

Update Sun Earth Ephemerides  
File: H\_FCP\_AOC\_3M03.xls  
Author: dsalt-hp



## Procedure Summary

### Objectives

The objective of this Herschel ACMS procedure is to update the Sun Earth Ephemerides values in the OBDB and SGM.

The procedure involves the following activities:

- sending values via dedicated TC
- confirming the OBDB values via DTM for OBDB2 or dumps

The inertial Sun vector is used to check that target quaternion is within the operational region. The ACMS ASW correct the inertial Sun vector using a linear approximation. This introduces a deviation from the actual motion within a couple of days. The propagation parameters need therefore to be maintained on a weekly basis.

When a CIR condition is raised, the ACMS autonomously triggers a Fine Pointing in SCM towards the Earth, as defined by the Earth quaternion. The latter has also to be maintained by Ground on a regular basis.

### Summary of Constraints

To be performed on a weekly basis at least, more regularly if possible.

As a pre-requisite it is assumed that the following has been processed:

- # inertial Earth quaternion;
- # inertial Sun vector;
- # Sun vector propagation parameters.

### Spacecraft Configuration

#### Start of Procedure

Spacecraft initial conditions:  
- S/C in a nominal mode

#### End of Procedure

Spacecraft final conditions:  
- as initial conditions plus updated Sun Earth Ephemerides

### Reference File(s)

#### Input Command Sequences

#### Output Command Sequences

AESEE\_00

### Referenced Displays

ANDs      GRDs      SLDs

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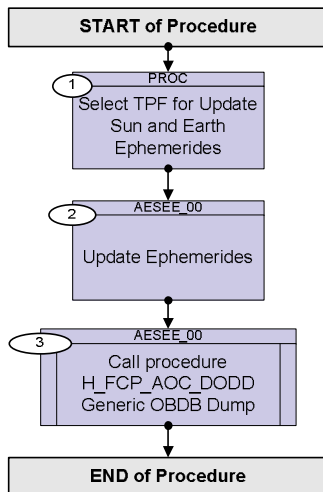
**Configuration Control Information**

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
03/08/08	1	1	Created	dsalt-hp	

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## Procedure Flowchart Overview



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
<b>Beginning of Procedure</b>				
PROC Procedure Properties				
SSID :				
1		Select TPF for Update Sun and Earth Ephemerides		Next Step: 2
		Check with Flight Dynamics the <b>exact name of the TPF instance</b> to be uplinked		
AESEEE_00 Update SE Ephem				
Sequence Parameter(s) : EphUpd Earth Q1 Q_EAR_X <dec> EphUpd Earth Q2 Q_EAR_Y <dec> EphUpd Earth Q3 Q_EAR_Z <dec> EphUpd Earth Q4 Q_EAR_S <dec> EphUpd SunV X U_SUN_X <dec> EphUpd SunV Y U_SUN_Y <dec> EphUpd SunV Z U_SUN_Z <dec> EphUpd SunDr Q1 Q_SUN_DX <dec> EphUpd SunDr Q2 Q_SUN_DY <dec> EphUpd SunDr Q3 Q_SUN_DZ <dec> EphUpd SunDr Q4 Q_SUN_DS <dec>				
EphUpd SunCo Q1 Q_SUN_UX <dec> EphUpd SunCo Q2 Q_SUN_UY <dec> EphUpd SunCo Q3 Q_SUN_UZ <dec> EphUpd SunCo Q4 Q_SUN_US <dec> SSID : 20				
2		Update Ephemerides		Next Step: 3
2.1		Uplink instance TC created by loading specified TPF		<input type="checkbox"/>
		Execute Telecommand		
		Update ephemerides	ACUE1002	
		Command Parameter(s) : ASW Function ID AHFUN002 EphemeridesUpd EphUpd DF86 Cmd AH8T1002 (Def) EphUpd DD86 Cmd AH8T2002 Enable 86 EphUpd Earth Q1 AHHK1002 Enable 86 EphUpd Earth Q2 AHHK2002 Q_EAR_X EphUpd Earth Q3 AHHK3002 Q_EAR_Y EphUpd Earth Q4 AHHK4002 Q_EAR_Z EphUpd SunV X AHHKX002 Q_EAR_S EphUpd SunV Y AHHKY002 U_SUN_X EphUpd SunV Z AHHKZ002 U_SUN_Y EphUpd SunDr Q1 AHHL1002 U_SUN_Z Q_SUN_DX		

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		EphUpd SunDr Q2 AHHL2002 EphUpd SunDr Q3 AHHL3002 EphUpd SunDr Q4 AHHL4002 EphUpd SunCo Q1 AHHM1002 EphUpd SunCo Q2 AHHM2002 EphUpd SunCo Q3 AHHM3002 EphUpd SunCo Q4 AHHM4002  TC Control Flags :  SSID : 20	Q_SUN_DY Q_SUN_DZ Q_SUN_DS Q_SUN_UX Q_SUN_UY Q_SUN_UZ Q_SUN_US  GBM IL DSE --Y -- ---	
2.2		Check the TC has been accepted		<input type="checkbox"/>
		Verify Packet Reception <b>TM_8_6 for EphemeridesUpdate - Updating</b> Packet Details:	<b>A86EPHUPD002</b>  APID: 512 Type: 8 Subtype: 6 PI1: 26114 PI2: 0	
3		Call procedure H_FCP_AOC_DODD Generic OBDB Dump		Next Step: END
		NOTE: This procedure enables a direct dump of the OBDB from RAM or Safe-Guard Memory (SGM), as well as reading the OBDB via diagnostic telemetry (DTM) packets		
		<u>Relevant details for use with H FCP AOC DODD</u>  Based upon the latest ASW ICD (H-P-4-TASW-IF-0002, Issue 3 F), this procedure loads the following parameters into specific OBDB offset locations in RAM: <b>C_NOM_AUX_SAT_QUAT_SUN_DRIFT_*_*</b> at offsets 259-262 <b>C_NOM_AUX_SAT_UPDATE_SUN_*_*</b> at offsets 263-266 These are located in <b>Block 2</b> of the OBDB  It also copies the following parameters into specific OBDB offset locations in SGM <b>C_NOM_AUX_SAT_QUAT_SUN_DRIFT_*_*</b> at offsets 159-162 <b>C_NOM_AUX_SAT_UPDATE_SUN_*_*</b> at offsets 163-166		
3.1		Dump via DTM		<input type="checkbox"/>

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		<p>Relevant details for use with H FCP AOC DODD</p> <p>The following parameters  <b>C_NOM_AUX_SAT_QUAT_SUN_DRIFT_**</b>  <b>C_NOM_AUX_SAT_UPDATE_SUN_**</b>            are located in <b>Block 2</b> of the OBDB</p>		
		<p>Use sequence <a href="#">HFADODDE</a></p>		
		<p>NOTE:            The contents of diagnostic packet A3DH0BDB2109 {DTM with Herschel OBDB data2} are spread over a group of 4 monitoring displays:</p> <p><b>ZAZ64999 DTMOBDB2_1 &lt;- values are in this display</b>            ZAZ65999 DTMOBDB2_2            ZAZ66999 DTMOBDB2_3            ZAZ67999 DTMOBDB2_4</p>		
		<p>NOTE:            This step enables diagnostic packets that contain data from specific blocks of the OBDB, where each block contains 250 onboard database parameters.</p> <p>The Herschel onboard database currently contains 2134 parameters and there are 8 diagnostic packets defined to cover the first 2000 entries. In HP-4-TASW-IF-0002 (ACC ASW_ICD) section 6.1 you can find a list of Herschel OBDB parameters ordered by offset.</p>		
3.2		<p>Dump from RAM</p>		□
		<p>Relevant details for use with H FCP AOC DODD</p> <p>Based upon the latest ASW ICD (H-P-4-TASW-IF-0002, Issue 3 F), this procedure loads the following parameters into specific OBDB offset locations in RAM:  <b>C_NOM_AUX_SAT_QUAT_SUN_DRIFT_**</b>            at offsets 259-262  <b>C_NOM_AUX_SAT_UPDATE_SUN_**</b>            at offsets 263-266</p> <p>The <u>absolute address</u> of offset 259 is therefore:  <b>020A = Memory ID</b>  <b>D324 = Start Address</b></p> <p>The <u>absolute address</u> of offset 263 is therefore:  <b>020A = Memory ID</b>  <b>D334 = Start Address</b></p>		
		<p>Use sequence <a href="#">HFADODDL</a></p> <p>to dump <u>all</u> the OBDB in RAM, or edit:            Start Address = <b>D324</b>            Length = 32</p>		

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		<p>NOTE:            The RAM memory address for a parameter with a given OBDB ID can be calculated as follows:            RAM address = OBDB start address + parameter offset;            OBDB start address = address of Asw_DatabaseManager_Obj + 12;            parameter offset = OBDB ID * 4.</p> <p>Parameter ID's are listed in the ASW ICD (H-P-4-TASW-IF-002).</p> <p>Asw_Databasemanager_Obj is an ASW container structure used in the management of the OBDB and its address has to be obtained from the linker memory map valid for the software build currently used onboard.</p>		
3.3		Dump from SGM		<input type="checkbox"/>
		<p>NOTE:            SGM inertial sun vector is updated every 10 seconds, therefore the dumped values might not exactly be the same as commanded ones</p> <p>Dump SGM configuration - A only</p>		
		<p>Relevant details for use with H_FCP_AOC_DODD</p> <p>Based upon the latest ASW ICD (H-P-4-TASW-IF-0002, Issue 3 F), this procedure copies the following parameters into specific OBDB offset locations in SGM</p> <p style="padding-left: 40px;">C_NOM_AUX_SAT_QUAT_SUN_DRIFT_*_*            at offsets 159-162</p> <p style="padding-left: 40px;">C_NOM_AUX_SAT_UPDATE_SUN_*_*            at offsets 163-166</p> <p>The <u>absolute address</u> of offset 159 is therefore:            EA0278 in SGA (=12190328 &lt;dec&gt;)            EA0278 in SGB (=15336056 &lt;dec&gt;)</p> <p>The <u>absolute address</u> of offset 163 is therefore:            EA0288 in SGA (=12190344 &lt;dec&gt;)            EA0288 in SGB (=15336072 &lt;dec&gt;)</p>		
		<p>Use sequences <a href="#">HFADODDJ</a> &amp; <a href="#">HFADODDK</a>            to dump <u>all</u> the OBDB in SGMA &amp; SGMB, or edit:            Start Address = BA0278 / EA0278            Length = 32</p>		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		<p><i>NOTE:</i>            The address of a parameter with a given ID can be calculated as follows:</p> <p><i>SGMA</i>            Address = 0xBA0000 + (ParamID-1) * 4</p> <p><i>SGMB</i>            Address = 0xEA0000 + (ParamID-1) * 4</p> <p>Parameter ID's refer to the listing of SGM OBDB parameters in the ASW ICD (H-P-4-TASW-IF-0002) and are not the same as the ID's in the RAM OBDB.</p>		
		<p><b>Confirm new values for Earth quaternion and USun in the SGM configuration data dump.</b></p>		
		<p>Earth Quaternion and USun are the last used data within the SGM configuraion data, starting at 32 bytes in, with following layout of 32 bits IEEE floats</p> <pre>-- Earth Quaternion start # Qx; # Qy; # Qz; # Qs; -- Earth Quaternion end # reserved; # reserved;</pre>		
		<pre>-- Inertia Sun Vector start # Ux; # Uy; # Uz; -- Inertia Sun Vector end # (not config data); # (not config data).</pre>		
<b>End of Procedure</b>				