| **Page** | **Section** | **Line** | **Type** | **Comment/ Rationale** | **Source of Comment (Name/Agency)** | **Suggested Disposition** | **Disposition****(Completed by Principal Editor)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 5-33 | 6.2.10 | 6.2.10.15 | ed | If I understand it correctly, covariance would then be given as:T = 10 [s]2.34567.6543 1.2345Why not use EPOCH (as in OEM) instead of T?  | A. Mancas/ESA | Consider switching to EPOCH from T. Also, I would add a requirement that if T is absent (implied EPOCH\_TZERO) then all covariance matrices in the block must be at EPOCH\_TZERO (ie you cannot have one cov matrix at EPOCH\_TZERO without T and another at a later epoch with T). | Agree that epoch would be useful, so adopted “T=” to denote epoch, and “DT=” to denote time relative to EPOCH\_TZERO.Recall that relative time was chosen for three reasons: (1) eliminate leap second issues; (2) greatly reduce message size; and (3) eliminate CPU associated with always converting Yr/Mo/Dy/ … into time.But now it is the user’s choice. |
| 5-33 | 6.2.10 | 6.2.10.15 – 6.2.10.19 | ed | It seems like these lines are allowed to repeat and maybe there should be separate table for covariance data lines. | A. Mancas/ESA | Consider adding a separate table for covariance data lines. | Not sure what is meant by “separate table” (?) |
| 5-38 | 6.2.11 | table 6-11 | ed | The STM\_CENTER\_NAME points to the NASA/JPL SSD Group. Would a SANA-registry not make more sense? | A. Mancas/ESA | To be discussed if SANA registry makes more sense. | Agree – adopted new SANA CENTERS |
| 5-41 | 6.2.1.9 |  |  | This is not consistent with the AEM. The AEM data contains absolute time tags. | J. Halverson | Fix | Agree – while the OCM exclusively adopted (from three years ago) relative timing throughout, I’ve now added absolute time |
| 5-2 | 6.2.1 | Sub sec 3 | te | The specified section ordering seems odd to me. In the data sections for OPM, OMM, OEM, the orbit data is presented first. An analogous ordering of the OCM data sections that roughly follows the ordering of the data in OPM, OMM, OEM (using your lettering) might be: d, a, f, g, c, b, e, h, i. | David S. Berry / NASA | Consider. Discuss at The Hague. | Reordered to be: phys char, orbit state, covar, maneuver, perts, OD, STM, EC and user-defned |
| 5-4 | Table 6-2 |  | ed/te | MESSAGE\_ID: This is in the OCM but none of the other ODMs. This is a potentially good idea to add to the OPM, OMM, OEM, but would introduce a version change. | David S. Berry / NASA | Discuss at The Hague. | Yes – we should.But now I’m confused on what constitutes a “new version” that would require retesting (?) |
| 5-4 | 6.2.3.5 | 2-3 | te | Allowing comments anywhere in the metadata section will eliminate the possibility of an XML implementation of the OCM. I recall your saying at San Antonio that you didn't intend to preclude the possibility of an XML section. | David S. Berry / NASA | Allowing comments anywhere in the OCM is a departure from consistency with the other ODMs, and it precludes the ability for an XML implementation that would otherwise be possible. I therefore think this exception should be reconsidered. This comment generally applies for ALL of the sections and tables of the OCM, which mention that comments can be "interspersed throughout". Allowing comments interspersed throughout eliminates the possibility of an XML OCM. | Fixed. But please confirm with me that XML can accommodate multiple lines of comments, perhaps via <CR><LF>, within one <XML></XML> set (?) |
| 5-6 | Table 6-3 |  | te | The "TIME\_SYSTEM\_ABS" and "TIME\_SYSTEM\_REL" seem unnecessary. Their provision seems to contradict the requirement stated in 6.2.3.6. If 6.2.3.6 is correct, then TIME\_SYSTEM\_REL must be the same as TIME\_SYSTEM\_ABS. Thus the distinction is unnecessary. It also introduces an unnecessary complication for time conversions. If times relative to EPOCH\_TZERO need to be converted to something else, then why not just choose "TIME\_SYSTEM(\_ABS)" to be that time system. Additionally, for times that are not relative to EPOCH\_TZERO (e.g., OEB\_FRAME\_EPOCH, MAN\_WIN\_START, MAN\_WIN\_STOP, etc.), what is the applicable TIME\_SYSTEM? I think this is a totally unnecessary and complicating feature. | David S. Berry / NASA | From: TIME\_SYSTEM\_ABSTo: TIME\_SYSTEMFrom: TIME\_SYSTEM\_RELTo: Delete the keyword | Agree – down-selected to only “TIME\_SYSTEM” |
| 5-10 to 5-11 | Table 6-5 |  | ed | The various \*\_MODEL keywords are spread throughout the table. It might be nice to have all the models (ATMOSPHERIC, GRAVITY, OCEAN\_TIDES, SHADOW, SOLID\_TIDES, SRP) contiguous (unless there are parameters of those models around them) | David S. Berry / NASA | Consider. | There are parameters surrounding them. |
| 5-12 | 6.2.6.8 |  | te | I'm not sure I completely understand what is meant by the "DC\_REF\_TIME" keyword... it seems to imply the maneuver ignition time. At any rate, there seems to be some interaction between the EPOCH\_TZERO and DC\_REF\_TIME keyword, e.g., if DC\_REF\_TIME is present, then all the timetags in the maneuver data need to be greater than DC\_REF\_TIME (if I understand that keyword properly). | David S. Berry / NASA | If I have interpreted the keyword properly, consider adding something about the relationship of the 2 keywords here. | Fixed and clarified. |
| 5-14 | 6.2.6.15 | All | te | I think this material should be in the ADM, not the ODM. | David S. Berry / NASA | See previous comments about detailed attitude information in this version of the ODM. Remove the section. | As discussed in den Hague – detailed attitude data is now in the ADM, but the OEB is a collision- and orbit-relevant parameter set, which is retained in the ODM. |
| 5-15 | 6.2.6.16 | 2 | te | Regarding the "multiple representations" uniqueness conditions that appear here and in several other sections of the OCM. After much reflection, I think these are an unnecessary complicating factor. This is a general comment regarding ALL instances of the "multiple representations" conditions. In order to implement this feature, a programmer producing an instantiation of the standard would have to keep a history of all the representations, and check the factors of each new representation against all of the prior representations. Then the recipient would need to do the same to ensure that the message is compliant with the standard. I believe this feature, which occurs in multiple of the OCM sections, will make prototyping more difficult (and require more time) than we would like, and is also very likely prone to error. I think it makes it hard for someone to confirm that they have a message that complies with the standard. | David S. Berry / NASA | Eliminate the uniqueness conditions specified for multiple representations, throughout the document. Allow the OCM originator to produce multiple representations without the complications associated with these uniqueness factors. If you want to discuss this at the Hague, that would be fine. But I am increasingly opposed to the "uniqueness" requirement. | I made these into recommendations. |
| 5-25 | 6.2.8.12 |  | te | The text seems to imply that ∆t = 0 ("EC\_START and EC\_TSTOP set to the same value"). Is this a correct interpretation? This scenario also seems to imply a divide by zero situation if I understand the equation in 7.8.2.5 page D-20 in Annex K.  | David S. Berry / NASA | Perhaps some explanation of this key mission event technique should be added to Annex K. | EC section has been deleted |
| 5-44 | Table 6-12 |  | te | COMMENT: There really are not special provisions for comments related to user defined parameters. There are numerous other opportunities for comments that can be used. | David S. Berry / NASA | Remove the COMMENT from Table 6-12.  | Disagree; while user-defined parameters can be beneficial and at times necessary, their greatest negative is the chance of misunderstanding them. I feel that comments are necessary here as an avenue to help mitigate risk of confusion or misinterpretation  |
| 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. | Fixed. |
| 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. | Will do later. |
| 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. | Fixed. |
| D-13 | Annex H | All |  | We should discuss whether the content of this Annex should address:Changes from V.2=>V.3 onlyChanges 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. | Fixed. Assumed V.2=>V.3. |
| 5-15 | 6.2.1.d, f, .g and Table 6-1 | d, f, g | Te | If there is a single object, a single perturbation set, a single OD, why is it necessary to have options for multiple orbit state time histories, multiple covariance time histories, multiple STM time histories? Is this just syntactical use of the word “histories” to represent the collected history of each of those items? | Cheryl Gramling/NASA-GSFC | If the intent of the text is to provide multiple versions of history, then the rationale for such a provision should be stated. If the intent is that the word “histories” actually refers to a time-ordered series of each of the parameter sets, they change the word to “history” (and the comment becomes editorial). | Multiple time histories are provided when that (same) data is represented in a different manner; i.e., for covariance, one or more of the following must be different: the selected covariance element set (COV\_TYPE) is unique; the orbit state covariance time history is based upon a unique orbit determination, attitude determination, navigation solution or Monte Carlo simulation; the reference frame is unique; the orbit center is unique; or the data interval timespan is unique (i.e., has no overlap with any other data interval(s)) |
| 5-29 | 6.2.9.7 |  | Te | Event times specified in DAYS may assume an Earth-day, however, per section 6.2.7 Orbit State Time History, the OD\_REF\_FRAME may not be Earth, which changes the definition of a DAY. | Cheryl Gramling/NASA-GSFC | The definition of DAY should be prescribed to be that of the ORB\_REF\_FRAME or otherwise defined. | Adopting an SI Earth Day (86400.0 s), consistent with RDM. |
| 5-29-5-31 | 6.2.9 |  | te | Missing information cogent to an OD: STATION\_GEOMETRY or some other term that allows the OD message recipient to understand the tracking asset diversity in terms of geometry and measurement data. This is necessary because WRMS alone is insufficient since it may present a skewed value if the solution is based on poor geometry and won’t allow insight into RIC terms with reduced observability.  | Cheryl Gramling/NASA-GSFC | Provide a means of optionally identifying the geometry of assets that provided data to the OD solution. This could be summarized in a GDOP-type of parameter. | Awaiting Cheryl’s specific recommendation |
| 5-29-5-31 | 6.2.9 |  | te | Missing information cogent to an OD: Qualifiers on the residuals on each DATA\_TYPE used in the OD are needed to provide insight into the efficacy and fidelity of the OD, especially when coupled with insight into all DATA\_TYPES and STATION\_GEOMETRY. | Cheryl Gramling/NASA-GSFC | Suggest adding MAX, MIN, and SIGMA (1) for the set of residuals for each DATA\_TYPE used in the OD solution as an option in the message. | Awaiting Cheryl’s specific recommendation |
| 6-20 | 6.2.7.10 | 1 | te | The MAN\_TYPE=ACCEL is an optional field. How is this considered when an operator has included the optional field specified in 6.2.7.9 MAN\_TYPE=THRUST? | INMARSAT | Clarify is 6.2.7.9 and 6.2.7.10 are mutually exclusive. The risk here is to double account for the same maneuvre | Fixed. |
| 8-1 thru 8-nn | 8 |  | te | I'm still incomplete providing this section for the OCM, waiting for the content to settle. | David S. Berry / NASA | None at this time. | Yes, but we’d agreed to wait. |
| A-13 | Annex A, A1.1 | 2 | ed | Document Title (missing character) | David S. Berry / NASA | From: Orbit Data MessageTo: Orbit Data Messages | Fixed. |
| A-15 | Annex A, A2 | Title | ed | Document Title (missing character) | David S. Berry / NASA | From: Orbit Data MessageTo: Orbit Data Messages | Fixed. |
| A-15 | Annex A, A2.4 | Row 1  | ed | Missing version number | David S. Berry / NASA | From: Document VersionTo: Document Version 3 | Fixed. |
| B-17 | Annex B | Intro | te | Missing keyword: EC\_REF\_FRAME | David S. Berry / NASA | Add "EC\_REF\_FRAME" to the list of reference frames for which the Annex (or SANA registry) is applicable. Could potentially condense this to a wild card "\*\_REF\_FRAME". | Fixed. |
| B-17 | Annex B | Intro | ed | Reference update | David S. Berry / NASA | From: "reference [L1]"To: "reference [P-1]" | Updated/revised. |
| B-18 | B1 | para 1 | ed/te | Once the time systems move to the SANA, the discussion about MET and MRT might get lost in the shuffle. Should it be moved into another document section? | David S. Berry / NASA | Consider. | I have it commented/noted. |
| B-19 | B2 |  | ed/te | The table doesn't have an entry that is simply "ICRF", without the year designation, but we show it as an example value in Tables 3-2 and 5-3 | David S. Berry / NASA | Add "ICRF" with no year designations to the table (and draft SANA material) | Fixed. |
| B-19 | B2 |  | ed | MOON\_MEIAUE: refers to "[L11]" | David S. Berry / NASA | From: "[L11]"To: "[P-11]"This is a generic change from [Lnn] to [P-nn] throughout the document that you may have already completed. | Already done. |
| B-19 | B2 |  | te | UVW: Says to use a comment field for the go-inertial epoch, but I think using a "REF\_FRAME\_EPOCH" keyword would be better than a comment and less prone to processing error. | David S. Berry / NASA | Consider. | Moved to SANA, and will use REF\_FRAME\_EPOCH (or equivalent) |
| B-20 | B2 |  | ed | The explanatory paragraph about NORAD TLEs might be better moved to the vicinity of Table 4-2 in preparation for this table moving to the SANA Registry. Either that, or incorporate the explanatory material into the "Meaning" column for TEME. | David S. Berry / NASA | Consider. | Fixed. |
| B-20 | B3 |  | ed/te | INSTRUMENT\_xx: In the "Meaning" column, it's not clear what the 'y' refers to. | David S. Berry / NASA | I think you want to change 'y' to 'xx'. | Now moved to SANA registry |
| B-21 | B3 |  | ed/te | SC\_BODY\_xx: There are two entries in the table, with different "Meanings", but since the value is the same it's not clear why 2 rows are needed. It's actually not clear why we need a body frame of a different spacecraft at all, since all ODMs refer to a single spacecraft. | David S. Berry / NASA | Consider removing the second row. | Now moved to SANA registry |
| B-23 | B4 |  | ed | The second through fourth introductory paragraphs should be moved to Table 6-8 in preparation for migration to the SANA registry. I'm not sure what to do about paragraph 1. | David S. Berry / NASA | Consider moving the text. | See new Annex B structure (subsection 7) |
| C-26 | Annex C | All | ed | I think these definitions should be moved into Section 1.5 rather than occupying an Annex. | David S. Berry / NASA | Consider moving them to the section 1.5, called "Definitions". | Fixed. Retaining Annex C for now, until it’s clear that the Annex (as a placeholder) can be deleted. |
| D-27 | D1 | para 5 | ed | The equation of ZOEB\_MIN refers to XOEB\_MAX and YOEB\_MAX, but based on the immediately preceding statement, the equation should refer to YOEB\_MED. | David S. Berry / NASA | Correct the equation. | Fixed. |
| D-28 | D1 | 1 | ed | Refers to "Optimally-Enclosing Box", which seems to have been replaced by the term "Optimally-Encompassing Box". | David S. Berry / NASA | From: EnclosingTo: Encompassing | Fixed. |
| D-28 | D1 |  | te | The purpose of the OEB\_PARENT\_FRAME is not entirely clear to me. It seems like it would need to be inertial (or at least indirectly tied to an inertial frame), but the definition in Table 6-4 allows many non-inertial frames, and it's not clear how the tie to an inertial frame would be achieved. | David S. Berry / NASA | It's quite possible I'm misunderstanding... | Correct – the parent frame could for example be TNW or RTN, used by GEO operators as the “parent” frame from which they can orient their spacecraft. |
| E-1 | E1 |  | te | In the various equations, rTarget does not appear to be used. | David S. Berry / NASA | If it is not used, it should be removed from the "Definitions". | Awaiting inputs from Pat North |
| E-1 | E1 |  | te | In the equation of Etarget , the angle $θ$(in $τ$Atmosphere($θ$)) is not defined; it's not mentioned in the definition of $τ$Atmosphere | David S. Berry / NASA | Provide definition if it's used, or remove from equation if it's not. | Awaiting inputs from Pat North |
| E-2 | E1 |  | ed/te | In the paragraph starting with "From the above equations...", it's not clear how the substitutions into the equation for VMabsolute are correct. The equation for VMabsolute is not provided. | David S. Berry / NASA | Provide equation for VM absolute based on the Definitions provided in this section. | Awaiting inputs from Pat North |
| E-1, E-2 | E1 |  | ed | To reduce number of Annexes, combine with Annex D. | David S. Berry / NASA | Consider. | Agreed and fixed. |
| F-3 | Annex F |  | ed | Paragraph starting with "Figures Annex Fig. F-1..." and "Figure Annex Fig. F-3..." are irrelevant to ODM V.3. | David S. Berry / NASA | Remove these 2 paragraphs (the two paragraphs immediately preceding Fig F-1. | Fixed. |
| F-3 | Fig F-1 |  | ed/te | The OBJECT\_NAME is fictional, the OBJECT\_ID is not. (The fact that this is here is my prior error as Lead Editor.) | David S. Berry / NASA | From: 1998-057ATo: 1998-999A (a fictional #) | Fixed. |
| F-4 | Fig F-2 |  | ed/te | The OBJECT\_NAME is real, but the OBJECT\_ID is not. (The fact that this is here is my prior error as Lead Editor.) | David S. Berry / NASA | From: 1998-099ATo: 2000-028A | Fixed. |
| F-5 | Fig F-3 |  | ed/te | The OBJECT\_NAME is fictional, the OBJECT\_ID is not. (The fact that this is here is my prior error as Lead Editor.) | David S. Berry / NASA | From: 1998-057ATo: 1998-999A (a fictional #) | Fixed. |
| F-6 | Fig F-4 |  | ed/te | The OBJECT\_NAME is real, but the OBJECT\_ID is not. (The fact that this is here is my prior error as Lead Editor.) | David S. Berry / NASA | From: 1998-099ATo: 2000-028A | Fixed. |
| F-7 | Fig F-5 |  | ed/te | The OBJECT\_NAME is fictional, the OBJECT\_ID is not. (The fact that this is here is my prior error as Lead Editor.) | David S. Berry / NASA | From: 1998-057ATo: 1998-999A (a fictional #) | Fixed. |
| H-13 |  |  | ed/te | Text starting with "Annex Fig. H-1..." and ending with "'CCSDS\_OEM-VERS=2.0' must be specified." is irrelevant for ODM 3.0. | David S. Berry / NASA | Delete cited text. | Deleted. |
| H-14 | Fig H-1 |  | ed/te | I think we don't need to worry about ODM V.1 any more. | David S. Berry / NASA | From: existing captionTo: "OEM Example with No Acceleration, No Covariance". | Fixed. |
| H-15 | Fig H-2 |  | ed/te | I think we don't need to worry about providing examples in the book about ODM V.1/ODM V.2 differences any more. | David S. Berry / NASA | From first comment, remove "MUST BE OEM VERSION 2.0" | Fixed. |
| H-15 | Fig H-2 |  | ed/te | I think we don't need to worry about version differences in examples any more. | David S. Berry / NASA | Remove "Version 2" from the caption. | Fixed. |
| H-16 | Fig H-3 |  | ed/te | I think we don't need to worry about version differences in examples any more. | David S. Berry / NASA | Remove "Version 2" from the caption. | Fixed. |
| H-16 | Fig H-4 |  | ed/te | I think we don't need to worry about version differences in examples any more. | David S. Berry / NASA | Remove first comment in the header "<COMMENT>THIS EXAMPLE CONFORMS...>Also, Remove tail end of second comment, specifically, remove "CAN ONLY BE OEM VERSION 2.0". | Fixed. |
| K-30 | K2.1 |  | ed/te | Requirement numbers were added to requirements in K2.2 and K2.3, but not K2.1 | David S. Berry / NASA | Add requirement numbers to requirements in K2.1 (i.e., the Primary Requirements). | Fixed. |
| K-31 | K2.3 |  | te | Requirement DC4 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 DC4, change "N" to "Y" for OEM. | Agreed, as is the OPM. |
| K-31 | K2.4 | 2 | ed | Refers to "three recommended messages". | David S. Berry / NASA | From: "three"To: "four" | Fixed. |
| K-32 | K3 | 1 | ed/te | Refers to "OPM, OMM, and/or OCM" but the title only deals with OPM and OMM. | David S. Berry / NASA | Change title to include OCM, or remove OCM from first sentence. NOTE: The first sentence is the only one that refers to OCM, so if that's meant to be included, the full section will need to be revised. | Fixed. |
| L-34 | L1 |  | ed/te | Row 5) add 6.2.3 to the Section list | David S. Berry / NASA | Add 6.2.3 to the section list | Fixed. |
| L-34 | L1 |  | ed/te | Row 8)  | David S. Berry / NASA | Change 7.5 to 7.5.5 | Fixed. |
| L-35 | L1 |  | ed/te | Row 11) and 12) | David S. Berry / NASA | Will need to be modified when annexes are moved to SANA. | Fixed. |
| M-36 | Intro |  | ed/te | Change to reflect current document | David S. Berry / NASA | From: "ODM 1.0 and ODM 2.0"To: "ODM 2.0 and ODM 3.0" | Fixed. |
| M-36 | M1 |  | ed/te | Item 1: Change to reflect OCM | David S. Berry / NASA | From: Mean-ElementsTo: ComprehensiveFrom: (OMM)To: (OCM) | Fixed. |
| M-36 | M1 |  | ed/te | Items 2 through 10 are obsolete | David S. Berry / NASA | Remove list items 2 through 10. | Fixed. |
| M-37 | M1 |  | ed/te | Items 11 through 12 are obsolete | David S. Berry / NASA | Remove list items 11 through 12. | Fixed. |
| M-37 | M2 |  | ed/te | Item 1 should be modified to reflect movement of Annex material to SANA | David S. Berry / NASA | Modify item 1 accordingly | Fixed. |
| M-37 | M2 |  | ed/te | Items 2 through 10 are obsolete. | David S. Berry / NASA | Remove list items 2 - 10. | Fixed. |
| M-37 | M2 |  | ed/te | Here are a few items that I think could be in this section:* Several annexes were added. Some are required by CCSDS rule changes, and some are for the provision of supplementary material.
* Examples for OPM, OMM, and OEM that formerly appeared in Sections 3, 4, and 5 respectively have been moved to Informative Annexes.
* The "Checklist ICD" that was added in ODM Version 2 has been removed. It is replaced by the material that can be specified in the Orbit Comprehensive Message.
 | David S. Berry / NASA | Consider adding these to M2. There may be more, but these are a start. | Fixed. |
| N-39 | N2 |  | ed | The reference for ODM originators refers to an Annex Q which is not in the document. | David S. Berry / NASA | From: Q-17To: P-17 | Fixed. |
| N-40 | N2 |  | te | The text in "red" can be replaced by a reference to our "Orbit Centers" SANA registry. | David S. Berry / NASA | Add "Orbit centers" to the list at the top of the page, and delete the red text. | Fixed. |
| N-40 | N2.1 |  | ed | The "Patent Considerations" are a separate class, not a SANA registry consideration. | David S. Berry / NASA | From: N2.1To: N3 | Fixed. |
| P-43 | [P-1] |  | ed | The document number 500.0-G-3, Issue number 4, and issue date are inconsistent. NOTE: The CCSDS Editor will take care of document numbers and Issue number consistency when the document is published, so we don't need to worry about it. Best to refer to the most recently published version of the Green Book. | David S. Berry / NASA | From: Issue 4To: Issue 3From: May 2018To: May 2010 | Fixed. |
| P-43 | [P-2] |  | ed | Issue date is incorrect. | David S. Berry / NASA | From: July 2014To: April 2014 | Fixed. |
| iv | Member Agencies | 2 | Ed | The BNSC needs changing to United Kingdom Space Agency (UKSA)  | Brian Swinburne/Airbus | Change BNSC to UKSA  | Tom Gannett will fix |
| 6-20 | 6.2.7.10 | 1 | te | The MAN\_TYPE=ACCEL is an optional field. How is this considered when an operator has included the optional field specified in 6.2.7.9 MAN\_TYPE=THRUST? | INMARSAT | Clarify is 6.2.7.9 and 6.2.7.10 are mutually exclusive. The risk here is to double account for the same maneuvre | Fixed. |
| 6-8 | 6.2.4 |  |  | Not sure why 6.2.4.8 – 6.2.4.11 are included?  | Julie Halverson/NASA |   | As we agreed in den Hague, the ability to crudely specify an encompassing box is needed for collision probability, drag, etc. and was accepted for inclusion in the OCM. |
| 6-8 | Table 6-4 |  |  | Fix subscript in second CD | Julie Halverson/NASA |  | Fixed. |
| 6-10 | Table 6-4 |  |  | Fix subscript in second CR | Julie Halverson/NASA |  | Fixed. |
| 6-10 | Table 6-4 |  |  | Fix inertia keywords (remove I33,I12, etc). Include a definition somewhere about how the inertia components are included in the matrix (negative off-diagonal). See the Annex C (C6) of the ADM. | Julie Halverson/NASA |   | Fixed. |
| 6-11 | Table 6-5 |  |  | In Description for GEOMAG\_AP, remove the dashes in the last ‘geomagnetic’ | Julie Halverson/NASA |  | Fixed. |
| 6-12 | Table 6-5 |  |  | In Description of OCEAN\_TIDES\_MODEL and SOLID\_TIDES\_MODEL, fix the parenthesis | Julie Halverson/NASA |  | Fixed. |
| 6-12 | Table 6-5 |  |  | In D\_NUTATION\_DEPS and D\_NUTATION\_DPSI fix δdeps and δdpsi | Julie Halverson/NASA |  | Fixed. |
| 6-13 | Table 6-5 |  |  | Do you have examples for POLAR\_MOTION\_XP, POLAR\_MOTION\_YP, ALBEDO, ALBEDO\_GRID\_SIZE | Julie Halverson/NASA |  | Fixed. |
| 6-13 | Table 6-5 |  |  | In the SOLAR\_F10P7 (and following) fields you have units of m2. Previously you used the form m\*\*2. | Julie Halverson/NASA |  | Fixed. |
| 6-18 | Table 6-6 |  |  | In DATA\_TYPE, what if the filter data are GPS point solutions? Are those defined somewhere? (Maybe I missed them in the TDM?) | Julie Halverson/NASA |  | Consider adding to TDM v3 |
| 6-20 | 6.2.7.8.1 |  |  | Here you have the DV components in km/s, above they are m/s | Julie Halverson/NASA |  | Fixed |
| 6-24 | Table 6-7 |  |  | In the Description block for MAN\_PRED\_SOURCE, change ‘from Indicate’ to ‘to indicate’ after ATT\_ID.  | Julie Halverson/NASA |  | Fixed. |
| 6-25 | Table 6-7 |  |  | Second to last entry. Maybe use DATA\_START and DATA\_STOP to indicate where the actual lines of data will be placed? Similar comments on the following tables, second to last entry. | Julie Halverson/NASA | It seems like having something to indicate where the actual data starts and stops would be helpful.  | Now delineated by T= or DT= |
| 6-25 |  |  |  | I assume the text in red below the table should be removed. | Julie Halverson/NASA |  | Yes, this is part of the discussion yet to be done/finalized. |
| 6-29 | Table 6-8 |  |  | I assume the block with orange background will be updated (ORB\_TYPE) | Julie Halverson/NASA |  | Fixed. |
| 6-41 | 6.2.11.12 |  |  | Section is incomplete. | Julie Halverson/NASA |  | Correct. Still in work. |
| 6-45 | Table 6-11 |  |  | Is EC\_TSTOP only in seconds format? If so, may should include that again. | Julie Halverson/NASA |  | Fixed. |
| 6-46 | Table 6-12 |  |  | ‘‘x’ is replaced by …’ Indicate what you mean by ‘x’.  | Julie Halverson/NASA |  | Fixed. |
| B-20 | B3 |  |  | Will you update the table to include all the relative reference frames in the new SANA document? (If this doesn’t all get replaced with a link to the SANA page.) | Julie Halverson/NASA |  | Yes, fixed. |
| All |  |  | ge | WRT comments levied on v2.36 in the “Suggested Disposition” column that state “List all acceptable values in the Examples column…”, I think clarification on the intent of this suggested is needed. As a list of examples, why should each acceptable value be included? It does not appear that all acceptable values are included for many other Examples in the messages. Does this only apply when there is a distinctly limited set of values for that Keyword? | C. Gramling/NASA GSFC | Not necessarily for the OCM owner to address, but I need clarification on why some Examples must list all acceptable values and some do not. | Understood and agree that we should discuss. |
| 6-4 & 6-6 | 6.2.3.3 & Table 6-3 (Meta) |  | Te/ed | The text in 6.2.3.3 lists 4 possible identification keywords (OBJECT\_NAME, OBJECT\_ID, CATALOG\_ID, INTERNATIONAL\_DESIGNATOR), but Table 6-3 lists 4 possible identification keywords (OBJECT\_NAME, INTERNATIONAL\_DESIGNATOR, CATALOG\_NAME, CATALOG\_ID), but the two sets are not consistent. (see the two underlined keywords in this comment for the differences). NOTE 2 in 6.2.3.3 should provide the full list of keywords, one of which must be mandatory in the OCM. | C. Gramling/NASA GSFC | Please identify the complete set of [4 or 5] keywords by which the object of the OCM can be identified. List these in a consistent order in the text sections and table 6-3. Clarify NOTE 2 in 6.2.3.3 with complete listing, one of which is mandatory. | Fixed. |
| 6-6 | Table 6-3 (Meta) |  | te | The INCL\_DATA\_BLOCKS in v 2.36 was changed to DATA\_TYPES in v2.37 in response to comment from D. Berry. However, DATA\_TYPES in the TDM refer to specific tracking data types or measured parameter types. It’s not clear to me that the identification of which modular data segments (or blocks) in the OCM is the corollary to DATA\_TYPES in the TDM. | C. Gramling/NASA GSFC | Consider re-visiting the change from INCL\_DATA\_BLOCKS in v2.36 to DATA\_TYPES in 2.37. Consider the impact as we move toward modular messaging possibly composed of ‘blocks’ of sub-message structures to create whole message. | Fixed by changing to DATA\_ELEMENTS |
| 6-7 | Table 6-3 (Meta) |  | Ed/te | Keywords START\_TIME and STOP\_TIME are each defined as ‘relative’ time. The parenthetical note for each includes the reference to section 7.5.9 for ‘absolute’ time format, which does not seem to apply to these keywords. Is the format being referenced merely as a way to depict relative time? | C. Gramling/NASA GSFC | Remove the text “For format specification, see 7.5.9 for absolute time format;” or clarify that it’s use is strictly for time formatting. | Fixed by switching to allow both relative and absolute time. |
| 6-7 | Table 6-3 (Meta) |  | te | Keywords START\_TIME and STOP\_TIME are each defined as relative time to EPOCH\_TZERO as “earliest of all time tags” or “end of TOTAL time span”. However, if an OD is definitive w EPOCH\_TZERO at the end or middle of the arc, or if an OD is DETERMINED for a maneuver, then the time tags in the OD, ORB STATE, COV, STM, and MNVR blocks may precede EPOCH\_TZERO. A note may be needed in START\_TIME and STOP\_TIME to indicate they may be negative values. | C. Gramling/NASA GSFC | Consider adding a note to START\_TIME and STOP\_TIME to indicate they may be negative values, and include an example of a negative value. | Fixed by switching to allow both relative and absolute time. |
| 6-8 | 6.2.4.7 (Phys) |  | Ed/te | The text refers the reader to Annex C for further definition of the Physical Characteristics in this section; the info for OEB is in Annex D. No other info is provided in an appendix for physical characteristics.  | C. Gramling/NASA GSFC | Please correct the typo from “ANNEX C” to “ANNEX D”. If it makes sense, refer to ANNEX D only for OEB definition. Alternatively, include another ref for the other modeling (preferred) or include the modeling on ANNEX D. | Fixed by limiting to OEB (and Annex C). |
| 6-11 | Table 6-5 (Perturb) |  | Te | Regarding GEOMAG\_AP and GEOMAG\_KP, these files are only valid for 3 hours. If the OD, ORB STATE, COV, STM cover a longer duration than 3 hr, more than one GEOMAG index set may be used. There is currently no accommodation for that in the OCM. This could imply a default segmentation of an OCM into 3-hr intervals to cover a longer time period.(Similarly for the 1-hr GEOMAG\_DST) | C. Gramling/NASA GSFC | Consider adding GEOMAG sets for multiple times relative to EPOCH\_TZERO, or some other means of identifying multiple indices and the use thereof.(Similarly for the 1-hr GEOMAG\_DST) | Fixed by changing the title of these keywords to “FIXED\_ …” and added both Space Weather and EOP sources and download dates. |
| 6-12 | Table 6-5 (Perturb) |  | Ed | Given the many keywords that refer to PERT\_CENTER\_NAME, should this keyword be moved earlier in the section/data block? | C. Gramling/NASA GSFC | Consider placement of keyword PERT\_CENTER\_NAME in the data block/section. | Agree – moved to first position. |
| 6-13 | Table 6-5 (Perturb) |  | Te | While the model for a shadow is provided, the current assumption is that the model applies to the Central Body. Do we need a provision for >1 shadow body? Perhaps the message should also specify which bodies the shadow modeling includes (earth & moon; Mars, Phobos, Deimos; etc). This is not necessarily the same set of bodies as cited in N\_BODY\_PERTURBATIONS. The next question is, would we assume that the model is the same for each body, or do we need a way to differentiate? For now, I’d suggest defaulting to same model per body. | C. Gramling/NASA GSFC | Consider adding a keyword such as SHADOW\_BODY to identify which body(ies) shadows were included.  | Fixed. |
| 6-13, 6-14 | Table 6-5 (Perturb) |  | Te | For SolarFlux, are four separate keyword instantiations needed (F, M, S, Y) for daily and 81-day avg, or is it satisfactory to identify the model used, then have the two keywords (daily, 81-dy avg) for that model? | C. Gramling/NASA GSFC | Consider consolidating keywords for the solar flux modeling. | No, doesn’t work that way. The JB2008 model requires S, M, and Y indices. See <https://spaceweather.usu.edu/files/Ch4_solar_geomag_indices.pdf>  |
| 6-15 | 6.2.6 |  | Te | ANNEX C defines a TRACK. The OD section that includes keywords for TRACKS\_AVAILABLE or TRACKS\_USED, is missing a reference to ANNEX C. | C. Gramling/NASA GSFC | Consider adding a reference to ANNEX B in the OD section text. | Annex C no longer contains “track”, But I added “A “Track” is defined above in Section 1.6” just prior to the OD table. |
| 6-17 | Table 6-6 (OD) |  | te | For OD\_METHOD, there are many potential methods (2 of which are listed). In order to understand the text in the value, do we need to refer to a list (like SANA) for the different types. The concern that someone may identify SRIF (square root information filter) or SSEM (sequential simultaneous estimation method) that would not be obvious to the recipient without an ICD or reference list. How best to avoid acronyms not defined elsewhere? Stating batch or sequential is not adequate as there are combination methods. | C. Gramling/NASA GSFC | Consider alternative or additional ways to define OD\_METHOD. Perhaps discuss ensemble at Gaithersburg. | As this is a free-text field, I clarified that the user can specify as they see fit, and I also added the SRIF and SSEM. |
| 6-18 | Table 6-6 (OD) |  | Te/ed | Is the use of DATA\_TYPES in the OD “block” commensurate with the use of DATA\_TYPES now used in the Metadata section in ODM v2.37? Seems two uses of the same Keyword would introduce confusion for decoding the message. (also, please see comment 1 from same source)  | C. Gramling/NASA GSFC | No change is suggested for the OD Table 6-6, but rather for the metadata section, per comment on reconsidering the use of DATA\_TYPES keyword in metadata section. | Already fixed per above. |
| 6-18 | TABLE 6-6 (OD) |  | ED | Since the keyword TRK\_MESSAGE\_IDS refers specifically to TDMs, would it make sense to change this keyword to TDM\_IDS? | C. Gramling/NASA GSFC | Consider renaming TRK\_MESSAGE\_IDS to a more telling (and briefer) keyword, TDM\_IDS. | Fixed. |
| 6-16-6-18 | Table 6-6 (OD) | Te |  | OD section consideration 1: The Orbit State Time History section includes an ORB\_REF\_FRAME, Maneuver section includes MAN\_REF\_FRAME. The corollary for OD would be inclusion of CENTRAL\_BODY. Similarly, the OD section does not include modeling used in the OD estimate. There is no other mandatory item in the OCM message to define the modeling that was used in the OD. | C. Gramling/NASA GSFC | Consider including either a listing of other modeling values within the OCM that can be included to assist in defining the OD, or some other means within the OD section to define the OD modeling. Alternatively, consider including a note that suggests if an OD section is included, so should a perturbations section and that modeling within the OD can be found in the perturbations section. (These considerations may also apply to the Orbit State Time History, COV, & STM sections.) | Fixed: “If an orbit determination parameters section is included in the message, it is recommended that a corresponding perturbations section be included as well to specify the perturbations incorporated in the orbit determination.” Also added that comment to orbit, covar and STM. |
| 6-16-6-18 | Table 6-6 (OD) |  | te | OD section consideration 2: The number of solve-fors in the OD estimate is a key parameter that is coincident with observability of the state. This is similar to ORB\_N keyword in the Orbit State Time History section.  | C. Gramling/NASA GSFC | Consider implementing a way to define all solve-for parameters. | Fixed. Added SOLVE\_N  |
| 6-16-6-18 | Table 6-6 (OD) |  | te | OD section consideration 3: Define which elements are solved-for in the OD. Element examples include pos (3), vel (3), station/measurement/frequency bias (n), drag, SRP, time bias/drift/rate, …This is similar to the comment on ORB\_N in the Orbit State Time History section that asks if the definition of each element should be clarified. | C. Gramling/NASA GSFC | Consider implementing a way to define all solve-for parameters. | Fixed. Added SOLVE\_STATES |
| 6-16-6-18 | Table 6-6 (OD) |  | te | OD section consideration 4a: Define the number of consider parameters in the OD solution to understand the uncertainties applied. | C. Gramling/NASA GSFC | Consider implementing a way to define all consider parameters. | Fixed. |
| 6-16-6-18 | Table 6-6 (OD) |  | te | OD section consideration 4b: Define each considered parameter using a term such as CONSIDER\_n with a text value and the associated modelling (CONSIDER\_n\_MODEL) with select text values such as random:zero mean, constant, or provision for another input. | C. Gramling/NASA GSFC | Consider implementing a way to define all consider parameters. | Fixed. |
| 6-16-6-18 | Table 6-6 (OD) |  | Te | OD section consideration 5: Add an integration step size and a measurement update interval (or step size) to the OD section to identify the efficacy of the OD for the respective orbit, both in [integer – I don’t think a real value is needed, but we should discuss] seconds. If measurement update interval (or integration step size) is variable, then that could be provided as an entry using a specified/defined value, perhaps of 0 (or something clearly defined). | C. Gramling/NASA GSFC | Consider incorporating INTEG\_STEP\_SIZE and MEAS\_UPDATE\_INTERVAL to the OD section with values as [integer] seconds and a value of [0] for variable. | Fixed. |
| 6-15 | 6.2.6 (OD) | 1+ | Ed/te | Based on the distinctions provided by Montenbruck & Gill [“Satellite Orbits”, chapter “Orbit Determination and Parameter Estimation”], for Orbit Determination (6 observations to solve for 6 elements) and Orbit Estimation (differential correction), perhaps we should rename this section *Orbit Estimation*? | C. Gramling/NASA GSFC | Consider renaming OD section to Orbit Estimation, implying application of a differential correction technique. This is relatively minor in the scheme of things. | Decided not to, as OD is such a common acronym and orbit determination is what’s commonly used in FDS teams. |
| 6-17 | Table 6-6 (OD) |  | Te | Articulating a comment against v2.36: “Event times specified in DAYS assumes an Earth-day; however, per section 6.2.7 Orbit State Time History, the OD\_REF\_FRAME may not be Earth, which changes the definition of a DAY.” Suggest that a variable definition be provided that coordinates with OD\_REF\_FRAME, and defaults to an SI Earth Day.  | C. Gramling/NASA GSFC | Consider implementing a variable DAY in terms of SI seconds that defaults to an SI Earth Day, but can be prescribed for the ref day associated with a body prescribed in OD\_REF\_FRAME. | Fixed; placed in metadata section. |
| 6-15-6-18 | Sec 6.2.6 and Table 6-6 (OD) |  | te | WRT comment levied on v2.36 for OD to include STATION\_GEOMETRY or some other term that allows the OD recipient to understand the tracking asset diversity, consider the implementation of a keyword **GDOP** for generalized dilution of precision based on the observability grammian as defined in Kaplan “Understanding GPS: Principles and Applications” | C. Gramling/NASA GSFC | Consider including a keyword, GDOP, that provides a metric for the observability of the element set from the OD. | Fixed. |
| 6-19 | 6.2.7.6 (MAN) |  | Ed | Now that attitude maneuvers are not included in the OCM (although their residual delta-V still needs to be included!), change FROM: “Impulsive, thrusting, acceleration and attitude maneuver data”TO: “Impulsive, thrusting, and acceleration maneuver data” | C. Gramling/NASA GSFC | Please update per decision to not include attitude maneuvers in the OCM. | Fixed. |
| 6-19 | 6.2.7.7 (MAN) |  | Ed | Now that attitude maneuvers are not included in the OCM, change FROM: “The thrusting and attitude maneuver specifications…”TO: “The thrusting maneuver specifications…” | C. Gramling/NASA GSFC | Please update per decision to not include attitude maneuvers in the OCM. | Fixed. |
| 6-21, 6-23 | 6.2.7.13.3.1); Table 6-7 (MAN) |  | Te | From v2.35 to v2.36, while updating the maneuver section, we discussed (during and after Rome mtg) including a distinction for DETERMINED in MAN\_BASIS. DETERMINED can have two flavors: 1. Based on propulsion and attitude system telemetry in near-real-time for reconstruction as DETERMINED\_TLM, 2. Based on observation-based orbit estimation for a calibration as DETERMINED\_OD. Based on other comments against v2.36 and perhaps a poorly phrased comment from me, that distinction has been removed in v2.37. To avoid confusion, if the DETERMINED\_OD comes from an onboard solution that has been telemetered to the ground, the MAN\_BASIS should be clarified by adding a note of explanation. | C. Gramling/NASA GSFC | Please reconsider implementing the distinction in the types of DETERMINED states for MAN\_BASIS: DETERMINED\_TLM for reconstruction and DETERMINED\_ OD for calibration.Consider including a clarifying statement for the MAN\_BASIS: “For definitive OD performed onboard whose solutions have been telemetered to the ground for inclusion in an OCM or as a basis for the maneuver section, the MAN\_BASIS is considered DETERMINED\_OD.” | Fixed. |
| 6-20-6-21 | 6.2.7.9 & 6.2.7.10 |  | Te | Regarding a comment (Lamy) levied on v2.36 “Clarify if 6.2.7.9 [=THRUST] and 6.2.7.10 [=ACCEL} are mutually exclusive. The risk here is to double account for the same maneuver.”Suggestion: If both THRUST and ACEEL are needed (e.g. two representations of the same maneuver), then perhaps separate Maneuver “blocks” for the same maneuver are needed. In this case, the comments should clearly articulate the similarity and distinction. | C. Gramling/NASA GSFC | Offered one consideration for ensuring no double booking of maneuvers provided by two representations. | Fixed. Expressly state whether a specified maneuver is “additive” |
| 6-23 | Table 6-6 (MAN) |  | Te | For the list under MAN\_PURPOSE, it would make sense to adjust some of the terms for improved representation and generalization:FROM: FLYBY\_TARGTO: GRAV\_ASSISTSince this isn’t about the targeting, but the actual maneuver purpose.FROM: PER\_REDTO: SMA\_ADJUSTSince the period of the orbit can be increased or decreased, but is based on SMA. | C. Gramling/NASA GSFC | Consider renaming the specific terms in the MAN\_PURPOSE section: FROM: FLYBY\_TARGTO: GRAV\_ASSIST,FROM: PER\_REDTO: SMA\_ADJUST. | Fixed. Adopted the first one, and used PERIOD\_ADJ for the second one |
| 6-23 | Table 6-6 (MAN) |  | Te | For the case where a maneuver is a FLYBY\_TARG (or GRAV\_ASSIST), the body used to obtain the delta-V needs to be identified in the message; it’s not necessarily the MAN\_CENTER\_NAME. | C. Gramling/NASA GSFC | Consider incorporating a term to define the body providing a gravity assist maneuver if other than MAN\_CENTER\_NAME. | Fixed. |
| 6-24 | Table 6-7 (MAN) |  | Te | MAN\_WIN\_START currently provides an absolute time and does not relate to EPOCH\_TZERO; perhaps it should, that way all maneuver timing can be related to EPOCH\_TZERO. | C. Gramling/NASA GSFC | Consider whether MAN\_WIN\_START should be an absolute time or whether it should be relative to EPOCH\_TZERO. | Fixed: allowing both relative and absolute times. |
| 6-24 | Table 6-7 (MAN) |  | Te | MAN\_WIN\_STOP currently provides an absolute time and does not relate to EPOCH\_TZERO; perhaps it should, that way all maneuver timing can be related to EPOCH\_TZERO. | C. Gramling/NASA GSFC | Consider whether MAN\_WIN\_STOP should be an absolute time or whether it should be relative to EPOCH\_TZERO. | Fixed: allowing both relative and absolute times. |
| 6-24 | Table 6-7 (MAN) |  | ed | Copy/paste typo and realignment of sections and Table numbers when responding to comment levied on v2.36:FROM: “…it is suggested to use ORB\_ID, OD\_ID, ATT\_ID from Indicate that thevalue for this keyword is recommended to be a valuefor keywords described in Tables 6-7, 6-9, 6-12, respectively, or a combination thereof”TO: “…it is suggested to be a valuefor keywords OD\_ID or ORB\_ID described in Tables 6-6 or 6-8,respectively, or a combination thereof.” | C. Gramling/NASA GSFC | Please correct the typographical errors. | Fixed. |
| 6-25 | Table 6-7 (MAN) |  | Te | Regarding MAN\_DC\_REF\_TIME, and in an attempt to address comments levied on v2.36 of the OCM, I offer an explanation of the intention for this keyword. The keyword should be able to provide a time relative to EPOCH\_TZERO, relative to MAN\_WIN\_START, or relative to an Event such as a sun pulse (or an integer sun pulse after MAN\_WIN\_START). (Note: We currently do not have a provision in the OCM to identify an Event for this purpose. Is such a parameter needed?) MAN\_DC\_REF\_TIME is suitable for use in either a spinning SC or a 3-axis stabilized SC. It differs from MAN\_DC\_REF\_DIR, and operators may have a need to execute maneuvers either way.Please see the reference diagrams below these comments. | C. Gramling/NASA GSFC |  | Fixed… See new version, plus figures and descriptive text in Annex C, Section C3. |
| 6-25 | Table 6-7 (MAN) |  | Te | Regarding comment levied on v2.36 on MAN\_DC\_REF\_TIME being a negative value: there are at least two considerations.Per OD\_EPOCH description, EPOCH\_TZERO is very likely the epoch for the OD. If the MAN\_BASIS is DETERMINED\_xx, then the MAN\_DC\_REF\_TIME and MAN\_WIN\_START time (likely also MAN\_WIN\_STOP time) will be negative values.IF MAN\_BASIS is PREDICTED and the ORBIT STATE TIME HISTORY is also a prediction, then it is possible that MAN\_DC\_REF\_TIME could be a negative value, depending on where EPOCH\_TZERO is anchored.Please see the reference diagrams below these comments. | C. Gramling/NASA GSFC | Consider providing a clarifying statement that, per the description of EPOCH\_TZERO, time references in the maneuver section may be negative. | Fixed. |
| 6-25 | Table 6-7 (MAN) |  | te | Regarding MAN\_DC\_REF\_DIR, we should discuss incorporating a clarification and/or a proviso as to whether the DIR represents the center of the duty cycle or the start of the duty cycle.  | C. Gramling/NASA GSFC | Consider adding a clarifying note to identify the intended (or default?) implementation for the direction specified by MAN\_DC\_REF\_DIR | Fixed. |
| 6-28 | Table 6-8 (ORB) | Comment | Te | The comment asks if further clarification of the orbit elements would make sense. I think that it would be helpful to identify all elements solved-for in the OD. See previous comment on OD section from same commenter. | C. Gramling/NASA GSFC | Agree with intent of comment that solve-for elements would assist the OCM message. Please consider adding a way to identify the element set solved-for and provided in Orbit State Time History. | Fixed. |
| 6-27 | 6.2.8.10 (ORB) |  | Ed/te | It is unclear if the use of comment(s) suggested in this guideline is meant to be interspersed in the orbit state time history or to be included in the early comment line. Based on commentary provided on previous versions of the OCM, it seems like this ambiguity has been fixed, but it still seems a bit ambiguous.  | C. Gramling/NASA GSFC | Consider clarifying text to ensure that all comments are included in the lone comment keyword of this section. | Fixed. |
| 6-28 | Table 6-8 (ORB) |  | Te | From v2.35 to v2.36, while updating the maneuver section, we discussed (during and after Rome mtg) including a distinction for DETERMINED in MAN\_BASIS. DETERMINED can have two flavors: 1. Based on propulsion and attitude system telemetry in near-real-time for reconstruction as DETERMINED\_TLM, 2. Based on observation-based orbit estimation for a calibration as DETERMINED\_OD. Based on other comments against v2.36 and perhaps a poorly phrased comment from me, that distinction has been removed in v2.37. In the Orbit State Time History table 6-8, ORB\_BASIS is given as PREDICTED or DETERMINED. If the MAN\_BASIS is updated to cover DETERMINED\_TLM and DETERMINED\_OD, ORB\_BASIS should follow suit, just for parallelism.To avoid confusion, if the DETERMINED\_OD comes from an onboard solution that has been telemetered to the ground, the ORB\_BASIS should be clarified by adding a note of explanation. | C. Gramling/NASA GSFC | If you have revised the implementation of the distinction in the types of DETERMINED states for MAN\_BASIS: DETERMINED\_TLM for reconstruction and DETERMINED\_ OD for calibration, considering adding those same terms to ORB\_BASIS.Consider including a clarifying statement for the ORB\_BASIS: “For definitive OD performed onboard whose solutions have been telemetered to the ground for inclusion in an OCM, the ORB\_BASIS is considered DETERMINED\_OD.” | Fixed. |
| 6-32 | Table 6-9 (COV) |  | Te | Similar to the MAN\_BASIS and ORB\_BASIS comments, COV\_BASIS as DETERMINED should be identified to be DETERMINED\_OD. | C. Gramling/NASA GSFC | Please reconsider the use of DETERMINED\_OD (instead of just DETERMINED) for COV-BASIS. | Fixed. |
| 6-30-6-32 | 6.2.9 & Table 6-9 (COV) |  | Te | If the covariance comes from a PREDICTED or DETERMINED (or EMPIRICAL) OD, then it may be useful to identify the OD that this covariance pertains to. This need for origin identification could apply to Monte Carlo analysis, too. Perhaps a keyword such as ORIGIN\_ID that is optional with a text field value, could fit the bill. | C. Gramling/NASA GSFC | Consider adding in an optional ORIGIN\_ID keyword with text field to identify the source of the covariance. | Added statement that OD is relevant to entire message and also added a BASIS\_ID to ORB, COV and STM |