



CENTRE NATIONAL D'ETUDES SPATIALES

INTEGRAL SPECTROMETER



SPI-MU-0-1062V3-CNES

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ANNEX 10

PSD LIBRARY UPLINK – MOC-SGS ICD



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EUROPEAN SPACE AGENCY
DIRECTORATE OF TECHNICAL & OPERATIONAL SUPPORT
MISSION OPERATIONS DEPARTMENT

INTEGRAL

**SPI PSD Library Uplink
MOC-SGS ICD**

INT-MOC-SYS-ICD-1003-TOS-OGI

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CHANGE RECORD SHEET

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1 Introduction

1.1 Background

The SPI Pulse Shape Discriminator (PSD) has an on-board library characterizing the possible pulse shapes from the 19 SPI detectors.

The library is stored on-board in the PSD EEPROM (300kbytes) and is fully re-programmable from ground.

During the mission it is estimated to update the library at least once every 6 months, usually after the annealing process (SPI UM ref.4).

The library is organized by "templates". When the library update is required, it could be necessary to load from ground a minimum of 2 templates up to a worst case of 1482 templates (full library).

The complete procedure for SPI PSD library update is reported in Annex-A.

It was decided (see ref.2, 3 and 5) that the data needed to build the commands to reprogram library will be transferred to MOC by means of electronic files in the **SCOS2000 Stack Import** format.

The choice is justified by the fact that this is the only IMCS (Integral Mission Control System) parameter transfer mechanism suitable for the application.

1.2 Purpose

The purpose of this ICD is to define the format, specify the records and provide an example of the files containing the data in order to build the PSD library load commands at MOC.

2 Reference Documents

- [1] STACK IMPORT ICD S2K-MCS-ICD-0002-TOS-GCI, Nov 02, 1999
- [2] Email from SPI (C. Larigauderie 22.02.2001)
- [3] Email MOC to SPI (F. Cordero 19.02.2001)
- [4] SPI User's Manual SPI-MU-0-1062V2-CNES
- [5] M.o.m. SPI Commissioning Phase/PSD Lib Uplink 30.05.2001
- [6] OBSMS-SGS ICD, INT-MOC-ICD-0003



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2.1 GLOSSARY OF TERMS

CEV: Command Execution Verification

CNES: Centre National D'Etudes Spatiales

CSER: TBD

CUC: CCSDS Unsegmented Time Code

DPE: Data Processing Electronics

ISDC: Integral Science Data Center

ISOC: Integral Science Operations Center

IMCS: INTEGRAL Mission Control System

OBSM: On-Board SW Maintenance

OBSMS: On-Board SW Maintenance System

MOC: Mission Operation Center (Darmstadt)

PTV: Pre-Transmission Validation

SCOS2000: SW installed on IMCS for Mission Control

SW: Software

TC: Telecommand

TM: Telemetry

TBD: To Be Defined

TBC: To Be Confirmed

TBW: To Be Written

TPF: Task Parameter File



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2.2 ASSUMPTIONS/OPERATIONAL CONSIDERATIONS

During the mission, whenever an update of the PSD library is necessary and approved by the Ground Segment parties, the SPI Team (CNES/CSER) should produce:

- 2 sets of stack import files (1 set for DPE1, 1 set for DPE2).
- The parameter values for E/F0306, E/F0307 and E/F0308 TCs (see Annex-A procedure) as database updates.

The 2 set of files and the database changes will then be passed to MOC via ISDC-ISOC. At MOC the files will be archived for configuration control purposes.

ISOC will foresee a specific time window in the POS (Preferred Observation Schedule), where SPI science ops are not suspended and where library uplink operations can take place.

During this window the following actions will be performed at MOC:

- One stack import file at a time, will be loaded into the Manual Stack task of the IMCS and the commands up-linked in automatic, applying the procedure in Annex-A: the time to load the full library data is around 8 h
- The parameter values for E/F0306, E/F0307 and E/F0308 TCs will be edited on the manual stack and up-linked. Eventually, the ODB will be modified to include the new values as default.

If no command failure occurs, no further operations will be required.

If a command failure occurs, specific recovery procedures will be attempted by MOC. As part of a possible troubleshooting procedure, SPI Team may require MOC to compare the Library EEPROM w.r.t. The expected content. In this case SPI Team will provide an OBSMS file containing the Library memory image (applicable ICD is ref.6). Using the IMCS OBSM task, MOC will dump the EEPROM and perform the comparison.

A simplified scheme of the possible GS interactions and MOC operations for Library update is depicted in Annex-B.



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3 GENERAL REQUIREMENTS

3.1 STACK IMPORT FORMAT

The files shall be built using the SCOS2000 Stack Import format (de-scribed in ref.1).

Basically, the Stack Import file is an ASCII file (UNIX compatible) containing several instances of the following basic records:

- Base Record (see ref.1 sect.2.4.1): one record only as header per file
- Command Record (see ref.1 sect.2.4.4): one record for each command
- Command Parameter Record (see ref.1 sect.2.4.5): one record for each command parameter

The stack import file format allows produce one single file for any number of commands necessary to re-program the library EEPROM (vari-able sequence of commands).

NOTES:

a - The SCOS2000 Transfer Parameter File (TPF) format is not suitable in this particular application. This is due to the variable sequence of commands needed for the library update.

b - OBSMS format is also not suitable due to the on-board implementa-tion of the re-programming commands.

3.2 NUMBER OF STACK IMPORT FILES AND NUMBER OF TEMPLATES PER FILE

CNES/CSER shall be able to produce two sets of Stack Import files: 1 set for PSD library load commands via DPE1, 1 set for PSD library load commands via DPE2, in case of failure of DPE1.

Each set of files can either contain the actual templates to be up-dated on-board or the full library. The choice will be dictated by time optimization and EEPROM write-cycles considerations done by CNES/CSER/MOC.

In case of failure in updating the library, MOC may be requested to go back to a default, working library version, while troubleshooting is on-going. For the purpose, CNES/CSER shall provide at least one full template library.

In order to improve MOC flexibility in uplinking the commands, each stack import file shall contain no more than 150 templates (corre-sponding to about 1200 commands, i.e. about 1hr continuous command uplink ops). As a consequence, each file set shall be composed of 10 files maximum. The envisaged maximum size of each file should be less than 350kbyte.



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3.2.1 Naming Conventions

The following naming convention shall apply for the Stack Import files:

`SPIx_PSD_LIB_n_of_m_yyyymmddhhmmss_vvv.STK`

where:

- x denotes whether it is DPE1 or DPE2 (x = 1 or 2)
- n denotes the file number (n = 1 ... m)
- m denotes the number of files necessary to uplink the new Library (max 10)
- yyyymmddhhmmss denotes the GMT when the file was created
- vvv denotes the version of the library (which should start from 0000 and increment each time a new PSD lib is submitted to MOC for uplink)

3.2.2 Archive and Compress

In order to ease the file transfer among CNES/CSER/ISDC/ISOC/MOC, each set of files (.STK files, i.e. m files) should be archived and compressed using the UNIX "tar" and "compress" utilities (standard UNIX utilities) in a single file with the following name:

`SPIx_PSD_LIB_yyyymmddhhmmss_vvv.tar.Z`

where:

- x denotes whether it is DPE1 or DPE2 (x = 1 or 2)
- yyyymmddhhmmss denotes the GMT when the file was created
- vvv denotes the version of the library

3.3 OBSMS IMAGE FILES

Regarding the OBSMS images for the PSD library, in case of need for troubleshooting, the name shall be (according to the applicable OBSMS ICD RD[6]):

`IIMG_P_PSD_1025_00004_T_d_rrr_000_0.INT` for SPI DPE1

`IIMG_R_PSD_1153_00004_T_d_rrr_000_0.INT` for SPI DPE2

where :

- rrr shall match with vvv of the .STK files.
- d :
 - X = Development Phase. To be used during ground tests
 - V = Operational Release. To be used for files applicable for SPI PSD FM



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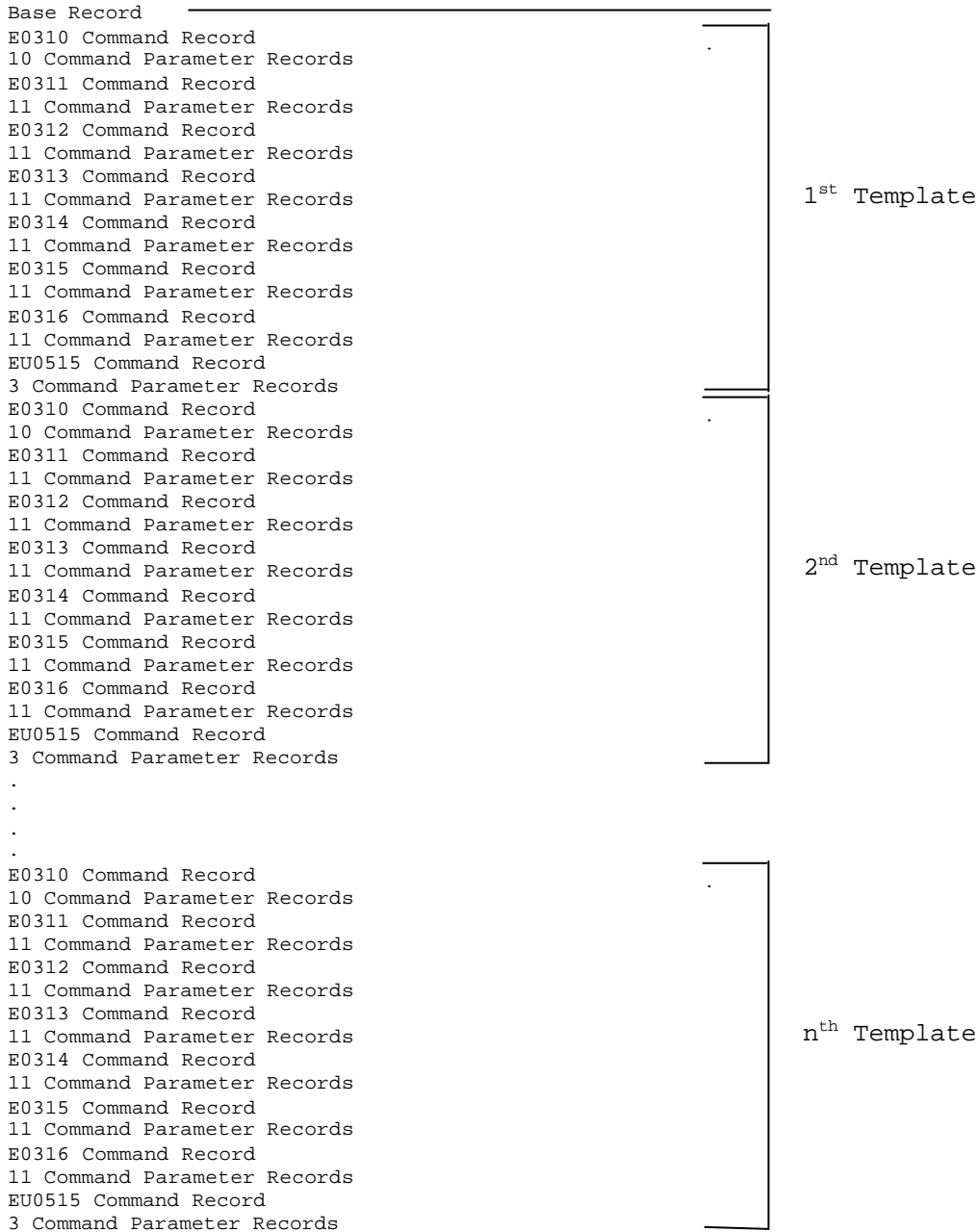
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4 LIBRARY LOAD COMMAND FILE FOR DPE1

Referring to the procedure in Annex-A step 3), each stack import file for DPE1 shall be built as follows:



The following sections of the document define the detailed specification of the records to build the file in the Stack Import format.



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4.1 SPECIFICATION OF THE FILE RECORDS

4.1.1 Base Record

```
2|MANS|984591719|0|27/02/01|0000000000
```

- The shaded field is the file creation time to be updated by SPI Team according to the absolute time CUC formatted: Number of sec-onds to be added to the reference epoch 1970.001.00.00.00.000. Ex-ample: 956355761 or 988885421.
- The lighter shaded field is the database version 27/02/01, which may be updated by MOC if needed.
- All other fields shall be left exactly as is.

4.1.2 E0310 Command Record

```
C|E0310|1|1|4|0|0|1|-1|0|0|0|10|0|1|0|0||7|||0
```

- No change is requested to this record. It shall be reported ex-actly as is any time E0310 is necessary.

NOTE: Same requirements apply for E0311 to E0316 command records here following specified.

4.1.2.1 Command Parameter Records

E8753	0	0	2	0	1	1
E8754	0	0	2	0	2	1
E8755	0	0	2	0	3	1
E8756	0	0	2	0	4	1
E8757	0	0	2	0	5	1
E8760	0	0	2	0	6	1
E8761	0	0	2	0	7	1
E8762	0	0	2	0	8	1
E8763	0	0	2	0	9	1
E9990	0	0	2	0	67	0

- The shaded fields are the parameter values to be updated by SPI Team. They are raw values (as no calibration is associated to these parameters) and shall be expressed in decimal.
- All other fields shall be left exactly as is.

NOTE: Same requirements apply for E0311 to E0316 and EU0515 command parameter records here following specified.

- This command parameter records set shall be inserted immediately after the E0310 command record.



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4.1.3 E0311 Command Record

C|E0311|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0

4.1.3.1 Command Parameter Records

E8764	0	0	2	0	10	1
E8765	0	0	2	0	11	1
E8766	0	0	2	0	12	1
E8767	0	0	2	0	13	1
E8768	0	0	2	0	14	1
E8769	0	0	2	0	15	1
E8770	0	0	2	0	16	1
E8771	0	0	2	0	17	1
E8772	0	0	2	0	18	1
E8773	0	0	2	0	19	1
E9990	0	0	2	0	68	0

4.1.4 E0312 Command Record

C|E0312|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0

4.1.4.1 Command Parameter Records

E8774	0	0	2	0	20	1
E8775	0	0	2	0	21	1
E8776	0	0	2	0	22	1
E8777	0	0	2	0	23	1
E8778	0	0	2	0	24	1
E8779	0	0	2	0	25	1
E8780	0	0	2	0	26	1
E8781	0	0	2	0	27	1
E8782	0	0	2	0	28	1
E8783	0	0	2	0	29	1
E9990	0	0	2	0	69	0

4.1.5 E0313 Command Record

C|E0313|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0

4.1.5.1 Command Parameter Records

E8784	0	0	2	0	30	1
E8785	0	0	2	0	31	1
E8786	0	0	2	0	32	1
E8787	0	0	2	0	33	1
E8788	0	0	2	0	34	1
E8789	0	0	2	0	35	1
E8790	0	0	2	0	36	1
E8791	0	0	2	0	37	1
E8792	0	0	2	0	38	1
E8793	0	0	2	0	39	1
E9990	0	0	2	0	70	0

4.1.6 E0314 Command Record

C|E0314|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0



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4.1.6.1 Command Parameter Records

E8794	0	0	2	0	40	1
E8795	0	0	2	0	41	1
E8796	0	0	2	0	42	1
E8797	0	0	2	0	43	1
E8798	0	0	2	0	44	1
E8799	0	0	2	0	45	1
E8800	0	0	2	0	46	1
E8801	0	0	2	0	47	1
E8802	0	0	2	0	48	1
E8803	0	0	2	0	49	1
E9990	0	0	2	0	71	0

4.1.7 E0315 Command Record

C	E0315	1	1	2	0	0	1	-1	0	0	0	11	0	1	0	0	7	0
---	-------	---	---	---	---	---	---	----	---	---	---	----	---	---	---	---	---	---

4.1.7.1 Command Parameter Records

E8804	0	0	2	0	50	1
E8805	0	0	2	0	51	1
E8806	0	0	2	0	52	1
E8807	0	0	2	0	53	1
E8808	0	0	2	0	54	1
E8809	0	0	2	0	55	1
E8810	0	0	2	0	56	1
E8811	0	0	2	0	57	1
E8812	0	0	2	0	58	1
E8813	0	0	2	0	59	1
E9990	0	0	2	0	88	0

4.1.8 E316 Command Record

C	E0316	1	1	2	0	0	1	-1	0	0	0	11	0	1	0	0	7	0
---	-------	---	---	---	---	---	---	----	---	---	---	----	---	---	---	---	---	---

4.1.8.1 Command Parameter Records

E8814	0	0	2	0	60	1
E8815	0	0	2	0	61	1
E8816	0	0	2	0	62	1
E8817	0	0	2	0	63	1
E8818	0	0	2	0	64	1
E8819	0	0	2	0	65	1
E8820	0	0	2	0	66	1
E8821	0	0	2	0	67	1
E8822	0	0	2	0	68	1
E8823	0	0	2	0	69	1
E9990	0	0	2	0	89	0

4.1.9 EU0515 Command Record

C	EU0515	1	1	2	0	0	1	9998	0	0	0	3	0	1	0	0	7	0
---	--------	---	---	---	---	---	---	------	---	---	---	---	---	---	---	---	---	---

- 9998 is the Command Verification Stage ID.

4.1.9.1 Command Parameter Records

E8932	0	0	2	0	0	1
E8935	0	0	2	0	1	1
E9990	0	0	2	0	68	0



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- The shaded field shall contain the SPI PSD memory address of the TM parameter E3879 (see procedure in Annex-A).

4.2 STACK IMPORT FILE FOR DPE1: EXAMPLE

Here is an example how the file should look like in case N=2 (2 lib templates). Parameter values are consecutive numbers just for the example pur-pose: they have no operational meaning.

```

2|MANS|984591719|0|27/02/01|0000000000
C|E0310|1|1|4|0|0|1|-1|0|0|0|10|0|1|0|0||7|||0
E8753|0|0|2|0|1|1
E8754|0|0|2|0|2|1
E8755|0|0|2|0|3|1
E8756|0|0|2|0|4|1
E8757|0|0|2|0|5|1
E8760|0|0|2|0|6|1
E8761|0|0|2|0|7|1
E8762|0|0|2|0|8|1
E8763|0|0|2|0|9|1
E9990|0|0|2|0|67|0
C|E0311|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0
E8764|0|0|2|0|10|1
E8765|0|0|2|0|11|1
E8766|0|0|2|0|12|1
E8767|0|0|2|0|13|1
E8768|0|0|2|0|14|1
E8769|0|0|2|0|15|1
E8770|0|0|2|0|16|1
E8771|0|0|2|0|17|1
E8772|0|0|2|0|18|1
E8773|0|0|2|0|19|1
E9990|0|0|2|0|68|0
C|E0312|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0
E8774|0|0|2|0|20|1
E8775|0|0|2|0|21|1
E8776|0|0|2|0|22|1
E8777|0|0|2|0|23|1
E8778|0|0|2|0|24|1
E8779|0|0|2|0|25|1
E8780|0|0|2|0|26|1
E8781|0|0|2|0|27|1
E8782|0|0|2|0|28|1
E8783|0|0|2|0|29|1
E9990|0|0|2|0|69|0
C|E0313|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0
E8784|0|0|2|0|30|1
E8785|0|0|2|0|31|1
E8786|0|0|2|0|32|1
E8787|0|0|2|0|33|1
E8788|0|0|2|0|34|1
E8789|0|0|2|0|35|1
E8790|0|0|2|0|36|1
E8791|0|0|2|0|37|1
E8792|0|0|2|0|38|1
E8793|0|0|2|0|39|1
E9990|0|0|2|0|70|0
C|E0314|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0
E8794|0|0|2|0|40|1
E8795|0|0|2|0|41|1
E8796|0|0|2|0|42|1
E8797|0|0|2|0|43|1
E8798|0|0|2|0|44|1
E8799|0|0|2|0|45|1
E8800|0|0|2|0|46|1
E8801|0|0|2|0|47|1
E8802|0|0|2|0|48|1
E8803|0|0|2|0|49|1
E9990|0|0|2|0|71|0
C|E0315|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0

```



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```

E8804 0|0|2|0|50|1
E8805 0|0|2|0|51|1
E8806 0|0|2|0|52|1
E8807 0|0|2|0|53|1
E8808 0|0|2|0|54|1
E8809 0|0|2|0|55|1
E8810 0|0|2|0|56|1
E8811 0|0|2|0|57|1
E8812 0|0|2|0|58|1
E8813 0|0|2|0|59|1
E9990 0|0|2|0|88|0
C|E0316 1|1|2|0|0|1|-1|0|0|0|10|0|1|0|0|||7|||0
E8814 0|0|2|0|60|1
E8815 0|0|2|0|61|1
E8816 0|0|2|0|62|1
E8817 0|0|2|0|63|1
E8818 0|0|2|0|64|1
E8819 0|0|2|0|65|1
E8820 0|0|2|0|66|1
E8821 0|0|2|0|67|1
E8822 0|0|2|0|68|1
E8823 0|0|2|0|69|1
E9990 0|0|2|0|89|0
C|EU0515 1|1|2|0|0|1|9998|0|0|0|3|0|1|0|0|||7|||0
E8932 0|0|2|0|999|1
E8935 0|0|2|0|0|1
E9990 0|0|2|0|68|1
C|E0310 1|1|4|0|0|1|-1|0|0|0|10|0|1|0|0|||7|||0
E8753 0|0|2|0|11|1
E8754 0|0|2|0|12|1
E8755 0|0|2|0|3|1
E8756 0|0|2|0|14|1
E8757 0|0|2|0|15|1
E8760 0|0|2|0|16|1
E8761 0|0|2|0|17|1
E8762 0|0|2|0|18|1
E8763 0|0|2|0|19|1
E9990 0|0|2|0|67|0
C|E0311 1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8764 0|0|2|0|110|1
E8765 0|0|2|0|111|1
E8766 0|0|2|0|112|1
E8767 0|0|2|0|113|1
E8768 0|0|2|0|114|1
E8769 0|0|2|0|115|1
E8770 0|0|2|0|116|1
E8771 0|0|2|0|117|1
E8772 0|0|2|0|118|1
E8773 0|0|2|0|119|1
E9990 0|0|2|0|68|0
C|E0312 1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8774 0|0|2|0|120|1
E8775 0|0|2|0|121|1
E8776 0|0|2|0|122|1
E8777 0|0|2|0|123|1
E8778 0|0|2|0|124|1
E8779 0|0|2|0|125|1
E8780 0|0|2|0|126|1
E8781 0|0|2|0|127|1
E8782 0|0|2|0|128|1
E8783 0|0|2|0|129|1
E9990 0|0|2|0|69|0
C|E0313 1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8784 0|0|2|0|130|1
E8785 0|0|2|0|131|1
E8786 0|0|2|0|132|1
E8787 0|0|2|0|133|1
E8788 0|0|2|0|134|1
E8789 0|0|2|0|135|1
E8790 0|0|2|0|136|1
E8791 0|0|2|0|137|1

```




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```

E8792|0|0|2|0|138|1
E8793|0|0|2|0|139|1
E9990|0|0|2|0|70|0
C|E0314|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8794|0|0|2|0|140|1
E8795|0|0|2|0|141|1
E8796|0|0|2|0|142|1
E8797|0|0|2|0|143|1
E8798|0|0|2|0|144|1
E8799|0|0|2|0|145|1
E8800|0|0|2|0|146|1
E8801|0|0|2|0|147|1
E8802|0|0|2|0|148|1
E8803|0|0|2|0|149|1
E9990|0|0|2|0|71|0
C|E0315|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8804|0|0|2|0|150|1
E8805|0|0|2|0|151|1
E8806|0|0|2|0|152|1
E8807|0|0|2|0|153|1
E8808|0|0|2|0|154|1
E8809|0|0|2|0|155|1
E8810|0|0|2|0|156|1
E8811|0|0|2|0|157|1
E8812|0|0|2|0|158|1
E8813|0|0|2|0|159|1
E9990|0|0|2|0|88|0
C|E0316|1|1|2|0|0|1|-1|0|0|0|10|0|1|0|0|||7|||0
E8814|0|0|2|0|60|1
E8815|0|0|2|0|61|1
E8816|0|0|2|0|62|1
E8817|0|0|2|0|63|1
E8818|0|0|2|0|64|1
E8819|0|0|2|0|65|1
E8820|0|0|2|0|66|1
E8821|0|0|2|0|67|1
E8822|0|0|2|0|68|1
E8823|0|0|2|0|69|1
E9990|0|0|2|0|89|0
C|EU0515|1|1|2|0|0|1|9998|0|0|0|3|0|1|0|0|||7|||0
E8932|0|0|2|0|999|1
E8935|0|0|2|0|0|1
E9990|0|0|2|0|68|1

```



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4.3 COMMAND PTV, CEV AND INTERLOCK

In order to up-link in automatic the whole library load command sequence, to stop it in case of command failure and to optimise the timing, the following was agreed (see ref.5 and procedure in Annex-A):

1. TM E3879 (PSD error count) will be automatically checked at the end of each template up-link. The check will consist in detecting any increase of the error count by means of an IMCS Derived Parameter.
2. In order to optimise the library up-link timing TM E3879 will be dumped from the PSD memory. TM E3879 would have in fact a refresh rate of 64s.
3. The dump will be executed by means of command EU0515. This user-defined command will have a CEV on the check (CVS_ID = 9998). It will also be interlocked at CEV level in order to stop the whole up-link sequence in case of on-board error.
4. Interlock shall be set at Release Level for all other commands from E0310 to E0315. In case of communication problems with the ground station the up-link sequence will be immediately stopped.
5. No special PTV is envisaged.

Interlocks, PTV and CEV are already specified according to these considerations in the E0310 to E0316, EU0515 command records.

4.4 COMMAND RELEASE TIMING

The following timing between commands is implemented:

- E0310 TC-C PD LIB1
{wait 2 s}
- E0311 TC-C PD LIB2
{wait 2 s}
- E0312 TC-C PD LIB3
{wait 2 s}
- E0313 TC-C PD LIB4
{wait 2 s}
- E0314 TC-C PD LIB5
{wait 2 s}
- E0315 TC-C PD LIB6
{wait 2 s}
- E0316 TC-C PD LIB7
{wait 2 s}
- EU0515 TC-C PD LIB7
{wait 4 s}

Wait times are specified in the E0310 to E0316, EU0515 command records.

Justifications

1 s is the minimum time resolution settable on IMCS for delta release time between commands.

2 s is at least required in order not to fill the complete command up-link bandwidth, preventing other commanding to the S/C.

4 s is the time necessary for verification of the correct template load (CEV on TC E0316), including some margin to account TM transmission delays up to MOC.



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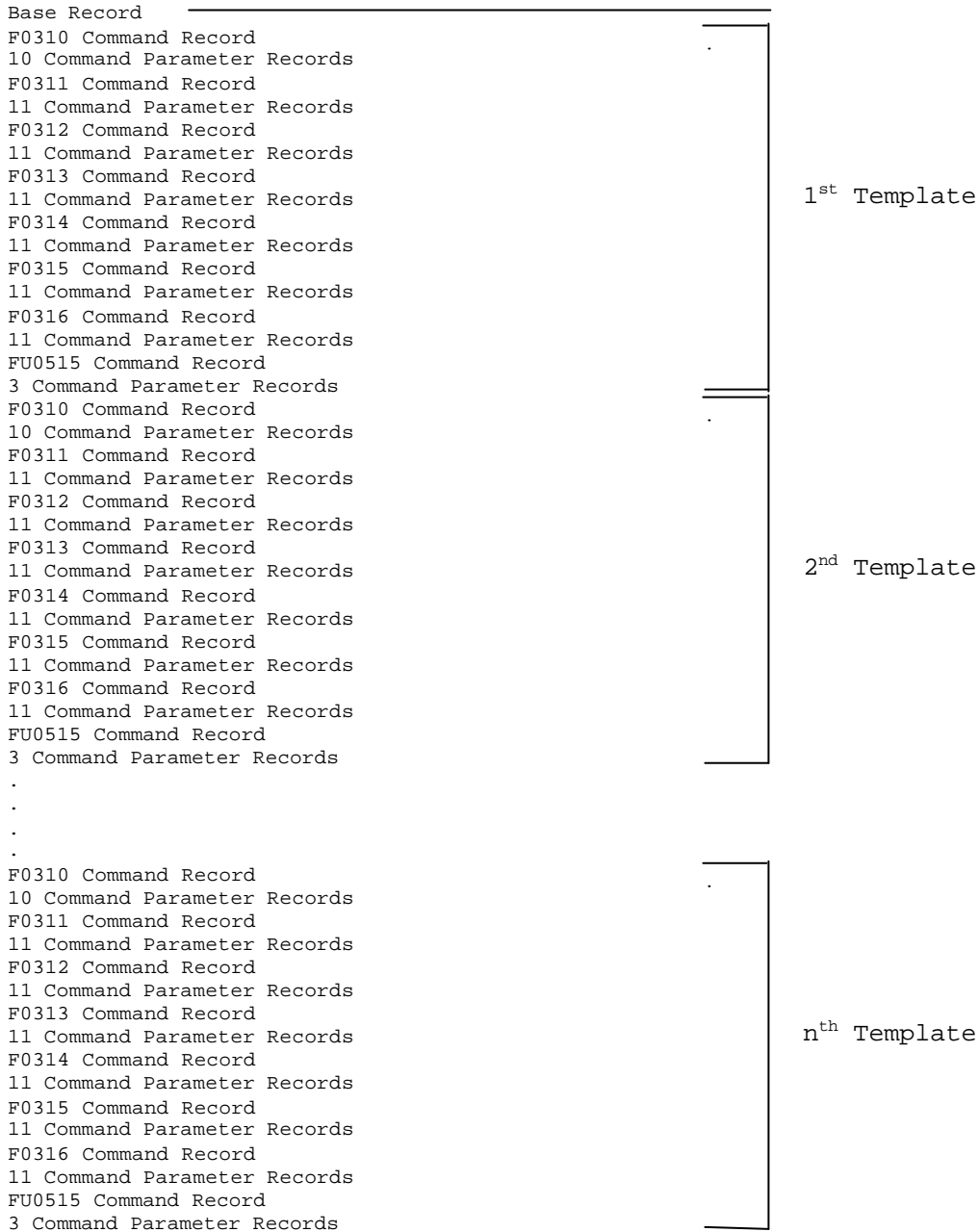
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5 LIBRARY LOAD COMMAND FILE FOR DPE2

Referring to the procedure in Annex-A step 3), each stack import file for DPE2 shall be built as follows:



The following sections of the document report the detailed specification of the records to build the file in the Stack Import format.



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5.1 SPECIFICATION OF THE FILE RECORDS

5.1.1 Base Record

```
2|MANS|984591719|0|27/02/01|0000000000
```

- The shaded field is the file creation time to be updated by SPI Team according to the absolute time CUC formatted : Number of seconds to be added to the reference epoch 1970.001.00.00.000. Example: 956355761 or 988885421.
- The lighter shaded field is the database version 27/02/01, which may be updated by MOC if needed.
- All other fields shall be left exactly as is.

5.1.2 F0310 Command Record

```
C|F0310|1|1|4|0|0|1|-1|0|0|0|10|0|1|0|0||7|||0
```

- No change is requested to this record. It shall be reported ex-actly as is any time F0310 is necessary.

NOTE: Same requirements apply for E0311 to E0316 command records here following specified.

5.1.2.1 Command Parameter Records

E8753	0	0	2	0	1	1
E8754	0	0	2	0	2	1
E8755	0	0	2	0	3	1
E8756	0	0	2	0	4	1
E8757	0	0	2	0	5	1
E8760	0	0	2	0	6	1
E8761	0	0	2	0	7	1
E8762	0	0	2	0	8	1
E8763	0	0	2	0	9	1
F9900	0	0	2	0	67	0

- The shaded fields are the parameter values to be updated by SPI Team. They are raw values (as no calibration is associated to these parameters) and shall be expressed in decimal.
- All other fields shall be left exactly as is.

NOTE: Same requirements apply for F0311 to F0316 and FU0515 command parameter records here following specified.

- This command parameter records set shall be inserted immediately after the F0310 command record.



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5.1.3 F0311 Command Record

C|F0311|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0

5.1.3.1 Command Parameter Records

E8764	0	0	2	0	10	1
E8765	0	0	2	0	11	1
E8766	0	0	2	0	12	1
E8767	0	0	2	0	13	1
E8768	0	0	2	0	14	1
E8769	0	0	2	0	15	1
E8770	0	0	2	0	16	1
E8771	0	0	2	0	17	1
E8772	0	0	2	0	18	1
E8773	0	0	2	0	19	1
F9900	0	0	2	0	68	0

5.1.4 F0312 Command Record

C|F0312|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0

5.1.4.1 Command Parameter Records

E8774	0	0	2	0	20	1
E8775	0	0	2	0	21	1
E8776	0	0	2	0	22	1
E8777	0	0	2	0	23	1
E8778	0	0	2	0	24	1
E8779	0	0	2	0	25	1
E8780	0	0	2	0	26	1
E8781	0	0	2	0	27	1
E8782	0	0	2	0	28	1
E8783	0	0	2	0	29	1
F9900	0	0	2	0	69	0

5.1.5 F0313 Command Record

C|F0313|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0

5.1.5.1 Command Parameter Records

E8784	0	0	2	0	30	1
E8785	0	0	2	0	31	1
E8786	0	0	2	0	32	1
E8787	0	0	2	0	33	1
E8788	0	0	2	0	34	1
E8789	0	0	2	0	35	1
E8790	0	0	2	0	36	1
E8791	0	0	2	0	37	1
E8792	0	0	2	0	38	1
E8793	0	0	2	0	39	1
F9900	0	0	2	0	70	0

5.1.6 F0314 Command Record

C|F0314|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0

5.1.6.1 Command Parameter Records

E8794	0	0	2	0	40	1
-------	---	---	---	---	----	---



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E8795	0	0	2	0	41	1
E8796	0	0	2	0	42	1
E8797	0	0	2	0	43	1
E8798	0	0	2	0	44	1
E8799	0	0	2	0	45	1
E8800	0	0	2	0	46	1
E8801	0	0	2	0	47	1
E8802	0	0	2	0	48	1
E8803	0	0	2	0	49	1
F9900	0	0	2	0	71	0

5.1.7 F0315 Command Record

C|F0315|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0

5.1.7.1 Command Parameter Records

E8804	0	0	2	0	50	1
E8805	0	0	2	0	51	1
E8806	0	0	2	0	52	1
E8807	0	0	2	0	53	1
E8808	0	0	2	0	54	1
E8809	0	0	2	0	55	1
E8810	0	0	2	0	56	1
E8811	0	0	2	0	57	1
E8812	0	0	2	0	58	1
E8813	0	0	2	0	59	1
F9900	0	0	2	0	88	0

5.1.8 F0316 Command Record

C|F0316|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0||7|||0

5.1.8.1 Command Parameter Records

E8814	0	0	2	0	60	1
E8815	0	0	2	0	61	1
E8816	0	0	2	0	62	1
E8817	0	0	2	0	63	1
E8818	0	0	2	0	64	1
E8819	0	0	2	0	65	1
E8820	0	0	2	0	66	1
E8821	0	0	2	0	67	1
E8822	0	0	2	0	68	1
E8823	0	0	2	0	69	1
F9900	0	0	2	0	89	0

5.1.9 FU0515 Command Record

C|FU0515|1|1|2|0|0|1|9998|0|0|0|3|0|1|0|0||7|||0

- 9998 is the Command Verification Stage ID.

5.1.9.1 Command Parameter Records

F8932	0	0	2	0	0	1
F8935	0	0	2	0	1	1
F9900	0	0	2	0	68	0

- The shaded field shall contain the SPI PSD memory address of the TM parameter E3879 (see procedure in Annex-A).



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5.2 LIBRARY LOAD COMMAND FILE FOR DPE2: EXAMPLE

Here is an example how the file should look like in case N=2 (2 lib templates). Parameter values are consecutive numbers just for the example purpose: they have no operational meaning.

```

2|MANS|984591719|0|27/02/01|0000000000
C|F0310|1|1|4|0|0|1|-1|0|0|0|10|0|1|0|0|||7|||0
E8753|0|0|2|0|1|1
E8754|0|0|2|0|2|1
E8755|0|0|2|0|3|1
E8756|0|0|2|0|4|1
E8757|0|0|2|0|5|1
E8760|0|0|2|0|6|1
E8761|0|0|2|0|7|1
E8762|0|0|2|0|8|1
E8763|0|0|2|0|9|1
F9900|0|0|2|0|67|0
C|F0311|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8764|0|0|2|0|10|1
E8765|0|0|2|0|11|1
E8766|0|0|2|0|12|1
E8767|0|0|2|0|13|1
E8768|0|0|2|0|14|1
E8769|0|0|2|0|15|1
E8770|0|0|2|0|16|1
E8771|0|0|2|0|17|1
E8772|0|0|2|0|18|1
E8773|0|0|2|0|19|1
F9900|0|0|2|0|68|0
C|F0312|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8774|0|0|2|0|20|1
E8775|0|0|2|0|21|1
E8776|0|0|2|0|22|1
E8777|0|0|2|0|23|1
E8778|0|0|2|0|24|1
E8779|0|0|2|0|25|1
E8780|0|0|2|0|26|1
E8781|0|0|2|0|27|1
E8782|0|0|2|0|28|1
E8783|0|0|2|0|29|1
F9900|0|0|2|0|69|0
C|F0313|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8784|0|0|2|0|30|1
E8785|0|0|2|0|31|1
E8786|0|0|2|0|32|1
E8787|0|0|2|0|33|1
E8788|0|0|2|0|34|1
E8789|0|0|2|0|35|1
E8790|0|0|2|0|36|1
E8791|0|0|2|0|37|1
E8792|0|0|2|0|38|1
E8793|0|0|2|0|39|1
F9900|0|0|2|0|70|0
C|F0314|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8794|0|0|2|0|40|1
E8795|0|0|2|0|41|1
E8796|0|0|2|0|42|1
E8797|0|0|2|0|43|1
E8798|0|0|2|0|44|1
E8799|0|0|2|0|45|1
E8800|0|0|2|0|46|1
E8801|0|0|2|0|47|1
E8802|0|0|2|0|48|1
E8803|0|0|2|0|49|1
F9900|0|0|2|0|71|0
C|F0315|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8804|0|0|2|0|50|1
E8805|0|0|2|0|51|1

```



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```

E8806|0|0|2|0|52|1
E8807|0|0|2|0|53|1
E8808|0|0|2|0|54|1
E8809|0|0|2|0|55|1
E8810|0|0|2|0|56|1
E8811|0|0|2|0|57|1
E8812|0|0|2|0|58|1
E8813|0|0|2|0|59|1
F9900|0|0|2|0|88|0
C|F0316|1|1|2|0|0|1|-1|0|0|0|10|0|1|0|0|||7|||0
E8814|0|0|2|0|60|1
E8815|0|0|2|0|61|1
E8816|0|0|2|0|62|1
E8817|0|0|2|0|63|1
E8818|0|0|2|0|64|1
E8819|0|0|2|0|65|1
E8820|0|0|2|0|66|1
E8821|0|0|2|0|67|1
E8822|0|0|2|0|68|1
E8823|0|0|2|0|69|1
F9900|0|0|2|0|89|0
C|FU0515|1|1|2|0|0|1|9998|0|0|0|3|0|1|0|0|||7|||0
F8932|0|0|2|0|999|1
F8935|0|0|2|0|0|1
F9900|0|0|2|0|68|1
C|F0310|1|1|4|0|0|1|-1|0|0|0|10|0|1|0|0|||7|||0
E8753|0|0|2|0|11|1
E8754|0|0|2|0|12|1
E8755|0|0|2|0|3|1
E8756|0|0|2|0|14|1
E8757|0|0|2|0|15|1
E8760|0|0|2|0|16|1
E8761|0|0|2|0|17|1
E8762|0|0|2|0|18|1
E8763|0|0|2|0|19|1
F9900|0|0|2|0|67|0
C|F0311|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8764|0|0|2|0|110|1
E8765|0|0|2|0|111|1
E8766|0|0|2|0|112|1
E8767|0|0|2|0|113|1
E8768|0|0|2|0|114|1
E8769|0|0|2|0|115|1
E8770|0|0|2|0|116|1
E8771|0|0|2|0|117|1
E8772|0|0|2|0|118|1
E8773|0|0|2|0|119|1
F9900|0|0|2|0|68|0
C|F0312|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8774|0|0|2|0|120|1
E8775|0|0|2|0|121|1
E8776|0|0|2|0|122|1
E8777|0|0|2|0|123|1
E8778|0|0|2|0|124|1
E8779|0|0|2|0|125|1
E8780|0|0|2|0|126|1
E8781|0|0|2|0|127|1
E8782|0|0|2|0|128|1
E8783|0|0|2|0|129|1
F9900|0|0|2|0|69|0
C|F0313|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8784|0|0|2|0|130|1
E8785|0|0|2|0|131|1
E8786|0|0|2|0|132|1
E8787|0|0|2|0|133|1
E8788|0|0|2|0|134|1
E8789|0|0|2|0|135|1
E8790|0|0|2|0|136|1
E8791|0|0|2|0|137|1
E8792|0|0|2|0|138|1
E8793|0|0|2|0|139|1

```




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```

F9900|0|0|2|0|70|0
C|F0314|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8794|0|0|2|0|140|1
E8795|0|0|2|0|141|1
E8796|0|0|2|0|142|1
E8797|0|0|2|0|143|1
E8798|0|0|2|0|144|1
E8799|0|0|2|0|145|1
E8800|0|0|2|0|146|1
E8801|0|0|2|0|147|1
E8802|0|0|2|0|148|1
E8803|0|0|2|0|149|1
F9900|0|0|2|0|71|0
C|F0315|1|1|2|0|0|1|-1|0|0|0|11|0|1|0|0|||7|||0
E8804|0|0|2|0|150|1
E8805|0|0|2|0|151|1
E8806|0|0|2|0|152|1
E8807|0|0|2|0|153|1
E8808|0|0|2|0|154|1
E8809|0|0|2|0|155|1
E8810|0|0|2|0|156|1
E8811|0|0|2|0|157|1
E8812|0|0|2|0|158|1
E8813|0|0|2|0|159|1
F9900|0|0|2|0|88|0
C|F0316|1|1|2|0|0|1|-1|0|0|0|10|0|1|0|0|||7|||0
E8814|0|0|2|0|60|1
E8815|0|0|2|0|61|1
E8816|0|0|2|0|62|1
E8817|0|0|2|0|63|1
E8818|0|0|2|0|64|1
E8819|0|0|2|0|65|1
E8820|0|0|2|0|66|1
E8821|0|0|2|0|67|1
E8822|0|0|2|0|68|1
E8823|0|0|2|0|69|1
F9900|0|0|2|0|89|0
C|FU0515|1|1|2|0|0|1|9998|0|0|0|3|0|1|0|0|||7|||0
F8932|0|0|2|0|999|1
F8935|0|0|2|0|0|1
F9900|0|0|2|0|68|1

```



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ANNEX-A: SPI PSD LIBRARY UPDATE PROCEDURE

NOTE: The procedure reported hereafter is for operations via DPE1. In case DPE2 is to be used, then the "E" prefix of the commands has to be replaced by "F" (e.g. TC E0502 becomes F0502).

- 1) Send TC E0502 to Enter Configuration Mode (IASW, PSD and all S/As) if not already in Config Mode
- 2) Send TC EU0515 to dump TM E3879 C PD ERROR L and initialise the check of this parameter to the current value
- 3) Iterate the following sub-procedure N times, where N can range from 1 to 1482 (2 libraries x 19 detectors x 39 templates = 1482):

START sub-proc

{**NOTE:** timing is justified in section 4.4}

Send TC E0310 to uplink 1st set of Template parameters

wait 2 s

Send TC E0311 to uplink 2nd set of Template parameters

wait 2 s

Send TC E0312 to uplink 3rd set of Template parameters

wait 2 s

Send TC E0313 to uplink 4th set of Template parameters

wait 2 s

Send TC E0314 to uplink 5th set of Template parameters

wait 2 s

Send TC E0315 to uplink 6th set of Template parameters

wait 2 s

Send TC E0316 to uplink 7th set of Template parameters

wait 2 s

Send TC EU0515 to dump TM E3879 C PD ERROR L

wait 4 s

Check that TM E3879 C PD ERROR L has not increased

IF successful

THEN CONTINUE {Template re-programming was OK}

ELSE STOP {enter anomaly procedure}

END sub-proc

- 4) Change the Library Selection parameters by Sending TCs E0306 to E0308 followed by TCs E0326 to E0328 for verification
- 5) At this point the PSD library load activity is over. SPI can be commanded back to the desired Science Mode



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ANOMALY PROCEDURE

1) Read last PSD error type TM E3880 PD LST-ER-TP

- 2) EEPROM write error →
- try a second time starting from TC E0310
 - if second write succeed then continue
 - if fails then interrupt: probable EEPROM error. Needs deeper investigation. Contact SPI PI.
- 3) CRC error →
- try a second time starting from TC E0310
 - if second write succeed then continue
 - if fails then interrupt: Needs deeper investigation. Contact SPI PI.
- 4) Other errors → follow PSD anomaly procedures. TBW in the SPI UM by CNES



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ANNEX-B: SPI PSD LIBRARY UPDATE DATA FLOW

