NanoPower
Deployable Solar Panel

Manual
Deployable solar panel for 3U or 6U satellite

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Confidentiality Notice

1 Table of Contents

2 Overview

3 Warnings

Handling

This product uses advanced solar cells that are fragile. Do not touch solar cells.
A good tip for handling is to use three fingers in the square holes on the two deploy backplates.

Only handle solar panels without touching solar cells or their tabs

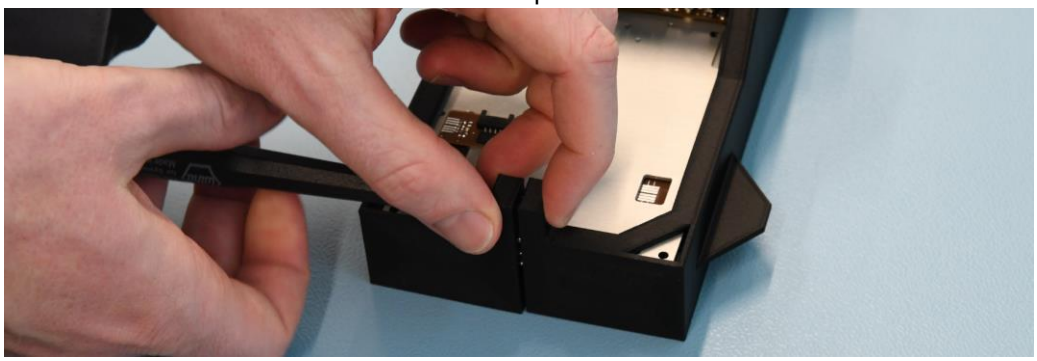
Never place anything on solar cells!

ESD

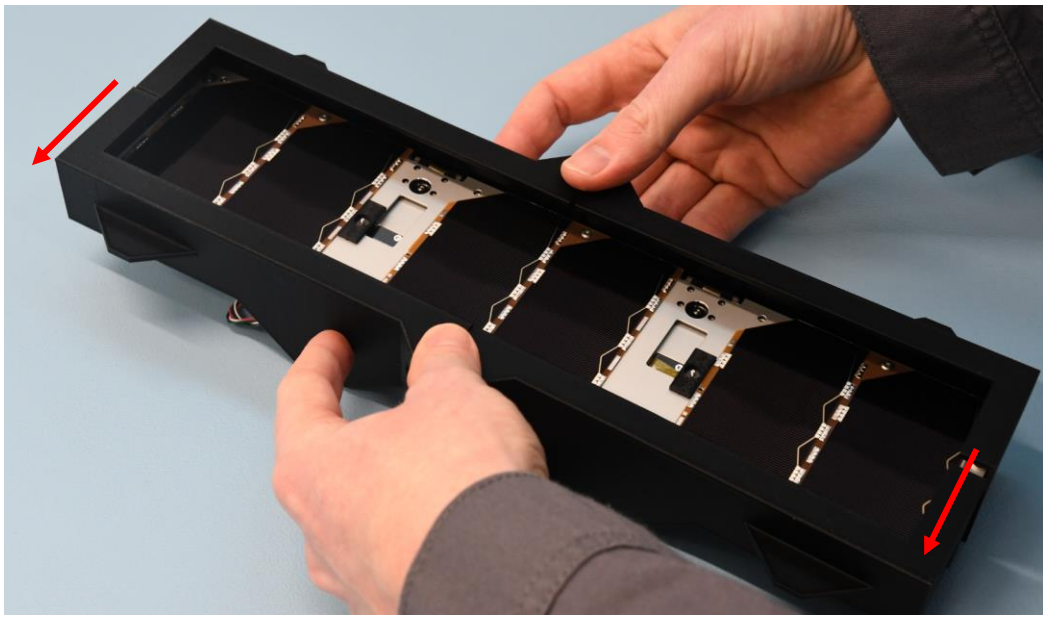
This product uses semiconductors that can be damaged by electrostatic discharge (ESD). When handling, care must be taken so that the devices are not damaged. Use appropriate precautions.

4 Unpacking

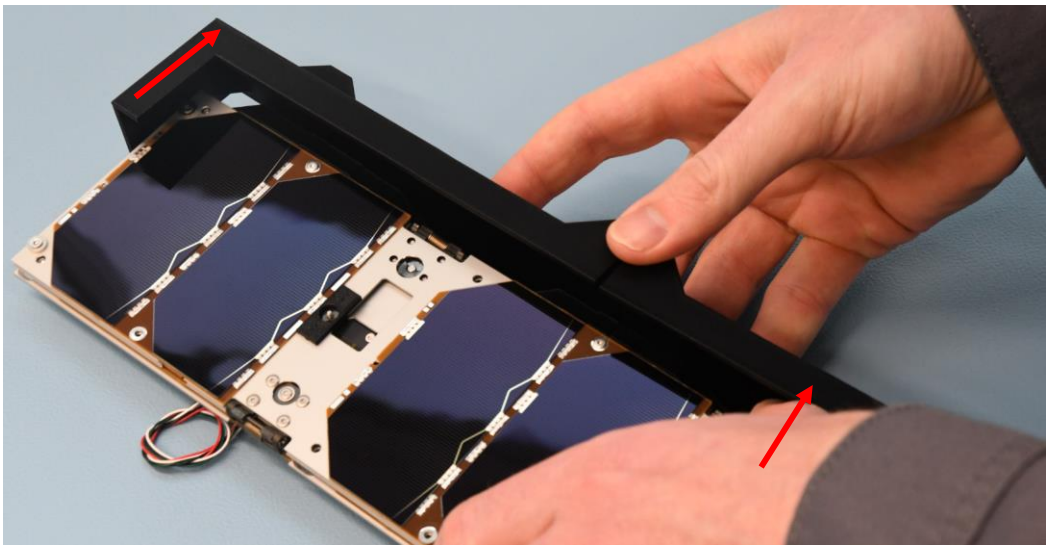
1. Take it out of the Pelicase by pulling onto the pull here label on the ESD-bag.
2. Open the ESD-bag
3. Pull out the DSP in its transport bracket
4. Unscrew both screws in the ends of the transport bracket



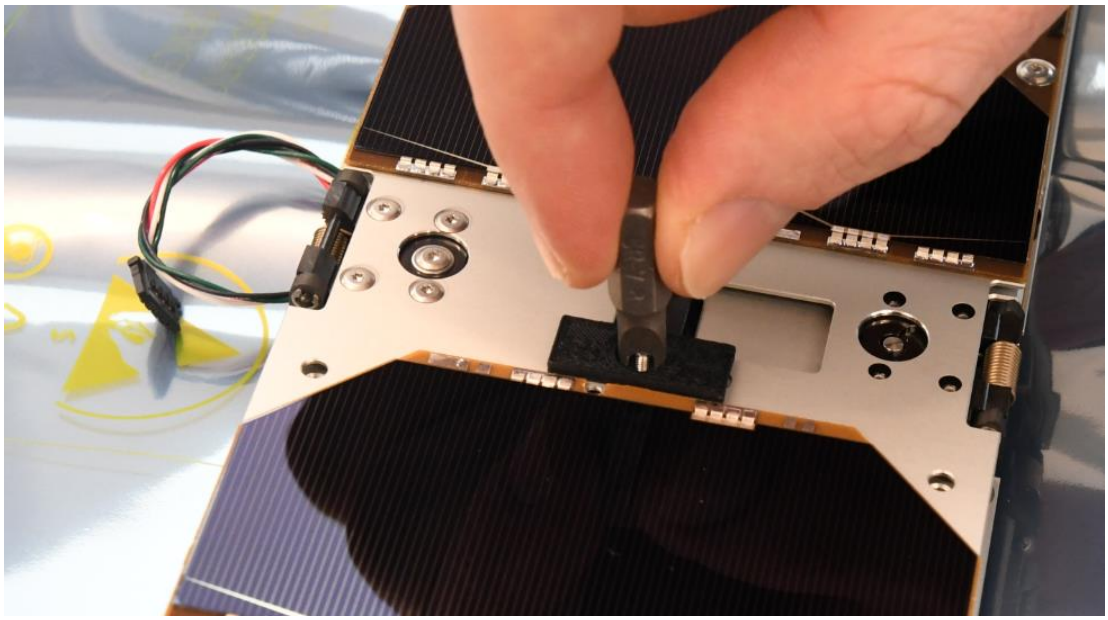
5. Slide one part of the transport bracket off.
    a. Caution: DSP rests loose within the transport bracket when both screws is removed.



6. While holding the panel, carefully remove the remaining half of the transport bracket by sliding aside



7. Remove the support bracket from the release mechanism using and SP10 bit.



8. The panels can now release and deploy.
9. Before mounting on any structure or during any further handling please install the support brackets described in Mounting of support brackets in deployed state in chapter 6.

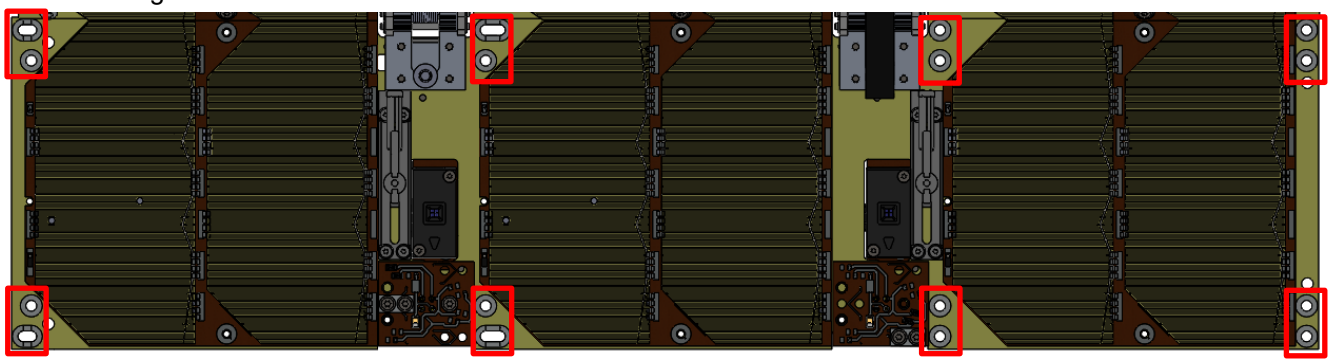
5 Mounting onto structure.

The mounting of the solar panels is described here.

5.1 General mounting

All three versions shall be mounted with one screw in the mounting holes of each red squares shown in the figure below.

The mounting holes fits M2.5 countersunk screws.



5.2 135° version onto the GomSpace 6U structure

The 1 mm spacer must be mounted between the structure and the DSP.

5.3 All versions

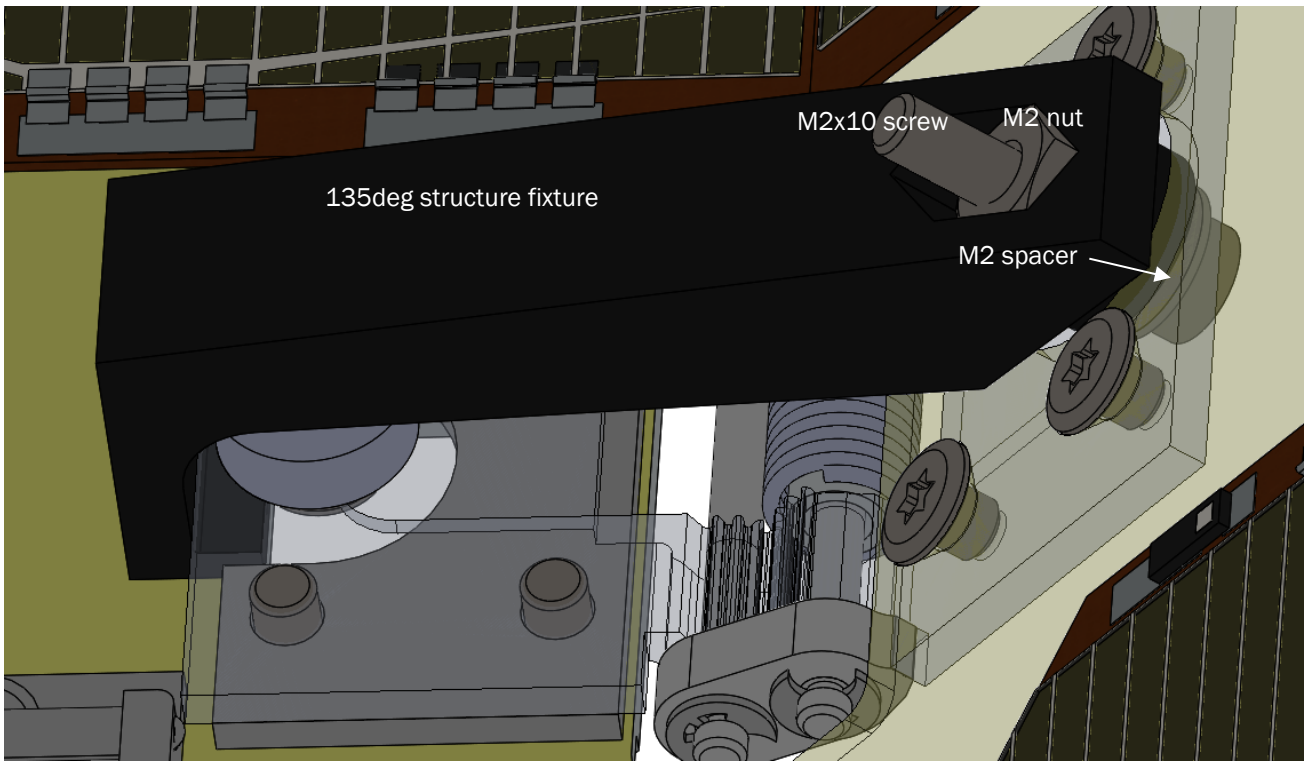
Cannot be mounted in stowed state and before mounting, the support brackets stated in chapter 0 should be mounted.

6 Mounting of support brackets in deployed state

Along with the panels are two support brackets for handling the solar panels in deployed state.
The support brackets should be used if the solar panels have to be handled with the gravity perpendicular to the plates plane.
It might be during integration, inspection, movement of the satellite with the panels deployed or other task where the panels must be deployed.

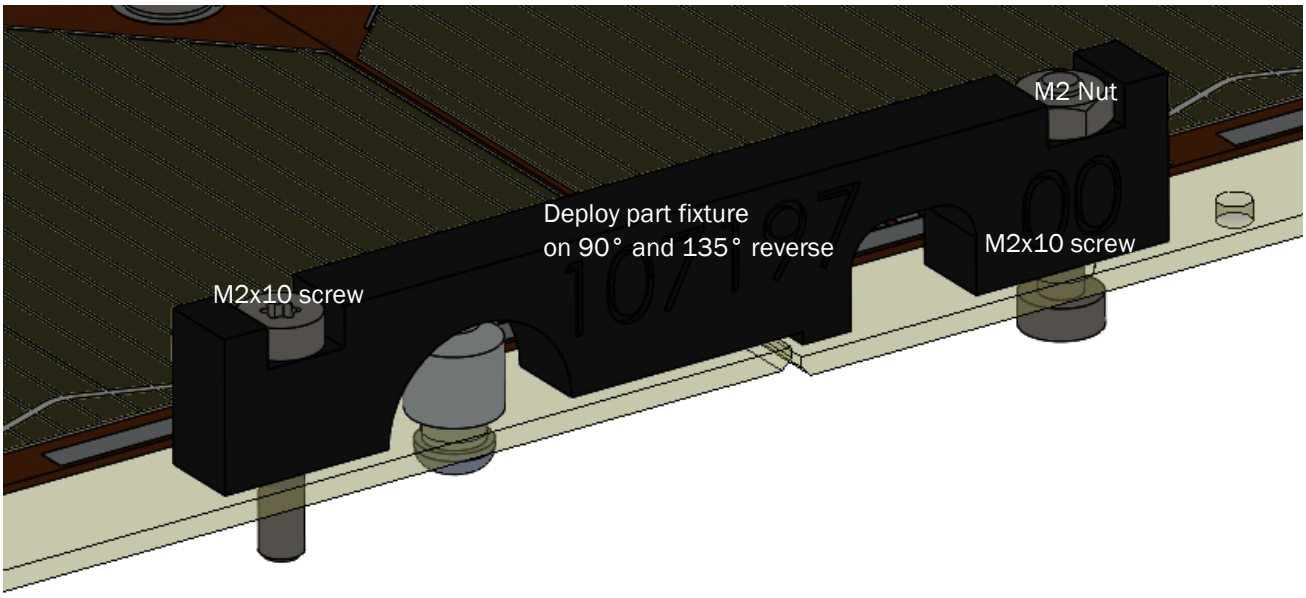
6.1 Structure support bracket for both 135° and 135° reverse version

The mounted 135 structure support bracket is shown below. All screws used for mounting the support bracket must only be finger tightened.



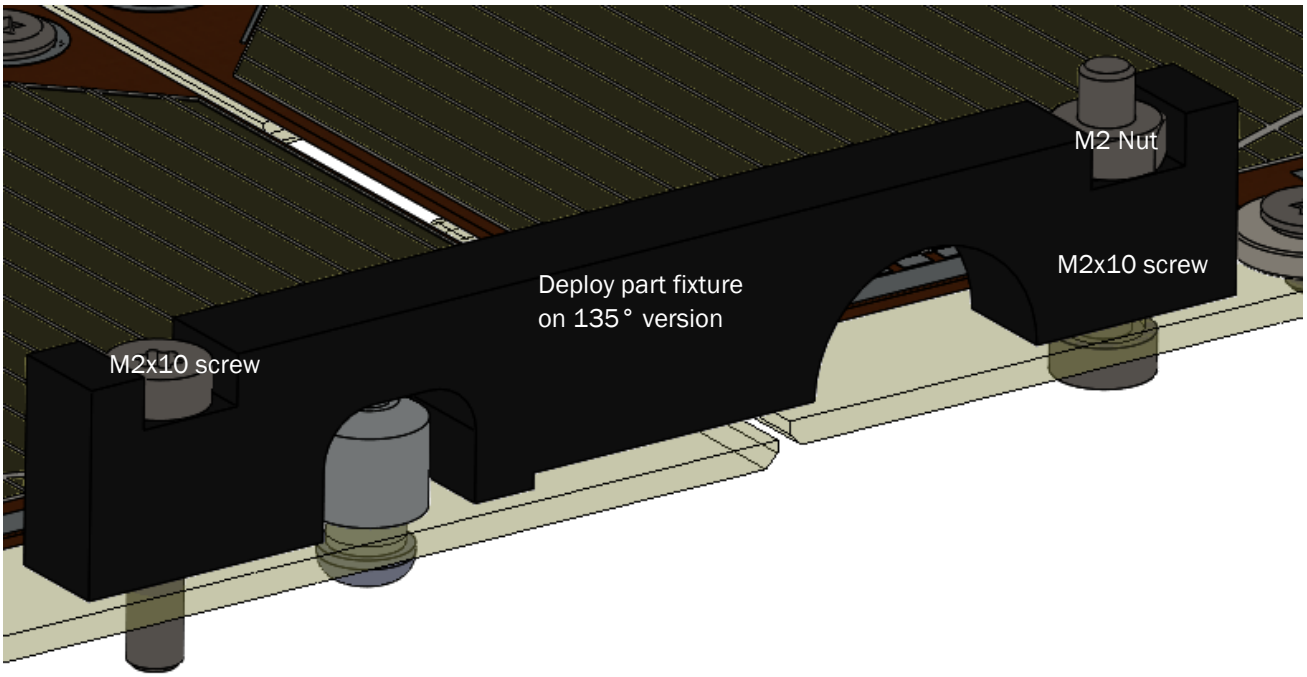
6.2 Deploy part support bracket for 90° and 135° reverse version

The mounted deploy part support bracket is shown below. All screws used for mounting the support bracket must only be finger tightened.



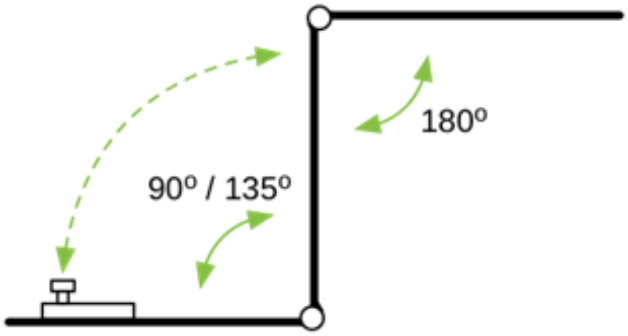
6.3 Deploy part support bracket for 135° version

The mounted deploy part support bracket is shown below. All screws used for mounting the support bracket must only be finger tightened



7 Release Mechanism

By burning through a wire, a sleigh with a spring, is released. A nut and bolt mounted on the sled release the panels which fold out by the springs in the hinge. The hinges themselves ensure correct opening angle.

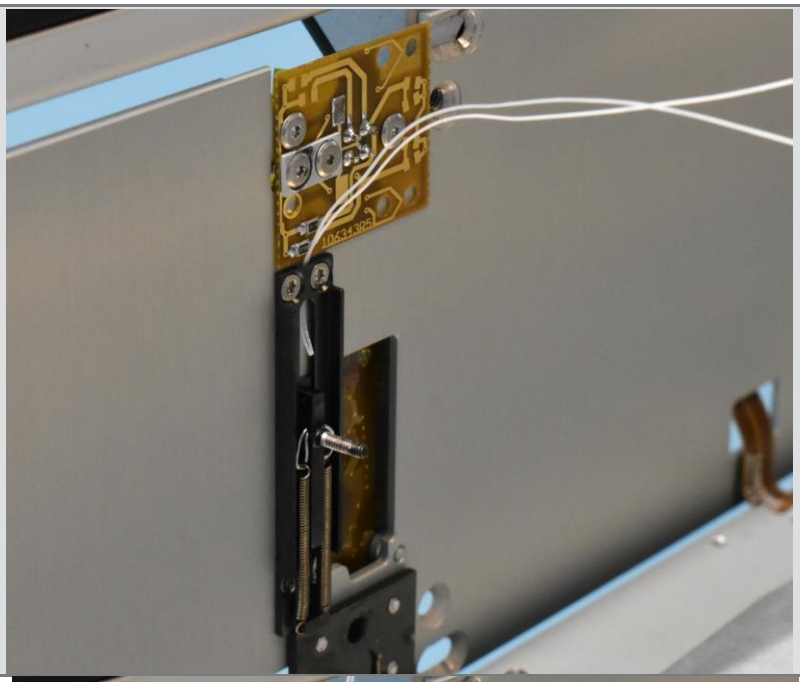


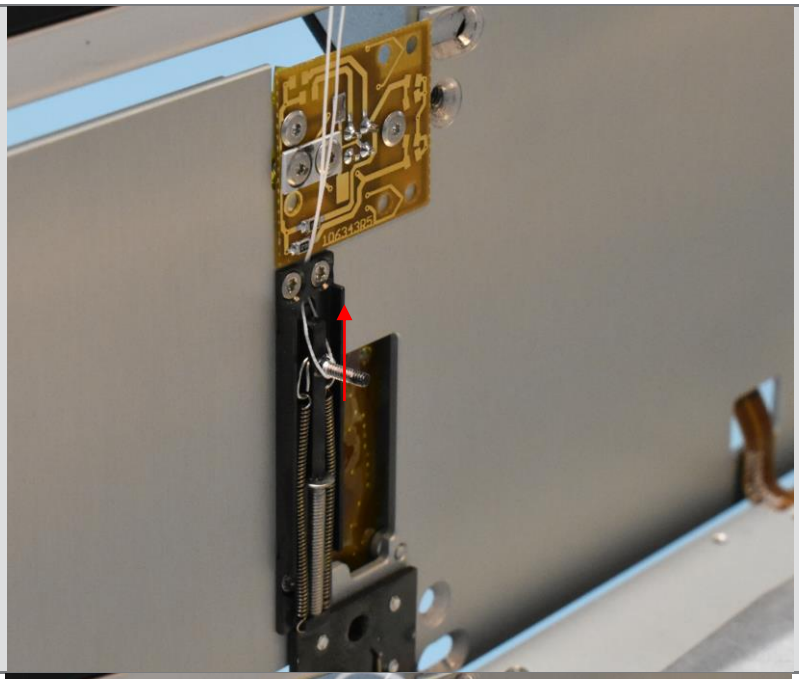
Step-by-step guide of arming the release mechanism is shown in section 7.1.

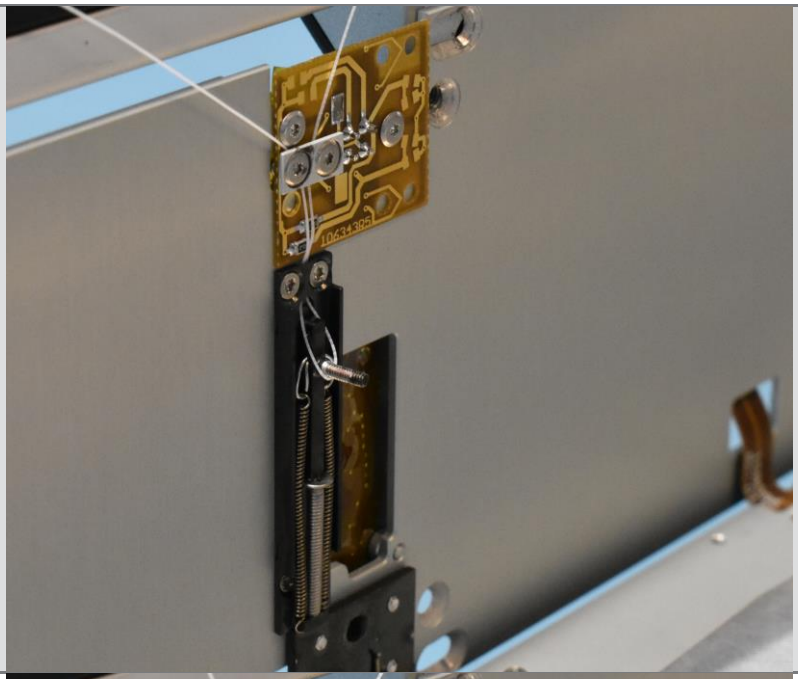
Critical release mechanism feature checks		
Torque	0.12-0.18 Nm	
Loctite	Yes, reapplied for every release for both the M2 screws and M1.6 threaded rod of the sleigh	
Burns	Maximum number of burns on each resistor is 8	
Position of burn wire	The black of the resistor must be seen on both sides of the burn wire.	
	OK	Not OK
		

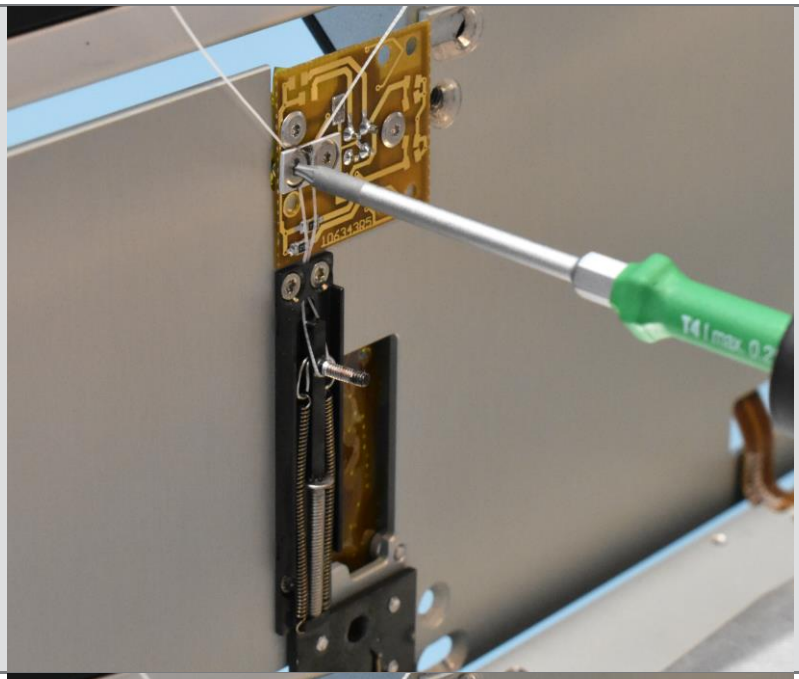
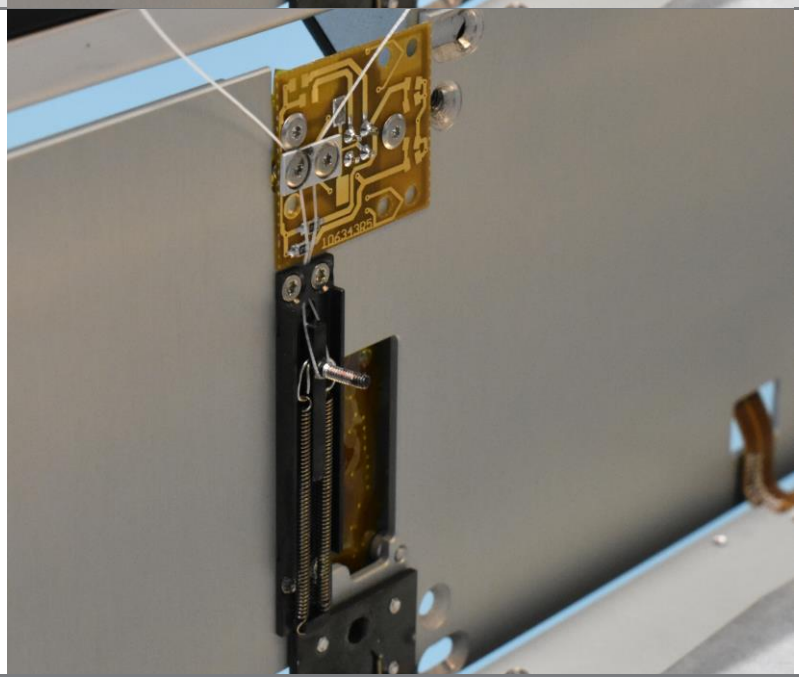
7.1 Step-by-Step arming of the deployment mechanism

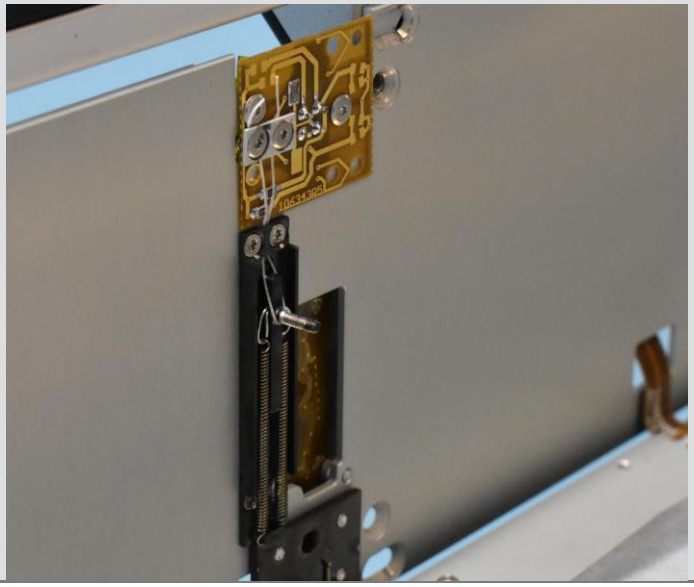
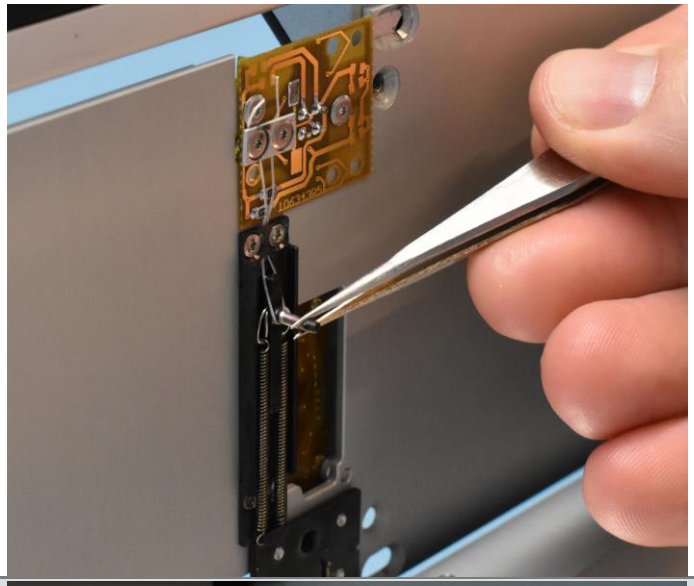
Text and description	Picture
Apply Loctite to the two screws at the hold down.	
Cut approx. 200 mm burn wire from the roll. Make a sharp bend at approximately the middle of the burn wire.	

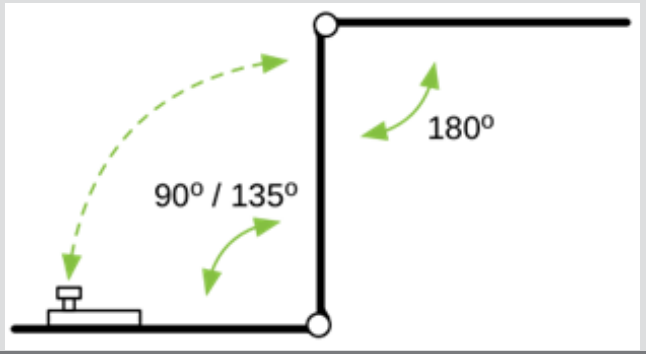
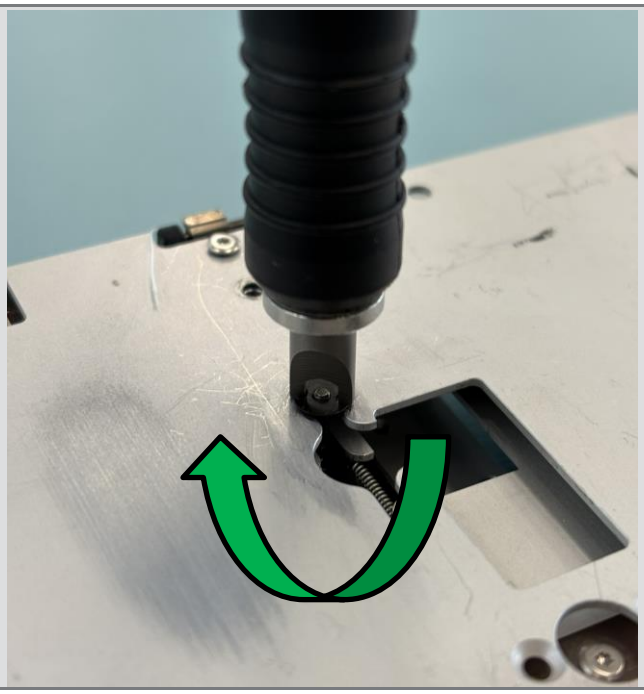
Insert the burn wire through the hole.	
Move the burn wire such that the noose is around the threaded rods.	

Insert a M2x16 countersunk screw or similar, to keep the sleigh in armed state.		
Put one end of the burn wire under the hold down.		

Put the other end of the burn wire under the hold down.		
Make sure the burn wires are aligned over the resistors.		

Tighten the two screws while keeping the alignment of the burn wires over the resistors.		
Remove the M2 x 16 screw or similar, to arm the deployment mechanism. **Check the alignment of the burn wire over the resistors.**		

Cut out the excess burn wire.	
Apply Loctite to the M1.6 threaded rod of the sleigh.	
To ensure proper curing, apply Activator Loctite SF7649 to the release nut, make sure to coat the threads thoroughly.	

Repeat the same procedure for the other release mechanism.	
Stow the panels.	
Screw the release nut onto each release mechanism, while the panels are stowed. **A SP10 bit fits in the release nut** **Pretension the panels as in chapter 8.** **Once both release nuts are properly installed, allow one hour for curing before proceeding to next step.**	
After at least an hour, perform a break torque test to determine whether the Loctite application is adequate. **Use a torque wrench and set it to 2 N·cm and apply a torque in the clockwise direction.** **The success criterion is that the release nut must not move when torque is applied.**	
Repeat the same procedure for the other release mechanism.	

8 Release nut pretension

To ensure the correct pretension of the deploy nut the following must be meet.
Align the top of the top nut with the top of the M1.6 thread.

Version	135° version	90° version	135° reverse version
Revolutions	3 – 3.5	0.1 – 0.5	0.1 – 0.5
D1 in mm	1 – 1.2	0.05 – 0.2	0.05 – 0.2

9 Disclaimer

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