Chapter 14
QBUS SYSTEMS

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14.1 QBUS CONFIGURATION and Part Number Guide

The following Q-Bus configuration guide is intended as an aid for field service engineers to help with configuration and add on checks. It can also be used as a **quick reference source for part numbers, module identification and for a summary on system enclosures.**

Any values given should be taken as a guide only, different sources quote different figures.

Figures have been rounded up to one decimal place in most instances.

******* THESE FIGURES SHOULD NOT BE TAKEN AS ABSOLUTE *******

Definitive figures can be found in the respective individual device technical manual. There are a lot of lists reproduced that are not wholly correct and errors are propagated from list to list.

This list was originally taken from the option power list on the Gems database. Any additions or alterations, can be conveyed to me or the Product and Technology group.

14.1.1 General Q Bus Options

1. The **+5v and +12v** figures in the following tables refer to the current taken from these supplies.
2. **AC and DC** figures are the AC load and DC load presented to the Q Bus.
3. **D/Q** refers to the physical size of the module, being either dual or quad height.
4. **Wa** refers to the power taken from all supplies in Watts.

Table 14–1: Q-Bus Options

OPTION	MODULE	+5v	+12v	Wa	AC	DC	D/Q	Comments
	G5148							QBus I/F to Par TU58
	M9058	0.52	-	2.6	-	-	D	BA123 distrib PCB
AAF01-A	A6009	4.1	0.0	20.5	4.0	1.0		Analog O/P FOR DRQ11
AAV11-A	A6001	2.5	0.0	12.5	0.9	1.0	Q	A/D Converter 4 Ch
AAV11-C	A6006	2.5	0.0	12.5	0.9	1.0	D	A/D Converter 4 Ch
AAV11-D	A1009	1.8	0.0	9.0	1.0	1.0	D	A/D Converter
ADF01-B	A814	3.8	0.0	18.8	4.0	1.0		A/D Convert for DRQ
ADQ32-A	A030	5.0	0.0	25.0	0.5	2.5	Q	A/D Converter + DMA
ADV11-A	A012	2.0	0.5	15.4	3.3	1.0	Q	A/D Converter
ADV11-C	A8000	2.0	0.0	10.0	1.3	1.0	D	A/D Converter
ADV11-D	A1008	3.2	0.02	16.5	1.0	1.0	D	A/D Converter
AMF01	A1007	0.3	-	1.5	-	-	Q	48 CH Mux For ADF01
ASF01	A411	0.7	-	3.5	-	-	D	Samp & Hold for ADF01
AXV11-C	A0026	2.0	0.0	10.0	1.3	1.0	D	16 A/D & 2 CH D/A
BDV11-AA	M8012	1.6	0.1	8.8	2.0	1.0	Q	Boot Term + Diag
BDV11-CA	M8012	1.6	0.1	8.8	2.0	1.0	Q	BDV11-AA + roms
BDV11-BA	M8060-YA	1.6	0.1	8.8	2.0	1.0	Q	roms + Term + Diag
CEV11	M8024							Modular I/O control
CEV11	M8025							Modular I/O control
CMQ11								Card Reader I/F
CMV11-AA	M7181	5.0			1.0	1.0	D	Host Contr For CMR Sys
CMV11-AA	M7182	5.0			1.0	1.0	D	Qbus Contr For CMR Sys
DAV11	M5927						Q	Inter proc buf QBus - UB
DAV11	M7230						D	Inter proc buf QBus - UB
DCQ11-M	M5971	0.9	0.1	5.3	-	-	D	EIA/20ma Conv DHV-DZQ
DDV11-xx								Special b/planes
DEQNA	M7504	3.5	0.5	23.5	2.2	0.5	D	Ethernet I/F
DELQA	M7516	2.7	0.5	19.5	2.2	0.5	D	Ethernet I/F
DELQA-T	M7516-YM	2.7	0.5	19.5	2.2	0.5	D	DELQA turbo
DHQ11	M3107	1.5	0.4	11.0	1.5	1.0	D	8 CH Async Mux
DHV11-A	M3104	4.5	0.5	29.1	2.9	0.5	Q	8 CH Async Mux
DHV11-W		1.3						
DLV11	M7940	1.0	0.2	7.2	2.5	1.0	D	Single SLU + Modem Contr
DLV11-E	M8017	1.0	0.2	6.8	1.3	1.0	D	Asycn Line I/F 20ma & EIA
DLV11-F	M8028	1.0	0.2	7.2	2.2	1.0	D	Async Line I/F 20ma & EIA
DLV11-J	M8043	1.0	0.3	8.0	1.0	1.0	D	4 CH. SLU
DLV11-KA	-	-	0.3	-	-	-	-	20ma Adapter
DLV11-L	M8046						D	DLV11 with Diff Drive
DLVJ1	M8043	1.0	0.3	8.0	1.0	1.0	D	4 CH. SLU
DMV11-AP	M8053-MA	4.7	0.4	28.3	2.0	1.0	Q	sync Contr RS232 / V.28
DMV11-BP	M8053-MA	4.7	0.4	28.3	2.0	1.0	Q	Sync Contr V.35 / DDS
DMV11-CP	M8064-MA	4.4	0.3	25.6	2.0	1.0	Q	Sync Contr with Modem
DMV11-FP	M8053-MA	4.7	0.4	28.3	2.0	1.0	Q	Sync Contr RS423/V24
DPQ11	M7914						Q	Sync line I/F wi fifo
DPV11	M8020	1.2	0.3	9.6	1.0	1.0	D	Serial Sync I/F
DRL11	M8034						Q	48 Ch TTL output
DRV11	M7941	0.9	0.0	4.5	2.8	1.0	D	Parall I/F
DRV11-BP	M7950	1.9	0.0	9.5	3.3	1.1	Q	Gen Purp I/F
DRV11-JP	M8049	1.8	0.0	9.0	2.0	1.0	D	4 Port Paral I/F
DRV11-P	M7948	0.9	0.0	4.5	1.4	1.0	Q	Foundation Mod
DRV11-WA	M7651	1.8	0.0	9.0	2.0	1.0	D	Hi spd par I/F
DRQ11-CF	M7193	1.6	0.0	8.0	4.0	1.0		Alt Buff DMA I/F

Table 14–1 (Cont.): Q-Bus Options

OPTION	MODULE	+5v	+12v	Wa	AC	DC	D/Q	Comments
DRQ11-CH	M7193/4	2.3	0.0	11.5	4.0	1.0		DRQ11-CF + L/L dvr
DRQ11-CJ	M7193	2.9	0.0	14.5	4.0	1.0		DRQ11-CH + Opto Iso
DRQ11-CJ	M5028							DRQ11-CH + Opto Iso
DRQ3B-A	M7658-PA	4.5	0.0	22.5	2.0	1.0	Q	Para I/F
DSV11-M	M3108	5.4	0.7	38.0	3.9	1.0	Q	2 Line sync Com I/F
DUV11-DA	M7951	1.2	0.4	10.4	3.9	1.0	Q	Sync Serial Line I/F
DW11-BF	M8217						Q	U/B to QBus I/F
DW11-BF	M9403						D	U/B to QBus I/F
DZV11-M	M7957	1.2	0.4	10.7	3.9	1.0	Q	4 CH. Async Mux
DZQ11-M	M3106	1.0	0.4	9.3	1.5	1.0	D	4 CH. Async Mux
FPF11-A	M8188	7.5	0.0	37.5	0.0	0.0	Q	Float pt PROC
FX25	M3132	4.0	0.5	25.0	3.3	1.0	Q	2 line sync Contr (BT only)
IAV11-A	A410	1.3	0.0	6.5	1.6	1.0		4 Ch Flying cap
IAV11-AA	A410-YA	1.3	0.0	6.3	1.6	1.0		16 CH. A/D
IAV11-B	A6007	1.5	0.0	7.5	1.4	1.0	D	4 Ch Analog out
IAV11-C	A029	0.2	0.0	1.0	0.0	0.0	D	16 CH. Flying cap MUX
IAV11-CA		0.1	0.0	0.4	0.0	0.0		16 Ch MUX Opto
IBV11	M7954	0.8	0.0	4.0	1.9	1.0	D	IEEE I/F
IBQ01-AA	M3125	5.0	0.0	25.0	4.6	1.0	Q	BIT-BUS I/F
IDV11-A	M5026	2.2	0.0	13.4	2.0	1.0	D	16 Bit Opto I/P
IDV11-B	M6029	0.5	0.0	2.2	1.4	1.0	D	16 BIT Opto O/P
IDV11-C	M8005	0.8	0.0	3.8	2.1	1.0	D	16 Bit Relay O/P
IDV11-D	M7197	0.9	0.0	4.5	2.0	1.0	D	5 Ch Opto Counter
IEQ11-AC	M8634	3.0	0.0	15.0	2.0	1.0	Q	2 x IEEE I/F
IEQ11-AD	M8634	3.0	0.0	15.0	2.0	1.0	Q	2 x IEEE I/F IEC Con
IEZ11-DB		This is not a QBus option but a 3100 SCSI option						
IPQ01	M3125	4.0		25.0				BITBUS TO QBUS I/F
IPV11		0.9	0.2	6.9			Q	QBus to Dbus I/F
IPV12	M7959						Q	QBus to Dbus I/F
IPV14	M7959						Q	IPV12 wi diff s/w
ISV11-C	M8085							DEC-Dataway coms I/F
KA620-AA	M7478-AA	6.2	0.2	32.7	2.7	1.0	Q	rtvax
KA630-AA	M7606-AA	6.2	0.2	32.7	2.7	1.0	Q	mvax2 + 1Mb + Console
KA640	M7624	6.0	0.24	32.9	3.5	1.0	Q	Mayfair 2 CPU
KA650	M7620	6.0	0.14	31.6	2.7	1.0	Q	Mayfair 1 CPU
KA655-AA	M7625-AA	3.7	0.14	21.0	2.2	1.0	Q	38/3900 Multiuser CPU
KA655-BA	M7625-BA	3.7	0.14	21.0	2.2	1.0	Q	38/3900 Single user CPU
KD11-F	M7264	1.8	0.8	18.6	2.4	1.0	Q	LSI-11 With 4Kb RAM
KD11-H	M7264-YA	1.8	0.8	18.6	2.4	1.0	Q	LSI-11 w/out 4Kb RAM
KD32[1]	M7136						Q	MVax1 mem control pcb
	M7135						Q	MVax1 data path G FPA
	M7135-YA	12.0	0.5	66.0	4.0	0.0	Q	MVax1 Data Path D FPA
KDA50-QA[2]	M7164	6.9	0.0	34.6	3.0	0.5	Q	proc pcb RA Disk Contr
	M7165A	6.6	0.03	33.2	-	-	Q	Etch C/D SDI Mod
	M7165A	4.1	0.03	20.7	-	-	Q	Etch E SDI Mod
KDF11-AA	M8186	2.0	0.1	10.3	2.0	1.0	D	11/23

[1]A MicroVax I CPU (KD32) consists of two modules, a Memory Controller and a Data Paths Module. Two variants of Data Path modules can be found ; G-Floating and D-Floating. The figure given is a total for a set using either of the Data Path Modules.

[2]A KDA50 controller consists of two modules, a processor module and an SDI module. Two etch revisions of module can be found ; etch Rev C/D and etch Rev E. Revision C and D draw more five volts current than rev E

Table 14–1 (Cont.): Q-Bus Options

OPTION	MODULE	+5v	+12v	Wa	AC	DC	D/Q	Comments
KDF11-BE	M8189	5.5	0.3	28.7	2.3	1.0	Q	11/23+
KDJ11-AA	M8192-YB	4.5	0.0	22.5	2.0	1.0	D	11/73
KDJ11-BB	M8190-AB	5.5	0.2	29.9	2.3	1.0	Q	11/73 15MHz
KDJ11-BF	M8190-AE	5.5	0.2	29.9	2.3	1.0	Q	11/83 18MHz
KDJ11-DA	M7554-00/01	2.5	0.8	22.1	3.0	1.0	Q	11/53 15MHz 0.5 Mb
KDJ11-DB	M7554-02	2.9	0.2	16.6	3.0	1.0	Q	11/53 15MHz 1.5 Mb
KDJ11-DD	M7554-04	2.9	0.2	16.6	3	1	Q	1153 18MHz 1.5Mb CSS
KDJ11-EA	M8981-AA	4.5	0.6	29.7	1	1	Q	1193 18MHz 2Mb
KDJ11-EB	M8981-BA	4.5	0.6	29.7	1	1	Q	1193 18MHz 4Mb
KFQSA	M7769	5.5	0.0	27.0	3.8	0.5	Q	DSSI Adapter
KLESI	M7740	3.0	0.0	15.0	2.3	1.0	Q	RC25 TU8x RV20 Contr
KMV1A-M	M7500	2.6	0.2	15.4	3.0	1.0	Q	Intelligent Coms Contr
KMV11-B	M7501	2.6	0.2	15.4	3.0	1.0	Q	Barcl Comms Contr
KPV11	M8016	0.1	0.8	10.4	1.6	1.0	D	Pwr Fail/LTC
KRP50	M7552						D	MSCP Contr for RRD50
KRQ50	M7552-00	3.5	0.0	17.5	2.4	0.5	D	RRD40/50 I/F
KRQ50	M7552-YA	3.5	0.0	17.5	2.4	0.5	D	Same wi remov decryption chip
KUV11-AA	M8018	3.0	0.0	15.0	1.4	1.0	Q	Writeable Cont Store
KWV11-A	M7952	1.8	0.01	9.0	3.4	1.0	Q	Prog real time clk
KWV11-C	M4002	2.2	0.13	12.5	1.0	1.0	D	Prog real time clk
KWV11-W	M8636	1.2	0.01	6.1	1.5	1.0	D	Watchdog Timer
KXJ11-CA[3]	M7616A	6.0	1.4	46.8	2.7	1.0	Q	I/O Proc wi DLV11-KA
KXJ11-CA[3]	M7616A	6.0	0.4	30.5	2.7	1.0	Q	I/O Proc W/out DLV11-KA
KXT11-AA	M8063-AA	2.8	1.1	27.2	1.7	1.0	D	SBC-11/21 (Falcon)
KXT11-AB	M7676	2.8	1.1	27.2	1.7	1.0	D	SBC-11/21+ (Falcon+)
KXT11-CA	M8377	5.0	0.06	27.4	2.0	1.0	Q	SBC
KXT11-CA	M8377	5.0	2.0	49.0	2.0	1.0	Q	SBC IF DLV11-KA fitted
KZQSA	M5976-AA							QBus to SCSI TLZ/RRD I/F
LAV11	M7949	0.5	0.0	2.5	1.8	1.0	D	Printer I/F
LNV21-AA	M7138	2.6	0.0	13.0	4.0	1.0	D	Scanner/Print I/F
LPV11	M8027	0.8	0.0	4.0	1.4	1.0	D	LP05/LA180 I/F
LSI-11	M7264	1.8	0.8	18.6	2.4	1.0	Q	SEE "KD11"
LSI 11/2	M7270	1.0	0.2	7.7	1.7	1.0	D	11/03
MCV11-DA	M8631-AA	1.9	0.0	9.5	2.0	1.0	D	8 Kb CMOS wi batt B/U
MCV11-DC	M8631-CA	1.2	0.0	6.0	2.0	1.0	D	32KB CMOS wi batt B/U
MIRA	M7763	2.1	0.0	11.0	3.2	1.0	D	MIRA LOGIC I/F
MRV11-AA	M7942	2.8	0.0	14.0	1.8	1.0	D	ROM (Unpop)
MRV11-BA	M8021	0.6	0.5	9.1	2.8	1.0	D	ROM (UNPOP)
MRV11-C	M8048	0.8	0.0	4.0	2.0	1.0	D	ROM (UNPOP)
MRV11-D	M8578	1.6	0.0	8.0	3.0	0.5	D	ROM (UNPOP)
MRV11-P		1.6	0.0	8.0	3.0	0.5		
MSV11-A	M7943						D	2KB no par
MSV11-B	M7944	0.6	0.3	6.6	1.9	1.0	D	8 KB no par
MSV11-CA	M7955-YA	1.1	0.6	12.0	2.3	1.0	Q	4 KB no par
MSV11-CB	M7955-YB	1.1	0.6	12.0	2.3	1.0	Q	8 KB no par
MSV11-CC	M7955-YC	1.1	0.6	12.0	2.3	1.0	Q	12 KB no par
MSV11-CD	M7955-YD	1.1	0.6	12.0	2.3	1.0	Q	16 KB no par
MSV11-DA	M8044-AA	1.7	0.4	13.0	2.0	1.0	D	8 KB no par
MSV11-DB	M8044-BA	1.7	0.4	13.0	2.0	1.0	D	16 KB no par
MSV11-DC	M8044-CA	1.7	0.4	13.0	2.0	1.0	D	32 KB no par

[3]A KXJ11-CA can have a DLV11-KA attached which increases the +12v current

Table 14–1 (Cont.): Q-Bus Options

OPTION	MODULE	+5v	+12v	Wa	AC	DC	D/Q	Comments
MSV11-DD	M8044-DA	1.7	0.4	13.0	2.0	1.0	D	64 KB no par
MSV11-ED	M8045-DA	2.0	0.4	14.6	2.0	1.0	D	64 KB wi par
MSV11-JD[4]	M8637-DA	3.7	0.1	18.7	2.7	0.5	Q	1 MB PMI FOR 11/83
MSV11-JE[4]	M8637-EA	4.1	0.0	20.5	2.7	0.5	Q	2 MB PMI FOR 11/83
MSV11-LF	M8059-FA	4.0	0.0	20.1	2.0	1.0	D	128 KB wi par
MSV11-LK	M8059-KA	4.0	0.0	20.1	2.0	1.0	D	256 KB wi par
MSV11-MA	M7506-AA	2.2	0.0	11.0	2.0	1.0	D	0.5 MB wi par
MSV11-MB	M7506-BA	2.2	0.0	11.0	2.0	1.0	D	1 MB wi par
MSV11-PF	M8067-FA	2.7	0.4	18.3	2.0	1.0	Q	128 KB wi par
MSV11-PK	M8067-KA	3.5	0.0	17.3	2.0	1.0	Q	256 KB wi par
MSV11-PL	M8067-LA	3.6	0.0	18.0	2.0	1.0	Q	512 KB wi par
MSV11-QA	M7551-AA	3.4	0.0	17.0	2.0	1.0	Q	1 MB wi par
MSV11-QB	M7551-BA	2.0	0.0	10.0	2.0	1.0	Q	2 MB wi par
MSV11-QC	M7551-CA	2.8	0.0	14.0	2.0	1.0	Q	4 MB wi par
MSV11-SA	M7558-AA						D	2 MB wi par
MXV11-AA	M8047-AA	1.2	0.1	7.2	2.0	2.0	D	8 KB + 2 slu + boot
MXV11-AC	M8047-CA	1.2	0.1	7.2	2.0	2.0	D	32 KB + 2 slu + boot
MXV11-BF	M7195-FA	3.4	0.1	16.7	2.3	0.5	D	128 KB + 2 slu + boot
MS630-AA	M7607-AA	1.0	0.0	5.0	-	-	D	1 MB pmi for MVax2
MS630-BA	M7608-AA	1.3	0.0	6.5	-	-	Q	2 MB pmi for MVax2
MS630-BB	M7608-BA	1.8	0.0	9.0	-	-	Q	4 MB pmi for MVax2
MS630-CA	M7609-AA[9]	3.1	0.0	15.3	-	-	Q	8 MB pmi for MVax2
MS650-AA	M7621-AA	3.9	0.0	24.5	-	-	Q	8 MB pmi for MV3xxx
MS650-BA	M7622-AA	3.1	0.0	15.5	-	-	Q	16 MB pmi for MV3xxx
REV11-A	M9400-YA	1.7	0.0	2.2	2.2	1.0	D	120 ohm term + boot
REV11-C	M9400-YC	1.7	0.0	2.2	2.2	1.0	D	ZERO term + boot
RKV11-D	M7269	1.8	0.0	1.9			D	RK11-D/RK05 I/F
RLV11A[5]	M8013						Q	
RLV11A	M8014	6.5	1.0	44.5	3.2	1.0	Q	RL01/RL02 Contr
RLV12	M8061	5.0	0.1	26.2	2.7	1.0	Q	RL01/RL02 Contr
RRD50	M7552	2.7	0.0	13.5	2.4	0.5	D	CD ROM has I/F kRQ50
RQC25	M7740	3.0	0.0	15.0	2.3	1.0	Q	RC25 Contr (see KLESI)
RQDX	M8639						Q	RD,RX Contr
RQDX1	M8639-YA	6.4	0.3	35.0	2.5	1.0	Q	RD,RX Contr
RQDX2	M8639-YB	6.4	0.1	33.2	2.0	1.0	Q	RD,RX Contr
RQDX3	M7555	2.5	0.06	13.2	1.0	1.0	D	RD,RX Contr
RQDX1-E	M7512						D	RQDX1/2 Exp Mod
RQDXE-AA	M7513	0.8	0.0	4.0	1.0	0.0	D	RQDX2/3 Exp Mod
RQZX1								QBus to SCSI Contr
RXV11	M7946	1.5	0.0	7.5	1.8	1.0	D	RX01 I/F
RXV21	M8029	1.8	0.0	9.0	3.0		D	RX02 I/F
TEV11	M9400-YB	0.5	0.0			1.0	D	120 ohm term (no boot)
TQK25	M7605	4.0	0.0	20.0	2.0	1.0	Q	TK25 60 MB I/F
TQK50	M7546	3.0	0.0	15.0	2.0	1.0	D	TK50 I/F
TQK70	M7559	3.5	0.0	17.5	4.3	0.5	D	TK70 I/F
TSV05	M7196	6.5	0.0	32.5	3.0	1.0	Q	TS05 I/F
TU81E-D	M7740	3.0	0.0	15.0	2.3	1.0	Q	TU8x Contr see KLESI

[4]MSV11-Jx memory takes 2.4A at +5v less than this in standby mode. Only one memory PCB should be counted at the higher figure

[5]A RLV11 consists of two modules, M8013 Drive Module and a M8014 Bus Interface Module. The values given are for a pair.

[9] A screened over the top connector should be used.
Part no 17-02174-01

Table 14–1 (Cont.): Q-Bus Options

OPTION	MODULE	+5v	+12v	Wa	AC	DC	D/Q	Comments
VCB01	M7602	4.6	0.1	24.2	3.0	1.0	Q	Video bit map Contr
VCB02A[6]	M7169						Q	
	M7168	9.2	0.8	55.0	3.5	1.0	Q	4 PLANE/16 Colour
VCB02A[6]	M7169						Q	
	2x M7168	12.6	0.8	72.0	3.5	1.0	Q	8 plane/256 Colour
VSV11	M7061-YA	2.8	0.1	15.3	0.0	1.0	Q	VSV11 sync gen
VSV11	M7062	1.7	0.5	31.7	0.0	1.0	Q	VSV11 Image Mem
VSV11	M7064	6.0	0.0	30.0	1.0	1.0	Q	VSV11 Disp Proc
VSV21-AA	M7656	6.0	0.2	31.7	2.0	1.0	Q	Graphics Contr
VTV30-J[7]	2K-EOMAA						Q	VT30 Mem board
VTV30-?	2K-EOMBA	4.7	0.3	26.3		1.0	Q	Contr PCB
VTV30-KA	M7368						D	Pn 2K-EOX3A-00
VTV30-KC	M7370						D	Pn 2K-EOX3A-20

[6]A VCB02 consists of a M7169 Base Module and one or two M7168 four Plane Modules. A total is given for a two board set and a three board set.
[7]A VTV30-J consists of two boards, a Memory Module and a Controller Module. The modules have CSS part numbers, 2K-EOMAA and 2K-EOMBA respectively.

AC loads - 20 per backplane Maximum but see Section 14.1.8
DC loads - 20 per system Maximum

14.1.2 S Box Options

S Box enclosures include the BA213, BA214, BA215 and the BA440. The difference between these options and general QBus Options being that they need front plates attached to the module for FCC regulations and airflow.

Table 14–2: BA213/4/5 and BA440 Options

OPTION	MODULE	+5V	+12V	Wa	AC	DC	D/Q	COMMENTS
	M9060-YA	5.3	0.0	26.5	0.0	0.0	Q	BA2xx LOAD MODULE
AAV11-SA	A1009-PA	1.8	0.0	9.0	2.1	0.5	Q	12 BIT D/A WITH DMA
ADQ32-SA	A030-PA	5.0	0.0	25.0	0.5	2.5	Q	A/D CONVERTER WITH DMA
ADV11-SA	A1008-PA	3.2	0.0	16.0	2.3	0.5	Q	12 BIT A/D WITH DMA
AXV11-SA	A0026-PA	2.0	0.0	10.0	1.2	0.3	Q	16 CH A/D, 2 CH D/A
CXA16-AA	M3118-YA	1.6	0.2	10.4	3.0	0.5	Q	16 CH RS423 MUX
CXB16-AA	M3118-YB	2.0	0.2	10.0	3.0	0.5	Q	16 CH RS422 MUX
CXY08-AA	M3119-YA	1.8	0.3	12.6	3.2	0.5	Q	8 CH RS232 MUX
DEFQA-AS	M7534-AS	5.12	.001	28			Q	FDDI SAS Option 1 PHY led
DEFQA-AD	M7534-AD	5.12	.001	28			Q	FDDI DAS Option 2 PHY leds
DELQA-SA	M7516-PA	2.7	0.5	19.5	2.2	0.5	Q	ethernet I/F
DEQNA-SA	M7504-PA	3.5	0.5	23.5	2.2	0.5	Q	ethernet I/F
DEQRA-CA	M7533-AB	5.0	0.1	21.2	5.0	2.0	Q	Token Ring (TRN)
DESQA-SA	M3127-PA	2.2	0.2	13.4	3.3	0.5	Q	thick/thin enet I/F
DFA01-A	M3121-PA	2.0	0.4	14.7	3.0	1.0	Q	twin modems
DLVE1-SF	M8017-PA							1 ch async I/F
DPV11-SF	M8020-PA	1.2	0.3	9.6	1.0	1.0	Q	RS232 sync I/F
DRQ3B-SA	M7658-PA	4.5	0.0	22.5	2.0	1.0	Q	Hi spd parrallel I/F

Table 14–2 (Cont.): BA213/4/5 and BA440 Options

OPTION	MODULE	+5V	+12V	Wa	AC	DC	D/Q	COMMENTS
DRV1J-SA	M8049-PA	1.8	0.0	9.0	2.0	1.0	Q	parallel I/F
DRV1W-SA	M7651-PA	1.8	0.0	9.0	2.0	1.0	Q	gen purp DMA I/F
DSV11-SA	M3108-PA	5.4	0.7	38.0	3.6	1.0	Q	2 line sync I/F
DTQNA-BA	M7130-00							map I/F token - Q22
DTC05-SA	DTC05-SA	4.0	0	15.8	3.6	.75	Q	DECvoice base module
DTCN5-UG	DTCN5-UG	7.17	0	35.8	7.0	1.5	Q	DECvoice line module
DZQ11-SA	M3106-PA	1.0	0.4	9.3	1.4	0.5	Q	RS232 4 ch async mux
H3600-SA	70-23988-01		Powered from KA module					Fr Panel for KA650/655
H3602-SA [5]	70-25775-01		Powered from KA module					Fr Panel for KA640/KA660
H3602-?? [5]	70-25775-02		Powered from KA module					Fr Panel for KN210
H3602-AC [5]	70-25775-03		Powered from KA module					Fr Panel for KN220
H3604[3]	70-27400-01	1.7	0.5	17.5	-	-	-	Fr Panel for KA670
	54-19787-01						S	DSSI I/F for KA670
H3605	70-27464		Powered from KA module					SCSI distr panel for KN220
IBQ01-SA	M3125-PA	5.0	0.0	25.0	4.6	1.0	Q	BIT-BUS I/F
IAV1S-A	A410-P0	1.3	0.0	6.5	1.6	1.0	Q	Analog I/P mod
IAV1S-AA	A410-PA	1.25	0.0	6.5	1.6	1.0	Q	Analog I/P mod non-opto
IAV1S-B	A6007-P0	1.5	0.0	7.5	1.4	1.0	Q	Analog O/P mod
IAV1S-C	A029-P0	0.2	0.0	1.0	0.0	0.0	Q	16 Ch Mux mod
IAV1S-CA	A029-PA	0.08	0.0	0.4	0.0	0.0	Q	16 Ch Mux non-opto
IDV1S-A	M5026-P0	0.7	0.0	3.6	2.0	1.0	Q	Digital I/P
IDV1S-B	M6029-P0	0.4	0.0	2.2	1.4	1.0	Q	Digital O/P
IDV1S-C	M8005-P0	0.8	0.0	3.8	2.1	1.0	Q	Relay O/P
IDV1S-D	M7197-P0	0.9	0.0	4.5	2.0	1.0	Q	5 Ch Counter
IEQ11-SA	M8634-PA	3.5	0.0	17.5	2.0	1.0	Q	Q22 TO IEEE I/F
IPV11-SA	M7959-SA						Q	Q22 TO D BUS I/F
KA640-AA	M7624-A	6.0	0.3	32.9	3.5	1.0	Q	3400 cpu Multi-User
KA640-BA	M7624-A	6.0	0.3	32.9	3.5	1.0	Q	3400 cpu Single-User
KA640-C	M7624-C	6.0	0.3	32.9	3.5	1.0	Q	3400 cpu wi 1Mb RAMs
KA650-AA	M7620	6.0	0.2	31.6	2.7	1.0	Q	MAYFAIR I CPU Multi-User
KA650-BA	M7620	6.0	0.2	31.6	2.7	1.0	Q	MAYFAIR I CPU Single-User
KA655	M7625-AA	3.7	0.14	21	2.2	1.0	Q	Faster KA650 for 38/3900
KA660-AA	M7626-AA							Spitfire 4200 CPU Multi us
KA660-BA	M7626-BA							Spitfire 4200 CPU Sing us
KA670-A/B[4]	L4001-CA	7.4	0.35	41.2	4	1	Q	4300 CPU /B is server
KA675-AA	L4002-CA						Q	4400 cpu
KA680-A/B [4]	L4002-BA						Q	4500 CPU /B is server
KA690-AA	L4002-AA						Q	4600 cpu
KA681-AA	L4005-BA						Q	4500A cpu
KA691-AA	L4005-AA						Q	4600A cpu
KA692-AA	L4006-AA						Q	4700A cpu
KFDDB-AA	54-20569-01						Q	4x00A 2 x DSSI daught pcb
KDA50-SA[1]	M7164	6.9	0.0	34.6	3.0	0.5	Q	PROC MOD RAxx disk contr
	M7165	4.1	0.03	20.7	-	-	Q	SDI (rev E) RAxx disk contr
KDJ11-SA	M7554-PA	2.5	0.8	22.1	3.0	1.0	Q	1153 0.5Mb 15Mhz
KDJ11-SC	M7554-SC	2.9	0.2	16.6	3.0	1.0	Q	1153 1.5Mb 15Mhz

[1] A KDA50 consists of two modules, the Processor Module and an SDI Module. The revision of the SDI module when used on a MV3xxx system must be revision E or greater

[3] Also -12v at 0.25A = 3W

[4] Also 3.4v at 0.27A and -12v at 0.04A = 9.5W

[5] The only difference between these is the cable plugs.

The -01 variant has one 40 way plug.
The -02 variant has two 40 way plugs.
The -03 variant has one 50 way plug.

They all use 40 way cable and the cables can be interchanged by dismantling the H3602.

Table 14–2 (Cont.): BA213/4/5 and BA440 Options

OPTION	MODULE	+5V	+12V	Wa	AC	DC	D/Q	COMMENTS
KFQSA-SA	M7769	5.5	0.0	27.5	4.4	0.5	Q	DSSI Adapter
KLESI-SA	M7740-PA	4.0	0.0	20.0	2.3	1.0	Q	TU8x RV20 Contr
KMV1A-SA	M7550-PA	2.6	0.2	15.4	3.0	1.0	Q	Intellig Comms Contr
KMV11-B	M7501	2.6	0.2	15.4	3.0	1.0	Q	Barcl Comms Contr
KN210	M7635-AA	4.5	0.13	25	3.5	1.0	Q	DS5400 CPU
KN210	M7636-AA	5.0	0.23	29	0	0	Q	DS5400 CPU I/O
KN220	M7637-AA		0.14		3.5	1	Q	DS5500 CPU
KN220	M7638-AA				0	0	Q	DS5500 CPU I/O
KRQ50-SA/F	M7552-PA	3.5	0.0	17.5	2.4	0.5	Q	RRD40 CDROM I/F
KWV11-SA	M4002-PA	2.2	0.1	11.15	1.0	0.3	Q	Prog real time Clk
KXJ11-SF	M7616[2]	6.0	1.4	46.8	2.7	1.0	Q	I/O Processor
KZQSA	M5976-SA							QBus to SCSI TLZ/RRD I/F
LNV21-SF	M8087	2.6	0.0	13.0	4.0	0.5	Q	print/scanner I/F
LPV11-SA	M8086-PA	2.8	0.0	14.0	1.8	0.5	Q	2 Ch Print I/F
MRV11-D	M8678	1.6	0	8	3	0.5		PROM unpopulated
MS220-AF	M7639-AA							32Mb ECC mem for DS5500
MS220-BF	M7639-BA							64Mb ECC mem for DS5500
MS650-AA	M7621-AA	2.7	0.0	13.5	-	-	Q	8 MB PMI FOR MV3xxx
MS650-BA	M7622-AA	3.1	0.0	15.5	-	-	Q	16Mb PMI for MV3xxx
MS670-BA	L4001-BA	3.25	0	16.25	-	-	Q	32Mb 4000 mem
MS690-AA	L4001-AA						Q	16Mb Mem for Mariahs
MS690-BA	L4004-BA						Q	32Mb Mem for NVAX
MS690-CA	L4004-CA						Q	64Mb Mem for NVAX
MS690-DA	L4004-DA						Q	128Mb Mem for NVAX
TQK50-SA	M7546	2.9	0.0	14.5	2.8	0.5	D	TK50 Contr
TQK70-SA	M7559	3.5	0.0	17.5	4.3	0.5	D	TK70 Contr
TSV05-SA	M7206-PA	6.5	0.0	32.5	3.0	1.0	Q	Old TS05 Contr
TSV05-PA	M7530-PA	6.5	0	32.5	1.5	1.0	Q	New TS05 Contr

[2]This is the same module number as the non S box variant because it uses same with a separate cover over 2 slots (H3603) the second slot has a quad grant card 70-28193-01

AC loads - 20 per backplane Maximum but see Section 14.1.8
DC loads - 20 per system Maximum

14.1.3 QBus Options (all) in part number order

If the engineer is presented with a QBus with lots of strange options (or is unfamiliar with QBus options in general) then this list will act as a cross reference to the 2 previous tables.

Table 14–3: Numerical list of QBus Options - cross reference

Part No	Option	Part No	Option
2K-EOMAA	VTV30-J	M7555	RQDX3
2K-EOMBA	VTV30-?	M7558-AA	MSV11-SA
54-19787-01		M7559	TQK70
54-20569-01		M7559	TQK70-SA
70-23988-01	H3600-SA	M7602	VCB01
70-25775-01	H3602-SA	M7605	TQK25
70-25775-02	H3602-??	M7606-AA	KA630-AA

Table 14–3 (Cont.): Numerical list of QBus Options - cross reference

Part No	Option	Part No	Option
70-25775-03	H3602-AC	M7607-AA	MS630-AA
70-27400-01	H3604	M7608-AA	MS630-BA
70-27464	H3605	M7608-BA	MS630-BB
A0026	AXV11-C	M7609-AA	MS630-CA
A0026-PA	AXV11-SA	M7616	KXJ11-SF
A012	ADV11-A	M7616A	KXJ11-CA
A029	IAV11-C	M7616A	KXJ11-CA
A029-P0	IAV1S-C	M7620	KA650
A029-PA	IAV1S-CA	M7620	KA650-BA
A030	ADQ32-A	M7620	KA650-AA
A030-PA	ADQ32-SA	M7621-AA	MS650-AA
A1007	AMF01	M7621-AA	MS650-AA
A1008	ADV11-D	M7622-AA	MS650-BA
A1008-PA	ADV11-SA	M7622-AA	MS650-BA
A1009	AAV11-D	M7624	KA640
A1009-PA	AAV11-SA	M7624-A	KA640-BA
A410	IAV11-A	M7624-A	KA640-AA
A410-P0	IAV1S-A	M7624-C	KA640-C
A410-PA	IAV1S-AA	M7625-AA	KA655-AA
A410-YA	IAV11-AA	M7625-AA	KA655
A411	ASF01	M7625-BA	KA655-BA
A6001	AAV11-A	M7626-AA	KA660-AA
A6006	AAV11-C	M7626-BA	KA660-BA
A6007	IAV11-B	M7635-AA	KN210
A6007-P0	IAV1S-B	M7636-AA	KN210
A6009	AAF01-A	M7637-AA	KN220
A8000	ADV11-C	M7638-AA	KN220
A814	ADF01-B	M7639-AA	MS220-AF
DTC05-SA	DTC05-SA	M7639-BA	MS220-BF
DTCN5-UG	DTCN5-UG	M7651	DRV11-WA
G5148	TU58 cntl	M7651-PA	DRV1W-SA
L4001-AA	MS690-AA	M7656	VSV21-AA
L4001-BA	MS670-BA	M7658-PA	DRQ3B-SA
L4001-CA	KA670-A	M7658-PA	DRQ3B-A
L4002-AA	KA690-AA	M7676	KXT11-AB
L4002-BA	KA680-A/	M7740	KLESI
L4002-CA	KA675-AA	M7740	RQC25
L4004-BA	MS690-BA	M7740	TU81E-D
L4004-CA	MS690-CA	M7740-PA	KLESI-SA
L4004-DA	MS690-DA	M7763	MIRA
L4005-AA	KA691-AA	M7769	KFQSA-SA
L4005-BA	KA681-AA	M7769	KFQSA
L4006-AA	KA692-AA	M7914	DPQ11
M3104	DHV11-A	M7940	DLV11
M3106	DZQ11-M	M7941	DRV11
M3106-PA	DZQ11-SA	M7942	MRV11-AA
M3107	DHQ11	M7943	MSV11-A
M3108	DSV11-M	M7944	MSV11-B
M3108-PA	DSV11-SA	M7946	RXV11
M3118-YA	CXA16-AA	M7948	DRV11-P
M3118-YB	CXB16-AA	M7949	LAV11
M3119-YA	CXY08-AA	M7950	DRV11-BP
M3121-PA	DFA01-A	M7951	DUV11-DA
M3125	IBQ01-AA	M7952	KWV11-A

Table 14–3 (Cont.): Numerical list of QBus Options - cross reference

Part No	Option	Part No	Option
M3125	IPQ01	M7954	IBV11
M3125-PA	IBQ01-SA	M7955-YA	MSV11-CA
M3127-PA	DESQA-SA	M7955-YB	MSV11-CB
M3132	FX25	M7955-YC	MSV11-CC
M4002	KWV11-C	M7955-YD	MSV11-CD
M4002-PA	KWV11-SA	M7957	DZV11-M
M5026	IDV11-A	M7959	IPV14
M5026-P0	IDV1S-A	M7959	IPV12
M5028	DRQ11-CJ	M7959-SA	IPV11-SA
M5927	DAV11	M8005	IDV11-C
M5971	DCQ11-M	M8005-P0	IDV1S-C
M5976-AA	KZQSA	M8012	BDV11-AA
M5976-SA	KZQSA	M8012	BDV11-CA
M6029	IDV11-B	M8013	RLV11A
M6029-P0	IDV1S-B	M8014	RLV11A
M7061-YA	VSV11	M8016	KPV11
M7062	VSV11	M8017	DLV11-E
M7064	VSV11	M8017-PA	DLVE1-SF
M7130-00	DTQNA-BA	M8018	KUV11-AA
M7135	KD32	M8020	DPV11
M7135-YA	KD32	M8020-PA	DPV11-SF
M7136	KD32	M8021	MRV11-BA
M7138	LNV21-AA	M8024	CEV11
M7164	KDA50-QA	M8025	CEV11
M7164	KDA50-SA	M8027	LPV11
M7165	KDA50-SA	M8028	DLV11-F
M7165A	KDA50-QA	M8029	RXV21
M7165A	KDA50-QA	M8034	DRL11
M7168	VCB02A	M8043	DLVJ1
M7168	VCB02A	M8043	DLV11-J
M7169	VCB02A	M8044-AA	MSV11-DA
M7169	VCB02A	M8044-BA	MSV11-DB
M7181	CMV11-AA	M8044-CA	MSV11-DC
M7182	CMV11-AA	M8044-DA	MSV11-DD
M7193	DRQ11-CJ	M8045-DA	MSV11-ED
M7193	DRQ11-CF	M8046	DLV11-L
M7193/4	DRQ11-CH	M8047-AA	MXV11-AA
M7195-FA	MXV11-BF	M8047-CA	MXV11-AC
M7196	TSV05	M8048	MRV11-C
M7197	IDV11-D	M8049	DRV11-JP
M7197-P0	IDV1S-D	M8049-PA	DRV1J-SA
M7206-PA	TSV05-SA	M8053-MA	DMV11-FP
M7230	DAV11	M8053-MA	DMV11-BP
M7264	KD11-F	M8053-MA	DMV11-AP
M7264	LSI-11	M8059-FA	MSV11-LF
M7264-YA	KD11-H	M8059-KA	MSV11-LK
M7269	RKV11-D	M8060-YA	BDV11-BA
M7270	LSI 11/2	M8061	RLV12
M7368	VTV30-KA	M8063-AA	KXT11-AA
M7370	VTV30-KC	M8064-MA	DMV11-CP
M7478-AA	KA620-AA	M8067-FA	MSV11-PF
M7500	KMV1A-M	M8067-KA	MSV11-PK
M7501	KMV11-B	M8067-LA	MSV11-PL
M7501	KMV11-B	M8085	ISV11-C

Table 14–3 (Cont.): Numerical list of QBus Options - cross reference

Part No	Option	Part No	Option
M7504	DEQNA	M8086-PA	LPV11-SA
M7504-PA	DEQNA-SA	M8087	LNV21-SF
M7506-AA	MSV11-MA	M8186	KDF11-AA
M7506-BA	MSV11-MB	M8188	FPF11-A
M7512	RQDX1-E	M8189	KDF11-BE
M7513	RQDXE-AA	M8190-AB	KDJ11-BB
M7516	DELQA	M8190-AE	KDJ11-BF
M7516-PA	DELQA-SA	M8192-YB	KDJ11-AA
M7516-YM	DELQA-T	M8217	DW11-BF
M7530-PA	TSV05-PA	M8377	KXT11-CA
M7533-AB	DEQRA-CA	M8377	KXT11-CA
M7534-AD	DEFQA-AD	M8578	MRV11-D
M7534-AS	DEFQA-AS	M8631-AA	MCV11-DA
M7546	TQK50-SA	M8631-CA	MCV11-DC
M7546	TQK50	M8634	IEQ11-AD
M7550-PA	KMV1A-SA	M8634	IEQ11-AC
M7551-AA	MSV11-QA	M8634-PA	IEQ11-SA
M7551-BA	MSV11-QB	M8636	KWV11-W
M7551-CA	MSV11-QC	M8637-DA	MSV11-JD
M7552	KRP50	M8637-EA	MSV11-JE
M7552	RRD50	M8639	RQDX
M7552-00	KRQ50	M8639-YA	RQDX1
M7552-PA	KRQ50-SA	M8639-YB	RQDX2
M7552-YA	KRQ50	M8678	MRV11-D
M7554-00/01	KDJ11-DA	M8981-AA	KDJ11-EA
M7554-02	KDJ11-DB	M8981-BA	KDJ11-EB
M7554-04	KDJ11-DD	M9058	BA123 RQDX Distr
M7554-PA	KDJ11-SA	M9060-YA	BA2xx Load Mod
M7554-SC	KDJ11-SC	M9400-YA	REV11-A
		M9400-YB	TEV11
		M9400-YC	REV11-C
		M9403	DW11-BF

14.1.4 Devices that can be located in CPU type Enclosures

This table and section has been moved to Chapter 16 Small Devices, please refer to that for power consumption.

14.1.5 Non Digital Q-Bus Options

This list is by no means complete. Figures for non digital options can be particularly hard to come by, so this list is particularly valuable.

See also the VES Chapter for some related information

Table 14–4: Non Digital Q-Bus Options

OPTION	PART NO	+5V	+12V	AC	DC	Q/D	COMMENTS
	Badel						
CTS.11	+L-42449						CONTROLLER
STS.11	+L-41007	4.0					CONTROLLER
540.CT	+L-41008	2.2	1.8				TAPE DRIVE
	CDC[4]						
94166-182	FD-15785-05	1.0	2.3				180Mb Wren III ESDI bus
94161-155		1.3	2.4				150Mb Wren III SCSI bus
94171-300	FD-12546-01						300Mb
94181-385H	FD-15241-03						320Mb Seagate SCSI
94181-385HD	FD-15241-04						320Mb Seagate SCSI
94181-702	FD-15241-01						600Mb Seagate SCSI
94601-12G	FD-16267-01						1.2Gb Seagate SCSI
	CMD						
CQD 220/M[3]	FD-15607-01	2.3	-	2.5	1	D	SCSI disk only
CQD 220/T[3]	FD-15608-01	2.3	-	2.5	1	D	SCSI tape only
CQD 220/TM[3]	FD-15609-01	2.3	-	2.5	1	D	SCSI tape and disk
	Dataram						
4Mb		1.8					
	DSD						
DSD8836	29-80335	3.0					
	Dilog						
DQ100		3.5					RK05 14"
DQ120		3.5					TM11 0.5"
DQ130	29-80800	3.6					TS11/TU80/TSV05
DQ132	29-80801	4.0	-	1	1		
DQ142	+L-43601						Cipher M990 Tape I/f
DQ202A	+L-13054	3.5	0.3	1	1		RP02/RP03
DQ214		3.5	0.3	1	1		RL01/RL02
DQ215	+L-40462	3.5	0.3	1	1		RK06/RK07
DQ228	+L-40365	3.5	0.3	1	1		RM02/RM05/RM80
DQ236	+L-43745						
DQ256	FD-10481-01						
DQ342		3.5					TS11/TU80/TSV05 0.25"
DQ404		3.5		1	1		RL01/RL02 8"
DQ409A	+L-10032	2.3		1	1		
DQ413		3.5		1	1		RP02/RP03 8" & 14"
DQ414		3.5		1	1		RL01/RL02 8" & 14"

[3] The 223 versions are the same as the 220 versions except that the 223 versions include an S-Box(BA2xx or BA4xx) adapter kit. These are FD-15610/1/2-01 for the disk/tape/disk and tape adapters accordingly

[4] See the VES chapter for more information on these devices

Table 14–4 (Cont.): Non Digital Q-Bus Options

OPTION	PART NO	+5V	+12V	AC	DC	Q/D	COMMENTS
	Dilog						
DQ419		2.3		1	1		RX02 8"
DQ444		3.5		1	1		RL01/RL02
DQ604E	+L-10033						
DQ614	+L-40463	3.5	0.3	1	1		RL01/RL02 5.25"
DQ615	+L-40862	4.0	0.3	1	1		RK06/RK07 5.25"
DQ619		2.3		1	1		RX02 5.25"
DQ634		3.5	0.3	1	1		RL01 5.25"
DQ656	FD-13123-01						
DQ686	FD-11873-01						QBus ESDI Contr
DQ696	FD-11872-01	2.5		1	1	D	MSCP RA8x to ESDI bus
SQ706	FD-12420-01	2.5	-				SCSI I/F
TS0100		3.6		1	1		
	Excelan						
EXOS203	29-81976	5.0	0.6				Ethernet I/F
	Emulex						
CS01(CC01)	29-80837	4.0				Q	16 ASYNC LINES DH11/DM11
CS02(CC02)	29-81205	6.2	0.5	1	1	Q	16 ASYNC LINES DHV11
DM01		2.6				D	RQDX to ST506 bus
DM02		2.6				D	RQDX to ESDI bus
QD01/D	29-81707	2.6				D	KDA50 to ST506 bus
QD21	29-81764-00	2.6	-	2.5	1	D	MSCP ESDI BUS
QD24	FD-14279-01	2.5					KDA50 to ESDI bus
QD32	29-81705	2.6		2.5	1	D	MSCP SMD BUS
QD33	FD-10354	2.6		2.5	1	D	MSCP SMD BUS
QD34	FD-14612-01	3.25				Q	MSCP SMD 4 disks S Box
QD35	FD-15442-01	6.3				Q	MVAX2 MSCP/SMD 4 Drives
QD35-3	FD-15443-01	6.3				Q	S-Box MSCP/SMD 4 Drives
QT13	FD-13935-01	2.5	-	2.5	1	D	TSV05 or TMSCP Emul
QT14	FD-13936-01	2.5				Q	TSV05 or TMSCP S Box
SC02-BX	29-80413	5.7		1	1	Q	RK611-RK06/07 EMULATION
SC03-CX	29-80063	8.0		1	1	Q	RH11/70-RM02/3/5 EMULATION
TC02-FS	29-80097	6.0				Q	TS11 PE EMULATION
TC03	29-81829-00	6.0	-	-	-	Q	TS11 PE/GCR EMULATION
TC05	29-81024	6.0					
UC02	29-81019	4.8					
UC04		2.6	-	2.5	1	D	INTELLIGENT HOST ADAPTER
UC07[4]	FD-15065-01					Q	One SCSI for non S-Box
UC07-111[4]	FD-15067-01					Q	One SCSI for S-Box
UC08[4]	FD-15066-01					Q	Two SCSIs for non S-Box
UC08-111[4]	FD-15113-01					Q	Two SCSIs for S-Box
	Exabyte						
Drive	FD-13213-01						Exabyte 820010-000 8mm Tape
8000W/8210 Encl	FD-17288-01						Pow Sup + Encl

[4] See the VES chapter for more information on these devices

Table 14–4 (Cont.): Non Digital Q-Bus Options

OPTION	PART NO	+5V	+12V	AC	DC	Q/D	COMMENTS
	Fujitsu						
	See Table 14–5						
	Hitachi[2]						
DK312C-20	FD-17628-01	1.2	2.4				SCSI 3.5" 209 Mb
DK314C-41	Non yet	0.6	0.8				SCSI 3.5" 450 Mb
DK312C-25	FD-17628-02	1.2	2.4				SCSI 3.5" 251 Mb
DK514-38	FD-14297-01	1.2	4.5				ESDI 5.25" 382 Mb
DK514C-38	+L-44405	1.2	4.5				SCSI 5.25" 382 Mb
DK515-78	FD-16404-01	2.5					ESDI 5 1/4" 780 Mb
DK515C-78	FD-16404-02	2.5					SCSI 5 1/4" 780 Mb
DK516-12/13	FD-21928-01	1.5	3.0				ESDI 5 1/4" 1.23 Gb
DK516-15	FD-21929-01	1.5	3.0				ESDI 5 1/4" 1.53 Gb
DK516C-16	FD-21930-01	1.5	3.0				SCSI 5 1/4" 1.34 Gb
DK517C-26	Unkn	1.6	3.2				SCSI 5 1/4" 2.05 Gb
DK517C-37	Unkn	1.6	3.2				SCSI 5 1/4" 2.87 Gb
	GRC						
BA/X3 BOX	+L 40530	20.0	3.4				PS CAN SUPPLY
MLV11	+L 40624	1.6	0.1	1	1		
MSV11-Q	+L 40886	6.0		2	1		1 MB
MSV11-R	+L 42020	6.0		2	1		4 MB
MWV11	+L 40531	4.3					
TBC MODULE		1.0	0.1				
	Gresham Lion						
SBD		4.5	0.3	1	1		SINGLE BOARD DISPLAY
SBD		4.5	1.3	1	1		WITH KEYBOARD
	Maxtor						
EXT-4380[1]	29-81860-00[1]						ESDI 382 Mb complete Dr
	29-81861-00						Logic Pcb for EXT-4380
XT-4380-E	FD-14410-01						ESDI 380Mb Complete Dr
	FD-14411-01						PCB for XT-4380-E
XT-4380-S	FD-14412-01						SCSI 380Mb complete Dr
	FD-14413-01						PCB for XT-4380-S
XT-8760-E	FD-14414-01						SMD Disk 600 Mbyte
	FD-14415-01						PCB for 8760-E
XT-8760-S	FD-14416-01						SCSI 600Mb complete Dr
	FD-14417-01						PCB for 8760-S

[1] The EXT-4380 parts are reputed to be no longer available. The EXT-4380 disk should be replaced by an XT-4380-E if it goes wrong. There should be no difference to the operation by doing this.

[2] The naming strategy for Hitachi disks can be demonstrated by the following

DK514-38 ... ESDI interface
DK514S-38S ... SMD interface single port
DK514S-38D ... SMD interface dual port
DK514C-38 ... SCSI interface

Table 14–4 (Cont.): Non Digital Q-Bus Options

OPTION	PART NO	+5V	+12V	AC	DC	Q/D	COMMENTS
	Micropolis						
1355	29-81870 29-81877/8/9						Disk 170 Mbyte ESDI Logic/Motor/preamp for 1355
	National Semiconductor						
NS23R NS630	+L 40345	4.0					MEMORY 4Mb MVAX 2 Memory
	Oxford Automation						
QLCM	+L 40479	2.5	0.1				
	Rodime						
200 SERIES 204E	+L 40863	0.65	2.0				WINCHESTER DISK DRIVE 40 MB DISK DRIVE
	Seagate						
	See CDC and the VES Chapter for these details						
	Sigma						
QDE 11SC		3.5	0.4	1	1		
SPC-LPV11	29-81904-00	1.0	-			D	Printer controller
SDC-RQD11	29-81903-00	3.5	-			Q	Disk Controller ESDI Bus
PEC b/plane	FD-10226-00					Q	Backplane as per XPS sys
PEC P.S.	29-81905-00	50.0	14.0				Pow Sup for above
	Transitional Technology (TTI)						
QTS-1	+L-44424		-			Q	Exabyte SCSI I/F BA23
QTS-3	+L-44429		-			Q	Exabyte SCSI I/F S-Box
	US Design						
HA1108E	+L-43947	-	-	-	-	Q	BA23 style SCSI I/F
HA1109	+L43949		-			Q	S-Box SCSI cont
	Viking						
QTO	FD-13220-01	2.8	-	2	1	Q	Exabyte SCSI I/F norm one
QTA	FD-13221-01	2.8	-	2	1	Q	Exabyte only SCSI I/F
QDT	FD-13216-01	2.8	-	2	2		Disk + Tape SCSI I/F

Table 14–5: Fujitsu Devices

Disk	Dia	Bus	Mbytes	+5v[2]	+12v[2]	FS-FUJ[3]	Part Nos/comments
M2227	5 1/4	ST506	51	.45	.42	-	
M2241	5 1/4	ST506	24				
M2242	5 1/4	ST506	55	1.8	1.6	20-AA	+L-42215
M2243	5 1/4	ST506	86	1.8	1.6	07-AA	29-81041 /+L-F2243
M2246e/s	5 1/4	ESDI/SCSI	172	1.8	1.6/2.0	16-AA	FD-11976-01
M2249e/s	5 1/4	ESDI/SCSI	389	1.8	1.6/2.0	49-TA/AA	FD-13413-01 /FD-13414-01
M2263e/s	5 1/4	ESDI/SCSI	778	1.6/1.8	1.6	09-RA/RB	FD-16800-01/FD-19500-01
M2266s/h	5 1/4	SCSI-1/2	1000	-	5.0	09-RH	TL-44563
M2280	14					80-AA	29-80787
M2284n[1]	14	SMD	168		Mains	84-AA	Many Parts/29-80763
M2311	8		49			11-AA	RSL
M2312[1]	8	SMD	84	3.0	3.5	12-AA	29-80494
M2321						UK324-AA	RSL
M2322k	8	SMD	169	3.5	3.0	22-AA	29-81080
M2333k/s	8	HSMD	337	4.5	3.5	05-AA	29-81297
M2343[1]	8	HSMD	690	3.5	3.5	07-RA	Obsolete
M2344k/s	8	HSMD	690	3.5	3.5	17-RA	FD-11945-01
M2350	19	MSMD	474		Mains		Eagle
M2351a[1]	19	MSMD	474		Mains	51-AA	Eagle 29-80427
M2360	19	HSMD	689		Mains		Super Eagle
M2361a	19	HSMD	689		Mains	61-AA	+L-F2361 Super Eagle
M2372k/s	8	MSMD	823	3.5	3.5	72-AA	FD-14472-01
M2380a	8	ESMD	1000		Mains		
M2382k	8	ESMD	1000	3.5	1.5	82-AA	FD-14477-01
M2392d/k	8	ESMD	1842/2027		Mains	39-RC/RB	+L-44431/+L-44430
M2611s/sa/sb	3 1/2	SCSI	45	.45	1.0	-	FD-19786/78/79-01
M2612s/sa/sb	3 1/2	SCSI	90	.45	1.0	-	FD-19787/80/81-01
M2613s/sa/sb	3 1/2	SCSI	136	.45	1.0	52-RB	FD-19788/82/83-01
M2614s/sa/sb	3 1/2	SCSI	182	.45	1.0	53-RB	FD-19789/84/85-01

Tape	Type	Bus	Mbytes	+5v	+12v	FS-FUJ	Part No/comments
M1016ad	IBM 3480	SCSI-2	-		Mains	54-RA	RSL 6xPCBs
M1016a	IBM 3480	SCSI-1	-		Mains	38-TB	RSL 6xPCBs
M2444	GCR	Pertec	140		Mains	19-AA	RSL/19 19 inch TU81 type
M2481	IBM 3480	SCSI	200	5.0	2.0		Drive FD-16798-01/ PS FD-16799-01

Printer			
M3040/1/2/3	300/600/900/1200 LPM	09-AD/A/B/C/D	LARGE PRINTERS

[1] These drives are obsolete or being phased out

[2] Power is only really of interest to 5 1/4 form factor devices other sized devices may also use +24v, -5v and -12v

[3] This is the LARs code i.e. a 07-AA in this column means a code of FS-FUJ07-AA should be used

14.1.6 System Enclosures

Table 14–6: System Enclosures

BOX	+5V MAX	+12V MAX	WATTS MAX	B/PLANE P/N	QBus ... M/S Slots ... Slots	P.S.	# OF Regs	P.S. P/N
BA11-M	18	3.5	110	H9270	4 0	H780	1	
BA11-N	22	11.0		H9273	9 0	H786	1	
BA11-S	36	5.0		H9276	9 0	H7861	1	
BA11-V	5.6	1.6						
BA23-A	36	6.0	230	H9278	8 2	H7864	1	30-20444-00
BA23-A	36	7.0	230	H9278	8 2	H7864-A[3]	1	30-21749-01
BA23-A	36	7.0	250	H9278	8 2	H7864-B[3]	1	30-21749-00
BA123	72	14.0	460	54-17507-01	12+1[1] ... 5		2	30-23616-01
BA213	66	14.0	460	70-23712-01	12 3	H7868-B	2	70-24227-03
BA214	33	7.0	230	54-17213-01	6 0	H7868-B	1	70-24227-03
BA215	33	7.0	230	70-25447-01	6 2	H7868-B	1	70-24227-03
BA430					12 4			
BA440 [4]	60	22	600	54-19354-01	7 4	H7874[4]	1	H7874[4]
				QBus Expansion Enclosures				
BA23-C				Same as BA23-A above could be any of 3				
B213F	66	15.2	460	70-23712-01	12 3	H7868-B	2	70-24227-03
B400X								
				Disk Expansion Enclosures				
R215F	33	7.0	230	n/a [2]	0 3	H7868-B	1	70-24227-03
R400X	60	22	600	n/a[2]	0 7	H7874 [4]	1	H7874 [4]
R23RF [5]				n/a[2]	0 2		1	
R23RZ [5]				n/a[2]	0 2		1	

[1] 1 slot (13th) is used for M9058 distribution board

[2] These ISE expansion enclosures have not got a QBus b/plane

[3] Order the same P.S. that was removed. However the H7864-A and H7864-B are interchangeable. The difference is in the manufacturer, and the maximum power. To change from a straight H7864 to a A or a B the air baffle on the fan has to be altered, kit A2-M1226-10 is required. See BA23-TT-03.
The power harness for the power supply should also be the uprated type (causes hangs and traps to 4) order EQ-01427-01

[4] The H7874 also supplies 3.4v with Max of 15A and -12v with a Max of 4A. There is a further restriction of 330W on the 3.4v + 5v rails.

[5] These are removable disk enclosures for the RF and RZ drives.

Notes

** Total power used on any regulator must not exceed the stated maximum. This means that maximum current at +5V and +12V cannot be drawn at the same time. For boxes with more than one regulator, ensure power loading is distributed in accordance with the configuration guidelines for that specific box.*

** When calculating the total current and power of a system, any mass storage devices connected to the system box should also be included. For system enclosures with more than one regulator, consult the configuration guidelines in the appropriate manual for details on power distribution.*

14.1.7 Backplanes

Table 14–7: Backplanes

B/PLANE P/N	USED IN	SLOTS	18/ 22	TERM[1]	SLOT DESCRIPTION[1]
H9270	BA11-M	4	18	0	Slots 1-4 CD
H9270-Q	BA11-M	4	22		Slots 1-4 zigzag
H9273-A	BA11-N	9	18	0	Slots 1-9 CD
H9274-A	VT103	4	18		Slots 1-4 Up-Down
H9275-A	BA11-S	9	22	120	Slots 1-9 zigzag
H9276-A	BA11-S	9	22	0	Slots 1-9 CD
H9278-A	BA23	8	22	220 R	Slots 1-3 CD then Slots 4-8 zigzag
54-17507-01	BA123	12+1[2]	22	220 R	SLOTS 1-4 CD then Slots 5-12 zigzag then Slot 13 : CD only . (for dist mod)
70-23712-01	BA213	12	22	R	Slots 1-12 CD
54-17213-01	BA214	6	22	R	Slots 1-6 CD
70-25447-01	BA215	6	22	R	Slots 1-6 CD
54-19354-01	BA440	7	22	R	Slots 6-12 CD

[1]Explanations are:
CD = CD interconnect
R = removable termination packs part no 13-18110-00

[2]1 slot (13th) is used for M9058 distribution board

14.1.8 Termination and Expansion Rules for single and multiple backplanes

Bus expansion systems are quite complex. Refer to Dec Standard 160 for details of all the rules. A backplane must be less than 14 inches in length electrically and is considered as a single point electrically. See table Section 14.3.2 for the CPU termination in ohms.

An **Open Ended System**

1. Single backplane with CPU term at one end, none at the other.
2. If CPU is 120 ohms can take 35 AC loads
3. If CPU is 240 ohms can take 20 AC loads
4. Can have up to 18 connection points (PCBs)

An **Intermediate System**

1. Single backplane with CPU term at one end AND termination at the other.
2. If both are 120 ohms can take 45 AC loads.
3. If one is 120 and other is 240 ohms can take 35 AC loads.
4. If both are 240 ohms can take 20 AC loads.
5. Can have up to 18 connection points (PCBs)

A **Multiple Backplane system** can have 2 or 3 backplanes and no more, it must be considered as a transmission line of characteristic impedance of 120 ohms, so it must be terminated at both ends by 120 ohms. Put another way this means, that the total resistance of all terminations in the boxes on either end of the bus must be 120 ohms.

A **Two backplane system**

1. Cable must be 2 to 16 feet long

2. Can take 22 AC loads per backplane, and should be roughly balanced.
3. Can have up to 12 connection points (PCBs) on each backplane

A Three backplane system

1. First cable can be 2 to 6 feet long.
2. Second cable can be 4 to 10 feet long.
3. Cables must not be the same length.
4. There is no termination at all on the middle backplane.
5. Can take 22 AC loads per backplane, but should be roughly balanced.
6. Can have up to 9 connection points (PCBs) on each backplane.

All systems are allowed only 20 DC loads in total independent of the number of backplanes.

BA23s in the H9642 cabinet do follow the above rules. They use 3 foot cables and the bus is terminated at each end with 120 ohms provided that **the SIPs, termination resistors, must be left in on both the BA23s for a MVAX2 system.** The SIPs are the DIL resistor packs that are plugged into the backplane, just after the last slot.

Table 14–8: Bus Expansion Systems

Option	Module	Term Ohms	Comments
BCV1A-xx	M9400-YD	0	Used prior to BA23s and also
	M9401	0	For 1st to 2nd b/plane in 2 and 3 b/plane systems
	BC05L-xx		Cable x 2
BCV1B-xx	M9400-YE	240	For 2nd to 3rd b/planes with a TEV11
	M9401	0	usually with systems prior to BA23
	BC05L-xx		Cable x 2
BCV1C-xx	12-11591		Dont know
	BC03U-xx		
BCV1D-xx	M9400-YJ	?	BCV1B with refresh and boot
	M9401	0	
	BC05L-xx		Cable x 2
BCV2A-xx	M9404	0	Used on BA23 systems
	M9405-YB	240	BA23A to a BA23C
	BC02D-03		Cable x 2
BA21X-SF	M9404-PA	0	Used on BA21x to B213x and BA440/4100 to B440 expander boxes
	M9405-PA	120	With host BA21x SIPs removed
	BC04V-09		Cables x 2
TEV11	M9400-YB	240	Used to terminate buses prior to BA23
REV11	M9400-YA	240	Used to terminate buses prior to BA23 and the first Q22 bus cable exp box
	M9405-YA	220	the second Q22 bus cable exp box
BDV11	M8012	120	Used to terminate single b/plane systems only

There are about 12 different flavours of M9400 only some of which occur in the table above (which are the most common). For a definitive list see the Option/Module list.

14.1.8.1 Termination SILs (Single In Line resistor packs)

These resistors cannot be measured directly, because they are all connected together inside the chip for a single pin for +5v and 0v. This has the effect of the measured resistance being roughly half the actual resistance of the lower value. The 2 end pins are +5v and 0v.

- A 120 ohm term is achieved by 180/390 ohm resistors and will measure 110/130 ohms
- A 220 ohm term is achieved by 360/720 ohm resistors (13-18110-00) and measures 230/260 ohms
- **The SCSI bus** is termed at 120 with 220/330 ohm resistors (13-26547-01 for the SILs) measuring 165/150 ohms.

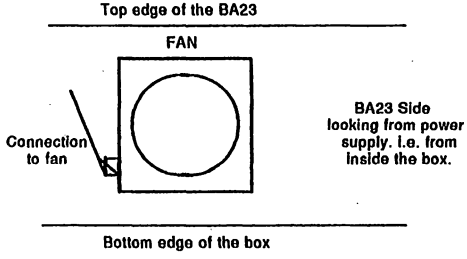
14.2 ENCLOSURES

14.2.1 BA23 Fans connected wrong - cause memory failures

The fans on a BA23 (12-17556-01) are both the same and are DC fans. If connected the wrong way round they do not suck instead of blow, but do not turn at all. The fan at the front of the BA23 is not so important and can easily been seen to be rotating. However the power supply fan is very important and causes the box and QBus options to overheat. It is the memory that is the first to suffer from heat. The fan is difficult to check visibly, but like any fan it is permissible to poke a bit of paper into it to check for its rotation.

As long as they are connected as in the following diagram they should turn the right way. If you are tempted to leave the connections to the top of the BA23 (so being easier to connect) then they will be wrong.

Figure 14–1: BA23 Fan Connections



14.2.2 BA23 and BA123 Power Harnesses burn out

In 1987 it was recognised that the power harness from the power supply to the backplane was not adequate, and in some cases was burning out the +5v wires.

This causes the modules to loose power, though DCOK and POK do not go low as the power supply still thinks all is OK. The DCOK light stays lit as normal for the same reason.

The symptoms of this are system halts and hangs without the usual indications like bugchecks and crash dumps, or on a PDP traps to 4. Problems are very often intermittant for long periods before the wires burn out altogether.

Table 14–9: Cable part numbers etc.

Box	Old Cable	New Cable	FCO number	EQ Part
BA23-A	70-20450-01	17-01311-01	BA23-I001	EQ-01427-01
BA23-C	70-20450-02	17-01312-01	BA23-I002	EQ-01467-01
BA123	70-00865-01	17-01311-01 [1]	BA123-I001	EQ-01468-01

[1] Two of these are required

The BA23-A is a CPU box, the BA23-C is an expansion box. It may be difficult to get the EQ kits now, if so order the cable.

There may be a safety hazard here, in as much as the cables do burn out and produce smoke, and it is vaguely possible for the box to catch fire

14.3 QBUS MVAX SYSTEMS -Problems and Features

14.3.1 QBus Vax computers and their parameters

Table 14–10: List of Qbus Vax Systems

	Name	CPU Chip	Box/Cab	CPU	Device Bus	Comments
MVax1	Seahorse	uvax 1	BA23/BA123	KA620	RQDX	Non left now
MVAX2	Mayflower	uvax 2	BA23/BA123 /H9642	KA630	RQDX/SDI	Most popular Vax
VS2/GPX	Mayflower	uvax 2	BA123	KA630/VCB	RQDX	W/Sta version
VS3200	Mayfair 1	cvax	BA23	KA650	RQDX	Work Sta.
MV3500	Mayfair 1	cvax	BA213	KA650	SDI	RA70 Supp
VS3500	Mayfair 1	cvax	BA213	KA650	SDI	Lat Server
MV3600	Mayfair 1	cvax	H96xx	KA650	SDI	RA70/82 Supp
VS3520/40	Firefox	cvax	BA213	KA60	SCSI	2/4 CPUs, MBus, W. Sta
MV3300	Mayfair 2	cvax	BA215	KA640	DSSI	RF30 supp
MV3400	Mayfair 2	cvax	BA213	KA640	DSSI	RF71 supp
MV3800	Mayfair 3	cvax2	BA213	KA655	DSSI	RF71 supp
MV3900	Mayfair 3	cvax2	H96xx	KA655	SDI	RA70/90 supp
Vax 4200	Spitfire	soc	BA215/BA430	KA660	DSSI	M7626 Uses MS650
Vax 4300	Pele	rigel	BA440	KA670	DSSIx2	Uses MS670
Vax 4400	omega-s	nvax16	BA440	KA675	DSSIx2	Uses MS690
Vax 4500	omega-c	nvax14	BA440	KA680	DSSIx2	Uses MS690
Vax 4500A	legacy	nvax14	BA440	KA681	DSSIx2	Uses MS690
Vax 4600	omega-p	nvax12	BA440	KA690	DSSIx2	Uses MS690
Vax 4600A	legacy	nvax12	BA440	KA691	DSSIx2	Uses MS690
Vax 4700A	legacy	nvax10	BA440	KA692	DSSIx2	Uses MS690
DS5400	Mipsfair	R3000	BA213/H96xx	KN210	DSSI	R3000 RISC/Ultrix only with CVAX for diags. Uses MS650
DS5500	Mipsfair 2	R3000A	BA430	KN220	DSSI/SCSI	Uses MS220

14.3.2 QBus Processor Information

Table 14–11: Processor Information

Processor	Ohms term	Model Name	Clk/VUPs	Max Adse	o/s sup	On-Board features
KDF11-A	240	PDP 1123		128Kw		2 SLUs 18 bit adse
KDF11-B	120	PDP 1123+		128Kw		2 SLUs 22 bit adse
KDJ11-A	240	PDP 1173	15Mhz	2Mw		
KDJ11-B	120	PDP 1183	18Mhz	2Mw		
KDJ11-DA		PDP 1153	15Mhz	2Mw		0.5 Mbytes
KDJ11-DB		PDP 1153+	15Mhz	2Mw		1.5 Mbytes
KDJ11-DD		PDP 1153+	18Mhz	2Mw		1.5 Mbytes CSS special
KDJ11-EA/B		PDP 1193	18Mhz	2Mw		2/4 Mbytes + 7 SLUs
KD32	120	MVax 1		2Mw	4.1-5.1	
KA630	240	MVax 2	0.8	16 Mb	4.1	1.0 Mbyte
KA640	240	MVax 33/3400	2.5	64 Mb	5.0-2A	4.0 Mb, thick/thin Ether, DSSI
KA650	240	MVax 32/35/3600	2.9	64 Mb	4.7A	None
KA60	MBus	MVAX 3520/40	6/12	64 Mb	5.1-1	SCSI + Ether thick/thin [1]
KA655	240	MVax 38/3900	4.5	64Mb	5.1	None
KA660		Vax 4200	5.0+	64Mb	5.4-2	1 x DSSI + Ether Thick/Thin
KA670	240	Vax 4300	8.0	512Mb	5.3-2	2 x DSSI + Thick/thin Ether
KA675	240	Vax 4400	16.0	512Mb	5.5-2	2 x DSSI + Thick/thin Ether
KA680	240	Vax 4500	24.0	512Mb	5.5-0	2 x DSSI + Thick/thin Ether
KA681	240	Vax 4500A	24.0	512Mb	5.5-2H4	2+2 x DSSI + Thick/thin Ether
KA690	240	Vax 4600	32.0	512Mb	5.5-0	2 x DSSI + Thick/thin Ether
KA691	240	Vax 4600A	32.0	512Mb	5.5-2H4	2+2 x DSSI + Thick/thin Ether
KA692	240	Vax 4700A	42.0	512Mb	5.5-2H4	2+2 x DSSI + Thick/thin Ether
KA52		Vax 4100[2]	24	128Mb	5.5-2	1 x DSSI + 1 x SCSI 2 +ether
KA52		Vax 4100A[2]	24	128Mb	5.5-2H4	1 or 2 x DSSI + 1 x SCSI 2 +ether
KA53		Vax 4105[2]	42	128Mb		1 or 2 x DSSI + 1 x SCSI 2 +ether
KN210	240	DS5400	20Mhz	64Mb	4.0	R3000 DSSI + Thick/thin Ether[1]
KN220-A	240	DS5500	30Mhz		4.1	R3000 DSSI+SCSI+Ether[1]
KN	xmi	DS5800	25Mhz		4.0	
KN	tce	DS5900	40Mhz	480Mb	4.2A	

[1] These options are on an I/O module that is mandatory for these CPUs

[2] More info on these desktop systems can be found in the Desktop Chapter

14.3.3 KA6xx firmware

The firmware on new machines is becoming more important. The diagnostic strategy for all new machines for normal repairs is to run the ROM based diagnostics. MDM should only be run where ROM based diags and the error log have failed to isolate the fault, or it is of an intermittant nature. Confidence checking and commissioning of swapped and new items is done by means of the ROM based diags. Boxed systems (2000 and 3100) have never supported MDM and are entirely ROM based.

14.3.3.1 Identification of Firmware

Figure 14–2: Identification from firmware banner at switch on

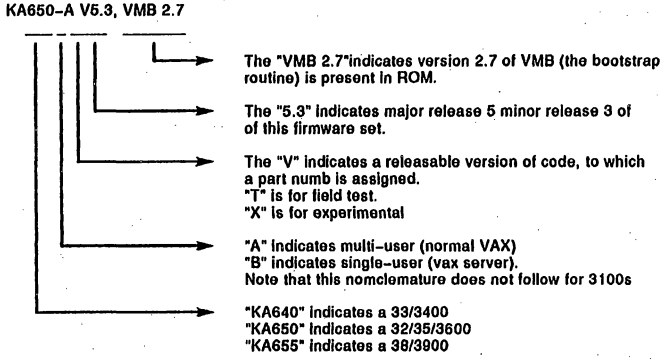


Table 14–12: Identification from EEPROM part numbers

Banner	Low Byte	High Byte	Date Released	Comments
KA650-A V1.2/0123	23-068E7	23-069E7	Nov-87	
KA650-B V1.2/0123	23-070E7	23-071E7	"	
KA650-A V1.4/0123	23-140E7	23-141E7	Jun-88	
KA650-B V1.4/0123	23-142E7	23-142E7	"	
KA650-A V5.1, VMB 2.6	23-178E7	23-179E7	Nov-88	
KA650-B V5.1, VMB 2.6	23-180E7	23-181E7	Nov-88	
KA650-A V5.3, VMB 2.7	23-192E7	23-193E7	Feb-89	After KA650 FCO
KA650-B V5.3, VMB 2.7	23-194E7	23-195E7	Feb-89	After KA650 FCO
KA640-A V4.1, VMB 2.6	23-152E7	23-153E7	Jul-88	
KA640-B V4.1, VMB 2.6	23-154E7	23-155E7	Jul-88	
KA640-A V5.1, VMB 2.6	23-174E7	23-175E7	Nov-88	
KA640-B V5.1, VMB 2.6	23-176E7	23-177E7	Nov-88	
KA640-A V5.3, VMB 2.7	23-188E7	23-189E7	Feb-89	
KA640-B V5.3, VMB 2.7	23-190E7	23-191E7	Feb-89	
KA655-A V5.3, VMB 2.7	23-015E8	-	Feb-89	
KA655-B V5.3, VMB 2.7	23-016E8	-	Feb-89	

As can be seen all firmware for KA640/650/655 is now the same version (V5.3). This means that all items such as console commands, tests, and booting procedures are the same. Therefore instructions in manuals about tests etc that refer to the old firmware should be ignored, and those for the KA655 used. This also goes for the **sniffer boot**. If the KA650 FCO is performed the KA650 no longer has the sniffer boot facility that the old firmware had, and becomes like the KA655, with much better boot default values, but no sniffer boot facility.

14.3.3.2 What different F/W versions do

Ver 1.2 . . . This very early version does only similar things to the MVAX2 firmware. It does sniffer boot, and has no niceties like >>>SHOW QBUS or >>>SHOW DEVICE. It should not be seen in the field now.
Ver 1.4 . . . It is unknown what this does.
Ver 4.1 . . . Provided KA640 support and has most facillities of later ver. I believe this has no sniffer boot.
Ver 5.1 This is the common version of most of the KA650 modules as supplied. It gives full function support, and it does a sniffer boot.
Ver 5.3 . . . This is as supplied on KA655 modules, it added support for them, it also fixed afew bugs of Ver 5.1. **It does NOT do sniffer boot** It is the only version not to do so. It is the version put on KA650 modules with the FCO KA650 I001, that was on REVCON, that Alex went round and did to all known KA650s in early 1990. There may be more than afew that missed this. It adds support for the KZQSA to console commands.

14.3.4 PMI memory organisation (MVax 2) where is on board memory

By the time the MVax 2 has come up to the >>> prompt, the firmware has polled the CD rows for the arrays present and put the arrays in order by slot number. **The Internal Memory is put at the lowest physical address by this console firmware.** A Vax's memory has not fixed addresses like the memory boards in a PDP.

When 2 x 8Mb boards are put in the on board memory is disabled.

The on board memory is not address at the top end and addressed out of the 24 bit addressing range.

14.3.5 Procedure for replacing Micro Vax 2 8 Mbyte memories

The repair process in Sunnyvale Ca. has not been stringent enough for finding all memory parity errors of a very intermittent nature.

This problem was corrected in June 1990.

The procedure once the failing memory module has been identified, is as follows:

1. Check whether the MS630-CA (M7609-AA) is below Rev A2 or C1, if so **install FCO MS630 F1 EQ-01549-01**, there are 4 of these in Reading at the moment, and it consists of a replacement PCB.

2. Check whether the module came from Sunnyvale Ca. This can be done by looking at the paper label stuck to the PCB near the handle (if it has not fallen off). It should have writing on like this:

```
7H8279770238    1/0    A    20NOV89
  M7609-AA      ZG63501800
```

   The 7H refers to Sunnyvale Ca. and 20NOV89 is the date.
   If it is from Sunnyvale Ca. before 25th June 1990 then replace it in the normal way.

3. **If there has been less than 2 parity errors in the past year, do not change the module** inform the customer that this is the acceptable limit. If there are more than 2 errors replace in the normal way. The memory used is parity memory and to some extent these are soft errors. A decision has been made that 2 per year is allowable.

Synopsis

On getting a parity error (one or more), check whether the FCO has been done, then check whether it came from Sunnyvale Ca. before June 1990, then check whether more than 2 errors have occurred within the last year before swapping it out.

14.3.6 Errors on ECC memory - MS650

This may apply to any memory that is ECC memory.

If $ SHOW ERROR or the errorlog shows hundreds of memory errors, it is not necessarily anything untoward. When a memory location is read with an error then ECC is applied, it is corrected and returned on the bus as good data. Subsequently an error is logged. However the data in memory is not rewritten with good data, so if consequently the location is read again the scenario will be repeated. i.e. an error will be logged everytime that location is read. If the location is in the executive area that does not get rewritted, then hundreds of errors will accrue very quickly.

The physical address in the errorlog for such entries should highlight this.

A reboot will always over write anything in memory, so if such errors go after a reboot, then this scenario has occurred.

ECC memories should not be replaced for memory errors, unless a reboot has been tried first, or the engineer is sure they come from different locations.

14.3.7 Phantom Uncorrectable memory errors from errrolog summary

This applies to MS650 and 3100 ECC memory. This bug shows up when doing an errorlog with the /summary qualifier. After the totals of hard and soft errors, comes a report of 1 fatal uncorrectable memory error. (note only one)

For some reason the errorlog intreprets something in the ECC system as having registered an uncorrectable error when there is not one. i.e. it is a phantom error.

14.3.8 KA640/650/655 Solicit Boot

There is a bug in the Pre V5.3 firmware of these processors, that will not allow a solicited boot to succeed, though it will appear to try to boot.

A solicited boot is of the form:

```
>>> BOOT/100 XQA0
Bootfile:
```

There are two work-arounds for this problem. The first is to send the Bootfile from the host, with a command of:

```
$ NCP SET NODE "node-name" LOAD FILE "file-name"
```

The other work-around can be done from the console to be booted, but is much more involved. For this and more general details see KA650 TT-001 on Speed Bulletin 567.

14.3.9 KA640 ethernet, Front Panel, and their Fuses

Before changing a KA640 CPU module, check the fuses first. All fuses are 1.5A pico fuses **Part Number 12-10929-08**. The table below gives details of these. All fuses are on the CPU module, are socketed, and are not far from the handle, in the order F1, F3, F2 from left to right with the handle at the top/away from you. See page 1-2 of the KA640 system maintenance guide.

If the ethernet does not work, bear in mind that the front panel contains the equivalent of a DESTA, which converts standard to thin wire ethernet. So if the LED lights for standard, but not for thin wire, then the front panel is almost certainly at fault. In this case a discrete DESTA can be used temporarily on the standard port, whilst an H3602 is procured.

Table 14–13: KA640/H3602 fuse check

Fuse	Quick Check
F1	H3602-SA Hex LED display is all off
F2	Both Thin and Standard ethernet LEDs are off
F3	LED on DSSI Bus terminator or Ext loopback terminator are off, though see the section on SCSI/DSSI buses in the Small Systems Devices chapter first.

The 5400 also uses the H3602, so these notes apply to it as well.

14.4 QBUS OPTIONS - Problems and features

14.4.1 VCB02s In BA4xxx enclosures sync problem

After a power fail, a monitor connected to a VS30U (VCB02) in a BA430, BA440 or B400X enclosure may not synchronise properly. Output on the video monitor will appear to scroll around on the screen. The problem is temperature sensitive and will ONLY occur after the enclosure is power cycled. The problem is due to a race condition that exists on the M7169 control module when the +5 and +12 volts initially turns on at power up time.

The preferred workaround is to power the system off for 2 to 30 minutes to allow the DAC on the M7169 module to cool off, if this condition exists. The alternative is to replace the M7169 module.

This problem can only occur if a VS30U (VCB02) is in an enclosure that uses the H7874 power supply.(BA430, BA440 or B400X) The problem will only occur at power up time.

Engineering is evaluating possible solutions to this problem.(June 92)

14.4.2 RQDX3 LED

There is a red LED on the RQDX3 (M7555). In all the literature it says there is a LED but not what it means, or about its state.

This LED is normally off.

At power on the RQDX3 goes through its self test, whence the LED flashes and then goes out.

If the LED comes on during system operation, (which it has been known to do on modules found to be faulty) it indicates the RQDX3 is faulty, though the nature of failure, or the tests it does are not known.

14.4.3 TQK50/70 LEDs At Power On

The two LEDs on the TQK50 (M7546) and TQK70 (M7559) at power on go through the self test routine. After this the bottom LED nearest the cable connector stays on. (D1 off, D2 on). At this point the TQK50 has PASSED it's self test.

When the system is booted both LED's go off after flashing. At this point the TQK50 has initialised in a TMSCP fashion. i.e. the packet structure is in place in main memory and the CPU can talk to the TQK50/70 intelligently.

The cookbooks etc suggest that D1 on, D2 off, is a failure. This is not the case between switch on and boot up.

All revisions of firmware do this.

14.4.4 TQK70 "Unused opcode interrupt error" F/W problem

When doing a backup to a 2nd or later tape, VMS will ask the operator for the next tape in the backup to be loaded by means of an OPCOM message. The way this problem shows itself is that the operator cannot satisfy this request, it just keeps issuing OPCOM requests. It has also been known to occur when mounting the first tape of a save set but much more rarely.

Ultrix just hangs the job, with no discernable error message.

This only happens very occasionally on affected sites, and is a product of the application (swapping the hardware will not fix it). If the job is then aborted the tape drive is locked out and the **vax must be rebooted** for it to be seen again.

In the errorlog logged under **PTA0** the above message is displayed from the SA register followed by "init sequence completed" and "sequence number reset". It can also show in the SA register as "single interrupt errors".

Very often the tape drive recovers and puts "unused opcode interrupt errors" in the error log, so if these errors are seen, even though the customer has not complained the TQK70 should be changed.

This is a firmware bug on the TQK70, TK50s are not affected.

There is no FCO for this problem the TQK70 is replaced in the ordinary way, **Rev D4 fixed this problem.**

14.4.5 KMV11 notes

14.4.5.1 Installation Problems

14.4.5.2 Switches

The Distribution panel has 4 DIP switches. The installation guide for setting these is wrong. For MDM to run successfully the switches should be set as for PSI.

Table 14–14: KMV dist panel switches that need to be on, all others off

Switch Pack	For PSI/MDM	For RS232
SW1	4	1 - 4
SW2	3	3
SW3	1	1 - 5
SW4	3	3 - 5

14.4.5.3 Cables

Getting the cable the right way round from the writing in the book is not easy. **If the cable was fitted the wrong way round the KMV firmware must be loaded again before it will work.** This is true if the modem or line was not available when the firmware was loaded. This problem shows as an unsynchronised line under NCP>.

To load the firmware:
NCP> SET LINE KMV-x MICROCODE DUMP NL:
where x is the number of the KMV (from sho kno nodes) usually 0.

The BC08 cable to the distribution panel should be the following way round.
With the KMV in a BA123 the stripe should be at the top, with the cable coming out of the plug nearest the PCB.
Looking at the back of the distribution panel, with the socket on the left, the stripe should be at the top with the cable coming out of the plug on the right (nearest the centre of the panel).

14.4.5.4 Changing CSRs and PSI

From Graham Criddle.

If you need to change the CSR's and/or Vectors on a KMV11 running PSI, then PSI will not work afterwards until PSI start up files are modified to reflect this.

This should be born in mind when adding a module into a system that is in the floating address space, or reconfiguring for fault finding.

A KMV11 running PSI, does not autoconfigure at boot time. The consequences of having different addresses is that a message comes up during boot saying a vector conflict exists, (which is easily missed) and doing a:

SYSGEN> SHOW/CONFIG
or a
$SHOW DEV

does not list the device, its CSR or Vector.

The file to be edited is:

SYS$MANAGER:LOAD_PSI041.COM
for PSI VER 4.1
SYS$MANAGER:LOAD_PSI042.COM
for PSI VER 4.2

Search for a line beginning "LOAD UVDRIVER"
the CSR and Vector can be found on it.

14.4.6 DSV11 bad chips

From Barry Lowery

The DSV11 is a QBus synchronous interface. Module number is M3108.

Some of these modules have been shipped with the incorrect DMA chip. The DMA chip is E49 which is a 40 pin chip and is the ninth chip up directly over backplane connector B, just below another 40 pin chip marked SCC 8530A.

The correct chips are marked:

iP8237A-5 or D8237A-5 or SAB8237A-5P.

The incorrect chips are marked:

iP8237A

The intermittent symptoms caused by a bad chip are:

1. Self test may fail with error 099x or 0bbx
2. MDM diagnostic may fail tests 7,8,9 or 10.
3. The customers application may fail with DSV11 offline or system crash.
4. There may be DAP-CRC errors.
5. THERE MAY BE UNDETECTED CORRUPTION OF THE CUSTOMERS DATA.

There is a 6 switch switchpack (E89) on the module. Make sure that switches 1 to 4 are closed, (on). Also switches 5 and 6 should be closed (on) for a DSV11 in a Q/Q slot and should be open (off) for a DSV11 in a Q/CD slot.

14.4.7 DELQA-Plus

There has been a new version of the DELQA module released known as the DELQA-T or DELQA-Plus. Although the Module appearance has not changed the part number is now M7516-YM. The DELQA-T is a go faster version and requires VMS 5.3 to fully utilise the PLUS capabilities. The module is supported on lower versions of VMS but will only function as per the old DELQA. There has also been a change to the switch setting as SW5 is now used.

Table 14–15: DELQA-T switch settings

switch	setting	meaning
S1	closed	First DELQA device bus address 17774440
	open	second DELQA device bus address 17774460
S2		Reserved
S3	closed	selects DELQA-normal mode
	open	selects DEQNA lock mode
S4	closed	host inactivity timer initialy disabled
	open	host inactivity timer initialy enabled
S5	closed	T-mode enabled (board can operate in as DELQA-normal or DELQA-T mode)
	open	T-mode disabled (board can operate only as a DELQA-normal or DEQNA board)

14.4.8 DEQNA migration procedures for later VMS versions (5,4+)

DEC Direct are offering customers a special price on the DELQA and DESQA for this upgrade (Nov 92). The mandatory part of the package is the requirement for a DEC Engineer to carry out the installation (DELQA or DESQA) and de-installation of (DEQNA). **The DEQNA must then be returned by the Engineer to Local Logistics,** who in turn send it to Central Logistics.

The return process is detailed in the UK Migration Plan distributed in October 1991.

Edited version of the UK Migration Plan for DEQNA

VMS 5.4-3 dropped support of the DEQNA for LAVCs.

VMS 5.5 dropped support for the DEQNA altogether.

Table 14–16: DEQNA upgrade packages available

Part Number	Description
DELQA-UA	DEQNA upgrade for BA11-M box
DELQA-UB	DEQNA Upgrade for BA23 Box
DELQA-UF	DEQNA Upgrade for H9642 Box
DESQA-UF	DEQNA Upgrade for BA200 box.

There are some 3700 DEQNAs in the UK so Welwyn should expect to do some 370.

The expected cost to the customer including installation is about 700 pounds. DEQNA upgrade packages are available from DECdirect.

To ensure maximum customer attention the following steps have been taken.

1. A direct mail shot will be sent to all customers who have a DEQNA on their contract.
2. A SIFT has been sent on the 19th of September to the Digital Sales force, to contact their DEQNA customers to migrate to the DELQA or DESQA.
3. There is a VMS V5.4-3 cover letter, clearly stating the DEQNA support position.

14.4.9 DZQ11 shorting to adjacent PCBs

There appears to be a common failure of the DZQ11 etch revision 50-16374-01, whereby a resistor at the top right of the module near the handle **burns out.**

If the plastic insulation sleeve on the two electrolytic capacitors just below this resistor has been damaged, a negative voltage may short to the back of an adjacent module.

Obviously damage could also have occurred to the adjacent module.

The situation is eased on later versions of the module (CS revision E2, etch 50-16374-02) as these components are nearer the middle of the module, however BOTH layouts are being shipped as spares so the problem is not going to go away.

Engineers should check that the insulated capacitor sleeves are undamaged **adding insulating tape** if necessary. Also care should be taken while working on these or adjacent modules to ensure that further damage does not occur.

14.5 VAX 4xxx SYSTEMS - Problems and Features

14.5.1 4200 Floating point problem

The 4200 FPU had a problem whereby it calculated wrongly. There can be no check on the numbers returned from FPUs without an obvious fault like a parity error on a bus develops, so this is an awkward point that causes data corruption. The following points are salient:

It occured in approx 5% of 4200s
It is heat related, above 80 degree centigrade it is much worse
Unless customers have software that invoke the FPU the symptoms will mostly be seen as login and licence passwords not always working.
It tends not to be intermittent, affected CPUs always display these symptoms.
Rev C is a fix for this problem, which is available on P1.

Because of the enormity and consequences of this problem we embarked on a campaign to put a test program on all 4200s in our patch. Several engineers were briefed and visited all 4200s.

This program called FPU TEST is invoked every 10 mins or so and checks a calculation against known results. If a wrong answer is returned the system is shut down in 15 minutes with a message not to reboot until the CPU is changed. Because only 5% of CPUs are affected, any CPU should suffice.

14.5.2 4200 Translation Buffer Problem - Poor performance

The SOC chip that is used with the 4200 may suffer from performance degradation due to getting translation buffer misses when it should not.

Though this is a hardware problem, there is a VMS patch for it. The patch is VMS 5.4-2 specific.

This patch is SYSLOA$S01_U2054 and comes with a customer letter explaining the reason for it.

14.5.3 KA670 H3604 Panel

The H3604 part number 70-27400-01 has a DSSI fuse for SHAC port 1 at the bottom of the H3604. This fuse is marked F3 and is a 2.0 amp pico fuse part number 12-10929-06.

If it is blown the DSSI terminator green LED will not be lit, and the 4300 will not pass its PUST, failing test 10 with:

? 5C 2 06 FF 0000 0000 00 ; SUBTEST_5C_06, DE_SHAC.LIS

See the notes on SCSI/DSSI terminations in the Small Systems Devices chapter.

14.5.4 KFQSA and KZQSA notes

For KFQSA and KZQSA information see the Small Systems Devices chapter specifically the section on SCSI DSSI bus info.

14.5.5 KA655 CDAL PE errors - 2nd level cache parity errors

The KA655 CPU Module (M7625 Rev B1) has an inherent fault whereby errors are logged against the CPU. These take the form of a machine check entry saying CDAL PE error, followed by a CACHE/BUS ERROR entry.

Frequency may be once a year to several times a second. If they occur more than 3 times in a second, then second level cache is disabled and the system will carry on with no further errors at least until a reboot, because this is a 2nd level cache problem. This means the customer will have degraded performance. (no 2nd level cache)

If they occur several times a second **during the boot process, the system will NOT BOOT and the only indication will be a machine check on the system console.**

The reason is a fault in the 2nd level cache, though the errorlog does not explicitly say so.

The fix is to replace the M7625 CPU module, as yet there is no FCO for this. **REV C1 fixes the problem.**

If there is less than 1 or 2 of these occurrances per month and 2nd level cache has never been disabled, ignore these errors.

14.5.6 KA670 FCO 001 - RA and TF Boot and MOVC5 and CMPC5 Instructions

If the console micro code is V3.4 or less, the KA670 will not boot RA disks, or TF85 (DSSI tapes). It only affects the tapes if they are set at odd number id's

There is a problem with certain aspects of the MOVC5 and CMPC5 instructions, this was a fault in the Rigel P-chip.

These 2 items were covered in the FCO which makes the L4000-AA/BA Rev C1.

14.5.7 Upgrading a 4300 to later 4xxx systems

When upgrading a Pele (4300) to an Omega or Legacy (later) system, there should be no problems provided that the upgrade kit has been ordered.

Basically all that is required is to remove the memory (MS670) and replace with (MS690), and replace the CPU, and perhaps the backplane.

Backplanes in systems later than WF04900000 or AY0400101 need not be changed. The required upgrade kit has a backplane in it in case it is required. The later backplanes had support for MS690 memory which is 64 bit wide, the MS670 is 32 bit wide.

Other items in the kit include badges etc.

Note it is not possible to upgrade the 4200/BA430 as this has a lot different.

14.5.8 SAFETY:– Rackmount 4000 –SAFETY

Some Rackmount 4000s (RM4000) have been shipped with a possible safety problem.

The problem lies in the AC switch assy 70-28603-01 whereby the live wire that is light brown in colour, maybe sheared through inside the plastic crimpon connector.

Units affected can be isolated by their product serial tags. They are in the range:
NI126xxxxx through NI135xxxxx

Parts should not be repaired but replaced. i.e. the 70-28603-01 should be replaced.

14.5.9 New Firmware for VAX 4400, 4500 and 4600 - Ver 4.8

These releases support the KA675, KA680, and KA690, the same file is used for all three system types.

The VAX 4000 Model 400 ships with this new V4.8 firmware.

The two firmware upgrade files can be copied from;

```
GEM::DISK$TEMP:[VAX4000]KA689_V48.EXE  ! Tape upgrade file
   KA689_V48.SYS  ! Ethernet upgrade file
   UPGRADE.README ! A copy of this file
```

Changes/fixes in V4.8

1. Fix around SII bug to allow TLZ06 to boot.
2. DEFQA device added to QBus configuration table.
3. An unconfigured processor (all F's in xsid after FEPROM blasting) will come up with "Uncnfg KA675-KA680-KA690?" banner message.
4. de_ibox_690.mar no longer fails when ROM is in the unconfigured state after upgrading.

This firmware will only need to be installed because the customer is complaining of one of these problems. The most common one by far will be boot support for the TLZ06

How to upgrade the CPU Firmware

For a full description on upgrading the firmware refer to the FEPROM Firmware Update chapter in the CPU System Maintenance Guide, EK-454AA-MG.

There are two methods of upgrading KA675/680/690 Flash ROMs. ROMs may be upgraded via Ethernet or via tape. Both methods are described below.

For either method, **a jumper on the H3604 (cover panel) module must be set in the "unsecure mode".**

```
Jumper:  There are two little black jumpers on the backside of the H3604
         cover panel.

            top of cover panel
          +----------------------+
          |                      |
          |                      |
          |                . . . |
          |                      |
          |                   |--|  Secure mode
          |             W4  . . . |
          |                   |--|  Unsecure mode
          |                      |
          |                +-----+
          |                |     |
          |                |  J6 |  Ribbon cable connector
          |                      |
          |                      |

The bottom jumper of the two needs to be moved
so that it covers the two posts for unsecure mode
to enable the ROMs to be blasted.
```

System Requirements for Ethernet Upgrade

The system on the Ethernet must be able to serve boot requests.

The system which you wish to upgrade must be on the same Ethernet segment as the serving system.

Copy the file KA689_V48.SYS into the MOM$SYSTEM account of the server.

KA689_V48.SYS is a bootable image which contains the ROM code appended to the FEPROM blasting program. This may be booted over the Ethernet with a solicited boot to any VAX 4000 Model 400, 500 or 600 system. DO NOT type the ".SYS" suffix when typing the Bootfile name.

See the example below.

System Requirements for Tape Upgrade

You must have a system with a TK70, TK50, or TF85 tape drive.

To make a bootable tape, copy the bootable image to tape as follows;

```
$ INIT MIA5: "Volume_Name"
$ MOUNT/BLOCK_SIZE = 512 MIA5: "Volume_Name"
$ COPY/CONTIG [directory]KA689_V48.EXE MIA5:KA689_V48.EXE
$ DISMOUNT MIA5:
```

For the tape blastable code, you must type the FULL filename at the solicited boot Bootfile prompt, KA689_V48.EXE.

Console Instructions for Tape Upgrade

This is the same as the Ethernet instructions below except for typing "B/100 MIA5" to boot from the tape. Type "SHOW DEVICE" at the console to determine what the tape controller name is for your system.

Console Instructions for Ethernet Upgrade

```
>>> BOOT/100 EZ                        * The computer will prompt you for a
                                       * Bootfile name.  Type the name of the
(BOOT/R5:100 EZ)                       * file.
  2..                                  * CAUTION  FROM THIS POINT ON, DO *NOT*
Bootfile: KA689_V48
-EZA0                                  * INTERRUPT UNTIL PROGRAM COMPLETION.
  1..0..                               * INTERRUPTION MAY RESULT IN AN UNUSABLE
 FEPROM BLASTING PROGRAM               * MODULE!!!  The program may take
 blasting in V4.8...                   * several minutes to complete.
                        ---CAUTION---
 EXECUTING THIS PROGRAM WILL CHANGE YOUR CURRENT ROM ---
Do you really want to continue [Y/N] ? : y          * Type 'Y' at the prompt

  DO NOT ATTEMPT TO INTERRUPT PROGRAM EXECUTION!
  DOING SO MAY RESULT IN LOSS OF OPERABLE STATE!
  The program will take at most several minutes.

starting uniform_program...
```

```
 byte 00070000 has been written with 0's...
 byte 00060000 has been written with 0's...
 byte 00050000 has been written with 0's...
 byte 00040000 has been written with 0's...
 byte 00030000 has been written with 0's...
 byte 00020000 has been written with 0's...
 byte 00010000 has been written with 0's...
 byte 00000000 has been written with 0's...
starting erase...

 byte 00070000 has been erased...
 byte 00060000 has been erased...
 byte 00050000 has been erased...
 byte 00040000 has been erased...
 byte 00030000 has been erased...
 byte 00020000 has been erased...
 byte 00010000 has been erased...
 byte 00000000 has been erased...
starting program...

 byte 00070000 has been reprogrammed...
 byte 00060000 has been reprogrammed...
 byte 00050000 has been reprogrammed...
 byte 00040000 has been reprogrammed...
 byte 00030000 has been reprogrammed...
 byte 00020000 has been reprogrammed...
 byte 00010000 has been reprogrammed...
 byte 00000000 has been reprogrammed...

FEPROM Programming successful
```

Post Blasting Instructions

The jumper W4 must be set to "secure mode"

Power down (or restart) the system in order to run it through its power up self test, as a check the procedure worked.

14.5.10 Notes on Legacy (VAX 4x00A) systems

The 4500A, 4600A, 4700A (Legacy) Systems are now current (December 93) and have replaced the 4400, 4500 and 4600 (Omega).

See the lists at the begining of this Chapter for part numbers and other listed details.

The same enclosures are used with Legacy systems as were used previously (BA440), though for disk and tape expansion the BA35x storeage works boxes may be used in future. For DSSI expansion the R400x must be used there is not a DSSI backplane for BA35x boxes. RAID using DSSI in and SCSI out (HSD05) can be used.

The differences are the CPU, which with the 4700 go faster (nvax10 chip), and with its on board socket for a daughter card. The daughter card which plugs into the cpu has 2 DSSI SHAC ports. It is called a **KFDDB-AA part no 54-20569-01**. The DSSI cables that plug into these ports have no termination so are suitable for the mid node of a tri host cluster, which is achieved by two DSSI I/O modules (as used on the KFQSA), which sit next to the H3604-SA.

These I/O modules do not cover up any QBus slots as the first six slots are used for cpu and memory, the H3604-SA only uses 4 slots. They actually sit on the memory side of the CPU board (remember the cpu is on the left next to QBus mod and memory expands from left to right), and is therefore a tight fit.

Care must be taken when removing the CPU. These daughter cards have been broken by just removing the CPU.

In order to support these extra DSSI SHACs and the cpu, MDM 138, VMS 5.5-2H4, and console code 4.? is required.

This new console code has many extras including specifying an individual DSSI port when doing >>>SHOW DEVICE BUS:4.

Upgrading systems is becoming quite common (Jan 94). Piece parts should not be ordered, but the aproapriate kit, with the correct labels and documentation etc. should be used.

14.6 KFQSA notes and DSSI warm swap notes

These are not in this chapter but in Chapter 16 Small Devices.

14.7 MDM notes

14.7.1 MDM 138

MDM 138 has been distributed to all relevant engineers.

This includes TK50s, CDROM, and RX50 set. It also includes major updates to the Grey MicroVAX maintenance information folders.

There is a new options list, which is very useful for QBus address and vector switch information. Note that the DHQ11 is still not included. Make a note in your new options manual to use the CXY08 info for setting up the DHQ11 again. The drawing of the KFQSA is still wrong. New devices and controllers added seem to have only the barest of information.

The booting problems of Ver 137 and 137A on the newly supported processors should be fixed.

It also supports the new 4000-100A, 4500A, 4600A, 4700A processors.

It will boot a SCSI based TZ30 but not TK50/70s or any QBus based tape devices **on the VAX 4000-100, and 4000-100A,** sometimes CDROM, ENET or hard disk boot will be required for these systems.

For all tapes the boot command has been simplified to

```
>>>B <DEVNAM>
i.e.
>>>B MIA5:   !previous versions required a solicit boot
```

If less than 5 Mb of main memory is available a solicit boot with Bootfile> MDM.SYS is necessary. This uses NA04Cx.SYS as the boot image, which requires 2 Mb of main memory. The image defaulted to normally is NA22Cx.SYS which requires 5 Mb.

As from MDM 137, MDM uses a bundled image. This means that **when doing a Config all the files are in memory, so Config of all images will only take a few seconds.** This alleviates the necessity to to ignore most devices and just Config the ones required for testing, in order to save time.

The following devices should be booted from a solicit boot using the following:

CDROM (SCSI and KRQ50) Bootfile:[SYS0.SYSEXE]MDMCD.SYS
ENET (Infoserver) CDROM Bootfile:MDMNET
SHAC (hard disk) Bootfile:[SYS0.SYSEXE]MDMSHA.SYS
KFQSA (hard disk) - It neither says it is supported or that it is not supported.
The command for QBus based hard disk was Bootfile:[SYS0.SYSEXE]MDM.SYS

Disks supported include RF36, RF74, but only up to RZ24 and RZ58, no RZ7x disks. TF857 and EF53 are supported but not TF86x. TLZ04 is supported but the TLZ06 only on the KZQSA. Remember most SCSI device support exists through the firmware diagnostics as usual with the VAX Desktop strategy.

MDM 138 has been put on the installations VS3100 as per my factflash, for engineers to create their MDM tapes. (This is also an ISO requirement).

14.8 The PDP 1193

The 1193 is now available, and the manuals for these are in the technical library.

They should not be any different to service from the 1173 or 1183, with the following exceptions. No extra training should be required.

Various aspects apply to both 1193 and 1194 because they use the same CPU board, though some problems are only documented on one CPU.

1. The KDJ11-EA is a M8981-AA and has 2 Mbytes on board
2. The KDJ11-EB is a M8981-BA and has 4 Mbytes on board
3. They do not support any PMI or other memory modules.
4. It has a KDJ11 (DCJ11) chip running at 18 Mhz the same as the 1183/4. so the extra 40% performance comes from the on board memory speed.
5. All the usual on board features are there i.e. EIS, FP, boot, toy clock, console F/W with PUST, but no ethernet or disk ports.
6. There is a console port and **7 SERIAL LINES ON BOARD**
7. The console firmware is similar to the 1183/1184 see section below.
8. Only the usual PDP disk support is included i.e. RQDX3 and KDA50.
9. The cab used is the BA23. (can be pedestal or rack mount i.e. H96xx cab)

Upgrading to a 1193 is no problem, just swap the CPU and distribution panel inserts with their cables. The backplane is the same as for other PDPs. Upgrade kits are available and are necessary.

14.8.1 XXDP Support

There are no CPU and Memory XXDP diagnostics for the KDJ11-E . They have not and are not going to be written. To test the CPU and Memory, run the power up self tests. These can be run separately from setup mode 3 for hardcopy or selecting selftest for the selftest menu on video terminal. XXDP can be booted and QBus/Unibus options tested as normal.

14.8.2 The console system

The console system dialog is completely different for hardcopy console (section 1.5 of the KDJ11-E Maintenance Manual) than from the video terminal (section 1.6). It is easy to be confused as to which is being used. Which is being used is decided by a NOVRAM parameter stored after a question from a dead start after language inquiry and time.

The hard copy console acts very much like the 1183. However the VDU console is different, the cursor is moved about the screen to a desired option then return selects it. **The big catch here is that to change numbers on the screen, the SPACE BAR is pressed to increment the number, and ERASE decrements it,** pressing the desired number on the keyboard has no effect.

14.8.3 Known Problems

Micro Hangs

These hangs occur within minutes of a customers application software being started, due to a MMU fault, whereby the system cannot be halted, and the power must be cycled to recover.

An ECO has been done to solve this, at Rev H or greater.

Memory Parity Errors

A small number of CPU modules show intermittent memory parity errors. Once again to cure this problem fit Rev H.

RSX software patch

A software patch is required for RSX 11M+ V4.3 and RSX 11M V4.6.

RSX 11M+ V4.4 and RSX 11M V4.7 have this patch installed.

The problem is in the hardware feature mask that indicates a QBus is present, which affects terminal drivers and DECNET, and gives subtle and difficult to diagnose problems.

DHQ11 must be Rev D1 or higher

If the M3107 is not Rev D1 or higher, it will fail under varous operating systems, and under diags and DECX.

I/O Speed

There are reports that the I/O speed is only as fast as the 1123. This could be because of the route from on board memory to QBus. This is under review by PTG at present. (July 91)

14.8.4 Parity error problems.

PDP 1193 cpu modules are still experiencing parity error problems as outlined in a blitz dated 5 March 1991. This blitz advised that systems experiencing the problem to upgrade to rev H of the M8981-aa/ba (2mbyte/4mbyte) module.

A new rev J module is available which experience has shown, does cure the parity error problem.

Logistics stock the correct rev of M8981-BA (4mbyte) module, but are still issuing M8981-AA (2mbyte) modules at rev H. Request rev J when ordering module (Mar 93).

14.9 Older PDPs

14.9.1 KDJ11-BF bad FPA chips

In 1988 it was found that some DCJ11 chips on the CPU board, were faulty, this was a serious problem and there may still be some around. The FPA chip is the large white chip with 2 gold coloured squares on it. The part number for it is between these squares. The only way to tell the defective chips is to check this part number.

54-09400-09 are good ones
54-09400-07 are the bad ones

The problem is undetectable to the operating system, (the exponent to a FPA instruction does not always get stored) so presumably the CPU is calculating wrong and no one knows. Only RSTS and IAS are affected, though customised operating systems may be.

You can use EQ-01440-01 to replace the module or simply replace the M8190-AE.

14.10 Other Bus Systems

14.10.1 Firefox VS3520/40

This is the only symetrical processing CPU outside the CI based machines to date. There are 2 CPUs per board (L2001-00). The VS3520 has one L2001 (2 x CPUs) and the VS3540 has two L2001 (4 cpus). It uses a bus called the M-Bus, which is similar to the BI but has dedicated node slots and cables off the boards (there is nothing on the backplane for the engineer to configure, as the BI has).

There is an M-Bus to QBus interface, but this gives only limited QBus support, namely for the TQK70 and RRD40. The QBus grant goes in a U similar to early QBus machines (VT103). Some OEMs have put Non Dec interfaces on the QBus, they do so on the understanding that they are not supported and therefore we can only do a best efforts repair on them.

It was only marketed as a workstation, with a VCB02 type interface that plugs into the M Bus. It is single user only, though as with all high powered workstations, they can be used as compute engines as a node in a VaxCluster.

The Firefox has, as standard, an I/O module (L2003), which has a SCSI and ethernet controller, amongst other items.

VMS sees devices on its I/O modules SCSI as DKA0: for example, not as usual on 3100s as DKA100:

It uses firmware for console and boot that is similar to the 3100. T 101 and T 50 work the same. There are lots of extra tests, and a console command
00 >>> SET CPU *proc-id* PRIMARY ENABLE
to set the console to another CPU of *proc-id* between 0 and 3. The console prompt has the *proc-id* before the >>>.

Because of the different architecture, an engineer needs to be trained on it to work on it.

Table 14–17: VS3520/40 PCBs that plug in the M Bus

Item	Option	Part Number
CPU dual	KA60	L2001-00
Memory 8Mb	MS60-AA	L2007-AA
Memory 16Mb	MS60-BA	L2007-BA
I/O Module	Unkn	L2003-00

Table 14–17 (Cont.): VS3520/40 PCBs that plug in the M Bus

Item	Option	Part Number
Graphics O/P	Unkn	L2005-AA
Graphics Base	Unkn	L2004-AA
Graphics Expansion 16 planes	Unkn	L2006-00
QBus I/F - called Tape Adapter Module	Unkn	L2008-00
Power Supply	H7868-B	H7868-B

F A C T F L A S H

Options Affected: **VAXBrick 4000 model 50**
Submitted By: **Jim Egginton**
Date: **6-MAY-1994**
Filing Instructions: **At end of chapter 14**

New Upgrade for BA200 BA400 systems - Vax 4000-50

There is a long awaited VAXBrick upgrade option that is going to be marketed in Europe. These are the salient points:

1. It is for upgrades only to protect existing investment/requirements for QBus systems.
2. It is a 4 board option **that replaces the existing CPU and MEMORY**
3. 20 VUPs/Specmarks
4. Has SCSI, DSSI, Thin wire, 4 Async 423 ports, and connects to and drives the existing QBus.
5. Contains up to 128 Mb
6. Is supported on 5.5-2H4 or 6.1+
7. Will cost about 15 to 20K pounds
8. There may well be follow on faster VAXBricks.
9. It is announced and orderable now - so tell customers and get orders in.

F A C T F L A S H

Options Affected: VAX 4000-100,105
Submitted By: Jim Egginton
Date: 10-MAY-1994
Filing Instructions: Chapter 15 14

New Firmware for 4100, 4100A and 3100-90

Several code related bugs exist in V2.3 (and earlier versions) of the MicroVAX 3100-90 and VAX 4000-100/100A console firmware. These bugs are fixed in V2.4 of the firmware. The major bug fixes are as follows:

1. The UNJAM command now does a SCSI bus reset on the SCSI bus for both the standard SCSI bus A always present and for the KZDDA SCSI option card bus B if option is present. UNJAM is always done on any bootstrap automatically.
2. The boot driver for the 53C94 chip on board and in the KZDDA option will now wait a full 4 minutes for a REWIND to complete, instead of just 60 seconds before. This allows for a TZ30 which can take up to 3 minutes to rewind.
3. The TZK11 and TLZ6L should work under system exerciser.
4. The DZ test when executed on power up will transmit only characters of 00. Before the 6 characters were 00,FF,00,FF,00,FF, the FFs (255) cause some terminals to display characters when test was run. The characters usually showed up right after 31.. in the countdown if they were going to show up. In V1.3 or earlier the characters may have shown up at a different place in countdown but otherwise same. (example before 34..33..32..31..yyy30..29..)
5. In some cases "T 0" could fail after stopping VMS even if U and I done. Problem was due to memory resident diagnostic pointers being corrupted since they are not protected. The saved Config information used for SHOW CONFIG is protected a little better now for these same cases.

```
The V2.4 Ethernet bootable image may be found in:
MAY30::hcwrk:[cullison.release.v24.EXE]KA50_V24_1_EZ.SYS
      .EXE]KA50.MAP map files
           .LIS]      listing files
The tape/disk bootable image may be found in:
MAY30::hcwrk:[cullison.release.v24.EXE]KA50_V24_1.EX
```

KA50_V24_1_EZ.SYS is a bootable image which contains the ROM code appended to the FEPROM blasting program. These may be booted over the Ethernet to any CHEETAH system. DO NOT type the ".SYS" suffix when typing the Bootfile name. SIMPLY TYPE "KA50_V24_1_EZ" when prompted for the Bootfile name. After the FEPROM upgrade program is loaded, simply type "y" at the prompt to start the FEPROM blast.

NOTE for blast procedure to clarify.....
Any time a LEGACY/CHEETAH/BRICK CPU FEPROM is upgraded and the system is not going to be power cycled after completion of the blast then the following must be done to prevent unpredictable results.

After successful blasting:

```
>>>U  ; unjam
>>>I  ; init
>>>T 9B ; flush all test pointers which are invalid
 due to new code.
>>>T 0 ; rerun all tests
```

Now ready for individual tests, commands etc.