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		H0						Actionees - OM - H SOM - Flight Dynamics - Subssystem - SPACON Engineers (MOC)							
	MET [ddd hh:mm]	Start Event or Date	End Event or Date	Duration [min]	Sat Mode	ACMS Mode	Sub-phase or activity	**OM** **H SOM** **FD** **SPACON**	**CDMS**	**ACMS**	**TTC** **PCS** **TCS** **CCU**	Call Procedures		Source/Ground Station Support	Characteristics/constraints
	H0=Lift Off (EPC Vulcain Engine ignition command)														
line	H0= 29/04/2009 13:24:24			27								Ref	Name		H0-T0=27 min
							This spreadsheet forms the **LEOP timeline** for the Heschel Spacecraft The timeline considers Herschel activities only (no Planck activities). Interactions between Planck and Herschel are limited to pre-agreement on sharing of GS support. Any further potential real-time interaction needs to be managed by the two SOMs								
1					LAM	ST/BY	**Pre-Launch Checks**								
2		H0-2 hour	H0	1 hr			CDMS checks		CDMS Sub-system Check in pre-launch configuration			H_FCP_DHS_LMCK	CDMS Subsystem Checkout	launch pad	parallel activities
3		H0-2 hour	H0				TTC checks				TTC Sub-system Check in pre-launch configuration	H_FCP_TTC_CHECK H_FCP_TTC_TCHK	TTC subsystem checkout	launch pad	
4		H0-2 hour	H0				ACMS checks			ACMS Sub-system Check in pre-launch configuration	ACMS SOE	H_FCP_AOC_CHECK	ACMS health check	launch pad	
5		H0-2 hour	H0				EPS checks				EPS Sub-system Check in pre-launch configuration	H_FCP_EPS_CHECK H_FCP_EPS_TCHK	PCS subsystem checkout	launch pad	
6		H0-2 hour	H0				TCS checks				TCS Sub-system Check in pre-launch configuration	H_FCP_TCS_CHECK	TCS subsystem checkout	launch pad	
7		H0-2 hour	H0				CCU checks				CCU Sub-system Check in pre-launch configuration	H_FCP_CCU_CHECK H_FCP_CCU_TCHK	CCU subsystem checkout	launch pad	
8							CCU checks				Check CCU monitoring period = 8 sec	H_FCP_CCU_MONS	CCU Temperature and Pressure sensors monitoring	launch pad	
9							CCU checks				CCU LV checks	H_FCP_CCU_MONV	CCU Valves Status monitoring	launch pad	
10															
11							**Lift-Off**								
12		**H0**					EPC Vulcain Engine ignition command							KRU	
13				29			time from lift-off to separation								
14							**Separation**								
15		**27 min after lift-off**			LAM	ST/BY	Separation detection by CDMU ASW							Launch Vehicle	Seperation occurs outside GS coverage, i.e. prior to first AOS
16															
17		20 s after seperation			LAM	SAM	ACC transition to SAM							CDMU ASW	Enable ACC WD A relay

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18		20 s after seperation			LAM	SAM	Autonomous TTC configuration	OM (for info)							Configure the XPND transmitter currently active by setting the bit rate (LOW_2), (5kbps), ranging ON, coherent mode ON, TM modulation index 1,2, output power -4dbm, ranging modulation index 0,6,external reference OFF, internal bit pattern generator OFF; Configure the TM Encoder to LOW_2 Bit Rate (5 kbps);
19					LAM	SAM	Switch ON Currently in Use TX	OM (for info)							TX N or R according to SGM context; **performance reached after 10min**
20		20 s after seperation			LAM	SAM	CDMU transition to SAM							CDMU ASW	
21															
22		5 min after separation													End of separation sequence is driven by enabling of AAD alarms
23							**First AOS - NNO**	H SOM: request from OM confirmation of AOS							
24	0:38	38						Ground Stations configuration for first AOS: - Nominal configuration (TM/TC): LOW-2/4k - Safemode configuration: LOW-1/125						G/NNO	Horizon
25	0:39	39												G/NNO	Five degrees elevation
26		39	42	3			Check S/C Separation status	**SOM: Verify correct separation through PAP-6**				H_LEO_SYS_CSEP	Check Separation	G/NNO	
27															
28	0:42	42	47	5	SAM	SAM	**Perform TC link acquisition**	request sweep of uplink							
29															
30	0:47	47	52	5	SAM	SAM	**Perform TC link check**				TTC-S Subsystem Checkout after separation	H_LEO_TTC_LCHK	Verify TTC status at AOS	G/NNO	including TC link test on BSW counter; (no service 17 available yet) Test commands via VC-0 and via VC-1
31															
32	0:52	52	53	1	SAM	SAM	**Ranging activation**	Inform Ground Station that drop in TM could be expected when enabling coherent mode in the next step of the LEOP timeline							
33	0:52	52	54	2	SAM	SAM					Enable Coherent Mode	H_FCP_TTC_TUCM	Transponder in use Coherent Mode Activation/Deactivation	G/NNO	
34	0:54	54	**56**	2							Set ranging transponder ON	H_FCP_TTC_TURM	Transponder in use Ranging Activation/ Deactivation	G/NNO	
35					SAM	SAM		Request Ranging until end of pass						G/NNO	
36					SAM	SAM		Inform FD about start of Ranging						G/NNO	
37															
38	0:56	56	**58**	2	SAM	SAM	**Update UIU for TWT1 status**				Update UIU for TWT1 status	H_LEO_TTC_TWT1	Switch TWT Amp in use ON	G/NNO	
39															
40	0:58	58	**63**	5	SAM	SAM	**Switch to MEDIUM bit rate**				Switch to MEDIUM bit rate on LGA	H_FCP_TTC_TUMR	TX and TM encoder in use configuration for MR	G/NNO	switch to MEDIUM bitrate on LGA

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	MET [ddd hh:mm]	Start Event or Date	End Event or Date	Duration [min]	Sat Mode	ACMS Mode	Sub-phase or activity	**OM** **H SOM** **FD** **SPACON**	**CDMS**	**ACMS**	**TTC** **PCS** **TCS** **CCU**	Call Procedures		Source/Ground Station Support	Characteristics/constraints
41	0:58	**58**			SAM	SAM		change Ground Station configuration to: Nominal configuration MEDIUM/4k							
42															
43	1:03	**63**	68	5	SAM	SAM			Select Packet Downlink for all nominal packets			H_FCP_DHS_1003	Nominal Transmitter Storage Settings	G/NNO	H_FCP_TTC_TUMR calls procedure H_FCP_DHS_1003
44	1:08	68	**73**	5	SAM	SAM			Enable default HK packets			H_FCP_DHS_1009	Enable Default HK Packets	G/NNO	H_SVT_TTC_TUMR calls procedure H_FCP_DHS_1009
45	1:13	73	78	5	SAM	SAM			LEOP connection test (part 2)			H_FCP_DHS_1029	TC Link Test - part 2	G/NNO	BD mode, AD mode, test to ACC
46	1:13	**73**	**78**	5	SAM	SAM	**SPIRE LL switch-off**				SPIRE LL - LPU switch-off	H_LEO_SYS_LL0	Manual LPU Switch-Off	G/NNO	Manual LPU switch-off
47	1:13	**73**	76	3	SAM	SAM	**Switch-on SREM**			Switch-on SREM		H_FCP_RM_ON	SREM Switch-On	G/NNO	SREM switch-on and start of accumulation
48	1:19	79	81	2	SAM	SAM						H_FCP_RM_ACC	SREM Accumulation	G/NNO	
49	1:18	78	83	5	SAM	SAM			Set Nominal Survival Register			H_FCP_DHS_1012	Write Survial Register after Separation	G/NNO	
50									Diasable PAP-6			H_FCP_DHS_4009	Disable PAP6 alarms	G/NNO	
51	1:18	**78**	83	5			**Check Cryo Valves**				Disable CCU monitoring #2	H_LEO_CCU_MON1	Disable periodic CCU packets with period 512s (CCUA/B monit #1)		
52		81	82	1			**Initiate transfer of VMC pictures to Packet Store 1**	SOM: request Software Support to disable alarm for SSC for APID 16 prior to transfer of VMC data from VMC to SSMM							
53	1:21	81	**84**	3	SAM	SAM				Start Transfer of VMC pictures from VMC to SSMM		H_LEO_VMC_OP	Herschel VMC Operations	G/NNO	Part 1 of the Produre to initiate transfer of pictures from VMC to SSMM The transfer of the images from the VMC to the SSMM will take approximately 53 minutes.
54	1:23	83	88	5	SAM	SAM			Dumping BSW TM routing Info array			H_FCP_DHS_1027	Dumping BSW TM routing Info array	G/NNO	file to be acquired for offline processing
55	1:23	83	88	5	SAM	SAM					H: Cryo-valves configuration checks	H_FCP_CCU_MONV	CCU Valves MONITORING	G/NNO	V501, V503, V103, V106 (only the valve status shall be checked; no full check procedure shall be done, relying on the implementation of limit checks and CCO)
56	1:24	**84**	124	40	SAM	SAM	**ACMS checkout**			Attitude check		H_FCP_AOC_3000	ACMS health check	G/NNO	
57					SAM	SAM				H: GYR status check included GYR,SAS,CRS,STR1 health check			H_FCP_AOC_5007, H_FCP_AOC_5008, H_FCP_AOC_5009, H_FCP_AOC_5010, H_FCP_AOC_5011, H_FCP_AOC_5012, H_FCP_AOC_5013, H_FCP_AOC_5014	G/NNO	Verify all attitude checks in SAM are satisfied
58	1:28	88	**93**	5	SAM	SAM			Confirm active HK packets			H_FCP_DHS_3033	Enable or disable the generation of an housekeeping or diagnostic packet	G/NNO	step 1 of procedure H_FCP_DHS_3033
59	1:28	88	93	5	SAM	SAM					CCU checks	H_FCP_CCU_CHECK	CCU subsystem checkout		
60	1:33	93	**98**	5	SAM	SAM					CCU checks	H_FCP_CCU_MONS	CCU Temperature and Pressure sensors monitoring		
61	1:33	**93**	128	35	SAM	SAM	**CDMS checkout**		CDMS checks			H_FCP_DHS_SACK	Check Acquisition Mode configuration	G/NNO	
62	1:38	**98**	**118**	20	SAM	SAM	**TTC checkout**				TTC checks	H_FCP_TTC_CHECK H_FCP_TTC_TCHK	TTC subsystem checkout	G/NNO	complete TTC check

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	MET [ddd hh:mm]	Start Event or Date	End Event or Date	Duration [min]	Sat Mode	ACMS Mode	Sub-phase or activity	**OM** **H SOM** **FD** **SPACON**	**CDMS**	**ACMS**	**TTC** **PCS** **TCS** **CCU**	Call Procedures		Source/Ground Station Support	Characteristics/constraints
63	1:58	**118**	138	20	SAM	SAM	**PCS checkout**				PCS checks	H_FCP_EPS_CHECK H_FCP_EPS_TCHK	PCS subsystem checkout	G/NNO	specifically battery status
64	2:04	124	**129**	5						Enable DTM for OBDB dump		H_FCP_AOC_DODD		G/NNO	
65	2:08	128	**133**	5	SAM	SAM			Verify/wait for good time correlation on MCS			N/A	N/A	G/NNO	
66	2:09	**129**	**129**							inform FD about OBDB coming in					
67	2:09	**129**	144	15	SAM	SAM	**Switch-on STR**			Switch-on STR		H_FCP_AOC_4S01	Declare STR Operational	G/NNO	**Note1:** The STR is switched on as soon as possible after the ACSM health checks in order to allow FD to improve the attitude knowledge. **Note2:** depending on the launch date and time the H STR operations may be impacted by moon-blinding. This is not predictable (since in SAM the attitude around the S/C z-axis is under rate control only.
68	2:17	**137**	147	10	SAM	SAM	**TC to transfer VMC packets to ground and switch OFF the VMC**		Transfer VMC images			H_LEO_VMC_OP	Herschel VMC Operations	G/NNO	Part 2 of the procedure to downlink VMC images from SSMM to ground and then to switch-off the VMC
69	2:18	138	143	5	SAM	SAM	**Switch On LCL's of RWS**				Proc Wheel LCL ON	H_LEO_EPS_RW1	Switch ON of 4 LCL dedidated to RWL	G/NNO	H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad)
70	2:23	143	163	20	SAM	SAM	**TCS checkout**				TCS checks	H_FCP_TCS_CHECK	TCS subsystem checkout	G/NNO	specifically S/C temperatures
71	2:24	144	149	5						Enable DTM for STR data for FD		H_FCP_AOC_D3FD	Define/Enable/Disable DTM for FD		
72	2:24	144	**145**	1	SAM	SAM		STR is now on and DTM for SPID 18018109 is enabled		Inform FD about STR switch-on and DTM for SPID 18018109				G/NNO	
73	2:27	147	**148**	1	SAM	SAM			1) Inform Software Support about arrival of VMC packets and request processing of TM and delivery of raw image files; 2) request Software Support to re-enable alarm for SSC for APID 16					G/NNO	**Note**: switch-off of VMC only after confirmation of Software Support on successful processing of VMC TM.
74	2:28	**148**	**163**	15	SAM	SAM	**Enable MTL**		Start the MTL function			FCP_DHS_1026	Start MTL function during LEOP	G/NNO	
75	2:43	**163**	173	10			**Configure RFDN SWs to select MGA on RX-2 via MTL**				RFDN switching	H_LEO_TTC_MGAR	Switch RX2 to MGA		dedicated LEOP procedure loads the initial antenna configuration into the MTL as a safe configuration in addition to the requested antenna configuration.
76	2:52	**172**	177	5							Select Rx2 bit rate to 125 bits/s	H_FCP_TTC_R2BR	Select Rx2 TC bit rate		
77	2:57	**177**	182	5			**Dump defined HKID**		Dump the defined HKID from SGM			H_FCP_DHS_1028	Dump the defined HKID from SGM	G/NNO	for OBSM off-line analysis

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78	3:27	**207**	**212**	5	SAM	SAM	**Verify End Of Charge**				Verify end of battery charge and transfer to SA power	H_LEO_EPS_BATF	Verify end of battery charge	G/NNO	condition for charged batteries: Vbatt > 25.32 V (99% full) expected ~3 hours after separation
79															
80	3:47	**227**	**237**	10				The lines in question are: CRS1 > 43ºC CRS2 > 43ºC STR1 PB > 11 & < 30ºC STRs < 30ºC STR2 PB > 11 & < 30ºC GYRO > 55ºC FHWOV < 12ºC FHHRV > 19 & < 25ºC FHWOH < 11ºC FHHRH > 25 & < 31ºC RCS 16 > 20ºC RCS5 > 12ºC RCS45 > 11ºC RCS47 > 20ºC RCS21 > 11ºC RCS24 > 11ºC RCS29 > 10ºC PT>11			Restore FCCT parameters in flight	H_LEO_TCS_FCCF	Restore FCCT parameters in flight	G/NNO	Note: the procedure is called to start monitoring of the loops in question; the actual update of the on-board tables to enable the FDIR shall only be done when the temperature level of the related average temperature TM parameter is within the FDIR nominal range; this activity may span into the Commissioning Phase.
81															
82								**Note: the remaining time of the NNO pass, the CEB pass and KRU passes are dedicated to ranging activities and to preparation of the first delta-V**							
83															
84							**STATION HAND-OVER: NNO to CEB**	After confirmation from SOM, release ground station							
85	7:07	427												G/NNO	
86		H0+7h07m													Note: release of NNO anticipated (i.e. well in time before physical visibility period ends) in order to allow more time for ranging on CEB. (Physical end of visibility for NNO: 29/04/2009 21:21:24 H0+07:57
87															
88							**STATION HAND-OVER: NNO to CEB**	H SOM: request from OM confirmation of AOS							
89	7:07	427						Ground Stations configuration for first AOS: - Nominal configuration (TM/TC): MEDIUM/4k - Safemode configuration: LOW-1/125						G/CEB	
90		H0+7h07m													
91															
92	7:07	427	432	5	SAM	SAM	**Perform TC link acquisition**	request sweep of uplink						G/CEB	

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93	7:12	432	437	5	SAM	SAM		Request Ranging until end of pass						G/CEB	
94															
95	7:17	437	442	5	SAM	SAM	TTC-S Subsystem Checkout at AOS				TTC checks	H_LEO_TTC_LCHK	Verify TTC status at AOS	G/CEB	
96	7:22	442	447	5	SAM	SAM	LEOP connection test (part 2)		Test command			H_FCP_DHS_1029	TC Link Test - part 2	G/CEB	BD mode, AD mode, test to ACC
97															
98							**STATION HAND-OVER: CEB to KRU**	After confirmation from SOM, release ground station						G/CEB	
99															
100							**STATION HAND-OVER: CEB to KRU**	H SOM: request from OM confirmation of AOS							
101	8:09	489						Ground Stations configuration: - Nominal configuration (TM/TC): MEDIUM/4k - Safemode configuration: LOW-1/125						G/KRU	Horizon 29/04/2009 21:33:23
102	8:20	500												G/KRU	Five degrees elevation 29/04/2009 21:44:38
103															
104	8:22	502	507	5	SAM	SAM	**Perform TC link acquisition**	request sweep of uplink							
105															
106	8:27	507	512	5	SAM	SAM	TTC-S Subsystem Checkout at AOS				TTC checks	H_LEO_TTC_LCHK	Verify TTC status at AOS	G/KRU	
107	8:32	512	517	5	SAM	SAM	LEOP connection test (part 2)		Test command			H_FCP_DHS_1029	TC Link Test - part 2	G/KRU	BD mode, AD mode, test to ACC
108															
109					SAM	SAM		Request Ranging until end of pass						G/KRU	
110					SAM	SAM		Inform FD about start of Ranging						G/KRU	
111															
112	9:00	**540**	570	30			**Shift Handover Team-A to Team-B**	Shift hand-over						G/KRU	
113		**H0+9h00m**													29/04/2009 22:24
114															
115							**Share KRU with Planck S/C**	After confirmation from SOM, release ground station							
116		1022 H0+17h02m												G/KRU	30/04/2009 06:26
117															
118		1022					**Start of sharing KRU ground station between Herschel and Planck**								30/04/2009 06:26
119															
120							**Note: LOS KRU at H0+1022 does not correspond to end of physical visibility period of KRU ground station, but is determined by the end of the physical visibility period of the MAS ground station which was used by the Planck S/C.**								

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121							**From now on until end of physical visiblity period of KRU, the KRU ground station shall be shared between Herschel and Planck, allocating passes of 1 hour duration in turns.**								
122															
123							**For all KRU passes assigned to Herschel until H0+1201 perform the following steps:**								
124															
125															
126							**Share KRU with Planck S/C**	H SOM: request from OM confirmation of AOS							
127								Ground Stations configuration: - Nominal configuration (TM/TC): MEDIUM/4k - Safemode configuration: LOW-1/125						G/KRU	
128															
129		start of pass	start of pass + 5min	5	SAM	SAM	**Perform TC link acquisition**	request sweep of uplink							
130															
131		start of pass + 5min	start of pass + 10 min	5	SAM	SAM					TTC-S Subsystem Checkout at AOS	H_LEO_TTC_LCHK	Verify TTC status at AOS	G/KRU	
132		start of pass + 5min	start of pass + 10 min	5	SAM	SAM			Test command			H_FCP_DHS_1029	TC Link Test - part 2	G/KRU	BD mode, AD mode, test to ACC
133															
134					SAM	SAM		Request Ranging until end of pass						G/KRU	
135					SAM	SAM		Inform FD about start of Ranging						G/KRU	
136															
137		start of pass + 5min	start of pass + 6 min	1	SAM	SAM	**Apply TCO fixed gradient to commanding**	SPACON to apply fixed TCO gradient on TMSPACON in TCO TAB						G/KRU	
138															
139		start of pass + 6 min		variable					Dump CEL and SSMM packet stores			H_FCP_DHS_1014	Dump of CEL and SSMM packet stores	G/KRU	
140		start of pass + 6 min		15 minutes					On board tables and config check			H_FCP_DHS_1030	CDMU OBSW data acquisition	G/KRU	
141															
142							**Share KRU with Planck S/C**	After confirmation from SOM, release ground station							
143		start of pass + 1 hour												G/KRU	
144															
145	19:46	1186					**End of physical visibility period of KRU**								Five degrees elevation 30/04/2009 09:10:36
146		H0+19h46m													

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147															
148	19:46	1186					**Stop of sharing KRU ground station between Herschel and Planck**								
149		H0+19h46m													
150															
151	20:00	**1200**	1230	30			**Shift Handover Team-B to Team-A**	Shift hand-over							30/04/2009 09:24
152		**H0+20h00m**													
153															
154							**AOS - NNO**	H SOM: request from OM confirmation of AOS							
155	21:00	1260						Ground Stations configuration: - Nominal configuration (TM/TC): MEDIUM/4k - Safemode configuration: LOW-1/125						G/NNO	Horizon 30/04/2009 10:25:15
156	21:24	1284												G/NNO	Five degrees elevation 30/04/2009 10:49:01
157															
158	21:29	1289	1294	5	SAM	SAM	**Perform TC link acquisition**	request sweep of uplink						G/NNO	
159															
160	21:34	1294	**1299**	5	SAM	SAM					TTC-S Subsystem Checkout at AOS	H_LEO_TTC_LCHK	Verify TTC status at AOS	G/NNO	
161	21:39	1299	**1304**	5	SAM	SAM			Test command			H_FCP_DHS_1029	TC Link Test - part 2	G/NNO	BD mode, AD mode, test to ACC
162															
163					SAM	SAM		Request Ranging until end of pass						G/NNO	
164					SAM	SAM		Inform FD about start of Ranging						G/NNO	
165															
166	21:44	1304	1305	1	SAM	SAM	**Apply TCO fixed gradient to commanding**	SPACON to apply fixed TCO gradient on TMSPACON in TCO TAB							
167															
168	21:44	1304		variable					Dump CEL and SSMM packet stores			H_FCP_DHS_1014	Dump of CEL and SSMM packet stores	G/KRU	
169	21:44	1304		15 minutes					On board tables and config check			H_FCP_DHS_1030	CDMU OBSW data acquisition	G/KRU	
170															
171	21:44	**1304**	**1344**	40	SAM	SAM	**Prepare Delta-V**			**Switch on all cat bed heaters for RCS A (Nominal for A1, A2, C1, C2, C3, C4)**		H_FCP_AOC_5CBH	Switch-on cat bed heaters	G/NNO	Note: cat bed heaters shall be on for at least 40 minutes prior to manouevre; the cat bed heaters can stay on permanently after initial switch-on
172							**Delta-V to remove Launcher Dispersion**								

		H0						Actionees - OM - H SOM - Flight Dynamics - Subssystem - SPACON Engineers (MOC)							
	MET [ddd hh:mm]	Start Event or Date	End Event or Date	Duration [min]	Sat Mode	ACMS Mode	Sub-phase or activity	**OM** **H SOM** **FD** **SPACON**	**CDMS**	**ACMS**	**TTC** **PCS** **TCS** **CCU**	Call Procedures		Source/Ground Station Support	Characteristics/constraints
173							**Note:** the manoeuver to compensate for the launcher dispersion may need to be split in two parts depending on the size of the required manoouvre. If > 30 m/s, then the manouvre is to be split and a gap of 30 minutes to allow the update of the Torque Matrix is to be inserted. In case the manoeuvre is < 30 m/s, then the update of the Torque Matrix can be don after the manoeuvre. The size of the required manoeuvre will only be known after the results of the initial orbit determination. The subsequent timeline is suitable for both cases, i.e. it can be used in case on ly one manoeuvre is needed, but also in case two parts need to be accomodated.									
174	21:44	**1304**	**1305**	1			**Request TPFs from FD**			Request TPFs as listed below from FD				G/NNO	
175								In case only one Delta-V is needed, the following TPF files are requireed from FD: **"SEE-1"** **"OFP-1"** (to slew to delta-V attitude) **"DVH-1"** (first [part of] delta-V) **"TLP"** (to update the SAM/OCM Torque Matrix after delta-V							TPFs: **SEE** **OFP** (for delta-V attitude) **DVH** **TLP** (for Torque Matrix update)
176								In case the Delta-V needs to be split in two parts (i.e. overal size >30 ms), the following additional TPFs are required for the second part of the Manoeuvre: **"DVH-2"** (2nd part of manoeuvre; same attitude as "DVH-1"							additional TPFs needed: **DVH**
177					SAM	SAM		S/C inertial attitude determination						G/NNO	Extra STR check
178					SAM	SAM		Inertial Sun vector determination						G/NNO	From STR attitude data
179					SAM	SAM		Inertial Earth vector determination						G/NNO	From STR attitude data
180					SAM	SAM		S/C velocity vector determination						G/NNO	From STR attitude data
181					SAM	SAM		Send TC parameters for the OCM						G/NNO	Based on data of first 3.5h
182															
183							**First part of the launcher dispersion compensation manoeuvre**								

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	MET [ddd hh:mm]	Start Event or Date	End Event or Date	Duration [min]	Sat Mode	ACMS Mode	Sub-phase or activity	**OM** **H SOM** **FD** **SPACON**	**CDMS**	**ACMS**	**TTC** **PCS** **TCS** **CCU**	Call Procedures		Source/Ground Station Support	Characteristics/constraints
184	22:19	**1339**	**1344**	5	SAM	SAM				Restore default OBDB settings just prior to first delta-V		H_FCP_AOC_D5DF	Restore default OBDB for first dV	G/NNO	
185				1			**ACC transition to OCM in preparation for first delta-V**			**Check that TPFs are available**				G/NNO	TPFs: **"SEE-1"** **"OFP-1"** (for delta-V attitude) **"DVH-1"** need to be available from FD.
186	22:24	**1344**	**1424**	80	SAM	SAM				General ACMS health Check Check off event buffer load epheremis update RCS Cmd Slew for deltaV target Delta-V		H_FCP_AOC_3O02	Entry into OCM for the first delta-V	G/NNO	step calling H_FCP_AOC_4S01 is redundant with step in line 87 above.
187	22:44	**1364**	**1374**	10	SAM	SAM	called by H_FCP_AOC_3O02			Update Sun-Earth-Ephemerides		H_FCP_AOC_3M03	Update Sun-Earth-Ephemerides	G/NNO	using TPF "SEE-1"
188	22:54	**1374**	**1404**	30	SAM	SAM				Slew to Delta-V attitude in OCM		H_FCP_AOC_0OCM	Procedure for Pointing in OCM	G/NNO	using TPFs "OFP-1"; 30 minutes is reserved in this timeline for maximum slew distance
189							**Delta V**								
190	23:24	**1404**			SAM	OCM	called by H_FCP_AOC_3O02			Perform delta-V		H_FCP_AOC_3O01	Perform delta-V	G/NNO	using TPF "DVH-1" for delta-v execution
191															
192			**T(end of first delta-V)=T1**				**End of first part of the launcher dispersion compensation manoeuvre**								
193															
194		**T1**	**T1+15**	30	SAM	OCM	**Update of SAM/OCM Torque Matrix and RM flag to index the Torque Matrix in SASM**			Update Torque Matrix for OCM-SAM and update index for Torque Matrix for SASM		H_FCP_AOC_D5SM	Set Survival Mode Thrust Level		TPF to be used: TLP Note: procedure H_FCP_AOC_D5SM updates the RCS thrust related control parameters in OBDB as well as the SM thrust control loevel pointer in the RMs
195															
196							**Note:** Depending on need to split the first delta-V (total manooevre > 30 m/s) the following steps as per line x to y are conditional	FD to provide TPF for second part of manouevre							additional TPF needed: **"DVH-2"**
197															
198		T1+30	**T(end of second delta-V)=T2**		SAM	OCM	**Second part of the launcher dispersion compensation manoeuvre**			Perform delta-V		H_FCP_AOC_3O01	Perform delta-V	G/NNO	note: procedure will comprise: (i) delta-V (TPF="DVH-2")
199															

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	MET [ddd hh:mm]	Start Event or Date	End Event or Date	Duration [min]	Sat Mode	ACMS Mode	Sub-phase or activity	**OM** **H SOM** **FD** **SPACON**	**CDMS**	**ACMS**	**TTC** **PCS** **TCS** **CCU**	Call Procedures		Source/Ground Station Support	Characteristics/constraints
200		**T(end of second delta-V)=T2**					**End of second part of the launcher dispersion compensation manoeuvre**								
201															
202		T2	T2+20	20			**Slew to safe attitude in OCM**	FD to provide TPF for OCM. In preparation for the RWL run-in in OCM, the attitude need to satisfy the constraints for the updated gains for OCM control used during the run-in as outlined in H-P-4-MA-007 issue 2/5 page 134 , i.e. at least 3 deg margin with the edge of the operational zone.							TPF: **"OFP-2"** (for safe RWL run in attitude).
203		**T2**	T2+20	20	SAM	OCM				Slew to safe attitude for RWL run-in in OCM		H_FCP_AOC_0OCM	Perform pointing in OCM		TPF to be used: OFP-2
204															
205								FD to provide TPFs for RWL run-in							TPFs: **"RWL-1"** to set the RWL speeds to an adequate value for the run-in **"RWL-2"** to set the RWL speeds to an adequate value for transition from OCM to SCM **"SFP-1"** (static transition from OCM to SCM - no slew)
206		T2+20	T2+320	300	SAM	OCM				Procedure for Entry into Herschel SCM for the first time		H_FCP_AOC_3S07	Entry into Herschel SCM for the first time after PM start/reset	G/NNO	note: procedure H_FCP_AOC_3S07 start in OCM, calls in subsequent steps the procedures to run-in the RWL in OCM and ends finally in the transition to SCM
207															
208		T2+30	T2+45	10	SAM	OCM	switch-on RWL called by H_FCP_AOC_3S07	procedure called by H_FCP_AOC_3S07		prepare RWLs and OCM for RWL run-in		H_FCP_AOC_4R14	Declare RWL assembly operational	G/NNO	- Switch-on RWLs -modify RCS control parameters for run-in - run-in RWLs
209		T2+45	T2+55	10	SAM	OCM	called by H_FCP_AOC_4R14	procedure called by H_FCP_AOC_4R14		bias RWLs		H_FCP_AOC_4R34	Perform RWL bias in OCM	G/NNO	using TPF "RWL-1" Objective is to run-in the RWLs until one of three criteria is met: - run-in duration > 4 hours - 1 kg fuel consumed - RWLs are below stiction threshold
210		T2+55	T2+295	240				SOM: verfify with PROJECT support, FD and ACMS engineer the monitoring of the RWL run-in and wait until one of the three conditions is met: - run-in duration > 4 hours - 1 kg fuel consumed - RWLs are below stiction threshold		- monitor RWL run-in in OCM - stop BIASING in OCM - restore RCS control parameters		H_FCP_AOC_4R14 as of step 14	Declare RWL assembly operational		

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	MET [ddd hh:mm]	Start Event or Date	End Event or Date	Duration [min]	Sat Mode	ACMS Mode	Sub-phase or activity	**OM** **H SOM** **FD** **SPACON**	**CDMS**	**ACMS**	**TTC** **PCS** **TCS** **CCU**	Call Procedures		Source/Ground Station Support	Characteristics/constraints
211															
212		T2+295	T2+305	10	SAM	OCM	called by H_FCP_AOC_4R14	procedure called by H_FCP_AOC_4R14		bias RWLs **- TBC**		H_FCP_AOC_4R34	Perform RWL bias in OCM	G/NNO	using TPF "RWL-2" Objective is to bring the RWL speeds from the high run-in speeds to an adequate level for entry into SCM **-TBC**
213		T2+305	T2+310	5						Set ACMS to AFO		H_FCP_AOC	Herschel ACMS : Set ACMS FDIR Mode		
214		T2+310	T2+320	10	SAM	SCM	called by H_FCP_AOC_3S07	procedure called by H_FCP_AOC_3S07		transition to SCM		H_FCP_AOC_3S01	Perform SCM Fine Pointing	G/NNO	static transition (same as OCM attitude) using TPF "SFP-1"
215		T2+320	T2+335	15	SAM	SCM				Verify SCM Configuration		H_FCP_AOC_3001	Verify SCM Configuration	G/NNO	
216								FD to provide TPF for RWL biasing in SCM in order to compensate for rates accumulated in OCM							TPF: **"RWB-1"** to compensate for rates accumulated in OCM
217		T2+335	T2+345	10	SAM	SCM	RWL Biasing is called by (and therfore part of) procedure H_FCP_AOC_3S07			Perform RWS Biasing		H_FCP_AOC_4R20	Perform RWS Biasing	G/NNO	Objective to compensate for the rates accumulated in OCM and to come to bias adequate for upcoming activities using "TPF RWB-1"
218															
219								FD to provide TPFs in order to slew to an adequate attitude which is attitude constraint free for the maximum time possible. Verified by FD whether a RWL bias is necessary to accommodate this slew.							TPFs needed: "RWB-2" "SFP-2"
220		T2+345	T2+355	10	SAM	SCM						H_FCP_AOC_4R20	Perform RWS Biasing	G/NNO	using TPF "RWB-2"; potentially redundandant with TPF RWB-1 above.
221		T2+355	T2+400	45	SAM	SCM						H_FCP_AOC_3S01	Perform SCM Fine Pointing	G/NNO	using TPF "SFP-2"
222															

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	MET [ddd hh:mm]	Start Event or Date	End Event or Date	Duration [min]	Sat Mode	ACMS Mode	Sub-phase or activity	**OM** **H SOM** **FD** **SPACON**	**CDMS**	**ACMS**	**TTC** **PCS** **TCS** **CCU**	Call Procedures		Source/Ground Station Support	Characteristics/constraints
223								SOM to clarify with PROJECT support, Flight Dynamics and the ACMS engineer wether the RWL run-in coul d be completed during 4 hours in OCM. In case the run-in needed to be truncated due to 4 hours exspiring or more than 1 kg fuel consumed, the RWL run shall continue in SCM. In order to achive a good RWL run-in and to keep the RWLs at high speed, regular RWL biasing commands in SCM need to be performed, conditional on FD monitoring of distrubance torques and RWL speeds. RWL run-in may need up to 32 hours, subject to close monitoring by PROJECT Support to determine when end conditions are met.							
224		T2+400	T2+420	20	SAM	SCM				Bias RWLs to high speeds for run-in		H_FCP_AOC_4R20	Perform RWS Biasing	G/NNO	
225										From T2+420 min until end of pass RWL run-in perform as follows: - contact FD and verify if and when a RWL bias to compensate distrubance torques and keep RWLs on high speed is necessay - get TPF "RWB"					
226								In case the RWL run-in has been completed, FD shall provide RWL bias commands to an adequate level in order to compensate for the external disturbance torques (big He nozzle) on a regular basis (every x hours, depending on the size of the observed disturbance torques)							
227															
228		when applicable		10	SAM	SCM				apply RWL bias		H_FCP_AOC_4R20	Perform RWS Biasing	G/NNO	
229										repeat until end of pass					
230															
231		**H0+32h00m**		30			**Shift Handover Team-A to Team-B**							G/NNO	**17/04/2009 21:34**
232															

		H0						Actionees - OM - H SOM - Flight Dynamics - Subssystem - SPACON Engineers (MOC)							
	MET [ddd hh:mm]	Start Event or Date	End Event or Date	Duration [min]	Sat Mode	ACMS Mode	Sub-phase or activity	**OM** **H SOM** **FD** **SPACON**	**CDMS**	**ACMS**	**TTC** **PCS** **TCS** **CCU**	Call Procedures		Source/Ground Station Support	Characteristics/constraints
233										Until end of pass RWL run-in perform as follows: - contact FD and verify if and when a RWL bias to compensate distrubance torques and keep RWLs on high speed is necessay - get TPF "RWB"					
234		when applicable		10	SAM	SCM				apply RWL bias		H_FCP_AOC_4R20	Perform RWS Biasing	G/NNO	
235										repeat until end of pass					
236															
237		1955 H0+32h35m					**STATION HAND-OVER: NNO to CEB**	**After confirmation from SOM, release ground station**							17/04/2009 22:09:00 Note: release of NNO anticipated (i.e. in time before physical visibility period ends) in order to facilitate smooth station hand-over to CEB. Physical end of visibility for NNO:
238														G/NNO	Five degrees elevation 30/04/2009 22:15:02
239														G/NNO	Horizon 30/04/2009 22:15:02
240															
241							**STATION HAND-OVER: NNO to CEB**	H SOM: request from OM confirmation of AOS							**30/04/2009 22:00**
242		1955 H0+32h35m						Ground Stations configuration: - Nominal configuration (TM/TC): MEDIUM/4k - Safemode configuration: LOW-1/125						G/CEB	Note: physical AOS for CEB was at: Horizon: 30/04/2009 19:09:52 Five degrees elevation: 30/04/2009 19:22:28
243															
244	32:37	1957	1962	5	SAM	SCM	**Perform TC link acquisition**	request sweep of uplink						G/CEB	
245															
246	32:42	1962	1967	5	SAM	SCM	TTC-S Subsystem Checkout at AOS				TTC checks	H_LEO_TTC_LCHK	Verify TTC status at AOS	G/CEB	
247	32:47	1967	1972	5	SAM	SCM	LEOP connection test (part 2)		Test command			H_FCP_DHS_1029	TC Link Test - part 2	G/CEB	BD mode, AD mode, test to ACC
248															
249					SAM	SCM		Request Ranging until end of pass						G/CEB	
250					SAM	SCM		Inform FD about start of Ranging						G/CEB	
251															
252	32:57	1977	1978	1	SAM	SCM	**Apply TCO fixed gradient to commanding**	SPACON to apply fixed TCO gradient on TMSPACON in TCO TAB							
253															

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	MET [ddd hh:mm]	Start Event or Date	End Event or Date	Duration [min]	Sat Mode	ACMS Mode	Sub-phase or activity	**OM** **H SOM** **FD** **SPACON**	**CDMS**	**ACMS**	**TTC** **PCS** **TCS** **CCU**	Call Procedures		Source/Ground Station Support	Characteristics/constraints
254										On regular basis, until end of RWL run-in, proceed as follows: - contact FD and verify if and when a RWL bias to compensate distrubance torques and keep RWLs on high speed is necessay - get TPF "RWB"					
255		when applicable		10	SAM	SCM				apply RWL bias		H_FCP_AOC_4R20	Perform RWS Biasing	G/CEB	
256										repeat until end of pass				G/CEB	
257															
258							**LOS - CEB**	After confirmation from SOM, release ground station							**01/05/2009 05:58:41 physical LOS CEB**
259	40:34	2434												G/CEB	
260		H0+40h34m													
261															
262		**H0+44h00m**		30			**Shift Handover Team-B to Team-A**	Shift hand-over							**01/05/2009 09:24**

players:

Orange	CDMS engineer	S.Manganelli
Green	TTC/EPS/CCU engineer	E. Picallo
Blue	ACMS engineer/ System Engineer Activities (SREM &VMC)	D. Salt
Grey	SOM	M.Schmidt
Red	OM/SOM interaction	
Purple	FD/SOM/SOE interaction	
Yellow	SPACON	