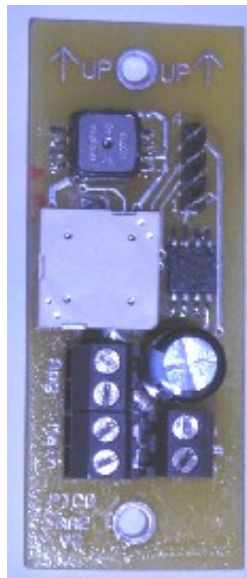


PICO

Altimeter



PICO-AA2

This accelerometer is used to trigger an event at apogee and then at a set altitude above ground during a rockets flight.

This unit also stores the acceleration and pressure data at a user specified rate for later download.

This unit is to be used by a rocketeer experienced in the use of electronics.

Contents:

- 1) Pico alt unit
- 2) This manual

Power Source:

It is very important that you adhere to the power requirements. Some power sources have too much internal resistance so they are unable to supply the momentary current spike that is required to fire some initiators. And some sources, such as 12V A23(N size) batteries, are temperature sensitive so under warm conditions such as on your test bench they work fine but when the ambient temp drops they are unable to supply the current required.

It is recommended to use a 9V battery for powering the accelerometer.

Please test your setup under conditions similar to the expected field conditions.

Remember you are responsible for your own setup, design and test it well. The suggestions here are merely suggestions.

Installing in rocket:

This unit is an acceleration reading unit. As such its orientation in the rocket is important. On the unit there are arrows that indicate UP. This is the side of the accelerometer that should face the nose cone of the rocket.

It also has a barometric sensor to detect the main deployment altitude. This sensor requires a vent hole to measure the outside pressure.

The bay should be sealed from the ejection gasses that occur during ejection charge firing. The altimeter must be protected from these gasses as they are corrosive and can damage the unit.

Mounting of the unit is going to be dependent upon your electronics bay design.

There are holes on the circuit board to be used to mount the accelerometer with #4 screws.

Operation:

Upon power up the unit will give a single power on beep.
It then waits a second before testing continuity of the output channels.
If it has continuity on the apogee channel it will beep two more times.
If it has continuity on the main channel it will beep three more times.

After the continuity test the unit will wait a second then sample the ground acceleration and pressure readings and wait for launch.

If the unit does not detect continuity on both channels it will output the peak altitude from the last flight.

Launch detect:

Launch is detected by a force of greater than 2G's for 200mS.
It also will not erase the last flight data until launch is detected.

Outputs:

The unit has a two outputs.
The apogee output fires when the accelerometer data detects apogee.
This output can be delayed.
The delay is adjustable from 1mS to 65seconds.
The output will fire after the delay times out.
This can be useful when used as a backup.
The factory default setting is apogee delay of 1mS(.001S).

The main output fires after apogee when the main deployment altitude is detected.
There is a ½ second delay after apogee before the main can fire.
The main altitude is user defined.

Wiring:

There are many ways you can wire this system.
This mostly depends upon your space available and the characteristics of your power source.
It also depends a lot on the igniter that you are using.
Always ground test a setup to verify it will work. When you are doing ground testing don't forget the effects of temperature on your batteries. When batteries get cold they can lose their ability to supply the current required by some igniters.
The output MOSFET is rated at 3.5A continuous and 14A pulsed.
Using a 9V battery is recommended.

Connecting to your computer:

To download flight data or to configure the output of the unit you will need to interface it to your computer.

The software to communicate to the accelerometer is written for Microsoft Windows operating systems.

Connect the interface cable to an unused com port on your computer.

The other end of this cable connects to the accelerometer.

Run the software and select the com port you are connected to in the setup dialog of the program (under Tools/Setup).

Now turn on the accelerometer by connecting a power source to it.

You will not hear the normal power on beep. This indicates the cable is properly connected.

The accelerometer will beep when you connect to communicate with it.

Parameter adjustment:

With the accelerometer connected to your computer and the program running go to Tools/Administer PICO.

Figure 1 shows this window.

Select the Connect button to connect. The accelerometer will beep once to indicate it's talking. The software will download the current settings from the accelerometer and display them in the window.

To manually read the settings out of the accelerometer select the button 'Read Values from PICO'. This can be useful to verify your settings after sending values to the accelerometer.

At the bottom of the window there is a Status display that shows what the software is doing.

Once connected you can adjust the settings.

There are three sections: Event- that controls the output , Sampling- that controls the flight logging and Launch Detect- that controls the launch detect parameters.

In the Event section you set the delay before the apogee output is turned on.

You also select the main deployment altitude.

The delay is in milliseconds and is adjustable from 1mS to 65535mS or 65.535seconds.

You can not specify a delay of zero so select 1mS if you want immediate triggering.

In the Sampling section you can control the sample rate and pre-launch buffer.

The sample rate is adjustable from as slow as 4 samples per second(4Hz) to as fast as 500 samples per second(500Hz).

The onboard memory can store 16,384 samples.

If you set your sample rate to the fastest rate of 500Hz then you will be able to store just over 32seconds of data.

The pre-launch buffer stores data before launch is detected.

Since it takes 200mS to detect launch there is always pre-launch detect data that needs to be stored.

The size of this buffer is adjustable from 64 samples to 4096 samples.

You want at least half of a second of pre-launch data considering launch detect takes 200mS.

Maybe more if you are looking for something specific.

The factory default setting is 500Hz sample rate with 512 samples of pre-launch data.

The Launch Detect section allows you to adjust the parameters used for launch detect.

The action time can be adjusted to make it more sensitive if needed.

The Calibrate button allows you to test/calibrate the acceleration sensor. Pressing this button will open a new dialog with two read buttons. Point the accelerometer up and hit one button then point it down and hit the other read button. This will calculate the difference which is the 2G value.

Launch is detected when this value of 2G is exceeded for the action time. This can be used to test the unit. Set the 2G value to $\frac{1}{4}$ of the 2G value $64/4=16$.

Simply write the value of 16 to the unit this will make it think 1/2G is 2G.

Now power on with the unit held horizontal. Point it down to simulate launch and hold for a couple seconds to simulate acceleration. Then point it up to simulate burnout and it will detect apogee after several seconds and fire that output. It will then fire the main output after 1/2second since it is obviously below the main deployment altitude.

Remember to reset the 2G value back to 64 before using.

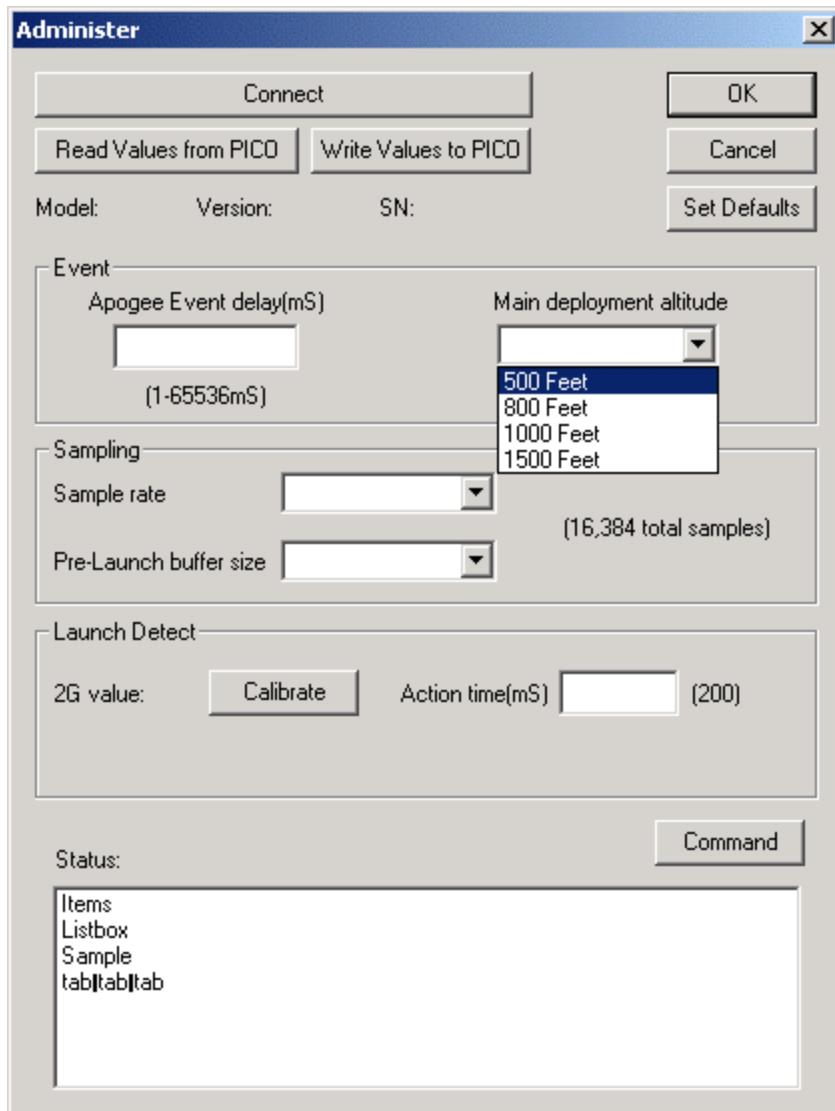


Figure 1 – PICO-AA2 Administration dialog

Specifications:

Circuit board size	1 inch x 2.3 inch
Weight	15grams without battery
Maximum acceleration	+ - 50G(default - higher values available)
Continuity report	Buzzer
Launch detect	>2G for 200mS
Acceleration Resolution	.025G (with +-50G sensor)
Main Altitude	500,800,1000,1500 feet(user defined)
Altitude resolution	7 feet
Pre-launch buffer	Max 4096 samples(user defined)
Max Sample rate	500 samples per second(user defined)
Total samples	16384 samples
Power requirements	Min = 5.3V, Max = 16V
Output	3.5A continuous, 14A pulsed
Firmware Version	132

Limited warranty:

This unit is warranted against defects in workmanship for a period of one year from the date of purchase. The manufacturer will repair or replace the unit at its own discretion. Misuse of or modifications to the unit voids all warranties.

Limitation of Liability:

In no event will the manufacturer, its employees or its suppliers be liable for any incidental or consequential damages whatsoever (including, without limitation, damages for loss) arising out of the use or inability to use this product, even if the manufacturer has been advised of the possibility of such damages..

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations may not apply to you.

This unit is a toy. As such no claims are made or implied as to the suitability or capability of this product in the manner in which you want to use it. The user accepts all responsibility for use of the unit.