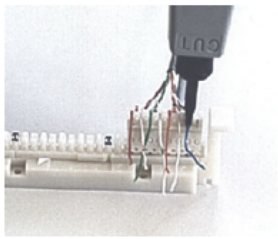
FOA Reference Guide



Virtual Hands-On
Premises Cabling - 110 Block Termination

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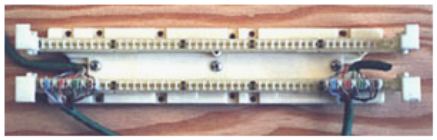
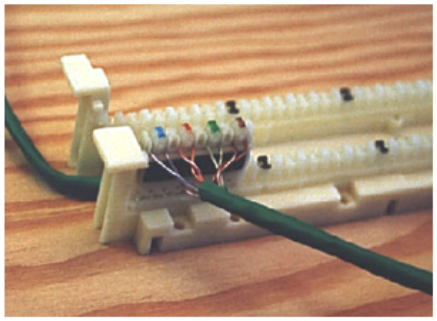
This FOA virtual hands-on (VHO) tutorial on fiber optics is intended to help understand the process of punching down UTP cable on a 110 block. It is copyrighted by the FOA and may not be distributed without FOA permission.

Terminating 110 Punchdown Block

- 110 Block has high density - typical block holds 50 pairs
- Joins two cables for interconnects
- Block, the base, is just plastic
- Actual IDC contacts are in connecting block





Here is a 110 punchdown block with terminated Cat 5e UTP cables. The termination is actually a joining of two cables with the 110 block acting as a transfer point. Punchdown blocks can be used for interconnecting cables in a telecom closet (TC) and the 110 style punchdown is commonly used for terminating cables on jacks and patch panels also.

The block is a plastic base with slots for 50 individual wires, since it was originally designed for termination of 25 pair telephone cables. The block itself does not have any metallic contacts. The connections are made by a connecting block. The first cable to be terminated is punched down into the block. Then a connecting block is then pressed on top of that set of wires, and the second cable's wires are punched onto it.

When dealing with many cables in a situation like this in the field, it is imperative that every cable be labeled at each termination point. For this exercise we will only refer to a single incoming cable and its corresponding outgoing cable.

The bottom photo shows the connecting block attached to the 110 block. One cable's wires are under the block, the other's on top.

As with all UTP terminations, It is important to keep the twists in the wires to within 1/2 inch (13mm) of the punchdowns and the cable jacket within 3/4 inch (19 mm). This will maintain the cable at Cat 5e performance.

Strip The Cable Jacket

- Using a jacket stripper, strip off about 2-3 inches of cable jacket
- The stripper should be set to cut almost through the jacket but not so deep it cuts the insulation on the wires which can affect the performance of the cable

Strip The Cable Jacket

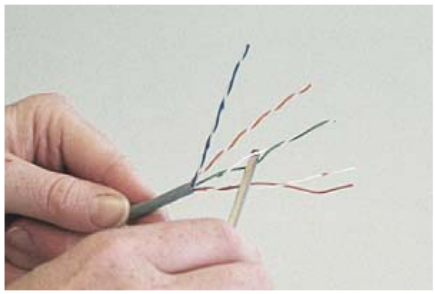
Using a commercial jacket stripper or one of the simple but effective ones given away by cable manufacturers, like this one, strip off about 2-3 inches of cable jacket

The stripper should be set to cut almost through the jacket so you can easily twist it off but not so deep it cuts the insulation on the wires which can affect the performance of the cable

There are many types of jacket strippers on the market, from simple (and usually free from manufacturers of cable) to complex, like the one shown above. The major concern with removing the jacket is to not cut the insulation on the wires, as that may adversely affect the performance of the cable. Some installers take off about 2 inches (50 mm) of jacket and use the ripcord to remove the jacket another 2-3 inches (50-75 mm) to insure no damage has been done to the wires.

Separate The Wires

- Using a sharp tool or screwdriver, separate the wires from each pair
- Leave about 1/2 inch (13mm) outside the jacket twisted



Separate The Wires

Begin the process by stripping the jacket from the cable, but, for jack termination, you should only expose 1-1/2 inches (37 mm) of the twisted wires. Untwist the wires to about 1/2 inch from the end of the jacket.Like for the jack, untwist the pairs for placing in the slots of the block.At this point it is important to realize that separating the wires does not follow the same color code convention as a plug or jack. The pairs are left in order- pairs 1 to 4 - on the block.

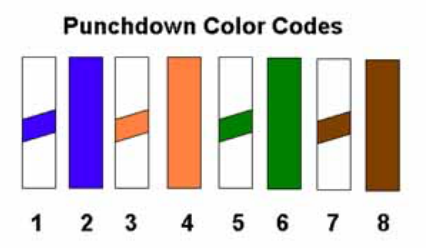
Notice the twists in the pairs of wires. These twists are critical to the Cat 5 performance. They must be maintained to within 1/2 inch (12 mm) of the termination point

.Note the different twist rates of the pairs. The different twist rates help minimize crosstalk, since each pair is an antenna tuned to a different frequency.

Also be aware of the 4 color coded pairs: blue, orange, green, and brown. Each pair consists of the solid color wire and a wire with white and a stripe of color.

Punchdown Color Codes

- All 4 pair cables are terminated on punchdown blocks in pair order:
  - Pair 1 - blue
  - Pair 2 - orange
  - Pair 3 - green
  - Pair 4 - brown
- Remember with the mnemonic BLOG = Blue-Orange-Green-brown



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Color Codes For Punchdown Blocks

All 4 pair cables are terminated on punchdown blocks in pair order:

Pair 1 - blue

Pair 2 - orange

Pair 3 - green

Pair 4 - brown

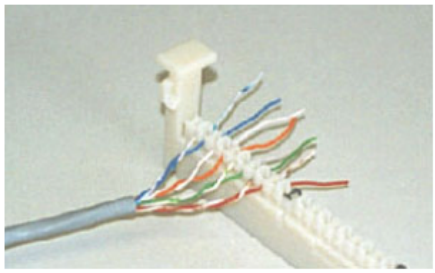
The convention is to remember to order them in this way: BL-O-G, which is BLue, Orange, Green, and brown by default.

It is also standard to terminate the white striped wire of the pair (tip) first then the solid wire of the pair (ring), as in: first, wire white-blue; second, blue; third, white-orange; fourth, orange; etc.

And especially remember that color codes for punchdowns are different from plugs and jacks!

Insert Wires in Block

- Insert in proper color-coded order
- Keep twists within 1/2 in (13 mm) of block
- Extra wire will be cut by punchdown tool.



Now that you have the individual wires exposed and separated, snap them in the punchdown block grooves by hand, starting at the first slot, observing these 2 rules:1

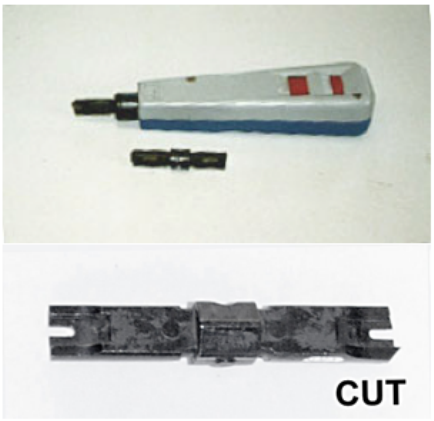
) Keep the twists in the wire pairs up to within 1/2 inch from the grooves in the block, and

2) Remember the BL-O-G order as you put the wires in the slots: white-blue, blue, white-orange, orange, white-green, green, white-brown, and brown.

You can allow an inch or more of the wires to extend beyond the punchdown grooves. These will be cut off with the punchdown tool.

Punchdown Tool - 110 Blade

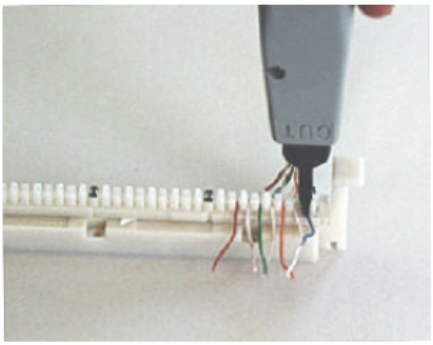
- Forces wire into punchdown slot
- Cuts off excess wire if desired
- Use the 110 Blade - CUT end
- Tool has a sharp “CUT” end that will cut wire, other end just punches down and leaves wire for further connections



Here is the punchdown tool. It does two things: it forces the wire strand into the slot, and it cuts off the end.One side of the blade is clearly labeled "CUT" or "CUTTER". This is the side you must have pointed toward the wire ends as you begin punching down the wires.

Punchdown Wires

- Check color codes
- Punchdown wires and cut
- Be sure you have “CUT” side of blade on correct side of block!



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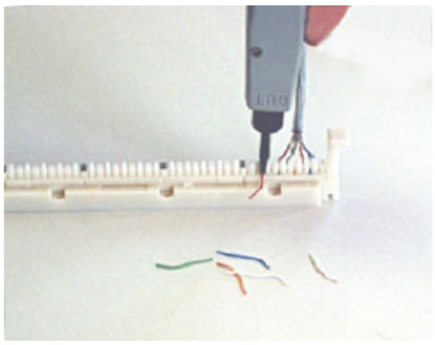
Once the wires are positioned and properly color-coded, you can begin punching them down with the punchdown tool.

Be sure you have “CUT” side of blade on correct side of block!

Again, note the position of the word "CUT" on the tool, and the order of the wire strands: white-blue, blue, white-orange, orange, etc.

Punchdown Wires

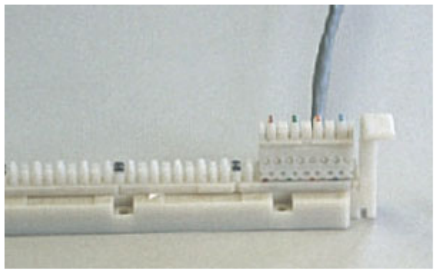
- Continue until all wires are punched down and cut
- Discard scraps



Note that as you punch down the wires they are neatly terminated at the block. The incoming cable extends from the other side of the block. Discard all scraps, as they can cause shorts if they get wedged in the wrong place. Now we are ready to attach the connecting block and the outgoing cable.

Connecting Block

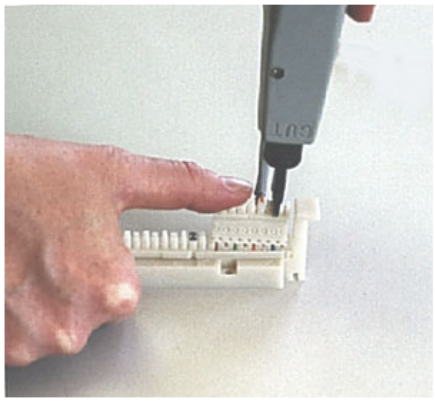
- Place connecting block with exposed connector blades down on top of wires
- Note the color codes on the block. Still remember BLOG and tip (color-stripe) before ring (solid color)



Place a connecting block over the wires you just punched down. Note the color coding on the top of the connecting block should correspond to the BL-O-G convention. Make sure you match it correctly with your wires.

Seat Connecting Block

- Use punchdown tool and your thumb to seat the connecting block on the punchdown block, piercing all wires in the cable

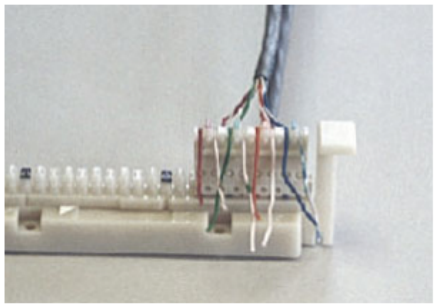


Use the punchdown tool (with the help of your thumb) to firmly seat the connecting block on the incoming cable wires.

This may take some effort, depending on the components used.

Place Wires On Connecting Block

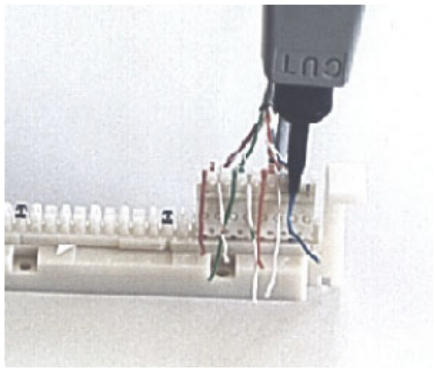
- Strip the second cable's jacket
- Separate wires leaving 1/2 inch (13mm) twisted
- Place wires in connecting block
- Remember color codes!



Strip the jacket off the outgoing cable, order and separate the wires, and insert them into the grooves of the connecting block.You must always remember the BL-O-G convention, and the white-blue, blue, white-orange, orange, etc order.

Punch Down Wires On Block

- Punch wires down on connecting block to complete termination
- Make sure cutter is on side to cut off excess wire



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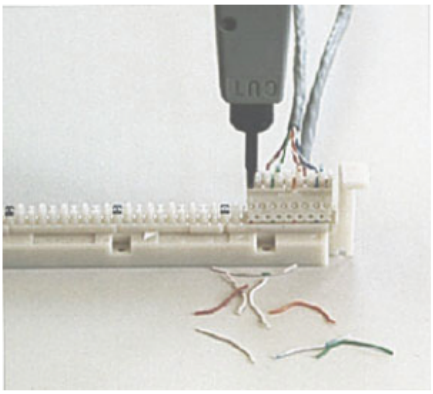
Complete the punchdown process again with the wires on the connecting block.

Be aware of which side the cutter is on!

Complete Punchdown

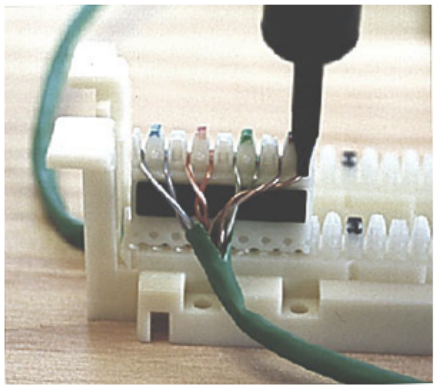
- Complete the punchdown process by punching down all 8 wires.
- The wires from both cables are now connected



This process completes the connection between the two cables and secures the connecting block to the main 110 punchdown block.

110 Punchdown Completed

- When the last wire is punched down, the connection is completed
- See how the twists are maintained
- Note how one cable is in the middle of the punchdown block while the other is on the outside - reduces cable clutter on the board



Notice, once again, the color ordering of the wire strands, and the maintaining of the twists in the pairs up to within 1/2 inch (12 mm) of the block.

See how the twists are maintained

Note how an alternative routing brings one cable into the middle of the punchdown block while the other is on the outside - may reduce cable clutter on the board

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