



Systems Engineering Process

PROJECT NEAR-SPACE BALLOON

PROJECT LEAD CORY McCARTAN

PHASE	DESCRIPTION	DONE
<u>Pre-A</u>	Concept Studies	✓
<u>A</u>	Concept and Technology Development	✓
<u>B</u>	Preliminary Design and Technology Completion	✓
<u>C</u>	Final Design and Fabrication	✓
<u>D</u>	System, Assembly, Integration, Test, and Launch	✓
<u>E</u>	Operations and Sustainment	<input type="checkbox"/>
<u>F</u>	Closeout	<input type="checkbox"/>

Pre-Phase A: Concept Studies

Concept Studies and Feasibility Summary **COMPLETED 10/5/15**

Others have done it. Feasible.

Final Operational Concept **APPROVED 10/5/15**

Balloon, goes up into atmosphere and back down. Takes pictures and records data.

Phase A: Concept and Technology Development

Project Requirements **APPROVED 10/5/15**

- (1) Reach maximum height between 90,000 and 100,000 feet.
- (2) Return to ground intact.
 - (a) Parachute
 - (b) Survive impact (2x parachute descent rate)
- (3) Internal temperature above -65°C
- (4) Internal pressure equalized to atmosphere
- (5) Able to be tracked
 - (a) GPS positioning
 - (i) Latitude
 - (ii) Longitude
 - (iii) Altitude
 - (b) Radio broadcast of GPS coordinates
 - (c) Antenna to transmit to ground with 75+ miles of range
- (6) Camera
 - (a) Pictures on timer
 - (b) Occasional video
- (7) Ambient temperature data and reporting
- (8) Atmospheric pressure data and reporting

Design Solutions **APPROVED 10/5/15**

- (1): Weather balloon
- (2): Parachute, and padding for impact.
- (3): Heating, insulation
- (4): Small holes
- (5): Radio, GPS sensor
- (6): Camera with scripting capability
- (7) and (8): Sensors connected to microcontroller to broadcast data back to ground



Phase B: Preliminary Design and Technology Completion

Subsystems **APPROVED 10/26/15**

There are five subsystems. Each part is labeled with a Part ID, whose first digit corresponds to its subsystem. Miscellaneous parts (or parts that aren't part of the probe) belong under the "Miscellaneous" category.

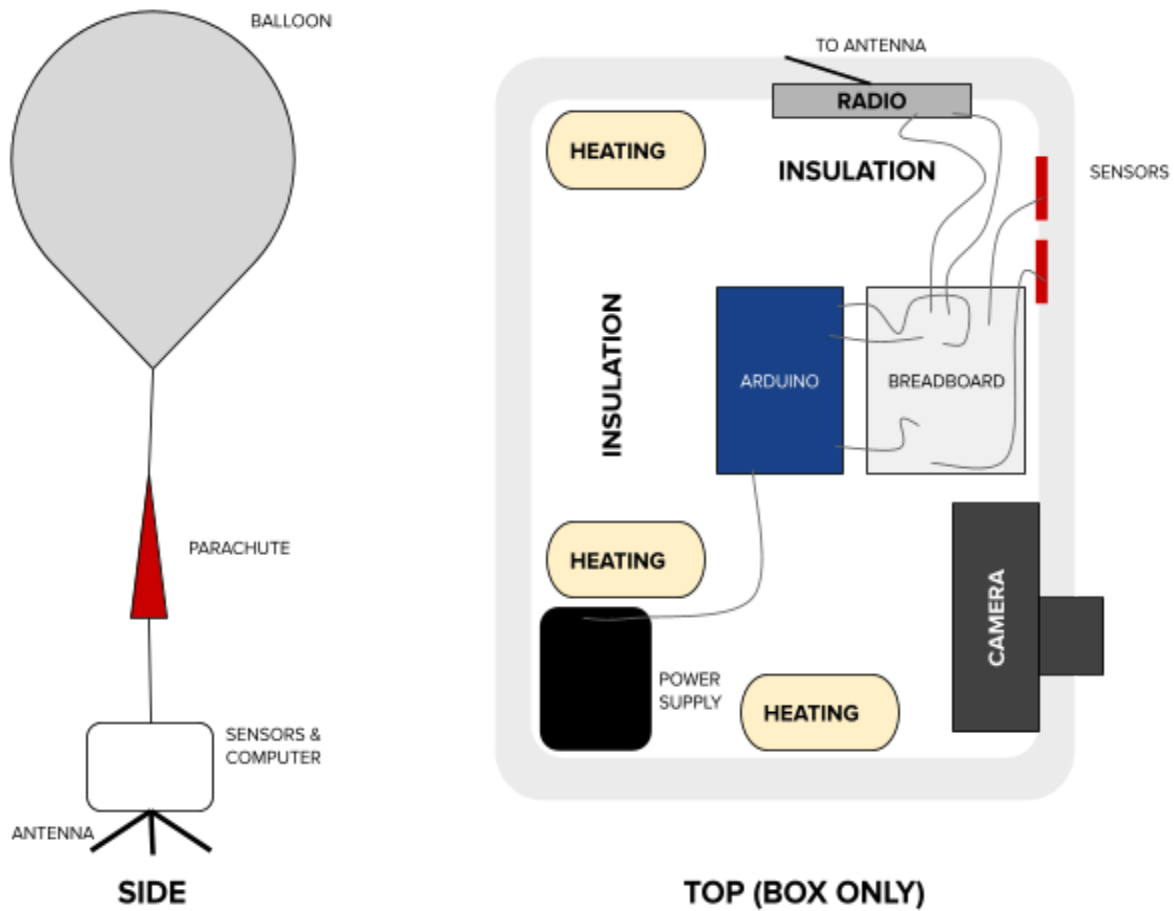
Part ID Code	Abbreviation	System
100	MOV	Ascent and descent
200	PKG	Casing, packaging and power
300	DAT	Sensors and data collection
400	SYS	Systems control and management
500	BRD	Broadcast
600	MSC	Miscellaneous

Subsystem Teams **APPROVED 10/26/15**

Given the size of the Near-Space Balloon team and the nature of the project itself, the actual teams that design and implement the probe will be divided differently than the six subsystems above, which are used more for design and part numbering. The four subsystem teams are:

Subsystem Team	Abbreviation	Responsible for
Ascent and Descent	<u>MOV</u>	MOV, MSC
Casing, packaging, and power	<u>PKG</u>	PKG
Sensors and data collection	<u>DAT</u>	DAT
Software	<u>SFT</u>	SYS, BRD

Preliminary Design Drawing **APPROVED 2/15/16**



Phase C: Final Design and Fabrication

[CAD Models](#)

[Project Management](#)

[Parts List](#)

[FMEA](#)

Phase D: System, Assembly, Integration, Test, and Launch

See system design documents for test planning, specification, and results.

Phase E: Operations and Sustainment



Phase F: Closeout