# FRCAL. A Utility for Calibrators and Data Analysts

## A Utility for Writing (Approved Calibrators Only) and Reading JSON files of Flight Recorder Calibration/Correction Data.

Introducing **FRCAL**, a utility for Reading and Writing JSON files. As the code executes on the Server, any platform that supports a suitable browser can be used, however one that supports a pointing device (mouse) will be easier to use.

JSON (pronounced as Jason), stands for "JavaScript Object Notation," is a human-readable and compact solution to represent a complex data structure and facilitate data interchange between systems.

For example, it will simplify the task of correcting Altitudes in Badge Claims and Competitions. It will also create Calibration/Correction Tables from JSON files, should they be required.

More information on the use of JSON files can be found in the Flight Recorder Specification Document (AL9) Appendix J,

For Approved Calibrators only, JSON files can be produced from .IGC files created in the process of calibration.

## Getting Started.

Click here to **Load the Program**.

The top line of the program is a Menu Bar. The option **Home** is not used.

A number of options are available to you. On the Right, is the **Settings** option.


This is where an Authorised Calibrator will add his/her Credentials, which will be stored for future use. If you are not an Authorised Calibrator, ignore this option.

## Filenames create by FRCAL

Files created by FRCAL, both .JSON and .PDF, follow a naming convention defined in the Flight Recorder Specification Document (AL9) Paragraph J7.2.2. It should be noted that some recorders incorporating Flarm functionality have Hardware and Firmware from different manufacturers in which case the first three characters of the filename will be the Three Letter Code of the Firmware Supplier (FLA) even though the recorder may not be sold as manufactured by FLARM, but by another Entity.

# If you are not an Authorised Calibrator:

The options are limited, but still very useful.

The first action to take is to load the JSON file you want to use. First, click on **Import JSON** in the Menu bar.


Select Browse to choose the file and then Upload to import the data into the program.

All being well, you will now see the data that you have imported.

Take a note of any comments at the bottom of the page. If under 'test conditions' it does not say 'Uploaded JSON file has VALID security signature', the file most probably did not originate from FRCAL and may be suspect.

You can now export the data as a Calibration/Correction table in either Metres or Feet, however please note that it will not include the Calibrator's Stamp/Signature.

If you wish to find a single corrected altitude, select the **Apply correction** option from the menu bar.


This is simple to use, Enter the figure that you want to correct, select the measurement unit (most important) and click on Apply Correction.

# If you are an Authorised Calibrator:

You can do all the above, but in addition:

You should be familiar with the Flight Recorder Specification Document (AL9) Chapter 4 Section 4.5.

For the purposes of Pressure Altitude Calibration, there are two types of Flight Recorders, those with Analogue Pressure Transducers and those with Digital Transducers. Those with Analogue Transducers are older types, listed below.

- *Cambridge Models 10, 20 & 25*
- *Garrecht Volksloggers*
- *LX Navigation LX5000-IGC*
- *LX Navigation LX20/21 (excluding LX20/2000)*
- *Scheffel Themi*
- *Position Recorders*

Flight Recorders with Analogue Pressure Transducers must be calibrated in a Barometric Chamber, as errors cannot be predicted. Flight Recorder Specification Document (AL9) Chapter 4 Section 4.5.1 applies.

For other Flight Recorder, after their Initial Calibration, a Single Point Altitude Correction may be performed, as per Flight Recorder Specification Document (AL9) Chapter 4 Section 4.5.2.

Note: The Corrected Ambient Pressure is Pressure reading on your Barometer local to the Instrument under test, corrected by the Barometer Calibration Table.

Be sure to apply the correction in the right direction!

It is worth remembering that many models of Flight Recorder do not log at the set interval (or at all) until a change in position (Vertical or Horizontal) has been detected.

Once you have added your credentials in the Settings tab, you can do all the tasks that may be performed by non-approved persons, but in addition you can perform the following tasks:

## *Barometric Calibrations*

Firstly, carry out the procedure described in the Flight Recorder Specification Document (AL9) 4.5.1 et seq., saving the .IGC file.

Make sure that you have Metres or Feet selected as the Calibration units in Settings.

Load the FRCAL program from the above link, and select the **Pressure Chamber calibration** option from the menu bar.

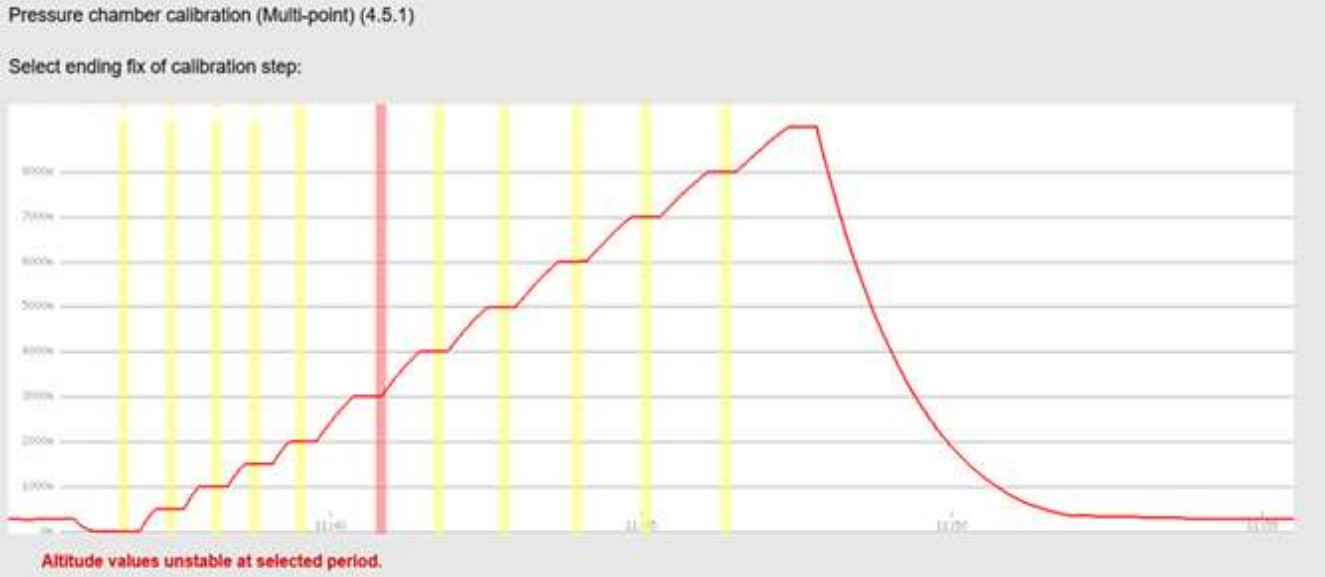

Browse for the IGC file created in the Barometric Chamber and click on Upload.

You will now see a barogram.

Starting at 0 feet/metres, click at the end of period of stable data.

The selected period should appear in Yellow. If it is marked in Red, altitude is unstable over that period, so pick a better period.

Repeat for all recorded steps.




If you are unable to find a stable period do not worry, just go on to the next step. You can enter missing steps later.

Click on Finalize when you have done all that you can.

You will now see a table of entries. You can enter any missing data by assessing the IGC file manually.

You must also enter the Ambient Temperature and Corrected Ambient Pressure, and click on Submit.

Save the calibration as a JSON file and as a PDF if you wish.

Using the filenames offered when saving is recommended, as it is a composite of the Flight Recorder S/ID, Calibration type and date of Calibration.

# And that is it done.

## *Single Point Correction.*

Firstly, carry out the procedure described in the Flight Recorder Specification Document (AL9) 4.5.2 et seq., saving the .IGC file. The PEV button can be used to initiate 30 seconds of fixes at 1 second intervals.

Make sure that you have Metres or Feet selected as the Calibration units in Settings.

Load the FRCAL program from the above link, and select the **Single Point correction** option from the menu bar.

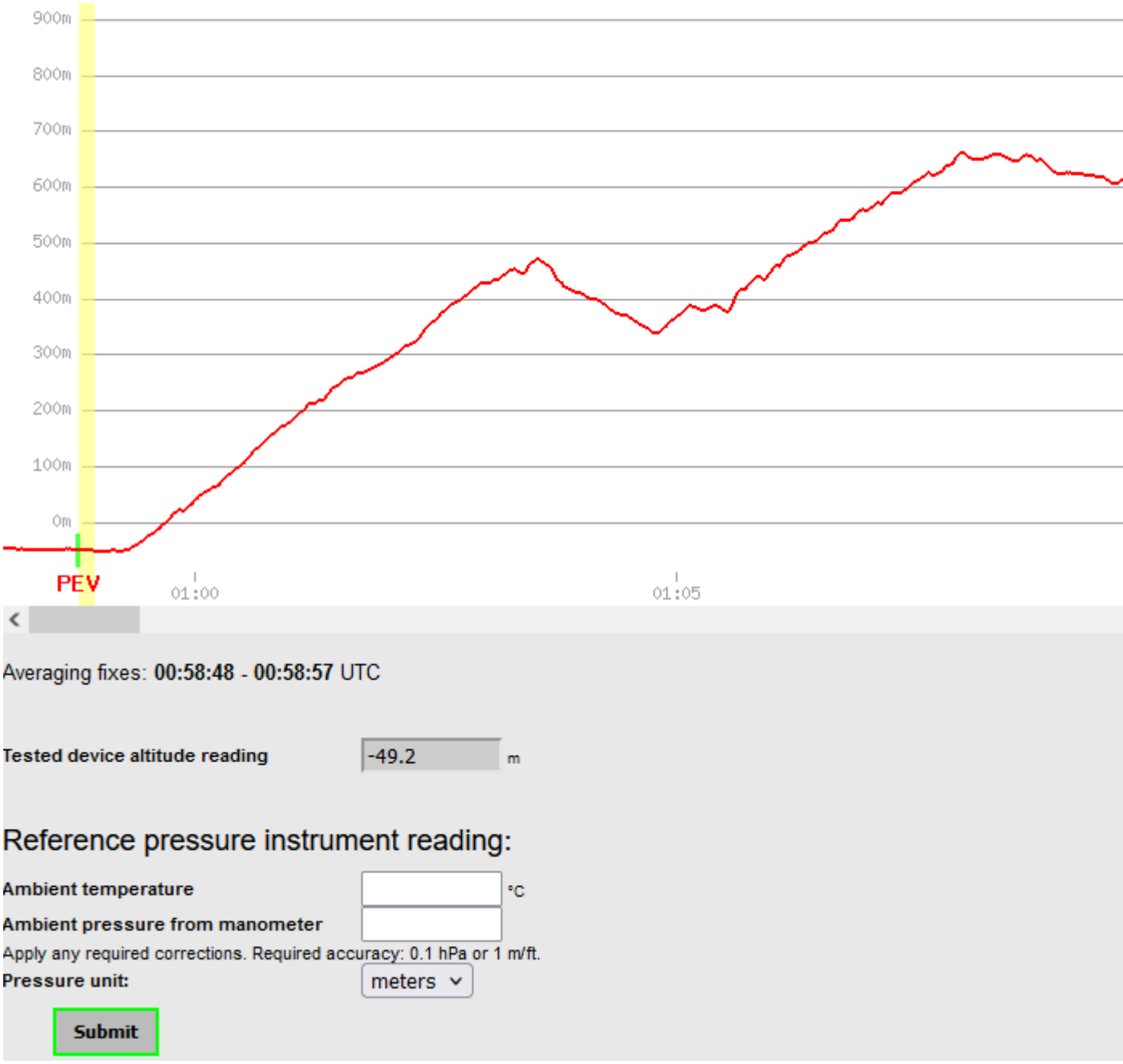

Browse for the IGC file created, and click on Upload.

You will now see a barogram.

Select the Point of Comparison. If you have used the PEV button, it will mark the Start of 1 second fixes. Pick a time after that.

The selected period should appear in Yellow. If it is marked in Red, altitude is unstable over that period, so pick a better period.

Having successfully selected the Point of Comparison, enter the Ambient Temperature and Corrected Ambient Pressure, and click on Submit.




Save the correction table as JSON file and as a PDF if you wish.

Using the filenames offered when saving is recommended, as it is a composite of the Flight Recorder S/ID, Calibration type and date of Calibration.

## And that is it done.

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