CSC dinghy repair manual

Michael Sulkis

Useful links and videos

Rigging manual for Quest, Toura, Venture

https://www.rssailing.com/wp-content/uploads/guides/RS_QUEST_RIGGING_MANUAL.pdf

https://www.rssailing.com/manuals/rigging-guides/RS-Toura-Rigging-Guide-MASTER-DO-NOT-DELETE.pdf

https://www.rssailing.com/manuals/rigging-guides/RS-Venture-S-SE-Rigging-Manual-MASTER-DO-NOT-DELETE.pdf

How-tos

Installing rivets: https://www.youtube.com/watch?v=h-vyFI1ia2M

Removing rivets: https://www.youtube.com/watch?v=rZTAQ8jCep4

Sail repair https://www.youtube.com/watch?v=Ob7jQbZhPsE

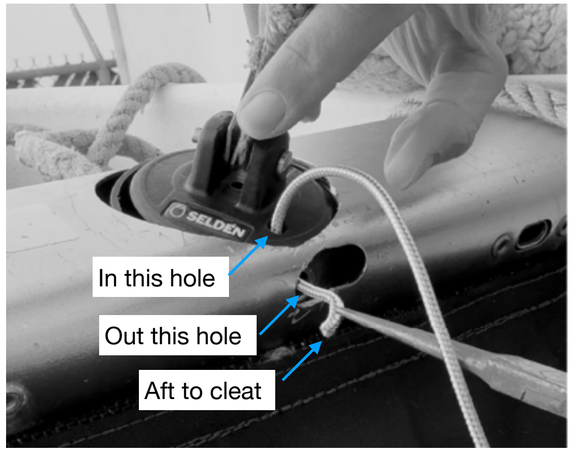
Installing deck hardware https://www.youtube.com/watch?v=L-Y0cIS6fSA

Jib furling line replacement

Common problems: fraying, breaking, irrecoverably fouled and cut

Procedure:

1. Remove the old furling line, save the stopper ball from the cleat end.
2. Unfurl the jib and tension the rig
3. Cut a new length of 3mm line from the spool. Approximate lengths for each boat are: Quest: 10 feet, Toura: 12 feet, Venture: 14 feet.
4. Thread the new line through the small hole in the top of the furler.
5. For Selden S20 furlers, feed the line out through the hole in the drum cover. A wire “fishhook” is helpful for this step. For Harken furlers, feed out through the fairest gap in the drum aimed at the furler cleat to avoid chafing. Tie a stopper knot on the end coming out of the top of the drum.
6. Charge (re-wind) the furler.
    6.1. With the jib still unfurled and rig tensioned, remove the jib sheets from their cleats and coil for easy handling. Rotate the jib around the forestay. This spins the drum and winds up the furling line. Have a helper keep some tension on the furling line so it winds tightly on the drum. Make about 8-10 revolutions.
    6.2. Check that enough line has been charged by releasing the sail and pulling the furling line for a test furl. Keep tension on the sheets. The jib should furl completely, the sheets wrapping 1-2 times is OK, but too many wraps will keep the sheets from reaching back to their cleats. If the jib does not furl completely, go back to step 6.1 and charge more line.
7. Run the furling line aft, through its fairlead (Venture) and through its cleat. Feed the stopped ball onto the line and tie a stopper knot.
8. Rerun the sheets to their cleats.
9. Test unfurl and furl.



Threading new line


Charging the drum


Finished furling

Harken 165 Furler



Selden S20 Furler



Building a new tiller extension

Common problems: snapped pole, cracked/worn out universal

This procedure uses power tools that can cause serious injury if used improperly. Don’t risk it. Ask for help if you need it.

Materials:

- 2 meter long carbon-kevlar tube (in the south west corner of the workshop)
- 5/8" rubber crutch tip (bag of white ones in dinghy parts container on Quest sails shelf)
- Aluminum tubing, preferably from old aluminum tiller extension, 5/8" OD by 1/2" ID
- G-flex 655 epoxy (sold as kit of two 4 oz tubes, part no. West Systems 655-8)
- Ronstan RF3133 tiller extension universal (includes pin and heat shrink and tiller mounted socket)
- 10-24 x 1-1/4" stainless phillips pan head machine screw, nylock nut, two #10 washers

Tools:

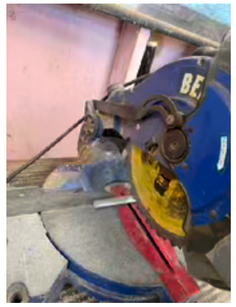
- chop saw preferably with diamond blade for kevlar tube
- Regular chop saw for aluminum tube
- 3/16" drill bit and drill
- 3/8" wrench and Phillips #2 screwdriver
- cardboard sheet and disposable brush or popsicle stick to mix epoxy (windsurfer boat repair locker)
- propane torch or heat gun to shrink heat shrink (torch is in the flammables cabinet)

Day 1:

1. Cut carbon-kevlar tube in half (1meter)



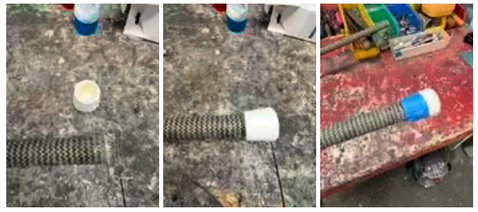
2. Cut a 3” length of aluminum tubing



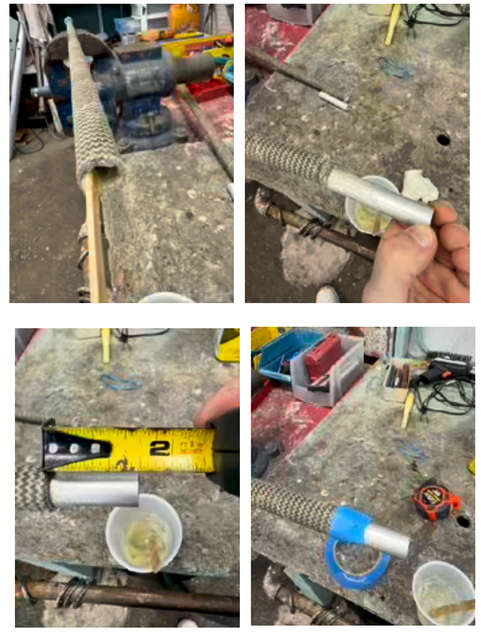
3. Prep surfaces for gluing
   - 3.1. Clean the outside of one end of the kevlar tube with acetone — this is for the crutch tip.
   - 3.2. Clean the inside of the crutch tip with acetone
   - 3.3. Clean the inside of the other end of the kevlar tube with acetone — this is for the aluminum tube.
   - 3.4. Clean the outside of the aluminum tube with acetone
4. Thoroughly mix G-flex epoxy 1:1 by volume
   - 4.1. Make about a tablespoon per tiller extension.



5. Coat inside of crutch tip and the crutch tip end of the kevlar tube with mixed epoxy. Push the crutch tip onto the tube. Spin a few times to spread the glue. Clean any excess with a paper tower. Wrap with blue painters tape to secure while curing.



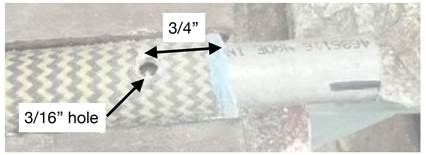
6. Coat the inside of universal-holding end of carbon-kevlar tube, outside of one half of aluminum tube, insert aluminum tube halfway into carbon-kevlar tube and secure with blue tape.



7. Place assembly into a quiet corner to set epoxy overnight.

Day 2:

8. Next day or later: remove blue tape, drill a 3/16” hole for screw through carbon-kevlar tube and aluminum tube about 3/4" from end of carbon-kevlar tube.



9. Disassemble tiller extension package, separate out pin and heat shrink, discard tiller mounted socket unless needed for new tiller, place snap-on cover over universal, slide heat shrink tubing over carbon kevlar tube.
10. Push the universal into the aluminum tube — you may need to sand off the rubber ribs or lubricate with water. Drill a 3/16” hole about 3/4” from the end of the aluminum tube. May require repeated drilling to remove all of the rubber.



11. Insert pin. Use pliers and a hammer to get it in.



12. Slide heat shrink over the pin and use a heat gun to shrink it.



13. Put a dab of nylok on the first few threads of the screw. Install with washers and nut through the hole in the kevlar tube. It’s finished!

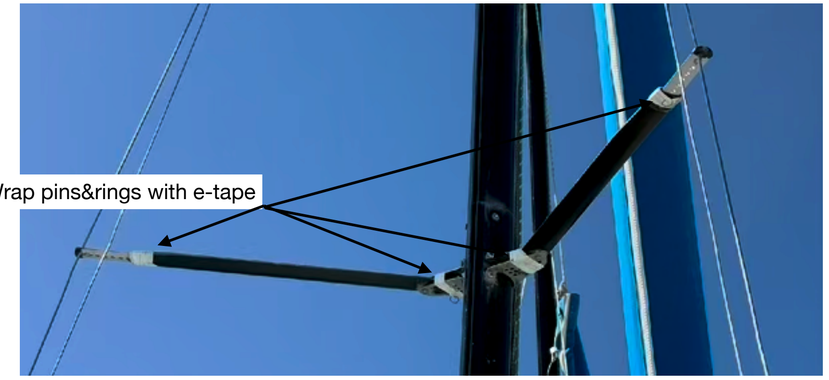


Replacing Spreaders

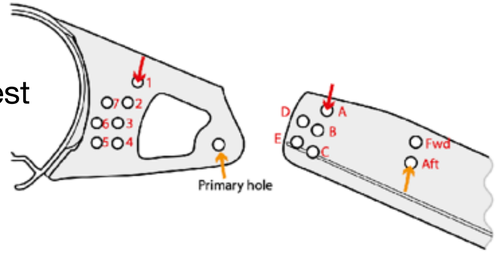
Common problems: snapped, bent

Procedure:

1. Roll the boat to the green “grass” by the hoist, use the hoist to lift the boat off the trainer, or with helpers slide the boat onto the grass
2. Pull the boat over on its side using the shrouds or trapeze wires. Use a cooler with a PFD to support the masthead off the ground, or have a helper hold it.
3. Remove the old spreaders, they are held in with clevis pins and split rings.
4. Loosen the screw on the tip of the spreader to unclamp the shroud.
5. Install the new spreaders, aligning the holes according to the figures shown on the right. It is important that the correct pattern be used for each boat so the spreaders are raked properly. Install pins with the heads on top and the rings on bottom. Wrap electrical tape around each.
6. Reload the shroud into the spreader end. It is important that the spreader end be oriented in the correct forward/aft direction, and be extended to the correct length. See figures.
7. Pull out the slack in the shroud between the tang on the mast and the spreader, then tighten the spreader end clamping screw.

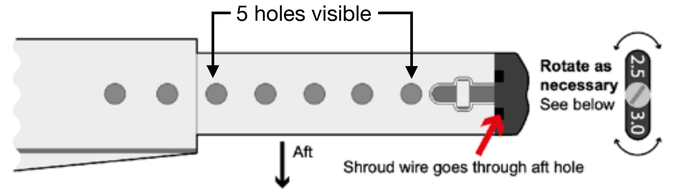


Quest



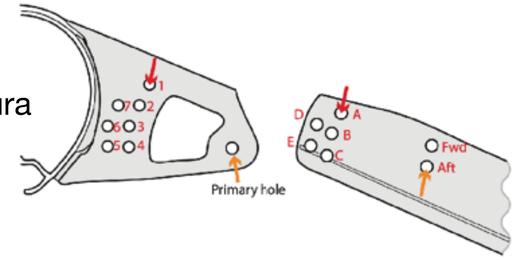
The Primary pin fits through the bracket's **primary hole** and through the **aft hole** in the spreader.

The Adjuster pin fits down through **hole 1** in the bracket and **hole A** in the spreader.



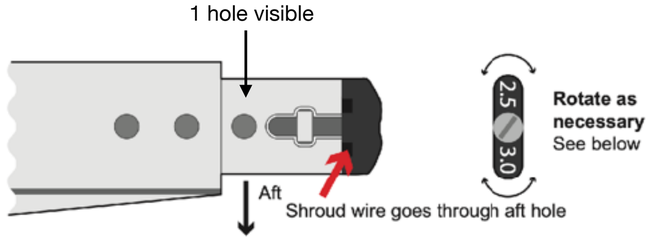
Quest uses 3mm wire, so the 3mm slot should be used in the **aft** position

Toura



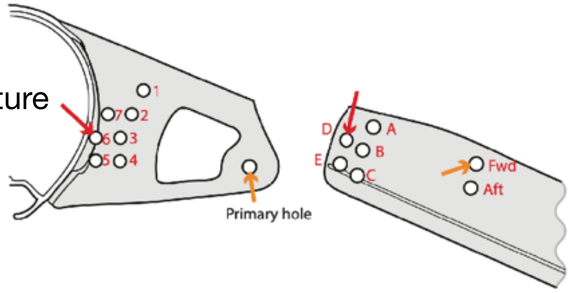
The Primary pin fits through the bracket's **primary hole** and through the **aft hole** in the spreader.

The Adjuster pin fits down through **hole 1** in the bracket and **hole A** in the spreader.



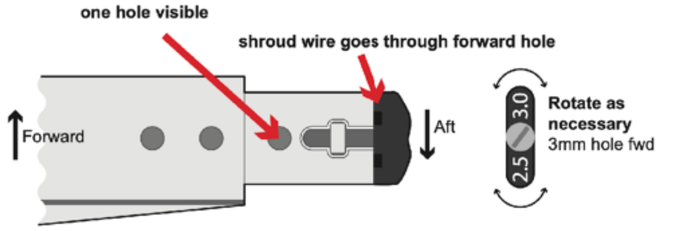
Toura uses 3mm wire, so the 3mm slot should be used in the **aft** position

Venture



The Primary pin fits through the bracket's **PRIMARY HOLE** and through the **FORWARD HOLE** in the spreader.

The Adjuster pin fits down through **HOLE 6** in the bracket and **HOLE D** in the spreader.



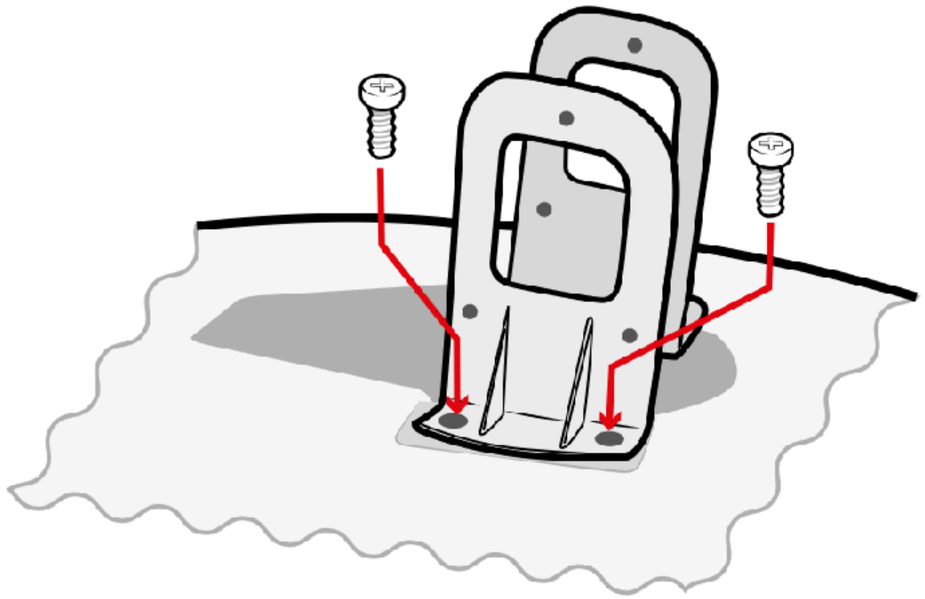
Venture uses 3mm wire, so the 3mm slot should be used in the **forward** position

Replacing the mast head float

Common problems: leaking

Procedure:

1. With the boat on its side or with the mast lowered, remove the old masthead float.
   It is held on with 4 bolts on Quests and Touras, and 6 bolts on Ventures
2. Install a new float
3. ReInstall the bolts, tighten.



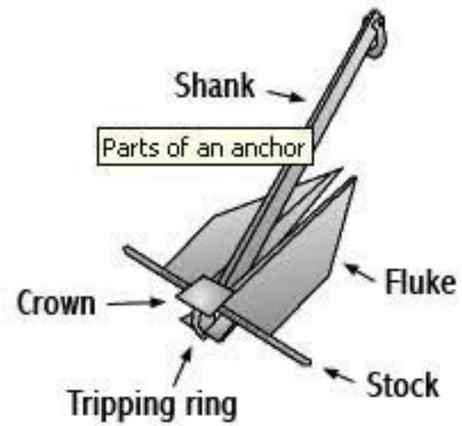


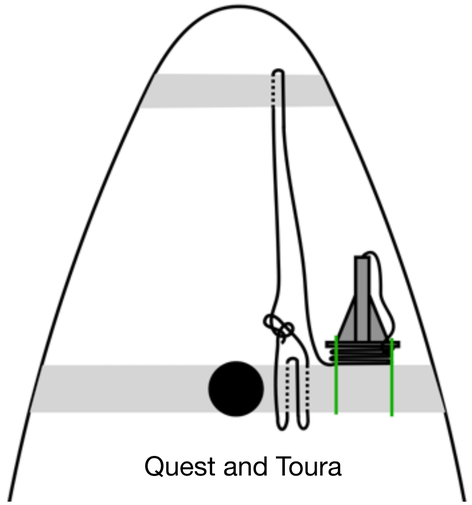
Replacing an Anchor

Common problems: lost, rusted out

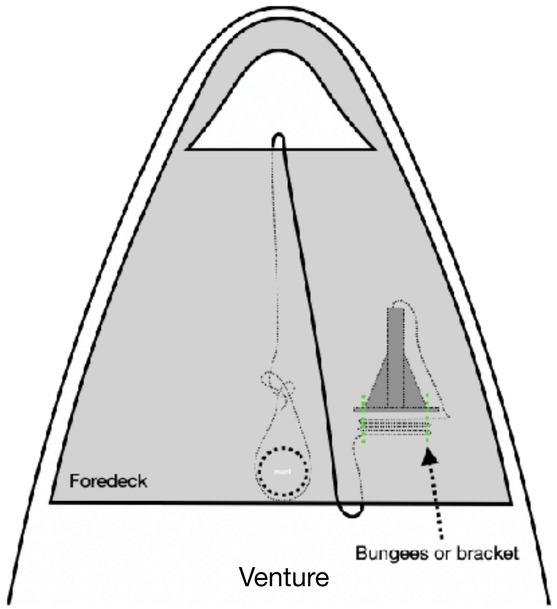
Procedure:

1. We use Danforth anchors because we have a mud bottom.
2. The anchor usually comes with a length of chain attached to the anchor shank with a shackle, and the pin should be moused with wire, line, or a cable wrap.
3. 50ft of 3 strand line is attached to the shackle with a crown splice. If you do not know how to do this then ask someone who does. It is critical to get this right.
4. The anchor is always rigged on the starboard side (so the flukes don't tear the gennaker bag on port). The stock is inserted into bungees on the thwart (the bar supporting the mast) and secured with other bungees if necessary. The line should be attached to the thwart with two turns around the thwart and a bowline or ideally a double bowline. The anchor line should run from the thwart under the tack bar on the starboard side and back to the anchor, free and clear of other lines, like jib sheets and the jib furling line.
5. Coil the anchor line and stuff it under the bungees. Do not tidy it up in any way, like wrapping parts of the line around the coil, as this will make it difficult to deploy.

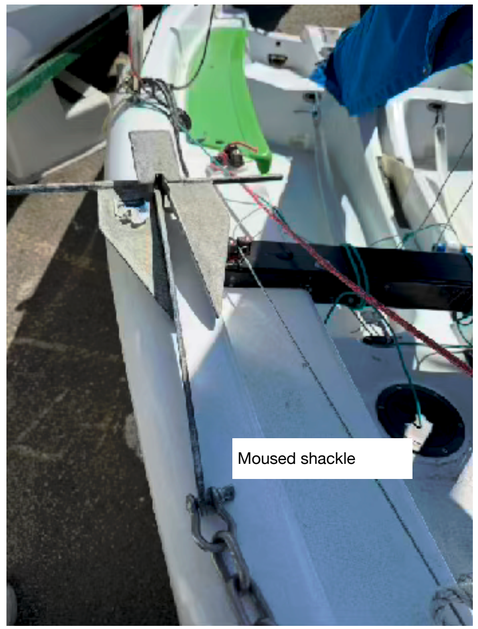


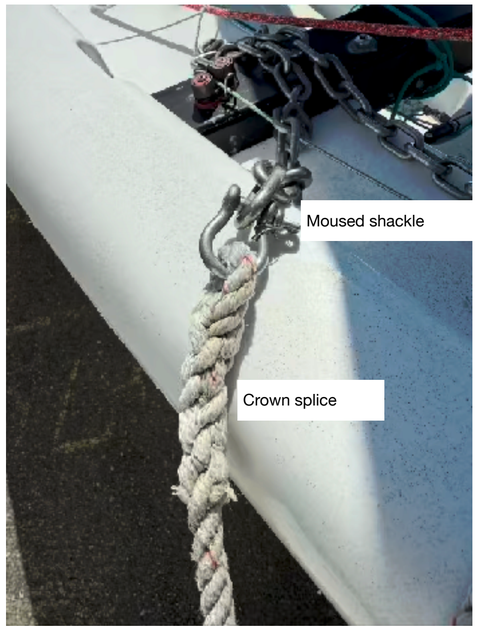


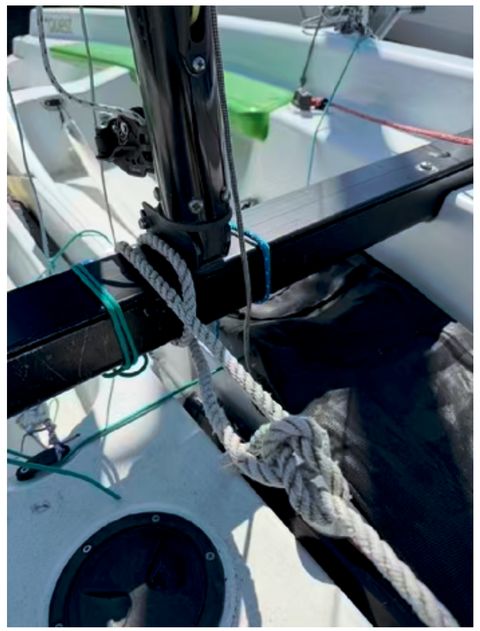
Quest and Toura



Venture







Two wraps around the thwart and a bowline



Properly stowed

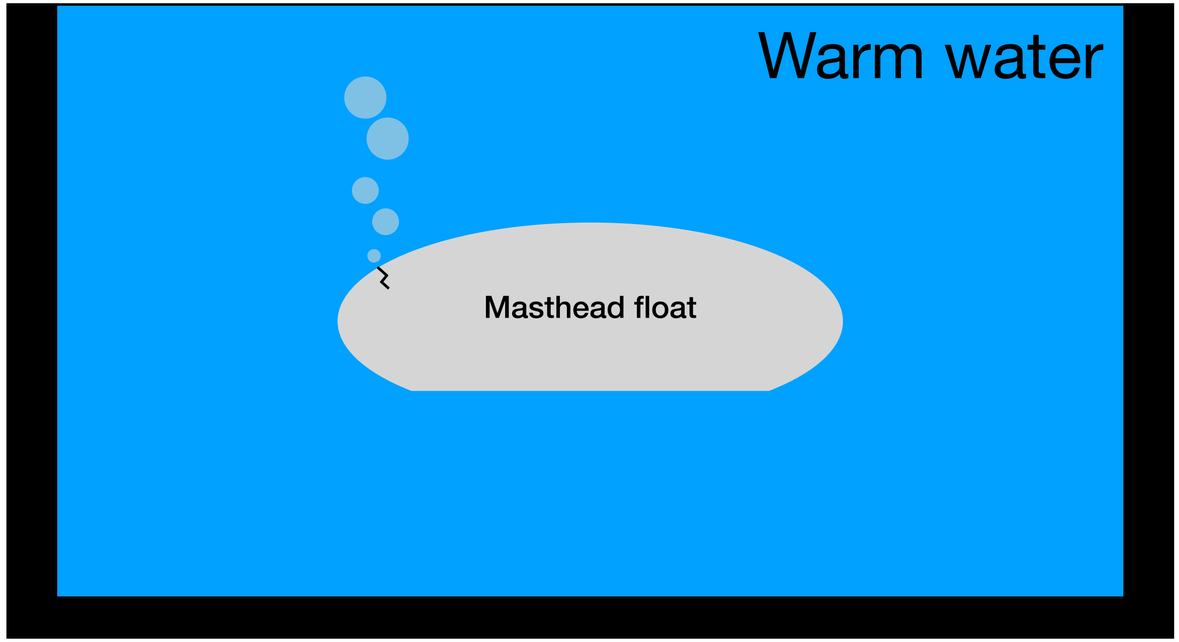
More detailed document from John B. https://docs.google.com/document/d/1rueEamAXnvzg9VfWhHLUZb9LLvW5fC6I9PeKSM6WgLY/edit?usp=sharing

Masthead float leak test

Common problems: full of water. Somehow.

Procedure:

1. Remove masthead float from boat
2. Submerge in tub of warm water
    2.1. The warm water will cause the air inside the float to expand and escape through the crack.
    2.2. Bubbles = leak



Asymmetrical spinnaker rigging

Common problems: replacing

Procedure:

1. Look up the the appropriate rigging manual for Quest, Toura, Venture
    1.1. https://www.rssailing.com/wp-content/uploads/guides/RS_QUEST_RIGGING_MANUAL.pdf
    1.2.https://www.rssailing.com/manuals/rigging-guides/RS-Toura-Rigging-Guide-MASTER-DO-NOT-DELETE.pdf
    1.3.https://www.rssailing.com/manuals/rigging-guides/RS-Venture-S-SE-Rigging-Manual-MASTER-DO-NOT-DELETE.pdf

Leak testing

When to do: diagnosing a leak, validating a repair.

Procedure:

1. Find a spray bottle and mix a small amount of dish soap with water.
2. Have a helper set up a shop-vac in blow-mode.
3. Remove the hull drain plug
4. Position the shop-vac hose ~2 inches away from the bung hole
5. Blow air into the hull.
    5.1.The goal is to create positive pressure inside of the hull. Air will escape through leaks
    5.2. It is very important to leave a 2+ inch gap between the vacuum hose and the bung hole. Some air needs to escape, otherwise the hull will inflate causing lots of damage.
6. Spray areas of interest with soapy water
    6.1. Fittings, plugs, screws, brackets. Anything mounted into the hull
    6.2. Visible cracks
    6.3. Repaired areas.
7. For a very thorough leak test you can roll the boat on it side and spray down the centerboard trunk area
8. Bubbles = leak. Repair accordingly.
9. You can test if the hull is airtight by:
    9.1. Blowing air into the hole with the shop vac and quickly sealing the bung hole with your hand.
    9.2. An airtight hull will hold pressure. A leaky hull will not.



Shop vac blowing air into drain hole



Soap bubbles indicates a leak

Replacing a halyard horn cleat with rivet nuts

Common problems: loose (tightening screws doesn't work), broken off mast

Tools:

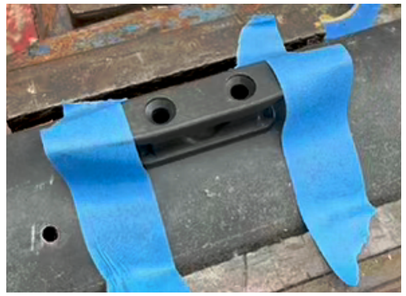
1. Riv-nut tool
2. Drill and drill bits (for drilling out old rivets and for drilling new holes)
3. New riv-nuts
4. Punch and mallet
5. Duralac

Procedure:

1. Remove the old cleat, save the screws and cleat to reuse if undamaged.
2. Drill out old riv-nuts
    2.1. Using a drill just larger than the threads of the riv-nut, carefully drill out the old riv-nuts in the mast.

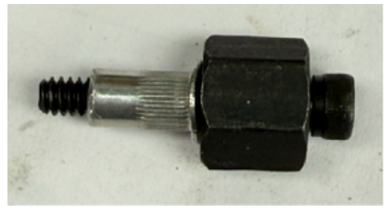



3. Decide strategy for replacement riv-nuts. If mounting holes in mast are:
    3.1. Still clean and round → try to reuse same size riv-nut, skip to step 6
    3.2. Wallowed out → either enlarge to next riv-nut size, or drill new holes in mast. Proceed to step 4
4. Mark & Prep Holes
    4.1. Use masking tape to temporarily hold cleat back in position
    4.2. Mark hole centers.
        4.2.1.You can use an old screw to mark the hole center, then remove the cleat and use a mallet and punch to make a more defined mark


Temporary mounting to locate holes


Punch to mark hole centers

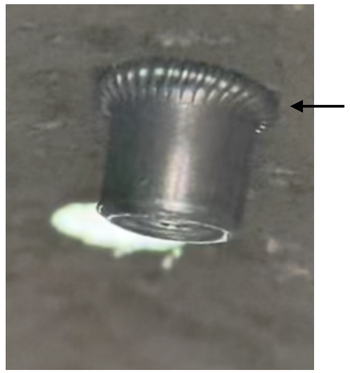
5. Drill holes
    5.1. Easiest to start with a pilot hole
    5.2. Step up to final diameter (match shank diameter of new riv-nut)
    5.3. After drilling the first hole, double check the location of the second hole in case the drill wandered.
6. Install new riv-nuts. **Add duralac anti-corrosion goop to the shank and underside of the head of the riv-nut**
    6.1. Method 1: Riv-Nut Tool https://www.youtube.com/watch?v=6D3oA_AvWh8
        6.1.1.Thread riv-nut onto tool mandrel
        6.1.2.Insert into hole
        6.1.3.Squeeze tool until riv-nut collapses tightly. The head should be flush, and it should not wiggle or spin.
    6.2. Method 2 (easier): (nuts and bolts) https://www.youtube.com/watch?v=qhzVDvnN_yM
        6.2.1.Bolt + washers + nut
        6.2.2.Thread into riv-nut
        6.2.3.Hold nut, tighten bolt to compress riv-nut. The head should be flush, and it should not wiggle or spin.


Riv-nut fitted onto tool


Insert into hole


Tighten to set riv-nut


Finished riv-nuts


Riv-nut compresses and mushrooms out, clamping and gripping onto the substrate

Inside the mast

7. Install cleat **Add duralac anti-corrosion goop to screw threads**



Don't forget this stuff


Finished

Replacing hiking straps

Common problems: worn out

Procedure:

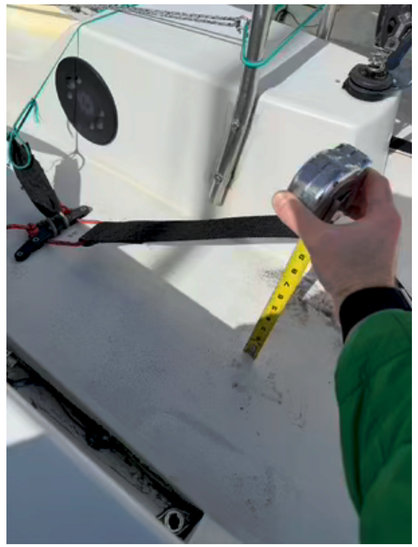
1. Untie or cut off ties to remove old strap
2. Find replacement straps in the back of the dinghy locker. Note the length needed for the boat type and position.
    2.1. Venture rear: 31in
    2.2. Venture front: 34in
    2.3. Toura rear: 42in
    2.4. Toura front: 48in
    2.5. Quest rear: 35in
    2.6. Quest front: 42in
3. If you need a new piece of line, estimate the length using the line you removed.
4. Cut a new piece of line, if needed
5. Rethread the line through the retainer brackets on the hull
6. Tie stopper knots in the ends and adjust to set the hiking position of the strap
    6.1. Check and match other boats, ~10” off the deck is a reasonable target



Remove the old strap



New strap and lines



Adjusted for hiking position

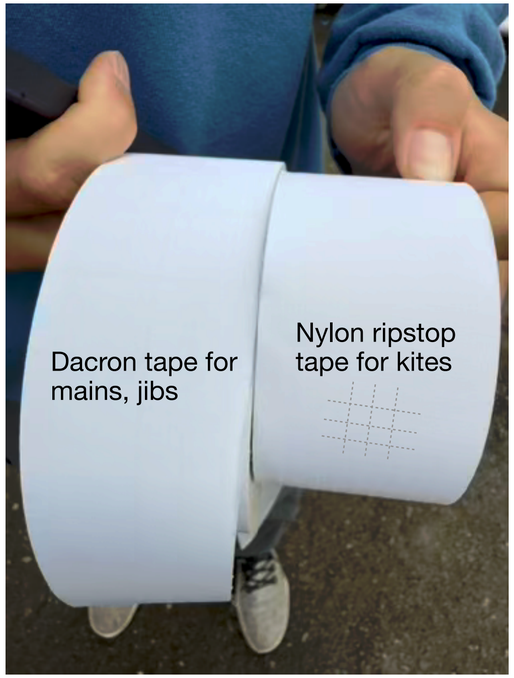
Repairing small sail tears

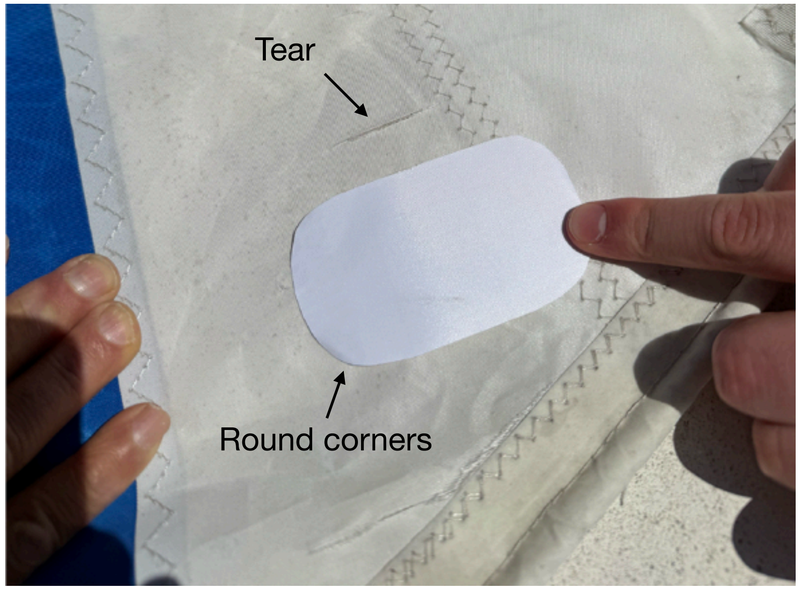
Common problems: small tears up to a few inches in a flat non-load bearing part of the sail.

- For larger tears remove sail and arrange for sail maker repair
- Rips on seams or load patches need sail maker repair

Procedure:

1. Locate tear, and let the sail dry if wet.
2. Clean the area
    2.1. Lay sail flat on a dry surface
    2.2. Wipe around the tear with acetone
    2.3. Let dry completely
3. Align the tear
    3.1. Carefully bring the torn edges back together. Make sure there are no overlaps or folds
4. Cut your patches
    4.1. Cut two patches (one for each side of the sail):
    4.2. Shape: rounded corners (oval or circle preferred to prevent peeling)
    4.3. Size: extend at least 1–1.5 inches (2–4 cm) beyond the tear in all directions
5. Apply first side
    5.1. Peel backing
    5.2. Carefully place patch over the tear
    5.3. Start in the center → press outward to avoid bubbles
6. Apply second side
    6.1. Flip sail over
    6.2. Apply second patch directly opposite the first
7. Burnish the repair
    7.1.Rub firmly with your thumb, or a plastic card. Focus on the edges.





Replacing sheet and furling cleats

Common problems: broken

Procedure (Quest and Toura):

1. Remove screws from old cleat, save for replacement if they are in good condition
    1.1. Note: Quests and Touras use brass threaded inserts directly molded into the hull. These require a correctly sized machine screw. Make sure a replacement screw threads in properly. When in doubt, check the rigging manual for the correct screw size.
2. Remove the old cleat
3. Locate a replacement part in the dinghy locker
    3.1. Test fit. Make sure the new part fits on the existing holes in the boat.
4. Install the new cleat, make sure orientation is correct.
5. Install and tighten screws. Don’t over tighten

Procedure (Venture):

1. Remove screws from old cleat, save for replacement if they are in good condition
    1.1. Note: fiberglass boats like RS Ventures use machine screws to screw cleats directly into the fiberglass hull. Make sure to use the correct type of screw for the replacement.
2. Remove the old cleat
3. Clean off any old sealant or gunk, clean the area with soap and water.
4. Drill out hole with larger drill to expose fresh fiberglass surface inside hole
5. clean again with acetone
6. mix epoxy resin (west systems 5 minute epoxy is good) & hardener & filler to make thickened mixture so it won't drip through the holes
7. Fill the holes allow to set
8. Sand the epoxy smooth
9. Drill one pilot hole in the center of one filled hole.
10. Put screw through one side of new cleat and coat tip of screw with caulk (5200 or silicone sealant) and screw into first pilot hole
11. Use other side of cleat as a guide to drill second hole, coat tip of second screw with caulk and screw it in and allow caulk to set.
12. Clean any excess sealant squeeze out

Gooseneck replacement

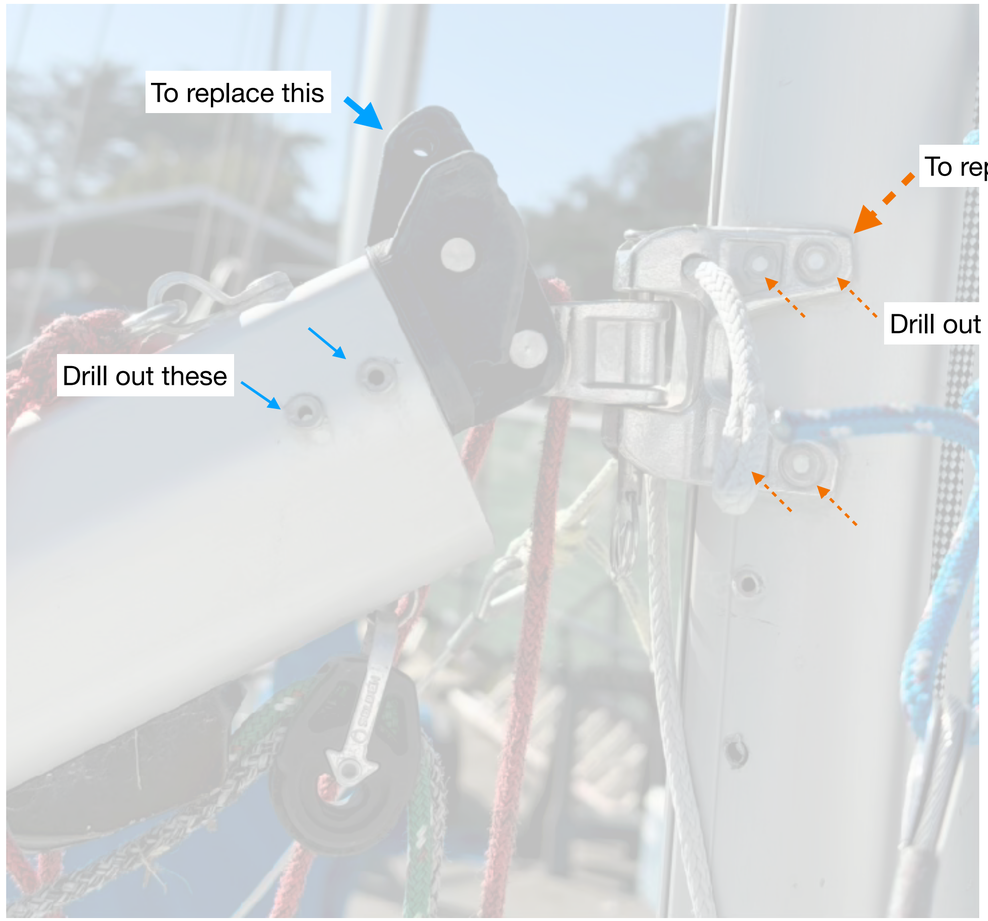
Common problems: broken

Materials:

1. Replacement gooseneck fitting
    1.1. Make sure to use a matching replacement part. These need correctly match the boom or mast extrusion shape.
2. 3/16” x 3/4” rivets

Procedure:

1. Drill out existing rivets
    1.1. Select drill bit matching diameter of rivet shaft
    1.2. Drill until head pops off
    1.3. Push remainder of rivet into the hole
2. Inspect holes
    2.1. If still round and even, plan to reuse same holes
    2.2. If wallowed out, plan to drill to next rivet size up
3. Clean the Area
    3.1.Remove old sealant and corrosion
    3.2.Lightly sand or Scotch-Brite the surface.
    3.3.Wipe clean (acetone or alcohol).
4. Drill holes (if needed)
    4.1. Match drill size to rivet shank diameter
5. Apply Duralac
    5.1.Back of the gooseneck fitting
    5.2.Rivet bodies before installation
6. Install Rivets
    6.1.Rivet sequence:
    6.2.Start with one hole to lock position
    6.3.Move to opposite side
    6.4.Fill remaining holes
7. Set Rivets Properly
    7.1.Use firm, steady pressure with the rivet gun.
    7.2.Ensure: Rivet heads sit flush, No gaps between gooseneck and mast



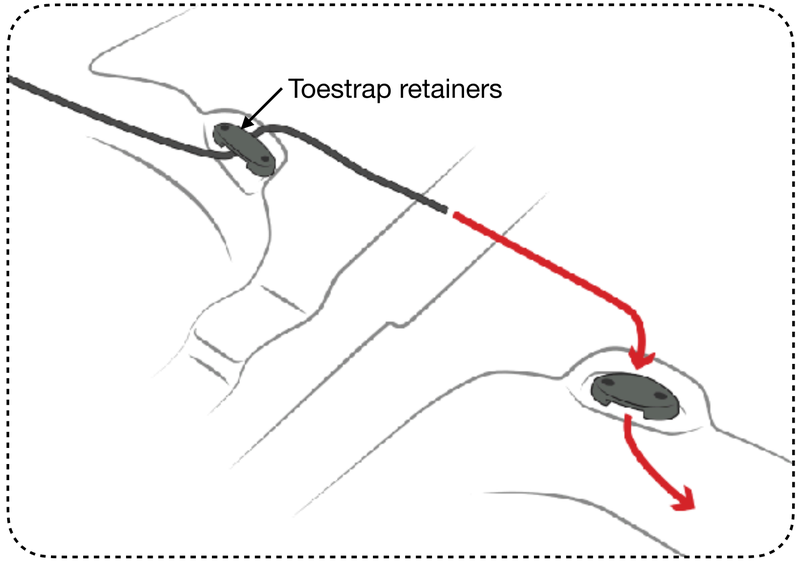
Trapeze bungee cord replacement

Common problems: Bungees (shock cords) are stretched out

Procedure:

1. Untie or cutoff the old bungee
2. Cut a of new shock cord. Since these are stretchy, the length is difficult to estimate. Best to run a new line directly off the spool then cut when you have the length figured out.
    2.1. Quest: approx. 80inches
    2.2. Toura: approx. 90inches
    2.3. Venture: approx 132inches
3. Pass a bight through the small eye in the trapeze ring
4. Tie a bowline or barrel stopper knot in the bitter end
5. Pass the bight over the trapeze ring and cinch down on the stopper
6. Pass the working end of the bungee down and through the lower shroud shackle (Quest/Toura) or through the small fairlead tied to the chainplate bolt (Venture)
7. On a quest and Toura, feed the bungee through the hiking strap retainers
    7.1. On a venture, there is a small block on the foredeck, run the bungee forward to this block, through the block, then aft to the opposite side of the hull
8. Pass the bungee out through the other shroud chainplate bolt and up to the other trapeze ring
9. Repeat step 3
10. Pull slack out of the bungee cord until it is able to hold the trapeze lines out at the shrouds.
11. Tie another stopper knot to set the length, and trim off the excess.

Quest and Toura









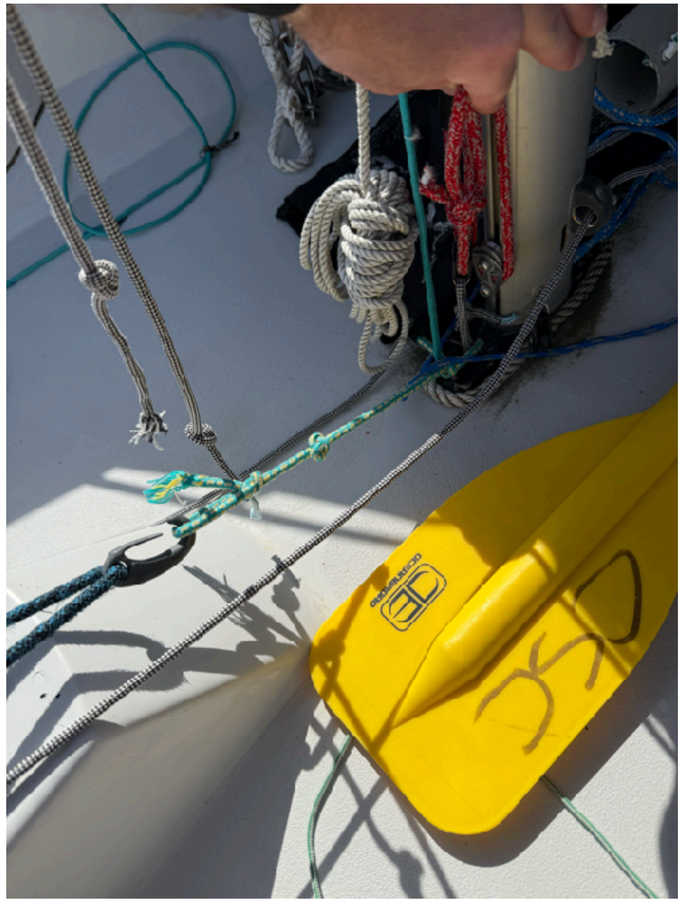
Venture

Replacing the center board bungee

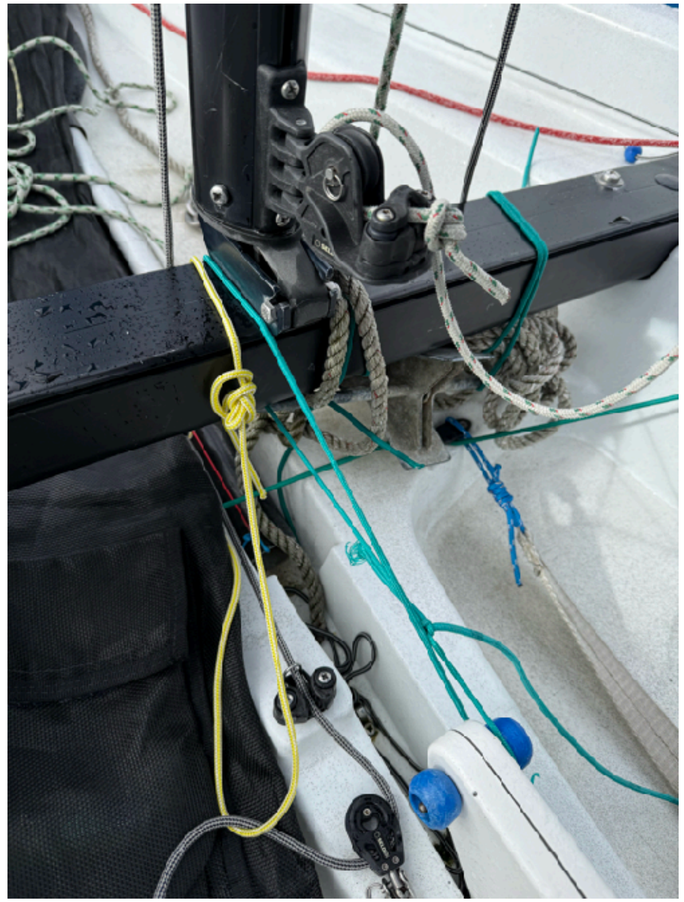
Common problems: broken and needs replacing, overstretched

Procedure:

1. Untie or cutoff the old bungee
2. Cut approximately 2ft of new bungee
3. Quest/Toura: tie the bungee cord in a loop around the mast support beam
4. Venture: tie the bungee cord in a loop around the mast step bolt
5. For either, the loop should be able to reach the centerboard handle or clip when fully raised, and provide enough tension to hold the centerboard fully raised.
    5.1. The loop can be adjusted by adding a adding a knot, such as an overhand on a bight.



Venture



Quest and Toura

Attaching the Jib tack

Common problems: broken, or redoing during jib replacement

Materials

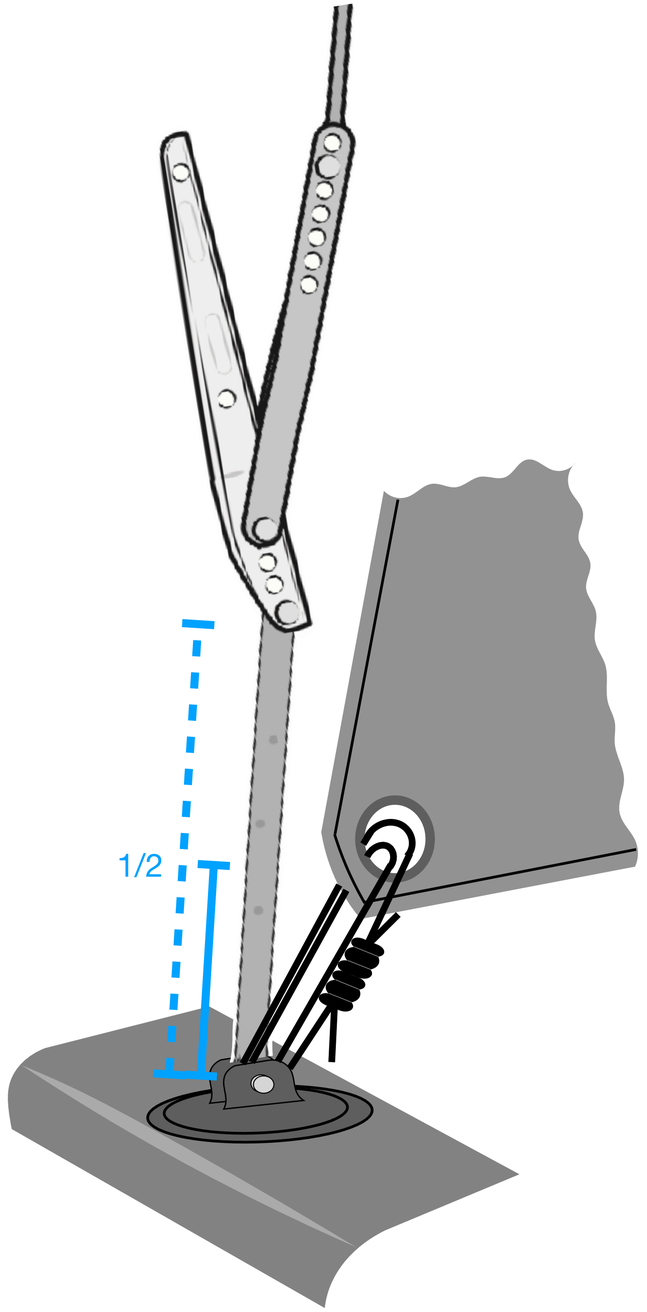
- 3mm Dyneema core line

Procedure (Quest):

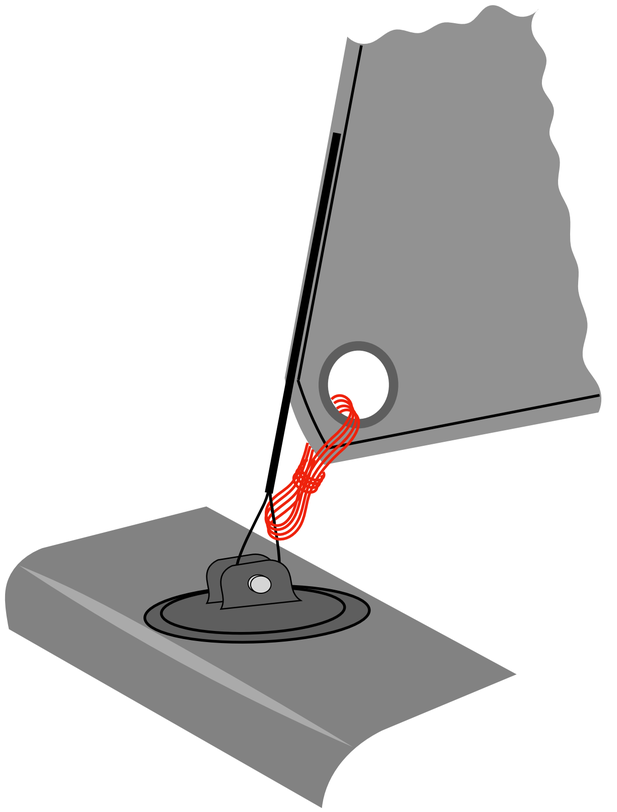
1. Tension the rig
2. Release jib halyard tension
3. Removed the old tack line if necessary.
4. Tie the tack of the jib to the clevis pin at the base of the forestay as shown in the diagram
    4.1. At least two turns will help distribute chafe
    4.2. Finish with a double fisherman's bend or a stack of half hitches around the lashing
    4.3. When finished the tack should be halfway between the furler pin and the tensioner arm pivot
5. Put on jib halyard tension and verify the jib tack is at the correct location, the lashing may need to be adjusted to get this right under tension
6. Check during a test furl/unfurl that the lashing does not wrap around the tensioner. They should rotate together.

Procedure (Toura and Venture):

1. de-tension the rig
2. Removed the old tack line if necessary.
3. Lash the tack of the jib to the eye at the end of the luff wire
    3.1. Several turns will be needed to hold the lashing
    3.2. Finish the lashing with a stack of half hitches around the lashing
4. The lashing is acting as the Cunningham for the jib, so the length plays a role in the luff tension of the sail. You can verify the lashing is set properly if the sail has slight wrinkles at a relatively low rig tension (light wind set up), and no wrinkles at high rig tension (high wind set up). Note: the jib luff should still have some give (you can pull on it and make wrinkles) at high rig tension. If not, the lashing and luff tension are too tight, and the sail may be damaged.



Quest



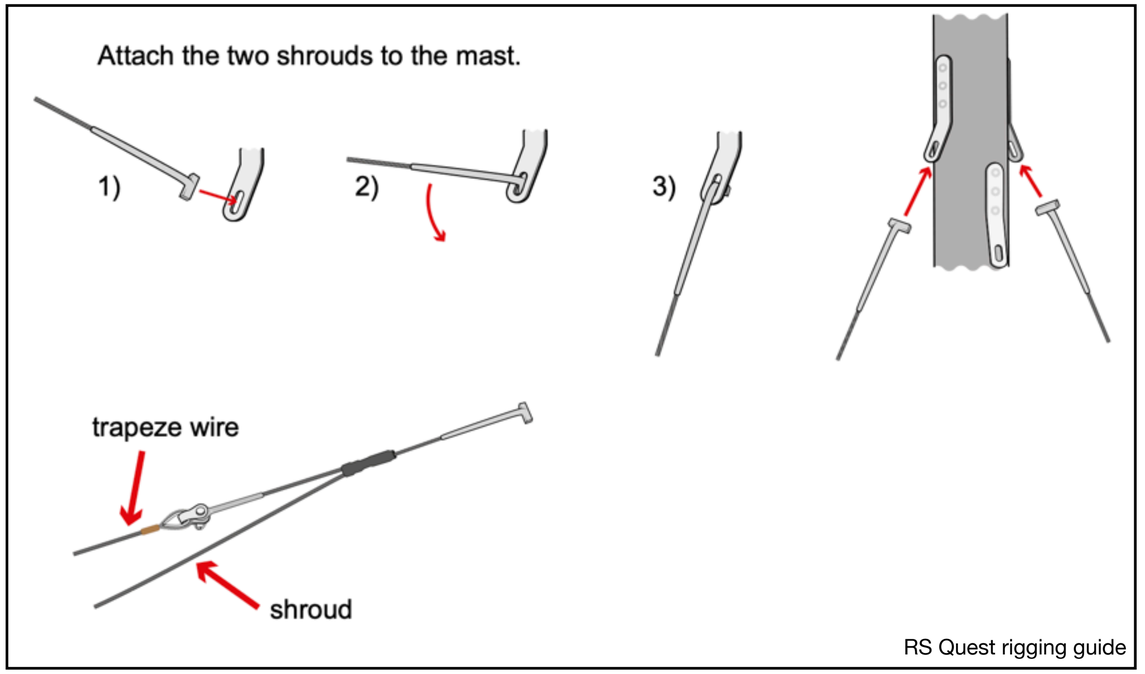
Toura and Venture

Trapeze line replacement

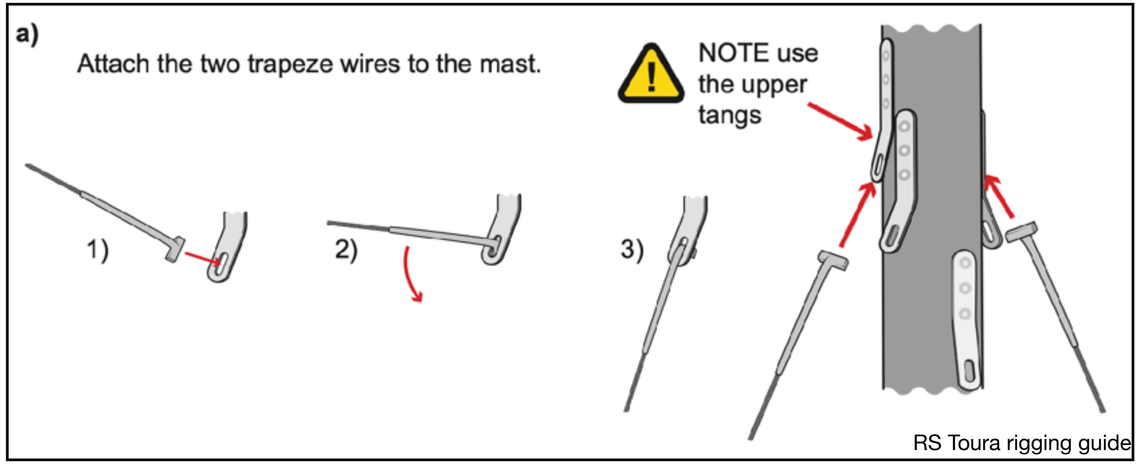
Common problems: broken and needs replacing.

Procedure:

1. To replace a trapeze wire, the mast should be lowered, or the boat turned on its side
2. Remove the old trapeze wire from where it attaches to the shroud (Quest) or mast (Toura)
3. Replace, and mouse the shackle.
    3.1. Dyneema trapeze line kits, made by CSC, may be used when OEM wires are unavailable. Reach out to First Vices for more info.
4. Re-run the trapeze bungee line



RS Quest rigging guide



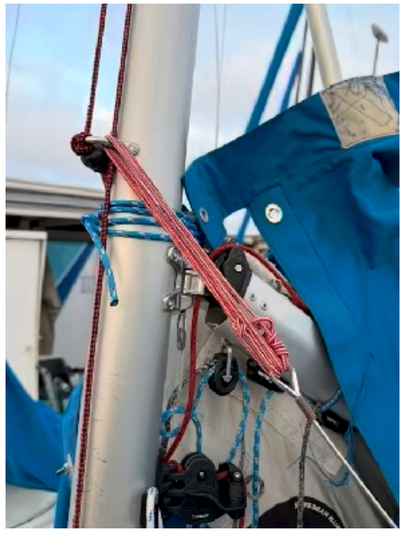
RS Toura rigging guide

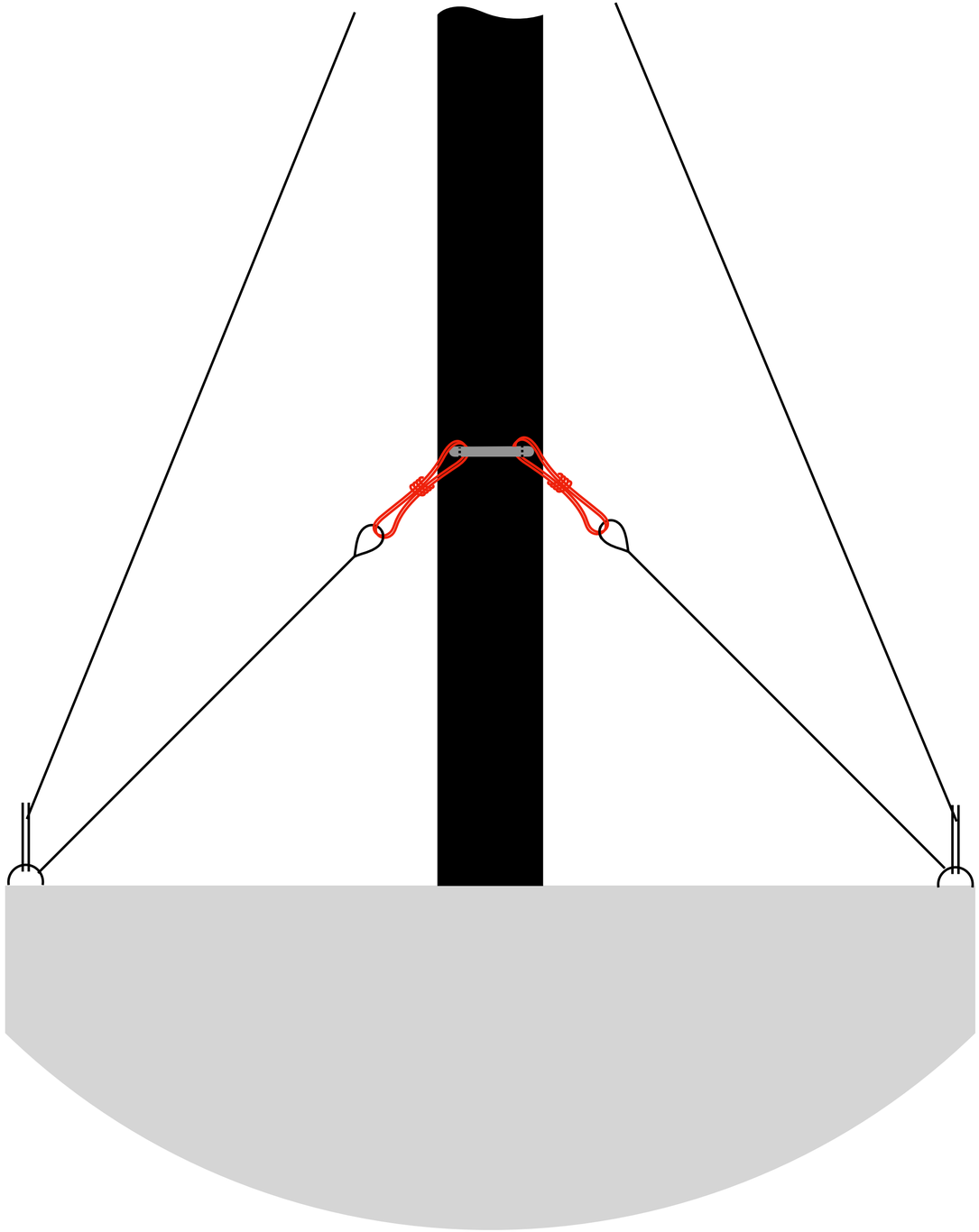
Lower Shroud Replacement - quests and touras

Common problems: broken and needs replacing

Procedure:

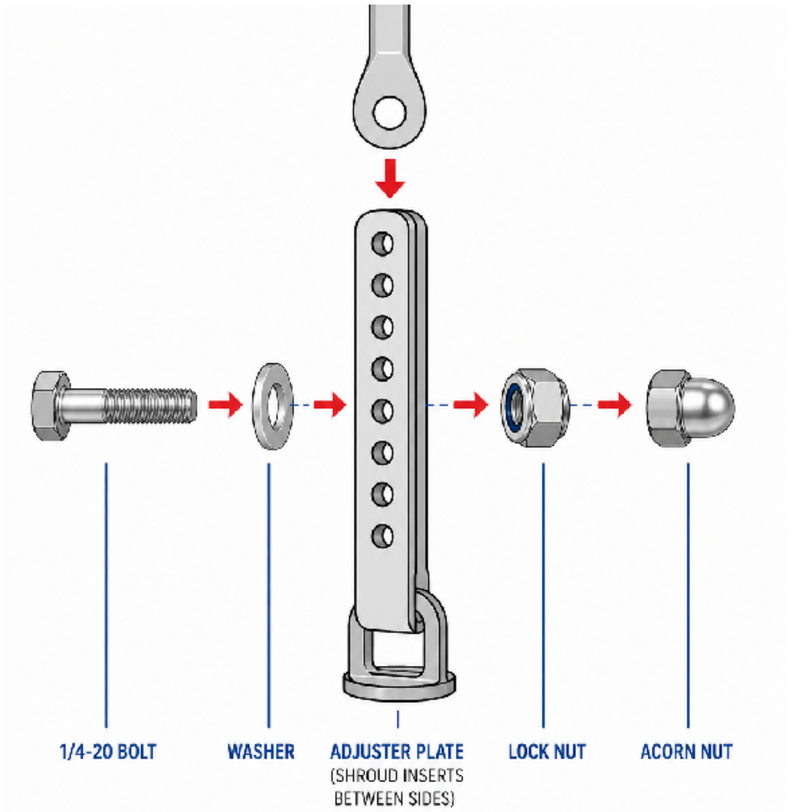
1. de-tension the rig
2. For wire lowers
    2.1. attach one end to the shroud chain plate bolt with a small shackle. Mouse the shackle pin.
    2.2. The upper end is attached to the ring on the mast in front of the gooseneck with a lashing.
    2.3. With a length of line, tie off one end to the mast ring with a bowline
    2.4. Pass the line through the eye in the shroud and back through the ring
    2.5. Make 3-4 turns like this through the ring and shroud eye, friction is needed to hold the lashing while you tie the finishing hitches.
    2.6. Finish the lashing with a stack of hitches around the lashing.
3. Tension the rig and verify the lowers are tight. The lashing may need to be adjusted.
4. Dyneema lower shroud kits, made by CSC, may be available when OEM wires are unavailable. Reach out to First Vices for more info.





Attaching shrouds to adjuster plates

Common problems: broken and needs replacing



HARDWARE ORDER (LEFT TO RIGHT)	
1	1/4-20 x 1" Stainless Steel Hex Head Bolt
2	1/4" Stainless Steel Flat Washer
3	ADJUSTER PLATE (Shroud between sides)
4	1/4-20 Stainless Steel Nylon Insert Lock Nut
5	1/4-20 Stainless Steel Acorn Nut

NOTE: Tighten the acorn nut against the lock nut to secure.

Plastic boat repair

Common problems: cracks, holes

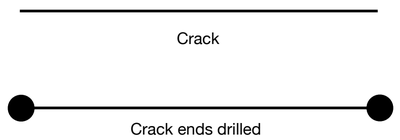
Tools/Materials::

1. G-flex epoxy
2. Drill and 1/8” bit
3. Utility knife
4. 80 grit sand paper
5. Acetone
6. Blow torch
7. Fiberglass (optional)
8. Sandpaper and paint for finishing

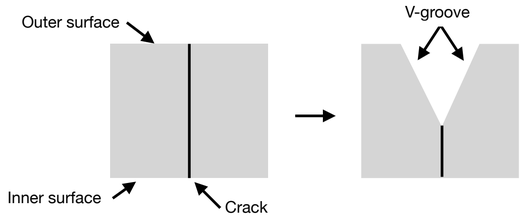
Procedure:

1. Clean the area with soap/water and acetone to remove dirt and grease.
2. Identify the full extent of the crack and make sure the area is completely dry before applying epoxy.
3. Drill a small hole (1/8") at each end of the crack to prevent further propagation.
4. Using a knife or file, open the crack into a V-groove to allow epoxy to penetrate fully.
5. Sand the groove and area around the crack with 80 grit sandpaper
6. Clean the area again with soap and water. The wipe the entire repair area with acetone. Use a clean wipe in one direction only -- do not scrub back and forth as this recontaminates the area.
7. Pass a torch flame quickly over the sanded area. This is to activate the plastic surface as it is naturally non-stick
    - 7.1. Move at ~4-6 inches/second, 2-3 passes per area, Surface should NOT char/melt, Slight glossy sheen = correct
    - 7.2. Apply epoxy within 20 minutes of flame treatment
8. Mix GFlex in a 1:1 ratio by volume (resin : hardener).
    - 8.1. Mix for 2 minutes, making sure to scrape the cup
    - 8.2. You have about 45 minutes of working time at 72°, less if it is hot out.
    - 8.3. Tip: save the cup you used to mix the epoxy until the end of the curing step. If the epoxy in the cup is fully cured, so is the epoxy in your repair. If not, clean out the bad epoxy from the hull and start over.
9. Force epoxy into the V-groove using a plastic spreader or popsicle stick. Work it fully into the crack.
10. For large structural cracks or holes, you can layer a piece of fiberglass cloth over the damaged area to add strength
    - 10.1. Wear gloves
    - 10.2. Cut a piece of fiberglass cloth large enough to extend 2” beyond the crack
    - 10.3. Saturate the fiberglass with epoxy and lay over the crack
    - 10.4. Smooth out the cloth and push out any bubbles.
11. If needed, Apply clamps to hold the damaged area in position while the epoxy cures
    - 11.1. Add a layer of wax paper under the clamps to prevent the clamp from bonding to the hull
12. After full cure (24 hours), sand smooth with 80-grit, then finish with 220-grit.
13. Perform a leak test to confirm the repair was successful. If needed apply additional epoxy.
14. Paint to match.

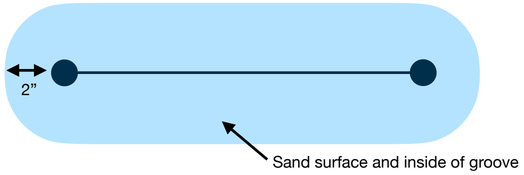
Step 2: drill crack ends



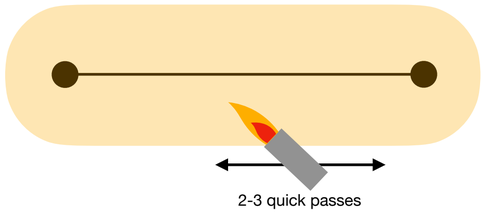
Step 3: cut V-groove



Step 4: Sanding



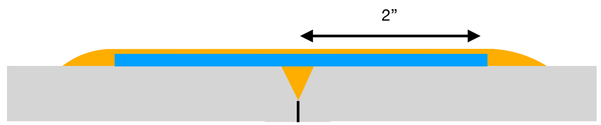
Step 6: Flame treatment



Step 8: Apply epoxy



Step 9: Apply fiberglass (optional)



Step 11: sand smooth



Pretty good video for reference: https://www.youtube.com/watch?v=eyIx9ixXdT0