| **Page** | **Section** | **Line** | **Type** | **Comment/ Rationale** | **Source of Comment (Name/Agency)** | **Suggested Disposition** | **Disposition**  **(Completed by Principal Editor)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 4-16 | Table 4-3 | last |  | RATE\_FRAME should also apply to the angular velocity data. It should be mandatory if a rate is included with the data. | Julie Halverson/NASA | Fix | OK  fixed |
| 4-17 | Table 4-3 | first |  | If angular rate data is included, INTERPOLATION\_METHOD can also include **propagate**. Should also specify if angular velocity data is to be interpolated. | Julie Halverson/NASA | Recommend | Discuss  I don’t understand why “propagate” should be an interpolation method. |
| 4-19 | 4.2.5.3 | first |  | Typo, remove the ‘=’ | Julie Halverson/NASA | Fix | Done |
| 4-21 | Figure 4.1 |  |  | There is nothing in the first example that tells the order of the quaternion components. This relates back to Table 4-4 where both orders are just specified as QUATERNION. Should add QUATERNION\_TYPE with the definition to Table 4-4. | Julie Halverson/NASA |  | Discuss ?  Quaternion type does not exist any more, for in particular more consistency between KVN and XML.  (no “QUATERNION\_TYPE” in XML) |
| C-5 |  |  |  | The matrix M should have the same subscripts, MBA, as in the quaternion definitions section. | Julie Halverson/NASA | Recommend | OK  Done: M renamed as MBA |
| C-6 |  |  |  | Make the inertia terms consistent with Table 3-3. Use XX,XY, etc rather than 11, 12, etc. | Julie Halverson/NASA | Recommend | OK  Done  Note : also noted an incorrect sign for IYY and IZZ |
| C-4 |  |  |  | Use Q1, Q2, Q3, QC rather than q1, q2, q3, qc to be consistent with Table 3-3 and Table 4-4. | Julie Halverson/NASA | Recommend | OK  done |
| 5-1 | 5.1 | 1 | ed | "[...] syntactical requirements [...]" should be replaced by "syntax requirements" | A. Mancas/ESA | consider replacing | OK, done |
| 5-2 | 5.5 | n/a | ge | are there no units allowed in the ADMs? There should be a requirement on blank spaces before the units | A. Mancas/ESA |  | Discuss.  Yes there should be a requirement about spaces.  But it does not seem to exist in any other book … |
| 5-2 | 5.5.8 | n/a | ed/te | I am not sure this requirement is that clear, as there are syntax requirements that still apply, eg blank spaces to META\_.... | A. Mancas/ESA | consider clarifying | Not sure to understand  Seems to be OK  No change necessary |
| 5-2 | 5.6.1 | n/a | ed | This could be reworded to make it more "requirements language", eg "angle measurements shall be given in degrees, with values between [...] " | A. Mancas/ESA | consider rewording | OK, done |
| 5-3 | 5.6.5 | n/a | ed/te | Should this requirement apply to the XML version only? Some of the other standards that have KVN and XML requirements separate the syntax into general, KVN and XML sections.  This is the only XML requirement in this document. | A. Mancas/ESA | consider separating the syntax into general/KVN/XML subsections or removing. | Discuss  The section is from ADM V1.0  It is not supposed to be related to XML version. |
| 5-4 | 5.8.1.4 | n/a | ed/te | I am not sure this optional requirement is needed, as similar requirements are not present in other NDMs. | A. Mancas/ESA | consider removing, or replacing 'should' with 'may' | agree.  This requirement has been removed |
| 5-5 | 5.8.2.2 | n/a | ed/te | This seems to break an earlier requirement that comment lines should not be needed to correctly interpret the message. | A. Mancas/ESA | consider removing | I agree.  That is unnecessary and possibly contradictory with other requirements.  Furthermore: it is not a requirement (“may”, that cannot be replaced by “shall” here).  Requirement Removed. |
| 5-5 | 5.8.3.2 | n/a | ed/te | Same comment as above + where should this comment go? | A. Mancas/ESA | consider removing | Agree.  This requirement about the use and contents of comment lines has been removed. |
| E-2 | E2 | Table E-1, line 7 | ed/te | " Identification of the center of attitude motion must be clearly identified and  unambiguous.  NOTE – The specification of a center name is not required for the  unambiguous specification of attitude but may be provided if desired."  I recall discussing this at the Den Haag meeting, but the central body (and orbit) will determine the gravity gradient torques. | A. Mancas/ESA | consider rewording and/or adding some clarification | Discuss  This requirement is from ADM V1.0  I agree this is not clear, as the center must be clearly identified, but at the same time is is optional.  I changed the sentence to: “Identification of the center of attitude motion must be possible” |
| 4-12 | 4.2.1.1 | c) | ed/te | Comments are part of the metadata | A. Mancas/ESA | consider removing comments | Agree.  c) has should be removed |
| 4-12 | 4.2.1.2 | n/a | ed/te | "some may be repeated" seems too vague for a standard. | A. Mancas/ESA | consider re-wording to "metadata-data pairs may be repeated in an AEM, as specified in 4.2.1.3" or "at least one metadata and data sections must be present in an AEM" | Agree.  This is vague  (this comes from ADM V1.0).  Requirement has been removed as bring no information compared to other requirements. |
| 4-14 | Table 4-2 | n/a | te | It might make sense to add a 'MESSAGE\_ID' keyword after ORIGINATOR. | A. Mancas/ESA | consider adding MESSAGE\_ID | OK  Done |
| 4-14 | Table 4-2 | OBJECT\_NAME and OBJECT\_ID | ed | might make sense to make a reference to the UN OOSA registry and add it to the references | A. Mancas/ESA | consider | Discuss  Reference to SANA will be added later (possibly in the next ADM version) |
| 4-14 | Table 4-2 | CENTER\_NAME | ed/te | I think there will be a SANA registry for these. | A. Mancas/ESA | Consider switching to SANA registry from JPL SSD | Discuss  Reference to SANA will be added later. |
| 4-17 | 4.2.4.1 | n/a | ed | This seems like an unnecessary requirement. | A. Mancas/ESA | Consider removing | Agree.  Requirement removed  (same remark from David) |
| 4-18 | Table 4-4 |  | te | The quaternion specification represents two options and one has to be selected? Because I do not see a way for the reader of the message to identify if the order is Q1, .... QC or QC, Q1, etc. The same applies to QUATERNION/DERIVATIVE.  I recall this being discussed at the Den Haag meetings, but I do not remember the conclusion. | A. Mancas/ESA | Either add another metadata keyword to select quaternion order (QC first or last) or impose the order in the standard. | OK  The table erroneously contains 2 possibilities.  The selected order is:  Q1, Q2, Q3, QC  That is, same order as in APM V1 |
| 4-19 | 4.2.5.4.2 | n/a | ed | This requirement should point to the syntax paragraph on CCSDS Time Codes | A. Mancas/ESA | replace with "The EPOCH shall use the time code format specified in 5.6.9." or something similar. | OK  Done  (see also David’s remarks) |
| 4-20 | 4.2.6 | n/a | ed | I think it would make more sense to distribute these requirements to the appropriate AEM section: 4.2.6.1, 4.2.6.2 to the header, 4.2.6.3 should be covered by a syntax requirement, etc. | A. Mancas/ESA | consider | Agree, done.  (see also David’s remarks) |
| 4-21 | 4.3.1 |  | ed | In the second Metadata section the outdated keyword QUATERNION\_TYPE (FIRST / LAST) is used. (This is the only relict of this keyword within entire document). | DLR/GSOC | Remove the line (“QUATERNION\_TYPE = LAST”) from the example | Done  Fixed |
| D-7 | App D | Last | Te | Text still says “DATA\_START and DATA\_STOP” which I believe have been eliminated. | NASA/Oltrogge | Should change to QUAT\_START, etc. | Done  Fixed |
| B-1 etc | Appl. B | All | Te | Diverging keywords/content… | NASA/Oltrogge | Recommend that we switch this (at the appropriate time, hopefully soon) all over to the SANA registry. | Agree (discuss)  Reference to SANA will be added later  Note : we should prepare some text all references to SANA registries. |
| 3-11 | 3 | Ex. | Te | Retains DATA\_STOP and erroneously brackets inertia content w/QUAT\_STOP | NASA/Oltrogge | Modify over to INERTIA\_START/STOP etc. | Done  Fixed |
| 3-2 | 3.2.2 | 80% | GE | Regarding “The value for the "ORIGINATOR" keyword "should"  come from the SANA Registry.” | NASA/Oltrogge |  | Agree  See previous remarks |
| 1-2 | 1.3 | N/A | te | Recall that we added a corrigendum regarding the use of the term "nutation" to the ADM in this section. | David S. Berry / NASA | Copy the corrigendum regarding nutation into this section. | OK  done |
| 2-1 | 2.2.2 | last | ed | "Orbit Parameter Message" is used without specifying the acronym; then the acronym is later used in the document. | David S. Berry / NASA | From: "Orbit Parameter Message (reference [7])"  To: "Orbit Parameter Message (OPM) (reference [7])" | To be discussed  Don’t understand the disposition.  Title of section 2.2 is attitude parameter message (APM). Isn’t it enough ? |
| 2-2 | 2.3.3 | last | ed | "Orbit Ephemeris Message" is used without specifying the acronym (similar to OPM topic above). | David S. Berry / NASA | From: "Orbit Ephemeris Message (reference [7])"  To: "Orbit Ephemeris Message (OEM) (reference [7])" | Same as above |
| 3-1 | 3.1.1 | 7 | ed | End parenthesis without matching beginning parenthesis. | David S. Berry / NASA | Remove unnecessary end parenthesis.  From: "maneuver planning data, if applicable, )"  To: "maneuver planning data, if applicable, " | Ok  Fixed |
| 3-1 | 3.1.3 |  | te | The section contains a requirement on the Working Group that an originator cannot really affect if they are compliant with the standard. The ADM document is built to implement the stated requirement; the originator has no control. | David S. Berry / NASA | Delete the second statement: "It shall be easily readable by both humans and computers.". This is a requirement on the Nav WG for the design of the ADM data structure, not on an APM originator. | OK  Done |
| 3-1 | 3.1.4 |  | te | Unenforceable "shall" statement | David S. Berry / NASA | From: "The APM file naming scheme shall be agreed..."  To: "The APM file naming scheme should be agreed..." | OK  Done |
| 3-2 | Table 3-1 |  | ed/te | CREATION\_DATE: unnecessary repetition of date format rules. | David S. Berry / NASA | We've been migrating to putting the formatting rules in one place.  From: existing text  To: "File creation date/time in UTC (for format  specification, see 5.6.9)" | OK  Done |
| 3-2 | Table 3-1 |  | te | ORIGINATOR: Add more info explaining the source of the value. | David S. Berry / NASA | From: "... should come from the SANA Registry."  To: "... should come from the 'Abbreviation' column in the 'Organizations' registry of the SANA Registry (https://sanaregistry.org/r/organizations )." | OK  Done |
| 3-2 | Table 3-1 |  | ed | MESSAGE\_ID: The last 3 cells of the row are left shifted by one cell (example indicator is missing, the example is in the wrong column, the "Mandatory" indicator is in the wrong column, the keyword is repeated in the last column). | David S. Berry / NASA | Fix accordingly. | OK  Changed |
| 3-3 | Table 3-2 |  | ed | OBJECT\_NAME: Description refers to "international designators" instead of "names" | David S. Berry / NASA | From: "use international designators from"  To: "use names from" | OK  Changed |
| 3-3 | Table 3-2 |  | ed | OBJECT\_NAME: should have a reference | David S. Berry / NASA | Add "(reference [2])" | OK  Done |
| 3-3 | Table 3-2 |  | te | OBJECT\_NAME: Annex F indicates that the value should be in an ICD if not in UNOOSA, but it's not mentioned here. | David S. Berry / NASA | Add something to the effect that if the value is not taken from UNOOSA, then it should be specified in an ICD. | Discuss  I suggest removing the reference to an ICD, because the text says “it is recommended”. |
| 3-3 | Table 3-2 |  | ed | OBJECT\_ID: Description refers to "names" instead of "international designators" | David S. Berry / NASA | From: "use names from"  To: "use international designators from" | OK  Changed |
| 3-3 | Table 3-2 |  | ed | OBJECT\_ID: should have a reference | David S. Berry / NASA | Add "(reference [2])" | OK  Changed |
| 3-3 | Table 3-2 |  | te | OBJECT\_ID: Annex F indicates that the value should be in an ICD if not in UNOOSA, but it's not mentioned here. | David S. Berry / NASA | Add something to the effect that if the value is not taken from UNOOSA, then it should be specified in an ICD. | Discuss  Same proposal as above: no reference to an ICD because the text says: “it is recommended” |
| 3-3 | Table 3-2 |  | ed | Empty table row at bottom | David S. Berry / NASA | Remove empty table row. | OK  Done |
| 3-4 | 3.2.4.1 | 2-3 | ed | The listing of logical blocks is not in the order they are in the table. | David S. Berry / NASA | Consider putting them in the order in which they appear in the table. | OK  Changed |
| 3-4 | 3.2.4.1 | 3 | te | Question based on my ignorance... is it clear that "spacecraft parameters" implies the inertia matrix? | David S. Berry / NASA | If so, ignore this. If not, indicate something like "spacecraft inertia parameters". | Agree  “Spacecraft inertia parameters” used instead of “spacecraft parameters” |
| 3-4 | N/A |  | te | Somewhere in this section you need a requirement that "At least one logical block shall appear in an APM." | David S. Berry / NASA | Add such a requirement; it could be made part of 3.2.4.3. | Discuss  see below |
| 3-4 | 3.2.4.3 |  | te | The statement as written is unclear... "as many logical blocks as necessary" to do what? | David S. Berry / NASA | Clarify. | Discuss  Replaced by: The message shall contain at least one logical block |
| 3-4 | 3.2.4.4 |  | te | This statement mystifies me. Since the APM is an attitude state at epoch, why would one need repeated logical blocks? (Exception is maneuver block in APM version 1, and assume the same for APM version 2). | David S. Berry / NASA | Clarify. | Discuss  The attitude can be sent relative to various frames for the recipient to, for instance, check frame transformations. For instance:  Attitude could be sent in ITRF (rotating frame) and also in ICRF (inertial frame) |
| 3-4 | N/A |  | te | Somewhere in this section it should be stated that there is no one mandatory logical block for an APM, but if a logical block is chosen, all elements marked 'mandatory' for that logical block must be present. This was not an issue in the APM version 1, since the quaternion was required. It becomes necessary now that the quaternion is no longer required. | David S. Berry / NASA | Add as 3.2.4.5? or maybe 3.2.4.2 and push the others down one step? | OK  The convention that has been chosen is the same as for the OCM (I think).  There is a sentence in the table. Not enough ? . |
| 3-4 | Table 3-3 |  | ed | EPOCH: replace "&" character with word "and". | David S. Berry / NASA | Fix | OK  done |
| 3-4 | Table 3-3 |  | ed/te | Move the COMMENT that appears just before QUAT\_START to just after QUAT\_START. | David S. Berry / NASA | Moving the COMMENT makes it clear that the comments apply to the quaternion, and is consistent with other standards that have COMMENTs right after the start of sections. | OK  done |
| 3-4 | Table 3-3 |  | ed | Last row in the table on this page is empty | David S. Berry / NASA | Remove the empty row. | OK, row removed |
| 3-5 | Table 3-3 |  | ed/te | Move the COMMENT that appears just before EULER\_START to just after EULER\_START. | David S. Berry / NASA | Moving the COMMENT makes it clear that the comments apply to the Euler angles, and is consistent with other standards that have COMMENTs right after the start of sections. | OK, done |
| 3-5  3-6 | Table 3-3 |  | ed/te | Move the COMMENT that appears just before ANGVEL\_START to just after ANGVEL\_START. | David S. Berry / NASA | Moving the COMMENT makes it clear that the comments apply to the angular velocity, and is consistent with other standards that have COMMENTs right after the start of sections. | OK, done |
| 3-6 | Table 3-3 |  | te | The ANGVEL block still has a "DATA\_TYPE" keyword that has been removed from other logical blocks | David S. Berry / NASA | Remove "DATA\_TYPE" in the ANGVEL block. | OK, done |
| 3-6 | Table 3-3 |  | ed/te | Move the COMMENT that appears just before SPIN\_START to just after SPIN\_START. | David S. Berry / NASA | Moving the COMMENT makes it clear that the comments apply to the spin data, and is consistent with other standards that have COMMENTs right after the start of sections. | OK, done |
| 3-7 | Table 3-3 |  | ed/te | Move the COMMENT that appears just before INERTIA\_START to just after INERTIA\_START. | David S. Berry / NASA | Moving the COMMENT makes it clear that the comments apply to the inertia data, and is consistent with other standards that have COMMENTs right after the start of sections. | OK, done |
| 3-7 | Table 3-3 |  | ed | IXY, IXZ, IYZ Descriptions... replace "&" character with "and" | David S. Berry / NASA | Fix | OK, done |
| 3-7 | Table 3-3 |  | ed | In description of the Maneuver block, the word "obligatory" appears. | David S. Berry / NASA | From: "obligatory"  To: "mandatory" | OK  Replaced by “mandatory” |
| 3-7 | Table 3-3 |  | ed/te | Move the COMMENT that appears just before MANEUVER\_START to just after MANEUVER\_START. | David S. Berry / NASA | Moving the COMMENT makes it clear that the comments apply to the maneuver data, and is consistent with other standards that have COMMENTs right after the start of sections. | OK, done |
| 3-8 | 3.2.6.1 |  | ed/te | This section should be moved to 3.2.2 | David S. Berry / NASA | Relates to APM Header. | OK.  This comes from ADM V1  =>Moved to section 3.2.2 |
| S | 3.2.6.2 |  | ed/te | This section should be moved to 3.2.2 | David S. Berry / NASA | Relates to APM Header. | OK.  This comes from ADM V1  =>Moved to section 3.2.2 |
| 3-8 | 3.2.6.3 |  | ed/te | This section should be moved to 3.2.2 | David S. Berry / NASA | Relates to APM Header. | OK.  This comes from ADM V1  =>Moved to section 3.2.2  “must” replaced by shall |
| 3-8 | 3.2.6.4 |  | ed | Use of forbidden word :-) | David S. Berry / NASA | From: "obligatory"  To: "mandatory" | OK  + change in all document |
| 3-9 | Figure 3-1 |  | ed | "CCSDS\_APM\_VERS = 1.0" is used | David S. Berry / NASA | Change to "CCSDS\_APM\_VERS = 2.0" | OK  Changed in whole file |
| 3-10 | Figure 3-2 |  | ed | "CCSDS\_APM\_VERS = 1.0" is used | David S. Berry / NASA | Change to "CCSDS\_APM\_VERS = 2.0" | OK |
| 3-10 | Figure 3-2 |  | ed | "DATA\_TYPE" keyword is used (now obsolete) | David S. Berry / NASA | Remove the line. | OK  + removed all similar lines in whole file |
| 3-11 | Figure 3-3 |  | ed | "CCSDS\_APM\_VERS = 1.0" is used | David S. Berry / NASA | Change to "CCSDS\_APM\_VERS = 2.0" | OK changed |
| 3-11 | Figure 3-3 |  | ed/te | Comments for logical blocks appear outside the logical block (QUAT, INERTIA, MANEUVER) | David S. Berry / NASA | Move COMMENT statements that apply to logical blocks after the "\*\_START" keywords | OK  fixed  (+all occurrences in the file) |
| 3-11 | Figure 3-3 |  | ed | REF\_FRAME\_A and REF\_FRAME\_B keywords have 2 values | David S. Berry / NASA | Fix | OK  fixed |
| 3-11 | Figure 3-3 |  | ed/te | QUAT logica block ends with "DATA\_STOP" | David S. Berry / NASA | From: DATA\_STOP  To: QUAT\_STOP | OK  fixed |
| 3-11 | Figure 3-3 |  | ed/te | Inertia block begins with "DATA\_START" and contains a "DATA\_TYPE" keyword | David S. Berry / NASA | Change "DATA\_START" to "INERTIA\_START" and remove the "DATA\_TYPE" keyword. | OK  fixed |
| 3-11 | Figure 3-3 |  | ed/te | Inertia block ends with "QUAT\_STOP" keyword | David S. Berry / NASA | Change "QUAT" to "INERTIA". | OK  fixed |
| 3-11 | Figure 3-3 |  | ??? | Question from ignorance: Is it odd to have a maneuver reference frame based on an instrument frame? (in this case, "INSTRUMENT\_A") | David S. Berry / NASA | Apologies for ignorance...  AL: ☺ | OK  Yes it is odd.  Changed to ICRF |
| 4-12 | 4.1.2 |  | te | The section contains a requirement on the Working Group that an originator cannot really affect if they are compliant with the standard. The ADM document is built to implement the stated requirement; the originator has no control. | David S. Berry / NASA | Delete the second statement: "It shall be easily readable by both humans and computers.". This is a requirement on the Nav WG for the design of the ADM data structure, not on an APM originator. | OK  Section removed |
| 4-12 | 4.1.3 |  | te | Unenforceable "shall" statement | David S. Berry / NASA | From: "The file naming scheme shall be agreed..."  To: "The AEM file naming scheme should be agreed..." | OK  fixed |
| 4-14 | Table 4-2 |  | ed/te | CREATION\_DATE: unnecessary repetition of date format rules. | David S. Berry / NASA | We've been migrating to putting the formatting rules in one place.  From: existing text  To: "File creation date/time in UTC (for format  specification, see 5.6.9)" | OK  fixed |
| 4-14 | Table 4-2 |  | te | ORIGINATOR: Add more info explaining the source of the value. | David S. Berry / NASA | From: "... should come from the SANA Registry."  To: "... should come from the 'Abbreviation' column in the 'Organizations' registry of the SANA Registry (https://sanaregistry.org/r/organizations )." | OK  fixed |
| 4-14 | Table 4-2 |  | te | MESSAGE\_ID: was added to APM, but is missing from the AEM. | David S. Berry / NASA | Consider adding the MESSAGE\_ID to AEM | OK  MESSAGE\_ID added |
| 4-15 | Table 4-3 |  | ed | OBJECT\_NAME: Description refers to "international designators" instead of "names" | David S. Berry / NASA | From: "use international designators from"  To: "use names from" | OK  fixed |
| 4-15 | Table 4-3 |  | ed | OBJECT\_NAME: should have a reference | David S. Berry / NASA | Add "(reference [2])" | OK  fixed |
| 4-15 | Table 4-3 |  | te | OBJECT\_NAME: Annex F indicates that the value should be in an ICD if not in UNOOSA, but it's not mentioned here. | David S. Berry / NASA | Add something to the effect that if the value is not taken from UNOOSA, then it should be specified in an ICD. | Discuss  Reference to ICD for OBJECT\_NAME removed |
| 4-15 | Table 4-3 |  | ed | OBJECT\_ID: Description refers to "names" instead of "international designators" | David S. Berry / NASA | From: "use names from"  To: "use international designators from" | OK  fixed |
| 4-15 | Table 4-3 |  | ed | OBJECT\_ID: should have a reference | David S. Berry / NASA | Add "(reference [2])" | OK  fixed |
| 4-15 | Table 4-3 |  | te | OBJECT\_ID: Annex F indicates that the value should be in an ICD if not in UNOOSA, but it's not mentioned here. | David S. Berry / NASA | Add something to the effect that if the value is not taken from UNOOSA, then it should be specified in an ICD. | Discuss  Reference to ICD for OBJECT\_NAME removed |
| 4-16 | Table 4-3 |  | ed | TIME\_SYSTEM: incomplete document name. | David S. Berry / NASA | From: Navigation Definitions and Conventions  To: Navigation Data - Definitions and Conventions | OK  fixed |
| 4-16 | Table 4-3 |  | te | USEABLE\_START\_TIME & USEABLE\_STOP\_TIME. A correction was put into ODM Version 2 that you may want to consider. | David S. Berry / NASA | See the text in the ODM Version 2 OEM for these 2 keywords in metadata, also see ODM V2 text in section 5.2.4.4 | Agree / Done  Text for ODM in ADM used  (this was exactly what was proposed form the ADM anyway) |
| 4-16 | Table 4-3 |  | ed | The row in the table after ATTITUDE\_TYPE is empty | David S. Berry / NASA | Remove the empty row. | OK  fixed |
| 4-16 | Table 4-3 |  | te | RATE\_FRAME: I think this keyword is obsolete in the ADM version 2. Euler angle rates are no longer included in the AEM. | David S. Berry / NASA | Delete RATE\_FRAME row from the table. | Discuss (in case)  Rates still valid, but are given as angular velocity vector coordinates.  =>  “Euler rates” replaced by “angular velocity data” |
| 4-17 | 4.2.3.3 |  | ed | I suggest moving this section to before Table 4-3; situated as it is it could get lost. | David S. Berry / NASA | Consider moving section before Table 4-3 | Discuss (in case)  I have removed this section as could be ambiguous. (“spacecraft time”)  SEE OTHER BOOKS |
| 4-17 | 4.2.4.1 |  | ed/te | I think this line is superfluous | David S. Berry / NASA | Consider removing | Agree  Removed |
| 4-18 | Table 4-4 |  | ed/te | I think the first "ATTITUDE\_TYPE" section of this table (quaternion real portion in first component) is obsolete. | David S. Berry / NASA | Remove the entire section. | Right.  Has been removed |
| 4-18 | Table 4-4 |  | ed | There are two empty rows in the table. | David S. Berry / NASA | Remove empty rows. | OK  Empty rows removed |
| 4-18 | 4.2.5.3 |  | te | You may want to add a "NOTE" after this section indicating that units do not appear in the ephemeris line, just the data values. | David S. Berry / NASA | Consider. | Agree.  This sentence has been added:  Note: The units do not appear in the AEM data lines. The data lines only contain values. |
| 4-19 | 4.2.5.3 |  | te | The "deg/s" line is missing the data elements ANGLE\_1\_DOT, ANGLE\_2\_DOT, ANGLE\_3\_DOT | David S. Berry / NASA | Add to deg/s line | Discuss  Deg/s is defined (on next page) but ANGLE\_1\_DOT, ANGLE\_2\_DOT, ANGLE\_3\_DOT  are missing => added |
| 4-19 | 4.2.5.5.1 |  | te | This text will need to be revised if the text for USEABLE\_START\_TIME and USEABLE\_STOP\_TIME is modified per the previous comment (see above). | David S. Berry / NASA | Consider | OK  New proposal consistent with ODM V2:  START\_TIME/STOP\_TIME section may overlap  But  USEABLE\_START\_TIME/ USEABLE\_STOP\_TIME  should not |
| 4-20 | 4.2.6.1 |  | ed/te | This section should be moved to 4.2.2 | David S. Berry / NASA | Relates to AEM Header. | OK  Moved to section 4.2.2 |
| 4-20 | 4.2.6.2 |  | ed/te | This section should be moved to 4.2.2 | David S. Berry / NASA | Relates to AEM Header. | OK  Moved to section 4.2.2 |
| 4-20 | 4.2.6.3 |  | ed/te | This section should be moved to 4.2.2 | David S. Berry / NASA | Relates to AEM Header. | OK  Moved to section 4.2.2 |
| 4-20 | 4.2.6.4 |  | ed | Use of forbidden word :-) | David S. Berry / NASA | From: "obligatory"  To: "mandatory" | OK  Changed |
| 4-20 | 4.2.6.5 |  | ed | This section should be moved to 4.2.3 | David S. Berry / NASA | Relates to AEM Metadata | OK  Moved to section 4.2.3 |
| 4-20 | 4.2.6.6 |  | ed | This section should be moved to 4.2.3 | David S. Berry / NASA | Relates to AEM Metadata | OK  Moved to section 4.2.3 |
| 4-20 | 4.2.6 |  | ed | If all the above moves are made, the section will be empty. You could add a statement similar to that of 3.2.6.4, or delete the section. | David S. Berry / NASA | Consider. | OK  Section removed.  4.2.6.4 was still there, but the text did not bring useful information => removed as well |
| N/A | N/A |  | te | Somewhere in Section 4 do you need to include a statement similar to that in 3.2.5.2.1? It is implied in 2.3.3, but that section is non-normative. | David S. Berry / NASA | Consider. | OK  2 statements added in 4.2.5.5 (version 7)  As for APM. |
| 4-21 | 4.3 |  | ed | Title should be plural since there are two examples (cf. 3.3) | David S. Berry / NASA | From: AEM EXAMPLE  To: AEM EXAMPLES | OK  fixed |
| 4-21 | Figure 4-1 |  | ed | "CCSDS\_AEM\_VERS = 1.0" is used | David S. Berry / NASA | Change to "CCSDS\_AEM\_VERS = 2.0" | OK  Fixed  (in second example as well) |
| 4-21 | Figure 4-1 |  | te | The times in both metadata blocks shown for USEABLE\_START\_TIME are not shown in the data, but should be. | David S. Berry / NASA | Add points in the Data Sections of the example that match the USEABLE\_START\_TIME data, OR change the USEABLE\_START\_TIMEs to points that are in the data. | Discuss  I don’t understand the comment.  I think USEABLE\_START\_TIME / USEABLE\_STOP\_TIME may not necessarily appear in the data |
| 4-21 | Figure 4-1 |  | ed/te | Second metadata section includes obsolete keyword "QUATERNION\_TYPE" | David S. Berry / NASA | Delete the line. | OK  Line removed. |
| 4-21 | Figure 4-1 |  | ed/te | The last components of the second and third quaternions in the second data section violate the condition established in Annex C, section C2. | David S. Berry / NASA | Fix (remove negative sign?) | OK  Good catch!  Sign changed  (even if the quaternions may not be meaningful)  Note: version 1 was not satisfactory either. |
| 4-22 | Figure 4-2 |  | ed | "CCSDS\_AEM\_VERS = 1.0" is used | David S. Berry / NASA | Change to "CCSDS\_AEM\_VERS = 2.0" | OK  Fixed |
| 5-2 | 5.5.7 |  | ed | Use of forbidden word :-) | David S. Berry / NASA | From: "obligatory"  To: "mandatory" | OK  Fixed |
| 5-2 | 5.5.7 |  | ed/te | The second sentence in this section (from "Exceptions...") is obsolete, I believe. | David S. Berry / NASA | Remove second sentence. | Agree  Exception removed |
| 5-2 | 5.5.8 |  | ed/te | There are quite a few more exceptions to KVN in the new ADM: QUAT\_START, QUAT\_STOP, etc. | David S. Berry / NASA | Either list them all or indicate the first word with an asterisk, e.g., \*\_START, \*\_STOP. | OK  List extend with all existing keywords |
| 5-2 | 5.6.3 |  | ed | You may want to add a "NOTE" after 5.6.3 explaining why blank spaces are shown in the example, which appears to be a contradiction of 5.6.2 that immediately precedes it. | David S. Berry / NASA | Consider. | Discuss  I may not be contradictory as the figures in the example are not part of data.  But yes this is strange.  I would removed the spaces in  2 147 483 648 |
| 5-4 | 5.7.2.1 |  | ed | Consider adding a refer back to section 4.2.5.3 | David S. Berry / NASA | Add "See 4.2.5.3." | OK  Reference added |
| 5-4 | 5.8.1.3 |  | ed | The text in this section appears to be in a smaller font than surrounding text | David S. Berry / NASA | Check and fix if applicable. | OK  Font changed |
| Annex A, 5-2 | A1.1 | 2 | ed | Name the specification | David S. Berry / NASA | From: "[Specification]"  To: "The Attitude Data Messages" | OK  Done |
| Annex A, 5-4 | A2.1.4 | 1 | ed | Add the CCSDS document number | David S. Berry / NASA | Add 504.0-B-2 | OK  Done |
| Annex A, 5-4 | A2.2 |  | te | Eventually the table will need to be filled out. | David S. Berry / NASA | Can defer... but not forever! | Right |
| B-2 | B3 |  | ed/te | Obsolete frame related keywords are used. | David S. Berry / NASA | Delete: "Q\_FRAME\_\*, EULER\_FRAME\_\*, and SPIN\_FRAME\_\* in an APM, and"  From: "REF\_FRAME\_\* in an AEM"  To: "REF\_FRAME\_\* in an APM or AEM | OK  New sentence:  They are valid for keywords REF\_FRAME\_\* in the APM and AEM messages, where ‘\*’ denotes ‘A’ or ‘B’.  Note:  “Inertial” removed as not all frames are inertial. |
| B-3 | B4 | 1 | ed/te | Incomplete keyword | David S. Berry / NASA | From: "FRAME\_\*"  To: "REF\_FRAME\_\*" | OK  fixed |
| C-4 | C2 |  | ed/te | Maybe the quaternion should be shown in vector notation since what is shown here is presumed to be the only style used in the ADM | David S. Berry / NASA | Consider. | Discuss  I don’t really understand. |
| C-5 | C2 |  | te | Contains the statement "The real component (qc) of the quaternion shall...". The annex is labeled "Informative", but you cannot have "shall" statements in an informative annex. | David S. Berry / NASA | Suggest moving this statement into Section 3 (APM) and Section 4 (AEM). There is an obvious place in Table 3-3; not so obvious in Section 4 (maybe in section 4.2.5.5?) | OK  shall -> should |
| C-5 | C3 | 4 | ed | Lack of "Oxford Comma" | David S. Berry / NASA | From: "Y-axis or Z-axis"  To: "Y-axis, or Z-axis" | OK  Comma added |
| C-6 | C4 | 1 | ed | Inconsistent capitalization | David S. Berry / NASA | From: "Frame A or frame B"  To: "frame A or frame B" (or both caps). Just be consistent. | OK  “frame” (not capitalized) used everywhere |
| C-6 | C5 |  | ed | Redundant statement | David S. Berry / NASA | From: "The following assumption is assumed:"  To: "The following is assumed:" | OK  Fixed |
| C-6 | C6 |  | ed/te | The inertia tensor is shown with numeric elements, but the APM uses letters. | David S. Berry / NASA | Make the inertia tensor consistent with terminology used in the APM Table 3-3 | OK  Change (Julie had the same remark) |
| D-7 | APM Changes |  | ed | Row 1 of the table is blank, and the indexes of the table rows start with 2. | David S. Berry / NASA | Remove row 1 and renumber the rows OR  copy rows 2 - 10 up one row and remove row 10. | OK  Table has been pdated: |
| D-7 | APM Changes |  | ed | In row 10, there are references to DATA\_START and DATA\_STOP that are no longer applicable. | David S. Berry / NASA | From: "DATA\_S"  To: "\*\_S | OK  Updated:  QUAT\_START… etc |
| D-7 | APM Changes |  | te | Should mention that MESSAGE\_ID was added. | David S. Berry / NASA | Add to table. | OK  Added to table |
| D-7 | APM Changes |  | te | Should mention that many frame related keywords were simplified to just "REF\_FRAME\_A" and "REF\_FRAME\_B" | David S. Berry / NASA | Add to table that Q\_FRAME, EULER\_FRAME, RATE\_FRAME, SPIN\_FRAME were removed from the APM. | OK  New sentence added |
| D-7 | APM Changes |  | te | Should mention that the attitude direction was removed, and now it's always A to B (no more B2A) | David S. Berry / NASA | Add to table. | OK  Sentence added |
| D-8 | AEM Changes |  | te | Should mention that MESSAGE\_ID was added (if in fact it was... it's not in table 4-2). | David S. Berry / NASA | Add to table if the MESSAGE\_ID was added. | OK  Added  (the keyword has effectively been added to APM and AEM) |
| D-8 | AEM Changes |  | te | Should mention that the QUATERNION\_TYPE was removed. | David S. Berry / NASA | Add to table. | OK  Information added  (row 6) |
| D-8 | AEM Changes |  | te | Should mention the other changes in the ephemeris type (QUATERNION/RATE removed, QUATERNION\_ANGVEL added, EULER\_ANGLE/RATE removed, EULER\_ANGLE/ANGVEL added, | David S. Berry / NASA | Change table accordingly. | OK  Information added  (row 7) |
| E-2 | E2, Table E-1 |  | te | I think the requirement that starts "Identification of the center of attitude motion..." is indicated wrong in the table. They are marked "N", but should be "Y" because there is a keyword in the Metadata sections of APM and AEMfor the center name. If we didn't have those keywords, then "N" would be applicable. | David S. Berry / NASA | From: "N" for APM and "N" for AEM  To: "Y" for APM and "Y" for AEM | Yes, you’re right  N changed to Y |
| E-2 | E2, Table E-1 |  | te | Last requirement should be removed because the standard has no file naming requirement. It's outside the purview of the WG really. | David S. Berry / NASA | Remove the last requirement. | OK  Requirement removed |
| E-2 | E2, Table E-1 |  | ed | There are no numbers on the requirements, which makes them difficult to refer to. | David S. Berry / NASA | Consider adding a far left column with a requirement number. | OK  Done |
| E-3 | E2, Table E-2 |  | ed | There are no numbers on the requirements, which makes them difficult to refer to. | David S. Berry / NASA | Consider adding a far left column with a requirement number. | OK  Done |
| E-3 | E2, Table E-3 |  | te | The first requirement in the list seems odd to me... could we define the orientation of a natural body with an APM or AEM? | David S. Berry / NASA | Apologies for ignorance. | Discuss  (OK)  Why not. Attitude data could be used for any object I suppose. |
| E-3 | E2, Table E-3 |  | ed | There are no numbers on the requirements, which makes them difficult to refer to. | David S. Berry / NASA | Consider adding a far left column with a requirement number. | OK  Done |
| F-1 | Table F-1 |  | ed | This version of APM doesn't have any format requirements for the ORIGINATOR | David S. Berry / NASA | Remove Row 5 of table. | OK  Row removed |
| F-1 | Table F-1 | Row 7 | ed | There is no mention of an ICD in section 3.2.4 | David S. Berry / NASA | From: 3.2.4  To: Annex B | TO DO |
| F-1 | Table F-1 | Row 8 | ed/te | There is no mention of SPIN\_ANGLE in 3.2.4, and I can't find any language about conventions for the values of the SPIN\_ANGLE in the document. | David S. Berry / NASA | From: 3.2.4  To: Remove??? | TO DO |
| F-1 | Table F-1 | Row 11 | ed | There is a footnote that is no longer applicable. | David S. Berry / NASA | Remove the footnote after "XML". | OK  Footnote removed |
| F-1 | Table F-1 | Row 12 | ed/te | There is no mention of the purported "ICD Item" in the body of the standard. | David S. Berry / NASA | Consider adding the requirement to an applicable document section. | TO DO |
| F-1 | Table F-1 | Row 13 | ed/te | The previous text of Row 13 was inexplicably removed... it related to "If angles are in radians..." | David S. Berry / NASA | Restore row 13 (see section 5.6.1 which was the apparent basis for the original item). | Discuss  Should units be allowed in radians ?  I don’t think so |
| F-1 | Table F-1 | Row 17 | ed/te | The language in B4 is different than is characterized in Row 17 | David S. Berry / NASA | From: "...if different from those specified in annex B"  To: "...if local frame". | OK - check  Sentence vis in current ADM version  I propose to change the sentence in annex B:  The exact specification of the frames (position of center, orientation) should be defined in an ICD |
| G-1 | Annex G | CCIR | ed | Acronym not used in document. | David S. Berry / NASA | Remove | OK  Acronym removed |
| G-1 | Annex G | TDM | ed | Acronym not used in document. | David S. Berry / NASA | Remove | OK  Acronym removed |
| H-1 | Annex H | [H1] | ed | This will become a reference for Section 1.5 when the XML material is added. | David S. Berry / NASA | In preparation for adding the XML content, move to Section 1.5 | OK  Copied to 1.5 |
| H-1 | Annex H | N/A | ed | The "Part 1" of reference [H1] will also be applicable in Section 1.5 when the XML material is added. | David S. Berry / NASA | In preparation for adding the XML content, add to Section 1.5 "Henry S. Thompson, et al., eds. XML Schema Part 1: Structures. 2nd ed. W3C  Recommendation. N.p.: W3C, October 2004. <http://www.w3.org/TR/2004/RECxmlschema-  1-20041028/>" | OK  Added to 1.5 |
| H-1 | Annex H | [H2] | ed/te | This reference is not applicable to the document. | David S. Berry / NASA | Remove reference. | OK  Reference removed |
| I-2 | A1.2 | 3 | ed/te | Copy paste error. | David S. Berry / NASA | From: "... collision avoidance analyses and potential..."  To: "...conveying planned spacecraft attitudes and potential..." OR other text you think more applicable. | OK – check  “Collision avoidance analyses” replaced by “spacecraft attitude analyses” |
| I-4 | A2 | 1 | ed/te | Change to conform to CCSDS regulation | David S. Berry / NASA | From: "Navigation Working Group chair"  To: "Area or Working Group responsible for maintenance of the ADM at the time of the request" | OK  Sentence replaced |
| I-4 | A2 |  | te | Addition to the list of items maintained on the SANA Registry | David S. Berry / NASA | Add a list item: "Values for the ORIGINATOR keyword." | OK  List item added |
| 4-18 | Table 4.3 |  | ed | USEABLE\_START\_TIME and USEABLE\_STOP\_TIME should be on different rows (i.e. one parameter per row) | Alain LAMY (CNES) | One row for each keyword. | OK |
| 4-18 | Table 4.3 |  | te | Overlapping of START\_TIME / STOP\_TIME USEABLE\_START\_TIME/USEABLE\_STOP\_TIME  Blocks | Alain LAMY (CNES) | … block. The **USEABLE\_**START\_TIME time tag for a block of  attitude ephemeris data must be equal to or greater  than the **USEABLE\_**STOP\_TIME time tag of the previous block. | Discuss |
| 4-18 | Table 4.3 |  |  | Interpolation method: may not ba appropriate for all data :  Quaternions and angular velocity may not be interpolated using the same method. | Alain LAMY (CNES) |  | Discuss |

About 160 remarks !