|  | LEOP version 2                  | 2.5 - HERS  | CHEL LFO         | P MASTFI          | R PROC      | EDURF |   |                                |                     |   |   |  |  |   |  |
|--|---------------------------------|---|------------------|-------------------|-------------|-------|---|--------------------------------|---------------------|---|---|--|--|---|--|
| Πİ   |                                 | H0  | 1                | 1                 |             |       |   | Actionees                      |                     |   |   |  |  |   |  |
|  |                                 |   |                  | 1                 | 1           | 1     |   | - OM                           |                     |   |   |  |  |   |  |
|  |                                 |   |                  |                   |             |       |   | - H SOM                        |                     |   |   |  |  |   |  |
|  |                                 | l   |                  | l                 |             | 1     |   | Flight Dynamics     Subssystem |                     |   |   |  |  |   |  |
|  |                                 | l   |                  | l                 |             | 1     |   | - SPACON                       |                     |   |   |  |  |   |  |
|  |                                 |   |                  |                   |             |       |   | Engineers (MOC)                |                     |   |   |  |  |   |  |
| l I  | MET                             | Start   | End              | Duration<br>[min] | Sat<br>Mode | ACMS  |   | OM                             | CDMS                | ACMS  | TTC   | Call Procedures  |  | Source/Ground   | Characteristics/constraints  |
|  | [ddd hh:mm]                     | Event or<br>Date                                  | Event or<br>Date | [min]             | Mode        | Mode  |   | H SOM<br>FD                    |                     |   | PCS<br>TCS  |  |  | Station Support   |  |
|  |                                 | Date  | Date             | l                 | l           |       |   | SPACON                         |                     |   | CCU   |  |  |   |  |
| Į.   | H0=Lift Off                     |   |                  |                   |             |       |   |                                |                     |   |   |  |  | ĺ   |  |
|  | (EPC Vulcain<br>Engine ignition | l   |                  | l                 |             | 1     |   |                                |                     |   |   |  |  |   |  |
| 0  | command)                        |   |                  |                   |             |       |   |                                |                     |   |   |  |  |   |  |
|  | H0=                             | 1   |                  | 27                | 1           | 1     |   |                                |                     |   |   | Ref  | Name   |   | H0-T0=27 min   |
|  | 29/04/2009<br>13:24:24          |   |                  |                   |             |       |   |                                |                     |   |   |  |  |   |  |
| $\vdash$   | T                               | 1   |                  | 1                 | <b>-</b>    |       |   |                                | 1                   |   | 1   |  |  | l .   | 1  |
|  |                                 |   |                  |                   |             |       | This spreadsheet forms the  |                                |                     |   |   |  |  |   |  |
|  |                                 |   |                  | 1                 | 1           | 1     | LEOP timeline for the   |                                |                     |   |   |  |  |   |  |
|  |                                 | l   |                  | l                 |             | 1     | Heschel Spacecraft<br>The timeline considers  |                                |                     |   |   |  |  |   |  |
|  |                                 |   |                  | l                 | l           |       | Herschel activities only (no  |                                |                     |   |   |  |  |   |  |
|  |                                 | l   |                  | l                 |             | 1     | Planck activities).   |                                |                     |   |   |  |  |   |  |
|  |                                 |   |                  | l                 | l           |       | Interactions between  |                                |                     |   |   |  |  |   |  |
|  |                                 |   |                  | l                 | l           |       | Planck and Herschel are<br>limited to pre-agreement   |                                |                     |   |   |  |  |   |  |
|  |                                 |   |                  | 1                 | 1           | 1     | on sharing of GS support.   |                                |                     |   |   |  |  |   |  |
|  |                                 |   |                  | l                 | l           |       | Any further potential real-   |                                |                     |   |   |  |  |   |  |
|  |                                 |   |                  |                   |             |       | time interaction needs to   |                                |                     |   |   |  |  |   |  |
|  |                                 | l   |                  | l                 |             | 1     | be managed by the two<br>SOMs   |                                |                     |   |   |  |  |   |  |
|  |                                 | l   |                  | l                 |             | I     | SOIVIS  | ĺ                              | 1                   |   | 1   | I  |  | 1   |  |
|  |                                 |   |                  |                   |             |       |   |                                |                     |   |   |  |  |   |  |
| $oxed{oxed}$   |                                 |   |                  |                   |             |       |   |                                |                     |   |   |  |  |   |  |
| 1  |                                 |   |                  |                   | LAM         | ST/BV | Pre-l aunch Checks  |                                |                     |   |   |  |  |   |  |
| 1 2  |                                 | H0-2 hour   | H0               |                   | LAM         | ST/BY | Pre-Launch Checks CDMS checks   |                                | CDMS Sub-system     |   |   | H_FCP_DHS_LMCK   | CDMS Subsystem Checkout  | launch pad  |  |
|  |                                 | H0-2 hour   | НО               |                   | LAM         | ST/BY | Pre-Launch Checks CDMS checks   |                                | Check in pre-launch |   |   | H_FCP_DHS_LMCK   | CDMS Subsystem Checkout  | launch pad  |  |
| 2  |                                 |   |                  |                   | LAM         | ST/BY | CDMS checks   |                                |                     |   | Tro Och water C   |  | ·  | ,   |  |
|  |                                 | H0-2 hour   |                  |                   | LAM         | ST/BY | Pre-Launch Checks CDMS checks TTC checks  |                                | Check in pre-launch |   | TTC Sub-system Check  | H_FCP_TTC_CHECK  | CDMS Subsystem Checkout  | launch pad  |  |
| 2  |                                 | H0-2 hour   | НО               |                   | LAM         | ST/BY | CDMS checks TTC checks  |                                | Check in pre-launch |   | in pre-launch<br>configuration  | H_FCP_TTC_CHECK<br>H_FCP_TTC_TCHK  | TTC subsystem checkout   | ,   |  |
| 2  |                                 |   | НО               |                   | LAM         | ST/BY | CDMS checks   |                                | Check in pre-launch | ACMS Sub-system   | TTC Sub-system Check<br>in pre-launch<br>configuration<br>ACMS SOE  | H_FCP_TTC_CHECK  | TTC subsystem checkout   | ,   |  |
| 3  |                                 | H0-2 hour   | НО               |                   | LAM         | ST/BY | CDMS checks TTC checks  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch<br>configuration  | H_FCP_TTC_CHECK<br>H_FCP_TTC_TCHK  | TTC subsystem checkout   | launch pad  |  |
| 3  |                                 | H0-2 hour   | H0<br>H0         |                   | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  |                                | Check in pre-launch | ACMS Sub-system<br>Check in pre-launch<br>configuration | in pre-launch<br>configuration<br>ACMS SOE  | H_FCP_TTC_CHECK<br>H_FCP_TTC_TCHK<br>H_FCP_AOC_CHECK   | TTC subsystem checkout  ACMS health check  | launch pad  |  |
| 3  |                                 | H0-2 hour   | H0<br>H0         | 1 hr              | LAM         | ST/BY | CDMS checks TTC checks  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch<br>configuration<br>ACMS SOE  | H_FCP_TTC_CHECK<br>H_FCP_TTC_TCHK<br>H_FCP_AOC_CHECK   | TTC subsystem checkout   | launch pad  | parallel activities  |
| 3 4  |                                 | H0-2 hour   | H0<br>H0         | 1 hr              | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration  | H_FCP_TTC_CHECK H_FCP_TTC_TCHK  H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK   | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  | launch pad launch pad   | parallel activities  |
| 3  |                                 | H0-2 hour   | H0<br>H0         | 1 hr              | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check   | H_FCP_TTC_CHECK H_FCP_TTC_TCHK  H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK   | TTC subsystem checkout  ACMS health check  | launch pad  | parallel activities  |
| 3 4  |                                 | H0-2 hour   | H0<br>H0         | 1 hr              | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch   | H_FCP_TTC_CHECK H_FCP_TTC_TCHK  H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK   | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  | launch pad launch pad   | parallel activities  |
| 3 4  |                                 | H0-2 hour   | H0<br>H0         | 1 hr              | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check CCU Sub-system Check   | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_TCS_CHECK H_FCP_CCU_CHECK                              | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  | launch pad launch pad   | parallel activities  |
| 3 4 5  |                                 | H0-2 hour   | H0<br>H0         | 1 hr              | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  TCS checks  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch  | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_TCS_CHECK  | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  | launch pad launch pad launch pad launch pad   | parallel activities  |
| 3 4 5 6  |                                 | H0-2 hour   | H0<br>H0<br>H0   | 1 hr              | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  TCS checks  CCU checks  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration  | H_FCP_TTC_CHECK H_FCP_TTC_TCHK  H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_TCS_CHECK H_FCP_CCU_CHECK H_FCP_CCU_TCHK                             | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  | launch pad launch pad launch pad launch pad launch pad  | parallel activities  |
| 3 4 5  |                                 | H0-2 hour<br>H0-2 hour<br>H0-2 hour               | H0<br>H0<br>H0   | 1 hr              | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  TCS checks  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Gub-system Check CCU monitoring | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_TCS_CHECK H_FCP_CCU_CHECK                              | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  CCU Temperature and Pressure                    | launch pad launch pad launch pad launch pad   | parallel activities  |
| 3 4 5 6  |                                 | H0-2 hour<br>H0-2 hour<br>H0-2 hour               | H0<br>H0<br>H0   | 1 hr              | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  TCS checks  CCU checks  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration Check CCU monitoring period = 8 sec | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_CS_CHECK H_FCP_CCU_CHECK H_FCP_CCU_TCHK H_FCP_CCU_MONS | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  CCU Temperature and Pressure sensors monitoring | launch pad launch pad launch pad launch pad launch pad launch pad   | parallel activities  |
| 3<br>3<br>4<br>5<br>6  |                                 | H0-2 hour<br>H0-2 hour<br>H0-2 hour               | H0<br>H0<br>H0   | 1 hr              | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  TCS checks  CCU checks  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Gub-system Check CCU monitoring | H_FCP_TTC_CHECK H_FCP_TTC_TCHK  H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_TCS_CHECK H_FCP_CCU_CHECK H_FCP_CCU_TCHK                             | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  CCU Temperature and Pressure                    | launch pad launch pad launch pad launch pad launch pad  | parallel activities  |
| 3<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10   |                                 | H0-2 hour<br>H0-2 hour<br>H0-2 hour               | H0<br>H0<br>H0   | 1 hr              | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  TCS checks  CCU checks  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration Check CCU monitoring period = 8 sec | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_CS_CHECK H_FCP_CCU_CHECK H_FCP_CCU_TCHK H_FCP_CCU_MONS | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  CCU Temperature and Pressure sensors monitoring | launch pad launch pad launch pad launch pad launch pad launch pad   | parallel activities  |
| 3<br>3<br>4<br>5<br>6<br>7<br>8<br>9   |                                 | H0-2 hour<br>H0-2 hour<br>H0-2 hour               | H0<br>H0<br>H0   | 1 hr              | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  TCS checks  CCU checks  CCU checks  CCU checks  Lift-Off  EPC Vulcain Engine  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration Check CCU monitoring period = 8 sec | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_CS_CHECK H_FCP_CCU_CHECK H_FCP_CCU_TCHK H_FCP_CCU_MONS | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  CCU Temperature and Pressure sensors monitoring | launch pad launch pad launch pad launch pad launch pad launch pad   | parallel activities  |
| 3<br>3<br>4<br>5<br>6<br>7<br>7<br>8<br>8<br>9<br>10<br>11<br>12                         |                                 | H0-2 hour H0-2 hour H0-2 hour                     | H0<br>H0<br>H0   |                   | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  TCS checks  CCU checks  CCU checks  CCU checks  Lift-Off EPC vulcain Engine ignition command  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration Check CCU monitoring period = 8 sec | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_CS_CHECK H_FCP_CCU_CHECK H_FCP_CCU_TCHK H_FCP_CCU_MONS | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  CCU Temperature and Pressure sensors monitoring | launch pad                                  | parallel activities  |
| 3<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10   |                                 | H0-2 hour H0-2 hour H0-2 hour                     | H0<br>H0<br>H0   | 1 hr              | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  CCU checks  CCU checks  CCU checks  Lift-Off  EPC vulcain Engine Ignition command time from lift-off to   |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration Check CCU monitoring period = 8 sec | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_CS_CHECK H_FCP_CCU_CHECK H_FCP_CCU_TCHK H_FCP_CCU_MONS | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  CCU Temperature and Pressure sensors monitoring | launch pad                                  | parallel activities  |
| 3<br>3<br>4<br>5<br>6<br>7<br>7<br>8<br>9<br>9<br>10<br>11<br>12                         |                                 | H0-2 hour H0-2 hour H0-2 hour                     | H0<br>H0<br>H0   |                   | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  TCS checks  CCU checks  CCU checks  CCU checks  Lift-Off EPC vulcain Engine ignition command  |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration Check CCU monitoring period = 8 sec | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_CS_CHECK H_FCP_CCU_CHECK H_FCP_CCU_TCHK H_FCP_CCU_MONS | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  CCU Temperature and Pressure sensors monitoring | launch pad                                  | parallel activities  |
| 3<br>3<br>4<br>5<br>6<br>7<br>7<br>8<br>8<br>9<br>10<br>11<br>11<br>12                   |                                 | H0-2 hour H0-2 hour H0-2 hour                     | H0<br>H0<br>H0   |                   | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  TCS checks  CCU checks  CCU checks  CCU checks  Lift-Off EPC Vulcain Engine ignition command time from lift-off to separation Separation Separation Separation detection by |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration Check CCU monitoring period = 8 sec | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_CS_CHECK H_FCP_CCU_CHECK H_FCP_CCU_TCHK H_FCP_CCU_MONS | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  CCU Temperature and Pressure sensors monitoring | launch pad                                  | parallel activities  |
| 3<br>3<br>4<br>5<br>6<br>7<br>8<br>8<br>9<br>10<br>11<br>12<br>13                        |                                 | H0-2 hour H0-2 hour H0-2 hour H0-2 hour           | H0<br>H0<br>H0   |                   |             |       | CDMS checks  TTC checks  ACMS checks  EPS checks  TCS checks  CCU checks  CCU checks  CCU checks  Lift-Off EPC Vulcain Engine ignition command time from lift-off to separation Separation Separation                         |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration Check CCU monitoring period = 8 sec | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_CS_CHECK H_FCP_CCU_CHECK H_FCP_CCU_TCHK H_FCP_CCU_MONS | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  CCU Temperature and Pressure sensors monitoring | launch pad                       | Seperation occurs outside<br>GS coverage, i.e. prior to              |
| 3<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15                 |                                 | H0-2 hour H0-2 hour H0-2 hour H0-2 hour           | H0<br>H0<br>H0   |                   |             |       | CDMS checks  TTC checks  ACMS checks  EPS checks  TCS checks  CCU checks  CCU checks  CCU checks  Lift-Off EPC Vulcain Engine ignition command time from lift-off to separation Separation Separation Separation detection by |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration Check CCU monitoring period = 8 sec | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_CS_CHECK H_FCP_CCU_CHECK H_FCP_CCU_TCHK H_FCP_CCU_MONS | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  CCU Temperature and Pressure sensors monitoring | launch pad                       | Seperation occurs outside  |
| 3<br>3<br>4<br>5<br>6<br>7<br>8<br>8<br>9<br>9<br>10<br>11<br>11<br>12<br>13<br>14<br>15 |                                 | H0-2 hour H0-2 hour H0-2 hour H0-2 hour H0-2 hour | H0<br>H0<br>H0   |                   | LAM         | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  CCU checks  CCU checks  CCU checks  CCU dhecks  Lift-Off EPC Vulcain Engine ignition command time from lift-off to separation Separation Separation detection by CDMU ASW   |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration Check CCU monitoring period = 8 sec | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_CS_CHECK H_FCP_CCU_CHECK H_FCP_CCU_TCHK H_FCP_CCU_MONS | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  CCU Temperature and Pressure sensors monitoring | launch pad | Seperation occurs outside<br>GS coverage, i.e. prior to<br>first AOS |
| 3<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15                 |                                 | H0-2 hour H0-2 hour H0-2 hour H0-2 hour           | H0<br>H0<br>H0   |                   |             | ST/BY | CDMS checks  TTC checks  ACMS checks  EPS checks  TCS checks  CCU checks  CCU checks  CCU checks  Lift-Off EPC Vulcain Engine ignition command time from lift-off to separation Separation Separation Separation detection by |                                | Check in pre-launch | Check in pre-launch                                     | in pre-launch configuration ACMS SOE  EPS Sub-system Check in pre-launch configuration TCS Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration CCU Sub-system Check in pre-launch configuration Check CCU monitoring period = 8 sec | H_FCP_TTC_CHECK H_FCP_TTC_TCHK H_FCP_AOC_CHECK H_FCP_EPS_CHECK H_FCP_EPS_TCHK H_FCP_CS_CHECK H_FCP_CCU_CHECK H_FCP_CCU_TCHK H_FCP_CCU_MONS | TTC subsystem checkout  ACMS health check  PCS subsystem checkout  TCS subsystem checkout  CCU subsystem checkout  CCU Temperature and Pressure sensors monitoring | launch pad                       | Seperation occurs outside<br>GS coverage, i.e. prior to              |

| L        | EOP version 2 | 2.5 - HERS         | CHEL LEO | P MASTE  | R PROC | EDURE |                                  |  |      |      |                                     |                 |  |                 |  |
|----------|---------------|--------------------|----------|----------|--------|-------|----------------------------------|--|------|------|-------------------------------------|-----------------|--|-----------------|--|
|          |               | H0                 |          |          |        |       |                                  | Actionees  |      |      |                                     |                 |  |                 |  |
|          |               |                    |          |          |        |       |                                  | - OM<br>- H SOM  |      |      |                                     |                 |  |                 |  |
|          |               |                    |          |          |        |       |                                  | - Flight Dynamics  |      |      |                                     |                 |  |                 |  |
|          |               |                    |          |          |        |       |                                  | - Subssystem   |      |      |                                     |                 |  |                 |  |
|          |               |                    |          |          |        |       |                                  | - SPACON<br>Engineers (MOC)  |      |      |                                     |                 |  |                 |  |
|          | MET           | Start              | End      | Duration | Sat    | ACMS  | Sub-phase or activity            | ОМ   | CDMS | ACMS | TTC                                 | Call Procedures |  | Source/Ground   | Characteristics/constraints  |
|          | [ddd hh:mm]   | Event or           | Event or | [min]    | Mode   | Mode  | , ,                              | н ѕом  |      |      | PCS                                 |                 |  | Station Support |  |
|          |               | Date               | Date     |          |        |       |                                  | FD   |      |      | TCS<br>CCU                          |                 |  |                 |  |
| 18       |               | 20 s after         |          |          | LAM    | SAM   | Autonomous TTC                   | SPACON OM (for info)   |      |      | CCU                                 |                 |  |                 | Configure the XPND   |
|          |               | seperatio          |          |          | L,     | 0,    | configuration                    | om (ioi iiio)  |      |      |                                     |                 |  |                 | transmitter currently active   |
|          |               | n                  |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | by setting the bit rate<br>(LOW_2), (5kbps), ranging   |
|          |               |                    |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | ON, coherent mode ON, TM   |
|          |               |                    |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | modulation index 1,2, output   |
|          |               |                    |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | power -4dbm, ranging   |
|          |               |                    |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | modulation index<br>0,6,external reference OFF,  |
|          |               |                    |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | internal bit pattern generator   |
|          |               |                    |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | OFF;   |
|          |               |                    |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | Configure the TM Encoder to<br>LOW_2 Bit   |
|          |               |                    |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | Rate (5 kbps);   |
| 19       |               |                    |          |          | LAM    | SAM   | Switch ON Currently in Use<br>TX | OM (for info)  |      |      |                                     |                 |  |                 | TX N or R according to SGM<br>context; performance   |
|          |               |                    |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | reached after 10min  |
| 20       |               | 20 s after         |          |          | LAM    | SAM   | CDMU transition to SAM           |  |      |      |                                     |                 |  | CDMU ASW        |  |
|          |               | seperatio          |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 |  |
| 21       |               | n                  |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 |  |
| 22       |               | 5 min              |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | End of separation sequence   |
|          |               | after<br>separatio |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | is driven by enabling of AAD alarms  |
|          |               | n                  |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | alamis   |
| 23       |               |                    |          |          |        |       | First AOS - NNO                  | H SOM:<br>request from OM confirmation of                                |      |      |                                     |                 |  |                 |  |
|          |               |                    |          |          |        |       |                                  | AOS  |      |      |                                     |                 |  |                 |  |
| 24       | 0:38          | 38                 | 3        |          |        |       |                                  | Ground Stations configuration for first AOS:                             |      |      |                                     |                 |  | G/NNO           | Horizon  |
|          |               |                    |          |          |        |       |                                  | - Nominal configuration (TM/TC):   |      |      |                                     |                 |  |                 |  |
|          |               |                    |          |          |        |       |                                  | LOW-2/4k   |      |      |                                     |                 |  |                 |  |
|          |               |                    |          |          |        |       |                                  | - Safemode configuration: LOW-1/125                                      |      |      |                                     |                 |  |                 |  |
| 25       | 0:39          | 39                 |          |          |        |       |                                  |  |      |      |                                     |                 |  | G/NNO           | Five degrees elevation   |
| 26       |               | 39                 | 42       | : 3      | 3      |       | Check S/C Separation<br>status   | SOM: Verify correct separation   |      |      |                                     | H_LEO_SYS_CSEP  | Check Separation                                       | G/NNO           |  |
| 27       |               |                    |          |          |        |       | status                           | through PAP-6  |      |      |                                     |                 |  |                 |  |
| 28       | 0:42          | 42                 | 47       | 5        | SAM    | SAM   | Perform TC link                  | request sweep of uplink  |      |      |                                     |                 |  |                 |  |
| 29       |               |                    |          |          |        |       | acquisition                      |  |      |      |                                     |                 |  |                 |  |
| 30       | 0:47          | 47                 | 52       | . 5      | SAM    | SAM   | Perform TC link check            |  |      |      | TTC-S Subsystem                     | H_LEO_TTC_LCHK  | Verify TTC status at AOS                               | G/NNO           | including TC link test on  |
|          |               |                    |          |          |        |       |                                  |  |      |      | Checkout after                      |                 |  |                 | BSW counter; (no service 17  |
|          |               |                    |          |          |        |       |                                  |  |      |      | separation                          |                 |  |                 | available yet)<br>Test commands via VC-0   |
|          |               |                    |          |          |        |       |                                  |  |      |      |                                     |                 |  |                 | and via VC-1   |
| 31       |               |                    |          |          | 0.47.  | 0.1   |                                  |  |      |      |                                     |                 |  |                 |  |
| 32       | 0:52          | 52                 | 53       | 1        | SAM    | SAM   | Ranging activation               | Inform Ground Station that drop in TM<br>could be expected when enabling |      |      |                                     |                 |  |                 |  |
|          |               |                    |          |          |        | 1     | 1                                | coherent mode in the next step of the                                    |      |      |                                     |                 |  |                 |  |
| 33       | 0.50          | 50                 | 2 54     | _        | SAM    | SAM   |                                  | LEOP timeline  |      |      | Enable Coherent Mode                | H_FCP_TTC_TUCM  | Transponder in use Coherent                            | G/NNO           |  |
|          | 0:52          | 52                 |          |          | SAIVI  | SAIVI |                                  |  |      |      |                                     |                 | Mode Activation/Deactivation                           |                 |  |
| 34       | 0:54          | 54                 | 56       | 2        | 2      |       |                                  |  |      |      | Set ranging transponder<br>ON       | H_FCP_TTC_TURM  | Transponder in use Ranging<br>Activation/ Deactivation | G/NNO           |  |
| 35       |               |                    |          |          | SAM    | SAM   |                                  | Request Ranging until end of pass  |      |      |                                     |                 |  | G/NNO           | <u> </u>   |
| 36       |               |                    |          |          | SAM    | SAM   |                                  | Inform FD about start of Ranging   |      |      |                                     |                 |  | G/NNO           |  |
| 37<br>38 |               |                    | 5 58     |          | SAM    | SAM   | Update UIU for TWT1              |  |      |      | Update UIU for TWT1                 | H_LEO_TTC_TWT1  | Switch TWT Amp in use ON                               | G/NNO           |  |
|          | 0:56          | 56                 | 58       | 2        | SAIVI  | SAIVI | status                           |  |      |      | status                              | n_LeO_IIC_IWI1  | Switch TWT Amp in use ON                               | G/NNO           |  |
| 39       |               |                    |          |          | 0.444  | 0.414 |                                  |  |      |      | Owiteh to MEDIUM 17                 | LL FOR TTO TIME | TV d TM d i-   | CAINO           | and the Asset of the State of t |
| 40       | 0:58          | 58                 | 63       |          | SAM    | SAM   | Switch to MEDIUM bit rate        |  |      |      | Switch to MEDIUM bit<br>rate on LGA | H_FCP_IIC_IUMR  | TX and TM encoder in use<br>configuration for MR       | G/NNO           | switch to MEDIUM bitrate on<br>LGA   |
|          |               |                    |          |          |        |       | pace                             | 1  |      |      | I GLO OII LOA                       | l .             | oormguration for IVIIN                                 |                 |  |

| -  | EOP version 2      | 5 - HEDO                  | CHELLEO                 | D MACTE           | D DDOO      | EDLIDE       |   |  |   |  |                                     |                                   |   |                                  |   |
|----|--------------------|---------------------------|-------------------------|-------------------|-------------|--------------|---|--|---|--|-------------------------------------|-----------------------------------|---|----------------------------------|---|
|    | LOP VEISION 2      | HERS                      | JI IEL LEU              | INMOTE            | IN PROU     | LUUKE        |   | Actionees  |   | 1  |                                     | l                                 |   |                                  | l   |
|    |                    |                           |                         |                   |             |              |   | - OM<br>- H SOM<br>- Flight Dynamics<br>- Subssystem   |   |  |                                     |                                   |   |                                  |   |
|    |                    |                           |                         |                   |             |              |   | - SPACON<br>Engineers (MOC)  |   |  |                                     |                                   |   |                                  |   |
|    | MET<br>[ddd hh:mm] | Start<br>Event or<br>Date | End<br>Event or<br>Date | Duration<br>[min] | Sat<br>Mode | ACMS<br>Mode | Sub-phase or activity                               | OM<br>H SOM<br>FD  | CDMS  | ACMS   | TTC<br>PCS<br>TCS                   | Call Procedures                   |   | Source/Ground<br>Station Support | Characteristics/constraints   |
|    |                    |                           |                         |                   |             |              |   | SPACON   |   |  | CCU                                 |                                   |   |                                  |   |
| 41 | 0:58               | 58                        |                         |                   | SAM         | SAM          |   | change Ground Station configuration<br>to:<br>Nominal configuration MEDIUM/4k  |   |  |                                     |                                   |   |                                  |   |
| 43 | 1:03               | 63                        | 68                      |                   | 5 SAM       | SAM          |   |  | Select Packet Downlink<br>for all nominal packets |  |                                     | H_FCP_DHS_1003                    | Nominal Transmitter Storage<br>Settings   | G/NNO                            | H_FCP_TTC_TUMR calls<br>procedure<br>H_FCP_DHS_1003   |
| 44 | 1:08               | 68                        | 73                      | 4,                | 5 SAM       | SAM          |   |  | Enable default HK packets                         |  |                                     | H_FCP_DHS_1009                    | Enable Default HK Packets   | G/NNO                            | H_SVT_TTC_TUMR calls<br>procedure<br>H_FCP_DHS_1009   |
| 45 | 1:13               | 73                        | 78                      | 4)                | SAM         | SAM          |   |  | LEOP connection test<br>(part 2)                  |  |                                     | H_FCP_DHS_1029                    | TC Link Test - part 2   | G/NNO                            | BD mode, AD mode, test to<br>ACC  |
| 46 | 1:13               | 73                        |                         |                   | 5 SAM       |              | SPIRE LL switch-off                                 |  | (part 2)  |  | SPIRE LL - LPU switch-<br>off       | H_LEO_SYS_LL0                     | Manual LPU Switch-Off   | G/NNO                            | Manual LPU switch-off   |
| 47 | 1:13               | 73                        | 76                      | 3                 | 3 SAM       | SAM          | Switch-on SREM                                      |  |   | Switch-on SREM   |                                     | H_FCP_RM_ON                       | SREM Switch-On  | G/NNO                            | SREM switch-on and start of<br>accumulation   |
| 48 | 1:19               | 79                        | 81                      | 2                 | 2 SAM       | SAM          |   |  |   |  |                                     | H_FCP_RM_ACC                      | SREM Accumulation   | G/NNO                            | accumulation  |
| 49 | 1:18               | 78                        | 83                      | ţ                 | SAM         | SAM          |   |  | Set Nominal Survival<br>Register                  |  |                                     | H_FCP_DHS_1012                    | Write Survial Register after<br>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<br>period 512s (CCUA/B monit #1)  |                                  |   |
| 52 |                    | 81                        | 82                      | 1                 | 1           |              | Initiate transfer of VMC pictures to Packet Store 1 | SOM: request Software Support to<br>disable alarm for SSC for APID 16<br>prior to transfer of VMC data from<br>VMC to SSMM |   |  |                                     |                                   |   |                                  |   |
| 53 | 1:21               | 81                        | 84                      | 3                 | 3 SAM       | SAM          |   |  |   | Start Transfer of VMC<br>pictures from VMC to<br>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                        |                         |                   | 5 SAM       | SAM          |   |  | Dumping BSW TM routing Info array                 |  |                                     | H_FCP_DHS_1027                    | Dumping BSW TM routing Info<br>array  | G/NNO                            | file to be acquired for offline<br>processing   |
| 55 | 1:23               | 83                        |                         |                   | 5 SAM       | SAM          |   |  |   |  | H: Cryo-valves configuration checks |                                   | CCU Valves MONITORING   | G/NNO                            | V501, V503, V103, V106<br>(only the valve status shall<br>be checked; no full check<br>procedure shall be done,<br>relying on the<br>implementation of limit<br>checks and CCO) |
| 56 | 1:24               | 84                        | 124                     | 40                | SAM         | SAM          | ACMS checkout                                       |  |   | Attitude check   |                                     | H_FCP_AOC_3000                    | ACMS health check   | G/NNO                            | V   |
| 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_50112, H_FCP_AOC_5013, H_FCP_AOC_5013, H_FCP_AOC_5014 | G/NNO                            | Verify all attitude checks in<br>SAM are satisfied  |
| 58 | 1:28               | 88                        | 93                      |                   | 5 SAM       | SAM          |   |  | Confirm active HK packets                         |  |                                     | H_FCP_DHS_3033                    | Enable or disable the generation<br>of an housekeeping or diagnostic<br>packet  | G/NNO                            | step 1 of procedure<br>H_FCP_DHS_3033   |
| 59 | 1:28               | 88                        | 93                      | ŧ                 | SAM         | SAM          | İ   |  |   |  | 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                | 5 SAM       | SAM          | CDMS checkout                                       |  | CDMS checks                                       |  |                                     | H_FCP_DHS_SACK                    | Check Acquisition Mode configuration  | G/NNO                            |   |
| 62 | 1:38               | 98                        | 118                     | 20                | 0 SAM       | SAM          | TTC checkout  |  |   |  | TTC checks                          | H_FCP_TTC_CHECK<br>H_FCP_TTC_TCHK |   | G/NNO                            | complete TTC check  |

|                      | LEOP version 2                               | 2.5 - HERS                             | CHEL LEO                                      | P MASTE                                      | R PROC            | EDURE             |   |  |   |   |  |  |  |                            | i  |
|----------------------|--|--|---|--|-------------------|-------------------|---|--|---|---|--|--|--|----------------------------|--|
|                      |  | H0                                     |   |  |                   |                   |   | Actionees  |   |   |  |  |  |                            |  |
|                      |  | 1                                      |   |  | 1                 |                   | 1   | - OM<br>- H SOM                                    |   |   | 1  |  |  |                            |  |
|                      |  | 1                                      |   |  |                   |                   | 1   | - Flight Dynamics                                  |   |   |  |  |  |                            |  |
|                      |  |  |   |  |                   |                   |   | - Subssystem                                       |   |   |  |  |  |                            | 1  |
|                      |  | 1                                      |   |  | 1                 |                   | 1   | - SPACON<br>Engineers (MOC)                        |   |   | 1  |  |  |                            | 1  |
|                      | MET  | Start                                  | End   |  |                   |                   | Sub-phase or activity   | OM   | CDMS  | ACMS  | TTC  | Call Procedures  | <del>                                     </del>   |                            | Characteristics/constraints  |
|                      | [ddd hh:mm]                                  | Event or                               | Event or                                      | [min]  | Mode              | Mode              | . ,   | н ѕом  |   |   | PCS  | 1  |  | Station Support            | [  |
|                      |  | Date                                   | Date  |  |                   |                   |   | FD<br>SPACON                                       |   |   | TCS<br>CCU   | 1  |  |                            | [ i  |
| 63                   | 1:58   | 118                                    | 138   | 20   | SAM               | SAM               | PCS checkout  | J- ACON  |   |   | PCS checks   | H FCP EPS CHECK  | PCS subsystem checkout   | G/NNO                      | specifically battery status  |
|                      |  |  |   |  |                   | 1                 |   |  |   |   |  | H_FCP_EPS_TCHK   |  |                            | , ,  |
| 64                   | 2:04   | 124                                    | 129   | -  |                   |                   |   | +  |   | Enable DTM for OBDB   |  | H_FCP_AOC_DODD   |  | G/NNO                      | <del>                                     </del>   |
|                      |  |  |   |  | <u>L</u>          |                   |   |  |   | dump  |  |  |  |                            |  |
| 65                   | 2:08   | 128                                    | 133   | 5  | SAM               | SAM               | ]   |  | Verify/wait for good time   | 7   |  | N/A  | N/A  | G/NNO                      |  |
|                      |  |  |   |  | 1                 |                   | 1   |  | correlation on MCS  |   |  | 1  |  |                            | 1  |
| 66                   | 2:09   | 129                                    | 129   |  |                   |                   |   |  |   | inform FD about OBDB  |  | 1  |  | 1                          |  |
| 67                   |  | 129                                    | 144   | 40   | SAM               | SAM               | Switch-on STR   | <del> </del>                                       |   | coming in<br>Switch-on STR  |  | H FCD AOC 4804   | Declare CTD Operational  | G/NNO                      | Noted: The CTD is outlined   |
| 6/                   | 2:09   | 129                                    | 144   | 15   | MAG               | SAM               | Switch-on STK   |  |   | SWITCH-ON STR   |  | H_FCP_AOC_4S01   | Declare STR Operational  | G/NNO                      | Note1: The STR is switched<br>on as soon as possible after   |
|                      |  |  |   |  |                   |                   |   |  |   |   |  | 1  |  |                            | the ACSM health checks in  |
|                      |  |  |   |  |                   |                   |   |  |   |   |  | 1  |  |                            | order to allow FD to improve   |
|                      |  |  |   |  |                   |                   |   |  | 1   |   |  |  |  |                            | the attitude knowledge.  Note2: depending on the   |
|                      |  |  |   |  |                   |                   |   |  |   |   |  | 1  |  |                            | launch date and time the H   |
|                      |  |  |   |  |                   |                   | 1   |  |   |   |  | 1  |  |                            | STR operations may be  |
|                      |  |  |   |  |                   |                   |   |  |   |   |  | 1  |  |                            | impacted by moon-blinding.   |
|                      |  |  |   |  |                   |                   |   |  |   |   |  | 1  |  |                            | This is not predictable (since<br>in SAM the attitude around   |
|                      |  |  |   |  |                   |                   |   |  | 1   |   |  |  |  |                            | the S/C z-axis is under rate   |
|                      |  |  |   |  |                   |                   | 1   |  |   |   |  | 1  |  |                            | control only.  |
|                      |  |  |   |  |                   |                   |   |  |   |   |  | 1  |  |                            | 1  |
|                      |  |  |   |  |                   | i                 | 1   | 1  |   |   |  |  |  |                            |  |
|                      |  |  |   |  |                   |                   |   |  |   |   |  |  |  |                            | ,  |
|                      |  |  |   |  |                   |                   | 70  |  | T. ( ) (110)  |   |  |  |  | 0.000                      |  |
| 68                   | 2:17   | 137                                    | 147   | 10   | SAM               | SAM               | TC to transfer VMC  |  | Transfer VMC images   |   |  | H_LEO_VMC_OP   | Herschel VMC Operations  | G/NNO                      | Part 2 of the procedure to downlink VMC images from  |
| 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                      | downlink VMC images from<br>SSMM to ground and then to   |
|                      |  |  |   |  |                   |                   | packets to ground and<br>switch OFF the VMC   |  | Transfer VMC images   |   |  |  | ·  |                            | downlink VMC images from<br>SSMM to ground and then to<br>switch-off the VMC   |
| 68                   | 2:17   | 137                                    |   |  | SAM<br>SAM        |                   | packets to ground and   |  | Transfer VMC images   |   | Proc Wheel LCL ON                                  | H_LEO_VMC_OP   | Switch ON of 4 LCL dedidated to  | G/NNO<br>G/NNO             | downlink VMC images from<br>SSMM to ground and then to<br>switch-off the VMC<br>H: 4 LCL dedicated to the  |
| 69                   | 2:18   | 138                                    | 143   |  | SAM               | SAM               | packets to ground and<br>switch OFF the VMC<br>Switch On LCL's of RWS   |  | Transfer VMC images   |   |  | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to RWL  | G/NNO                      | downlink VMC images from<br>SSMM to ground and then to<br>switch-off the VMC<br>H: 4 LCL dedicated to the<br>RW shall be set ON (Not<br>performed at Launch Pad)   |
|                      |  |  | 143   |  |                   |                   | packets to ground and<br>switch OFF the VMC   |  | Transfer VMC images   |   | Proc Wheel LCL ON TCS checks                       | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to  |                            | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C   |
| 69<br>70             | 2:18   | 138                                    | 143   | 20   | SAM               | SAM               | packets to ground and<br>switch OFF the VMC<br>Switch On LCL's of RWS   |  | Transfer VMC images   | Enable DTM for STR  |  | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to RWL TCS subsystem checkout   | G/NNO<br>G/NNO             | downlink VMC images from<br>SSMM to ground and then to<br>switch-off the VMC<br>H: 4 LCL dedicated to the<br>RW shall be set ON (Not<br>performed at Launch Pad)   |
| 69<br>70<br>71       | 2:18   | 138                                    | 143<br>163<br>149                             | 20   | SAM<br>DSAM       | SAM               | packets to ground and<br>switch OFF the VMC<br>Switch On LCL's of RWS   |  | Transfer VMC images   | Enable DTM for STR<br>data for FD                                   |  | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to RWL  | G/NNO<br>G/NNO             | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C   |
| 69<br>70             | 2:18   | 138                                    | 143<br>163<br>149                             | 20   | SAM               | SAM               | packets to ground and<br>switch OFF the VMC<br>Switch On LCL's of RWS   | STR is now on and DTM for SPID                     | Transfer VMC images   | data for FD<br>Inform FD about STR                                  |  | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to RWL TCS subsystem checkout   | G/NNO<br>G/NNO             | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C   |
| 69<br>70<br>71       | 2:18<br>2:23<br>2:24                         | 138                                    | 143<br>163<br>149                             | 20   | SAM<br>DSAM       | SAM               | packets to ground and<br>switch OFF the VMC<br>Switch On LCL's of RWS   |  | Transfer VMC images   | data for FD<br>Inform FD about STR<br>switch-on and DTM for         |  | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to RWL TCS subsystem checkout   | G/NNO<br>G/NNO             | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C   |
| 69<br>70<br>71       | 2:18<br>2:23<br>2:24                         | 138                                    | 143<br>163<br>149                             | 20   | SAM<br>SAM<br>SAM | SAM               | packets to ground and<br>switch OFF the VMC<br>Switch On LCL's of RWS   | STR is now on and DTM for SPID                     | 1) Inform Software  | data for FD<br>Inform FD about STR                                  |  | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to RWL TCS subsystem checkout   | G/NNO<br>G/NNO             | downlink VMC images from<br>SSMM to ground and then to<br>switch-off the VMC<br>H: 4 LCL dedicated to the<br>RW shall be set ON (Not<br>performed at Launch Pad)<br>specifically S/C<br>temperatures   |
| 69<br>70<br>71<br>72 | 2:18<br>2:23<br>2:24<br>2:24                 | 138<br>143<br>144                      | 143<br>163<br>149<br>145                      | 20   | SSAM<br>OSAM<br>S | SAM<br>SAM        | packets to ground and<br>switch OFF the VMC<br>Switch On LCL's of RWS   | STR is now on and DTM for SPID                     | I) Inform Software     Support about arrival of   | data for FD<br>Inform FD about STR<br>switch-on and DTM for         |  | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to RWL TCS subsystem checkout   | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of  |
| 69<br>70<br>71<br>72 | 2:18<br>2:23<br>2:24<br>2:24                 | 138<br>143<br>144                      | 143<br>163<br>149<br>145                      | 20   | SSAM<br>OSAM<br>S | SAM<br>SAM        | packets to ground and<br>switch OFF the VMC<br>Switch On LCL's of RWS   | STR is now on and DTM for SPID                     | 1) Inform Software<br>Support about arrival of<br>VMC packets and   | data for FD<br>Inform FD about STR<br>switch-on and DTM for         |  | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to RWL TCS subsystem checkout   | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on  |
| 69<br>70<br>71<br>72 | 2:18<br>2:23<br>2:24<br>2:24                 | 138<br>143<br>144                      | 143<br>163<br>149<br>145                      | 20   | SSAM<br>OSAM<br>S | SAM               | packets to ground and<br>switch OFF the VMC<br>Switch On LCL's of RWS   | STR is now on and DTM for SPID                     | Inform Software     Support about arrival of     VMC packets and     request processing of  | data for FD<br>Inform FD about STR<br>switch-on and DTM for         |  | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to RWL TCS subsystem checkout   | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of   |
| 69<br>70<br>71<br>72 | 2:18<br>2:23<br>2:24<br>2:24                 | 138<br>143<br>144                      | 143<br>163<br>149<br>145                      | 20   | SSAM<br>OSAM<br>S | SAM               | packets to ground and<br>switch OFF the VMC<br>Switch On LCL's of RWS   | STR is now on and DTM for SPID                     | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files:  | data for FD<br>Inform FD about STR<br>switch-on and DTM for         |  | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to RWL TCS subsystem checkout   | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on  |
| 69<br>70<br>71<br>72 | 2:18<br>2:23<br>2:24<br>2:24                 | 138<br>143<br>144                      | 143<br>163<br>149<br>145                      | 20   | SSAM<br>OSAM<br>S | SAM               | packets to ground and<br>switch OFF the VMC<br>Switch On LCL's of RWS   | STR is now on and DTM for SPID                     | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software   | data for FD<br>Inform FD about STR<br>switch-on and DTM for         |  | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to RWL TCS subsystem checkout   | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of   |
| 69<br>70<br>71<br>72 | 2:18<br>2:23<br>2:24<br>2:24                 | 138<br>143<br>144                      | 143<br>163<br>149<br>145                      | 20   | SSAM<br>OSAM<br>S | SAM               | packets to ground and<br>switch OFF the VMC<br>Switch On LCL's of RWS   | STR is now on and DTM for SPID                     | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software<br>Support to re-enable                                 | data for FD<br>Inform FD about STR<br>switch-on and DTM for         |  | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to RWL TCS subsystem checkout   | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of   |
| 69<br>70<br>71<br>72 | 2:18<br>2:23<br>2:24<br>2:24                 | 138<br>143<br>144                      | 143<br>163<br>149<br>145                      | 20   | SSAM<br>OSAM<br>S | SAM               | packets to ground and<br>switch OFF the VMC<br>Switch On LCL's of RWS   | STR is now on and DTM for SPID                     | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software   | data for FD<br>Inform FD about STR<br>switch-on and DTM for         |  | H_LEO_EPS_RW1  | Switch ON of 4 LCL dedidated to RWL TCS subsystem checkout   | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of   |
| 70<br>71<br>72<br>73 | 2:18<br>2:23<br>2:24<br>2:24<br>2:27         | 138<br>143<br>144<br>144               | 143<br>163<br>149<br>145                      | 20   | SAM  SAM  SAM     | SAM<br>SAM<br>SAM | packets to ground and switch OFF the VMC Switch On LCL's of RWS TCS checkout  | STR is now on and DTM for SPID                     | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software<br>Support to re-enable<br>alarm for SSC for APID<br>16 | data for FD<br>Inform FD about STR<br>switch-on and DTM for         |  | H_LED_EPS_RW1 H_FCP_TCS_CHECK H_FCP_AOC_D3FD   | Switch ON of 4 LCL dedidated to RWL  TCS subsystem checkout  Define/Enable/Disable DTM for FD  | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of   |
| 70 71 72 73 74 74    | 2:18<br>2:23<br>2:24<br>2:24<br>2:27         | 138<br>143<br>144<br>144<br>147        | 143<br>163<br>149<br>145<br>148               | 20   | SSAM<br>OSAM<br>S | SAM<br>SAM<br>SAM | packets to ground and switch OFF the VMC Switch On LCL's of RWS TCS checkout  | STR is now on and DTM for SPID 18018109 is enabled | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software<br>Support to re-enable                                 | data for FD<br>Inform FD about STR<br>switch-on and DTM for         | TCS checks   | H_LEO_EPS_RW1 H_FCP_TCS_CHECK H_FCP_AOC_D3FD   | Switch ON of 4 LCL dedidated to RWL  TCS subsystem checkout  Define/Enable/Disable DTM for FD  | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of VMC TM.   |
| 70<br>71<br>72<br>73 | 2:18<br>2:23<br>2:24<br>2:24<br>2:27         | 138<br>143<br>144<br>144               | 143<br>163<br>149<br>145<br>148               | 20   | SAM  SAM  SAM     | SAM<br>SAM<br>SAM | packets to ground and switch OFF the VMC Switch On LCL's of RWS TCS checkout  Enable MTL Configure RFDN SWs to                        | STR is now on and DTM for SPID 18018109 is enabled | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software<br>Support to re-enable<br>alarm for SSC for APID<br>16 | data for FD<br>Inform FD about STR<br>switch-on and DTM for         |  | H_LED_EPS_RW1 H_FCP_TCS_CHECK H_FCP_AOC_D3FD   | Switch ON of 4 LCL dedidated to RWL  TCS subsystem checkout  Define/Enable/Disable DTM for FD  | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of   |
| 70 71 72 73 74 74    | 2:18<br>2:23<br>2:24<br>2:24<br>2:27         | 138<br>143<br>144<br>144<br>147        | 143<br>163<br>149<br>145<br>148               | 20   | SAM  SAM  SAM     | SAM<br>SAM<br>SAM | packets to ground and switch OFF the VMC Switch On LCL's of RWS TCS checkout  | STR is now on and DTM for SPID 18018109 is enabled | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software<br>Support to re-enable<br>alarm for SSC for APID<br>16 | data for FD<br>Inform FD about STR<br>switch-on and DTM for         | TCS checks   | H_LEO_EPS_RW1 H_FCP_TCS_CHECK H_FCP_AOC_D3FD   | Switch ON of 4 LCL dedidated to RWL  TCS subsystem checkout  Define/Enable/Disable DTM for FD  | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of VMC TM.  dedicated LEOP procedure loads the initial antenna configuration into the MTL as   |
| 70 71 72 73 74 74    | 2:18<br>2:23<br>2:24<br>2:24<br>2:27         | 138<br>143<br>144<br>144<br>147        | 143<br>163<br>149<br>145<br>148               | 20   | SAM  SAM  SAM     | SAM<br>SAM<br>SAM | packets to ground and switch OFF the VMC Switch On LCL's of RWS TCS checkout  Enable MTL Configure RFDN SWs to select MGA on RX-2 via | STR is now on and DTM for SPID 18018109 is enabled | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software<br>Support to re-enable<br>alarm for SSC for APID<br>16 | data for FD<br>Inform FD about STR<br>switch-on and DTM for         | TCS checks   | H_LEO_EPS_RW1 H_FCP_TCS_CHECK H_FCP_AOC_D3FD   | Switch ON of 4 LCL dedidated to RWL  TCS subsystem checkout  Define/Enable/Disable DTM for FD  | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of VMC TM.  dedicated LEOP procedure loads the initial antenna configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration in the MTL as a safe configurati |
| 70 71 72 73 74 74    | 2:18<br>2:23<br>2:24<br>2:24<br>2:27         | 138<br>143<br>144<br>144<br>147        | 143<br>163<br>149<br>145<br>148               | 20   | SAM  SAM  SAM     | SAM<br>SAM<br>SAM | packets to ground and switch OFF the VMC Switch On LCL's of RWS TCS checkout  Enable MTL Configure RFDN SWs to select MGA on RX-2 via | STR is now on and DTM for SPID 18018109 is enabled | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software<br>Support to re-enable<br>alarm for SSC for APID<br>16 | data for FD<br>Inform FD about STR<br>switch-on and DTM for         | TCS checks   | H_LEO_EPS_RW1 H_FCP_TCS_CHECK H_FCP_AOC_D3FD   | Switch ON of 4 LCL dedidated to RWL  TCS subsystem checkout  Define/Enable/Disable DTM for FD  | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of VMC TM.  dedicated LEOP procedure loads the initial antenna configuration into the MTL as as as econfiguration in the requested   |
| 70 71 72 73 74 74    | 2:18<br>2:23<br>2:24<br>2:24<br>2:27         | 138<br>143<br>144<br>144<br>147        | 143<br>163<br>149<br>145<br>148               | 20   | SAM  SAM  SAM     | SAM<br>SAM<br>SAM | packets to ground and switch OFF the VMC Switch On LCL's of RWS TCS checkout  Enable MTL Configure RFDN SWs to select MGA on RX-2 via | STR is now on and DTM for SPID 18018109 is enabled | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software<br>Support to re-enable<br>alarm for SSC for APID<br>16 | data for FD<br>Inform FD about STR<br>switch-on and DTM for         | TCS checks   | H_LEO_EPS_RW1 H_FCP_TCS_CHECK H_FCP_AOC_D3FD   | Switch ON of 4 LCL dedidated to RWL  TCS subsystem checkout  Define/Enable/Disable DTM for FD  | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to SMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of VMC TM.  dedicated LEOP procedure loads the initial antenna configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration into the MTL as a safe configuration in the |
| 70 71 72 73 74 74    | 2:18<br>2:23<br>2:24<br>2:24<br>2:27         | 138<br>143<br>144<br>144<br>147        | 143<br>163<br>149<br>145<br>148               | 20   | SAM  SAM  SAM     | SAM<br>SAM<br>SAM | packets to ground and switch OFF the VMC Switch On LCL's of RWS TCS checkout  Enable MTL Configure RFDN SWs to select MGA on RX-2 via | STR is now on and DTM for SPID 18018109 is enabled | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software<br>Support to re-enable<br>alarm for SSC for APID<br>16 | data for FD<br>Inform FD about STR<br>switch-on and DTM for         | TCS checks   | H_LEO_EPS_RW1 H_FCP_TCS_CHECK H_FCP_AOC_D3FD   | Switch ON of 4 LCL dedidated to RWL  TCS subsystem checkout  Define/Enable/Disable DTM for FD  | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of VMC TM.  dedicated LEOP procedure loads the initial antenna configuration into the MTL as a safe configuration in to the MTL as a safe configuration in the requested   |
| 70 71 72 73 73 74 75 | 2:18<br>2:23<br>2:24<br>2:24<br>2:27<br>2:27 | 138<br>143<br>144<br>144<br>147<br>148 | 143<br>163<br>149<br>145<br>148<br>148        | 20 20 11 11 11 11 11 11 11 11 11 11 11 11 11 | SAM  SAM  SAM     | SAM<br>SAM<br>SAM | packets to ground and switch OFF the VMC Switch On LCL's of RWS TCS checkout  Enable MTL Configure RFDN SWs to select MGA on RX-2 via | STR is now on and DTM for SPID 18018109 is enabled | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software<br>Support to re-enable<br>alarm for SSC for APID<br>16 | data for FD<br>Inform FD about STR<br>switch-on and DTM for         | TCS checks  RFDN switching                         | H_LEO_EPS_RW1 H_FCP_TCS_CHECK H_FCP_AOC_D3FD  FCP_DHS_1026 H_LEO_TTC_MGAR                    | Switch ON of 4 LCL dedidated to RWL TCS subsystem checkout Define/Enable/Disable DTM for FD  Start MTL function during LEOP Switch RX2 to MGA    | G/NNO G/NNO G/NNO G/NNO    | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of VMC TM.  dedicated LEOP procedure loads the initial antenna configuration into the MTL as as as econfiguration in the requested   |
| 70 71 72 73 74 74    | 2:18<br>2:23<br>2:24<br>2:24<br>2:27         | 138<br>143<br>144<br>144<br>147        | 143<br>163<br>149<br>145<br>148<br>148        | 20 20 11 11 11 11 11 11 11 11 11 11 11 11 11 | SAM  SAM  SAM     | SAM<br>SAM<br>SAM | packets to ground and switch OFF the VMC Switch On LCL's of RWS TCS checkout  Enable MTL Configure RFDN SWs to select MGA on RX-2 via | STR is now on and DTM for SPID 18018109 is enabled | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software<br>Support to re-enable<br>alarm for SSC for APID<br>16 | data for FD<br>Inform FD about STR<br>switch-on and DTM for         | TCS checks   | H_LEO_EPS_RW1  H_FCP_TCS_CHECK  H_FCP_AOC_D3FD  FCP_DHS_1026  H_LEO_TTC_MGAR  H_FCP_TTC_R2BR | Switch ON of 4 LCL dedidated to RWL  TCS subsystem checkout  Define/Enable/Disable DTM for FD  Start MTL function during LEOP  Switch RX2 to MGA | G/NNO  G/NNO  G/NNO  G/NNO | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of VMC TM.  dedicated LEOP procedure loads the initial antenna configuration into the MTL as a safe configuration in addition to the requested antenna configuration.  |
| 70 71 72 73 73 74 75 | 2:18<br>2:23<br>2:24<br>2:24<br>2:27<br>2:27 | 138<br>143<br>144<br>144<br>147<br>148 | 143<br>163<br>149<br>145<br>148<br>163<br>173 | 200  | SAM  SAM  SAM     | SAM SAM SAM SAM   | packets to ground and switch OFF the VMC Switch On LCL's of RWS TCS checkout  Enable MTL Configure RFDN SWs to select MGA on RX-2 via | STR is now on and DTM for SPID 18018109 is enabled | 1) Inform Software<br>Support about arrival of<br>VMC packets and<br>request processing of<br>TM and delivery of raw<br>image files;<br>2) request Software<br>Support to re-enable<br>alarm for SSC for APID<br>16 | data for FD Inform FD about STR switch-on and DTM for SPID 18018109 | TCS checks  RFDN switching  Select Rx2 bit rate to | H_LEO_EPS_RW1  H_FCP_TCS_CHECK  H_FCP_AOC_D3FD  FCP_DHS_1026  H_LEO_TTC_MGAR  H_FCP_TTC_R2BR | Switch ON of 4 LCL dedidated to RWL TCS subsystem checkout Define/Enable/Disable DTM for FD  Start MTL function during LEOP Switch RX2 to MGA    | G/NNO  G/NNO  G/NNO  G/NNO | downlink VMC images from SSMM to ground and then to switch-off the VMC H: 4 LCL dedicated to the RW shall be set ON (Not performed at Launch Pad) specifically S/C temperatures  Note: switch-off of VMC only after confirmation of Software Support on successful processing of VMC TM.  dedicated LEOP procedure loads the initial antenna configuration into the MTL as as as econfiguration in the requested   |

| Bidd Hormon   Provider   Security   Securi   |  | <del></del>   |
|--|--|---|
| MART   Start   |  |   |
| Mode   Part of Power   Part of Date   Mode   Mode   Mode   Part of Date   Part    |  |   |
| 1  | PCS<br>TCS Station Support   | aracteristics/constraints   |
| 10   | Verify end of battery charge and transfer to   SA power   SA pow | pected ~3 hours after   |
| Note: the remaining time of the Note: the remaining time of the Incomplete of the In | parameters in flight  to start m loops in c update of tables to shall only temperate related as TM param FDIR non activity m   | ote: the procedure is called start monitoring of the<br>ops in question; the actual<br>date of the on-board<br>oles to enable the FDIR<br>all only be done when the<br>mperature level of the<br>lated average temperature<br>A parameter is within the<br>DIR nominal range; this<br>tivity may span into the<br>ommissioning Phase. |
| NNO pass, the CEB pass and KRU passes are dictated to ranging activities and to preparation of the first delta-V   |  |   |
| STATION HAND-OVER: NNO to CEB   STATION HAND-OVER: NNO to CEB   STATION HAND-OVER: NNO to CEB   STATION HAND-OVER: NNO to CEB   H0+7h07   N  |  |   |
| NNO to CEB   ground station  | S4   |   |
| 86   |  |   |
| NNO to CEB request from OM confirmation of AOS AOS Ground Stations configuration for first AOS: - Nominal configuration (TM/TC): MEDIUM/4k - Safemode configuration: LOW-1/125   | Note: rele anticipate before ph period en more time CEB. (Physical NNO:  | hysical end of visibility for NO:<br>/04/2009 21:21:24  |
| AOS  89 7:07 427 Ground Stations configuration for first AOS: - Nominal configuration (TM/TC): MEDIUM/4k - Safemode configuration: LOW-1/125   |  |   |
| AOS: - Nominal configuration (TM/TC): MEDIUM/4k - Safemode configuration: LOW-1/125  |  |   |
| m m  |  |   |
|  |  |   |
| 91   |  |   |
| 92 7:07 427 432 5 SAM SAM Perform TO link request sweep of uplink groups through the constraint of the | GICEB  |   |

| LEOD               | E 1:55-  | OUEL : = =  | D 144 07-   | D DDO-                                      | EDIVE        |  |   |  |  |  |                 |   |  | 7  |
|--------------------|--|---|---|---|--------------|--|---|--|--|--|-----------------|---|--|--|
| LEOP version 2     |  | CHEL LEO  | P MASTE   | K PROC                                      | EDURE<br>T   | 1  | Actionees   |  | 1  | I  | T               | I   | ı  | I  |
|                    |  |   |   |   |              |  | - OM<br>- H SOM<br>- Flight Dynamics<br>- Subssystem<br>- SPACON<br>Engineers (MOC)   |  |  |  |                 |   |  |  |
| MET<br>[ddd hh:mm] | Event or   | Event or  | Duration<br>[min]   | Sat<br>Mode                                 | ACMS<br>Mode |  | H SOM<br>FD   | CDMS   | ACMS   | TTC<br>PCS<br>TCS<br>CCU   | Call Procedures |   | Source/Ground<br>Station Support   | Characteristics/constraints  |
| 7:12               | 432  | 437   | 5   | SAM   | SAM          |  | Request Ranging until end of pass   |  |  |  |                 |   | G/CEB  |  |
| 7:17               | 437  | 442   | . 5   | SAM   | SAM          | TTC-S Subsystem  |   |  |  | TTC checks   | H_LEO_TTC_LCHK  | Verify TTC status at AOS  | G/CEB  |  |
| 7:22               | 442  | 447   | 5   | SAM   | SAM          | LEOP connection test (part<br>2)   |   | Test command   |  |  | H_FCP_DHS_1029  | TC Link Test - part 2   | G/CEB  | BD mode, AD mode, test to<br>ACC   |
|                    |  |   |   |   |              | -/   |   |  |  |  |                 |   |  |  |
|                    |  |   |   |   |              | STATION HAND-OVER:<br>CEB to KRU   | After confirmation from SOM, release ground station   |  |  |  |                 |   | G/CEB  |  |
|                    |  |   |   |   |              |  |   |  |  |  |                 |   |  |  |
|                    |  |   |   |   |              | STATION HAND-OVER:<br>CEB to KRU   | request from OM confirmation of   |  |  |  |                 |   |  |  |
| 8:09               | 489  |   |   |   |              |  | Ground Stations configuration: - Nominal configuration (TM/TC): MEDIUM/4k   |  |  |  |                 |   | G/KRU  | Horizon<br>29/04/2009 21:33:23   |
| 8:20               | 500  |   |   |   |              |  |   |  |  |  |                 |   | G/KRU  | Five degrees elevation 29/04/2009 21:44:38   |
|                    |  |   |   |   |              |  |   |  |  |  |                 |   |  |  |
| 8:22               | 502  | 507   | 5   | SAM   | SAM          | Perform TC link acquisition  | request sweep of uplink   |  |  |  |                 |   |  |  |
| 8-27               | 507  | 512   | 5   | SAM   | SAM          | TTC-S Subsystem  |   |  |  | TTC checks   | H LEO TTC LCHK  | Verify TTC status at AOS  | G/KRU  |  |
| 8:32               | 512  | 517   |   |   | SAM          | Checkout at AOS<br>LEOP connection test (part  |   | Test command   |  |  | H_FCP_DHS_1029  | TC Link Test - part 2   | G/KRU  | BD mode, AD mode, test to  |
|                    |  |   |   |   |              | 2)   |   |  |  |  |                 |   |  | ACC  |
|                    |  |   |   | SAM   | SAM          |  | Request Ranging until end of pass   |  |  |  |                 |   | G/KRU  |  |
|                    |  |   |   | SAM   | SAM          |  | Inform FD about start of Ranging  |  |  |  |                 |   | G/KRU  |  |
| 9:00               | 540  | 570   | 30  | )   |              | Shift Handover<br>Team-A to Team-B   | Shift hand-over   |  |  |  |                 |   | G/KRU  |  |
|                    | H0+9h00<br>m   |   |   |   |              |  |   |  |  |  |                 |   |  | 29/04/2009 22:24   |
|                    |  |   |   |   |              | Share KRU with Planck  | After confirmation from SOM, release  |  |  |  |                 |   |  |  |
|                    | 1022<br>H0+17h0  |   |   |   |              | IS/C   | ground station  |  |  |  |                 |   | G/KRU  | 30/04/2009 06:26   |
|                    | 2m   |   |   |   |              |  |   |  |  |  |                 |   |  |  |
|                    | 1022   |   |   |   |              | Start of sharing KRU<br>ground station between<br>Herschel and Planck  |   |  |  |  |                 |   |  | 30/04/2009 06:26   |
|                    |  |   |   |   |              |  |   |  |  |  |                 |   |  |  |
|                    |  |   |   |   |              | of KRU ground station,<br>but is determined by the<br>end of the physical<br>visibility period of the  |   |  |  |  |                 |   |  |  |
|                    | MET [ddd hh:mm] 7:12 7:17 7:22  8:09 8:20 8:22 8:27 8:32 | 8:09 485 8:20 500 8:22 502 8:27 507 8:32 512 9:00 540 H0+9h00 m | 8:20 500  8:22 502 507  8:27 507 512  8:32 512 517  9:00 540 570  H0+9h00  m  1022 H0+17h0 2m | 8:20 500 8:22 502 507 512 58:32 512 517 5 5 | H0           | MET   Start   End   Duration   Sat   ACMS   Mode   Mode   Mode   Mode   Mode   T:12   432   437   5 SAM   SAM   SAM   T:17   437   442   5 SAM   SAM | MET   Start   End   Duration   Sat   ACMS   Sub-phase or activity   Mode   T:12   432   437   5   SAM   SAM   SAM   Tr. Subsystem   Checkout at AOS   T:17   437   442   5   SAM   SAM   Tr. Subsystem   Checkout at AOS   T:17   T:18   T:19   Actionees - OM - In SOM - In S | Actionees — Committee of the continuation of t | MeT   Start   Start   County   Mode            | Mode   Mode | March   Marc | Marie   Mari |

| _                 | LEOP version 2 | 0.5 11500                    | 01151 1 50                   | DAMOTE            | D DDOO       | FDUDE        |  |   |                                  |      |                                    |                 |                                    |                 | 1  |
|-------------------|----------------|------------------------------|------------------------------|-------------------|--------------|--------------|--|---|----------------------------------|------|------------------------------------|-----------------|------------------------------------|-----------------|--|
| Ь т               | LEOF Version 2 | 2.5 - HERS                   | OFFEL LEO                    | - IVIASTE         | N PROC       | LDUKE        |  | Actionees   |                                  |      |                                    |                 |                                    | ı               |  |
|                   | MET            |                              | Fad                          | Donatio           | 0-1          | 40146        |  | Actionees - OM - H SOM - Flight Dynamics - Subssystem - SPACON Engineers (MOC) OM                                 | opus.                            | ACMS | 110                                | Oall Describe   |                                    | S               |  |
|                   | [ddd hh:mm]    | Start<br>Event or<br>Date    | End<br>Event or<br>Date      | Duration<br>[min] | Mode<br>Mode | ACMS<br>Mode | Sub-phase or activity  | H SOM<br>FD   | CDMS                             | ACMS | TTC<br>PCS<br>TCS                  | Call Procedures |                                    | Station Support | Characteristics/constraints                |
| 121               |                |                              |                              |                   |              |              | From now on until end of physical visibility period of KRU, the KRU ground station shall be shared between Herschel and Planck, allocating passes of 1 hour duration in turns. | SPACON  |                                  |      | ccu                                |                 |                                    |                 |  |
| 122               |                |                              |                              |                   |              |              |  |   |                                  |      |                                    |                 |                                    |                 |  |
| 122<br>123        |                |                              |                              |                   |              |              | For all KRU passes<br>assigned to Herschel<br>until H0+1201 perform<br>the following steps:  |   |                                  |      |                                    |                 |                                    |                 |  |
| 124               |                |                              |                              |                   |              |              |  |   |                                  |      |                                    |                 |                                    |                 |  |
| 124<br>125<br>126 |                |                              |                              |                   |              |              | Share KRU with Planck<br>S/C   | H SOM: request from OM confirmation of  |                                  |      |                                    |                 |                                    |                 |  |
| 127               |                |                              |                              |                   |              |              |  | AOS Ground Stations configuration: - Nominal configuration (TM/TC): MEDIUM/4k - Safemode configuration: LOW-1/125 |                                  |      |                                    |                 |                                    | G/KRU           |  |
| 128               |                |                              |                              |                   |              |              |  |   |                                  |      |                                    |                 |                                    |                 |  |
| 129               |                | start of pass                | start of<br>pass +<br>5min   | 5                 | SAM          | SAM          | Perform TC link acquisition  | request sweep of uplink   |                                  |      |                                    |                 |                                    |                 |  |
| 130               |                |                              |                              |                   |              |              |  |   |                                  |      |                                    |                 |                                    |                 |  |
| 131               |                | start of<br>pass +<br>5min   | start of<br>pass + 10<br>min |                   | SAM          | SAM          |  |   |                                  |      | TTC-S Subsystem<br>Checkout at AOS | H_LEO_TTC_LCHK  | Verify TTC status at AOS           | G/KRU           |  |
| 132               |                | start of<br>pass +<br>5min   | start of<br>pass + 10<br>min | 5                 | SAM          | SAM          |  |   | Test command                     |      |                                    | H_FCP_DHS_1029  | TC Link Test - part 2              | G/KRU           | BD mode, AD mode, test to<br>ACC           |
| 133               |                |                              |                              |                   | 0.114        | 0.114        |  |   |                                  |      |                                    |                 |                                    | 0.4/011         |  |
| 134<br>135        |                |                              |                              |                   | SAM          | SAM          |  | Request Ranging until end of pass Inform FD about start of Ranging  |                                  |      |                                    |                 |                                    | G/KRU<br>G/KRU  |  |
| 136               |                |                              |                              |                   | JAN          |              |  |   |                                  |      | <del> </del>                       |                 |                                    |                 |  |
| 137               |                | start of<br>pass +<br>5min   | start of<br>pass + 6<br>min  | 1                 | SAM          | SAM          | Apply TCO fixed gradient to commanding   | SPACON to apply fixed TCO gradient<br>on TMSPACON in TCO TAB  |                                  |      |                                    |                 |                                    | G/KRU           |  |
| 138               |                | start of<br>pass + 6         |                              | variable          |              |              |  |   | Dump CEL and SSMM packet stores  |      |                                    | H_FCP_DHS_1014  | Dump of CEL and SSMM packet stores | G/KRU           |  |
| 140               |                | start of<br>pass + 6         |                              | 15<br>minutes     |              |              |  |   | On board tables and config check |      |                                    | H_FCP_DHS_1030  | CDMU OBSW data acquisition         | G/KRU           |  |
| 141               |                |                              |                              |                   |              |              |  |   |                                  |      |                                    |                 |                                    |                 |  |
| 142               |                |                              |                              |                   |              |              | Share KRU with Planck  | After confirmation from SOM, release ground station   |                                  |      |                                    |                 |                                    |                 |  |
| 143               |                | start of<br>pass + 1<br>hour |                              |                   |              |              |  | gisano satiuri  |                                  |      |                                    |                 |                                    | G/KRU           |  |
| 144<br>145        | 19:46          | 1186                         |                              |                   |              |              | End of physical visibility   |   |                                  |      | <del></del>                        |                 |                                    |                 | Five degrees elevation                     |
| 170               | 19:46          | 1100                         |                              |                   |              |              | period of KRU  |   |                                  |      |                                    |                 |                                    |                 | Five degrees elevation 30/04/2009 09:10:36 |
| 146               |                | H0+19h4                      |                              |                   |              |              |  |   |                                  |      |                                    |                 |                                    |                 |  |
| 1                 |                | 6m                           |                              |                   | 1            | 1            | l  |   |                                  |      |                                    | l               |                                    | l               |  |

| _          | EOP version 2      | E UEDO                    | CHELLEO                 | DMACTE            | D DDOO      | EDLIDE       |   |   |                                     |   |                                    |                 |                                    |                                  |  |
|------------|--------------------|---------------------------|-------------------------|-------------------|-------------|--------------|---|---|-------------------------------------|---|------------------------------------|-----------------|------------------------------------|----------------------------------|--|
|            |                    | H0                        | CHEL LEC                | PIVIASTE          | K PROC      | L            |   | Actionees   | I                                   | l   | T                                  | 1               | I                                  | 1                                |  |
|            |                    | 110                       |                         |                   |             |              |   | - OM<br>- H SOM<br>- Flight Dynamics<br>- Subssystem<br>- SPACON  |                                     |   |                                    |                 |                                    |                                  |  |
|            |                    |                           |                         |                   |             |              |   | Engineers (MOC)   |                                     |   |                                    |                 |                                    |                                  |  |
|            | MET<br>[ddd hh:mm] | Start<br>Event or<br>Date | End<br>Event or<br>Date | Duration<br>[min] | Sat<br>Mode | ACMS<br>Mode | Sub-phase or activity                         | OM<br>H SOM<br>FD   | CDMS                                | ACMS  | TTC<br>PCS<br>TCS                  | Call Procedures |                                    | Source/Ground<br>Station Support | Characteristics/constraints  |
|            |                    |                           |                         |                   |             |              |   | SPACON  |                                     |   | CCU                                |                 |                                    |                                  |  |
| 147<br>148 | 40.47              | 1106                      |                         |                   |             | -            | Stop of sharing KRU                           |   |                                     |   |                                    |                 |                                    |                                  |  |
| 1.0        | 19:46              | 1100                      |                         |                   |             |              | ground station between<br>Herschel and Planck |   |                                     |   |                                    |                 |                                    |                                  |  |
| 149        |                    | H0+19h4                   |                         |                   |             |              |   |   |                                     |   |                                    |                 |                                    |                                  |  |
| 150        |                    | 6m                        |                         |                   |             |              |   |   |                                     |   |                                    |                 |                                    |                                  |  |
| 151        | 20:00              | 1200                      | 1230                    | 30                | 0           |              | Shift Handover<br>Team-B to Team-A            | Shift hand-over   |                                     |   |                                    |                 |                                    |                                  | 30/04/2009 09:24   |
| 152        |                    | H0+20h0                   |                         |                   |             |              |   |   |                                     |   |                                    |                 |                                    |                                  |  |
| 153        |                    | 0m                        |                         | 1                 |             | 1            |   |   |                                     |   |                                    |                 |                                    |                                  |  |
| 154        |                    |                           |                         |                   |             |              | AOS - NNO                                     | H SOM:<br>request from OM confirmation of<br>AOS  |                                     |   |                                    |                 |                                    |                                  |  |
| 155        | 21:00              | 1260                      |                         |                   |             |              |   | Ground Stations configuration:  - Nominal configuration (TM/TC): MEDIUM/4k  - Safemode configuration: LOW-1/125 |                                     |   |                                    |                 |                                    | G/NNO                            | Horizon<br>30/04/2009 10:25:15   |
| 156        | 21:24              | 1284                      |                         |                   |             | _            |   |   |                                     |   |                                    |                 |                                    | G/NNO                            | Five degrees elevation   |
| 157        |                    |                           |                         |                   |             |              |   |   |                                     |   |                                    |                 |                                    |                                  | 30/04/2009 10:49:01  |
| 158        | 21:29              | 1289                      | 1294                    |                   | SAM         | SAM          | Perform TC link acquisition                   | request sweep of uplink   |                                     |   |                                    |                 |                                    | G/NNO                            |  |
| 159        |                    |                           |                         |                   |             |              | acquisition                                   |   |                                     |   |                                    |                 |                                    |                                  |  |
| 160        | 21:34              | 1294                      | 1299                    | 5                 | SAM         | SAM          |   |   |                                     |   | TTC-S Subsystem<br>Checkout at AOS | H_LEO_TTC_LCHK  | Verify TTC status at AOS           | G/NNO                            |  |
| 161        | 21:39              | 1299                      | 1304                    |                   | SAM         | SAM          |   |   | Test command                        |   |                                    | H_FCP_DHS_1029  | TC Link Test - part 2              | G/NNO                            | BD mode, AD mode, test to ACC  |
| 162<br>163 |                    |                           |                         |                   | SAM         | SAM          |   | Request Ranging until end of pass   |                                     |   |                                    |                 |                                    | G/NNO                            |  |
| 164        |                    |                           |                         |                   | SAM         | SAM          |   | Inform FD about start of Ranging  |                                     |   |                                    |                 |                                    | G/NNO                            |  |
| 165        |                    | 100                       |                         |                   |             | 04           | A L. TOO C                                    | ODAGONIAI. " LTGG "   |                                     |   |                                    |                 |                                    |                                  |  |
| 166        | 21:44              | 1304                      | 1305                    | 5 1               | SAM         | SAM          | Apply TCO fixed gradient to commanding        | SPACON to apply fixed TCO gradient<br>on TMSPACON in TCO TAB  |                                     |   |                                    |                 |                                    |                                  |  |
| 167        |                    |                           |                         |                   |             |              |   |   |                                     |   |                                    |                 |                                    |                                  |  |
| 168        | 21:44              | 1304                      |                         | variable          |             |              |   |   | Dump CEL and SSMM<br>packet stores  |   |                                    | H_FCP_DHS_1014  | Dump of CEL and SSMM packet stores | G/KRU                            |  |
| 169        | 21:44              | 1304                      |                         | 15<br>minutes     |             |              |   |   | On board tables and<br>config check |   |                                    | H_FCP_DHS_1030  | CDMU OBSW data acquisition         | G/KRU                            |  |
| 170        |                    |                           |                         |                   |             |              |   |   |                                     |   |                                    |                 |                                    |                                  |  |
| 171        | 21:44              | 1304                      | 1344                    | 4(                | O SAM       | SAM          | Prepare Delta-V                               |   |                                     | Switch on all cat bed<br>heaters for RCS A<br>(Nominal for A1, A2,<br>C1, C2, C3, C4) |                                    | H_FCP_AOC_5CBH  | Switch-on cat bed heaters          | G/NNO                            | Note: cat bed heaters shall<br>be on for at least 40 minutes<br>prior to manouevre; the cat<br>bed heaters can stay on<br>permanently after initial<br>switch-on |
| 172        | _                  |                           |                         |                   |             |              | Delta-V to remove<br>Launcher Dispersion      |   |                                     |   |                                    |                 |                                    |                                  |  |

| _   | EOP version 2 | OF HEDS           | CHELLEO    | D MACTE  |          | PEDLIDE |  |  |          |  |              |                 |              |                 |  |
|-----|---------------|-------------------|------------|----------|----------|---------|--|--|----------|--|--------------|-----------------|--------------|-----------------|--|
|     | LOF VEISION 2 | 2.5 - HERS<br>IHO | OI IEL LEU | - WASIE  | N PROC   | LDUKE   |  | Actionees  |          |  |              | 1               |              |                 |  |
|     |               | 1.0               |            |          |          | 1       |  | - OM   | 1        |  |              |                 | 1            |                 |  |
|     |               |                   |            |          |          |         |  | - H SOM  |          |  |              |                 |              |                 |  |
|     |               |                   |            |          |          |         |  | - Flight Dynamics  |          |  |              |                 |              |                 |  |
|     |               |                   |            |          |          |         |  | - Subssystem   |          |  |              |                 |              |                 |  |
|     |               |                   |            |          |          |         |  | - SPACON<br>Engineers (MOC)                                    |          |  |              |                 |              |                 |  |
| -   | MET           | Start             | End        | Duration | Cot      | A CMC   | Sub-phase or activity                                      | OM   | CDMS     | ACMS   | ттс          | Call Procedures |              | Course/Cround   | Characteristics/constraints                    |
|     |               | Event or          | Event or   | [min]    | Mode     | Mode    |  | H SOM  | CDIVIS   | ACWS   | PCS          | Call Flocedules |              | Station Support | Characteristics/constraints                    |
|     | ,,            | Date              | Date       | į        |          |         |  | FD   |          |  | TCS          |                 |              |                 |  |
|     |               |                   |            |          |          |         |  | SPACON   |          |  | CCU          |                 |              |                 |  |
| 173 |               |                   |            |          |          |         | Note: the manoeuver to                                     |  |          |  |              |                 |              |                 |  |
|     |               |                   |            |          |          |         | compensate for the   |  |          |  |              |                 |              |                 |  |
|     |               |                   |            |          |          |         | launcher dispersion may                                    |  |          |  |              |                 |              |                 |  |
|     |               |                   |            |          |          |         | need to be split in two parts<br>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<br>inserted.                        |  |          |  |              |                 |              |                 |  |
|     |               |                   |            |          |          | 1       | In case the manoeuvre is <                                 |  | İ        |  |              |                 | 1            |                 | Ì  |
|     |               |                   |            |          |          | 1       | 30 m/s, then the update of                                 |  | İ        |  |              |                 | 1            |                 | Ì  |
|     |               |                   |            |          |          | 1       | the Torque Matrix can be                                   |  | İ        |  |              |                 | 1            |                 | Ì  |
|     |               |                   |            |          |          | 1       | don after the manoeuvre.                                   |  | İ        |  |              |                 | 1            |                 | Ì  |
|     |               |                   |            |          |          | 1       | The size of the required                                   |  | İ        |  |              |                 | 1            |                 | Ì  |
|     |               |                   |            |          |          |         | manoeuvre will only be<br>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       | i 1      |          |         | Request TPFs from FD                                       |  |          | Request TPFs as listed<br>below from FD      |              |                 |              | G/NNO           |  |
| 175 |               |                   |            |          |          | +       |  | In case only one Delta-V is needed,                            |          | below Ironi FD                               |              |                 | <u> </u>     |                 | TPFs:  |
|     |               |                   |            |          |          |         |  | the following TPF files are requireed                          |          |  |              |                 |              |                 | SEE  |
|     |               |                   |            |          |          |         |  | from FD:   |          |  |              |                 |              |                 | OFP (for delta-V attitude)                     |
|     |               |                   |            |          |          |         |  | "SEE-1"  |          |  |              |                 |              |                 | DVH  |
|     |               |                   |            |          |          |         |  | "OFP-1" (to slew to delta-V attitude)                          |          |  |              |                 |              |                 | TLP (for Torque Matrix                         |
|     |               |                   |            |          |          |         |  | "DVH-1" (first [part of] delta-V) "TLP" (to update the SAM/OCM |          |  |              |                 |              |                 | update)  |
|     |               |                   |            |          |          | 1       |  | Torque Matrix after delta-V                                    |          |  |              |                 | 1            |                 | 1  |
|     |               |                   |            |          |          | 1       |  | 101400 Hattix aitoi dolla V                                    |          |  |              |                 | 1            |                 | 1  |
|     |               |                   |            |          |          | 1       |  |  | 1        |  |              |                 | 1            |                 |  |
| 176 |               |                   |            |          |          | +       |  | In case the Delta-V needs to be split                          |          |  |              |                 | <del> </del> | 1               | additional TPFs needed:                        |
| 5   |               |                   |            |          |          | 1       |  | in two parts (i.e. overal size >30 ms),                        |          |  |              |                 | 1            |                 | DVH  |
|     |               |                   |            |          |          | 1       |  | the following additional TPFs are                              |          |  |              |                 | 1            |                 | Ì  |
|     |               |                   |            |          |          | 1       |  | required for the second part of the                            |          |  |              |                 | 1            |                 | Ì  |
|     |               |                   |            |          |          | 1       |  | Manoeuvre:   |          |  |              |                 | 1            |                 | 1  |
|     |               |                   |            |          |          | 1       |  | "DVH-2" (2nd part of manoeuvre; same attitude as "DVH-1"       |          |  |              |                 | 1            |                 | Ì  |
|     |               |                   |            |          |          | 1       |  | aundo do Svii-i  | 1        |  |              |                 | 1            |                 |  |
| 177 |               |                   |            |          | SAM      | SAM     |  | S/C inertial attitude determination                            |          |  |              |                 |              | G/NNO           | Extra STR check                                |
| 178 |               |                   |            |          | SAM      | SAM     |  | Inertial Sun vector determination                              | -        |  | <del> </del> |                 | <del> </del> | G/NNO<br>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                              |          |  | <del> </del> |                 | <del> </del> | G/NNO           | From STR attitude data                         |
| 181 |               |                   |            |          | SAM      | SAM     |  | Send TC parameters for the OCM                                 |          |  | <del> </del> |                 | <del> </del> | G/NNO           | Based on data of first 3.5h                    |
|     |               |                   |            |          | J/(IVI   | SAW     |  | cond to parameters for the OOM                                 |          |  |              |                 |              | 5,.4140         | Sacoa on data or mat 3.011                     |
| 182 |               |                   |            |          |          |         |  |  |          |  |              |                 |              |                 |  |
| 183 |               |                   |            |          |          | 1       | First part of the launcher                                 |  | İ        |  |              |                 | 1            |                 | Ì  |
|     |               |                   |            |          |          | 1       | dispersion compensation<br>manoeuvre                       |  | ĺ        |  |              |                 | 1            |                 | 1  |
|     |               | <u> </u>          | <u> </u>   | <u></u>  | <u>L</u> |         |  |  | <u> </u> | <u>                                     </u> | <u> </u>     |                 | <u> </u>     |                 | <u>                                       </u> |
|     |               |                   |            |          |          |         |  |  |          |  |              |                 |              |                 |  |

|     | EOP version 2      | 5 - HERS          | CHELLEO         | P MASTE           | R PROC      | FDURE  |  |                                      |      |  |            |                 |                                      |                                  |   |
|-----|--------------------|-------------------|-----------------|-------------------|-------------|--|--|--------------------------------------|------|--|------------|-----------------|--------------------------------------|----------------------------------|---|
|     | LOF VEISION 2      | H0                | CHILL LLO       | FIVIAGIL          | KFROC       | LDUKL  |  | Actionees                            |      |  |            |                 |                                      |                                  |   |
|     |                    |                   |                 |                   |             |  |  | - OM                                 |      |  |            |                 |                                      |                                  |   |
|     |                    |                   |                 |                   |             |  |  | - H SOM<br>- Flight Dynamics         |      |  |            |                 |                                      |                                  |   |
|     |                    |                   |                 |                   |             |  |  | - Subssystem                         |      |  |            |                 |                                      |                                  |   |
|     |                    |                   |                 |                   |             |  |  | - SPACON                             |      |  |            |                 |                                      |                                  |   |
|     |                    |                   |                 |                   | _           |  |  | Engineers (MOC)                      |      |  |            |                 |                                      |                                  |   |
|     | MET<br>[ddd hh:mm] | Start<br>Event or | End<br>Event or | Duration<br>[min] | Sat<br>Mode | ACMS<br>Mode                                     | Sub-phase or activity                                    | OM<br>H SOM                          | CDMS | ACMS   | TTC<br>PCS | Call Procedures |                                      | Source/Ground<br>Station Support | Characteristics/constraints                             |
|     | [ddd illi.llilli]  | Date              | Date            | []                | wood        |  |  | FD                                   |      |  | TCS        |                 |                                      | Oldion Support                   |   |
|     |                    |                   |                 |                   |             |  |  | SPACON                               |      |  | CCU        |                 |                                      |                                  |   |
| 184 | 22:19              | 1339              | 1344            | - 5               | SAM         | SAM  |  |                                      |      | Restore default OBDB<br>settings just prior to first |            | H_FCP_AOC_D5DF  | Restore default OBDB for first dV    | G/NNO                            |   |
|     |                    |                   |                 |                   |             |  |  |                                      |      | delta-V  |            |                 |                                      |                                  |   |
| 185 |                    |                   |                 | 1                 |             |  | ACC transition to OCM in                                 |                                      |      | Check that TPFs are                                  |            |                 | İ                                    | G/NNO                            | TPFs:   |
|     |                    |                   |                 |                   |             |  | preparation for first delta-                             |                                      |      | available  |            |                 |                                      |                                  | "SEE-1"   |
|     |                    |                   |                 |                   |             |  | v  |                                      |      |  |            |                 |                                      |                                  | "OFP-1" (for delta-V<br>attitude)                       |
|     |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  | "DVH-1"   |
|     |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  | need to be available from                               |
|     |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  | FD.   |
| 186 | 22:24              | 1344              | 1424            | 80                | SAM         | SAM  |  |                                      |      | General ACMS health                                  |            | H_FCP_AOC_3O02  | Entry into OCM for the first delta-V | G/NNO                            | step calling  |
|     |                    |                   |                 |                   |             |  |  |                                      |      | Check<br>Check off event buffer                      |            |                 |                                      |                                  | H_FCP_AOC_4S01 is<br>redundant with step in line        |
|     |                    |                   |                 |                   |             |  |  |                                      |      | load epheremis                                       |            |                 |                                      |                                  | 87 above.   |
|     |                    |                   |                 |                   |             |  |  |                                      |      | update RCS   |            |                 |                                      |                                  | or above.   |
|     |                    |                   |                 |                   |             |  |  |                                      |      | Cmd Slew for deltaV                                  |            |                 |                                      |                                  |   |
|     |                    |                   |                 |                   |             |  |  |                                      |      | target<br>Delta-V                                    |            |                 |                                      |                                  |   |
|     |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  |   |
| 187 | 22:44              | 1364              | 1374            | 10                | SAM         | SAM  | called by<br>H_FCP_AOC_3O02                              |                                      |      | Update Sun-Earth-                                    |            | H_FCP_AOC_3M03  | Update Sun-Earth-Ephemerides         | G/NNO                            | using TPF "SEE-1"                                       |
| 188 | 22:54              | 1374              | 1404            | 30                | SAM         | SAM  | H_FCP_AUC_3U02   |                                      |      | Ephemerides<br>Slew to Delta-V attitude              |            | H FCP AOC OOCM  | Procedure for Pointing in OCM        | G/NNO                            | using TPFs "OFP-1";                                     |
|     | 22.54              |                   |                 |                   |             |  |  |                                      |      | in OCM   |            |                 |                                      |                                  | 30 minutes is reserved in                               |
|     |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  | this timeline for maximum                               |
| 189 |                    |                   |                 |                   |             |  | Delta V  |                                      |      |  |            |                 |                                      |                                  | slew distance   |
| 190 | 23:24              | 1404              |                 |                   | SAM         | ОСМ  | called by  |                                      |      | Perform delta-V                                      |            | H_FCP_AOC_3001  | Perform delta-V                      | G/NNO                            | using TPF "DVH-1"                                       |
|     |                    |                   |                 |                   |             |  | H_FCP_AOC_3O02   |                                      |      |  |            |                 |                                      |                                  | for delta-v execution                                   |
| 191 |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  |   |
| 192 |                    |                   | T(end of        |                   |             |  | End of first part of the                                 |                                      |      |  |            |                 |                                      |                                  |   |
|     |                    |                   | first delta-    | 1                 |             |  | launcher dispersion                                      |                                      |      |  |            |                 |                                      |                                  |   |
|     |                    |                   | V)=T1           |                   |             |  | compensation<br>manoeuvre                                |                                      |      |  |            |                 |                                      |                                  |   |
|     |                    |                   |                 |                   |             |  | manoeuvie  |                                      |      |  |            |                 |                                      |                                  |   |
| 193 |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  |   |
| 194 |                    | T1                | T1+15           | 30                | SAM         | OCM  | Update of SAM/OCM  |                                      |      | Undate Torque Matrix for                             |            | H FCP AOC D5SM  | Set Survival Mode Thrust Level       |                                  | TPF to be used:   |
|     |                    |                   |                 |                   | 0,          | 00   | Torque Matrix and RM                                     |                                      |      | Update Torque Matrix for<br>OCM-SAM and update       |            | 00              | Cot Carvivar mode 11mast 2516.       |                                  | TLP   |
|     |                    |                   |                 |                   |             |  | flag to index the Torque                                 |                                      |      | index for Torque Matrix                              |            |                 |                                      |                                  |   |
|     |                    |                   |                 |                   |             |  | Matrix in SASM   |                                      |      | for SASM   |            |                 |                                      |                                  | Note: procedure<br>H FCP AOC D5SM                       |
|     |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  | updates the RCS thrust                                  |
|     |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  | related control parameters in                           |
|     |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  | OBDB as well as the SM<br>thrust control loevel pointer |
|     |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  | in the RMs  |
|     |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  |   |
| 195 |                    |                   |                 |                   |             | <del>                                     </del> | <del> </del>   |                                      |      |  |            | +               |                                      | 1                                |   |
| 196 |                    |                   |                 |                   |             |  |  | FD to provide TPF for second part of |      |  |            |                 |                                      |                                  | additional TPF needed:                                  |
|     |                    |                   |                 |                   |             |  | to split the first delta-V                               | manouevre                            |      |  |            |                 |                                      |                                  | "DVH-2"   |
| 1 1 |                    |                   |                 |                   |             | 1  | (total manooevre > 30 m/s)<br>the following steps as per |                                      |      | 1  | 1          |                 |                                      |                                  | ]   |
|     |                    |                   |                 |                   |             |  | line x to y are conditional                              |                                      |      |  |            |                 |                                      |                                  |   |
|     |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  |   |
|     |                    |                   |                 |                   |             |  |  |                                      |      |  |            |                 |                                      |                                  |   |
| 197 |                    |                   |                 |                   |             |  |  |                                      |      | İ  | İ          |                 |                                      |                                  |   |
| 198 |                    |                   | T(end of        |                   | SAM         | OCM  | Second part of the                                       |                                      |      | Perform delta-V                                      |            | H_FCP_AOC_3001  | Perform delta-V                      | G/NNO                            | note:   |
|     |                    |                   | second delta-   |                   |             |  | launcher dispersion compensation                         |                                      |      |  |            |                 |                                      |                                  | procedure will comprise:<br>(i) delta-V (TPF="DVH-2")   |
| 1 1 |                    |                   | deπa-<br>V)=T2  |                   |             | 1  | manoeuvre  |                                      |      |  | 1          |                 |                                      |                                  | (1) GONG-V (11 I = DVII-Z )                             |
| 199 |                    |                   | ,               |                   |             | <u> </u>   |  |                                      |      |  |            |                 |                                      |                                  |   |
| 199 |                    |                   | L               |                   | <u> </u>    |  | 1  |                                      |      | 1  | 1          |                 | 1                                    | <u> </u>                         | 1   |

|     | LEOP version 2     | 5 - HERS                              | CHELLEO                 | P MASTE           | R PROC      | EDURE        |   |   |      |  |                   |                                 |                                  |                                  | 1  |
|-----|--------------------|---------------------------------------|-------------------------|-------------------|-------------|--------------|---|---|------|--|-------------------|---------------------------------|----------------------------------|----------------------------------|--|
|     | 51 101010112       | H0                                    |                         |                   | 1           |              |   | Actionees   |      |  |                   |                                 |                                  |                                  |  |
|     |                    |                                       |                         |                   |             |              |   | - OM<br>- H SOM<br>- Flight Dynamics<br>- Subssystem<br>- SPACON<br>Engineers (MOC)   |      |  |                   |                                 |                                  |                                  |  |
|     | MET<br>[ddd hh:mm] | Start<br>Event or<br>Date             | End<br>Event or<br>Date | Duration<br>[min] | Sat<br>Mode | ACMS<br>Mode |   | OM<br>H SOM<br>FD   | CDMS | ACMS   | TTC<br>PCS<br>TCS | Call Procedures                 |                                  | Source/Ground<br>Station Support | Characteristics/constraints  |
|     |                    |                                       |                         |                   |             |              |   | SPACON  |      |  | CCU               |                                 |                                  |                                  |  |
| 200 |                    | T(end of<br>second<br>delta-<br>V)=T2 |                         |                   |             |              | End of second part of the<br>launcher dispersion<br>compensation<br>manoeuvre |   |      |  |                   |                                 |                                  |                                  |  |
| 201 |                    | T2                                    | T2+20                   | 20                |             | 1            | Slew to safe attitude in  | FD to provide TPF for OCM.  |      |  |                   |                                 |                                  | +                                | TDE:   |
|     |                    |                                       |                         |                   |             |              | ОСМ   | For the provide IPF 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 IPP-4 MM-007 issue 2/5 page 134 , i.e. at least 3 deg margin with the edge of the operational zone. |      |  |                   |                                 |                                  |                                  | "OFP-2" (for safe RWL run in attitude).  |
| 203 |                    | T2                                    | T2+20                   | 20                | SAM         | OCM          |   |   |      | Slew to safe attitude for<br>RWL run-in in OCM   |                   | H_FCP_AOC_0OCM                  | Perform pointing in OCM          |                                  | TPF to be used:<br>OFP-2   |
| 204 |                    |                                       |                         |                   |             |              |   |   |      | RWL Tull-III III OCIVI   |                   |                                 |                                  |                                  | OFF-2  |
| 205 |                    | T2+20                                 | T2+320                  | 200               | SAM         | OCM          |   | FD to provide TPFs for RWL run-in   |      | Procedure for Entry into   |                   | H_FCP_AOC_3S07                  | Entry into Herschel SCM for the  | G/NNO                            | 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)  note: procedure |
|     |                    | 12120                                 | 121320                  | 300               | O-IW        | CON          |   |   |      | Herschel SCM for the first time  |                   | 1                               | first time after PM start/reset  | O/MNO                            | 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 |                    | TO 00                                 | TO 45                   | 4.0               |             | 0011         |   |   |      | BUIL 1001  |                   |                                 | D 1 DW                           | CAULO                            | 0 : 1  |
| 200 |                    | T2+30                                 | T2+45                   | 10                | SAM         | ОСМ          | switch-on RWL<br>called by<br>H_FCP_AOC_3S07                                  | procedure called by<br>H_FCP_AOC_3S07   |      | prepare RWLs and OCM<br>for RWL run-in   |                   | H_FCP_AOC_4R14                  | Declare RWL assembly operational | G/NNO                            | - Switch-on RWLs<br>-modify RCS control<br>parameters for run-in<br>- run-in RWLs  |
| 209 |                    | T2+45                                 | T2+55                   | 10                | SAM         | ОСМ          | called by<br>H_FCP_AOC_4R14   | procedure called by<br>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: verifity 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<br>OCM<br>- stop BIASING in OCM<br>- restore RCS control<br>parameters |                   | H_FCP_AOC_4R14<br>as of step 14 | Declare RWL assembly operational |                                  |  |

|     | LEOP version 2 | 5 - HERS                  | CHELLEO                 | P MASTE           | R PROC      | EDURE        |  |  |      |                             |                          |                 |                                       |                                  |  |
|-----|----------------|---------------------------|-------------------------|-------------------|-------------|--------------|--|--|------|-----------------------------|--------------------------|-----------------|---------------------------------------|----------------------------------|--|
| H   |                | Н0                        | 1                       |                   |             | LUGIKE       |  | Actionees  |      |                             |                          |                 |                                       | 1                                |  |
|     |                |                           |                         |                   |             |              |  | - OM<br>- H SOM<br>- Flight Dynamics<br>- Subssystem<br>- SPACON   |      |                             |                          |                 |                                       |                                  |  |
|     |                |                           |                         |                   |             |              |  | Engineers (MOC)  |      |                             |                          |                 |                                       |                                  |  |
|     | [ddd hh:mm]    | Start<br>Event or<br>Date | End<br>Event or<br>Date | Duration<br>[min] | Sat<br>Mode | ACMS<br>Mode |  | OM<br>H SOM<br>FD<br>SPACON  | CDMS | ACMS                        | TTC<br>PCS<br>TCS<br>CCU | Call Procedures |                                       | Source/Ground<br>Station Support | Characteristics/constraints  |
| 211 |                |                           |                         |                   |             |              |  |  |      |                             |                          |                 |                                       |                                  |  |
| 212 |                | T2+295                    | T2+305                  | 10                | SAM         | ОСМ          |  | procedure called by<br>H_FCP_AOC_4R14  |      | bias RWLs - TBC             |                          | H_FCP_AOC_4R34  | Perform RWL bias in OCM               | G/NNO                            | using TPF "RWL-2"<br>Objective is to bring the<br>RWL speeds from the high<br>run-in speeds to an<br>adequate level for entry into<br>SCM -TBC |
| 213 |                | T2+305                    | T2+310                  | 5                 |             |              |  |  |      | Set ACMS to AFO             |                          | H_FCP_AOC       | Herschel ACMS : Set ACMS FDIR<br>Mode |                                  |  |
| 214 |                | T2+310                    | T2+320                  | 10                | SAM         | SCM          |  | procedure called by<br>H_FCP_AOC_3S07  |      | transition to SCM           |                          | H_FCP_AOC_3S01  | Perform SCM Fine Pointing             | G/NNO                            | static transition (same as<br>OCM attitude)<br>using TPF "SFP-1"   |
| 215 |                | T2+320                    | T2+335                  | 15                | SAM         | SCM          |  |  |      | Verify SCM<br>Configuration |                          | H_FCP_AOC_3001  | Verify SCM Configuration              | G/NNO                            |  |
| 216 |                |                           |                         |                   |             |              |  | FD to provide TPF for RWL biasing<br>in SCM in order to compensate for<br>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<br>(and therfore part of )<br>procedure<br>H_FCP_AOC_3S07 |  |      | Perform RWS Biasing         |                          | H_FCP_AOC_4R20  | Perform RWS Biasing                   | G/NNO                            | Objective to compensate for<br>the rates accumulated in<br>OCM and to come to bias<br>adequate for upcoming<br>activities<br>using "TPF RWB-1" |
| 218 |                |                           |                         |                   |             |              |  |  |      |                             | _                        |                 |                                       |                                  |  |
| 219 |                |                           |                         |                   |             |              |  | FD to provide TPFs in order to slew<br>to an adequate attitude which is<br>attitude constraint free for the<br>maximum time possible.<br>Verified by FD whether a RWL bias is<br>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";<br>potentially redundandant<br>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 |                |                           |                         |                   |             |              |  |  |      |                             |                          |                 |                                       |                                  |  |

|     | LEOP version 2     | 5.HERS            | CHELLEO         | D MASTER          | PROC        | EDLIRE   |                       |  |      |   |            |                 |                     |                                  |                             |
|-----|--------------------|-------------------|-----------------|-------------------|-------------|--|-----------------------|--|------|---|------------|-----------------|---------------------|----------------------------------|-----------------------------|
|     |                    | H0                |                 | . MAGTEI          |             | LOCKE  |                       | Actionees  |      |   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       | - OM   |      |   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       | - H SOM<br>- Flight Dynamics   |      |   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       | - Flight Dynamics<br>- Subssystem  |      |   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       | - SPACON   |      |   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       | Engineers (MOC)  |      |   |            |                 |                     |                                  |                             |
|     | MET<br>[ddd hh:mm] | Start<br>Event or | End<br>Event or | Duration<br>[min] | Sat<br>Mode | ACMS<br>Mode                                     | Sub-phase or activity | OM<br>H SOM  | CDMS | ACMS  | TTC<br>PCS | Call Procedures |                     | Source/Ground<br>Station Support | Characteristics/constraints |
|     | [ddd IIII.IIII]    |                   | Date            | [iiiii]           | ivioue      | wioue  |                       | FD   |      |   | TCS        |                 |                     | Station Support                  |                             |
|     |                    |                   |                 |                   |             |  |                       | SPACON   |      |   | CCU        |                 |                     |                                  |                             |
| 223 |                    |                   |                 |                   |             |  |                       | SOM to clarify with PROJECT  |      |   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       | support, Flight Dynamics and the   |      |   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       | ACMS engineer wether the RWL run-<br>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<br>RWL run shall continue in SCM.     |      |   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       | RVVE full shall continue in SCIVI.   |      |   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       | 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,<br>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   |            | H_FCP_AOC_4R20  | Perform RWS Biasing | G/NNO                            |                             |
|     |                    |                   |                 |                   |             |  |                       |  |      | speeds for run-in   |            |                 |                     |                                  |                             |
| 225 |                    |                   |                 |                   |             |  |                       |  |      | From T2+420 min until   |            |                 |                     |                                  |                             |
| 220 |                    |                   |                 |                   |             |  |                       |  |      | end of pass RWL run-in  |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       |  |      | perform as follows:   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       |  |      | <ul> <li>contact FD and verify if<br/>and when a RWL bias to</li> </ul> |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       |  |      | compensate distrubance  |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       |  |      | torques and keep RWLs   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       |  |      | on high speed is  |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       |  |      | necessay<br>- get TPF "RWB"   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       |  |      | - get IFF KWD   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  |                       |  |      |   |            |                 |                     |                                  |                             |
| 200 |                    |                   |                 |                   |             | <u> </u>   |                       | la accepta DMII avania han l   |      |   |            |                 |                     |                                  |                             |
| 226 |                    |                   |                 |                   |             |  |                       | In case the RWL run-in has been<br>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)  |      |   |            |                 |                     |                                  |                             |
|     |                    |                   |                 |                   |             |  | 1                     |  |      |   |            |                 |                     | 1                                |                             |
| 227 |                    |                   |                 |                   |             | <u> </u>   | -                     |  |      |   |            |                 |                     |                                  |                             |
| 228 |                    | when              |                 | 10                | SAM         | SCM  | <del> </del>          |  |      | apply RWL bias  |            | H_FCP_AOC_4R20  | Perform RWS Biasing | G/NNO                            |                             |
| -   |                    | applicable        |                 |                   |             |  | 1                     |  |      | ,,,,  |            | _ 55020         |                     | 1                                |                             |
| 057 |                    |                   |                 |                   |             |  | ļ                     |  |      |   |            |                 |                     | ļ                                |                             |
| 229 |                    |                   |                 |                   |             |  |                       |  |      | repeat until end of pass  |            |                 |                     |                                  |                             |
| 230 |                    |                   |                 |                   |             | <b>-</b>   |                       |  |      |   |            |                 |                     | 1                                |                             |
| 231 |                    | H0+32h0           |                 | 30                |             | t  | Shift Handover        |  |      |   |            |                 |                     | G/NNO                            | 17/04/2009 21:34            |
|     |                    | 0m                |                 |                   |             |  | Team-A to Team-B      |  |      |   |            |                 |                     | 1                                |                             |
| 232 |                    |                   | -               | <b>}</b>          |             | <del>                                     </del> |                       |  |      |   |            |                 |                     | -                                |                             |
| 232 |                    |                   |                 | l                 |             |  | 1                     | 1  |      |   |            |                 |                     | 1                                |                             |

|            |                    | H0                        | CHEL LEO                |                   |             |              |   | Actionees   | 1            |   |                   |                 | 1                        |                                  |  |
|------------|--------------------|---------------------------|-------------------------|-------------------|-------------|--------------|---|---|--------------|---|-------------------|-----------------|--------------------------|----------------------------------|--|
|            |                    | но                        |                         |                   |             |              |   | Actionees - OM - H SOM - Flight Dynamics - Subssystem - SPACON  |              |   |                   |                 |                          |                                  |  |
|            |                    |                           |                         |                   |             |              |   | Engineers (MOC)   |              |   |                   |                 |                          |                                  |  |
|            | MET<br>[ddd hh:mm] | Start<br>Event or<br>Date | End<br>Event or<br>Date | Duration<br>[min] | Sat<br>Mode | ACMS<br>Mode |   | OM<br>H SOM<br>FD   | CDMS         | ACMS  | TTC<br>PCS<br>TCS | Call Procedures |                          | Source/Ground<br>Station Support | Characteristics  |
| 233        |                    |                           |                         |                   |             | 1            |   | SPACON  |              | Until end of pass RWL   | CCU               |                 |                          | _                                |  |
| 233        |                    |                           |                         |                   |             |              |   |   |              | Until lend of pass RWI. 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                      |                         | 10                | SAM         | SCM          |   |   |              | apply RWL bias  |                   | H_FCP_AOC_4R20  | Perform RWS Biasing      | G/NNO                            |  |
|            |                    | applicable                |                         | 10                | _,          | 30           |   |   |              |   |                   | 0. 3.0020       |                          | 3,,,,,,                          |  |
| 235        |                    |                           |                         |                   |             |              |   |   |              | repeat until end of pass  |                   |                 |                          |                                  |  |
|            |                    |                           |                         |                   |             |              |   |   |              |   |                   |                 |                          |                                  |  |
| 236<br>237 |                    | 1055                      |                         |                   |             |              | STATION HAND-OVER:                        | After confirmation from SOM,  |              |   |                   |                 |                          |                                  | 17/04/2009 22  |
|            |                    | H0+32h3<br>5m             |                         |                   |             |              | NNO to CEB                                | release ground station  |              |   |                   |                 |                          |                                  | Note: release of anticipated (i.e. before physical period ends) in facilitate smooth hand-over to Cl.  Physical end of |
| 238        |                    |                           |                         |                   |             |              |   |   |              |   |                   |                 |                          | G/NNO                            | NNO:<br>Five degrees e   |
| 239        |                    |                           |                         |                   |             | _            |   |   |              |   |                   |                 |                          | G/NNO                            | 30/04/2009 22<br>Horizon   |
|            |                    |                           |                         |                   |             |              |   |   |              |   |                   |                 |                          | G/NNO                            | 30/04/2009 22  |
| 240<br>241 |                    |                           |                         |                   |             |              |   |   |              |   |                   |                 |                          |                                  |  |
| 241        |                    |                           |                         |                   |             |              | STATION HAND-OVER:<br>NNO to CEB          | H SOM:<br>request from OM confirmation of<br>AOS  |              |   |                   |                 |                          |                                  | 30/0   |
| 242        |                    | 1955<br>H0+32h3<br>5m     |                         |                   |             |              |   | Ground Stations configuration: - Nominal configuration (TM/TC): MEDIUM/4k - Safemode configuration: LOW-1/125 |              |   |                   |                 |                          | G/CEB                            | Note: physical /<br>was at:<br>Horizon:<br>30/04/2009 19<br>Five degrees el<br>30/04/2009 19                           |
| 243        |                    |                           |                         |                   |             |              |   |   |              |   |                   |                 |                          |                                  |  |
| 244        | 32:37              | 1957                      | 1962                    | 5                 | SAM         | SCM          | Perform TC link acquisition               | request sweep of uplink   |              |   |                   |                 |                          | G/CEB                            |  |
| 245<br>246 | 32:42              | 1962                      | 1967                    | 5                 | SAM         | SCM          | TTC-S Subsystem<br>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<br>2)          |   | Test command |   |                   | H_FCP_DHS_1029  | TC Link Test - part 2    | G/CEB                            | BD mode, AD n<br>ACC   |
| 248<br>249 |                    |                           |                         |                   | SAM         | SCM          |   | Paguage Panging until and of page   |              |   |                   | +               |                          | G/CEB                            |  |
| 250        |                    |                           |                         |                   | SAM         | SCM          | 1   | Request Ranging until end of pass Inform FD about start of Ranging  |              |   |                   | 1               |                          | G/CEB                            |  |
| 251        |                    |                           |                         |                   |             |              |   |   |              |   |                   |                 |                          |                                  |  |
| 252        | 32:57              | 1977                      | 1978                    | 1                 | SAM         | SCM          | Apply TCO fixed gradient<br>to commanding | SPACON to apply fixed TCO gradient<br>on TMSPACON in TCO TAB  |              |   |                   |                 |                          |                                  |  |

|            | LEOP version 2     | 2.5 - HERS      | CHEL LEO                | P MASTE           | R PROC      | EDURE        |                                    |  |      |  |                          |                 |                     |                                  |   |
|------------|--------------------|-----------------|-------------------------|-------------------|-------------|--------------|------------------------------------|--|------|--|--------------------------|-----------------|---------------------|----------------------------------|---|
|            |                    | НО              |                         |                   |             |              |                                    | Actionees - OM - H SOM - Flight Dynamics - Subssystem - SPACON Engineers (MOC) |      |  |                          |                 |                     |                                  |   |
|            | MET<br>[ddd hh:mm] | Event or        | End<br>Event or<br>Date | Duration<br>[min] | Sat<br>Mode | ACMS<br>Mode | ,                                  | OM<br>H SOM<br>FD<br>SPACON  | CDMS | ACMS   | TTC<br>PCS<br>TCS<br>CCU | Call Procedures |                     | Source/Ground<br>Station Support | Characteristics/constraints             |
| 254        |                    |                 |                         |                   |             |              |                                    |  |      | On regular basis, until<br>end of RWL run-in,<br>proceed as follows:<br>- contact FD and verify if<br>and when a RWL bias to<br>compensate distrubance<br>torques and keep RWLs<br>on high speed is<br>necessay<br>- get TPF "RWB" |                          |                 |                     |                                  |   |
| 255        |                    | when applicable |                         | 10                | SAM         | SCM          |                                    |  |      | apply RWL bias   |                          | H_FCP_AOC_4R20  | Perform RWS Biasing | G/CEB                            |   |
| 256<br>257 |                    |                 |                         |                   |             |              |                                    |  |      | repeat until end of pass   |                          |                 |                     | G/CEB                            |   |
| 258        |                    |                 |                         |                   |             |              | LOS - CEB                          | After confirmation from SOM, release ground station                            |      |  |                          |                 |                     |                                  | 01/05/2009 05:58:41<br>physical LOS CEB |
| 259<br>260 | 40:34              | 2434<br>H0+40h3 |                         |                   |             |              |                                    |  |      |  |                          |                 |                     | G/CEB                            |   |
| 261        |                    | 4m              |                         |                   |             |              |                                    |  |      |  |                          |                 |                     |                                  |   |
| 262        |                    | H0+44h0<br>0m   |                         | 30                | )           |              | Shift Handover<br>Team-B to Team-A | Shift hand-over  |      |  |                          |                 |                     |                                  | 01/05/2009 09:2                         |

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