CoolTech: Computerized Battery Analyzer

Kevin Hardy, Associate EIC

Batteries and **solar panels** provide power solutions for many remote operations. Both have a "sweet spot" that delivers the most power. Engineers must take that into account. An elegant, low-cost peripheral to a laptop, West Mountain Radio's **Computerized Battery Analyzer (CBA IV)** will give unbiased and detailed discharge data on all primary and secondary cells, coin size to automotive lead-acid, as well as characterize power output for a solar panel.

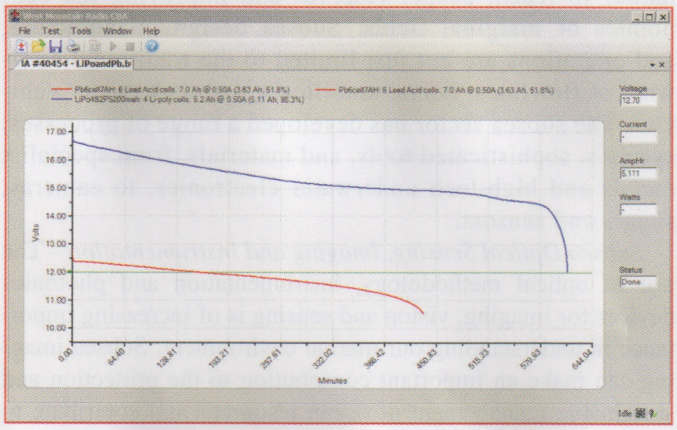
The West Mountain Radio Computerized Battery Analyzer (CBA IV) attaches to a laptop with a USB cable, and to a subject battery or solar panel with Powerpole® Connectors.

Characterizing a Battery

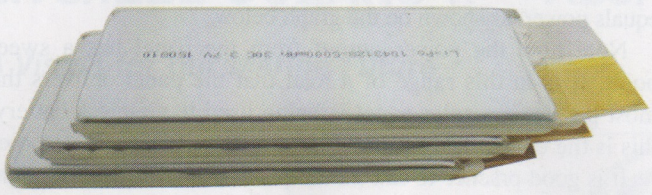
The CBA does constant current battery capacity testing, graphically displaying the performance characteristics of a single cell or battery stack. It provides accurate measurement from low (10mA) to high current (150 W) drains.

There are presets for the common chemistries used underwater· NiCad, NiMH, Lead Acid, Li, Li-Ion, LiPo, Alkaline, as well as many others. It comes with a temperature probe, so it's a simple matter to monitor and record battery performance at any desired temperature.

Using a pressure chamber with feedthroughs, measurements can be made of battery charge/discharge at depth of a



LiPo & Lead-acid battery testing showing minutes of use at 500 ma average current. (Courtesy West Mountain Radio)



LiPO pouch cells have been shown to operate in ambient pressures to 20,000 psi.

pressure compensated battery pack, something of interest to the cable-to-shore world and AUVs with deep sea recharging stations.

The CBA IV is capable of tests up to 100 watts continuous, or 150 watts for short periods of time. With an optional amplifier, tests can be done to 500 watts. Additionally, up to four amplifiers can be used at once for a total test power of 2000 watts.

The CBA tests the total amount of energy stored in a battery (capacity in amp-hours), graphically displays and charts the voltage versus time using a constant current load. Graphs may be displayed, saved and printed. The axis parameters can be changed at anytime. Multiple test graphs of the same battery, or multiple batteries, may be compared or overlaid. The battery test data can be printed on any printer. Test result labels can be printed to put directly on the tested batteries.

The well thought out software supplied with the CBA is designed to protect both the CBA and the batteries being tested, providing automatic sensing of the battery cell count, a safety check of the test rate, and recommending a minimum safe discharge voltage. Capacity discharge tests may be viewed in Amp Hours or Watt Hours. A lab calibrate current adjustment improves the accuracy for testing at very low discharge rates, or for critical applications. The Charge Monitor Test charts and records the voltage rise during recharging, so you can see the performance of the battery under those conditions.

A WaveGlider splashes along, pulling energy from the sun and sea. Solar power converted to electricity is stored in LiPo batteries.

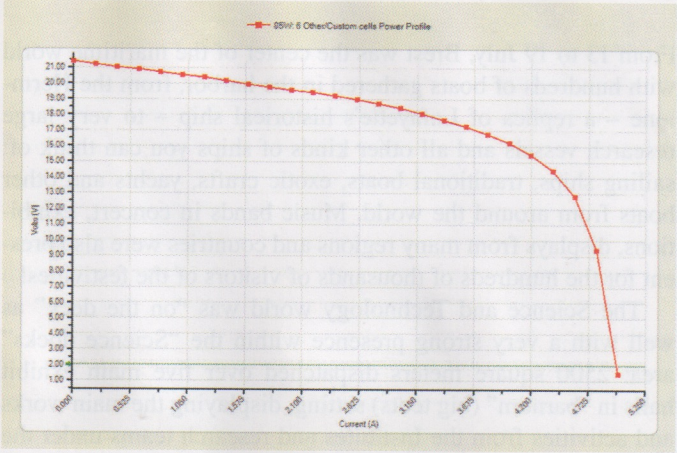
Battery testing may be done for manufacturer quality assurance or end-user battery qualification testing before specifying a battery for critical use. Tests should match or exceed maximum expected conditions.

Characterizing a Solar Panel

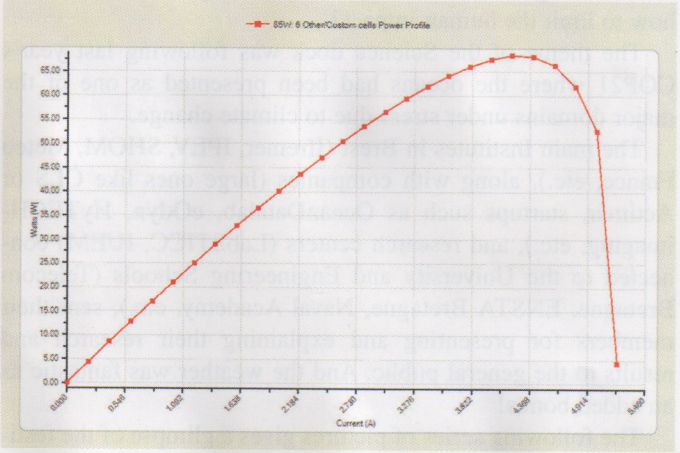
The CBA IV Pro version is capable of a Power Profile test, useful for power supply testing or solar cell analysis. The resulting graph displays Voltage vs. Amps or Watts. This is useful for designers working with solar recharging systems on buoys and unmanned surface vehicles (USV). Solar panels have a performance curve like everything else. There is a sweet spot on the power output curve where maximum power is delivered, and it falls off rapidly after that.

Solar panels have a dramatic drop in output voltage as the load increases. The CBA IV has the ability to sweep the solar panel, by varying the load, to see how the panel reacts. The chart below of an 85W panel shows a simple current (I) vs. voltage (V) chart in direct sunlight for one panel. Note how the load becomes greater as the voltage drops, until there comes a point at which the panel is of no use.

It is important to look at the solar panel characteristics to determine the charge level needed for charging a battery. An important characteristic of a solar panel is known as the "maximum power



(Courtesy West Mountain Radio)



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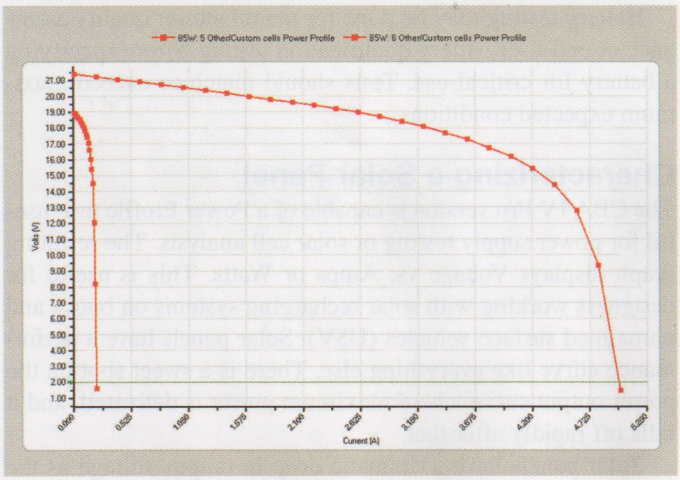

(Courtesy West Mountain Radio)

point" For each point on the I/V graph, voltage times current equals power, as shown on the graph below.

Note how the power output from the panel has a sweet point. It is in this range of a load that the panel delivers the most power. If a solar panel is being used to charge a battery, this is the charge level to use.

It is good practice to test a solar panel under different sunlight conditions, such as bright sun directly on the panel, bright sun at an angle to the panel, a cloudy day, and so on. The chart below shows the top line from direct sunlight exposure with the panel pointed south vs. indirect sunlight with the panel pointed to the north.

It's $160 for the base model, under $200 for the "Pro" version. (Hint: You want the Pro.) You can find more detailed information or order on-line at: westmountainradio.com.

(*Editor's Note*: See the July 2016 issue of Ocean News & Technology for more details on battery chemistries and the CBA IV.)

Table of Contents