# Telemetry Output

## EEPAA

36-words every 4 Minor Frames (synched with Major frame)

|  |  |  |
| --- | --- | --- |
| Word # | Data | Notes |
| 01 | Not Used |  |
| 02 | Sync Word |  |
| 03 | Status |  |
| 04 | Status | Bit 14-HV/16, Bits 13:8-step#,Bit 7-HV enable, Bit 5 TP enable ; bit #(15:0) |
| 05 | Status |  |
| 06 | ADC – stepper voltage | 12 bit, 3.3v ref |
| 07 | ADC – MCP voltage | 12 bit, 3.3v ref |
| 08 | ADC – MCP current | 12 bit, 3.3v ref |
| 09 | ADC – Stack voltage | 12 bit, 3.3v ref |
| 10 | ADC – Stack current | 12 bit, 3.3v ref |
| 11 | ADC – 3.3v monitor (1/2) | 12 bit, 3.3v ref |
| 12 | ADC – 5.0v monitor (1/2) | 12 bit, 3.3v ref |
| 13 | ADC – Temperature monitor | 12 bit, 3.3v ref, 1uA/K across 7.5k resistor |
| 14 | Counter01 |  |
| 15 | Counter02 |  |
| 16 | Counter03 |  |
| 17 | Counter04 |  |
| 18 | Counter05 |  |
| 19 | Counter06 |  |
| 20 | Counter07 |  |
| 21 | Counter08 |  |
| 22 | Counter09 |  |
| 23 | Counter10 |  |
| 24 | Counter11 |  |
| 25 | Counter12 |  |
| 26 | Counter13 |  |
| 27 | Counter14 |  |
| 28 | Counter15 |  |
| 29 | Counter16 |  |
| 30 | Counter17 |  |
| 31 | Counter18 |  |
| 32 | Counter19 |  |
| 33 | Counter20 |  |
| 34 | Counter21 |  |
| 35 | Counter22 | 625kHz clock input |
| 36 | Not Used |  |

## IEPAA

28 words every 4 Minor Frames (synched with Major frame)

|  |  |  |
| --- | --- | --- |
| Word # | Data | Notes |
| 01 | Not Used |  |
| 02 | Sync Word |  |
| 03 | Status |  |
| 04 | Status | Bit 14-HV/16, Bits 13:8-step#,Bit 7-HV enable, Bit 5 TP enable ; bit #(15:0) |
| 05 | Status |  |
| 06 | ADC – stepper voltage | 12 bit, 3.3v ref |
| 07 | ADC – MCP voltage | 12 bit, 3.3v ref |
| 08 | ADC – MCP current | 12 bit, 3.3v ref |
| 09 | ADC – Stack voltage | 12 bit, 3.3v ref |
| 10 | ADC – Stack current | 12 bit, 3.3v ref |
| 11 | ADC – 3.3v monitor (1/2) | 12 bit, 3.3v ref |
| 12 | ADC – 5.0v monitor (1/2) | 12 bit, 3.3v ref |
| 13 | ADC – Temperature monitor | 12 bit, 3.3v ref, 1uA/K across 7.5k resistor |
| 14 | Counter01 | Pad 1,2,3 |
| 15 | Counter02 | Pad 4,5,6 |
| 16 | Counter03 | Pad 7,8,9 |
| 17 | Counter04 | Pad 10,11,12 |
| 18 | Counter05 | Pad 13,14,15 |
| 19 | Counter06 | Pad 16,17,18 |
| 20 | Counter07 | Pad 19,20,21 |
| 21 | Counter08 | 625kHz clock input |
| 22 | Not Used |  |

## LEESA

36-words every 4 Minor Frames (synched with Major frame)

|  |  |  |
| --- | --- | --- |
| Word # | Data | Notes |
| 01 | Not Used |  |
| 02 | Sync Word |  |
| 03 | Status |  |
| 04 | Status | Bit 14-HV/16, Bits 13:8-step#,Bit 7-HV enable, Bit 5 TP enable ; bit #(15:0) |
| 05 | Status |  |
| 06 | ADC – stepper voltage | 12 bit, 3.3v ref |
| 07 | ADC – MCP voltage | 12 bit, 3.3v ref |
| 08 | ADC – MCP current | 12 bit, 3.3v ref |
| 09 | ADC – Stack voltage | 12 bit, 3.3v ref |
| 10 | ADC – Stack current | 12 bit, 3.3v ref |
| 11 | ADC – 3.3v monitor (1/2) | 12 bit, 3.3v ref |
| 12 | ADC – 5.0v monitor (1/2) | 12 bit, 3.3v ref |
| 13 | ADC – Temperature monitor | 12 bit, 3.3v ref, 1uA/K across 7.5k resistor |
| 14 | Counter01 |  |
| 15 | Counter02 |  |
| 16 | Counter03 |  |
| 17 | Counter04 |  |
| 18 | Counter05 |  |
| 19 | Counter06 |  |
| 20 | Counter07 |  |
| 21 | Counter08 |  |
| 22 | Counter09 |  |
| 23 | Counter10 |  |
| 24 | Counter11 |  |
| 25 | Counter12 |  |
| 26 | Counter13 |  |
| 27 | Counter14 |  |
| 28 | Counter15 |  |
| 29 | Counter16 |  |
| 30 | Counter17 |  |
| 31 | Counter18 |  |
| 32 | Counter19 |  |
| 33 | Counter20 |  |
| 34 | Counter21 |  |
| 35 | Counter22 | 625kHz clock input |
| 36 | Not Used |  |

## 

## LP

9- words every minor frame

For each minor frame the first 8 LP words are the DeltaN/N signal, it is sampled at 32kHz, so each sample is 31.25usec time step, but you can use the time tag for the first value as a fixed from the frame and the remainder are a 31.25usec delta on top of the first. We will also probably subtract one minor frame (250usec) from the time value as the data is really sampled in the frame prior to where it happens.

The 9th word is one of 4 cycling values, ni, ne\_Swept, ni\_swept, step. It steps each minor frame to the next value then repeats. So ni is the 9th word for LP on frame 0,3,7, …, ne\_swept is frame 1,4,8, etc

Channel 1 through 8: DeltaN/N

Channel 9: ni, ne\_swept, ni\_swept, step (cycles each frame)

# Equipment list

## Flight

2x EEPAA

2x IEPAA

1x LEESA

5x Arm plugs

~~5x Power harnesses for particle detectors (Installed on payload)~~

~~5x Data harnesses for particle detectors (Installed on payload)~~

2x LP electronics

~~2x Power harnesses for LP (Installed on payload)~~

~~2x Data harnesses for LP (Installed on payload)~~

~~5x deployer arms for particle detectors (Installed on payload)~~

~~4x LP deployers (Installed on payload)~~

~~4x LP shafts with cable (Installed on payload)~~

4x SMB connectors to solder on at Wallops after install (Installed on payload)

4x Flight LP spheres (gold plated)

Purge tubing

2x Purge Tee

2x inline filter

## GSE

Ulyssix computer #1- mouse, cable harness, wifi

Ulyssix computer #2 – keyboard, mouse, monitor, cable harness, wifi

4x Test LP spheres (non plated)

5x Arm Plugs with divide by 16

5x Purge covers

FPGA JTAG interface cable

Spare boards?

Test board for debug at Wallops?

Will need some protective cover for header

Power supply?

Wallops probably has a 28V supply that can be borrowed, do we bring a triple supply?

FPGA JTAG interface cable

What about programing FPGAs in the field?

# TODOs

Mount for vacuum chamber

VI for grabbing UDP data

## LP Board

Change Gains for Swept probe

Replace DPad on fixed side for SN2

Test new FPGA code

## MCP Holder / Anode

Install flight plates

## Housing

Install tubing for purge

# Maybe to-dos if there is time

Make arm-plugs with divide by 16 red

ESD Covers for 9 pin connectors (male connector on instrument side)

Resistor bank for testing LP

SMA connector to block of selectable resistors

3D print protective covers for Headers

# To order

ESD covers ESD Covers for 9 pin connectors (male connector on instrument side)

More memory for old Ulyssix machine (DDR3 memory)