Roller Furler Repair on an I-36

6 October 1999 - 4 August 2002

Preface

March 2009

This article has been turning over in my mind for several years. It summarizes the most horrific maintenance action I have yet undertaken on our 1978 Islander 36 sailboat, Charisma.

Even though the events are now seven years old, I believe their capture and the recounting of my experience is something that I am obliged to share with the Islander 36 Association, especially for anyone with a roller furler system. Regrettably, I did not take photographs of the events as they unfolded. I did record most of the events in Charisma's logbook and have used the log to reconstruct events here. I have also included recent pictures of the "bad actors" to enable the reader to understand better their roles in the events.

It is my hope that my roller furler experience may empower another sailor.

John Hamlet
Captain S/V Charisma (1978 I-36)
Philadelphia

jhamlet1@verizon.net
cb_sailor@msn.com
609.386.0903

Roller Furler Repair on an I-36

by John Hamlet, Captain - S/V Charisma

The first indication I had that our 1978 Islander's roller furling system might need serious repair came when I was recommissioning her in the spring of 2002. I had begun a routine of injecting grease into the roller furling drum after I had replaced two ball bearing assemblies in 1999. In the spring of 2002, while winding the roller furler foil to expose the grease fitting (shown in Figure 1), the jib halyard wrapped around the furler swivel at the top of the mast. I freed the halyard, unaware that the furler foil had cut into the jibstay cable strands. More on this oversight later.

Figure 1 - Furler grease fitting

Trouble Brewing

Previously, in the summer of 1999, our Hood roller furler had seized while we were broad reaching into a narrow creek entrance in an 18 knot wind. Quickly we had to head the boat up in order to reduce our headway and avert catastrophe. While in the eye of the wind, I manually rolled the genoa around the roller furling foil. The genoa remained furled for the rest of our cruise.

Upon our return to the marina, I worked up the courage to open the furler's take-up drum. It required a hex wrench to unscrew the drum bolts. I was surprised when about a dozen pebble-shaped iron peas fell on the deck. These odd sized pebbles did not resemble ball bearings. The take-up drum had rotated rough lately. Now, I understood why. I continued to disassemble the roller furler drum with the hex wrench and found two circular bearing assemblies - one at the bottom of the drum and a second at its top. There were two snap rings and two rubber O-rings securing the cylindrical jibstay shaft in the center of the drum. The bearing races were rusted through in places. When I cleaned and brushed a bearing race, I could discern the numbers "6208RS" and "Romania". I soon was to become a lot more knowledgeable about bearing assemblies and roller furler system construction.

I typed "6208RS" into the Google search engine and got several hits. "6208RS" translated into a "deep grooved", single row, rubber sealed, radial ball bearing assembly with the following bearing characteristics:

ID (inner diameter)/Bore = 40mm (1.57in)
OD (outer diameter) = 80mm (3.15in)
Width/Height/thickness = 18mm (0.71in)
Balls = 9, RS = rubber seal
Bearing Race Radius = 1.1mm (0.04in)

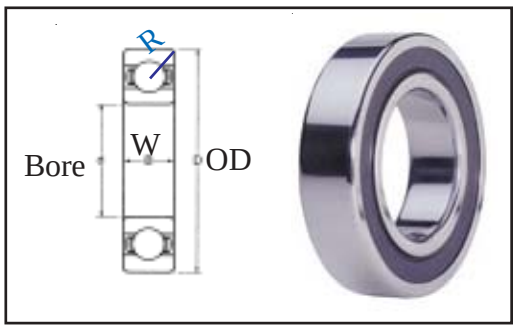

Figure 2 - 6208RS drum bearing

The "boundary dimensions" are shown in Figure 2. I ordered a set of two in stainless steel with a rubber seal on each side. Total cost was $62.10. Removing and replacing the stainless steel retaining rings (Rotor Clip DSH-40) was the hardest part.

As a consequence of this three weekend “adventure,” the injection of white lithium grease into the roller furler take-up drum now had become an annual maintenance action when I recommissioned Charisma each spring. For two years I furled and unfurled our genoa with ease. The previous binding at the take-up drum had disappeared. I was happy.... But, in a little over two years time, another roller furler “adventure” was in store for us.

The subsequent replacement of the jibstay turned out to be the hardest task I have undertaken to date. I felt like Robert Fulton must have when we was constucting his steamship, the Clermont. Everyone said, “Buy a new roller furler system.” This repair effort lasted twelve weekends. We were lucky that we did not lose the mainmast when this adventure began.

Disaster Strikes

On May 26, 2002 my wife and I were exiting the Wye River on Maryland’s Eastern Shore. The main was up and I had just begun to unfurl the genoa when I noticed that the take-up drum had unscrewed from its bow swivel fitting. Quickly, we anchored out of the channel and dropped the main. We let the genoa fly as I began to assess the cause. I could not manually furl the genoa as I had done previously because the take-up drum was free from its mounting. I decided to release the halyard and lower the genoa by sliding it off of the roller furler foil. As soon as I began, I could see the entire roller furler foil was coming down. I winched the halyard back up into position. I removed the swivel pin from the take-up drum swivel at the bow; screw the swivel back into the base of the drum; and reattached the swivel to its bow fitting. Removing and reinserting the swivel clevis pin (See Fig 3) was no easy task with the genoa luffing in the breeze. It required a great deal of patience. I again released the halyard to gain some play at the swivel. Finally, I got the swivel pin in without dropping it overboard. Once the take-up drum assembly was reattached at the bow, I could not rotate the drum without unscrewing the swivel. So I unreeved the genoa sheets and manually wrapped the genoa around the foil. At this point I did not realize that the jibstay had parted. The backstay tensioner was eased to reduce the strain on the jibstay. We sailed “gently” under the main alone for two days to return to our marina.

Figure 3 - Drum swivel clevis pin

Home at Last

Upon our return to Charisma’s slip, we examined the roller furler swivel at the top of the mast using binoculars. We could see the frayed wire strands from the jibstay cable. The next action was to lower the roller furler foil and remove the genoa sail, but first I decided to secure the mast forward by using the spinnaker halyard. It was good to have the spinnaker halyard available. We lowered the foil, with the sail attached, onto the deck using the jib halyard. The jibstay had been sawed through by the rotation of the aluminum foil’s end just below the top jibstay toggle. The jib halyard was still attached to the “car” that slides up and down the foil with the genoa head attached. I cut the wire halyard from the car, put on a temporary clamp, and attached it to the bow toggle for additional support of the mainmast. With the foil on deck, the genoa was unfurled and carefully extracted from

its track. The genoa was undamaged.

With the help of our marina neighbors, we disconnected the drum toggle from the bow and moved the entire roller furler system to an open area at the marina where disassembly could be performed. The roller furler system was identified as a Hood Seafurl Model BC. In order to extract the cable, I used a Dremel tool with cutting disk to remove the mangled cable end at the top end of the foil. A 46 foot 3 inch, 316 stainless steel, 1x19 jibstay cable went through the center of the foil. The jibstay cable diameter was 9/32 inch. There were 1 inch long plastic bushings along the entire length of the cable. These bushings helped to reduce friction as the foil rotated around the cable. The top of the foil was open. This was assessed as the reason that the jibstay rigging parted. Repeated rotations of the foil had frayed the cable strands. The foil comprised eight oblate, extruded aluminum sections of 4 to 6 foot lengths. Each foil section was interlocked with the next. There were no rivets holding the foil sections in place. I used a thin flat-bladed screwdriver to pry each section apart. The jibstay cable was easily extracted from the foil.

Figure 4 - Foil "car" attaches to genoa head

Missing a Norseman

The cable was attached through the axis of the take up drum. Typically, a Norseman cone, a small, tapered metal wedge, is driven into the bottom of the cable to hold it inside the drum. I could not locate the Norseman cone. I cut the cable above the top of the drum and took the drum to a local machine shop to have the cable delicately drilled out of the drum. The machinist carefully removed the end of the cable. He did not find a Norseman cone. A new length of 316 stainless steel cable was ordered from Defender Industries. I spent several days calling various riggers up and down the East Coast to find out how the cable had been secured inside the take-up drum. Everyone said there should be a Norseman cone. One evening I was reading Nigel Calder's book, *Boatowner's Mechanical and Electrical Manual.* It is published by International Marine, Camden, Maine. Serendipity was with me that night because in a drawing in the Standing Rigging section of the book there was a description of how to install Castlok fittings. Castlok is a two-part resin, similar to epoxy that is used to secure elevator cables. Eureka! A quick search of the Web revealed that there was one supplier - Loos & Company in Naples, Florida. I called them and ordered "a kit". All they needed to know was the diameter of my cable. Three days later a small container arrived with instructions. I read the instructions several times. The instructions were very clear and emphasized that the end of the cable must be unlaid so that the cable strands formed into a Coke bottle shape. The strands must be thoroughly cleaned with acetone. While I was working up my courage to undertake the resin mixing operation, I threaded the plastic sleeves onto the new length of cable. I had to do this from both ends of the cable due to the tightness of the sleeves. I used lithium grease to help distribute the sleeves evenly along the cable. I threaded the cable end through the take-up drum. Following Loos directions, I unlaid about a foot of the cable strands. I used an old toothbrush to scrub all oil and residue from the cable strands. I tested that I could insert the cable end quickly into the drum center.

Excalibur

I was now ready to begin mixing the resin. I used a small paper cup to mix the two parts of the resin

rather than pour one part into the other. The Loos kit contained the two resin components, plastic gloves, and a small wooden stir stick to mix the two parts. The cable was to be inserted into the small axial opening through the center of the drum. When I mixed the two resin components together, the mixture was red in color. It began to get hot and expand within a couple of minutes. I smeared the mixture over all of the unlaid cable strands. I concentrated on the interior of the Coke bottle shape. After I had thoroughly coated the cable strands, I shifted my attention on smearing the resin mixture inside the drum axis. About three minutes into the operation, as I was pulling the cable end into the drum, I noticed that the paper cup was smoking and the stir stick was stuck in the remaining resin. Five minutes after starting, the remainder of the resin mixture in the paper cup had expanded to about three times its original volume and the stir stick was stuck in the mixture like King Arthur's Excalibur sword. Resin had oozed from the bottom of the drum. I breathed a big sigh of relief that I had successfully sealed the cable end inside the drum. I let the drum and cable sit for one day before moving it. The next day I screwed the drum toggle back into the base of the drum.

Measure Twice; Cut Once

I had to solve the problem with the top of the foil cutting into the cable strands before I threaded the cable back through the foil. I decided to epoxy a 3/8 inch thick plastic bushing to the top foil, add 3 plastic washers, thread on a 3 inch long stainless steel helical spring (Century Spring Corp. #72133S) to hold the foil down on the drum and away from the top eye terminal, and top it all off with a short length of 1/2 inch PVC pipe to enclose the spring. Getting the cable back through the eight foil sections required a lot of perserverance. Vise-Grip pliers and lithium grease helped. Each section was done separately; then each foil section was reconnected in turn. Another big sigh of relief was uttered when the cable finally appeared at the top of the last foil section. The plastic bushing was epoxied on the top and left for two days. Then the three plastic washers were threaded over the cable, along with the spring. My original sketch of the arrangement is shown in Figure 4.

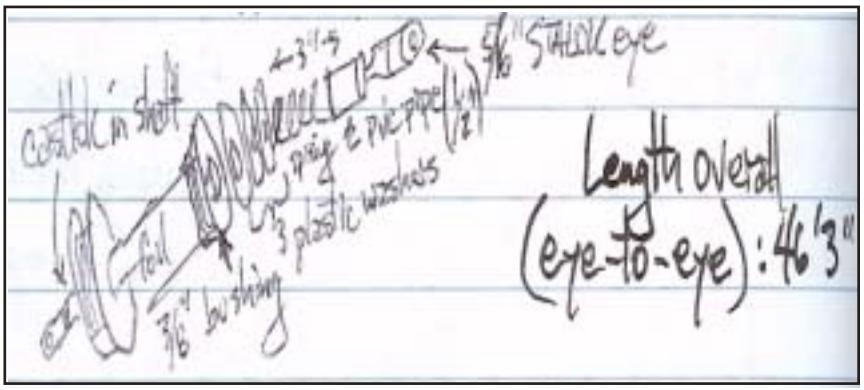

Figure 4 - Components at top of foil

I chose a Sta-Lok eye terminal to connect the jibstay cable to the eye at the top of the mast. The Sailing Services web site (http://www.sailingservices.com/) provided excellent instructions on the assembly of the Sta-Lok eye terminal. Probably the greatest challenge was deciding where to cut the cable. The old carpenter's adage - 'measure twice; cut once' applied. I knew if I cut the cable too short I'd have to start all over. If the cable were too long, I'd have to shorten it and hope to preserve enough to add a new eye terminal. I measured and re-measured the foil sections, old cable length, drum thickness, and the lengths of the eye terminal on each end of the cable. Finally, I decided to release the backstay tensioner; winch my wife up the mast (she actually likes that); and use a long windable measuring tape to measure from the masthead eye to the drum terminal eye, just to be doubly sure. 46 feet 3 inches - eye to eye was what was needed. I cut the cable allowing 1 1/2 inch for the assembly of the Sta-Lok eye terminal. My notes are shown in Figure 5. I put silicon caulk

inside the Sta-Lok fitting and applied Locktite to its threads. The foil was now reassembled and ready to go back up the mast. Slip neighbors helped carry the foil back aboard Charisma. I attached a long line to the top of the foil and winched my wife back up the mast streaming the hauling line. We hauled the top of the foil up to her where she inserted and secured the top swivel clevis pin. When I swung the base of the foil over to the bow toggle to insert the clevis pin, it was short by about 1 inch! I was worried that I had cut the cable too short. I verified that the backstay tensioner was released, but it would not allow the bottom swivel to line up so I could insert the clevis pin. A neighbor who was helping me placed his foot on the top of the take-up drum and with that action the clevis went into the swivel and toggle perfectly. I secured the cotter pin and breathed a huge sigh of relief.

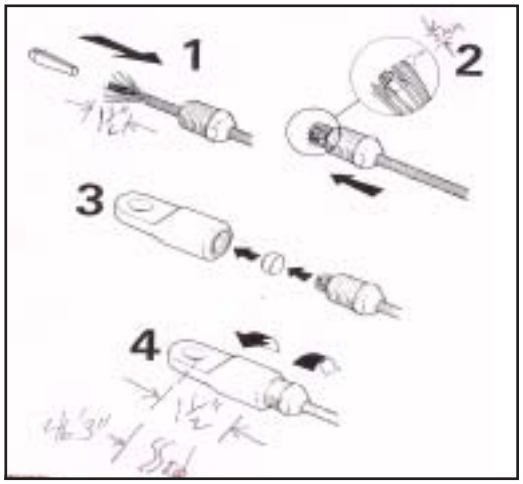

Figure 5 - Sta-Lok notes

I removed the stabilizing lines to the mainmast and replaced the drum take-up line. I was careful which way to wind the take-up line because the genoa's ultraviolet protection fabric along the sail's leech, is on one side only. When the wind had died down, I raised the genoa up the foil track; and wound the genoa around the foil with the new take-up line. I was done! 70 days had elapsed from the day the jibstay parted. The roller furler system has worked flawlessly for seven years.

Lessons Learned

1. Never give up.

From the start there were many nay-sayers who thought this repair was too extensive to be completed by a do-it-yourselfer. My perserverance was challenged continuously with each new obstacle. When I felt overwhelmed, I would read technical articles on standing rigging. Nigel Calder was inspirational.

2. The Web is a tremendous resource for D-I-Ys.

There were several sites that provided information on do-it-yourself rigging. Listed below are a few of the most valuable:
http://sailingservices.com
http://www.stalok.com
http://www.globalspec.com
http://www.mmbearco.com
http://www.shark24.org
http://www.loos.thomasregister.com
http://www.seafarer-research-center.com
http://www.boatus.com/seaworthy/rigging/
http://www.rotorclip.com
http://www.sailnet.com/forums/gear-maintenance-articles/

3. Don't ignore roller furler maintenance.