**ELECTRONICS PRE-FLIGHT CHECKLIST**

**PERSONNEL ASSIGNMENTS**

**Electronics Specialist Lead [ESL]–** *Gabe (Mic 3)*

* Manage overall electrical system setup. Ensure that setup is going smoothly and in order.
* Aid and double check the work of the specialists.
* Ensure that the entire checklist is completed correctly before launch

**Electronic Specialist 1 [ES 1]** – *James*

* Complete the “tracking” sections of the Electronics Pre-flight checklist.
* Complete “Flight Computer” sections of the Electronics Pre-flight Checklist

**Electronic Specialist 2 [ES-2]** – *Thomas*

* Complete the “Data Acquisition” sections of Electronics Pre-flight Checklist.
* Complete the “RF Relay setup and launch procedure” sections of the Electronics Pre-flight Checklist.

**PRELIMINARY CHECKS**

* **DATA ACQUISITION**
* Inspect solder on IMU, Thermocouple readers, stratologger switch, Voltage regulation PCB, and beaglebone capes.
* Use a Laptop to perform a test run of the data acquisition programs on both of the BBB’s. If data is not being recorded correctly, make sure to troubleshoot and fix any issues.
* Make sure plywood-all thread tower is tightened down.
* Ensure that there are no tangled or stressed wires connected to the BBB setup.
* Make sure that LiFePO4 battery is full charged: *nominal:* **12.8 V,** *measured:\_\_\_\_*
* Connect BBB power plug to voltage regulator. **Note voltage regulator shall remain disconnected from LiFePO4 battery until on the pad**
* **TRACKING**
  + Use a computer to open up the BeelineGPS.exe program and click on the “Clear Flash” button in the GUI to clear any old data that may be left on the device.
  + Use the .exe program to write the following settings to the GPS before flight:
    - Convert meters to feet: **on**
    - Position logging: **on**
    - Wrap data log: **on**
    - Tx rate: **1 second**
    - Store Interval: **0.5 second**
    - Output power: **10 dBm**
    - Overwrite memory on power up: **off**
    - Low Voltage shutdown: **on**
    - Smart Launch Detect: **off**
* Make sure that GPS battery is full charged: *nominal:* **4.8 V**, *measured:\_\_\_\_\_\_*
* Ensure Baofeng Radio is fully charged, i.e. when placed on charger, LED should be steady green.
* Ensure that Channel is set to 433.920 MHZ.
  + Select the preset channel 1 by pressing 001 in channel mode to get 433.920 MHZ or select 433.920 MHZ in frequency mode by utilizing the up and down arrows.
  + Make sure the up and down arrow to the left of the 2 frequencies is next to the frequency you desire.
* Perform test of GPS transmission inside of the rocket using the custom 2 prong TRRS to single prong TRRS cable to connect between the Baofeng Radio and a computer or phone that is running APRS Decoding software.
* Re-connect GPS to satellite before inserting into the rocket for launch
* **FLIGHT COMPUTERS**
  + **G-Wiz HCX**
    - Install the JP1/3 safety shunt
    - Ensure that JP5 jumper is removed
      * Ensure there is no short across TB2-5 and TB2-6
    - Ensure that JP2 jumper is installed
    - Ensure that JP7 Jumper is installed
    - Ensure Mini-SD memory card is properly inserted
    - Connect the positive lead of battery clip 1 to TB1-1.
    - Connect the **negative** lead of battery clip 1 to TB1-2.
    - Connect the positive lead of battery clip 2 to TB2-6.
    - Connect the **negative** lead of battery clip 2 to TB2-5.
    - Connect **HCX Drogue** E-match to **HCX** 
      * Connect either lead of drogue e-match to TB1-5.
      * Connect other lead of drogue e-match to TB1-6.
    - Connect **HCX Main** E-match to the **HCX** 
      * Connect either lead of main match to TB1-7.
      * Connect other **lead** of main match to TB1-8.
  + **SL CF**
    - Connect **SL Drogue** E-match leads to drogue terminal (polarity independent)
    - Connect **SL Main** E-match leads to main terminal (polarity independent)
    - Connect **negative** lead of battery clip 3 to “NEG” terminal
    - Connect positive lead of battery clip 3 to positive terminal
    - Ensure switch leads are installed in switch terminal block (B)
* **RF RELAY SETUP**
  + Perform test run of RF relay setup at required distance
  + Ensure that first 12V car battery is full charged: *nominal:* **12.5 V**
  + Ensure that the second car battery is fully charged:*nominal:* **12.5 V**
  + Ensure that the Lead Acid battery is fully charged: *nominal:* **12.8 V**

**ON THE PAD**

**DATA ACQUISITION**

* Ensure that each of the sensors (thermocouple, piezo-vibration, and strain gauge) is snugly connected to their respective screw terminal blocks.
* Ensure that the BeagleBone capes are snug in the BBB GPIO headers and that the sensor cape is plugged into “BBB 1” marked with green tape and the IMU cape is plugged into “BBB 2” marked with the red tape.
* Plug LiFePO4 battery into voltage regulator PCB. The blue power LED should be steady on, and the USER LEDs should be flashing in an erratic manner. If the blue power LED is flashing, then unplug the power source immediately as this indicates excess current flow.

**Time BBB turned on:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Time of lift off:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* Monitor the BBB setup for the first minute after power-up to ensure that there is no smoke, erratic behavior, or any other sign of a malfunction.

**TRACKING**

***Beeline GPS***

* Ensure that the GPS and is firmly secured to the platform

***Baofeng HT Radio***

* Ensure that Channel is set to 433.920 MHZ.
* Ensure that the radio and decoding software pair are outputting accurate GPS coordinates before closing up the Electronics Bay.

**FLIGHT COMPUTERS**

*Computer Setup*

***G-Wiz HCX***

*HCX is currently set to fire drogue 0 seconds after apogee; main at 1500 ft*

* Install safety shunt (JP1/3)
* Ensure **HCX Drogue** E-match is connected to **HCX** 
  + Connect either lead of drogue e-match to TB1-5.
  + Connect other lead of drogue e-match to TB1-6.
* Ensure **HCX Main** E-match is connected to the **HCX** 
  + Connect either lead of main match to TB1-7.
  + Connect other **lead** of main match to TB1-8.
* Ensure that the voltage across two brand new 9V batteries is ≥ 9V
* Connect measured 9V batteries to HCX battery clips
* Visually inspect all wiring and ensure terminals are secure and polarities are correct
* Inspect battery and ensure battery clips are secured with zip ties
* Ensure that the JP1/3 safety shunt is installed correctly
* Monitor for error codes on HCX, normal status is as follows
  + LED turns on and then off
  + LED on, two low-pitch beeps
  + LED off, one half-second pause
  + One set of two short beeps
  + Two sets of one short beep
  + One set of two short beeps

***Perfect Flite StratoLoggerCF***

*SL is currently set to fire drogue 1 seconds after apogee; main at 1500 ft*

* Ensure that safety shunt is installed
* Ensure voltage across brand new 9V battery is ≥ 9V
* Connect measured 9V battery to battery clip 3
* Visually inspect all wiring and ensure terminals are secure and polarities are correct
* Inspect battery and ensure battery clip is secured with a zip tie
* Ensure that snap action switch is depressed and that the Stratologger is off.

*After rocket Setup is completed*

* Close flight computer chamber, leave safety shunts inserted in their respective locations
* Remove safety shunts right before launch.

**NOTE:** once safety shunts have been removed, the HCX is armed, and the stratologger can potentially arm, but should not until after the rocket has reached 300 ft AGL.

*Listen for the following Stratologger altimeter settings to be reported*

* *If a repeating error siren plays, turn altimeter off and correct the problem*
* *If an unexpected setting is reported, turn altimeter off and correct the setting*
* Currently selected program preset is **3**
  + **Long-beep**-pause-**beep-beep-beep-**long pause
* Main deployment altitude is set to **1500 ft**
  + **Long-beep**-pause-**beep-**pause-**beep**-pause- **beep-beep**-**beep-beep**-**beep-beep-beep**-**beep-beep**-**beep**-pause-**beep-beep**-**beep-beep**-**beep-beep-beep**-**beep-beep**-**beep-**long pause
* Apogee firing is set to be delayed
  + **Continuous five second tone**
* Altitude of last flight
* Battery voltage in tenths of a volt reported to be near 9 volts
  + Battery voltage:\_\_\_\_\_\_\_\_\_\_ V
* Power-up delay, 2 second pause
* Continuity beeps every 0.8 seconds, reporting good drogue & main E-match continuity status
  + Long pause-**beep-beep-beep-**repeat

***SL and HCX are ready for flight.***

**RF RELAY SETUP AND LAUNCH PROCEDURE**

* Ensure that the small 12V lead acid is full charged: *nominal:* **12 V** *measured:\_\_\_\_\_*
* Plug the small 12V lead acid battery into the connector labeled “Radio” on Launch Box
* Ensure that first 12V car battery is full charged: *nominal:* **12 V** *measured:\_\_\_\_\_*
* Plug 12V 18AH lead acid into the connector labeled “Main” on Launch Box.
* Plug helium fill relay into connector labeled “He Fill” on Launch Box
* Plug helium vent relay into connector labeled “He Vent” on Launch Box
* Plug Nitrous fill relay into connector labeled “N20 Fill” on Launch Box
* Plug Nitrous Vent relay into connector labeled “N20 Vent” on Launch Box
* Plug Oxygen relay into connector labeled “Sting Oxygen” on Launch Box
* Plug Nitrous quick disconnect into connector labeled N20 QD on Launch Box
* Plug igniter into quick disconnect terminal labeled “E-match” on the launch box
* Connect Pressure Transducer BNC’s into their respective connectors on Launch Box
  + Power and Ground BNC with Red tape to BNC labeled “Pressure Power” with red tape
  + Signal BNC with yellow tape to BNC labeled “Pressure Signal” with yellow tape
* Connect all 3 Button Load Cell BNC’s into their respective connectors on Launch Box
  + Power and Ground BNC with red tape to BNC labeled “Load Power 1” with red tape
  + Signal BNC with yellow tape to BNC labeled “Load Signal 1” with yellow signal
  + Power and Ground BNC with red tape to BNC labeled “Load Power 2” with red tape
  + Signal BNC with yellow tape to BNC labeled “Load Signal 2” with yellow signal
  + Power and Ground BNC with red tape to BNC labeled “Load Power 3” with red tape
  + Signal BNC with yellow tape to BNC labeled “Load Signal 3” with yellow signal
* Flip rocker switch on relay arm connector to arm the RF Relay switches
* Make sure that all RF relays are in the off position by verifying on both the computer and on the relay board.
* Flip rocker switch on solenoid power to arm power the AC and DC solenoids
* Plug radio module into USB port of computer and run the program “NCD Base Station”
* Open up the program entitled “ProXR Enhanced relay control command set”
* Make sure that the “banks to control” setting is set to “1” and that “Include bank number with command” is checked at the top of the GUI.
* Complete successful relay check
  + Turn each relay on and off starting at relay 1 by clicking the on/off buttons under the section entitled “control individual relays in selected bank.” Make sure to click the “Read Status of all 8 relays” button before and after each relay trigger. **NOTE:** IF ANY RELAY IS ON THAT SHOULDN’T BE, MAKE SURE TO CLICK THE “ALL OFF” BUTTON IMMEDIATELY.
* Run separate program entitled “AD sample 5.exe”
* Ensure that The load cell is receiving reasonable data
* Ensure that the Pressure transducer is receiving reasonable data
* Ensure that second 12V car battery is full charged: *nominal:* **12 V** *measured:\_\_\_\_\_*
* Plug second 12V car battery into the connector labeled “igniter” on the launch box.
* Flip rocker switch on igniter arm connector to arm the igniters
* Make all people leave launch area immediately.
* Make sure that the “AD sample 5” and “ProXR Enhanced Relay Control Command Set” programs are both open before beginning launch sequence.

*LAUNCH SEQUENCE (SOLID MOTOR)*

* Give a 5-4-3-2-1 countdown and then switch relay number 8 corresponding to the E-match.

LAUNCH SEQUENCE (HYBRID MOTOR)

* Activate Nitrous fill by switching relay 1. Fill until nitrous load cell reads 12 lbs
* Activate Nitrous vent by switching relay 2, vent until you can no longer see nitrous.
* Activate Nitrous QD by switching relay 3. Have cameras confirm separation
* Activate Helium fill by switching relay 4. Fill until pressure transducer reads 1500 psi
* Activate Helium vent by switching relay 5. Vent until pressure transducer reads zero.
* Activate Helium QD by switching relay 6. Have cameras confirm separation
* Activate Oxygen flow by switching relay 7. Allow to flow for 5 seconds before igniting
* Activate Igniter by switching relay 8.