

Command SSO Tracking  
File: H\_FCP\_AOC\_3S05.xls  
Author: dsalt-hp



## Procedure Summary

### Objectives

The objective of this Herschel ACMS procedure is to send the command for Solar System Object (SSO) tracking.

The procedure involves the following activities:

- uplink the SSO command
- execute SCM Fine Pointing (calls H\_FCP\_AOC\_3S01)
- verify S/C behaviour & status
- perform next observation

The SSO procedure is activated through a dedicated command TC\_TRACK\_SOLAR\_SYSTEM\_OBJECT. This contains the Chebyshev coefficients for the SSO correction quaternion, which is added to the control setpoint each cycle, starting from the time of the receipt of the next observation TC.

### Summary of Constraints

1. Some constraints need to be taken into account, namely:
  - # The relative speed shall not exceed 10arsec/min;
  - # The maximum order of the Chebyshev polynom is 3.
2. The next observation command must be either a Fine Pointing, a Raster Pointing, a Line Scan or a peak-up command;
3. Only one Fine Pointing, Raster Pointing or Line Scan will be affected.
4. Apart from during Line Scan, the Peak-up correction can be run at the same time as the SSO, the two correction quaternions will be effectively added up.

### Spacecraft Configuration

#### Start of Procedure

ACMS mode SCM

#### End of Procedure

The next Fine Pointing, Raster Pointing or Line Scan will include SSO tracking.

### Reference File(s)

#### Input Command Sequences

#### Output Command Sequences

AETRK\_00

### Referenced Displays

ANDs      GRDs      SLDs

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ZAA01999  
 ZAA00999  
 ZAA54999  
 ZAA55999  
 ZAA03999  
 ZAA04999

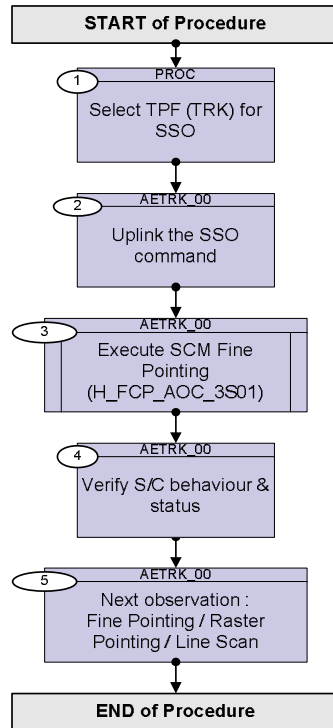
**Configuration Control Information**

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
03/08/08	1	1	Created	dsalt-hp	
21/05/09	2.5	2	TC now time-tagged	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 (TRK) for SSO		Next Step: 2
		Check with Flight Dynamics the <b>exact name of the <u>TPF instance</u></b> to be uplinked		
TC Seq. Name : AETRK_00 (Track SSO)				
TimeTag Type: B Sub Schedule ID: 20				
□				
2		Uplink the SSO command		Next Step: 3
2.1		Send the SSO command		□
	ET=+00.00.00 UT=+	Execute Telecommand  Track Solar System Obj  Command Parameter(s) : ASW Function ID            AHFUN002 SsoTrck AID Cmd            AHHS2002 SsoTrck DF86Cmd            AH8D3002 SsoTrck DD86Cmd            AH8D4002 SsoTrck Cff CX0            AHHSB002 SsoTrck Cff CY0            AHHSC002 SsoTrck Cff CZ0            AHHSD002 SsoTrck Cff CX1            AHHSF002 SsoTrck Cff CY1            AHHSG002 SsoTrck Cff CZ1            AHHSH002 SsoTrck Cff CX2            AHHSJ002	ACAT1002  SSO_Tracking (Def) Track pending (Def) Enable 86 Enable 86 SSO_X0 SSO_Y0 SSO_Z0 SSO_X1 SSO_Y1 SSO_Z1 SSO_X2	
		SsoTrck Cff CY2            AHHSK002 SsoTrck Cff CZ2            AHHSL002 SsoTrck Cff CX3            AHHSN002 SsoTrck Cff CY3            AHHS0002 SsoTrck Cff CZ3            AHHSP002	SSO_Y2 SSO_Z2 SSO_X3 SSO_Y3 SSO_Z3	
		TC Control Flags :  Subsch. ID : 20 Det. descr. : TC_TRACK_SOLAR_SYSTEM_OBJECT	GBM IL DSE --Y -- --	
2.2		Check the TC has been accepted		□

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Packet Reception <b>TM_8_6 for SSO_Tracking - TrackingPending</b> Packet Details: <b>APID:</b> 512 <b>Type:</b> 8 <b>Subtype:</b> 6 <b>PI1:</b> 26775 <b>PI2:</b> 0	A86SS0PND002	
		Verify Packet Telemetry (Pkt = A86SS0PND002) <b>SsoTrck Cff CX0</b> <b>AEHSB002</b>	(TPF value)	AND=ZAAL7999
		Verify Packet Telemetry (Pkt = A86SS0PND002) <b>SsoTrck Cff CY0</b> <b>AEHSC002</b>	(TPF value)	AND=ZAAL7999
		Verify Packet Telemetry (Pkt = A86SS0PND002) <b>SsoTrck Cff CZ0</b> <b>AEHSD002</b>	(TPF value)	AND=ZAAL7999
		Verify Packet Telemetry (Pkt = A86SS0PND002) <b>SsoTrck Cff CX1</b> <b>AEHSF002</b>	(TPF value)	AND=ZAAL7999
		Verify Packet Telemetry (Pkt = A86SS0PND002) <b>SsoTrck Cff CY1</b> <b>AEHSG002</b>	(TPF value)	AND=ZAAL7999
		Verify Packet Telemetry (Pkt = A86SS0PND002) <b>SsoTrck Cff CZ1</b> <b>AEHSH002</b>	(TPF value)	AND=ZAAL7999
		Verify Packet Telemetry (Pkt = A86SS0PND002) <b>SsoTrck Cff CX2</b> <b>AEHSJ002</b>	(TPF value)	AND=ZAAL7999
		Verify Packet Telemetry (Pkt = A86SS0PND002) <b>SsoTrck Cff CY2</b> <b>AEHSK002</b>	(TPF value)	AND=ZAAL7999
		Verify Packet Telemetry (Pkt = A86SS0PND002) <b>SsoTrck Cff CZ2</b> <b>AEHSL002</b>	(TPF value)	AND=ZAAL7999
		Verify Packet Telemetry (Pkt = A86SS0PND002) <b>SsoTrck Cff CX3</b> <b>AEHSN002</b>	(TPF value)	AND=ZAAL7999
		Verify Packet Telemetry (Pkt = A86SS0PND002) <b>SsoTrck Cff CY3</b> <b>AEHS0002</b>	(TPF value)	AND=ZAAL7999
		Verify Packet Telemetry (Pkt = A86SS0PND002) <b>SsoTrck Cff CZ3</b> <b>AEHSP002</b>	(TPF value)	AND=ZAAL7999
		Verify Telemetry <b>SsoTrckPending</b> <b>AESM4002</b>	= TRUE	AND=ZAA01999
3		<i>Execute SCM Fine Pointing (H_FCP_AOC_3S01)</i>		Next Step: 4
		Execute Procedure: <b>H_FCP_AOC_3S01</b> <b>Perform SCM Fine Pointing</b>		
		NOTE: As the Solar System Object tracking is only applied during the next pointing manoeuvre, this must now be commanded in order to observe its effect.		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
4		Verify S/C behaviour & status		Next Step: 5
4.1		Verify attitude evolution according to commanded manoeuvre		<input type="checkbox"/>
		Verify Telemetry Cur Target Q1                      AEHT6002	Coherent with what commanded.	AND=ZAA00999
		Verify Telemetry Cur Target Q2                      AEHT7002	Coherent with what commanded.	AND=ZAA00999
		Verify Telemetry Cur Target Q3                      AEHT8002	Coherent with what commanded.	AND=ZAA00999
		Verify Telemetry Cur Target Q4                      AEHT9002	Coherent with what commanded.	AND=ZAA00999
		Verify Telemetry Est Attitude Q1                      AESA6001	According to commanded manoeuvre.	AND=ZAA54999
		Verify Telemetry Est Attitude Q2                      AESA7001	According to commanded manoeuvre.	AND=ZAA54999
		Verify Telemetry Est Attitude Q3                      AESA8001	According to commanded manoeuvre.	AND=ZAA54999
		Verify Telemetry Est Attitude Q4                      AESA9001	According to commanded manoeuvre.	AND=ZAA54999
4.2		Verify STR measurements		<input type="checkbox"/>
		Verify Telemetry STRM Att Q1                      AEXA1001	according to the commanded manoeuvre	AND=ZAA54999
		Verify Telemetry STRM Att Q2                      AEXA2001	according to the commanded manoeuvre	AND=ZAA54999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry STRM Att Q3 AEXA3001	according to the commanded manoeuvre	AND=ZAA54999
		Verify Telemetry STRM Att Q4 AEXA4001	according to the commanded manoeuvre	AND=ZAA54999
		Verify Telemetry STRM IL sts AEXJ1002	as commanded	AND=ZAA55999
		Verify Telemetry STRM new stars AEXJ4002		AND=ZAA55999
		Verify Telemetry STRM same stars AEXJ5002		AND=ZAA55999
		Verify Telemetry STRM Att qual AEXMY001		AND=ZAA55999
4.3		Verify rate evolution according to commanded manoeuvre		<input type="checkbox"/>
		Verify Telemetry Est ang rate X AESR7001	According to commanded manoeuvre.	AND=ZAA54999
		Verify Telemetry Est ang rate Y AESR8001	According to commanded manoeuvre.	AND=ZAA54999
		Verify Telemetry Est ang rate Z AESR9001	According to commanded manoeuvre.	AND=ZAA54999
4.4		Verify Gyro basic HK status		<input type="checkbox"/>
		Verify Telemetry GYR A rsnrtemp AEGTA002		AND=ZAA03999
		Verify Telemetry GYR B rsnrtemp AEGTB002		AND=ZAA03999
		Verify Telemetry GYR C rsnrtemp AEGTC002		AND=ZAA03999
		Verify Telemetry GYR D rsnrtemp AEGTD002		AND=ZAA04999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
4.5		Verify evolution of total angular momentum		<input type="checkbox"/>
		Verify Telemetry Est total H X                      AESHX001	According to commanded manoeuvre.	AND=ZAA01999
		Verify Telemetry Est total H Y                      AESHY001	According to commanded manoeuvre.	AND=ZAA01999
		Verify Telemetry Est total H Z                      AESHZ001	According to commanded manoeuvre.	AND=ZAA01999
4.6		Verify manoeuvre convergence - Minimization of control error		<input type="checkbox"/>
		Verify Telemetry Attitude err X                      AESBX002	Within pointing performance requirements. Trend: Decreasing	AND=ZAA54999
		Verify Telemetry Attitude err Y                      AESBY002	Within pointing performance requirements. Trend: Decreasing	AND=ZAA54999
		Verify Telemetry Attitude err Z                      AESBZ002	Within pointing performance requirements. Trend: Decreasing	AND=ZAA54999
		Verify Telemetry Velocity err X                      AESWX002	Within pointing performance requirements. Trend: Decreasing	AND=ZAA54999
		Verify Telemetry Velocity err Y                      AESWY002	Within pointing performance requirements. Trend: Decreasing	AND=ZAA54999
		Verify Telemetry Velocity err Z                      AESWZ002	Within pointing performance requirements. Trend: Decreasing	AND=ZAA54999



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
4.7		Verify current load on RWA system		<input type="checkbox"/>
		Verify Telemetry RWL1 wheel spd                      AEWS1002	According to the momentum correspondent to the manoeuvre commanded.	AND=ZAA54999
		Verify Telemetry RWL2 wheel spd                      AEWS2002	According to the momentum correspondent to the manoeuvre commanded.	AND=ZAA54999
		Verify Telemetry RWL3 wheel spd                      AEWS3002	According to the momentum correspondent to the manoeuvre commanded.	AND=ZAA54999
		Verify Telemetry RWL4 wheel spd                      AEWS4002	According to the momentum correspondent to the manoeuvre commanded.	AND=ZAA54999
		Verify Telemetry RWL1 tacho spd                      AEW1A002	Coherent with corresponding wheel speed/sign	AND=ZAA54999
		Verify Telemetry RWL2 tacho spd                      AEW2A002	Coherent with corresponding wheel speed/sign	AND=ZAA54999
		Verify Telemetry RWL3 tacho spd                      AEW3A002	Coherent with corresponding wheel speed/sign	AND=ZAA54999
		Verify Telemetry RWL4 tacho spd                      AEW4A002	Coherent with corresponding wheel speed/sign	AND=ZAA54999
		Verify Telemetry RWL1 tacho Sign                      AEW1B002	Coherent with corresponding wheel speed/sign	AND=ZAA54999
		Verify Telemetry RWL2 tacho Sign                      AEW2B002	Coherent with corresponding wheel speed/sign	AND=ZAA54999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry RWL3 tacho Sign                      AEW3B002	Coherent with corresponding wheel speed/sign	AND=ZAA54999
		Verify Telemetry RWL4 tacho Sign                      AEW4B002	Coherent with corresponding wheel speed/sign	AND=ZAA54999
		Verify Telemetry RWL1 tacho ovr                      AEW1C002	= NO OVERFLOW	AND=ZAA54999
		Verify Telemetry RWL2 tacho ovr                      AEW2C002	= NO OVERFLOW	AND=ZAA54999
		Verify Telemetry RWL3 tacho ovr                      AEW3C002	= NO OVERFLOW	AND=ZAA54999
		Verify Telemetry RWL3 tacho ovr                      AEW3C002	= NO OVERFLOW	AND=ZAA54999
5		Next observation : Fine Pointing / Raster Pointing / Line Scan		Next Step: END
		NOTE: As this Solar System Object tracking command is only applied once, all subsequent pointing manoeuvres will be unaffected by this activity.		
<b>End of Procedure</b>				