

Marine Electrical 101

VIBS 2018 - Woman's Day



By Jeff Cote

Pacific Yacht Systems Inc.

design • installation • service • support

A Little about PYS



- 11 years in business
- Genesis: wanted a reliable and safe electrical system
- What makes us different
 - Expertise through specialization & repetition
 - 2017: Over 750 boats
 - Teamwork breeds synergy
- Team members
 - Detailed oriented
 - Passion for doing it right the 1st time
 - Our installations are safe and follow:
ABYC and NMEA standards



Electrical Cornerstone: Battery Monitor



- Monitoring for system health
 - Available capacity
 - Usage patterns, planning
- “Fuel gauge” & “speedometer” functionality for your batteries
- Information on your system
 - Current draw/charge
 - Amp hours
 - Voltage



AGM vs Flooded Batteries



	AGM	Firefly AGM	Flooded
Cost	\$\$	\$\$\$\$	\$
Gassing	Limited	Limited	Yes
Useable capacity	55%	65%	35%
Maintenance	None	None	Regular top-off
Self-discharge	2% per month	2% per month	15% per month
Purpose	Dual	Dual	Single
Sulfation	Yes	No	Yes

Battery Sizes & Chemistry



- Batteries come in all sizes
 - Group 24, Group 27, Group 31
 - 4D, 8D
 - Golf Carts
 - Slimline
 - L16
- All battery sizes come in different lead acid types:
 - Flooded , AGM, Firefly AGM, Gel
- Flooded batteries are built specifically for a purpose
 - Starter
 - Deep cycle
 - Dual purpose

Flooded Battery Tips



- Liquid in the bottom of your battery box is probably electrolyte, **NOT** water
 - Make sure battery box is leak proof
 - Why did it boil over?
 - Neutralize with baking soda



Flooded Battery Tips



- Always keep water level topped-off
- Never expose your flooded battery plates to air
 - Permanent battery damage



What's an Inverter?



- Run AC appliances without shore power or a generator
 - TV
 - Microwave
 - Computer
 - AC outlets
- Inverts DC battery power to AC power
- Inverter is opposite of battery charger (aka converter)



Inverter - Purchasing Tips

Wattage Size?



- What's inverter intended purpose?
 - Microwave, computer charging, TV, blender, etc...
 - Look at wattage specification of AC appliances
- Advice: Get a slightly larger inverter than you need
- EXAMPLES
 - Inverter: 300W – 600W
 - TV, computer charging, portable powertool battery charging
 - Inverter: 1000W
 - Small microwave, blender, etc...
 - Inverter: 2000W
 - Coffee/espresso machine, hairdryer, etc...

Recharging Your Batteries



- Ways to recharge Batteries
 - Charger(s)
 - Alternator(s)
 - Solar
 - Methanol Fuel Cell



Smart Battery Charger



- Charges batteries from AC shorepower or genset
- **Smart Charger => Reduce** the charge time
- Three-phase smart charge cycle:
 - Bulk, Absorption, Float
- Right rate of charge for extended battery
 - Minimize sulfation



Smart Charger

Reduce Genset Runtime



- **Reduce** battery charging time by **increasing** charger output
- Add 2nd charger to your boat
 - E.g. 1 hour morning and evening



Alternator



- Converting engine power to DC power
 - Note: AC power has nothing to do with alternator output
- Why maximize alternator output
 - No or reduced genset runtime
 - Typical little engine runtime (sailboat or fast power boat)



Alternator Limitations



- Stock Alternator: 55 Amps with internal regulator
 - Realistic Output: 30 to 35 Amps

Why?

- 55 amps is cold rated
 - de-rate by ~ 15% when hot
- Internal regulator limits output
 - de-rate by ~33%
- Effective Charge Rate =
(Alternator output) minus (loads while running)



Solar Panels



- Size solar panels for:
 - Keep batteries topped-off
 - Offset refrigeration
 - An extra day at anchor
 - All power needs
- Flexible or rigid solar panel



Northwest Advantages



- During peak summer months:
 - 15 + hours of sunlight a day
- Relatively sunny days during summer months
- Most boaters have
 - extensive canvas covers (e.g. bimini, dodger), or
 - hardtops



Adhesive Backed Panel



Surface Mount



Hardtop Installation



Solar Panels

- Purchasing Tips



- Daily output estimate:
 - Short-hand formula: wattage / 4
- Wide selections of makes and sizes
- Flexible mounting options:
 - Zipper
 - Snaps
 - Velcro
 - Grommet



Methanol Powered Battery Charger



- DC Charging with:
 - No noise
 - No vibration
 - No smoke
- Extends time at anchor
- Great for boats
 - Without genset
 - Limited battery bank
 - Limited alternator output



Methanol Power Battery Charger Tips



- Choose the right daily output:
 - 80, 140, 210
- Carry extra fuel onboard
- Popular model
 - EFOY



Connect with PYS



- Starting Point: PYS Electrical Audit for your boat
 - 90 minutes: Batteries, DC distribution, charger, alternator, inverter
 - Written report: observations & recommendations
 - Cost: \$189
- PYS Design Services for DIYers
 - Electrical system designed by PYS (collaborative and to code)
 - Installed by yourself or other outfit
- Pacific Yachting magazine - Monthly Tech Talk Column
- www.pysystems.ca 100s of articles
- Monthly email newsletter



Questions?



Pacific Yacht Systems

marine electronics & electrical

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