SU/GPB P0682 Rev -

STANFORD UNIVERSITY
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GRAVITY PROBE B, RELATIVITY GYROSCOPE EXPERIMENT
STANFORD, CALIFORNIA 94305-4085

CONNECT INPUT CABLE TO SQUID

P0682 Rev -

May 25, 2000

GP-B SCIENCE MISSION PROCEDURE

Run # _____

PREPARED	_____	_____
	B. Muhlfelder, SQUID Hardware Manager	date
APPROVED	_____	_____
	R. Brumley, Gyro Manager	date
APPROVED	_____	_____
	D. Ross, Quality Assurance	date
APPROVED	_____	_____
	G. Keiser, Chair, Contamination Control Committee	date
APPROVED	_____	_____
	B. Muhlfelder, Technical Manager	date

TABLE OF CONTENTS

1 SCOPE

This procedure describes the connection of the input cable to the SQUID. It is intended for use in the situation where the entire SQUID kit has already been installed using P0415, but the readout cable has been disconnected and needs to be reconnected. This would occur, for instance, if a gyroscope has been replaced without replacing the SQUID. If the SQUID needs to be installed, P0415 should be used in lieu of this procedure.

2. APPLICABLE DOCUMENTS

2.1 Plans and Procedures

P0057	Stanford Magnetic Control Plan
P0080	Magnetic Screening Procedure
P0177	SIA to Probe Integration
P0432	Wire Lok QBF Bolts, Install Rails, SQUID Brackets, Plumbing Links
P0476	ESD/EOS Risk Mitigation Procedure
P0419	Operations Manual for the Probe Precision Manipulator

3. GENERAL REQUIREMENTS

3.1 Environmental Requirements

This procedure will be conducted in the Stanford Class 10 Cleanroom in the HEPL facility.

3.1.1. Cleanliness

The Class 10 clean room where this integration takes place shall be maintained at the cleanliness levels per GPB Contamination Control Plan P0059. Certified Class 10 cloth garments shall be worn in the Class 10 clean room.

3.1.2 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 GP-B Contamination Control Plan (P0059). Take all necessary precautions to keep tools and handling equipment free of particulate contamination. The cleanroom vacuum shall be used during fastening operations as required to maintain cleanliness.

To the maximum extent possible, personnel shall keep parts of their bodies downstream of the QB/T, relative to the HEPA wall.

At all times during the completion of this procedure a portable particle detector shall be situated near the work area to monitor for excessive generation of particulates.

3.1.3. Magnetic Contamination

All parts and tools shall be screened as required by P0057, the GPB Magnetic Control Plan.

3.1.4. Electrostatic Discharge Control

The particle ionizer should always be upstream of the quartz block relative to the fan wall, to prevent electrostatic charge buildup on the quartz block. P0476 shall be read prior to starting this procedure and shall be signed for here:

_____	_____	_____
Test Director (sign)	Test Director (print)	date

3.2 Integration Personnel

3.2.1 Integration and Test Director

The Integration and Test Director (ITD) shall be Dr. Barry Muhlfelder or his designate. He has overall responsibility for the implementation of this procedure and shall sign off the completed procedure.

3.2.2 Personnel

All engineers and technicians participating in this procedure shall work under the direction of the ITD who shall determine whether the person is qualified to participate in this procedure.

3.3 Safety

3.3.1 General

Personnel working in the Class 10 Cleanroom must be cognizant of the base of the Precision Manipulator, and take special care to avoid tripping or bumping into it.

3.3.2 Hardware Safety

Extreme care must be taken to avoid accidentally bumping the QB and other delicate flight hardware.

3.3.3 Maximum Number of People in Cleanroom

Under normal operating conditions, there shall be no more than 5 people in the Class 10 Cleanroom. This is to avoid violating legal make up air requirements, and to provide an efficient workspace. Exceptions must be for short periods only, and be approved by the test director.

3.4 Quality Assurance

Integration shall be conducted on a formal basis to approved and released procedures. The QA program office shall be notified of the start of this procedure. A Quality Assurance Representative, nominally D. Ross, or her designee, shall be present during the procedure and shall review any discrepancies noted and approve their disposition. Upon completion of this procedure, the QA Program Engineer, D. Ross will certify her concurrence that the effort was performed and accomplished in accordance with the prescribed instructions by signing and dating in the designated place(s) in this document. Discrepancies will be recorded in a D-log or as a DR per Quality Plan P0108.

The ONR representative shall be notified prior to beginning this procedure.

3.5 Red-line Authority

Authority to red-line (make minor changes during execution) this procedure is given solely to the ITD or his designate and Ming Luo. Additionally, approval by the Technical Manager shall be required, if in the judgment of the Test Director or QA Representative, experiment functionality or probe integrity may be affected.

4. REQUIRED EQUIPMENT

Flight Hardware

Verify the following hardware is available.

Hardware	Part Number	Quantity	Notes
Clip Kit, Thermal Ground. On/off	**25326-101**	**1**	**Kit itemized below**
Washer, Insulator	25149-101	1	
Washer Shoulder	25129-102	1	
Screw, Hex, Washer Head	25614-103	1	
Clip Kit, Thermal Ground	**25236-101**	**2**	**Kit itemized below**
Clip Thermal Ground	25146-101	2	
Screw, Hex, Washer Head	25614-102	2	
SQUID, Capacitor Kit	**25375-101**	**1**	**Kit itemized below**
Body Filter	25350-101	1	
Washer, Insulating	25351-101	1	
Flange, SC Cable	25352-101	1	
Contact Block	25355-101	2	
Wedge, Contact	25356-101	1	
Capacitor, Ring	25376-101	1	
Screw, SHC, #0-80 X .135, Vented	25053-103 or 105	4	
Screw, SHC, #2-56 X .130, Vented	25054-101	2	
Gasket, Lead	25043-101	1	
Screw, SHC, #2-56 X .180, Vented	25054-102	4	

Note: Serial Numbers and/or Lot Date Code of Flight Hardware are listed in the various tables as the assembly occurs in Section 5.

Ground Support Equipment

Approved non-magnetic tools
Fluke 85 or 87 ohmmeter (calibrated)
Capacitance meter (calibrated)
Fiberlite Model 190, Dolan-Jenner Industries
Allen wrenches, various
Cleanroom vacuum cleaner
Non-magnetic cable bending tools

Low power ohm meter

5 INITIAL CHECKS AND SETUP

Record Start Date and Time _____

- Make sure the Ion Bar Array is positioned between the HEPA wall and the cold end of the probe where the SQUID packages are to be installed.

- Raise or lower the probe , if necessary, to a comfortable working height of approximately 4 feet. Use the Probe Precision Manipulator to do this, in accordance with procedure P0419.

- Rotate the probe, if necessary, so that the SQUID being worked upon is oriented toward the ceiling, and slightly rotated toward you.

NOTE: For Science Mission, SQUID packages are installed in positions 1, 2, 3, and 4 for Gyros 1-4, respectively. Positions are shown below. Note that spaces allocated for other SQUID packages are no longer numbered.

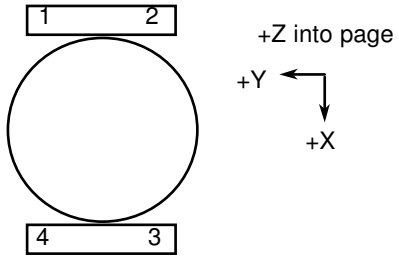

Figure 1. SQUID Positions

- Run # _____ of this procedure applies to Gyro # _____-

- Using the Fluke ohmmeter, measure the round-trip resistance and resistance-to-ground of each pickup loop of the gyro whose readout cable is being connected. Record in Table 1.

Table 1. Pickup Loop Resistances Before Routing

GYRO NUMBER	PICKUP LOOP ROUND-TRIP RESISTANCE BEFORE ROUTING (ohms)	PICKUP LOOP RESISTANCE TO GROUND BEFORE ROUTING (ohms)

6 CONNECT INPUT CABLES TO SQUIDS

- Scrape readout cable ends to achieve shiny surface.

- Using the probe rails, tie down the input readout cables from the gyroscope with 2 thermal ground clip kits (25236-101) and an on/off thermal ground clip kit (25326-101). The on/off

clip kit is located between the 2 ground clip kits.. The on/off clip kit requires the attachment of the gyro's gyro and readout cable heater assy (23550-101). Route the readout cables to the SQUID. The probe is rotated as required to allow the routing of the readout cables.

- Assemble the input filter onto the readout cable. Measure capacitance to ground of each conductor and the capacitance between conductors. Record in Table 2.

- Remove the cover to the SQUID package. Measure the resistances of the input to the SQUID carrier and pickup loop. Record in Table 2. Attach the readout cable to the carrier in the SQUID package.. Measure the parallel resistance of the SQUID carrier and pickup loop. The resistance to ground of each readout cable is measured and recorded in Table 2 after the cable is attached to the SQUID.

- Install one lead gasket (25043-101) onto the top of the SQUID Package.

- Replace the cover to SQUID package. Secure with vented 2-56 screws (25054-102).

Table 2: SQUID Input Readout Cable Resistances

Item	Value
Capacitance between first conductor and ground (nF)	
Capacitance between second conductor and ground (nF)	
Capacitance between conductors (nF)	
Pickup Loop round-trip resistance before hookup (ohms)	
SQUID Carrier input resistance before hookup (ohms)	
Parallel Resistance of SQUID and Pickup Loop after hookup (ohms)	
Pickup Loop resistance to ground after hookup (ohms)	

7 PROCEDURE COMPLETION

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

Test Director: _____ Date _____

Readout Engineer (optional): _____ Date_____

The information obtained under this assembly and test procedure is as represented and the documentation is complete and correct.

Quality Assurance: _____ Date _____

8 DATA BASE ENTRY

The following data shall be entered into the GP-B Data Base:

- Name, number and revision of this procedure
- An electronic copy of this document
- A copy of the "as-built" procedure with data and pictures, when completed.