



W. W. Hansen Experimental Physics Laboratory  
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Gravity Probe B Relativity Mission

Gravity Probe B Operations Order  
"Flight" Hardware

**CRYO DIP TESTING AND TWE TESTING  
OF  
QUARTZ FLIGHT WINDOWS 1, 2 AND 3 SUBSTRATES**

**P0187**

**July 28, 1998**

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Prepared by: \_\_\_\_\_ Date \_\_\_\_\_  
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Approved by: Phil Unterriener \_\_\_\_\_ Date \_\_\_\_\_  
Quality Assurance

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Approved by: J. Turneaure \_\_\_\_\_ Date \_\_\_\_\_  
Hardware Manager



**1. GENERAL DESCRIPTION**

This Op Order Cryo Dips all of the quartz flight windows 1, 2 & 3 substrates after polishing.

**2. APPLICABLE DOCUMENTS**

<u>Document number</u>	<u>Rev</u>	<u>Title</u>
1C34175	C	Substrate, Windows 1 - 3

**2.1 These windows are flight windows and shall be treated with the utmost care during all testing.**

**3. PARTS**

**3.1 Have the polishing house, General Optics, send all the quartz windows to attention Dr. Suwen Wang, GP-B for testing prior to final cleaning. SU**

3.1.1 Have the windows delivered to Dr. Suwen Wang's telescope laboratory.  
All testing shall be performed at SU under the direction of Dr. Suwen Wang and Paul F. Schweiger.

3.1.2 Visually inspect upon receipt. Map any imperfections

<b>Qty</b>	<b>Part number</b>	<b>Description</b>	<b>PO#</b>	<b>Dwg Rev</b>
7	1C34175-102	Substrate, Window 1 - 3	SLEX6360	C

#### 4. ASSEMBLY & TEST

##### 4.1 Cryo Testing

- 4.1.1 Pour LN2 into a scratch free container large enough to submerge the window.
- 4.1.2 Using suitable lens tissue, cradle the window and slowly lower it into the container to prevent thermal shock. P
- 4.1.3 Allow the window to soak in the LN2 until the bubbling has stopped P
- 4.1.4 Remove the window using the lens tissue cradling it and place it on a suitable area to warm up to room temperature naturally. P

<b>NOTE</b>
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**DO NOT touch the cold window with your hands or any other body part or with any metal surface. Failure to do so can result in damage to the window resulting in scraping it.**

- 4.1.5 Inspect each window for damage P

##### 4.2 TWE Testing

- 4.2.1 TWE testing is to be performed at General Optics.

##### 4.3 Cleaning

- 4.3.1 Lightly clean the windows as deemed necessary to prevent staining of the polished surfaces. NOTE - these windows are to be recleaned at General Optics using acid cleaning techniques. Do not jeopardize the optical surfaces trying to precision clean them. P

**4.5 Drawing Status**

4.5.1 Cognizant Engineer to determine drawing revision status at the completion of testing and verify that all parts tested were per latest revision. If part was tested to an early revision, cognizant engineering to generate a D-log and recommend disposition of parts. Document revision status below:

<b>Part number</b>	<b>Rev</b>
_____	_____
_____	_____

Cognizant Engineer Signature

**4.6 Inspection**

4.6.1 Inspection to verify that all DRs and D-logs are closed and identify parts with part number, rev letter, operation order number and as having conformed to print.

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**5 ROUTING OF HARDWARE**

**5.1 Repackage the windows exactly the way they were received**

**P**

**5.2 Have SU return the windows to General Optics using FED-X overnight delivery.**

**P**

**6 ASSEMBLY COMMENTS**

This section is provided to given the fabricator/assembler an opportunity to record suggestions for future builds

**7 CLOSURE**

**7.1** Lab Lead to verify operations order complete. *initial in box on front page*

**7.2** QE to verify operations order complete. **QE**