GRAVITY PROBE B

PROCEDURE FOR

PAYLOAD VERIFICATION

GSE CAGING AND SPINUP BUFFER LINE INSTALLATION

Sept. 28, 2000

Prepared by: B. Muhlfelder

Approvals

Program Responsibility	Signature	Date
Dorrene Ross GP-B Quality Assurance		
Chris Gray Vacuum Specialist		
Barry Muhlfelder Payload Technical 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
SMD	Science Mission Dewar
QA	Quality Assurance personnel
HEPA	High Efficiency Particulate Air filter

Table of Contents

A Scope

This procedure effects the installation and leak check of the GSE for the caging, P1, and spinup buffer lines. The system is mounted on the exterior of the dewar at the tophat.

B Requirements Verification

B.1 Requirements Cross Reference: N/A

B.2 Expected Data for verification per requirement: N/A

C Configuration Requirements

Probe-C is integrated into the SMD per drawing 65113-1C34292 and may be oriented with the +Z axis in any orientation such that ports can be accessed during installation.

D Hardware Required

D.1 Flight hardware required

Description	No. Req'd
65113-1C34292 Probe-C / SMD Assy.	1

D.2 Commercial test equipment (fill in chart as required):

Manufacturer	Model	Serial Number	Calibr. Exp. Date

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

D.4 GSE Hardware:

Description	No. Req'd.
Gamah to VCR connector with manual Nupro valve	12

D.5 Tools

Description	No. Req'd
wrenches	as required

D.6 Expendables

Description	Quantity
Aluminum gaskets for 1/4" Gamah connectors	as required
Nickel Steel gaskets for 1/4" VCR connectors	as required
Felpro C-100 anti-seize compound	as required
Helium gas (filtered)	as required
Nitrogen gas (filtered)	as required

E **Software Required:** N/A

F **Procedures Required:** N/A

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

H **Personnel Requirements**

This test to be conducted only by certified personnel. Ken Bower, Chuck Warren, Dave Murray, Tom Welsh, Rob Brumley, Chris Gray, and Mike Taber are qualified to perform this procedure. The QA representative shall be either Russ Leese or Dorrene Ross.

I Safety Requirements

I.1 Movement of the gantry used to support the HEPA downflow booth (if required) requires two persons.

I.2 Care should be taken to prevent nicking, overtorqueing, or otherwise damaging flight vacuum sealing surfaces.

I.3 Care should be used when manipulating any electrical cables connected to any part of the flight hardware. This procedure does not imply any authority to disconnect any such electrical connectors.

I.4 General emergency procedures can be found in "FIST Emergency Procedures" (P0141).

J General Instructions

J.1 Redlines must be approved by QA.

J.2 Any nonconformance or test anomaly should be per P0108. Do not alter or break test configuration if a test failure occurs; notify quality assurance.

J.3 Only the following persons have the authority to exit/terminate this operation or perform a restart: Chris Gray, Ken Bower

J.4 Work done inside the HEPA downflow unit should be performed under conditions consistent with class 1000 cleanroom practices (apparel, tool cleanliness, operational restrictions, etc.).

J.5 During this entire operation the spinup and P1 line valves are to remain closed.

K References and Applicable Documents: N/A

Op. Order No._____
Date Initiated_____
Time Initiated_____

L Operations

L.1 Verify cleanliness of system.

L.1.1 Install or verify installation of the HEPA downflow unit over the top of the SMD/probe.

L.1.2 Measure the background particle count of the area around the tophat record in the table below.

L.1.3 Remove bagging material from buffer line assembly.

L.1.4 Connect a clean gas supply (Nitrogen recommended) to a buffer line.

L.1.5 Lightly blow clean gas through the buffer line and measure the particulate output near each connector of the manifold and record the measurements in Table 1 below. If the resultant particle count is higher than the background count, purge

and/or reevaluate the system. If the particle count is not above the background count, accept the system.

L.1.6 Maintaining a light positive gas flow, remove buffer line from gas flow.

L.1.7 Repeat steps L.1.3 through L.1.6 for each assembly.

L.1.8 Cleanliness acceptable: completed by:_____

QA approval:_____

	Background	Buffer Line Reading
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

Table 1

L.2 Installing flight buffer line assemblies.

L.2.1 Verify all buffer line assembly valves are open _____.

L.2.2 Install one buffer line assembly (with gasket) on to each of the flight caging ports, spinup ports, and P1 port. Use a back–up wrench on the port fittings to prevent torque stresses from transferring to the flight hardware. Properly tighten the nut until the gasket is fully deformed to provide a proper seal. If desired, anti-seize compound may be applied to the contact area between the nut and plain fitting of the connector saver (NO ANTI-SEIZE COMPOUNDS MAY BE APPLIED TO THE FLIGHT HARDWARE).

L.3 Flight Manual Valve leak checks

L.3.1 Hook up leak detector to probe vacuum.

L.3.2 Bag each spinup line manual valve and P1 valves. Flow He gas into bag for 60 minutes.

L.3.3 Record background leak rate _____.

L.3.4 Record in Table 2 below leak rates for each valve. Remove bag.

Valve Number	Leak Rate
S1	
S2	
S3	
S4	
P1A	
P1	

Table 2

For caging lines attach leak detector and He supply to each buffer line.

Open paired manual valves for each circuit, backfill with He gas to 1 atm, pump out He gas, and then refill with He gas to 1 atm.

Close flight valve to 60 in-lbs. He background for leak detector shall be less than 1e-7.

Wait 30 minutes. Record in Table 3 below leak rates for each caging valve

Valve ID	Leak Rate
C1	
C2	
C3	
C4	
C5	
C6	

Table 3

After successfully completing leak test, pump out each caging line and close each manual flight caging valve with 60 in-lbs of torque.

L.4 Leak check the buffer lines.

L.4.1 Connect a certified Helium leak detector to a buffer line assembly utilizing any hardware as required.

L.4.2 Perform a leak check of the entire plumbed assembly. Note: buffer lines have been previously leak checked so that most important aspect of current leak check is Gamah connector checkout.

L.4.3 Perform repairs (and/or repeat any steps above) until no leaks are detected.

L.4.4 Repeat steps L.4.1 through L.4.3 for each buffer line assembly.

L.4.5 Vacuum performance acceptable:

completed by:_____

QA approval:_____

L.5 Helium purge the buffer lines.

L.5.1 Connect a vacuum system and clean Helium gas supply to a buffer line assembly.

L.5.2 Evacuate the buffer line assembly.

L.5.3 Fill the buffer line assembly with Helium gas (to two atmospheres absolute pressure).

L.5.4 Repeat step L.5.2 and L.5.3 one additional time.

L.5.5 Close the buffer line assembly valve with 60 in-lbs of torque.

L.5.6 Repeat steps L.5.1 through L.5. for each buffer line assembly.

L.6 Leak check the buffer line manual valves.

L.6.1 Connect a certified Helium leak detector to a buffer line assembly utilizing any hardware as required.

L.6.2 Perform a leak check of the buffer line manual valve.

L.6.3 Perform repairs (and/or repeat any steps above) until no leaks are detected.

L.6.4 Repeat steps L.7.1 through L.7.3 for each buffer line assembly.

L.6.5 Leak detector background shall be less than 1e-7. Record valuves in Table 4 below. Record duration of each leak check of buffer line valve in Table 4 below.

Valve ID	He Background	Leak check duration	Buffer Line Leak Rate
S1			
S2			

S3			
S4			
C1			
C2			
C3			
C4			
C5			
C6			
P1			
P1A			

Table 4

L.6.6 Vacuum performance acceptable:

completed by:_____

QA approval:_____
Operation completed.

Completed by: _____

Witnessed by: _____

Date: _____

Time: _____

Payload Test Director:_____

Responsible Quality Engineer:_____