LAB 3 - Pulse Reflections On A Line And Velocity Factor

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Purpose:

1. To measure the reflection time of a pulse that has been applied to a random length of coax and calculate velocity factor.

2. To observe the impact of various terminations on the line to reflection coefficient.

Equipment:

- Agilent 8110A Pulse Generator
- Agilent 54622A or 54600B 100 MHz Oscilloscope
- Agilent Intuilink or Benchlink software
- 1 BNC to BNC Cable (RG-58u)
- 1 BNC to TEE connector
- 1 50 ohm load with BNC connector
- 1 random length of coax cable with BNC connector on one end
- Assorted resistors: 51 ohm, 22ohm and 100 ohm

Procedure:

1. Connect the pulse generator output to the oscilloscope input. Use a tee connector on the oscilloscope and attach a 50 ohm load to one end in order to properly terminate the pulse generator output.

2. Adjust the pulse generator to the following specifications:
   Agilent 8110A - positive going pulse, amplitude 1 volt, pulse duration 20 ns and period 150 ns.
   Obtain a printout from the Agilent Intuilink or Benchlink software.

3. Remove the 50 ohm load and note the difference in the pulse shape. Acquire another printout. Account for the difference. In place of the 50 ohm load connect the random length of coax cable. Leave the far end open. Measure the time delay between the incident and reflected pulses.

4. Measure the length of the cable and calculate velocity factor. Does this agree with theory?

   Note: When you have identified the reflected pulse note that the time duration (use the time cursor on the oscilloscope) between the incident pulse and the reflected pulse represents the time for the pulse to go to the end of the line and back to the source (oscilloscope). You will need to consider this in your calculation for velocity factor.

5. Terminate the cable in each of the following ways. For each note amplitude and polarity of the reflected pulse. Either sketch or use Intuilink/Benchlink to provide a presentation of each condition including two incident pulses in the printout. Determine the reflection coefficient (gamma) for each termination.

   a.) open circuit
   b.) short circuit
   c.) 51 ohm resistor
   d.) 22 ohm resistor
   e.) 100 ohm resistor