

AN255

Removing Test Lead Length from the Measurement

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Abstract

The 20/20 TDR's default starting point for all distance measurements is the coax or RJ45 connectors at the top of the instrument. If test leads are used, it is often advantageous to subtract their length out before making measurements so the distances in the display, at the cursors and saved to memory, are reference from the end of the test lead.

General

Using test leads to make the connection between the TDR and the cable-under-test is often an essential part of the measurement process. In some cases, relatively long extended test leads are used to lend convenience to the measurement situation. Telco technicians will often extend the test leads 30 feet (9 meters) to reach a connection in a manhole or on a telephone pole. However, forgetting to subtract their length from that of the cable-under-test can present an issue when determining the distance from the TDR to the end of the cable or an event on the cable. The test leads should also be calibrated out of the equation when "Sampling a Cable" to determine its velocity. This will avoid mixing the potentially different velocity of the test leads with that of the cable to be sampled.

Process

- Step 1 – First determine which test lead set will be used to make the measurement, and connect those leads or lead extension wire to the TDR, leaving the far end open.
- Step 2 – At the TDR press the F5 key, then select "Test Lead Cal"
- Step 3 – Note the dialog box's instructions ensuring the twist in TWP cable is fully maintained from the TDR to the end of the test leads. This is particularly important if an extension wire (lead) is added to the telco or other alligator clips.
- Step 4 – Press the ENTER key. This will return the TDR to the Measurement screen with Cursor 1 active. Cursor 1 is the only cursor required and cursor 2 is disabled. Also note that no cursor distance data is presented. This helps avoid pre-judging where the electrical end of the cable actually is. See Figure 1 for sample display.

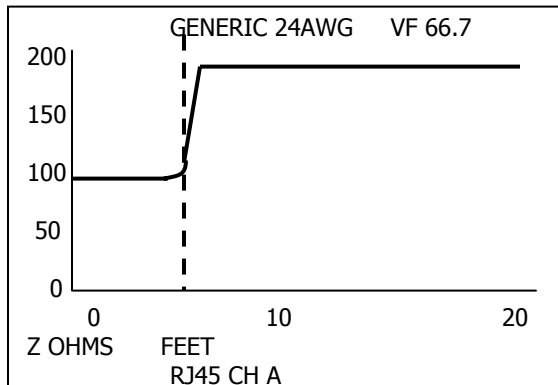


Figure 1

Step 5 – Use the ZOOM and STEP keys if required, and position cursor 1 at the open end of the cable. Then press ENTER

Step 6 – In some cases the TDR may ask for a second positioning of cursor 1 to get a higher resolution position at the end of the cable. If this is the case another dialog box will appear instructing this be done. Press ENTER to make the second measurement.

Step 7 – Use only the STEP key and Cursor 1 to position the cursor precisely at the indicated open. Then press ENTER to complete the measurement process.

Test Lead Cal Completed – The result will be a display that eliminates the length of the test lead from the plot as shown in figure 2.

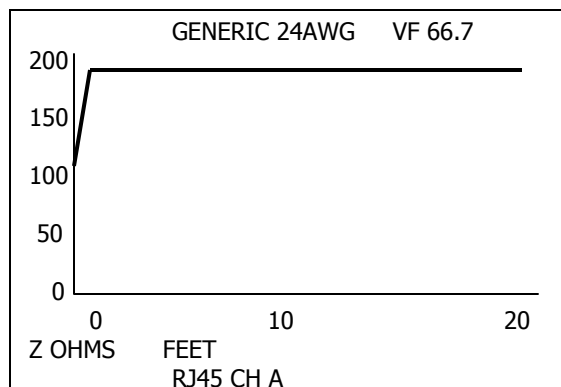


Figure 2

Conclusion

It takes about 1 minute to follow the steps and calibrate the test leads out of plots, and has all of the following benefits:

- A. Measurements on the display will be accurate and read directly
- B. Mental math mistakes from subtracting test leads are eliminated from cable measurements
- C. Stored and uploaded traces will not show the test leads
- D. Cables with sampled velocities will have a more accurate velocity factor (VF)

Keywords: TDR test lead length, remove test leads from measurement, TDR test leads, test lead nulling