



ATmega 328 Datalogger altimeter

AltiMulti V1 and V2 operating instructions

Version	date	Author	Comments
1.0	17/07/2020	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	2
Related documentation	2
What is dual deployment?	2
Choosing the power supply	3
Installing the altimeter in the electronic bay	4
Presetting the deployment altitude for the main.....	6
Powering on the altimeter	7
Testing the altimeter on the ground.....	8
Connecting the altimeter using an Android device	9
Using the console application	10
Flashing your firmware	11
Trouble shooting	14



Goal

The goal of this document is to explain how to use the datalogger altimeter kit (AltiMulti V1 or V2) that you just bought or built from the schematic. The document assumes that you have already installed altimeters in a rocket payload bay.

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.

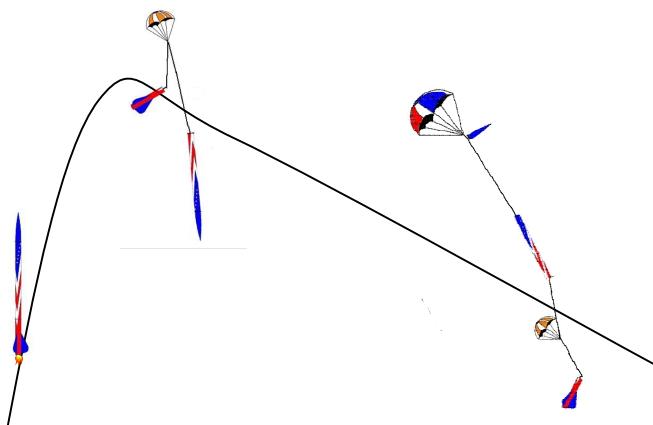
Related documentation

This document assumes that you have successfully built the AltiMultiV1 or bought the V2 altimeter and that you have read the kit building instructions. This will also cover things such as flashing the altimeter from the Android Console.

What is dual deployment?

The altiMulti V1 or V2 is a 3 pyros output with 2 of them used for 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.





What is air start?

The Alti Multi has a 3rd pyro output that can be used for air start to basically start a rocket motor.

You could also use all outputs as timer if you wish. With the Android console you can decide what to do with all your outputs.

Choosing the power supply

The kit has been designed to use a 9Volt battery or a lipo 2S battery with a voltage between 7 and 12 volts. If you are using a 9 Volts rechargeable battery make sure that you use a good one.

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 lipo battery. You can get 9Volts ones but be careful you will need a special charger.

This is the rechargeable battery that I am using. I can do more than 10 flights without recharging. They are about 10 dollars each but trust me it really worth it.



They are also a lot lighter less than 27g

Standard rechargeable battery

Lipo rechargeable battery



ATmega 328 datalogger Altimeter “AltiMulti V1 and V2” – operating instructions



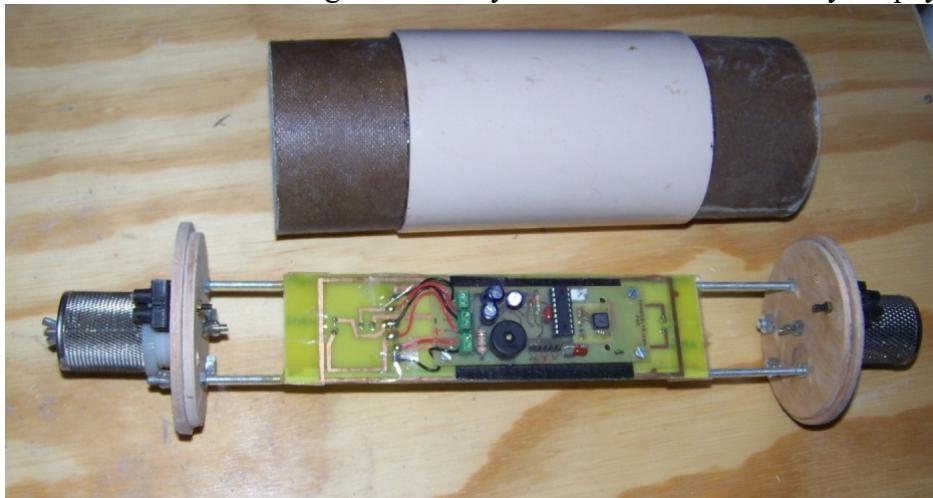
Installing the altimeter in the electronic bay

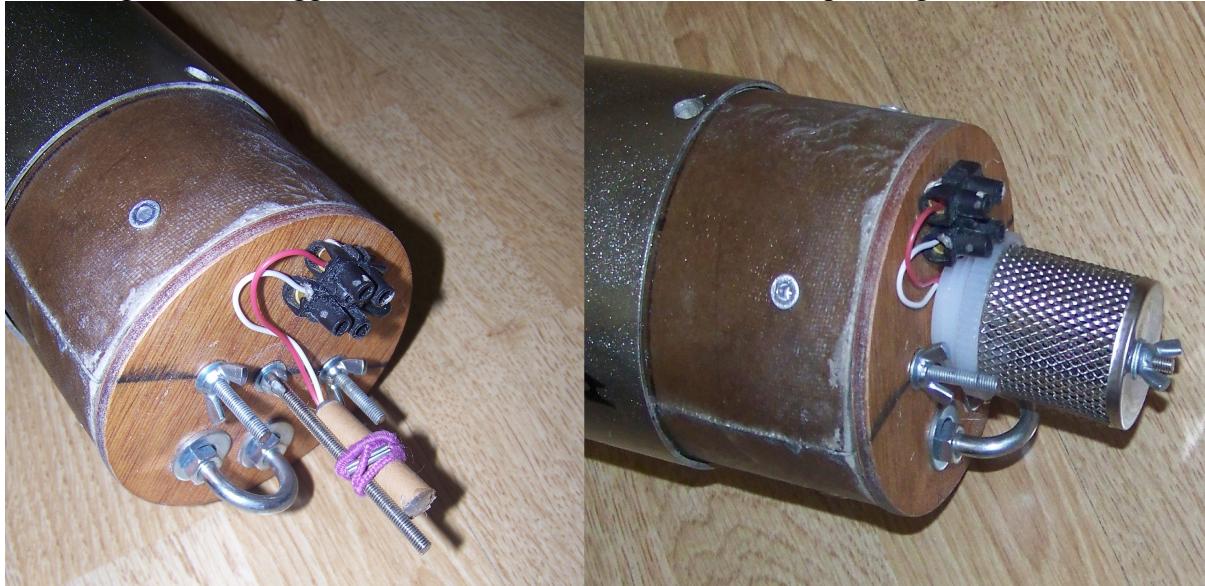
You need to install and maintain the altimeter using 4 screws inside the electronic bay. I use 3mm allen screw because it has a smaller head.



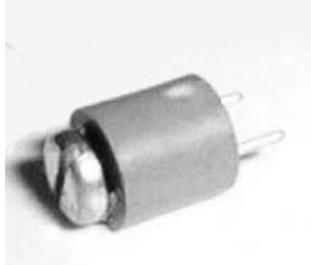
Make sure that the electronic is protected from ejection smokes which are very corrosives and could damage the altimeter board very quickly.

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.



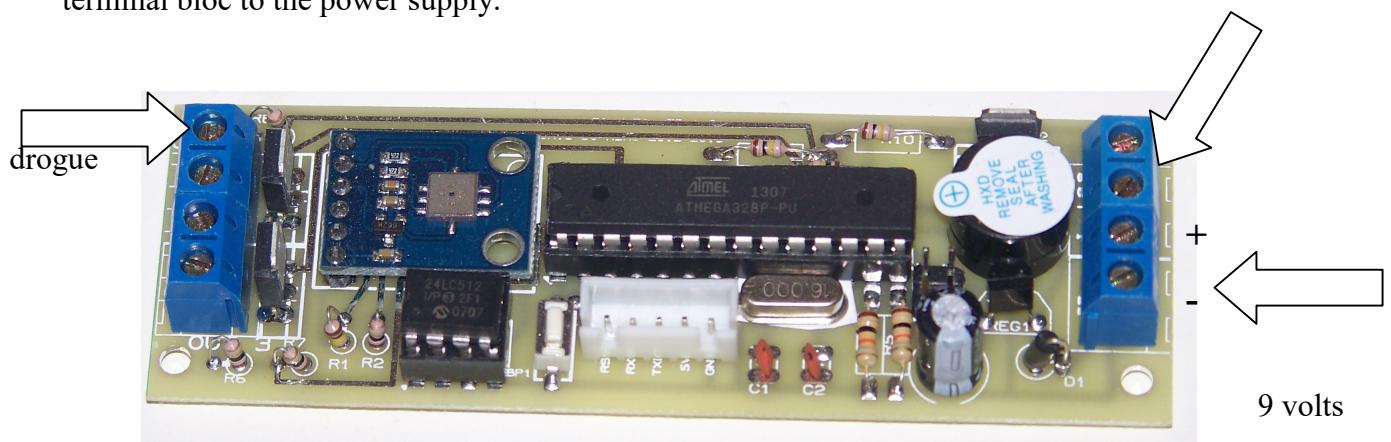
Connecting all the output and input

Note that all outputs can be programmatically changed. Those are the factory default:

If you have the AltiMulti V1

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

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



The bottom left terminal bloc can be used as a timer.

The bottom right terminal bloc is always the power supply which can be between 7 and 12 volts.

If you have the Altimeter V2 those are the default.



The right terminal bloc is always the power supply and again can be between 7 and 12 volts.

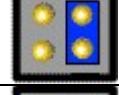
Presetting the deployment altitude for the main



ATmega 328 datalogger Altimeter “AltiMulti V1 and V2” – operating instructions
On older version of the firmware you can use the jumpers. **Newest versions of the firmware use the console to set the altitudes so jumpers are no longer required.**

The main deployment altitude can be preset using a couple of jumpers. With version 1.0 and 1.1 of the program you can choose from 4 different altitudes. They are 50, 100, 150 or 200 meters.

Here is a table with all possible options:

50m	
100m	
150m	
200m	

Powering on the altimeter

Now that you have everything installed in your rocket you can turn it on. It will then initiate and 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 until lift off is detected. Lift off being by default reference altitude + 20 meters.

After the altimeter has fired all charges then it will beep the apogee altitude and the main deployment altitude.

Beep resolution is 10 meters so it will round up the results.

1 long beep = 100m

1 short beep = 10 m

Note that the altimeter will keep on beeping the altitude of the apogee and main until it is switch off.

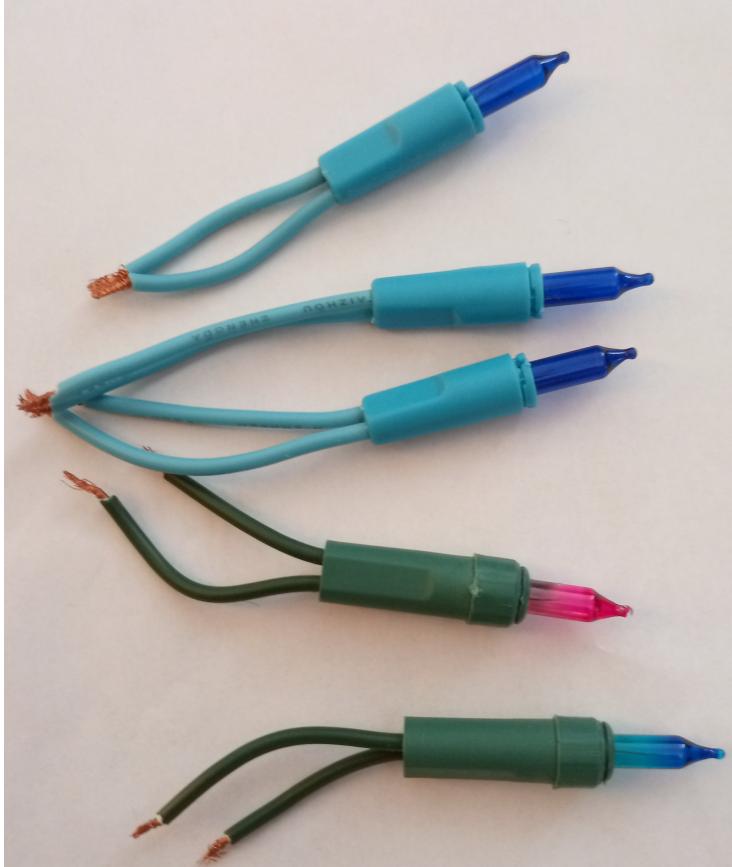
It does not save the altitude when powered off.



Testing the altimeter on the ground

In order to test all the firing sequences, 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.

When testing it do not use pyro charges, replace them with Xmas light bulb.

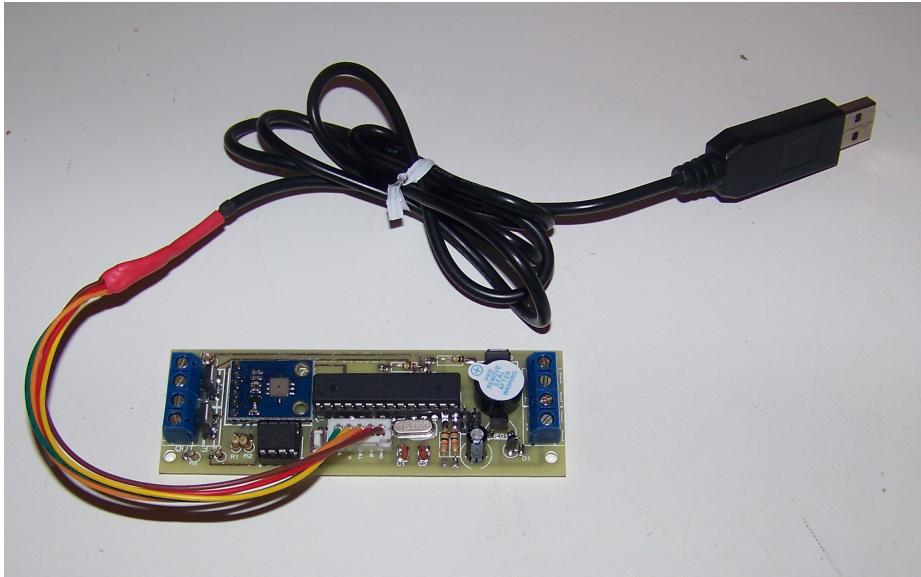


Should you need additional help do not hesitate to ask, my contact details are on
<http://rocket.payload.free.fr/>

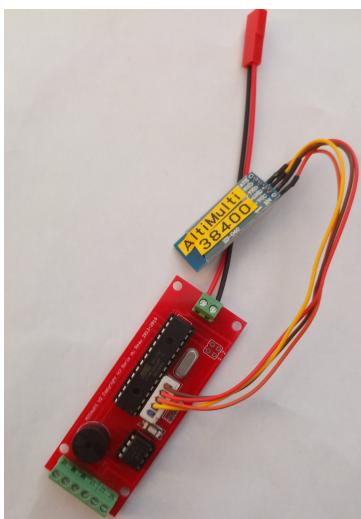


Connecting the altimeter using an Android device

The data logger has the ability to log flights and those can be retrieved and plotted using an Android device (phone or tablet). In order to connect to an Android device you will need to use a ttl cable



or a bluetooth module.



The serial communication speed has been set to 38400 baud both on the altimeter and on the Bluetooth module. If you change the serial speed on the altimeter you will have to do it also on the Bluetooth module.

Warning warning !!! if both speed are not identical you will be unable to connect to your altimeter using the bluetooth module.

See trouble shooting section to recover from that.

To connect to the Bluetooth module from your Android device you will need to pair them. The pairing code is 1234.



Using the console application

The Android console application can be used to connect to all the Bear altimeters that have a serial port. It will automatically detect which altimeter you are using. You can either compile it from the source code or get it from the Google play store. It should be compatible with most Android devices with Android 4.4 minimum. First you need to decide whether you want to connect using a cable or a bluetooth module. Bluetooth modules are very convenient because you do not have to open your electronic bay each time you need to download your flight.

Depending on the connection method you choose you will have to set it on the “Application settings” menu.

To connect to the altimeter click the connect button. If using the bluetooth module, first you will need to select the Bluetooth module you want to connect to. As soon as you are connected the led on the bluetooth module will stop blinking and you can talk to the altimeter.

Briefly here is what you can do

- Change the altimeter config
- Live telemetry (using 3DR modules)
- Read the flights
- Check the altimeter status
- Turn on/off continuity

Please refer to the on line help accessible from the console help menu. Tooltips have been added to the screens to explain what it does. Currently the application is available in English and French. Should you want it in your own language I can provide a file with strings that can be translated and I will update the application with your own translations.

You can also refer on the Console documentation but it might not be up to date.



Flashing your firmware

If you are a software developer you can get the firmware source code, compile it and upload it using the Arduino environment. It can be done using the ttl cable provided and by pressing the reset button before

If you are a regular user, to make sure that the console program and the firmware are at the same level you need to flash the firmware using the Bear console application and the ttl



+ OTG cable provided and eventually a type C adapter.



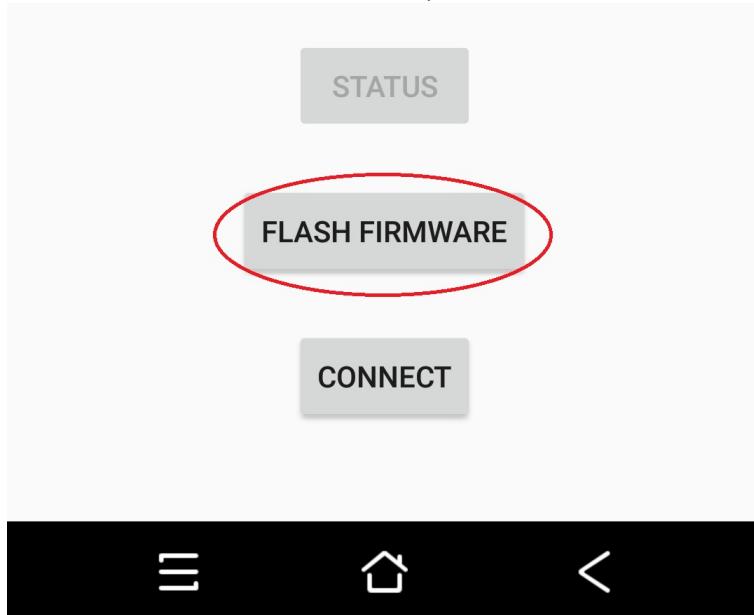
There are 2 types of TTL cables:

- A 6 wires cable which can be used to flash the altimeter without having to press the reset button.
- A 5 wires cable which will require that the user press the reset button while flashing the altimeter.

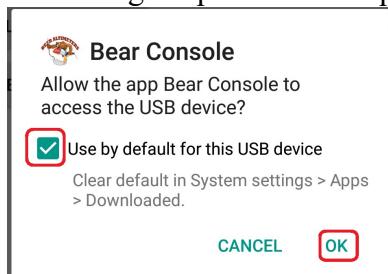


ATmega 328 datalogger Altimeter “AltiMulti V1 and V2” – operating instructions
Note that when flashing the altimeter no need to configure the application to use USB, it will automatically connect to it because a USB cable is the only way to flash the altimeter, you cannot do it with a Bluetooth module.

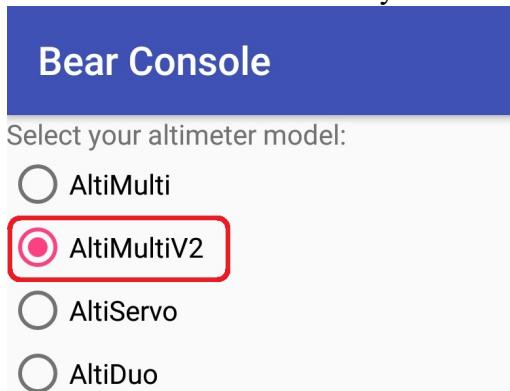
Just connect your altimeter to your phone using the TTL cable + the OTG cable and click on the FLASH FIRMWARE button,



You will get a permission request to use the USB



then select the firmware that you want to upload



Then click on the reset button of the altimeter followed by pressing the FLASH button on the console.



AltiMultiV2

AltiServo

AltiDuo

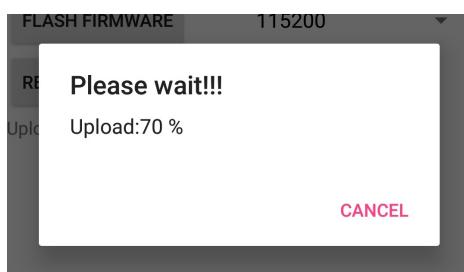
FLASH FIRMWARE

115200

RECOVER FIRMWARE

Make sure that you choose the appropriate firmware, if you don't you will have unexpected behaviour.

A popup will display with the firmware progress



Make sure that you do not interrupt it while uploading otherwise you will have to do it again.

Note that you might have to first flash a recover firmware followed by a firmware flash. In order to do that you will need to first click on recover firmware and then on flash firmware.



Trouble shooting

Because you have the ability to configure quite a lot of things on your altimeter things can go wrong and you might not be able to connect to your altimeter anymore.....

Do not worry; it is possible to reset the configuration of your altimeter.

Scenario 1: able to connect to the altimeter but the unable to modify the altimeter config without crashing the application

Solution:

Connect to the altimeter using the console (Bluetooth or cable) and reset the altimeter config to the

Scenario 2: able to connect to the altimeter but the unable to load the flights without crashing the app.

Solution 1: You might be using Android version 8 or greater so you need to use a different graphic library. Go to the “Application Settings” menu and change the graphics lib to MPAndroidChart and click save.

Solution 2: You have probably stored flights with an older version of the firmware so you are unable to read them. You need to delete them all. In order to do that click on the “RESET SETTINGS” button and delete all flights.

Scenario 3: unable to connect to the altimeter

Solution 1: It could be because you have changed the altimeter baudrate and it is not matching the Bluetooth module baud rate anymore. You can try to connect using a cable and change the baudrate of the cable until you find the correct baud rate. Then you change the baud rate to 38400 and save the config. Alternatively you can reset the config.

Solution 2: you might need to flash a recover firmware and then flash the new firmware

Scenario 4: after upgrading the console the altimeter does not connect

Solution 1: you might need to flash the firmware from the console in order to make sure that your altimeter and firmware are in sync.

Solution 2: you might need to flash a recover firmware and then flash the new firmware

Scenario 5: unable to flash the altimeter

Solution: you might need to press the reset button on the altimeter before pressing the FLASH FIRMWARE button.



Scenario 6: Altimeter behaviour is not as expected

Solution 1: maybe the firmware is incorrect, reflash it to the correct one

Solution 2: reset the config to the default one

Scenario 7: cannot connect to the altimeter using the Bluetooth cable

Solution 1: make sure that the connection type is Bluetooth

Solution 2: make sure that you have selected the correct Bluetooth module. When connected the led should not blink anymore

Scenario 8: cannot connect to the altimeter using the TTL cable

Solution 1: make sure that you have selected USB from the “Application settings” menu and that the baud rate is 38400 (unless you have changed it to something else).

If you experience any other issues that are not listed please contact me for advices. You will need to provide the following information:

- Altimeter model
- Firmware version
- Android version
- Console version