| **Page** | **Section** | **Line** | **Type** | **Comment/ Rationale** | **Source of Comment (Name/Agency)** | **Suggested Disposition** | **Disposition**  **(Completed by Principal Editor)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 5-46 thru 5-48 | Figures 6-2 thru 6-4 |  |  | NOTE: I didn't spend too much time reviewing example OCM's, but there are a few inconsistencies between the examples and the evolution of the metadata, e.g., these contain keywords that have apparently been phased out of the OCM: TECH\_POC, OBJECT\_ID, TIME\_SYSTEM. | David S. Berry / NASA | Ultimately the examples will need to be updated. It's an open question as to whether examples should be updated as changes to the specification is made, or whether the examples should be all updated at the conclusion of the specification development. |  |
| 5-50 | Fig 6-5 |  |  | The example indicates "<intervening data records omitted here>". Since you know how many lines were omitted given EC\_REPR\_N, the number of intervening lines should be given. | David S. Berry / NASA | From: "<intervening data records..."  To: "< 8 intervening data records..." in the first case, and ""< 18 intervening data records..." in the second case. |  |
| 6-1 | 7.3.1 |  | ed/te | "Comment line;" was added to the list of line types, but I think the order should be changed such that comment lines follow data lines in the list. | David S. Berry / NASA | From: "Comment line;" followed by "Data line; or"  To: "Data line;" followed by "Comment line; or"  i.e., reverse the existing order of the 2 lines. |  |
| 6-2 | 7.4.1.6 | 4 | ed | Indicates to "See 0". | David S. Berry / NASA | I'm not certain what section the reader is being referred to... 5.2.5.4 is a possibility, but it explicitly lists 6 elements, which could be misleading for an OCM reference. |  |
| 6-4 | 7.6.1.1 | (c) | ed/te | There is an implied division of units here that is not specified. [Note this is my omission from the prior version of ODM.] | David S. Berry / NASA | It may be desirable to consider something like the Section 1.4.1 "Unit Notation" shown in the RDM. On the other hand, given some of the other ODM concepts, these unit operations are pretty elementary. |  |
| 6-6 | 7.7.9 |  | te | This specification makes impossible an XML schema definition of the OCM. We could still have an XML representation, but there would be no way to validate it with a schema checker. | David S. Berry / NASA | Consider the true desirability of the specification as written. It is possible to have many comments in an OCM in specific places and write an XML schema to match that, but "comments anywhere" in combination with many adjacent optional keywords will fail validation, as has been illustrated. |  |
| 6-7 | 7.8.1 | Last | te | The statement currently reads: "The following version numbers are supported:". Technically, any CCSDS version of the ODM other than the current Blue Book is referred to as a "Silver Book", and is "Historical". Thus it is technically not "supported" by the CCSDS; however, individual users may have implementations that conform to earlier versions of the ODM, and may not wish to change. | David S. Berry / NASA | From: "... are supported:"  To: "... are supported (Blue Book) or have been supported in the past (Silver Book):" |  |
| 6-8 | Table |  | ed | The top part of the table (versions 1.0 and 2.0) is sorted by order of message type appearance in the ODM, then by version number. The bottom part (version 3.0) is sorted by only by order of message type appearance in the ODM. | David S. Berry / NASA | Consistent sort: either all version 1.0 together, 2.0 together, 3.0 together; or all OPM entries together, OMM entries together, etc. |  |
| 6-9 | 7.8.2.4 |  | ed | Table 6-11 is left out of the list. | David S. Berry / NASA | Add Table 6-11 to the list of applicable tables of keywords for an OCM. |  |
| A-4 | A2.4 |  | ed | The document number refers to the TDM. | David S. Berry / NASA | From: 503.0  To: 502.0 |  |
| A-5 | A2.5 |  | te | The table is blank. | David S. Berry / NASA | Eventually we need to fill this out. I agree it can be left until the content solidifies, though it should be fairly easy to fill out for the OPM, OMM, OEM. |  |
| A-9 |  |  | ed/te | Since we have "ITRFyyyy" in the list, should we remove "ITRF-93" and "ITRF-97"? or "grandfather" these two entries? | David S. Berry / NASA | Consider. |  |
| A-9 | B2 |  | te | MOON\_MEIAUE... good idea to add a technical reference here. | David S. Berry / NASA | No action necessary, but could consider for other frames as well... Ref L-1 is unlikely to ever include all these frames in my opinion. |  |
| A-10 | B3 |  | te | Most of the frames in this table require an ICD to be effective (spacecraft body related, actuator related, sensor related, etc.). | David S. Berry / NASA | Perhaps add a general statement at the beginning of B3 indicating that an ICD is likely necessary for most of these. |  |
| A-10 | B3 |  | te | Several of the frame values are limited to 1 digit (e.g., ACTUATOR\_x), but some "major" spacecraft have more than 10 actuators (e.g., Stardust spacecraft had 8 RCS thrusters and 8 TCM thrusters, Mars Reconnaissance Orbiter has 8 RCS thrusters and 6 TCM thrusters, etc.). | David S. Berry / NASA | Consider whether one digit should be expanded to 2 for any of the relative frames. |  |
| A-10 | B3 |  | ed | For CSS\_xy, it might be helpful to specify what is different about "x" and "y". (At least, I personally don't know). | David S. Berry / NASA | Consider adding explanatory sentence. |  |
| A-10 | B3 |  | ed/te | For "RTN", we have the parenthetical "(QSW)". For "RSW" we have "Another name for 'Radial, Transverse, Normal". | David S. Berry / NASA | Can the phrase "Also known as 'QSW' or 'RSW'." be added to the RTN definition? or should "QSW" be explicitly added as a table entry? |  |
| A-12 | B4 | 1 | ed/te | Specify in the first line that these element set keywords are only applicable to the OCM. | David S. Berry / NASA | From: "... time histories may..."  To: "... time histories in the OCM may..." |  |
| A-12 | B4 | para3 | ed/te | Replace "implied normative" statements with the "approved" vocabulary. Also, break this one sentence into two. (PART 1 of 2) | David S. Berry / NASA | From: "It is not allowed to specify non-inertial reference frames when employing inertial element sets..."  To: "Non-inertial reference frames shall not be specified when employing inertial element sets." |  |
| A-12 | B4 | para3 | ed/te | Replace "implied normative" statements with the "approved" vocabulary. Also, break this one sentence into two. (PART 2 of 2) | David S. Berry / NASA | From: "or to specify inertial reference frames when employing non-inertial element sets."  To: "Similarly, inertial reference frames shall not be specified when employing non-inertial element sets." |  |
| A-12 | B4 |  | ed | For ADBARV and LDBARV, the "Meaning" text has one element description that contains a comma (specifically, the "inertial azimuth angle"). This requires the use of a semi-colon to separate the individual elements. | David S. Berry / NASA | Either remove the comma between "inertial azimuth angle" and "measured" (it's not strictly necessary), or replace all the other commas in this "Meaning" text with semi-colons. I think removing the offending comma is easier. |  |
| A-12, A-13 | B4  B5 |  | ed | Note that these lists of elements do not use "the Oxford comma" construction. See p.35 in https://cwe.ccsds.org/cesg/docs/Boot%20Camp%20Slides/2017-05%20Technical%20Editor%20Boot%20Camp%20Slides.pptx | David S. Berry / NASA | You can save the CCSDS Editor some time by adding a comma separating the last 2 elements in each "Meaning" statement. |  |
| A-13 | B5 |  | ed | For TADBARV and TLDBARV, the "Meaning" text has one element description that contains a comma (specifically, the "inertial azimuth angle"). This requires the use of a semi-colon to separate the individual elements. | David S. Berry / NASA | Either remove the comma between "inertial azimuth angle" and "measured" (it's not strictly necessary), or replace all the other commas in this "Meaning" text with semi-colons. I think removing the offending comma is easier. |  |
| A-14 | B5 |  | te | For COV\_NNXNN, an ICD should be required. | David S. Berry / NASA | Remove "in adjacent COMMENTS or". |  |
| A-15 | C1 |  | te | The x, y, z dimension descriptions of the OEB assume that the box has 3 unique dimensions that can be ordered max, med, min. This ripples into the discussion of the roll, pitch, yaw and keywords in the Physical Characteristics section of the OCM. | David S. Berry / NASA | Add some text that describes how to deal with a situation where 2 or 3 of the dimensions are exactly the same. |  |
| D-1 | D1 | para1, line 3 | te | An esoteric term is used without example, "exoatmospheric Resident Space Object (RSO)". | David S. Berry / NASA | Provide an example of what you mean here. |  |
| D-1 | D1 | Phase | ed | On definition of phase, "CATS" acronym used without expansion. | David S. Berry / NASA | Either add expansion here or add "CATS" to annex E. |  |
| D-1 | D1 |  | ed | On ETarget the abbreviation "w/o" is used. | David S. Berry / NASA | From: "w/o"  To: "without" |  |
| D-1 | D1 |  | ed/te | On "VMapparent", the designation "[vmag]" follows the equation, which based on other usage in this section implies that it is a units designation, but it's not. | David S. Berry / NASA | Remove "[vmag]" (cf. "VMabsolute" on p.D-2 |  |
| D-2 | D1 |  | ed/te | On "Phase()", the designation "[ratio]" follows te equation, which based on other usage in this section implies that it is a units designation, but it's not. | David S. Berry / NASA | Remove "[ratio]" |  |
| D-8 | F2.2 |  | te | I think one of the "Heritage Requirements" is too focused on NASA networks, which may have made sense at the beginning, but may no longer be entirely applicable. Specifically, the second in the table: "Ephemeris data provided for Deep Space Network (DSN), ..." | David S. Berry / NASA | I would remove the list of NASA networks, and the requirement then reads: "Ephemeris data provided for scheduling or operations (metric predicts) is to be certified by the providing Agency...". |  |
| D-8 | F2.3 |  | te | The fourth "Desirable Characteristic" has an "N" for "OEM?" In my experience OEMs are in fact used for purposes other than exclusively predicts generation. | David S. Berry / NASA | On the fourth "Desirable Characteristic" ("... is consistent with, and ideally a part of..."), change "N" to "Y". |  |
| D-7 thru D-8 |  |  | ed/te | I had trouble describing which requirement in Annex F I was referring to in the previous 2 comments. This suggests a numbering scheme. | David S. Berry / NASA | Apply a requirement number to each of the ODM requirements. (I should have done this when we worked on version 2... mea culpa.) |  |
| D-9 | F3 | 4 | te | Question: I'm wondering why the OCM is included here. I'm not understanding the logic of asserting that the OCM is "engineered only for low-to-medium-fidelity orbit propagation". Most of the apparatus defined for the OCM is much more comprehensive that that provided for any of the other messages in the ODM, so it makes me wonder what was left out that, were it included, would make the OCM "high fidelity". | David S. Berry / NASA | Discuss at The Hague. |  |
| D-10 | F3 | para2, lines 2-3 | ed | States that "A number of potential COMMENT statements are included in Annex G". I believe this is a reference to what was Annex D, section D2, in ODM V.2. The need for this this Annex material is supplanted by the OCM. | David S. Berry / NASA | Suggest removing the referenced statement. |  |
| D-11 | G1 | 3) | ed | The item regarding KVN for XML format has been moved. | David S. Berry / NASA | From: 2.1  To: 1.1 |  |
| D-11 | G1 | 5) | te | The ICD suggestion for the format on values of "ORIGINATOR" no longer appears in the document. | David S. Berry / NASA | Remove #5) from the list of items. |  |
| D-11 | G1 | 6) | ed/te | The section trace includes 6.2.3, but "OBJECT\_ID" has been removed the OCM Metadata. | David S. Berry / NASA | Either remove 6.2.3 from the Section trace or add OBJECT\_ID to OCM metadata. The latter is consistent with the other messages in the ODM. |  |
| D-11 | G1 | 7) | ed | The section trace number (6.2.10) is not correct for the user defined parameters. | David S. Berry / NASA | First correct the section number for the User Defined Keywords, then update the trace table. |  |
| D-11 | G1 | 8) | ed | The trace to section 4.2.3 is no longer correct; change it to Annex B2 | David S. Berry / NASA | From: 4.2.3  To: Annex B2 |  |
| D-11 | G1 | 10) | ed/te | The item regarding "Information which must appear in comments..." appears to have been removed from the document. | David S. Berry / NASA | Remove Item (10) from the table. |  |
| D-12 | G1 | 12) | ed | "Specific information security interoperability provisions ..." traces to section 0. | David S. Berry / NASA | Replace "0" with "Annex J1". |  |
| D-12 | G1 | 13) | ed | Regarding exceptions REF\_FRAME and TIME\_SYSTEM | David S. Berry / NASA | From: annex A2.5  To: annex B2 and B1 |  |
| D-12 | G1 | 14) | ed | Time systems MET, MRT, SCLK | David S. Berry / NASA | From: A2.5  To: B1 |  |
| D-12 | G1 | N/A | te | In the OCM material there are a number of references to using an ICD that should be added to this annex, e.g., regarding:   * OEB\_FRAME in 6.2.4 * MAN\_REF\_FRAME in 6.2.6 * ORB\_REF\_FRAME in 6.2.7 * number of elements in set in 6.2.7 and B4 * orbit averaging method in 6.2.7 * EC\_REF\_FRAME in 6.2.8 * ephemeris compression specifics in 6.2.8 * orbit state elements in 6.2.8 * ephemeris compression functions and algorithms in 6.2.8 * OD confidence metric in 6.2.9 * covariance time history in 6.2.10 * COV\_REF\_FRAME in 6.2.10 * covariance matrix dimension in 6.2.10 * state transition matrix in 6.2.11 * STM\_REF\_FRAME in 6.2.11 * special max line length in 7.3.3 * spacecraft body reference frames in B3 | David S. Berry / NASA | Add to Annex as appropriate. Recall our relatively recent history with the PRM with pushback from the CESG on the extent of requirement for an ICD. I foresee that we could be heading for additional such pushback on the ODM. Consider whether all of these requirements or suggestions for use of an ICD are justified, and accordingly, if there is a way to reduce the extent of reliance on ICD. |  |
| D-13 | Annex H | Title | ed/te | Title refers to "Version 2" of ODM | David S. Berry / NASA | change to "Version 3" |  |
| D-13 | Annex H | All |  | We should discuss whether the content of this Annex should address:  Changes from V.2=>V.3 only  Changes from V.1=>V.2 followed by V.2=>V.3 | David S. Berry / NASA | Discuss at the Hague. Ultimately this section will need to be revised. |  |
| D-15 | Annex I | All | te | It made sense to include this material in version 2, but I don't know if it makes continued sense in version 3. | David S. Berry / NASA | Discuss at the Hague. Remove section? Revise to how to produce V.1 compatible from V.3? Add how to produce V.2 compatible from V.3? |  |
| D-17 | J1.2 | 3-4 | ed/te | Refers to "... pointing request and potential satellite and instrument pointing maneuvers..." | David S. Berry / NASA | From: "... pointing request and potential satellite and instrument pointing maneuvers..."  To: "... preparing pointing and frequency predicts used during spacecraft commanding, and may also be used in collision avoidance studies..." |  |
| D-18 | J2 | 2 | ed/te | Refers to "ODM XML templates", but we are planning a schema | David S. Berry / NASA | From: "ODM XML templates"  To: "ODM XML schemas" |  |
| D-18 | J2 | 4-5 | te | States that spacecraft names will be drawn from SANA, but elsewhere we have referred to UNOOSA as the source. | David S. Berry / NASA | Remove the line: "- the spacecraft names that appear as origin and target in the ODM", plus the following error. |  |
| D-18 | J2 | 6 | ed | Reference source not found... | David S. Berry / NASA | Point to SANA Registry of Organizations: https://sanaregistry.org/r/organizations |  |
| D-19 | J2 | 1 | ed | This line duplicates the last line of page D-18 | David S. Berry / NASA | Remove. |  |
| D-19 | J2 | 2-4 | ed/te | These lines regarding identification of celestial bodies applied to the PRM, but do not apply to the ODM. | David S. Berry / NASA | Remove. |  |
| D-20 | Annex K | para 1, line 11-15 | ed | Option (3) in the discussion of EC performance is in my opinion a bit awkward with the many "or" and "and" options. It might be best to try to streamline this sentence a bit. | David S. Berry / NASA | Consider. |  |
| D-22 | Annex L | L-2, line 2 | ed | The Organization Processes for CCSDS was updated since this entry was written. | David S. Berry / NASA | From: A02.1-Y-3  To: A02.1-Y-4  From: Issue 3  To: Issue 4  From: July 2011  To: April 2014 |  |