

CONSTRUCTION MANUAL

For assembly of Educational Passages Mini Boats

Note: This manual gives the complete instructions starting with just the cut out parts. It is easy to construct but you may purchase kits in any stage of completion.

Compiled June 2014

General Comments:

These kit boats are easy to assemble and anyone with good basic building skills should be able to easily assemble these kits. You will need to work with fiber glass resin and putty, but you do not have to use any fiber glass cloth or fabric. The deck fits over the hull like a shoebox lid and is fastened in place with a good marine adhesive/sealer. You will use fiber glass putty to fasten two plywood bulkheads across the hull. The mast step will already be molded into the hull and deck. You will have to mix fiberglass resin with sand which is used to fill the hollow keel for ballast and to strengthen it.

You will want to install the 4" deck plate into the watertight compartment. The GPS will already be waterproofed and is simply epoxied onto the deck. The keel fits into a heavily constructed enclosed slot in the hull and is also epoxied in place. The mast is slid through the deck support and into the mast step and epoxied in place. Then the sail is simply slid over the mast and lashed in place and you are ready for launching.

CAUTION: *When working with fiber glass resin or putty work outdoors or in a well ventilated area.*

PARTS LIST:

You should have received the following parts:

1. Hull
2. Deck
3. Keel*
4. Mast
5. Sail with batten sewn in place
6. 4" deck Plate
7. 3 eyes to be mounted on the deck
8. 12 3/4"X6 stainless steel machine screws with nuts for deck plate & deck eyes.
9. 2 cartridges of marine adhesive/sealer
10. 1 cartridge of West Marine thicken epoxy adhesive/glue and two "spouts".
11. 2 plywood bulkheads
12. 1 fiberglass washer (1" inside dia.)
13. 6 wooden blocks
14. 3 wooden strips to reinforce the keel

*Please note the keel is a nice thick foil for giving superior performance. The molding itself however is thin and difficult to mold and may have some "chips" in the gel coat. During construction you will fill it with ballast, wood, and resin which will make it one solid and extremely strong piece. We'll also show you how to remedy any gel coat imperfections.

STEP I. INTALLING THE BULKHEADS:

1. Check the fit. The stern bulkhead is puttied across the boat at approximately 14" from the backside of the transom. Mark 14" on the top of the sheer line of the hull and check the fit. Make sure the bulkhead doesn't extend above the hull or the deck won't fit flush. Also ensure the bulkheads don't push the edge of the hull outward and make it too wide for the deck to fit over the hull. You want approximately 1/8 " between the hull and deck so there is room for the adhesive sealer. Since each hull is molded individually there will be some variations so you may have to sand or file the edges, or trim the top a bit to get a good fit. Repeat this same process for the forward bulkhead which should be placed approximately 25" behind the stem or very front of the boat. Measure from the outside of the stem along the side of the hull to approximately 25" on each side.



Stern bulkhead should be approximately 14 " forward of the transom.



The second bulkhead should be approximately 25" aft of the stem. We no longer use a forward bulkhead which is shown in the bow of the above photo.

2. Now sand the inside of the hull so the fiber glass putty will adhere to the hull and hold the bulkheads securely in place. When fiber glass cures it leaves a waxy surface and this needs to be sanded and roughened up a bit to get good adherence.
3. You will need 2 quarts of fiber glass resin to complete the boat which can be purchased at your marine hardware store or perhaps an automotive store. You will also need to purchase fiberglass putty or you can make your own by adding sawdust or powder to the resin to make a paste.
4. Use something like duct tape to tape the bulkheads in place and then tack the bulkheads to the hull with fiberglass putty. When the putty dries remove the tape and use your fingertips (with rubber gloves) or a popsicle stick to putty the bulkheads firmly to the hull on both sides.

STEP II. INSTALLING THE FLOATION:

1. Most of our crates are lined with 1" blue board and this is excellent for providing positive floatation. Cut out the foam in large pieces using a sharp knife with a thin serrated blade or a utility knife so it fits snugly between the bulkheads. Layer them up as shown in the photo. The more foam you fit in the better but don't let it push the sides of the hull outward or the deck won't fit properly over the hull.
2. Later on you will have to turn the hull upside down to fasten the deck. To keep the foam from falling out you can make little wedges from the blue board and wedge it between the bulkheads to hold the foam in place. Don't wedge it tightly to the sides as this will push the sides out and then the deck won't fit properly.

STEP III. FITTING THE DECK:

1. With the boat right side up fit the deck in place. Slide the mast in place and make sure it is seated in the mast step which is already molded into the hull and is designed to rake back approximately 5 degrees. Turn the boat over to make sure the deck fits properly around the hull leaving approximately 3/8" space all around for the adhesive sealer to fill the gap between the deck flange and hull.
2. Hold the deck down firmly in place and take a pencil and mark all around the hull at the level of the deck edge (see photo).



Hold the deck firmly to the hull and Pencil a nice line around top of hull.



Tape just below the pencil line & then you'll know you have the deck down tight to the hull. Then sand thoroughly above the line.



Sanding the inside of the deck flange & bottom of the deck

3. Remove the deck. Tape all around the hull just under the penciled line you just drew. Then thoroughly sand the outside of the hull above the deck line you have drawn. Also sand the underside of the deck as well as the inside of the ½" downturned flange that will fit over the top side of the hull. You need to get all the wax off the fiber glass on the hull, the inside of the deck flange and the bottom of the deck to ensure a good bond.

4. You might want to tape the outside of the deck flange to keep the adhesive sealer off the deck where you don't want it. The sealer is unbelievably sticky and can become very messy so be sure to have plenty of rubber/latex gloves.

STEP IV. INSTALLING DECK HARDWARE: (some kits come with pre-assembled deck hardware)

1. The 4" deck plate will be installed in the center of the flat area on the deck. Take the clear deck cover off, center it on the flat deck area and outline the opening with a pencil. Then cut out the circle and check to make sure the deck plate fits properly. **Be sure you don't lose the little black rubber gasket that seals the cover.** This is necessary to make a watertight seal.
2. Drill 6 holes for the stainless steel machine screws provided.
3. The deck eye's holes have been pre-drilled. One eye goes in the center of the stern deck in approximately 1 ½" in from the outside edge of the deck and can be used to launch your boat off a ship at sea by putting a light line through the eye and lowering the boat to the sea. The other two deck eyes are mounted beside the mast and will hold the sail in place.
4. Now it is time to put your gloves on and open the adhesive sealer. Cut a small hole (approx. 1/8" dia.) in the nozzle of the adhesive sealer to start as it's messy and you don't want this to go anywhere except where you want it. Start with the eyes. Put a dab of sealer over each screw hole, then insert the screw through the eye and put a dab of sealer on the head of each screw.
5. Then screw the eyes in place, turn the deck over put a dab of sealer on the underside of the deck where the nut will go. Install the nuts on and gently tighten. If you over tighten you will squeeze all the sealer and adhesive out.

- Repeat steps 4 and 5 above for the six deck plate screws. Make sure there is sealer all around each screw hole and a nice bead of sealer between each screw hole to ensure it doesn't leak (see photo). Temporarily seal the sealer cartridge by wrapping the nose in plastic and taping it in place to prevent the sealer from curing.



Circle the cutout in front of the screw holes with sealer. Then circle each screw hole with sealer.



This deck plate has enough sealer to ensure A leak proof seal. Excess sealer should be Removed after several hours once it starts harden.

- Now place the deck plate on the deck and insert the machine screws. If you find it hard to find the screw holes on the deck, use a finishing nail. Fasten the nuts and gently snug them. Again don't over tighten them or you'll squeeze out most of the sealer.



Photo showing underside of deck. Make sure the under surface of the deck is completely sealed between the cutout and the deck plate. The adhesive sealer will keep the nuts tight so don't over-tighten them.

STEP V. INSTALLING THE DECK:

1. Have at least 4 supporting straps or pieces of light line each about 5 feet long, six small wooden blocks, a 1 or 1 ½" putty knife, mineral spirits, paper towels or rags, and 1 ½ cartridges of high quality marine adhesive sealer (provided).
2. Check to make sure the foam floatation will stay in place when you tip the boat over.
3. Make a trial run by placing the deck upside-down on the work bench with the foredeck hanging off the bench so you'll have access to the mast step. Place the 4 supporting straps under the deck and space them out about equally. Turn the hull upside down and place it over the deck. Slide the mast in place and into the mast step molded into the hull. Check to make sure the hull fits inside the deck flanges all around the hull. If everything lines up OK, then you are ready to proceed.



Check to ensure there is a small gap of approximately 1/8" gap all around the hull & deck joint. This joint is held together with the adhesive sealer which will make an amazingly strong and water tight joint.

1. Remove the hull. Cut the nozzle to the adhesive back so the hole is approximately ¼".
2. Squirt the adhesive liberally around the inside edge of the deck mold. Push the adhesive forward as you go trying to make it contact both the inside edge of the deck flange and the bottom of the deck as you go. Be sure there are no gaps. This is not the time to scrimp on the adhesive sealer (see photos).



To ensure a good seal push the adhesive into the side of the deck flange and into the bottom of the deck as you push the cartridge forward.



Apply sealer liberally!!! 1 and a half cartridges will be plenty.

3. Squirt the adhesive liberally around the inside edge of the deck mold. Push the adhesive forward as you go trying to make it contact both the inside edge of the deck flange and the bottom of the deck as you go. Be sure there are no gaps. This is not the time to scrimp on the adhesive sealer (see photos).
4. Carefully put the hull down on the deck. I find it easiest to start by putting the transom in place making sure both corners are seated properly in the deck and then slowly lowering the boat onto to the deck and making sure the stem fits in place.
5. To insure you have proper alignment insert the mast in place **WITHOUT** any adhesive as you don't want it glued in place yet.
6. Use the four straps to snug the deck to the boat. Place the 6 wooden blocks under the 3 after most straps to ensure the deck is held firmly against the hull. You don't need blocks on the forward most strap as the deck isn't crowned in this area (see photos below).



If you look closely you will see there are 4 straps holding the deck to the hull and that the 3 after straps have wooden blocks at the outside edge of the deck to keep the deck against the hull. These blocks are clearly shown in the adjacent photo.



The adhesive sealer has cured and the straps are ready for removal. Notice there is a little “mast stub” sticking through the foredeck which was inserted during the deck installation to ensure that everything lined up properly.

7. Now take the sealer and go around the boat to completely fill the hull deck seam with the sealer. Use the small putty knife to go around the boat pushing the adhesive into the joint to ensure you’ll have a tight joint with no voids or bubbles in the sealer. Try to make the top of the seam nice and smooth.



This installer has added raspberry colored masking tape to keep the adhesive off the hull. Notice the hull/deck joint is full of adhesive sealer and is being compressed into the joint.

8. Check the seam to make sure you're happy with it.
9. Once you have this as good as you can make it and the supporting straps are secure you can remove the tape.
10. Now set the boat aside and let the adhesive start to cure. **DON'T TAKE THE STRAPS OFF UNTILL THE ADHESIVE HAS CURED** which usually takes 4 or 5 days and depends on temperature and humidity. It will gradually set-up firmer and firmer and also harden making it nearly impossible to separate.
11. After about 4 to 8 hours the adhesive will be partially cured and spills onto the hull and deck can be quite easily removed where you haven't sanded with a putty knife or sharp chisel. Don't wait too long or the excessive adhesive will become very difficult to remove.

Congratulations! You just completed the hardest step. You'll find the rest easy.

STEP VI. PREPARING THE KEEL:

1. In a well ventilated area or outdoors mix approximately 1 ½ cups of resin with the catalyst. Don't be excessive with the catalyst; use it as directed on the can.
2. Add 5 cups of sand to the resin and mix thoroughly.
3. Carefully pour or spoon this mixture into the keel. Take a stick and push it down to insure there are no voids. If needed add more liquid catalyzed resin to solidly bond the sand in place. Place the keel upright in the normal operating position in a corner supporting it so the bottom of the keel is resting flat on the floor with the front top edge resting against the wall (see photo). Let the fiberglass /sand mixture cure.



This keel has 5 cups of sand mixed in resin inside and has been set aside to cure.



The six wooden blocks, wooden strips, and resin have been added to increase strength, reduced the amount of resin, and get the weight right.

4. Place the wooden blocks inside the keel and then add the wooden strips so the tops are protruding out the top of the keel as shown.

5. Mix more catalyzed resin. You can add body powder or sawdust to extend and thicken the resin if you wish. Now fill the keel right to the very top with the resin and set it aside to cure in the same position as you did after adding the sand mixture. The wooden strips and fiberglass will add strength right to the top of the keel.
6. Trim the wood flush to the top of the keel.

STEP VII. FITTING & INSTALLING THE KEEL:

1. You will have to do some pretty serious sanding and maybe even some filing to the top of the keel to make the tab so it fits into the keel slot in the hull. Wear a dust mask for protection.
2. **Don't forget to thoroughly sand** the inside of the keel slot on the hull to remove the wax.
3. Check the fit to ensure the keel fits all the way into the slot. Use the West thickened epoxy adhesive and apply liberally and spread it all around the inside of the slot and onto the keel tab.
4. With the boat upside down and on the floor or worktable slide the keel in place and support the back of the keel against the wall as shown in photo below. Be sure to check that the keel is vertical and all the way into the slot.



Is the keel all the way into the slot?
Is the keel vertical?



The epoxy is slippery and the keel tends to slip out of the slot so fix the back of the keel against the wall and stabilize the boat so it can't move. This installer used sandbags.

5. Take your finger or a popsicle stick and go around the base of the keel to make a nice fair smooth keel joint. This will also fix or hide any chipping of the gel coat around the edge of the keel which is almost always there.

6. Check again to ensure the keel is vertical and properly seated all the way into the slot. Sometimes the boat will slide forward and the keel tends to slide out of the slot so stabilize the boat on the floor as needed.
7. Let it cure for at least 24 hours.

STEP VIII. FITTING & INSTALLING THE MAST:

1. The 1" fiberglass washer fits around the base of the mast and gets epoxied to the deck and mast to ensure a water tight bond.
2. Be sure the underside of the washer is sanded as well as the deck around the base of the mast.
3. Insert the washer onto the mast and then check that the mast fits properly into the hull. The mast should slide in easily the first 4" after which you will probably have to push a little harder and maybe give a little twist to get the base of the mast to slide into the mast step which is molded into the bottom of the hull. When the mast is properly in place it should rake back approximately 5 degrees and not move around in the step when a little forward, back or side to side pressure is applied to the top of the mast.
4. When you are sure it fits properly put your gloves back on and squirt lots of epoxy deep down into the mast step. Also apply epoxy around the inside of the tube through the deck and the bottom 5" of the mast. Slide the mast in place and apply a liberal coat of epoxy around the base of the mast and slide the fiberglass washer (sanded side down) into the epoxy. This will help ensure you don't get leaks around the mast.
5. Let the epoxy set up for at least 24 hours and you are ready to go.

We wish your boat a fantastic & exciting voyage. These boats are good sailors, strong and usually cross oceans and survive hurricanes. Our Board of Directors consists of captains, maritime academy professors, a NOAA oceanographer, educators, and a solo sailor. We would be happy to answer any questions, and we would happy to assist you with route planning and finding the best launching areas for the voyage you are planning. In fact we want to know your plans and follow the voyage.

For questions or assistance email Dick@educationalpassages.com or call Richard Baldwin at 207-322-1901 www.educationalpassages.com