

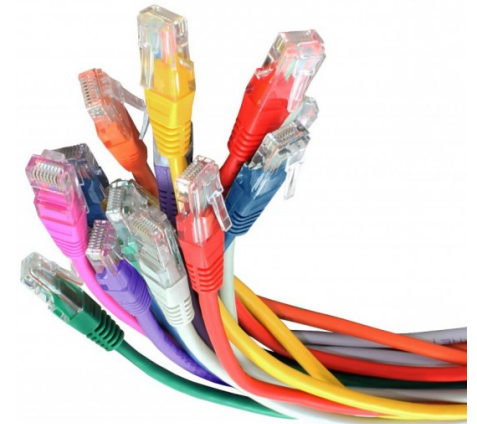
PW-02. MAKE AN ETHERNET CABLE FOR TWISTED PAIR CAT5 AND CAT6.

1. PURPOSE OF WORK

- 1.1. Study of technical data and designs of UTP Cat5 and Cat6 cables (twisted pair) used in computer networks.
- 1.2. Exploring the EIA/TIA-568A/B standards for connecting the 8P8C connector (sometimes called RJ45) and the Twisted Pair cable.
- 1.3. Get the initial skills of crimping and testing UTP Cat5 network cable.

2. TASKS FOR WORK

- 2.1. Study of technical data and designs of EIA/TIA-568A/B, UTP/STP, RJ45.
- 2.2. View short films about handmade Ethernet UTP/STP Cables.
- 2.3. Make and test Your Cable UTP Cat5e.



3. REPORT

Make a report about this work (**Take a selfie together with your Cable plugged on Tester**) and send it to the teacher's email.

REPORT FOR PW-02: MAKE AN ETHERNET CABLE FOR TWISTED PAIR CAT5 AND CAT6.

Student Name Surname	Student ID	Date

PHOTO 1.

4. GUIDELINES

4.1. THEORETICAL BASIS.

4.1.1. Types of Cables

Cable Types by Wired

Both for internal (building cables) and for external wiring, three classes of wired communication lines are most often used

- Twisted pair
- Coaxial cables
- Fiber optic cables

Cable Types by UTP Categories

UTP Category	Data Rate	Max. Length	Cable Type	Application
CAT1	Up to 1Mbps	-	Twisted Pair	Old Telephone Cable
CAT2	Up to 4Mbps	-	Twisted Pair	Token Ring Networks
CAT3	Up to 10Mbps	100m	Twisted Pair	Token Rink & 10BASE-T Ethernet
CAT4	Up to 16Mbps	100m	Twisted Pair	Token Ring Networks
CAT5	Up to 100Mbps	100m	Twisted Pair	Ethernet, FastEthernet, Token Ring
CAT5e	Up to 1 Gbps	100m	Twisted Pair	Ethernet, FastEthernet, Gigabit Ethernet
CAT6	Up to 10Gbps	100m	Twisted Pair	GigabitEthernet, 10G Ethernet (55 meters)
CAT6a	Up to 10Gbps	100m	Twisted Pair	GigabitEthernet, 10G Ethernet (55 meters)
CAT7	Up to 10Gbps	100m	Twisted Pair	GigabitEthernet, 10G Ethernet (100 meters)

Cable Types by Cross

There are two types of network cables

- Direct cable (Direct Connection) - to connect a network card port to a switch or hub
- A crossover cable with an inverted pinout of the connector for directly connecting two network cards installed in computers, as well as for connecting some older models of hubs and switches (uplink port).

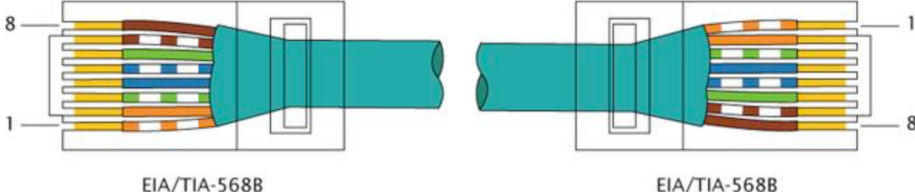
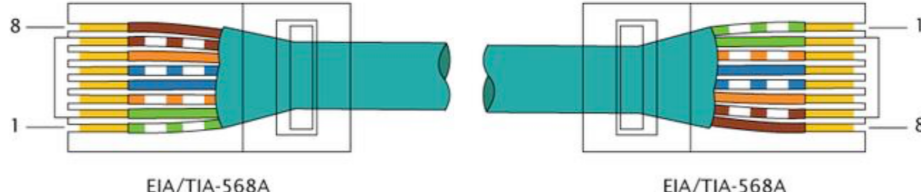
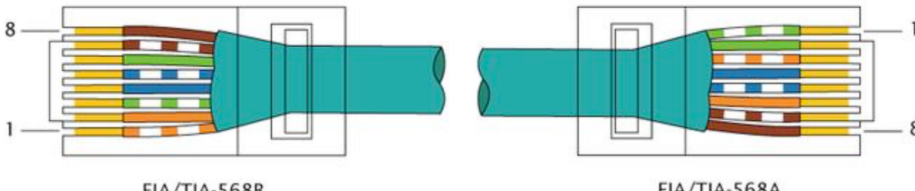
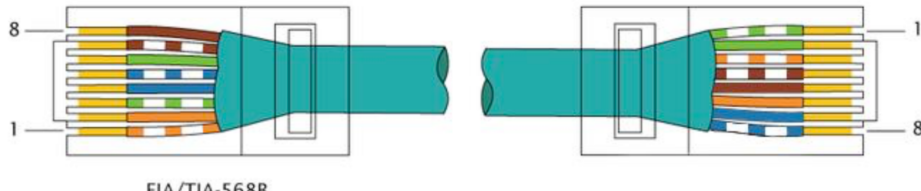
There are some network cards that can automatically detect the type of cable and adapt to it.

Cable Types by Crimping

There are two types of crimping (preparation) of the plug. In practice, the EIA / TIA-568B connection scheme is more often used.

- EIA/TIA-568A
- EIA/TIA-568B (You do It !)

4.1.2. Ethernet UTP Cables Schemes

1. Direct Cable Cat5/5e/6 EIA/TIA-568B (You do It !)  EIA/TIA-568B	2. Direct Cable Cat5/5e/6 EIA/TIA-568A  EIA/TIA-568A
3. Cross Cable Cat5/5e/6 EIA/TIA-568B/A (100MB/s)  EIA/TIA-568B	4. Cross Cable Cat5/5e/6 EIA/TIA-568B/x (1000MB/s)  EIA/TIA-568B

4.2. SHORT FILMS ABOUT HANDMADE ETHERNET UTP/STP CABLES.

Three films for start

1. Terminating CAT5 Unshilded Cable with RJ45 Connector
<https://www.youtube.com/watch?v=WvP0D0jiyLg>
2. Terminating CAT6 Unshilded Cable with EZ-RJ45 Connector
<https://www.youtube.com/watch?v=0vZs5oHyzgU>
3. Terminating CAT6 Shielded Cable with RJ45 Connector
<https://www.youtube.com/watch?v=-bQjDirT6g>

4.3. MAKE AND TEST YOUR CABLE UTP CAT5E.

A purchased Ethernet cable may not always be physically installed, or pre-made length do not always correspond to the desired length, or sometimes you need to repair a previously placed cable.

4.3.1. You need (required)

1. Bulk Ethernet Cable - or CAT5e or CAT6.



2. RJ45 Crimpable Connectors for CAT-5e (or for CAT-6).



3. Plug Shields for RJ45 Connectors (optional)!



4. HT- 568 Crimping Tool for RJ-45 (Crimper)



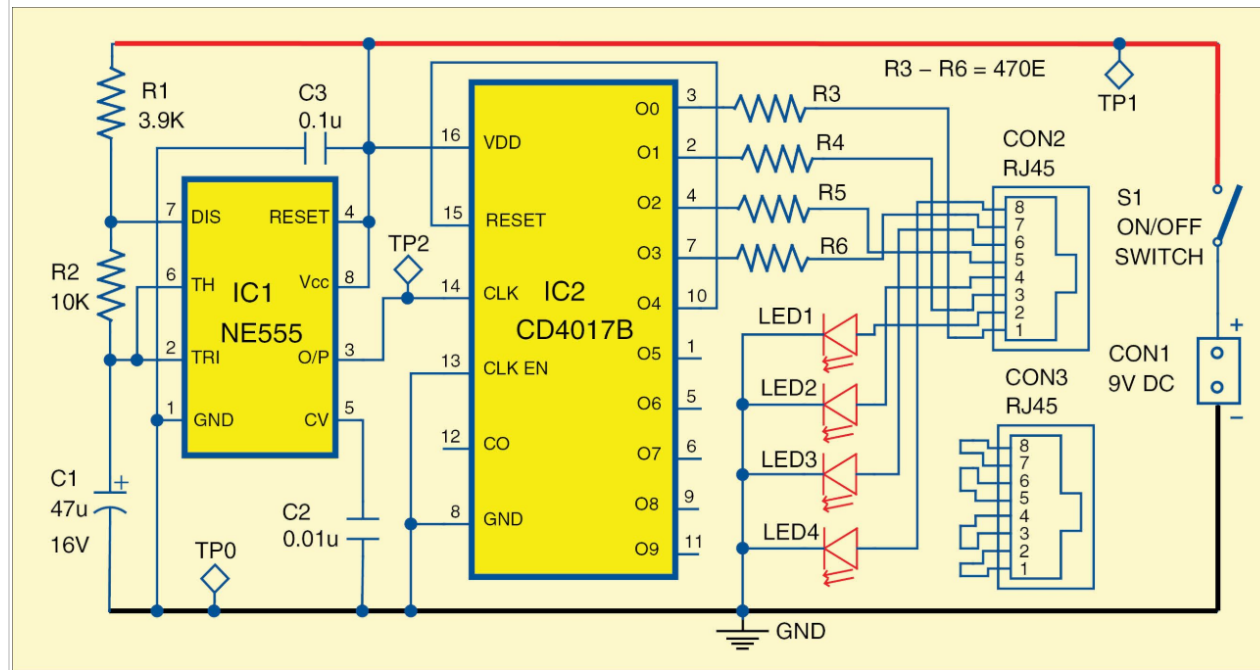
5. UTP Cable Stripper (optional)!



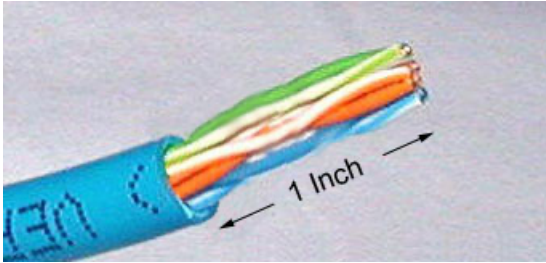
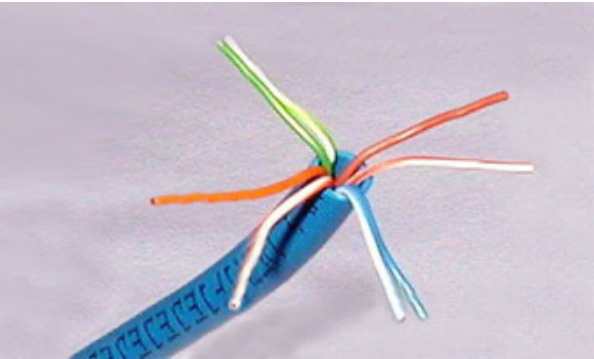
6. Cable Tester for RJ-45



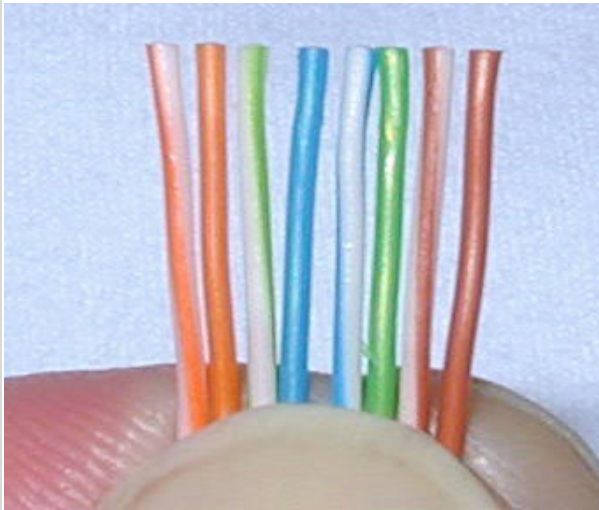
Cable Tester Scheme



4.3.2. Make a EIA/TIA-568B Direct UTP Cable.

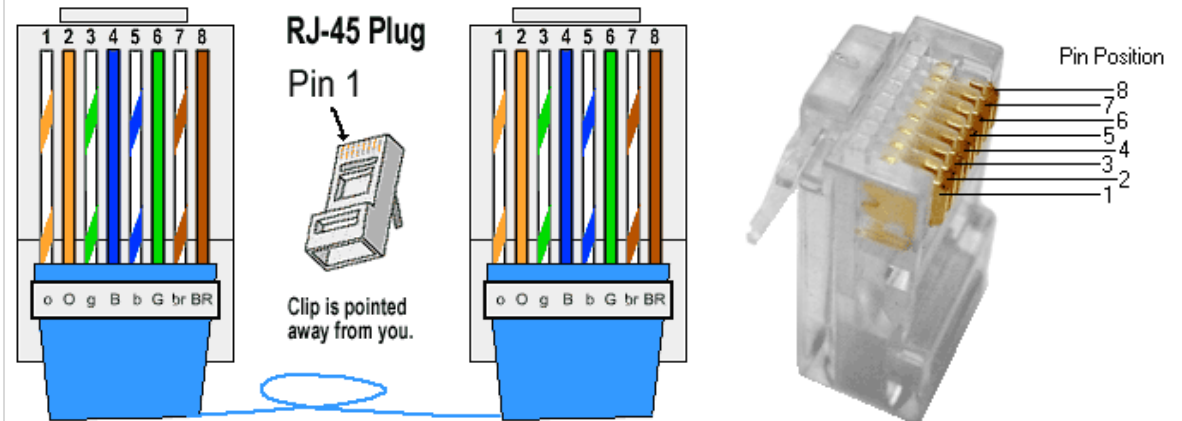
1	 or	Use Crimping Tool or Scissors, cut a cable 0.5 m long.
2		Use Crimping Tool or Cable Stripper clean the outer shell about 1 Inch (2.5 cm) from the one end of the cable. The crimping tool has a razor blade that will do the trick with practice. To do this: • insert the end of the cable into the rear round hole of the crimper • clamp the ends of the crimper and rotate the outer shell 
3		Unwind and pair the similar colors.

4



Pinch the wires between your fingers and straighten them out as shown. The color order is important to get correct.

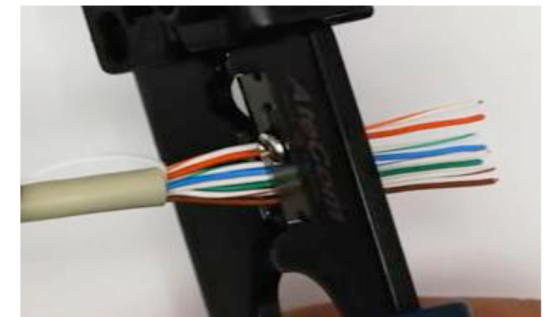
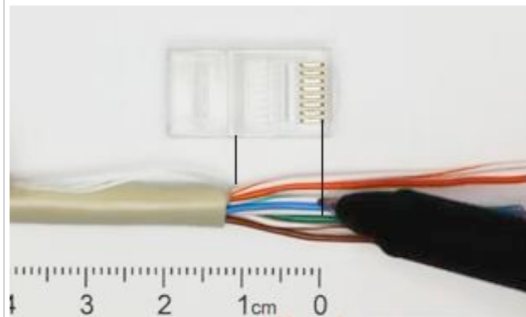
You make EIA/TIA-568B Direct UTP Cable Numbering in 8P8C (RJ45) connector



5



Use Crimping Tool or Scissors to make a straight cut across the 8 wires to shorten them to **1/2 Inch** (1.3 cm) from the cut sleeve to the end of the wires.



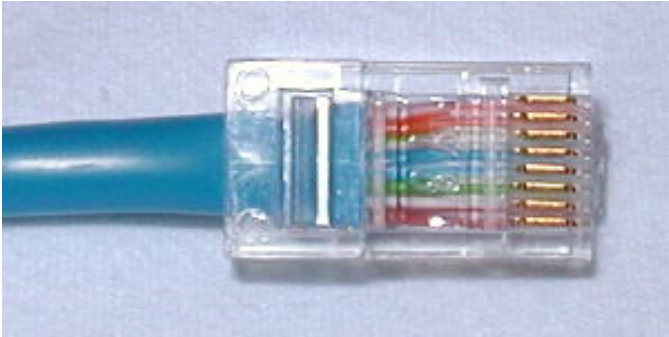
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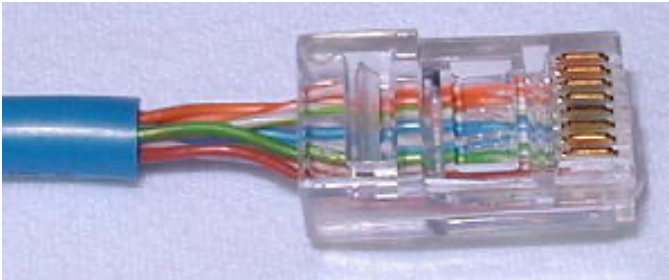
Carefully push all 8 unstripped colored wires into the connector.

TRUE WAY - Note the position of the blue plastic sleeve.

Also note how the wires go all the way to the end.



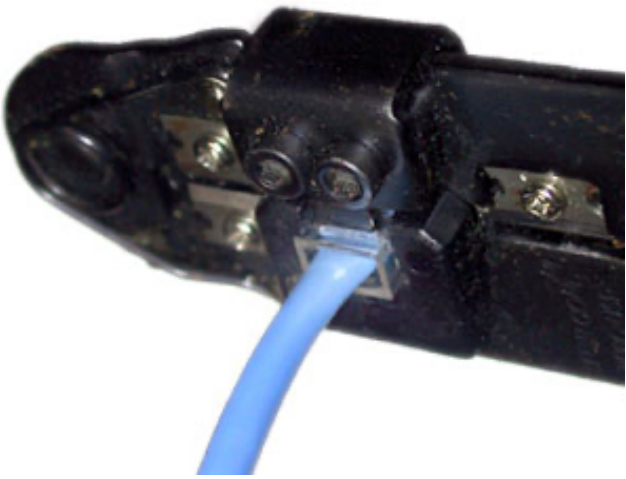
TRUE WAY - A view from the top. All the wires are all the way in. There are no short wires.



WRONG WAY - Note how the blue plastic sleeve is not inside the connector where it can be locked into place. The wires are too long. The wires should extend only 1/2 inch from the blue cut sleeve.



WRONG WAY - Note how the wires do not go all the way to the end of the connector.

7		CRIMPING THE CABLE ... carefully place the connector into the Ethernet Crimper and cinch down on the handles tightly. The copper splicing tabs on the connector will pierce into each of the eight wires. There is also a locking tab that holds the blue plastic sleeve in place for a tight compression fit. When you remove the cable from the crimper, that end is ready to use.
8		Attach 2 cable plug shields (not required for lab work!)
9	REPEAT STEPS OTHER END 	For a standard "Direct" cable, repeat steps 2-7. (For a Cross-over cable, the other end will have a different color order as shown by the crossover pictures above.)

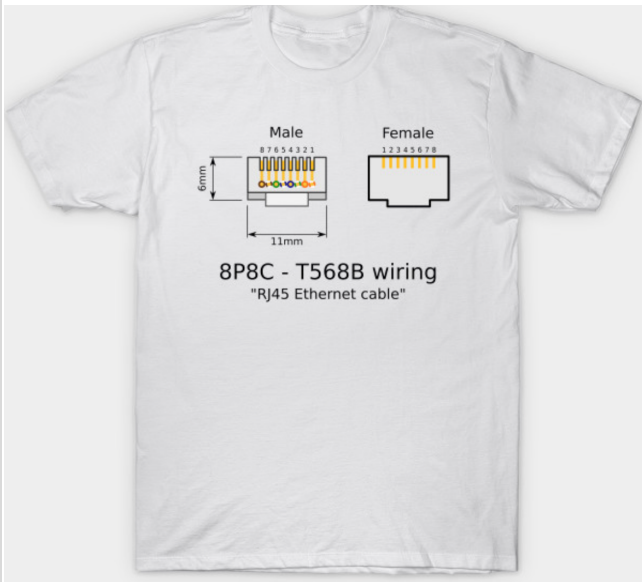
4.3.3. Test Your Cable UTP Cat5e.



If you have Tester.

Make sure to test the cables before installing them. An inexpensive Ethernet cable tester does this quite well.

Testing results: Short-**Connected**-Non Parallel-No Connection



Finish work.

Now you can wear it !