SMOV Morning Meeting

Pointing Control System
Sensor Analysis and Calibration
June 12, 2009
2.2 PCS

2.2.4 Gyro Calibration Slews (SMOV week 4)

- **Description of change:**
  - Gyro calibration slews performed to calibrate gyro alignment and scale factors

- **Justification for contents of change:**
  - Slews to update calibration needed to meet slew miss-distance requirement

- **Implementation Approach:**
  - Loaded vendor provided calibration determined from ground testing during Servicing Mission
  - Perform maneuvers via SMS commanding in PN format
    - **Verify Observer Bias Terms** (QDVTHEJ) are zero after last guiding interval, i.e. autonomous gyro bias update
      - If not, zero observer bias terms via COP 3.04 – Zero Observer Bias
    - **Ground command gyros** to high mode/autonomous mode switching disabled prior to first attitude determination
    - **Ground command gyros** to low mode/autonomous mode switching enabled after last attitude determination
  - Calibration changes determined using SAC algorithms
    - Requires SSR dump of engineering data
    - Full Gyro Calibration was last performed early 2000
    - Delta Gyro Calibration was last performed 2004/188
    - Retested in March 2009
  - **Uplink calibration using ROP DF-15** – RGA Table Uplink
    - ROP DF-15 – RGA Table Uplink last used 2004/188
    - More recent safemode recoveries used COP 3.48 RGA reconfiguration
  - **Perform confirmation set of maneuvers** via SMS commanding in PN format
    - Verify Observer Bias Terms (QDVTHEJ) are zero after last guiding interval
      - If not, zero observer bias terms via COP 3.04 – Zero Observer Bias
    - **Ground command gyros** to high mode/autonomous mode switching disabled prior to first attitude determination
    - **Ground command gyros** to low mode/autonomous mode switching enabled after last attitude determination
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- CARD:
  » Waiver requested/approved for Restriction 3.1.7.5 – SSM Thermal Health and Safety Telemetry
    • PN format for ~6 consecutive hours for each set of maneuvers
  » The FSW code design and this procedure properly handle all activities for installation. This procedure complies with the following CARD paragraphs:
    • 3.1.9.36 Memory Load Using STFS Type 9 Command
    • 3.1.9.38 Telemetry Diagnostic Address Sampling
    • 3.1.9.41 HST 486 Flight Software Background Memory Integrity Check

- Analysis Plan:
  » Data collected during first set of maneuvers will be processed to determine updated calibration
  » Second set of maneuvers will validate updated calibration
  » Maneuver miss-distance is continually trended by PCS for inclusion in quarterly reports
  » Calibrated values targeted for uplink Tuesday afternoon (2009/167)

- Reporting Plan:
  » Results of calibration presented to GSAWG
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MEGG to be marked up when delivered

Ops Requests to be generated when TDRS schedule available
- Prime Ops Request verifies zero observer bias and handles gyro mode switching
  » One for each calibration period
- Contingency Ops Request to zero the observer bias
- Ops Request generated late Monday/early Tuesday to uplink calibration values

Contingencies
- Loss of communications during commanding
  » Continue at the next available opportunity
  » May reduce data available for calibration which may, depending on the severity, result in the confirmation maneuvers becoming the prime set of maneuvers for the calibration
- Loss of communications during monitoring
  » No impact, continuous engineering recorder running
- CCS crash
  » Switch to back-up string and continue
- Preceding Guide Star Acquisition failure
  » May need to command COP 3.04 to zero the observer bias
- Post Test Guide Star Acquisition failure
  » Investigate failure mode
    • Stars – Do nothing
    • Attitude – monitor during test, OBADs scheduled at end of test, COP 3.55 to command additional OBADs
    • Gyro Bias Error – monitor during test, ROP DF-14 to update bias prior to acquisition if large bias observed