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ON-ORBIT SERVICER DESIGN USING MANIPULATOR ARM FOR POWER ENHANCEMENTS

Abstract

Astroscale is developing an on-orbit servicer called LEXI® for life extension of client satellites that have depleted their fuel and are unable to continue providing services. As part of LEXI's capabilities, a power communication enhancement service can be added, thus expanding on the versatility of the LEXI. The design calls for a manipulator arm that can be deployed by LEXI and manoeuvre an umbilical connector to provide power enhancements to a client satellite.

Geostationary satellites have an umbilical connection at their aft end. This connection allows ground maintenance of the satellite prior to launch. Electrical power is provided to the satellite while on the ground by the umbilical connection, which also allows communication to the satellite's computer. While in orbit, the aging satellites tend to lose either battery power or solar panel cells. The efficiency of the solar cells also tends to degrade through the lifetime of the satellite and generate less needed electrical power. As a result, the client's power capabilities are degraded so the satellite cannot fulfill its power requirements. These degradations effect the service provided by the client vehicle and in some cases may result in powering off some of the payload, with a loss of revenues.

For providing life extension services, LEXI is connected to the client's satellite through its docking arms, attached to the launch adapter ring of the client's satellite. The client's umbilical connection is also located on the same panel of the launch adapter ring. The LEXI umbilical connector forms an electrical connection with the client spacecraft, allow for the provision of power or software upgrades to the client spacecraft. The paper shall detailed the design and method of providing such power enhancement capabilities.