

"RemoveDEBRIS" – the space junk hunter

A luggage-sized satellite deployed from the International Space Station (ISS), called *RemoveDEBRIS*, is endeavouring to capture and make safe space junk using several different experimental techniques

REMOVEDEBRIS SATELLITE CUTAWAY

DebrisSat-1: Space junk simulator

Antennas

Battery

Harpoon and target assembly

Vision-Based Navigation (VBN)

Net cannon

Dragsail

Supervision cameras

DebrisSat-2: Space junk simulator

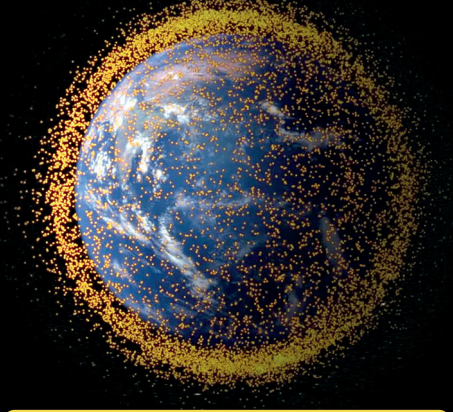
Reaction wheel: Controls orientation

Sun sensor

Solar panel powercard

65cm

ORBITAL DEBRIS

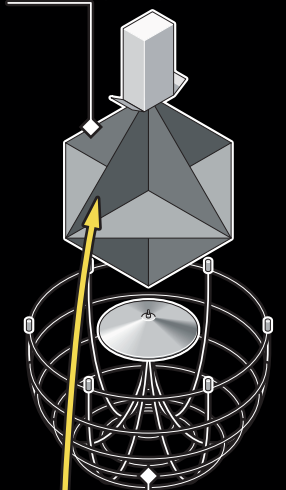


Defined as any man-made object orbiting Earth which has no function, such as defunct spacecraft, abandoned launch vehicles and fragmentation debris. There are **500,000** pieces of junk, marble-sized or larger, which can travel at speeds of up to **28,000km/h** – fast enough for small flecks of paint to damage satellites, spacecraft or even the ISS

FOUR METHODS

■ **Experiment 1: Net**
Carried out Sep 19, 2018

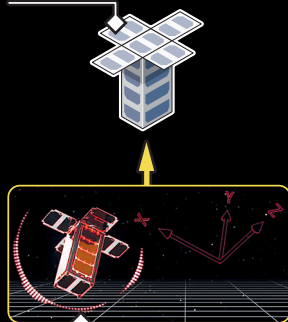
DebrisSat-1: Launches and inflates balloon to simulate piece of space junk



Net: Fires at target and successfully encloses it

■ **Experiment 2: VBN**
Nov 2018*

DebrisSat-2: Ejected for use as target for satellite's cameras



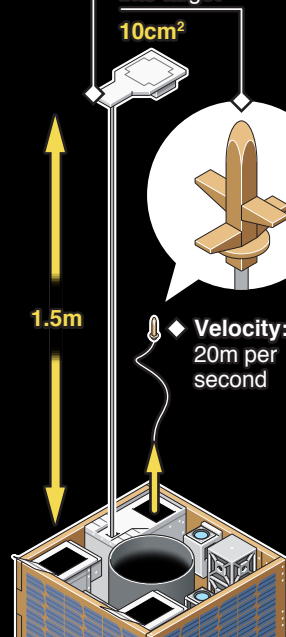
Purpose: Test flight data image processing and navigation algorithms through two cameras

Cameras: LiDAR pulsed laser measuring and regular 2D optics

■ **Experiment 3: Harpoon**
Jan 2019*

Target: Extends outwards from satellite, ready to be shot by harpoon

Harpoon: Barbs deploy after impact to lock into target



10cm²

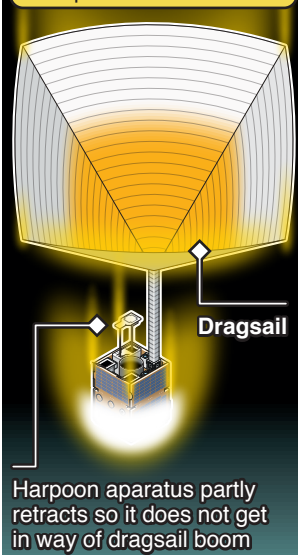
1.5m

◆ **Velocity:** 20m per second

■ **Experiment 4: Dragsail**
Mar 2019*

De-orbit: When deployed, dragsail accelerates rate of decline of satellite so it re-enters atmosphere far sooner than it would without it – in this case by around 11 months

Method could be used by future space junk hunters to dispose of debris



Harpoon apparatus partly retracts so it does not get in way of dragsail boom