

INTELSAT SPACECRAFT DISPOSAL: ORBIT RAISING CONSIDERATIONS

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ABSTRACT

At the end of their operational lifetimes, the Intelsat communications satellites use their remaining propellant to raise their orbits above the geostationary arc. For the Intelsat IV and IVA series of spacecraft, Intelsat allocated end-of-life propellant to allow orbit raising by at least 150 km. This paper describes the orbit raising maneuvers used for those spacecraft series, and the accuracy of maneuver accounting in predicting the propellant available at end-of-life.

We list the considerations behind the 150 km altitude-raising target. A particular concern is the long-term eccentricity variation of the graveyard orbit due to radiation forces since the target altitude should insure that one apse never moves back to the geostationary arc. The disposal method for body-stabilized spacecraft needs further study. In particular, when the attitude control and solar-array drive electronics are turned off and the spacecraft starts to tumble, is there a preferred orientation of the two solar-array panels, relative to the central body, which minimizes eccentricity buildup in the graveyard orbit due to radiation forces?

Initial graveyard orbits are usually specified as circular orbits. We show that if maneuver accuracy permits, one should aim for an eccentricity and perigee longitude for the initial graveyard orbit which would minimize the maximum long-term orbital eccentricity produced by radiation forces and lunar gravity.