Catalina 350

C350 Association Technical Editor
Tim Ryan
Tjt3c@verizon.net

I am happy to report that for the first time ever in my experience, the C350 IA members have submitted a surplus of projects and articles for publication in *Mainsheet* Magazine. This is great! I thank you all. It tells me that our efforts to stimulate submissions with small rewards, is working. Thank you one and all. This surplus may cause some ruffled feathers though. I am submitting the articles as they are received. I am saving the others for the next issues. So if your article does not appear in the August issue, it will probably appear in the November issue. Keep those projects and pictures coming my way.

In this issue, you will be treated to an article by Bonnie Mitchell on the storage of bikes for cruising.

You will be dazzled by Dave "Maggie" Brown's project of repairing and/or replacing various brackets on our Universal/Westerbeke/Kubota engines.

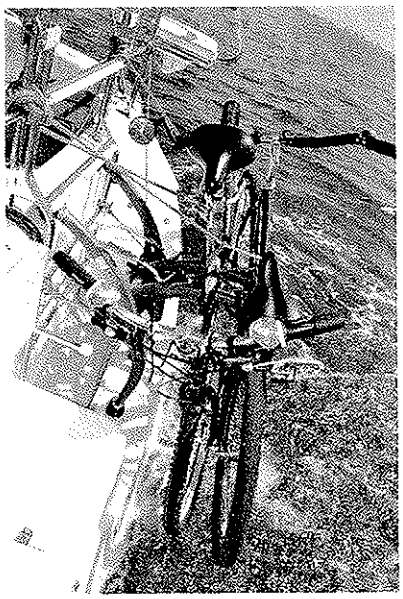
And finally, you will be interested to read about Bill Van Wagoner's five year engine maintenance project especially dealing with the exhaust riser.

Enjoy the articles and join in the fun. Send me your latest project and pictures no matter how large or small and you too can be the recipient of a fabulous personalized gift from your ever-gratetful C350IA. *–Tim Ryan*

Bike Racks

We have taken up biking and after borrowing folding bikes from friends for a couple of trips decided to try and mount our full sized bikes on *Kyknos*. Because of the type of sailing we do this works for us. We travel from yacht club to yacht club and have found many great bike trails in Naples, Sarasota, Clearwater, Tampa and St. Pete.

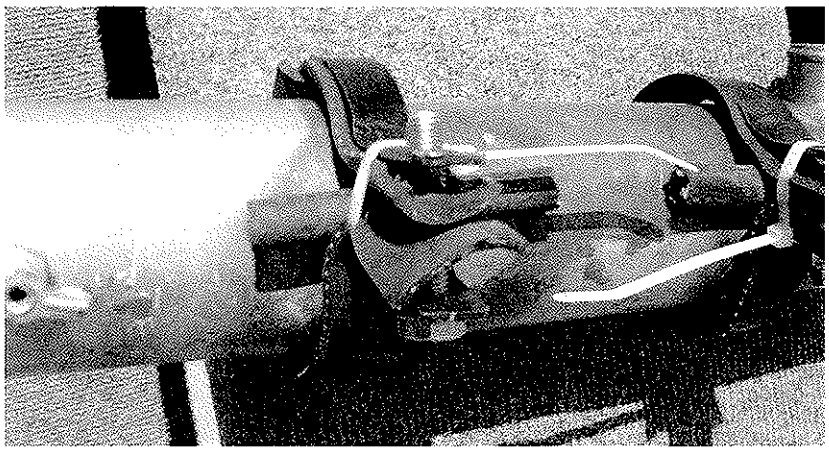
We tie the Saris bike rack to the stern rails and swim ladder then mount the bikes. It is easier to get the bikes on and off if we have a side tie. They do travel above the water but do get plenty of salt spray. We have to wash them down after the trip and spray with a good lubricant. We have found folding pedals that are usually installed on the folding bikes can also be installed on ours. We have also purchased a removable mounting bar for the women's bike so it doesn't tip down so far. *–Bonnie Mitchell,* Kyknos *C350 #49*

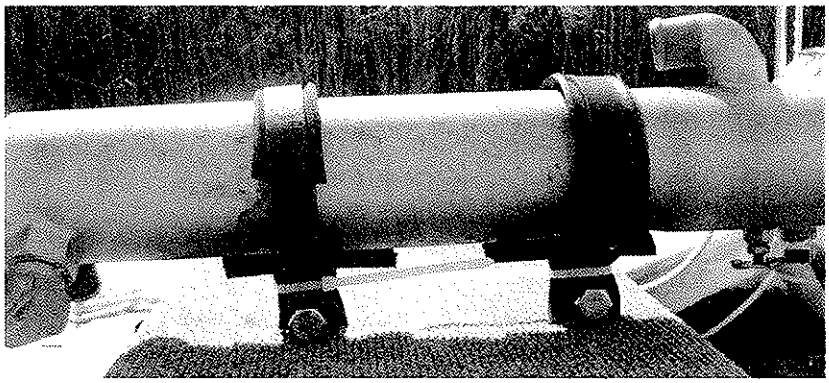


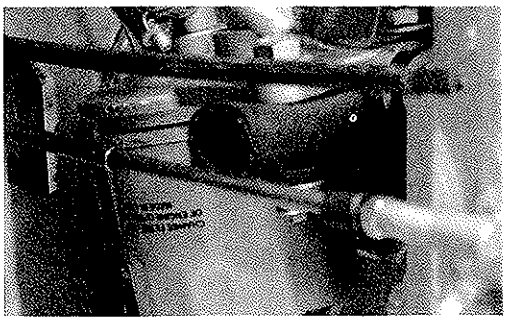
Broken Brackets on Fuel Filter and Heat Exchanger Repairs

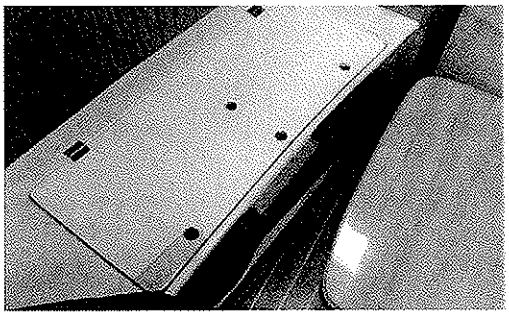
I picked up my Catalina 350 (#246) new in May of 2004. It is equipped with the standard Universal M-35 4 cylinder diesel. I use the boat regularly throughout the year in Niceville Florida (in the Panhandle) and have approximately 450 hours on the engine. Over the years, the engine has proven to be very reliable and I have had very few problems. I change the oil annually and try to do all the recommended periodic maintenance to include inspections of all the hoses, fittings, and other connections. About three years ago, I noticed that the primary/screw-on fuel filter on the starboard side of the engine was loose. The "L" bracket that held the fuel filter assembly to the engine had sheared at the 90 degree angle. The fuel lines to/from the filter were the only things holding the filer assembly in place, and were rubbing against other parts of the engine--probably not a good thing. I assumed that I just had a bad bracket and took both parts to a welder who repaired it using an extra heavy bead at the broken seam to make it a bit stronger. Inspecting the engine a few months later, I found a bolt head lying at the bottom of the containment bilge under the engine. Naturally, finding a sheared off bolt head under the engine is a bit alarming to say the least. After a lengthy search, I found that the guilty bolt head (and the rest of the bolt) had come from the newly welded fuel filter assembly bracket. The bracket was fine and the second bolt was still holding, but now the obvious problem was excessive vibrations from the engine. I had a mechanic check the engine mountings and they were all fine. Instead of just replacing the bolts, I got two longer, high quality stainless steel bolts, and a 4 inch length of 1 in. inch radiator hose. I drilled two holes thru the radiator hose to correspond to the holes with the mounting bracket and the fuel filter assembly. Then I took the two new bolts and re-mounted the fuel filter assembly, but using the radiator hose as a shock absorber between the bracket and the filter assembly. (See photo). I admit it's a "jury rig" but it appears to work fine and I haven't had a problem since. Given the discussions I've seen in 350 IA e-mails, it seems that several other boats have had the same problem. I would also venture to guess that several boats in the fleet have the problem with the broken bracket/loose fuel filter, but they don't know it yet as making sure the fuel filter is secure is probably not a routine check item. So I would recommend that anybody with about 20 minutes free time and $4 to buy the length of hose and two stainless steel bolts from Ace hardware do the same modification.

But wait...my problems with engine vibrations weren't over. Last week, when pulling into a dock with the motor in idle, I got a very rapid over temp. I cut off the engine and made it to the dock under sail. Investigating the problem, I found that I had a substantial amount of engine coolant in the containment bilge under the engine. &^%#^!#^^&$)!*!(!! I checked all the usual suspects-belt, thermostat, raw water pump, engine mounted coolant pump—even the thru hull. I couldn't find any leaks and couldn't figure out why it was overheating or how the coolant had leaked out. After many contortions in and around the engine, several skinned knuckles, and lots of cussing, I eventually tracked down the problem. The two mounting brackets for the heat exchanger (you guessed it) had broken and the heat exchanger was resting on the aft part of the engine. Eventually, the vibrating contact with the engine had worn on the bottom of the heat exchanger cylinder and opened a small crack which allowed about half the coolant to leak out before I shut down the engine. It went into the containment bilge from the aft part of the



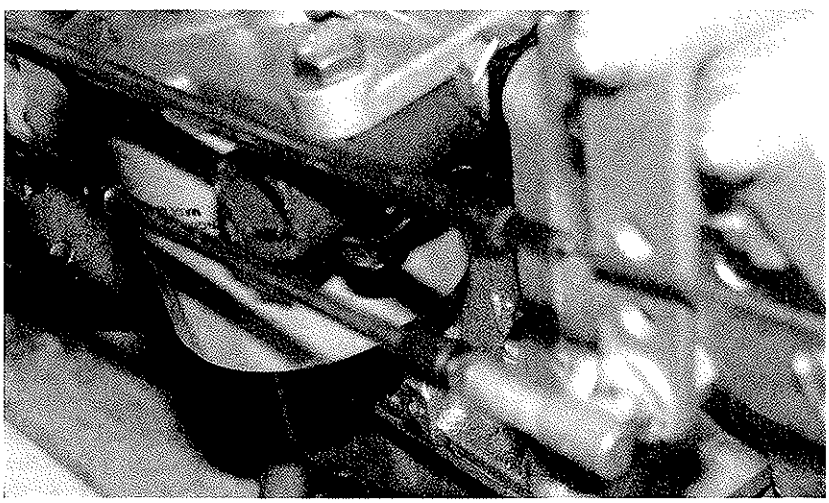






engine which explains why I couldn't find the source.

I took the heat exchanger to the good people at the Fort Walton Beach Radiator Repair shop (in Ft Walton Beach, FL). As the heat exchanger cylinder is copper, they braised the crack and also built up other areas on the cylinder that had some wear from vibrating against the engine. Then I asked them to manufacture two new mounting brackets, but to make them a larger diameter than the originals. They had to have the same shape as the old ones so as to properly fit the heat exchanger correctly in its place behind the engine, but I wanted to wedge sections of filleted radiator hose in between the bracket and the cylinder. I also placed a small section of hose where the brackets pinched together to provide added padding for the heat exchanger. I pulled the brackets together with a large vice grip, and used plastic ties to hold them snug against the cylinder. I drilled out the part of the hose that was covering the mounting bolt holes and then threaded thru two longer high-grade stainless steel bolts to replace the shorter original mounting bolts. (see photo). While it didn't look especially pretty, my intent was to pad the brackets and to prevent metal-metal contact between the cylinder & brackets and the cylinder & engine. Then I maneuvered the cylinder back into position and after many more contortions, skinned knuckles, and lots of cussing I managed to get the bolts threaded into their mounting holes in the engine. Once the bolts began to thread in, I cut away the plastic ties.



I have to warn you that for me it was very difficult to get at the mounting bolts to tighten them up. I removed the aft cabin mattress and floor boards and contorted my way around all the hoses and other equipment. But after all that effort, it appears that the fix works just fine.

I had considered buying a new heat exchanger. However, new ones on the web are advertised for about $1100 plus shipping. They come with two mounting brackets, but I was not going to spend that much to buy into the same problem again. The radiator shop charged me about $260 for the repair which included their manufactured brackets, two new end caps, seals and they also cleaned and pressure checked the cylinder.

So the bottom line is that I believe all Catalina 350 owners, or at least those with the Universal M-35 should do a monthly check of the engine--looking and feeling for loose brackets, broken bolts and other possible vibration damage. A cracked heat exchanger with the resulting coolant loss and overheating will always cause consternation and could be real bad if you happen to really need the engine right then. But a leak from a frayed fuel line on a loose filter can be catastrophic.

I recommend that all owners do the quick, simple and cheap fuel filter modification. I don't know what to tell you to do about the heat exchanger. My suggestion is to check the brackets at least monthly, and to do this or another mod-

ification if one is found broken. —*Dave Brown, 2004 Catalina 350, #246 – BAT 06 dbrown@ewa.com*

Five Year Maintenance and the C350 Exhaust Riser

After five years and 182 hours on the clock, I decided to do more than routine maintenance on the Universal M35B diesel in my C350 including replacement of a number of hoses, removal of the heat exchanger for cleaning and pressure testing, changing the long-life DEXCOOL coolant, and replacement of the exhaust riser, which is the main topic of this article. None of these service items were difficult from a technical perspective, but there were a number of bruised knuckle incidents due to tight spaces, particularly when dealing with the heat exchanger. The following are some points of interest discovered during this service:

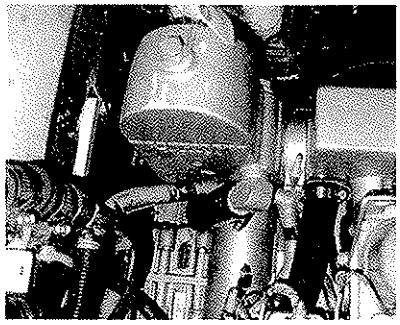
1. The clear plastic hose to the coolant expansion tank was leaking and was easily replaced with a section of heater hose (my local NAPA auto parts store had the right size, which I believe, was 5/16-inches).

2. The 7/8-inch raw water hose from the heat exchanger to the raw water pump (runs along the port side of the engine) had several areas of abrasion and was replaced. I noted that this hose was about five inches longer than what is recommended in the manual so I replaced it with the correct 26-inch length allowing for a better fit and minimal chafing potential. While I was at it, I also replaced the short 11-inch section of 1 1/8-inch hose carrying coolant from the exhaust manifold to the top of the heat exchanger.

3. The hose running from the heat exchanger to the fresh water pump adjacent to the long raw water hose described above, had just about worn through in several spots. This was caused by contact with the improper length raw water hose. This is an expensive custom shape hose (over $40 – Universal part no. 200439) which now fits much better with the correct sized adjacent raw water hose.

4. The heat exchanger had considerable deposits in it, although not to the point it caused an increase in engine operating temperature. It passed the pressure testing with no problems and should probably serve well for the next five years.

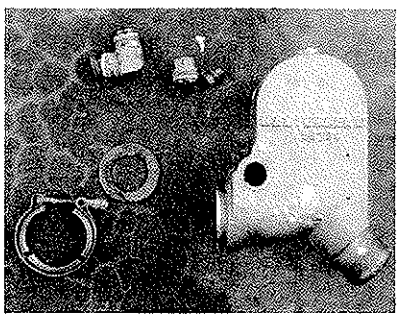
5. Probably the messiest job was replacing the coolant, as the main drain plug is located very low on the engine near the forward port side engine mount. Upon removal of the brass drain plug, a large amount of coolant pours out very quickly and is very difficult to catch. In order to remove as much of the old coolant as possible, I disconnected both of the hoses leading from the engine to the hot water heater. One of my biggest concerns was bleeding the air from the coolant circuit (based on experience with my prior boat, a Catalina 30). In an effort to avoid any issues, I added as much new coolant as I could to these hoses at the hot water heater end prior to reconnecting them. I was pleasantly surprised that the engine did not overheat at all so there were no major air locks; however, the system has "burped" several times and I have added a bit more coolant.



Exhaust Riser before removal

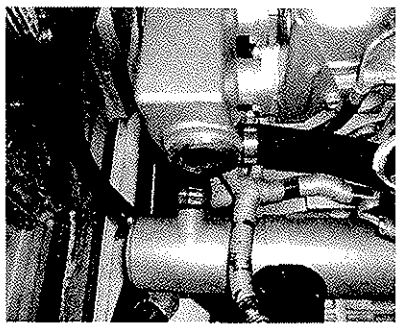
Exhaust Riser Inspection

The exhaust riser has been the focus of my concerns as it is an all-aluminum casting where seawater is injected in a passage directly above the exhaust passage, and any failure of the wall between them would allow seawater to enter the engine. My local Westerbeke dealer indicated that these risers last about six or seven years, so I thought it was a good time to take a close look at it. However, there is no good way to inspect it, so I decided to replace it just to be safe.



Exhaust riser and associated components after removal

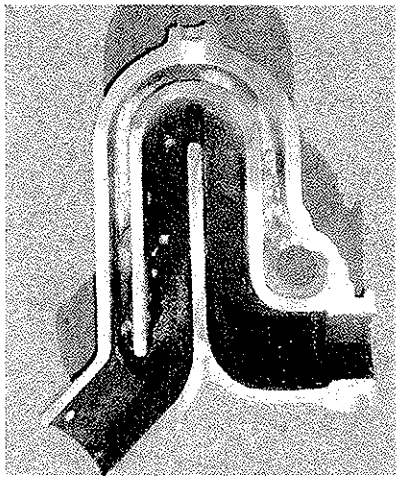
Upon removal of the riser, I observed significant corrosion inside the seawater passage and a few spots of corrosion inside the exhaust passage, mostly on the top and sides but not on the bottom. My first thought was that small pinhole leaks had formed and that possibly a small amount of water might have found its way into the engine. However, there was no sign of corrosion in the visible portions of the exhaust manifold, nor on the bottom of the exhaust passage suggesting that these small areas of corrosion in the exhaust passage might be due to condensation after shutting down the engine.



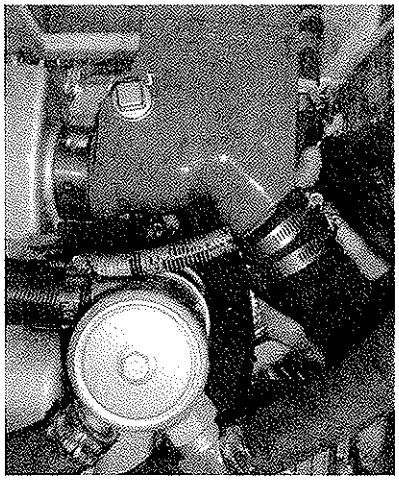
View of the exhaust manifold flange after riser removal

To verify my hypothesis regarding the observed localized corrosion deposits in the exhaust passage of the exhaust riser, I cut the riser in half to do a forensic inspection. I was very pleased to see that the aluminum wall between the seawater passage and the exhaust passage is very thick. This verified my hypothesis that the few localized areas of corrosion in the exhaust passage were not caused by leaking from the sea water side of the riser, but instead were likely due to condensation. I also considered the possibility of seawater sloshing up the exhaust passage and through the riser. However, if this had occurred, seawater would have pooled at the bottom of the exhaust passage, which is slightly lower than the exhaust manifold flange, and there would be considerable corrosion at the low spot. The absence of significant corrosion at this point is evidence that no seawater had sloshed up and through the riser exhaust passage. Additionally, I found that the riser provides about 5-inches of rise above the entrance to the exhaust manifold, essentially adding 5-inches of vertical distance that seawater within the exhaust system would have to travel before it could enter the engine.

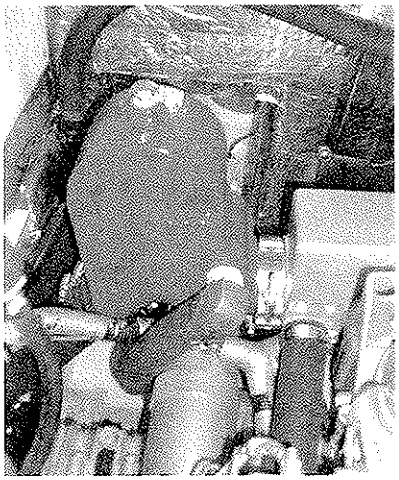
Once the riser was opened up, I observed some apparent thinning (but still very thick) of the aluminum wall on the lower portion of the seawater inlet (note that I scraped away a considerable amount of material prior to taking the photo). I also noted that there was some corrosion or deposits in the seawater passage which if allowed to progress, would eventually restrict the flow of water through the riser. Based on this observation, I believe it is more likely



View inside the Exhaust riser after cutting it in half (port side half shown)



View of the new Exhaust Riser in Place



that the riser would start to cause problems due to blockage in the seawater passage (most likely overheating) before the wall between the seawater and exhaust passages corrodes through. This is good news as the later could result in catastrophic engine failure. Regardless, I believe a five-year replacement schedule for the exhaust riser is probably good insurance and the job is not that difficult.

Exhaust Riser Replacement

The exhaust hose and raw water inlet hose were not difficult to remove despite five years of service. Likewise, the clamp holding the exhaust riser, and the riser itself were not hard to remove. Once removed however, the exhaust manifold flange needed to be scraped clean prior to installation of the new riser. I was able to find a new exhaust riser for about $225 (Westerbeke part no. 37403 which replaces old part no. 36734, although my new riser, painted fire engine red, has the old part number cast on the side). This includes the riser, the brass fittings, the clamp and gasket, and an instruction sheet. You will need some high temperature gasket sealer, Teflon tape or similar material, and a torque wrench, a pipe wrench or set of channel locks to screw in the brass fittings, as well as a screwdriver to remove and replace the hose clamps.

After removing the old riser, the first step is to make sure the exhaust manifold flange is clean. Then the gasket is glued on to the manifold flange with gasket sealer and allowed to dry. The brass fitting are then coated with Teflon tape and screwed into the aluminum exhaust riser casting. I made sure that the seawater inlet (on the starboard side of the riser) was oriented in the same direction as the old riser. The mounting clamp is then set loosely on the exhaust riser flange followed by mating the riser flange to the gasket surface on the manifold flange. I found it easiest to rotate the clamp so that the gap is on top allowing visibility of both flange surfaces so that you can make sure everything is lined up before tightening the clamp. Final tightening is done with the torque wrench to between 8 and 10 foot-pounds per the instruction sheet. Re-connect the seawater inlet hose and the exhaust hose and you are done. Fire up the engine to make sure you don't have any water or exhaust leaks. *–William T. Van Wagoner, P.E., Destiny C350 No. 229*