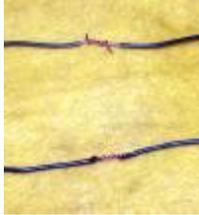
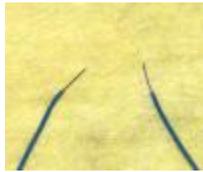


Electrical Connections

Before you can make connections with wire you must strip the insulation from the wire. To do this you need wire strippers. See the [tools](#) section for a picture of different types of wire strippers. For most connections you only need to strip about 1/2" of insulation from the end of the wire.

The most basic wire connection is simply twisting two wires together.



<p>Strip 1/2" insulation from the ends of the wires</p>	<p>Place the wires together and twist. Insulate bare wires with electrical tape.</p>	<p>Alternately, hold the wires facing each other and twist the wires together. This type of connection tends to unravel so you may need to consider soldering the connection (bottom set of wires in picture.) Insulate with electrical tape.</p>
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You can also make connections using wire nuts. Wire nuts are sized according to the gauge of wire you are joining. Wire nuts work best when joining two wires of the same size. Make sure you use wire nuts that are sized properly for your wire or they will not work correctly. Strip 1/2" insulation from each wire. Place the wires side by



[Video: Using a wire nut](#)

side. Hold the wires just below the bare wire. Place the wire nut over both wires and twist down.

Wire Crimp Connectors

You can use wire crimp connectors to join two pieces of wire together as well as to join wires to other components. Click the thumbnail on the right to see some of the various types of crimp connectors that are available. Like wire nuts, crimp connectors are sized according to gauge wire they are designed for. Make sure you use the correct size crimp connectors for the wire you are using.



Crimp connectors come in both insulated and non-insulated versions. I recommend you always use the insulated connectors.

To use crimp connectors you need a pair of wire crimpers. Like wire nuts, crimp connections are sized based on the wire gauge being joined. It is important to use the proper size crimp connector or the wire may slip out.

The crimpers should have several slots to insert the crimp connection based on wire size. Identify the proper crimp slot for the wire you are joining. Strip 1/2" of insulation from the wire. Insert the bare wire into the back of the crimp connection and place the crimp connection in the proper slot. The insulation on the crimp connection extends beyond the metal designed to make the crimp so make sure that

the jaws of the slot are over the metal portion of the crimp connection and not over just the insulation. Squeeze firmly.

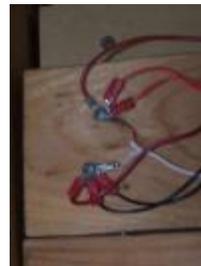
Video: Using crimpers to make a crimp connection.

Types of Crimp Connectors

Butt joint: Used for joining two pieces of wire together. Strip 1/2" insulation from each wire. Push the stripped wires into each end of the connector and use the crimpers to crimp both ends of the connector.



Ring Terminal: Ring terminals are used to make wire connections to screw terminals. They can also be used to join several wires together with a bolt and nut or by using a screw through the rings. Ring terminals are sold by wire gauge size and by the size bolt that the rings will accept. The image on the far right shows ring terminals being used with a screw to connect several wires together. This allows for relatively easy connection and disconnection of wiring.



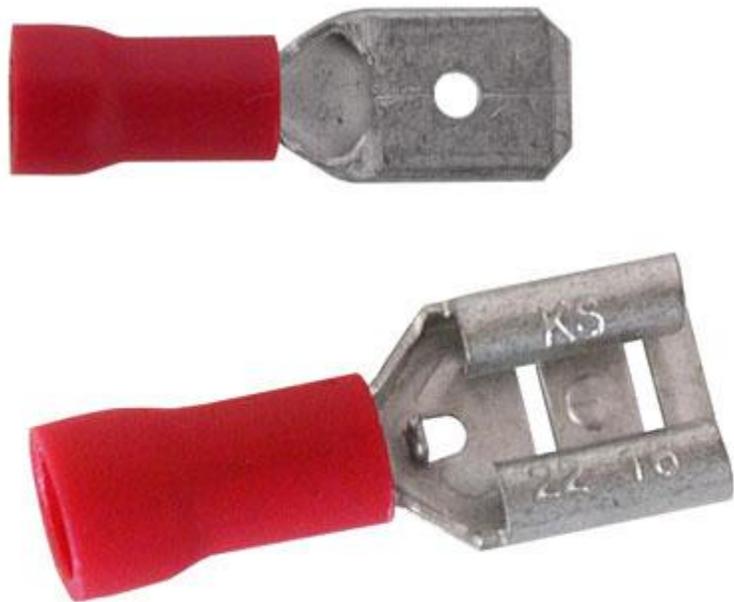
Spade terminal: Spade



terminals are used similar to Ring Terminals. They are also sold by wire gauge and bolt size. The primary difference between a Ring Terminal and a Spade Terminal is that the bolt or screw does not have to be completely removed in order to make the connection as the spade can slip under the bolt or screw once it has been loosened.

Quick Disconnect: Quick Disconnects are for joining two pieces of wire together and to be able to easily disconnect them at a later time. Quick disconnects are sold in two versions: Male and Female Quick Disconnects. It takes one of each in order to be able to join wires together. This is useful for being able to easily remove components from your devices.

Many 12 V batteries have terminals that a female quick disconnect will fit. This makes it very easy to connect



and disconnect power from the battery. (Something you need to do anytime you work on your device.)

Other types of connections

Screw terminals: You can find screw terminals on several devices, including motors and light sockets. They are designed to either have a stripped piece of wire twisted around them or to be used with a ring terminal or spade terminal. The image at the right shows screw terminals on the side of an electric light switch and electrical outlet. The screws are loosened and the stripped end of the wire is wrapped clockwise around the threads of the screw and then the screw is retightened.



Solder tabs – Many small hobby motors have solder tabs for the motor terminals. This terminals are designed to have the wire soldered into place. It IS possible to just insert the wire through the tabs and twist the wire to make a connection but you



must be very careful if you try to do this because it is very easy to tear the solder tab off of the motor.

Terminal Block: Terminal blocks are generally a combination of several screw terminals in line on a plastic or rubber block. They are useful for connecting larger wires together. For instance, in the image to the right the terminal block could be mounted inside of a device you have constructed. The wires that are connected could be power connections to a motor. The wire that is not mounted could be the power leads from an external power source. This allows disconnection of one set of wires without disturbing the other set.



Perf Board Terminal Block: These are smaller terminal blocks designed for use on circuit boards. They generally work by inserting bare wire into a small slot. A screw is then tightened down to hold



the wires into place. The picture on the right is from the "Tinkering" pages. The three burnt orange wedges on the perf board in the bottom right hand of the picture are Perf Board Terminal Blocks.

Trailer wiring harness – This is a wiring harness that is designed for connecting truck lights to a trailers lights. However, this could be just the thing you team needs to be able to easily connect and disconnect four wires at the same time. Look for other types of harness connectors at automobile shops.



Source: <http://tech.texasdi.org/electricalconnections>