



## **Trogear Bowsprit Through Hull Installation Manual**

**Congratulations on your purchase of the Trogear Bowsprit** which can be installed on most sailboats. The through hull installation is not a complicated process, but it does require careful measurements. ***Please read the instructions thoroughly first, and if in doubt contact us or your boat rigger with any questions.***

Keep in mind that these instructions present the basic process. As each boat is designed differently, your boat may require specific installation modifications. Again, please consult your rigger if in any doubt, and you may decide that it is best to have your rigger install the Bowsprit for you.

**NOTE:** *If you are not able to install our bowsprit using this method, our side mounts or deck mounting solution might be right for your yacht. Custom options are also possible and we can work with you to devise a suitable method for your yacht. See our website or contact us for details.*

### **Materials and Tools Required**

- Masking Tape
- Marker or pencil
- Tape measure
- Drill motor
- Pilot drill bit and 1 inch drill bit
- Round or rotary file
- Structural Epoxy –West System Six10 or similar
- Isopropyl alcohol or acetone
- Vinyl gloves
- Paper towels
- Sandpaper grid 60
- Blue Loctite
- Safety Goggles

### **Parts for the Adjustable Bobstay Attachment (not included )**

- 5/16 Dyneema (The bobstay purchase is 2:1. Measurements are specific to each boat)
- U Bolt for Bob stay attachment (*consult your rigger or sailmaker to determine the working loads for your boat*)
- Low friction rings, Stainless steel rings or blocks
- Bungee cord (*Recommended from Davis - MiniShockle™*)
- Preventer Dyneema (Safety feature)

## OVERVIEW

The bowsprit is attached to the boat via a removable shaft connecting the bowsprit ends. The shaft rotates inside a transversely mounted Fiberglass tube (Hinge tube).

The Hinge tube is permanently bonded to the hull with structural epoxy such as West System Six10 or equivalent. The installation is similar to other through hull installations such as depth sensors, through valves, etc.

In some cases, depending of the construction (cored hulls) or thickness of the hull, the area surrounding the Hinge tube should be reinforced by adding layers of Fiber Glass or Marine Grade Plywood from inside. (*Consult your rigger or contact us if in doubt*)

**Due to the high compression forces that the bowsprit can generate, each Hinge tube end should not protrude past the hull more than  $\frac{3}{4}$ ".** If the hull is narrow, such as on a trimaran, the Trogear Side Mounts or external structural spacers are a viable solution. Please contact us with any questions.



**Important:** Before installing, do a dry fit of the bowsprit. Be sure that the bowsprit can move up freely and not hit the sides of the boat, bow roller or a rub rail if relevant. Additionally, be sure there are no obstructions below deck in the area.

(Fig. 1 & Fig 2)



Fig. 1: Inside the hull is clear



Fig. 2: Inside the hull showing the Hinge Tube installed

## INSTALLATION PROCEDURE

### A) Determine the Location of the Through Hull Holes for the Hinge Tube:

**Note:** Keep in mind that for the strongest attachment, the position of the tube should be as close to the deck hull joint as possible. Make sure the Hinge tube is low enough to not interfere with the deck.

1. First, determine the vertical distance from the deck for the center of the Hinge tube hole. Place masking tape below the deck on each side of the bow in the area where the tube will be installed. This protects the hull finish and is for temporary markings. **(Fig. 3)**
2. **Horizontal location of the Hinge tube:** Align the Bowsprit symmetrically with the Bow and have the ends touching the hull. Insert a marker in the Bowsprit Shaft attachment holes and mark the Hinge tube locations. **(Fig. 4)**  
*(This is best accomplished with a helper)*
3. The location of the Port and Starboard hole should be symmetrical. Check by comparing the distances using a piece of non-stretching line attached to the headstay or other method as appropriate. *(Adjust the hole center locations if necessary)* **(Fig. 5)**



**Fig 3:** Tape below the deck.



**Fig 4:** Use the Bowsprit to determine placement.



**Fig 5:** Using non-stretching line attached to the headstay, or other method as appropriate, check that the distances you marked are the same on each side of the boat.



## B) Drilling Holes for the Hinge Tube:

NOTE: You may cover upholstery or other parts inside against debris

1. First, drill a pilot hole through the hull on each side. The hole should be horizontal and perpendicular to the boat's longitudinal axis. (Fig. 6)
2. Next, using a 1" step drill, drill the holes for the tube. (Fig. 7)
3. Fine-tune the holes with a rotary or round file until the Hinge Tube can be pushed through. For the best results, the gap between the Hinge tube and opening should be approximately 0.01". (Fig. 8)



Fig 6: Drill a pilot hole first.



Fig 7: Drill holes using a 1" step drill.



Fig 8: fine tune holes with a rotary or round file.

## C) Bonding Hinge Tube to the Hull:

1. Mask area around the holes leaving about ¼ " exposed for epoxy fillet. (Fig. 9)
2. Mask the Hinge tube ends to prevent the epoxy from entering the tube. Clean area surrounding the drilled holes and Hinge Tube ends with alcohol or acetone and lightly sand with 60-grid sandpaper. Blow out the dust and don't touch.
3. **For Yachts with cored hulls:** reinforce the area by removing at least ½" of core surrounding the hole and filling it with West System 404 High Density Adhesive Epoxy Filler or similar. After the epoxy cures, make sure the tube will fit and has a proper gap of approx. 0.01". Fine tune the hole as needed. (see B 3 above).

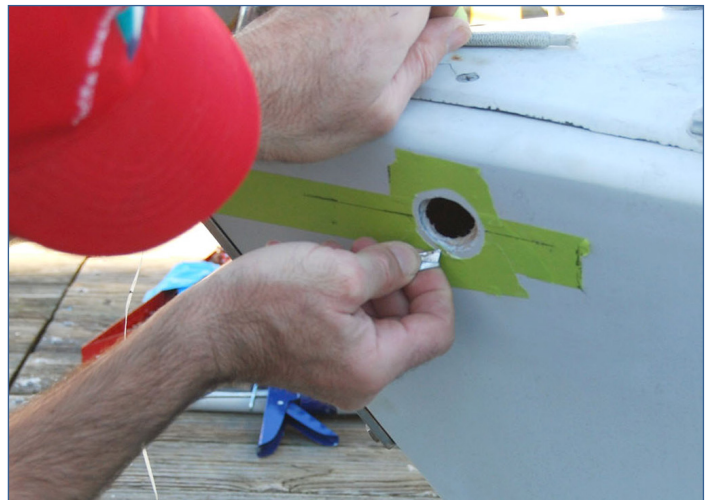


Fig 9: Leave about ¼ " exposed for epoxy fillet.



4. **If for some reason the Gap between the Hinge tube and Hull opening is too large (more than 0.05"):** Mix epoxy and completely coat the drilled holes, working the epoxy into the surface. After the epoxy cures, trim any excess epoxy from the holes with a round or rotary file. For the best results the gap between the Hinge Tube and opening should be 0.01"

5. **Applying Thickened Structural Epoxy onto the holes and bonding the tube:** Mix Epoxy and completely coat the drilled holes, working the epoxy into the surface. Coat about 2" of the Hinge Tube end and insert it into the previously coated hole and slide it in about a half of its length. Next, also coat about 2" of the protruding tube end and push and rotate the tube at the same time until it protrudes from the opposite opening. Move and rotate the tube back and forth, and if necessary add additional Epoxy, to make sure that there is a proper bond without voids or gaps. (Fig. 10 ) Then, center the tube so that both ends protrude an equal distance from the hull; you can form a fillet around the tube/hull locations at this time. (Fillets around the tube could be added later once Epoxy cures). **Remove the tape before the epoxy dries.**

**NOTE: There must be no voids or gaps between Hinge Tube and Hull.**



Fig 10: Make sure that there is a proper bond without voids or gaps.

#### D) Install a Bobstay U Bolt:

The Bobstay is attached on one end to the tip of the Bowsprit and is routed to a U Bolt attached to the bow. To further decrease bobstay friction during adjustment, a low friction ring can be inserted inside the U Bolt, as shown here. (Fig. 11)

Select the U Bolt based on hull thickness and choose a Marine grade Stainless Steel with minimum working load based on your sails and intended bowsprit use. (Most boats should be fine with 5/16" U Bolts). The angle of the Bobstay is important. For a best load distribution, it should at least 45 deg. when the Bowsprit is in a horizontal position.

(IMPORTANT: *Code 0 type sail generates forces on bobstay twice as high as an Asymmetrical Spinnaker*) – if in doubt, consult your rigger or sail maker.

Install the U Bolt following the manufacturer's instructions.

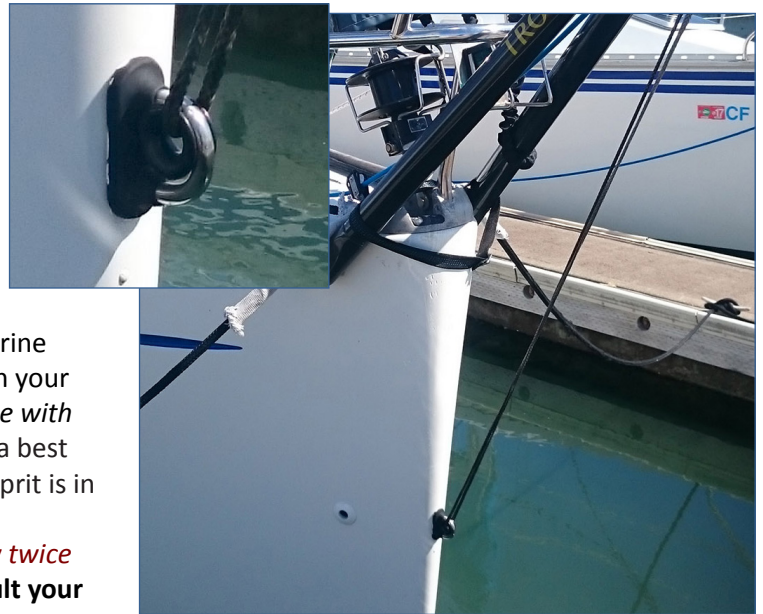


Fig 11: U Bolt attached to the bow.

#### E) Attaching the Bowsprit:

**Note:** This is best done with a helper but with a little skill it can be done alone too.

1. Align the Bowsprit tube end hole with the Hinge tube hole and slide the Hinge shaft into the tube. Use 5/16 bolts, threads coated with a blue Threadlocker or equivalent and washers to secure it in place. (Torque 130 in-lbs)
2. If the Bobstay rigging and Stop strap and Bungee are not in place yet, temporarily secure the bowsprit in place with a line. (Fig. 12)



Fig 12: Temporarily secure the Bowsprit with a line

## F) Rigging the Bowsprit:

There are many ways to rig the Trogear Bowsprit. (For more rigging details, see our rigging example section online).

### 1. Permanently Fixed Bowsprit:

The simplest rigging is when the Trogear Bowsprit is used in a permanently extended position without the need for adjustment. Use a fixed length Bobstay with one end attached to the U Bolt and the other attached to the tip of the Bowsprit.

### 2. Adjustable Bowsprit – hinged attachment:

The Trogear bowsprit's main design feature is the hinged attachment, which allows it to rotate up and down. We recommend a 2:1 Bobstay purchase with the control line leading to a clutch and winch in the cockpit. This allows you to take full advantage of our unique design and adjust the sail luff tension or bring the Bowsprit to an upright position (for stowing or changing sails only) (Fig. 13).

**IMPORTANT NOTE:** The Trogear Bowsprit should be close to a horizontal position when flying the sails. See our use instructions enclosed with your purchase or online for more details.

A **Bungee cord** can be used to hold the Bowsprit in an upright position or pop it up when the bobstay is released (similar in function to a Pole Topping lift). We recommend the MiniShockle™ from Davis but others can be suitable as well. (Fig. 14)

**Safety Measure:** A method of preventing the bowsprit from pivoting down past a predefined angle is needed in the event the sail drops to the water.

**Preventer Dyneema:** The preventer should be made from Dyneema and attached to the headstay toggle and the lower friction ring at the tip of the Bowsprit. The length of the Dyneema should be such that the sprit does not drop past ~20deg of horizontal when under tension. Think of it as an inverted bobstay or a topping lift on a spinnaker pole. (Fig. 15)

*See next page for more rigging details.*



Fig 13: Bowsprit in upright position to attach a furler.



Fig 14: Showing Bungee Cord and Stop Strap.

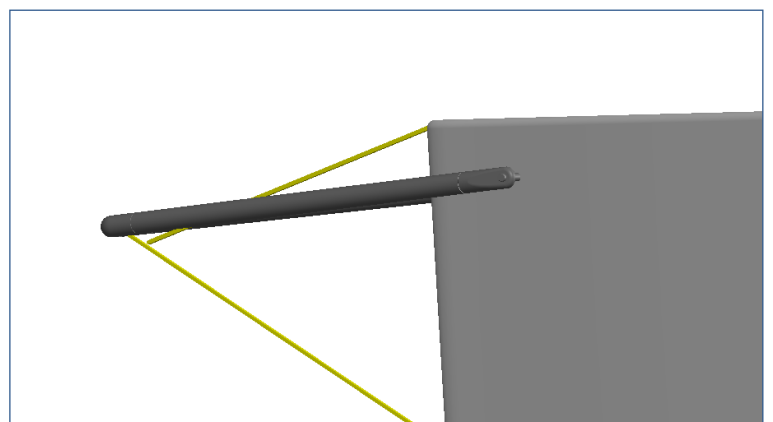
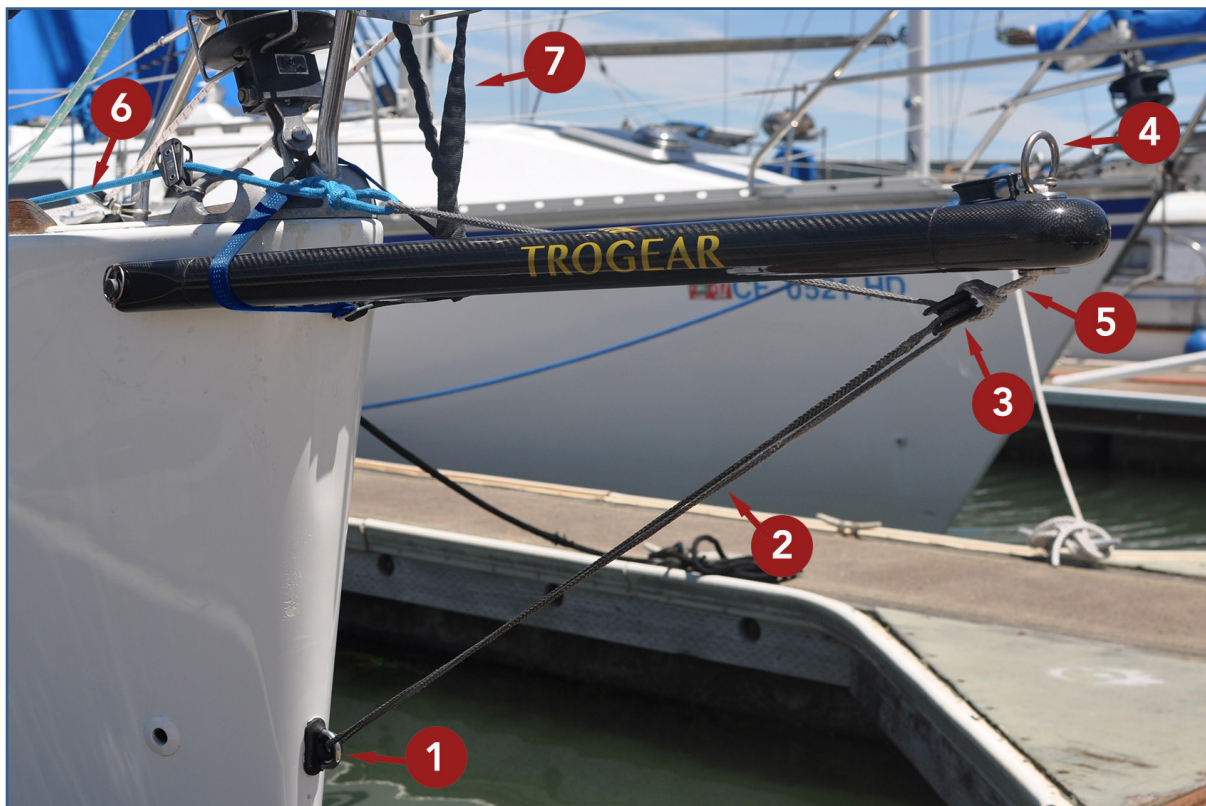


Fig 15: Preventer from Dyneema



**Rigging Example:** (each yacht owner can configure the rigging that is most suitable for their needs.)



1. U Bolt (shown here with low friction ring)
2. Bobstay Dyneema - 2:1 purchase
3. Low friction ring
4. Stainless steel ring for furler attachment or with block for tack line
5. Dyneema loop lead through the bowsprit bushing connects stainless steel ring (#4) and low friction ring (#3)
6. Bobstay control line led through a clutch to a winch in the cockpit.
7. Bungee cord

1. Furler attached to stainless steel ring.
2. Block for tack line
3. Bobstay Dyneema

