| **Pg** | **Sec** | **Para** | **Line** | **Type** | **Comment/ Rationale** | **Reviewer (Name/Agency)** | **Suggested Disposition** | **Final Disposition**  **(Do Not Fill In)** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| N/A | 2 | N/A | N/A | ge | General: I think the size of the document is getting close to what was envisioned for volume 1, however, I think the cuts in Section 2 were maybe just a bit too aggressive. Having some definitions of terms is good (note the title of the document), however, detailed discussions of flight dynamics functions, allocation of responsibilities to organizations, etc., was not. | David Berry / NASA/JPL | We should discuss material cut from Section 2 that could be added back to the Green Book V.1 |  |
| 1-1 | 1.1 | 1 | 1 | ed | Awkward phrase: "... exchanged between during cross support..." | David Berry / NASA/JPL | Remove the word "between" to fix the sentence. |  |
| 1-1 | 1.1 | 1 | 4 | ed | Awkward phrase: "...facilitated through use of the various data messages defined in diverse navigation data messages (see Section 3)." | David Berry / NASA/JPL | Remove the phrase "... defined in diverse navigation data messages (see Section 3)."  This leaves "...facilitated through use of the various data messages defined in Section 3." |  |
| 1-1 | 1.1 | 2 | 1 | ed | Missing comma | David Berry / NASA/JPL | From: "...orbit, attitude, maneuver and conjunction assessment..."  To: "...orbit, attitude, maneuver**,** and conjunction assessment..." |  |
| 1-1 | 1.2 | 1 | 1 | te | Expanded statement of applicability. | David Berry / NASA/JPL | From: "... for the development of international standards..."  To: "... for the development and usage of international standards..." |  |
| 1-2 | 1.3 | 1 | 1, 5 | ed | 1.3(b) should refer to section 2, and 1.3(c) should refer to Section 3. | David Berry / NASA/JPL | Correct references. |  |
| 1-2 | 1.3 | 1 | 1 | ed | missing word | David Berry / NASA/JPL | From: "...overview of spacecraft navigation process..."  To: "...overview of the spacecraft navigation process..." |  |
| 1-2 | 1.3 | 2 | 2 | ed | When I look at the "changes accepted" version, the phrase "navigation data messagesnavigation data messages" appears. (NOTE: This appears 7 times in the document, making me think it was a global find/replace type error) | David Berry / NASA/JPL | Remove one instance of the phrase "navigation data messages" from the concatenation. |  |
| 1-2 to 1-3 | 1.5 | Refs [2], [3], [4],  [5],  [12] | N/A | ed | None of these references appears to be referred to in this version. May have to remove them. | David Berry / NASA/JPL | When limited general flight dynamics function information is added back to the document (see first comment in this CRM), these references may become applicable again. |  |
| 1-3 | 1.5 | Ref [13] | 1 | ed, te | Since this is a Blue Book, the document is no longer "Proposed" | David Berry / NASA/JPL | From: Proposed for Space  To: Recommendation for Space |  |
| 1-3 | 1.5 | Ref [14] | N/A | ed | This reference appears to have been removed, but the number is still there (the PRM shows as reference [14] [15]) | David Berry / NASA/JPL | Correct reference list. |  |
| 1-3 | 1.5 | Refs [15],  [16],  [17] | 1 | ed, te | Error in title. | David Berry / NASA/JPL | From: "Proposed Draft Recommended Standard for Space"  To: "Proposed Recommendation for Space..." |  |
| 1-3 | 1.5 | Refs [15], [16], [17] | 1 | ed, te | Error in issue date. | David Berry / NASA/JPL | From: "August 2012", "July 2012", "April 2012" respectively  To: "to be published" |  |
| 1-4 | 1.5 | Ref [19] | 2 | ed | Ref [20] appears on the same line as the second line of Ref [19]. Needs a line break to put reference [20] on a separate line. | David Berry / NASA/JPL | Add line breaks as needed to fix. |  |
| 1-4 | 1.5 | Ref [22] | All | ed | I don't think this reference is applicable to the Green Book. | David Berry / NASA/JPL | Remove reference [22] |  |
| 2-5 | 2 | Title | 1 | ed | The last reference of section 1.5 ([23]) appears as part of the title of section 2. | David Berry / NASA/JPL | Move [23] to Section 1.5. This is relatively easy to fix (but hard to explain how...) |  |
| 2-6 | 2.3 | Fig 2-2 | caption | ed | Capitalization in the caption is inconsistent. | David Berry / NASA/JPL | From: "data message"  To: "Data Message" |  |
| 2-6 | 2.3 | Fig 2-2 | figure | ed, te | Figure 2-2 has "old" terminology | David Berry / NASA/JPL | If possible, change the text in the drawing of the arrow from "Navigation Message" to "Navigation Data Message" in accordance with our new convention. This may not be possible given the heritage of the drawing... |  |
| 2-7 | 2.3 | 5 | 1 | ed | capitalization consistency | David Berry / NASA/JPL | From: "...scenarios, Navigation data..."  To: : "...scenarios, navigation data..." |  |
| 2-7 | 2.3 | 5 | 1-2 | te | Missing exchange mode | David Berry / NASA/JPL | From: "... ground-to-ground and flight-to-ground..."  To: "... ground-to-ground, ground-to-flight, and flight-to-ground..."  Or: "... ground-to-ground, ground-to-flight/flight-to-ground..." |  |
| 2-7 | 2.3 | 6 | 1 | ed | There's a lonely "navigation data message" phrase standing alone here. | David Berry / NASA/JPL | Remove... |  |
| 2-7 | 2.3.1(a) | 1 | 3 | ed | I think references to [18, 13] should be [7, 19]. In general I think the reference annotations in the document need to be updated (e.g., here, p.2-8, p.3-12, p.3-18, etc.). This need for renumbering is likely just a consequence of the re-ordering of references that was previously suggested. | David Berry / NASA/JPL | Review reference annotations throughout the document and correct as applicable. |  |
| 3-10 | 3.1 | 2 | 2 | ed, te | The statement "Standards are essential..." is asserted without discussion. I think "essential" might be too strong a word here given that many cross-agency supports are done without standardization in many areas... though it is true that doing cooperative missions without standards often points out the desirability. Replacing "essential" with "highly desirable" or "important" might be better. | David Berry / NASA/JPL | Consider replacing "essential" with "highly desirable" or "important". |  |
| 3-10 | 3.1 | 2 | 9-10 | ed | Word suggestion. | David Berry / NASA/JPL | From: "... could facilitate a level of automation..."  To: "... could facilitate an increased level of automation..." |  |
| 3-10 | 3.1 | 3 | N/A | ed | I think this paragraph could be re-organized a bit, as follows: (a) first part of paragraph remains as is, up to the word "respectively"; (b) immediately follow this with the sentences from lines 9-10 that refer to the 5 year process for reviewing the published standards; (c) create a new paragraph that starts with "There are also several navigation data standards being developed..."; (d) create a new paragraph starting with the phrase "The objective of all navigation data messages...". These 3 paragraphs now discuss in succession the published standards, the emerging standards, and the general characteristics of both. | David Berry / NASA/JPL | Consider. |  |
| 3-11 | 3.1 | Fig 3-1 | N/A | ed, te | The diagram still contains references to the Events Message (EVM), but all references to EVM have been removed from the text based on previous suggestions. Ironically, at the Fall 2014 Meetings just concluded, we got some approval to start reconsidering the development of the EVM given that the Timelines Data Exchange effort has seemed to fall a bit out of favor! I think we should leave the diagram as is, but maybe just add a sentence to the "in development" standards paragraph on the previous page that states something like: "Also under consideration is a standard framework for the exchange of orbit and attitude events; this standard is tentatively named the 'Events Message (EVM)', and leave it at that. I also wonder if we should change it to "Navigation Events Message", but that should be discussed in the WG. | David Berry / NASA/JPL | Consider adding sentence to the new paragraph on "in development standards". |  |
| 3-11 | 3.2 | 1 | 7-8 | ed | Minor grammar. | David Berry / NASA/JPL | From: "... agencies to tolerate the availability issues..."  To: "... agencies to tolerate availability issues..." |  |
| 3-12 | 3.2 | last | 9 | ed | Minor typo (capitalization convention) | David Berry / NASA/JPL | From: "(CSTS) working group"  To: "(CSTS) Working Group" |  |
| 3-13 | 3.3 | last | 6 | ed | Minor typo (word left out) | David Berry / NASA/JPL | From: "...deliver the trajectories to European..."  To: "...deliver the trajectories to the European..." |  |
| 3-14 | 3.3 | 1 | 8 | ed | Minor typo (sentence ends with comma) | David Berry / NASA/JPL | From: "...(JSpOC),"  To: "...(JSpOC)." |  |
| 3-14 | 3.3 | 1 | N/A | te | Suggestion for a sentence at the end of the last sentence (the one that ends with "JSpOC")... add a sentence something like: "Several other implementations are likely to exist given the popularity and flexibility of the OEM." | David Berry / NASA/JPL | Consider. I think we've reached a point where it's increasingly difficult to list all the implementations of the OEM. |  |
| 3-14 | 3.4 | N/A | N/A | te | Should this section have a couple of sentences on the topic of the active/passive attitude transformations? Joe has suggested this topic for V.2 of the Green Book, but I wonder if it should be introduced (very briefly) here? Then again, it might not be necessary at all. | David Berry / NASA/JPL | Consider. |  |
| 3-14 | 3.4 | last | 1 | ed | Minor typo. | David Berry / NASA/JPL | From: "...forecast or the spacecraft's attitude."  To: "...forecast of the spacecraft's attitude." |  |
| 3-15 | 3.4 | 1 | 2 | ed | Unnecessary words (this same "Even though..." phrase is used in two additional places in the document, and it's more appropriate there; here it seems unnecessary and overused). | David Berry / NASA/JPL | From: "Even though the APM allows..."  To: "The APM allows..." |  |
| 3-15 | 3.4 | 1 | 10 | te | "Files" and "messages" should be distinguished. | David Berry / NASA/JPL | From: "multiple APM or AEM files must be used"  To: "multiple APM or AEM messages must be used" |  |
| 3-15 | 3.4 | first | last | te | Besides GSFC I think that the ESOC is using the APM or AEM (probably the AEM) in some of its internal processing. | David Berry / NASA/JPL | Confirm with Jürgen Fertig. I recall his stating something to this effect at the Noorwijkerhout meetings. |  |
| 3-16 | 3.7 | 1 | 1 | ed, te | Should have some examples. | David Berry / NASA/JPL | At end of first sentence, add something like: ", e.g., from star trackers, accelerometers, inertial reference units, satellite global navigation systems (GNS), etc." |  |
| 3-16 | 3.8 | 1 | 3 | ed, te | Frequency of exchange is assumed, but should not be. | David Berry / NASA/JPL | From: "The frequent exchange of maneuver data..."  To: "The exchange of maneuver data..." |  |
| 3-16 | 3.8 | 3 | next to last | ed | Word choice. | David Berry / NASA/JPL | From: "...Delta-V related to one or several coordinate systems..."  To: "...Delta-V related to one or more coordinate systems..." |  |
| 3-17 | 3.9 | 1, 2 | All | ed, te | Suggestion for restructuring first 2 paragraphs: (a) leave first two sentences as is; (b) move the entirety of paragraph 2 immediately following the second sentence of paragraph 1; (c) create new paragraph starting with "Even though..." | David Berry / NASA/JPL | Consider. |  |
| 3-17 | 3.9 | 1 | 5 | ed | Extra word. | David Berry / NASA/JPL | From: "Likewise, the XML..."  To: "Likewise, XML..." |  |
| 3-17 | 3.9.1 | 1 | 1 | ed | Suggested re-phrasing that I think better captures your thought. | David Berry / NASA/JPL | From: "There is a lot in common with the suite..."  To: "There is much structural commonality within the suite..." |  |
| 3-17 | 3.9.1 | 1 | 5-7 | te | Another element of technical commonality is the use of SI units (where possible). | David Berry / NASA/JPL | From: "...origin of a particular message."  To: "... origin of a particular message; also, insofar as is possible, the units for all measurements in the NDMs are drawn from the International System of Units (SI)." |  |
| A-1 | "Attitude" | 1 | 1 | te | Add a qualifier | David Berry / NASA/JPL | From: "the body reference frame"  To: "the spacecraft body reference frame" |  |
| A-1 | Global Positioning System | 1 | 1 | ed, te | GPS is not discussed in the document. | David Berry / NASA/JPL | Consider removing this entry from the glossary. |  |
| A-1 | ground-to-flight | 1 | 1 | ed, te | I would reverse the order of the spacecraft and non-spacecraft participants. This will distinguish it from the "flight-to-ground" definition seen previously. | David Berry / NASA/JPL | Consider. |  |
| A-2 | Navigation Data Message | 1 | 1 | ed | Capitalization convention | David Berry / NASA/JPL | From: "Navigation data message"  To: "Navigation Data Message" |  |
| A-2 | Orbit | 1 | 1 | ed, te | Additional clarification | David Berry / NASA/JPL | From: "...body in space"  To: "...body in space, typically a path around a central celestial body" |  |
| A-2 | Range | 1 | 1 | ed | The term being defined ("Range") is not bold, but all other terms being defined are bold. | David Berry / NASA/JPL | Bold the term being defined for consistency. |  |
| A-2 | Spacecraft | 1 | 2 | te | Additional clarification | David Berry / NASA/JPL | From: "... *in situ* assets."  To: "... *in situ* assets such as landers or rovers." |  |
| A-2 | Trajectory | N/A | N/A | te | Missing term | David Berry / NASA/JPL | Consider adding, with definition: "The path followed by a celestial body in space." (yes, very similar to "orbit"). |  |
| B-1, B-2 | N/A | N/A | N/A | ed, te | Missing acronyms used in document: CARA, CSTS, JSpOC, NORAD, SFTP, TLE | David Berry / NASA/JPL | Consider adding terms to acronyms list. |  |
| B-1, B-2 | N/A | N/A | N/A | ed, te | Terms in acronyms list not used in document: GLONASS, GPS, NAVSTAR | David Berry / NASA/JPL | Consider removing terms from acronyms list. |  |