W. W. Hansen Experimental Physics Laboratory

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STANFORD, CALIFORNIA 94305 - 4085

Gravity Probe B Relativity Mission

# PROCEDURE FOR

# Science Telescope Cool Down

# GP-B P0234 Rev -

**January 16, 1998**

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# GP-B Procedure Document 234

## Science Telescope Cool Down

R. E.: Suwen Wang
ESTIMATED DURATION: 3 days.

Objective:

Cool down the telescope from room temperature to 4 K.

Success Criteria:

Telescope temperature is brought down to about 4 K and at least one detector on each readout axis still functioning.

Requirements:

- Procedure to be performed by certified personnel only.
- Certified personnel include:
  Suwen Wang

Authority to redline this procedure:

Suwen Wang

Precautions:

- No special precautions required.

Calibration:

- The readings taken during this procedure is only for the purpose of rough guidance. No calibration is required.

Ground Support Equipment required:

- Turbo pumping station.
- Vacuum leak detector.
- Helium transfer syphon.
- Liquid nitrogen fill plumbing.

Expendable Materials required:

- Liquid nitrogen.
- Compressed helium gas.
- Liquid helium.

Initial Configuration:

- Telescope under test:
  Dwg No: 25091-201 Rev - _____.
  Telescope Serial No. _____.

- Procedure Start Date: _____.

1 Procedure for cooling to 77 K:

1.1 Pump down the probe through a liquid nitrogen trap to about 10 mtorr if not already done.

1.2 Connect all the boil off plumbing properly.

1.3 Install connectors for thermometers.

1.4 Run LabView program nChanTemp v. 1.0 on Pentium #1 to monitor the temperature of the probe and windows.

1.5 Fill the probe with about 100 mtorr of helium gas as exchange gas.

1.6 Install liquid nitrogen fill line.

1.7 Open the fill valve so that the flow rate indicator has the Ping-Pong ball up to about 2nd to 3rd line from bottom.

1.8 Monitor the temperature on the thermometer at the bottom of the dewar. The filling should be stopped when the bottom of the dewar starts to collect liquid and resumed when the liquid is boiled off.

1.9 The liquid nitrogen fill is complete when the interior of the probe is below 100 K.

1.10 Shut off the liquid nitrogen fill valve and remove fill line.

1.11 The telescope readout should be monitored occasionally to check the functionality.

1.12 Procedure 1 complete.

Signed: _____ Date: _____

2. Procedures for cooling to 4.2 K

2.1 Cool probe with cold helium gas till the interior of the probe is about 10 K.

2.2 Start a regular helium transfer.

2.3 If the telescope readouts are still working, fill helium level to 24".

2.4 Procedure 2 complete.

Signed: _____ Date: _____

3. Procedures for cooling to 2 K (Optional)

3.1 Connect the boil off plumbing so that the dewar can be pumped on.

3.2 Slowly open the pumping valve and monitor the dewar temperature and pressure.

3.3 When the pumping reaches equilibrium, adjust the pumping valve so that the dewar temperature stays around 2 K.

3.4 Procedure 3 complete.

Signed: _____ Date: _____

4. Completion status:

   Success: _____

   Fail: _____

   Reason for failure: _____