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480 x 320 Screen with 8 Button Controller (with logic)

Quick Start Guide

The purpose of this document is to allow you to adapt a Ben Eater style 6502 computer to work with a commonly available TFT screen and a 8 button controller using logic gates to reduce the number of inputs to the VIA and a shift register to increase the number of buttons.

Further documentation and example code is available on my GitHub here.

Requirements

The following materials are required:

Material	Available from
Dealikee 480 x 320 TFT screen	Amazon
Dupont cables	Amazon
4 Push button switches	Included in Ben Eater's kit
Connecting wire	Included in Ben Eater's kit
74HC32 Logic Gate	Amazon
74HC165 Shift Register	Amazon

Basic knowledge of reading schematics, a functioning Ben Eater 6502 computer and a method for programming EEPROMs to write code to test the build.

Test Code

This setup can be tested using the program BIOS V3 and Catch Clemo V5, available on GitHub here.

Screen Setup

Physical connection of the screen to the VIA is the same for both 320x280 and 480x320 screens. The following table outlines the connections necessary which are achieved in my build via the use of Dupont cables.

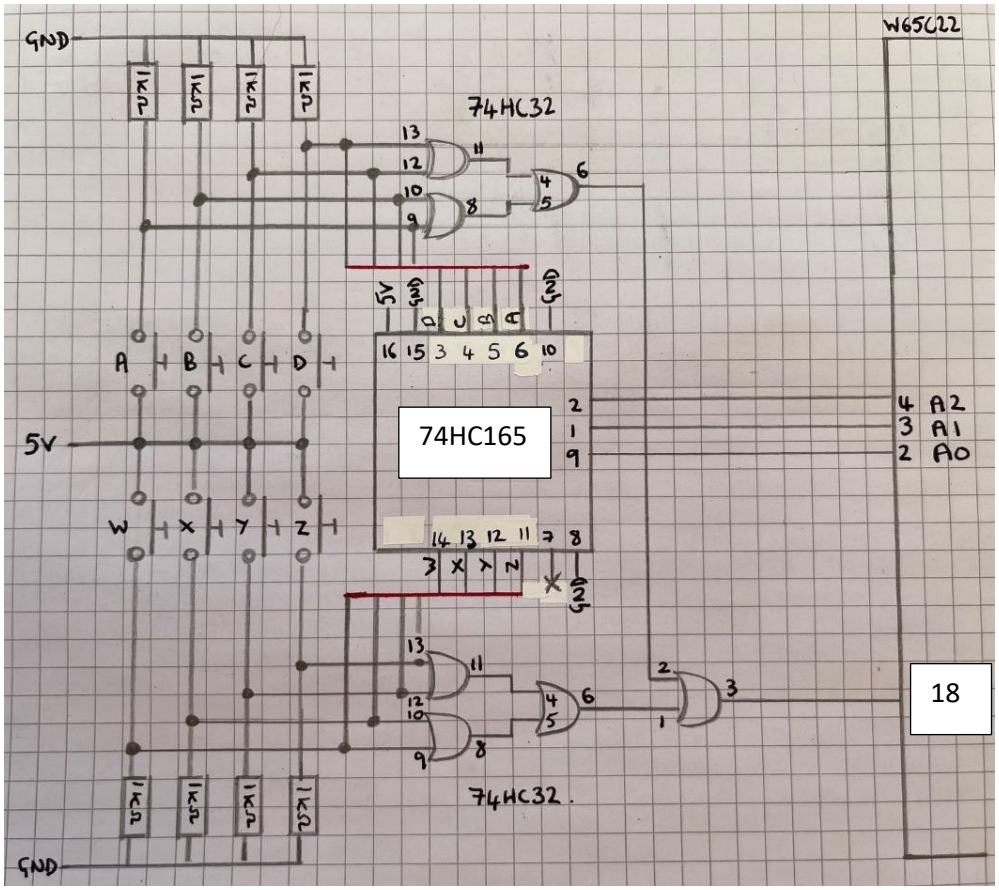
VIA Pin	Screen Pin	Purpose
6 A4	LCD_CS	LCD control pins
7 A5	LCD_RS	LCD control pins
8 A6	LCD_WR	LCD control pins
9 A7	LCD_RD	LCD control pins
10 B0	LCD_D0	LCD data pins
11 B1	LCD_D1	LCD data pins
12 B2	LCD_D2	LCD data pins
13 B3	LCD_D3	LCD data pins
14 B4	LCD_D4	LCD data pins
15 B5	LCD_D5	LCD data pins
16 B6	LCD_D6	LCD data pins
17 B7	LCD_D7	LCD data pins
(+5V)	LCD_RST	Used to reset screen
(+5V)	5V	Power for screen
(Ground)	Ground	Ground for screen

Controller Setup

8 Button (with logic and shift register)

This more complex setup reduces the number of connections to the VIA and increases the number of input buttons via the use of a shift register. This setup works with *BIOS V3,* and *Catch Clemo V5*.

Requires: 8 x push buttons, 8 x 1k resistors, 2 x 74HC32 OR gate, 1 x 74HC165 Shift register, connecting wires



1. Connect resistors to ground
2. Connect push button to resistor and +5V
3. Connect from each button to respective pin on 74HC165
4. Connect 74HC165 to the VIA
5. Connect from each button to respective pin on the 74HC32s
6. Connect the 74HC32s to the VIA

When a button is pressed it pulls the interrupt (through the OR gates) and the data pin of the VIA high triggering the interrupt. The interrupt routine then uses *Read_Controller* to read from the shift register, returning the button which was pressed into the variable *CONTROLLER_STATUS*.