3 pyro output datalogger altimeter with an ATmega 328 microcontroller
Kit assembly instructions

Version	date	Author	Comments
1.0	29/05/2013	Boris du Reau	Initial version

Rocket Type

Micro-max	Model Rocket	Mid power	High power
No	yes	yes	yes

Category

Construction technic	Ground Support	Electronic	Other
		X	X

Goal

The goal of this document is to explain how to build the datalogger altimeter (Alti Multi) kit designed around an ATmega 328 microcontroller. The kit is using classic components on purpose so that anybody can do it without any major difficulties.

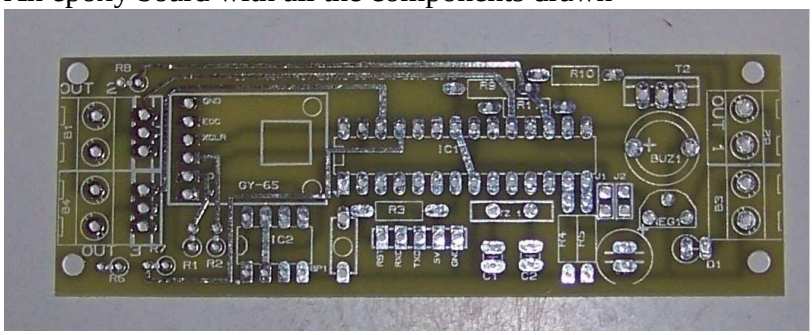
Before your start

Remember that it is a kit and that you can modify the program and behaviour of your altimeter.

The country where you live might not even allow the use of such device. You have to assume total legal responsibility for any damages or claims including personal injury that results from the use of this device. I shall not be responsible for the above. If you disagree with that, please do not build it or use it.

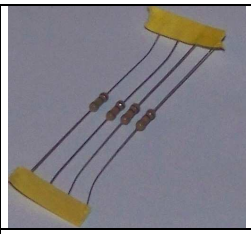
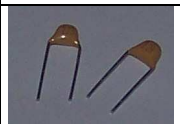
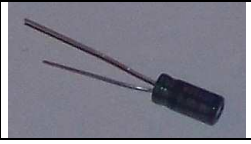
Kit content

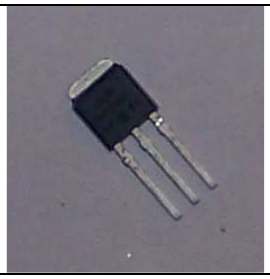
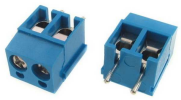
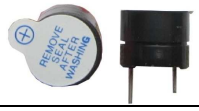
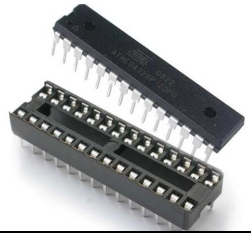
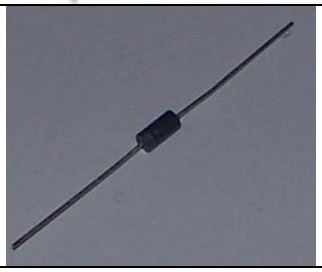
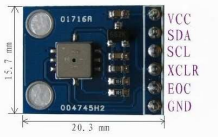
An epoxy board with all the components drawn

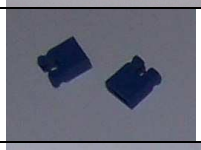
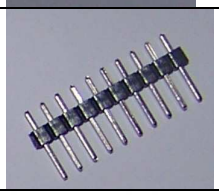
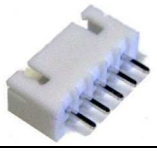


and the components in a plastic bag

The components list is as follow

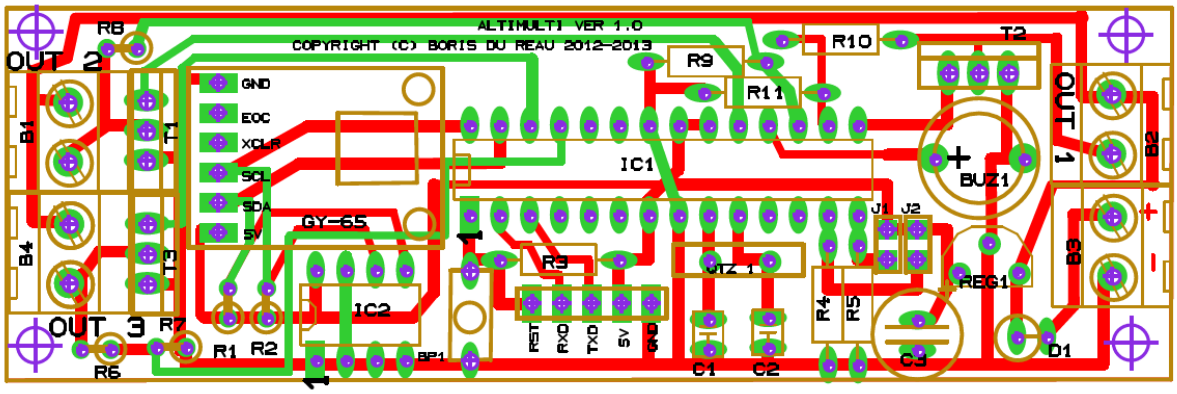
R1, R2, R6 et R7	100Kohm (brown, black and yellow) to 150Kohm (brown, green and yellow)	
R3, R4, R5	10Kohm (brown, black and orange) to 15kohm (brown, green and orange)	
C1, C2	22pf	
C3	47µf (- is marked on the cap, + is the other lead)	

T1, T2, T3	Transistor (IRF540 or IRFZ44)	
Reg1	78L05 (T092 package)	
B1, B2, B3	2 screw terminal bloc pitch 5,08mm	
Q1	16Mhz Cristal	
Buzz1	5 volts active buzzer	
IC1	Atmega 328 + 28 pins socket (programmed with an Arduino bootloader)	
IC2	24LC512+8 pins socket	
D1	Can be 1N4001 to 1N4007	
Capteur	BMP085 (on a GY-65 module)	
BP1	Momentary Push button The board has been designed to accept 2 types of button, you will get one or the other (4 or 2 legs)	

Clip pile	9 volt battery clip	
J1 et J2	Jumpers (used to configure the main altitude)	
connector	and 2 x 2 pins strip	
connector	5 pins strip or connector	

As an option if you want to program it you could buy a USB connector

Components layout :



An epoxy board is provided with the kit, all components are drawn so that they can be quickly identified. This is a single sided board. This means that you only need to solder the components on one side.

Tools required

Holes in the board have already been drilled to the correct diameter depending on the component used, you just need to plug them and solder them.

The tools below are the minimum needed to build the kit.

Solder	
Wire cutter	
Needle-nosed pliers	
A soldering iron (a good one 25/30W, brand JBC for example)	
A magnifier on a double hand holder	

A sponge with a soldering iron stand	

Soldering the components

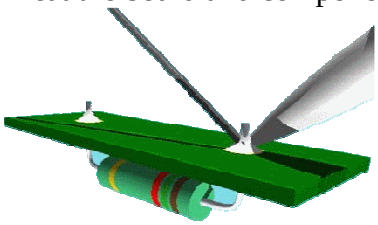
Before you get started here are some recommendations. Check the kit content and insure that you have indentified correctly all the components. Be careful to put the parts in the proper place, as it can be difficult to remove them. Make sure that you do not get mistaken between the transistors and the voltage regulator. Read the reference on the component with the help of the magnifier glass.
Do not revert active component such as the transistor and whenever there is a « + » sign on a component (ie; it has to be plugged one way and not the other) then it is mentioned
Always start by the thinner components so that after you plugged them you do not have to hold them while soldering.

Some advices to do good soldering

- Do not hesitate to clean up frequently your soldering iron in order to do good soldering.

- Always start by the thinner components and then plug them to the board.

- Heat the board and component lead together first and then bring the solder when hot enough.



- Do not overheat the components as it could permanently damage them. Be careful to solder properly if you want them to last, something working today might not later. Just one missing connection can cause failure.

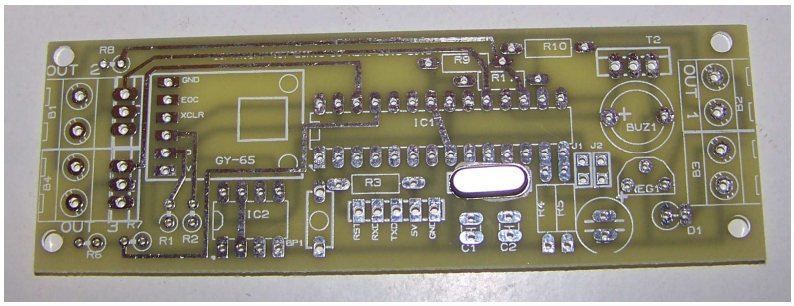
- Always work in a comfortable position on a tidy table with some space.

If you need help to solder your components just check on the internet there is lots of good tutorial out there that will teach you how to do some soldering.

Kit assembly

I am assuming that you have done electronics kits before, so if you have problems reading the following instructions ask for help.

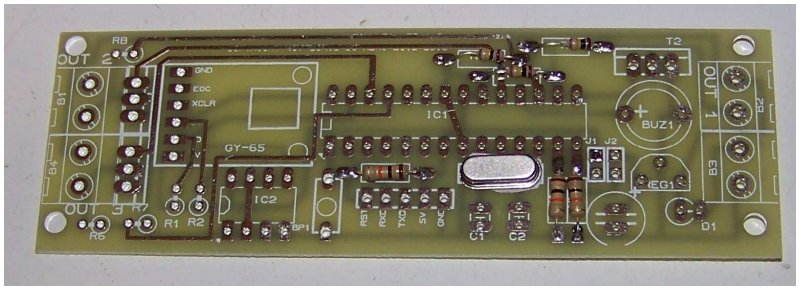
The crystal



Plug the crystal and push it until the end
You will need to isolate the crystal from the microcontroller pins.

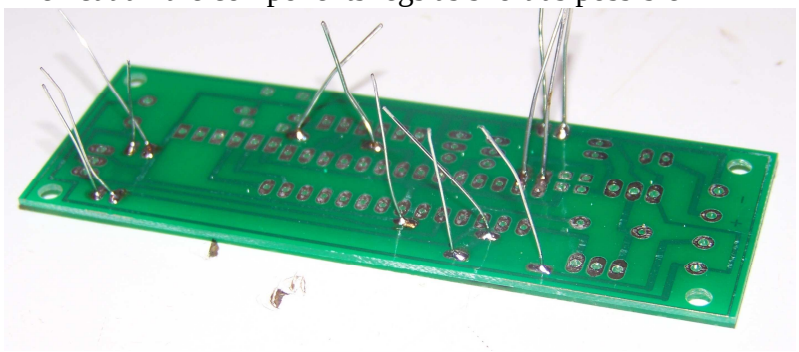
The resistors

Bend the leads about 45 degrees. Plug all the resistors where they should be, they should be 7 of them:
3x 10K (brown, black and orange) and 4x 100K (brown, black and yellow)
First solder the 10K

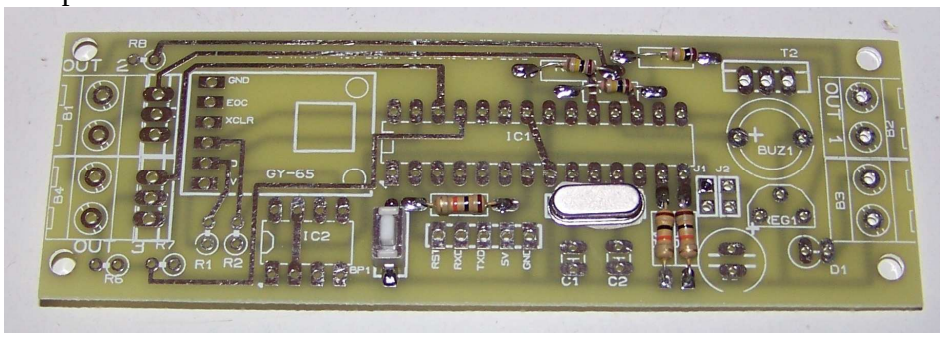


Then the 100k

Then cut all the components legs as short as possible

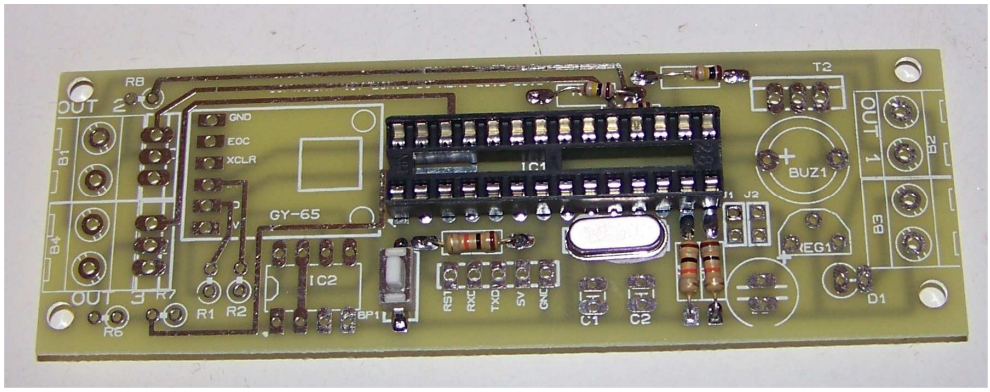


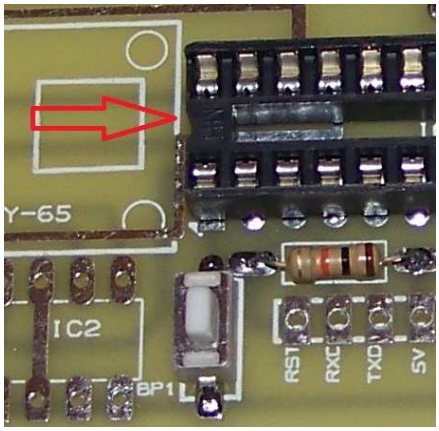
The push button



Then plug the momentary push button and solder it.

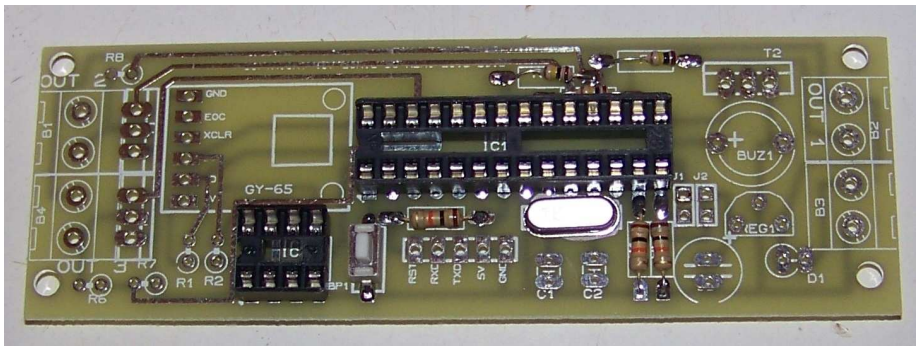
The microcontroller socket

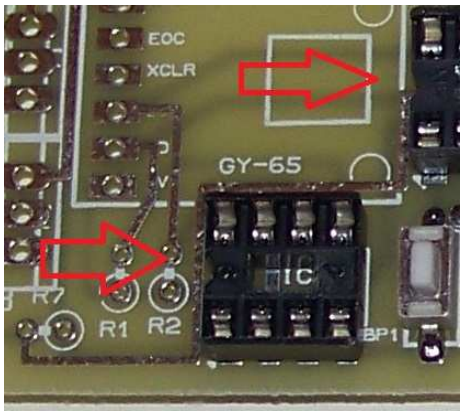




Plug the 28 pins socket and make sure that you do not miss any pin. You have a mark on the socket make sure it is on the left, this will help you later on when you plug the micro controller. Check the photo to position it.

The EEPROM socket

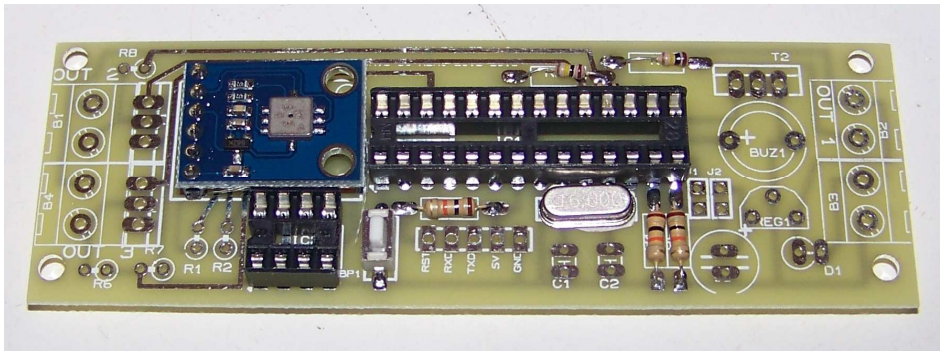




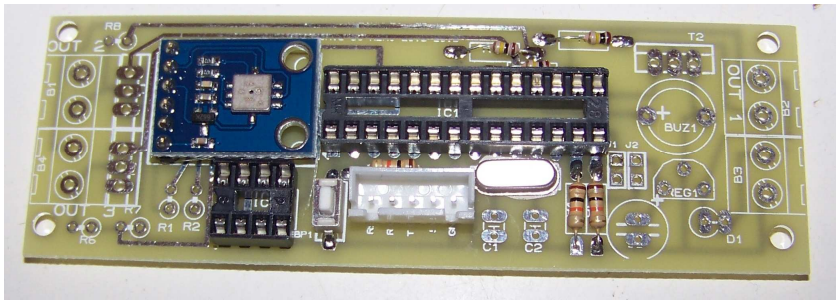
The pressure sensor

The pressure sensor is already soldered on a little board.

You need to solder that board directly on the altimeter board.

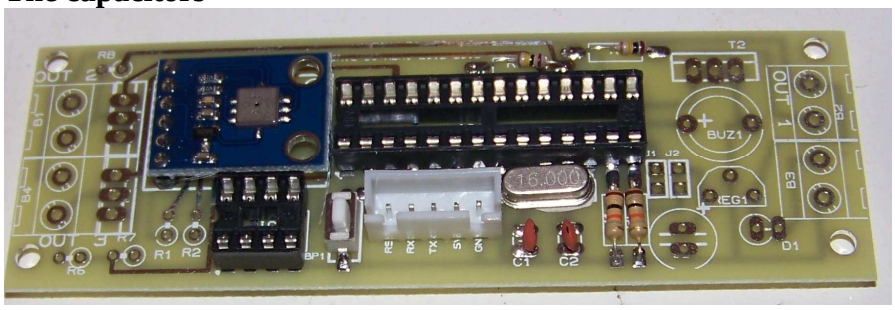


The connectors

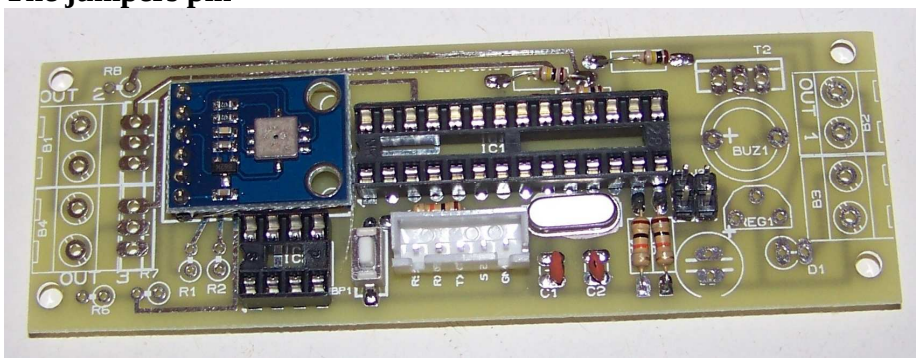


If it has not been done already; cut the connectors so that one is 6 pins and the other two are 2 pins. Then plug them to the board. Use cella tape to hold them while you are soldering. Make sure the connector is soldered like in the picture.

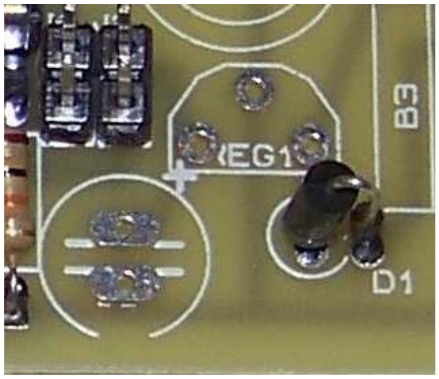
The capacitors



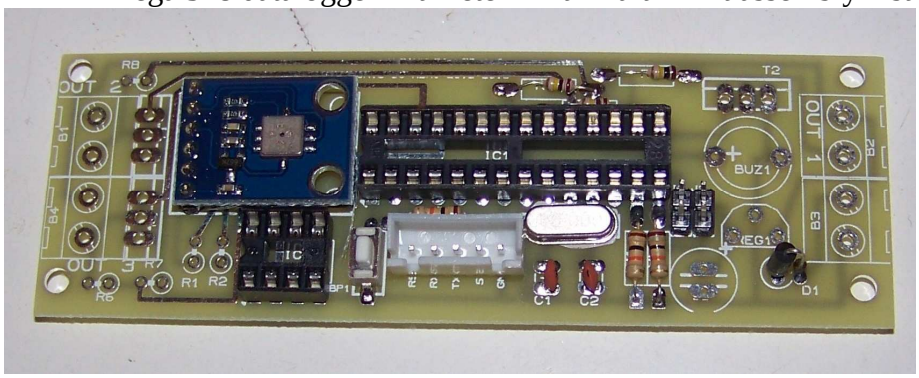
The jumpers pin



Protection diode

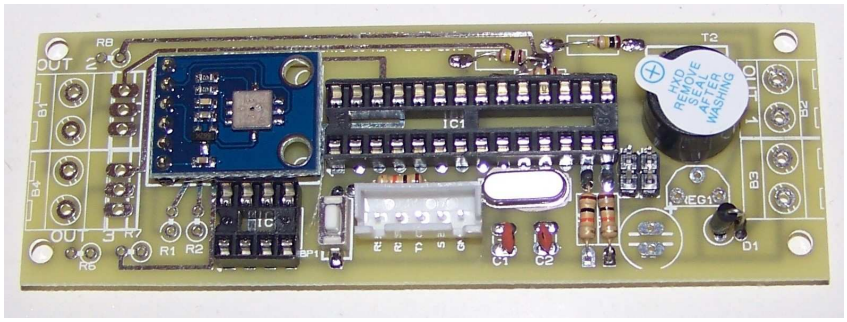


The protection diode has to be correctly plugged. The silver ring should be at the bottom, touching the board.
This is actually optional it is just to protect against polarity inversion, however it will reduce the maximum current and the voltage will slightly drop; if you do not want it replace it by a wire.



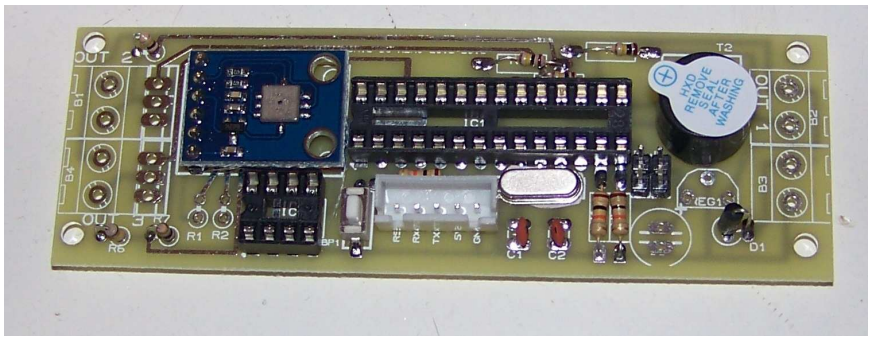
Without a diode if you reverse the voltage by mistake (ie: when you plug the battery) then the circuit will be permanently damaged.

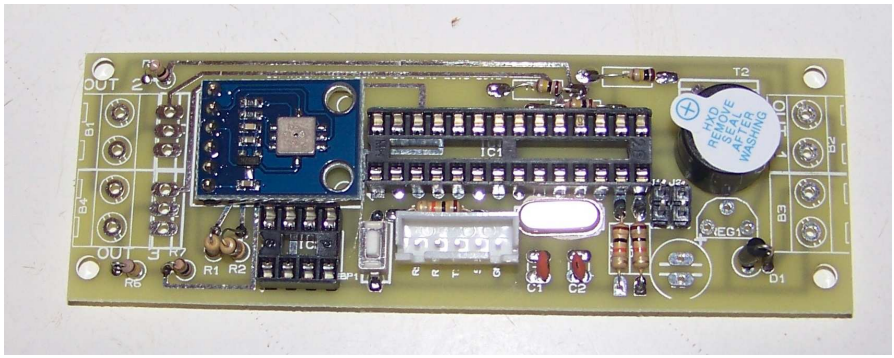
The buzzer



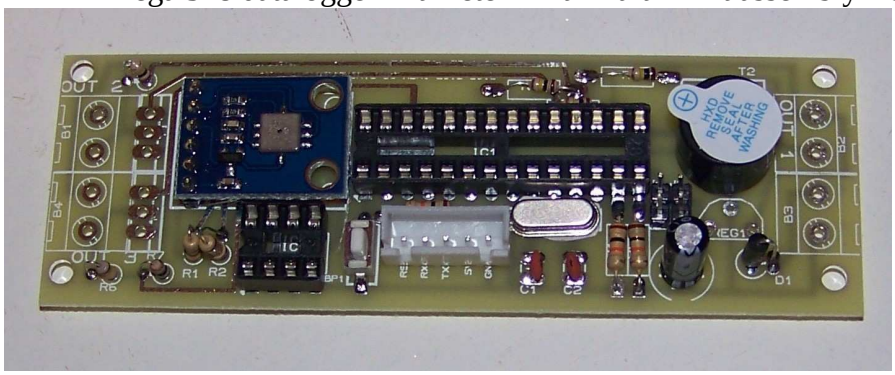
Note the « + » sign on the buzzer do not reverse it (remove the tape and check that you also have a + sign on the plastic cap). The “+” sign should be also the longest leg.

The vertical resistors



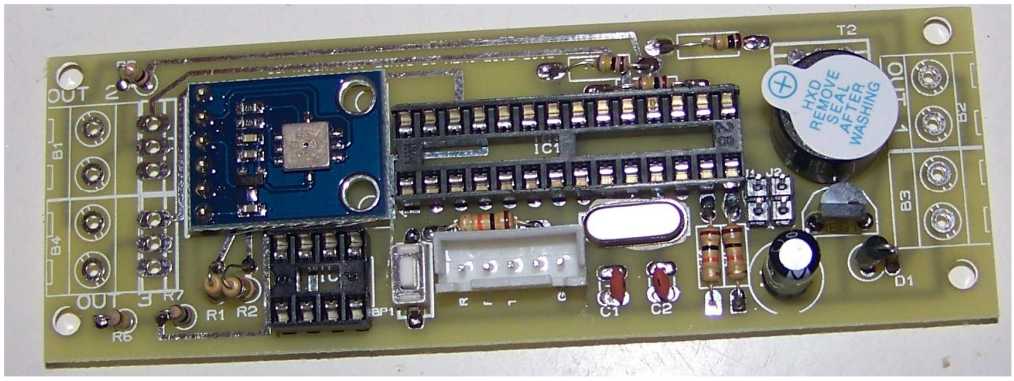


Capacitors

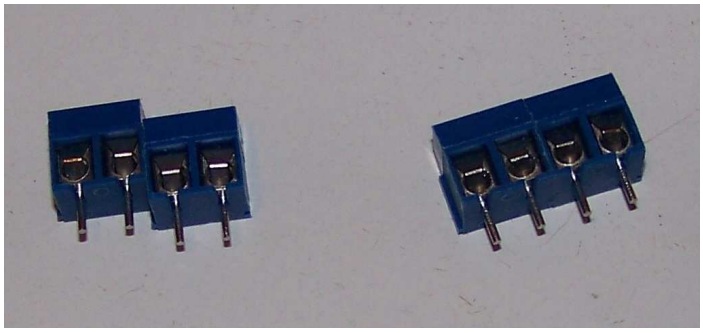


The 2 small one are the 22pF and they are around the crystal.
However the 47µF capacitor has a « + » which should go up, the other leg being connected to the ground at the bottom.

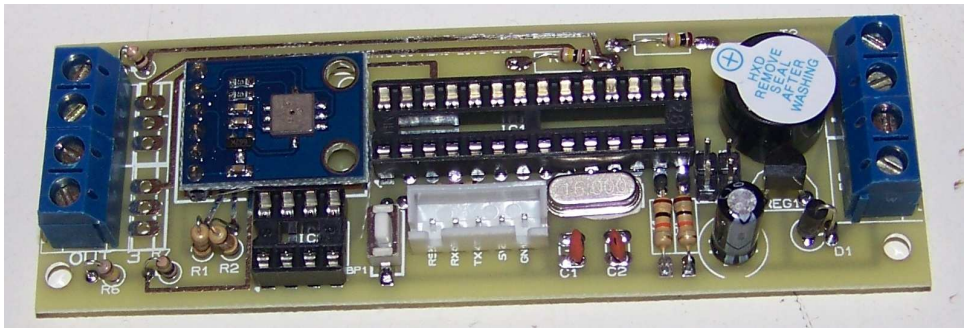
The voltage regulator



The terminal blocs

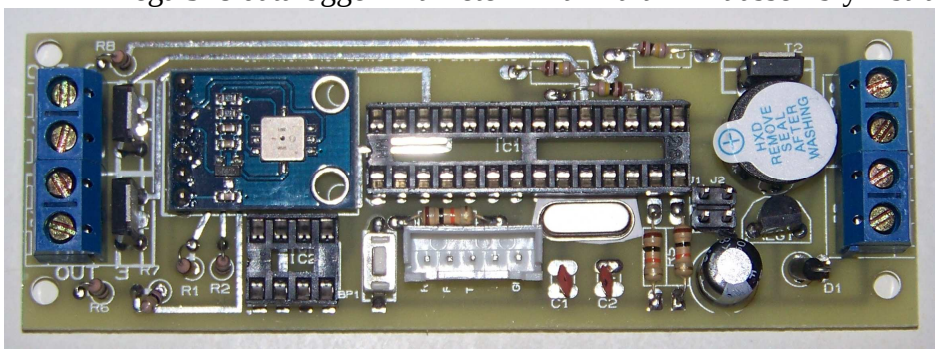


The terminal bloc can be clipped together.
Make sure you do it; then it will be stronger on the board



Make sure that the terminal blocs output are facing each end of the circuit board.

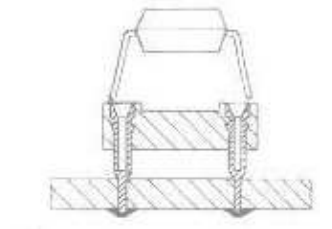
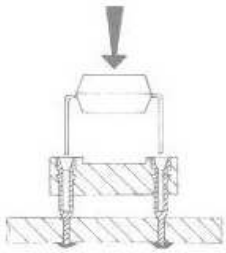
Output transistors



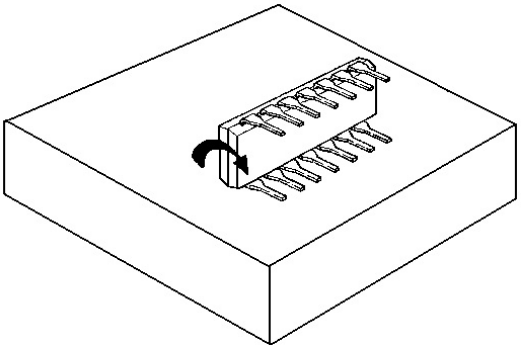
Be very careful those need to be positioned correctly they cannot be reverted. Make sure that you read what is written on the components.

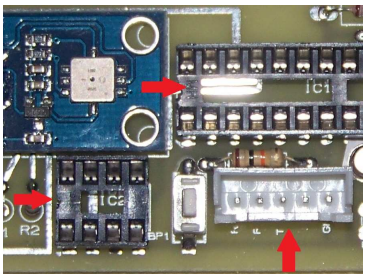
The microcontroller and EEPROM

Plug the microcontroller in the correct direction. Before you plug it you have to bend the microcontroller legs if it has not been done already.

	On a new circuit, legs are wider than the socket		You need to bend them slightly. Do that so that you can safely plug the circuit in the socket.

If you need to bend the microcontroller legs do it like in the picture below:

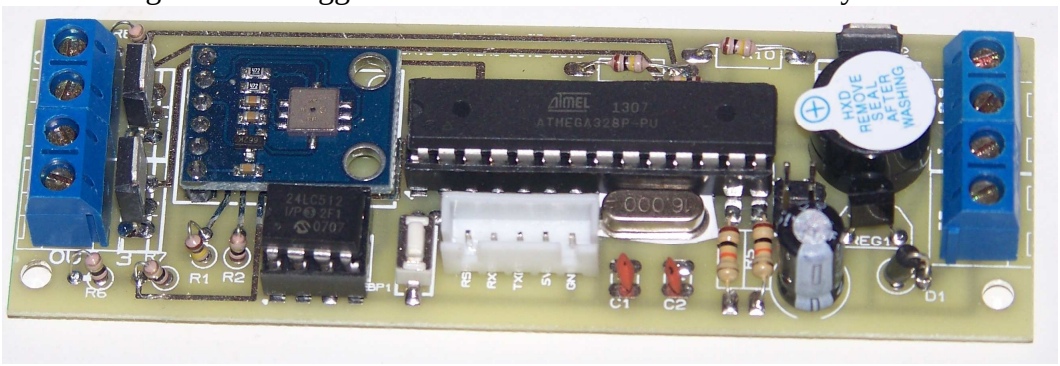




If the socket has been correctly soldered use the socket mark to place the microcontroller and align both marks.
Do the same for the EEPROM.

The finished kit is below

The finished kit looks like this. Double check yours and make sure all components have been correctly positioned. One mistake and the altimeter will not work and the components could be damaged.



Should you need additional help do not hesitate to ask.

