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## **N° 14–1998: ARIANE-502 - RESULTS OF DETAILED DATA ANALYSIS**

### **8 April 1998**

The results of Ariane 502 flight data analysis - a detailed evaluation covering all information gathered during the flight - were presented to the Launcher Qualification Board on 1 April. The analysis confirmed that the launcher performed well overall and did not reveal any anomalies that had not previously been identified.

The most significant anomaly, namely excessive roll torque during cryogenic main stage flight, has now been explained. It will be remembered that the possible causes of the 900 Nm (Newton metre) roll torque registered in flight were narrowed down to two :

- \* roughness of the internal surface of the Vulcain engine divergent causing the boundary layer of the main jet to spiral;
- \* snapping of one of the rods attaching the Vulcain engine turbine exhaust lines to the aft end of the divergent.

Three test firings of the Vulcain engine were performed on a teststand equipped with a roll torque measurement device. Throughout engine running time on all three tests, roll values very similar to those encountered in flight 502 were recorded. The first of the above explanations is therefore confirmed. The excess roll torque phenomenon will now be countered by repositioning the turbine exhausts.

As a precautionary measure and to obtain in-flight confirmation of the cause of the roll problem, the additional attitude control unit that has already been developed will still be used on flight 503.

The studies and tests conducted since flight 502 have also shown that the premature main stage shutdown that occurred during that flight was caused by the excessive roll torque. Action to overcome the torque problem will therefore also prevent a recurrence of the premature shutdown.



Ariane-5 is an ESA programme for which ESA has delegated management responsibility to CNES.

Flight 503, conducted under ESA responsibility, will be the last of the Ariane-5 qualification flights. The launcher used will be the first production-series unit ordered by Arianespace from European industry.

Launch operations are managed by Arianespace at the ELA-3 launch site at the Guiana Space Centre, Europe's space port.

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