CARME NEARSPACE BALLOON SYSTEM

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Test Plan

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TEST PLAN

1. INTRODUCTION

1.1. Purpose

The purpose of this document is to propose design alternatives for the Carme Nearspace Balloon System (CNBS). These alternatives will be evaluated and a design strategy selected.

1.2. Project

Our goal is to build two Carme payloads, CNBS-1 and CNBS-2, both of which will be launched from weather balloons with parachute recovery. The system should provide, minimally, a human-receivable radio signal as well as a machine-receivable APRS digital signal. Both signals should provide the location and altitude of the payload to provide tracking and recovery.

1.3. Features

The Carme system shall provide the following features:

- The system shall on a regular time interval not exceeding 2 minutes, broadcast its callsign and location via Morse code on the 70cm amateur radio band.
- The system shall on a regular time interval not exceeding 2 minutes, broadcast telemetry to the existing APRS telemetry network.

Via the APRS broadcast, interested parties shall be able to view the telemetry data through the HabHub Tracker website. To facilitate operations, the payload shall be waterproof and include a return system.

1.4. References

- HabHub Tracker – http://tracker.habhub.org
- Carme Requirements Specification – https://jameshoward.us/projects/carme/
- Carme Test Plan – https://jameshoward.us/projects/carme/

2. COMPONENT TESTING

2.1. GPS

The GPS unit will be tested through a custom software code. The software will read the current location and time and print that to the serial console. The location will be sampled once every 30 seconds for the test. If the correct location and time and displayed, the test is passed.

2.2. Radio

The radio will be tested in two separate ways. First, the Morse code signal will be tested and then APRS signal will be tested.

2.2.1. Morse Code

The Morse Code signal will be tested via a custom software that will transmit a predefined string via Morse Code. This signal will be detected with a handheld radio. If the correct Morse Code signal is received by the handheld radio, the test is passed.

2.2.2. APRS

The APRS signal will be tested via a custom software signal that will transmitea predefined message via APRS. This signal will be detected with a portable APRS receiver. If the correct APRS signal is received by the portable receiver, the test is passed.

3. INTEGRATION TESTING

Integration testing will ensure that all of the individual components work in concert with each other to achieve the design goals. Because of multiple design objectives, integration testing will be conducted in two phases.

3.1. Ground Test

Following assembly, the system shall be run in a ground test mode where it will collect its location and other information from the GPS receiver and broadcast its location via Morse Code and APRS to ground-based receiving stations. If the APRS and Morse code signals are received during the Ground Test, the test is passed.

3.2. Tethered Test

In the Tethered Test, the assembly will be flown on a balloon that is tethered to the ground. It will be allowed a slack line of 190 feet and allowed to float freely between 0 and 190 feet. At this altitude, the Morse Code signal will be tested via a portable receiver. Further, the APRS system will be tested by the HabHub Tracker platform which will receive the APRS signal, displaying the received telemetry on the Web. If the Morse Code and APRS signals are received, the Tethered Test is passed.

4. SUMMARY

This document presents a test plan for the Carme Nearspace Balloon System. If the tests included herein are passed, we are confident the system is ready to fly and can be deployed at the next available opportunity.

APPENDIX A: REVISION HISTORY

Version	Date	Author	Comment
1.0	May 15, 2016	James Howard	Initial test plan