

Desulfator Development Notes.

Chuck Carpenter, W5USJ, 27 Nov '09

After recovering a "dead" 6V 12Ahr VRLA battery using the desulfator function of my B&D Smart Charger, I started looking for a stand-alone version. A web search brought up several sources. The most common reference was to various versions of one called the Couper 1kHz desulfator. Couper's design was published in Home Power Magazine. A breadboard version of Couper's circuit was built and it worked as described. A link to the Couper breadboard is included in the Battery Tool Kit desulfator page.

In the mean time, I joined a Yahoo group specifically for discussion and information about desulfators. One participant, a design engineer by profession, was actively developing desulfator SPICE Model designs. One design, a simple 10kHz single inductor desulfator using sophisticated pulse techniques, was especially interesting.

With permission of the designer, a breadboard was built and tested with a pair of 6V 12Ahr VRLA batteries (includes the previously "dead" one). In honor of the designer, it's called the Roth 10kHz desulfator.

Although the on-hand components used to build the breadboard are not those spec'd in the SPICE model, they were approved as acceptable substitutes. The test results agreed closely with the intent of the design. A good indication of the design flexibility. Spec'd parts are now on hand for further testing.

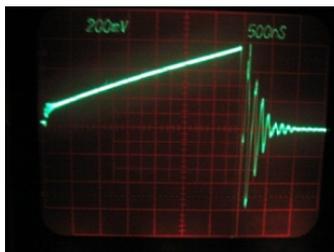
To provide a more useful test of the Roth 10kHz single coil desulfator, a sulfated lawn tractor battery was obtained as a loan from a local battery collection point. The battery was clean, fully hydrated and undamaged. It measured 12.3V and would not accept a 2A charge after 5 hours. A likely victim of sulfation due to long term neglect. The battery needs to supply a small amount of power for the desulfator.

The Roth 10kHz Desulfator was connected to the battery along with a stable 13.8V no load float charger. Because the desulfator is self-powered, there will be some discharging during operation. The float charger prevents that. Desulfation was started at 1800z 21 Nov '09 with 13.1V across the battery. Over the next few days the voltage continued to rise and reached 13.55V after 6 days. A probable indication that desulfation is taking place and the electrolyte is being restored.

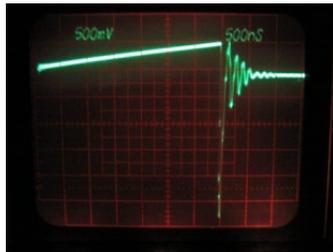
Very little current is needed to maintain a good battery at float. If desulfation has actually occurred, the battery should reach float voltage and stabilize there.

Testing the battery with a spec'd discharge and charge cycle will indicate if desulfation is successful. At the time this is being written, that step has not occurred. Stay tuned...

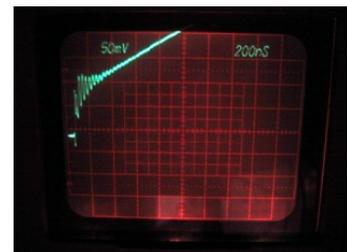
Pulses from the Roth 10kHz single coil desulfator connected, along with the 13.8 Volt float charger, to a sulfated ~34Ahr lawn tractor battery. Tektronix 7623 100Mhz O'scope



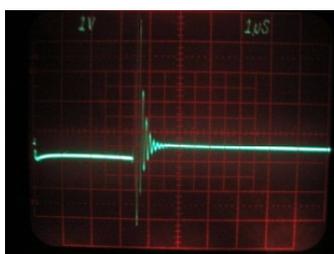
Current pulse measured across 0.1 Ohm Rsense



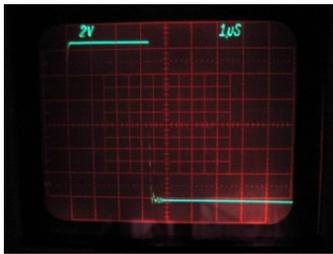
Current pulse adjusted to show neg excursion



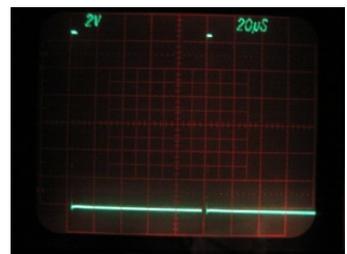
Current pulse adjusted to show leading edge



Voltage pulse measured directly across battery



FET gate drive pulse Width ~3µs



FET gate drive pulse Rate ~ 100µs