**Payload Title:**

**Payload Class:**  Small Large (circle one)

**Flight Number:**

**Institution:**

**Contact Name:**

**Contact Phone:**

**Contact E-mail:**

**Submit Date:**

1. **Mechanical Specifications:**
	1. Measured weight of the payload in grams (not including payload plate):

|  |  |  |  |
| --- | --- | --- | --- |
| **Item** | **Mass (g)** | **Uncertainty** | **Measured or Estimated** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| **TOTAL** |  |  |  |

* 1. Provide a mechanical drawing detailing the major components of your payload. Mechanical drawings detailing the attach points from the payloads to the payloads plate are required. Please include component reference numbers on the drawings. These reference numbers should match the specific part in the Bill of Materials required in Appendix B.
	2. Other relevant mechanical information
1. **Power Specifications:**
	1. Measured current draw at 30 VDC:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item** | **Current (A)** | **Voltage (V)** | **Power (W)** | **Uncertainty** |
|  |  |  |  |  |
|  |  |  |  |  |
| **TOTAL** |  |  |  |  |

* 1. If HASP is providing power to your payload, provide a detailed power system wiring diagram starting from pins on the student payload interface plate EDAC 516 connector to all major components of your payload. All voltage lines must be labeled, and any power converters must be documented.
	2. Other relevant power information
1. **Downlink Telemetry Specifications:**
	1. Serial data downlink format: Stream Packetized (circle one)
	2. Approximate serial downlink rate (in bits per second):
	3. Specify your serial data record including record length and information contained in each record byte. You must complete the table and include a sample data record.

|  |  |  |
| --- | --- | --- |
| **Byte** | **Bits** | **Description** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

* 1. Number of analog channels being used:
	2. If analog channels are being used, what are they being used for?
	3. Number of discrete lines being used:
	4. If discrete lines are being used what are they being used for?
	5. Are there any on-board transmitters? If so, list the frequencies being used and the transmitted power.

|  |  |  |
| --- | --- | --- |
| **Transmitter Model** | **Frequency** | **Transmitting Power** |
|  |  |  |
|  |  |  |
|  |  |  |

* 1. Other relevant downlink telemetry information.
1. **Uplink Commanding Specifications:**
	1. Command uplink capability required: Yes No (circle one)
	2. If so, will commands be uplinked in regular intervals: Yes No (circle one)
	3. How many commands do you expect to uplink during the flight (can be an absolute number or a rate, i.e. *n commands per hour*):
	4. Provide a table of all uplink commands for your payload

|  |  |  |
| --- | --- | --- |
| **Command Name** | **2-Byte Command (Hex Format)** | **Command Description** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

* 1. Are there any on-board receivers? If so, list the frequencies being used.
	2. Other relevant uplink commanding information.
1. **Integration and Logistics**
	1. Date and Time of your arrival for integration:
	2. Approximate amount of time required for integration:
	3. Name of the integration team leader:
	4. Email address of the integration team leader:
	5. List **ALL** integration participants (first and last names) who may be present for integration with their email addresses:

|  |  |  |
| --- | --- | --- |
| **Name** | **E-Mail Address** | **Phone Number** |
| Jon Jones | jj@jj.com | 888-888-8888 |
|  |  |  |
|  |  |  |
|  |  |  |

* 1. Define a successful integration of your payload:
	2. List all expected integration steps:
	3. List all checks that will determine a successful integration:
	4. List any additional LSU personnel support needed for a successful integration other than directly related to the HASP integration (i.e. lifting, moving equipment, hotel information/arrangements, any special delivery needs…):
	5. List any LSU supplied equipment that may be needed for a successful integration:
1. **Hazards**
	1. Are you flying anything that is potentially hazardous, as listed in the Call for Proposal and the HASP Student Manual, to HASP or the ground crew before or after launch: Yes No (Circle one)


# **Appendix A: NASA Hazard Tables**

If you intend to fly a listed hazard on HASP, you must **fully complete** the appropriate hazard form and include the form on **both** the Preliminary PSIP and the Final PSIP. This documentation is required for NASA safety to clear your payload for flight. Be specific and as detailed as possible with the information requested.

**I. Radio Frequency Transmitter Requirements for HASP Flights**

RF transmitters are listed as a safety hazard by NASA. As such, the use of RF transmitters on HASP must be documented and approved in the Ground and RF flight safety plans. Any team that will use a transmitter must provide the following information in both their application and in the PSIP document supplied later in the flight season. **In addition, the frequency range 425 – 435 MHz is used for critical flight operations and therefore BANNED** for any payload use. This table needs to be completed for each RF transmitting device type that will be flown on HASP.

|  |
| --- |
| HASP 2024 RF System Documentation |
| Manufacture Model |  |
| Part Number |  |
| Ground or Flight Transmitter |  |
| Type of Emission |  |
| Transmit Frequency (MHz) |  |
| Receive Frequency (MHz) |  |
| Antenna Type |  |
| Gain (dBi) |  |
| Peak Radiated Power (Watts) |  |
| Average Radiated Power (Watts) |  |

**II: High Voltage Hazard Requirements for HASP**

High Voltage systems are listed as a safety hazard on NASA payloads. Therefore, the use of High Voltage on HASP must be documented and approved in the Ground and Flight safety plans. A source is considered High Voltage if the output voltage is greater than 50V. Any team that will use a high voltage source must provide the following information in both their application and in the PSIP document supplied later in the flight season for each source type. In addition, a detailed schematic, safety plan and procedure for operation must be included in this application. A final version of these requirements must be included in the PSIP submitted later in the flight cycle.

|  |
| --- |
| HASP 2024 High Voltage System Documentation |
| Manufacture Model |  |
| Part Number |  |
| Location of Voltage Source |  |
| Fully Enclosed (Yes/No) |  |
| Is High Voltage source Potted? |  |
| Output Voltage |  |
| Power (W) |  |
| Peak Current (A) |  |
| Run Current (A) |  |

**III: Lasers (Class 1, 2, and 3R) Hazard Requirements for HASP**

Lasers are listed as a safety hazard on NASA payloads. Therefore, the use of lasers on HASP must be documented and approved in the Ground and Flight safety plans. Only Class 1, 2, and 3R lasers will be considered for flight. All other laser classes are **banned**. Any team that will use an on-board laser must provide the following information in both their application and in the PSIP document supplied later in the flight season for each source type. The laser approval process is a very time-consuming operation and complete data must be submitted with the application to ensure that payload team is notified of approval status early in the HASP timeline. In addition, a detailed schematic, safety plan and procedure for operation must be documented in the PSIP.

|  |
| --- |
|  HASP 2024 Laser System Documentation |
| Manufacture Model |  |
| Part Number |  |
| Serial Number |  |
| GDFC ECN Number |  |
| Laser Medium |  |
| Type of Laser |  |
| Laser Class |  |
| NOHD (Nominal Ocular Hazard Distance) |  |
| Laser Wavelength |  |
| Wave Type  | *(Continuous Wave, Single Pulsed, Multiple Pulsed)* |
| Interlocks | *(None, Fallible, Fail-Safe)* |
| Beam Shape  | *(Circular, Elliptical, Rectangular)* |
| Beam Diameter (mm) |  | **Beam Divergence (mrad)** |  |
| Diameter at Waist (mm) |  | **Aperture to Waist Divergence (cm)** |  |
| Major Axis Dimension (mm) |  | **Major Divergence (mrad)** |  |
| Minor Axis Dimension (mm) |  | **Minor Divergence (mrad)** |  |
| Pulse Width (sec) |  | **PRF (Hz)** |  |
| Energy (Joules) |  | **Average Power (W)** |  |
| Gaussian Coupled (e-1, e-2) | *(e-1, e-2)* |
| Single Mode Fiber Diameter |  |
| Multi-Mode Fiber Numerical Aperture (NA) |  |
| Flight Use or Ground Testing Use? |  |
| Beams Enclosed? |  |
| Transmitting External to payload? |  |

**IV: On-Board Batteries Hazard Requirements for HASP**

Batteries are listed as a safety hazard on NASA payloads. Therefore, the use of any batteries on HASP must be documented and approved in the Ground and Flight safety plans. Unmodified general use alkaline and lithium-ion batteries will be approved but must be documented in the form below. Any modifications to pre-packaged batteries are **banned** and will not be allowed on HASP**.** In addition, all rechargeable batteries are banned from use on HASP. All Li-ion batteries must have a UL certification. When not installed in the instrument, Li-Ion batteries must be stored in a fire-rated bag or cabinet. Examples of previous battery types that have been approved on HASP are listed below:

* Any domestic battery manufacturer: Duracell, Energizer, Rayovac, etc
* Ultralife U9VL-J-P

|  |
| --- |
| HASP 2024 Battery Hazard Documentation |
| Battery Manufacturer |  |
| Battery Type |  |
| Chemical Makeup |  |
| Battery modifications | *(Must be NO)* |
| UL Certification for Li-Ion |  |
| SDS from manufacturer |  |
| Product information sheet from manufacturer |  |

**V: Pressurized System Hazard Requirements for HASP**

Pressurized systems are listed as a safety hazard on NASA payloads. Therefore, the use of any pressurized systems on HASP must be documented and approved in the Ground and Flight safety plans. Any component that has a pressure differential with the external atmosphere surrounding it is considered a pressurized system. Teams that have questions about Pressurized System hazards can request, through HASP Management, a meeting with the NASA Pressure Systems Manager.

Additional documents required for review and certification of the pressurized or vacuumed systems include:

* The following requirements apply to all components within the pressure boundary (the pressure source to the exhaust/relief valve)

- Detailed Pressure Systems Configuration Drawings/Schematics

- Detailed Bill of Materials with Maximum Allowable Working Pressure (MAWP) pressure ratings

- Data Sheets of Applicable Pressurized Components (Valves, Regulators, Relief Valves, Gauges, flexible hoses)

* Proof Pressure Test Records &/or Leak Test Records

Pressure Vessels containing custom made or non-coded components will need to be tested. Pressure/Leak Test results must be included documenting a stable chamber for a per applicable safety and engineering practices. NASA Safety guidelines require a 10-minute pressure/leak test. Mission Assurance testing should be 12 hours.

* Functional Test Record for Relief Valves (sticker or tag on equipment)

- All relief valves must be ASME rated. New valve needs the requires stamp information. Reused valves require a pop test.

* Applicable calibration record for pressure gauges (stickers or tags on equipment)

- Safety critical pressure gauges must be calibrated every 3 years. Reference only pressure gauges must be calibrated every 5 years. Calibration documentation must be included.

* Applicable engineering analyses (possibly analysis may include pipe/tube stress analysis per ASME B31.3, tube pressure rating table or relief device sizing analysis)
* Provide pressurization hazardous procedure, if applicable, and SDS(s)
* Note: Personnel training in pressure system or compressed gas safety is also required to operate pressure systems at NASA WFF or its associated facility.

- Pressure systems safety training and on the job training for mission operations required. A letter from university management certifying that students or system operators have completed this training must be included.

|  |
| --- |
| HASP 2024 Pressurized System Hazard Documentation |
| System Description |  |
| Maximum Expected Operating Pressure (PSIG) or Vacuum |  |
| Fluids (e.g. GN2, GHe, Air)\* |  |
| Notes |  |
| SDS from manufacturer |  |

\***Note:** Only gaseous fluids are allowed here. Any liquids are still banned on HASP.

# **Appendix B: Mechanical Bill of Materials**

The Mechanical Bill of Material must document all structural components of your payloads. This includes internal and external framing, exterior panels, and any additional support structure on your payload. Use the table below for your BOM. I have included some sample entries so detail how you must use the BOM. You may add additional rows to the spreadsheet if you need it. This must be as complete as possible because NASA safety will use this BOM to determine if there are any structural issues with your payload design.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Ref # | Item Description | Quantity | Vendor | Vendor Part Number | Link | Notes |
|  01 |  2.5” x 3.5” x 0.5” Aluminum L-Channel | 4 |  Mcmaster | 11A111A111 | <https://link> to part |  Vertical structural components |
|  02 |  Hex Bolts Grade 5 ¼-20 X 3inches | 25 | Amazon | 123321123321 | https:////// | Frame bolts |
|  03 |  4” x 10” x 0.25” Polished Aluminum Sheet | 4 | Grainger | 1233A3321 | https:// | External payload walls |
|   |   |   |   |   |  |   |
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