A Navigation Summary of OMM10 Performance

OMM10 was successfully implemented on 1 December 1998 at the scheduled burn centroid time of 20:36:40 UTC. This maneuver occurred on orbit number 29,508 near the boundary between cycles 228 and 229. The commanded magnitude was 3.105 mm/sec, compared to an ideal value of 3.100 mm/sec. This maneuver was applied in the orbit along-track direction to increase the mean semimajor axis by ~6.66 meters to reverse the satellite ground track drift westward and thereby remain inside the ±1-km control band.

The maneuver magnitude was selected in the presence of solar array lead positioning during all post-maneuver fixed yaw periods. This strategy allows the adaptive use of lead or lag solar array positioning during subsequent fixed yaw periods to selectively add orbital boost or deboost as needed to compensate for any errors in maneuver execution, or in predicting solar activity and the anomalous forces.

At the time of the maneuver, the ground track was ~252 meters from the eastern control boundary, having a projected control band exit on 17 December 1998. OMM10 implementation on 1 December 1998 allowed for a single backup opportunity at the next cycle boundary on 11 December 1998; this location was ~35 meters inside the control band.

Orbit determination solutions obtained from the GSFC/FDF following the maneuver were used by the NAVT to estimate an achieved ΔV of ~2.877 mm/s, ~7.3% lower than the commanded value of 3.105 mm/s. The lower ΔV caused the westward-most position of the predicted post-maneuver ground track to fall ~255 meters short of the planned pre-maneuver value.

As practiced in the recent past, solar array articulation strategies during fixed yaw periods will continue to be used to maximize maneuver spacing. The first post-OMM10 application of this technique will be used to remove the effects of the 7.3% low ΔV magnitude observed on OMM10. This adjustment requires additional orbital boost, to be applied with a partial lead/lag strategy while the satellite is flying backwards in fixed yaw between 19 and 30 December 1998. The lag will be introduced near β'=-9 deg early on 27 December 1998 and then removed during the yaw flip on 30 December 1998.

Subsequent fixed yaw periods will be used in similar ways to increase controllability of the ground track without use of propulsive techniques.

Based on the observed OMM10 performance, predicted solar activity, and the capabilities of the lead/lag strategies, it is expected that the next maneuver (OMM11) will not be required until September 1999, or perhaps later.

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