

STEREO MOC Status Report
Time Period: 2014:342 - 2014:348

STEREO Ahead (STA) Status:

1. The following Ground System anomalies/events occurred during this reporting period:
 - On day 348, during the DSS-43 support, turbo decoder lock was lost intermittently beginning at 1948z. This anomaly resulted in the loss of five frames of SSR data.

2. The following spacecraft/instrument events occurred during this week. Note that the Ahead observatory is operating on the first side lobe of the HGA to prevent overheating of the HGA feed assembly which is currently at 117 degrees C with the HGA angle at 7.4 degrees, with respect to the spacecraft-Sun line.
 - On day 343, the 74th momentum dump was executed successfully at 2030z, which imparted a delta V of 0.086 m/sec.
 - On day 348, IMU-B was powered on at 1915z and temporary fault protection changes were loaded to C&DH RAM in preparation for changing the star tracker thermal electric cooler temperature set point in EEPROM.
 - On day 349, during the DSS-43 support, the star tracker was taken off-line for four minutes at 0119z to change the thermal electric cooler temperature set point to -10 degrees C in the star tracker EEPROM. This change may result in quicker initial star field identification, thereby minimizing the "lazy" star tracker performance which contributed to the current STEREO BEHIND loss of communications anomaly. IMU-B was powered off at 0213z and the temporary changes to the fault protection rules were removed. Real-time science data, which was suspended from the telemetry downlink to allow for monitoring this change, was restored at 0342z.
 - The average daily science data return for Ahead, while operating on the first side lobe on the HGA, was 56 Mbits during this week.

STEREO Behind (STB) Status:

1. The following Ground System anomalies/events occurred during this reporting period:

- None.

2. Detailed status of the activities that occurred on the Behind loss of communication anomaly, which occurred on day 274, are listed below. To ensure communications on the LGA during long term recovery efforts, the Behind track coverage have been reduced to 3 hour 70 meter supports for 3 days in a row each week.

- On days 342 through 344, during the DSN 70 meter supports, recovery commanding was conducted to ensure that the transmitter is in its operational configuration. No signal was received by the DSN radio science receivers.

Significant findings to date:

1. Analysis of the three DSN extracted telemetry frames from the carrier signal just before the planned observatory reset/anomaly occurred on day 274, October 1st, showed nominal performance of the spacecraft, i.e., no anomalies, IMU off, and the star tracker providing an attitude solution.

2. Post reset, from the very limited telemetry, three packets, extracted from the carrier signal by the DSN, the X-axis gyro on IMU-A had failed. Unfortunately, this telemetry contained only G&C anomaly data and no spacecraft summary data, i.e., the state of the RF, G&C, fault protection and other subsystems is not known at the time of the anomaly. With a failed IMU and the star tracker being off-line for an undetermined duration, the sun sensors will keep the observatory pointed at the Sun, though the G&C will not have any roll knowledge, and cannot roll the observatory as part of the safing configuration to re-establish communications on the LGAs. From analysis of this telemetry and initial G&C simulations, it is highly suspected that the observatory is rotating about the principal axis of inertia due to an autonomous momentum dump initiated by bad gyro data flagged good, but this has not yet been confirmed.

3. At least two anomalies occurred post reset, the star tracker not promoting to AAD mode and the X-axis gyro failure. Unfortunately, due to the number of possible combinations, the STEREO fault protection system is not designed for simultaneous failures.

The cause and effect analysis of the loss of communications from the LGAs is continuing. G&C simulations using the bad gyro data flagged good are continuing to better understand the potential impact to the observatory state. Recovery from a negative power state is also being investigated. While the recovery and analysis efforts continue on Behind, as the Ahead observatory will enter superior solar conjunction in March, the primary focus of the engineering team is on developing operational configuration changes to add robustness to the G&C rate sensor usage to ensure the Ahead observatory's continued safety.

Once communications are restored and the anomaly resolved, the operational plan for exiting the solar conjunction testing will continue to return the Behind observatory back to nominal science data collection as soon as safely possible.