**Payload Title:**

**Payload Class** (Small / Large)**:**  **Flight Number:** 2023-

**Institution:**

**Contact Name:**

**Contact Phone:**

**Contact E-mail:**

**Submit Date:**

**Flight Operations Release:** By submitting this Flight Operation Plan you acknowledge the following conditions, limitations, and constraints. Your payload is your responsibility. The CSBF and HASP flight and management team will not be responsible for any payload problems, failures or damage due to lack of proper documentation, inadequate planning and/or design, or delayed notification of remedial action. The HASP flight team will not be able to perform any time intensive or involved tasks necessary to prepare your payload for flight. If you have a set of tasks that needs to be performed prior to flight then a team member from your group should be on the flight line until, at least, launch. The HASP flight team will attempt to perform simple tasks for your payload, but only if these tasks are fully documented by the time of payload integration. Full documentation includes written instructions, images of key steps and/or configuration changes, and labeling on your payload of values, switches, releases, or other key features in these operations. Target launch and recovery dates are not guaranteed. These dates depend critically upon weather conditions and are likely to slip by several days and possibly by a week or more. Flight termination and landing are violent events and it is possible that your payload will be damaged beyond repair. The CSBF and HASP flight team will make every effort to assure that your payload is successfully launched, flown, recovered, and returned to you intact.

**I. Flight-line Setup & Pre-launch Checkout Procedures:**

In this section provide a line-by-line list of tasks for the periods indicated below.This should include detailed instructions, pictures, descriptions, and anything else that will be needed to properly complete each task. Please refer to the Flight Operations Release located at the top of this document and see Appendix A for a timeline of the typical sequence of events prior to launch as well as pre-launch and flight operations. Your flight operation planning should take both the release statement and timeline into account. The line-by-line task list should contain the following:

1. The time at which the task needs to be completed with respect to launch time (i.e. T=0).
2. Time to complete task.
3. A short title for task.

4. Task detailed instructions as described above. If task requires opening HASP personnel opening your payload, a step-by-step guide with images is required. Remember doors and hatches must follow the keep out zone requirements.

5. A description of what constitutes a successful completion of the task (e.g. indicator lights, change in telemetry, picture showing new configuration)

6. The person responsible for completing the task. Indicate if it is your desire for HASP personnel to attempt to complete the task.

**A. Flight-line Setup Period:** Provide a task list and timeline for the period leading up to the final HASP hang test and MRR. That is from about T = -7 days to about T = - 3 days. This is the period where you will have the greatest access to your payload and the most time available for setup activities. At the time of the MRR your payload should be ready for launch on a few hours’ notice and access to your payload will become limited.

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| **Timeline (T= -7D to -3D)** | **Time to complete** | **Task** | **Task Description** | **Task Result** | **Person Responsible** |
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**B. Pre-launch Checkout Period:** Provide a task list and timeline for the pre-launch period starting at T = - 5 hours. Note that access to your payload after pickup (T = -4 hours) is **very** limited due to safety considerations. Thus, only very simple operations (e.g. flipping a switch, opening a valve) that can be performed external to your payload will be possible after HASP pickup.

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| **Timeline (T= -5H to 0H)** | **Time to complete** | **Task** | **Task Description** | **Task Result** | **Person Responsible** |
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**II. Flight Operation Procedures**

 This section documents your procedures for operating your payload from launch through termination. Generally, this will be a list of commands transmitted to the payload in a particular order, observing the payload response via telemetry or video, identifying if the response is valid and, if needed, executing a contingency. Note that **all** payloads have at least “Power On” and “Power Off” commands. These commands should be listed as necessary in your procedures. Each command or procedure step should include, at least, the following information:

1. The name of the command.

2. The bytes (two) in hex format of the serial command.

3. A description of the command.

4. A brief description of how it will be determined, from the ground, that the command was successfully executed.

5. The ramifications to flight success if a command isn’t executed properly.

**A. Uplink Command List:** This list should contain a complete list of all the commands for your payload.

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| --- | --- | --- | --- | --- |
| **Command Name** | **2-Byte Command (Hex Format)** | **Command Description** | **Expected Result** | **Failure Impact** |
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**B. Commands to be executed during climb-out:** Provide a list of commands that will be transmitted to the ballooncraft after launch (T = 0) but prior to reaching float altitude (~T = +2 hours). These may be commands that initialize your payload or start your payload’s operations.

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| --- | --- | --- | --- |
| **Time for Launch (T=0 to T=+2H)** | **2-Byte Command (Hex Format)** | **Command Description** | **Expected Result** |
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**C. Flight Configuration Setup:** Provide a list of commands that will be used for the flight configuration of your payload. Indicate when this procedure should be executed (e.g. once payload reaches float; after every “Power On”).

**D. Failure Response:** This should be a series of procedures that would be executed in response to particular payload failure modes. Each potential failure mode should be listed along with the method used to determine if the failure has occurred, the list of commands used to attempt a remedy and the method used to determine if the attempted remedy was successful

**E. Termination:** Provide a list of commands that will be used just prior to the termination of the float phase and the beginning of the descent phase of the HASP flight. All payloads will be powered during before termination unless a valid reason is provided in section F.

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| --- | --- | --- | --- |
| **Time before Termination** | **2-Byte Command (Hex Format)** | **Command Description** | **Expected Result** |
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**F.** **Descent:** If you wish for your payload to be powered on during the descent, you must state so here. Payloads left powered on during the descent will not be powered down until the recovery crew arrives on scene and disconnects the batteries. **NOTE: Payloads must have a valid scientific reason for staying on during descent.**

Powered On during descent (circle appropriate choice): YES / NO

If YES, please provide your scientific justification:

**III. Recovery, Packing and Shipping Instructions**

In this section provide detailed instructions for special handling of your payload during recovery, packing and shipping. These instructions should be as detailed as possible including appropriate pictures and payload labeling. As noted above in the Flight Operations Release, incomplete documentation on your part may lead to inadvertent payload damage or data loss.

**A. Recovery Instructions:** List any specific recovery instructions including handling of hazardous or critical items such as pressurized containers, electronics, storage devices and /or cameras. It is recommended that a step by step instruction list is included with pictures illustrating these steps. **Flight teams will NOT be allowed on the recovery trip.**

**B. Packing Instructions:** Provide instructions on how to pack your payload for shipping. It is recommended that a step by step instruction list is included with pictures illustrating these steps.

**C. Shipping:** Provide shipping instructions. Payloads will be shipped shortly after recovery. Your team is required to provide a shipping box with packing materials, any shipping documentation required, a pre-paid shipping label to ship your payload from Ft Sumner, NM to your institution. If you are picking up your payload from Ft Sumner, please explicitly state that in this section.

**IV. List of Participants**

 Provide the full name, e-mail address, phone number and anticipated deployment dates (arrival, departure) for all personnel who will be participating in flight operations at Ft. Sumner, New Mexico. A complete list is required in order to authorize your access to the Ft. Sumner balloon base. Any participant on this list must have been included on the NASA Flight On-site Security Clearance submitted on June 30, 2023. Anyone not on that list will **not** be approved.

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| **Name** | **E-Mail Address** | **Phone Number** | **Anticipated****Arrival** | **Anticipated Departure** | **Role** |
| Jon Jones | jj@jj.com | 888-888-8888 | 1/1/21 | 1/31/21 | Software |
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**Timeline Prior to Launch Day:** HASP flightline operations will typically begin about 1 week prior to the target launch day. During the first five days we will be performing final assembly, detailed system checks and other tasks necessary to prepare HASP for launch. This is the time period when you will have the most access to your payload and the most time to do any last-minute pre-launch setup. At about T = - 3 days we will do a final hang test (if necessary) and the Mission Readiness Review (MRR). After the MRR we wait for optimum surface and high-altitude weather conditions in order to stage the launch and flight. This wait can last anywhere from a few days to a couple of weeks. Following the MRR access to your payload will be limited as HASP will be in a launch ready condition.

**Typical Flight Day Timeline:** The following is an example timeline of the sequence of events and approximate times (in hours relative to T=0) that occur on launch day. Your flight operation planning should take this timeline into account.

 **T = -5.0H Show:** This is the time when all crew appear at the flight line. Since launch is usually scheduled for 7:30 am, this is around 2:30 am. Final payload preparation should be accomplished prior to pickup. **This is the last time anyone but HASP Management will have access to the payload.**

 **T = -4.0H Ready for pickup:** The launch vehicle is mated with HASP and system checks are performed. For most of this period HASP is on line power and the payloads are off. Prior to “pickup complete” the payloads are briefly powered on for a functional test.

 **T = -3.0H Pickup complete:** All systems and payloads have been verified to be functional and all payloads are powered down.

 **T = -2.5H Roll out to pad:** Weather conditions are checked and the vehicle is authorized to begin the trip to the launch pad. Effort up to this point is fully reversible and, thus, if a scrub occurs it will usually happen at this point.

 **T = -2.2H Arrive at pad:** Layout launch line and begin final preparations for launch

 **T = -2.0H Switch to HASP internal batteries:** Power down HASP, remove line power and switch to internal flight batteries. Power up HASP and check systems. Configure all payloads for flight. Payloads are powered up for flight shortly before balloon layout is authorized.

 **T = -1.5H Layout balloon:** The balloon is unpacked from the shipping crate, attached to the flight train and readied for filling. This is a major milestone in launch operations as it is very difficult (though not impossible) to repack a balloon once it is laid out. Thus, all HASP systems and payloads must be in flight configuration and fully functional prior to this step. As this step implies a commit to launch there can be a delay in authorization if wind and/or weather conditions are problematic.

 **T = -0.7H Fill balloon:** Once the authorization to fill the balloon with helium is given, this is very close to a full launch commit. The only option to abort the launch once helium begins to enter the balloon is to cut the balloon from the flight train resulting in irreversible damage to the balloon. Thus, there can be a delay in authorization if wind and/or weather conditions are problematic.

 **T = 0.0H Launch:** Self explanatory and usually a fairly impressive sight.

 **T = 2.0H Reach float altitude:** The balloon vehicle will climb out at a rate of about 1000 feet per minute and will reach a float altitude around 124,000 feet at about this time.

 **T = 12.0H Switch to downrange station:** The balloon will have drifted west and out of line-of-sight range at about this time. The primary telemetry downlink will be switched to the downrange station and data will be returned to Ft. Sumner over the internet.

 **T = 17.5H Prepare for termination:** All payloads are configured for flight termination and powered down.

 **T = 18.0H Termination:** The balloon is released from the flight train, rapidly free falls to ~90,000 feet when the parachute begin to slow the descent.

 **T = 18.8H Landing:** The official end of the flight. Recovery team is already in the field and recovery operations will begin in the morning.

**Target Dates:** For the current flight year you can use the following target dates in your planning. However, as discussed in the Flight Operations Release the target dates for launch and recovery can be delayed by days or weeks.

**Flight Operations Start** August 2023 (TBD)

**HASP MRR** August 2023 (TBD)

**Target Launch Date** September 2023 (TBD)

**Earliest Post-Flight access to payloads** September 2023 (TBD)

**HASP return to LSU** September 2023 (TBD)