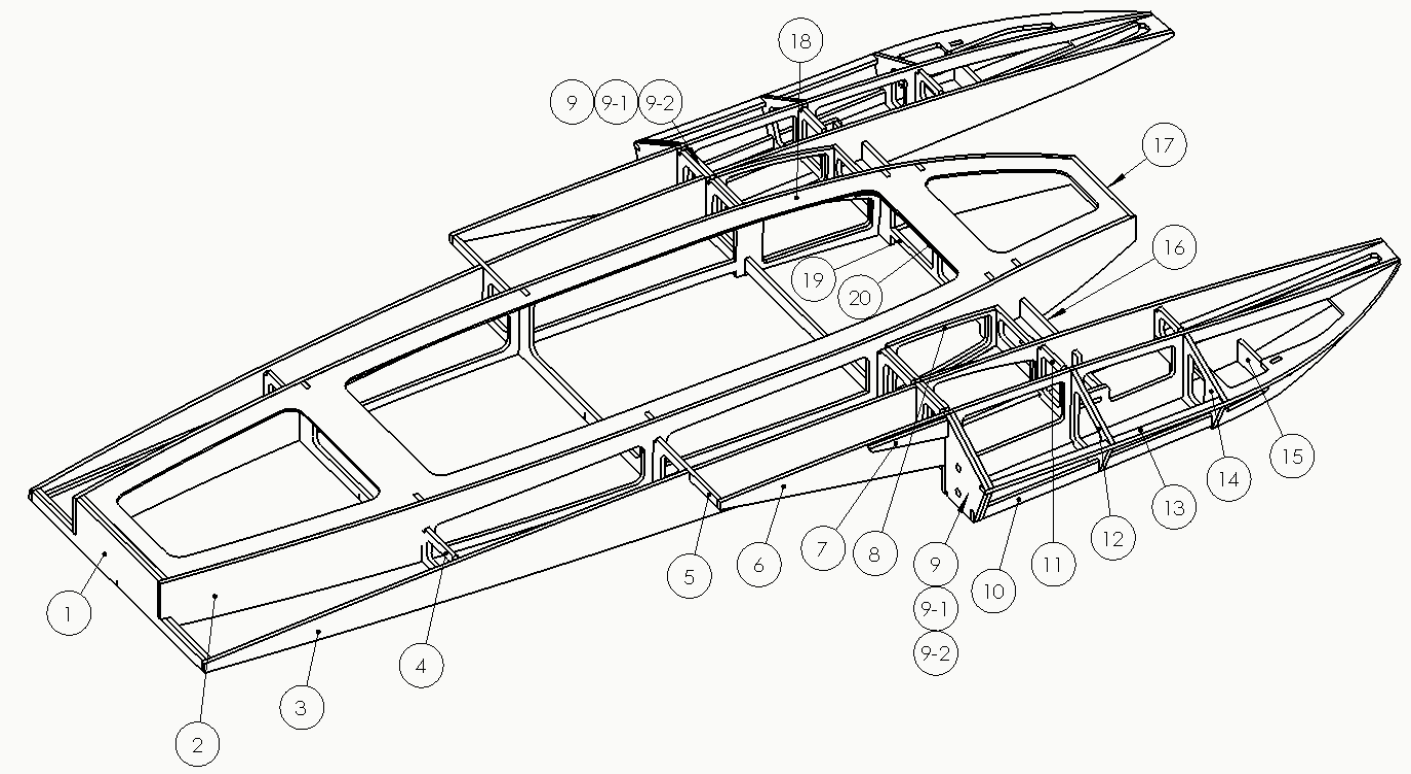
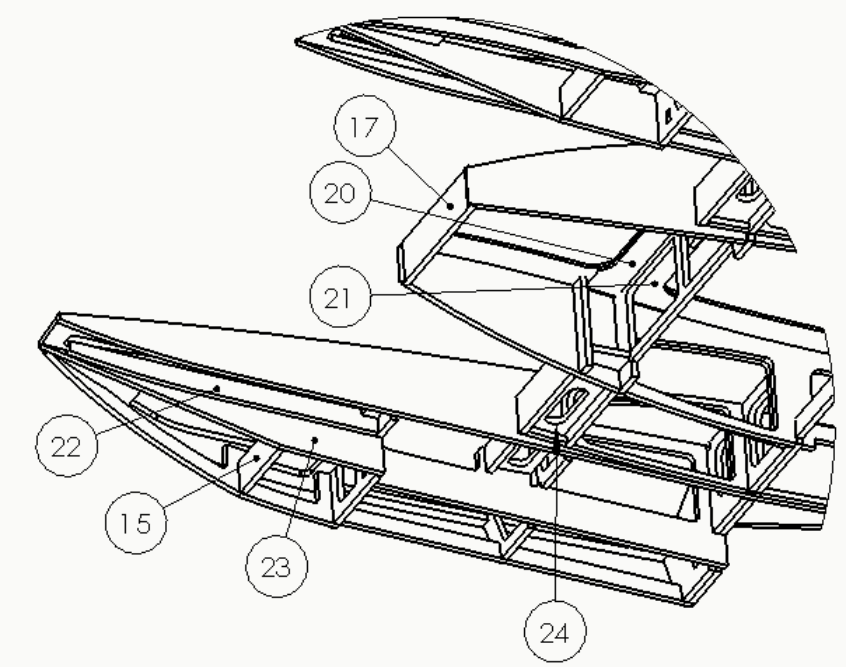
Whiplash P 31”/34” Sport Hydro

Designed by: Blazer Marine

www.BlazerMarine.com





Thank you for choosing to build the Whiplash P Sport Hydro. Blazer Marine sport hydroplanes have won more national championships and broke more world records than any other manufacture on the market. The Whiplash P Sport Hydro, as with every kit from Blazer Marine is designed using state of the art 3d modeling software. Each piece in the laser cut kit will fit up perfectly with the mating part. We hope you enjoy the build as much as we enjoy bringing successful, fully tested, original designs to the market. Take your time and have fun with the build!

Tools and supplies required to build the Whiplash P Sport Hydro:

1. 3/4”x11”x36” MDF or Particle Board for jig (see step 3).
2. 2 ounces of Medium CA glue
3. 2 ounces of Thin CA glue
4. 2 ounces of CA Accelerator
5. 24oz high quality epoxy (example: MAS or West System).
6. Bottle of Titebond wood glue
7. Sanding blocks with 80 and 120 grit paper.
8. Small block planer is helpful, but not necessary.
9. Weights (anything around the house will work)
10. Spring clamps(You can never have enough)
11. Square
12. Razor knife
13. 1 pool noodle or foam (Used for floatation)
14. Wax Paper
15. Straight edge (36” ruler or flat piece of metal/wood)
16. Paper towels
17. Latex gloves
18. Bristle brush or foam brush for epoxy
19. PATIENCE AND PRIDE

Recommended hardware:

1. Electric motor of your choice (We use the TP4070)
2. ESC of your choice.
3. Motor Mount of your choice (narrower the better)
4. 3/16” cullet for engine
5. 3/16 flex shaft cable, 24” long
6. 2-Channel radio with a high torque servo (150oz or greater)
7. Rudder pushrod
    - (1) 4-40 size rod, 12”long
    - (2) Clevises
8. (2)Pushrod seals
9. 3/16” Round Bottom Strut (Speedmaster SPDS-005-R)
10. Rudder (Speedmaster SPDRS-006-DUA)
    3/16” Drive Dog
11. Prop Nut
12. 5’ large (5/32”i.d.) silicone water line
13. 1/4” diameter brass tube – 24” long

14. 9/32” diameter brass tube – 6” long
15. Props we have used so far with success (Dependent on your motor KV)
    - ABC 1815/2 17-45
    - ABC 1815/3 23-50
    - ABC 1817/2 17-45
    - ABC 1817/3 23-50

Build Techniques:

Building Jig:

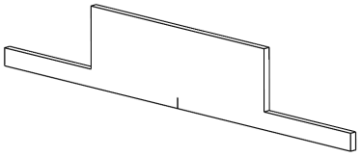
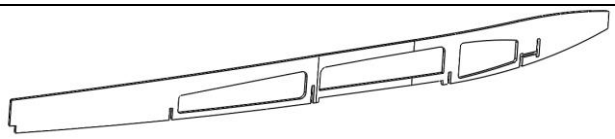
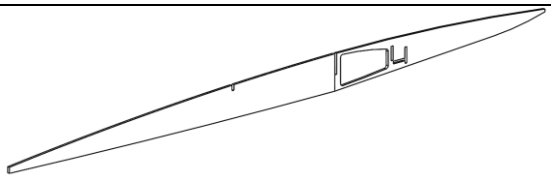
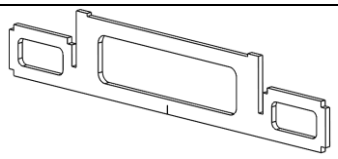
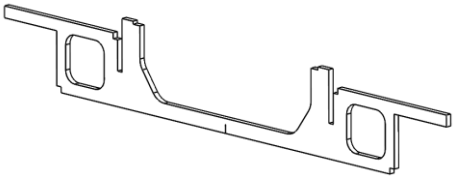
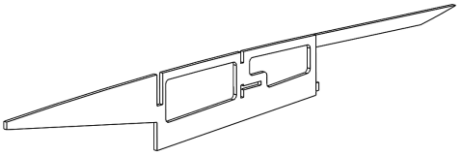
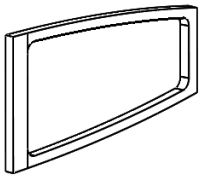
- The only building jig you need is a flat surface. The flatter your work surface is, the flatter your boat will be. Trust the laser cut parts! A traditional jig where the top of the jig matches the bottom contour of the boat will never be as accurate as what the laser cut parts will automatically give you. Keep it simple and just use a flat board (MDF works well)

Where to CA (Cyanoacrylate – Super Glue), where to use Titebond and where to Epoxy:

- Everyone has different opinions on this topic. Some people don’t use any CA, some people use CA for the frames, some people use CA everywhere. It is a fact that CA is strong, but brittle and susceptible to cracking due to vibration or impact.
- I have never cracked an internal frame joint with the outer skin still bonded. I have always tacked my frames together with medium CA or Titebond. You do not want to use thin CA for this as thin CA requires compression of the mating parts to work well.
- I use titebond wood glue when bonding frame faces together (transom pieces and turn fin doubler frames). Apply titebond to the face and clamp together.
- I use thin CA when gluing the 1/8”x1/8” basswood to the birch frames. CA works well here – you just need to make sure you clamp the basswood securely prior to applying the thin CA. Thin CA will wick into the joint, so you can clamp dry, then apply the CA.
- We believe all skins should be glued with epoxy. Gluing with CA is a lot faster, but if you want a boat to last for years, epoxy is the way to go.
- Once the boat is finished, we like to thin epoxy with a little denatured alcohol. Coat the entire boat and wipe off excess with a playing card.

Part preparation:

- Lightly sand the face of each part to get rid of the burn marks caused by the laser.
- Do not sand the burn mark off the outside edges until you are ready to apply skins. Epoxy/CA does not stick to the burnt edges very well, but it is beneficial to leave the outside burnt edge on each piece. When your framework is tacked together, you will have to block sand the framework prior to gluing any skin onto the boat. As you sand the framework, the burnt edges will sand away. If you are sanding and you still have a burnt edge visible, then you know you have a low spot in the framework.
- We like to sand the internal notches on the 1/8” parts to remove the burn marks. Use a popsicle stick with some 180grit sand paper to get into the joint.
- It is necessary to sand the 1/16” edges to remove the burn marks prior to gluing the skins to the boat.

FRAME #	THICKNESS	QUANTITY	PART IDENTIFICATION
1	**1/8”**	**2**	
2	**1/8”**	**2**	
3	**1/8”**	**2**	
4	**1/8”**	**1**	
5	**1/8”**	**1**	
6	**1/8”**	**1**	
7	**1/16”**	**2**	
8	**1/8”**	**4**	

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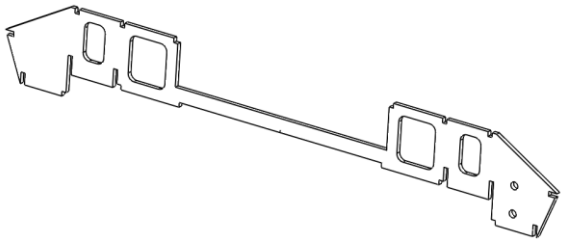
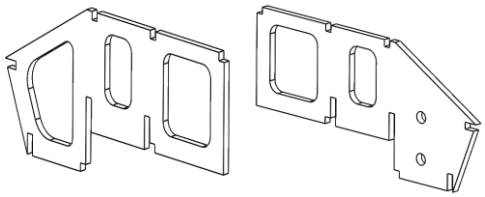
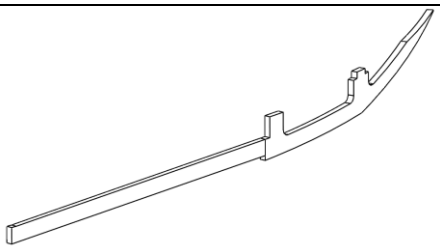
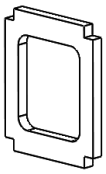
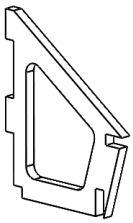
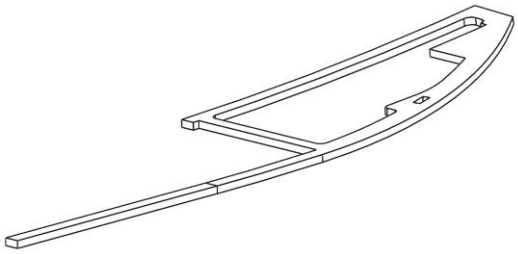
9	**1/8”**	**1**	
9-1 **9-2**	**1/8”**	**1**	
10	**1/8”**	**2**	
11	**1/8”**	**2**	
12	**1/8”**	**2**	
13	**1/8”**	**2**	

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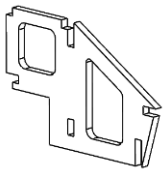
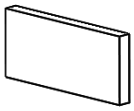
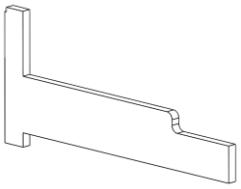
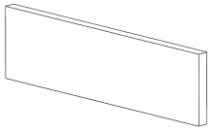
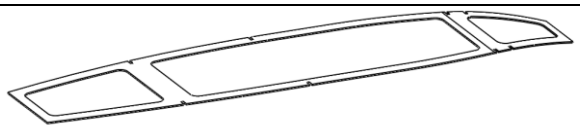
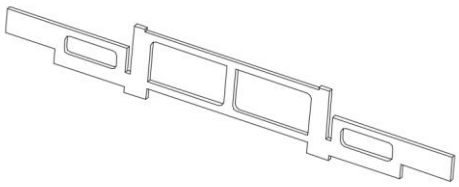
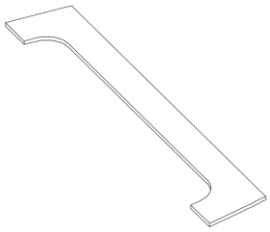
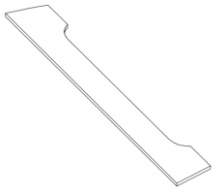
14	**1/8”**	**2**	
15	**1/8”**	**2**	
16	**1/8”**	**2**	
17	**1/8”**	**1**	
18	**1/16”**	**1**	
19	**1/8”**	**1**	
20	**1/16”**	**1**	
21	**1/16”**	**1**	

FRAME #	THICKNESS	QUANTITY	PART IDENTIFICATION
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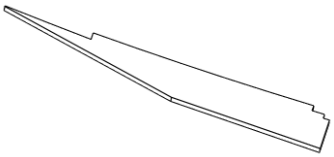
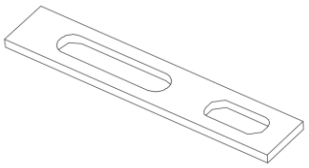
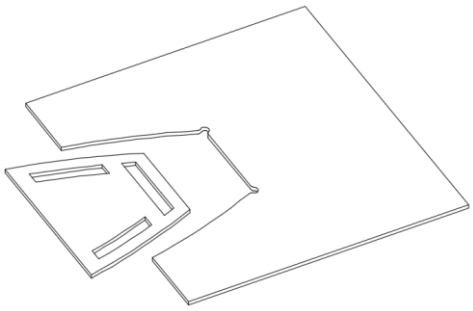
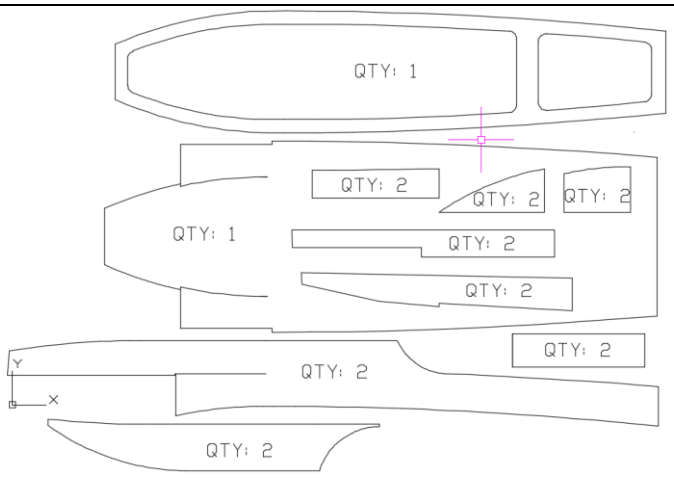
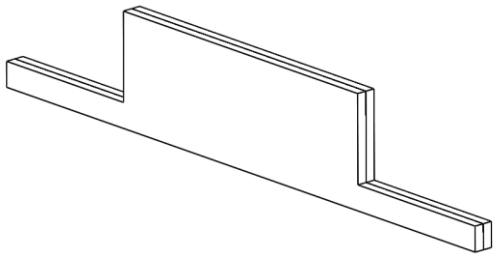
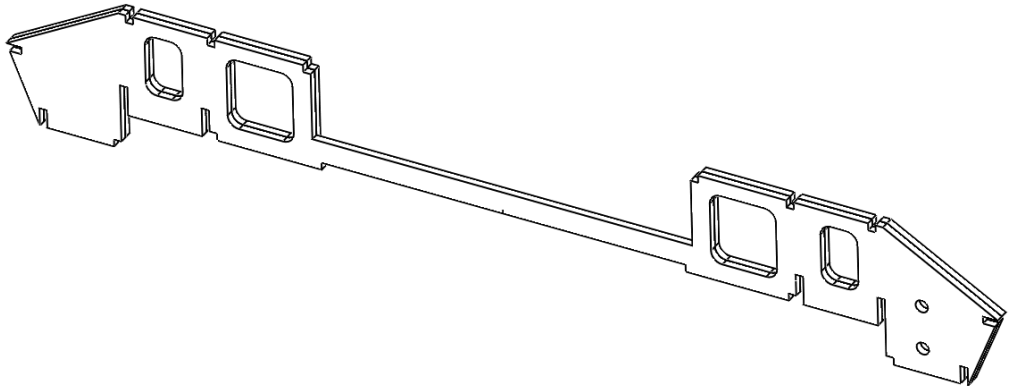
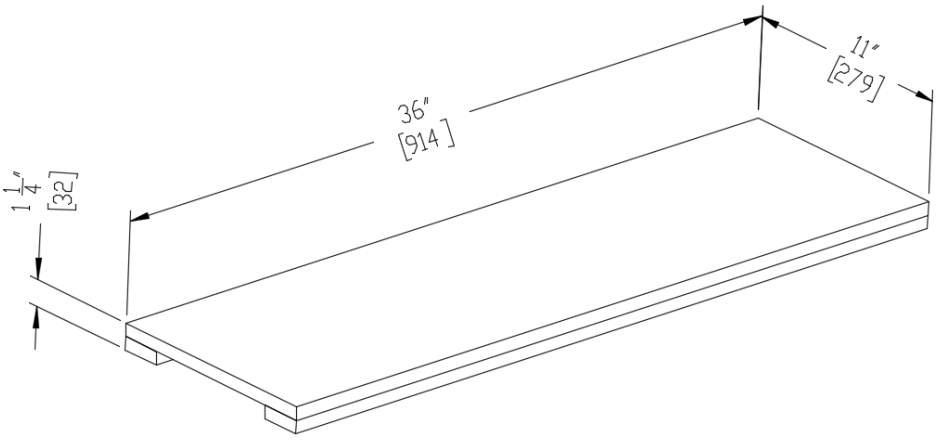
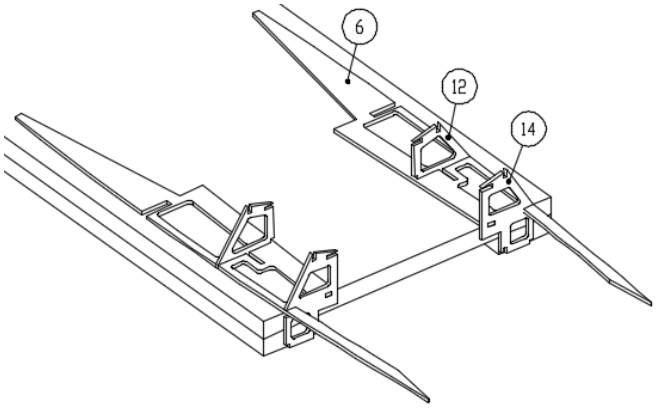
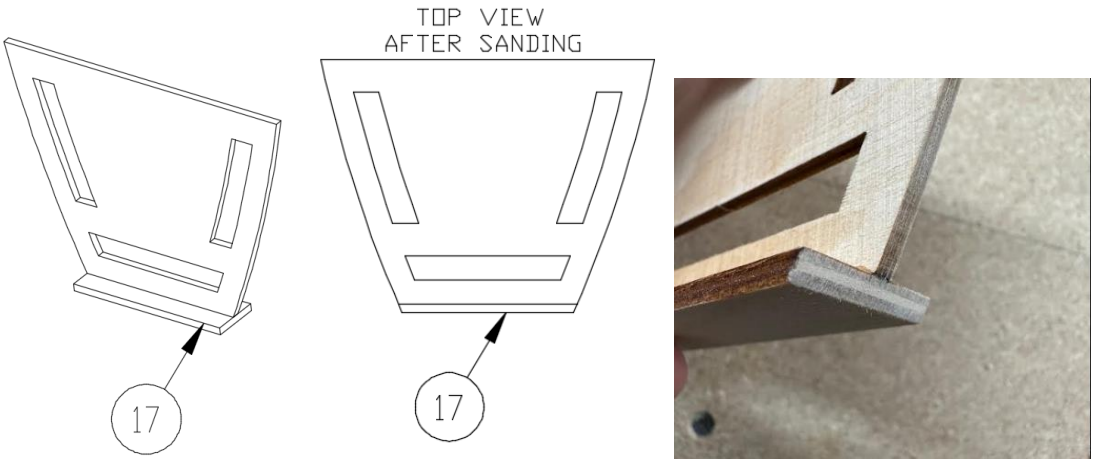
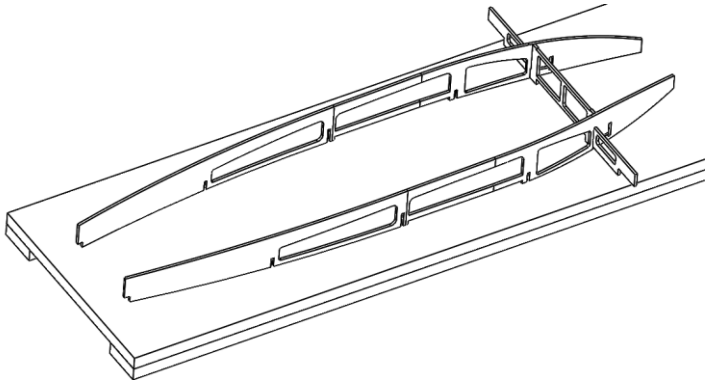
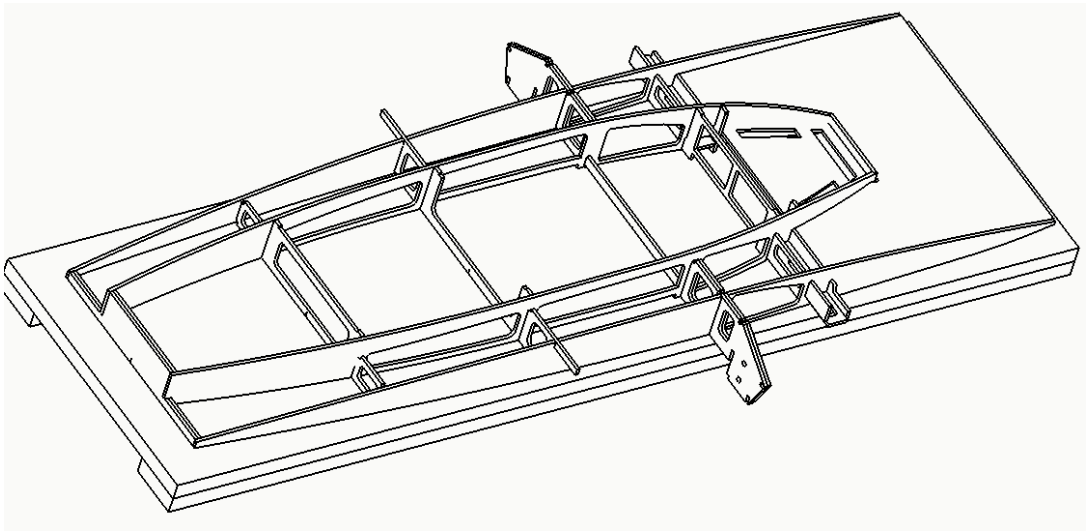
23	**1/8”**	**1**	
24	**1/8”**	**2**	
Not Shown	**1/8”**	**1**	
Not Shown	**1/16”**	**Noted**	

No	Direction and Detail
1.	Glue the two #1 frames together with CA, Epoxy, or Titebond. These parts are identical. 
2.	Glue frames 9, 9-1 and 9-2 together with CA, Epoxy, or Titebond. The doublers go towards the front of the boat. 
3.	The building jig is critical to a boat that runs true. We like to use particle board for our jigs, but you can use anything you want, as long as its flat. The overall height needs to be greater than 1" [25mm]. We screw 2" [51mm] wide pieces to the bottom of the jig to increase the height. Once the jig is complete, draw a straight line in the middle of the jig from front to back. This will help locate the frames. 

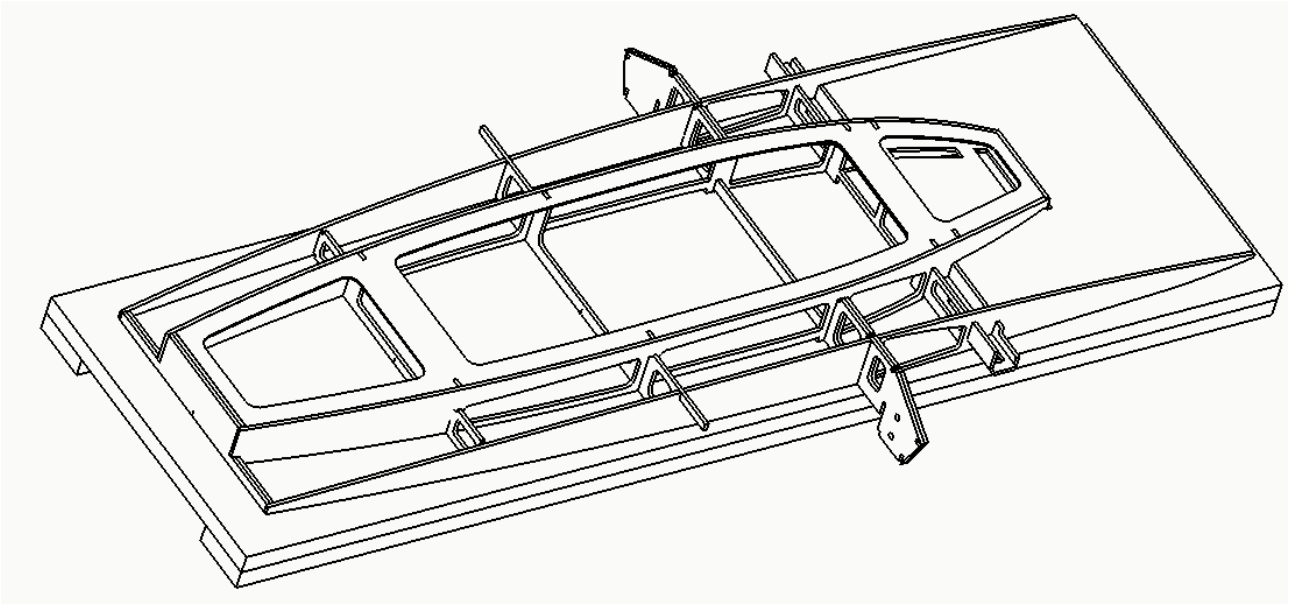
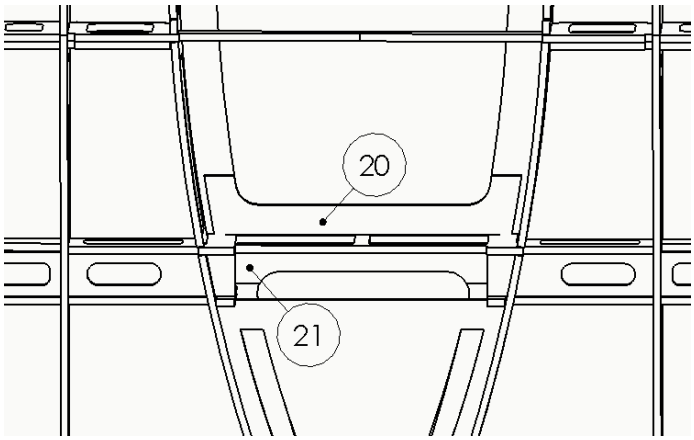
No	Direction and Detail
4.	Using your jig as a flat surface, glue frames 6, 12 and 14 together as shown. Make sure 12 and 14 are perpendicular to frame 6. Create a left hand and right hand assembly. We recommend using CA to glues these pieces in place. Remember to sand all lasered edges that will receive glue. 
5.	Item 17 is cut to the same length as the nose template and has two etched lines on it to align the template. Tack these two pieces together with CA (these two pieces will eventually be separated, so don't go crazy with the glue). Block sand the edges of item 17 to the same angle of the nose block. Take your time with this as the center section of the boat will conform to the sides of item 17. Use the plywood layers as a cue to paralellism. 
6.	There is a sequence to fitting the framework together. The first three pieces that slide together are both frame #2's and frame #19. Don't glue anything in place yet, we are just dry-fitting. 

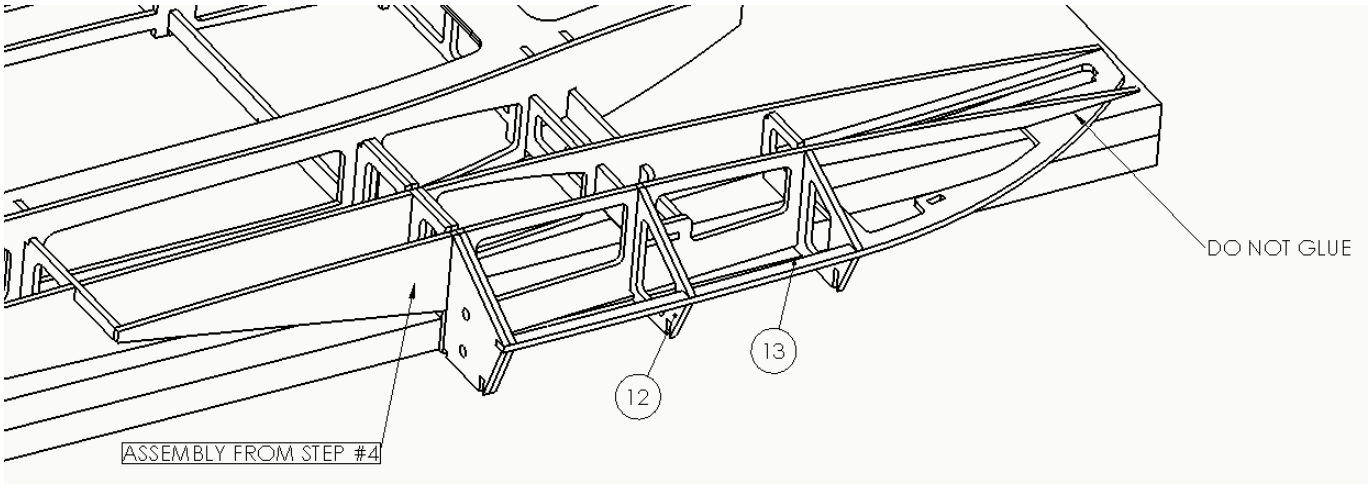
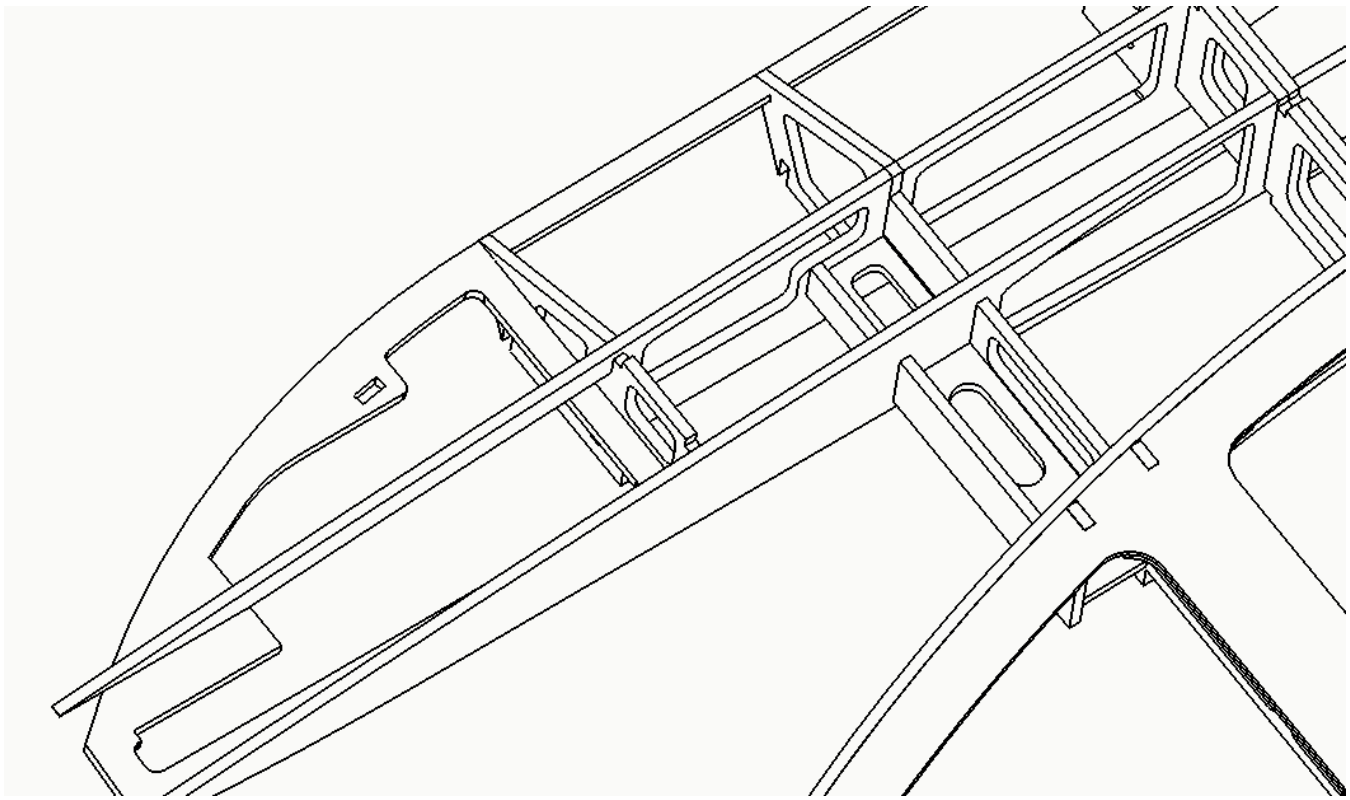
No	Direction and Detail
7.	The only two frames we are going to glue in this step are the transom and the nose piece. The other frames in this image should be dry fitted only to form the shape of the center section. Don't glue any of them. Frames needed for this step are the following: 1 (step 1), 2, 3, 4, 5, 9 (step 2), 16, 17 (step 5), 19 and 24. You will also use both nose/sponson jigs provided with this kit.

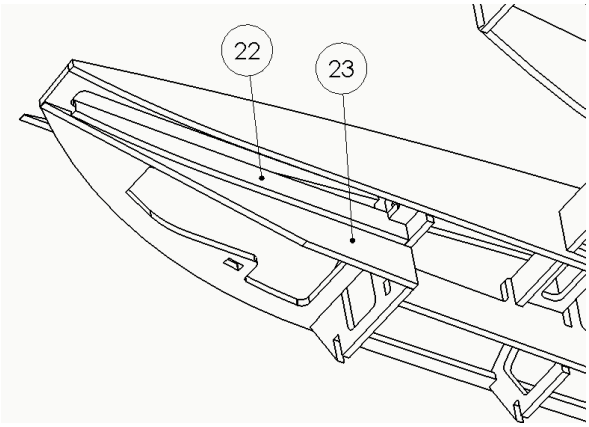
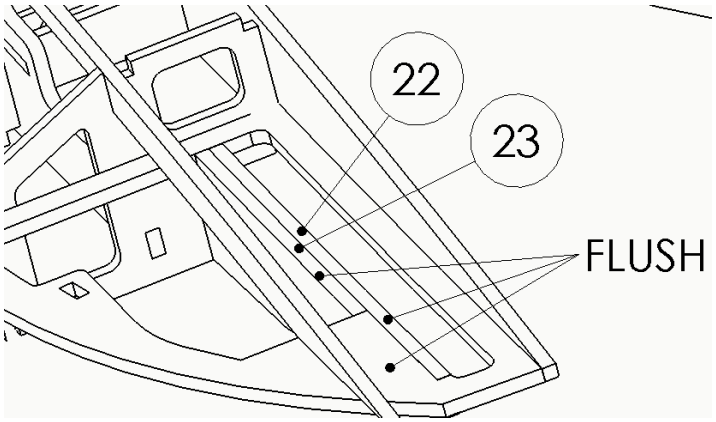
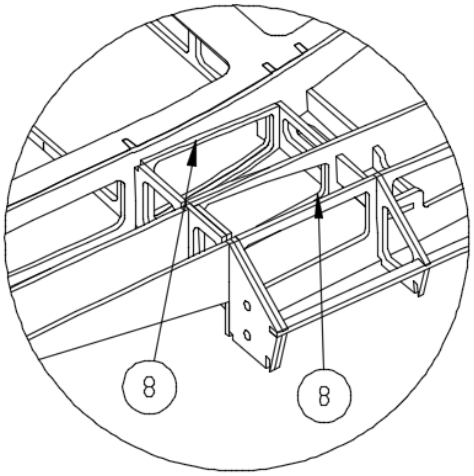
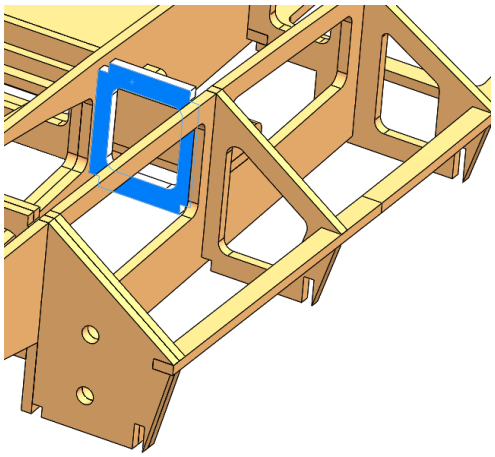


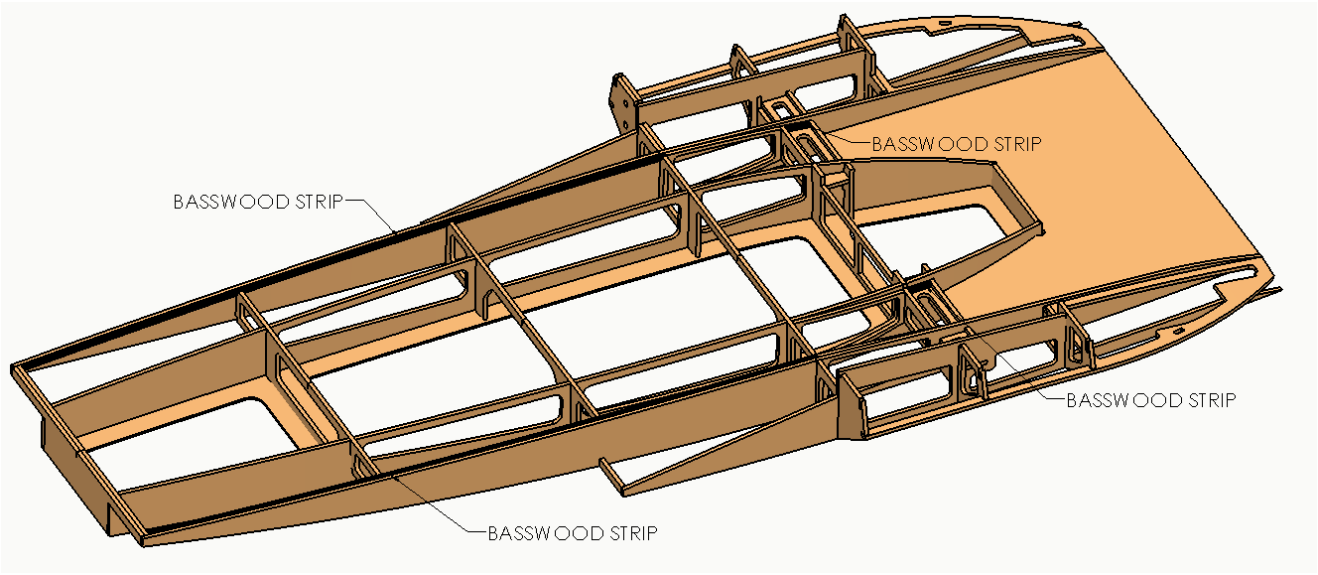
The vertical walls of the transom (frame 1) need to be block sanded to the same angle as frames 2 and 3. Note that frames 2 and 3 will extend past the transom a bit. The extensions will be sanded flush with the transom once glued. Note that the lateral frames in this step have a lasered notch in the center of each part. When you glue the transom and the nose in place, align these notches with the line on your jig. Go ahead and glue the transom in place.

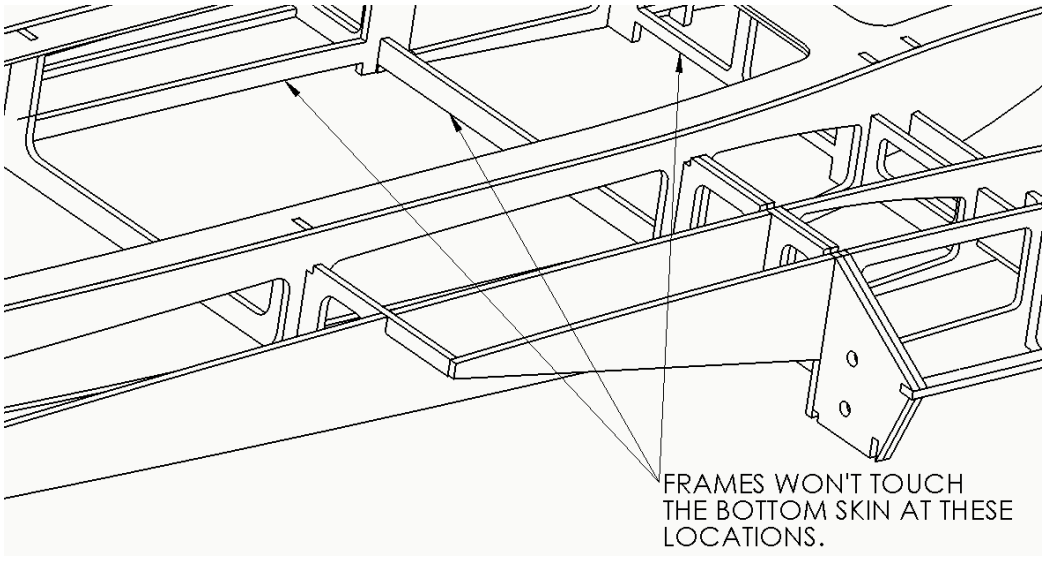
For the nose, start by gluing some small pieces of 1/8" basswood vertically at the front of frames 2. These strips will be removed later, but helps hold the nose together while using clamps. The basswood will slide into the circular notches in the jig. Clamp the top and bottom of the nose in place, ensure the fit is as good as you can get it, then glue in place with CA.

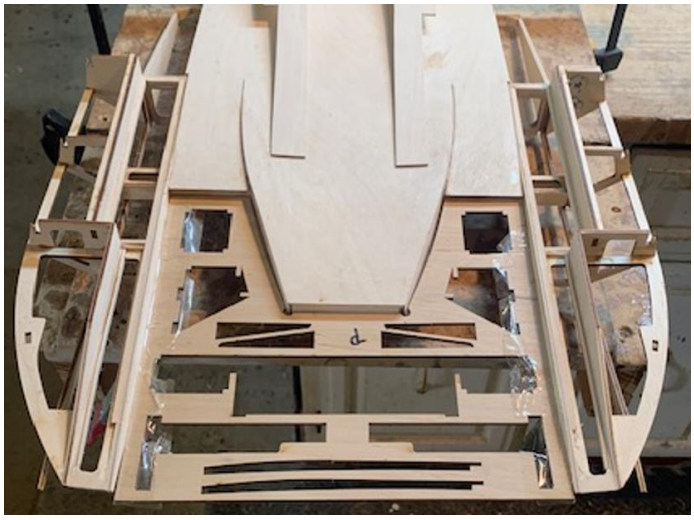
No	Direction and Detail
8.	The next couple of pieces to glue in place are the 1/16” cowl ledge and doublers, parts 18, 20 and 21. Start by sanding the black charr off the sides of all three pieces. You will probably need to slightly sand the outside of the cowl ledge to get it to fit inside the center section. Once you are happy with the fit, start at the transom and glue with CA as you work your way forward. The top of the cowl ledge should be flush with the top of the mating frames. Once glued in place, your boat perfectly square and somewhat rigid.  Next, glue the two cross grained doublers in place on the underside of the cowl ledge. These two pieces add a tramendous amount of stiffness to the boat. The picture below is a shot of the underside of the boat. Glue in place with CA or Titebond.  Don’t glue any other pieces at this time.

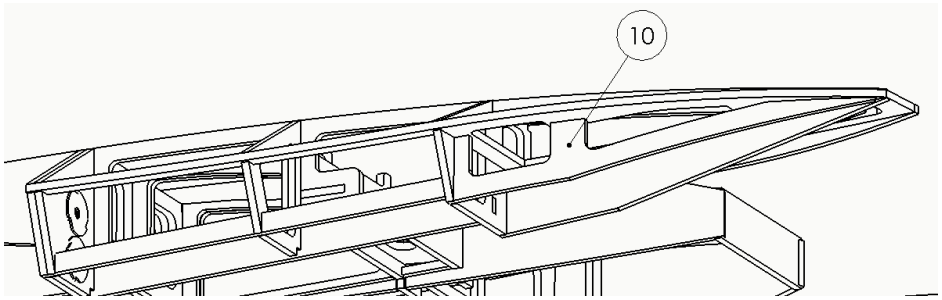
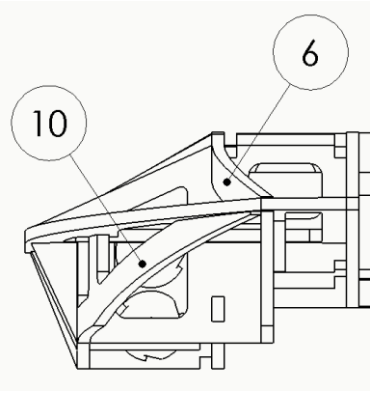
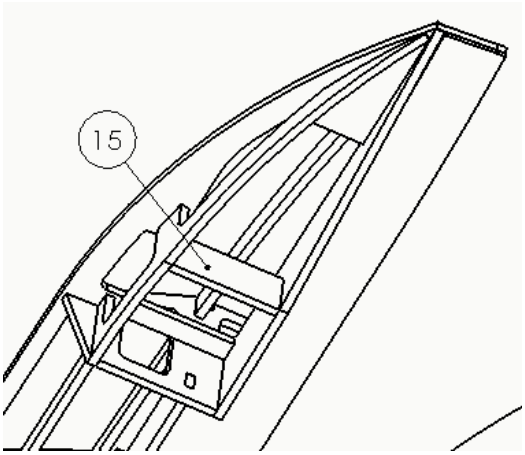
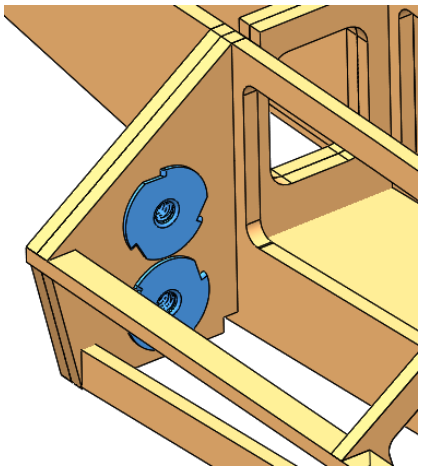
No	Direction and Detail
9.	Fit the assembly from step #4 in place, as well as frame #12 and #13. Frame #5 and frame #12 should be perpendicular to the #4 assembly. The assembly from step #4 is a little long where it mates with frame #12. This will be sanded flush after glued. The tip of frame #13 should be bent upward until it meets the tip of the inside sponson. Once you are happy with the fitup, you can start gluing the frames in place. Make sure you have both building jigs clamped in place during this step to ensure everythign remains square. Do NOT glue the front of frame #6 yet. We don't want anything glued to the sponson that may pull the sponson outward. All frames that we didn't glue in previous steps can now be glued in place.  

No	Direction and Detail
10.	Next, flip the boat over and glue the recovery pad frames #22 and #23 in place. Both should be parallel with the inside sponson and flush with the top of frame #13.  
11.	Glue the deck/bottom sheeting frames (#8) in place. All four pieces are the same. You can use CA or Titebond to secure these. 
12.	Glue frame #11 in place against frame $19. The top of the frame should be flush with the top sponson. CA this in pla 

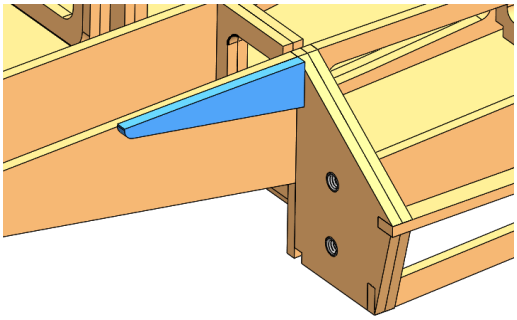
No	Direction and Detail
13a	The first “skin” that needs to be glued in place is the bottom sheet. First, remove the nose template as this is no longer needed. Included with the kit are several strips of 1/8”x1/8” basswood. These strips are glued to the framework to double the gluing surface for the skins. Wherever there is an 1/8” notch in the framework, you will glue basswood strips with CA or Titebond. Once the strips are glued in place, block sand so all frames are coplanar. Block sanding is an extremely important part of building a wood boat. All waves or imperfections with the framework will be evident when you sand the skins. When block sanding the area between the nose and the sponson, make sure this frame (#16) is perfectly flat and parallel. The better you get this, the easier it will be to fit the deck block later on in the build process. 
13b	Here is a picture of the various sanding blocks we use when building a boat. Some are store bought, and some are just wood blocks with sandpaper stapled or glued to them. We also use a block plane to quickly take material off skins after the glue has dried. The block plane gets the material close, then a block sander is used for the finishing. We usually use 40 grit, 80 grit and 120 grit sandpaper. 

No	Direction and Detail
13c	When you are satisfied with the fitup of the bottom skin, plan out how you are going to hold everything down to your building jig. You will need a variety of clamps throughout the building process so you may want to look at the build pictures in the future photos to get an idea of the clamps we use. We suggest that you apply epoxy the underside of the cowl ledge piece (#18) during this step. Since epoxy has to be applied to the underside of this piece anyway, it is easiest to do it now. Apply epoxy to the skin, place your skin on the jig and lay your framework on the skin, then apply your clamps/weights. There are sections of framework that don't touch the bottom skin as shown below. The two center frames will have the cross brace removed, and the side brace may also be removed depending on where you place your batteries.  

No	Direction and Detail
14.	The next two skins to epoxy in place is the air release skin and the tear drop skin. All of the skins are purposly made a bit larger than needed so you can custom fit to your build. Before you glue the skins, glue the 1/8” basswood strips in place to either create a gluing surface, or double the gluing surface. Note that the tear drop is not a rectangle. One side has a slight arc to follow the shape of the boat. Once you glue these pieces in place, the sponsons will be somewhat rigid, so make sure your jig is seated perfectly. When clamping, try to use the same style of clamp on each side to have an equal weight distribution from left to right.    

No	Direction and Detail
15.	Now that we have some rigidity on the sponson area, we can glue frame #10 in place and also glue the front of frame #6. Both should be pulled to the inside sponson as shown.  
16.	Next is to glue the front recovery pad frame #15 in place. This should be located at the corners of frames #10 and #23. Sand to fit, ensure the frame is perpendicular to the inside sponson and glue in place. 
17.	Prior to gluing the sponson pads, we need to add the #8-32 T-Nuts for the skid fin mount. Best to use a little epoxy on these for extra security. We like to use channel-locks to squeeze the T-Nuts in place. Note: There is a lot of stress on the back of the sponson, so make sure you have good glue joints in this area. 

No	Direction and Detail
18.	The next piece of skin to epoxy in place is the outside chine pieces and top sub hatch. Block sand as required and clamp in place. You can glue these pieces on individually or do it all at once. Again, all pieces are cut big to sand to fit once dry.  
19.	Next, epoxy the main sponsons pads and rear recovery pads in place. Once cured, it is critical that the edges of the sponson pads are sharp. Note that we use wood blocks on top of the skins while clamping. This helps to keep the pads flat, without concavity. During this step, you can also glue the nose block in position. The kit contains a pine block for the nose, but you can change it out to a more exotic wood of your choice if you so choose. The main sponson pad should have 0 degrees of anhedral and about 3 degrees angle of attack.  

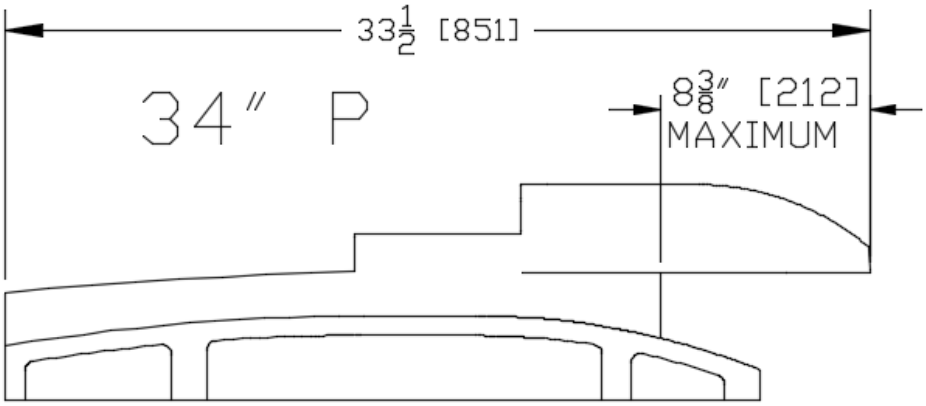
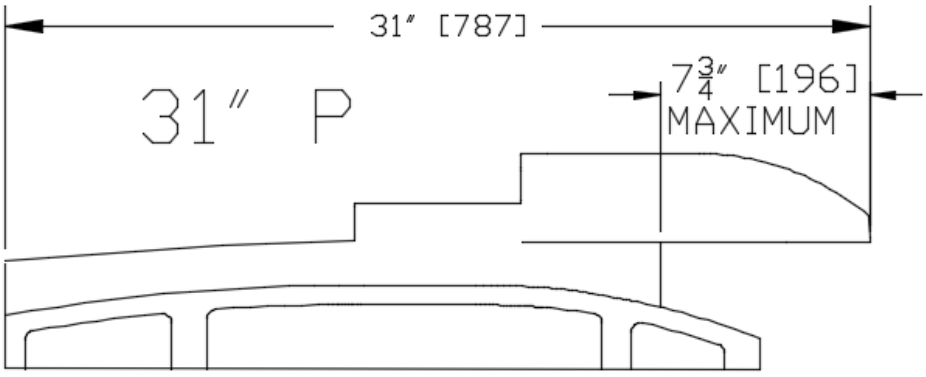
No	Direction and Detail
20.	Block sand for the front recovery pad. When you place the pad, cover the sand plys with the pad and keep the trailing edge of the pad sharp. DO NOT blend this into the 2nd recovery pad –LEAVE SHARP.  
21.	If you like the look sponson deck blending into the side of the boat, you will want to glue frame 7 to the side of the boat. This will strengthen the glue joint. 

No	Direction and Detail
22.	Block sand the sponsons in preparation for the sponson sheeting (you are probably an expert now at block sanding). Prior to gluing in place, place as much floatation (we use pool noodles) in the sponsons as you can. Note that if you are planning on sliding the batteries into the side compartment, don't fill this area with floatation. Epoxy the inside of the sponson (lightly sand already cured epoxy) as well as the sponson skin. Build tip: we like to use ¼" sections of PVC pipe for the clamps in this area as shown. This skin is fairly oversized to make sure it covers everything. You can trim prior to gluing if you want to. Block sand once cured.   

No	Direction and Detail
23.	Next will be the deck. The decks look best when you keep the outside edge at the sponson deck square (don't sand it to the same angle as the side sponson deck). You will want to pre-fit the top sponson deck outside edge where it meets the angled sponson deck so it barely covers the sanded edges prior to gluing it in place. You don't want to sand this area after the deck is glued in place. Don't forget your floatation!

Keep this edge sharp. Don't contour to the angle of the sponson deck (aesthetic reasons).

Try not to sand after glued in place. Try to get the fit perfect prior to gluing.

No	Direction and Detail
24.	The final pieces that need glued in place are the deck blocks. The kit contains pine blocks which you can use, or you can use an exotic material of your choice. We like to use mahogany. To figure out the shape the sides, use the sponson/nose jig you have been using throughout your build. Simply place your jig over your block of wood, trace the line and cut.  There is a rule you need to follow if you are racing in IMPBA or NAMBA. The bow can't be recessed more than 25% of the overall length of the boat. The 34" P can't be more than 8-3/8" [212] and the 31" P can't be more than 7-3/4" [196]. It is best to multiply the length of your completed boat by .25 to get the maximinum allowable dimension. There is no minimum requirement.  

No	Direction and Detail
25	Balance Points: The balance point varies depending on how fast you plan on going. Ideally, you want to bed able to move things around to be plug or minus ½" from the numbers below. 50MPH: 3-1/2" [89] from the back of the sponson. 60MPH: 3" [76] from the back of the sponson. 70MPH: 2-1/2" [64] from the back of the sponson. 80mph: 2-1/4" [57] from the back of the sponson
	Notes: