W. W. Hansen Experimental Physics Laboratory

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Gravity Probe B Relativity Mission

PROCEDURE FOR

Integration of Science Telescope and Telescope Test Probe

GP-B P0220 Rev -

January 14, 1998

Prepared by: Suwen Wang Date
Engineer

Approved by: John Lipa Date
Manager, Telescope Development

Approved by: B. Taller Date
Quality Assurance

Approved by: J. Turneaure Date
Hardware Manager

GP-B Procedure Document 220

Integration of Science Telescope and Telescope Test Probe

RE: Suwen Wang
ESTIMATED DURATION: 1 day

Objective:

To integrate Science Telescope into Telescope Test Probe #2 for tests under Artificial Star #2.

Success Criteria:

Science Telescope integrated with test probe without damage.

Requirements:

- Test director (John Lipa) approval required prior to the start of the procedure.
- Procedure to be performed by certified personnel only.
- Certified personnel include:
  Suwen Wang
  Ken Bower

Authority to redline this procedure:

Suwen Wang

Precautions:

- Science Telescope is made of fused quartz, a fragile material. Extra precaution is to be taken during all handling to prevent damaging the Telescope.
- No special electrostatic handling precaution required.

Ground Support Equipment Required:

- MGP Class 10 or Class 1000 clean room with precision manipulator.
- Assorted tools.

Expendable Materials Required:

- Clean room supplies.
- Indium wires.

Initial Configuration:

- Telescope under operation:
  Dwg No: 25091-201 Rev - _____.
  Telescope Serial No. _____.
- All the detectors were tested and available.
- Telescope Test Probe #2 ready for integration.
- Telescope Assembly complete.

1. Procedures to be performed in Telescope Assembly Clean Room:

1.1.Bag the telescope with clean bag.

1.2.Put the bagged telescope in the carrying box.

1.3.Procedure 1 complete.

Signed: _____ _____ Date: _____

2. Procedures for transportation:

2.1. Carry the box from Telescope Assembly Clean Room to Main Clean Room gowning room.

2.2. Clean the outside of the carrying box with clean room wipe and alcohol.

2.3. Carry the box from gowning room to class 1000 clean room.

2.4. Open the box and carry the bagged telescope from class 1000 clean room to class 10 clean room (this step is only for integration in the class 10 clean room).

2.5. Procedure 2 complete.

Signed: _____ _____ Date: _____

Choose option:

____ MGP Class 10 clean room

____ MGP Class 1000 clean room

3. Procedures in class 10 clean room or class 1000 clean room:

3.1. Lower down the probe without vacuum can onto the base fixture with precision manipulator.

3.2. Undo three bottom screws which attaches to bottom plate of the probe to the probe tube.

3.3. Lift probe up high enough (about 2 feet) to allow installation of telescope.

3.4. Install screws for holding the probe base to the base fixture.

3.5. Check the position of the Quartz Block Simulator to make sure that it is seated properly on the Teflon screw heads at the bottom.

3.6. Place three 0.005" thick kapton shims on the quartz block simulator to prevent optical contact between telescope and quartz block simulator.

3.7. Unbag the telescope.

3.8. Seat telescope on soft cushion such as 20 sheets of clean room wipe on a solid table top.

3.9. Make sure the kapton shims are still on the Quartz Block Simulator.

3.10. Move the telescope onto the quartz block simulator.

3.11. Manipulate the telescope to the proper clocking. The X-Y axis (nominally the directions which the relay lenses are mounted) of the telescope should roughly align with the probe axis (the sides of the square top).

3.12. Install three clamps for holding the telescope onto the quartz block simulator.

3.13. Install Si diode thermometers.

3.14. Install telescope readout detectors if not already installed.

3.15. Arrange wires in such a way that they will not interfere with the probe wall.

3.16. Secure the wires of the bottom Si diode thermometers to the side wall of the telescope with kapton tape.

3.17. Lower down the probe slowly. Have at least one person checking on the position and centration of the telescope with respect to the i.d. of the probe.

3.18. When the probe is about 2" above the probe base, remove the base holding screws.

3.19. Lower the probe till it's about 1/4" above the base.

3.20. Install three bottom screws.

3.21. Lower the probe all the way down. Tighten three bottom screws and torque them to 3 in-lb.

3.22. Mate connectors for detectors and thermometers.

3.23. Install detector thermal conduction leads.

3.24. Lift the probe back up to allow the installation of the vacuum can.

3.25. Clean the indium mating surface.

3.26. Place indium wire on vacuum can.

3.27. Place vacuum can on the base fixture.

3.28. Lower the probe into vacuum can with a speed no higher than .1"/sec.

3.29. Tighten all screws for indium seal.

3.30. Lift probe back up.

3.31. Remove base fixture.

3.32. Lower probe to the proper height and wheel the cart into place.

3.33. Lower probe to the cart.

3.34. Undo top fixtures on the probe.

3.35. Wheel the cart out of the clean room.

3.36. Integration complete with no damage.

Signed: _____ _____ Date: _____

4. Procedure completion status:

Success: _____ Fail: _____