



Operation Change Request

OCR No: 029

Issue: A

Title: Investigation of extra-misalignment contributions in pitch, roll and yaw

Description of Request:

In a tbd time period several special states shall be implemented and executed to gain further knowledge about extra misalignment of the optical axis. It is proposed to use primarily the Sun in the SO&C-window above the atmosphere as target. This is to exclude as good as possible any effects from the atmosphere on the apparent position of the Sun. In different states the sequence of phases shall be varied whereby the phases shall perform sun-measurements while tracking the Sun in correction 8 (SC-AOCS = prediction), correction 4 (SFS-acquisition), correction 9 (SC-AOCS = improved prediction), correction 6 (SFS-pointing) and in addition scanning over the Sun. This is to permit to define the centre of the Sun using developed algorithms. Comparable measurements for ESM and ASM shall be executed.

It is expected, that the change of the mirror position for the ESM at acquisition will provide results as found in the recent model analysis. For the ASM-acquisition the yet unexplained jump at execution of nominal states 47 and 49 might be different in case it is an impact of the atmosphere. Otherwise an azimuth jump of similar size would be a hint for a potential ASM offset.

Additionally the proposed sequence of correction modes may yield information about the impact of the sun angular rates. For details see the annex.

Originator: E.Krieg/DLR-DFD

Date of Issue: 14.02.2007

Signature: email 14.02.2007

Assessment of SSAG (necessary for requests by scientists):

As the remaining error(s) on pointing knowledge is one of the most important deficiencies, it is recommended to analyse the proposed request for implementation.

SSAG:

H. Bovensmann, IUP

Date:

18.2.2007

Signature:

e-mail 18.2.2007

Classification of OCR:

OCR Analysis (incl. Implementation Option):

For the implementation of this OCR special states and special timelines have to be defined.

States:

It is proposed to overwrite the settings of state ID 55 (Moon_pointing_troposphere). The following parameter tables have to be modified to implement the changes required for the 4 special states, which will be executed in subsequent orbits:

- Scanner state parameter
- State duration
- State RTCS index
- State index
- Exposure parameter

While State duration, State RTCS index, State index and Exposure parameter are identical for all 4 special states the sequence of the correction algorithms to be applied to ASM and ESM is different. Therefore several CTI parameter table uploads are required.

Timelines:

Only one special timeline is defined (set 09, ID 14). It contains only one state, i.e. the modified state ID 55. Running t/l 14 with different CTI parameter settings results in the execution of the required special states. The duration of t/l 14 amounts to about 47 sec. The timeline starts at a solar altitude of 150 km. Thus it can be executed immediately after timeline 2 (set 34, short SO&C timeline) and no scientific measurements are affected.

T/L 14 shall be executed for a total of 16 orbits with 4x for each special state.

SOST: M.Gottwald ; E.Krieg (ESA, Industry if necessary)	Date: 28.02.2007	Signature: email 28.02.2007
Approval of Proposed Implementation:		
Originator Approval: M. Gottwald, DLR-IMF	Date: 28/02/2007	Signature: via e-mail 28/02/2007
SSAG Approval: H. Bovensmann	Date: 18.2.2007	Signature: e-mail. 18.2.2007
Decision / Approval: OCR shall be implemented as proposed by M.Gottwald & E. Krieg.		
DLR Approval: Ch. Chlebek	Date: 12.3.2007	Signature: e-mail, 12.3.2007
Implementation by SOST: Starting 17 th April the execution of special state ID55 will be performed as follows: 1. Orbits 26812 incl. 26815 ESM behaviour with ASM-acquisition first 2. Orbits 26816 incl. 26819 ESM behaviour with ESM-acquisition first 3. Orbits 26826 incl. 26829 ASM behaviour with ASM-acquisition first 4. Orbits 26830 incl. 26833 ASM behaviour with ESM-acquisition first The final parameter settings are tested by means of the design tools and attached to this version of OCR_29		
SOST: M.Gottwald; E.Krieg	Date: 12.3.2007	Signature: e-mail, 12.3.2007

Annex 1: Scan phases

It is proposed to execute as the first and main task 4 different states using the Sun as target above the atmosphere with a duration of 40 sec each. The decision about using the moon as well is not yet done, since the IFE is still assessing/analysing the feasibility of the special states proposed by SOST-DLR.

A. ESM-behaviour

a) ASM-acquisition first

- | | | |
|----------------------------|--------|-------------------|
| 1. ESM + ASM prediction | 4 sec | |
| 2. ASM acquisition | 4 sec | |
| 3. ESM acquisition | 2 sec | |
| 4. ESM improved prediction | 20 sec | nominal SO&C-scan |
| 5. ESM acquisition | 2 sec | |
| 6. ESM pointing | 8 sec | |

b) ESM-acquisition first

- | | | |
|----------------------------|--------|-------------------|
| 1. ESM + ASM prediction | 4 sec | |
| 2. ESM acquisition | 4 sec | |
| 3. ASM acquisition | 2 sec | |
| 4. ESM improved prediction | 20 sec | nominal SO&C-scan |
| 5. ESM acquisition | 2 sec | |
| 6. ESM pointing | 8 sec | |

B. ASM-behaviour

a) ASM-acquisition first

- | | | |
|----------------------------|--------|---|
| 1. ESM + ASM prediction | 4 sec | |
| 2. ASM acquisition | 4 sec | |
| 3. ESM acquisition | 2 sec | |
| 4. ASM improved prediction | 20 sec | nominal SO&C-scan, increased scan width |
| 5. ASM acquisition | 2 sec | |
| 6. ASM pointing | 8 sec | |

b) ESM-acquisition first

- | | | |
|----------------------------|--------|---|
| 1. ESM + ASM prediction | 4 sec | |
| 2. ESM acquisition | 4 sec | |
| 3. ASM acquisition | 2 sec | |
| 4. ASM improved prediction | 20 sec | nominal SO&C-scan, increased scan width |
| 5. ASM acquisition | 2 sec | |
| 6. ASM pointing | 8 sec | |

The short description of the 6 measurement phases is related to the scanner correction applied. Explanations to these corrections are given on the SOST web-page. Executing in the 1st measurement phase an alignment of the LoS to the Sun by using the angular data given in the START-TL-mcmd and in the 2nd measurement phase the acquisition of the Sun controlled by the SFS should provide the deviation between predicted direction and one SFS-axis. The 3rd phase should provide the deviation between predicted direction and the other SFS-axis. The 4th phase should deliver the centre of the Sun as seen by the detectors/PMDs i.e. it should provide the deviation between SFS centre and the LoS. The 5th phase should indicate possible deviations due to the changing angular rate within phase 4. Phase 6 must produce no discontinuity in the angular positions measured.

State RTCS index

	State ID	HEX	ALPHAN
Sun extra_misalignment ESM-ASMacq-1st	55	0259	STT_02

State index

	State ID	Cluster Definition Index	Cooding Index High Data Rate	Cooding Index Low Data Rate	Measurement Category ID
Sun extra_misalignment ESM-ASMacq-1st	55	1	32	31	29

PET

State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
55	Low	,0625	,0625	,0625	,0625	,0625	,0625	,0625	,0313	,0313	,0625	55	High	,0625	,0625	,0625	,0625	,0625	,0625	,0625	,0313	,0313	,0625

State duration

	State ID	Restart Time	(SDPU) Mode	SDPU Duration (Number of BCPS)	Wait Measurement Execution	State Duration	Scanner Reset Wait
Sun extra_misalignment ESM-ASMacq-1st	55	255	STANDARD	640	10217	11515	8

Scanner state

ESM: ASM-acquisition first; ESM scan

Scanner State Parameter #55	55	Sun extra misalignment ESM-ASMacq-1st							
	Common Param.	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	55								
spare									
Relative Scan Profile 1 Factor	000								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	002								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	8								
Duration of Phase [msec]		1300,0	4000,0	4000,0	2000,0	20000,0	2000,0	8000,0	780,0
Phase Type		0	1	1	1	1	1	1	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		8	8	4	4	4	4	6	0
Azimuth Relative Scan Profile Identifier		5	5	5	5	5	5	5	0
H/W constellation		3	3	3	3	3	3	3	0
Azimuth Basic Scan Profile Identifier		3	3	3	3	3	3	3	0
Azimuth Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0
spare									
Elevation Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		8	8	8	4	9	4	6	0
Elevation Relative Scan Profile Identifier		5	5	5	5	4	5	5	0
spare									
Elevation Basic Scan Profile Identifier		14	14	3	3	3	3	3	0
Elevation Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0

ESM: ESM-acquisition first; ESM scan

	55	Sun extra misalignment ESM-ESMacq-1st							
	Common Param.	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID									
spare									
Relative Scan Profile 1 Factor	000								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	002								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	8								
Duration of Phase [msec]		1300,0	4000,0	4000,0	2000,0	20000,0	2000,0	8000,0	780,0
Phase Type		0	1	1	1	1	1	1	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		8	8	8	4	4	4	6	0
Azimuth Relative Scan Profile Identifier		5	5	5	5	5	5	5	0
H/W constellation		3	3	3	3	3	3	3	0
Azimuth Basic Scan Profile Identifier		3	3	3	3	3	3	3	0
Azimuth Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0
spare									
Elevation Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		8	8	4	4	9	4	6	0
Elevation Relative Scan Profile Identifier		5	5	5	5	4	5	5	0
spare									
Elevation Basic Scan Profile Identifier		14	14	3	3	3	3	3	0
Elevation Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0

ASM: ASM-acquisition first; ASM scan

	55	Sun extra misalignment ASM-ASMaccq-1st							
	Common Param.	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID									
spare									
Relative Scan Profile 1 Factor	000								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	004								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	8								
Duration of Phase [msec]		1300,0	4000,0	4000,0	2000,0	20000,0	2000,0	8000,0	780,0
Phase Type		0	1	1	1	1	1	1	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		8	8	4	4	9	4	6	0
Azimuth Relative Scan Profile Identifier		5	5	5	5	4	5	5	0
H/W constellation		3	3	3	3	3	3	3	0
Azimuth Basic Scan Profile Identifier		3	3	3	3	3	3	3	0
Azimuth Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0
spare									
Elevation Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		8	8	8	4	4	4	6	0
Elevation Relative Scan Profile Identifier		5	5	5	5	5	5	5	0
spare									
Elevation Basic Scan Profile Identifier		14	14	3	3	3	3	3	0
Elevation Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0

ASM: ESM-acquisition first; ASM scan

	55	Sun extra misalignment ASM-ESMacq-1st							
	Common Param.	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID									
spare									
Relative Scan Profile 1 Factor	000								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	004								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	8								
Duration of Phase [msec]		1300,0	4000,0	4000,0	2000,0	20000,0	2000,0	8000,0	780,0
Phase Type		0	1	1	1	1	1	1	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		8	8	8	4	9	4	6	0
Azimuth Relative Scan Profile Identifier		5	5	5	5	4	5	5	0
H/W constellation		3	3	3	3	3	3	3	0
Azimuth Basic Scan Profile Identifier		3	3	3	3	3	3	3	0
Azimuth Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0
spare									
Elevation Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		8	8	4	4	4	4	6	0
Elevation Relative Scan Profile Identifier		5	5	5	5	5	5	5	0
spare									
Elevation Basic Scan Profile Identifier		14	14	3	3	3	3	3	0
Elevation Number of Repetition of Rel. Scan		0	1	1	0	9	0	3	0