Control Moment Gyroscope 2 (CMG-2) Shutdown

Loss of Attitude Control due to CMG-2 Shut Down

Start GMT 21-April-2004, 112/18:00:01.531

NOTES:

- At GMT 21-April-2004, 112/20:18, Control Moment Gyroscope 2 (CMG-2) lost power and spun down due to a tripped Remote Power Control Module (RPCM).

- The ISS was in +XVV/+ZLV Torque Equilibrium Attitude when the shutdown occurred. The variation seen in the baseline in all three axes between 20:30 and 21:40 is due to the drift away from normal LVLH attitude while the ISS was under Loss of Attitude Control (LoAC).

- At 20:57, momentum in the remaining CMG’s climbed to 87%, and desaturation by thruster firings was requested. These appear in the plot as 4 to 8 µg peaks in the -Z axis and about 1 µg peaks in the -X axis.
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ISS Rates and Angles After CMG-2 Shutdown
Start GMT 21-April-2004, 112/18:00:01.531

NOTES:
- Plots shown are the attitude angles (left column) and rotational rates (right column) for the time period surrounding the CMG-2 shutdown event.
- After the shutdown (designated by red dotted line at 2.3 hours), the ISS enters LoAC and drifts from nominal attitude by 5-10 degrees per axis. Small variations in angular rates can also be seen at this time.
- ISS telemetry data plotted is from MAMS real-time GSE Packet. Angles are Yaw, Pitch, Roll sequence relative to LVLH attitude. Rates are for Space Station Analysis X, Y, and Z relative to J2000.

Description
- Sensor: ISS Telemetry, radgse 0.0625 sa/sec
- Location: LAB1O2, ER1, Lockers 3,4
- Orientation: Space Station Analysis (SSA)
- Inc/Flight: Increment: 8, Flight: 7S
- Plot Type: Acceleration Magnitude

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Regime: Quasi-steady
Category: Vehicle
Source: CMG
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Loss of Attitude Control due to CMG–2 Shut Down
Gravity Gradient + Rotational Components Overlay
Start GMT 21–April–2004, 112/18:00:01.531

NOTES:

- The plot on the left shows the quasi-steady profile as measured by MAMS (black line) overlaid with gravity gradient + rotational components (red line) calculated using ISS Rates and angles telemetry data (see previous page).

- Close agreement between MAMS and the ISS telemetry calculations indicate the majority of the disturbance during LoAC following the CMG-2 shutdown is due to drift away from nominal LVLH attitude.

- The approximately 0.3 µg discrepancy in the Y-axis is most likely due to an as yet unidentified phenomenon that is present when a 100 Hz signal is seen in SAMS data. This 100 Hz signal is confirmed present during the time period shown. See quasi-steady handbook page titled “Unknown Quasi-steady Y-axis Step” for more details.