# Dual altimeter
# Mini Alti Duo SMT operating instructions

| Version | date | Author | Comments |
|---------|------|--------|----------|
| 1.0 | 18/01/2014 | Boris du Reau | Initial version |
| 1.1 | 15/02/2014 | Boris du Reau | Updated document |
| 1.2 | 08/03/2014 | Boris du Reau | Updated document |
| 1.3 | 13/03/2014 | Boris du Reau | Updated document |
| 1.4 | 20/09/2014 | Boris du Reau | Updated document with batteries requirement |
| 1.4.1 | 27/09/2014 | Boris du Reau | Replaced pictures |

**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 use the dual altimeter board that you just got. The document assumes that you have already installed altimeters in a rocket payload bay.

Before your start
*Remember that it is a rocket altimeter be sure that you know what you are doing and use with caution.*
*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 buy it or use it.*

## Related documentation

This altimeter is an SMD/SMT version of the mini AltiDuo kit, the only difference is an additional jumper that can be used to change the unit from metrics to feet. It is also a lot more compact and can be used in model rocket. If you want know more details on how it works read the kit programs, schematics and documentation on my website. This document will not cover things such as flashing the altimeter because it is impossible to flash the altimeter without removing (ie: unsolder) the microcontroller.

## What is dual deployment?

The Mini AltiDuo SMT is a dual deployment altimeter. The idea is that when you start reaching very high altitudes the rocket will land very far from the launch pad because it takes time to get back on the ground.
One solution is to use a dual deployment altimeter that will use a very small parachute called the drogue, slightly larger than the fins that you deploy at apogee. Ejecting the drogue prevents the rocket from doing a ballistic flight; then just before you land you deploy another parachute called the main.
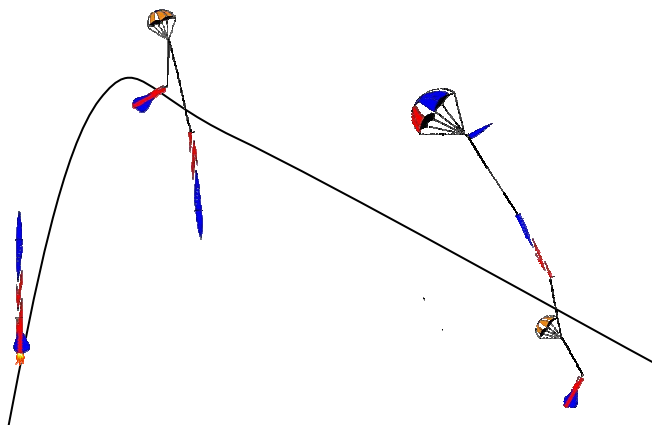
## Choosing the power supply

The altimeter has been designed to use a battery between 4.5V to 7.4Volts typically a 2 cells lipo battery with a voltage around 7 volts.

**Using a poor quality battery may result in an ejection failure which could cause a ballistic crash!!!!** Remember that when you power on the altimeter it is doing continuity test and beeping which is discharging the battery.

My recommendation would be to use a 2 cell lipo or li-ion battery. You can get 7.4Volts ones 200 or 300mA should be enough

but be careful you will need a special charger.

I am using 2 x 3.7V rechargeable li-ion batteries. They are about few dollars each and you can use a coupler. Just be careful because they are identical to the standard 1.2V  AA batteries.

Do not use 9 volts batteries. Unlike the kits, the SMT versions are working internally in a lower voltage. Using 9 volts batteries will shorten their life.

## Installing the altimeter in the electronic bay

You need to install and maintain the altimeter using 4 screws inside the electronic bay. I use 2.5mm allen screw because it has a smaller head.
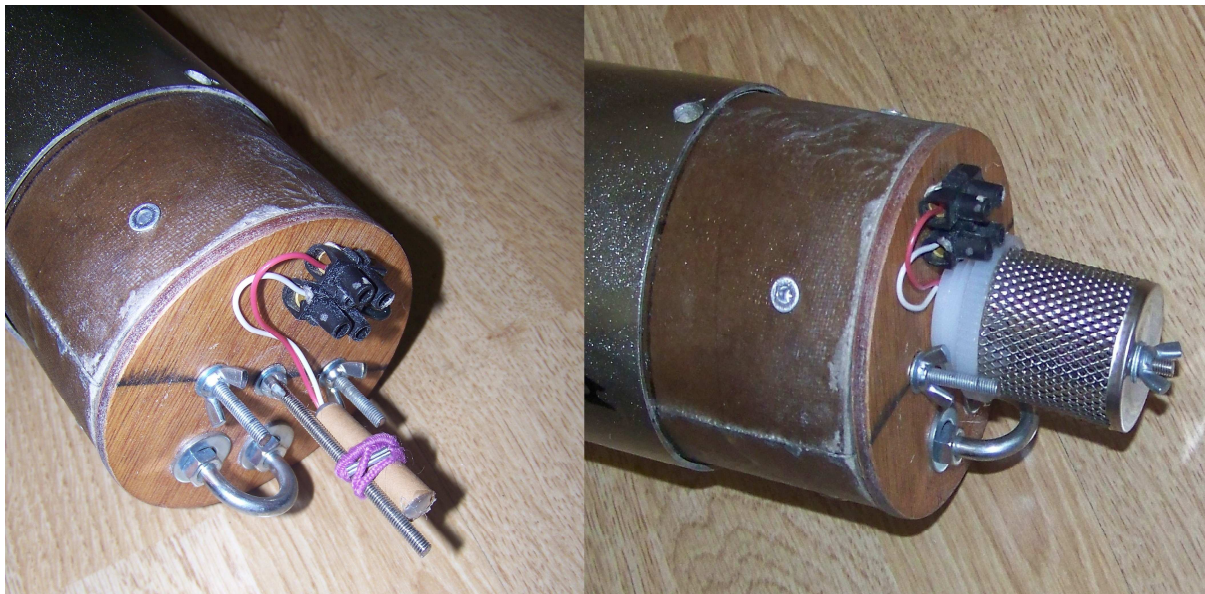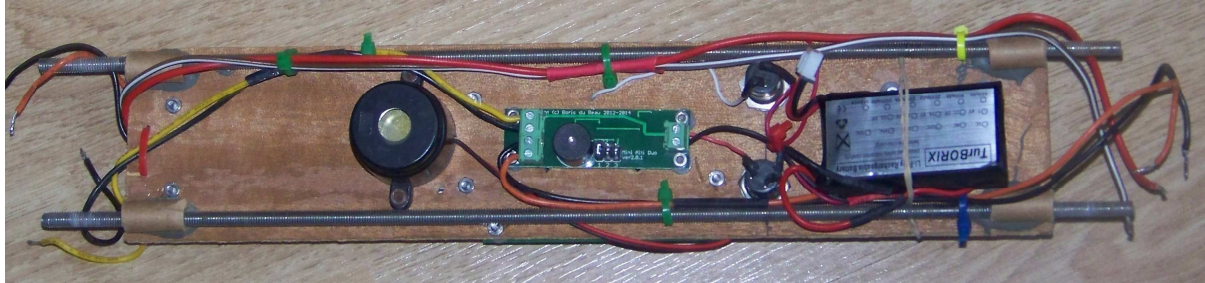
Make sure that the electronic is protected from ejection smokes which are very corrosives and could damage the altimeter board very quickly.

However remember that you have a pressure sensor which needs to measure pressure changes to work out altitude changes… hence you need to drill a hole in your payload bay.







In my rockets what I do is use screw switches to turn on my altimeter so the hole for the screw switch is also used for exchanging pressures.

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.
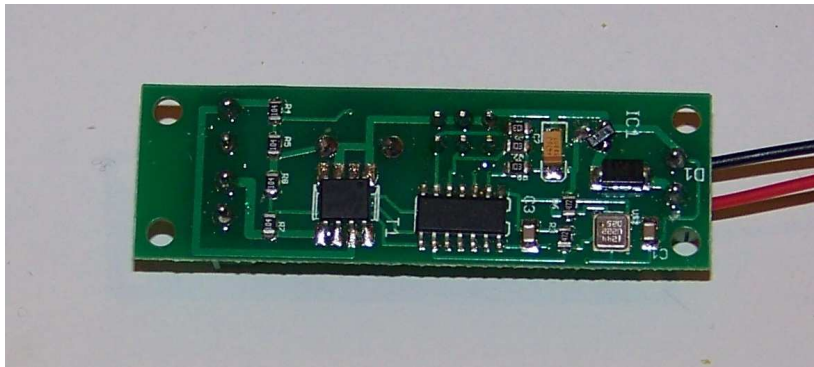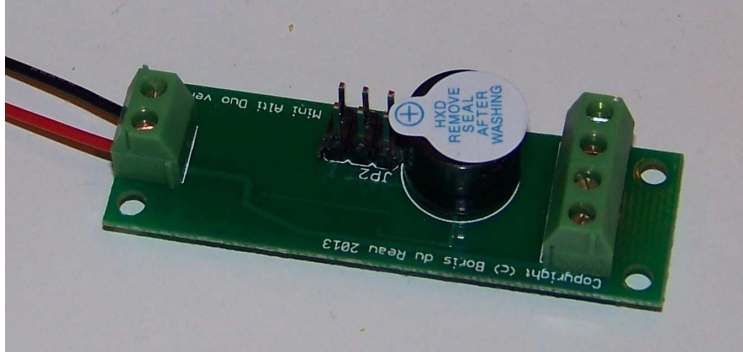
For the wire make sure that you use different colours.
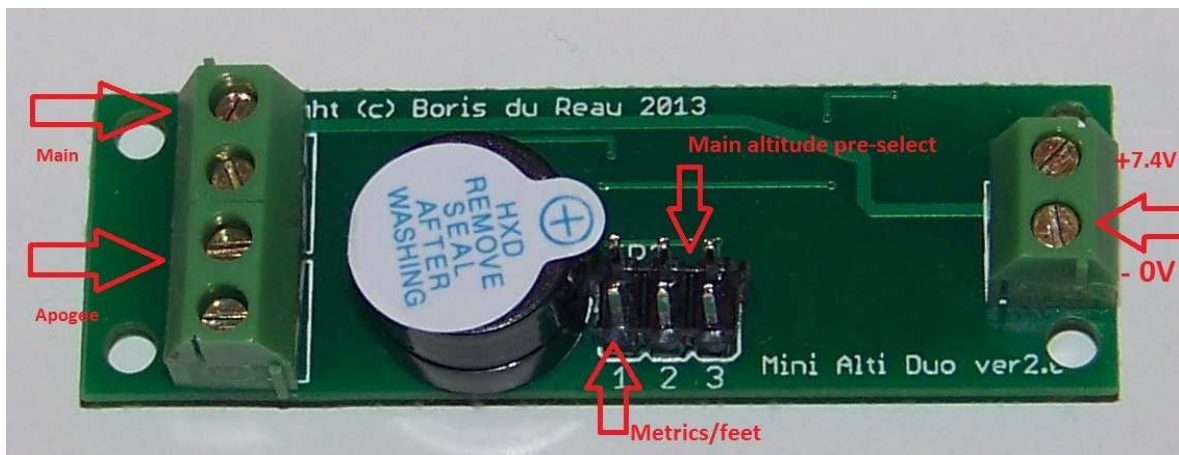
**The Alti Duo SMT**

The altimeter that you got looks like this. It is pre-programmed and some its functionalities can be customized using standard jumpers. The altimeter comes with 3 jumpers.





**Connecting all the output and input**

Connect the top left terminal bloc to the ejection charge that will push out your **main** parachute ie: the big one.

Connect the bottom left terminal bloc to the **drogue** charge and connect the **right** terminal bloc to the power supply.

**Jumper selection**
Jumper 1: choose between metrics and feet (this is used for reporting the altitude)
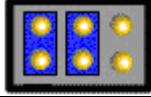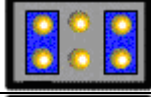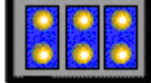Jumper 2 and 3 are used to preset the main deployment altitude

**Presetting the deployment altitude for the main**

The main deployment altitude can be preset using a couple of jumpers. With version 1.4 of the program you can choose from 4 different altitudes. They are 50, 100, 150 or 200 meters. Note that the altimeter is working internally in meters but you can change the altitude reporting with a jumper.
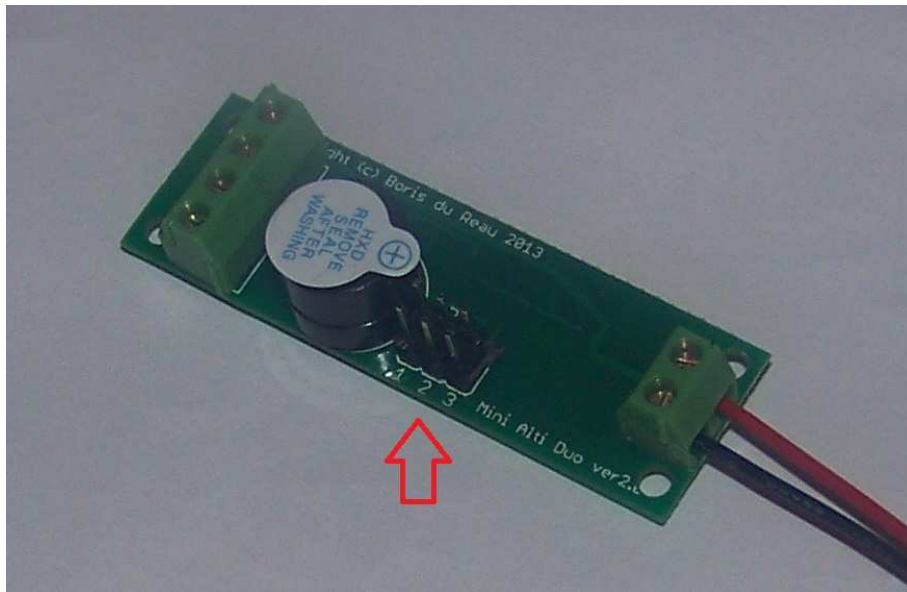


When you look at the jumper with jumper number 1 on your left here are some tables with all possible options:

For metrics

| 50m |  |
|---|---|
| 100m |  |
| 150m |  |
| 200m |  |

For imperial

| 164feet | |
|---------|---|
| 328feet | |
| 492feet | |
| 656feet | |

**Powering on the altimeter**

Now that you have everything installed in your rocket you can turn it on. It will then initiate, beep the version (1 long beep and 4 short beeps means version 1.4) and then continuously beep. Beeps are for the continuity test (ie: to make sure that your electric matches are ok); basically if you get a long beep that mean that the circuit is open for one of the charges. If you get 2 long beeps that mean that both charges are either not connected or bad. If you get 2 short beeps that mean both charges are fine.

The altimeter will continuously beep continuity until lift off is detected. Lift off being reference altitude + 20 meters.

After the altimeter has fired both charges then it will beep the apogee altitude and the main deployment altitude.
Beep resolution is 10 meters or 10 feet so it will round up the results.

Depending of the jumper selected unit
1 long beep = 100m or 100 feet
1 short beep = 10m or 10 feet

Note that the altimeter will keep on beeping the altitude of the apogee and main until it is switch off.
It does not save the altitude when powered off.

**Testing the altimeter on the ground**

The altimeter has been built and tested for you but I suggest that you build a very basic pressure chamber. It will cost you a couple of dollar and you will make sure that your altimeter is working before you fly your rocket.

Should you need additional help do not hesitate to ask, my contact details are on
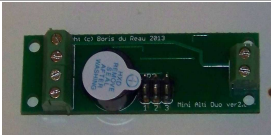http://rocket.payload.free.fr/

## Altimeter characteristics

The altimeter is quite robust it has a protection diode which prevents polarity mistakes. It also uses a Kalman filter to prevent premature ejections.

| | |
|---|---|
| Altimeter model | AltiDuoSmt |
| Picture |  |
| Size in mm | 56x18 mm |
| Weight | 7.3 grams |
| Number of pyro output | 2 |
| Micro controller | ATtiny84 |
| USB interface connector | no |
| power supply | 4.5V to 7.4V |
| Max Output Current | 9A |
| Pressure sensor | BMP180 |
| Memory | no |
| Pressure range | 300-1100hPa |
| Altitude range | -500 to 9000m |
| Kit | no |
| Main parachute altitude selection | 50m, 100m, 150m and 200m |
| Current software version | 1.4 (stable) |
| Front end version | none |
| Software update | Impossible unless you have microcontroller dev tools |
| Unit | metrics/imperial (jumper selectable) |