AN211
Poor Splice in Coaxial Cable

Written by Paul DeWinter for
AEA Technology Inc.
www.aeatechnology.com

Abstract

Poor splices have distinct characteristics that show better on a step TDR's display than any pulse TDR. This application note highlights those characteristics and their trace appearances.

General

Connector Type Splices

Coaxial cable systems are rarely spliced directly together. In most cases, both ends are connectorized and a barrel (double female) connector is used to connect the two cables. There are now five opportunities for an impedance mismatch to occur:

1. Left side connector's attachment to its corresponding cable
2. Right side connector's attachment to its corresponding cable
3. Barrel connector with dissimilar impedance than the cables it connects
4. Left side connector-to-barrel's connection surfaces
5. Right side connector-to-barrel's connection surfaces

If all of these connectors and connection points are of good quality, a coaxial cable splice should be invisible to the TDR. However, defects will display on the trace in one of several ways:

1. A solid open or short at either connector will display as an open or short with the TDR's trace going to infinity or zero ohms respectively.

2. A barrel connector with greater or lesser impedance than that of the two cable's being connected will display either a small upward deviation for greater impedance or a small downward deviation for lesser impedance. See Figure 1 depiction of a 75Ω barrel connector connecting two 50Ω sections of coax cable.

5933 Sea Lion Pl Suite 101, Carlsbad, CA 92010 ◦ Phone (760) 931-8979 ◦ Fax (760) 931-8969 www.aeatechnology.com

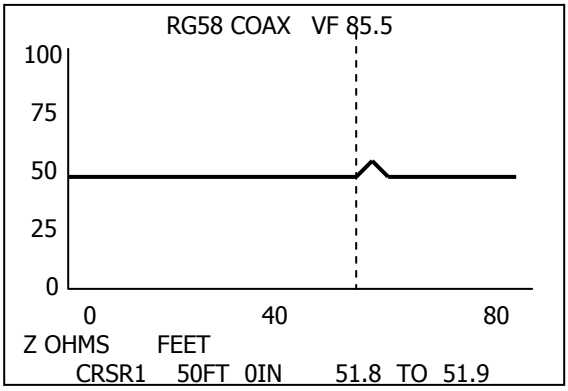

Figure 1

3. Corrosion on the connection surfaces, on either the center conductor or the shield of the connectors, create a resistive fault that will raise the impedance going through the connection. The amount of resistance is random depending on the amount of poor connection surface, but the resistance will raise the impedance trace on the far side of the connection as shown in Figure 2.

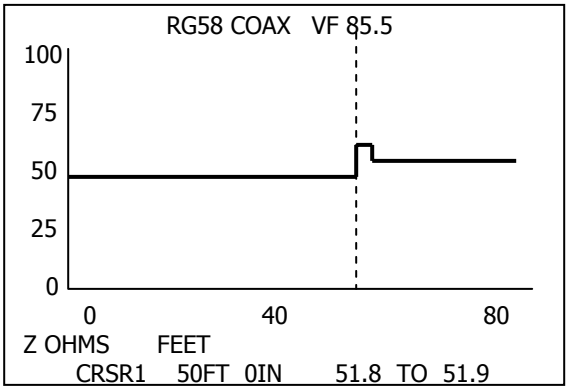

Figure 2

Directly Wired Splice

If the coax cable has been directly spliced without the use of connectors and a poor connection results from a cold solder joint, dirty connection or corrosion, it will appear as a resistive fault. It will also raise the impedance trace on the far side of the splice and appear similar to the trace shown in figure 2.

A second type of problem that can affect directly wired splices is that too much of the dielectric material is missing or replaced with a different material that changes the impedance at the splice. Figure 3 is the depiction of a splice with lowered impedance.

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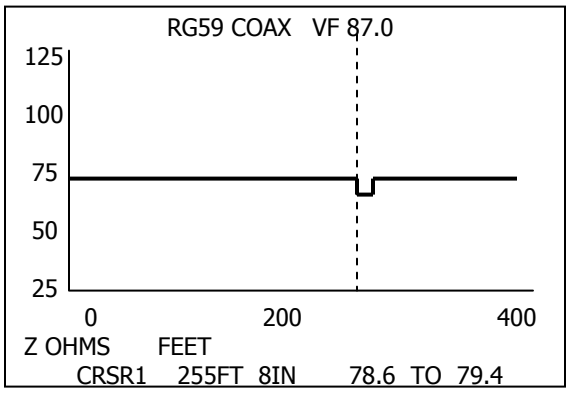

Figure 3

AEA's 20/20 Step TDR measures a cable's length and Impedance and can find poor splices better than a pulse TDR.

Keywords: Measuring coaxial cable splice, coaxial cable splice resistance, coaxial cable splice impedance, measuring coaxial cable splice with TDR

1489 Poinsettia Ave. Suite 134 Vista, CA 92081 ◦ Phone (760) 798-9687 ◦ Fax (760) 798-9689 www.aeatechnology.com