

1010: Cable Resistive Loss Correction

The CT100 has a system for correcting for resistive loss (“dribble up”) in cables. This allows the operator to measure impedance more accurately through long and/or lossy cables. Because of the lossy nature of cables, the signal becomes attenuated the greater the distance being measured. This causes the traces drawn of long cables to appear to rise as the length increases. The CT100B has a way to mathematically adjust the trace.

Problem Description

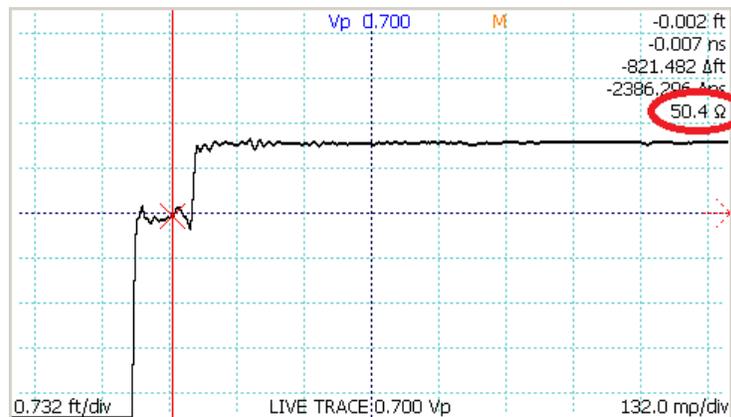
After using Autofit on a long 75 ohm cable, the trace will appear something like this:



Note the continuous rise in the measured impedance. Yet, we know that there actually is no impedance change in the cable. The rise in the trace is an artifact of the measurement loss we see because of the difference between theory and practice.

Setting the Vertical Correction Factor

If we zoom in (using the HORIZONTAL and VERTICAL SCALE knobs) on the left cursor position, we get a closeup view of the connector on the front of the CT100B. Note that it is measured as 50.4 ohms.

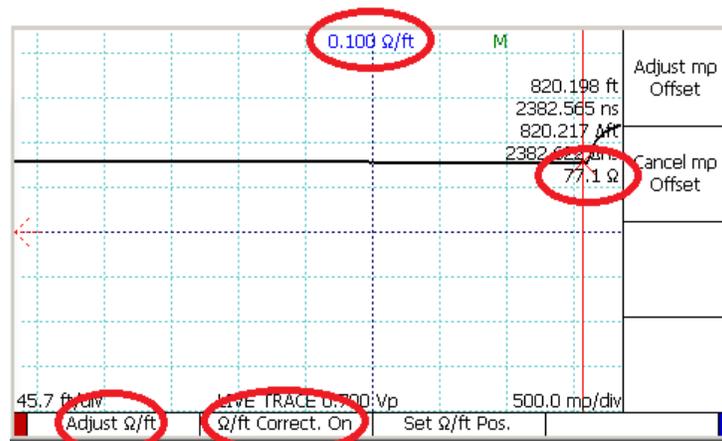


Zooming in even more and slowly scrolling the cursor to the right, we can see that the first foot or so of the cable measures in the range of 74.4 to 78.7 ohms, seeming to average around 77 ohms over that range.



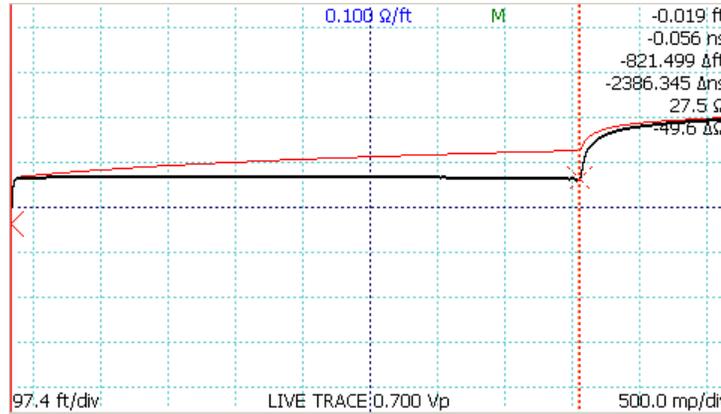
If we assume that the 77 ohms is a valid number, we should be able to go to end of the cable and define that as the correct value. The trace will then be redrawn using that assumption to mathematically adjust the readings as a function of the distance along the cable.

Use Autofit again to rescale the trace. Use the Cursor button to select the cursor that is at the end of the trace. Zoom in a bit and move the cursor if necessary to make sure it is positioned on the cable and not on the rise that represents the open at the end. Press the BLUE button - Measurement soft menu – Vertical Correction soft menu – Ω/ft Correct. On soft menu¹. Then press the Adjust Ω/ft soft menu and use the M-FUNCTION knob to adjust the correction value until the measured ohms at the end of the cable is also approximately 77.



¹ This example uses feet as the distance unit. The adjustment can be done using any measurement units.

Now if you use Autofit to redraw the trace, you can see that the long rising slope caused by the slowly deteriorating signal has been corrected. The cable scan now shows a long nearly horizontal line. The corrected trace is not perfectly flat because the loss effect on the measured signal is not perfectly linear. For comparison, the scanned trace is this figure shows the original, uncorrected, trace in red.



Conclusion

Use this correction to make more accurate impedance measurements on a length of cable.

Another technique to get an even more precise adjustment is to attach a known impedance reference, such as a resistive terminator, to the end of the cable. Then adjust the ohms per unit length correction until the measured impedance on the terminator displays the correct value.