



1. Introduction

- During the PFM-2 cryogenic test campaign various thermal qualification/characterisation tests will be carried out on the instrument.
- The QM2 FCU is used to read out the Prime Flight thermistors (though C10 harness)
- Various AC and DC biased Lakeshore units are used to read out the Redundant Flight thermistors (through the C12 harness)
- Some doubt exists as to the absolute accuracy of the measurements derived from the QM2 FCU
- It has been proposed that the Prime and Redundant harnesses (C10/C12) be swapped to cross check the measurements.
 - This operation is to be carried out when the instrument is at the normal cryogenic operating temperature
- This procedure has been written to control the activities during the swap out to minimise any risk to PFM instrument

2. Background

C10 connects to:

FPU J19 – Prime Cooler

FPU J21 – Prime S-Cal

FPU J23 – Prime Thermometry (including the PTC heater elements)

The principal danger to the instrument is due to ESD events during mating/de-mating of the connectors.

The devices connected to C10 are the following:

Cooler: 3 heaters / 5 thermistors

S-Cal: 2 heaters / 3 thermistors

Thermometry: 6 thermistors / 1 heater (1Meg)

Providing that the correct ESD precautions (enumerated below) are followed, these devices are relatively immune to damage from mating procedures.

3. ESD Precautions

- The operation is to be carried out only by RAL personnel that have an up-to-date ESD Control certificate.
- The operator is to wear a wrist strap connected to ground via a discharge resistor at all times when handling or in close proximity to the instrument harnesses
- An air ionizer is to be used to neutralise any charge accumulated on a connector prior to a mate/demate operation

4. Procedure

1. Shut down the DRCU and the DPU according to the standard procedure
2. Switch off the Lakeshore units
3. Un-mate the harness connecting C12 to the lakeshore units
4. Place the un-mated C12 connectors in ESD shielded bags
5. Re-route the C12 harness to the DRCU
6. Un-mate the C10 harness from the DRCU
7. Place the un-mated C10 connectors in ESD shielded bags



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SPIRE Prime/Redundant Thermometry Harness Swap Procedure
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8. Mate the C12 harness to the DCRU (P12 to J11, P24 to J23 and P26 to J25)
9. Re-route C10 harness to the lakeshore units
10. Remove the C10 connectors from the ESD control bag and mate to Lakeshore harness
11. Switch on Lakeshore units
12. Switch on DPU/DRCU as normal
13. Carry out measurements.

To return the instrument in the nominal configuration, the same procedure is carried out with the exception that harness names are swapped in the reverse procedure and P11 is mated to J11 etc.