

Eggtimer Proton Release Notes

Version 2.01C (Feb. 2024)

Internal Changes

Validation Code Change

Previously, the Validation Code that is used to verify submission of the Arming, Disarming, and Deployment Test pages was generated with a pseudo-random algorithm, the numbers were generally random but they repeated after power-on. Because of this, there was the possibility of a “replay” of submitted browser pages, if the user “swiped” the page instead of closing them. For this to happen, the Validation Code imbedded in the swiped page would have to match the active Validation Code. In particular, if the user performed a deployment test immediately after power-on, swiped the test-submission page, powered off the Proton, refreshed the test-submission page to resubmit the request (with the Proton off), powered on the Proton, connected to the Proton’s SSID, then put the swiped page into the foreground it would repeat the deployment test. Yes, that’s a lot of things to happen to make the deployment test repeat, but we’ve had two reports of people actually doing this out in the field, basically because they performed a deployment test on their worktable and swiped the page instead of closing it, then restored the swiped page on the pad.

So, to prevent this from happening, we have changed the Validation Code routine to be based on the number of milliseconds since power-on, rather than being a pseudo-random sequence. It is extremely unlikely that any swiped or cached pages would have the same Validation Code imbedded in it as the active code, so this change essentially prevents swiped/cached pages from causing a “replay”. The Validation Code will no longer repeat after power-on.

Note that the best practice is still to CLOSE THE BROWSER PAGE AFTER ARMING, DISARMING, OR PERFORMING A DEPLOYMENT TEST. We have updated the documentation to “remind” the user of this.

Bug Fixes

Maximum Velocity Detail Display Error

The Maximum Velocity was not being displayed properly on the Flight Summary screen under certain circumstances, this has been fixed.

Version 2.01A – 7/2023

Changes

Support for C-series Proton Hardware

The 2.x versions of the Proton firmware provide support the new C-series Proton hardware, which uses an Analog Devices ADXL375B accelerometer in place of the discontinued ST Micro AIS1120ST accelerometer. The ADXL375B has a range of 200G vs. 120G for the AIS1120SX, however the resolution is lower (0.05G vs. 0.015G). In comparative flight testing, we found no significant difference between the two accelerometer chips in terms of performance, and the ADXL375B appears to be less noisy too.

Deployment Power Status Indicator (C-Series Protons only)

If you have the newer C-series Proton, you will see a Deployment Power status line on the Status Page. This indicates whether deployment power is present or not (due to hardware limitations it does not show the voltage, however). This is helpful if you are adding a pull-pin switch to the deployment power; it will tell you that it's **OFF** if no power is detected. You will not be able to arm the Proton if deployment power is not present, and if you have it set to auto-arm it will fail to arm. Also, on the Status Page any enabled outputs set to Igniter output will have a status of **UNK** since deployment power must be present for the continuity checking circuitry to work.

Flight Comments Field

You can now add flight comments, up to 30 characters. Allowable characters are 0-9, a-z, A-Z, ".", "-", and "_" (dash and underscore). Spaces are not supported... we recommend using a period in its place. The field is at the end of the Setup screen, and the data is displayed at the top of the Status Page and the Flight Summary page. This is handy to keep track of the rocket name, motor used, etc. for each flight.

Channel Naming

You can now add a name to channels, up to 8 characters for each channel. Allowable characters are 0-9, a-z, A-Z, ".", "-", and "_". Spaces are not supported... we recommend using a period in its place. The channel name is configured in the channel configuration pages, and is displayed on the Status screen with the channel summary, and also on the test screen when you select the channel. This makes it easier to see which output may not have continuity, since it's a lot easier to deal with names than channel numbers.

When you initialize a channel, the channel name is set to "CHn" where n is the channel number (i.e. CH3). Channel number is displayed in the heading of the Flight Detail CSV download.

Boost Markers Now in Detail CSV File

The start of each detected Boost is now included in the Flight Detail CSV download file. Honestly, we don't know how we managed to miss this, since the Burnout for each Boost has been in the CSV since the initial release...

Suppress Display of Flight Events for Non-Flight

Previously, if you displayed a "flight" that never reached LDA (such as a test-arming), the data on the Flight Summary screen was incorrect. Since the data is really not valid if LDA has never been reached, flight events are now suppressed on the Flight Summary screen if there was not a valid flight.

More Detailed Display of Channel Firing Status

Firing status for each enabled channel now shows a more detailed list of why the firing was not triggered and/or failed, rather than just a single character status (i.e. "Deviation > 20" rather than just "D").

Bug Fixes

Servo Pulse Percentage for Channel 3 in Drogue Mode Not Selectable

When Channel 3 was set to Drogue Mode and the deployment mode was set to Servo, the drop-down list for the servo pulse percentage was not being displayed, so you could not change it. This has been fixed.

Airstart Parameters For Channel 1 Being Reset

If Channel 1 was set to Airstart Mode and you subsequently turned another channel's mode to OFF, some of the airstart parameters for Channel 1 were being reset to the initialization defaults. This has been fixed.

Launch Detect Altitude/Time/Event Marking Displayed Incorrectly

In the Flight Summary screen, the Launch Detect altitude and time was always displaying the baro value, even if the accelerometer-based value triggered first (which it often will). Also, in the Flight Detail CSV download the LDA marker was also displaying the baro value. Both of these have now been corrected, if the accelerometer-based launch detect occurs first it will be reflected in the displays. Note that this was a display issue only; the actual in-flight launch detect and any dependent events were being handled correctly.

Version 1.04U – 2/2023

Changes

Secondary Nose-Over Detection

A secondary nose-over detection mechanism has been added, in order to enhance deployments in pressure-noisy environments. This was first employed in Quantum firmware 1.08Q, and has proven to be highly effective.

Removal of Low-Velocity Reporting

Since the low-velocity check is no longer the sole determinant of apogee/nose-over, we have removed the display of the low-velocity metric. It is still saved in the dump data, in case it's needed for troubleshooting.

Version 1.04S – 8/2022

Changes

Internal Temperature/Altitude Improvements

Internal changes have been made to improve the accuracy of temperature readings, and the short-term stability of unfiltered pressure/altitude readings.

Browser Page Improvements

Internal changes have been made to improve the stability of the browser pages, and prevent processor resets during certain browser operations.

Version 1.04P – 12/2021

Changes

“Not Ready” Telemetry Status

When you refresh the status page prior to arming, a “not ready” status code will now be sent out the port serial port. If you have an Eggtimer Telemetry Module attached, and are viewing it with the Eggfinder LCD, you will see a “NR” status in the display, and if you have the Eggtimer Voice Module on the LCD receiver you will hear “ALTIMETER NOT READY DO NOT LAUNCH”.

Version 1.04N – 9/2021

Bug Fixes

Issue with Airstart Minimum Altitude

If a channel was set to Airstart Mode, you could set a Minimum Altitude for triggering to a value up to 9800', however the bounds checking would not save any value over 3,000'. This has been fixed; you can now set a minimum altitude up to 9800'.

Changes

“Ready” Output Signal

A new hardware status signal that outputs a logical “1” (+3.3V) when the Proton is armed for flight has been created, it is output on the ESP8266 pin IO16. This is the fourth pad from the left on the bottom row (viewing the module from the top, with the antenna to the left). This is to support a future product, however you can use it as a visual “Armed” indicator with an LED and a 330 ohm or greater dropping resistor.

Version 1.04L – 05/2021

Bug Fixes

Issue with Failsafe

If a channel was set to Main Mode and failsafe was disabled, under certain circumstances it could fire shortly after apogee even though the failsafe parameters had not been set and the velocity threshold had not been reached. This has been fixed.

Display of High Altitudes

Some screens and the .csv detail download were not displaying altitudes above approximately 32,000 correctly. This has been fixed, altitudes up to a bit over 60,000' will now display properly.

Flight Summary Display Issues

When a flight was selected, channels that were enabled in the flight but are not currently enabled would not be displayed in the Flight Summary. That has been fixed so that channels are displayed based on the enabled channels in that flight.

If the Settings option was selected, if a channel was set to Main Mode the Failsafe options were not displaying. That has been fixed.

Changes

Hardware Setup Menu/Voltage Offset

A new page has been added for "Hardware Setup", these are for things that are global to the hardware and will not normally be changed from one flight to another. The menu can be accessed by going to the page 192.168.4.1/hsetup.

The first item on the Hardware Setup menu is a Voltage Offset parameter, this is used to fine-tune the displayed voltage on the web page to what your battery is actually reporting with a DVM. The default is 0.2V. When you change the value and click on Submit, the page does not change; you need to manually close it. This parameter takes effect immediately.

Custom SSID

You may now change the SSID that is sent out by your Proton to a custom value, rather than the default “Proton_nnnnn” value. This is very handy if you have multiple Protons in your rocket, for example for a two-stage rocket; it allows you to easily determine which unit is which.

The SSID is located on the Hardware Setup menu. It needs to be 8-14 characters, allowable characters are A-Z, a-z 0-9, and the underscore (“_”). When you change the SSID, it does not take effect until you power-cycle your Proton. Since this is a new SSID as far as your phone is concerned, you will have to re-enter the passkey; the passkey does not change, it’s the same 8-digit number as before. If you forget the passkey, you can retrieve it with the data cable; see the section at the end of the Eggtimer Proton User’s Guide.

Change in “I’m Armed” Sound

Previously, the “I’m Armed” sound was a short beep, once per second. We’ve received feedback that this sound is too much like the “error” beeps and can be confusing, especially if there are other non-Proton altimeters in the AV bay, making it difficult to hear. We have changed the sound to be the same as other Eggtimer Altimeters, namely to a fast “chirping” sound. We recommend that you ground test first so you know what this sounds like.

Addition of Telemetry Features

Telemetry over the serial port has been enhanced to support the Eggtimer Telemetry Module data link to the Eggfinder LCD receiver. Further details can be found in the Eggtimer Telemetry Module User’s Guide.

Version 1.03L – 09/2020

Bug Fixes

Baro-Accel Deviation Issues

The Baro-Accel Deviation qualification for airstarts was not working as intended. Upon lengthy testing and flight data inspection, it was found that the issue was that the calculation of the Acceleration-derived filtered altitude was not correct, due to issues with the calibration of the accelerometer. It has been corrected.

Changes

Elimination of Accelerometer Calibration Screen and Arming Procedure Changes

There has been a major change to the calibration procedure for the accelerometer, and consequently the arming procedure. Previously, the accelerometer was either calibrated horizontally after a 5-minute warmup period, or was calibrated vertically on the pad after the warmup period. This was inconvenient, requiring the user to basically leave the AV bay alone for 5 minutes after connecting the power. The user had to explicitly calibrate the accelerometer; if they did not, the Proton would not allow arming. This caused a lot of frustration, because users would often forget, and could not arm the Proton after the rocket was racked and raised to flight position. The “vertical on-pad” arming option was added in version 1.02N to make this a little less painful, however it still had to be done before the Proton could be armed.

The accelerometer calibration has now been changed so that it is performed automatically when the Proton is armed, with the only condition being that the accelerometer warmup period (3 minutes, reduced from 5 minutes previously) has expired. The assumption is that the Proton is going to be armed while the rocket is pointed to the vertical, which is the NAR/TRA rule for electronic deployments. The manual calibration procedure (and the calibration screen) has been eliminated.

To let you know how much time you have left before you can arm the Proton, a “Wait to Arm” parameter has been added below the button on the Main Status screen. The legend of the button will now say “REFRESH” instead of “ARM” if the Proton is not ready for arming; this more accurately reflects its function under that condition. The “Wait to Arm” parameter goes away after the 3-minute wait has elapsed, and the legend on the button changes to “ARM” to let you know that it is now armable. The assumption of course is that you will be arming the Proton while the rocket is on the pad and pointed vertically.

Addition of Auto-Arming Option

Previously, the Proton required manual remote arming, unlike “other” altimeters it did not automatically start a flight sequence after power-up if all pre-flight checks passed. While we strongly recommend this procedure from a safety point of view, we recognize that some people may want to add a mechanical switch to the master power on the Proton, so in some cases it would be advantageous to have the Proton auto-arm.

Consequently, we have added an auto-arm option to the Global Settings menu. If selected, the Proton will auto-arm after the 3-minute accelerometer waiting period. It will give you a short “blip” once every 5 seconds while this 3-minute period is in progress, after which it will go into the normal flight sequence assuming all continuity and other checks pass. Like the remote arming procedure, it is assumed that you power-up the Proton while it is on the pad and pointed vertically.

You can abort the auto-arm sequence at any time by connecting to the WiFi page; that will put it into manual-arm mode. If you want to make changes to the settings you can do so, afterwards you can either manually arm it by entering the arming code and clicking on the ARM button, or by power-cycling it in which case the auto-arm sequence will restart.

Minimum LDA Altitude Change

By request, the minimum allowable Launch Detect Altitude has been changed from 100’ to 50’. You may want to use this value with short-burn, high-thrust motors such as the CTI VMax or the Aerotech ST series. It’s also great for water rockets, too.

Maximum Baro-Altitude Deviation Change

By request, the maximum allowable Baro-Altitude deviation has been changed from 25% to 30%.

Version 1.02T – 05/2020

Bug Fixes

Servo Mode Test Issue

Channel tests in servo mode were not working, and in some cases caused a processor reset. This has been fixed. Note that this did not affect servo deployments in flight... servo tests use a different piece of code than the flight code.

Version 1.02S – 01/2020

Bug Fixes

Airstart Baro LDA Issue

Airstarts triggering off LDA was not working correctly in some cases. This has been fixed.

Changes

Default Trigger for Airstarts

The default trigger for airstarts was previously LDA + delay time. In speaking to a number of users, the consensus was that it should be based on the first accelerometer-detected burnout + delay time, so we have changed the default for newly-assigned airstart channels to default to that.

Version 1.02R – 07/2019

Changes

Landing Detection Change

In previous versions, landing was detected when you reached an AGL of < 30' for at least three seconds. This led to some issues with memory exhaustion when landing in an elevated location, such as a hill or a tree. The landing logic has been changed so that after the rocket has reached an AGL of half of the apogee, landing will be detected if the baro altitude does not change +/- 10' for more than 10 seconds.

Version 1.02Q – 06/2019

New Features

Mode Change Screens

In previous versions, when you changed the mode of a channel it went back to the Status Page, although the settings were reset to the defaults for that mode. Now, when you change the mode it immediately goes to the settings page for that mode, with the defaults.

Bug Fixes

Horizontal Calibration Redirect Screen

In previous versions, if you hit the refresh button on your browser after performing a horizontal calibration it would redo the calibration. This was a problem because we found out that people would refresh the browser while the rocket was vertical on the pad, which would calibrate the accelerometer incorrectly and prevent you from arming the Proton. Now, when you do the horizontal calibration it redirects to the Status Page, so if you do a refresh it simply goes back to the Status Page.

Descent Sample Bug

Descent samples per second were not being saved properly, so they were always 2 samples/sec even if you changed them. They now save and apply properly.

Igniter/Servo Mode Bug

Channels 4-6 displayed the Igniter/Servo option for the Drogue & Main modes even though are only supported on Channel 1-3. The prompt has been removed from those channels, since it defaults to Igniter mode.

Version 1.02N - 05/2019

New Features

Vertical “On Pad” Accelerometer Calibration

In previous versions, the accelerometer calibration (required for arming) had to be done while the rocket was in a horizontal position. If you forgot to calibrate the accelerometer and put the rocket up on the pad, you couldn't arm it because the accelerometer could not tell if you were vertical or not. That's a good safety feature, but the necessity of having to calibrate horizontally was a hassle... if you forgot to do it then you had to take the rocket off the pad, calibrate, then put it back on.

To make the required accelerometer calibration more convenient, we've added a new calibration option, “Vertical (On-Pad)”. If you choose this option, the calibration is performed when you arm the Proton, the assumption being that your rocket is vertical, or nearly so. There is a parameter for “Offset from Vertical” that will compensate for any rod tilt that you may be using.

We think most people will end up using this option... in our testing, we found that it's WAY more convenient.

Airstart Trigger from Burnouts

There is now an option to trigger airstarts from detected burnouts, up to six of them. With this option, the channel is fired after the selected delay from the burnout. This means that for many multiple stage projects you don't have to mess with guessing what the timer value from LDA should be.... Instead you can just select the time from the first burnout that you want the motor (or separation charge) to fire.

Note that we still STRONGLY recommend that you simulate any airstart... this feature just makes it easier to implement your sim.

Delay Time Changes

Delay times for airstarts and drogue firing have been extended to 30 seconds, by popular request. This adds flexibility for non-deployment or non-airstart events (drag brakes, etc.). In addition, airstart delays can now go to zero seconds (previously the minimum was 0.3 secs).

Changes to Flight Summary Display

Some of the abbreviations have been expanded, and some of the fonts have been cleaned up to make the Flight Summary display easier to read and understand.

Changes to Flight Detail Display

The Maximum Velocity and Maximum Acceleration event markers are now referenced to the actual value, instead of the altitude that it occurred. If you graph these events, you should select the appropriate Velocity or Acceleration graph too, or your event will look odd.

Changes to Test Menu

For airstart clustered channels, if you select the "master" airstart channel it will also fire any clustered channels. If you select the individual clustered channel, it will only fire that channel. This allows you to test your battery with all clustered loads to make sure that they will fire.

Boot Up Display

Some diagnostics have been added to the boot up display that you get if you connect the USB-serial cable at power up. These will be helpful if you have a problem after building your Proton.

Bug Fixes

Processor Resets During Flight Displays

Previously, if you did a vacuum-only test the Proton might reset when you connected to the WiFi to display the Flight Summary page. This was due to the accelerometer not being triggered... the value for acceleration was not valid. Now, this will not occur, and you will see "n/a" in the Flight Summary display.

Under some rare conditions, the Proton might have reset during a Flight Detail display. That condition has been fixed.

Occasionally the Proton may have reset itself after landing and subsequently being connected to a device to display the Flight Summary display. That issue has been resolved.

Minimum Voltage for Deployment Batteries is 7V

This isn't really a bug, but the minimum voltage for a separate deployment battery is about 7V. The Proton is designed to be used with a 2S LiPo battery, however if you need to use a separate battery for the deployment side we recommend that it be no smaller than a 2S LiPo as well. You cannot use a 1S/3.7V LiPo... its voltage output is below the minimum voltage spec of the driver IC's, and you will not get a good continuity reading. Larger batteries are just fine... the drivers are rated to 28V, so if you're driving a solenoid or high-current igniter then a 3S or a 4S LiPo will be OK.

SOF Wasn't Always Accurate

The Start of Flight (SOF) time/altitude on the Flight Summary display was not correct if SOF was initiated by the accelerometer rather than the baro sensor (which is more often than not the case). It was always displaying the baro SOF. This has been fixed.

Detail Display Bugs

Previously, negative numbers in the flight display showed up as a large positive number. That has been fixed.

Version 1.01A – Initial Release 11/2018