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| <p>CLRC</p> | <p style="text-align: center;">SPIRE HARNESS DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 1 of 136</p> |
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| Subject: | HERSCHEL SPIRE HARNESS DEFINITION |
|----------|--|

PREPARED BY: D.K. GRIFFIN **Date:**

APPROVED BY: J. DELDERFIELD..... **Date:**

APPROVED BY: K. KING..... **Date:**

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CHANGE RECORD

| ISSUE | DATE | SECTION | CHANGE(S) MADE |
|------------------|---|-------------|---|
| Draft 0.1 | 28/3/01 | All | First Issue |
| Draft 0.2 | 11/4/01 | All | Still getting it together! No unified style for lists yet. |
| Draft 0.3 | 10/5/01 | Section 3 | Update diagrams to fit latest SPIRE block diagram |
| | | W1-6 | Clarify screens as per communication 26/4/01, leaving other pins unchanged. |
| | | C&I 1&3 | Update Type 2 and Type 3 harnesses to fit 1:1 to membranes' back harness contacts, using 25pin filters. |
| | | C Type1s | Simplify by carrying signal ground on screens. |
| | | I1 | Remove nasty 3 row double density 44 way connectors |
| | | All Cs | Put in JFET and FET filter designations |
| | | I1 Type3 | Nasty 44pin 3row DCU connectors removed. |
| | | C10-C13 | Add tail wiring details. omitting FCU pin details until unit layout confirmed. Changed HSFCU J21 and J22 to 15 way because don't need more pins. |
| Draft 0.4 | 10/8/01 | Section 3 | Update diagrams to fit SPIRE block diagram iss. 2.5. This uses 37way not 25way BDA service filter modules. |
| | | BP & BS | Include JFET unit Back-Harnesses as separate section, in order to control all major Spire harnesses herein. Move overview of them from section 3 into this new one. |
| | | I11&I13 | Change HSFCU J21 and J22 back to 25way because do actually need more pins...stimulator heater omitted in iss0.3! |
| | | F1-15 | Make clear has plug/socket at HSFPU wall [A & B] |
| | | C1-13 | Ensure harness outer shields inside the cryostat include a break and do not unchangeably join the 100way CVV connector bodies to the HSFPU/HSJFP/HSJFS backshells. Linking them is a left-over from when these units and the 300mK plumbing were all fixed grounded to the cryostat. Shields inside the cryostat now come through 100way pins, reducing their availability for use as signal grounds. The harness is now compatible with the Spire grounding scheme in which either the cryogenic or the warm end of the bolometer analogue system can be joined to chassis ground. |
| | | Acronym | List inserted. |
| | | Wiring list | Append as Annex. This will be included in the IID-B but IS NOT a sufficient specification for the C/I harnesses |
| | | C1 and C3 | In draft 0.2 fixed on 12ax for C harnesses inside cryostat where practical to minimise heatleak with screened twisted pairs used on I harnesses outside where RF fields may be larger. Switch to screened twisted pairs on bias lines in C1 and C3 to improve screening at JPL's request, but taking this as OK because they are only small proportion of the overall wires. |
| C1 and C3 | JFET membrane heater wires sized same as combined JFET voltage supply wires because power needs to be the same and heaters will now be sized to make their voltages similar | | |
| Draft 0.4 contd. | 10/8/01 | C1-2 & C4-9 | Show 12ax third wires as joined to ground pin at 25way MDMs and not just at the 100way CVV connectors, to reduce ground noise. |

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| | | C1 and I1 | Remove 300mK Thermal Control Thermistor a.c. Biasing from Spectrometer side harness. |
| | | I11 & I13 | BSM temp. removed from BSM tail listing as is already in temperature sensors' tail |
| | | T Harnesses | Update Harness drawing etc. to remove "sync": from S/C to HSDRCU and to split EGSE units. |
| | | C/I 10 & 12 | Remove JFET box thermistors included in error. Affects DCU J23 and J24 + FCU J23 and J24. Permits cleaner shield to 100way pin allocations. |
| | | C/I 10 & 12 | Change to updated Spectrometer Calibrator Wiring. |
| | | C3 | Alter multiple heater wires to be in same proportions as multiplicity of JFET modules they heat, rather than the reverse! This arrangement is a bit of a left-over from using 12-ax for this harness, and may disappear in the next issue. |
| 0.5 | 22/8/01 | Appendix | Include Channel # cross-reference listing. |
| | | C4 | Remove notes on tail connector PCB tracking. |
| | | F1-15 | Include pinouts |
| | | C/I 11&13 | Adjust launch latch wires as requested. |
| 0.6 | 15/09/01 | C/I 11&13 | Update based on SMEC lists "010906.doc" |
| | | Section 3 | Update harness layout with new SMEC FCU connectors |
| | | At end | Append grounding diagram as agreed. |
| | | Annex | Put SMEC updates into wiring list. |
| | | C1/3+Annex | Sort out sexes of RF filters so all the same as C11/13 |
| | | C/I 11&13 | Make BSM latch drive wire resistance same as SMEC's |

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ACRONYM LIST

| Term | Meaning |
|-------------|--|
| ADC | Analogue to Digital Converter |
| AIV | Assembly, Integration and Verification |
| AME | Absolute Measurement Error |
| AOCS | Attitude and Orbit Control System |
| APART | Arizona's Program for the Analysis of Radiation Transfer |
| APE | Absolute Pointing Error |
| ASAP | Advanced Systems Analysis Program |
| AVM | Avionics Model |
| BDA | Bolometer Detector Array |
| BFL | Back Focal Length |
| BRO | Breault Research Organization |
| BSM | Beam Steering Mirror |
| CDMS | Command and Data Management System |
| CDMU | Command and Data Management Unit |
| CDR | Critical Design Review |
| CMOS | Complimentary Metal Oxide Silicon |
| CPU | Central Processing Unit |
| CVV | Cryostat Vacuum Vessel |
| DAC | Digital to Analogue Converter |
| DAQ | Data Acquisition |
| DCU | Detector Control Unit = HSDCU |
| DPU | Digital Processing Unit = HSDPU |
| DSP | Digital Signal Processor |
| DQE | Detective Quantum Efficiency |
| EDAC | Error Detection and Correction |
| EGSE | Electrical Ground Support Equipment |
| EMC | Electro-magnetic Compatibility |
| EMI | Electro-magnetic Interference |
| ESA | European Space Agency |
| FCU | FCU Control Unit = HSFCU |
| FIR | Far Infrared |
| FIRST | Far Infra-Red and Submillimetre Telescope |
| FOV | Field of View |
| F-P | Fabry-Perot |
| FPGA | Field Programmable Gate Array |
| FPU | Focal Plane Unit |
| FTS | Fourier Transform Spectrometer |
| FWHM | Full Width Half maximum |
| GSFC | Goddard Space Flight Center |
| HK | House Keeping |
| HOB | Herschel Optical Bench |
| HPDU | Herschel Power Distribution Unit |
| HSDCU | Herschel-SPIRE Detector Control Unit |
| HSDPU | Herschel-SPIRE Digital Processing Unit |
| HSFCU | Herschel-SPIRE FPU Control Unit |
| HSO | Herschel Space Observatory |
| IF | Interface |
| IID-A | Instrument Interface Document - Part A |
| IID-B | Instrument Interface Document - Part B |
| IMF | Initial Mass Function |

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| Term | Meaning |
|-------------|---|
| IR | Infrared |
| IRD | Instrument Requirements Document |
| IRTS | Infrared Telescope in Space |
| ISM | Interstellar Medium |
| JFET | Junction Field Effect Transistor |
| ISO | Infrared Space Observatory |
| LCL | Latching Current Limiter |
| LIA | Lock-In Amplifier |
| LVDT | Linear Variable Differential Transformer |
| MAC | Multi Axis Controller |
| LWS | Long Wave Spectrometer (an instrument used on ISO) |
| MCU | Mechanism Control Unit = HSMCU |
| M-P | Martin-Puplett |
| NEP | Noise Equivalent Power |
| NTD | Neutron Transmutation Doped |
| OBS | On-Board Software |
| OMD | Observing Modes Document |
| OPD | Optical Path Difference |
| PACS | Photodetector Array Camera and Spectrometer |
| PCAL | Photometer Calibration source |
| PID | Proportional, Integral and Differential (used in the context of feedback control loop architecture) |
| PLW | Photometer, Long Wavelength |
| PMW | Photometer, Medium Wavelength |
| POF | Photometer Observatory Function |
| PROM | Programmable Read Only Memory |
| PSW | Photometer, Short Wavelength |
| PUS | Packet Utilisation Standard |
| RMS | Root Mean Squared |
| SCAL | Spectrometer Calibration Source |
| SCUBA | Submillimetre Common User Bolometer Array |
| SED | Spectral Energy Distribution |
| SMEC | Spectrometer Mechanics |
| SMPS | Switch Mode Power Supply |
| SOF | Spectrometer Observatory Function |
| SPIRE | Spectral and Photometric Imaging Receiver |
| SRAM | Static Random Access Memory |
| SSSD | SubSystem Specification Document |
| STP | Standard Temperature and Pressure |
| SVM | Service Module |
| TBC | To Be Confirmed |
| TBD | To Be Determined |
| TC | Telecommand |
| URD | User Requirements Document |
| UV | Ultra Violet |
| WE | Warm Electronics |
| ZPD | Zero Path Difference |

DISTRIBUTION LIST

| Institute | Holder | Issue/ Revision and Distribution Date | | | | | | | |
|-----------|-------------|---------------------------------------|----------------|----------------|----------------|----------------|----------------|--|--|
| | | 0.1 28/3/01 | 0.2 11/4/01 | 0.3 10/5/01 | 0.4 10/8/01 | 0.5 22/8/01 | 0.6 15/9/01 | | |
| RAL | Delderfield | x | x | x | x | x | x | | |
| | Swinyard | x | x | x | x | x | x | | |
| | Griffin | x | x | x | x | x | x | | |
| | Parker | x | x | x | x | x | x | | |
| | King | x | x | x | x | x | x | | |
| | Smith | | | | | | | | |
| QMW | Griffin | x | x | x | x | x | x | | |
| | Hargrave | x | x | x | x | x | x | | |
| ATC | Cunningham | x | x | x | x | x | x | | |
| | Stobie | x | x | x | x | x | x | | |
| MSSL | Winter | x | x | x | x | x | x | | |
| CEA-SBT | Duband | x | x | x | x | x | x | | |
| CEA-SAP | Cara | x | x | x | x | x | x | | |
| | Auguères | x | x | x | x | x | x | | |
| | Pinsard | x | x | x | x | x | x | | |
| JPL | Bock | x | x | x | x | x | x | | |
| | Lilienthal | x | x | x | x | x | x | | |
| | Hristov | x | x | x | x | x | x | | |
| LAM | Pouliquen | x | x | x | x | x | x | | |
| Can. | Taylor | x | x | x | x | x | x | | |
| | Peterson | x | x | x | x | x | x | | |
| ESA | Jackson | x | x | x | x | x | x | | |
| | Heske | x | x | x | x | x | x | | |
| | Bruston | | | | x | x | x | | |
| CESR | Pons | x | x | x | x | x | x | | |
| IFSI | Giorgio | x | x | x | x | x | x | | |
| | Orfei | x | x | x | x | x | x | | |
| ALCATEL | Lund | | | | x | x | x | | |
| Astrium | Fass | | | | | | X | | |

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1 SCOPE

This document at its latest issue is the primary definition of all HERSCHEL SPIRE flight harnesses.

It is an applicable document in the SPIRE IID-B, and as such is called up, and is applicable in full, to all SPIRE subsystems

It also contains information covering some test harnesses, but some harnesses / back-planes that stay entirely within sub-systems are not necessarily included.

Electrical and physical data are included, included contact functions, screening details, hold-down/shape details if appropriate, etc.. This information will become more detailed as designs are refined until it can be used as a basis for harness manufacture.

A conductor count/sizing summary list for the C/I series cryoharness is appended as an Annex and may, together with other summary information, be edited into the SPIRE IID-B. Spire is unusual in that these harnesses are not standard I/Fs between separately grounded systems but rather links within extended analogue systems. As such, the conductor count/sizing summary list alone is not an adequate specification to ensure the required performance, particularly w.r.t. consistency between ground calibration and flight performance.

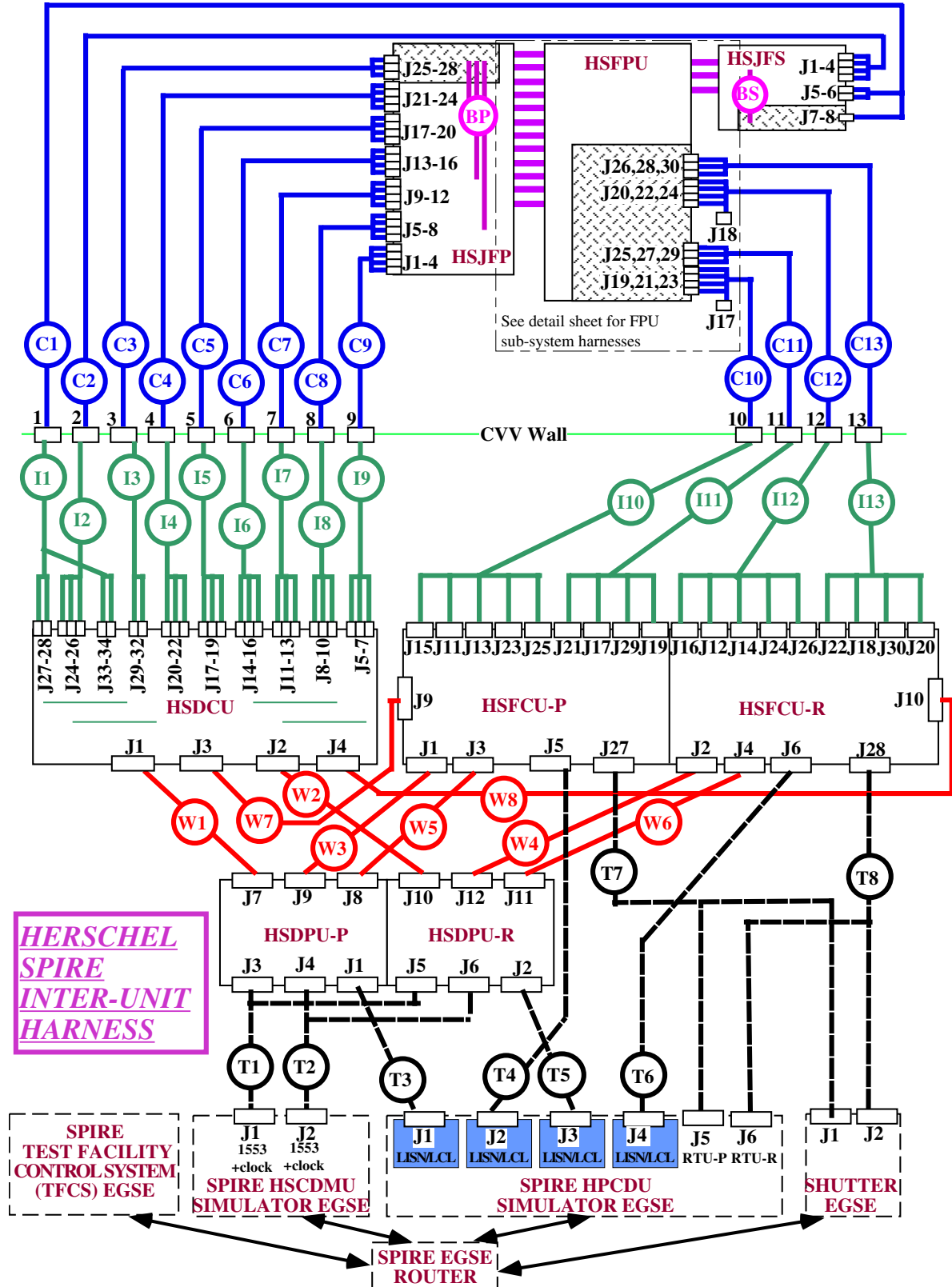
The Spire instrument grounding diagram is appended.

2 APPLICABLE DOCUMENTS

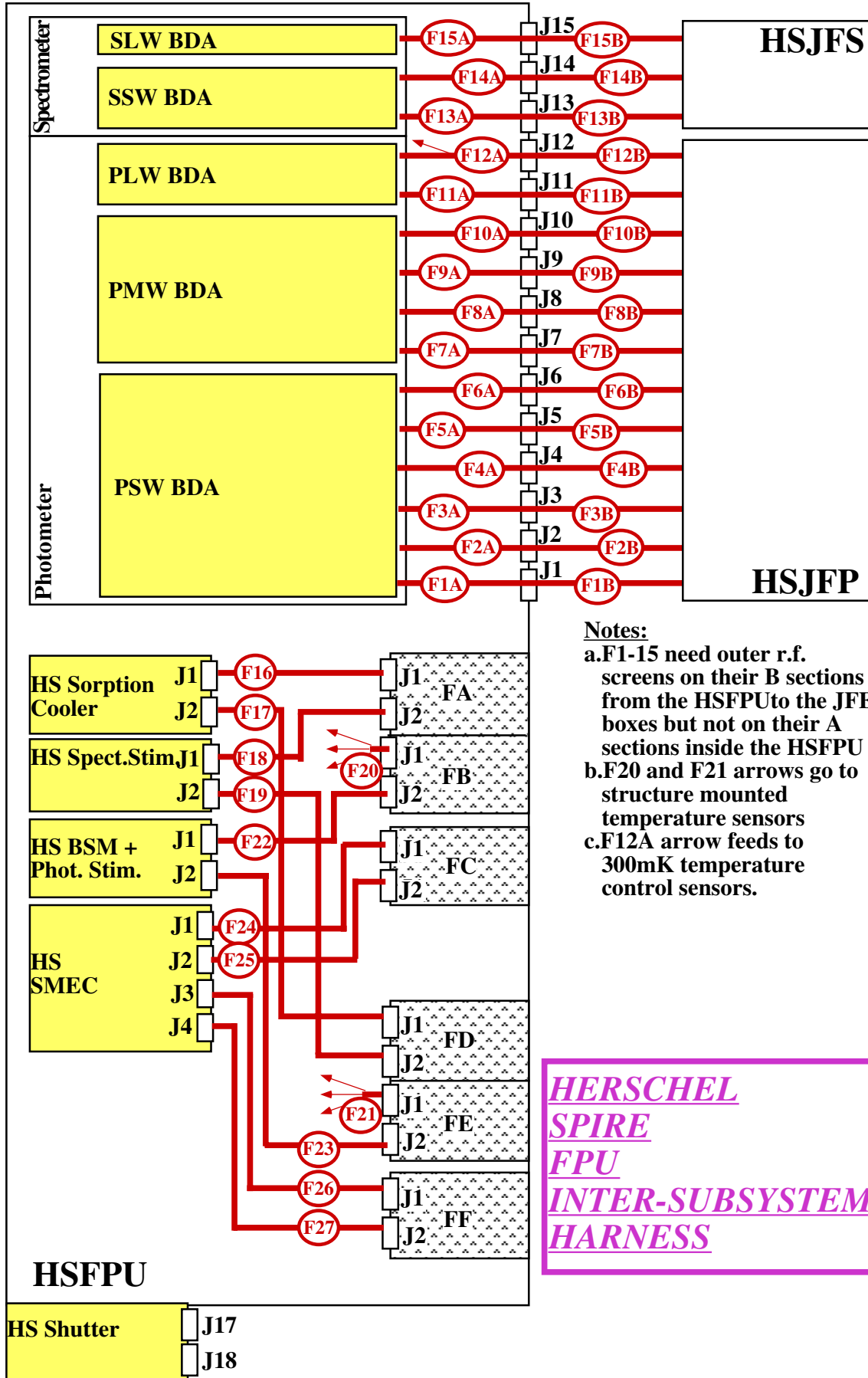
| ID | TITLE | NUMBER |
|------|---|----------------------|
| AD-1 | SPIRE Development Plan and Model Philosophy | SPIRE-RAL-PRJ-000035 |

3 INTRODUCTION

The overall HERSCHEL SPIRE harnesses are configured as shown:



The details in the HSFPU are as follows:



- Notes:**
- a. F1-15 need outer r.f. screens on their B sections from the HSFPU to the JFET boxes but not on their A sections inside the HSFPU
 - b. F20 and F21 arrows go to structure mounted temperature sensors
 - c. F12A arrow feeds to 300mK temperature control sensors.

HERSCHEL
SPIRE
FPU
INTER-SUBSYSTEM
HARNES

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Notes:

There are some "loop" harnesses that start and terminate within the same unit, such as on the HS DCU. These are treated as parts of the units rather than instrument harness.

The HSJFS + HSJFP "back-harnesses", BS and BP respectively, are now within the scope of this document as they permit the instrument 's architecture to be more clearly followed.

The Test harnesses, type T, are shown dashed as they are non-flight and will be substituted by ESA Contractor furnished items as SPIRE is integrated on to HERSCHEL. They will be RAL furnished for use with the instrument EGSE, but individual suppliers will need to make their own versions for unit level testing before delivery to the instrument.

The Cryogenic and Intermediate harnesses, types C and I, are RAL furnished for instrument level calibration but again are substituted by ESA Contractor furnished items as SPIRE is integrated on to HERSCHEL.

The FPU harnesses, F series, are each provided by the institute which sources the sub-system to which they connect.

The model philosophy definition, in AD-1, can be used to determine how many versions of each harness are required for the programme. For SPIRE it is necessary that most harnesses, of whatever version, are EMC and thermally representative.

4 HARNESS DETAILS

4.1 Warm Harnesses

4.1.1 W1 HSDPU-P to HSDCU-P

Overall Mechanical Drwg.

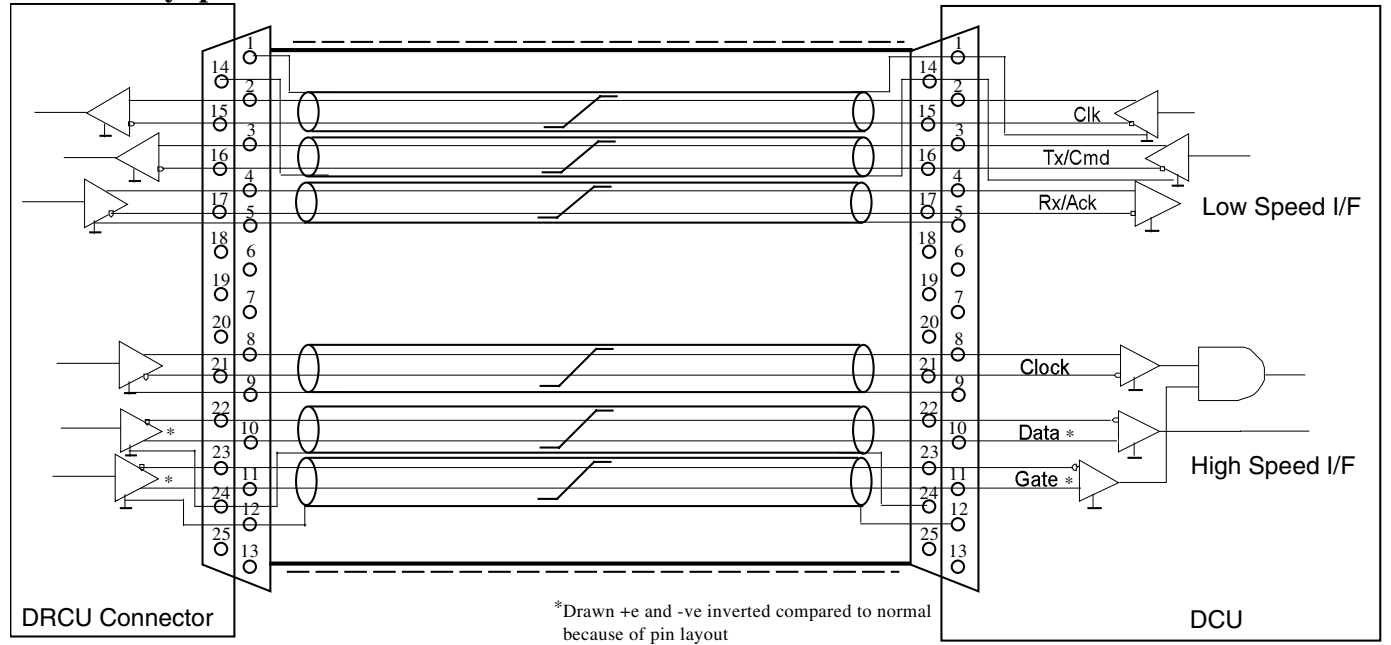
1:1 harness of insulated screened 28AWG twisted pairs with backshell to backshell screen, covered on outside with insulation.

Connector/Backshell Details

Prime Side Harness

DBMA 25 P +XXXX to mate with DCU J1 t o DBMA 25 S +XXXX to mate with DPU J7

Harness Layup



Contact Details

Wired 1:1 in harness

| Signal Name | Pin | Wire | Signal Name | Pin | Wire |
|----------------|-----|-------------|----------------|-----|-------------|
| CLKS-DCU_P_shd | 1 | 28AWG STP-A | CMD-DCU_P_shd | 14 | 28AWG STP-B |
| CLKS-DCU_P_+ | 2 | 28AWG STP-A | CLKS-DCU_P_- | 15 | 28AWG STP-A |
| CMD-DCU_P_+ | 3 | 28AWG STP-B | CMD-DCU_P_- | 16 | 28AWG STP-B |
| ACK-DCU_P_+ | 4 | 28AWG STP-C | ACK-DCU_P_- | 17 | 28AWG STP-C |
| ACK-DCU_P_shd | 5 | 28AWG STP-C | | 18 | |
| | 6 | | | 19 | |
| | 7 | | | 20 | |
| CLKF-DCU_P_+ | 8 | 28AWG STP-D | CLKF-DCU_P_- | 21 | 28AWG STP-D |
| CLKF-DCU_P_shd | 9 | 28AWG STP-D | DATA-DCU_P_- | 22 | 28AWG STP-E |
| DATA-DCU_P_+ | 10 | 28AWG STP-E | GATE-DCU_P_- | 23 | 28AWG STP-F |
| GATE-DCU_P_+ | 11 | 28AWG STP-F | DATA-DCU_P_shd | 24 | 28AWG STP-E |
| GATE-DCU_P_shd | 12 | 28AWG STP-F | | 25 | |
| | 13 | | | | |

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4.1.2 W2 HSDPU-R to HSDCU-R

Overall Mechanical Drwg.

1:1 harness of insulated screened 28AWG twisted pairs with backshell to backshell screen, covered on outside with insulation.

Connector/Backshell Details

Redundant side harness

DBMA 25 P +XXXX to mate with DCU J2 t o DBMA 25 S +XXXX to mate with DPU J10

Harness Layup

As W1

Contact Details

Wired 1:1 in harness

| Signal Name | Pin | Wire | Signal Name | Pin | Wire |
|----------------|-----|-------------|----------------|-----|-------------|
| CLKS-DCU_R_shd | 1 | 28AWG STP-A | CMD-DCU_R_shd | 14 | 28AWG STP-B |
| CLKS-DCU_R_+ | 2 | 28AWG STP-A | CLKS-DCU_R_- | 15 | 28AWG STP-A |
| CMD-DCU_R_+ | 3 | 28AWG STP-B | CMD-DCU_R_- | 16 | 28AWG STP-B |
| ACK-DCU_R_+ | 4 | 28AWG STP-C | ACK-DCU_R_- | 17 | 28AWG STP-C |
| ACK-DCU_R_shd | 5 | 28AWG STP-C | | 18 | |
| | 6 | | | 19 | |
| | 7 | | | 20 | |
| CLKF-DCU_R_+ | 8 | 28AWG STP-D | CLKF-DCU_R_- | 21 | 28AWG STP-D |
| CLKF-DCU_R_shd | 9 | 28AWG STP-D | DATA-DCU_R_- | 22 | 28AWG STP-E |
| DATA-DCU_R_+ | 10 | 28AWG STP-E | GATE-DCU_R_- | 23 | 28AWG STP-F |
| GATE-DCU_R_+ | 11 | 28AWG STP-F | DATA-DCU_R_shd | 24 | 28AWG STP-E |
| GATE-DCU_R_shd | 12 | 28AWG STP-F | | 25 | |
| | 13 | | | | |

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4.1.3 W3 HSDPU-P to HSSCU-P

Overall Mechanical Drwg.

1:1 harness of insulated screened 28AWG twisted pairs with backshell to backshell screen, covered on outside with insulation.

Connector/Backshell Details

Prime Side Harness

DBMA 25 P +XXXX to mate with FCU J1 t o DBMA 25 S +XXXX to mate with DPU J9

Harness Layup

As W1

Contact Details

Wired 1:1 in harness

| Signal Name | Pin | Wire | Signal Name | Pin | Wire |
|----------------|-----|-------------|----------------|-----|-------------|
| CLKS-SCU_P_shd | 1 | 28AWG STP-A | CMD-SCU_P_shd | 14 | 28AWG STP-B |
| CLKS-SCU_P_+ | 2 | 28AWG STP-A | CLKS-SCU_P_- | 15 | 28AWG STP-A |
| CMD-SCU_P_+ | 3 | 28AWG STP-B | CMD-SCU_P_- | 16 | 28AWG STP-B |
| ACK-SCU_P_+ | 4 | 28AWG STP-C | ACK-SCU_P_- | 17 | 28AWG STP-C |
| ACK-SCU_P_shd | 5 | 28AWG STP-C | | 18 | |
| | 6 | | | 19 | |
| | 7 | | | 20 | |
| CLKF-SCU_P_+ | 8 | 28AWG STP-D | CLKF-SCU_P_- | 21 | 28AWG STP-D |
| CLKF-SCU_P_shd | 9 | 28AWG STP-D | DATA-SCU_P_- | 22 | 28AWG STP-E |
| DATA-SCU_P_+ | 10 | 28AWG STP-E | GATE-SCU_P_- | 23 | 28AWG STP-F |
| GATE-SCU_P_+ | 11 | 28AWG STP-F | DATA-SCU_P_shd | 24 | 28AWG STP-E |
| GATE-SCU_P_shd | 12 | 28AWG STP-F | | 25 | |
| | 13 | | | | |

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4.1.4 W4 HSDPU-R to HSSCU-R

Overall Mechanical Drwg.

1:1 harness of insulated screened 28AWG twisted pairs with backshell to backshell screen, covered on outside with insulation.

Connector/Backshell Details

Redundant side harness

DBMA 25 P +XXXX to mate with FCU J2 t o DBMA 25 S +XXXX to mate with DPU J12

Harness Layup

As W1

Contact Details

Wired 1:1 in harness

| Signal Name | Pin | Wire | Signal Name | Pin | Wire |
|----------------|-----|-------------|----------------|-----|-------------|
| CLKS-SCU_R_shd | 1 | 28AWG STP-A | CMD-SCU_R_shd | 14 | 28AWG STP-B |
| CLKS-SCU_R_+ | 2 | 28AWG STP-A | CLKS-SCU_R_- | 15 | 28AWG STP-A |
| CMD-SCU_R_+ | 3 | 28AWG STP-B | CMD-SCU_R_- | 16 | 28AWG STP-B |
| ACK-SCU_R_+ | 4 | 28AWG STP-C | ACK-SCU_R_- | 17 | 28AWG STP-C |
| ACK-SCU_R_shd | 5 | 28AWG STP-C | | 18 | |
| | 6 | | | 19 | |
| | 7 | | | 20 | |
| CLKF-SCU_R_+ | 8 | 28AWG STP-D | CLKF-SCU_R_- | 21 | 28AWG STP-D |
| CLKF-SCU_R_shd | 9 | 28AWG STP-D | DATA-SCU_R_- | 22 | 28AWG STP-E |
| DATA-SCU_R_+ | 10 | 28AWG STP-E | GATE-SCU_R_- | 23 | 28AWG STP-F |
| GATE-SCU_R_+ | 11 | 28AWG STP-F | DATA-SCU_R_shd | 24 | 28AWG STP-E |
| GATE-SCU_R_shd | 12 | 28AWG STP-F | | 25 | |
| | 13 | | | | |

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4.1.5 W5 HSDPU-P to HSMCU-P

Overall Mechanical Drwg.

1:1 harness of insulated screened 28AWG twisted pairs with backshell to backshell screen, covered on outside with insulation.

Connector/Backshell Details

Prime Side Harness

DBMA 25 P +XXXX to mate with FCU J3 t o DBMA 25 S +XXXX to mate with DPU J8

Harness Layup

As W1

Contact Details

Wired 1:1 in harness

| Signal Name | Pin | Wire | Signal Name | Pin | Wire |
|----------------|-----|-------------|----------------|-----|-------------|
| CLKS-MCU_P_shd | 1 | 28AWG STP-A | CMD-MCU_P_shd | 14 | 28AWG STP-B |
| CLKS-MCU_P_+ | 2 | 28AWG STP-A | CLKS-MCU_P_- | 15 | 28AWG STP-A |
| CMD-MCU_P_+ | 3 | 28AWG STP-B | CMD-MCU_P_- | 16 | 28AWG STP-B |
| ACK-MCU_P_+ | 4 | 28AWG STP-C | ACK-MCU_P_- | 17 | 28AWG STP-C |
| ACK-MCU_P_shd | 5 | 28AWG STP-C | | 18 | |
| | 6 | | | 19 | |
| | 7 | | | 20 | |
| CLKF-MCU_P_+ | 8 | 28AWG STP-D | CLKF-MCU_P_- | 21 | 28AWG STP-D |
| CLKF-MCU_P_shd | 9 | 28AWG STP-D | DATA-MCU_P_- | 22 | 28AWG STP-E |
| DATA-MCU_P_+ | 10 | 28AWG STP-E | GATE-MCU_P_- | 23 | 28AWG STP-F |
| GATE-MCU_P_+ | 11 | 28AWG STP-F | DATA-MCU_P_shd | 24 | 28AWG STP-E |
| GATE-MCU_P_shd | 12 | 28AWG STP-F | | 25 | |
| | 13 | | | | |

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4.1.6 W6 HSDPU-R to HSMCU-R

Overall Mechanical Drwg.

1:1 harness of insulated screened 28AWG twisted pairs with backshell to backshell screen, covered on outside with insulation.

Connector/Backshell Details

Redundant side harness

DBMA 25 P +XXXX to mate with FCU J4 t o DBMA 25 S +XXXX to mate with DPU J11

Harness Layup

As W1

Contact Details

Wired 1:1 in harness

| Signal Name | Pin | Wire | Signal Name | Pin | Wire |
|----------------|-----|-------------|----------------|-----|-------------|
| CLKS-MCU_R_shd | 1 | 28AWG STP-A | CMD-MCU_R_shd | 14 | 28AWG STP-B |
| CLKS-MCU_R_+ | 2 | 28AWG STP-A | CLKS-MCU_R_- | 15 | 28AWG STP-A |
| CMD-MCU_R_+ | 3 | 28AWG STP-B | CMD-MCU_R_- | 16 | 28AWG STP-B |
| ACK-MCU_R_+ | 4 | 28AWG STP-C | ACK-MCU_R_- | 17 | 28AWG STP-C |
| ACK-MCU_R_shd | 5 | 28AWG STP-C | | 18 | |
| | 6 | | | 19 | |
| | 7 | | | 20 | |
| CLKF-MCU_R_+ | 8 | 28AWG STP-D | CLKF-MCU_R_- | 21 | 28AWG STP-D |
| CLKF-MCU_R_shd | 9 | 28AWG STP-D | DATA-MCU_R_- | 22 | 28AWG STP-E |
| DATA-MCU_R_+ | 10 | 28AWG STP-E | GATE-MCU_R_- | 23 | 28AWG STP-F |
| GATE-MCU_R_+ | 11 | 28AWG STP-F | DATA-MCU_R_shd | 24 | 28AWG STP-E |
| GATE-MCU_R_shd | 12 | 28AWG STP-F | | 25 | |
| | 13 | | | | |

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4.1.7 W7 HSFCU-P to HSDCU-P

Overall Mechanical Drwg.

1:1

Connector/Backshell Details
Prime side secondary power distribution harness
DBMA 25 P +XXXX to mate with FCU J9 t o DBMA 25 S +XXXX to mate with DCU J3

Harness Layup

Contact Details

TBC

| | | |
|-------------|------------------------------------|---|
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4.1.8 W8 HSFCU-R to HSDCU-R

Overall Mechanical Drwg.

1:1

Connector/Backshell Details

Redundant side secondary power distribution harness

DBMA 25 P +XXXX to mate with FCU J10 t o DBMA 25 S +XXXX to mate with DCU J4

Harness Layup

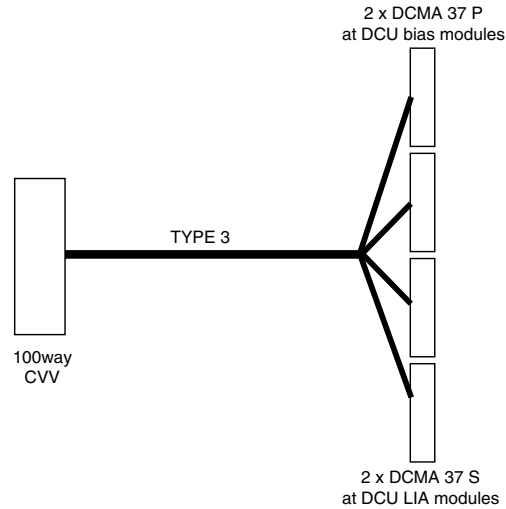
As W7

Contact Details

As W7

4.2 Intermediate Harnesses
4.2.1 I1 HSDCU to CVV1 Type3

Overall Mechanical Drwg.

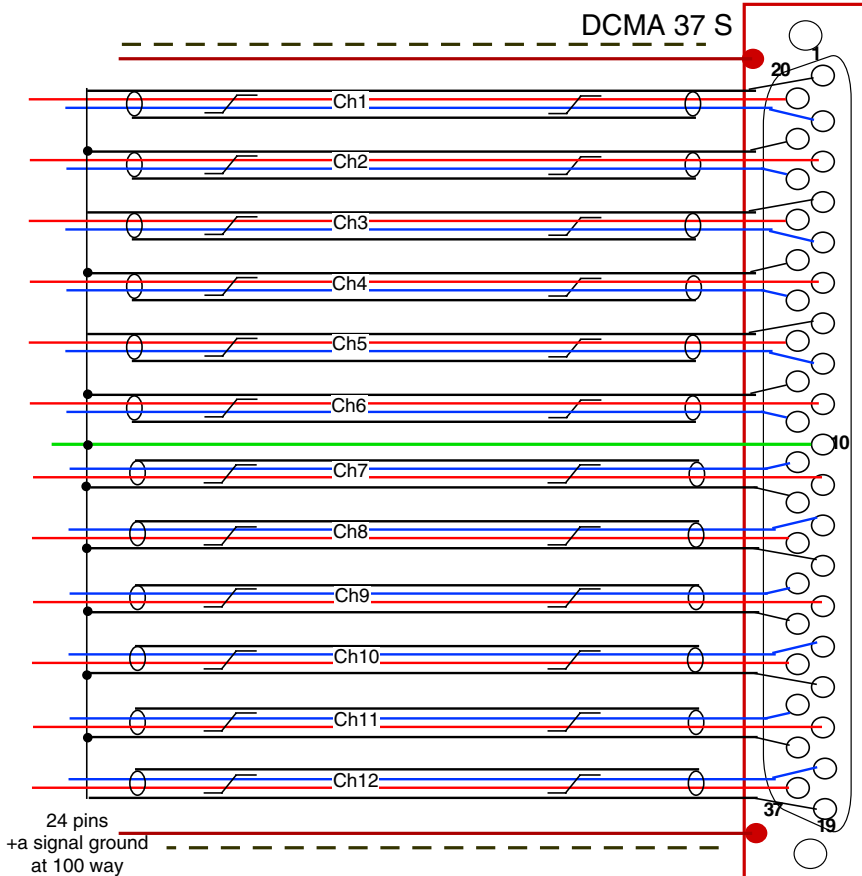


Connector/Backshell Details:

DCMA 37 S + XXXX: interface to HSDCU J27 12ch. bolometer
 DCMA 37 S + XXXX: interface to HSDCU J28 12ch. bolometer
 DCMA 37 P + XXXX: interface to HSDCU J33 Spect bias A
 DCMA 37 P + XXXX: interface to HSDCU J34 Spect bias B

Harness Lay-up

Two Bolometers Tails thus:



12 Channel Bolometer Tail (typ) for Type 3 & Type4 Spectrometer Harness.

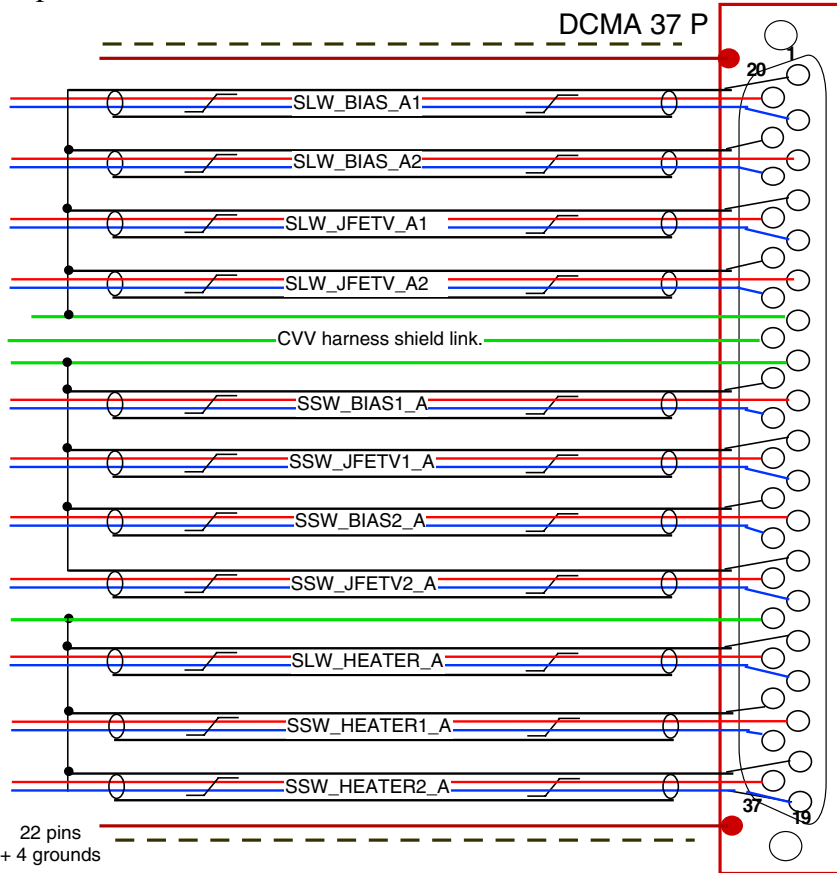
Common to all such tails, although others have ch. 13-24, etc.
 Good flat layup for cryoharness

12 insulated screened twisted pairs plus 1 ground wire.

The whole overlain with RF screen shown: ——— joined to backshell CVV and DCU ends.

Dotted lines show insulation, probably put around bundles but only strictly needed at clamp points.

Two Spectrometer Bias tails thus:



DCU Type 3 Bias Tail

Two such tails, other with B instead of A at end of each name.

Good flat layup for cryoharness

11 insulated screened twisted pairs plus 3 ground wires.

The whole overlain with RF screen shown: ——— joined to backshell CVV and DCU ends.

Dotted lines show insulation, probably put around bundles but only strictly needed at clamp points.

Contact Details

There are $(22+24) \times 2 = 92$ signal wires, leaving 8 spare on the 100 way. There are actually 10 ground wires but they only have five functions, so some judicious pin sharing will be needed but note that this harness carries signal and bias for two BDAs, etc. so to keep the ground configuration loopfree the signal ground pins through the 100way are not all commoned together as in Type 1 harness

| Name | 100Way #1 | 37way A J27 | 37wayBJ28 | 37way C J33 | 37way D J34 |
|-------------------|-----------|-------------|-----------|-------------|-------------|
| Channel 1 + | TBD | 20 | | | |
| Channel 1 - | TBD | 2 | | | |
| Channel 1gnd shld | XXX | 1 | | | |
| Channel 2 + | TBD | 3 | | | |
| Channel 2 - | TBD | 22 | | | |
| Channel 2gnd shld | XXX | 21 | | | |
| Channel 3 + | TBD | 23 | | | |
| Channel 3 - | TBD | 5 | | | |
| Channel 3gnd shld | XXX | 4 | | | |
| Channel 4 + | TBD | 6 | | | |
| Channel 4 - | TBD | 25 | | | |
| Channel 4gnd shld | XXX | 24 | | | |
| Channel 5 + | TBD | 26 | | | |
| Channel 5 - | TBD | 8 | | | |
| Channel 5gnd shld | XXX | 7 | | | |
| Channel 6 + | TBD | 9 | | | |
| Channel 6 - | TBD | 28 | | | |
| Channel 6gnd shld | XXX | 27 | | | |
| SSW GND WIRE | XXX | 10 | | | |
| Channel 7 + | TBD | 11 | | | |
| Channel 7 - | TBD | 29 | | | |
| Channel 7gnd shld | XXX | 30 | | | |

SPIRE HARNES DEFINITION

| Name | 100Way #1 | 37way A J27 | 37wayBJ28 | 37way C J33 | 37way D J34 |
|--------------------|-----------|-------------|-----------|-------------|-------------|
| Channel 8 + | TBD | 31 | | | |
| Channel 8 - | TBD | 12 | | | |
| Channel 8gnd shld | XXX | 13 | | | |
| Channel 9 + | TBD | 14 | | | |
| Channel 9 - | TBD | 32 | | | |
| Channel 9gnd shld | XXX | 33 | | | |
| Channel 10 + | TBD | 34 | | | |
| Channel 10 - | TBD | 15 | | | |
| Channel 10gnd shld | XXX | 16 | | | |
| Channel 11 + | TBD | 17 | | | |
| Channel 11 - | TBD | 35 | | | |
| Channel 11gnd shld | XXX | 36 | | | |
| Channel 12 + | TBD | 37 | | | |
| Channel 12 - | TBD | 18 | | | |
| Channel 12gnd shld | TBD | 19 | | | |
| Channel 13 + | TBD | | 20 | | |
| Channel 13 - | TBD | | 2 | | |
| Channel 1gnd shld | XXX | | 1 | | |
| Channel 14 + | TBD | | 3 | | |
| Channel 14 - | TBD | | 22 | | |
| Channel 1gnd shld | XXX | | 21 | | |
| Channel 15 + | TBD | | 23 | | |
| Channel 15 - | TBD | | 5 | | |
| Channel 15gnd shld | XXX | | 4 | | |
| Channel 16 + | TBD | | 6 | | |
| Channel 16 - | TBD | | 25 | | |
| Channel 16gnd shld | XXX | | 24 | | |
| Channel 17 + | TBD | | 26 | | |
| Channel 17 - | TBD | | 8 | | |
| Channel 17gnd shld | XXX | | 7 | | |
| Channel 18 + | TBD | | 9 | | |
| Channel 18 - | TBD | | 28 | | |
| Channel 18gnd shld | XXX | | 27 | | |
| SSW GND WIRE | XXX | | 10 | | |
| Channel 19 + | TBD | | 11 | | |
| Channel 19 - | TBD | | 29 | | |
| Channel 19gnd shld | XXX | | 30 | | |
| Channel 20 + | TBD | | 31 | | |
| Channel 20 - | TBD | | 12 | | |
| Channel 1gnd shld | XXX | | 13 | | |
| Channel 21 + | TBD | | 14 | | |
| Channel 21 - | TBD | | 32 | | |
| Channel 21gnd shld | XXX | | 33 | | |
| Channel 22 + | TBD | | 34 | | |
| Channel 22 - | TBD | | 15 | | |
| Channel 22gnd shld | XXX | | 16 | | |
| Channel 23 + | TBD | | 17 | | |
| Channel 23 - | TBD | | 35 | | |
| Channel 23gnd shld | XXX | | 36 | | |
| Channel 24 + | TBD | | 37 | | |
| Channel 24 - | TBD | | 18 | | |
| Channel 24gnd shld | TBD | | 19 | | |
| SLW_BIAS_A1+ve | TBD | | | 20 | |
| SLW_BIAS_A1-ve | TBD | | | 2 | |
| SLW_BIAS_A1 shld | XXX | | | 1 | |
| SLW_BIAS_A2 +ve | TBD | | | 3 | |
| SLW_BIAS_A2 -ve | TBD | | | 22 | |
| SLW_BIAS_A2 shld | XXX | | | 21 | |

SPIRE HARNES DEFINITION

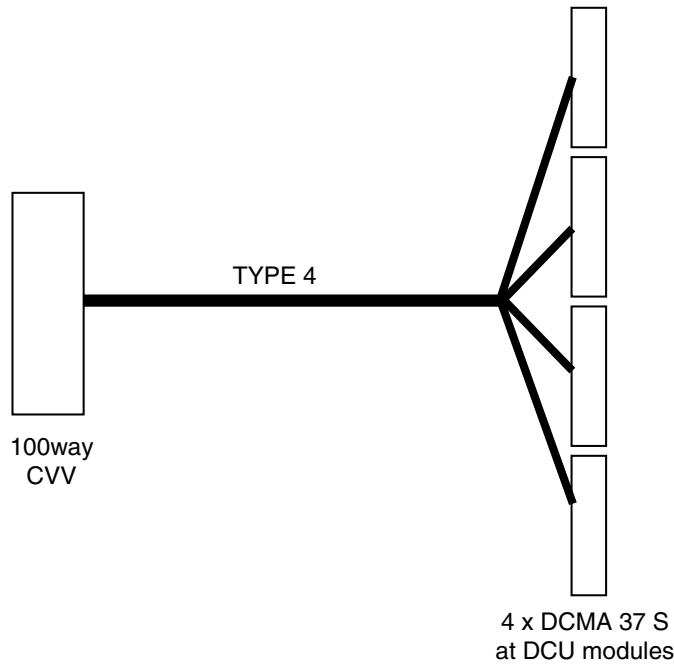
| Name | 100Way #1 | 37way A J27 | 37wayBJ28 | 37way C J33 | 37way D J34 |
|-------------------------|-----------|-------------|-----------|-------------|-------------|
| SLW_JFETV_A1 +ve | TBD | | | 23 | |
| SLW_JFETV_A1 -ve | TBD | | | 5 | |
| SLW_JFETV_A1 shld | XXX | | | 4 | |
| SLW_JFETV_A2 +ve | TBD | | | 6 | |
| SLW_JFETV_A2 -ve | TBD | | | 25 | |
| SLW_JFETV_A2 shld | XXX | | | 24 | |
| SLW_GND WIRE_A | TBD | | | 7 | |
| CVV Harness Shield Link | TBD | | | 26 | |
| SSW_GND WIRE_A | TBD | | | 8 | |
| SSW_BIAS1_A +ve | TBD | | | 9 | |
| SSW_BIAS1_A -ve | TBD | | | 28 | |
| SSW_BIAS1_A shld | XXX | | | 27 | |
| SSW_JFETV1_A +ve | TBD | | | 29 | |
| SSW_JFETV1_A -ve | TBD | | | 11 | |
| SSW_JFETV1_A shld | XXX | | | 10 | |
| SSW_BIAS2_A +ve | TBD | | | 12 | |
| SSW_BIAS2_A -ve | TBD | | | 31 | |
| SSW_BIAS2_A shld | XXX | | | 30 | |
| SSW_JFETV2_A +ve | TBD | | | 32 | |
| SSW_JFETV2_A -ve | TBD | | | 14 | |
| SSW_JFETV2_A shld | XXX | | | 13 | |
| S_HEATER GROUND WIRE_A | TBD | | | 33 | |
| SLW_HEATER_A +ve | TBD | | | 34 | |
| SLW_HEATER_A -ve | TBD | | | 16 | |
| SLW_HEATER_A shld | XXX | | | 15 | |
| SSW_HEATER1_A +ve | TBD | | | 17 | |
| SSW_HEATER1_A -ve | TBD | | | 36 | |
| SSW_HEATER1_A shld | XXX | | | 35 | |
| SSW_HEATER2_A +ve | TBD | | | 37 | |
| SSW_HEATER2_A -ve | TBD | | | 19 | |
| SSW_HEATER2_A shld | XXX | | | 18 | |
| SLW_BIAS_B1+ve | TBD | | | | 20 |
| SLW_BIAS_B1-ve | TBD | | | | 2 |
| SLW_BIAS_B1 shld | XXX | | | | 1 |
| SLW_BIAS_B2 +ve | TBD | | | | 3 |
| SLW_BIAS_B2 -ve | TBD | | | | 22 |
| SLW_BIAS_B2 shld | XXX | | | | 21 |
| SLW_JFETV_B1 +ve | TBD | | | | 23 |
| SLW_JFETV_B1 -ve | TBD | | | | 5 |
| SLW_JFETV_B1 shld | XXX | | | | 4 |
| SLW_JFETV_B2 +ve | TBD | | | | 6 |
| SLW_JFETV_B2 -ve | TBD | | | | 25 |
| SLW_JFETV_B2 shld | XXX | | | | 24 |
| SLW_GND WIRE_B | TBD | | | | 7 |
| SSW_GND WIRE_B | TBD | | | | 8 |
| SSW_BIAS1_B +ve | TBD | | | | 9 |
| SSW_BIAS1_B -ve | TBD | | | | 28 |
| SSW_BIAS1_B shld | XXX | | | | 27 |
| SSW_JFETV1_B +ve | TBD | | | | 29 |
| SSW_JFETV1_B -ve | TBD | | | | 11 |
| SSW_JFETV1_B shld | XXX | | | | 10 |
| SSW_BIAS2_B +ve | TBD | | | | 12 |
| SSW_BIAS2_B -ve | TBD | | | | 31 |
| SSW_BIAS2_B shld | XXX | | | | 30 |
| SSW_JFETV2_B +ve | TBD | | | | 32 |
| SSW_JFETV2_B -ve | TBD | | | | 14 |
| SSW_JFETV2_B shld | XXX | | | | 13 |
| S_HEATER GROUND WIRE_B | TBD | | | | 33 |

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| Name | 100Way #1 | 37way A J27 | 37wayBJ28 | 37way C J33 | 37way D J34 |
|--------------------|------------------|--------------------|------------------|--------------------|--------------------|
| SLW_HEATER_B +ve | TBD | | | | 34 |
| SLW_HEATER_B -ve | TBD | | | | 16 |
| SLW_HEATER_B shld | XXX | | | | 15 |
| SSW_HEATER1_B +ve | TBD | | | | 17 |
| SSW_HEATER1_B -ve | TBD | | | | 36 |
| SSW_HEATER1_B shld | XXX | | | | 35 |
| SSW_HEATER2_B +ve | TBD | | | | 37 |
| SSW_HEATER2_B -ve | TBD | | | | 19 |
| SSW_HEATER2_B shld | XXX | | | | 18 |

4.2.2 I2 HSDCU to CVV2 Type4

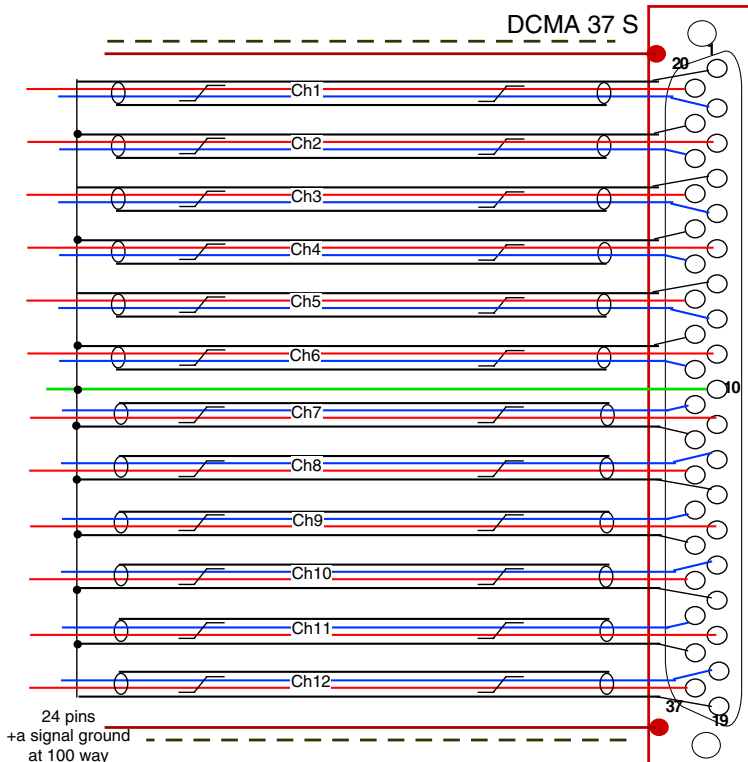
Overall Mechanical Drwg.



Connector/Backshell Details

DCMA 37 S + XXXX: interface to HSDCU J23 12ch. bolometer
 DCMA 37 S + XXXX: interface to HSDCU J24 12ch. bolometer
 DCMA 37 S + XXXX: interface to HSDCU J25 12ch. bolometer
 DCMA 37 S + XXXX: interface to HSDCU J26 12ch. bolometer

Harness Layup



12 Channel Bolometer Tail (typ) for Type 3 & Type4 Spectrometer Harness.

Common to all such tails, although others have ch. 13-24, etc.
 Good flat layup for cryoharness

12 insulated screened twisted pairs plus 1 ground wire.

The whole overlain with RF screen shown: ———— joined to backshell CVV and DCU ends.

Dotted lines show insulation, probably put around bundles but only strictly needed at clamp points.

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Contact Details

| Name | 100Way #2 | 37way J23 | 37way J24 | 37way J25 | 37way J26 |
|--------------------|-----------|-----------|-----------|-----------|-----------|
| Channel 1 + | TBD | 20 | | | |
| Channel 1 - | TBD | 2 | | | |
| Channel 1gnd shld | XXX | 1 | | | |
| Channel 2 + | TBD | 3 | | | |
| Channel 2 - | TBD | 22 | | | |
| Channel 2gnd shld | XXX | 21 | | | |
| Channel 3 + | TBD | 23 | | | |
| Channel 3 - | TBD | 5 | | | |
| Channel 3gnd shld | XXX | 4 | | | |
| Channel 4 + | TBD | 6 | | | |
| Channel 4 - | TBD | 25 | | | |
| Channel 4gnd shld | XXX | 24 | | | |
| Channel 5 + | TBD | 26 | | | |
| Channel 5 - | TBD | 8 | | | |
| Channel 5gnd shld | XXX | 7 | | | |
| Channel 6 + | TBD | 9 | | | |
| Channel 6 - | TBD | 28 | | | |
| Channel 6gnd shld | XXX | 27 | | | |
| GND | XXX | 10 | | | |
| Channel 7 + | TBD | 11 | | | |
| Channel 7 - | TBD | 29 | | | |
| Channel 7gnd shld | XXX | 30 | | | |
| Channel 8 + | TBD | 31 | | | |
| Channel 8 - | TBD | 12 | | | |
| Channel 8gnd shld | XXX | 13 | | | |
| Channel 9 + | TBD | 14 | | | |
| Channel 9 - | TBD | 32 | | | |
| Channel 9gnd shld | XXX | 33 | | | |
| Channel 10 + | TBD | 34 | | | |
| Channel 10 - | TBD | 15 | | | |
| Channel 10gnd shld | XXX | 16 | | | |
| Channel 11 + | TBD | 17 | | | |
| Channel 11 - | TBD | 35 | | | |
| Channel 11gnd shld | XXX | 36 | | | |
| Channel 12 + | TBD | 37 | | | |
| Channel 12 - | TBD | 18 | | | |
| Channel 12gnd shld | TBD | 19 | | | |
| Channel 13 + | TBD | | 20 | | |
| Channel 13 - | TBD | | 2 | | |
| Channel 1gnd shld | XXX | | 1 | | |
| Channel 14 + | TBD | | 3 | | |
| Channel 14 - | TBD | | 22 | | |
| Channel 1gnd shld | XXX | | 21 | | |
| Channel 15 + | TBD | | 23 | | |
| Channel 15 - | TBD | | 5 | | |
| Channel 15gnd shld | XXX | | 4 | | |
| Channel 16 + | TBD | | 6 | | |
| Channel 16 - | TBD | | 25 | | |
| Channel 16gnd shld | XXX | | 24 | | |
| Channel 17 + | TBD | | 26 | | |
| Channel 17 - | TBD | | 8 | | |
| Channel 17gnd shld | XXX | | 7 | | |
| Channel 18 + | TBD | | 9 | | |
| Channel 18 - | TBD | | 28 | | |
| Channel 18gnd shld | XXX | | 27 | | |
| GND WIRE | XXX | | 10 | | |
| Channel 19 + | TBD | | 11 | | |

SPIRE HARNES DEFINITION

| Name | 100Way #2 | 37way J23 | 37way J24 | 37way J25 | 37way J26 |
|--------------------|-----------|-----------|-----------|-----------|-----------|
| Channel 19 - | TBD | | 29 | | |
| Channel 19gnd shld | XXX | | 30 | | |
| Channel 20 + | TBD | | 31 | | |
| Channel 20 - | TBD | | 12 | | |
| Channel 1gnd shld | XXX | | 13 | | |
| Channel 21 + | TBD | | 14 | | |
| Channel 21 - | TBD | | 32 | | |
| Channel 21gnd shld | XXX | | 33 | | |
| Channel 22 + | TBD | | 34 | | |
| Channel 22 - | TBD | | 15 | | |
| Channel 22gnd shld | XXX | | 16 | | |
| Channel 23 + | TBD | | 17 | | |
| Channel 23 - | TBD | | 35 | | |
| Channel 23gnd shld | XXX | | 36 | | |
| Channel 24 + | TBD | | 37 | | |
| Channel 24 - | TBD | | 18 | | |
| Channel 24gnd shld | TBD | | 19 | | |
| Channel 25 + | TBD | | | 20 | |
| Channel 25 - | TBD | | | 2 | |
| Channel 25gnd shld | XXX | | | 1 | |
| Channel 26 + | TBD | | | 3 | |
| Channel 26 - | TBD | | | 22 | |
| Channel 26gnd shld | XXX | | | 21 | |
| Channel 27 + | TBD | | | 23 | |
| Channel 27 - | TBD | | | 5 | |
| Channel 27gnd shld | XXX | | | 4 | |
| Channel 28 + | TBD | | | 6 | |
| Channel 28 - | TBD | | | 25 | |
| Channel 28gnd shld | XXX | | | 24 | |
| Channel 29 + | TBD | | | 26 | |
| Channel 29 - | TBD | | | 8 | |
| Channel 29gnd shld | XXX | | | 7 | |
| Channel 30 + | TBD | | | 9 | |
| Channel 30 - | TBD | | | 28 | |
| Channel 30gnd shld | XXX | | | 27 | |
| GND WIRE | XXX | | | 10 | |
| Channel 31 + | TBD | | | 11 | |
| Channel 31 - | TBD | | | 29 | |
| Channel 31gnd shld | XXX | | | 30 | |
| Channel 32 + | TBD | | | 31 | |
| Channel 32 - | TBD | | | 12 | |
| Channel 32gnd shld | XXX | | | 13 | |
| Channel 33 + | TBD | | | 14 | |
| Channel 33 - | TBD | | | 32 | |
| Channel 33gnd shld | XXX | | | 33 | |
| Channel 34 + | TBD | | | 34 | |
| Channel 34 - | TBD | | | 15 | |
| Channel 34gnd shld | XXX | | | 16 | |
| Channel 35 + | TBD | | | 17 | |
| Channel 35 - | TBD | | | 35 | |
| Channel 35gnd shld | XXX | | | 36 | |
| Channel 36 + | TBD | | | 37 | |
| Channel 36 - | TBD | | | 18 | |
| Channel 36gnd shld | TBD | | | 19 | |
| Channel 37 + | TBD | | | | 20 |
| Channel 37 - | TBD | | | | 2 |
| Channel 37gnd shld | XXX | | | | 1 |
| Channel 38 + | TBD | | | | 3 |

| | | |
|-------------|------------------------------------|---|
| CLRC | SPIRE HARNES DEFINITION | Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 29 of 136 |
|-------------|------------------------------------|---|

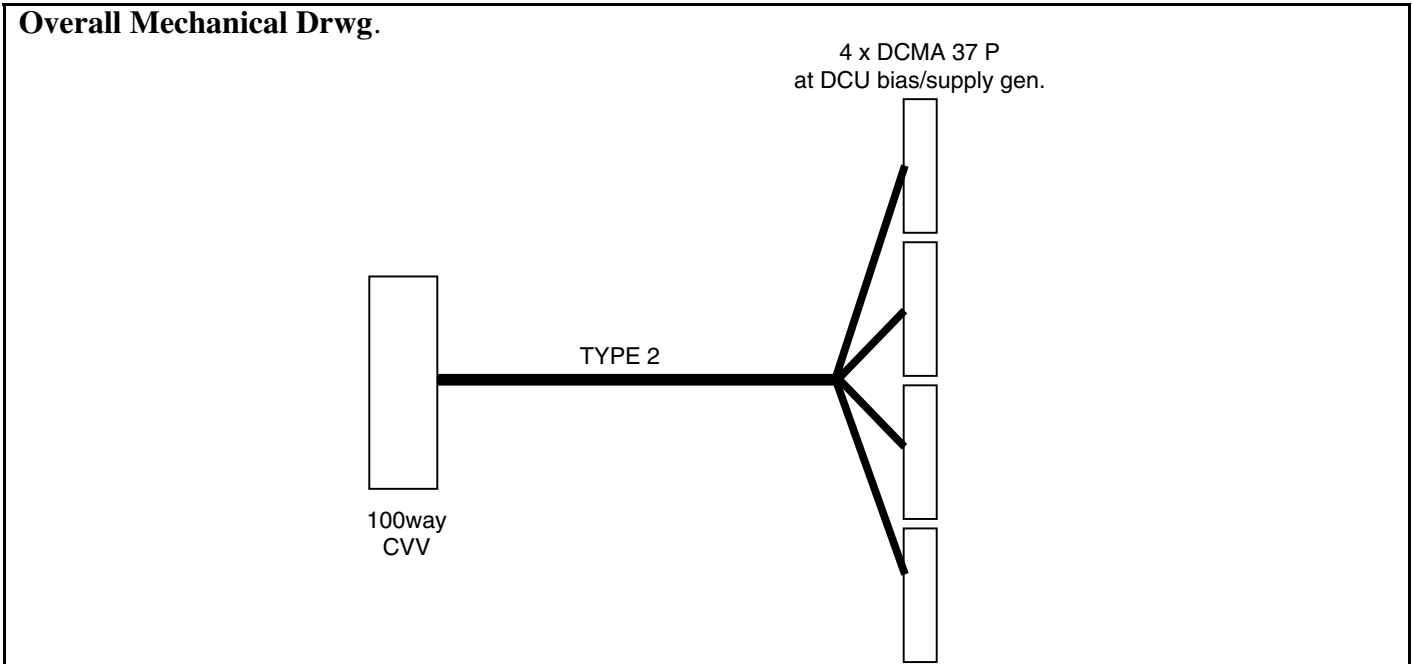
| Name | 100Way #2 | 37way J23 | 37way J24 | 37way J25 | 37way J26 |
|--------------------|-----------|-----------|-----------|-----------|-----------|
| Channel 38 - | TBD | | | | 22 |
| Channel 38gnd shld | XXX | | | | 21 |
| Channel 39 + | TBD | | | | 23 |
| Channel 39 - | TBD | | | | 5 |
| Channel 39gnd shld | XXX | | | | 4 |
| Channel 40 + | TBD | | | | 6 |
| Channel 40 - | TBD | | | | 25 |
| Channel 40gnd shld | XXX | | | | 24 |
| Channel 41 + | TBD | | | | 26 |
| Channel 41 - | TBD | | | | 8 |
| Channel 41gnd shld | XXX | | | | 7 |
| Channel 42 + | TBD | | | | 9 |
| Channel 42 - | TBD | | | | 28 |
| Channel 42gnd shld | XXX | | | | 27 |
| GND WIRE | XXX | | | | 10 |
| Channel 43 + | TBD | | | | 11 |
| Channel 43 - | TBD | | | | 29 |
| Channel 43gnd shld | XXX | | | | 30 |
| Channel 44 + | TBD | | | | 31 |
| Channel 44 - | TBD | | | | 12 |
| Channel 44gnd shld | XXX | | | | 13 |
| Channel 45 + | TBD | | | | 14 |
| Channel 45 - | TBD | | | | 32 |
| Channel 45gnd | XXX | | | | 33 |
| Channel 46 + | TBD | | | | 34 |
| Channel 46 - | TBD | | | | 15 |
| Channel 46gnd shld | XXX | | | | 16 |
| Channel 47 + | TBD | | | | 17 |
| Channel 47 - | TBD | | | | 35 |
| Channel 47gnd shld | XXX | | | | 36 |
| Channel 48 + | TBD | | | | 37 |
| Channel 48 - | TBD | | | | 18 |
| Channel 48gnd shld | TBD | | | | 19 |

XXX= on ground wire ring, supported by the 4 otherwise unused contacts.

Although just 3 contacts could be used for the inner screens, leaving one to carry through the harness shield from inside the CVV, there is no-where to join this harness shield at the DCU connector end!

| | | |
|--|---|--|
| <p style="text-align: center;">CLRC</p> | <p>SPIRE</p> <p>HARNES DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608</p> <p>Issue: 0.6</p> <p>Date: 15/09/01</p> <p>Page 30 of 136</p> |
|--|---|--|

4.2.3 I3 HSDCU to CVV3 Type2



Connector/Backshell Details

- DCMA 37P + xxxxxx: interface to HSDCU J29 PHOT BIAS A1
- DCMA 37P + xxxxxx: interface to HSDCU J31 PHOT BIAS A2
- DCMA 37P + xxxxxx: interface to HSDCU J30 PHOT BIAS B1
- DCMA 37P + xxxxxx: interface to HSDCU J32 PHOT BIAS B2

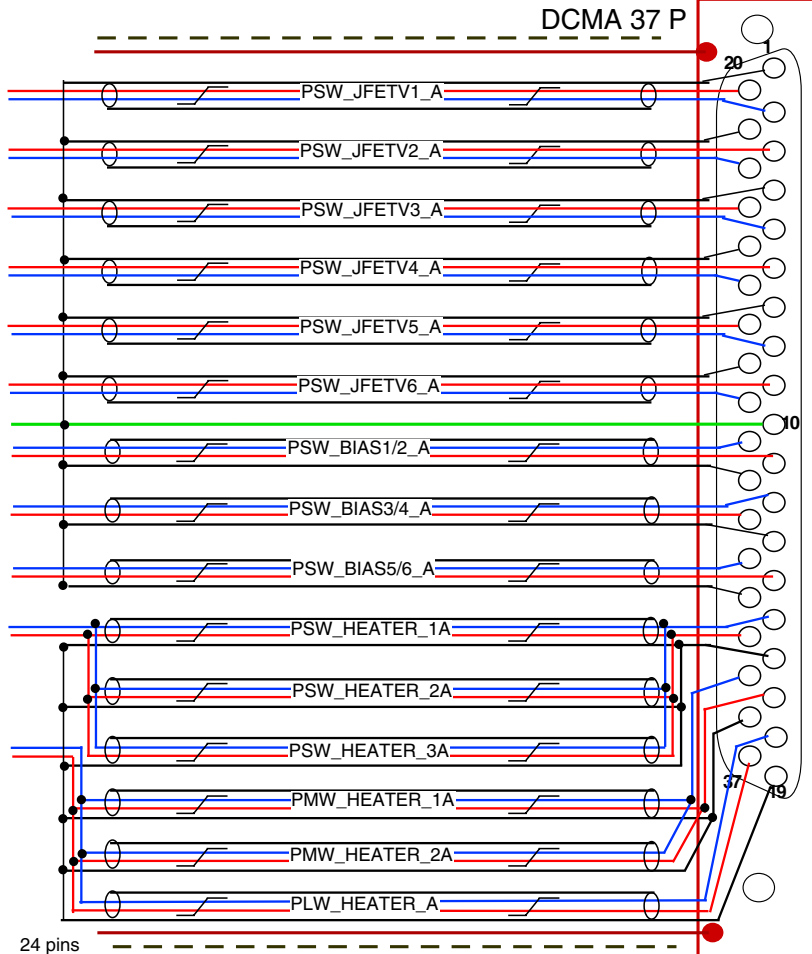
Harness Layup

There are $(22+24) \times 2 = 92$ signal wires, leaving 8 spare on the 100 way. There are actually 10 ground wires but they only have five functions, so some judicious pin sharing will be needed but note that this harness carries grounds fr various functions so to keep the ground configuration loopfree the signal ground pins through the 100way are not all commoned together as in Type 1 harness.

Contd. on next page.

SPIRE HARNESS DEFINITION

CLRC



Type 2A Side Photometer Bias/Supply at DCU

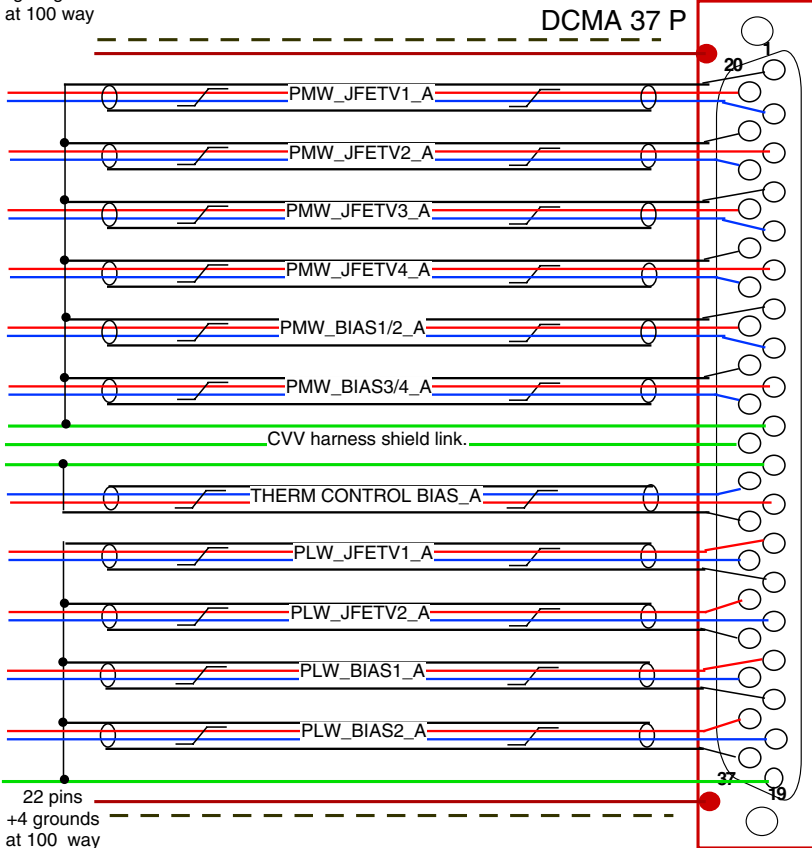
Heaters parallel wired because assumed take takes same current as JFET supplies. May be simplified if heavier gauge can be used for heater wires.

Note ground separation on 2nd tail.

The whole overlain with RF screen shown: _____ joined to backshell CVV and DCU ends.

Dotted lines show insulation, probably put around bundles but only strictly needed at clamp points.

Note that for the other Bias tails change the last A in each name to B



| | | |
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| CLRC | SPIRE HARNES DEFINITION | Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 32 of 136 |
|-------------|------------------------------------|---|

Contact Details

| Name | 100Way #3 | 37way J29 | 37way J31 | 37Way J30 | 37way J32 |
|--------------------------|-----------|-----------|-----------|-----------|-----------|
| PSW_JFETV1_A + | | 20 | | | |
| PSW_JFETV1_A - | | 2 | | | |
| PSW_JFETV1_A shld | | 1 | | | |
| PSW_JFETV2_A + | | 3 | | | |
| PSW_JFETV2_A - | | 22 | | | |
| PSW_JFETV2_A shld | | 21 | | | |
| PSW_JFETV3_A + | | 23 | | | |
| PSW_JFETV3_A - | | 4 | | | |
| PSW_JFETV3_A shld | | 5 | | | |
| PSW_JFETV4_A + | | 6 | | | |
| PSW_JFETV4_A - | | 25 | | | |
| PSW_JFETV4_A shld | | 24 | | | |
| PSW_JFETV5_A + | | 26 | | | |
| PSW_JFETV5_A - | | 8 | | | |
| PSW_JFETV5_A shld | | 7 | | | |
| PSW_JFETV6_A + | | 9 | | | |
| PSW_JFETV6_A - | | 28 | | | |
| PSW_JFETV6_A shld | | 27 | | | |
| PSW_GRND_A | | 10 | | | |
| PSW_BIAS1/2_A + | | 11 | | | |
| PSW_BIAS1/2_A - | | 29 | | | |
| PSW_BIAS1/2_A shld | | 30 | | | |
| PSW_BIAS3/4_A + | | 31 | | | |
| PSW_BIAS3/4_A - | | 12 | | | |
| PSW_BIAS3/4_A shld | | 13 | | | |
| PSW_BIAS5/6_A + | | 14 | | | |
| PSW_BIAS5/6_A - | | 32 | | | |
| PSW_BIAS5/6_A shld | | 33 | | | |
| PSW_HEATER_A +x3 | | 34 | | | |
| PSW_HEATER_A -x3 | | 15 | | | |
| PSW_HEATER_A shldx3 | | 16 | | | |
| PMW_HEATER_A +x2 | | 17 | | | |
| PMW_HEATER_A -x2 | | 35 | | | |
| PMW_HEATER_A shldx2 | | 36 | | | |
| PLW_HEATER_A + | | 37 | | | |
| PLW_HEATER_A- | | 18 | | | |
| PLW_HEATER_A shld | | 19 | | | |
| PMW_JFETV1_A + | | | 20 | | |
| PMW_JFETV1_A - | | | 2 | | |
| PMW_JFETV1_A shld | | | 1 | | |
| PMW_JFETV2_A + | | | 3 | | |
| PMW_JFETV2_A - | | | 22 | | |
| PMW_JFETV2_A shld | | | 21 | | |
| PMW_JFETV3_A + | | | 23 | | |
| PMW_JFETV3_A - | | | 5 | | |
| PMW_JFETV3_A shld | | | 4 | | |
| PMW_JFETV4_A + | | | 6 | | |
| PMW_JFETV4_A - | | | 25 | | |
| PMW_JFETV4_A shld | | | 24 | | |
| PMW_BIAS1/2_A + | | | 26 | | |
| PMW_BIAS1/2_A - | | | 8 | | |
| PMW_BIAS1/2_A shld | | | 7 | | |
| PMW_BIAS3/4_A + | | | 9 | | |
| PMW_BIAS3/4_A - | | | 28 | | |
| PMW_BIAS3/4_A shld | | | 27 | | |
| PMW_GND WIRE_A | | | 10 | | |
| CVV Harness shld. Link_A | | | 29 | | |

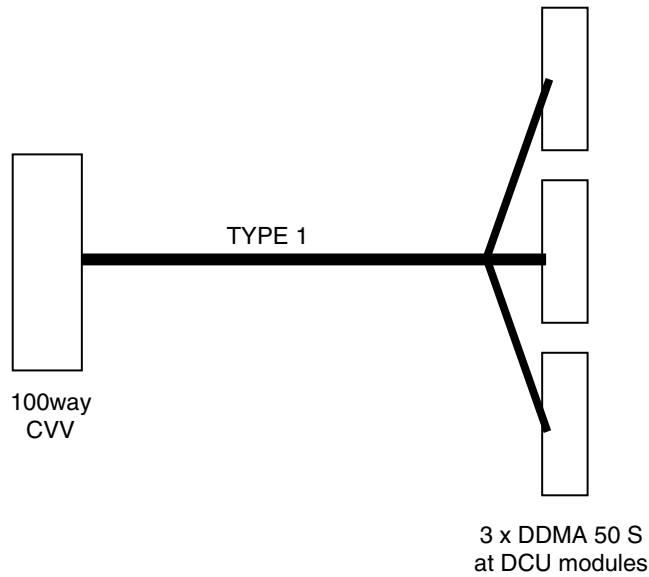
| Name | 100Way #3 | 37way J29 | 37way J31 | 37Way J30 | 37way J32 |
|----------------------------|-----------|-----------|-----------|-----------|-----------|
| THERM GND WIRE_A | | | 11 | | |
| THERM CONTROL BIAS_A + | | | 12 | | |
| THERM CONTROL BIAS_A - | | | 30 | | |
| THERM CONTROL BIAS_A shld. | | | 31 | | |
| PLW_JFETV1_A + | | | 13 | | |
| PLW_JFETV1_A - | | | 32 | | |
| PLW_JFETV1_A shld | | | 15 | | |
| PLW_JFETV2_A + | | | 33 | | |
| PLW_JFETV2_A - | | | 15 | | |
| PLW_JFETV2_A shld | | | 34 | | |
| PLW_BIAS1_A + | | | 16 | | |
| PLW_BIAS1_A - | | | 36 | | |
| PLW_BIAS1_A shld | | | 17 | | |
| PLW_BIAS2_A + | | | 37 | | |
| PLW_BIAS2_A - | | | 18 | | |
| PLW_BIAS2_A shld | | | 37 | | |
| PLW_A GND WIRE | | | 19 | | |
| PSW_JFETV1_B + | | | | 20 | |
| PSW_JFETV1_B - | | | | 2 | |
| PSW_JFETV1_B shld | | | | 1 | |
| PSW_JFETV2_B + | | | | 3 | |
| PSW_JFETV2_B - | | | | 22 | |
| PSW_JFETV2_B shld | | | | 21 | |
| PSW_JFETV3_B + | | | | 23 | |
| PSW_JFETV3_B - | | | | 4 | |
| PSW_JFETV3_B shld | | | | 5 | |
| PSW_JFETV4_B + | | | | 6 | |
| PSW_JFETV4_B - | | | | 25 | |
| PSW_JFETV4_B shld | | | | 24 | |
| PSW_JFETV5_B + | | | | 26 | |
| PSW_JFETV5_B - | | | | 8 | |
| PSW_JFETV5_B shld | | | | 7 | |
| PSW_JFETV6_B + | | | | 9 | |
| PSW_JFETV6_B - | | | | 28 | |
| PSW_JFETV6_B shld | | | | 27 | |
| PSW_GRND_B | | | | 10 | |
| PSW_BIAS1/2_B + | | | | 11 | |
| PSW_BIAS1/2_B - | | | | 29 | |
| PSW_BIAS1/2_B shld | | | | 30 | |
| PSW_BIAS3/4_B + | | | | 31 | |
| PSW_BIAS3/4_B - | | | | 12 | |
| PSW_BIAS3/4_B shld | | | | 13 | |
| PSW_BIAS5/6_B + | | | | 14 | |
| PSW_BIAS5/6_B - | | | | 32 | |
| PSW_BIAS5/6_B shld | | | | 33 | |
| PSW_HEATER_B +x3 | | | | 34 | |
| PSW_HEATER_B -x3 | | | | 15 | |
| PSW_HEATER_B shldx3 | | | | 16 | |
| PMW_HEATER_B +x2 | | | | 17 | |
| PMW_HEATER_B -x2 | | | | 35 | |
| PMW_HEATER_B shldx2 | | | | 36 | |
| PLW_HEATER_B + | | | | 37 | |
| PLW_HEATER_B- | | | | 18 | |
| PLW_HEATER_B shld | | | | 19 | |
| PMW_JFETV1_B + | | | | | 20 |
| PMW_JFETV1_B - | | | | | 2 |
| PMW_JFETV1_B shld | | | | | 1 |
| PMW_JFETV2_B + | | | | | 3 |

SPIRE HARNES DEFINITION

| Name | 100Way #3 | 37way J29 | 37way J31 | 37Way J30 | 37way J32 |
|----------------------------|-----------|-----------|-----------|-----------|-----------|
| PMW_JFETV2_B - | | | | | 22 |
| PMW_JFETV2_B shld | | | | | 21 |
| PMW_JFETV3_B + | | | | | 23 |
| PMW_JFETV3_B - | | | | | 5 |
| PMW_JFETV3_B shld | | | | | 4 |
| PMW_JFETV4_B + | | | | | 6 |
| PMW_JFETV4_B - | | | | | 25 |
| PMW_JFETV4_B shld | | | | | 24 |
| PMW_BIAS1/2_B + | | | | | 26 |
| PMW_BIAS1/2_B - | | | | | 8 |
| PMW_BIAS1/2_B shld | | | | | 7 |
| PMW_BIAS3/4_B + | | | | | 9 |
| PMW_BIAS3/4_B - | | | | | 28 |
| PMW_BIAS3/4_B shld | | | | | 27 |
| PMW_GND_B | | | | | 10 |
| CVV Harness shld. Link B | | | | | 29 |
| Therm GND_B | | | | | 11 |
| THERM CONTROL BIAS_B + | | | | | 12 |
| THERM CONTROL BIAS_B - | | | | | 30 |
| THERM CONTROL BIAS_B shld. | | | | | 31 |
| PLW_JFETV1_B + | | | | | 13 |
| PLW_JFETV1_B - | | | | | 32 |
| PLW_JFETV1_B shld | | | | | 15 |
| PLW_JFETV2_B + | | | | | 33 |
| PLW_JFETV2_B - | | | | | 15 |
| PLW_JFETV2_B shld | | | | | 34 |
| PLW_BIAS1_B + | | | | | 16 |
| PLW_BIAS1_B - | | | | | 36 |
| PLW_BIAS1_B shld | | | | | 17 |
| PLW_BIAS2_B + | | | | | 37 |
| PLW_BIAS2_B - | | | | | 18 |
| PLW_BIAS2_B shld | | | | | 37 |
| PLW_B GND WIRE | | | | | 19 |

4.2.4 I4 HSDCU to CVV4 Type1

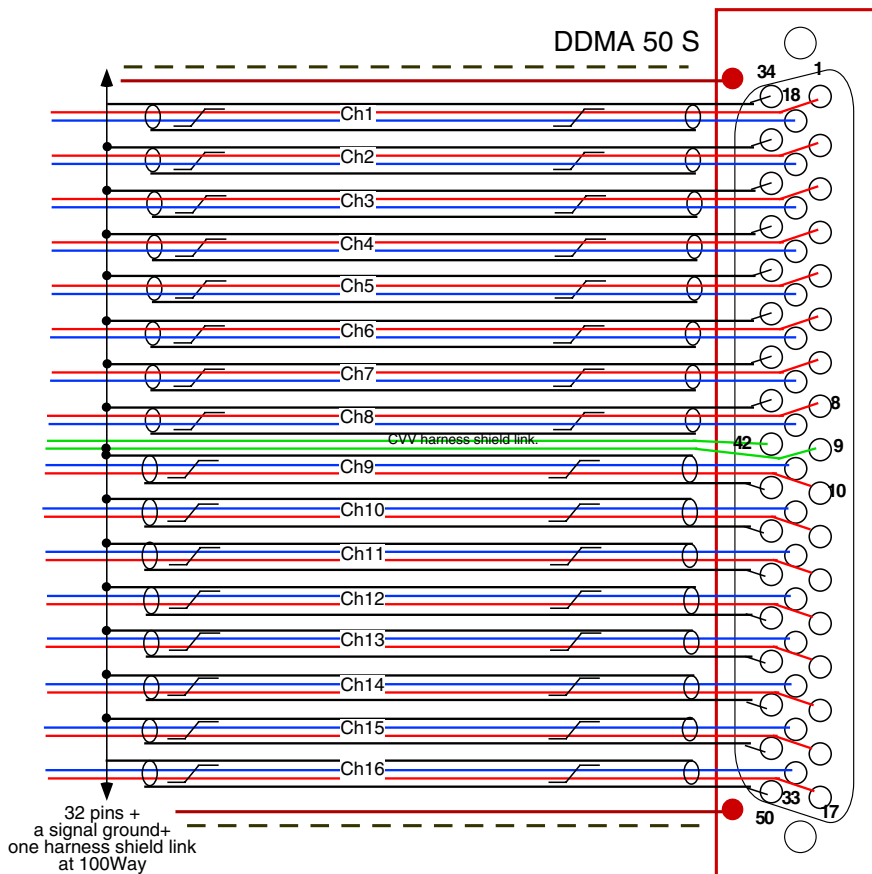
Overall Mechanical Drwg.



Connector/Backshell Details

DDMA 50 S + XXXX: interface to HSDCU J20 16ch. bolometer
 DDMA 50 S + XXXX: interface to HSDCU J21 16ch. bolometer
 DDMA 50 S + XXXX: interface to HSDCU J22 16ch. bolometer

Harness Layup



Type 1 DCU tails

Common to all 3 tails, although others have ch. 17-32 and 33-48.
 Good flat layup for cryoharness

16 insulated screen twisted pairs plus 2 ground pins with single higher conductivity signal gnd.

The whole overlain with RF screen shown: ——— joined to backshell CVV and DCU ends.

Dotted lines indicate insulation, probably put all around bundles but only strictly needed at clamp points.

| | | |
|-------------|------------------------------------|---|
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|-------------|------------------------------------|---|

Contact Details

Note the contacts are named as "channels 1-48" end-to-end, and mapping to specific detector position is only maintained internally to the instrument. The information is in the BDA ICDs.

| Name | 100Way #4 | 50way A | 50wayB | 50way C |
|---------------------|-----------|---------|--------|---------|
| Channel 1 + | TBD | 1 | | |
| Channel 1 - | TBD | 18 | | |
| Channel 1gnd shld | XXX | 34 | | |
| Channel 2 + | TBD | 2 | | |
| Channel 2 - | TBD | 19 | | |
| Channel 2gnd shld | XXX | 35 | | |
| Channel 3 + | TBD | 3 | | |
| Channel 3 - | TBD | 20 | | |
| Channel 3gnd shld | XXX | 36 | | |
| Channel 4 + | TBD | 4 | | |
| Channel 4 - | TBD | 21 | | |
| Channel 4gnd shld | XXX | 37 | | |
| Channel 5 + | TBD | 5 | | |
| Channel 5 - | TBD | 22 | | |
| Channel 5gnd shld | XXX | 38 | | |
| Channel 6 + | TBD | 6 | | |
| Channel 6 - | TBD | 23 | | |
| Channel 6gnd shld | XXX | 39 | | |
| Channel 7 + | TBD | 7 | | |
| Channel 7 - | TBD | 24 | | |
| Channel 7gnd shld | XXX | 40 | | |
| Channel 8 + | TBD | 8 | | |
| Channel 8 - | TBD | 25 | | |
| Channel 8gnd shld | XXX | 41 | | |
| GND WIRE | XXX | 9 | | |
| Harness Shield Link | XXX | 42 | | |
| Channel 9 + | TBD | 10 | | |
| Channel 9 - | TBD | 26 | | |
| Channel 9gnd shld | XXX | 43 | | |
| Channel 10 + | TBD | 11 | | |
| Channel 10 - | TBD | 27 | | |
| Channel 10gnd shld | XXX | 44 | | |
| Channel 11 + | TBD | 12 | | |
| Channel 11 - | TBD | 28 | | |
| Channel 11gnd shld | XXX | 45 | | |
| Channel 12 + | TBD | 13 | | |
| Channel 12 - | TBD | 29 | | |
| Channel 12gnd shld | TBD | 46 | | |
| Channel 13 + | TBD | 14 | | |
| Channel 13 - | TBD | 30 | | |
| Channel 1gnd shld | XXX | 47 | | |
| Channel 14 + | TBD | 15 | | |
| Channel 14 - | TBD | 31 | | |
| Channel 1gnd shld | XXX | 48 | | |
| Channel 15 + | TBD | 16 | | |
| Channel 15 - | TBD | 32 | | |
| Channel 15gnd shld | XXX | 49 | | |
| Channel 16 + | TBD | 17 | | |
| Channel 16 - | TBD | 33 | | |
| Channel 16gnd shld | XXX | 50 | | |
| Channel 17 + | TBD | | 1 | |
| Channel 17 - | TBD | | 18 | |
| Channel 17gnd shld | XXX | | 34 | |
| Channel 18 + | TBD | | 2 | |

SPIRE HARNESS DEFINITION

| Name | 100Way #4 | 50way A | 50wayB | 50way C |
|---------------------|-----------|---------|--------|---------|
| Channel 18 - | TBD | | 19 | |
| Channel 18gnd shld | XXX | | 35 | |
| Channel 19 + | TBD | | 3 | |
| Channel 19 - | TBD | | 20 | |
| Channel 19gnd shld | XXX | | 36 | |
| Channel 20 + | TBD | | 4 | |
| Channel 20 - | TBD | | 21 | |
| Channel 1gnd shld | XXX | | 37 | |
| Channel 21 + | TBD | | 5 | |
| Channel 21 - | TBD | | 22 | |
| Channel 21gnd shld | XXX | | 38 | |
| Channel 22 + | TBD | | 6 | |
| Channel 22 - | TBD | | 23 | |
| Channel 22gnd shld | XXX | | 39 | |
| Channel 23 + | TBD | | 7 | |
| Channel 23 - | TBD | | 24 | |
| Channel 23gnd shld | XXX | | 40 | |
| Channel 24 + | TBD | | 8 | |
| Channel 24 - | TBD | | 25 | |
| Channel 24gnd shld | TBD | | 41 | |
| GND WIRE | XXX | | 9 | |
| Harness Shield Link | XXX | | 42 | |
| Channel 25 + | TBD | | 10 | |
| Channel 25 - | TBD | | 26 | |
| Channel 25gnd shld | XXX | | 43 | |
| Channel 26 + | TBD | | 11 | |
| Channel 26 - | TBD | | 27 | |
| Channel 26gnd shld | XXX | | 44 | |
| Channel 27 + | TBD | | 12 | |
| Channel 27 - | TBD | | 28 | |
| Channel 27gnd shld | XXX | | 45 | |
| Channel 28 + | TBD | | 13 | |
| Channel 28 - | TBD | | 29 | |
| Channel 28gnd shld | XXX | | 46 | |
| Channel 29 + | TBD | | 14 | |
| Channel 29 - | TBD | | 30 | |
| Channel 29gnd shld | XXX | | 47 | |
| Channel 30 + | TBD | | 15 | |
| Channel 30 - | TBD | | 31 | |
| Channel 30gnd shld | XXX | | 48 | |
| Channel 31 + | TBD | | 16 | |
| Channel 31 - | TBD | | 32 | |
| Channel 31gnd shld | XXX | | 49 | |
| Channel 32 + | TBD | | 17 | |
| Channel 32 - | TBD | | 33 | |
| Channel 32gnd shld | XXX | | 50 | |
| Channel 33 + | TBD | | | 1 |
| Channel 33 - | TBD | | | 18 |
| Channel 33gnd shld | XXX | | | 34 |
| Channel 34 + | TBD | | | 2 |
| Channel 34 - | TBD | | | 19 |
| Channel 34gnd shld | XXX | | | 35 |
| Channel 35 + | TBD | | | 3 |
| Channel 35 - | TBD | | | 20 |
| Channel 35gnd shld | XXX | | | 36 |
| Channel 36 + | TBD | | | 4 |
| Channel 36 - | TBD | | | 21 |
| Channel 36gnd shld | TBD | | | 37 |

SPIRE HARNES DEFINITION

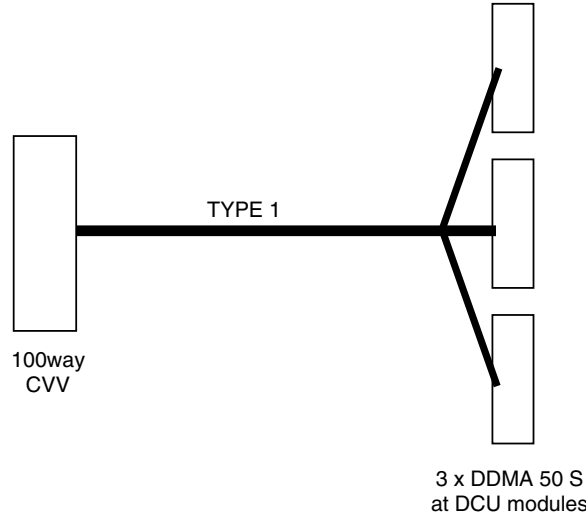
| Name | 100Way #4 | 50way A | 50wayB | 50way C |
|---------------------|-----------|---------|--------|---------|
| Channel 37 + | TBD | | | 5 |
| Channel 37 - | TBD | | | 22 |
| Channel 37gnd shld | XXX | | | 38 |
| Channel 38 + | TBD | | | 6 |
| Channel 38 - | TBD | | | 23 |
| Channel 38gnd shld | XXX | | | 39 |
| Channel 39 + | TBD | | | 7 |
| Channel 39 - | TBD | | | 24 |
| Channel 39gnd shld | XXX | | | 40 |
| Channel 40 + | TBD | | | 8 |
| Channel 40 - | TBD | | | 25 |
| Channel 40gnd shld | XXX | | | 41 |
| GND WIRE | XXX | | | 9 |
| Harness Shield Link | XXX | | | 42 |
| Channel 41 + | TBD | | | 10 |
| Channel 41 - | TBD | | | 26 |
| Channel 41gnd shld | XXX | | | 43 |
| Channel 42 + | TBD | | | 11 |
| Channel 42 - | TBD | | | 27 |
| Channel 42gnd shld | XXX | | | 44 |
| Channel 43 + | TBD | | | 12 |
| Channel 43 - | TBD | | | 28 |
| Channel 43gnd shld | XXX | | | 45 |
| Channel 44 + | TBD | | | 13 |
| Channel 44 - | TBD | | | 29 |
| Channel 44gnd shld | XXX | | | 46 |
| Channel 45 + | TBD | | | 14 |
| Channel 45 - | TBD | | | 30 |
| Channel 45gnd shld | XXX | | | 47 |
| Channel 46 + | TBD | | | 15 |
| Channel 46 - | TBD | | | 31 |
| Channel 46gnd shld | XXX | | | 48 |
| Channel 47 + | TBD | | | 16 |
| Channel 47 - | TBD | | | 32 |
| Channel 47gnd shld | XXX | | | 49 |
| Channel 48 + | TBD | | | 17 |
| Channel 48 - | TBD | | | 33 |
| Channel 48gnd shld | TBD | | | 50 |

XXX= on ground wire ring, supported by thtree of the 4 otherwise unused contacts.

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4.2.5 I5 HSDCU to CVV5 Type1

Overall Mechanical Drwg.



Connector/Backshell Details

DDMA 50 S + XXXX: interface to HSDCU J17 16ch. bolometer
DDMA 50 S + XXXX: interface to HSDCU J18 16ch. bolometer
DDMA 50 S + XXXX: interface to HSDCU J19 16ch. bolometer

Harness Layup

As I 4.

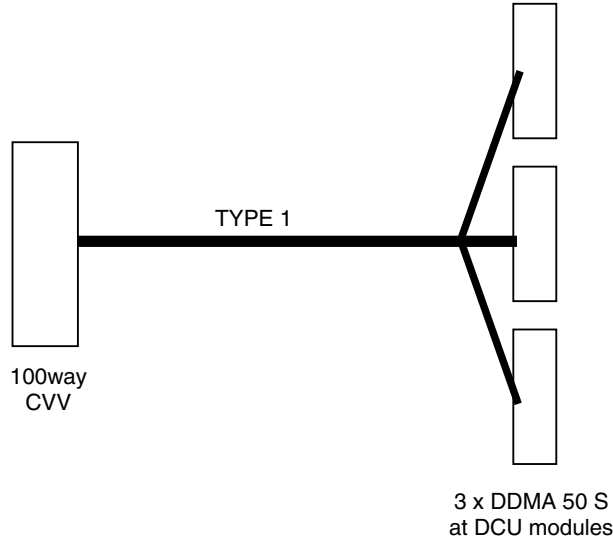
Contact Details

As I 4.

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4.2.6 I6 HSDCU to CVV6 Type1

Overall Mechanical Drwg.



Connector/Backshell Details

DDMA 50 S + XXXX: interface to HSDCU J14 16ch. bolometer
DDMA 50 S + XXXX: interface to HSDCU J15 16ch. bolometer
DDMA 50 S + XXXX: interface to HSDCU J16 16ch. bolometer

Harness Layup

As I 4.

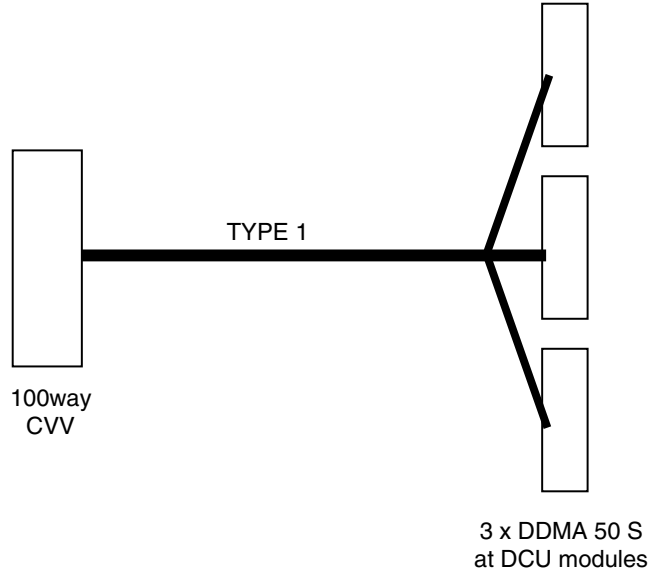
Contact Details

As I 4.

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| <p style="text-align: center;">CLRC</p> | <p>SPIRE</p> <p>HARNES DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608</p> <p>Issue: 0.6</p> <p>Date: 15/09/01</p> <p>Page 41 of 136</p> |
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4.2.7 I7 HSDCU to CVV7 Type1

Overall Mechanical Drwg.



Connector/Backshell Details

DDMA 50 S + XXXX: interface to HSDCU J11 16ch. bolometer
 DDMA 50 S + XXXX: interface to HSDCU J12 16ch. bolometer
 DDMA 50 S + XXXX: interface to HSDCU J13 16ch. bolometer

Harness Layup

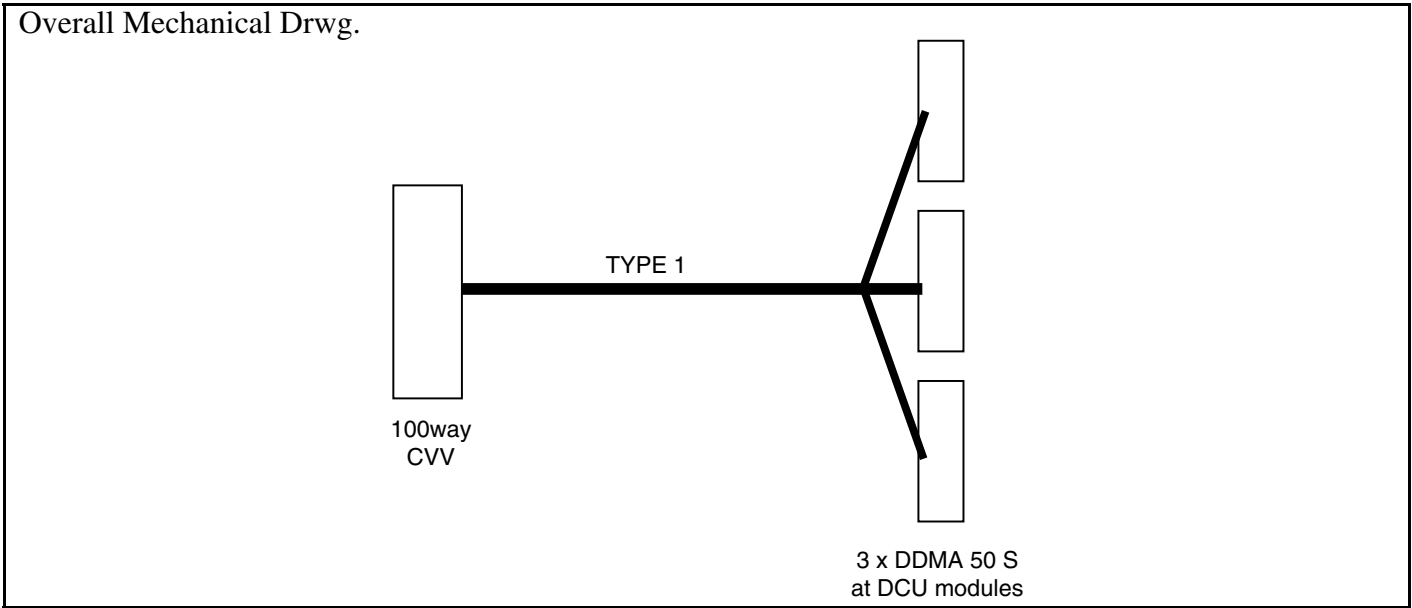
As I 4.

Contact Details

As I 4.

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4.2.8 I8 HSDCU to CVV8 Type1



Connector/Backshell Details
 DDMA 50 S + XXXX: interface to HSDCU J8 16ch. bolometer
 DDMA 50 S + XXXX: interface to HSDCU J9 16ch. bolometer
 DDMA 50 S + XXXX: interface to HSDCU J10 16ch. bolometer

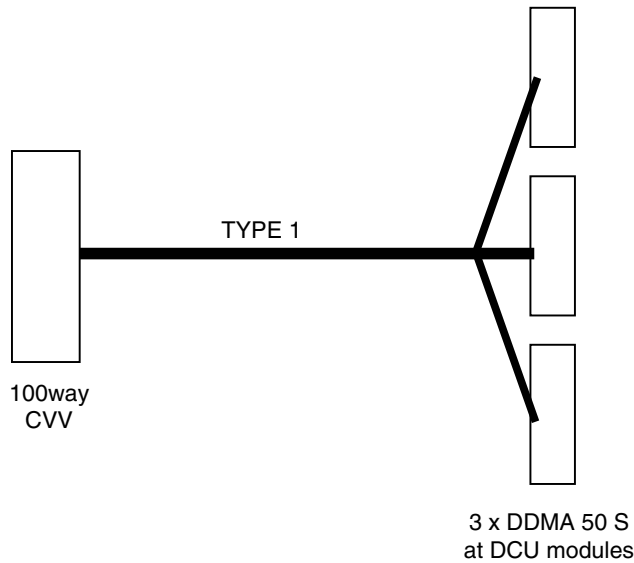
Harness Layup
 As I 4.

Contact Details
 As I 4.

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4.2.9 I9 HSDCU to CVV9 Type1

Overall Mechanical Drwg.



Connector/Backshell Details

DDMA 50 S + XXXX: interface to HSDCU J5 16ch. bolometer
DDMA 50 S + XXXX: interface to HSDCU J6 16ch. bolometer
DDMA 50 S + XXXX: interface to HSDCU J7 16ch. bolometer

Harness Layup

As I 4.

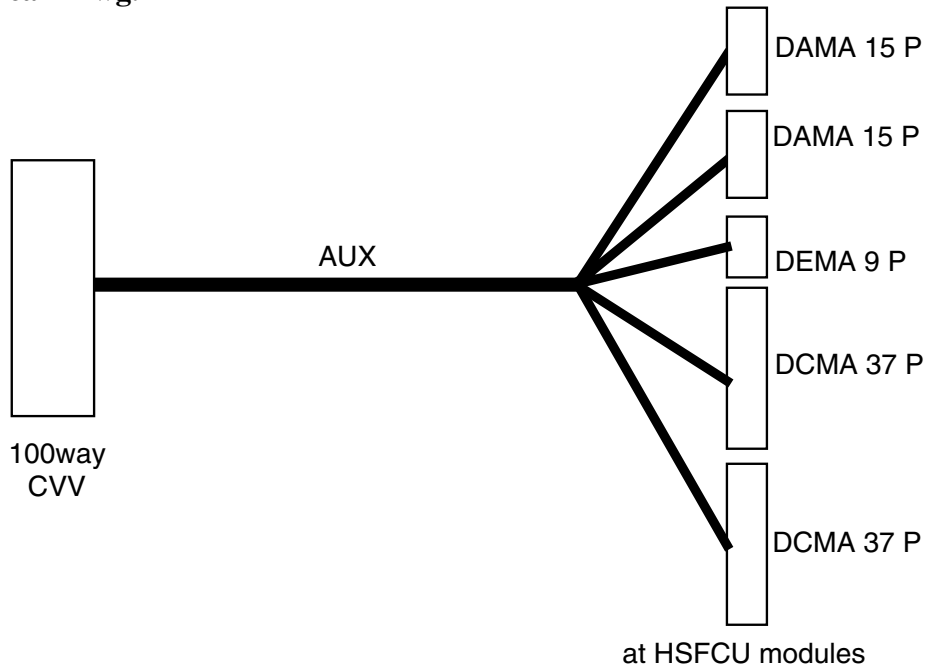
Contact Details

As I 4.

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4.2.10 I10 HSDCU to CVV10 AUX-P

Overall Mechanical Drwg.



Connector/Backshell Details

Prime side harness

DAMA 15 P + XXXX: interface to HSFCU J15 Shutter

DAMA 15 P + XXXX: interface to HSFCU J11 Cooler

DMA 9 P + XXXX: interface to HSFCU J13 FTS Stimulus

DCMA 37 P + XXXX: interface to HSFCU J23 Temperature sensors A

DCMA 37 P + XXXX: interface to HSFCU J25 Temperature sensors B

| | | |
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Shutter Tail J15

| Function | Pin # on J15 | Max Current | Wire lay-up | Max Ohms* |
|------------------------------------|--------------|-------------|---------------------------------|-----------|
| Actuator Position Sensor + | 1 | | Insulated screened twisted quad | 1000 |
| Actuator Position Sensor - | 9 | | | 1000 |
| Latch Sense + | 2 | | | 1000 |
| Latch Sense - | 10 | | | 1000 |
| Sense Shld | 3 | | | 1000 |
| Latch Drive + | 11 | | Insulated screened twisted quad | 10 |
| Vane Heater+ | 4 | | | 10 |
| Stepper Drive Phase A + | 12 | | | 10 |
| Stepper Drive Phase B + | 5 | | | 10 |
| Power Ground / Rtn. as shld | 13 | | | 10 |
| Temp Sensor Bias+ | 6 | | Insulated screened twisted quad | 1000 |
| Vane Temp V+ | 14 | | | 1000 |
| Common Temp V | 7 | | | 1000 |
| Actuator Temp V- | 15 | | | 1000 |
| Temp Sensor Bias -/Shld | 8 | | | 1000 |

All 15 ways used

Cooler Tail Listing J11

| Function | 15way J11 | Max. current | Wire lay-up | Max Ohms | 100way #10 |
|--|-----------|--------------|--------------|----------|------------|
| Sorption Pump heater I+ _A | 1 | 25 mA | twisted quad | 10 | |
| Sorption Pump heater I+ _B | 2 | 25 mA | | 10 | |
| Sorption Pump heater I- _A | 9 | 25 mA | | 10 | |
| Sorption Pump heater I- _B | 10 | 25 mA | | 10 | |
| Sorption Pump Heat Switch heater I+ _A | 4 | 1.5 mA | twisted quad | 50 | |
| Sorption Pump Heat Switch heater I+ _B | 5 | 1.5 mA | | 50 | |
| Sorption Pump Heat Switch heater I- _A | 11 | 1.5 mA | | 50 | |
| Sorption Pump Heat Switch heater I- _B | 12 | 1.5 mA | | 50 | |
| Evaporator Heat Switch heater I+ _A | 7 | 1.5 mA | twisted quad | 50 | |
| Evaporator Heat Switch heater I+ _B | 8 | 1.5 mA | | 50 | |
| Evaporator Heat Switch heater I- _A | 14 | 1.5 mA | | 50 | |
| Evaporator Heat Switch heater I- _B | 15 | 1.5 mA | | 50 | |

12 ways used.

Spectrometer Stimulus Tail Listing J13

| Function | 9way J13 | Max. current | Wire lay-up | Max Ohms | 100way #10 |
|---------------------------|----------|--------------|--------------|----------|------------|
| HS Spect. 4% heater I+ _A | 1 | 9 mA | twisted quad | 30 | |
| HS Spect. 4% heater I+ _B | 2 | 9 mA | | 30 | |
| HS Spect. 4% heater I- _A | 6 | 9 mA | | 30 | |
| HS Spect. 4% heater I- _B | 7 | 9 mA | | 30 | |
| HS Spect. 2% heater I+ _A | 3 | 7 mA | twisted quad | 30 | |
| HS Spect. 2% heater I+ _B | 4 | 7 mA | | 30 | |
| HS Spect. 2% heater I- _A | 8 | 7 mA | | 30 | |
| HS Spect. 2% heater I- _B | 9 | 7 mA | | 30 | |

8 ways used

| | | |
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FPU Thermometry Listing A J23

| Function | 37way J23 | Max. current | Wire lay-up | Max Ohms | 100way #10 |
|--|-----------|--------------|---------------------------------|----------|------------|
| HSFPU Opt. Bench temperature I+ | | 1 μ A | Insulated screened twisted quad | 1000 | |
| HSFPU Opt. Bench temperature V+ | | N/A | | 1000 | |
| HSFPU Opt. Bench temperature V- | | N/A | | 1000 | |
| HSFPU Opt. Bench temperature I- | | 1 μ A | | 1000 | |
| HSFPU Opt. Bench temperature shld*B | | N/A | | N/A | |
| Spectrometer 2K box temperature I+ | | 1 μ A | Insulated screened twisted quad | 1000 | |
| Spectrometer 2K box temperature V+ | | N/A | | 1000 | |
| Spectrometer 2K box temperature V- | | N/A | | 1000 | |
| Spectrometer 2K box temperature I- | | 1 μ A | | 1000 | |
| Spectrometer 2K box temperature shld* | | N/A | | N/A | |
| Photometer 2K box temperature I+ | | 1 μ A | Insulated screened twisted quad | 1000 | |
| Photometer 2K box temperature V+ | | N/A | | 1000 | |
| Photometer 2K box temperature V- | | N/A | | 1000 | |
| Photometer 2K box temperature I- | | 1 μ A | | 1000 | |
| Photometer 2K box temperature shld* | | N/A | | N/A | |
| M3,5,7 Optical SubBench temperature I+ | | 1 μ A | Insulated screened twisted quad | 1000 | |
| M3,5,7 Optical SubBench temperature V+ | | N/A | | 1000 | |
| M3,5,7 Optical SubBench temperature V- | | N/A | | 1000 | |
| M3,5,7 Optical SubBench temperature I- | | 1 μ A | | 1000 | |
| M3,5,7 Optical SubBench temperature shld* | | N/A | | N/A | |
| HSFPU Input Baffle temperature I+ | | 1 μ A | Insulated screened twisted quad | 1000 | |
| HSFPU Input Baffle temperature V+ | | N/A | | 1000 | |
| HSFPU Input Baffle temperature V- | | N/A | | 1000 | |
| HSFPU Input Baffle temperature I- | | 1 μ A | | 1000 | |
| HSFPU Input Baffle temperature shld* | | N/A | | N/A | |
| BSM/HOB I/F temperature I+ | | 1 μ A | Insulated screened twisted quad | 1000 | |
| BSM/HOB I/F temperature V+ | | N/A | | 1000 | |
| BSM/HOB I/F temperature V- | | N/A | | 1000 | |
| BSM/HOB I/F temperature I- | | 1 μ A | | 1000 | |
| BSM/HOB I/F temperature shld* | | N/A | | N/A | |
| HS Spect. Stimulus nr. HOB temperature I+ | | 1 μ A | Insulated screened twisted quad | 1000 | |
| HS Spect. Stimulus nr. HOB temperature V+ | | N/A | | 1000 | |
| HS Spect. Stimulus nr. HOB temperature V- | | N/A | | 1000 | |
| HS Spect. Stimulus nr. HOB temperature I- | | 1 μ A | | 1000 | |
| HS Spect. Stimulus nr. HOB temperature shld* | | N/A | | N/A | |
| Thermal Control Heater I+_A | | 2mA | Insulated screened twisted quad | 100 | |
| Thermal Control Heater I+_B | | 2 mA | | 100 | |
| Thermal Control Heater I-_A | | 2 mA | | 100 | |
| Thermal Control Heater I-_B | | 2 mA | | 100 | |
| Thermal Control Heater shld. | | N/A | | N/A | |

32 ways + 2 shields used

| | | |
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FPU Thermometry Listing B J25

| Function | 37way J25 | Max. current | Wire lay-up | Max Ohms | 100way #10 |
|---|-----------|--------------|---------------------------------|----------|------------|
| Sorption Pump temperature I+ | | 1 µA | Insulated screened twisted quad | 1000 | |
| Sorption Pump temperature V+ | | N/A | | 1000 | |
| Sorption Pump temperature V- | | N/A | | 1000 | |
| Sorption Pump temperature I- | | 1 µA | | 1000 | |
| Sorption Pump temperature shld* | | N/A | | N/A | |
| Evaporator temperature I+ | | 1 µA | Insulated screened twisted quad | 1000 | |
| Evaporator temperature V+ | | N/A | | 1000 | |
| Evaporator temperature V- | | N/A | | 1000 | |
| Evaporator temperature I- | | 1 µA | | 1000 | |
| Evaporator temperature shld* | | N/A | | N/A | |
| Sorption Pump Heat Switch temperature I+ | | 1 µA | Insulated screened twisted quad | 1000 | |
| Sorption Pump Heat Switch temperature V+ | | N/A | | 1000 | |
| Sorption Pump Heat Switch temperature V- | | N/A | | 1000 | |
| Sorption Pump Heat Switch temperature I- | | 1 µA | | 1000 | |
| Sorption Pump Heat Switch temperature shld* | | N/A | | N/A | |
| Evaporator Heat Switch temperature I+ | | 1 µA | Insulated screened twisted quad | 1000 | |
| Evaporator Heat Switch temperature V+ | | N/A | | 1000 | |
| Evaporator Heat Switch temperature V- | | N/A | | 1000 | |
| Evaporator Heat Switch temperature I- | | 1 µA | | 1000 | |
| Evaporator Heat Switch temperature shld* | | N/A | | N/A | |
| Thermal Shunt temperature I+ _A | | 1 µA | Insulated screened twisted quad | 1000 | |
| Thermal Shunt temperature V+ _B | | N/A | | 1000 | |
| Thermal Shunt temperature V- _A | | N/A | | 1000 | |
| Thermal Shunt temperature I- _B | | 1 µA | | 1000 | |
| Thermal Shunt temperature shld* | | N/A | | N/A | |
| HS Spect. 4% temperature I+ | | 1 µA | Insulated screened twisted quad | 1000 | |
| HS Spect. 4% temperature V+ | | N/A | | 1000 | |
| HS Spect. 4% temperature V- | | N/A | | 1000 | |
| HS Spect. 4% temperature I- | | 1 µA | | 1000 | |
| HS Spect. 4% temperature shld* | | N/A | | N/A | |
| HS Spect. 2% temperature I+ | | 1 µA | Insulated screened twisted quad | 1000 | |
| HS Spect. 2% temperature V+ | | N/A | | 1000 | |
| HS Spect. 2% temperature V- | | N/A | | 1000 | |
| HS Spect. 2% temperature I- | | 1 µA | | 1000 | |
| HS Spect. 2% temperature shld* | | N/A | | N/A | |

* = linked on 100 way.

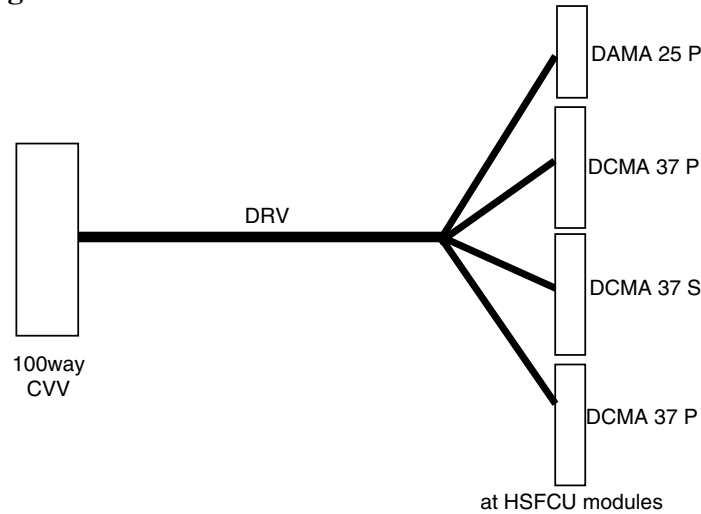
28 ways + 1 ground shield in use out of 37 ways.

Total number of contacts in use = 15 +12+ 8 +34 +29 + harness shield link = 99 contacts.

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4.2.11 I11 HSDCU to CVV11 DRV-P

Overall Mechanical Drwg.



Connector/Backshell Details

Redundant side harness

DBMA 25 P + XXXX: interface to HSFCU J21 Temperatures

DCMA 37P+ XXXX: interface to HSFCU J17 SMEC Control

DCMA 37S+ XXXX: interface to HSFCU J29 SMEC Launch

DCMA 37 P + XXXX: interface to HSFCU J19 BSM

Harness Layups

As per tail listings.

Temperature Tail Listing J21

| Function | 25way J21 | Max. current | Wire lay-up | Max Ohms | 100way #11 |
|------------------------------------|-----------|--------------|---------------------------------|----------|------------|
| BSM temperature I+ | 1 | 1 μ A | Insulated screened twisted quad | 1000 | |
| BSM temperature V+ | 14 | N/A | | 1000 | |
| BSM temperature V- | 15 | N/A | | 1000 | |
| BSM temperature I- | 2 | 1 μ A | | 1000 | |
| BSM temperature shld | 3 | N/A | | N/A | |
| SMEC temperature I+ | 4 | 1 μ A | Insulated screened twisted quad | 1000 | |
| SMEC temperature V+ | 17 | N/A | | 1000 | |
| SMEC temperature V- | 18 | N/A | | 1000 | |
| SMEC temperature I- | 5 | 1 μ A | | 1000 | |
| SMEC temperature shld | 16 | N/A | | N/A | |
| SMEC/HOB I/F temperature I+ | 6 | 1 μ A | Insulated screened twisted quad | 1000 | |
| SMEC/HOB I/F temperature V+ | 19 | N/A | | 1000 | |
| SMEC/HOB I/F temperature V- | 20 | N/A | | 1000 | |
| SMEC/HOB I/F temperature I- | 7 | 1 μ A | | 1000 | |
| SMEC/HOB I/F temperature shld | 8 | N/A | | N/A | |
| Photometer Point Stim. heater I+_A | 11 | 7 mA | twisted quad | 10 | |
| Photometer Point Stim.heater I+_B | 23 | 7 mA | | 10 | |
| Photometer Point Stim.heater I-_A | 12 | 7 mA | | 10 | |
| Photometer Point Stim.heater I-_B | 24 | 7 mA | | 10 | |

19 contacts used.

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SMEC Control Tail Listing

| Function | 37way J17 | Max. current | Wire lay-up | Max Ohms | 100way #11 |
|---|-----------|--------------|---------------------------------|----------|------------|
| SMEC Drive Coil I+ | 1 | 100mA | Insulated screened twisted pair | 5 | |
| SMEC Drive Coil I- | 2 | 100mA | | 5 | |
| SMEC Drive Coil shld | 20 | N/A | | N/A | A |
| SMEC Drive Coil (Rob) I+ | 21 | 100mA | Insulated screened twisted pair | 5 | |
| SMEC Drive Coil (Rob) I- | 22 | 100mA | | 5 | |
| SMEC Drive Coil (Rob) shld | 3 | N/A | | N/A | A |
| SMEC Drive Coil Sense+ | 4 | 10 μ A | Insulated screened twisted pair | 500 | |
| SMEC Drive Coil Sense- | 5 | 10 μ A | | 500 | |
| SMEC Drive Coil shld | 23 | N/A | | N/A | |
| SMEC position sensor Led power supply | 7 | 1mA | Insulated screened twisted pair | 100 | |
| SMEC position sensor Led power return | 8 | 1mA | | 100 | |
| SMEC position sensor Led power Shield | 26 | N/A | | N/A | |
| SMEC position sensor power supply | 27 | 1mA | Insulated screened twisted pair | 100 | |
| SMEC position sensor power return | 28 | 1mA | | 100 | |
| SMEC position sensor power Shield | 9 | N/A | | N/A | |
| SMEC position sensor photodiode #1 I+ | 10 | 20 μ A | Insulated screened twisted pair | 1000 | |
| SMEC position sensor photodiode #1 I- | 11 | 20 μ A | | 1000 | |
| SMEC position sensor photodiode Shield | 29 | N/A | | N/A | B |
| SMEC pos. sensor photodiode #1 feedback + | 30 | 10 μ A | Insulated screened twisted pair | 1000 | |
| SMEC pos. sensor photodiode #1 feedback - | 31 | 10 μ A | | 1000 | |
| SMEC pos. sensor photodiode feedback Shld | 12 | N/A | | N/A | C |
| SMEC position sensor photodiode #2 I+ | 13 | 20 μ A | Insulated screened twisted pair | 1000 | |
| SMEC position sensor photodiode #2 I- | 14 | 20 μ A | | 1000 | |
| SMEC position sensor photodiode Shield | 32 | N/A | | N/A | B |
| SMEC pos. sensor photodiode #2 feedback + | 33 | 10 μ A | Insulated screened twisted pair | 1000 | |
| SMEC pos. sensor photodiode #2 feedback - | 34 | 10 μ A | | 1000 | |
| SMEC pos. sensor photodiode feedback Shld | 15 | N/A | | N/A | C |
| SMEC position sensor photodiode #3 I+ | 16 | 20 μ A | Insulated screened twisted pair | 1000 | |
| SMEC position sensor photodiode #3 I- | 17 | 20 μ A | | 1000 | |
| SMEC position sensor photodiode Shield | 35 | N/A | | N/A | B |
| SMEC pos. sensor photodiode #3 feedback + | 36 | 10 μ A | Insulated screened twisted pair | 1000 | |
| SMEC pos. sensor photodiode #3 feedback - | 37 | 10 μ A | | 1000 | |
| SMEC pos. sensor photodiode feedback Shld | 18 | N/A | | N/A | C |

33(28) contacts in use.

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SMEC Launch Tail Listing

| Function | 37way J29 | Max. current | Wire lay-up | Max Ohms | 100way #11 |
|---|--------------|---------------|---------------------------------------|-------------|---------------|
| SMEC launch latch # 1 confirmation + | 1 | 1 mA | Insulated screened twisted pair | 5 | |
| SMEC launch latch # 1 confirmation - | 20 | 1 mA | | 5 | |
| SMEC launch latch # 1 confirmation Shield | 3 | N/A | | N/A | A [noisy SVM] |
| SMEC launch latch # 2 confirmation + TBC | 2 | 1 mA | Insulated screened twisted pair | 5 | |
| SMEC launch latch # 2 confirmation - TBC | 21 | 1 mA | | 5 | |
| SMEC launch latch # 2 confirmation Shld TBC | 3 | N/A | | N/A | A[noisy SVM] |
| SMEC launch latch #1 power supply_1 | 21 | 400 mA / 50ms | Insulated screened twisted pair | 5 | |
| SMEC launch latch #1 power return_1 | 22 | 400 mA / 50ms | | 5 | |
| SMEC launch latch #1 power Shield_1 | 4 | N/A | | N/A | B |
| SMEC launch latch #1 power supply_2 | 5 | 400 mA / 50ms | Insulated screened twisted pair | 5 | |
| SMEC launch latch #1 power return_2 | 6 | 400 mA / 50ms | | 5 | |
| SMEC launch latch #1 power Shield_2 | 23 | N/A | | N/A | B |
| SMEC launch latch #2 power supply_1 | 24 | 400 mA / 50ms | Insulated screened twisted pair | 5 | |
| SMEC launch latch #2 power return_1 | 25 | 400 mA / 50ms | | 5 | |
| SMEC launch latch #2 power Shield_1 | 7 | N/A | | N/A | B |
| SMEC launch latch #2 power supply_2 TBC | 8 | 400 mA / 50ms | Insulated screened twisted pair | 5 | |
| SMEC launch latch #2 power return_2 TBC | 9 | 400 mA / 50ms | | 5 | |
| SMEC launch latch #2 power Shield_2 TBC | 26 | N/A | | N/A | B |
| SMEC LVDT primary coil power supply (P) | 32 | 5 mA | Insulated screened twisted pair | 5 | |
| SMEC LVDT primary coil power supply (N) | 33 | 5 mA | | 5 | |
| SMEC LVDT primary coil power supply Shld | 15 | N/A | | N/A | D |
| SMEC LVDT secondary coil # 1 signal (P) | 35 | 50 μ A | Insulated screened twisted pair | 5 | |
| SMEC LVDT secondary coil # 1 signal (N) | 36 | 50 μ A | | 5 | |
| SMEC LVDT secondary coil # 1 signal Shield | 17 | N/A | | N/A | D |
| SMEC LVDT secondary coil # 2 signal (P) | 18 | 50 μ A | Insulated screened twisted pair | 5 | |
| SMEC LVDT secondary coil # 2 signal (N) | 19 | 50 μ A | | 5 | |
| SMEC LVDT secondary coil # 2 signal Shield | 37 | N/A | | N/A | D |

27(21) contacts used

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BSM Tail Listing

| Function | 37way J25 | Max. current | Wire lay-up | Max Ohms | 100way #11 |
|--|--------------|-----------------|---|-------------|------------|
| Chop Position Sensor 1 | 1 | 1 μ A | Insulated screened twisted pair | 1000 | |
| Chop Position Sensor 2 | 20 | N/A | | 1000 | |
| Chop Position Sensor shld1 | to A | N/A | | N/A | linked |
| Chop Position Sensor 3 | 2 | 250 nA | Insulated screened twisted triple | 1000 | |
| Chop Position Sensor 4 | 21 | N/A | | 1000 | |
| Chop Position Sensor 5 | 3 | N/A | | 1000 | |
| Chop Position Sensor shld2=A | 22 | N/A | | N/A | |
| Jiggle Position Sensor 1 | 4 | 1 μ A | Insulated screened twisted pair | 1000 | |
| Jiggle Position Sensor 2 | 23 | N/A | | 1000 | |
| Jiggle Position Sensor shld1 | to B | N/A | | N/A | linked |
| Jiggle Position Sensor 3 | 5 | 250 nA | Insulated screened twisted triple | 1000 | |
| Jiggle Position Sensor 4 | 24 | N/A | | 1000 | |
| Jiggle Position Sensor 5 | 6 | N/A | | 1000 | |
| Jiggle Position Sensor shld2=B | 22 | N/A | | N/A | |
| BSM Launch latch confirmation 1 | 30 | 1mA | Insulated screened twisted pair | 1000 | |
| BSM Launch latch confirmation 2 | 12 | 1mA | | 1000 | |
| Launch latch confirmation shld to platform gnd | 31 | N/A | | N/A | |
| BSM Launch latch drive + | 13 | 35mA | Insulated screened twisted triple | 10 | |
| BSM Launch latch drive - | 32 | 35mA | | 10 | |
| BSM Launch latch drive shld | 33 | N/A | | N/A | |
| Chop Motor Drive 1 | 15 | 40 mA | Insulated screened twisted quad | 10 | |
| Chop Motor Drive 2 | 34 | 40 mA | | 10 | |
| Chop Motor Drive 3 | 16 | 40 mA | | 10 | |
| Chop Motor Drive 4 | 35 | 40 mA | | 10 | |
| Chop Motor Drive shld | 17 | N/A | | N/A | |
| Chop Motor Drive 1 | 36 | 40 mA | Insulated screened twisted quad | 10 | |
| Chop Motor Drive 2 | 18 | 40 mA | | 10 | |
| Chop Motor Drive 3 | 37 | 40 mA | | 10 | |
| Chop Motor Drive 4 | 19 | 40 mA | | 10 | |
| Chop Motor Drive shld | 17 | N/A | | N/A | linked |

This 37way connector is has 30(27) ways populated.

Total number of contacts in use at 100way = 19+28+21+27=95.

| | | |
|-------------|-------------------------------------|---|
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|-------------|-------------------------------------|---|

4.2.12 I12 HSDCU to CVV12 AUX-R

Overall Mechanical Drwg.

Redundant version of I10, and the same as it

Connector/Backshell Details

Prime side harness

DAMA 15 P + XXXX: interface to HSFCU J16 Shutter

DAMA 15 P + XXXX: interface to HSFCU J12 Cooler

DMA 9 P + XXXX: interface to HSFCU J14 FTS Stimulus

DCMA 37 P + XXXX: interface to HSFCU J24 Temperature sensors

DCMA 37 P + XXXX: interface to HSFCU J26 Temperature sensors

Harness Layup

As I10

| | | |
|-------------|------------------------------------|---|
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4.2.13 I13 HSDCU to CVV13 DRV-R

Overall Mechanical Drwg.

Format as I11, maybe differing lengths.

Connector/Backshell Details

Redundant side harness

DBMA 25 P + XXXX: interface to HSFCU J22 Temperatures

DCMA 37P+ XXXX: interface to HSFCU J18 SMEC Control

DCMA 37S+ XXXX: interface to HSFCU J30 SMEC Launch

DCMA 37 P + XXXX: interface to HSFCU J20 BSM

Harness Layup

As I11.

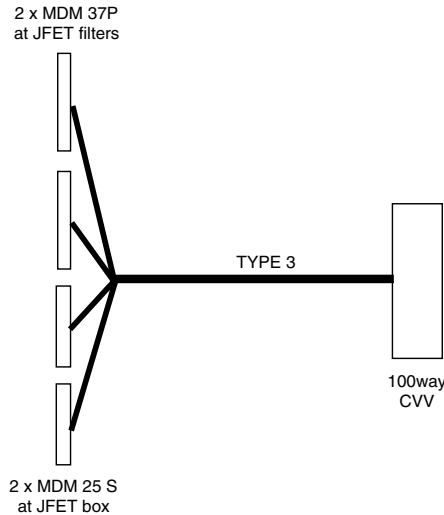
Contact Details

As I11

4.3 Cryogenic Harnesses

4.3.1 C1 CVV1 to HSJFS Type3

Overall Mechanical Drwg.

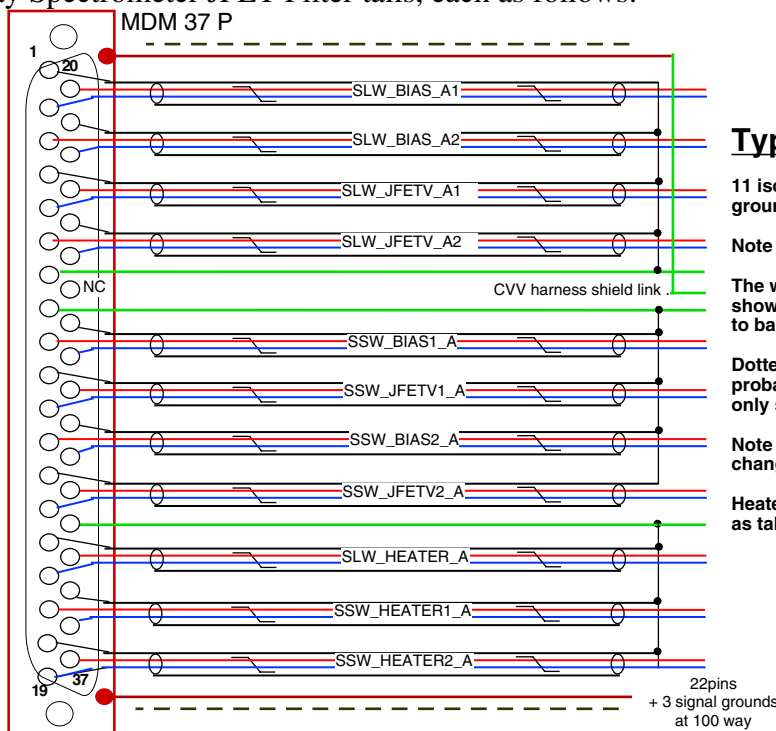


Connector/Backshell Details:

- MDM 25 S + XXXX: interface to HSJFS J5
- MDM 25 S + XXXX: interface to HSJFS J6
- MDM 37 P + XXXX: interface to HSJFS J9 bias A
- MDM 37 P + XXXX: interface to HSJFS J10 bias B

Harness Layup

Two 25way JFET bolometer tails, each as those in C4.
 Two 37 way Spectrometer JFET Filter tails, each as follows:



Type 3 Bias Filters

11 isolated screened twisted pairs + 3 ground single wires.

Note SLW and SSW ground separation.

The whole overlain with RF screen shown: **NOT** joined to backshell CVV end.

Dotted lines show insulation, probably put around bundles but only strictly needed at clamp points.

Note that for the other Bias tail change the last A in each name to B

Heaters parallel wires shown single. OK as takes same current as JFET supplies.

Because the small SLW has no subgroups that might fail, EACH of the JFET bachharness leads is double-wired in this cryoharness, requiring linked across in the filters.

Contact details

SPIRE HARNESS DEFINITION

| Name | 25way A J5 | 25wayB J6 | 37way C J9 | 37way D J10 | 100Way #1 |
|--------------------|---------------|--------------|---------------|----------------|-----------|
| Channel 1 + | 1 | | | | TBD |
| Channel 1 - | 14 | | | | TBD |
| Channel 1gnd shld | NC | | | | XXX |
| Channel 2 + | 2 | | | | TBD |
| Channel 2 - | 15 | | | | TBD |
| Channel 2gnd shld | NC | | | | XXX |
| Channel 3 + | 3 | | | | TBD |
| Channel 3 - | 16 | | | | TBD |
| Channel 3gnd shld | NC | | | | XXX |
| Channel 4 + | 4 | | | | TBD |
| Channel 4 - | 17 | | | | TBD |
| Channel 4gnd shld | NC | | | | XXX |
| Channel 5 + | 5 | | | | TBD |
| Channel 5 - | 18 | | | | TBD |
| Channel 5gnd shld | NC | | | | XXX |
| Channel 6 + | 6 | | | | TBD |
| Channel 6 - | 19 | | | | TBD |
| Channel 6gnd shld | NC | | | | XXX |
| Channel 7 + | 20 | | | | TBD |
| Channel 7 - | 7 | | | | TBD |
| Channel 7gnd shld | NC | | | | XXX |
| Channel 8 + | 21 | | | | TBD |
| Channel 8 - | 8 | | | | TBD |
| Channel 8gnd shld | NC | | | | XXX |
| Channel 9 + | 22 | | | | TBD |
| Channel 9 - | 9 | | | | TBD |
| Channel 9gnd shld | NC | | | | XXX |
| Channel 10 + | 23 | | | | TBD |
| Channel 10 - | 10 | | | | TBD |
| Channel 10gnd shld | NC | | | | XXX |
| Channel 11 + | 24 | | | | TBD |
| Channel 11 - | 11 | | | | TBD |
| Channel 11gnd shld | NC | | | | XXX |
| Channel 12 + | 25 | | | | TBD |
| Channel 12 - | 12 | | | | TBD |
| Channel 12gnd shld | NC | | | | TBD |
| SSW GND WIRE | 13 | | | | XXX |
| Channel 13 + | | 1 | | | TBD |
| Channel 13 - | | 14 | | | TBD |
| Channel 1gnd shld | | NC | | | XXX |
| Channel 14 + | | 2 | | | TBD |
| Channel 14 - | | 15 | | | TBD |
| Channel 1gnd shld | | NC | | | XXX |
| Channel 15 + | | 3 | | | TBD |
| Channel 15 - | | 16 | | | TBD |
| Channel 15gnd shld | | NC | | | XXX |
| Channel 16 + | | 4 | | | TBD |
| Channel 16 - | | 17 | | | TBD |
| Channel 16gnd shld | | NC | | | XXX |
| Channel 17 + | | 5 | | | TBD |
| Channel 17 - | | 18 | | | TBD |
| Channel 17gnd shld | | NC | | | XXX |
| Channel 18 + | | 6 | | | TBD |
| Channel 18 - | | 19 | | | TBD |
| Channel 18gnd shld | | NC | | | XXX |
| Channel 19 + | | 20 | | | TBD |
| Channel 19 - | | 7 | | | TBD |

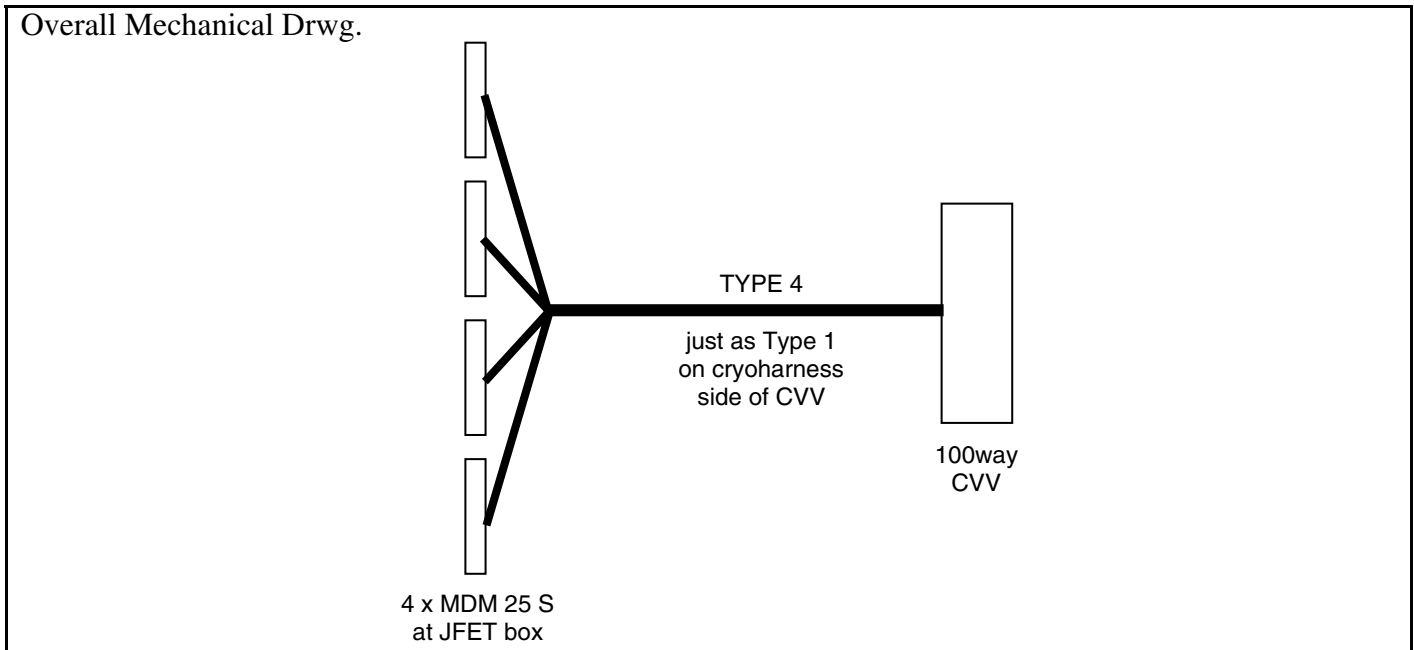
| Name | 25way A J5 | 25wayB J6 | 37way C J9 | 37way D J10 | 100Way #1 |
|------------------------|---------------|--------------|---------------|----------------|-----------|
| Channel 19gnd shld | | NC | | | XXX |
| Channel 20 + | | 21 | | | TBD |
| Channel 20 - | | 8 | | | TBD |
| Channel 1gnd shld | | NC | | | XXX |
| Channel 21 + | | 22 | | | TBD |
| Channel 21 - | | 9 | | | TBD |
| Channel 21gnd shld | | NC | | | XXX |
| Channel 22 + | | 23 | | | TBD |
| Channel 22 - | | 10 | | | TBD |
| Channel 22gnd shld | | NC | | | XXX |
| Channel 23 + | | 24 | | | TBD |
| Channel 23 - | | 11 | | | TBD |
| Channel 23gnd shld | | NC | | | XXX |
| Channel 24 + | | 25 | | | TBD |
| Channel 24 - | | 12 | | | TBD |
| Channel 24gnd shld | | NC | | | TBD |
| SSW GND WIRE | | 13 | | | XXX |
| SLW_BIAS_A1+ve | | | 20 | | TBD |
| SLW_BIAS_A1-ve | | | 2 | | TBD |
| SLW_BIAS_A1 shld | | | 1 | | XXX |
| SLW_BIAS_A2 +ve | | | 3 | | TBD |
| SLW_BIAS_A2 -ve | | | 22 | | TBD |
| SLW_BIAS_A2 shld | | | 21 | | XXX |
| SLW_JFETV_A1 +ve | | | 23 | | TBD |
| SLW_JFETV_A1 -ve | | | 5 | | TBD |
| SLW_JFETV_A1 shld | | | 4 | | XXX |
| SLW_JFETV_A2 +ve | | | 6 | | TBD |
| SLW_JFETV_A2 -ve | | | 25 | | TBD |
| SLW_JFETV_A2 shld | | | 24 | | XXX |
| SLW_GND WIRE_A | | | 7 | | TBD |
| Harness shield Link | | | N/C | | Yes |
| SSW_GND WIRE_A | | | 8 | | TBD |
| SSW_BIAS1_A +ve | | | 9 | | TBD |
| SSW_BIAS1_A -ve | | | 28 | | TBD |
| SSW_BIAS1_A shld | | | 27 | | XXX |
| SSW_JFETV1_A +ve | | | 29 | | TBD |
| SSW_JFETV1_A -ve | | | 11 | | TBD |
| SSW_JFETV1_A shld | | | 10 | | XXX |
| SSW_BIAS2_A +ve | | | 12 | | TBD |
| SSW_BIAS2_A -ve | | | 31 | | TBD |
| SSW_BIAS2_A shld | | | 30 | | XXX |
| SSW_JFETV2_A +ve | | | 32 | | TBD |
| SSW_JFETV2_A -ve | | | 14 | | TBD |
| SSW_JFETV2_A shld | | | 13 | | XXX |
| S_HEATER GROUND WIRE_A | | | 33 | | TBD |
| SLW_HEATER_A +ve | | | 34 | | TBD |
| SLW_HEATER_A -ve | | | 16 | | TBD |
| SLW_HEATER_A shld | | | 15 | | XXX |
| SSW_HEATER1_A +ve | | | 17 | | TBD |
| SSW_HEATER1_A -ve | | | 36 | | TBD |
| SSW_HEATER1_A shld | | | 35 | | XXX |
| SSW_HEATER2_A +ve | | | 37 | | TBD |
| SSW_HEATER2_A -ve | | | 19 | | TBD |
| SSW_HEATER2_A shld | | | 18 | | XXX |
| SLW_BIAS_B1+ve | | | | 20 | TBD |
| SLW_BIAS_B1-ve | | | | 2 | TBD |
| SLW_BIAS_B1 shld | | | | 1 | XXX |

SPIRE HARNES DEFINITION

| Name | 25way A J5 | 25wayB J6 | 37way C J9 | 37way D J10 | 100Way #1 |
|------------------------|---------------|--------------|---------------|----------------|-----------|
| SLW_BIAS_B2 +ve | | | | 3 | TBD |
| SLW_BIAS_B2 -ve | | | | 22 | TBD |
| SLW_BIAS_B2 shld | | | | 21 | XXX |
| SLW_JFETV_B1 +ve | | | | 23 | TBD |
| SLW_JFETV_B1 -ve | | | | 5 | TBD |
| SLW_JFETV_B1 shld | | | | 4 | XXX |
| SLW_JFETV_B2 +ve | | | | 6 | TBD |
| SLW_JFETV_B2 -ve | | | | 25 | TBD |
| SLW_JFETV_B2 shld | | | | 24 | XXX |
| SLW_GND WIRE_B | | | | 7 | TBD |
| Harness shield link | | | | N/C | Yes |
| SSW_GND WIRE_B | | | | 8 | TBD |
| SSW_BIAS1_B +ve | | | | 9 | TBD |
| SSW_BIAS1_B -ve | | | | 28 | TBD |
| SSW_BIAS1_B shld | | | | 27 | XXX |
| SSW_JFETV1_B +ve | | | | 29 | TBD |
| SSW_JFETV1_B -ve | | | | 11 | TBD |
| SSW_JFETV1_B shld | | | | 10 | XXX |
| SSW_BIAS2_B +ve | | | | 12 | TBD |
| SSW_BIAS2_B -ve | | | | 31 | TBD |
| SSW_BIAS2_B shld | | | | 30 | XXX |
| SSW_JFETV2_B +ve | | | | 32 | TBD |
| SSW_JFETV2_B -ve | | | | 14 | TBD |
| SSW_JFETV2_B shld | | | | 13 | XXX |
| S_HEATER GROUND WIRE_B | | | | 33 | TBD |
| SLW_HEATER_B +ve | | | | 34 | TBD |
| SLW_HEATER_B -ve | | | | 16 | TBD |
| SLW_HEATER_B shld | | | | 15 | XXX |
| SSW_HEATER1_B +ve | | | | 17 | TBD |
| SSW_HEATER1_B -ve | | | | 36 | TBD |
| SSW_HEATER1_B shld | | | | 35 | XXX |
| SSW_HEATER2_B +ve | | | | 37 | TBD |
| SSW_HEATER2_B -ve | | | | 19 | TBD |
| SSW_HEATER2_B shld | | | | 18 | XXX |

| | | |
|--------------------|---|---|
| <p>CLRC</p> | <p style="text-align: center;">SPIRE HARNESSES DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 58 of 136</p> |
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4.3.2 C2 CVV2 to HSJFS Type4



Connector/Backshell Details

MDM 25 S +xxxx: interface to HSJFS J1
MDM 25 S +xxxx: interface to HSJFS J2
MDM 25 S +xxxx: interface to HSJFS J3
MDM 25 S +xxxx: interface to HSJFS J4

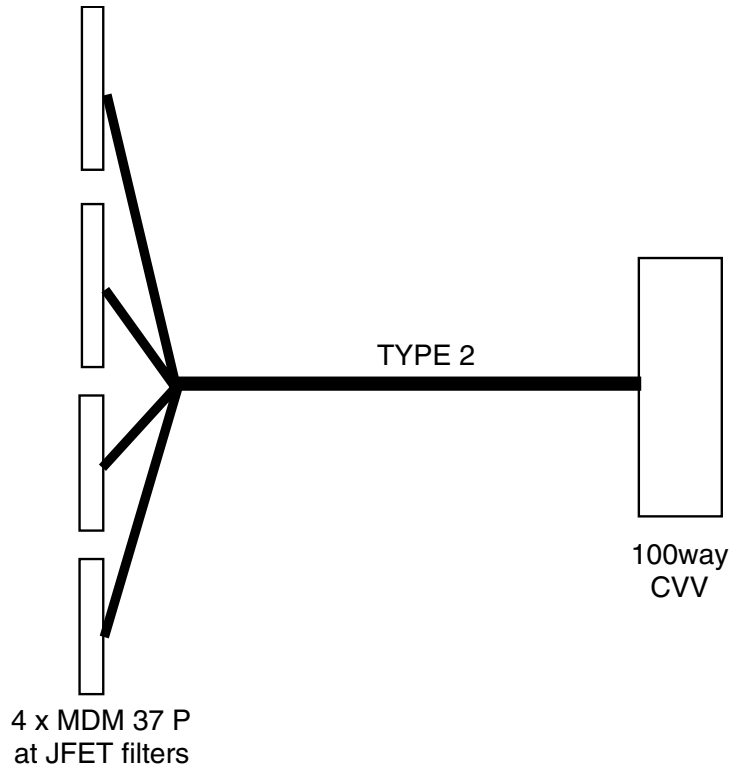
Harness Layup

4 JFET bolometer tails as in C4, Type 1.

| | | |
|--------------------|--|---|
| <p>CLRC</p> | <p style="text-align: center;">SPIRE HARNES DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 59 of 136</p> |
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4.3.3 C3 CVV3 to HSJFP Type2

Overall Mechanical Drwg.



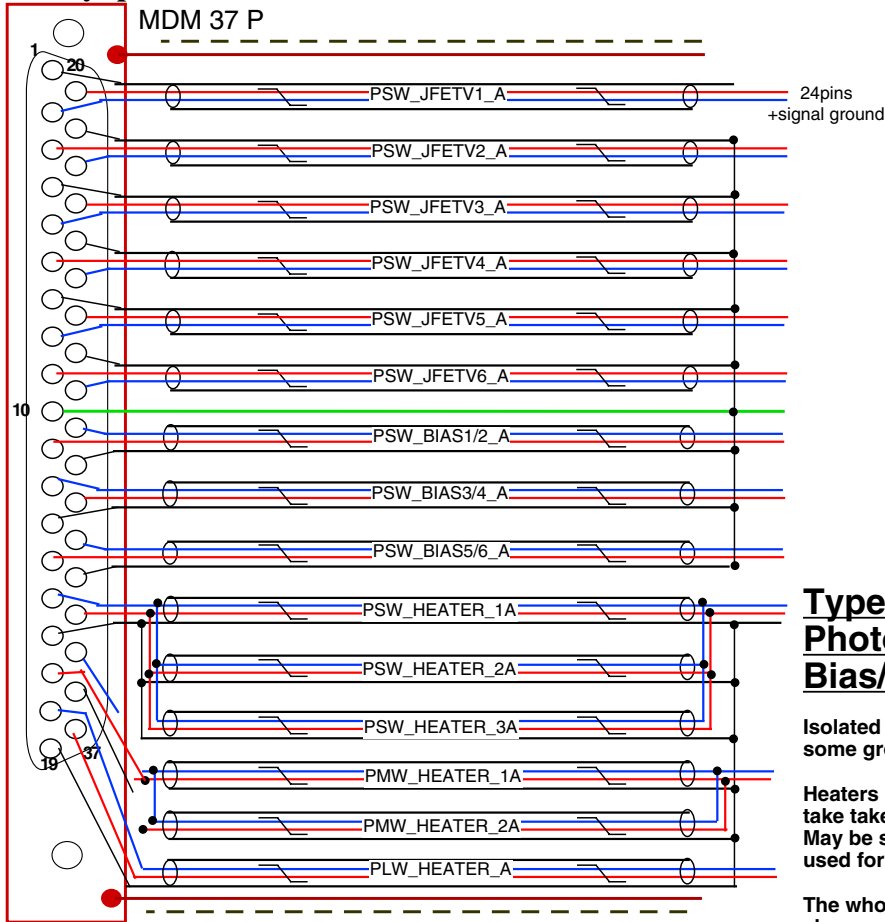
Connector/Backshell Details

- MDM 37 P +xxxx: interface to HSJFP J25
- MDM 37 P +xxxx: interface to HSJFP J27
- MDM 37 P +xxxx: interface to HSJFP J26
- MDM 37 P +xxxx: interface to HSJFP J28

SPIRE HARNESS DEFINITION

CLRC

Harness Layup



Type 2A Side Photometer Bias/Supply Filters

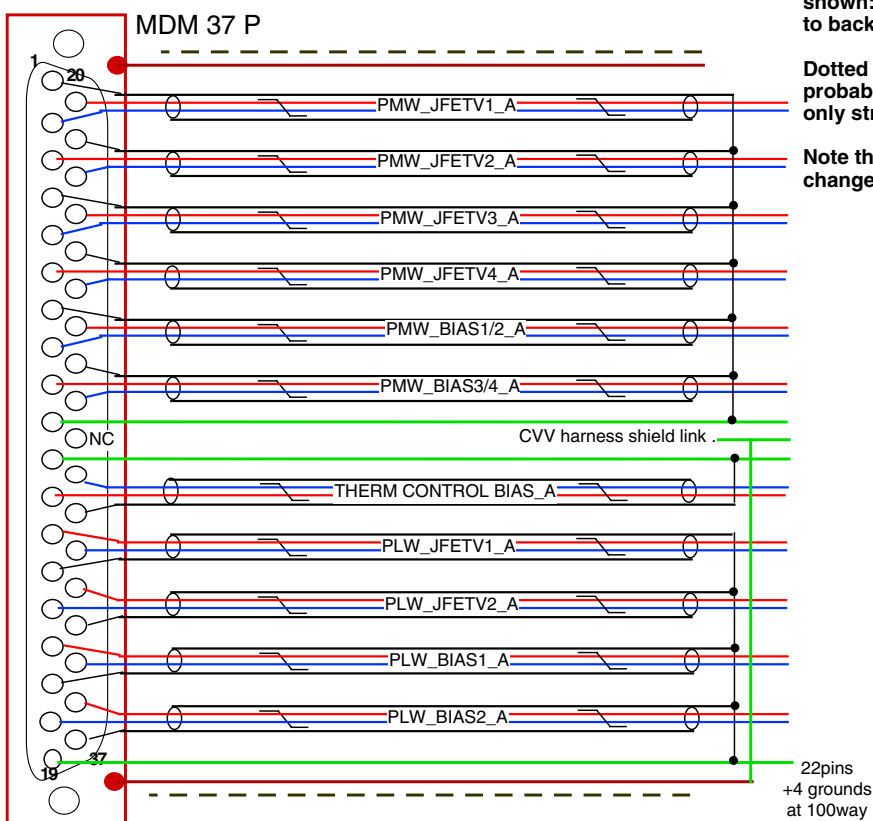
Isolated screened twisted pairs with some ground singlr wires.

Heaters parallel wired because assumed take takes same current as JFET supplies. May be simplified if heavier gauge can be used for heater wires.

The whole overlain with RF screen shown: ——— NOT joined to backshell CVV end.

Dotted lines show insulation, probably put around bundles but only strictly needed at clamp points.

Note that for the other Bias tails change the last A in each name to B



22pins
+4 grounds
at 100way

| | | |
|-------------|------------------------------------|---|
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Contact Details

| Name | 37way J25 | 37way J27 | 37Way J26 | 37way J28 | 100Way #3 |
|---------------------|-----------|-----------|-----------|-----------|-----------|
| PSW_JFETV1_A + | 20 | | | | |
| PSW_JFETV1_A - | 2 | | | | |
| PSW_JFETV1_A shld | 1 | | | | |
| PSW_JFETV2_A + | 3 | | | | |
| PSW_JFETV2_A - | 22 | | | | |
| PSW_JFETV2_A shld | 21 | | | | |
| PSW_JFETV3_A + | 23 | | | | |
| PSW_JFETV3_A - | 4 | | | | |
| PSW_JFETV3_A shld | 5 | | | | |
| PSW_JFETV4_A + | 6 | | | | |
| PSW_JFETV4_A - | 25 | | | | |
| PSW_JFETV4_A shld | 24 | | | | |
| PSW_JFETV5_A + | 26 | | | | |
| PSW_JFETV5_A - | 8 | | | | |
| PSW_JFETV5_A shld | 7 | | | | |
| PSW_JFETV6_A + | 9 | | | | |
| PSW_JFETV6_A - | 28 | | | | |
| PSW_JFETV6_A shld | 27 | | | | |
| PSW_GRND_A | 10 | | | | |
| PSW_BIAS1/2_A + | 11 | | | | |
| PSW_BIAS1/2_A - | 29 | | | | |
| PSW_BIAS1/2_A shld | 30 | | | | |
| PSW_BIAS3/4_A + | 31 | | | | |
| PSW_BIAS3/4_A - | 12 | | | | |
| PSW_BIAS3/4_A shld | 13 | | | | |
| PSW_BIAS5/6_A + | 14 | | | | |
| PSW_BIAS5/6_A - | 32 | | | | |
| PSW_BIAS5/6_A shld | 33 | | | | |
| PSW_HEATER_A +x3 | 34 | | | | |
| PSW_HEATER_A -x3 | 15 | | | | |
| PSW_HEATER_A shldx3 | 16 | | | | |
| PMW_HEATER_A +x2 | 17 | | | | |
| PMW_HEATER_A -x2 | 35 | | | | |
| PMW_HEATER_A shldx2 | 36 | | | | |
| PLW_HEATER_A + | 37 | | | | |
| PLW_HEATER_A- | 18 | | | | |
| PLW_HEATER_A shld | 19 | | | | |
| PMW_JFETV1_A + | | 20 | | | |
| PMW_JFETV1_A - | | 2 | | | |
| PMW_JFETV1_A shld | | 1 | | | |
| PMW_JFETV2_A + | | 3 | | | |
| PMW_JFETV2_A - | | 22 | | | |
| PMW_JFETV2_A shld | | 21 | | | |
| PMW_JFETV3_A + | | 23 | | | |
| PMW_JFETV3_A - | | 5 | | | |
| PMW_JFETV3_A shld | | 4 | | | |
| PMW_JFETV4_A + | | 6 | | | |
| PMW_JFETV4_A - | | 25 | | | |
| PMW_JFETV4_A shld | | 24 | | | |
| PMW_BIAS1/2_A + | | 26 | | | |
| PMW_BIAS1/2_A - | | 8 | | | |
| PMW_BIAS1/2_A shld | | 7 | | | |
| PMW_BIAS3/4_A + | | 9 | | | |
| PMW_BIAS3/4_A - | | 28 | | | |
| PMW_BIAS3/4_A shld | | 27 | | | |
| PMW_GND WIRE_A | | 10 | | | |

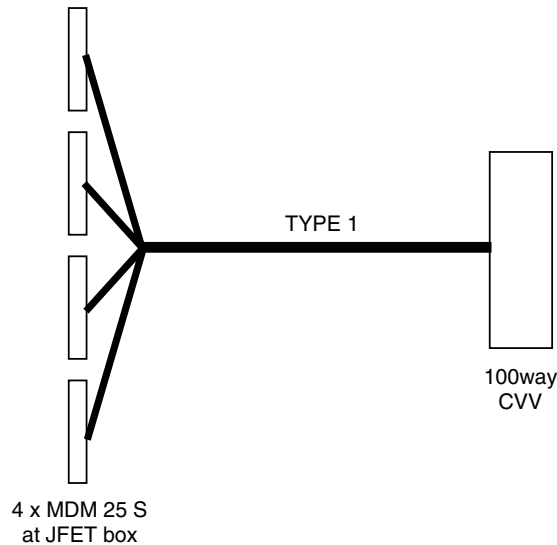
| Name | 37way J25 | 37way J27 | 37Way J26 | 37way J28 | 100Way #3 |
|----------------------------|-----------|-----------|-----------|-----------|-----------|
| Harness Shield Link | | NC | | | Yes |
| THERM GND WIRE_A | | 11 | | | |
| THERM CONTROL BIAS_A + | | 12 | | | |
| THERM CONTROL BIAS_A - | | 30 | | | |
| THERM CONTROL BIAS_A shld. | | 31 | | | |
| PLW_JFETV1_A + | | 13 | | | |
| PLW_JFETV1_A - | | 32 | | | |
| PLW_JFETV1_A shld | | 15 | | | |
| PLW_JFETV2_A + | | 33 | | | |
| PLW_JFETV2_A - | | 15 | | | |
| PLW_JFETV2_A shld | | 34 | | | |
| PLW_BIAS1_A + | | 16 | | | |
| PLW_BIAS1_A - | | 36 | | | |
| PLW_BIAS1_A shld | | 17 | | | |
| PLW_BIAS2_A + | | 37 | | | |
| PLW_BIAS2_A - | | 18 | | | |
| PLW_BIAS2_A shld | | 37 | | | |
| PLW_A GND WIRE | | 19 | | | |
| PSW_JFETV1_B + | | | 20 | | |
| PSW_JFETV1_B - | | | 2 | | |
| PSW_JFETV1_B shld | | | 1 | | |
| PSW_JFETV2_B + | | | 3 | | |
| PSW_JFETV2_B - | | | 22 | | |
| PSW_JFETV2_B shld | | | 21 | | |
| PSW_JFETV3_B + | | | 23 | | |
| PSW_JFETV3_B - | | | 4 | | |
| PSW_JFETV3_B shld | | | 5 | | |
| PSW_JFETV4_B + | | | 6 | | |
| PSW_JFETV4_B - | | | 25 | | |
| PSW_JFETV4_B shld | | | 24 | | |
| PSW_JFETV5_B + | | | 26 | | |
| PSW_JFETV5_B - | | | 8 | | |
| PSW_JFETV5_B shld | | | 7 | | |
| PSW_JFETV6_B + | | | 9 | | |
| PSW_JFETV6_B - | | | 28 | | |
| PSW_JFETV6_B shld | | | 27 | | |
| PSW_GRND_B | | | 10 | | |
| PSW_BIAS1/2_B + | | | 11 | | |
| PSW_BIAS1/2_B - | | | 29 | | |
| PSW_BIAS1/2_B shld | | | 30 | | |
| PSW_BIAS3/4_B + | | | 31 | | |
| PSW_BIAS3/4_B - | | | 12 | | |
| PSW_BIAS3/4_B shld | | | 13 | | |
| PSW_BIAS5/6_B + | | | 14 | | |
| PSW_BIAS5/6_B - | | | 32 | | |
| PSW_BIAS5/6_B shld | | | 33 | | |
| PSW_HEATER_B +x3 | | | 34 | | |
| PSW_HEATER_B -x3 | | | 15 | | |
| PSW_HEATER_B shldx3 | | | 16 | | |
| PMW_HEATER_B +x2 | | | 17 | | |
| PMW_HEATER_B -x2 | | | 35 | | |
| PMW_HEATER_B shldx2 | | | 36 | | |
| PLW_HEATER_B + | | | 37 | | |
| PLW_HEATER_B- | | | 18 | | |
| PLW_HEATER_B shld | | | 19 | | |
| PMW_JFETV1_B + | | | | 20 | |
| PMW_JFETV1_B - | | | | 2 | |
| PMW_JFETV1_B shld | | | | 1 | |

SPIRE HARNES DEFINITION

| Name | 37way J25 | 37way J27 | 37Way J26 | 37way J28 | 100Way #3 |
|----------------------------|-----------|-----------|-----------|-----------|-----------|
| PMW_JFETV2_B + | | | | 3 | |
| PMW_JFETV2_B - | | | | 22 | |
| PMW_JFETV2_B shld | | | | 21 | |
| PMW_JFETV3_B + | | | | 23 | |
| PMW_JFETV3_B - | | | | 5 | |
| PMW_JFETV3_B shld | | | | 4 | |
| PMW_JFETV4_B + | | | | 6 | |
| PMW_JFETV4_B - | | | | 25 | |
| PMW_JFETV4_B shld | | | | 24 | |
| PMW_BIAS1/2_B + | | | | 26 | |
| PMW_BIAS1/2_B - | | | | 8 | |
| PMW_BIAS1/2_B shld | | | | 7 | |
| PMW_BIAS3/4_B + | | | | 9 | |
| PMW_BIAS3/4_B - | | | | 28 | |
| PMW_BIAS3/4_B shld | | | | 27 | |
| PMW_GND_B | | | | 10 | |
| Shield Link Wire | | | | N/C | Yes |
| Therm GND_B | | | | 11 | |
| THERM CONTROL BIAS_B + | | | | 12 | |
| THERM CONTROL BIAS_B - | | | | 30 | |
| THERM CONTROL BIAS_B shld. | | | | 31 | |
| PLW_JFETV1_B + | | | | 13 | |
| PLW_JFETV1_B - | | | | 32 | |
| PLW_JFETV1_B shld | | | | 15 | |
| PLW_JFETV2_B + | | | | 33 | |
| PLW_JFETV2_B - | | | | 15 | |
| PLW_JFETV2_B shld | | | | 34 | |
| PLW_BIAS1_B + | | | | 16 | |
| PLW_BIAS1_B - | | | | 36 | |
| PLW_BIAS1_B shld | | | | 17 | |
| PLW_BIAS2_B + | | | | 37 | |
| PLW_BIAS2_B - | | | | 18 | |
| PLW_BIAS2_B shld | | | | 37 | |
| PLW_B GND WIRE | | | | 19 | |

4.3.4 C4 CVV4 to HSJFP Type1

Overall Mechanical Drwg.

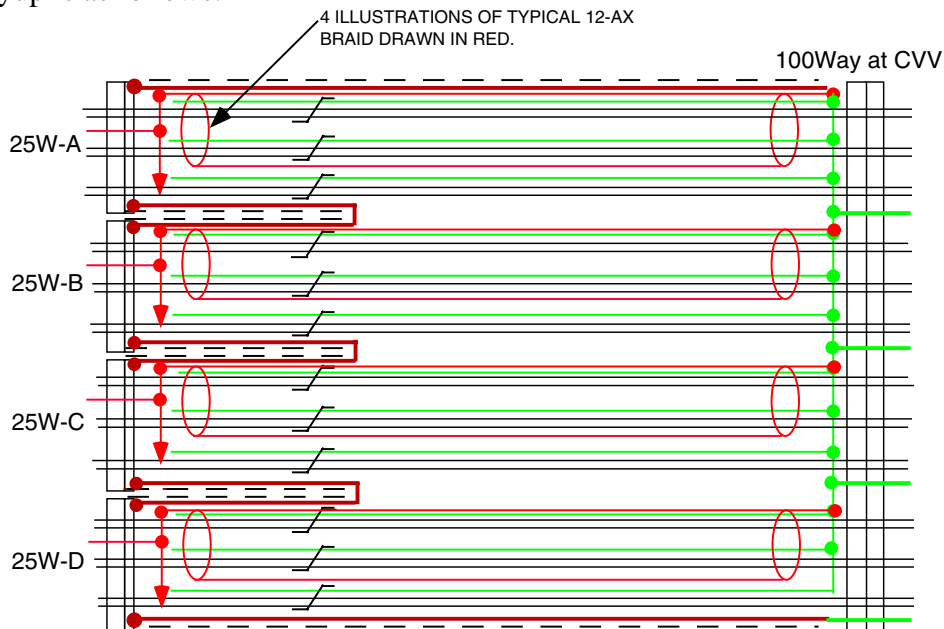


Connector/Backshell Details

MDM 25 S +xxxx: interface to HSJFP11 J21
MDM 25 S +xxxx: interface to HSJFP11 J22
MDM 25 S +xxxx: interface to HSJFP12 J23
MDM 25 S +xxxx: interface to HSJFP12 J24

Harness Layup

The total harness layup is as follows:



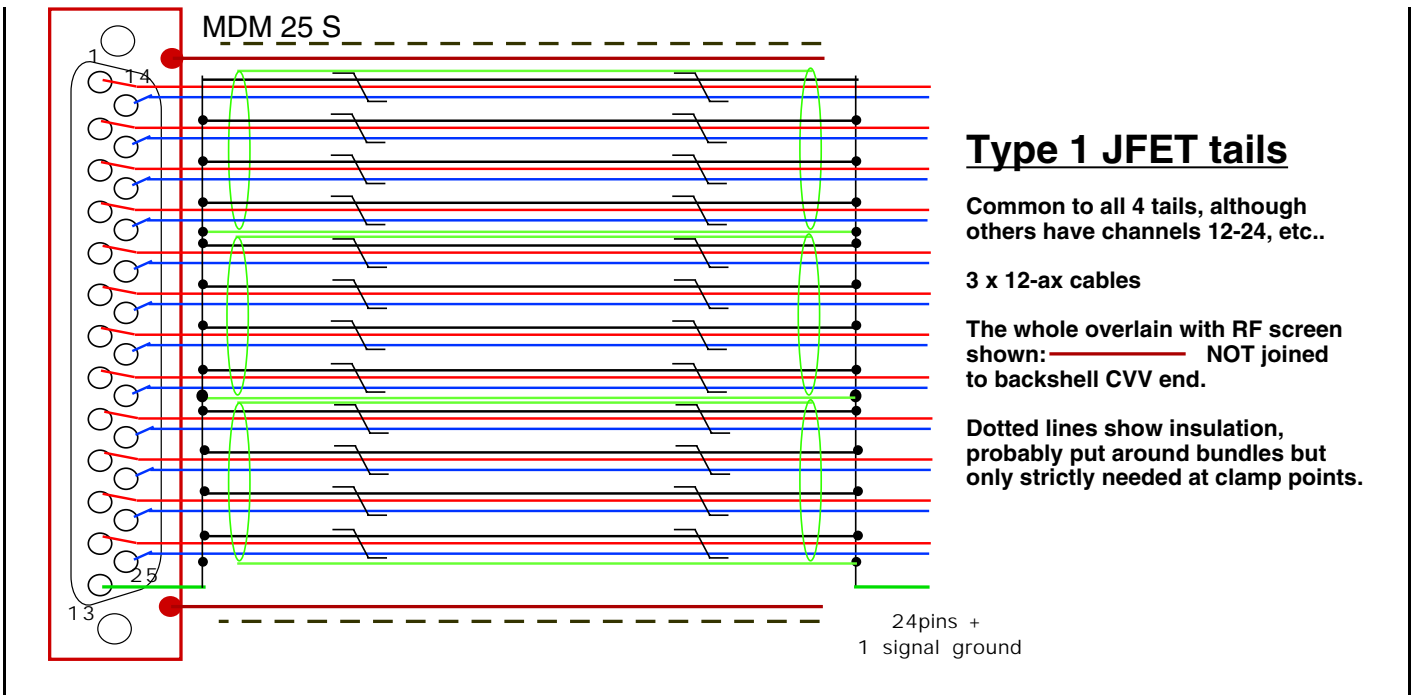
There are 48 channels each carried as a twisted triple, grouped in fours as "12-ax", each with its own insulated screen. So there are 12 x 12-ax in all with three 12-ax to each 25 way MDM. The use of a third wire twisted with each channel's + & - signal wires minimises interchannel cross-talk inside each 12-ax.

As for the intermediate harness, 4 pins carry ground through the 100 way and carry an isolated ground ring. All the third wires are made off to this, as are all the 12-ax screens.

At the 25way MDMs, the three 12-ax braids (which have a much higher conductivity than that of the sum of all the third twisted wires) are joined to the third wires and passed through the one non-signal pin..

To keep RF screening distinct from low noise bolometer grounds, all of this harness is enclosed in separate outer r.f. screen, EMC sealed to connector boots at the JFET end, overwrapped with insulation, and carried on a pin at the 100 way.

Any one MDM tail, as drawn for the other harnesses, looks like:-



Contact Details....this assumes JPL re-pin PCB connectors, see note at end.

Note the contacts are named as "channels 1-48" end-end, and mapping to specific detector position is only maintained internal to the instrument.

| Name | 25way A | 25wayB | 25Way C | 25way D | 100Way #4 |
|---------------|---------|--------|---------|---------|-----------|
| Channel 1 + | 1 | | | | TBD |
| Channel 1 - | 14 | | | | TBD |
| Channel 1gnd | NC | | | | XXX |
| Channel 2 + | 2 | | | | TBD |
| Channel 2 - | 15 | | | | TBD |
| Channel 2gnd | NC | | | | XXX |
| Channel 3 + | 3 | | | | TBD |
| Channel 3 - | 16 | | | | TBD |
| Channel 3gnd | NC | | | | XXX |
| Channel 4 + | 4 | | | | TBD |
| Channel 4 - | 17 | | | | TBD |
| Channel 4gnd | NC | | | | XXX |
| Channel 5 + | 5 | | | | TBD |
| Channel 5 - | 18 | | | | TBD |
| Channel 5gnd | NC | | | | XXX |
| Channel 6 + | 6 | | | | TBD |
| Channel 6 - | 19 | | | | TBD |
| Channel 6gnd | NC | | | | XXX |
| Channel 7 + | 20 | | | | TBD |
| Channel 7 - | 7 | | | | TBD |
| Channel 7gnd | NC | | | | XXX |
| Channel 8 + | 21 | | | | TBD |
| Channel 8 - | 8 | | | | TBD |
| Channel 8gnd | NC | | | | XXX |
| Channel 9 + | 22 | | | | TBD |
| Channel 9 - | 9 | | | | TBD |
| Channel 9gnd | NC | | | | XXX |
| Channel 10 + | 23 | | | | TBD |
| Channel 10 - | 10 | | | | TBD |
| Channel 10gnd | NC | | | | XXX |
| Channel 11 + | 24 | | | | TBD |
| Channel 11 - | 11 | | | | TBD |
| Channel 11gnd | NC | | | | XXX |
| Channel 12 + | 25 | | | | TBD |
| Channel 12 - | 12 | | | | TBD |

SPIRE HARNESS DEFINITION

| Name | 25way A | 25wayB | 25Way C | 25way D | 100Way #4 |
|---------------|---------|--------|---------|---------|-----------|
| Channel 12gnd | NC | | | | TBD |
| GND WIRE | 13 | | | | XXX |
| Channel 13 + | | 1 | | | TBD |
| Channel 13 - | | 14 | | | TBD |
| Channel 1gnd | | NC | | | XXX |
| Channel 14 + | | 2 | | | TBD |
| Channel 14 - | | 15 | | | TBD |
| Channel 1gnd | | NC | | | XXX |
| Channel 15 + | | 3 | | | TBD |
| Channel 15 - | | 16 | | | TBD |
| Channel 15gnd | | NC | | | XXX |
| Channel 16 + | | 4 | | | TBD |
| Channel 16 - | | 17 | | | TBD |
| Channel 16gnd | | NC | | | XXX |
| Channel 17 + | | 5 | | | TBD |
| Channel 17 - | | 18 | | | TBD |
| Channel 17gnd | | NC | | | XXX |
| Channel 18 + | | 6 | | | TBD |
| Channel 18 - | | 19 | | | TBD |
| Channel 18gnd | | NC | | | XXX |
| Channel 19 + | | 20 | | | TBD |
| Channel 19 - | | 7 | | | TBD |
| Channel 19gnd | | NC | | | XXX |
| Channel 20 + | | 21 | | | TBD |
| Channel 20 - | | 8 | | | TBD |
| Channel 1gnd | | NC | | | XXX |
| Channel 21 + | | 22 | | | TBD |
| Channel 21 - | | 9 | | | TBD |
| Channel 21gnd | | NC | | | XXX |
| Channel 22 + | | 23 | | | TBD |
| Channel 22 - | | 10 | | | TBD |
| Channel 22gnd | | NC | | | XXX |
| Channel 23 + | | 24 | | | TBD |
| Channel 23 - | | 11 | | | TBD |
| Channel 23gnd | | NC | | | XXX |
| Channel 24 + | | 25 | | | TBD |
| Channel 24 - | | 12 | | | TBD |
| Channel 24gnd | | NC | | | TBD |
| GND WIRE | | 13 | | | XXX |
| Channel 25 + | | | 1 | | TBD |
| Channel 25 - | | | 14 | | TBD |
| Channel 25gnd | | | NC | | XXX |
| Channel 26 + | | | 2 | | TBD |
| Channel 26 - | | | 15 | | TBD |
| Channel 26gnd | | | NC | | XXX |
| Channel 27 + | | | 3 | | TBD |
| Channel 27 - | | | 16 | | TBD |
| Channel 27gnd | | | NC | | XXX |
| Channel 28 + | | | 4 | | TBD |
| Channel 28 - | | | 17 | | TBD |
| Channel 28gnd | | | NC | | XXX |
| Channel 29 + | | | 5 | | TBD |
| Channel 29 - | | | 18 | | TBD |
| Channel 29gnd | | | NC | | XXX |
| Channel 30 + | | | 6 | | TBD |
| Channel 30 - | | | 19 | | TBD |
| Channel 30gnd | | | NC | | XXX |
| Channel 31 + | | | 20 | | TBD |
| Channel 31 - | | | 7 | | TBD |
| Channel 31gnd | | | NC | | XXX |
| Channel 32 + | | | 21 | | TBD |
| Channel 32 - | | | 8 | | TBD |
| Channel 32gnd | | | NC | | XXX |

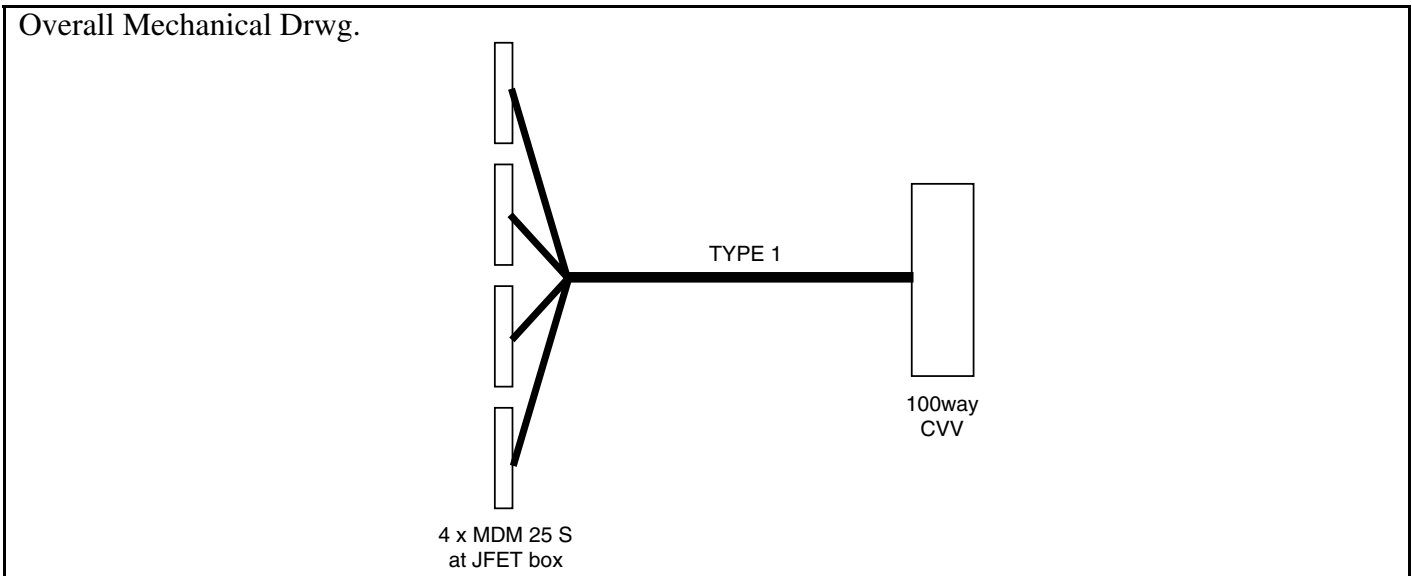
SPIRE HARNES DEFINITION

| Name | 25way A | 25wayB | 25Way C | 25way D | 100Way #4 |
|---------------|---------|--------|---------|---------|-----------|
| Channel 33 + | | | 22 | | TBD |
| Channel 33 - | | | 9 | | TBD |
| Channel 33gnd | | | NC | | XXX |
| Channel 34 + | | | 23 | | TBD |
| Channel 34 - | | | 10 | | TBD |
| Channel 34gnd | | | NC | | XXX |
| Channel 35 + | | | 24 | | TBD |
| Channel 35 - | | | 11 | | TBD |
| Channel 35gnd | | | NC | | XXX |
| Channel 36 + | | | 25 | | TBD |
| Channel 36 - | | | 12 | | TBD |
| Channel 36gnd | | | NC | | TBD |
| GND WIRE | | | 13 | | XXX |
| Channel 37 + | | | | 1 | TBD |
| Channel 37 - | | | | 14 | TBD |
| Channel 37gnd | | | | NC | XXX |
| Channel 38 + | | | | 2 | TBD |
| Channel 38 - | | | | 15 | TBD |
| Channel 38gnd | | | | NC | XXX |
| Channel 39 + | | | | 3 | TBD |
| Channel 39 - | | | | 16 | TBD |
| Channel 39gnd | | | | NC | XXX |
| Channel 40 + | | | | 4 | TBD |
| Channel 40 - | | | | 17 | TBD |
| Channel 40gnd | | | | NC | XXX |
| Channel 41 + | | | | 5 | TBD |
| Channel 41 - | | | | 18 | TBD |
| Channel 41gnd | | | | NC | XXX |
| Channel 42 + | | | | 6 | TBD |
| Channel 42 - | | | | 19 | TBD |
| Channel 42gnd | | | | NC | XXX |
| Channel 43 + | | | | 20 | TBD |
| Channel 43 - | | | | 7 | TBD |
| Channel 43gnd | | | | NC | XXX |
| Channel 44 + | | | | 21 | TBD |
| Channel 44 - | | | | 8 | TBD |
| Channel 44gnd | | | | NC | XXX |
| Channel 45 + | | | | 22 | TBD |
| Channel 45 - | | | | 9 | TBD |
| Channel 45gnd | | | | NC | XXX |
| Channel 46 + | | | | 23 | TBD |
| Channel 46 - | | | | 10 | TBD |
| Channel 46gnd | | | | NC | XXX |
| Channel 47 + | | | | 24 | TBD |
| Channel 47 - | | | | 11 | TBD |
| Channel 47gnd | | | | NC | XXX |
| Channel 48 + | | | | 25 | TBD |
| Channel 48 - | | | | 12 | TBD |
| Channel 48gnd | | | | NC | TBD |
| GND WIRE | | | | 13 | XXX |

XXX= on ground wire ring, supported by the 4 otherwise unused contacts.

| | | |
|--------------------|--|---|
| <p>CLRC</p> | <p align="center">SPIRE HARNESSES DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 68 of 136</p> |
|--------------------|--|---|

4.3.5 C5 CVV5 to HSJFP Type1



Connector/Backshell Details

MDM 25 S +xxxx: interface to HSJFP9 J17
MDM 25 S +xxxx: interface to HSJFP9 J18
MDM 25 S +xxxx: interface to HSJFP10 J19
MDM 25 S +xxxx: interface to HSJFP10 J20

Harness Layup

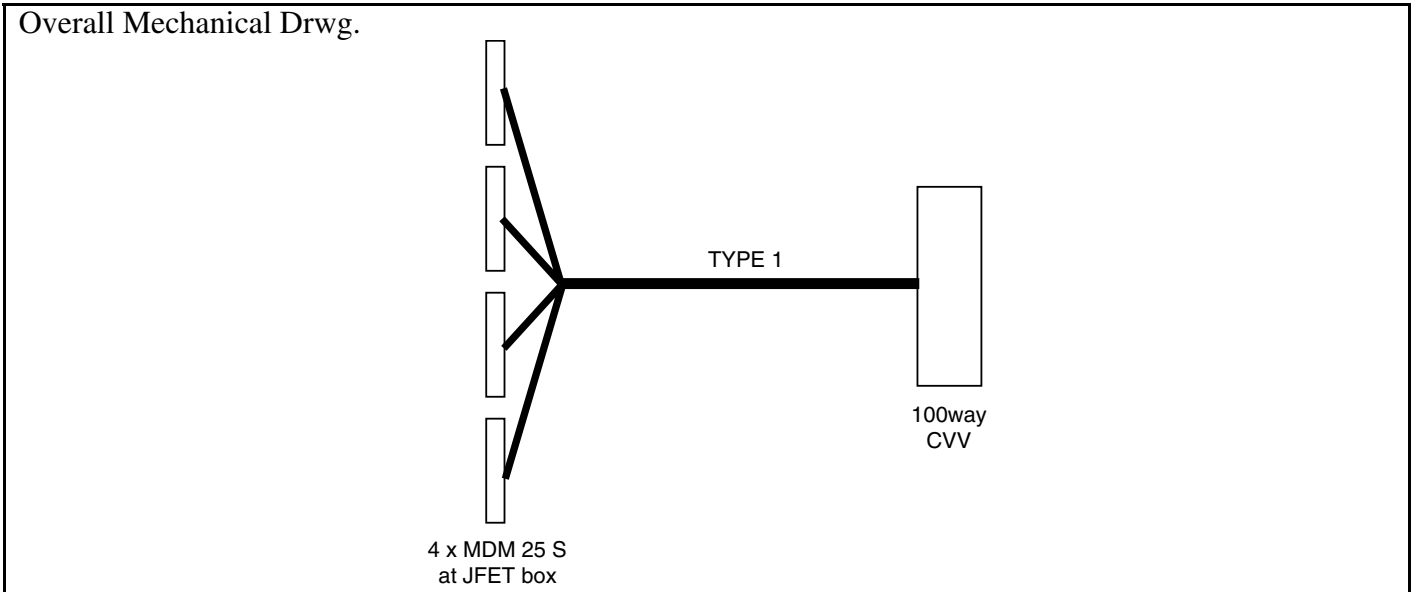
As C4.

Contact Details

As C4.

| | | |
|--------------------|---|---|
| <p>CLRC</p> | <p style="text-align: center;">SPIRE HARNESSES DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 69 of 136</p> |
|--------------------|---|---|

4.3.6 C6 CVV6 to HSJFP Type1



Connector/Backshell Details

- MDM 25 S +xxxx: interface to HSJFP7 J13
- MDM 25 S +xxxx: interface to HSJFP7 J14
- MDM 25 S +xxxx: interface to HSJFP8 J15
- MDM 25 S +xxxx: interface to HSJFP8 J16

Harness Layup

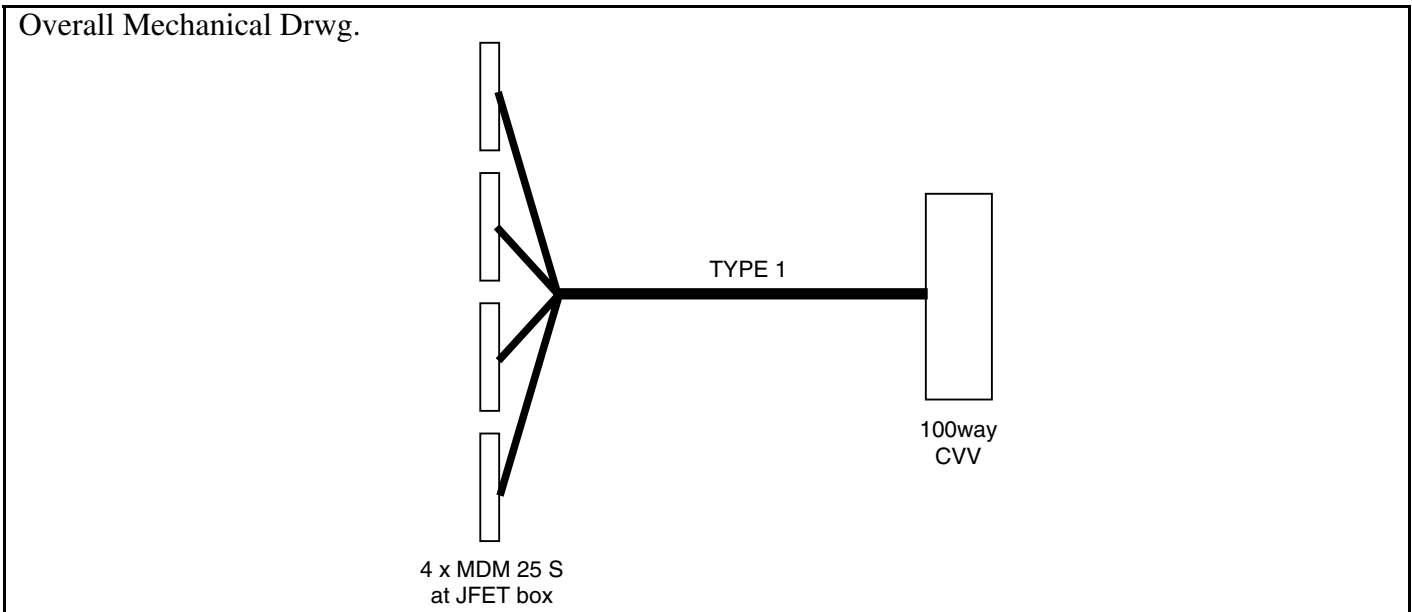
As C4.

Contact Details

As C4.

| | | |
|--------------------|--|---|
| <p>CLRC</p> | <p style="text-align: center;">SPIRE HARNES DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 70 of 136</p> |
|--------------------|--|---|

4.3.7 C7 CVV7 to HSJFP Type1



Connector/Backshell Details

MDM 25 S +xxxx: interface to HSJFP5 J9
MDM 25 S +xxxx: interface to HSJFP5 J10
MDM 25 S +xxxx: interface to HSJFP6 J11
MDM 25 S +xxxx: interface to HSJFP6 J12

Harness Layup

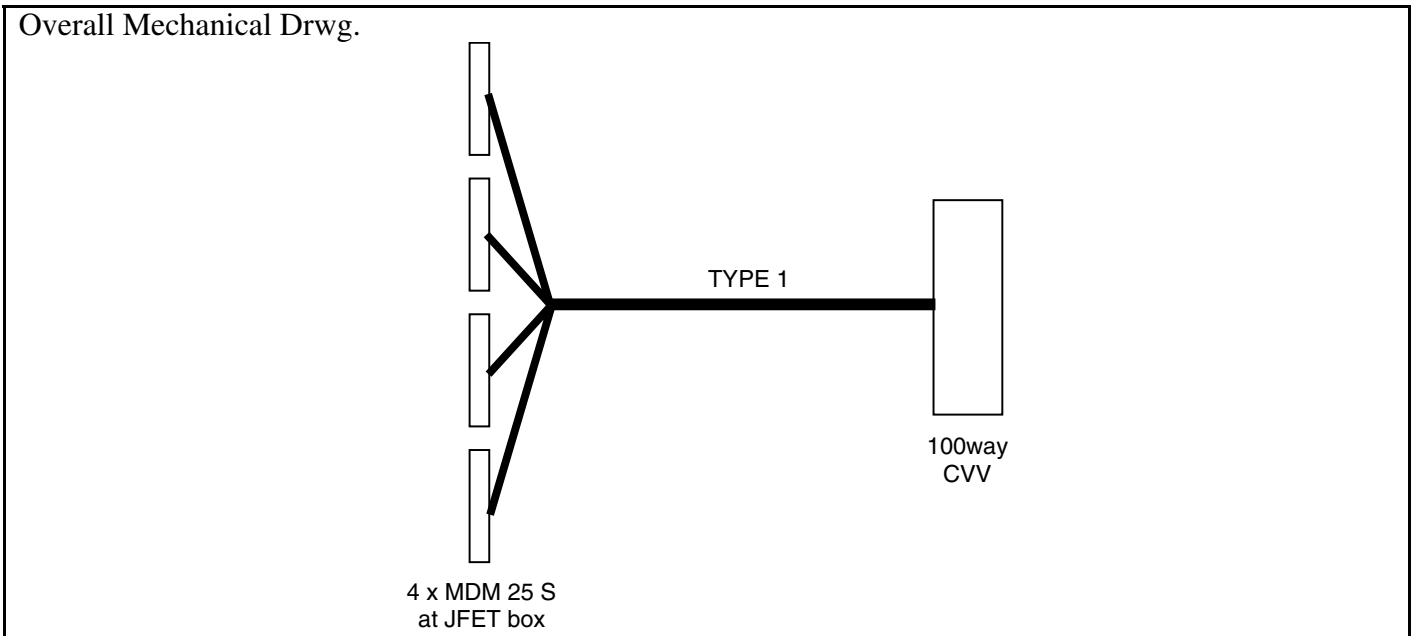
As C4.

Contact Details

As C4.

| | | |
|--------------------|---|---|
| <p>CLRC</p> | <p align="center">SPIRE HARNES DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 71 of 136</p> |
|--------------------|---|---|

4.3.8 C8 CVV8 to HSJFP Type1



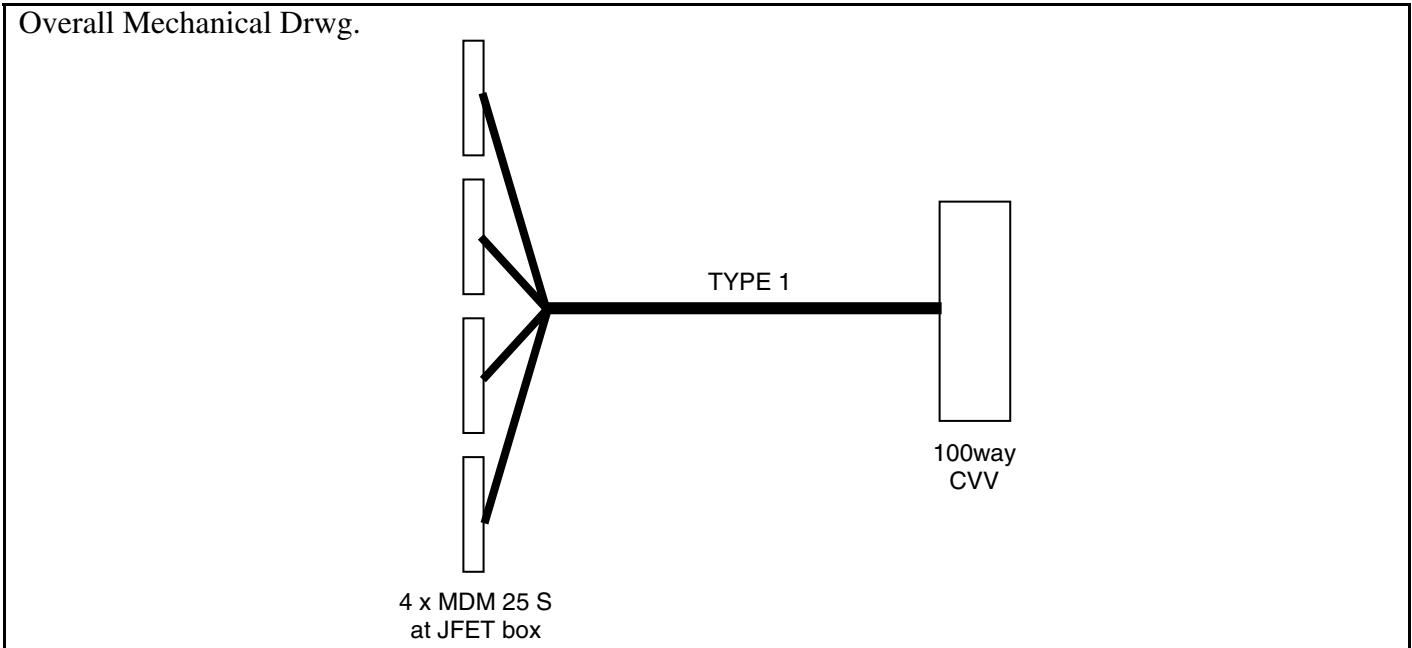
Connector/Backshell Details
MDM 25 S +xxxx: interface to HSJFP3 J5
MDM 25 S +xxxx: interface to HSJFP3 J6
MDM 25 S +xxxx: interface to HSJFP4 J7
MDM 25 S +xxxx: interface to HSJFP4 J8

Harness Layup
As C4.

Contact Details
As C2

| | | |
|--------------------|--|---|
| <p>CLRC</p> | <p style="text-align: center;">SPIRE HARNES DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 72 of 136</p> |
|--------------------|--|---|

4.3.9 C9 CVV9 to HSJFP Type1



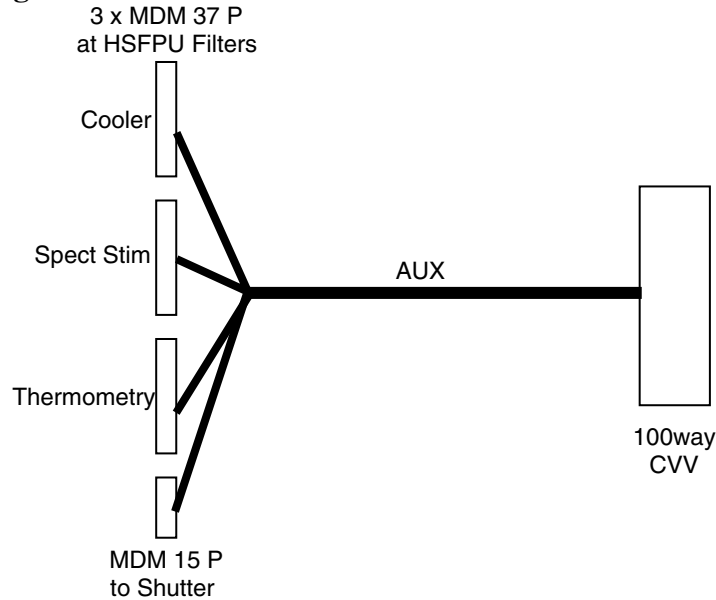
Connector/Backshell Details
MDM 25 S +xxxx: interface to HSJFP1 J1
MDM 25 S +xxxx: interface to HSJFP1 J2
MDM 25 S +xxxx: interface to HSJFP2 J3
MDM 25 S +xxxx: interface to HSJFP2 J4

Harness Layup
As C4.

Contact Details
As C4.

4.3.10 C10 CVV10 to HSFPU AUX-P

Overall Mechanical Drwg.



Connector/Backshell Details

Prime side harness

MDM 37 P + XXXX: interface to HSFPU Filter FA J19 for Cooler

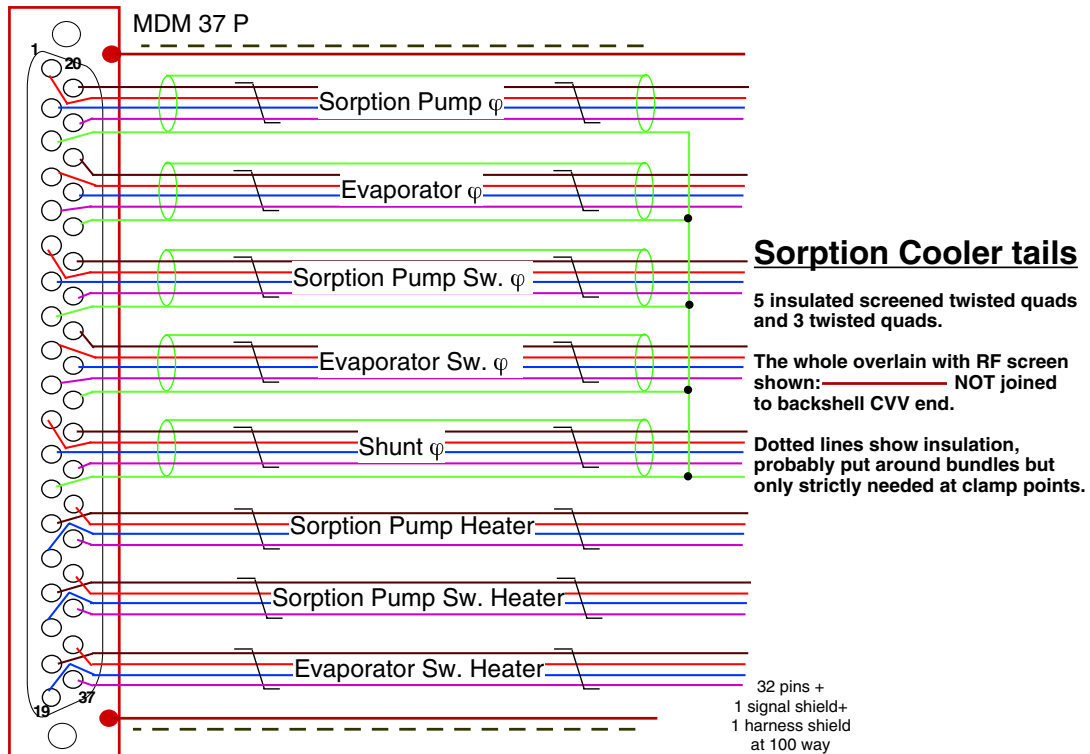
MDM 37 P + XXXX: interface to HSFPU Filter FA J21 for Spectrometer Stim

MDM 37 P + XXXX: interface to HSFPU Filter FB J23 for Thermometry

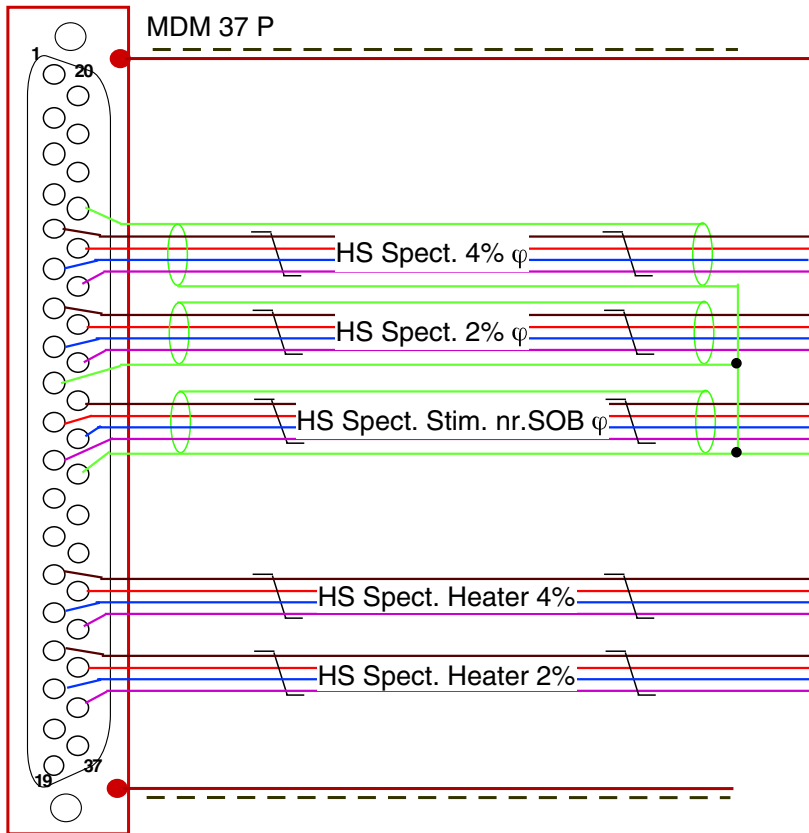
MDM 15 P + XXXX: interface to HSFPU J17 Shutter

Harness Layup

Cooler Tail



Spect. Stimulus Tail



Spectrometer Stimulus tails

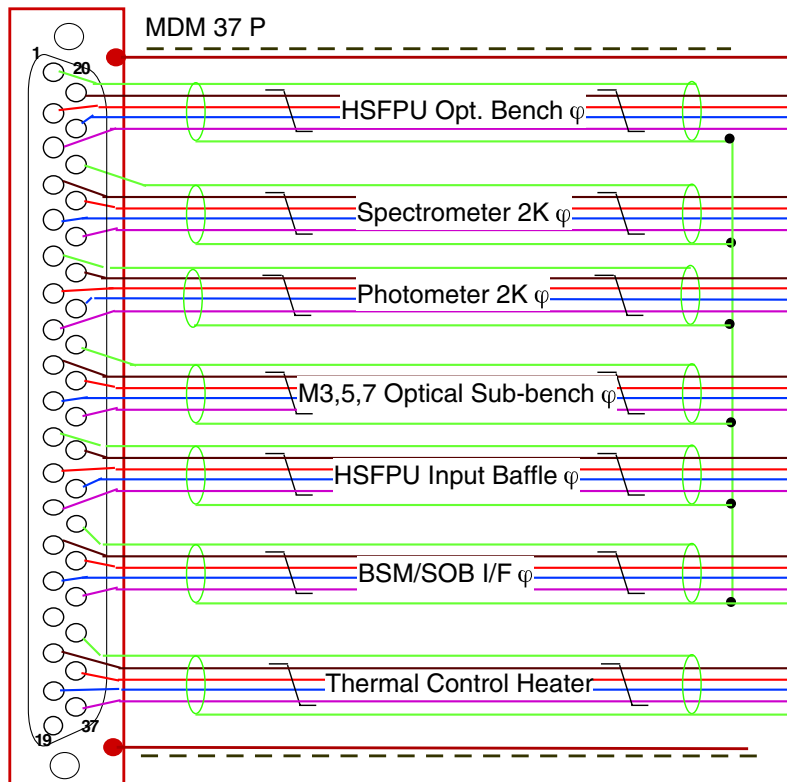
3 insulated screened twisted quads
and 2 insulated twisted quads.

The whole overlain with RF screen
shown: ——— NOT joined
to backshell CVV end.

Dotted lines show insulation,
probably put around bundles but
only strictly needed at clamp points.

20 pins +
1 signal shield+
harness shield
at 100 way

HSFPU Thermometry Tail



Thermometry tails

7 insulated screened twisted quads.

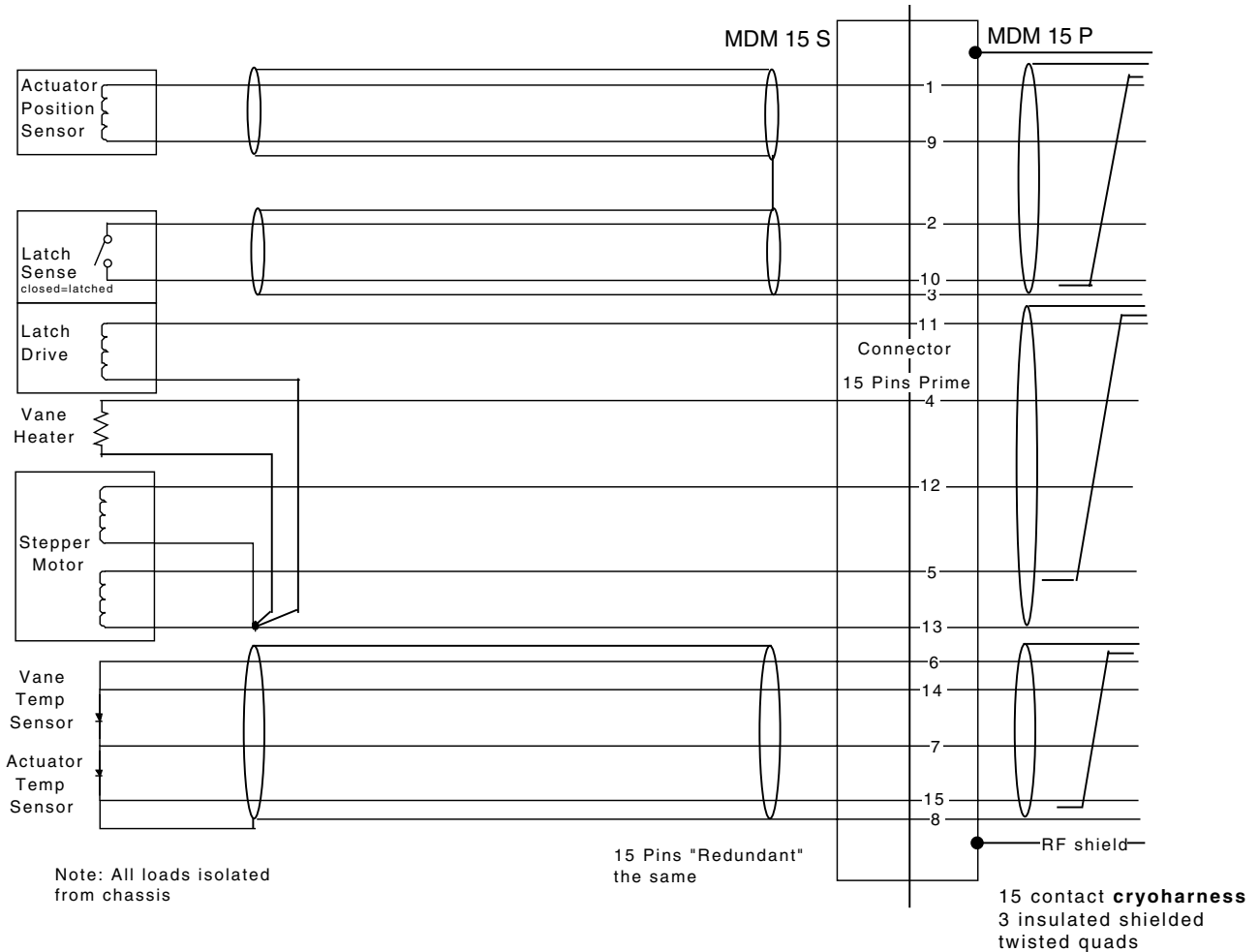
The whole overlain with RF screen
shown: ——— NOT joined
to backshell CVV end.

Dotted lines show insulation,
probably put around bundles but
only strictly needed at clamp points.

28 pins +
2signal grounds+
harness screen
at 100way

Shutter Tail

This is a longer tail by about 600mm than those that terminate into HSFPU filters because it is routed outside HSFPU to the shutter unit itself.



The number of wires to pass through the 100 way accumulates as follows:

| Tail Source | "Signals" | Shields etc. | Harness Shld. | |
|------------------------------|-----------|--------------|---------------|-------------|
| Cooler | 32 | 1 | 0.25 | |
| Spectrometer Stimulus | 20 | 1 | 0.25 | |
| Thermometry | 28 | 2 | 0.25 | |
| Shutter | 12 | 3 | 0.25 | |
| Total | 92 | 7 | 1 | 100 in all! |

The C10 harness contacts are tabulated on the following pages. Note that C10 is a PRIME harness and all wires herein (excepting the shutter function) are PRIME, although this is not explicitly written ad nauseam.

The above layouts show one further feature, it is in the Thermometry Tail. The number of wires do not appear to add up correctly! The cryoharness permits implementing an option that cannot yet be determined. There are 4 wires harnessed to run a 300mK thermostating heater. They fit OK on the 37way. If system is implemented, harness F20 will include the links on thermometer sensor current feeds shown dotted. The sensors are then conditioned in 4 pairs. Four of the 8 wires thus saved on the 100way CVV are used to power the 300mK heater. (System duplicated via C12 and F21).

| | | |
|-------------|------------------------------------|---|
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Cooler Tail Listing

| Function | 37way J19 | Max. current | Wire lay-up | Max Ohms | 100way #10 |
|---|-----------|--------------|---------------------------------|----------|------------|
| Sorption Pump temperature I+ | 20 | 1 μ A | Insulated screened twisted quad | 1000 | |
| Sorption Pump temperature V+ | 1 | N/A | | 1000 | |
| Sorption Pump temperature V- | 2 | N/A | | 1000 | |
| Sorption Pump temperature I- | 21 | 1 μ A | | 1000 | |
| Sorption Pump temperature shld* | 3 | N/A | | N/A | |
| Evaporator temperature I+ | 22 | 250 nA | Insulated screened twisted quad | 1000 | |
| Evaporator temperature V+ | 4 | N/A | | 1000 | |
| Evaporator temperature V- | 5 | N/A | | 1000 | |
| Evaporator temperature I- | 23 | 250 nA | | 1000 | |
| Evaporator temperature shld* | 24 | N/A | | N/A | |
| Sorption Pump Heat Switch temperature I+ | 25 | 1 μ A | Insulated screened twisted quad | 1000 | |
| Sorption Pump Heat Switch temperature V+ | 6 | N/A | | 1000 | |
| Sorption Pump Heat Switch temperature V- | 7 | N/A | | 1000 | |
| Sorption Pump Heat Switch temperature I- | 26 | 1 μ A | | 1000 | |
| Sorption Pump Heat Switch temperature shld* | 8 | N/A | | N/A | |
| Evaporator Heat Switch temperature I+ | 27 | 1 μ A | Insulated screened twisted quad | 1000 | |
| Evaporator Heat Switch temperature V+ | 9 | N/A | | 1000 | |
| Evaporator Heat Switch temperature V- | 10 | N/A | | 1000 | |
| Evaporator Heat Switch temperature I- | 28 | 1 μ A | | 1000 | |
| Evaporator Heat Switch temperature shld* | 29 | N/A | | N/A | |
| Thermal Shunt temperature I+ _A | 30 | 1 μ A | Insulated screened twisted quad | 1000 | |
| Thermal Shunt temperature V+ _B | 11 | N/A | | 1000 | |
| Thermal Shunt temperature V- _A | 12 | N/A | | 1000 | |
| Thermal Shunt temperature I- _B | 31 | 1 μ A | | 1000 | |
| Thermal Shunt temperature shld* | 13 | N/A | | N/A | |
| Sorption Pump heater I+ _A | 14 | 25 mA | twisted quad | 10 | |
| Sorption Pump heater I+ _B | 32 | 25 mA | | 10 | |
| Sorption Pump heater I- _A | 15 | 25 mA | | 10 | |
| Sorption Pump heater I- _B | 33 | 25 mA | | 10 | |
| Sorption Pump Heat Switch heater I+ _A | 16 | 1.5 mA | twisted quad | 50 | |
| Sorption Pump Heat Switch heater I+ _B | 34 | 1.5 mA | | 50 | |
| Sorption Pump Heat Switch heater I- _A | 17 | 1.5 mA | | 50 | |
| Sorption Pump Heat Switch heater I- _B | 35 | 1.5 mA | | 50 | |
| Evaporator Heat Switch heater I+ _A | 18 | 1.5 mA | twisted quad | 50 | |
| Evaporator Heat Switch heater I+ _B | 36 | 1.5 mA | | 50 | |
| Evaporator Heat Switch heater I- _A | 19 | 1.5 mA | | 50 | |
| Evaporator Heat Switch heater I- _B | 37 | 1.5 mA | | 50 | |

*=linked

32 wires and 1 temperature sensor signal shield

| | | |
|-------------|------------------------------------|---|
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|-------------|------------------------------------|---|

Spectrometer Stimulus Tail Listing

| Function | 37way J21 | Max. current | Wire lay-up | Max Ohms | 100way #10 |
|---|-----------|--------------|---------------------------------|----------|------------|
| HS Spect. 4% temperature I+ | 5 | 1 μ A | Insulated screened twisted quad | 1000 | |
| HS Spect. 4% temperature V+ | 6 | N/A | | 1000 | |
| HS Spect. 4% temperature V- | 24 | N/A | | 1000 | |
| HS Spect. 4% temperature I- | 25 | 1 μ A | | 1000 | |
| HS Spect. 4% temperature shld* | 23 | N/A | | N/A | |
| HS Spect. 2% temperature I+ | 7 | 1 μ A | Insulated screened twisted quad | 1000 | |
| HS Spect. 2% temperature V+ | 8 | N/A | | 1000 | |
| HS Spect. 2% temperature V- | 26 | N/A | | 1000 | |
| HS Spect. 2% temperature I- | 27 | 1 μ A | | 1000 | |
| HS Spect. 2% temperature shld* | 9 | N/A | | N/A | |
| HS Spect. Stim near HOB temperature I+ | 10 | 1 μ A | Insulated screened twisted quad | 1000 | |
| HS Spect. Stim near HOB temperature V+ | 11 | N/A | | 1000 | |
| HS Spect. Stim near HOBtemperature V- | 28 | N/A | | 1000 | |
| HS Spect. Stim near HOB temperature I- | 29 | 1 μ A | | 1000 | |
| HS Spect. Stim near HOB temperature shld* | 30 | N/A | | N/A | |
| HS Spect. 4% heater I+_A | 14 | 9 mA | twisted quad | 30 | |
| HS Spect. 4% heater I+_B | 15 | 9 mA | | 30 | |
| HS Spect. 4% heater I-_A | 33 | 9 mA | | 30 | |
| HS Spect. 4% heater I-_B | 34 | 9 mA | | 30 | |
| HS Spect. 2% heater I+_A | 16 | 7 mA | twisted quad | 30 | |
| HS Spect. 2% heater I+_B | 17 | 7 mA | | 30 | |
| HS Spect. 2% heater I-_A | 35 | 7 mA | | 30 | |
| HS Spect. 2% heater I-_B | 36 | 7 mA | | 30 | |

20 wires + 1 temperature sensor signal shield

Shutter tail

| Function | Pin # on J17 | Max Current | Wire lay-up | Max Ohms* |
|-----------------------------|--------------|-------------|---------------------------------|-----------|
| Actuator Position Sensor + | 1 | | Insulated screened twisted quad | 1000 |
| Actuator Position Sensor - | 9 | | | 1000 |
| Latch Sense + | 2 | | | 1000 |
| Latch Sense - | 10 | | | 1000 |
| Sense Shld | 3 | | | 1000 |
| Latch Drive + | 11 | | Insulated screened twisted quad | 10 |
| Vane Heater+ | 4 | | | 10 |
| Stepper Drive Phase A + | 12 | | | 10 |
| Stepper Drive Phase B + | 5 | | | 10 |
| Power Ground / Rtn. as shld | 13 | | | 10 |
| Temp Sensor Bias+ | 6 | | Insulated screened twisted quad | 1000 |
| Vane Temp V+ | 14 | | | 1000 |
| Common Temp V | 7 | | | 1000 |
| Actuator Temp V- | 15 | | | 1000 |
| Temp Sensor Bias -/Shld | 8 | | | 1000 |

12wires + 3 shields

| | | |
|-------------|-------------------------------------|---|
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FPU Thermometry Listing

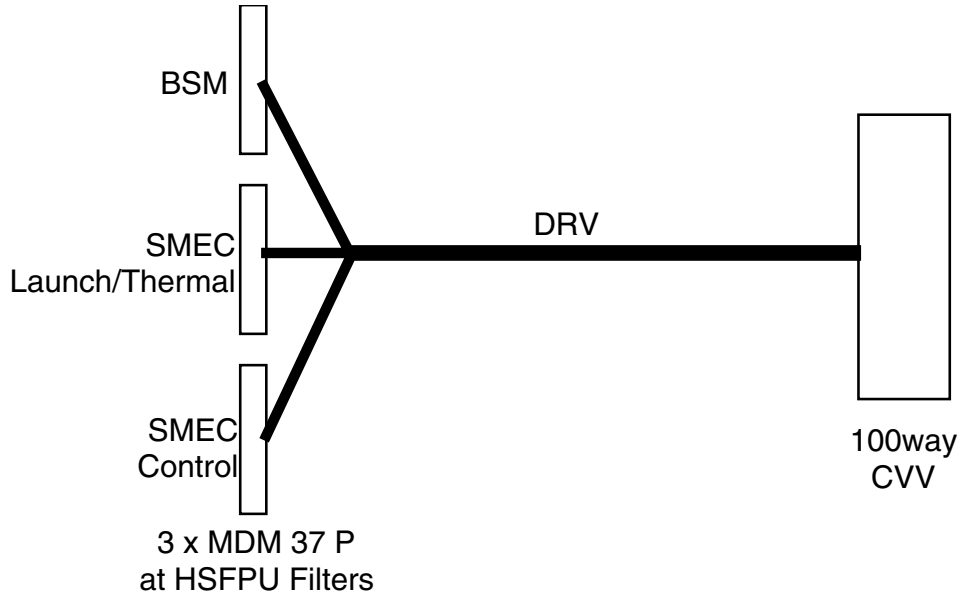
| Function | 37way J23 | Max. current | Wire lay-up | Max Ohms | 100way #10 |
|--|-----------|--------------|---------------------------------|----------|------------|
| HSFPU Opt. Bench temperature I+ | 20 | 1 μ A | Insulated screened twisted quad | 1000 | |
| HSFPU Opt. Bench temperature V+ | 2 | N/A | | 1000 | |
| HSFPU Opt. Bench temperature V- | 3 | N/A | | 1000 | |
| HSFPU Opt. Bench temperature I- | 21 | 1 μ A | | 1000 | |
| HSFPU Opt. Bench temperature shld* | 1 | N/A | | N/A | |
| Spectrometer 2K box temperature I+ | 4 | 1 μ A | Insulated screened twisted quad | 1000 | |
| Spectrometer 2K box temperature V+ | 23 | N/A | | 1000 | |
| Spectrometer 2K box temperature V- | 24 | N/A | | 1000 | |
| Spectrometer 2K box temperature I- | 5 | 1 μ A | | 1000 | |
| Spectrometer 2K box temperature shld* | 22 | N/A | | N/A | |
| Photometer 2K box temperature I+ | 25 | 1 μ A | Insulated screened twisted quad | 1000 | |
| Photometer 2K box temperature V+ | 7 | N/A | | 1000 | |
| Photometer 2K box temperature V- | 8 | N/A | | 1000 | |
| Photometer 2K box temperature I- | 26 | 1 μ A | | 1000 | |
| Photometer 2K box temperature shld* | 6 | N/A | | N/A | |
| M3,5,7 Optical Subench temperature I+ | 9 | 1 μ A | Insulated screened twisted quad | 1000 | |
| M3,5,7 Optical Subench temperature V+ | 28 | N/A | | 1000 | |
| M3,5,7 Optical Subench temperature V- | 29 | N/A | | 1000 | |
| M3,5,7 Optical Subench temperature I- | 10 | 1 μ A | | 1000 | |
| M3,5,7 Optical Subench temperature shld* | 27 | N/A | | N/A | |
| HSFPU Input Baffle temperature I+ | 30 | 1 μ A | Insulated screened twisted quad | 1000 | |
| HSFPU Input Baffle temperature V+ | 12 | N/A | | 1000 | |
| HSFPU Input Baffle temperature V- | 13 | N/A | | 1000 | |
| HSFPU Input Baffle temperature I- | 31 | 1 μ A | | 1000 | |
| HSFPU Input Baffle temperature shld* | 11 | N/A | | N/A | |
| BSM/HOB I/F temperature I+ | 14 | 1 μ A | Insulated screened twisted quad | 1000 | |
| BSM/HOB I/F temperature V+ | 33 | N/A | | 1000 | |
| BSM/HOB I/F temperature V- | 34 | N/A | | 1000 | |
| BSM/HOB I/F temperature I- | 15 | 1 μ A | | 1000 | |
| BSM/HOB I/F temperature shld* | 32 | N/A | | N/A | |
| Thermal Control Heater I+_A | 17 | 2mA | Insulated screened twisted quad | 100 | |
| Thermal Control Heater I+_B | 18 | 2 mA | | 100 | |
| Thermal Control Heater I-_A | 36 | 2 mA | | 100 | |
| Thermal Control Heater I-_B | 37 | 2 mA | | 100 | |
| Thermal Control Heater shld. | 35 | N/A | | N/A | |

* = linked.

Total contacts 28 wires and 2 shields

4.3.11 C11 CVV11 to HSFPU DRV-P

Overall Mechanical Drwg.



Connector/Backshell Details

Redundant side harness

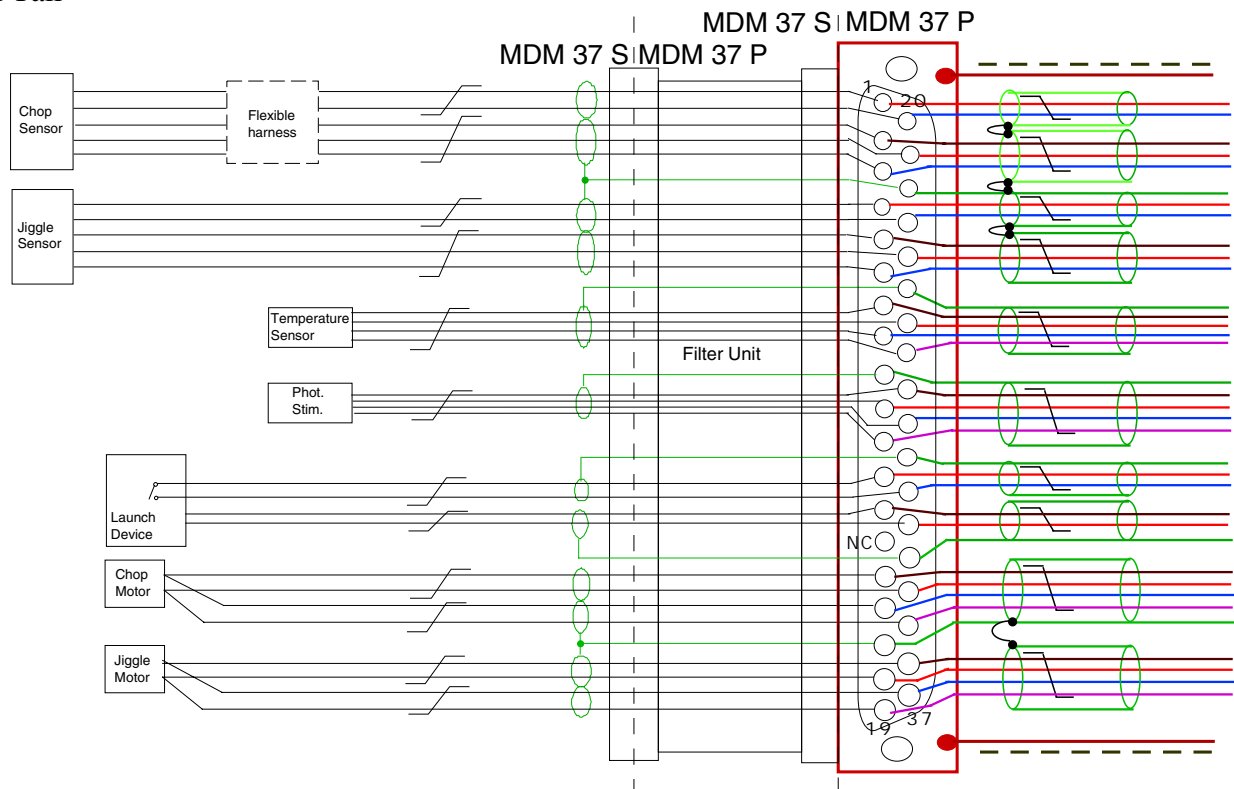
MDM 37 P + XXXX: interface to HSFPU Filter FB J25

MDM 37 P + XXXX: interface to HSFPU Filter FC J27

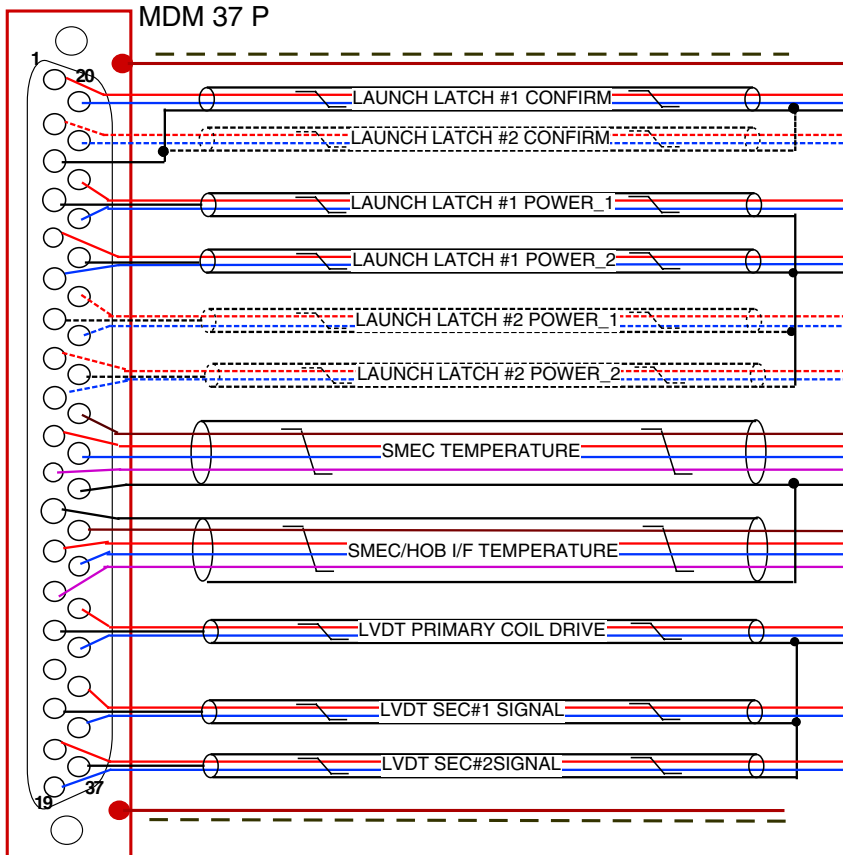
MDM 37 P + XXXX: interface to HSFPU Filter FC J29

Harness Layup

BSM Tail



SMEC Launch/Thermal Tail



SMEC Launch/Thermal Tail

9(6) insulated screened twisted pairs
and 2 insulated screened twisted quads.

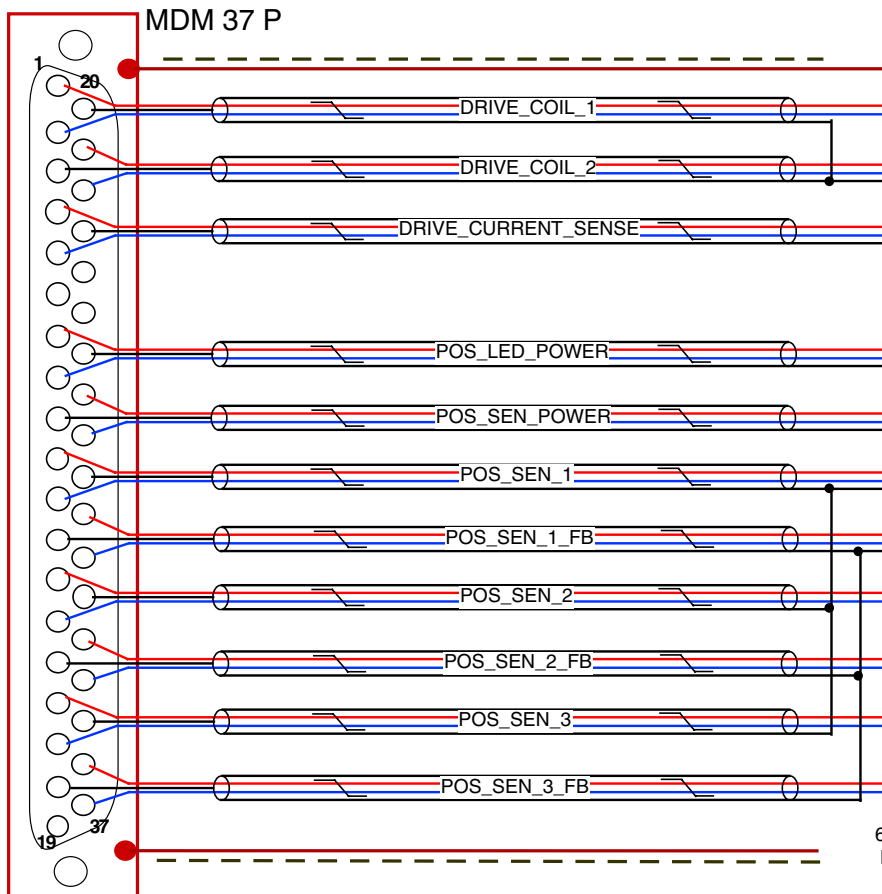
The whole overlain with RF screen
shown: —— NOT joined
to backshell CVV end.

Dotted outer lines show insulation,
probably put around bundles but
only strictly needed at clamp points.

Dotted conductors are TBC

26 (20) signal pins +
4 signal grounds +
harness screen
at 100way

SMEC Control Tail



SMEC Control Tail

11 insulated screened twisted pairs.

The whole overlain with RF screen
shown: —— NOT joined
to backshell CVV end.

Dotted lines show insulation,
probably put around bundles but
only strictly needed at clamp points.

22 signal pins +
6 signal grounds +
harness screen
at 100way

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BSM Tail Listing

| Function | 37way J25 | Max. current | Wire lay-up | Max Ohms | 100way #11 |
|--|--------------|-----------------|---|-------------|------------|
| Chop Position Sensor 1 | 1 | 1 μ A | Insulated screened twisted pair | 1000 | |
| Chop Position Sensor 2 | 20 | N/A | | 1000 | |
| Chop Position Sensor shld1 | to A | N/A | | N/A | linked |
| Chop Position Sensor 3 | 2 | 250 nA | Insulated screened twisted triple | 1000 | |
| Chop Position Sensor 4 | 21 | N/A | | 1000 | |
| Chop Position Sensor 5 | 3 | N/A | | 1000 | |
| Chop Position Sensor shld2=A | 22 | N/A | | N/A | |
| Jiggle Position Sensor 1 | 4 | 1 μ A | Insulated screened twisted pair | 1000 | |
| Jiggle Position Sensor 2 | 23 | N/A | | 1000 | |
| Jiggle Position Sensor shld1 | to B | N/A | | N/A | linked |
| Jiggle Position Sensor 3 | 5 | 250 nA | Insulated screened twisted triple | 1000 | |
| Jiggle Position Sensor 4 | 24 | N/A | | 1000 | |
| Jiggle Position Sensor 5 | 6 | N/A | | 1000 | |
| Jiggle Position Sensor shld2=B | 22 | N/A | | N/A | |
| BSM temperature I+ | 7 | 1 μ A | Insulated screened twisted quad | 1000 | |
| BSM temperature V+ | 26 | N/A | | 1000 | |
| BSM temperature V- | 8 | N/A | | 1000 | |
| BSM temperature I- | 27 | 1 μ A | | 1000 | |
| BSM temperature shld | 25 | N/A | | N/A | |
| Photometer Point Stim. heater I+ _A | 28 | 7 mA | Insulated screened twisted quad | 10 | |
| Photometer Point Stim.heater I+ _B | 10 | 7 mA | | 10 | |
| Photometer Point Stim.heater I- _A | 29 | 7 mA | | 10 | |
| Photometer Point Stim.heater I- _B | 11 | 7 mA | | 10 | |
| Photometer Point Stim.heater shld | 9 | N/A | | N/A | |
| BSM Launch latch confirmation 1 | 30 | 1mA | Insulated screened twisted pair | 1000 | |
| BSM Launch latch confirmation 2 | 12 | 1mA | | 1000 | |
| Launch latch confirmation shld to platform gnd | 31 | N/A | | N/A | |
| BSM Launch latch drive + | 13 | 35mA | Insulated screened twisted triple | 10 | |
| BSM Launch latch drive - | 32 | 35mA | | 10 | |
| BSM Launch latch drive shld | 33 | N/A | | N/A | |
| Chop Motor Drive 1 | 15 | 40 mA | Insulated screened twisted quad | 10 | |
| Chop Motor Drive 2 | 34 | 40 mA | | 10 | |
| Chop Motor Drive 3 | 16 | 40 mA | | 10 | |
| Chop Motor Drive 4 | 35 | 40 mA | | 10 | |
| Chop Motor Drive shld | 17 | N/A | | N/A | |
| Chop Motor Drive 1 | 36 | 40 mA | Insulated screened twisted quad | 10 | |
| Chop Motor Drive 2 | 18 | 40 mA | | 10 | |
| Chop Motor Drive 3 | 37 | 40 mA | | 10 | |
| Chop Motor Drive 4 | 19 | 40 mA | | 10 | |
| Chop Motor Drive shld | 17 | N/A | | N/A | linked |

This 37way connector is has 36 ways populated.

Commoning the Launch Latch Drive shield with that of the motor drives and reassigning launch latch drive 3 would give the BSM a slightly messy 2 wire cryoharness "contingency".

The photometer point stimulus heater shield may be denied a contact on the 100way depending on demand by the SMEC tails, TBC. In which case, and only this case, it would be grounded in the BSM.

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SMEC Launch/Therm.Tail Listing

| Function | 37way J27 | Max. current | Wire lay-up | Max Ohms | 100way #11 |
|---|--------------|---------------|---------------------------------------|-------------|---------------|
| SMEC launch latch # 1 confirmation + | 1 | 1 mA | Insulated screened twisted pair | 5 | |
| SMEC launch latch # 1 confirmation - | 20 | 1 mA | | 5 | |
| SMEC launch latch # 1 confirmation Shield | 3 | N/A | | N/A | A [noisy SVM] |
| SMEC launch latch # 2 confirmation + TBC | 2 | 1 mA | Insulated screened twisted pair | 5 | |
| SMEC launch latch # 2 confirmation - TBC | 21 | 1 mA | | 5 | |
| SMEC launch latch # 2 confirmation Shld TBC | 3 | N/A | | N/A | A[noisy SVM] |
| SMEC launch latch #1 power supply_1 | 21 | 400 mA / 50ms | Insulated screened twisted pair | 5 | |
| SMEC launch latch #1 power return_1 | 22 | 400 mA / 50ms | | 5 | |
| SMEC launch latch #1 power Shield_1 | 4 | N/A | | N/A | B |
| SMEC launch latch #1 power supply_2 | 5 | 400 mA / 50ms | Insulated screened twisted pair | 5 | |
| SMEC launch latch #1 power return_2 | 6 | 400 mA / 50ms | | 5 | |
| SMEC launch latch #1 power Shield_2 | 23 | N/A | | N/A | B |
| SMEC launch latch #2 power supply_1 | 24 | 400 mA / 50ms | Insulated screened twisted pair | 5 | |
| SMEC launch latch #2 power return_1 | 25 | 400 mA / 50ms | | 5 | |
| SMEC launch latch #2 power Shield_1 | 7 | N/A | | N/A | B |
| SMEC launch latch #2 power supply_2 TBC | 8 | 400 mA / 50ms | Insulated screened twisted pair | 5 | |
| SMEC launch latch #2 power return_2 TBC | 9 | 400 mA / 50ms | | 5 | |
| SMEC launch latch #2 power Shield_2 TBC | 26 | N/A | | N/A | B |
| SMEC temperature I+ | 27 | 1 μ A | Insulated screened twisted quad | 1000 | |
| SMEC temperature V+ | 10 | N/A | | 1000 | |
| SMEC temperature V- | 28 | N/A | | 1000 | |
| SMEC temperature I- | 11 | 1 μ A | | 1000 | |
| SMEC temperature shld | 29 | N/A | | N/A | C |
| SMEC/HOB I/F temperature I+ | 30 | 1 μ A | Insulated screened twisted quad | 1000 | |
| SMEC/HOB I/F temperature V+ | 13 | N/A | | 1000 | |
| SMEC/HOB I/F temperature V- | 31 | N/A | | 1000 | |
| SMEC/HOB I/F temperature I- | 14 | 1 μ A | | 1000 | |
| SMEC/HOB I/F temperature shld | 12 | N/A | | N/A | C |
| SMEC LVDT primary coil power supply (P) | 32 | 5 mA | Insulated screened twisted pair | 5 | |
| SMEC LVDT primary coil power supply (N) | 33 | 5 mA | | 5 | |
| SMEC LVDT primary coil power supply Shld | 15 | N/A | | N/A | D |
| SMEC LVDT secondary coil # 1 signal (P) | 35 | 50 μ A | Insulated screened twisted pair | 5 | |
| SMEC LVDT secondary coil # 1 signal (N) | 36 | 50 μ A | | 5 | |
| SMEC LVDT secondary coil # 1 signal Shield | 17 | N/A | | N/A | D |
| SMEC LVDT secondary coil # 2 signal (P) | 18 | 50 μ A | Insulated screened twisted pair | 5 | |
| SMEC LVDT secondary coil # 2 signal (N) | 19 | 50 μ A | | 5 | |
| SMEC LVDT secondary coil # 2 signal Shield | 37 | N/A | | N/A | D |

31 contacts used

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SMEC Control Tail Listing

| Function | 37way J29 | Max. current | Wire lay-up | Max Ohms | 100way #11 |
|---|-----------|--------------|---------------------------------|----------|------------|
| SMEC Drive Coil I+ | 1 | 100mA | Insulated screened twisted pair | 5 | |
| SMEC Drive Coil I- | 2 | 100mA | | 5 | |
| SMEC Drive Coil shld | 20 | N/A | | N/A | A |
| SMEC Drive Coil (Rob) I+ | 21 | 100mA | Insulated screened twisted pair | 5 | |
| SMEC Drive Coil (Rob) I- | 22 | 100mA | | 5 | |
| SMEC Drive Coil (Rob) shld | 3 | N/A | | N/A | A |
| SMEC Drive Coil Sense+ | 4 | 10 µA | Insulated screened twisted pair | 500 | |
| SMEC Drive Coil Sense- | 5 | 10 µA | | 500 | |
| SMEC Drive Coil shld | 23 | N/A | | N/A | |
| SMEC position sensor Led power supply | 7 | 1mA | Insulated screened twisted pair | 100 | |
| SMEC position sensor Led power return | 8 | 1mA | | 100 | |
| SMEC position sensor Led power Shield | 26 | N/A | | N/A | |
| SMEC position sensor power supply | 27 | 1mA | Insulated screened twisted pair | 100 | |
| SMEC position sensor power return | 28 | 1mA | | 100 | |
| SMEC position sensor power Shield | 9 | N/A | | N/A | |
| SMEC position sensor photodiode #1 I+ | 10 | 20 µA | Insulated screened twisted pair | 1000 | |
| SMEC position sensor photodiode #1 I- | 11 | 20 µA | | 1000 | |
| SMEC position sensor photodiode Shield | 29 | N/A | | N/A | B |
| SMEC pos. sensor photodiode #1 feedback + | 30 | 10 µA | Insulated screened twisted pair | 1000 | |
| SMEC pos. sensor photodiode #1 feedback - | 31 | 10 µA | | 1000 | |
| SMEC pos. sensor photodiode feedback Shld | 12 | N/A | | N/A | C |
| SMEC position sensor photodiode #2 I+ | 13 | 20 µA | Insulated screened twisted pair | 1000 | |
| SMEC position sensor photodiode #2 I- | 14 | 20 µA | | 1000 | |
| SMEC position sensor photodiode Shield | 32 | N/A | | N/A | B |
| SMEC pos. sensor photodiode #2 feedback + | 33 | 10 µA | Insulated screened twisted pair | 1000 | |
| SMEC pos. sensor photodiode #2 feedback - | 34 | 10 µA | | 1000 | |
| SMEC pos. sensor photodiode feedback Shld | 15 | N/A | | N/A | C |
| SMEC position sensor photodiode #3 I+ | 16 | 20 µA | Insulated screened twisted pair | 1000 | |
| SMEC position sensor photodiode #3 I- | 17 | 20 µA | | 1000 | |
| SMEC position sensor photodiode Shield | 35 | N/A | | N/A | B |
| SMEC pos. sensor photodiode #3 feedback + | 36 | 10 µA | Insulated screened twisted pair | 1000 | |
| SMEC pos. sensor photodiode #3 feedback - | 37 | 10 µA | | 1000 | |
| SMEC pos. sensor photodiode feedback Shld | 18 | N/A | | N/A | C |

29 contacts used.

Total used through 100 way = 36 + 31 + 29 = 96.

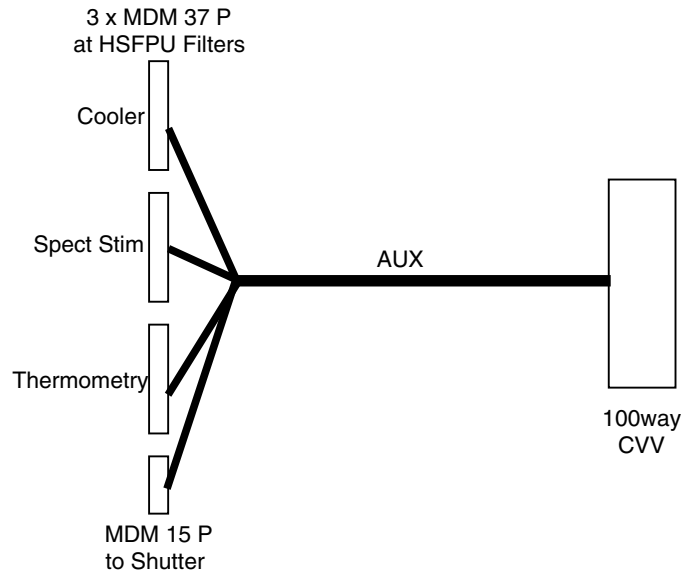
SMEC above based on "Cryo_harness_010906.doc".

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4.3.12 C12 CVV12 to HSFPU AUX-R

Overall Mechanical Drwg.

Redundant version of C10, and the same as it



Connector/Backshell Details

Prime side harness

MDM 37 S + XXXX: interface to HSFPU Filter FD J20 for Cooler

MDM 37 S + XXXX: interface to HSFPU Filter FD J22 for Stectrometer stimulus

MDM 37 S + XXXX: interface to HSFPU Filter FE J24 for Thermometry

MDM 15 P + XXXX: interface to HSJFS J18 Shutter

Harness Layup

Redundant version of C10, and the same as it.

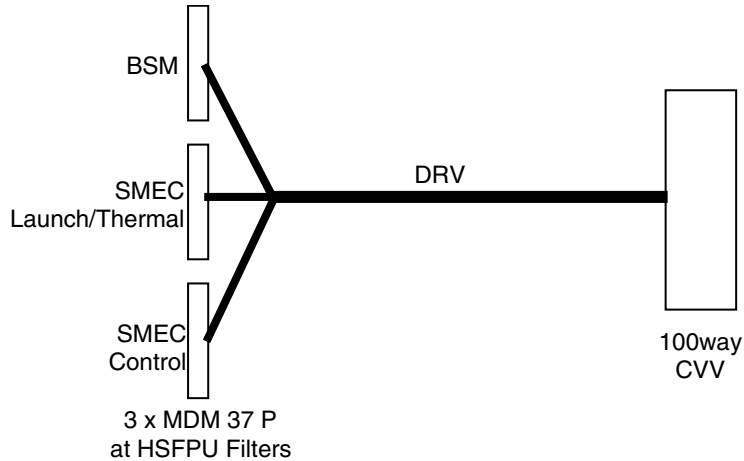
Add one to all the connector numbers compared to C10.

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4.3.13 C13 CVV13 to HSFPU DRV-R

Overall Mechanical Drwg.

Format as C11, maybe differing length.



Connector/Backshell Details

Redundant side harness

MDM 37 P + XXXX: interface to HSFPU Filter FE J26

MDM 37 P + XXXX: interface to HSFPU Filter FF J28

MDM 37 P + XXXX: interface to HSFPU Filter FF J30

Harness Layup

As C11.

Contact Details

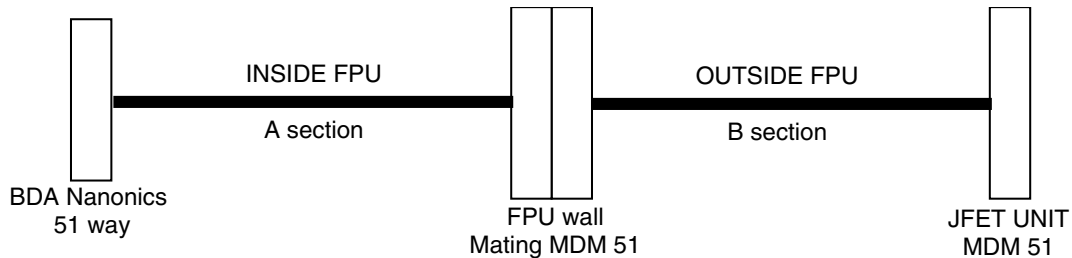
As C11, but add one to all the connector numbers compared to C11.

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4.4 FPU Harnesses

4.4.1 F1[A&B] PSW-A BDA to HSJFP

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A section** does not.

B section may have thermal heatsink attachments, TBD.

Length and tie-downs optimised to minimise capacitance and microphony.

Consists of 6 x 12-ax, each carrying 4 channels, making 24 channels in all plus a screened twisted pair for bias.

Careful control of those screens that cannot have their own contact assignment.

Contact Details

| Function | MDM51 contact | Cable | Nanonics contact |
|--------------|-------------------------|-------|-------------------------|
| Channel A + | 35 | 12-ax | 1 |
| Channel A - | 51 | | 26 |
| Channel Agnd | To 12-ax shield one end | | To 12-ax shield one end |
| Channel B + | 17 | | 2 |
| Channel B - | 18 | | 27 |
| Channel Bgnd | To 12-ax shield one end | | To 12-ax shield one end |
| Channel C + | 15 | | 3 |
| Channel C - | 16 | | 28 |
| Channel Cgnd | To 12-ax shield one end | | To 12-ax shield one end |
| Channel D + | 34 | | 4 |
| Channel D - | 50 | | 29 |
| Channel Dgnd | To 12-ax shield one end | | To 12-ax shield one end |
| Channel E + | 33 | 12-ax | 5 |
| Channel E - | 49 | | 30 |
| Channel Egnd | To 12-ax shield one end | | To 12-ax shield one end |
| Channel F + | 13 | | 6 |
| Channel F - | 14 | | 31 |
| Channel Fgnd | To 12-ax shield one end | | To 12-ax shield one end |
| Channel G + | 32 | | 7 |
| Channel G - | 48 | | 32 |
| Channel Ggnd | To 12-ax shield one end | | To 12-ax shield one end |
| Channel H + | 31 | | 8 |
| Channel H- | 47 | | 33 |

SPIRE HARNES DEFINITION

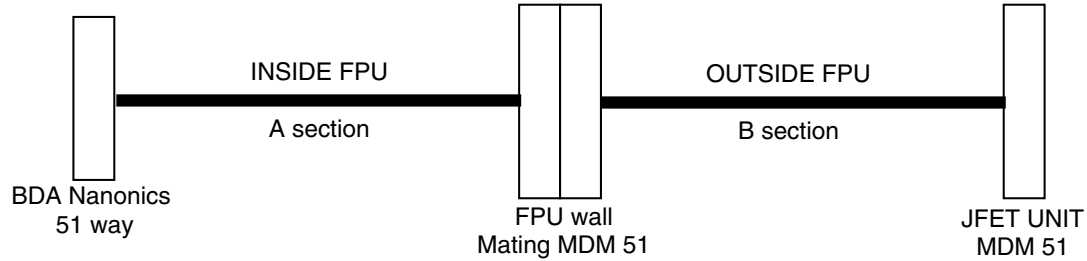
| Function | MDM51 contact | Cable | Nanonics contact | |
|--------------|-------------------------|-------------------------|-------------------------|----|
| Channel Hgnd | To 12-ax shield one end | | To 12-ax shield one end | |
| Channel I + | 30 | 12-ax | 9 | |
| Channel I- | 46 | | 34 | |
| Channel Ignd | To 12-ax shield one end | | To 12-ax shield one end | |
| Channel J + | 29 | | 10 | |
| Channel J- | 45 | | 35 | |
| Channel Jgnd | To 12-ax shield one end | | To 12-ax shield one end | |
| Channel K + | 28 | | 11 | |
| Channel K - | 44 | | 36 | |
| Channel Kgnd | To 12-ax shield one end | | To 12-ax shield one end | |
| Channel L + | 11 | | 12 | |
| Channel L - | 12 | | 37 | |
| Channel Lgnd | To 12-ax shield one end | | To 12-ax shield one end | |
| Channel M + | 27 | | 12-ax | 13 |
| Channel M- | 43 | | | 38 |
| Channel Mgnd | To 12-ax shield one end | To 12-ax shield one end | | |
| Channel N + | 26 | 14 | | |
| Channel N - | 42 | 39 | | |
| Channel Ngnd | To 12-ax shield one end | To 12-ax shield one end | | |
| Channel P + | 9 | 15 | | |
| Channel P - | 10 | 40 | | |
| Channel Pgnd | To 12-ax shield one end | To 12-ax shield one end | | |
| Channel R + | 25 | 16 | | |
| Channel R- | 41 | 41 | | |
| Channel Rgnd | To 12-ax shield one end | To 12-ax shield one end | | |
| Channel S+ | 24 | 12-ax | | 17 |
| Channel S - | 40 | | | 42 |
| Channel Sgnd | To 12-ax shield one end | | To 12-ax shield one end | |
| Channel T+ | 7 | | 18 | |
| Channel T - | 8 | | 43 | |
| Channel Tgnd | To 12-ax shield one end | | To 12-ax shield one end | |
| Channel U + | 23 | | 19 | |
| Channel U - | 36 | | 44 | |
| Channel Ugnd | To 12-ax shield one end | | To 12-ax shield one end | |
| Channel V + | 22 | | 20 | |
| Channel V- | 38 | | 45 | |
| Channel Vgnd | To 12-ax shield one end | | To 12-ax shield one end | |
| Channel W + | 5 | | 12-ax | 21 |
| Channel W - | 6 | | | 46 |
| Channel Wgnd | To 12-ax shield one end | To 12-ax shield one end | | |
| Channel X + | 21 | 22 | | |
| Channel X - | 37 | 47 | | |
| Channel Xgnd | To 12-ax shield one end | To 12-ax shield one end | | |
| Channel Y + | 20 | 23 | | |
| Channel Y - | 38 | 48 | | |
| Channel Ygnd | To 12-ax shield one end | To 12-ax shield one end | | |
| Channel Z+ | 3 | 24 | | |
| Channel Z - | 4 | 49 | | |
| Channel Zgnd | To 12-ax shield one end | To 12-ax shield one end | | |
| Bias + | 1 | STT | | 25 |
| Bias_ | 2 | | | 50 |
| Bias gnd | 19+commoned shlds | | 51+commoned shlds | |

N.B. None of the gnds./braids in the above shall be connected to backshell and hence chassis.

| | | |
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4.4.2 F2[A&B] PSW-B BDA to HSJFP

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

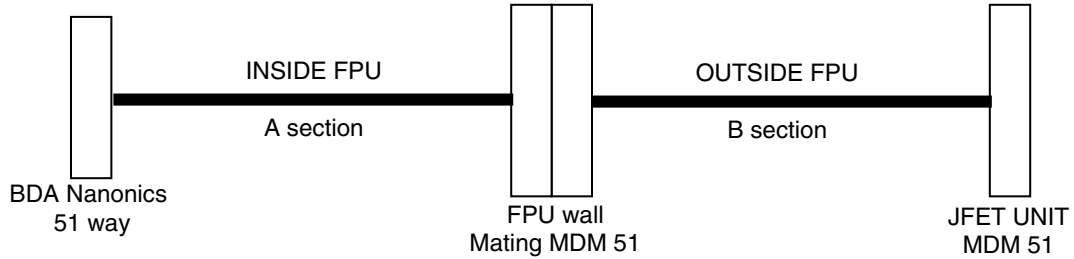
Contact Details

as F1

| | | |
|-------------|------------------------------------|---|
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|-------------|------------------------------------|---|

4.4.3 F3[A&B] PSW-C BDA to HSJFP

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

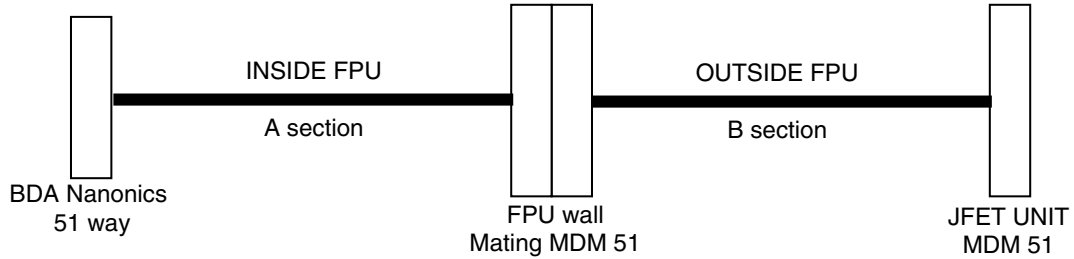
Contact Details

as F1

| | | |
|--------------------|--|---|
| <p>CLRC</p> | <p style="text-align: center;">SPIRE HARNES DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 90 of 136</p> |
|--------------------|--|---|

4.4.4 F4[A&B] PSW-D BDA to HSJFP

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

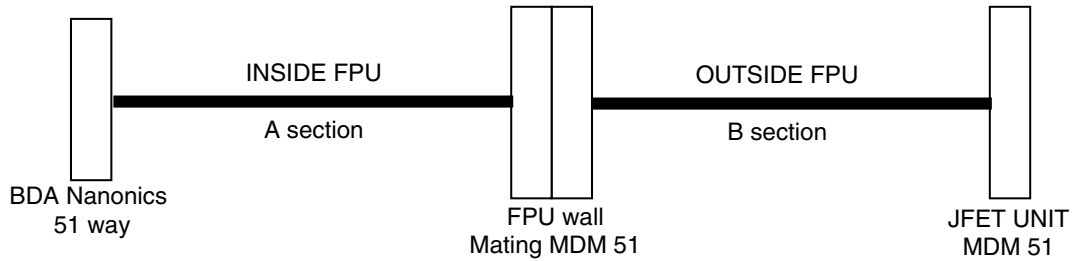
Contact Details

as F1

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4.4.5 F5[A&B] PSW-E BDA to HSJFP

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

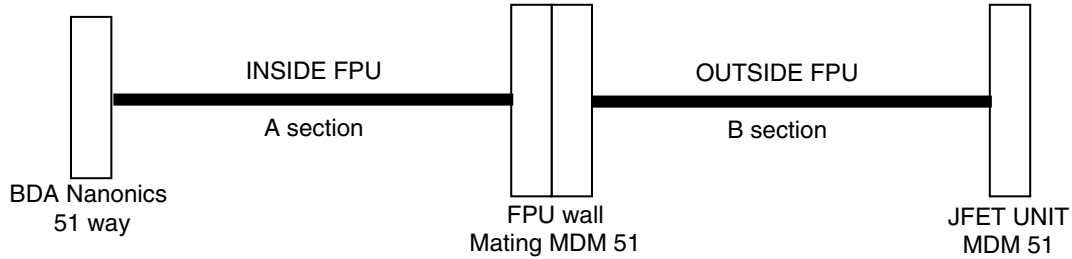
Contact Details

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4.4.6 F6[A&B] PSW-F BDA to HSJFP

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

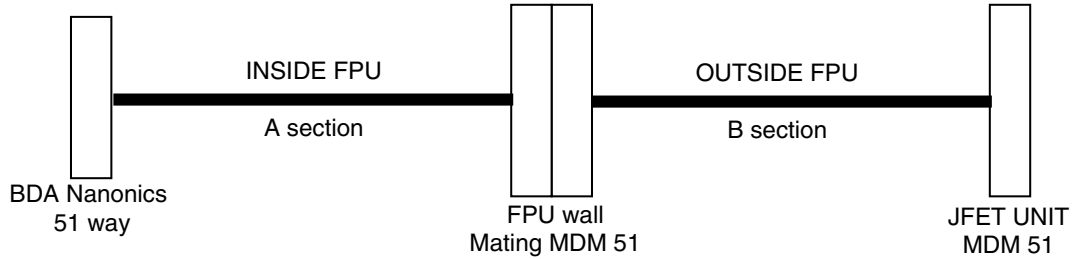
Contact Details

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4.4.7 F7[A&B] PMW-A BDA to HSJFP

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

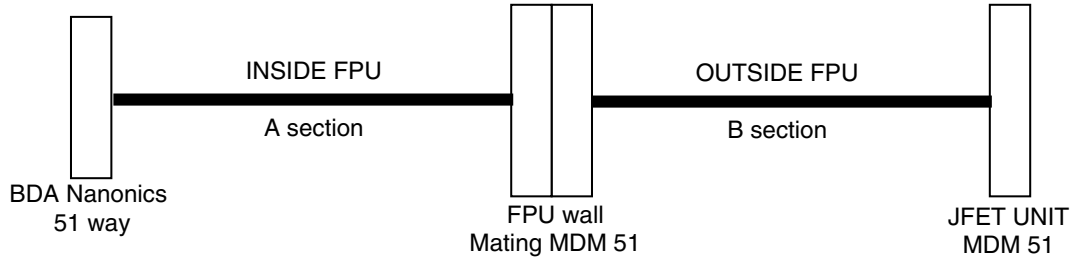
Contact Details

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| CLRC | SPIRE HARNES DEFINITION | Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 94 of 136 |
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4.4.8 F8[A&B] PMW-B BDA to HSJFP

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

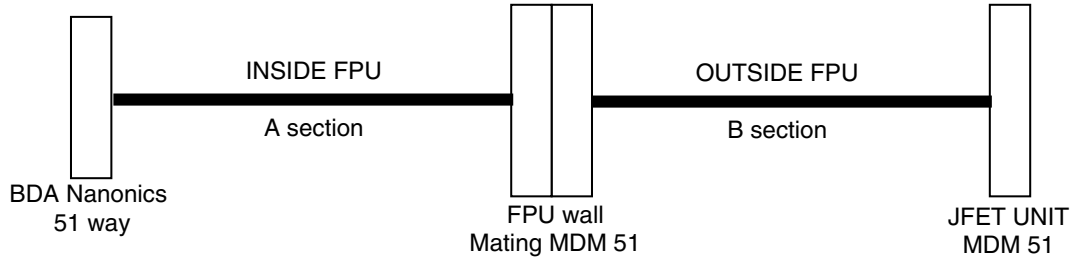
Contact Details

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| CLRC | SPIRE HARNES DEFINITION | Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 95 of 136 |
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4.4.9 F9[A&B] PMW-D BDA to HSJFP

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

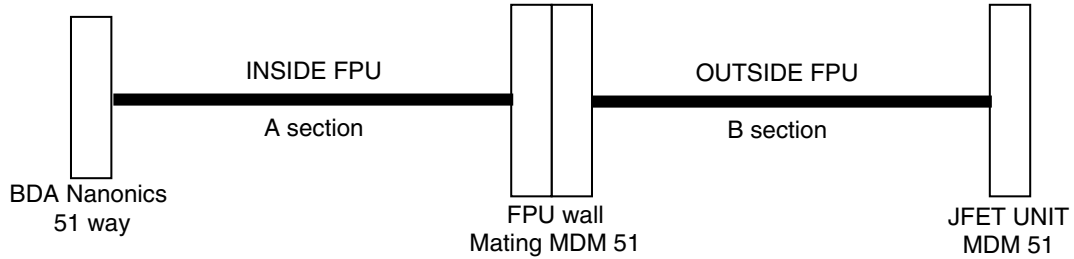
Contact Details

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| CLRC | SPIRE HARNES DEFINITION | Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 96 of 136 |
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4.4.10 F10[A&B] PMW-D BDA to HSJFP

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

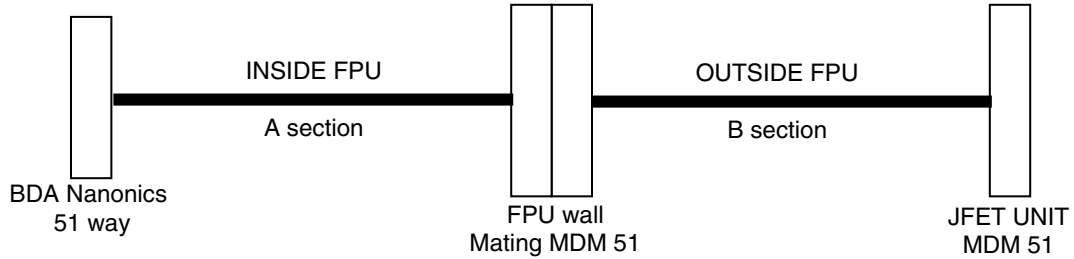
Contact Details

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4.4.11 F11[A&B] PLW-A BDA to HSJFP

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

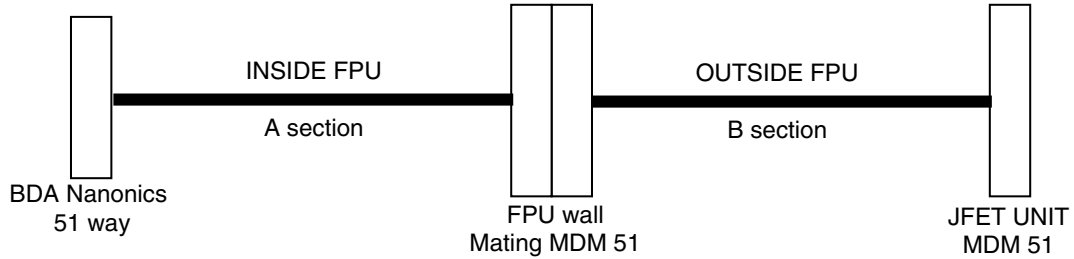
Contact Details

as F1

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| CLRC | SPIRE HARNES DEFINITION | Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 98 of 136 |
|-------------|------------------------------------|---|

4.4.12 F12[A&B] PLW-B BDA to HSJFP

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

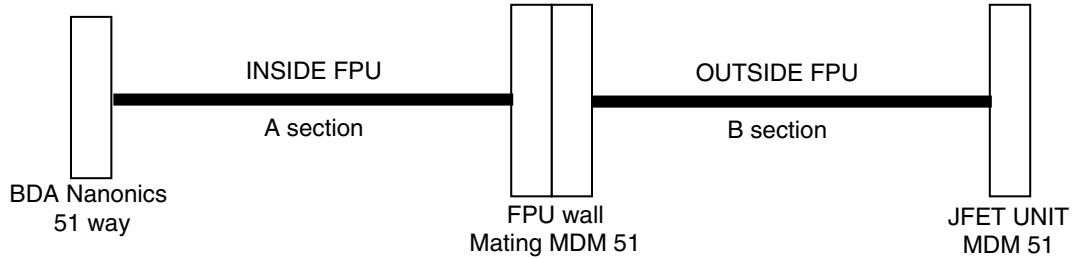
Contact Details

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| CLRC | SPIRE HARNES DEFINITION | Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 99 of 136 |
|-------------|------------------------------------|---|

4.4.13 F13[A&B] SSW-A BDA to HSJFS

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

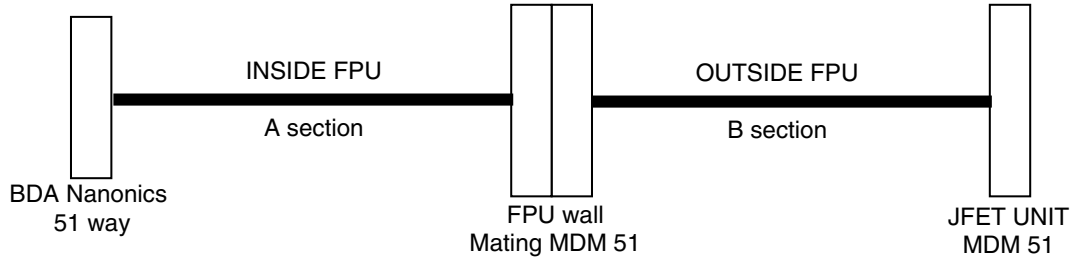
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| CLRC | SPIRE HARNES DEFINITION | Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 100 of 136 |
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4.4.14 F14[A&B] SSW-B BDA to HSJFS

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

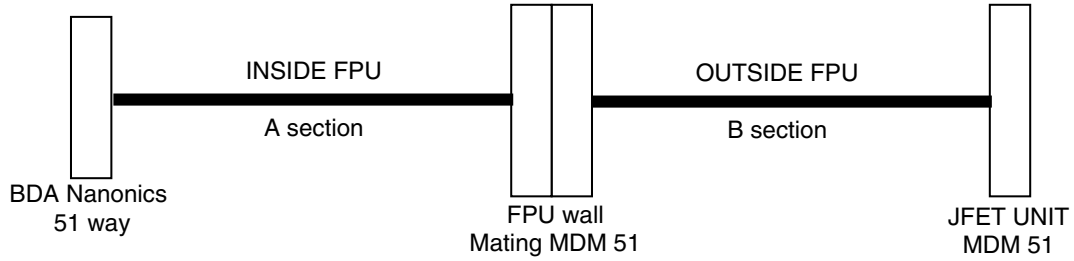
Contact Details

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4.4.15 F15[A&B] SLW-A BDA to HSJFS

Overall Mechanical Drwg.



JPL configured Photometer BDA lead, maintaining Faraday cage HSJFP to FPU, and keeping signal ground separate from chassis ground.

Connector/Backshell Details

A section: Nanonics STM50PC2DC012N? to MDM51S mounted in wall

B section: MDM51P with XXXX to MDM51S with XXXX at JFET module.

Harness Layup

B section requires outer RF shield, **A** section does not.

B section may have thermal heatsink attachments, TBD.

As F1, length a variable

Contact Details

as F1

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4.4.16 F16 COOLER-P to FA

Overall Mechanical Drwg.

37 way MDM into Cooler prime J1 to 37 way MDM into HSFPU Filter FA J1

Connector/Backshell Details

Harness Layup

As C10 tail layup

Contact Details

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4.4.17 F17 COOLER-R to FA

Overall Mechanical Drwg.

37 MDMway to Cooler redundant to 37 MDMway on HSFPU Filter FD J1

Connector/Backshell Details

Harness Layup

Contact Details

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4.4.18 F18 SPECT_STIM-P to FA

Overall Mechanical Drwg.

21way MDM to J1 Spectrometer Stim to 37way MDM at J2 on HSFPU Filter FA

Connector/Backshell Details

Harness Layup

Contact Details

| | | |
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4.4.19 F19 SPECT_STIM-R to FD

Overall Mechanical Drwg.

21way MDM to J2 Spectrometer Stim to 37way MDM at J2 on HSFPU Filter FD

Connector/Backshell Details

Harness Layup

Contact Details

| | | |
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| CLRC | SPIRE HARNES DEFINITION | Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 106 of 136 |
|-------------|------------------------------------|--|

4.4.20 F20 THERM-P from FA

Overall Mechanical Drwg.

Multiple TBD to 37way MDM at J1 on HSFPU Filter FB

Connector/Backshell Details

Harness Layup

Contact Details

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|-------------|------------------------------------|--|

4.4.21 F21 THERM-R from FE

Overall Mechanical Drwg.

Multiple TBD to 37way MDM at J1 on HSFPU Filter FE

Connector/Backshell Details

Harness Layup

Contact Details

| | | |
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| CLRC | SPIRE HARNES DEFINITION | Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 108 of 136 |
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4.4.22 F22 BSM-P to FB

Overall Mechanical Drwg.

Connector/Backshell Details

51 MDMway to BSM Prime to 37 MDMway on HSFPU Filter FB J2

Harness Layup

Contact Details

| | | |
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4.4.23 F23 BSM-R to FE

Overall Mechanical Drwg.

Connector/Backshell Details
51 MDMway to BSM Redundant to 37 MDMway on HSFPU Filter FE J2

Harness Layup

Contact Details

| | | |
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4.4.24 F24 SMECSIG-P to FC

Overall Mechanical Drwg.

Connector/Backshell Details

37 MDMway to SMEC Signal Prime to 37 MDMway on HSFPU Filter FC J1

Harness Layup

Contact Details

| | | |
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4.4.25 F25 SCECDRV-P to FC

Overall Mechanical Drwg.

Connector/Backshell Details

37 MDMway to SMEC Drive Prime to 37 MDMway on HSFPU Filter FC J2

Harness Layup

Contact Details

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4.4.26 F26 SMECSIG-R to FF

Overall Mechanical Drwg.

Connector/Backshell Details

37 MDMway to SMEC Signal Redundant to 37 MDMway on HSFPU Filter FF J1

Harness Layup

Contact Details

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4.4.27 F27 SMECDRV-P to FF

Overall Mechanical Drwg.

Connector/Backshell Details

37 MDMway to SMEC Drive Prime to 37 MDMway on HSFPU Filter FF J2

Harness Layup

Contact Details

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4.5 JFET unit Back-Harnesses

4.5.1 Overview

The Bolometer Back Harness provides the routing of wires from the JFET membrane 15way "service" connectors into the 37way filter units which link them to harnesses C3 and half of C1.

The 15ways each provide 7 double wired functions on 14 pins as follows, all d.c. isolated from ground in the JFET boxes themselves:

| Function | A-wire | B-wire | |
|-----------|--------|--------|---|
| JFET V- | 1 | 8 | |
| JFET V + | 10 | 14 | These colour codes are carried through to the drawing below |
| JFET Vgnd | 9 | 15 | |
| Bias + | 2 | 7 | |
| Bias - | 4 | 5 | |
| Heater + | 3 | 6 | Values agree with |
| Heater - | 11 | 13 | 30/7/01 JPL review |

Basically the back harness is 1:1 pinned, not in the sense of numbering but in that of in-wiring splices. Actually, for the photometer, the $4 \times 37 = 148$ filter contacts cannot accommodate all the $12 \times 14 = 168$ contacts from the JFET boxes, but some splicing is not really a problem in a copper-based harness that does not span temperature differentials. However not all the total of $148 + [3 \times 14] = 190$ wires entering the 37 way filters can proceed through the 150 ways available in harnesses C3 and half of C1, not least because without introducing in-line jumpers in the filter units (a potential failure point) some contacts are used as terminations for shields on C1 and C3. Appropriate commoning is done by wire links in the 37way units, which means that there are often options for linking up JFET Vgnd.

There remains no splicing in the C or I series cryoharnesses.

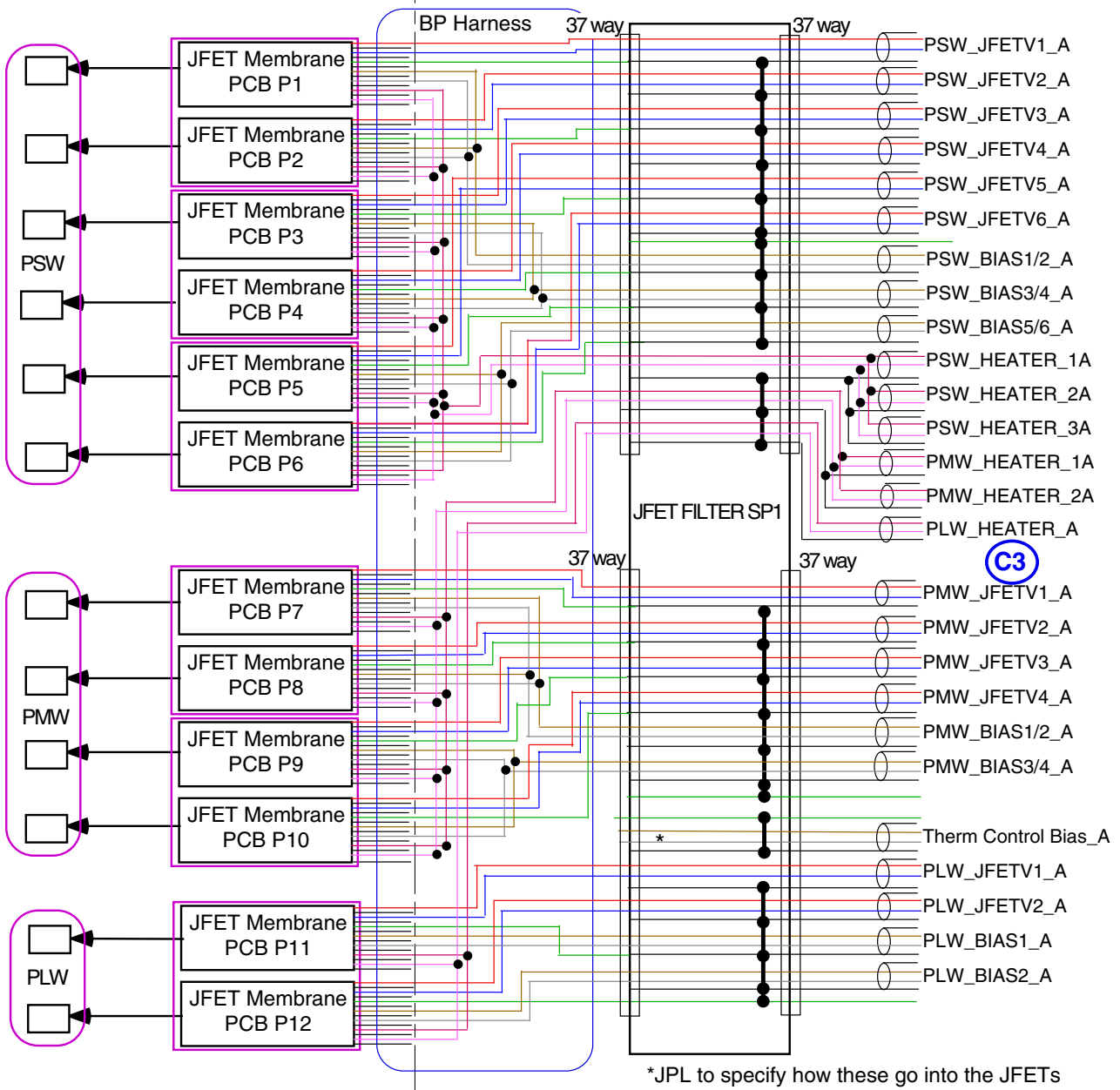
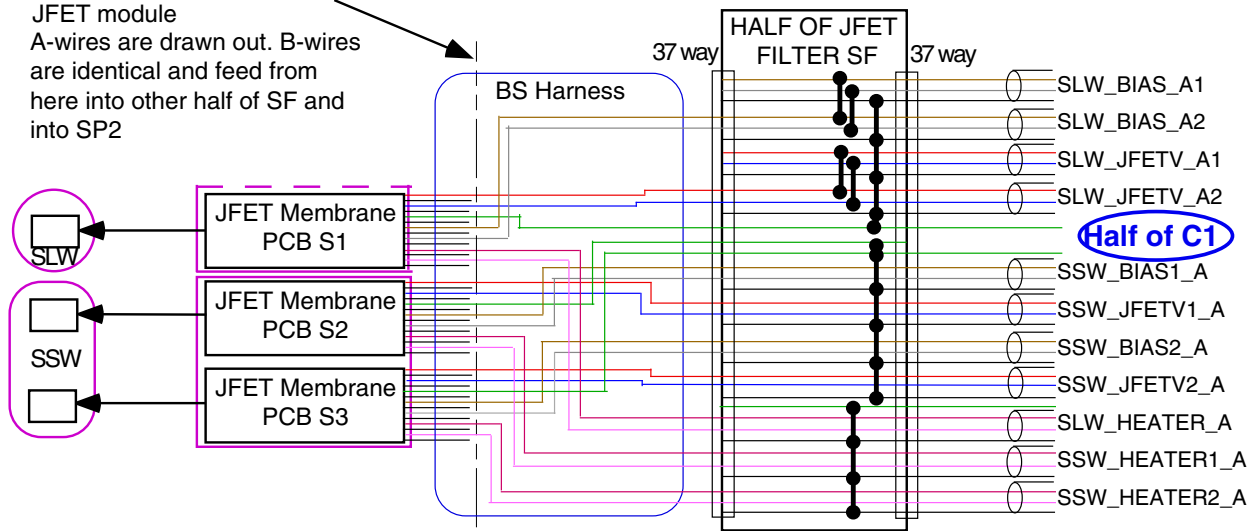
Looking at the table above*, note that the A and B wires for each of these functions must be linked in the HSDCU to maintain cryoharness robustness against single wire breakage, *whether or not* they then split into two again and feed into Prime and Redundant DCU electronics functions. The reasons that A and B wires do not follow each other in the same harness tail and get linked inside the harness itself at the warm end are both that mechanical distress to the cryoharness is likely to be on a tail-by-tail (connector-by-connector) basis and one does not want both the A and B wires of any function broken, and that they ate bundled close together anyway to minimise loop areas.

*Strictly speaking this paragraph applies to the grouped functions that get through the 37way linking, but it remains true for any particular BDA looking into the wiring.

The philosophy of deciding which how to common up the a.c. bias generators was decided in issue 0.3 of this document with a view to failure control. If the supposedly impossible happened and both the A and B wires of a particular function were to break, that function should not take out a complete BDA array. This is accomplished on 4 BDAs by allocating them more than a single function, whilst on the 5th, the small SLW BDA there is enough spare pin capacity to double up the wiring again. This provides the HSDCU with as many separately wired a.c. bias generator wires as can be fitted through the harnesses C/I3 and half of C/I1. Apart from the required linking of A and B wires as mentioned above, it is then a matter of on-going detailed design for HSDCU reliability that determines any further grouping or splitting.

In changing back to 37way filters for the JFET functions there is the beneficial side effect that far more of the BS and BF harness wires can be accommodated directly on to contacts, minimising splices in these harnesses. It can be seen that splices are essentially restricted to the JFET heater wires, with just a few still needed for the bias distribution. It is however flagged that JPL have still to confirm pin arrangements for Thermal Control biases that are fed in with the PMW detectors (presumably one MDM enlarged from 15 ways will handle back-harness, bias input and wires to the sensors).

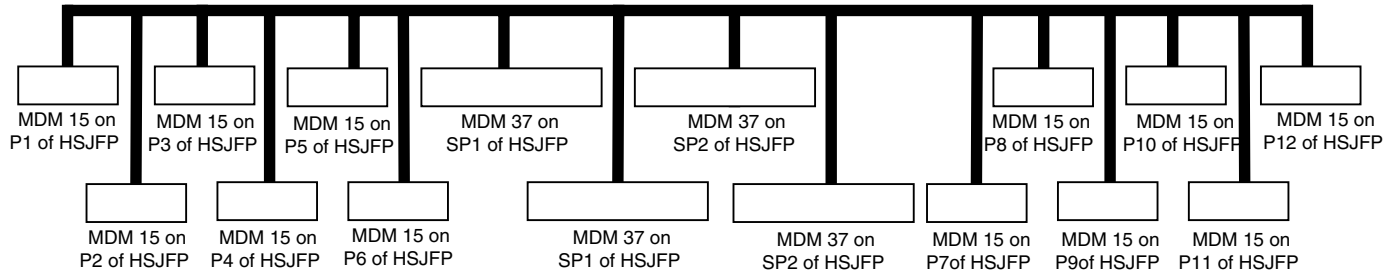
14 wires, colour coded as in table above leave each JFET module
 A-wires are drawn out. B-wires are identical and feed from here into other half of SF and into SP2



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4.5.2 BP-Photometer

Overall Mechanical Drwg.



Connector/Backshell Details

JPL to specify.

Harness Layup

The BS harness is all at one temperature. Crimped 28AWG copper MDM?

Pairs of wires should at least be twisted, and some inter-function screens may be appropriate, JPL to specify.

The whole harness must be very well RF screened to all its backshells: not only does it form part of a Faraday cage but it forms part of one that is on the detector side of the Murata filter system.

This is definitely a harness to build on a dimensionally accurate horse!

| | | | | | | | | | | | | | | | | |
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| | HARNES DEFINITION | | | | | | | | | | | | | | | |
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| Name | SP1A 87way | SP1B 87way | SP2A 87way | SP2B 87way | P1 15 way | P2 15 way | P3 15 way | P4 15 way | P5 15 way | P6 15 way | P7 15way | P8 15way | P9 15way | P10 15way | P11 15way | P12 15way |
|---------------------------|---------------|---------------|---------------|---------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|--------------|--------------|--------------|
| Harness Shield Link | | NC | | | | | | | | | | | | | | |
| THERM_GND_WIRE_A | | 11 | | | | | | | | | | | | | | |
| THERM_CONTROL_BIAS_A_+ | | 12 | | | | | | | | | | | | | | |
| THERM_CONTROL_BIAS_A- | | 30 | | | | | | | | | | | | | | |
| THERM_CONTROL_BIAS_A shld | | 31 | | | | | | | | | | | | | | |
| PLW_JFETV1_A_+ | | 13 | | | | | | | | | | | | | 1 | |
| PLW_JFETV1_A- | | 32 | | | | | | | | | | | | | 10 | |
| PLW_JFETV1_A shld | | 15 | | | | | | | | | | | | | | |
| PLW_JFETV2_A_+ | | 33 | | | | | | | | | | | | | | 1 |
| PLW_JFETV2_A- | | 15 | | | | | | | | | | | | | | 10 |
| PLW_JFETV2_A shld | | 34 | | | | | | | | | | | | | | |
| PLW_BIAS1_A_+ | | 16 | | | | | | | | | | | | | 2 | |
| PLW_BIAS1_A- | | 36 | | | | | | | | | | | | | 4 | |
| PLW_BIAS1_A shld | | 17 | | | | | | | | | | | | | 9 | |
| PLW_BIAS2_A_+ | | 37 | | | | | | | | | | | | | | 2 |
| PLW_BIAS2_A- | | 18 | | | | | | | | | | | | | | 4 |
| PLW_BIAS2_A shld | | 37 | | | | | | | | | | | | | | |
| PLW_A_GND_WIRE | | 19 | | | | | | | | | | | | | | 9 |
| PSW_JFETV1_B_+ | | | 20 | | 8 | | | | | | | | | | | |
| PSW_JFETV1_B- | | | 2 | | 14 | | | | | | | | | | | |
| PSW_JFETV1_B shld | | | 1 | | 15 | | | | | | | | | | | |
| PSW_JFETV2_B_+ | | | 3 | | | 8 | | | | | | | | | | |
| PSW_JFETV2_B- | | | 22 | | | 14 | | | | | | | | | | |
| PSW_JFETV2_B shld | | | 21 | | | | | | | | | | | | | |
| PSW_JFETV3_B_+ | | | 23 | | | | 8 | | | | | | | | | |
| PSW_JFETV3_B- | | | 4 | | | | 14 | | | | | | | | | |
| PSW_JFETV3_B shld | | | 5 | | | 15 | | | | | | | | | | |
| PSW_JFETV4_B_+ | | | 6 | | | | | 8 | | | | | | | | |
| PSW_JFETV4_B- | | | 25 | | | | | 14 | | | | | | | | |
| PSW_JFETV4_B shld | | | 24 | | | | | | | | | | | | | |
| PSW_JFETV5_B_+ | | | 26 | | | | | | 8 | | | | | | | |
| PSW_JFETV5_B- | | | 8 | | | | | | 14 | | | | | | | |
| PSW_JFETV5_B shld | | | 7 | | | | 15 | | | | | | | | | |
| PSW_JFETV6_B_+ | | | 9 | | | | | | | 8 | | | | | | |
| PSW_JFETV6_B- | | | 28 | | | | | | | 14 | | | | | | |
| PSW_JFETV6_B shld | | | 27 | | | | | | | | | | | | | |
| PSW_GRND_B | | | 10 | | | | | | | | | | | | | |
| PSW_BIAS1/2_B_+ | | | 11 | | 7 | 7 | | | | | | | | | | |
| PSW_BIAS1/2_B- | | | 29 | | 5 | 5 | | | | | | | | | | |
| PSW_BIAS1/2_B shld | | | 30 | | | | | 15 | | | | | | | | |
| PSW_BIAS3/4_B_+ | | | 31 | | | | 7 | 7 | | | | | | | | |
| PSW_BIAS3/4_B- | | | 12 | | | | 5 | 5 | | | | | | | | |
| PSW_BIAS3/4_B shld | | | 13 | | | | | | 15 | | | | | | | |
| PSW_BIAS5/6_B_+ | | | 14 | | | | | | 7 | 7 | | | | | | |
| PSW_BIAS5/6_B- | | | 32 | | | | | | 5 | 5 | | | | | | |
| PSW_BIAS5/6_B shld | | | 33 | | | | | | | 15 | | | | | | |
| PSW_HEATER_B_+x3 | | | 34 | | 6 | 6 | 6 | 6 | 6 | 6 | | | | | | |
| PSW_HEATER_B_ -x3 | | | 15 | | 13 | 13 | 13 | 13 | 13 | 13 | | | | | | |
| PSW_HEATER_B shldx3 | | | 16 | | | | | | | | | | | | | |
| PMW_HEATER_B_+x2 | | | 17 | | | | | | | | 6 | 6 | 6 | 6 | | |
| PMW_HEATER_B_ -x2 | | | 35 | | | | | | | | 13 | 13 | 13 | 13 | | |
| PMW_HEATER_B shldx2 | | | 36 | | | | | | | | | | | | | |
| PLW_HEATER_B_+ | | | 37 | | | | | | | | | | | | 6 | 6 |
| PLW_HEATER_B- | | | 18 | | | | | | | | | | | | 13 | 13 |
| PLW_HEATER_B shld | | | 19 | | | | | | | | | | | | | |
| PMW_JFETV1_B_+ | | | | 20 | | | | | | | 8 | | | | | |
| PMW_JFETV1_B- | | | | 2 | | | | | | | 14 | | | | | |

4.5.3 BS-Spectrometer

Overall Mechanical Drwg.



Connector/Backshell Details

JPL to specify.

Harness Layup

The BS harness is all at one temperature. Crimped 28AWG copper MDM?

Pairs of wires should at least be twisted, and some inter-function screens may be appropriate, JPL to specify.

The whole harness must be very well RF screened to all its backshells: not only does it form part of a Faraday cage but it forms part of one that is on the detector side of the Murata filter system.

Contact Details

| Function | HSJFS 37wayA | HSJFS 37wayA | SLW PCBS1 15way | SSW PCBS2 15way | SSW PCBS3 15way |
|------------------|-----------------|-----------------|--------------------|--------------------|--------------------|
| SLW_BIAS_A1+ve | 20 | | 2 | | |
| SLW_BIAS_A1-ve | 2 | | 4 | | |
| SLW_Grnd_A | 1 | | | | |
| SLW_BIAS_A2 +ve | 3 | | 2 | | |
| SLW_BIAS_A2 -ve | 22 | | 4 | | |
| SLW_Grnd_A | 21 | | | | |
| SLW_JFETV_A1 +ve | 23 | | 1 | | |
| SLW_JFETV_A1 -ve | 5 | | 10 | | |
| SLW_Grnd_A | 4 | | | | |
| SLW_JFETV_A2 +ve | 6 | | 1 | | |
| SLW_JFETV_A2 -ve | 25 | | 10 | | |
| SLW_Grnd_A | 24 | | | | |
| SLW_Grnd_A | 7 | | 9 | | |
| SSW_Grnd_A | 26 | | | 9 | |
| SSW_Grnd_A | 8 | | | | 9 |
| SSW_BIAS1_A +ve | 9 | | | 2 | |
| SSW_BIAS1_A -ve | 28 | | | 4 | |
| SSW_Grnd_A | 27 | | | | |
| SSW_JFETV1_A +ve | 29 | | | 1 | |
| SSW_JFETV1_A -ve | 11 | | | 10 | |
| SSW_J Grnd_A | 10 | | | | |
| SSW_BIAS2_A +ve | 12 | | | | 2 |
| SSW_BIAS2_A -ve | 31 | | | | 4 |

SPIRE HARNES DEFINITION

| Function | HSJFS 37wayA | HSJFS 37wayA | SLW PCBS1 15way | SSW PCBS2 15way | SSW PCBS3 15way |
|-------------------|-----------------|-----------------|--------------------|--------------------|--------------------|
| SSW_Grnd_A | 30 | | | | |
| SSW_JFETV2_A +ve | 32 | | | | 1 |
| SSW_JFETV2_A -ve | 14 | | | | 10 |
| SSW_Grnd_A | 13 | | | | |
| S_Heater_Grnd | 33 | | | | |
| SLW_HEATER_A +ve | 34 | | 3 | | |
| SLW_HEATER_A -ve | 16 | | 11 | | |
| S_Heater_Grnd_A | 15 | | | | |
| SSW_HEATER1_A +ve | 17 | | | 3 | |
| SSW_HEATER1_A -ve | 36 | | | 11 | |
| S_Heater_Grnd_A | 35 | | | | |
| SSW_HEATER2_A +ve | 37 | | | | 3 |
| SSW_HEATER2_A -ve | 19 | | | | 11 |
| S_Heater_Grnd_A | 18 | | | | |
| SLW_BIAS_B1+ve | | 20 | 7 | | |
| SLW_BIAS_B1-ve | | 2 | 5 | | |
| SLW_Grnd_B | | 1 | | | |
| SLW_BIAS_B2 +ve | | 3 | 7 | | |
| SLW_BIAS_B2 -ve | | 22 | 5 | | |
| SLW_Grnd_B | | 21 | | | |
| SLW_JFETV_B1 +ve | | 23 | 8 | | |
| SLW_JFETV_B1 -ve | | 5 | 14 | | |
| SLW_Grnd_B | | 4 | | | |
| SLW_JFETV_B2 +ve | | 6 | 8 | | |
| SLW_JFETV_B2 -ve | | 25 | 14 | | |
| SLW_Grnd_B | | 24 | | | |
| SLW_Grnd_B | | 7 | 15 | | |
| SSW_Grnd_B | | 26 | | 15 | |
| SSW_Grnd_B | | 8 | | | 15 |
| SSW_BIAS1_B +ve | | 9 | | 7 | |
| SSW_BIAS1_B -ve | | 28 | | 5 | |
| SSW_Grnd_B | | 27 | | | |
| SSW_JFETV1_B +ve | | 29 | | 8 | |
| SSW_JFETV1_B -ve | | 11 | | 14 | |
| SSW_J Grnd_B | | 10 | | | |
| SSW_BIAS2_B +ve | | 12 | | | 7 |
| SSW_BIAS2_B -ve | | 31 | | | 5 |
| SSW_Grnd_B | | 30 | | | |
| SSW_JFETV2_B +ve | | 32 | | | 8 |
| SSW_JFETV2_B -ve | | 14 | | | 14 |
| SSW_Grnd_B | | 13 | | | |
| S_Heater_Grnd | | 33 | | | |
| SLW_HEATER_B +ve | | 34 | 6 | | |
| SLW_HEATER_B -ve | | 16 | 13 | | |
| S_Heater_Grnd_B | | 15 | | | |
| SSW_HEATER1_B +ve | | 17 | | 6 | |
| SSW_HEATER1_B -ve | | 36 | | 13 | |
| S_Heater_Grnd_B | | 35 | | | |
| SSW_HEATER2_B +ve | | 37 | | | 6 |
| SSW_HEATER2_B -ve | | 19 | | | 13 |
| S_Heater_Grnd_B | | 18 | | | |

4.6 Test Harnesses

4.6.1 T1 Primary 1553 Bus + Clock

Overall Mechanical Drwg.

1:1

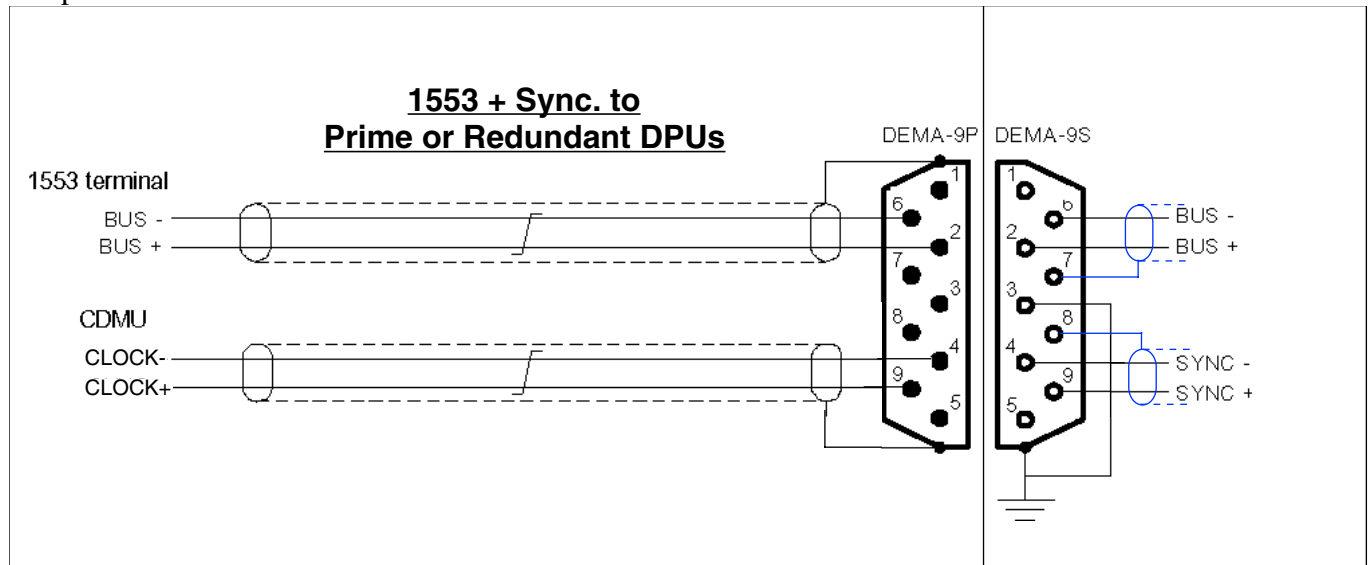
Connector/Backshell Details

To HSDPU J3 and J5

Harness Layup

Contact Details

As per SPIRE-RAL-COM-000562 Iss2



| | | |
|-------------|------------------------------------|--|
| CLRC | SPIRE HARNES DEFINITION | Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 123 of 136 |
|-------------|------------------------------------|--|

4.6.2 T2 Secondary 1553 Bus + Clock

Overall Mechanical Drwg.

1:2

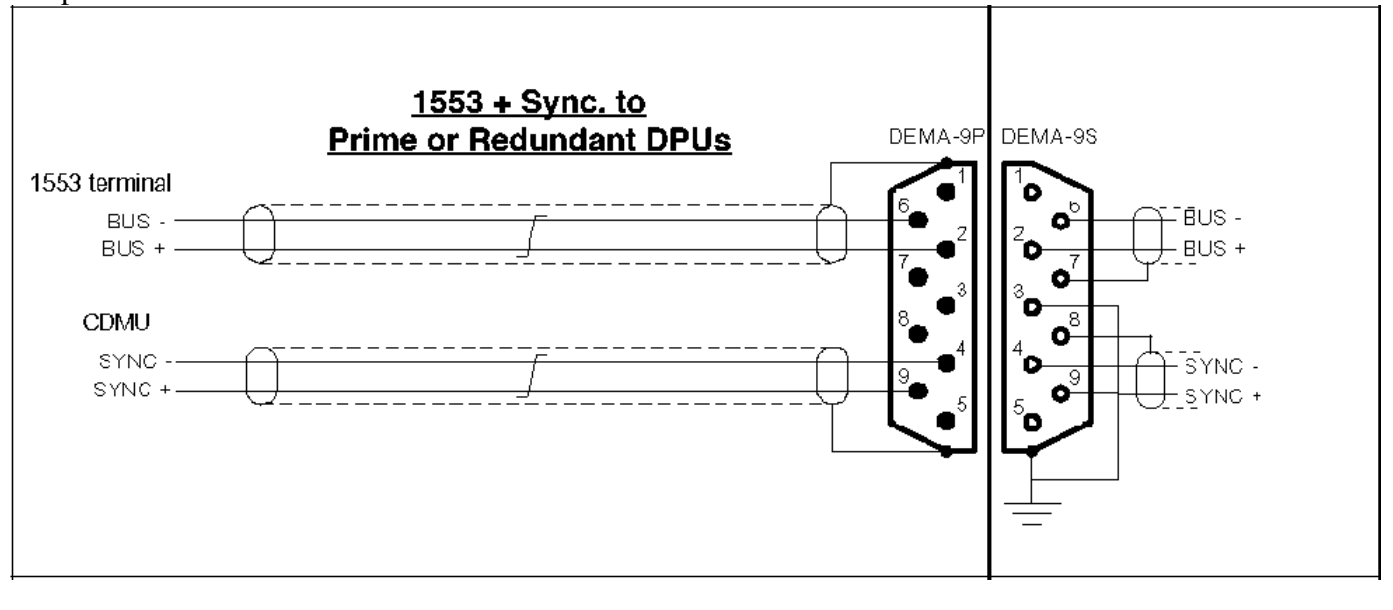
Connector/Backshell Details

To HSDPU J4 and J6

Harness Layup

Contact Details

As per SPIRE-RAL-COM-000562 Iss2



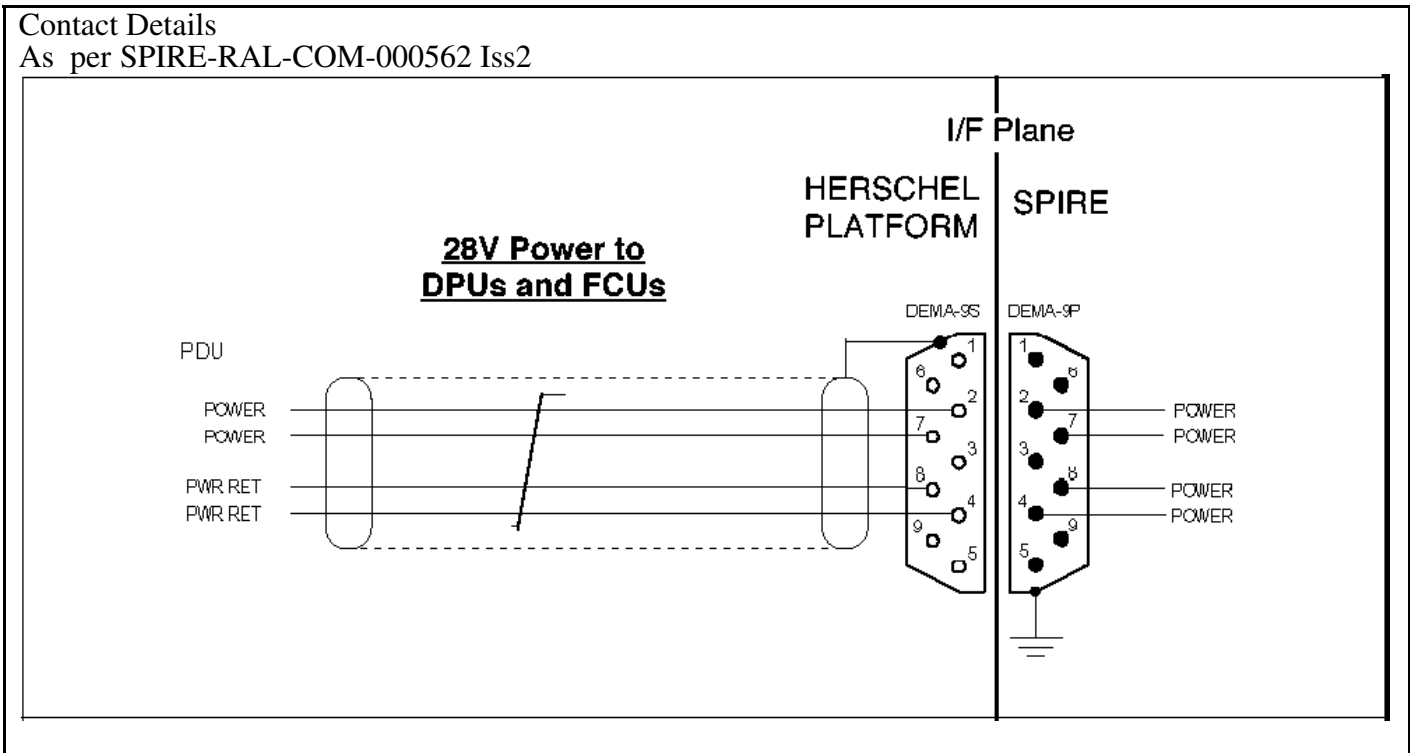
| | | |
|--------------------|--|--|
| <p>CLRC</p> | <p align="center">SPIRE HARNES DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 124 of 136</p> |
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4.6.3 T3 DPU-P Power

Overall Mechanical Drwg.

Connector/Backshell Details
To HSDPU J1

Harness Layup



4.6.4 T4 DPU-R Power

Overall Mechanical Drwg.

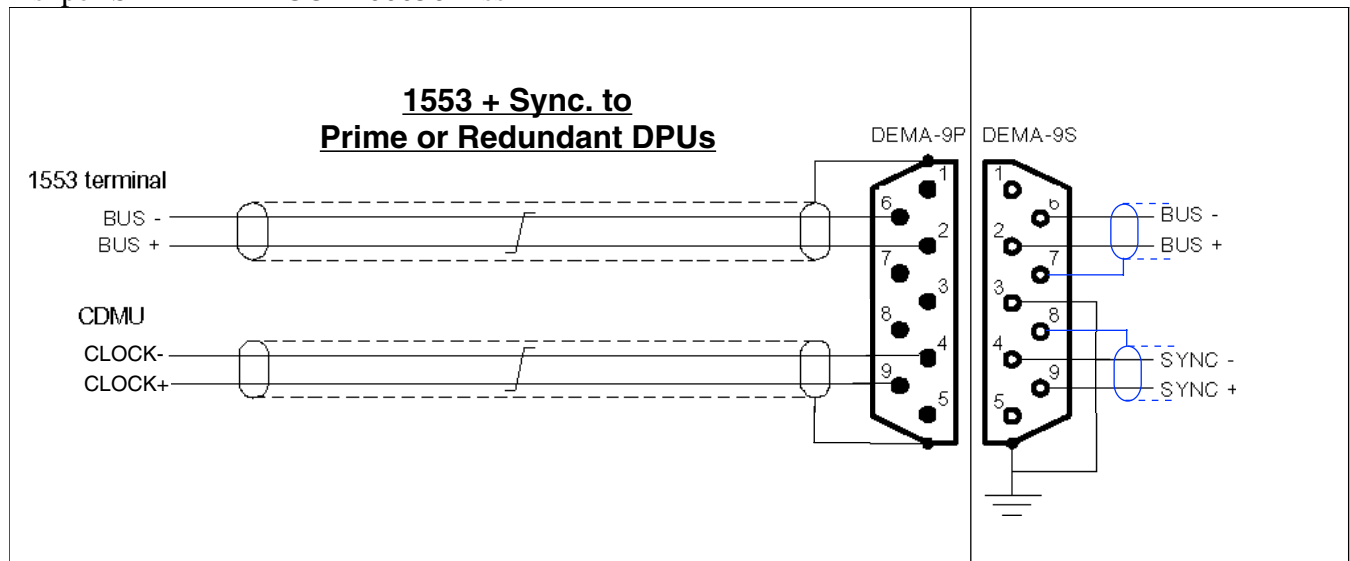
Connector/Backshell Details

To HSDPU J2

Harness Layup

Contact Details

As per SPIRE-RAL-COM-000562 Iss2



| | | |
|--------------------|---|--|
| <p>CLRC</p> | <p style="text-align: center;">SPIRE HARNES DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 126 of 136</p> |
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4.6.5 T5 FCU-P Power

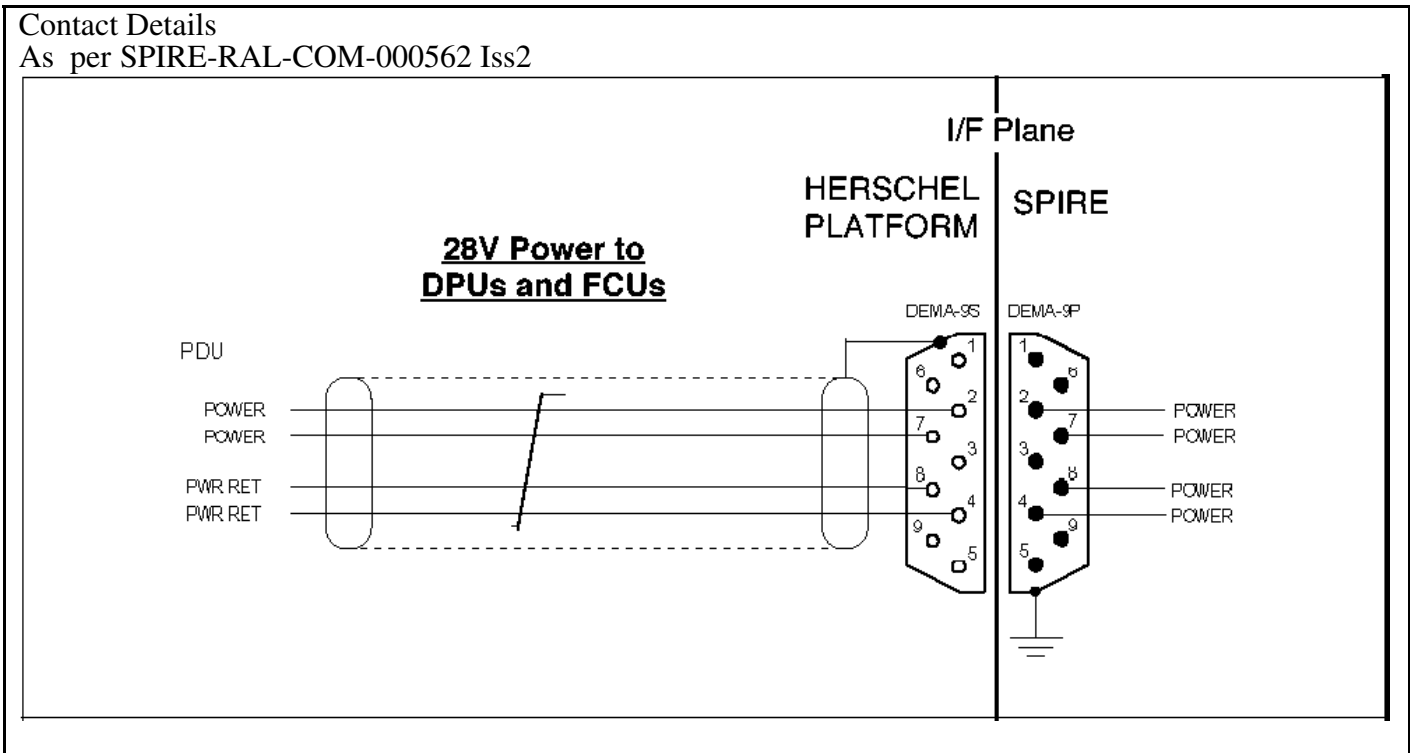
Overall Mechanical Drwg.

1:1

Connector/Backshell Details

To HSFCU J5

Harness Layup



| | | |
|--------------------|---|--|
| <p>CLRC</p> | <p style="text-align: center;">SPIRE HARNES DEFINITION</p> | <p>Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 127 of 136</p> |
|--------------------|---|--|

4.6.6 T6 FCU-R Power

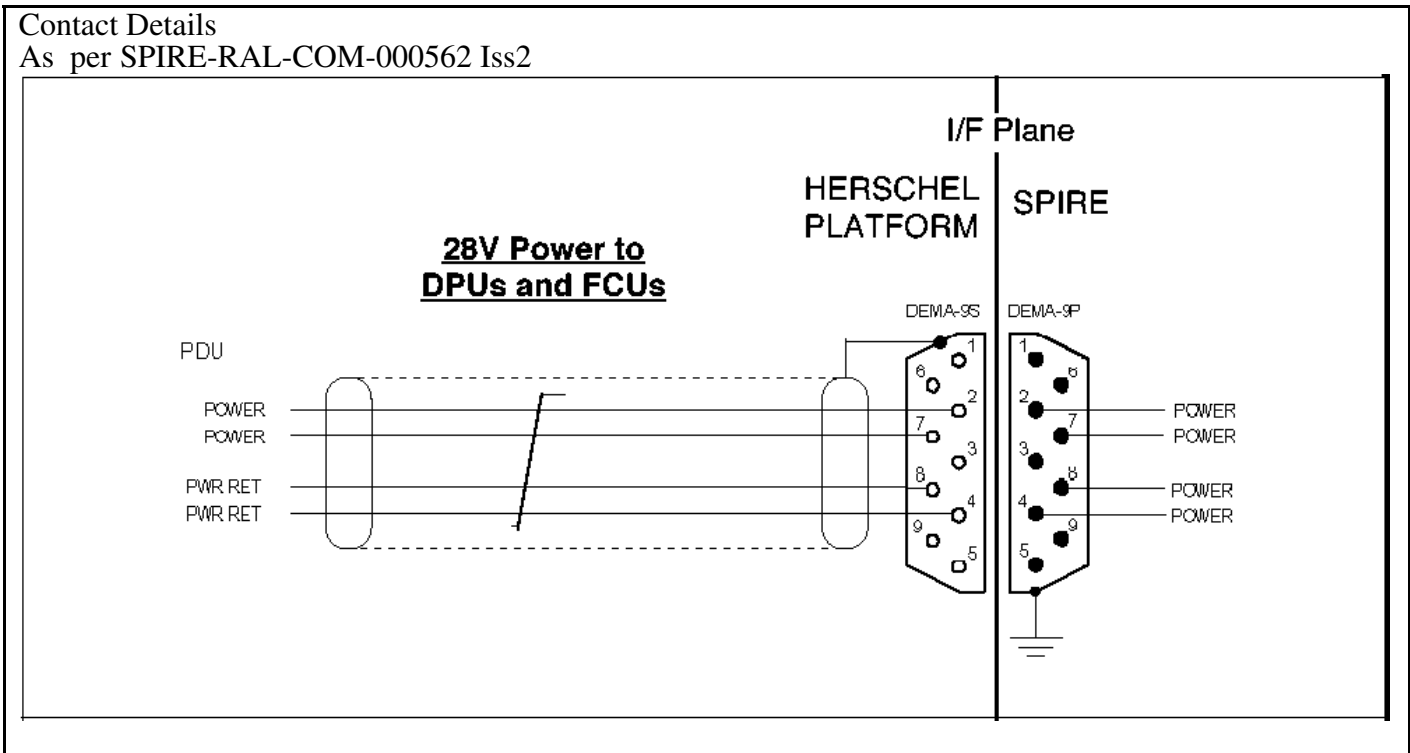
Overall Mechanical Drwg.

1:1

Connector/Backshell Details

To HSFCU J6

Harness Layup



| | | |
|-------------|------------------------------------|--|
| CLRC | SPIRE HARNES DEFINITION | Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 128 of 136 |
|-------------|------------------------------------|--|

4.6.7 T7 SHT via FCU-P

Overall Mechanical Drwg.

Connector/Backshell Details

Harness Layup

Contact Details

| | | |
|-------------|------------------------------------|--|
| CLRC | SPIRE HARNES DEFINITION | Doc #: SPIRE-RAL-PRJ-000608 Issue: 0.6 Date: 15/09/01 Page 129 of 136 |
|-------------|------------------------------------|--|

4.6.8 T8 SHT via FCU-R

Overall Mechanical Drwg.

Connector/Backshell Details

Harness Layup

Contact Details

SPIRE HARNES DEFINITION

| Name | 100 Way Connector | FPU/JFS/JFP Connector | C Harness Connector Type | Description | Number of Conductors excl. shlds | Number of inner Shields | Type | Max. Impedance | | Max Current per Conductor | Average Current | Duty Cycle | | Max. Volts | |
|--------------------|--------------------|-----------------------|--------------------------|---|-----------------------------------|-------------------------|-------|----------------|--------|---------------------------|-----------------|------------|------|------------|-----------|
| | | | | | | | | R (W) | C (pF) | | | L (uH) | t | | T (t x T) |
| C11 Drive-P | | | | 300mK Thermal Control Heater | 4 | 1 | STQ | 30 | | 100uA | | 50% | 33% | 17% | |
| | | FPU J17 | MDM15P | Actuator position sense + Latch Confirm | 4 | 1 | STQ | 1000 | | ? | | 0% | 0% | 0% | 10 |
| | | | | Latch+solenoid drives and vane heater | 4 | 1 | STQ | 10 | | 100mA | | 0% | 0% | 0% | |
| | | | | Vane thermistor bias and readout | 4 | 1 | STQ | 1000 | | 1uA | | 0% | 0% | 0% | |
| | | | | RF Overshield sealed to both backshells | | Outer | >93% | | 0.01 | | | | | | no |
| | | CVW 11 | FPU J25 | BSM Chopper Sensors | 5 | 2 | STT+P | 1000 | | 250nA | | 100% | 33% | 33% | 0.4 |
| | | | | BSM Jiggle Sensors | 5 | 2 | STT+P | 1000 | | 1uA | | 100% | 33% | 33% | |
| | | | | BSM Temperature | 4 | 1 | STQ | 1000 | | 1uA | | 100% | 33% | 33% | |
| | | | | Photometer Stimulus Heater | 4 | 1 | STQ | 10 | | 7mA | | 5% | 33% | 2% | |
| | | | | BSM Launch latch sense | 2 | 1 | STP | 1000 | | 0 | | 0% | 0% | 0% | |
| C12 Aux-R | | | | BSM Launch latch solenoid | 3 | 1 | STT | 10 | | 35mA | | 0% | 0% | 0% | |
| | | | | BSM Chop motor drive | 4 | 1 | STQ | 10 | | 40mA | | 0% | 0% | 0% | |
| | | | | BSM Jiggle motor drive | 4 | 1 | STQ | 10 | | 40mA | | 0% | 0% | 0% | |
| | | FPU J27 | MDM 37P | SMEC Thermometry | 8 | 2 | STQ | 1000 | | 1uA | | 100% | 33% | 33% | |
| | | | | SMEC LVDT Primary | 2 | 1 | STP | 500 | | 5mA | | 50% | 33% | 17% | 5 |
| | | | | SMEC LVDT Secondary | 4 | 2 | STP | 500 | | 50uA | | 50% | 33% | 17% | 15 |
| | | | | SMEC Launch Latch1 | 4 | 2 | STP | 10 | | 0 | | 0% | 0% | 0% | 15 |
| | | | | SMEC Launch Latch1 Confirm | 2 | 1 | STP | 100 | | 1mA | | 0% | 0% | 0% | 15 |
| | | | | SMEC Launch Latch2 | 4 | 2 | STP | 10 | | 0 | | 0% | 0% | 0% | 15 |
| | | | | SMEC Launch Latch2 Confirm | 2 | 1 | STP | 100 | | 400mA/50mS | | 0% | 0% | 0% | 15 |
| C13 Drive-R | | | | SMEC Drive Coil | 4 | 2 | STP | 5 | | 1mA | | 50% | 33% | 17% | 15 |
| | | FPU J29 | MDM 37P | SMEC Drive coil voltage sensor | 2 | 1 | STP | 500 | | 10uA | | 0% | 33% | 0% | 15 |
| | | | | SMEC Position sensor supplies | 4 | 2 | STP | 100 | | 1mA | | 50% | 33% | 17% | 5 |
| | | | | SMEC Position sensor photodiodes | 6 | 3 | STP | 1000 | | 20uA | | 50% | 33% | 17% | 5 |
| | | | | SMEC Position sensor photodiodes FB | 6 | 3 | STP | 1000 | | 10uA | | 50% | 33% | 17% | 5 |
| | | Shield | FPU J20 | RF Overshield sealed to both backshells | | Outer | >93% | | 0.01 | | | | | | no |
| | | CVW 12 | FPU J20 | Sorption Pump Heater | 4 | 0 | TQ | 10 | | 25mA | | 6% | 33% | 2% | |
| | | | | Heat switch heaters | 8 | 0 | TQ | 50 | | 1.5mA | | 100% | 33% | 33% | |
| | | | | Various cooler thermistors | 20 | 5 | STQ | 1000 | | 1uA | | 100% | 33% | 33% | |
| | C13 Drive-R | | FPU J22 | MDM 37P | Spectrometer Stimulus Thermistors | 12 | 3 | STQ | 1000 | | 1uA | | 100% | 33% | 33% |
| | | | | Spectrometer Stimulus Heater 4% | 4 | 0 | TQ | 30 | | 9mA | | 100% | 33% | 33% | 4 |
| | | | | Spectrometer Stimulus Heater 2% | 4 | 0 | TQ | 30 | | 7mA | | 50% | 33% | 17% | |
| | | FPU J24 | MDM 37P | FPU Thermometry | 24 | 6 | STQ | 1000 | | 1uA | | 100% | 33% | 33% | |
| | | | | 300mK Thermal Control Heater | 4 | 1 | STQ | 30 | | 1uA | | 100% | 33% | 33% | |
| | | FPU J18 | MDM15P | Actuator position sense + Latch Confirm | 4 | 1 | STQ | 1000 | | 100uA | | 50% | 33% | 17% | |
| | | | | Latch+solenoid drives and vane heater | 4 | 1 | STQ | 1000 | | ? | | 0% | 0% | 0% | 10 |
| | | | | Vane thermistor bias and readout | 4 | 1 | STQ | 10 | | 100mA | | 0% | 0% | 0% | |
| | | Shield | FPU J26 | RF Overshield sealed to both backshells | | Outer | >93% | | 0.01 | | | | | | no |
| | | CVW 13 | FPU J26 | BSM Chopper Sensors | 5 | 2 | STT+P | 1000 | | 250nA | | 100% | 33% | 33% | 0.4 |
| C13 Drive-R | | | | BSM Jiggle Sensors | 5 | 2 | STT+P | 1000 | | 1uA | | 100% | 33% | 33% | |
| | | | | BSM Temperature | 4 | 1 | STQ | 1000 | | 1uA | | 100% | 33% | 33% | |
| | | | | Photometer Stimulus Heater | 4 | 1 | STQ | 1000 | | 7mA | | 5% | 33% | 2% | |
| | | | | BSM Launch latch sense | 2 | 1 | STP | 1000 | | 0 | | 0% | 0% | 0% | |
| | | | | BSM Launch latch solenoid | 3 | 1 | STT | 10 | | 35mA | | 0% | 0% | 0% | |
| | | | | BSM Chop motor drive | 4 | 1 | STQ | 10 | | 40mA | | 0% | 0% | 0% | |
| | | | | BSM Jiggle motor drive | 4 | 1 | STQ | 10 | | 40mA | | 0% | 0% | 0% | |
| | | FPU J28 | MDM 37P | SMEC Thermometry | 8 | 2 | STQ | 1000 | | 1uA | | 100% | 33% | 33% | |
| | | | | SMEC LVDT Primary | 2 | 1 | STP | 500 | | 5mA | | 50% | 33% | 17% | 5 |
| | | | | SMEC LVDT Secondary | 4 | 2 | STP | 500 | | 50uA | | 50% | 33% | 17% | 15 |
| C13 Drive-R | | | | SMEC Launch Latch1 | 4 | 2 | STP | 10 | | 0 | | 0% | 0% | 0% | 15 |
| | | | | SMEC Launch Latch1 Confirm | 2 | 1 | STP | 100 | | 1mA | | 0% | 0% | 0% | 15 |
| | | | | SMEC Launch Latch2 | 4 | 2 | STP | 100 | | 0 | | 0% | 0% | 0% | 15 |
| | | | | SMEC Launch Latch2 Confirm | 2 | 1 | STP | 100 | | 1mA | | 0% | 0% | 0% | 15 |
| | | FPU J30 | MDM 37P | SMEC Drive Coil | 4 | 2 | STP | 5 | | 100mA | | 50% | 33% | 17% | 15 |
| | | | | SMEC Drive coil voltage sensor | 2 | 1 | STP | 500 | | 10uA | | 0% | 33% | 0% | 15 |
| | | | | SMEC Position sensor supplies | 4 | 2 | STP | 100 | | 1mA | | 50% | 33% | 17% | 5 |
| | | | | SMEC Position sensor photodiodes | 6 | 3 | STP | 1000 | | 20uA | | 50% | 33% | 17% | 5 |
| | | | | SMEC Position sensor photodiodes FB | 6 | 3 | STP | 1000 | | 10uA | | 50% | 33% | 17% | 5 |
| | | Shield | | RF Overshield sealed to both backshells | | Outer | >93% | | 0.01 | | | | | | no |

SPIRE HARNES DEFINITION

| Name | 100 Way Connector | SVM Connector | I Harness Connector Type | Description | Number of Conductors excl. shlds | Number of inner Shields | Type | R (W) | C(pF) | L(uH) | Max.Current per Conductor | Average t | Duty Cycle T | (t x T) | Max. Volts |
|-----------------|-------------------|---------------|--------------------------|---|----------------------------------|-------------------------|------|-------|-------|-------|---------------------------|-----------|--------------|---------|------------|
| I1 Type3 | CVV 1 | DCU J27 | DCMA37 S | 12 ch. SLW Bolometer(1-12) Ground Wire | 24 | 12 | STP | 100 | 1500 | 0.12 | 1nA | 50% | 33% | 17% | 0.1 |
| | | DCU J28 | DCMA37 S | 12 ch. SLW Bolometer(13-24) Ground Wire | 24 | 0 | STP | 100 | 1500 | 0.12 | 1nA | 50% | 33% | 17% | 0.1 |
| | | DCU J33 | DCMA37P | Spectrometer Bias (SLW & SSW) JFET Power Heaters (SLW and SSW) | 8 | 4 | STP | 1000 | 1500 | 0.12 | 1mA | 50% | 33% | 17% | 0.1 |
| | | | | Ground wires | 8 | 4 | STP | 100 | 1500 | 0.12 | 5mA | 50% | 33% | 17% | 10 |
| | | | | | 6 | 3 | STP | 100 | 1500 | 0.12 | 5mA | 50% | 33% | 17% | 0.1 |
| | | DCU J34 | DCMA37P | Spectrometer Bias (SLW & SSW) JFET Power Heaters (SLW and SSW) | 8 | 4 | STP | 1000 | 1500 | 0.12 | 1mA | 50% | 33% | 17% | 0.1 |
| I2 Type4 | | Shield | | RF Overshield insulated from CVV wall | | self | >93% | | | 0.01 | | | | | |
| | CVV 2 | DCU J23 | DCMA37 S | 12 ch. SSW Bolometer (1-12) Ground Wire | 24 | 12 | STP | 200 | 1500 | 0.12 | 1nA | 50% | 33% | 17% | 0.1 |
| | | DCU J24 | DCMA37 S | 12 ch. SSW Bolometer (13-24) Ground Wire | 24 | 0 | STP | 200 | 1500 | 0.12 | 1nA | 50% | 33% | 17% | 0.1 |
| | | DCU J25 | DCMA37 S | 12 ch. SSW Bolometer (25-36) Ground Wires | 24 | 12 | STP | 200 | 1500 | 0.12 | 1nA | 50% | 33% | 17% | 0.1 |
| | | DCU J26 | DCMA37 S | 12 ch. SSW Bolometer (37-48 inc.spares) Ground Wires | 24 | 12 | STP | 200 | 1500 | 0.12 | 1nA | 50% | 33% | 17% | 0.1 |
| | | Shield | | RF Overshield insulated from CVV wall | | self | >93% | | | 0.01 | | | | | |
| I3 Type2 | CVV 3 | DCU J29 | DCMA37P | PSW JFET Power PSW Bias Heaters | 12 | 6 | STP | 100 | 1500 | 0.12 | 5mA | 50% | 33% | 17% | 0.1 |
| | | | | Ground Wire | 12 | 6 | STP | 100 | 1500 | 0.12 | 1mA | 50% | 33% | 17% | 0.1 |
| | | DCU J31 | DCMA37P | PMW/PLW JFET Power PMW/PLW Bias Temp. Control Bias | 12 | 6 | STP | 100 | 1500 | 0.12 | 5mA | 50% | 33% | 17% | 0.1 |
| | | | | Ground Wire | 12 | 6 | STP | 100 | 1500 | 0.12 | 1mA | 50% | 33% | 17% | 0.1 |
| | | DCU J30 | DCMA37P | PSW JFET Power PSW Bias Heaters | 12 | 6 | STP | 100 | 1500 | 0.12 | 5mA | 50% | 33% | 17% | 0.1 |
| | | | | Ground Wire | 12 | 6 | STP | 100 | 1500 | 0.12 | 1mA | 50% | 33% | 17% | 0.1 |
| I4 Type1 | CVV 4 | DCU J32 | DCMA37P | PMW/PLW JFET Power PMW/PLW Bias Temp. Control Bias | 12 | 6 | STP | 100 | 1500 | 0.12 | 5mA | 50% | 33% | 17% | 0.1 |
| | | | | Ground Wire | 12 | 6 | STP | 100 | 1500 | 0.12 | 1mA | 50% | 33% | 17% | 0.1 |
| | | Shield | | RF Overshield insulated from CVV wall | | self | >93% | | | 0.01 | | | | | |
| | | DCU J20 | DDMA 50S | 16 ch. PMW (1-16) Ground Wire | 32 | 16 | STP | 100 | 1500 | 0.12 | 1nA | 50% | 33% | 17% | 0.1 |
| | | DCU J21 | DDMA 50S | 16 ch. PMW (17-32) Ground Wire | 32 | 16 | STP | 100 | 1500 | 0.12 | 1nA | 50% | 33% | 17% | 0.1 |
| | | DCU J22 | DDMA 50S | 16 ch. PMW (33-48) Ground Wire | 32 | 16 | STP | 100 | 1500 | 0.12 | 1nA | 50% | 33% | 17% | 0.1 |
| I5 Type1 | CVV 5 | DCU J17 | DDMA 50S | RF Overshield insulated from CVV wall 16 ch. PMW (1-16) Ground Wire | 32 | 16 | STP | 100 | 1500 | 0.12 | 1nA | 50% | 33% | 17% | 0.1 |
| | | DCU J18 | DDMA 50S | 16 ch. PMW (17-32) | 32 | 16 | STP | 100 | 1500 | 0.12 | 1nA | 50% | 33% | 17% | 0.1 |

SPIRE HARNESS DEFINITION

| Name | 100 Way Connector | SVM Connector | I Harness Connector Type | Description | Number of Conductors excl. shlds | Number of inner Shields | Type | R (W) | Max. Impedance C(pF) | L(uH) | Max.Current per Conductor | Average | t | Duty Cycle T | (t x T) | Max. Volts |
|--------------------|-------------------|---------------|--------------------------|--|----------------------------------|-------------------------|--------|-------|----------------------|-------|---------------------------|---------|--------|--------------|---------|------------|
| I6 Type1 | CVV 6 | Shield | DCU J19 | Ground Wire 16 ch. PMW (33-48) | 2 | 0 | Single | 1000 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | | | DCU J14 | Ground Wire RF Overshield insulated from CVV wall 16 ch. PMW (1-16) | 32 | 16 | STP | 100 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | CVV 7 | Shield | DCU J15 | Ground Wire 16 ch. PMW (17-32) | 2 | 0 | Single | 1000 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | | | DCU J16 | Ground Wire 16 ch. PMW (33-48) | 2 | 0 | Single | 1000 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | | | DCU J11 | Ground Wire RF Overshield insulated from CVV wall 16 ch. PMW (1-16) | 32 | 16 | STP | 100 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | | | DCU J12 | Ground Wire 16 ch. PMW (17-32) | 2 | 0 | Single | 1000 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| I7 Type1 | CVV 7 | Shield | DCU J13 | Ground Wire 16 ch. PMW (33-48) | 2 | 0 | Single | 1000 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | | | DCU J8 | Ground Wire RF Overshield insulated from CVV wall 16 ch. PMW (1-16) | 32 | 16 | STP | 100 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | CVV 8 | Shield | DCU J9 | Ground Wire 16 ch. PMW (17-32) | 2 | 0 | Single | 1000 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | | | DCU J10 | Ground Wire 16 ch. PMW (33-48) | 2 | 0 | Single | 1000 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | | | DCU J5 | Ground Wire RF Overshield insulated from CVV wall 16 ch. PMW (1-16) | 32 | 16 | STP | 100 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | | | DCU J6 | Ground Wire 16 ch. PMW (17-32) | 2 | 0 | Single | 1000 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| I9 Type1 | CVV 9 | Shield | DCU J7 | Ground Wire 16 ch. PMW (33-48) | 2 | 0 | Single | 1000 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | | | FCU J15 | Ground Wire RF Overshield insulated from CVV wall 16 ch. PMW (1-16) | 32 | 16 | STP | 100 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | CVV 10 | Shield | FCU J11 | Ground Wire 16 ch. PMW (17-32) | 2 | 0 | Single | 1000 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | | | FCU J23 | Ground Wire 16 ch. PMW (33-48) | 2 | 0 | Single | 1000 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | | | FCU J25 | Ground Wire RF Overshield insulated from CVV wall 16 ch. PMW (1-16) | 32 | 16 | STP | 100 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| | | | FCU J21 | Ground Wire 16 ch. PMW (17-32) | 2 | 0 | Single | 1000 | 1500 | 0.12 | 1nA | | 50% | 33% | 17% | 0.1 |
| I10 Aux-P | CVV 10 | Shield | DAMA 15P | Ground Wire RF Overshield insulated from CVV wall 16 ch. PMW (1-16) | 4 | 1 | STQ | 1000 | 1000 | 0.01 | ? | | 0% | 0% | 0% | 10 |
| | | | DAMA 15P | Actuator position sense + Latch Confirm Latch-solenoid drives and vane heater Vane thermistor bias and readout Cooler heaters | 4 | 1 | STQ | 10 | 1000 | 0.12 | 100mA | 1mA | 0% | 0% | 0% | 0% |
| | CVV 11 | Shield | DAMA 37P | Sorption pump heat switch heaters Evaporator heat switch heaters Spectrometer Stimulator Heater Drives FPU Thermometry A | 4 | 0 | TQ | 10 | 50 | 0.12 | 25mA | 1mA | 6% | 1/3 | 2% | |
| | | | DCMS 37P | FPU Thermometry B 300mK Thermal Control Heater | 4 | 0 | TQ | 50 | 50 | 0.12 | 1.5mA | 100% | 1/3 | 33% | | |
| | | | DBMA 25P | FPU Thermometry C RF Overshield insulated from CVV wall | 8 | 0 | TQ | 30 | 30 | 0.12 | 1.5mA | 100% | 33.30% | 33% | | |
| | | | MDM 37P | FPU Thermometry B Photometer Stimulus Heater BSM Chopper Sensors | 32 | 8 | STQ | 1000 | 1000 | 0.12 | 9mA | 100% | 33% | 17% | | |
| I11 Drive-P | CVV 11 | Shield | DBMA 25P | FPU Thermometry C RF Overshield insulated from CVV wall | 4 | 1 | STQ | 30 | 1000 | 0.12 | 100uA | 1uA | 100% | 33% | 17% | |
| | | | MDM 37P | Photometer Stimulus Heater BSM Chopper Sensors | 28 | 7 | STQ | 1000 | 1000 | 0.01 | 1uA | 1uA | 100% | 33% | 33% | |
| | CVV 11 | Shield | FCU J19 | Photometer Stimulus Heater BSM Chopper Sensors | 12 | 3 | STQ | 1000 | 1000 | 0.12 | 1uA | 1uA | 100% | 33% | 33% | |
| | | | FCU J19 | BSM Jiggle Sensors Photometer Stimulus Heater BSM Launch latch sense | 4 | 0 | TQ | 10 | 1000 | 0.12 | 7mA | 250nA | 100% | 33% | 33% | 0.4 |
| | | | FCU J19 | BSM Jiggle Sensors Photometer Stimulus Heater BSM Launch latch sense | 5 | 2 | STT+P | 1000 | 1000 | 0.12 | 1uA | 1uA | 100% | 33% | 33% | |
| | | | FCU J19 | BSM Launch latch sense BSM Launch latch solenoid | 5 | 2 | STT+P | 1000 | 1000 | 0.12 | 7mA | 5mA | 100% | 33% | 2% | |

BDA Channels

CROSS-REFERENCE OF SPIRE CHANNELS TO HARNESSES NAMES

Most of this information can be worked out by following the Spire block diagram but it is included here for ease of reference.

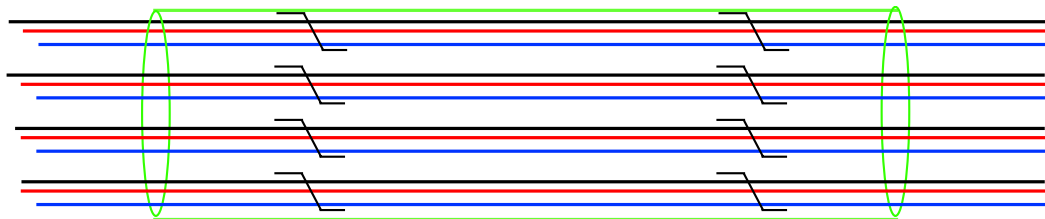
| BDA | PLW | | PMW | | | | PSW | | | | | | SLW | SSW | |
|-------------|------------|-----|------------|-----|-----|-----|------------|-----|-----|-----|-----|-----|----------|------------|--|
| JPL BDA # | 10209800-1 | | 10209800-2 | | | | 10209800-3 | | | | | | 1...00-4 | 10209800-5 | |
| C/I Harness | 6 | | 5 | | 4 | | 9 | | 8 | | 7 | | half 1 | 2 | |
| Nanonics # | | | | | | | | | | | | | | | |
| Channel | J05 | J06 | J01 | J02 | J03 | J04 | J01 | J02 | J03 | J04 | J05 | J06 | J05 | J06 | |
| A | 1 | 25 | 1 | 25 | 49 | 73 | 1 | 25 | 49 | 73 | 97 | 121 | 1 | 25 | |
| B | 2 | 26 | 2 | 26 | 50 | 74 | 2 | 26 | 50 | 74 | 98 | 122 | 2 | 26 | |
| C | 3 | 27 | 3 | 27 | 51 | 75 | 3 | 27 | 51 | 75 | 99 | 123 | 3 | 27 | |
| D | 4 | 28 | 4 | 28 | 52 | 76 | 4 | 28 | 52 | 76 | 100 | 124 | 4 | 28 | |
| E | 5 | 29 | 5 | 29 | 53 | 77 | 5 | 29 | 53 | 77 | 101 | 125 | 5 | 29 | |
| F | 6 | 30 | 6 | 30 | 54 | 78 | 6 | 30 | 54 | 78 | 102 | 126 | 6 | 30 | |
| G | 7 | 31 | 7 | 31 | 55 | 79 | 7 | 31 | 55 | 79 | 103 | 127 | 7 | 31 | |
| H | 8 | 32 | 8 | 32 | 56 | 80 | 8 | 32 | 56 | 80 | 104 | 128 | 8 | 32 | |
| I | 9 | 33 | 9 | 33 | 57 | 81 | 9 | 33 | 57 | 81 | 105 | 129 | 9 | 33 | |
| J | 10 | 34 | 10 | 34 | 58 | 82 | 10 | 34 | 58 | 82 | 106 | 130 | 10 | 34 | |
| K | 11 | 35 | 11 | 35 | 59 | 83 | 11 | 35 | 59 | 83 | 107 | 131 | 11 | 35 | |
| L | 12 | 36 | 12 | 36 | 60 | 84 | 12 | 36 | 60 | 84 | 108 | 132 | 12 | 36 | |
| M | 13 | 37 | 13 | 37 | 61 | 85 | 13 | 37 | 61 | 85 | 109 | 133 | 13 | 37 | |
| N | 14 | 38 | 14 | 38 | 62 | 86 | 14 | 38 | 62 | 86 | 110 | 134 | 14 | 38 | |
| P | 15 | 39 | 15 | 39 | 63 | 87 | 15 | 39 | 63 | 87 | 111 | 135 | 15 | 39 | |
| R | 16 | 40 | 16 | 40 | 64 | 88 | 16 | 40 | 64 | 88 | 112 | 136 | 16 | 40 | |
| S | 17 | 41 | 17 | 41 | 65 | 89 | 17 | 41 | 65 | 89 | 113 | 137 | 17 | 41 | |
| T | 18 | 42 | 18 | 42 | 66 | 90 | 18 | 42 | 66 | 90 | 114 | 138 | 18 | 42 | |
| U | 19 | 43 | 19 | 43 | 67 | 91 | 19 | 43 | 67 | 91 | 115 | 139 | 19 | 43 | |
| V | 20 | 44 | 20 | 44 | 68 | 92 | 20 | 44 | 68 | 92 | 116 | 140 | 20 | 44 | |
| W | 21 | 45 | 21 | 45 | 69 | 93 | 21 | 45 | 69 | 93 | 117 | 141 | 21 | 45 | |
| X | 22 | 46 | 22 | 46 | 70 | 94 | 22 | 46 | 70 | 94 | 118 | 142 | 22 | 46 | |
| Y | 23 | 47 | 23 | 47 | 71 | 95 | 23 | 47 | 71 | 95 | 119 | 143 | 23 | 47 | |
| Z | 24 | 48 | 24 | 48 | 72 | 96 | 24 | 48 | 72 | 96 | 120 | 144 | 24 | 48 | |

Within the C/I harness listings, channel numbers are shown in modulo 48

Addendum: What is 12-ax?

This cableform is maybe not self-explanatory in the same way as the others in this document. A rather specific format of 12-ax is intended.

It is drawn in diagrams as:



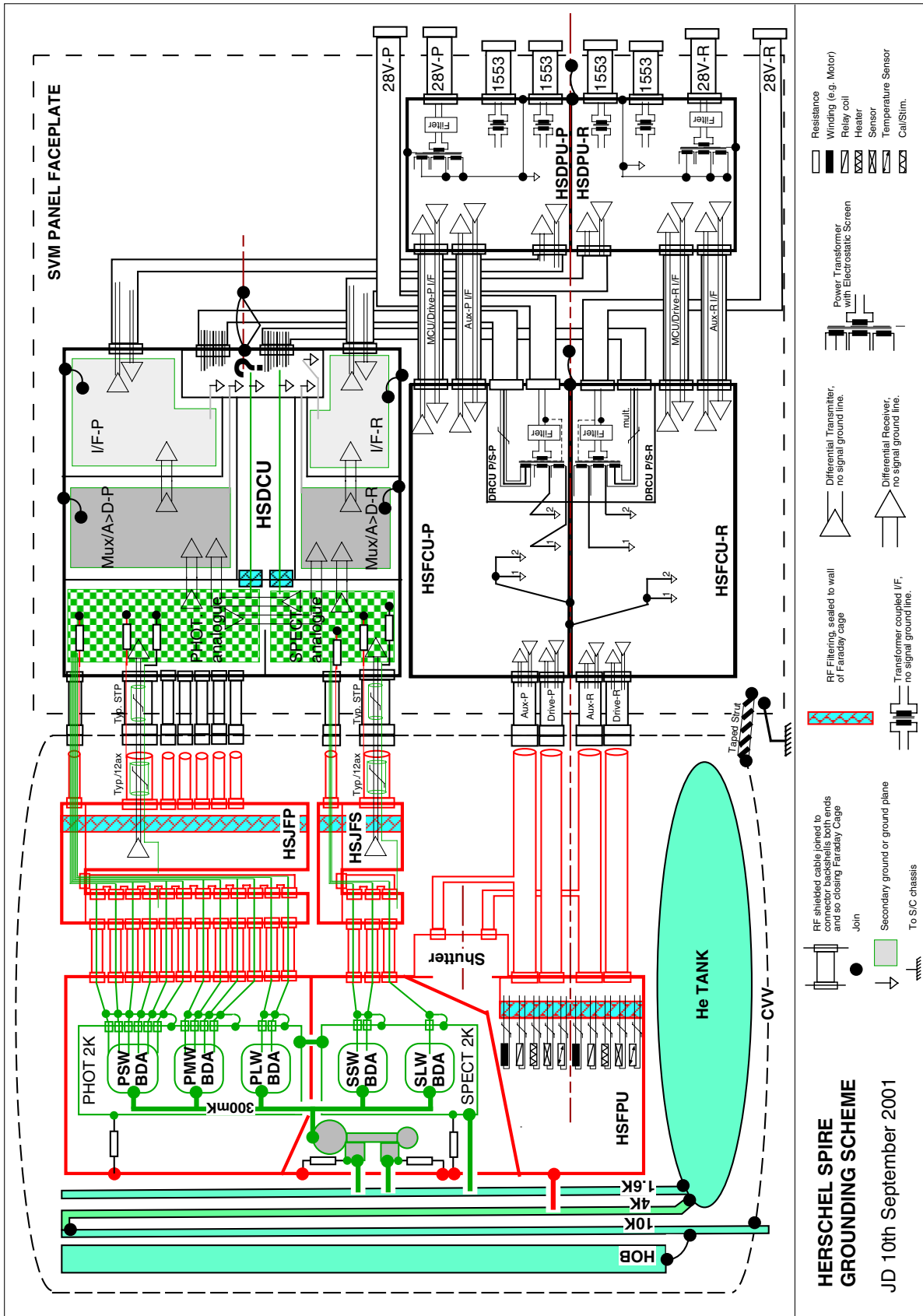
This consists of 4 twisted triples, each triple being three insulated multicore wires, inside one braided shield, all inside an outer insulator.

The material, identified by JPL, uses stainless steel for all conductors, nominally 38AWG.

Using the black wires as screens for twisted pairs (red and blue), capacitance and thermal conductivity are low compared to four screened twisted pairs and cross-talk is apparently acceptable.

Note that the outer screen is also quite light-weight, and for this reason it is not used as the main RF shield on harnesses in Spire.

Spire Grounding Diagram



End of Doc.