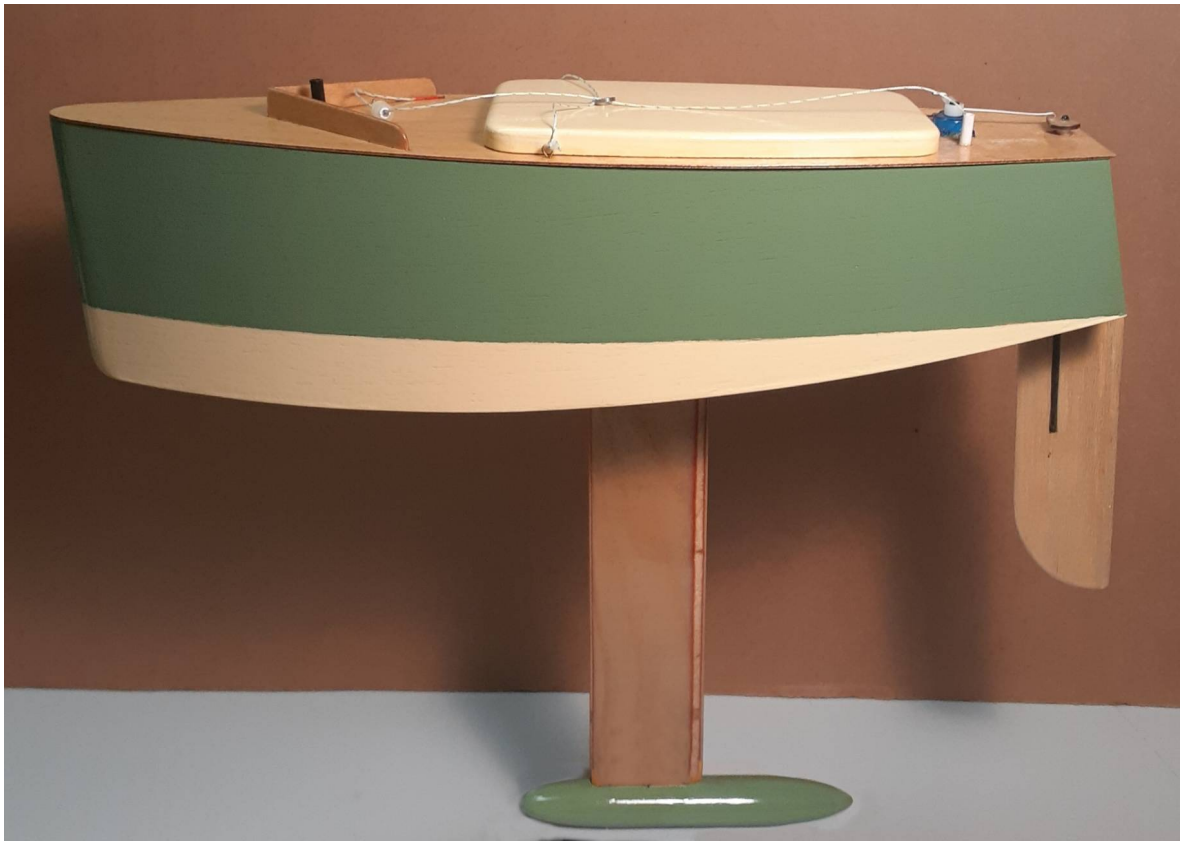
McALLISTER MODELS & DESIGN

BANSHEE HULL BUILDING INSTRUCTIONS



The BANSHEE is a Footy class sailboat
controlled by a two-channel radio control system on the rudder and the sails.

McAllister Models & Design has developed this simple balsa built version of the now out-of-production kit built Banshee.

Dimensions of the Banshee are:

hull length	**12 3/8"**	**(315mm)**
max. beam at deck	**3 1/2"**	**(90mm)**
draft	**7 3/4”**	**(195mm)**
bulb weight	**8.0oz**	**(226g)**
suggested sail area	**140 sq.in**	**(9 dm.sq)**

One mini and one micro size servo are required.
Hitec HS-55 micro servo on rudder recommended.

If you have any questions please contact us at:

email: mcallistermodels@gmail.com

Sheboygan, Wisconsin 53081 USA

BANSHEE was originally sold as a "foam core" kit. I no longer produce the kits so I have developed this balsa and ply built version for those who would like to continue to build and sail Banshees.

The plan contains the basic building guide for the new balsa hull and in these further instructions I'll include photos of the original "foam core" type where they are helpful. This will mainly deal with the rigging and radio installation. Just bear in mind that some images will look different, but the measurements and rigging are exactly the same.

BEFORE YOU BEGIN

Important: The keel weight is cast in lead. After handling the lead your hands should be washed thoroughly. The lead weight should be painted once installed on the model to reduce future contact with the bare metal. Keep away from children.

▷ We recommend you use a waterproof wood glue like Titebond III.

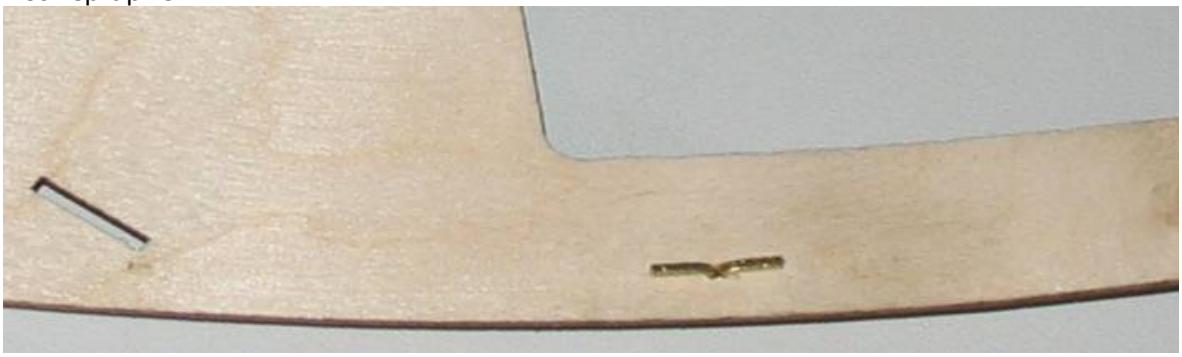
▷ Rigging a yacht is always a tricky job and working this small does not make it easier. Go slow and steady following the instructions and all of those rigging lines should NOT end up in a tangle!

▷ The instructions use the proper names for the boat and rigging parts in many places with non-nautical language descriptions interspersed to help the uninitiated. Learning the language though is half the fun so we hope that you will pick up a few terms as you go along.

▷ Seal all knots in the rigging thread with a small drop of medium cyano adhesive or wood glue.

▷ Model sailing is easy. It is always a good idea to seek out help if this is your first boat, but if you have an enclosed pond or lake with access all around there is very little that can go wrong. If you sail badly your boat will probably just stop and flap its sails until you work out what to do next.

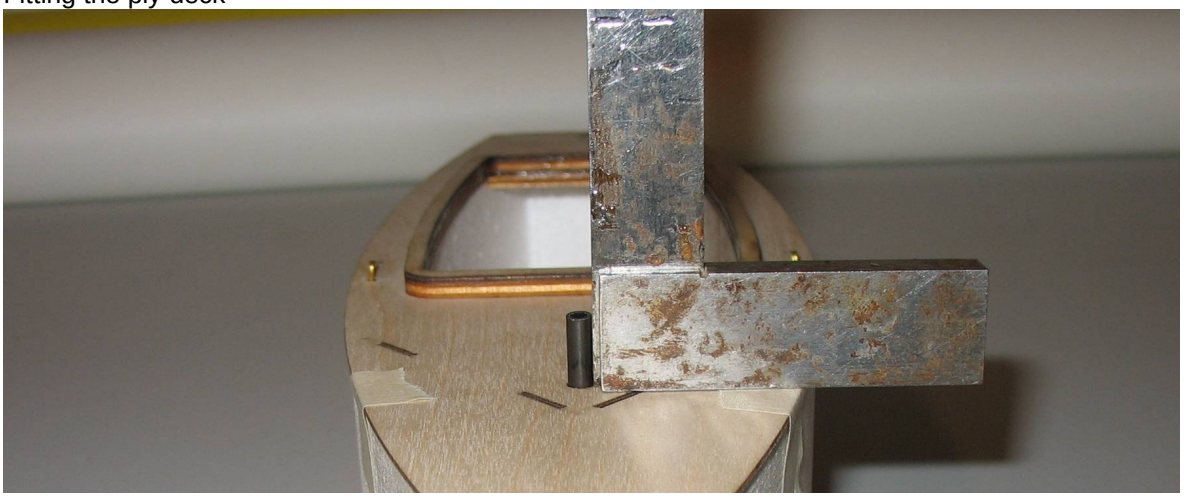
Deck split pins



▷ Take two 3/64" (1.2mm) brass split pins and trim the legs to 3/8" (9mm) or so. These split pins fit through the deck in the holes near each edge of the deck about halfway back.

▷ Slip the split pins through with the loops on the top side of the deck, open the legs against the ply running front to back, and secure with a little epoxy or super glue.

Fitting the ply deck

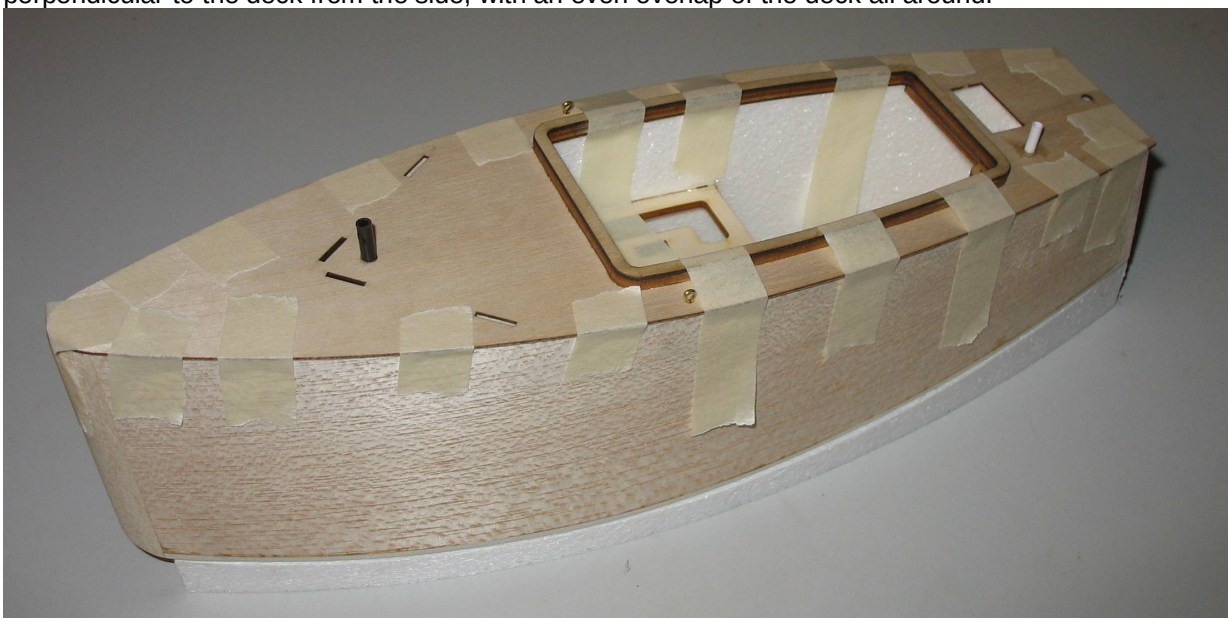


▷ Check that the tube is perpendicular to the deck from the side. The angle front and back will be set by the tube being against bulkhead B1. Now see how the deck fits. There should be a small overlap all around with less at the bow, and typically more at the transom.

▷ Press down on the deck where the split pins are so that you can compress the balsa a little to make space for them before gluing the deck.

▷ Mix a little slow setting epoxy and put a small blob in the round hole in the mast step. Also smear a little on the mast tube where it will meet the deck. You can put some on B1 where the tube touches it, too. Set the tube bottom into the mast step and against B1.

▷ Glue the deck in place on the hull with a good coat of waterproof wood glue applied to the sub-deck. Slide the deck onto the mast tube and align it as before. Make sure the mast tube is back against B1 and perpendicular to the deck from the side, with an even overlap of the deck all around.



▷ Use plenty of masking tape to hold the deck firmly in place. Add some weight just behind the mast tube and at the bow, if possible.

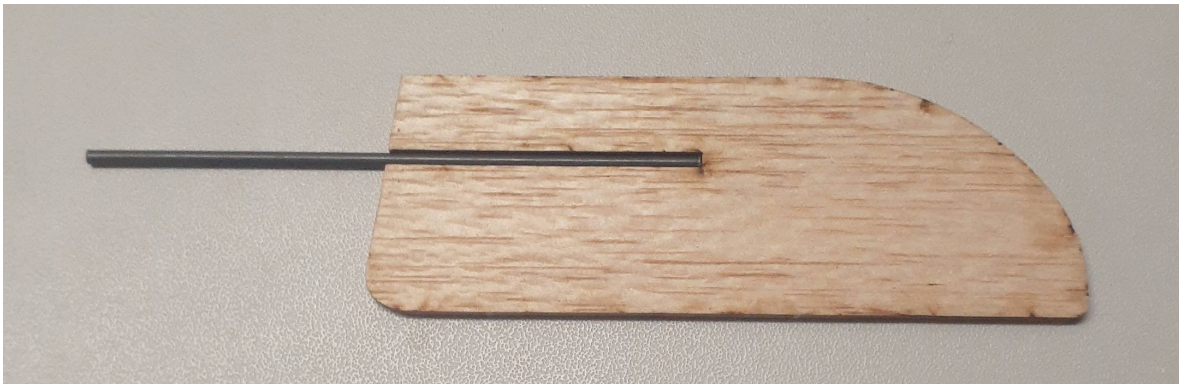
Deck splash deflector

▷ Locate the two 1/16” (1.5mm) ply splash deflectors. The tabs fit into the slots in the deck.

▷ Using waterproof wood glue or epoxy, glue the two parts into the deck so that they are vertical and meet at the front.

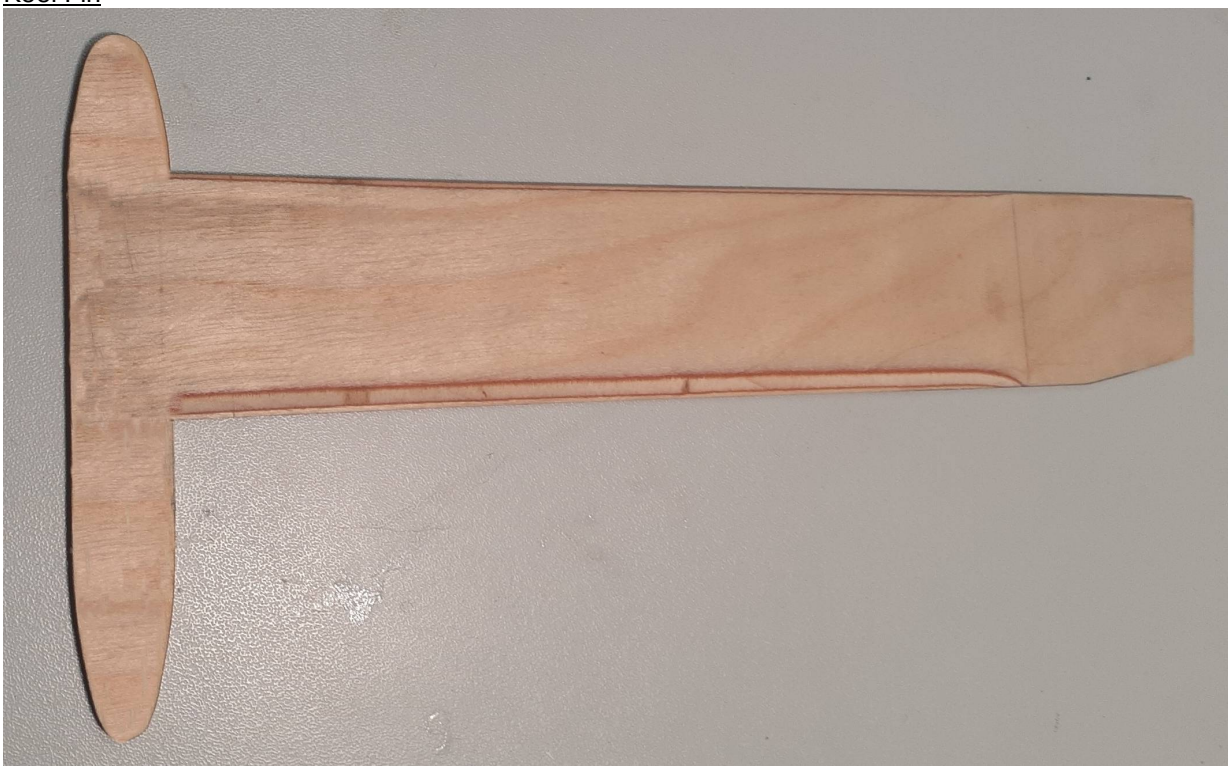
Rudder

▷ Cut out 3/32” (2.4mm) balsa rudder and a carbon rudder shaft. Epoxy the shaft into the rudder on a flat non-stick surface (sellotape or packing tape on wood) so that the shaft is straight and at the bottom of the slot in the rudder.



▷ Add more epoxy to each side after it’s cured to end up with a smooth surface each side. Finally, sand the rudder to taper to the rear and have a rounded front edge. Put aside for now.

Keel Fin



▷ Glue the two parts together with epoxy. Clamp or weight the parts onto a flat surface to make sure that the finished laminate is flat.
▷ Use coarse sandpaper glued to a stick to taper the rear edge of the keel. Round the front edge of the vertical part of the keel. Leave the upper part which goes through the hull bottom square edged.
▷ Slide the fin into the hull -- using a set square or triangle -- check that it is at 90 degrees to the hull bottom. Check from both sides. If it is not, then carefully sand the inside edge of the slot in the servo tray at one side until the fin is vertical (90 degrees to the hull bottom) when viewed from the front or rear.
▷ When satisfied, apply epoxy to the fin slot in the hull bottom and the servo tray slot, then slide the fin into place and make a good fillet of epoxy on the inside and outside of the hull bottom and also where it meets the servo plate (the front edge of the fin being against the front of the servo tray slot). Again, check for vertical alignment, then leave to cure. Add epoxy later if required to get a good waterproof seal.

This completes the basic hull assembly

Check all around the ply and balsa edge joints now and sand smooth any slight overlaps, Always sand along the direction of the grain to avoid scratching the surface and spoiling your final finish.
We would advise that you go ahead and apply your desired finish to the hull at this stage. It's easier without the weight of the keel bulb. But you should leave the keel bulb area at the bottom of the keel unfinished (bare wood) for now.
If you wish to include the bulb weight as part of the overall color scheme, go ahead and fit it now. See below for the section on fitting the bulb.

Finish

There are many ways to finish a wooden hull. This is our suggested method which works well with the mix of materials used.

Sand to a smooth surface all over. If there are any deeper grooves in the grain of the balsa skim over those with a light filler like DryDex spackling. Sand again.
Brush three coats of sanding sealer, shellac, or dope onto the balsa surfaces. This seals and also hardens the surface. Lightly sand between coats with fine sandpaper.
For a painted hull and varnished deck and keel, for instance, we like to brush paint the hull with craft acrylic over the sanded sealer. Two or three coats goes on quickly and easily. Then seal over that and any parts to be varnished with gloss Spar Varnish like Minwax Helmsman. Again, three coats should look good, or more as you wish.

Inside, give the hull floor, keel, and servo tray a couple of coats of sealer.

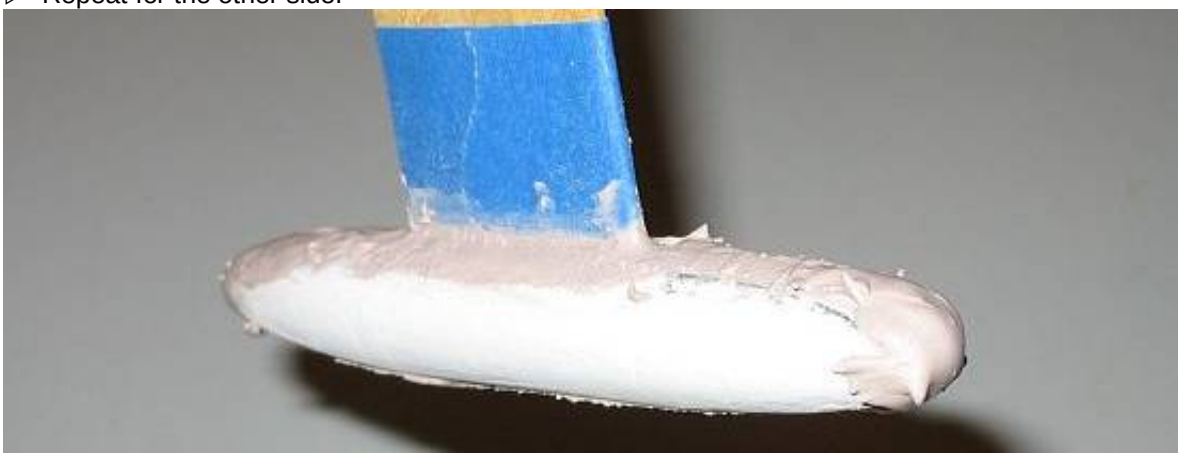
Another option is to use a thin laminating epoxy (Z-poxy) on the hull. This can be left as is, or sanded and painted with a primer and finish coat. Rustoleum™ or Krylon™ sprays work well.

Keel Bulb

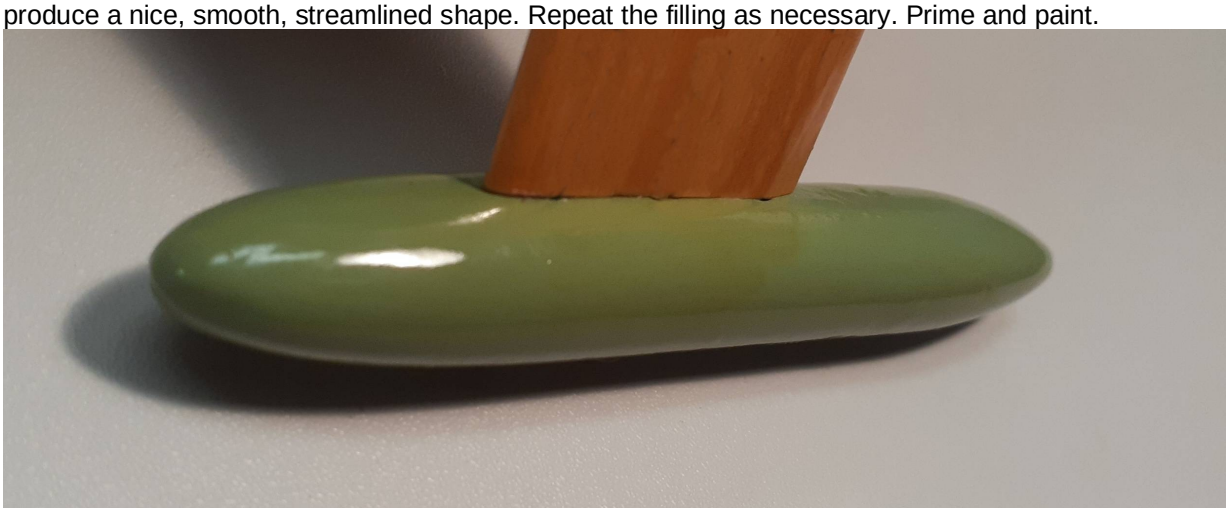
▷ If using a McAllister Designs type keel weight. Take the two halves of the cast lead bulb. Note that on the inside faces there is a chevron **>** pointing forward. Score the inside surface of each half to help the epoxy grip.

▷ Apply a good coat of epoxy to the inside of one bulb half and the appropriate side of the ply bulb core. Bring them together and use masking tape to hold the lead in place. Smear the excess epoxy around the joint to start to fill the gaps and make a good fillet from the lead to the fin. Allow to cure.

▷ Repeat for the other side.



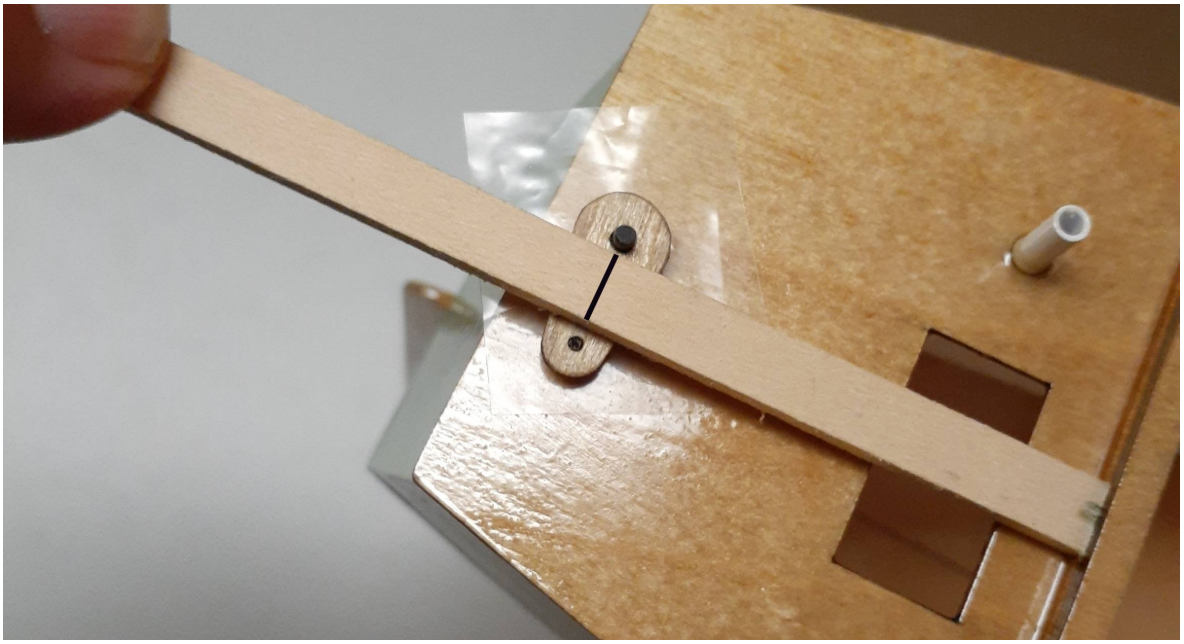
▷ Sand away any lumps of epoxy. Do this outside and wear a mask because the epoxy or lead dust should not to be inhaled. The gaps can be easily filled with a two-part car body putty or more epoxy with a filler added like micro balloons. Fill the joints and build up the front and back of the bulb. Then sand to produce a nice, smooth, streamlined shape. Repeat the filling as necessary. Prime and paint.



Fitting the rudder

▷ Slide the rudder shaft into the rudder tube from below and test fit the ply rudder horn on the carbon shaft. It should be a tight fit. Seal the bottom of the ply horn with shellac or cyano. The rudder control arm needs to be at 90 degrees to the rudder blade and to the right-hand side as viewed from the rear of the boat so that it aligns with the rudder servo output arm. Check that the rudder turns freely from side to side.

▷ Remove the rudder horn. A strip of wax paper or plastic bag material is pushed over the rudder shaft so that it forms a seal over the end of the rudder tube.



▷ Apply a little epoxy in the hole in the rudder horn, push it down over the rudder shaft, and turn it so that it is set at 90 degrees to the rudder blade as before. Add more epoxy around the protruding top end of the carbon rod to form a good fillet. When cured, tear the wax paper from under the rudder horn.

REMINDER… these photos are from the original kit version using a foam core. So they do look different but the set up is the same.

RADIO CONTROL INSTALLATION

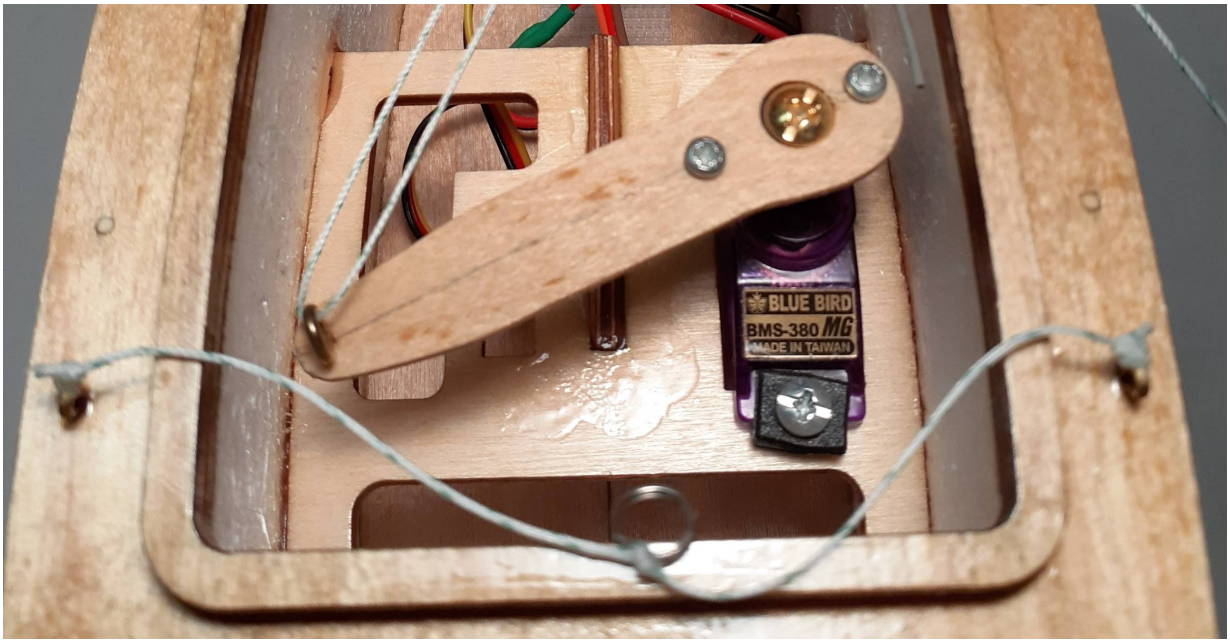
Sail servo

▷ Take the plastic cross-style servo arm from your servo and cut off two side arms. Place the ply sail control arm on top of the remaining plastic arm and mark the position of two holes.

▷ Drill these holes on the centre line 1/16” (1.5mm) diameter. Using two small 1/4” (6mm) screws, screw the ply sail control arm on to the top of the plastic servo arm.

▷ Remove the arm again.

▷ Take a brass screw eye and screw it into the hole near the end of the sail control arm with the loop on top. Seal it in place with epoxy around the threads underneath the arm.



▷ Fit the sail servo into the larger cutout in the servo tray with the output spindle towards the back of the boat. Drill the tray to suit your servo mounting lugs and screw in place with 1/2” (12mm) screws.

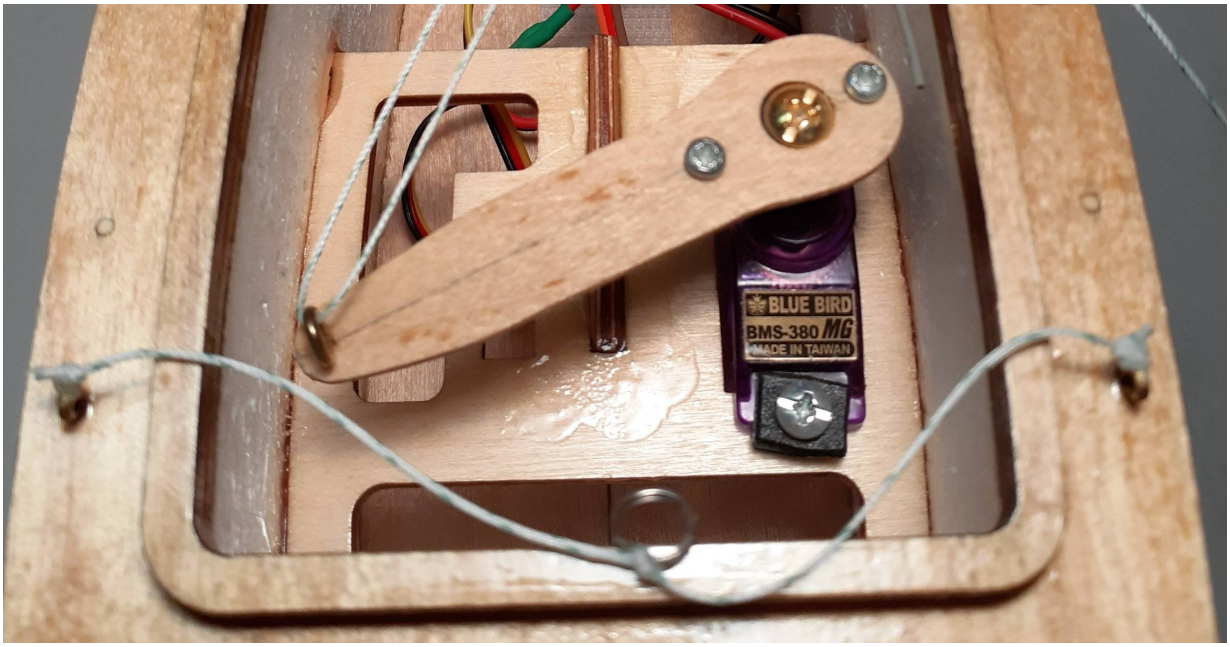
Rudder servo

▷ Mount the micro servo (Hitec HS-55 or similar size) in the servo slot on the rear deck. Fit it inverted first to mark the mounting hole positions. The output spindle should be towards the centre of the boat. Trim one of the servo output arms down to a single arm. Choose an arm with a hole at about 13/32” (10mm) from the centre.

▷ Put a small bead of silicone sealant around the top of the case and push the servo into the slot from below. Screw into place with two 1/4” (6mm) screws. Smear more silicone carefully around the servo to seal any gaps.

▷ Remove the arm again.

▷ Before refitting the servo arms, connect the switch and battery to the mounted servos, turn on your transmitter and turn on the receiver. Check that the rudder and sail control trim levers are both central on the transmitter. With the rudder servo in this position, put the rudder servo arm on so that it lays across the body of the micro servo as close as possible to straight across the hull. Replace the servo arm screw. Pull the sail control stick on the transmitter to the bottom of it’s travel and leave it there (This stick should be fitted with a ratchet which is usually available as an extra, if not standard). Now put the sail arm on the servo spindle so that the end of it is pointing at the deck split pin at that side. (See photo below).



Move the sail control stick on the transmitter to the top and check that the sail control arm moves towards the rear. Replace the servo arm screw. You can unplug the battery and receiver for now. Go ahead and mount the switch through the switch hole in the servo tray if you are using one.

Rudder Pushrod

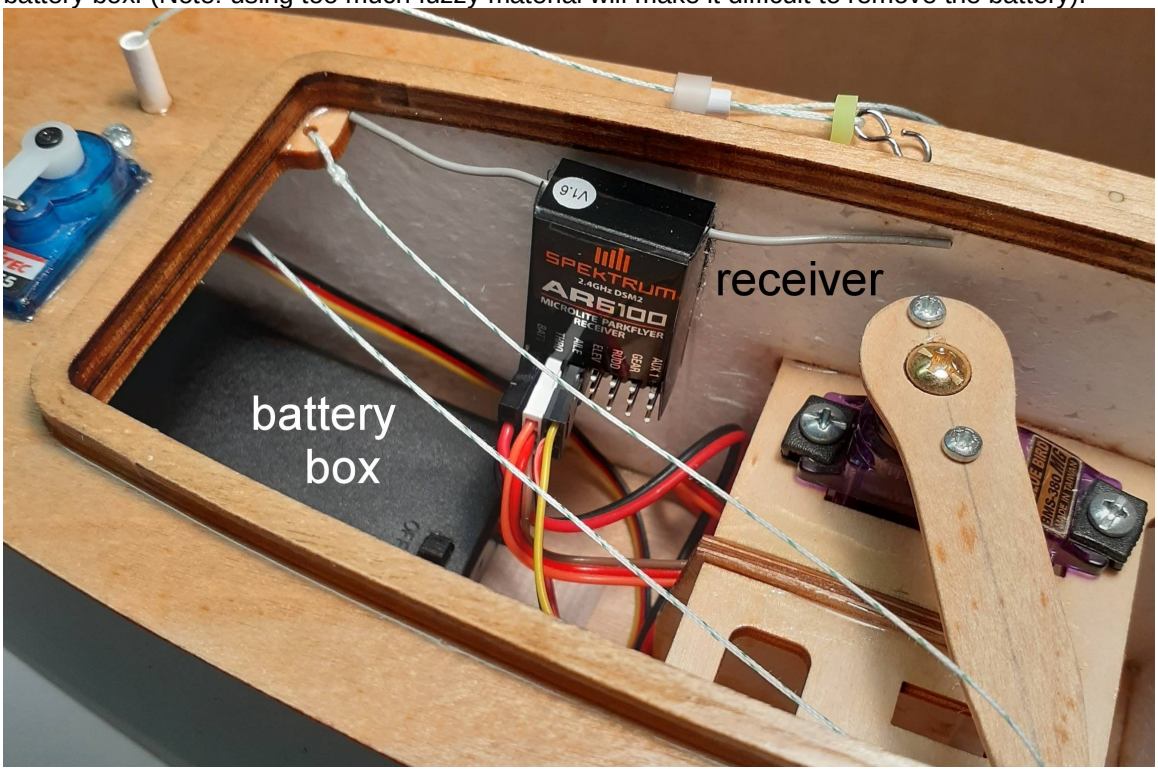
▷ The rudder pushrod is made from the 1/32” (0.8mm) wire. Feed the Z bend into the rudder arm and, with the rudder straight, mark where to bend the Z bend in the other end of the wire to pass through the servo arm. Note in the photo how the bends are oriented.

Battery

The battery or battery box sits on the floor at the rear of the hull opening.

▷ Take a strip of hook-and-loop material and separate the hook half. Stick this strip along the hull bottom below the battery position as far back as possible.

▷ Cut two 3/8” (9mm) lengths of the fuzzy side of the material and stick these on the bottom of the battery box. (Note: using too much fuzzy material will make it difficult to remove the battery).



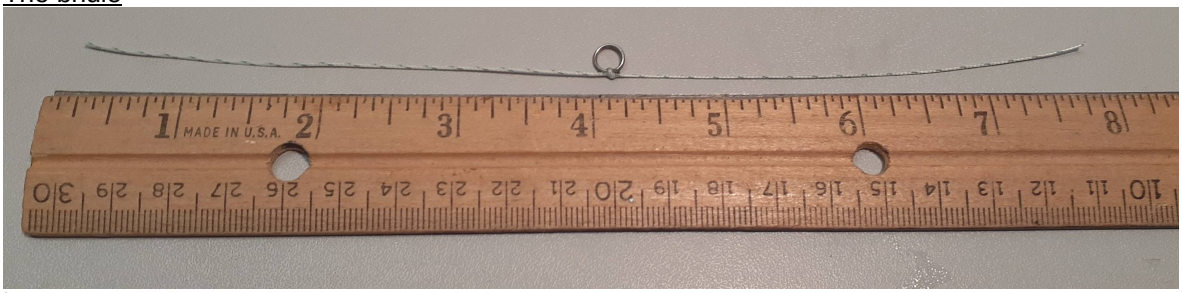
Receiver

The receiver is installed using hook-and-loop material. Attach high up on the inside of the hull opening. (Or for simple splash-proofing, bundle the wires together once everything is connected and put the receiver in a small plastic bag or small balloon with the neck roll cut off). Hold the wire exit tight with a plastic twisty or small rubber band. This will not be totally waterproof unless you seal it further with silicone rubber sealant, but it will protect the receiver from any small amount of water that finds its way into the hull. If you do that, jam the receiver in position with a bit of foam.

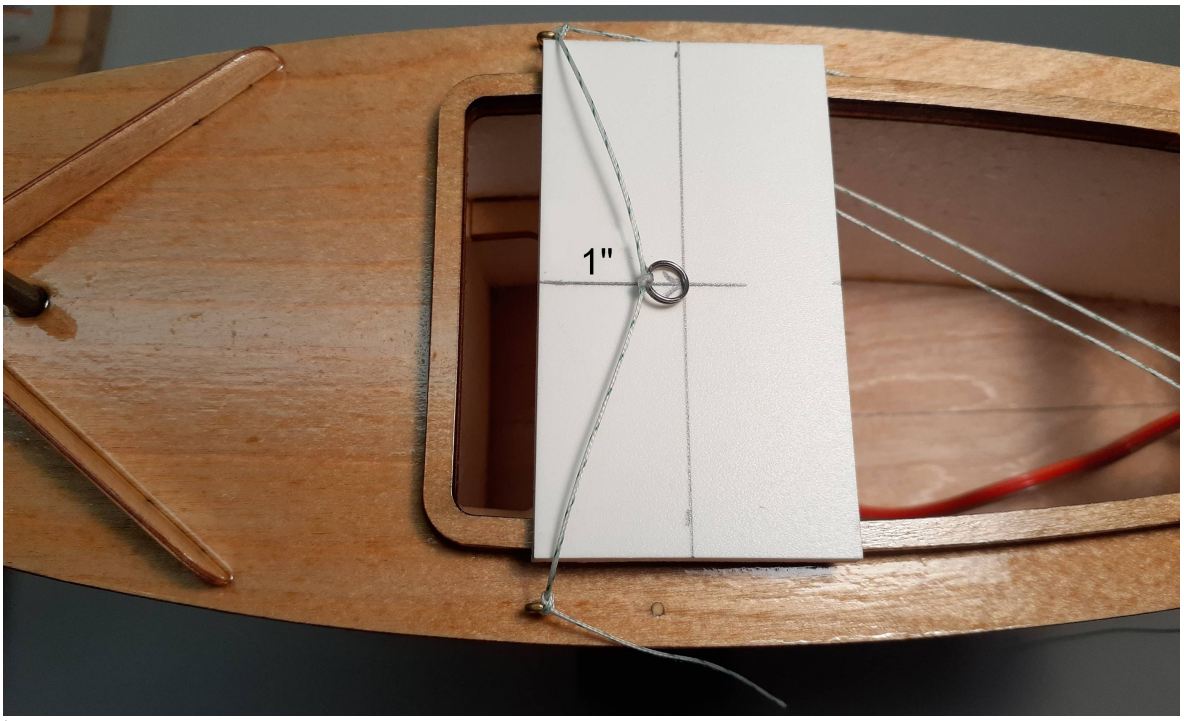
Route the wires neatly and tuck as much as possible under the servo tray. We must avoid anything that could tangle with the sail control line.

RIGGING

The bridle



▷ Take an 8” - 10” length of rigging thread and tie a small metal ring at its midpoint. Seal the knots with medium Cyano.



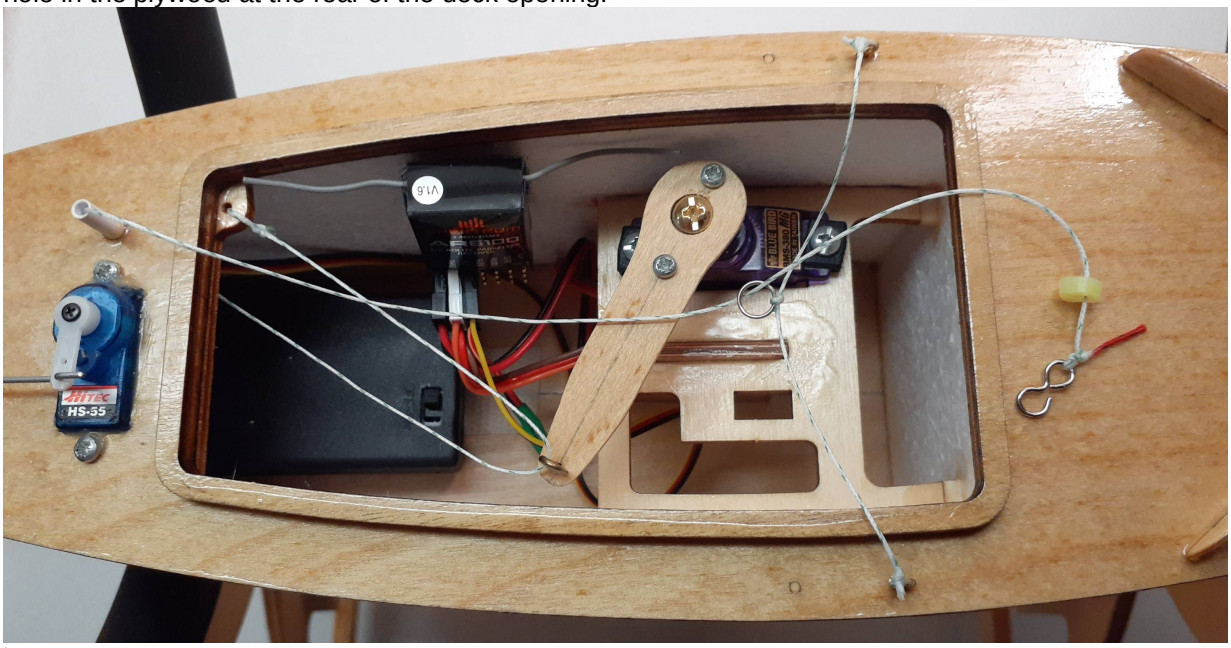
▷ Now tie this bridle assembly between the two split pin loops on the deck sides. Tie the line such that if laid on the deck the loop knots will be about 1" (25mm) behind an imaginary line drawn between the two split pins. The metal loop must be on the fore and aft centre line of the deck. When satisfied with the position of the loop, seal the knots.

SAIL CONTROL

Banshee is designed to sail with a UNA or single sail rig. If you are fitting the McAllister Designs OPUS rig, or another type, the set up will be very similar.

Main Sheet

▷ Switch on the radio control. Always turn on the transmitter first and then the receiver.
▷ Set the sail control stick (on the left) to the mid position.
▷ Take a length of rigging thread and put it down through the fairlead (the plastic tube) on the rear deck. Run it forward inside the hull through the brass screw eye on the servo arm and back to tie it off to the hole in the plywood at the rear of the deck opening.



▷ Run the other end of the sheet line through the metal loop on the bridle, then tie it off to a figure 8 hook. You should leave this knot loose until you have your rig available to set the correct length.
▷ Open one end of the "8" to form a hook. This hook will link into the split pin under the boom of the

OPUS rig or a loop on your chosen rig. The starting point for the position of the boom attachment is 3-1/2" (86mm) back from the boom pivot rod.

You will need the sail rig available from here on.
▷ Pull the sail control stick on the transmitter to the down, fully in, position.
▷ Swing the boom so that the end of the boom points to either rear corner of the deck. Hook the control line on to the boom if possible. Adjust the length so that the sheet is just tight with the boom in this position.
▷ Push the transmitter sail control stick to the top (the sails fully out position). Swing the boom out until the sheet is tight again. The boom should be at 90 degrees to the hull centre line or a little past that.
▷ Slip a narrow 1/16" (1.5mm) ring of the silicone tube over the middle of the figure 8 hook. This will stop the hooks from falling out of the boom ring while sailing.

NOTE: The amount of swing obtained may vary according to the servo and radio control equipment you are using. The measurements given should give a good starting point, but if you are getting too much or not enough movement of the boom a number of things can be adjusted to make it right.
…Moving the loop connection point on the boom towards the rear end will lessen the boom swing angle.
…Moving the loop connection point on the boom towards the mast will increase the boom swing angle.
…Some transmitters will allow you to adjust the sail servo swing angle electronically.

GO SAILING!

Materials required

1/32" (0.8mm) birch ply… deck
1/16" (1.5mm) birch ply… small parts
1/8" (3mm) Liteply… keel support plate
1/16" (1.5mm) balsa… hull side sheeting
3/32" (2.4mm) balsa sheet… rudder, hatch top
1/8" x 4" (3.2mm x100mm) balsa sheet… sub-deck
3/8" x 4" (9mm x 100mm) balsa sheet… hull bottom
Lead bulb halves or alternative

Fittings required

2mm carbon rod rudder shaft	4-1/8"	105mm
Plastic rudder tube (to fit the above)	2-1/4"	58mm
4mm carbon mast tube	3-1/2"	89mm
Rigging Thread		
Hook & loop material		
Brass screw eye	1	
3/64" x 1/2" brass split pins	2	
Figure 8 hook	1	
Small ring	1	
1/4" screws	4	
1/2" screws	2	
1/32" stiff wire rudder pushrod	1	(0.8mm D)