

Tugster

Tug Boat

Competition or Sport Tug Kit



A Zippkits R/C Boat

Building Instructions

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www.zippkits.com

Toll Free (866) 922-ZIPP

The Zippkits Tugster was developed from the very popular Springer class models.

The Tugster is really great at just putting around, or retrieving dead boats and seaplanes.

One of the best things to do with your Tugster is to play water polo. Use a mini soccer ball and our included Push Knee kit.

Set up simple goals and try to capture the ball and get it through the opponent's goal. The fun is proportional to the number of boats.

Tip: use some sort of rub strip around your boat. Competition can get intense, and collisions are common. A rub strip helps protect your paint job.

Suitable for all skill levels and ages, this kit is fully customizable. We supply our standard "Indiana" wheel house, but you can purchase optional wheel houses and superstructure kits from us, as well as make your own from scratch.

Maybe model it after a tug you like?

However you decide to finish it, take the time to read this entire manual, so that you are familiar with all of the buildings steps and their proper order. Take your time; make sure you understand everything before you do it and you will be rewarded with a great running tug!

This kit can be considered a toy. Although R/C boating is a fun and rewarding hobby, it can be dangerous if not done with common sense and safety in mind. Just about anyone should be able to build this kit, but care should be taken, especially when handling LiPo batteries.

The manufacturer assumes no liability for damages or other loss in the use of this product, as we have no control over the construction or end use of this product.

Tools and supplies needed to build

- Sanding blocks with 80 and 150 grit paper
- Drill with 1/16, 3/32, 1/8 and 5/32 bits
- Flat file
- Round (1/8) file
- FLAT Workbench
- Flat work surface
- Medium CA glue and accelerator
- Good quality 30 minute epoxy
- Epoxy finishing resin, polyurethane, lacquer or shellac
- Spring clamps, paper clamps, c clamps, etc.
- Razor blade or X-Acto knife
- Masking tape
- Waxed paper
- Wood filler
- Primer
- Paint

Additional items needed to complete

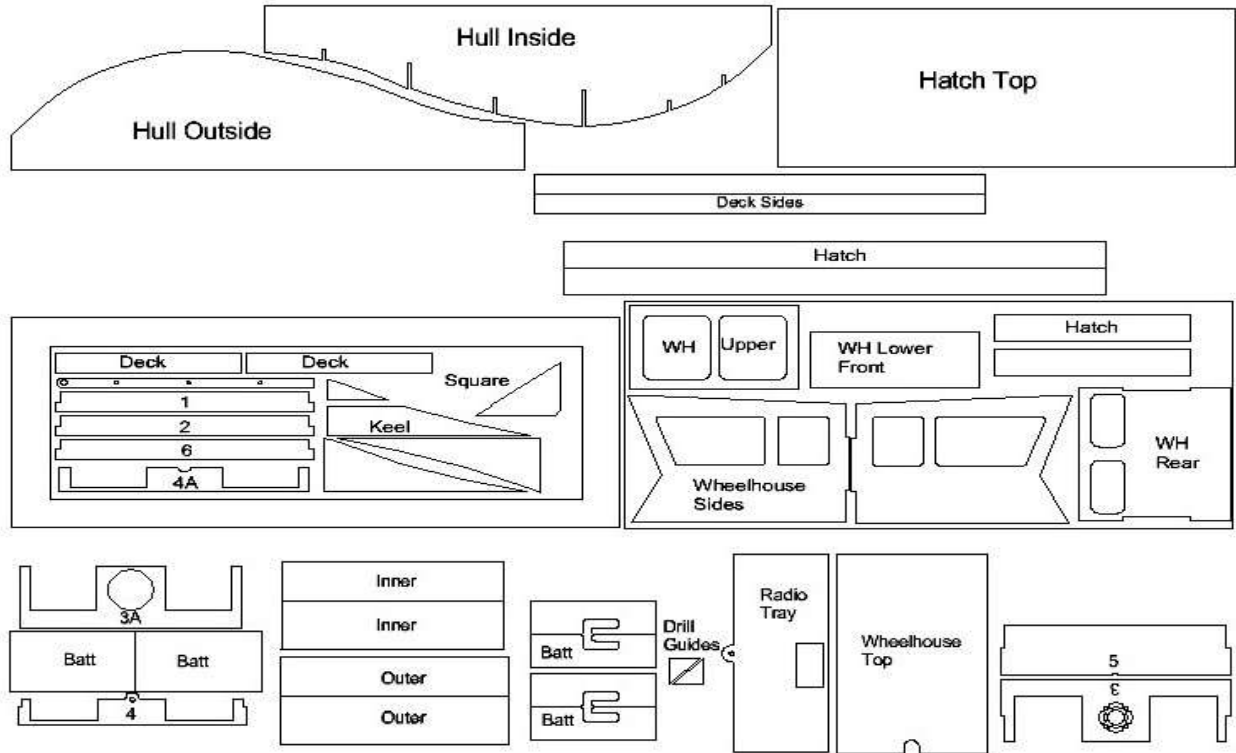
- 550 size brushed motor (Zipp 504)
- Electronic Speed Control (Zipp 503)
- 2 channel radio
- Standard size servo (Zipp 5003)
- Ballast (BB's or lead)
- Battery- 6v 4.5A Gel Cell (2)

The following parts required are included in the optional Tugster Hardware Set

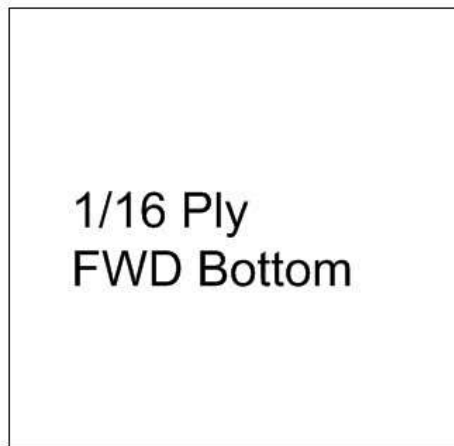
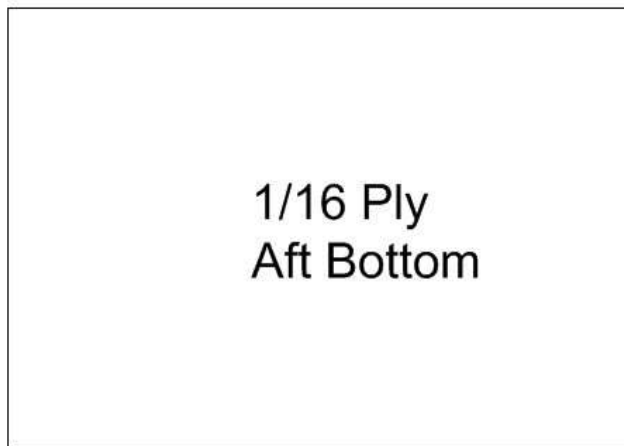
- 1/8 inch drive shaft
- 5/32 Brass shaft tube
- 1/8 to 1/8 coupler
- 1.5 inch 3 blade prop
- Rudder pushrod
- 1/8 inch steering arm
- Rudder
- Shaft Oiler Set

Let's identify the parts so that we can easily find them when needed. Mark the parts with light pencil.

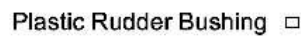
1/8 plywood parts:



Misc. parts



1/2 Inch Dowel Stack



Plastic Rudder Bushing □

Do an inventory of all the parts, to be sure that everything is there. If anything is missing or damaged, contact us as soon as possible, so that we can get replacements to you quickly.

Glue

You can use any type of water proof glue you want. This includes Titebond, Gorilla glue, CA, epoxy, etc.

We used medium CA for the entire build.

Work Surface

We recommend that you use a straight, flat work surface.

Minimum size would be at least 24 by 12 inches.

Every critical component on this hull depends on a straight, flat surface.
Do whatever it takes to get this done.

A note about Ballast:

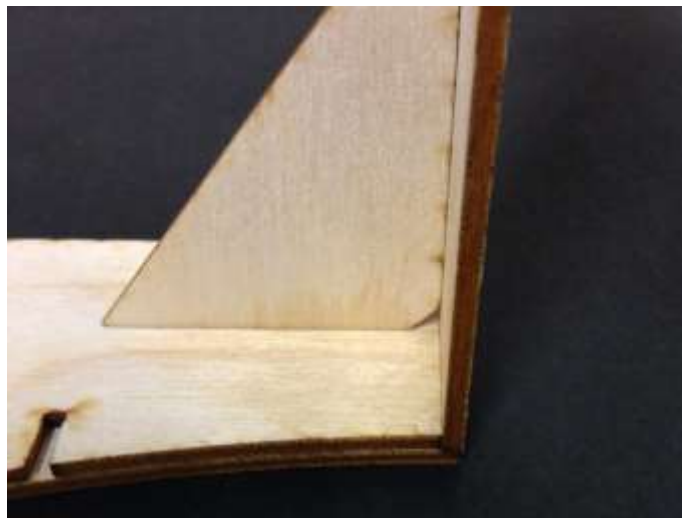
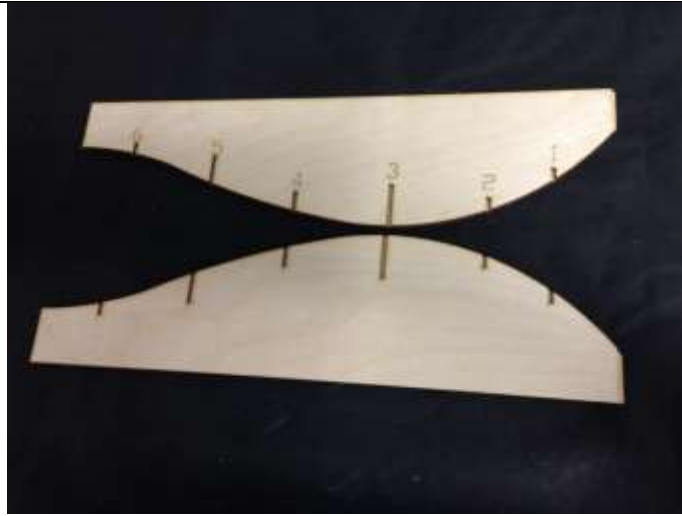
This tug requires ballast-If using a LiPo battery, you will need a lot of it.

We use BB's and epoxy, but you can use anything heavy.

Some regulations require that this tug weigh 8 pounds with battery, and we recommend at least 6 pounds.

If you are having a contest (water polo), make sure that you set a minimum weight, as the lighter boats will be faster.

In this manual, we show several different versions of our Tugster. They may not look exactly like this one, but we do this to better illustrate a point.



Hull

The hull sides are laminated from 2 pieces of ply.

The inner piece has the slots for the bulkheads.

The inner piece is also shorter than the outer. This allows you to glue the end pieces (marked "outer") into a strong joint.

We used medium CA glue for all assembly. You can also use epoxy or any water proof glue.

Glue the inner hull to the outer hull, leaving 1/8 inch on each end.

Be sure to make a right and left side. The best way to do this is to make mirror images of the sides as shown.

Be sure that you make a right and left side.

Weight or clamp until cured.

Bulkheads

Test fit the bulkheads in place. They will only fit in their respective slots.

Use the large square provided so that these are 90 degrees to the hull sides.

Bulkheads 1, 2 and 6 are the same. Glue these in place on one of the hull sides.

Use the square and be sure all bulkheads are square in 2 planes as shown. Get the bulkheads square side to side as well as front to back.

Glue the rest of the bulkheads in place using the square provided.



Be sure that all bulkheads are fully seated and again check that all are square to the hull side.

Turn your square 90 degrees and check that all bulkheads are square to the bench.

Glue in doubler 3A in FRONT (motor side) of BH 3.

Glue in doubler 4A in FRONT of BH 4.

Glue in the ends. These are marked Outer.

Put the hull upside down on your bench on wax paper and glue all bulkheads to the other hull side.

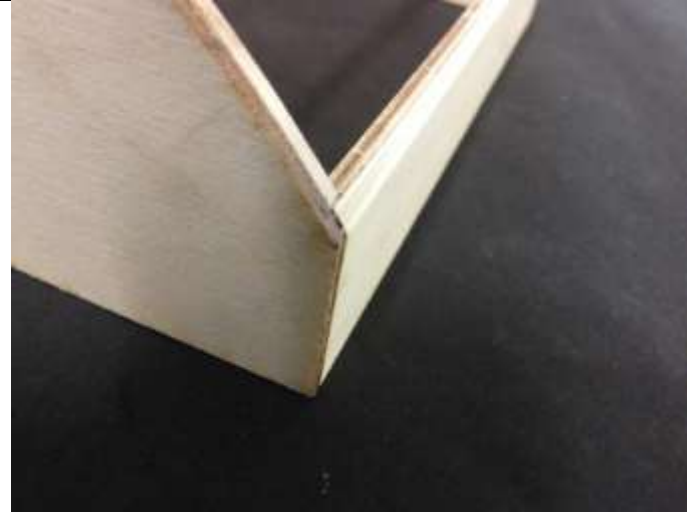
Glue in the fwd and aft bulkhead doublers. These are marked "inner".

Allow to cure.

Step back and admire your new tug. That was no work at all. Just fun...

Let's get ready to put the bottom in place.





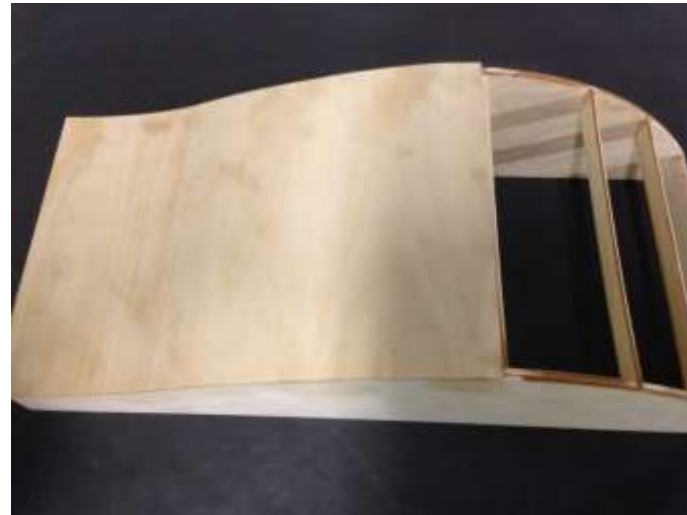
Bottom

The hull bottom is 2 sheets of 1/16 plywood, installed cross grain.

The aft bottom is longer and they both meet at BH3.

You can wet the aft bottom if you want (outside only) but you don't have to.

Sand the hull bottom so that no bulkheads are sticking up and the ply has a smooth surface to attach to.



Sand the front bulkhead so that the angle matches the hull side.

Glue the aft sheet in place, starting halfway across bulkhead 3 and moving all the way back.

Note that the bottom sheets are larger than required, and will be sanded later.

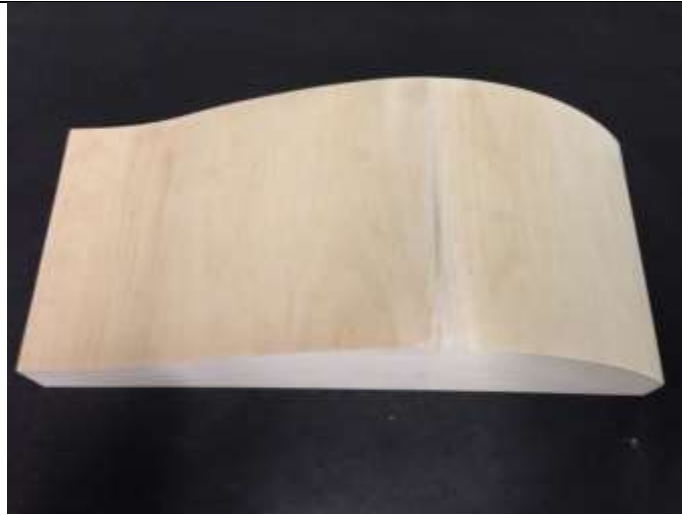
Use clamps, rubber bands, your wife, weights, tape or whatever you need to hold the aft bottom on complete contact with the hull.



Double check that the aft bottom only covers half of bulkhead 3 and that you have a little overhang all around.

Allow to cure.

Glue the fwd bottom the same way, butting it up against the aft sheet at bulkhead 3. Leave an overhang all around and allow to cure.



When cured, sand the bottom all around. You may round the corners slightly, but not much.

This is really starting to look like something now!



Seal the bottoms of the battery trays. When cured, glue in place so that the front of the tray is nearly flush with the front of bulkhead 3.

Glue the tray sides in place.



Take this time to seal the inside of the hull with 2 coats of sealer. This can be epoxy, lacquer, polyurethane, shellac or just about any oil based paint or sealer.

Also seal the radio tray. DO NOT GLUE IN PLACE YET.

Let's get the stuff put in to make her go!





Keel

The keel is laminated from 4 pieces, leaving a groove all the way through.

Grab one of the keel sides and glue inner keel A to it.

Glue inner keel B above it, leaving a 1/8 inch gap.

Be sure to match the inner keel outline to the outer.

Glue the other keel side over the inner keels, again matching the outline.

Allow to cure.

Drill out the slot with a 5/32 drill bit.

Run the drill in and out of the keel a few times to make a nice round slot.

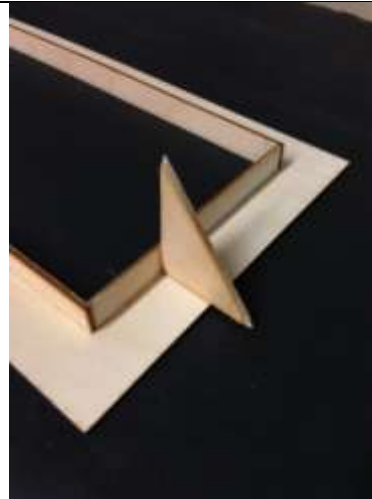
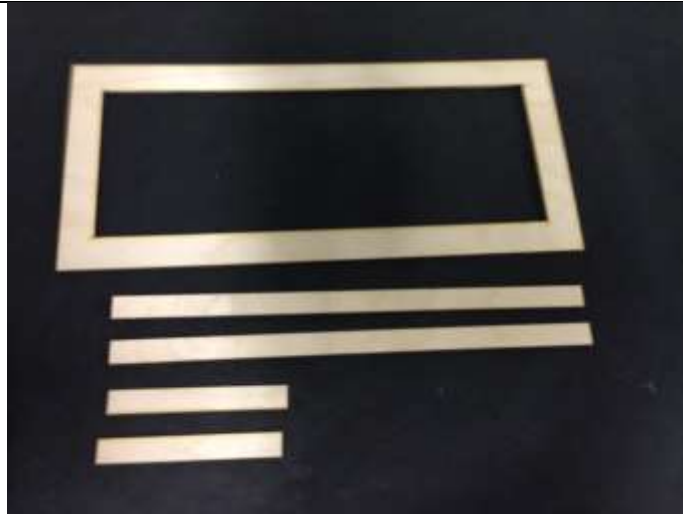
Deck

The deck has 5 parts. 4 of them form a lip that the hatch fits on.

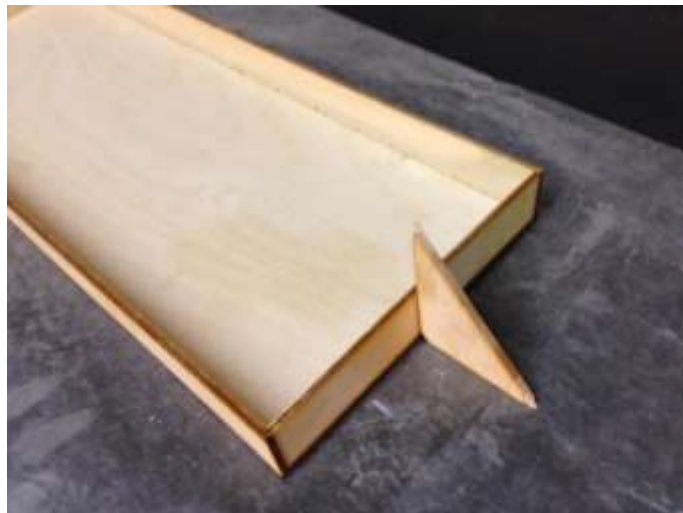
Glue the long strips in place first.

Use your square and make sure they are flat on the bench, and flush with the bottom of the deck.

Glue the 2 short end pieces in place. These go between the long ones. Use your square.



You can seal this as soon as you are finished.



Hatch

The hatch is assembled from 5 pieces. 4 of them form the lip that goes over the deck that you made earlier.

Glue the 2 long strips on top of the hatch.

Note that all strips are glued to the **top** of the hatch, not the side.



Be sure to use your square, and glue all 4 strips in place.

The shorter strips go between the longer ones.

Make double sure they are all square.

When cured, sand if necessary and then seal both sides.



Wheelhouse

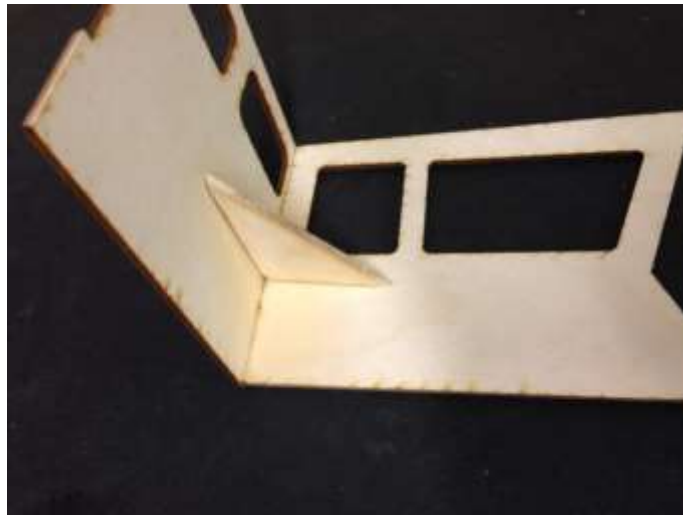
The wheelhouse is the focal point of the tug. This is one area that you can really make your tug special.

We supply the standard "Indiana" wheelhouse, but we have others available.

The wheelhouse is assembled from 6 pieces.

Note that all windows are on the upper part of the wheelhouse.

Keep that in mind when assembling.



Start by gluing the back to one side.

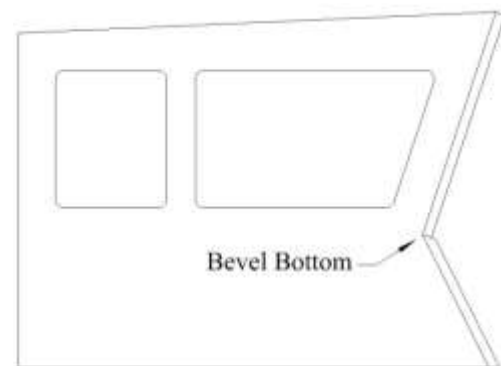
Use your square and be sure it is all good.

Add the other side.

What are you going to use? Your square!

When cured, glue the top front in place.

Glue this so that it is all the way down to the "corner" formed by the upper and lower front.



The lower front (without windows) must be sanded to a bevel to match the upper front.



Take your time and get a nice joint here.

Remember, everyone will see this part, so do a good job...

Once the glue has cured, sand the top and bottom flat.

Glue the roof in place so that the cutout is in the rear, and flush with the back.

This cutout is for the smoke stack.



Sand the wheelhouse and apply sealer.

Seal both inside and out.

If you have not done so, apply a second coat of sealer to all parts and allow to cure.



Shaft Tube

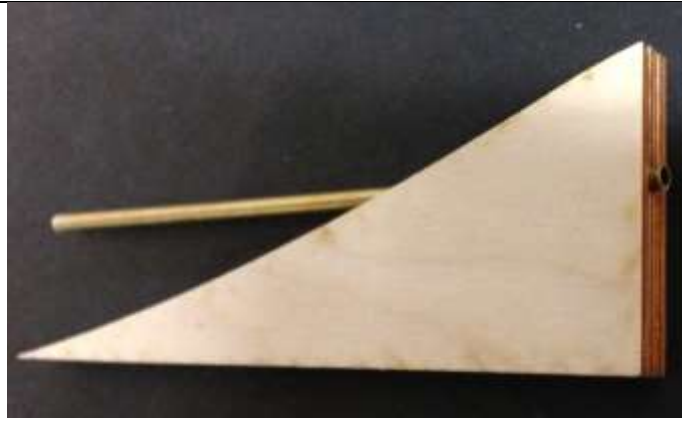
We need to drill a 5/32 hole through the bottom for the shaft tube.

To do this, use a drill bit by hand and drill from **inside** the hull.

Drill through the shaft hole in bulkhead 5 (actually a shaft "notch").

You are only drilling through 1/16 ply so it won't take long.

This is important for a smooth running shaft so take a little time to get it right.



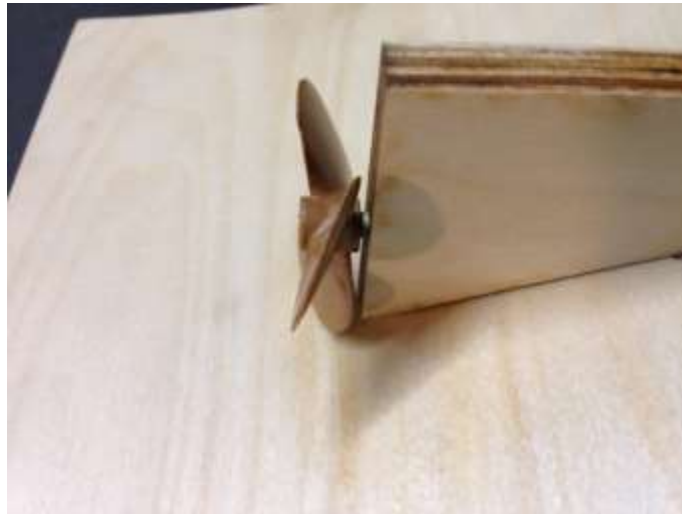
Once you get the hole through you can chuck your bit in a drill and clean up the hole from outside the boat..

Push the 6 inch shaft tube in place through the hull bottom. Be careful as the shaft tube will easily bend.

Don't bend the shaft tube in any way...

With the tube in place through bulkheads 5 and 4, slip the keel onto the shaft tube to check the fit of the keel against the hull bottom.

Grab the 1/8 stainless steel shaft and press on the plastic prop to one end.



The easiest way to do this is to lay the prop on the bench (with the little groove facing up) and tap the stainless shaft into it.

Slide this shaft into the shaft tube and occasionally check to be sure that it spins easily.

You may find that as you push the keel against the hull, the shaft will start to bind. To fix this, use a small round file to open up the hole in the bottom until it doesn't bind.

If all is okay, remove the keel and tube.

If using the shaft oiler, now is the time to test fit it onto the shaft tube. It should slide onto the tube with some resistance, but should not be hard to push on. Use your 5/32 drill bit to ream the hole if needed.



Rough up the outside of the shaft tube with 80 grit paper and glue it into the keel so that about 1/16 inch is protruding from the rear.



Make a small mark on the bottom of the hull in the center. This mark should be at the front of the keel, to help center it when gluing.

Slip the oiler block onto the tube just before it goes into bulkhead 4.

Glue the keel to the hull bottom.

Once the keel has cured, put a little glue on the shaft tube (inside the hull) where it comes in.

Glue the oiler block to bulkhead 4.

When you are done, the plastic oiler should be in contact with bulkhead 4 with the hole facing straight up.

Allow to cure.



Remove the steel shaft and drill a 3/32 inch hole into the shaft tube from the oiler block for oil.

Run the steel shaft in and out a few times to break the little burr from drilling.



Glue a 1-5/8 long 5/32 brass tube into the top of the oiler block.

Rudder

The rudder mounts to a brass tube in the hull, and is supported on the bottom by the keel shoe.

It is very important that you drill the hole for the rudder correctly.

If you do not, the rudder will not line up with its lower support.

Glue the 2 small squares together.

Glue these just at their edges as shown.

This leaves a little "notch" that we can use as a drill guide.

Sand the tops of the bulkheads and glue the radio tray in place.

When cured, use the drill square you just made and drill a 5/32 hole thru the hull bottom.

Drill down through the hole in the radio tray.

Use your square to be sure that the bit is square in 2 planes.

Take your time and make sure that you are drilling straight.

Roughen the 5/32x1-5/8 brass tube and slip it in place.

Leave a tiny bit of brass sticking through the bottom. About 1/16 or less is good.

DO NOT GLUE YET...





Slip the rudder in from the bottom and check to see if it is straight up and down and centered behind the prop.

If it is off, you can open up the hole in the bottom a tiny bit and shift the tube until it is straight.

When you are happy with this, glue the tube in place.

Be sure to leave a tiny bit sticking out the bottom and double check for square.

Keel Shoe

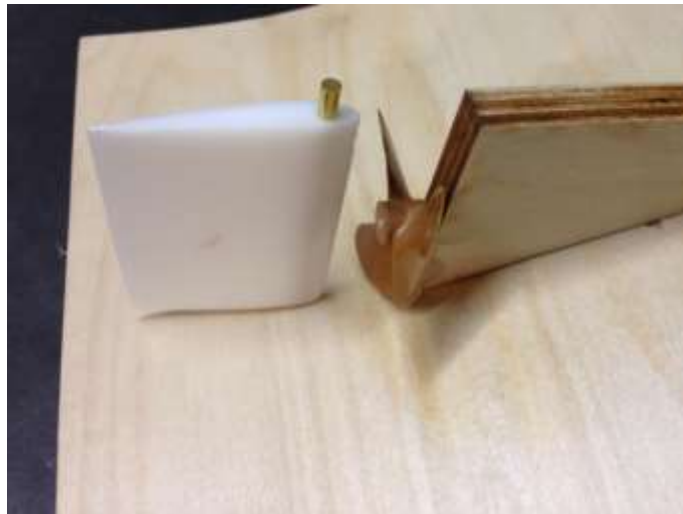
The keel shoe does several things.

It provides a lower support for the rudder and protects the prop form obstacles.

The keel shoe needs some work before we can install it.

The first thing we need to do is install the bushing for the rudder.

This is simply a piece of plastic tube that gets glued in place.



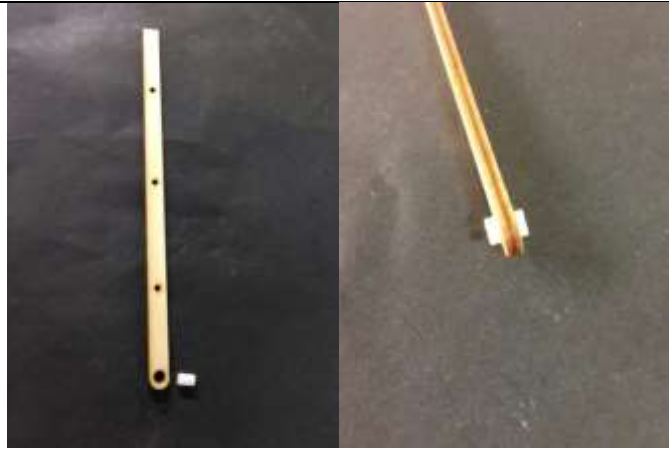
Grab the small piece of white plastic tubing and check the fit in the shoe.

This bushing goes in the last hole (the rounded end of the shoe).

If all is well, carefully glue in place. Leave some sticking out of both sides.

Do not get any glue inside the bushing.

Allow to cure.



When cured, sand the top and bottom of the tube flush.

You may have to run a 1/8 drill bit thru this bushing several times until the rudder shaft turns smoothly, without being tight.



With the boat upside down and the rudder in place, set the keel shoe on the keel, and poke the rudder shaft up into the plastic bushing.

The keel shoe should be pretty straight on the keel.

You will have to sand a bevel on the front of the shoe to match the hull bottom.

Once you have the shoe fitted, its time to screw it down.



Before we mount the shoe, we need to countersink the 3 holes for our flat head screws.

You can use a countersink if you have one, or you can use a 1/4 inch drill bit to carefully countersink all 3 holes.

Be sure you countersink the side opposite of the bevel.

Put the shoe back in place and mark the location of the 3 holes in the keel.

Drill the holes with a 1/16 drill bit.

Be careful not to drill too deep and hit the shaft tube.



Secure the keel shoe with the 3 brass flat head screws.

Remove the shoe and apply sealer to all sides.

Motor

Slip the motor in place from the front and secure with the 2 M3x8 screws and washers.

Run the motor wires to the starboard side of the hull.



Prop Shaft

The prop shaft is 1/8 stainless steel, and the plastic prop simply pushes on the end.

Don't worry about the prop slipping. There is not enough torque to make it slip.

Clean the prop shaft with any solvent as it is manufactured with a protective coating.

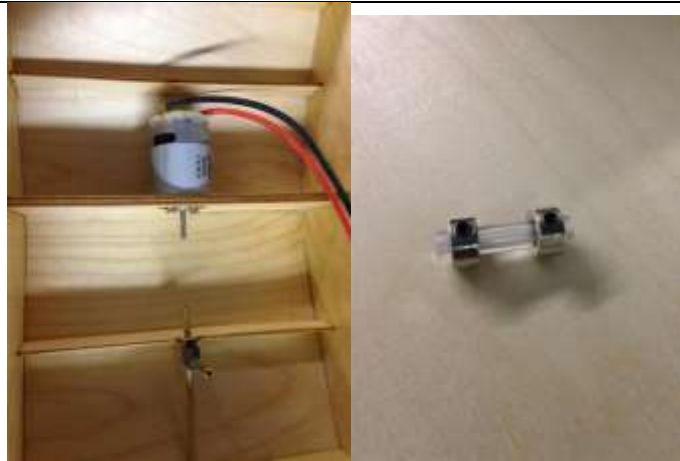
Assemble the motor coupler. This is a piece of clear plastic tubing with 2 metal collars.

Slip a collar on each end of the clear tube.

Make them about 1/8 inch from the ends.

Put in the set screws but do not tighten.





Slide the motor coupler assembly onto the motor shaft so that it is about 1/4 inch from touching the motor.

Lightly oil the prop shaft and wipe off excess oil.

Slide the propshaft into the shaft tube, and into the motor coupler.

Leave a tiny gap between the prop and shaft tube.

Tighten both set screws until they are just snug. Do not over tighten...



Radio

Assemble the rudder and keel shoe.

Put the rudder steering arm on the rudder shaft so that it is touching the rudder tube.

Install your rudder servo.

Leave a gap towards the front of the servo so that the wire can exit.

Install the EZ connector onto your servo arm.

Put the .050 music wire "Z" bend into the rudder steering arm and slip the other end into the EZ connector.

Don't tighten anything yet.

Use two sided tape to attach the ESC (Electronic Speed Control) to the radio tray on the starboard side.

Mount the radio receiver the same way on the port side.

Attach the motor leads to the ESC.

Plug in the ESC and rudder servo to the receiver. Rudder is usually channel 1 and ESC channel 2.



Turn on your transmitter and be sure that the rudder trim is centered.

Plug in your battery.

Turn on the ESC and check for servo and motor function.

Reset the rudder servo arm so that it is straight side to side.

Set the rudder steering arm parallel to the servo arm.

Make sure the rudder is straight and tighten the steering arm screw. Don't over tighten.

Put in the servo arm screw.

Batteries

Insert 2 6v SLA or Gel Cell batteries in their trays.

Use a rubber band to secure the batteries in place so they don't move forward when you hit something...



Exhaust Stack

The supplied stack is pre-beveled dowel.

Glue together as shown.

If you are painting your Tugster, don't glue the stack or wheelhouse yet.

Ballast

Put your tug in the bathtub. Make sure it is fully ready to run.

Add weight (a lot) until the hull sits at the designed water line as shown on last page.

Note that the transom is in the water, but the nose is out.

This gives a slightly nose up ride, and helps keep the bow wave from coming over the deck.

When satisfied, use sealer or epoxy to secure the ballast.

We mix epoxy and BB's then pour the mixture in the boat.

Make sure you put the deck and wheelhouse in place, and the battery and everything else should be installed.

Tip:

You can add ballast under the rudder servo if needed.





Finishing

Glue the deck to the hull.

Sand all around and round all edges slightly.

Seal the outside with 2 coats of sealer.

At this point, everything should have 2 coats of sealer.

If not, get it done now.

If you are painting, it's easier to paint the stack and inside of the wheelhouse before you glue them to the deck.

Sand the entire boat with 220, then 400 grit paper.

Don't forget the stack, wheelhouse and keel shoe.

Apply paint and allow to dry

Determine where you want to position the wheelhouse and glue it in place.

We like to use an automotive clear coat for maximum protection from our buddies...

Good luck and happy boating!



