MyZ80

Build a Computer YOU can Program!

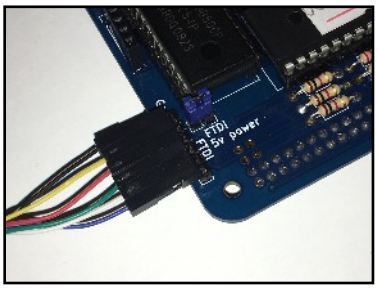
User Guide

centre for computing history _

FTDI Cables

There are a number of FTDI cables available and the one supplied may differ depending on availability. Please use the instructions below depending on which cable you have.

FTDI Cable (Individual Plugs)

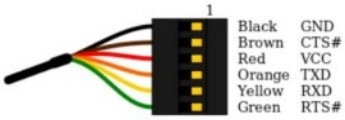


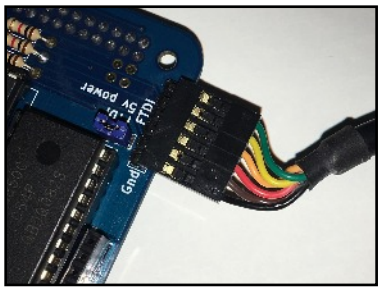
FTDI Cable	MyZ80 Pins
Black wire : Gnd	Pin 1 : Gnd
Yellow wire : RTS	Pin 2 : RTS
Red wire : 5v	Pin 3 : 5v
Green wire : TXD	Pin 4 : RXD
White wire : RXD	Pin 5 : TXD
Blue wire : CTS	Pin 6 : CTS

Why are the TXD & RXD wires swapped over?
It's called a cross-over connection. The output (TXD) of the MyZ80 needs to be connected to the input of your computer and vice-versa.

FTDI Cable (Single Plug)

For FTDI cables with a single plug, simply line up the **Black Wire** with the **Gnd pin** on the MyZ80 FTDI Connector. The rest will all be correct.





Connecting Up

Now you have built your MyZ80 computer we need to connect it to a host computer that will act as a serial terminal. A serial terminal is a device that does not have any computing power itself but provides a way of entering and displaying data via its keyboard and screen.

The connection to the MyZ80 is a serial connection called RS232 which was very commonly used by computers of the 80s. Most modern computers do not have an RS232 port so we have supplied a USB serial adaptor called an FTDI cable. This converts the RS232 data into modern USB standard.

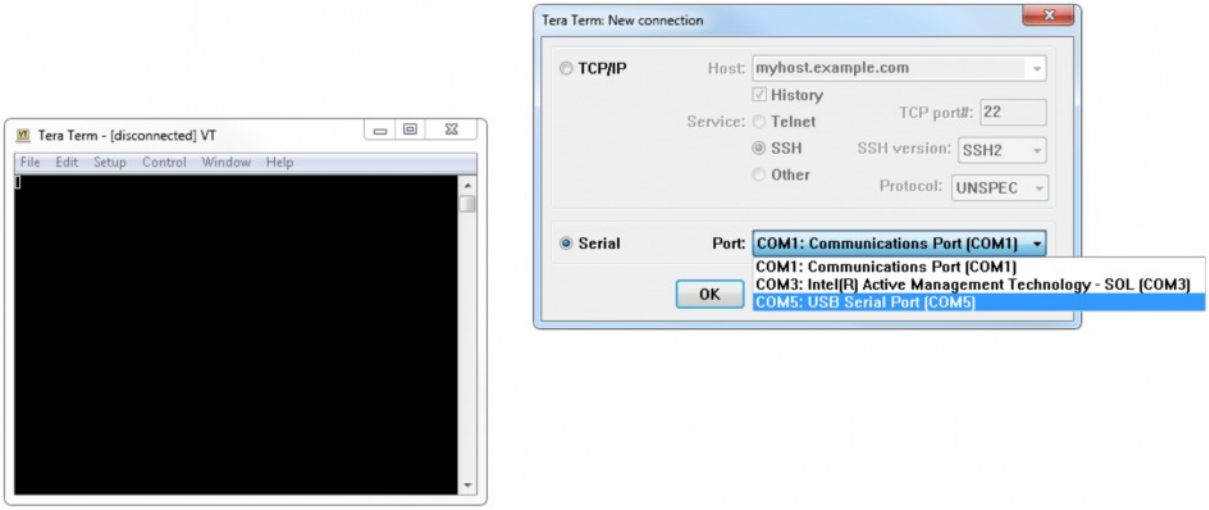
Connect one end of the FTDI cable to the FTDI connector of the MyZ80 and the other end to an available USB port of your computer.

If the FTDI Power jumper is in place on your MyZ80 then the MyZ80 will be powered from your computer so there is no need to use the power cable supplied.

You computer should recognise the FTDI cable as a '**USB Serial Port**' and assign it a new COM number like COM2, COM3, COM4 etc..

Now, you'll need a terminal emulator program. There are several free programs available but we will describe the use of **Tera Term**. Just Google 'Tera Term' and you'll find it. It is free and open source. Just download and install it to your computer in the usual way.

When you run Tera Term you will see these screens. On the set-up screen click the 'Serial' button.



If your FTDI cable has been detected properly you will see '**COMx: USB Serial Port**' where x is the number of the port your machine has chosen. Select the USB Serial Port and click **OKAY**.

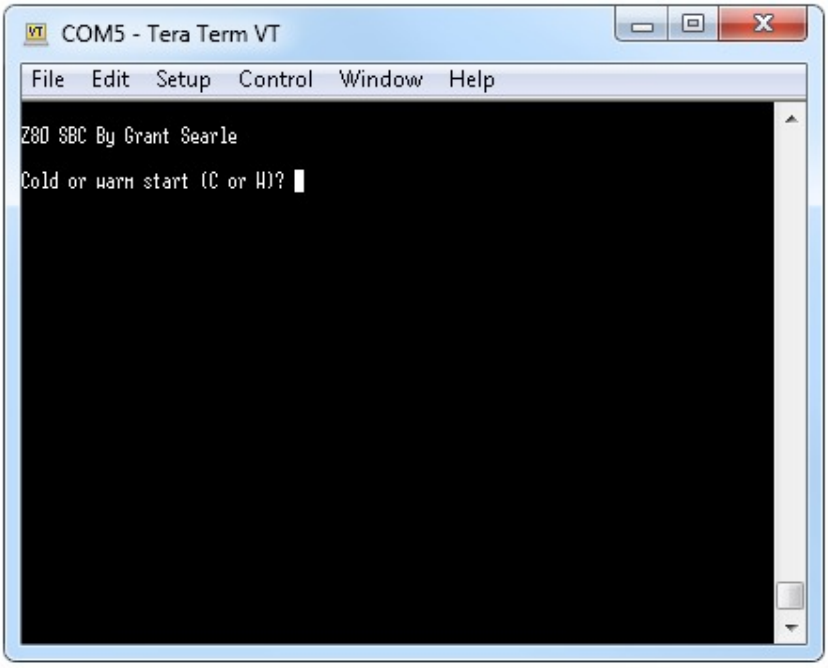
Once you have selected the Com port, the set-up window will disappear.

Click on **Setup** → **Serial Port**.

Ensure that the baud rate is 115,200, data is 8bit, no parity, 1 stop bit and flow control is hardware. Then click OKAY.

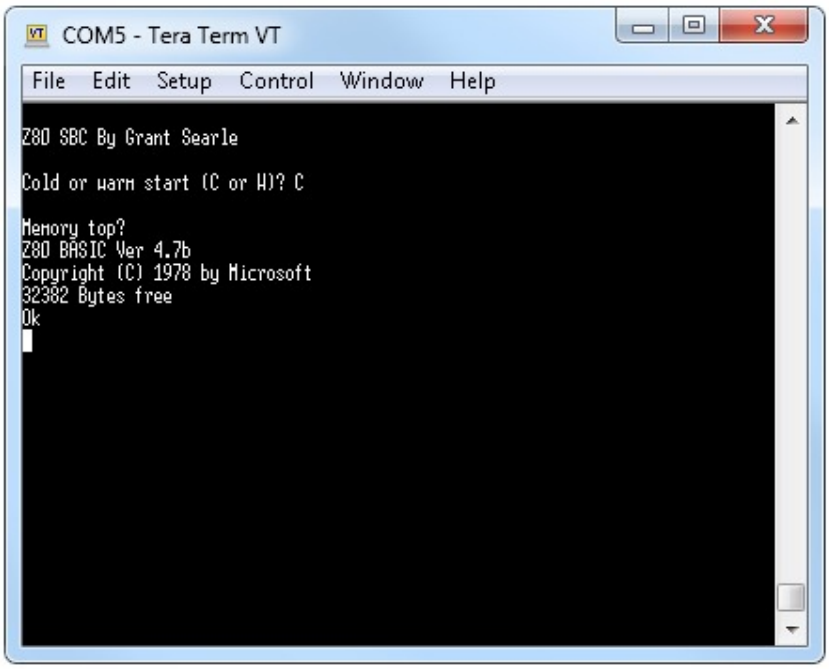
If your FTDI cable has been detected properly you will see '**COMx: USB Serial Port**' where x is the number of the port your machine has chosen. Select the USB Serial Port and click **OKAY**.

Press the Reset button on your MyZ80 and you should see :



Press **C** to tell the machine to clear all memory and start.

Then just press **Enter** to tell BASIC to use all the memory available.



You're now in Microsoft BASIC from 1978 and you're ready to start programming!!

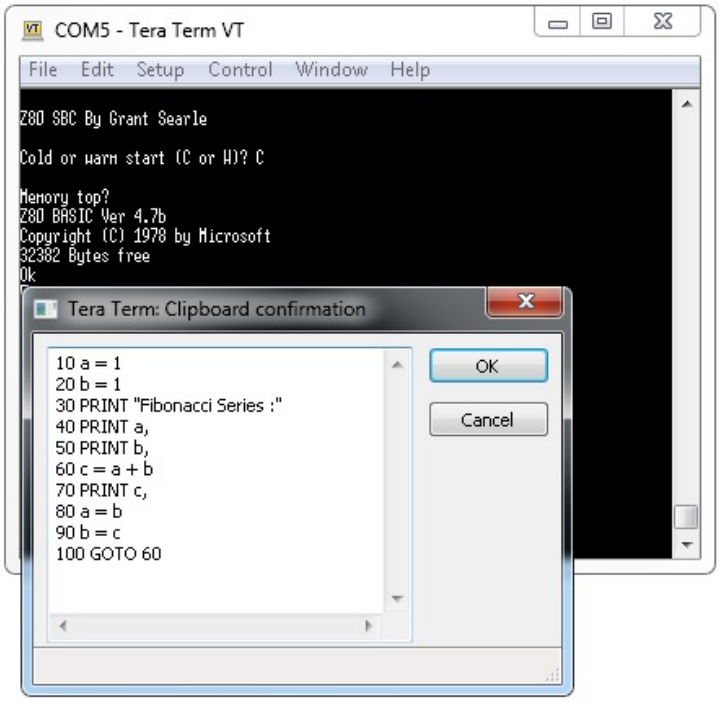
A Helpful Hint for Programming

You can simply start typing in code direct to your MyZ80, but how would you save your program? It has no long term storage like a cassette interface or floppy disk interface!

But don't worry, that's where your host computer helps! Write your code in a text editor application like Notepad or even better, download Programmers Notepad. You can write your code using those applications and save them to your computer.

When you want to run the code, simply copy all of the code to your clipboard using **CTRL A** and then **CTRL C**.

Then right click in the Tera Term window and it will give you the option to paste that code to your MyZ80 just as if you were typing it in by hand!



When you click okay, it will send the file to your MyZ80. You may need to press the enter key just to enter the very last line. Then you can simply type RUN and the MyZ80 will execute your instructions!

Another Hint:
You could add the direct command NEW to the beginning of your program. This ensures the MyZ80 clears the memory before loading your program. In the same way you could add RUN to the end of your program so that as soon as you download the code to your MyZ80 it will run it!! So your program would look like this :

```
NEW
10 PRINT "Hello World!"
20 GOTO 10
RUN
```

Yet Another Hint:
You can even copy and paste the example code from this PDF directly to your MyZ80 !!

Variables and Strings :

```
10 INPUT "Hello! What is your name"; name$
20 PRINT "Great to meet you "; name$
30 INPUT "What number are you thinking of"; n
40 PRINT "Ah! I was so close "; name$; "!!"
50 PRINT "I thought you would say"; n-1
```

Print the Fibonacci Series :

```
10 a = 1
20 b = 1
30 PRINT "Fibonacci Series :"
40 PRINT a,
50 PRINT b,
60 c = a + b
70 PRINT c,
80 a = b
90 b = c
100 GOTO 60
```

What is the Fibonacci Series?

What are the numbers that it prints out that look like 1.34627E+06 ?

Why does it crash?

Prime Number Finder :

```
10 PRINT "Prime Number Finder"
20 PRINT
30 INPUT "How far should I search"; limit
40 FOR N = 1 TO limit
50 FOR D = 2 TO (N-1)
60 IF N/D=INT(N/D) THEN GOTO 100
70 NEXT D
80 PRINT N;
90 GOTO 110
100 PRINT ".";
110 NEXT N
120 END
```

What are prime numbers?

Can you spot twin primes?

Why does it slow down as the numbers get bigger?

Sine Waves :

```
10 FOR i=0 to 999 STEP 0.25
20 PRINT TAB(INT(SIN(i)*15)+15);"*"
30 NEXT i
40 GOTO 10
```

Think of a Number :

```
10 CLS
20 NUM=INT(RND(1)*100)
30 PRINT "I AM THINKING OF A NUMBER"
32 PRINT "BETWEEN 0 AND 100"
34 PRINT
35 PRINT "WHAT NUMBER AM I THINKING OF"
38 INPUT GUESS
40 IF GUESS = NUM THEN GOTO 100
50 IF GUESS > NUM THEN PRINT "LOWER"
60 IF GUESS < NUM THEN PRINT "HIGHER"
70 GOTO 38
100 PRINT "YOU GUESSED IT!!"
110 END
```

Microsoft BASIC

The MyZ80 uses a form of BASIC written by Microsoft way back in 1978. Specifically it uses the BASIC implemented by NASCOM computers. You can download a PDF of the original NASCOM manual from our website at :

www.ComputingHistory.org.uk/MyZ80

Please note that some features are not implemented on the MyZ80 due to hardware limitations. For instance SAVE and LOAD are not functional on the MyZ80.

Reserved Words

These are the words that the MyZ80 specifically interprets as commands or functions.

```
LIST        CLEAR       TAB(        LOG
NEW         END         TO          EXP
RUN         FOR         FN          COS
            NEXT        SPC(        SIN
            DATA        THEN        TAN
            INPUT       NOT         ATN
            DIM         SLEEP       PEEK
            READ        AND         DEEK
            LET         OR          POINT
            GOTO        SGN         LEN
            IF          INT         STR$
            RESTORE     ABS         VAL
            GOSUB       USR         ASC
            RETURN      FRE         CHR$
            REM         INP         LEFT$
            STOP        POS         RIGHT$
            OUT         SQR         MID$
            ON          RND
            WAIT
            DEF
            POKE
            DOKE
            LINES
            CLS
            WIDTH
            MONITOR
            SET
            RESET
            PRINT
            CONT
```

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Digital I/O Expansion

An 8 bit I/O expansion card that consists of 8 LEDs and 8 switches is available for a very reasonable price. We recommend this expansion card if you are interested in the world of physical computing.

You can also purchase a ‘backplane’ that allows you to connect more than one expansion card at a time.

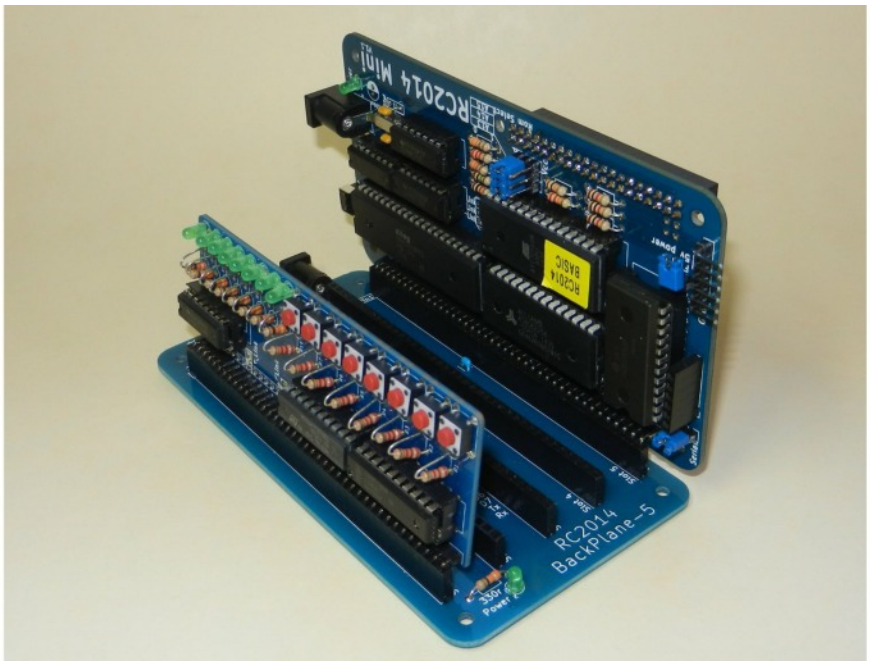
The MyZ80 is a re-packaged version of the RC2014 designed by Spencer Owen.

Google search for RC2014 …

You’ll find add-ons and a backplane to connect them together available to by on Tindie.

However, all of the address, data and control lines are clearly identified on the edge connector and connecting peripheral chips is quite straightforward.

You can even expand your MyZ80 into a fully fledged CP/M computer!



Raspberry Pi Zero Graphics Card!

Your MyZ80 will even connect directly to a Raspberry Pi Zero that will act as a ‘graphics card’.

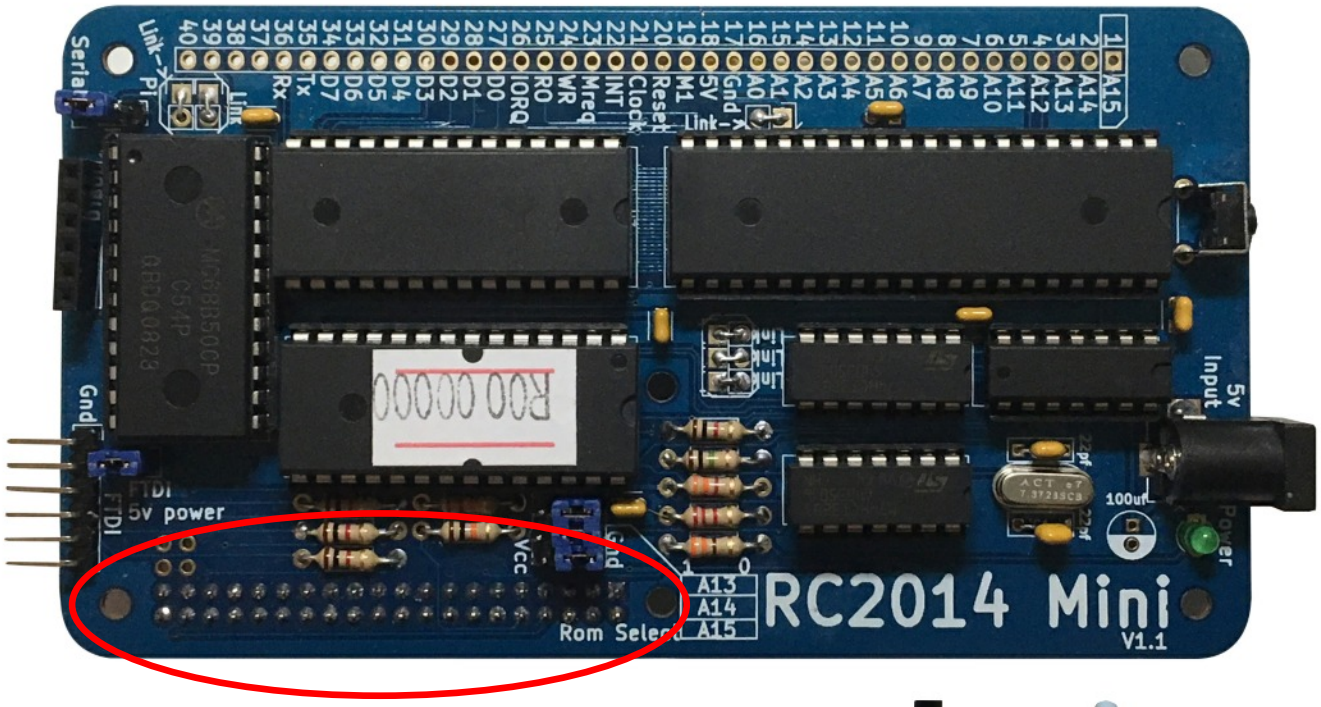
Well … graphics card might be overstating it a little but as a way to connect an HDMI monitor and a USB keyboard so that it doesn’t rely on using your computer as the screen and keyboard.

It’s a neat trick and if you have a Pi Zero, you can download the code here :

http://www.ComputingHistory.org.uk/MyZ80

These three files need to be written to a MicroSD card and inserted into the Raspberry Pi Zero.

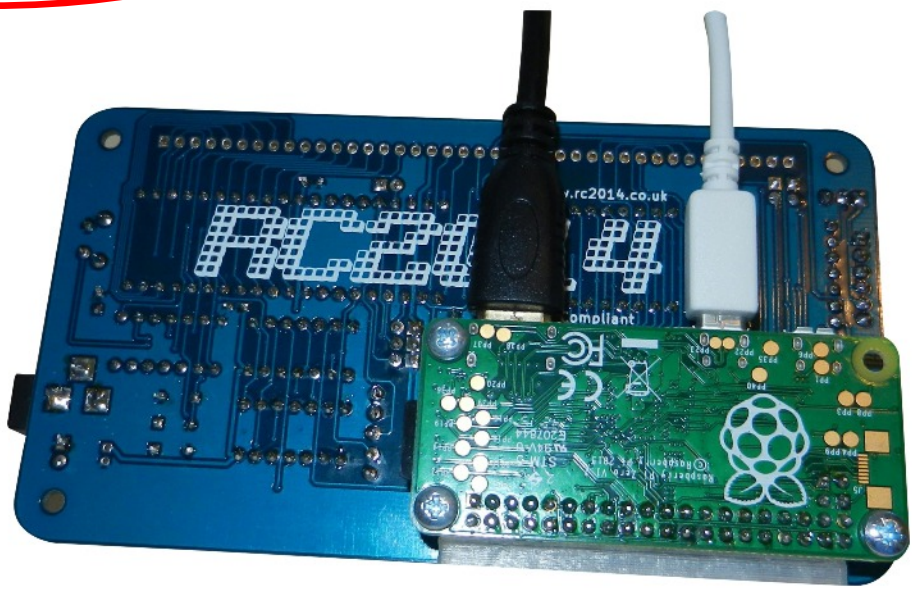
You’ll need to solder on the Raspberry Pi Zero header pins at the bottom left hand hand side of the MyZ80 and then mount the Raspberry Pi Zero in place.



The Raspberry Pi Zero mounts in place like this :

There are 3mm mounting holes provided if you want to secure it in place.

If you are using the Pi Zero make sure the Serial/Pi jumper on the MyZ80 is set to Pi.



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 MyZ80s 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 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 ?
  Is hardware handshaking enabled?
- Push the reset button again.
  Did that work?

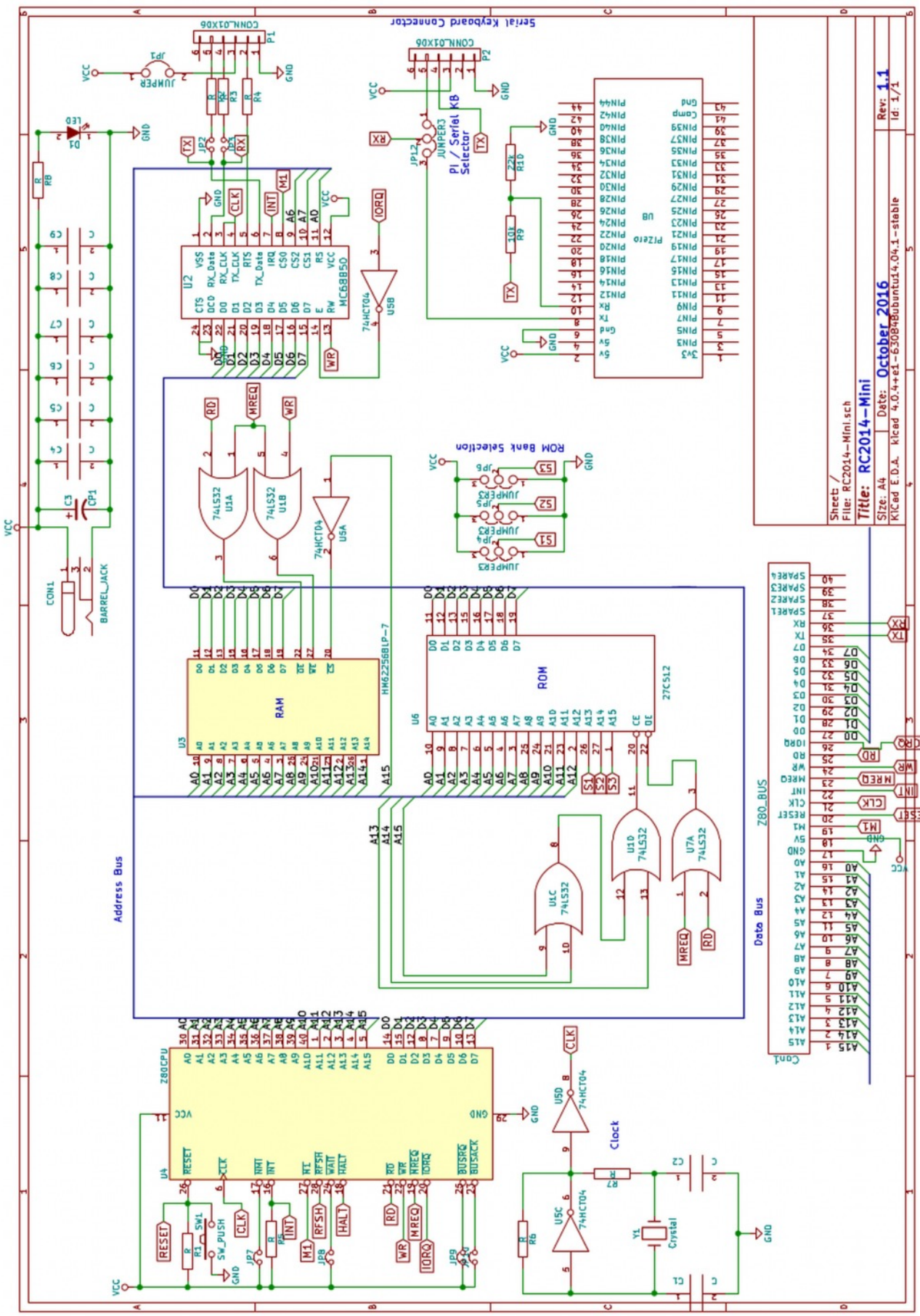
Bill of Materials

These following components are included in your kit.

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

1 x FDTI cable

Circuit Diagram



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Lots of old computer manuals used to have a page like this …
I never knew why …