

About Soldering —Making Clip Leads—CLK

Introduction

In the course of these experiments, you will solder together wires and electronic components to make an adjustable regulated direct current power supply and other devices. Before you start doing the experiments, you and your partner will do three things involving soldering, namely: making two clip leads, putting alligator clips on the multimeter leads, and putting alligator clips on the wall transformer leads.

Soldering is a way of joining metals with solder, an alloy that melts at about 180°C (360°F). The hollow core of the wire solder in your tool kit contains a flux that cuts through oxide films on the surfaces of the metals so that the molten solder can wet and bond them.

Soldering Iron

Your tool kit contains a pencil type soldering iron. Plug it in and after 2 to 3 minutes, rub its conical tip with solder to tin it; that is, a film of molten solder wets it.

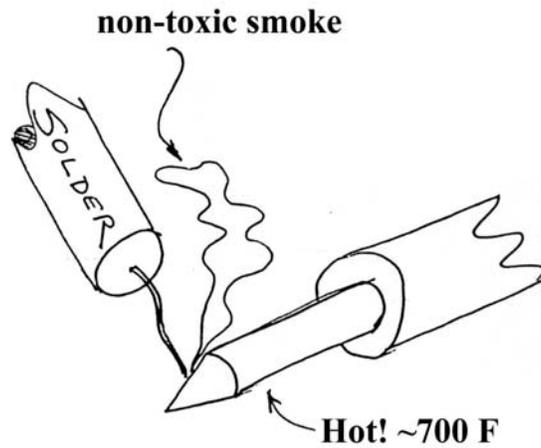


Figure 1: Tinning the soldering iron

The soldering iron in your toolkit requires some care. Once you have tinned the iron, you can clean the tip with a quick pass with a paper towel or emery cloth. It is important to keep your iron tinned otherwise oxides will form on the tip of the iron and the solder will not wet it. Unplug your soldering iron when not in use. Keep the soldering iron away from flammable materials. The tip of the iron gets very hot; be careful not to touch it.

Soldering Wires

To solder, put the iron up against the wires to be joined, letting the iron heat up the wires for a few seconds. Feed solder to the iron tip near the wires so that the molten solder can conduct heat to them and wet them. Smoke and vapors from this procedure are not harmful. Remove the

iron and let the solder solidify before moving the wires. The resulting joint should not come apart except with a very strong pull.

Typical Connection

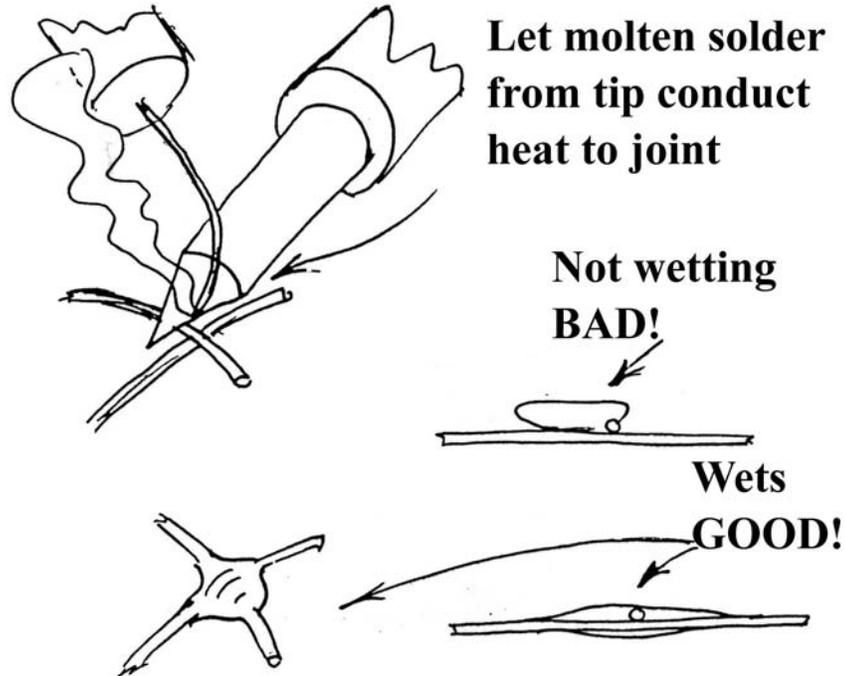


Figure 2: Soldering Connections

You should practice stripping (removing) the vinyl insulation from the ends of the stranded wire (in the clip lead kit), twisting the strands and tinning them with molten solder using your soldering iron. Then solder the two ends of the wires together. Try tugging them apart.

Making Clip Leads

Cut two pieces of vinyl-insulated stranded wire, about 300 *mm* (12 inch) long, one red, one black. You'll find wire in the Clip Lead Kit (CLK). You can use the wire cutter part of the long-nose pliers, or the wire strippers or scissors. Loosen the adjusting nut of the stripper, and set it so that the notch in the jaws just allows a regular paper clip to slide through. Wire is most easily stripped of its insulation by holding the wire with pliers with the part to be stripped protruding and then levering the wire strippers against the plier jaws. Try not to cut any of the strands. Remove about 4 *mm* (1/4 inch) of insulation from each end of each of the wires, and twist the strands into a compact bundle.

#22 stranded wire: red or black

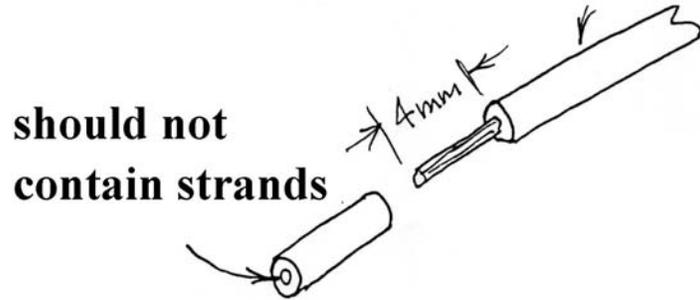


Figure 3: Stripping wires

Tin all the ends, which means put solder on them with your iron so that the strands are bound together. Put two sleeves of the same color as the wire insulation on the wires, large end facing the wire ends. Make a right angle bend in the middle of the tinned part and put that through the hole in the end of the alligator clip from above (the side where there is a round pad to put your thumb when opening the jaws of the clip).

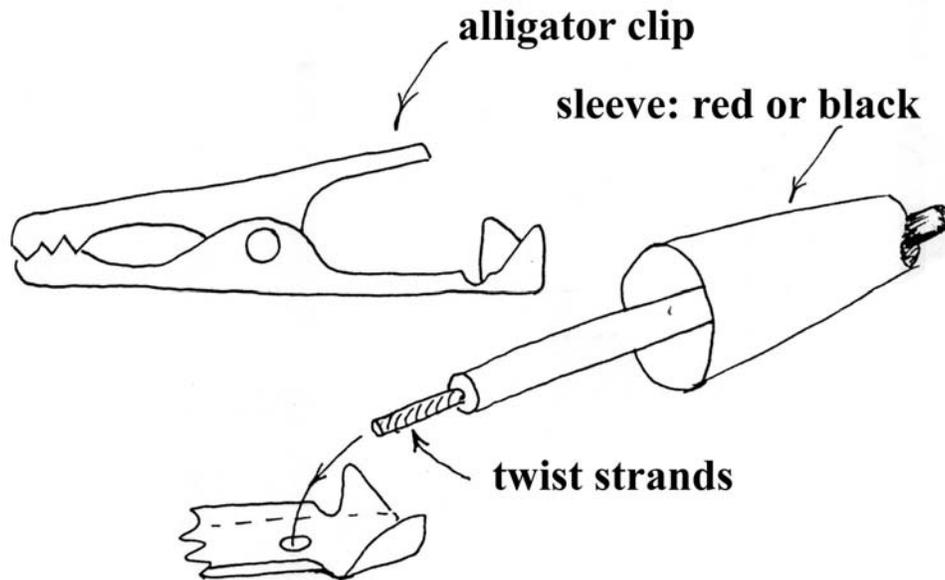


Figure 4: Alligator clip

Solder the tinned wire to the bottom side of the clip. You may find that it helps to hold the clip in your pliers using a rubber band around the handle of the pliers to give a firm grip. Let it all cool. Bend the insulated part back and crimp the end of the clip around it. Work the sleeve over the clip. **Repeat three more times to make two clip leads.**

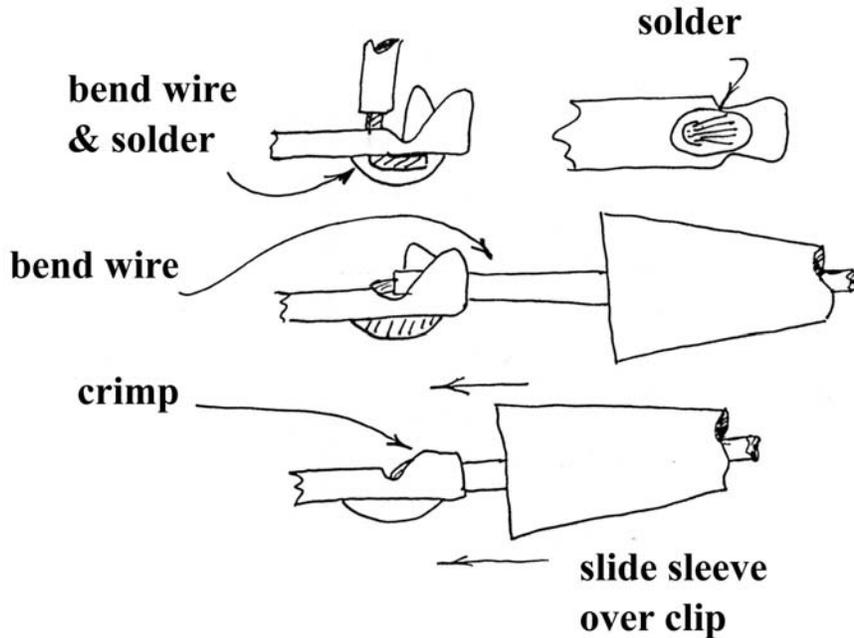


Figure 5: Soldering clip leads

Alligator Clips on Transformer Leads: In your Red Box you will find a Wall Transformer, that reduces the input $120V$ ac, $60Hz$ (30 watt) from the line to a safe and convenient $12V$ ac $1A$ output with only moderate loss of power (heating the transformer). It is **IMPORTANT** that the leads of the transformer should be of unequal length to reduce the likelihood of short circuits. If they are not, cut one of them so that it is about $50mm$ (2 inches) shorter than the other. Put a black sleeve on each of the leads. Strip about $4mm$ ($1/4$ inch) of insulation from each end of each of the leads. **Solder on alligator clips as before.**

Putting Alligator clips on the Multimeter Leads: Whenever you want to make a measurement with your meter, you will use the red and black test leads. Your analog multimeter comes with test prods that have been removed. These prods would be useful in making quick measurements from point to point in some devices. They are not good for our purposes where we want to leave the meter connected for extended times. Put red and black sleeves on the appropriate leads. **Solder on alligator clips as you did for clip leads.**