MIU-PSU IRS

IS.EL.ENG.CondorMS

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**Interface Requirements Specification (IRS)**

**for the**

***PSU – MIU Communication Interface***

**for the**

***Condor-MS System***

**Contract Number *[8L0028104]***

**CDRL Sequence No. *[NA]***

Prepared by :

*EO-ISTAR Business Unit*

*ELBIT Systems Electro-Optics - Elop, Ltd.*

*PO Box 1165, Rehovot 76111, Israel*

**List of changed from Previous Version**

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| **Paragraph** | **Change Description** | **Reason of Change** |
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**List of TBDs**

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| Reference | Description |
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**List of TBRs**

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| **Reference** | **Description** |
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**List of TBCs**

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| **Reference** | **Description** |
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# SCOPE

This document specifies the format and content of the communication messages between the MIU and the PSU.

## Interface Overview

The PSU shall have a 100MbEth interface with which communication is accomplished with the MIU (performed using MDC - Management and Display Card of the MIU). The same interface shall also be used for downloading PSU logfile via the MIU Ethernet switch directly to external computer.

## Document Overview

The document structure is as follows:

* Chapter 1 – Scope
* Chapter 2 – Applicable documents
* Chapter 3 – General Interface Protocol
* Chapter 4 – MIU to PSU Messages
* Chapter 5 – PSU to MIU Messages
* Chapter 6 - PSU Logfile Structure

## Abbreviations and Acronyms

|  |  |
| --- | --- |
| AC- | Alternating Current |
| A/C- | Aircraft |
| ADLS- | Airborne Data Link System |
| ATP- | Automatic Test Procedure |
| AUF- | Airborne Uninhibited Fighter |
| BIT- | Built In Test |
| BP- | Best Practice |
| BTOK- | Bench Test OK |
| CBIT- | Continuous Built-In-Test |
| CCTCU- | Camera Compartment Temperature Control Unit |
| CE- | Conducted Emission |
| C.M.- | Common Mode |
| CND- | Can Not Duplicate |
| COG- | Center Of Gravity |
| COTS- | Commercial Of The Shelf |
| CS- | Conducted Susceptibility |
| CSM- | Common Sensor Model |
| CT- | Corrective Time |
| CPLD- | Complex Programmable Logic Device |
| CPU- | central processing unit |
| DC- | Direct Current |
| D.M.- | Differential Mode |
| DRPU- | Dual Receiver Processor Unit |
| ECS- | Environment Control System |
| ECTCU- | Electronics Compartment Temperature Control Unit |
| EDU- | Encryption Decryption System |
| EI- | Electrical Interface |
| EMC- | Electro-Magnetic Compatibility |
| EMI- | Electro-Magnetic Interference |
| ER- | Established Reliability |
| ESS- | Environmental Stress Screening |
| ETI- | Elapsed Time Indication |
| ETM- | Elapsed Time Meter |
| EVT- | Environmental Verification Test |
| FAI- | First Article Inspection |
| FDU- | Filter & Distribution Unit |
| FIL- | Filtered |
| FFI- | For Future Implementation |
| FPGA- | Field Programmable Gate Array |
| FPS- | Frames Per Second |
| F/W- | Firmware |
| H/W- | Hardware |
| IBIT- | Initiated Built-In-Test |
| ICD- | Interface Control Document |
| ID- | Identification |
| I/F- | Interface |
| ILCTE- | Intermediate Level Computerized Test Equipment |
| ILS- | Integrated Logistic Support |
| INS- | Inertial Navigation System |
| LRU- | Line Replaceable Unit |
| MDC- | Management and Display Card |
| MIU- | Mission management & Image processing Unit |
| MS- | Multi-Spectral |
| MTBCF- | Mean Time Between Critical Failures |
| MTBF- | Mean Time Between Failures |
| MTBMA- | Mean Time Between Maintenance Action |
| MTO- | Military Temperature Only |
| MTTR- | Mean Time To Replace |
| NA- | Not Applicable |
| NATO- | North Atlantic Treaty Organization |
| OLTE- | Operational Level Test Equipment |
| O.V.- | Over Voltage |
| PBIT- | Periodic Built In Test |
| PCB- | Printed Circuit Board |
| POD- | Proof Of Design |
| PSD- | Power Spectral Density |
| PSU- | Power Supply Unit |
| PUBIT- | Power-Up Built In Test |
| PUI- | Project Unique Identifier |
| RAM- | Random Access Memory |
| RE- | Radiated Emission |
| REG- | Regulated |
| RF- | Radio Frequency |
| RFI- | Radio Frequency Interference |
| RH- | Relative Humidity |
| RMS- | Root Mean Square |
| RS- | Radiated Susceptibility |
| SRU- | Shop Replaceable Unit |
| STANAG- | Standard Agreement |
| S/W- | Software |
| SyRS- | System Requirements Specification |
| TBC- | To Be Confirmed |
| TBD- | To Be Defined |
| TBR- | To Be Reviewed |
| TCU- | Temperature Control Unit |
| UART- | Universal Asynchronous Receiver Transmitter |
| U.V.- | Under Voltage |
| VCRM- | Verification Cross Reference Matrix |
| WD- | Watch Dog |

## Glossary

To Be Confirmed (TBC)  – Requires further verification or agreement.

To Be Defined (TBD)      – A requirement that has yet to be developed.

To Be Reviewed (TBR)  – A requirement that might over-constrain the design. This requirement shall be investigated during the preliminary design phase and updated if necessary.

For Future Implementation (FFI) – A requirement which is not necessary for product delivery but may require implementation in future versions. Foundations for implementation should be applied, provided that additional effort is reasonable and does not cause unnecessary risk to the program.

# Referenced Documents

## Elbit Systems Documents

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Title** | **ID** | **Revision** | **Date** |
| **1.** | Condor-MS SyRS | 5495-1000-00PS |  |  |
| **2.** | Condor-MS Interface Control Document (ICD) | 5495-1000-00IC |  |  |
| **3.** | PSU Prime Item Development Specification (PIDS) | 5495-6000-00PS |  |  |
| **4.** | MIU Prime Item Development Specification (PIDS) | 5495-2000-00PS |  |  |
| **5.** | System Functional & Operational Requirements Specification (SYS\_FRS\_ORS) | 5495-1000-00FF |  |  |

## Others

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Title** | **ID** | **Revision** | **Date** |
| **6.** | Serial Communications (Ethernet) | IEEE 802.3 |  |  |

# General Interface Protocol

The interface shall be used to:

* Send commands from the MIU to the PSU for controlling TCUs – ON/OFF.
* Receive BIT status and telemetry information from the PSU.
* Download logfile from the PSU.
* Synchronize GMT time.

The proprietary communication protocol definition shall be as follows:

* Interface Type: Ethernet 100Mbit
* Protocol: Asynchronous
* Format: Little Endian

## UDP message structure

The message structure is described in the following table:

|  |  |  |
| --- | --- | --- |
| Byte | Content | Remark |
| 1 ÷ N | Message Data | <Length> bytes |

## Variables Type Definition

|  |  |
| --- | --- |
| **Type** | **Description** |
| U1 | Unsigned, 8-bit integer |
| U2 | Unsigned, 16-bit integer |
| U4 | Unsigned, 32-bit integer |
| U8 | Unsigned, 64-bit integer |
| S1 | Signed, 8-bit integer |
| S2 | Signed, 16-bit integer |
| S4 | Signed, 32-bit integer |
| S8 | Signed, 64-bit integer |
| Bx | String of x bytes, without terminating NULL |

# MIU to PSU Messages (commands)

The following table is a list of the MIU messages that can be sent to the PSU:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Message**  **ID** | **Name** | **Description** | **Message rate** | **Message size**  **(Bytes)** |
| 0x01 | Keep\_Alive | Keep alive validation message | 1 Hz | 1 |
| 0x02 | TCU\_Control | Command to switch off or on any TCU. | Message sent upon event. TCU\_Control message is sent only on TCU malfunction event. | 3 |
| 0x03 | Logfile\_Maintenance | Start/Stop Logfile recording / Log erase command | Message sent upon event. Logfile\_Maintenance message is sent every start / end of a sortie situations. | 2 |
| 0x04 | GMT\_Time | Set GMT time | Message sent upon event. Set GMT time message is sent every System Power-On / System Reset events. | 7 |

## Keep Alive Message

The Keep Alive message shall be sent periodically by the MIU, and shall include the following message element:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Type** | **Name** | **Units** | **Range** | **Resolution (Scale factor)** | **Sign convention** | **Description** | **Comments** |
| 1 | U1 | Message\_ID | N/A | 0x01 | N/A | N/A | Unique message ID |  |

## TCU Control Command

The following command shall be sent as required by the MIU, and includes the following message elements:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Type** | **Name** | **Units** | **Range** | **Resolution (Scale factor)** | **Sign convention** | **Description** | **Comments** |
| 1 | U1 | Message\_ID | N/A | 0x02 | N/A | N/A | Unique message ID |  |
| 2 | U1 | TCU\_ID | N/A | 0 – 1 | N/A | N/A | TCU identification | 0x00 – ECTCU  0x01 - CCTCU |
| 3 | U1 | ON\_OFF | N/A | 0 – 1 | N/A | N/A | ON/OFF command | 0x00 – OFF  0x01 – ON |

## Logfile Maintenance Command

The following command shall be sent as required by the MIU, and includes the following message elements:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Type** | **Name** | **Units** | **Range** | **Resolution (Scale factor)** | **Sign convention** | **Description** | **Comments** |
| 1 | U1 | Message\_ID | N/A | 0x03 | N/A | N/A | Unique message ID |  |
| 2 | U1 | Start\_Stop\_Erase\_Logfile | N/A | 0 – 2 | N/A | N/A | Start/Stop Logfile recording / Log erase command | 0x00 – Halt and close Logfile.  0x01 - Commence Logfile recording.  0x02 - Erase Logfile. |

## GMT Time Command

The following command shall be sent as required by the MIU, and includes the following message elements:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Type** | **Name** | **Units** | **Range** | **Resolution**  **(Scale factor)** | **Sign convention** | **Description** | **Comments** |
| 1 | U1 | Message\_ID | N/A | 0x04 | N/A | N/A | Unique message ID | Set GMT Time |
| 2 | U4 | GMT\_Time | seconds | N/A | 1 sec | N/A | Number of seconds elapsed since 00:00 hours, Jan 1, 1970, UTC |  |
| 3 | U4 | Micro\_Sec | Microseconds | N/A | 1 Microsecond | N/A | Microseconds in GMT Time |  |

# PSU to MIU Messages (status & telemetry)

The following table is a list of the PSU messages that shall be sent to the MIU periodically:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Message**  **ID** | **Name** | **Description** | **Message rate** | **Message size**  **(Bytes)** |
| 0x81 | Telemetry\_and\_BIT | Telemetry and BIT information. | 100Hz | 196 |

## Telemetry and BIT Message

* Since PSU status changes can occur intermittently, in order not to miss the occurrence, the faulty notification shall be latched and recorded on the Logfile until sent to the MIU via communication channel. Only after the faulty notification was sent to MIU, it will be cleared.

The following status message shall be sent periodically by the PSU, and shall include the following message elements:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **#** | **Type** | **Name** | **Units** | **Range** | **Resolution**  **(Scale factor)** | **Sign convention** | **Description** | **comments** |
| 1 | U1 | Message\_ID | N/A | 0x81 | N/A | N/A | Unique message ID |  |
| 2 | S2 | VDC\_IN | VDC | +/- 100VDC | 50mV | N/A | 28VDC Input voltage |  |
| 3 | S2 | VAC\_IN\_PH\_A | VAC | +/- 200VAC | 100mV | N/A | 115 VAC phA input  voltage |  |
| 4 | S2 | VAC\_IN\_PH\_B | VAC | +/- 200VAC | 100mV | N/A | 115 VAC phB input  voltage |  |
| 5 | S2 | VAC\_IN\_PH\_C | VAC | +/- 200VAC | 100mV | N/A | 115 VAC phC input  voltage |  |
| 6 | S2 | I\_DC\_IN | A DC | +/- 100A | 50mA | N/A | Input DC current |  |
| 7 | S2 | I\_AC\_IN\_PH\_A | A AC | +/- 200A | 50mA | N/A | AC phA input  current |  |
| 8 | S2 | I\_AC \_IN\_PH\_B | A AC | +/- 200A | 50mA | N/A | AC phB input  current |  |
| 9 | S2 | I\_AC \_IN\_PH\_C | A AC | +/- 200A | 50mA | N/A | AC phC input  current |  |
| 10 | S2 | V\_OUT\_1 | VDC | +/- 100VDC | 50mV | N/A | Output Voltage to Fan CCA |  |
| 11 | S2 | V\_OUT\_2 | VDC | +/- 100VDC | 50mV | N/A | Output Voltage to MWIR Cooler |  |
| 12 | S2 | V\_OUT\_3\_ph1 | VAC | +/- 200VAC | 100mV | N/A | Output Voltage to ADLS phase 1 |  |
| 13 | S2 | V\_OUT\_3\_ph2 | VAC | +/- 200VAC | 100mV | N/A | Output Voltage to ADLS phase 2 |  |
| 14 | S2 | V\_OUT\_3\_ph3 | VAC | +/- 200VAC | 100mV | N/A | Output Voltage to ADLS phase 3 |  |
| 15 | S2 | V\_OUT\_4 | VAC | +/- 200VAC | 100mV | N/A | Output Voltage to EDU phase 1 |  |
| 16 | S2 | V\_OUT\_5 | VDC | +/- 100VDC | 50mV | N/A | Output Voltage to VNIR channel |  |
| 17 | S2 | V\_OUT\_6 | VDC | +/- 100VDC | 50mV | N/A | Output Voltage to SWIR/MWIR channel |  |
| 18 | S2 | V\_OUT\_7 | VDC | +/- 100VDC | 50mV | N/A | Output Voltage to MCC |  |
| 19 | S2 | V\_OUT\_8 | VDC | +/- 100VDC | 50mV | N/A | Output Voltage to MIU |  |
| 20 | S2 | V\_OUT\_9 | VDC | +/- 100VDC | 50mV | N/A | Output Voltage to LOS motors |  |
| 21 | S2 | V\_OUT\_10 | VDC | +/- 100VDC | 50mV | N/A | Output Voltage to INS / EDU / SPARE |  |
| 22 | S2 | I\_OUT\_1 | A DC | +/- 100A | 50mA | N/A | Output Current to Fan CCA |  |
| 23 | S2 | I\_OUT\_2 | A DC | +/- 100A | 50mA | N/A | Output Current to MWIR Cooler |  |
| 24 | S2 | I\_OUT\_3\_ph1 | A AC | +/- 200A | 100mA | N/A | Output Current to ADLS\_phase 1 |  |
| 25 | S2 | I\_OUT\_3\_ph2 | A AC | +/- 200A | 100mA | N/A | Output Current to ADLS\_phase 2 |  |
| 26 | S2 | I\_OUT\_3\_ph3 | A AC | +/- 200A | 100mA | N/A | Output Current to ADLS\_phase 3 |  |
| 27 | S2 | I\_OUT\_4 | A AC | +/- 200A | 100mA | N/A | Output Current to EDU phase 1 |  |
| 28 | S2 | I\_OUT\_5 | A DC | +/- 100A | 50mA | N/A | Output Current to VNIR channel |  |
| 29 | S2 | I\_OUT\_6 | A DC | +/- 100A | 50mA | N/A | Output Current to SWIR/MWIR channel |  |
| 30 | S2 | I\_OUT\_7 | A DC | +/- 100A | 50mA | N/A | Output Current to MCC |  |
| 31 | S2 | I\_OUT\_8 | A DC | +/- 100A | 50mA | N/A | Output Current to MIU |  |
| 32 | S2 | I\_OUT\_9 | A DC | +/- 100A | 50mA | N/A | Output Current to LOS motors |  |
| 33 | S2 | I\_OUT\_10 | A DC | +/- 100A | 50mA | N/A | Output Current to INS / EDU / SPARE |  |
| 34 | U2 | AC\_Power | VA | 10KW | 1VA | N/A | Total AC Power Consumption |  |
|  |  |  |  |  |  |  |  |  |
| 35 | U2 | Fan1\_Speed | RPM | [1 - 30,000] | 1RPM | N/A | PSU Fan1 Speed |  |
| 36 | U2 | Fan2\_Speed | RPM | [1 - 30,000] | 1RPM | N/A | PSU Fan2 Speed |  |
| 37 | U2 | Fan3\_Speed | RPM | [1 - 30,000] | 1RPM | N/A | PSU Fan3 Speed |  |
| 38 | U8 | Volume\_size | Bytes | 10Gbyte | 1byte | N/A | Total available volume allocated for logfiles. |  |
| 39 | U8 | Logfile\_size | Bytes | [0-10Gbyte] | 1byte | N/A | Total usage of logfiles. |  |
| 40 | S1 | T1 | °C | +/- 127°C | 1°C | N/A | Thermistor 1 |  |
| 41 | S1 | T2 | °C | +/- 127°C | 1°C | N/A | Thermistor 2 |  |
| 42 | S1 | T3 | °C | +/- 127°C | 1°C | N/A | Thermistor 3 |  |
| 43 | S1 | T4 | °C | +/- 127°C | 1°C | N/A | Thermistor 4 |  |
| 44 | S1 | T5 | °C | +/- 127°C | 1°C | N/A | Thermistor 5 |  |
| 45 | S1 | T6 | °C | +/- 127°C | 1°C | N/A | Thermistor 6 |  |
| 46 | S1 | T7 | °C | +/- 127°C | 1°C | N/A | Thermistor 7 |  |
| 47 | S1 | T8 | °C | +/- 127°C | 1°C | N/A | Thermistor 8 |  |
| 48 | S1 | T9 | °C | +/- 127°C | 1°C | N/A | Thermistor 9 |  |
| 49 | U4 | ETM | minutes | N/A | 1min | N/A | Elapsed Time Meter |  |
| 50 | U1 | Major | N/A | 00-FF | N/A | N/A | Software Version Major |  |
| 51 | U1 | Minor | N/A | 00-FF | N/A | N/A | Software Version Minor |  |
| 52 | U1 | Build | N/A | 00-FF | N/A | N/A | Software Version Build |  |
| 53 | U1 | Hotfix | N/A | 00-FF | N/A | N/A | Software Version Hotfix |  |
| 54 | U1 | SN | N/A | 00-FF | N/A | N/A | Serial Number |  |
| 55 | U8 | PSU\_Status \*\* | N/A | N/A | N/A | N/A | PSU Status | [PSU Status](#scroll-bookmark-1) |
| 56 | U1 | Control\_Panel\_Lamp\_Indication | N/A | 0 – 3 | N/A | N/A | Control Panel Lamp Indication | 0x00 – Lamp in OFF indication.  0x01 - Lamp in ON indication.  0x02 -Lamp in Flash (fast rate) indication.  0x03 -Lamp in Flash (slow rate) indication. |
| 57 | U8 | Spare | N/A | N/A | N/A | N/A | N/A |  |
| 58 | U8 | Spare | N/A | N/A | N/A | N/A | N/A |  |
| 59 | U8 | Spare | N/A | N/A | N/A | N/A | N/A |  |
| 60 | U8 | Spare | N/A | N/A | N/A | N/A | N/A |  |
| 61 | U8 | Spare | N/A | N/A | N/A | N/A | N/A |  |
| 62 | U8 | Spare | N/A | N/A | N/A | N/A | N/A |  |
| 63 | U8 | Spare | N/A | N/A | N/A | N/A | N/A |  |
| 64 | U8 | Spare | N/A | N/A | N/A | N/A | N/A |  |
| 65 | U8 | Spare | N/A | N/A | N/A | N/A | N/A |  |
| 66 | U8 | Spare | N/A | N/A | N/A | N/A | N/A |  |

\*\* - The PSU\_Status field (#55) is persistent.

PSU\_Status:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Data bits** | **Description** | **Values** | **Default Value** | **Remarks** |
| 0 | DC\_IN\_Status | 0=OK 1=FAIL | 0 | DC Input Voltage Status - OK (0) or Fail (1) |
| 1 | AC\_IN\_Status | 0=OK 1=FAIL | 0 | AC Input Voltage Status - OK (0) or Fail (1) |
| 2 | Power\_Out\_Status | 0=OK 1=FAIL | 0 | Output power Status - OK (0) or Fail (1) |
| 3 | MIU\_COM\_Status | 0=OK 1=FAIL | 0 | MIU Communication Status - OK (0) or Fail (1) |
| 4 | OUT1\_OC | 0=OK 1=Overcurrent | 0 | Overcurrent Indication for Output1 |
| 5 | OUT2\_OC | 0=OK 1=Overcurrent | 0 | Overcurrent Indication for Output2 |
| 6 | OUT3\_OC | 0=OK 1=Overcurrent | 0 | Overcurrent Indication for Output3 |
| 7 | OUT4\_OC | 0=OK 1=Overcurrent | 0 | Overcurrent Indication for Output4 |
| 8 | OUT5\_OC | 0=OK 1=Overcurrent | 0 | Overcurrent Indication for Output5 |
| 9 | OUT6\_OC | 0=OK 1=Overcurrent | 0 | Overcurrent Indication for Output6 |
| 10 | OUT7\_OC | 0=OK 1=Overcurrent | 0 | Overcurrent Indication for Output7 |
| 11 | OUT8\_OC | 0=OK 1=Overcurrent | 0 | Overcurrent Indication for Output8 |
| 12 | OUT9\_OC | 0=OK 1=Overcurrent | 0 | Overcurrent Indication for Output9 |
| 13 | OUT10\_OC | 0=OK 1=Overcurrent | 0 | Overcurrent Indication for Output10 |
| 14 | DC\_IN\_OV | 0=OK 1=Overvoltage | 0 | Overvoltage indication for DC Input |
| 15 | OUT1\_OV | 0=OK 1=Overvoltage | 0 | Overvoltage Indication for Output1 |
| 16 | OUT2\_OV | 0=OK 1=Overvoltage | 0 | Overvoltage Indication for Output2 |
| 17 | OUT3\_OV | 0=OK 1=Overvoltage | 0 | Overvoltage Indication for Output3 |
| 18 | OUT4\_OV | 0=OK 1=Overvoltage | 0 | Overvoltage Indication for Output4 |
| 19 | OUT5\_OV | 0=OK 1=Overvoltage | 0 | Overvoltage Indication for Output5 |
| 20 | OUT6\_OV | 0=OK 1=Overvoltage | 0 | Overvoltage Indication for Output6 |
| 21 | OUT7\_OV | 0=OK 1=Overvoltage | 0 | Overvoltage Indication for Output7 |
| 22 | OUT8\_OV | 0=OK 1=Overvoltage | 0 | Overvoltage Indication for Output8 |
| 23 | OUT9\_OV | 0=OK 1=Overvoltage | 0 | Overvoltage Indication for Output9 |
| 24 | OUT10\_OV | 0=OK 1=Overvoltage | 0 | Overvoltage Indication for Output10 |
| 25 | DC\_IN\_UV | 0=OK 1=Undervoltage | 0 | Undervoltage indication for DC Input |
| 26 | AC\_IN\_UV | 0=OK 1=Undervoltage | 0 | Undervoltage indication for AC Input |
| 27 | PH1\_Status | 0=OK 1=MISSING | 0 | Phase 1 OK (0) or missing indication (1) |
| 28 | PH2\_Status | 0=OK 1=MISSING | 0 | Phase 2 OK (0) or missing indication (1) |
| 29 | PH3\_Status | 0=OK 1=MISSING | 0 | Phase 3 OK (0) or missing indication (1) |
| 30 | Neutral\_Status | 0=OK 1=MISSING | 0 | Neutral OK (0) or missing indication (1) |
| 31 | Is\_Logfile\_Running | 0= Logfile not Running 1= Logfile Running | 0 | Is Logfile running? |
| 32 | Is\_Logfile\_Erase\_In \_Process | 0 = Logfile not in erase process 1 = Logfile in erase process | 0 | Is Logfile Erase In process? |
| 33 | Fan1\_Speed\_Status | 0 = OK 1 = Fan speed fail | 0 | Fans speed Status - OK (0) or Fail (1) |
| 34 | Fan2\_Speed\_Status | 0 = OK 1 = Fan speed fail | 0 | Fans speed Status - OK (0) or Fail (1) |
| 35 | Fan3\_Speed\_Status | 0 = OK 1 = Fan speed fail | 0 | Fans speed Status - OK (0) or Fail (1) |
| 36 | OVER\_TEMP\_Status | 0 = OK 1 = Over Temperature | 0 | PSU Temperature OK (0) or Over Temperature indication (1) |
| 37 | CC\_Inhibit | 0 = OFF 1 = ON | 0 | CCTCU OFF (0) or ON (1) indication |
| 38 | EC\_Inhibit | 0 = OFF 1 = ON | 0 | ECTCU OFF (0) or ON (1) indication |
| 39 | System\_Reset | 0 = Short Reset Not Initiated  1 = Short Reset Initiated | 0 | Short Reset Initiated indication.  Intermittent indication to Logfile. |
| 40 | System\_Off | 0 = Power Down Process Not Initiated  1 = Power Down Process Initiated | 0 | Power Down Process Initiated indication.  Intermittent indication to Logfile. |
| 41 | MIU\_Watchdog\_Status | 0 = Watchdog Status - OK 1 = Watchdog Status - Fail | 0 | MIU Watchdog Status - OK (0) or Fail (1)  The PSU samples the MIU Watchdog line, implemented as a discrete that changes state at 1Hz rate. |
| 42 | ON\_OFF\_Switch\_State | 0 = ON/OFF Switch in OFF State 1 =  ON/OFF Switch in ON State | 0 | ON/OFF Switch State indication |
| 43 | Capacitor1\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-1 end of life  indication - Optional TBD |
| 44 | Capacitor2\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-2 end of life  indication - Optional TBD |
| 45 | Capacitor3\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-3 end of life  indication - Optional TBD |
| 46 | Capacitor4\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-4 end of life  indication - Optional TBD |
| 47 | Capacitor5\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-5 end of life  indication - Optional TBD |
| 48 | Capacitor6\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-6 end of life  indication - Optional TBD |
| 49 | Capacitor7\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-7 end of life  indication - Optional TBD |
| 50 | Capacitor8\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-8 end of life  indication - Optional TBD |
| 51 | Capacitor9\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-9 end of life  indication - Optional TBD |
| 52 | Capacitor10\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-10 end of life  indication - Optional TBD |
| 53 | Capacitor11\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-11 end of life  indication - Optional TBD |
| 54 | Capacitor12\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-12 end of life  indication - Optional TBD |
| 55 | Capacitor13\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-13 end of life  indication - Optional TBD |
| 56 | Capacitor14\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-14 end of life  indication - Optional TBD |
| 57 | Capacitor15\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-15 end of life  indication - Optional TBD |
| 58 | Capacitor16\_end\_of\_life | 0 = Capacitor OK 1 = Capacitor end of life | 0 | Capacitor-16 end of life  indication - Optional TBD |
| 59 | Spare |  |  |  |
| 60 | Spare |  |  |  |
| 61 | Spare |  |  |  |
| 62 | Spare |  |  |  |
| 63 | Spare |  |  |  |

# PSU Logfile Structure

## PSU Logfile handling - general rules

* Logfile shall be recorded in the PSU at 1KHz rate.
* A Logfile is defined as a sequence of recorded entries (entry format detailed in par 6.2 below).
* Every time input minimum voltage is supplied to the PSU (see PSU PIDS paragraph 3.1.10 for minimum voltage conditions for log operation), a new log file will be started with the following name:
  + At first the name of the file will be based on the starting date of 01/01/1970 and a sequential cyclic counter. E.g. **1970\_01\_01\_00\_00\_00\_PSU\_0000.log**
  + Once receiving the actual time from the MIU, the file name will be updated according to the actual date and time, using the following format: YYYY\_MM\_DD\_HH\_MM\_SS\_PSU\_XXXX.log (YYYY-Year, MM-Month, DD-Day, HH-Hour, MM-Minutes, SS-Seconds, XXXX – stays as before with the sequential counter).
  + In case no communication with the MIU is established, then the file name shall remain with the date of 1970 and the sequential counter.
* Whenever the input voltages drop below the minimum requirements (see PSU PIDS paragraph 3.1.10), the log shall record additional entries at least according to the longest output voltage hold-up time (50 msec), before closing the file. This means that there should be at least additional 50 entries upon input voltage off.
* Log files will be recorded as long as there is memory capacity for the recording. When the memory is completely full, the recording will stop.
* Logfile shall be downloaded using SFTP client.

## PSU Logfile record entry structure

### Initial entry for every new file (once only at start of file):

TBD

### Structure for all entries after initial entry (at rate of 1KHz):

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Name** | **Description** | **comments** |
| 1 | Log\_Header | Log Header | [Log Header](#scroll-bookmark-1) |
| 2 | Log Payload | The fields structure of the Log Payload is defined in the PSU Telemetry and BIT Message (not including the message ID Byte) |  |
| 3 | Log\_Trailer | Log Trailer | [Log Trailer](#scroll-bookmark-1) |

Log\_Header:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| # | **Name** | **Description** | **Variables Type** | **Range** | **Remarks** |
| 1 | Log\_ID | Log ID | B10 | LX12345678 | Constant value |
| 2 | Log\_Payload\_Size | Payload Size [Bytes] | U2 | 195 | Not including Log Header/Trailer. Constant value. |
| 3 | GMT\_Time | number of seconds elapsed since 00:00 hours, Jan 1, 1970 UTC | U4 | 0-FFFFFFFF | At first start from 0, when time from MIU received, continue from there. |
| 4 | Micro\_Sec | micro seconds in GMT Time | U2 | 0-FFFF | Micro second, fixed point. The LSB is 10^6 / (0xFFFF).  At first start from 0, when time from MIU received, continue from there. |

Log\_Trailer:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| # | **Name** | **Description** | **Variables Type** | **Range** | **Remarks** |
| 1 | Checksum | Sum of all log header bytes and log payload bytes. | U1 | 0-FF | The checksum is calculated for each record entry seperately. |