



BOMARC

Specifications:

Length: 45.25"
 Diameter 2.6"
 Weight: 39oz
 Recovery: 36" Nylon Chute
 Motor Mount: 29mm
 Features: Water Slide Decals
 Fins: 1/8" Plywood
 CG: 23.5" from nose tip

Recommended Motors:

Single Use	RMS		
F50T-4	390'	F40W-4	420'
G77R-7	750'	G64W-7	940'

Parts List

1. (1) Nose cone
2. (2) Custom balsa ramjet cone sets
3. (2) Pre-slotted pod body tubes
4. (1) Pre-slotted aft body tube
5. (1) Forward body tube
6. (1) Coupler
7. (1) 29mm motor tube
8. (1) Laser-cut wing/stab/fin set
9. (2) Pod fins
10. (2) 1/8"x3"x36" Balsa
11. (4) 1/4"x1/2"x36" Balsa
12. (1) 1/4"x1/4"x36" Balsa
13. (2) 1/4"x36" Triangle Balsa
14. (1) 1/4"x6" Dowel
15. (3) Centering rings
16. (1) Kevlar® shock cord section
17. (1) Nylon shock cord section
18. (1) 9"x9" flameproof chute protector
19. (1) 36" Nylon chute
20. (2) 1/4" launch lugs
21. (2) Water slide decal sheets

Required to complete: 5 minute epoxy, wood glue, zap, 120/220 sandpaper, masking tape, finishing filler/paint, scissors to cut decals.

K-119



8 98666 00119 2



Please make sure you read all directions and understand how to assemble your model before you start construction. It is also a good idea to test fit each part before assembly – some manufacturing tolerances may require light sanding before final assembly.

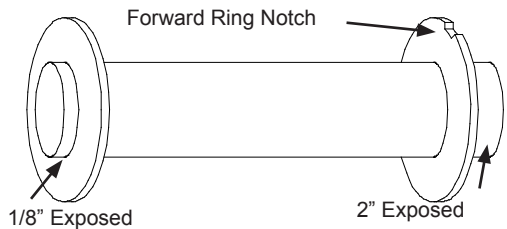
Laser cut parts will exhibit varying amounts of charring on the edges depending on the density of the plywood. The charred edges do not interfere with bonding and do not need to be cleaned before assembly. In most cases the charring will be cleaned up during sanding for finishing and painting.

Step 1 – Motor Mount Assembly

Test fit the centering rings over the motor mount tube and sand if necessary. The rings should have a snug fit but loose enough to move the ring over the motor tube without deforming it. Also test fit the centering rings in the body tube and sand if necessary. One of the rings will have a notch for the shock cord - this will be the forward ring.

Spread some epoxy on the outside of one end of the motor tube and slide the ring (without the notch) until there is approximately 1/8" of motor tube exposed. **IMPORTANT:** Make sure you clean the motor tube of any epoxy so as not to interfere with the fin tangs later.

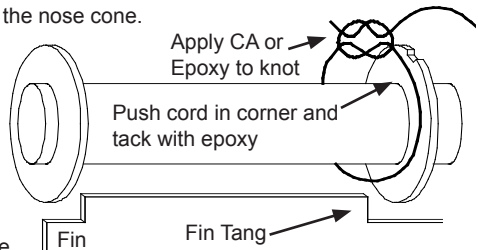
After the aft ring is dry, make a mark 2" from the other end of the motor tube. Spread some epoxy on the motor tube and slide the forward ring (with the notch) until it aligns with the mark.



Step 2 – Shock Cord Attachment

The shock cord in this kit consists of a shorter section of Kevlar and a longer section of nylon cording. The two sections should be tied together using a single overhand, ring bend or double fisherman's knot. The Kevlar section will be attached to the motor mount and the nylon section will be attached to the nose cone.

Wrap the end of the Kevlar shock cord around the forward end of the motor tube and tie a square knot or bowline knot near the notch in the forward centering ring. Apply some epoxy to the knot to make sure it doesn't come loose later. Make sure the Kevlar loop is seated against the forward centering ring so that it will not interfere with the fin tangs later. You can tack with epoxy or CA to hold in place.

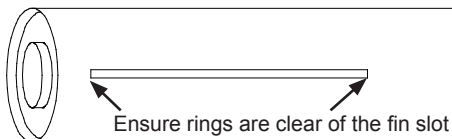


Step 3 – Insert Motor Tube Assembly into Body Tube

Wrap the shock chord into a small bundle and stuff it inside the motor tube for this next step. Make sure the cord passes over the notch in the forward centering ring. The motor tube is going to go into the end of the body tube with a single slot. Test fit the motor tube assembly into the body tube to ensure a snug fit. Sand the centering rings if necessary.

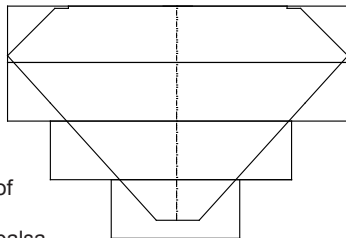
When you are satisfied with the fit, spread some epoxy on the inside of the body tube and slide the forward centering ring of the motor assembly into the body tube. **Make sure you have the motor assembly facing the right way! (The shock cord goes**

over the forward centering ring) Spread some more epoxy on the inside edge of the body tube before sliding the rear centering ring into the body tube. Continue sliding the assembly inside the body tube until the aft end of the motor tube is even with the aft end of the body tube. It's a good idea to test fit a fin in the fin slot here before the epoxy sets. Hold the body tube with the motor tube assembly down until the epoxy sets. Make sure the weight of the motor assembly doesn't cause it to slide out of alignment.



Step 4 – Wing & Horizontal Stabilizer Assembly

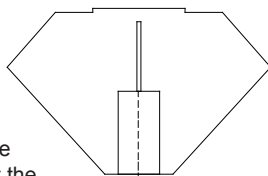
Using a flat surface, layout the two plywood pieces of the wing and join the 2 parts using zap, epoxy or wood glue. After the glue sets, make sure the top of the wing assembly is flat (no glue sticking up) so that the laminated balsa will glue flush to the plywood in the next step.



Next, cut two 18" lengths, one 13" length and one 7" length from the 1/8" x 3" balsa stock. Spread a thin layer of wood glue on top of the plywood wing and plank the wing with the 1/8" balsa. Be sure to glue the edges of the 1/8" balsa planks as well. Place some heavy objects on the wing while it dries to ensure the wing will be flat.

After this assembly is dry, use an xacto knife to trim the balsa planks to the same outline as the plywood wing. Next, mark the centerline of the wing on top and bottom (the balsa side is the top of the wing). Next, draw 2 lines 0.75" away from both sides of the centerline on the bottom and top of the wing marking out a 1.5" wide center section of the top and bottom of the wing. Sand the balsa to an airfoil shape - this is an optional step and is purely for looks - not required for stable flight. **IMPORTANT:** do not sand the center section of the wing (inside the 1.5" wide center section) to an airfoil shape, this section will be covered by a balsa box shaped conduit later.

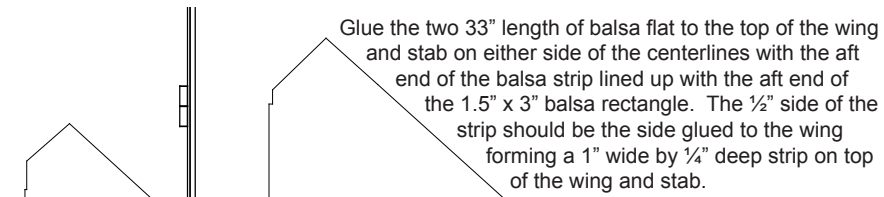
Just like you did on the wing, mark the horizontal stab on top and bottom with centerlines and the 1.5" center section marked out. Next, cut a 1.5" x 3" rectangle from the remaining 1/8" x 3" balsa stock. Glue the 1.5" x 3" rectangle to the top of the horizontal stab flush with the leading edge of the horizontal stab and centered between the 1.5" center section lines drawn earlier (as shown). Note that the balsa will not extend all the way to the trailing edge of the stab and will cover some of the slot in the stab – this is ok.



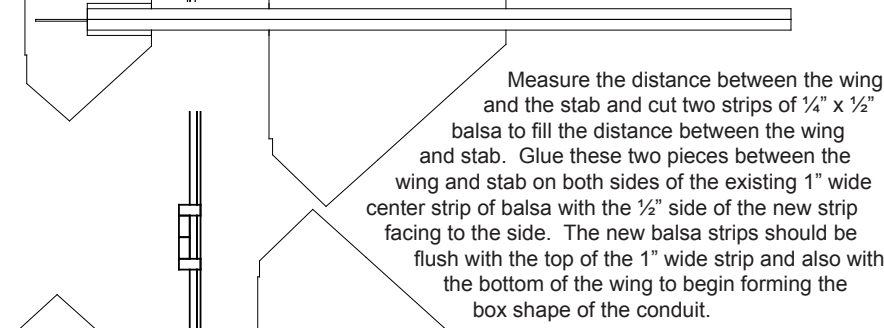
Step 5 – Conduit Assembly

IMPORTANT: sometimes balsa lengths will warp because of weather differences between manufacturing site and your site. This is not a problem because any warping can be taken out when the conduit is glued together. It is important that as you laminate these parts together that you carefully clamp the pieces together and keep the parts straight while the glue sets.

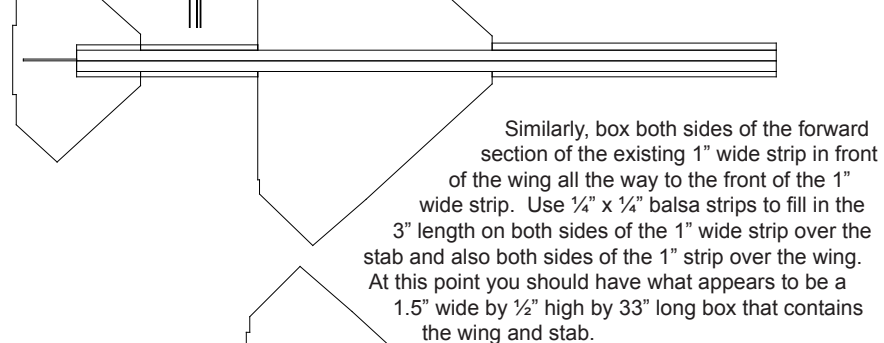
First, cut 2 pieces of the 1/4" x 1/2" stock to 33" length. Next, using a large flat surface and a long straight edge, layout the wing and the horizontal stab so that the centerlines are lined up and there is 11.5" between the wing trailing edge (TE) and the horizontal stab's TRAILING edge (TE) – approximately 5.5" between the two parts.



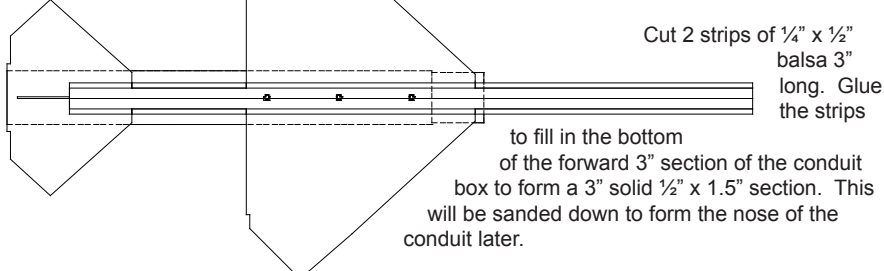
Glue the two 33" length of balsa flat to the top of the wing and stab on either side of the centerlines with the aft end of the balsa strip lined up with the aft end of the 1.5" x 3" balsa rectangle. The 1/2" side of the strip should be the side glued to the wing forming a 1" wide by 1/4" deep strip on top of the wing and stab.



Measure the distance between the wing and the stab and cut two strips of 1/4" x 1/2" balsa to fill the distance between the wing and stab. Glue these two pieces between the wing and stab on both sides of the existing 1" wide center strip of balsa with the 1/2" side of the new strip facing to the side. The new balsa strips should be flush with the top of the 1" wide strip and also with the bottom of the wing to begin forming the box shape of the conduit.



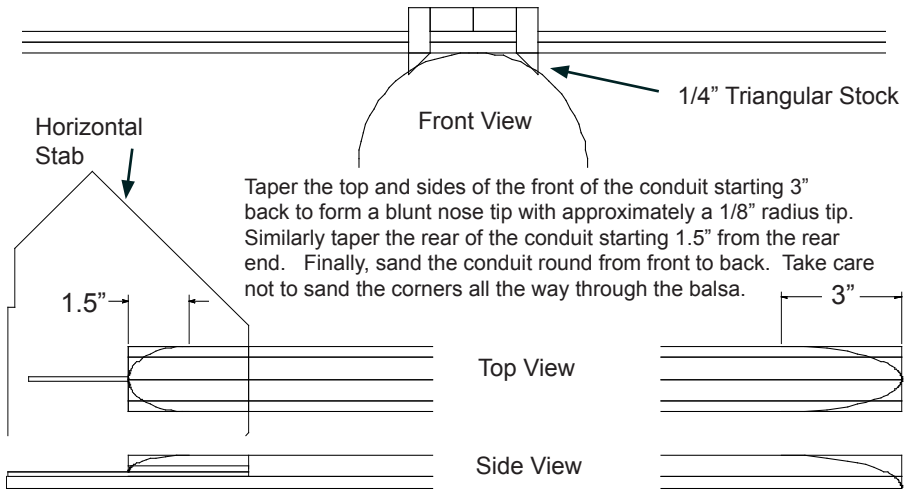
Similarly, box both sides of the forward section of the existing 1" wide strip in front of the wing all the way to the front of the 1" wide strip. Use 1/4" x 1/4" balsa strips to fill in the 3" length on both sides of the 1" wide strip over the stab and also both sides of the 1" strip over the wing. At this point you should have what appears to be a 1.5" wide by 1/2" high by 33" long box that contains the wing and stab.



Cut 2 strips of 1/4" x 3/4" balsa 3" long. Glue the strips to fill in the bottom of the forward 3" section of the conduit box to form a 3" solid 1/2" x 1.5" section. This will be sanded down to form the nose of the conduit later.

Next, glue the 1/4" triangular strips to the bottom of the outside edge of the conduit so that the outside of the triangular stock is flush with the lines drawn on the bottom of the wing and stab. Line the front of the 36" length with the front of the conduit. Cut any excess that may extend past the TE of the horizontal stab.

Wrap some sand paper around a section of the body tube and sand the triangular stock until the conduit seats against the body tube. **IMPORTANT:** Clear the balsa covering the vertical fin slot on the horizontal stab so that the vertical fin will fit properly in the slot. Also clear a slot forward of the vertical fin slot to allow the root edge of the vertical fin to seat flush onto the horizontal stab.



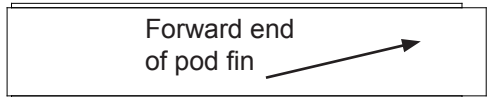
Taper the top and sides of the front of the conduit starting 3" back to form a blunt nose tip with approximately a 1/8" radius tip. Similarly taper the rear of the conduit starting 1.5" from the rear end. Finally, sand the conduit round from front to back. Take care not to sand the corners all the way through the balsa.

Last, epoxy the vertical fin in the slot in the horizontal stab. Make sure the vertical fin is 90 degrees to the horizontal stab and the root of the vertical fin is flush with the top of the plywood part of the horizontal stab. Set this assembly aside for later.

Step 6 – Ramjet Pods Assembly

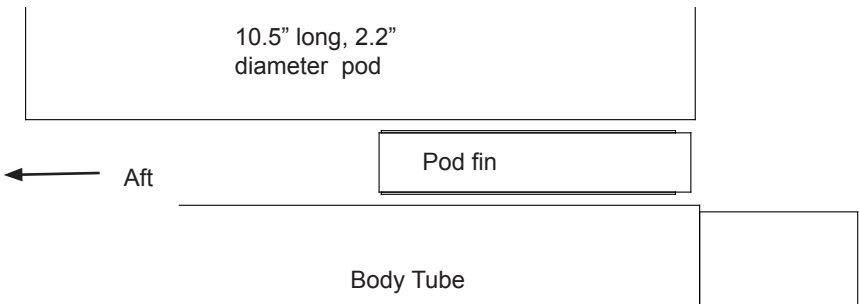
Start by cutting eight 0.9" x 3" rectangles from the 1/8" x 3" balsa stock. Plank both sides of the two plywood pod fins. Make sure the small tangs remain exposed. After this assembly is dry, sand the pods to an airfoil shape. The longer section in front of the tang is to forward end of the pod fin.

Glue the coupler into forward section of the rear body tube (the end with 2 slots) with 1/2 of the coupler exposed. Make sure no epoxy is in the 2 slots as this will interfere with the pod fins. Note: the coupler will cover some of the fin slots which is ok.



Attach the pod fins to the 90 degree slots with the long end extending forward of the fin slot closest to the coupler.

Attach the pod body tubes with the long end extending aft (toward the body tube end with a single slot away from the exposed coupler). Filet all pod joints.



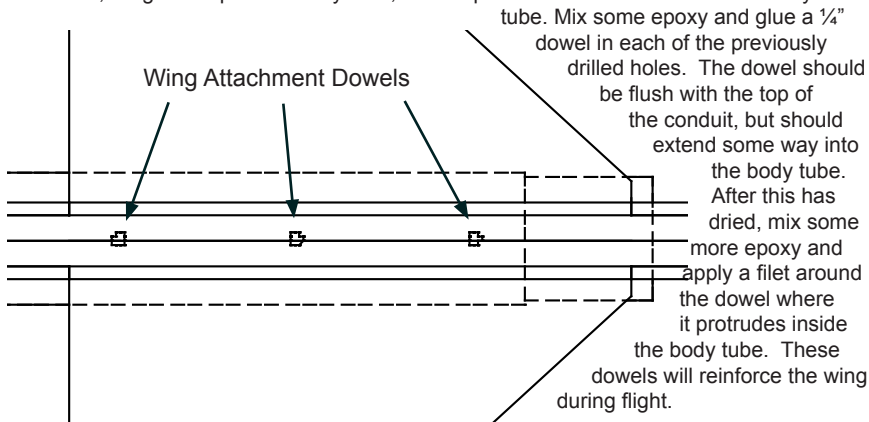
Locate the small conical nose sections that will form the center of the ramjet nose cone. Using epoxy, attach these to the front center of the ramjet nose cone bases. After this assembly has dried, attach the ramjet nose cones to the front of the ramjet body tubes.

Step 7 – Wing Attachment

Sand the glassine off the top of the body tube where the wing and conduit will attach to the body tube so epoxy will stick.

Mix epoxy and apply to bottom of wing and stab and fin tang of vertical fin. Attach wing and make sure wing has contact with body tube. **IMPORTANT:** make sure you keep the wing over the coupler and the coupler clear of epoxy so you can add the forward section of the body tube later. Make sure the wing, stab and vertical fin are aligned properly on top of the body tube while the epoxy dries.

Cut three 1" lengths of the 1/4" dowel. Drill three 1/4" holes along the centerline of the wing, one 1" from the front of the body tube and the second 1" from the TE of the wing and the third about halfway between the first two holes. The hole should go thru the conduit, wing and top of the body tube, but not penetrate the lower side of the body



Next, tack the remaining centering ring to the top of the coupler. This will keep the recovery system from sliding aft during liftoff and hanging up on the wing dowels. Attach upper body tube using epoxy. Use zap to make sure the rest of the conduit is secured to the forward section of the body tube.

Step 8 – Launch Lug Attachment

Mark the CG point, as specified in the specs on the first page, under the wing against the conduit. Make sure you measure the CG point from the tip of the nose cone and NOT the end of the body tube. Apply a small amount of epoxy on one of the launch lugs and epoxy to the side of the conduit under the wing against the body tube at the CG mark. Similarly epoxy the second launch lug under the horizontal stab a few inches from the aft end of the rocket. You can sit down the tube and look through the launch lugs to make sure they are aligned with each other.

Step 9 – Final Assembly

Insert the largest motor that you intend to fly (or simulate the weight with an appropriate substitute) and ensure that the CG is forward of the point defined in the specifications on the first page. The CG should be measured from the tip of the nose cone. If the CG is behind the specified point, add weight inside the nose cone by pouring lead shot into the nose cone tip and adding some epoxy. **IMPORTANT: Screw in several screws through the plastic nose cone into the lead to hold it in place. Grind or cut off the screw head before filling and applying the nose cone finish. The epoxy will not stick to the inside of the nose cone and if you do not anchor with screws, the liftoff force will cause the weight to become dislodged causing an unstable model.**

Your model is now ready to paint and apply the decals.

Step 10 – Flying Your Model

Attach the end of the shock cord and the parachute to the nose cone. You can also attach the chute protector to the shock cord just below the nose cone.

When packing your chute, wrap the chute protector around the chute with the opening in the chute protector facing forward. Always make sure your chute is well protected as the hot ejection motor gasses will melt the nylon chute.

IMPORTANT: always use positive motor retention to secure the motor. Failure to use motor retention will cause the motor to be ejected instead of the parachute making for a dangerous ballistic reentry.

IMPORTANT: some motors do not have a thrust ring that rides against the back of the motor tube. You can construct a thrust ring by wrapping a ¼" wide strip of masking tape around the aft end of the motor until you have a layer of masking tape approximately the same thickness of the motor tube. Do not fly without a thrust ring as the motor will fly through the rocket causing a dangerously unstable free flying rocket motor.

IMPORTANT: always remember to check your balance point and ensure your CG is ahead of the specified CG point.

IMPORTANT: Always follow the NAR safety code and remember that rockets are not toys and can be dangerous if not prepared and used properly. If you are a beginner, it is a good idea to fly with a club or other group of experienced rocketeers until you have gained some experience.

IMPORTANT: In no event shall Madcow Rocketry be liable for any direct, indirect, punitive, incidental, special consequential damages whatsoever arising out of or connected with the use or misuse of it's products. The buyer assumes all risk and liability resulting from ANY use of any and all products sold by Madcow Rocketry. Your purchase and use of any Madcow Rocketry product constitutes your agreement to and acceptance of these terms. If you do not agree to these terms and conditions, you must return the unused product in resalable condition for a refund or credit.

IMPORTANT: Please contact us via phone or email if you have any questions about constructing or flying your model.



24338 El Toro Rd #E-134
Laguna Woods, CA 92637
949.547.8847
www.madcowrocketry.com
©2006 MadCow Rocketry™