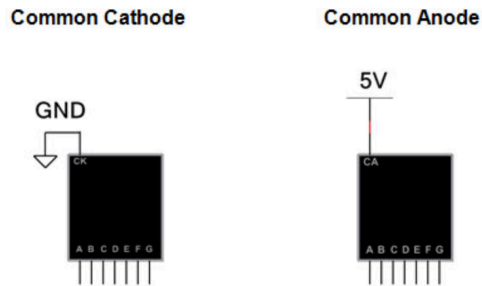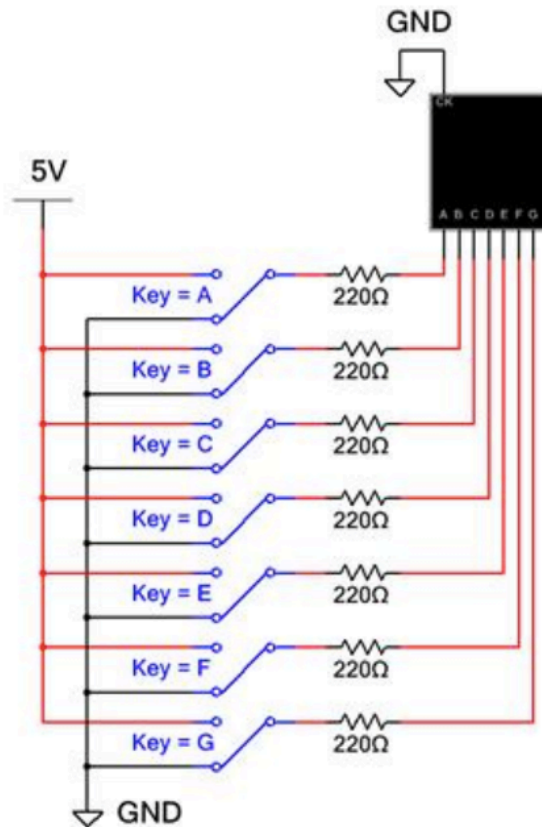# Seven Segment Displays

Introduction

What do alarm clocks, cable TV converter boxes, home answering machines, and inexpensive calculators all have in common? In addition to being built from electronics, many also include **seven-segment displays** as part of their design. There are two types of seven-segment displays: **common cathode** and **common anode**. Understanding how these displays work and the differences between them is fundamental to designing many different types of electronic devices. In this activity you will learn how to use seven-segment displays to display both alpha and numeric characters. You will also be introduced to the Seven-Segment Display Driver.

1. Let's investigate what alpha-numeric characters we can display on a seven-segment display.

2. Using the CDS, enter the common cathode seven-segment display test circuit shown below. Please note that the seven-segment display is a common cathode display.

3. For the seven switches (A through G), determine the settings required so that the seven-segment display will display 0–9. Use the results to complete the table below.

Number	A	B	C	D	E	F	G
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							

4. Using the seven SPDT switches (A through G), determine at least 10 alpha characters (letters) that you could display using the seven-segment display. Don't forget to include lowercase characters. Record your findings in the table below.

Display	A	B	C	D	E	F	G

5. Now, let's see how you can use a seven-segment display in a logic circuit.
   a. Analyze the seven-segment display circuit below and complete the display table. The display is a common cathode.

   b. What message do you predict will be displayed?
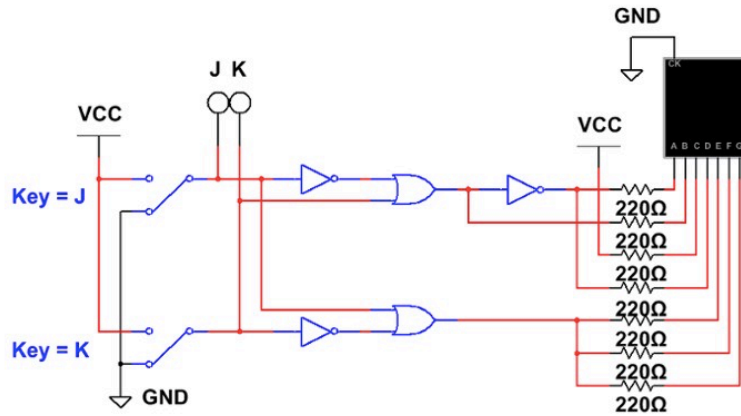
6. To display numbers on a seven-segment display, you need to use a specific driver that will translate four lines of binary into seven-segment numerical code.
   - The 74LS48 SSD Driver is designed for the Common Cathode SSD.
   - The 74LS47 SSD Driver is designed for the Common Anode SSD.

   Simulate the circuit shown below.
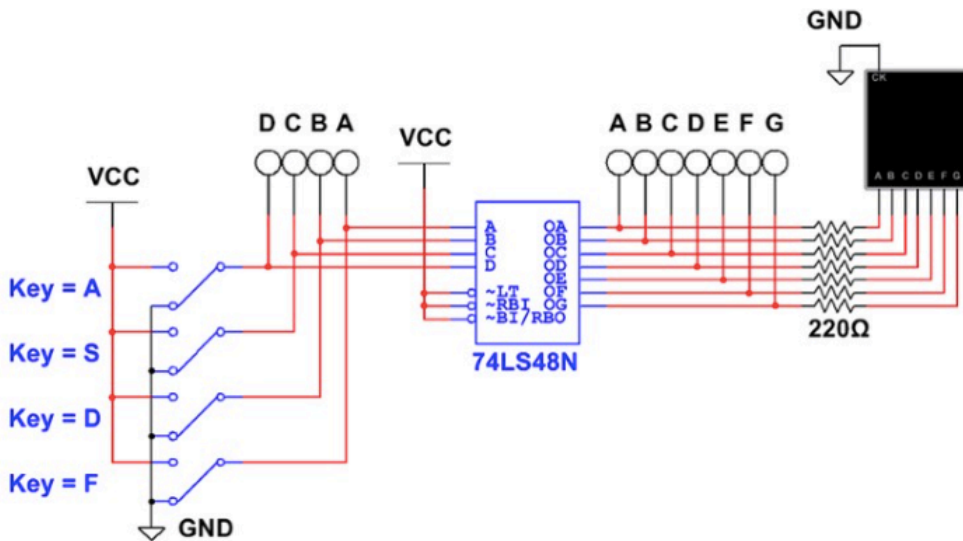
74LS48N Seven-Segment Display Driver with Common Cathode SSD

   a. If output QA is on "high", is segment A on or off?

Answer these last questions in your engineering notebook:

7. Complete the wiring of the seven-segment displays shown so that they will display your age. If you are 15, display a 1 on the common cathode display and a 5 on the common anode display.
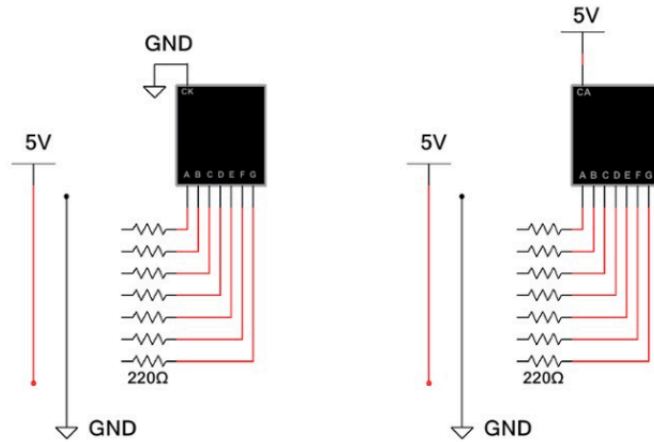
8. List five words of three characters or more that you could spell out using a seven-segment display. Don't forget about lowercase letters. Be creative. Be polite.

9. Describe what you should look for if you designed a circuit with an SSD that appears to work in simulation, but does not appear to be working when you create the circuit. (Hint: It may actually be working.)