

# STEREO *IMPACT*

## Harness Specification

IMPACTHarnessSpec\_H.doc  
Version H – 2003-Oct-08

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**Document Revision Record**

| Rev. | Date        | Description of Change  | Approved By |
|------|-------------|--|-------------|
| A    | 2001-Mar-16 | Preliminary Draft  | -           |
| B    | 2001-Mar-20 | <ul style="list-style-type: none"> <li>• Add harness responsibilities</li> <li>• Add details of spacecraft harness</li> <li>• Minor fixes</li> </ul>   | -           |
| C    | 2001-Aug-1  | <ul style="list-style-type: none"> <li>• Change power from TP to TSQ</li> <li>• Add BOOM temp sensor to BOOM-P2</li> <li>• Split STE, SEPT-E, SIT</li> </ul>   | -           |
| D    | 2001-Sep-26 | <ul style="list-style-type: none"> <li>• Move SEPT and SIT actuator connector from SEP Central</li> <li>• Change IDPU-J2 to two twinax</li> <li>• Split STE into STE-U, STE-D</li> <li>• Add SEP mating connector info in sections 3.5 to 3.10</li> <li>• Add SEP subsystem connector pinouts in sections 4.5.2 to 4.10.1</li> <li>• Change SEP S/C thermal con. type/size</li> </ul>  | -           |
| E    | 2002-Nov-26 | <ul style="list-style-type: none"> <li>• Change to GSFC connector specifications for D connectors</li> <li>• Replace SWEA-J1 &amp; -J3 with MDM connectors</li> <li>• Remove SWEA-J2 (internal)</li> <li>• Update SWEA connector pin-outs</li> <li>• Some connectors become internal (HET, LET, STE)</li> <li>• SEPT connectors combined at SEP end</li> <li>• Update SEPT connector pinouts.</li> <li>• Modify MAG connector pinouts</li> </ul> | -           |
| F    | 2003-May-12 | <ul style="list-style-type: none"> <li>• Corrections to SEPT signal names</li> <li>• Add PLASTIC harness connector type &amp; pinout</li> <li>• Update SIT Connector</li> </ul>  |             |
| G    | 2003-Sep-29 | <ul style="list-style-type: none"> <li>• PLASTIC Mating Connector P/N</li> <li>• Update spacecraft power harness wire size</li> <li>• Change SEPTE-J3 and SEPT-NS pinout</li> <li>• Add connector panel thickness</li> <li>• Add chassis ground to SIT-J3</li> </ul>   |             |

|   |            |   |  |
|---|------------|---|--|
| H | 2003-Oct-8 | <ul style="list-style-type: none"><li>• Add harness shielding &amp; termination details</li></ul> |  |
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## 1. Introduction

This specification describes the harnesses between the various parts of the IMPACT instrument suite, as well as the interface connectors to the spacecraft. The spec covers the connector types and pinouts as well as the harness wiring details.

### 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 a code such as UCB indicating who is responsible for providing the data, and a unique reference number.

### 1.2. Applicable Documents

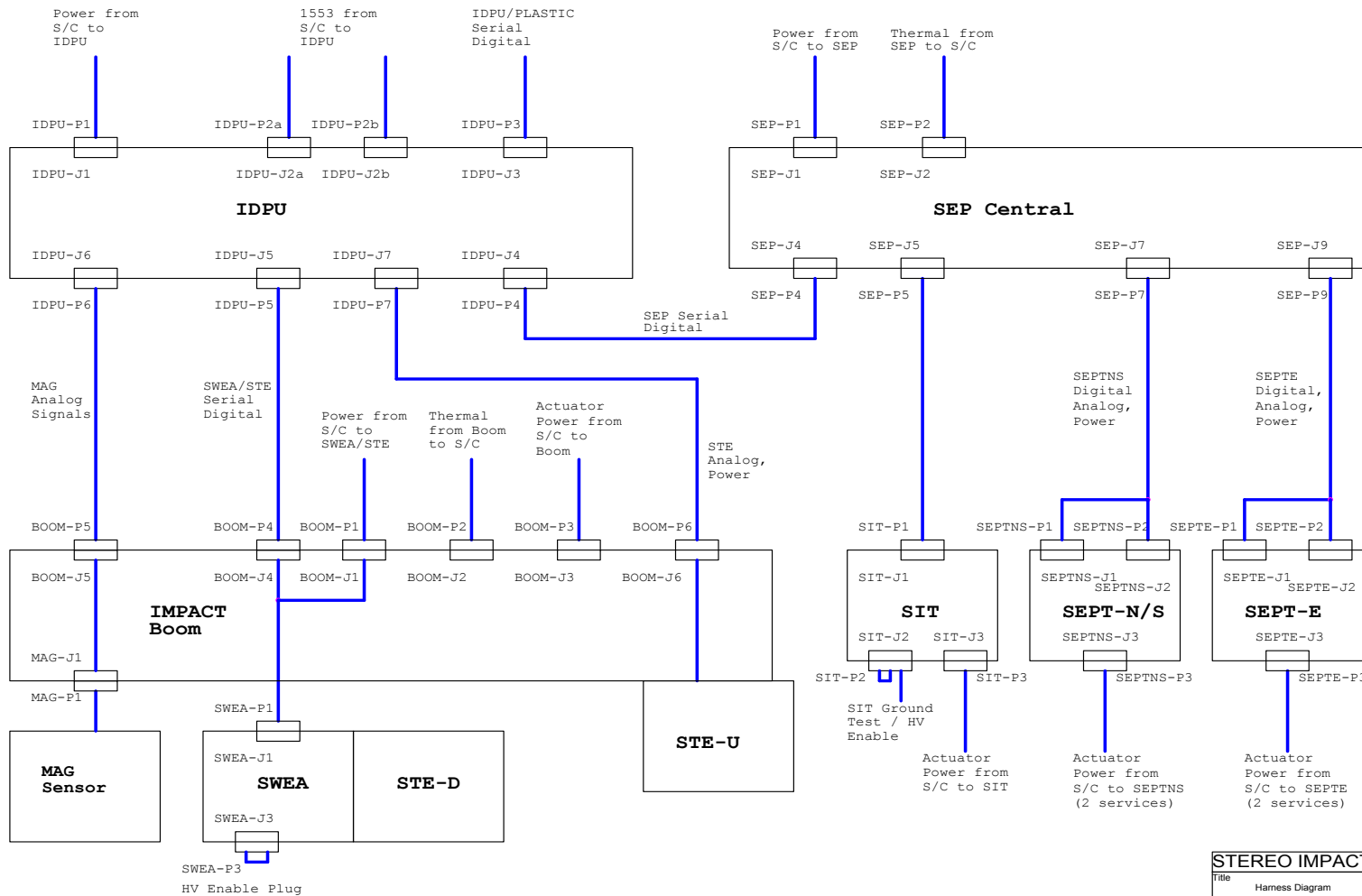
The following documents include drawings and STEREO Project policies. All documents and drawings can be found on the Berkeley STEREO/IMPACT FTP site:

<http://sprg.ssl.berkeley.edu/impact/dwc/>

1. IMPACT/Spacecraft ICD (on APL web site)
2. ICD/Impact Serial Interface
3. [Project/EMC\\_7381-9030A STEREO EMC Requirements](#)
4. [Project/ContaminationControlPlan\\_7381-9006A.pdf](#)

## 2. Harness Figures

Figure 2-1 is a schematic of the STEREO IMPACT harness indicating the connector designations, where they are, and what they connect to. Figure 2-2 shows the SEP harnessing, showing some internal details.



|                      |                            |  |        |
|----------------------|----------------------------|--|--------|
| <b>STEREO IMPACT</b> |                            | University of California Space Science Lab |        |
| Title                |                            | Harness Diagram                            |        |
| Size                 | Document Number            | Rev  |        |
| B                    | IMPACT_HARNESS             | E  |        |
| Date:                | Thursday, October 31, 2002 | Sheet                                      | 1 of 1 |

Figure 2-1 - IMPACT Harness Schematic

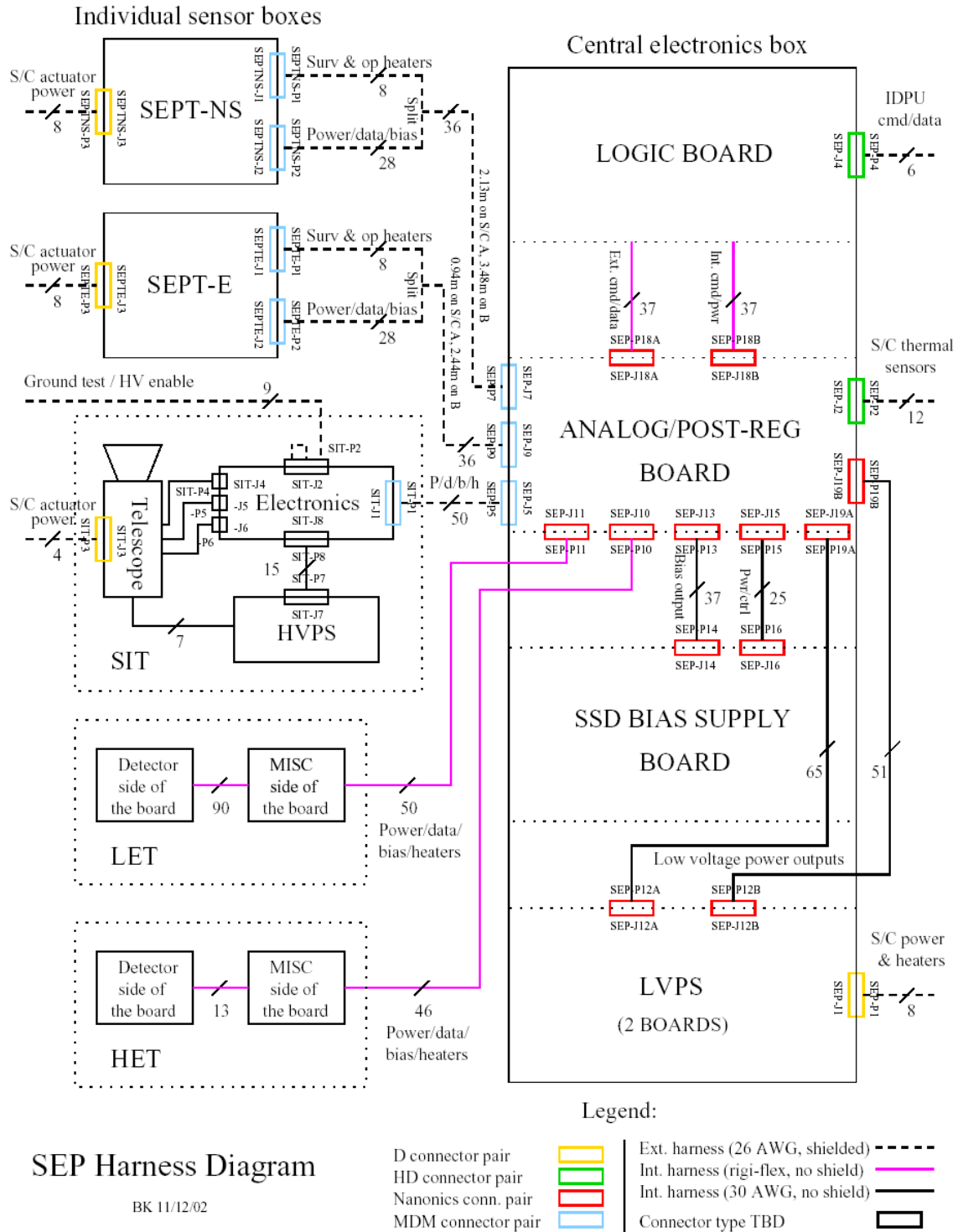


Figure 2-2 SEP Harness



### 3. Connector Types

The instrument harness connectors are described below. "D" connectors are standard density, "HD" are High Density D-type Connectors. "MDM" are MDM D 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.

#### 3.1. IDPU Connectors

| Name      | Use                              | Type   | Part Number             | Mating Connector        | Con. Mount |
|-----------|----------------------------------|--------|-------------------------|-------------------------|------------|
| IDPU -P1  | IDPU Power from Spacecraft       | D15S   | GSFC<br>311P409-2S-B-15 | GSFC<br>311P409-2P-B-12 | Front      |
| IDPU -P2a | 1553 A Interface from Spacecraft | Twinax | Sabritec<br>015028-2000 | Sabritec<br>015100-5001 | Front      |
| IDPU -P2b | 1553 B Interface from Spacecraft | Twinax | Sabritec<br>015028-2000 | Sabritec<br>015100-5001 | Front      |
| IDPU -P3  | IDPU to PLASTIC Interface        | HD15S  | GSFC<br>311P407-1S-B-12 | GSFC<br>311P407-1P-B-12 | Front      |
| IDPU -P4  | IDPU to SEP Interface            | HD15S  | GSFC<br>311P407-1S-B-12 | GSFC<br>311P407-1P-B-12 | Front      |
| IDPU -P5  | IDPU to SWEA/STE Interface       | HD15S  | GSFC<br>311P407-1S-B-12 | GSFC<br>311P407-1P-B-12 | Front      |
| IDPU -P6  | IDPU to MAG Interface            | HD15P  | GSFC<br>311P407-1P-B-12 | TBD-MAG-001             | Front      |
| IDPU -P7  | IDPU to STE-U Interface          | HD26P  | GSFC<br>311P407-2P-B-12 | GSFC<br>311P407-2S-B-12 | Front      |

#### 3.2. Boom Connectors

| Name     | Use                                 | Type  | Part Number             | Mating Connector        | Con. Mount    |
|----------|-------------------------------------|-------|-------------------------|-------------------------|---------------|
| BOOM -P1 | SWEA/STE Power from Spacecraft      | D15S  | GSFC<br>311P409-2S-B-15 | GSFC<br>311P409-2P-B-12 | Rear<br>1.6mm |
| BOOM -P2 | Temp Sensor Interface to Spacecraft | D9P   | GSFC<br>311P409-1P-B-15 | GSFC<br>311P409-1S-B-12 | Rear<br>1.6mm |
| BOOM -P3 | Boom Actuator Power from Spacecraft | D9S   | GSFC<br>311P409-1S-B-15 | GSFC<br>311P409-1P-B-12 | Rear<br>1.6mm |
| BOOM -P4 | IDPU to SWEA/STE Interface          | HD15P | GSFC<br>311P407-1P-B-12 | GSFC<br>311P407-1S-B-12 | Rear<br>1.6mm |
| BOOM -P5 | IDPU to MAG Interface               | HD15S | GSFC<br>311P407-1S-B-12 | GSFC<br>311P407-1P-B-12 | Rear<br>1.6mm |
| BOOM -P6 | IDPU to STE-U Interface             | HD26S | GSFC<br>311P407-2S-B-12 | GSFC<br>311P407-2P-B-12 | Rear<br>1.6mm |

**3.3. SWEA Connectors**

| Name    | Use                                       | Type   | Part Number    | Mating Connector            |
|---------|---|--------|----------------|-----------------------------|
| SWEA-P1 | SWEA/STE Interface<br>(Signal+Power+Temp) | MDM15R | M83513/04-B11N | Airborn MK-232-015-125-2200 |
| SWEA-P3 | Enable Plug                               | MDM15R | M83513/04-B11N | M83513/04-B1NP              |

**3.4. MAG Connector**

| Name   | Use                             | Type  | Part Number | Mating Connector        |
|--------|---------------------------------|-------|-------------|-------------------------|
| MAG-P1 | MAG Sensor Pigtail<br>Connector | HD15P | TBD-MAG001  | GSFC<br>311P407-1S-B-12 |

**3.5. SEP Connectors**

| Name   | Use  | Type   | Part Number                 | Mating Connector                 | Con. Mount     |
|--------|--|--------|-----------------------------|----------------------------------|----------------|
| SEP-P1 | SEP Power from<br>Spacecraft               | D15S   | GSFC<br>311P409-2S-B-15     | GSFC<br>311P409-2P-B-12          | Rear,<br>1.5mm |
| SEP-P2 | SEP Temp Sensor<br>Interface to Spacecraft | HD15S  | GSFC<br>311P407-1S-B-15     | GSFC<br>311P407-1P-B-12          | Rear,<br>1.5mm |
| SEP-P4 | IDPU to SEP Interface                      | HD15P  | M24308/7-373                | GSFC<br>311P407-1S-B-12          | Rear,<br>1.5mm |
| SEP-P5 | SEP to SIT Interface                       | MDM51S | MWDM2L-51S-<br>6J5-7M-429A  | MWDM2L-<br>51PCBRP-.110-<br>429A | Rear,<br>1.5mm |
| SEP-P7 | SEP to SEPT-NS<br>Dig/Ana/Pwr Interface    | MDM37S | MWDM2L-37S-<br>6J5-xxM-429A | MWDM2L-<br>37PCBRP-.110-<br>429A | Rear,<br>1.5mm |
| SEP-P9 | SEP to SEPT-E<br>Dig/Ana/Pwr Interface     | MDM37S | MWDM2L-37S-<br>6J5-xxM-429A | MWDM2L-<br>37PCBRP-.110-<br>429A | Rear,<br>1.5mm |

**3.6. SEPT-E Connectors**

| Name     | Use                                 | Type   | Part Number             | Mating Connector         | Con. Mount  |
|----------|-------------------------------------|--------|-------------------------|--------------------------|-------------|
| SEPTE-P1 | SEP to SEPT-E Heater Interface      | MDM9P  | MWDM2L-9P-6J5-12M-429A  | MWDM2L-9S-6J5-12M-429A   | Rear, 1.0mm |
| SEPTE-P2 | SEP to SEPT-E Dig/Ana/Pwr Interface | MDM31P | MWDM2L-31P-6J5-12M-429A | MWDM2L-31SCBRP-.110-429A | Rear, 1.0mm |
| SEPTE-P3 | Spacecraft to SEPT-E Actuator Power | D9S    | GSFC 311P409-1S-B-15    | GSFC 311P409-1P-B-12     | Rear, 1.0mm |

**3.7. SEPT-NS Connectors**

| Name      | Use                                  | Type   | Part Number             | Mating Connector         | Con. Mount  |
|-----------|--------------------------------------|--------|-------------------------|--------------------------|-------------|
| SEPTNS-P1 | SEP to SEPT-NS Heater Interface      | MDM9P  | MWDM2L-9P-6J5-12M-429A  | MWDM2L-9S-6J5-12M-429A   | Rear, 1.0mm |
| SEPTNS-P2 | SEP to SEPT-NS Dig/Ana/Pwr Interface | MDM31P | MWDM2L-31P-6J5-12M-429A | MWDM2L-31SCBRP-.110-429A | Rear, 1.0mm |
| SEPTNS-P3 | Spacecraft to SEPT-NS Actuator Power | D9S    | GSFC 311P409-1S-B-15    | GSFC 311P409-1P-B-12     | Rear, 1.0mm |

**3.8. SIT Connectors**

| Name   | Use                                  | Type        | Part Number             | Mating Connector         | Con. Mount  |
|--------|--------------------------------------|-------------|-------------------------|--------------------------|-------------|
| SIT-P1 | SEP to SIT Interface                 | MDM51P      | MWDM2L-51P-6J5-12M-429A | MWDM2L-51SCBRP-.110-429A | Rear, 1.5mm |
| SIT-P2 | SIT HV Disable Plug / Test Interface | TBD-SIT-002 | TBD-SEP-001             | TBD-SEP-001              | Rear, 1.5mm |
| SIT-P3 | Spacecraft to SIT Actuator Power     | D9S         | GSFC 311P409-1S-B-15    | GSFC 311P409-1P-B-12     | Rear, 1.5mm |

**3.9. PLASTIC Connector (IDPU interface only)**

| Name   | Use                       | Type | Part Number          | Mating Connector     | Con. Mount   |
|--------|---------------------------|------|----------------------|----------------------|--------------|
| PLA-P4 | IDPU to PLASTIC interface | D25P | GSFC 311P409-3P-B-12 | GSFC 311P409-3S-B-12 | Rear, 0.075" |

## 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.
- TSP is a twisted shielded pair with the shield connected to a pin.
- TP is a twisted pair, no shield or jacket (just two wires twisted together).
- TT is a twisted triple
- T5 is a twisted 5-wire group
- TSQ is a twisted shielded quad (shield terminated at backshell)
- Coax is an RG178 (**TBR-UCB-002**) coax
- TA is 77 ohm twinax used for the 1553 harness, type M17/176-00002

All harnesses will have a common over-shield connected to chassis ground at both ends via the connector shell and mounting hardware except where otherwise noted. Chassis ground pin on connectors is normally not connected in the harness.

### 4.1. IDPU Connectors

#### 4.1.1. IDPU-P1 (IDPU Power)

| Pin | Signal                                      | Destination | Harness           |
|-----|---|-------------|-------------------|
| 1   | Spare                                       |             |                   |
| 2   | +28V Primary                                | Spacecraft  | #26 TSQ w/3,10,11 |
| 3   | +28V Redundant                              | Spacecraft  | #26 TSQ w/2,10,11 |
| 4   | Spare                                       |             |                   |
| 5   | +28V Heater Primary                         | Spacecraft  | #26 TSQ w/6,13,14 |
| 6   | +28V Heater Redundant                       | Spacecraft  | #26 TSQ w/5,13,14 |
| 7   | Spare                                       |             |                   |
| 8   | Chassis (connected in IDPU to IDPU chassis) |             |                   |
| 9   | Spare                                       |             |                   |
| 10  | +28V Return Primary                         | Spacecraft  | #26 TSQ w/2,3,11  |
| 11  | +28V Return Redundant                       | Spacecraft  | #26 TSQ w/2,3,10  |
| 12  | Spare                                       |             |                   |
| 13  | +28V Heater Return Primary                  | Spacecraft  | #26 TSQ w/5,6,14  |
| 14  | +28V Heater Return Redundant                | Spacecraft  | #26 TSQ w/5,6,13  |
| 15  | Spare                                       |             |                   |

## 4.1.2. IDPU-J2 (1553 Interface to Spacecraft)

IDPU-J2a

| Pin | Signal                  | Destination | Harness   |
|-----|-------------------------|-------------|-----------|
| 1   | 1553_A_P                | Spacecraft  | TA-blue   |
| 2   | 1553_A_N (Inner shield) | Spacecraft  | TA-white  |
| 3   | Outer Shield            | Spacecraft  | TA-Shield |

IDPU-J2b

| Pin | Signal                  | Destination | Harness   |
|-----|-------------------------|-------------|-----------|
| 1   | 1553_B_P                | Spacecraft  | TA-blue   |
| 2   | 1553_B_N (Inner shield) | Spacecraft  | TA-white  |
| 3   | Outer Shield            | Spacecraft  | TA-Shield |

## 4.1.3. IDPU-P3 (IDPU to PLASTIC)

| Pin | Signal                                      | Destination   | Harness          |
|-----|---|---------------|------------------|
| 1   | CLK   | PLA-P4 pin 1  | Coax w/2         |
| 2   | CLK-RET                                     | PLA-P4 pin 2  | Coax Shield w/1  |
| 3   | Spare                                       |               |                  |
| 4   | Spare                                       |               |                  |
| 5   | Spare                                       |               |                  |
| 6   | CMD   | PLA-P4 pin 6  | Coax w/7         |
| 7   | CMD-RET                                     | PLA-P4 pin 7  | Coax Shield w/6  |
| 8   | Spare                                       |               |                  |
| 9   | Spare                                       |               |                  |
| 10  | Spare                                       |               |                  |
| 11  | TLM   | PLA-P4 pin 11 | Coax w/12        |
| 12  | TLM-RET                                     | PLA-P4 pin 12 | Coax Shield w/11 |
| 13  | Spare                                       |               |                  |
| 14  | Spare                                       |               |                  |
| 15  | Chassis (connected in IDPU to IDPU chassis) |               |                  |

## 4.1.4. IDPU-P4 (IDPU to SEP)

| Pin | Signal                                      | Destination   | Harness          |
|-----|---|---------------|------------------|
| 1   | CLK   | SEP-P4 pin 1  | Coax w/2         |
| 2   | CLK-RET                                     | SEP-P4 pin 2  | Coax Shield w/1  |
| 3   | Spare                                       |               |                  |
| 4   | Spare                                       |               |                  |
| 5   | Spare                                       |               |                  |
| 6   | CMD   | SEP-P4 pin 6  | Coax w/7         |
| 7   | CMD-RET                                     | SEP-P4 pin 7  | Coax Shield w/6  |
| 8   | Spare                                       |               |                  |
| 9   | Spare                                       |               |                  |
| 10  | Spare                                       |               |                  |
| 11  | TLM   | SEP-P4 pin 11 | Coax w/12        |
| 12  | TLM-RET                                     | SEP-P4 pin 12 | Coax Shield w/11 |
| 13  | Spare                                       |               |                  |
| 14  | Spare                                       |               |                  |
| 15  | Chassis (connected in IDPU to IDPU chassis) |               |                  |

(Note: This is a 1:1 harness)

## 4.1.5. IDPU-P5 (IDPU to SWEA/STE)

| Pin | Signal                                      | Destination    | Harness          |
|-----|---|----------------|------------------|
| 1   | CLK   | BOOM-P4 pin 1  | Coax w/2         |
| 2   | CLK-RET                                     | BOOM-P4 pin 2  | Coax Shield w/1  |
| 3   | Spare                                       |                |                  |
| 4   | Spare                                       |                |                  |
| 5   | Spare                                       |                |                  |
| 6   | CMD   | BOOM-P4 pin 6  | Coax w/7         |
| 7   | CMD-RET                                     | BOOM-P4 pin 7  | Coax Shield w/6  |
| 8   | Spare                                       |                |                  |
| 9   | Spare                                       |                |                  |
| 10  | Spare                                       |                |                  |
| 11  | TLM   | BOOM-P4 pin 11 | Coax w/12        |
| 12  | TLM-RET                                     | BOOM-P4 pin 12 | Coax Shield w/11 |
| 13  | Spare                                       |                |                  |
| 14  | Spare                                       |                |                  |
| 15  | Chassis (connected in IDPU to IDPU chassis) |                |                  |

(Note: This is a 1:1 harness)

## 4.1.6. IDPU-P6 (IDPU to MAG)

| Pin | Signal   | Destination    | Harness         |
|-----|--|----------------|-----------------|
| 1   | XYZ Drive                                      | BOOM-P5 pin 1  | Coax w/9        |
| 2   | X Sensor Sig                                   | BOOM-P5 pin 2  | Coax w/10       |
| 3   | Y Sensor Sig                                   | BOOM-P5 pin 3  | Coax w/11       |
| 4   | Z Sensor Sig                                   | BOOM-P5 pin 4  | Coax w/12       |
| 5   | MAG Temp Sensor                                | BOOM-P5 pin 5  | #26 TSP w/13,14 |
| 6   | MAG Heater                                     | BOOM-P5 pin 6  | #26 TSP w/7,8   |
| 7   | MAG Heater RET                                 | BOOM-P5 pin 7  | #26 TSP w/6,8   |
| 8   | MAG Heater Shield                              | BOOM-P5 pin 8  | #26 TSP Shield  |
| 9   | XYZ Drive RET, T2 Ret                          | BOOM-P5 pin 9  | Coax Shield w/1 |
| 10  | X Sensor Sig RET                               | BOOM-P5 pin 10 | Coax Shield w/2 |
| 11  | Y Sensor Sig RET                               | BOOM-P5 pin 11 | Coax Shield w/3 |
| 12  | Z Sensor Sig RET                               | BOOM-P5 pin 12 | Coax Shield w/4 |
| 13  | MAG Temp Sensor RET                            | BOOM-P5 pin 13 | #26 TSP w/5,14  |
| 14  | MAG Temp Sensor Shield,<br>T2                  | BOOM-P5 pin 14 | #26 TSP Shield  |
| 15  | Chassis (connected in IDPU<br>to IDPU chassis) |                |                 |

(Note: This is a 1:1 harness)

## 4.1.7. IDPU-P7 (IDPU to STE-U)

| Pin | Signal                                      | Destination    | Harness          |
|-----|---|----------------|------------------|
| 1   | OUTPUT1                                     | BOOM-P6 pin 1  | Coax w/2         |
| 2   | OUTPUT RET                                  | BOOM-P6 pin 2  | Coax Shield w/1  |
| 3   | OUTPUT2                                     | BOOM-P6 pin 3  | Coax w/4         |
| 4   | OUTPUT RET                                  | BOOM-P6 pin 4  | Coax Shield w/3  |
| 5   | OUTPUT3                                     | BOOM-P6 pin 5  | Coax w/6         |
| 6   | OUTPUT RET                                  | BOOM-P6 pin 6  | Coax Shield w/5  |
| 7   | OUTPUT4                                     | BOOM-P6 pin 7  | Coax w/8         |
| 8   | OUTPUT RET                                  | BOOM-P6 pin 8  | Coax Shield w/7  |
| 9   | Spare                                       |                |                  |
| 10  | Test RET                                    | BOOM-P6 pin 10 | Coax Shield w/11 |
| 11  | Test  | BOOM-P6 pin 11 | Coax w/10        |
| 12  | Ground                                      | BOOM-P6 pin 12 | #26 TT w/13,14   |
| 13  | +5V   | BOOM-P6 pin 13 | #26 TT w/12,14   |
| 14  | -5V   | BOOM-P6 pin 14 | #26 TT w/12,13   |
| 15  | Bias  | BOOM-P6 pin 15 | #26              |
| 16  | -12V (TBR-UCB-004)                          | BOOM-P6 pin 16 | #26              |
| 17  | Spare                                       |                |                  |
| 18  | Spare                                       |                |                  |
| 19  | Door Close Act.                             | BOOM-P6 pin 19 | #26 TT w/20,21   |
| 20  | Door Open Act.                              | BOOM-P6 pin 20 | #26 TT w/19,21   |
| 21  | Door Act. RET                               | BOOM-P6 pin 21 | #26 TT w/19,20   |
| 22  | Spare                                       |                |                  |
| 23  | Spare                                       |                |                  |
| 24  | STE Temp                                    | BOOM-P6 pin 24 | #26 TP w/25      |
| 25  | STE Temp RET                                | BOOM-P6 pin 25 | #26 TP w/24      |
| 26  | Chassis (connected in IDPU to IDPU chassis) |                |                  |

(Note: This is a 1:1 harness)



## 4.2. Boom Connectors

### 4.2.1. BOOM-P1 (SWEA/STE Power)

| Pin | Signal                                       | Destination | Harness           |
|-----|--|-------------|-------------------|
| 1   | Spare  |             |                   |
| 2   | +28V Primary                                 | Spacecraft  | #26 TSQ w/3,10,11 |
| 3   | +28V Redundant                               | Spacecraft  | #26 TSQ w/2,10,11 |
| 4   | +28V Boom Deployment Heater Primary          | Spacecraft  | #22 TSQ w/7,12,15 |
| 5   | +28V Heater Primary                          | Spacecraft  | #26 TSQ w/6,13,14 |
| 6   | +28V Heater Redundant                        | Spacecraft  | #26 TSQ w/5,13,14 |
| 7   | +28V Boom Deployment Heater Redundant        | Spacecraft  | #22 TSQ w/4,12,15 |
| 8   | Chassis (connected in BOOM to BOOM chassis)  |             |                   |
| 9   | Spare  |             |                   |
| 10  | +28V Return Primary                          | Spacecraft  | #26 TSQ w/2,3,11  |
| 11  | +28V Return Redundant                        | Spacecraft  | #26 TSQ w/2,3,10  |
| 12  | +28V Boom Deployment Heater Return Primary   | Spacecraft  | #22 TSQ w/4,7,15  |
| 13  | +28V Heater Return Primary                   | Spacecraft  | #26 TSQ w/5,6,14  |
| 14  | +28V Heater Return Redundant                 | Spacecraft  | #26 TSQ w/5,6,13  |
| 15  | +28V Boom Deployment Heater Return Redundant | Spacecraft  | #22 TSQ w/4,7,12  |

### 4.2.2. BOOM-P2 (SWEA S/C Temp Sensor)

| Pin | Signal                                      | Destination | Harness    |
|-----|---|-------------|------------|
| 1   | SWEA Temp Sensor                            | Spacecraft  | #24 TP w/6 |
| 2   | BOOM Temp Sensor                            | Spacecraft  | #24 TP w/7 |
| 3   | STE-U Temp Sensor                           | Spacecraft  | #24 TP w/8 |
| 4   | Spare                                       |             |            |
| 5   | Spare                                       |             |            |
| 6   | SWEA Temp Sensor RET                        | Spacecraft  | #24 TP w/1 |
| 7   | BOOM Temp Sensor RET                        | Spacecraft  | #24 TP w/2 |
| 8   | STE-U Temp Sensor RET                       | Spacecraft  | #24 TP w/3 |
| 9   | Chassis (connected in BOOM to BOOM chassis) |             |            |

## 4.2.3. BOOM-P3 (Boom Actuator Power)

| Pin | Signal  | Destination | Harness     |
|-----|---|-------------|-------------|
| 1   | BOOM Release                                      | Spacecraft  | #22 TSP w/6 |
| 2   | BOOM Release                                      | Spacecraft  | #22 TSP w/7 |
| 3   | Spare   |             |             |
| 4   | Spare   |             |             |
| 5   | Spare   |             |             |
| 6   | BOOM Release RET                                  | Spacecraft  | #22 TSP w/1 |
| 7   | BOOM Release RET                                  | Spacecraft  | #22 TSP w/2 |
| 8   | Spare   |             |             |
| 9   | Shield Ground (Connected in BOOM to BOOM chassis) |             |             |

## 4.2.4. BOOM-P4 (SWEA/STE to IDPU)

| Pin | Signal                                      | Destination    | Harness          |
|-----|---|----------------|------------------|
| 1   | CLK   | IDPU-P5 pin 1  | Coax w/2         |
| 2   | CLK-RET                                     | IDPU-P5 pin 2  | Coax Shield w/1  |
| 3   | Spare                                       |                |                  |
| 4   | Spare                                       |                |                  |
| 5   | Spare                                       |                |                  |
| 6   | CMD   | IDPU-P5 pin 6  | Coax w/7         |
| 7   | CMD-RET                                     | IDPU-P5 pin 7  | Coax Shield w/6  |
| 8   | Spare                                       |                |                  |
| 9   | Spare                                       |                |                  |
| 10  | Spare                                       |                |                  |
| 11  | TLM   | IDPU-P5 pin 11 | Coax w/12        |
| 12  | TLM-RET                                     | IDPU-P5 pin 12 | Coax Shield w/11 |
| 13  | Spare                                       |                |                  |
| 14  | Spare                                       |                |                  |
| 15  | Chassis (connected in BOOM to BOOM chassis) |                |                  |

(Note: This is a 1:1 harness)

## 4.2.5. BOOM-P5 (IDPU to MAG)

| Pin | Signal   | Destination    | Harness         |
|-----|--|----------------|-----------------|
| 1   | XYZ Drive                                      | IDPU-P6 pin 1  | Coax w/9        |
| 2   | X Sensor Sig                                   | IDPU-P6 pin 2  | Coax w/10       |
| 3   | Y Sensor Sig                                   | IDPU-P6 pin 3  | Coax w/11       |
| 4   | Z Sensor Sig                                   | IDPU-P6 pin 4  | Coax w/12       |
| 5   | MAG Temp Sensor                                | IDPU-P6 pin 5  | #26 TSP w/13,14 |
| 6   | MAG Heater                                     | IDPU-P6 pin 6  | #26 TSP w/7,8   |
| 7   | MAG Heater RET                                 | IDPU-P6 pin 7  | #26 TSP w/6,8   |
| 8   | MAG Heater Shield                              | IDPU-P6 pin 8  | #26 TSP Shield  |
| 9   | XYZ Drive RET, T2 Ret                          | IDPU-P6 pin 9  | Coax Shield w/1 |
| 10  | X Sensor Sig RET                               | IDPU-P6 pin 10 | Coax Shield w/2 |
| 11  | Y Sensor Sig RET                               | IDPU-P6 pin 11 | Coax Shield w/3 |
| 12  | Z Sensor Sig RET                               | IDPU-P6 pin 12 | Coax Shield w/4 |
| 13  | MAG Temp Sensor RET                            | IDPU-P6 pin 13 | #26 TSP w/5,14  |
| 14  | MAG Temp Sensor Shield,<br>T2                  | IDPU-P6 pin 14 | #26 TSP Shield  |
| 15  | Chassis (connected in<br>BOOM to BOOM chassis) |                |                 |

(Note: This is a 1:1 harness)

## 4.2.6. BOOM-P6 (IDPU to STE-U)

| Pin | Signal                                      | Destination    | Harness          |
|-----|---|----------------|------------------|
| 1   | OUTPUT1                                     | IDPU-P7 pin 1  | Coax w/2         |
| 2   | OUTPUT RET                                  | IDPU-P7 pin 2  | Coax Shield w/1  |
| 3   | OUTPUT2                                     | IDPU-P7 pin 3  | Coax w/4         |
| 4   | OUTPUT RET                                  | IDPU-P7 pin 4  | Coax Shield w/3  |
| 5   | OUTPUT3                                     | IDPU-P7 pin 5  | Coax w/6         |
| 6   | OUTPUT RET                                  | IDPU-P7 pin 6  | Coax Shield w/5  |
| 7   | OUTPUT4                                     | IDPU-P7 pin 7  | Coax w/8         |
| 8   | OUTPUT RET                                  | IDPU-P7 pin 8  | Coax Shield w/7  |
| 9   | Spare                                       |                |                  |
| 10  | Test RET                                    | IDPU-P7 pin 10 | Coax Shield w/11 |
| 11  | Test  | IDPU-P7 pin 11 | Coax w/10        |
| 12  | Ground                                      | IDPU-P7 pin 12 | #26 TT w/13,14   |
| 13  | +5V   | IDPU-P7 pin 13 | #26 TT w/12,14   |
| 14  | -5V   | IDPU-P7 pin 14 | #26 TT w/12,13   |
| 15  | Bias  | IDPU-P7 pin 15 | #26              |
| 16  | -12V (TBR-UCB-004)                          | IDPU-P7 pin 16 | #26              |
| 17  | Spare                                       |                |                  |
| 18  | Spare                                       |                |                  |
| 19  | Door Close Act.                             | IDPU-P7 pin 19 | #26 TT w/20,21   |
| 20  | Door Open Act.                              | IDPU-P7 pin 20 | #26 TT w/19,21   |
| 21  | Door Act. RET                               | IDPU-P7 pin 21 | #26 TT w/19,20   |
| 22  | Spare                                       |                |                  |
| 23  | Spare                                       |                |                  |
| 24  | STE Temp                                    | IDPU-P7 pin 24 | #26 TP w/25      |
| 25  | STE Temp RET                                | IDPU-P7 pin 25 | #26 TP w/24      |
| 26  | Chassis (connected in IDPU to IDPU chassis) |                |                  |

(Note: This is a 1:1 harness)

### 4.3. Internal Boom Harness

#### 4.3.1. BOOM-J1 (SWEA/STE Power)

| Pin | Signal                                       | Destination       | Harness      |
|-----|--|-------------------|--------------|
| 1   | Spare  |                   |              |
| 2   | +28V Primary                                 | SWEA-P1 pin 8     | #26 TSP w/5  |
| 3   | +28V Redundant                               | SWEA-P1 pin 8     | #26 TSP w/5  |
| 4   | +28V Boom Deployment Heater Primary          | Deployment heater |              |
| 5   | +28V Heater Primary                          | SWEA-P1 pin 7     | #26 TSP w/2  |
| 6   | +28V Heater Redundant                        | SWEA-P1 pin 7     | #26 TSP w/2  |
| 7   | +28V Boom Deployment Heater Redundant        | Deployment heater |              |
| 8   | Chassis (connected in BOOM to BOOM chassis)  |                   |              |
| 9   | Spare  |                   |              |
| 10  | +28V Return Primary                          | SWEA-P1 pin 14    | #26 TSP w/13 |
| 11  | +28V Return Redundant                        | SWEA-P1 pin 14    | #26 TSP w/13 |
| 12  | +28V Boom Deployment Heater Return Primary   | Deployment heater |              |
| 13  | +28V Heater Return Primary                   | SWEA-P1 pin 15    | #26 TSP w/10 |
| 14  | +28V Heater Return Redundant                 | SWEA-P1 pin 15    | #26 TSP w/10 |
| 15  | +28V Boom Deployment Heater Return Redundant | Deployment heater |              |

Note primary and redundant power connected at BOOM-J1, with a single TP up the boom. Terminate internal shields on TSP to chassis/backshell.

#### 4.3.2. BOOM-J2 (SWEA S/C Temp Sensor)

| Pin | Signal                                      | Destination   | Harness     |
|-----|---|---------------|-------------|
| 1   | SWEA Temp Sensor                            | SWEA-P1 pin 4 | #26 TSP w/6 |
| 2   | BOOM Temp Sensor                            | Boom          | #26 TP w/7  |
| 3   | STE-U Temp Sensor                           | STE-U         | #26 TP w/8  |
| 4   | Spare                                       |               |             |
| 5   | Spare                                       |               |             |
| 6   | SWEA Temp Sensor RET                        | SWEA-P1 pin 5 | #26 TSP w/1 |
| 7   | BOOM Temp Sensor RET                        | Boom          | #26 TP w/2  |
| 8   | STE-U Temp Sensor                           | STE-U         | #26 TP w/3  |
| 9   | Chassis (connected in BOOM to BOOM chassis) | Boom Chassis  |             |

Terminate internal shield on TSP to chassis/backshell

## 4.3.3. BOOM-J4 (SWEA/STE to IDPU)

| Pin | Signal   | Destination    | Harness          |
|-----|--|----------------|------------------|
| 1   | CLK  | SWEA-P1 pin 1  | Coax w/2         |
| 2   | CLK-RET  | SWEA-P1 pin 2  | Coax Shield w/1  |
| 3   | Spare  |                |                  |
| 4   | Spare  |                |                  |
| 5   | Spare  |                |                  |
| 6   | CMD  | SWEA-P1 pin 6  | Coax w/7         |
| 7   | CMD-RET  | SWEA-P1 pin 7  | Coax Shield w/6  |
| 8   | Spare  |                |                  |
| 9   | Spare  |                |                  |
| 10  | Spare  |                |                  |
| 11  | TLM  | SWEA-P1 pin 11 | Coax w/12        |
| 12  | TLM-RET  | SWEA-P1 pin 12 | Coax Shield w/11 |
| 13  | Spare  |                |                  |
| 14  | Spare  |                |                  |
| 15  | Chassis (connected in<br>BOOM to BOOM chassis) |                |                  |

(Note: This is a 1:1 harness)

## 4.3.4. BOOM-J5 (IDPU to MAG)

| Pin | Signal   | Destination   | Harness         |
|-----|--|---------------|-----------------|
| 1   | XYZ Drive                                      | MAG-J1 pin 1  | Coax w/9        |
| 2   | X Sensor Sig                                   | MAG-J1 pin 2  | Coax w/10       |
| 3   | Y Sensor Sig                                   | MAG-J1 pin 3  | Coax w/11       |
| 4   | Z Sensor Sig                                   | MAG-J1 pin 4  | Coax w/12       |
| 5   | MAG Temp Sensor                                | MAG-J1 pin 5  | #26 TSP w/13,14 |
| 6   | MAG Heater                                     | MAG-J1 pin 6  | #26 TSP w/7,8   |
| 7   | MAG Heater RET                                 | MAG-J1 pin 7  | #26 TSP w/6,8   |
| 8   | MAG Heater Shield                              | MAG-J1 pin 8  | #26 TSP Shield  |
| 9   | XYZ Drive RET, T2 Ret                          | MAG-J1 pin 9  | Coax Shield w/1 |
| 10  | X Sensor Sig RET                               | MAG-J1 pin 10 | Coax Shield w/2 |
| 11  | Y Sensor Sig RET                               | MAG-J1 pin 11 | Coax Shield w/3 |
| 12  | Z Sensor Sig RET                               | MAG-J1 pin 12 | Coax Shield w/4 |
| 13  | MAG Temp Sensor RET                            | MAG-J1 pin 13 | #26 TSP w/5,14  |
| 14  | MAG Temp Sensor Shield,<br>T2                  | MAG-J1 pin 14 | #26 TSP Shield  |
| 15  | Chassis (connected in<br>BOOM to BOOM chassis) |               |                 |

(Note: This is a 1:1 harness)

## 4.3.5. BOOM-J6 (IDPU to STE-U)

| Pin | Signal                         | Destination | Harness          |
|-----|--------------------------------|-------------|------------------|
| 1   | OUTPUT1                        | STE-U       | Coax w/2         |
| 2   | OUTPUT RET                     | STE-U       | Coax Shield w/1  |
| 3   | OUTPUT2                        | STE-U       | Coax w/4         |
| 4   | OUTPUT RET                     | STE-U       | Coax Shield w/3  |
| 5   | OUTPUT3                        |             | Coax w/6         |
| 6   | OUTPUT RET                     |             | Coax Shield w/5  |
| 7   | OUTPUT4                        |             | Coax w/8         |
| 8   | OUTPUT RET                     |             | Coax Shield w/7  |
| 9   | Spare                          | STE-U       |                  |
| 10  | Test RET                       | STE-U       | Coax Shield w/11 |
| 11  | Test                           |             | Coax w/10        |
| 12  | Ground                         | STE-U       | #26 TT w/13,14   |
| 13  | +5V                            | STE-U       | #26 TT w/12,14   |
| 14  | -5V                            | STE-U       | #26 TT w/12,13   |
| 15  | Bias                           | STE-U       | #26              |
| 16  | -12V (TBR-UCB-004)             | STE-U       | #26              |
| 17  | Spare                          | STE-U       |                  |
| 18  | Spare                          | STE-U       |                  |
| 19  | Door Close Act.                | STE-U       | #26 TT w/20,21   |
| 20  | Door Open Act.                 | STE-U       | #26 TT w/19,21   |
| 21  | Door Act. RET                  | STE-U       | #26 TT w/19,20   |
| 22  | Spare                          |             |                  |
| 23  | Spare                          |             |                  |
| 24  | STE Temp                       | STE-U       | #26 TP w/25      |
| 25  | STE Temp RET                   | STE-U       | #26 TP w/24      |
| 26  | Chassis (connected to chassis) |             |                  |

Note: BOOM-J6 is connected to the STE-U pig-tail.

## 4.3.6. SWEA-P1 (IDPU to SWEA)

| Pin | Signal                                      | Destination    | Harness          |
|-----|---|----------------|------------------|
| 1   | Chassis (connected in SWEA to SWEA chassis) |                | TSP shields      |
| 2   | TLM-RET                                     | BOOM-J4 pin 12 | Coax Shield w/9  |
| 3   | SWEA Temp.                                  | BOOM-J2 pin 1  | #26 TSP w/5      |
| 4   | CMD-RET                                     | BOOM-J4 pin 7  | Coax Shield w/10 |
| 5   | SWEA Temp. RET                              | BOOM-J2 pin 6  | #26 TSP w/3      |
| 6   | CLK-RET                                     | BOOM-J4 pin 2  | Coax Shield w/11 |
| 7   | +28V Heater                                 | BOOM-J1 pin 5  | #26 TSP w/15     |
| 8   | +28V  | BOOM-J1 pin 2  | #26 TSP w/14     |
| 9   | TLM   | BOOM-J4 pin 11 | Coax w/2         |
| 10  | CMD   | BOOM-J4 pin 6  | Coax w/4         |
| 11  | CLK   | BOOM-J4 pin 1  | Coax w/6         |
| 12  | Spare                                       |                |                  |
| 13  | Spare                                       |                |                  |
| 14  | +28V RET                                    | BOOM-J1 pin 10 | #26 TSP w/8      |
| 15  | +28V Heater RET                             | BOOM-J1 pin 13 | #26 TSP w/7      |



## 4.3.7. MAG-J1 (IDPU to MAG)

| Pin | Signal  | Destination            | Harness                   |
|-----|---|------------------------|---------------------------|
| 1   | XYZ Drive   | BOOM-J5 pin 1          | Coax w/9                  |
| 2   | X Sensor Sig  | BOOM-J5 pin 2          | Coax w/10                 |
| 3   | Y Sensor Sig  | BOOM-J5 pin 3          | Coax w/11                 |
| 4   | Z Sensor Sig  | BOOM-J5 pin 4          | Coax w/12                 |
| 5   | MAG Temp Sensor                                       | BOOM-J5 pin 5          | #26 TSP w/13,14           |
| 6   | MAG Heater  | BOOM-J5 pin 6          | #26 TSP w/7,8             |
| 7   | MAG Heater RET  | BOOM-J5 pin 7          | #26 TSP w/6,8             |
| 8   | MAG Heater Shield                                     | BOOM-J5 pin 8          | #26 TSP Shield            |
| 9   | XYZ Drive RET, T2 Ret                                 | BOOM-J5 pin 9          | Coax Shield w/1           |
| 10  | X Sensor Sig RET                                      | BOOM-J5 pin 10         | Coax Shield w/2           |
| 11  | Y Sensor Sig RET                                      | BOOM-J5 pin 11         | Coax Shield w/3           |
| 12  | Z Sensor Sig RET                                      | BOOM-J5 pin 12         | Coax Shield w/4           |
| 13  | MAG Temp Sensor RET                                   | BOOM-J5 pin 13         | #26 TSP w/5,14            |
| 14  | MAG Temp Sensor Shield,<br>T2                         | BOOM-J5 pin 14         | #26 TSP Shield            |
| 15  | Chassis (Connect to thermal<br>blanket ground at MAG) | Boom chassis<br>ground | Overshield &<br>Backshell |

The wire bundle up the boom consists of the wires to MAG-J1 and SWEA-P1. This includes 7 coaxes and 5 twisted shielded pairs. A common over-shield shall be tied to chassis ground at both ends (the bottom of the boom and SWEA; MAG thermal blankets should also be connected to over-shield ground). For most of the length of the harness, the stacer shall be the outer shield; for the extension from SWEA to the MAG a shield will be added.

#### 4.4. SWEA Connectors

##### 4.4.1. SWEA-P1 (IDPU to SWEA)

See section 4.3.6

##### 4.4.2. SWEA-P3 (HV/Actuator Enable)

| Pin | Signal                            | Destination    | Harness |
|-----|-----------------------------------|----------------|---------|
| 13  | 28V Supply (sec)                  | SWEA-P3 pin 11 |         |
| 12  | 28V Supply (sec)                  | SWEA-P3 pin 2  |         |
| 15  | SWEA Cover Act. Supply            | SWEA-P3 pin 8  |         |
| 10  | STE Cover Open Act.<br>Supply     | SWEA-P3 pin 4  |         |
| 9   | STE Cover Close Act.<br>Supply    | SWEA-P3 pin 7  |         |
| 11  | 28V MCP HV                        | SWEA-P3 pin 13 |         |
| 2   | 28V NC HV                         | SWEA-P3 pin 12 |         |
| 8   | SWEA Cover Act.                   | SWEA P3-pin 15 |         |
| 4   | STE Cover Open Act.               | SWEA-P3 pin 10 |         |
| 7   | STE Cover Close Act.              | SWEA-P3 pin 9  |         |
| 14  | 28V Supply RET (pri,<br>SWEA Act) |                |         |
| 5   | RET (sec, HV, STE Act)            |                |         |
| 6   | RET (sec, HV, STE Act)            |                |         |
| 3   | RET (sec, HV, STE Act)            |                |         |
| 1   | RET (sec, HV, STE Act)            |                |         |

Note: The RET signals are for test purposes (a dummy load/indicator can be installed between the supply and RET signals to verify operation)

#### 4.5. SEP Connectors

##### 4.5.1. SEP-P1 (SEP Power)

| Pin | Signal                                    | Destination | Harness           |
|-----|---|-------------|-------------------|
| 1   | Spare                                     |             |                   |
| 2   | +28V Primary                              | Spacecraft  | #26 TSQ w/3,10,11 |
| 3   | +28V Redundant                            | Spacecraft  | #26 TSQ w/2,10,11 |
| 4   | Spare                                     |             |                   |
| 5   | +28V Heater Primary                       | Spacecraft  | #26 TSQ w/6,13,14 |
| 6   | +28V Heater Redundant                     | Spacecraft  | #26 TSQ w/5,13,14 |
| 7   | Spare                                     |             |                   |
| 8   | Chassis (connected in SEP to SEP chassis) |             |                   |
| 9   | Spare                                     |             |                   |
| 10  | +28V Return Primary                       | Spacecraft  | #26 TSQ w/2,3,11  |
| 11  | +28V Return Redundant                     | Spacecraft  | #26 TSQ w/2,3,10  |
| 12  | Spare                                     |             |                   |
| 13  | +28V Heater Return Primary                | Spacecraft  | #26 TSQ w/5,6,14  |
| 14  | +28V Heater Return Redundant              | Spacecraft  | #26 TSQ w/5,6,13  |
| 15  | Spare                                     |             |                   |

##### 4.5.2. SEP-P2 (SEP S/C Temp. Sensors)

| Pin | Signal                                    | Destination | Harness     |
|-----|---|-------------|-------------|
| 1   | SEP Temp Sensor                           | Spacecraft  | #24 TP w/9  |
| 2   | SEPT-NS Temp Sensor                       | Spacecraft  | #24 TP w/10 |
| 3   | SIT S/C TEMP                              | Spacecraft  | #24 TP w/11 |
| 4   | SEPT-E S/C TEMP                           | Spacecraft  | #24 TP w/12 |
| 5   | HET S/C TEMP                              | Spacecraft  | #24 TP w/13 |
| 6   | LET S/C TEMP                              | Spacecraft  | #24 TP w/14 |
| 7   | Spare                                     |             |             |
| 8   | Spare                                     |             |             |
| 9   | SEP Temp Sensor RTN                       | Spacecraft  | #24 TP w/1  |
| 10  | SEPT-NS S/C TEMP RTN                      | Spacecraft  | #24 TP w/2  |
| 11  | SIT S/C TEMP RTN                          | Spacecraft  | #24 TP w/3  |
| 12  | SEPT-E S/C TEMP RTN                       | Spacecraft  | #24 TP w/4  |
| 13  | HET S/C TEMP RTN                          | Spacecraft  | #24 TP w/5  |
| 14  | LET S/C TEMP RTN                          | Spacecraft  | #24 TP w/6  |
| 15  | Chassis (connected in SEP to SEP chassis) |             |             |

#### 4.5.3. SEP-P3 (SIT & SEPT Cover Actuators)

(Reconfigured, see 4.6.3; 4.7.3 and 4.8.3)

#### 4.5.4. SEP-P4 (SEP to IDPU)

| Pin | Signal                                    | Destination    | Harness          |
|-----|---|----------------|------------------|
| 1   | CLK                                       | IDPU-P4 pin 1  | Coax w/2         |
| 2   | CLK-RET                                   | IDPU-P4 pin 2  | Coax Shield w/1  |
| 3   | Spare                                     |                |                  |
| 4   | Spare                                     |                |                  |
| 5   | Spare                                     |                |                  |
| 6   | CMD                                       | IDPU-P4 pin 6  | Coax w/7         |
| 7   | CMD-RET                                   | IDPU-P4 pin 7  | Coax Shield w/6  |
| 8   | Spare                                     |                |                  |
| 9   | Spare                                     |                |                  |
| 10  | Spare                                     |                |                  |
| 11  | TLM                                       | IDPU-P4 pin 11 | Coax w/12        |
| 12  | TLM-RET                                   | IDPU-P4 pin 12 | Coax Shield w/11 |
| 13  | Spare                                     |                |                  |
| 14  | Spare                                     |                |                  |
| 15  | Chassis (connected in SEP to SEP chassis) |                |                  |

(Note: This is a 1:1 harness)

## 4.5.5. SEP-P5 (SEP to SIT)

| Pin | Signal           | Destination   | Harness           |
|-----|------------------|---------------|-------------------|
| 1   | SIT +5.1A RTN    | SIT-P1 pin 1  | #26 TQ w/19,20,36 |
| 2   | SIT Bias         | SIT-P1 pin 2  | #28 TP w/3        |
| 3   | SIT Bias         | SIT-P1 pin 3  | #28 TP w/2        |
| 4   | SIT +13A         | SIT-P1 pin 4  | #26               |
| 5   | SIT -13A         | SIT-P1 pin 5  | #26               |
| 6   | SIT -6A          | SIT-P1 pin 6  | #26               |
| 7   | SIT +3.4D        | SIT-P1 pin 7  | #26               |
| 8   | SIT -6A          | SIT-P1 in 8   | #26               |
| 9   | SIT +5.1D        | SIT-P1 pin 9  | #26               |
| 10  | SIT MSTR RTN     | SIT-P1 pin 10 | #28 TS14          |
| 11  | SIT CMD IN       | SIT-P1 pin 11 | #28 TS14          |
| 12  | SIT CMD OUT      | SIT-P1 pin 12 | #28 TS14          |
| 13  | SIT DATA OUT     | SIT-P1 pin 13 | #28 TS14          |
| 14  | SIT S/C TEMP     | SIT-P1 pin 14 | #28 TQ w/30,31,49 |
| 15  | SIT DATA OUT     | SIT-P1 pin 15 | #28 TS14          |
| 16  | SIT OP HTR       | SIT-P1 pin 16 | #28 TS8           |
| 17  | SIT INNER SHIELD | SIT-P1 pin 17 | Shield for TS14   |
| 18  | SIT SURV HTR     | SIT-P1 pin 18 | #28 TS8           |
| 19  | SIT +5.1A        | SIT-P1 pin 19 | #26 TQ w/1,20,36  |
| 20  | SIT +5.1A RTN    | SIT-P1 pin 20 | #26 TQ w/1,19,36  |
| 21  | SIT PWR RTN      | SIT-P1 pin 21 | #26               |
| 22  | SIT +13A         | SIT-P1 pin 22 | #26               |
| 23  | SIT +6A          | SIT-P1 pin 23 | #26               |
| 24  | SIT -13A         | SIT-P1 pin 24 | #26               |
| 25  | SIT -5.2D        | SIT-P1 pin 25 | #26               |
| 26  | SIT +3.4D        | SIT-P1 pin 26 | #26               |
| 27  | SIT CMD IN       | SIT-P1 pin 27 | #28 TS14          |
| 28  | SIT CMD OUT      | SIT-P1 pin 28 | #28 TS14          |
| 29  | SIT SUB RTN      | SIT-P1 pin 29 | #28 TS14          |
| 30  | SIT S/C TEMP     | SIT-P1 pin 30 | #28 TQ w/14,31,49 |
| 31  | SIT S/C TEMP RTN | SIT-P1 pin 31 | #28 TQ w/14,30,49 |
| 32  | SIT OP HTR       | SIT-P1 pin 32 | #28 TS8           |
| 33  | SIT OP HTR RTN   | SIT-P1 pin 33 | #28 TS8           |
| 34  | SIT SURV HTR     | SIT-P1 pin 34 | #28 TS8           |
| 35  | SIT SURV HTR RTN | SIT-P1 pin 35 | #28 TS8           |
| 36  | SIT +5.1A RTN    | SIT-P1 pin 36 | #26 TQ w/1,19,20  |
| 37  | SIT PWR RTN      | SIT-P1 pin 37 | #26               |
| 38  | SIT +6A          | SIT-P1 pin 38 | #26               |
| 39  | SIT -5.2D        | SIT-P1 pin 39 | #26               |
| 40  | SIT +2.6D        | SIT-P1 pin 40 | #26               |
| 41  | SIT +2.6D        | SIT-P1 pin 41 | #26               |

|    |                  |               |                   |
|----|------------------|---------------|-------------------|
| 42 | SIT +5.1D        | SIT-P1 pin 42 | #26               |
| 43 | SIT RESET        | SIT-P1 pin 43 | #28 TS14          |
| 44 | SIT RESET        | SIT-P1 pin 44 | #28 TS14          |
| 45 | SIT MSTR RTN     | SIT-P1 pin 45 | #28 TS14          |
| 46 | SIT FRAME SYNC   | SIT-P1 pin 46 | #28 TS14          |
| 47 | SIT FRAME SYNC   | SIT-P1 pin 47 | #28 TS14          |
| 48 | SIT SUB RTN      | SIT-P1 pin 48 | #28 TS14          |
| 49 | SIT S/C TEMP RTN | SIT-P1 pin 49 | #28 TQ w/14,30,31 |
| 50 | SIT OP HTR RTN   | SIT-P1 pin 50 | #28 TS8           |
| 51 | SIT SURV HTR RTN | SIT-P1 pin 51 | #28 TS8           |

(Note: This is a 1:1 harness)

Shield for TS8, along with over-shield, terminated on connector backshell

## 4.5.6. SEP-P6 (SEP to SEPT-NS)

Removed

## 4.5.7. SEP-P7 (SEP to SEPT-NS)

| Pin | Signal                        | Destination      | Harness   |
|-----|-------------------------------|------------------|---|
| 1   | SEPT-NS Bias                  | SEPTNS-P2 pin 1  | #28 TQ w/2,20,21  |
| 2   | SEPT-NS Bias RTN              | SEPTNS-P2 pin 2  | #28 TQ w/1,20,21  |
| 3   | SEPT-NS Ana RTN               | SEPTNS-P2 pin 3  | #28 TQ w/4,22,23  |
| 4   | SEPT-NS +5.6VA                | SEPTNS-P2 pin 4  | #28 TQ w/4,22,23  |
| 5   | SEPT-NS Dig RTN               | SEPTNS-P2 pin 5  | #28 T6 w/6,7,24,25,26                                       |
| 6   | SEPT-NS +2.6VD                | SEPTNS-P2 pin 6  | #28 T6 w/5,7,24,25,26                                       |
| 7   | SEPT-NS +5.3VD                | SEPTNS-P2 pin 7  | #28 T6 w/5,6,24,25,26                                       |
| 8   | SEPT-NS Star Ground           | SEPTNS-P2 pin 8  | #28   |
| 9   | SEPT-NS Cmd In                | SEPTNS-P2 pin 9  | #28 TS8 w/10,11,12,28,29,30,31                              |
| 10  | SEPT-NS Mstr RTN              | SEPTNS-P2 pin 10 | #28 TS8 w/9,11,12,28,29,30,31                               |
| 11  | SEPT-NS Data Out              | SEPTNS-P2 pin 11 | #28 TS8 w/9,10,12,28,29,30,31                               |
| 12  | SEPT-NS Sub RTN               | SEPTNS-P2 pin 12 | #28 TS8 w/9,10,11,28,29,30,31                               |
| 13  | SEPT-NS S/C Temp              | SEPTNS-P2 pin 13 | #28 TQ w/14,32,33   |
| 14  | SEPT-NS S/C Temp RTN          | SEPTNS-P2 pin 14 | #28 TP w/13,32,33   |
| 15  | SEPT-NS Op Htr                | SEPTNS-P1 pin 1  | #28 TS8 w/16,17,18,34,35,36,37                              |
| 16  | SEPT-NS Op Htr RTN            | SEPTNS-P1 pin 2  | #28 TS8 w/15,16,17,34,35,36,37                              |
| 17  | SEPT-NS Survival Htr          | SEPTNS-P1 pin 3  | #28 TS8 w/15,16,18,34,35,36,37                              |
| 18  | SEPT-NS Survival Htr RTN      | SEPTNS-P1 pin 4  | #28 TS8 w/15,16,17,34,35,36,37                              |
| 19  | SEPT-NS Internal Shield       | SEPTNS-P2 pin 16 | TS8 shield (10,11,etc.)                                     |
| 20  | SEPT-NS Bias Red.             | SEPTNS-P2 pin 17 | #28 TQ w/1,2,21   |
| 21  | SEPT-NS Bias RTN Red.         | SEPTNS-P2 pin 18 | #28 TQ w/1,2,20   |
| 22  | SEPT-NS Ana RTN Red.          | SEPTNS-P2 pin 19 | #28 TQ w/3,4,23   |
| 23  | SEPT-NS +5.6VA Red.           | SEPTNS-P2 pin 20 | #28 TQ w/3,4,22   |
| 24  | SEPT-NS Dig RTN Red.          | SEPTNS-P2 pin 21 | #28 T6 w/5,6,7,25,26  |
| 25  | SEPT-NS +2.6VD Red.           | SEPTNS-P2 pin 22 | #28 T6 w/5,6,7,24,26  |
| 26  | SEPT-NS +5.3VD Red.           | SEPTNS-P2 pin 23 | #28 T6 w/5,6,7,24,25  |
| 27  | SEPT-NS Star Ground Red.      | SEPTNS-P2 pin 24 | #28   |
| 28  | SEPT-NS Cmd In Red.           | SEPTNS-P2 pin 25 | #28 TS8 w/9,10,11,12,29,30,31                               |
| 29  | SEPT-NS Mstr RTN Red.         | SEPTNS-P2 pin 26 | #28 TS8 w/9,10,11,12,28,30,31                               |
| 30  | SEPT-NS Data Out Red.         | SEPTNS-P2 pin 27 | #28 TS8 w/9,10,11,12,28,29,31                               |
| 31  | SEPT-NS Sub RTN Red.          | SEPTNS-P2 pin 28 | #28 TS8 w/9,10,11,12,28,29,30                               |
| 32  | SEPT-NS S/C Temp Red          | SEPTNS-P2 pin 29 | #28 TQ w/13,14,33   |
| 33  | SEPT-NS S/C Temp RTN Red.     | SEPTNS-P2 pin 30 | #28 TQ w/13,14,32   |
| 34  | SEPT-NS Op Htr Red.           | SEPTNS-P1 pin 6  | #28 TS8 w/15,16,17,18,35,36,37                              |
| 35  | SEPT-NS Op Htr RTN Red.       | SEPTNS-P1 pin 7  | #28 TS8 w/15,16,17,18,34,36,37                              |
| 36  | SEPT-NS Survival Htr Red.     | SEPTNS-P1 pin 3  | #28 TS8 w/15,16,17,18,34,35,37                              |
| 37  | SEPT-NS Survival Htr RTN Red. | SEPTNS-P1 pin 4  | #28 TS8 w/15,16,17,18,34,35,36<br>(TS8 shield to backshell) |

## 4.5.8. SEP-P8 (SEP to SEPT-E)

Removed

## 4.5.9. SEP-P9 (SEP to SEPT-E)

| Pin | Signal                       | Destination     | Harness   |
|-----|------------------------------|-----------------|---|
| 1   | SEPT-E Bias                  | SEPTE-P2 pin 1  | #28 TQ w/2,20,21  |
| 2   | SEPT-E Bias RTN              | SEPTE-P2 pin 2  | #28 TQ w/1,20,21  |
| 3   | SEPT-E Ana RTN               | SEPTE-P2 pin 3  | #28 TQ w/4,22,23  |
| 4   | SEPT-E +5.6VA                | SEPTE-P2 pin 4  | #28 TQ w/4,22,23  |
| 5   | SEPT-E Dig RTN               | SEPTE-P2 pin 5  | #28 T6 w/6,7,24,25,26                                       |
| 6   | SEPT-E +2.6VD                | SEPTE-P2 pin 6  | #28 T6 w/5,7,24,25,26                                       |
| 7   | SEPT-E +5.3VD                | SEPTE-P2 pin 7  | #28 T6 w/5,6,24,25,26                                       |
| 8   | SEPT-E Star Ground           | SEPTE-P2 pin 8  | #28   |
| 9   | SEPT-E Cmd In                | SEPTE-P2 pin 9  | #28 TS8 w/10,11,12,28,29,30,31                              |
| 10  | SEPT-E Mstr RTN              | SEPTE-P2 pin 10 | #28 TS8 w/9,11,12,28,29,30,31                               |
| 11  | SEPT-E Data Out              | SEPTE-P2 pin 11 | #28 TS8 w/9,10,12,28,29,30,31                               |
| 12  | SEPT-E Sub RTN               | SEPTE-P2 pin 12 | #28 TS8 w/9,10,11,28,29,30,31                               |
| 13  | SEPT-E S/C Temp              | SEPTE-P2 pin 13 | #28 TQ w/14,32,33   |
| 14  | SEPT-E S/C Temp RTN          | SEPTE-P2 pin 14 | #28 TP w/13,32,33   |
| 15  | SEPT-E Op Htr                | SEPTE-P1 pin 1  | #28 TS8 w/16,17,18,34,35,36,37                              |
| 16  | SEPT-E Op Htr RTN            | SEPTE-P1 pin 2  | #28 TS8 w/15,16,17,34,35,36,37                              |
| 17  | SEPT-E Survival Htr          | SEPTE-P1 pin 3  | #28 TS8 w/15,16,18,34,35,36,37                              |
| 18  | SEPT-E Survival Htr RTN      | SEPTE-P1 pin 4  | #28 TS8 w/15,16,17,34,35,36,37                              |
| 19  | SEPT-E Internal Shield       | SEPTE-P2 pin 16 | TS8 shield (10,11,etc.)                                     |
| 20  | SEPT-E Bias Red.             | SEPTE-P2 pin 17 | #28 TQ w/1,2,21   |
| 21  | SEPT-E Bias RTN Red.         | SEPTE-P2 pin 18 | #28 TQ w/1,2,20   |
| 22  | SEPT-E Ana RTN Red.          | SEPTE-P2 pin 19 | #28 TQ w/3,4,23   |
| 23  | SEPT-E +5.6VA Red.           | SEPTE-P2 pin 20 | #28 TQ w/3,4,22   |
| 24  | SEPT-E Dig RTN Red.          | SEPTE-P2 pin 21 | #28 T6 w/5,6,7,25,26  |
| 25  | SEPT-E +2.6VD Red.           | SEPTE-P2 pin 22 | #28 T6 w/5,6,7,24,26  |
| 26  | SEPT-E +5.3VD Red.           | SEPTE-P2 pin 23 | #28 T6 w/5,6,7,24,25  |
| 27  | SEPT-E Star Ground Red.      | SEPTE-P2 pin 24 | #28   |
| 28  | SEPT-E Cmd In Red.           | SEPTE-P2 pin 25 | #28 TS8 w/9,10,11,12,29,30,31                               |
| 29  | SEPT-E Mstr RTN Red.         | SEPTE-P2 pin 26 | #28 TS8 w/9,10,11,12,28,30,31                               |
| 30  | SEPT-E Data Out Red.         | SEPTE-P2 pin 27 | #28 TS8 w/9,10,11,12,28,29,31                               |
| 31  | SEPT-E Sub RTN Red.          | SEPTE-P2 pin 28 | #28 TS8 w/9,10,11,12,28,29,30                               |
| 32  | SEPT-E S/C Temp Red          | SEPTE-P2 pin 29 | #28 TQ w/13,14,33   |
| 33  | SEPT-E S/C Temp RTN Red.     | SEPTE-P2 pin 30 | #28 TQ w/13,14,32   |
| 34  | SEPT-E Op Htr Red.           | SEPTE-P1 pin 6  | #28 TS8 w/15,16,17,18,35,36,37                              |
| 35  | SEPT-E Op Htr RTN Red.       | SEPTE-P1 pin 7  | #28 TS8 w/15,16,17,18,34,36,37                              |
| 36  | SEPT-E Survival Htr Red.     | SEPTE-P1 pin 3  | #28 TS8 w/15,16,17,18,34,35,37                              |
| 37  | SEPT-E Survival Htr RTN Red. | SEPTE-P1 pin 4  | #28 TS8 w/15,16,17,18,34,35,36<br>(TS8 shield to backshell) |



#### 4.6. SEPT-E Connectors

##### 4.6.1. SEPT-E-P1 (SEP to SEPT-E)

| Pin | Signal                       | Destination   | Harness   |
|-----|------------------------------|---------------|---|
| 1   | SEPT-E Op Htr                | SEP-P9 pin 15 | #28 TS8 w/16,17,18,34,35,36,37                              |
| 2   | SEPT-E Op Htr RTN            | SEP-P9 pin 16 | #28 TS8 w/15,16,17,34,35,36,37                              |
| 3   | SEPT-E Survival Htr          | SEP-P9 pin 17 | #28 TS8 w/15,16,18,34,35,36,37                              |
| 4   | SEPT-E Survival Htr RTN      | SEP-P9 pin 18 | #28 TS8 w/15,16,17,34,35,36,37                              |
| 5   | SEPT-E Chassis Ground        |               |   |
| 6   | SEPT-E Op Htr Red.           | SEP-P9 pin 34 | #28 TS8 w/15,16,17,18,35,36,37                              |
| 7   | SEPT-E Op Htr RTN Red.       | SEP-P9 pin 35 | #28 TS8 w/15,16,17,18,34,36,37                              |
| 8   | SEPT-E Survival Htr Red.     | SEP-P9 pin 36 | #28 TS8 w/15,16,17,18,34,35,37                              |
| 9   | SEPT-E Survival Htr RTN Red. | SEP-P9 pin 37 | #28 TS8 w/15,16,17,18,34,35,36<br>(TS8 shield to backshell) |

##### 4.6.2. SEPT-E-P2 (SEP to SEPT-E)

| Pin | Signal                  | Destination   | Harness                        |
|-----|-------------------------|---------------|--------------------------------|
| 1   | SEPT-E Bias             | SEP-P9 pin 1  | #28 TQ w/2,17,18               |
| 2   | SEPT-E Bias RTN         | SEP-P9 pin 2  | #28 TQ w/1,17,18               |
| 3   | SEPT-E Ana RTN          | SEP-P9 pin 3  | #28 TQ w/4,19,20               |
| 4   | SEPT-E +5.6VA           | SEP-P9 pin 4  | #28 TQ w/4,19,20               |
| 5   | SEPT-E Dig RTN          | SEP-P9 pin 5  | #28 T6 w/6,7,21,22,23          |
| 6   | SEPT-E +2.6VD           | SEP-P9 pin 6  | #28 T6 w/5,7,21,22,23          |
| 7   | SEPT-E +5.3VD           | SEP-P9 pin 7  | #28 T6 w/5,6,21,22,23          |
| 8   | SEPT-E Star Ground      | SEP-P9 pin 8  | #28                            |
| 9   | SEPT-E Cmd In           | SEP-P9 pin 9  | #28 TS8 w/10,11,12,25,26,27,28 |
| 10  | SEPT-E Mstr RTN         | SEP-P9 pin 10 | #28 TS8 w/9,11,12, 25,26,27,28 |
| 11  | SEPT-E Data Out         | SEP-P9 pin 11 | #28 TS8 w/9,10,12, 25,26,27,28 |
| 12  | SEPT-E Sub RTN          | SEP-P9 pin 12 | #28 TS8 w/9,10,11, 25,26,27,28 |
| 13  | SEPT-E S/C Temp         | SEP-P9 pin 13 | #28 TQ w/14,29,30              |
| 14  | SEPT-E S/C Temp RTN     | SEP-P9 pin 14 | #28 TQ w/13,29,30              |
| 15  | Spare                   |               |                                |
| 16  | SEPT-E Internal Shield  | SEP-P9 pin 19 | TS8 shield (10,11,etc.)        |
| 17  | SEPT-E Bias Red.        | SEP-P9 pin 20 | #28 TQ w/1,2,18                |
| 18  | SEPT-E Bias RTN Red.    | SEP-P9 pin 21 | #28 TQ w/1,2,17                |
| 19  | SEPT-E Ana RTN Red.     | SEP-P9 pin 22 | #28 TQ w/3,4,23                |
| 20  | SEPT-E +5.6VA Red.      | SEP-P9 pin 23 | #28 TQ w/3,4,22                |
| 21  | SEPT-E Dig RTN Red.     | SEP-P9 pin 24 | #28 T6 w/5,6,7,25,26           |
| 22  | SEPT-E +2.6VD Red.      | SEP-P9 pin 25 | #28 T6 w/5,6,7,24,26           |
| 23  | SEPT-E +5.3VD Red.      | SEP-P9 pin 26 | #28 T6 w/5,6,7,24,25           |
| 24  | SEPT-E Star Ground Red. | SEP-P9 pin 27 | #28                            |
| 25  | SEPT-E Cmd In Red.      | SEP-P9 pin 28 | #28 TS8 w/9,10,11,12,26,27,28  |

|    |                      |               |                               |
|----|----------------------|---------------|-------------------------------|
| 26 | SEPT-E Mstr RTN Red. | SEP-P9 pin 29 | #28 TS8 w/9,10,11,12,25,27,28 |
| 27 | SEPT-E Data Out Red. | SEP-P9 pin 30 | #28 TS8 w/9,10,11,12,25,26,28 |
| 28 | SEPT-E Sub RTN Red.  | SEP-P9 pin 31 | #28 TS8 w/9,10,11,12,25,26,27 |
| 29 | SEPT-E S/C Temp Red  | SEP-P9 pin 32 | #28 TQ w/13,14,30             |
|    | SEPT-E S/C Temp RTN  | SEP-P9 pin 33 | #28 TQ w/13,14,29             |
| 30 | Red.                 |               |                               |
| 31 | Spare                |               |                               |

## 4.6.3. SEPT-E-P3 (S/C to SEPT-E)

| Pin | Signal  | Destination | Harness     |
|-----|---|-------------|-------------|
| 1   | SEPT-E ACT1                                   | Spacecraft  | #20 TSP w/3 |
| 2   | SEPT-E ACT1                                   | Spacecraft  | #20 TSP w/4 |
| 3   | SEPT-E ACT1 RTN                               | Spacecraft  | #20 TSP w/1 |
| 4   | SEPT-E ACT1 RTN                               | Spacecraft  | #20 TSP w/2 |
| 5   | SEPT-E chassis)<br>Chassis (con. in SEPT-E to |             |             |
| 6   | SEPT-E ACT2                                   | Spacecraft  | #20 TSP w/8 |
| 7   | SEPT-E ACT2                                   | Spacecraft  | #20 TSP w/9 |
| 8   | SEPT-E ACT2 RTN                               | Spacecraft  | #20 TSP w/6 |
| 9   | SEPT-E ACT2 RTN                               | Spacecraft  | #20 TSP w/7 |

**4.7. SEPT-NS Connectors****4.7.1. SEPTNS-P1 (SEP to SEPT-NS)**

| Pin | Signal                        | Destination   | Harness   |
|-----|-------------------------------|---------------|---|
| 1   | SEPT-NS Op Htr                | SEP-P7 pin 15 | #28 TS8 w/16,17,18,34,35,36,37                              |
| 2   | SEPT-NS Op Htr RTN            | SEP-P7 pin 16 | #28 TS8 w/15,16,17,34,35,36,37                              |
| 3   | SEPT-NS Survival Htr          | SEP-P7 pin 17 | #28 TS8 w/15,16,18,34,35,36,37                              |
| 4   | SEPT-NS Survival Htr RTN      | SEP-P7 pin 18 | #28 TS8 w/15,16,17,34,35,36,37                              |
| 5   | SEPT-NS Chassis Ground        |               |   |
| 6   | SEPT-NS Op Htr Red.           | SEP-P7 pin 34 | #28 TS8 w/15,16,17,18,35,36,37                              |
| 7   | SEPT-NS Op Htr RTN Red.       | SEP-P7 pin 35 | #28 TS8 w/15,16,17,18,34,36,37                              |
| 8   | SEPT-NS Survival Htr Red.     | SEP-P7 pin 36 | #28 TS8 w/15,16,17,18,34,35,37                              |
| 9   | SEPT-NS Survival Htr RTN Red. | SEP-P7 pin 37 | #28 TS8 w/15,16,17,18,34,35,36<br>(TS8 shield to backshell) |

**4.7.2. SEPTNS-P2 (SEP to SEPT-NS)**

| Pin | Signal                   | Destination    | Harness                        |
|-----|--------------------------|----------------|--------------------------------|
| 1   | SEPT-NS Bias             | SEP-P7 pin 1   | #28 TQ w/2,17,18               |
| 2   | SEPT-NS Bias RTN         | SEP-P7 pin 2   | #28 TQ w/1,17,18               |
| 3   | SEPT-NS Ana RTN          | SEP-P7 pin 3   | #28 TQ w/4,19,20               |
| 4   | SEPT-NS +5.6VA           | SEP-P7 pin 4   | #28 TQ w/4,19,20               |
| 5   | SEPT-NS Dig RTN          | SEP-P7 pin 5   | #28 T6 w/6,7,21,22,23          |
| 6   | SEPT-NS +2.6VD           | SEP-P7 pin 6   | #28 T6 w/5,7,21,22,23          |
| 7   | SEPT-NS +5.3VD           | SEP-P7 pin 7   | #28 T6 w/5,6,21,22,23          |
| 8   | SEPT-NS Star Ground      | SEP-P7 pin 8   | #28                            |
| 9   | SEPT-NS Cmd In           | SEP-P7 pin 9   | #28 TS8 w/10,11,12,25,26,27,28 |
| 10  | SEPT-NS Mstr RTN         | SEP-P7 pin 10  | #28 TS8 w/9,11,12, 25,26,27,28 |
| 11  | SEPT-NS Data Out         | SEP-P7 pin 11  | #28 TS8 w/9,10,12, 25,26,27,28 |
| 12  | SEPT-NS Sub RTN          | SEP-P7 pin 12  | #28 TS8 w/9,10,11, 25,26,27,28 |
| 13  | SEPT-NS S/C Temp         | SEP-P7 pin 13  | #28 TQ w/14,29,30              |
| 14  | SEPT-NS S/C Temp RTN     | SEP-P7 pin 14  | #28 TQ w/13,29,30              |
| 15  | Spare                    |                |                                |
| 16  | SEPT-NS Internal Shield  | SEP-P7 pin 19  | TS8 shield (10,11,etc.)        |
| 17  | SEPT-NS Bias Red.        | SEP-P7 pin 20  | #28 TQ w/1,2,18                |
| 18  | SEPT-NS Bias RTN Red.    | SEP-P7 pin 21  | #28 TQ w/1,2,17                |
| 19  | SEPT-NS Ana RTN Red.     | SEP-P7 pin 22  | #28 TQ w/3,4,23                |
| 20  | SEPT-NS +5.6VA Red.      | SEP-P7 pin 23  | #28 TQ w/3,4,22                |
| 21  | SEPT-NS Dig RTN Red.     | SEP-P7 pin 24  | #28 T6 w/5,6,7,25,26           |
| 22  | SEPT-NS +2.6VD Red.      | SEP-P7 pin 25  | #28 T6 w/5,6,7,24,26           |
| 23  | SEPT-NS +5.3VD Red.      | SEP-P7 pin 26  | #28 T6 w/5,6,7,24,25           |
| 24  | SEPT-NS Star Ground Red. | SEP-P7 pin 27  | #28                            |
| 25  | SEPT-NS Cmd In Red.      | SEP-P7 pin 28  | #28 TS8 w/9,10,11,12,26,27,28  |
| 26  | SEPT-NS Mstr RTN Red.    | SEP-P79 pin 29 | #28 TS8 w/9,10,11,12,25,27,28  |

|    |                       |               |                               |
|----|-----------------------|---------------|-------------------------------|
| 27 | SEPT-NS Data Out Red. | SEP-P7 pin 30 | #28 TS8 w/9,10,11,12,25,26,28 |
| 28 | SEPT-NS Sub RTN Red.  | SEP-P7 pin 31 | #28 TS8 w/9,10,11,12,25,26,27 |
| 29 | SEPT-NS S/C Temp Red  | SEP-P7 pin 32 | #28 TQ w/13,14,30             |
| 30 | SEPT-NS S/C Temp RTN  | SEP-P7 pin 33 | #28 TQ w/13,14,29             |
| 31 | Red.<br>Spare         |               |                               |

## 4.7.3. SEPTNS-P3 (S/C to SEPT-NS)

| Pin | Signal  | Destination | Harness     |
|-----|---|-------------|-------------|
| 1   | SEPT-NS ACT1                                    | Spacecraft  | #20 TSP w/3 |
| 2   | SEPT-NS ACT1                                    | Spacecraft  | #20 TSP w/4 |
| 3   | SEPT-NS ACT1 RTN                                | Spacecraft  | #20 TSP w/1 |
| 4   | SEPT-NS ACT1 RTN                                | Spacecraft  | #20 TSP w/2 |
| 5   | Chassis (con. in SEPT-NS to<br>SEPT-NS chassis) |             |             |
| 6   | SEPT-NS ACT2                                    | Spacecraft  | #20 TSP w/8 |
| 7   | SEPT-NS ACT2                                    | Spacecraft  | #20 TSP w/9 |
| 8   | SEPT-NS ACT2 RTN                                | Spacecraft  | #20 TSP w/6 |
| 9   | SEPT-NS ACT2 RTN                                | Spacecraft  | #20 TSP w/7 |

## 4.8. SIT Connectors

### 4.8.1. SIT-P1 (SEP to SIT)

| Pin | Signal           | Destination   | Harness           |
|-----|------------------|---------------|-------------------|
| 1   | SIT +5.1A RTN    | SEP-P5 pin 1  | #26 TQ w/19,20,36 |
| 2   | SIT Bias         | SEP-P5 pin 2  | #28 TP w/3        |
| 3   | SIT Bias         | SEP-P5 pin 3  | #28 TP w/2        |
| 4   | SIT +13A         | SEP-P5 pin 4  | #26               |
| 5   | SIT -13A         | SEP-P5 pin 5  | #26               |
| 6   | SIT -6A          | SEP-P5 pin 6  | #26               |
| 7   | SIT +3.4D        | SEP-P5 pin 7  | #26               |
| 8   | SIT -6A          | SEP-P5 pin 8  | #26               |
| 9   | SIT +5.1D        | SEP-P5 pin 9  | #26               |
| 10  | SIT MSTR RTN     | SEP-P5 pin 10 | #28 TS14          |
| 11  | SIT CMD IN       | SEP-P5 pin 11 | #28 TS14          |
| 12  | SIT CMD OUT      | SEP-P5 pin 12 | #28 TS14          |
| 13  | SIT DATA OUT     | SEP-P5 pin 13 | #28 TS14          |
| 14  | SIT S/C TEMP     | SEP-P5 pin 14 | #28 TQ w/30,31,49 |
| 15  | SIT DATA OUT     | SEP-P5 pin 15 | #28 TS14          |
| 16  | SIT OP HTR       | SEP-P5 pin 16 | #28 TS8           |
| 17  | SIT INNER SHIELD | SEP-P5 pin 17 | Shield for TS14   |
| 18  | SIT SURV HTR     | SEP-P5 pin 18 | #28 TS8           |
| 19  | SIT +5.1A        | SEP-P5 pin 19 | #26 TQ w/1,20,36  |
| 20  | SIT +5.1A RTN    | SEP-P5 pin 20 | #26 TQ w/1,19,36  |
| 21  | SIT PWR RTN      | SEP-P5 pin 21 | #26               |
| 22  | SIT +13A         | SEP-P5 pin 22 | #26               |
| 23  | SIT +6A          | SEP-P5 pin 23 | #26               |
| 24  | SIT -13A         | SEP-P5 pin 24 | #26               |
| 25  | SIT -5.2D        | SEP-P5 pin 25 | #26               |
| 26  | SIT +3.4D        | SEP-P5 pin 26 | #26               |
| 27  | SIT CMD IN       | SEP-P5 pin 27 | #28 TS14          |
| 28  | SIT CMD OUT      | SEP-P5 pin 28 | #28 TS14          |
| 29  | SIT SUB RTN      | SEP-P5 pin 29 | #28 TS14          |
| 30  | SIT S/C TEMP     | SEP-P5 pin 30 | #28 TQ w/14,31,49 |
| 31  | SIT S/C TEMP RTN | SEP-P5 pin 31 | #28 TQ w/14,30,49 |
| 32  | SIT OP HTR       | SEP-P5 pin 32 | #28 TS8           |
| 33  | SIT OP HTR RTN   | SEP-P5 pin 33 | #28 TS8           |
| 34  | SIT SURV HTR     | SEP-P5 pin 34 | #28 TS8           |
| 35  | SIT SURV HTR RTN | SEP-P5 pin 35 | #28 TS8           |
| 36  | SIT +5.1A RTN    | SEP-P5 pin 36 | #26 TQ w/1,19,20  |
| 37  | SIT PWR RTN      | SEP-P5 pin 37 | #26               |
| 38  | SIT +6A          | SEP-P5 pin 38 | #26               |
| 39  | SIT -5.2D        | SEP-P5 pin 39 | #26               |

|    |                  |               |                   |
|----|------------------|---------------|-------------------|
| 40 | SIT +2.6D        | SEP-P5 pin 40 | #26               |
| 41 | SIT +2.6D        | SEP-P5 pin 41 | #26               |
| 42 | SIT +5.1D        | SEP-P5 pin 42 | #26               |
| 43 | SIT RESET        | SEP-P5 pin 43 | #28 TS14          |
| 44 | SIT RESET        | SEP-P5 pin 44 | #28 TS14          |
| 45 | SIT MSTR RTN     | SEP-P5 pin 45 | #28 TS14          |
| 46 | SIT FRAME SYNC   | SEP-P5 pin 46 | #28 TS14          |
| 47 | SIT FRAME SYNC   | SEP-P5 pin 47 | #28 TS14          |
| 48 | SIT SUB RTN      | SEP-P5 pin 48 | #28 TS14          |
| 49 | SIT S/C TEMP RTN | SEP-P5 pin 49 | #28 TQ w/14,30,31 |
| 50 | SIT OP HTR RTN   | SEP-P5 pin 50 | #28 TS8           |
| 51 | SIT SURV HTR RTN | SEP-P5 pin 51 | #28 TS8           |

(Note: This is a 1:1 harness)

Shield for TS8, along with over-shield, terminated on connector backshell.

#### 4.8.2. SIT-P2 (SIT HV Disable/Test)

TBD-SIT-004

#### 4.8.3. SIT-P3 (S/C to SIT)

| Pin | Signal             | Destination | Harness     |
|-----|--------------------|-------------|-------------|
| 1   | SIT ACT            | Spacecraft  | #20 TSP w/6 |
| 2   | SIT ACT            | Spacecraft  | #20 TSP w/7 |
| 3   | Spare              |             |             |
| 4   | Spare              |             |             |
| 5   | Spare              |             |             |
| 6   | SIT ACT RTN        | Spacecraft  | #20 TSP w/1 |
| 7   | SIT ACT RTN        | Spacecraft  | #20 TSP w/2 |
| 8   | Spare              |             |             |
| 9   | SIT chassis ground |             |             |

#### 4.9. **PLASTIC Connectors**

##### 4.9.1. PLA-J4 (IDPU to PLASTIC)

| Pin | Signal                                       | Destination    | Harness          |
|-----|--|----------------|------------------|
| 1   | CLK  | IDPU-P3 pin 1  | Coax w/2         |
| 2   | CLK-RET                                      | IDPU-P3 pin 2  | Coax Shield w/1  |
| 3   | Spare  |                |                  |
| 4   | Spare  |                |                  |
| 5   | Spare  |                |                  |
| 6   | CMD  | IDPU-P3 pin 6  | Coax w/7         |
| 7   | CMD-RET                                      | IDPU-P3 pin 7  | Coax Shield w/6  |
| 8   | Spare  |                |                  |
| 9   | Spare  |                |                  |
| 10  | Spare  |                |                  |
| 11  | TLM  | IDPU-P3 pin 11 | Coax w/12        |
| 12  | TLM-RET                                      | IDPU-P3 pin 12 | Coax Shield w/11 |
| 13  | Spare  |                |                  |
| 14  | Spare  |                |                  |
| 15  | Spare  |                |                  |
| 16  | Spare  |                |                  |
| 17  | Spare  |                |                  |
| 18  | Spare  |                |                  |
| 19  | Spare  |                |                  |
| 20  | Spare  |                |                  |
| 21  | Spare  |                |                  |
| 22  | Spare  |                |                  |
| 23  | Spare  |                |                  |
| 24  | Spare  |                |                  |
| 25  | Chassis (connected in<br>PLASTIC to chassis) |                |                  |

## 5. Harness Shielding and Termination

The EMC requirements called out in reference 3 detail the shielding requirements for the STEREO harnesses.

- IMPACT has submitted a waiver against the requirement for 20 mils Aluminum equivalent shielding against deep dielectric discharge effects on harnesses exterior to the spacecraft (due to immunity of the signals to small discharges).
- All noisy signals shall be internally shielded as coax or foil over-wrap. Internal shields shall be connected to signal return at both ends.
- Power shall be twisted with return lines. Primary power lines are considered noisy and will be internally shielded.
- An over-shield shall be used, terminated to the connector backshells at both ends. This shield must have an insulating over-wrap for any portion of the cable that is internal to the spacecraft bus.
- The over-shield must be circumferentially terminated to the connector body.
- The over-shield shall be terminated to spacecraft structure where the harness penetrates the spacecraft body. It may also be terminated at selected locations along its route.
- Shield bonding from shield to connector shall be less than 2.5 milliohms.

Section 6 of this document outlines which harnesses UCB, APL, and Caltech build. Each institution uses somewhat different techniques. APL harness fabrication is discussed elsewhere. The internal boom harness is described elsewhere.

### 5.1. UCB Harnesses

UCB harnesses use standard and high density D connectors (see section 3). Glenair 557-186 composite backshells will be used, Glenair Aracon Braid shall be used for the harness over-shield, with Kapton tape over-wrap used inside the bus. See Figure 5.1-1.

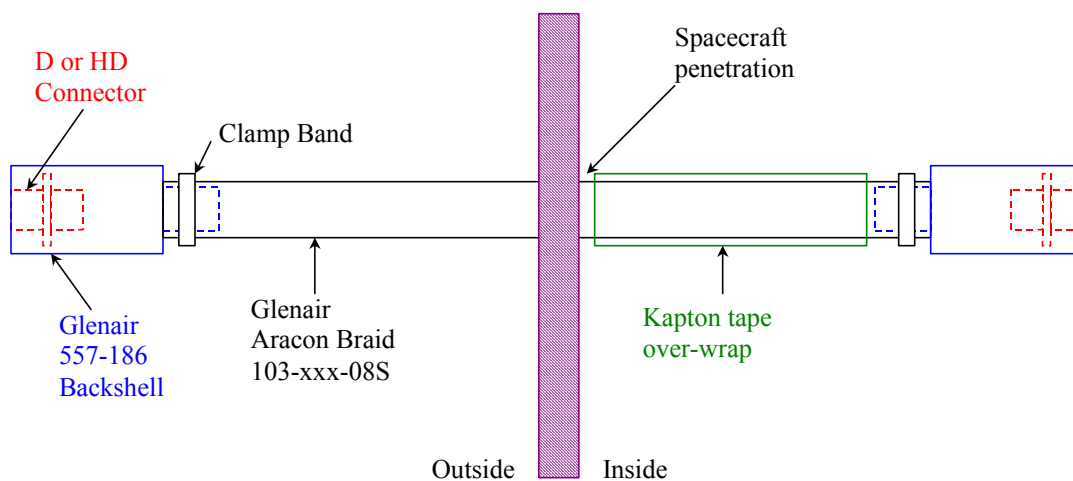


Figure 5.1-1 UCB Harness Fabrication



We have two sizes of the Aracon braid: 103-009-008S (1/4" ID) and 103-009-016S (1/2" ID). The small braid should be adequate for the IDPU-P3 to PLA-P4, IDPU-P4 to SEP-P4 and IDPU-P5 to BOOM-P4 harnesses. The larger will probably be required for IDPU-P6 to BOOM-P5 and IDPU-P7 to BOOM-P6 (use the smaller braid if it fits).

Backshells come in different connector sizes, different harness size, and different connector mounting schemes. The backshells to be used are:

| Connector | Backshell          |
|-----------|--------------------|
| IDPU-P3   | 557T186XM1F0H0-02B |
| IDPU-P4   | 557T186XM1F0H0-02B |
| IDPU-P5   | 557T186XM1F0H0-02B |
| IDPU-P6   | 557T186XM1F0H0-02B |
| IDPU-P7   | 557T186XM2F0H0-04B |
| BOOM-P4   | 557T186XM1R3H0-02B |
| BOOM-P5   | 557T186XM1R3H0-02B |
| BOOM-P6   | 557T186XM2R3H0-04B |
| SEP-P4    | 557T186XM1R3H0-02B |
| PLA-P4    | 557T186XM3R4H0-02B |

Coaxes shall be terminated and spliced to short individual wires that are attached to the connector pins. This splicing should take place inside the connector backshell if possible. Splicing should be done in such a way as to provide strain relief for the fragile coax connections.

Twisted shielded pairs shall be built up from foil-wrapped pairs extracted from the boom harness material. To avoid damage to the foil or shorting between foils and the braid, this material should be over-wrapped in kapton tape. The drain wire must be spliced to a jacketed wire or else tape-wrapped to avoid shorting with the braid or other shield wires.

In order to provide strain relief to the harness, the cable bundle (excluding over shield) shall be wrapped in kapton tape where it exists the connector backshell such that the shell clamps the harness.

The method of terminating the harness braid to the spacecraft structure at penetration (and perhaps other places) is TBD.

The method of tying down the cable to spacecraft structure is TBD

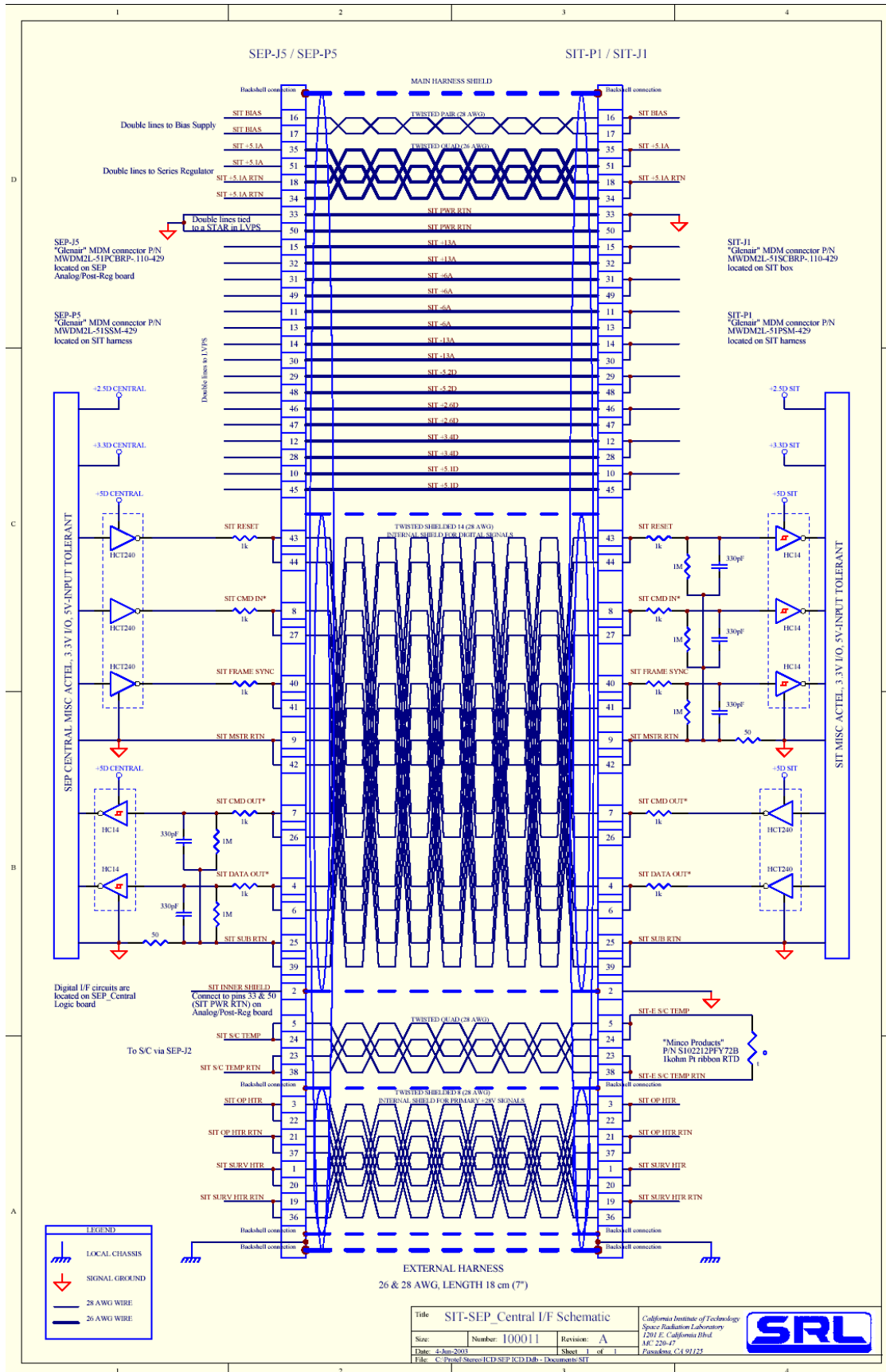
Harness manufacture must be performed in a clean area and meet the contamination requirements in reference 4, section 8.4.1.

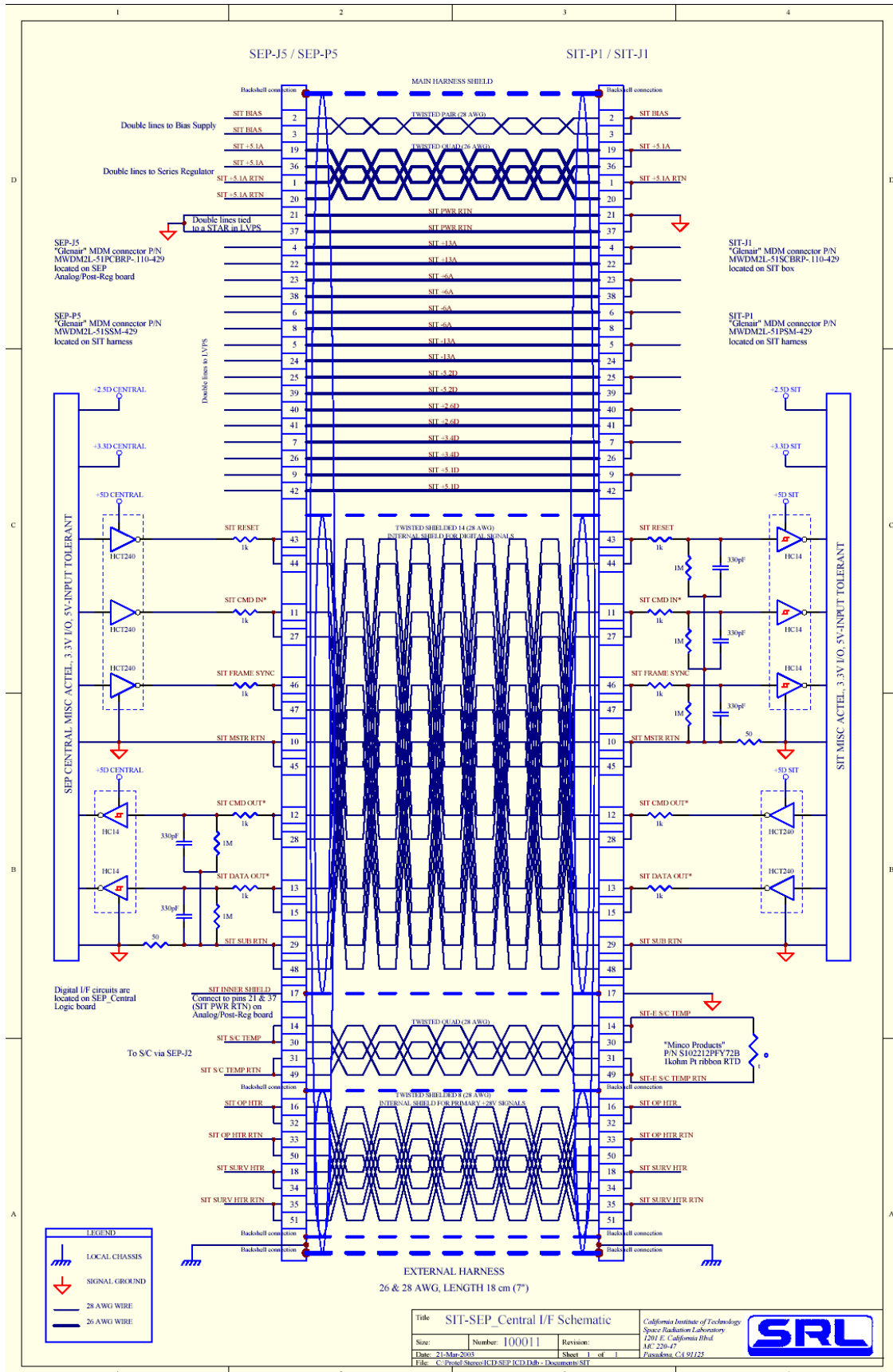
Harnesses shall be built up using the APL spacecraft mock-ups.

Harness will be continuity-checked and hi-pot tested at APL after fabrication.

## 5.2. *Caltech Harnesses*

The following two figures describe the Caltech harness design. Details of the fabrication are TBD.





## 6. Harness Responsibilities

APL is responsible for the harness between the spacecraft systems and IMPACT, including the harnesses to:

- IDPU-P1
- IDPU-P2
- BOOM-P1
- BOOM-P2
- BOOM-P3
- SEP-P1
- SEP-P2
- SIT-P3
- SEPTE-P3
- SEPTNS-P3

UCB is responsible for the harness between PLASTIC and IDPU-P3

UCB is responsible for the following harnesses:

- IDPU-P4 to SEP-P4
- IDPU-P5 to BOOM-P4
- IDPU-P6 to BOOM-P5
- IDPU-P7 to BOOM-P6
- 
- Boom Harness:
  - BOOM-J5 to MAG-J1,
  - BOOM-J1, J2, J4 to SWEA-P1
- SWEA-P3 enable plug(s)

GSFC/Acuna is responsible for the pig-tail on MAG to MAG-P1

Caltech & UCB (Caltech defines & provides connectors; UCB to build - TBR) are responsible for:

- SEPTNS-P1 and SEPTNS-P2 to SEP-P7
  - SEPTE-P1 and SEPTE-P2 to SEP-P9
  - SEP-P5 to SIT-P1

UMd is responsible for the SIT-P2 disable plug/test access harness