جامعة الملك فهد للبترول والمعادن
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MultiSim Tutorial II

Transient Analysis

In this tutorial, you will be guided through the use of the electronic circuit simulation tool MultiSim in Transient analysis. You can get your own copy of the text book version of MultiSim from the EE 201 class webpage. Software installation and initial steps were highlighted in Tutorial I.

- Build the circuit show in Figure 1.
- The Single Pole Double Throw (SPDT) switch (J1) is controlled by the space bar (you can change the control to any letter on your keyboard if needed).

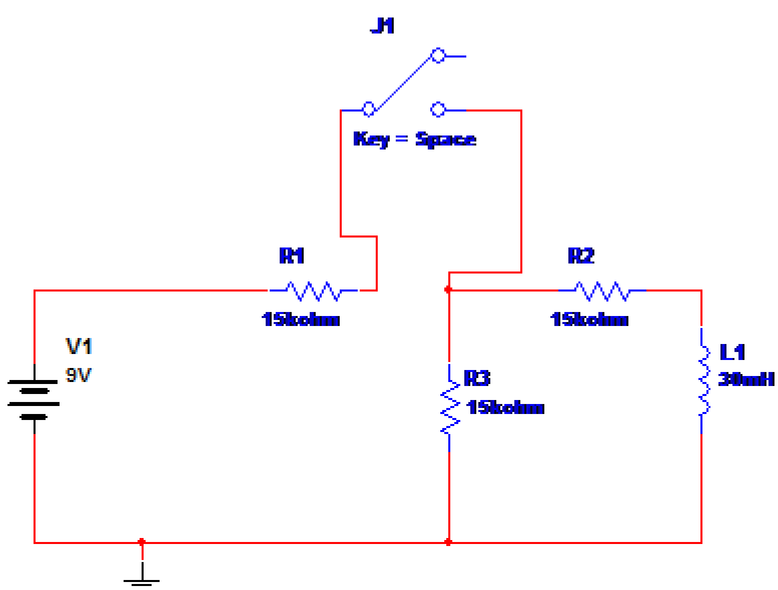

Figure 1

- Connect an oscilloscope as shown in Figure 2 to view the voltages between R2 and R3 with respect to GND. An oscilloscope will show you the voltage change as a function of time across at a node in your circuit with respect to the reference node.
- Double click on the oscilloscope to get the screen in Figure 3.
- Choose the settings shown in Figure 3 for the two inputs A and B. Note that in put B is shifted downwards in the y-axis to allow its curve to appear in the bottom view of the Oscilloscope screen.

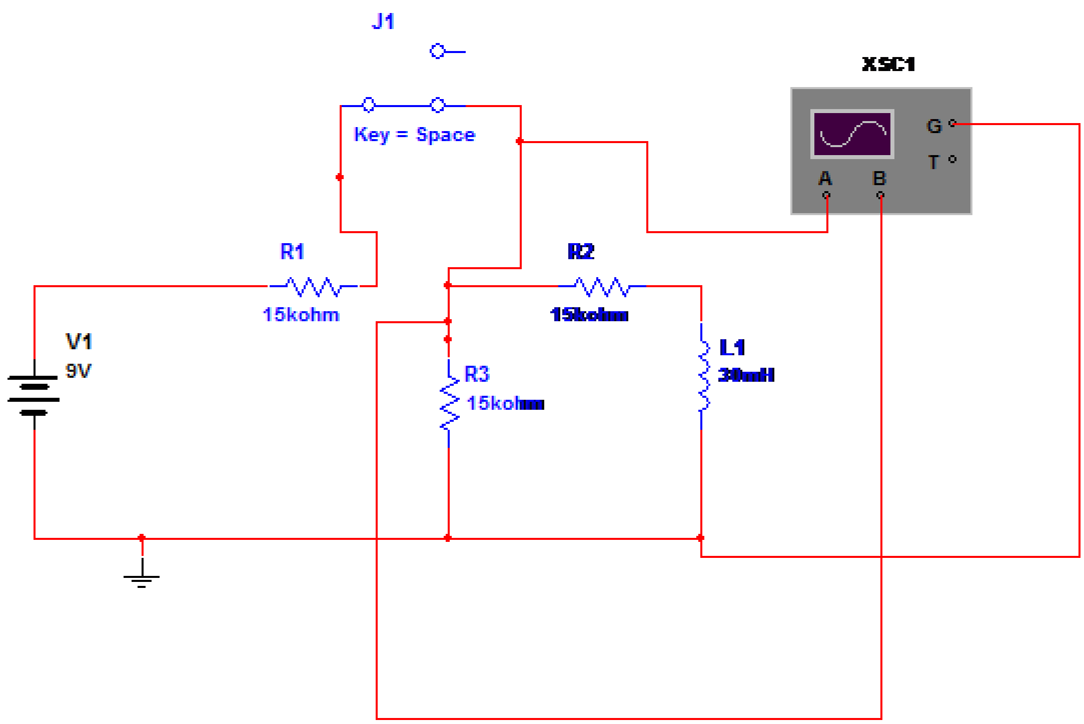

Figure 2

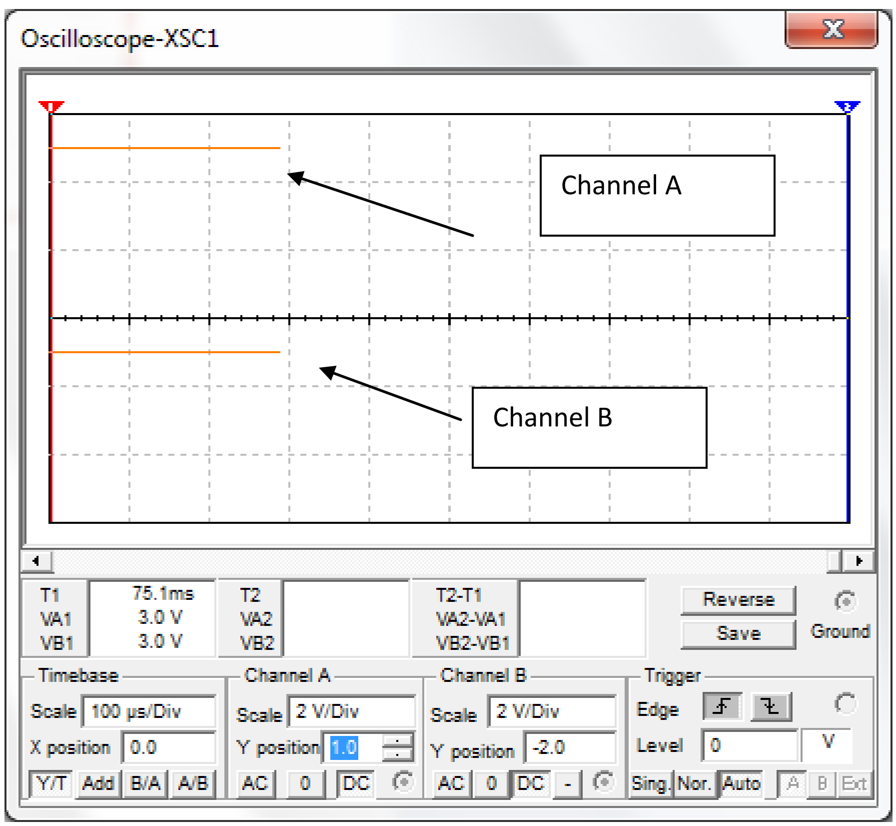

Figure 3

- Start the circuit operation, and right after you switch the SPDT switch to its t>0 position as in problem 7.2 in your text book, pause the simulation. Zoom in using the "Timebase scale" in your oscilloscope window, and you will get something similar to Figure 4. You can move the view backwards until you catch the transition period in the voltage values.

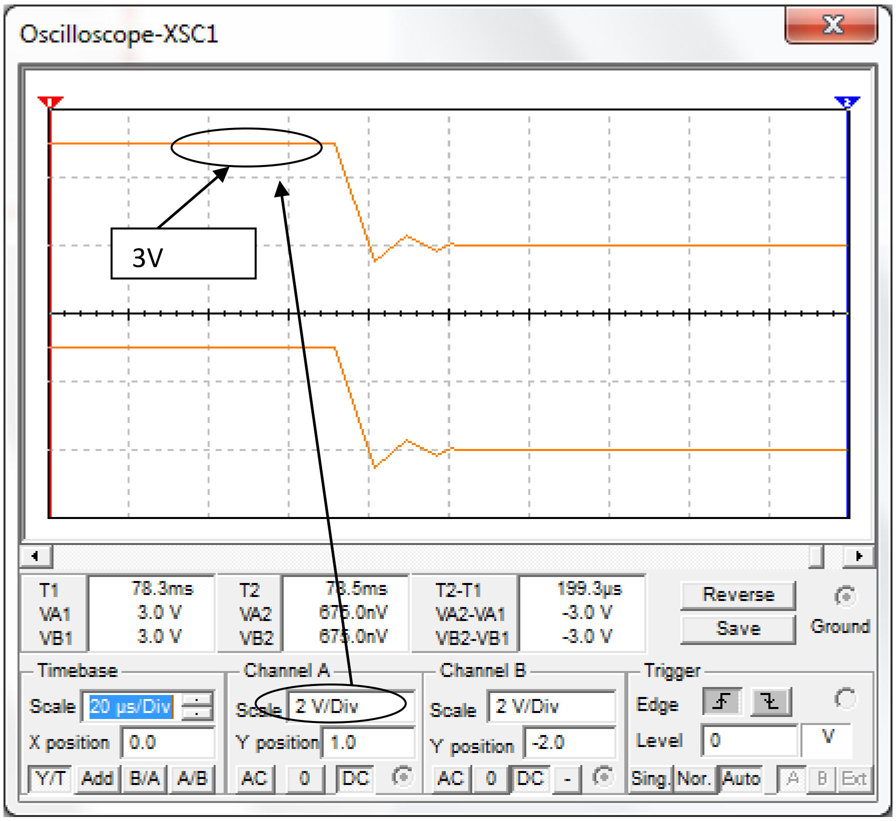

Figure 4

- Now, the value of the voltage $v1(0^-)$and $v2(0^-)$are shown to be 3V, because we have 1.5 divisions on the oscilloscope screen, and each division is worth 2V as per the Channel A scale. Also, $i_1(0^-)$and $i_2(0^-)$can be found from ohm's law, since the inductor is short circuit for DC. This gives, $i_1\ (0^-)= 3/15k = i_2\ (0^-)= 0.2mA$.
- The time constant of the circuit after the switch disconnects the second loop from the source loop will depend on the values of R2 and R3 as well as L1, where $\tau= L/R = 30m/30k = 1\mu s$.
- The solution for $i_1(t)$ will be of the form: $\mathbf{i_1\ (0^-)e^{-t/\tau}\quad t \geq 0}$