W. W. Hansen Experimental Physics Laboratory

STANFORD UNIVERSITY

STANFORD, CALIFORNIA 94305 - 4085

Gravity Probe B Relativity Mission

PROCEDURE FOR INSTALLATION OF SM GYROSCOPES IN THE LOW TEMPERATURE COMMISSIONING PROBE

GP-B P0204 Rev -A

December 5, 1997

Prepared by: David Hipkins **Engineer**	**Date**
Approved by: Yueming Xiao **Manager, Gyroscope Commissioning**	**Date**
Approved by: Sasha Buchman **Manager, Gyroscope Development**	**Date**
Approved by: B. Taller **Quality Assurance**	**Date**
Approved by: J. Turneaure **Hardware Manager**	**Date**

PROCEDURE FOR INSTALLATION OF SM GYROSCOPES IN THE LOW TEMPERATURE COMMISSIONING PROBE

This procedure is to be performed only by persons listed as certified operators of the gyroscope acceptance facilities.

Equipment: Cubic 10 (class 10) Clean room garments
TyVek (class 100) Clean room garments
Latex gloves, rinsed using DI water
Non-magnetic screwdriver
Low temperature commissioning probe clean room
Gyroscope Commissioning Probe (GCP)

Cleanliness precautions:

Before beginning installation

Before transporting the gyroscope from 132 clean room make sure the commissioning probe clean room is cleared of any unnecessary tools or equipment. Next rinse the probe with freon to dislodge any particles that may have accumulated while the vacuum can was removed. Finally, rinse the bench that sits directly below the probe with ethyl alcohol and inspect any surfaces surrounding the probe. When leaving the clean room close the interior doors and remove the top layer of the sticky mat.

During installation and removal

Always keeps your hands *downstream* of the gyroscope. Do not let anything come between the HEPA filters and the gyroscope.

Preparation: Obtain the Cubic 10,TyVek garments and gloves required and place them in the anti-room of the commissioning probe clean room. Next, bring the Gyroscope from the assembly/storage area transporting it in its stainless steel pot enclosed in a bag to the commissioning probe clean room. Place it in the anti-room of the c.p. clean room. Gown up according to procedure P0300.

E.S.D. Precautions: Static straps must be worn from the time the gyro is removed from the pot until the vacuum can is installed.

Procedure: Open the doors to the probe and remove the stainless steel pot from the bag. Place the pot on the bench below the probe. If the pickup loops have been closed since the last gyroscope was removed you will need to open the large and medium sized loops. In the case they have been left open the following step can be skipped.

Remember: use only a nonmagnetic screwdriver for this procedure.

I. *To open the large loops, remove the nylon screws which hold the large loop to the support structure. Be careful to remove them from the side which is not hinged. You will need to open both large loops in order for the medium loop to have room to open sufficiently for the gyroscope to fit. Next find the two (2) spacer rods which maintain the proper seperation of the medium loops. Remove the screw from one side of each of these rods. This will allow the two medium loops to fold out as they are also hinged at the bottom.*

With the loops open you are ready to place the gyroscope in the support structure. Remove the lid from the pot and lift the gyroscope out using the lexan support tee while supporting the electrical cables and optical fiber with the other hand. The gyroscope has only two possible orientations due to the recessed fit of the support tee. The proper one is that where the exhaust port is closest to you when the gyroscope is installed. Guide the gyroscope coaxially to the quadrupole and small dipole loops until the top of the tee fits flush with the surface of the platform it rests in.

II. *Fasten the two (2) nylon screws which hold the support tee to the platform.* ***Insert these screws from the bottom*** *so as to minimize the chance of creating particulates directly above the gyroscope when threading the nuts.*

III. *Close the medium pickup loops and refasten the spacer rods. Close the large loops.*

Make the following connections:

- Suspension lines (6 LEMO connectors)
- Ground plane (2 LEMO connectors)
- Optical fiber (2 LEMO connectors)
- UV bias wire (2 pin/socket connectors)
- Superconducting connection for parting plane pickup loop (2 niobium to quartz ball connections)
- Thermometer (GRT) (1 LEMO connector; optional)
- Heater (1 LEMO connector; optional)
- Spinup and exhaust bellows

IV. *Complete the following tasks and initial.*

I. Are the ***Spin-Up and Exhaust lines*** connected? _____

II. Is the ***gyroscope support*** securely fastened? _____

III. Are the ***UV bias wires*** connected? _____

IV. Is the ***optical readout*** connected? _____

V. Measure the resistance of the ***pick up loop*** (Record in **LT-Op #5**) _____

VI. Measure the resistance of the ***Helmholtz loops*** (Record in **Lt-Op #1**) _____

When items I through IV are completed prepare an indium seal for the vacuum can. Install the vacuum can onto the probe but do not tighten completely. Steps VII and VIII need to be performed outside the clean room so close the interior doors, remove clean room gown and proceed.

VII. Check ***suspension lines*** for nominal capacitance (Complete **Lt-Op #2**) _____

VIII. Check ***instrumentation*** for nominal resistance (Complete **Lt-Op #1**) _____

V. *Upon successful completion of VII and VIII return to the clean room to finish tightening the vacuum can bolts. It will be sufficient to dress in TyVek clean room clothing at this point since the gyroscope is enclosed in the vacuum can. Complete installation by tightening the bolts on the vacuum can. The bolts should be tightened by moving one bolt at a time clockwise or counterclockwise so long as the direction is consistant throughout the entire process. (Steps VII. and VIII. can also be performed by a second person in which case it may not be necessary to leave the clean room.)*