

# In-situ Ethernet cable tester

I recently needed to install an Ethernet cable between buildings with the cable going through holes no larger than the cable diameter, so the RJ45 connectors had to be crimped on each end after installation. This also meant that I could not use my patch cable tester because both ends of the cable must be plugged into the tester.

Low-cost in-situ Ethernet cable testers are readily available, but where is the fun in buying a tool when you can easily build your own?

This circuit tests Ethernet cables of virtually any length using a small remote unit and a larger main unit. They connect at either end of the RJ45 cable. RJ45 stands for Registered Jack 45, which corresponds to an 8-position 8-contact or 8P8C plug/socket.

The main unit contains an Arduino Pro Mini with 8 LED indicators to show the test results. The remote unit simply has an RJ45 socket and four diodes.

To power the unit up, pushbutton S1 is held down. Initially, all eight LEDs are lit briefly (as a lamp test), followed by the eight digital outputs being sequentially pulsed high, one per second. Each output is connected to a status LED and an RJ45 socket pin via a diode, to prevent one Arduino pin shorting out another via the cable.

As the receiver diodes are connected between cable pairs, a good cable

will light two adjacent LEDs when an odd-numbered output is high, and only one corresponding LED when an even-numbered pin is high. Thus the correct LED sequence is: 1+2, 2, 3+4, 4, 5+6, 6, 7+8, 8 and this sequence then repeats. You can see a video of it in operation, with a good cable, at: [siliconchip.com.au/link/aaxj](http://siliconchip.com.au/link/aaxj)

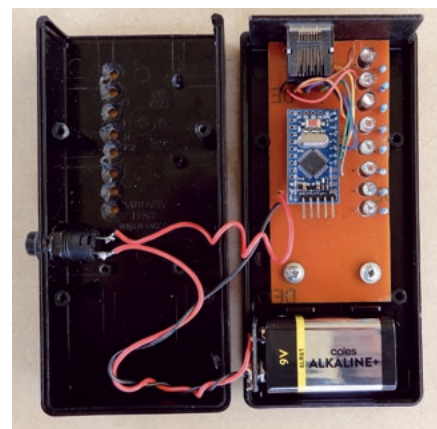
Cable wiring errors, shorts or open circuits will show as an incorrect step in the sequence. The fault can be deduced by noting which LEDs are lit (or not) during the incorrect step in the sequence.

The whole thing runs off a 9V battery to make it compact and portable. This connects to the VIN pin of the Arduino via S1.

An option is shown for a remote unit to suit crossover cables, but this is unlikely to be needed now as most Ethernet cables are wired straight-through due to the widespread use of auto MDI-X configuration.

In other words, most modern Ethernet transceivers will detect when they are connected to another similar transceiver and automatically swap their receive & transmit pins to allow communication, regardless of the cable being a wired in a straight-through or crossover configuration.

The Arduino sketch, consisting of three .ino files, is available for download from the SILICON CHIP website.



To program the Pro Mini, you need to have the Arduino IDE software installed on your computer, and you also need a USB-to-serial interface. The marginally more expensive Arduino Nano is easier to program as it has an onboard USB interface.

You could substitute a 9-position rotary switch for the Arduino, with one position used for power-off. Diodes D1-D8 could also be eliminated. However, counter-intuitively, it would cost more than the Arduino Pro Mini. However, it might make fault diagnosis simpler as the switching sequence can be paused on one conductor.

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*Editor's note: diodes D1-D8 could also be eliminated if the software is modified to set the outputs which are not being actively driven high as inputs, rather than active-low outputs.*

