|  |
| --- |
| 1U Stack Assembly Procedure  Insert here the name of the project. |
| ISIS-TVL2-PRC-0002 |
|  |
| Version: 1.0 |
| CI Number: N/A |
| DRL ID: N/A |

Release Information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
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Execution Information

|  |  |  |  |
| --- | --- | --- | --- |
| Project = Insert here the name of the project.  WO = Insert here the name of the project. | | | |
|  | Name (Initials) | Date | Signature |
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| QA inspection by: |  |  |  |

Distribution List

|  |  |  |
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| Name | Organization | Description |
| N/A | ISISPACE | Innovative Solutions In Space B.V. |
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Change Log

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Date | Affects | Description |
| 1.0 | 2024-11-15 | All | First Version |

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Acronyms

| Name | Description |
| --- | --- |
| ABF | Apply Before Flight |
| CSKB | CubeSat Kit Bus |
| DB | IOBC Daughterboard |
| ESD | Electrostatic Discharge |
| GSE | Ground Support Equipment |
| ICEPS2 | ISISPACE Compact Electric Power System (version 2) |
| IOBC | ISISPACE On Board Computer |
| MGSE | Mechanical Ground Support Equipment |
| MMCX | Micro Miniature Coaxial connector |
| PCB | Printed Circuit Board |
| PLT | Platform |
| RX | Receiver |
| SAIT | System Assembly, Integration, and Test |
| STA1U | Stack Integration 1U Support Jig |
| STS | ISISPACE Structure |
| TRXVU | ISISPACE Transmitter/Receiver VHF/UHF |
| TX | Transmitter |

# Introduction

This document concerns the standard **1U platform**, **Type B** structure. This document contains the procedure for the assembly of the platform module.

The procedure is performed without payload. The assembly of customer’s payload needs to be prepared by the customer itself as part of their satellite integration plan. Payload assembly will depend on the specific characteristics of the payload. However, recommendation for a normal PCB (PC104) payload assembly is given.

## Applicable Documents

The table below contains documents which applicability is required. The contents of the present document follow the standards, guidelines and requirements here mentioned.

Table 1 - Applicable Documents

|  |  |  |
| --- | --- | --- |
| **Reference** | **Name** | **Version** |
| ISIS-1UPLT-PLN-001 | 1U CubeSat Platform SAIT Plan | 2.0 |
| ISIS-1UPLT-DDD-0003 | 1U CubeSat Platform Design Description (Type B STS) | 1.0 |

## Reference Documents

The table below contains documents that are not fully applicable and will provide supplementary information relevant for the present document.

Table 2 - Reference Documents

|  |  |  |
| --- | --- | --- |
| Reference | Name | Version |
| ISIS.SAIT.GL.001 | SAIT guidelines | 1.0 |
| ISIS-QMS-PLN-0001 | Product Assurance Plan | 1.1 |
| ISIS.SAIT.POL.002 | SAIT Cleanliness and Contamination Control Policy | 1.0 |

# Required Equipment

## Satellite Equipment and Parts

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Subsystem | Amount | Remark | ID / Serial number | Check |
| 1U Type B STS | 1  4 | Top Bracket (ISISPACE-STS-1-02-012)  Stack Rod (ISISPACE-STS-1-08-051) |  |  |
| ICEPS | 1 | ISISPACE Compact Electric Power System (version 2) |  |  |
| TRXVU | 1 | ISISPACE Transmitter/Receiver VHF/UHF band |  |  |
| PAYLOAD | 1 | Tevel2 Payload assembly |  |  |
| Sub-assemblies | 1  1 | OBC sub-assembly, **already torqued and epoxied**  Separation switches sub-assembly (Bottom Bracket (ISISPACE-STS-1-02-014) + separation switch harnesses) |  |  |
| Spacers: | 4  4  4  4  16  4 | M3x0.5mm  M3x1mm  M3x2mm  M3x4mm  M3x12mm  M3x13 |  |  |

## Ground Support Equipment and tools

| Item | Remark | ID / Serial number | Check |
| --- | --- | --- | --- |
| Screwdriver Torx 6 (M2) | Example: AEX 6x75 |  |  |
| Screwdriver Torx 8 (M2.5) | Example: AEX 8x75 |  |  |
| Screwdriver Torx 10 (M3) | Example: AEX 10x75 |  |  |
| Torque Wrench with 5.5mm Open End Captive Pin | Torque ≈ 0.9 Nm  Example: Gedore TBN 2 with 5.5mm Open End Drive |  |  |
| Calliper |  |  |  |
| Torque screwdriver | Torque ≈ 0.3 Nm  Example: A.301MT |  |  |
| Torque Bit Torx 6 (M2) | Example: EX.106 |  |  |
| VISJ jig | Stack Integration 1U Support Jig |  |  |
| ESD wrist strap |  |  |  |
| ESD cable for MGSE |  |  |  |
| ESD cable for the satellite |  |  |  |

## Consumables

| Item | Remark | ID / Serial number | Check |
| --- | --- | --- | --- |
| Epoxy | Example: Scotch-Weld DP2216 Epoxy adhesive |  |  |
| Large ESD bag |  |  |  |

## Preparation

| Step | Description | Remark | Check |
| --- | --- | --- | --- |
|  | Collect all satellite equipment and parts, GSE and Tools according to the checklists in this section | Make sure not to touch anything without gloves and ESD wrist strap attached |  |
|  | Make sure all fasteners and spacers are cleaned with ultrasound machine |  |  |
|  | Make sure also that all structural parts are clean. |  |  |
|  | Take high resolution pictures of during the execution of the procedure and store them in the appropriate folder following the subsequent naming guidelines: |  |  |

# Platform Module Main Assembly Procedure

## Stack subsystem assembly

| Step | Description | Check | Comment |
| --- | --- | --- | --- |
|  | Place all the components for the stack on the bench. |  |  |
|  | Place the separation switches sub-assembly (ISIS-STS-1-02-014-A-1 : TBS Kill Switch Stack Bracket + separation switch harnesses) on the Jig.  Check if all kill switches (according to project requirements) are in place. The number of kill switches may vary between 2 and 4 depending on project requirements. However, the standard configuration for the Type B 1U projects will be three (03) switches.    *Take photos of the stack* |  | Sep Switch are placed on KS2 and KS4 |
|  | Place the bracket in the Vertical Integration Satellite Jig (VISJ) |  |  |
|  | Label on the integration Jig the X+ and Y+ direction. Note the CSKB is on the Y+ side of the satellite. |  |  |
|  | Attach a grounding cable to the bracket with a (1) M2.5x5mm cylinder screw in a Solar Panel hole (not at the feet) |  |  |
|  | Put four (4) ISIS-STS-1-08-051-A-1: 1U TypeB M3 Rod 90.8mm on the bracket.  **Torque ≈ 0.9 Nm** with the 5.5mm torque wrench    *Take photos of the stack* |  |  |
|  | Put a small drop of **epoxy** next to the screw heads/nuts of the rods  **Note:** apply epoxy on the rounded sides (safe area in the picture) of the screw heads/nuts so you can still use a tool to remove them if needed)  *Take photos of the epoxied screws* |  | For flight prep only |
|  | Put a (1) M3x12mm SPACER on every rod. (4 spacers in total) |  |  |
|  | Place the ICEPS-RevE-TypeA on the spacers like the image below.  - Make sure that the battery pack is pointing down.  - Make sure the CSKB is oriented to the correct side of the bracket (Y+).    *Take photos of the stack* |  |  |
|  | Put a (1) M3x12mm SPACER on every rod. (4 spacers in total) |  |  |
|  | Place the TRXVU RevE on the spacers like the image below.  - Make sure the CSKB is oriented to the correct side of the bracket (Y+).  - Carefully place the CSKB so the pins are not bend.    *Take photos of the stack* |  |  |
|  | Put a (1) M3x12mm SPACER on every rod. (4 spacers in total)  Put a (1) M3x4mm SPACER on every rod. (4 spacers in total)  Put a (1) M3X0.5mm SPACER on every rod. (4 spacers in total)  **Note:** Make sure the Round side of the M3x0.5mm spacer, so it will not damage the next PCB / Subsystem. |  | 16.5mm total |
|  | Inspect the IOBC.  **Note:** Make sure the daughterboard is assembled on the board and has epoxy on the daughterboard attachment screws (is flight prepped). |  |  |
|  | Place the IOBC with Daughterboard attached on the spacers like the image below.  - Make sure the CSKB is oriented to the correct side of the bracket (Y+).  - Carefully place the CSKB so the pins are not bend.  Mount harness #3 to the J1 connector of the iOBC for ease of assembly.    *Take photos of the stack* |  |  |
|  | Put a (1) M3x13mm SPACER on every rod. (4 spacers in total) |  |  |
|  | Place the Payload over the rods on top of the spacers and place 12mm SPACERS between the two boards of the payload.  - Make sure the CSKB is oriented to the correct side of the bracket (Y+).  - Carefully place the CSKB so the pins are not bend. |  |  |
|  | *Take photos of the stack from all 5 sides (No bottom). Also make an ISO-view photo.*  Make sure there is (at least) one photo where all spacers on a rod are visible |  |  |
|  | Continue to the stack close up procedure |  |  |

|  |
| --- |
| **Activity performed by:** Initials  **Date:** Click here to enter a date. |

## Stack close up procedure

| Step | Description | Check | Comment |
| --- | --- | --- | --- |
|  | Put a (1) M3x2mm SPACER on every rod. (4 spacers in total) |  |  |
|  | Put the ISISPACE-STS-1-02-012-A-1 : TBS Top Btm Bracket (7.55mm feet) on top of the rods. |  |  |
|  | Screw the rods in place with four (4x) M2x6 Countersunk Screw.  **Torque ≈ 0.3 Nm** |  |  |
|  | Take the satellite out of the jig and make verification measurements. From feet surface to feet surface.  The distance shall be:  Write the measured distance (also when out of spec) in the comment box. See the next step if the distance is out of spec. |  | **Measured:**  1:  2:  3:  4: |
|  | **If the Satellite is within spec. Go to the next step. Otherwise:**  If the measured distance is out of spec, repeat the Stack close up procedure, but with a different custom spacer or shim.  E.g. If the stack is 0.1 mm too high, take a custom spacer or shim that is 0.1mm less high than the original one.  E.g. It can happen that one side is within spec. But another side not. Is is allowed to have different sizes of custom spacers or shims on every rod. However, it is wished to have them all the same height if possible.  **New measured distance:**  1:  2:  3:  4: |  |  |
|  | Stack integration is now completed.  *Take photos of the stack from all 5 sides (No bottom). Also make an ISO-view photo.* |  |  |
|  | Place the platform module in a safe place (e.g. ESD bag and Useful box) |  |  |

|  |
| --- |
| **Activity performed by:**  **Date:** Click here to enter a date. |

# Procedure Variation Log

The following table shall be used to log all variations with respect to the original procedure. Please provide as much information as possible regarding the nature and cause of the change. Add pages as required.

| PV # | Section / Page / Step affected | Description | Reason for deviation | Initiated by (Initials) | QA Sign off |
| --- | --- | --- | --- | --- | --- |
| …… | …… | …… | …… | …… | …… |
| …… | …… | …… | …… | …… | …… |
| …… | …… | …… | …… | …… | …… |
| …… | …… | …… | …… | …… | …… |
| …… | …… | …… | …… | …… | …… |
| …… | …… | …… | …… | …… | …… |
| …… | …… | …… | …… | …… | …… |