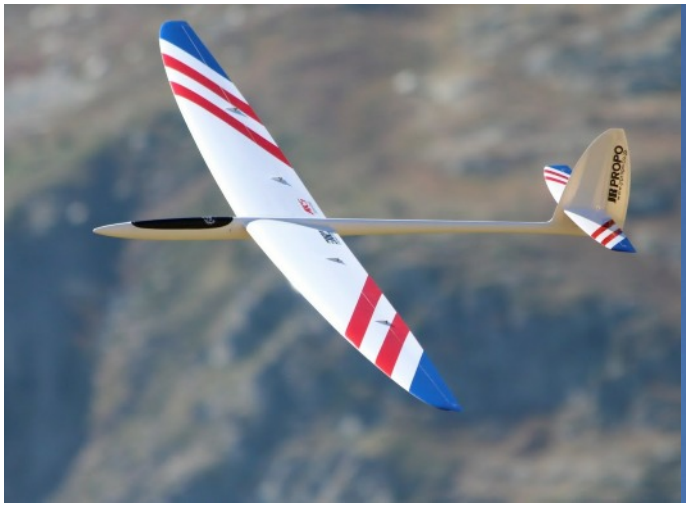
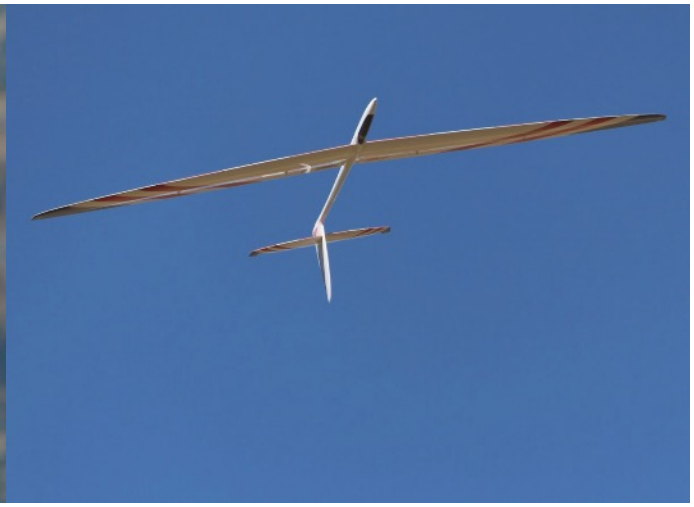
SCHWING 88

A high performance model glider for slope soaring, designed by James D Hammond and brought to you by Sloperacer.





Thank you for purchasing the Schwing 88. The design remit was to extend the flight envelope of James's previous designs but deliver a high performance verses cost which was an important consideration. It's the first of many and has gone through rigorously development and testing by some of the best pilots in our sport. We hope you enjoy it whether you like to fly the right way up or not!

It's a high performance sports model and deserves really careful installation just as you would with a top end competition model. So just like the latest breed of racers it's very slim and only just big enough to fit all the components.

To complete your model you will either have to obtain the following from your distributor or supply your own:-
Wiring loom, hardware, ballast and optional wing and fuselage bag set.

Ballast:

The Schwing takes a 9.5mm diameter by 165mm long slug in each wing. In the fuselage it takes 8 slugs of 19mm diameter by 35mm long. Fully loaded the Schwing can carry nearly 900g of ballast and that should be enough for anyone!

Hardware:

Clevises, 2mm threaded rods, 2mm lock-nuts, RDH arm adaptors (optional).

Radio gear:

The Schwing radio installation was designed around budget 12mm wide Savox SH-255/257mg servos. However, you will notice that the servo access holes in the wings have been made large enough so that a 10mm 'Thin Wing' servo, such as the KST DS125MG, Hyperion DS095FMD or even MKS 6125 can easily be installed. You may also like to consider the use of Fu-Fix External Bearing kits (highly recommended) for the wing servos.
Note: 13mm servos such as the Hitec HS85 are really too big but will just fit in the flap bay with a blister servo cover (not supplied).

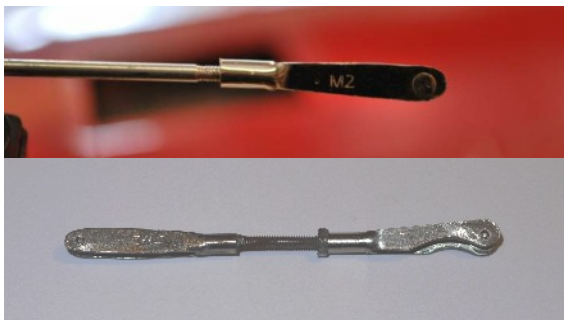
The laser cut radio tray is sized for 2/3AF 4-cell NiMh battery pack.

Assembly Instructions

Wings:

Before installing the servos the wing leading edges need a small bit of work. There is a small joining seam lip and this need to be carefully removed so that the all important aerofoil section is maintained, see Fig 1. First use 100 grade grit paper and 240 grade to finish off. Use a rocking motion to ensure the correct shape but ***be very careful not to remove too much!***

The servo installation is standard for this style of moulded glider and it is possible have a flush installation to give a cleaner wing. Start by preparing the clevises. As manufactured M2 clevises are too big, they need to be slimmed down so that they will fit under the shrouds, use a Dremel (or similar tool) fitted with a small grinding wheel to do this.



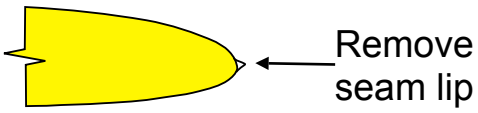
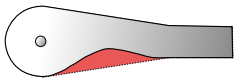
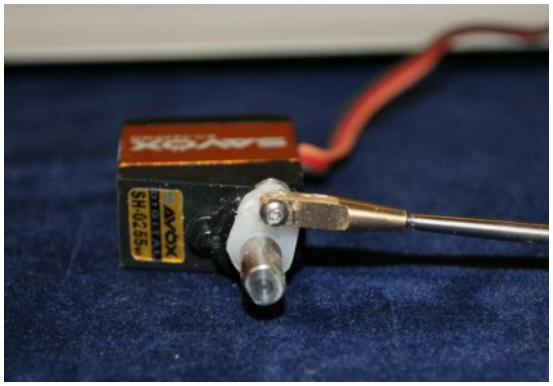


Fig 1

At the servo end you can either use a clevis or a very neat solution is to use RDH adapters. If you intend to use a clevis at the servo end then it will need to be scalloped out so that it does not foul the servo output shaft. (Remove red shaded area)



The horn geometry allows a small arm and by using nearly all of the servo travel you will have all the recommended throws required. Mechanically, this is much better than longer arms that you have to rate down the travel and provides greater torque and less mechanical play. As a guide, you will probably need 11mm of linear pushrod movement for the flaps and 7mm of linear movement for the ailerons. Depending on the servos used, this should mean that the flap servo needs a 7.5mm arm radius and the ailerons need a 5mm arm radius.

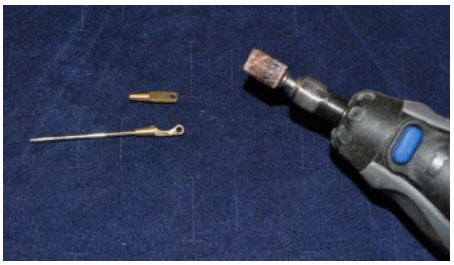


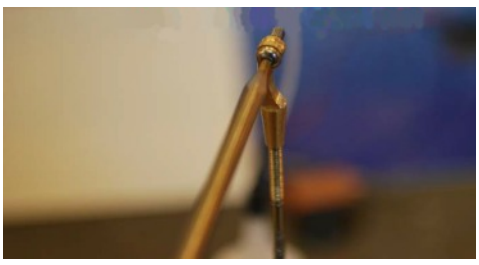


To prevent the pushrod fouling the shafts the arms are set at 2 clicks off centre for the ailerons towards the TE and one click for the flaps.

Note: These pictures show the linkages connected, with RDH brass adapters, to the servo arm and using the Fu-Fix bearing kit. This requires extra clearance with the small arms required for the aileron only.

To fit brass RDH adapters: If using Bearing kit then shape the aileron RDH adapter with Dremel tool. Cyano a 2mm bolt into adapter **BUT keep turning bolt with screwdriver until cyano has set**. Flatten the top of a servo arm and cut and shape arm as necessary. A locknut needs to be placed on the rear face of the arm, to allow it to engage you will need to grind a flat on the servo arm spline moulding side, then bolt together and cyano a nut to the thread end. Move the assembly a few times and check that the rotation is in the RDH adapter hole and not turning the bolt.



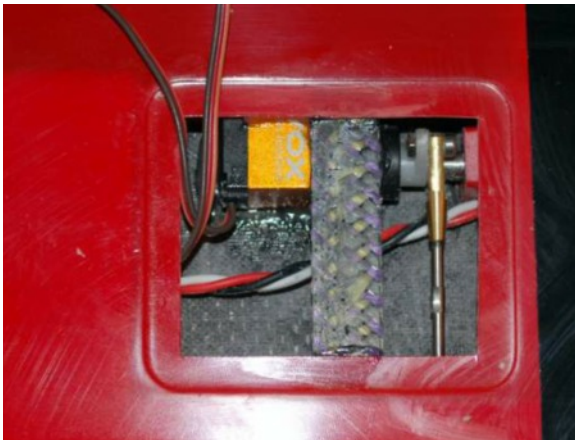




Before you glue the servos in, remember to set the output horns correctly i.e. ailerons 2 splines towards the TE and flaps one spline towards the TE.

Use coarse grit sandpaper to roughen up the surfaces where the servos will be glued to. If you are using 12mm wide servos then these should be installed right under the forward edge of the access cutout. You may want to cut off the mounting lugs in order to move the servo nearer to the main spar and into the deepest part of the wing.

If you are gluing the servos to the wing then do not sand or clean the servo. This is important as it allows the servo to release if you ever need to remove it. Gluing actually uses very little epoxy.



If you wish to add the Fu-Fix External Bearing kits for extra support to the aileron and flap servo output shafts then fit them as per the instructions that come with these kits.

Then a support strap can be added. It's not critical what it's made from, thin G10 fibreglass is very good but basically anything that is about the same strength as the top skin. Finally glue the bearing housing to the bottom skin.

Before fitting the wing part of the wiring loom, check that the loom functions properly. (Once installed it is far harder to rectify any faults) Then fit into the wing.

This all ensures a ridgedly held servo. Servos that pop off do so because of flex in the skins. Doing it this way there's a lot of gluing area and no flex so the servo cannot pop off. A weak glue joint with an unprepared servo is perfectly adequate. The servo is held on the top skin, bottom skin and the head is held by the bearing housing which itself is bonded to both skins!
To remove just cut the strap, unbolt the shaft and twist the servo. It pops out clean! But most of the time it may be you just need to replace the arm. Then it's even easier as you just unbolt the shaft and leave the servo in situ.

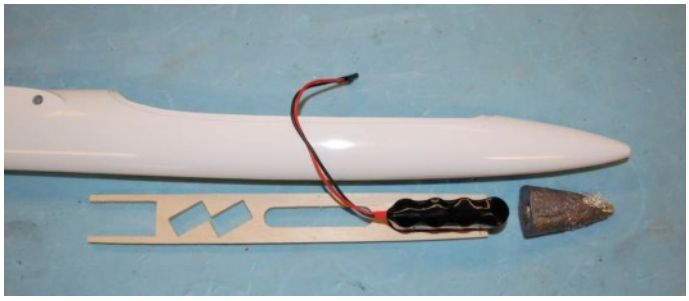


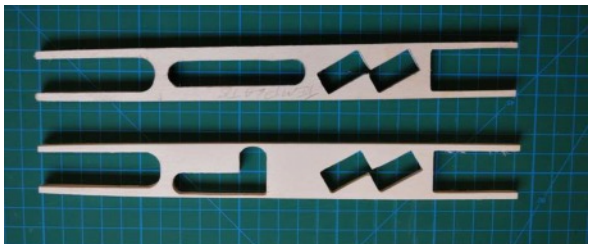
If you are using 10mm thin wing type servos then you should not encounter any real installation problems. You may want to use a 4mm plywood servo mount to make removal easier. If you do then check to ensure that the screws do NOT project below the bottom surface of the mount. Whatever servos you choose, do ensure that that both flap servos (and both aileron servos) are in the same position thus ensuring that the pushrods will be the same length.

Once the servos are glued into position measure and cut 2mm threaded rod to length. When satisfied with the operation of the wing servos, either secure the rod at each end with lock-nuts, glue or solder.

Fuselage:

Start by making the lead nose weight. Fill a container (e.g. a small plant pot) with damp sand. Tightly wrap the fuselage nose with aluminium kitchen foil. Then insert nose and foil in sand ensuring a close fit and support. Remove the fuse leaving a good impression to cast your nose weight. Simply melt lead in an old pan and with the plant pot/sand/cast on the scales weigh out approx 180g. You need approx 175g so a bit over for shaping with a file to get a good fit inside the nose. Do not forget to flattened the tip as the inside laminate here will stick in a bit.

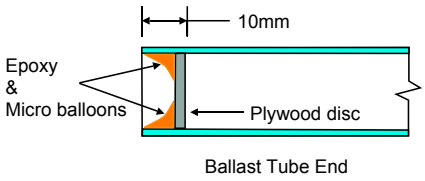




The laser cut radio tray adds structural strength to the nose. It has a receiver slot to fit most types but if you use a Futaba R617 rx with top plugging you need to modify or cut your own as shown.

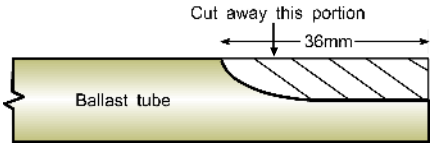
The tray will need the long edges filed/sanded to a slight bevel. A test fit with the radio tray and battery will show that there should be some space too for trimming weight, you should need around 10-15g. **Do NOT glue in yet!**

Ballast tube: At one end roughen 10mm on the inside of the tube and using Cyano,glue in the supplied ply disc, then backfill the open few mm with thickened epoxy. The length of the tube needs to be long enough to fit in 8 slugs (Slug size 19mm(¾ inch) diameter by 35mm long) The open end of the tube is flush with the end face of the 8th slug.



Ballast Tube End

Cut the tube end as shown in diagram.







The front end of the tube needs to be marked on the fuselage for the correct CG. With a pencil, mark on the outside of the tube the point between the forth and fifth ballast slugs. On the fuselage place some masking tape and put a mark on it at a point 99 aft of the leading edge. When the tube is eventually glued in the marks on the tube and fuselage need to line up.

Now mark where the front edge of the ballast tube begins. The radio tray cut out for the ballast tube is positioned at this mark. The slugs insert at an angle then sit flush and slide back down the tube. **(Do NOT glue in yet!)**

Prepare the fuselage wiring loom, (you have tested it haven't you?). Glue in the plugs, MPX greens are recommended, and site the 4 leads so that they go under the ballast tube, this will raise the front slightly. At the front of the fuselage, roughen up the areas where the radio tray and ballast tube will sit.

The fuselage comes with the rudder and elevator pushrods factory installed, however, it is necessary for you to fit the rudder end clevis and adapter. With cyano glue a 2mm adapter to the rudder pushrod. In order to obtain full rudder throw it is necessary to scallop the rudder clevis (see page 2). Then wind the clevis all the way onto the adapter, use a drop of cyano or epoxy to ensure that the clevis does not work loose in the future. Attach the clevis to the rudder control horn.

Now you need to decide whether the elevator servo goes in the fin or in the nose. The supplied bell crank assemble weighs just under 7grams and a 9 gram servo weighs about, errr, 9 grams! So, if the servo goes in the tail the model will need about 5 grams more in the nose. (Note: the same length of servo wire is of similar weight to pushrod) It is your decision but both methods are covered here.

Bellcrank Method:

The position of the bellcrank is not like an all moving tail, this is an elevator and the rotation is different! Although not super critical, the positioning is shown here.



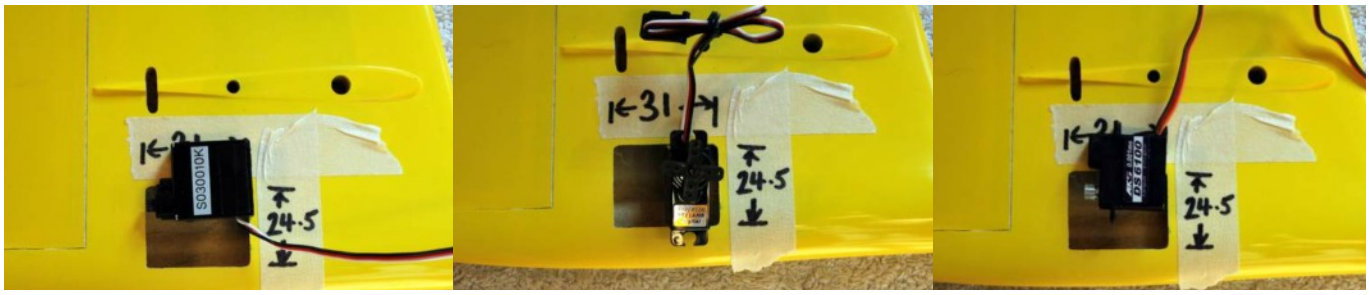


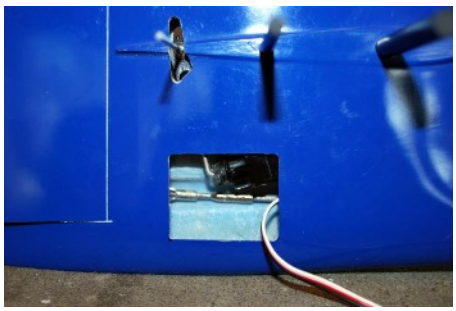
You want the inverted back to front 'L' crank roughly at 90 degrees to give equal up and down. The pre-installed carbon pushrod needs a 2mm adapter end and clevis to be fitted. Try to ensure a fairly straight run. (Note: the picture on the right shows the use of an RDH connector) Rough up the inside skins and the bellcrank round mounting pads and using a thick gap filling epoxy mix, glue the bellcrank into position. When the epoxy is set check for a 'bind free' elevator operation and make any adjustments if necessary.

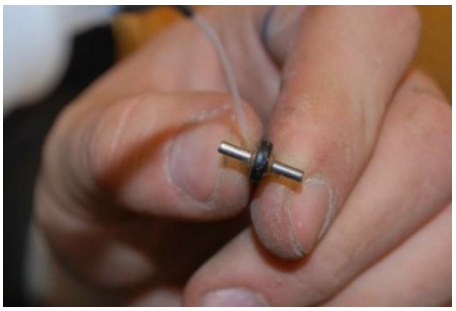
Servo in Fin Method:

First, remove the carbon elevator pushrod and then, through the fin hatch any 11mm or smaller servo can be fitted. The pictures show Hyperion 9mm and 11mm servos and MKS 6100 servo. You might want to consider the use of a metal geared servo because should the gears become damaged, removal of the servo may not be easy.

Test fit your chosen servo, the position should be similar to that shown in the picture. **Ensure that it does not foul the rudder pushrod!**







Use a 2mm ball link with a short piece of 2mm dia thin walled tube cyanoed onto the ball. This acts as a sleeve for the 1.4mm elevator drive wire. You need a 4.5mm servo arm and a short pushrod with a 90 degree bend or as an alternative to the 90 deg bend you could use a RDH adapter (see below). You could also use a Fu-Fix External Bearing should you wish. Check the servo is centred and fully fit the pushrod then glue into position. The servo should be bonded to both skins. Before the glue has set fit the tailplane, check with the radio on that the elevator is centred and that the servo is in the correct position. (Trying to adjust the pushrod length once the glue has set is rather difficult!) When the glue is set check for a 'bind free' elevator operation and make any adjustments if necessary. Extend the servo lead and route it under the ballast tube along with the rest of the loom before you glue the radio tray etc in place. Trying to fit the servo lead after the ballast tube is glued in will prove very difficult!!!



Final Assembly or 'Now you can start gluing!'

Test fit the nose weight, radio tray and ballast tube to ensure that they all fit together. With the radio tray, check for servo depth, have you allowed enough room? The orientation of the servo is shown, basically you need around 6mm arms and these require control runs near the sides or they will block access to your ballast.





Also make sure that the radio tray is not too tight a fit and that it does not introduce any distortions, distortions which might cause a slight widening of the fuselage sides at the wing leading edge position. Test by fitting the wings and checking the fit of the wing root to the fuselage sides

Slow setting epoxy will give you the necessary working time to get everything lined up and true.

Now remove the tray and tube,then glue in the nose weight. When it is set, glue in the ballast tube, remembering to line up the pencil marks on the tube and fuselage. The wires to the receiver should run underneath the ballast tube.



Finally, fit the radio tray, it should be approximately 12mm below the edge of the fuselage at the centre of the canopy area (the height may vary according to servos used). With a methodical working you will be able to do quite neatly but do ensure a good joint to the ballast tube and fuse with the tray. It's 6mm thick to add structural strength but it won't be doing much if not bonded properly! Once the tray is installed fit the servo or servos and connect them to their pushrods. The servo arms only need to be 6-7mm long (centre of arm to centre of hole). You will have to scallop the clevises again. Fit the receiver and battery. You may have room for a switch but if not then plug the battery directly into the receiver. With the model fully assembled add lead to balance (do not forget to check the lateral balance)

The canopy can be attached either with clear sticky tape at either end (simple and effective) or by an engineered method. To do this you will need some steel wire 25cm long by 1.5mm dia. (16SWG) Round off the wire ends then align the wire inside the canopy along the centreline with both ends of the wire projecting an equal distance beyond the canopy edge. Using thick cyano glue the wire to the canopy in the centre, then reinforce this with a strip of glass cloth.

A set up guide from one of our test pilots is included on page 9. It's quite safe, especially the CG setting, most flyers have only varied from this setting by a few mm.

Happy flying!

Setup

Item	ref (mm)		Additional information
CG	99		Measured from leading edge
Elevator	Up	Down	
	5	7	30% positive expo
Rudder	Left and Right	15	
	Up	Down	
Ailerons	17	9	Measured at ail/flap interface
Flap			
(with Aileron)	6	4	Measured at ail/flap interface
Flap/ail with Elevator			
	Flap	Ail	Down flap/ail with up elevator; Measured at ail/flap interface
	2.5	1	Typical setting, most conditions/flying weights
	6	3	Maximum (hardly ever use)
Thermal	Flap	Ail	Measured at ail/flap interface
setting	1	<0.5	Min
	3	1.5	Typical
	8	4	Max
Speed	Flap	Ail	Measured at ail/flap interface
	0.5	0.5	Min
	1.5	1.5	Max
Butterfly	Flap	Ail	
	30	18	Add elevator to suit (approx 4mm down)

All the above values have been proven to work, however, experienced pilots will adjust to taste.

Contents:

Fuselage
Canopy
Ballast tube
Ballast tube end disc
Servo tray
Wing panels left and right
Wing joiner
Wing servo covers 4 off
Tailplane halves left and right
Carbon rod 6mm dia x
Carbon rod 3mm dia x
Wire rod 1.5mm x

Optional extras:

Wing wiring loom
Ballast
Wing/Fuselage bag set
Fu-Fix External Bearing kits
RDH pushrod ends



Instructions written by Tony Fu and Peter Burgess (v1.4)