BALLOON STELLAR – STRATOSPHERE
FREQUENTLY ASKED QUESTIONS - EXPERIMENTS

1 INTRODUCTION

This document captures questions that have been frequently asked by teams competing in the Balloon Stellar – Stratosphere competition. We have also included questions that we think you are likely to ask as you prepare your experiments for flight.

If you have any questions that are not covered here, do not hesitate to ask the Team Stellar engineers, Mr Robert Brand, Mr Vilko Klein and Mr Tim Blaxland.

2 FREQUENTLY ASKED QUESTIONS AND ANSWERS

2.1 WILL ALTITUDE AND POSITION DATA BE SUPPLIED?

Yes, we will make this data available.

You should consider these points to determine if the data is suitable for your needs:

- The data cannot be communicated between our trackers and your experiment in real-time. If your experiment needs real-time position and altitude you will need to determine a method of obtaining that data from within your own experiment, for example, GPS receiver/logger.
- We will provide a post-flight data log of the tracking data in an electronic format. We will advise the format once it has been confirmed.
- The time stamp and sampling intervals on our tracking data will be different to the time stamps and sampling intervals on your experiments. We are also likely to receive tracking data from multiple sources. Accordingly, the data will need to be synchronised and interpolated to match your experiment's data tables. We will provide you with assistance with this, including recording the time that your experiment is switched on prior to launch.

2.2 WHAT TYPE OF GPS RECEIVER SHOULD I USE?

If you do require position and altitude data from your own payload, a special serial GPS receiver is required. Most GPS receivers do not function above approximately 18 km but a serial GPS receiver will function up to approximately 80 km.

2.3 WHAT BATTERY TYPE SHOULD I USE?

Lithium batteries should be used.

There are many different types of lithium batteries but any are suitable for use in the balloon flight. Of course, you need to select a battery type that is suitable for your experiment's needs.

You should notify us if you are intending to use LiPo (Lithium Polymer) batteries. This type of battery may require special handling or enclosure. Mr Vilko Klein can provide further details.

Rechargeable batteries should not be used unless non-rechargeable batteries are not suitable for your experiment. Rechargeable batteries require a lot of effort to manage properly – battery chargers, monitoring self-discharge, potential damage from over-charging, etc.

2.4 HOW LONG DOES THE BATTERY LIFE NEED TO BE?

The duration from when the experiment is switched on until recovery is expected to be up to 5.5 hours.

If you only require measurements from launch until maximum altitude, a battery duration of 3 hours will be sufficient.

If you are recording your experiment's results in memory, non-volatile flash memory should be used so that the memory is retained in case the battery expires before the experiment is recovered.

2.5 SHOULD BATTERIES BE FUSED?

All batteries should be fused. The fuse size should be calculated from the peak current times 1.5 and then round up to the next available fuse size.

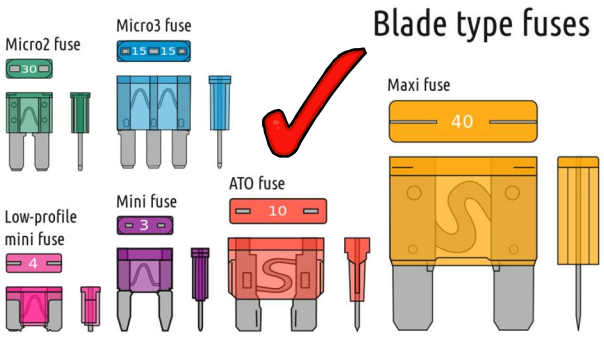
2.6 WHAT BATTERY ENCLOSURE SHOULD BE USED?

Batteries should be insulted to keep them warm – the cold temperature will reduce their life and output voltage. Bubble wrap is a suitable insulator. If the battery is wrapped with the electronics, the heat from the electronics will help to keep the batteries warm.

2.7 WHAT TYPE OF FUSE SHOULD I USE?

We recommend automotive blade fuses (see example on right).

We do not recommend glass cylindrical fuses (see example below). The entrapped gas may cause the fuse to explode at low pressures.



2.8 HOW SHOULD ELECTRICAL CONNECTIONS BE MADE?

Electrical connections should be soldered.

2.9 WHAT TYPE OF ON/OFF SWITCH SHOULD I PROVIDE?

Use a switch that has a short or cut-down lever and ensure the switch is mounted so that the switch cannot be accidently knocked on/off.

External plug-in connectors may be used instead of a switch.

For further detail, refer to the guide produced by Mr Robert Brand.

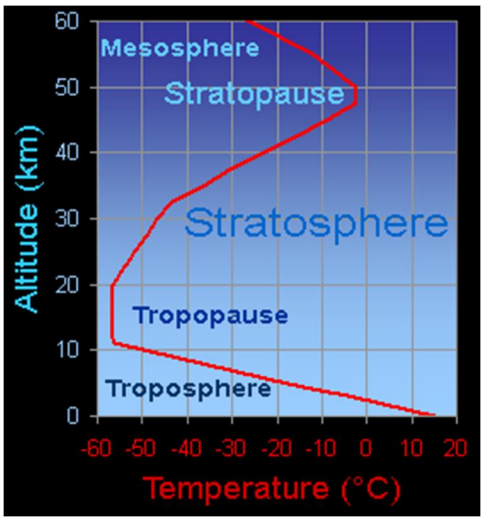
2.10 WHAT CAN I USE TO ENCLOSE MY EXPERIMENT?

Use an enclosure that is light and strong, and that will absorb the impact the landing.

For enclosure suggestions refer to the guide produced by Mr Robert Brand.

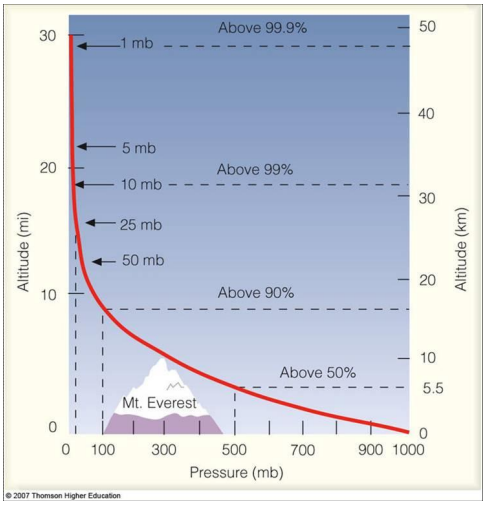
2.11 WHAT IS THE EXPECTED TEMPERATURE ENVIRONMENT?

The atmospheric temperature will vary from a maximum of approximately 20°C on the ground down to a minimum of approximately -60°C in the stratosphere (see graph at right).



2.12 WHAT IS THE EXPECTED PRESSURE ENVIRONMENT?

The atmospheric pressure will vary from approximately 1013 millibar (101.3 kPa) down to approximately 1 millibar (0.1 kPa) in the stratosphere (see graph at right).



2.13 WHAT ALTITUDE WILL THE BALLOON RISE TO?

We expect the balloon to rise to approximately 30 km. The balloon may burst at a lower altitude due to unforeseen defects.

2.14 WHAT DISTANCE WILL THE BALLOON TRAVEL?

The balloon travel distance will vary greatly depending on the prevailing winds on the day of launch. The balloon could travel distances up to 250 km. Team Stellar's engineers will run predictions for the balloon travel during the days leading up to the launch.

2.15 WHAT IS THE EXPECTED STABILITY OF THE BALLOON AND EXPERIMENT?

The balloon is not expected to be stable. Destabilising events include: wind gusts and thermals, balloon bursting and landing impact. You should ensure that the experiment will not be damaged or fail if it is subject to sudden changes in orientation.

2.16 WHAT IS THE EXPECTED CLIMB RATE?

The normal climb rate is 3 to 5 metres per second. Climb rates of up to 10 metres per second may occur if the balloon flies through a thermal column.

2.17 WHAT IS THE EXPECTED DESCENT RATE?

The descent rate will be 3 to 9 metres per second in the lower atmosphere. Much higher descent rates will be encountered in the stratosphere where the pressure is lower and the parachute cannot brake effectively.

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