

## **Greg Cowens' \$10 PVC Roller Reefing for CP-16's** by *Greg Cowen*

Below are the instructions to build a roller-furling unit for under \$10. Read the entire process before beginning the project.

### **Materials:**

- 2 10' sections of 1/2 inch schedule 40 PVC
- 5 1/2" PVC coupler for each hank (Compac 16 usually takes 5)
- 6 1/2" PVC end caps
- 2 1/2" PVC four way couplers (+)
- 2 SS washers (hole size should be the same measurement in step #3 of the top end cap assembly)
- 2 Aluminum spacers (1/2 x 1/2 with a 1/4" hole in the center)
- 20' of 1/4" line

### **Tools:**

- 1 PVC cutter or saw
- Small containers of PVC primer and glue
- 1 Round wood file 3/8'
- 1 Drill and 1/4" drill bit (may vary depending on the stay hardware size)

### **Variables, for a Com-Pac 16:**

- Length of the stay from turnbuckle to turnbuckle
- Outside diameter of the smooth area, just before the threads start on the turnbuckle.
- The size of the end cap hole and the SS washer depend on this dimension. Fit as snug as possible to reduce wear.
- Distance between each hank.

**Procedure** (DRY FIT ALL PIECES IN THE FOLLOWING STEPS, DO NOT GLUE):

### **Roller tube assembly:**

Stretch out jib snugly and measure the distance between each hank from center to center. (This is very important for a tight fit).

Start out with a 2' section of PVC with a 1/2' coupler attached. (THIS WILL BE THE TOP OF THE ASSEMBLY)

With the measurements from step 1, cut the next section of PVC to line up with the second hank.

At this point you should have a 2' end section - a coupler - another pre-measured section - and another coupler. The center of each coupler to the center of the next should be the exact measurement of the hanks.

Continue this process until there is a coupler for each hank, and approx 2' of excess PVC out each end.

Using the wood file. Start in the middle of the PVC coupler and slowly file it down (horizontally) until a hole begins to develop in the PVC pipe.

At this point file vertically into the pipe to make a hole about 1/2' X 3/8" in size. This hole has to be just big enough for the hank to enter the pipe. Repeat this process until all are cut in the same location.

### **Top end cap assembly:**

From the top hank of the sail, measure to the end of the sail, or to where the jib halyard would be attached.

Add 3-4 inches to this measurement and cut the top of the PVC to this overall measurement. (should be about 8").

Measure the diameter of the smooth area of the turnbuckle on the front stay. (area right before the threads).

Drill a hole that size directly in the center of the PVC 1/2" cap (drill both caps at this time).

Attach cap to the top of the tube assembly.

At this point you have a long tube of PVC with an end cap at one end and a coupler at various lengths that match up with each hank for your sail. Nothing is glued at this point.

### **Spool for reefing line** (feel free to improve on this method and let me know what you come up with!!):

Using the two four way couplers and a small scrap of 1/2" PVC, (to attach two couplers together, use a scrap of PVC approx 1 1/2 "- 2", and glue the pieces together.)

Dry fit the two couplers so they are oriented "opposite of each other". This will be the

spool for the reefing line.

At this point you will have two four way couplers attached together rotated 90 degrees from each other.

Using scrap PVC and four end caps, Attach end caps on all of the four way coupler ends.

This completes the spool assembly for the roller. If all pieces fit flush and tight together without the scrap PVC visible, glue assembly together at this time.

### **Bottom section between the bottom hank and the spool:**

As in step 1 and 2 of the Top end cap assembly, measure from the bottom hank to the end of the sail.

Add 3-4 inches to this measurement and cut PVC.

Attach the tube assembly to the spool assembly.

### **Attaching tube and spool assembly to the end cap:**

Using another scrap of PVC, attach the end cap (previously drilled) to the bottom of the spool.

Now we have the completed tube and spool with an end cap at each end. The overall length of the assembly must fall within the measurement of the front stay from end to end less the length of the spacer and washer. This gets confusing to describe in words but the front stay will run through the tube assembly and when installed will rotate on the smooth area of the stay. The length of the assembly will have no more than 1/2" of play if you slide it up and down.

(\*\*\*) The space between each hank cannot change. The spaces between the top hank and the cap, the bottom hank and the spool, and the space between the spool and the bottom cap can be adjusted for a proper fit to the stay.

Only the spool is glued together at this time.

**Trial fitting the assembly to the front stay** (Mast is not stepped and is in the cradle):

Remove the turnbuckle from the bottom end of the stay. Note how far this was screwed down.

Slide on the aluminum spacer first, followed by the SS washer. (These parts do two things. Protect exposed threads on the stay, and acts as a bushing for the end cap to spin against.)

Now slide the entire assembly on to the stay until it butts against the top.

Guide the stay through the end cap at the bottom.

Slide on the last SS washer and then the last spacer.

Replace the turnbuckle to the end of the stay to the same place it was prior to this step.

If everything is the right size the entire assembly is on the stay, with just a small amount of play from end to end.

Too loose??? - increase the length of the assembly by one of the methods listed above. (\*\*\*)

Too tight??? - reduce the length of the assembly by cutting the PVC at the areas listed above. (\*\*\*)

When assembly spins freely on the stay with a small amount of end to end play, Remove and GLUE EVERYTHING together. (Note: When gluing PVC together, Be sure to push firmly together until the glue sets (5 seconds), or the parts will not seat together and will affect your measurements.)

Rotate the assembly on a flat surface so that the hank holes are facing away from you.

Looking at the top cap, try and drill a 1/4" hole through the cap above the halfway point on the same side the hanks are cut.

At the bottom of the assembly and the top of the spool (four way coupler). Drill a hole oriented the same way as the top.

Run a 1/4" line through the holes, to later be attached to the sail.

Drill a 1/4" hole on one of the "arms" of the top part of the spool, at the point where the cap and coupler are joined, for the roller reefing line.

Install assembly back on the stay.

Clean up assembly by lightly sanding or using acetone to get the "finish" you like.

### **Installing the Sail:**

Re-attach the assembly on the stay and ensure everything fits properly.

At each of the couplers you will see the wire of the stay thru the hole in the coupler. Insert the hanks into the opening and around the stay as you normally would do.

Continue until all hanks are secure and the two ends of the sail are free. Each end of the sail does not extend beyond the top cap or the spool.

With the line at the top cap and the top of the spool. Attach the ends of the sail and tighten to your preference.

At this point you can see how the sail can be rolled around the assembly with little effort. Good job!

Leave sail rolled up for the next steps

### **Completion:**

Prepare the boat to step the mast. As you step the mast, you will notice the extra weight, and stiffness of the furler.

Attach the stay as normal and verify that the proper tension is achieved.

Ensure there is still play in the assembly by a slight up and down movement, and everything spins freely.

Now, run the long line from the top part of the spool down the port side of the boat to the cockpit.

Stand to the side of the assembly and find a place to attach a pad eye to achieve a 90 degree angle from the assembly to ensure the line will roll properly. In my case, I attached a pad eye to the base of the pulpit.

Attach the sheets to the sail and wrap them around the assembly about three times before running aft.

The roller furler line should not be wrapped around the spool at this point.

While holding a small amount of tension on the furler line, pull out on the sheets.

The furler line will spool up as the sail comes out.

To roll in, release the sheets and pull on the furler line and tie off.

To stop the sail at any point in between, just tie off where desired.