

Ten Problems, Tips, and Tricks for Captains

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Blog: svlux.blogspot.com





experience [ik-**speer**-ee-uh-ns]

verb (used with object)

6. to have experience of, undergo, feel

7. to learn by experience

Corollary:

Experience is what you get
when you don't get what you want.

Ref: Dictionary.com

The Situation: Engine

- Port engine begins making rumbling and grinding sounds, unlike any prior sound
- Diver reported loose saildrive
- Damaged engine mount!
(That's easy!)



The Situation: Engine

Oh, S***



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Week or two
in Charleston

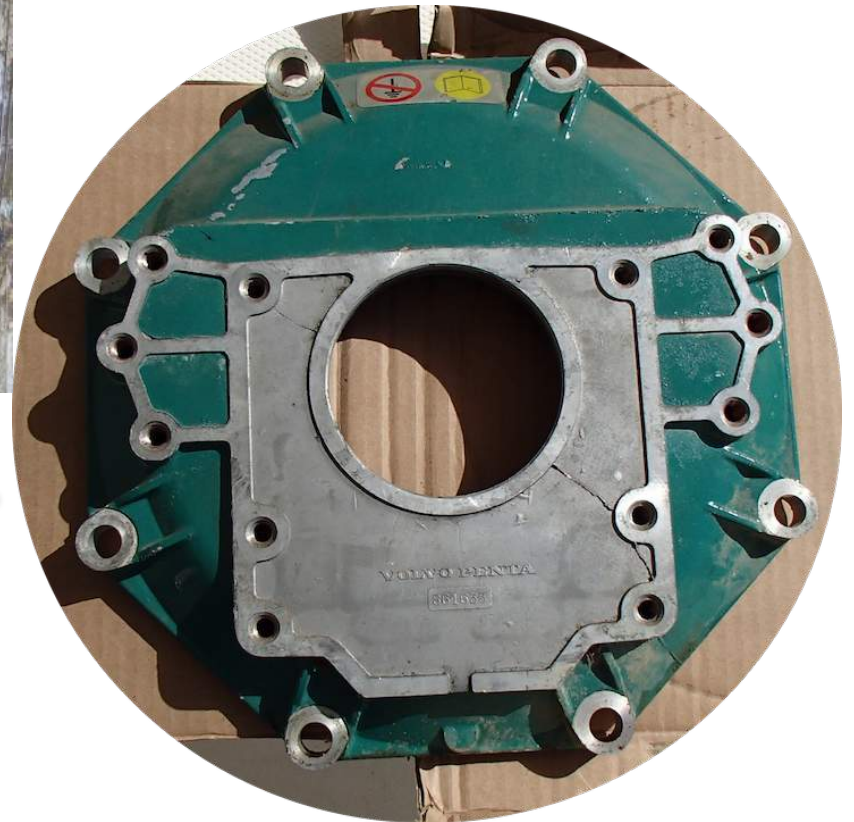
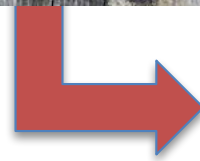


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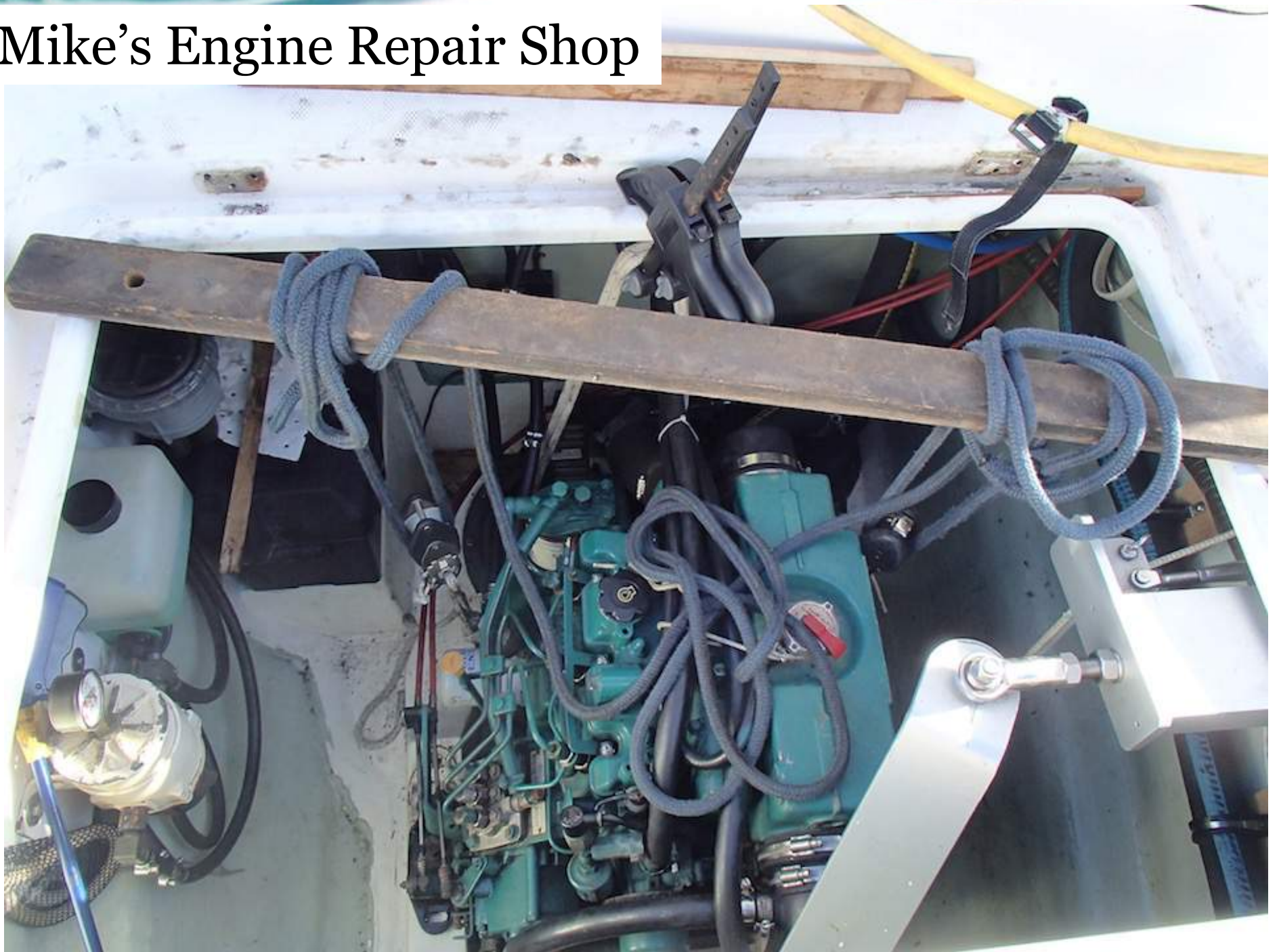
The Situation: Engine



A new part arrives!
ebay: the “new-to-you”
source for economy parts



Mike's Engine Repair Shop



The Situation: Engine

Removal:

Gear puller, big socket, and heat!



Installation:

All-thread rod, big washer, and heat gun!

The Situation: Engine

- Success!
- Tools:
 - Extension mirror
 - Camera
 - eBay
 - Tractor Supply
- Lesson: better examination;
find the real cause



Knowledge: Runaway Diesel Engine

- Causes:
 - Jammed feed pump
 - Worn rings or valve guides
 - Too much oil in the crankcase
 - Turbocharger shaft seal failure (oil in the intake)
 - Any air-borne combustible (propane, fine powder, atomized oil)



Stopping a Runaway Diesel

- Compression release
- Suffocate the engine
 - CO₂ in the air intake
 - Board on the air intake (not your hand)
- Beware, the engine can throw parts if it destructs





Knowledge: Emergency Engine Starting

- Newport to Bermuda race
 - Wind SE 18-25kn, stbd tack beat for 5 days
- Electrical problems
 - Batteries discharging in 45 minutes
 - Engine tries to start itself
- Found water dripping from the back of the starter switch
 - Source: spray onto the instrument panel
 - Port side cockpit mounting

Knowledge: Emergency Engine Starting

- Rubber switch cover not sufficient



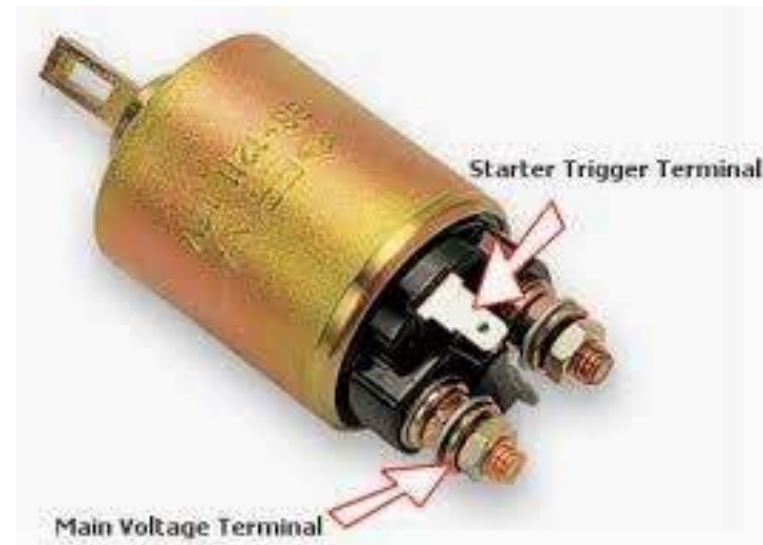


Knowledge: Emergency Engine Starting

- Resolution
 - Bypass the starter switch with spare toggle switch
 - Convoluted engine starting and stopping process
 - Starting:
 - Turn on switch (ignition)
 - Press starter button on starter solenoid
or second starter switch or jumper the solenoid
 - Stopping:
 - Pull engine stop morse cable control
 - Turn switch off

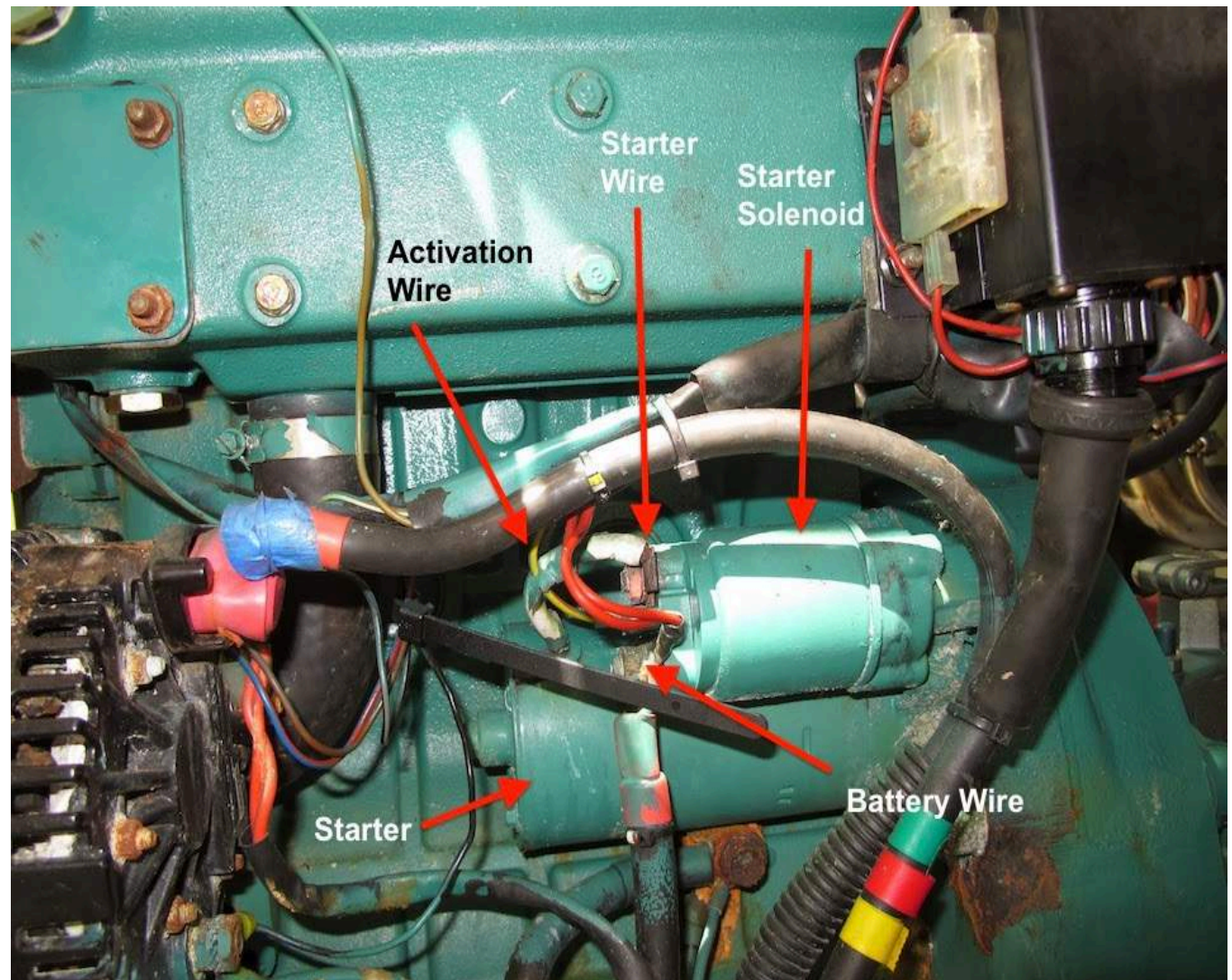
Knowledge: Emergency Engine Starting

- Identify solenoid connections
- Jumper 12v to the Starter Trigger Terminal



Knowledge: Emergency Engine Starting

- Or jumper 12v to the Starter Wire
 - More Amps; larger wire



Tools: Eyes Where You Need Them

- Problem with high water
 - Not enough air!
- Atlantic Beach Bridge, Morehead City, NC
- High tide
- Boards read 62.5ft



Tools: Eyes Where You Need Them

- Solution: Take a look
- Remote eyes:
 - GoPro up the mast – taped to a boat hook, tied to a halyard
 - WiFi to an iPad



<https://vimeo.com/168473706>

**Atlantic Beach Bridge
Morehead City, NC
One hour after high tide
Height boards read 62.5 ft
Checking the bridge height with
a GoPro camera with WiFi**



Tools: Cameras

- See things you can't see
 - Small print (close-up or macro mode)
 - Under and around obstructions
 - Running cables and hoses
 - Checking underwater
 - Thermal
 - Water intrusion
 - Poor electrical connections
 - Engine thermal signature



Knowledge: Lithium Batteries

- Comparison with lead-acid
 - Weight 39%, Similar size, similar voltages, 1.45 x usable capacity, 4 x cycles, 3 x price
- What about fires?
 - Different chemistry: LiCoO_2 (Lithium Cobalt Oxide)





Safety of Lithium Iron Phosphate Batteries

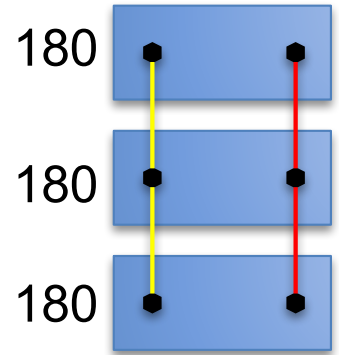
Phosphate based technology possesses superior thermal and chemical stability which provides better safety characteristics than those of Lithium-ion technology made with other cathode materials.

Lithium phosphate cells are incombustible in the event of mishandling during charge or discharge, they are more stable under overcharge or short circuit conditions and they can withstand high temperatures without decomposing. [2]

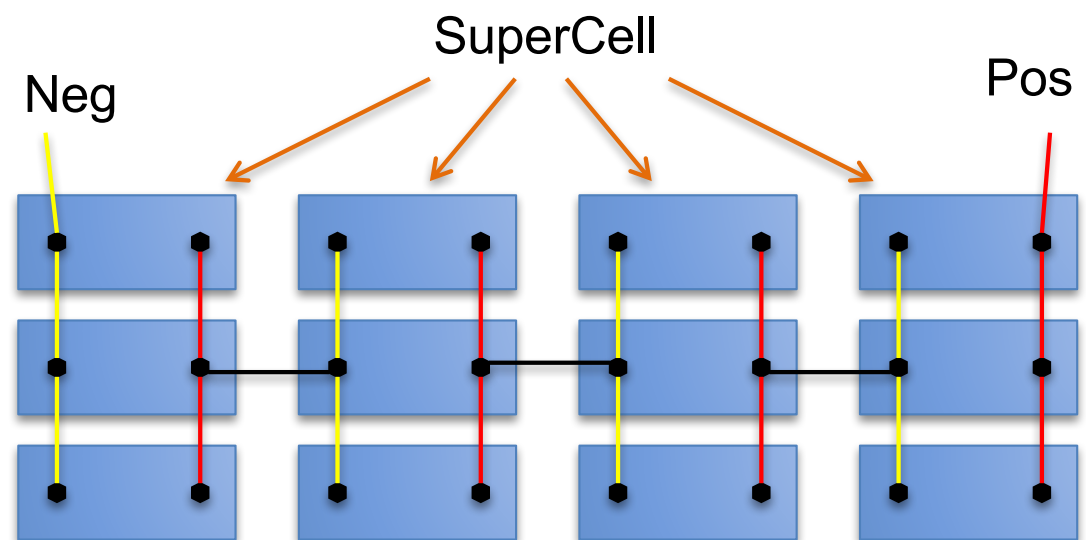
Summary: They are safe

Lithium Battery Bank Design

- Make super-cells for desired capacity
 - Connect cells in parallel: $180\text{AH} \times 3 = 540\text{AH}$
- Connect super-cells in series for the desired voltage
 - Need 4 cells in series to make a nominal 12v bank
 - $3.15 - 3.5 \text{ v} \times 4 \text{ cells} = 12.6 - 14.0\text{v}$ bank voltage

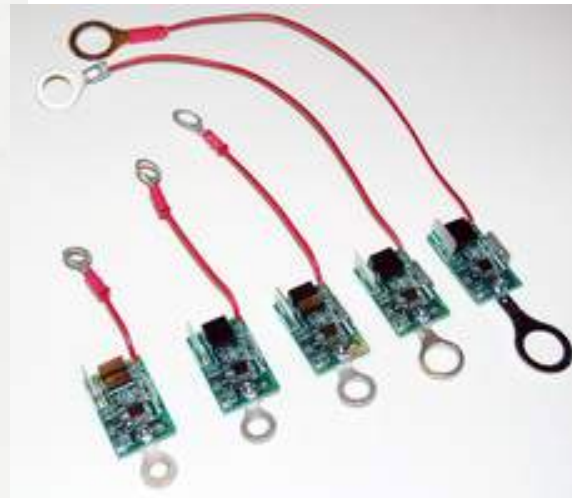
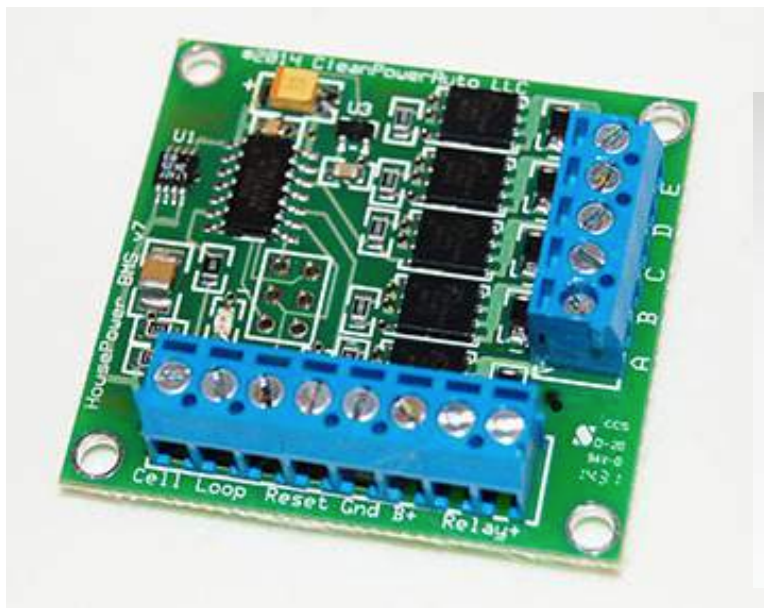


- Terminology
 - **3** Parallel cells
 - **4** Series super-cells
 - **3P4S**



Knowledge: Lithium Battery Monitoring System

- Additional protection against over and under voltage (due to over and under charging)



- Contactor/relay isolates the battery in case of a problem
- Know where it is and how it functions

Knowledge: Lithium Batteries

- Charge profile similar to AGM
 - Don't trickle charge
 - Constant current to battery voltage, then constant voltage until the current drops
 - Shut off charging when full (set float voltage at a nominal voltage, 13.2v)
- Capable of higher charge/discharge current



Knowledge: Sailing

- Downwind with main and spinnaker
- Wind eddy around main backwinds the spinnaker and wraps it around the forestay



Knowledge: Sailing

- Sam Lyness steps up:
I'll show you how to fix that
- Chase the wrap
 - Turn the boat 360 degrees
 - Same direction as the wrap
 - Use the engine; Main sheeted in and lines out of the water



Knowledge: Hydraulic Steering

- Priscilla Travis: 1800+ nm on autopilot across the Atlantic
- Cockpit helm wouldn't work at Ireland (pilothouse helm worked!)
- Found red hydraulic fluid – evidence of leaks



A Sea-Star steering cylinder designed to work with a power steering system.
The NO STEP shield protects the ram when retracted.



Knowledge: Hydraulic Steering

- Be careful around hydraulics – fluid can be injected through your skin at pressures of 100psi
 - Gloves won't help with high pressure leaks
 - Can cause a serious or fatal injury
- Rams should not be wet
 - Cycle lock-to-lock then check for fluid
 - Replace rams that show any pitting
- Don't overtighten fittings

<http://www.powerandmotoryacht.com/systems/how-maintain-hydraulic-steering-system>

Knowledge: Fuel System

- Port engine seemed fuel starved
 - Filters were cleaned and remained clean
 - Could pull fuel through the main filter with hand pump
 - Engine fuel pump was replaced



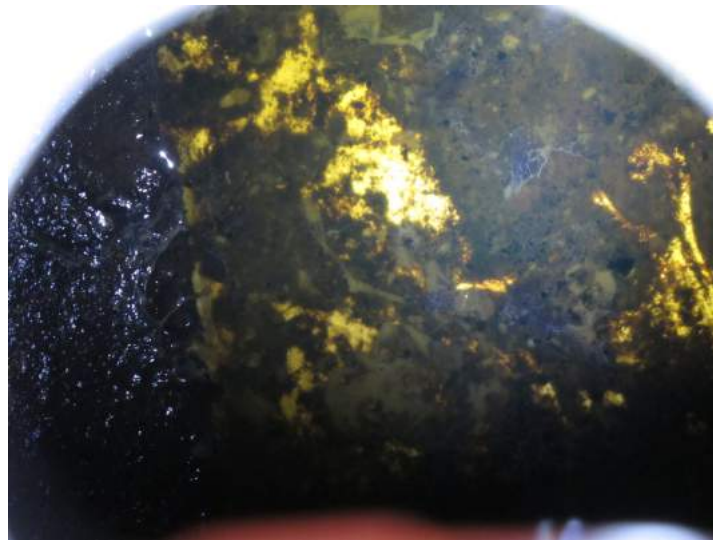
Knowledge: Fuel System

- Eventually tried an alternative pickup, which worked
 - Added an electric fuel pump
- Solution: Clean the tanks



Stbd Fuel Tank

Port Fuel Tank





Knowledge: Fuel Systems

- The Cause: Asphaltenes
 - Oily, slimy, stringy sludge (not necessarily biological)
 - High pressure and high temp (return fuel) creates it
 - Created a dam around the pickup

Diesel Fuel Myths:

http://www.marshmarine.net/index_8.htm

http://www.lcbamarketing.com/asphaltenes_and_fuel_filter_plug.htm

<http://www.bigdumboat.com/LTS/asphaltenes.html>



Tools: Waterproof Light

- Delivery in the Caribbean, Mona Passage, 3 men
 - 46 ft catamaran with a previous hull repair in lumpy seas
- Bilge pump starts running continuously
 - High volume water ingress not reachable inside

Note: Cruisers Forum post. Even if not accurate, it is a good use-case

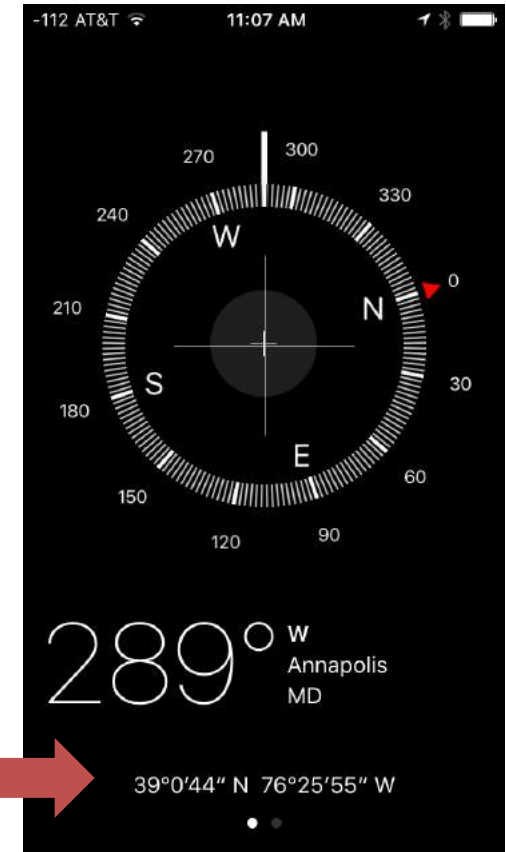
Tools: Waterproof Flashlight

- Captain goes over the side with mask and flashlight
 - Rough-edged hole found
 - Covering the hole with a sail didn't work
- Abandoned ship and soon rescued
- Other uses
 - Bad weather light
 - Attracting fish and squid at night



Tool: Navigation by Cell Phone

- Transiting from the Bahamas to the US
 - Navigation system failure
- Paper charts and GPS coordinates from a phone
 - Just like “in the old days”
 - Plot a fix every hour
 - Convert from deg, min, sec to decimal



A photograph of a woman with brown hair tied back, wearing a white t-shirt, sitting and talking to a young boy with light brown hair, wearing a light blue t-shirt. The boy is sitting on the floor with his hands clasped near his face. The woman is gesturing with her right hand. The scene is set in a bright, indoor environment. The entire image is framed by a gold border. Two speech bubbles are overlaid on the image. The first speech bubble, coming from the boy, contains the text: "MOMMY, WHEN I GROW UP, I WANT TO A SAILOR." The second speech bubble, coming from the woman, contains the text: "WELL, YOU DECIDE. YOU CANNOT DO BOTH".

MOMMY,
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