

Lab 8.4.1: Media Connectors Lab Activity



Typical Cable Meter

Learning Objectives

Upon completion of this lab, you will be able to:

- Test cables using a cable tester and a network multimeter
- Become familiar with the most common functions of a cable tester.
- Test different cables for type and wiring problems.

Background

Category (CAT 5) unshielded twisted-pair (UTP) cables are wired according to function. End devices, such as routers and host computers, connect to switches with CAT 5 straight-through cables. When connected together, however, a CAT 5 crossover cable must be used. This is also true of switches. When connecting one switch to another, a CAT 5 crossover cable is used again.

Problems related to cables are one of the most common causes of network failure. Basic cable tests can be very helpful in troubleshooting cabling problems with UTP. The quality of cabling components used, the routing and installation of the cable, and quality of the connector terminations will be the main factors in determining how trouble-free the cabling will be.

The following resources are required:

- Good CAT 5 straight-through and crossover wired cables of different colors.
- Category 5 straight-through and crossover wired cables with open wire connections in the middle or one or more conductors shorted at one end that are different colors and different lengths.
- A cable meter.
- A network multimeter

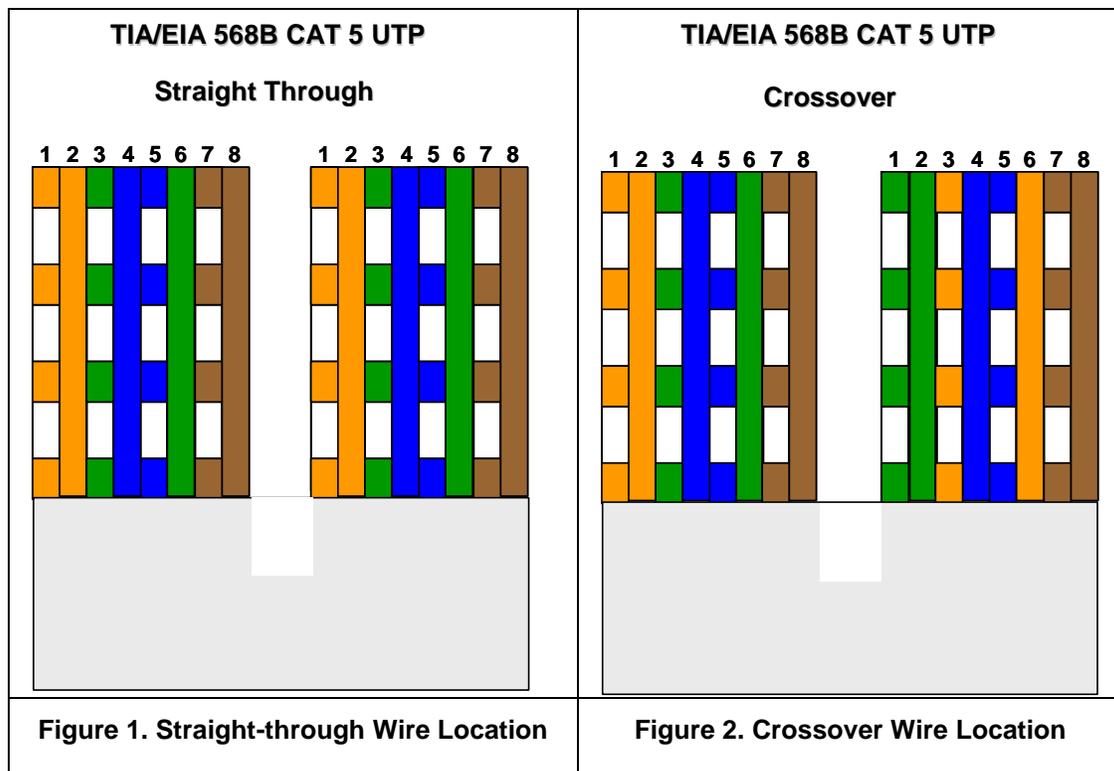
TIA/EIA 568B is different from TIA/EIA 568A wiring. TIA/EIA 568A straight-through cables can be identified by the color coding. Similar to Figure 2, below, the right wiring diagram, starting with the green-white cable, will be identical on both ends.

Scenario

First, you will visually determine whether the CAT 5 cable type is crossover or straight-through. Next, you will use the cable tester to verify the cable type, as well as common features available with the tester.

Finally, you will use the cable tester to test for bad cables that cannot be determined with a visual inspection.

Task 1: Become Familiar with the Most Common Functions of a Cable Tester.



Figures 1 and 2 show the TIA/EIA 568B CAT 5 UTP wire positioning for a straight-through and crossover cable, respectively. When CAT 5 connectors are held together, wire color is a quick way to determine the cable type.

Step 1: Visually determine cable types.

There should be two numbered cables available. Perform a visual inspection of the cables and then fill out the chart below with the cable color, cable type, and use:

Cable No.	Cable Color	Cable Type (straight-through or crossover)	Cable Use (Circle correct device)
1			Switch to: host / switch
2			Switch to: host / switch

It is now time to verify the cable type and learn about the common features of the cable tester.

Step 2: Perform initial configuration of the cable meter.

Place the cable meter in wire map mode. Refer to the instruction manual if necessary. The wire map function displays which pins on one end of the cable are connected to which pins on the other end.

Refer to the instruction manual and choose the appropriate options until the tester is set to the following cabling settings:

Tester Option	Desired Setting – UTP
CABLE:	UTP
WIRING:	10BASE-T or EIA/TIA 4PR
CATEGORY:	CATEGORY 5
WIRE SIZE	AWG 24
CAL to CABLE?	NO
BEEPING:	ON or OFF
LCD CONTRAST	From 1 through 10 (brightest)

When satisfied with the correct settings, exit setup mode.

Step 3: Verify cable wire map.



Figure 3. Cable Coupler and Cable Identifier

Use the following procedure to test each cable with the LAN cable coupler and cable identifier, shown in Figure 3. The coupler and the cable identifier are accessories that come with many cable meters.

Place the near end of the cable into the RJ-45 jack labeled UTP/FTP on the tester. Place the RJ-45-RJ-45 female coupler on the far end of the cable, and then insert the cable identifier into the other side of the coupler.

The wiring of both the near and far end of the cable will be displayed. The top set of numbers displayed on the LCD screen refers to the near end, and the bottom set of numbers refers to the far end.

Perform a Wire Map test on each of the cables provided, and fill in the following table based on the results. For each cable, write down the number and color, and whether the cable is straight-through or crossover.

Cable No.	Cable Color	Cable Type (straight-through or crossover)
1		
2		

Note any problems encountered during this test:

Step 4: Verify cable length.

Refer to the instruction manual to place the cable meter in the TEST mode. If power was cycled, repeat the setup steps described in Step 2. The tester LENGTH function displays the length of the cable.

Perform a basic cable test on each of the cables, and complete the following table based on the results. For each cable, write down the number and color, the cable length, the tester screen test results, and what the problem is, if there is a problem.

Cable No.	Cable Color	Cable Length
1		
2		

Note any problems encountered during this test:

Repeat these steps until you are comfortable with the use of the cable tester. In the next task, unknown cables will be tested.

Task 2: Test Different Cables for Type and Wiring Problems.

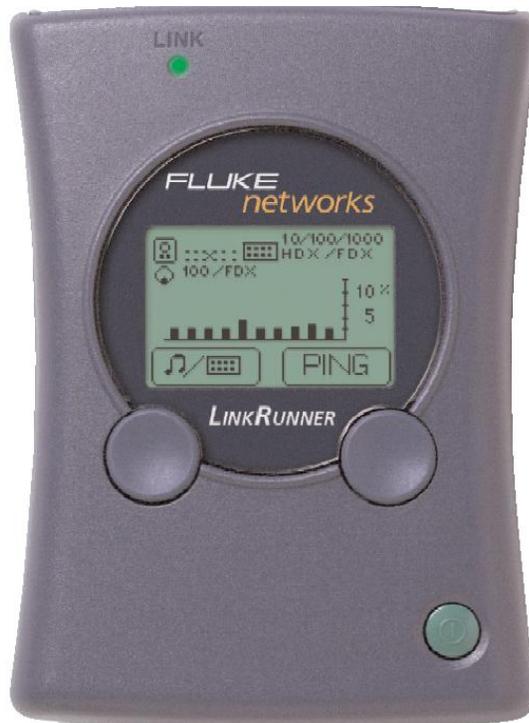
Obtain at least 5 different cables from your instructor. Move the rotary switch selector on the tester to the WIRE MAP position. If power was cycled, repeat the setup steps described in Task 1, Step 2.

Refer to the instructions to place the cable tester WIRE MAP function to perform a Wire Map test on each of the cables provided. Then fill in the following table based on the result for each Category 5 cable tested. For each cable, write down the number and color, whether the cable is straight-through or crossover, the tester screen test results, and any problem.

Cable No.	Cable Type (Visual inspection)	Cable Color	Cable type (straight-through or crossover)	* Test Results	Problem Description
1					
2					
3					
4					
5					

* Refer to the product manual for detailed description of test results for wire map.

Task 3: Perform initial configuration of the network multimeter



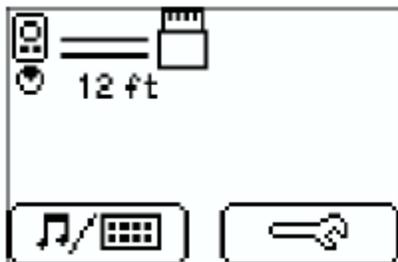
Typical network multimeter

Step 1: Turn the network multimeter on.

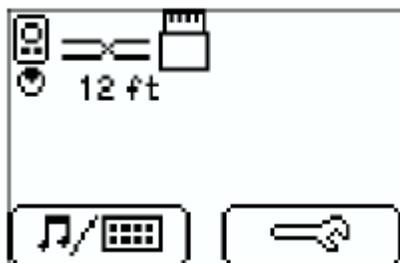
Step 2: Turn it back off.

Step 3: Place both ends of the cable into the LAN and MAP ports or equivalent located on top of the network multimeter and turn it on.

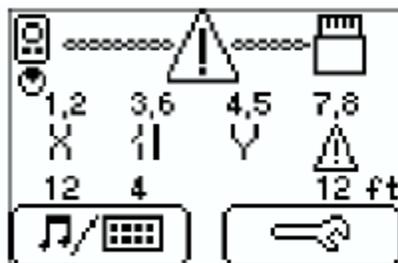
If it is a correct straight-through cable then two parallel lines (as shown below) will appear on the upper left corner on the screen. Refer to the operating instructions if your multimeter does not display two parallel lines in this and the following steps.



If it is a correct crossover cable then two intersecting lines (as shown below) will appear on the upper left corner on the screen.



If it is a bad cable,  will appear and details will be displayed below.



- | Open
- Y Short
- ◇ Split
- X Reversal
- ⚠ Unknown

Task 4: Verify Cable Length

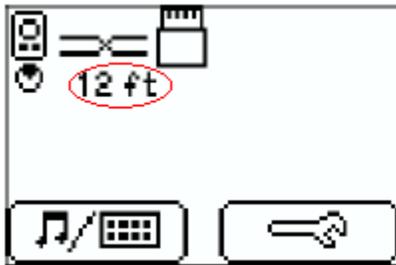
Note: The instructions to test a cable are the same as determining cable length.

Step 1: Turn the network multimeter on.

Step 2: Turn it back off.

Step 3: Place both ends of the cable into the LAN and MAP ports located on top of the network multimeter and turn it on.

Step 4: Locate the length of the cable below the icon indicating the type of cable (as shown below).



Task 5: Reflection

Problems related to cables are one of the most common causes of network failure. Network technicians should be able to determine when to use CAT 5 UTP straight-through and crossover cables.

A cable tester is used to determine cable type, length, and wire map. In a lab environment, cables are constantly moved and reconnected. A properly functioning cable today may be broken tomorrow. This isn't unusual, and is part of the learning process.

Task 6: Challenge

Look for opportunities to test other cables with the cable meter. Skills learned in this lab will enable you to quickly troubleshoot wrong cable types and broken cables.

Task 7: Clean Up

The cable tester is very expensive and should never be left unattended. Return the cable tester to the instructor when finished.

Ask the instructor where to return used cables. Store the cables neatly for the next class.