Doc No. :PT-HMOC-OPS-FOP-6001-OPS-OAH

Fop Issue : 3.0
Issue Date: 13/04/10

Perform RWL bias in OCM File: H_FCP_AOC_4R34.xls

Author: dsalt-hp





Procedure Summary

Objectives

The objective of this Herschel ACMS procedure is to commanded the reaction wheels to maintain a specific angular rate in OCM.

The procedure involves the following activities:

- verify ACMS status and mode (=OCM)
- verify RWL power and health status $% \left(1\right) =\left(1\right) +\left(1\right$
- select specific TPF (RWL) on manual stack
- command RWL momentum bias and hold

It relies on the bias and hold loop which brings the wheels to the commanded rate (except for a steady state controller offset due to friction) and maintains them at constant speed.

NOTE:

The procedure can also be used for the initial wheel run-in after power-on in orbit. After prolonged storage and during operations on ground the RWL's have a higher loss torque because of non-uniform distribution of lubricant on the bearings. A run-in at constant speed in orbit has been recommended by the supplier as a way to guarantee a uniform layer of lubricant and reduce the loss torque.

Summary of Constraints

- 1. ACMS pointing in OCM
- 2. All RWL's powered.
- 3. Specific TPF (RWL) delivered by FD and available on MCS $\,$

Spacecraft Configuration

Start of Procedure

Spacecraft initial conditions - ACMS pointing in OCM

- all RWLs switched ON

End of Procedure

Spacecraft final conditions - same as initial conditions

Reference File(s)

Input Command Sequences

Output Command Sequences

AERWL_00

Referenced Displays

ANDS GRDS SLDS

Status : Version 12 - Unchanged

Last Checkin: 04/05/09 Page 1 of 6

Doc No. :PT-HMOC-OPS-FOP-6001-OPS-OAH Fop Issue : 3.0 3.0

Issue Date: 13/04/10

Perform RWL bias in OCM File: H_FCP_AOC_4R34.xls

Author: dsalt-hp





ZAA01999 ZAA00999 ZAA02999

Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
03/08/08	1	1	Created	dsalt-hp	
05/09/08		2	Sub Schedule ID now defined (SSID=20) for the MPS	dsalt-hp	
24/09/08		3	Formal parameters for RWL ID removed in Step 5 and replaced with fixed values.	dsalt-hp	
27/11/08		4	Sequence AERWL_00 updated to be planable by all sources and -ve time-tags applied to 1st & 2nd TCs in Step 5.	dsalt-hp	
05/12/08	2	5	Timet-tag on 3rd TC in Step 5 changed to relative time to ensure correct time deltas between all 3 TCs	dsalt-hp	
22/03/09		6	Updated to enable SCM pointing TC execution with RCS in Coarse (Step 6-9) as nominal, as per Section 2.1.2 of H-P-4-DS-MA-002 (Issue 2, Rev.5) NOTE: These additional TCs are linked to the TPF=RWL to ensure autonomous loading during routine Delta-Vs and all other OCM-to-SCM transitions that require wheel bias/hold conditions	dsalt-hp	
23/03/09		7	Name and offset for OBDB parameters corrected in Step 7 & 8 after Industry updates to Section 2.1.2 of H-P-4-DS-MA-002 (Issue 2, Rev.5)	dsalt-hp	
23/03/09		8	Correction of TC time-tags in Step 7	dsalt-hp	
23/03/09		9	Correction of TC time-tags in Step 7 & 8	dsalt-hp	
23/03/09		10	Small correction to TC time-tags in Step 8	dsalt-hp	
25/03/09	2.2	11	Comment added to Step 6-9 to remove TCs from the Manual Stack if the sequence is run under ground supervision, as they are also include in H_FCP_AOC_OSCM	dsalt-hp	
04/05/09	2.4	12	TCs to enable transition from OCM to SCM in RCS Coarse now removed (transfered to H_FCP_AOC_0SFX)	dsalt-hp	

Status : Version 12 - Unchanged

Page 2 of 6 Last Checkin: 04/05/09

Doc No. :PT-HMOC-OPS-FOP-6001-OPS-OAH Fop Issue : 3.0

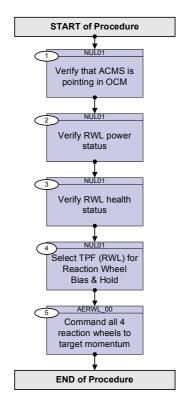
Issue Date: 13/04/10

Perform RWL bias in OCM File: H_FCP_AOC_4R34.xls Author: dsalt-hp





Procedure Flowchart Overview



: Version 12 - Unchanged

Page 3 of 6 Last Checkin: 04/05/09

Doc No. :PT-HMOC-OPS-FOP-6001-OPS-OAH Fop Issue : 3.0

Issue Date: 13/04/10

Perform RWL bias in OCM File: H_FCP_AOC_4R34.xls

Author: dsalt-hp





Step No. Time	Activity/Remarks	TC/TLM	Display/ Branch		
NO: 11me	Beginning of Procedure	10/1111	Display/ Blanch		
	TC Seq. Name :NUL01 (Null Sequence 01)				
	TimeTag Type: Sub Schedule ID:				
1	Verify that ACMS is pointing in OCM		Next Step: 2		
	Verify Telemetry AcmsMode AESMG002	= OCM	AND=ZAA01999		
	Verify Telemetry AcmsSubstate AESMF002	= OCM Pointing	AND=ZAA01999		
	NOTE: After prolonged storage and during operations on ground the RWL's have a higher loss torque because of non-uniform distribution of lubricant on the bearings. A run-in at constant speed after power-on in orbit has been recommended by the supplier as a way to guarantee a uniform layer of lubricant and reduce the loss torque. The procedure relies on the bias-and-hold loop in OCM to control the wheel at a constant rate for a prolonged time (of the order of 1 - 2 days).				
2	Verify RWL power status		Next Step:		
	Verify Telemetry RWL1 power AE4P3002	= ON	AND=ZAA00999		
	Verify Telemetry RWL2 power AE4P4002	= ON	AND=ZAA01999		
	Verify Telemetry RWL3 power AE4P5002	= ON	AND=ZAA01999		
	Verify Telemetry RWL4 power AE4P6002	= ON	AND=ZAA01999		
3	Verify RWL health status		Next Step:		
	Verify Telemetry RWL1 Health Sts AES45002	= Healthy	AND=ZAA02999		
	Verify Telemetry RWL2 Health Sts AES46002	= Healthy	AND=ZAA02999		
	Verify Telemetry RWL3 Health Sts AES47002	= Healthy	AND=ZAA02999		

Status : Version 12 - Unchanged

Last Checkin: 04/05/09

Doc No. :PT-HMOC-OPS-FOP-6001-OPS-OAH Fop Issue : 3.0

Issue Date: 13/04/10

Perform RWL bias in OCM File: H_FCP_AOC_4R34.xls Author: dsalt-hp





St.	_	Time	Activity/Remarks	TC/TLM	Display/ Branch
			Verify Telemetry RWL4 Health Sts AES48002	= Healthy	AND=ZAA02999
					Next Step:
4			Select TPF (RWL) for Reaction Wheel Bias & Hold		5
			Check with Flight Dynamics the exact name of the <u>TPF</u> <u>instance</u> to be uplinked	-	

			TC Seq. Name :AERWL_00 (RWL bias & hold) TimeTag Type: B Sub Schedule ID: 20		
			Formal Parameter List : Bias H_RWL1 h HW_1=	Nms	
			Bias H_RWL2 h HW_2=	Nms	
			Bias H_RWL3 h HW_3=	Nms	
			Bias H_RWL4 h HW_4=	Nms	Dr. L. Gr.
5			Command all 4 reaction wheels to target momentum		Next Step: END
			Execute Telecommand		
		'=TR- .00.10	Stop Function	AC082109	
	דט	'= +	Command Parameter(s): Any Function ID AHFUN109	Biasing	
			TC Control Flags :		
			GBM IL DSE		
			Y Subsch. ID : 20		
			Det. descr.: TC(8,2) Stop Function		
			NOTE: This command is send as a precaution and is necessary only if the bias-and-hold function is already active at the moment when the procedure is called (the function must be stopped explicitly before another angular momentum target can be commanded).		
			NOTE: Validation tests on the Herschel simulator show that the following TC (START_FUNCTION_biasing) must also be sent in order to prevent the next TC being rejected by the ACC/ASW and returning a TM Acceptance Report - Failure (TM_1_2_131)		

: Version 12 - Unchanged Status

Page 5 of 6 Last Checkin: 04/05/09

Doc No. :PT-HMOC-OPS-FOP-6001-OPS-OAH Fop Issue : 3.0

Issue Date: 13/04/10

Perform RWL bias in OCM File: H_FCP_AOC_4R34.xls Author: dsalt-hp





Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=TR- 00.00.05	Execute Telecommand Start Function	AC081109	
	UT=+	Command Parameter(s): Any Function ID AHFUN109	Biasing	
		TC Control Flags : GBM IL DSE		
		Subsch. ID : 20 Det. descr. : TC(8,1) Start Function		
		Send BiasHold command with formal parameters defin by FD in specific TPF (RWL) version.	ed	
	ET=TR+00.00.0	Execute Telecommand Bias and hold RWLs	ACWH1002	
	UT=+	Command Parameter(s): ASW Function ID AHFUN002 Biasing AID Cmd AHFWB002 Bias DF86 Cmd AH8E1002 Bias DD86 Cmd AH8E2002 Bias Nrof RWL AHFWN002 Biasing RWL ID AHFWW002 Bias H_RWL1 h AHFW0002 Bias H_RWL2 h AHFW0002 Bias H_RWL3 h AHFWE002	BiasHold (Def) Disable 86 (Def) Disable 86 (Def) 4 <dec> (Def) 1 <dec> (Def) HW_1 2 <dec> (Def) HW_2 3 <dec> (Def)</dec></dec></dec></dec>	
		Biasing RWL ID AHFWW002 Bias H_RWL4 h AHFWF002	T TUEC (DCI)	
		TC Control Flags : GBM IL DSEY		
		Subsch. ID : 20 Det. descr. : TC_BIAS_RWL_hold		
		Wait about 30 seconds to allow the status of the band hold loop to be modified in TM.	ias	
		Verify Telemetry CurrentBiasAid AESM9002	= BiasHold	AND=ZAA01999
		End of Procedure		

Status : Version 12 - Unchanged

Page 6 of 6 Last Checkin: 04/05/09