EET 150
Introduction to EET
Lab Activity 6
Introduction to Wire Splicing and Soldering

Required Parts, Software and Equipment

Parts

None for this activity

Equipment

Required

Hookup wire (22 AWG)
Wire cutter/stripper
Soldering Iron*
Soldering Iron Stand*
Solder (Use standard lead/tin solder not lead-free)
Safety Glasses

Software

MS Word

*These are part of the SP-1A kit.

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Introduction

The wires of electrical systems often need repair or extension. When repairing cables only the damaged section of cable can be replaced saving time and wire cost. To do this the bad section of wire needs to be removed and a new section spliced into its place. Wire splices are used when installing a new section of wire, or when adding a junction to a pre-existing system.

Wire and cables must have strong mechanical connections that also provide good electrical conductivity. Poor electrical connections lead to arcing and may produce enough heat to start a fire in high power circuits. Poor connections in lower power systems, such as electronic devices can produce intermittent open or short circuits that are difficult to troubleshoot and repair.

There are many different types of wire splicing techniques, each having a special purpose. In this lab, we will cover a few of these techniques along with learning how to use a soldering iron. Soldering the splices will help ensure a good connection between the new wire and the existing wire along with strengthening the connection.

When using the soldering iron make sure to follow some simple rules to ensure safe practice and good solder joints. A good solder joint requires sufficient heat to cause the solder to flow and bond properly. Too cool of a temperature will not melt the solder and produces a dull, crystallized joint. All parts of a solder joint should be clean and free of contamination. Always clean and tin the tip of your soldering iron. Tinning a soldering iron means coating the tip of the soldering iron with a thin film of solder. This will allow maximum heat transfer from the soldering iron to the joint.

When soldering you are melting metal in order to create a bond and electrical connection between two parts. This is why you should always practice good safety. Safety glasses should be worn at all times in order to minimize metal or other objects from entering the eye. When you are not using the soldering iron be sure to put it in its holder to reduce chances of being burned and creating a fire hazard.

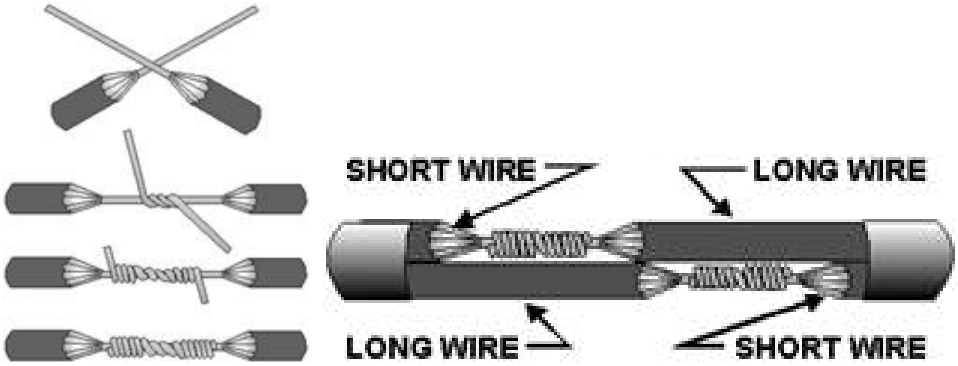
Objective

The objective of this lab is to provide students the opportunity to perform wire splicing and allow them to learn the basics of soldering. The students will be able to demonstrate proper technique for wire splicing and soldering of the connections.

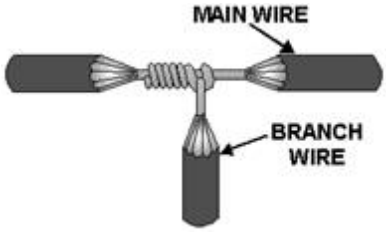
Procedure

1. Put on safety glasses, they should be worn for the entire time in the lab. Plug in the soldering iron and put it in its holder.

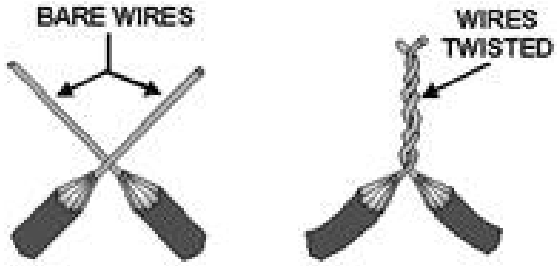
2. Strip two pieces of wire and perform a Western Union splice as seen below. Remember there should be 5-10 turns per side. **On-campus students**: show the instructor your connection before continuing. **On-line students**: take a photo of the joint and import the photo into a Word document. When the lab is complete, convert the Word document to a pdf and submit it with your lab documentation to the assignment in the course.



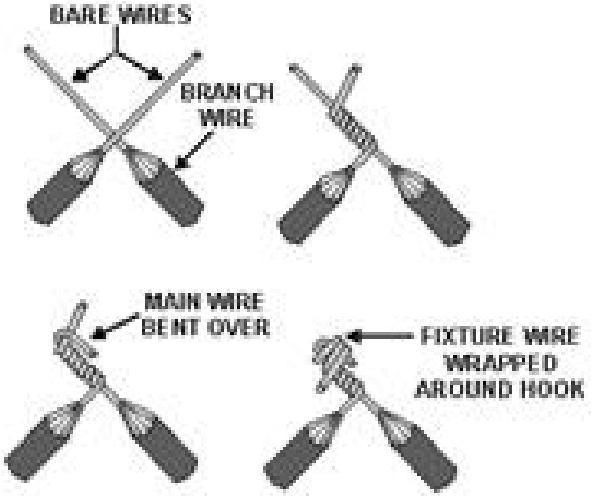
3. Strip two pieces of wire and perform tap splice as seen below. **On-campus students**: show the instructor your connection before continuing. **On-line students**: take a photo of the joint and import the photo into a Word document. When the lab is complete, convert the Word document to a pdf and submit it with your lab documentation to the assignment in the course.



4. Strip two pieces of wire and perform the rat tail splice as seen below. **On-campus students**: show the instructor your connection before continuing. **On-line students**: take a photo of the joint and import the photo into a Word document. When the lab is complete, convert the Word document to a pdf and submit it with your lab documentation to the assignment in the course.



5. Strip two pieces of wire and perform the fixture splice as seen below. **On-campus students**: show the instructor your connection before continuing. **On-line students**: take a photo of the joint and import the photo into a Word document. When the lab is complete, convert the Word document to a pdf and submit it with your lab documentation to the assignment in the course.



6. Use the solder provided to tin the tip of your soldering iron make sure you wipe off any excess solder with a damp sponge.

7. Apply the iron to the wire splices in order to heat them up. **DO NOT HOLD THE WIRE** because it will become hot with the soldering iron. Use a pair of pliers to hold the wire or wrap it slightly around the soldering iron holder. Brush the solder wire across the connection until it starts to melt. Put a thin coat of solder over the connection.

8. After you have soldered all the connections place the soldering iron back in its holder and unplug it. Remember it will take time for the soldering iron to cool off. **DO NOT** place the tip in water or hold it on wet material to cool the tip, this will **DAMAGE THE IRON**. **On-campus students**: show the instructor the completed solder joints. **On-line students**: take a photo of all soldered joints and submit it with your lab documentation as described above.

Discussion Points

When would you use wire splicing techniques? Why are the two wires offset in the Western Union multi-wire splice? When using a wire nut in what direction would you twist the rat tail connection in order for the wire nut to work properly? Why would you use wire splices instead of crimp connectors? Why did you solder the splice? When would you use a tap splice?