European Space Agency

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No.15 - Preparing for the payload commissioning

15 Jan 2004

The spacecraft is now in its 187th orbit, in good status and with all functions performing nominally. In order to fine tune the altitude of the apogee point, required to minimise the length of the eclipses due to occur in March, the ion drive is currently being used only when the spacecraft is around perigee. This strategy will last until the end of January.

Starting from early February the ion engine will not be used to generate thrust for a period of three weeks. This phase of the mission will be used to perform the scientific instrument commissioning. A series of observations of celestial targets with different instruments is being prepared and will be described in a future report.

Another milestone was reached this week: the mission commissioning results review was held at ESOC. This review was planned to be held as soon as the first mission phase, the exit of the radiation belts, was completed. The results of the on-orbit verification of all the spacecraft subsystems were presented. All the subsystems have now been verified. However, some spacecraft functions have yet to be tested. This is because some are triggered by a failure scenario and others have not yet been needed.

A plan has been prepared to solve the few anomalies that are still affecting the spacecraft's smooth operations. These include a software function to autonomously re-start the electric propulsion engine after an unexpected shutdown, a proper strategy to improve the performance of the star tracker that is affected by the combined effects of high temperature and radiation induced degradation, and a proper strategy to circumvent the occasional failures of the telemetry Reed-Solomon coding checksum. Updates on the progress being made will be posted in future status reports.

Orbital/Trajectory information

The osculating orbital elements are periodically computed by the ESOC specialists. These elements define the so called "osculating orbit" which would be travelled by the spacecraft if at that instant all perturbations, including EP thrust, would cease. So it is an image of the situation at that epoch. In reality the path travelled by the spacecraft is a continuous spiral leading from one orbit to another. The most recent osculating elements are as follows:

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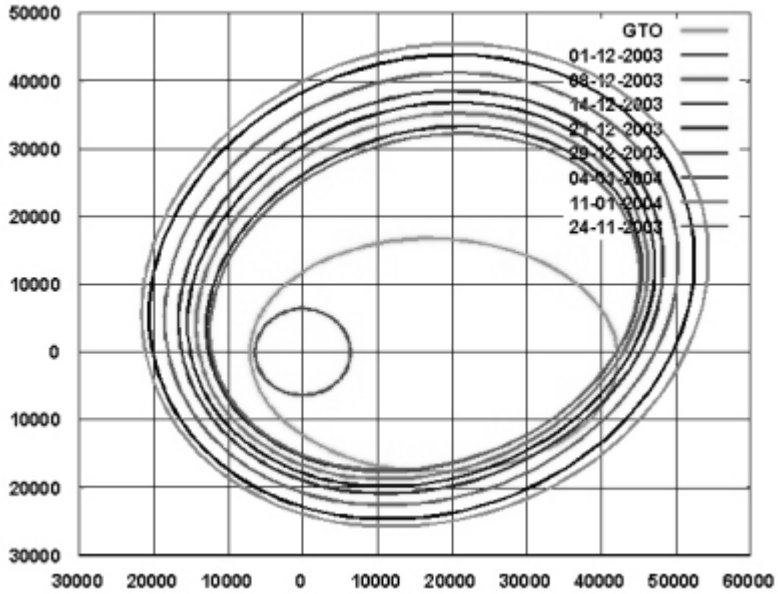
Elements WRT Earth (J2000)	
Pericentre Distance (km)	20 107.697351
Apocentre Distance (km)	58 363.288771
Semi Major Axis (km)	39 235.493061
Eccentricity	0.487513
Inclination (deg)	6.876771
Asc. Node (deg)	150.679570
Arg. of Pericentre (deg)	211.174542
True Anomaly (deg)	180.280612
Osc. Orbital Period (h)	21.484594

In this diagram the osculating orbits at launch (GTO) and at different times are plotted. From the

start, the electric propulsion system has managed to increase the semi-major axis of the orbit by 14 606 km, increasing the perigee altitude from the original 656 km to 13 729 km. The orbital period has been more than doubled, from the initial 10 hours 41 minutes to the present 21 hours and 29 minutes.



SMART-1 osculating orbit up to 11 January 2004

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