

NETWORK CABLE TOOLS

Last updated: 2/11/2000

Modular Plug Crimp Tool. You will need a modular crimp tool. This one is very similar to the one I have been using for many years for all kinds of telephone cable work and it works just fine for Ethernet cables. You don't need a lot of bells and whistles, just a tool which will securely crimp RJ-45 connectors. This one is made by [Eclipse Enterprises, Inc.](#) Even though the crimper has cutters which can be used to cut the cable and individual wires, and possibly stripping the outer jacket, I find that the following tools are better for stripping and cutting the cable...



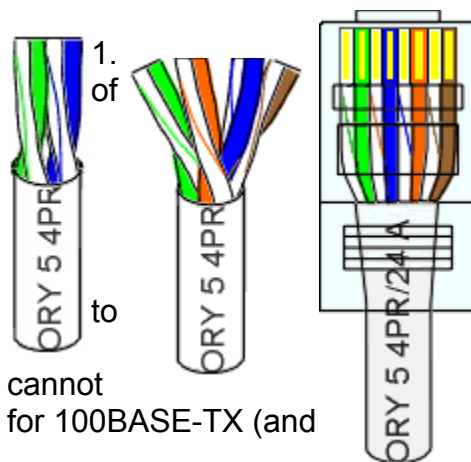
Universal UTP Stripping Tool (Eclipse). I recently bought one of these tools and it works slick, and it makes a much neater cut. I recommend that you purchase one if you will be making many cables.



Diagonal Cutters ("4 to 6"). It is easier to use diagonal cutters ("diags" or "dikes") to fine tune the cable ends during have a stripper, you can strip the cable by utility, etc.) to carefully slice the outer jacket longitudinally and use the diags to cut it off around the circumference.



cut the cable off at the reel and assembly. Also, if you don't using a small knife (X-acto,

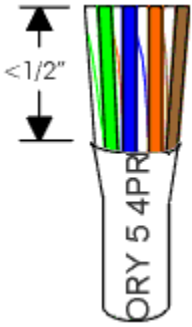


1. Pull the cable off the reel to the desired length and cut. I have a box cable at one end of my shop and a mark on the floor 10' away. For cable lengths which are a fraction of ten feet, I eye-ball the length as I pull the cable out of the box (also, my feet are about one foot long). For longer cables, I pull it out to the ten foot mark and go back to the box and pull the remaining fraction or another ten feet. If you are pulling cables through walls, a hole in the floor, etc., it easier attach the RJ-45 plugs after the cable is pulled. The total length of wire segments between a PC and a hub or between two PC's exceed 100 Meters (328 feet or about the length of a football field) 10BASE-T).

2. Strip one end of the cable with the stripper or a knife and diags. If you are using the stripper, place the cable in the groove on the blade (left) side of the stripper and align the end of the cable with the right side of the stripper. This is about right to strip a little over 1/2" of the jacket off the cable. Turn the stripper about one turn or so. If you turn it much more, you will probably nick the wires. The idea is to score the outer jacket, but not go all the way through. Once scored, you should be able to twist the end of the jacket loose and pull it off with one hand while holding the rest of the cable with the other. If you are using a knife and diags, carefully slit the cable for about an inch or so and neatly trim around the circumference of the cable with the diags to remove the jacket.

3. Inspect the wires for nicks. Cut off the end and start over if you see any. You may have to adjust the blade with the screw at the front stripper. Cable diameters and jacket thicknesses vary.

4. Spread and arrange the pairs roughly in the order of the desired cable end.



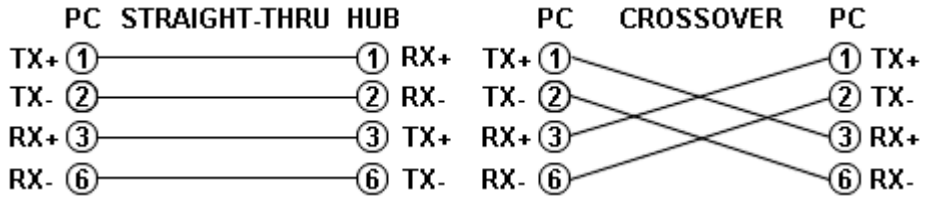
5. Untwist the pairs and arrange the wires in the order of the desired cable end. Flatten the end between your thumb and forefinger. Trim the ends of the wires so they are even with one another. **It is very important that the unstripped (untwisted) end be slightly less than 1/2" long.** If it is longer than 1/2" it will be out-of-spec and susceptible to crosstalk. If it less than slightly less than 1/2" it will not be properly clinched when RJ-45 plug is crimped on.. Flatten again. There should be little or no space between the wires.

6. Hold the RJ-45 plug with the clip facing down or away from you. Push the wire firmly into the plug. **Now, inspect the darn thing... before crimping and wasting the plug!** Looking through the bottom of the plug, the wire on the far left side will have a white background. The wires should alternate light and dark from left to right. The furthest right wire is brown. The wires should all end evenly at the front of the plug. The jacket should end just about where you see it in the diagram--right on the line. Aren't you glad you didn't crimp the plug?

COLOR-CODE STANDARDS

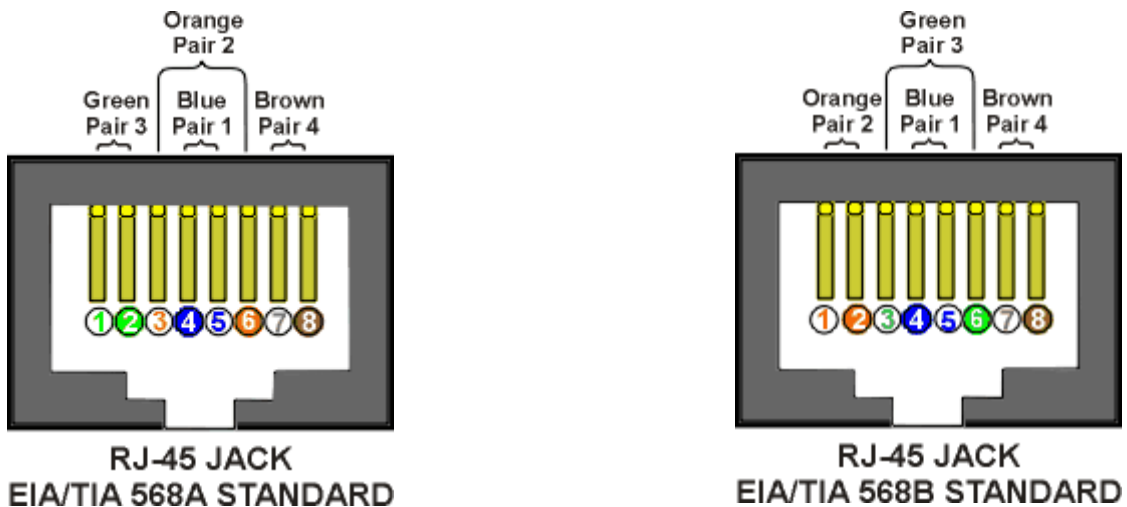
Last updated: 8/9/2004

Again, please bear with me... Let's start with simple pin-out diagrams of the two types of UTP Ethernet cables and watch how committees can make a can of worms out of them. Here are the diagrams:

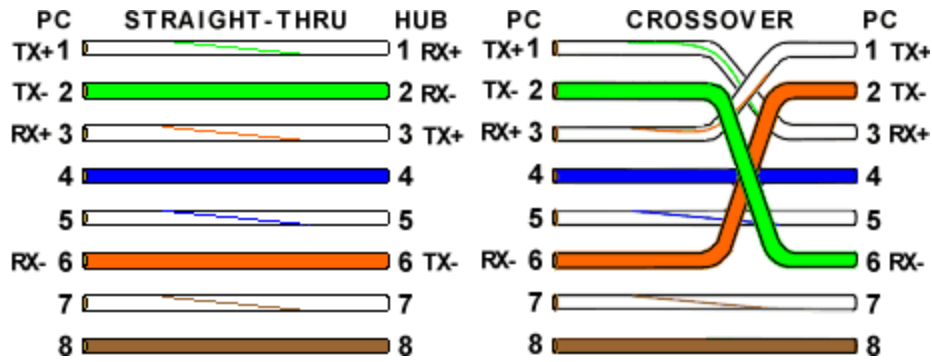


Note that the TX (transmitter) pins are connected to corresponding RX (receiver) pins, plus to plus and minus to minus. And that you must use a crossover cable to connect units with identical interfaces. If you use a straight-through cable, one of the two units must, in effect, perform the cross-over function.

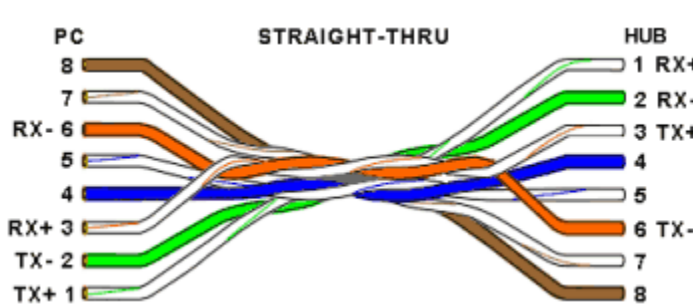
Two wire color-code standards apply: EIA/TIA 568A and EIA/TIA 568B. The codes are commonly depicted with RJ-45 jacks as follows (the view is from the front of the jacks):



If we apply the 568A color code and show all eight wires, our pin-out looks like this:



Note that pins 4, 5, 7, and 8 and the blue and brown pairs are not used in either standard. Quite contrary to what you may read elsewhere, these pins and wires are not used or required to implement 100BASE-TX duplexing--they are just plain wasted.



However, the actual cables are not physically that simple. In the diagrams, the orange pair of wires are not adjacent. The blue pair is upside-down. The right ends match RJ-45 jacks and the left ends do not. If, for example, we invert the left side of the 568A "straight"-thru cable to match a 568A jack--put one 180° twist in the entire cable from end-to-end--and twist together and rearrange the appropriate pairs, we get the following can-of-worms:

This further emphasizes, I hope, the importance of the word "twist" in making network cables which will work. You cannot use a flat-untwisted telephone cable for a network cable. Furthermore, you must use a pair of twisted wires to connect a set of transmitter pins to their corresponding receiver pins. You cannot use a wire from one pair and another wire from a different pair.

Keeping the above principles in mind, we can simplify the diagram for a 568A straight-thru cable by untwisting the wires, except the 180° twist in the entire cable, and bending the ends upward. Likewise, if we exchange the green and orange pairs in the 568A diagram we will get a simplified diagram for a 568B straight-thru cable. If we cross the green and orange pairs in the 568A diagram we will arrive at a simplified diagram for a crossover cable. All three are shown below.

