| **Page** | **Section** | **Line** | **Type** | **Comment/ Rationale** | **Source of Comment (Name/Agency)** | **Suggested Disposition** | **Disposition**  **(Completed by Principal Editor)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **ALL PAGE, SECTION, AND LINE NUMBERS ARE REFERENCED TO THE "CHANGES ACCEPTED" VERSION OF THE DOCUMENT.** |  |  |  |
| Many | 1 thru 4, 6 thru 8 |  | ed | The paragraph numbering that was formerly used has been removed for some reason. Compare with the paragraph numbering in Section 5 (which is more along what has previously been used). I don't think the change will sit well with the CCSDS Editor. | David S. Berry / NASA | Correct the paragraph numbering using version 1 as a rough guide. |  |
| 1-1 | 1.2 | para 2, line 3 | ed | First instance of the acronym "ICD" is here, but there is no "translation" of the acronym. | David S. Berry / NASA | The expansion of the acronym occurs in Section 3.1, but should occur at the first instance. |  |
| 1-1 | 1.2 | para 3, line 2 | ed | Says XML format "is avail' | David S. Berry / NASA | Point the user to the section... add "in Section 6" at the end of the first sentence. |  |
| 1-2 | 1.4 | 2,3 | ed/te | Needs to mention the ACM. | David S. Berry / NASA | From; "... (APM) and Attitude Ephemeris Message (AEM)."  To: "... (APM)**,** Attitude Ephemeris Message (AEM), and Attitude Comprehensive Message (ACM)." |  |
| 1-2 | 1.4 |  | ed/te | I believe given our SANA Registry plan that Annex B will be soon obsolete. | David S. Berry / NASA | Consider removing the sentence on Annex B in the document structure, alernatively, some thing will eventually take its place, so you could decide which annex that will be and modify the Annex B description line in 1.4 |  |
| 1-2 | 1.4 |  | ed/te |  | David S. Berry / NASA | From: "... the complete list of changes...  To: "... a summary of changes... |  |
| 1-4 | 1.5 |  | te | Regarding reference [3] (JPL Solar System Dynamics)... we may want to delete this reference, since the only use is for the CENTER\_NAME and we are replacing it with the SANA "orbit centers" registry. | David S. Berry / NASA | Consider deleting reference [3], or changing it to reference the orbit centers registry https://sanaregistry.org/r/orbit\_centers |  |
| 1-4 | 1.5 |  | ed/te | The SANA registries that have been developed are not listed as references. | David S. Berry / NASA | Consider adopting the convention used by Alexandru in the RDM references for SANA registries. |  |
| 3-2 | 3.2.2 | para2, line 3 | ed | After "reference [4]", it would be helpful to the reader/user to explicitly cite "ASCII Time Code A or B". | David S. Berry / NASA | Add "ASCII Time Code A or B" after the reference number |  |
| 3-3 | Table 3-2 |  | te | CENTER\_NAME: starts with "Origin of reference frame...". But which one? | David S. Berry / NASA | Maybe change the definition to "Central body orbited, if applicable" or something like that? |  |
| 3-3 | Table 3-2 |  | te | CENTER\_NAME: allows "another spacecraft" for the CENTER\_NAME... is this really necessary for an attitude message? | David S. Berry / NASA | Consider whether or not it's actually necessary, and delete use of another spacecraft for the center if it's not. |  |
| 3-3 | Table 3-2 |  | te | CENTER\_NAME: should use values from the Nav WG "orbit centers" registry instead of JPL SSD. | David S. Berry / NASA | Change source of values to the Nav WG "orbit centers" registry https://sanaregistry.org/r/orbit\_centers |  |
| 3-4 | Table 3-2 |  | te | TIME\_SYSTEM: should use values from the Nav WG "time systems" registry instead of Annex B. | David S. Berry / NASA | Change source of values to the Nav WG "time systems" registry https://sanaregistry.org/r/time\_systems |  |
| 3-4 | 3.2.4 | list item (d) | ed/te | List item (d) should indicate that units may also be in the column | David S. Berry / NASA | From: "values (either the list of all normative values or examples)"  To: "values/units (either the list of all normative values, or examples, or units if applicable)" |  |
| 3-4 | 3.2.4 | last before Table 3-3 | te | Should specify that even if blocks are repeated, all blocks except the maneuver are at the same EPOCH. | David S. Berry / NASA | Add text to clarify that there is only one applicable epoch for the APM data. |  |
| 3-5 | 3.2.4 | Table 3-3 | te | REF\_FRAME\_A and REF\_FRAME\_B in quaternion block: should use values from the Nav WG SANA reference frames registries instead of Annex B. | David S. Berry / NASA | We currently have "Celestial Body Reference Frames" and "Orbit Relative Reference Frames", will soon have "Spacecraft Body Reference Frames" too. |  |
| 3-5 | 3.2.4 | Table 3-3 | te | Q1, Q2, Q3, QC: Should indicate that the angle is measured in degrees. | David S. Berry / NASA | Add that angle theta is measured in degrees. |  |
| 3-5 | 3.2.4 | Table 3-3 | te | Q1\_DOT, Q2\_DOT, Q3\_DOT, QC\_DOT: Should we indicate in the description that these are "Time derivative" values? That would be consistent with the text for Euler angle derivatives. | David S. Berry / NASA | Consider. |  |
| 3-5 | 3.2.4 | Table 3-3 | te | REF\_FRAME\_A and REF\_FRAME\_B in Euler angle block: should use values from the Nav WG SANA reference frames registries instead of Annex B. | David S. Berry / NASA | We currently have "Celestial Body Reference Frames" and "Orbit Relative Reference Frames", will soon have "Spacecraft Body Reference Frames" too. |  |
| 3-6 | 3.2.4 | Table 3-3 | te | REF\_FRAME\_A and REF\_FRAME\_B in angular velocity block: should use values from the Nav WG SANA reference frames registries instead of Annex B. | David S. Berry / NASA | We currently have "Celestial Body Reference Frames" and "Orbit Relative Reference Frames", will soon have "Spacecraft Body Reference Frames" too. |  |
| 3-6 | 3.2.4 | Table 3-3 | te | REF\_FRAME\_A and REF\_FRAME\_B in spin block: should use values from the Nav WG SANA reference frames registries instead of Annex B. | David S. Berry / NASA | We currently have "Celestial Body Reference Frames" and "Orbit Relative Reference Frames", will soon have "Spacecraft Body Reference Frames" too. |  |
| 3-6 | 3.2.4 | Table 3-3 | ed | There is a blank row between REF\_FRAME\_B and SPIN\_ALPHA | David S. Berry / NASA | Delete empty row. |  |
| 3-7 | 3.2.4 | Table 3-3 | te | INERTIA\_REF\_FRAME keyword... should it just be "REF\_FRAME" consistent with other simplifications in the APM? | David S. Berry / NASA | Consider. Discuss with WG (we do have "COV\_REF\_FRAME" in ODM, etc., so it may not make sense to change). |  |
| 3-7 | 3.2.4 | Table 3-3 | te | INERTIA\_REF\_FRAME block: should use values from the Nav WG SANA reference frames registries instead of Annex B. | David S. Berry / NASA | We currently have "Celestial Body Reference Frames" and "Orbit Relative Reference Frames", will soon have "Spacecraft Body Reference Frames" too. |  |
| 3-7 | 3.2.4 | Table 3-3 | te | MAN\_EPOCH\_START: should mention the format and reference to 7.7. Should show an example. | David S. Berry / NASA | Add reference to "[4], ASCII Time Code A or B", or a reference to 7.7. Also add example. |  |
| 3-7 | 3.2.4 | Table 3-3 | te | MAN\_REF\_FRAME: should use values from the Nav WG SANA reference frames registries instead of Annex B. There is no example. | David S. Berry / NASA | We currently have "Celestial Body Reference Frames" and "Orbit Relative Reference Frames", will soon have "Spacecraft Body Reference Frames" too. Also add example, as on other reference frame keywords. |  |
| 3-7 | 3.2.5.1 | para 1 | ed | Instructions for reader. | David S. Berry / NASA | From: "See 'CREATION\_DATE in table 3-1 or see reference [4] for examples..."  To: See Section 7.7 for instructions..." |  |
| 3-7 | 3.2.5.1 | para2 line 4 | ed | Since we are long past the time period 200x, we should change the example. | David S. Berry / NASA | From: 200x  To: 20xx (all instances) |  |
| 3-7 | 3.2.5.2 | Title | ed/te | In section 4.2.5.2, with similar material, the title is "Technical", here it is "General". I think "Technical" maybe is better. | David S. Berry / NASA | From: GENERAL  To: TECHNICAL |  |
| 3-8  3-9 | 3.3 |  | ed/te | Neither example uses the new "MESSAGE\_ID" keyword | David S. Berry / NASA | Add "MESSAGE\_ID" to one of the examples |  |
| 3-9 | 3.3 | Fig 3-2 | ed/te | In the Euler angle block, REF\_FRAME\_A is listed as "Euler", but it is not clear what frame this is... I don't think it's specific enough, and it's not in Annex B. | David S. Berry / NASA | Fix the frame name. |  |
| 4-12 | 4.2.2 | para2 line 2 | ed | After "reference [4]", it would be helpful to the reader/user to explicitly cite "ASCII Time Code A or B". | David S. Berry / NASA | Add "ASCII Time Code A or B" after the reference number |  |
| 4-14 | 4.2.3 | Table 4-3 | te | CENTER\_NAME: starts with "Origin of reference frame...". But which one? | David S. Berry / NASA | Maybe change the definition to "Central body orbited, if applicable" or something like that? |  |
| 4-14 | 4.2.3 | Table 4-3 | te | CENTER\_NAME: allows "another spacecraft" for the CENTER\_NAME... is this really necessary for an attitude message? | David S. Berry / NASA | Consider whether or not it's actually necessary, and delete use of another spacecraft for the center if it's not. |  |
| 4-14 | 4.2.3 | Table 4-3 | te | CENTER\_NAME: should use values from the Nav WG "orbit centers" registry instead of JPL SSD. | David S. Berry / NASA | Change source of values to the Nav WG "orbit centers" registry https://sanaregistry.org/r/orbit\_centers |  |
| 4-14 | 4.2.3 | Table 4-3 | te | REF\_FRAME\_A and REF\_FRAME\_B: should use values from the Nav WG SANA reference frames registries instead of Annex B. | David S. Berry / NASA | We currently have "Celestial Body Reference Frames" and "Orbit Relative Reference Frames", will soon have "Spacecraft Body Reference Frames" too. |  |
| 4-15 | 4.2.3 | Table 4-3 | te | TIME\_SYSTEM: should use values from the Nav WG "time systems" registry instead of Annex B. | David S. Berry / NASA | Change source of values to the Nav WG "time systems" registry https://sanaregistry.org/r/time\_systems |  |
| 4-15 | 4.2.3 | Table 4-3 | ed | Unnecessary comma. There is an orphan comma after the "USEABLE\_START\_TIME" keyword. | David S. Berry / NASA | Remove comma |  |
| 4-15 | 4.2.3 | Table 4-3 | ed | Unnecessary comma, subject/verb agreement in the phrase "it may be necessary, to utilize this keywords" | David S. Berry / NASA | From: "it may be necessary**,** to utilize this keyword**s**"  "it may be necessary to utilize this keyword" |  |
| 4-17 | 4.2.5 | Table 4-4 | ed/te | For "Quaternion Options", "Euler Angle Options", and "Spin Axis Options" there is an unclear note. My "Suggested Disposition" provides what I think you intended with the "note". | David S. Berry / NASA | From: note that keywords and values appear only in Metadata  To: note that keyword definitions appear only in 'Table 3-3, APM Data' |  |
| 4-18 | 4.2.5.1 | para 1 | ed | Instructions for reader. | David S. Berry / NASA | From: "See 'CREATION\_DATE in table 3-1 or see reference [4] for examples..."  To: See Section 7.7 for instructions..." |  |
| 4-18 | 4.2.5.1 | para2 line 4-5 | ed | Since we are long past the time period 200x, we should change the example. | David S. Berry / NASA | From: 200x  To: 20xx (all instances) |  |
| 4-18 | 4.2.5.2 | para 1 lines 3-4 | ed/te | Since we are in the AEM section, I think we should use different messages. | David S. Berry / NASA | From: OPM in line 3, APM in line 4  To: OEM in line 3, AEM in line 4 |  |
| 4-18 | 4.2.5.2 | para 7 | ed | This paragraph is a duplicate of paragraph 2 in the same section. | David S. Berry / NASA | Remove paragraph 7. |  |
| 4-19 | 4.3 | Fig 4-1 | ed | CREATION\_DATE is in November, but the comment says it was created in October. | David S. Berry / NASA | Make the CREATION\_DATE and comment consistent. |  |
| 4-20 | 4.3 | Fig 4-2 | ed/te | The OBJECT\_ID shown is 2006224, which could be OK, but doesn't conform to the recommended format in Table 4-3 | David S. Berry / NASA | From: 2006224  To: 2006-224A (or something else that conforms to the OBJECT\_ID format recommendation. |  |
| 4-21 | 5.1.1  5.1.4 |  | ed | The first sentence of 5.1.4 is more or less a duplicate of the first sentence in 5.1.1 | David S. Berry / NASA | Consolidate and smooth the text, probably in 5.1.1 and remove the first sentence of 5.1.4. |  |
| 4-23 | Table 5-2 |  | ed/te | For CCSDS\_ACM\_VERS, 1.0 is shown as the value. By convention, we reflect the Blue Book version that is applicable, so this is not STRICTLY the actual ACM version. | David S. Berry / NASA | From: 1.0  To: 2.0 |  |
| 4-24 | Table 5-3 |  | ed | COMMENT: Far right column in table is blank. | David S. Berry / NASA | From: blank  To: "No" |  |
| 4-24 | Table 5-3 |  | ed | OBJECT\_ID: Typo. | David S. Berry / NASA | From: "Wile"  To: "While" |  |
| 4-24 | Table 5-3 |  | ed | OBJECT\_ID: Word choice in line 4 of Description. | David S. Berry / NASA | From: "names"  To: "values" |  |
| 4-24 | Table 5-3 |  | te | CENTER\_NAME: starts with "Origin of reference frame...". But which one? | David S. Berry / NASA | Maybe change the definition to "Central body orbited, if applicable" or something like that? |  |
| 4-24 | Table 5-3 |  | te | CENTER\_NAME: allows "another spacecraft" for the CENTER\_NAME... is this really necessary for an attitude message? | David S. Berry / NASA | Consider whether or not it's actually necessary, and delete use of another spacecraft for the center if it's not. |  |
| 4-24 | Table 5-3 |  | te | CENTER\_NAME: replace "link TBS" | David S. Berry / NASA | From: "link TBS"  To: https://sanaregistry.org/r/orbit\_centers |  |
| 4-25 | 5.2.4.2 | 2 | ed | Wrong table ID cited. | David S. Berry / NASA | From: 5-8  To: 5-4 |  |
| 4-25 | 5.2.4.6 |  | ed | Awkward wording. | David S. Berry / NASA | From: Each of these keywords...  To: Each keyword... |  |
| 4-25 | 5.2.4.7 |  | te | Regarding multiple blocks and the uniqueness requirement, Dan has changed the "shalls" to "shoulds" in the OCM, given the burden placed on both the producer and consumer of the message to program all the uniqueness considerations correctly to achieve a message that conforms to the standard. | David S. Berry / NASA | Consider changing "shall" to "should". This may require some other rewording in the section. |  |
| 4-26 | 5.2.4.12 |  | ed/te | I think this section more logically appears before 5.2.4.8 | David S. Berry / NASA | Consider relocating 5.2.4.12. |  |
| 4-27 | Table 5-4 |  | te | REF\_FRAME\_A and REF\_FRAME\_B: should use values from the Nav WG SANA reference frames registries instead of Annex B. | David S. Berry / NASA | We currently have "Celestial Body Reference Frames" and "Orbit Relative Reference Frames", will soon have "Spacecraft Body Reference Frames" too. |  |
| 4-27 | Table 5-4 |  | ed | ATT\_TYPE: typo(?) | David S. Berry / NASA | From: "ANNEX B, section B5ANNEXB"  To: "ANNEX B, section B5" |  |
| 4-27 | Table 5-4 |  | te | ATT\_TYPE: Units issue. In first paragraph of 7.7, it is stated that angles are measured in degrees. The units here are specified in radians. | David S. Berry / NASA | Consider changing "rad" to "deg" in "Units" column. We may want to discuss radians vs. degrees in more detail at Darmstadt meetings. |  |
| 4-27 | Table 5-4 |  | te | RATE\_TYPE: Units issue. In first paragraph of 7.7, it is stated that angles (and thus angular rates) are measured in degrees. The units here are specified in radians. | David S. Berry / NASA | Consider changing "rad/s" to "deg/s" in "Units" column. We may want to discuss radians vs. degrees in more detail at Darmstadt meetings. |  |
| 4-27 | 5.2.5.2 |  | ed | The statement as written doesn't make much sense. | David S. Berry / NASA | Suggest copying the text of 5.2.4.2, which is what I think was intended for 5.2.5.2 |  |
| 4-28 | Table 5-5 |  | ed | PHYS\_START, PHYS\_STOP: The "Examples" column is blank. | David S. Berry / NASA | Suggest using "n/a" in the Examples column here, as in Table 5-4. Some other tables have used "n/a", and others have blank. Consider consistent treatment for examples in all the ACM tables for these demarcation keywords. |  |
| 4-29 | 5.2.6.9 |  | te | The statement here contradicts row 2 of Table 5-6. | David S. Berry / NASA | Resolve contradiction. In general, we try to have some reasonable restrictions on placement of comments, primarily motivated by the XML representations. |  |
| 4-29 | 5.2.6.12 |  | ed/te | Requirements language... | David S. Berry / NASA | From: "...elements could be defined..."  To: "...elements may be defined..." |  |
| 4-30 | Table 5-6 |  | te | ATT\_BASIS: "Units" column. | David S. Berry / NASA | From: blank  To: "n/a" |  |
| 4-30 | Table 5-6 |  | te | REF\_FRAME: If not provided, how shall the data be used? | David S. Berry / NASA | Should REF\_FRAME be considered a requirement if this section is provided in an ACM? |  |
| 4-30 | Table 5-6 |  | te | REF\_FRAME: Should there be a reference to a TBS SANA registry? | David S. Berry / NASA | Consider potential covariance data specifications that we could put into a SANA registry. |  |
| 4-30 | Table 5-6 |  | te | COV\_ATT\_STATES, COV\_RATE\_STATES: if covariance data is provided, it's unclear how a user would associate the numbers to the attitude states... or would it tie back directly to the contents of Table 5-4? | David S. Berry / NASA | Consider whether these should be required keywords or whether it would just tie back to the related Attitude State Time History keywords. |  |
| 4-30 | Table 5-6 |  | te | COV\_ATT\_STATES, COV\_RATE\_STATES: if covariance data is provided, it's unclear how a user would associate the numbers to the attitude states... or would it tie back directly to the contents of Table 5-4? | David S. Berry / NASA | Consider whether these should be required keywords or whether it would just tie back to the related Attitude State Time History keywords. |  |
| 4-30 | Table 5-6 |  | te | COV\_ATT\_STATES: Units issue. In first paragraph of 7.7, it is stated that angles are measured in degrees. The units here are specified in radians. | David S. Berry / NASA | Consider changing "rad" to "deg" in "Units" column. We may want to discuss radians vs. degrees in more detail at Darmstadt meetings. |  |
| 4-30 | Table 5-6 |  | te | COV\_RATE\_STATES: Units issue. In first paragraph of 7.7, it is stated that angles (and thus angular rates) are measured in degrees. The units here are specified in radians. | David S. Berry / NASA | Consider changing "rad/s" to "deg/s" in "Units" column. We may want to discuss radians vs. degrees in more detail at Darmstadt meetings. |  |
| 4-30 | 5.2.7.7 | 1 | ed/te | Indicates that "MAN\_TYPE" keyword must appear, but that keyword is not defined in Table 5-7. Is it supposed to be MAN\_PURPOSE? | David S. Berry / NASA | Consider whether 5.2.7.7 and Table 5-7 should both refer to MAN\_TYPE or MAN\_PURPOSE, or if these are 2 separate keywords with different uses. |  |
| 4-31 | Table 5-7 |  | ed/te | MAN\_PURPOSE: Requirements language. | David S. Berry / NASA | There are 2 instances of "can" in the Description that should be changed to "may". |  |
| 4-31 | Table 5-7 |  | ed/te | MAN\_BEGIN, MAN\_END: Units issue. | David S. Berry / NASA | From: "sec"  To: "s" |  |
| 4-31 | Table 5-7 |  | ed/te | TARGET\_MOMENTUM: Units issue. | David S. Berry / NASA | From: "N-m-s"  To: "N\*m\*s"  per 7.8.1 |  |
| 4-32 | 5.2.8.5 | 1 | ed | Typo | David S. Berry / NASA | From: "only on Attitude"  To: "only one Attitude" |  |
| 4-32 | 5.2.8.7 | 1 | ed | Word choice | David S. Berry / NASA | From: "This attitude determination section..."  To: "The attitude determination section..." |  |
| 4-32 | Table 5-8 |  | ed | COMMENT: Mentions "EST\_START" keyword, which is no longer used. | David S. Berry / NASA | From: "EST\_START"  To: "AD\_START" |  |
| 4-32 | Table 5-8 |  | ed/te | AD\_METHOD: references Annex C7, which is not present in the document. | David S. Berry / NASA | Forthcoming? |  |
| 4-32 | Table 5-8 |  | ed | NUMBER\_COV\_STATES: typo in Units column | David S. Berry / NASA | From: "n/q"  To: "n/a" |  |
| 4-32 | Table 5-8 |  | ed | The rows "NUMBER\_STATES" and "NUMBER\_COV\_STATES" are duplicated. | David S. Berry / NASA | Delete duplicate table rows. |  |
| 4-32 | Table 5-8 |  | te | REF\_FRAME\_A, REF\_FRAME\_B: The source of the values is not specified. | David S. Berry / NASA | Specify the source of the values. |  |
| 4-33 | Table 5-8 |  | ed | SENSOR\_NOISE\_STDDEV\_i: Typo (capitalization of index value) | David S. Berry / NASA | From: NUMBER\_SENSOR\_NOISE\_COVARIANCE\_**I**  To: NUMBER\_SENSOR\_NOISE\_COVARIANCE\_**i** |  |
| 4-34 | Table 5-9 |  | ed/te | COMMENT: says comments are "allowed at any point(s) throughout the ACM User-Defined Data section". | David S. Berry / NASA | From: "allowed prior to each User-Defined Parameter" (consistent with 5.2.9.4) |  |
| 4-34 | 5.2.9, Table 5-9 |  | ed | There are several formulations of the main subject of this section:  "User Defined Parameter"  "User-Defined Parameter"  "user-defined parameter"  "User defined parameter"  "user defined parameter"  "User-Defined Data"  "user-defined data" | David S. Berry / NASA | Suggest consistency of usage. |  |
| 4-35 | Fig 5-1 |  | ed/te | Is missing "NUMBER\_STATES" keyword, which is specified as mandatory in Table 5-4 | David S. Berry / NASA | Add "NUMBER\_STATES = 4" |  |
| 4-36 | Fig 5-2 |  | ed/te | Data blocks are not in the order specified in Table 5-1 | David S. Berry / NASA | Rearrange blocks to match specification in Table 5-1. |  |
| 4-36 | Fig 5-2 |  | ed/te | The format of TARGET\_MOMENTUM doesn't match what is shown in Table 5-7, which shows comma separated values enclosed in square brackets, with a units specification. | David S. Berry / NASA | Not sure which format is desired, but the table and the figure should be consistent. Units should be added. |  |
| 4-37 | Fig 5-3 |  | ed/te | OBJECT\_NAME and OBJECT\_ID appear out of the order specified in table 5-3 | David S. Berry / NASA | Move these keywords between ORIGINATOR\_POC and TIME\_SYSTEM. |  |
| 4-37 | Fig 5-3 |  | ed/te | Value for OBJECT\_ID matches recommended format, but the number of objects is huge (26^3) | David S. Berry / NASA | Maybe change "ZZZ" to a single letter? |  |
| 4-37 | Fig 5-3 |  | ed/te | Includes a keyword "CM" that I think is supposed to be "CP" based on Table 5-5 | David S. Berry / NASA | From: "CM"  To: "CP" |  |
| 4-38 | Fig 5-4 |  | ed/te | TIME\_SYSTEM is out of order... should appear before EPOCH\_TZERO | David S. Berry / NASA | Reverse order of EPOCH\_TZERO and TIME\_SYSTEM |  |
| 4-38 | Fig 5-4 |  | ed/te | The covariance and attitude determination sections are not in the order specified in Table 5-1 | David S. Berry / NASA | Rearrange blocks to match specification in Table 5-1. |  |
| 4-38 | Fig 5-4 |  | ed/te | Uses a keyword "ATTITUDE\_STATES" that I think may have been left out of Table 5-8 (?) based on the description of "RATE\_STATES". | David S. Berry / NASA | Add ATTITUDE\_STATES to Table 5-8 (?) |  |
| 4-38 | Fig 5-4 |  | ed/te | Uses a keyword "COV\_ATT\_STATES" that is defined for the Covariance Time History, but not the Attitude Determination section. | David S. Berry / NASA | Not sure how to resolve this one. |  |
| 4-40 | 6.4 |  | ed | The section headers such as "OVERVIEW", "XML VERSION", "BEGINNING THE INSTANTIATION", etc. should be "Header 3" (e.g., 6.4.1) but the header attribute has been removed in most of the document. You can use the NDM/XML document 505 as a template since most of the headings in the APM and AEM sections are the same now that they are moved to the ADM. | David S. Berry / NASA | Restore section numbering in the document. |  |
| 4-42 | 6.4 | 3 | ed | There is a section number "5-?". The ? is now known. | David S. Berry / NASA | From: 5-?  To: 5-2 |  |
| 4-43 | 6.6 | 3 | ed | There is a NOTE regarding figures. I think a figure would most properly go just prior to Section 6.7 after all the specifications for building an APM/XML have been presented. | David S. Berry / NASA | Move the "NOTE" to page 4-46, just before Section 6.7. Eventually it can be replaced with an example. |  |
| 4-46 | 6.7 | 3 | ed | There is a NOTE regarding figures. I think a figure would most properly go just prior to Section 6.7 after all the specifications for building an AEM/XML have been presented. | David S. Berry / NASA | Move the "NOTE" to page 4-49, just before Section 6.8. Eventually it can be replaced with an example. |  |
| 4-48 | DISCUSSION | para 2, lines 3-5 | ed | In the section with header "DISCUSSION", paragraph 2, there is a sentence "As in the KVN representation of the quaternion... scalar component first or last)." This statement is no longer true given the changes in the AEM. | David S. Berry / NASA | Delete the cited sentence. |  |
| 4-49 | 6.8 |  | te | There is no discussion of how to construct an ACM/XML instantiation. | David S. Berry / NASA | New Action Item for David. |  |
| 7-1 | 7.1 | 2 | ed | Subsections cited are not correct. | David S. Berry / NASA | From: "5.2 through 5.8"  To: "7.2 through 7.9" |  |
| 7-1 | 7.4 | 1 | ed | Subsections cited are not correct. | David S. Berry / NASA | From: "5.2.1 through 5.2.7"  To: "5.2.2 through 5.2.9" |  |
| 7-1 | 7.5 |  | te | We have had 254 characters line length for the APM and AEM, but the OCM (upon which the ACM is based) specifies "arbitrary length" (which I personally don't think is necessary... there really is a practical limit). | David S. Berry / NASA | Discuss line length for ACM at Darmstadt? |  |
| 7-1 | 7.6 |  | ed | Specifies a "0" section number: "... as noted in 0". This is a consequence of removing the paragraph numbering that existed in earlier versions of the ADM. | David S. Berry / NASA | See row 2 of this CRM. |  |
| 7-2 | 7.6 | last para | ed/te | The list of keywords that are exceptions to the KVN syntax is incomplete, e.g., it does not include "MANEUVER\_START/STOP" and does not include the many "START/STOP" pairs found in the ACM. | David S. Berry / NASA | We should consider using something like "COMMENT, \*\_START, \*\_STOP, and AEM data lines" instead of the long list of START/STOP pairs. However, there is at least one exception to this also that we will need to resolve, i.e., MAN\_EPOCH\_START, which IS a KVN keyword. |  |
| 7-2 | 7.7 | para 5 | ed | Needs to mention ACM. | David S. Berry / NASA | From: "... within an APM or an AEM."  To: "... within an APM, AEM, or ACM." |  |
| 7-3 | 7.7  Time string format |  | ed | In the first time format string, there is an extra colon. | David S. Berry / NASA | From: "DD**:**Thh"  To: "DDThh" |  |
| 7-3 | 7.7 | last para | ed | Missing comma between minutes and seconds. | David S. Berry / NASA | From: "... hours, minutes seconds, and..."  To: "... hours, minutes**,** seconds, and..." |  |
| 7-4 | 7.8.1 |  | te | Add division of units | David S. Berry / NASA | Add list item (e): e) division of units shall be denoted with a forward slash '/' (e.g., deg/s) |  |
| 7-4 | 7.8.3 (new section) |  | te | Add section for "ACM Restrictions". Seems like this would be a combination of APM and AEM since some ACM keywords have units specifications and others (in data lines mostly) do not. | David S. Berry / NASA | Add applicable section in next version. |  |
| 7-5 | 7.9.3.1 |  | ed | I don't think this section number is necessary. Compare for example 7.9.2 and 7.9.4, which don't have such a section title "General". | David S. Berry / NASA | Remove section header 7.9.3.1, but retain the text as 7.9.3 |  |
| 8-1 | 8.2 |  | te | Line length we should discuss at Darmstadt | David S. Berry / NASA | Discuss ACM line length limit at Darmstadt. |  |
| 8-1 | 8.2 |  | te | Escaped characters recommendation... these have not been an issue to date. It's not clear that we need something for this. | David S. Berry / NASA | Leave the red text in the document for now; let's discuss at Darmstadt. |  |
| 8-2 | 8.3 | last | ed/te | Since it is not necessarily clear what the "ndm:epochType" is, add "(see 7.7)" at the end of the line. | David S. Berry / NASA | Add reference as cited. |  |
| 8-2 | 8.4 | 2 | ed | Section citations are faulty. | David S. Berry / NASA | From: "Sections 1 through Error! Reference source not found."  To: "Sections 3 through 5" |  |
| 8-2 | 8.4 | 4 | ed | Refers reader to Annex C for examples. | David S. Berry / NASA | Since the ADM examples are inline with the APM, AEM, and ACM, the example XML formats should be either in Section 3,4,5 as applicable or all in Section 6. |  |
| B-1 | B2 |  | ed/te | We may want to replace this with our SANA Time Systems registry, though I note that there are 3 time system values in B2 that are not in the SANA Time Systems registry: GMST, MET, MRT. | David S. Berry / NASA | Discuss at Darmstadt, in particular, the ones that are in ADM but not in SANA. |  |
| B-2 | B3 |  | ed/te | We can probably replace this with our SANA reference frames registries. Some of the items in this annex are in the Celestial Body Reference Frames registry, and the rest are in the Orbit Relative Reference Frames registry. | David S. Berry / NASA | Consider removing this section of the Annex and point to the SANA registries. |  |
| B-3 | B4 |  | ed/te | We can probably replace this with our SANA reference frames registries (Spacecraft Body Reference Frames), though the relevant material has not yet been submitted to SANA... but it will be soon. | David S. Berry / NASA | Consider removing this section of the Annex and point to the SANA registries. |  |
| B-3 | B5, B6 |  | ed/te | We should discuss at Darmstadt if we want to include the material in these tables to SANA Registries; I suspect we will want to include this material in registries and remove from the document. | David S. Berry / NASA | Discuss at Darmstadt. |  |
| C-5 | C1 | 1 | ed | Word choice. | David S. Berry / NASA | From: "paragraph"  To: "annex" |  |
| C-5 | C2 | 11 | te | The units of the angle measure should be stated. | David S. Berry / NASA | From: " is the rotation angle,"  To: " is the rotation angle in degrees," (or "measured in degrees" |  |
| C-6 | C2 | 3 | ed/te | Uses "should", which is "requirements language". We are not allowed to use "requirements language" in an informative annex. | David S. Berry / NASA | Two approaches are possible:  (1) From: "should be made non negative by convention"  To: "is non negative by convention"  (2) Remove the statement about QC's non-negativity from the annex, and add it to the definition of QC in Table 3-3. |  |
| C-7 | C5 | 10 | ed/te | States "The following is assumed:", implying that there are some assumptions to follow. But the next line also ends with a colon followed by a list of angular momentum vector components. It is not clear that the second phrase ending with ":" is the assumption. If it is true that the angular momentum vector components are an assumption, it seems odd that we are standardizing it. | David S. Berry / NASA | Either (a) make it clear what actually is being assumed, or (b) delete the statement "The following is assumed:". It seems to me that the second statement with list of components is capable of standing alone. If the components are actually assumptions, then you could accomplish (a) above by writing: "It is assumed that the angular momentum vector has components in the frame B:" followed by the list of components. |  |
| D-8  D-9 | Annex D |  | ed/te | It is not clear WHY some of these changes are being made (some seem rather arbitrary), which may bother organizations that have invested in software to process messages described in the ADM 1.0 Blue Book. | David S. Berry / NASA | Add a column to the tables titled "Rationale" or "Rationale for Change". Then describe why the change is technically better than what was available in ADM 1.0 |  |
| D-9 | Annex D |  | ed | In the AEM table, row 7 | David S. Berry / NASA | From: QUATERNION\_ANGVEL  To: QUATERNION/ANGVEL |  |
| D-9 | Annex D |  | te | Doesn't mention that the ACM was added. | David S. Berry / NASA | Add a (very brief) section on the ACM. It doesn't need to say much other than that "The Attitude Comprehensive Message (ACM) was added to provide symmetry with the Orbit Comprehensive Message (OCM) being added to the Orbit Data Messages standard." That may be all that is necessary. |  |
|  |  |  |  | **NOTE: For the next few requirements related to Annex E you may want to check the requirements annex in the ODM to see what was done there (in particular, with requirement numbering).** |  |  |  |
| E-2 | E2 | Table E-1 | ed/te | There is no column for the ACM | David S. Berry / NASA | Add a column for the ACM, and populate the rows of the table according to how requirements are satisfied (or not) by the ACM. NOTE: the ACM may also require the addition of some new requirements. |  |
| E-3 | E2 | Table E-2 | ed/te | The title of the Section is "Primary Requirements", but Table E-2 lists "Heritage Requirements". | David S. Berry / NASA | Two approaches are possible:  (1) Remove the word "Primary" from the title of E2.  (2) Add a section E3 entitled "Heritage Requirements" |  |
| E-3 | E2 | Table E-2 | ed/te | There is no column for the ACM | David S. Berry / NASA | Add a column for the ACM, and populate the rows of the table according to how requirements are satisfied (or not) by the ACM. |  |
| E-3 | E2 | Table E-2 | ed/te | The title of the Section is "Primary Requirements", but Table E-3 lists "Desirable Characteristics". | David S. Berry / NASA | Two approaches are possible:  (1) Remove the word "Primary" from the title of E2.  (2) Add a section E4 entitled "Desirable Characteristics" |  |
| E-3 | E2 | Table E-3 | ed/te | There is no column for the ACM | David S. Berry / NASA | Add a column for the ACM, and populate the rows of the table according to how requirements are satisfied (or not) by the ACM. NOTE: the ACM may also require the addition of some new desirable characteristics. |  |
| E-3 | E2 | Table E-3 | ed/te | Requirement 1 and requirement 5 are duplicates. | David S. Berry / NASA | Delete requirement 5. |  |
| E-4 | E3 | 2 | ed | Cites two messages | David S. Berry / NASA | From: "two recommended messages"  To: "three recommended messages" |  |
| E-4 | E3 | Table E-4 | ed/te | There is no column for the ACM | David S. Berry / NASA | Add a column for the ACM, and populate the rows of the table according to how the zAcriteria are satisfied (or not) by the ACM. |  |
| E-4 | E4 | Table E-4 | ed/te | There is no column for the ACM | David S. Berry / NASA | Add a column for the ACM, and populate the rows of the table according to how the services are satisfied (or not) by the ACM. |  |
| F-1 | Table F-1 |  | ed/te | Row 6: may want to reference SANA reference frame registries | David S. Berry / NASA | Consider changing  From: "annex B"  To: "SANA reference frame registries" |  |
| F-1 | Table F-1 |  | ed/te | Row 7: Mentions Annex C, section C5, but that section doesn't say anything about needing an ICD. | David S. Berry / NASA | Add mention of using ICD in Annex C, Section C5 |  |
| F-1 | Table F-1 |  | ed/te | Row 7: Mentions Annex C, section C5, but has a trace to 3.2.4 | David S. Berry / NASA | From: "3.2.4"  To: "Annex C, Section C5" |  |
| F-1 | Table F-1 |  | ed | Row 7: Typo | David S. Berry / NASA | From: "different form"  To: "different from" |  |
| F-2 | Table F-1 |  | te | Row 11: There doesn't seem to be any discussion in the body of the text about this topic, or the need for an ICD. | David S. Berry / NASA | Either add appropriate text in Section 3, 4, and/or 5; or assess the need for an ICD in ADM 2.0. If an ICD is not necessary, delete this row. |  |
| H-1 | [H2] | 2 | ed | Document number is incorrect. | David S. Berry / NASA | From: "-G-2"  To: "-G-3" |  |
| I-4 | A2 |  | te | The existing SANA material in the Annex I is OK, however, the other registries we have been working on should be mentioned, specifically, the time systems, reference frames, orbit centers. We also may be adding some more attitude related registries (see comments on page B-3 related to Annex sections B5 and B6) | David S. Berry / NASA | Consider adding the additional SANA registries in Annex I. |  |