Document Classification	
X	Public

CubeSat Inspection and Fit-Check Procedure (CIFP)

To be used in conjunction with the CubeSat Acceptance Checklist (CAC)

Cal Poly CubeSat Laboratory

Date: ______________________

Satellite Name: ______________________

Satellite Serial Number: ______________________

Satellite Size: ______________________

Location: ______________________

QA Engineer: ______________________

CubeSat Developer: ______________________

Support Engineers: ______________________

CHANGE HISTORY LOG

Date	Rev	Author	Description of Changes
3/31/2020	2.0W	Alicia Johnstone	Initial release of CIFP for public use

1 Introduction

This standard CubeSat Inspection and Fit-check Procedure (CIFP) describes the process of inspecting the CubeSats and results should be recorded on the CubeSat Acceptance Checklist (CAC). In order to maintain the CubeSat standard and ensure proper integration with a typical CubeSat Dispenser, CubeSat developers must adhere to the specifications stated in the CubeSat Design Specifications (CDS).

2 Applicable Documents

Documents	
CAC	CubeSat Acceptance Checklist
CDS	CubeSat Design Specification

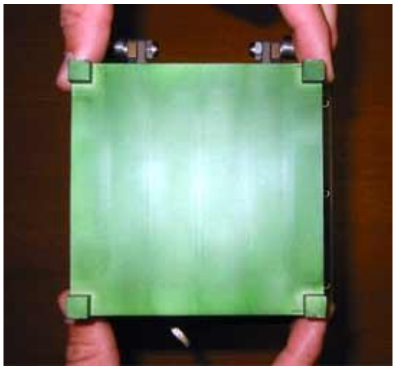
3 Required Equipment

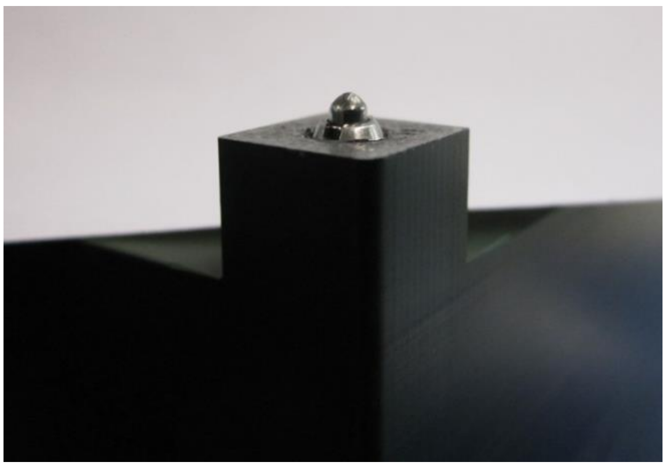
Gather all required equipment listed below before performing this Fit Check.

- CubeSat — QA Initials:_____
- CubeSat Acceptance Checklist (CAC) — QA Initials:_____
- 6 inch digital calipers — QA Initials:_____
- 12 inch digital calipers (for 1.5U and 2U CubeSats) — QA Initials:_____
- 2 ft digital calipers (for 3U, 6U, and 12U CubeSats) — QA Initials:_____
- Digital multimeter and probes — QA Initials:_____
- CubeSat inspection stand — QA Initials:_____
- Digital camera — QA Initials:_____
- 10 kg scale or scale capable of weighing CubeSat — QA Initials:_____
- Lint-free wipes — QA Initials:_____
- Isopropyl alcohol — QA Initials:_____
- ESD wrist straps — QA Initials:_____

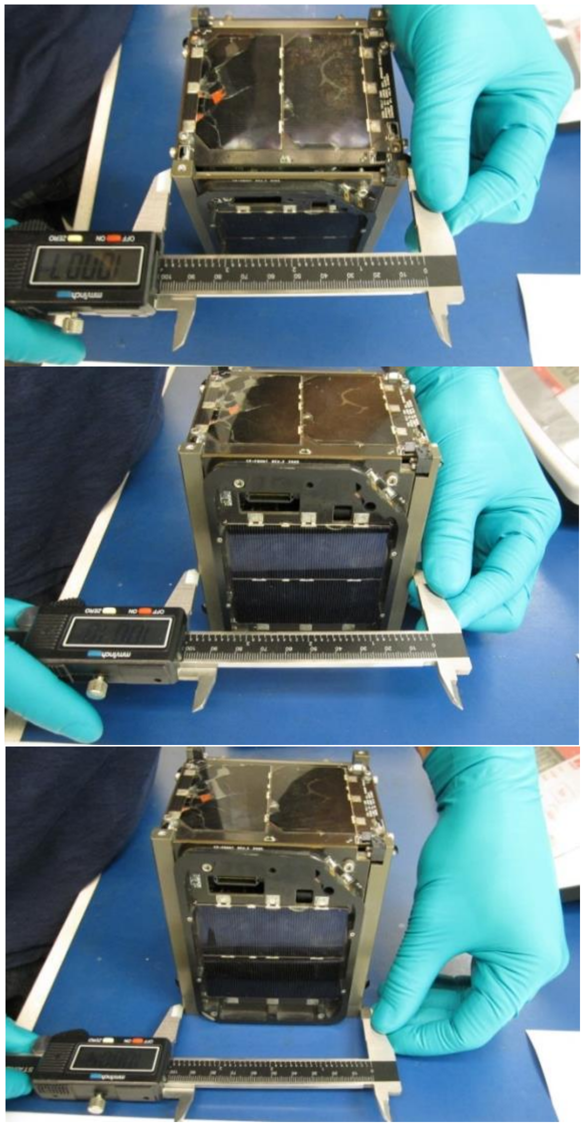
4 CubeSat Inspection

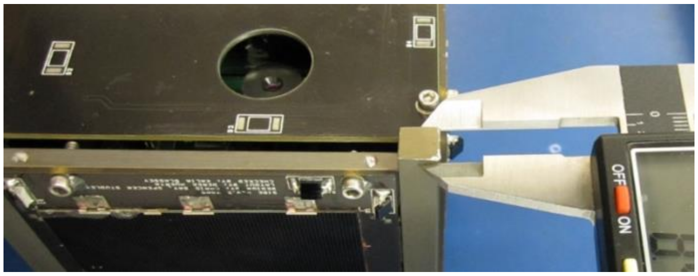
For this entire procedure, record values in the CAC.

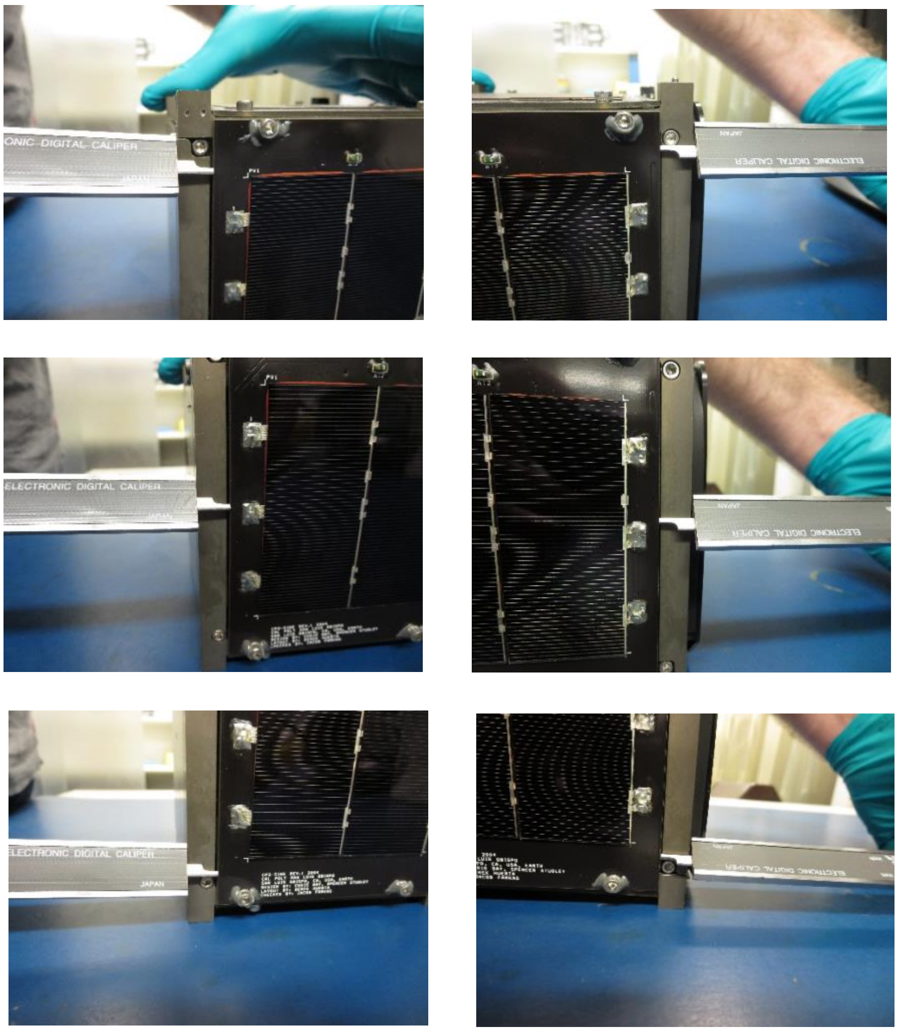
Step #	Description Date:	Time	Sig.
1.	**Inspection Start** Clean work area with IPA and wipes. Ensure the ground mat is connected to earth ground.		
2.	Place ESD strap on wrist, and connect to ground point. Ensure that the ground point is connected to earth ground.		
3.	Place CubeSat on workbench. Hold only the rails of the CubeSat.  **Figure 1: Holding CubeSat by The Rails**		
4.	Take pictures of CubeSat. Capture all sides of CubeSat, including top and bottom. Use macro mode on the camera for close-up shots.		
5.	On the graphic in the CubeSat Acceptance Checklist (CAC), mark the CubeSat's coordinate system (axes), locations of the RBF pin, umbilical connectors, deployment switches/spring plungers, deployables, and any known envelope violation locations.		
6.	Measure and record the mass of the CubeSat on the CAC. Taking a picture of the CubeSat while it is on the scale is highly recommended as a source for future reference. Note if the RBF pin or other removable items are in place. Weigh these items separately and subtract their mass from the total to find the flight mass, or note on the CAC that the RBF items are included in the mass.		

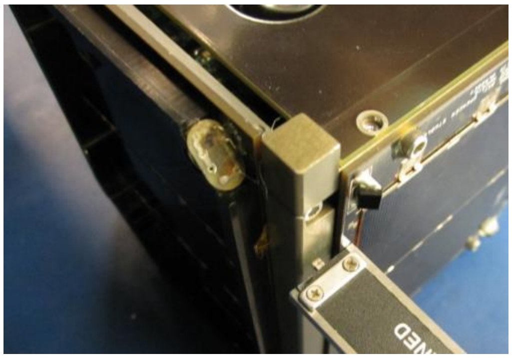
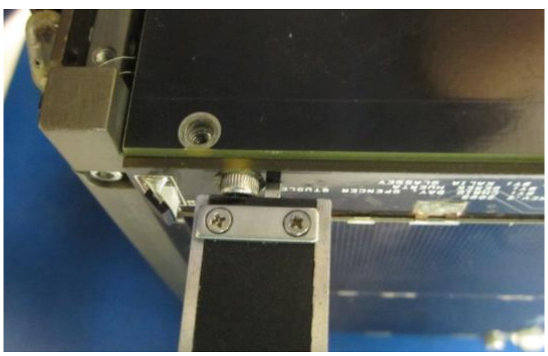
Step #	Description Date:	Time	Sig.
7.	Visually inspect that the CubeSat's RBF pin will fit into the dispenser during integration into the dispenser. The RBF pin should not protrude more than 6.5mm from the surface of the rails. **Note:** Do not remove the RBF pin.		
8.	If the CubeSat has separation mechanisms on the ends of the standoffs, test each of them on the CubeSat by pressing down and releasing it to ensure that all of the mechanisms are working. Make sure that each mechanism doesn't extend past the face of the standoff when depressed. Record in CAC.  **Figure 2: Separation spring housing protruding above standoff.** This will ensure that the CubeSat rail height measurements will remain true and reliable once it is integrated for testing or flight. **CubeSat Separation Spring Inspection:** ☐ **Pass** ☐ **Fail**		
9.	Inspect the deployment switch(es). Mark on CAC graphic the location of these switches. If they are located on the ends of the standoffs, ensure they are flush with the standoffs when depressed. Record in the CAC.		

Step #	Description Date:	Time	Sig.
10.	Use the digital multimeter to verify anodization of each aluminum rail. Place one probe on each side of each rail and take several measurements. All measurements should be Open Loop (OL), as anodized aluminum is non-conducting. Record in the CAC.		
11.	All width/length/protrusion measurements should be taken with extreme care, as it is absolutely crucial that these are in spec for proper integration of the CubeSat into a P-POD or TestPOD. If you are at all unsure of a measurement, redo it. Begin by zeroing your calipers as shown below – this will help ensure the accuracy of these measurements.  **Figure 3: Zeroing calipers. This is to be done before each set of measurements.**		

Step #	Description Date:	Time	Sig.
12.	Beginning with side 1, measure the rail-to-rail width of the CubeSat at the top, middle, and bottom of its height.  **Figure 4: Measurement of one side of CubeSat width.**		
13.	Ensure all measurements for all sides are within tolerance, and record in CAC. Note any deviations or anomalies.		

Step #	Description Date:	Time	Sig.
14.	Lay CubeSat down on test stand and measure the length of each rail from foot to foot, making sure they are within tolerance. Be sure not to set caliper jaws on separation springs or deployment switches; this will ensure that the measurement will reflect the actual height of the rail. Record length measurements in CAC. Note any deviations or anomalies.		
15.	Measure the widths for all CubeSat +Z and –Z standoffs (2 measurements per standoff, 8 standoffs total). One such measurement is illustrated below.  **Figure 5: CubeSat standoff measurements. Measurement of both sides for each standoff is required.** Record measurements in CAC. Note any deviations or anomalies.		

Step #	Description Date:	Time	Sig.
16.	Measure the distance from the rail edge to the first object protruding past the rail surface. This is typically the side panel. Do this measurement for both rails on each face, at the top, middle, and bottom of the CubeSat. Record measurements in CAC. Note any deviations or anomalies.  **Figure 6: Distance measured from edge of rail to first protrusion**		

Step #	Description Date:	Time	Sig.
17.	Measure any protrusions normal to each face of the CubeSat relative to a rail surface, taking care not to contact/scratch sensitive surfaces such as solar cells. Depending on the location of the protrusion and sensitivity of surrounding hardware, these measurements require varying levels of arithmetic and manual dexterity. Measurement of a fairly simple protrusion is detailed below as an example.  **Figure 7: CubeSat face protrusion measurement example 1.** Height of circuit board relative to rail surface measured (Figure 7), call this A.  **Figure 8: CubeSat face protrusion measurement example 2.** Height of screw head relative to circuit board measured (Figure 8), call this B. Total screw protrusion = A+B. Record the largest protrusion on each face in the CAC. Note any deviations or anomalies.		

Step #	Description Date:	Time	Sig.
18.	If the CubeSat has the U+ extra volume, commonly referred to as a Tuna Can, use the U+ CAC to record the location and volume, and verify that they adhere to the CubeSat Design Specification. Measure the length of the U+ volume from the end of the standoffs to the end of the end of the U+ volume. Measure the diameter of the U+ volume. Measure the location of the center of the U+ volume relative to the closest standoff. Record measurements in CAC. Note any deviations or anomalies. **Note**: For a 1U, the location measurement can be taken from any corner. For 6U and 12U, use the closest corners as identified on the CAC. **Note:** Take extra caution when measuring the protrusions and do not touch sensitive components such as solar cells, camera lens, optical surfaces/tapes, and sensors.		
19.	Initial in the “Authorized By” box on the CAC and circle whether or not the CubeSat passed the CubeSat Acceptance Checklist.		

5 Comments/Observations

6 Quality Completion Steps

Description	Time	Date	Sig.
Validate all information in this test document is complete.			

QA Signature:_____________________________________ **Date:**______________