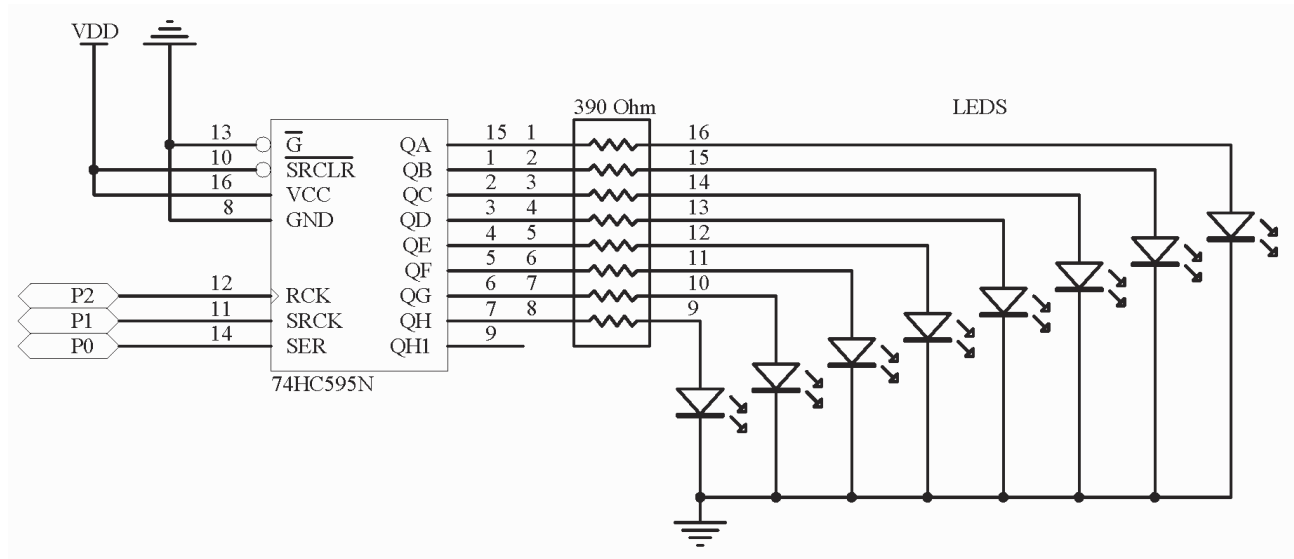


## Description

The 74hc595 is a Serial to Parallel shift register. This application note demonstrates how to interface to the 74hc595 using SHIFTOUT. The below schematic can be easily wired on a solderless prototyping board. In this application we use the 74hc595 to display a binary counter counting from 0 to 255. This application also demonstrates using the 74hc595 as an I/O extension. We are only using 3 I/O lines to drive 8 LEDs. The 74hc595 can easily be used to drive other devices. This method of I/O extension is relatively quick so it would work for most applications.

## Schematic



## Program Listing

The below program increments a variable named Counter. Each pass through the For..Next loop calls a routine named Out595. In this routine we use the SHIFTOUT command with MSBPRES to output the data to the 74HC595. Then we use a PULSOUT command to latch the internal register of the 74HC595 (refer to the 74HC595 data sheet).

```
SER          CON P0          ; serial output
SRCK         CON P1          ; shift clock
RCK          CON P2          ; output latch
Delay        CON 100
counter VAR Byte
'-----
main
  for counter=0 to 255
    gosub Out595
    pause 100                ;Change to in/decrease speed
  next
  goto main
'-----
Out595:
  Shiftout SER,SRCK,MSBPRES,[counter\8] ; send pattern to 74hc595
  Pulsout RCK,8               ; latch outputs(min 8us) can be as little as 4us
Return
```

## ShiftOut Explanation

You will notice we used MSBPRE for the ShiftOut mode setting in our program. The first part of the mode MSB is not always device specific and more user specific. You could send the data to the 74HC595 using LSB just as easily. MSB stands for Most Significant Bit and LSB stands for Least Significant Bit. This means a value of %11110000 using MSB would transmit the %1111 first and using LSB would transmit the %0000 of our byte value first.

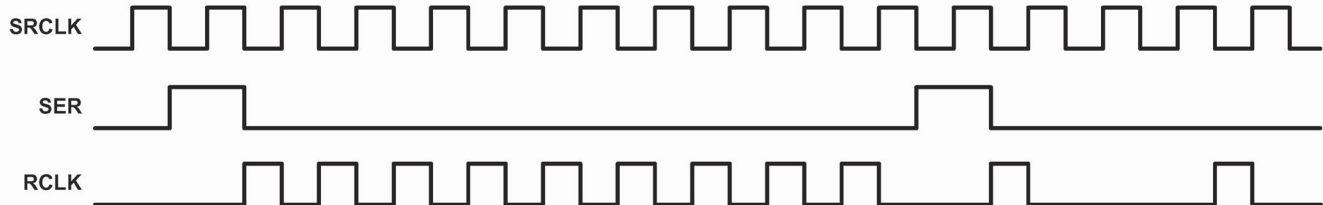
Deciding PRE or POST is a device specific matter. Below is the timing diagram for the 74HC595. The SRCLK is our clock pulse and SER is our data. If you look at the timings you will see that a clock pulse always comes before the data. Since this is the case we use PRE which means before. So the PRE indicates a clock pulse before the data and POST means data before the clock.

The last part of our timing diagram shows the timings for the RCLK. The RCLK controls the 74HC595 internal latch. We use the PULSOUT command to trigger the latch with a 8us pulse. A pulse as little as 4us would work also.

Sometimes data sheets are a little intimidating. In most cases when using the SHIFTIN / SHIFTOUT commands you will only need to glance at the timing diagrams to figure out which mode to use.

## Timing Diagram

### MSBPRE or LSBPRE



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