Catalina 320 Bilge pump alarm and high water pump project
Danny Jensen, A BOA VIDA hull #972

BACKGROUND:

I often single hand my boat as much as 20 miles off shore. I currently have an electric diaphragm 5 GPM Jabsco pump and a 28 GPM Whale manual pump. If I'm driving the boat , it is not likely I would notice a big leak until it was too late. If I did have a big leak in the boat, my current electric pump would not be able to keep up and it would not be possible for me to operate the manual pump *and* fix the leak at the same time. An independent $50 high water bilge alarm in the cockpit would alarm me at sea and my dock neighbors while on docked that my primary pump is not able to keep up with my pumping capacity.

It is often the case that leaks occur over a long period of time and go unnoticed because automatic bilge pumps pump the evidence overboard. This evidence pumped overboard is often an indication that some maintenance is necessary. Pump cycle counters give you issue recognition. A pump counter costs under $50 and is relatively easy to install.

My existing 5 GPM pump works great at removing almost all water from the bilge. Installing a high capacity secondary pump with an independent float switch would provide for backup of my primary pump. The backup pump should almost never cycle.

Required Reading:
All About Bilge Pumps by David H. Pascoe, Marine Surveyor
http://marinesurvey.com/yacht/bilge_pumps.htm

Requirements:

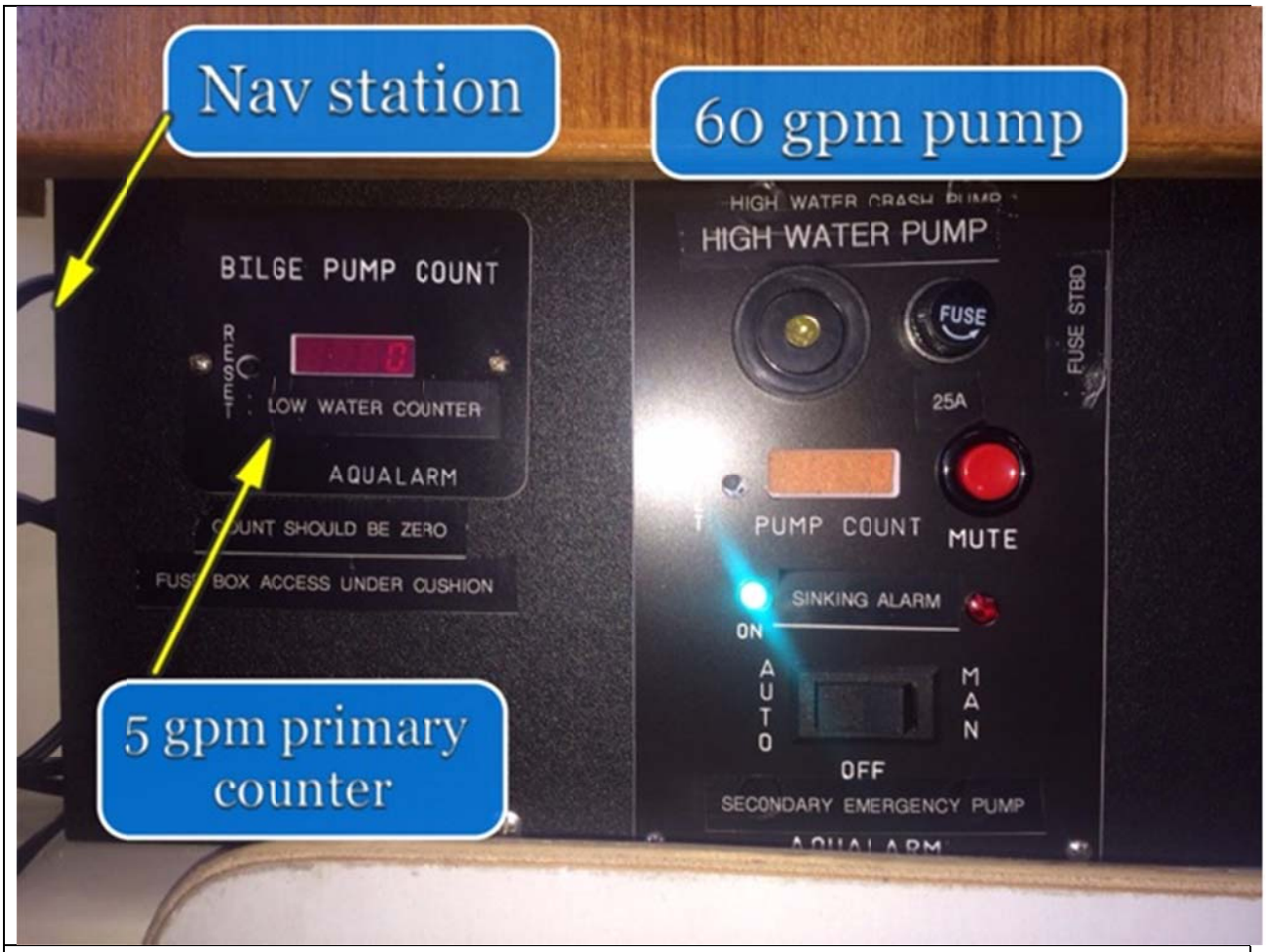
1. Install an high water alarm under locker in cockpit
    a. The high water alarm will have an independent switch level above the primary pump switch.
2. Install an electric bilge counter on my current primary electric pump so I will know when the primary pump has been cycling. This will give me advance information about any leaks I may have before they become big leaks.
3. Install high water submersible Rule 3700 as secondary high water pump
    a. Switch and pump will be slightly higher than existing. Build a starboard bilge shelf to suspend new pump and high water switch.
    b. Install new 1.5 inch hose and new through hull. No check valves will be used.
    c. Wire high water pump/alarm to battery via an existing 24hr fuse box already feeding my Xantrex battery monitor independent of my battery switch. I will use a heat shrink connectors with terminal blocks dipped in liquid electrical tape to make the new pump terminations. My bilge is very dry all the time thanks to gortex packing material

Parts List:

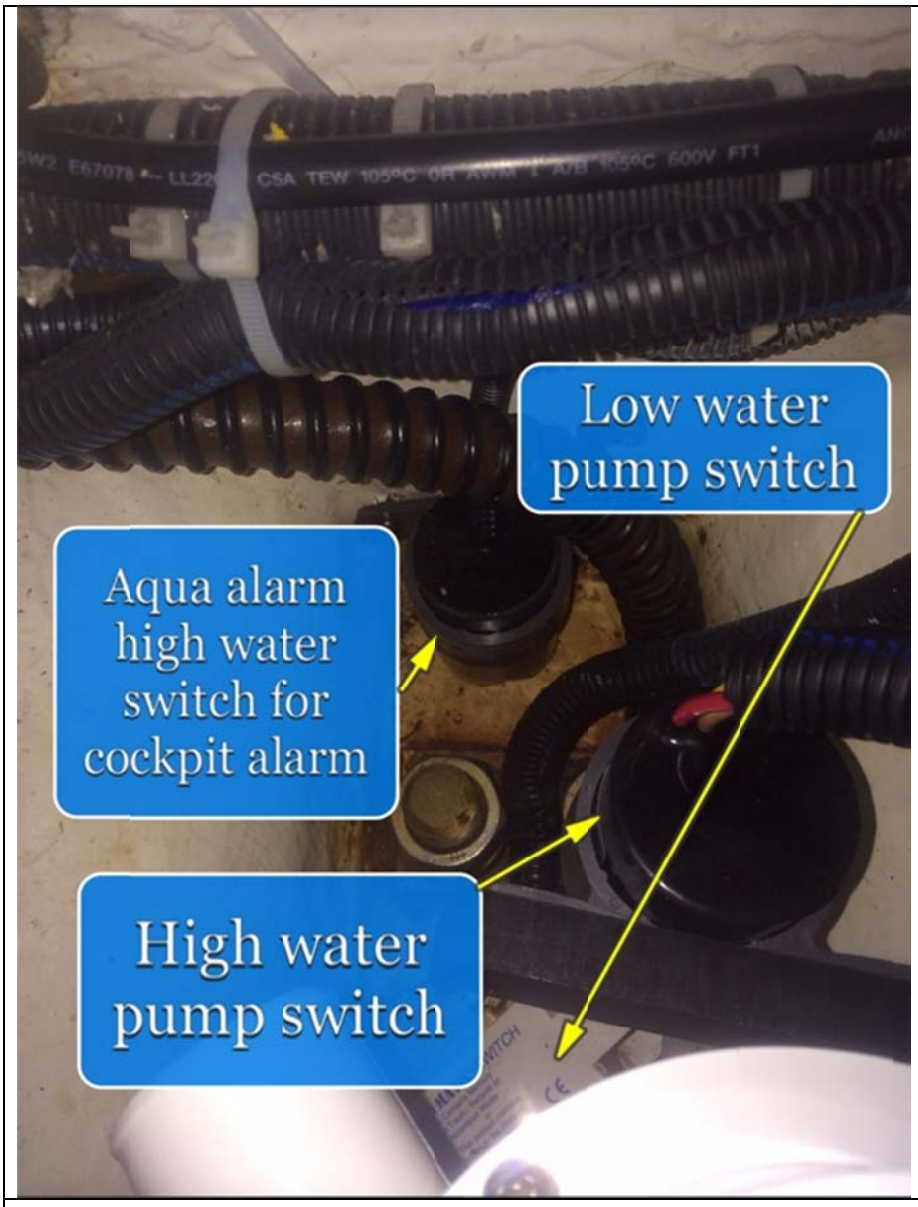
AQA20045 AQUALARM BILGE PUMP COUNTER 1 42.46 42.46 EAC
AQA20043 AQUALARM BILGE PUMP MONITOR - 12 VOLT 1 91.69 91.69 EAC
AQA20240 AQUALARM HIGH WATER WARNING, BLACK WITH 208A 1 44.92 44.92 EAC
AQA20090 AQUALARM PS-309-12 PUMP SWITCH, 12 VOLT 1 30.15 30.15 EAC
TRI147-1126 TRIDENT VAC XHD BILGE AND LIVE WELL "SUPER FLEXIBLE" HEAVY SMOOTH WALL, BLACK 1.5 in x50/ Reel Box
Heat Shrink Butt Splice Connectors (Genuinedealz.com)
Heat Shrink Ring Connectors to terminate
Terminal Block Connectors
Black Starboard 4'x4' x ½ (bought from Defender.com) $70
Rule 3700 model 14a manual pump
Blue Sea Fuse Box for 24 hour DC supply
Marine Boat wire (see schematic)
Split Loom tubing
Plastic Project Electric box
Carlton Electric J Box

Link to Schematic:
http://www.mammothcondos.com/Catalina-320-bilge-pump-electrical-schematic-v1.pdf

This panel is screwed to a plastic project box I bought on Amazon. Com. The box is mounted to a small piece of ½ inch starboard that is glued with 5500. The wire runs through a spare set of wires I had in the aft cabin. This is powered by a 24hr fuse connected to the battery. The kit comes with a separate very small sensor switch I mounted in the bilge area.

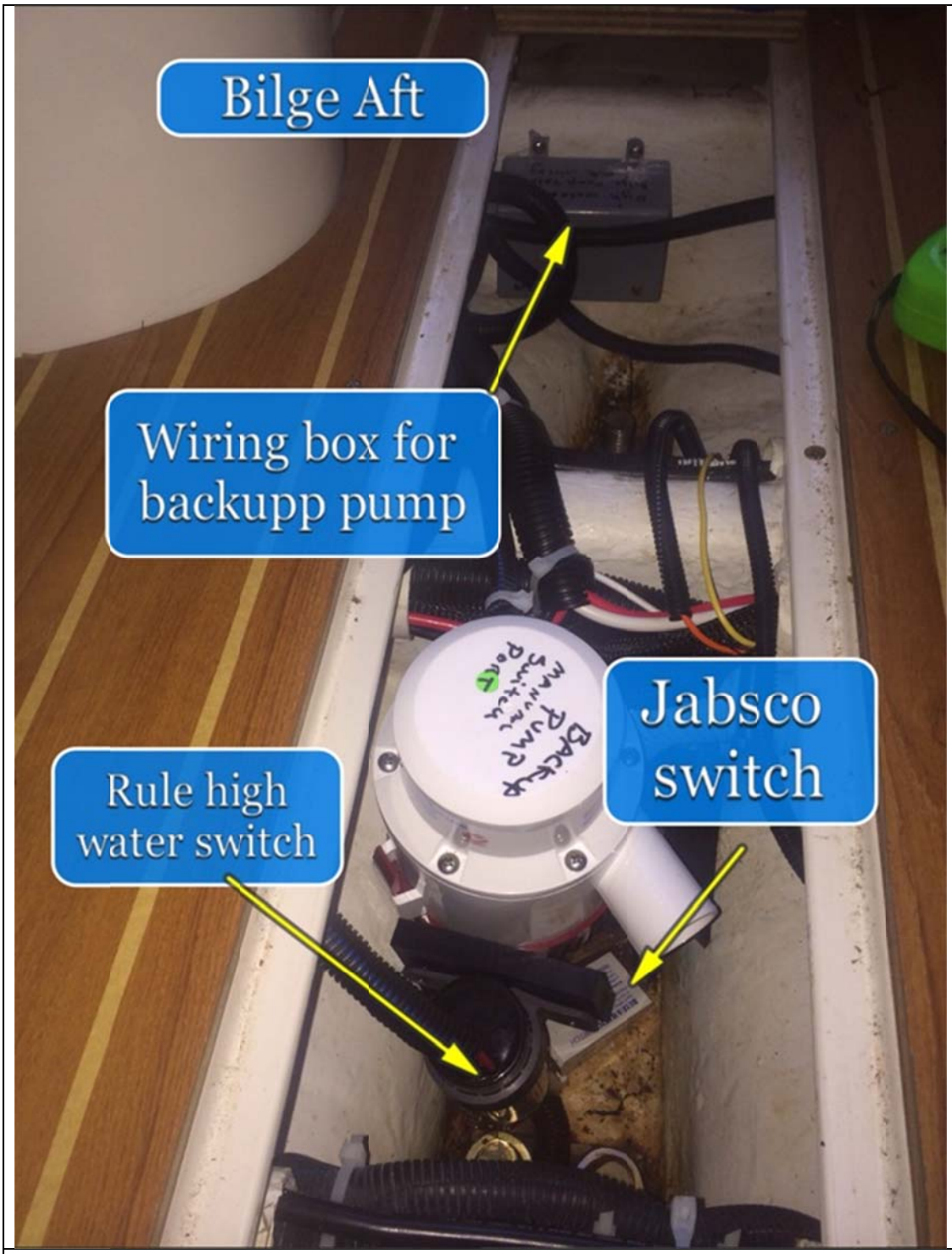


Pump counter addition to existing bilge pump. I just needed to hook the counter wire onto the bilge indicator light connector piggy back on the dc panel and power the counter. Next I added the control switch for the new backup bilge pump. Notice the backup control has an alarm and separate counter. The panel is powered by a fuse connected directly to the battery and you can't disable the automatic pump by switching this to off. The schematic is here http://www.mammothcondos.com/Catalina-320-bilge-pump-electrical-schematic-v1.pdf . A terminal block is mounted to the back side of the panel. Here I tie the wiring together with ring terminals. The panel is starboard. The 25A fuse you see is a secondary fuse just used for the manual switch. The fuse supplying this panel is near the battery bank.



Here you see the factory low water switch mounted to the bottom of the bilge. Just a bit higher you can see the Aqua Alarm switch for the cockpit alarm. Next you see the Aqua Alarm switch mounted on the starboard pump shelf bracket that is set to go off at a higher level just above the water level of the secondary pump. The rule 3700 is in the foreground.

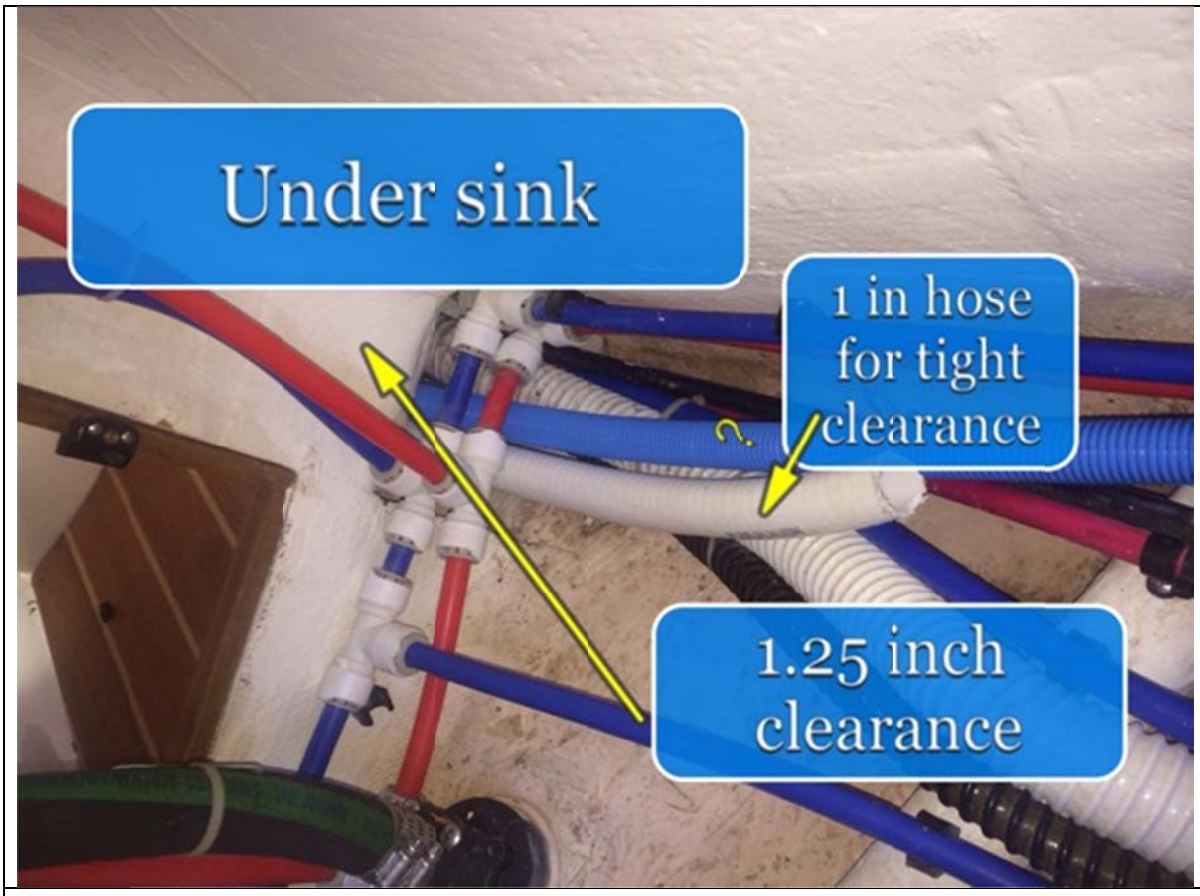
Rule 3700 sits on top of this starboard bilge shelf. Shelf legs radiate out to the side of the bilge. Holes in the base of the shelf allow the pump to mount to the shelf. I use L brackets to tie shelf to the aft side of the bilge compartment. Shelf is easy to remove. This was one of the hardest part of the project. I needed jigsaw. I used 3M 5500 and screws to make the shelf.



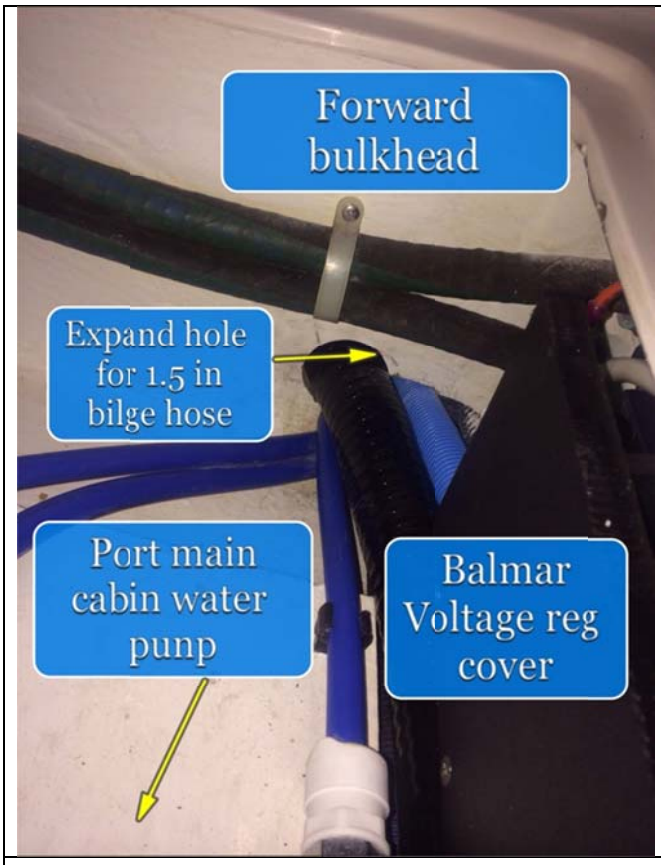
I made a 7 shaped bracket to attach to the pump shelf where I mounted the secondary pump switch. If it looks like the Rule 3700 barely fits, you are right it is no illusion. The Jabsco primary switch just clears the shelf. I used #8 wire for the major runs port and starboard to minimize voltage drop. Smaller wires wire run to the pump. These wires terminated on a terminal block incased in that grey J box (ACE hardware) in the back of this picture. The grey box has a small hole in the bottom of it and the terminal block is coated with liquid electrical tape. All connections are made with heat shrink adhesive crimp terminals. I have long loops of wire connecting the pump and the pump switch so the pump can be

easily removed. I'm also planning on putting an angel aluminum bar across the front of the pump to make sure the pump stays secure in case of a knock down.

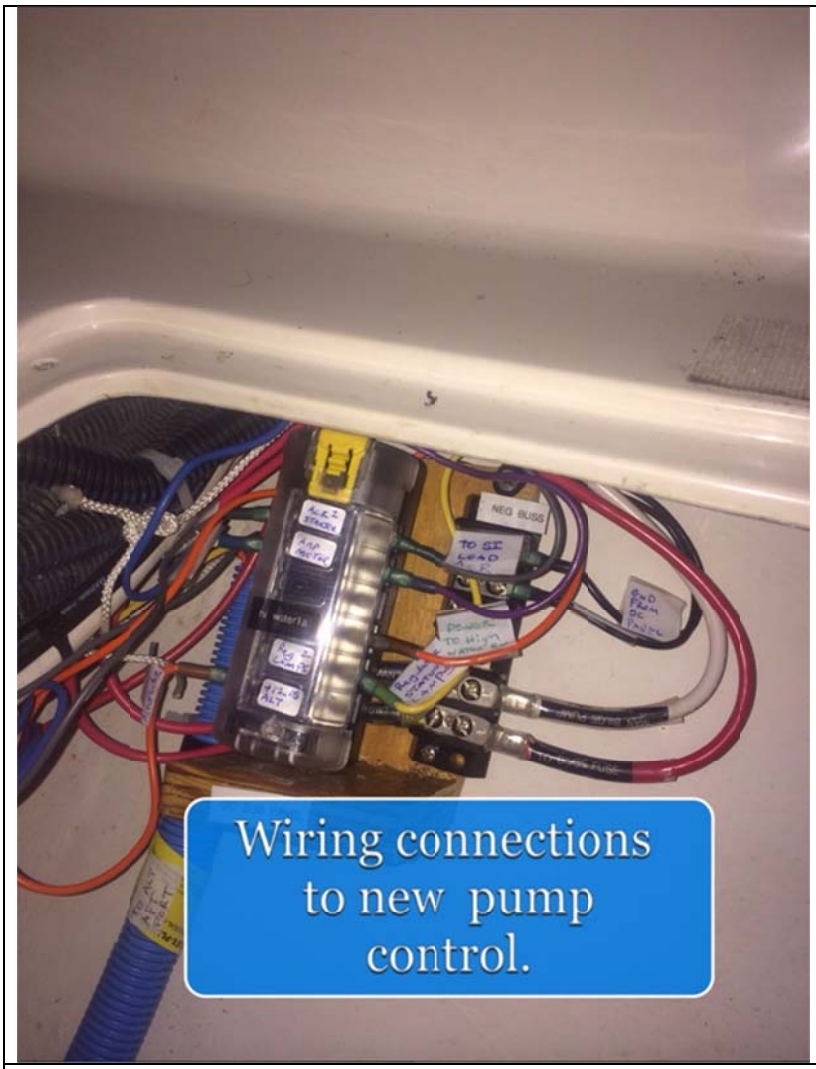
The new 1.5 inch hose needs to go into the bilge pump locker next to the have station. The hole need to be opened up and we can just get the hose into the bilge.



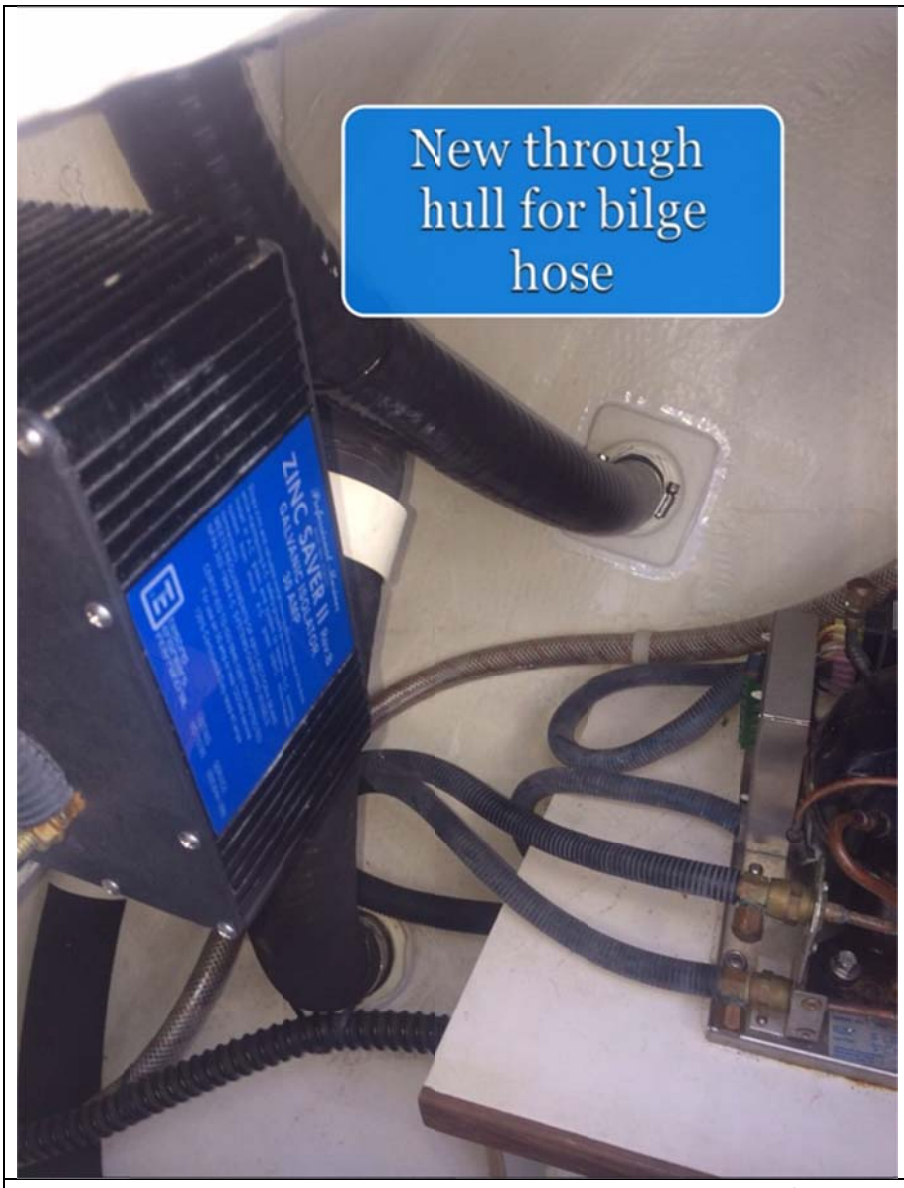
This was the bad discovery that I couldn't get a 1.5 inch hose over the rib in the hull so I needed to use a 1 inch segment of hose for this run over the rib. This section of hose is running from the locker below the nav table to the area under the sink. We are looking at the sink area with the cabinet removed. The blue conduit I use for running my wiring to my Balmar MC614 voltage regulator in the aft cabin.



The bilge hose is running on port side from the sink area into the aft cabin.

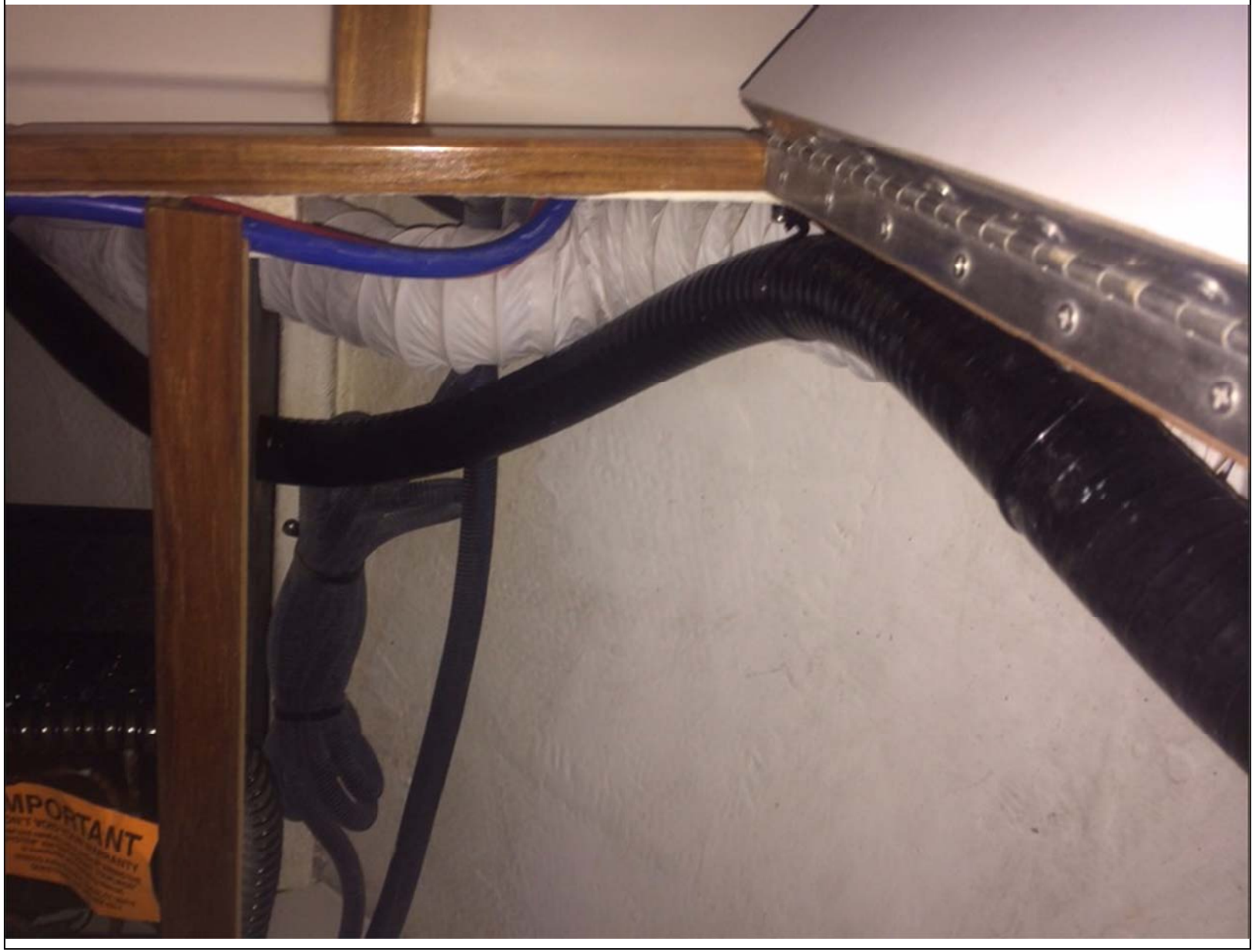


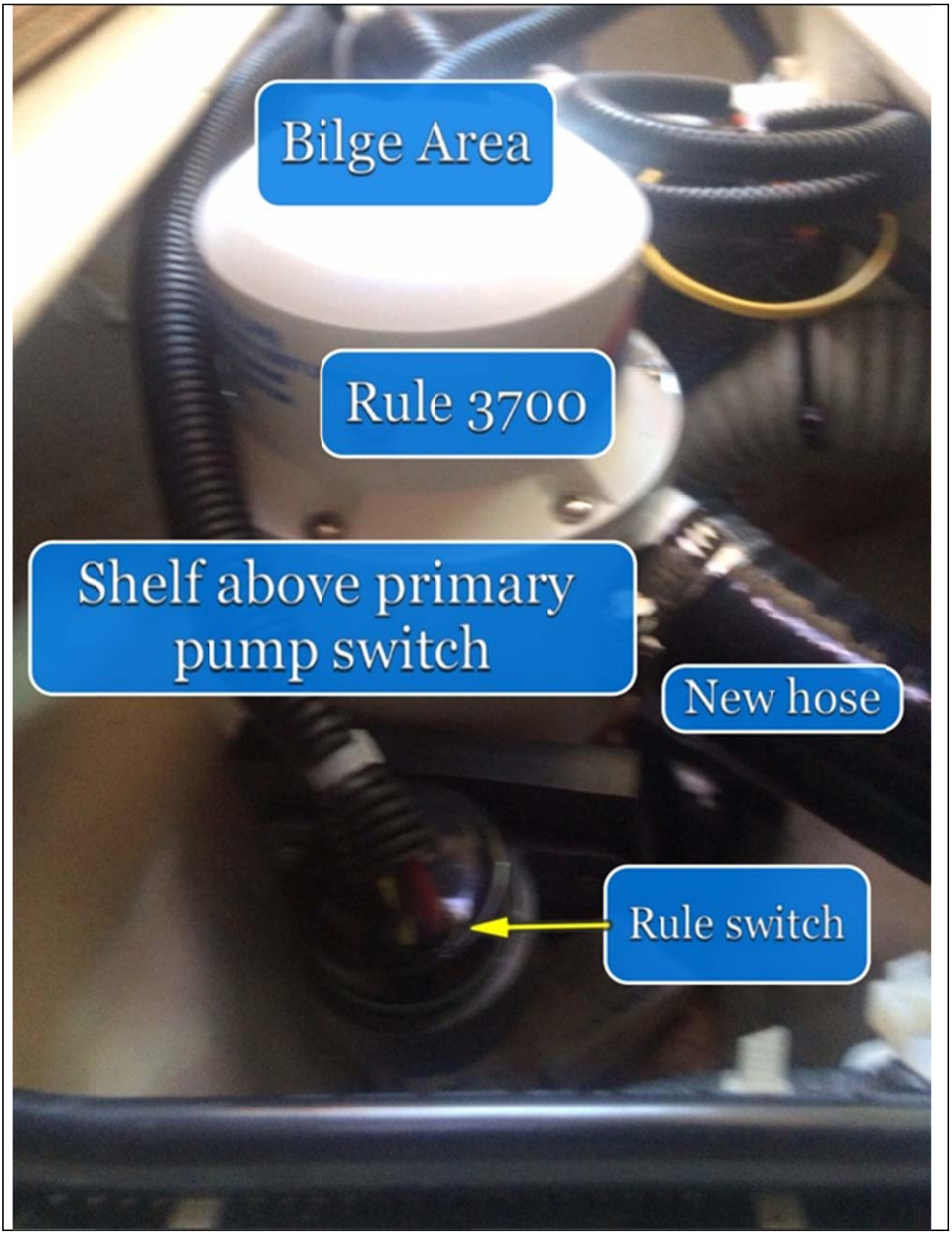
DC sub in port locker next to nav station is used to power 24hr circuits needed for new pump, pump counter and high water alarm. I also need to translate #8 pump power wire to smaller #10 wire for the run to the pump panel. Some of the wiring here is for my voltage regulator aft.



New through hull above water line port side. This was too scary for me. The boat was in the water. I paid $500 to have the hose run and the hole drilled.


Route new
bilge hose


MPORTANT


Bilge Area
Rule 3700
Shelf above primary pump switch
New hose
Rule switch

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Revision: 10/15/2014
A Boa Vida Hull 972

Catalina 320 Sailboat Bilge Pump Electrical Schematic

Note:
This schematic adds a high water cockpit alarm panel in port aft locker. The switch for this alarm is in the bilge area set for a water level an inch higher than the 5 GPM primary pump switching level. A secondary emergency 60 GPM pump is added with an emergency alarm panel. A counter display is also added for the primary pump. The pump counter, high water alarm and secondary pump is all wired independently from the main DC panel and is powered by a fuse box in the starboard battery compartment. It is not possible turn off the automatic secondary bilge pump unless you pull the breaker on the starboard side. The secondary Pump has a manual switch.