ArcadeNano Colour Construction Kit

Contents:

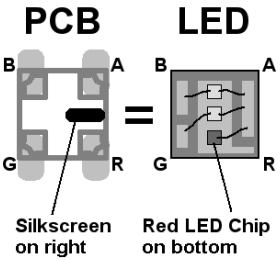
1	PCB (ArcadeNano Colour Rev. 1.0)
1	Microcontroller ATmega644A/P/PA (TQFP44)
1	USB/UART Converter CH340C (SO16)
4	LED Drivers SCT2024CSSG (SSOP24)
4	Shift Registers 74HC164PW (TSSOP14)
1	Voltage Reg. MCP170x-3302 (SOT23-3)
13	Dual p-Channel MOSFETs FDG6306P (SC70-6)
530	RGB LEDs, com. anode (size 0404, 10 spares)
7	Resistor Arrays 4x 220 Ω (1206)
1	Resistor Array 4x 1 kΩ (1206)
1	Resistor Array 4x 2.2 kΩ (1206)
5	Resistors 4.7 kΩ (0805)
2	Ceramic Capacitors 12 pF/15 pF (0805)
11	Ceramic Capacitors 100 nF (0805)
2	Tantalum Capacitors 1 µF (size A)
1	Tantalum Capacitor 100 µF (size C)
1	Crystal, 18.432 MHz (SMD, 5.0x3.2 mm)
1	Slide Switch ESP4020 (SMD, flat)
1	Micro-SD Card Slot (Molex 502774-0891)
1	Mini-USB-B Connector
1	USB Cable, A plug to Mini-B plug

SMD Soldering Advice

The components on the back can be soldered with a regular soldering iron, but **reflow soldering is required for the LEDs!** A set of solder paste stencils for both sides of the PCB is available at BlinkenArea. When using hand soldering or rework, use flux (e.g. Edsyn FL 22) to facilitate soldering the fine pitch components. Shorts under or between LEDs are easily removed by heating up the area with a hot air soldering iron and gently tapping the LEDs with tweezers. **I recommend soldering the components in the order listed below.**

Top Side

1. LEDs: LED orientation is given by white silkscreen line on PCB, see image to the right. All LEDs have the same orientation. The red LED chip can be identified by its red shimmer with good lighting from the correct angle. I highly recommend using a microscope to place the LEDs, or at least check their orientation before soldering.



2. Resistor Arrays (R6~R12): All of these are 220 Ω, marked "221". Orientation doesn't matter.

3. Switch (S1): If you'd like to use a stencil to apply solder paste to the back of the PCB, the switch should be left off and only be installed after soldering all other components, using a regular soldering iron.

Bottom Side

4. ICs (IC1~IC11, bottom):

IC	Type	Orientation
IC1	ATmega644A	Circle in one corner of IC must match circle in outline on PCB
IC2~5	SCT2024CSSG	Dent in one corner must face towards notch in outline on PCB
IC6~9	74HC164PW	Small printed dot in one corner must face towards notch in outline on PCB
IC10	CH340C	Circle in one corner must face towards notch in outline on PCB
IC11	MCP170x-3302	IConly fits in one orientation

5. Transistors (T1~T13): Orientation doesn't matter (really!).

6. Crystal (Q1): Orientation doesn't matter.

7. Resistor Arrays (R13, R14): Orientation doesn't matter.

Array	Value	Marking
R13	1 kΩ	102
R14	2.2 kΩ	222

8. Capacitors (C1~C16):
Orientation is only important for the tantalum capacitors: the printed bar on the capacitor must match the bar on the PCB.

Capacitor	Value	Type	Marking
C1~C11	100 nF	Ceramic	none
C12, C13	12 pF or 15 pF	Ceramic	none
C14	100 µF	Tantalum	107
C15, C16	1 µF	Tantalum	105

9. USB Connector (X1): Solder the four mechanical pins on the side of the connector first, then the pins on the back of connector. Use flux to solder the fine pitch pins (see soldering advice above), or if using solder paste, make sure the paste doesn't bridge between pads.

10. MicroSD Card Slot (X2): Solder mechanical pads in the corners first. Don't forget the two pads on the bottom edge of the slot (near R16 and R17).

Assembly and Operation

Cut a hole for the USB connector into the bottom of a TicTac box using a sharp, pointy knife. Remove all of the round indent on the bottom of the box. Also cut off the lid just below the ridge for "clicking" it into the box.

Power Supply
- USB power: move switch to the "USB" position to turn the ArcadeNano Colour on.
- Alternative power source: connect a 5 V power source to the two "EXT" pads next to the Micro-SD card slot. This power source will be used when the switch is in the "Ext" position. The voltage should be well regulated as the colour temperature of the LEDs will shift with supply voltage.

Using the ArcadeNano Colour
After turning it on, the ArcadeNano Colour should display the BlinkenPlus (B+) logo. You can now send an MCUF stream through the USB virtual serial port (115200 Baud) or insert a Micro-SD card. The MCUF format for streaming is described at
http://wiki.blinkenarea.org/index.php/MicroControllerUnitFrameEnglish
MMC, SD and SDHC cards are supported with a FAT16 or FAT32 filesystem. The first primary partition with a FAT16 or FAT32 partition ID (0x04, 0x06, 0x0B, 0x0C) will be used. Files on the SD card must be stored in a directory with the name `ARCADE.RGB` and will be played in the order listed in the FAT. If there is no `ARCADE.RGB` directory, an error message will scroll across the LEDs. All files must be 26x20 pixels, 3 channels (red, green, blue). The supported file formats are BIN, BLM, BML and BBM, described at http://wiki.blinkenarea.org/index.php/FileFormats

Programming the Controller: The controller is pre-programmed. To update, connect an AVR programmer to the solder pads on main PCB. Target voltage is 5 V.

Pad (PCB)	I	O	C	R	G	5
Programmer	MOSI	MISO	SCK	RESET	GND	V_{CC} (V_{Target})

Questions? Problems? Comments? Ideas? Please contact me:
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Hardware project page: http://wiki.blinkenarea.org/index.php/ArcadeNanoColourEnglish
Firmware project page: http://wiki.blinkenarea.org/index.php/BlinkenPlusEnglish