Hacking Old 97, Part 1: Batteries

Steve Leibson - April 01, 2007

My Fluke Scopemeter 97 is a bit more than 10 years old. It was the top of the line for a new series of three new instruments that put a portable, battery-powered scope in the palm of your hand. The Scopemeter was and still is a great concept. Fluke still makes Scopemeters (now improved over the original 90 series) and several vendors now offer competing products.

Although little used, my Scopemeter was dead. The original battery pack wasn’t just flat, it had leaked. In addition, I’d never purchased the special optical interface for Old 97 so it couldn’t talk to anything. Fluke’s engineers had originally designed the Scopemeter to directly drive Epson dot-matrix and HP ink-jet printers. I wanted to bring this instrument back to life and, figuring that images of it’s waveforms might prove useful in future blogs, wanted a way to interface it directly to my PC instead of driving a printer. I’ll be devoting several future blog entries to my progress in hacking Old 97.

The first step was to fix the battery situation. The retail price on genuine replacement PM9086 NiCd packs is around $89. Fluke’s Scopemeter battery pack is a proprietary design incorporating four NiCd C cells in a shrink-wrapped package with a special charging tab. Over on eBay (a good place to look for old electronics stuff and repair parts), replacement battery packs cost $19 plus $7 shipping. The replacement pack on eBay has a 2800 mAh capacity. Perhaps we can do better.

I’ve been buying AA NiMH cells for a while now for digital photography. I usually buy the Lenmar brand. When I started buying these cells at Fry’s a few years ago, Lenmar’s AA NiMH cells had a capacity of 2000 mAh. That number has steadily risen every year since. These days, Lenmar’s top-of-the-line NiMH AA cells have a capacity of 2700 mAh each! Each AA cell has nearly the same capacity as the entire NiCd replacement pack for the Scopemeter. Perhaps I could find a way to use standard NiMH cells instead.

The first step was to look for NiMH C cells. Little to no research seems to have gone into engineering rechargeable C cells. At least I find them very hard to buy. You can get sub-C cells for building battery packs (the radio-control hobby market likes these) but I wanted batteries I could easily buy off the shelf at a store. It’s easy to find rechargeable AA cells. Lots of companies offer them.

Lenmar doesn’t offer NiMH C cells but they do sell PROAA2C plastic adapters that convert AA cells into C cells. These adapters retail for $10/pack of four but the local Fry’s will sell you a pack for less than $5. Now we’re talking. A quick trip to Fry’s and I was ready for an experiment. I already had four 2500-mAh NiMH AA batteries, which I charged up externally, inserted into the adapters, and crammed into the Scopemeter’s battery compartment. The instrument immediately powered up.
**NiMH AA cell and AA-to-C adapter**

So now my Scopemeter was running on rechargeable AA batteries but it couldn’t charge them, which was a pain because the Scopemeter’s battery box is gasketed, sealed, and held in place with two Torx screws. It would be much easier if the Scopemeter could charge the new batteries in place. However, Fluke’s engineers had designed the original battery pack with a special, separate charging tab so that the Scopemeter wouldn’t be able to charge non-rechargeable C cells, which would not contact the charging tab.

**Scopemeter 97 charging tab**

The original Fluke rechargeable NiCd pack has a tab leading from its positive terminal to the charging plate in the battery box. To permit the Scopemeter to recharge the NiMH AA cells, I had to provide a path from the charging plate in the battery box to the positive terminal of the appropriate C cell. I did that very simply by gluing a strip of wire braid onto the side of an AA-to-C-cell adapter.

**Charging-braid hack**

The glued section of braid along the side of the battery adapter contacts the charging plate. The free end of the braid wraps around the end of the battery adapter and is sandwiched between the AA battery’s positive terminal and the positive terminal in the battery box. The Scopemeter can now charge the four AA batteries while they’re inside of the battery compartment.

First Old 97 hack accomplished.