GRAVITY PROBE B

PROCEDURE FOR

PAYLOAD VERIFICATION

P0927 REV -
CAGING LINE CLOSEOUT

28 June 2002

Prepared by: R. Brumley
Approvals:

Program Responsibility	Signature	Date
K. Bower Payload Hardware Engineer		
R. Pressburg Stanford Quality Assurance		
R. Brumley 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
-	06/28/02		Original rev.

Acronyms and Abbreviations:

Acronym / Abbreviation	Meaning
FEE	Forward Equipment Enclosure

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A Scope

This procedure installs plugs on the ends of the Probe C top hat connections to the caging lines. These lines have already been evacuated, and the manual valves have been closed. This procedure double checks that those manual valves are properly torqued, then removes the buffer lines currently installed and replaces them with caps. There is no provision for pumping out the interstitial space between the caps and the manual valve, or filling that space with Helium. This is because the caging lines are not used in flight, and the manual valves have already been sealed for the final time.

B Requirements Verification

No requirement verification is performed as part of this procedure.

C Configuration Requirements

The flight payload is installed in the spacecraft. The caging lines should be accessible. The operator and all hardware associated with this procedure should be situated so as to minimize the potential for damage to the flight hardware.

D Hardware Required

D.1 Flight hardware required

Hardware	Part Number	Quantity	Serial # or LDC
Gamah Plug	FPS14104-18-1 **OR** FPS14104-43-1	6	
Gamah Gasket, Aluminum	S14004A	6	
Gamah Nut	N14104-43	6	

D.2 Commercial test equipment

None.

D.3 Mechanical/Electrical Special test equipment

None.

D.4 Tools

Description	No. Req'd
Wrenches for tightening Gamah connections	2
60 in-lb torque wrench (calibrated)	1

D.5 Expendables

None.

E Software Required

No software is required.

F Procedures Required

No other procedures are required.

G Equipment Pretest Requirements

No equipment pretests required.

H Personnel Requirements

This operation may be conducted by the following personnel:

- Ken Bower
- Chris Gray
- Tom Welsh
- Robert Brumley

I Safety Requirements

General

It is important to be cognizant at all times of the space vehicle and all hardware and cables attached to it. If any hardware does not connect smoothly and securely, do not try to force it. Instead, remove the connector and inspect it to find the reason for the difficulty. Great care must be taken at all times during the performance of this procedure.

Personnel Safety

All operations shall take place in accordance with Lockheed Martin safety guidelines. Any person observing a situation that they deem unsafe shall report the fact immediately to the test director. The Quality Assurance representative shall be responsible for monitoring that all activities are performed in a safe manner.

J General Instructions

- Redlines can be initiated by the engineer performing this procedure. All redlines must be approved by QA.
- 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.
- This procedure does not contain operations that are contamination sensitive, other than ensuring that the mating surfaces of the gasket and Gamah plug are clean. Operations shall be performed in accordance with standard operating procedure around the space vehicle. At a minimum, clean room smocks and clean room gloves shall be worn while performing this procedure.

K References and Applicable Documents

Op. Order No._____
Date Initiated_____
Time Initiated_____

L OPERATIONS

Quality Assurance must be present during all operations

L1 Pre-Test Checklist

Start Date: _____

Start Time: _____

Vehicle orientation: _____

L.2 Verify Torque on Caging Valves

QA to Witness

Using a calibrated torque wrench, verify that the caging valves are all torqued closed to 60 inch-pounds. Record in the table below

Torque Wrench Used: _____

Calibration Expiration Date: _____

Table 1

Caging Valve	Gyroscope #	Torque Verified	QA Witness
CG1	3 and 4 (in parallel)		
CG2	3 and 4 (in parallel)		
CG3	2		
CG4	2		
CG5	1		
CG6	1		

Perform Operation L.3 through L.4 for each of the 6 caging valves. At the discretion of engineering, the operations may be performed in parallel or serially for each of the 6 caging valves Record completion in Table 2.

L.3 Remove Caging Line Buffer Assemblies

Using two wrenches, carefully loosen the connection of the buffer assembly to the top hat. Note that as this step is performed, the buffer assembly will come to atmospheric pressure. Remove the buffer assembly and discard the used Gamah gasket.

L.4 Install Caging Line Caps

L.4.1 Connect Gamah Cap

Inspect the Gamah fittings on each side of the connection and clean as required. Install the Gamah plain plug and nut, using a new, flight qualified, FN12 Gamah gasket to seal the connection. At the engineer's discretion, carefully apply lubricant to the back of the S1 Fill & Drain Valve's Gamah Flange per engineering direction.

Fully engage the threads, but do not tighten. Record in Table 2.

L.4.2 Tighten Gamah Cap

Quality Assurance to Witness (see Table 2):

Please note: only experienced personnel may tighten Gamah connectors.

Verify that the Gamah is Finger-tight. Utilizing two wrenches, tighten the Gamah nut until "snug-fit". After attaining a "snug-fit", continue to tighten the Gamah nut an additional 1/8 of a turn. Record in Table 2.

Table 2

Caging Valve	Caging Buffer Line Removed (L.3)	Caging Line Cap Installed (L.4.1)	Caging Line Cap Final Tightening (L.4.2)	QA Witness
CG1				
CG2				
CG3				
CG4				
CG5				
CG6				

L.5 Procedure Completion

Record completion of this procedure in the traveler, as appropriate.

Record any abnormalities or deviations from this procedure in the D-Log. If the QA representative decides it is appropriate, open a Discrepancy Report to document the event.

This test has been completed according to the procedure contained herein. All redlines used have been integrated into this document.

Operation Engineer: (sign)	(print)
QA Representative: (sign)	(print)