

Solar B EIS MTM/TTM wiring definition

This document defines the harnessing to be used on the Solar B EIS MTM/TTM.

Contents.

1.0	Harness description.....	page 3
1.1	Vacuum feed-through diagram.....	page 4
2.0	Sensor and internal heater harness layout diagram.....	page 5
2.1	Heater mat location diagram.....	page 5
3.0	Thermocouple locations diagram.....	page 6
4.0	Heater A harness.....	page 7
5.0	Heater B harness.....	page 8
6.0	Thermocouple harness.....	page 9
6.1	Thermocouple harness.....	page 10
7.0	QCM harness.....	page 11
8.0	Adaptor A harness.....	page 12
9.0	Adaptor B harness.....	page 13
10.0	EIS Thermal Balance Test Heaters.....	page 14

1.0

MTM/TTM harness description.

For vibration tests the MTM/TTM is temporarily fitted with accelerometers and microphones (either screwed or glued).

Cables for these sensors exit the structure through the nearest available aperture.

Accelerometer and microphone cables are removed before vacuum tests.

For thermal vacuum tests the MTM/TTM is fitted with heater resistors, heater mats, thermocouples and a quartz crystal monitor (QCM1).

The wires for the internal thermocouples and heaters exit through existing connector apertures.

The last attachment point for the whole thermocouple and heater harness is between the ROE radiator and the connector panel.

In the RAL 5 meter chamber EIS will use the JET-X flange in the chamber wall.

This flange is fitted with four 25 way D types (females inside, males outside).

Connectors VC1 and VC2 on the flange will take the 20 heater lines.

Connector VC3 on the flange will take the QCM wires.

All 37 thermocouples exit the chamber via the dedicated thermocouple flange.

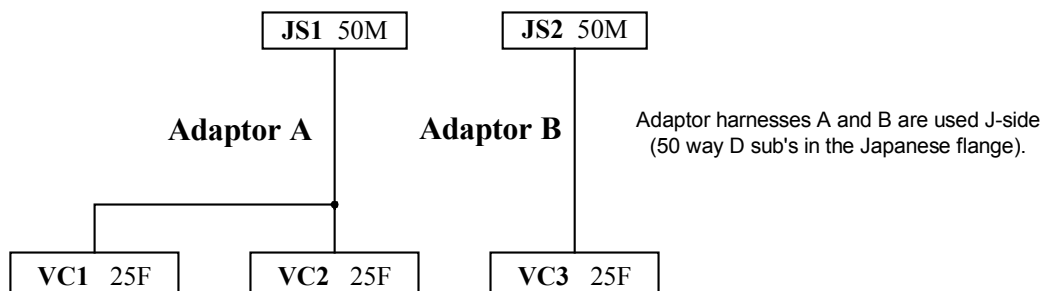
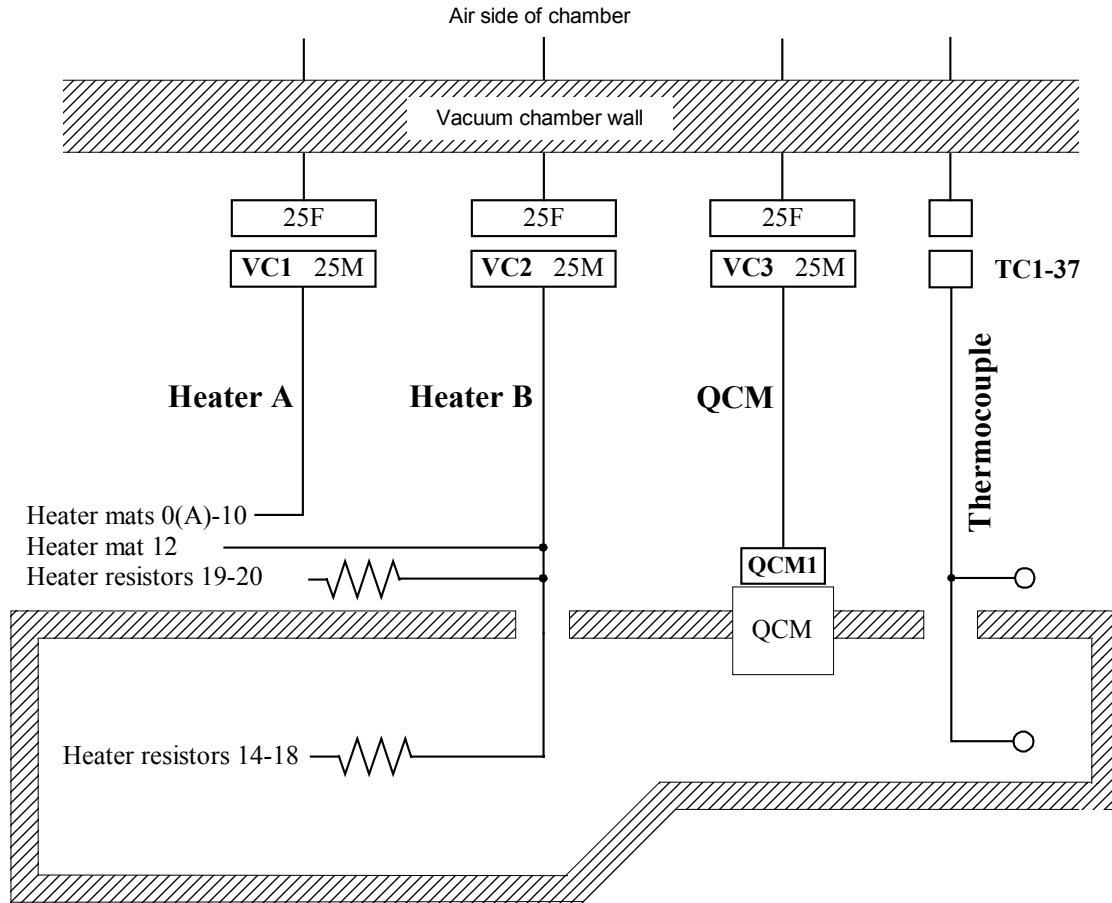
J-side

The Melco chamber in Japan uses 50 way D types. Adaptor cables (A and B) will be supplied for this.

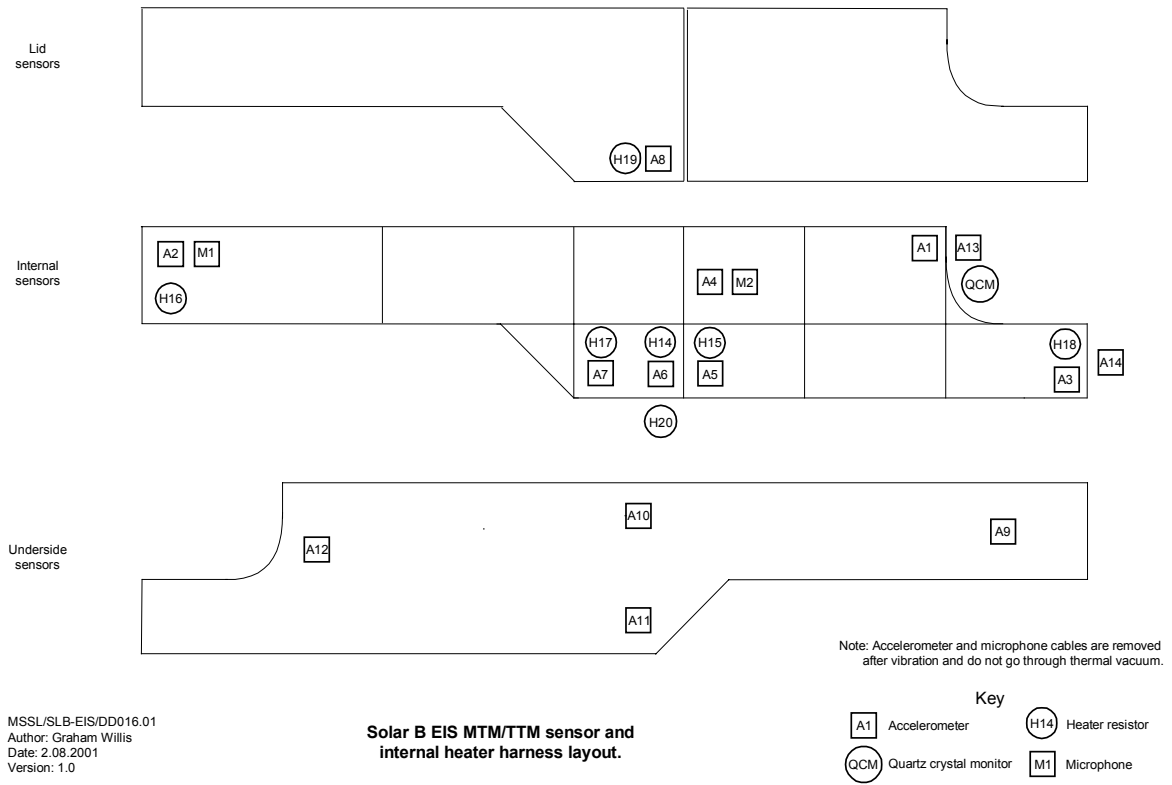
The Melco thermocouple flange is compatible with the MTM/TTM SHX thermocouple connectors.

All the thermocouples will remain fitted to the MTM for the delivery to Japan. Any combination of these thermocouples can be used J-side (agreed as 25).

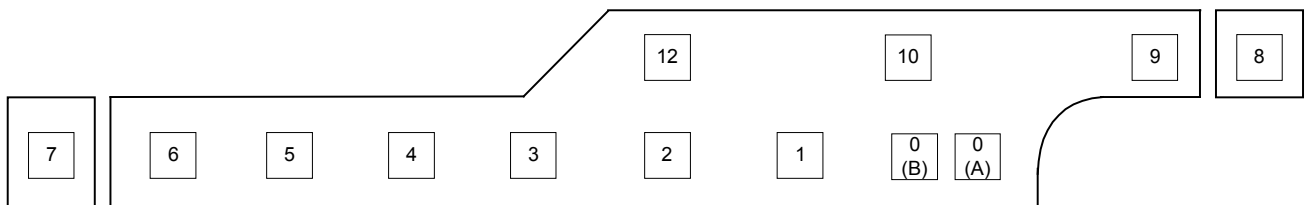
1.1 RAL vacuum feed-through diagram.



2.0 Sensor and internal heater harness layout

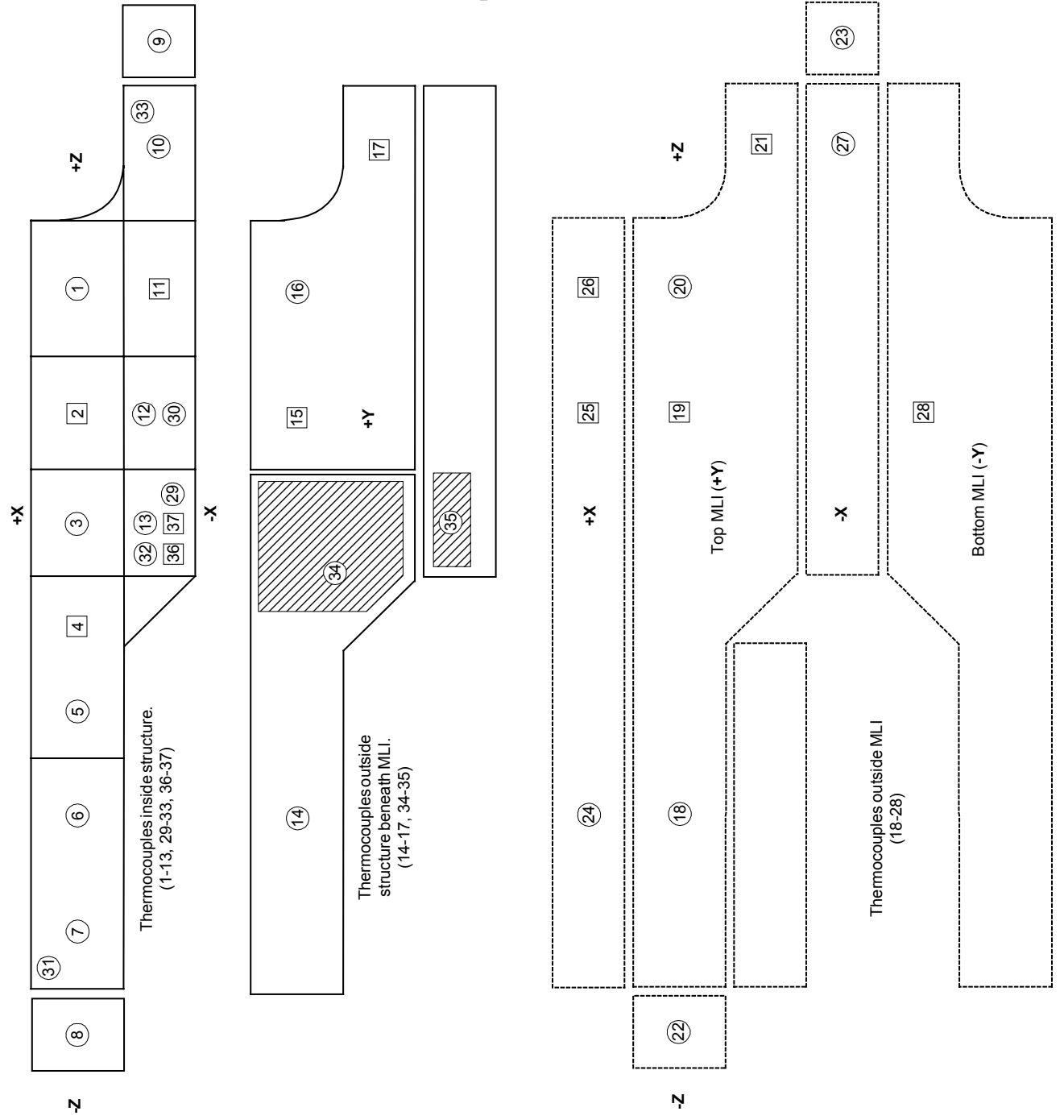


2.1 Heater mat locations



3.0

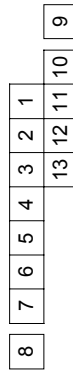
Thermocouple locations



Solar B EIS MTM/TTM thermocouple locations.

MSSL / SLB-EIS / DD015:01
 Author: Graham Willis
 Date: 19.02.2002
 Version: 1.1

Node numbers



Thermocouple locations

- 1-17 Structure
- 18-28 MLI
- 29 ROE
- 30 MHC
- 31 MIR
- 32 CCD (FPA)
- 33 GRAT
- 34 CCD radiator
- 35 ROE radiator
- 36 ROE radiation shield (top)
- 37 ROE radiation shield (btm.)

Key

- ⑦ RAL and J-side thermocouple
- ③⑥ RAL thermocouple only
- MLI
- ▨ Radiator

4.0

Harness name: **Heater A**

Description: Vacuum compatible harness connecting the JET-X flange to the MTM/TTM heater mats.

Connector name: **VC1**

Connector type: 25 way male D type. (Positronic RD25M0000S-S340)

Wire type: 24 awg PTFE insulated.

Harness length:

VC1 Pin no.	Signal name	Destination	Wire size	Notes
1	Heater 0(A) go	Heater mat 0(A)	24 awg	twist 14
2	Heater 0(B) go	Heater mat 0(B)	24 awg	twist 15
3	Heater 1 go	Heater mat 1	24 awg	twist 16
4	Heater 2 go	Heater mat 2	24 awg	twist 17
5	Heater 3 go	Heater mat 3	24 awg	twist 18
6	Heater 4 go	Heater mat 4	24 awg	twist 19
7	Heater 5 go	Heater mat 5	24 awg	twist 20
8	Heater 6 go	Heater mat 6	24 awg	twist 21
9	Heater 7 go	Heater mat 7	24 awg	twist 22
10	Heater 8 go	Heater mat 8	24 awg	twist 23
11	Heater 9 go	Heater mat 9	24 awg	twist 24
12	Heater 10 go	Heater mat 10	24 awg	twist 25
13				
14	Heater 0(A) rtn.	Heater mat 0(A)	24 awg	twist 1
15	Heater 0(A) rtn.	Heater mat 0(A)	24 awg	twist 2
16	Heater 1 rtn.	Heater mat 1	24 awg	twist 3
17	Heater 2 rtn.	Heater mat 2	24 awg	twist 4
18	Heater 3 rtn.	Heater mat 3	24 awg	twist 5
19	Heater 4 rtn.	Heater mat 4	24 awg	twist 6
20	Heater 5 rtn.	Heater mat 5	24 awg	twist 7
21	Heater 6 rtn.	Heater mat 6	24 awg	twist 8
22	Heater 7 rtn.	Heater mat 7	24 awg	twist 9
23	Heater 8 rtn.	Heater mat 8	24 awg	twist 10
24	Heater 9 rtn.	Heater mat 9	24 awg	twist 11
25	Heater 10 rtn.	Heater mat 10	24 awg	twist 12

5.0

Harness name: **Heater B**

Description: Vacuum compatible harness connecting the JET-X flange to MTM/TTM heater mat 13 and the SLA connector..

Connector name: **VC2**

Connector type: 25 way male D type. (Positronic RD25M0000S-S340)

Connector name: **SLA**

Connector type: 37 way male D type. (Positronic RD37M0000S-S340)

Wire type: 24 awg PTFE insulated.

Harness length:

VC2 Pin no.	Signal name	Destination	Wire size	Notes VC2
1				
2	Heater 12 go	Heater mat 12	24 awg	twist 15
3	Heater 14 go (ROE)	Heater resistor 14	24 awg	twist 16
4	Heater 15 go (MHC)	Heater resistor 15	24 awg	twist 17
5	Heater 16 go (MIR)	Heater resistor 16	24 awg	twist 18
6	Heater 17 go (CCD or FPA)	Heater resistor 17	24 awg	twist 19
7	Heater 18 go (GRAT)	Heater resistor 18	24 awg	twist 20
8	Heater 19 go (CCD radiator)	Heater resistor 19	24 awg	twist 21
9	Heater 20 go (ROE radiator)	Heater resistor 20	24 awg	twist 22
10	Heater 10 go remote V sense	Heater mat 10	24 awg	twist 23
11				
12				
13				
14				
15	Heater 12 rtn.	Heater mat 12	24 awg	twist 2
16	Heater 14 rtn. (ROE)	Heater resistor 14	24 awg	twist 3
17	Heater 15 rtn. (MHC)	Heater resistor 15	24 awg	twist 4
18	Heater 16 rtn. (MIR)	Heater resistor 16	24 awg	twist 5
19	Heater 17 rtn. (CCD or FPA)	Heater resistor 17	24 awg	twist 6
20	Heater 18 rtn. (GRAT)	Heater resistor 18	24 awg	twist 7
21	Heater 19 rtn. (CCD radiator)	Heater resistor 19	24 awg	twist 8
22	Heater 20 rtn. (ROE radiator)	Heater resistor 20	24 awg	twist 9
23	Heater 10 rtn. remote V sense	Heater mat 10	24 awg	twist 10
24				
25				

Note: Heaters 11 and 13 do not exist.

Heater 10 is wired for 'remote' voltage sensing at the heater itself and not at the rheostat. This allows for a good estimate of the voltage lost in the cable and therefore an accurate figure for the actual heater power.

6.0

Harness name: **Thermocouple**
 Description: Vacuum compatible harness connecting 37 thermocouples from the internal thermocouple flange to the MTM/TTM
 Connector names: **TC1-TC22**
 Connector type: Omega SHX-M-(T)
 Wire type: Teflon insulated 0.2mm solid core T type thermocouple wire.
 Harness length:

	Pin no.	Signal name	Destination	Temp. measured when fitted (°C)*	Notes
TC1	1	Thermocouple 1 +	Thermocouple 1	21.1	
	2	Thermocouple 1 -	Thermocouple 1		
TC2	1	Thermocouple 2 +	Thermocouple 2	Not working	White wire broken New thermocouple fitted
	2	Thermocouple 2 -	Thermocouple 2		
TC3	1	Thermocouple 3 +	Thermocouple 3	20.9	
	2	Thermocouple 3 -	Thermocouple 3		
TC4	1	Thermocouple 4 +	Thermocouple 4	20.8	
	2	Thermocouple 4 -	Thermocouple 4		
TC5	1	Thermocouple 5 +	Thermocouple 5	21.8	
	2	Thermocouple 5 -	Thermocouple 5		
TC6	1	Thermocouple 6 +	Thermocouple 6	21.4	
	2	Thermocouple 6 -	Thermocouple 6		
TC7	1	Thermocouple 7 +	Thermocouple 7	Not working	Brown wire broken New thermocouple fitted
	2	Thermocouple 7 -	Thermocouple 7		
TC8	1	Thermocouple 8 +	Thermocouple 8	21.2	
	2	Thermocouple 8 -	Thermocouple 8		
TC9	1	Thermocouple 9 +	Thermocouple 9	Not working	White wire broken New thermocouple fitted
	2	Thermocouple 9 -	Thermocouple 9		
TC10	1	Thermocouple 10 +	Thermocouple 10	21.4	
	2	Thermocouple 10 -	Thermocouple 10		
TC11	1	Thermocouple 11 +	Thermocouple 11	21.4	
	2	Thermocouple 11 -	Thermocouple 11		
TC12	1	Thermocouple 12 +	Thermocouple 12	21.3	
	2	Thermocouple 12 -	Thermocouple 12		
TC13	1	Thermocouple 13 +	Thermocouple 13	21.4	
	2	Thermocouple 13 -	Thermocouple 13		
TC14	1	Thermocouple 14 +	Thermocouple 14	21.7	
	2	Thermocouple 14 -	Thermocouple 14		
TC15	1	Thermocouple 15 +	Thermocouple 15	21.6	
	2	Thermocouple 15 -	Thermocouple 15		
TC16	1	Thermocouple 16 +	Thermocouple 16	21.7	
	2	Thermocouple 16 -	Thermocouple 16		
TC17	1	Thermocouple 17 +	Thermocouple 17	21.7	
	2	Thermocouple 17 -	Thermocouple 17		
TC18	1	Thermocouple 18 +	Thermocouple 18		
	2	Thermocouple 18 -	Thermocouple 18		
TC19	1	Thermocouple 19 +	Thermocouple 19		
	2	Thermocouple 19 -	Thermocouple 19		
TC20	1	Thermocouple 20 +	Thermocouple 20		
	2	Thermocouple 20 -	Thermocouple 20		
TC21	1	Thermocouple 21 +	Thermocouple 21		
	2	Thermocouple 21 -	Thermocouple 21		
TC22	1	Thermocouple 22 +	Thermocouple 22		
	2	Thermocouple 22 -	Thermocouple 22		

* Temperature readings taken in the RAL clean room over a two hour period 18.2.2002

6.1

Harness name: **Thermocouple** (continued)

Description: Vacuum compatible harness connecting 37 thermocouples from the internal thermocouple flange to the MTM/TTM

Connector names: **TC23-TC37**

Connector type: Omega SHX-M-(T)

Wire type: Teflon insulated 0.2mm solid core T type thermocouple wire.

Harness length:

	Pin no.	Signal name	Destination	Temp. measured when fitted (°C)*	Notes
TC 23	1	Thermocouple 23 +	Thermocouple 23		
	2	Thermocouple 23 -	Thermocouple 23		
TC24	1	Thermocouple 24 +	Thermocouple 24		
	2	Thermocouple 24 -	Thermocouple 24		
TC25	1	Thermocouple 25 +	Thermocouple 25		
	2	Thermocouple 25 -	Thermocouple 25		
TC 26	1	Thermocouple 26 +	Thermocouple 26		
	2	Thermocouple 26 -	Thermocouple 26		
TC27	1	Thermocouple 27 +	Thermocouple 27		
	2	Thermocouple 27 -	Thermocouple 27		
TC 28	1	Thermocouple 28 +	Thermocouple 28		
	2	Thermocouple 28 -	Thermocouple 28		
TC 29	1	Thermocouple 29 +	Thermocouple 29	21.1	
	2	Thermocouple 29 -	Thermocouple 29		
TC 30	1	Thermocouple 30 +	Thermocouple 30	21.1	
	2	Thermocouple 30 -	Thermocouple 30		
TC 31	1	Thermocouple 31 +	Thermocouple 31	21.2	
	2	Thermocouple 31 -	Thermocouple 31		
TC 32	1	Thermocouple 32 +	Thermocouple 32	21.5	
	2	Thermocouple 32 -	Thermocouple 32		
TC 33	1	Thermocouple 33 +	Thermocouple 33	21.3	
	2	Thermocouple 33 -	Thermocouple 33		
TC 34	1	Thermocouple 34 +	Thermocouple 34	20.8	
	2	Thermocouple 34 -	Thermocouple 34		
TC 35	1	Thermocouple 35 +	Thermocouple 35	21.4	
	2	Thermocouple 35 -	Thermocouple 35		
TC 36	1	Thermocouple 36 +	Thermocouple 36	21.6	
	2	Thermocouple 36 -	Thermocouple 36		
TC 37	1	Thermocouple 37 +	Thermocouple 37	21.5	
	2	Thermocouple 37 -	Thermocouple 37		

- Temperature readings taken in the RAL clean room over a two hour period 18.2.2002

After thermal tests at RAL the following two thermocouples were added.

New thermocouple added to Clamshell dummy mass. This thermocouple exits the MTM via the SLA connector aperture (small coil of thermocouple wire identified by a single knot of lacing cord).

New thermocouple added to CCD dummy mass. This thermocouple exits the MTM via the SLA connector aperture, (large coil of thermocouple wire identified by two knots of lacing cord).

7.0

Harness name: **QCM**

Description: Vacuum compatible harness connecting the JET-X flange to the MTM/TTM QCM1.

Connector name: **VC3**

Connector type: 25 way male D type. (Positronic RD25M0000S-S340)

Connector name: **QCM1**

Connector type: Bendix JT06RE-10-13S (001).

Wire type: 24 awg PTFE insulated.

Harness length:

VC3 Pin no.	Signal name	QCM1 Pin no.	Wire size	Notes
1				
2	Output freq.	2	24 awg	
3	RTD high	3	24 awg	
4	RTD low	4	24 awg	
5	Power and signal ground	5	24 awg	
6	Power	6	24 awg	
7	Sensor heater	7	24 awg	
8	Heater return	8	24 awg	
9				
10				
11				
12	Sensor heater	12	24 awg	
13	Heater return	13	24 awg	
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

8.0

Harness name: **Adaptor A**

Description: Vacuum compatible harness connecting Heater A (25M) and Heater B (25M) to the 50 way D type (M/F?) feed through in the ISAS Space Chamber.

Connector name: **J side 1 (JS1)**

Connector type: 50 way M/F? D type. (model no.)

Connector name: **VC1 (Heater A)**

Connector type: 25 way D type female (model no.)

Connector name: **VC2 (Heater B)]**

Connector type: 25 way D type female (model no.)

Wire type: 24 awg PTFE insulated.

Harness length:

JS1 Pin no.	Signal name	Destination	Wire size	Notes JS1
1	Heater 0(A) go	VC1 pin 1	24 awg	twist 2
2	Heater 0(A) ret.	VC1 pin 14	24 awg	twist 1
3	Heater 0(B) go	VC1 pin 2	24 awg	twist 4
4	Heater 0(B) ret.	VC1 pin 15	24 awg	twist 3
5	Heater 1 go	VC1 pin 3	24 awg	twist 6
6	Heater 1 ret.	VC1 pin 16	24 awg	twist 5
7	Heater 2 go	VC1 pin 4	24 awg	twist 8
8	Heater 2 ret.	VC1 pin 17	24 awg	twist 7
9	Heater 3 go	VC1 pin 5	24 awg	twist 10
10	Heater 3 ret.	VC1 pin 18	24 awg	twist 9
11	Heater 4 go	VC1 pin 6	24 awg	twist 12
12	Heater 4 ret.	VC1 pin 19	24 awg	twist 11
13	Heater 5 go	VC1 pin 7	24 awg	twist 14
14	Heater 5 ret.	VC1 pin 20	24 awg	twist 13
15	Heater 6 go	VC1 pin 8	24 awg	twist 16
16	Heater 6 ret.	VC1 pin 21	24 awg	twist 15
17				
18	Heater 7 go	VC1 pin 9	24 awg	twist 19
19	Heater 7 ret.	VC1 pin 22	24 awg	twist 18
20	Heater 8 go	VC1 pin 10	24 awg	twist 21
21	Heater 8 ret.	VC1 pin 23	24 awg	twist 20
22	Heater 9 go	VC1 pin 11	24 awg	twist 23
23	Heater 9 ret.	VC1 pin 24	24 awg	twist 22
24	Heater 10 go	VC1 pin 12	24 awg	twist 25
25	Heater 10 ret.	VC1 pin 25	24 awg	twist 24
26	Heater 10 + remote voltage sense	VC2 pin 10	24 awg	twist 27
27	Heater 10 - remote voltage sense	VC2 pin 23	24 awg	twist 26
28	Heater 12 go	VC2 pin 2	24 awg	twist 29
29	Heater 12 ret.	VC2 pin 15	24 awg	twist 28
30	Heater 14 go	VC2 pin 3	24 awg	twist 31
31	Heater 14 ret.	VC2 pin 16	24 awg	twist 30
32	Heater 15 go	VC2 pin 4	24 awg	twist 33
33	Heater 15 ret.	VC2 pin 17	24 awg	twist 32
34	Heater 16 go	VC2 pin 5	24 awg	twist 35
35	Heater 16 ret.	VC2 pin 18	24 awg	twist 34
36	Heater 17 go	VC2 pin 6	24 awg	twist 37
37	Heater 17 ret.	VC2 pin 19	24 awg	twist 36
38	Heater 18 go	VC2 pin 7	24 awg	twist 39
39	Heater 18 ret.	VC2 pin 20	24 awg	twist 38
40	Heater 19 go	VC2 pin 8	24 awg	twist 41
41	Heater 19 ret.	VC2 pin 21	24 awg	twist 40
42	Heater 20 go	VC2 pin 9	24 awg	twist 43
43	Heater 20 ret.	VC2 pin 22	24 awg	twist 42
44				
45				
46				
47				
48				
49				
50				

9.0

Harness name: **Adaptor B**

Description: Vacuum compatible harness connecting VC3 (25M) to the 50 way D type (M/F?) feed through in the ISAS Space Chamber.

Connector name: **J side 2 (JS2)**

Connector type: 50 way M/F? D type. (model no.)

Connector name: **VC3 (QCM1)**

Connector type: 25 way D type female (model no.)

Wire type: 24 awg PTFE insulated.

Harness length:

JS2 Pin no.	Signal name	Destination VC3	Wire size	Notes
1				
2	Output freq.	2	24 awg	
3	RTD high	3	24 awg	
4	RTD low	4	24 awg	
5	Power and signal ground	5	24 awg	
6	Power	6	24 awg	
7	Sensor heater	7	24 awg	
8	Heater return	8	24 awg	
9				
10				
11				
12	Sensor heater	12	24 awg	
13	Heater return	13	24 awg	
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				

10.0 EIS Thermal Balance Test Heaters

Heater Number	Thermal Node	Max. Power (W)	Resistance (Ohms)	Equivalent Sensor	Heater Type	Heater Position Description (bt=between, P=Panel)
0 (A & B)	6032	6 W	106	1	2 x Mats	P1, bt P2, P12A0, P13, P9
1	6011	4 W	106	2	Heater Mat	P1, bt P2, P13, P14, P10
2	6009	4 W	106	3	Heater Mat	P1, bt P2, P14, P15, P11
3	6050	4 W	106	4	Heater Mat	P1, bt P2, P15, P16, P3
4	6049	4 W	106	5	Heater Mat	P1, bt P2, P15, P16, P3
5	6048	4 W	106	6	Heater Mat	P1, bt P2, P16, P7, P3
6	6047	4 W	106	7	Heater Mat	P1, bt P2, P16, P7, P3
7	6059	4 W	106	8	Heater Mat	P7 centre
8	6028	4 W	106	9	Heater Mat	P8 centre
9	6025	4 W	106	10	Heater Mat	P1, bt P9, P8, P12C0, P4
10	6024	4 W	106	11	Heater Mat	P1, bt P9, P12C0, P13, P4
11	6012			12		P1, bt P10, P13, P14, P4
12	6010	4 W	106	13	Heater Mat	P1, bt P11, P14, P15, P4
14	6079	6.6 W	100	29	Resistor	ROE
15	6065	4.5 W	150	30	Resistor	MHC
16	6063	4.5 W	150	31	Resistor	Mirror
17	6070	4 W	150	32	Resistor	CCD or FPA
18	6064	6.5 W	100	33	Resistor	Grating
19	6075	16 W	68	34	Resistor	CCD Radiator
20	6076	4 W	150	35	Resistor	ROE Radiator

Table taken from:

EIS MTM/TTM THERMAL BALANCE TEST SPECIFICATION, PROCEDURES AND PREDICTIONS

Document No. BU/SLB-EIS/TN/020.02

Compiled by H. Mapson-Menard and C. V. Goodall

Change record:

Heater 0 changed to 0 (A & B).

Heater 11 removed.

Heater resistors 13-19 re-numbered 14-20 (ROE – ROE radiator)