

Skull Bandit



The Skull Bandit is the combination of the best design elements of Open “B” class radio control combat airplanes in the spring of 2002. The Bandit utilizes the Selig airfoil and a profile fuselage created from High Density Polyethylene (HDPE). The components of the fuselage are CNC routed, and then the finishing touches are hand crafted and inspected. It’s unique, and we think very attractive shape combine form and function. The fuselage hump over the wing which we call the “launch handle”, serves not only as a place to hold for hand launching but securely locks the wing into the fuselage. The fuselage is only as thick or wide as is needed to survive even the worst strikes and crashes.



The Skull Bandit is fast and turns tight, but can be slowed down and flown as comfortable as you can fly most sports planes. It is a go where you point it design that is extremely durable.

Our planes have been powered by a variety of engines including OS .25FX, Norvel AME BB .25s, and Magnum .28s. Your plane when finished should weigh between 3 Lbs 1 ounce and 3 Lbs 6 ounces depending on choice of engine, radio, battery, and wing covering material.

Materials included in each kit:

- HDPE Fuselage with Lexan wing saddle attached with socket head screws
- Two Hi-Load 40 wing cores pre slotted for wing spars (2)
- Two 1/8" fiberglass rods for use as wing spars (2)
- Corrugated Vertical and Horizontal Stabilizer (one each)
- 1/4" dowels for wing hold downs (2)
- 1/4" polypropylene LE Rod
- 5/16" X 5/16" balsa trailing edge caps (2)
- Two 3/8" X 1-1/4" X 36" ailerons (2)

Items you will need to complete the Skull Bandit:

1. Wing covering material: Ripstop nylon, tapes, or your choice of covering material
2. Five Minute Epoxy, 30-minute epoxy
3. 4-40 X 3/4" socket head cap screws and blind nuts (4) for engine mounting.
4. Bi-Directional packing tape and 8" tie wraps to secure fuel tank, servos, battery, and receiver.
5. Six ounce fuel tank. (Sullivan 6 Oz slant tank) We prefer the hard plastic rather than flexible
6. .25 to .30 size engine.
7. Two standard servos for elevator and ailerons, one mini servo for throttle.
8. 4 channel receiver and extensions for ailerons and battery connectors.
9. Foam padding for battery and receiver
10. 4 2-56 rods with threaded ends and clevises for throttle (1), elevator (1), and ailerons (2).
11. Nylon control horns for elevator (1), and ailerons (2).
12. Bamboo skewers (min. 2) to stiffen corrugated plastic stab and elevator to prevent deformation in high-speed turns.

Required Tools:

1. Phillips screwdriver.
2. 2" chip brushes
3. 4-40 Hex driver.
4. X-Acto knife with extra sharp blades.
5. Various grits of sandpaper.
6. Electric drill and various bits
7. T-pins to hold the trailing edge to the foam as it dries; to hold spar in place as you glue it and to hold the wing panels in alignment as they dry.
8. 8-12 mini spring clamps
9. Short supply of elbow grease.

Power tools that make life easier:

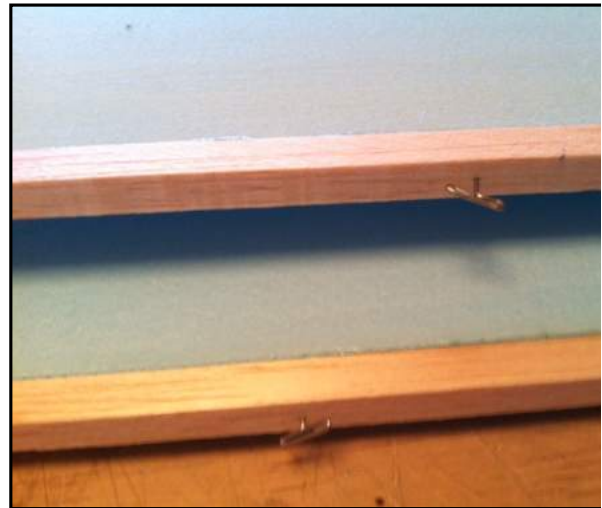
1. Drill press.
2. Dremel with sanding drum and cutting bit to enlarge servo holes if necessary.

Step 1: Attach Balsa trailing edge

Using five-minute epoxy, mix up enough to glue the balsa TE on one wing panel at a time. It's easier to glue the trailing edge on both the wing panels before joining them. Don't ask how we know. We usually pin them in place using T-pins. Put weights on the surface to make sure it remains straight. Remember to clean your work surface so that nuts and bolts don't embed themselves in the lovely foam cores we have provided you.



you will need 5 min epoxy, T-pins, mixing tool



Balsa TE end caps held in place with T-pins



Save the excess balsa end caps that you removed from the trailing edge as they will be used as shims in the next step of joining the wing panels

Figure 1 Save the excess balsa end caps

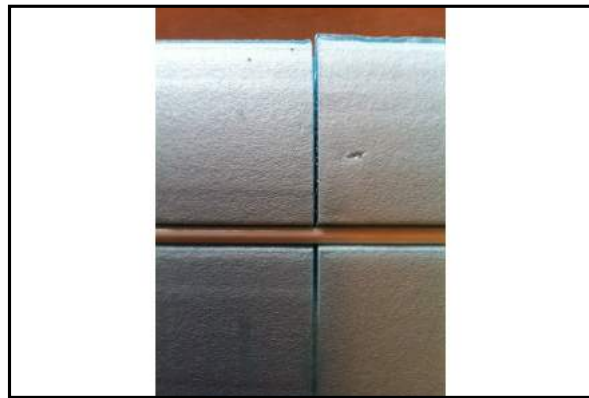
The supplied TE stock is 36" long but each panel is 32" so when the TE has dried cut off the excess and lightly sand the root of each panel before joining. Save the segments for the 5/16th balsa sticks you just cut off to use as shims under the wing tips as you join the 2 wing panels.

Step 2: Join the wing Panels

Once the TE caps are in place and trimmed we will be joining the wing panels using five-minute epoxy. Begin by test fitting the panels together and aligning the rod pockets using one of the supplied fiberglass rods. Use the excess 5/16th balsa stock you saved in the prior step to shim-up the wing tips while test fitting the wing panels together.



Shim wing tips and test fit wing cores



Align the rod pockets

Once satisfied with the fit, slather 5 minute epoxy on the root and re-assemble the two panels together. You can use masking tape to hold the foam cores together as they cure or use T-pins to secure them while the epoxy cures



Figure 2 Glue wing halves together



Figure 3 align leading and trailing edges

Be careful and make sure the panels are aligned properly! If you get them twisted in relation to each other you will have built a very elegant high speed corkscrew.

Step 3: Insert 1/8" fiber glass spars

A 1/8" groove has been cut into the wings, 1- top and 1- bottom to accommodate the two 1/8" fiberglass rods. The wingspan is 64" and the glass rods are 60" so you will have to center them in the grooves – leaving the last two inches of wing slot open. Place the 5/16" shim under each wing tip to make sure the wing stays straight. Use 15-minute epoxy for this step....If you are fast builder the use 5 min epoxy. We place the rod in the slot and use T-pins to hold it down into the groove The T-pins are pushed in at an angle and across the fiberglass rod.



Figure 4 add plenty of epoxy to the rod and groove



Figure 5squeeze the epoxy into groove and around rod

Apply 5-minute epoxy over the rod. While it is curing it flows down in the slot around the rod to lock it in place. Use a squeegee (old credit card) to force the epoxy down into the groove. It is sometimes necessary to apply a second application of epoxy to the rod to make sure that it is firmly adhered to the foam. Any excess epoxy is squeegee onto the wing core the full length of the rod. This also helps the covering material adhere to the foam when you get to that step.

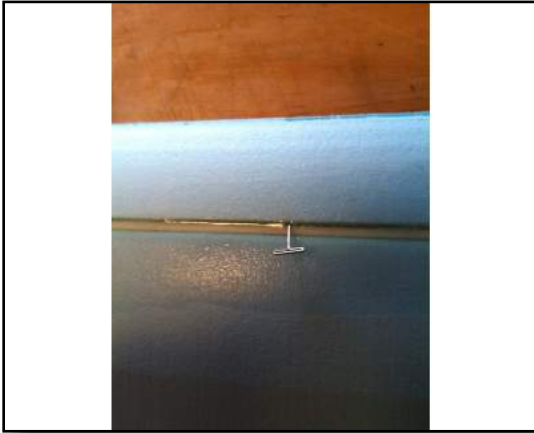


Figure 6 T-pin holding rod in place



Figure 7 Properly installed fiberglass rod!

It's starting to look like a pretty good airplane wing now, isn't it?

Step 4: Insert Leading Edge Plastic Rod

After the wing panels have been joined and the fiberglass rods are glued in place, insert the ¼" polypropylene leading edge rod into the cut out on the leading edge of the newly joined panels.



Figure 8 Insert Leading Edge plastic rod



Figure 9 Sand Leading Edge foam to fit rod

Once the rod is in place, use 220 grit sandpaper to “blend” the foam with the shape of the ¼” plastic rod. You could apply a spot of shoe goo to a couple of locations to hold it in place, however we just let the rod float in the groove. It will be held in place at the final taping stage.

Step 5: Cover the wing

Now is the time to cover your wing. The wing is covered in two parts, Top first then the bottom. Be sure to have everything ready before you start. You will need your rip-stop fabric, polyurethane, a dozen clamps, sharp X-Acto knife, blocks or old tape cores. Lay everything out and think it through before starting. Note that there are several methods that can be used to cover the wing. We have covered with several materials: Rip-stop Nylon, plain Nylon, and polyester fabric packing tape. We prefer rip-stop nylon adhered with water based polyurethane.

Begin by cutting your rip-stop fabric into a rectangle large enough to cover 1/2 of the wing. Either top or bottom, it doesn’t matter. Cut your fabric large enough to over-hang the wing cores by 2-3 inches on all 4 sides. On a separate table or work space, lay-out fabric and wet-it out with chip brush and water based poly urethane.



Figure 10 cut fabric to size -1"- 2" larger than foam core



Figure 11 Polycrylic Polyurethane

We prefer MINWAX Polycrylic polyurethane (flat finish). Begin by wetting-out first piece of fabric and allow the poly to stand on the fabric while you coat-out the one side of the wing to be covered. Allowing the polyurethane to stand on the fabric will relax the fibers in the fabric making it “stretchy”. Once you have an even coat on the foam, lay the fabric over the foam

centered in both directions. Ensure you have excess material hanging over all of the edges. Starting at the center, use your hand or brush to smooth out the fabric.

Try and move quickly as the poly will start to cure quickly. You may want to wear latex gloves for this step. Smooth out all of the wrinkles and try to remove all of the air bubbles as well.



Figure 12 Coat-out foam



Figure 13 Coat-out fabric

With the rip-stop fabric stretched out covering the foam, smooth out the fabric by hand removing all of the wrinkles and air bubbles. You may want to use an old credit card to assist in the process.



Figure 14 use old credit card to help smooth-out air bubbles



Figure 15 Move excess urethane to top of wood trailing edge

Once satisfied with the smoothing process, place the wing on a platform to raise it off of the table surface 3-4 inches. We use expired tape roll cores for this. Again, move quickly on each of

these steps for best results. With the wing on its platform, attach spring clips or any other type of weights around the perimeter of the fabric to help prevent it from curling and it cures.

The rip-stop will shrink as it cures. Let the wing cure for several hours, over night or until you are satisfied that it is dry enough to flip it over and repeat the process on the other side.

Once the poly has cured, use a sharp X-Acto knife to trim around the perimeter of the wing. Trim the wing tips even with the foam. Trim the trailing edge even with the balsa TE and trim leading edge even the poly rod.

Now flip the wing over and repeat the process!

Step 6: Tape the TE and LE

After the wing is covered and the covering has been trimmed. Tape the Leading edge of the wing using 1 strip of bi-directional tape the full length of the 64" wing. Start by placing the tape on top of the wing so that it will be centered on the LE poly rod. Press in place and smooth the tape around the leading edge to the bottom of the wing. The tape should be smooth, and rounded as it helps maintain the leading edge shape of the airfoil.

Next, cover the trailing edge in the same manner. Since the wings are tapered on the trailing edge, tape it using two strips of tape, left then right. Center the tape so that it will cover a portion of the top and bottom of the trailing edge. You may find it easy to center the tape strip on the trailing edge then fold it over towards top and then bottom of wing. The idea is to "seal" the trailing edge with tape and then adhere the rip stop to the wing.

Step 7: Attach ailerons

After the wing is covered and the leading edge and trailing edges are taped it is time to attach your ailerons.

Trim your Ailerons to 30 1/2". You may want to cut a small taper at the root for cosmetic appearance then ensure that your ailerons will clear the rear wing hold-down dowels.

Once you aileron is cut to desired shape, use one strip of bi-directional tape to cover half of the aileron top and bottom. This strip of tape covers the trailing edge of the top of the aileron the folds over to the bottom side of the aileron the full length. . A second strip of bi-directional tape

is cut the length of the aileron and over lapped on top of the first layer of tape. Approximately ½ of the tape will over-hang the aileron and this will be attached to the wing. Attach the aileron to the wing in the “fully flexed” down position. The aileron is now taped to the wing,

Next, fold the aileron back onto the top of the wing exposing the hinge line and “adhesive” side of the upper hinge tape. Center a 3rd strip of tape along the hinge line then smooth it down the bottom of the aileron followed by the wing bottom. This creates a “gap-less” hinge line and attaches the aileron to the wing its full length. Repeat the process for the second aileron.

Step 8: Install servo and linkages

Be sure to place the wing into the wing saddle to establish servo location.

Step 9: Fuselage

Your fuselage has the wing saddle already mounted to the HDPE with hex head screws. Insert the 1/4” dowels provided in your kit into the holes in the fuselage just forward and just behind the wing saddle.



Step 1:

Attach the tail feathers to the fuselage. Your fuse comes with the holes pre drilled and the screws started in the HDPE. Install your stab/elevator first then put in the rudder. The stabilizer is held in place with 3 provided socket head screws. They go inside the “slot” where the vertical rudder goes. The holes have been pre-drilled.

Step 2:

Tighten them to a snug fit but be careful not to over tighten the screws or you will strip the holes. The vertical fin is attached in the same manner as the stabilizer. Slide it into the slot and use the provided three socket head screws to attach fin to fuse.

Step 3:

Mount the engine directly to the fuse in the cut out provided. Drill and tap for 4-40 X 3/4" socket head screws (not provided) take your time, work carefully and make certain it balances where we show on the plans (1 15/16" back from leading edge). Remember nose heavy planes fly poorly, but tail heavy planes fly once!

Step 4:

Install a mini servo in the cut out provided under the wing for throttle control. You may have to use your Dremel or a hand file to open up the servo opening to accommodate your servos. The slot is sized to accommodate a JR331 or Expert SL300 but you may have to open it up slightly to fit your servo. Use 2-56 threaded rod and clevis to make the throttle connection.

Step 5:

Install the elevator control horn in the moving portion of the horizontal stabilizer. We have found that you need to stiffen the tail or it will deflect in the air causing great reduction in control authority. Insert bamboo skewers available from your local grocery into a flute near the hinge line on both the fixed portion and moving portion of the stab. Due to its width you will need to use two skewers to strengthen the entire span. Shove the pointed end into the Coro flute. This works better than pushing the pointed end into your hand. Before inserting coat them with either thick CA or Pro-Bond so they grip the coroplast flute. When dry, cut them off with side cutter pliers or an X-Acto knife.

Step 6:

Install the standard size elevator servo in the hole provided; enlarge the hole to accommodate your servo if necessary. Make sure the arm of the servo is opposite the exhaust of the engine. Make up a 2-56 rod and clevis pushrod to actuate the elevator.

Step 7:

Insert the wing into the fuse saddle and mark the location of the wing servo. It needs to clear the glass rods and the launch handle hump on the fuselage. Cut the servo opening and install the servo by your preferred method. We have made plywood servo boxes and others have glued the servo into the foam with silicone glue or high temp glue gun, all three ways work fine.

Step 8:

Install tank, battery, and receiver at the locations of your choice. We normally put our receiver under the wing saddle against the fuselage on the side opposite the engine exhaust. We wrap our receiver in foam and then drill holes in the lexan wing saddle that we can run tie wraps through then around our foam wrapped receiver. Others have made receiver "cases" out of scrap foam. These are basically boxes that the receiver goes into that are then secured with tie wraps.

Step 9:

Our tanks go behind the engine on either side of the fuselage and the batteries are attached to the nose of the fuse or under the tank. We suggest that you put the battery on the fuse opposite the fuel tank and hold them both on with electrical tape or tie wraps.

Step 10: Install receiver

The hardest part of equipment installation is getting a neat wiring job. You will have wire going all over, which made us consider naming the plane Medusa instead of Bandit, but then we got to thinking what Southern Red Neck would know anything about Greek Mythology so we just stuck with Bandit and worked out how to get our wiring neat using small tie wraps and or Velcro.

Step 11: Balance aircraft

Balance the plane at 1 15/16" to 2" back from the leading edge. Do not under any circumstances set the CG any further back from LE than 2".

The recommended control throws are: Elevator 3/8" up and down; Aileron – about 1/2" up and down.

Now go cut some streamers!!