Olin Rocketry

Andromeda Phase A Plan

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Andromeda Phase A Plan

1.0 Phase Overview

1.1 Introduction:

Phase A of the Andromeda program is the Spring semester of the 2018-2019 academic year. It will consist of research, conceptual design, and preliminary testing of critical technological goals for each subsystem. Successful completion and documentation of Phase A will leave us with proven technologies that can be readily implemented into the Phoenix III, competition flight vehicle in Phase B in the Fall.

1.2 Objectives:

The technological objectives for Phase A are laid out on a subsystem level. For the Avionics Subsystem the goal is real time altitude detection. For the Recovery Subsystem the goal is pneumatic, single parachute deployment. For the Structures Subsystem the goal is replacement hardware for the Phoenix II made out of composite materials. For the Engine Subsystem the goal is a hot fire test of a small APCP engine.

In addition to these technological objectives, the team will have testing and documentation objectives to guarantee these young technologies' success in the future. The testing goals will be laid out in detail in each subsystem's Technology Development Plan and the documentation objectives can be found in the Documentation Plan.

1.3 Mission Description:

The only missions that will take place in Phase A are two test launches of the Phoenix II for both the Avionics and Structures subsystems. The Phoenix II is a flight proven system that will be suited quite well for our test purposes. All replacement hardware supplied by the structures subsystem will be tested for strength beforehand to insure against launch failure. These launches will follow procedures put in place last semester.

1.4 Management Structure:

The management plan for Phase A of the Andromeda program will be a collection of subsystems operating under the direction of the Project Manager (PM). These subsystems shall be Avionics, Recovery, Structures, and Engine. Each subsystem will be headed by a subsystem lead who shall be responsible for the document and design deliverables requested from their respective subsystem. Phase A will notably have a lack of a Systems Engineer. This is due to the lack of a cohesive system being built. Each subsystem will work very independently from each other for Phase A with the PM providing general guidance and gathering financial support for the future phases.

2.0 Project Control Plans

2.1 Technical, Schedule, & Cost Control Plan:

Technical control will be maintained through released documents in GitHub. The team's Google Drive folder will function as a sandbox for the team and only official, released documentation will be pushed to GitHub for future use. The plan for schedule control is to re-evaluate the proposed timeline at the IDR and throughout the build sprint. If, for any reason, the schedule is slipping the PM, and Subsystem Leads will come together to discuss pathways moving forward that interfere the least with the Technology Development Plan. Cost will be controlled by the PM and the orders given to the Aero program at Olin.

2.2 Risk Management Plan:

A Risk Assessment will be conducted by the PM at the onset of Phase B. This document will then be updated at the end of Phase B to reflect changes that need to occur for the Critical Design Review in Phase C.

2.3 Acquisition Plan:

All subsystems will submit a list of materials to be ordered for testing and final construction purposes at the conclusion of the design sprint. These will be immediately ordered (funds allowing) so that shipping time is minimized. All materials should be available ~1.5 weeks prior to the Spring Break so that full manufacturing efforts can commence.

2.4 Technology Development Plan:

All subsystems will be required to submit a Technology Development Plan exiting the design sprint. These will guide the team's design deliverables as well as the team's scheduling efforts throughout Phases A and B.

2.5 Software Management Plan:

The Avionics subsystem will create a software management plan before the beginning of the build phase.

2.6 Verification & Validation Plan

V&V activities will be limited in Phase A. Most testing will confirm design hypotheses as opposed to proving hardware ready for flight. A V&V plan for each subsystem will be developed at the beginning of Phase B.

2.7 Review Plan

The team will hold an Internal Design Review (IDR) halfway through the design sprint to conduct a thinning of designs for the Recovery subsystem. In addition to this, all other subsystem's will have their designs checked over to prepare for build and test operations.

A Technological Design Review (TDR) will be held at the conclusion of Phase A to present the team's findings from initial testing. We hope to have both faculty and companies in attendance at this design review. The PM will prepare a Phase A Review Plan at the conclusion of the design sprint that will contain confirmations for the reviewers in attendance and a firm time and date for the TDR.

The TDR Presentation document required from the PM at the conclusion of the presentation sprint will serve as the team's exit document from Phase A as well as the comprehensive design document for the team at the TDR.

2.8 Mission Operations Plan

The mission documents used in the previous launch of the Phoenix II will be used for the two flight missions to be undertaken in Phase A.

2.9 Environment Management Plan

All project machining activities will take place within the confines of the Olin Machine Shop and will therefore be under the rules of "The Shop". This will prevent any environmental concerns resulting from the manufacturing process.

The Phoenix II will be retrieved following the mission removing any environmental risks from the area.

2.10 Configuration Management

Configuration Management in Phase A will be surrounding the documents produced by each subsystem and the PM per the Documentation Plan. GitHub will be used to protect a "version of truth" that all in the team will have read access to at all times for use in the future.

2.11 Communications Plan

Outreach will occur in the weeks leading up to the launch date. Attendance at the launch is not a project imperative, however every effort shall be taken to inform Olin community members of the launch.

In addition to this type of outreach, the PM will be making outreach attempts to businesses for financial support.