

Wire-Wrapping Guide

Introduction

The Northmicro NM101 prototyping board has all the circuitry that does not change between designs included on a PCB with a large prototyping area that has been designed to accommodate wire-wrap prototyping.

When done correctly, wire-wrapping has been proven to be a reliable method of making electrical connections quickly yet allows changes to be made with the use of only a few simple tools. It is an excellent prototyping method as it allows the design to evolve as new features or errors are corrected with little outlay in cost. The alternative of making a circuit board is costly and time consuming. It may take 3 to 5 days to get a new board back from a PCB manufacturer at the cost of hundreds of dollars.

The Wrap

The wire is first stripped of its insulation approximately 1 inch or 3 cm. It is loaded into a wire-wrapping tool. The tool has a slot going down one side into which we need to load the wire. Looking into the end of the tool, you will see two holes. One hole is in the center, while the other is towards the outside. It is the hole towards the outside that we need to thread the stripped wire into.

Balance the tool between your hands and thread the wire into this hole. You should see the wire emerge into the groove on the outside of the tool. Push the wire up into the tool, until the insulated wire can go no further. If the wire appears to be longer than the groove then cut it now with a pair of snips.

The connection is made by inserting the tool (center hole) over a wire-wrapping pin and wrapping the solid wire around the square pin in a clockwise direction. It is important not to apply much pressure; otherwise the wrap will crunch up. Pencil writing pressure is all that is required. In doing this, the wire is deformed at every corner of the square post. You should end up with about 6 to 8 turns of stripped wire and 1 to 1 ½ turns of insulated wire at the bottom of the post. This is called a modified wire-wrap.

The wire can then be routed between the pins of the IC socket to the next connection. You need to estimate the length of wire needed and then cut and strip the wire in the same way as before. Try not to leave excessive amounts of wire as it will quickly get in the way.

Wires can be daisy chained between same points on a circuit eg data lines. It is usually not a good idea to do this with power connections. It is better to take them back individually to a common power trace or to a single pin.

Unwrapping

To remove a connection, it is relatively easy. You can use an unwrap tool which looks like a miniature corkscrew, or most wire-wrapping tools have the capability of being used to unwrap as well.

Position the tool over the pin that you wish to unwrap from. Apply a downward pressure and rotate in an anticlockwise direction. You should find that the wrap will unravel relatively easily.

Do not use the unwrapped connection again. The wire will be fatigued and can easily break. Cut off the wrapped portion of the wire and then connect to the new location if the wire is long enough.

Wire-wrap terminals

Wire-wrapping should only be done to wire-wrap pins. Sockets are available for DIL ICS in a variety of sizes. The Northmicro board proto-area has wholes designed to accommodate these larger leads. Individual pins are available that you can use to connect to the likes of resistors and capacitors.

Having said that, if you do not want to use these pins you can wrap the wire around a resistor or capacitor lead, but you must then solder the connection as the wrap will not guarantee a connection in this case.

Additional info

Sockets are usually not soldered to the board, but use the wire-wrap to hold them in place. It is important therefore when wire-wrapping to a socket for the first time, that you hold the socket in place while wrapping the first connection.

Wire-wrap the power supply connections first to each IC. If possible use a different coloured wire for these.

Remember that the pin numbers of the IC's will be reversed when viewed from below. This is a very common problem for "new wrappers". You can buy plastic templates that slip over the leads to identify the pin numbers or you can print some off that you have made your self on paper.

Multiple connections can be made to the same pin (usually a maximum of 3 connections).

If you need to remove a connection that is under others, this can lead to a number of rewraps. You can also choose to cut the connection if you no longer need to connect to that pin. For this reason, if part of the design is subject to change, wrap this part of the circuit last so that it will be the upper connection on a pin. In this way it is easier to make changes without disturbing other connections.

Suggested Suppliers



WIRE WRAP TOOL

Wire wrap tool. Strips, wrap and unwraps 30 AWG wire.

Radio Shack Catalog #:276-1570 \$7.49

Order on line



Wire wrap sockets are available from multiple vendors in many sizes. Radio shack and Digikey for example.



30-Gauge Wire for Wrapping-Red

Available from Radio Shack Catalog #: 278-501

\$2.99

or from Digikey

Various lengths and colors are available.

www.digikey.com

www.radioshack.com

Professional grade wire wrapping tools are available from the OK Industries tool company and its distributors.

<http://www.okindustries.com/products/4.1.1.htm>