Spacecraft Bus Requirements and System Engineering

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S/C Bus Verification Matrices

• Goal Is to Assure That Observatory Hardware and Software Will Perform the Desired Mission

• to Achieve Goal:
  - Spacecraft Bus Design Specification NCST-S-FM001
    - Establishes Complete Set of Performance, Design, Interface and Safety Requirements
  - Verification Matrices
    - Establish Traceability From Requirement Documents to Design Implementation
    - Identifies Methods to Verify Each Requirement
  - Systems Engineering along With Individual Spacecraft Bus Subsystem Lead Are Responsible for Performing Verification and Documenting Evidence That Boxes/Subsystems Comply With Subsystem Requirement Document
## Key Requirement Flowdown
From MRD to S/C Bus Design Specification

<table>
<thead>
<tr>
<th>Spacecraft</th>
<th>Observing Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rotation Period</td>
</tr>
<tr>
<td></td>
<td>Precession Period</td>
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<tr>
<td></td>
<td>Sun Angle</td>
</tr>
</tbody>
</table>

### Astrometric Mission Requirements - Along Scan

<table>
<thead>
<tr>
<th>Rotation of Line of Sight (Modelable)</th>
<th>Solar Radiation Torques</th>
<th>Earthshine Torques</th>
<th>Solar Irradiance Variation</th>
<th>Combine to 0.26 μrad/sec in 300 sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotation of Line of Sight (Unmodelable)</td>
<td>Along Scan Jitter at 0.2 Hz</td>
<td>0.01 μrad Peak to Peak</td>
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</tr>
<tr>
<td></td>
<td>Along Scan Jitter at 1.0 Hz</td>
<td>0.001 μrad Peak to Peak</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Along Scan Jitter at 10 Hz</td>
<td>0.003 μrad Peak to Peak</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Along Scan Jitter at 100 Hz</td>
<td>0.01 μrad Peak to Peak</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Fuel Slosh</td>
<td>TBD</td>
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<td></td>
</tr>
</tbody>
</table>
Key Requirement Flowdown
From MRD to S/C Bus Design
Specification
FAME Requirements Verification
- Buyoff Procedure

• Utilize NRL Buy-Off Procedure to Support Verification
  
  - Buyoff Is a Formal Processs for Reviewing, at Pre-Defined Phases, the Work Performed Which Demonstrates Compliance and Establishes Requirements Traceability
    
    - Performed for Each Box/Subsystem Component and at Selected System Assembly Milestones
    
    - Ensures All Related Engineering Drawings Have Been Released
    
    - Verifies H/W Built and Tested to Approved Engineering Requirements
    
    - Verifies That All Discrepancies, Anomalies, and Non-Conformances Have Been Documented and Dispositioned
    
    - Summarizes Verifications Completed to Level of Buyoff
  
  - Copy of Buyoff Package Is Maintained by QA (tbr) to Support Verification and Future Inquiries
Verification Plan

• Verification Methods
  - Analysis
  - Inspection
  - Demonstration or Measurement
  - Simulation
  - Test

• Specific Tests, Analyses, and Inspections Are Presented in Subsystem, System Test Presentations