**STANFORD UNIVERSITY**
W.W. HANSEN EXPERIMENTAL PHYSICS LABORATORY
GRAVITY PROBE B, RELATIVITY GYROSCOPE EXPERIMENT
STANFORD, CALIFORNIA 94305-4085

# PREPARE PROBE FOR CLASS 10 CLEANROOM

## GP-B SCIENCE MISSION PROCEDURE

9 October, 1998

| | | |
|---|---|---|
| PREPARED | A. Nakashima, Systems | Date |
| APPROVED | D. Bardas, Integration Manager | Date |
| APPROVED | J. Stamets, Integration Engineer | Date |
| APPROVED | J. Janicki, Safety Engineering | Date |
| APPROVED | B. Taller, Quality Assurance | Date |

| | | |
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| APPROVED | S. Buchman, Hardware Mgr. (acting) | Date |

## TABLE OF CONTENTS

# 1 SCOPE

- This document provides the procedure for preparing Probe-C for entry into the Class 10 cleanroom. It entails bringing Probe-C into the Class 1000 cleanroom , cleaning the probe bagging and gurney, exchanging wheels on the gurney, moving the probe into the Class 10 cleanroom and positioning it, still on the gurney in front of the Precision Manipulator.

- This procedure does not cover mounting it to the Precision Manipulator. This is covered in procedure P0205(SM) entitled "Mount Probe onto Precision Manipulator"

- This procedure assumes that the probe starts off located in the area outside the double doors of the Class 1000 cleanroom, is horizontal in its gurney and still single-bagged as received from the FIST Ops cleanroom facility.

## 1.2 Acronyms

The following acronyms are used in this document

| | |
|---|---|
| HEPL | Hansen Experimental Physics Lab |
| GPB | Gravity Probe B |
| QA | Quality Assurance |
| ITD | Integration and Test Director |
| PM | Probe Precision Manipulator |

# 2 APPLICABLE DOCUMENTS

## 2.1 Plans and Procedures

| | |
|---|---|
| P0059 | GPB Contamination Control Plan |
| P0057 | Stanford Magnetic Control Plan |
| P0205(SM) | Mounting Probe on Precision Manipulator |

# 3 GENERAL REQUIREMENTS

## 3.1 Environmental Requirements

### 3.1.1 Cleanliness

The Class 1000 clean room shall be maintained at the cleanliness levels per GPB Contamination Control Plan P0059. Minimum protective garments for personnel working in the clean rooms shall be the standard Tyvek clean room apparel for room classes from 10,000 to 100. Class 10 clean room apparel shall be used in the Class 10 cleanroom,

### 3.1.2 Particulate Contamination

All parts and tools shall be cleaned using methods consistent with achieving and maintaining level 100 cleanliness per GPB Contamination Control Plan P0059. Take all necessary precautions to keep tools and handling equipment free of particulate contamination. Tools to be sprayed with Freon from Pressure can (filtered to < 0.2 micron) prior to use, or when contaminated.

### 3.1.3 Magnetic Contamination

Parts to be handled are in Zones 3, 4, SP and 5. Take precautions to keep tooling, not considered to be GP-B non-magnetic, away from zones other than SP and 5.

## 3.2 Integration and Test Personnel

### 3.2.1 Integration and Test Director

The Integration and Test Director (ITD) is Dr. Doron Bardas or his deputy, Dr. Michael Taber have overall responsibility for the implementation of this procedure and shall sign off the completed procedure.

### 3.2.2 Integration Engineers

The engineers performing this operation shall nominally be J. Stamets , C. Warren, Gideon Asher. The ITD shall determine which personnel are qualified to participate in this procedure.

## 3.3 Safety

### 3.3.1 General

All participating personnel shall ensure they are aware of the specific and hardware safety concerns indicated in the safety requirements, cautions and warnings in the procedure.

**Safety Engineering to be notified prior to the start of this procedure**

### 3.3.2 Hardware Safety

Extreme care must be taken to avoid accidentally bumping the Probe or damaging the connectors.

### 3.4 Quality Assurance

This procedure shall be conducted on a formal basis to approved and released procedures. The QA Program Engineer shall be notified of the start of this procedure. A Quality Assurance representative designated by B. Taller shall review any discrepancy noted during assembly or test. Redlines shall be approved by the QA representative. The QA representative will nominally be A. Nakashima. Upon completion of this procedure, the QA Program Engineer, B. Taller or P. Unterreiner, will certify his concurrence that the effort was performed and accomplished in accordance with the prescribed instructions by signing and dating his approval line at the end of the procedure.

### 3.5 Red-line Authority

Authority to red-line (make minor changes during execution ) this procedure is given solely to the ITD. Approval by the Hardware Manager shall be required, if in the judgment of the ITD or QA Representative, experiment functionality may be affected. *For procedures in the cleanroom, "redlines" shall be accomplished using RED BOLD ITALICS and "signatures" in BLACK BOLD ITALICS.*

## 4 REQUIRED EQUIPMENT

Flight Hardware

| **Hardware** | **Part Number** |
|---|---|
| Probe-C Assembly, without sunshade | 1C34115-102 |

Ground Support Equipment (GSE)

Probe Gurney
Probe Yoke Collar
Ethyl Alcohol Bottles
Isopropanol Bottles
Cleanroom wipes
Tools (various)

## 5 MOVE THE PROBE INTO CLASS 1000 CLEANROOM

Record Start Date: _____Time: _____

- Draw the curtains in the Class 1000 room, to separate the North side of the Class 1000 room (also designated room 3) forming an entrance vestibule for the Class 1000 room.

- Ensure that this part of the Class 1000 room is cleared so that the probe/gurney, once situated there, can be properly accommodated with reasonable access around it.

- At least two people shall be in this room, suited in Class 1000 cleanroom garments.

- With the curtains drawn, open the doors to the corridor. The people inside should stay as far away from the outside doors as practical.

- Roll the gurney through the double doors into Room 3 guiding the gurney carefully. Once clearly inside the cleanroom, close and lock the double doors.

**Completed:**

Integration Engineer(s) _____ Date _____

_____ Date _____

_____ Date _____

Discrepancies if any:

Disposition./.sign-off: _____ Date _____
ITD

Concurrence: _____ Date _____

QA Designated Representative

## 6 INITIAL WIPE DOWN AND WHEEL EXCHANGE

- Immobilize the gurney on its jacks. Remove all four wheels and set aside.
- Wipe down the vestibule room, its curtains and doors. Mop the floor.
- Wipe down the bagging covering the probe, as well as the gurney, with ethyl alcohol and cleanroom wipes. Start at the top and work downwards.
- Allow the vestibule to come to cleanliness equilibrium for a minimum of 1 hour.
- Install four cleanroom wheels on the gurney.

**Completed:**

Integration Engineer(s) _____ Date _____

_____ Date _____

_____ Date _____

Discrepancies if any:

Disposition./.sign-off: _____ Date _____
ITD

Concurrence: _____ Date _____
QA Designated Representative

## 7 MOVING PROBE INTO THE CLASS 10 CLEANROOM

- People (min of 2), clothed in Class 10 cleanroom gowns, shall perform this operation.
- Open the curtains separating the Class 1000 vestibule from the rest of the room.
- Roll the gurney to the Class 10 doors with the Top Hat of the probe nearest the door.
- Remove all bagging which serves no function in the Class 10 cleanroom. An example of bagging which shall remain is that which covers the gears of the yoke mechanism.
- Wipe down all exposed surfaces of the probe first with isopropyl alcohol and then with ethyl alcohol.
- Open the Class 10 doors and roll the probe into position in front of the PM with Top Hat end facing South (i.e. towards the observation window).

**Completed:**

Integration Engineer(s) _____ Date _____

_____ Date _____

_____ Date _____

Discrepancies if any:

Disposition./.sign-off: _____ Date _____
ITD

Concurrence: _____ Date _____
QA Designated Representative

## 8 PROCEDURE COMPLETION

The results obtained in the performance of this procedure are acceptable:

The information obtained under this assembly and test procedure is as represented and the documentation is complete and correct:

ITD: _____ Date _____

QA Representative: _____ Date _____

QA Program Engineering: _____ Date _____

## 9 DATA BASE ENTRY

The following data shall be entered into the GP-B Data Base:

- Name, number and revision of this procedure