TMSC Instruments

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Alt-Temp Logger

User Guide

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# Overview

The TMSC Instruments Alt-Temp Logger is designed to aid in capture of data related to temperature gradients at altitude. This information can then be used to calculate glide slope ratios and other information for unpowered aircraft. The logger includes a combined pressure and temperature sensor, a 128x64 OLED display, a micro SD card slot, a 500mAh lithium polymer battery and a microUSB interface for charging and firmware updates. It is designed to fit into a Mecaplex style window present on many glider models. While in operation, the display indicated the observed temperature, attitude above ground level, the system time, and an indication if the system is recording. Controls include a button to zero the altitude, record start button, record stop button, and a power switch.

# Operating Instructions

## Setup

1. Insert an 8GB or smaller microSD card into the logger formatted for the FAT32 file system.
2. Insert the logger into the aircraft window (details and pictures will be added here after design is finalized).
3. Attach DOP prevention string to something in the cockpit that will not inhibit the use of flight controls or egress from the cockpit in the event of an emergency.

## Operation

1. Flip the toggle switch on the side of the unit to power up the system (up position).
2. Wait for about a minute as the logger performs power on checks. If an error is displayed, power off the unit and return to the instrumentation lead for troubleshooting.
3. While the tow rope for the glider is being attached, press the “zero” button. This will set the ground level from which the AGL attitude will be calculated. The altitude display should change to 0 when pressed. It is normal for the altitude reading to fluctuate up to +/-5 ft while sitting still.
4. Once test conditions are reached, press the “start” button to begin recording. The word “Recording” should appear at the bottom of the display. If it does not, try pressing “start” again. If the indication still does not appear, record data manually and return the logger to the instrumentation lead for troubleshooting.
5. Manually record the system time when recording is started. This will aid in finding the correct file later.
6. Once the test point is complete, press the “stop” button. This will close out the log file.
7. Repeat steps 4-6 as necessary to complete required test points. Each time the logger is set to a record state from a non-record state it will create a new log file on the SD card.
8. When all steps are complete, turn off the logger using the toggle switch on the side.

## Charging

1. Connect a microUSB cable with a 5v USB power source to the microUSB port on the bottom of the unit.
2. Battery level indications will be implemented in a later version of the firmware. Leave plugged in overnight to ensure full battery level.

# Reading Log Data

Log data is stored on the memory card using the .CSV format. File names are based on the system time when recording was initiated. For instance, a recording started at 7 seconds system time would be named “007.csv”. One created at 2 hours, 15 minted 5 seconds system time would be “2155.csv”. The files can be viewed with any common spreadsheet software or a standard text editor. There will be three columns of data, one for system time, one for temperature, and one for altitude AGL.

# Specifications

|  |  |
| --- | --- |
| Processor | Cortex M0 ATSAMD21G18 @ 48MHz |
| Processor Memory | 256KB of FLASH + 32KB of RAM |
| Battery Charge Rate | 100mA |
| Battery Type | Lithium Polymer |
| Battery Size | 3.7v, 500mAh |
| Pressure/Temperature Sensor | Bosch BMP388 |
| Sensor Interface | I2C |
| Assumed Sea Level Pressure at Boot | 1013.25 hPa |
| Pressure Sensor Operating Range | 300 – 1250 hPa |
| Absolute accuracy pressure (typ.)  P=900 ...1100 hPa (T=25 ... 40°C) | ±0.5 hPa |
| Relative accuracy pressure (typ.)  P=900…1100 hPa (T=25 … 40°C) | ±0.08 hPa (~0.5 meters altitude) |
| Noise in pressure (lowest bandwidth, highest resolution) | 0.03 Pa |
| Long-term stability (12 months) | ±0.33 hPa |
| Temperature Absolute Accuracy | ±0.50 °C |
| Display Type | OLED |
| Display Resolution | 128x64 |
| Housing Material | PETG |