How to Make a Parts and Crafts Lightsaber Kit

So you want to make a lightsaber, and you like our design, but you don’t want to buy our kit? Cool. This is what you’ll need to do to manufacture the pieces we provide -- pictures provided where words seem to fail.

First, a few words about why we made some of our design decisions.

1) PVC pipe press-fit connections, etc. This can seem kind of finicky and kludgey, but that’s kind of the point. Our goals in making kits for people to build at home are somewhat different from a lot of manufacturers. Ideally a kid would buy a lightsaber kit (or have one bought for them), build it, and, not just get a cool lightsaber, but get a feeling for how they might make one themselves.

By using a very recognizable and readily available material (PVC pipe, available at every hardware store), and modifying it using very easily understood techniques that can be done by almost anyone, we think we implicitly teach and inspire kids to build their own projects much more so than we would if we had precision molded custom parts that don’t look obviously makeable in a normal person’s basement.

2) Reed switch. Why a reed switch? Why use a fragile glass tube and a complicated magnet system instead of a normal everyday button or switch? A few reasons.

First, electromagnetism is the force. It’s much, much cooler to turn your lightsaber on using an invisible force that acts upon the world in mysterious ways than by moving bits of metal around with your fingers.

Second, it’s a cool component, and part of our goal in designing projects is showing cool and interesting and new components to kids in fun contexts -- normally at Parts and Crafts kids will build an LED flashlight, or a toy electric car, or some other simple power+load circuit with a normal switch before building a lightsaber.

Third, and very important. The reed switch allows the electronic part of the project to be completely distinct from the physical part. When teaching people new things, it’s incredibly helpful to be able to silo certain parts of learning experiences from others so that learners can feel confident about a new concept without immediately adding complication. This design allows kids to do the circuit, realize it works, and feel confidently done with it before moving on to putting together the handle+blade. Any kind of switch that requires wires to physically pass through the handle breaks this separation a bit.
As for how we ended up hot-gluing it to the battery pack, well, that’s more of what I talked about when talking about the PVC pipe. This is something anyone could obviously do, use simple readily available tools, and works.

Okay, so, the parts, and how we modify them:

**2 foot polycarbonate tubing** -- we use ½” OD, ¾” ID from US Plastics

We cut it down to 2 feet with a miter saw, and then use a heat gun and a pair of pliers to melt and fold over one of the ends. This prevents the diffusive tube from coming out of the end, and also makes the end translucent, which looks nice when the lights are on.

**2 foot light-diffusing tube**


**2 foot LED strand**

This is a bunch of LEDs soldered together. You can solder it yourself, you can scrounge it from a cheap/broken lightsaber toy such as --
http://www.amazon.com/Pack-LED-Light-Saber-28/dp/B00DWKEBA0/ref=sr_1_4?ie=UTF8&qid=1449866870&s=r-4 -- or you could try to repurpose some other kind of LED light string.

Unfortunately we have yet to find a really good supplier for strands of LEDs presoldered, but are keeping a look-out on alibaba. LED strip-lights such as
http://www.amazon.com/Happyskymall-Controller-Decoration-RGB-Nonwaterproof-DC12V-5A-Adapter/dp/B00XG2U6US/ref=sr_1_10?ie=UTF8&qid=1449867490&sr=8-10 -- have lights only pointing in one direction, and tend to be manufactured for 12V, and “christmas light” style lights tend to be too big to fit into a tube, and to have too much spacing between LEDs to be satisfying.

Still, if you don’t want to solder a bunch of LEDs together or scrounge from another light-toy, this kind of light-string is probably your best bet --

We take components out of premade cheap lightsabers and repurpose them -- there’s a lot of good stuff that you can separate in these toys -- switches and battery packs and lights and handles -- and we continually do our best to figure out something to do with all of the parts. Deep in our heart we’d prefer to find a way to buy just the soldered-LEDs, but we haven’t found a way to make this economically feasible yet, so instead we give ourselves the puzzle of “what to do with the rest of this stuff….”

Handle Assembly

1x ¾” PVC endcap
   self explanatory
1x 9 inch length of ¾” PVC pipe with 1” slits cut at top
1x 1 inch length of 1” PVC with lateral cut across one side and ⅜” hole drilled

1x 2 inch length of 1” PVC with lateral cut across one side (to wrap around ¾” PVC handle and make connection to blade snug)

1x 1 inch length of ½” PVC with lateral cut across one side (to fit around ½” polycarbonate tube and inside ¾” PVC to act as press-fit interface between them)
We cut the PVC either with miter saw + band saw, or with hand-held PVC cutters. We drill with a drill press or handheld power drill.

**Electrical Circuit**

2x AA battery pack --  

Reed switch --  
http://www.mouser.com/ProductDetail/Hamlin-Littelfuse/MDCG-4-37-43/?qs=sGAEpIMZZMvFdY0L2HfHxp8me%252bqUBsASEQJ5HhAXQ%3d

Quick-disconnect terminals  
--http://www.amazon.com/Premium-Grade-22-18-Male-Female-Solderless-Disconnect/dp/B00963TXH8/ref=sr_1_4?ie=UTF8&qid=1449869966&sr=8-4

This is probably the most elaborate bit of preparation that we do. The reed switch + magnet setup is a very convenient way to separate the outer aesthetic portion of the lightsaber from the inner electronic portion, and allows people to build the outer and inner portions of their project separately and then put them together.

The downside of the reed switch is that it is a fragile glass tube, and therefore somewhat easily breakable. The easiest way to break the reed switch is to put any bending stresses on the metal terminals themselves. The actual glass tube is relatively sturdy, but the connection between the tube and the terminals is very very fragile and will break with almost any amount of bending force.
To prevent this from happening, we pre-solder the reed switch to the battery packs and tack them in place with hot-glue so that all of the bending happens on the wires themselves.

This is a somewhat messy-seeming process, but if done right, you can protect the reed switches from having any bending forces on them at all, which will keep them safe. The things to be really careful about here are:

1) Really for serious -- make sure to tack the wires in place above the reed switch so that the bending-points of the wires are well away from the reed switch connections.

2) Use the glue thoroughly but sparingly. Make sure that the battery-pack can still very easily slip inside of the ¾” PVC pipe. If the glue catches/rubs on the pipe on the way in, it’s very easy for this to turn into a shearing force that breaks the reed switch.

After gluing+prepping the reed-switch/battery pack, we attach the terminals to the LED strand and battery pack + reed switch assembly with crimpers.
And you're done..