GRAVITY PROBE B

PROCEDURE FOR

PAYLOAD VERIFICATION

(PTP) PROBE PRESSURE MEASUREMENT SYSTEM REMOVAL

P0649 REV. -

12/8/99

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
RGA	Residual Gas Analyzer
SMD	Science Mission Dewar
UTS	Utility Turbopump System

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A Scope

This procedure effects the removal of the Probe Pressure Measurement System. It is mounted onto the upper cylinder portion of the SMD and is connected to the interior of the Probe-C via pressure sense port P1 (See Figs. 1, 2a). A Convectron pressure gauge (GSE version of P9) will then be attached to the P1 pressure sense port. This gauge is mounted on a small manifold with a Nupro shutoff valve teed into it (see Fig. 2b).

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 oriented with the +Z axis vertical. The exchange gas has been pumped out of the Probe and the pressure is less than 10^{-4} torr. The PPMS is installed and connected to pressure sense port P1 per P0558, Probe Pressure Measurement System Installation and Leak Check Procedure.

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

Manufacturer	Model	Serial Number	Calibr. Exp. Date
Varian He Leak Detector	960	DRAD6002	N/A
Alternate leak detector: Varian He Leak Detector	636-60	W-161	N/A
Varian Calibrated He leak for LD	F3264302	LLC9030	3/10/00
Calibrated He leak for alternate LD	F3264302	EBAL5056	3/18/00

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

D.4 GSE / hardware:

Description	No. Req'd
Convectron gauge assembly (Fig. 2b)	1
4' x 4' HEPA filter downflow unit with vinyl curtains mounted below gantry	1
1/2" aluminum Gamah gasket	1
1" or 1.5" stainless flexible pumping line (length A/R)	1
KF-VCR adapter (to connect between pumping line and 1/4" male VCR)	
Utility Turbopump System (Fig. 3)	1

D.5 Tools

Description	No. Req'd
wrenches	A/R
75 ft-lb. torque wrench	1

D.6 Expendables

Description	Quantity
1/2" aluminum Gamah gasket	1
1/4" VCR gaskets	A/R
Aluminum foil	A/R
Felpro C5-A anti-seize compound (or equivalent)	A/R
He gas	A/R

E Software Required

E.1 Flight Software: N/A

E.2 CSTOL Scripts: N/A

E.3 SPC Scripts: N/A

E.4 Test Support Software

Test Software Name	Version No.
Inficon TranspectorWare (for RGA)	3

F **Procedures Required**: N/A

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

H Personnel Requirements

This test to be conducted only by qualified personnel. Chuck Warren, Dave Murray, Tom Welsh, and Mike Taber are qualified to perform this procedure with either Mike Taber or Dave Murray being operations leader. The QA representative shall be either Russ Leese or Dorrene Ross.

I Safety Requirements

Movement of the gantry used to support the HEPA downflow booth 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. General emergency instructions can be found in "FIST Emergency Procedures", P0141.

J General Instructions

J.1 Redlines can be initiated by Mike Taber or Dave Murray 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 Only the following persons have the authority to exit/terminate this operation or approve D-Log dispositions: Mike Taber, Dave Murray.

J.4 Work done inside the HEPA filter downflow unit should with proper clean room garb consistent with Class 1000 conditions.

K **References and Applicable Documents**: P0558, Probe Pressure Measurement System Installation and Leak Check Procedure

Op. Order No._____
Date Initiated_____
Time Initiated_____

L Operations

L.1 Removing the PPMS:

L.1.1 Turn off / verify off both ion gauges and the RGA on the PPMS.

L.1.2 Close the probe P1 isolation valve.

L.1.3 Install / verify installed the HEPA downflow unit over the top of the SMD / probe; at least one hour of operation in this location should elapse before proceeding. Observe General Instruction J.4 in the following steps.

L.1.4 Remove the KF-40 cap at the guard valve on the PPMS and connect a flexible pumping line to the UTS (Fig. 3).

L.1.5 Connect a purged source of He gas to the let-up port at TV-5.

L.1.6 Start up the UTS:

L.1.6.1 Place the Interlock switch in the “override” position.

L.1.6.2 Push the red “reset” button to reset the interlock circuit.

L.1.6.3 Turn on the Vane Pump and Converter.

L.1.6.4 Verify that the foreline valve switch (red illuminated switch on the front panel) is on.

L.1.6.5 Push the Sensor button on the vacuum gauge display so that the “Pir” annuciator shows.

L.1.6.6 Slowly open TV-4.

L.1.6.7 When the vacuum gauge reads < 1 torr, open the guard valve on the PPMS.

L.1.6.8 Push the Start button on the Turbo Controller.

L.1.6.9 When the “Normalbetrieb” light comes on, open the gatevalve, TV-1, and close TV-4.

L.1.6.10 Switch the valve interlock switch to the “protected” position

L.1.6.11 Push the sensor button on the Vacuum Gauge readout so that the “Hi-Vac” annuciator shows, and push the Emis button to turn on the cold

cathode gauge (TG-1).

L.1.7 When TG-1 reads less than 10^{-4} torr, open the PPMS pumpout valve.

L.1.8 Turn off TG-1 and close TV-1.

L.1.9 Slowly open TV-5 and admit He gas until TG-3 reads ~9 torr.

L.1.10 Record the pressure at TG-3 for 30 minutes and verify that the pressure does not drop by more than 0.2 torr during the last 20 minutes.

Time:				
Pressure:				

L.1.11 Slowly open TV-5 and admit He gas until TG-3 reads one atmosphere.

L.1.12 Verify that probe temperatures have not changed as a consequence of venting the PPMS.

L.1.13 Close the PPMS guard valve.

L.1.14 Disconnect the flexible pumping line and cap off the PPMS access port.

L.1.15 Disconnect the PPMS from the P1 sense line at the 1/2" Gamah fitting and cover the glands with aluminum foil.

L.1.16 Remove the PPMS from its mounting bracket and stow.

L.1.17 Remove the PPMS mounting bracket from the dewar and stow with its mounting hardware.

L.2 Installing the Convectron gauge assembly to P1:

L.2.1 Locate the P1 Convectron assembly and verify that the Gamah nut has a small amount of anti-seize compound on the interface between the nut and the gland.

L.2.2 Using a fresh aluminum Gamah gasket, install the Convectron gauge assembly on the P1 port. Care should be taken to minimize the rotation between the two Gamah glands.

L.3 Leak checking the Convectron gauge assembly:

L.3.1 Verify leak detector operation:

L.3.1.1 Install a blankoff plug on the LD test port.

L.3.1.2 Perform LD autocal (model 960) or manually check LD tuning.

L.3.1.3 Turn on LD calibrated leak and record: _____sccs He

Calibrated leak value: _____sccs He

QA witness:_____

L.3.1.4 Turn off the calibrated leak and vent LD.

L.3.2 Connect the pumping line to the LD and connect the other end to the Convectron assembly access valve using a KF-VCR adapter.

L.3.3 Install a plastic bag around the Convectron assembly including the Gamah joint to P1 isolation valve.

L.3.4 Open the Convectron assembly access valve.

L.3.5 Start LD and apply He to the bag for three minutes; increase above background should be $<10^{-7}$ sccs He. Record results:

Background leak rate:_____sccs

Leak rate during test: _____sccs

QA witness: _____

L.4 Verify Convectron operation:

L.4.1 Connect Convectron gauge cable.

L.4.2 Turn on Convectron and verify proper operation. Record pressure: mtorr.

L.4.3 When the pressure in the Convectron assembly is <1 mtorr, close the Convectron assembly access valve.

L.4.4 Vent the leak detector and verify that the Convectron gauge reading does not change.

L.4.5 Open the probe P1 isolation valve. Record pressure:_____mtorr.

L.5 Finalize configuration:

L.5.1 Disconnect the pumping line from the Convectron assembly access valve.

L.5.2 [Optional] Shut down the LD per manufacturer's instructions.

L.5.3 [Optional] Turn off and remove the HEPA downflow unit per engineering instructions.

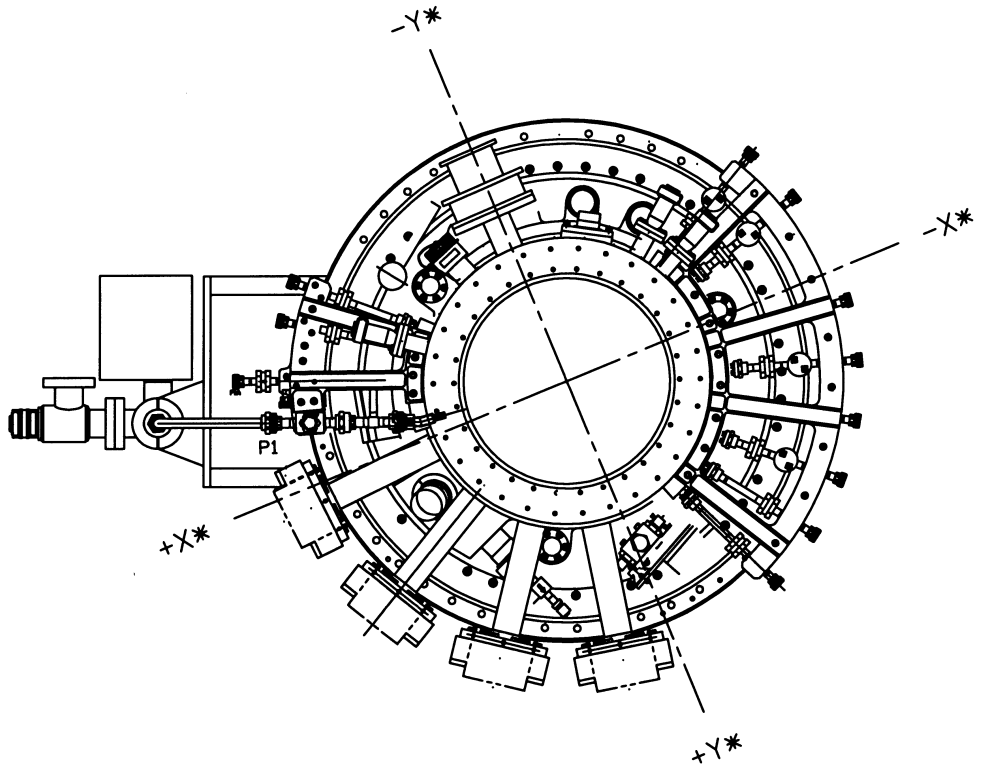
Operation completed.

Completed by: _____

QA witness: _____

Date: _____

Time: _____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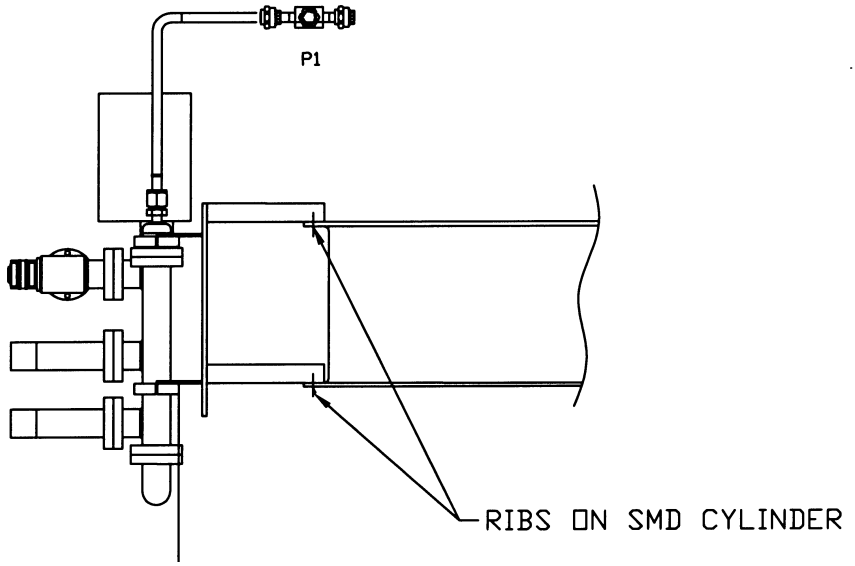
P1
RIBS ON SMD CYLINDER

Figure 2a Initial configuration with PPMS installed

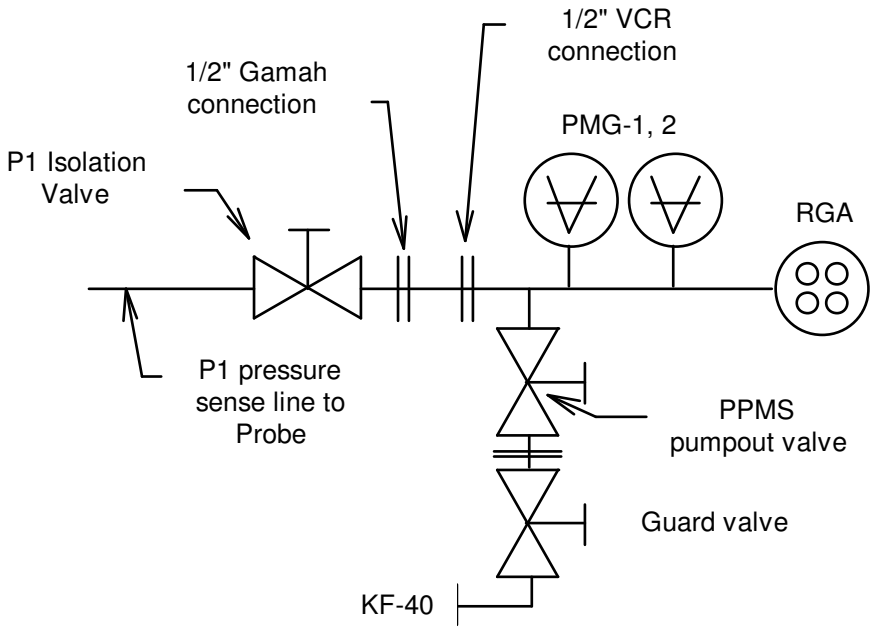

Figure 2b Configuration with Convectron assembly installed

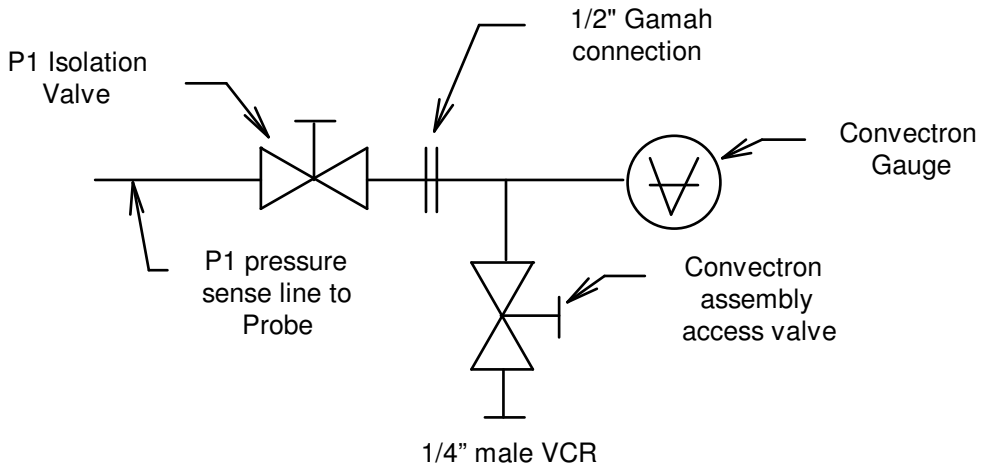

Figure 3 Utility Turbopump System configuration and nomenclature