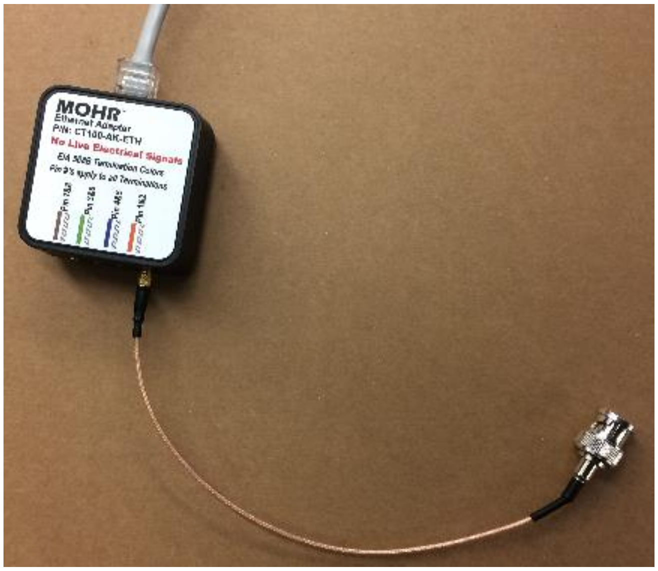
1012: Ethernet Adapter

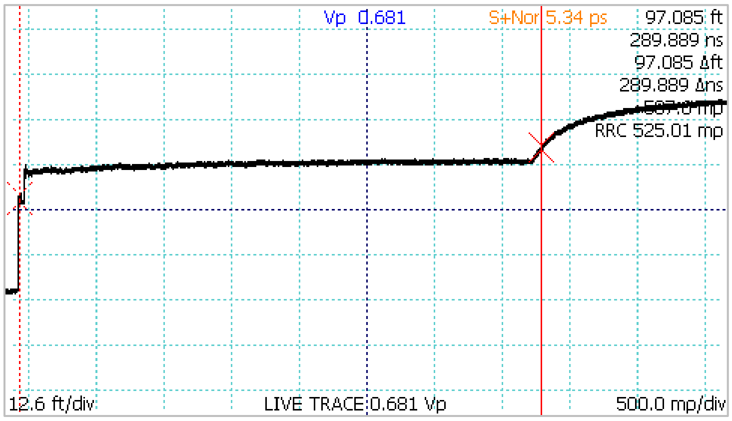
MOHR sells an adapter kit that can be used for testing Ethernet cables terminated with RJ-45 connectors (EIA 568B colors). This application note will demonstrate the use of the kit testing a patch cable with a defect. This note is part of a series. It is assumed that the reader has previously read or learned the topics previously discussed.

Set the Configuration

Connect the cable to the MOHR Ethernet adapter. Insert the BNC jumper cable into the Pin 1&2 position. Now connect the jumper cable to the CT-100B shorting BNC connector.



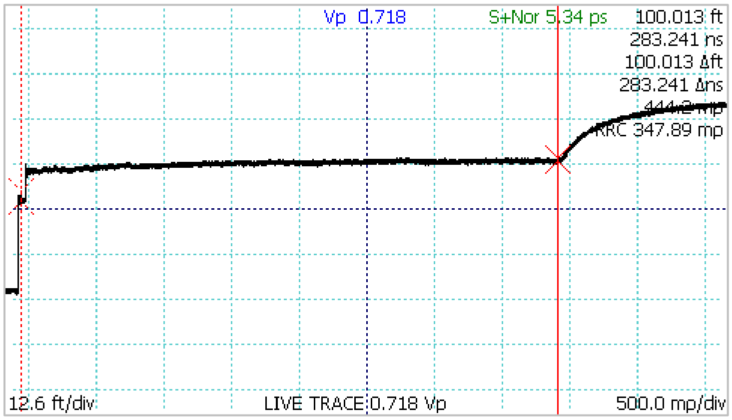
Our test cable is about 100 ft. long. After the cable has been connected to the CT100B, set the scanning resolution to *Normal* and the Cable Length to Short, and then use Autofit.[1] One of the cursors is now positioned approximately at the end of the cable.



---

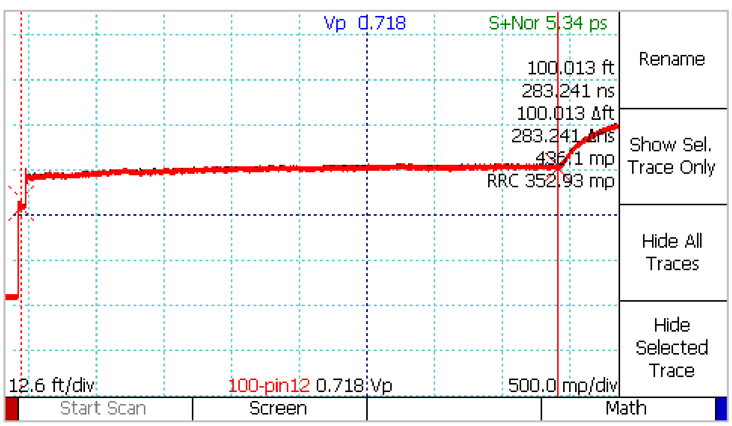
[1] These steps were all covered in earlier CT100B App. Notes.

Move that cursor so that it is exactly at the cable end. Since we know it is a 100 ft. cable, we can turn the M-FUNCTION knob to adjust the Vp setting until we see 100 ft. as the position. For this case, the Vp ended up at 0.718. (Don't worry about round-off error for this example. If we cared, we could turn on the six significant digits option for Vp and then zoom in horizontally to set an exact value. Our cable length is only known approximately anyway.)

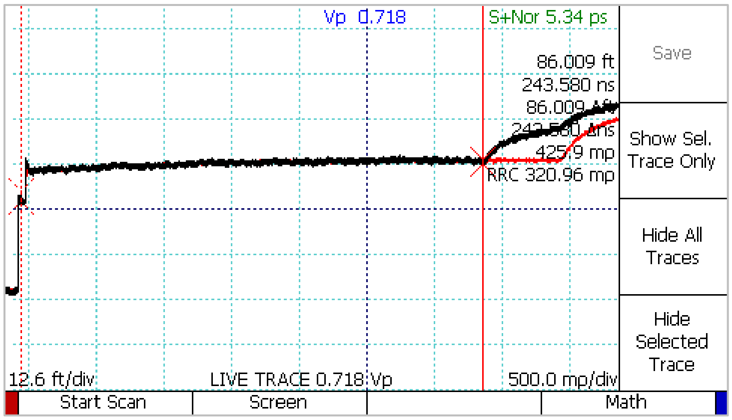


Scan the Four Wire Pairs

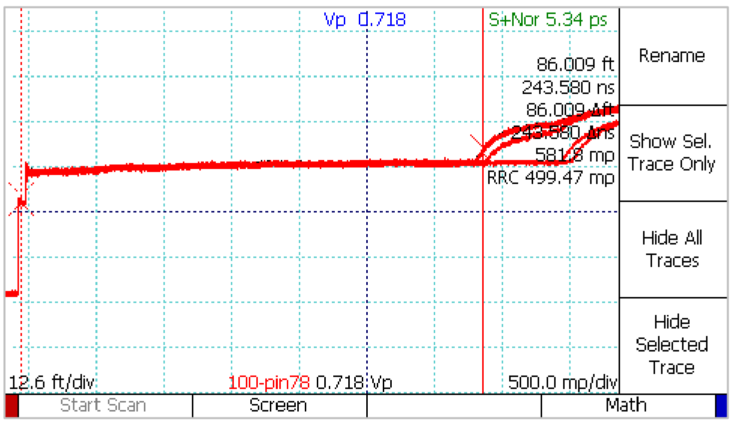
We can take and save a scan now. Press the SCAN button, make sure we are set to Screen scan since we're using Normal resolution, and press Start Scan. Then save the trace with the name '100-pin12'.



Now disconnect the jumper cable from the CT100B, move it to the next pin position in the adapter (Pin 4&5), and reconnect it to the CT100B.



This pin pair shows a much different trace. The cable appears to be broken at about the 86 foot mark. Let's take and save a scan, and then quickly repeat the testing with the other two wire pairs in the cable.



One wire in the 7-8 pin pair is also broken. Let's examine the cable at the 86 foot mark.

The cut in the cable sliced through two of the individual wires, affecting two of the wire pairs in the cable.

Other Details

There are other things to notice about the four plots though. None of the four traces is exactly as long as the others. It seems that we should have had two short traces and two long ones? What is the explanation?

CAT-5E cable is manufactured to a very specific specification that has the four twisted pair wires each having a differing amount of twist. This is designed to minimize the crosstalk between the pairs. The net result is that each of the individual wires may in fact have an identical Vp, but the wire pairs as assembled in the cable differ when measured as a whole. The four traces (wire pairs) each have a unique *effective* Vp value. If we were a manufacturing operation doing quality control, we'd have to set the Vp for each pair specifically, or at least allow for this difference.

Envelope Plot

If this cable were known to have an intermittent failure, we could have used the Envelope Plot option for each pair while flexing the cable. The plot below shows the Envelope Plot for the Pin 3&6 pair.