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Benefits of 24/7 Battery Equalization

By Mick Abraham

Solar power has been romanticized as a “green technology”, but truly independent power also includes lots of “black technology”. An off-grid system may have clean non-polluting solar modules smiling at the sun, but it also includes heavy chemical batteries containing toxic substances like lead and sulfuric acid. Batteries are the dark industrial underbelly of off-grid renewable energy systems.

I’ve had a love/hate relationship with deep cycle batteries ever since buying my first one in 1984. Chemical batteries will remain essential to independent energy for many years to come, but they also represent the number one problem area. Performance gradually degrades in ways that are barely noticeable at first, but the pack eventually reaches an “avalanche point” where the battery capacity falls off a cliff. This causes a crisis for the system owner which requires emergency money transfusions to their battery vendor.

Battery problems are so chronic that off-grid energy owners can become highly discouraged. I’ve become acquainted with many “off gridders” as customers who later developed into friends, so I know a bit about their frustrations. Many have reached the point of selling their homes, bringing in costly line extensions from the grid, and taking other drastic measures. To me, each of these events represented a failure for myself, for the off-grid energy industry, and for its technology. Watching my friends and customers endure their battery disappointments, I gradually developed a personal quest to learn more about batteries and to look for ways to reduce these problems. My quest has now been under way for more than ten years, and it has affected my alternate energy business in positive ways.

In 1997 I introduced the PowerPulse® electronic sulfation dissolver to the alternate energy world, and I’ve shipped over 7,000 of those units since that time. That product (and the competing clones which soon followed) became a common battery enhancement, but battery longevity has continued to disappoint. Even my PowerPulse customers are still experiencing battery disasters.

I’m now launching a new battery enhancement device which may prove more significant than the sulfate dissolver. This is an automatic battery balancer called **BatteEQ™**. The product began at the Urbana-Champaign campus of the [University of Illinois](#). [SmartSpark® Energy Systems, Inc.](#) has licensed this and other patents from the [U of I](#), and my company is SmartSpark’s sole distributor for the alternate energy market.

[SSES](#) builds several different versions of their equalizer. The first one I’m rolling out is optimized for 6-volt batteries in a 24-volt configuration. This model is ideal for the popular “L-16 floor scrubber” or “T-105 golf cart” batteries. It captures energy from those L-16’s with “above average voltage” and dumps that energy into the ones with “below average voltage”. When the overachievers try to excel in voltage, their excess energy is used to bring the underachievers up to par. The result is that all the L-16’s are continually held within narrow bands of nearly identical voltage—with important effects on battery health and performance.

Retail price for the unit is about half the price of four L-16’s, so **BatteEQ** has a good value proposition. I believe it will dramatically reduce the need for wasteful equalization charging, for emergency service calls, and for premature battery replacements. The savings in money, generator fuel, and human stress represent a powerful payback. As a bonus, **BatteEQ** should significantly benefit the environment because our heavy industrial batteries will spend more time in the power system and less time in the recycling system.

Dynamic battery balancers are not new, but competing products are prohibitively expensive, appropriate for small batteries only, or unable to balance six volt increments of the pack. Some competitors only balance the pack while it’s under charge—thereby simulating an EQ charge. I have

found, however, that balancing the pack *during discharge* is just as important as balancing during recharge—surprise!

When I first started testing **BatteQ**, I put it on some unbalanced batteries, and took voltmeter/ammeter readings as the voltages converged. That was interesting, but the really dramatic results came when I built a capacity testing rig that could count the amp-hour delivery of a battery prior to low voltage cutoff. I tested two different sets of old batteries that were out of whack and low on capacity. In the less dramatic case, I observed 2.3 times more battery capacity within hours of installing **BatteQ** on the string! In the more dramatic case, the capacity increase I measured is even more amazing. ***These are the most impressive results I've seen in twenty-two years of battery experience.*** A test report is posted on my website: www.abrahamsolar.com

BatteQ is what “energy nerds” like me have been waiting for. Both SSES and I have made major investments to bring the fourth generation device into production, and we now need to ramp up the volume. EarthToys[™] readers can help as follows:

* Post links back to this article in various chat rooms and forums. Help us spread the word about the environmental and economic benefits of automatic battery equalization.

* If you're interested in **BatteQ** for your own use or experimentation, help me channel your retail order through an established renewable energy vendor in your geographic area. I can sell single units to end users who have no suitable retailer nearby, but I'd rather sell a dozen units (at a discount) to your local, performance oriented alternate energy dealer. Who better to help me find the top installers than their customers who respect them? What better dealer incentive than a retail customer who's ready to buy?

* Someone needs to moderate an internet forum on **BatteQ** and related battery health issues. If a suitable forum location (preferably on neutral ground) is suggested to me, I'll try to share some of my knowledge there, and the SmartSpark engineers may also participate in the forum.

My goal is to distribute **BatteQ** mainly through “hands on installers”. The battery boys out in the field should welcome such an important product, especially if it isn't available on www.zeroprofitsolar.com. To suitably reward SmartSpark for their innovation (and their support of this marketing plan), I need to connect with many of those “hands on installers” who'll order a dozen units or more.

There are numerous “high spec” capacitors and transistors involved in the “big battery” version of **BatteQ**; this translates into a high production cost. Custom electronics fabrication like this becomes profitable only with higher selling prices or with high volume production. We're pricing the unit so it can be bought by mere mortals, but big volume needs to follow in order to minimize future price increases.

I extend my thanks to EarthToys for publishing this article, and I hope many EarthToys readers will come to share my vision of better battery performance through automatic, continuous equalization.

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