

Herschel Science Centre



Herschel Pointing Calibration Report

*Miguel Sánchez-Portal, Bruno Altieri,
Dieter Lutz, Anthony Marston,
Ulrich Klaas, Markus Nielbock
& the Herschel Pointing Working group*

Document No: HERSCHEL-HSC-DOC-1515

Version: 1.0

November 25, 2009



HSC

Document No.: HERSCHEL-HSC-DOC-1515

Issue/Rev.: 1.0

Date: November 25, 2009

Page: 2

Document history

Date	Issue	Pages	Reason for Change
September 28, 2009	0.1 Draft	All	First version
November 25, 2009	1.0	All	Change from review within the Pointing WG. Major changes include sections on SSO tracking results and on the assessment of the misalignment between the star trackers.

The Herschel Pointing Calibration Working Group:

B. Altieri (HSC & PACS)
G. Gienger (ESA Flight Dynamics)
M. Griffin (Cardiff U. & SPIRE [PI])
W. Jellema (SRON & HIFI)
U. Klaas (MPIA & PACS)
M. Krassenburg (ESA Project)
A. Marston (HSC)
P. Morris (NHSC & HIFI)
G. Pilbratt (ESA, Herschel PS)
M. Oort (Dutch Space)
M. Palomba (ESA Project)
M. Pohlen (Cardiff U. & SPIRE)
M. Reichenbacher (ESA Flight Dynamics)
M. Sánchez-Portal (Chair, HSC)
M. Schmidt (ESA, Herschel S/C Ops. Mgr.)
M. Tuttlebee (ESA Flight Dynamics)



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 3

Contents

1	Introduction	4
1.1	Acronyms	4
2	Pointing Calibration Activities	4
2.1	Planned Activities	4
2.2	Implementation of the plan: pointing ODs and observations performed	6
3	Aperture alignment history	38
3.1	SIAM 0032_0003 – since OD38	38
3.2	SIAM 0053_0002 – since OD53	39
3.3	SIAM 0055_0002 – since OD55	39
3.4	SIAM 0068_0003 – since OD68	39
3.5	SIAM 0078_0001 – since OD78	41
3.6	SIAM 0082_0001 – since OD82	41
3.7	SIAM 0098_0001 – since OD98	41
3.8	SIAM 0122_0001 – since OD122	42
4	Pointing performances	42
4.1	APE measurement	43
4.2	APE dependency on SAA and pointing drift	43
4.3	RPE measurements	46
4.4	SRPE measurements	47
4.5	SSO tracking tests	47
4.6	Pointing performance in interlacing mode	47
5	Other pointing calibration activities	48
5.1	Relative alignment of star trackers	48
5.2	Nodding using fine pointing sequences	49
5.3	Measure of drifts after a STR switch	49
A	Appendix: SIAM generation tool	49
	References	51



1 Introduction

This document reports on the results of Herschel's pointing calibration activities carried out during commissioning (CoP) and performance verification (PVP) phases using the scientific instruments. ACMS commissioning activities are not covered by this document. Mapping of performed activities is performed against the Herschel Pointing Calibration Plan [AD.1]. The purpose of the plan was twofold: on the one hand, it was aimed to accurately determine the location of the different instrument apertures (as described in [RD.1]), and on the other hand, to derive the main figures of merit characterising the pointing performance (namely APE, SRPE, RPE).

This paper is structured as follows: In Section 2, we summarise the pointing calibration activities as defined in [AD.1] and describe the implementation of the plan. Section 3 describes the different SIAMs computed since in-flight. Finally, in Section 4, the pointing performance figures derived from CoP and PVP activities are presented. The SIAM computation tool is described in Annex A.

1.1 Acronyms

The following acronyms are used throughout the document:

Acronym	Meaning
ACA	Attitude Control Axes
ACC	Attitude Control Computer
ACMS	Attitude Control and Measurement System
APE	Absolute Pointing Error
CoP	Commissioning Phase
FoV	Field of View
HIFI	Heterodyne Instrument for the Far Infrared
HSC	Herschel Science Centre
ICC	Instrument Control Centre
INS	Instrument (frame)
OD	Operational Day
PACS	Photodetector Array Camera & Spectrometer
PMW	(SPIRE) Photometer Medium Wave (array)
PSW	(SPIRE) Photometer Short Wave (array)
PVP	Performance Verification Phase
RPE	Relative Pointing Error
SAA	Solar Aspect Angle (β angle)
SIAM	Spacecraft/Instrument Alignment Matrix
SLW	(SPIRE) Spectrometer Long Wave (array)
SPIRE	Spectral and Photometric Imaging Receiver
SRPE	Spatial Relative Pointing Error
SSO	Solar System Object
SSW	(SPIRE) Spectrometer Short Wave (array)
TBD	To Be Decided

2 Pointing Calibration Activities

In this section we summarise the planned pointing calibration activities. For a complete reference, please see [AD.1].

2.1 Planned Activities

The pointing activities are thoroughly described in [AD.1]. Table 1 below summarises them. The actual mapping of planned to scheduled/performed observation is described in Section 2.2.

Table 1: Planned pointing activities in [AD.1]

Instrument	Activity	Planned time (h)	Comments	Activity Label
PACS photometer	PACS pointing scan	1	low scan speed, after PACS BOLO_BIAS_2 completion	PACS_SIAM_search
PACS photometer	PACS pointing check	0.2	RT science check of SIAM update from successful PACS_SIAM_search.	PACS_SIAM_check
PACS photometer	Early APE(goal) measure (STR1 only)	5	SAA in [-10,+30] range, after PACS_SIAM_check completion	PACS_APE_measure
PACS photometer	Refined PACS photometer SIAM verification	1.25	Verification of the refined SIAM produced in the PACS_APE_measure activity, in range [-10,+30]	PACS_refined_SIAM_check
PACS photometer	APE(requirement) PACS_SAA_dependence	12	STR1 on, SAA in [-30,+30] range, after PACS_SIAM_check completion	PACS_SAA_dependence
PACS photometer	SRPE measure and gyro propagation	4	SRPE, gyro propagation (reconstruction) check, after PACS_SIAM_check completion	PACS_SRPE_measure
PACS photometer	Measure of scan leg accuracy	2	PACS scan map AOT, after PACS_SIAM_check completion	PACS_SRPE_scan
PACS photometer	Measure of tracking accuracy	4	Availability of Jovian satellite for fast SSO, after PACS_SIAM_check completion	PACS_tracking_performance
PACS spectrometer	Measure position of the PACS spectrometer aperture	1	Betegeuse/planet availability. Uses basic raster (eng. Mode) + gyro prop.? after PACS_SIAM_check completion	PACS_spectrometer_aperture
PACS spectrometer	Basic check of the position of the PACS spectrometer aperture	2	Betegeuse/planet availability. Uses basic raster (eng. Mode) + gyro prop.? after PACS_spectrometer_aperture	PACS_spectrometer_check1
PACS spectrometer	Advanced check of the position of the PACS spectrometer aperture	7	Seven very bright (~100 Jy) targets availability. Uses basic raster (eng. Mode) + gyro prop.? after PACS_spectrometer_check1	PACS_spectrometer_check2
SPIRE photometer	Initial photometer pointing assessment	2.5	basic raster with gyro propagation, concatenated observations using same OFF gyro position reference, after PACS_SIAM_check completion	SPIRE_Initpoint_PHOT
SPIRE spectrometer	Initial spectrometer pointing assessment	2	basic raster with gyro propagation, concatenated observations using same OFF gyro position reference, after PACS_SIAM_check completion	SPIRE_Initpoint_SPEC
SPIRE photometer	FPG scan photometer	1	nominal scan rate, at 60 deg inclination, 8 arcmin field, after SPIRE_Initpoint_PHOT completion	SPIRE_FPGscan_PHOT
SPIRE spectrometer	FPG scan spectrometer	0.5	nominal scan rate, at 60 deg inclination, 2.6 arcmin field, after SPIRE_Initpoint_SPEC completion	SPIRE_FPGscan_SPEC
HIFI band - 4 groups	Focal plane geometry: commissioning 1	13	Requires a planet, after HIFI-COP-1 thru 5 and PACS_SIAM_check completion	HIFI-COP-6-FPG1
HIFI all bands	Focal plane geometry: commissioning 2	17.5	Requires a planet, after HIFI-COP-6-FPG1 completion	HIFI-COP-6-FPG2



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 5



2.2 Implementation of the plan: pointing ODs and observations performed

The pointing calibration plan implementation spans 28 ODs across the CoP and PVP. Table 2 summarises the OD allocation¹, total time and mapping to activities in [AD.1]. In Tables 3 and 4 details of the observations carried out are given.

The total observing time allocated to pointing observations is 196.7 h (excluding 16.7 h allocated to the “sneak preview”), i.e. about 2.6 times longer than assessed in [AD.1]. There are several reasons for this excess, including: (a) A thorough study of the S/C behaviour vs. SAA was carried out in ODs 101, 104 & 105 (43.2 h), and (b) A number of observations failed due to STR reconfigurations (20.8 h). Moreover, the alignment as given by the SIAM and the APE had to be re-checked after each STR switch to verify that there was no hysteresis effects (10.5 h). In addition, some SPIRE pointing calibration measurements needed to be repeated due to the difficulty of establishing the SPIRE SIAM without consistent and repeatable pointing.

Table 2: Allocation of ODs to pointing activities

OD	Instr.	Allocation (hours)	Maps to plan activity	Comments
32	PACS Photo	16.7	PACS_SIAM_search	“Sneak preview”. This successful first PACS image was used for determining the bulk offset of the apertures w.r.t. the nominal ground alignment. SIAM 0001_0009 used.
38	PACS Photo	1.9	PACS_SIAM_check	SIAM 0032_0003 used for the first time.
41	PACS Photo	3.3	PACS_APE_measure	First SSO tracking check on 18 Melpomene. Alignment of scans over 1 deg ²
42	SPIRE Photo	6.6	PACS_tracking_performance SPIRE_Initpoint_PHOT SPIRE_FPGScan_PHOT	Use Uranus as fixed target to allow on-ground improvement by gyro propagation.
46	HIFI	12.9	HIFI-COP-6-FPG1	First HIFI measures on Saturn
53	HIFI PACS Photo	4.8	HIFI-COP-6-FPG1 PACS_refined_SIAM_check	SIAM 0053_0002 used for the first time. Observations affected by pointing anomaly due to an incorrect aberration correction at STR level.
55	HIFI	19.1	HIFI-COP-6-FPG2	SIAM 0055_0002 used for the first time.
56	SPIRE Photo	0.7	SPIRE_FPGScan_PHOT	Use Uranus as fixed target.
60	SPIRE Spectro	3.8	SPIRE_Initpoint_SPEC SPIRE_FPGScan_SPEC	Id.
64	PACS Photo PACS Spectro	3.7	PACS_APE_measure PACS_spectrometer_aperture	35 stars in the SAA range [-10, +30]
66	SPIRE Photo	6.3	SPIRE_Initpoint_PHOT SPIRE_FPGScan_PHOT	Use bright quasar 3C273.
70	SPIRE Photo	16.9	SPIRE_Initpoint_PHOT SPIRE_FPGScan_PHOT	Use 3C273. SIAM 0068_0003 used.
71	SPIRE SPEC	18.4	SPIRE_Initpoint_SPEC SPIRE_FPGScan_SPEC	Use 3C273.
72	SPIRE Photo PACS Photo	12.5	SPIRE_FPGScan_PHOT PACS_SAA_dependence	Testing of SAA pointing performance and alignment dependence in the [-20, -10] & [-30, -20] ranges

Continues

¹Testing of SPIRE modes carried out in OD26 & 33 is not included

²see observation 1342179005 on Mrk 273–HIP66738



HSC

Document No.: HERSCHEL-HSC-DOC-1515
 Issue/Rev.: 1.0
 Date: November 25, 2009
 Page: 7

Continued

OD	Instr.	Allocation (hours)	Maps to plan activity	Comments
73	PACS Photo	0.2	PACS_SAA_dependence	Verification of offsets in "cold" attitude after OD72 ("hot" attitude).
78	PACS Spectro	5.0	PACS_spectrometer_check1	SIAM 0078.0001 used for the first time.
82	SPIRE SPEC	7.0	SPIRE_Initpoint_SPEC SPIRE_FPGScan_SPEC	Use quasar B0420-014. Failed due to STR reconfiguration (GYR crosscheck). First assessment of STR2/STR1 misalignment after ACMS commissioning. SIAM 0082.0001 used.
86	PACS Photo SPIRE SPEC	8.1	PACS_SAA_dependence SPIRE_Initpoint_SPEC SPIRE_FPGScan_SPEC	Test "cold case", i.e. $SAA \in [+20, +30]$ SPIRE used quasar B0420-014.
87	SPIRE SPEC	2.5	SPIRE_FPGScan_SPEC	Use quasar B0420-014.
92	PACS Photo	4.2	PACS_SAA_dependence PACS_APE_measure	$SAA \in [0, +30]$. Failed due to STR reconfiguration. Accurate STR2/STR1 misalignment computation, in very good agreement with ACMS commissioning results.
93	PACS Photo	9.6	PACS_SAA_dependence PACS_SRPE_measure	$SAA \in [+20, +30]$. Pointing drift tests + SRPE tests. Partially lost due to STR reconfiguration, though some observation were still useful to compute the STR2/STR1 relative alignment.
96	PACS Photo	0.0	Not mapped	Test of nodding using a sequence of fine pointings rather than a raster. Insufficient number of nods.
97	PACS Photo	0.3	Not mapped	Same as above, with increased number of nods.
101	PACS Photo	10.7	PACS_SAA_dependence PACS_APE_measure PACS_SRPE_measure	$SAA \in [0, +30]$ & SRPE tests.
102	PACS Spectro	5.5	PACS_spectrometer_check2	
103	PACS Spectro	3.1	PACS_spectrometer_check2	
104	PACS Photo	15.7	PACS_SAA_dependence	$SAA \in [-20, -10]$ + long observations at $SAA \simeq +25^\circ$
105	PACS Photo	17.3	PACS_SAA_dependence	$SAA \in [-30, -25]$ + long observations at $SAA \simeq +25^\circ$
161	PACS Photo	10.5	Not mapped	Checkout of PACS aperture drift after STR switch. A long observation at $SAA \simeq +27^\circ$

Table 3: Log of pointing observations

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
032	Messier 51	1342178512	13h29m52.37s	+47d11m40.8s	-1.1784	2009-06-14T15:00:37Z	3752
032	Messier 51	1342178513	13h29m52.37s	+47d11m40.8s	-1.1517	2009-06-14T16:05:00Z	3752
032	Messier 51	1342178516	13h29m52.37s	+47d11m40.8s	-1.1199	2009-06-14T17:21:40Z	3752
032	Messier 51	1342178517	13h29m52.37s	+47d11m40.8s	-1.0931	2009-06-14T18:26:03Z	3752
032	Messier 51	1342178520	13h29m52.37s	+47d11m40.8s	-1.0613	2009-06-14T19:42:43Z	3752
032	Messier 51	1342178521	13h29m52.37s	+47d11m40.8s	-1.0346	2009-06-14T20:47:06Z	3752
032	Messier 51	1342178524	13h29m52.37s	+47d11m40.8s	-0.9905	2009-06-14T22:33:23Z	3752
032	Messier 51	1342178525	13h29m52.37s	+47d11m40.8s	-0.9638	2009-06-14T23:37:46Z	3752
032	Messier 51	1342178528	13h29m52.37s	+47d11m40.8s	-0.9319	2009-06-15T00:54:26Z	3752
032	Messier 51	1342178529	13h29m52.37s	+47d11m40.8s	-0.9052	2009-06-15T01:58:49Z	3752
032	Messier 51	1342178532	13h29m52.37s	+47d11m40.8s	-0.8734	2009-06-15T03:15:29Z	3752
032	Messier 51	1342178533	13h29m52.37s	+47d11m40.8s	-0.8467	2009-06-15T04:19:52Z	3752
032	Messier 51	1342178536	13h29m52.37s	+47d11m40.8s	-0.8148	2009-06-15T05:36:32Z	3752
032	Messier 51	1342178537	13h29m52.37s	+47d11m40.8s	-0.7881	2009-06-15T06:40:55Z	3752
032	Messier 51	1342178540	13h29m52.37s	+47d11m40.8s	-0.7563	2009-06-15T07:57:35Z	3752
032	Messier 51	1342178541	13h29m52.37s	+47d11m40.8s	-0.7295	2009-06-15T09:01:58Z	3752
038	Messier 51	1342178865	13h29m52.37s	+47d11m40.8s	-1.1806	2009-06-14T14:55:20Z	1367
038	Messier 51	1342178865	13h29m52.37s	+47d11m40.8s	2.9037	2009-06-21T10:55:56Z	1367
038	Messier 51	1342178866	13h29m52.37s	+47d11m40.8s	2.9136	2009-06-21T11:19:46Z	1367
038	HIP 77619	1342178867	15h50m46.62s	+48d28m58.9s	-12.6392	2009-06-21T11:48:01Z	159
038	HIP 78574	1342178868	16h02m39.17s	+47d14m25.3s	-14.6887	2009-06-21T11:52:53Z	1035
038	HIP 78574	1342178869	16h02m39.17s	+47d14m25.3s	-14.6845	2009-06-21T12:11:11Z	1035
038	HIP 78574	1342178870	16h02m39.17s	+47d14m25.3s	-14.6804	2009-06-21T12:29:29Z	159
038	HIP 80704	1342178871	16h28m38.55s	+41d52m54.0s	-21.4901	2009-06-21T12:35:20Z	159
038	HIP 81835	1342178872	16h42m55.88s	+54d54m13.6s	-10.0803	2009-06-21T12:42:04Z	159
041	Mrk273-HIP66738	1342179005	13h42m43.17s	+55d16m32.6s	6.8478	2009-06-24T00:23:22Z	2621
041	HIP 78574	1342179006	16h02m39.17s	+47d14m25.3s	-13.8408	2009-06-24T01:12:30Z	805
041	HIP 78574	1342179007	16h02m39.17s	+47d14m25.3s	-13.8375	2009-06-24T01:26:58Z	1039
041	gamma draconis	1342179008	17h56m36.37s	+51d29m20.0s	-15.1734	2009-06-24T01:49:18Z	1063
041	gamma draconis	1342179009	17h56m36.37s	+51d29m20.0s	-15.1731	2009-06-24T02:08:04Z	1063
041	18 Melpomene	1342179011	Not specified	Not specified	n/a	2009-06-24T03:36:53Z	3304
041	18 Melpomene	1342179012	Not specified	Not specified	n/a	2009-06-24T04:33:00Z	2126
042	3C273	1342179023	12h29m06.70s	+2d03m08.6s	-2.6688	2009-06-24T22:14:12Z	42
042	3C273	1342179024	12h29m06.70s	+2d03m08.6s	-2.6682	2009-06-24T22:15:10Z	6303
042	3C273	1342179025	12h29m06.70s	+2d03m08.6s	-2.5991	2009-06-25T00:00:29Z	42
042	Ceres20090624	1342179026	11h19m05.50s	+14d50m01.5s	18.2313	2009-06-25T00:06:24Z	42
042	Ceres20090624	1342179027	11h19m05.50s	+14d50m01.5s	18.2320	2009-06-25T00:07:24Z	6303

continues

HSC

Document No.: HERSCHEL-HSC-DOC-1515
 Issue/Rev.: 1.0
 Date: November 25, 2009
 Page: 8

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
042	Ceres20090624	1342179028	11h19m05.50s	+14d50m01.5s	18.3002	2009-06-25T01:52:45Z	42
042	Uranus20090624	1342179030	23h48m22.76s	-2d06m08.3s	-6.9196	2009-06-25T03:45:32Z	42
042	Uranus20090624	1342179031	23h48m22.76s	-2d06m08.3s	-6.9202	2009-06-25T03:46:30Z	639
042	Uranus20090624	1342179032	23h48m22.76s	-2d06m08.3s	-6.9273	2009-06-25T03:57:21Z	42
042	Uranus20090624	1342179033	23h48m22.76s	-2d06m08.3s	-6.9280	2009-06-25T03:58:19Z	639
042	Uranus20090624	1342179034	23h48m22.76s	-2d06m08.3s	-6.9351	2009-06-25T04:09:10Z	42
042	Uranus20090624	1342179035	23h48m22.76s	-2d06m08.3s	-6.9357	2009-06-25T04:10:08Z	462
042	Uranus20090624	1342179036	23h48m22.76s	-2d06m08.3s	-6.9409	2009-06-25T04:18:02Z	42
042	Uranus20090624	1342179037	23h48m22.76s	-2d06m08.3s	-6.9416	2009-06-25T04:19:00Z	462
042	Uranus20090624	1342179038	23h48m22.76s	-2d06m08.3s	-6.9468	2009-06-25T04:26:54Z	42
042	Uranus20090624	1342179039	23h48m22.76s	-2d06m08.3s	-6.9474	2009-06-25T04:27:52Z	639
042	Uranus20090624	1342179040	23h48m22.76s	-2d06m08.3s	-6.9545	2009-06-25T04:38:43Z	42
042	Uranus20090624	1342179041	23h48m22.76s	-2d06m08.3s	-6.9552	2009-06-25T04:39:41Z	639
042	Uranus20090624	1342179042	23h48m22.76s	-2d06m08.3s	-6.9623	2009-06-25T04:50:32Z	42
042	Uranus20090624	1342179043	23h48m22.76s	-2d06m08.3s	-6.9630	2009-06-25T04:51:30Z	462
042	Uranus20090624	1342179044	23h48m22.76s	-2d06m08.3s	-6.9682	2009-06-25T04:59:24Z	42
042	Uranus20090624	1342179045	23h48m22.76s	-2d06m08.3s	-6.9688	2009-06-25T05:00:22Z	462
042	Uranus20090624	1342179046	23h48m22.76s	-2d06m08.3s	-6.9740	2009-06-25T05:08:16Z	42
042	Uranus20090624	1342179047	23h48m22.76s	-2d06m08.3s	-6.9746	2009-06-25T05:09:14Z	6303
042	Uranus20090624	1342179048	23h48m22.76s	-2d06m08.3s	-7.0439	2009-06-25T06:54:32Z	42
046	No Pointing	1342179300	Not specified	Not specified	n/a	2009-06-29T04:03:05Z	849
046	Saturn	1342179301	Not specified	Not specified	n/a	2009-06-29T05:02:14Z	12046
046	Saturn	1342179302	10h52m00s	07d00m00s	25.7388	2009-06-29T08:24:29Z	12038
046	No Pointing	1342179303	Not specified	Not specified	n/a	2009-06-29T11:45:07Z	337
046	Saturn	1342179304	Not specified	Not specified	n/a	2009-06-29T11:51:48Z	3840
046	No Pointing	1342179305	Not specified	Not specified	n/a	2009-06-29T12:55:48Z	338
046	Saturn	1342179306	Not specified	Not specified	n/a	2009-06-29T13:02:31Z	5753
046	No Pointing	1342179307	Not specified	Not specified	n/a	2009-06-29T14:38:24Z	1852
046	Saturn	1342179308	Not specified	Not specified	n/a	2009-06-29T15:10:41Z	9349
053	HIP 95413	1342179551	19h24m33.07s	+50d14m29.1s	-16.9583	2009-07-06T05:57:23Z	159
053	HIP 95413	1342179552	19h24m33.07s	+50d14m29.1s	-16.9588	2009-07-06T06:01:05Z	539
053	HIP 81835	1342179553	16h42m55.88s	+54d54m13.6s	-7.0926	2009-07-06T06:15:45Z	159
053	PI Hercules	1342179554	17h15m02.83s	+36d48m33.0s	-25.5879	2009-07-06T06:23:16Z	1063
053	HIP 80704	1342179555	16h28m38.55s	+41d52m54.0s	-16.5649	2009-07-06T06:44:40Z	159
053	HIP 78574	1342179556	16h02m39.17s	+47d14m25.3s	-9.4922	2009-07-06T06:50:30Z	159
053	HIP 78574	1342179557	16h02m39.17s	+47d14m25.3s	-9.4913	2009-07-06T06:54:12Z	902
053	HIP 78574	1342179558	16h02m39.17s	+47d14m25.3s	-9.4871	2009-07-06T07:10:17Z	692
053	HIP 77619	1342179559	15h50m46.62s	+48d28m58.9s	-7.2256	2009-07-06T07:24:03Z	159

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
 Issue/Rev.: 1.0
 Date: November 25, 2009
 Page: 9

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
053	HIP 77619	1342179560	15h50m46.62s	+48d28m58.9s	-7.2245	2009-07-06T07:28:20Z	159
053	HIP 77619	1342179561	15h50m46.62s	+48d28m58.9s	-7.2235	2009-07-06T07:32:02Z	1063
053	No Pointing	1342179564	Not specified	Not specified	n/a	2009-07-06T08:39:53Z	846
053	Saturn	1342179565	Not specified	Not specified	n/a	2009-07-06T09:38:02Z	11154
055	No Pointing	1342179609	Not specified	Not specified	n/a	2009-07-07T17:17:05Z	347
055	Saturn	1342179610	Not specified	Not specified	n/a	2009-07-07T17:27:45Z	4919
055	Saturn	1342179611	Not specified	Not specified	n/a	2009-07-07T18:50:49Z	4899
055	No Pointing	1342179612	Not specified	Not specified	n/a	2009-07-07T20:12:28Z	1846
055	Saturn	1342179613	Not specified	Not specified	n/a	2009-07-07T20:44:39Z	4870
055	Saturn	1342179614	Not specified	Not specified	n/a	2009-07-07T22:07:14Z	4850
055	No Pointing	1342179615	Not specified	Not specified	n/a	2009-07-07T23:28:04Z	223
055	Saturn	1342179616	Not specified	Not specified	n/a	2009-07-07T23:33:38Z	4870
055	Saturn	1342179617	Not specified	Not specified	n/a	2009-07-08T00:56:39Z	4845
055	No Pointing	1342179618	Not specified	Not specified	n/a	2009-07-08T02:17:24Z	313
055	Saturn	1342179619	Not specified	Not specified	n/a	2009-07-08T02:55:03Z	4948
055	Saturn	1342179620	Not specified	Not specified	n/a	2009-07-08T04:18:35Z	4963
055	No Pointing	1342179622	Not specified	Not specified	n/a	2009-07-08T06:22:45Z	1848
055	Saturn	1342179623	Not specified	Not specified	n/a	2009-07-08T06:55:01Z	4914
055	Saturn	1342179624	Not specified	Not specified	n/a	2009-07-08T08:18:23Z	4894
055	No Pointing	1342179625	Not specified	Not specified	n/a	2009-07-08T09:39:57Z	3063
055	Saturn	1342179626	Not specified	Not specified	n/a	2009-07-08T10:32:29Z	12046
056	Uranus-20090710	1342179634	23h48m21.48s	-2d06m40.8s	-20.2173	2009-07-09T04:09:11Z	42
056	Uranus-20090710	1342179635	23h48m21.48s	-2d06m40.8s	-20.2179	2009-07-09T04:10:09Z	462
056	Uranus-20090710	1342179636	23h48m21.48s	-2d06m40.8s	-20.2231	2009-07-09T04:18:03Z	42
056	Uranus-20090710	1342179637	23h48m21.48s	-2d06m40.8s	-20.2238	2009-07-09T04:19:01Z	462
056	Uranus-20090710	1342179638	23h48m21.48s	-2d06m40.8s	-20.2290	2009-07-09T04:26:55Z	42
056	Uranus-20090710	1342179639	23h48m21.48s	-2d06m40.8s	-20.2296	2009-07-09T04:27:53Z	639
056	Uranus-20090710	1342179640	23h48m21.48s	-2d06m40.8s	-20.2368	2009-07-09T04:38:44Z	42
056	Uranus-20090710	1342179641	23h48m21.48s	-2d06m40.8s	-20.2374	2009-07-09T04:39:42Z	639
056	Uranus-20090710	1342179642	23h48m21.48s	-2d06m40.8s	-20.2446	2009-07-09T04:50:33Z	42
060	Uranus-20090713	1342180188	23h48m14.40s	-2d07m32.9s	-24.1204	2009-07-13T05:54:38Z	45
060	Uranus-20090713	1342180189	23h48m14.40s	-2d07m32.9s	-24.1211	2009-07-13T05:55:43Z	6637
060	Uranus-20090713	1342180190	23h48m14.40s	-2d07m32.9s	-24.1943	2009-07-13T07:46:37Z	45
060	Uranus-20090713	1342180191	23h48m14.40s	-2d07m32.9s	-24.1950	2009-07-13T07:47:41Z	783
060	Uranus-20090713	1342180192	23h48m14.40s	-2d07m32.9s	-24.2039	2009-07-13T08:01:03Z	783
060	Uranus-20090713	1342180193	23h48m14.40s	-2d07m32.9s	-24.2127	2009-07-13T08:14:25Z	447
060	Uranus-20090713	1342180194	23h48m14.40s	-2d07m32.9s	-24.2178	2009-07-13T08:22:11Z	447
060	Uranus-20090713	1342180195	23h48m14.40s	-2d07m32.9s	-24.2229	2009-07-13T08:29:50Z	45

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 10

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
060	Uranus-20090713	1342180196	23h48m14.40s	-2d07m32.9s	-24.2236	2009-07-13T08:30:54Z	357
060	Uranus-20090713	1342180197	23h48m14.40s	-2d07m32.9s	-24.2277	2009-07-13T08:37:10Z	357
060	Uranus-20090713	1342180198	23h48m14.40s	-2d07m32.9s	-24.2319	2009-07-13T08:43:26Z	533
060	Uranus-20090713	1342180199	23h48m14.40s	-2d07m32.9s	-24.2379	2009-07-13T08:52:38Z	533
060	Uranus-20090713	1342180200	23h48m14.40s	-2d07m32.9s	-24.2439	2009-07-13T09:01:43Z	45
060	Uranus-20090713	1342180201	23h48m14.40s	-2d07m32.9s	-24.2446	2009-07-13T09:02:47Z	783
060	Uranus-20090713	1342180202	23h48m14.40s	-2d07m32.9s	-24.2535	2009-07-13T09:16:09Z	783
060	Uranus-20090713	1342180203	23h48m14.40s	-2d07m32.9s	-24.2623	2009-07-13T09:29:31Z	447
060	Uranus-20090713	1342180204	23h48m14.40s	-2d07m32.9s	-24.2674	2009-07-13T09:37:17Z	447
060	Uranus-20090713	1342180205	23h48m14.40s	-2d07m32.9s	-24.2725	2009-07-13T09:44:56Z	45
064	HIP 100605	1342180038	20h24m03.56s	+75d15m13.6s	6.7255	2009-07-16T19:02:13Z	159
064	HIP 104719	1342180039	21h12m47.25s	+60d05m52.8s	-6.6267	2009-07-16T19:09:17Z	159
064	HIP 108317	1342180040	21h56m39.14s	+63d37m32.0s	-1.2124	2009-07-16T19:14:59Z	159
064	HIP 112545	1342180041	22h47m43.43s	+55d09m30.3s	-4.1151	2009-07-16T19:21:20Z	159
064	HIP 114507	1342180042	23h11m30.07s	+52d53m12.5s	-3.2633	2009-07-16T19:26:39Z	159
064	HIP 1901	1342180044	0h24m01.95s	+38d34m37.3s	-1.2264	2009-07-16T19:45:46Z	159
064	HIP 117591	1342180045	23h50m51.80s	+47d30m28.5s	-1.7040	2009-07-16T19:52:08Z	159
064	HIP 116705	1342180046	23h39m01.42s	+52d15m44.9s	-0.4654	2009-07-16T19:57:38Z	159
064	HIP 117763	1342180047	23h52m56.24s	+61d00m08.4s	6.1657	2009-07-16T20:03:45Z	159
064	HIP 1834	1342180048	0h23m14.27s	+55d47m33.2s	6.8886	2009-07-16T20:09:31Z	159
064	HIP 3179	1342180049	0h40m30.44s	+56d32m14.4s	9.3705	2009-07-16T20:14:27Z	159
064	HIP 8565	1342180050	1h50m29.28s	+53d44m34.0s	17.9956	2009-07-16T20:20:46Z	159
064	HIP 9203	1342180051	1h58m25.12s	+51d53m37.2s	18.8107	2009-07-16T20:25:38Z	159
064	HIP 9234	1342180052	1h58m44.33s	+45d26m06.9s	17.5445	2009-07-16T20:31:26Z	159
064	HIP 9640	1342180053	2h03m53.95s	+42d19m47.0s	17.7598	2009-07-16T20:36:35Z	159
064	PPM 45199	1342180054	2h33m28.80s	+45d39m15.8s	23.5669	2009-07-16T20:42:18Z	159
064	HIP 9582	1342180055	2h03m09.36s	+55d13m56.6s	20.0549	2009-07-16T20:48:46Z	159
064	HIP 9306	1342180056	1h59m35.12s	+54d49m20.0s	19.4832	2009-07-16T20:52:28Z	159
064	HIP 6093	1342180057	1h18m13.88s	+57d48m11.4s	14.5759	2009-07-16T20:58:14Z	159
064	HIP 4008	1342180058	0h51m26.00s	+62d55m14.9s	13.1059	2009-07-16T21:03:56Z	159
064	HIP 17881	1342180059	3h49m30.02s	+80d19m20.9s	26.0342	2009-07-16T21:11:52Z	159
064	HIP 36547	1342180060	7h31m04.46s	+82d24m41.3s	28.8172	2009-07-16T21:18:01Z	159
064	HIP 75847	1342180061	15h29m34.57s	+78d38m00.3s	15.8611	2009-07-16T21:25:15Z	159
064	HIP 80802	1342180062	16h29m57.90s	+72d16m49.2s	9.0262	2009-07-16T21:31:08Z	159
064	HIP 72607	1342180063	14h50m42.33s	+74d09m19.8s	15.9737	2009-07-16T21:37:01Z	159
064	HIP 69816	1342180064	14h17m19.90s	+66d47m39.2s	16.2207	2009-07-16T21:43:02Z	159
064	HIP 67627	1342180065	13h51m25.94s	+64d43m23.8s	18.3165	2009-07-16T21:48:12Z	159
064	HIP 73199	1342180066	14h57m35.01s	+65d55m56.9s	12.1490	2009-07-16T21:54:02Z	159

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 11

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
064	HIP 79804	1342180067	16h17m15.35s	+59d45m18.1s	1.2340	2009-07-16T22:00:26Z	159
064	HIP 81835	1342180068	16h42m55.88s	+54d54m13.6s	-4.6523	2009-07-16T22:06:05Z	159
064	HIP 82249	1342180069	16h48m16.63s	+57d48m49.4s	-2.9392	2009-07-16T22:11:08Z	159
064	HIP 83866	1342180070	17h08m24.50s	+64d19m08.7s	0.6808	2009-07-16T22:16:57Z	159
064	HD 160540	1342180071	17h37m00.12s	+57d44m25.3s	-6.7158	2009-07-16T22:22:51Z	159
064	HIP 87816	1342180072	17h56m22.16s	+58d12m52.6s	-7.4745	2009-07-16T22:27:49Z	159
064	HIP 94162	1342180073	19h10m02.34s	+66d06m10.0s	-2.4288	2009-07-16T22:34:18Z	159
064	HIP 21479	1342180110	4h36m45.59s	-62d04m37.8s	-1.2603	2009-07-17T05:44:05Z	2568
064	HIP 21479	1342180111	4h36m45.59s	-62d04m37.8s	-1.2655	2009-07-17T06:28:21Z	2568
064	HIP 21479	1342180112	4h36m45.59s	-62d04m37.8s	-1.2707	2009-07-17T07:12:37Z	2568
066	3C273	1342180326	12h29m06.70s	+2d03m08.6s	19.8526	2009-07-18T17:27:00Z	43
066	3C273	1342180327	12h29m06.70s	+2d03m08.6s	19.8533	2009-07-18T17:28:03Z	1329
066	3C273	1342180328	12h29m06.70s	+2d03m08.6s	19.9997	2009-07-18T21:10:01Z	43
066	3C273	1342180329	12h29m06.70s	+2d03m08.6s	20.0004	2009-07-18T21:11:01Z	640
066	3C273	1342180330	12h29m06.70s	+2d03m08.6s	20.0075	2009-07-18T21:21:54Z	43
066	3C273	1342180331	12h29m06.70s	+2d03m08.6s	20.0082	2009-07-18T21:22:54Z	1800
066	3C273	1342180332	12h29m06.70s	+2d03m08.6s	20.0281	2009-07-18T21:53:07Z	43
066	3C273	1342180333	12h29m06.70s	+2d03m08.6s	20.0288	2009-07-18T21:54:07Z	532
066	3C273	1342180334	12h29m06.70s	+2d03m08.6s	20.0348	2009-07-18T22:03:12Z	43
066	3C273	1342180335	12h29m06.70s	+2d03m08.6s	20.0354	2009-07-18T22:04:12Z	1454
066	3C273	1342180336	12h29m06.70s	+2d03m08.6s	20.0516	2009-07-18T22:28:39Z	43
066	3C273	1342180337	12h29m06.70s	+2d03m08.6s	20.0522	2009-07-18T22:29:39Z	640
066	3C273	1342180338	12h29m06.70s	+2d03m08.6s	20.0594	2009-07-18T22:40:32Z	43
066	3C273	1342180339	12h29m06.70s	+2d03m08.6s	20.0601	2009-07-18T22:41:32Z	1800
066	3C273	1342180340	12h29m06.70s	+2d03m08.6s	20.0800	2009-07-18T23:11:45Z	43
066	3C273	1342180341	12h29m06.70s	+2d03m08.6s	20.0807	2009-07-18T23:12:45Z	1454
066	3C273	1342180342	12h29m06.70s	+2d03m08.6s	20.0968	2009-07-18T23:37:12Z	43
066	3C273	1342180343	12h29m06.70s	+2d03m08.6s	20.0974	2009-07-18T23:38:12Z	532
066	3C273	1342180344	12h29m06.70s	+2d03m08.6s	20.1034	2009-07-18T23:47:17Z	43
070	3C273	1342180584	12h29m06.70s	+2d03m08.6s	23.7961	2009-07-22T21:01:45Z	640
070	3C273	1342180585	12h29m06.70s	+2d03m08.6s	23.8034	2009-07-22T21:12:42Z	640
070	3C273	1342180586	12h29m06.70s	+2d03m08.6s	23.8106	2009-07-22T21:23:35Z	43
070	3C273	1342180587	12h29m06.70s	+2d03m08.6s	23.8112	2009-07-22T21:24:35Z	1833
070	3C273	1342180588	12h29m06.70s	+2d03m08.6s	23.8315	2009-07-22T21:55:21Z	43
070	3C273	1342180589	12h29m06.70s	+2d03m08.6s	23.8322	2009-07-22T21:56:21Z	1833
070	3C273	1342180590	12h29m06.70s	+2d03m08.6s	23.8525	2009-07-22T22:27:07Z	43
070	3C273	1342180591	12h29m06.70s	+2d03m08.6s	23.8532	2009-07-22T22:28:07Z	532
070	3C273	1342180592	12h29m06.70s	+2d03m08.6s	23.8592	2009-07-22T22:37:16Z	532

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 12

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
070	3C273	1342180593	12h29m06.70s	+2d03m08.6s	23.8652	2009-07-22T22:46:21Z	43
070	3C273	1342180594	12h29m06.70s	+2d03m08.6s	23.8659	2009-07-22T22:47:21Z	1479
070	3C273	1342180595	12h29m06.70s	+2d03m08.6s	23.8823	2009-07-22T23:12:13Z	43
070	3C273	1342180596	12h29m06.70s	+2d03m08.6s	23.8830	2009-07-22T23:13:13Z	1479
070	3C273	1342180597	12h29m06.70s	+2d03m08.6s	23.8994	2009-07-22T23:38:05Z	43
070	3C273	1342180599	12h29m06.70s	+2d03m08.6s	24.0365	2009-07-23T03:05:36Z	43
070	3C273	1342180600	12h29m06.70s	+2d03m08.6s	24.0372	2009-07-23T03:06:41Z	29891
070	3C273	1342180601	12h29m06.70s	+2d03m08.6s	24.3666	2009-07-23T11:25:14Z	43
070	3C273	1342180602	12h29m06.70s	+2d03m08.6s	24.3673	2009-07-23T11:26:10Z	43
070	3C273	1342180603	12h29m06.70s	+2d03m08.6s	24.3679	2009-07-23T11:27:10Z	640
070	3C273	1342180604	12h29m06.70s	+2d03m08.6s	24.3752	2009-07-23T11:38:07Z	640
070	3C273	1342180605	12h29m06.70s	+2d03m08.6s	24.3823	2009-07-23T11:49:00Z	43
070	3C273	1342180606	12h29m06.70s	+2d03m08.6s	24.3830	2009-07-23T11:50:00Z	1833
070	3C273	1342180607	12h29m06.70s	+2d03m08.6s	24.4033	2009-07-23T12:20:46Z	43
070	3C273	1342180608	12h29m06.70s	+2d03m08.6s	24.4040	2009-07-23T12:21:46Z	1833
070	3C273	1342180609	12h29m06.70s	+2d03m08.6s	24.4243	2009-07-23T12:52:32Z	43
070	3C273	1342180610	12h29m06.70s	+2d03m08.6s	24.4250	2009-07-23T12:53:32Z	1479
070	3C273	1342180611	12h29m06.70s	+2d03m08.6s	24.4414	2009-07-23T13:18:24Z	43
070	3C273	1342180612	12h29m06.70s	+2d03m08.6s	24.4421	2009-07-23T13:19:24Z	1479
070	3C273	1342180613	12h29m06.70s	+2d03m08.6s	24.4585	2009-07-23T13:44:16Z	43
070	3C273	1342180614	12h29m06.70s	+2d03m08.6s	24.4592	2009-07-23T13:45:16Z	532
070	3C273	1342180615	12h29m06.70s	+2d03m08.6s	24.4652	2009-07-23T13:54:25Z	532
070	3C273	1342180616	12h29m06.70s	+2d03m08.6s	24.4712	2009-07-23T14:03:30Z	43
071	3C273	1342180710	12h29m06.70s	+2d03m08.6s	24.5381	2009-07-23T15:44:38Z	43
071	3C273	1342180711	12h29m06.70s	+2d03m08.6s	24.5387	2009-07-23T15:45:34Z	43
071	3C273	1342180713	12h29m06.70s	+2d03m08.6s	24.6794	2009-07-23T19:18:31Z	43
071	3C273	1342180715	12h29m06.70s	+2d03m08.6s	24.8165	2009-07-23T22:46:02Z	43
071	3C273	1342180716	12h29m06.70s	+2d03m08.6s	24.8172	2009-07-23T22:46:58Z	43
071	3C273	1342180718	12h29m06.70s	+2d03m08.6s	24.9579	2009-07-24T02:19:55Z	43
071	3C273	1342180721	12h29m06.70s	+2d03m08.6s	24.9785	2009-07-24T02:51:07Z	45
071	3C273	1342180722	12h29m06.70s	+2d03m08.6s	24.9792	2009-07-24T02:52:11Z	357
071	3C273	1342180723	12h29m06.70s	+2d03m08.6s	24.9834	2009-07-24T02:58:27Z	357
071	3C273	1342180724	12h29m06.70s	+2d03m08.6s	24.9875	2009-07-24T03:04:43Z	533
071	3C273	1342180725	12h29m06.70s	+2d03m08.6s	24.9936	2009-07-24T03:13:55Z	533
071	3C273	1342180726	12h29m06.70s	+2d03m08.6s	24.9996	2009-07-24T03:23:00Z	45
071	3C273	1342180727	12h29m06.70s	+2d03m08.6s	25.0003	2009-07-24T03:24:04Z	783
071	3C273	1342180728	12h29m06.70s	+2d03m08.6s	25.0091	2009-07-24T03:37:26Z	783
071	3C273	1342180729	12h29m06.70s	+2d03m08.6s	25.0180	2009-07-24T03:50:48Z	447

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 13

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
071	3C273	1342180730	12h29m06.70s	+2d03m08.6s	25.0231	2009-07-24T03:58:34Z	447
071	3C273	1342180731	12h29m06.70s	+2d03m08.6s	25.0282	2009-07-24T04:06:13Z	45
071	3C273	1342180732	12h29m06.70s	+2d03m08.6s	25.0289	2009-07-24T04:07:18Z	19558
071	3C273	1342180733	12h29m06.70s	+2d03m08.6s	25.2446	2009-07-24T09:33:36Z	45
071	3C273	1342180734	12h29m06.70s	+2d03m08.6s	25.2453	2009-07-24T09:34:40Z	357
071	3C273	1342180735	12h29m06.70s	+2d03m08.6s	25.2494	2009-07-24T09:40:56Z	357
071	3C273	1342180736	12h29m06.70s	+2d03m08.6s	25.2536	2009-07-24T09:47:12Z	533
071	3C273	1342180737	12h29m06.70s	+2d03m08.6s	25.2597	2009-07-24T09:56:24Z	533
071	3C273	1342180738	12h29m06.70s	+2d03m08.6s	25.2657	2009-07-24T10:05:29Z	45
071	3C273	1342180739	12h29m06.70s	+2d03m08.6s	25.2664	2009-07-24T10:06:33Z	783
071	3C273	1342180740	12h29m06.70s	+2d03m08.6s	25.2752	2009-07-24T10:19:55Z	783
071	3C273	1342180741	12h29m06.70s	+2d03m08.6s	25.2840	2009-07-24T10:33:17Z	447
071	3C273	1342180742	12h29m06.70s	+2d03m08.6s	25.2892	2009-07-24T10:41:03Z	447
071	3C273	1342180743	12h29m06.70s	+2d03m08.6s	25.2942	2009-07-24T10:48:42Z	45
072	HIP 79349	1342180670	16h11m38.04s	+23d29m41.3s	-16.5610	2009-07-24T17:55:24Z	13194
072	HIP 77615	1342180671	15h50m41.73s	+15d08m01.1s	-16.1092	2009-07-24T21:38:56Z	159
072	WW Ser	1342180672	15h32m24.84s	+3d38m27.5s	-16.6707	2009-07-24T21:45:36Z	159
072	HIP 75456	1342180673	15h24m55.14s	-2d14m06.7s	-17.0165	2009-07-24T21:51:20Z	159
072	HIP 73714	1342180674	15h04m04.22s	-25d16m55.1s	-18.8038	2009-07-24T21:59:39Z	159
072	HIP 72432	1342180675	14h48m38.05s	-36d38m04.9s	-18.0305	2009-07-24T22:06:15Z	159
072	HIP 70026	1342180676	14h19m44.35s	-36d51m29.6s	-12.4528	2009-07-24T22:11:53Z	159
072	HIP 70969	1342180677	14h30m58.62s	-30d05m51.8s	-12.9002	2009-07-24T22:17:46Z	159
072	HIP 76423	1342180678	15h36m28.19s	+15d06m05.1s	-12.9993	2009-07-24T22:29:29Z	159
072	HIP 77450	1342180679	15h48m44.38s	+18d08m29.6s	-14.3165	2009-07-24T22:34:50Z	159
072	HIP 79233	1342180680	16h10m14.52s	+25d04m14.3s	-15.3469	2009-07-24T22:40:56Z	159
072	HIP 80259	1342180681	16h23m05.11s	+30d51m00.6s	-14.6177	2009-07-24T22:46:42Z	159
072	HIP 84004	1342180682	17h10m18.53s	+40d41m23.8s	-15.7679	2009-07-24T22:53:33Z	159
072	HIP 87833	1342180683	17h56m36.37s	+51d29m20.0s	-12.5079	2009-07-24T23:00:21Z	159
072	HIP 98424	1342180684	19h59m53.79s	+52d08m59.4s	-18.0147	2009-07-24T23:07:57Z	159
072	HIP95413	1342180685	19h24m33.07s	+50d14m29.1s	-19.0915	2009-07-24T23:13:39Z	159
072	HIP 87850	1342180686	17h56m48.53s	+45d21m03.1s	-17.6228	2009-07-24T23:20:47Z	159
072	HIP 84329	1342180687	17h14m24.54s	+36d22m04.5s	-19.3747	2009-07-24T23:27:25Z	159
072	HIP 82526	1342180688	16h52m04.85s	+14d58m27.2s	-28.9992	2009-07-25T00:01:44Z	13194
072	2MASS J18092467+3446192	1342180689	18h09m24.68s	+34d46m19.3s	-27.6872	2009-07-25T03:48:02Z	159
072	HIP 90883	1342180690	18h32m20.08s	+36d59m55.6s	-28.1775	2009-07-25T03:53:40Z	159
072	HIP 91373	1342180691	18h38m06.48s	+39d40m06.0s	-26.3128	2009-07-25T03:58:45Z	159
072	HIP 92862	1342180692	18h55m20.10s	+43d56m45.9s	-23.6682	2009-07-25T04:04:22Z	159
072	HIP 95902	1342180693	19h30m12.85s	+46d08m52.1s	-23.3053	2009-07-25T04:10:13Z	159

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 14

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
072	HIP 94438	1342180694	19h13m15.52s	+46d58m55.8s	-21.7896	2009-07-25T04:15:19Z	159
072	HIP 88832	1342180695	18h07m58.99s	+42d13m25.6s	-21.3001	2009-07-25T04:22:04Z	159
072	KT HER	1342180696	17h31m28.80s	+32d29m52.6s	-24.5174	2009-07-25T04:28:46Z	159
072	HIP 84027	1342180697	17h10m37.07s	+27d35m30.2s	-24.6778	2009-07-25T04:34:39Z	159
072	HIP 80488	1342180698	16h25m47.47s	+18d53m32.9s	-21.4574	2009-07-25T04:41:33Z	159
072	HIP 75593	1342180699	15h26m38.35s	-5d39m20.0s	-18.2911	2009-07-25T04:50:39Z	159
072	HIP 75177	1342180700	15h21m48.37s	-36d15m41.0s	-24.2896	2009-07-25T05:00:06Z	159
072	HIP 76377	1342180701	15h35m57.35s	-49d30m28.6s	-27.5737	2009-07-25T05:07:03Z	159
072	HIP 77023	1342180702	15h43m33.61s	-37d10m10.1s	-28.7077	2009-07-25T05:13:53Z	159
072	HIP 79593	1342180703	16h14m20.74s	-3d41m39.6s	-28.8149	2009-07-25T05:24:13Z	159
072	HD 151204	1342180704	16h45m34.09s	+12d08m11.6s	-28.9996	2009-07-25T05:31:54Z	159
072	HIP 82526	1342180705	16h52m04.85s	+14d58m27.2s	-28.8374	2009-07-25T05:37:07Z	159
072	HIP 21479	1342180708	4h36m45.59s	-62d04m37.8s	-2.6095	2009-07-25T07:18:00Z	13194
073	HIP 55355	1342180776	11h20m6.23s	-65d15m7.1s	-1.1458	2009-07-26T13:22:59Z	801
078	HIP 21479	1342181052	4h36m45.59s	-62d04m37.8s	-3.5785	2009-07-31T05:43:50Z	2568
078	HIP 21479	1342181053	4h36m45.59s	-62d04m37.8s	-3.5834	2009-07-31T06:28:05Z	2568
078	HIP 21479	1342181054	4h36m45.59s	-62d04m37.8s	-3.5884	2009-07-31T07:12:20Z	2568
078	HIP 21479	1342181055	4h36m45.59s	-62d04m37.8s	-3.5933	2009-07-31T07:56:35Z	2568
078	HIP 21479	1342181056	4h36m45.59s	-62d04m37.8s	-3.5983	2009-07-31T08:40:50Z	2568
078	HIP 21479	1342181057	4h36m45.59s	-62d04m37.8s	-3.6032	2009-07-31T09:25:05Z	2568
078	HIP 21479	1342181058	4h36m45.59s	-62d04m37.8s	-3.6081	2009-07-31T10:09:20Z	2568
082	B0420-014	1342181292	4h23m15.80s	-1d20m33.1s	20.5545	2009-08-03T22:15:25Z	45
082	B0420-014	1342181293	4h23m15.80s	-1d20m33.1s	20.5537	2009-08-03T22:16:40Z	20678
082	B0420-014	1342181294	4h23m15.80s	-1d20m33.1s	20.3431	2009-08-04T04:01:47Z	45
082	B0420-014	1342181295	4h23m15.80s	-1d20m33.1s	20.3425	2009-08-04T04:02:51Z	357
082	B0420-014	1342181296	4h23m15.80s	-1d20m33.1s	20.3387	2009-08-04T04:09:07Z	357
082	B0420-014	1342181297	4h23m15.80s	-1d20m33.1s	20.3348	2009-08-04T04:15:23Z	533
082	B0420-014	1342181298	4h23m15.80s	-1d20m33.1s	20.3292	2009-08-04T04:24:35Z	533
082	B0420-014	1342181299	4h23m15.80s	-1d20m33.1s	20.3237	2009-08-04T04:33:40Z	45
082	B0420-014	1342181300	4h23m15.80s	-1d20m33.1s	20.3230	2009-08-04T04:34:44Z	798
082	B0420-014	1342181301	4h23m15.80s	-1d20m33.1s	20.3147	2009-08-04T04:48:21Z	798
082	B0420-014	1342181302	4h23m15.80s	-1d20m33.1s	20.3064	2009-08-04T05:01:58Z	441
082	B0420-014	1342181303	4h23m15.80s	-1d20m33.1s	20.3017	2009-08-04T05:09:38Z	441
086	HIP 64569	1342181645	13h14m04.38s	-2d48m25.1s	26.7361	2009-08-07T18:03:39Z	159
086	HIP 67665	1342181646	13h51m47.48s	+34d26m39.3s	25.0816	2009-08-07T18:14:31Z	159
086	HIP 67410	1342181647	13h48m57.04s	+39d32m33.2s	25.8142	2009-08-07T18:20:10Z	159
086	HIP 67627	1342181648	13h51m25.94s	+64d43m23.8s	23.1161	2009-08-07T18:28:56Z	159
086	CS Dra	1342181649	11h15m55.90s	+75d08m34.6s	28.8390	2009-08-07T18:36:22Z	159

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 15

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
086	HD 39741	1342181650	6h02m32.30s	+74d30m27.1s	26.5526	2009-08-07T18:44:17Z	159
086	HIP 22667	1342181651	4h52m31.96s	+14d15m02.3s	28.1475	2009-08-07T18:58:54Z	159
086	HIP 24436	1342181652	5h14m32.27s	-8d12m05.9s	26.7917	2009-08-07T19:07:27Z	159
086	PPM 725418	1342181653	5h41m28.26s	-20d46m59.5s	26.7760	2009-08-07T19:14:35Z	159
086	HIP 36377	1342181654	7h29m13.83s	-43d18m05.2s	26.0043	2009-08-07T19:24:27Z	159
086	HD 91760	1342181655	10h34m51.01s	-44d56m56.1s	25.7221	2009-08-07T19:34:28Z	159
086	HIP 57607	1342181656	11h48m39.22s	-35d59m12.9s	25.6113	2009-08-07T19:41:57Z	159
086	HIP 59588	1342181657	12h13m12.94s	-34d07m31.0s	23.3215	2009-08-07T19:47:38Z	159
086	HIP 57642	1342181658	11h49m11.78s	-41d45m27.3s	21.2540	2009-08-07T19:53:54Z	159
086	HIP 27286	1342181659	5h46m56.31s	-31d41m28.4s	21.5861	2009-08-07T20:09:23Z	159
086	HIP 23203	1342181660	4h59m36.35s	-14d48m22.5s	20.7461	2009-08-07T20:17:18Z	159
086	PPM 700186	1342181661	4h33m44.89s	+0d01m36.8s	20.0087	2009-08-07T20:24:37Z	159
086	HIP 21421	1342181662	4h35m55.24s	+16d30m33.5s	24.5843	2009-08-07T20:32:00Z	159
086	HIP 21046	1342181663	4h30m41.68s	+57d24m42.3s	24.5162	2009-08-07T20:43:12Z	159
086	HIP 36547	1342181664	7h31m04.46s	+82d24m41.3s	23.2131	2009-08-07T20:52:20Z	159
086	HIP 69816	1342181665	14h17m19.90s	+66d47m39.2s	20.2070	2009-08-07T21:01:07Z	159
086	HIP 69038	1342181666	14h07m55.76s	+43d51m16.0s	22.4048	2009-08-07T21:09:28Z	159
086	HIP 68417	1342181667	14h00m22.38s	+37d52m16.2s	23.6110	2009-08-07T21:15:17Z	159
086	HIP 68357	1342181668	13h59m33.47s	+37d11m50.3s	23.7397	2009-08-07T21:19:01Z	159
086	PPM 103009	1342181669	13h59m38.48s	+27d47m14.5s	22.8984	2009-08-07T21:25:22Z	159
086	HIP 66100	1342181670	13h33m00.11s	-7d11m41.0s	20.9337	2009-08-07T21:35:38Z	159
086	B0420-014	1342181674	4h23m15.80s	-1d20m33.1s	16.9186	2009-08-08T01:15:28Z	46
086	B0420-014	1342181675	4h23m15.80s	-1d20m33.1s	16.9178	2009-08-08T01:16:46Z	20678
086	B0420-014	1342181676	4h23m15.80s	-1d20m33.1s	16.7058	2009-08-08T07:01:56Z	46
086	B0420-014	1342181677	4h23m15.80s	-1d20m33.1s	16.7051	2009-08-08T07:03:04Z	357
086	B0420-014	1342181678	4h23m15.80s	-1d20m33.1s	16.7012	2009-08-08T07:09:23Z	357
086	B0420-014	1342181679	4h23m15.80s	-1d20m33.1s	16.6973	2009-08-08T07:15:42Z	533
086	B0420-014	1342181680	4h23m15.80s	-1d20m33.1s	16.6916	2009-08-08T07:24:57Z	533
086	B0420-014	1342181681	4h23m15.80s	-1d20m33.1s	16.6860	2009-08-08T07:34:05Z	46
086	B0420-014	1342181682	4h23m15.80s	-1d20m33.1s	16.6853	2009-08-08T07:35:13Z	783
086	B0420-014	1342181683	4h23m15.80s	-1d20m33.1s	16.6771	2009-08-08T07:48:38Z	783
086	B0420-014	1342181684	4h23m15.80s	-1d20m33.1s	16.6689	2009-08-08T08:02:03Z	447
086	B0420-014	1342181685	4h23m15.80s	-1d20m33.1s	16.6640	2009-08-08T08:09:52Z	447
087	B0420-014	1342181740	4h23m15.80s	-1d20m33.1s	16.0692	2009-08-09T00:17:41Z	44
087	B0420-014	1342181741	4h23m15.80s	-1d20m33.1s	16.0685	2009-08-09T00:18:45Z	630
087	B0420-014	1342181742	4h23m15.80s	-1d20m33.1s	16.0619	2009-08-09T00:29:35Z	630
087	B0420-014	1342181743	4h23m15.80s	-1d20m33.1s	16.0553	2009-08-09T00:40:21Z	44
087	B0420-014	1342181744	4h23m15.80s	-1d20m33.1s	16.0546	2009-08-09T00:41:25Z	1815

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 16

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
087	B0420-014	1342181745	4h23m15.80s	-1d20m33.1s	16.0358	2009-08-09T01:11:59Z	44
087	B0420-014	1342181746	4h23m15.80s	-1d20m33.1s	16.0352	2009-08-09T01:13:03Z	1815
087	B0420-014	1342181747	4h23m15.80s	-1d20m33.1s	16.0164	2009-08-09T01:43:37Z	44
087	B0420-014	1342181748	4h23m15.80s	-1d20m33.1s	16.0157	2009-08-09T01:44:41Z	524
087	B0420-014	1342181749	4h23m15.80s	-1d20m33.1s	16.0101	2009-08-09T01:53:45Z	524
087	B0420-014	1342181750	4h23m15.80s	-1d20m33.1s	16.0046	2009-08-09T02:02:45Z	44
087	B0420-014	1342181751	4h23m15.80s	-1d20m33.1s	16.0039	2009-08-09T02:03:49Z	1439
087	B0420-014	1342181752	4h23m15.80s	-1d20m33.1s	15.9890	2009-08-09T02:28:07Z	44
087	B0420-014	1342181753	4h23m15.80s	-1d20m33.1s	15.9883	2009-08-09T02:29:11Z	1439
092	HIP 66100	1342182092	13h33m00.11s	-7d11m41.0s	26.7970	2009-08-13T23:28:28Z	159
092	HD 120806	1342182093	13h51m51.67s	-3d40m34.0s	23.5040	2009-08-13T23:34:14Z	159
092	HIP 70669	1342182094	14h27m16.39s	+4d40m41.1s	17.2182	2009-08-13T23:40:56Z	159
092	HIP 76423	1342182095	15h36m28.19s	+15d06m05.1s	3.1028	2009-08-13T23:48:39Z	159
092	HIP 77450	1342182096	15h48m44.38s	+18d08m29.6s	1.0284	2009-08-13T23:54:02Z	159
092	HIP 76573	1342182097	15h38m16.63s	+24d31m18.7s	4.9797	2009-08-13T23:59:53Z	159
092	WX Ser	1342182098	15h27m47.04s	+19d33m51.7s	6.1895	2009-08-14T00:05:31Z	159
092	HIP 72208	1342182099	14h46m05.95s	+15d07m54.4s	14.9773	2009-08-14T00:11:58Z	159
092	HIP 69673	1342182100	14h15m39.67s	+19d10m56.7s	22.8359	2009-08-14T00:18:03Z	159
092	PPM 103009	1342182101	13h59m38.48s	+27d47m14.5s	27.3271	2009-08-14T00:24:23Z	159
092	HIP 71802	1342182102	14h41m13.38s	+31d34m19.7s	18.6074	2009-08-14T00:30:42Z	159
092	HIP 71644	1342182103	14h39m15.86s	+32d32m22.3s	19.1186	2009-08-14T00:35:13Z	159
092	HIP 70885	1342182104	14h29m45.27s	+38d51m40.6s	21.4458	2009-08-14T00:41:06Z	159
092	HIP 68357	1342182105	13h59m33.47s	+37d11m50.3s	27.4001	2009-08-14T00:46:51Z	159
092	HIP 68417	1342182106	14h00m22.38s	+37d52m16.2s	27.2132	2009-08-14T00:50:36Z	159
092	HIP 69038	1342182107	14h07m55.76s	+43d51m16.0s	25.4476	2009-08-14T00:56:27Z	159
092	HIP 67627	1342182108	13h51m25.94s	+64d43m23.8s	23.9444	2009-08-14T01:04:35Z	159
092	HIP 69816	1342182109	14h17m19.90s	+66d47m39.2s	20.8523	2009-08-14T01:09:47Z	159
092	HIP 73199	1342182110	14h57m35.01s	+65d55m56.9s	16.9582	2009-08-14T01:15:09Z	159
092	HIP 80802	1342182111	16h29m57.90s	+72d16m49.2s	9.6689	2009-08-14T01:21:32Z	159
092	HIP 72607	1342182112	14h50m42.33s	+74d09m19.8s	16.9292	2009-08-14T01:27:28Z	159
092	HIP 75847	1342182113	15h29m34.57s	+78d38m00.3s	14.4700	2009-08-14T01:33:02Z	159
092	HIP 46806	1342182114	9h32m14.60s	-62d47m19.9s	12.6701	2009-08-14T02:01:22Z	159
092	HIP 46701	1342182115	9h31m13.32s	-57d02m03.8s	18.4242	2009-08-14T02:07:02Z	159
092	HIP 50230	1342182116	10h15m14.83s	-54d28m42.0s	20.4289	2009-08-14T02:12:55Z	159
092	HIP 51087	1342182117	10h26m15.64s	-53d53m29.3s	20.6670	2009-08-14T02:17:42Z	159
092	HIP 55537	1342182118	11h22m31.67s	-53d22m11.5s	18.2206	2009-08-14T02:23:51Z	159
092	HIP 57642	1342182119	11h49m11.78s	-41d45m27.3s	25.6645	2009-08-14T02:30:35Z	159
092	HIP 59588	1342182120	12h13m12.94s	-34d07m31.0s	28.3656	2009-08-14T02:36:54Z	159

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 17

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
092	HIP 64778	1342182121	13h16m31.83s	-44d42m15.7s	12.2521	2009-08-14T02:44:04Z	159
092	HIP 66666	1342182122	13h39m59.81s	-49d56m59.8s	6.0576	2009-08-14T02:49:53Z	159
092	HIP 61084	1342182123	12h31m09.96s	-57d06m47.6s	9.5462	2009-08-14T02:56:33Z	159
092	HIP 61404	1342182124	12h34m54.45s	-67d45m24.8s	1.4965	2009-08-14T03:02:58Z	159
092	HIP 55355	1342182125	11h20m06.23s	-65d15m07.1s	7.7565	2009-08-14T03:08:59Z	159
092	HIP 83866	1342182126	17h08m24.50s	+64d19m08.7s	3.3503	2009-08-14T03:34:09Z	159
092	HIP 79804	1342182127	16h17m15.35s	+59d45m18.1s	7.2202	2009-08-14T03:40:07Z	159
092	HIP 82249	1342182128	16h48m16.63s	+57d48m49.4s	2.7845	2009-08-14T03:45:33Z	159
092	HIP 81835	1342182129	16h42m55.88s	+54d54m13.6s	2.3451	2009-08-14T03:50:39Z	159
092	HIP 77619	1342182130	15h50m46.62s	+48d28m58.9s	8.1436	2009-08-14T03:57:00Z	159
092	HIP 78574	1342182131	16h02m39.17s	+47d14m25.3s	5.9132	2009-08-14T04:01:56Z	159
092	HIP 77501	1342182132	15h49m31.31s	+39d34m17.9s	6.3327	2009-08-14T04:07:59Z	159
092	HIP 78235	1342182133	15h58m30.76s	+36d01m19.7s	3.7291	2009-08-14T04:13:19Z	159
092	WW Ser	1342182134	15h32m24.84s	+3d38m27.5s	1.3902	2009-08-14T04:22:49Z	159
092	HIP 75456	1342182135	15h24m55.14s	-2d14m06.7s	1.7350	2009-08-14T04:28:34Z	159
092	HIP 70969	1342182136	14h30m58.62s	-30d05m51.8s	5.9317	2009-08-14T04:37:46Z	159
092	HIP 70026	1342182137	14h19m44.35s	-36d51m29.6s	5.6136	2009-08-14T04:43:41Z	159
092	HIP 67457	1342182138	13h49m26.72s	-34d27m02.8s	12.2085	2009-08-14T04:49:30Z	159
092	HD 121714	1342182139	13h57m43.17s	-31d04m10.9s	12.1544	2009-08-14T04:54:48Z	159
092	HIP 76423	1342182140	15h36m28.19s	+15d06m05.1s	3.2817	2009-08-14T05:07:00Z	159
092	HIP 77450	1342182141	15h48m44.38s	+18d08m29.6s	1.1994	2009-08-14T05:12:23Z	159
092	HIP 76573	1342182142	15h38m16.63s	+24d31m18.7s	5.1375	2009-08-14T05:18:14Z	159
092	WX Ser	1342182143	15h27m47.04s	+19d33m51.7s	6.3602	2009-08-14T05:23:52Z	159
092	HIP 80802	1342182144	16h29m57.90s	+72d16m49.2s	9.6660	2009-08-14T05:36:18Z	159
092	HIP 66666	1342182145	13h39m59.81s	-49d56m59.8s	6.1591	2009-08-14T05:59:00Z	159
092	HIP 61084	1342182146	12h31m09.96s	-57d06m47.6s	9.6295	2009-08-14T06:05:40Z	159
092	HIP 61404	1342182147	12h34m54.45s	-67d45m24.8s	1.5676	2009-08-14T06:12:05Z	159
092	HIP 55355	1342182148	11h20m06.23s	-65d15m07.1s	7.8186	2009-08-14T06:18:06Z	159
092	HIP 83866	1342182149	17h08m24.50s	+64d19m08.7s	3.3615	2009-08-14T06:43:16Z	159
092	HIP 79804	1342182150	16h17m15.35s	+59d45m18.1s	7.2456	2009-08-14T06:49:14Z	159
092	HIP 82249	1342182151	16h48m16.63s	+57d48m49.4s	2.8108	2009-08-14T06:54:40Z	159
092	HIP 81835	1342182152	16h42m55.88s	+54d54m13.6s	2.3779	2009-08-14T06:59:46Z	159
092	HIP 77619	1342182153	15h50m46.62s	+48d28m58.9s	8.1942	2009-08-14T07:06:07Z	159
092	HIP 78574	1342182154	16h02m39.17s	+47d14m25.3s	5.9653	2009-08-14T07:11:03Z	159
092	HIP 77501	1342182155	15h49m31.31s	+39d34m17.9s	6.4005	2009-08-14T07:17:06Z	159
092	HIP 78235	1342182156	15h58m30.76s	+36d01m19.7s	3.8025	2009-08-14T07:22:26Z	159
092	WW Ser	1342182157	15h32m24.84s	+3d38m27.5s	1.5081	2009-08-14T07:31:56Z	159
092	HIP 75456	1342182158	15h24m55.14s	-2d14m06.7s	1.8574	2009-08-14T07:37:41Z	159

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 18

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
092	HIP 70969	1342182159	14h30m58.62s	-30d05m51.8s	6.0545	2009-08-14T07:46:53Z	159
092	HIP 70026	1342182160	14h19m44.35s	-36d51m29.6s	5.7314	2009-08-14T07:52:48Z	159
092	HIP 67457	1342182161	13h49m26.72s	-34d27m02.8s	12.3260	2009-08-14T07:58:37Z	159
092	HD 121714	1342182162	13h57m43.17s	-31d04m10.9s	12.2748	2009-08-14T08:03:56Z	159
092	HIP 64778	1342182163	13h16m31.83s	-44d42m15.7s	12.4326	2009-08-14T08:11:07Z	159
092	HIP 55537	1342182164	11h22m31.67s	-53d22m11.5s	18.3575	2009-08-14T08:18:59Z	159
092	HIP 46701	1342182165	9h31m13.32s	-57d02m03.8s	18.5027	2009-08-14T08:26:17Z	159
092	HIP 46806	1342182166	9h32m14.60s	-62d47m19.9s	12.7519	2009-08-14T08:31:57Z	159
092	HIP 75847	1342182167	15h29m34.57s	+78d38m00.3s	14.4350	2009-08-14T09:00:18Z	159
092	HIP 72607	1342182168	14h50m42.33s	+74d09m19.8s	16.9175	2009-08-14T09:05:52Z	159
092	HIP 73199	1342182169	14h57m35.01s	+65d55m56.9s	16.9942	2009-08-14T09:11:59Z	159
092	HIP 71644	1342182170	14h39m15.86s	+32d32m22.3s	19.3539	2009-08-14T09:21:49Z	159
092	HIP 71802	1342182171	14h41m13.38s	+31d34m19.7s	18.8513	2009-08-14T09:26:21Z	159
092	HIP 72208	1342182172	14h46m05.95s	+15d07m54.4s	15.3024	2009-08-14T09:33:40Z	159
092	HIP 70669	1342182173	14h27m16.39s	+4d40m41.1s	17.5993	2009-08-14T09:40:15Z	159
092	HIP 70885	1342182174	14h29m45.27s	+38d51m40.6s	21.6579	2009-08-14T09:50:13Z	159
092	HIP 68357	1342182175	13h59m33.47s	+37d11m50.3s	27.6214	2009-08-14T09:55:58Z	159
092	HIP 68417	1342182176	14h00m22.38s	+37d52m16.2s	27.4306	2009-08-14T09:59:43Z	159
092	HIP 69038	1342182177	14h07m55.76s	+43d51m16.0s	25.6294	2009-08-14T10:05:34Z	159
092	HIP 67627	1342182178	13h51m25.94s	+64d43m23.8s	23.9858	2009-08-14T10:13:42Z	159
092	HIP 69816	1342182179	14h17m19.90s	+66d47m39.2s	20.8846	2009-08-14T10:18:54Z	159
092	PPM 103009	1342182180	13h59m38.48s	+27d47m14.5s	27.6268	2009-08-14T10:29:48Z	159
092	HIP 69673	1342182181	14h15m39.67s	+19d10m56.7s	23.1824	2009-08-14T10:36:08Z	159
092	HIP 66100	1342182182	13h33m00.11s	-7d11m41.0s	27.2514	2009-08-14T10:45:25Z	159
092	HD 120806	1342182183	13h51m51.67s	-3d40m34.0s	23.9547	2009-08-14T10:51:11Z	159
092	HIP 50230	1342182184	10h15m14.83s	-54d28m42.0s	20.5786	2009-08-14T11:06:16Z	159
092	HIP 51087	1342182185	10h26m15.64s	-53d53m29.3s	20.8270	2009-08-14T11:11:03Z	159
092	HIP 57642	1342182186	11h49m11.78s	-41d45m27.3s	25.9186	2009-08-14T11:18:44Z	159
092	HIP 59588	1342182187	12h13m12.94s	-34d07m31.0s	28.6575	2009-08-14T11:25:03Z	159
093	HIP 67419	1342182235	13h49m02.00s	-28d22m03.5s	15.5483	2009-08-14T18:25:53Z	1018
093	HIP 67419	1342182236	13h49m02.00s	-28d22m03.5s	15.5598	2009-08-14T18:43:48Z	1736
093	HIP 69816	1342182237	14h17m19.90s	+66d47m39.2s	20.9160	2009-08-14T19:29:12Z	9894
093	HIP 69816	1342182238	14h17m19.90s	+66d47m39.2s	20.9252	2009-08-14T22:15:03Z	9894
093	HIP 69816	1342182239	14h17m19.90s	+66d47m39.2s	20.9344	2009-08-15T01:00:54Z	9894
096	HIP 55355	1342182419	11h20m6.23s	-65d15m7.1s	9.8271	2009-08-18T12:56:54Z	159
097	HIP 55355	1342182422	11h20m6.23s	-65d15m7.1s	9.9213	2009-08-18T17:48:06Z	944
101	HIP 67419	1342182611	13h49m02.00s	-28d22m03.5s	22.8896	2009-08-22T16:34:04Z	4185
101	HIP 67419	1342182612	13h49m02.00s	-28d22m03.5s	22.9352	2009-08-22T17:44:46Z	4829

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 19

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
101	HIP 67419	1342182613	13h49m02.00s	-28d22m03.5s	22.9876	2009-08-22T19:06:12Z	1018
101	HIP 67419	1342182614	13h49m02.00s	-28d22m03.5s	22.9991	2009-08-22T19:24:07Z	1736
101	HIP 67457	1342182615	13h49m26.72s	-34d27m02.8s	19.9259	2009-08-22T19:56:11Z	159
101	HD 121714	1342182616	13h57m43.17s	-31d04m10.9s	20.0774	2009-08-22T20:01:31Z	159
101	HIP 69346	1342182617	14h11m34.40s	-28d53m07.4s	18.3852	2009-08-22T20:06:50Z	159
101	HIP 70969	1342182618	14h30m58.62s	-30d05m51.8s	14.0393	2009-08-22T20:12:15Z	159
101	HIP 70026	1342182619	14h19m44.35s	-36d51m29.6s	13.3840	2009-08-22T20:18:11Z	159
101	HIP 72432	1342182620	14h48m38.05s	-36d38m04.9s	8.1755	2009-08-22T20:23:52Z	159
101	HIP 75177	1342182621	15h21m48.37s	-36d15m41.0s	1.9799	2009-08-22T20:29:42Z	159
101	HIP 73714	1342182622	15h04m04.22s	-25d16m55.1s	8.8228	2009-08-22T20:36:15Z	159
101	HIP 75393	1342182623	15h24m19.79s	-22d54m39.9s	5.0485	2009-08-22T20:41:49Z	159
101	HIP 75456	1342182624	15h24m55.14s	-2d14m06.7s	9.8393	2009-08-22T20:49:38Z	159
101	WW Ser	1342182625	15h32m24.84s	+3d38m27.5s	9.2079	2009-08-22T20:55:23Z	159
101	HIP 70669	1342182626	14h27m16.39s	+4d40m41.1s	25.3542	2009-08-22T21:02:34Z	159
101	HIP 72208	1342182627	14h46m05.95s	+15d07m54.4s	22.3387	2009-08-22T21:09:13Z	159
101	WX Ser	1342182628	15h27m47.04s	+19d33m51.7s	13.0294	2009-08-22T21:15:41Z	159
101	HIP 76423	1342182629	15h36m28.19s	+15d06m05.1s	10.3053	2009-08-22T21:21:13Z	159
101	HIP 77615	1342182630	15h50m41.73s	+15d08m01.1s	6.9313	2009-08-22T21:26:26Z	159
101	HIP 77450	1342182631	15h48m44.38s	+18d08m29.6s	7.9200	2009-08-22T21:31:33Z	159
101	HIP 79349	1342182632	16h11m38.04s	+23d29m41.3s	3.6295	2009-08-22T21:37:32Z	159
101	HIP 79233	1342182633	16h10m14.52s	+25d04m14.3s	4.2455	2009-08-22T21:42:15Z	159
101	HIP 80259	1342182634	16h23m05.11s	+30d51m00.6s	2.6184	2009-08-22T21:48:02Z	159
101	HIP 76573	1342182635	15h38m16.63s	+24d31m18.7s	11.3194	2009-08-22T21:54:36Z	159
101	HIP 75143	1342182636	15h21m23.96s	+31d22m02.6s	15.7565	2009-08-22T22:00:38Z	159
101	HIP 71802	1342182637	14h41m13.38s	+31d34m19.7s	24.3252	2009-08-22T22:06:45Z	159
101	HIP 71644	1342182638	14h39m15.86s	+32d32m22.3s	24.7199	2009-08-22T22:11:17Z	159
101	HIP 70885	1342182639	14h29m45.27s	+38d51m40.6s	26.2214	2009-08-22T22:17:12Z	159
101	HIP 77501	1342182640	15h49m31.31s	+39d34m17.9s	10.8059	2009-08-22T22:24:16Z	159
101	HIP 78235	1342182641	15h58m30.76s	+36d01m19.7s	8.5958	2009-08-22T22:29:36Z	159
101	HIP 80704	1342182642	16h28m38.55s	+41d52m54.0s	3.8670	2009-08-22T22:35:41Z	159
101	HIP 78574	1342182643	16h02m39.17s	+47d14m25.3s	9.3366	2009-08-22T22:41:35Z	159
101	HIP 77619	1342182644	15h50m46.62s	+48d28m58.9s	11.4479	2009-08-22T22:46:31Z	159
101	HIP 81835	1342182645	16h42m55.88s	+54d54m13.6s	4.5079	2009-08-22T22:52:53Z	159
101	HIP 82249	1342182646	16h48m16.63s	+57d48m49.4s	4.5143	2009-08-22T22:57:59Z	159
101	HIP 79804	1342182647	16h17m15.35s	+59d45m18.1s	8.8366	2009-08-22T23:03:24Z	159
101	HIP 83866	1342182648	17h08m24.50s	+64d19m08.7s	4.0572	2009-08-22T23:09:22Z	159
101	HIP 80802	1342182649	16h29m57.90s	+72d16m49.2s	9.4091	2009-08-22T23:15:30Z	159
101	HIP 73199	1342182650	14h57m35.01s	+65d55m56.9s	17.7335	2009-08-22T23:21:52Z	159

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 20

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
101	HIP 67627	1342182651	13h51m25.94s	+64d43m23.8s	24.6326	2009-08-22T23:27:45Z	159
101	HIP 69816	1342182652	14h17m19.90s	+66d47m39.2s	21.3646	2009-08-22T23:32:57Z	159
101	HIP 72607	1342182653	14h50m42.33s	+74d09m19.8s	16.4086	2009-08-22T23:39:00Z	159
101	HIP 75847	1342182654	15h29m34.57s	+78d38m00.3s	13.3009	2009-08-22T23:44:33Z	159
101	HIP 36547	1342182655	7h31m04.46s	+82d24m41.3s	17.5058	2009-08-22T23:51:51Z	159
101	HIP 17881	1342182656	3h49m30.02s	+80d19m20.9s	10.7418	2009-08-22T23:57:56Z	159
101	HIP 29919	1342182657	6h17m54.82s	+61d30m55.0s	25.4221	2009-08-23T00:05:56Z	159
101	HIP 30945	1342182658	6h29m40.93s	+61d32m33.4s	26.6746	2009-08-23T00:10:35Z	159
101	PPM 30600	1342182659	6h40m46.49s	+59d52m01.6s	28.6548	2009-08-23T00:15:28Z	159
101	HIP 35264	1342182660	7h17m08.56s	-37d05m50.9s	26.9337	2009-08-23T00:36:31Z	159
101	HIP 36377	1342182661	7h29m13.83s	-43d18m05.2s	24.2436	2009-08-23T00:42:26Z	159
101	HD 48505	1342182662	6h40m52.21s	-52d26m00.3s	12.1225	2009-08-23T00:49:03Z	159
101	HIP 30438	1342182663	6h23m57.11s	-52d41m44.4s	9.8965	2009-08-23T00:54:03Z	159
101	PPM 767023	1342182664	6h36m15.43s	-55d51m46.5s	9.4806	2009-08-23T00:59:19Z	159
101	HIP 31057	1342182665	6h31m01.11s	-66d52m14.5s	2.2645	2009-08-23T01:05:47Z	159
101	HIP 46806	1342182666	9h32m14.60s	-62d47m19.9s	15.2453	2009-08-23T01:13:24Z	159
101	HIP 46701	1342182667	9h31m13.32s	-57d02m03.8s	20.9049	2009-08-23T01:19:04Z	159
101	HIP 50230	1342182668	10h15m14.83s	-54d28m42.0s	23.8577	2009-08-23T01:24:58Z	159
101	HIP 51087	1342182669	10h26m15.64s	-53d53m29.3s	24.3466	2009-08-23T01:29:46Z	159
101	HIP 55537	1342182670	11h22m31.67s	-53d22m11.5s	23.0552	2009-08-23T01:35:57Z	159
101	HIP 55355	1342182671	11h20m06.23s	-65d15m07.1s	11.9195	2009-08-23T01:42:32Z	159
101	HIP 57505	1342182672	11h47m14.34s	-76d37m04.5s	0.5394	2009-08-23T01:49:04Z	159
101	HIP 61404	1342182673	12h34m54.45s	-67d45m24.8s	6.3315	2009-08-23T01:55:19Z	159
101	HIP 61084	1342182674	12h31m09.96s	-57d06m47.6s	15.1770	2009-08-23T02:01:44Z	159
101	HIP 66666	1342182675	13h39m59.81s	-49d56m59.8s	12.9801	2009-08-23T02:08:26Z	159
101	HIP 64778	1342182676	13h16m31.83s	-44d42m15.7s	19.3579	2009-08-23T02:14:15Z	159
101	HIP 61404	1342182677	12h34m54.45s	-67d45m24.8s	6.3416	2009-08-23T02:22:32Z	159
101	HIP 57505	1342182678	11h47m14.34s	-76d37m04.5s	0.5512	2009-08-23T02:28:47Z	159
101	HIP 31057	1342182679	6h31m01.11s	-66d52m14.5s	2.2665	2009-08-23T02:37:04Z	159
101	PPM 767023	1342182680	6h36m15.43s	-55d51m46.5s	9.4725	2009-08-23T02:43:32Z	159
101	HIP 80802	1342182681	16h29m57.90s	+72d16m49.2s	9.4022	2009-08-23T03:12:12Z	159
101	HIP 83866	1342182682	17h08m24.50s	+64d19m08.7s	4.0701	2009-08-23T03:18:20Z	159
101	HIP 79804	1342182683	16h17m15.35s	+59d45m18.1s	8.8680	2009-08-23T03:24:18Z	159
101	HIP 82249	1342182684	16h48m16.63s	+57d48m49.4s	4.5504	2009-08-23T03:29:44Z	159
101	HIP 81835	1342182685	16h42m55.88s	+54d54m13.6s	4.5552	2009-08-23T03:34:50Z	159
101	HIP 78574	1342182686	16h02m39.17s	+47d14m25.3s	9.4160	2009-08-23T03:41:09Z	159
101	HIP 80704	1342182687	16h28m38.55s	+41d52m54.0s	3.9646	2009-08-23T03:47:03Z	159
101	HIP 78235	1342182688	15h58m30.76s	+36d01m19.7s	8.7195	2009-08-23T03:53:08Z	159

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 21

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
101	HIP 80259	1342182689	16h23m05.11s	+30d51m00.6s	2.7750	2009-08-23T03:59:04Z	159
101	HIP 79233	1342182690	16h10m14.52s	+25d04m14.3s	4.4280	2009-08-23T04:04:51Z	159
101	HIP 79349	1342182691	16h11m38.04s	+23d29m41.3s	3.8213	2009-08-23T04:09:34Z	159
101	HIP 77450	1342182692	15h48m44.38s	+18d08m29.6s	8.1370	2009-08-23T04:15:33Z	159
101	HIP 77615	1342182693	15h50m41.73s	+15d08m01.1s	7.1621	2009-08-23T04:20:40Z	159
101	HIP 76423	1342182694	15h36m28.19s	+15d06m05.1s	10.5436	2009-08-23T04:25:52Z	159
101	WW Ser	1342182695	15h32m24.84s	+3d38m27.5s	9.4938	2009-08-23T04:32:25Z	159
101	HIP 75456	1342182696	15h24m55.14s	-2d14m06.7s	10.1437	2009-08-23T04:38:10Z	159
101	HIP 75393	1342182697	15h24m19.79s	-22d54m39.9s	5.3747	2009-08-23T04:45:59Z	159
101	HIP 73714	1342182698	15h04m04.22s	-25d16m55.1s	9.1542	2009-08-23T04:51:33Z	159
101	HIP 75177	1342182699	15h21m48.37s	-36d15m41.0s	2.3077	2009-08-23T04:58:06Z	159
101	HIP 72432	1342182700	14h48m38.05s	-36d38m04.9s	8.5059	2009-08-23T05:03:56Z	159
101	HIP 70026	1342182701	14h19m44.35s	-36d51m29.6s	13.7158	2009-08-23T05:09:37Z	159
101	HIP 70969	1342182702	14h30m58.62s	-30d05m51.8s	14.3937	2009-08-23T05:15:33Z	159
101	HIP 69346	1342182703	14h11m34.40s	-28d53m07.4s	18.7455	2009-08-23T05:20:58Z	159
101	HD 121714	1342182704	13h57m43.17s	-31d04m10.9s	20.4376	2009-08-23T05:26:16Z	159
101	HIP 67457	1342182705	13h49m26.72s	-34d27m02.8s	20.2830	2009-08-23T05:31:37Z	159
101	HIP 64778	1342182706	13h16m31.83s	-44d42m15.7s	19.4693	2009-08-23T05:38:19Z	159
101	HIP 66666	1342182707	13h39m59.81s	-49d56m59.8s	13.0953	2009-08-23T05:44:08Z	159
101	HIP 61084	1342182708	12h31m09.96s	-57d06m47.6s	15.2757	2009-08-23T05:50:50Z	159
101	HIP 55355	1342182709	11h20m06.23s	-65d15m07.1s	12.0003	2009-08-23T05:57:26Z	159
101	HIP 46806	1342182710	9h32m14.60s	-62d47m19.9s	15.3000	2009-08-23T06:04:04Z	159
101	HIP 30438	1342182711	6h23m57.11s	-52d41m44.4s	9.8581	2009-08-23T06:12:44Z	159
101	HD 48505	1342182712	6h40m52.21s	-52d26m00.3s	12.0880	2009-08-23T06:17:44Z	159
101	HIP 17881	1342182714	3h49m30.02s	+80d19m20.9s	10.5922	2009-08-23T07:17:55Z	159
101	HIP 36547	1342182715	7h31m04.46s	+82d24m41.3s	17.3746	2009-08-23T07:24:00Z	159
101	HIP 75847	1342182716	15h29m34.57s	+78d38m00.3s	13.2522	2009-08-23T07:31:18Z	159
101	HIP 72607	1342182717	14h50m42.33s	+74d09m19.8s	16.3815	2009-08-23T07:36:51Z	159
101	HIP 73199	1342182718	14h57m35.01s	+65d55m56.9s	17.7553	2009-08-23T07:42:58Z	159
101	HIP 77619	1342182719	15h50m46.62s	+48d28m58.9s	11.5858	2009-08-23T07:50:35Z	159
101	HIP 77501	1342182720	15h49m31.31s	+39d34m17.9s	11.0056	2009-08-23T07:56:46Z	159
101	HIP 75143	1342182721	15h21m23.96s	+31d22m02.6s	16.0182	2009-08-23T08:03:07Z	159
101	HIP 76573	1342182722	15h38m16.63s	+24d31m18.7s	11.6212	2009-08-23T08:09:09Z	159
101	WX Ser	1342182723	15h27m47.04s	+19d33m51.7s	13.3802	2009-08-23T08:14:48Z	159
101	HIP 71802	1342182724	14h41m13.38s	+31d34m19.7s	24.5926	2009-08-23T08:22:00Z	159
101	HIP 71644	1342182725	14h39m15.86s	+32d32m22.3s	24.9812	2009-08-23T08:26:32Z	159
101	HIP 70885	1342182726	14h29m45.27s	+38d51m40.6s	26.4405	2009-08-23T08:32:28Z	159
101	HIP 67627	1342182727	13h51m25.94s	+64d43m23.8s	24.6487	2009-08-23T08:41:28Z	159

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 22

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
101	HIP 69816	1342182728	14h17m19.90s	+66d47m39.2s	21.3751	2009-08-23T08:46:40Z	159
101	HIP 29919	1342182729	6h17m54.82s	+61d30m55.0s	25.1597	2009-08-23T08:58:20Z	159
101	HIP 30945	1342182730	6h29m40.93s	+61d32m33.4s	26.4152	2009-08-23T09:02:59Z	159
101	PPM 30600	1342182731	6h40m46.49s	+59d52m01.6s	28.3912	2009-08-23T09:07:52Z	159
101	HIP 35264	1342182732	7h17m08.56s	-37d05m50.9s	26.8285	2009-08-23T09:28:52Z	159
101	HIP 36377	1342182733	7h29m13.83s	-43d18m05.2s	24.1794	2009-08-23T09:34:47Z	159
101	HIP 46701	1342182734	9h31m13.32s	-57d02m03.8s	20.9931	2009-08-23T09:43:15Z	159
101	HIP 50230	1342182735	10h15m14.83s	-54d28m42.0s	23.9826	2009-08-23T09:49:09Z	159
101	HIP 51087	1342182736	10h26m15.64s	-53d53m29.3s	24.4813	2009-08-23T09:53:57Z	159
101	HIP 55537	1342182737	11h22m31.67s	-53d22m11.5s	23.2373	2009-08-23T10:00:08Z	159
101	HIP 70669	1342182738	14h27m16.39s	+4d40m41.1s	25.8578	2009-08-23T10:15:53Z	159
101	HIP 72208	1342182739	14h46m05.95s	+15d07m54.4s	22.7926	2009-08-23T10:22:33Z	159
101	8 Flora	1342182740	Not specified	Not specified	n/a	2009-08-23T10:31:19Z	4954
102	HIP 68815	1342182779	14h05m19.88s	-76d47m48.3s	-4.2581	2009-08-23T23:56:08Z	3536
102	HIP 21479	1342182780	4h36m45.59s	-62d04m37.8s	-7.0421	2009-08-24T01:02:48Z	2568
102	HIP 13502	1342182781	2h53m52.77s	-49d53m22.7s	-21.0902	2009-08-24T01:50:30Z	2568
102	HIP 67419	1342182789	13h49m02.00s	-28d22m03.5s	24.6864	2009-08-24T15:05:11Z	2568
102	HIP 84071	1342182791	17h11m17.02s	-32d19m30.7s	-17.9846	2009-08-24T16:19:11Z	3536
102	IRAS22134+5834	1342182792	22h15m08.90s	+58d49m08.0s	-20.1080	2009-08-24T17:37:10Z	2568
102	HIP 27989	1342182795	5h55m10.31s	+7d24m25.4s	26.0911	2009-08-24T18:59:59Z	2568
103	HIP 27989	1342182819	5h55m10.31s	+7d24m25.4s	25.5423	2009-08-25T09:11:52Z	11058
104	PPM 787044	1342182823	17h14m16.23s	-74d08m54.8s	-14.1817	2009-08-25T16:44:08Z	159
104	PPM 787209	1342182824	17h56m20.63s	-70d21m44.3s	-18.2661	2009-08-25T16:49:40Z	159
104	HIP 110428	1342182825	22h22m02.52s	-84d39m58.4s	-16.0692	2009-08-25T16:57:14Z	159
104	HD 11290	1342182826	1h44m58.35s	-80d11m07.8s	-16.6791	2009-08-25T17:03:16Z	159
104	HIP 11455	1342182827	2h27m46.84s	-69d31m26.4s	-19.4484	2009-08-25T17:09:47Z	159
104	HIP 14930	1342182828	3h12m33.16s	-57d19m17.6s	-17.7802	2009-08-25T17:16:38Z	159
104	HIP 15474	1342182829	3h19m31.00s	-21d45m28.3s	-17.3404	2009-08-25T17:26:45Z	159
104	HIP 14135	1342182830	3h02m16.77s	+4d05m23.0s	-17.6609	2009-08-25T17:35:30Z	159
104	HIP 13092	1342182831	2h48m19.74s	+17d30m33.8s	-17.4706	2009-08-25T17:42:27Z	159
104	HIP 10687	1342182832	2h17m32.96s	+44d18m17.8s	-12.8307	2009-08-25T17:51:20Z	159
104	HIP 8565	1342182833	1h50m29.28s	+53d44m34.0s	-11.4303	2009-08-25T17:57:44Z	159
104	HIP 6093	1342182834	1h18m13.88s	+57d48m11.4s	-12.2403	2009-08-25T18:03:29Z	159
104	HIP 4008	1342182835	0h51m26.00s	+62d55m14.9s	-10.6523	2009-08-25T18:09:14Z	159
104	HIP 108317	1342182836	21h56m39.14s	+63d37m32.0s	-15.5468	2009-08-25T18:16:54Z	159
104	HIP 88832	1342182837	18h07m58.99s	+42d13m25.6s	-12.2101	2009-08-25T18:27:22Z	159
104	2MASS J18092467+3446192	1342182838	18h09m24.68s	+34d46m19.3s	-15.7586	2009-08-25T18:33:21Z	159
104	2MASS J18114749+3128199	1342182839	18h11m47.50s	+31d28m20.0s	-17.6171	2009-08-25T18:38:34Z	159

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
 Issue/Rev.: 1.0
 Date: November 25, 2009
 Page: 23

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
104	HIP 87747	1342182840	17h55m25.19s	+26d03m00.0s	-16.4338	2009-08-25T18:44:25Z	159
104	HIP 84346	1342182841	17h14m39.78s	+11d04m10.0s	-11.5838	2009-08-25T18:51:53Z	159
104	HIP 82912	1342182842	16h56m37.84s	-30d34m48.2s	-13.6951	2009-08-25T19:02:47Z	159
104	HIP 82273	1342182843	16h48m39.89s	-69d01m39.8s	-12.7348	2009-08-25T19:13:12Z	159
104	HIP 85258	1342182844	17h25m17.99s	-55d31m47.6s	-18.3110	2009-08-25T19:20:09Z	159
104	HIP 84780	1342182845	17h19m46.50s	+2d08m22.3s	-14.7498	2009-08-25T19:33:28Z	159
104	HD 168829	1342182846	18h20m30.28s	+31d45m21.3s	-19.1425	2009-08-25T19:43:10Z	159
104	HIP 90883	1342182847	18h32m20.08s	+36d59m55.6s	-18.8045	2009-08-25T19:48:54Z	159
104	HIP 91373	1342182848	18h38m06.48s	+39d40m06.0s	-18.3955	2009-08-25T19:54:01Z	159
104	HIP 92862	1342182849	18h55m20.10s	+43d56m45.9s	-18.6353	2009-08-25T19:59:40Z	159
104	HIP 94438	1342182850	19h13m15.52s	+46d58m55.8s	-19.1681	2009-08-25T20:05:07Z	159
104	HIP 95413	1342182851	19h24m33.07s	+50d14m29.1s	-18.3096	2009-08-25T20:10:26Z	159
104	HIP 104719	1342182852	21h12m47.25s	+60d05m52.8s	-18.0193	2009-08-25T20:18:01Z	159
104	HIP 117763	1342182853	23h52m56.24s	+61d00m08.4s	-15.9022	2009-08-25T20:25:45Z	159
104	HIP 1834	1342182854	0h23m14.27s	+55d47m33.2s	-18.5925	2009-08-25T20:31:36Z	159
104	HIP 3179	1342182855	0h40m30.44s	+56d32m14.4s	-16.6169	2009-08-25T20:36:35Z	159
104	HIP 9234	1342182856	1h58m44.33s	+45d26m06.9s	-15.1918	2009-08-25T20:43:53Z	159
104	HIP 9640	1342182857	2h03m53.95s	+42d19m47.0s	-16.0762	2009-08-25T20:49:04Z	159
104	HIP 12193	1342182858	2h37m02.34s	+34d15m51.4s	-14.0410	2009-08-25T20:55:29Z	159
104	HIP 12557	1342182859	2h41m30.57s	+34d30m58.0s	-13.0969	2009-08-25T20:59:19Z	159
104	HIP 13654	1342182860	2h55m48.50s	+18d19m53.9s	-15.6650	2009-08-25T21:06:36Z	159
104	HIP 16647	1342182861	3h34m12.48s	-16d09m50.7s	-13.4056	2009-08-25T21:16:40Z	159
104	HD 24607	1342182862	3h52m47.03s	-45d49m48.2s	-12.0541	2009-08-25T21:25:51Z	159
104	HIP 17889	1342182863	3h49m35.82s	-52d04m47.8s	-12.7961	2009-08-25T21:31:38Z	159
104	HD 22868	1342182864	3h37m44.56s	-55d23m46.8s	-14.5156	2009-08-25T21:36:56Z	159
104	HIP 18744	1342182865	4h00m53.81s	-62d09m33.4s	-11.4517	2009-08-25T21:42:54Z	159
104	HIP 17678	1342182866	3h47m14.34s	-74d14m20.3s	-12.3706	2009-08-25T21:49:33Z	159
104	HIP 19424	1342182867	4h09m35.89s	-81d51m17.6s	-10.8657	2009-08-25T21:55:34Z	159
104	HIP 67627	1342182868	13h51m25.94s	+64d43m23.8s	24.7270	2009-08-25T22:23:40Z	9894
104	HIP 67627	1342182869	13h51m25.94s	+64d43m23.8s	24.7294	2009-08-26T01:09:31Z	9894
104	HIP 67627	1342182870	13h51m25.94s	+64d43m23.8s	24.7316	2009-08-26T03:55:22Z	9894
104	HIP 67627	1342182871	13h51m25.94s	+64d43m23.8s	24.7337	2009-08-26T06:41:13Z	9894
104	HIP 67627	1342182872	13h51m25.94s	+64d43m23.8s	24.7357	2009-08-26T09:27:04Z	9894
105	HIP 117591	1342182875	23h50m51.80s	+47d30m28.5s	-28.7623	2009-08-26T16:28:15Z	9894
105	HIP 117591	1342182876	23h50m51.80s	+47d30m28.5s	-28.8316	2009-08-26T19:14:06Z	9894
105	HIP 117591	1342182877	23h50m51.80s	+47d30m28.5s	-28.9008	2009-08-26T21:59:57Z	9894
105	HIP 11350	1342182878	2h26m02.32s	-0d10m41.8s	-28.6465	2009-08-27T00:56:31Z	159
105	HD 224126	1342182879	23h55m21.74s	+48d38m17.7s	-27.6368	2009-08-27T01:10:49Z	159

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
 Issue/Rev.: 1.0
 Date: November 25, 2009
 Page: 24

continued

OD	Target name	obsId	RA	DEC	SAA(deg)	Start time	Durat. (sec)
105	HIP 116705	1342182880	23h39m01.42s	+52d15m44.9s	-25.3477	2009-08-27T01:16:19Z	159
105	HIP 114507	1342182881	23h11m30.07s	+52d53m12.5s	-25.9867	2009-08-27T01:21:47Z	159
105	HIP 87668	1342182882	17h54m26.13s	-23d14m09.7s	-25.0125	2009-08-27T01:43:16Z	159
105	HIP 89642	1342182883	18h17m37.64s	-36d45m42.1s	-29.0554	2009-08-27T01:50:25Z	159
105	HIP 102082	1342182884	20h41m18.27s	+48d08m28.8s	-27.4412	2009-08-27T02:10:19Z	159
105	HIP 117591	1342182885	23h50m51.80s	+47d30m28.5s	-29.0094	2009-08-27T02:20:12Z	159
105	HIP 11350	1342182886	2h26m02.32s	-0d10m41.8s	-28.7104	2009-08-27T02:34:32Z	159
105	HD 224126	1342182887	23h55m21.74s	+48d38m17.7s	-27.6779	2009-08-27T02:48:50Z	159
105	HIP 116705	1342182888	23h39m01.42s	+52d15m44.9s	-25.3847	2009-08-27T02:54:20Z	159
105	HIP 114507	1342182889	23h11m30.07s	+52d53m12.5s	-26.0192	2009-08-27T02:59:48Z	159
105	HIP 87668	1342182890	17h54m26.13s	-23d14m09.7s	-24.9461	2009-08-27T03:21:16Z	159
105	HIP 89642	1342182891	18h17m37.64s	-36d45m42.1s	-28.9914	2009-08-27T03:28:25Z	159
105	HIP 102082	1342182892	20h41m18.27s	+48d08m28.8s	-27.4439	2009-08-27T03:48:18Z	159
105	HIP 117591	1342182893	23h50m51.80s	+47d30m28.5s	-29.0502	2009-08-27T03:58:11Z	159
105	HIP 114507	1342182894	23h11m30.07s	+52d53m12.5s	-26.0405	2009-08-27T04:04:23Z	159
105	HIP 116705	1342182895	23h39m01.42s	+52d15m44.9s	-25.4133	2009-08-27T04:09:51Z	159
105	HIP 72208	1342182896	14h46m05.95s	+15d07m54.4s	25.8729	2009-08-27T04:28:52Z	9894
105	HIP 72208	1342182897	14h46m05.95s	+15d07m54.4s	25.9670	2009-08-27T07:14:43Z	9894
105	HIP 72208	1342182898	14h46m05.95s	+15d07m54.4s	26.0610	2009-08-27T10:00:34Z	9894



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 25



HSC

Document No.: HERSCHEL-HSC-DOC-1515
 Issue/Rev.: 1.0
 Date: November 25, 2009
 Page: 26

Table 4: Log of pointing observations (continuation)

OD	obsId	Observing Mode	Pointing Mode
032	1342178512	PacsPhoto	Line_scan
032	1342178513	PacsPhoto	Line_scan
032	1342178516	PacsPhoto	Line_scan
032	1342178517	PacsPhoto	Line_scan
032	1342178520	PacsPhoto	Line_scan
032	1342178521	PacsPhoto	Line_scan
032	1342178524	PacsPhoto	Line_scan
032	1342178525	PacsPhoto	Line_scan
032	1342178528	PacsPhoto	Line_scan
032	1342178529	PacsPhoto	Line_scan
032	1342178532	PacsPhoto	Line_scan
032	1342178533	PacsPhoto	Line_scan
032	1342178536	PacsPhoto	Line_scan
032	1342178537	PacsPhoto	Line_scan
032	1342178540	PacsPhoto	Line_scan
032	1342178541	PacsPhoto	Line_scan
038	1342178865	PacsPhoto	Line_scan
038	1342178865	PacsPhoto	Line_scan
038	1342178866	PacsPhoto	Line_scan
038	1342178867	PacsPhoto	Nodding
038	1342178868	PacsPhoto	Line_scan
038	1342178869	PacsPhoto	Line_scan
038	1342178870	PacsPhoto	Nodding
038	1342178871	PacsPhoto	Nodding
038	1342178872	PacsPhoto	Nodding
041	1342179005	PacsPhoto	Line_scan
041	1342179006	PacsPhoto	Line_scan
041	1342179007	PacsPhoto	Line_scan
041	1342179008	PacsPhoto	Line_scan
041	1342179009	PacsPhoto	Line_scan
041	1342179011	PacsPhoto	Nodding
041	1342179012	PacsPhoto	Line_scan
042	1342179023	SpirePhotoPcalFlash	Basic-fine
042	1342179024	SpirePhoto_CalGCO_FpgInitialPointing	Custom-map-pointing
042	1342179025	SpirePhotoPcalFlash	Basic-fine
042	1342179026	SpirePhotoPcalFlash	Basic-fine
042	1342179027	SpirePhoto_CalGCO_FpgInitialPointing	Custom-map-pointing
042	1342179028	SpirePhotoPcalFlash	Basic-fine
042	1342179030	SpirePhotoPcalFlash	Basic-fine
042	1342179031	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
042	1342179032	SpirePhotoPcalFlash	Basic-fine
042	1342179033	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
042	1342179034	SpirePhotoPcalFlash	Basic-fine
042	1342179035	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
042	1342179036	SpirePhotoPcalFlash	Basic-fine
042	1342179037	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
042	1342179038	SpirePhotoPcalFlash	Basic-fine
042	1342179039	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
042	1342179040	SpirePhotoPcalFlash	Basic-fine
042	1342179041	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
042	1342179042	SpirePhotoPcalFlash	Basic-fine
042	1342179043	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
 Issue/Rev.: 1.0
 Date: November 25, 2009
 Page: 27

continued

OD	obsId	Observing Mode	Pointing Mode
042	1342179044	SpirePhotoPcalFlash	Basic-fine
042	1342179045	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
042	1342179046	SpirePhotoPcalFlash	Basic-fine
042	1342179047	SpirePhoto_CalGCO_FpgInitialPointing	Custom-map-pointing
042	1342179048	SpirePhotoPcalFlash	Basic-fine
046	1342179300	HifiEngSwitchonLO	No-pointing
046	1342179301	HifiMappingProcFastDBSRaster	Nodding-of-raster
046	1342179302	HifiEngHalfThrowFastDBSRaster	Nodding-of-raster
046	1342179303	HifiEngSwitchonLO	No-pointing
046	1342179304	HifiMappingProcFastDBSRaster	Nodding-of-raster
046	1342179305	HifiEngSwitchonLO	No-pointing
046	1342179306	HifiMappingProcFastDBSRaster	Nodding-of-raster
046	1342179307	HifiEngSwitchonLO	No-pointing
046	1342179308	HifiMappingProcFastDBSRaster	Nodding-of-raster
053	1342179551	PacsPhoto	Nodding
053	1342179552	PacsPhoto	Line_scan
053	1342179553	PacsPhoto	Nodding
053	1342179554	PacsPhoto	Line_scan
053	1342179555	PacsPhoto	Nodding
053	1342179556	PacsPhoto	Nodding
053	1342179557	PacsPhoto	Line_scan
053	1342179558	PacsPhoto	Line_scan
053	1342179559	PacsPhoto	Nodding
053	1342179560	PacsPhoto	Nodding
053	1342179561	PacsPhoto	Line_scan
053	1342179564	HifiEngSwitchonLO	No-pointing
053	1342179565	HifiEngHalfThrowFastDBSRaster	Nodding-of-raster
055	1342179609	HifiEngSwitchonLO	No-pointing
055	1342179610	HifiMappingProcFastDBSRaster	Nodding-of-raster
055	1342179611	HifiEngHalfThrowFastDBSRaster	Nodding-of-raster
055	1342179612	HifiEngSwitchonLO	No-pointing
055	1342179613	HifiMappingProcFastDBSRaster	Nodding-of-raster
055	1342179614	HifiEngHalfThrowFastDBSRaster	Nodding-of-raster
055	1342179615	HifiEngSwitchonLO	No-pointing
055	1342179616	HifiMappingProcFastDBSRaster	Nodding-of-raster
055	1342179617	HifiEngHalfThrowFastDBSRaster	Nodding-of-raster
055	1342179618	HifiEngSwitchonLO	No-pointing
055	1342179619	HifiEngHalfThrowFastDBSRaster	Nodding-of-raster
055	1342179620	HifiMappingProcFastDBSRaster	Nodding-of-raster
055	1342179622	HifiEngSwitchonLO	No-pointing
055	1342179623	HifiMappingProcFastDBSRaster	Nodding-of-raster
055	1342179624	HifiEngHalfThrowFastDBSRaster	Nodding-of-raster
055	1342179625	HifiEngSwitchonLO	No-pointing
055	1342179626	HifiMappingProcFastDBSRaster	Nodding-of-raster
056	1342179634	SpirePhotoPcalFlash	Basic-fine
056	1342179635	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
056	1342179636	SpirePhotoPcalFlash	Basic-fine
056	1342179637	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
056	1342179638	SpirePhotoPcalFlash	Basic-fine
056	1342179639	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
056	1342179640	SpirePhotoPcalFlash	Basic-fine
056	1342179641	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
056	1342179642	SpirePhotoPcalFlash	Basic-fine

continues



HSC

Document No.: HERSHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 28

continued

OD	obsId	Observing Mode	Pointing Mode
060	1342180188	SpireSpectroPcalFlash	Basic-fine
060	1342180189	SpireSpectro_CalGCO_FpgInitialPointing	Custom-map-pointing
060	1342180190	SpireSpectroPcalFlash	Basic-fine
060	1342180191	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
060	1342180192	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
060	1342180193	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
060	1342180194	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
060	1342180195	SpireSpectroPcalFlash	Basic-fine
060	1342180196	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
060	1342180197	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
060	1342180198	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
060	1342180199	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
060	1342180200	SpireSpectroPcalFlash	Basic-fine
060	1342180201	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
060	1342180202	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
060	1342180203	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
060	1342180204	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
060	1342180205	SpireSpectroPcalFlash	Basic-fine
064	1342180038	PacsPhoto	Nodding
064	1342180039	PacsPhoto	Nodding
064	1342180040	PacsPhoto	Nodding
064	1342180041	PacsPhoto	Nodding
064	1342180042	PacsPhoto	Nodding
064	1342180044	PacsPhoto	Nodding
064	1342180045	PacsPhoto	Nodding
064	1342180046	PacsPhoto	Nodding
064	1342180047	PacsPhoto	Nodding
064	1342180048	PacsPhoto	Nodding
064	1342180049	PacsPhoto	Nodding
064	1342180050	PacsPhoto	Nodding
064	1342180051	PacsPhoto	Nodding
064	1342180052	PacsPhoto	Nodding
064	1342180053	PacsPhoto	Nodding
064	1342180054	PacsPhoto	Nodding
064	1342180055	PacsPhoto	Nodding
064	1342180056	PacsPhoto	Nodding
064	1342180057	PacsPhoto	Nodding
064	1342180058	PacsPhoto	Nodding
064	1342180059	PacsPhoto	Nodding
064	1342180060	PacsPhoto	Nodding
064	1342180061	PacsPhoto	Nodding
064	1342180062	PacsPhoto	Nodding
064	1342180063	PacsPhoto	Nodding
064	1342180064	PacsPhoto	Nodding
064	1342180065	PacsPhoto	Nodding
064	1342180066	PacsPhoto	Nodding
064	1342180067	PacsPhoto	Nodding
064	1342180068	PacsPhoto	Nodding
064	1342180069	PacsPhoto	Nodding
064	1342180070	PacsPhoto	Nodding
064	1342180071	PacsPhoto	Nodding
064	1342180072	PacsPhoto	Nodding
064	1342180073	PacsPhoto	Nodding

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
 Issue/Rev.: 1.0
 Date: November 25, 2009
 Page: 29

continued

OD	obsId	Observing Mode	Pointing Mode
064	1342180110	PacsCal_Spec_Chopped_Raster	Raster
064	1342180111	PacsCal_Spec_Chopped_Raster	Raster
064	1342180112	PacsCal_Spec_Chopped_Raster	Raster
066	1342180326	SpirePhotoPcalFlash	Basic-fine
066	1342180327	SpirePhoto_CalGCO_FpgInitialPointing	Custom-map-pointing
066	1342180328	SpirePhotoPcalFlash	Basic-fine
066	1342180329	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
066	1342180330	SpirePhotoPcalFlash	Basic-fine
066	1342180331	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
066	1342180332	SpirePhotoPcalFlash	Basic-fine
066	1342180333	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
066	1342180334	SpirePhotoPcalFlash	Basic-fine
066	1342180335	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
066	1342180336	SpirePhotoPcalFlash	Basic-fine
066	1342180337	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
066	1342180338	SpirePhotoPcalFlash	Basic-fine
066	1342180339	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
066	1342180340	SpirePhotoPcalFlash	Basic-fine
066	1342180341	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
066	1342180342	SpirePhotoPcalFlash	Basic-fine
066	1342180343	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
066	1342180344	SpirePhotoPcalFlash	Basic-fine
070	1342180584	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180585	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180586	SpirePhotoPcalFlash	Basic-fine
070	1342180587	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180588	SpirePhotoPcalFlash	Basic-fine
070	1342180589	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180590	SpirePhotoPcalFlash	Basic-fine
070	1342180591	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180592	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180593	SpirePhotoPcalFlash	Basic-fine
070	1342180594	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180595	SpirePhotoPcalFlash	Basic-fine
070	1342180596	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180597	SpirePhotoPcalFlash	Basic-fine
070	1342180599	SpirePhotoPcalFlash	Basic-fine
070	1342180600	SpirePhoto_CalGCO_FpgInitialPointing	Custom-map-pointing
070	1342180601	SpirePhotoPcalFlash	Basic-fine
070	1342180602	SpirePhotoPcalFlash	Basic-fine
070	1342180603	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180604	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180605	SpirePhotoPcalFlash	Basic-fine
070	1342180606	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180607	SpirePhotoPcalFlash	Basic-fine
070	1342180608	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180609	SpirePhotoPcalFlash	Basic-fine
070	1342180610	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180611	SpirePhotoPcalFlash	Basic-fine
070	1342180612	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180613	SpirePhotoPcalFlash	Basic-fine
070	1342180614	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
070	1342180615	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
 Issue/Rev.: 1.0
 Date: November 25, 2009
 Page: 30

continued

OD	obsId	Observing Mode	Pointing Mode
070	1342180616	SpirePhotoPcalFlash	Basic-fine
071	1342180710	SpirePhotoPcalFlash	Basic-fine
071	1342180711	SpirePhotoPcalFlash	Basic-fine
071	1342180713	SpirePhotoPcalFlash	Basic-fine
071	1342180715	SpirePhotoPcalFlash	Basic-fine
071	1342180716	SpirePhotoPcalFlash	Basic-fine
071	1342180718	SpirePhotoPcalFlash	Basic-fine
071	1342180721	SpireSpectroPcalFlash	Basic-fine
071	1342180722	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180723	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180724	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180725	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180726	SpireSpectroPcalFlash	Basic-fine
071	1342180727	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180728	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180729	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180730	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180731	SpireSpectroPcalFlash	Basic-fine
071	1342180732	SpireSpectro_CalGCO_FpgInitialPointing	Custom-map-pointing
071	1342180733	SpireSpectroPcalFlash	Basic-fine
071	1342180734	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180735	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180736	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180737	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180738	SpireSpectroPcalFlash	Basic-fine
071	1342180739	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180740	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180741	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180742	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
071	1342180743	SpireSpectroPcalFlash	Basic-fine
072	1342180670	PacsPhoto	Nodding
072	1342180671	PacsPhoto	Nodding
072	1342180672	PacsPhoto	Nodding
072	1342180673	PacsPhoto	Nodding
072	1342180674	PacsPhoto	Nodding
072	1342180675	PacsPhoto	Nodding
072	1342180676	PacsPhoto	Nodding
072	1342180677	PacsPhoto	Nodding
072	1342180678	PacsPhoto	Nodding
072	1342180679	PacsPhoto	Nodding
072	1342180680	PacsPhoto	Nodding
072	1342180681	PacsPhoto	Nodding
072	1342180682	PacsPhoto	Nodding
072	1342180683	PacsPhoto	Nodding
072	1342180684	PacsPhoto	Nodding
072	1342180685	PacsPhoto	Nodding
072	1342180686	PacsPhoto	Nodding
072	1342180687	PacsPhoto	Nodding
072	1342180688	PacsPhoto	Nodding
072	1342180689	PacsPhoto	Nodding
072	1342180690	PacsPhoto	Nodding
072	1342180691	PacsPhoto	Nodding
072	1342180692	PacsPhoto	Nodding

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
 Issue/Rev.: 1.0
 Date: November 25, 2009
 Page: 31

continued

OD	obsId	Observing Mode	Pointing Mode
072	1342180693	PacsPhoto	Nodding
072	1342180694	PacsPhoto	Nodding
072	1342180695	PacsPhoto	Nodding
072	1342180696	PacsPhoto	Nodding
072	1342180697	PacsPhoto	Nodding
072	1342180698	PacsPhoto	Nodding
072	1342180699	PacsPhoto	Nodding
072	1342180700	PacsPhoto	Nodding
072	1342180701	PacsPhoto	Nodding
072	1342180702	PacsPhoto	Nodding
072	1342180703	PacsPhoto	Nodding
072	1342180704	PacsPhoto	Nodding
072	1342180705	PacsPhoto	Nodding
072	1342180708	PacsPhoto	Nodding
073	1342180776	PacsPhoto	Nodding-raster
078	1342181052	PacsCal_Spec_Chopped_Raster	Raster
078	1342181053	PacsCal_Spec_Chopped_Raster	Raster
078	1342181054	PacsCal_Spec_Chopped_Raster	Raster
078	1342181055	PacsCal_Spec_Chopped_Raster	Raster
078	1342181056	PacsCal_Spec_Chopped_Raster	Raster
078	1342181057	PacsCal_Spec_Chopped_Raster	Raster
078	1342181058	PacsCal_Spec_Chopped_Raster	Raster
082	1342181292	SpireSpectroPcalFlash	Basic-fine
082	1342181293	SpireSpectro_CalGCO_FpgInitialPointing	Custom-map-pointing
082	1342181294	SpireSpectroPcalFlash	Basic-fine
082	1342181295	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
082	1342181296	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
082	1342181297	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
082	1342181298	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
082	1342181299	SpireSpectroPcalFlash	Basic-fine
082	1342181300	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
082	1342181301	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
082	1342181302	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
082	1342181303	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
086	1342181645	PacsPhoto	Nodding
086	1342181646	PacsPhoto	Nodding
086	1342181647	PacsPhoto	Nodding
086	1342181648	PacsPhoto	Nodding
086	1342181649	PacsPhoto	Nodding
086	1342181650	PacsPhoto	Nodding
086	1342181651	PacsPhoto	Nodding
086	1342181652	PacsPhoto	Nodding
086	1342181653	PacsPhoto	Nodding
086	1342181654	PacsPhoto	Nodding
086	1342181655	PacsPhoto	Nodding
086	1342181656	PacsPhoto	Nodding
086	1342181657	PacsPhoto	Nodding
086	1342181658	PacsPhoto	Nodding
086	1342181659	PacsPhoto	Nodding
086	1342181660	PacsPhoto	Nodding
086	1342181661	PacsPhoto	Nodding
086	1342181662	PacsPhoto	Nodding
086	1342181663	PacsPhoto	Nodding

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
 Issue/Rev.: 1.0
 Date: November 25, 2009
 Page: 32

continued

OD	obsId	Observing Mode	Pointing Mode
086	1342181664	PacsPhoto	Nodding
086	1342181665	PacsPhoto	Nodding
086	1342181666	PacsPhoto	Nodding
086	1342181667	PacsPhoto	Nodding
086	1342181668	PacsPhoto	Nodding
086	1342181669	PacsPhoto	Nodding
086	1342181670	PacsPhoto	Nodding
086	1342181674	SpireSpectroPcalFlash	Basic-fine
086	1342181675	SpireSpectro_CalGCO_FovMapFpgScan	Custom-map-pointing
086	1342181676	SpireSpectroPcalFlash	Basic-fine
086	1342181677	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
086	1342181678	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
086	1342181679	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
086	1342181680	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
086	1342181681	SpireSpectroPcalFlash	Basic-fine
086	1342181682	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
086	1342181683	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
086	1342181684	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
086	1342181685	SpireSpectro_CalGCO_FovMapFpgScan	Line-scan-with-off
087	1342181740	SpirePhotoPcalFlash	Basic-fine
087	1342181741	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
087	1342181742	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
087	1342181743	SpirePhotoPcalFlash	Basic-fine
087	1342181744	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
087	1342181745	SpirePhotoPcalFlash	Basic-fine
087	1342181746	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
087	1342181747	SpirePhotoPcalFlash	Basic-fine
087	1342181748	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
087	1342181749	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
087	1342181750	SpirePhotoPcalFlash	Basic-fine
087	1342181751	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
087	1342181752	SpirePhotoPcalFlash	Basic-fine
087	1342181753	SpirePhoto_CalGCO_FovMapFpgScan	Line-scan-with-off
092	1342182092	PacsPhoto	Nodding
092	1342182093	PacsPhoto	Nodding
092	1342182094	PacsPhoto	Nodding
092	1342182095	PacsPhoto	Nodding
092	1342182096	PacsPhoto	Nodding
092	1342182097	PacsPhoto	Nodding
092	1342182098	PacsPhoto	Nodding
092	1342182099	PacsPhoto	Nodding
092	1342182100	PacsPhoto	Nodding
092	1342182101	PacsPhoto	Nodding
092	1342182102	PacsPhoto	Nodding
092	1342182103	PacsPhoto	Nodding
092	1342182104	PacsPhoto	Nodding
092	1342182105	PacsPhoto	Nodding
092	1342182106	PacsPhoto	Nodding
092	1342182107	PacsPhoto	Nodding
092	1342182108	PacsPhoto	Nodding
092	1342182109	PacsPhoto	Nodding
092	1342182110	PacsPhoto	Nodding
092	1342182111	PacsPhoto	Nodding

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 33

continued

OD	obsId	Observing Mode	Pointing Mode
092	1342182112	PacsPhoto	Nodding
092	1342182113	PacsPhoto	Nodding
092	1342182114	PacsPhoto	Nodding
092	1342182115	PacsPhoto	Nodding
092	1342182116	PacsPhoto	Nodding
092	1342182117	PacsPhoto	Nodding
092	1342182118	PacsPhoto	Nodding
092	1342182119	PacsPhoto	Nodding
092	1342182120	PacsPhoto	Nodding
092	1342182121	PacsPhoto	Nodding
092	1342182122	PacsPhoto	Nodding
092	1342182123	PacsPhoto	Nodding
092	1342182124	PacsPhoto	Nodding
092	1342182125	PacsPhoto	Nodding
092	1342182126	PacsPhoto	Nodding
092	1342182127	PacsPhoto	Nodding
092	1342182128	PacsPhoto	Nodding
092	1342182129	PacsPhoto	Nodding
092	1342182130	PacsPhoto	Nodding
092	1342182131	PacsPhoto	Nodding
092	1342182132	PacsPhoto	Nodding
092	1342182133	PacsPhoto	Nodding
092	1342182134	PacsPhoto	Nodding
092	1342182135	PacsPhoto	Nodding
092	1342182136	PacsPhoto	Nodding
092	1342182137	PacsPhoto	Nodding
092	1342182138	PacsPhoto	Nodding
092	1342182139	PacsPhoto	Nodding
092	1342182140	PacsPhoto	Nodding
092	1342182141	PacsPhoto	Nodding
092	1342182142	PacsPhoto	Nodding
092	1342182143	PacsPhoto	Nodding
092	1342182144	PacsPhoto	Nodding
092	1342182145	PacsPhoto	Nodding
092	1342182146	PacsPhoto	Nodding
092	1342182147	PacsPhoto	Nodding
092	1342182148	PacsPhoto	Nodding
092	1342182149	PacsPhoto	Nodding
092	1342182150	PacsPhoto	Nodding
092	1342182151	PacsPhoto	Nodding
092	1342182152	PacsPhoto	Nodding
092	1342182153	PacsPhoto	Nodding
092	1342182154	PacsPhoto	Nodding
092	1342182155	PacsPhoto	Nodding
092	1342182156	PacsPhoto	Nodding
092	1342182157	PacsPhoto	Nodding
092	1342182158	PacsPhoto	Nodding
092	1342182159	PacsPhoto	Nodding
092	1342182160	PacsPhoto	Nodding
092	1342182161	PacsPhoto	Nodding
092	1342182162	PacsPhoto	Nodding
092	1342182163	PacsPhoto	Nodding
092	1342182164	PacsPhoto	Nodding

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
 Issue/Rev.: 1.0
 Date: November 25, 2009
 Page: 34

continued

OD	obsId	Observing Mode	Pointing Mode
092	1342182165	PacsPhoto	Nodding
092	1342182166	PacsPhoto	Nodding
092	1342182167	PacsPhoto	Nodding
092	1342182168	PacsPhoto	Nodding
092	1342182169	PacsPhoto	Nodding
092	1342182170	PacsPhoto	Nodding
092	1342182171	PacsPhoto	Nodding
092	1342182172	PacsPhoto	Nodding
092	1342182173	PacsPhoto	Nodding
092	1342182174	PacsPhoto	Nodding
092	1342182175	PacsPhoto	Nodding
092	1342182176	PacsPhoto	Nodding
092	1342182177	PacsPhoto	Nodding
092	1342182178	PacsPhoto	Nodding
092	1342182179	PacsPhoto	Nodding
092	1342182180	PacsPhoto	Nodding
092	1342182181	PacsPhoto	Nodding
092	1342182182	PacsPhoto	Nodding
092	1342182183	PacsPhoto	Nodding
092	1342182184	PacsPhoto	Nodding
092	1342182185	PacsPhoto	Nodding
092	1342182186	PacsPhoto	Nodding
092	1342182187	PacsPhoto	Nodding
093	1342182235	PacsPhoto	Line_scan
093	1342182236	PacsCal_PacsPhotoDAC	Line-scan-with-off
093	1342182237	PacsPhoto	Nodding
093	1342182238	PacsPhoto	Nodding
093	1342182239	PacsPhoto	Nodding
096	1342182419	PacsPhoto	Nodding
097	1342182422	PacsPhoto	Nodding
101	1342182611	PacsPhoto	Raster
101	1342182612	PacsCal_PacsPhotoDAC	Raster
101	1342182613	PacsPhoto	Line_scan
101	1342182614	PacsCal_PacsPhotoDAC	Line-scan-with-off
101	1342182615	PacsPhoto	Nodding
101	1342182616	PacsPhoto	Nodding
101	1342182617	PacsPhoto	Nodding
101	1342182618	PacsPhoto	Nodding
101	1342182619	PacsPhoto	Nodding
101	1342182620	PacsPhoto	Nodding
101	1342182621	PacsPhoto	Nodding
101	1342182622	PacsPhoto	Nodding
101	1342182623	PacsPhoto	Nodding
101	1342182624	PacsPhoto	Nodding
101	1342182625	PacsPhoto	Nodding
101	1342182626	PacsPhoto	Nodding
101	1342182627	PacsPhoto	Nodding
101	1342182628	PacsPhoto	Nodding
101	1342182629	PacsPhoto	Nodding
101	1342182630	PacsPhoto	Nodding
101	1342182631	PacsPhoto	Nodding
101	1342182632	PacsPhoto	Nodding
101	1342182633	PacsPhoto	Nodding

continues



HSC

Document No.: HERSHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 35

continued

OD	obsId	Observing Mode	Pointing Mode
101	1342182634	PacsPhoto	Nodding
101	1342182635	PacsPhoto	Nodding
101	1342182636	PacsPhoto	Nodding
101	1342182637	PacsPhoto	Nodding
101	1342182638	PacsPhoto	Nodding
101	1342182639	PacsPhoto	Nodding
101	1342182640	PacsPhoto	Nodding
101	1342182641	PacsPhoto	Nodding
101	1342182642	PacsPhoto	Nodding
101	1342182643	PacsPhoto	Nodding
101	1342182644	PacsPhoto	Nodding
101	1342182645	PacsPhoto	Nodding
101	1342182646	PacsPhoto	Nodding
101	1342182647	PacsPhoto	Nodding
101	1342182648	PacsPhoto	Nodding
101	1342182649	PacsPhoto	Nodding
101	1342182650	PacsPhoto	Nodding
101	1342182651	PacsPhoto	Nodding
101	1342182652	PacsPhoto	Nodding
101	1342182653	PacsPhoto	Nodding
101	1342182654	PacsPhoto	Nodding
101	1342182655	PacsPhoto	Nodding
101	1342182656	PacsPhoto	Nodding
101	1342182657	PacsPhoto	Nodding
101	1342182658	PacsPhoto	Nodding
101	1342182659	PacsPhoto	Nodding
101	1342182660	PacsPhoto	Nodding
101	1342182661	PacsPhoto	Nodding
101	1342182662	PacsPhoto	Nodding
101	1342182663	PacsPhoto	Nodding
101	1342182664	PacsPhoto	Nodding
101	1342182665	PacsPhoto	Nodding
101	1342182666	PacsPhoto	Nodding
101	1342182667	PacsPhoto	Nodding
101	1342182668	PacsPhoto	Nodding
101	1342182669	PacsPhoto	Nodding
101	1342182670	PacsPhoto	Nodding
101	1342182671	PacsPhoto	Nodding
101	1342182672	PacsPhoto	Nodding
101	1342182673	PacsPhoto	Nodding
101	1342182674	PacsPhoto	Nodding
101	1342182675	PacsPhoto	Nodding
101	1342182676	PacsPhoto	Nodding
101	1342182677	PacsPhoto	Nodding
101	1342182678	PacsPhoto	Nodding
101	1342182679	PacsPhoto	Nodding
101	1342182680	PacsPhoto	Nodding
101	1342182681	PacsPhoto	Nodding
101	1342182682	PacsPhoto	Nodding
101	1342182683	PacsPhoto	Nodding
101	1342182684	PacsPhoto	Nodding
101	1342182685	PacsPhoto	Nodding
101	1342182686	PacsPhoto	Nodding

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515

Issue/Rev.: 1.0

Date: November 25, 2009

Page: 36

continued

OD	obsId	Observing Mode	Pointing Mode
101	1342182687	PacsPhoto	Nodding
101	1342182688	PacsPhoto	Nodding
101	1342182689	PacsPhoto	Nodding
101	1342182690	PacsPhoto	Nodding
101	1342182691	PacsPhoto	Nodding
101	1342182692	PacsPhoto	Nodding
101	1342182693	PacsPhoto	Nodding
101	1342182694	PacsPhoto	Nodding
101	1342182695	PacsPhoto	Nodding
101	1342182696	PacsPhoto	Nodding
101	1342182697	PacsPhoto	Nodding
101	1342182698	PacsPhoto	Nodding
101	1342182699	PacsPhoto	Nodding
101	1342182700	PacsPhoto	Nodding
101	1342182701	PacsPhoto	Nodding
101	1342182702	PacsPhoto	Nodding
101	1342182703	PacsPhoto	Nodding
101	1342182704	PacsPhoto	Nodding
101	1342182705	PacsPhoto	Nodding
101	1342182706	PacsPhoto	Nodding
101	1342182707	PacsPhoto	Nodding
101	1342182708	PacsPhoto	Nodding
101	1342182709	PacsPhoto	Nodding
101	1342182710	PacsPhoto	Nodding
101	1342182711	PacsPhoto	Nodding
101	1342182712	PacsPhoto	Nodding
101	1342182714	PacsPhoto	Nodding
101	1342182715	PacsPhoto	Nodding
101	1342182716	PacsPhoto	Nodding
101	1342182717	PacsPhoto	Nodding
101	1342182718	PacsPhoto	Nodding
101	1342182719	PacsPhoto	Nodding
101	1342182720	PacsPhoto	Nodding
101	1342182721	PacsPhoto	Nodding
101	1342182722	PacsPhoto	Nodding
101	1342182723	PacsPhoto	Nodding
101	1342182724	PacsPhoto	Nodding
101	1342182725	PacsPhoto	Nodding
101	1342182726	PacsPhoto	Nodding
101	1342182727	PacsPhoto	Nodding
101	1342182728	PacsPhoto	Nodding
101	1342182729	PacsPhoto	Nodding
101	1342182730	PacsPhoto	Nodding
101	1342182731	PacsPhoto	Nodding
101	1342182732	PacsPhoto	Nodding
101	1342182733	PacsPhoto	Nodding
101	1342182734	PacsPhoto	Nodding
101	1342182735	PacsPhoto	Nodding
101	1342182736	PacsPhoto	Nodding
101	1342182737	PacsPhoto	Nodding
101	1342182738	PacsPhoto	Nodding
101	1342182739	PacsPhoto	Nodding
101	1342182740	PacsPhoto	Nodding

continues



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 37

continued

OD	obsId	Observing Mode	Pointing Mode
102	1342182779	PacsCal_Spec_Chopped_Raster	Raster
102	1342182780	PacsCal_Spec_Chopped_Raster	Raster
102	1342182781	PacsCal_Spec_Chopped_Raster	Raster
102	1342182789	PacsCal_Spec_Chopped_Raster	Raster
102	1342182791	PacsCal_Spec_Chopped_Raster	Raster
102	1342182792	PacsCal_Spec_Chopped_Raster	Raster
102	1342182795	PacsCal_Spec_Chopped_Raster	Raster
103	1342182819	PacsCal_PacsLineSpec_PV	Nodding-raster
104	1342182823	PacsPhoto	Nodding
104	1342182824	PacsPhoto	Nodding
104	1342182825	PacsPhoto	Nodding
104	1342182826	PacsPhoto	Nodding
104	1342182827	PacsPhoto	Nodding
104	1342182828	PacsPhoto	Nodding
104	1342182829	PacsPhoto	Nodding
104	1342182830	PacsPhoto	Nodding
104	1342182831	PacsPhoto	Nodding
104	1342182832	PacsPhoto	Nodding
104	1342182833	PacsPhoto	Nodding
104	1342182834	PacsPhoto	Nodding
104	1342182835	PacsPhoto	Nodding
104	1342182836	PacsPhoto	Nodding
104	1342182837	PacsPhoto	Nodding
104	1342182838	PacsPhoto	Nodding
104	1342182839	PacsPhoto	Nodding
104	1342182840	PacsPhoto	Nodding
104	1342182841	PacsPhoto	Nodding
104	1342182842	PacsPhoto	Nodding
104	1342182843	PacsPhoto	Nodding
104	1342182844	PacsPhoto	Nodding
104	1342182845	PacsPhoto	Nodding
104	1342182846	PacsPhoto	Nodding
104	1342182847	PacsPhoto	Nodding
104	1342182848	PacsPhoto	Nodding
104	1342182849	PacsPhoto	Nodding
104	1342182850	PacsPhoto	Nodding
104	1342182851	PacsPhoto	Nodding
104	1342182852	PacsPhoto	Nodding
104	1342182853	PacsPhoto	Nodding
104	1342182854	PacsPhoto	Nodding
104	1342182855	PacsPhoto	Nodding
104	1342182856	PacsPhoto	Nodding
104	1342182857	PacsPhoto	Nodding
104	1342182858	PacsPhoto	Nodding
104	1342182859	PacsPhoto	Nodding
104	1342182860	PacsPhoto	Nodding
104	1342182861	PacsPhoto	Nodding
104	1342182862	PacsPhoto	Nodding
104	1342182863	PacsPhoto	Nodding
104	1342182864	PacsPhoto	Nodding
104	1342182865	PacsPhoto	Nodding
104	1342182866	PacsPhoto	Nodding
104	1342182867	PacsPhoto	Nodding

continues



continued

OD	obsId	Observing Mode	Pointing Mode
104	1342182868	PacsPhoto	Nodding
104	1342182869	PacsPhoto	Nodding
104	1342182870	PacsPhoto	Nodding
104	1342182871	PacsPhoto	Nodding
104	1342182872	PacsPhoto	Nodding
105	1342182875	PacsPhoto	Nodding
105	1342182876	PacsPhoto	Nodding
105	1342182877	PacsPhoto	Nodding
105	1342182878	PacsPhoto	Nodding
105	1342182879	PacsPhoto	Nodding
105	1342182880	PacsPhoto	Nodding
105	1342182881	PacsPhoto	Nodding
105	1342182882	PacsPhoto	Nodding
105	1342182883	PacsPhoto	Nodding
105	1342182884	PacsPhoto	Nodding
105	1342182885	PacsPhoto	Nodding
105	1342182886	PacsPhoto	Nodding
105	1342182887	PacsPhoto	Nodding
105	1342182888	PacsPhoto	Nodding
105	1342182889	PacsPhoto	Nodding
105	1342182890	PacsPhoto	Nodding
105	1342182891	PacsPhoto	Nodding
105	1342182892	PacsPhoto	Nodding
105	1342182893	PacsPhoto	Nodding
105	1342182894	PacsPhoto	Nodding
105	1342182895	PacsPhoto	Nodding
105	1342182896	PacsPhoto	Nodding
105	1342182897	PacsPhoto	Nodding
105	1342182898	PacsPhoto	Nodding

3 Aperture alignment history

In this section we describe the different alignment matrices produced during CoP and PVP. Eight SIAM matrices have been computed and used in operations since launch. Currently the instrument's alignment is believed to be known to within 1–2 arcsec accuracy. At least one additional SIAM update is expected for the PACS photometer (TBD; derived within the activities described in Section 4.1) and possibly updates to other apertures will be performed as well.

3.1 SIAM 0032_0003 – since OD38

The SIAM 0032_0003 was produced on 16-June-2009, being the first in-flight SIAM derived from the “sneak preview” data. The “sneak preview” observations replaced the “SIAM search” activity within the pointing calibration plan. The idea behind was to use the PACS photometer (blue channel) to derive a common offset to be applied to all apertures (HIFI, PACS and SPIRE).

The required offsets in the Y and Z axes were computed by the PACS ICC (Bruno Altieri) by comparing the PACS (aberration decorrected) and MIPS coordinates of the satellite galaxy NGC 5195. The ones applied were:

$$\Delta Y = -51.88766 \text{ arcsec}$$

$$\Delta Z = -78.17807 \text{ arcsec}$$



The offsets were verified at the HSC using the SIAM tool (see Annex A) v4 and the following input data:

$$\begin{aligned}\Delta\alpha &= -46.25976 \text{ arcsec} \\ \Delta\delta &= 81.499 \text{ arcsec} \\ \delta &= 47.26624 \text{ deg} \\ \langle PA \rangle &= 306.876 \text{ deg}\end{aligned}$$

A very good agreement was found between the values derived and those provided by the PACS ICC.

The full set of 131 matrices were produced using the SIAM tool (v4) by applying a common rotation to all the matrices within the ground-derived SIAM 0001_0009.

Tests carried out at the PACS ICC showed a very good agreement between the MIPS coordinates and the PACS ones (within some 2 arcsec). However, further tests (see Section 3.2 below) revealed a residual offset of 6–7 arcsec in PACS photometer point-source and scan map observations (anyhow, the first update was well within the 10 arcsec requirement for the “SIAM search” activity).

3.2 SIAM 0053_0002 – since OD53

The SIAM 0053_0002 was produced on 26-June-2009, using the SIAM tool (v5) from SIAM 0032_0003 and contains a single update for the PACS photometer aperture (P01_0). The rest of apertures remained identical. The offsets were computed by the PACS ICC:

$$\begin{aligned}\Delta Y &= -4.60 \text{ arcsec} \\ \Delta Z &= -5.50 \text{ arcsec}\end{aligned}$$

SIAM 0053_0002 was tested on several scan maps from OD38 and OD41. The (random) deviation from the PACS maps to the SIMBAD position was found about 2 arcsec r.m.s., with apparently no systematics in the instrument coordinates of the residuals (4 sources tested: HIP 78574, Gamma Dra, Mrk283 and HIP 66738).

3.3 SIAM 0055_0002 – since OD55

The SIAM 0055_0002 was produced on 02-July-2009 using the SIAM tool (v5) from SIAM 0053_0002. An update of all HIFI apertures was performed, by applying a common offset computed by the HIFI ICC from the Saturn observations performed in OD46:

$$\begin{aligned}\Delta\alpha &= 20.0 \text{ arcsec} \\ \Delta\delta &= -8.0 \text{ arcsec} \\ \delta &= 7.0 \text{ deg} \\ \langle PA \rangle &= 293.0 \text{ deg}\end{aligned}$$

The SIAM file was produced at the HSC and the HIFI ICC confirmed its validity: the use of the SIAM in the pipeline placed the target (Saturn) at $\simeq(0,0)$ for the OD46 observations.

3.4 SIAM 0068_0003 – since OD68

The SIAM 0068_0003 was produced on 13-July-2009 using the SIAM tool (v5) to merge the SPIRE and PACS matrices as given by SIAM 0055_0002 (for PACS and SPIRE apertures) and the input file provided by the HIFI ICC 0068_002 that updates all HIFI apertures. The Y, Z offsets are described in Table 5. For PACS and SPIRE, the matrices remain unchanged from 0055_0002.



Table 5: HIFI aperture positions used as input for SIAM 0068_0001

Aperture	description chop/subband/polar.	ΔY (arcsec)	ΔZ (arcsec)	Tilt angle (deg)
H11_0	center(0) A(0) S(0)	589.38	-58.00	0.0
H12_0	center(0) A(0) H(1)	592.47	-59.11	0.0
H13_0	center(0) B(1) S(0)	589.38	-58.00	0.0
H14_0	center(0) B(1) H(1)	592.47	-59.11	0.0
H15_0	chopped(1) A(0) S(0)	588.00	43.82	0.0
H16_0	chopped(1) A(0) H(1)	591.10	42.71	0.0
H17_0	chopped(1) B(1) S(0)	588.00	43.82	0.0
H18_0	chopped(1) B(1) H(1)	591.10	42.71	0.0
H21_0	center(0) A(0) S(0)	405.40	-54.03	0.0
H22_0	center(0) A(0) H(1)	407.58	-53.36	0.0
H23_0	center(0) B(1) S(0)	405.40	-54.03	0.0
H24_0	center(0) B(1) H(1)	407.58	-53.36	0.0
H25_0	chopped(1) A(0) S(0)	404.59	47.73	0.0
H26_0	chopped(1) A(0) H(1)	406.77	48.39	0.0
H27_0	chopped(1) B(1) S(0)	404.59	47.73	0.0
H28_0	chopped(1) B(1) H(1)	406.77	48.39	0.0
H31_0	center(0) A(0) S(0)	272.70	-63.44	0.0
H32_0	center(0) A(0) H(1)	275.30	-61.68	0.0
H33_0	center(0) B(1) S(0)	272.70	-63.44	0.0
H34_0	center(0) B(1) H(1)	275.30	-61.68	0.0
H35_0	chopped(1) A(0) S(0)	272.24	50.82	0.0
H36_0	chopped(1) A(0) H(1)	274.83	52.59	0.0
H37_0	chopped(1) B(1) S(0)	272.24	50.82	0.0
H38_0	chopped(1) B(1) H(1)	274.83	52.59	0.0
H41_0	center(0) A(0) S(0)	169.04	-54.20	0.0
H42_0	center(0) A(0) H(1)	169.62	-52.54	0.0
H43_0	center(0) B(1) S(0)	169.04	-54.20	0.0
H44_0	center(0) B(1) H(1)	169.62	-52.54	0.0
H45_0	chopped(1) A(0) S(0)	169.27	45.32	0.0
H46_0	chopped(1) A(0) H(1)	169.85	46.97	0.0
H47_0	chopped(1) B(1) S(0)	169.27	45.32	0.0
H48_0	chopped(1) B(1) H(1)	169.85	46.97	0.0
H51_0	center(0) A(0) S(0)	75.11	-42.61	0.0
H52_0	center(0) A(0) H(1)	75.12	-43.99	0.0
H53_0	center(0) B(1) S(0)	75.11	-42.61	0.0
H54_0	center(0) B(1) H(1)	75.12	-43.99	0.0
H55_0	chopped(1) A(0) S(0)	74.82	53.84	0.0
H56_0	chopped(1) A(0) H(1)	74.83	52.46	0.0
H57_0	chopped(1) B(1) S(0)	74.82	53.84	0.0
H58_0	chopped(1) B(1) H(1)	74.83	52.46	0.0
H61_0	center(0) A(0) S(0)	-10.81	-49.16	0.0
H62_0	center(0) A(0) H(1)	-11.16	-49.30	0.0
H63_0	center(0) B(1) S(0)	-10.81	-49.16	0.0
H64_0	center(0) B(1) H(1)	-11.16	-49.30	0.0
H65_0	chopped(1) A(0) S(0)	-11.06	44.82	0.0
H66_0	chopped(1) A(0) H(1)	-11.41	44.68	0.0
H67_0	chopped(1) B(1) S(0)	-11.06	44.82	0.0

continues



continued

Aperture	description chop/subband/polar.	ΔY (arcsec)	ΔZ (arcsec)	Tilt angle (deg)
H68_0	chopped(1) B(1) H(1)	-11.41	44.68	0.0
H71_0	center(0) A(0) S(0)	-104.81	-45.37	0.0
H72_0	center(0) A(0) H(1)	-104.80	-44.86	0.0
H73_0	center(0) B(1) S(0)	-104.81	-45.37	0.0
H74_0	center(0) B(1) H(1)	-104.80	-44.86	0.0
H75_0	chopped(1) A(0) S(0)	-104.79	41.92	0.0
H76_0	chopped(1) A(0) H(1)	-104.78	42.44	0.0
H77_0	chopped(1) B(1) S(0)	-104.79	41.92	0.0
H78_0	chopped(1) B(1) H(1)	-104.78	42.44	0.0

3.5 SIAM 0078_0001 – since OD78

The SIAM 0068_0003 was produced on 22-July-2009 using the SIAM tool (v5) from SIAM 0068_0003, It contains exclusively an update to the PACS spectrometer aperture P02_0 based on the following offsets provided by the PACS ICC:

$$\Delta\alpha = -0.645 \text{ arcsec}$$

$$\Delta\delta = -10.516 \text{ arcsec}$$

$$\delta = -62.077 \text{ deg}$$

$$\langle PA \rangle = 43.105 \text{ deg}$$

For the PACS photometer, HIFI and SPIRE the matrices remain unchanged from SIAM 0068_0003.

3.6 SIAM 0082_0001 – since OD82

The SIAM 0082_0001 was produced on 27-July-2009 using the SIAM tool (v5) from SIAM 0078_0001; The apertures updated are all of the SPIRE photometer apertures (S01_0 to S17_0), and all of the SPIRE spectrometer apertures (S18_0 to S54_0, and S56_0 to S73_0). PACS and HIFI apertures, as well as SPIRE/PACS parallel aperture (S55_0) remained unchanged.

The observations used to derive the offsets were 1342180327 from OD66 (SPIRE photometer) and 1342180189 from OD60 (SPIRE spectrometer). See Tables 3 and 4 for more information.

The offsets derived by the SPIRE ICC are:

SPIRE photometer:

$$\Delta Y = 5.6 \text{ arcsec}$$

$$\Delta Z = 5.1 \text{ arcsec}$$

SPIRE spectrometer:

$$\Delta Y = -2.22 \text{ arcsec}$$

$$\Delta Z = 30.02 \text{ arcsec}$$

3.7 SIAM 0098_0001 – since OD98

The SIAM 0098_0001 was produced on 14-August-2009 using the SIAM tool (v5) SIAM 0082_0001, and included two new apertures S74 and S75 for PMW detectors D6 and D7. The location of the new



apertures is given in Table 6. No other apertures were affected. PACS and HIFI apertures, as well as SPIRE apertures S01 to S73 remained unchanged.

Table 6: New SPIRE photometer apertures (from SIAM 0098_0001)

Aperture	description	ΔY (arcsec)	ΔZ (arcsec)	Tilt angle (deg)
S74_0	PMW Array: Bolometer D6	25.11975322	637.5529491	0.0
S75_0	PMW Array: Bolometer D7	-15.96398845	638.7162882	0.0

3.8 SIAM 0122_0001 – since OD122

The SIAM 0122_0001 has been produced on 03-September-2009 using the SIAM tool (v5, rev. 1.3) from SIAM 0098_0001. The changes are limited to a number of SPIRE apertures, namely S01-S17, S20, S24, S60, S74 & S75. PACS and HIFI apertures remained unchanged.

The primary observations for the photometer consisted of PSWE8 cross-rasters from OD 87 and OD 106³: 1342181755 (OD87), 1342182906, 1342182909 and 1342182912 (OD106). The primary observations for the spectrometer consisted of five cross-rasters (1342182934 – 1342182938)⁴.

The average offsets for the four PSWE8 Cross Rasters on OD 87 and OD 106 are:

$$\Delta Y = -1.0 \text{ arcsec}$$
$$\Delta Z = -9.5 \text{ arcsec}$$

The results showed that a bulk shift should be applied to all photometer apertures. On the other hand, no good evidence for a bulk shift for the spectrometer apertures was found. Therefore only the three most important apertures were affected by this update. The offsets below were computed from a weighted average of two of the cross raster observations and the FPG initial pointing for the central aperture. The weighting was based on the errors in the individual measurements:

S24 (SSW-D4):

$$\Delta Y = -2.8 \text{ arcsec}$$
$$\Delta Z = -4.2 \text{ arcsec}$$

S20 (SSW-E2):

$$\Delta Y = -5.2 \text{ arcsec}$$
$$\Delta Z = -3.4 \text{ arcsec}$$

S60 (SLW-D2):

$$\Delta Y = -5.5 \text{ arcsec}$$
$$\Delta Z = 1.0 \text{ arcsec}$$

4 Pointing performances

In this section we describe the pointing performance figures measured in the framework of the pointing calibration plan implementation: APE, SRPE and RPE. We also present the results on the investigation of the SAA dependency of the aperture offsets and the APE.

³These observations are not part of the pointing calibration plan and therefore are not included in Tables 3 and 4

⁴Id.



4.1 APE measurement

The purpose of the ‘‘PACS APE measurement’’ activity was twofold: on the one hand, to derive the residual alignment of the P01 aperture (i.e. to compute the refined SIAM matrix for the PACS photometer) and on the other hand, to derive the absolute pointing accuracy as characterised by the APE. This can be accomplished by measuring a large number of stars with accurate astrometry using the PACS Photo PointSource (nodding pointing) mode. In the absence of drifts (e.g. due to heating at large negative SAA, see Section 4.2 below), it is expected that, for a large number of samples, the distribution of the Y, Z offsets (actual position w.r.t. expected positions) follows Gaussian-like distributions in both the Y and Z axes: their mean values represent the residual alignment offsets to update the alignment matrix, while the dispersion, characterised by $\sqrt{\sigma_Y^2 + \sigma_Z^2}$ will define the APE.

The required observations were carried out in six ODs: 38, 64, 86, 92, 101 & 104. About 250 stars from the PACS catalogue of pointing calibration stars [RD.2] were targeted in the SAA range [-20,+30]: early checks performed in OD64 demonstrated that, when observing in that range, no drifts are observed and the distribution of pointing offsets can be well approximated by a Gaussian.

The PACS Photo PointSource mode makes use of the nodding pointing mode, i.e. the S/C is switching (nodding) between two positions, separated by some 52 arcsec (the size of one blue bolometer matrix). Therefore, the object’s position can be measured either in each nod position separately, or in the averaged position. To this end, a modified version of D. Lutz’s CAP (Calibration Analysis Procedure) v3.1.1 was used in batch mode to make a Gaussian fitting of the 12 -dithered -nod on/off - chop on/off and derived offsets in S/C Y and Z axis, for the two nods averaged as well as the two nods separately.⁵

The main results are presented in Table 7 below. Figure 1 shows the spatial distribution of offsets. Histograms of the offset distributions are shown in Figure 2, along with Gaussian fits to the distributions.

Table 7: APE measurements

	σ_Y (arcsec)	σ_Z (arcsec)	APE (arcsec)
Two nods averaged	1.00068	1.50012	1.80326
Positions at nod A	1.08774	1.55893	1.90091
Positions at nod B	1.11768	1.69113	2.02710
Gaussian fit to both nod positions	0.811762	1.34072	1.56732
Gaussian fit at nod A	0.955511	1.37227	1.67216
Gaussian fit at nod B	0.903790	1.57502	1.81591

4.2 APE dependency on SAA and pointing drift

Early results from OD72 suggested that, for observations in the SAA range [-20,-10] the pointing accuracy was not compromised (no drifts, similar APE and excellent reproducibility) and that no additional offset were required, while in the [-30, -20] range the distribution of offsets could not be reproduced by a Gaussian-like distribution, suggesting that the structure did not settle within the period of the experiment (time constant longer than expected). Moreover, it was concluded that the offsets were likely quite different from those in the colder SAA ranges. Finally, it was also derived that, when going from a long period in warm ([-30,-20]) attitude to cold attitude, the time to settle is longer (probably much longer) than 2 hours.

⁵it was argued that the actual APE (as given by the measurements on individual nods) would be $\sqrt{2}$ larger than that measured on the averaged positions; actually it has been found that the APE measured by individual nods is only 5–10% higher, indicating (as expected) that the offsets measured at both positions are correlated.

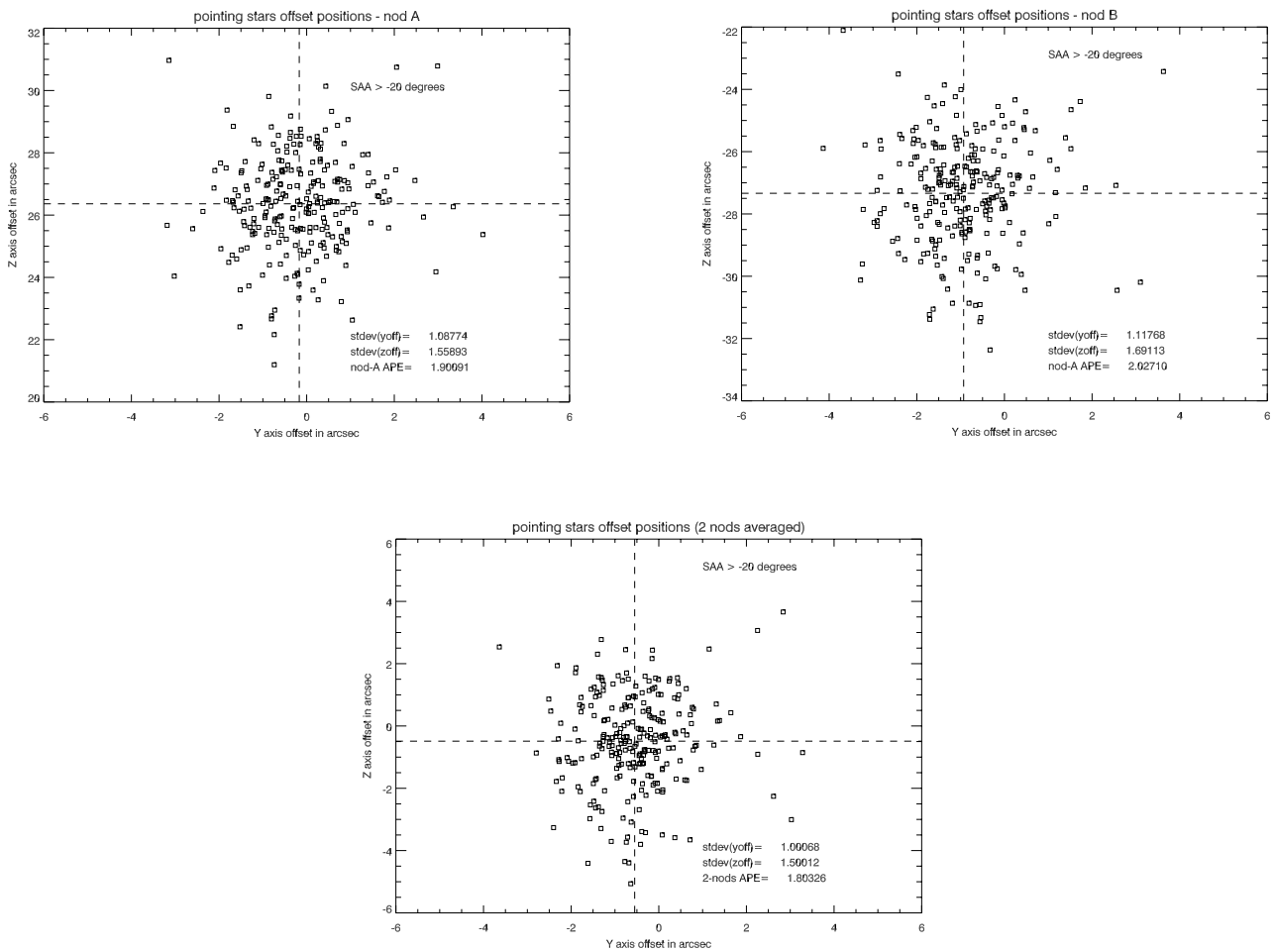


Figure 1: Spatial distribution of offsets: top left – nod A; top right – nod B; bottom – average of two nods. Targets in the SAA range [-20,+30]



HSC

Document No.: HERSHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 45

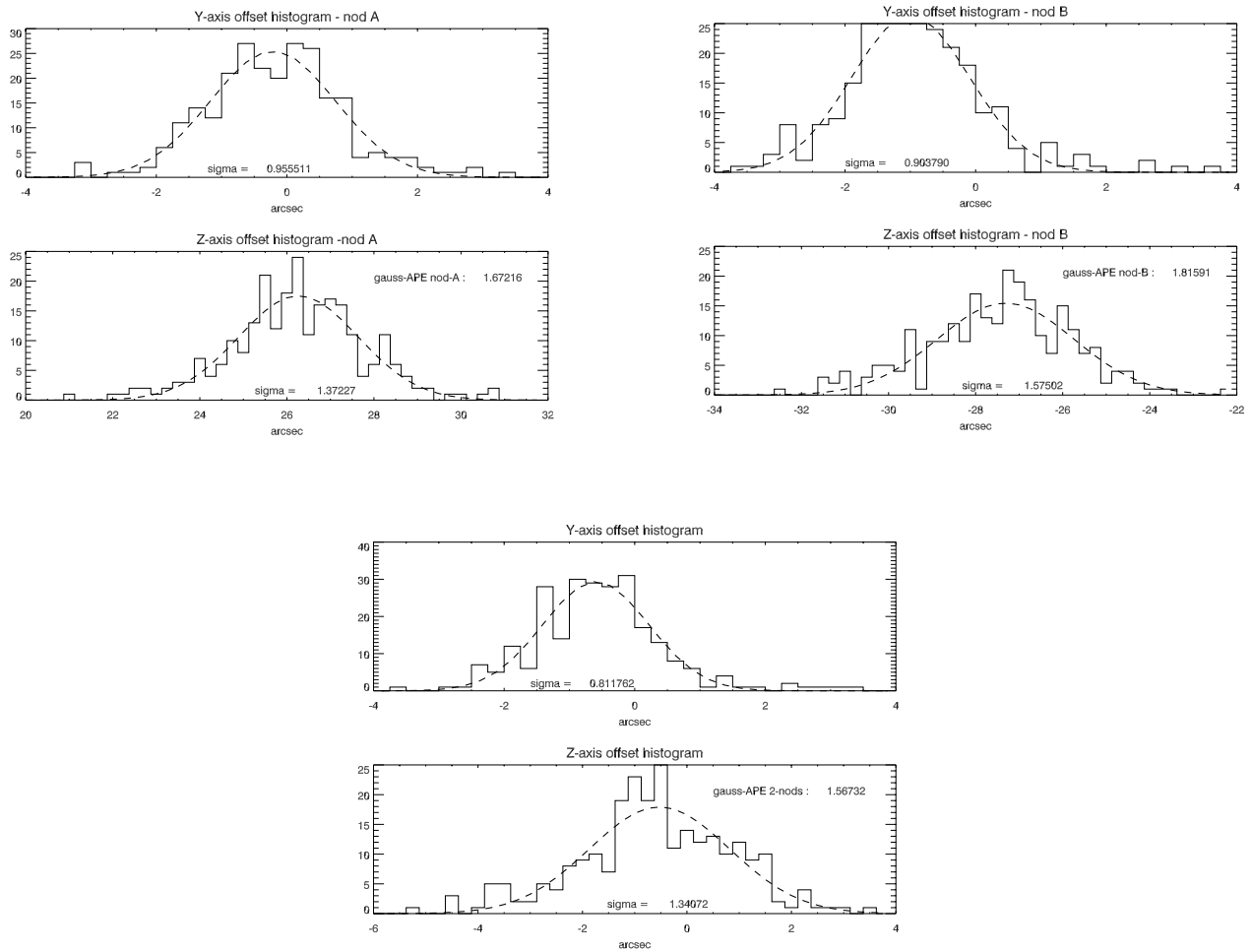


Figure 2: Y and Z distributions of offsets: top left – nod A; top right – nod B; bottom – average of two nodes. Targets in the SAA range [-20,+30]



Further experiments were carried out in ODs 104 & 105. In OD 104, 45 stars were measured in the [-20,-10] SAA range. Only a small offset of 1.3 arcsec (mostly in the -Z direction) was found w.r.t. to the average position found in OD101 (cold attitude) and a marginal degradation of the APE was reported (2.12 arcsec vs. 1.75 arcsec). On the other hand, measurements carried out at the end of OD104 on a calibration star (HIP 67627) at $SAA \simeq 25$ deg revealed no significant drift over a period of 14 hours (max. rate $\simeq 0.125$ arcsec/hr). Therefore, it was eventually decided to include the measurements carried out in OD104 in the global computation of the APE and SIAM offset (Section 4.1 above).

In OD105, stars at extreme negative SAA angles ([-30,-20]) were observed. First, three long staring observations at $SAA \simeq -29$ deg was performed in order to determine the positional drift. A very clear drift at a rate of $\simeq 0.25$ arcsec/hr is observed. The final offset observed after 8h is -5 arcsec along the Z axis. Then, short observations on 18 pointing calibration stars were performed. The central point of the offset shift further towards negative values (red points in Figure 3): $\Delta Y = -1.3$ arcsec, $\Delta Z = -3.1$ arcsec, but the scatter on the Z axis is very large, with some stars showing an offset of only -1.5 arcsec, and others up to -5/-6 arcsec. However there is no trend in time of these offsets.

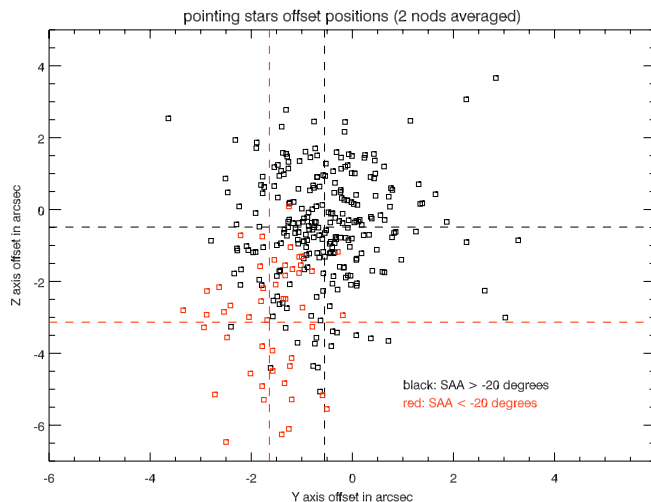


Figure 3: Spatial distribution of offsets, including the [-20,+30] range (black points) and the [-30,-20] range (red points).

We can therefore conclude that the SAA range [-20,+30] is a safe one for scheduling purposes (i.e. no substantial degradation of the APE, no drifts, no extra SIAM offsets), while it is advisable to avoid the [-30,-20] range except for short (no longer than 1 hour) periods. Moreover, when forced to observe at this extreme negative range, it is recommended to schedule the observations towards the end of the OD (so they do not impact on further observations at cold attitudes within the same OD).

4.3 RPE measurements

The RPE has been measured by the PACS ICC using the 'triplechop' mode of the PacsCal Phot PSF FieldDistortion generic AOR in ODs 85 and 101. A detailed description is given in [RD.3]. For both a star (α Boo) and an SSO (asteroid 19 Fortuna), the RPE, defined as the 68% percentile of radial offsets of the source position from its median position over a period of 1 minute, has been determined and found below the requirement of 0.3 arcsec ($\langle RPE \rangle = 0.189$ arcsec for α Boo and $\langle RPE \rangle = 0.287$ arcsec for 19 Fortuna). See [RD.3] for a complete description of the observations, data processing and analysis and



results.

4.4 SRPE measurements

While several dedicated observations (in OD101; see Table 2) were carried out to estimate the SRPE in raster maps and the SRPE-like figure for line scan maps, the data haven't been analysed yet at the time of writing this draft report. Nevertheless, a naïve SRPE have been estimated from the nods of the point-source mode ($2\text{-point} \times 1\text{-line}$ raster) The nod throw is fixed at 52arcsec^6 along the Z spacecraft axis. The distribution of the throw projected on the instrument axis is shown in Figure 4). The quadratic sum of the two dispersions gives a naïve $\text{SRPE} = 1.45\text{arcsec}$.

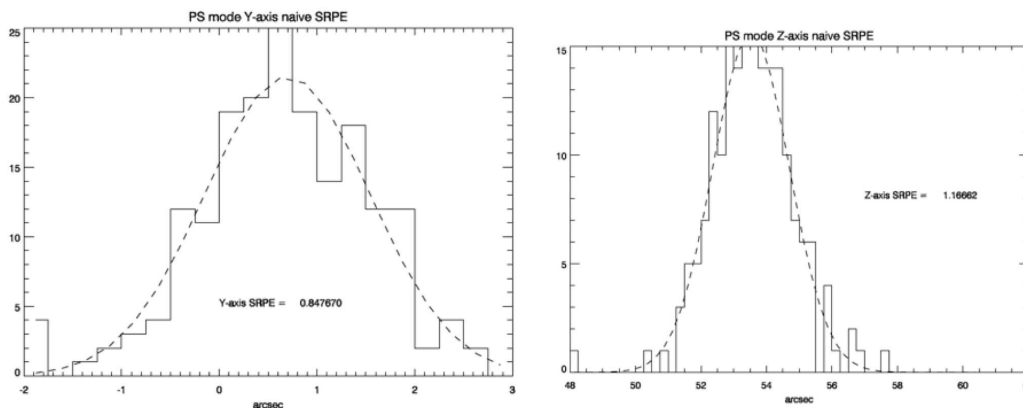


Figure 4: Naïve SRPE derived from Point Source mode observations (2×1 raster maps with 52arcsec throw).

4.5 SSO tracking tests

SSO tracking tests were performed in several SSOs, including 18 Melpomene, 19 Fortuna and 8 Flora at rates $\simeq 1\text{arcsec}/\text{min}$ for periods longer than one hour. Given the small sample of SSOs observed, no detailed APE figures have been derived, but the positional offsets measured are similar to those obtained for fixed targets, suggesting that the APE is not degraded when pointing to moving targets. Regarding the RPE, as mentioned in Section 4.3 above the actual system performance ($\langle RPE \rangle = 0.287\text{arcsec}$) meets or slightly exceeds the requirement (0.3arcsec).

In summary, the Herschel spacecraft tracking capabilities can be deemed as excellent.

4.6 Pointing performance in interlacing mode

As defined in [RD.4] the STR is provided with an “interlacing” function that can be enabled by means of a parameter in the pointing telecommand whenever 15 or more stars are available within the STR FoV. When interlacing is active, the STR determines the attitude using the stars from two consecutive frames (instead of a single frame as in the standard operations). In this way up to 18 different stars (versus the

⁶While the SRPE is defined over areas as large as $4 \times 4\text{deg}$



9 stars of the standard operations) are used for the attitude determination, with an average improvement in the accuracy on the bias error of about $\sqrt{2}$. In order to get the maximum accuracy it is necessary that the ACC provides as input to the STR an accurate value of the S/C angular rate (the maximum performance are achieved with rate errors below 0.2 arcsec/sec). In case the ACC has not a sufficiently accurate knowledge of the S/C angular rate, it can also decide (through an option of the telecommand) to demand the evaluation of this parameter to the STR itself, but, in this case the accuracy improvement is no longer guaranteed.

It has been proposed to carry out a small PACS pointing calibration program to measure the APE for a set of some 20–30 stars. It is envisaged to do that around OD200.

5 Other pointing calibration activities

5.1 Relative alignment of star trackers

The first (rough) estimate of the misalignment between STR1 and STR2 was performed during the ACMS commissioning early in the CoP. These initial results were confirmed by SPIRE observations carried out in OD82. Nevertheless, the initial STR2/STR1 misalignment quaternion was not uploaded to the onboard ACMS database until OD93. The residual misalignment was measured by Hendrik Linz (PACS ICC/MPIA) by comparing PACS observations on the pointing calibration star HIP 69816 carried out in OD93 (observation IDs 1342182237–9; STR2 prime) and the average offsets measured at similar SAA on 26 pointing calibration stars in OD86 (STR1 prime), using the calibration analysis procedure developed by D. Lutz. The mean offsets measured with respect to the reference pixel were:

$$\begin{aligned}\Delta Y_{STR2} &= -14.57 \text{ arcsec} \\ \Delta Z_{STR2} &= -7.64 \text{ arcsec}\end{aligned}$$

while the mean offsets measured in OD86 were:

$$\begin{aligned}\Delta Y_{STR1} &= -0.52 \text{ arcsec} \\ \Delta Z_{STR1} &= -0.66 \text{ arcsec}\end{aligned}$$

Therefore, the derived offset was:

$$\begin{aligned}\Delta Y_{STR2-STR1} &= -14.05 \text{ arcsec} \\ \Delta Z_{STR2-STR1} &= -6.98 \text{ arcsec}\end{aligned}$$

Thus in order to put the source in the PACS photometer reference pixel when the STR2 is active, the offset to be applied is 14.05 and 6.98 arcsec in the Y and Z axes, respectively. Based on this input, the rotation matrix furnished to FDS for computing the residual misalignment quaternion was derived at the HSC. As per SIAM definition, the representations of a vector \vec{u} in the ACA and instrument (INS) frames are linked by the relation:

$$\vec{u}_{INS} = SIAM \cdot \vec{u}_{ACA}$$

When STR2 is active, and due to the residual uncalibrated misalignment STR2-STR1, we are not in the ACA frame but in the ACA' frame, such as:

$$\vec{u}_{INS} = SIAM' \cdot \vec{u}_{ACA'}$$

A key issue is that the SIAM matrices are not changed by a STR reconfiguration. Otherwise, the currently loaded timelines, and all the already planned schedules would be invalidated if such reconfiguration occurs. Let's define a rotation R such as $\vec{u}_{ACA} = R \cdot \vec{u}_{ACA'}$. Then:



$$\vec{u}_{INS} = SIAM \cdot R \cdot \vec{u}_{ACA'}$$

and therefore $SIAM' = SIAM \cdot R$ or $R = SIAM^T \cdot SIAM'$. The matrix R contains the residual rotation to be applied in order to keep using the same SIAM matrices for both STRs. The required matrices were computed using the SIAM generation tool (v5), yielding:

$$R = \begin{pmatrix} 0.999999997107532 & 6.811600639818942 \times 10^{-5} & 3.383999655152785 \times 10^{-5} \\ -6.81160134077739 \times 10^{-5} & 0.9999999976800829 & 2.0598656353045844 \times 10^{-7} \\ -3.383998244203953 \times 10^{-5} & -2.0829160859347202 \times 10^{-7} & 0.999999999427406 \end{pmatrix}$$

This matrix was furnished to FDS for uploading to the spacecraft.

5.2 Nodding using fine pointing sequences

The repeatability accuracy of nodding operations using sequences of fine pointings (rather than rasters) was tested on OD161 by means of a PACS photometer point source observation with several nods. The data were analysed by B. Altieri (PACS ICS/HSC), finding a slight bi-modal distribution of the pointing centroids separated by about 0.17 arcsec along the nod direction. This behaviour could not be confirmed since no additional observations were performed. Yet overall the 1-sigma (rms) dispersion is ~ 0.2 arcsec per axis and hence the total rms is ~ 0.3 arcsec. This is aligned with the goal result (the RPE), thus confirming that the use of sequences of fine pointings rather than rasters does not noticeably degrade the pointing repeatability.

5.3 Measure of drifts after a STR switch

On OD161, STR dumps took place during the DTCP period. In order to implement the procedure, it was required to reconfigure the STRs (the CCD dump cannot be performed when the STR is active). Eventually, the STR2 was switched-off and the STR1 was left active, so some pointing drift could be expected while the temperature of the STR support baseplate was stabilising. In order to perform a long (10.5 h) pointing drift check, several PACS point source observations were scheduled at the beginning of the operational day, immediately after the orbit prologue. The analysis was performed by H. Link (PACS ICC/MPIA) and the results are compiled in [RD.5]. The main findings are:

- All the 240 measured offsets are always small and never exceed 2 arcsec.
- A weak drift trend is seen in the Y direction . It is smaller than 0.5 arcsec over the entire observing run. Furthermore, the drift seems to weaken more and more as the observations proceed. A real drift trend in the Z direction is not clearly seen.
- At the beginning of the observing run, the standard deviation for Y and Z is relatively high, but settles down during the course of the observations.

A Appendix: SIAM generation tool

The SIAM generation tool is a Jython script that runs in the Jide/Hipe environment allowing to perform a number of actions, including:

1. Create a new SIAM 'product' in FITS format filling all the metadata keywords. For each matrix, input data can be either X, Y, Z positions in the focal plane (in mm) plus frame tilt (deg) or Y, Z positions in the sky (arcsec) plus frame tilt (deg).



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 50

2. Create a new SIAM file in ASCII format (as detailed in the SIAM ICD document). For each matrix, input data can be either X, Y, Z positions in the focal plane (in mm) plus frame tilt (deg) or Y, Z positions in the sky (arcsec) plus frame tilt (deg).
3. Load a SIAM file in ASCII or FITS format, update one or several matrices by applying either (Y, Z) or (RA, DEC) sky offsets and optionally a frame tilt (i.e. rotation around the line of sight) and save the resulting set in ASCII/FITS format.
4. Load a set of sky offsets and frame tilts in ASCII format, create the corresponding matrices and write them in ASCII/FITS format.
5. Concatenate a set of input files in ASCII or FITS format and write a single output file in ASCII/FITS format

The SIAMs are derived as direction cosines matrices by computing the ACA components of the orthonormal basis vectors of the reference frames associated with the different instrument apertures from either the X, Y, Z positions in the focal plane or the Y, Z positions in the sky. Then, the alignment matrices will be computed as:

$$SIAM = \begin{pmatrix} \hat{\mathbf{x}}_{INS} \cdot \hat{\mathbf{x}}_{ACA} & \hat{\mathbf{x}}_{INS} \cdot \hat{\mathbf{y}}_{ACA} & \hat{\mathbf{x}}_{INS} \cdot \hat{\mathbf{z}}_{ACA} \\ \hat{\mathbf{y}}_{INS} \cdot \hat{\mathbf{x}}_{ACA} & \hat{\mathbf{y}}_{INS} \cdot \hat{\mathbf{y}}_{ACA} & \hat{\mathbf{y}}_{INS} \cdot \hat{\mathbf{z}}_{ACA} \\ \hat{\mathbf{z}}_{INS} \cdot \hat{\mathbf{x}}_{ACA} & \hat{\mathbf{z}}_{INS} \cdot \hat{\mathbf{y}}_{ACA} & \hat{\mathbf{z}}_{INS} \cdot \hat{\mathbf{z}}_{ACA} \end{pmatrix} \quad (1)$$

The updates to existing matrices are computed by composing the different update components (i.e. Y, Z or RA, DEC offsets in the sky and a frame tilt), i.e.

$$SIAM_{final} = ROT(tilt) \cdot ROT(\Delta Y, \Delta Z) \cdot SIAM_{orig} \quad (2)$$

where $ROT(tilt)$ is the matrix corresponding to a simple rotation of angle $tilt$ (deg) around the X axis and $ROT(\Delta Y, \Delta Z)$ is computed using the same algorithm as that for the SIAM matrix (i.e. eq. 1.)



HSC

Document No.: HERSCHEL-HSC-DOC-1515
Issue/Rev.: 1.0
Date: November 25, 2009
Page: 51

References

- [AD.1] Herschel Pointing Calibration Plan, HERSCHEL-HSC-DOC-1139, v1.1 (3-April-2009)
- [RD.1] Instruments' apertures and SIAM identifiers, HERSCHEL-HSC-DOC-0715, v1.1 (30-May-2008)
- [RD.2] PACS Pointing Calibration Sources, PICC-MA-TN-003, v1.1 (10-April-2008)
- [RD.3] PACS PV report: RPE in staring mode (PCD/PV plan 2.6.2 B), PICC-ME-TN-031 v1.0 (28-August-2009)
- [RD.4] Herschel/Planck ACMS User Manual, H-P-4-DS-MA-001, v4.4 (12-February-2009)
- [RD.5] PACS PV report: Photometer Point Source Mode: Pointing Drift Check on OD 161 , PICC-MA-TN-009 v1.0 Draft (28-October-2009)