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Subject: Engineering Workshop
(Electrical)

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Class : 1-CE-3

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★ Experiment - 6* Aim:- Introduction to Soldering Techniques* Theory:-* Introduction of Soldering:-

Soldering is the joining of two metals to give physical bonding & good electrical conductivity. It is used primarily in electrical & electronic circuitry. Solder is a combination of metals, which are solid at normal room temperatures & become liquid at between 180 & 200°C . Solder bonds well to various metals, & extremely well to copper.

In electronics a 60/40 fluxed core solder is used. This consists of 60% Lead & 40% Tin, with flux cores added through the length of solder.

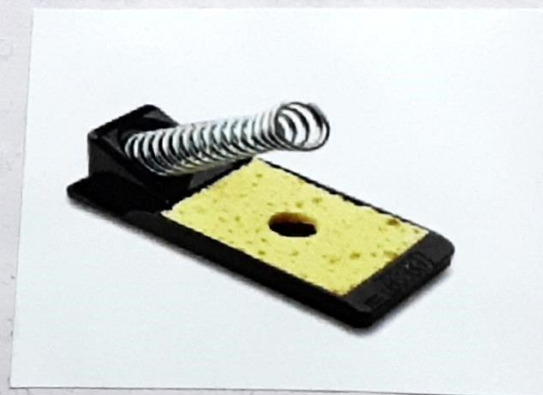
* Soldering Techniques:-

(1) Mass Soldering methods

- a. Wave Soldering
- b. Oven reflow
- c. Vapour phase reflow

(2) Directed energy methods

- a. Hot-gas Soldering
- b. Hot-bar soldering
- c. Laser soldering
- d. Soldering Iron
- e. Pinpoint torch



The metal surfaces must be clean of contamination & oxidation. This cleaning action is performed by the flux, a chemically active compound that, when heated, removes minor surface oxidation, minimizes oxidation of the base metal, & promotes the formation of an intermetallic layer between solder & base metal.

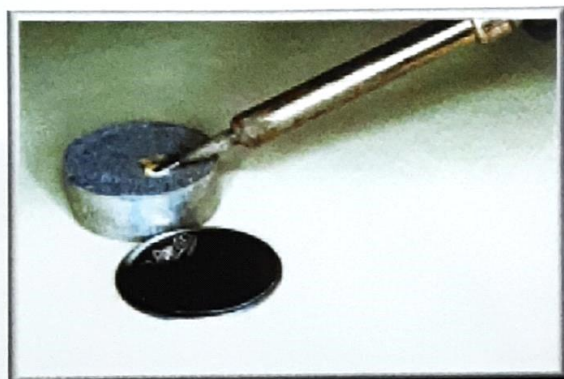
- React with or remove oxide & other contamination on the surface to be soldered
- Dissolve the metal salts formed during the reaction with metal oxides.
- Protect the surface from re-oxidation before soldering occurs
- Provide a thermal blanket to spread the heat evenly during soldering.
- Reduce the interfacial surface tension between the solder & the substrate in order to enhance wetting

* Tools:-

These are the tools, which heat the solder from room temp. to its melting point. A modern basic electrical soldering iron consists of the following:-

- heating element
- handle
- Soldering bit
- power cord

The heating element can be either a resistance wire wound around a ceramic tube. The element is then insulated & placed into a metal tube for strength & protection. The element reaches temp. of around 370 to 400°C i.e. approx. 200 degrees higher than melting point of solder.



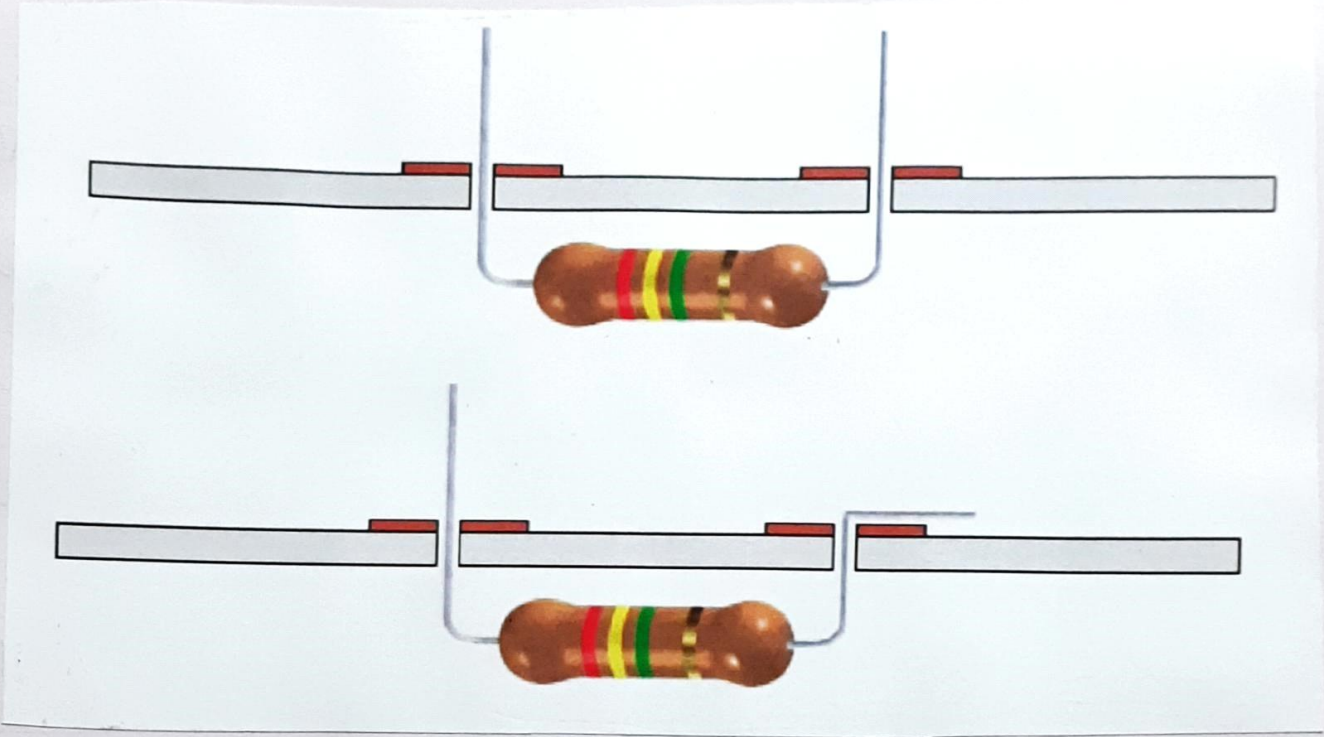
* Example:-

- Step 1:- Add your component by pushing the wires through the holes you have drilled in your PCB.

- Step 2:- Bend over all of the wires you're not going to solder now.

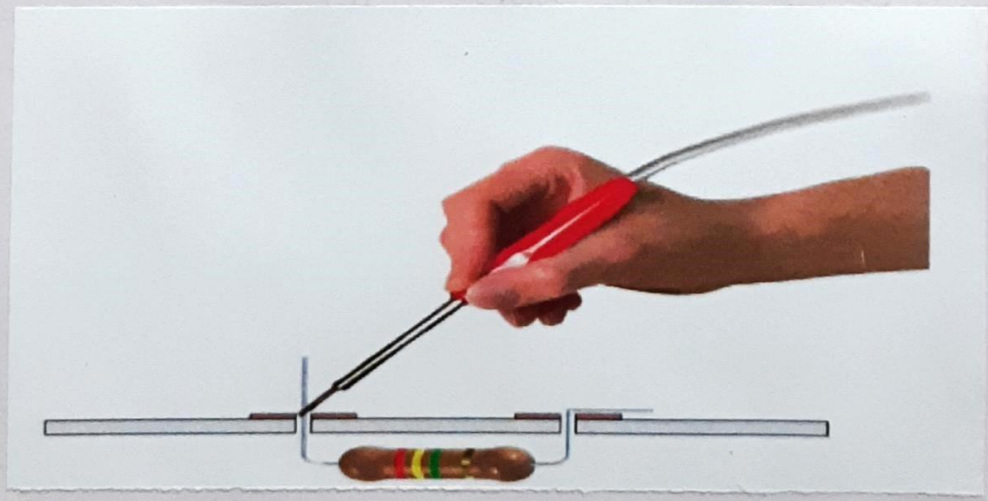
If you heat it for too long, the track will burn away.
If you don't heat it for long enough, the solder will not stick.

- Step 3:- Touch the Solder wire onto the track & heat it quickly from above with iron.
- Step 4:- Liquefy just enough solder to make join & then pull the iron away.

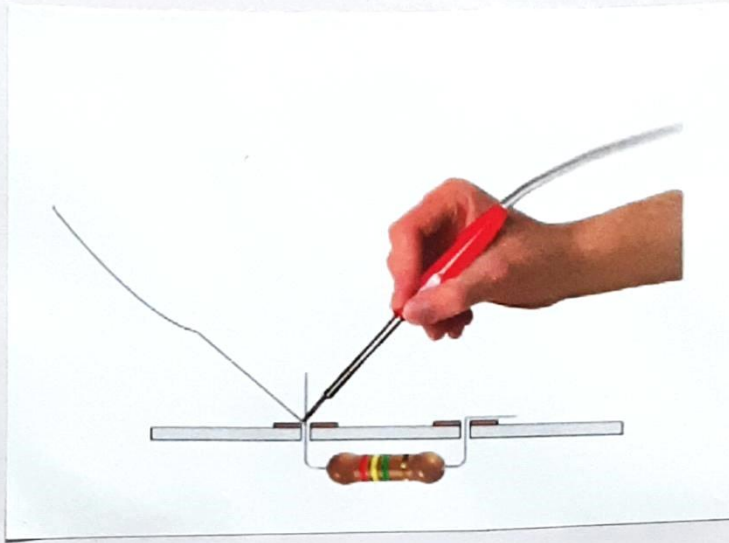


Step 1:-

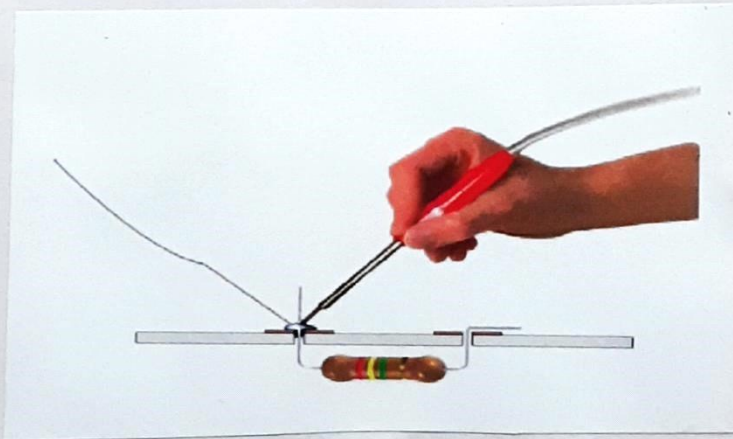
Step 2 :-



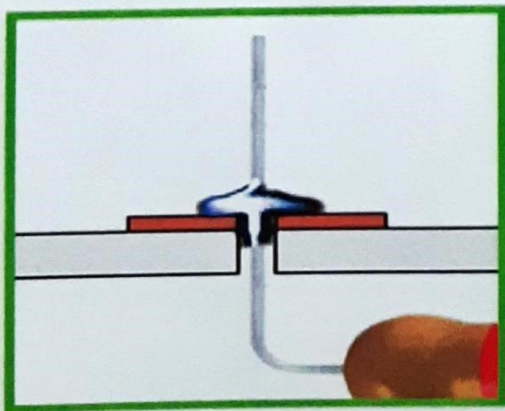
Step 2:-



Step 3:-

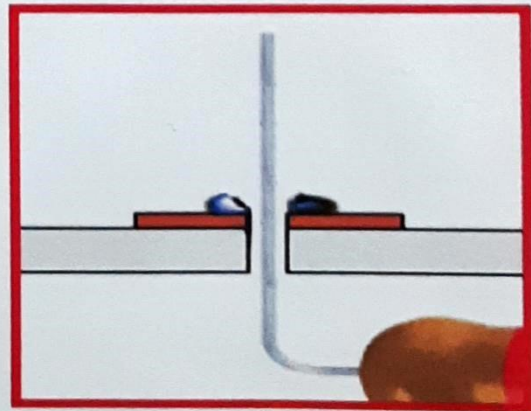


Step 4:-



GOOD:

The join is complete and will hold in place.



BAD:

Not enough solder applied. No join.