

The Three Star River Tow Boat Mark IV

Introduction:

A short history:

A number of years ago Jim Smith, a long time member of the club, obtained a set of plans for "The Battling Polo Tug." He built his first one of these boats from those plans, and was able to determine that the boat required a few changes. His suggestions included increasing the width of the hull for added stability, and to increase the draft of the hull.

Back in 2001 I was able to obtain a copy of these plans, along with the article that Mr. Smith had written to explain the changes that he suggested. The original plans were not very good, and trying to incorporate Mr. Smith's suggestions on the fly was a little more work than I really wanted to do. So I sat down at my trusty computer, and dusted off an old copy of AutoCAD, and generated a new set of plans that incorporated Mr. Smith's suggested changes.

In the beginning we all just referred to these boats as "Polo Tugs" until it was pointed out that the name "Polo Tug" might be a registered Trade Mark. So the Edina Model Yacht Club elected to rename these boats to "The 3 Star River Tow Boat", or as I often call them The 3S RTB's.

At the present time (to the best of my knowledge) the club has not established any specifications, or standards for motors, propellers, batteries, drive shafts, stuffing boxes or any other hardware. All these things are left up to the builder, and to available materials.

The materials called out are only suggestions, and can be replaced with whatever materials the builder may have available to them.

Note of Caution: Many of the dimensions on the drawings are dependent on using the suggested materials. If the builder chooses to use materials other than what is suggested on the drawings, care should be taken to adjust the dimensions appropriately. For example if 1/8 thick Balsa is used where 1/16 Bass is suggested, the dimensions of all adjoining objects may need to be adjusted for the extra material thickness.

The Mark I:

The original plans for "The Battling RC "Polo Tug" Event - Regulation Design For Special Events in RC - "Work Boats"" As designed by Joe E. Brown of Western Rivers Work Boats, and William Zumwalt of Sink'um & Float'us Salvage Co. As adapted by The St. Louis Admirals RC Model Boat Club.

There are a number of dimensioning errors in these original plans, and so many of the dimensions just do not add up right. So I created the layout for the Mark I, in order to correct these dimensioning errors.

The Mark II:

While based on the original “Polo Tug” designs, the Mk. II incorporates the changes that Mr. Smith has suggested. Including his design for the “Rudder Cross”.

The Mark III:

Is based on Mr. Smiths suggestions for the original “Polo Tug”, while incorporating a number of my own ideas, and is inspired by one of the boats actually built by Mr. Smith.

Where the Mk. I, and the Mk. II incorporate the original “fast-back” cabin design. The Mk. III is based more on an typical River Tow Boat design, that we might see around here.

Note: Printed copies for the complete set of plans for the Mk. III might still be available. Though I do not personally have any more copies left. It seems that I gave them all away, I guess.

Appendix A: Contains a copy of the original Cover Page from “The Battling RC “Polo Tug”” plans.

Appendix B: Contains a copy of Jim Smiths notes about this project. As well as his suggestions for material selection for the steering and drive systems.

Appendix C: Contains some general notes concerning the Rudder Assembly.

Appendix D : Contains general notes about this release of the Mark IV.

The Mark IV:

What is new:

I have incorporated a number of design changes that I hope will improve the operation of the boat. I have included a few suggestions from other people who have also built the Mk. III.

The Mk. III called for the Rudders to be fabricated from Brass. This caused some problems for people who did not have access to metal working tools. Those who wish to, can still use 3/16 Thk. Brass as called for in the Mk. III plans.

The Mk. I - III are designed to use a smaller motor, such as the Graupner 400, or the Pitman that Mr. Smith is using.

A number of us have learned that a 550 size motor is just a little too big. Short of glueing the motor can to the bottom of the hull, a 550 requires the propeller shaft to be mounted at an angle of approximately five to ten degrees. At higher speeds this has caused the propeller to push the stern of the boat up, causing the bow to be submerged.

So I have increased the draft by a half inch, to allow for a 550 size motor to be used, while maintaining a more horizontal drive shaft.

The increase in the draft, also allows for wider rudders, which should provide better handling.

I have also decreased the attack angle of the bow. It has been my observation that the bow angle was just too shallow.

I have made some slight modifications to the design of the Main Cabin. Now the builder has a choice in building options.

- 1.) The Mk. IVA. Building the cabin assemblies so that the entire cabin structure is removed to gain access to the interior.
- 2.) The Mk. IVB. Attach the walls of the Main Cabin to the deck, and then gain access to the interior by removing the cabin roof(s).

I have added a couple of 'cat walks' out to the Bow Knees. No special reason. I just think that they look better that way. These 'cat-walks' are optional, and can be left off if you choose.

In any event, the Bow Knees are now shorter (as measured from the deck) then they were in the Mk. III. Though they are longer in over all length than before. The changes to the bow, allow the Knees to be extended further below the water line, which should make pushing other boats (should be read as assisting stranded boats) easier.

The shorter Knees, along with the old bow angle made it too easy to ride up over some boats when attempting to push them.

Appendix A

Appendix B

BATTLING - RC POLO TUG - Edina Model Yacht Club update:

Jim Smith June 1996

I built the wooden portion of the St Louis Admirals' Battling - RC Polo Tug over- one three day weekend. It's box like construction lends itself to rapid building. The three rudder option is another story. I did find a few dimensional discrepancies in the plans, but the drawings lend themselves to direct measurement if you have any doubts. The drive shaft dimensions are a case in point

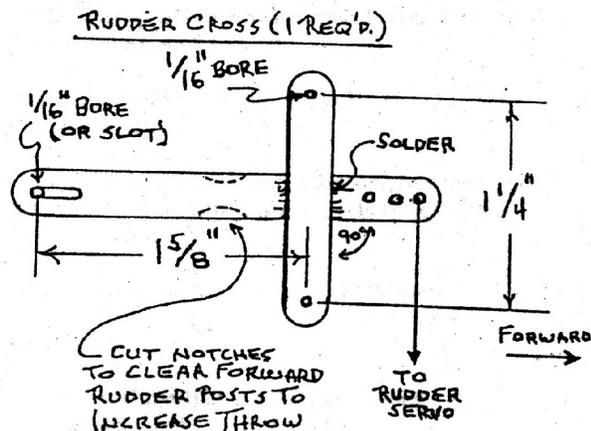
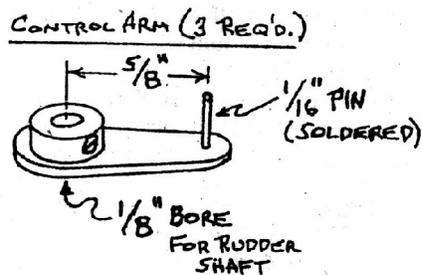
I built the complete boat using 1.5mm (1/16") Australian Hoop Pine plywood. There is no reason why common 1/16" or 1/32" birch ply from the hobby shop can't be used: Hard, 1/16" balsa would be fine if you planned on fiber glassing the hull. I used 2 oz. fiberglass cloth and West Systems epoxy on my ply hull. An adjustment to the height of the supplied "Hull - Template - Pattern" must be made if you use any wood thickness other than the 1/8" thickness specified in the plans, e.g. I added 1/8" to the height above the waterline since I used 1/16" sheeting for deck and hull bottom.

After cutting out the two hull sides, I outlined the inside edges with 3/16" square Basswood (spruce or hard balsa would do as well). This gave me a bit more surface area on which to Fasten the hull bottom and deck. The hull bottom sheeting is fastened with the grain running across the hull to allow for flexing of the aft double bend. I then cut same scrap blue building foam to the hull side template shape, sliced it into two 15/16" thick pieces (sanding works well), cut out a rough 3/16" x 3/16" groove around the outside centers with a sharp X-Acto blade and epoxied one to each side. The plans illustrated "Splash Bulkhead" glued directly to the inside of the foam. Add a bit of foam forward of the splash bulkhead, and you've almost got an unsinkable hull. Do not use regular CA glues on the foam, it will dissolve. Some "odorless" CA's may not attack foam.

The superstructure is "a piece of cake", all square and quite easy. I cut out the pilot house windows and all of the portholes, but there's no reason you can't just paint 'em on as per the plans. A little fiberglass cloth on the inside of all comers adds a lot to strength but virtually nothing to the boat's weight

Although my boat has yet to see water, I believe that a triple rudder is worth the effort to build. Maneuvering, especially in reverse, should be spectacular. Since the three rudder arrangement shown on the plans looked rather strange, I designed my own mechanism. It consists of three rudders, three parallel control arms and a solid brass cross which turns all of the arms together. After completing my mechanism, it dawned on me that by using a slightly shorter control arm on the aft, center rudder, and cutting a slot parallel to the long arm of the cross in which its pin could slide, that the center rudder could be made to turn through a greater angle than the forward rudders.

As built, all three control arms are 5/8" long. I cut them from 1/16" brass, soldered a 1/8" model airplane wheel collar on the rudder end and a 1/16" pin into the other. (Grind or sand off



the chrome plating from the wheel collars or the solder will not adhere). The cross is also cut from 1/16" brass. I like to drill a small hole through the top of each rudder shaft and inset a piece of soft wire. In the event that the rudder set screw loosens, the rudder can not drop out and end up on the bottom of the lake.

I installed a **Pittman #8313 motor**. This 12 volt motor is available at the Fridley AxMan and occasionally at the Bloomington store for \$2.50. This installation allows for one flat seven cell 1400 mah Ni-Cd on each side of the motor. Duration should be more than adequate. I used a Graupner #2308.35, 35 mm, three bladed propeller. By wrapping the prop end of the shaft with very fine copper wire and soldering it in place and then applying a very light touch with a jeweler's file I was able to screw the Graupner, 4 mm threaded prop onto the 1/8" shaft.

It would be great to see a gaggle of these boats on the pond in the coming months. Polo, anyone?

Additional Info: June 2001

By using 5/32" brass rod as the drive shaft, a 4mm die can be used to thread the prop end, It will then fit the whole family of Graupner plastic (black nylon) props (available from Hobby Lobby in Nashville), I used a 40mm, 3 bladed prop on my second Polo Tug. North West Short Line (Box 423, Seattle, WA 98111-0423) makes an excellent small dog bone style universal joint. Their #495-6 couples a 5/32" (4mm) shaft to a 1/8" shaft. The #496-6 couples a 5/32" to a 3mm shaft. (Product Sheet \$1.00), The universals themselves are about \$3.00.

I recommend widening the hull to 7" from the 6" beam shown on the plans. I would also increase the height of the hull to 2 1/4" rather than the 1 7/8" shown on the plans. This increases stability and freeboard. The deck house should be widened to 4 1/2", affording extra interior room for batteries, etc.

Finally, build the bow a bit higher than shown, The plans show the bow about 1/4" higher than

the projected height of the main deck. I would increase that to ½". That helps reduce the amount of water over the deck when operating at higher speeds.

All the above changes seemed to have no adverse effects on the operation of the boat. They do allow me to run two 7 cell 1700mAh packs (in parallel) without having decks awash. Duration is upwards of 2 ½ hours,

Appendix C

The Rudder Assembly:

I have discovered that fabricating the rudders from either Plywood, or Bass wood will work just as well as using Brass. Provided that the rudders are covered with at least two layers of fiberglass cloth. A ½ Oz. or ¾ Oz. Micro-Glass cloth is suitable when you double cover both sides of the rudders.

Laminating (2) 1/16th thick pieces of wood (either Plywood, or Bass) to get to the 1/8 in. thickness will help to increase the strength as well.

I have also discovered that recycled “Popsicle” sticks work very well, for fabricating the two arms of the steering “Cross”.

When making the control arms for the Rudder assembly: If you locate the pin to the other side of the cover plate from the set collar. Then mount the cross on top of the rest of the assembly. This way it will not be necessary to cut any notches into the steering cross.

If the cross wants to bounce off? You can use pin backs (those little things that they use to hold straight pins in place), or even just a small scrap piece of plastic mounted on the pins to act as a retainer.

Note: Wood is not as heavy as Brass. When fabricating the rudders, and/or “Rudder Cross” from wood (instead of Brass) additional ballast will be required to compensate for this difference in weight.

I have also called for using 1/4 OD Brass tubing now, instead of using solid Brass round stock, for the rudder shafts. This was done for the same reason as making the rudders from wood, instead of brass. Many people are not going to have access to metal working tools.

If you choose to make your rudder shafts from the tubing, you will need to fill the tubing with an epoxy putty (such as “MultiPut”, or a home made (mixing saw dust with a slow cure epoxy(the longer the better)) epoxy putty will work just as well) after you have glued the rudders into place. Otherwise the tubing will bend too easily.

Appendix D

If you choose the building option of building the main cabin, so as to allow access to the interior by removing the roof (Mk. IVB), then you will want to fiberglass the main cabin side pieces, and the roof. If you choose the building option for removing the entire cabin assembly to gain access (Mk. IVA), then it should not be necessary to fiberglass any of the cabin pieces.

It is strongly recommended that you do fiberglass the entire hull.

For fiber glassing. Two layers of a ½ Oz. Micro-Glass cloth is more than sufficient.

The Bow has been beefed up a little bit. Items 14 (qty. 2), and 15 (qty. 1) from the assembly drawing 002-00 (or see BOM) are now each made up of two pieces of one eighth inch thick Bass (or Balsa) wood, laminated together providing a total thickness of a quarter inch. If you have any quarter inch thick stock laying around, you could make these pieces out of that instead, but you do not need to go out and buy quarter inch stock just for the project.

The same goes for the Knees as well. If you do not have any three-quarter thick stock laying around in your scrap bin, you can just laminate together what you do have. Depending on what you have for a saw, you can either cut the pieces out first, then laminate them together, or you can cut them out after you have laminated them.

Originally it was my intent to develop the drawings for the Mk. III at full scale (1:1) to allow myself (and others) to make the parts by just cutting out the drawings and pasting them on what ever material was appropriate, and then cutting out the parts.

While working on the new designs for the Mk. III, I found myself forced into early retirement, and I was no longer able to gain access to an appropriate plotter to plot out the new drawings. Ultimately I was compelled to redraw all of the parts, so that I could print them out on my printer at home.

Since then I have acquired an older plotter. With the intent of revising my original plan to produce full scale drawings. Unfortunately I have been forced once again to put off that plan. I have lost my source for paper, and pens for the plotter, when they were forced out of business.

I have also lost my old computer, when the mother board blew out. My new system is using Vista,(as the OS) and Microsoft (Vista) no longer supports my old Epson Laser printer. My old printer has a couple of emulation modes, but neither of them are supported any longer either. Though there is on emulation mode that is kind of close to a printer that Vista does still support. It is not close enough, at least not for AutoCAD.

In short. At present I do not have the ability to print out anything onto paper. As a result, the electronic copies (PDF files) of these plans is all that I am able to publish.

In the near future I hope to publish a complete set of plans for the Mk. III in PDF file format as well.

There are plans in the working for designing additional, or alternative tops (cabins) for the Mk. IV. At present I am planning on designing a WWII PT Boat, a WWII Aircraft Carrier, a WWII Battleship, a 18th Century Heavy Frigate (Constitution Class), a Dreadnaught class WWI Battleship, and a (possibly working) Tow (wrecker (as in tow truck)) Boat top.

