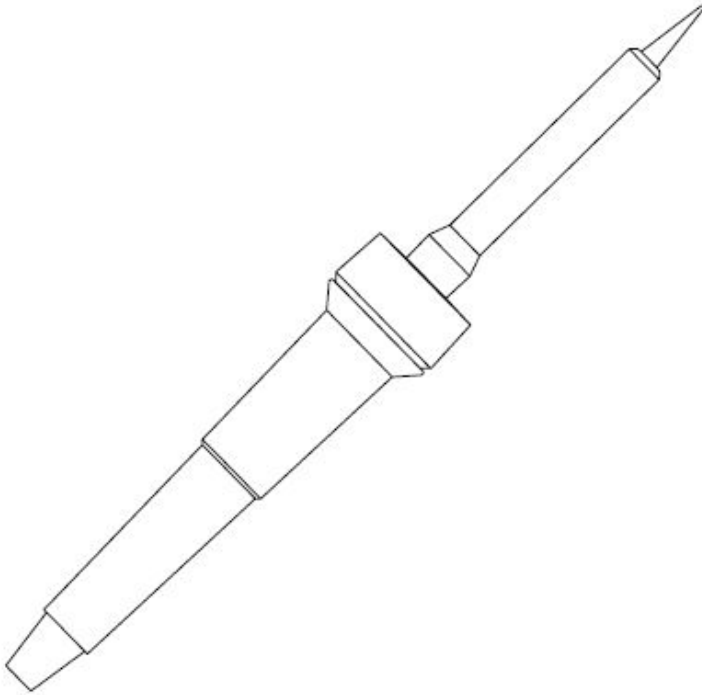


# How to Use a Soldering Iron



By: Matthew Moraguez

Moraguez Soldering Essentials  
Gainesville, FL 2013

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# 1. Safety Information

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<sup>[1]</sup> **WARNING:** Risk of eye injury. Always wear safety goggles when working with hot **solder**.

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<sup>[1]</sup> **WARNING:** Risk of lung irritation. Avoid direct inhalation of solder fumes. Always solder in a well-ventilated area.

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<sup>[1]</sup> **WARNING:** Risk of severe burns. Soldering iron tips become very hot when used. **NEVER** touch the iron tip.

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## 2. Disclaimer

This manual has been produced to ensure the safe, effective use of this product. Moraguez Soldering Essentials has taken every necessary precaution to ensure the safety of its products. These precautions include, but are not limited to, the production of detailed instruction manuals for consumer products. Moraguez Soldering Essentials is not responsible for damage or injury resulting from misuse of this product due to failure to read instructions. Under no circumstances would we recommend attempting to solder prior to reading this instruction manual. It is important that the user always strictly adhere to the proper procedure and safety precautions detailed in this manual.

### 3. Overview

This manual provides in-depth, step-by-step instructions on how to use a soldering iron. The manual is intended to be used by a novice with no prior experience soldering. Definitions of unfamiliar terms, which are bolded upon first use in this text, are provided in a glossary at the end of this manual. Users with experience soldering are strongly encouraged to read the safety guidelines and the instructions on maintaining and cleaning the **soldering iron**.

### 4. Operating Principle of Soldering

Soldering is a process used to make an electrical connection between wires, resistors, capacitors, or any other electrical component.

When soldering, the soldering iron tip is heated to above the melting point of the solder. The heated iron is then used to melt the solid solder. Melting the solder allows it to flow around the wires that are being joined. When the wires are connected with solder, electricity can flow from one wire to the other.

Solder will only adhere to clean surfaces that are heated above the melting point of the solder. The surface to be soldered is cleaned with a material known as **flux**, which is often found inside the solder. To allow the solder to flow, heat must be applied to the **foil** of the circuit board.

However, if too much heat is applied, the electrical components in the circuit may be damaged. Conversely, if insufficient heat is supplied, a **cold solder** may occur. A cold solder connection has a dull appearance and is not firmly attached to the surface. A good solder connection has a shiny appearance and firm adherence to the surface.

Soldering is a valuable skill that allows you to complete various electrical do-it-yourself projects.

## 5. Required Materials

### 5.1. List of Required Materials

In order to solder, you will need:

- 15W Soldering Iron



**WARNING:** Risk of severe burns. Soldering iron tips become very hot when used. NEVER touch the iron tip.

- Lead-free, **rosin-core solder**



**WARNING:** Risk of lung irritation. Avoid direct inhalation of solder fumes. Always solder in a well-ventilated area.

- Circuit board, wires, resistors, and capacitors
- Safety glasses\*



**WARNING:** Risk of eye injury. Always wear safety goggles when working with hot solder.

- Wet Sponge\*

\*not provided in this kit

## 5.2. Comments on Required Materials

### Soldering Iron:

Different soldering irons produce different amounts of heat. The iron provided in this kit is a 15-watt iron. Soldering guns, an alternative to irons, produce more heat. However, soldering guns are only needed in special situations where high heat is necessary. Soldering stations, a more costly alternative, allow for variable heat production. The provided iron will produce sufficient heat for normal applications while limiting the risk of overheating the electrical components.

### Solder:

Lead-free solder, which is composed primarily of tin, eliminates the health risk of leaded solder.

### Wet Sponge:

The wet sponge will be used to clean the tip of the soldering iron while working.

## **6. Instructions**

### 6.1. Preparation

1. Gather the required materials in a well-ventilated area.
2. Plug the soldering iron into an electrical outlet.



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3. Wait about two minutes for the iron to heat.

## 6.2. Tinning the Tip

**Tinning the tip** removes any oxide coat from the iron tip.

1. Touch the solder to the tip of the iron until a ball of melted solder forms on the tip, as shown in Figure 2.

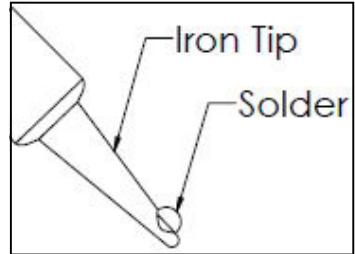


Figure 2: Solder on Tip of Iron

**Note:** If the solder does not melt, continue to wait for the iron to heat. If it still does not melt, go to 8.1 on p. 10.

2. Wipe the solder from the iron using the wet sponge.

## 6.3. Applying Solder

Repeat for the each of the 10 terminals in the top row.

1. Touch the iron tip to the foil of a terminal on the top row of the circuit board (See Figure 3). This will heat the foil.

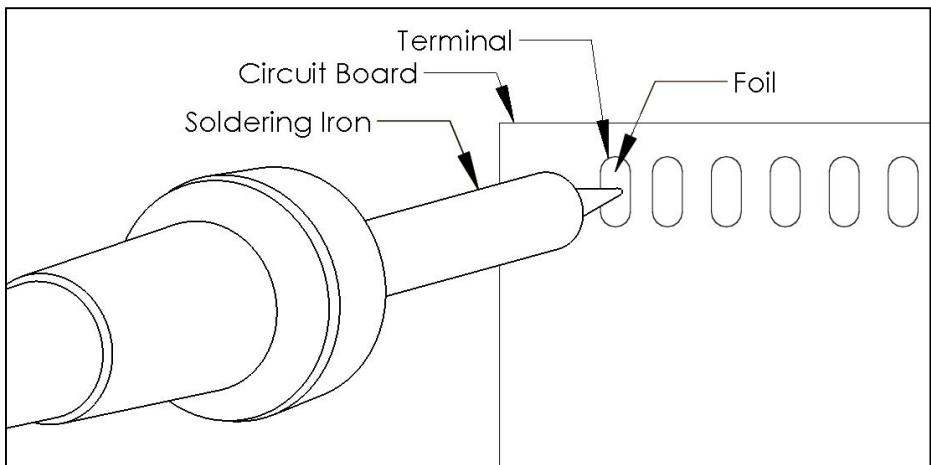


Figure 3: Heating the Circuit Board Foil with Soldering Iron

2. Apply solder at the point where the iron touches the foil  
(See Figure 4).

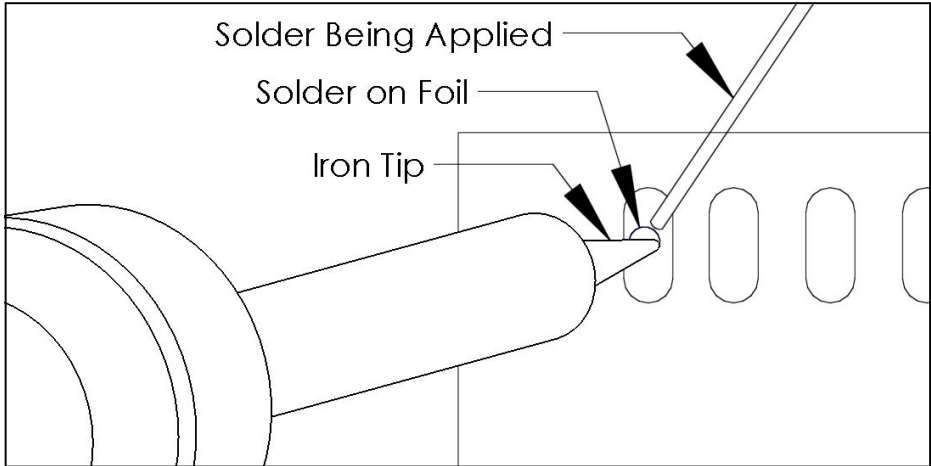


Figure 4: Soldering Being Applied to Circuit Board

3. Simultaneously, stop applying solder and remove the iron from the terminal.
4. Check that the solder connection looks shiny and does not have peaks.

**Note:** If your connection appears dull, consult troubleshooting section 8.2 on p.10-11.

#### 6.4. Removing a Solder Bridge

A solder bridge occurs when solder from two adjacent terminals touch. This often results when too much solder is applied. A solder bridge should be removed to prevent a short circuit.



1. Touch the iron tip to the circuit board near the solder bridge.
2. Drag the iron tip straight through the solder bridge as shown in Figure 5 .

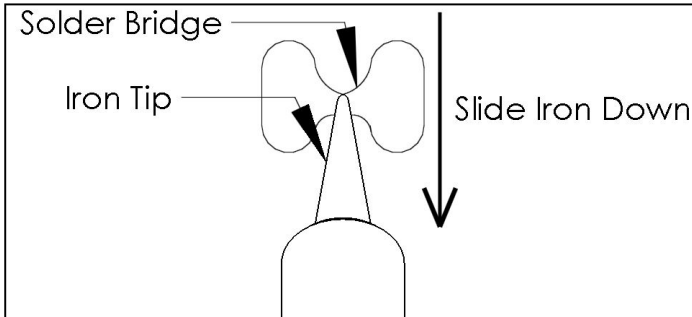


Figure 5: Drag Iron to Remove Solder Bridge

## 7. Maintaining Your Soldering Iron

Maintenance of the soldering iron keeps the iron functioning properly and can extend the life of the iron.

### 7.1. Care During Use

- Unplug the iron when not in use.

Keeping the iron turned on when not in use can lead to corrosion of the iron's tip.

### 7.2. Care During Storage

- Tin the tip of the iron as described in the instruction section entitled "6.2. Tinning the Tip".
- Unplug the iron by pulling on the plug, not the cable.

## 8. Troubleshooting

### 8.1. Solder Will Not Melt

1. Wait about five more minutes to give the iron time to heat up. If the solder still does not melt, proceed to step 2.
2. Touch the soldering iron tip to the wet sponge.
  - Outcome 1: If the water steams and you hear a hissing noise, then the soldering iron is heating properly. Proceed to step 3.
  - Outcome 2: If the water does not steam and no hissing noise is heard, plug the soldering iron into a different socket. Return to step 1.
3. If these troubleshooting steps do not resolve your problem, call Moraguez Soldering Essentials at 1-800-555-1234 ext. 111. The customer service representative will provide you with advanced troubleshooting options. If problems persist, a new soldering iron will be sent to your household at no cost.

### 8.2. Solder Appears Dull or Brittle

1. Clean the iron tip on the wet sponge.
2. Tin the tip as described in the instruction section entitled “6.2. Tinning the Tip”.
3. Press the iron firmly against the foil for several seconds.

4. Apply solder to the point where the iron and foil meet.
5. Remove the iron from the foil.
6. If the solder still appears dull or brittle, watch the instructional video entitled “Cold Solders” on our website, <http://www.moraguezsoldering.com>

## 9. Glossary

**Cold Solder-** Occurs when insufficient heat is applied. The solder will appear dull and brittle.

**Flux-** A material used to clean a metal surface by removing the oxide coat.

**Foil-** The thin metallic sheet found in circuit boards that is used to conduct electricity. Soldering connections are made between electrical components and this foil.

**Rosin-core Solder-** Rosin is a type of flux safe for use with electrical devices. The solder provided in this kit has the rosin in the core of the solder.

**Solder-** A metallic material used to make electrically conductive connections.

**Soldering iron-** A device with a heated tip that is used to melt the solder.

**Tinning the Tip-** A process in which solder is put on the soldering iron tip. This process removes any oxide coat from the iron tip and allows for efficient heat transfer.

## 10. Environmental Considerations

Moraguez Soldering Essentials strives to maintain sustainable business practices. For this reason, we encourage proper disposal of soldering equipment. The soldering iron and lead-free solder provided in this kit can both be recycled at your local waste management facility. We appreciate your compliance with our recycling efforts.

## 11. Graphics References

[1] "Hazard Warning Labels." *Labelident*. 2011. Web. 28 Feb. 2013.

**Note:** All other graphics were generated by Matthew Moraguez using Solidworks 2013.