GRAVITY PROBE B

PROCEDURE FOR

PAYLOAD VERIFICATION

(PTP) INSTALL GSE GAS/VAC. LINES (+Z AXIS UP)

9/1/99

Prepared by: M. Taber

Approvals:

Program Responsibility	Signature	Date
C. Warren Gas/Vac. Engineer		
M. Taber Payload Test Director		
D. Ross GP-B Quality Assurance		
S. Buchman GP-B Hardware Manager		

NOTES:
Level of QA required during performance of this procedure:
_X_ Stanford QA Representative
___ Government QA Representative

All redlines must be approved by QA

Revision Record:

Rev	Rev Date	ECO #	Summary Description

Acronyms and Abbreviations:

Acronym / Abbreviation	**Meaning**
GSE	Ground Support Equipment
LD	Leak Detector
LGS	Leakage Gas System
PPMS	Probe Pressure Measurement System
SMD	Science Mission Dewar

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A Scope

This procedure effects the installation of gas/vacuum lines between the Probe and the Gyro Spinup Gas / Vac. GSE. These lines include the leakage gas pumping line, the spinup gas supply lines and the spinup gas exhaust lines.

B Requirements Verification N/A

C Configuration Requirements

Probe-C is integrated into the SMD per drawing 65113-1C34292 and oriented with the +Z axis vertical and the +X axis facing the LGS. The LGS already has two Viton-sealed elbows installed and aligned with the first elbow oriented vertically (see Fig. 1). The LGS is shut down and vented to 1 atmosphere.

D Hardware Required

D.1 Flight hardware required

Description	No. Req'd
65113-1C34292 Probe-C / Science Mission Dewar Assembly	1

D.2 Commercial test equipment: N/A

D.3 Mechanical/Electrical special test equipment: N/A

D.4 GSE / hardware:

Description	No. Req'd
Spinup Gas/Vac. System	1
8" LGS mitered pumping line per Fig. 1	1
8" 90° elbows with K-style ISO 200 flanges	3
6" x 8" dia. bellows with K-style ISO 200 flanges	1
3" x 8" dia. bellows with K-style ISO 200 flanges	1
3/8-16 threaded rods for 6" bellows	4
3/8-16 threaded rods for 3" bellows	4
3/8-16 spherical nuts and washers	32 nuts, 16 washers
6"-8" adapter with ion gauge ports (to adapt from 8" line to 6" Vatterfly valve)	1
Edwards steel double-claw clamps for K-style ISO 200 vacuum flanges	48 (8/seal)
Evac aluminum seals for ISO 200 vacuum flanges	6
ISO 160 centering ring with Viton o-ring (for adapter / Vatterfly joint)	1
4' x 4' HEPA filter downflow unit with vinyl curtains mounted below gantry	1
Spinup line "connector savers" (1/4" female Gamah to 1/4" male VCR with VCR gaskets and caps preinstalled)	4
1/4" stainless steel spinup lines made of cleaned and capped tubing, with female VCR fittings on the ends, and configured to run from the gas supply outlets to the gyro inlet connections S1-S4 on the Probe	4
1/4" aluminum Gamah gaskets	4
Copper gaskets for 2.75" Conflat	4
2.75" Conflat blankoff flange	1

D.5 Tools

Description	No. Req'd
misc wrenches including 17 mm	A/R

D.6 Expendables

Description	Quantity
ethanol	A/R

E **Software Required**: N/A

F **Procedures Required**: P0567, Probe Gas/Vac. GSE Certification.

G **Equipment Pretest Requirements**: N/A

H **Personnel Requirements**

This test to be conducted only by certified personnel. Persons certified to perform this procedure are Mike Taber, Chuck Warren, Ken Bower, and Tom Welsh with Mike Taber being the leader.

I **Safety Requirements**

These operations are to be preformed in the vicinity of flight equipment. Two persons are required for manipulation of the 8" pumping line and care should be taken to prevent impacting of the flight equipment. Movement of the gantry used to support the HEPA downflow booth also requires two persons. Care should also be taken to prevent scratching or otherwise damaging vacuum sealing surfaces, particularly those which those which are on flight equipment and/or must be sealed with metal gaskets.

J **General Instructions**

J.1 Redlines can be initiated by Mike Taber and must be approved by QA.

J.2 Any nonconformance or test anomaly should be reported by a Discrepancy Report. Refer to the Quality Plan, P0108, for guidance. Do not alter or break test configuration if a test failure occurs; notify quality assurance.

J.3 Work done inside the HEPA filter downflow unit should with proper clean room garb consistent with Class 1000 conditions.

K **References and Applicable Documents:** N/A

Op. Order No._____
Date Initiated_____
Time Initiated_____

L Operations

L.1 Locate the 4' x 4' HEPA filter downflow unit with vinyl curtains mounted below gantry over the LGS adapter cone.

L.2 Turn on the HEPA downflow unit and allow to run at least an hour to clean up before performing operations under the downflow unit.

L.3 Verify that the pumping line components have been cleaned and bagged.

L.4 Installation of the 8" LGS pumping line:

NOTE:

While assembling a vacuum joint with an Evac aluminum seal, do not attempt to reclock the joint during assembly as this may damage the aluminum seal and cause a leak.

L.4.1 Move the pumping line hardware to a class 1000 clean environment.

L.4.2 Using the Evac aluminum seals and 8 clamps for each seal, preassemble the the 6" bellows on the long end and the 3" bellows on the short end of the mitered 8" pumping line as shown in Fig. 1. Do not install threaded rod struts across either bellows.

L.4.3 Cover the open ends of the preassembled pumping line with aluminum foil.

L.4.4 Install a Conflat tee on ion gauge port of the 6"-8" adapter with the tee oriented transverse to the axis of the adapter.

L.4.5 Install two "Stabil-ion" ion gauges into the ion gauge ports on the adapter unit and return the adapter unit to its clean bag. Rebag the adapter assembly.

L.4.6 Remove the preassembled hardware to the FIST Lab.

L.4.7 In the following steps, the person working in the HEPA downflow unit should use appropriate clean room garb:

L.4.7.1 Close the isolation valve on the PPMS and remove the PPMS from the LGS adapter cone and cap the port with a Conflat blankoff flange. Wrap the open port on the PPMS isolation valve with aluminum foil and remove from the HEPA downflow booth.

L.4.7.2 Use a scribe to mark the clocking orientation of the first elbow relative to the LGS adapter cone.

L.4.7.3 Remove the two elbows as a unit and replace the centering ring assembly between the first elbow and the LGS adapter with an Evac aluminum seal. Carefully reassemble using 8 clamps and the scribe

marks for orientation.

L.4.7.4 Using two persons to support the pumping line, mate the long end of the pumping line onto the second elbow and clamp together using 8 clamps.

L.4.7.5 Arrange a support for the pumping line in the vicinity of the SMD, and carefully swing the pumping line away from the 6" Vatterfly valve on the Probe.

L.4.7.6 Move the HEPA downflow unit over the top of the SMD / probe.

L.4.7.7 Verify that the pressure gauge on the cover over the 6" Vatterfly valve located in the -X-Y quadrant is reading a positive pressure relative to an atmosphere.

L.4.7.8 Remove the Vatterfly cover and install the 6"-8" adapter using an ISO 160 centering ring and Viton o-ring such that the ion gauge tee is located on the +Z side.

L.4.7.9 Install the last elbow on the adapter using an Evac aluminum seal and 8 clamps.

L.4.7.10 Carefully mate the end of the 3" bellows to the elbow attached to the adapter flange using an Evac aluminum seal. If necessary, loosen the clamps to the Vatterfly valve to rotate the adapter slightly to achieve correct alignment. Also, it may be necessary to install the threaded rods on the 6" bellows using spherical nuts and washers and/or loosen the clamps between the first and second elbows (where there is still an standard centering ring) to properly align the pumping line. Once proper alignment is achieved, clamp the joint with 8 clamps.

L.4.7.11 Move the HEPA downflow unit back over the top of the LGS conical adapter and wait for ~1 hour.

L.4.7.12 Remove the temporary centering ring (between the first and second elbows) and install an Evac aluminum seal using 8 clamps.

L.4.8 Install / verify installed the threaded rod support struts on both bellows using the spherical nuts and washers.

L.4.9 Installation of the pumping line complete.

QA witness: _____

Date / time: _____

L.5 Install the spinup supply lines

L.5.1 Verify that the HEPA downflow unit is located over the top of the GSE spinup gas supply connection fittings and has been running in that location for ~1 hour.

L.5.2 Route the four 1/4" stainless spinup lines along the 8" pumping line and secure to the pumping line.

L.5.3 Remove the caps from the spinup GSE supply fittings and connect the spinup supply lines.

L.5.4 Move the HEPA downflow unit back over the top of the probe and dewar and wait for ~1 hour.

L.5.5 Install the four spinup line connector savers: One at a time remove the Gamah caps from S1-S4 and install the assembled connector savers. Bag and store the Gamah caps.

L.5.6 Remove the VCR caps from the the connector savers at S1-S4 and connect the lines. Verify that the correct line assignments have been made.

L.6 Move the HEPA downflow unit away from the dewar and remove from the gantry. Stow the HEPA unit back on its mounting frame.

L.7 Connect the ion gauge cables from LGM-2 to the ion gauge tubes, being sure to have the IG-1 and IG-2 identifications consistent with that used in calibration.

L.8 Leak check of the GSE lines.

L.8.1 Perform certification of the Probe gas/vac. GSE (P0567) which has the option of leak checking the pumping and gas lines to the Probe. Record Op Order No._____,

Operation completed.

Completed by: _____

QA witness: _____

Date: _____

Time: _____

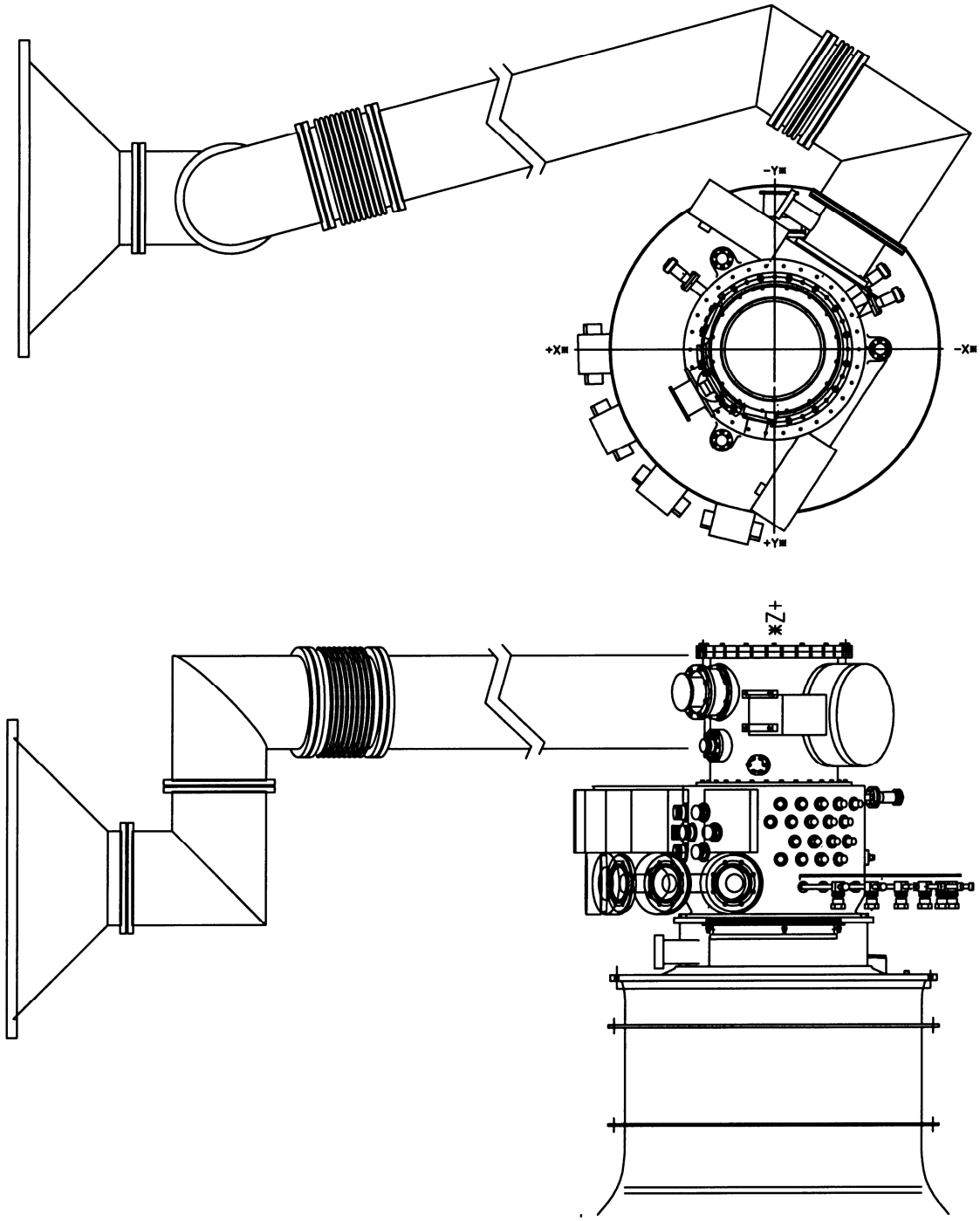

Figure 1