DRAGONFLY

FM Assembly Procedure

Chart, arrow

Description automatically generated

Rev. G: 2024/06/07

Kyushu Institute of Technology

BIRDS-X project

Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Revision Number** | **Writer** | **Annotations** |
| 2023/12/15 | NC | Jorge Casir/ Jairo | Initial Release |
| 2023/12/23 | A | Jorge Casir | Fixes |
|  | B | Jorge Casir | Fixes |
| 2024/01/28 | C | Tim Hoksong | Add spring plunger |
| 2024/01/29 | D | Tim Hoksong | Change “burner circuit” to “heat cutter” / add spring plunger diagram  Combine screw and nut with the same part number in 4.1.3 |
| 2024/03/14 | E | Jorge Casir | Final fix |
| 2024/05/30 | F | Merisa Kosiyakul | STEP#13, #26 fixes |
| 2024/06/07 | G | Merisa Kosiyakul | Table 4.1.3 fixes |

# Introduction

This document shall be used as a guide to facilitate the proper assembly of the Flight Model of the DRAGONFLY satellite. Necessary steps in the assembly are illustrated with relevant images and a checklist of parts, tools, and fasteners required.

# Reference documents

[1] JX-ESPC-101133-E JEM Payload Accommodation Handbook. Vol 8

# Requirements

1. Be sure to prepare one day before the assembly procedure begins. Therefore, the assembly work will take two days minimum.
2. Perform RTV adhesion work on the preparation day and perform assembly work after 24 hours have elapsed.
3. The assembly team shall comprise the following people:

* one member of the structure team
* one member of the interface team
* one member of the safety team

1. Wear rubber gloves, a hair cap, a surgical face mask, and a dustproof coat when working in the clean room.
2. The structure elements and subsystems shall not be assembled with bare hands. Appropriate gloves shall be worn.
3. At least one member of the critical sub-system must be present during the assembly of a critical subsystem. In this case, a critical sub-system shall refer to any sub-system that requires a separate assembly protocol other than that indicated in this document.
4. Do not proceed with assembly if you do not understand a step. Ask the structure subsystem responsible.
5. Carefully read and observe every precaution documented for each assembly stage (if any).

# Assembly procedure for CubeSat (DRAGONFLY)

## Axis definition CubeSat

The axis of the Satellite shall be defined as shown below (Figure 1)



**Figure 1 Satellite Axis Definition**

## Structure Assembly protocol

1. The team member that executes the assembly shall write his name.
2. The AIT/Safety/Verification・member (or any member assigned) shall confirm that all checklists were executed.
3. A photograph must be taken when an assembly step is completed.
4. The structure must be cleaned with ethanol.
5. Hand gloves must be used at all times.
6. The team must be extra careful when handling electronic circuit boards. Make sure to wear an antistatic wristband on your wrist or ankle. Make sure that the metal part of the wristband is touching the skin and connected to the ground at this time.
7. Pins of extra length protruding from the electronic circuit board must be cut as short as possible to prevent short circuits due to contact with other parts.
8. All metal parts such as electronic circuit boards and deployment switches need to be insulated by pasting Kapton tape.

## General Precautions

1. Confirm the torque for all fasteners before you tighten. Ensure you apply the required torque using the torque drive.
2. Always use the Support Provided for the Satellite structure, do not place it directly on the table.
3. If unsure of a step, ask the Structure team members.

## 4.1 Preparation

**Working progress**

1. Preparation and confirmation of the tools to be used.
2. Preparation and confirmation of the parts to be used and weighing each part.
3. Preparation and confirmation of the fasteners to be used.
4. Preparation of electronic circuit board

* Cut all extra-length pins protruding from the electronic circuit board as short as possible.
* Insulate all metal parts such as electronic circuit boards, RF shields, and deployment switches with Kapton tape.

1. Assembling the battery

**4.1.1 Preparation and confirmation of the tools to be used**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tools Checklist** | | | |
| **No.** | **Tool** | **Picture** | **Check** |
| **Common** | | | |
| 1 | Rubber gloves | 関連画像 |  |
| 2 | Hair cap | 「川西工業 使い切りキャップ」の画像検索結果「川西工業 使い切りキャップ」の画像検索結果 |  |
| 3 | Surgical face mask | 「サージカルフェイスマスク」の画像検索結果「サージカルフェイスマスク」の画像検索結果 |  |
| 4 | Dustproof coat | **https://jp.images-monotaro.com/Monotaro3/pi/full/mono39496493-140515-02.jpg** |  |
| 5 | Torque driver socket (2 types) |  |  |
| 6 | Bit conversion adapter |  |  |
| 7 | Extension bit |  |  |
| 8 | Square | **A picture containing text, device  Description automatically generated** |  |
| 9 | Digital tester | 「テスター」の画像検索結果 |  |
| 10 | Wire stripper | 「ワイヤーストリッパー」の画像検索結果 |  |
| 11 | crimper |  |  |
| 12 | Vernier Caliper | 「ノギス」の画像検索結果 |  |
| 13 | Height gauge | 「ハイトゲージ」の画像検索結果 |  |
| 14 | Weighing balance | A picture containing indoor, device, kitchen, scale  Description automatically generated |  |
| 15 | Torque Driver |  |  |
| 16 | Hex Bit 1.3 mm | 56 ヘックスビットB 東日製作所 02469223 |  |
| 17 | Hex Bit 1.50 mm | **Schematic  Description automatically generated with low confidence** |  |
| 18 | Tweezers | http://g01.a.alicdn.com/kf/HTB1CxsFKpXXXXX1aXXXq6xXFXXXa.jpg「ピンセット 逆作動」の画像検索結果 |  |
| 19 | Scissors | 「はさみ」の画像検索結果 |  |
| 20 | Pliers | 「ペンチ」の画像検索結果 |  |
| 21 | Kapton tape | 「カプトンテープ」の画像検索結果「カプトンテープ」の画像検索結果 |  |
| 22 | Alcohol | 「洗浄ボトル」の画像検索結果 |  |
| 23 | Kim Wipes | 「キムワイプ」の画像検索結果 |  |
| 24 | Antistatic wrist strap | 「静電気防止　リストバンド」の画像検索結果 |  |
| 25 | Marker | 「マッキーペン」の画像検索結果 |  |
| 26 | Precision screwdriver | M6SD 精密ドライバーセット モノタロウ 20366578 |  |
| 27 | Spatula | A close-up of a pen  Description automatically generated with low confidence |  |
| 28 | Loctite 263 glue | https://jp.images-monotaro.com/Monotaro3/pi/full/mono34933543-161109-02.jpg |  |
| 29 | Araldite glue | AR-S30 スタンダード 高性能エポキシ系強力接着剤 アラルダイト 33240715 |  |
| 30 | Worktable for assembly | A picture containing text, piece  Description automatically generated |  |
| 31 | Insertion tool (with tap handle) | WhatsApp Image 2019-10-11 at 14 |  |
| 32 | Magnetic breaker | WhatsApp Image 2019-10-11 at 14 |  |
| 33 | Paper clips | ソース画像を表示 |  |
| 34 | Hex Bit 2.5mm | **Schematic  Description automatically generated with low confidence** |  |

### 4.1.2 Preparation and confirmation of the parts to be used and weighing each parts

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Parts** | **Picture** | **Qty.** | **Check** |
| 1 | Battery case | A picture containing electronics  Description automatically generated | 1 |  |
| 2 | Base Insulator (Teflon) | Shape  Description automatically generated | 2 |  |
| 3 | Short width side Insulator (Teflon) | Shape, arrow  Description automatically generated | 2 |  |
| 4 | Length side Insulator (Teflon) | A picture containing tool  Description automatically generated | 2 |  |
| 5 | Battery |  | 1 |  |
| 6 | Thermistor | A picture containing text, device  Description automatically generated | 1 |  |
| 7 | Battery cover | A picture containing text, case  Description automatically generated | 1 |  |
| 8 | Nichrome wire |  | 2 |  |
| 9 | Deployment mechanism |  | 2 |  |
| 10 | Dipole UHF antenna elements |  | 4 |  |
| 11 | Dipole VHF antenna elements |  | 4 |  |
| 12 | Wire | A picture containing text, device, gauge, compass  Description automatically generated | 4 |  |
| 13 | Deployment switch | A picture containing electronics  Description automatically generated | 3 |  |
| 14 | +Y+X rail  (Frame 2U) Plunger spring |  | 1 |  |
| 15 | +Y-X rail  (Frame 2U) deployment switch |  | 1 |  |
| 16 | -Y+X rail  (Frame 2U) deployment switch |  | 1 |  |
| 17 | -Y-X rail  (Frame 2U) deployment switch |  | 1 |  |
| 18 | Frame 7 | アイコン  自動的に生成された説明 | 3 |  |
| 19 | -Z frame |  | 1 |  |
| 20 | 0Z frame |  | 1 |  |
| 21 | +Z frame |  | 1 |  |
| 22 | Stacking rod |  | 4 |  |
| 23 | Backplane Board |  | 1 |  |
| 24 | Front  Access  Board  (FAB) |  | 1 |  |
| 25 | RBF pin | A close-up of a computer mouse  Description automatically generated with low confidence | 2 |  |
| 26 | OBC/EPS Board |  | 1 |  |
| 27 | COM Board |  | 1 |  |
| 28 | APRS R1 |  | 1 |  |
| 29 | APRS R2 |  | 1 |  |
| 30 | APRS P1 |  | 1 |  |
| 31 | APRS P2 |  | 1 |  |
| 32 | APRS P3 |  | 1 |  |
| 33 | APRS P4 |  | 1 |  |
| 34 | APRS P5 |  | 1 |  |
| 35 | New UHF Board |  | 1 |  |
| 36 | Rear  Access Board  (RAB) |  | 1 |  |
| 37 | Coaxial cable (UHF) | 「MMCX SMA ケーブル」の画像検索結果 | 2 |  |
| 38 | Coaxial cable (VHF) | 「MMCX SMA ケーブル」の画像検索結果 | 8 |  |
| 39 | -X panel |  | 1 |  |
| 40 | +X panel |  | 1 |  |
| 41 | -Z panel |  | 1 |  |
| 42 | +Z panel |  | 1 |  |
| 43 | +Y-Z panel |  | 1 |  |
| 44 | +Y+Z panel |  | 1 |  |
| 45 | -Y+Z panel |  | 1 |  |
| 46 | -Y-Z panel |  | 1 |  |
| 47 | +Z Mount cover |  | 1 |  |
| 48 | -Z Mount cover |  | 1 |  |
| 49 | Spring plunger | A close-up of a faucet  Description automatically generated with medium confidence | 1 |  |

## Preparation and confirmation of the fasteners to be used

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Type** | **Part No** | **Qty. FM** | **Vendor** | **Initial Torque** |
| Screw | SCB2-12 | 11 | MISUMI | 0.176 |
| Screw | SCB2-4 | 6 | MISUMI | 0.176 |
| Screw | SCB2-6 | 44 | MISUMI | 0.176 |
| Screw | CBSTSR2-6 | 12 | MISUMI | 0.160 |
| Screw | SNSS-M2-6-SD | 18 | NBK | 0.176 |
| Screw | SNSS-M1.6-6 | 3 | MISUMI | 0.086 |
| Screw | SCB2-6 | 16 | MISUMI | 0.176 |
| Nut | SLBNR3 | 4 | MISUMI | 0.176 |
| Nut | SLBNR2 | 4 | MISUMI | 0.176 |
| Nut | KNTR2 | 8 | MISUMI | 0.176 |
| Nut | M00202000020000000 | 16 | Nezikuru | 0.176 |
| Screw (Battery Box) | CBSTSR 2-5 | 8 | MISUMI | 0.160 |
| Insert | SH-HLTS2-3 | 16 | MISUMI |  |
| Spacer | 4.53 mm | 4 | MISUMI |  |
| Spacer | 19.15 mm | 4 | MISUMI |  |
| Spacer | 6.50 mm | 4 | MISUMI |  |
| Spacer | 5.40 mm | 4 | MISUMI |  |
| Spacer | 31.82 mm | 4 | MISUMI |  |
| Spacer | 14.40 mm | 24 | MISUMI |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Spacer | 5.90 mm | 4 | MISUMI |  |
| Spacer | 15.20 mm | 4 | MISUMI |  |
| Spacer | 5.75 mm | 4 | MISUMI |  |

## Soldering of solar cells into panels

|  |  |  |  |
| --- | --- | --- | --- |
| **Adhesive position** | | | |
| **No.** | **Boards** | **Position** | **Check** |
| **1** | **-X panel** | **Azur Solar Cells** |  |
| **2** | **+X panel** | **Azur Solar Cells** |  |
| **3** | **-Y panel** | **Azur Solar Cells** |  |
| **5** | **+Y panel** | **Azur Solar Cells** |  |
| **6** | **-Z panel** | **Azur Solar Cells** |  |
| **7** | **+Z panel** | **Azur Solar Cells** |  |

## Cut all extra length pins protruding from the electronic circuit board as short as possible.

|  |  |  |  |
| --- | --- | --- | --- |
| **Cutting position Checklist** | | | |
| **No.** | **Boards** | **Position** | **Check** |
| **1** | **Backplane** | **Solar cell connection pin** |  |
| **2** | **Backplane** | **All 50 pin connector** |  |
| **3** | **FAB** | **50 pin connector** |  |
| **4** | **FAB** | **Front access connector (right)** |  |
| **5** | **-X Panel** | **RBF** |  |
| **6** | **FAB** | **Solar cell connection pin** |  |
| **7** | **FAB** | **Front Access connector (left)** |  |
| **8** | **OBC Board** | **50 pin connector** |  |
| **9** | **COM Board** | **50 pin connector** |  |
| **10** | **APRS#R1** | **50 pin connector** |  |
| **11** | **APRS#R1** | **Radiometrix (transceiver)** |  |
| **12** | **APRS#R2** | **50 pin connector** |  |
| **13** | **APRS#R2** | **ATMEGA 128P (transceiver)** |  |
| **14** | **APRS#P1** | **50 pin connector** |  |
| **15** | **APRS#P1** | **(transceiver)** |  |
| **16** | **APRS#P2** | **50 pin connector** |  |
| **17** | **APRS#P2** | **(transceiver)** |  |
| **18** | **APRS#P3** | **50 pin connector** |  |
| **19** | **APRS#P3** | **(transceiver)** |  |
| **20** | **APRS#P4** | **50 pin connector** |  |
| **21** | **APRS#P4** | **(transceiver)** |  |
| **22** | **APRS#P5** | **50 pin connector** |  |
| **23** | **APRS#P5** | **(transceiver)** |  |

## Insulate all metal parts such as electronic circuit boards and deployment switches with Kapton tape

|  |  |  |  |
| --- | --- | --- | --- |
| **Pasting position Checklist** | | | |
| **No.** | **Parts** | **Position** | **Check** |
| **1** | **Backplane** | **Solar cell connection pin** |  |
| **2** | **Backplane** | **All 50 pin connector** |  |
| **3** | **Backplane** | **3 corners**  **(To prevent harness cutting of the deployment switch)** |  |
| **4** | **FAB** | **50 pin connector** |  |
| **5** | **FAB** | **Battery connector** |  |
| **6** | **FAB** | **RBF** |  |
| **7** | **FAB** | **Front Access connector** |  |
| **8** | **FAB** | **Solar cell connection pin** |  |
| **9** | **OBC Board** | **50 pin connector** |  |
| **10** | **COM Board** | **50 pin connector** |  |
| **11** | **COM Board** | **Front surface** |  |
| **12** | **COM Board** | **Back surface** |  |
| **13** | **APRS#R1** | **50 pin connector** |  |
| **14** | **APRS#R2** | **50 pin connector** |  |
| **15** | **APRS#P1** | **50 pin connector** |  |
| **16** | **APRS#P2** | **50 pin connector** |  |
| **17** | **APRS#P3** | **50 pin connector** |  |
| **18** | **APRS#P4** | **50 pin connector** |  |
| **19** | **APRS#P5** | **50 pin connector** |  |
| **20** | **RAB** | **50 pin connector** |  |
| **21** | **Deployment switch** | **Harness connection part** |  |
| **22** | **Dipole Antennas** | **Wire attachment part** |  |

## Precaution

**Precautions for tightening screws**

1. To apply force as evenly as possible, please tighten the screw so that it is diagonal to the screw that you just tightened. As the order of screw tightening is stated, please follow it.
2. Please tighten by hand without applying torque at first.

Instead of tightening them all at once, please be sure to tighten them separately several cycles.

The depth of tightening within one cycle should be the same.

At this time, please stop just before the screw head hits.

1. Next, please apply torque in the same order as above.
2. If screws are difficult to fit, do not try to force them, please remove all screws once and try again. When redoing, please shorten the tightening depth and repeat several cycles and gradually tighten.
3. Please ensure the end creep of the coil insert is located inside the part. After inserting the coil check to ensure the open side of the insert is at the same level as the surface of the part.
4. Next, please break the end creep of the coil insert with breaking tool and make sure the creep end is out safely.



**Precautions for Loctite (fastener bond)**

1. The work of applying Loctite is done in a clean room.
2. Work should be done in a room-temperature environment of 25 degrees or less.
3. Preliminarily clean the surface to be coated with Loctite by alcohol.
4. Fix fasteners within 20 minutes after application of the Loctite.
5. Maintain the satellite in a clean room for 24 hours to dry the Loctite after assembly.
6. Wipe off the residue when using the Loctite.

**Precautions for wire**

1. The wire should be stretched with the appropriate load.
2. Before using it, make sure there is no damage.
3. If the wire may encounter other structures, apply Kapton tape to the contact points of the structure to prevent damage to the wire.
4. Knots are taped to keep them loose.
5. After fixing the antenna, make sure the wire is not damaged.

**4.2 CubeSat Assembling (Day1)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step#** | **1** | **Install the insulator in the battery case and attach the thermistor** | | | | |
| **Note** |  | | | | | |
| A white metal object with holes  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| Battery case | | 1 |  |
| Base Insulator | | 1 |  |
| Short width side Insulator | | 2 |  |
| Length side Insulator | | 2 |  |
| Harness | | | |
| Connection source | Access point | Qty. | Check |
| Battery case | - | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step#** | **2** | **Install the battery in the battery case and attach the thermistor** | | | | |
| **Note** | **・Pass the battery harness through the hole of the battery case.**  **・After inserting the battery, cover the insulator from above.**  **・Make sure the battery cell terminals and the cell itself are covered with Kapton.**  **・Make sure each cable from the battery cell to the connector is covered with Kapton tape.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| Step#1 Battery case | | 1 |  |
| Thermistor | | 1 |  |
| Battery | | 1 |  |
| Base Insulator | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Step#** | **3** | **Lock the battery case with the battery cover** | | | | | | | |
| **Note** | **Pay attention to the order of tightening the screws. Apply Loctite to Fasteners.** | | | | | | | | |
| A black rectangular object with red circles  Description automatically generated | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step#2 Battery case | | | | | 1 |  |
| Battery cover | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | CBSTSR  2-5 | | 1.27 | 0.16 | 8 |  |
| Harness | | | | | | |
| Connection source | | Access point | | | Qty. | Check |
| Battery | | - | | | 1 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

# 4.3 Kapton extension

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step#** | **4** | **Put 200 mm of the back side of Kapton tape on the table and attach it with adhesive tape.** | | | | |
| **Note** | **The first layer of Kapton tape** | | | | | |
| A metal ruler and yellow tape  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| Kapton tape | | 2 |  |
| Adhesive tape | | 2 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step#** | **5** | **Put two 350 mm wires in the middle of the Kapton tape.** | | | | |
| **Note** | **Align the wires in the center of the tape. One end is for attaching with the antenna element, and another end is for attaching with antenna deployment.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| Kapton tape | | 2 |  |
| Wire | | 4 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step#** | **6** | **Put 300 mm Kapton tape adhesive side over the wires and step 4 Kapton tape.** | | | | |
| **Note** | **The second layer of Kapton tape** | | | | | |
| A person sitting on a chair with a ruler and a long ruler  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| Kapton tape with PE lines | | 2 |  |
| Kapton tape | | 2 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step#** | **7** | **Place another 2 layers of 300 mm of adhesive side of Kapton tapes on step 6 Kapton extension.** | | | | |
| **Note** | **There are 4 layers of Kapton tape in this step** | | | | | |
| A ruler and yellow tape on a white surface  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| 2 layers of Kapton tape with wires | | 2 |  |
| Kapton tapes | | 4 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step#** | **8** | **Turn the Kapton tape extension upside down and attach the tips with adhesive tape.** | | | | |
| **Note** |  | | | | | |
| A ruler and a long thin line  Description automatically generated with medium confidence | | | Parts | | | |
| Name | | Qty. | Check |
| 4 layers of Kapton tape with wires | | 8 |  |
| Adhesive tape | | 4 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step#** | **9** | **Place another 2 layers of 200 mm Kapton tape adhesive side over the Kapton tape extension step 8.** | | | | |
| **Note** |  | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| 4 layers of Kapton tape with wires | | 2 |  |
| Kapton tapes | | 4 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Step#** | **10** | **Cut off the excess Kapton tape to approximately 3 mm in width with scissors.** | | | | |
| **Note** |  | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| 6 layers of Kapton tape with wires | | 2 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

# 4.4 Tying procedure

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Step#** | **11** | **Attach the nichrome wire to the -Y panel** | | | | | | |
| **Note** | **・ Apply the Loctite** | | | | | | | |
| A computer screen shot of a blue square  Description automatically generatedA computer screen shot of a blue square  Description automatically generated | | | Parts | | | | | |
| Name | | | | Qty. | Check |
| -Y panel | | | | 1 |  |
| Nichrome wire | | | | 1 |  |
| Fasteners | | | | | |
| Model | | | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-4 | | 0.176 | 2 |  |
| Nut | SLBNR2 | | - | 2 |  |
| Checklist | | | | | |
| Picture | |  | | | |
| Torque mark | |  | | | |
| Loctite | |  | | | |
| Responsible | |  | | | |

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| **Step#** | **12** | **Fasten the deployment mechanism to the -Y panel** | | | | | | |
| **Note** | **- Adjust the position of the feeding point wire to align with the antenna element holes of the antenna deployment**  **- Apply the Loctite** | | | | | | | |
| A computer screen shot of a blue and grey square  Description automatically generated | | | Parts | | | | | |
| Name | | | | Qty. | Check |
| -Y panel | | | | 1 |  |
| Deployment mechanism | | | | 1 |  |
| Fasteners | | | | | |
| Model | | | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 0.176 | 4 |  |
| Nut | KNTR2 | | - | 4 |  |
| Checklist | | | | | |
| Picture | |  | | | |
| Torque mark | |  | | | |
| Loctite | |  | | | |
| Responsible | |  | | | |

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| **Step#** | **13** | **Attach dipole antennas to the deployment mechanism** | | | | | | |
| **Note** | **- Align dipole antennas with the feeding point wire carefully. Make sure they touch perfectly.**  **- Apply the Loctite** | | | | | | | |
| A close-up of a metal object  Description automatically generated | | | Parts | | | | | |
| Name | | | | Qty. | Check |
| Deployment mechanism | | | | 1 |  |
| Dipole VHF antenna elements | | | | 2 |  |
| Dipole UHF antenna elements | | | | 2 |  |
| Fasteners | | | | | |
| Model | | | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 0.176 | 8 |  |
| Nuts | M00202000020000000 | | 0.176 | 8 |  |
| Checklist | | | | | |
| Picture | |  | | | |
| Torque mark | |  | | | |
| Loctite | |  | | | |
| Responsible | |  | | | |

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| **Step#** | **14** | **Tie a Kapton tape extension to the end of the VHF antenna. Cover the knot with a small piece of Kapton tape.** | | | | |
| **Note** | **・Cover the edge of the hole through which the wire passes with Kapton.**  **・Pass the wire through the hole at the end of the antenna and tie it by two half-hitches.**  **・Pass another wire through the same hole and tie it with two half-hitches.**  **・Cover knots with Kapton tape** | | | | | |
| A needle with a blue thread  Description automatically generated    A long metal object with a brown handle  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Kapton tape extension | | 1 |  |
| Kapton tape | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **15** | **Fold the antenna along with the deployment mechanism guide.** | | | | |
| **Note** |  | | | | | |
| A person holding a piece of paper  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **16** | **Embed the wires of the Kapton tape extension on the guide position (R0.7) for a heat cutter.** | | | | |
| **Note** | **Trim the excess Kapton tape extension to fit the length with the deployment mechanism.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **17** | **Put the wires of the Kapton tape extension into the hole for the heat cutter area.** | | | | |
| **Note** | **Hold the antennas by a clipper to keep the antennas in place.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **18** | **Using tweezers, pass the wires through the nichrome wire** | | | | |
| **Note** | **Make sure the wires touch the nichrome wire.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **19** | **Make a loop on one of the wires.** | | | | |
| **Note** |  | | | | | |
| A close-up of a antenna panel  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **20** | **Pass the wires through the R0.7 chamfered hole of heat cutter tying area.** | | | | |
| **Note** | **Leave the made loop on the side of heat cutter.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **21** | **Put the end of wire through the made loop and tie it by pushing the end of wire to opposite side of heat cutter.** | | | | |
| **Note** | **- Adjust the position of the knot to the heat cutter side to fold the antenna element tightly**  **- Apply epoxy on the knot** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **22** | **Repeat step 19 to 21 with the other wire.** | | | | |
| **Note** | **- Adjust the position of the knot to the heat cutter side to fold the antenna element tightly**  **- Apply epoxy on the knot** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **23** | **Cut off the excess wires** | | | | |
| **Note** |  | | | | | |
| A blue and white electronic device  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| -Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **24** | **Attach the nichrome wire to the +Y panel** | | | | | | |
| **Note** | **・ Apply the Loctite** | | | | | | | |
| A computer screen shot of a blue square  Description automatically generatedA computer screen shot of a blue square  Description automatically generated | | | Parts | | | | | |
| Name | | | | Qty. | Check |
| +Y panel | | | | 1 |  |
| Nichrome wire | | | | 1 |  |
| Fasteners | | | | | |
| Model | | | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-4 | | 0.176 | 2 |  |
| Nut | SLBNR2 | | - | 2 |  |
| Checklist | | | | | |
| Picture | |  | | | |
| Torque mark | |  | | | |
| Loctite | |  | | | |
| Responsible | |  | | | |

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| **Step#** | **25** | **Fasten the deployment mechanism to the +Y panel** | | | | | | |
| **Note** | **- Adjust the position of the feeding point wire to align with the antenna element holes of the antenna deployment**  **- Apply the Loctite** | | | | | | | |
| A computer screen shot of a blue and grey square  Description automatically generatedA computer screen shot of a blue and white object  Description automatically generated | | | Parts | | | | | |
| Name | | | | Qty. | Check |
| +Y panel | | | | 1 |  |
| Deployment mechanism | | | | 1 |  |
| Fasteners | | | | | |
| Model | | | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 0.176 | 4 |  |
| Nut | KNTR2 | | - | 4 |  |
| Checklist | | | | | |
| Picture | |  | | | |
| Torque mark | |  | | | |
| Loctite | |  | | | |
| Responsible | |  | | | |

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| **Step#** | **26** | **Attach dipole antennas to the deployment mechanism** | | | | | | |
| **Note** | **- Align dipole antennas with the feeding point wire carefully. Make sure they touch perfectly.**  **- Apply the Loctite** | | | | | | | |
| A close-up of a metal object  Description automatically generated | | | Parts | | | | | |
| Name | | | | Qty. | Check |
| Deployment mechanism | | | | 1 |  |
| Dipole VHF antenna elements | | | | 2 |  |
| Dipole UHF antenna elements | | | | 2 |  |
| Fasteners | | | | | |
| Model | | | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 0.176 | 8 |  |
| Nuts | M00202000020000000 | | 0.176 | 8 |  |
| Checklist | | | | | |
| Picture | |  | | | |
| Torque mark | |  | | | |
| Loctite | |  | | | |
| Responsible | |  | | | |

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| **Step#** | **27** | **Tie a Kapton tape extension to the end of the VHF antenna. Cover the knot with a small piece of Kapton tape.** | | | | |
| **Note** | **・Cover the edge of the hole through which the wire passes with Kapton.**  **・Pass the wire through the hole at the end of the antenna and tie it by two half-hitches.**  **・Pass another wire through the same hole and tie it with two half-hitches.**  **・Cover knots with Kapton tape** | | | | | |
| Close-up of hands in gloves holding a needle  Description automatically generated  A needle with a blue thread  Description automatically generated    A long metal object with a brown handle  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Kapton tape extension | | 1 |  |
| Kapton tape | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **28** | **Fold the antenna along with the deployment mechanism guide.** | | | | |
| **Note** |  | | | | | |
| A person holding a piece of paper  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **29** | **Embed the wires of the Kapton tape extension on the guide position (R0.7) for a heat cutter.** | | | | |
| **Note** | **Trim the excess Kapton tape extension to fit the length with the deployment mechanism.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **30** | **Put the wires of the Kapton tape extension into the hole for the heat cutter area.** | | | | |
| **Note** | **Hold the antennas by a clipper to keep the antennas in place.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **31** | **Using tweezers, pass the wires through the nichrome wire** | | | | |
| **Note** | **Make sure the wires touch the nichrome wire.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **32** | **Make a loop on one of the wires.** | | | | |
| **Note** |  | | | | | |
| A close-up of a antenna panel  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **33** | **Pass the wires through the R0.7 chamfered hole of heat cutter tying area.** | | | | |
| **Note** | **Leave the made loop on the side of heat cutter.** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **34** | **Put the end of wire through the made loop and tie it by pushing the end of wire to opposite side of heat cutter.** | | | | |
| **Note** | **- Adjust the position of the knot to the heat cutter side to fold the antenna element tightly**  **- Apply epoxy on the knot** | | | | | |
| A diagram of a antenna panel  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **35** | **Repeat step 32 to 34 with the other wire.** | | | | |
| **Note** | **- Adjust the position of the knot to the heat cutter side to fold the antenna element tightly**  **- Apply epoxy on the knot** | | | | | |
|  | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **36** | **Cut off the excess wires** | | | | |
| **Note** |  | | | | | |
| A blue and white electronic device  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| +Y panel | | 1 |  |
| Deployment mechanism | | 1 |  |
| Kapton tape extension | | 1 |  |
| Checklist | | | |
| Picture |  | | |
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# 4.5 CubeSat Assembling (Day2)

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| **Step#** | **37** | **Solder the harness to the deployment switches** | | | | |
| **Note** | **Please try to solder firmly as small as possible so that the solder part does not bulge** | | | | | |
| A yellow wire on a plastic surface  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| Deployment switch | | 3 |  |
| Harness | | | |
| Connection source | Access point | Qty. | Check |
| Deployment switch | - | 3 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **38** | **Paste Kapton tape on the deployment switch** | | | | |
| **Note** | **Thinly cover all conductive parts. Test switch functionality after all procedures.** | | | | | |
| A gold square on a green cloth  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| Step#22 Deployment switch | | 3 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **39** | **Pass the harness of the deployment switch through the hole of Frame 7** | | | | |
| **Note** | **Be careful while handling the harness of the deployment switch**  **Make sure that each harness connected to DepSW2 is covered with Kapton.**  **Fit the deployment switch into Frame 7** | | | | | |
| A gloved hand holding a small device  Description automatically generated | | | Parts | | | |
| Name | | Qty. | Check |
| Step#23 Deployment switch | | 3 |  |
| Frame 7 | | 3 |  |
| Harness | | | |
| Connection source | Access point | Qty. | Check |
| Deployment switch | - | 3 |  |
| Checklist | | | |
| Picture |  | | |
| Responsible |  | | |

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| **Step#** | **40** | **Prepare all the rails, Install the deployment switch into the three rails and fasten the switch cover with M1.6 screws. +Y+X rail (With the spring plunger )** | | | | | |
| **Note** | **Make sure to check with the tester whether the deployment switch is in contact with the rail. Please reapply the Kapton tape to the deployment switch if it is in contact. Apply Loctite to Fasteners.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| +Y+X rail | | | 1 |  |
| -Y+X rail | | | 1 |  |
| +Y-X rail | | | 1 |  |
| -Y-X rail | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **41** | **Prepare +Y+X rail and -Y+X rail in paralel** | | | | | |
| **Note** |  | | | | | | |
| A pair of metal bars  Description automatically generated with medium confidence  **A metal bars on a green wall  Description automatically generated** | | | Parts | | | | |
| Name | | | Qty. | Check |
| +Y+X rail | | | 1 |  |
| -Y+X rail | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **42** | **Attach the -Z frame to the rails** | | | | | | | |
| **Note** | **The bottom left +Y+X rail is fastened to the frame using 2 small screws from the -Z side, while the bottom right -Y+X rail is fastened using 1 longer screw from the -Y side. Apply Loctite to fasteners.** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| -Z frame | | | | | 1 |  |
| STEP 26 +Y+X rail | | | | | 1 |  |
| STEP 26 -Y+X rail | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-  M2-4 | | 1.5 | 0.176 | 2 |  |
| Screw | SCB2-12 | | 1.5 | 0.176 | 1 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **43** | **Attach the 0Z frame to the rails** | | | | | | | |
| **Note** | **SAFETY CRITICAL: the 0Z frame must be mounted such that the holes close to the rails face away from the -Z frame, i.e. away from FAB side. Apply Loctite to Fasteners.** | | | | | | | | |
| Safety Critical  Loctite | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| 0Z frame | | | | | 1 |  |
| STEP 27 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-12 | | 1.5 | 0.176 | 2 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **44** | **Fit test the backplane board** | | | | | |
| **Note** | **Place the backplane board correctly, without fastening it to the rails yet. Be extremely careful to not damage any components by hitting the rails with the board. Leave it in place for the next steps.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| Backplane board | | | 1 |  |
| Step 28 Structure | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **45** | **Attach the +Z frame to the structure** | | | | | | | |
| **Note** | **SAFETY CRITICAL: you will need to move the BPB around for this frame to fit. Be extremely careful. Apply Loctite to Fasteners.** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| +Z frame | | | | | 1 |  |
| Step 29 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-12 | | 1.5 | 0.176 | 2 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **46** | **Fasten the Backplane Board to the structure** | | | | | | | |
| **Note** | **There are 18 screws in total. Apply Loctite to Fasteners.** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 30 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | SNSS-  M2-6-SD | | 1.5 | 0.176 | 18 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **47** | **Attach the -X-Y rail to the structure** | | | | | | | |
| **Note** | **Apply Loctite to Fasteners. If it proves difficult to connect the boards to the backplane board with the rail on, this step can be done after installed all the boards. EM assembly will define this.** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| -X-Y rail | | | | | 1 |  |
| STEP 31 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-12 | | 1.5 | 0.176 | 3 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **48** | **Pass the cable through the hole of the -Z frame and connect to the Female connector on the BPB, only the rail connected to the BPB is attached the other ones will be fastened and attached later** | | | | | | | |
| **Note** | **Note the holes in the frames. The larger diameter holes are for the rods, the smaller holes closer to the corners of the frame are for the deployment switch cables.** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step#31 Assembly | | | | | 2 |  |
| Step#24 Deployment switch | | | | | 3 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | SNSS-  M1.6-6 | | 1.5 | 0.086 | 3 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |
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| **Step#** | **49** | **Insert the stacking rods to the -Z frame** | | | | | |
| **Note** | **Safety critical: these rods are very delicate, including the threading. Be extremely careful when manipulating the satellite and the stacking rods are hanging from the -Z side to not hit anything with them or otherwise bend them. Insert the stacking rods until they are fully inside the -Z frame. Use a hex bit size 2.5** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| Stacking rod | | | 4 |  |
| Step 33 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **50** | **Connect the FAB to the BPB** | | | | | |
| **Note** | **Make sure all the pins align correctly.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| FAB | | | 1 |  |
| Step 34 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **51** | **Install 4.53mm spacers between -Z frame and the BPB, 19.55mm spacers after the BPB, and thread the rods into the long spacers.** | | | | | | | |
| **Note** | **As always, be extremely careful when manipulating the rods** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 35 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 4.53mm | |  |  | 4 |  |
| Spacer | 19.55mm | |  |  | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

**4.6 Connect the deployment switches**

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| **Step#** | **52** | **Mount the Battery** | | | | | |
| **Note** | **Do not connect the battery yet** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| Step 3 Battery | | | 1 |  |
| Step 36 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **53** | **Install two 0.5mm spacers on the right (-Y) side and two 6.0mm spacers on the left (+Y) side, and thread the rods into them. Mount the OBC RF Shield at this point.** | | | | | | | |
| **Note** | **As always, be extremely careful when manipulating the rods** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 37 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 0.5mm | |  |  | 2 |  |
| Spacer | 6.0mm | |  |  | 2 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

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| **Step#** | **54** | **Connect the OBC/EPS Board to the BPB. Put two 5.0mm spacers between the RF shield and the OBC.** | | | | | | | |
| **Note** | **Make sure all the pins align correctly.** | | | | | | | | |
| A computer generated image of a machine  Description automatically generated with medium confidence | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| OBC/EPS Board | | | | | 1 |  |
| Step 38 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 5.0mm | |  |  | 2 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

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| **Step#** | **55** | **Install four 5.40mm spacers, and thread the rods into them** | | | | | | | |
| **Note** | **As always, be extremely careful when manipulating the rods** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 39 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 5.40mm | |  |  | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

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| **Step#** | **56** | **Connect the COM Board to the BPB** | | | | | |
| **Note** | **Make sure all the pins align correctly. The board will be connected to the antenna in a later step.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| COM Board | | | 1 |  |
| Step 40 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **57** | **Install four 33.02mm spacers, and thread the rods into them** | | | | | | | |
| **Note** | **As always, be extremely careful when manipulating the rods** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 41 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 33.02mm | |  |  | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

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| **Step#** | **58** | **Connect the APRS R1 Board to the BPB** | | | | | |
| **Note** | **Make sure all the pins align correctly. The board will be connected to the antenna in a later step.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| APRS R1 | | | 1 |  |
| Step 42 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **59** | **Install four 14.40mm spacers, and thread the rods into them** | | | | | | | |
| **Note** | **As always, be extremely careful when manipulating the rods** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 43 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 14.40mm | |  |  | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

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| **Step#** | **60** | **Connect the APRS P1 to the BPB** | | | | | |
| **Note** | **Make sure all the pins align correctly. The board will be connected to the antenna in a later step.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| APRS P1 | | | 1 |  |
| Step 44 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **61** | **Install four 14.40mm spacers, and thread the rods into them** | | | | | | | |
| **Note** | **As always, be extremely careful when manipulating the rods** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 45 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 14.40mm | |  |  | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

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| **Step#** | **62** | **Connect the APRS P2 to the BPB** | | | | | |
| **Note** | **Make sure all the pins align correctly. The board will be connected to the antenna in a later step.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| APRS P2 | | | 1 |  |
| Step 46 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **63** | **Install four 14.40mm spacers, and thread the rods into them** | | | | | | | |
| **Note** | **As always, be extremely careful when manipulating the rods** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 47 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 14.40mm | |  |  | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

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| **Step#** | **64** | **Connect the APRS P3 to the BPB** | | | | | |
| **Note** | **Make sure all the pins align correctly. The board will be connected to the antenna in a later step.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| APRS P3 | | | 1 |  |
| Step 48 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **65** | **Install four 14.40mm spacers, and thread the rods into them** | | | | | | | |
| **Note** | **As always, be extremely careful when manipulating the rods** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 49 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 14.40mm | |  |  | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

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| **Step#** | **66** | **Connect the APRS P4 to the BPB** | | | | | |
| **Note** | **Make sure all the pins align correctly. The board will be connected to the antenna in a later step.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| APRS P4 | | | 1 |  |
| Step 50 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **67** | **Install four 14.40mm spacers, and thread the rods into them** | | | | | | | |
| **Note** | **As always, be extremely careful when manipulating the rods** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 51 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 14.40mm | |  |  | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

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| **Step#** | **68** | **Connect the APRS P5 to the BPB** | | | | | |
| **Note** | **Make sure all the pins align correctly. The board will be connected to the antenna in a later step.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| APRS P5 | | | 1 |  |
| Step 52 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **69** | **Install four 14.40mm spacers, and thread the rods into them** | | | | | | | |
| **Note** | **As always, be extremely careful when manipulating the rods** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 53 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 14.40mm | |  |  | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

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| **Step#** | **70** | **Connect the APRS R2 Board to the BPB** | | | | | |
| **Note** | **Make sure all the pins align correctly. The board will be connected to the antenna in a later step.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| APRS R2 | | | 1 |  |
| Step 54 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **71** | **Install four 5.90mm spacers, and thread the rods into them** | | | | | | | |
| **Note** | **As always, be extremely careful when manipulating the stacking rods** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 55 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 5.90mm | |  |  | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

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| **Step#** | **72** | **Connect the New UHF Board to the BPB** | | | | | |
| **Note** | **Make sure all the pins align correctly. The board will be connected to the antenna in a later step.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| **New UHF board** | | | 1 |  |
| Step 56 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **73** | **Install four 15.20mm spacers, and thread the rods into them** | | | | | | | |
| **Note** | **As always, be extremely careful when manipulating the stacking rods** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 57 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 15.20mm | |  |  | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

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| **Step#** | **74** | **Connect the RAB to the BPB** | | | | | |
| **Note** | **Make sure all the pins align correctly.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| RAB | | | 1 |  |
| Step 58 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **75** | **Install four 5.75mm spacers, and thread the rods into them** | | | | | | | |
| **Note** | **As always, be extremely careful when manipulating the stacking rods** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| Step 59 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Spacer | 5.75mm | |  |  | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Responsible | |  | | | | |

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| **Step#** | **76** | **Apply Loctite and thread the stacking rods into the Nuts located at the end of the +Z frame** | | | | | |
| **Note** | **Apply Loctite on both ends.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| Step 60 Assembly | | | 1 |  |
| Nut SLBNR3 | | | 4 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Torque mark |  | Loctite | |  |
| Responsible |  | | | |

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| **Step#** | **77** | **Install the +Y-X rail, this rail contains a deployment switch which is already connected, this step is just to attach** | | | | | | | |
| **Note** | **Apply Loctite to Fasteners.** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| +Y-X rail | | | | | 1 |  |
| Step 61 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-12 | | 1.5 | 0.176 | 3 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **78** | **Insert main structure into POD and check movement** | | | | | |
| **Note** | If structure does not fit smoothly, retry re-assembling rails (remove outside panels first) | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| POD | | | 1 |  |
| Step 62 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **79** | **Connect all APRS P1-P5 boards and the APRS R2 board to the 6-way RF Switch (RAB)** | | | | | |
| **Note** | **The cables must run through the space between all the boards and the structure.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| Step 63 Assembly | | | 1 |  |
| Coaxial cables (VHF) | | | 6 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **80** | **Connect the APRS R1 and the COM board antenna cables to the -Y-Z panel** | | | | | |
| **Note** | **Critical: make sure to connect the correct boards to the correct antennas.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| -Y-Z panel | | | 1 |  |
| Step 64 Assembly | | | 1 |  |
| Coaxial cable (UHF) | | | 1 |  |
| Coaxial cable (VHF) | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **81** | **Attach the antenna board to the assembly** | | | | | | | |
| **Note** | **Use Loctite on the fasteners. Handle the -Y-Z panel carefuly.** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| -Y-Z panel | | | | | 1 |  |
| Step 65 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | CBSTSR2-6 | | 1.3 | 0.16 | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
|  | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **82** | **Connect the 6-way RF switch on RAB and the New UHF Board antenna cables to the +Y+Z panel** | | | | | |
| **Note** | **Critical: make sure to connect the correct boards to the correct antennas.** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| +Y+Z panel | | | 1 |  |
| Step 66 Assembly | | | 1 |  |
| Coaxial cable (UHF) | | | 1 |  |
| Coaxial cable (VHF) | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **83** | **Attach the antenna board to the assembly** | | | | | | | |
| **Note** | **Critical: make sure to connect the correct boards to the correct antennas. Use Loctite on the fasteners. Handle the +Y+Z panel carefuly.** | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| +Y+Z panel | | | | | 1 |  |
| Step 67 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | CBSTSR2-6 | | 1. | 0.16 | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **84** | **Install the -Y+Z panel** | | | | | | | |
| **Note** | The solar cells are very fragile, be careful. Use Loctite on the fasteners. | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| -Y+Z panel | | | | | 1 |  |
| Step 68 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 1.5 | 0.176 | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **85** | **Install the +Y-Z panel** | | | | | | | |
| **Note** | The solar cells are very fragile, be careful. Use Loctite on the fasteners. | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| +Y-Z panel | | | | | 1 |  |
| Step 69 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 1.5 | 0.176 | 4 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **86** | **Install the +X panel** | | | | | | | |
| **Note** | The solar cells are very fragile, be careful. Use Loctite on the fasteners. | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| +X panel | | | | | 1 |  |
| Step 70 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 1.5 | 0.176 | 6 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **87** | **Install the +Z panel** | | | | | | | |
| **Note** | The solar cells are very fragile, be careful. Use Loctite on the fasteners. | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| +Z panel | | | | | 1 |  |
| Step 71 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 1.5 | 0.176 | 10 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **88** | **Install the -Z panel** | | | | | | | |
| **Note** | The solar cells are very fragile, be careful. Use Loctite on the fasteners. | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| -Z panel | | | | | 1 |  |
| Step 72 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 1.5 | 0.176 | 6 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **89** | **Connect the Battery** | | | | | |
| **Note** | **There are two connectors** | | | | | | |
| Battery cable | | | Parts | | | | |
| Name | | | Qty. | Check |
| Step 73 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **90** | **Connect the Battery** | | | | | |
| **Note** | **Attach RBF pins on the -z panel** | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| Step 74 Assembly | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **91** | **Install the -X panel** | | | | | | | |
| **Note** | The solar cells are very fragile, be careful. Use Loctite on the fasteners. | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| -X panel | | | | | 1 |  |
| Step 75 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | SCB2-6 | | 1.5 | 0.176 | 6 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **92** | **Install the -Z Mount cover** | | | | | | | |
| **Note** | Use Loctite on the fasteners. | | | | | | | | |
|  | | | Parts | | | | | | |
| Name | | | | | Qty. | Check |
| -Z Mount cover | | | | | 1 |  |
| Step 76 Assembly | | | | | 1 |  |
| Fasteners | | | | | | |
| Model | | | Bit  size | Torque  [N・m] | Qty. | Check |
| Screw | CBSTSR2-6 | | 1.5 | 0.16 | 2 |  |
| Checklist | | | | | | |
| Double Check | |  | | Picture | |  |
| Torque mark | |  | | Loctite | |  |
| Responsible | |  | | | | |

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| **Step#** | **93** | **Install the +Z Mount cover** | | | | | | | |
| **Note** | **Use Loctite on the fasteners.** | | | | | | | | |
|  | | | **Parts** | | | | | | |
| **Name** | | | | | **Qty.** | **Check** |
| **+Z Mount cover** | | | | | **1** |  |
| **Step 77 Assembly** | | | | | **1** |  |
| **Fasteners** | | | | | | |
| **Model** | | | **Bit**  **size** | **Torque**  **[N・m]** | **Qty.** | **Check** |
| **Screw** | **CBSTSR2-6** | | **1.5** | **0.16** | **2** |  |
| **Checklist** | | | | | | |
| **Double Check** | |  | | **Picture** | |  |
| **Torque mark** | |  | | **Loctite** | |  |
| **Responsible** | |  | | | | |

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| **Step#** | **94** | **Attach spring plunger to the rail** | | | | | |
| **Note** |  | | | | | | |
|  | | | Parts | | | | |
| Name | | | Qty. | Check |
| Spring plunger | | | 1 |  |
| Checklist | | | | |
| Double Check |  | Picture | |  |
| Responsible |  | | | |

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| **Step#** | **95** | **Insert main structure into POD and check movement** | | | | | |
| **Note** | **If structure does not fit smoothly, retry re-assembling rails (remove outside panels first)** | | | | | | |
|  | | | **Parts** | | | | |
| **Name** | | | **Qty.** | **Check** |
| **POD** | | | **1** |  |
| **Step 78 Assembly** | | | **1** |  |
| **Checklist** | | | | |
| **Double Check** |  | **Picture** | |  |
| **Responsible** |  | | | |

A yellow and white chart with numbers

Description automatically generated