| **Page** | **Section** | **Line** | **Type** | **Comment/ Rationale** | **Source of Comment (Name/Agency)** | **Suggested Disposition** | **Disposition****(Completed by Principal Editor)** |
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| General |  |  | GE | The Nav WG Guidelines suggest placing examples in annexes. Should the ODM be updated to collect the examples into an annex or set of annexes? | Cheryl Gramling/NASA GSFC | Determine whether following the guidelines during this ODM update cycle reaps a worthwhile ROI. | Per direction from David on telecon 8 Feb 2017, we will leave the examples inline in the text for the ODM unless instructed otherwise. |
| General |  |  | GE | Consider adding an ODM (or at least an OCM) Summary Sheet in an annex that identifies which optional metadata is required if certain data blocks are included.  | Cheryl Gramling/NASA GSFC | Discussion. | Agree. Added a R.H. column to Table 6.3 entitled, “ **Any OCM sections relying upon this field ?” where those reliances are listed.** |
| 6-4 | 6.2.3 | General | GE, TE | It may be helpful to have the MetaData section identify whether a maneuver or other optional sections of the OCM, are included in the message. This provides the recipient with a quick reference as to OCM contents. Similar to how Alain added a CONTENT keyword in the ADM, suggest the OCM include a CONTENT keyword (or similar, as long as the keyword is consistent among the message types) to identify the types of optional ‘blocks’ that are included in the OCM. The ADM and OCM should try to follow the guideline to be consistent. | Cheryl Gramling/NASA GSFC | Perhaps include a set of bi-level flags in the MetaData to identify inclusion (=1) or absence (=0) of each of the optional sections in the OCM. Or the CONTENT keyword. Aim to have the ADM and OCM be consistent. | In general, I am resistant to this, especially if mandatory, because of its potential verbosity. My assumption is that almost all OCMs will be ingested by a machine, and the KVN or XML keywords will easily be identified as being present (or not). |
| 6-7 | 6.2.4 | General | GE, TE | Are any other PHYS CHAR needed if we need to include attitude maneuvers that induce dV, or thruster locale/direction cosines (plume impingement?), or other phys char for non-propulsive maneuvers? | Cheryl Gramling/NASA GSFC | For discussion. | Yes, we should discuss. Happy to add fields as we identify them. |
| 6-13 | 6.2.6.11.1) | 1 | TE | The use of the term “DETERMINED” is ambiguous as it can be determined from telemetry only, or from a tracking data/sensor-based orbit estimate. | Cheryl Gramling/NASA GSFC | Suggest changing “DETERMINED” into two flavors: TELEMETRY for a reconstruction, and OD from a post-maneuver orbit determination solution. | Fully agree. Modified to “ DETERMINED\_TLM” and “DETERMINED\_OD” |
| 6-12 | 6.2.6.7 | 4 | TE | Missing a resultant delta-V; provides a quick reference as to the magnitude of the overall maneuver | Cheryl Gramling/NASA GSFC | Suggest including a resultant delta-V with the vector form. | Yes, we should discuss. In general, I am resistant to this, especially if the field can be easily derived from its components rather than adding a field. My assumption is that almost all OCMs will be ingested by a machine, and the KVN or XML keywords will easily be ingested (and can then be added). |
| 6-12 | 6.2.6.5, 6.2.6.7 | 1+ | TE | The term “IMPULSIVE” is generally reserved for either a maneuver that takes place over a very short time interval such that it can be modeled as an instantaneous velocity change or an ejection of a n object from another object (e.g. payload separation). The text in the OCM section is using the term IMPULSIVE to mean a longer maneuver represented over a time series. | Cheryl Gramling/NASA GSFC | Suggest the term “IMPULSIVE” be used to provide a delta-V that occurs at or can be modeled at one specific time. Another term, such as “FINITE” can be employed to provide delta-V data in the OCM that is modeled or occurs as a time series of velocity changes. | I’d like to discuss this. My observation over the past several years of working this is that our language relevant to this is certainly non-standardized and often contradictory. |
| 6-12, 6-13 | 6.2.6.7, 6.2.6.9, & 6.2.6.10 |  | ED | The text describing a change in mass is not consistent in the three sections listed. To avoid confusion or mis-interpretation, provide the same description for a mass change in the three sections. | Cheryl Gramling/NASA GSFC | Suggest use of “mass change (where a negative number denotes a loss of mass)” in each section instead of “mass decrement….” In section 6.2.6.7 & 6.2.6.10. | Good point, agreed. Made them consistent. |
| 6-7+ | 6.2.4 | Table 6-4, row 9 | TE | The OCM limits the axes to an Optimally Encompassing Box vs allowing a reference to a spacecraft body XYZ or other frame, as other messages have allowed. | Cheryl Gramling/NASA GSFC | Suggest providing an option for other axis/frame definition.(Note: Need to include the OEB in the Nav Green Book Definitions/Conventions) | Agree, and I believe this is already fixed via PHYSDIM\_FRAME, which may be aligned with any supported absolute or relative frame allowed by the message. Also added the attitude subsection and SC\_BODY to the description. |
| 6-10 | 6.2.5 | Table 6-5, Row 10 | ED | CIO and CIP are not defined. | Cheryl Gramling/NASA GSFC | Suggest defining Celestial Intermediate Origin and Pole in the text. (NOTE: include definitions in Nav Green Book Definitions/Conventions.) | Agreed and adopted. |
| 6-15 | 6.2.7 | all | TE | Why develop a separate Orbit State Time History Section instead of simply referring to an OEM, or an OPM if only a single state is needed. If the OEM doesn’t include all the necessary parameters, then perhaps the OEM should be modified to be inclusive of necessary data definitive, predictive).  | Cheryl Gramling/NASA GSFC | Suggest use of an OEM or OPM, as appropriate, instead of developing a new/different way of representing a time history file or repeating information. Update OEM to include new parameters (ORB\_TYPE, ELEMENT\_AVERAGING, BASIS | The main point of the OCM is to provide a comprehensive message, which is self-contained, that includes as optional content any/all elements that commonly need to get conveyed. It would be my goal that the OCM can eventually replace the OEM, OPM and OMM with a single message. |
| 6-18 | 6.2.8 | All | TE | Could include a reference to a TDM set to make it more complete (not repeat the TDM, just reference the message IDs used in the OD) | Cheryl Gramling/NASA GSFC |  | Agreed and adopted. Note that the TDM does not currently have an ID field, so I allow file name. |
| 6-18 | 6.2.8.6 |  | TE | Understanding there is a distinction being made between “Observation” and “Sensor Track”, does “Observation” mandate one single observation of a single type from one source at one time (e.g. Doppler from DSS 54 @ 13:04:50z), or could it mean one observation set of multiple data types from one source at one time (e.g. range and Doppler from DSS 54 @ 13:04:50z)? | Cheryl Gramling/NASA GSFC | Suggest clarifying text be included, or a proviso for multiple types of observations. | Agreed and clarified. |
| 6-18 | 6.2.8.6 |  | TE | in “Sensor Track”, suggest changing from “where each observation is within a specified number of minutes (which is dependent on the orbit regime of the object)” to “where each observation occurs within one Acquisition of Signal to Loss of Signal period” (or something similar) in order to remove the perception that the contact period may be specified in the message or that the contact is dependent on the orbit (contact may depend on several factors, like asset type and constraints, asset loading, SC orbit, OD need for geometry variation, etc). | Cheryl Gramling/NASA GSFC | Please clarify the text. | I believe this follows the (rigid) AF SPACECOM definition. We can discuss to see whether it’s possible to have multiple definitions, but I’d like for us to at least accommodate the AF one. |
| 6-20 | 6.2.8, Table 6-8 | Row 2 & 4 | ED | two “COMMENT” entries exist – needed? | Cheryl Gramling/NASA GSFC | Remove one COMMENT entry. | Has been fixed. |
| 6-20 | 6.2.8, Table 6-8 | All | TE | If one allows for an OD method to be specified, then other parameters of the OD estimation are relevant to understanding the information provided to assess the states from the OD – number of states solved for, simultaneous vs singular craft estimation, integrator (e.g. RK, Cowell, etc), process noise associated with the filter, is the EKF only a filter, or could it include a smoother (and if so, over what time span and methodology for execution), sampling interval of input sensor data, data weighing, etc. I could get a ‘good’ value of a WRMS on the same set of observations using several different combinations of these OD set ups, yet end up with very different orbit states. Or I could get the same WRMS using a different set of observations and a similar set-up and obtain very different orbit states. Understood that the complexity involved in OD (aka, the “art”) doesn’t lend itself to the intent of this message, but suggest that a note to that effect be included in section 6.2.8 at a minimum. | Cheryl Gramling/NASA GSFC | Consider a proviso for additional parameters as optional inputs to the OD section. | Under consideration. Would welcome specific recommendations. |
| 6-20 | 6.2.8, Table 6-8 | Row 6, 7 | ED | for the sake of consistency, suggest “DAYS\_SINCE\_FIRST\_OB” be changed to “DAYS\_SINCE\_FIRST\_OBS”. Similarly, for “DAYS\_SINCE\_LAST\_OB”, change to “DAYS\_SINCE\_LAST\_OBS”. | Cheryl Gramling/NASA GSFC | Consider the recommended change to keywords. | Agreed and adopted. |
| 6-20 | 6.2.8, Table 6-8 | Rows 10, 11+ | TE | Suggest the addition of DATA\_TYPE to offer greater insight into the efficacy of the OD by providing the type of sensor data used in the solution. DATA\_TYPE is defined in CCSDS 503x0 (TDM), Table 3-5. Discussion: Then, should “OBS\_AVAIL” and “OBS\_USED” be provided for each DATA\_TYPE bc they likely will not be the exact same; or should the number of OBS\_AVAIL and OBS\_USED be cumulative across all DATA\_TYPES; or develop another way of indicating the distinction. This is especially useful if the OD occurs directly after a maneuver completes. | Cheryl Gramling/NASA GSFC | Suggest use of a consistent approach and a proviso for DATA\_TYPE. | Agreed and adopted. |
| 6-21 | 6.2.8, Table 6-8 | Row 1 | ED, TE | For the “WEIGHTED\_RMS”, suggest removing the descriptive text about the EKF since it is stated that the keyword is only useful for BLS OD. A single value for WRMS does only make sense for BLS. | Cheryl Gramling/NASA GSFC | Suggest removing text about EKF in the WRMS descriptor. | Agreed and adopted. |
| 6-21 | 6.2.8, Table 6-8 | Rows 2-4 | ED | For the three eigen values, they can be provided at any epoch point in the estimation; mandating the last observation either assumes a sequential estimation or could give a skewed interpretation of a BLS. | Cheryl Gramling/NASA GSFC | Please clarify descriptive text and intent. | Agree that it can be skewed, but want to somehow convey goodness of the OD as estimated by the OD system. Changed it to: OD\_EPOCH\_EIGMAJ etc. |
| 6-33 | 6.2.11, Table 6-11 |  | ED | In the Ephem Compression section, “EC\_BASIS\_PROP”, the propagator type should also provide the order of the propagator (e.g. RK 4/5 or RK 8/9; Cowell 9). | Cheryl Gramling/NASA GSFC | Please add clarifying text to ensure the proper text is provided as the keyword value. | Agreed and clarified. |
| OCM | General |  | GE, TE | Is it assumed (and therefore should be specifically stated) that the EC\_BASIS\_PROP in the Ephem Compression, the Force Model section, and the info in the Maneuver section are all incorporated in the OD? | Cheryl Gramling/NASA GSFC | Please clarify the intent. | Agree to clarify. This is not intended to need to be consistent. |
| 6-33 | 6.2.11, Table 6-11 | Row 6 | ED | in “EC\_ORB\_STATE”, change ““EC\_TYPE = YYY” to “EC\_BASIS\_PROP” to be consistent with the updated text. | Cheryl Gramling/NASA GSFC | Please consider the suggested update. | Agreed. |
| OCM | General |  | GE | There is no example of the OD section in the OCM examples. | Cheryl Gramling/NASA GSFC | Please consider including an example of the OD section. | Agree and will add. |