

Power at Sea - Dustin Fox

1. Power at Sea - cover slide

2. Dustin Fox - background/experience

- a. 15 Years
 - b. CMET
 - c. ABYC EL
 - d. A.S. Electronics Technology w/ Speciality in Telecommunications
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3. Power Management

- You all have probably seen this, so I'll just gloss over it quickly. To manage power, you need to know how much power you are using or going to use.

 - Are there any questions on this?
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4. State of Charge vs. Voltage

- This can still be a topic of debate. I'm going to talk to you for a second about my views on it.
 - State of charge gives you a number representing % or battery state based on how much current (power) has come out of the battery bank. This is important because voltage is not an accurate measure of state of charge.
 - Who wants to tell me I'm wrong right now? Before you do, let me clarify. Voltage can be used only when under constant load. Not something we see when at sea.
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5. Solar

- Everyone has seen solar by now. I'm sure most of you already have it, right?
- Advantages of solar
 - ◆ Light weight
 - ◆ Easy to use
 - ◆ Low maintenance
- Disadvantages of solar
 - ◆ Easier to damage
 - ◆ Have to move per tack, etc.
- How much do you need? A better Q: would be, How much can you fit?
- Flexible vs. Glass Panels
- Regulators are not created equal

PWM	<u>vs.</u>	MPPT
Low cost		Higher cost
Lower efficiency		Greater efficiency

- ◆ RF Noisy
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6. Hydro Generator

- Has anyone had a chance to use one of these yet? I love these units.
 - The problem with these is the cost and the installation.
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7. Blue Seas Dual Circuit Plus

- Some of you may know about these and for others this is a new concept you will have to wrap your heads around. These switches allow for two battery banks to feed two different systems at the same time.
 - Why am I showing you this?
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8. Make a Plan.....and make a backup plan

- The next few slides are how I tend to install battery switches and why.
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9. ON/ON

- Here is a typical diagram of how I will normally do an install
 - Here we see how the power flows with both switches in the on position
 - Very straight forward. The house bank feeds the breaker panel and the start bank powers the engine
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10. COMBINE/ON

- This is what I call the OHH-Shit! Position. Someone has to say “ohh shit” before you ever get to this position.
 - In this case all of the batteries are tied together. This is so you can start the engine from the house bank, for example
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11. COMBINE/OFF

- And here we have a fun one.
 - In this case the house switch is off and the engine switch is in the combine position. This is allowing the start bank to power the house panel.
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12. Or...just wing it.

- Do I need to cover this in more detail or do you guys got it?
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13. Lithium Batteries and safety

- OK, Show of hands, how many people have seen a lithium battery catch on fire?
- So I'm going to give you a VERY high level overview of a very complicated issue. There are a lot of different chemistries all lumped into the same group. For example Tesla is using a much different chem then we would normally see on a boat.
- Most boating applications will be using Lithium Iron Phosphate and that's what I'll be talking to you more about. It is known as the safest chem.
- One true statement about ALL lithium products is Lithium and water do not get along.

14. Lithium Batteries for boats

- There are safe batteries for boats
- Here is a product that I am finally happy to recommend.
- As there are a lot of products out there let me just talk about the things I was looking for in a marine battery and how many points this battery covered.
- (Go over list on screen)
- What this product does not have that we would like is external comms
- Even if it had external comms there is not much that can tell you about the details.

15. Lithium batteries and accessories

- BMS's and Lithium...
- Different lithium batteries have different charge requirements
- The K2 I showed you would like to be charged to 14.6 to 14.9 volts. That is above most standard chargers default settings.
- Solar regulators are not all programmable to custom voltages either.
- That Watt&Sea hydrogenerator can have a regulator custom programmed from the factory, but by default is not that great for... well lithium
- Shore chargers, same deal
- ACR's are not compatible with the voltages of lithium.

16. Contact Info