# Balloon Competition Logger

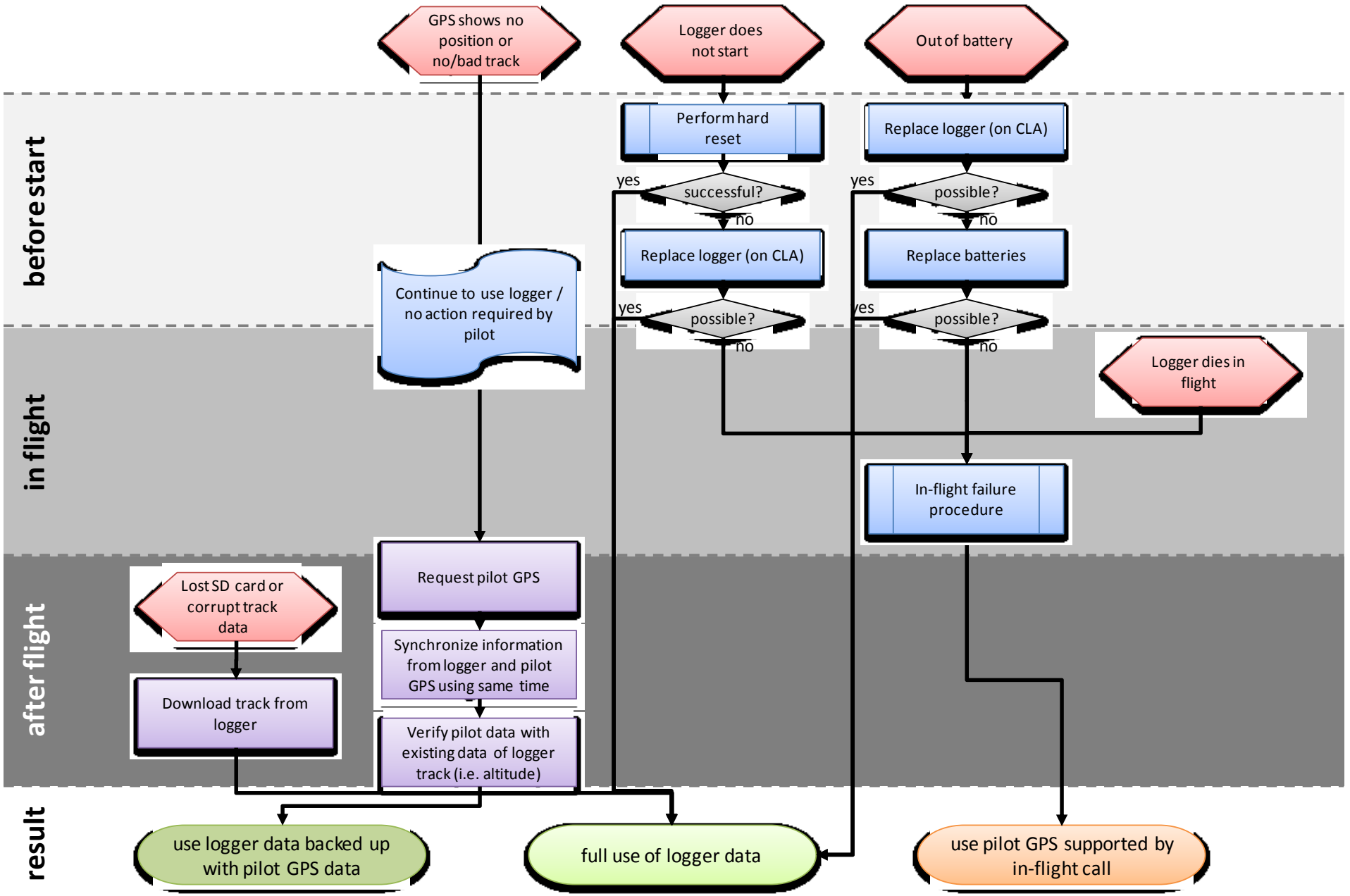
## Risk management and fail-over procedures

March 31, 2011

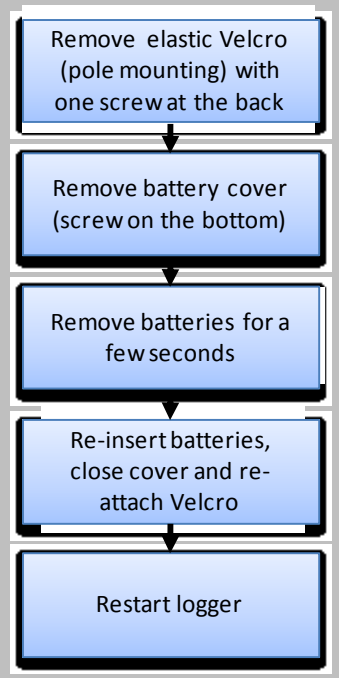
Purpose of this document is to describe the integrated risk management in the CIA loggers and possible fail-over procedures in the case of a logger failure.
The logger has already a **lot of failover features integrated** (data redundancy, independent recording of information, etc) to reduce the number of failures or missing data to a minimum. It is important to mention that after 2 years of experience the **failure rate of the devices is very low**. No event has been reported where a failure could not be backed and corrected. The most important element is to communicate and operate a **hotline number** to give support or instructions to the pilots in case of problems with the loggers. It has proved to be very helpful as many problems could be solved very easily.
For the unlikely event of a complete in-flight failure, we propose to install the fail-over procedure as described below.
The following table describes possible events, the features or procedures to mitigate the problem and the resulting implications for pilots and officials. For a more graphical view a process diagram has been attached as well.

## Possible problems and actions

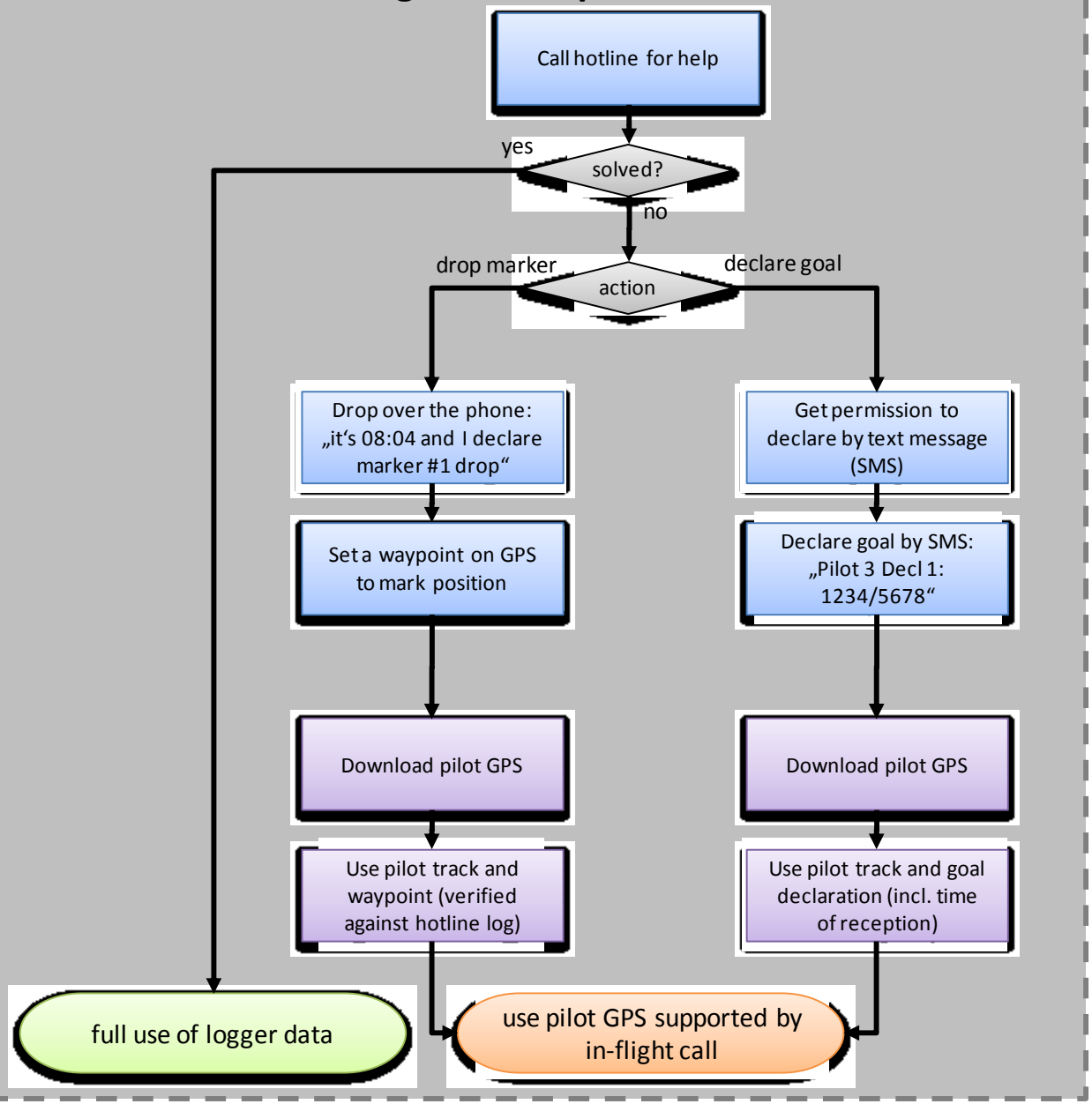
| Problem | Mitigation / Procedures | Implication for pilot | Implication for officials | Probability / result |
|---|---|---|---|---|
| **Lost SD Card or corrupt track file** | Redundant storage of track (approx. last 5h) in internal flash memory of GPS logger. Lost track can be fully recovered from the device. | • None | • Use Logger Management Software to download track from logger device. | Low<br><br>Full use of logger data |
| **Logger shows no position or no/ bad track data** | Independent recording of position, altitude and time. By using a second source, the missing information can be replaced. | • The logger still records marker drops and goal declarations. Pilot can still drop marker or declare goals even if i.e. GPS coverage is lost. | • Ask for track from backup GPS (Pilot GPS)<br>• Synchronize altitude, position and events between backup and logger track using same time to replace missing information (i.e. GPS position) | Very low<br><br>Use logger data backed up with pilot GPS |
| **Logger does not start** | 1. Perform hard reset by removing batteries<br>2. Replace logger (on CLA)<br>3. Follow in-flight failure | • Remove battery cover and remove batteries temporarily<br>• Call logger hotline for help (or replacement on CLA). | • Install and communicate a hotline number to provide help and instructions.<br>• It is recommended that officials keep a spare logger ready on launch field for last minute replacement. | Very low<br><br>Full use of logger data but pilot intervention required |
| **Out of battery** | 1. Replace logger (if possible)<br>2. Replace batteries<br>3. Follow in-flight failure | • If a logger replacement is not possible, the batteries can be replaced with standard AA batteries. Only do so when instructed by the hotline and report to Chief Logger (to prevent damage to the device when charging). | • Install and communicate a hotline number to provide help and instructions.<br>• It is recommended that officials keep a spare logger ready on launch field for last minute replacement.<br>• Re-insert rechargeable batteries before charging. | Very low<br><br>Full use of logger data but pilot intervention required |
| **Logger dies in flight or display breaks** | An alternative procedures has to be in place for goal declarations or marker drops in the event of non-curable failures.<br>Please see proposed procedure. | • It's important that every pilot is briefed how a fail-over procedure works. We recommend communicating a hotline number that provides help and instructions.<br>• Any in-flight failure will bring distraction and stress to the pilot. With the very low probability this has to be accepted. | • Objective should be to use any credible information to give the pilot a result. Credible information means any information that cannot be changed easily ex-post. | Did not happen so far<br><br>Use pilot GPS supported by in-flight call |


before start
in flight
after flight
result
GPS shows no position or no/bad track
Logger does not start
Out of battery
Perform hard reset
Replace logger (on CLA)
yes
successful?
no
possible?
Replace logger (on CLA)
Replace batteries
Continue to use logger / no action required by pilot
Logger dies in flight
In-flight failure procedure
Request pilot GPS
Lost SD card or corrupt track data
Synchronize information from logger and pilot GPS using same time
Download track from logger
Verify pilot data with existing data of logger track (i.e. altitude)
use logger data backed up with pilot GPS data
full use of logger data
use pilot GPS supported by in-flight call

## hard reset procedure




## in-flight failure procedure



## Recommendations

**In-flight failover procedure**

1. Install hotline number for any requests regarding loggers
2. In the event of a problem try to fix it with the pilot or his crew (answer questions, instruct a hard reset or send replacement)
3. If the problem cannot be solved in time, allow the pilot to declare goals or drop markers over the phone
    a. Whenever he wants to drop marker he can call in and do so by declaring it on the phone ("its 08:04 and I declare marker #1 drop") in connection with an waypoint mark on his own GPS. The scoring team can use the pilots' track and waypoint mark (verified against the log file of the hotline) to calculate the result.
    b. To avoid misunderstandings on the phone and possible protests, any goal declaration shall be done by sending a text message to a dedicated number / the hotline number.

**Recommendations for hotline**

To avoid busy lines in the event of a problem we suggest operating multiple phones. This can be achieved by either by communicating more than one number or installing a one number that is rotating between the phones (multiple hunting). We propose to increase the number of hotline phones with the number of pilots:

| | |
|---|---|
| Up to 30 | 1 phone |
| Up to 50 | 2 phones |
| Up to 100 | 3 phones |

**Proposal for implementation in Section II**

a) Handling: The logger will be handed out to the competitor at briefing. It must be switched on approximately 10 min before the intended take off time in order to allow proper GPS initialization. The "Balloon Competition Logger – Quick Guide" must be followed to operate the logger.

b) Mark / Scoring:
i – An electronic mark is mandatory for each task, unless otherwise stated in the TDS.
ii - In case of any problems which can not be fixed by the competitor, he shall immediately call the chief scorer. The scorer will try to help or may give permission to drop your loggermarker by phone or declare a goal by SMS.

c) Logger Setup: The time interval for the official loggers is set to 1s. At logger startup pressure altimeter in the official logger is set by the competitor to the QNH given on the task sheet. The competitors GPS must be set to 5s or shorter time interval.

d) Log data: Permission and authority to exploit all rights to the use of any material, electronic or other, that forms part of any method or system for observing, scoring, performance evaluation or information utilized in the Event, must be sought by way of prior agreement with the organizer.