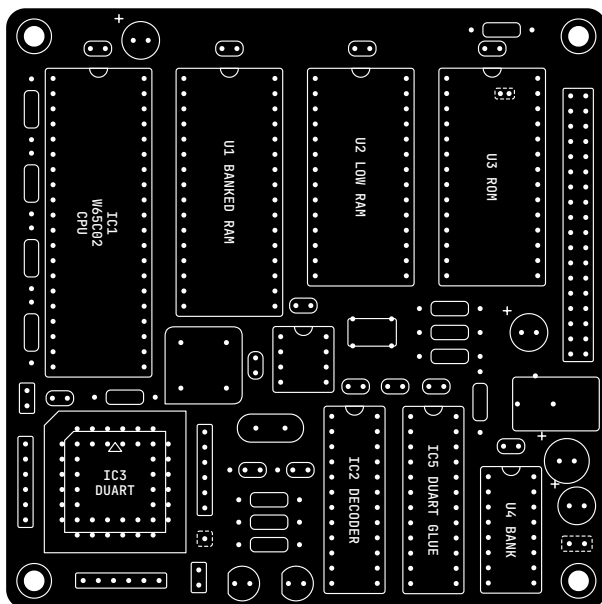


THROUGH-HOLE KIT • BUILD GUIDE

rosc0_6502

Revision 4

A 65C02 computer on a single board, built by you from a bare PCB to a monitor prompt. Five soldering stages, lowest parts first, then power-up.

**W65C02**

CPU AT 10 MHZ

544 KB + 32 KB

RAM + EEPROM

2 × UART

PLUS SPI / SD

100 × 100 mm

379 SOLDER JOINTS

Before you solder		2	4	LEDs, headers, power	6
1	Resistors	3	5	Chips and jumpers	7
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rosc0_6502 is open-source hardware by Ross Bamford and contributors (The Really Old-School Company), released under the CERN Open Hardware Licence. Kit and guide by SolderDemon.

READ FIRST

Before you solder

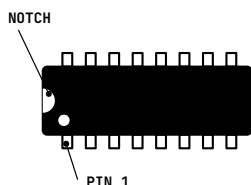
Tick the kit off against the packing list, then build in the order of this guide. Low parts go first, so the board always lies flat while you solder.

WHICH WAY ROUND

Every map shows the component side with the 2×18 expansion header **J5 on the right**. Keep your board that way and “left”, “right” and “up” in this guide always match what you see.

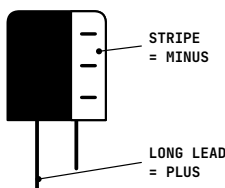
YOU NEED

Temperature-controlled iron with a fine tip, solder 0.6–1 mm, flush cutters, small pliers, multimeter, masking tape. For repairs: flux and solder wick.

THREE PARTS THAT CAN GO IN BACKWARDS

Chips and sockets

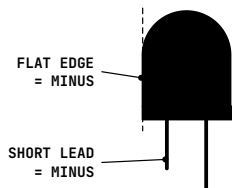
The notch marks the pin 1 end. Match it to the notch printed on the board.

Here: every notch points up.


Electrolytic caps

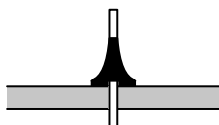
The long lead goes in the hole marked +. The stripe faces away from it.

Here: every stripe faces right.

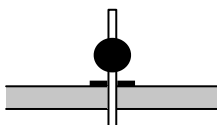

LEDs

The flat edge of the body sits on the flat of the printed outline.

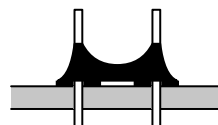
Here: both flat edges face left.

EVERY JOINT

Good

A small cone that wets both the pad and the lead.


Bead on the lead

Solder never reached the pad. Add flux, reheat pad and lead together.


Bridge

Two pads joined. Draw the excess off with wick, then check the gap.

THE ROUTINE

- 1** Heat the pad and the lead together.
- 2** Feed solder into the joint, not onto the tip.
- 3** Take the solder away, then the iron. Hold still until it sets.
- 4** Trim the lead just above the cone.

STATIC

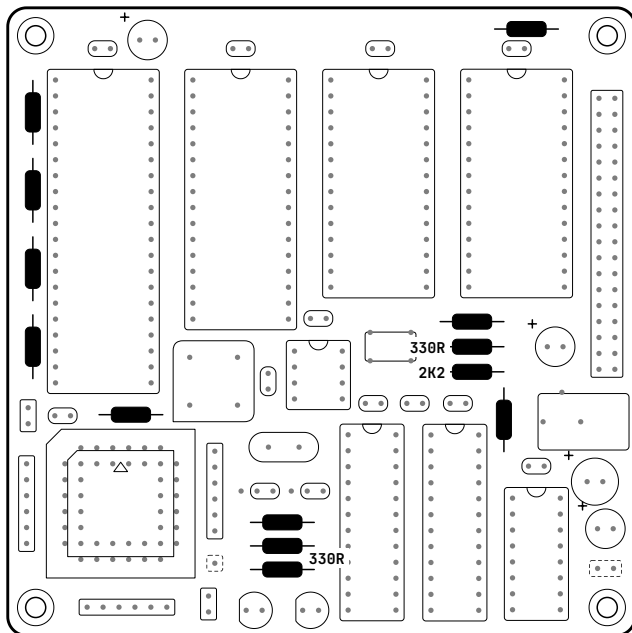
The chips are static-sensitive. Leave them in their packing until stage 5 and touch something grounded before you handle them.

1

STAGE 1

Resistors

13 PARTS

26 JOINTS

☒ FIT NOW ☒ ALREADY FITTED ☐ LATER

NO LABEL ON THE MAP = 3K3

VALUE	QTY	4 BANDS	5 BANDS	POSITIONS
☐ 3K3	9	orange orange red	orange orange black brown	R1-R4 R7 R10-R13
☐ 2K2	1	red red red	red red black brown	R8
☐ 330R	3	orange orange brown	orange orange black black	R5 R6 R9

HOW

- 1** Resistors have no polarity. Bend both leads at the body, press the part flat on the board, solder, trim.
- 2** Finish one value before you open the next bag.

Read the bands from the end where they are grouped. The last band, set apart, is the tolerance.

LOOK-ALIKES

3K3 and 330R differ only in the third band: red for 3K3, brown for 330R. Measure one of each before you start.

BEFORE STAGE 2 ☐ 13 resistors fitted, none left over ☐ Every lead trimmed

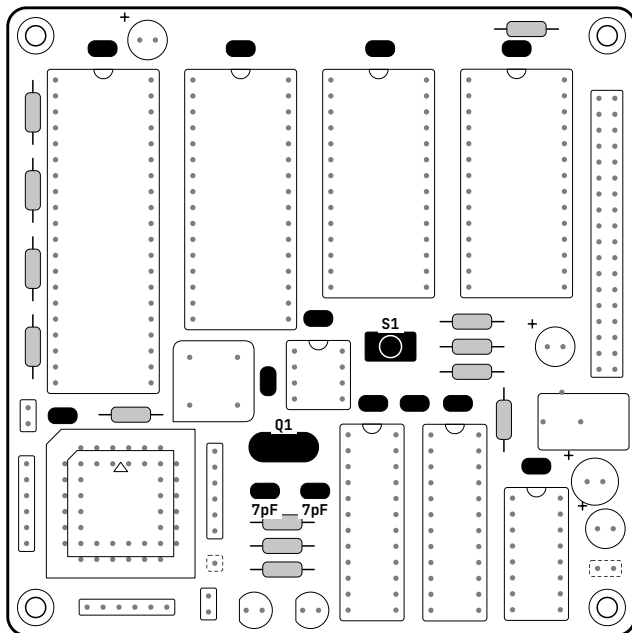
2

STAGE 2

Small capacitors, crystal

15 PARTS

32 JOINTS



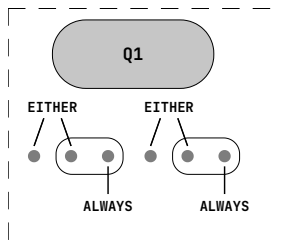
FIT NOW
 ALREADY FITTED
 LATER
 NO LABEL ON THE MAP = 100nF

HOW

- 1** Nothing in this stage has polarity. Either way round is correct.
- 2** Seat each capacitor low on the board. Straighten leads that are wider than the holes with pliers first.
- 3** Tape the crystal down and solder it quickly. If a joint will not take, let it cool and try again.
- 4** The button only fits one way. Solder all four legs.

THREE HOLES

C13 C14 have three holes for two leads. One lead always goes in the hole marked **ALWAYS** below, the other in whichever remaining hole fits the lead spacing.



PART	QTY	MARKED	POSITIONS
☐ 100nF ceramic	11	104	C1-C4 C8-C12 C15 C19
☐ 7pF ceramic	2	7	C13 C14, below the crystal
☐ 3.6864 MHz crystal	1	3.6864	Q1
☐ Button	1		S1, centre right

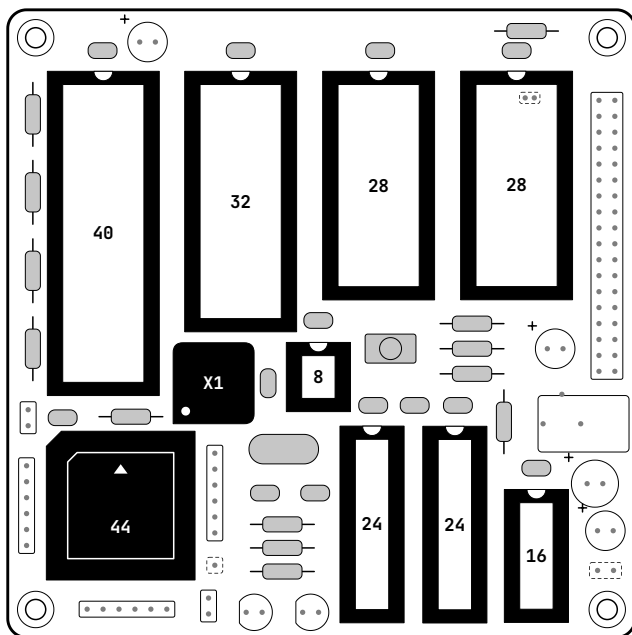
BEFORE STAGE 3
 ☐ 13 capacitors fitted
 ☐ Crystal flat on the board
 ☐ Button seated

3

STAGE 3

Sockets and oscillator

10 PARTS

248 JOINTS


 FIT NOW  ALREADY FITTED  LATER

NUMBER = PIN COUNT

PART	QTY	POSITIONS	WHICH WAY
☐ 40-pin socket	1	IC1	notch up
☐ 32-pin socket	1	U1	notch up
☐ 28-pin socket	2	U2 U3	notch up
☐ 24-pin socket	2	IC2 IC5	notch up
☐ 16-pin socket	1	U4	notch up
☐ 8-pin socket	1	IC4	notch up
☐ 44-pin PLCC socket	1	IC3	cut corner top left
☐ 10 MHz oscillator	1	X1	sharp corner bottom left; soldered, no socket

HOW

- Drop the socket in, notch over the printed notch. Solder two opposite corner pins.
- Look from the side. Not flat, or notch wrong? Reheat a corner and fix it now.
- Solder the remaining pins. It is easy to skip one in a long row.

NO CHIPS YET

The sockets stay empty until stage 5.

The oscillator is a metal can with one sharp corner: that is pin 1, usually marked with a dot. It has four legs in an 8-pin outline.

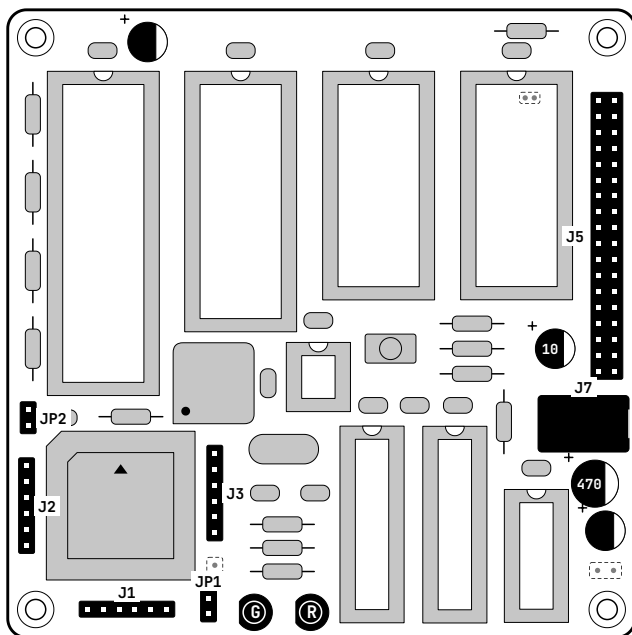
BEFORE STAGE 4 ☐ 9 sockets flat, notches match the map ☐ No pin skipped

4

STAGE 4

LEDs, headers, power

13 PARTS

73 JOINTS


HOW

- 1** LEDs first. Solder one lead, check the LED stands straight, then the other.
- 2** Headers next. Tack one pin, check the header is upright, then the rest.
- 3** Electrolytics, the 470µF last. Push each one flat first.
- 4** The DC jack has thick tabs: give each one a few seconds of heat and enough solder to fill the slot.

POLARITY

A reversed electrolytic can burst. A reversed LED stays dark. Check each stripe and flat edge against the map before soldering.

J4 J6 stay empty: no parts are supplied for them.

■ FIT NOW ■ ALREADY FITTED □ LATER

G = GREEN, R = RED · 470 = 470µF, 10 = 10µF, NO LABEL = 100µF

PART	QTY	POSITIONS	WHICH WAY
☐ LED green	1	LED1	flat edge and short lead left
☐ LED red	1	LED2	flat edge and short lead left
☐ Header 2×18	1	J5	short pins into the board
☐ Header 1×6	3	J1-J3	short pins into the board
☐ Header 1×2	2	JP1 JP2	short pins into the board
☐ 100µF electrolytic	2	C16 C18	long lead in + hole (left), stripe right
☐ 10µF electrolytic	1	C20	long lead in + hole (left), stripe right
☐ 470µF electrolytic	1	C17	long lead in + hole (left), stripe right
☐ DC jack	1	J7	opening to the board edge

BEFORE STAGE 5 ☐ 2 LEDs: flat edges left ☐ 4 electrolytics: stripes right ☐ Headers upright

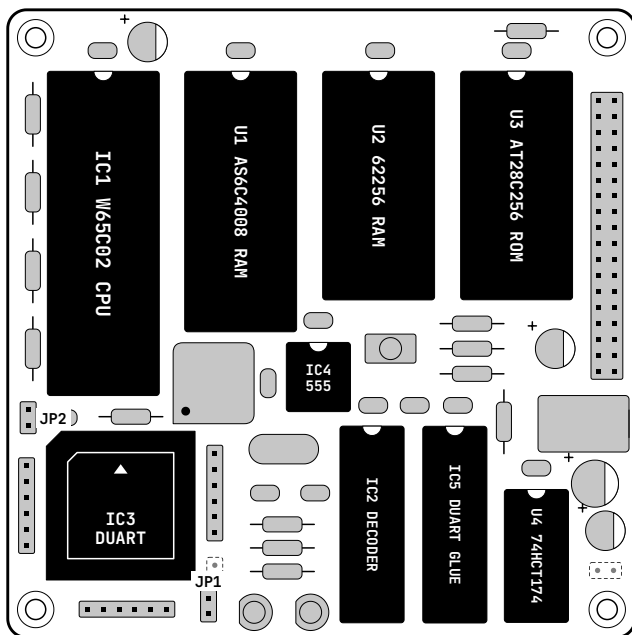
5

STAGE 5

Chips and jumpers

9 CHIPS

NO SOLDERING



 FIT NOW
  ALREADY FITTED
  LATER
 POSITION AND CHIP

LOOK-ALIKES

IC2 and IC5 are both ATF22V10C, but each is programmed for its socket: go by the label. U2 and U3 are both 28-pin: U2 is the RAM, U3 the ROM with the firmware label.

JUMPERS

Leave JP1 and JP2 open for the first power-up. Park each cap on one pin.

- **JP1** JP2 power the board from a serial adapter on J1 or J2. Never both, never with a supply on J7.
- **JP3** is a pair of solder pads next to U3. Leave them unbridged.

FIRST, WITH THE SOCKETS STILL EMPTY

- 1** Check every joint with a magnifier: beads, bridges, skipped pins.
- 2** Multimeter on continuity across the two empty holes of J6, bottom right. A brief chirp is the capacitors charging. A steady tone is a short: find it first.

THEN THE CHIPS

- 1** Press each row of legs gently against the bench until both rows are parallel.
- 2** Notch to notch, every leg in its hole, then press down evenly.
- 3** IC3: cut corner to cut corner (top left), then straight down until it sits level.

BEFORE POWER

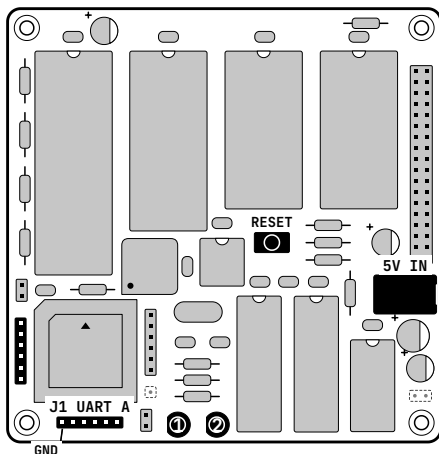
☐ Notches match the map

☐ No leg folded under

☐ JP1 JP2 open

LAST STEP

Power-up


J1 PINS, LEFT TO RIGHT

1	2	3	4	5	6
GND	RTS	VCC	RXD	TXD	CTS

- 1 Power.** 5 V DC, regulated, at least 400 mA, centre positive, into J7. Measure the supply before you connect it.
- 2 Serial.** A USB serial adapter set to 5 V on J1 (UART A). With loose wires: board TXD to adapter RXD, RXD to TXD, GND to GND.
- 3 Terminal.** 115200 baud, 8 data bits, no parity, 1 stop bit.
- 4 Switch on** and watch the LEDs.

NO PROTECTION

Reversed polarity or more than 5 V will destroy chips. There is no fuse and no regulator on the board.

A HEALTHY BOARD

LED1 green blinks about once a second

LED2 red stays off

ON THE TERMINAL


The backslash is the WozMon prompt: the board is ready.

SOMETHING ELSE HAPPENS? UNPLUG FIRST.

- Green LED never blinks:** measure 5 V across the J6 holes, check the oscillator corner and every notch.
- A chip gets hot:** it is in backwards or in the wrong socket.
- LED blinks, no text:** swap TXD and RXD, check the baud rate, check you are on J1 and not J2.
- Bankcheck failed:** reseal U1 and U4, look for a leg folded under.
- Garbage on screen:** wrong baud rate, or IC2 and IC5 swapped.


STILL STUCK? WE WILL HELP.

Send clear photos of both sides of the board and tell us what the two LEDs do.

solderdemon.com/docs

t.me/solderdemon_official

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