Perform SCM scan
File: H_FCP_AOC_3S03.xls
Author: dsalt-hp

Procedure Summary

Objectives

The objective of this Herschel ACMS procedure is for the
execution of a line scan.

The procedure involves the following activities:
- check ACMS configuration (calls H_FCP_AOC_3001)
- select & uplink the Line Scan command
- verify slew start
- verify line scan execution
- verify pointing at end of activity

The procedure is meant for use in nominal operations and is
therefore based on the assumption that the ACMS is already in SCM
when the procedure is executed. The design of the subsystem
allows all SCM pointing commands, including scans, to be issued
in SAM and OCM, but this option will not be used during
operations in flight.

Summary of Constraints

Prior to execution in routine operations, the ACMS must be in
conditions which will prevent the triggering of TC execution
checks.

All necessary conditions are verified by calling procedure Verify
SCM Configuration, which carries out the following checks:
1. ACMS in SCM and pointing.
2. ACMS configuration allows execution of SCM pointing
   commands; i.e., the following conditions must be
   satisfied:
2.1. No SIR
2.2. No CIR
2.3. No critical TC flag raised.
3. Unit configuration is sufficient to carry out an SCM
   pointing. The procedure accepts any valid unit
   configuration for SCM and is not limited to the
   defaults (RWL 1-2-3-4, GYR 1-2-3, STR1),
3.1 One STR in active configuration, powered and healthy.
    STR mode = AAD, STR submode = ATFAD.
3.2 At least three wheels in active configuration,
    powered and healthy
3.3 One GYRE selected, powered and healthy.
3.4 Three GYR sensors in active configuration are healthy

[N.B. Flight Dynamics ensure no wheel unloading when defining
their TC inputs]

Spacecraft Configuration

Start of Procedure

n/a

End of Procedure

n/a

Reference File(s)

Input Command Sequences

Status   : Version 2 - Unchanged
Last Checkin: 13/05/09

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Output Command Sequences

AELSC_00

Referenced Displays

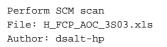| ANDs	GRDs	SLDs
ZAA50999		
ZAALH999		
ZAA52999		

Configuration Control Information

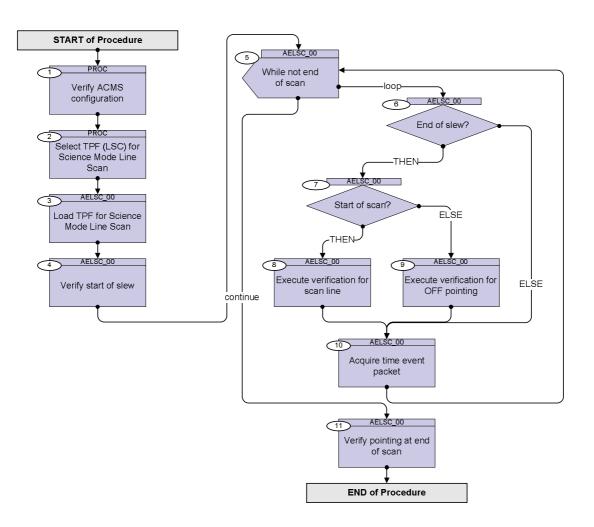| DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
03/08/08	1	1	Created	dsalt-hp	
13/05/09	2.5	2	TC in Step 3 regenerated to ensure CP calibrations are coherent with MIB updates	dsalt-hp	

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Procedure Flowchart Overview

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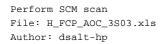| Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Beginning of Procedure		
		PROC Procedure Properties *SSID :*		
1		*Verify ACMS configuration*		Next Step: 2
		Execute Procedure: **H_FCP_AOC_3001** **Verify SCM Configuration**		
2		*Select TPF (LSC) for Science Mode Line Scan*		Next Step: 3
		Check with Flight Dynamics the **exact name of the <u>TPF instance</u>** to be uplinked		
		NOTE: *Flight Dynamics check that RWL profiles will not exceed any constraints during the maneouvre (i.e. the wheel momenta should be sufficient to stay within allowed boundaries during the entire operation) when generating this TPF.* *If there is a likelihood of this happening, they will also provide an associated wheel bias TPF (RWB), to be applied beforehand (i.e. via H_FCP_AOC_4R20)*		
		TC Seq. Name :AELSC_00 (Command Line Scan) *TimeTag Type: B* *Sub Schedule ID: 20* *Formal Parameter List :* AcmsH STR IL STRILACE= AcmsH Cmd TQ1r Q_1ST_X= AcmsH Cmd TQ2r Q_1ST_Y= AcmsH Cmd TQ3r Q_1ST_Z= AcmsH Cmd TQ4r Q_1ST_S= AcmsH N lines N_LINES= AcmsH tiltangle TILT_ANG= AcmsH D1 line D_SCAN= AcmsH d2 lines D_LINE=	<dec> <dec> <dec> <dec> <dec> deg arcs arcs	
		AcmsH scan rate SCAN_RAT= AcmsH T_slew T_SLEW_1= AcmsH T_ll T_SL_LIN= AcmsH Cmd OQ1r Q_OFF_X= AcmsH Cmd OQ2r Q_OFF_Y= AcmsH Cmd OQ3r Q_OFF_Z= AcmsH Cmd OQ4r Q_OFF_S= AcmsH K OFF K_OFF= AcmsH T_sop T_SL_OFF= AcmsH T_op T_PT_OFF=	A/s s s <dec> <dec> <dec> <dec> <dec> s s	

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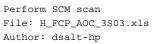| Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
3		*Load TPF for Science Mode Line Scan*		Next Step: 4
	ET=+00.00.00 UT=+	Execute Telecommand SCM Line scan *Command Parameter(s) :* 　　　ASW Function ID　　XH319990 　　AcmsH AID Cmd　　XH320990 　　AcmsH DF86 Cmd　　XH322990 　　AcmsH DD86 Cmd　　XH323990 　　　AcmsH STR IL　　XH324990 　　AcmsH Cmd TQ1r　　XH327990 　　AcmsH Cmd TQ2r　　XH328990 　　AcmsH Cmd TQ3r　　XH329990 　　AcmsH Cmd TQ4r　　XH330990 　　　AcmsH N lines　　XH331990 　　AcmsH tiltangle　　XH333990	XC070990 ACMSMain (Def) SCM prep scan (Def) Enable 86 Enable 86 STRILACE Q_1ST_X Q_1ST_Y Q_1ST_Z Q_1ST_S N_LINES TILT_ANG	
		AcmsH D1 line　　XH348990 　　AcmsH d2 lines　　XH335990 　　AcmsH scan rate　　XH349990 　　　AcmsH T_slew　　XH336990 　　　AcmsH T_ll　　XH339990 　　AcmsH Cmd OQ1r　　XH340990 　　AcmsH Cmd OQ2r　　XH341990 　　AcmsH Cmd OQ3r　　XH342990 　　AcmsH Cmd OQ4r　　XH343990 　　　AcmsH K OFF　　XH344990 　　　AcmsH T_sop　　XH345990 　　　AcmsH T_op　　XH346990 *TC Control Flags :* GBM IL DSE	D_SCAN D_LINE SCAN_RAT T_SLEW_1 T_SL_LIN Q_OFF_X Q_OFF_Y Q_OFF_Z Q_OFF_S K_OFF T_SL_OFF T_PT_OFF	
		--Y -- --- *Subsch. ID : 20* *Det. descr. : TC_PERFORM_SCM_LINE_SCAN*		
4		*Verify start of slew*		Next Step: 5
		Verify Telemetry 　　　ScmType　　AESMC002	= Slew	AND=ZAA50999
		Verify Telemetry 　　　OnTargetFlag　　AESM0002	= LOW	AND=ZAA50999
5		*While not end of scan*		Next Step: loop 6 continue 11
		Verify Packet Reception 　　AccAsw TM_5_1_16441 - Mode Timedevent　　A51T1MEVE109 *Packet Details:* 　　　　　APID:　　512 　　　　　Type:　　5 　　　　Subtype:　　1 　　　　　PI1:　　16441 　　　　　PI2:　　0		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry **AcmsMain AID** **AESM3002**	**= SCM pnt S rdy** **= SCM pnt S0 rdy**	AND=ZAA50999
		The loop which verifies the status of the ACMS during each phase of the scan should continue until TM indicates that all commanded elements of the scan have been completed. This condition is detected using the value of AcmsMain AID which should indicate one of the "ready" states (i.e., continuing pointing after the end of commanded pointing or scan). At the end of a scan the ACMS can leave the spacecraft either at the pointing position reached after deceleration from the last scan or at the OFF position and the procedure checks against the two corresponding values of AcmsMain AID.		
		Note that the value of AcmsMain AID used in the verification must come from ACMS HK TM and not from the event packet. This is due to the fact that AcmsMain AID in mode-related event packets has a value that corresponds to the preceding ACMS cycle and therefore does not reflect the change of state of the ACMS which triggered the event.		
6		*End of slew?*		Next Step: THEN 7 ELSE 10
		Verify Telemetry **Time_Id** **AE5FG109**	**= Time Id Tll** **= Time Id Tslew** **= Time Id Tsop**	AND=ZAALH999
		The individual conditions above should be combined through a logical OR. *The Time_Id parameter indicates which of the commanded manoeuvre phases has been completed. The statement above checks against values which indicate the end of three types of slews possible during a scan: line to line (Tll), initial acquisition (Tslew), manoeuvre to or from the off position (Tsop).*		
7		*Start of scan?*		Next Step: THEN 8 ELSE 9
		Verify Telemetry **Timed_Event_K** **AE5GZ002**	**<> 0 <dec>**	AND=ZAALH999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		The same Time_Id code is used for both slews towards the off position and back to the scanning pattern. In order to distinguish between these two possibilities, the procedure checks the value of the off position counter. The counter is reset to 0 at the beginning of the slew towards the off position and always has a non-zero value when the subsystem is executing a scan line or slewing towards it. *Note that the value of the counter used in the check comes from the event packet rather than the regular TM.*		
8		*Execute verification for scan line*		Next Step: 10
		Verify Telemetry **AcmsSubstate** **AESMF002**	**= SCM Scanning**	AND=ZAA50999
		Verify Telemetry **ScmType** **AESMC002**	**= Scan**	AND=ZAA50999
		Verify Telemetry **OnTargetFlag** **AESM0002**	**= HIGH**	AND=ZAA50999
		The check of the OTF flag (effectively the settling status of the controller) may fail if sufficient settling time is not allowed for the controller after acceleration at the start of a scan line. The maximum time allowed is controlled by an OBDB parameter, which the user may set to a low value for operations which do not require the full pointing accuracy during the scan. If the procedure is used with this configuration of the controller, the check on the value of the OTF should be omitted.		
		Verify Telemetry **AcmsMain AID** **AESM3002**	**= SCM Scan Prep**	AND=ZAA50999
		Verify Telemetry **AcmsH Cur Lin N** **AEHAN002**		AND=ZAA50999
		Verify Telemetry **AcmsH Cur OFF K** **AEHAK002**		AND=ZAA50999
		The values of N and K should be consistent with the commanded sequence of manoeuvres.		
		Checks of STR status		
		Verify Telemetry **STRM Mode** **AEX04001**	**= Auto attdetect**	AND=ZAA50999
		Verify Telemetry **STRM Submode** **AEX03001**	**= STB nom ATFAD**	AND=ZAA50999

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Step No.	Time	Activity/Remarks		TC/TLM	Display/ Branch
		Verify Telemetry			
		STRM IL sts	AEXJ1002	(TPF value)	AND=ZAA52999
9		*Execute verification for OFF pointing*			Next Step: 10
		Verify Telemetry			
		AcmsSubstate	AESMF002	= SCM Pointing	AND=ZAA50999
		Verify Telemetry			
		ScmType	AESMC002	= Point	AND=ZAA50999
		Verify Telemetry			
		OnTargetFlag	AESM0002	= HIGH	AND=ZAA50999
		Verify Telemetry			
		AcmsMain AID	AESM3002	= SCM pnt ScnOff	AND=ZAA50999
		Checks of STR status			
		Verify Telemetry			
		STRM Mode	AEX04001	= Auto attdetect	AND=ZAA50999
		Verify Telemetry			
		STRM Submode	AEX03001	= STB nom ATFAD	AND=ZAA50999
		Verify Telemetry			
		STRM IL sts	AEXJ1002	(TPF value)	AND=ZAA52999
10		*Acquire time event packet*			Next Step: 5
		This is only a placeholder to close the while loop. The verification of event packet acquisition is done at the top of the loop.			
11		*Verify pointing at end of scan*			Next Step: END
		A placeholder which may include any manual checks normally carried out at the end of commanded pointings and scans. The checks may cover verification of estimated attitude and attitude errors, STR parameters such as attitude quality, number of tracked stars, wheel momentum, etc.			

End of Procedure