

1 R8.2  
2 U1.16  
R10  
1 (GND)  
2 U3:6 R11.1  
R11  
1 R10.2  
2 U1:19  
R12  
1 (GND)  
2 R13.1 U3.5  
R13  
1 U2.5 R12.2  
2 U1:17

IC:Pin\Connection

R14  
1 (GND)  
2 R15.1  
R15  
1 U2.1 R14.2  
2 U1:15  
R16  
1 U2.2 U3.2  
2 R17.1  
R17  
1 R16.2 U1.18  
2 VCC

R18

1 R19.1  
2 GND

R19

1 R18.1 U1.12 C7.2  
2 VCC

C1  
1 (GND)  
2 (VCC) USB.1  
C2  
1 U1:7 (VCC) C1.2 R1.2  
2 C1:1 (GND)  
C3  
1 XTAL:1  
2 GND  
C4  
1 XTAL:2  
2 GND  
C5  
1 VCC3\_6  
2 GND  
C6  
1 VCC3\_6  
2 GND

C7

- 1 PHONO2
- 2 R19.1

IC:Pin\Connection

D1

- 1 R6.2
- 2 U1:3 (TX)

D2

- 1 R6.2
- 2 U1:5 (OC2B)

D3

- 1 GND
- 2 R3:1 USB:3 (D+)

D4

- 1 GND
- 2 R2.1 R1.1

D5

Doesn't exist.

D6

- 1 D7.2
- 2 (VCC)

D7

- 1 R4:2 VCC3\_6
- 2 D6.1

LED

- 1 R7.2
- 2 GND

XTAL

- 1 U1:9 C3:1
- 2 U1:10 C4:1

USB

- 1 (VCC) C1.2
- 2 (D-) R2.1
- 3 (D+) D3.2
- 4 (GND)

Phono Video

- 1 R6.1
- 2 GND

Phono Audio

- 1 C7.1
- 2 R18.1

LK1

- 1 U1.27 PC54.2 LK1.2
- 2 R7.1 LK1.1

Headers

Top

- 1 C5
- 2 C4

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3	C3
4	C2
5	C1
6	C0
7	NC
8	GND
9	GND
10	5V
11	3.6V
12	NC

Bottom

1	PD0
2	PD1
3	PD2
4	PD3
5	PD4
6	PD5
7	PD6
8	PD7
9	PB0
10	PB1
11	PB2
12	PB3
13	PB4
14	PB5
15	GND
16	AREF



## Checking Shorts

It's just as important to check for shorts - that is, many connections SHOULD NOT connect together. The ones you really need to check are connections next to each other (i.e. U1:1 shouldn't connect to U1:2. U1:2 shouldn't connect to U1:3 etc), since this is where you're likely to have made a mistake.

Check U1's adjacent connections. None should connect to each other.

Check U2's adjacent connections. Only U2:7 and U2:8 should connect.

Check U3's adjacent connections. Only U3:7 and U3:8 should connect.

Check the USB signal connections. None should connect to each other.

Check C1, C2, C3, C4 and C5. Pins 1 and 2 should not connect to each other. You may hear a very brief click as the capacitors discharge though.

Pay special attention to the switches, since some. The Vertical connections on a particular switch should connect (when looking at the board sideways), but SW1:1 and SW2:2 shouldn't connect as shouldn't SW2:1 and SW3:2; SW3:1 and SW4:1. Similarly, SW5:2 and SW6:1 shouldn't connect, SW6:2 and SW7:1 shouldn't connect. SW7:2 and SW8:1 shouldn't connect. SW1:3 shouldn't connect to SW5:2, nor should SW1:3 connect to SW5:3. SW2:3 shouldn't connect to SW6:2. SW3:3 shouldn't connect to SW7:2 and SW4:3 shouldn't connect to SW8:2. SW1:2 shouldn't connect to R4:2 and SW1:1 shouldn't connect to R4:1.

LED1 and 2 shouldn't connect and neither should R7:1 and R7:2.

R8:1 and R9:1 shouldn't connect, similarly R10:1 and R11:1 shouldn't connect neither should R12:1 and R13:1 nor R14:1 and R15:1, nor R16:1 and R17:1

The most important thing to check is that VCC and GND aren't shorted.

## Testing the Board: The Final Stages

You're now ready to start testing the board with actual power connected! At this stage, the ICs shouldn't be inserted. The first test is the non-functioning power on test.

1. First check there's no stray bits of metal under the PCB, nor stuck to the underside of the PCB!
2. Next check the USB-B cable can plug into the USB-B socket. Hold only the edges of the PCB and insert the USB-B cable, then remove it.
3. Connect your USB cable to your USB power adapter.
4. Whilst touching only the edge of the PCB and (whilst getting ready to remove it if there's a problem) insert the USB-B connector.
5. If there's no smoke or pops or anything else, then you've passed the first power-on test!!! Well done!!!

## Part Two: Power On With Inserted Chips.

Now **REMOVE** the USB-B lead from the FIGnition computer!!!

### Inserting The ICs

For some reason manufacturers supply ICs with their pins splayed out, but the sockets need them to be vertical as shown below:



You'll need to bend them all at the same time so they stay in line, but they're fairly fragile, so you need to be careful. Start with the 8-pin ICs as they're easier.

1. Hold a chip with one end in a pair of pliers and the other end between my fingers.
2. Then level the pins against a straight wooden surface for one side.
3. Then carefully turn the chip around (being careful not to touch the pins themselves with your fingers)
4. Repeat the process for the other side.
5. Repeat steps 1 to 4 for the other 2 chips - but NOTE: You may find the initial batch of U1 chips have the legs 'straightened' and will already fit in the sockets).



Now you're ready to insert the chips.

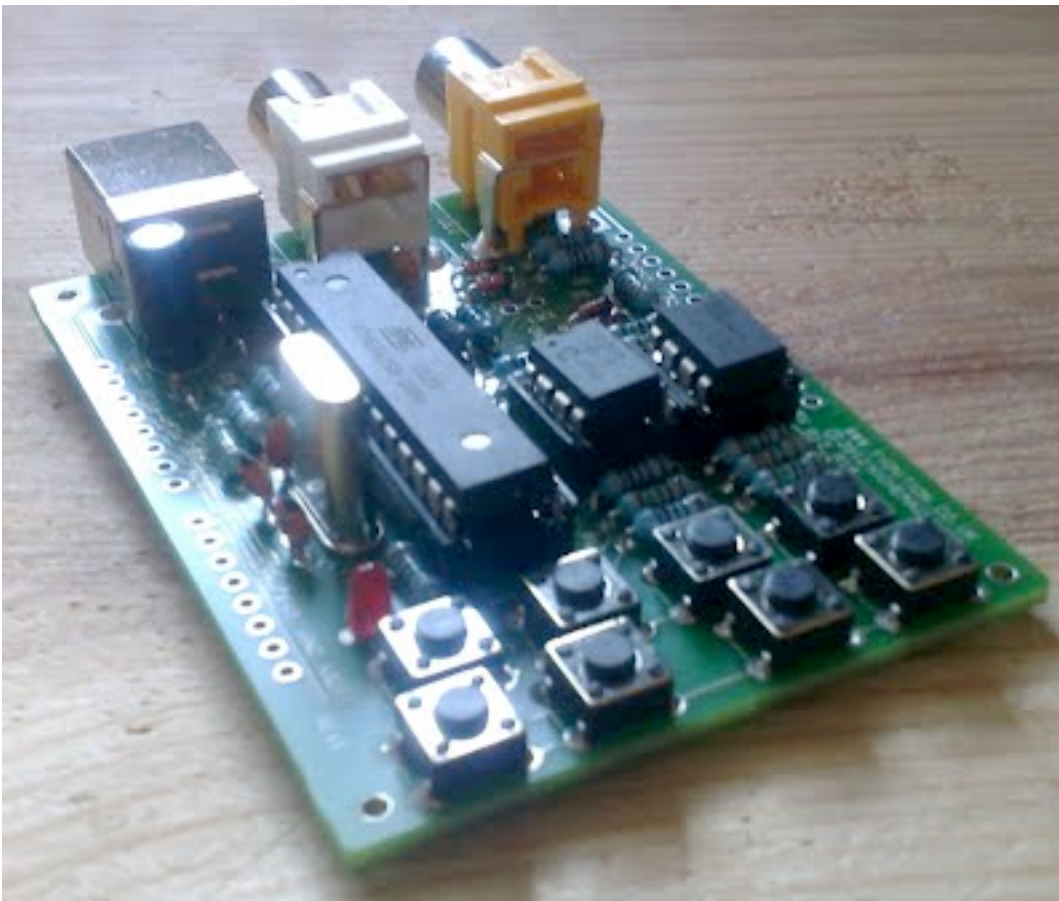
Start with U2 (which says "23K640" on it) then U3 (which says "AMIC" on it) then U1 (the big chip). Inserting the chips is a bit of a procedure in itself:

1. Place the PCB on your bench with the front side of the PCB facing you.
2. Locate the notch on one end of the chip. That's the end that should point to the top of the PCB (towards the USB and Phono sockets).

3. Use your fingers to hold the chip by its plastic body, at the far ends of its body, whilst avoiding touching the legs as they can be damaged with static electricity.
4. Carefully insert the chip into its socket **WITHOUT** bending any of the legs, or twisting them etc. You might need to readjust the legs (using pliers of course), but you must make sure they're all located well enough before applying force. You'll need a certain amount of force, but it shouldn't be too hard just using your fingers. Remember to insert the chips with even force since if one side or end goes in first it may twist or bend the legs of the other end, preventing it from fitting.

Again you need to do some checking.

1. Check the pins have all gone in OK (there's no metal pins squiffing out of a socket).
2. Check that the notch on each IC is pointing to the top, which is towards the USB and phono sockets (otherwise you're likely to burn out entire chips as you'll connect VCC to its GND pin and vice-versa).
3. Check that U3, the one on the right says "AMIC" and that U2 the one in the middle says "23K640" on it.



Once you've done that you're ready for the next test:

1. Whilst touching only the edge of the PCB and (whilst getting ready to remove it if there's a problem) insert the USB-B connector.
2. If there's no smoke or pops or anything else, then you've passed the **SECOND** power-on test!!! Well done!!!
3. Wait a little while to see that it continues to be OK. The LED shouldn't light nothing should happen for the moment.

OK, remove the USB-B connector again.

Now let's try it with your TV. CRT TVs work best, and LCD TVs require more precise timing - they can work, but the image may jitter (perhaps a future firmware revision may improve this).

Plug one end of your phono lead into your TV.

Turn on the TV.

Select the correct video input (I guess either SCART or Composite depending on how your phono lead connects to your TV). With the correct connection the image should be a steady black image even before you've powered on the FIGnition computer.

Plug the USB-B connector back in without touching any of the keys on the keypad. The FIGnition logo should instantly appear and a couple of seconds later the power-on message should appear!



**CONGRATULATIONS - YOU'VE BUILT YOUR OWN COMPUTER FROM SCRATCH AND IT STARTS UP!!!!**

Now you need to take another tea break, before you test the actual system!

### **Testing Basic Functionality.**

1. Test the keyboard works by holding the top right key and pressing the others in turn you should get: m, n, o (then on the bottom row), p, q, r, z. Hit the top, right button to delete chars.
2. Test the RAM can work. Use the Use-it section and type: **43 const x <enter>** (the computer will display **OK**). **x . <enter>** and you should see **43 OK**.
3. Test the Flash can work (using the screen editor). Type **0 edit <enter>**. And then move about the screen and enter up to 500 characters of text.
4. Type <command (SW2+SW6)> then Shift (SW5), then 'W' (SW8+SW5) to write your text to block 0 of Flash. The computer should show a bit of gibberish on the top of the screen, and display OK again.
5. Type **cls <enter>** the screen should clear.
6. Type **0 list <enter>** the screen should display the text you edited previously.
7. Test the USB uploading works. You'll only need to do this when you want to upload new firmware, but it's good to try doing it as soon as possible. Follow the instructions for [upgrading the firmware](#) using avrdude (you'll need avrdude at this point). The procedure is covered there and should work OK.