Order of Construction (HW V3.2)

1. Teensy3.5 or 3.6
   1. Hold in place with putty and fill all solder holes
   2. Check all Teensy Pin Connections
   3. Check 3V Short
   4. On the back-side, fill in the two small holes to connect to the Teensy USB pads
   5. Once back-side holes are filled, use solder-wicking braid to remove any excess solder. These holes are hidden under the IMU and excess solder will not allow the IMU to sit flush against the board, potentially making sensor readings inaccurate.
2. USB Plug
   1. Check the fit. If it is interfering with adjacent boards, use sandpaper to remove rough edges
   2. Hold in place with putty and fill all solder holes
   3. Check all connections with multimeter
   4. Check 5V Short
3. IMU (LSM9DS1 or Pololu Mini Alt-9)
   1. Ensure proper alignment to board, hold in place with putty
   2. Fill all solder holes
   3. Check 3V Short
   4. Check 5V Short
4. Program Test
   1. Place the EEPROMsettings.txt and settings.txt files onto a Class-10 SD card
   2. Place SD card into the socket
   3. Connect your laptop to the flight computer through the USB
   4. Select the correct serial port with the Arduino IDE
   5. Upload the flight code
   6. Open the serial monitor to ensure that data is flowing from the flight computer. Error messages are OK since its not yet fully built
   7. If the Teensy did not connect, or data is not flowing, check all connections. Re-solder any holes where the connection is broken
5. GPS Module (See mounting note)
   1. Use a soldering iron and solder paste to place a small bead of solder on each GPS module pad
   2. Line it up and solder just one pad to the board to keep it in place.
   3. Put it in the oven and reflow.
   4. Check 3V Short
   5. Connect the flight PC to the laptop and see if GPS data is coming through the serial monitor
   6. If not, then check pin connections, check for shorts, and ensure the GPS module case is not shorted to any pins (it happens sometimes)
6. GPS Antenna
   1. Clip 1-2mm off the end of the GPS antenna pin. The pin is too long and it presses up on other back-side components
   2. Remove the backing to expose the antenna adhesive
   3. Press in place
   4. On the back-side, fill the solder hole and remove excess with solder-wicking braid
7. Teensy Test-Mode Button
   1. Place the push button in the two holes on the Teensy board
   2. Solder in-place
8. Resistors
   1. Place all resistors in their correct sockets. Use 1K Ohm and 10K Ohm resistors. Precision resistors are not needed as these are simple circuits. If you plan to use a primary battery in excess of 10V, then you will need to recalculate the necessary Ohms for the continuity voltage divider circuits. Otherwise the continuity pins will become dead-pins.
9. Terminal Blocks
   1. Connect the row of terminal blocks together
   2. Solder in place
10. Beeper
    1. Trim the pins to an appropriate length
    2. Solder in place
11. MOSFETs & Voltage Regulator
    1. Cut the tabs off the TO-220 cases. Use sandpaper to remove rough edges. It is vital that the remaining metal from the tabs not touch adjacent components. There must be a small gap between them otherwise shorts will occur.
    2. Place them in their appropriate holes on the flight PC
    3. Use super-glue on the back-side of the components to adhere them to the back-side of the terminal blocks
    4. Once the glue is dry, flip the unit over and trim the TO-220 leads
    5. Solder in place.
12. H3LIS331DL
    1. Ensure correct alignment to the flight PC board
    2. Hold in-place with putty and fill all solder holes
13. Barometric Pressure Sensor
    1. Hold in-place with putty, ensure it is flush against the flight PC board
    2. Remove any impediments if it is not flush
    3. Fill all solder holes
    4. Check for shorts on power an I2C lines
14. LoRa
    1. Hold in-place with putty, solder all pads
    2. Check 3V Short
    3. Connect the unit to the laptop again. You should see no error messages. If errors are seen, it should identify sensors that are not properly connected.
15. Servo Connector Pins (Optional)
    1. Place two rows of 0.1 pitch header pins into the slots
    2. Solder in place
16. SMA Connector
    1. Solder in place
17. Accelerometer calibration
    1. Open the Arduino IDE
    2. Hold-down the test-mode button and power the unit through the USB
    3. While the unit is beeping, press the button again.
    4. Open the Arduino Serial monitor
    5. Hold the unit vertical until a solid tone is given
    6. Watch for calibration data to come across the serial monitor
    7. Once complete, power down the unit
    8. Do this again once your rocket is complete and the flight PC installed. Ensure the system is on a perfectly level surface and pointed in the direction of travel when this calibration is performed.
18. Barometer calibration
    1. Download a barometer app on your smartphone and open the app
    2. Hold down the test-mode button and power the unit
    3. Open the serial monitor
    4. Follow the calibration instructions from the serial monitor
19. Flight Simulation Test
    1. Connect Christmas tree lightbulbs or LED & resistors into each pyro channel
    2. Configure the settings.txt file to use two pyro channels at apogee and two pyro channels for mains
    3. Hold down the test-mode button and power the unit
    4. Open the serial monitor
    5. Once the unit has completed pre-flight checks, turn on the ground station and ensure it is connected
    6. Give the unit a quick jolt upwards
    7. Serial monitor data should stop, but other data should flow to the ground station and display on-screen.
    8. After 15 seconds, the unit will stop and go into post-flight mode
    9. Power down the unit and remove the SD card from the flight PC
    10. Use the parser program to examine the flight data. Look for any anomalies, such as the HighG accelerometer and IMU giving data in opposite directions, or major anomalies in the barometric data.
    11. Trouble-shoot any issues.
20. Magnetometer calibration (optional)
    1. Build your rocket and install the flight PC as it would be for flight
    2. Open the EEPROMsettings.txt file and set the “magnetometer calibrate” option to “1”
    3. Save the file to the SD card and install it in the flight PC
    4. Close the avionics bay and take the avionics bay outdoors
    5. Power the unit on and wait for the tone to end
    6. Hold the avionics bay in an orientation as if the rocket was ready for launch, and then spin the avionics bay as if the rocket was spinning in flight. Do not rotate the bay as if the rocket is tumbling in flight.
    7. Once the tone ends, power the unit down. Calibration is complete.