

# Solar B – EIS

**MULLARD SPACE SCIENCE LABORATORY**

**UNIVERSITY COLLEGE LONDON**

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## FM ICU Backplane Definition

**Document Number: MSSL/SLB-EIS/DD011.05**

**Distribution:**

EIS Science		
EIS Tech		

Author:		Date:	
Authorised By		Date:	
Distributed:		Date:	

## CHANGE RECORD

ISSUE	DATE	PAGES CHANGED	COMMENTS
01	1 February 2001	All new	
02	30 March 2001	All	major update
03	27 August 2002	8.2/p4	See ECR 13 – GND labels changed
04	22 February 2003	4.3/p1 & p9	Up issue for FM release
05	9 July 2003	i, p1	Updated front page, drawing numbers

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## 1 Schematics

Drawing Number:

5275/008

Issue 1

Hierarchical list of sheets:

PM\_BKP1v1.1

20/02/2001

Mechanical Drawing:

Instrument Control Unit Backplane PCB

A2/5275/303-12 Issue 4

## 2 PCB Manufacturing and Board Assembly and Parts List

Drawing Number:

5275/008-5 drill plot

Issue 1

5275/008-6 assembly drawing and parts list

Issue 4

X-1636-001 PCB

Issue 1

## 3 Bill of Materials

Generated from Viewlogic design for PM\_BKP1v1:

PM\_BKP.LST

11/0231/2001

**Note** - see separate attached sheet.

## 4 Construction Operations

### 4.1 Hypertac Key Positions

Hypertac key positions are:

P0,P1 6F (29-way Hypertac connectors)

P2,P3,P4,P5,P6,P7 3C (98-way Hypertac connectors)

### 4.2 Select on Test Items

none.

### 4.3 Modifications

Do not fit Hypertac connectors P8 and P9.

Do not fit any test points.

#### 4.3.1 Add Wires

none.

#### 4.3.2 Track Cuts

none.

## 5 Updated Schematic

none

## 6 Layout Instructions

### 6.1 Input to Mentor

Files are generated from a Viewlogic conversion utility to mentor format.

Filename & path	Description
~\Designs\Solar-B\PM_ICU\sch \PM_BKP1v1.1	Viewlogic PM_ICU Backplane design directory
~\Apps\WV7.53\STANDARD\mentor.cfg	Viewlogic netlister configuration control file for Mentor system
~\Designs\Solar-B\PM_ICU \men_PM_BKP1v1\comps_file.cmps	Viewlogic component packages file
~\Designs\Solar-B\PM_ICU \men_PM_BKP1v1\nets_file.net	Viewlogic design netlist file

### 6.2 Notes

1. ICU+5V is the main 5V power plane.
2. ICU\_GND is the main ground plane.
3. Run ICU\_GND signal track on either side of CLK20MHz and CLK125K.

### 6.3 Feedback from Mentor

None

## 7 Layout Changes

none.

## 8 ICU Backplane Connections

### 8.1 Backplane Bus Connections

Pin Name	Pin Function	Slot 0 PSU-0	Slot 1 Mon	Slot 2 CM_Ctl	Slot 3 SC_PROC	Slot 4 PSU-1
PMA [23:21][4:0]	Program Memory Address	not used	•	•	•	not used
PMD [31:16]	Program Memory Data	not used	•	•	•	not used
PMS 1*	Program Memory Select	not used	•	•	•	not used
PMRD*	Program Memory Read Strobe	not used	•	•	•	not used
PMWR*	Program Memory Write Strobe	not used	•	•	•	not used
PMACK	Program Memory Acknowledge	not used	not used	•	•	not used
PMPAGE	Program Memory Page Boundary	not used	not used	not used	not used	not used
PMTS*	Program Memory Three-State Control	not used	not used	not used	not used	not used
PMWR_STB*	3-Wait-State PM WR Strobe	not used	•	•	•	not used
DMA [23:0]	Data Memory Address	not used	not used	•	•	not used
DMD [23:8]	Data Memory Data	not used	not used	•	•	not used
DMS 1,3*	Data Memory Select	not used	not used	•	•	not used
DMRD*	Data Memory Read Strobe	not used	not used	•	•	not used
DMWR*	Data Memory Write Strobe	not used	not used	•	•	not used
DMACK	Data Memory Acknowledge	not used	not used	•	•	not used
DMPAGE	Data Memory Page Boundary	not used	not used	not used	not used	not used
DMTS*	Data Memory Three-State Control	not used	not used	•	•	not used
DMWR_STB*	3-Wait-State DM WR Strobe	not used	•	•	•	not used
CLK20MHz	20MHz Clock Signal	not used	not used	•	•	not used
TIMEXP	Timer Expired	not used	not used	•	•	not used
CLK125k	125kHz Clock Signal	not used	•	•	•	•
RESET*	Power-ON/Watchdog RESET	•	•	•	•	•
RCOMP	Compensation Resistor 1k8//100pF to EVDD	not used	not used	not used	on pcb	not used
TCK	Test Clock - JTAG	not used	not used	not used	on pcb	not used
TMS	Test Mode Select- JTAG	not used	not used	not used	on pcb	not used
TDI	Test Data Input- JTAG	not used	not used	not used	on pcb	not used
TDO	Test Data Output- JTAG	not used	not used	not used	on pcb	not used
TRST*	Test Reset- JTAG	not used	not used	not used	on pcb	not used
IRQ 3-1*	Interrupt Request Lines	not used	not used	•	•	not used
FLAG 3-0*	External Flag I/O	not used	•	•	•	•
BR*	Bus Request	not used	not used	not used	not used	not used
BG*	Bus Grant	not used	not used	not used	not used	not used
ICU+5V	Power Supply to ICU	•	•	•	•	•
ICU+2V5	Power Supply to ICU	•	•	•	•	not used
ICU_GND	ICU Power Supply Return	•	•	•	•	•
ICU+15V	Power Supply to ICU	•	•	not used	not used	not used
ICU-15V	Power Supply to ICU	•	•	not used	not used	not used
CAM+15V	Power Supply to Structure	•	•	not used	not used	not used
CAM-12V	Power Supply to Structure	•	•	not used	not used	not used
CAM+7V	Power Supply to Structure	•	•	not used	not used	not used
CAM-7V	Power Supply to Structure	•	•	not used	not used	not used
CAMxV_GND	Structure Power Supply Return	•	•	not used	not used	not used
SC+28V	Space Craft Main Power	•	•	not used	not used	not used
SC+28V_COM	Space Craft Main Power Return	•	•	not used	not used	not used
MIxV	Monitor Current sense line	•	•	not used	not used	not used
MI_GND	Monitor Line Return	•	•	not used	not used	not used
V_FAIL	ICU Voltage Monitor Line	•	•	not used	•	not used
TEMPx	CPU Temperature Sensor Line	not used	•	•	•	not used
SENSORx_GO	SpaceCraft Temperature Sensor	•	•	not used	not used	not used
SENSORx_RTN	SpaceCraft Temperature Sensor Return Line	•	•	not used	not used	not used

## 8.2 PSU-0 Card – Slot 0

### Old Version

Connector P1 – Hypertac HPD029UFXE0070			
29	ICU+5V	28	ICU+5V
27	ICU+5V	26	ICU+5V
25	ICU+5V	24	ICU+5V
23	spare	22	spare
21	ICU_GND	20	ICU_GND
19	ICU_GND	18	ICU+2V5
17	ICU_GND	16	ICU+2V5
15	ICU_GND	14	ICU_GND
13	SENSOR8_GO	12	spare
11	SENSOR8_RTN	10	spare
9	SENSOR9_Go	8	spare
7	SENSOR9_RTN	6	spare
5	ICU_GND	4	ICU_GND
3	ICU_GND	2	ICU_GND
1	ICU_GND		

Connector P2 – Hypertac HPD029UFXE0070			
29	V_FAIL	28	RESET*
27	ICU_GND	26	ICU_GND
25	spare	24	spare
23	spare	22	CAM+15V
21	ICU+15V	20	CAM+15V_GND
19	ICU-15V	18	CAM-12V
17	ICU_GND	16	CAM-12V_GND
15	MI+2V5	14	CAM+7V
13	MI+5V	12	CAM+7V_GND
11	MI-12V	10	CAM-7V
9	MI+15V	8	CAM-7V_GND
7	MI_GND	6	nc
5	nc	4	SC+28V
3	SC+28V_COM	2	SC+28V
1	SC+28V_COM		

### New Version

Connector P1 – Hypertac HPD029UFXE0070			
29	ICU+5V	28	ICU+5V
27	ICU+5V	26	ICU+5V
25	ICU+5V	24	ICU+5V
23	spare	22	spare
21	ICU_GND	20	ICU_GND
19	ICU_GND	18	ICU+2V5
17	ICU_GND	16	ICU+2V5
15	ICU_GND	14	ICU_GND
13	SENSOR8_GO	12	spare
11	SENSOR8_RTN	10	spare
9	SENSOR9_Go	8	spare
7	SENSOR9_RTN	6	spare
5	ICU_GND	4	ICU_GND
3	ICU_GND	2	ICU_GND
1	ICU_GND		

Connector P2 – Hypertac HPD029UFXE0070			
29	V_FAIL	28	RESET*
27	ICU_GND	26	ICU_GND
25	spare	24	Spare
23	spare	22	CAM+13V
21	ICU+15V	20	GND_D (+13V RTN)
19	ICU-15V	18	CAM+8V
17	ICU_GND	16	GND_C (+8V,-8V,+39V RTN)
15	MI+2V5	14	CAM+7V
13	MI+5V	12	GND_B (+7V RTN)
11	MI-15V	10	CAM-8V
9	MI+15V	8	CAM+39V
7	MI_GND	6	Nc
5	nc	4	SC+28V
3	SC+28V_COM	2	SC+28V
1	SC+28V_COM		

All ICU\_GND pins form a common return (Ground A) for ICU+5V, ICU+2V5, ICU+15V & ICU-15V

Note: this is a change to the document only. The netlist has been generated from the “old version”. The new GND\_x names for the backplane only appear in this document.

**MON Card – Slot 1**

<b>Connector P1 – Hypertac HPF098UFXE0070</b>					
97	ICU+5V	95	ICU+5V	98	ICU+5V
94	ICU+5V	92	ICU+5V	96	ICU+5V
91	ICU_GND	89	ICU_GND	93	ICU_GND
88	ICU_GND	86	ICU+2V5	90	ICU+2V5
85	ICU+2V5	83	ICU_GND	87	PMD16
82	ICU_GND	80	ICU_GND	84	PMD17
79	PMWR*	77	ICU_GND	81	PMD18
76	spare	74	ICU_GND	78	PMD19
73	PMRD*	71	ICU_GND	75	PMD20
70	n0	68	ICU_GND	72	PMD21
67	n1	65	ICU_GND	69	PMD22
64	n2	62	ICU_GND	66	PMD23
61	n3	59	ICU_GND	63	ICU_GND
58	n4	56	ICU_GND	60	PMD24
55	n5	53	ICU_GND	57	PMD25
52	n6	50	ICU_GND	54	PMD26
49	ICU_GND	47	ICU_GND	51	PMD27
46	ICU_GND	44	ICU_GND	48	PMD28
43	PMA23	41	ICU_GND	45	PMD29
40	PMA22	38	ICU_GND	42	PMD30
37	PMA21	35	ICU_GND	39	PMD31
34	ICU_GND	32	ICU_GND	36	ICU_GND
31	spare	29	ICU_GND	33	ICU_GND
28	ICU_GND	26	ICU_GND	30	ICU_GND
25	spare	23	ICU_GND	27	PMA4
22	spare	20	ICU_GND	24	PMA3
19	spare	17	ICU_GND	21	PMA2
16	ICU_GND	14	ICU_GND	18	PMA1
13	PMS1*	11	ICU_GND	15	PMA0
10	spare	8	ICU_GND	12	ICU_GND
7	PMWR STB*	5	ICU_GND	9	DMWR STB*
4	ICU_GND	2	TEMP0_GO	6	ICU_GND
1	TEMP0_RTN		-	3	CLK125K

<b>Connector P2 – Hypertac HPF098UFXE0070</b>					
97	spare	95	ICU_GND	98	spare
94	spare	92	ICU_GND	96	spare
91	spare	89	ICU_GND	93	spare
88	spare	86	ICU_GND	90	FLAG3
85	spare	83	ICU_GND	87	FLAG2
82	spare	80	ICU_GND	84	FLAG1
79	spare	77	ICU_GND	81	FLAG0
76	spare	74	ICU_GND	78	spare
73	spare	71	ICU_GND	75	spare
70	spare	68	ICU_GND	72	spare
67	spare	65	ICU_GND	69	spare
64	spare	62	ICU_GND	66	spare
61	spare	59	ICU_GND	63	spare
58	spare	56	ICU_GND	60	spare
55	spare	53	ICU_GND	57	spare
52	spare	50	ICU_GND	54	spare
49	spare	47	ICU_GND	51	spare
46	spare	44	ICU_GND	48	spare
43	spare	41	ICU_GND	45	spare
40	spare	38	ICU_GND	42	spare
37	spare	35	ICU_GND	39	spare
34	spare	32	RESET*	36	spare
31	spare	29	V_FAIL*	33	spare
28	spare	26	spare	30	spare
25	ICU+15V	23	ICU-15V	27	spare
22	CAM+15V	20	CAM+15V_GND	24	MI+2V5
19	CAM-12V	17	CAM-12V_GND	21	MI+5V
16	CAM+7V	14	CAM+7V_GND	18	MI-12V
13	CAM-7V	11	CAM-7V_GND	15	MI+15V
10	nc	8	nc	12	MI_GND
7	nc	5	SC+28V	9	nc
4	SC+28V	2	SC+28V_COM	6	SC+28V
1	SC+28V_COM		-	3	SC+28V_COM

### 8.3 CM\_Ctl Card – Slot 2

Connector P1 – Hypertac HPF098UFXE0070					
97	ICU+5V	95	ICU+5V	98	ICU+5V
94	ICU+5V	92	ICU+5V	96	ICU+5V
91	ICU_GND	89	ICU_GND	93	ICU_GND
88	ICU_GND	86	ICU+2V5	90	ICU+2V5
85	ICU+2V5	83	ICU_GND	87	PMD16
82	spare	80	ICU_GND	84	PMD17
79	PMWR*	77	ICU_GND	81	PMD18
76	PMACK	74	ICU_GND	78	PMD19
73	PMRD*	71	ICU_GND	75	PMD20
70	n0	68	ICU_GND	72	PMD21
67	n1	65	ICU_GND	69	PMD22
64	n2	62	ICU_GND	66	PMD23
61	n3	59	ICU_GND	63	ICU_GND
58	n4	56	ICU_GND	60	PMD24
55	n5	53	ICU_GND	57	PMD25
52	n6	50	ICU_GND	54	PMD26
49	ICU_GND	47	ICU_GND	51	PMD27
46	ICU_GND	44	ICU_GND	48	PMD28
43	PMA23	41	ICU_GND	45	PMD29
40	PMA22	38	ICU_GND	42	PMD30
37	PMA21	35	ICU_GND	39	PMD31
34	ICU_GND	32	ICU_GND	36	ICU_GND
31	CLK20MHZ	29	ICU_GND	33	ICU_GND
28	ICU_GND	26	ICU_GND	30	ICU_GND
25	DMRD*	23	ICU_GND	27	PMA4
22	DMACK	20	ICU_GND	24	PMA3
19	DMWR*	17	ICU_GND	21	PMA2
16	ICU_GND	14	ICU_GND	18	PMA1
13	PMS1*	11	ICU_GND	15	PMA0
10	TIMEXP	8	ICU_GND	12	ICU_GND
7	PMWR_STB*	5	ICU_GND	9	DMWR_STB*
4	ICU_GND	2	TEMP0_GO	6	ICU_GND
1	TEMP0_RTN		-	3	CLK125K

Connector P2 – Hypertac HPF098UFXE0070					
97	DMA0	95	ICU_GND	98	IRQ1*
94	DMA1	92	ICU_GND	96	IRQ0*
91	DMA2	89	ICU_GND	93	FLAG3
88	DMA3	86	ICU_GND	90	FLAG2
85	DMA4	83	ICU_GND	87	FLAG1
82	DMA5	80	ICU_GND	84	FLAG0
79	DMA6	77	ICU_GND	81	DMD23
76	DMA7	74	ICU_GND	78	DMD22
73	DMA8	71	ICU_GND	75	DMD21
70	DMA9	68	ICU_GND	72	DMD20
67	DMA10	65	ICU_GND	69	DMD19
64	DMA11	62	ICU_GND	66	DMD18
61	DMA12	59	ICU_GND	63	DMD17
58	DMA13	56	ICU_GND	60	DMD16
55	DMA14	53	ICU_GND	57	DMS1*
52	DMA15	50	ICU_GND	54	DMS0*
49	DMA16	47	ICU_GND	51	DMD15
46	DMA17	44	ICU_GND	48	DMD14
43	DMA18	41	ICU_GND	45	DMD13
40	DMA19	38	ICU_GND	42	DMD12
37	DMA20	35	ICU_GND	39	DMD11
34	DMA21	32	RESET*	36	DMD10
31	DMA22	29	V_FAIL*	33	DMD9
28	DMA23	26	spare	30	DMD8
25	spare	23	spare	27	spare
22	spare	20	spare	24	spare
19	spare	17	spare	21	spare
16	spare	14	spare	18	spare
13	spare	11	spare	15	spare
10	nc	8	nc	12	spare
7	nc	5	nc	9	nc
4	nc	2	nc	6	nc
1	nc		-	3	



### 8.4 SC\_PROC Card – Slot 3

Connector P1 – Hypertac HPF098UFXE0070					
97	ICU+5V	95	ICU+5V	98	ICU+5V
94	ICU+5V	92	ICU+5V	96	ICU+5V
91	ICU_GND	89	ICU_GND	93	ICU_GND
88	ICU_GND	86	ICU+2V5	90	ICU+2V5
85	ICU+2V5	83	ICU_GND	87	PMD16
82	spare	80	ICU_GND	84	PMD17
79	PMWR*	77	ICU_GND	81	PMD18
76	PMACK	74	ICU_GND	78	PMD19
73	PMRD*	71	ICU_GND	75	PMD20
70	n0	68	ICU_GND	72	PMD21
67	n1	65	ICU_GND	69	PMD22
64	n2	62	ICU_GND	66	PMD23
61	n3	59	ICU_GND	63	ICU_GND
58	n4	56	ICU_GND	60	PMD24
55	n5	53	ICU_GND	57	PMD25
52	n6	50	ICU_GND	54	PMD26
49	ICU_GND	47	ICU_GND	51	PMD27
46	ICU_GND	44	ICU_GND	48	PMD28
43	PMA23	41	ICU_GND	45	PMD29
40	PMA22	38	ICU_GND	42	PMD30
37	PMA21	35	ICU_GND	39	PMD31
34	ICU_GND	32	ICU_GND	36	ICU_GND
31	CLK20MHZ	29	ICU_GND	33	ICU_GND
28	ICU_GND	26	ICU_GND	30	ICU_GND
25	DMRD*	23	ICU_GND	27	PMA4
22	DMACK	20	ICU_GND	24	PMA3
19	DMWR*	17	ICU_GND	21	PMA2
16	ICU_GND	14	ICU_GND	18	PMA1
13	PMS1*	11	ICU_GND	15	PMA0
10	TIMEXP	8	ICU_GND	12	ICU_GND
7	PMWR_STB*	5	ICU_GND	9	DMWR_STB*
4	ICU_GND	2	TEMP0_GO	6	ICU_GND
1	TEMP0_RTN		-	3	CLK125K

Connector P2 – Hypertac HPF098UFXE0070					
97	DMA0	95	ICU_GND	98	IRQ1*
94	DMA1	92	ICU_GND	96	IRQ0*
91	DMA2	89	ICU_GND	93	FLAG3
88	DMA3	86	ICU_GND	90	FLAG2
85	DMA4	83	ICU_GND	87	FLAG1
82	DMA5	80	ICU_GND	84	FLAG0
79	DMA6	77	ICU_GND	81	DMD23
76	DMA7	74	ICU_GND	78	DMD22
73	DMA8	71	ICU_GND	75	DMD21
70	DMA9	68	ICU_GND	72	DMD20
67	DMA10	65	ICU_GND	69	DMD19
64	DMA11	62	ICU_GND	66	DMD18
61	DMA12	59	ICU_GND	63	DMD17
58	DMA13	56	ICU_GND	60	DMD16
55	DMA14	53	ICU_GND	57	DMS1*
52	DMA15	50	ICU_GND	54	DMS0*
49	DMA16	47	ICU_GND	51	DMD15
46	DMA17	44	ICU_GND	48	DMD14
43	DMA18	41	ICU_GND	45	DMD13
40	DMA19	38	ICU_GND	42	DMD12
37	DMA20	35	ICU_GND	39	DMD11
34	DMA21	32	RESET*	36	DMD10
31	DMA22	29	V_FAIL*	33	DMD9
28	DMA23	26	spare	30	DMD8
25	spare	23	spare	27	spare
22	spare	20	spare	24	spare
19	spare	17	spare	21	spare
16	spare	14	spare	18	spare
13	spare	11	spare	15	spare
10	nc	8	nc	12	spare
7	nc	5	nc	9	nc
4	nc	2	nc	6	nc
1	nc		-	3	

### 8.5 PSU-1 Card – Slot 4

Connector P1 – Hypertac HPD029UFXE0070			
29	ICU+5V	28	ICU+5V
27	ICU+5V	26	ICU+5V
25	spare	24	spare
23	spare	22	spare
21	spare	20	spare
19	spare	18	spare
17	spare	16	spare
15	spare	14	spare
13	spare	12	spare
11	spare	10	spare
9	spare	8	spare
7	spare	6	spare
5	ICU_GND	4	spare
3	ICU_GND	2	ICU_GND
1	spare		ICU_GND

Connector P2– Hypertac HPF098UFXE0070					
97	spare	95	ICU_GND	98	spare
94	spare	92	ICU_GND	96	spare
91	spare	89	ICU_GND	93	spare
88	spare	86	ICU_GND	90	FLAG3
85	spare	83	ICU_GND	87	FLAG2
82	spare	80	ICU_GND	84	FLAG1
79	spare	77	ICU_GND	81	FLAG0
76	spare	74	ICU_GND	78	spare
73	spare	71	ICU_GND	75	spare
70	spare	68	ICU_GND	72	spare
67	spare	65	ICU_GND	69	spare
64	spare	62	ICU_GND	66	spare
61	spare	59	ICU_GND	63	spare
58	spare	56	ICU_GND	60	spare
55	spare	53	ICU_GND	57	spare
52	spare	50	ICU_GND	54	spare
49	spare	47	ICU_GND	51	spare
46	spare	44	ICU_GND	48	spare
43	spare	41	ICU_GND	45	spare
40	spare	38	ICU_GND	42	spare
37	spare	35	ICU_GND	39	spare
34	spare	32	spare	36	spare
31	spare	29	spare	33	spare
28	spare	26	spare	30	spare
25	spare	23	spare	27	spare
22	spare	20	spare	24	spare
19	spare	17	spare	21	spare
16	spare	14	spare	18	spare
13	spare	11	spare	15	spare
10	nc	8	nc	12	spare
7	nc	5	nc	9	nc
4	nc	2	nc	6	nc
1	nc		-	3	

## 9 Parts List

Viewlogic file.

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#	QTY	REFDES	DEVICE	VALUE	PKG_TYPE	PART_SPEC
1	2	P0, P1,			HPD029AFXE0020	HYPERTAC 29-WAY FEMALE STRAIGHT
2	6	P2, P3, P4, P5, P6, P7,			HFP098AFXE0020	HYPERTAC 98-WAY FEMALE STRAIGHT
3	59	X1, X2, X3, X4, X5, X6, X7, X8, X9, X10, X11, X12, X13, X14, X15, X16, X17, X18, X19, X20, X21, X22, X23, X24, X25, X26, X27, X28, X29, X30, X31, X32, X33, X34, X35, X36, X37, X38, X39, X40, X41, X42, X43, X44, X45, X46, X47, X48, X49, X50, X51, X52, X53, X54, X55, X56, X57, X58, X59	TEST_POINT		C063_PAD	TEST POINT

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