AN INTRODUCTION TO SOLDERING

Soldering is the joining together of two metals to give physical bonding and good electrical conductivity. **Solder** is a combination of metals which are solid at normal room temperatures and become liquid at between 180 and 230°C. Solder bonds well to various metals, particularly copper.

Soldering has many uses. It is used primarily to assemble electronic components such as resistors, capacitors and integrated circuits (IC's) onto printed circuit boards. However, it can also be used to join wires, metals, and even manufacture jewellery. In education **lead free fluxed core solder** is used. This consists of approximately 99% Tin and 1% copper depending on the brand of solder used. Sometimes a small percentage of silver is added to soften the solder and reduce the melting point temperature.

Flux is an aggressive chemical that removes oxides and impurities from the parts to be soldered. This ensures a good physical and electrical joint is made. Fluxes enable good 'wetting' or 'tinning'.

Wetting is a term that describes good adhesion of the solder to the components being soldered.

Tinning describes the application of solder to the soldering iron tip, or to a component being prepared for soldering.

The strength or power of a soldering iron is usually expressed in **Watts**. Irons generally used in electronics are typically in the 12 to 25 Watt range, and schools and hobbyists generally use 18 and 25-Watt versions. Most irons are available in a variety of voltages, 12V, 24V, 115V, and 230V are the most popular. You should always use a low voltage iron where possible, as it is much safer.

1. PREPARATION

1. Plan the component layout making sure the components are all in the right place. Check polarity!
2. Mount the smallest components first. If there is any wire, tin if required.
3. Bend the wire/legs to fit the position on the PCB. Do not bend too close to the component body as damage to the component may occur.
4. If the component is temperature sensitive use a pair of pliers as a heatsink between the component body and the point to be soldered.
5. Tin the location where the component is to be soldered.

2. TAKE CARE

1. Try to leave component identification markings visible.
2. Keep soldering time to a minimum to reduce the risk of heat damage to the component/PCB, ensuring that you have applied the soldering iron long enough so that the solder flows correctly.
3. Beware of solder bridging across tracks. This could cause a short circuit.
4. If working with static sensitive components always use a wrist strap connected to an earthing point.

3. SOLDERING

1. Switch on the soldering iron and feed solder to the tip of the iron when it heats up (370-380°C).
2. Wipe off excess solder onto a damp sponge or a brass wool tip cleaner.
3. Place the hot iron on the component lead and the PCB pad. Feed the solder into the far side of the component lead. Solder will begin to flow around the lead. Do not use too much solder.
4. Remove the solder source followed by the iron.
5. Do not disturb the component for a few seconds until the solder has solidified.
6. Trim the component leads to within 1mm of the soldered joint.

4. CHECK YOUR WORK

1. Are all of the soldered joints neat and tidy?
2. Is there too much or too little solder on the joint?
3. Has the solder flowed evenly around the lead? Is the solder joint nice and shiny?
4. Are all components inserted the right way around? (Check polarity!).