

Lab 2A: Build an Ethernet Cable

BAT-111: Building Automation Systems



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OBJECTIVES

Upon completion of this activity the student will be able to:

1. Build a CAT-5e cable of specified length.
2. Test a CAT-5e cable.

PARTS AND EQUIPMENT

- Bulk ethernet cable – Category 5e
- RJ-45 crimpable connectors
- RJ-45 crimping tool
- Scissors
- Ethernet cable tester

REFERENCES

[Making Ethernet Cables – Simple and Easy](https://www.groundcontrol.com/galileo/ch5-ethernet.htm)

(plain text: <https://www.groundcontrol.com/galileo/ch5-ethernet.htm>)

[The Poet's Guide to the Physics of Twisted Pair Cabling](https://www.flukenetworks.com/blog/cabling-chronicles/physics-twisted-pair-cabling)

(plain text: <https://www.flukenetworks.com/blog/cabling-chronicles/physics-twisted-pair-cabling>)

[Ten Dumb Industrial Ethernet Mistakes Smart People Make](https://www.flukenetworks.com/blog/cabling-chronicles/ten-dumb-industrial-ethernet-mistakes-smart-people-make)

(plain text: <https://www.flukenetworks.com/blog/cabling-chronicles/ten-dumb-industrial-ethernet-mistakes-smart-people-make>)

Deep Dive: [Industrial Ethernet University](https://www.industrialethernetu.com/)

(plain text: <https://www.industrialethernetu.com/>)

BACKGROUND

Cat 5e ethernet cables are made up of four sets of twisted pair wires. Each twisted pair is part of a single differential circuit, which means that one wire carries the signal and the other wire carries the signal inverted. Therefore, interference from the pair to the other pairs in the cable is reduced since their emanations tend to cancel. Also, the common mode noise, which is introduced to the pair in the same polarity, can be removed. Twisting the wires together allows noise from the surrounding environment to affect each wire more similarly than straight wires. The order of the wires in the connector is important so that the differential signal is interpreted properly on the receiving end. Cat 5e cable is unshielded, and so can have the label of UTP (unshielded twisted pair).

Cat 5e has a transmission speed of up to 1000Mbps (= 1 gigabit per second). The maximum cable length is 100 meters.

The Registered Jack (RJ), the RJ45, is a standard 8-position, 8-contact connector.

Many types of ethernet cables are available. Read the articles listed under References to learn more.

PROCEDURES

Make a cable of 2 to 3 feet in length, with an RJ45 connector on each end.

Follow the steps as outlined in the Ground Control webpage. The pdf version is included on Blackboard for your convenience.

Test the cable after you have finished with the supplied tester. If it doesn't test as good, look at your connections. Determine why the cable does not test as good. Are the wires in the correct order on both ends? Did all of the wires make good connection in the connector? Clip the connector and try again. Repeat until you get a good cable. **Take a picture of both ends of the completed cable and describe the tester results in a sentence or two.**