Gravity Probe B Relativity Mission
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DETECTOR PACKAGE ASSEMBLY INTEGRATION WITH TELESCOPE PROCEDURE

Approved:

Mark Sullivan, DPA Responsible Engineer	Date
Paul Ehrensberger, TRE IPT Leader	Date
Ben Taller, Quality Engineer	Date
John Turneaure, Hardware Manager	Date

DETECTOR PACKAGE ASSEMBLY INTEGRATION WITH TELESCOPE PROCEDURE

1. SCOPE

This procedure describes the integrating (Section 5) and deintegrating (Section 6) of the Detector Package Assemblies with a Telescope.

1.1 Acronyms

The following acronyms are used in this document:

DPA	Detector Package Assembly
GP-B	Gravity Probe B
HEPL	Hansen Experimental Physics Laboratory
IPT	Integrated Product Team
QA	Quality Assurance
RE	Responsible Engineer
TRE	Telescope Read-out Electronics

2. APPLICABLE DOCUMENTS

2.1 Drawings

25712 Detector Package Kit
25713 Detector Package Assembly
25091 Telescope Assembly
25679 Post, Detector Package

2.2 Plans and Procedures

P0059 GP-B Contamination Control Plan
P0057A GP-B Magnetic Control Plan
P0108 GP-B Quality Assurance Plan

3. GENERAL REQUIREMENTS

3.1 Environmental Requirements

3.1.1 Facility

This procedure will be conducted in the Telescope Class 1000 Clean Room in the HEPL facility.

3.1.2 Cleanliness

The Telescope Class 1000 Clean Room shall be maintained at the cleanliness levels per the GP-B Contamination Control Plan, P0059. Certified class 1000 garments shall be worn in the Telescope Clean Room.

3.1.3 Particulate Contamination

All parts and tools shall be cleaned at least to the cleanliness levels of the rooms where they are used for assembly or testing. In addition, all flight parts shall be maintained at Level 100 cleanliness per the GP-B Contamination Control Plan. Take all necessary precautions to keep tools and handling equipment free of particulate contamination.

NOTE: Extreme care should be taken to keep the plano-convex lens on the DPA free of all particulates.

3.1.4 Magnetic Contamination

All parts and tools shall be screened per procedure P0057A.

3.1.5 Electrostatic Discharge Control

Ground plugs shall be attached to the DPA Connectors during this procedure. All integration personnel shall wear wrist straps.

3.2 Integration Personnel

Mark Sullivan is authorized to perform the procedure described below.

A certified Telescope Flight Part handler per P0282 shall be present during the procedure.

3.3 Safety

3.3.1 General

Personnel working in the Telescope Clean Room must be cognizant of the bonding clean bench. Care shall be taken to avoid contamination of any flight parts on the bench. Safety Engineering shall be notified prior to any major movement of the Telescope (i.e., any movement other than rotations or minor adjustments).

3.3.2 Hardware Safety

Extreme care must be taken to avoid accidentally bumping or scratching the Telescope. Extreme care must be taken to avoid touching the polished bonding surfaces or optical surfaces of the Telescope.

3.3.3 Maximum Number of People in Clean Room

Under normal operating conditions, there shall be no more than 5 people in the Telescope Class 1000 Clean Room. This is to avoid violating legal make-up air requirements and to provide an efficient workspace. Exceptions must be for short periods only, and approved by the integration personnel.

3.4 Quality Assurance

Integration shall be conducted on a formal basis using approved and released procedures. The QA program office shall be notified of the start of the procedure. A QA representative designated by Ben Taller shall receive any discrepancy noted during this procedure and approve its disposition. Redlines shall be stamped by the QA representative. The QA representative will nominally be Ben Taller. Upon completion of this procedure, the QA engineer, Ben Taller or Phil Unterreiner, will certify his concurrence that the effort was performed and accomplished in accordance with the prescribed instructions by signing and dating this. Any deviation shall be recorded in a Discrepancy Log (D-log) and/or a Discrepancy Report per the QA Plan P0108.

3.5 Redline Authority

Authority to redline (make minor changes during execution) this procedure is given to the Responsible Engineer, Mark Sullivan, or his designate. Approval by the Hardware Manager, John Turneaure, shall be required if, in the judgment of the RE or QA engineer, experiment functionality may be affected.

4. REQUIRED EQUIPMENT AND MATERIALS

4.1 Flight Hardware

Parts kit per drawing 25712

4.2 Ground Support Equipment

Four grounding plugs for Connectors
Wrist straps
Clean box

4.3 Tools and Miscellaneous

Titanium hex key, 7/64"
Small jewelers' screwdriver with titanium nitride coating
Non-magnetic (e.g., titanium) tweezers, pointed tips
Kapton tape

5. DETECTOR PACKAGE ASSEMBLY INTEGRATION WITH TELESCOPE

5.1 DPA Integration Procedure

5.1.1 Obtain parts from bonded stores. Parts shall have been already cleaned to Level 100 conditions.

5.1.2 Assemble parts as shown in drawing 25712.

5.1.3 The Capture Shoulder Screw and Nut Plate are assembled to Post first. CAUTION: The fused quartz/metal interface is susceptible to damage. Assemble Screw and Plate with care.

5.1.4 Position the Detector Package Assembly above the Post. A second person will need to handle and secure the Cables while the Housing is being set on the Post.

5.1.5 Bring the DPA down onto the Post with the Shoulder Screw inserting into the hole in the Post. Housing interface surfaces should mate with top and side of Post. CAUTION: The fused quartz/titanium interface is a critical alignment surface susceptible to damage. Place the DPA on the Post with exceptional care.

5.1.6 Use one hand to hold DPA squarely on Post while tightening Shoulder Screw with hex key. Shoulder Screw should bottom out on Nut Plate.

5.1.7 Verify Detector Package Housing is making proper contact with Post interface surfaces. Some light fringes may be visible at the interface surfaces when viewed from below DPA through Post. Sketch contact area below.

5.2 Procedure Completion

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

Performed by:_____
Signature Date

Quality Engineer:_____
Signature Date

Sketch & Discrepancies (if any):

6. DETECTOR PACKAGE ASSEMBLY DEINTEGRATION FROM TELESCOPE

6.1 DPA Deintegration Procedure

6.1.1 Disassemble parts as shown in drawing 25712. A second person will need to handle the Cables while the rest of the DPA is being lifted away from the Post.
CAUTION: The fused quartz/titanium interface is a critical alignment surface susceptible to damage. Remove the DPA from the Post with exceptional care.
NOTE: The Shoulder Screw should unscrew from the Nut Plate with only moderate torque. Care should be taken not to exert excessive torque as this could damage Post or Telescope.

6.1.2 Attach Grounding Plugs to Cable Connectors.

6.1.3 Place DPAs in clean GP-B Flight Parts box. Secure Housing and Connectors with Kapton tape, or equivalent.

6.1.4 Nut Plate and Capture Shoulder Screw may be left on Post.

6.1.5 Check for any damage to quartz Post or Housing after deintegration.

6.2 Procedure Completion

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

Performed by:_____
Signature Date

Quality Engineer:_____
Signature Date

Discrepancies (if any):