| **Pg** | **Sec** | **Para** | **Line** | **Type** | **Comment/ Rationale** | **Reviewer (Name/Agency)** | **Suggested Disposition** | **Final Disposition****(Do Not Fill In)** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| N/A | N/A | N/A | N/A | N/A | Note: Comments on Section 4 and 6, and Annexes F and H, were previously submitted. | David Berry / NASA/JPL | N/A |  |
| 1-1 | 1.1 | 2, 3 | All | ed | I think this material might be better for Section 2 of the document. | David Berry / NASA/JPL | Consider moving these 2 paragraphs to Section 2. |  |
| 1-1 | 1.1 | 1 | N/A | ed, te | A natural question to ask for someone looking at this document for the first time might be "What is meant by the term 'Navigation Hardware'?" | David Berry / NASA/JPL | This term is defined in section 1.6.1, but it might be worth repeating the operational definition here, OR pointing the reader to section 1.6.1. |  |
| 1-1 | 1.1 | 2 | 6-7 | ed | There appears to be a superfluous word "data" at the end of the sentence: "The data is then used to monitor and analyze performance of the hardware and of the spacecraft use of the hardware data." | David Berry / NASA/JPL | Consider editingFrom: "...use of the hardware data."To: "...use of the hardware." |  |
| 1-2 | 1.5 | First 5 | All | ed | I can't help but wonder if a more natural arrangement might be to have KVN structure and syntax as contiguous sections, followed by XML structure and syntax | David Berry / NASA/JPL | Consider re-ordering current Section 5 as Section 4 and current Section 4 as Section 5 ... Suggest discussion at London meetings. |  |
| 1-3 | 1.5 | 2 | 1 | ed | Says "Annex C discusses Security...", but it's actually Annex B. | David Berry / NASA/JPL | From: Annex CTo: Annex BALTERNATIVELY... we need to insert a normative annex after Annex A to include the Implementation Conformance Specification (ICS) annex, now required by the CCSDS procedures. If that annex is included, then the pointer to Annex C would be correct. |  |
| 1-3 | 1.5 | N/A | N/A | te | There is no ICS (Implementation Conformance Specification) annex | David Berry / NASA/JPL | Add a space for the annex. We can populate much of it later. Some boilerplate can be borrowed from the CDM. |  |
| 1-3 | 1.5 | 3,4 | 1 | ed | There are 2 descriptions of Annex D. | David Berry / NASA/JPL | Correct the error, but take into account previous comment and need to include a normative annex after the existing Annex A. |  |
| 1-3 | 1.5 | 6 | 1 | ed | Both Annexes F and G are described on the same line. | David Berry / NASA/JPL | Insert a line/paragraph break after the description of Annex F. |  |
| 1-3 | 1.5 | 8 | 1 | ed | Note that the graphical representation referred appears to be "broken". | David Berry / NASA/JPL | Confirm that graphic appears in the MS Word version of the document (this could be a Mac/PC incompatibility problem because it looks like there is a space for the graphic in the MS Word version, but there is a big red "X" and a message "The image part with relationship ID rld21 was not found in the file." |  |
| 1-3 | 1.5 | 9 | N/A | te | In the ADM and ODM, the normative sections for TIME\_SYSTEM and REF\_FRAME are combined in one normative annex. A separate annex J for the reference frame is a departure from this convention. | David Berry / NASA/JPL | Suggest combining the TIME\_SYSTEM and reference frame information in a single normative annex. At any rate, CCSDS publications are supposed to have all normative annexes before the first informative annex, so at the very least Annex J will need to move to be Annex B or C. |  |
| 1-3 | 1.6 | 1 | 2 | ed, te | Annex designation for the informative reference is not correct; also, there is a second reference that should be added. | David Berry / NASA/JPL | From: "... reference [F2]"To: "... references [G2], [G3]." or "...reference [G2] and reference [G3]." |  |
| 1-3 | 1.6.1 | 3 | All | ed, te | Definition of KVN seems a bit backward | David Berry / NASA/JPL | Suggested possible definition: denotes a format which associates a value with a keyword. The keyword designates an important property or attribute of the subject under discussion, and the value represents a measurement or descriptive state of that property. |  |
| 1-4 | 1.6.3 | 4 | 3 | ed | Typo | David Berry / NASA/JPL | From: "... acharacter string..."To: "... a character string..." |  |
| 1-4 | 1.6.3 | 5 | All | ed | Paragraph that starts with "Additional definitions..." seems superfluous given that there don't seem to be any additional terms defined in section 2.2 | David Berry / NASA/JPL | Consider deleting paragraph. |  |
| 1-5 | 1.7 | [3] | 1 | ed | Typo | David Berry / NASA/JPL | From: "... Internationaldes..."To: "... International des..." |  |
| 1-5 | 1.7 | [8] | All | te | I believe the Spacewarn Bulletin is obsolete at this point (?). In the CDM we referred to INTERNATIONAL\_DESIGNATORs without specifying where to find them, but a good source is the UN Register of Space Objects.  | David Berry / NASA/JPL | Consider using a reference to the UN Register of Space Objects... we should maybe discuss this at London. |  |
| 2-1 | 2.2.3 | 1 | All | ed | By the time we get to this paragraph, it's well established that the format is ASCII. It's a bit anti-climactic to restate that in the 3rd paragraph. I think this paragraph would be best as Section 2.2.1 instead of 2.2.3. | David Berry / NASA/JPL | Consider moving existing 2.2.3 to 2.2.1 |  |
| 3-1 | 3.1 | All | All | ed | This section starts with "GENERAL", and section 4 starts with "DISCUSSION". Maybe they should use the same header, since they are both non-normative. | David Berry / NASA/JPL | Consider. |  |
| 3-1 | 3.2.1(c) | 1 | 1 | ed | Here the term "Navigation Data Records" is used, and the reader is referred to section 3.4. In 3.4, the term "Hardware Data Records" is used. | David Berry / NASA/JPL | Be consistent with terminology (probably "Hardware Data Records") |  |
| 3-1 | 3.1.3 | 1 | 2 | ed | Refers reader to section 0 | David Berry / NASA/JPL | Fix reference |  |
| 3-1 | 3.1.4 | 1 | 1-2 | ed, te | States that there will be one metadata section and one data section in an NHM, but this may not be the best structure. | David Berry / NASA/JPL | We should discuss at London if one big undifferentiated Data Section is the best structure for the NHM. |  |
| 3-1 | 3.1.6 | 1 | 1-2 | ed | The first and second sentences are redundant. NHM may not be "easily readable by humans". | David Berry / NASA/JPL | Remove redundant sentence. Decide whether easy readability by humans is really a requirement. This may be a topic for discussion at London. |  |
| 3-1 | 3.1.8 | 1 | 4 | te | Mentions "...processing tracking data", which should probably be "...processing telemetry data" | David Berry / NASA/JPL | From: processing tracking dataTo: processing telemetry data |  |
| 3-2 | 3.2.4 | 1 | 1 | ed | Use of indefinite article | David Berry / NASA/JPL | From: "a NHM Header" To: "an NHM Header"NOTE: I conferred with the CCSDS Editor on this item. |  |
| 3-2 | Table 3-1 | COMMENT |  | ed | Refers reader to "0" | David Berry / NASA/JPL | Correct reference |  |
| 3-2 | Table 3-1 | ORIGINATOR |  | ed, te | Instead of referring user to an ICD, should we refer them to the SANA registry (as was done for CDM)? | David Berry / NASA/JPL | Discuss at London. |  |
| 3-3 | 3.3.4.5 | 1 | All | ed, te | This specification is superfluous given 3.3.6 | David Berry / NASA/JPL | Remove 3.3.4.5 |  |
| 3-4 | 3.3.6 | 1 | 1 | ed | Use of indefinite article | David Berry / NASA/JPL | From: "a NHM Metadata Section" To: "an NHM Metadata Section "NOTE: I conferred with the CCSDS Editor on this item. |  |
| 3-4 | Table 3-2 | COMMENT |  | ed | Refers reader to "0" | David Berry / NASA/JPL | Correct reference |  |
| 3-4 | Table 3-2 | COMMENT |  | ed, te | Allowing comments "anywhere after META\_START and before META\_STOP" is problematic.  | David Berry / NASA/JPL | Comments in Metadata should only be allowed immediately after META\_START or in the proper place in the DEFINE block. Doing otherwise unnecessarily complicates and clutters up the XML schema, as well as causing a situation where the schema will not validate. This is easier to show you than to explain, but basically if you want comments anywhere in the metadata then you have to make EVERY keyword in Table 3-2 obligatory (it has to do with the ambiguities in the XML). |  |
| 3-5 | Table 3-2 | OBJECT\_ID |  | ed | Typo. The typo starts on one line and ends on the following line... there is a dash at the end of the first line that should be at the beginning of the second line. | David Berry / NASA/JPL | From: "...where:-From: "YYYY ="To: "...where:"To: "- YYYY =" |  |
| 3-5 | Table 3-2 | DEFINE |  | ed, te | Using a DEFINE keyword here instead of MNEMONIC causes some inconsistency with the construction of the XML message. | David Berry / NASA/JPL | We should discuss at London. I think the older MNEMONIC keyword was better here (instead of DEFINE). It occurs to me it might be best to have "DEFINE = <text describing the instrument, that now appears in a COMMENT>", followed by the applicable "MNEMONIC = ...", "FRAME = ...", and "CALCURVE =..." statements. Might be cleaner, e.g.:DEFINE=Three axis magnetometerMNEMONIC=ACS.TAM1.FIELD.V4.I3BFRAME=SENSORCALCURVE=-301.5 0.00724DEFINE=<next instrument>... |  |
| 3-6 | Table 3-2 | FRAME | 7 | ed | Typo | David Berry / NASA/JPL | From: "msut"To: "must" |  |
| 3-6 | Table 3-2 | FRAME | last sentence | ed | The statement regarding "... must come after the line..." etc. is superfluous. There is already a statement at beginning of Table 3-2 fixing the order. There are no other analogous statements in Table 3-2 | David Berry / NASA/JPL | Remove last sentence. |  |
| 3-6 | Table 3-2 | FRAME | N/A | te | I am wondering how it will be communicated to the users of the data exactly which EXTERNAL frame applies (if EXTERNAL is used). For BODY and SENSOR it seems fairly obvious, but for EXTERNAL it is not. | David Berry / NASA/JPL | Discuss at London. |  |
| 3-6 | Table 3-2 | CALCURVE | 4-7 | te | The description of CALCURVE states that it is used to convert units from one type to another. However, neither the source nor the target unit type is specified. | David Berry / NASA/JPL | Discuss CALCURVE concept at London... since units are not specified in the NHM, we need some way to understand the from and the to units. Is this specified in the ICD? If so, then state it. |  |
| 3-6 | Table 3-2 | CALCURVE | 4-7 | te | Is having the zeroth order as the first coefficient a standard form? Normally when one sees the expansion with coefficients one sees the nth order first, however, if one uses the summation (sigma) notation, the zeroth order would be first. | David Berry / NASA/JPL | Discuss format at London. |  |
| 3-6 | Table 3-2 | CALCURVE | 4-7 | te | For parsing purposes, should the number of coefficients be provided (similar to the concept of the value count field)? | David Berry / NASA/JPL | Discuss format at London. |  |
| 3-7 | 3.4.3, 3.4.4 | All | All | ed, te | I think that the "Fixed" and "Variable" Data Record is overkill here. It really harks back to "the good old days" in computer programming. DATA\_START, DATA\_STOP, and COMMENT can't really be considered "Data Records". Properly, DATA\_START and DATA\_STOP are delimiters. COMMENTs are just comments... they aren't meant to convey operationally useful data (at least not in the standard itself... some users may choose to codify operational data in ICDs, but that is beyond the scope of the standard). | David Berry / NASA/JPL | Consider eliminating the distinction between "fixed" and "variable" Data Records. It is a needless complication. |  |
| 3-7 | 3.4.5 | 1 | 1 | ed, te | Remove "Variable" from the specification. | David Berry / NASA/JPL | See previous comment about fixed/variable data records. |  |
| 3-7 | 3.4.5 | NOTE |  | ed, te | Remove fixed/variable data record distinction. | David Berry / NASA/JPL | From: "NOTE - More detail on the format of Fixed Hardware Data Record is shown in table 3-3 and more detail on the format of Variable Data Records is shown in Table 3-4.."To: "NOTE - More detail on the format of Hardware Data Records is shown in Table 3-3." |  |
| 3-7 | Table 3-3 | All | All | ed, te | The table on "Fixed Data Record Format" is superfluous. | David Berry / NASA/JPL | Remove Table 3-3 |  |
| 3-8 | 3.4.9 | 1 | 1-2 | ed | Several recommended changes. | David Berry / NASA/JPL | From: "... containing keywords other than those specified in the MetaData Section shall not be processed."To: "... containing a keyword not specified in the Metadata Section shall not be processed." |  |
| 3-8 | 3.4.9 | NOTE | 1 | ed | Consistency | David Berry / NASA/JPL | From: MetaDataTo: Metadata |  |
| 3-8 | 3.4.10.2 | 1 | 2 | ed, te | We should be careful for KVN about stating that there is a number of values greater than 1. In the case of the NHM, there is one multi-partite value. See section 5.2.7. | David Berry / NASA/JPL | Let's discuss at London. Perhaps "Value Count" should be "Measurement Count". |  |
| 3-8 | 3.4.10.2 | 1 | 2 | ed, te | There is a phrase at the end of 3.4.10 that might be good here, specifically, "... as defined for the record's mnemonic in the Metadata Section.". | David Berry / NASA/JPL | Consider adding the phrase "... as defined for the record's mnemonic in the Metadata Section." at the end of this specification. |  |
| 3-8 | 3.4.10.4 | 1 | All | te | I think this specification is unnecessary (it should be clear from other material in the standard), but if you feel it is necessary, then the verb should be "must" or "shall", not "may". | David Berry / NASA/JPL | Either: (a) delete this specification, or (b) change "may" to "must" or "shall". There is no provision for multiple timetags in a single Hardware Data Record. |  |
| 3-8 | 3.4.11 | 1 | 1 | te | The requirement for ascending time order is not consistent with the Tracking Data Message. Though I understand why one might want such a requirement, we should discuss (e.g., some providers might want the data for each mnemonic to be in ascending time order, which means that at the boundary between two mnemonics there is a high probability of violating this specification. | David Berry / NASA/JPL | Consider whether a strict ordering is a true requirement. Discuss at London. |  |
| 3-8 | 3.4.12 | 1 | 1 | te | DATA\_STOP is not a "Hardware Data Record". This specification is superfluous. | David Berry / NASA/JPL | Remove 3.4.12. |  |
| 5-1 | 5.1.1 | 1 | 1 | ed | Section number error | David Berry / NASA/JPL | From: "5.2 through 0"To: "5.2 through 5.8 |  |
| 5-1 | All section 5 | 1 | 1 | te | I wonder if we should use the word “record” when in 3.1.1 we describe the NHM as being ASCII text “lines” in 3.1.1. | David Berry / NASA/JPL | From: "record, “records”To: "line", “lines” |  |
| 5-1 | 5.2.4 | 1 | 1 | ed | Grammar | David Berry / NASA/JPL | From: "A NHM..."To: "An NHM..." |  |
| 5-1 | 5.2.7 | 1 | 1 | ed | Grammar | David Berry / NASA/JPL | From: "A NHM..."To: "An NHM..." |  |
| 5-1 | 5.2.10 | 1 | 3 | ed | The last sentence "Before and after... " is redundant with specification 5.2.15. | David Berry / NASA/JPL | Remove last sentence from this specification |  |
| 5-3 | 5.3.1.2 | 1  | 1 | ed | The terms "Mnemonic Keyword(s)" and "Mnemonic(s)" are used interchangeably. | David Berry / NASA/JPL | Specify that the two terms are equivalent...From: "The Mnemonic Keyword shall be an alphanumeric string..."To: "The Mnemonic Keyword (aka "Mnemonic" in the singular and "Mnemonics" in the plural) shall be an alphanumeric string..." |  |
| 5-3 | 5.3.1.2 | 1 | 2 | ed | There is no space after the period between sentence 1 and sentence 2. | David Berry / NASA/JPL | Add a space after the period between sentence 1 and sentence 2. |  |
| 5-3 | Between 5.3.1.2 &5.3.1.3 | N/A | N/A | ed, te | I wonder if between 5.3.1.2 and 5.3.1.3 would be a good place to put the Table 5-1 (?) | David Berry / NASA/JPL | Consider. |  |
| 5-3 | 5.3.1.5 | 1 | 1 | ed, te | Doesn't state the size of the string. All the examples show 3 characters, except "PWRR" in Table C-1 | David Berry / NASA/JPL | From: "...shall consist of an alphanumeric string."To: "... shall consist of a 3 character alphanumeric string."Alternatively: Put this 3 character limitation into Table 5-1 (as was done with Hardware Type) |  |
| 5-3 | 5.3.1.11 | 1 |  | ed | The length of the data group field is not specified... is it truly "arbitrary"? or should it be constrained to some reasonable value (e.g., no more than 10 characters, or something like that)? | David Berry / NASA/JPL | Consider adding information about the length of the field. |  |
| 5-3 | 5.3.1.12 | Title | 1 | ed, te | In KVN, normally we say there is one value for each keyword. In the case of the NHM, the "value" is multipartite... a timetag + some number of measurements. I think a better name for this field would be "Measurement Count Field" or "Data Count Field". Personally I prefer "Measurement..." | David Berry / NASA/JPL | From: "Value Count Field"To: "Measurement Count Field" or "Data Count Field". |  |
| 5-3 | 5.3.1.13 | 1 | 1-2 | ed, te | Lacks focus on the definition of the Mnemonic Keyword. | David Berry / NASA/JPL | From: "The fourth field of a Mnemonic Keyword shall ..."To: " The fourth field of a Mnemonic Keyword definition shall ..." |  |
| 5-3 | 5.3.1.13 | 1 | 1-2 | ed, te | Could improve economy of terminology | David Berry / NASA/JPL | From: "... number of data items (in addition to timetag) that will appear..."To: "... number of measurements that will appear..." |  |
| 5-3 | 5.3.1.13 | 1 | 2 | ed, te | Use previously defined term (i.e., "Hardware Data Record") | David Berry / NASA/JPL | From: "... in each record of the Data Section that begins with the Mnemonic Keyword."To: "... in each Hardware Data Record that begins with the given Mnemonic Keyword." |  |
| 5-4 | 5.3.1.13 | 1 | 1 | ed, te | Change terminology from "Value Count" to "Measurement Count" | David Berry / NASA/JPL | From: "This field is referred to as the Value Count field."To: "This field is referred to as the Measurement Count field." |  |
| 5-5 | Table 5-1 | Field, Value Count | 1 | ed, te | In the "Field" column the term "Measurement Count" should be substituted. | David Berry / NASA/JPL | From: "VALUE COUNT [ELEMENT COUNT?]" To: "MEASUREMENT COUNT" |  |
| 5-5 | Table 5-1 | Field, Value Count | 1 | ed, te | In the "Description" column the term "measurement count" should be substituted for "value count". | David Berry / NASA/JPL | From: "... value count field..."To: "...measurement count field..." |  |
| 5-5 | Table 5-1, Data Type | Description | 1 | ed | Word substitution | David Berry / NASA/JPL | From: "The data format shall..."To: "The data type shall..." |  |
| 5-5 | Table 5-1, Data Type | Description | 2-3 | ed | Consistency | David Berry / NASA/JPL | From: "... for each of the elements"To: "... for each of the measurements" |  |
| 5-5 | Table 5-1, Data Type | Description | 4-5 | ed, te | In the "Description" column the term "MEASUREMENT COUNT" should be substituted for "VALUE COUNT". | David Berry / NASA/JPL | From: "... VALUE COUNT ..."To: "...MEASUREMENT COUNT ..." |  |
| 5-5 | 5.4 | Missing | N/A | ed | A statement analogous to 6.3.1 should be present, but is not. | David Berry / NASA/JPL | Add statement analogous to 6.3.1. |  |
| 5-5 | 5.4.1 | 1 | 1 | ed, te |  | David Berry / NASA/JPL | From: "Non-empty value fields must..."To: "A non-empty value must ..." |  |
| 5-5 | 5.4.2 | 1 | 1 | te | For KVN there is only one value for each keyword, but the value may have structure and be made up of multiple elements, components, or measurements. | David Berry / NASA/JPL | From: "The number of values for each Mnemonic Keyword provided must equal the number in the 'Value Count' field of the Mnemonic."To: "The number of measurements for each Mnemonic Keyword provided must equal the number in the 'Measurement Count' field of the Mnemonic." |  |
| 5-5 | 5.4.3 | 1 | 1 | ed | Word substitution. | David Berry / NASA/JPL | From: "... the format of the value fields for each Mnemonic Keyword..."To: "... the format of the measurements for each Mnemonic Keyword..." |  |
| 5-6 | 5.4.7.4 | 1 | 1-2 | ed, te | Error in ASCII character assignments. Both "+" and "-" are stated as being "ASCII Character 43". | David Berry / NASA/JPL | Either: (1) put the correct ASCII codes, or (2) remove the ASCII character information.  |  |
| 5-6 | 5.4.9 | 1 | 1 | ed | Looks like it's supposed to be a header (since it's an incomplete sentence), but the font seems to be incorrect. | David Berry / NASA/JPL | Correct the font type (or line type) so it's clear it is a heading. |  |
| 5-6 | 5.4.9.3 | 1 | 1 | ed, te | Having character fields start/end with a quote will be problematic.  | David Berry / NASA/JPL | Must discuss at London. Questions:1. Is a mnemonic keyword in the metadata section DEFINE statement a "character value"? I think yes.2. Why aren't the text values in the example (Annex E) in quotes? (There are MANY instances of character values NOT in quotes). |  |
| 5-7 | 5.4.9.4 | 1 | 1 | ed | Sentence doesn't end with a period. | David Berry / NASA/JPL | End sentence with a period. |  |
| 5-7 | 5.4.9.4 | All | All | ed, te | I tend to feel this section isn't necessary. If it is, then there should be an example in Annex E. | David Berry / NASA/JPL | Consider removing section, OR, add a real example of data with the characteristic described in this section. |  |
| 5-7 | 5.4.10 | 1 | 1 | te | The meaning of "0" and "1" is not defined, but should be. | David Berry / NASA/JPL | For this standard, the meaning of zero should always be the same... either always "false" or "bad" or "error", or always "true" or "good" or "no error". If the actual binary flags on the instrument are OPPOSITE this, then the program that takes the telemetry data and formats the NHM should make the conversion so in the STANDARD, 0/1 always have the same value. 5.4.10 should enlarge on this topic. Table C-1 in Annex C has similar info in the units column, but that is non-normative. |  |
| 5-7 | 5.4.11 | 1 | 1 | ed, te | I think the present 5.4.11 should precede the current 5.4.10. | David Berry / NASA/JPL | Current structure goes from specific to general. I think general to specific is better in this case. |  |
| 5-7 | 5.4.12 | 1 | Missing | ed, te | The instruction for fractional seconds is not provided. | David Berry / NASA/JPL | Add phrase that appears in ODM: "As many 'd' characters to the right of the period as required may be used to obtain the required precision, up to the maximum allowed for a fixed point number." |  |
| 5-7 | 5.5 | 1 | 1 | te | The Table in Annex C shows several possible units for some of the mnemonics. We need to discuss how to handle the units problem in NHMs. | David Berry / NASA/JPL | Discuss at London. |  |
| 5-8 | 5.6.2 | Missing | Missing | te | One of the possible places for comments is missing from the list. | David Berry / NASA/JPL | Add that COMMENTs may appear "at the beginning of the NHM Metadata Section (i.e., immediately after the 'META\_START' keyword, as shown in Table 3-2)". |  |
| 5-8 | 5.7.1 | 1 | All | ed | This section seems unnecessary. There is already a statement at the beginning of Table 3-2 that states the order of occurrence of the keywords is fixed. | David Berry / NASA/JPL | Remove 5.7.1 |  |
| 5-8 | 5.7.2, 5.7.3, 5.7.4, 5.7.5 | 1111 | 11-21-21-2 | ed, te | There is only one value for the FRAME keyword, but it might consist of one or two frame specifications. | David Berry / NASA/JPL | Re-work this text to eliminate references to "two values". It is also worth considering whether or not SENSOR, BODY, EXTERNAL is complete enough, particularly in the case of EXTERNAL. Is the detail to be found in the ICD? If so, that should be stated. |  |
| 5-9 | 5.7 Notes | #3 | 1 | ed | Punctuation will help | David Berry / NASA/JPL | From: "...associated with them one of which is..."To: "...associated with them, one of which is..." (add a comma between "them" and "one". |  |
| 5-9 | 5.7 Notes | #4 | All | ed, te | We should discuss at London the content of Note 4. It is not clear to me. For example, it refers to "...the measurements represented in the corresponding define block", but the define block doesn't contain measurements... it's just definitions. What is the format of the rotation? etc. | David Berry / NASA/JPL | Discuss at London. |  |
| 5-9 | 5.8.1 | 1 | All | ed | This section seems unnecessary. There is already a statement at the beginning of Table 3-2 that states the order of occurrence of the keywords is fixed. | David Berry / NASA/JPL | Remove 5.8.1 |  |
| 5-9 | 5.8.2 | 1 | 1 | ed, te | There is only one value for the CALCURVE keyword, but it might consist of an arbitrary number of coefficients. (Actually it's not totally arbitrary, because of the 254 character line limit, but that's probably not necessary to state). | David Berry / NASA/JPL | From: "There may be an arbitrary number of values in a line..."To: "There may be an arbitrary number of coefficients in a line..." |  |
| 5-9 | 5.8.2 Notes | #1 | 1 | ed, te | Change "values" to "numbers" | David Berry / NASA/JPL | From: 'The "n" values in a line...'To: 'The "n" numbers in a line...' |  |
| A-1 | AnnexA | 1 | 2 | ed | Refers reader to reference F2, but Annex F is the XML example. | David Berry / NASA/JPL | Either change "F2" to "G2" OR potentially combine the KVN example and XML example into the same Annex. Also be aware of next comment. You may need to change "F2" to "H2". |  |
| N/A | Missing (After AnnexA) | N/A | N/A | ed, te | The CCSDS now requires a normative "ICS" annex (Implementation Conformance Statement). See the CDM. | David Berry / NASA/JPL | For now, add a new Annex B for the ICS (it has to be normative, and all the normative annexes are required to appear before any informative annexes appear); bump the Annex designation for all other annexes starting with the existing Annex B up by one. |  |
| B-3 | B1.7 | 1 | 2 | ed | Expand acronym | David Berry / NASA/JPL | From: "IT"To: "Information Technology" |  |
| B-3 | B2 | Missing | Missing | ed, te | Add a paragraph that is required by the SANA operator. | David Berry / NASA/JPL | Between B2 and B2.1, add the following:"The following NHM-related items will be registered with the SANA Operator. The registration rule for new entries is the approval of new requests by the CCSDS Navigation Working Group Chair.  |  |
| B-3 | B2.1 | 1 | 1 | te | Add a line to the paragraph. | David Berry / NASA/JPL | After the existing sentence, add a second sentence: "New requests for this registry should be sent to SANA (mailto:info@sanaregistry.org)." |  |
| B-3 | B2.2 | 1 | 1 | te | Add a line to the paragraph. | David Berry / NASA/JPL | After the existing first sentence, add a second sentence: "New requests for this registry should be sent to SANA (mailto:info@sanaregistry.org)." |  |
| B-3 | B2.2 | 2 | 1 | ed | Incomplete Note | David Berry / NASA/JPL | From: "Note: See"To: ??? |  |
| C-1 | N/A | Units | N/A | ed, te | There is no mention of an ICD here, however, because there are potentially many different units possible for measurements from some of the hardware types, it seems there should be some statement to the effect that "An ICD must identify which units are used for which instruments and/or measurements." | David Berry / NASA/JPL | Consider adding a statement about the necessity for elaboration of units in the ICD. |  |
| C-1 | Table C-1 | NAV | N/A | te | Is the only data from the NAV system the ephemeris? Should we remove the "(ephemeris)" qualifier? | David Berry / NASA/JPL | Consider . |  |
| C-2 | Table C-1 | N/A | N/A | ed | The table headings do not appear on pages 2 and 3. | David Berry / NASA/JPL | Use MS Word "Heading Rows Repeat" feature. |  |
| C-2 | Table C-1 | N/A | N/A | ed, te | Table is quite long for an example. It will take a lot of work to proofread as we approach the final standard. | David Berry / NASA/JPL | Consider shortening the examples. |  |
| C-2 | Table C-1 | N/A | 1 | ed | Value for Power System has 4 characters. (Note: This little typo pointed out to me that we don't specify anywhere that the system field should have 3 characters. | David Berry / NASA/JPL | From: PWRRTo: PWR |  |
| C-2 | Table C-1 | N/A | Units | ed, te | There are a few inconsistencies in the Units column of the table, "degrees" and "deg", "radians" and "rad", "sec" and "s", "mA" and "milliamps" | David Berry / NASA/JPL | Pick one designation and stick with it |  |
| C-2 | Table C-1 | ACC | N/A | te | Lacks a unit identifier | David Berry / NASA/JPL | Add units for acceleration. |  |
| C-2 | Table C-1 | PSI | N/A | te | I think "PSI" might be too generic for a Hardware Type, but I think it could be a good "System Field" value. | David Berry / NASA/JPL | Consider moving "PSI" to the "System Field" section of the table. |  |
| C-2 | Table C-1 | THR | Units | te | Seems that there would be units for tank pressure other than "counts". Also, might there also be accumulated on time? | David Berry / NASA/JPL | Consider augmenting units field accordingly. |  |
| D-4 | Table D-1 | N/A | N/A | te | The information included in an ICD should specify which of the many potential units applies to a given measurement. | David Berry / NASA/JPL | Consider adding a specification of the units that applies to a given mnemonic. |  |
| E-1 | Example | N/A | 1 | te | The CCSDS\_NHM\_VERS lacks an "=" sign | David Berry / NASA/JPL | Add the "=" between keyword and value. |  |
| E-1 | Example | N/A | 4 | te | The text value is lacking quotes | David Berry / NASA/JPL | From: NASATo: 'NASA' (as required by the current draft, though I happen to really think the quotes requirement should be removed). The way the standard is written, then the values in this example for the COMMENT, ORIGINATOR, TIME\_SYSTEM, DEFINE, and FRAME keywords should be in quotes. |  |
| E-1 | Example | N/A | After 6 | te | The OBJECT\_NAME and OBJECT\_ID are not specified. | David Berry / NASA/JPL | Add the missing required keywords. NOTE: This also affects the XML example in Annex F. I need to send you a new example! |  |
| E-1 | Example | N/A | 7 | te | The START\_TIME has an invalid date/time in it. | David Berry / NASA/JPL | Change 1709 to a year that is within the space age. The "hour" in the time is "4." which does not conform to the hour format (should be "04", with no period/decimal point). |  |
| E-1 | Example | N/A | 11 | ed | Minor typo | David Berry / NASA/JPL | From: milligausTo: milligauss |  |
| E-1 | Example | N/A | 17 | ed | Minor typo | David Berry / NASA/JPL | From: "First Star" To: "Second Star" (First star was defined on STAR1) |  |
| E-1 | Example | N/A | 25 | te | There is a second "START\_TIME" keyword that is out of place. It also contains an invalid value. It maybe was intended to be "STOP\_TIME", but it is still out of place and still has a wrong value. | David Berry / NASA/JPL | Delete second START\_TIME keyword or convert to STOP\_TIME and move to proper place in message. |  |
| E-1E-2 | Example | N/A | 28ff | te | The timetags in the example are invalid... the years are only 3 characters, and they do not correspond with the START\_TIME in the metadata. The month is invalid (13). | David Berry / NASA/JPL | I know the data are not "real" but they should be "realistic". |  |
| E-1E-2 | Example | N/A | 33-342-3 | te | The mnemonic ACS.STA2.\* is not defined. | David Berry / NASA/JPL | Either define the mnemonic or change STA2 to STA1. Probably the latter is easier. |  |
| F-1 | Example | 1 | 1 | ed | Use of indefinite article | David Berry / NASA/JPL | From: "... a NHM..."To: "...an NHM..." |  |
| G-1 |  |  |  | ed | References labeled F1-F3 should be G1-G3 (or maybe H1-H3 given requirement to add ICS annex) | David Berry / NASA/JPL | Change references here and throughout document. |  |
| I-1 | Graphic |  |  | ed | Graphic seems to be broken. | David Berry / NASA/JPL | Upload new graphic. |  |
| J-1 | N/A | 1 | 1 | ed | Minor typo | David Berry / NASA/JPL | From: FRAMESTo: FRAME |  |
| J-1 | J1 | 1 | 3-4 | te | Dumb question based on my ignorance... somehow it seems odd to me that a body frame would be defined relative to one or more specifi instrument frames... it makes more sense to me the other way around, but I'm no expert. | David Berry / NASA/JPL | None |  |
| J-1 | J1 | 3 | All | ed, te | The frame definitions expressed in this Annex should be specified in the ICD. | David Berry / NASA/JPL | Consider adding statement to the effect that frame definitions (if not standard, well documented frames) must be described in the ICD. |  |
| J-2 | J3 | 1 | last | ed | Minor verb tense | David Berry / NASA/JPL | From: "Definitions that might be used is given..."To: "Definitions that might be used are given..." |  |