

20-June-2017

APOLLO SOLAR WHITE PAPER

## EXAMPLE OF AN APOLLO SOLAR SITE WITH PROPER BATTERY SETTINGS

The site in this example has the Battery Charging Parameters set correctly. This specific site has been working consistently without any problem since 2012. The Charts below were downloaded using the Apollo Remote Monitoring and show the results.

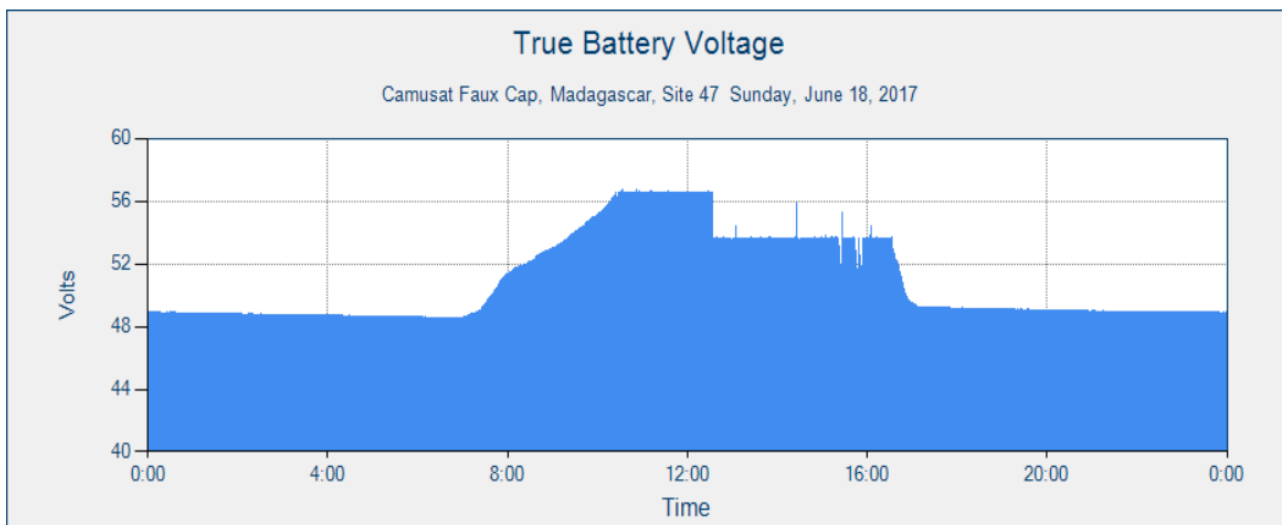
The 3 settings that control the Battery Charging from the PV array are set on the LCD screen on the Master T80HV. This site uses Flooded batteries. The settings will be different for AGM or Gel batteries.

**ABSORB VOLTAGE:** - The Absorb Voltage is set to **56.4 volts**, or 2.35 volts per cell. The Chart below shows the plateau at 56.4 volts starting at about 10:20 AM.

**ABSORB TIME:** - The Absorb Time is set for **120 minutes** and we see that the battery voltage stays at 56.4 volts for 2 hours.

**FLOAT VOLTAGE:** - The Float Voltage is set to **53.52 volts** or 2.23 volts per cell. After 2 hours in Absorb, it goes into Float Mode so the Voltage drops to the Float Voltage setting at 53.52 volts.

Chart Period to Show Frequency Start Date and Time  
 True Battery Voltage Show One Day Raw Data 2017 Jun 18 0:00 Refresh



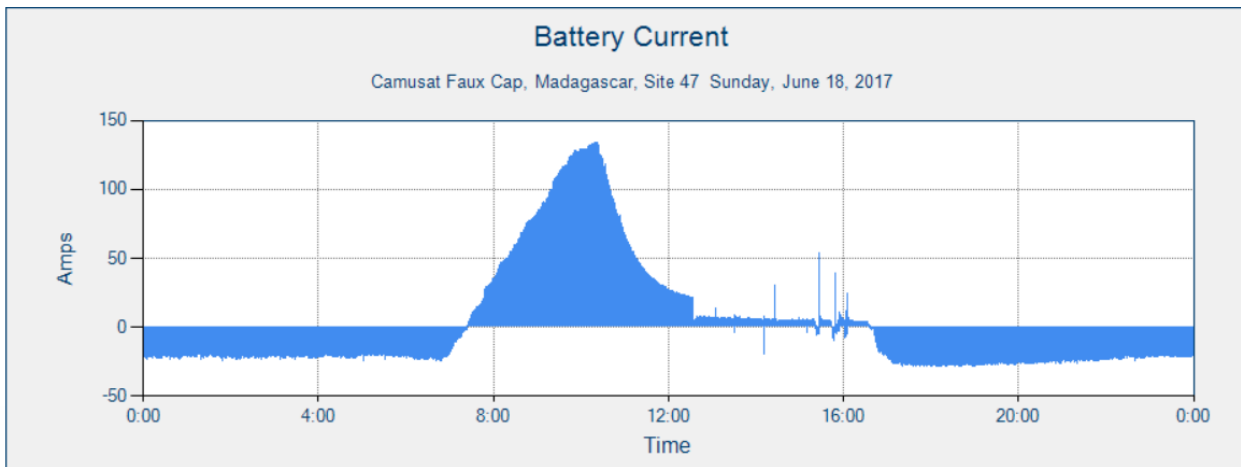
Since a battery is 100% fully charged when it goes into Float mode, the battery at this site is fully charged by about 12:20, just after noon on this sunny day. The State of Charge meter in the T80HV is reset to 100% when it goes into Float Mode. Before Float is reached the first time, the SOC meter will display ???.

To further explain the results, we can examine the Battery Current Chart. As shown below the current is negative at night since the Load is drawing current from the battery. At about 7:00AM, the sun on the PV Array drives positive current into the battery. This is the Bulk Charging Mode.

Then at 10:20AM, the current hits a peak. This is the time when the battery voltage reached the Absorb Set Point and the T80HV Charge Controller switched to the Absorb Mode. Refer back to the True Battery Voltage chart above.

In the Absorb Mode, the Battery Voltage stays constant, while the Current drops quickly. At the end of the 2 hour Absorb Time, the Battery current has plateaued and the T80HV switches to Float Mode. The Battery Current remains positive showing that the PV Array is continuing to keep the battery charges while also supplying full current to the load.

Chart: Battery Current  
 Period to Show: Show One Day  
 Frequency: Raw Data  
 Start Date and Time: 2017 Jun 18 0:00  
 Refresh



Finally, the Irradiance Chart below shows that this day was free of clouds in the morning.

Chart: Irradiance Received  
 Period to Show: Show One Day  
 Frequency: Raw Data  
 Start Date and Time: 2017 Jun 18 0:00  
 Refresh

