



High Energy Spectroscopic Imager (HESSI) Instrument Harness Specification

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Document Revision Record

Rev.	Date	Description of Change	Approved By
A	1998-Aug-25	Preliminary Draft	-
B	1998-Sep-3	Add some connector pinouts, harness length estimates, misc mods	-
C	1998-Sep-15	Misc minor changes	-
D	1998-Oct-13	Change connector type call out to harness rather than box connectors for consistency, define more pinouts.	-
E	1998-Oct-16	Add PSI connector pin-outs, new connector types	-
F	1999-Feb-19	Various minor corrections and additions	-
G	1999-Mar-12	<ul style="list-style-type: none"> • Change actuator harness from #20 TO #22 GAUGE (Max for IDPU-J4) • Change HV harness routing, add Spectrum length estimates. • Add CSA feed-through pinouts 	-
H	1999-Mar-15	Change SF feed-through pinout to match ETU	-
I	1999-Apr-29	<ul style="list-style-type: none"> • Add CSA power switch signal • Change IDPU-P1n coax insert pinout • Swap SF feedthrough pinout again (temp sensor/return swapped) • Add HVPS / HV Mother Board connectors • Add harness lengths measured off harness mock-up • Imager harness changed to consistently 24 gauge wire • Update Imager harness pinout & connectors 	
J	1999-5-31	<ul style="list-style-type: none"> • Add Earthshine signals to RAS/ADP harness • Add PD-J4 signal out to GSE • Change RAS-P3 from SDD15 to SND9 	
K	1999-7-16	<ul style="list-style-type: none"> • Update Imager harness length estimates • Remove IPC_SYNC • Add CPC_SYNC_RET 	
L	1999-11-15	Add a second set of wires for +5VD/DGND between the IDPU and IPC to reduce line drop	

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1. Introduction

This document describes the physical characteristics of the HESSI Instrument interconnect harnesses, excluding the spacecraft to instrument harness which is described in reference 1.

1.1. Document Conventions

In this document, **TBD** (To Be Determined) means that no data currently exists. A value followed by **TBR** (To Be Resolved) means that this value is preliminary. In either case, the value is typically followed by UCB (University of California at Berkeley) and / or SA (Spectrum Astro) indicating who is responsible for providing the data, and a unique reference number.

1.2. Applicable Documents

1. HESSI Spacecraft to IDPU ICD, file HSI_SYS_001
2. HESSI Spectrometer Harness Shielding, file HSI_HARN_001

HESSI documents can be found at:

<ftp://apollo.sll.berkeley.edu/pub/hessi/HESSI Documents.html>

2. Connectors

The instrument harness connectors are described below. SND, SDD, and SCBS connectors are Positronics ‘D’ type connectors. Note that these are the HARNESS connectors, not the box connectors. Harness connectors are designated by the box they attach to (such as IPC), followed by -Pn (where n is the connector number on that box), while box connectors designators are identical except they are followed by -Jn.

2.1. IPC Connectors

Name	Use	Type	Part Number	Mating Connector
IPC-P1	Instrument Power from Spacecraft	D9S	SND9F100E2G + DE24657 shell	SND9M100T2G
IPC-P2	Power to IDPU VME Chassis	D37P	SND37M10HE2G	SND37F100T2G
IPC-P3	HV control from IDPU VME chassis	D25S	SND25F10HE2G	SND25M5R70T2G
IPC-P4	HV Enable Plug	D9P	SND9M100E2G + DE24657 shell?	SND9F100T2G
IPC-P5	Particle Detector Bias Voltage	Reynolds series 600 HV	Cable Assembly to mate with IPC-J5	167-3771
IPC-P6	Actuator Enable Plug	D9P	SND9M100E2G + DE24657 shell?	SND9F100T2G
HV _n -P1	HV _n to Spectrometer Detector #n (J2 on HVPS schematic)	Reynolds series 600 HV	Cable Assembly to mate with HV _n -P1	167-3771
HV _n -P2	HV _n to Mother Board (J1 on HVPS schematic)	MDM-9S	MDM-9PBS-A174	MDMV04-A9-11A174
HVPS _n	High Voltage Mother Board to HVPS #n	MDM-9P	MDMV04-A9-11A174	MDM-9PBS-A174

NOTE: $n = 1-9$ **2.2. IDPU VME Chassis Connectors**

Name	Use	Type	Part Number	Mating Connector
IDPU-P1	Data Controller to Spacecraft	D37S	SND37F10HE2G	SND37M5R70T2G
IDPU-P2	Power Controller to IPC/CPC	HD62S	SDD62F10HE2G	SDD62M4R70T2G
IDPU-P3	Power Controller to Imager	D37P	SND37M100E2G*	SND37F5R70T2G
IDPU-P4	Power Controller to Spectrometer	HD44P	SDD44M10HE2G	SDD44F4R70T2G
IDPU-P5	Data Controller to Particle Detector	ComboD 5W1M	SCBC5W1M100E2G + MCC4101M + DE24657 shell	SCBM5W1F5R70T 2G + FRT4201M
IDPU-P6	Data Controller to GSE (Clock)	HD15P	SDD15M100E2G	SDD15F4R70G
IDPU-P7	ADP to Imager Power	HD44S	SDD44F10HE2G	SDD44M4R70T2G
IDPU-P8	ADP to Imager Data	HD62P	SDD62M10HE2G	SDD62F4R70T2G
IDPU-P9	ADP to GSE (Test)	D9S	SND9F10HE2G	SND9M5R70T2G
IDPU-P _{1n}	Detector Interface Board # _n to Spectrometer	ComboD 13W3M	SCBC13W3M10HE2 G + MCC4101M	SCBM13W3F5R70 T2G + FRT4201M

NOTE: $n = 1-9$

* Hood & mounting hardware is TBD for all connectors

2.3. Particle Detector Connectors

Name	Use	Type	Part Number	Mating Connector
PD-P1	to IDPU Data Controller	ComboD 5W1F	SCBC5W1F100E2G + FCC4101M + DE24657 shell	SCBC5W1M100T2G + MRT4201
PD-P2	to IPC (400V)	Reynolds series 600 HV	Cable Assembly to mate with HN _n -P1 = type 167-3771	167-3771
PD-P3	To GSE (test pulser)	SMA	142-0402-001	050-645-0000-310
PD-P4	To GSE (Signal)	SMA	142-0402-001	050-645-0000-310

2.4. CPC Connectors

Name	Use	Type	Part Number	Mating Connector
CPC-P1	Cryocooler Power service from Spacecraft	D9S	SND9F10HE2G	SND9M100T2G
CPC-P2	CPC Control from IDPU VME Chassis	D15S	SND15F10HE2G	SND15M100T2G
CPC-P3	Power to Cryocooler	D15P	SND15M10HE2G	SND15F100T2G

2.5. Spectrometer Connectors

Name	Use	Type	Part Number	Mating Connector
CSAn-P1	Power from IDPU-P1n	VP5	VP5/4CE26	VR5/4AB20
CSAn-P2	Rear Segment Signal to IDPU-P1n	SMA	142-0402-001	050-645-0000-310
CSAn-P3	Front segment signal to IDPU-P1n	SMA	142-0402-001	050-645-0000-310
CSAn-P4	Spectrometer Feed-through (attached)	VP7	TBD	TBD
CSAn-P5	Spectrometer Feed-through (attached)	VP7	TBD	TBD
Filt n -P1	Test Pulse from IDPU-P1n	SMA	142-0402-001	050-645-0000-310
Filt n -P2	Test Pulse from GSE	SMA	142-0402-001	050-645-0000-310
Filt n -P3	HV from HV n -P1 (IPC)	Reynolds series 600 HV	Cable Assembly to mate with Filt n -P3	167-3771
SF-P1	Service Filter (aka cold plate, aka Utility Box) to IDPU-P4	HD15S	SDD15F100E2G + DE24657 shell	SDD15M100T2G
SF-P2	Spectrometer Feed-through (attached)	VP7	TBD	TBD
SF-P3	Spectrometer Feed-through (attached)	VP7	TBD	TBD
Shut-P1	Shutter Control from IDPU-P4	D25S	SND25F10HE2G	SND25M100T2G
Cryo-P1	Cryocooler Power from CPC-P3	D15S	SND15F10HE2G	SND15M100T2G
Rad-P1	Radiator Heaters (from IDPU-P4)	Winchester	JF2S	JF2P
Rad-P2	Radiator Thermistor #1 (from IDPU-P4)	Winchester	JF2P	JF2S
Rad-P3	Radiator Thermistor #2 (from IDPU-P4)	Winchester	JF2P	JF2S
VV-P1	Vacuum Valve Actuator to IDPU-P4	D9S	SND9F100E2G + DE24657 shell	SND9M100T2G

NOTE: $n = 1-9$

2.6. RAS Connectors

Name	Use	Type	Part Number	Mating Connector
RAS-P1	RAS data to ADP (IDPU-P8)	HD15P	SDD15M100E2G*	SDD15F100T2G
RAS-P2	RAS power from ADP (IDPU-P7)	HD15S	SDD15F100E2G*	SDD15M100T2G
RAS-P3	RAS Shutter Actuator to IDPU-P3	HD15P	SND9F100E2G*	SDD9M1B30T2G

* Hood & mounting hardware for RAS harness connectors is TBD

2.7. Imager Connectors

Name	Use	Type	Part Number	Mating Connector
SAS _n -P1	SAS data to ADP	HD15P	SDD15M100E2G*	SDD15F100T2G
SAS _n -P2	SAS power from ADP	HD15S	SDD15F100E2G*	SDD15M100T2G
UGT-P1	Upper Grid Tray heater/thermistors to IDPU-P3	HD15S	SDD15F100E2G*	SDD15M1B30T2G
LGT-P1	Lower Grid Tray heater/thermistors to IDPU-P3	HD15S	SDD15F100E2G*	SDD15M1B30T2G
TMS-P1	TMS Test Connector	D50S	SND50F **	SND50P

NOTE: n=1-3

* No hoods on the Imager connectors.

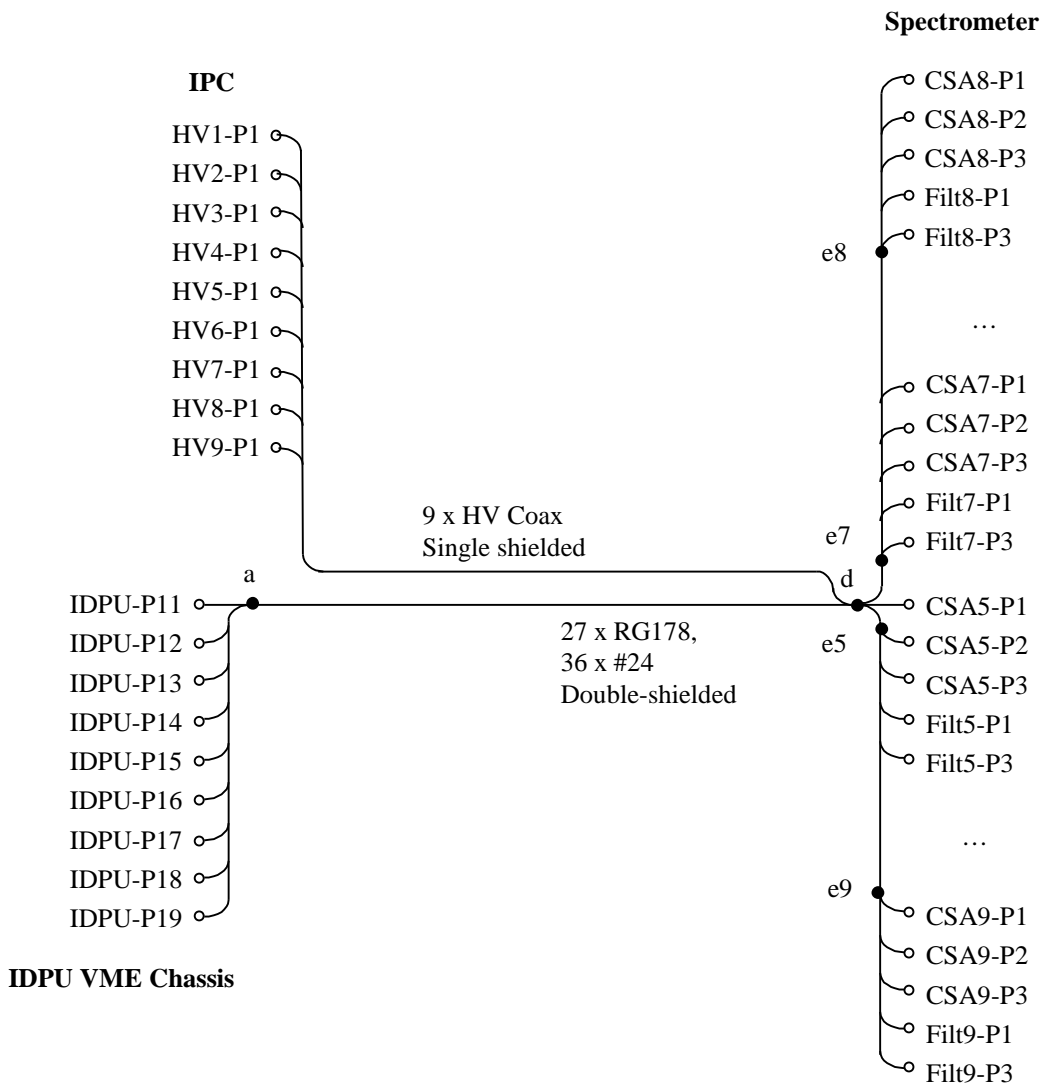
** Provided by PSI

3. Harnesses

Instrument harnesses shall consist of #24, #22, or #20 wire, RG178 coax, and HV Coax (similar dimensions to RG178). Harnesses shall have one or two a tape shields terminated as indicated. The outer shield shall typically be spacecraft chassis ground. An outer layer of kapton tape may be used to avoid shorting this layer to other grounds. All lengths are currently **TBR**.

3.1. IDPU to Spectrometer Signal Harness

This harness must be routed separately from other spectrometer harnesses due to EMI concerns. It shall be double-shielded with signal ground on the inside, terminated on the Spectrometer chassis, and spacecraft chassis ground on the outside, terminated on the IDPU chassis via the IDPU connector backshells. The IPC branch meets the VME chassis branch at the VME chassis prior to routing the full bundle down the closest spacecraft strut to the spectrometer. At the point where the harness reaches the Spectrometer, it divides into two halves and routes in opposite directions around the spectrometer, branching off at each CSA/Filter box.



Harness Leg	Length
IDPU (a) junction to Spectrometer breakout (d)	0.71m ***
IPC Breakout (d) to HV1-P1	1.15m *
IPC Breakout (d) to HV2-P1	1.14m *
IPC Breakout (d) to HV3-P1	1.15m *
IPC Breakout (d) to HV4-P1	1.18m *
IPC Breakout (d) to HV5-P1	1.20m *
IPC Breakout (d) to HV6-P1	1.23m *
IPC Breakout (d) to HV7-P1	1.26m *
IPC Breakout (d) to HV8-P1	1.29m *
IPC Breakout (d) to HV9-P1	1.32m *
IDPU Breakout (a) to IDPU-P11	0.10m ***
IDPU Breakout (a) to IDPU-P12	0.12m ***
IDPU Breakout (a) to IDPU-P13	0.13m ***
IDPU Breakout (a) to IDPU-P14	0.14m ***
IDPU Breakout (a) to IDPU-P15	0.16m ***
IDPU Breakout (a) to IDPU-P16	0.17m ***
IDPU Breakout (a) to IDPU-P17	0.18m ***
IDPU Breakout (a) to IDPU-P18	0.19m ***
IDPU Breakout (a) to IDPU-P19	0.20m ***
Spectrometer Breakout (d) to CSA/Filt 9 Breakout (e9)	0.85m **
Spectrometer Breakout (d) to CSA/Filt 2 Breakout (e2)	0.65m **
Spectrometer Breakout (d) to CSA/Filt 3 Breakout (e3)	0.47m **
Spectrometer Breakout (d) to CSA/Filt 5 Breakout (e5)	0.25m **
Spectrometer Breakout (d) to CSA/Filt 7 Breakout (e7)	0.31m **
Spectrometer Breakout (d) to CSA/Filt 6 Breakout (e6)	0.49m **
Spectrometer Breakout (d) to CSA/Filt 4 Breakout (e4)	0.70m **
Spectrometer Breakout (d) to CSA/Filt 1 Breakout (e1)	0.88m **
Spectrometer Breakout (d) to CSA/Filt 8 Breakout (e8)	1.08m **
CSA/Filt n Breakout (en) to CSA n -P1	0.1m
CSA/Filt n Breakout (en) to CSA n -P2	0.1m
CSA/Filt n Breakout (en) to CSA n -P3	0.1m
CSA/Filt n Breakout (en) to Filt n -P1	0.1m
CSA/Filt n Breakout (en) to Filt n -P3	0.1m

$n=1-9$

NOTE: The Spectrometer Breakout to CSA/Filt Breakouts actually consists of a tree with two branches (CSA/Filt 5,3,2,9 in one direction and CSA/Filt 7,6,4,1,8 in the other). Each branch has breakouts as indicated at each CSA/Filt.

(* - Spectrum Astro estimates, 99-3)

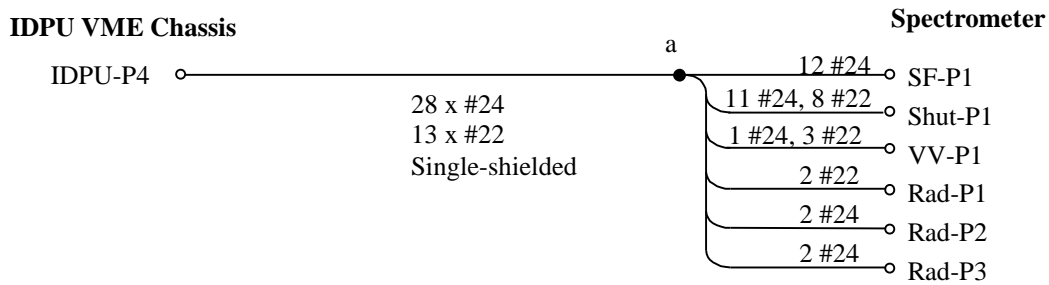
(** - Curtis estimates off Spectrometer ICD HSI_SYS_014F, 99-3)

(*** - Curtis measurements on Spectrum Harness mockup, approximate, 99-4)

3.2. IDPU to Spectrometer Miscellaneous Harness

This harness carries various heater, thermistor, and actuator circuits. It consists of 34 #24 wires and a single tape shield at spacecraft chassis ground, terminated at the IDPU box via the IDPU-

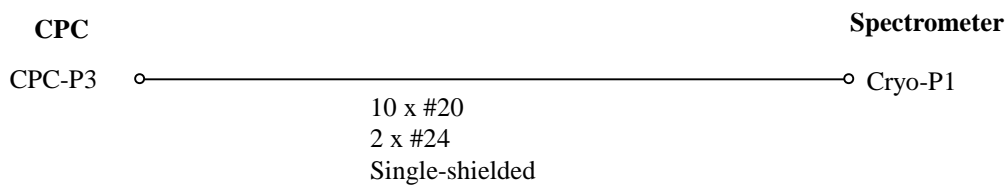
P4 backshell. This harness should be routed away from the IDPU to Spectrometer signal harness, down a different leg of the spacecraft.



Harness Leg	Length
IDPU-P4 to Spectrometer breakout (a)	0.87m ***
Spectrometer Breakout (a) to SF-P1	1.1m **
Spectrometer Breakout (a) to Shut-P1	0.5m
Spectrometer Breakout (a) to VV-P1	0.50m **
Spectrometer Breakout (a) to Rad-P1	0.5m
Spectrometer Breakout (a) to Rad-P2	1.1m **
Spectrometer Breakout (a) to Rad-P3	0.5m

3.3. CPC to Cryocooler Harness

This harness carries Cryocooler power from the CPC to the cryocooler in the Spectrometer. It contains 5 twisted pairs of #20 wire with a single shield, terminated on the backshell of CPC-P3. This harness should be routed away from any sensitive signals, particularly the IDPU to Spectrometer signal harness, down a different leg of the spacecraft. It shall have a single shield at spacecraft chassis ground, terminated at the CPC-P3 connector backshell.

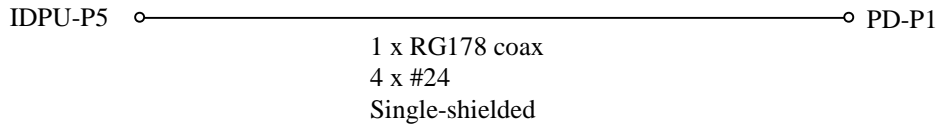


This harness is 1.85m in length ***.

3.4. IDPU VME Chassis to Particle Detector Harness

The Particle Detector is mounted to the IDPU VME chassis. This harness connects the Data Controller card in the VME chassis to the Particle Detector. It consists of an RG178 coax and three #24 wires with a single shield at spacecraft chassis ground connected at the IDPU end via IDPU-P5 connector's backshell.

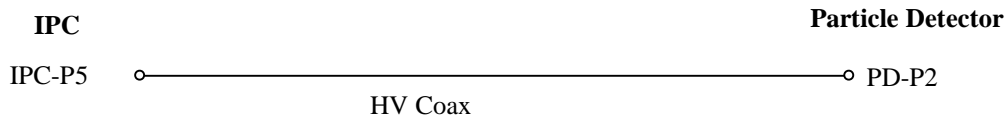
IDPU VME Chassis



This harness is 0.65m in length ***.

3.5. IPC to Particle Detector Harness

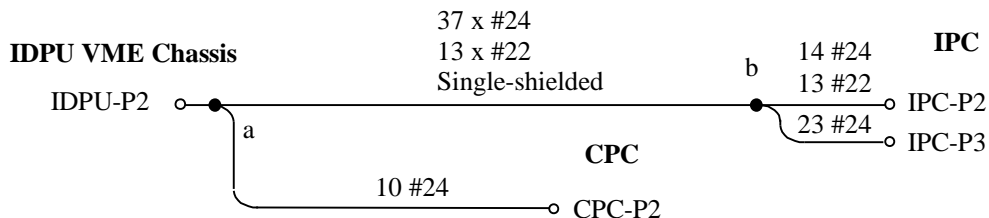
This harness contains a single HV coax. No shield is required.



This harness is 0.84m in length *.

3.6. IDPU / IPC / CPC Harness

This harness interconnects the IDPU VME chassis, the IPC, and the CPC. It has a single shield terminated at the IDPU-P2 connector backshell. Due to the large quantity of wires in the IDPU to IPC leg, this leg should probably be routed as directly as possible (outside the deck?). It shall have a single shield terminated to spacecraft chassis ground at the IDPU-P2 connector backshell.

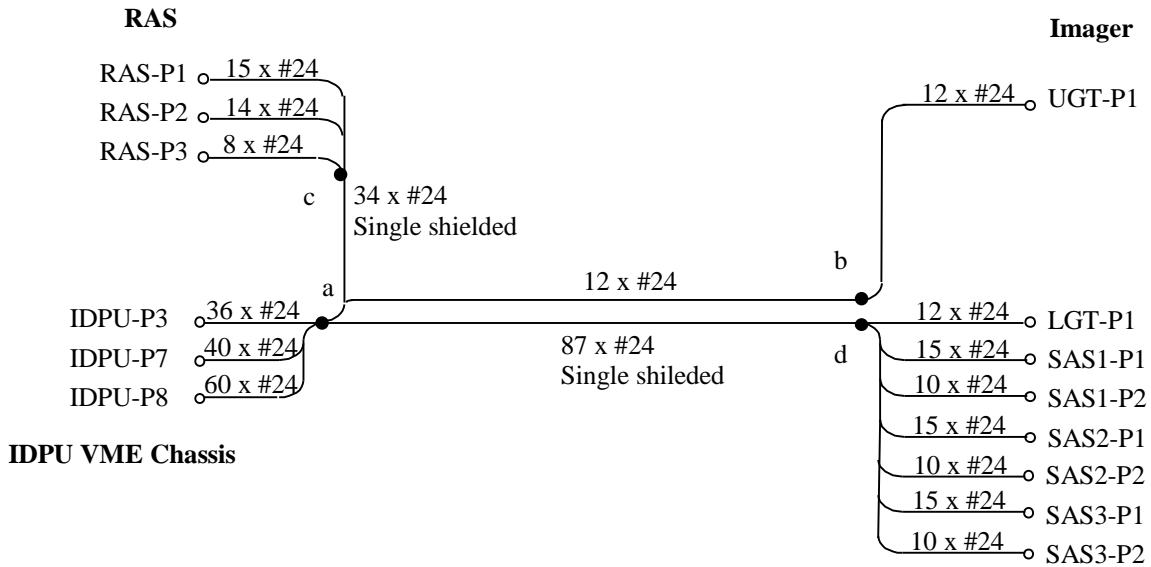


Harness Leg	Length
IDPU-P2 to IPC/CPC Breakout (a)	0m
IPC/CPC breakout (a) to CPC-P2	0.97m ***
IPC/CPC breakout (a) to IPC breakout (b)	0.76m ***
IPC Breakout (b) to IPC-P2	0m
IPC Breakout (b) to IPC-P3	0m

3.7. IDPU / Imager / RAS Harness

This harness shall be provided by Berkeley using connectors provided by PSI. It connects the SAS and end-tray heaters/thermistors to the IDPU. It also connects the RAS to the IDPU. It

consists of only #24 wires throughout with a single shield terminated to spacecraft chassis ground at IDPU-P3, -P7, and -P8.



Harness Leg	Length
IDPU Breakout (a) to RAS breakout (c)	0.92m ***
IDPU Breakout (a) to Imager LGT breakout (d, @ +Y-axis)	0.43m ***
IDPU Breakout (a) to Imager Strut (b, @+X axis)	1.17m ***
IDPU-P3 to IDPU Breakout (a)	0m
IDPU-P7 to IDPU Breakout (a)	0m
IDPU-P8 to IDPU Breakout (a)	0m
RAS-P1 to RAS Breakout (c)	0m
RAS-P2 to RAS Breakout (c)	0m
RAS-P3 to RAS Breakout (c)	0m
Imager Strut (b) to UGT-P1	1.00m \$\$
Imager LGT Breakout (d) to LGT-P1	0.50m \$\$
Imager LGT Breakout (d) to SAS1-P1	0.10m \$
Imager LGT Breakout (d) to SAS1-P2	0.10m \$
Imager LGT Breakout (d) to SAS2-P1	0.59m \$
Imager LGT Breakout (d) to SAS2-P2	0.59m \$
Imager LGT Breakout (d) to SAS3-P1	0.59m \$
Imager LGT Breakout (d) to SAS3-P2	0.59m \$

\$ - Curtis, off Imager ICD HSI_SYS_009C, 99-4

\$\$ - Zehnder update, 99-6

4. Connector Pinouts

In the following tables:

- TSPN is a twisted-shielded pair with shield not connected (at this end).
- TSPS is a twisted shielded pair with shield terminated on the connector backshell.
- TP is a twisted pair, no shield or jacket (just two wires twisted together).
- TT is a twisted tripple, no shield or jacket

4.1. IPC Connectors

4.1.1. IPC-P1 (Instrument Power from Spacecraft)

This connector is called out in the reference 1.

4.1.2. IPC-P2 (Power to IDPU VME Chassis)

Pin	Signal	Destination	Harness
1	+5V	IDPU-P2 pin 10	#22 TP w/20
2	+12V	IDPU-P2 pin 11	#22 TP w/21
3	+15V	IDPU-P2 pin 13	#24
4	+28V	IDPU-P2 pin 14	#24 TP w/23
5	+5V Digital	IDPU-P2 pin 16	#22 TP w/24
6	Actuator	IDPU-P2 pin 17	#22 TP w/25
7	Switched 28V	IDPU-P2 pin 18	#22 TP w/26
8	IDPUHtr 28V	IDPU-P2 pin 19	#22 TP w/27
9	Spare		
10	CPHtr (100V)	IDPU-P2 pin 21	#24
11	Spare		
12	+5V Digital	IDPU-P2 pin 20	#22 TP w/13
13	DGND	IDPU-P2 pin 54	#22 TP w/12
14	CPHtrEBL	IDPU-P2 pin 59	#24
15	Spare		
16	IPCThermistor	IDPU-P2 pin 41	#24 TP w/35
17	PDHVCTRL	IDPU-P2 pin 48	#24
18	IMON5V	IDPU-P2 pin 43	#24
19	IMON5VD	IDPU-P2 pin 44	#24
20	-5V	IDPU-P2 pin 31	#22 TP w/1
21	-12V	IDPU-P2 pin 32	#22 TP w/2
22	SGND	IDPU-P2 pin 34	#22
23	+28V Return	IDPU-P2 pin 35	#24 TP w/4
24	DGND	IDPU-P2 pin 37	#22 TP w/5
25	Actuator Return	IDPU-P2 pin 38	#22 TP w/6
26	Switched 28V Return	IDPU-P2 pin 39	#22 TP w/7
27	IDPUHtr 28V Return	IDPU-P2 pin 40	#22 TP w/8
28	Spare		
29	Spare		

30	Spare		
31	ActEBL	IDPU-P2 pin 60	#24
32	Spare		
33	Spare		
34	Spare		
35	IPCThermistor Return	IDPU-P2 pin 42	#24 TP w/16
36	IMON15V	IDPU-P2 pin 45	#24
37	IMON12V	IDPU-P2 pin 46	#24

4.1.3. IPC-P3 (HV Control from IDPU VME Chassis)

Pin	Signal	Destination	Harness
1	HV+12V	IDPU-P2 pin 12	#24 TP w/3
2	HVCTRL 1	IDPU-P2 pin 22	#24
3	HV-12V	IDPU-P2 pin 33	#24 TP w/1
4	HVSGND	IDPU-P2 pin 47	#24
5	HV28V Ret	IDPU-P2 pin 36	#24 TP w/25
6	HVMON 3	IDPU-P2 pin 3	#24
7	HVMON 4	IDPU-P2 pin 4	#24
8	HVMON 5	IDPU-P2 pin 5	#24
9	HVMON 6	IDPU-P2 pin 6	#24
10	HVMON 7	IDPU-P2 pin 7	#24
11	HVMON 8	IDPU-P2 pin 8	#24
12	HVMON 9	IDPU-P2 pin 9	#24
13	Spare		
14	Spare		
15	HVMON 1	IDPU-P2 pin 1	#24
16	HVCTRL 2	IDPU-P2 pin 23	#24
17	HVMON 2	IDPU-P2 pin 2	#24
18	HVCTRL 3	IDPU-P2 pin 24	#24
19	HVCTRL 4	IDPU-P2 pin 25	#24
20	HVCTRL 5	IDPU-P2 pin 26	#24
21	HVCTRL 6	IDPU-P2 pin 27	#24
22	HVCTRL 7	IDPU-P2 pin 28	#24
23	HVCTRL 8	IDPU-P2 pin 29	#24
24	HVCTRL 9	IDPU-P2 pin 30	#24
25	HV28V	IDPU-P2 pin 15	#24 TP w/5

4.1.4. IPC-P4 (HV Enable Plug)

This connector is not harnessed. The indicated jumpers are included in an enable connector which is installed when detector high voltage.

Pin	Signal	Harness
1	+28V In	#24 jumper to 6
2	+28V In	#24 jumper to 7

3	Spare	
4	Spare	
5	Spare	
6	+28V Out	#24 jumper to 1
7	+28V Out	#24 jumper to 2
8	Spare	
9	Spare	

4.1.5. IPC-P5 (Particle Detector Bias Voltage)

This connector is a single Reynolds connector carrying a programmable voltage up to 400V. The shield is connected to signal ground at the Particle Detector end (the Particle Detector chassis is also at signal ground). This means that the shield must be isolated from chassis ground at the IPC end. IPC-P5 connects to PD-P2.

4.1.6. IPC-P6 (Actuator Enable Plug)

Pin	Signal	Harness
1	+28V In	#24 Jumper to 6
2	+28V In	#24 Jumper to 7
3	Spare	
4	Spare	
5	Spare	
6	+28V Out	#24 jumper to 1
7	+28V Out	#24 jumper to 2
8	Spare	
9	Spare	

4.1.7. HV n -P1 (9 Detector High Voltage Outputs to Spectrometer)

These are Reynolds connectors carrying a programmable voltage up to 5000V. The shield is connected to signal ground at the Spectrometer end (the Spectrometer chassis is also at signal ground). This means that the shield must be isolated from chassis ground at the IPC end. HV n -P1 connects to Filt n -P3 (n=1-9).

4.1.8. HV n -P2 (9 Detector High Voltage Supplies to High Voltage Mother Board)

These connections are internal to the IPC.

Pin	Signal	Harness
1	+12V	N/A
2	Spare	
3	HVCTRL	N/A
4	VMON	N/A
5	-12V	N/A

6	+28V	N/A
7	Signal Ground	N/A
8	+28V Return	N/A
9	Spare	

4.2. IDPU Connectors

4.2.1. IDPU-P1 (Data Controller to Spacecraft)

This connector is called out in the reference 1.

4.2.2. IDPU-P2 (Power Controller to IPC/CPC)

Pin	Signal	Destination	Harness
1	HVMON 1	IPC-P3 pin 15	#24
2	HVMON 2	IPC-P3 pin 17	#24
3	HVMON 3	IPC-P3 pin 6	#24
4	HVMON 4	IPC-P3 pin 7	#24
5	HVMON 5	IPC-P3 pin 8	#24
6	HVMON 6	IPC-P3 pin 9	#24
7	HVMON 7	IPC-P3 pin 10	#24
8	HVMON 8	IPC-P3 pin 11	#24
9	HVMON 9	IPC-P3 pin 12	#24
10	+5V	IPC-P2 pin 1	#22 TP w/31
11	+12V	IPC-P2 pin 2	#22 TP w/32
12	HV+12V	IPC-P3 pin 1	#24 TP w/33
13	+15V	IPC-P2 pin 3	#24
14	+28V	IPC-P2 pin 4	#24 TP w/35
15	HV28V	IPC-P3 pin 25	#24 TP w/36
16	+5V Digital	IPC-P2 pin 5	#22 TP w/37
17	Actuator	IPC-P2 pin 6	#22 TP w/38
18	Switched 28V	IPC-P2 pin 7	#22 TP w/39
19	IDPUHtr 28V	IPC-P2 pin 8	#22 TP w/40
20	+5V Digital	IPC-P2 pin 12	#22 TP w/54
21	CPHtr (100V)	IPC-P2 pin 10	#24
22	HVCTRL 1	IPC-P3 pin 2	#24
23	HVCTRL 2	IPC-P3 pin 16	#24
24	HVCTRL 3	IPC-P3 pin 18	#24
25	HVCTRL 4	IPC-P3 pin 19	#24
26	HVCTRL 5	IPC-P3 pin 20	#24
27	HVCTRL 6	IPC-P3 pin 21	#24
28	HVCTRL 7	IPC-P3 pin 22	#24
29	HVCTRL 8	IPC-P3 pin 23	#24
30	HVCTRL 9	IPC-P3 pin 24	#24
31	-5V	IPC-P2 pin 20	#22 TP w/10
32	-12V	IPC-P2 pin 21	#22 TP w/11

33	HV-12V	IPC-P3 pin 3	#24 TP w/12
34	SGND	IPC-P2 pin 22	#22
35	+28V Return	IPC-P2 pin 23	#24 TP w/14
36	HV28V Ret	IPC-P3 pin 5	#24 TP w/15
37	DGND	IPC-P2 pin 24	#22 TP w/16
38	Actuator Return	IPC-P2 pin 25	#22 TP w/17
39	Switched 28V Return	IPC-P2 pin 26	#22 TP w/18
40	IDPUHtr 28V Return	IPC-P2 pin 27	#22 TP w/19
41	IPCThermistor	IPC-P2 pin 16	#24 TP w/42
42	IPCThermistor Return	IPC-P2 pin 35	#24 TP w/41
43	IMON5V	IPC-P2 pin 18	#24
44	IMON5VD	IPC-P2 pin 19	#24
45	IMON15V	IPC-P2 pin 36	#24
46	IMON12V	IPC-P2 pin 37	#24
47	HVSGND	IPC-P3 pin 4	#24
48	PDHVCTRL	IPC-P2 pin 17	#24
49	CPCThermistor	CPC-P2 pin 8	#24 TP w/50
50	CPCThermistor Ret	CPC-P2 pin 15	#24 TP w/49
51	CPCSGND	CPC-P2 pin 9	#24
52	CryoCtrl	CPC-P2 pin 1	#24
53	BalanceCtrl	CPC-P2 pin 2	#24
54	DGND	IPC-P2 pin 13	#22 TP w/20
55	CPCRestart	CPC-P2 pin 12	#24
56	CPCDisabled	CPC-P2 pin 11	#24
57	CPCHtr	CPC-P2 pin 6	#24 TP w/58
58	CPCHTR Ret	CPC-P2 pin 13	#24 TP w/57
59	CPHtrEBL	IPC-P2 pin 14	#24
60	ActEBL	IPC-P2 pin 31	#24
61	CPCSync Ret	CPC-P2 pin 4	#24 TP w/62
62	CPCSync	CPC-P2 pin 5	#24 TP w/61

4.2.3. IDPU-P3 (Power Controller to Imager)

Pin	Signal	Destination	Harness
1	T3 - UPPER TRAY	UGT-P1 pin 1	#24 TP w/2
2	T3 RTN- UPPER TRAY	UGT-P1 pin 2	#24 TP w/1
3	T4 - UPPER TRAY	UGT-P1 pin 3	#24 TP w/4
4	T4 RTN- UPPER TRAY	UGT-P1 pin 4	#24 TP w/3
5	T5 - UPPER TRAY	UGT-P1 pin 5	#24 TP w/6
6	T5 RTN- UPPER TRAY	UGT-P1 pin 6	#24 TP w/5
7	T6 - UPPER TRAY	UGT-P1 pin 7	#24 TP w/8
8	T6 RTN- UPPER TRAY	UGT-P1 pin 8	#24 TP w/7
9	HT1	UGT-P1 pin 9	#24 TP w/10
10	HT1 RTN	UGT-P1 pin 10	#24 TP w/9

11	HT2	UGT-P1 pin 11	#24 TP w/12
12	HT2 RTN	UGT-P1 pin 12	#24 TP w/11
13	T7 - LOWER TRAY	LGT-P1 pin 1	#24 TP w/14
14	T7 RTN- LOWER TRAY	LGT-P1 pin 2	#24 TP w/13
15	T8 - LOWER TRAY	LGT-P1 pin 3	#24 TP w/16
16	T8 RTN-LOWER TRAY	LGT-P1 pin 4	#24 TP w/15
17	T9 - LOWER TRAY	LGT-P1 pin 5	#24 TP w/18
18	T9 RTN- LOWER TRAY	LGT-P1 pin 6	#24 TP w/17
19	T10 - LOWER TRAY	LGT-P1 pin 7	#24 TP w/20
20	T10 RTN- LOWER TRAY	LGT-P1 pin 8	#24 TP w/19
21	HT3	LGT-P1 pin 9	#24 TP w/22
22	HT3 RTN	LGT-P1 pin 10	#24 TP w/21
23	HT4	LGT-P1 pin 11	#24 TP w/24
24	HT4 RTN	LGT-P1 pin 12	#24 TP w/23
25	ACT1	RAS-P3 pin 2	#24 TP w/26
26	ACT1 RTN	RAS-P3 pin 3	#24 TP w/25
27	ACT2	RAS-P3 pin 4	#24 TP w/28
28	ACT2 RTN	RAS-P3 pin 5	#24 TP w/27
29	T1 (Spacecraft)	RAS-P3 pin 6	#24 TP w/30
30	T1 RTN (Spacecraft)	RAS-P3 pin 7	#24 TP w/29
31	T2	RAS-P3 pin 8	#24 TP w/32
32	T2 RTN	RAS-P3 pin 9	#24 TP w/31
33	T11	RAS-P2 pin 14	#24 TP w/34
34	T11 RTN	RAS-P2 pin 15	#24 TP w/33
35	HT11	RAS-P2 pin 12	#24 TP w/36
36	HT11 RTN	RAS-P2 pin 13	#24 TP w/35
37	SCREEN GND		

4.2.4. IDPU-P4 (Power Controller to Spectrometer)

Pin	Signal	Destination	Harness
1	CPHtr1	SF-P1 pin 1	#24
2	CPHtr2	SF-P1 pin 2	#24
3	CPHtr3	SF-P1 pin 3	#24
4	SGND	SF-P1 pin 4	#24 TT w/5,6
5	SF+5V	SF-P1 pin 5	#24 TT w/4,6
6	SF-12V	SF-P1 pin 6	#24 TT w/4,5
7	SpecHtr	Rad-P1 pin 1	#22 TP w/8
8	SpecHtrRET	Rad-P1 pin 2	#22 TP w/7
9	SpecTemp1	Rad-P2 pin 1	#24 TP w/10
10	SpecTemp1RET	Rad-P2 pin 2	#24 TP w/9
11	SpecTemp2	Rad-P3 pin 1	#24 TP w/12
12	SpecTemp2RET	Rad-P3 pin 2	#24 TP w/11
13	Spare		

14	ShutTemp	Shut-P1 pin 1	#24 TP w/15
15	ShutTempRET	Shut-P1 pin 2	#24 TP w/14
16	CryoTemp1	SF-P1 pin 9	#24
17	CryoTemp2	SF-P1 pin 10	#24
18	CryoTemp3	SF-P1 pin 11	#24
19	CryoTemp4	SF-P1 pin 12	#24
20	CryoTemp5	SF-P1 pin 13	#24
21	Accelerometer	SF-P1 pin 14	#24
22	Spare		
23	Shut+5V	Shut-P1 pin 6	#24 TP w/24
24	ShutSGND	Shut-P1 pin 7	#24 TP w/23
25	Shut1ActState	Shut-P1 pin 8	#24
26	Shut2ActState	Shut-P1 pin 9	#24
27	Shut1InState	Shut-P1 pin 10	#24
28	Shut1OutState	Shut-P1 pin 11	#24
29	Shut2InState	Shut-P1 pin 12	#24
30	Shut2OutState	Shut-P1 pin 13	#24
31	VVAct1	VV-P1 pin 1	#22
32	VVAct2	VV-P1 pin 2	#22
33	VVActRET	VV-P1 pin 3	#22
34	VVStatus	VV-P1 pin 9	#22
35	ShutLockDownState	Shut-P1 pin 5	#22
36	Spare		
37	Shut1InAct	Shut-P1 pin 18	#22
38	Shut1OutAct	Shut-P1 pin 19	#22
39	Shut2InAct	Shut-P1 pin 20	#22
40	Shut2OutAct	Shut-P1 pin 21	#22
41	Shut1UnstickAct	Shut-P1 pin 22	#22
42	Shut2UnstickAct	Shut-P1 pin 23	#22
43	ShutLockDownAct	Shut-P1 pin 24	#22
44	ShutActRET	Shut-P1 pin 25	#22

4.2.5. IDPU-P5 (Data Controller to Particle Detector)

Pin	Signal	Destination	Harness
A1	Signal, shield=SGND	PD-P1 A1	RG178
1	PD+5V	PD-P1 pin 1	#24 TP w/ 3
2	PDSGND	PD-P1 pin 2	#24 TP w/ 4
3	PD-5V	PD-P1 pin 3	#24 TP w/ 1
4	PDThermistor	PD-P1 pin 4	#24 TP w/ 2

4.2.6. IDPU-P6 (Data Controller to GSE)

Pin	Signal	Destination	Harness
1	UPDLAT0		
2	UPDLAT1		
3	UPDLAT2		
4	UPDLAT3		
5	UPDLAT4		
6	UPDLAT5		
7	UPDLAT6		
8	UPDLAT7		
9	GSE+5VD		
10	DGND		
11	CLK1HZ		
12	CLK1MHZ		
13	UPSID		
14	UPTRAP		
15	HWRESET		

4.2.7. IDPU-P7 (ADP to Imager Power)

Pin	Signal	Destination	Harness
1	+14.5V	RAS-P2 pin 1	#24 TP w/16
16	+14.5VR	RAS-P2 pin 2	#24 TP w/1
31	+12V	RAS-P2 pin 3	#24 TP w/3
32	+5V	RAS-P2 pin 4	#24 TP w/17
17	+5VR	RAS-P2 pin 5	#24 TP w/32
2	+ES	RAS-P2 pin 6	#24 TP w/9
3	+12VR	RAS-P2 pin 7	#24 TP w/31
18	+5VD	RAS-P2 pin 8	#24 TP w/33
33	+5VDR	RAS-P2 pin 9	#24 TP w/18
34	CHECK2R4	RAS-P2 pin 10	#24
19	Spare		
4	+14.5V1	SAS1-P2 pin 1	#24 TP w/5
5	+14.5V1R	SAS1-P2 pin 2	#24 TP w/4
20	+12V1	SAS1-P2 pin 3	#24 TP w/6
35	+5V1	SAS1-P2 pin 4	#24 TP w/36
36	+5V1R	SAS1-P2 pin 5	#24 TP w/35
21	Spare		
6	+12V1R	SAS1-P2 pin 7	#24 TP w/21
7	+5V1D	SAS1-P2 pin 8	#24 TP w/22

22	+5V1DR	SAS1-P2 pin 9	#24 TP w/7
37	CHECK2S1	SAS1-P2 pin 10	#24
23	RESVS1	SAS1-P2 pin 11	#24
8	+14.5V2	SAS2-P2 pin1	#24 TP w/24
24	+14.5V2R	SAS2-P2 pin 2	#24 TP w/8
38	+12V2	SAS2-P2 pin 3	#24 TP w/10
39	+5V2	SAS2-P2 pin 4	#24 TP w/25
25	+5V2R	SAS2-P2 pin 5	#24 TP w/39
9	-ES	RAS-P2 pin 11	#24 TP w/2
10	+12V2R	SAS2-P2 pin 7	#24 TP w/38
26	+5V2D	SAS2-P2 pin 8	#24 TP w/40
40	+5V2DR	SAS2-P2 pin 9	#24 TP w/26
41	CHECK2S2	SAS2-P2 pin 10	#24
11	RESVS2	SAS2-P2 pin 11	#24
12	+14.5V3	SAS3-P2 pin 1	#24 TP w/27
27	+14.5V3R	SAS3-P2 pin 2	#24 TP w/12
42	+12V3	SAS3-P2 pin 3	#24 TP w/14
43	+5V3	SAS3-P2 pin 4	#24 TP w/28
28	+5V3R	SAS3-P2 pin 5	#24 TP w/43
13	Spare		
14	+12V3R	SAS3-P2 pin 7	#24 TP w/42
29	+5V3D	SAS3-P2 pin 8	#24 TP w/44
44	+5V3DR	SAS3-P2 pin 9	#24 TP w/29
30	CHECK2S3	SAS3-P2 pin 10	#24
15	SCREEN GND		

4.2.8. IDPU-P8 (ADP to Imager Data)

Pin	Signal	Destination	Harness
1	+STRTR4	RAS-P1 pin 1	#24 TP w/22
22	-STRTR4	RAS-P1 pin 6	#24 TP w/1
43	+CLKR4	RAS-P1 pin 2	#24 TP w/44
44	-CLKR4	RAS-P1 pin 7	#24 TP w/43
23	+FSRR4	RAS-P1 pin 3	#24 TP w/2
2	-FSRR4	RAS-P1 pin 8	#24 TP w/23
3	+DINR4	RAS-P1 pin 4	#24 TP w/24
24	-DINR4	RAS-P1 pin 9	#24 TP w/3
45	+MR40	RAS-P1 pin 5	#24 TP w/46
46	-MR40	RAS-P1 pin 10	#24 TP w/45
25	+MR41	RAS-P1 pin 11	#24 TP w/4
4	-MR41	RAS-P1 pin 12	#24 TP w/25
5	+MR42	RAS-P1 pin 13	#24 TP w/26
26	-MR42	RAS-P1 pin 14	#24 TP w/5

47	CHECK1R4	RAS-P1 pin 15	#24
6	+STRTS1	SAS1-P1 pin 1	#24 TP w/27
27	-STRTS1	SAS1-P1 pin 6	#24 TP w/6
48	+CLKS1	SAS1-P1 pin 2	#24 TP w/49
49	-CLKS1	SAS1-P1 pin 7	#24 TP w/48
28	+FSRS1	SAS1-P1 pin 3	#24 TP w/7
7	-FSRS1	SAS1-P1 pin 8	#24 TP w/28
8	+DINS1	SAS1-P1 pin 4	#24 TP w/29
29	-DINS1	SAS1-P1 pin 9	#24 TP w/8
50	+MS10	SAS1-P1 pin 5	#24 TP w/51
51	-MS10	SAS1-P1 pin 10	#24 TP w/50
30	+MS11	SAS1-P1 pin 11	#24 TP w/9
9	-MS11	SAS1-P1 pin 12	#24 TP w/30
10	+MS12	SAS1-P1 pin13	#24 TP w/31
31	-MS12	SAS1-P1 pin14	#24 TP w/10
52	CHECK1S1	SAS1-P1 pin 15	#24
11	+STRTS2	SAS2-P1 pin 1	#24 TP w/32
32	-STRTS2	SAS2-P1 pin 6	#24 TP w/11
53	+CLKS2	SAS2-P1 pin 2	#24 TP w/54
54	-CLKS2	SAS2-P1 pin 7	#24 TP w/53
33	+FSRS2	SAS2-P1 pin 3	#24 TP w/12
12	-FSRS2	SAS2-P1 pin 8	#24 TP w/33
13	+DINS2	SAS2-P1 pin 4	#24 TP w/34
34	-DINS2	SAS2-P1 pin 9	#24 TP w/13
55	+MS20	SAS2-P1 pin 5	#24 TP w/56
56	-MS20	SAS2-P1 pin 10	#24 TP w/55
35	+MS21	SAS2-P1 pin 11	#24 TP w/14
14	-MS21	SAS2-P1 pin 12	#24 TP w/35
15	+MS22	SAS2-P1 pin13	#24 TP w/36
36	-MS22	SAS2-P1 pin14	#24 TP w/15
57	CHECK1S2	SAS2-P1 pin 15	#24
16	+STRTS3	SAS3-P1 pin 1	#24 TP w/37
37	-STRTS3	SAS3-P1 pin 6	#24 TP w/16
58	+CLKS3	SAS3-P1 pin 2	#24 TP w/59
59	-CLKS3	SAS3-P1 pin 7	#24 TP w/58
38	+FSRS3	SAS3-P1 pin 3	#24 TP w/17
17	-FSRS3	SAS3-P1 pin 8	#24 TP w/38
18	+DINS3	SAS3-P1 pin 4	#24 TP w/39
39	-DINS3	SAS3-P1 pin 9	#24 TP w/18
60	+MS30	SAS3-P1 pin 5	#24 TP w/61
61	-MS30	SAS3-P1 pin 10	#24 TP w/60
40	+MS31	SAS3-P1 pin 11	#24 TP w/19
19	-MS31	SAS3-P1 pin 12	#24 TP w/40
20	+MS32	SAS3-P1 pin13	#24 TP w/41

41	-MS32	SAS3-P1 pin14	#24 TP w/20
62	CHECK1S3	SAS3-P1 pin 15	#24
21	NC		
42	SCREEN GND		

4.2.9. IDPU-P9 (ADP to GSE)

Pin	Signal	Destination	Harness
1	TMSG		
2	TDOG		
3	TD1G		
4	TRSTG/		
5	TCKG		
6	+5VD		
7	EMU0G		
8	EMU1G		
9	GNDD		

4.2.10. IDPU-P1_n (Detector Interface Board *n* to Spectrometer)

Pin	Signal	Destination	Harness
A2	Filter <i>n</i> Test Pulse	Filt <i>n</i> -P1	RG178
A3	Detector <i>n</i> Rear Segment Signal	CSA <i>n</i> -P2	RG178
A1	Detector <i>n</i> Front Segment Signal	CSA <i>n</i> -P3	RG178
1	CSA <i>n</i> +12V	CSA <i>n</i> -P1 pin A	#24 TT w/ 2,3
2	CSA <i>n</i> -12V	CSA <i>n</i> -P1 pin B	#24 TT w/ 1,3
3	CSA <i>n</i> SGND	CSA <i>n</i> -P1 pin C	#24 TT w/ 1,2
4	CSA <i>n</i> PWR	CSA <i>n</i> -P1 pin D	#24
5	Spare		
6	Spare		
7	Spare		
8	Spare		
9	Spare		
10	Spare		

4.3. Particle Detector Connectors

4.3.1. PD-P1 (IDPU Data Controller)

Pin	Signal	Destination	Harness
A1	Signal, shield=SGND	IDPU-P5 A1	RG178
1	PD+5V	IDPU-P5 pin 1	#24 TP w/ 3
2	PDSGND	IDPU-P5 pin 2	#24 TP w/ 4
3	PD-5V	IDPU-P5 pin 3	#24 TP w/ 1
4	PDThermistor	IDPU-P5 pin 4	#24 TP w/ 2

4.3.2. PD-P2 (Particle Detector Bias Supply)

This connector is a single Reynolds connector carrying a programmable voltage up to 400V. The shield is connected to signal ground at the Particle Detector end (the Particle Detector chassis is also at signal ground). This means that the shield must be isolated from chassis ground at the IPC end. PD-P2 connects to IPC-P5.

4.3.3. PD-P3 (GSE)

This is a single SMA coax connector for use during ground checkout (test pulser input). The shield connects to the Particle Detector Chassis, which is at signal ground.

4.4. CPC Connectors

4.4.1. CPC-P1 (Cryocooler Power Service from Spacecraft)

This connector is called out in the reference 1.

4.4.2. CPC-P2 (CPC Control from IDPU VME Chassis)

Pin	Signal	Destination	Harness
1	CryoCtrl	IDPU-P2 pin 52	#24
2	BalanceCtrl	IDPU-P2 pin 53	#24
3	Spare		
4	CPCSync Ret	IDPU-P2 pin 61	#24 TP w/5
5	CPCSync	IDPU-P2 pin 62	#24 TP w/4
6	CPCHtr	IDPU-P2 pin 57	#24 TP w/13
7	Spare		
8	CPCThermistor	IDPU-P2 pin 49	#24 TP w/15
9	CPCSGND	IDPU-P2 pin 51	#24
10	Spare		
11	CPCDisabled	IDPU-P2 pin 56	#24
12	CPCRestart	IDPU-P2 pin 55	#24
13	CPCHTR Ret	IDPU-P2 pin 58	#24 TP w/6
14	Spare		
15	CPCThermistor Ret	IDPU-P2 pin 50	#24 TP w/8

4.4.3. CPC-P3 (Power to Cryocooler)

Pin	Signal	Destination	Harness
1	CryoPower A	Cryo-P1 pin 1	#20 TP w/9
2	CryoPower B	Cryo-P1 pin 2	#20 TP w/10
3	CryoPower C	Cryo-P1 pin 3	#20 TP w/11
4	CryoPower D	Cryo-P1 pin 4	#20 TP w/12
5	BallancePower	Cryo-P1 pin 5	#20 TP w/13
6	Spare		
7	Spare		
8	SpecTemp	Cryo-P1 pin 8	#24 TP w/ 15
9	CryoPower A Ret	Cryo-P1 pin 9	#20 TP w/1
10	CryoPower B Ret	Cryo-P1 pin 10	#20 TP w/2
11	CryoPower C Ret	Cryo-P1 pin 11	#20 TP w/3
12	CryoPower D Ret	Cryo-P1 pin 12	#20 TP w/4
13	BalancePower Ret	Cryo-P1 pin 13	#20 TP w/5
14	Spare		
15	SpecTemp RET	Cryo-P1 pin 15	#24 TP w/ 8

4.5. Spectrometer Connectors

4.5.1. CSA_n-P1 (CSA Power)

Pin	Signal	Destination	Harness
A	CSA _n +12V	IDPU-P1 _n pin 1	#24 TT w/ 2,3
B	CSA _n -12V	IDPU-P1 _n pin 2	#24 TT w/ 1,3
C	CSA _n SGND	IDPU-P1 _n pin 3	#24 TT w/ 1,2
D	CSA _n PWR	IDPU-P1 _n pin 4	#24
E	Spare		

4.5.2. CSA_n-P2 (Rear Segment Signal)

This is an SMA coax connector. The shield carries signal ground from the IDPU Detector Interface Card to the CSA and the CSA chassis. The coax routes to the IDPU-P1_n connector, pin A3.

4.5.3. CSA_n-P3 (Front Segment Signal)

This is an SMA coax connector. The shield carries signal ground from the IDPU Detector Interface Card to the CSA and the CSA chassis. The coax routes to the IDPU-P1_n connector, pin A1.

4.5.4. CSAn-P4 (Front Segment Spectrometer Feed-through)

This connector is not actually a harness connector, but is included here for completeness. It is the feed-through connector on the spectrometer for the CSA signals (one of two). The J connector is mounted to the CSA and the P connector is mounted to the spectrometer.

Pin	Signal	Destination	Harness
A	FET source	CSAn-J4 pin A	N/A
B	FET back gate	CSAn-J4 pin B	N/A
C	FET drain	CSAn-J4 pin C	N/A
D	Reset transistor emitter	CSAn-J4 pin D	N/A
E	Reset transistor base	CSAn-J4 pin E	N/A
F	Protection diode	CSAn-J4 pin F	N/A
H	Feedback	CSAn-J4 pin H	N/A

4.5.5. CSAn-P5 (Rear Segment Spectrometer Feed-through)

This connector is not actually a harness connector, but is included here for completeness. It is the feed-through connector on the spectrometer for the CSA signals (one of two). The J connector is mounted to the CSA and the P connector is mounted to the spectrometer.

Pin	Signal	Destination	Harness
A	FET source	CSAn-J5 pin A	N/A
B	FET back gate	CSAn-J5 pin B	N/A
C	FET drain	CSAn-J5 pin C	N/A
D	Reset transistor emitter	CSAn-J5 pin D	N/A
E	Reset transistor base	CSAn-J5 pin E	N/A
F	Protection diode	CSAn-J5 pin F	N/A
H	Feedback	CSAn-J5 pin H	N/A

4.5.6. Filtn-P1 (Test Pulse from IDPU)

This is an SMA coax connector. The shield carries signal ground from the IDPU Detector Interface Card to the HV Filter and the HV Filter chassis. The coax routes to the IDPU-P1_n connector, pin A2.

4.5.7. Filtn-P2 (Test Pulse from GSE)

This is a single SMA coax connector for use during ground checkout (test pulser input). The shield connects to the Filter Chassis, which is at signal ground.

4.5.8. Filtn-P3 (HV from IPC)

These are Reynolds connectors carrying a programmable voltage up to 5000V. The shield is connected to signal ground at the Filter box (the Spectrometer chassis is also at signal ground). This means that the shield must be isolated from chassis ground at the IPC end. HV_n-P1 connects to Filtn-P3 (n=1-9).

4.5.9. SF-P1 (Service Filter)

Pin	Signal	Destination	Harness
1	CPHtr1	IDPU-P4 pin 1	#24
2	CPHtr2	IDPU-P4 pin 2	#24
3	CPHtr3	IDPU-P4 pin 3	#24
4	SGND	IDPU-P4 pin 4	#24 TT w/5,6
5	SF+5V	IDPU-P4 pin 5	#24 TT w/4,6
6	SF-12V	IDPU-P4 pin 6	#24 TT w/4,5
7	Spare		
8	Spare		
9	CryoTemp1	IDPU-P4 pin 16	#24
10	CryoTemp2	IDPU-P4 pin 17	#24
11	CryoTemp3	IDPU-P4 pin 18	#24
12	CryoTemp4	IDPU-P4 pin 19	#24
13	CryoTemp5	IDPU-P4 pin 20	#24
14	Accelerometer	IDPU-P4 pin 21	#24
15	Spare		

4.5.10. SF-P2 (Left Spectrometer Feed-through)

This connector is not actually a harness connector, but is included here for completeness. It is the feed-through connector on the spectrometer for the SF signals (one of two). The J connector is mounted to the SF and the P connector is mounted to the spectrometer.

Pin	Signal	Destination	Harness
A	TempSense1 Return	SF-J2 pin A	N/A
B	Heater Power 3 (Z)	SF-J2 pin B	N/A
C	Heater Power 2 (Y)	SF-J2 pin C	N/A
D	TempSense1 (Cold Plate away from Sapphire)	SF-J2 pin D	N/A
E	TempSense2 Return	SF-J2 pin E	N/A
F	TempSense2 (Cold Plate @ Sapphire)	SF-J2 pin F	N/A
H	Heater Power 1 (X)	SF-J2 pin H	N/A

4.5.11. SF-P3 (Right Spectrometer Feed-through)

This connector is not actually a harness connector, but is included here for completeness. It is the feed-through connector on the spectrometer for the SF signals (one of two). The J connector is mounted to the SF and the P connector is mounted to the spectrometer.

Pin	Signal	Destination	Harness
A	TempSense4 (S-Link Secondary)	SF-J3 pin A	N/A
B	TempSense5 Return	SF-J3 pin B	N/A
C	TempSense5 (Outer Shield Mid-Point)	SF-J3 pin C	N/A

D	TempSense4 Return	SF-J3 pin D	N/A
E	TempSense3 (S-Link Primary)	SF-J3 pin E	N/A
F	Unused	SF-J3 pin F	N/A
H	TempSense3 Return	SF-J3 pin H	N/A

4.5.12. Shut-P1 (Shutter Control)

Pin	Signal	Destination	Harness
1	ShutTemp	IDPU-P4 pin 14	#24 TP w/2
2	ShutTempRET	IDPU-P4 pin 15	#24 TP w/1
3	Spare		
4	Spare		
5	ShutLockDownState	IDPU-P4 pin 35	#24
6	ShutSensePower	IDPU-P4 pin 23	#24 TP w/7
7	ShutSGND	IDPU-P4 pin 24	#24 TP w/6
8	Shut1ActState	IDPU-P4 pin 25	#24
9	Shut2ActState	IDPU-P4 pin 26	#24
10	Shut1InState	IDPU-P4 pin 27	#24
11	Shut1OutState	IDPU-P4 pin 28	#24
12	Shut2InState	IDPU-P4 pin 29	#24
13	Shut2OutState	IDPU-P4 pin 30	#24
14	Spare		
15	Spare		
16	Spare		
17	Spare		
18	Shut1InAct	IDPU-P4 pin 37	#22
19	Shut1OutAct	IDPU-P4 pin 38	#22
20	Shut2InAct	IDPU-P4 pin 39	#22
21	Shut2OutAct	IDPU-P4 pin 40	#22
22	Shut1UnstickAct	IDPU-P4 pin 41	#22
23	Shut2UnstickAct	IDPU-P4 pin 42	#22
24	ShutLockDownAct	IDPU-P4 pin 43	#22
25	ShutActRET	IDPU-P4 pin 44	#22

4.5.13. Cryo-P1 (Cryocooler Power from CPC)

Pin	Signal	Destination	Harness
1	CryoPower A	CPC-P3 pin 1	#20 TP w/9
2	CryoPower B	CPC-P3 pin 2	#20 TP w/10
3	CryoPower C	CPC-P3 pin 3	#20 TP w/11
4	CryoPower D	CPC-P3 pin 4	#20 TP w/12
5	BallancePower	CPC-P3 pin 5	#20 TP w/13
6	Spare		
7	Spare		

8	SpecTemp	CPC-P3 pin 8	#24 TP w/ 15
9	CryoPower A Ret	CPC-P3 pin 9	#20 TP w/1
10	CryoPower B Ret	CPC-P3 pin 10	#20 TP w/2
11	CryoPower C Ret	CPC-P3 pin 11	#20 TP w/3
12	CryoPower D Ret	CPC-P3 pin 12	#20 TP w/4
13	BalancePower Ret	CPC-P3 pin 13	#20 TP w/5
14	Spare		
15	SpecTemp RET	CPC-P3 pin 15	#24 TP w/ 8

4.5.14. Rad-P1 (Radiator Heaters)

Pin	Signal	Destination	Harness
A	SpecHtr	IDPU-P4 pin 7	#22 TP w/2
B	SpecHtrRET	IDPU-P4 pin 8	#22 TP w/1

4.5.15. Rad-P2 (Radiator Thermistor #1)

Pin	Signal	Destination	Harness
A	SpecTemp1	IDPU-P4 pin 9	#24 TP w/2
B	SpecTemp1RET	IDPU-P4 pin 10	#24 TP w/1

4.5.16. Rad-P3 (Radiator Thermistor #2)

Pin	Signal	Destination	Harness
A	SpecTemp2	IDPU-P4 pin 11	#24 TP w/2
B	SpecTemp2RET	IDPU-P4 pin 12	#24 TP w/1

4.5.17. VV-P1 (Vacuum Valve Actuator)

Pin	Signal	Destination	Harness
1	VVAct1	IDPU-P4 pin 31	#22
2	VVAct2	IDPU-P4 pin 32	#22
3	VVActRET	IDPU-P4 pin 33	#22
4	Spare		
5	Spare		
6	Spare		
7	Spare		
8	spare		
9	VVStatus	IDPU-P4 pin 34	#24

4.6. RAS Connectors

4.6.1. RAS-P1 (RAS Data to ADP)

Pin	Signal	Destination	Harness
1	+STRTR4	IDPU-P8 pin 1	#24 TP w/6
6	-STRTR4	IDPU-P8 pin 22	#24 TP w/1
2	+CLKR4	IDPU-P8 pin 43	#24 TP w/7
7	-CLKR4	IDPU-P8 pin 44	#24 TP w/2
3	+FSRR4	IDPU-P8 pin 23	#24 TP w/8
8	-FSRR4	IDPU-P8 pin 2	#24 TP w/3
4	+DINR4	IDPU-P8 pin 3	#24 TP w/9
9	-DINR4	IDPU-P8 pin 24	#24 TP w/4
5	+MR40	IDPU-P8 pin 45	#24 TP w/10
10	-MR40	IDPU-P8 pin 46	#24 TP w/5
11	+MR41	IDPU-P8 pin 25	#24 TP w/12
12	-MR41	IDPU-P8 pin 4	#24 TP w/11
13	+MR42	IDPU-P8 pin 5	#24 TP w/14
14	-MR42	IDPU-P8 pin26	#24 TP w/13
15	CHECK1R4	IDPU-P8 pin 47	#24

4.6.2. RAS-P2 (RAS power from ADP)

Pin	Signal	Destination	Harness
1	+14.5V	IDPU-P7 pin 1	#24 TP w/2
2	+14.5VR	IDPU-P7 pin 16	#24 TP w/1
3	+12V	IDPU-P7 pin 31	#24 TP w/7
4	+5V	IDPU-P7 pin 32	#24 TP w/5
5	+5VR	IDPU-P7 pin 17	#24 TP w/4
6	+ES	IDPU-P7 pin 2	#24 TP w/11
7	+12VR	IDPU-P7 pin 3	#24 TP w/3
8	+5VD	IDPU-P7 pin 18	#24 TP w/9
9	+5VDR	IDPU-P7 pin 33	#24 TP w/8
10	CHECK2R4	IDPU-P7 pin 34	#24
11	-ES	IDPU-P7 pin 9	#24 TP w/6
12	HT11	IDPU-P3 pin 35	#24 TP w/13
13	HT11 RTN	IDPU-P3 pin 36	#24 TP w/12
14	T11	IDPU-P3 pin 33	#24 TP w/15
15	T11 RTN	IDPU-P3 pin 34	#24 TP w/14

4.6.3. RAS P3 (RAS Actuator)

Pin	Signal	Destination	Harness
1	Spare		
2	ACT1	IDPU-P3 pin 25	#24 TP w/3

3	ACT1 RTN	IDPU-P3 pin 26	#24 TP w/2
4	ACT2	IDPU-P3 pin 27	#24 TP w/5
5	ACT2 RTN	IDPU-P3 pin 28	#24 TP w/4
6	T1 (Spacecraft)	IDPU-P3 pin 29	#24 TP w/7
7	T1 RTN (Spacecraft)	IDPU-P3 pin 30	#24 TP w/6
8	T2	IDPU-P3 pin 31	#24 TP w/9
9	T2 RTN	IDPU-P3 pin 32	#24 TP w/8

4.7. Imager Connectors

4.7.1. SAS1-P1 (SAS1 Data from ADP)

Pin	Signal	Destination	Harness
1	+STRTS1	IDPU-P8 pin 6	#24 TP w/6
6	-STRTS1	IDPU-P8 pin 27	#24 TP w/1
2	+CLKS1	IDPU-P8 pin 48	#24 TP w/7
7	-CLKS1	IDPU-P8 pin 49	#24 TP w/2
3	+FSRS1	IDPU-P8 pin 28	#24 TP w/8
8	-FSRS1	IDPU-P8 pin 7	#24 TP w/3
4	+DINS1	IDPU-P8 pin 8	#24 TP w/9
9	-DINS1	IDPU-P8 pin 29	#24 TP w/4
5	+MS10	IDPU-P8 pin 50	#24 TP w/10
10	-MS10	IDPU-P8 pin 51	#24 TP w/5
11	+MS11	IDPU-P8 pin 30	#24 TP w/12
12	-MS11	IDPU-P8 pin 9	#24 TP w/11
13	+MS12	IDPU-P8 pin 10	#24 TP w/14
14	-MS12	IDPU-P8 pin 31	#24 TP w/13
15	CHECK1S1	IDPU-P8 pin 52	#24

4.7.2. SAS2-P1 (SAS3 Data from ADP)

Pin	Signal	Destination	Harness
1	+STRTS2	IDPU-P8 pin 11	#24 TP w/6
6	-STRTS2	IDPU-P8 pin 32	#24 TP w/1
2	+CLKS2	IDPU-P8 pin 53	#24 TP w/7
7	-CLKS2	IDPU-P8 pin 54	#24 TP w/2
3	+FSRS2	IDPU-P8 pin 33	#24 TP w/8
8	-FSRS2	IDPU-P8 pin 12	#24 TP w/3
4	+DINS2	IDPU-P8 pin 13	#24 TP w/9
9	-DINS2	IDPU-P8 pin 34	#24 TP w/4
5	+MS20	IDPU-P8 pin 55	#24 TP w/10

10	-MS20	IDPU-P8 pin 56	#24 TP w/5
11	+MS21	IDPU-P8 pin 35	#24 TP w/12
12	-MS21	IDPU-P8 pin 14	#24 TP w/11
13	+MS22	IDPU-P8 pin 15	#24 TP w/14
14	-MS22	IDPU-P8 pin 36	#24 TP w/13
15	CHECK1S2	IDPU-P8 pin 57	#24

4.7.3. SAS3-P1 (SAS3 Data from ADP)

Pin	Signal	Destination	Harness
1	+STRTS3	IDPU-P8 pin 16	#24 TP w/6
6	-STRTS3	IDPU-P8 pin 37	#24 TP w/1
2	+CLKS3	IDPU-P8 pin 58	#24 TP w/7
7	-CLKS3	IDPU-P8 pin 59	#24 TP w/2
3	+FSRS3	IDPU-P8 pin 38	#24 TP w/8
8	-FSRS3	IDPU-P8 pin 17	#24 TP w/3
4	+DINS3	IDPU-P8 pin 18	#24 TP w/9
9	-DINS3	IDPU-P8 pin 39	#24 TP w/4
5	+MS30	IDPU-P8 pin 60	#24 TP w/10
10	-MS30	IDPU-P8 pin 61	#24 TP w/5
11	+MS31	IDPU-P8 pin 40	#24 TP w/12
12	-MS31	IDPU-P8 pin 19	#24 TP w/11
13	+MS32	IDPU-P8 pin 20	#24 TP w/14
14	-MS32	IDPU-P8 pin 41	#24 TP w/13
15	CHECK1S3	IDPU-P8 pin 62	#24

4.7.4. SAS1-P2 (SAS1 Power from ADP)

Pin	Signal	Destination	Harness
1	+14.5V1	IDPU-P7 pin 4	#24 TP w/2
2	+14.5V1R	IDPU-P7 pin 5	#24 TP w/1
3	+12V1	IDPU-P7 pin 20	#24 TP w/7
4	+5V1	IDPU-P7 pin 35	#24 TP w/5
5	+5V1R	IDPU-P7 pin 36	#24 TP w/4
6	Spare		
7	+12V1R	IDPU-P7 pin 6	#24 TP w/3
8	+5V1D	IDPU-P7 pin 7	#24 TP w/9
9	+5V1DR	IDPU-P7 pin 22	#24 TP w/8
10	CHECK2S1	IDPU-P7 pin 37	#24
11	RESVS1	IDPU-P7 pin 23	#24
12	NC		
13	NC		

14	NC		
15	NC		

4.7.5. SAS2-P2 (SAS2 Power from ADP)

Pin	Signal	Destination	Harness
1	+14.5V2	IDPU-P7 pin 8	#24 TP w/2
2	+14.5V2R	IDPU-P7 pin 24	#24 TP w/1
3	+12V2	IDPU-P7 pin 38	#24 TP w/7
4	+5V2	IDPU-P7 pin 39	#24 TP w/5
5	+5V2R	IDPU-P7 pin 25	#24 TP w/4
6	Spare		
7	+12V2R	IDPU-P7 pin 10	#24 TP w/3
8	+5V2D	IDPU-P7 pin 26	#24 TP w/9
9	+5V2DR	IDPU-P7 pin 40	#24 TP w/8
10	CHECK2S2	IDPU-P7 pin 41	#24
11	RESVS2	IDPU-P7 pin 11	#24
12	NC		
13	NC		
14	NC		
15	NC		

4.7.6. SAS3-P2 (SAS3 Power from ADP)

Pin	Signal	Destination	Harness
1	+14.5V3	IDPU-P7 pin 12	#24 TP w/2
2	+14.5V3R	IDPU-P7 pin 27	#24 TP w/1
3	+12V3	IDPU-P7 pin 42	#24 TP w/7
4	+5V3	IDPU-P7 pin 43	#24 TP w/5
5	+5V3R	IDPU-P7 pin 28	#24 TP w/4
6	Spare		
7	+12V3R	IDPU-P7 pin 14	#24 TP w/3
8	+5V3D	IDPU-P7 pin 29	#24 TP w/9
9	+5V3DR	IDPU-P7 pin 44	#24 TP w/8
10	CHECK2S3	IDPU-P7 pin 30	#24
11	RESVS3	IDPU-P7 pin 15	#24
12	NC		
13	NC		
14	NC		
15	NC		

4.7.7. UGT-P1 (Upper Grid Tray heater / Thermistors)

Pin	Signal	Destination	Harness
1	T3	IDPU-P3 pin 1	#24 TP w/2
2	T3 RTN	IDPU-P3 pin 2	#24 TP w/1
3	T4	IDPU-P3 pin 3	#24 TP w/4
4	T4 RTN	IDPU-P3 pin 4	#24 TP w/3
5	T5	IDPU-P3 pin 5	#24 TP w/6
6	T5 RTN	IDPU-P3 pin 6	#24 TP w/5
7	T6	IDPU-P3 pin 7	#24 TP w/8
8	T6 RTN	IDPU-P3 pin 8	#24 TP w/7
9	HT1	IDPU-P3 pin 9	#24 TP w/10
10	HT1 RTN	IDPU-P3 pin 10	#24 TP w/9
11	HT2	IDPU-P3 pin 11	#24 TP w/12
12	HT2 RTN	IDPU-P3 pin 12	#24 TP w/11
13	NC		
14	NC		
15	NC		

4.7.8. LGT-P1 (Lower Grid Tray heater / Thermistors)

Pin	Signal	Destination	Harness
1	T7	IDPU-P3 pin 13	#24 TP w/2
2	T7 RTN	IDPU-P3 pin 14	#24 TP w/1
3	T8	IDPU-P3 pin 15	#24 TP w/4
4	T8 RTN	IDPU-P3 pin 16	#24 TP w/3
5	T9	IDPU-P3 pin 17	#24 TP w/6
6	T9 RTN	IDPU-P3 pin 18	#24 TP w/5
7	T10	IDPU-P3 pin 19	#24 TP w/8
8	T10 RTN	IDPU-P3 pin 20	#24 TP w/7
9	HT3	IDPU-P3 pin 21	#24 TP w/10
10	HT3 RTN	IDPU-P3 pin 22	#24 TP w/9
11	HT4	IDPU-P3 pin 23	#24 TP w/12
12	HT4 RTN	IDPU-P3 pin 24	#24 TP w/11
13	NC		
14	NC		
15	NC		

4.7.9. TMS-P1 (TMS to GSE)

TBD