Paper ID: 79292
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21st IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Interactive Presentations - 21st IAA SYMPOSIUM ON SPACE DEBRIS (IPB)

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UK ADR: THE UK SPACE AGENCY'S ACTIVE DEBRIS REMOVAL MISSION

Abstract

The UK Space Agency (UKSA) has commissioned two Phase B preliminary design studies for an Active Debris Removal (ADR) mission, delivered by Astroscale-led and ClearSpace-led consortiums in parallel. The mission requires the safe capture and subsequent de-orbit of at least two UK-licensed defunct satellites in the congested Low Earth Orbit (LEO) zone. Uniquely, this debris, also known as the client satellites, must be unprepared for capture; that is, not fitted with technologies intended to aid In-Orbit Servicing (IOS), such as docking plates and fiducial markers. Clients mush also be completely uncooperative.

In developing capability to perform such a service, the mission aims to help mitigate the major collision risks faced by current and future space missions. To further drive IOS innovations and demonstrate best practice in space sustainability, the servicing spacecraft must also be capable of being refurbished by a potential future mission. Refurbishment of life-limiting factors, such as fuel and other consumables or components degraded by radiation damage, for example, may pave the way for extended mission operations and removal of further debris from LEO.

Phase B builds upon the success of three parallel UKSA-funded Phase 0/Phase A studies delivered in March 2022. Together, these are the first steps towards a potential UK-led IOS mission with a launch date in the next three to five years. This paper summarises the progress of the mission to date, including outputs from the three Phase 0/Phase A feasibility studies. Key design drivers, criteria and methodologies used to down-select the major system elements are examined. The approach to Phase B is discussed, including each study's proposed concept, which a particular focus on the debris capture method.