Experiment 11: Schmitt Trigger – II

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Purpose:

To view the voltage transfer function of a Schmitt trigger; to compare the behavior of the hysteresis loop with the design equations.

Method:

The same Schmitt trigger that was used in Experiment 10 will be subjected to a sequence of input voltages and the corresponding output voltages measured. A plot of v_{OUT} vs v_{IN} will be generated in a manner that will show the directionality of traversal of the hysteresis loop. The position and width of the loop as a function of the circuit parameters will be investigated.

Hardware Setup:

The circuit is similar to the one used in Experiment 10. This time its voltage transfer function rather than its time-dependent behavior will be observed.
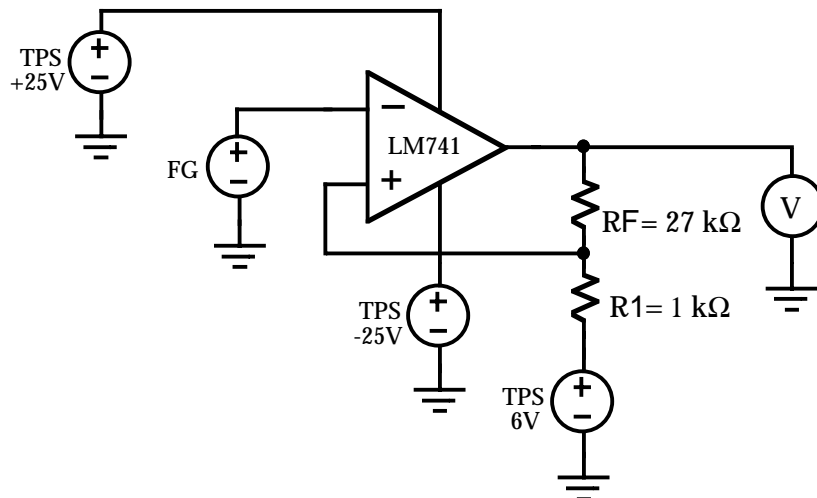
Software Setup:

This time the function generator operates in DC mode, and the multimeter in DC volts mode. The component drivers should be used this time to minimize the running time of the sequence. Two For Range objects will control the offset voltage: one will increase it, and the other will then decrease it to complete a full cycle. The second will be triggered to start when the other ends by a connection between its sequence input pin and the sequence output pin of the first. The output of both will go to the two input terminals of a **Junction** object (*Menu Bar --> Flow --> Junction*), which combines the two streams of values into a single sequence that becomes the **offset** input to the function generator driver.

The functions of the triple power supply are the same as before. No changes in the driver commands are needed. An X vs Y Plot object will display the transfer function.

Procedure:

Set the reference voltage to zero, open the display object, and run the program. As the plot is drawn, you may need to click on Auto Scale repeatedly to keep it on screen. Carefully observe the progress of the trace as the input increases, then decreases. You will be able to identify the direction in which the hysteresis loop is traversed. Use the markers on the plot to find the values of V_1 and V_2, then compare them with values calculated from equations (10-1) and (10-2).

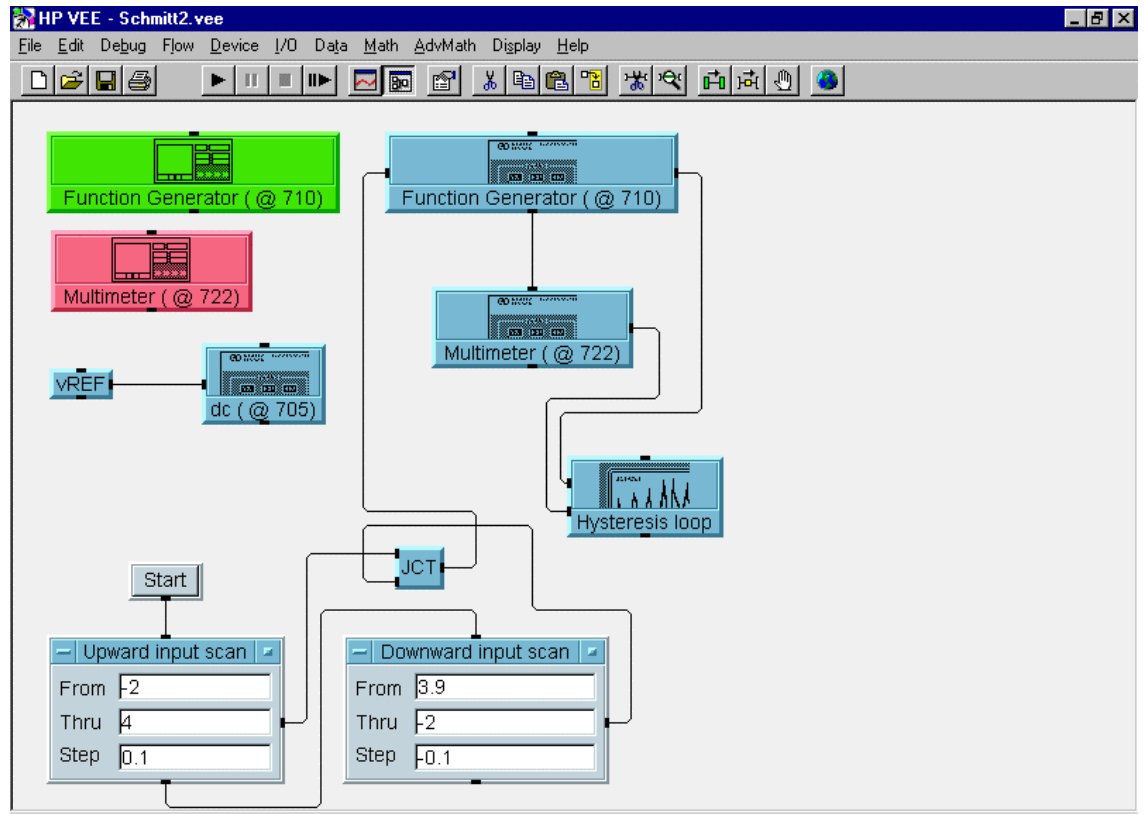Repeat the experiment for several combinations of v_{REF} (positive and negative) and resistor ratio.

Fig. 11-1 Agilent VEE Setup