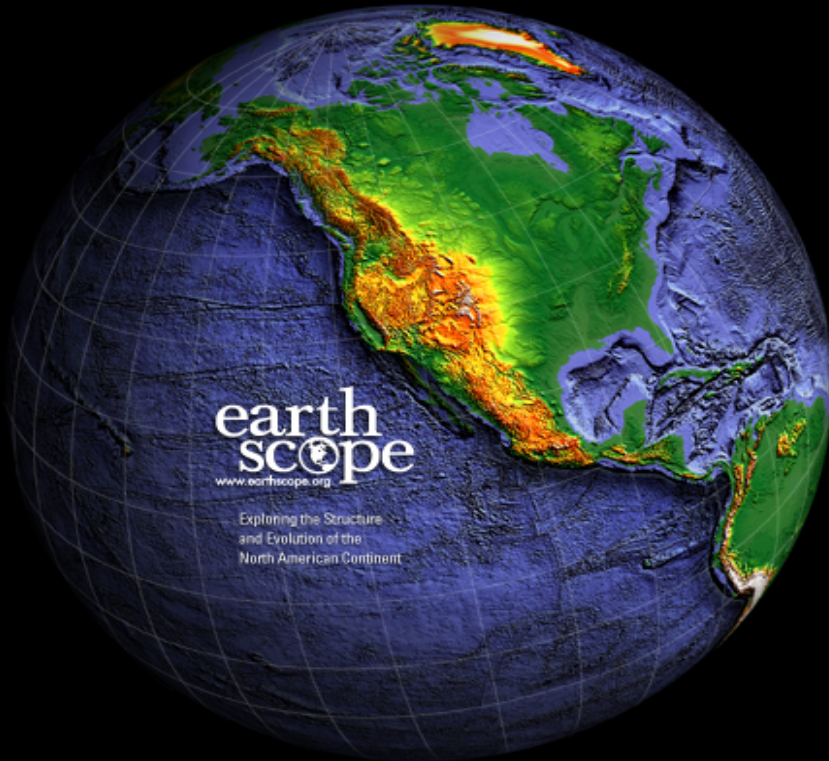


Alaska TA Power System 2015

Integration of Rechargeable LiFePO₄



Ryan Bierma
Alaska TA Station Specialist

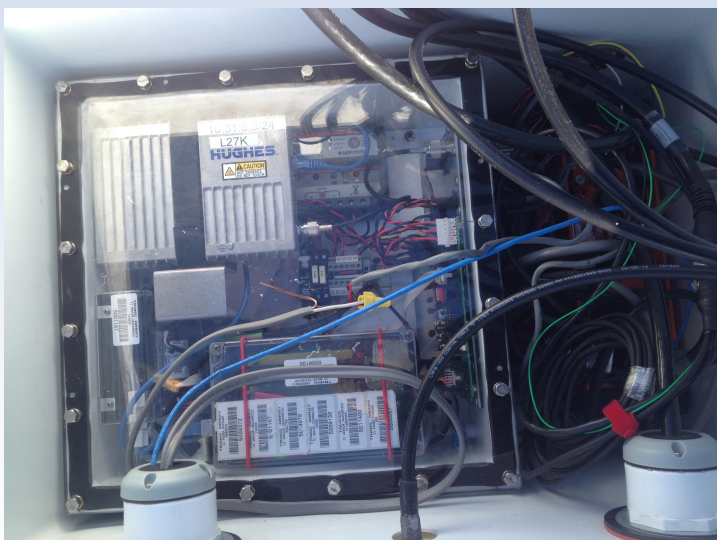
*IRIS TIM Meeting
27-28 April, 2015
Albuquerque, NM*

- Current/past ATA basic power system
- Technologies that will be incorporated during Summer 2015 Field Season

1. Enclosure: Plaschem hut, Grizzly cooler, or similar
2. PV System: typically [3] 80 or 90 Watt panels



1. Enclosure: Plaschem hut, Grizzly cooler, or similar
2. PV System: typically [3] 80 or 90 Watt panels
3. Power storage: typically [10-18] 100Ah 12V Concorde lead acid AGM batteries
4. Power control: Standard TA VIE box with Morningstar 15A Solar Controller and other various circuitry and cabling



This listing is not comprehensive

Focus Here:

1. Batteries

Type, quantity, layout

2. Solar Controller

Characteristics, control logic

Genasun LiFePO4 Battery

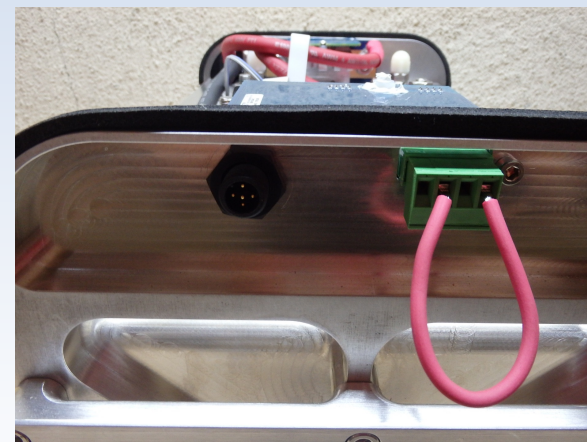
- High Energy Density: 180 Ah @ 58 lbs with Aluminum casing (vs 100 Ah @ 70 lbs AGM)
- Each battery regulated independently with on-board Battery Management System (BMS), also for safety
- Slightly larger package than a 100 Ah AGM
- Tolerant of deep discharge (down to 5-10%)
- CAN bus for MPPT data link with Controller and Q330



BMS exposed with lid off



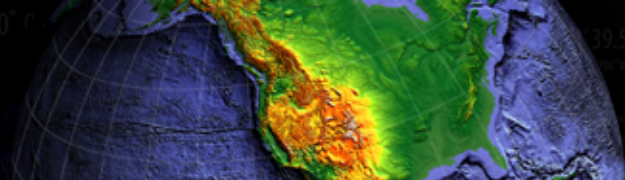
4 AWG twin tray cable with
175 A Anderson connector



Side view, note CAN bus M12 socket
and "grenade pin" Master switch
for BMS operation

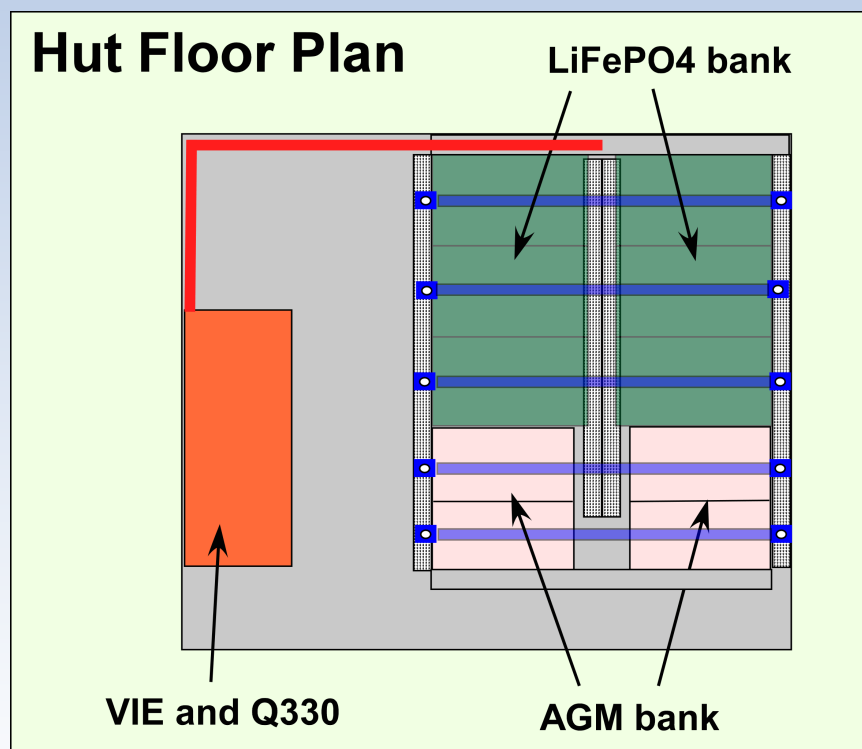
2015 Alaska Battery System

- Main (Batt1): 6 Genasun 180 Ah LiFePO₄ batteries
- Primary (Batt2): 4 Concorde 100 Ah AGM lead acid batteries
- Nominal total of 1480 Ah in the system with half the weight of an equivalent AGM bank!
- After cold de-rating and allowable cycle depth,
1 LiFePO₄ ~ 3 AGM

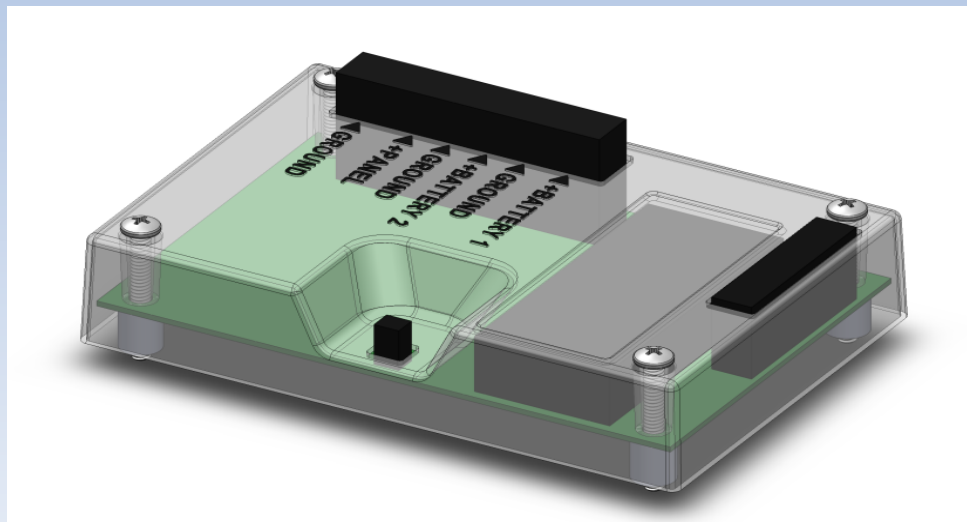


Battery System layout

- 2015 system design will include **6 LiFePO₄** and **4 AGM** batteries.
Don't mix chemistries!
- Standard configuration will be inside a Plaschem hut
- All LiFePO₄ batteries in 2016!
-6 on Batt1 and 2 on Batt2
- LiFePO₄ will soon come in a Fiber-Reinforced case instead of aluminum.



Genasun Solar Controller



Genasun Solar Controller drawing

- **LiFePO4 batteries on Batt1 input (Main)**
- **AGM (backup) batteries on Batt2 input (Primary)**
- **Provides CAN bus protocol regulation and output to Q330**
- **LCD displays Voltage, Amperage, Load, etc.**
- **Priority charge on Batt1**

Genasun Solar Controller Logic

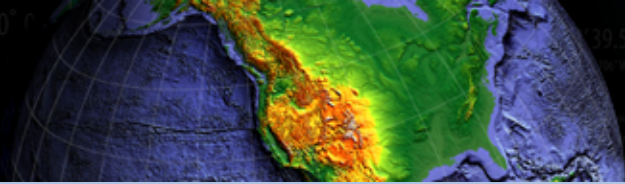
- **Batt1 (LiFePO4) provides full power on Load 1 (all equipment powered) until state of charge threshold is reached (30% charge), then...**
- **Batt2 (AGM) bank will discharge to 30% with Load 1 at full power, until LVD (10.8V), then...**
- **Batt1 down to 10%, with only Load 2 active (seismic and Q330 ONLY), then...**
- **Batt2 to 0% with only Load 2 active, then...**
- **Darkness and Cold win the battle!**

ATA Power System 2015-2016

- **Enclosure: Plaschem fiberglass hut with mounted 270 Watt Photovoltaic array**
- **Storage: 1480 Ah of battery
Bank of 6 LiFePO4 batteries and 4 AGM batteries**
- **Control: Genasun Solar Controller mounted in TA VIE box. Integrates with existing logic board**

“We want to limit the number of snowflakes”- Max Enders

That said, there are always individual outliers including Grizzly cooler, AC powered stations, AGM only huts



39.53°N 120.05°W
133°25'41.852000"N 138°20'50.5752000"W
46.644°N 146°8'43.08"W

TA Alaska

Questions?

