

WORKING ON YOUR BOAT

by
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A famous philosopher once said:

"You won't need it, until you need it!"

and

"If you have it with you, you won't need it!"

These are just a couple of important phrases to remember when you begin to work on your boat.

"I just bought my boat, why should I think about working on this thing of beauty?" "I bought the boat completely race equipped so that I would not have to do any work on the boat myself." This is the dream of every sailor. However, as you travel around and meet other Day Sailer owners; compete on different bodies of water with varying sailing conditions; inspect the deck layouts of your competitors; lose a couple of races; and repair the foot print that you left in the side of your boat; you realize that individual who rigged your boat knew less about boat rigging than you do. Even if this is your first boat, and you have never held a drill motor in your hands before, by following a few simple basic rules of boat building you will be able to make any modification to your boat to enhance convenience and improve boat speed.

Before we talk about boat building rules, let's list the basic tools that every sailor should have in his tool kit (so he really won't need them).

Open end wrench set: most common sizes are; 5/16, 3/8, 7/16, 1/2, 9/16.
Sometimes you may need 2 of each size.

Socket and ratchet set: the set should have at least the sizes listed above.

The above sets are especially useful when raising and lowering the mast or removing the centerboard for inspection or fairing. They are very useful for installing deck hardware in their new locations.

Screw driver set: Including a large and small flat blade and a large and small Phillips head.

A medium vise-grip pliers

A Kline pliers (heavy duty pliers with wire cutters)

Drill Motor: 1/4 inch (preferably rechargeable)

Drill bits: 1/16 to 5/16 inch in diameter

A small Cable cutter

A micro press vise and sleeves for 1/16, 3/32, and 1/8 Inch cable.

Spinnaker Rip Stop

An assortment of clevis pins

Assortment of stainless steel screws (various size sheetmetal and machine screws with flat washers, lock washers, and nuts).

Silicon sealer such as Boatlife, Loctite, or GE brands.

100 feet of three prong extension cord (at least). We all know how close the nearest electrical outlet is to the boat launching area.

Pop Rivet tool with 1/8 and 3/16 aluminum and stainless steel pop rivets.

If you have at least the items we have mentioned (on shore, not in your boat) you will be able to perform any

modification to your deck layout that you want or make almost any field repair when misfortune strikes while underway.

We have found that we have met a lot of very nice people because we did have these items and we were able to assist when someone needed help to make a repair.

WHAT ABOUT THE BASIC RULES OF BOAT BUILDING?

1. Stainless steel does not like aluminum!
2. Fiberglass does not like any metal fastening!
3. Always back-up high stress connections to the hull!
4. Always use flathead screws or bolts in countersunk holes.
5. Always use round head machine screws or bolts when not using a countersink.

Rule #1: Aluminum and stainless steel are dissimilar metals. When they are placed in contact in the presence of water, especially salt water, a galvanic (battery) action is produced which corrodes the aluminum rapidly and leaves a very weak connection. Always use silicon sealer on screws and pop rivets when making attachments to aluminum parts with stainless steel fasteners. This will prevent this corrosion from occurring.

Rule #2: Metal fastenings have a nasty habit of imposing high local loading on the attachment location. (In this case, the fiberglass.) It is good practice to have flat washers twice the diameter of the bolt, but better still, three times the diameter, under the nut. Another good practice, is to place a thin piece of rubber or a thin layer of silicon sealer between any metal fitting and the fiberglass to act as a cushion between the pieces. This will also help distribute the stress generated around each fastener.

Rule #3: High stress regions of the boat include: The chain plates, mast step region, the area in the transom where the gudgeons for the rudder attach, main sheet and traveler attachments, spinnaker turning block attachments, and the fairlead for the spinnaker pole down haul.

Usually, a piece of 1/4" plywood twice the size of the fitting that you are mounting is sufficient to distribute the load on a Day Sailer. These backups will prevent these fittings from pulling out, at a critical point, in the middle of a heavy air sail.

Rule #4: Flat head screws are designed for use in areas where you don't want a bump from the screw head to interfere with the operation of the fitting or to leave a dent in your bottom from sitting on it. They are supposed to disappear! They are also designed to distribute the load around the complete circumference of the head and not only where the threads end and the head begins. When flat head screws are used where round head screws should be, they usually interfere with the fitting or block, become a major safety hazard causing many minor cuts and sometimes major ones, and WORST OF ALL they catch and tear sails when they are being raised and lowered. We lived the sailors' dream, or shall we say nightmare. We bought our boat "race equipped", ready to go racing, and we still have not been able to replace all the flat head screws and bolts that were used where round heads were supposed to be.

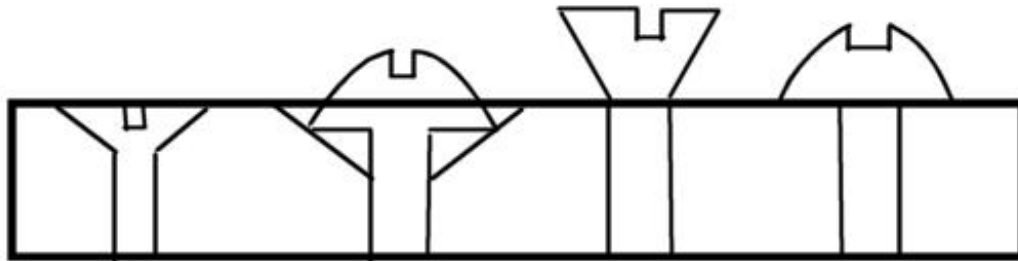
Rule #5: Round head screws or bolts should be used any time you have a flat surface for the head of the screw to rest against. DON'T place a round head screw in a countersunk hole. You will have insufficient material left to hold the fitting properly and it will most likely pull out.

Rule #4

Rule #5

Countersunk Fasteners

Flat Surface Fasteners



Correct

Incorrect

Incorrect

Correct

Before you begin to work on your boat, there is one other bit of information that you should know before you ask the person at the chandlery for a screw or bolt. You must know how to describe what you want. Most of the time you will ask for a #10 wood or sheet metal screw. You might also ask for a 10-24 x 1 1/2 stainless steel machine screw with a #10 lock washer, a #10 flat washer, and a #10-24 nut. Lets look at what we just asked for. What is a #10 whatever?

Bolts and screws manufactured in the USA are measured in 1/64 inches. This is standardized. So instead of listing a lot of fractions on the screw boxes, they just use the numerator of the fraction. Therefore, a #10 whatever is a screw that is 10/64 inch in diameter. This can also be listed as 5/32, which may be the case when buying a drill bit. What does the 24 in 10-24 x 1 1/2 mean? The second number is the number of threads per inch of length of bolt. The 1 1/2 is the length in inches that you need to complete your job. So, a 10-24 x 1 1/2 is a machine screw that is 10/64 inches diameter; with 24 threads per inch; that is 1 1/2 inches in length. These definitions hold true whether you have a 4-40 x 1/2, 6-32 x 1/2, 8-32 x 3/4, or 10-24 x 1-1/2. The only variation is when you increase in size to machine bolts. These begin at #16. At this point we change to the actual fraction plus the # of threads per inch. For example, 1/4-20, 5/16-18, or 3/8-18. The length will vary with the location where it will be used. They may also be called cap screws. The last size, 3/8-18, would probably be used on our trailer and not on the boat.

This month we have discussed tools, rules, and fasteners. (I know it doesn't rhyme, oh well!) If you follow the basic rules and use the correct tools, you can make any modification to your boat that will be less likely to fail. Also, remember how to describe the fasteners that you need, this will make life much easier for you and the sales person.

This is a new venture for us. We intend to write articles about working on boats from stem to stern, bilge to masthead fly. If you like the idea and the information that we have given you, or if you would like to know how or where to place a piece of hardware, drop us a line and we will share ideas. Send your letters to Grant and Marta Day, 189 Winthrop Drive, Cheshire, CT 06410

If we make a mistake, remember this is an art not a science.

Next issue we will be talking about how to mount blocks that need to be bolted through the deck. Starting in late April, if the ice melts, we hope to see you on the course.

Until then, keep the wind at your back!