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WORK IN PROGRESS - DO NOT USE

Converting a Surefire C20 Charger to work with 18650 batteries

This page describes conversion of a Surefire C20 charging base for their 9N flashlight to charge 18650 Li-Ion batteries, rather than the NiCd battery that was stock for this light.

The Surefire 9N flashlight was an incandescent (Xenon bulb) flashlight with two fairly unique features for its day, particularly in the Surefire product line:

- It had a dual-output head using two bulbs: a low-power, 20-lumen bulb, and a 140-lumen main light (with 20 minutes' runtime with a fully-charged battery).
- It was powered by a 3.6-volt, 1800-mAh NiCd battery back, with a drop-in charger that allowed the battery to be charged without removing it from the flashlight. A variety of chargers were available, varying in input power, charging rate, and sophistication.

Somewhat surprisingly, compatible battery packs are still available from third-party vendors, but they're expensive and still suffer from the common limitations of NiCd battery technology. By contrast, the ubiquitous 18650 Li-Ion cell is inexpensive, widely available, and has an energy capacity up to twice as great as the stock battery pack. The 18650 is not mechanically compatible (it's smaller than the stock battery pack), but adapters are available to address this (e.g., http://tadcustoms.com/b90-b92-battery-adapter.htm). It also is not electrically compatible with the charging base; attempting to charge a 18650 battery in the stock charging base will quickly damage the battery.

This page describes conversion of the C20 charging base (12-hour “dumb” charger for the NiCd pack) to implement smart charging of 18650 Li-Ion batteries instead. After completing this process, the base will no longer charge the legacy NiCd packs; if you still have several of these, you may want to consider a different charging method for the 18650s.

Overview

The C20 charger consists of the base itself containing rudimentary charging circuitry, and a hard-wired 12-volt, 500-mA “wall wart” power supply. In this conversion, everything except the base itself will be discarded. In place of the factory power supply, this will require a micro-USB charger with an output capacity of at least 1A.

Conversion

Conversion starts by gathering the necessary tools and materials.

Materials

You'll need the following items to perform this conversion:

- Surefire 9N flashlight, 18650 battery adapter, and C20 charger. Other charging bases can likely be used, but I haven't worked with any of them to say for sure.
- TP4056-based Li-Ion charging module (e.g., https://www.amazon.com/Micro-USB-Battery-Charger-Over-Discharge/dp/B01LHD9D7E)
- Panel-mount micro-USB extension (e.g., https://www.amazon.com/UseBean-Female-Extension-Screws-Charge/dp/B072FG6R66)
- Fine-gauge (20 ga. or smaller) primary wire
- One 3mm green LED (optional)
- Small crimp-on ring or fork terminals
- https://www.thingiverse.com/thing:3503915 (optional)

Tools

You'll also need the following tools:

- Wire cutter/stripper/crimper
- Soldering iron with fine tip
- Dremel or similar tool to modify charging base
- Drill
- Screwdrivers
- 3D printer (optional)

Disassembly

Begin by disassembling the charging base. The bottom metal plate is held on with six Phillips-head screws and one 3/32 hex-head screw. Remove these screws and the metal plate.

Once the metal plate is removed, you'll see the circuit board. Toward the front end (left side in this picture) is a retainer for the LEDs; you can remove it with a pair of tweezers or needle-nose pliers (or your fingers if they're small enough). The board is held in place by two 3/32 hex-head screws near each end; remove these as well. Then gently push the strain relief out of the back end, and you can remove the entire board.

The two screws that held in the circuit board, also fastened it to the charging contacts, so they'll probably fall away as you remove the board. Don't lose them.

Re-assembly

Cut two pieces of your primary wire about 6“ (150 mm) long, strip the ends, and crimp on small ring terminals to one end of each.