



SPIRE
INSTRUMENT BLOCK DIAGRAM

Doc #: SPIRE-RAL-DWG-000646
Issue: 5.0
Date: 19th November 2002
Page 1 of 8

Subject: **SPIRE BLOCK DIAGRAM**

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Page 2 of 8

CHANGE RECORD

| ISSUE | DATE | CHANGE(S) MADE |
|-------|----------|---|
| 2.0 | 7/6/01 | First Controlled Issue after IIDR |
| 2.1 | 18/6/01 | Deleted S/C Synchronisation. Added Master Clock Lines Split FCU into Modules, avoiding mixing Prime and Redundant connections via same motherboard, and requiring BSM module to be split Prime/Redundant, TBC. Re-ordered signal channels into harnesses to get breaks between BDAs to better align with LIA divisions. Removed last vestiges of showing Fast and Slow I/Fs separately as they are linked by W1-W6. Fix FCU J26 duplication. |
| 2.2 | 29/6/01 | Put BDA connector numbers in line with JPL's that indicate which of the six geometric positions are used. Bundle back-harness wires as per JPL diagram. Define LCL names. |
| 2.3 | 7/7/01 | Rearrange JFETs to stress "modularity" |
| 2.4 | 7/8/01 | Increase FCU J21 and J22 to 25way...to take calibrator heater wires that were omitted. Swop JFETs to using 37way filters with partially populated contacts. |
| 2.5 | 8/8/01 | Put in FPU clamshell connectors as harness name "breaks". Delete TBD. |
| 2.6 | 7/9/01 | Update SMEC connectors on FPU from 50 way to 2x37way each side. |
| 2.7 | 9/10/01 | Put in fully updated HSFCU |
| 2.8 | 12/10/01 | Correct way I harness tails split on to FCU...in error in version 2.7 Remove branch from F12A and route 300mK temperature "detectors" via HSJFS J7 AND J8 and new F 28. Correct PMW BDA Allocation. Add note to F20 and F21 so clear that each has one "Cernox" that is actually a 300Mk heater. Put in HSDCU with connectors drawn to scale. |
| 2.9 | 18/10/01 | Correct errors with W3-6 labels that crept into issue 2.8 |
| 3.0 | 30/10/01 | Swop numbers on connector lines for DCU redundant bias generator so they fit with harness definition document, and connectors 29-34 remain if generators were to be put on one module or otherwise reconfigured. |
| 3.1 | 31/10/01 | Remove Filter Modules from JFET racks, thus adopting JPL's intention to use filter connectors and spliced harness. |
| 3.2 | 9/11/01 | Reduce HSDCU Bias module front panel sizes and house them in one double sided module. Call S4 T1 as per Doug's drawings. |
| 3.3 | 21/11/01 | Add last few connector IDs to JFET racks. |
| 3.4 | 11/12/01 | Got J1-J4 on FCU the correct way around [SCU to MCU!] |
| 3.5 | 18/12/01 | Move Connectors around on HSFPU to match CEA's v0.5 HSFPU ICD. Keep JTAG connectors shown elsewhere in DRCU ICD/Spec..but renumber as |



SPIRE
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Doc #: SPIRE-RAL-DWG-000646
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Page 3 of 8

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| | | <p>J37 and J38</p> <p>Combine HSFCU SCU's DPU I/F and Cooler/Stimulus Modules</p> <p>Re-jig Shutter DRCU connectors to not be wired via HSFCU Modules</p> <p>Reduce J25/J26 Connector sizes as moving shutter wiring removes some pins from them.</p> <p>Change 1553 buses to A & B rather than Prime & Redundant</p> <p>Change J23 and J24 sizes because of HSFCU PCB frame restrictions.</p> <p>Move HSFCU Connectors to be in correct physical layout.</p> <p>Add J29 and J30 to shutter wiring to accommodate non-shutter launch latch confirm inputs. Change J15 and J16 to 25way as Doug's given the shutter more wires.</p> <p>Change HSFCU Shutter J17 and J18 to 21way MDM to match.</p> <p>Show power links on DRCU unit because these are not internal.</p> <p>Update HSDCU Bias connectors J29/32 to use 78-way HD triple row connectors after their acceptance by ESA.</p> |
| 3.6 | 20/12/01 | Frederic's comments on J22 and 3TCs implemented. |
| 3.7 | 1/1/02 | HSFCU Duplicate J29/30 Fixed, bumping numbers for JTAGs |
| 3.8 | 1/2/02 | Change SCAL 21 ways to 37 ways. |
| 3.9 | 25/2/02 | As per Passvogel decision, put four "skin" connectors on cryostat associated with cryoharnesses 10-13, to act as access points for EGSE for shutter operation and latch confirmations. Bracket on side of HSFCU deleted, and links to HCDMU's RTUs. |
| | | As HERSCHEL latest accommodation, add connector plate on top of SVM and change cryoharness to include extra/extended/external "E" sections, which are all 1:1 with CVV wall connectors to minimise external RF. loops (except skin connector functions as per above change). "I" harnesses become copper for flight. |
| | | Rationalise sex/sizes of HSFCU internal power connectors |
| 4.0 | 5/3/02 | Route 300 mk temperature control via Harness 2 and not Harness 1 due to needing to keep spare pins on CVV connectors. |
| | | Optimise alignment of drawing |
| 4.1 | 12/4/02 | Correct HSFCU J9/10 & 31-36 shell size as per SVM meeting |
| 4.2 | 22/4./02 | Change E harness category to I and I harness category to S(SVM) to be the same as PACS and HIFI. |
| | | Add caveat about using this diagram as a harness definition diagram |
| | | Show which one of each pair of cryoharness in-line connectors are chassis mounted by adding P/J notes along I/F lines |
| | | Include representation of 300mK cooling busbar and move 300mK sensor/heater unit to show how it links into F harnesses. Call this sub-system HSPTC (Photometer Temperature Control). |
| | | Move EGSE break-out connectors from CVV skin to SCM connector panel as Astrium design implements. |
| 4.3 | 15/5/02 | Corrected one of two J33s to J34 on HSJFP |
| | | Updated BDA Nanonics J numbers...which define their positions |
| | | Move J22 link to SVM panel rather than in air above HSDCU. |
| 4.4 | 1/6/02 | Remove connectors on SME because unfortunately only flying leads can be |



SPIRE
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Doc #: SPIRE-RAL-DWG-000646
Issue: 5.0
Date: 19th November 2002
Page 4 of 8

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| | | accommodated. |
| | | Relabel Harness S4 Type 1a not Type 1 because of its small variation compared to other Type 1s, i.e its link to S2. |
| | | Add note to HSDCU J26 saying that this is the connector to which the 6 spare SSW bolometer channels would go if they were wired through. They are actually terminated at HSDCU end of S2 with 15K Ω resistors. |
| 4.5 | 26/6/02 | Shutter removed and thus launch latch SVM panel connectors simplified. |
| | | 37 and 78 way connector positions swapped on bias on HSDCU |
| 4.6 | 9/7/02 | Drawing re-arrangement of 28V Power wiring and HSFCU to HSDCU secondary feed cables to better represent recent update of DRCU ICDs. Not a hardware change. |
| | | Sex of JTAG connectors on HSFCU changed...not an external SPIRE I/F. |
| | | Small changes to order of modules in HSFCU |
| | | All connectors on HSFCU mating to cryoharness rotated 180° relative to view of unit face as drawn....SPR-MX-5200 000 C |
| 4.7 | 22/7/22 | Corrected some S-harness tails on to HSFCU placed incorrectly in 4.6 changes |
| 4.8 | 30/9/02 | Change HSFCU J9/10/31/32 to be 25 pin not 15. HSFCU Internal harness. |
| 4.9 | 11/10/02 | Make RF Filter in FPU individual rather than pairs. Thanks Dominique. |
| 5.0 | 19/11/02 | Tidy up DCU, replacing J4 connector outline that disappeared in v4.9, and adding bolometer signal channel module numbers. |
| | | Change label to Herschel Optical Bench so not confused with Spire item. |
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Doc #: SPIRE-RAL-DWG-000646
Issue: 5.0
Date: 19th November 2002
Page 5 of 8

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 |



SPIRE

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Issue: 5.0

Date: 19th November 2002

Page 6 of 8

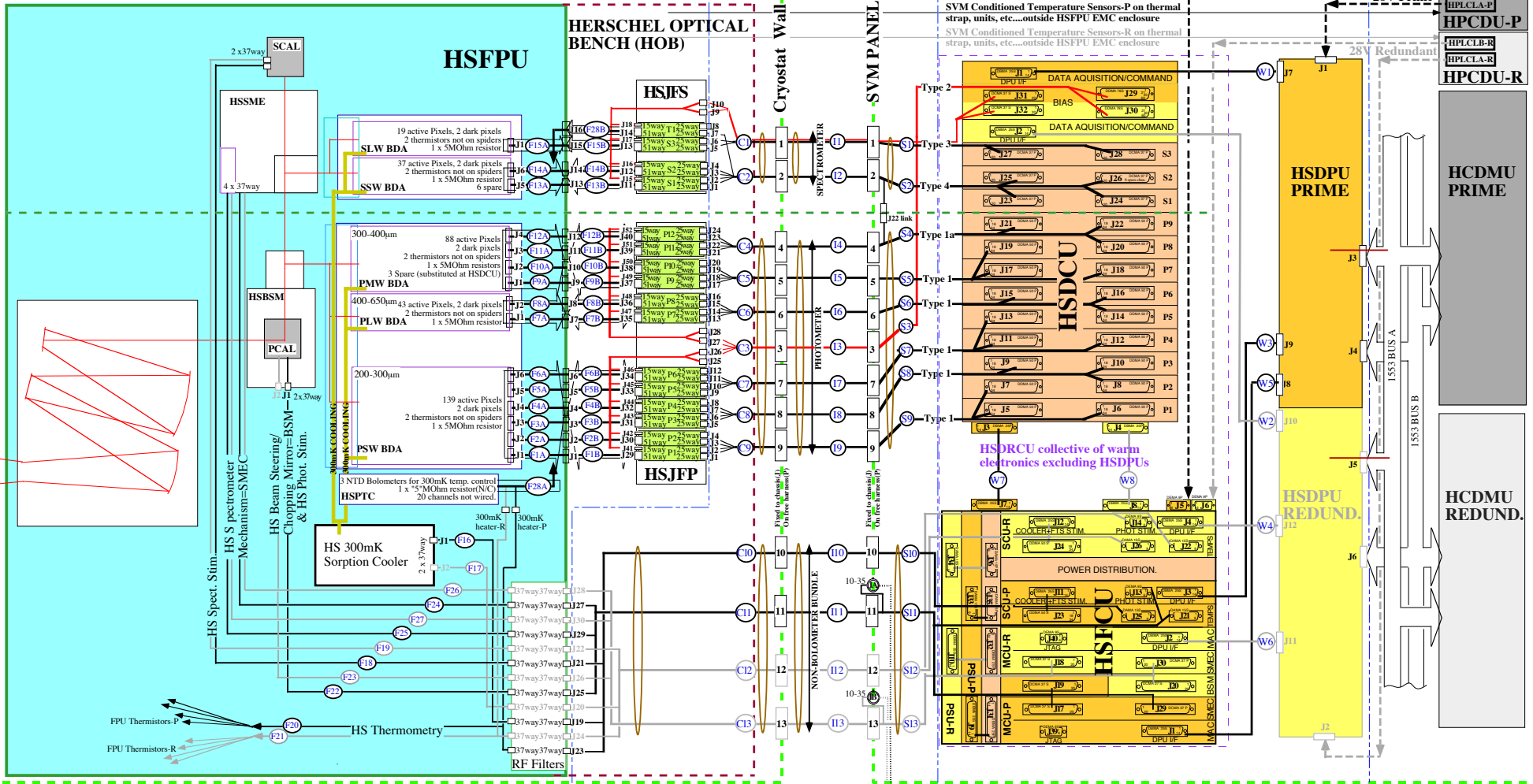
| Term | Meaning |
|-------|---|
| IID-B | Instrument Interface Document - Part B |
| IMF | Initial Mass Function |
| IR | Infrared |
| IRD | Instrument Requirements Document |
| IRTS | Infrared Telescope in Space |
| ISM | Interstellar Medium |
| JFET | Junction Field Effect Transistor |
| ISO | Infrared 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 |

HERSCHEL-SPIRE(HS)

HERSCHEL

HERSCHEL-SPIRE(HS)

HERSCHEL



KEY

- Bundled together, not an electrical screen
- Master clock
- Prime harness
- Redund. harness
- Herschel to Herschel/Spire I/F lines, drawn simplified...I/Fs are all at HS connector planes
- Flight Harness Identity

CAUTION This instrument block diagram shows how SPIRE units relate functionally, it is not a harness specification. The connectors happen to be labelled with the names of the fixed items on the units, not the mating harness parts.

EGSE