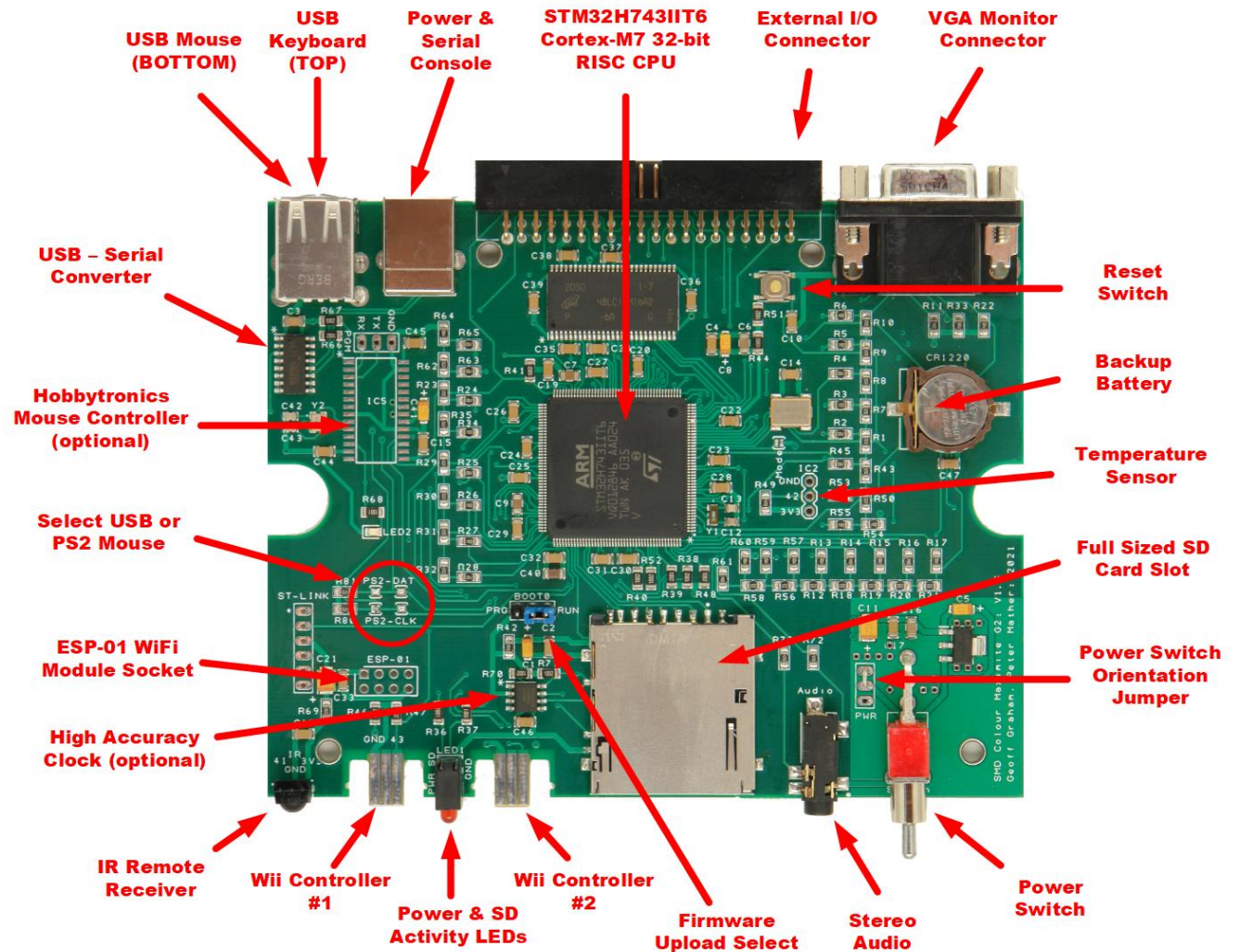# Generation 2 Colour Maximite 2 Construction Pack

The Colour Maximite 2 is a small self contained computer inspired by the home computers of the early 80's such as the Tandy TRS-80, Commodore 64 and Apple II. It includes its own BASIC interpreter and powers up in under a second into the BASIC interpreter (there is no operating system to boot). The emphasis is on ease of use and, as a result, a first time user could enter a small program and have it running within minutes.

This design is optimised for automated machine assembly and is suited to users who would like to purchase a partially or fully assembled Colour Maximite 2. All vendors will supply this version with the small on board components, including the microcontroller, already soldered. The extra components (connectors, battery holder, etc) listed as "thru hole parts" below may be supplied loose for you to solder yourself (easy) or the vendor might offer it fully assembled and tested (check their website).

This pack contains the design files, firmware and construction notes for building the Generation 2 Colour Maximite 2 by yourself. There are two ways that you can do this:

1. Solder the components, one by one, by yourself. To do this you need to be **very** good at SMD soldering so it is not recommended for the average home builder.

2. Get someone like JLCPCB (https://jlcpcb.com) to fabricate the boards, supply the components and solder them for you – see the next page for the details. Included in this pack are the pick-and-place files used by JLCPCB so, if you want to go this way, you can.

For an introduction to the Colour Maximite 2 go to: http://geoffg.net/maximite.html

JLCPCB Assembly

You can get JLCPCB (https://jlcpcb.com) to fabricate the boards, supply the small SMD components and solder them into position for you. Generally this is only economic if two or more assembled boards are required.

Other suppliers (mostly in China) will also do this but JLCPCB was used to assemble the prototype boards and the pick-and-place files supplied in the construction pack are formatted to suit their requirements.
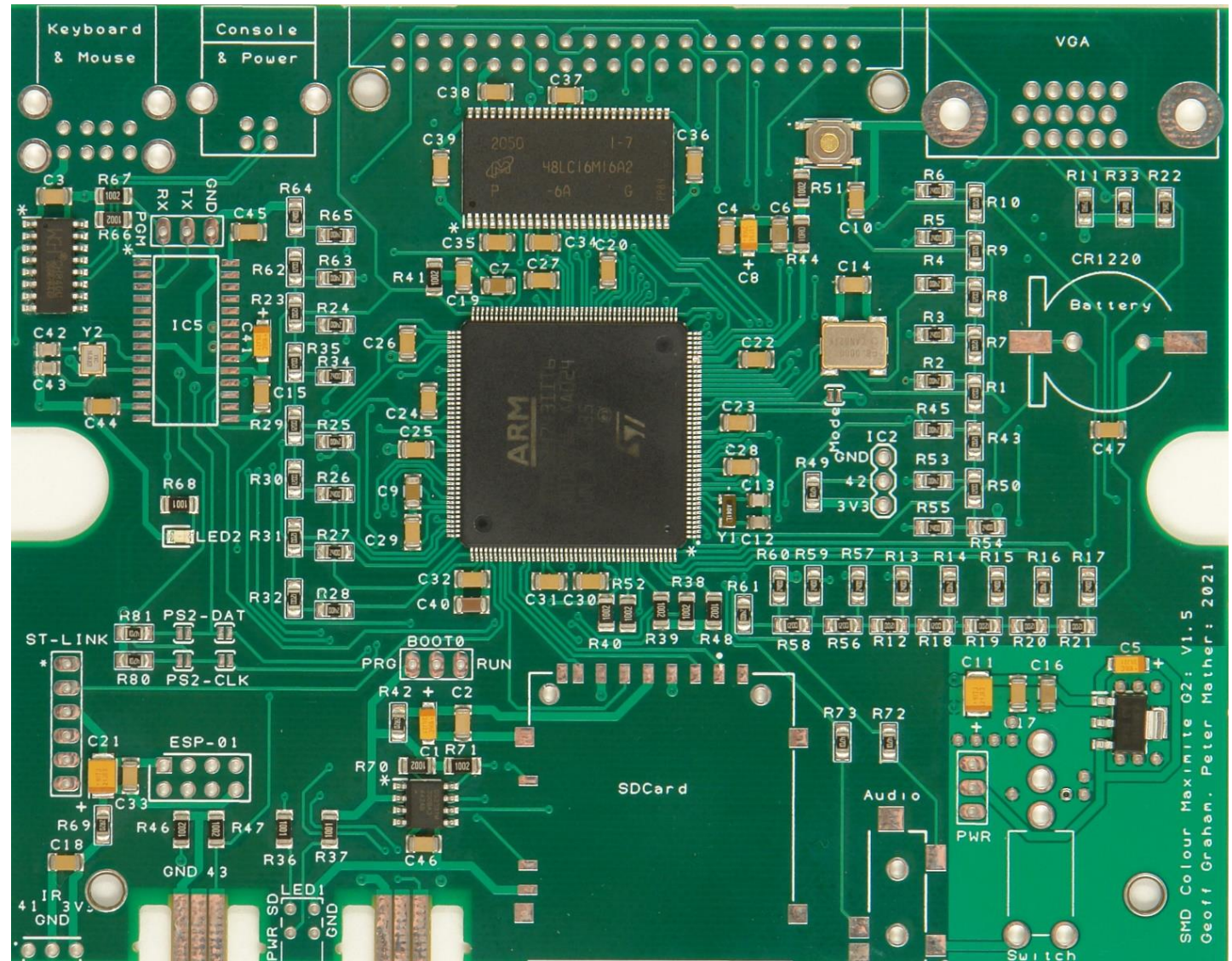
Go to their website and upload the Gerbers and set any options for the PCB if required (normally the defaults are fine). At the bottom of the page will be an option for SMT assembly. Select this and you can upload the Bill Of Materials (BOM) and a Component Placement List (CPL) files (in directory *JLCPCB Assembly Files*).

Note that the PCB layers are:

1. Top Copper
2. Layer 2 is GND
3. 3V3
4. Bottom Copper

Refer to the JLCPCB help files for selecting options and other details. JLCPCB will then price the boards for you including supply of the SMD components and soldering them into place.

Note that you might find that the ARM processor and/or the 32 megabit memory chips are out of stock. This will be due to the global shortage of semiconductors and, if it occurs, you will have to use another fabricator or wait until they come back into stock.

This is what the board should look like after JLCPCB has assembled it (this includes the optional high accuracy RTC and the passive components surrounding the optional IC5). Note that JLCPCB supply and solder only the small SMD components. Larger components like the connectors must be manually soldered later.

Parts List

Thru hole parts

These cannot be supplied/fitted by JLCPCB, they must be manually soldered.

1   15 Pin D-Sub Socket (RS 481-443, AMP 1-1734530-1, MULTICOMP SPC15430, Element14 1557991).
1   3.5mm Stereo Socket. Switchcraft 35RASMT4BHNTRX (RS 705-1490, Mouser 502-35RASMT4BHNTRX).
1   3mm Dual LED Assembly. Dialight 553-0112F (RS 546-0570, Mouser 645-553-0112F).
1   Dual USB Type-A PCB Socket. Amphenol ICC 72309-8034BLF (RS 771-0044).
1   USB V2.0 Type B Connector Amphenol FCI 61729-0010BLF (RS 771-0035).
1   Right-angle vertical PCB-mount SPDT toggle switch [Altronics S1320, RS 734-7107, element14 9473297, Digi-key EG2364-ND, Mouser 706-34ASP11B2M7QT.
1   SD Card Socket. Hirose DM1AA-SF-PEJ(21) (RS 502-5004, Mouser 798-DM1AA-SF-PEJ21).
1   40 Way, 2 Row, Right Angle PCB Header, 2.54mm Pitch. Hirose HIF3F-40PA-2.54DS(71) (RS 896-1067, Mouser 798-HIF3F40PA254DS71).
1   Header 3 pin 0.1" pitch (for jumper for RUN/PROG mode).
1   Jumper, slide on, 0.1" (for RUN/PROG mode).
1   Coin Cell Holder for CR1220 Battery. HARWIN S8411-45R (RS 161-3710, Mouser 855-S8411-45R).
1   CR1220 Battery
1   Multicomp Pro G738 or G748A Instrument Case 140x110x35 mm (Jaycar HB5970, Altronics H0472, Element14 1526699, Farnell 1526699)

Optional

1   Optional Dallas DS18B20+ temperature sensor. TO92 package. (RS 540-2805)
1   Optional Vishay TSOP4838 IR Remote Receiver 38KHz. (RS 708-5115)

SMD Devices

These can be fitted by JLCPCB (see the Bill Of Materials (BOM) file).

Comment	Designator	Footprint	LCSC Part #
100nF	C2,C3,C4, C10, C14, C15,C17,C18,C19,C20,C22,C23,C24,C25,C26,C27	1206	C24497
100nF	C28,C29,C30,C31,C32,C33,C34,C35,C36,C37,C38,C39,C44,C45,C46,C47	1206	C24497
10K	R38,R39,R40,R41, R46,R47,R48,R51, R52,R70,R71	1206	C17902
10R	R44	1206	C17903
10uF	C1, C5, C8	CASE-A_3216	C7171
120R	R1,R7,R8,R9,R10,R43,R50	805	C17437
120R	R12,R18,R19,R20,R21,R56,R58	805	C17437
120R	R23,R29,R30,R31,R32, R35,R62	805	C17437
6pF	C12, C13	805	C67560
1K	R36, R37	1206	C4410
1uF	C6, C16	1206	C1848
2.2R	R42,R69	805	C17521
2.2uF	C7, C9	1206	C50254
240R	R2,R3,R4,R5,R6,R45,R53,R54,R55	805	C17572
240R	R13,R14,R15,R16,R17,R57,R59,R60,R61	805	C17572
240R	R24,R25,R26,R27,R28, R34,R63,R64,R65	805	C17572
4.7uF	C40	1206	C29823
3.3v LDO	U1	SOT-223	C6186
32768Hz Crystal	Y1	SMD-3215_2P	C32346
100uF	C11,C21	CASE-D_7343	C16133
4.7K	R49, R72, R73,R80,R81	805	C17673
75R	R11, R22, R33	805	C20638
8MHz XO	Y3	SMD-7050	C70513
STM32H743IIT6	IC3	LQFP-176_24.0x24.0x0.5P	C89597
Switch	S2	SMD-SW-4_5.1x5.1x2.5	C318889
SDRAM	IC4	TSOP54	C26393
CH340C	IC8	SOIC-16	C84681

Optional High Accuracy Real Time Clock

DS3231MZ+TRL	IC7	SOIC-8_3.9x4.9x1.27P	C107410

Optional Hobbytronics USB Mouse Controller

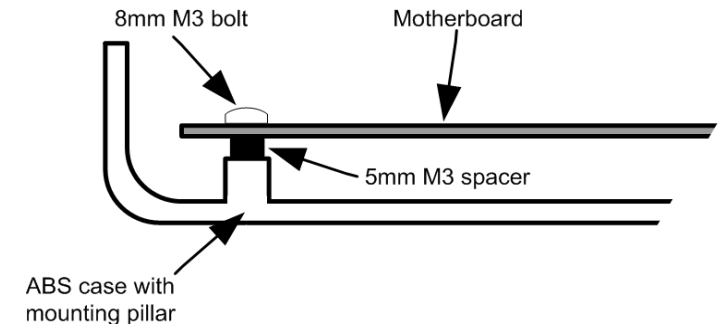|				
USBHOST-SOIC	IC5		SOIC-28	https://www.hobbytronics.co.uk/
16MHz Crystal	Y2		SMD-CRY-3225_4P	C13738
18pF	C42,C43		805	C1797
10K	R66, R67		1206	C17902
1K	R68		1206	C4410
LED	LED2		LED_0805	C2297
10uF	C41		CASE-A_3216	C7171

Printed Circuit Board

Send the Gerber files in this bundle to a PCB fabrication house to get the motherboard made. The fabrication house should be told that "drill output is 3,5 leading in inches".

The copper pour in the PCB is complex and can confuse some Gerber viewers. View the design using: https://www.pcbway.com/project/OnlineGerberViewer.html

Case

The case is a standard item from Jaycar (HB5970, Altronics (H0472) or Element14 (1526699).

When mounting the PCB in the case it needs 5mm spacers be placed between the PCB and the four mounting posts in the case. These raise the PCB and the connectors so that they will match the cut-outs in the front and rear panels.

CMM2 vendors sell pre cut and labelled front and rear panels to finish off the computer with a professional appearance. You can also make the required cut-outs in the blank panels supplied with the case.

Loading the Firmware

A copy of the firmware is included in this pack but it would be worth checking if a later version has been released. To load the firmware refer to Appendix G of the *Colour Maximite 2 User Manual* for the procedure. Both can be downloaded from http://geoffg.net/maximite.html.

Fault Finding

The current drawn by the motherboard and the STM32 processor is a good indication of the health of the CMM2.

- The assembled board with a blank microcontroller (ie, firmware not programmed) the current should be about 45mA.
- The assembled board with the correct firmware loaded the current with no keyboard, monitor or SD card connected should be about 180mA to 200mA.

Many USB chargers and other sources of USB 5V have noisy outputs so if your Colour Maximite 2 is suffering from intermittent issues such as reboots, errors reading the SD card, etc then you should try sources with better power (ie, a regulated supply, PC or a charger with a with a much higher capacity (eg, 2 amps or more). You should also check the USB Type-A to Type-B cable used for power as that has caused trouble for some people.

Keyboards

Keyboards with a built in mouse function (ie, track pad) will not work, the reason is that they have a built in USB hub and the CMM2 keyboard port does not support hubs. A typical keyboard that works well is the Logitech K270 which is wireless and low cost. It is possible that some normal keyboards will not work. The reason for this is not clear so it would be worth while trying a few different ones.

VGA Monitor

Use the monitor's auto sync feature if the image shows instability or part of the image is cut off.