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Astroscale's New Patent Transforms Space Debris Removal

Astroscale Holdings Inc. (Headquarters: Sumida-ku, Tokyo; Founder and CEO: Mitsunobu Okada; hereinafter "Astroscale") has announced the issuance of U.S. Patent No. 12,234,043 B2 for its "Method and System for Multi-Object Space Debris Removal" to further advance its efforts to realize a sustainable space environment. As low Earth orbit becomes increasingly congested with aging satellites and fragmented debris, and new satellites are launched at an accelerating pace, this innovative patented technology establishes a new foundation for existing active debris removal (ADR) operations by enabling the removal of multiple debris objects and controlled reentry (Note 1), while also enabling pursuit of cost reduction.

When safely reentering multi-ton debris objects from orbit and guiding them to fall into safe zones on Earth, traditional debris removal methods have faced significant limitations. Due to constraints such as fuel capacity, these methods could only remove one debris object per mission, resulting in high costs and limited agility. Astroscale's proprietary technology overcomes these barriers and introduces the option of controlled reentry, enabling fragments from large debris objects to avoid posing risks to inhabited areas or critical infrastructure on the ground. This approach addresses growing public safety concerns and aligns with international best practices. Under this method, the servicer satellite docks with a debris object (the "client") and transfers it to a reentry support satellite in a lower orbit (the "reentry shepherd satellite") (Note 2). Once the client is docked with the reentry shepherd satellite, the servicer separates and proceeds to engage a new client, while the shepherd safely guides the initial client into Earth's atmosphere for reentry. By repeating this process, the servicer can remove multiple large debris objects in a single mission, thereby enabling pursuit of cost reduction.

Astroscale's architecture allows for flexible mission profiles: for example, the reentry shepherd satellite may remain docked with the client through reentry, separate after performing reentry insertion and return to orbit, or in some cases, missions may proceed without a shepherd satellite altogether. Given the diverse size and risk profiles of debris objects, Astroscale believes that this high level of adaptability is essential.

"Our distributed architecture solves a key challenge in orbital debris removal by enabling the deorbit and reentry of multiple large debris objects sustainably and economically," said Mike Lindsay, CTO at Astroscale. "This approach allows us to reuse our advanced servicers, capable of capturing and detumbling multi-ton objects, instead of burning them up with the debris upon reentry. This not only saves cost but also reduces the amount of potentially harmful material released into the Earth's upper atmosphere."

This new patent builds on Astroscale's approach to multi-object debris removal. Astroscale offers two types of debris removal services: End-of-Life (EOL) and Active Debris Removal (ADR). For EOL, which targets satellites that have reached the end of their operational life and are equipped with interfaces for capture and removal, Astroscale plans to demonstrate

multi-removal capabilities in a single mission with the launch of ELSA-M in 2026. In contrast, ADR targets large debris objects such as rocket bodies and legacy satellites that lack docking interfaces. With this newly granted patent, Astroscale can safely guide multiple debris objects into Earth's atmosphere using a single servicer satellite, potentially enabling more cost-effective debris removal operations.

This new patent further strengthens Astroscale's intellectual property portfolio and, by pursuing cost-effective operations, reinforces its position as a practical and innovative leader in on-orbit servicing—supporting the safe and sustainable use of space for future generations.

This matter is expected to have a minimal impact on our consolidated financial forecast.

Note 1: Controlled reentry refers to the technology of intentionally and systematically guiding orbital objects such as satellites or spacecraft back into Earth's atmosphere. This enables prediction and management of the reentry location and burn-up status, minimizing the risk of damage on the ground.
Note 2: A reentry shepherd satellite is a satellite that supports the controlled reentry of debris into Earth's atmosphere.