

A Few 1.5 Building Thoughts

(Don't take as gospel, just one blokes ideas) by R Moore

Instructions to be used in conjunction with construction CD as supplied by 1.5 manufacturer "Manaroo Design" of Bairnsdale Victoria

(CD) means check the pictures * means attention!! *** (Could save a stuff up)

If you have purchased a 1.5 hull with inwales and transom fitted.

Before construction can be started the hull must be supported and preferably "waterline level"

If you don't have access to a building jig or have not purchased a transport cradle. A building frame can be constructed by bracing a few profiles cut out of chipboard

1. Fit and glue the Transom Deck Beam into place making sure it is wide enough and strong enough to take the strain and mounting screws of the Backstay fitting
2. Fit and glue any additional tempory "cross hull braces" you may require, making sure the 300mm max beam is correct. Glue 80 or 100 grit sand paper to a length of timber (600mm min) to make a fairing batten and carefully sand the gunwales till they are fair and flat in all directions (this is most important to ensure the deck has a good seal and all the deck beams etc will be "fair")
3. Drill the 2 dimples (3mm) on the hull to mark the position of the Rudder and the Keel. (The Keel dimple corresponds to the Keel bolt position) * Mark a Reference point on the Hull, (the Keel Bolt), to both Inwales (all measurements for all construction can now be taken from the keel bolt position) as per plan

As per plans and (CD) cut out and shape the keel, making sure the blade is longer than required, this can be trimmed to the correct length later, when the bulb is fitted. * Make sure the Centreline is clearly marked on the Keel). Fair the foil shape to the keel using a plane and sander (a template can be made out of aluminium for the keel and the Rudder as per plan) * Slightly taper the sides of the keel blade where it enters the hull (to avoid sticking). Check the length of the "tapered" part of the keel from where it will enter the hull to the underside of the "king plank" on the top of the keel box. Deep drill the bolt hole in the keel and epoxy the bolt into the keel

4. It is preferable to sheath the keel and rudder blades and a substitute for expensive f/g tissue is a Nylon stocking. Hang the keel and rudder blade and stretch a stocking over them (weighted) and epoxy with "Boat Coat" or similar see (CD) dscn0908). If wood is porous 3 coats of epoxy "Wattyl timber preserver" thinned as instructed is eaiser than sheathing
5. As per the pictures, clamp the rudder blade (vertical). Cut out the Centre case sides larger than required and epoxy the inside faces. * Stick layers of Tape (CD) dscn0914 on the rudder blade, (this is to allow for the thickness of the layers of paint etc) Clamp the c/ case sides to the keel, measure and make case logs etc to suit the case

6. * Make sure the sides of the keel box are long enough to penetrate the hull when the c/case is fitted. **** When assembling and Clueing the case together on the blade (CD) dscn0918, make sure that wherever the glue can run you cover it with plastic tape, a little wd 40 or some release agent on the pvc helps (to avoid the box and the blade becoming one item). Don't laugh its happened
7. Mark the position for the keel box on the hull (using the keel bolt reference point). Cut the section out of the hull, making sure the slot is true fore and aft,(CD) dscn1486. Fit the box to the hull, measure and fit the cross beam and cut the recess out of the back of the keel box, leaving a small projection (CD) dscn1484.)
8. Dry fit the keel box and glue the cross beam into the hull. When the keel box is glued into the hull a small clamp can be used to clamp the crossbeam to the projection on the keel box, this will hold the box in the correct position till the glue dries (*note: pictures on the CD will vary as these are pictures of several boats and they are only meant to be a source for ideas, but (CD) dscn1484 is the way to go)
9. The keel box can be aligned in several different ways. Insert the keel into the box. **** PVC tape and a release agent ANYWHERE glue can run when the box is fitted. If you have access to the alignment jig and a level bench with a hole, level the deck with the spirit level, glue the box into place, align the keel blade fore and aft with either a spirit level, or align by eye using plumb bobs. Use a clamp to hold the cross beam to the keel box until the epoxy goes off
If using you own building jig it can easily be aligned by packing and clamps
IDEAS. Several keels have been fitted by levelling the hull ie: waterline and across the beam upside down and aligning the keel with a plumb bob from the ceiling. One class recommends hanging a weight on the bottom of the keel and letting gravity align the keel.???
10. Fit the "chain plate" hull reinforcing to the hull as per plan (CD) dscn0949 (I prefer to laminate the chain plate reinforcing) it will give the holding screws more bite.
* As the screws are in shear, bolts are not really necessary
11. Fit the cross beam at the front end of the chain plate. *(Mark and cut out the slots in the cross beams for the "king plank" before gluing them into position)
12. Fit cross bracing and truss braces the keel box as per (CD) dscn0948
13. The rest of the deck beams and king plank can now be fitted. To support the king plank at the stem, glue a support block underneath (CD) dscn0954
14. *** If you wish to "lighten the king plank" be careful not to cut out where the deck fittings will go (if you are using light cedar you will only save about 5g
15. Fit and glue he rest of the framing to the hull, paying particular attention to the Winch mounting and the Hatch openings ** the hatch opening is more than adequate in

length. I prefer to shorten the opening at the rear as to allow a bit more room to get the hatch cover off without fouling the “mainsheet post”. (If you are going to use “end boom sheeting as per plan) ** make sure at this stage you know what main sheet post you are going to use and provide adequate mounting for it. Fit the supports for the Radio deck and build deck

16. Drill drain hole in Transom. Run a little epoxy around the inside of the transom to make sure of a good seal and seal the drain hole.
17. If you wish to run the antenna for your receiver internally, fit the tube now (drinking straws are good) **Make sure antenna runs as high as possible in the hull and along the king plank (if you run it along the gunwale, when the boat is heeled signal will be lost) (CD) dscn0971. A good idea is to run a cord up the tube and return it to the hatchway . The cord can be attached to the Antenna wire and used to position the wire when installing or re- fitting the Rx in the hull
18. Now is the time to check and make sure all you deck hardware has adequate mountings provided. ***** Make a drawing of ALL the framing in your hull; use the keel bolt hole as your reference point. Once the deck is on you must know where to screw fittings
19. Give the timber in the yacht a good coat of epoxy wood preservative
20. ***** Float the hull in water and ballast it to about 9kg and check for leaks. If you have a strong building jig fill, it with 10ltr and check for leaks. (Even with the best lay up very small pinholes can appear between the weave in the cloth. Another check is to stick it on you head like a hat and look at the sun (although you neighbours will think your nuts)
21. Sand the top of the hull fair with your big fairing block
22. Cut out your deck with a couple of mm overhang, I prefer to roughly cut out the openings as well. Coat the underside of the deck sheet with epoxy wood preservative. ** Put a slight camber in the sheet while the epoxy is drying, because when the epoxy dries it shrinks a little and can cup the deck, making it harder to get the deck flat
23. ***** Run PVC tape around the gunwale about a mm or so down from the top, this will stop any epoxy that is squeezed out from sticking to the hull (very hard to remove)
24. **Fit the deck to the hull use a small nails at the bow and the stern as locating pins when gluing the deck **** Use a good “stiff 20 minute epoxy (like Norglass epoxy) to glue the deck down. Liquid nails or similar can be used for deck beams etc but epoxy must be used on the gunwales. Weight the deck down while the glue goes off eg;(CD) dscn0973 to ensure a good joint along the gunwales
25. Cut out openings and frame the hatch and build hatch cover as per plan

A FEW FINAL THOUGHTS

The current way to fit the bulb to the blade is with the joint horizontal and with the bottom of the keel blade cut off square (helps keep the bulb horizontal as well)

Drill a deep hole for the bolt into the blade

Measure the blade of the keel from the bottom of the hull for max draft (as per class rules) allowing for the thickness of the lower half of the bulb and cut blade to length

Glue the bolt into the blade

**** Keep the off cut of the blade, as it can be used as a template to mark the bolt hole position in the lower half of the bulb (CD)dscn0974

- When drilling and cutting Lead. Lubricate the drill bit often and clean swath as soon as it reaches the top of the drill flutes. Place the Lead in the freezer to cool it (the colder it is the easier it is to cut)
- **NOTE** when cutting and fitting keel bulb, the Centre of Gravity (balance point) is 26mm AFT of the Centre line of the Keel.
- Balance the bulb on a straight edge and mark C of G on it.
- The Bulb supplied will weigh approx + 6.3 kg. Between 300 & 400g will be lost in the cut out material. Your final bulb weight will depend on the final weight of your complete yacht and your complete keel will weigh between 5.5 & 6.0 kg.
Note: The balance point (cog) of the bulb, after the cut out will be the same
- If you find the bulb needs to be heavier, a lead shim can be inserted between the bulb halves. If too heavy, the bulb can be planed, (preferably drilled) to the desired weight ** A good way to adjust the boats trim.
- 1.5 class rules allow different keel weights to be used, A light weight keel will be around 5.4 + kg a heavy one about 6.0 + kg
- Ensure the keel, where it enters the hull is bearing on the side of the keel box when the blade is fitted. The keel blade can easily built up with a strip of filler to take up any gap (if the blade is loose in the box and the keel bolt is tightened, all the free movement will be taken on the bolt and may result in failure
- Tip !. “if in doubt” ask an NMSC member for advice

Tip to fit a Keel Box

1.5 Construction Help.

Moore

FITTING A KEEL BOX

By Bob

Recommendation

Lightly sand inside of hull and paint with a thin coat of laminating Epoxy (Boat Coat or similar)

Form a shallow dam (with tape or putty) where the Keel Box penetrates the hull . Fill with Epoxy resin 2-3mm deep (This will stop the hull from moving and give a more stable platform when the slot is cut out for the Keel Box)

Drill thru the hull at the Center Mark for the keel (This indicates the center of the keel blade and Keel Bolt) at deck level. Mark this position on the Gunwales, as all deck measurements relate to this position

Mark the position for the Keel Box (checking alignment fore and aft) and cut out the slot
Dry fit the Keel box making sure the box cheeks go thru the hull and the logs bear on the hull
Make and epoxy the Deck Beam aft of the Keel Box to the Gunwales (use the projection on the keel box to clamp the beam into position (DO NOT glue the box to the beam yet)
Align the hull in your cradle or building jig so the Waterline of the hull is Horizontal. Use a level across the hull at amidships to level the Deck

Cover the top of the Keel Blade and 50mm below the Hull with PVC Tape (a light smear of oil or soap over the PVC is advisable

Epoxy the box cheeks, logs, and location lug and fit the Keel Box to the hull using a clamp to hold the keel Box to the deck beam

Insert the keel blade into the box and use a piece of timber across the gunwales to locate the keel bolt and hold it into position. Use a spirit level to check the alignment of the Keel Blade, adjust the clamp as required. When the epoxy has just about gone off, REMOVE the keel Blade

(The object of exercise is to have a removable Keel , without care and the PVC, it may become a permanent fixture)

Make good stiff “Bog” of Epoxy (using micro balloons, Talc, wood dust etc) and place a good fillet around the Keel Box to the Hull (a teaspoon makes a good filleting tool)