

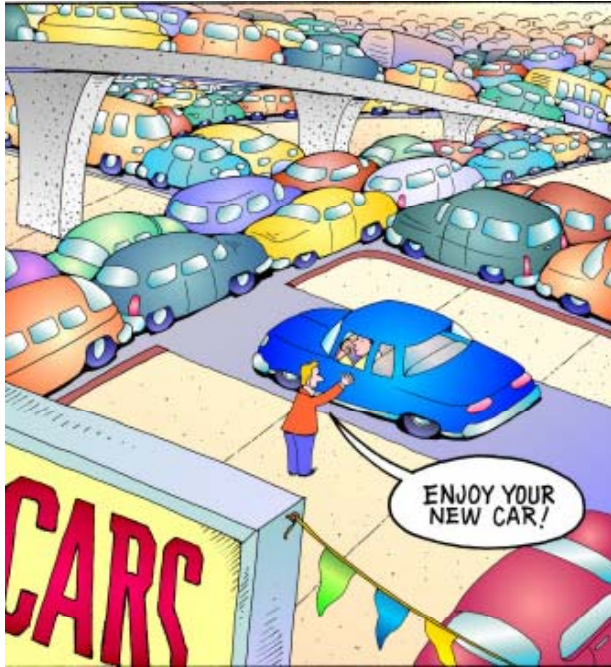
# Multisim BUS Tutorial

- based upon Multisim Help Files

By D. H. Haley

28 May 07



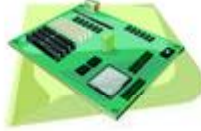
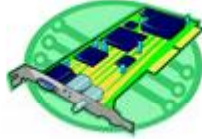



# What is a BUS?



- a "highway" for digital signals
- a common communications path
- Electrically, a collection of specified voltage and/or current levels and signals



# Electronic Interface Buses

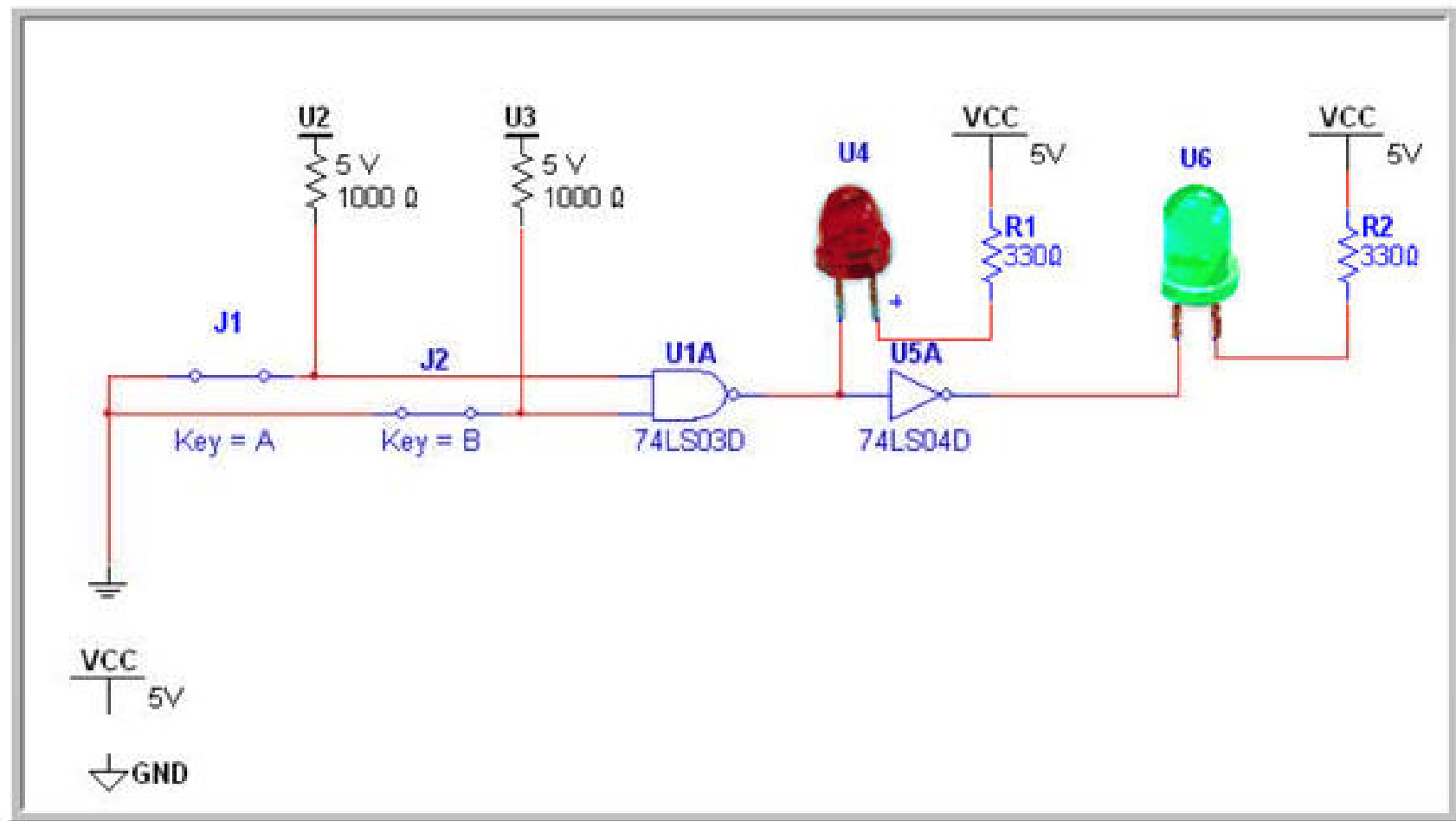
						
<u>PC Buses</u>	<u>Cable Buses</u>	<u>Backplane Buses</u>	<u>Mezzanine Buses</u>	<u>IC Buses</u>	<u>SoC Buses</u>	<u>Wireless</u>
<a href="#">PCIe Bus</a>	<a href="#">Automotive</a>	<a href="#">Switched Fabric</a>	DaughterCards	HubLink Bus	WISHBONE	RF
<a href="#">Apple Buses</a>	<a href="#">Video Buses</a>	VME Bus	PMC Bus	MicroWire	AMBA Bus	<a href="#">IR</a>
<a href="#">Monitor Bus</a>	<a href="#">Field Buses</a>	cPCI Bus	IP Bus	SMbus	More Buses	802.11
<a href="#">SATA Bus</a>	<a href="#">Avionic Buses</a>	Card-to-Card	CMC	Memory Bus	IP Core	Bluetooth
PCI Bus	Copper/Fiber	Embedded Buses	Other Boards	IC Buses	Buses	--

Some example of Electronic Interface Buses include:

- Computer Buses
- Cable Buses
- Processor Buses
- IC Buses
- Embedded Buses.

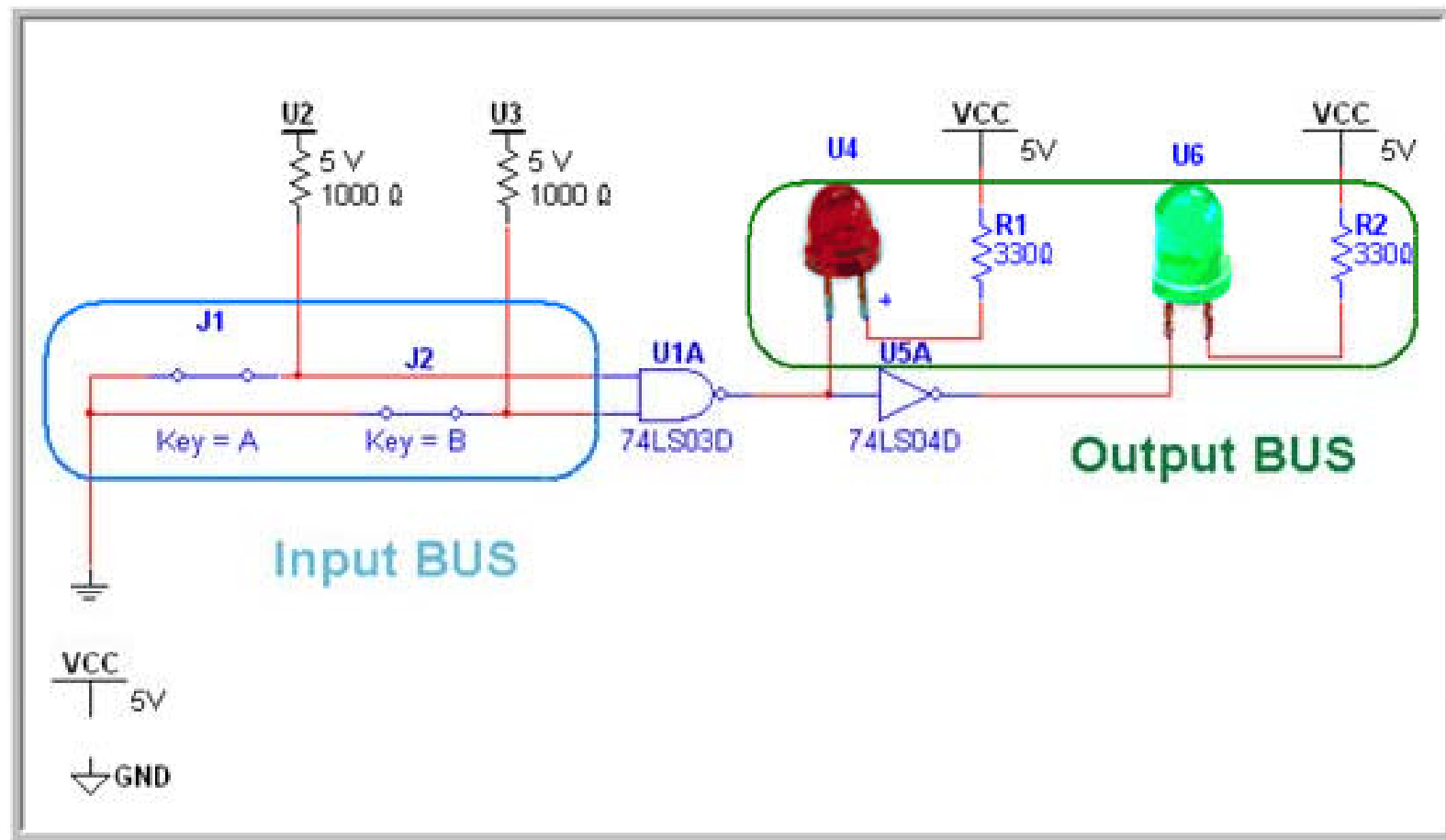
Source: [http://www.interfacebus.com/Interface\\_Bus\\_Types.html](http://www.interfacebus.com/Interface_Bus_Types.html)

# A Very Simple Circuit

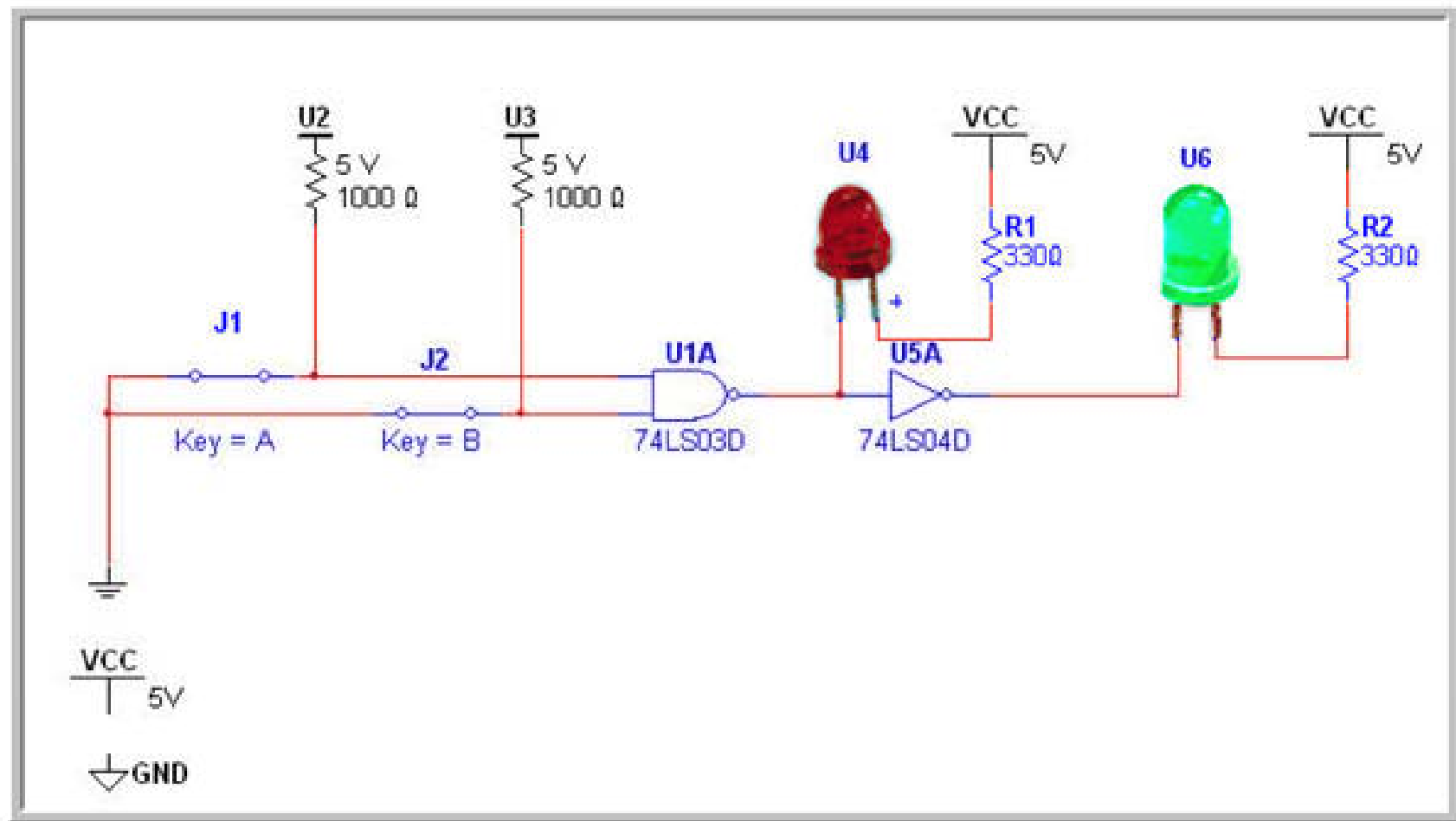


Nothing complicated or messy about this circuit – likely does not need a BUS

# Let's Add an Input BUS and an Output BUS

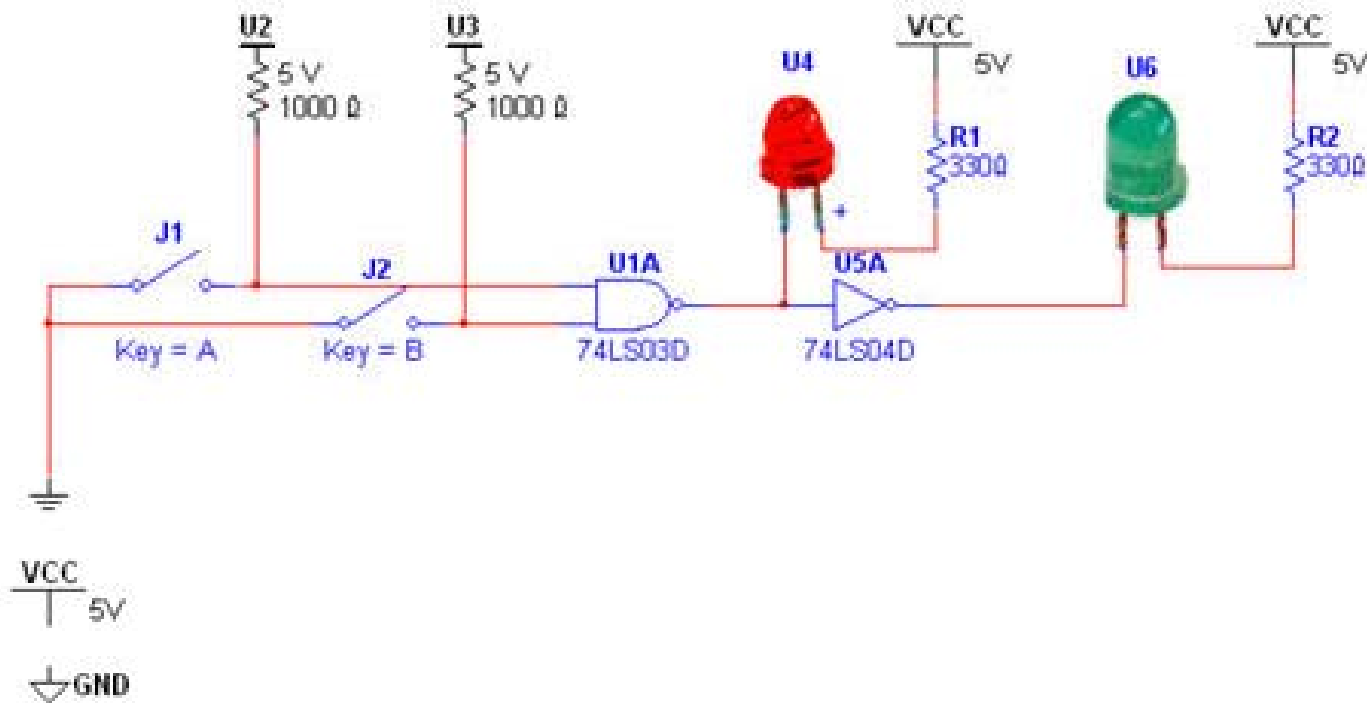


# A Very Simple Circuit



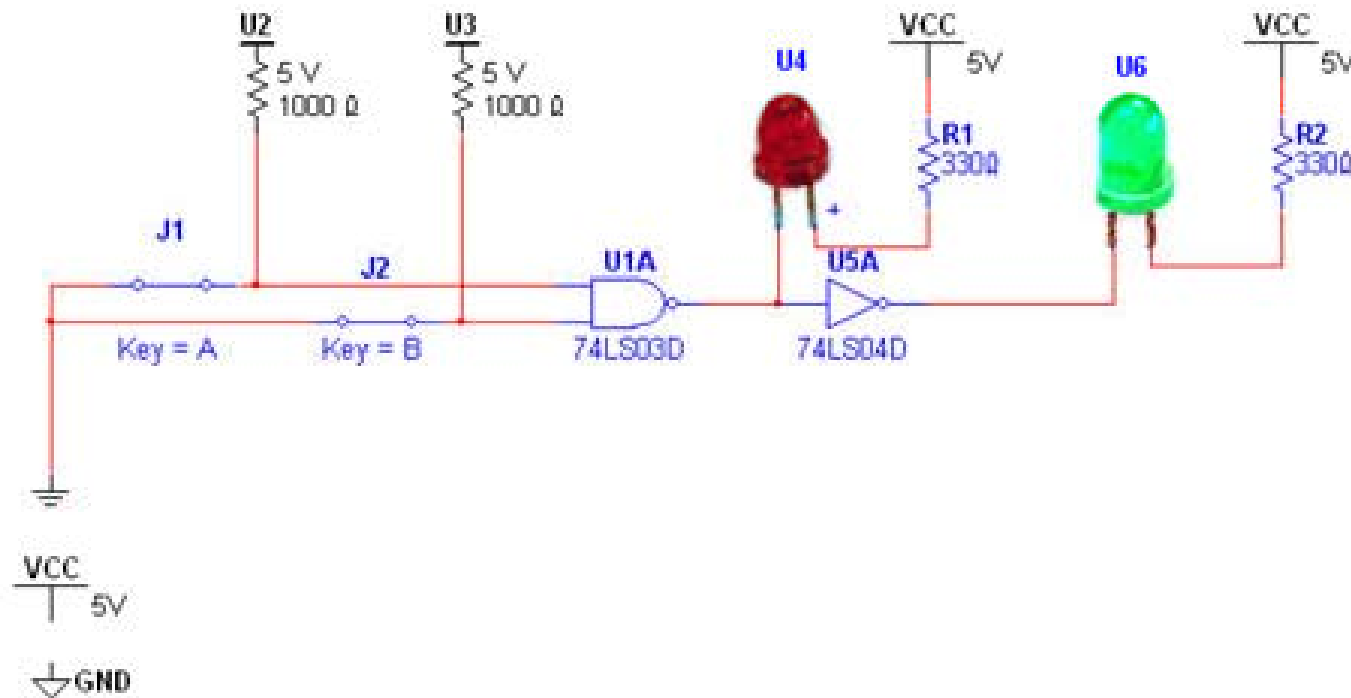
BUILD THIS CIRCUIT before proceeding with the tutorial.

# Confirm your circuit correctly functions



If both inputs to the NAND gate are TRUE, then the RED LED turns on signifying an alarm condition.

# Confirm your circuit correctly functions



If either or both of the inputs to the NAND gate are FALSE, then the GREEN LED turns on signifying a safe condition.

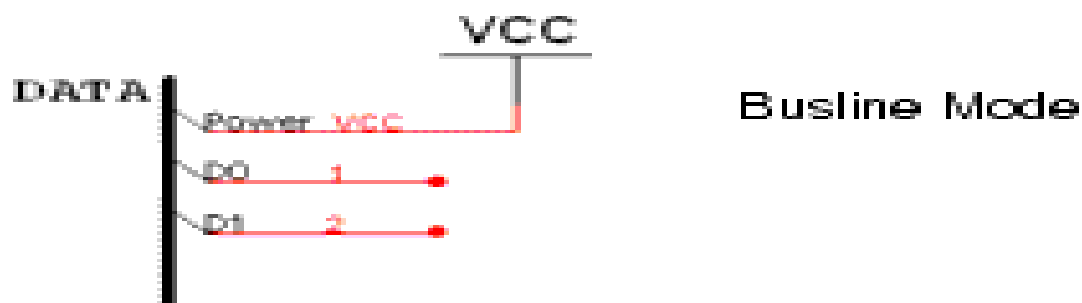


# Multisim Buses...

In order to simplify wiring, buses may be used to carry multiple nets. Buses may be used within a page, across pages, and down into nested circuits (subcircuits and hierarchical blocks).

In *busline mode*, you may pre-define the number and names of buslines that are contained in that bus. When connecting a wire to the bus via a bus entry, you are prompted to specify which of the existing buslines the new wire should attach to. All wires attached to the same busline are merged into the same net.

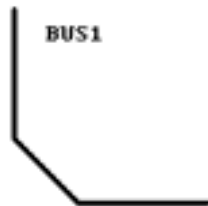
**Note** The bus wiring mode is set in the **Wiring** tab of the **Sheet Properties** dialog box. See [Sheet Properties - Wiring Tab](#).



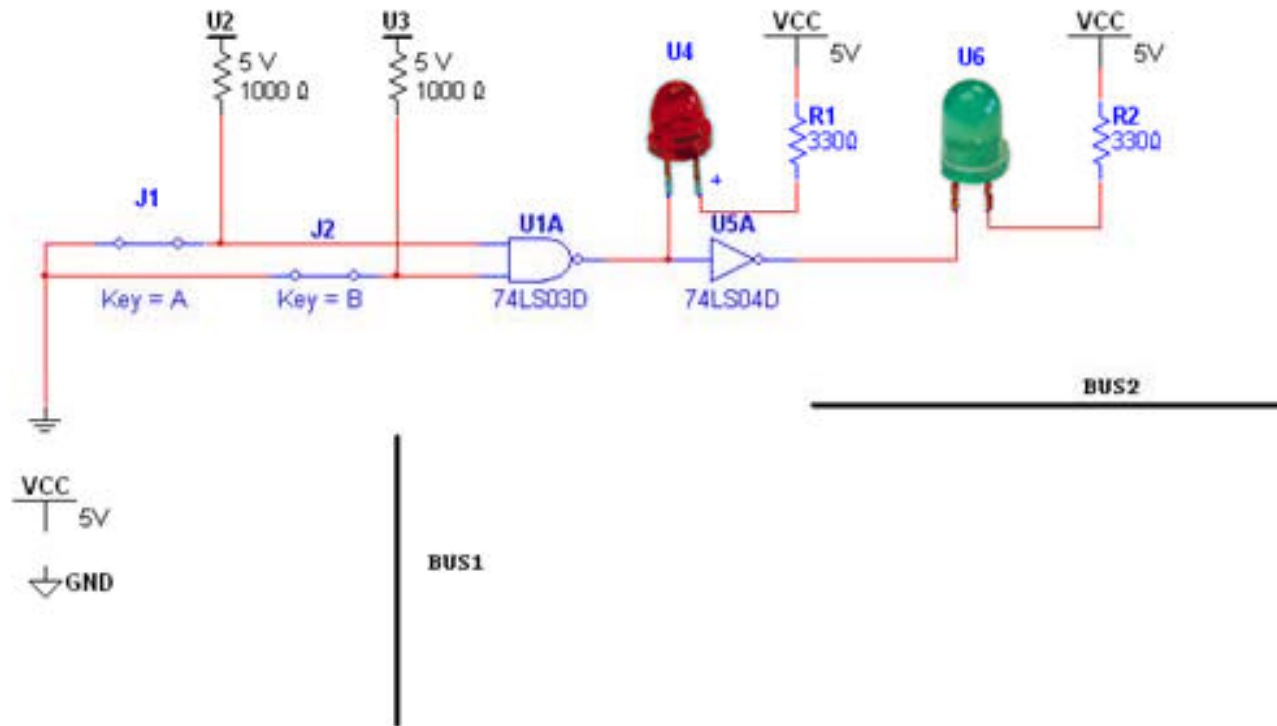
# Placing a BUS

➤ To place a bus in your circuit:

1. Select **Place/Bus**.
2. Click on the first point for the bus.
3. Click on the next point for the bus.
4. Continue to click on points until the bus is complete. Buses can be placed horizontally, vertically, and at 45 degrees.
5. Double-click to mark the ending point of the bus.



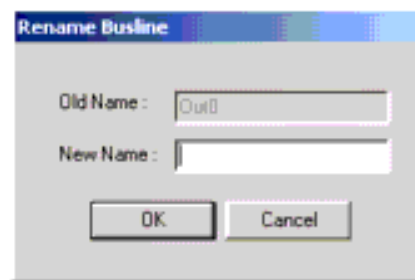
# Buses are placed...



# Renaming a BUS

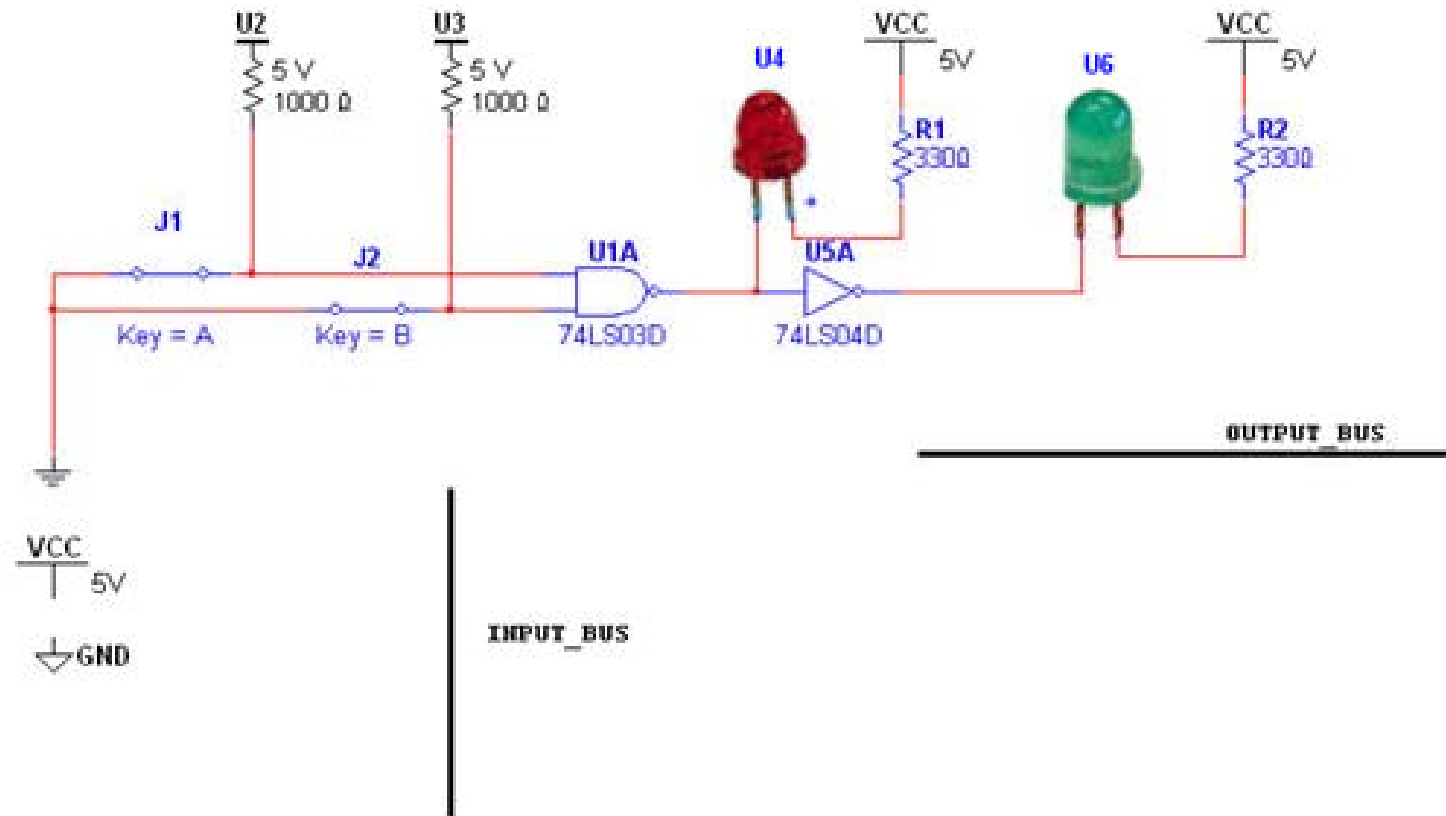
➤ To rename buslines in a bus:

1. Double-click on a placed bus to display the **Bus Properties** dialog box.
2. Select the desired bus(es) in the **Buslines (Net)** field and click **Rename**. The **Rename Busline** dialog box appears.

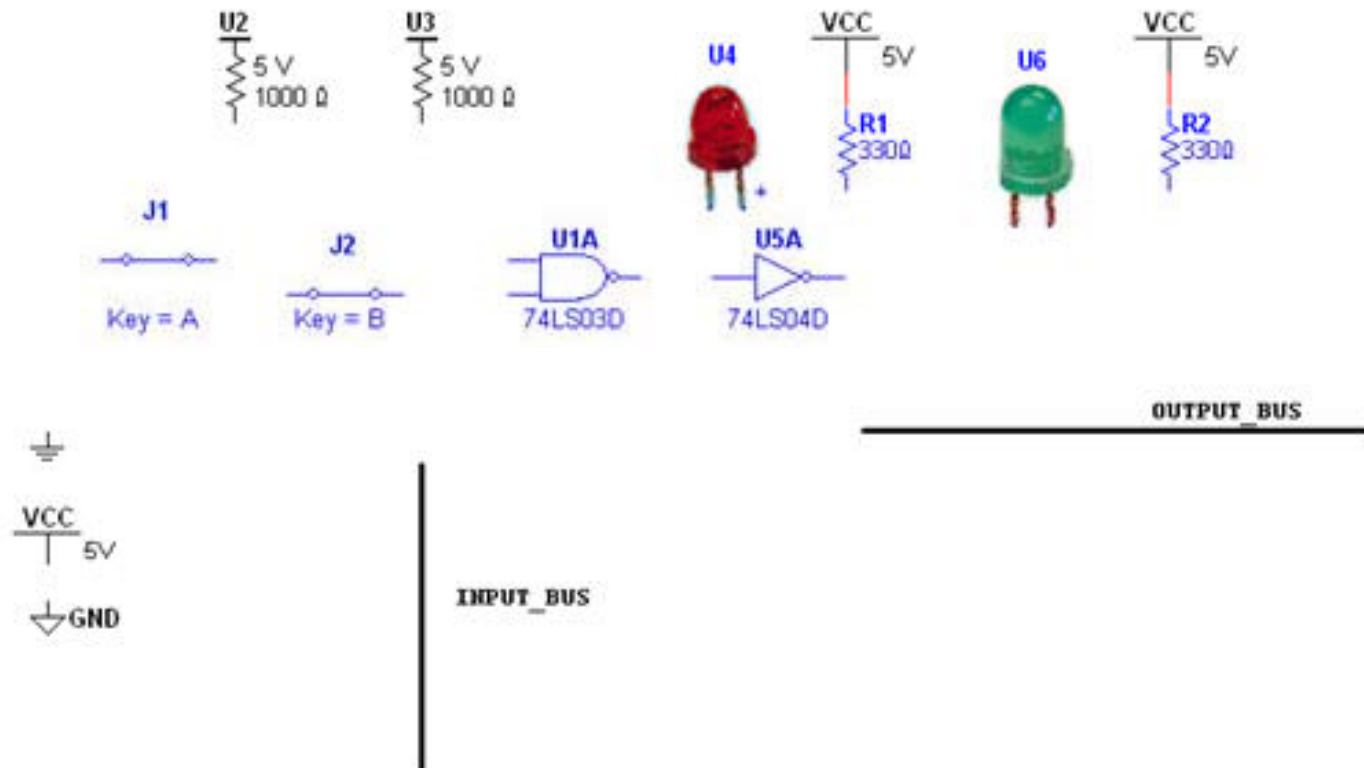


3. Enter the desired name in the **New Name** field and click **OK**.

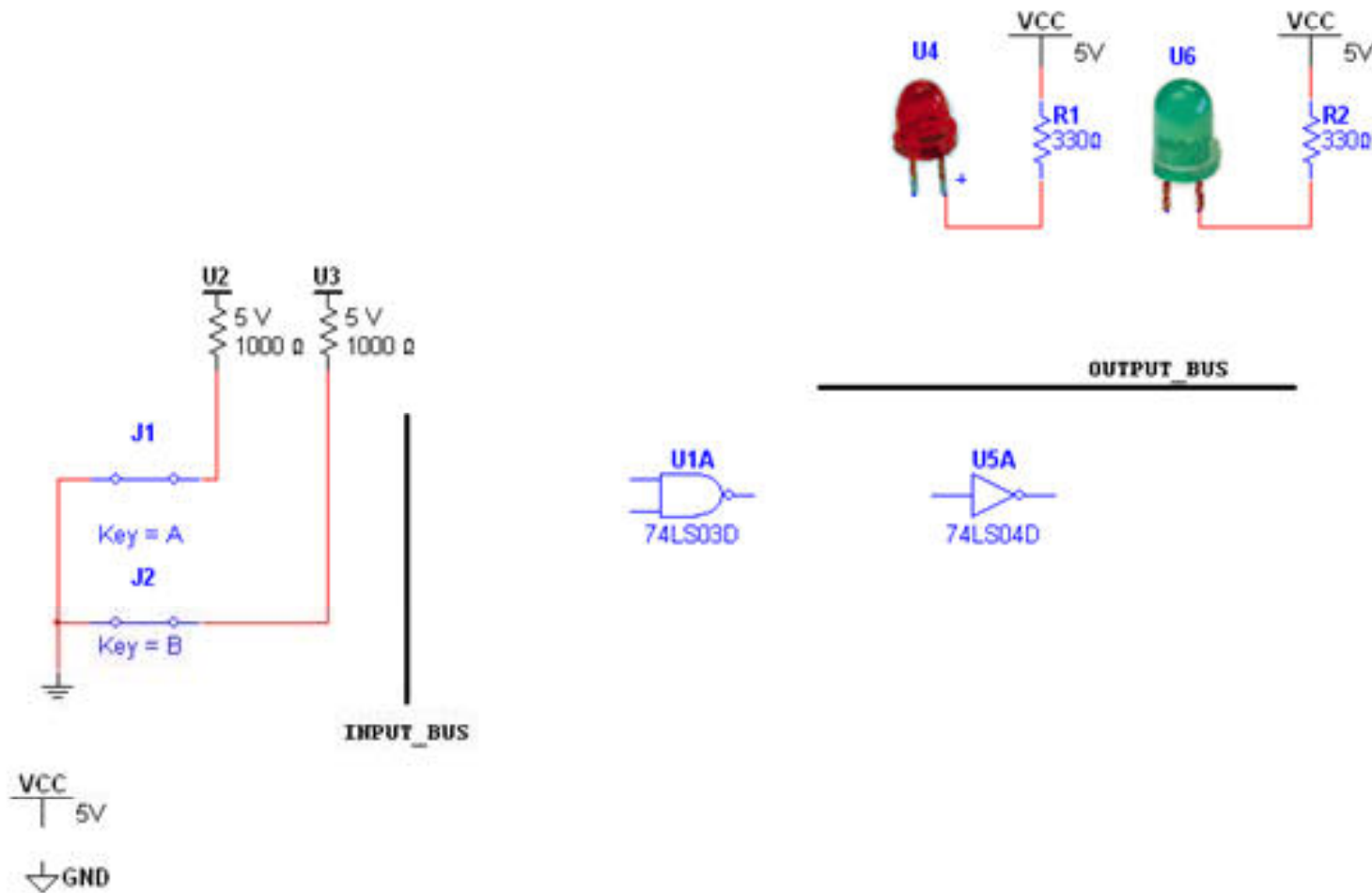
# Buses are renamed...



# Strip out existing wiring...

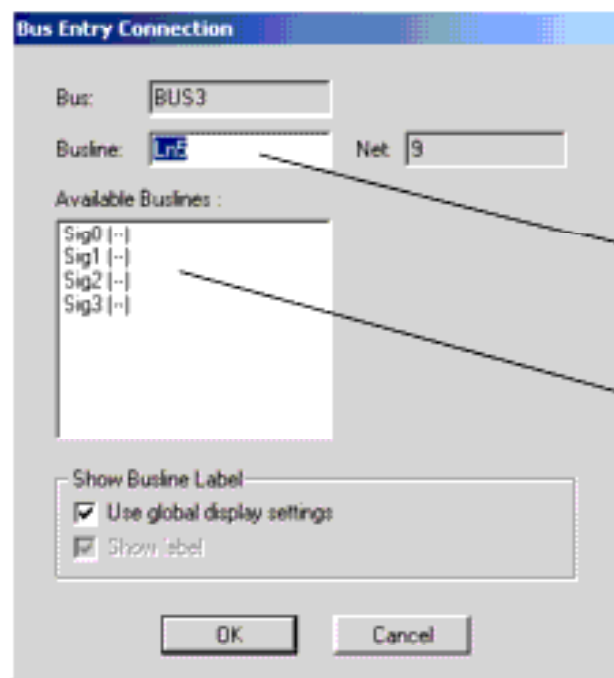


# Re-arrange the components...



# Wiring to a BUS

1. Wire the bus into your circuit by drawing a wire to any location on the bus. The **Bus Entry Connection** dialog box appears:



Use the default busline name,  
or type a new name.

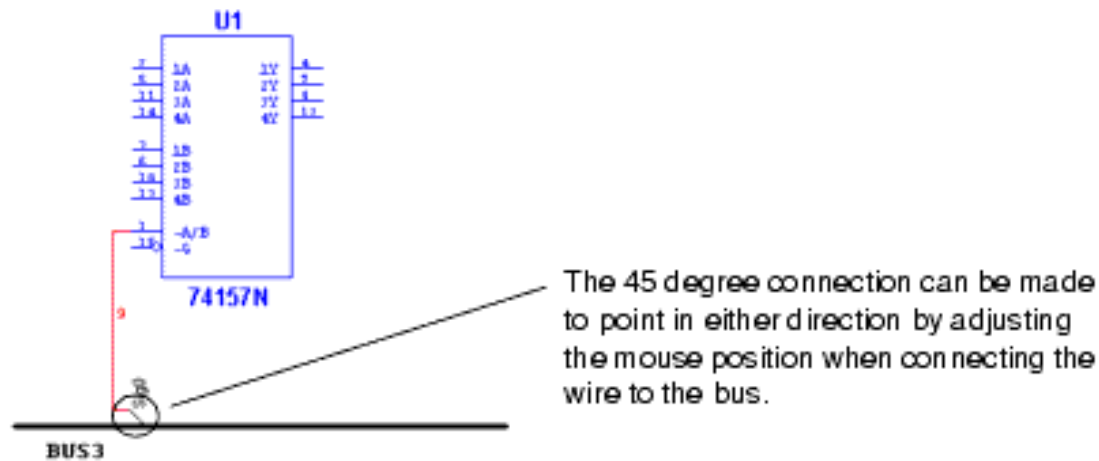
*Or*

Select one of the available  
buslines.



# Wiring to a BUS

2. Select the desired busline and click **OK**.

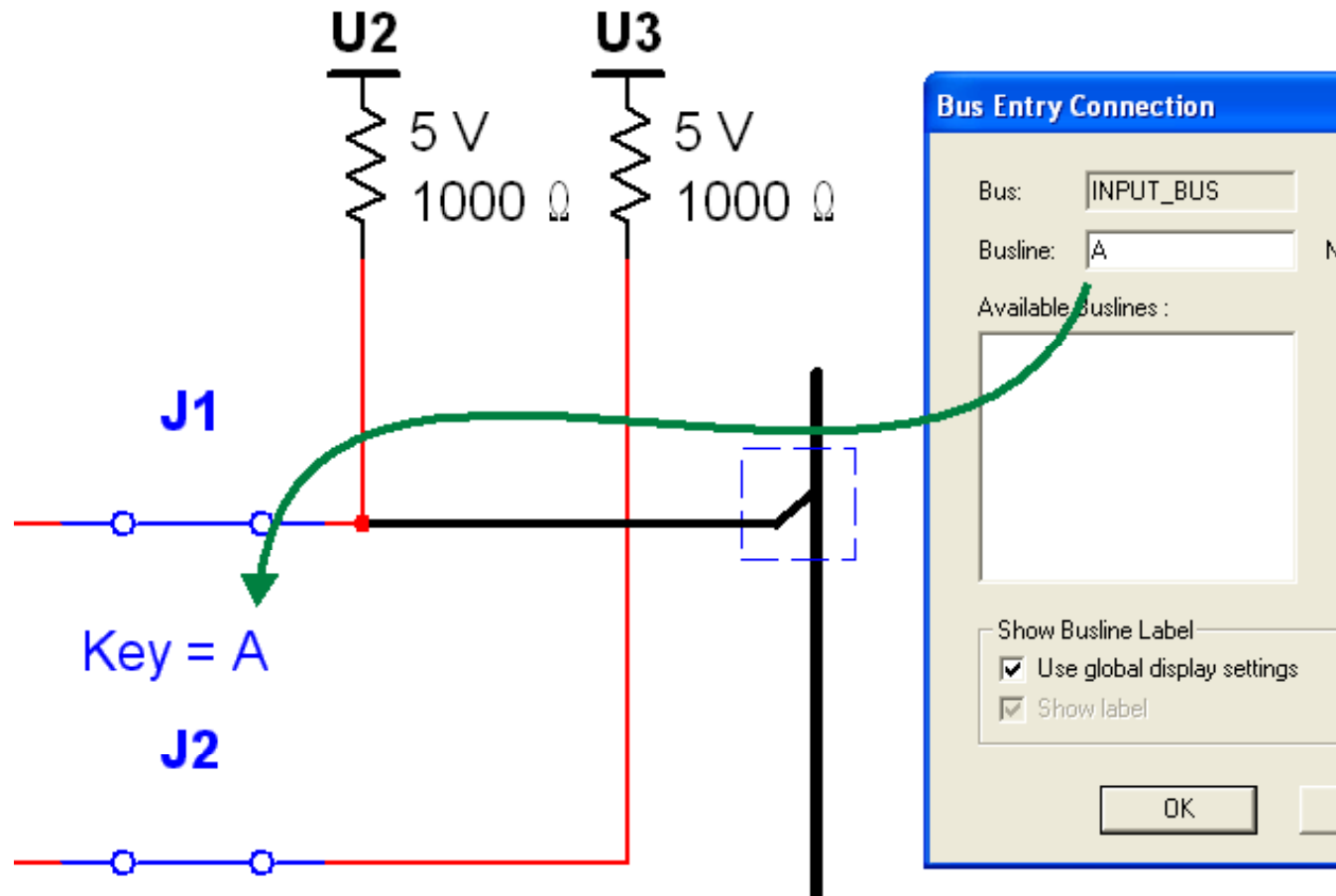


**Note** After wiring, you can re-name the net, by double-clicking on it and editing the name in the **Net** dialog box that appears.

**Note** You can select a bus entry to move it with the Arrow keys, or rotate it with SHIFT-R.

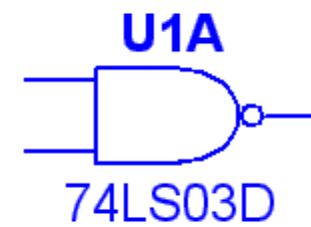
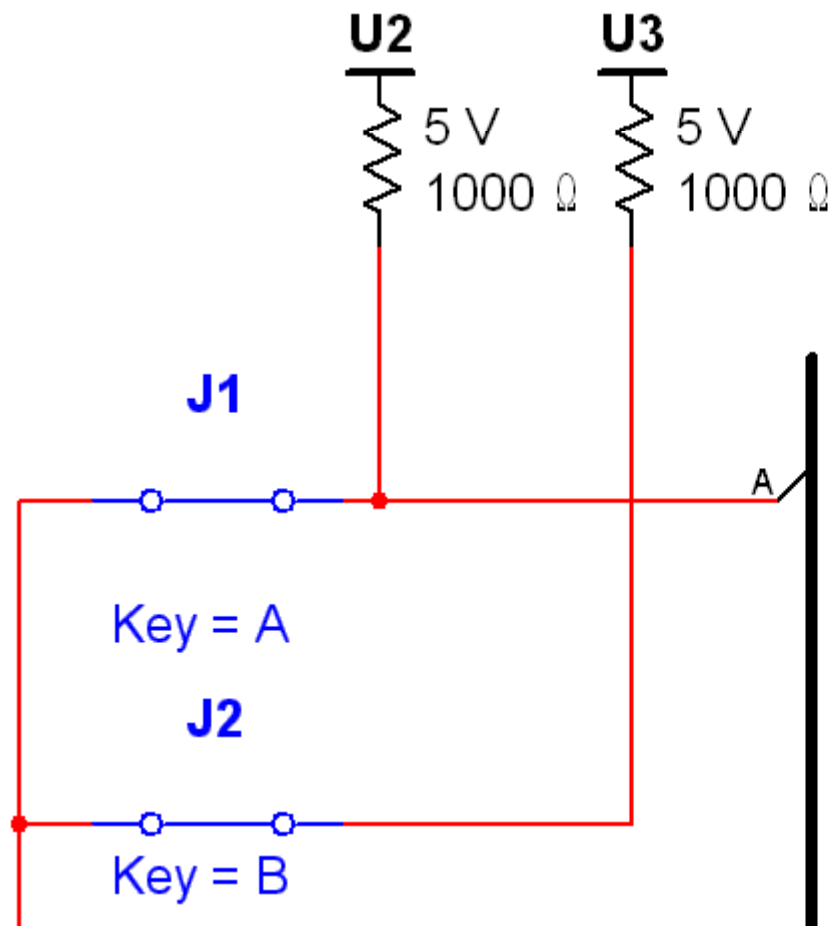
**Note** You can double-click on a bus entry to edit its properties via the **Bus Entry Connection** dialog box.

# Example of Wiring to a BUS



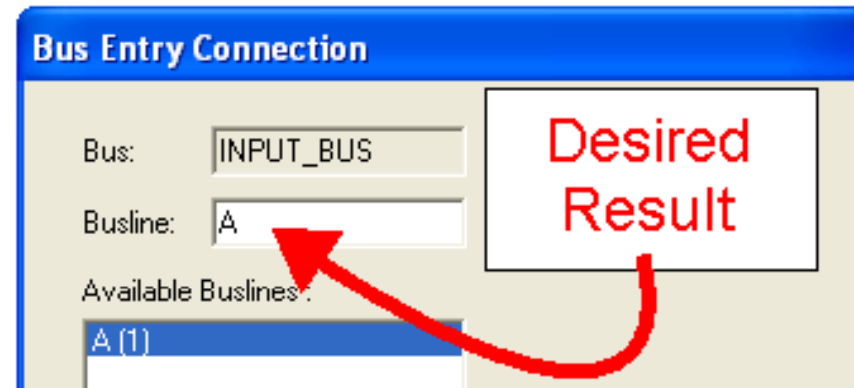
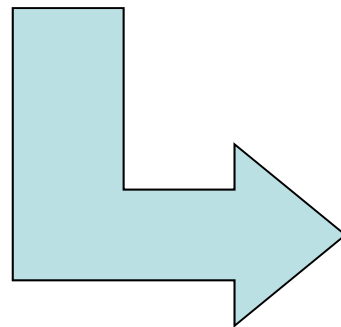
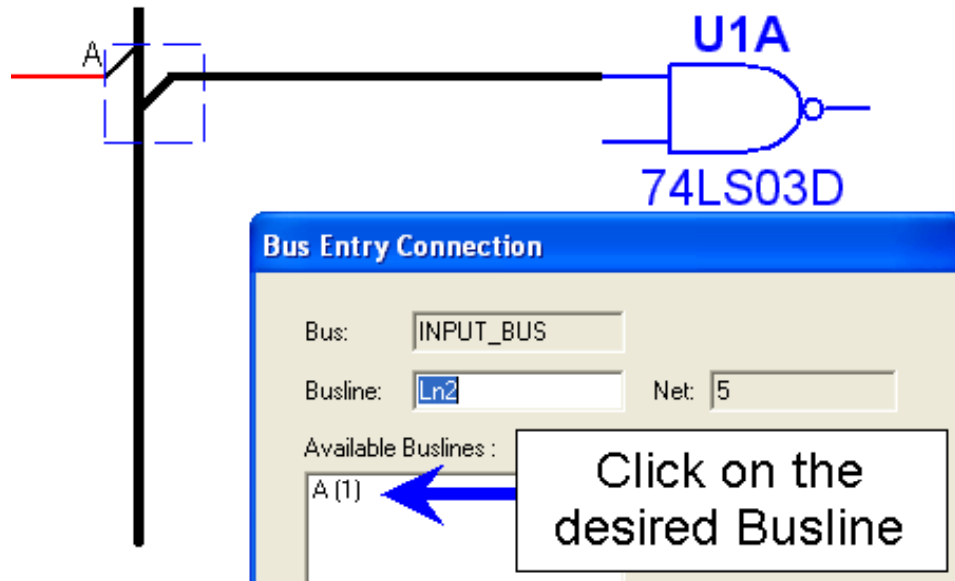
Wire from the component to the BUS (insert a Junction if required), then name the Busline as illustrated in the above example.

# Result...

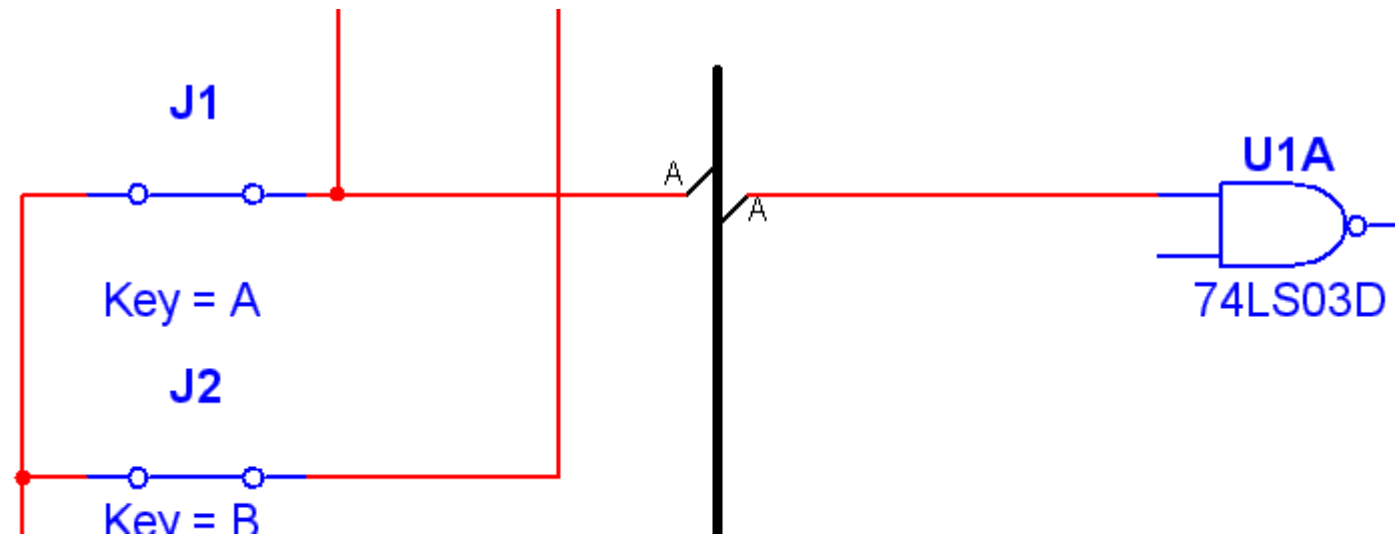


# Example of Wiring from a BUS

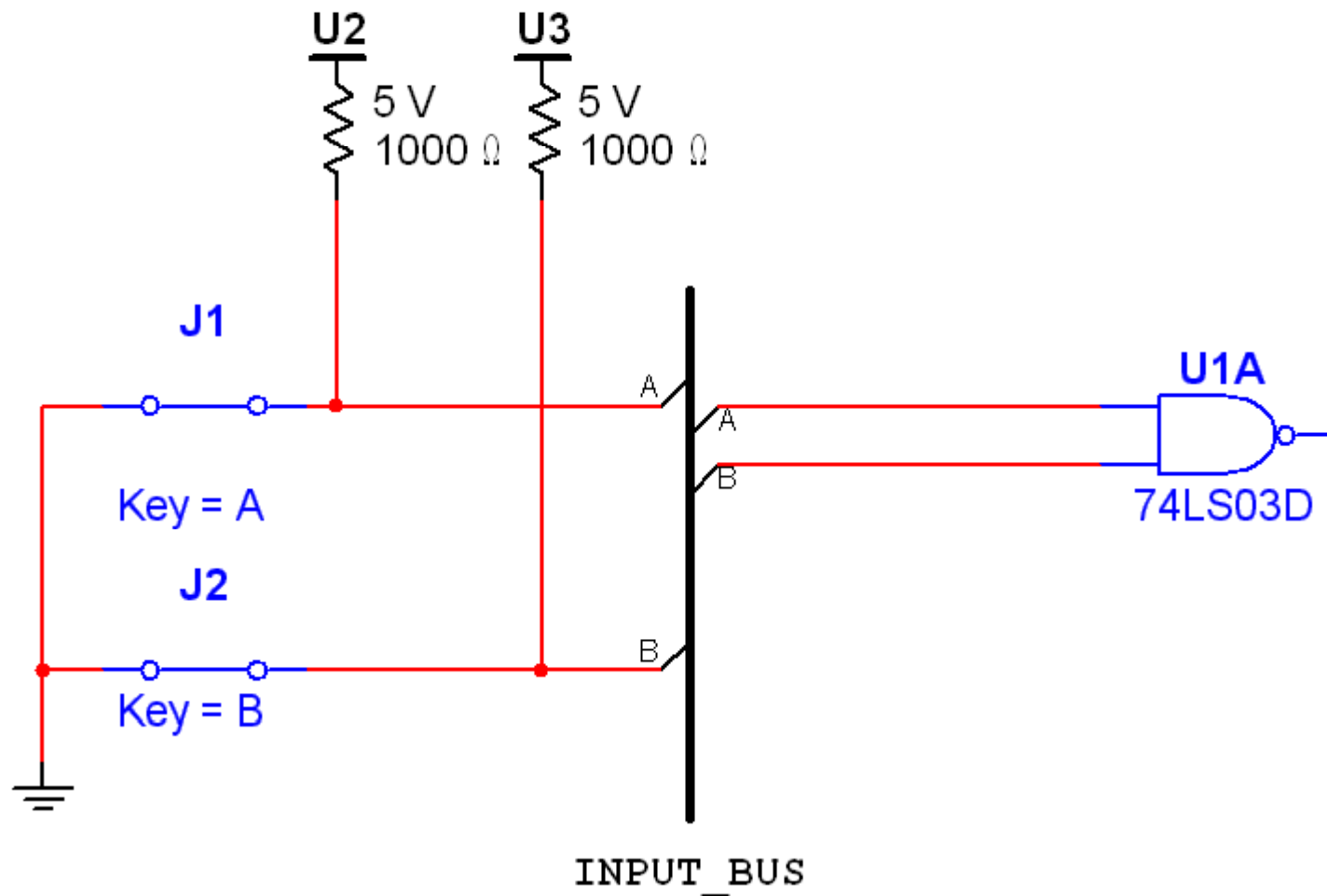
Wire from the component to the BUS



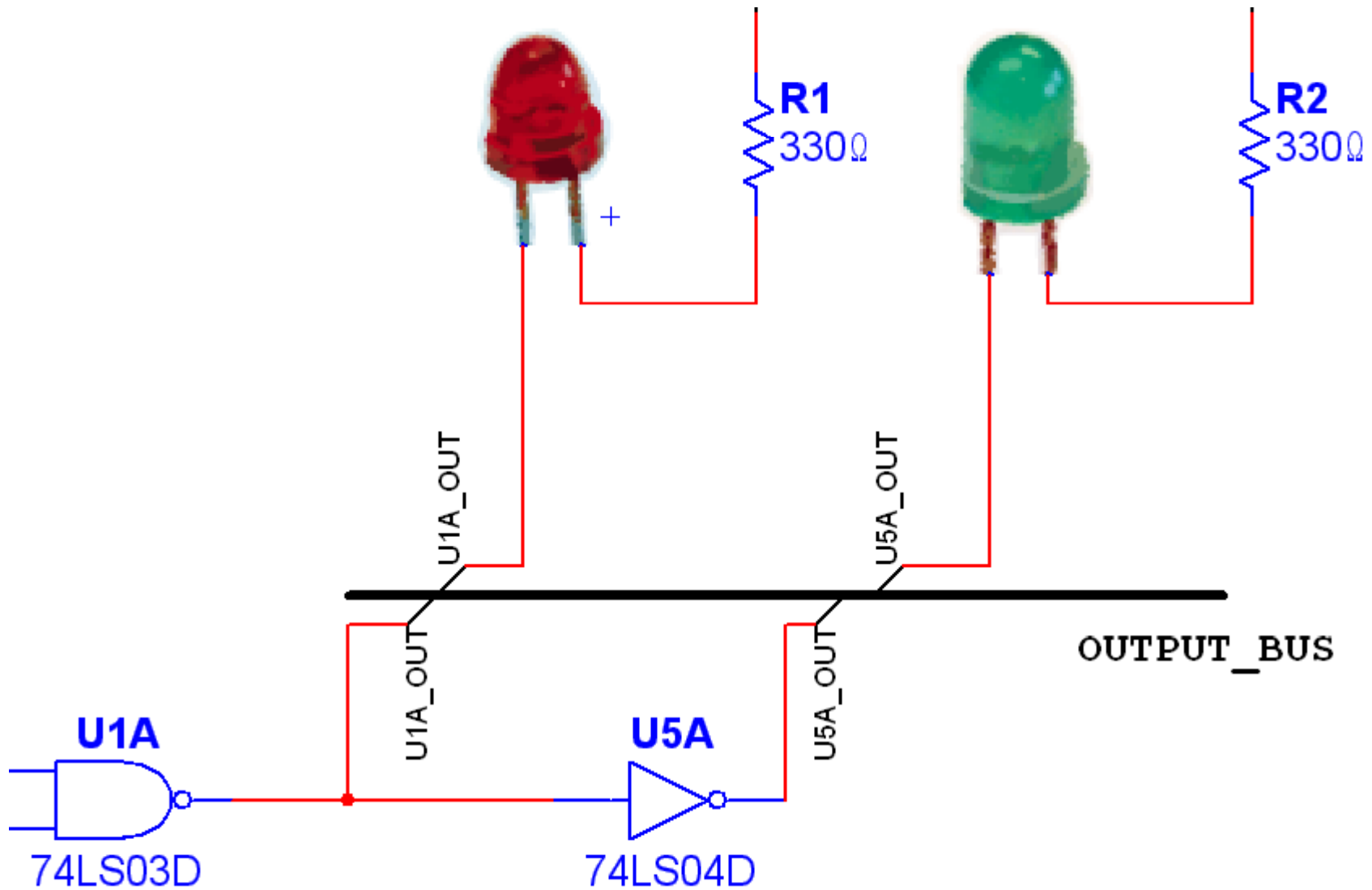
# Result



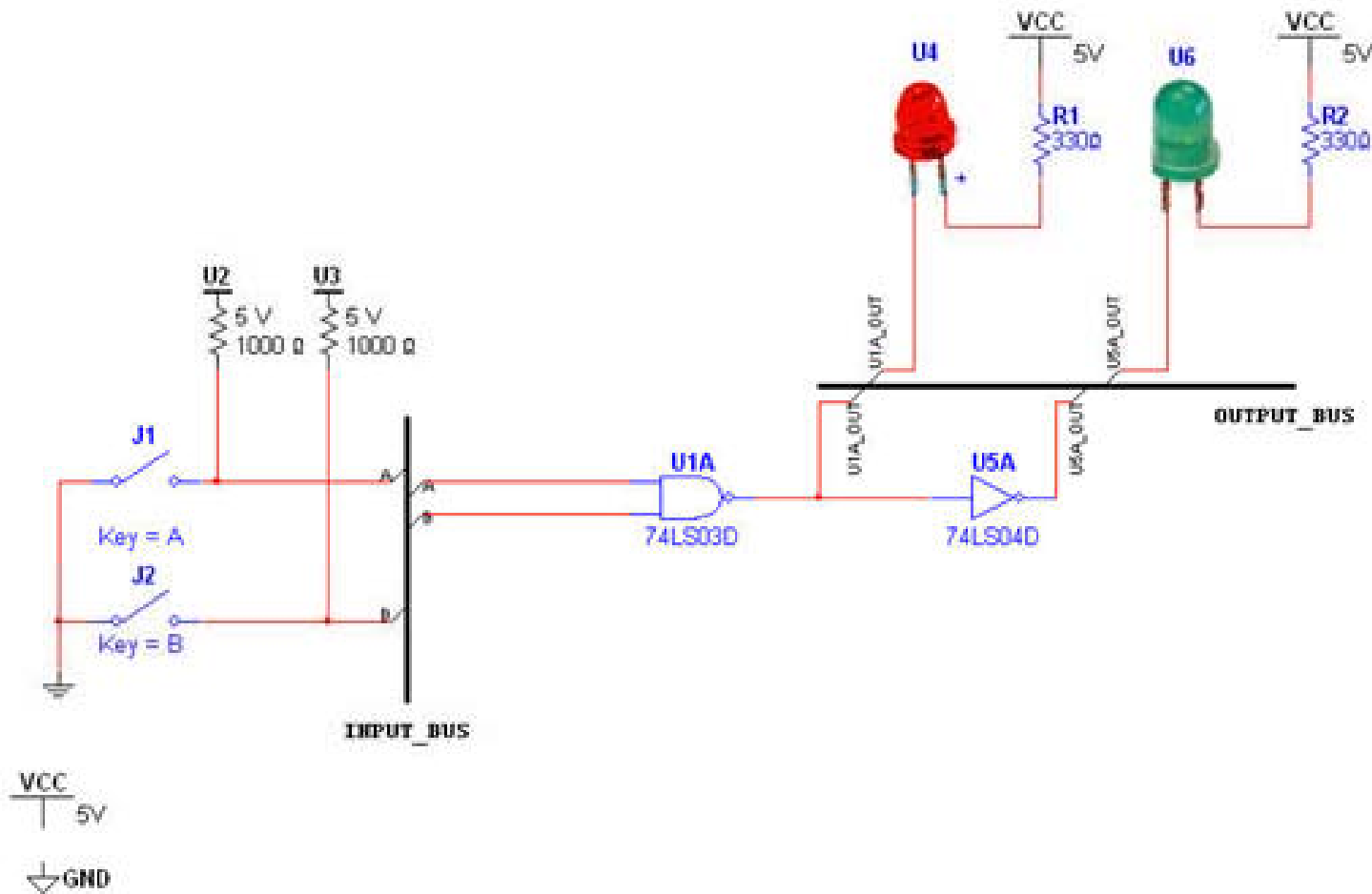
Complete the Input BUS wiring as indicated...



Complete the Output BUS wiring as indicated...



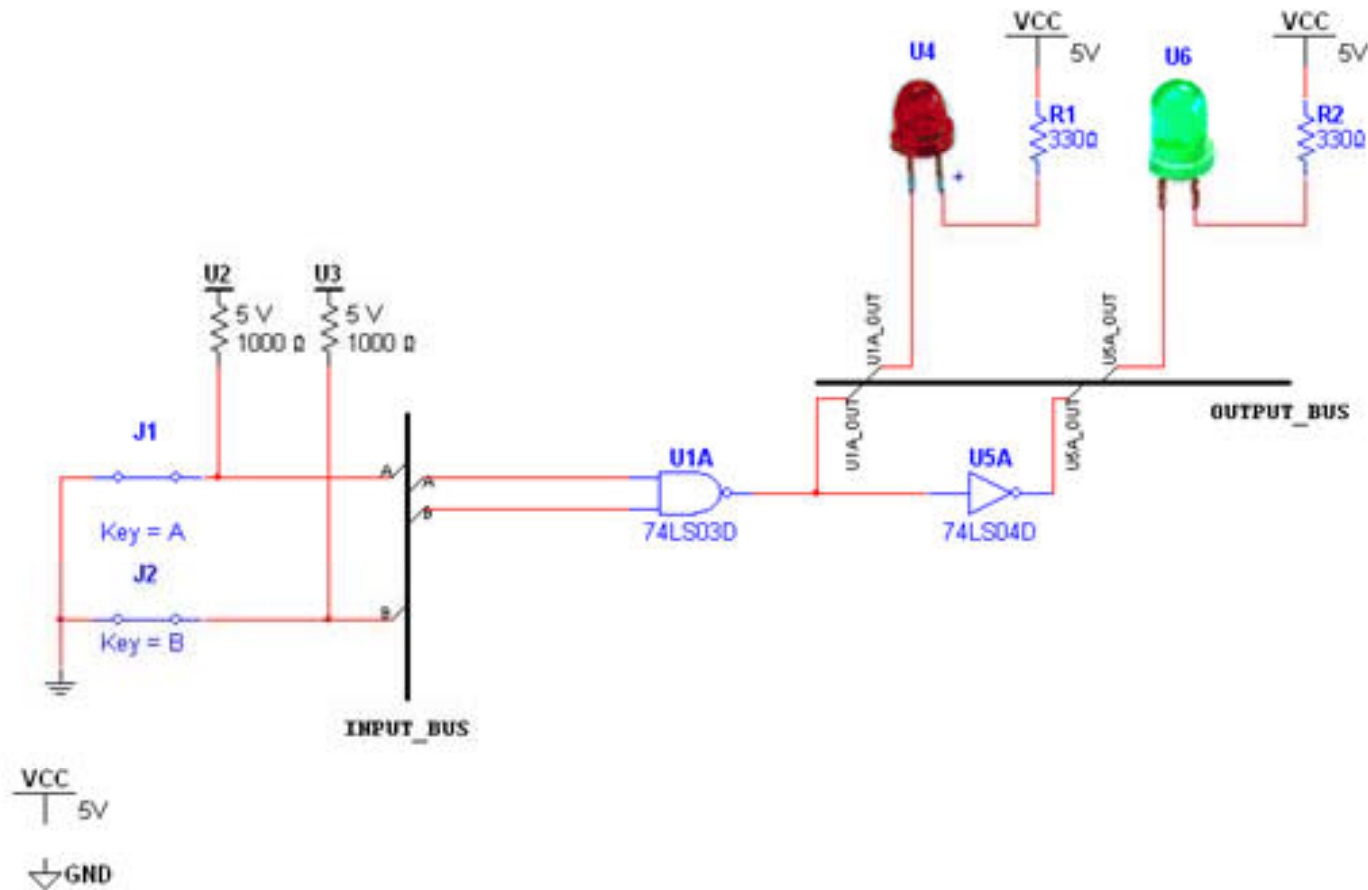
# Confirm your circuit correctly functions



If both inputs to the NAND gate are TRUE, then the RED LED turns on signifying an alarm condition.



# Confirm your circuit correctly functions



If either or both of the inputs to the NAND gate are FALSE, then the GREEN LED turns on signifying a safe condition.

# Need to know more?

