Soling Rudder Refit

During our recent lunch, we talked about stepped up rehab projects for our Solings in light of the questionable supply situation for new boats. I agreed to put out some emails with some suggestions, sources of supply and some guidance with the thought that we might spend some time before next season addressing some of the repetitive maintenance and repair issues in our older boats. Inasmuch as my boat is at least 12 years old, it's a good example to use.

This email will address the rudder.

The Soling rudder is a balanced, freestanding rudder that is prone to damage when transporting the boat. Because it hangs or penetrates the aft end of the boat, it stresses the hull in a difficult to reach spot and creates cracks that open as the boat is steered. The entry point for the rudder post is one of the most suspect spots for water leaks.

Class rules allow for the building of a replacement rudder vs ordering a new one from the manufacturer, and this rudder is one I made many years ago. This one is fiberglass and is built around the standard 5/32 solid bass rod - same dimension as comes in the kit. The outside dimensions of this rudder are identical to the kit version. If I had known I would be using the boat in salt water, I would have used stainless steel vs brass, but I haven't had issues with corrosion, probably because I greased it when first installed. I have not pulled this rudder out of the boat since it was built a dozen years ago, but did so for this email. It needed grease.

The post for the rudder is located slightly forward of the center line so that the rudder is nearly balanced by water flow across it. This allows for good control with a very modest servo. You do not need anything more than the most basic servo for a Soling rudder. A Hitec HS-322 HD is a good choice - less than $12. It produces 42 in/oz of torque which is about as low as you can get within a standard sized servo. Hitec has 3 or 4 similar models. I chose this one because it

has much stronger gears (“Karbonite”) than the slightly cheaper versions costing $10. Two dollars well spent.

Lessening the chance of hull cracks around the rudder post takes a little ingenuity, particularly with a retrofit project. You will see in subsequent photos that I built this boat with conventional (for larger) rc boat framing which allowed me to support the rudder without adding a lot of weight, but the basics can be installed in a retrofit boat.

Here is the rudder tube coming in from the bottom of the boat. A small wooden block has been shaped and glued to the inside bottom of the hull where the plans indicate the rudder is to be located. It’s a brass 5/32 “inside diameter” tube and it’s about 2” long. You want it comfortably above the waterline but still providing comfortable access to the steering arm. Any shorter, and water will flow in around the rudder post. The block was attached with Liquid Nails, the hole was drilled to provide a tight fit and the tube was pushed up through the bottom of the boat. The last half inch of the tube was roughed up with a file and some epoxy smeared around the tube as the last half inch was pushed into the hull. Keep the epoxy out of the tube.

This block is not sufficient support for the rudder. You need something at the top end of the rudder post so that the rudder does not flex back and forth.

Here is the complete installation. I mentioned this boat has conventional framing, and you can see the so-called king beam running under the deck all the way back to the transom. Probably overkill for a Soling, but the block attached to the king beam at the top of the rudder post is critical. Such a block can be glued under the deck to pick up the post. I drilled the same sized hole in a second block, but I wanted it to act as a sort of bearing for the post, so the hole didn't go all the way through. After I pushed the tube into the boat from the bottom, I took a long piece of 5/32 rod, inserted it into the tube, picked up the top block with some glue on it and pushed the rod up as far as it would go inside the boat. This lined up everything while the glue dried. With a long rob coming out the bottom of the boat, you can sight down the keel to make sure it is aligned properly.

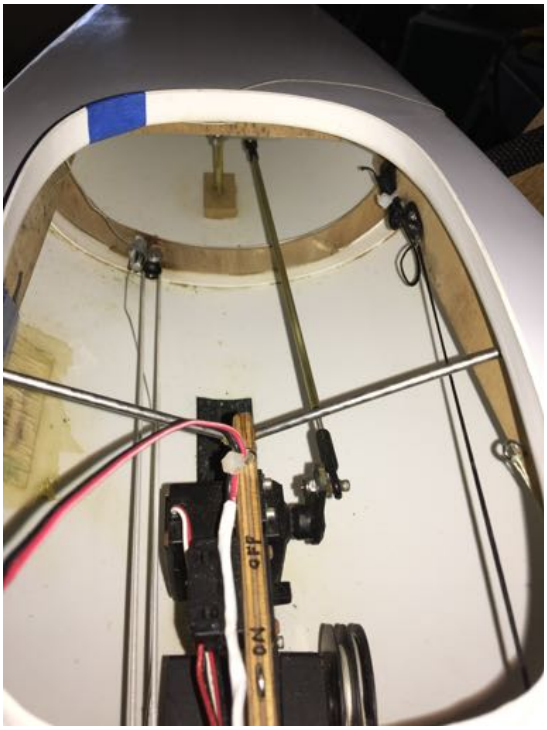
This is a very strong installation without adding a lot of weight, and no cracks in a dozen years.

The rudder linkage is pretty simple. A few pictures below. Not sure what I was thinking about with the brass tube. There is a threaded rod inside. A single 12" stainless threaded rod would be better. The linkage is less than 12" in most Solings so a standard threaded rod will work. A ball link at either end. The steering arm is from Du-Bro, item #166. I changed the set screw to stainless. The threaded rod and ball links are 2-56 size, plenty for Solings. I like using the beveled spacers that come with the Du-Bro ball links. Keeps the friction down. You can see the spacer between the steering arm and ball link in the right side photo below. Note also aircraft nuts (nylon inserts). You don't want to torque down on the machine screws holding the components together. They need to rotate freely.

Note the rudder post has a flat section to grab the set screw on the steering arm. It will provide more grab for the steering arm and prevent the rudder from slipping out of the boat if the set screw starts to loosen. You will get a little warning before you lose the rudder.

Screw the ball links about half way onto the threaded rod. This will provide some wiggle room to adjust the final length to square up the rudder with the keel. Final tuning will be done with the radio, but you want to get it as lined up with the keel as possible. I attached the rudder end of the linkage first, powered up the boat to allow the rudder servo to center itself, then pushed the servo arm lightly onto the servo so that I could easily pull it off, take a couple of turns and re-install to straighten the rudder.

Here's the whole setup. Your radio board will probably be horizontal. I use a drum winch and have all the electronics vertical, but the setup is the same for a conventional radio board lying horizontal in the boat.



Sources of supply and item numbers:

Servo City. Great site for servos, radios and all the connections. I'll refer back to them when discussing sail servos.

2-56 threaded rod item #98847A003.
2-56 Heavy duty ball links item #585706
Hitec rudder servo HS-322 HD.
Super Duty servo arm set. A collection of servo arms that are very strong - worth the $11. Note, the major servo companies have different spline patterns (the gear teeth pattern on the drive shaft). For Hitec, the most common is a C1 pattern. If you order the servo arm set, be sure to specify the correct one. The sail winch to be discussed uses the same pattern.

Tower Hobbies. The mother lode for everything RC. Competitive prices to Servo City. A huge variety of products. Tower has threaded rods and Hitec servos as well.

DuBro steering arm item # LXD 912 - includes the beveled spacers, but plan to replace the machine screw with stainless. When the supplied one rusts, you've got a problem.

McMaster-Carr for stainless rods and tubes.