RC2014 Mini

Assembly Guide

Building and using an RC2014 Mini is quite straightforward. Whilst a knowledge of electronics, computer architecture, assembly language and BASIC programming is helpful, it is not a requirement.

A bit of soldering experience is assumed though, and kind of essential for building a RC2014. None of it is difficult, there are no surface mount components or anything on a very fine pitch, but there are a lot of joints. If you haven't soldered before, or it's been a while since you picked up a soldering iron, there are a lot of good tutorials on YouTube, or check out the Soldering Is Easy guide by Mighty Ohm.

The best advice I can give is to take your time and enjoy the experience. Although it is possible to plow through and finish it in an hour or so, it's also possible to make mistakes that way too. [Although don't underestimate troubleshooting as a great way to really get to know your RC2014!]

Start by laying out out the components and familiarise yourself with them. Matching them up on the schematic can help your understanding of how the RC2014 works, but is not essential. Read through this guide at least once before you start, and refer to the photos online to identify any items that are unclear. There are a few decisions to make too, so knowing what you plan to do beforehand will help. Before you start, pay particular attention to the PCB tracks that run from the CPU to the RAM – for the simple reason that the layout here took me ages, but it looks beautiful, and will be hidden once the build is complete!

Up to date information and full size schematics can be found at
www.rc2014.co.uk

RC2014 Mini

Overview

- Start by fitting the IC sockets. There is a notch at the one end to identify which way around the IC goes
- Fit the crystal slightly above the PCB so nothing shorts out
- 6 100nf capacitors go where indicated
- 2 22pf capacitors go either side of the crystal
- Fit the resistors where indicated
- Use the offcuts from the resistor leads to solder links where indicated
- If you plan on using the Universal Micro Keyboard, fit the 6 pin female header. If not, you can leave this out
- If you plan on connecting to an FTDI lead, connect the 6 pin right-angle header (angled outwards!) and 2 pin right angle header on the left hand side
- Fit the 4 3 pin headers for ROM selection and keyboard selection
- Fit the reset button and power socket on right hand side
- You have a choice of 3 expansion headers (straight, angled and female), which have their own advantages for connecting to backplane or other Modules. If you don't know which you need, leave this off for now.
- If you will be fitting a Raspberry Pi Zero, fit the 20x2 header on the underside
- To fit the ICs, the pins will need to be bent in slightly. Grasp the chip firmly by the ends and push the pins gently against your tabletop
- The keyboard jumper can be set to Pi or Serial. If set to serial, the RC2014 will accept characters from either the FTDI or Universal Micro Keyboard. If set to Pi, it will accept them from the Raspberry Pi Zero
- There are 8 banks of 8k on the ROM. Only the first bank is used, and this is selected by putting all the ROM jumpers to 0. You can add other images to the ROM with an EPROM programmer and select those by changing the jumpers.
- An FTDI cable should be connected as shown. If you are powering the RC2014 Mini from this, the 5v FTDI jumper should be fitted.
- If you are not powering the RC2014 Mini from FTDI, use the USB to Barrel Jack cable to power the RC2014. Any USB adapter of 500ma or over will be fine.

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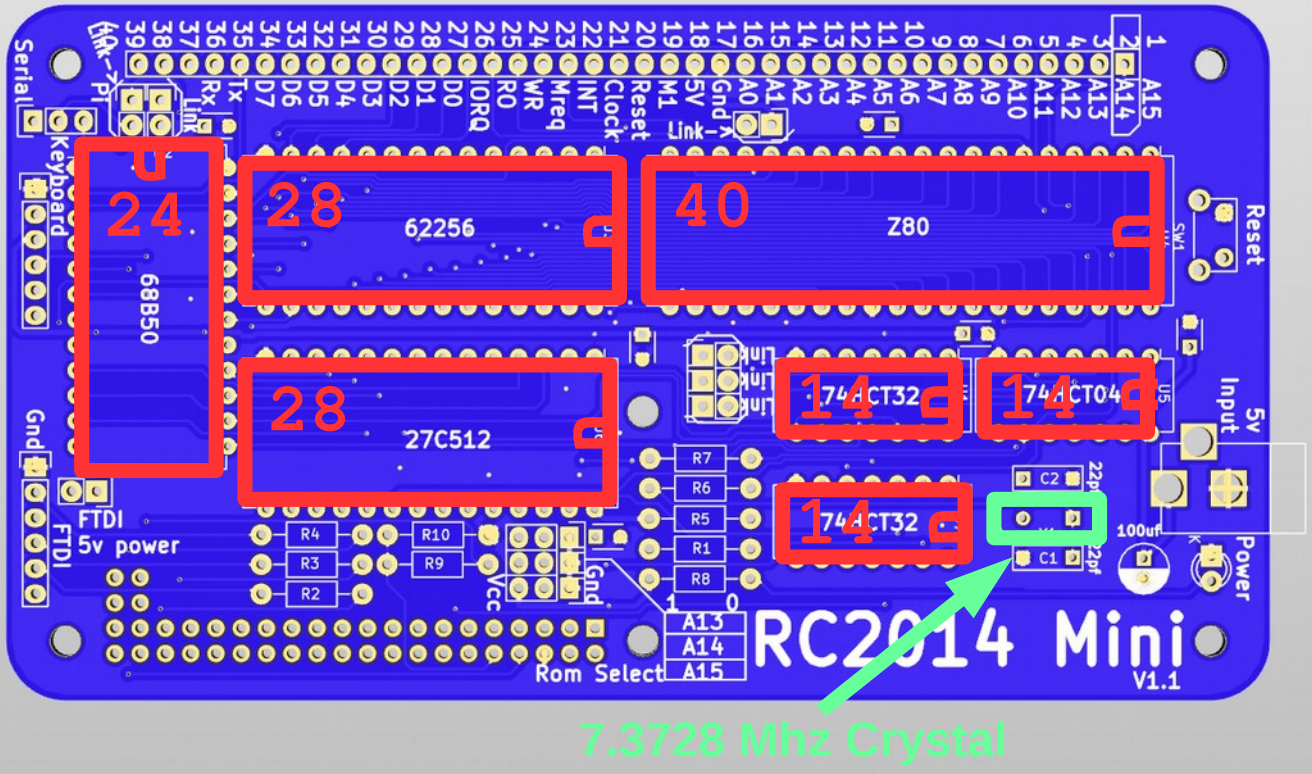
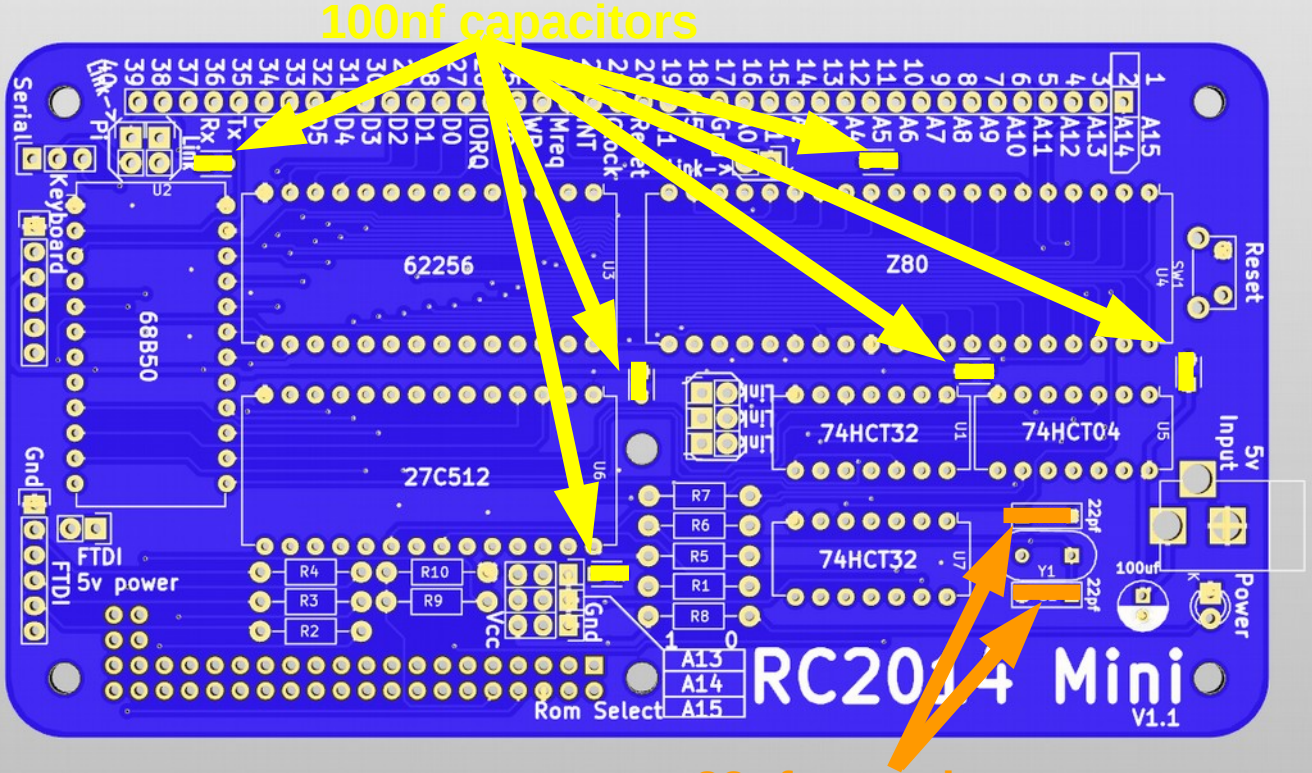
Start by fitting the IC Sockets, paying attention to the orientation notch





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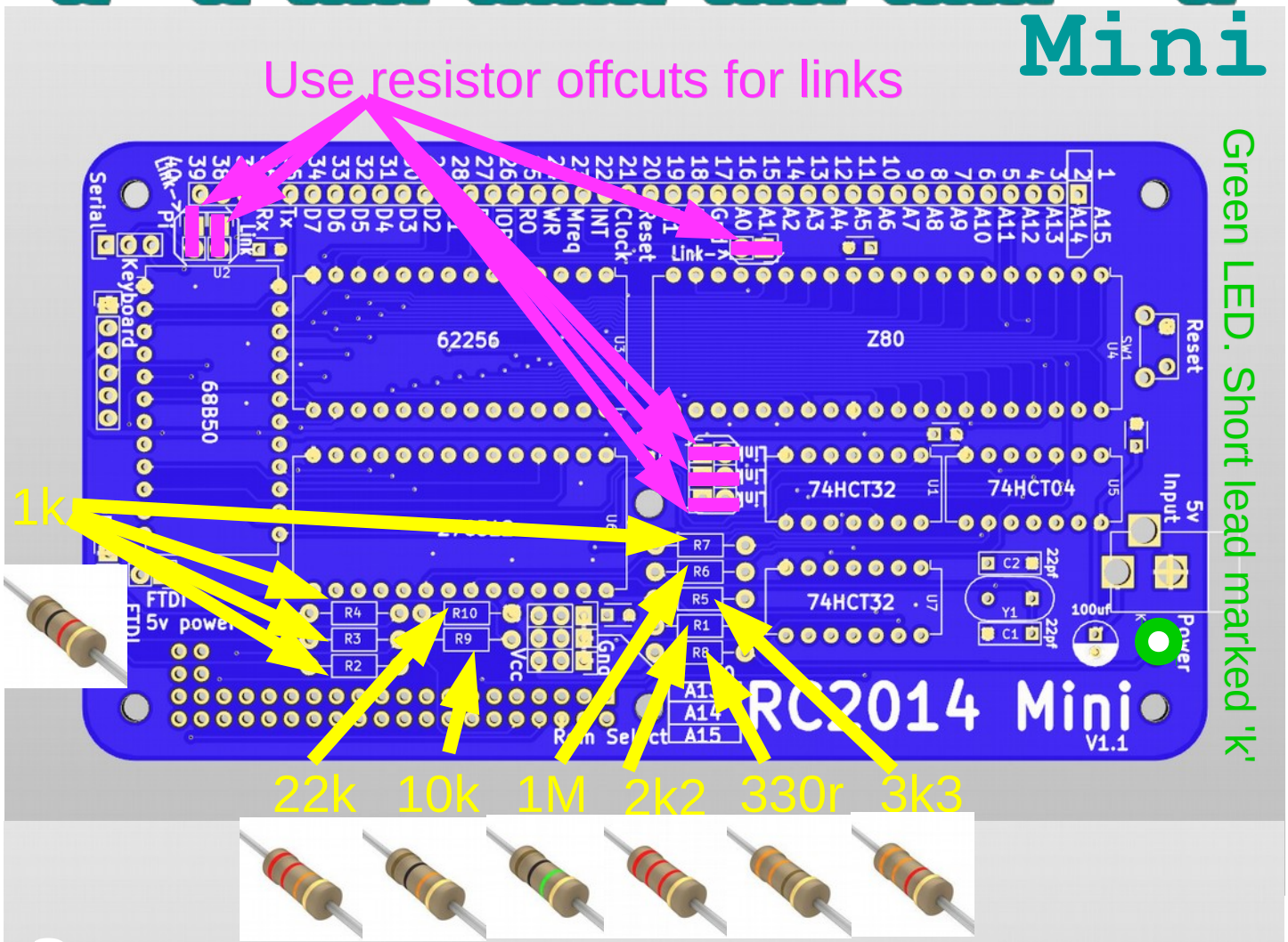
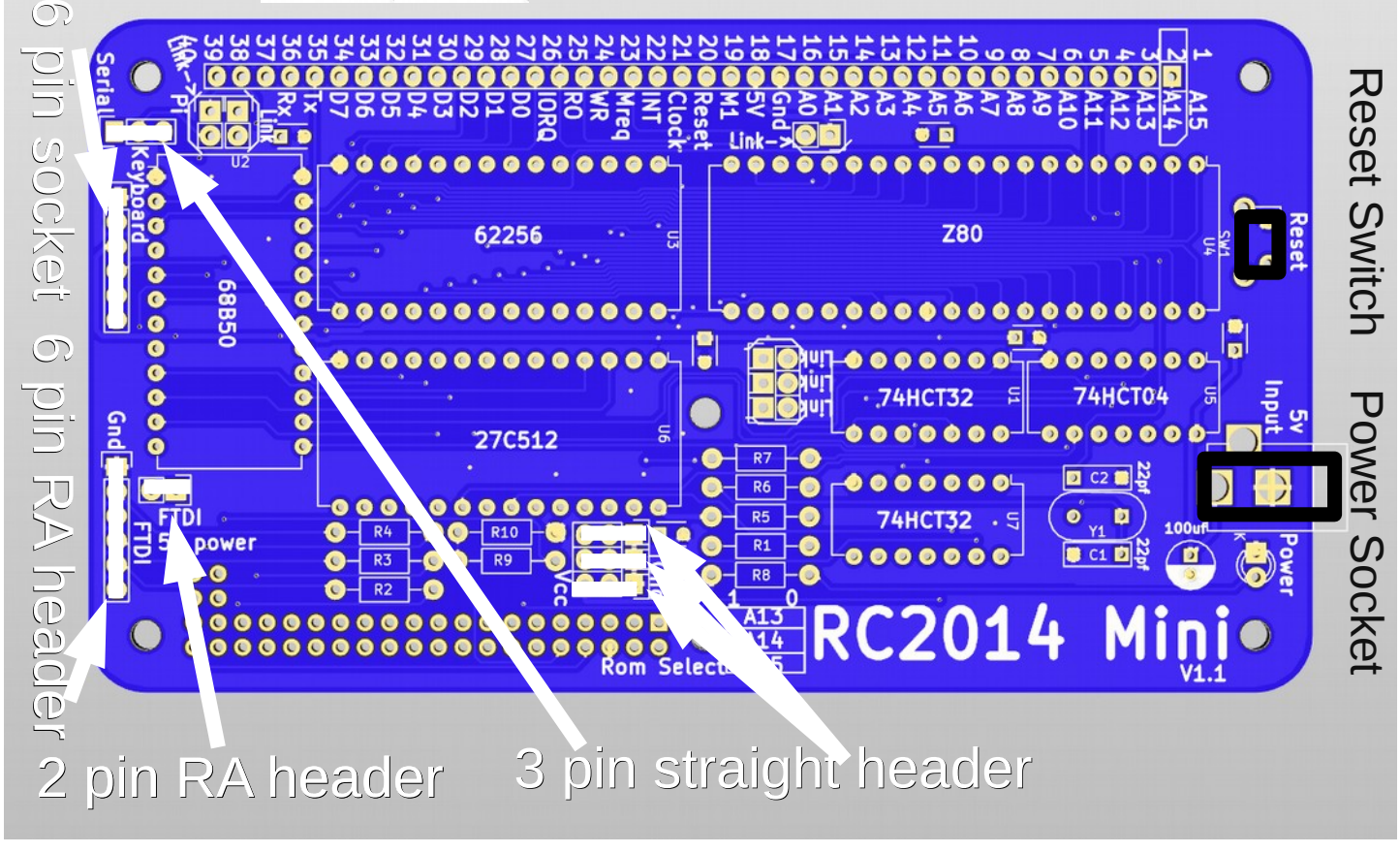
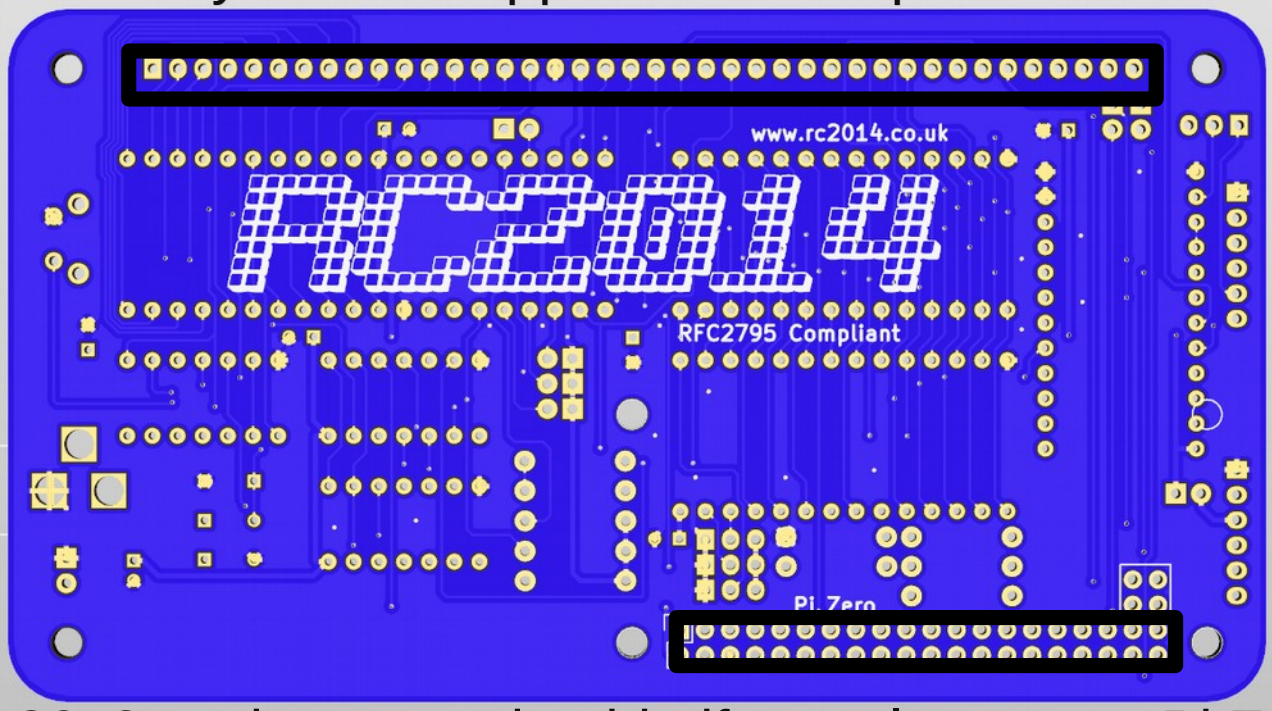

Use resistor offcuts for links
Green LED. Short lead marked 'k'
1k
22k
10k
1M
2k2
330r
3k3
RC2014 Mini
V1.1


6 pin socket
6 pin RA header
Reset Switch
Power Socket
2 pin RA header
3 pin straight header
RC2014 Mini
V1.1

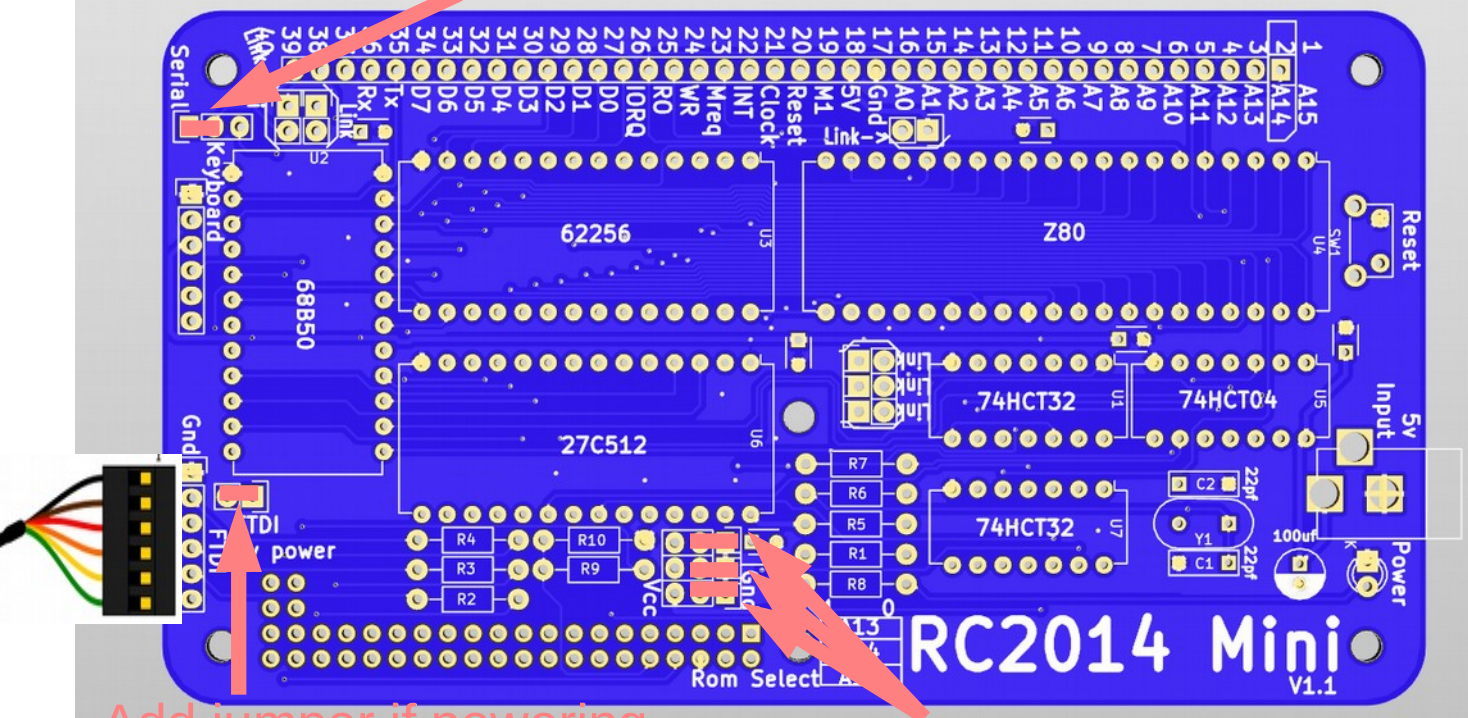
RC2014

40 way straight pins, 40 way Right Angled pins
And 40 way socket supplied. Fit to top or bottom



Fit 20x2 socket on underside if you plan to use Pi Zero

Set the keyboard jumper to Pi or serial
depending what keyboard input you want



Add jumper if powering
From FTDI cable

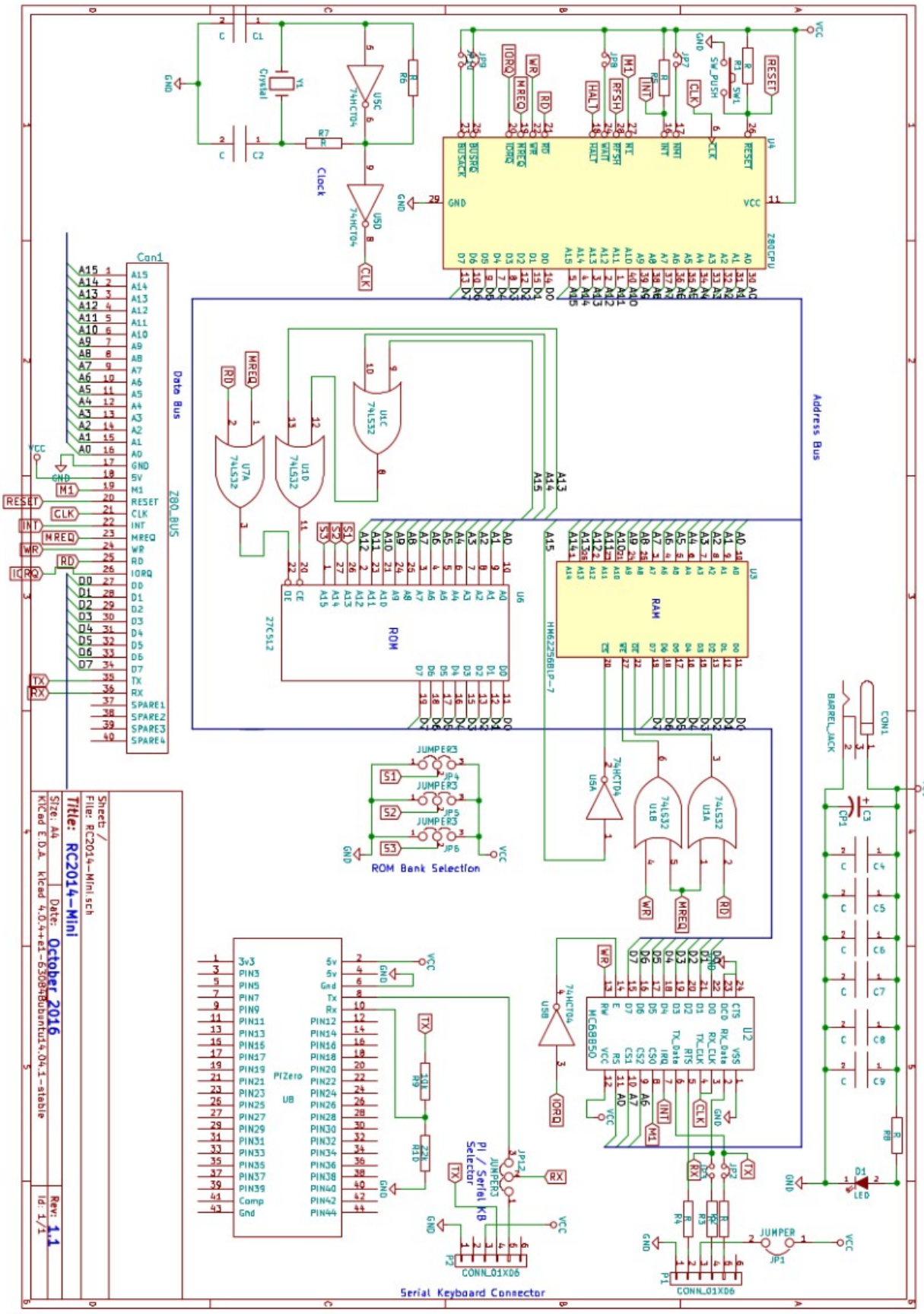
Connect jumpers to the Gnd (0)
Position for BASIC

RC2014 Mini

Bill of materials

1	x	RC2014 Mini PCB
1	x	24 pin wide DIL socket
2	x	28 pin wide DIL socket
1	x	40 pin wide DIL socket
3	x	14 pin narrow DIL socket
1	x	Z80 CPU
1	x	27C512 EPROM BASIC
1	x	62256 RAM
1	x	MC68B50
1	x	74HCT04
2	x	74LS32
1	x	7.3728 Mhz Xtal
2	x	22pf ceramic cap
6	x	100nf cap
4	x	1k resistor
1	x	1M resitor
1	x	10k resistor
1	x	22k resistor
1	x	2k2 resistor
1	x	330r resistor
1	x	3k3 resistor
1	x	3mm green led
1	x	RA Tactile Switch
1	x	2 pin header
4	x	3 pin header
2	x	20 pin header
1	x	40 pin header
1	x	40 pin RA header
1	x	6 pin ra header
1	x	2 x 20 pin socket
1	x	40 Way SIL Socket
1	x	6 way SIL socket
5	x	jumper
1	x	2.1mm power jack
1	x	USB Barrel Lead

RC2014 Mini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Id: 1/1
Clock
Crystal
74HCT04
Z80CPU
Z80_BUS
Data Bus
Address Bus
ROM
RAM
27C512
HM62256BLP-7
74LS32
ROM Bank Selection
MC68B50
PIZero
Pi / Serial KB Selector
Serial Keyboard Connector
CONN_01X06
BARREL_JACK
LED
JUMPER
RESET
SW_PUSH

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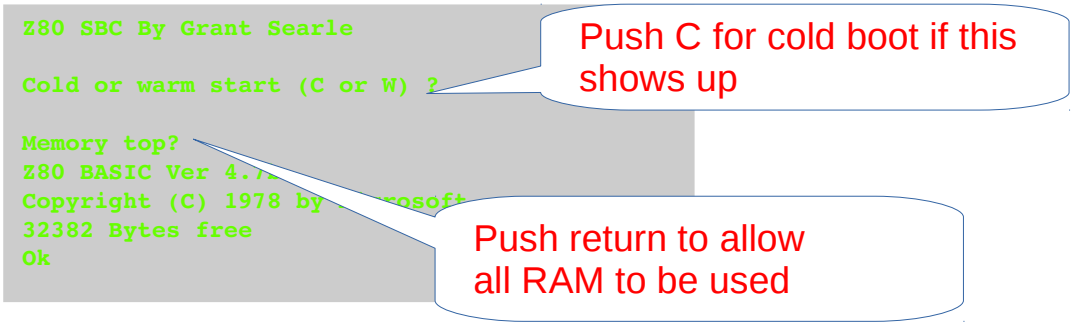
First Time Use

When everything is soldered together, give everything a quick visual inspection and check that the jumpers are set correctly.

Initially, I recommend powering the RC2014 from a 5v FTDI cable plugged in to the FTDI header on the left hand side. Start by plugging the FTDI cable in to a USB socket on your PC/Laptop, and opening your preferred serial terminal (I recommend PuTTY or Teraterm) and setting the baud rate to 115,200bps. The other settings should default to 8-N-1. Plug the other end in to the FTDI socket, noting the black (Ground) cable goes nearest to the large IC and the green cable goes towards the mounting hole.

Hit the reset button and you will be greeted with the following



Congratulations! Your RC2014 works! Now it's time to type in your first program;

```
10 for a=1 to 10
20 print "RC2014 is cool"
30 next a
run
```

Troubleshooting

If you have connected up your RC2014 and it hasn't sprung in to life then it's time to start troubleshooting.

Firstly, re-read the rest of this guide and see if there's something you have missed. As mentioned at the beginning, this is only a guide, so you don't have to follow it exactly – but if you have deviated from the guide or implemented your own ideas, just double check that you know why. If you take the suggestions here, it *should* work. The following steps, although seemingly obvious, have bought most troubled RC2014s to life;

- Are all the ICs of the correct part type, and the correct orientation within the socket?
- Give all the joints a visual inspection – Any solder bridges between pins? Or dodgy looking joints?
- Does the power LED come on when plugged in? If so, is 5v across the power pins of each of the ICs?
- Are you powering it from FTDI cable? If so, is the 5v FTDI power jumper on? (Are you using a 5v FTDI adapter?)
- Are the jumper pins on the ROM module all set to 0?
- Have you selected the correct serial port on your terminal software? Is it set to 115,200, 8, N, 1?
- Push the reset button again. Did that work?