Mission Operations Manual (Check List)
Team 3114 (RSX)
Version 2.0

Ground Station Configuration

Ground Station Crew (GSC): Luke Watson and Angelique Liao

- ☐ Ground station crew heads to ground station tables to set up the ground station.
- ☐ Connect the RPSMA wire from the QHA antenna into the ground station XBee.
- ☐ Insert the ground station XBee into the SparkFun XBee regulated dongle and connect to the ground station laptop to provide power through the USB port of the ground station laptop.
- ☐ Place the antenna on the table using the stand and prepare for use as a handheld antenna right before launch.
- ☐ Turn on the ground station laptop, run the ground station GUI, and select the correct serial (COM) XBee under the *connection* tab.
- ☐ Ensure that the Net ID on the XBee is set to the Team ID and change if necessary.
- ☐ After the Cansat is powered on, check the connection with the ground station under the *connection* tab to ensure everything is set up correctly.
- ☐ From the GUI, send the altitude calibration command to zero the barometer. Also ensure to set the time as well to either GPS time or ground station computer time depending on the judges' input. Verify updated values in the telemetry *Live Values* section.
- ☐ Finally, to start the mission and telemetry graphing, click *Start Mission* under the *Telemetry* tab.

Cansat Preparation

CanSat Crew (CCR): Arthur Goetkze-Coburn, Alexey Albert, Daniel Yu

- ☐ On the Cansat Payload, open one half of the shroud to verify both Cansat batteries (main and buzzer) are fully charged (~8.4v and 4.2v respectively) and securely connected. Double check the RTC backup battery voltage as well and replace it if the voltage is lower than 3v.
- ☐ Disconnect the main board from both the power and camera board.
- ☐ Upload the last stable version of the flight software to the main ESP32.
- ☐ Ensure both camera ESP32s have SD cards. Blue SD card belongs to camera 1 (ESP32 closer to JST) and red SD card belongs to camera 2.
- ☐ To access SD card on camera 2, undo the camera cable extension.
- ☐ Reconnect all three boards together, turn on both main and buzzer switches, and ensure that all three boards all light up.
- ☐ Confirm that the ground station GUI is able to receive telemetry data and is able to detect the ground camera boards after the completion of the Ground Station Configuration operation.
- ☐ Debug any problems that arise, then put the second half of the shroud back onto the Cansat Payload.
- ☐ Ensure all the rubber bands on the rotors are attached correctly and replace them if they are broken.
- ☐ Actuate all four rotors. Both *GYRO* servos should be at rest (parallel to the shroud direction) at 90 degrees. The *Camera* servo should also be at rest at 90 degrees (pointing in the normal direction of the Cansat shroud). The rest position of the *Release* servo is at 0 degrees (holding the payload)
  - ☐ Actuate both *GYRO* servos to 135 (+45 rel) and 45 (-45 rel)
  - ☐ Actuate the *Camera* servo to 100 (+10 rel) and 80 (-10 rel)
  - ☐ Actuate the *Release* servo to 35 (+35 from rel) and back to 0.
- ☐ Turn off the Cansat.
- ☐ Separate the Cansat container from its shoulder. Fold the rotors down and place the Cansat payload into the Cansat container's wall.
- ☐ Slide the top rotor shaft into the container's shoulder
- ☐ Turn the ESP32 back on, this will initiate the container integration sequence which will move the release servo out of the way, allowing the payload's rotor shaft to slide in, and then actuates 10 seconds later to lock the payload in place.
- ☐ Turn off the Cansat to save battery and wait for the Integration step.

Cansat Integration

CanSat Crew (CCR): Arthur Goetkze-Coburn, Alexey Albert, Daniel Yu

- ☐ Turn the Cansat back on and verify the ground station still receives telemetry.
- ☐ Verify the rope connection between the eye bolt and the ripstop nylon as well as the connection between the ripstop nylon rope and the 6 parachute ropes.
- ☐ Fold the parachute and put it in the rocket payload section before the Cansat. Insert the Cansat container into the rocket payload section with the eyebolt going in first and the nose cone pointing to the sky.

Launch Preparation

- ☐ Take the rocket to the flight line and get a launch pad assignment (should be pad #3 if no changes have been made according to the preflight brief).
- ☐ Walk out with the pad manager and have the rocket installed on the rail.
- ☐ Pad manager installs igniter.
- ☐ Pad manager verifies igniter continuity if launcher has continuity tester.
- ☐ Team takes a picture next to the rocket.
- ☐ Team goes back to the flight line and is assigned crew positions.

Launch Procedures

Mission control officer will step through this procedure to launch the Cansat. At any time during the launch procedure, any crew member or officer can call out for a hold to stop the launch. It is required to say HOLD three times using a voice radio to stop the launch. If the hold does not require the rocket to be removed from the launch pad, then the procedures are stopped at the current step. If the hold requires the Cansat to be removed, the removal procedures must be executed.

- ☐ Flight coordinator will query field judges and spotters if they are ready for the next launch.
- ☐ Mission Control Officer (Adam) performs any pre-launch checks.
- ☐ The Mission Control Officer (Adam) will verify with the ground station that the ground station is ready for launch.

- ☐ Mission Control Officer (Adam) will request Launch Control Officer to select appropriate launch pad.
- ☐ The Mission Control Officer (Adam) will tell the Launch Control Officer when to launch the rocket.
- ☐ The Launch Control Officer will launch the rocket.