

## 1005: Difference Trace

Difference traces are traces calculated from the subtraction of one waveform from another waveform. Difference traces often allow the operator to identify subtle changes in cable or connector performance.

It is recommended that for any important cable and connector assembly, the as-manufactured or known-good configuration of the assembly be scanned and archived on the CT100B and/or a host PC running CT Viewer 2. Later, these archived traces can be used to create difference traces compared to current data to highlight changes in cable assembly impedance.

This application note will walk you through an example.

### Set Up for Reference Scan

After your cable has been connected to the CT100B, we'll set the scanning resolution to Normal. Then set the cable length and Vp to match your test cable. Finally, run Autofit.<sup>1</sup> For our sample cable, we get a display like this:

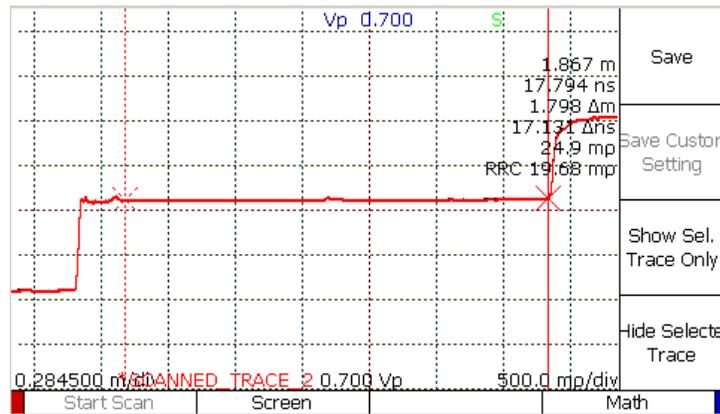


<sup>1</sup> These steps were all covered in earlier CT100B App. Notes.

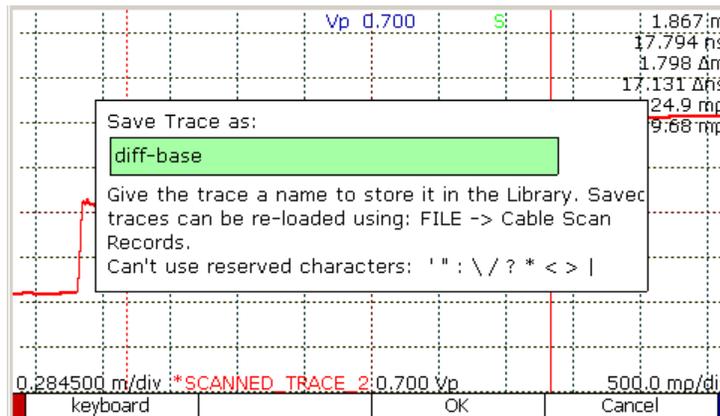
### Save Reference Scan

Press the SCAN button to load the SCAN menu. The second menu item on the bottom allows you to choose "Screen", "Cursor" or "Custom". We'll use the Screen setting.

Press the Start Scan menu item to actually take a scan. The resulting SCANNED TRACE is now displayed in red superimposed on top of the live trace.

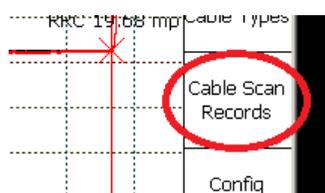


This will be our reference trace, so we'll need to save it in our library. Press the Save menu item and give the scanned trace a name.



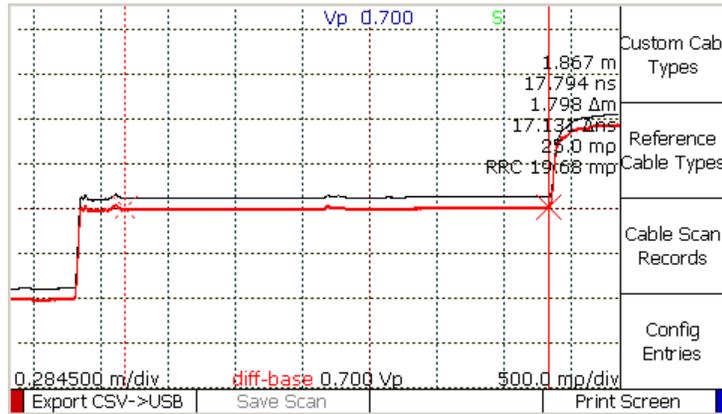
### Create Difference Trace

Now pretend that it is some future date and you wish to compare the current condition of the cable to the saved trace. (For this demo, I've loosened the connector in the middle of my test cable.) First, let's do the usual setup: Normal resolution, cable length and Vp, and run Autofit. Press the File button and choose the Cable Scan Records menu item to select the saved trace.

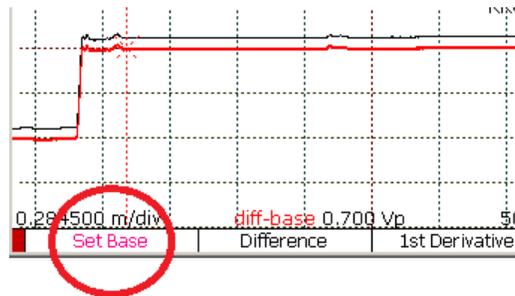


Load Saved Waveforms from Internal Storage		
Created	Description	TYP
16-11-01 14:10:1	probe_lead	TDR
16-11-02 13:23:2	diff-base	TDR

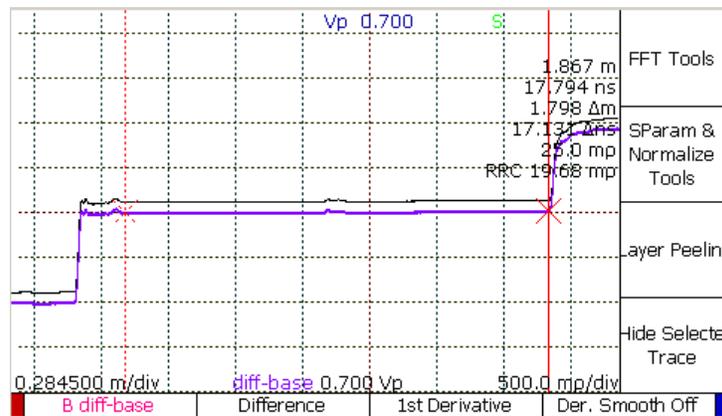
After loading the save trace, we have the following display. The two traces look very similar at this scale, but we'll use a difference trace to highlight any changes.



To create a difference trace, we first have to designate our reference trace. Press the SCAN button and choose the Math menu item. Now select the Set Base menu item.



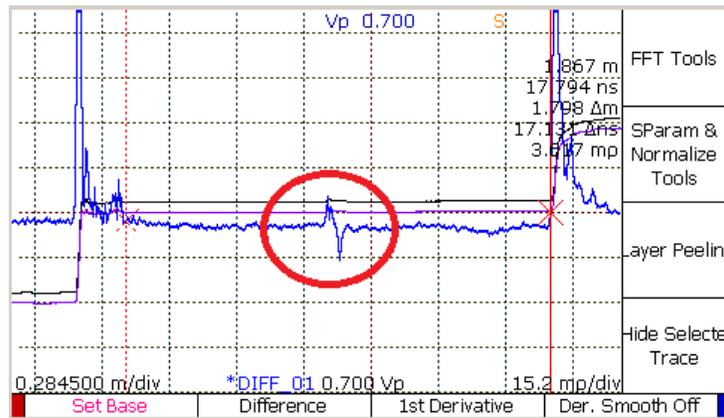
Our "diff-base" trace is now our "base" trace for the comparison.



Now use the Select button to cycle through the traces on the screen until the LIVE TRACE is selected (its name will appear at the bottom of the screen).



Now choose the Difference menu item to create a trace that shows the differences between the base trace and the live trace. Use the VERTICAL SCALE to emphasize the differences.



Note the difference at the connector in the middle of the cable. Using the difference trace made it very easy to highlight this detail.