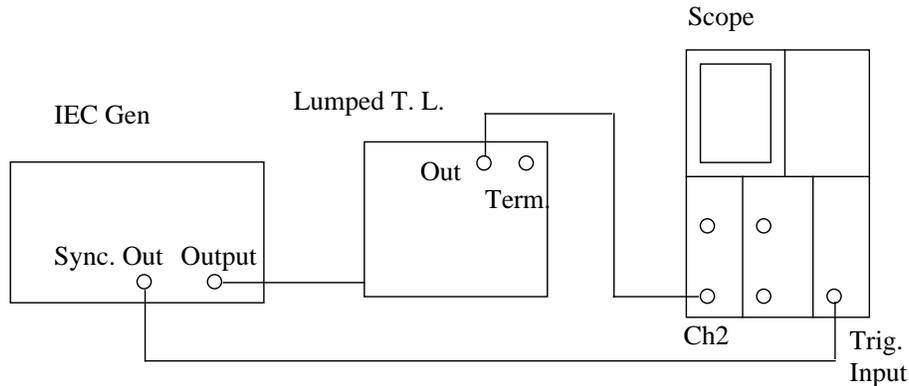


Lumped Element Transmission Line

Setup:



Procedure:

1. Low-pass Demo

- Travelling Wave

Gen. Setting: $.5 \times 100$ K Hz

(a). Direction of phase velocity

Adjust the vertical position of the waveform so that it moves upward as the T. L. switch moves toward the Load. From the slope of the constant phase trace, one can tell that the phase velocity is moving to the right side (toward the Load).

(b). Phase change/section

Much less than π

- Evanescent Wave

Gen. Setting: 10.5×100 K Hz

Adjust the vertical position of the waveform so that it moves upward as the T. L. switch moves toward the Load.

(a). Amplitude

Decrease

(b). Phase change/section

π

2. High-pass Demo

- Direction of phase velocity

Gen. Setting: 0.8×100 K Hz

Adjust the vertical position of the waveform so that it moves upward as the T. L. switch moves toward the Load. From the slope of the constant phase trace, one can tell that the phase velocity is moving to the left side (toward the Gen.).

- Group velocity

Gen. Setting: 0.8×100 K Hz

Adjust the vertical position of the waveform so that it moves upward as the T. L. switch moves toward the Load. It can be seen that the envelope of the waveform moves to the right side, while the phase moves to the left side.