

## V3.03 Matrix Controller assembly instructions

### 1. List of Parts:

- IC1 Atmega168-20AU, TQFP 32 7x7  
( Mouser: 556-ATMEGA168-20AU )
- IC2-5 74HC595, ST EZ80731, SO16
- C1-2 22pF, should match X1
- C3,C5 100nF  
( Mouser: 505-MKS02.1/63/10 )
- C4 47 $\mu$ F  
( Mouser: 75-515D474M050JA6AE3 )
- R25 10k
- R27 10k
- R26 1k
- D1 LED, 3mm
- RE reset enable, 2pin male header (cut to size) + low profile jumper
- R1-24 suitable resistors for RGB LEDs. 270 $\Omega$  may work for all
- MATRIX 4x 8pin female header
- PORTC/D 10pin female header
- ICSP 2x3pin male header
- SPI 2x3pin male header + 3 jumper
- SW,RST general purpose switch, Schurter 1301.9302  
( Farnell: 1217773 )
- FTDI 6pin male header
- X1 16MHz Quartz, HC49U-S package, low profile !  
( Mouser: 520-HCU1600-SX )
- spacer Quartz spacer, non conductive  
( or piece of plastic under the quartz, e.g. laser transparency )

When you buy the parts, make sure none of the components consume more than 7.5mm of height when assembled.

### 2. You will need:

- Soldering iron with a tip suitable for 0.5-0.8mm traces, not too small
- Solder with flux core, preferably "no clean", about 0.5-0.8mm diameter
- Additional "no clean" flux, in a syringe or dispenser pen
- wire cutter
- strong magnifier for solder joint inspection
- tweezers
- cotton wipes + isopropyl alcohol for removing residual flux
- Programmer to flash the bootloader. USBtinyISP works just fine

### **3. Tips:**

- Align the SMD parts as good as possible or you will have "lots of fun"
- Always use plenty of flux
- Always clean the tip
- Don't rush it

### **4. Suggested assembly steps:**

- Start with the first group of parts with numbers 1 – 6 to build a minimal working system
- Flash the bootloader
- Continue to attach the remaining 4 SMT chips in group 7
- Now just follow the numbers until done.

If you want to change the order of attaching parts I'd put on the SMT chips first. If you put them on after the headers and other through hole parts you'll have "a lot of fun" while avoiding to burn holes into various components.

### **5. Compatible RGB LED matrices:**

- <http://stores.ebay.com/LEDSEE-electronics>
- <http://www.seeedstudio.com/depot/60mm-square-88-led-matrix-super-bright-rgb-p-113.html>

## 6. Pin assignment:

"PORTC" :

PIN	NAME	FUNCTION	ARDUINO PIN	ARDUINO PIN
1	PC0	ADC0	analog IN 0	digital IN/OUT 14
2	PC1	ADC1	analog IN 1	digital IN/OUT 15
3	PC2	ADC2	analog IN 2	digital IN/OUT 16
4	PC3	ADC3	analog IN 3	digital IN/OUT 17
5	PC4	ADC4, <b>SDA</b>	analog IN 4	digital IN/OUT 18
6	PC5	ADC5, <b>SCL</b>	analog IN 5	digital IN/OUT 19
7	ADC6	ADC6	analog IN 6	(only on SMD boards)
8	ADC7	ADC6	analog IN 7	(only on SMD boards)
9	+	5V	-	-
10	-	GND	-	-

"PORTD" :

PIN	NAME	FUNCTION	ARDUINO PIN	ARDUINO PIN
1	PD0	RXD	RXD	digital IN/OUT 0
2	PD1	TXD	TXD	digital IN/OUT 1
3	PD2	INT0	-	digital IN/OUT 2
4	PD3	INT1, OC2B	PWM	digital IN/OUT 3
5	PD4	XCK, T0	-	digital IN/OUT 4
6	PD5	T1, OC0B	PWM	digital IN/OUT 5
7	PD6	AIN0, OC0A	PWM	digital IN/OUT 6
8	PD7	AIN1	-	digital IN/OUT 7
9	+	5V	-	-
10	-	GND	-	-

- The button "SW" is connected to PB0 / digital IN/OUT 8
- The LED is connected to PD4 / digital IN/OUT 4