

# AmSE Crate, Box Flight Design Summary PROVISIONAL SEP '03

(E:324 PMT, R:680 PMT, T: 192 Ladder, S: 34 ToF, 16 ACC, U:82 Mod, AST, GPS - with "Guido" DC-DC mods in SPD)

M. Capell

23 Sep 03

http://ams.cern.ch/AMS/Electronics/FlightDesign.html, .pdf, .xls

Crate xPD	Qty	Function (tot det)	Slots	Cards	Brick	USCM	CAN	28V in
E	2	ECal (324 PMT)	8	8	3			
R	2	RICH (680 PMT)	7	7	2			
REPD	2	R+E power	10	10				2
J	1	DAQ(MDC+JxIF)	22	22			4	
JT	1	DAQ(Trig+JINJ)	14	7				
JPD	1	J+JT power(MDI)	11	7		2	2	2
M	1	Monitor, AST, GPS & Laser Align.	12	12		2	2	
"MPD"	1		3	3				2
S	4	Scint(34ToF+8ACC)	5	5	1			
"SPD"	4		3	3				2
T	8	Tracker (192 Ladder)	19	19				
TPD	8		10	10				1
TT	1	Tracker Thermal Elec. (1H1C)	8	8		2	2	
"TTPD"	1		2	2				2
U	2	TRD (82 Module)	19	19				
UPD	2		10	10				1
UG	1	TRD Gas Elec	11	11		2	2	
UGPD	1		7	7				2

Nominal Heat (W)			
Unit	Sum	ex-Box	Subsys
15.79		44.8	
22.39	109.8	24.0	179
16.70			
29.06			
2.57	52.5		53
20.88			
24.46	40.9	(ASTC +GPS)	55
16.42			
36.96	197.3	14.0	211
12.35			
37.66	502.1	138.3	640
25.10			
3.53	3.9	(TTCS)	74
0.40			
19.60	70.1	19.4	90
15.47			
13.21	18.7	(UGB)	83
5.49			
(1384)			
3.84	7.7		(M)
6.11	6.1		
250.00	250.0		250
40.00	40.0		40
80.33	80.3	400.0	480
0.00	0.0		0
0.00	0.0		0
0.00	0.0		0
70.00	70.0		(TT)
0.00	0.0		
64.00	64.0		(UG)

CURRENT Kg		Delta (Jan'02)
Unit	Subsys	
16.80		
11.70	70.7	+4.3
6.83		
14.26		
6.96	30.6	-3.3
9.39		
8.09	10.0	-1.8
1.88		
8.40	41.1	-1.7
1.88		
12.27	150.2	-13.5
6.51		
5.70	6.9	+6.9
1.21		
12.27	37.3	-9.0
6.38		
7.49	12.3	-0.8
4.76		
(359.0)		
3.25	8.0	-0.0
1.50		
42.50	42.5	+7.5
48.00	(114.3)	
12.28		
6.00		
12.50		
17.00		
27.50		
40.00		(40.0)
40.00		(40.0)
105.00	(105.0)	
60.0		-10.0
-11.0		0.0
459		-2

Other (most direct mount to USS)									
ASTC	2	Amica Star Tracker Cameras, with Support, Baffle, Cable							
GPS	1	GPS Elec Box + 2 Antenna, Cable							
PDB	1	Power Distribution				2	2	0	
CAB	1	Cryo Mag Avionics (inc shunt 1.2Kg)				0	2	2	
CCEB	1	Cyro Cool Elec Box	19	13		2	2	0	
CDD	2	Cryo Dump (aka Free, Fly-Wheeling) Diodes - Port & Starb							
UPS	2	CAB UPS (8 cells + BMS)							
CVB	1	Cryo Mag Valves							
C-cabling		inc current leads (2*0/2 to magnet+1*0/2 to CDDs=9.5), etc.							
TTCB-P	1	Tracker Thermal inc 50W preheat NOT Elec. Primary (Port)							
TTCB-S	1	Tracker Thermal inc 50W preheat NOT Elec. Second(Star)							
UGB	1	TRD Gas Boxes S + C, inc 50W peak local heaters							

Cables		intercrate
Mounting		removed end walls

Cards	Brick	USCM	CAN	28V in
464	14	12	18	32

**Control**

**32**

**2,154**

**2,000**

**460**

<b>Current</b>	<b>provisional.</b>
<b>Summary</b>	increased intercrate cable weight 20->30Kg
<b>UG, JPD</b>	remove excess, free, slots
<b>E,R,S,T,U</b>	remove USCMs.
<b>TPD,UPD</b>	remove S9054 (USCM power)
<b>E,R,S</b>	place xHV bricks outside crate.
<b>TTCB-P,-S</b>	boxes renames to TTCB-P, -S.
<b>TTPD</b>	reduce to 1 DCDC + 1 filter, host in nearby TPD-> TTPD
<b>RE,T,U,UG-PD</b>	Rename S9053 to S9053I and S9053D to S9053
<b>RE,M,S,TT,UG-</b>	Corrected S9011B2 weight (=S9011B)
<b>11 Aug 03</b>	
<b>UGPD</b>	replaced S9052 with (12V)
<b>TPD</b>	S9055D renamed S9055 (but still dioded)
<b>REPD</b>	slot 8 S9054 changed frame from L to S
<b>01 Jul 03</b>	
<b>E</b>	Removed EPSFE (Lin Reg moved to EIB).
<b>REPD, R</b>	R part, unreplaced S9072 with S9053 & S9054.
<b>REPD, E</b>	E part, unreplaced S9072 with S9053 & S9054.
<b>U,UPD</b>	power values and frame sizes updated according Florian's calcs.
<b>16 Jun 03</b>	<b>Inclusion of proposed Guido DC-DC mods</b>
<b>xPD</b>	PD elec & filter renamed S9011A & S9011B or S9011B2
<b>CCEB</b>	Rough design included.
<b>E,R,S</b>	Included 5 and 3.3V current for xHV's, +39W !
<b>REPD</b>	R part, replaced S9053D & S9054 with S9072 E part, replaced S9053 & S9054 with S9072 Removed S9011A Control Board
<b>JT</b>	Included support wall in crate, number of slots changed from 14 to 15.
<b>MPD</b>	Better definition of M-Crate power requirements. Removed 1*S9054, S9011A, 2*S9053. Remaining S9054 may be replaced with MDI based DC-DC. Relocated to end of nearby TPD (as for SPD), which becomes TMPD.
<b>SPD</b>	Replaced S9053 & S9054 with S9072 Replaced 3*S9052 with S9052 Hi Pwr Removed S9011A Control Board Relocated to end of four TPDs, which become TSPDs.
<b>DCDC</b>	Included proposed Guido DC-DC mods
<b>23 Apr 03</b>	<b>Changes I can remember from version 28 Mar 03</b>
<b>Note</b>	This doe not include Guido proposals.
<b>E,R,S</b>	Included 5 and 3.3V current for xHV's, +39W !
<b>REPD</b>	Oops, put S9053D back into REPD for RICH.
<b>SPD</b>	Inverted S9053 & S9054 order.
<b>Cards</b>	Included, updated CAEN model numbers
<b>28 Mar 03</b>	<b>Changes I can remember from version 27 Mar 03</b>

<b>Summary</b>	Fix up Delta power column and (and hidden Jun 02 power column).
<b>REPD</b>	replace S9053 with S9053D for RICH
<b>Cards</b>	insert and correct a few CAEN part numbers and other minor corrections.
<b>27 Mar 03</b>	<b>Changes I can remember from version 12 Dec 02</b>
<b>most</b>	recolor coded the columns, because I keep confusing power & weight in meetings.
<b>Summary</b>	included ASTC+GPS power under M+MPD ex-box
	Moved TTCS power to TT+TTPD line
	updated PDB dissipation
	upddated CCEB dissipation
	split TTCS into P & S, included 50W preheating
	included 70W heater power for UGB
<b>E-UG</b>	combined remarks fields
	categorized xPD DCDC as small, medium or large
	order in most xPD's shifted
	voltages of s9053, s9053D, s9054 updated
	powering of USCMs updated
<b>E</b>	nc (few corrections)
<b>R,REPD</b>	power updates from Jesus
	added one S9057 for RICH
<b>J,JPD</b>	power updates form YT Ting
<b>JT</b>	nc
<b>M, MPD</b>	nc
<b>S, SPD</b>	power & card updates from Diego, added 2 s9052
<b>T, TPD</b>	power updates from eduardo & mauro
<b>TT, TPD</b>	nc
<b>U, UPD</b>	power updates from Florian
<b>UG</b>	few corrections, updates
<b>cards</b>	added new S cards
<b>dcdc</b>	updated voltages
<b>formats</b>	included S,M,L for hi & lo power DCDC
<b>Accom</b>	few updates
<b>Accom(2)</b>	correspondingly

# E Crate

# FLIGHT QTY=2

Resp: S.Galeotti/F.Spinella

23 Sep 03

## Voltage,Current

Slot	Board	State	5.5	3.35	3.9	2.9	3.9	2.9	28	Heat	Format	Wght	Remarks
1	EDR2	1H1O		0.26	0.02	0.03				1.04	AMS-2VME	0.35	SUPPORT
2	EDR2	1H1O		0.26	0.02	0.03				1.04	AMS-2VME	0.35	
3	EDR2	1H1O		0.26	0.02	0.03				1.04	AMS-2VME	0.35	
4	JINF	1H1O		0.30						1.01	AMS-cPCI(5C)	0.35	
5	ETRG	1H1O		0.61						2.03	AMS-2VME	0.35	Both crates TBD, SUPPORT
6	EDR2	1H1O		0.26			0.02	0.03		1.04	AMS-2VME	0.35	
7	EDR2	1H1O		0.26			0.02	0.03		1.04	AMS-2VME	0.35	
8	EDR2	1H1O		0.26			0.02	0.03		1.04	AMS-2VME	0.35	SUPPORT
90	EBP	Passive									Backplane	0.40	all slots
99	E crate mech	Passive									Crate Body	2.50	slot1-26, -25g*(M-n)
8	<b>Total Crate</b>		0.36	3.07	0.19	0.28	0.19	0.22	0.11	15.8	8	16.8	Includes bricks...

indicates backplane support behind this slot.

3.2

qty

3	EHV (Mech+S9063+	1H1O	0.12	0.15					0.04	2.16	E HV Brick	3.70	2E+5Reg(ea:8ch, 11out)
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qty

18	EIB (On Detector)			0.01	0.01	0.01	0.01	0.01		0.13			
	EIB's total/crate			0.16	0.13	0.19	0.13	0.13		2.4			

EPSFE replacement

### NOTES:

9 Super layer, 2\*18 PMT/superlayer, 324 PMT total.

150 uA/PMT nom, 220uA max.

1 or 2 PMT/HVRegChan.

EPD combined with RPD, see REPD.

V= 2.0 means V= - 2.0, etc.



# J Crate+JPD (MDI)

FLIGHT QTY=1

Resp: YT Ting

23 Sep 03

Slot	Board	State	Nom Voltage,Current J-Crate							V,I JT		V,I JPD			Heat	Format	Wght	Remarks
			3.3	5.0	5.0	5.0	5.2	5.0	5.0	3.3	3.3	5.0	5.0	5.0				
1	JSBC	ON (Hot)	2.40												7.92	AMS-cPCI(<5C)	0.40	JMDC0-s0, no bridge, support
2	JIM-CAN	ON (Hot)	0.20	0.20											1.66	AMS-cPCI(<5C)	0.35	JMDC0-s1
3	JBU	ON (Hot)	0.70												2.31	AMS-cPCI(<5C)	0.35	JMDC0-s2
4	JIM-AMSW&1553	ON (Hot)	0.40	0.22											2.42	AMS-cPCI(<5C)	0.35	JMDC0-s3
5	JIM-HRDL/422	ON (Hot)	0.20	0.27	0.30										3.51	AMS-cPCI(<5C)	0.35	JMDC0-s4
6	JSBC	OFF													0.00	AMS-cPCI(<5C)	0.40	JMDC1-s0, no bridge, support
7	JIM-CAN	OFF													0.00	AMS-cPCI(<5C)	0.35	JMDC1-s1
8	JBU	OFF													0.00	AMS-cPCI(<5C)	0.35	JMDC1-s2
9	JIM-AMSW&1553	OFF													0.00	AMS-cPCI(<5C)	0.35	JMDC1-s3
10	JIM-HRDL/422	OFF													0.00	AMS-cPCI(<5C)	0.35	JMDC1-s4
11	JHIF	1H10+10				0.60	1.20	0.00							9.24	AMS-cPCI(<5C)	0.35	2*JFOM+J422
12	JLIF	1H10							0.40						2.00	AMS-cPCI(<5C)	0.35	2*J1553. SUPPORT
13	JIM-HRDL/422	OFF													0.00	AMS-cPCI(<5C)	0.35	JMDC2-s4
14	JIM-AMSW&1553	OFF													0.00	AMS-cPCI(<5C)	0.35	JMDC2-s3
15	JBU	OFF													0.00	AMS-cPCI(<5C)	0.35	JMDC2-s2
16	JIM-CAN	OFF													0.00	AMS-cPCI(<5C)	0.35	JMDC2-s1
17	JSBC	OFF													0.00	AMS-cPCI(<5C)	0.40	JMDC3-s0, no bridge, support
18	JIM-HRDL/422	OFF													0.00	AMS-cPCI(<5C)	0.35	JMDC3-s4
19	JIM-AMSW&1553	OFF													0.00	AMS-cPCI(<5C)	0.35	JMDC3-s3
20	JBU	OFF													0.00	AMS-cPCI(<5C)	0.35	JMDC3-s2
21	JIM-CAN	OFF													0.00	AMS-cPCI(<5C)	0.35	JMDC3-s1
22	JSBC	OFF													0.00	AMS-cPCI(<5C)	0.40	JMDC3-s0, no bridge, support
90	JBP	Passive															1.10	Backplane
99	J crate mech	Passive															5.26	Crate Body
22	<b>Total Crate</b>		3.90	0.69	0.30	0.60	1.20	0.00	0.40	1.02	0.31				<b>29.1</b>	<b>22</b>	<b>14.3</b>	

Slot	Board	State	VDCDC-out							V,I JT		V,I JPD			Heat	Format	Wght	Remarks
			3.4	5.1	5.1	5.5	5.8	5.5	5.5	3.4	3.4	5.5	6.0	6.0				
1	JPMD	1H10	3.90	0.69	0.30										8.41	AMS-2Slot(P)	1.00	SUPPORT
2	JPSC	1H1C										0.82	0.20	0.20	3.28	AMS-2VME(P)	0.60	Special F/P over
3	JPJT	2H40								1.02	0.31				2.26	AMS-2Slot(P)	0.75	Special F/P under
4	USCM (A)	ON (Hot)										0.20			1.00	AMS-2VME	0.35	SUPPORT
5	USCM (B)	Standby (Cold)										0.02			0.10	AMS-2VME	0.35	
6	JPIF	1H10				0.60	1.20	0.00	0.40						5.83	AMS-2Slot(P)	0.65	
7	JPMD	2*OFF													0.00	AMS-2Slot(P)	1.00	JMDC 2 & 3 SUPPORT
8	JPBP	Passive															0.55	Backplane slots 1-15
9	JP28	Passive															0.05	bracket for 28V in.
10	JP crate mech	Passive															3.09	Crate Body
11	<b>Total xPD</b>														<b>20.9</b>	<b>7</b>	<b>9.4</b>	

NOTES: JPD also supplies JT crate. V= 5.2 means V= - 5.2, etc.

**JT Crate**

**FLIGHT QTY=1**

Resp: CH Lin

23 Sep 03

V,I

Slot	Board	State	3.3	3.3	3.3	3.3	3.3	3.3	Heat	Format	Wght	Remarks_B
1												SUPPORT
2	JLV1 A	ON (Hot)	0.75						0.79	AMS-2Slot	0.37	
3												
4	JTBX	1H1O	0.27						0.76	AMS-2Slot	0.37	
5												SUPPORT
6	JLV1 B	OFF		0.00					0.00	AMS-2Slot	0.37	
98	Wall	Passive								Side Walls/2	0.46	Inserted Jun'03
7												
8	JINJ 0	ON (Hot)			0.31				1.02	AMS-2Slot--	0.25	
9												
10	JINJ 1	OFF				0.00			0.00	AMS-2Slot--	0.25	SUPPORT
11												
12	JINJ 2	OFF					0.00		0.00	AMS-2Slot--	0.25	
13												
14	JINJ 3	OFF						0.00	0.00	AMS-2Slot--	0.25	SUPPORT
90	JTBP	Passive								Backplane	0.70	
99	JT crate mech	Passive								Crate Body	3.68	
14	<b>Total Crate</b>		1.02	0.00	0.31	0.00	0.00	0.00	2.57	7	6.96	

**NOTES:**

JT Crate is powered by JPD

**M Crate+MPD**

**FLIGHT QTY=1**

Resp: G.Viertel

16 Jun 03

**Voltage,Current**

Slot	Board	State	5.1	12.0	12.0	6.3	Heat	Format	Wght	Remarks
1	GPSE	ON	0.95	0.20		x	7.15	AMS-2VME	0.35	TBD, SUPPORT
2	ASTE	ON	2.10	0.44	0.20		10.71	AMS-2VME	0.35	for both ASTC
3	ASTP	ON		0.25	0.04		3.48	AMS-2VME	0.35	for both ASTC
4	MCE	1H1O	0.39	0.03			2.00	AMS-2VME	0.35	dual redund 4*(Bx,By,Bz,T)
5	USCM	ON	0.20				1.02	AMS-2VME	0.35	
6	USCM	OFF	0.02				0.10	AMS-2VME	0.35	SUPPORT
7	LAC	OFF	0.00	0.00	0.00		0.00	AMS-2VME	0.35	
8	LAD	OFF	0.00	0.00	0.00		0.00	AMS-2VME	0.35	
9	LAD	OFF	0.00	0.00	0.00		0.00	AMS-2VME	0.35	
10	LAD	OFF	0.00	0.00	0.00		0.00	AMS-2VME	0.35	
11	LAD	OFF	0.00	0.00	0.00		0.00	AMS-2VME	0.35	
12	LAD	OFF	0.00	0.00	0.00		0.00	AMS-2VME	0.35	SUPPORT
90	MBP	Passive						Backplane	0.60	
99	M Crate Mech	Passive						Crate Body	3.29	
12	<b>Total Crate</b>		3.66	0.92	0.24	0.00	24.46	12	8.09	

2	ASTC (Qty=2)			0.22	0.10		3.84			EACH
1	GPS(TOPSTAR3000)		0.95			0.2	6.11			
4	3-D B +T sensors (Qty=4)			0.008			0.10			EACH

VDCDC-out  
effic

<b>5.2</b>	<b>12.1</b>	<b>12.1</b>	
0.75	0.70	0.70	

11	S9054 or MDI	1H1O	3.66				6.71	DCDC LV(25W) L	0.34	Independent, dioded at Backplane ?
12	S9011B2 (dual)	Passive						28V Filter	0.20	
13	(+12) MDI based.	1H1O		1.40	0.44		9.71	DCDC LV(25W) L	0.34	unk
90	MPD Wiring	Passive						xPD Wiring	0.15	
99	MPD mech	Passive						xPD Mech	0.85	
3	<b>Total xPD</b>						16.42	3	1.88	

6.3V made from 12V on GPSE board - tbc.

NOTE: Board order to be decided by MBP designer (Commichau).

**NOTE: MPD is "hosted" at the end the TMPD. Wght is for 3 sides of box(no end walls).**

NOTE: S9054 may be replaced by (+5V) MDI based

NOTE: A or B converters selected via 28V feed.

**S Crate+SPD (34+16)**

**FLIGHT QTY=4**

Resp: D.Casadei

23 Sep 03

Slot	Board	State	Voltage,Current					Heat	Format	Wght	Remarks
			5.55	3.35	5.55	5.55	28				
1	SDR2	1H1O		0.30				1.00	S single	0.35	"A"+"B", 2 cdp, support
2	SFET2	1H1O	0.24	0.36	0.61	0.61		9.30	S double	0.73	plane end)
3	SPT2	1H1O		0.45				1.50	S single	0.35	"A"+"B",pretrigger
4	SFET2	1H1O	0.24	0.36	0.61	0.61		9.30	S double	0.73	end)
5	SFEA2	1H1O	0.24	0.36	0.61	0.61		9.30	S double	0.73	Support
90	SBP	Passive							Backplane	0.25	slots 1-7 TBC
99	S crate mech	Passive							Crate Body	1.91	
5	<b>Total Crate</b>		1.44	2.031	1.875	1.875	0.048	<b>36.96</b>	<b>5</b>	<b>8.40</b>	including brick

qty

1	SHV (SFEC2)	1H1O 1H1O	0.72	0.15			0.05	5.86	S HV Brick	3.25	"A"+"B", 24ch, 2 or 4 free.
				0.06	0.045	0.045		0.70	board in brick	0.10	chg measurements

PMT's

4 115

16 175

lower, use 1/2

2 230 ]

**3.49**

	VDCDC-out effic		5.6	3.40	5.6	5.6	28				Remarks
			0.75	0.75	0.75	0.75	0.72				
11	S9072(3.4,5.6)	1H1O	1.44	2.03				5.16	DCDC LV(25W) L	0.34	Independent
12	S9011B2 (dual)	Passive					A,B		28V Filter	0.20	
13	s9052(+/-5.6) Hi Pwr	1H1O			1.88	1.88		7.19	DCDC LV(25W) L	0.34	Independent
90	SPD wiring	Passive							xPD Wiring	0.15	
99	SPD mech	Passive							xPD Mech	0.85	
3	<b>Total xPD</b>							<b>12.35</b>	<b>3</b>	<b>1.88</b>	

**NOTE: SPD is "hosted" at the end of four of eight TPDs called TSPDs. Wght is for 3 sides of box(no end walls).**

NOTE: A or B converters selected with 28V A or B feed - no other control.

**Note: 8,8,10,8 ToF paddles, 16 ACC paddles**

Number given above are for upper [lower] crates.

S1: 6 rect paddles with 2 PMT each end + 2 trapezoidal paddles with 3 PMT, total/side 18 PMT, 8 HV Chan, 8 Signals

S2: 6 rect paddles with 2 PMT each end + 2 trapizoidal paddles with 2 PMT, total/side 16 PMT, 8 HV Chan, 8 Signals

S3: 8 rect paddles with 2 PMT each end + 2 trapizoidal paddles with 2 PMT, total/side 20 PMT, 10 HV Chan, 10 Signals

S4 (=S1): 6 rect paddles with 2 PMT each end + 2 trapizoidal paddles with 3 PMT, total/side 18 PMT, 8 HV Chan, 8 Signals

ACC: 16 paddles with 1 PMT for each two adjacent ends, total per 1/4 of ACC: 4 PMT, 4 HV Chan, 4 Signals

Upper crates connected to one side of S1 & S2 and 1/4 of ACC (38 PMT, 20HVR, 20 Signals).

Lower crates connected to one side of S3 & S4 and 1/4 of ACC (42 PMT, 22HVR, 22 Signals).

**Note: 2 (or 3 for trapiz. S1, S4) ToF or 1 ACC PMT per HVR ch.**

V= 5.2 means V= - 5.2, etc.



# TT Crate+TTPD

# FLIGHT QTY=1

Resp: M.Pohl

23 Sep 03

Slot	Board	State	Voltage,Current			Heat	Format	Wght	Remarks
			5.1	3.35	3.35				
1	TTE1	ON		0.12		0.40	AMS-2VME	0.35	TBD, SUPPORT
2	TTE2	ON		0.12		0.40	AMS-2VME	0.35	TBD
3	TTE3	ON		0.12		0.40	AMS-2VME	0.35	TBD
4	TTE1	OFF		0.12		0.40	AMS-2VME	0.35	TBD
5	TTE2	OFF		0.12		0.40	AMS-2VME	0.35	TBD
6	TTE3	OFF		0.12		0.40	AMS-2VME	0.35	TBD
7	USCM	Hot	0.20			1.02	AMS-2VME	0.35	prime
8	USCM	OFF	0.02			0.10	AMS-2VME	0.35	redund, SUPPORT
90	TTBP	Passive					Backplane	0.40	
99	TT Crate Mech	Passive					Crate Body	2.50	
8	<b>Total Crate</b>					<b>3.53</b>	<b>8</b>	<b>5.70</b>	

VDCDC-out  
effic

5.2	3.40	3.40
0.75	0.75	0.75

1	S9054(+5.6)	1H1O	0.22			0.40	DCDC LV(25W) S	0.34	INDEPENDENT
2	S9011B2 (dual)	Passive					28V Filter	0.20	
90	TTPD Wiring	Passive					xPD Wiring	0.10	
99	TTPD mech	Passive					xPD Mech	0.57	
2	<b>Total xPD</b>					<b>0.40</b>	<b>2</b>	<b>1.21</b>	

**NOTE: (TTCS, TT, TTPD) together run as 1H1Off.**

**NOTE: These electronics were mislaid for a while.**

**NOTE: Placeholders - for Tracker Thermal Control Systems Electronics.**

Note: TTPD will be hosted in a nearby TPD -> TTPD as for SPD, MPD.

# U Crate+UPD

FLIGHT QTY=2

Resp: F.Hauler

23 Sep 03

			Voltage,Current															
Slot	Board	State	5v1	3.30	2.0	2.0	2.0	2.0	120	5.0	120	5.0	120	5.0	Heat	Format	Wght	Remarks
1	UDR2	1H1O	~	0.13		0.27									0.96	AMS-2VME	0.35	pg0 SUPPORT
2	UPSFE	Hot	~	0.07	0.33	0.28									1.44	AMS-2VME	0.35	pg0
3	UPSFE	Off	~	0.07	0.00	0.00									0.21	AMS-2VME	0.35	pg0
4	UDR2	1H1O	~	0.13		0.27									0.96	AMS-2VME	0.35	pg0
5	UDR2	1H1O	~	0.13		0.27									0.96	AMS-2VME	0.35	pg0 SUPPORT
6	UPSFE	Hot	~	0.07	0.33	0.28									1.44	AMS-2VME	0.35	pg0
7	UPSFE	Off	~	0.07	0.00	0.00									0.21	AMS-2VME	0.35	pg0
8	UDR2	1H1O	~	0.13		0.27									0.96	AMS-2VME	0.35	pg0
9	JINF	1H1O	~	0.36											1.19	AMS-cPCI(5C)	0.35	
10	UDR2	1H1O	~	0.13				0.27							0.96	AMS-2VME	0.35	pg1 SUPPORT
11	UPSFE	Off	~	0.07			0.33	0.28							1.44	AMS-2VME	0.35	pg1
12	UPSFE	Hot	~	0.07			0.00	0.00							0.21	AMS-2VME	0.35	pg1
13	UDR2	1H1O	~	0.13				0.27							0.96	AMS-2VME	0.35	pg1
14	UHVg	1H1C	~	0.02					0.01	0.03					1.28	AMS-2VME	0.35	
15	UHVg	1H1C	~	0.02					0.01	0.03					1.28	AMS-2VME	0.35	SUPPORT
16	UHVg	1H1C	~	0.02						0.01	0.03				1.28	AMS-2VME	0.35	
17	UHVg	1H1C	~	0.02						0.01	0.03				1.28	AMS-2VME	0.35	
18	UHVg	1H1C	~	0.02								0.01	0.03		1.28	AMS-2VME	0.35	
19	UHVg	1H1C	~	0.02								0.01	0.03		1.28	AMS-2VME	0.35	SUPPORT
90	UBP	Passive	~													Backplane	0.95	
99	U Crate Mech	Passive	~													Crate Body	4.67	
19	<b>Total Crate</b>		0.00	1.65	0.67	1.62	0.33	0.81	0.02	0.05	0.02	0.05	0.02	0.05	<b>19.6</b>	<b>19</b>	<b>12.27</b>	

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UFE (41units)				2.14	1.05	1.11	0.55								<b>9.7</b>	frontend		
---------------	--	--	--	------	------	------	------	--	--	--	--	--	--	--	------------	----------	--	--

5v2	3.40	2.6	2.5	2.5	2.5	120	5.0	120	5.0	120	5.0
0.55	0.74	0.72	0.72	0.68	0.68	0.55	0.55	0.55	0.55	0.55	0.55

0	S9011A (PD elec)	1H1C	~	0.10											0.34	PD Elec	0.10	
1	S9053(+3.6)	1H1C	~	1.75											2.27	DCDC LV(25W) M	0.34	MOSFETed, U.1-13
2	S9048(+2.5)	1H1C	~					0.92							1.17	DCDC LV(<25) S	0.26	join at LVR out. pg1:U.10-11(dig)
3	S9048(+2.5)	1H1C	~				1.11								1.42	DCDC LV(<25) S	0.26	join at LVR out. pg1:U.10-11(ana)
4	S9011B (filter)	Passive	~													28V Filter	0.20	
5	S9048(+2.5)	1H1C	~		2.22										2.36	DCDC LV(<25) M	0.26	join at LVR out. pg0:U.2-3,6-7(ana)
6	S9048(+2.5)	1H1C	~			1.84									1.95	DCDC LV(<25) M	0.26	join at LVR out. pg0:U.2-3,6-7(dig)
7	S9056(120,+5)	1H1C	~					0.02	0.05						1.99	DCDC LV(<25) M	0.26	join UHVg out. U.16,17
8	S9056(120,+5)	1H1C	~							0.02	0.05				1.99	DCDC LV(<25) M	0.26	join UHVg out. U.18,19
9	S9056(120,+5)	1H1C	~									0.02	0.05		1.99	DCDC LV(<25) M	0.26	join UHVg out. U.20,21
90	UPD wiring	Passive	~													xPD Wiring	0.45	
99	UPD mech	Passive	~													xPD Mech	3.47	
10	<b>Total xPD</b>													<b>15.5</b>	<b>10</b>	<b>6.38</b>		

**Note: 20 Layers=82 Modules, 64 wires/module,7 module per UDR2, UHVg**  
**V= 2.0 means V= + - 2.0, etc.**

UG Crate+UGPD

FLIGHT QTY=1

Resp: A. Bartoloni

23 Sep 03

Slot	Board	State	Voltage,Current						Heat	Format	Wght	Remarks_B
			5.1	3.35	120	6	11.6	24				
1	USCM	Hot	0.20						1.02	AMS-2VME	0.35	prime, SUPPORT
2	USCM	Cold	0.02						0.10	AMS-2VME	0.35	redund
3	UGBS	Hot	0.03	0.30				0.01	1.40	AMS-2VME	0.35	Box S prime
4	UGBS	Cold	0.03	0.30				0.01	1.40	AMS-2VME	0.35	Box S redund
5	UGBC	Hot	0.04	0.30				0.01	1.57	AMS-2VME	0.35	Box C prime
6	UGBC	Cold	0.04	0.30				0.01	1.57	AMS-2VME	0.35	Box C redund, SUPPORT
7	UHVG	1H1O		0.02	0.01	0.06			1.48	AMS-2VME	0.35	Calib tube HV
8	UGFV	Hot	0.01	0.30				0.01	1.17	AMS-2VME	0.35	FV AC Prime
9	UGFV	Cold	0.01	0.30				0.01	1.17	AMS-2VME	0.35	FV AC redund
10	UGFV	Hot	0.01	0.30				0.01	1.17	AMS-2VME	0.35	FV BD prime
11	UGFV	Cold	0.01	0.30				0.01	1.17	AMS-2VME	0.35	FV BD redund, SUPPORT
90	UGBP	Passive								Backplane	0.55	
99	UG Crate Mech	Passive								Crate Body	3.09	
11	<b>Total Crate</b>		0.40	2.42	0.01	0.06	0.06	0.04	<b>13.21</b>	<b>11</b>	<b>7.49</b>	

			5.2	3.40	120	7	11.6	24				
			0.75	0.75	0.75	0.75	0.75	0.75				
0	S9011A (PD elec)	1H1O	0.10						0.52	PD Elec	0.10	
1	S9054(+5.6)	1H1O	0.50						1.01	DCDC LV(25W) S	0.34	INDEPENDENT, UG.0-12
2	S9053(+3.6)	1H1O		2.42					2.86	DCDC LV(25W) M	0.34	INDEPENDENT, UG.1-10
3	S9011B2 (dual)	Passive								28V Filter	0.20	
4	S9056(120,+5)	1H1O			0.01	0.06			0.55	DCDC LV(<25) S	0.26	join UHVG out. UG.11
5	(12V)	1H1O					0.06		0.23	DCDC LV(<25) S	0.26	Independ (S9052?)
6	(24V)	1H1O						0.04	0.32	DCDC LV(25W) S	0.34	INDEPENDENT For valves
90	UGPD wiring	Passive								xPD Wiring	0.30	
99	UGPD mech	Passive								xPD Mech	2.62	
7	<b>Total xPD</b>								<b>5.49</b>	<b>7</b>	<b>4.76</b>	

**CCEB**

**FLIGHT QTY=1**

Resp: U.Roeser

16 Jun 03

Slot	Board	State	Heat	Format	Wght	Remarks
1	CCMO	ON (Hot)	2.00	AMS-2VME	0.35	SUPPORT
2	CCMO	ON (Hot)	2.00	AMS-2VME	0.35	
3	USCM	ON (Hot)	0.20	AMS-2VME	0.35	
4	USCM	OFF	0.00	AMS-2VME	0.35	SUPPORT
5	CCIF	ON (Hot)	2.00	AMS-2VME	0.35	
6	CCIF	ON (Hot)	2.00	AMS-2VME	0.35	
7	CCIF	ON (Hot)	2.00	AMS-2VME	0.35	
8	CCIF	ON (Hot)	2.00	AMS-2VME	0.35	SUPPORT
90	CCBPC	Passive		Backplane	0.40	for slots 1-8
98	Wall	passive		Side Walls/2	0.46	
10						SUPPORT
11	CCDC	ON (Hot)	8.13	AMS-2Slot(P)	0.65	e=.6
12						
13	CCPA	ON (Hot)	15.00	AMS-2Slot(P)	0.70	
14						
15	CCPA	ON (Hot)	15.00	AMS-2Slot(P)	0.70	SUPPORT
16						
17	CCPA	ON (Hot)	15.00	AMS-2Slot(P)	0.70	
18						
19	CCPA	ON (Hot)	15.00	AMS-2Slot(P)	0.70	SUPPORT
91	CCBPP	Passive		Backplane	0.50	for slots 9-18
99	CCEB Mech	Passive		Crate Body	4.67	
19	<b>Total Crate</b>		<b>80.3</b>	<b>13</b>	<b>12.3</b>	

**NOTE: This is a very preliminary design. All heats, weights TBD.**

# Cards in Flight Design

M.Capell

23 Sep 03

Card	Loc.	Format	Part Numbers		Description
			AMS	CAEN	
ASTE	M	AMS-2VME			DSP, etc for ASTC star trackers
ASTP	M	AMS-2VME			Switches, etc, for ASTC star trackers,
CCBPC	CC	Backplane			CCEB Control Bankplane
CCBPP	CC	Backplane			CCEB Power Backplane
CCDC	CC	AMS-2Slot(P)?			CC DC-DC Converter board
CCIF	CC	AMS-2VME			CC Interface Board
CCMO	CC	AMS-2VME			CC Monitor ??
CCPA	CC	AMS-2slot(P)?			CC Power Amplifier
EBP	E	Backplane			E-Crate Backplane
EDR2	E	AMS-2VME	34		FE DAQ for 27 Ecal PMT, 2 Redund, Exclusive CDP
EHV	E	E HV Brick			2Elev(800V)+5LinReg (11 out each)+control, 2 redund (Mech + S9063 + 2*S9064 + 5*(S9066E+ 5*S9046M+3*S9046H))
EPSFE	E	AMS-2VME	73		Redundant LV Regulators for EFE, 2*6 Ch., 27 EFE/Ch.
ETRG	E	AMS-2VME	35		Ecal trigger board, 2 Redund, exclusive CDP
GPSE	M	AMS-2VME			GPS Electronics (Topstar 3000 derivative)
JBP	J	Backplane			J-Crate Backplane
JBU	J	AMS-cPCI(<5C)	03		JMDC 2*1GB Memory Buffer
JHIF	J	AMS-cPCI(<5C)	01		Redund HRDL (ISS)=JFOM + single RS422(STS)=J422 Interfaces
JIM-AMSW&1553	J	AMS-cPCI(<5C)	06		JMDC Interface to AMSWire & 1553 (LRDL) via JLIF & 1553 (STS)
JIM-CAN	J	AMS-cPCI(<5C)	05		JMDC Interface to CAN
JIM-HRDL/422	J	AMS-cPCI(<5C)	04		JMDC Interface to HRDL or RS422 via JHIF
JINF	E,R,T,U	AMS-cPCI(5C)	07		Intermediate DAQ, 2 Redund CDDC plus trigger Fan in/out
JINJ	JT	AMS-2VME	23		Intermediate DAQ, 1 CDDC, 24 links to slaves, 4 to masters
JLIF	J	AMS-cPCI(<5C)	08		Redundant LRDL (1553)=J1553 Interfaces
JLV1	JT	AMS-2VME	21		Level-1 trigger processor
JPBP	JP	Backplane			JPD backplane
JPIF	J	AMS-2VME(P)	27		DC-DC & M&C for JHIF & JLIF
JPMD	J	AMS-2VME(P)	24		DC-DC & M&C for 2 JMDC's
JPJT	J	AMS-2VME(P)	26		DC-DC & M&C for JT
JPSC	J	AMS-2VME(P)	25		DC-DC & M&C for USCM, JPD internals
JSBC	J	AMS-cPCI(<5C)	02		JMDC Processor
JTBP	JT	Backplane			JT-Crate Backplane
JTBX	JT	AMS-2VME	22		fast trigger signal fan in/out & logic.
LAC	M	AMS-2VME			Laser Alignment control board
LAD	M	AMS-2VME			Laser Alignment driver boards
MCE	M	AMS-2VME			Monitoring, Control Electronics (B, ...)
RBP	R	Backplane			R-Crate Backplane

RDR2	R	AMS-2VME	36		FE DAQ for (32 RICH PMT=RFE on non-redund CDP)
RHV	R	R HV Brick	72		1Elev(900V)+5LinReg (8 out each)+Control 2 redund
SBP	S	Backplane			S-Crate Backplane
SDR2	S	S Single	37		FE DAQ for S-Crate, 2 Redund, Exclusive CDP.
SFEA2	S	S double	38		4ACC time measurements...(could = SFET2)
SFEC2	S	board in brick	39 TBR		16,18ToF+4ACC charge measurements...
SFET2	S	S double	40		8,10 ToF time measurements, 1/2 plane OR
SPT2	S	S Single	39 TBR		ToF pretrigger
SHV	S	S HV Brick	71		1Elev(2000V)+3LinReg (8 out each), 2 redund (Mech+S9063+S9064+ 5*(S9066E+ 8*S9046L) )
TBP	T	Backplane		S9015	T-Crate Backplane
TBS	T	AMS-2VME	29	S9068	Tracker Bias supply regulator (12 ladders)
TDR2	T	AMS-2VME	30	S9018	FE DAQ for 2* (Tracker ladders on non-redund CDP)
TPSFE	T	AMS-2VME	28	S9067	FE Tracker LV regulator, 6 ch per ladders S and 6 K
TTBP	TT	Backplane			TT-Crate Backplane
TTEx	TT	AMS-2VME			Tracker Thermal Control Systems Electronics Placeholders
UBP	U	Backplane		S9058	U-Crate Backplane
UDR2	U	AMS-2VME	33	S9043	FE DAQ for 7 TDR towers, 2 Redund, Exclusive CDP
UGBP	UG	Backplane			UG-Crate Backplane
UGBC	UG	AMS-2VME	41		Monit & Control Elec for TRD Gas Box C
UGBS	UG	AMS-2VME	42		Monit & Control Elec for TRD Gas Box S
UGFV	UG	AMS-2VME	43		M&C Elec for TRD Gas Flip Valv & Manif Pressure sensors
UHVg	U,UG	AMS-2VME	32		TRD HV 2*(7 redund generators)
UPSFE	U	AMS-2VME	31	S9070	FE TRD LV Regulators, 7 ch "dig"+ 7 ch "ana"
USCM	most	AMS-2VME	61-70		Universal Slow Control Module

Total of 60 different types of cards.

## DC/DC converters specifications for the AMS-02 experiment

G. Ambrosi, M.Capell

27 Mar 03

V2.4

P-max (W), I-max (A), I-typ (A) for one DCDC converter

DC-DC	Loc.	Wiring	P-max	V1	I1	I-typ	V2	I2	I-typ	V3	I3	I-typ
<b>s9048(+2.5)</b>	UPD	Independent	12	+2.5	2.4		-2.5	2.4				
s9051(+2.5,+5.6)	TPD	Independent	14	+2.5	1.2	0.8	-2.5	2.4	1.6	+5.6	0.9	0.6
s9052(+5.6)	SPD, UG	Independent	12	+5.6	1.1	0.9	-5.6	1.1	0.9			
s9053(+3.6)	xPD	MOSFET	25	+3.4	7.0	5.0						
s9053I(+3.6)	not TPD, UPD	Independent	25	+3.4	7.0	5.0						
s9054D(+5.6)	M?	Dioded	25	+5.2	4.5	3.0						
s9054(+5.6)	most	Independent	25	+5.2	4.5	3.0						
s9055(120,+6)	TPD	Dioded	5	+120	0.010		+6	0.140	0.054	-6	0.140	0.030
<b>s9056(120,+5)</b>	UPD	Independent	5	+120	0.035		+5	0.150	0.054			
<b>s9057(+3.6-2.6)</b>	<b>EPD, RPD</b>	<b>Independent</b>	<b>10</b>	<b>+3.6</b>	<b>1.5</b>		<b>-2.6</b>	<b>1.5</b>				
(+12V)	MPD	TBD		+12.3			-12.3					
(24V)	UGPD	TBD	25	+24	1.0							
s9031(-2200)	SPD	Separate	7	-2500	0.0025							
s9032(-900)	EPD, RPD	Separate	7	-1000	0.007							

based on  
prototype

s9021 IDK  
s9021 both  
s9022 both  
s9023 one  
s9023 both  
s9024 both  
s9024 both  
s9025 both  
s9025 both  
s9027 both

Common characteristics: min value max value  
Vin (Volts) 26.5 30.5  
Toperation (degree C) -20 70

S9057 voltages to be fixed.

PCB layout such that two LV converters fit on one PCB approx. 150x160 mm<sup>2</sup>  
and that a pair of HV converters (elevators) fit into a volume of 30x70x170 mm<sup>3</sup>

### Modification with respect to the units delivered in 2001 noted in red

Exact value of V1 for the elevators to be set by S responsible (Guido) for s9031 and by E-R responsible (Stefano-Jesus) for s9032  
(s9031 and s9032 are adjustable in the range 0 - V1)

**All voltages are at the output of the DC/DC converters, BEFORE DIODING (if present)**

s9052(+5.6) Hi Pwr	SPD, UG	Independent	25	+5.6	2.2	1.8	-5.6	2.2	1.8			
s9072(+3.4,+5.6un)	SPD, REPD	Independent	25	+3.4	3.9	3.1	+5.6	2.1	1.7			

s9022 both  
s9023 one

S9052 Hi Pwr just meets requirements.

S9072 has unregulated +5.6V output, must be reg'd before load.

S9072 as specified here is underpowered for RICH 3.3V part of REPD but overpowered on +5.6V for everything but S.

## Card, etc formats and weights.

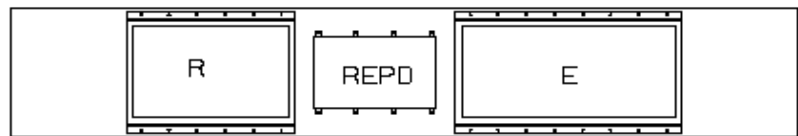
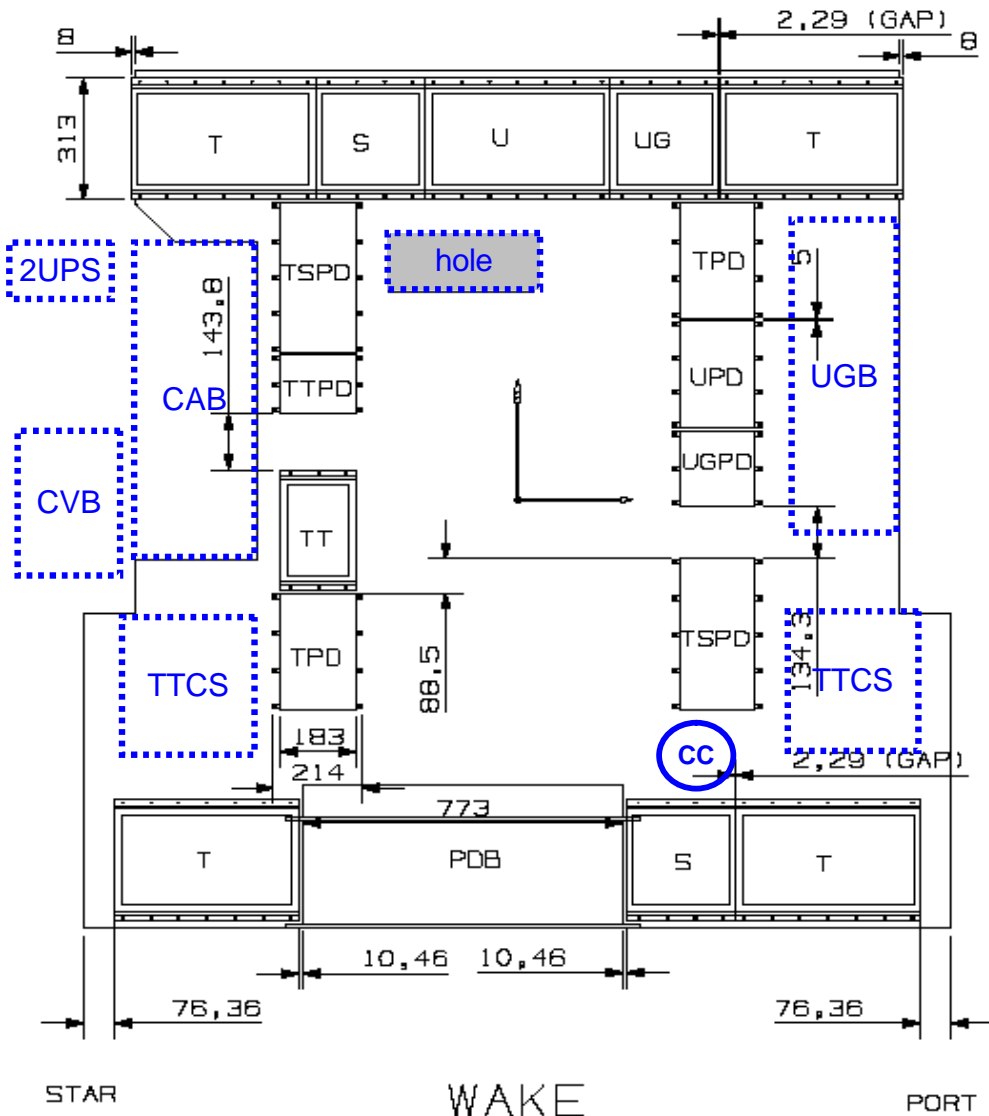
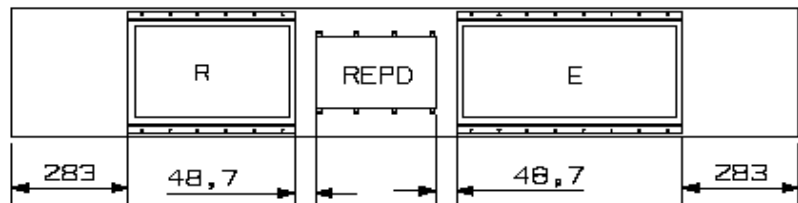
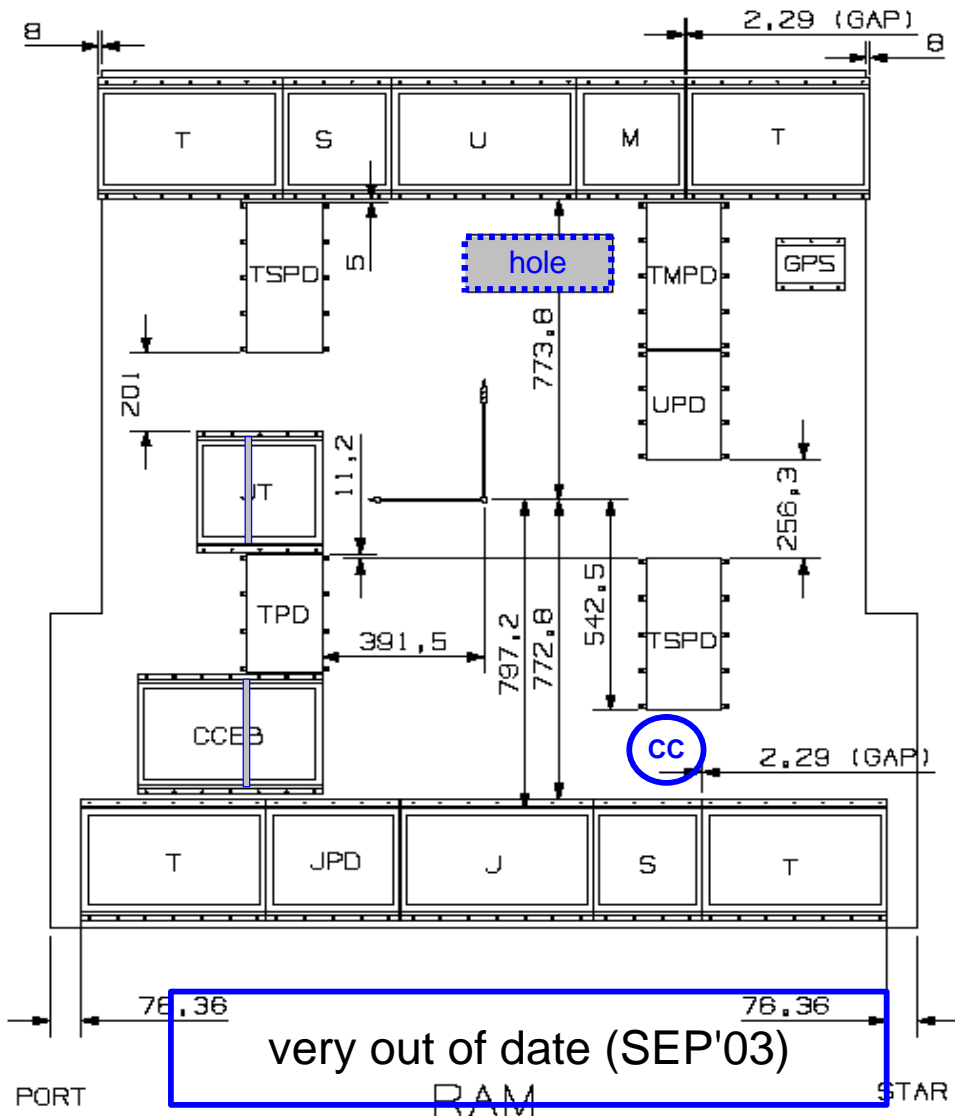
Location	Format	Weight	Notes
x Crate	AMS-2VME	0.350	"Standard" (mech=63g, no stiffener)
x Crate	AMS-2Slot	0.370	2VME, 2 Slot (mech 83g), extra slot solder side
x Crate	AMS-2Slot--	0.250	JPxx,xx=MD,IF, extra slot solder side
x Crate	AMS-2Slot(P)	0.650	JPxx,xx=MD,IF, extra slot solder side
x Crate	AMS-2VME(P)	0.650	JPxx,xx=SC,JT, no extra slot
x Crate	AMS-cPCI(5C)	0.350	ie JINF - NO SUPPORT THIS SLOT
x Crate	AMS-cPCI(<5C)	0.350	other cPCI
S Crate	S double	0.730	Guido double (250+240+240struct)
S Crate	S single	0.350	Guido single(Guido=460)
JPD, UG	free	0.020	empty slot with front panel.
x Crate	Backplane	0.050	per slot
x Crate	no B/P wiring	0.025	per slot
x Crate	Crate Body	0.197	
x Crate	Crate EndWalls	0.925	
xPD	DCDC LV(<25) S	0.260	not inc. Small I Frame (dissip<2W)
xPD	DCDC LV(25W) S	0.340	not inc. Small I Frame (dissip<2W)
xPD	DCDC LV(<25) M	0.260	not inc. Medium I Frame (Dissip 2-3W)
xPD	DCDC LV(25W) M	0.340	not inc. Medium I Frame (Dissip 2-3W)
xPD	DCDC LV(<25) L	0.260	not inc. Large I Frame (Dissip >3W)
xPD	DCDC LV(25W) L	0.340	not inc. Large I Frame (Dissip >3W)
E Crate	E HV Brick	3.700	2 Elev 900+5 HVReg(8-chan) + Ctrl: 5 slots.
R Crate	R HV Brick	3.300	1 Elev 900+5 HVReg(8-chan) +Ctrl: 5 slots
S Crate	S HV Brick	3.250	1 Elev 2.2K + 3 HVReg(8-chan) + Ctrl: 5 slots
xPD	28V filter	0.200	
xPD	PD Elec	0.100	"S9011"
xPD	xPD Wiring	0.050	50g*# slots
xPD	xPD Mech	0.283	per slot, inc I frame
xPD	xPD EndWalls	0.640	

Includes Card Locks, etc, should be the "hook weight" of the flight units.

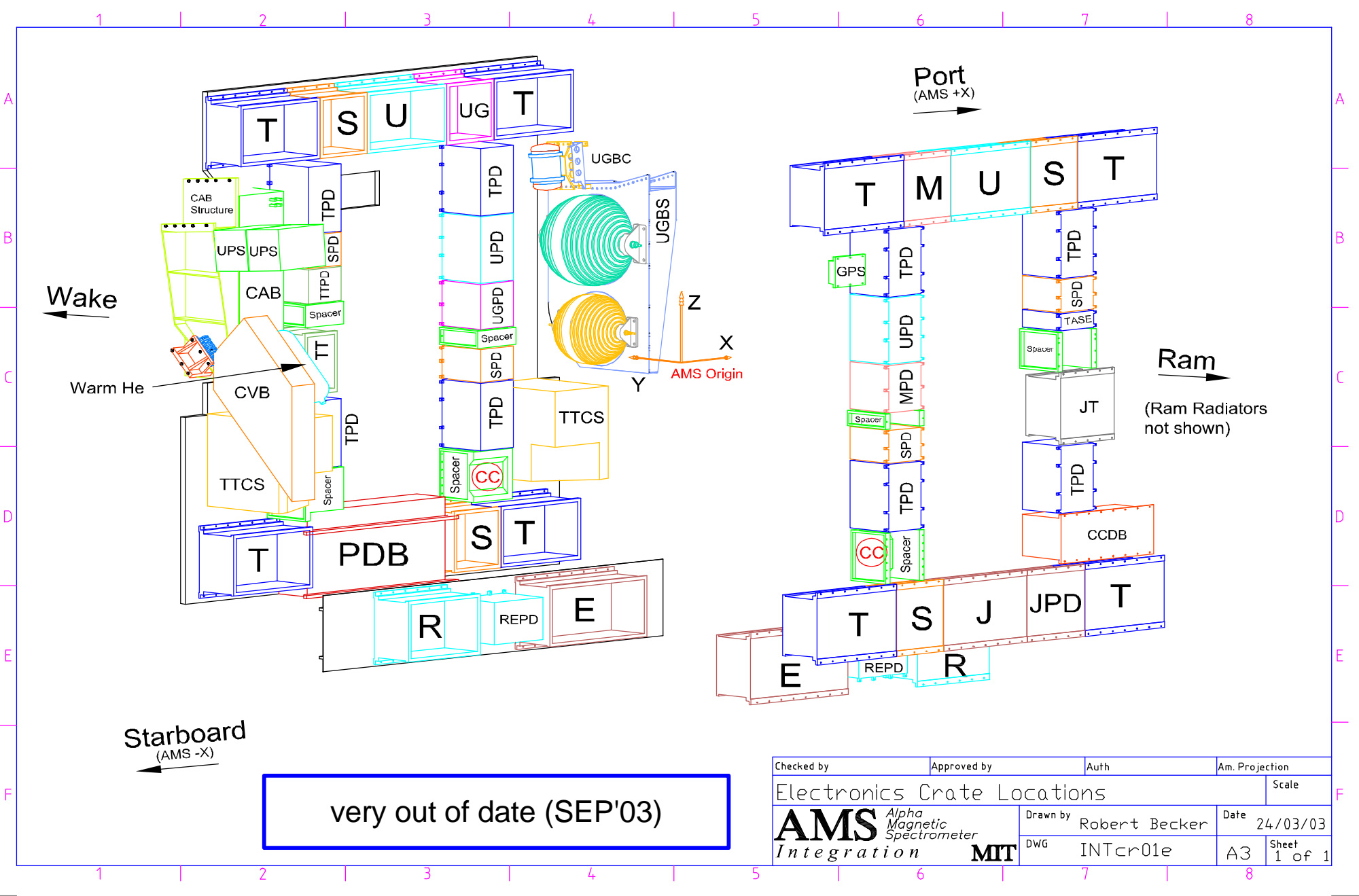
Brick	02 May	10 May	27 Oct	11 Dec
EHV	4.00	3.40	3.65	3.50
RHV	4.00	2.80	3.30	3.10
SHV	3.00	2.80	3.05	3.20
<b>Brick in crate</b>				
EHV	4.80	4.20	4.90	4.75
RHV	4.80	3.60	4.55	4.35
SHV	3.80	3.60	4.30	4.45

add 0.2  
struct.  
15 Jan 22 Sep  
3.70  
3.30  
3.05 3.25  
OUT  
3.70  
3.30  
3.25

VIEW FROM MAGNET LOOKING OUT



23.05.2003



very out of date (SEP'03)

Checked by	Approved by	Auth	Am. Projection
Electronics Crate Locations			Scale
<b>AMS</b> Alpha Magnetic Spectrometer Integration		Drawn by Robert Becker	Date 24/03/03
MIT		DWG INTcr01e	Sheet 1 of 1