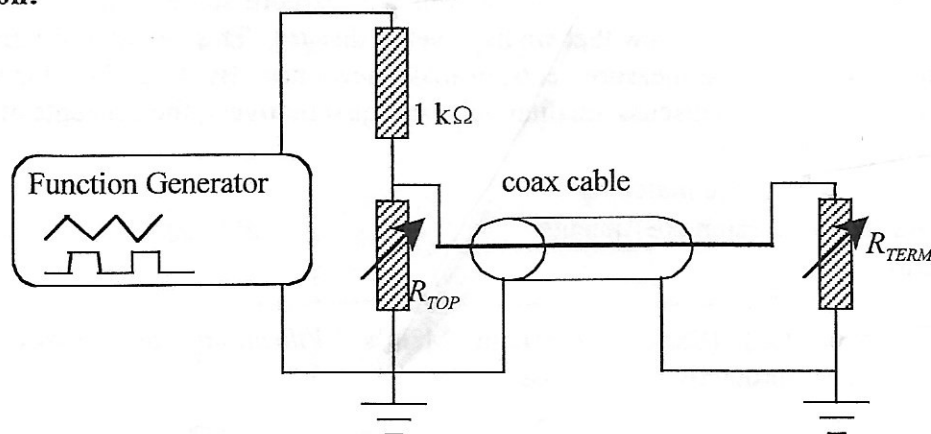- Various connectors and wires
- **Resistors** and **variable resistors**: to terminate the coaxial cable
- **Multimeter**

Familiarization:

This is the basic circuit you'll consider. You'll apply some voltage (square pulse or sine depending on the application) with the function generator, and use an oscilloscope to measure the voltage at various places. For example, you might measure across resistor R_{TOP} and/or R_{TERM} as you change R_{TERM}. (R_{TOP} itself is variable also -- set it to the impedance of the cable and leave it at that value). **Pay attention** to the ground connections – they must all be connected to the same point, and when you connect the oscilloscope, connect the scope ground to the ground points shown above.

Experiment with the knobs on both the function generator (FG) and scope. Be sure you know how to take accurate time and voltage readings from it.

The role of the 1-kΩ resistor in the circuit above is to provide a large resistance that draws essentially a constant current from the FG. Even if you change the variable resistors, the total resistance across the FG is not too different from 1 kΩ. The role of the variable resistor R_{TOP} is to eliminate reflections at the "top" end of the cable. Once you have a pulse propagating in the cable, you will see multiple reflections. **Vary R_{TOP} until the second reflection is eliminated. Then leave R_{TOP} at this value.**

Examine a spare bit of coaxial cable that is lying about. What is inside it? Where do you think the signal flows? Why is one connector braided on the outside? What is the stuff between the conductors? Why is it there? If an electrical wave propagates down this line, how fast do you think it will travel?

I. Measurement of the speed of propagation:

Description: Use the function generator to make a voltage pulse (you will have to think about how wide to make it and how often it repeats. Measure the pulse at the "top" end of the cable – you will see the trace as it enters and as it returns. .

By Janet Tate, revised 2/1/2017 by MW Graham

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PARADIGMS IN PHYSICS