Catalina 310

C310 Association Technical Editor

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Bilge Pump Float Switch

Many owners have expressed the concern that when they are healing on a port tack the bilge pump switch flips to the on position. Due to limited space in the bilge pump well the switch cannot be mounted parallel to the centerline. My solution is to eliminate the float switch and replace it with an Accu-Gage Monitoring System Bilge Buddy manufactured by Snake River Electronics.

Shut off the power at the panel and remove the existing switch by removing the two screws in the base and cutting the wires where they tie into the wire harness. Dry out the left over screw holes and fill with 5200 or other appropriate patching material. Select a location to mount the two sensors for the new switch. I mounted them on the stringer at the aft end of the bilge pump well (Photo 1). This location puts the unit close to the existing wiring harness so that there will be enough wire to simply make the connection. I mounted the low water sensor on the port side touching the bottom of the well. Pre-drill an 1/8" hole and attach the low water sensor with a 3/4" screw and a little 4200 around it to seal it off from moisture. This sensor will detect low water at approximately 3/4" allowing the pump to run an additional 5 seconds. This will clear the well to the extent possible with the stock pump.

Cut the wires to an appropriate length and tin all of the ends. Follow the instructions for the "High Current Modifications & Switch Installation Instructions" as shown in the unit's installation manual for wiring. You will connect the Red and Purple wires to the boat's Brown 12 VDC wire coming from the Manual side of the Bilge Pump Selector switch on the panel. Connect the Black wire and the pump's ground wire to the boat's common ground. Connect the Yellow wire and the pump's positive wire to the boat's Orange 12 VDC wire coming from the Automatic side of the Bilge Pump Selector switch. The wiring diagram in the manual is difficult to follow, thus the explanation above.

Pre-drill an 1/8" hole and attach the high water sensor with a 3/4" screw and a little 4200 around it to seal it off from moisture. The high water sensor can be mounted at a level with which you feel comfortable, I put mine approximately 2 inches off of the bottom of the well which allows about 2 1/2 inches of water to accumulate in the bilge. Test the pump in all modes, manual and automatic, to make sure it is functioning properly. *–Bill*

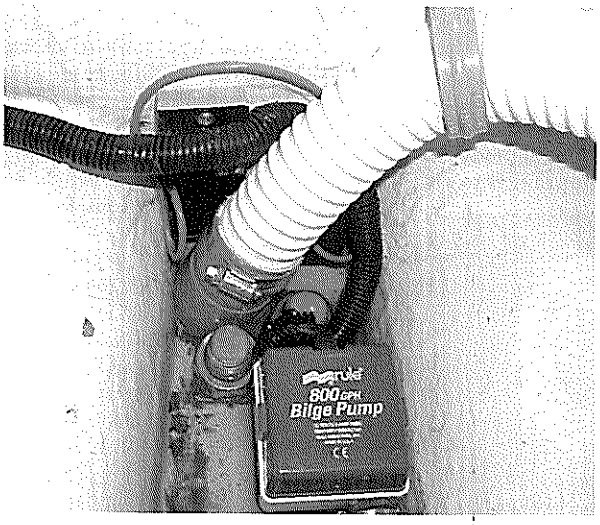
Dry Locker and Refer Hatch Hold Open

It is always a challenge to hold open the Refer or the Dry Locker hatch when loading or retrieving items. WM sells a stainless steel Hatch Holder for holding open just such a hatch. I mounted the Dry Locker spring approximately 6" from the back of the locker and 5" from the back of the hatch. For the Refer hatch I used the same dimensions. Be sure to use a screw no longer than 3/8" into the hatch. Mark and pre-drill your holes being careful not to go all the way through the hatch. (Photo 2) *–Bill*

Your Tech Section

The tech section for the 310 is your opportunity to share your ideas and solutions with other owners as well as gather information for your own use. The Internet has been an excellent source for information, however it seams that the chat lines, etc. have the C310 owners scattered to the four winds. Please feel free to send me your ideas, articles and questions so that we can utilize the Mainsheet as conduit for sharing information.

Next issue I will have tackled the retro fit of my Maxwell Windlass to rope and chain, adding a tank monitoring system and maybe a little sailing in between. *–Bill*



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Tank Monitor System

I elected to install the Acu-gage Monitor System from Snake River Electronics. This was purchased from WM and, the truth be told, it was on sale for a really great price. This system uses externally mounted monitors on the tank so no holes are drilled and the installation is fairly painless.

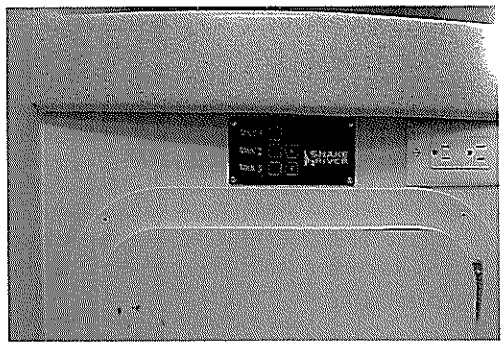
I started with the fresh water tank. It will be necessary to completely remove the tank so start by emptying all the water out of the tank. In order to access the main water supply hose connection remove the built in drawers under the forward berth by first removing the drawers and then removing the framework. The removal is easily accomplished by removing 4 screws from the frame and sliding the cabinet out of its position. With a little maneuvering the drawer unit can be moved aft out of the way. By removing the drawers you will reveal the water line connection at the base of the tank behind what used to be the drawer cabinet. Remove the hose clamp and slide the water line off of the hose barb being careful not to break off the hose barb.

Now that the work aft of the forward berth is complete slide the mattress aft and stand it on the cabin sole to get it out of your way for the next step. Don't forget to leave the forward hatch open as you may wish to access the forward berth area this way. Remove the wood hatch over the tank to expose the top of the tank. Loosen the hose clamps for the fill hose and the vent hose. Remove each hose from its hose barb and slide them out of the way. With all hoses clear you may now lift the tank out of its cradle in the bow being careful not to break the hose barb at the bottom of the tank.

The Acu-gage system requires the installation of two conductive strips to the side of the tank running from top to bottom. With the tank out of its cradle this task is easily achieved. The instructions for the system are very clear on how to mount the conductive tape and the associated sensor module. I mounted the module high on the tank so that when the tank was in place I could access the wires for the sensor module for running the wiring at a later time. With this step complete you can reinstall the tanking by following the above steps in the reverse order. Note that this is an excellent time to clean out the left over construction debris floating around in the hull under the tank and behind the drawers.

Next I installed the conductor strips and sensor module on the waste tank. This work was accomplished without the removal of the tank. Working through the hatch at the aft side of the aft berth I was able to reach between the fiberglass cover and the bulkhead and install the two conductor strips and the sensor module. I mounted the sensor module low in this case so that the wires are accessible, but close to the hull for routing the wiring out of the way. All of this was about a half a days worth of work. Not to let the other half go to waste I went sailing and tackled the next phase another day.

Now that the sensors are installed it is necessary to run three #18 Ga. wires from the sensor to the monitor control panel. I mounted the monitor control panel under the sink in the head as this seemed like the most useful and



centralized location. I considered the nav station, but it seems that there are more critical instruments to be mounted in that precious piece of real estate. The routing of the wiring is a mater of preference. I ran the three wires from the waste tank under the aft bulkhead, along the starboard side of the port locker, across the forward bulkhead of the locker, behind the head and into the sink cabinet. I ran the three wires from the fresh water tank down the aft side of the tank and through the same hole as the water line. From there I ran the wires through the conduit under the mast compression post, along the port side of the hull, under the floor of the head and into the sink cabinet. All wires need to be secured up off of the hull with zip ties and properly protected from chafe. All wires can now be properly attached to the monitor's wiring harness in accordance with the instruction manual.

The final step is to run 12v power from the panel to the monitor. My accessory count is getting high so I needed to construct a bus so that all of the wiring for various devices can be properly terminated, but that is another project for another issue. With all the circuitry connected the system can be energized and properly calibrated following the instructions in the manual. The time consuming part is emptying and filling tanks in order to properly calibrate the system. The system seems to be accurate and it only draws current for the brief moment you press the monitor button and read the level. There is an add-on available for monitoring the diesel tank, but I think I will stick with the gage at the helm. May your fresh tank be full and your waste tank be empty, or at the very least you should be able to know the status. *–Bill*

Windlass Upgrade

My boat came with the Maxwell VC500 windlass, which only accommodates rope rode. After battling my chain and anchor in a couple of storms I decided to upgrade my windlass by adding a chain gypsy. You can order a kit directly from Maxwell or go to the chandlery and order the kit. I bought mine through WJM marine for less money than the manufacture wanted for the same kit. In addition to ordering the kit you will also want to get the VW500 Owners Manual. Maxwell will sell you one or they will fax you one for free, or at least they were willing to do that for me. The blow-up illustration of the parts and the parts list are indispensable for retrofitting the chain gypsy since the kit does not come with instructions.

You may have more nimble hands than I and you may be able to make the change without completely removing the windlass, but I removed the windlass in order to more easily retrofit the unit. You will need to access the unit from the top and bottom so you will want remove the round access port inside the anchor locker and the square access hatch at the forward bulkhead above the forward birth.

Start by turning off the power at the windlass breaker and disconnecting the red and black wires at the windlass motor. Remove the windlass drum by prying off the end cap and unscrewing

the large machine screw under the cap. The drum will slide off with a little coxing, but a wheel puller makes it really easy. Under the drum, on the remaining deck plate, there are four hex head bolts, remove these bolts while your partner holds the drive unit from underneath. With the bolts removed the drive unit can be removed from behind the bulkhead. Note that it may be glued in place from the original installation and will require some twisting and muscling to extricate the unit. With the drive unit removed you can easily remove the nuts and washers that hold the deck plate fast to the anchor locker wall. It is likely that it is sealed with 4200 so you will need to razor cut the seal and pry the unit off of the locker wall. With the deck plate removed unscrew and remove each of the four studs that are used to secure it in place.

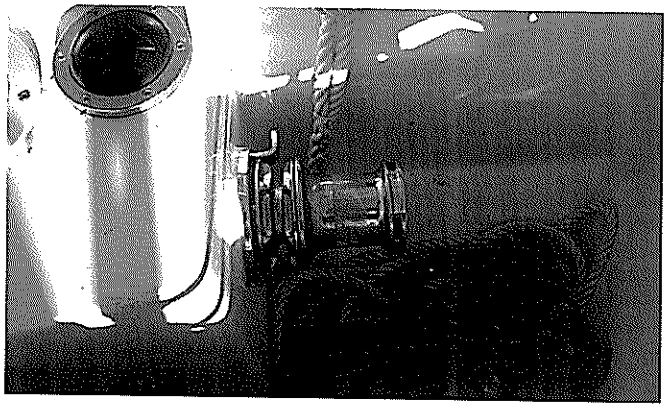
The final step in the disassembly process is to remove the main shaft from the drive unit. The only special tool required for this job is a pair of external snap ring pliers. Using these pliers remove the snap ring from the main shaft at the bottom end of the drive unit. Slide the main shaft out of the drive gear housing. This completes the disassembly required for the retrofit.

The new deck plate is delivered with the bushing separately packed in a protective wrapper. The bushing needs to be mechanically pressed into the deck plate. I placed both the deck plate and the bushing into the kitchen freezer for a couple hours. Once suitably chilled I pressed the bushing in using my bench top vice with wood blocks to protect the new parts. Install the original threaded studs into the new deck plate and reinstall the deck plate into the original holes using 4200 caulk to seal between the deck plate and the bulkhead. Note that the stripper arm on the new deck plate should be oriented toward the aft wall of the anchor locker. This will allow the chain to freefall into the locker when in use.

Prepare the new, longer, main shaft by lightly greasing it and installing the first key into the lower most slot. Slide the main shaft into the drive unit and reinstall the snap ring at the back end of the main shaft. Reinstall the drive motor by having your partner slide the unit into place being careful not to mar the drive shaft as they feed it through the deck plate bushing. Reinstall the hex head bolts through the deck plate into the drive unit and tighten. Reinstall the power wires to the drive unit being sure to match the positive wire to the positive terminal. You are now finished with the below decks work and can close up the previously opened deck and bulkhead access hatches.

For the final assembly of the chain wheel and drum you will simply slide the remaining components into place on the main shaft. First install the ring seal over the raised inner edge of the main shaft. The next piece to install is the lower clutch cone, which has a setscrew in it, so be sure to back out the setscrew before installing the clutch cone. Install the middle key being careful to hold it in place while you slide the lower clutch cone onto the main shaft and over the key. Slide it all of the way onto the main shaft and tighten the setscrew. Place the chain wheel over the main shaft up against the lower clutch cone and slide the upper clutch cone onto the main shaft, aligning it with the key, and up against the chain wheel.

Place the last key into the keyway on the main shaft and hold it in place while you slide the drum onto the main shaft aligning it with the key. The clutch nut is then threaded onto the main shaft and drawn up tight to the drum using the supplied aluminum lever bar.



Finally install the retaining washer and machine screw into the end of the main shaft and tighten with a screwdriver to lock in the assembly. Give the unit a test run to confirm that the rotation is correct. You are now ready for the ease and grace of pulling you chain rode with your newly retro fitted windlass. Until next time. *–Bill*

Support Your Association
and send in your articles, news and technical notes for the next issue!

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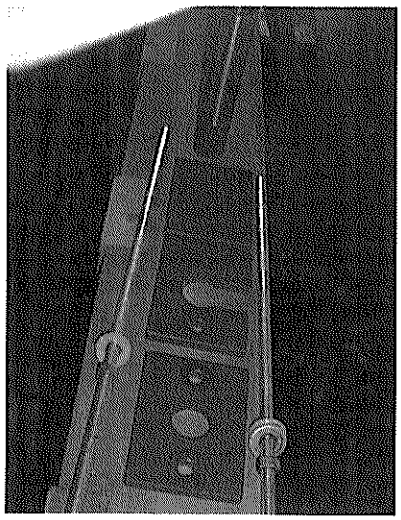
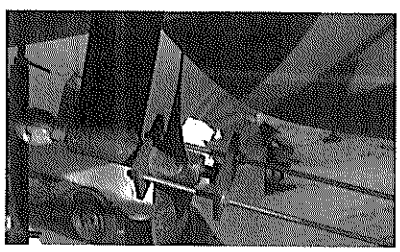
Installation of a New Cutlass Bearing

In April '02, after 35 hours of engine operation, I had to replace the cutlass bearing. I fabricated a combination prop puller/cutlass bearing remover/installer.



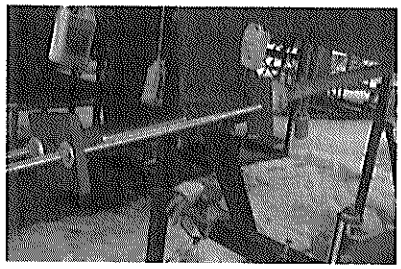
This tool pulls the prop and pushes the bearing up the shaft. Alternately if the 1" tube is split in half it can be installed above the strut and be used to push the bearing down and off the shaft. The materials required to fabricate the tool are 3/8" x 3" x 12" flat steel bar stock, 1" OD x 1.25" ID x 6" steel pipe, 2 – 14' x 3/8" all thread rods and 6 - 3/8" nuts and washers.

Remove the prop first, but do not put a lot of load on the puller if you have a brass or bronze shaft. In a few moments of mindlessness, attempting brute force instead of finesse, I managed to bend the threaded end of the shaft and actually compressed the cotter pin hole. The correct way to remove the prop is to tighten up the puller, then using a couple of heavy mallets, block the prop hub with one and smartly whack the other side. Barring corrosion, it will pop right off.



The next step is to prepare to remove the old bearing. Remove the zinc from the shaft and the setscrews from the strut that holds the cutlass bearing. The shaft needs to be cleaned down to a smooth surface to allow the bearing slide up the shaft. You are now ready to install the bearing removal tool and push the bearing up the shaft.

The slotted bar on the tool is placed on the upper side of the strut, positioned with clearance for the bearing to push through. The 1" tube is placed on the shaft where the prop was located, a little lubrication inside and out helps the process. With the two threaded rods in place through the first bar slip on the bar with 1 1/16" hole in it and snug up the nuts.



Alternately tighten the nuts to push the bearing up the shaft. Once the bearing is completely exposed cut the bearing with a dremel or other grinder along its sides, being careful not to nick the shaft, split the bearing and remove it.

Finally remove the tooling from the shaft. Push in the new bearing by hand and tighten up the setscrews. You may now reinstall the prop. Reinstall your new zinc and the job is complete. I used shaft Magnesium instead of shaft Zinc. Zinc is a lot less reactive in fresh water, so Magnesium is one rung up on the periodic table and more reactive, but a lot more expensive.

You can get some clues on the engine alignment buy checking the wear pattern on the old bearing. Engine alignment should be done a week or so after launch with the rig installed and tensioned. *–Peter Sandford, Hull #147 For Pete's Sake, Oakville Yacht Squadron, Oakville, ON*

Cutlass Bearing Removal/ Installation Tool

This is a modification of a tool I saw listed on the Internet. I do not know who designed the original or I would credit them for the idea.

I used two pieces of 3/8" thick x 4.5" square plate steel.

In one of the two pieces I bored a 1 3/8" hole in the center of the plate.

In the second piece I bored a 1 1/16" hole in the center of the plate. I turned this plate so that it was diamond shaped and drew two lines from the outside edge of the centered hole to the edges of the plate. Use a hacksaw (you will want a new blade to do this in 3/8" steel) and cut a 1 1/16" wide slot to the centered hole. Lay one plate on top of the other and drill two 1/2" holes in the outside points of the diamond about 1" in from the points.

You will need a small piece of 1/4"x 2.5" wide x 3.5" long steel for this next part. Center a 1 1/16" hole in the 1/4" plate. Take the 1/4" plate with the 1 1/16" hole and center the hole in the hole on the 3/8" plate that has the 1 3/8" hole. Once it is centered, clamp together and bore two-1/4" holes in the upper two corners of the 1/4" plate through the 3/8" plate. What you are doing is making an adapter to decrease the hole size of your 3/8" plate from 1 3/8" to 1 1/16". You use this adapter to install the new cutlass bearing.

The bearing removal insert is probably the most challenging to do. If you do not have access to a lathe, drill press or 1/2" hand-held drill contact a machine shop to have this piece made. I used a 1" black pipe (Lowe's) 6" long. My cutlass bearing is listed at 11/4" OD (outside diameter) but it is actually 1.255" or 5 thousandths over 11/4". I have a small wood lathe with a three-jawed chuck that I clamped the pipe into. After cleaning up the sawdust around the lathe, I used a 4" grinder then a metal rasp, a metal file and emery cloth to turn the OD of the pipe to 1.245" or 5 thousandths under 11/4". You could also use a drill press with a long bolt and spacers through the pipe or a hand held drill in a bench vise. Anyway to rotate the pipe as you use the grinder. I had the lathe on a low speed and use calipers to check the diameter and make sure at least 41/2" of the 6" pipe is consistent. After milling down to the correct diameter, I used a hacksaw and cut the pipe lengthwise then crosscut to a 41/2" length. Don't be too concerned about a perfectly straight lengthwise cut. It is easier with a slightly wandering line to match the halves up to each other. Use a hose clamp to keep the two pieces together.

The last items you need are two lengths of 1/2" threaded rod each 12" long. (Threaded rod is usually sold in 36" lengths). Four 1/2" NC (national coarse) nuts finish the hardware.

Removal/Installation of Cutlass Bearing

Before using the tool, the prop must come off the shaft. (I actually spent about 2 hours removing the prop and about 20 minutes removing/installing the cutlass bearing so be prepared. My problem was the cotter pin was corroded inside the prop shaft and I eventually ended up drilling it out with a newly purchased cobalt drill bit.) Once the cotter pin is out, remove the castle nut, turn the nut around and thread back on until flush with the end of the shaft. I used a 3/8" nut to protect the end of the shaft from the point of the 2-jawed puller and removed the prop with the puller. The reversed castle nut helps keep the threads from being damaged or the end of the shaft from expanding when the puller exerts force against the shaft end.

After removing the prop, place the two halves of the bearing removal pipe over the shaft above the cutlass bearing and re-clamp the two halves together. Wipe some marine grease over the entire pipe.

Remove the two stainless set screws that hold the cutlass bearing in the strut.

Line up the 1/2" holes in the two 41/2" plates and insert the threaded rods then thread the nuts on the rod ends.

Spread the plates apart about 9-10" and slide the slotted plate over the prop shaft above the bearing removal pipe. Center the lower plate on the lower end of the shaft and check to make sure that the old cutlass bearing has clearance to get pushed through the 13/8" hole in the lower plate.

Gradually tighten the nuts on the threaded rods- a half turn or so on one side then move to the other side. Try to maintain as even a pressure as you can. When you reach the hose clamp on the removal pipe, take the clamp off. The tool should be far enough in the bearing holder. The bearing will probably make a loud "pop!" before moving-this is normal.

Push the old bearing out and remove the pipe.

Wipe marine grease on the new cutlass bearing. Check the prop shaft for any burrs or sharp points and wipe grease on the shaft from the prop taper to the strut. Gently slide the new bearing on the shaft up to the strut.

Take the small plate and bolt on to the lower 3/8" plate. Then spread the two 3/8" plates apart again to 9-10" and re-install on the shaft.

Again, gradually tighten the nuts on each side of the plates to push the new bearing into place.

Once it is flush, install the set screws with a drop of Loc-tite on each and put the prop back on. *–Courtesy of Pete Hazel*

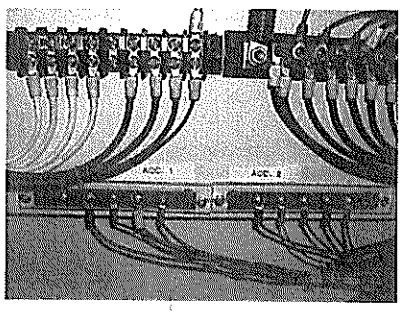
Added Power Connection Capacity

As I add more electronic equipment to my boat I find that I needed to properly expand my circuit breaker (CB) capacity. Not wanting to buy a whole new electrical panel or add a remote panel I have arrived at a simple solution. I have added two five terminal bus bars giving me plenty of capacity.

If your boat is equipped like mine, hull number 73, your CB panel has one accessory CB and one spare space for an accessory CB. The first step in the evolution was to install another 10 amp CB, but before I knew it there were three wires hanging off of each of the two CBs. Bearing in mind that most of the items being powered by these CBs were low draw, 0.1 – 1.5 amp loads, and each device has its own in line fuse, it made sense to properly connect multiple loads to a single CB. Additionally, the loads are generally not run simultaneously.

The next step in the evolution was to install two five terminal buses. I am really cheap so I purchased two pieces of predrilled and tapped brass bus bar from Minnie's (spelled used boat stuff) for 99 cents each. Each piece has seven pre-tapped holes with brass screws and measures approximately 4" in length. Cut a piece of 1/8" acrylic 1" longer than the brass bus bar and drill four 3/16" holes in the acrylic plate. Two holes are used to fasten the bus bar to the acrylic insulator and two holes are used to attaché the assembly to the backboard behind the panel. Place a 3/8" diameter felt pad or electrical tape over the heads of the two screws that fasten the bus bar to the acrylic to be sure that they are isolated from any conductive material.

Fastened the two assemblies to the backboard behind the CB panel and label them to correspond to the two accessory CBs. Run a number 12 wire from the load side of the CB to the nearest terminal on the new bus bar, then attach the positive lead from the

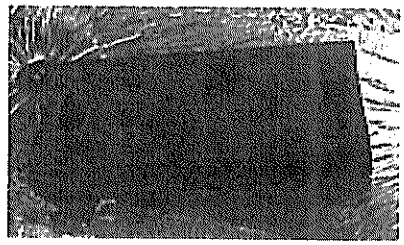


various electronic devices to each of the terminal screws. Try to put items that will operate at the same time on different CBs to minimize and distribute the load to the two CBs. Also route the wires in such a way that the in line fuses remain easily accessible.

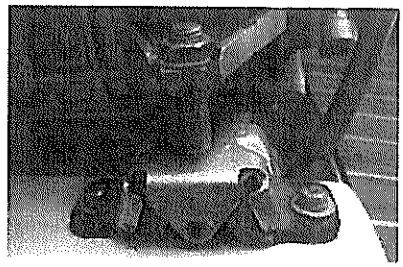
A likely alternative to the bus bar is a duel bus with built in fuses that is sold by WM and others, but that would cost more money. *–Bill*

Engine Mount Modification:

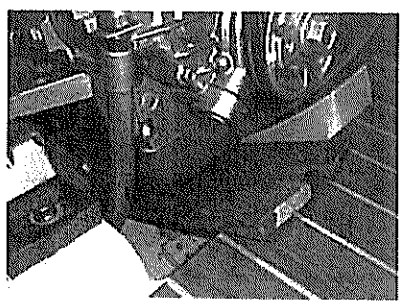
On hull #127, I found that the engine height needed to properly center the prop shaft in the hull tube required extending the front engine mount post almost to the top of it's travel, thus creating a long moment arm and subsequent vibration of the engine.



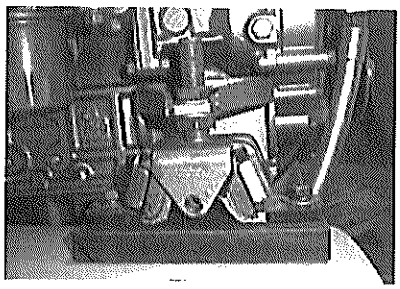
To get around this problem, I determined to add a spacer between the engine mount and hull support, choosing a piece of 3/4-inch teak. I fashioned two identical pieces from a small piece of scrap wood that I found at the local chandlery.



I supported the front of the engine under the oil pan with a couple of short pieces of cedar so that I could insert the teak spacer one at a time under each front mount.



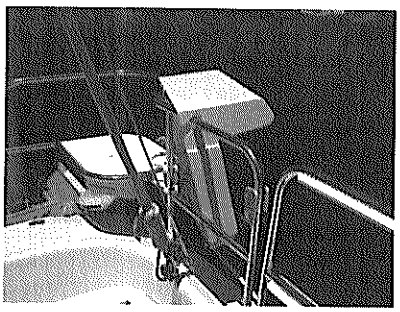
The existing stainless bolts were more than long enough to go through the spacer and tighten firmly in the aluminum plates below the fiberglass.

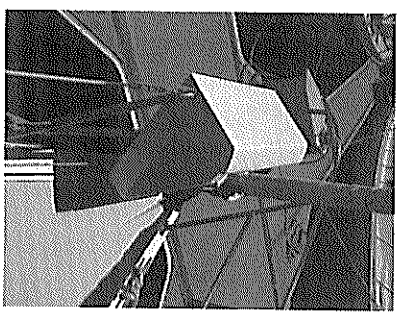


As can be seen, the spacer allowed for a much shorter height of the adjusting bolt, thus reducing the amount of vibration that would be transmitted from the movement of the engine at this point. After careful alignment of the engine to shaft, insuring equal distance on all sides of the shaft to the hull tube, the engine vibration was significantly reduced. This is an extremely easy modification, but one that pays big dividends in the reduction of engine vibration and peace of mind.

Where to put Your Seat

There has been a lot of discussion lately on where to stow your fiberglass helm seat when you are not using it. Mine generally stays in place accept at anchor. You will notice that the seat has a slot cut into it on either side. Conveniently this slot is just slightly wider then the diameter of the stainless steel rails on the boat. I started out hanging the seat off of the starboard stern rail. It was a nice complement to the Bar BQ that hung off of the port stern rail in that it acted like a small table. I have since install a teak flag staff so now the seat goes forward to hang on the port side of the bow pulpit. The port side works well because the anchor locker may still be latched open and the seat does not interfere during an anchor drill. Some Owners simply put the seat on the aft birth and others have indicated that the seat has found a place in the garage. *–Bill*





Westerbeke Service Bulletin #247

Models: Universal M25XPB, M25XPC, M35B, M35BC, M40B

Subject: Fuel Filter Bracket #300103

Fractures have been reported from the field in the area of the 90-degree bend in the #300103 bracket.

Inspection of the brackets returned from the field has shown that the 90-degree bend was incorrectly performed using a knife-edge bender rather than a radius bender. This knife edge bending process places a noticeable crease along the bend, which can stress this area of the metal creating the possibility of a fracture taking place along this crease.

The above subject models using this bracket manufactured prior to September 2004 (E409) are suspect. Visually inspect the bracket and if a crease is visible along the bend area contact Westerbeke Corporation at 508-823-7677. Provide the engine model and serial number and a shipping address and a replacement bracket will be sent at no charge.

Note: To low of an engine idle speed will produce vibrations that can affect the filter bracket and lead to its fracturing at the 90-degree bend. –Bill