

RASCUBE

EDUCATIONAL SATELITE

QUICK START GUIDE
WITH SAFETY + WARRANTY INFORMATION

CONTENTS

PARTS LIST	3
STRUCTURE ASSEMBLY	4
ELECTRONICS ASSEMBLY	9
ELECTRONICS INTEGRATION	15
CONNECTING TO COMPUTER	21
SAFETY WARNINGS	22
WARRANTY INFORMATION	23

Assembly video link (recommended) is available via:
www.robinson-aerospace.com/assembly

GLOSSARY

EPS	Electrical Power System: A module to charge batteries and distribute power
OBC	On-Board Computer: The module which completes most of the satellites processing
RBF	Remove Before Flight
RF	Radio Frequency
UI	User Interface: Computer software used to display data.
Telemetry	Wireless data transmission

PARTS LIST



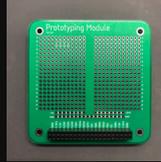
x1 RBF Pin



x2 18650 Battery



x1 Top Plate



x1 Prototyping Board



x1 Antenna Board



x18 12mm M-F Standoff



x2 2P Jumper



x1 Base Plate



x1 Sensor Module



x1 Side Access Panel



x5 10mm F-F Standoff



x1 Short Antenna



x2 Side Panel (A - No Inserts)



x1 EPS Module



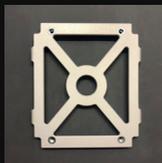
x3 Solar Panel



x10 Felt Feet



x2 RF Cable



x2 Side Panel (B - With Inserts)



x1 Telemetry Module



x2 Hex Key



x25 6mm and
x40 8mm Screws



x3 Ribbon Cable



x1 Receiver



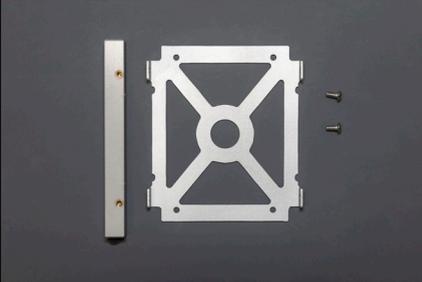
x1 OBC Module



x4 Edge Rail

Your parts may slightly differ depending on your version numbers and stock/supplier availabilities.

STEP ONE



PARTS

- x2 Edge Rail
- x2 Side Panel (A - No Thread Inserts)
- x4 6mm Screw

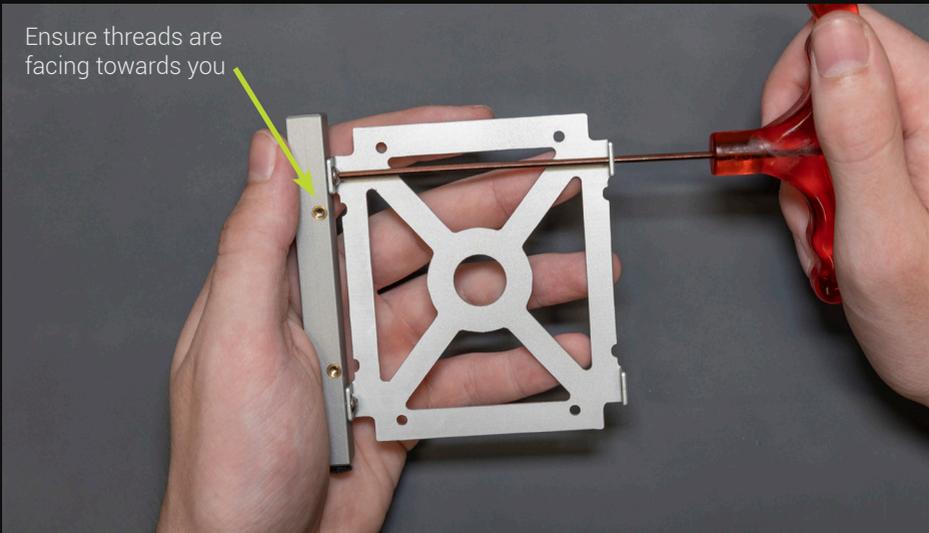
STEPS

Screw the side panel to the edge rail in the orientation shown below. Note the position of the brass thread inserts on the edge rail.

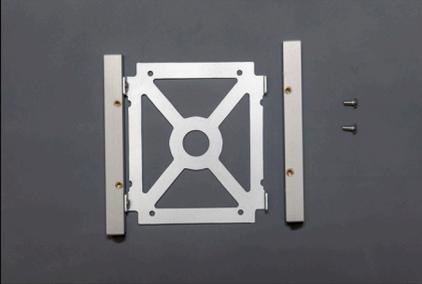
Repeat this step with the remaining edge rail, side panel and screws to ensure you have x2 of these assemblies.

NOTE

Push the hex key through the screw hole on the opposite side of the side panel to ensure the screw goes in straight. Insert both screws loosely before tightening properly. Do not over-tighten!



STEP TWO



PARTS

- x2 Edge Rail
- x4 6mm Screw
- x2 Assembly from Step 1

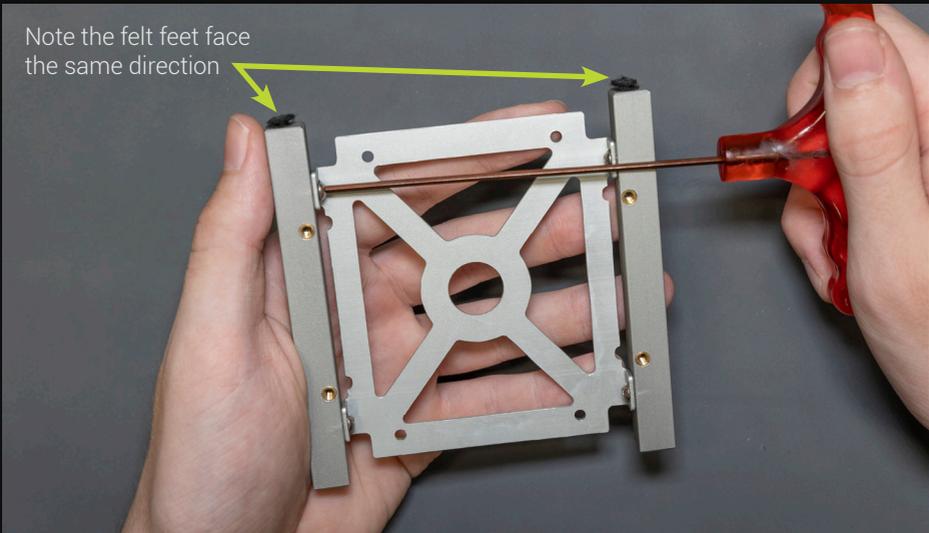
STEPS

Screw the edge rail to the assembly from Step 1, using two 6mm screws, as shown below.

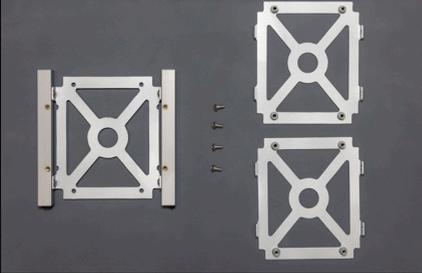
NOTE

If the felt feet are already installed on the edge rails, ensure they are facing the same direction! This will be the bottom of the satellite.

Repeat this step for the remaining edge rail and assembly from Step 1 so you have two of these.



STEP THREE

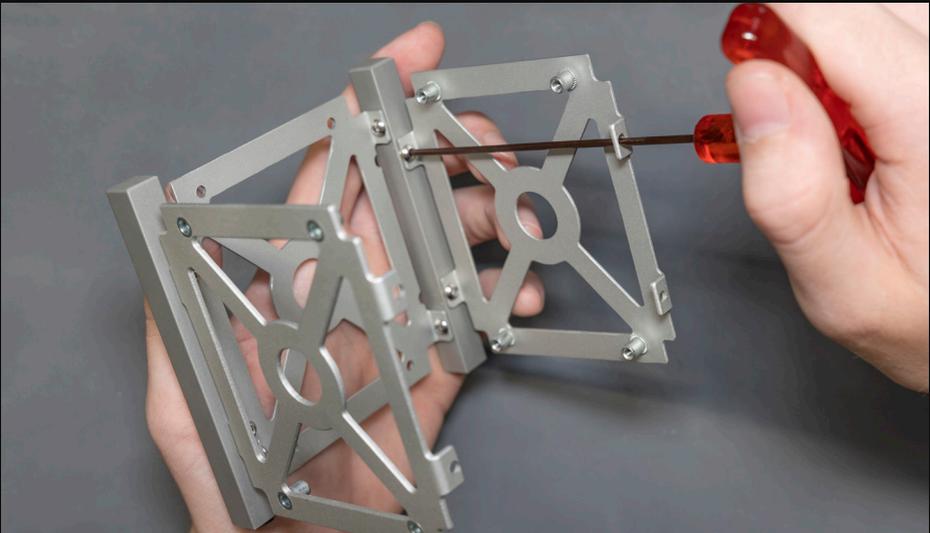


PARTS

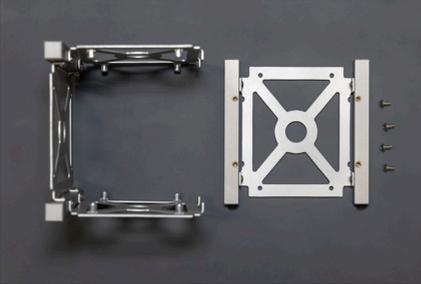
- x2 Side Panel (B - With Thread Inserts)
- x4 6mm Screw
- x1 Assembly from Step 2

STEPS

Screw two side panels onto one of the assemblies from Step 2, in the orientations shown below.



STEP FOUR



PARTS

x4 6mm Screw

x1 Assembly from Step 2

x1 Assembly from Step 3

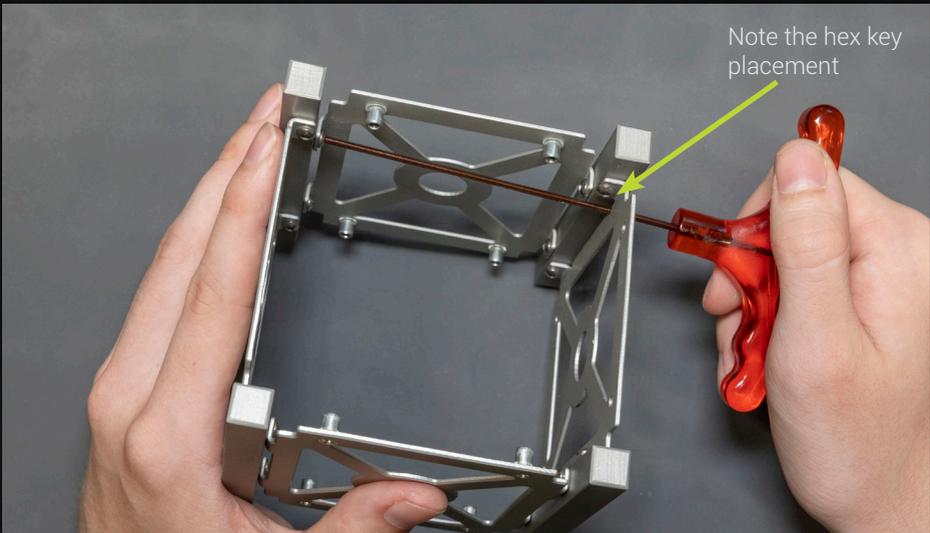
STEPS

This step can be very tricky, take your time to carefully understand how to do it!

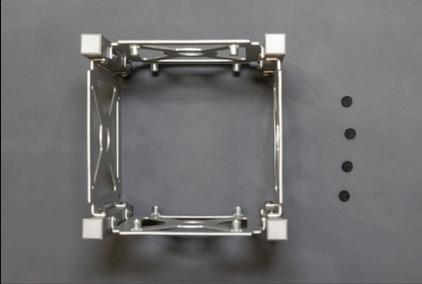
NOTE

Ensure the hex key stays in the designated slots, otherwise it may get stuck. Ensure the felt feet are facing the same direction.

Position the hex key in the designated slots in the assembly from Step 3. Screw both of the Step 2 and Step 3 assemblies together, along both edge rails.



STEP FIVE



PARTS

x4 Felt Feet

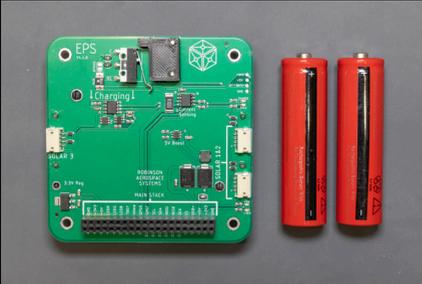
x1 Assembly from Step 4

STEPS

If the felt feet are not yet installed (this is the first time the kit is being assembled), peel off the adhesive protection and stick felt feet onto the base of each edge rail.



STEP SIX



PARTS

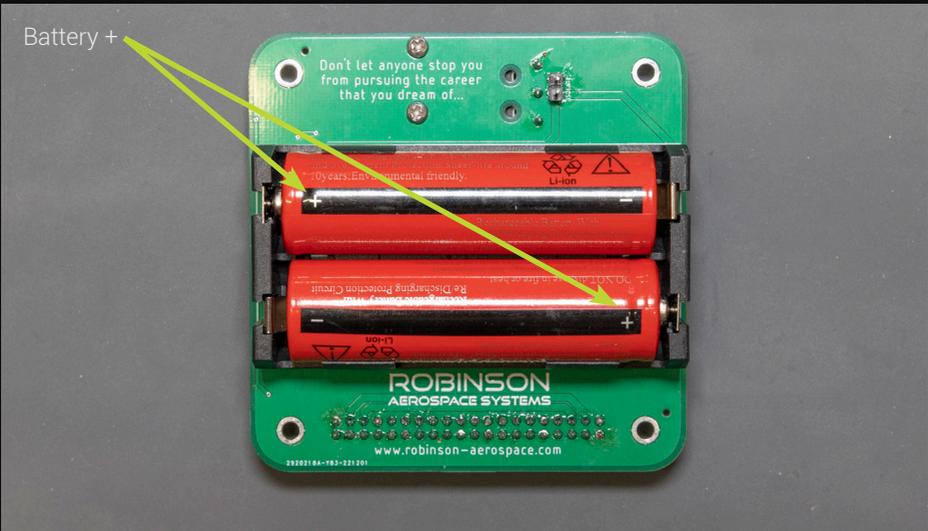
- x1 EPS Module
- x2 18650 Battery

STEPS

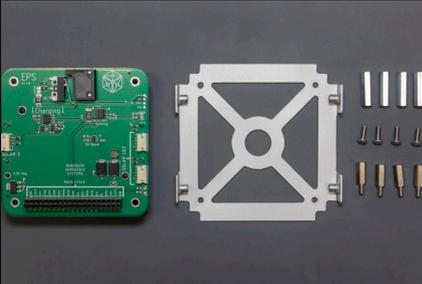
Install the two batteries into the EPS module. Ensure the batteries are orientated correctly, by matching their polarity to the symbols on the underside of the EPS module. Incorrect battery placement may damage the EPS module's electronics.

NOTE

Failure to insert batteries correctly may damage RASCube's electronics or become a safety hazard!



STEP SEVEN

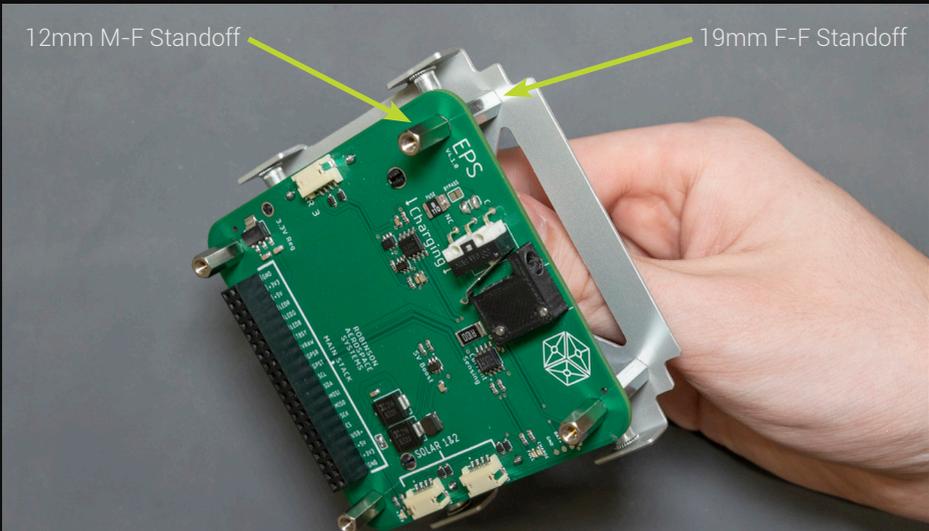


PARTS

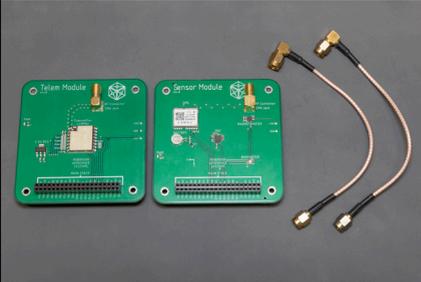
- x1 Base Plate
- x4 19mm F-F Standoff
- x4 12mm M-F Standoff
- x4 8mm screw
- x1 Assembly from Step 6

STEPS

Screw each of the 19mm standoffs to the inside of the base plate, one in each corner. Then, attach the EPS module onto the 19mm standoffs by using the 12mm standoffs. This is the beginning of the electronics stack.



STEP EIGHT



PARTS

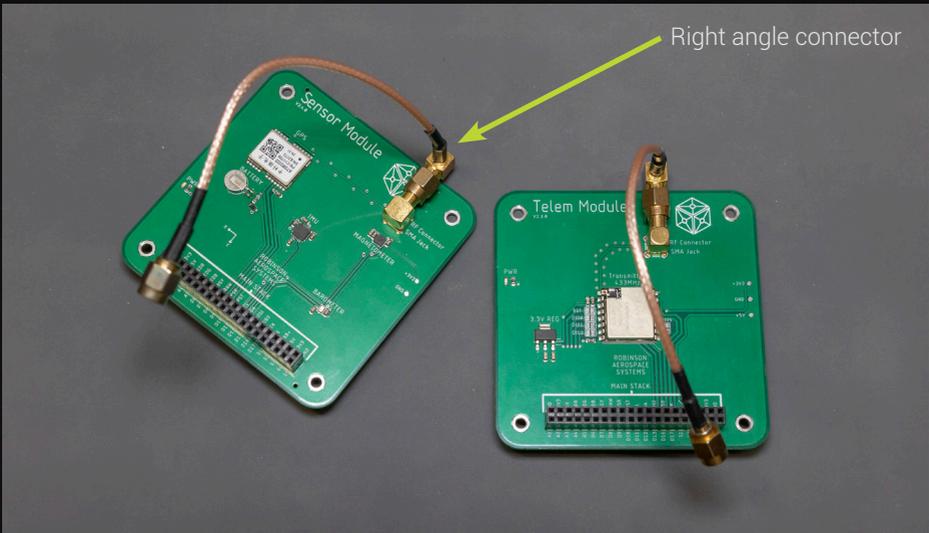
x2 RF Cable

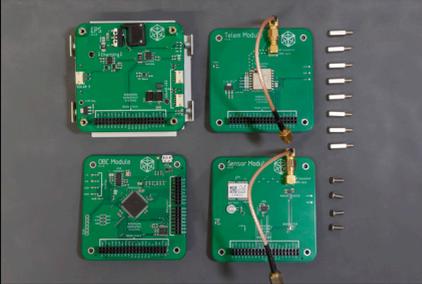
x1 Sensor Module

x1 Telemetry Module

STEPS

Notice one end of the RF cable is a right angle. Screw these right angle ends of the RF cables into the RF connectors on both modules. Ensure the cables are facing upwards, away from the circuit boards.





PARTS

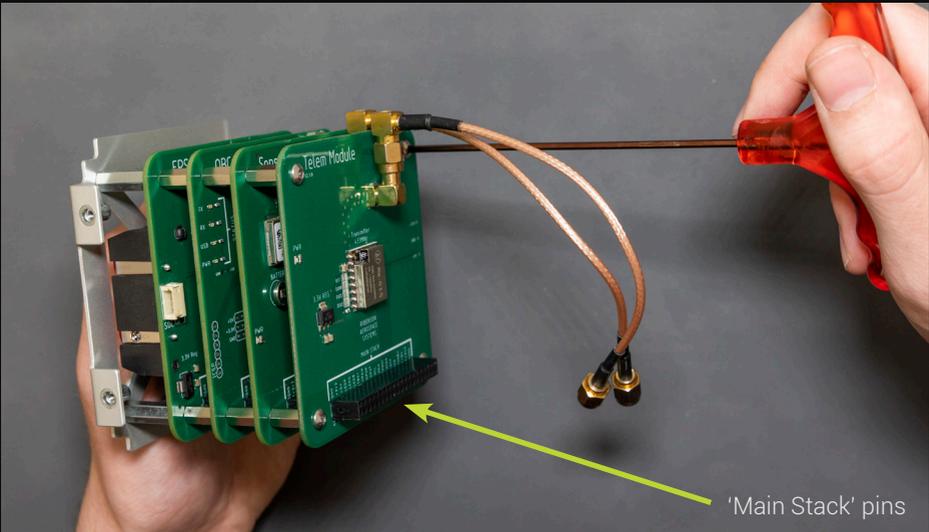
- x1 OBC Module
- x8 12mm M-F Standoff
- x4 8mm Screw
- x1 Assembly from Step 7
- x1 Assemblies from Step 8

STEPS

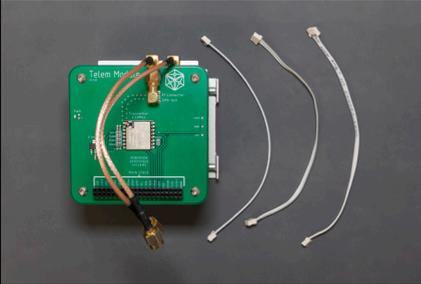
Continue stacking the remaining modules on top of the EPS and base plate, with 12mm standoffs in between each module. The module order is EPS (bottom), then OBC, Sensors and Telem (top). Once all modules are stacked, secure the final module with screws, using the hex key.

NOTE

To avoid major damage, carefully ensure the 40x pins labelled 'Main Stack' are aligned perfectly before pushing the modules together.



STEP TEN



PARTS

x3 Ribbon Cable

x1 Assembly from Step 9

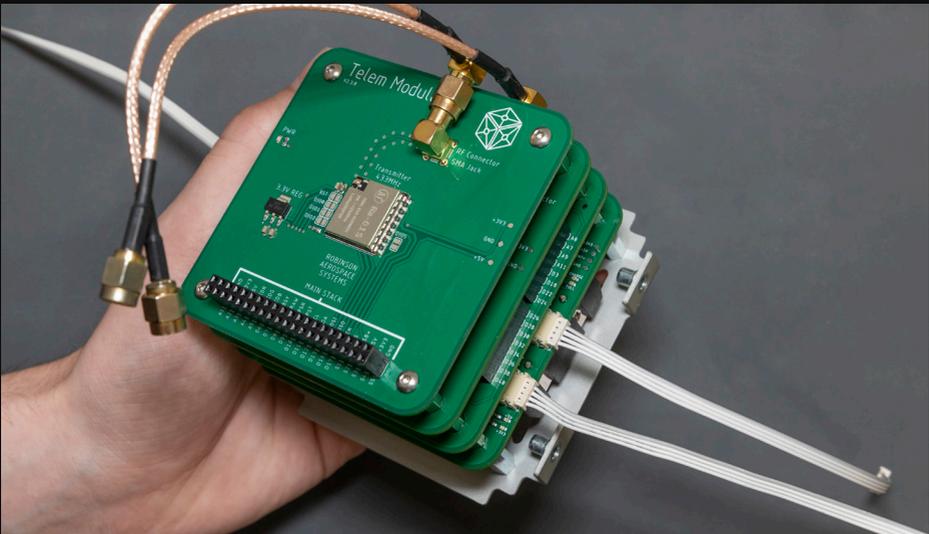
STEPS

Connect a ribbon cable to each of the 3 solar connectors on the EPS module.

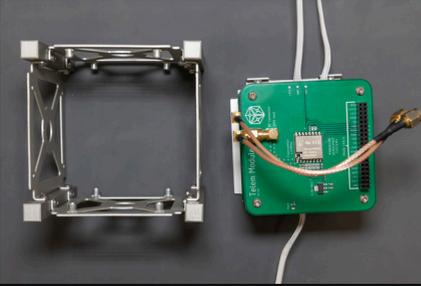
Ensure the connector is pushed all the way in, they can be a tight fit.

NOTE

To avoid damage, do not excessively bend cables.



STEP ELEVEN



PARTS

x1 Assembly from Step 5

x1 Assembly from Step 10

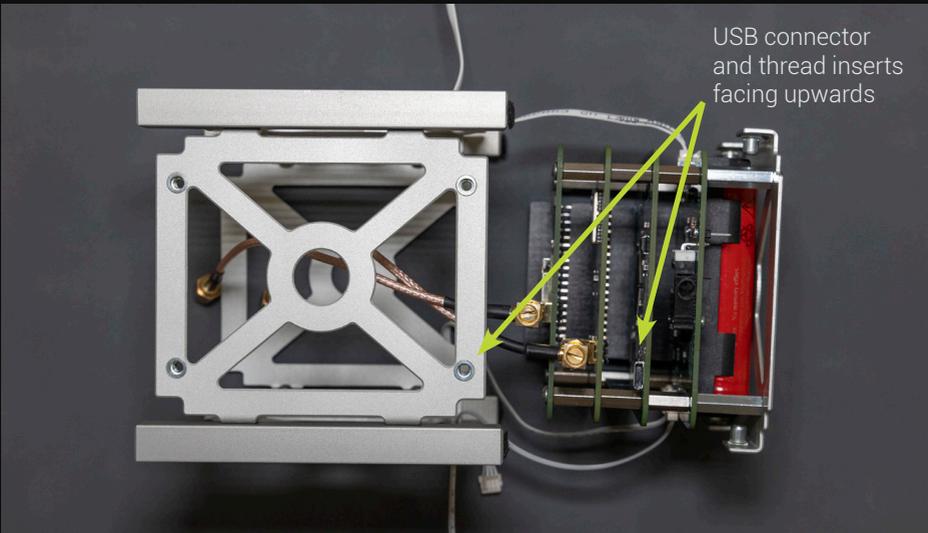
STEPS

Align the electronics stack and aluminium structure as shown below. Note the thread inserts on the aluminium structure and the USB connector on the electronics stack facing upwards.

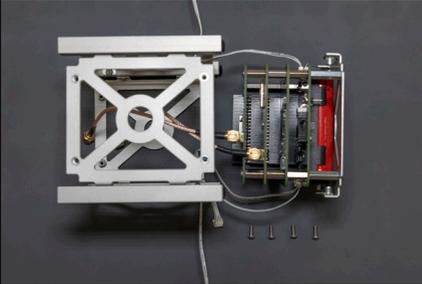
Feed the RF cables through the structure. Feed the ribbon cables through the bottom cut-outs in the side panels, where a solar panel will be installed.

NOTE

A solar panel will not be installed on the side containing the OBC module's USB connector and the EPS module's on/off pin. Do not put a cable for a solar panel on this side.



STEP TWELVE



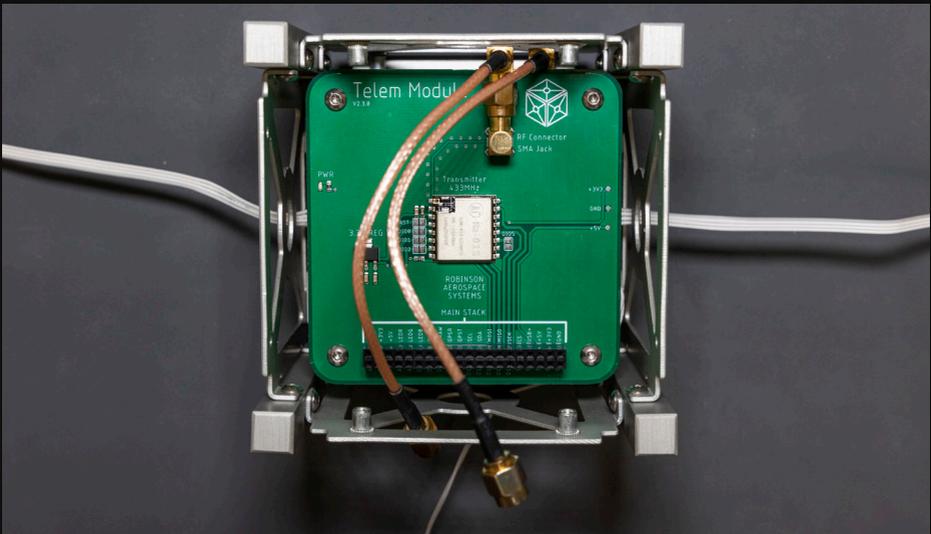
PARTS

x4 8mm Screw

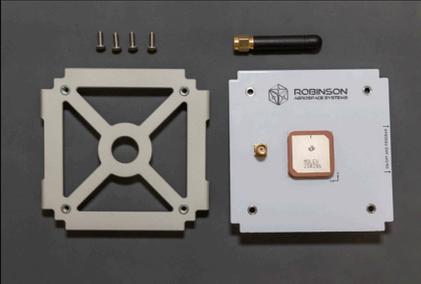
x1 Assembly from Step 11

STEPS

Carefully slide the electronics stack into the aluminium structure, pulling each cable through slowly. Once the electronics stack is in place, screw 4x screws through the side panels and into the base plate.



STEP THIRTEEN



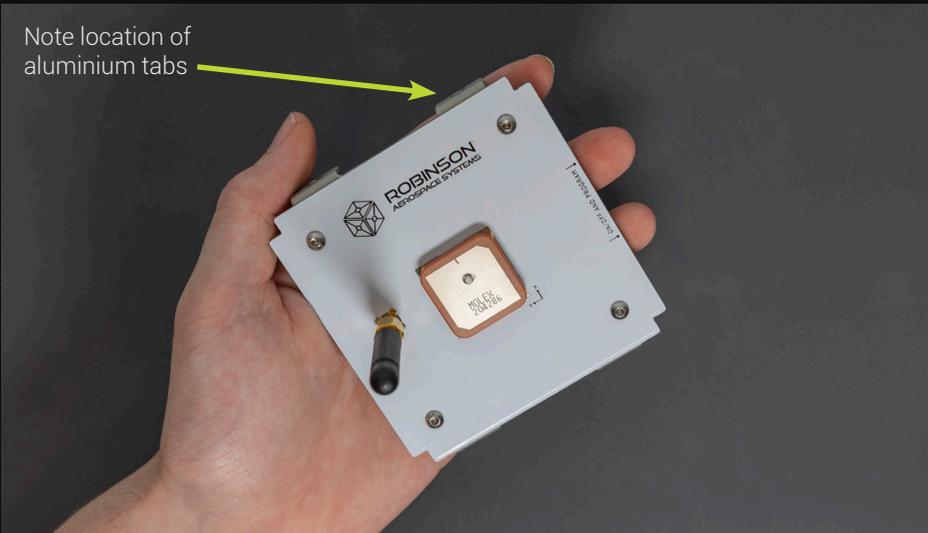
PARTS

- x1 Top Plate
- x1 Antenna Board
- x1 Short Antenna
- x4 8mm Screw

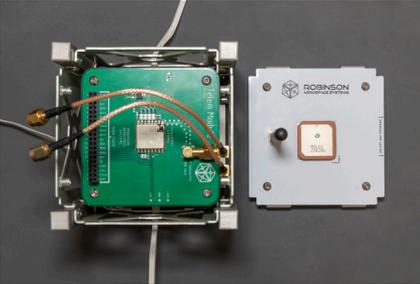
STEPS

Screw the antenna board to the top plate in the orientation shown below.

Screw the communications antenna onto the antenna connector.



STEP FOURTEEN



PARTS

x1 Assembly from Step 12

x1 Assembly from Step 13

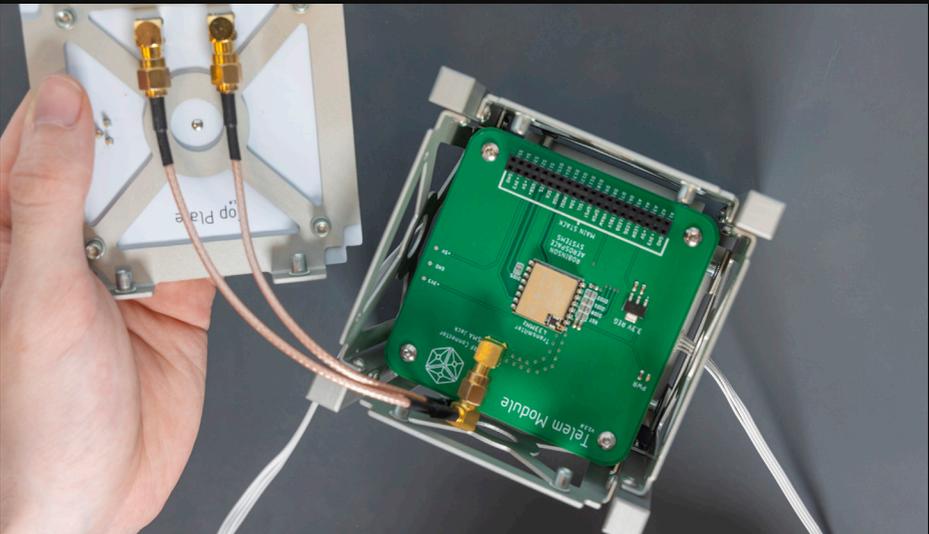
STEPS

Screw the RF cables from the electronics stack onto the appropriate connectors on the antenna board.

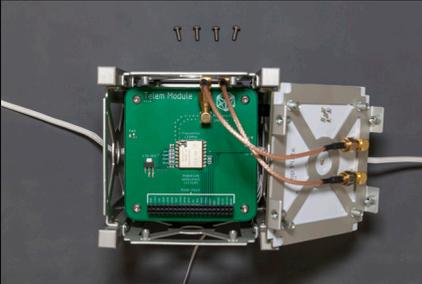
NOTE

It is critical to attach the cables to the correct connectors, otherwise the satellite will not have GPS data or wireless communications!

The cable from the Sensor Module goes to the connector labeled 'GPS'. The remaining cable (from the Telem module) goes to the connector labeled 'Telem'.



STEP FIFTEEN



PARTS

x4 8mm Screw

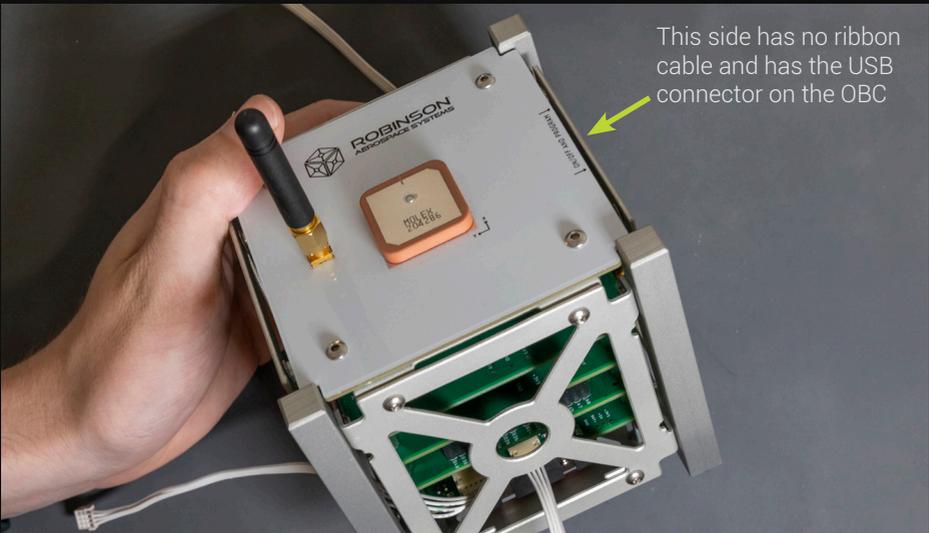
x1 Assembly from Step 14

STEPS

Position the antenna board onto the top of the satellite and attach with screws.

NOTE

Ensure the arrows saying 'on/off and program' on the antenna board point to the side where no solar panel will be installed (no ribbon cable).



STEP SIXTEEN



PARTS

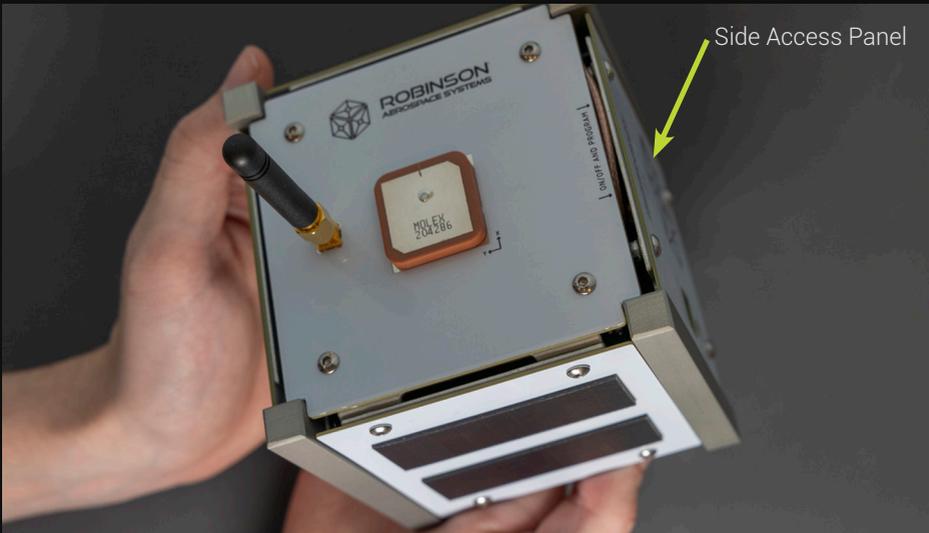
- x1 Side Access Panel
- x8 8mm Screw
- x3 Solar Panel
- x1 Assembly from Step 15

STEPS

Screw the side access panel to the aluminium structure. Connect a ribbon cable to each solar panel, feeding the excess cable into the satellite as you move the solar panels into position. Screw the solar panels in place.

NOTE

Two of these solar panels will require existing screws to be removed for installation, as these solar panels and the top and bottom plates use the same screws.



STEP SEVENTEEN



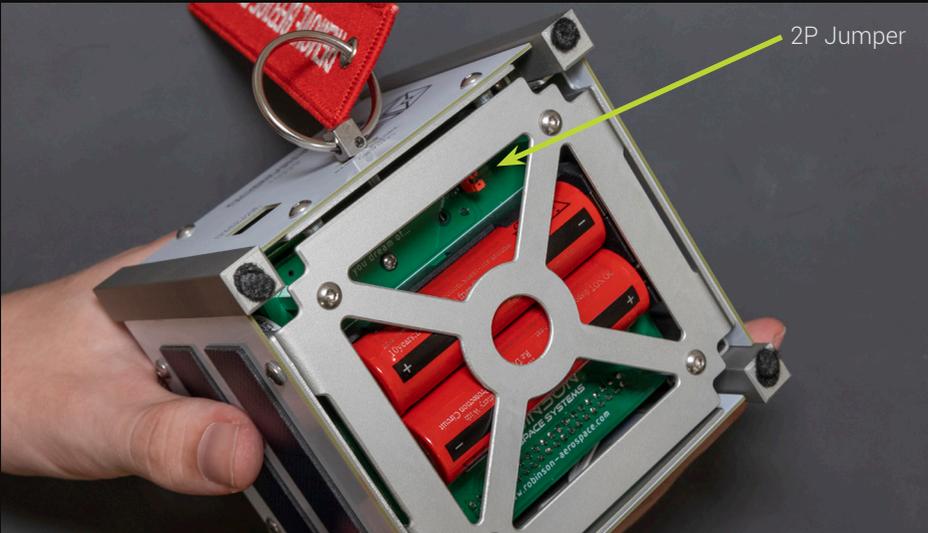
PARTS

x1 2P Jumper

x1 RBF Pin

STEPS

Slide the RBF pin into the satellite, at the side access panel. Insert the 2P jumper onto the header labelled 'Isolation' on the bottom of the EPS Module. The 2P jumper should cover both of the exposed pins.



STEP EIGHTEEN



NOTE

In the drop-down menu, your USB receiver should say 'USB Serial Port'.

PARTS

x1 Receiver

x1 Assembled CubeSat

STEPS

Insert the receiver into a computer's USB port. Open an internet browser and go to 'ui.robinson-aerospace.com'. Select your USB receiver from the drop-down menu, then type in the Serial Number of your satellite. Remove the RBF pin to turn on the satellite, do not touch the satellite until the red LED starts blinking blue.

Supported browsers: Chrome, Edge



SAFETY WARNINGS

BATTERIES

RASCube uses two (2) 18650 Li-Ion battery cells to power its systems.

When misused, these cells can become damaged and cause harm.

1. Do not tamper with the batteries.
2. If you notice your operating time has greatly reduced, replace the batteries.
3. Do not short battery terminals. This may result in fire, burns or overheating.
4. Do not store or use batteries where the ambient temperature may exceed 50 degrees Celsius.
5. Dispose of batteries responsibly. Never incinerate or crush battery cells. Always follow local regulations.
6. Only use 18650 cells which include protection circuitry. All unprotected cells are highly volatile.
7. When not using RASCube for long periods of time, remove the batteries and put tape over the battery terminals.
8. Always switch off RASCube before removing batteries.

ELECTRICAL CONTACTS

Never short any electrical contacts.

1. Shorting contacts may damage components or batteries.
2. Contacts may be sharp, avoid touching when possible. Handle with care to avoid injury.
3. Always ensure all forty (40) header pins align correctly to avoid damage.

TOOLS

Misuse of included tools may result in physical harm.

1. Hex keys should only be used for screwing in the provided screws and should always face towards RASCube.
2. Never point the sharp end of a hex key towards a person or yourself.

FLIGHT AND LAUNCH

RASCube is designed to be used in-class, on a table or bench.

1. RASCube is not designed for launch to space. It will not survive the harsh environment, including temperatures and radiation.
2. RASCube can be used on flights involving weather balloons, however we do not encourage this. Safe recovery of RASCube is the responsibility of the user. RAS has not tested weather balloon flights.

AGE RATING

RASCube is designed to be used by ages 12+. Younger ages may not understand the use of tools, the assembly process or the dangers involved. Small parts may be of risk to young children.

WATER AND WEATHER

Water may damage RASCube's electronics. Do not use in wet conditions. If water is spilt on RASCube, immediately isolate and remove the batteries.

ELECTRONICS

RASCube's electronics can be damaged when misused, or cause harm.

1. Electronics may become hot. Avoid touching electronics when hot.
2. Handle electronics carefully to ensure small parts do not become detached from the Printed Circuit Boards (PCB).

ALUMINIUM STRUCTURE

Aluminium parts may have sharp edges as a result of manufacturing variations or misuse. Regularly inspect each piece for sharp edges and contact Robinson Aerospace if you are concerned. Sharp edges or burrs may cause injury.

WIRELESS SYSTEMS

1. Avoid turning on RASCube without an antenna installed. This can damage the wireless transmitter.
2. If you are aware of other devices in the area using the 433MHz LoRa band, do not use RASCube. This may cause interference of potentially important data.

DATA PRIVACY

All data sent to RASCube's User Interface (UI) is saved locally (temporarily, on your computer).

1. Note: No data is saved offsite on servers, for your privacy. This includes GPS location.
2. Never use RASCube to track someone's location without their permission.

MANUFACTURER'S WARRANTY

RASCUBE EDUCATIONAL SATELLITE KITS - LIMITED WARRANTY

HEAD OFFICE - ADELAIDE

Suite 43, Stone and Chalk
Marnirni-Apinthi Building, Lot Fourteen
North Terrace, Adelaide SA 5000

Robinson Aerospace products are manufactured to high quality standards and are thoroughly inspected and tested before dispatch. In addition to any statutory rights you may have, Robinson Aerospace warrants its products sold new in Australia against defective workmanship and faulty materials from the date of purchase by the customer, for two (2) years.

Robinson Aerospace will repair or replace as necessary, free of charge, each product or part which qualifies on the condition that:

- The complete product is returned to Robinson Aerospace in person or via freight paid for by the customer and found on examination to be suffering from a manufacturer defect.
- The product or part has not been subject to misuse, neglect or abuse.
- The repairs are not required as a result of normal wear and tear.

In Australia, "Robinson Aerospace" means ROBINSON AEROSPACE SYSTEMS PTY LTD, ACN: 658 664 414.

IMPORTANT NOTE FOR AUSTRALIAN CUSTOMERS

Robinson Aerospace products come with guarantees that cannot be excluded under the Australian Consumer Law (ACL). You are entitled to a replacement or refund for a major failure and for compensation for any other foreseeable loss or damage. You are also entitled to have the products repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Please go to www.robinson-aerospace.com to contact Robinson Aerospace support.

Please retain a copy of your tax invoice for warranty.

RASCube is an educational satellite kit that is designed to look, feel, function and assemble just like a real satellite, but not go to space. It is a 1U CubeSat, which means once assembled, it forms a 10cm cube. This kit includes all circuit boards, aluminium pieces and hardware required to assemble and use RASCube.



www.robinson-aerospace.com

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