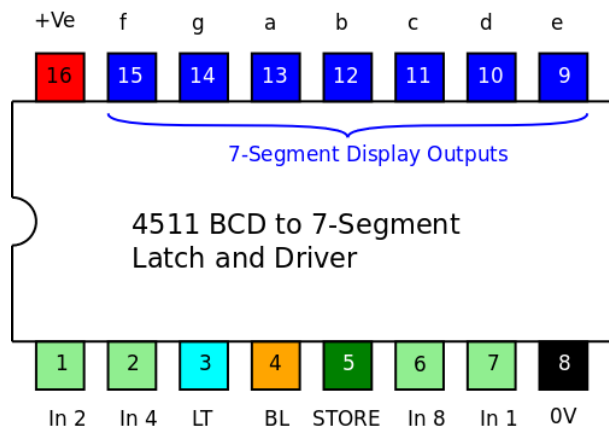# Display Decoder and Latch

Introduction

The 4511 accepts a 4 bit Binary input and converts this to the corresponding output to drive a 7 Segment Display.

The decoder only accepts Binary Coded Decimal i.e. the binary numbers 0 to 9, all other binary inputs are ignored.

The 4511 can also store the input.

The 4511 decoder is designed to work with the 4510 BCD Counter and will source enough current to drive a standard common cathode 7 Segment Display with appropriate current limiting resistors.

Basic Operation

When used in the most basic circuits, **LT** and **BL** are held HIGH and **STORE** is held LOW.

A binary input is applied to the four Input Pins (**In 1**, **In 2**, **In 4** and **In 8**) with **In 1** being the Least Significant Bit. The binary input is decoded and appears on the seven output pins that can source enough current to drive a standard 7 Segment Display.

The output is such that there are no tails on the 6 and 9 and the 1 is right justified.

The output pins can source up to 25 mA per segment but are not current limited. Short circuiting the outputs or connecting them directly to the 7 Segment Display will damage the 4511 Decoder IC. Current limiting resistors must always be used for each individual output.

If the **STORE** input is made HIGH the value of the input at the instant **STORE** changed from LOW to HIGH is stored on the output and further changes to the input are ignored.

Making the blanking input pin (**BL**) LOW means that all the outputs go LOW and the display is not illuminated. A suitable pulse width modulated signal applied to the **BL** pin can be used as a brightness control.

Making the Lamp Test (**LT**) input LOW makes all the output pins HIGH and all segments of the display will be illuminated.

Sample Circuit
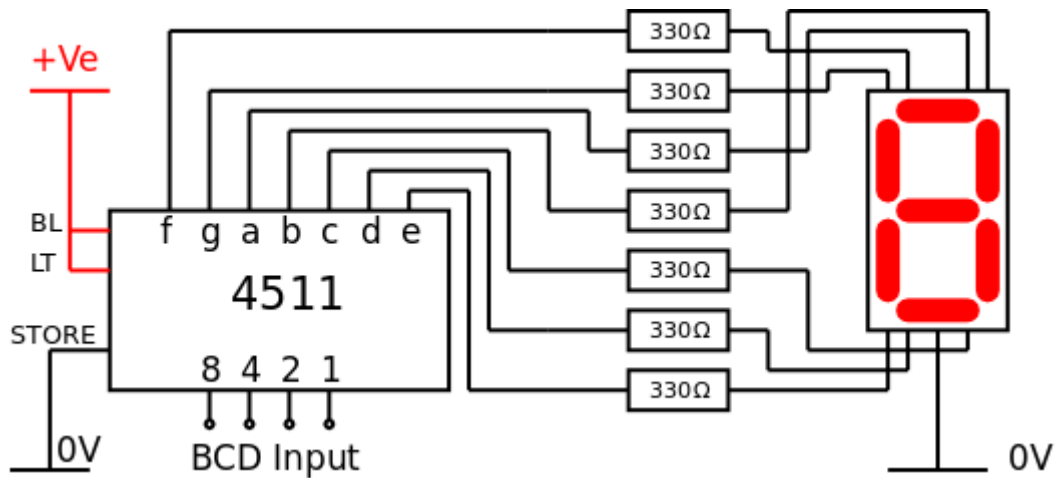
STORE is held LOW as it is connected to 0 V. **LT** and **BL** are held HIGH as they are connected directly to the positive supply rail.

As the 4 bit binary word changes on the inputs, the corresponding number is displayed on the 7 Segment Display. If the value of the binary word is in the range 10 to 15, the display is blank.

Low value resistors are used between the decoder and the 7 Segment Display to limit the current to less than 25 mA. The values shown on the diagram are typically used with small displays. The Common of the display is connected to 0 V.

Example Circuit
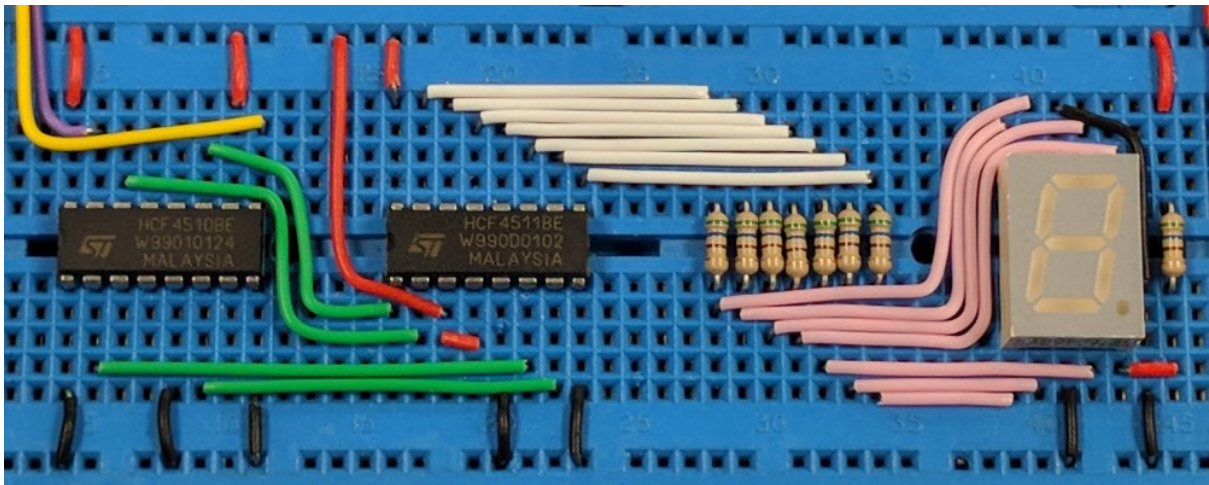
Wiring up the 4511 to a 7 Segment Display and (in this case) 4510 Counter can be challenging using a prototyping board. The photograph shows a good example of how this can be achieved neatly.

The 4510 Counter and 4511 Decoder are connected in their most basic standard configurations.

The Green wires are the 4 bit binary outputs from the BCD counter.

White wires connect the decoder to a bank of resistors

Pink wires connect the resistors to the 7 Segment Display.

On the counter, the purple wire is the clock signal and the yellow wire the reset.

Red and Black wires hold various pins HIGH and LOW respectively.

Website

https://www.electronicsteaching.com/Electronics_Resources/DocumentIndex.html

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