Task List README

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Make to Innovate: CySat

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The document titled “ADCS_High_Level_Task_List” is the high-level task list for CySat-I. It includes a schematic of how the task list should flow along with a detailed flow chart for each major step in the process. Each step is high-level in the sense that it states what telecommands and telemetry are required, but not the byte string formatted in I2C. That will follow in an additional document by me or will be accomplished by someone else on CySat during the Spring 2019 semester.

The first two steps are essentially "passive detumble mode". This means that these are the steps that it will complete right after power-up after deployment. It does not require any communication with the ground station. This mode will turn any arbitrary tumbling CySat-I will have to a Y-Thomsen spin. This is a controlled rotation about the y-axis. This mode will be the emergency mode that CySat-I reverts to if communication is lost for a specified period (which can be assumed that CySat-I has tumbled out of the Y-Thomsen).

This document was primarily developed using the CubeSpace ADCS commissioning manual. I did a lot of copy and pasting, and it is possible that I missed a block or repeated something unnecessarily. A thorough cross-checking of both documentations will be necessary for verification.

One thing that I am unsure of and need clarification on (whether this be from testing or by contacting CubeSpace, is located on page 9 of the “ADCS_High_Level_Task_List” document. Notice the block “Set Estimation Mode (TC 14) -- Mode = Magnetometer rate filter with pitch estimation (3)”. In the CubeSpace Commissioning Manual on page 24, it states “Since the pitch estimation makes use of the IGRF model and must know the satellite position, it will be necessary to set the orbit parameters to recent TLEs provided by NORAD on www.space-track.org or www.celestrak.com”. This directly contradicts what is stated in Table 9 (also on page 29) which does not include the telecommand of updating the TLE. Now, on page 26, it states, “Since Y-momentum mode makes use of the pitch estimation or the EKF estimation mode, it will be necessary to set the orbit parameters to recent TLEs provided by NORAD on www.space-track.org or www.celestrak.com” and does include the Telecommand which updates TLE (Set Orbit Parameters (TC 45) – Current TLE’s). This leads me to believe that the statement on page 29 is incorrect and it is in fact the control mode that requires the TLE telecommand. This is what is in the current iteration of the ADCS task list. However, if uncertain, it might be best to include the TLE telecommand in the Y-wheel ramp-up test section on page 9 of the “ADCS_High_Level_Task_List” document.

A final note is that on page 16 of the “ADCS_High_Level_Task_List” document, the entire task titled “Overpass Actions” logs telemetry of suggested data. There may be other telemetry data that is of interest to CySat and thus should be included there. The list of telemetry commands is in the CubeSpace ADCS commissioning manual.