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Format for Data Files submitted with the MESSENGER Energetic Particle Spectrometer (EPS) Calibration Report

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INTRODUCTION

This document describes the data formats of the files that were analyzed to produce the MESSENGER Energetic Particle Spectrometer (EPPS/EPS) Calibration Report [MESSENGER Document Number 7384-9471]

The MESSENGER EPS instrument was calibrated at the JHU/APL calibration facilities prior to flight. Twenty six (26) beam runs were identified in the EPS calibration report (Appendix 10). All calibration data were recorded using GSEOS software (www.gseos.com), and the relevant science data were extracted from the GSEOS recorded file and put into text file for each run as described in this document.

Appendix 10 of the EPS calibration report contains detailed information about the instrument and beam settings during each calibration run. That information is being repeated in this document as Appendix A. Users of the calibration data are strongly advised to consult the EPS calibration report together with the EPS science team before analyzing the data. The parameters represented below are defined and described in the document referenced above.

DATA DESCRIPTION

The integration periods (N1 and N2) were set to 10 seconds for all calibration runs. Selected blocks of data from the EPS instrument were exported from the GSEOS recorded file for each run. We name the exported text file with the appropriate run numbers (example: EPS_Cal_Runs14.txt for Runs #14 in Appendix A). The GSEOS exports blocks of data into a text file as soon as they become available after each integration period. Therefore for each exported text file, it contains blocks of data in sequential order. Each block of data is labeled and formatted:

Name: **EPS_Status.MET**
Type: Integer
Number of items: 1
Description: Time tag in seconds from last reboot on PC

Name: **EPP_EPS_HiDCom.RateCounter**
Type: Integer
Number of items: 42
Description: Hardware counters (digital number) for various measurements during each integration periods. They are:
0 Fast 0 (Electron)
1 Fast 1 (Ion)
2 Fast 2 (Electron)
3 Fast 3 (Ion)
4 Fast 4 (Electron)
5 Fast 5 (Ion)
6 Fast 6 (Electron)
7 Fast 7 (Ion)

8 Fast 8 (Electron)
9 Fast 9 (Ion)
10 Fast 10 (Electron)
11 Fast 11 (Ion)
12 Shaped 0 (Electron)
13 Shaped 1 (Ion)
14 Shaped 2 (Electron)
15 Shaped 3 (Electron)
16 Shaped 4 (Ion)
17 Shaped 5 (Electron)
18 Shaped 6 (Electron)
19 Shaped 7 (Ion)
20 Shaped 8 (Electron)
21 Shaped 9 (Electron)
22 Shaped 10 (Ion)
23 Shaped 11 (Electron)
24 Anode 0
25 Anode 1
26 Anode 2
27 Anode 3
28 Anode 4
29 Anode 5
30 Electron event
31 Ion event
32 Starts
33 Stops
34 Valid TOF
35 Software counter - Electron event
36 Software counter - High energy ion event (Triple)
37 Software counter - Low energy ion event (Double)
38 Software counter – Discarded electron pileup event
39 Software counter – Discarded electron multiple hits event
40 Software counter – Discarded ion pileup event
41 Software counter – Discarded ion multiple hits event

Name: **EPP_EPS_LowDCom.EnergyAddr**
Type: Integer
Number of items: 300
Description: Detector address (digital number; 0-5 for 6 directions) for the first 300 particles within the 10 seconds integration period.

Name: **EPP_EPS_LowDCom.EnergyBase**
Type: Integer
Number of items: 300
Description: Base energy channel (digital number, 0-4096) for the first 300 particles within the 10 seconds integration period.

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Name: **EPP_EPS_LowDCom.EnergyPeak**
Type: Integer
Number of items: 300
Description: Peak energy channel (digital number, 0-4096) for the first 300 particles within the 10 seconds integration period.

Name: **EPP_EPS_LowDCom.TOF**
Type: Integer
Number of items: 300
Description: TOF channel number (digital number) for the first 300 particles within the 10 seconds integration period.

Name: **EPP_EPS_LowDCom.TOF_Seg**
Type: Integer
Number of items: 300
Description: TOF anode channel (digital number, 0-5 for 6 directions) for the first 300 particles within the 10 seconds integration period.