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PRE-INTEGRATION PROBE INSTRUMENTATION WIRING CHECK-OUT

GP-B SCIENCE MISSION PROCEDURE

14 October, 1998

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APPROVED	S. Buchman, Hardware Manager	Date

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1 SCOPE

This document provides the procedure for checking the Probe-C instrumentation wiring, after delivery to Stanford. It assumes that Probe-C is mounted on the Precision Manipulator per P0205(SM) in the HEPL Class 10 Cleanroom, and the Probe Vacuum Shell has been removed per P0376(SM). This procedure checks for resistances (including shorts) between individual wires, from wires to ground, from wires to instrumentation shields, and from shields to ground. The corresponding connectors at the Top Hat are I-1 through -7 (no I-4) and those inside the probe are TB-1 through -7. Top Hat Connectors I-8 and I-9, which are connected to telescope instrumentation, are covered in another procedure. For those wires that are already connected to instrumentation in the probe, resistance values of the device will be checked for device integrity and comparison to previously measured results.

Subsequent instrumentation checkouts using similar table formats, will be performed and recorded after: a) the probe is integrated with the SIA as instrumentation are connected, and b) when the probe is in the dewar at cryogenic temperatures.

1.1 Acronyms

The following acronyms are used in this document

PM	Precision Manipulator
T-_Q	SIA Temperature Sensor
T-_P	Probe Temperature Sensor
H-_P	Probe Heater
H-_Q	Probe Heater
GRT	Germanium Resistance Thermometer
SD	Silicon Diode
TB_	Terminal Block X
DMM	Digital Multimeter
BPS_	Belleville Preload System
SIA	Science Instrument Assembly
HEPL	Hansen Experimental Physics Lab
GPB	Gravity Probe B
QA	Quality Assurance
ITD	Integration and Test Director
NA or N/A	Not Applicable
SM	Science Mission
Mohm or MΩ	Meg Ohm
V	Volt
I	Current
I-_	Top Hat Connector
HEX_	Heat Exchanger

2 APPLICABLE DOCUMENTS

2.1 Plans and Procedures

P0059	GPB Contamination Control Plan
P0057	Stanford Magnetic Control Plan
P0205(SM)	Mounting Probe on Precision Manipulator
P0376(SM)	Removing the Probe Vacuum Shell

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.

Personnel should always work downstream of the probe relative to the HEPA wall, and avoid putting any part of their body between the HEPA wall and the probe.

3.1.2 Particulate Contamination

All parts and tools shall be cleaned using methods consistent with achieving Mil Spec 1246B Level 100 cleanliness. In addition, all parts shall be maintained at level 100 cleanliness per Procedure P0059. A portable particle counter shall monitor downstream of the local work area, to ensure that particulate counts are consistent with GP-B Contamination Control Plan P0059.

3.1.3 Magnetic Contamination

Parts to be handled are in Zones 2A, 2B, and SP. Also possibly Zone 3 if circumstances require during testing. Take all necessary precautions to keep tooling and handling free of magnetic contamination. Tools that come in contact with these components must be of Beryllium Copper, Phosphor Bronze, ceramic, copper, brass, titanium, mating GP-B flight connectors, as well as appropriate plastics.

3.2 Integration Personnel

3.2.1 Integration and Test Director

The Integration and Test Director (ITD) shall be Dr. Doron Bardas. He has overall responsibility for the implementation of this procedure and shall sign off the completed procedure.

3.2.2 Other Personnel

All personnel participating in this procedure shall work under the direction of the ITD who shall determine whether the person is qualified. Different people will likely be designated at different times.

For this procedure, participating integration engineers are expected to be (at various times) John Stamets, Chris Gray, Gary Reynolds and/or other LMMS personnel. Section 6 will show all appropriate signatures.

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 Probe or damaging the connectors. Connector savers or equivalent adapters, shall be used to protect the connector pins from damage during the measurements.

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 for short periods only must be approved by the ITD.

3.4 Quality Assurance

All assembly and testing shall be conducted on a formal basis to approved and released assembly and test procedures.. A Quality Assurance representative shall review and document any discrepancy noted during integration or test, and approve its disposition. This representative is nominally Art Nakashima, who is expected to be present unless otherwise determined by the ITD. Upon completion of each procedure, the QA representative will certify his/her concurrence that the effort was performed and accomplished in accordance with the prescribed instructions by signing and dating the approval line at the end of the procedure. Discrepancies will be recorded.

3.5 Red-line Authority

Authority to red-line this procedure is given solely to the ITD and QA representative. Approval by the Hardware Manager shall be required if experiment functionality may be affected. QA Program Engineering concurrence is required before final review/buyoff (on last page) of the completion of the activity described in this procedure.

4 REQUIRED EQUIPMENT

Flight Hardware

Hardware	Part Number
Probe-C Assembly, without sunshade	1C34115-102

Ground Support Equipment — Calibration Date

Digital Multimeter: Fluke Model 45 or equivalent
ENSURE METER USED CANNOT DAMAGE TESTING OF SILICON DIODES OR OTHER ITEMS.

Miscellaneous wiring and clip leads	N/A
Lemo adapters for cold end connectors	N/A
Top Hat Instrumentation connector breakout box	N/A
Grounded cuff straps for ESD protection	N/A

Note: Ion sprayers not required, since the SIA is not installed during this procedure.

5 INSTRUMENTATION RESISTANCE CHECKS

Record Start Date and Time _____

Note: Use grounded wrist straps when making these measurements.

5.1 Initial Preparations

5.1.1 The Probe should be horizontal on the Precision Manipulator at a height of approximately 4 feet, with the cold end toward the observation window.

5.1.2 Clear off an appropriate cleanroom table and position it under the Top Hat.

5.1.3 Set up the Digital Multimeter to read resistance on the self-ranging scale. Short the test leads together to verify a reading close to zero ohms (typically < 0.2 ohms)

5.1.4 Rotate the probe so that the instrumentation connector you are working on is in a position convenient for mating the connector, on the cable from the breakout box, to the Top Hat 55 pin Instrument connector being currently checked out.

5.2 Resistance between Cable Wires and Ground (Top Hat potential)

5.2.1 Using the breakout box test points, each of which corresponds to a pin on a Top Hat connector, check the resistance between each of the 55 pins and ground (Top Hat). These are all expected to be open circuits, i.e. > 10 MOhm. If so, record a check mark in the relevant column in the appropriate table below for that Top Hat Connector. If the resistance is < 10 MOhm, record its actual value. Also record relevant comments (such as historical information) in the adjacent column.

5.3 End to End resistance for each instrumentation wire

5.3.1 Using the breakout box at the Top Hat connector and an appropriate connector at the cold end (i.e. Lemo connector or pin), measure the “end-to-end” resistance of each of the wires in I-1 through I-7. For those wires already connected to a device this measurement cannot be done, however wire integrity is determined from the data in Section 5.2.

5.4 Resistance between cable wires

5.4.1 Using the breakout box test points, each of which corresponds to a pin on a Top Hat connector, check the resistance between each pin and all the other pins in that connector. To accomplish this, connect one probe of the DMM to each pin in turn, and then connect the other probe to each of the other pins in turn. Begin with pin 1 and measure resistance between it and pins 2, 3,..., 55. Record the data in the relevant column in the appropriate table below for that Top Hat Connector. Next, connect the meter to pin 2, and measure resistance between it and pins 3, ..., 55, in turn, and so on..

Note that some wires are already connected to devices as marked in the Table. Record these resistance values. In particular, note that SD measurements are polarity dependent. Confirm diode property and installation and record the resistance.

TABLE 1. I-1 CONNECTOR CHECKOUT

I-1 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-1 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
1			I1J2	1		T-5Q	GRT (V+) Not Installed					
2			I1J2	2		T-5Q	GRT (V-) Not Installed					
3	*No connection*											
4			I1J6	1		T-6Q	GRT (V+) Not Installed					
5			I1J6	2		T-6Q	GRT (V-) Not Installed					
6			I1J9	1		T-17Q	GRT (V+) Not Installed					
7			I1J9	2		T-17Q	GRT (V-) Not Installed					
8			I1J10	1		T-1Q	GRT (V+) Not Installed					
9			I1J10	2		T-1Q	GRT (V-) Not Installed					
10			I1J3	1		T-2Q	GRT (V+) Not Installed					

TABLE 1. I-1 CONNECTOR CHECKOUT

I-1 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-1 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
11			I1J3	2		T-2Q	GRT (V-) Not Installed					
12			I1J4	1		T-3Q	GRT (V+) Not Installed					
13			I1J4	2		T-3Q	GRT (V-) Not Installed					
14			I1J11	1		T-4Q	GRT (V+) Not Installed					
15			I1J11	2		T-4Q	GRT (V-) Not Installed					
16-22	*No connection*											
23			I1J5	1		X-1	Spare					
24			I1J5	2		X-1	Spare					
26			I1J5	3		X-2	Spare					
27			I1J5	4		X-2	Spare					

TABLE 1. I-1 CONNECTOR CHECKOUT

I-1 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-1 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
28			I1J7	1		X-3	Spare					
29			I1J7	2		X-3	Spare					
30			I1J7	3		X-4	Spare					
31			I1J7	4		X-4	Spare					
32			I1J10	3		T-1Q	GRT (I+) Not Installed					
33			I1J10	4		T-1Q	GRT (I-) Not Installed					
34			I1J3	3		T-2Q	GRT (I+) Not Installed					
35			I1J3	4		T-2Q	GRT (I-) Not Installed					
36			I1J4	3		T-3Q	GRT (I+) Not Installed					
37			I1J4	4		T-3Q	GRT (I-) Not Installed					

TABLE 1. I-1 CONNECTOR CHECKOUT

I-1 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-1 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
38			I1J11	3		T-4Q	GRT (I+) Not Installed					
39			I1J11	4		T-4Q	GRT (I-) Not Installed					
40			I1J9	3		T-17Q	GRT (I+) Not Installed					
41			I1J9	4		T-17Q	GRT (I-) Not Installed					
42			I1J2	3		T-5Q	GRT (I+) Not Installed					
43			I1J2	4		T-5Q	GRT (I-) Not Installed					
44			I1J6	3		T-6Q	GRT (I+) Not Installed					
45			I1J6	4		T-6Q	GRT (I-) Not Installed					
46	*No connection*											
47			I1J8	1		X-1A	spare					

TABLE 1. I-1 CONNECTOR CHECKOUT

I-1 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-1 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
48			I1J8	2		X-2A	spare					
49			I1J8	3		X-3A	spare					
50			I1J8	4		X-4A	spare					
51			I1J1	1		X-5A	spare					
52			I1J1	2		X-6A	spare					
53			I1J1	3		X-7A	spare					
54			I1J1	4		X-8A	spare					
55	*No Connection*											

TABLE 2. I-2 CONNECTOR CHECKOUT

I-2 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-2 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
1			TB2	16		T-6P	GRT (V+)	(2)	NA	(21)	NA	
2			TB2	17		T-6P	GRT (V-)	(1)	NA	NA	(22)	
3	*No connection*											
4			TB2	24		T-7P	GRT (V+)	(5)	NA	(23)	NA	
5			TB2	25		T-7P	GRT (V-)	(4)	NA	NA	(24)	
6			TB2	26		T-8P	GRT (V+)	(7)	NA	(25)	NA	
7			TB2	27		T-8P	GRT (V-)	(6)	NA	NA	(26)	
8			TB2	28		T-9P	GRT (V+)	(9)	NA	(27)	NA	
9			TB2	29		T-9P	GRT (V-)	(8)	NA	NA	(28)	
10, 11	*No connection*											

TABLE 2. I-2 CONNECTOR CHECKOUT

I-2 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-2 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
12			TB2	18		X-5	spare					
13			TB2	19		X-5	spare					
14-20	*No Connection*											
21			TB2	9		T-6P	GRT (I+)	NA	(22)	(1)	NA	
22			TB2	10		T-6P	GRT (I-)	NA	(21)	NA	(2)	
23			TB2	11		T-7P	GRT (I+)	NA	(24)	(4)	NA	
24			TB2	12		T-7P	GRT (I-)	NA	(23)	NA	(5)	
25			TB2	13		T-8P	GRT (I+)	NA	(26)	(6)	NA	
26			TB2	14		T-8P	GRT (I-)	NA	(25)	NA	(7)	
27			TB2	22		T-9P	GRT (I+)	NA	(28)	(8)	NA	

TABLE 2. I-2 CONNECTOR CHECKOUT

I-2 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-2 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
28			TB2	23		T-9P	GRT (I-)	NA	(27)	NA	(9)	
29-34	*No Connection*											
35			TB2	20		X-6	spare					
36			TB2	21		X-6	spare					
37-46	*No Connection*											
47			TB2	1		H-1P	Heater (V+)	(48)	NA	NA	NA	
48			TB2	2		H-1P	Heater (V-)	(47)	NA	NA	NA	
49			TB2	3		H-2P	Heater (V+)	(50)	NA	NA	NA	
50			TB2	4		H-2P	Heater (V-)	(49)	NA	NA	NA	
51			TB2	5		H-3P	Heater (V+)	(52)	NA	NA	NA	
52			TB2	6		H-3P	Heater (V-)	(51)	NA	NA	NA	

TABLE 2. I-2 CONNECTOR CHECKOUT

I-2 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-2 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
53			TB2	7		H-4P	Heater (V+)	(54)	NA	NA	NA	
54			TB2	8		H-4P	Heater (V-)	(53)	NA	NA	NA	
55	*No Connection*											

TABLE 3. I-3 CONNECTOR CHECKOUT

I-3 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-3 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
1			I3J6	1		H-1Q	Heater (V+) Not Installed					
2			I3J6	2		H-1Q	Heater (V-) Not Installed					
3		*No connection*										
4			I3J6	3		H-2Q	Heater (V+) Not Installed					
5			I3J6	4		H-2Q	Heater (V-) Not Installed					
6			I3J9	1		H-3Q	Heater (V+) Not Installed					
7			I3J9	2		H-3Q	Heater (V-) Not Installed					
8			I3J9	3		H-4Q	Heater (V+) Not Installed					
9			I3J9	4		H-4Q	Heater (V-) Not Installed					
10			I3J2	1		H-5Q	Heater (V+) Not Installed					

TABLE 3. I-3 CONNECTOR CHECKOUT

I-3 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-3 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
11			I3J2	2		H-5Q	Heater (V-) Not Installed					
12			I3J2	3		H-6Q	Heater (V+) Not Installed					
13			I3J2	4		H-6Q	Heater (V-) Not Installed					
14			I3J1	1		H-7Q	Heater (V+) Not Installed					
15			I3J1	2		H-7Q	Heater (V-) Not Installed					
16	*No Connection*											
17			I3J1	3		H-8Q	Heater (V+) Not Installed					
18			I3J1	4		H-8Q	Heater (V-) Not Installed					
19			I3J10	1		H-9Q	Heater (V+) Not Installed					
20			I3J10	2		H-9Q	Heater (V-) Not Installed					

TABLE 3. I-3 CONNECTOR CHECKOUT

I-3 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-3 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
21			I3J10	3		H-10Q	Heater (V+) Not Installed					
22			I3J10	4		H-10Q	Heater (V-) Not Installed					
23			I3J3	1		H-11Q	Heater (V+) Not Installed					
24			I3J3	2		H-11Q	Heater (V-) Not Installed					
25	*No Connection*											
26			I3J3	3		H-12Q	Heater (V+) Not Installed					
27			I3J3	4		H-12Q	Heater (V-) Not Installed					
28			I3J7	1		X-7	spare					
29			I3J7	2		X-7	spare					
30			I3J7	3		X-8	spare					

TABLE 3. I-3 CONNECTOR CHECKOUT

I-3 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-3 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
31			I3J7	4		X-8	spare					
32			I3J5	1		X-9	spare					
33			I3J5	2		X-9	spare					
34			I3J5	3		X-10	spare					
35			I3J5	4		X-10	spare					
36, 37	*No connection*											
38			I3J8	1		T-18Q	SD (I+) Not Installed					
39			I3J8	2		T-18Q	SD (I-) Not Installed					
40			I3J8	3		T-7Q	SD (I+) Not Installed					
41			I3J8	4		T-7Q	SD (I-) Not Installed					

TABLE 3. I-3 CONNECTOR CHECKOUT

I-3 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-3 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
42			I3J11	1		T-8Q (alt)	GRT (V+) Not Installed					
43			I3J11	2		T-8Q (alt)	GRT (V-) Not Installed					
44			I3J11	3		T-8Q (alt)	GRT (I+) Not Installed					
45			I3J11	4		T-8Q (alt)	GRT (I-) Not Installed					
46	*No connection*											
47			I3J4	1		T-10Q (alt)	GRT (V+) Not Installed					
48			I3J4	2		T-10Q (alt)	GRT (V-) Not Installed					
49			I3J4	3		T-10Q (alt)	GRT (I+) Not Installed					
50			I3J4	4		T-10Q (alt)	GRT (I-) Not Installed					
51-55	*No Connection*											

TABLE 4. I-5 CONNECTOR CHECKOUT

I-5 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-5 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
1			TB5	17		T-12Q	GRT (V+) Not Installed					
2			TB5	24		T-12Q	GRT (V-) Not Installed					
3	*No connection*											
4			TB5	31		T-13Q	GRT (V+) Not Installed					
5			TB5	38		T-13Q	GRT (V-) Not Installed					
6			TB5	2		T-14Q	GRT (V+) Not Installed					
7			TB5	9		T-14Q	GRT (V-) Not Installed					
8			TB5	16		T-15Q	GRT (V+) Not Installed					
9			TB5	23		T-15Q	GRT (V-) Not Installed					
10			TB5	7		T-10P	GRT (V+)	(11)	NA	(40)	NA	

TABLE 4. I-5 CONNECTOR CHECKOUT

I-5 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-5 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
11			TB5	14		T-10P	GRT (V-)	(10)	NA	NA	(41)	
12			TB5	21		T-11P	GRT (V+)	(13)	NA	(42)	NA	
13			TB5	28		T-11P	GRT (V-)	(12)	NA	NA	(43)	
14			TB5	3		T-16Q	SD (V+) Not Installed					
15			TB5	2		T-16Q	SD (V-) Not Installed					
16	*No Connection*											
17			TB5	20		T-19P	SD (V+)	(18)	NA	NA	NA	
18			TB5	27		T-19P	SD (V-)	(17)	NA	NA	NA	
19			TB5	34		T-20P	SD (V+)	(20)	NA	NA	NA	
20			TB5	41		T-20P	SD (V-)	(19)	NA	NA	NA	

TABLE 4. I-5 CONNECTOR CHECKOUT

I-5 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-5 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
21			TB5	18		T-21Q	GRT (V+) Not Installed					
22			TB5	25		T-21Q	GRT (V-) Not Installed					
23 - 26	*No connection*											
27			TB5	32		T-21Q	GRT (I+) Not Installed					
28			TB5	39		T-21Q	GRT (I-) Not Installed					
29 - 31	*No connection*											
32			TB5	30		T-12Q	GRT (I+) Not Installed					
33			TB5	37		T-12Q	GRT (I-) Not Installed					
34			TB5	1		T-13Q	GRT (I+) Not Installed					

TABLE 4. I-5 CONNECTOR CHECKOUT

I-5 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-5 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
35			TB5	8		T-13Q	GRT (I-) Not Installed					
36			TB5	15		T-14Q	GRT (I+) Not Installed					
37			TB5	22		T-14Q	GRT (I-) Not Installed					
38			TB5	29		T-15Q	GRT (I+) Not Installed					
39			TB5	36		T-15Q	GRT (I-) Not Installed					
40			TB5	35		T-10P	GRT (I+)	NA	(41)	(10)	NA	
41			TB5	42		T-10P	GRT (I-)	NA	(40)	NA	(11)	
42			TB5	6		T-11P	GRT (I+)	NA	(43)	(12)	NA	
43			TB5	13		T-11P	GRT (I-)	NA	(42)	NA	(13)	
44-46	*No Connection*											

TABLE 4. I-5 CONNECTOR CHECKOUT

I-5 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-5 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
47			TB5	33		H-14P	Heater (V+)	(48)	NA	NA	NA	
48			TB5	40		H-14P	Heater (V-)	(47)	NA	NA	NA	
49			TB5	4		H-15P	Heater (V+)	(50)	NA	NA	NA	
50			TB5	11		H-15P	Heater (V-)	(49)	NA	NA	NA	
51			TB5	5		H-5P	Heater (V+)	(52)	NA	NA	NA	
52			TB5	12		H-5P	Heater (V-)	(51)	NA	NA	NA	
53			TB5	19		H-6P	Heater (V+)	(54)	NA	NA	NA	
54			TB5	26		H-6P	Heater (V-)	(53)	NA	NA	NA	
55	*No Connection*											

TABLE 5. I-6 CONNECTOR CHECKOUT

I-6 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-6 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
1						T-5P	GRT (V+)	(2)	NA	(19)	NA	
2						T-5P	GRT (V-)	(1)	NA	NA	(20)	
3	*No connection*											
4						T-13P	SD (V+)	(5)	NA	(21)	NA	
5						T-13P	SD (V-)	(4)	NA	NA	(22)	
6						T-14P	SD (V+)	(7)	NA	(23)	NA	
7						T-14P	SD (V-)	(6)	NA	NA	(24)	
8						T-12P	SD (I+)	NA	(9)	NA	NA	
9						T-12P	SD (I-)	NA	(8)	NA	NA	
10						T-1P	SD (I+)	NA	(11)	NA	NA	

TABLE 5. I-6 CONNECTOR CHECKOUT

I-6 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-6 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
11						T-1P	SD (I-)	NA	(10)	NA	NA	
12						T-2P	SD (I+)	NA	(13)	NA	NA	
13						T-2P	SD (I-)	NA	(12)	NA	NA	
14						T-3P	SD (I+)	NA	(15)	NA	NA	
15						T-3P	SD (I-)	NA	(14)	NA	NA	
16	*No Connection*											
17						T-4P	SD (I+)	NA	(18)	NA	NA	
18						T-4P	SD (I-)	NA	(17)	NA	NA	
19						T-5P	GRT (I+)	NA	(20)	(1)	NA	
20						T-5P	GRT (I-)	NA	(19)	NA	(2)	

TABLE 5. I-6 CONNECTOR CHECKOUT

I-6 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-6 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
21						T-13P	SD (I+)	NA	(22)	(4)	NA	
22						T-13P	SD (I-)	NA	(21)	NA	(5)	
23						T-14P	SD (I+)	NA	(24)	(6)	NA	
24						T-14P	SD (I-)	NA	(23)	NA	(7)	
25	*No connection*											
26						T-28P	GRT (I+) spare	NA	(27)	(28)	NA	
27						T-28P	GRT (I-) spare	NA	(26)	NA	(29)	
28						T-28P	GRT (V+) spare	NA	(29)	(26)	NA	
29						T-28P	GRT (V-) spare	NA	(28)	NA	(27)	
30	*No connection*											

TABLE 5. I-6 CONNECTOR CHECKOUT

I-6 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-6 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
31						BPS-1	(V+)	(32)	NA	(33)	NA	
32						BPS-1	(V-)	(31)	NA	NA	(34)	
33						BPS-1	(I+)	NA	(34)	(31)	NA	
34						BPS-1	(I-)	NA	(33)	NA	(32)	
35						BPS-2	(V+)	(36)	NA	(37)	NA	
36						BPS-2	(V-)	(35)	NA	NA	(38)	
37						BPS-2	(I+)	NA	(38)	(35)	NA	
38						BPS-2	(I-)	NA	(37)	NA	(36)	
39						BPS-3	(V+)	(40)	NA	(41)	NA	
40						BPS-3	(V-)	(39)	NA	NA	(42)	

TABLE 5. I-6 CONNECTOR CHECKOUT

I-6 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-6 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
41						BPS-3	(I+)	NA	(42)	(39)	NA	
42						BPS-3	(I-)	NA	(41)	NA	(40)	
43						T-31P	SD (I+)	NA	(43)	NA	NA	
44						T-31P	SD (I-)	NA	(42)	NA	NA	
45						T-32P	SD (I+)	NA	(46)	NA	NA	
46						T-32P	SD (I-)	NA	(45)	NA	NA	
47						H-8P	Heater (V+)	(48)	NA	NA	NA	
48						H-8P	Heater (V-)	(47)	NA	NA	NA	
49						H-9P	Heater (V+)	(50)	NA	NA	NA	
50						H-9P	Heater (V-)	(49)	NA	NA	NA	

TABLE 5. I-6 CONNECTOR CHECKOUT

I-6 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-6 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
51-55	*No Connection*											

TABLE 6. I-7 CONNECTOR CHECKOUT

I-7 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-7 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
1			TB7	13		H-10P	Heater (V+)	(2)	NA	NA	NA	
2			TB7	14		H-10P	Heater (V-)	(1)	NA	NA	NA	
3	*No connection*											
4			TB7	19		H-11P	Heater (V+)	(5)	NA	NA	NA	
5			TB7	20		H-11P	Heater (V-)	(4)	NA	NA	NA	
6			HEX1	1		H-16P	Heater (V+)	(7)	NA	NA	NA	
7			HEX1	2		H-16P	Heater (V-)	(6)	NA	NA	NA	
8			HEX1	3		H-17P	Heater (V+)	(9)	NA	NA	NA	
9			HEX1	4		H-17P	Heater (V-)	(8)	NA	NA	NA	
10			HEX2	1		H-18P	Heater (V+)	(11)	NA	NA	NA	

TABLE 6. I-7 CONNECTOR CHECKOUT

I-7 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-7 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
11			HEX2	2		H-18P	Heater (V-)	(10)	NA	NA	NA	
12			HEX2	3		H-19P	Heater (V+)	(13)	NA	NA	NA	
13			HEX2	4		H-19P	Heater (V-)	(12)	NA	NA	NA	
14			HEX2	1		H-20P	Heater (V+)	(15)	NA	NA	NA	
15			HEX2	2		H-20P	Heater (V-)	(14)	NA	NA	NA	
16	*No Connection*											
17			HEX2	1		H-21P	Heater (V+)	(18)	NA	NA	NA	
18			HEX2	2		H-21P	Heater (V-)	(17)	NA	NA	NA	
19			TB7	17		H-12P	Heater (V+)	(20)	NA	NA	NA	
20			TB7	18		H-12P	Heater (V-)	(19)	NA	NA	NA	

TABLE 6. I-7 CONNECTOR CHECKOUT

I-7 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-7 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
21			TB7	23		H-13P	Heater (V+)	(22)	NA	NA	NA	
22			TB7	24		H-13P	Heater (V-)	(21)	NA	NA	NA	
23			TB7	7		X-13	Spare					
24			TB7	8		X-13	Spare					
25			TB7	9		X-14	Spare					
26			TB7	10		X-14	Spare					
27			HEX1	5		T-21P	SD (I+)	NA	(28)	NA	NA	
28			HEX1	6		T-21P	SD (I-)	NA	(27)	NA	NA	
29			HEX1	7		T-22P	SD (I+)	NA	(30)	NA	NA	
30			HEX1	8		T-22P	SD (I-)	NA	(29)	NA	NA	
31	*No connection*											

TABLE 6. I-7 CONNECTOR CHECKOUT

I-7 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-7 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
32			HEX2	5		T-23P	SD (I+)	NA	(33)	NA	NA	
33			HEX2	6		T-23P	SD (I-)	NA	(32)	NA	NA	
34			HEX2	7		T-24P	SD (I+)	NA	(35)	NA	NA	
35			HEX2	8		T-24P	SD (I-)	NA	(34)	NA	NA	
36			HEX3	5		T-25P	SD (I+)	NA	(37)	NA	NA	
37			HEX3	6		T-25P	SD (I-)	NA	(36)	NA	NA	
38			HEX3	7		T-26P	SD (I+)	NA	(39)	NA	NA	
39			HEX3	8		T-26P	SD (I-)	NA	(38)	NA	NA	
40			HEX4	1		T-27P	SD (I+)	NA	(41)	NA	NA	
41			HEX4	2		T-27P	SD (I-)	NA	(40)	NA	NA	

TABLE 6. I-7 CONNECTOR CHECKOUT

I-7 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-7 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
			HEX4	3-8	*No connection*							
42			TB7	5		T-17P	SD (I+)	NA	(43)	NA	NA	
43			TB7	6		T-17P	SD (I-)	NA	(42)	NA	NA	
44			TB7	11		T-18P	SD (I+)	NA	(45)	NA	NA	
45			TB7	12		T-18P	SD (I-)	NA	(44)	NA	NA	
46	*No Connection*											
47			TB7	15		T-15P	GRT (I+)	NA	(48)	(51)	NA	
48			TB7	16		T-15P	GRT (I-)	NA	(47)	NA	(52)	
49			TB7	21		T-16P	GRT (I+)	NA	(50)	(53)	NA	
50			TB7	22		T-16P	GRT (I-)	NA	(49)	NA	(54)	

TABLE 6. I-7 CONNECTOR CHECKOUT

I-7 pin #	Res to Gnd (Ohms) √=>10 MΩ	Res Pin to Pin (Ohms) √=>10 MΩ	Lemo #	Lemo pin #	Res End-to-End (Ohms)	Device ID	Device Type and Polarity	Res to other I-7 pins of same device (Ohms). √ = > 10 MΩ				Comments about Measurements or Wiring Change Work-Arounds that are Required as a result of these Checkouts
								V+ to V-	I+ to I-	V+ to I+	V- to I-	
51			TB7	1		T-15P	GRT (V+)	(52)	NA	(47)	NA	
52			TB7	2		T-15P	GRT (V-)	(51)	NA	NA	(48)	
53			TB7	3		T-16P	GRT (V+)	(49)	NA	(54)	NA	
54			TB7	12		T-16P	GRT (V-)	NA	(53)	NA	(50)	
55	*No Connection*											

6 PROCEDURE COMPLETION

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

Integration Engineer (S)

_____ Date _____

_____ Date _____

_____ Date _____

_____ Date _____

_____ Date _____

Discrepancies if any:

ITD _____ Date _____

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

QA Representative _____ Date _____

QA Program Engineer_____ Date _____

7 DATA BASE ENTRY

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

1) Name, number and revision of this procedure

2) Date of successful completion of procedure.