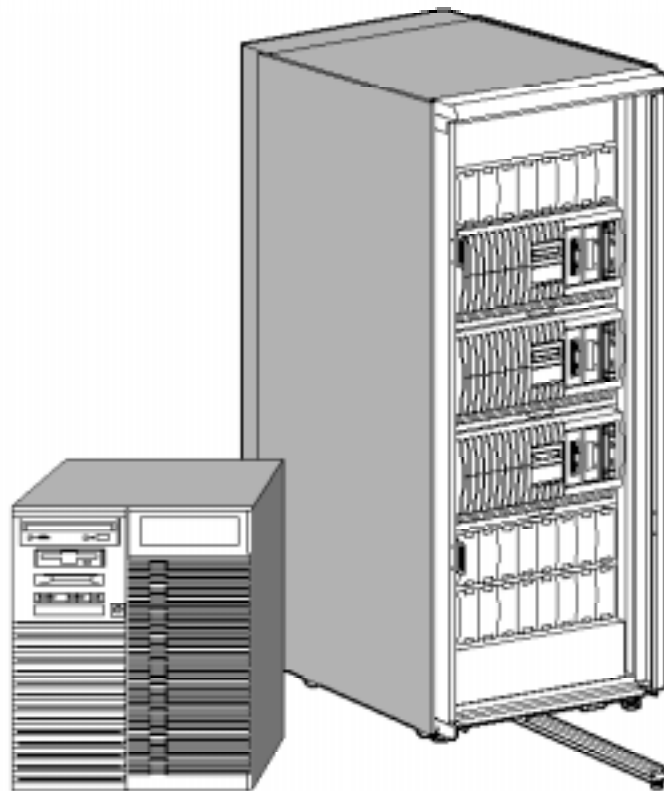


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THE NETHERLANDS

# AS1000 & AS1000A

## STUDENT GUIDE



**K-MN-AS1000-00-JG00.M**

Created by: Wouter Brackman

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## Document Update Information

Revision	Date	Description
A00	12-SEP-1996	Initial Release
A01	23-SEP-1996	Changed number of typo's, Added some missing information
A02	4-OCT-1996	Added some information
A03	18-OCT-1996	Added Firmware CD V3.7 information
A04	12-NOV-1996	Added some notes on Advanced Diagnostics
A05	21-NOV-1996	Small improvements in layout and additions to existing subjects
A06	7-JAN-1997	Added Firmware CD V3.8 information
A07	17-JAN-1997	Changed front, Some small improvements Added AS1000(A) Rackmount information Added AS1000A EV45 and EV5 information Added console password and how to hack
A08	28-FEB-1997	Added Pinnacle SROM information
A09	27-MRT-1997	Added storage shelf information
B00	16-MAY-1997	Changed concept; no separate appendix with figures Deleted a number of confusing SCSI pictures. Added a complete list with descriptions and syntax of available SRM console comands Added EV list Added console shell operators Added control characters and special keys Added Firmware CD V3.9 information Added LAB on how to redirect output to floppy Added LAB on upgrading/downgrading CPUs and saving/restoring NVRAM data
B01	27-JUN-1997	Added copyright page Added jumper settings EV5 daughtercards Added jumper settings AS1000A motherboard Added complete revision matrix for firmware CDs Improvements to chapter on firmware updates
B02	26-SEP-1997	Format of document reworked to comply with JGO Engineering standards. Changed number of typos Added number of test procedures Added procedure to copy bootable floppies on PC Added Firmware CD 4.0 information Added different information sources Added number of blitzes
B03	9-OCT-1997	Added information sources Added 500MHz CPU Added DECevent info Added some notes and troubleshooting hints Updated parts list with latest CPUs

B04	30-OCT-1997	<p>Small corrections and improvements</p> <p>Added note on RCM</p> <p>Added serial line commands (ECU)</p> <p>Added memexer and test command</p> <p>Added EV4 SROM information</p> <p>Added AS1000A motherboard information</p> <p>Added AS1000A upgrade information</p> <p>Added register, machine check and other errorlog analysis information</p> <p>Added CRD troubleshooting information</p> <p>Added info FW CD V5.0</p> <p>Added chapter on differences ARC and AlphaBIOS</p> <p>Added AlphaBIOS option key mapping table</p>
C	19-NOV-1997	<p>Revision numbering compliant with engineering standards</p>
D	12-FEB-1998	<p>Changed number of typos and added some comments</p> <p>Added some labs</p> <p>Changed StorageWorks address</p> <p>Added procedure to create bootable floppies on PC or notebook</p> <p>Added some info on Primo for Mikasa</p> <p>Added specific WNT installation information</p> <p>Added WNT information site internet address</p> <p>Added AS1000 to AS1000A (SCSI) update information</p> <p>Added option restrictions AS1000(A)</p> <p>Changed chapter on memory configurations</p> <p>Added OS memory requirements</p>
E	30-MAR-1998	<p>Reordered chapters</p> <p>Added some information sources</p> <p>Added some environment parameter descriptions</p> <p>Improved description set password and set secure</p> <p>Improved description boot and edit command</p> <p>Added labs for both ARC (EV4) and AlphaBIOS (EV5)</p> <p>Added blitzes</p> <p>Added date and number to most blitzes</p> <p>Added FW CD V5.1 release notes</p>
F	8-MAY-1998	<p>Changed some typos</p> <p>Changed errors in the lab on testing disks using the exer command</p>
G		<p>Revision G skipped to comply to engineering standards</p>
H	19-MAY-1998	<p>Added blitzes</p>

I		Revision I skipped to comply to engineering standards
J	19-AUG-1998	Converted document to Word 97 Added some console labs Added info on running programs from CD using ARC Added console V5.2 release notes
K	31-OCT-1998	Changed some cosmetic errors Changed some minor errors in the console labs Changed order and text of console labs Added troubleshooting tip (LFU verify fails) Added blitz on floppy problems
L	27-JAN-1998	Added console V5.3 release notes
M	01-MAR-1999	Changed frontpage Changed copyright page Removed some typos Added Z-help information on SCSI configurations AS1000A Updated WNT related issues (CH12)

# Table of Contents

---

<b>1 SYSTEM OVERVIEW .....</b>	<b>15</b>
1.1 THEORY .....	15
1.1.1 Overview Motherboards and Daughterboards .....	15
1.1.2 AS1000 overview .....	16
1.1.3 AS1000A Overview .....	16
1.1.3.1 OpenVMS versions which support AS1000A .....	17
1.1.4 AS1000(A) Rackmount Systems .....	18
1.1.5 AS1000 Rear/Right View - FRUs .....	19
1.1.6 AS1000 System Architecture .....	19
1.1.7 AS1000A (200 MHz) System Architecture .....	20
1.1.8 AS1000A (266 MHz) System Architecture .....	20
1.1.9 AS1000A (300 MHz) System Architecture .....	21
1.1.10 EV56 Daughterboard Architecture (Primo) .....	21
1.1.11 Layout Motherboard AS1000 .....	22
1.1.12 Layout Motherboard AS1000A .....	22
1.1.13 AS1000 to AS1000A Upgrade Option .....	23
1.1.13.1 AS1000 to AS1000A SCSI Update .....	23
<b>2 PARTS DETERMINATION, JUMPERS, CABLES AND CONNECTORS .....</b>	<b>25</b>
2.1 EXERCIZES AND LABS .....	25
2.1.1 LAB 2.1 Identifying Jumpers and Cables .....	25
2.2 THEORY .....	26
2.2.1 Motherboard Jumpers (Default Settings) AS1000 .....	26
2.2.2 Motherboard Jumpers (Default Settings) AS1000A .....	27
2.2.3 OCP Module Cable (10-pin) .....	28
2.2.4 Floppy Drive Cable (34-pin) .....	29
2.2.5 Power Supply Current Sharing Cable (3-pin) .....	30
2.2.6 Power Supply DC Cable Assembly (Signal/Misc,15-pin), (+5V, 24-pin), (+3.3V, 20-pin) .....	30
2.2.7 Power Supply Storage Harness (12-pin) .....	31
2.2.8 Interlock/Server Management Cable (2-pin) .....	31
<b>3 (DIS-)ASSEMBLY .....</b>	<b>33</b>
3.1 EXERCIZES AND LABS .....	33
3.1.1 LAB 3.1 (Dis-)assembly AS1000(A) .....	33
3.2 THEORY .....	34
3.2.1 Remove front panel .....	34
3.2.2 Remove OCP module .....	34
3.2.3 Disconnect the fan cable from the motherboard and remove fan .....	35
3.2.4 Removing the Power Supply .....	35
3.3 TROUBLESHOOTING .....	36
3.3.1 BLITZ: Service Strategy for NVRAM chip and ENET ROM .....	36
3.3.2 BLITZ: AS1000(A) may Hang after Replacing Motherboard .....	37
<b>4 PROCESSOR CONFIGURATIONS AND TROUBLESHOOTING .....</b>	<b>39</b>
4.1 EXERCIZES AND LABS .....	39
4.1.1 LAB 4.1 Upgrading and Downgrading CPU's (the preferred way) .....	39
4.1.2 LAB 4.2 Upgrading and Downgrading CPU's (the rough way) .....	39
4.1.3 LAB 4.3 SROM Jumper .....	39

4.2 THEORY.....	40
4.2.1 AS1000(A) EV4/xxx CPU Daughtercard Jumper Settings .....	40
4.2.1.1 J3 and J4 Jumper Settings.....	40
4.2.1.2 J1 Jumper Settings.....	41
4.2.2 AS1000(A) EV5/300 CPU Daughtercard Jumper Settings .....	42
4.2.2.1 J3 Jumper Settings.....	42
4.2.2.2 J4 Jumper Settings.....	42
4.2.3 AS1000(A) EV5/333 CPU Daughtercard Jumper Settings .....	43
4.2.3.1 J3 Jumper Settings.....	43
4.2.3.2 J1 Jumper Settings.....	43
4.2.4 AS1000(A) EV5/400 CPU Daughtercard Jumper Settings .....	44
4.2.4.1 J3 Jumper Settings.....	44
4.2.4.2 J1 Jumper Settings.....	44
4.2.5 AS1000(A) EV5/500 CPU Daughtercard Jumper Settings .....	45
4.2.5.1 J3 Jumper Settings.....	45
4.2.5.2 J1 Jumper Settings.....	45
4.2.6 Upgrading and Downgrading CPU's.....	46
4.2.6.1 Upgrade from EV4 to EV5 CPU .....	46
4.2.6.2 Downgrade from EV5 to EV4 CPU .....	46
4.2.6.3 Things to Check when Upgrade or Downgrade Fails .....	46
<b>5 MEMORY CONFIGURATIONS AND TROUBLESHOOTING.....</b>	<b>47</b>
5.1 EXERCIZES AND LABS.....	47
5.1.1 LAB 5.1 Memory Configurations.....	47
5.1.2 LAB 5.2 Memory Tests on EV4 System .....	47
5.1.3 LAB 5.3 EV5 System and ECC SIMMs.....	47
5.2 THEORY .....	48
5.2.1 AS1000(A) Memory Configuration Rules.....	48
5.2.2 Operating System Memory Requirements .....	48
5.2.3 Data Integrity.....	48
5.2.4 Isolating Failing SIMMs using EV4 Daughterboard .....	49
5.2.5 SRAM Memory Power-Up Tests, Bank 2 .....	49
5.2.6 SRAM Memory Power-Up Tests, Bank 3 .....	50
5.2.7 SRAM Memory Power-Up Tests, Bank 4 .....	51
5.2.8 SRAM Memory Power-Up Tests, Bank 5 .....	51
5.2.9 AlphaServer 1000(A) Memory Layout.....	52
5.3 TROUBLESHOOTING INFORMATION .....	53
5.3.1 Correctable Read Data (CRD) Analysis (EV5) .....	53
5.3.1.1 Data Required for CRD Analysis .....	53
<b>6 ISA, EISA AND PCI CONFIGURATION.....</b>	<b>55</b>
6.1 EXERCIZES AND LABS.....	55
6.1.1 LAB 6.1 Configure ISA/EISA boards .....	55
6.1.2 LAB 6.2 Set and Show the bus_probe_algorithm .....	55
6.2 THEORY .....	56
6.2.1 General information on ECU.....	56
6.2.2 Physical difference ISA and EISA options.....	57
6.2.3 Setting Up a Serial Terminal to Run ECU.....	57
6.2.3.1 Serial Line Keyboard Commands.....	57
6.2.4 Remote Console Monitoring (RCM) Support .....	58
6.2.5 Summary of Procedure for Configuring EISA Bus (EISA Options Only).....	59
6.2.6 Summary of Procedure for Configuring EISA Bus with ISA Options.....	60
6.3 TROUBLESHOOTING INFORMATION .....	61
6.3.1 EISA Bus Problems Indicated at Power-Up .....	61
6.3.2 Additional EISA Troubleshooting Tips.....	62
6.3.3 PCI Bus Problems Indicated at Power-Up.....	63
6.3.4 Option Restrictions AS1000 (EV4 and EV5).....	64
6.3.5 Option Restrictions AS1000A (EV4) .....	64

6.3.6 Option Restrictions AS1000A (EV5) .....	65
6.3.7 BLITZ: AS1000A 5/xxx - PB2GA S3 PCI Slot Restriction.....	66
6.3.8 BLITZ: Digital UNIX Patches for PB2GA-JC/JD S3 TRIO64 V+.....	67
6.3.9 BLITZ: Problems with AS1000A using PB2GA Graphics Card.....	68
6.3.10 BLITZ: AS1000A - ISA/EISA Options may not Work Properly .....	69
6.3.11 BLITZ: AS1000A - PBXGA-AA/-BA/-CA, Potential DMA Write Problem .....	71
<b>7 SCSI CONFIGURATION AND TROUBLESHOOTING .....</b>	<b>73</b>
7.1 THEORY.....	73
7.1.1 SCSI Storage configuratons AS1000(A) .....	73
7.1.2 Difference BA350 versus AS1000(A) Storage Shelf .....	74
7.1.3 SCSI Termination at Rear Port.....	74
7.1.4 Single Controller Configuration with Single Bus StorageWorks Shelf AS1000 .....	75
7.1.5 Single Controller Configuration AS1000A .....	76
7.1.6 Wide-SCSI (Native Controller to StorageWorks Shelf) Cable (68-pin) AS1000A.....	77
7.1.7 Single Controller Configuration with Dual Bus StorageWorks Shelf AS1000.....	78
7.1.8 Dual Controller Configuration with Single Bus StorageWorks Shelf AS1000.....	79
7.1.9 Dual Controller Configuration with Dual Bus StorageWorks Shelf AS1000 .....	80
7.1.10 Dual Controller Configuration with Split StorageWorks Backplane AS1000A .....	81
7.1.11 Triple Controller Configuration with Split StorageWorks Backplane AS1000A.....	82
7.2 TROUBLESHOOTING INFORMATION .....	83
7.2.1 Mass Storage Troubleshooting Table .....	83
7.2.2 SCSI Related Option Restrictions AS1000 .....	85
7.2.3 SCSI Related Option Restrictions AS1000A (EV4).....	85
7.2.4 SCSI Related Option Restrictions AS1000A (EV5).....	85
7.2.5 BLITZ: AS1000 Split Bus Intermittent Fault .....	86
7.2.6 New Configuration of Internal SCSI on AS1000A.....	87
<b>8 CACHE OPTIONS .....</b>	<b>89</b>
8.1 EXERCIZES AND LABS.....	89
8.2 THEORY.....	89
<b>9 CONSOLE COMMANDS.....</b>	<b>91</b>
9.1 EXERCIZES AND LABS.....	91
9.1.1 LAB 9.1 Get help from the System .....	91
9.1.2 LAB 9.2 Get information from the System.....	91
9.1.2.1 LAB 9.2A Displaying and Clearing the Eventlog .....	92
9.1.3 LAB 9.3 Exercizers and Tests .....	92
9.1.4 LAB 9.4 Testing the Disks in the System.....	93
9.1.5 LAB 9.5 Running Commands in the Background .....	93
9.1.6 LAB 9.6 Building Scripts .....	94
9.1.7 LAB 9.7 Building a Script in NVRAM .....	94
9.1.8 LAB 9.8 Changing from SRM to ARC and vice-versa (EV4 only).....	95
9.1.9 LAB 9.9 Changing from SRM to AB and vice-versa (EV5 only) .....	95
9.1.10 LAB 9.10 Setting Boot and System Parameters .....	96
9.1.11 LAB 9.11 Save and Restore Environmental Data to/from Floppy .....	97
9.1.12 LAB 9.12 Redirecting Console Output to a File .....	97
9.1.13 LAB 9.13 Redirecting Console Output to Floppy .....	97
9.1.14 LAB 9.14 Identifying Commands and Scripts.....	97
9.1.15 LAB 9.15 Changing the OCP Message .....	98
9.1.16 LAB 9.16 Testing Network Cards .....	99
9.1.17 LAB 9.17 Examining and Depositing.....	101
9.1.18 LAB 9.18 Make a Script available using NVRAM .....	102
9.2 THEORY.....	103
9.2.1 AS1000(A) Console Commands .....	103
9.2.2 Control Characters and Special Keys .....	118
9.2.3 Console Shell Operators.....	119
9.2.4 AS1000(A) - Environment Variables .....	120



9.2.5 Differences between ARC and AlphaBIOS .....	127
9.2.5.1 Revamped User Interface .....	127
9.2.5.2 Hard-Disk Setup .....	127
9.2.5.3 Changing CMOS and NVRAM Values .....	127
9.2.5.4 Working with Operating Systems .....	128
9.2.5.5 Running a Program from AlphaBIOS .....	128
9.2.5.6 Differences in System Configuration Display .....	128
9.2.5.7 Resetting to Factory Defaults .....	128
9.2.5.8 Multilingual Support .....	128
9.2.5.9 AlphaBIOS Option Key Mapping .....	129
9.2.6 How to Run a Program from CD under ARC .....	129
9.2.7 SRM naming Convention .....	130
9.2.8 Boot Flags - Description .....	130
9.2.9 Boot Flags (Digital UNIX) .....	130
9.2.10 Root Number Settings (OpenVMS) .....	131
9.2.11 Boot Flags (OpenVMS) .....	131
9.2.12 Alternative boots .....	131
9.2.13 Listing ARC Firmware Boot Device Names .....	132
9.2.14 ARC Firmware Boot Device Names .....	132
9.2.15 Set Default Environment Variables (ARC) .....	133
9.2.15.1 Example ARC Hardware Configuration Display .....	134
9.2.16 Example Show Config Display .....	135
9.2.17 Example Show Device Display .....	135
9.2.18 Console Event Log Example .....	135
9.2.19 Example show_status with no errors .....	136
9.2.20 er*0_protocols, ew*0_protocols .....	137
9.2.21 set tga_sync_green .....	138
9.2.22 netew - Description .....	138
9.2.22.1 Example - Testing an Ethernet Port: (netew) .....	138
9.2.22.2 Example - Testing an Ethernet Port: (network) .....	138
9.2.23 >>>nettest - Description .....	139
9.2.23.1 Example net -s .....	139
9.2.24 Test Command - Description .....	140
9.2.24.1 Examples of the TEST command .....	140
9.2.25 Advanced Diagnostics .....	141
9.2.26 Console Password (and how to hack your way out) .....	142
9.3 TROUBLESHOOTING .....	143
9.3.1 How to Use the Exercize Command .....	143
9.3.2 Diagnostic Flow for Problems Getting to Console Mode .....	144
<b>10 FIRMWARE UPDATES, REVISIONS AND FAIL SAFE LOADER.....</b>	<b>145</b>
10.1 EXERCIZES AND LABS .....	145
10.1.1 LAB 10.1 Firmware Update CDROM V3.7 or higher .....	145
10.1.2 LAB 10.2 Using the Floppy Loader .....	145
10.1.3 LAB 10.3 Saving and Restoring NVRAM Data to/from Floppy .....	146
10.2 THEORY .....	147
10.2.1 What Version Firmware is on which CD .....	147
10.2.2 Notes on firmware CD V3.7 .....	148
10.2.2.1 Revision Matrix CD V3.7 .....	148
10.2.2.2 General Info on CD V3.7 .....	148
10.2.2.3 Functional changes CD V3.7 .....	148
10.2.3 Notes on firmware CD V3.8 .....	149
10.2.3.1 Revision Matrix CD V3.8 .....	149
10.2.3.2 Functional changes CD V3.8 .....	149
10.2.4 Notes on firmware CD V3.9 .....	150
10.2.4.1 Revision Matrix CD V3.9 .....	150
10.2.4.2 Functional changes CD V3.9 .....	150
10.2.4.3 New LFU Commands (save_nvram, restore_nvram) .....	151
10.2.4.4 New Command: Redirect Console Output to FAT-Formatted Floppy .....	152
10.2.5 Notes on firmware CD V4.0 .....	153

10.2.5.1	Revision Matrix CD V4.0.....	153
10.2.5.2	Functional changes CD V4.0.....	153
10.2.5.3	Bug Fixes Console V4.9.....	154
10.2.5.4	Known Anomalies, Restrictions and Workarounds.....	154
10.2.5.5	Console Support for Silently Update Console Firmware (CD V4.0).....	155
10.2.5.6	Console (V4.9) Notes for the DE500-AA/DE500-BA Fast EtherWorks Adapters .....	156
10.2.6	Notes on firmware CD V5.0.....	157
10.2.6.1	Revision Matrix CD V5.0.....	157
10.2.6.2	Functional changes Console V5.0 .....	157
10.2.6.3	Bug Fixes Console V5.0.....	157
10.2.6.4	Known Anomalies, Restrictions and Workarounds.....	157
10.2.7	Notes on firmware CD V5.1 .....	158
10.2.7.1	Revision Matrix CD V5.1.....	158
10.2.7.2	Functional changes Console V5.1 .....	158
10.2.7.3	Known Anomalies, Restrictions and Workarounds.....	159
10.2.8	Notes on firmware CD V5.2.....	160
10.2.8.1	Revision Matrix CD V5.2.....	160
10.2.8.2	Functional changes Console V5.2 .....	160
10.2.8.3	Known Anomalies, Restrictions and Workarounds.....	161
10.2.9	Notes on firmware CD V5.3.....	162
10.2.9.1	Revision Matrix CD V5.3.....	162
10.2.9.2	Functional changes Console V5.3 .....	162
10.2.9.3	ISP1020/1040 V5.57 Highlights .....	162
10.2.9.4	KZPCM-DA PCI-slot Restriction Removed .....	163
10.2.9.5	Console EV - pka0_soft_term .....	163
10.2.9.6	CCMAB-AA Memory Channel 2.....	163
10.2.9.7	Known Anomalies, Restrictions and Workarounds.....	163
10.2.9.8	Notes on DE500 .....	163
10.2.10	How to Locate the Files on CDROM .....	165
10.2.11	How to Create Bootable Floppies using OpenVMS .....	165
10.2.12	How to Create Bootable Floppies on your PC (MKBOOT.EXE).....	166
10.2.13	How to Copy Bootable Floppies using MSDOS .....	166
10.2.14	Fail-Safe Loader .....	167
10.2.15	Activating the Fail-Safe Loader (Floppy Boot).....	167
10.3	TROUBLESHOOTING .....	168
10.3.1	Some Things to Check when you can not Boot the Firmware CD.....	168
10.3.2	System cannot determine Processor Speed (OCP displays 5/???).....	168
10.3.3	FW CD can be Booted but Verification after Update Fails.....	168
<b>11</b>	<b>POWERUP SEQUENCE, SELFTEST STRATEGY AND ERROR HANDLING.....</b>	<b>169</b>
11.1	EXERCIZES AND LABS.....	169
11.1.1	LAB 11.1 Power-up countdown messages .....	169
11.2	THEORY.....	170
11.2.1	Power-up sequence .....	170
11.2.1.1	AC Power-up sequence .....	170
11.2.1.2	DC Power-up sequence .....	170
11.2.1.3	Serial ROM Diagnostics.....	170
11.2.1.4	Console Firmware-Based Diagnostics.....	171
11.2.2	Interpreting Error Beep Codes AS1000 (EV4).....	172
11.2.3	Interpreting Error Beep Codes AS1000A (EV4).....	173
11.2.4	Interpreting Console Power-Up Countdown messages (EV4).....	175
11.2.5	Interpreting Error Beep Codes (EV5, Pinnacle).....	176
11.2.6	Interpreting SROM OCP Codes (EV5, Pinnacle).....	176
11.2.7	PALcode Exception Handling .....	179
11.2.8	Machine Check / Interrupts .....	180
11.2.9	Processor Machine Check (SCB: 670) .....	181
11.2.9.1	EV4 Systems .....	181

11.2.9.2 EV5 Systems .....	181
11.2.10 System Machine Check (SCB: 660) .....	182
11.2.10.1 EV4 Systems .....	182
11.2.10.2 EV5 Systems .....	182
11.2.11 Processor-Corrected Machine Check (SCB: 630) .....	183
11.2.11.1 EV4 Systems .....	183
11.2.11.2 EV5 Systems .....	183
11.2.12 System-Corrected Machine Check (SCB: 620) .....	183
11.2.13 Operator System Error Handling .....	183
11.2.14 670/660 Machine Check Frame Format (EV5) .....	184
11.2.15 630/620 Machine Check Frame Format (EV5) .....	185
11.2.16 Machine Check Codes (EV5) .....	186
11.2.16.1 CPU Errors .....	186
11.2.16.2 CIA Specific Codes .....	186
11.2.16.3 EISA System Component Codes .....	187
11.2.16.4 System Level Codes .....	187
11.2.17 System Specific Registers.....	189
11.2.17.1 PCI to EISA Bridge Chip (PCEB) Registers .....	189
11.2.17.2 ESC to EISA Controller Chip Registers .....	189
11.2.17.3 AS1000 Specific Registers .....	189
11.2.17.4 AS1000A Specific Registers .....	189
11.2.18 Fault Detection and Reporting.....	190
11.2.19 Using DECEvent.....	191
11.2.19.1 Translating Event Files.....	192
11.2.19.2 How to Select an Alternate Input File .....	192
11.2.19.3 How to Send Reports to an Output File.....	192
11.2.19.4 How to Reverse the Order of the Input Events.....	192
11.2.19.5 Filtering Events .....	193
11.2.19.6 Selecting Alternative Reports .....	194
11.3 TROUBLESHOOTING INFORMATION .....	195
11.3.1 Diagnostic Flow for Problems Reported by the Console Program .....	195
<b>12 TYPICAL PROBLEMS AND SOLUTIONS .....</b>	<b>197</b>
12.1 THEORY.....	197
12.1.1 Malfunctioning COM ports .....	197
12.1.2 Using a VGA Controller Other than the Standard, On-Board VGA.....	197
12.1.3 Fan Speed unregular .....	197
12.1.4 WNT Issues related to AS1000 5/xxx and AS1000A 5/xxx.....	198
12.1.4.1 Version Conflict CPU revision, AlphaBIOS fw and WNT HAL files .....	198
12.2 TROUBLESHOOTING INFORMATION .....	206
12.2.1 Power Problems.....	206
12.2.2 Power Supply Configuration Rules .....	207
12.2.3 Redundant PSU failure.....	207
12.2.4 Diagnostic Flow for Boot Problems .....	208
12.2.5 Diagnostic Flow for Errors Reported by the Operating System .....	209
12.2.6 BLITZ: AS1000A - Problem with Digital UNIX Pack .....	210
12.2.7 BLITZ: No Updates for TruCluster 1.4 only 1.4A .....	211
12.2.8 BLITZ: Floppy Data Read Problems AS1000(A) .....	212
<b>APPENDIX A USEFUL INFORMATION SOURCES .....</b>	<b>213</b>
RELATED DOCUMENTATION .....	213
WHERE TO FIND BLITZES, SPECS, ETC. (PROSIC) .....	213
WHERE TO FIND OPTION INFORMATION.....	214
WHERE TO FIND FIRMWARE UPDATES.....	214
STORAGEWORKS INFORMATION SOURCE .....	214
WHERE TO GET Z-HELP FOR STORAGE PRODUCTS.....	214

PARTNUMBER INFORMATION SOURCE .....	215
TECHNICAL AND LOGISTICS SUPPORT (ENGQA).....	215
TRAINING INFORMATION AND ENROLLMENT .....	215
WINDOWS NT SUPPORT INFORMATION, HAL AND AB FILES .....	215
HANDY TOOLS FOR SCSI TERMINATION CHECKING.....	216
<b>APPENDIX B PARTNUMBERS, CABLES, ETC.....</b>	<b>217</b>
PARTNUMBERS AS1000 .....	217
PARTNUMBERS AS1000A.....	219
POWER CORD NUMBERS.....	220

# 1 System Overview

---

## 1.1 Theory

### 1.1.1 Overview Motherboards and Daughterboards

#### *Motherboards:*

<b>MIKASA</b> (AS1000)	54-23308-01	(2xPCI, 7xEISA, 1xPCI/EISA)
<b>NORITAKE</b> (AS1000A)	54-23499-01	(7xPCI, 2xEISA, 1xPCI/EISA, VGA)
	54-23499-02	(7xPCI, 2xEISA, 1xPCI/EISA, no VGA) (see note below)

#### *Daughterboards:*

EV4, EV45, can be used on both MIKASA and NORITAKE

200 MHz	54-23297-01
233 MHz	54-23297-03
266 MHz	54-23297-04

EV5, can be used on both MIKASA (a.k.a. **PINKASA**) and NORITAKE (a.k.a. **PINTAKE**)

300 MHz	54-24719-01	a.k.a. <b>PINACLE</b>
---------	-------------	-----------------------

EV56, seems to work on both MIKASA and NORITAKE, however Primo may not be supported on MIKASA.

333 MHz	54-24799-01	a.k.a. <b>PRIMO</b>
400 MHz	54-24799-02	a.k.a. <b>PRIMO</b>
500 MHz	54-24799-03	a.k.a. <b>PRIMO</b>

*Important note: Motherboards (containing the flashROMs) are shipped from repair with EV4 or EV5 firmware, dependent on the technician. This may cause problems when swapping the motherboard, which may contain the wrong firmware for a particular CPU daughterboard. If this problem occurs it must be resolved with a floppy boot, so do not send the module back as a DOA.*

*Note: There are 2 types of AS1000A motherboards:*

<b>54-23499-01</b>	<b>has on-board VGA controller</b>	<b>supports EV4 and EV5</b>
<b>54-23499-02</b>	<b>NO on-board VGA controller</b>	<b>supports EV5 only</b>
	<b>NO ECC SIMM slots</b>	

*Note: EV4 is ARC based, EV5 is AlphaBIOS based. Refer to chapter 9 for a comparison between ARC and AlphaBIOS.*

## 1.1.2 AS1000 overview

- ◆ High performance **Deskside Server**
- ◆ Supports **Windows NT, Open VMS and Digital Unix**
- ◆ **Single processor** system
- ◆ Supports up to **2 x Power Supplies** (1 x always redundant)
- ◆ **ECC memory (up to 2GB)**
- ◆ **ECC Backup Cache, 2 MB, Direct Mapped, Write Back**
- ◆ **128-bit datapath** to memory
- ◆ **7 x EISA** slots
- ◆ **2 x PCI** slots
- ◆ **1 x EISA or PCI** slot
- ◆ Integrated **SVGA controller** (only useful for console, useless for other applications)

Storage:

- ◆ **Dual SCSI backplane**
- ◆ Integrated **Fast SCSI-2 Controller**
- ◆ **10 internal storage slots**
- ◆ (7 x 3.5", 2 x 5.25", 1 x floppy drive)
- ◆ Wide SCSI ready backplane
- ◆ Hot swap disk capability

## 1.1.3 AS1000A Overview

- ◆ High performance **Deskside Server**
- ◆ Supports **Windows NT, Open VMS and Digital Unix**
- ◆ **Single processor** system
- ◆ Supports up to **2 x Power Supplies** (1 x always redundant)
- ◆ **ECC memory (up to 2 GB)**
- ◆ **ECC Backup Cache, 2 MB, Direct Mapped, Write Back**
- ◆ **128-bit datapath** to memory
- ◆ **2 x EISA** slots
- ◆ **7 x PCI** slots (Fully compliant with PCI V2 Specification)
- ◆ Integrated **SVGA controller** (only useful for console, useless for other applications)

Storage:

- ◆ **Dual SCSI backplane**
- ◆ Integrated **Fast Wide SCSI-2 Controller**
- ◆ **10 internal storage slots**  
(7 x 3.5", 2 x 5.25", 1 x floppy drive)
- ◆ Hot swap disk capability

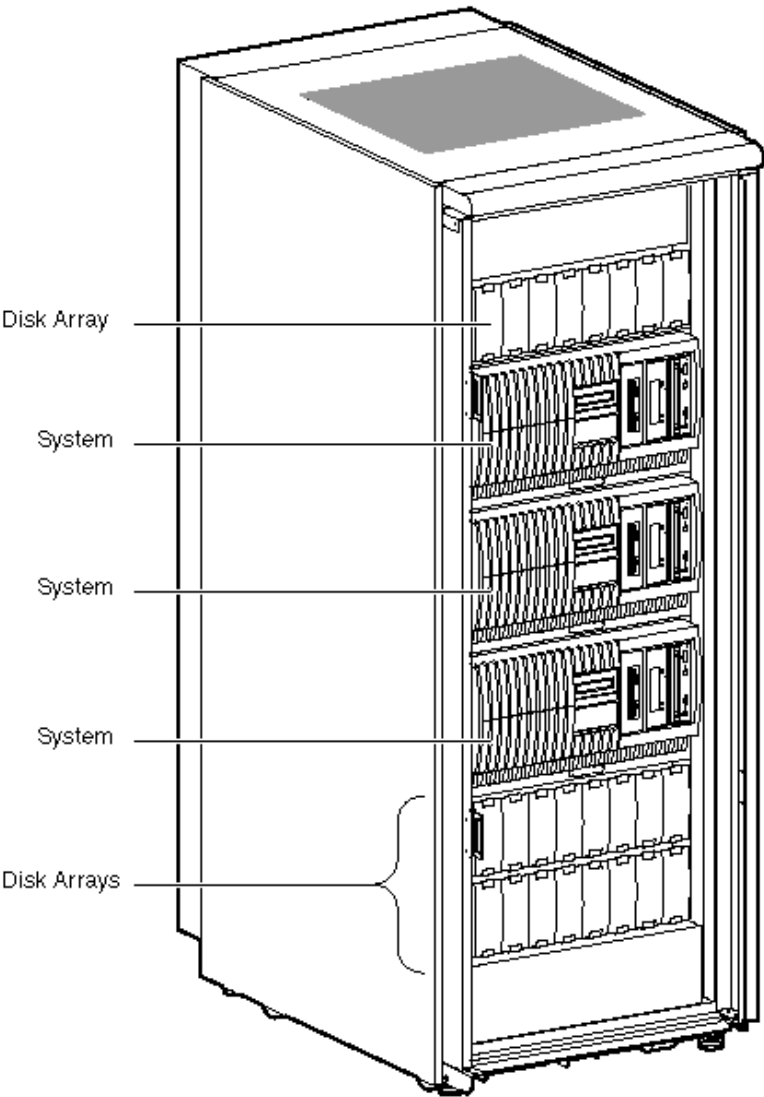
### ***1.1.3.1 OpenVMS versions which support AS1000A***

VMS V6.2	Does not support AS1000A
<b>VMS V6.2-1H3</b>	<b>Supports AS1000A</b>
VMS V7.0	Does not support AS1000A
<b>VMS V7.1</b>	<b>Supports AS1000A</b>

Reason for this is that V6.2 was developed before AS1000A. V7.0 was almost ready to market, therefore, to not delay the release of V7.0, an update to V6.2 has been released which contains an extra kernel for AS1000A. V7.1 includes this kernel.

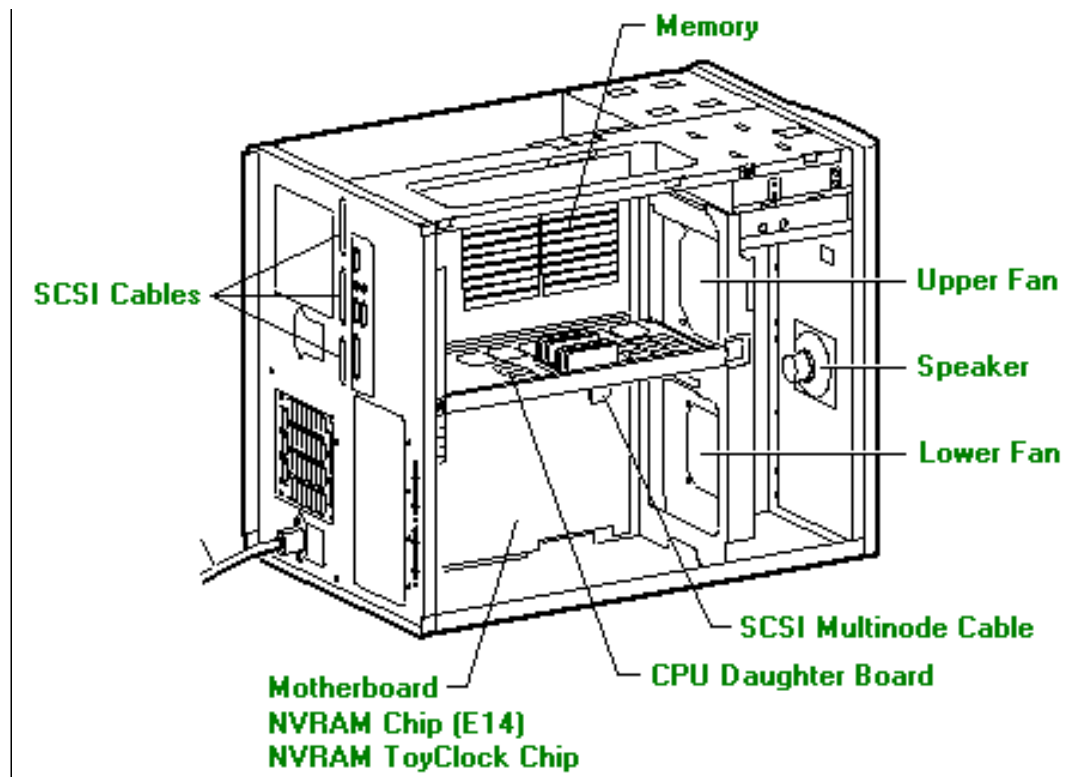
### 1.1.4 AS1000(A) Rackmount Systems

The AS1000(A) is a rackmountable box with the same features as the pedestal system. The rackmount system fits in a 19" rack and can have 3 internal disk drives. Additional storage can also be mounted in the rack.

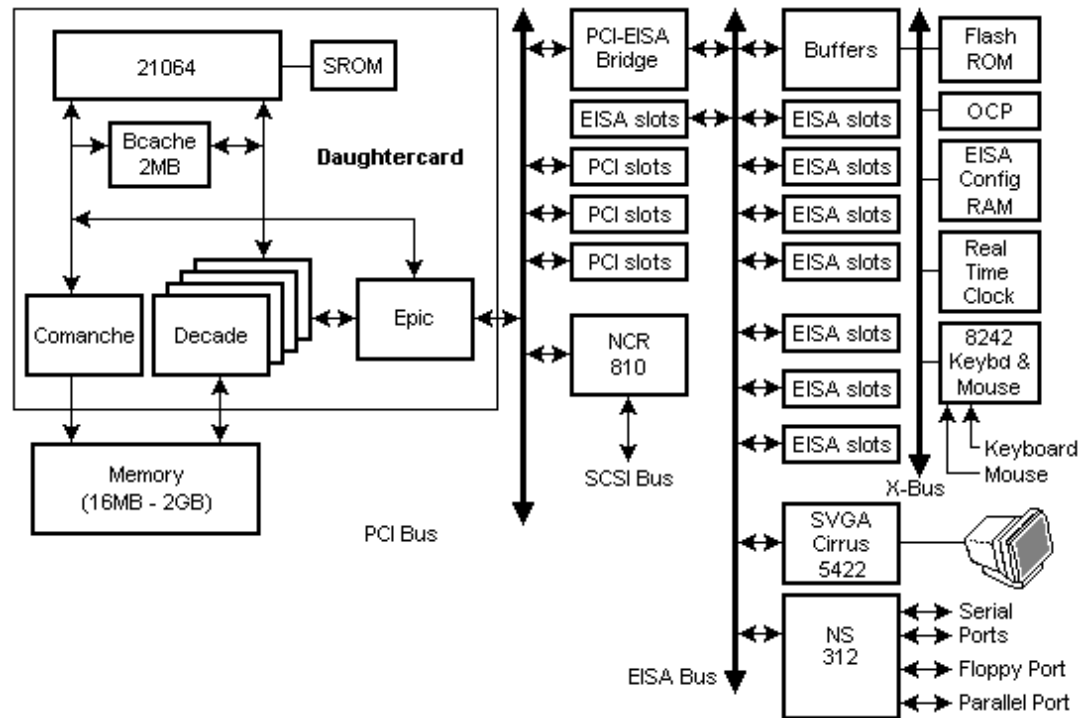




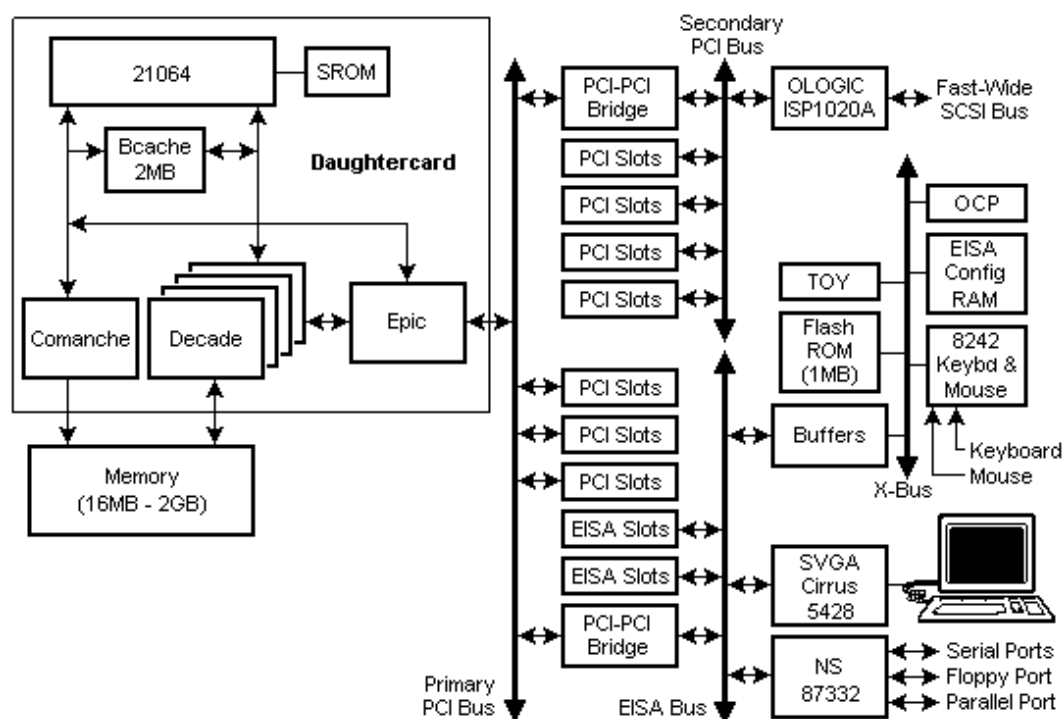
### 1.1.5 AS1000 Rear/Right View - FRUs



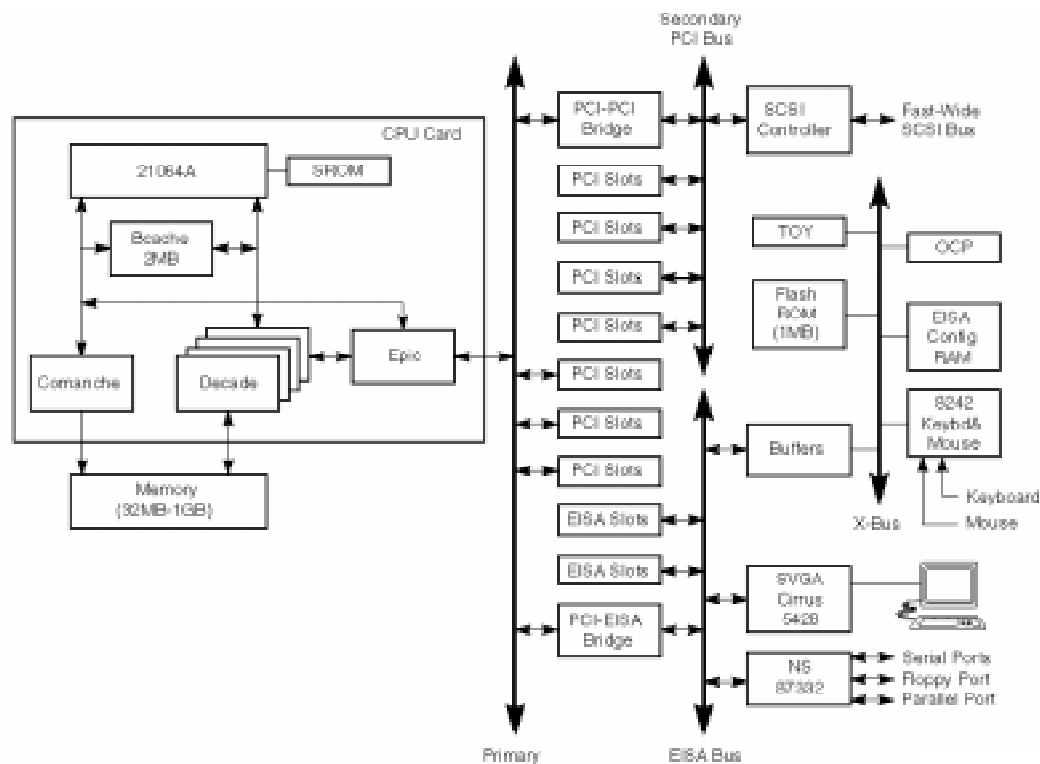
### 1.1.6 AS1000 System Architecture



### 1.1.7 AS1000A (200 MHz) System Architecture

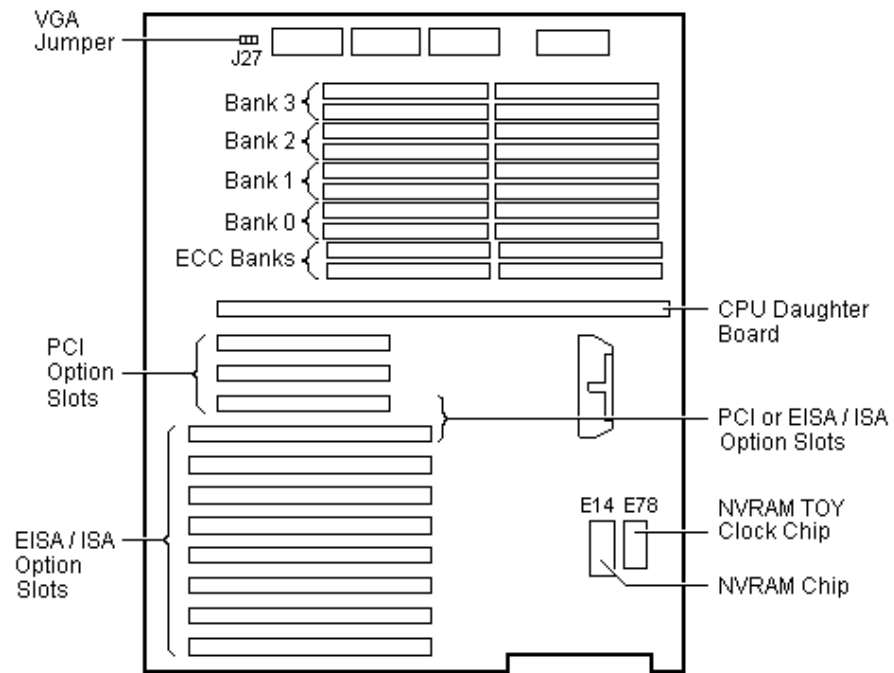


### 1.1.8 AS1000A (266 MHz) System Architecture



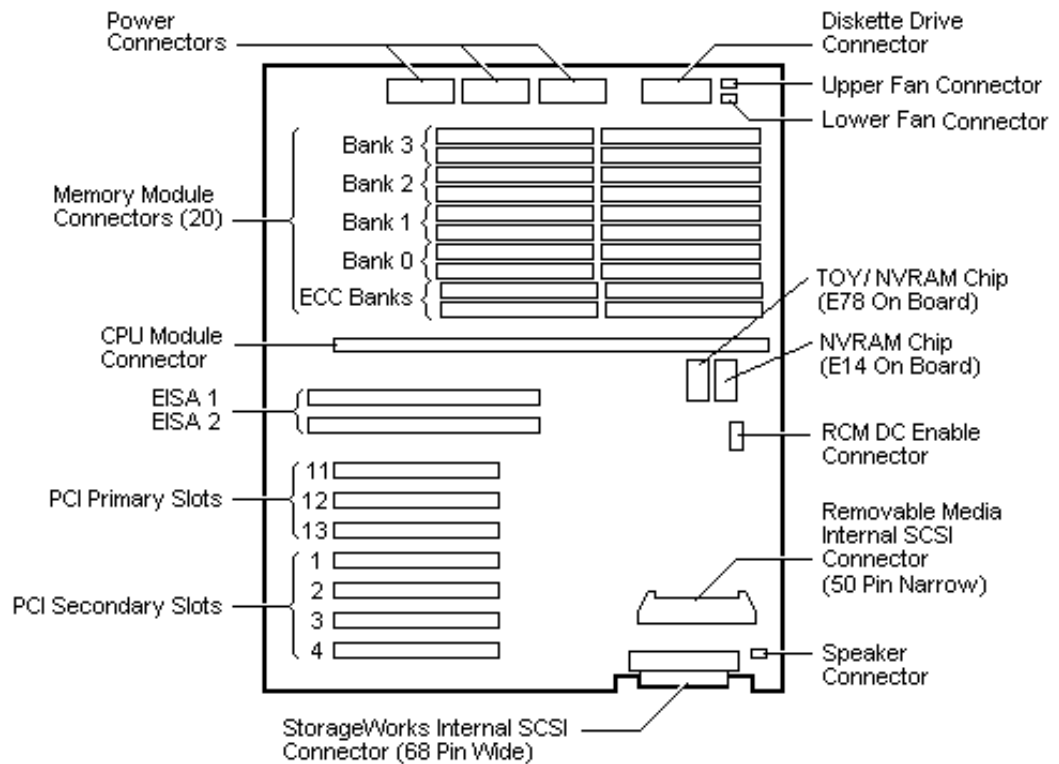


### 1.1.11 Layout Motherboard AS1000



*Note: PCI (11 to 13) and EISA (1 to 8) logical slot numbers, number from the top connector down.*

### 1.1.12 Layout Motherboard AS1000A



### 1.1.13 AS1000 to AS1000A Upgrade Option

The AS1000A upgrade option allows you to transfer the memory, hard disk drives, CDROM and other options from the AS1000. The resulting system will be an AS1000A with fast wide SCSI controller and an increased number of PCI slots (3 x primary and 4 x secondary).

The upgrade option will contain the following parts:

Description	CPU	System Module	Power Supply	Cust. Doc Kit	64MB ECC SIMM
PB73U-XA/XB	54-23297-03 (233 MHz)	54-23499-01	30-43120-02	QZ-00UAA-GW	54-23170-LA
PB73U-XA/XB	54-23297-04 (266 MHz)	54-23499-01	30-43120-02	QZ-00UAA-GW	54-23170-LA

Minimum Software Revisions:

Software	Minimum Acceptable Revision	MCD/License Package P/N
Windows NT Server	V3.51	QB-23CAA-SC (QB-23C8A-SA, International)
Digital UNIX	V3.2d-2	QL-MT4AE-6R
OpenVMS	V6.2-1H2	QL-MT1AE-6R

#### 1.1.13.1 AS1000 to AS1000A SCSI Update

Note: The AS1000 has a narrow SCSI controller connected to a fast-wide ready storage shelf. The AS1000A motherboard features a fast-wide controller, with a connector for narrow SCSI (to internal devices like CDROM) and another connector for the fast-wide connection with the (fast-wide) storage shelf.

Therefore you need to use a fast-wide cable (**17-04022-01**) connecting the fast-wide connector to the storage shelf, when updating AS1000 to AS1000A.

## 2 Parts Determination, Jumpers, Cables and Connectors

---

### 2.1 Exercizes and Labs

#### 2.1.1 LAB 2.1 Identifying Jumpers and Cables

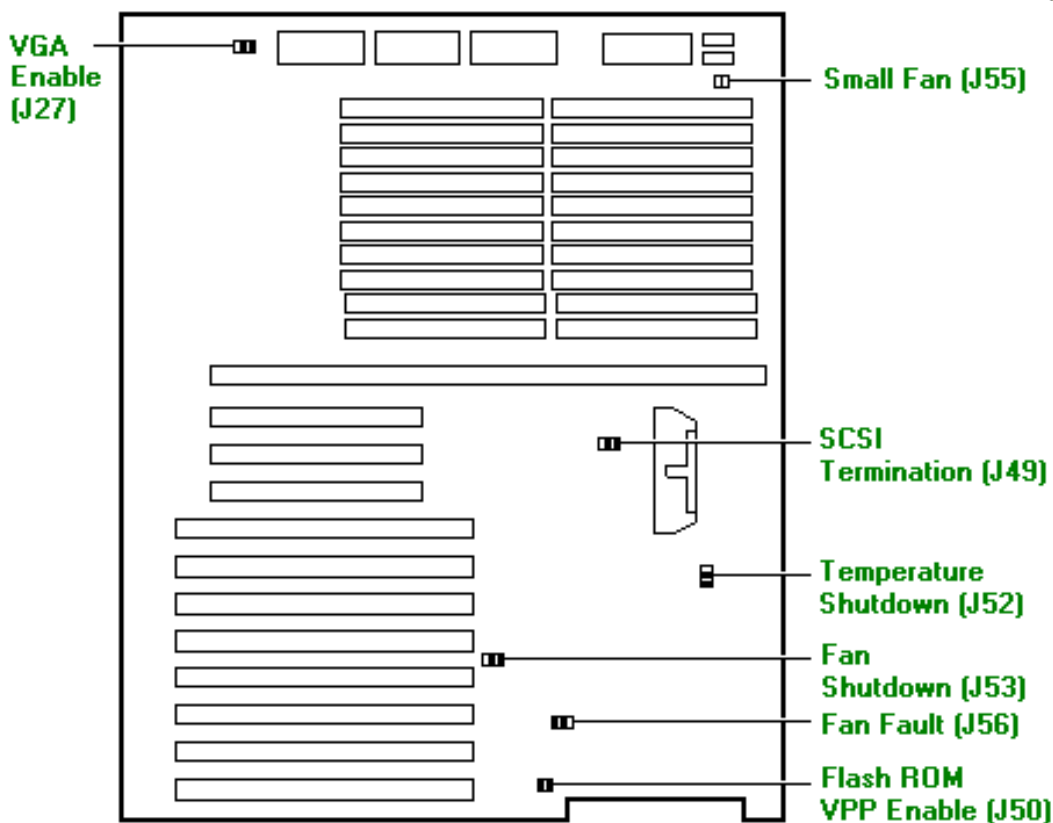
1. Identify the different jumpers and cables.
2. Identify the NVRAM.
3. Compare the AS1000 (Mikasa) and AS1000A (Noritake) motherboard.
4. Identify the interlock switch.

## 2.2 Theory

*Note: Refer to the chapter on SCSI for SCSI cabling, termination, partnumbers, etc.*

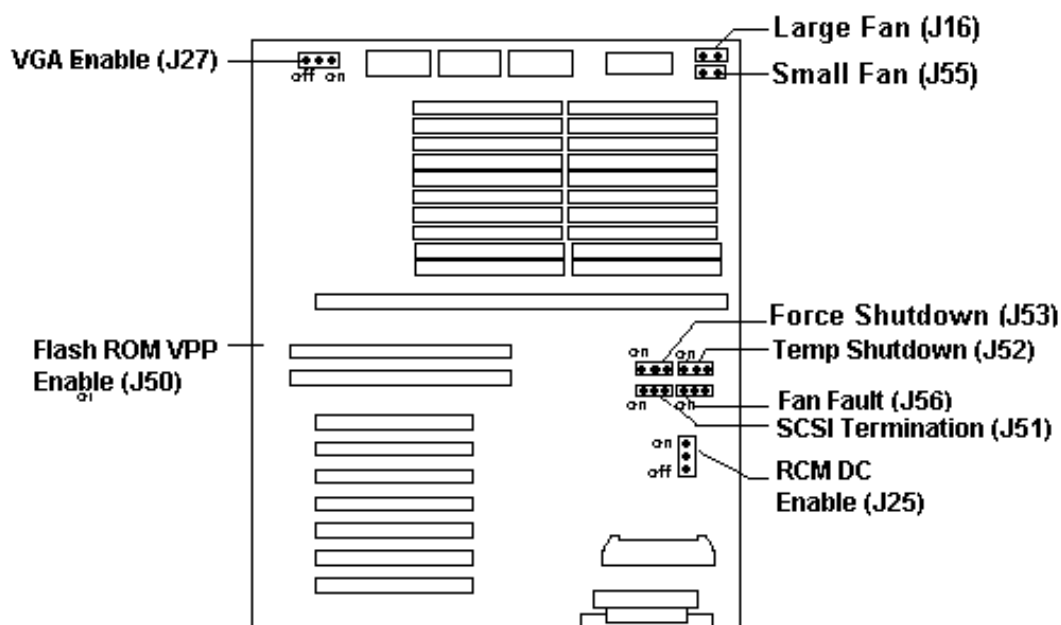
*Note: Refer to the chapter on CPUs for processor board jumper settings.*

### 2.2.1 Motherboard Jumpers (Default Settings) AS1000



Jumper	Name	Description	Default Setting
<b>J27</b>	VGA Enable	When enabled (as shown), the on-board VGA logic is activated.	Enabled for on-board VGA; Disabled if an EISA- or PCI-based VGA option is installed.
<b>J49</b>	SCSI Termination	Allows the internal SCSI terminator to be disabled.	Enabled (as shown).
<b>J50</b>	Flash ROM VPP Enable	Permits the 12V voltage needed to update the Flash ROMS.	Jumper installed.
<b>J52</b>	Temperature Shutdown	Allows the temperature sensor to shut down the system in an over temperature condition. Temperature sensors are E85 and E87 on the motherboard.	Currently ships enabled (as shown).
<b>J53</b>	Force Shutdown	Allows the software to shut down the system if a fan fails.	Enabled (as shown).
<b>J55</b>	Small Fan	Allows the small fan to be disabled to accommodate rackmount enclosure.	This jumper is not installed on AS1000 systems.
<b>J56</b>	Fan Fault	When enabled, the hardware forces the system to shut down if a fan fails. When disabled, the firmware generates a machine check; the system crashes and shuts down if a fan fails.	Enabled (as shown).

## 2.2.2 Motherboard Jumpers (Default Settings) AS1000A

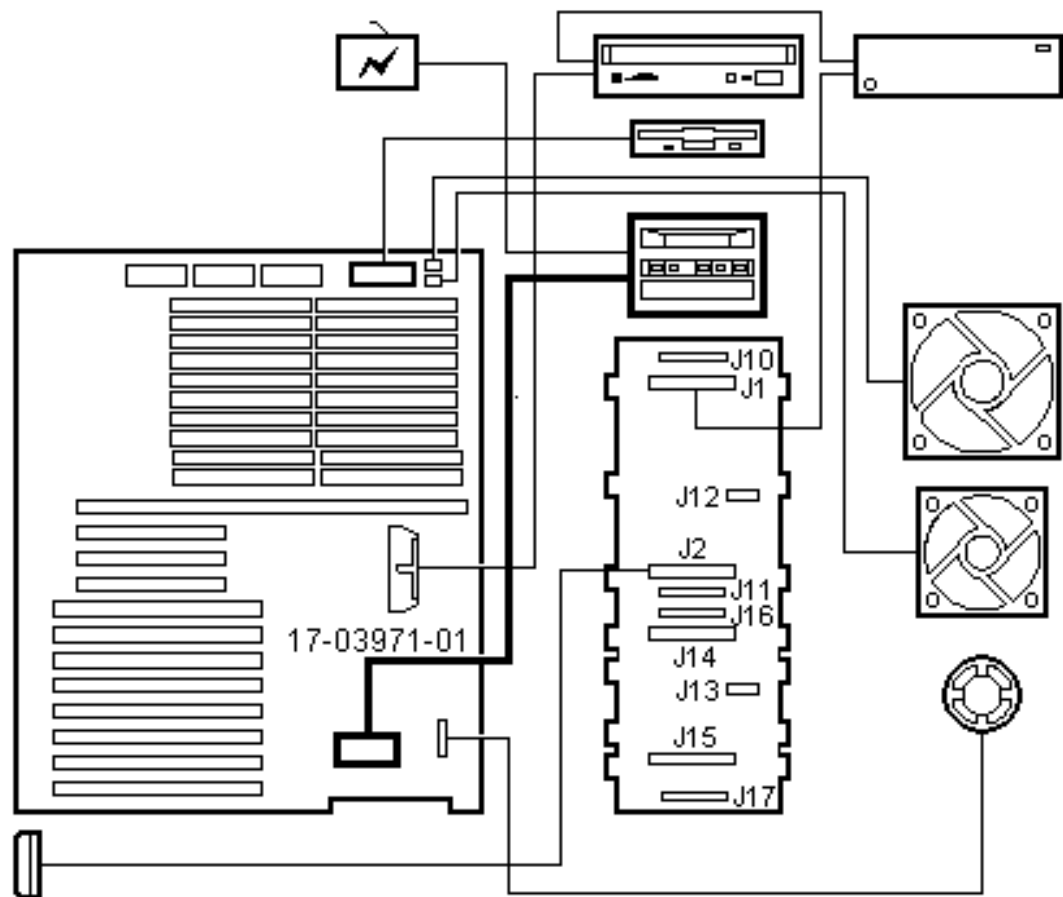


Jumper	Name	Description	Default Setting
<b>J27</b>	VGA Enable	When enabled (as shown), the on-board VGA logic is activated. <b>Note:</b> The latest revisions of the motherboard do not have the VGA logic and jumper.	Enabled for on-board VGA; Disabled if an EISA- or PCI-based VGA option is installed.
<b>J51</b>	SCSI Termination	Allows the internal SCSI terminator to be disabled.	Enabled (as shown).
<b>J50</b>	Flash ROM VPP Enable	Permits the 12V voltage needed to update the Flash ROMS.	Jumper installed.
<b>J52</b>	Temperature Shutdown	Allows the temperature sensor to shut down the system in an over temperature condition. Temperature sensors are E85 and E87 on the motherboard.	Currently ships enabled (as shown).
<b>J53</b>	Force Shutdown	Allows the software to shut down the system if a fan fails.	Enabled (as shown).
<b>J55</b>	Small Fan	Allows the small fan to be disabled to accommodate rackmount enclosure.	This jumper is not installed on AS1000A systems.
<b>J56</b>	Fan Fault	When enabled, the hardware forces the system to shut down if a fan fails. When disabled, the firmware generates a machine check; the system crashes and shuts down if a fan fails.	Enabled (as shown).

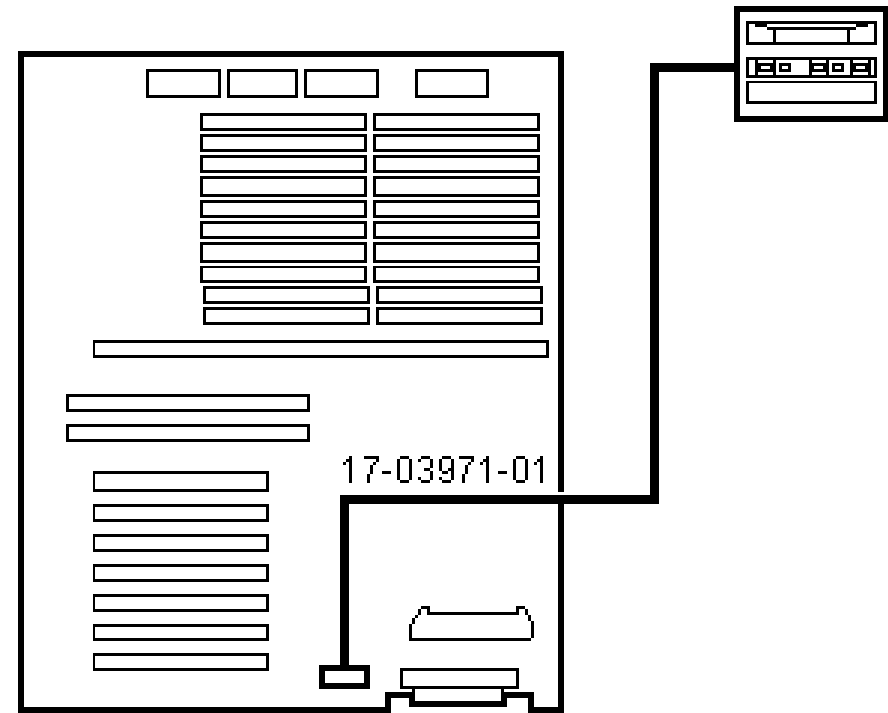


2.2.3 OCP Module Cable (10-pin)

AS1000

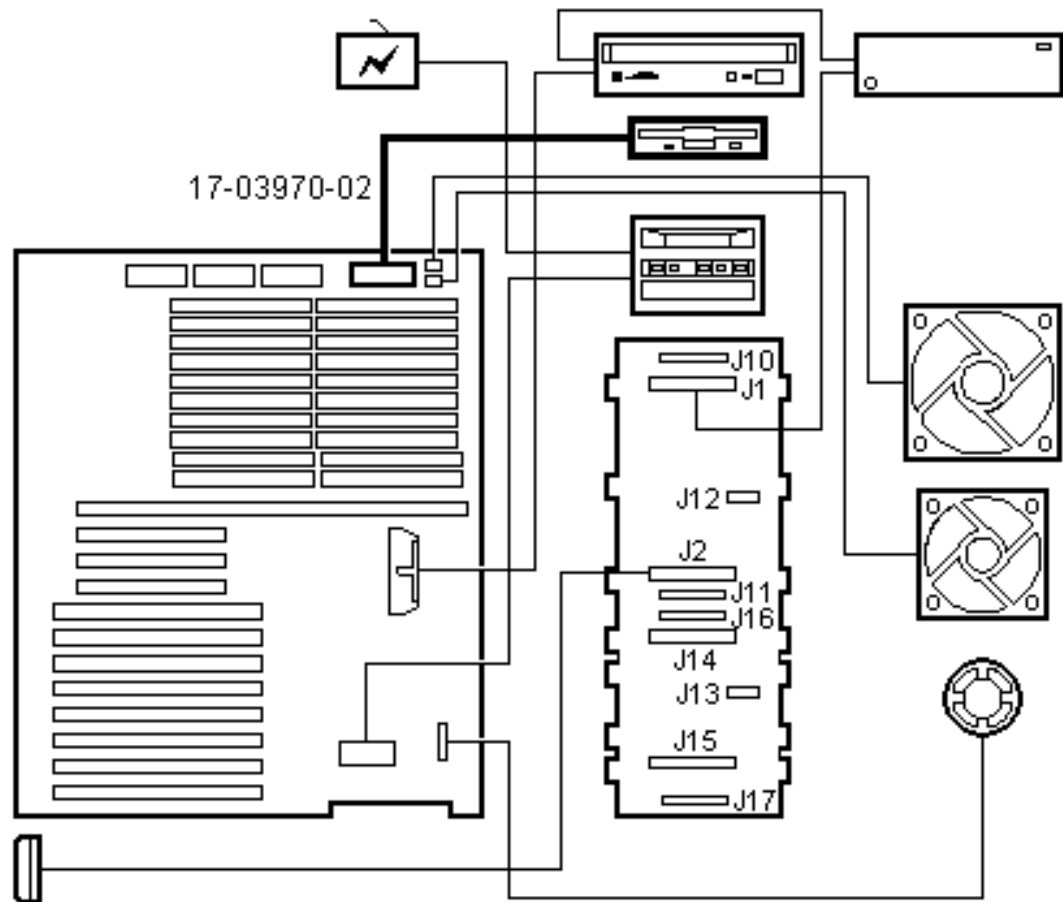


AS1000A

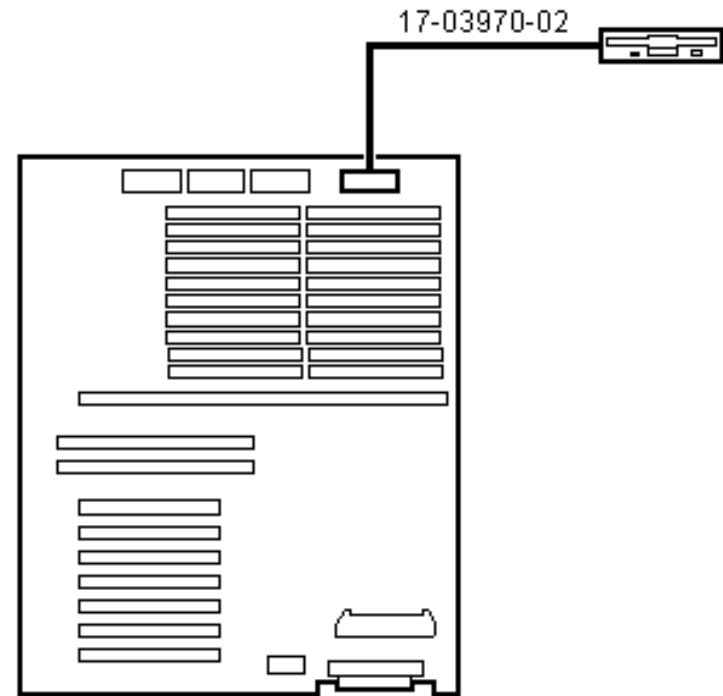


2.2.4 Floppy Drive Cable (34-pin)

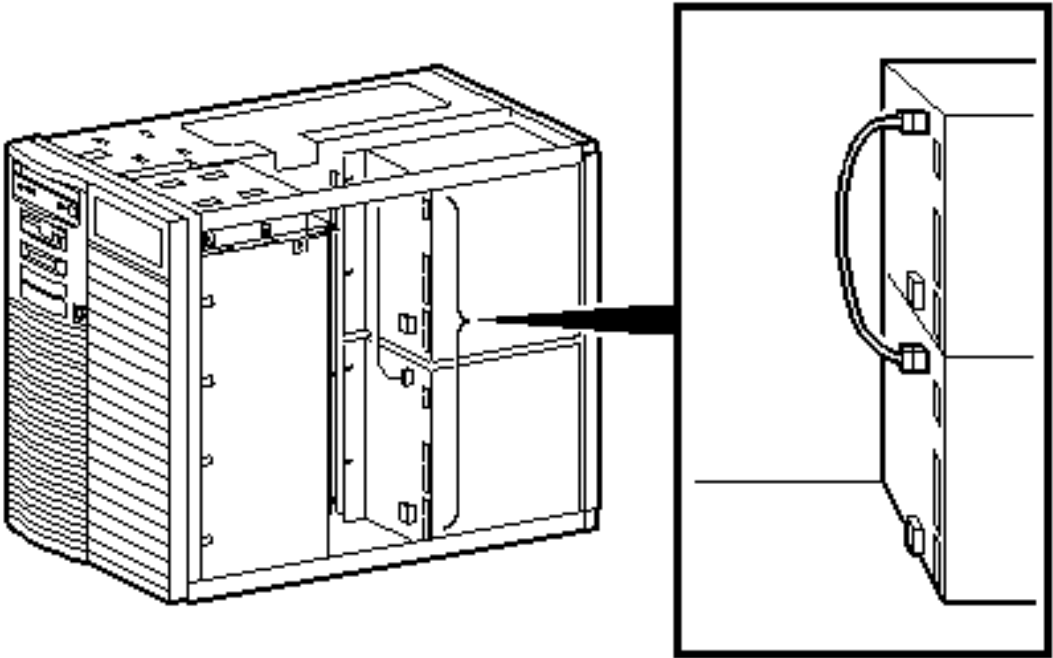
AS1000



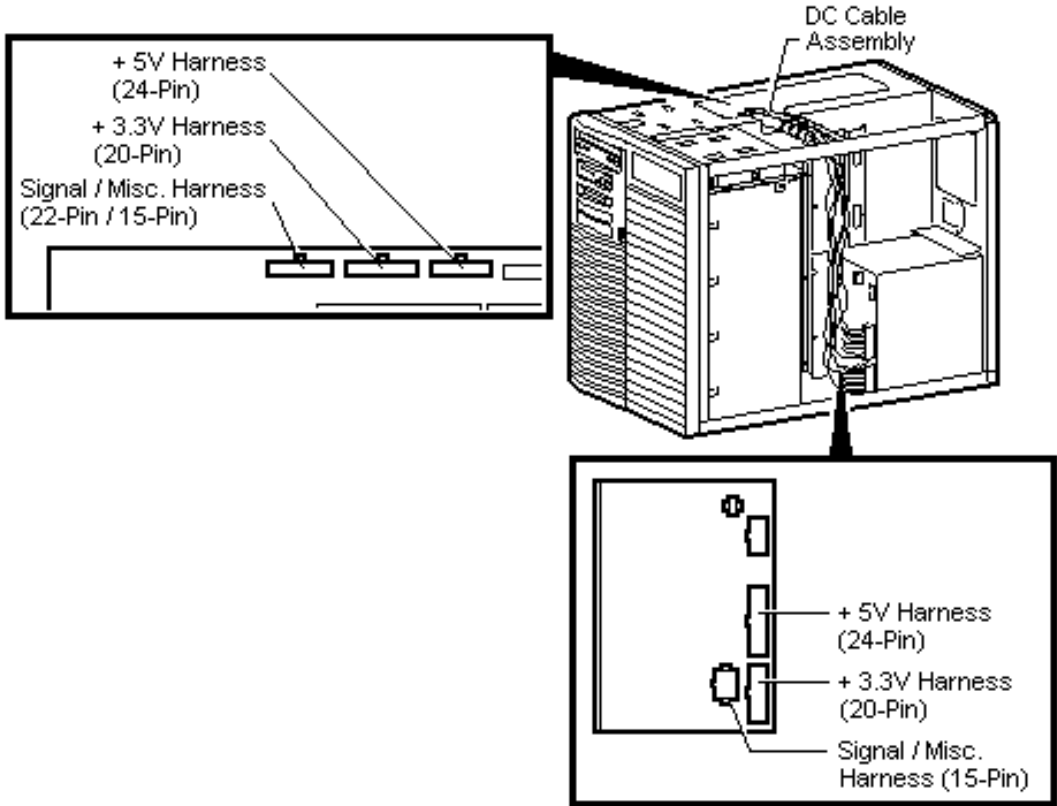
AS1000A



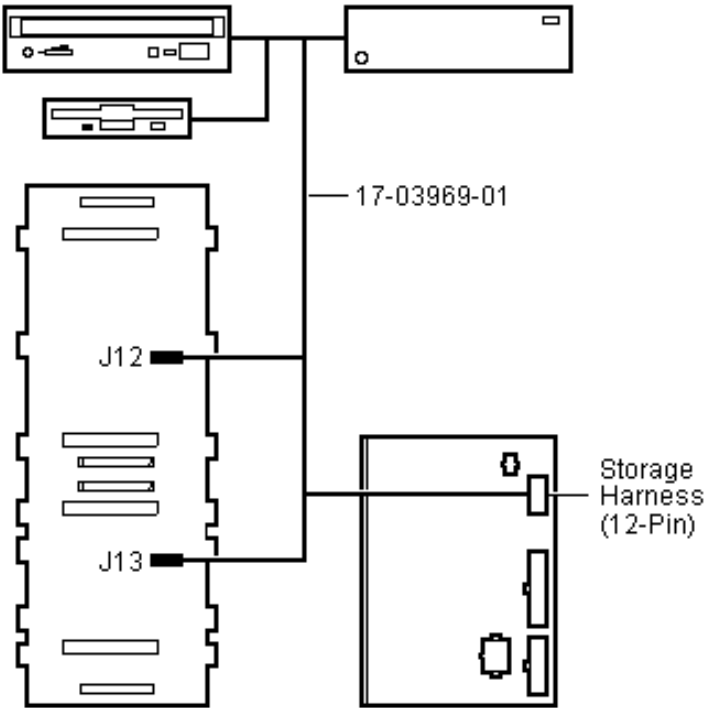
2.2.5 Power Supply Current Sharing Cable (3-pin)



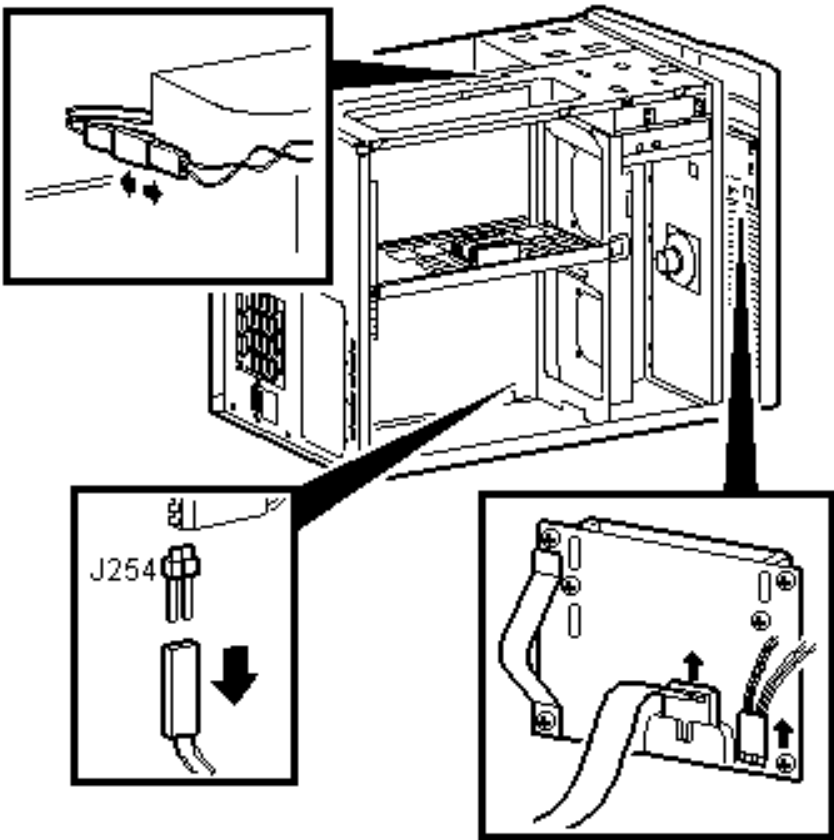
2.2.6 Power Supply DC Cable Assembly (Signal/Misc,15-pin), (+5V, 24-pin), (+3.3V, 20-pin)



2.2.7 Power Supply Storage Harness (12-pin)



2.2.8 Interlock/Server Management Cable (2-pin)



## 3 (Dis-)assembly

---

### 3.1 Exercizes and Labs

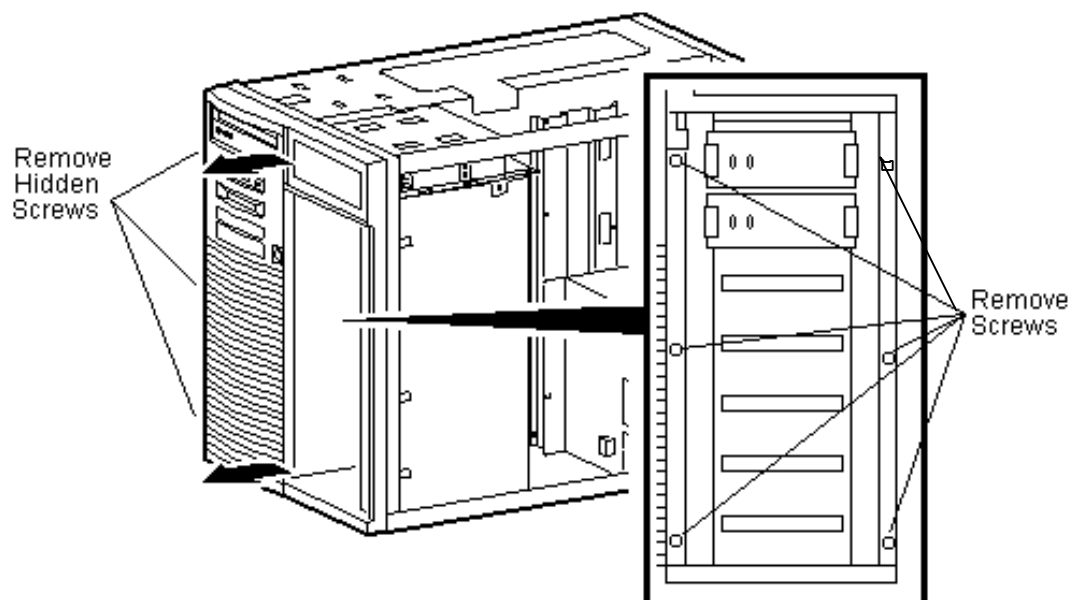
Take care of ESD precautions when not in a repair environment.

#### 3.1.1 LAB 3.1 (Dis-)assembly AS1000(A)

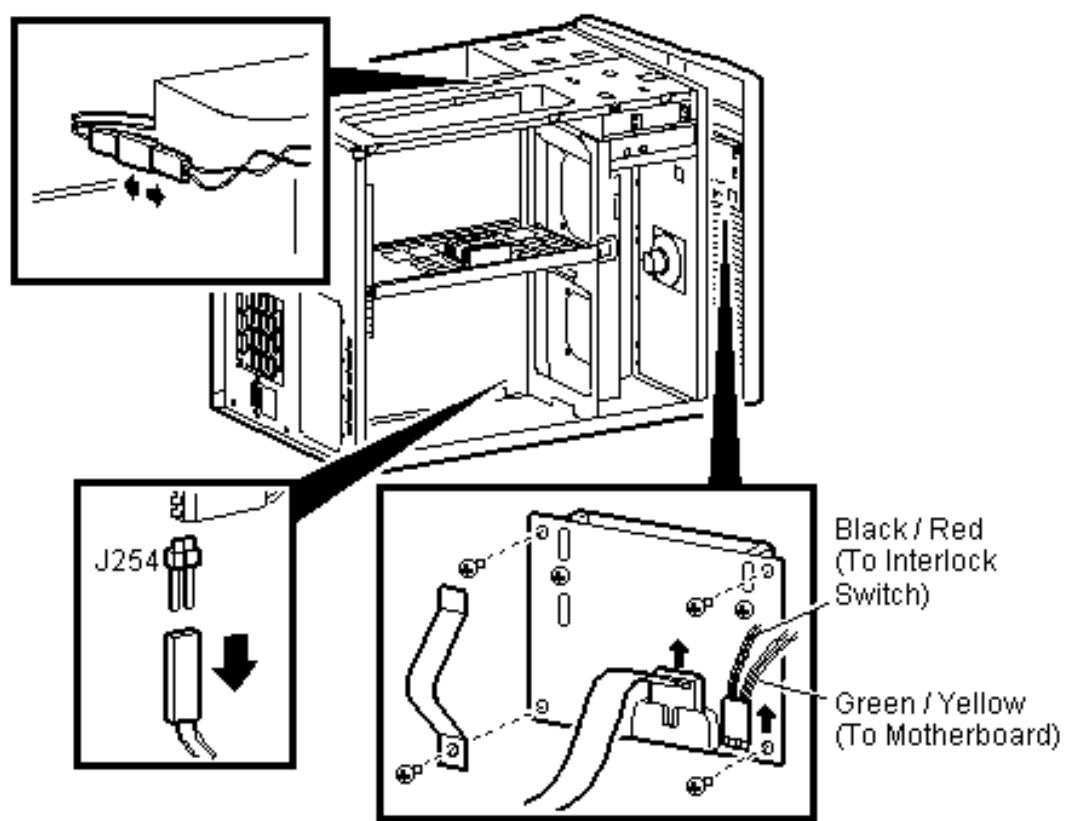
1. Make sure system performs basic selftests before taking it apart.
2. Remove EISA and PCI options (when installed).
3. Remove CPU daughterboard.
4. Detach motherboard cables, remove screws and motherboard.
5. Locate the NVRAM chip (E14) and NVRAM TOY chip (E78). When replacing a motherboard these chips may be exchanged when installed on a socket.
6. Remove Power Supply and Fans.
7. Remove Floppy drive and CD ROM drive.
8. Remove Operator Control Panel. (Front door, Front is attached with 9 screws; 6 at the front, 3 at the back).
9. Take a look at the back of the Storage Works box(es) and determine the SCSI Terminator(s) and Jumper Connector (single bus configuration).
10. Reassemble the system.
11. Test the system.

## 3.2 Theory

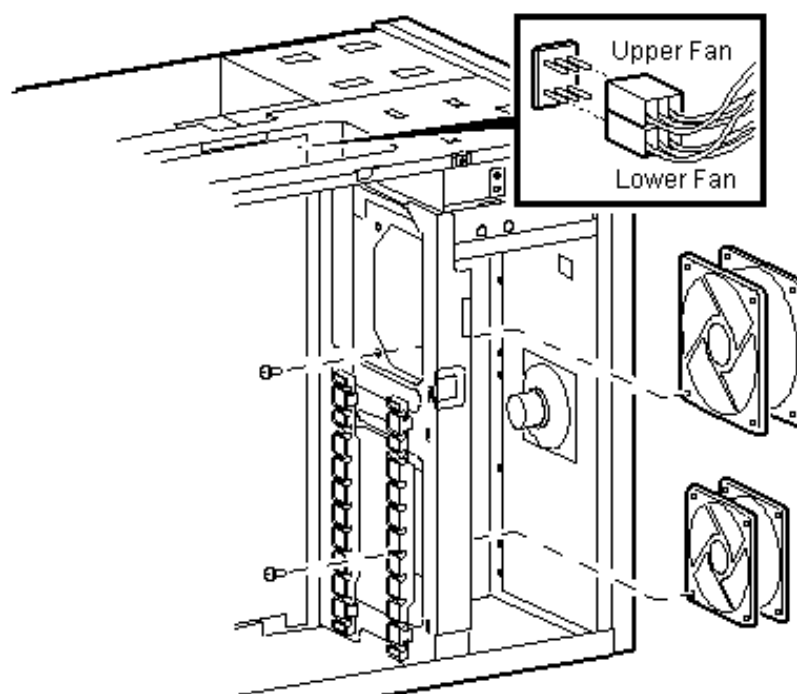
### 3.2.1 Remove front panel



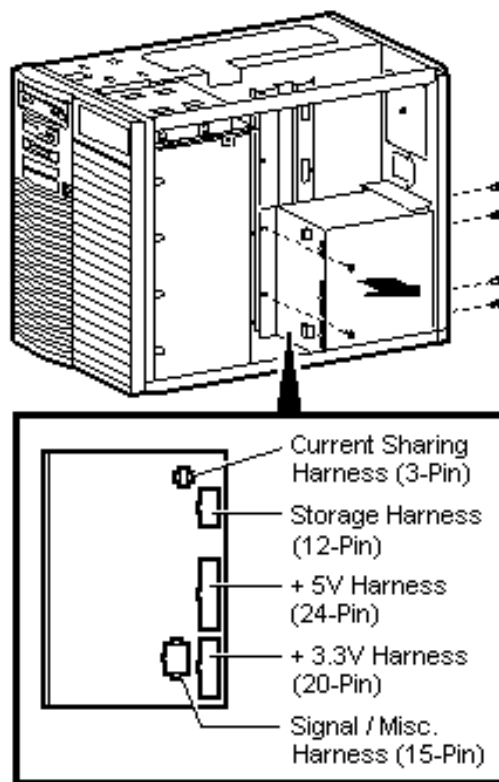
### 3.2.2 Remove OCP module



### 3.2.3 Disconnect the fan cable from the motherboard and remove fan



### 3.2.4 Removing the Power Supply



## 3.3 Troubleshooting

### 3.3.1 BLITZ: Service Strategy for NVRAM chip and ENET ROM

Blitz number: TD 1755  
Date: 19 dec 1994

**Problem Information:**

The NVRAM chip on the AS1000(A) failing motherboard must be swapped to the replacement motherboard. Doing this will reduce the MTTR by 45 minutes.

**Resolution Information:**

AS1000(A) has only NVRAM chips (2 chips) that must be removed from the failing motherboard and installed to the replacement motherboard.

No Ethernet ID ROM is on AS1000 Kernel system. It is located on the PCI or EISA Ethernet option. It must be removed from the failing option and installed on the replacement FRU.



### 3.3.2 BLITZ: AS1000(A) may Hang after Replacing Motherboard

Blitz number: TD 2197

Date: n/a

#### **Problem:**

An AS1000(A) system may hang on power-up if console firmware is not updated after replacing the main logic board. The main logic board from logistics may contain EV4 or EV5 firmware. Model 4/xxx systems require EV4 firmware while Model 5/xxx systems require EV5 firmware.

#### **Resolution/Workaround:**

Update console firmware after installing the main logic board. To update console firmware select the Fail-Safe Loader [FSL] on the CPU daughter card and use an "bootable floppy".

1. Power down system to replace main logic board
2. Move jumper J1 to the FSL position on CPU Daughter Card
3. Insert bootable floppy into floppy driver
4. Power-up system
5. Update firmware
6. Power-down system
7. Move J1 jumper to its original position

On power-up, the console via the FSL jumper will perform a "floppy boot" to invoke the Loadable-Firmware Utility [LFU]. Update firmware after the LFU prompt is displayed from your console terminal. e.g. >>> update \*.

## 4 Processor Configurations and Troubleshooting

---

### 4.1 Exercizes and Labs

#### 4.1.1 LAB 4.1 Upgrading and Downgrading CPU's (the preferred way)

Use the *cpu\_upgrade* and *cpu\_downgrade* scripts from the UPD> prompt, as described later in this chapter.

#### 4.1.2 LAB 4.2 Upgrading and Downgrading CPU's (the rough way)

Of course it is possible to just insert an EV5 board in a EV4 machine or vice versa. By performing a floppy boot (with the proper bootable floppy) you can update the firmware. This you may do in the lab, but is not the preferred way.

#### 4.1.3 LAB 4.3 SRAM Jumper

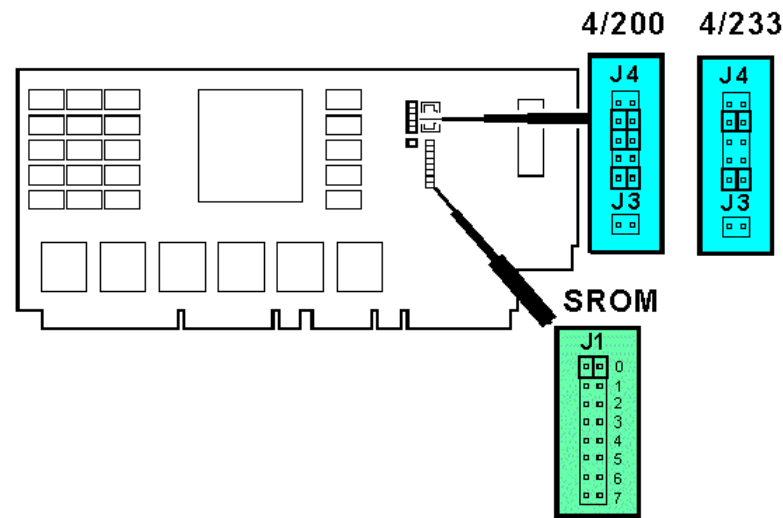
Try what happens when you select the standard boot setting for AS1000A on a AS1000 or vice versa. This is a common mistake, so you may want to see the symptoms.

# 4.2 Theory

Note: You may check the SROM revision with >>> **show config**.

EV4 CPU daughtercards (**54-23297-03** and **54-23297-04**) must have SROM revision **V2.8** (the chip has a sticker with **466E9**).

## 4.2.1 AS1000(A) EV4/xxx CPU Daughtercard Jumper Settings



### 4.2.1.1 J3 and J4 Jumper Settings

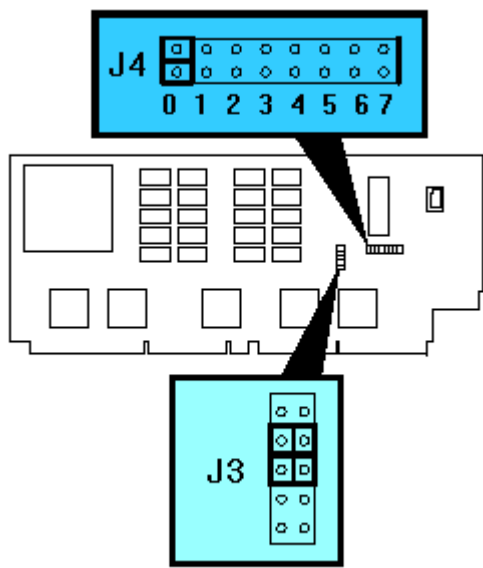
4/200		4/233	
J3	J4	J3	J4
This Jumper is Never Installed	OFF	This Jumper is Never Installed	OFF
	ON		ON
	ON		OFF
	OFF		OFF
	ON		ON

#### 4.2.1.2 J1 Jumper Settings

Note: The jumper settings below correspond with **SROM V2.8**

Bank	Description	
0	Standard Boot Setting AS1000 (Mikasa)	
1	Standard Boot Setting AS1000A (Noritake)	
	Test or Function Name	Test or Function Description
2	SROM Cache test	B-Cache test
3	SROM B-Cache test	B-Cache and MEM test
4	SROM Memtest	MEM test with B-Cache and D-Cache Disabled
5	SROM Memtest Cache On	MEM test with B-Cache and D-Cache Enabled
6	SROM B-Cache Tag test	Backup Cache Tag test
7	Fail-Save Loader setting	Floppy boot, may be used as fail-save mechanism. When you use bootable floppy with firmware update, you need a separate floppy for Mikasa and Noritake and for EV4(5) and EV5 processors.

4.2.2 AS1000(A) EV5/300 CPU Daughtercard Jumper Settings



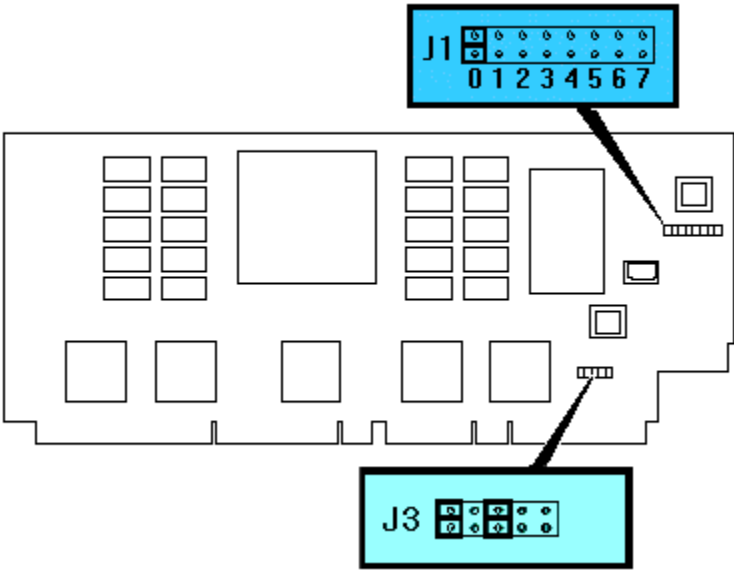
4.2.2.1 J3 Jumper Settings

Supported J3 Settings				
OFF	ON	ON	OFF	OFF

4.2.2.2 J4 Jumper Settings

Bank	Jumper Description
0	Standard boot setting AS1000 (Mikasa)
1	Standard boot setting AS1000A (Noritake)
2	Mini-console setting (Internal Use Only)
3	Mini-console setting (Internal Use Only)
4	Power up with no B-cache: allows the system to run despite bad B-cache until a replacement daughter board is available.
5	Mini-console setting (Internal Use Only)
6	Mini-console setting (Internal Use Only)
7	Floppy boot, may be used as fail-save mechanism. When you use bootable floppy with firmware update, you need a separate floppy for Mikasa and Noritake and for EV4(5) and EV5 processors.

4.2.3 AS1000(A) EV5/333 CPU Daughtercard Jumper Settings



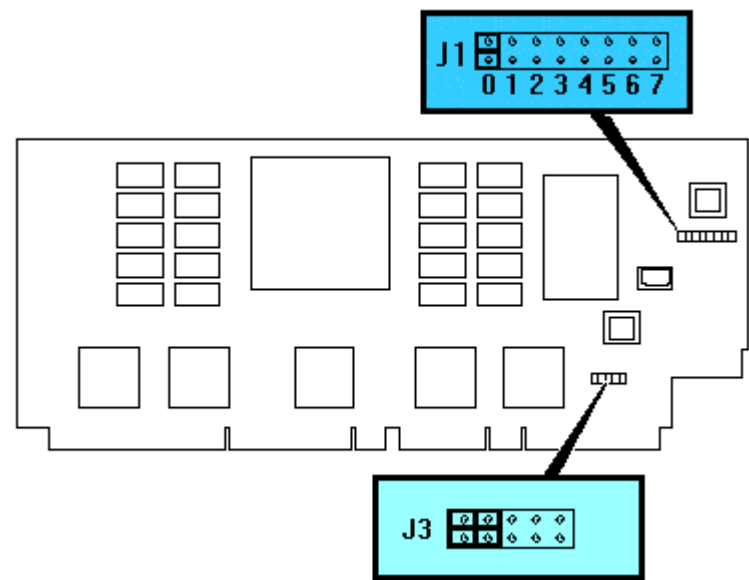
4.2.3.1 J3 Jumper Settings

Supported J3 Settings				
ON	OFF	ON	OFF	OFF

4.2.3.2 J1 Jumper Settings

Bank	Jumper Description
0	Standard boot setting AS1000 (Mikasa)
1	Standard boot setting AS1000A (Noritake)
2	Mini-console setting (Internal Use Only)
3	Mini-console setting (Internal Use Only)
4	Power up with no B-cache: allows the system to run despite bad B-cache until a replacement daughter board is available.
5	Mini-console setting (Internal Use Only)
6	Mini-console setting (Internal Use Only)
7	Floppy boot, may be used as fail-save mechanism. When you use bootable floppy with firmware update, you need a separate floppy for Mikasa and Noritake and for EV4(5) and EV5 processors.

4.2.4 AS1000(A) EV5/400 CPU Daughtercard Jumper Settings



4.2.4.1 J3 Jumper Settings

Supported J3 Settings				
ON	ON	OFF	OFF	OFF

4.2.4.2 J1 Jumper Settings

Bank	Jumper Description
0	Standard boot setting AS1000 (Mikasa)
1	Standard boot setting AS1000A (Noritake)
2	Mini-console setting (Internal Use Only)
3	Mini-console setting (Internal Use Only)
4	Power up with no B-cache: allows the system to run despite bad B-cache until a replacement daughter board is available.
5	Mini-console setting (Internal Use Only)
6	Mini-console setting (Internal Use Only)
7	Floppy boot, may be used as fail-save mechanism. When you use bootable floppy with firmware update, you need a separate floppy for Mikasa and Noritake and for EV4(5) and EV5 processors.

# 4.2.5 AS1000(A) EV5/500 CPU Daughtercard Jumper Settings

<TBD>

## 4.2.5.1 J3 Jumper Settings

Supported J3 Settings				
OFF	OFF	OFF	OFF	OFF

## 4.2.5.2 J1 Jumper Settings

Bank	Jumper Description
0	Standard boot setting AS1000 (Mikasa)
1	Standard boot setting AS1000A (Noritake)
2	Mini-console setting (Internal Use Only)
3	Mini-console setting (Internal Use Only)
4	Power up with no B-cache: allows the system to run despite bad B-cache until a replacement daughter board is available.
5	Mini-console setting (Internal Use Only)
6	Mini-console setting (Internal Use Only)
7	Floppy boot, may be used as fail-save mechanism. When you use bootable floppy with firmware update, you need a separate floppy for Mikasa and Noritake and for EV4(5) and EV5 processors.



## 4.2.6 Upgrading and Downgrading CPU's

### 4.2.6.1 Upgrade from EV4 to EV5 CPU

>>> **boot dka400**

Boot FW CD.

bootfile: <CR>

Press return to select default file.

UPD> **cpu\_upgrade**

Run the upgrade script.

Power down the system and replace CPU board with EV5. Power up and run ECU.

### 4.2.6.2 Downgrade from EV5 to EV4 CPU

>>> **boot dka400**

Boot FW CD.

bootfile: <CR>

Press return to select default file.

UPD> **cpu\_downgrade**

Run the downgrade script.

Power down the system and replace CPU board with EV4. Power up and run ECU.

### 4.2.6.3 Things to Check when Upgrade or Downgrade Fails

**Note 1:** When you downgrade from EV5 to EV4, make sure that you have the ECC SIMMs inserted. If no ECC SIMMs, the system will not see any memory, and thus will be dead.

**Note 2:** Make sure the SROM jumper is set to the proper standard boot setting (bank 0 for AS1000, bank 1 for AS1000A).

# 5 Memory Configurations and Troubleshooting

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## 5.1 Exercizes and Labs

### 5.1.1 LAB 5.1 Memory Configurations

1. Configure the system with different memory combinations. Try if you can skip bank 0.
2. Use the following command to confirm your installation:  
`>>> show memory`

### 5.1.2 LAB 5.2 Memory Tests on EV4 System

1. Run the different memory tests available via jumper J1 (EV4 only). Refer to the chapters below for descriptions.
2. Have a look at the OCP for test results.
3. If a faulty SIMM is available, run the tests to see what happens.

### 5.1.3 LAB 5.3 EV5 System and ECC SIMMs

1. Run a EV4 system with and without ECC SIMMs. Does it make any difference?
2. Run a EV5 system with and without ECC SIMMs. Does it make any difference?

## 5.2 Theory

### 5.2.1 AS1000(A) Memory Configuration Rules

- ◆ Bank 0 must contain a memory option.
- ◆ A memory option (= bank) consists of five SIMMs for 4/xxx systems (0, 1, 2, 3 and 1 ECC SIMM for the bank), or four SIMMs for 5/xxx systems (0, 1, 2, and 3). The EV5 on model 5/xxx systems make use of quadword ECC (while EV4 makes use of longword ECC) and therefore does not need the additional ECC bits on the ECC SIMMs.
- ◆ All SIMMs within a bank must be of the same capacity.

**Note 1:** Some SIMM sets are delivered with 4 identical SIMMs and one different SIMM for ECC. Experience learns that memory problems may be solved using 5 identical SIMMs. (Selftest hangs: **EB, EC, EB, EC, etc**).

**Note 2:** Although only one SIMM is referred to as ECC SIMM, a number of ECC bits are found on the "DATA" SIMMs.

### 5.2.2 Operating System Memory Requirements

Operating System	Minimum Memory	Recommended Memory
Digital Unix	32 MB	64 MB
OpenVMS	32 MB	64 MB
Windows NT	16 MB	32 MB
Windows NT Server	32 MB	64 MB

### 5.2.3 Data Integrity

ECC is generated and checked in the 21x64 Microprocessor and the DECADE Asics (memory interface located on the CPU daughter board).

*Data traveling between Cache and Memory is not checked.*

CPU (memory) read:	CPU checks ECC
CPU (memory) write:	CPU generates ECC
DMA read:	DECADE checks ECC
DMA write:	DECADE generates ECC
Programmed I/O read:	DECADE generates ECC
Programmed I/O write:	DECADE checks ECC

## 5.2.4 Isolating Failing SIMMs using EV4 Daughterboard

To test SIMM memory and report the position of a failing SIMM, set SROM power-up tests by using the **J1 jumper** of the CPU daughter board. The progress and results of these tests are reported on the LCD display on the operator control panel (OCP).

To thoroughly test memory and data paths, complete the SROM tests in the order listed below. If a SIMM is reported bad, replace the SIMM and resume testing at bank 4 (Memory Test).

Note: The information below requires SROM V2.8

**Bank 2, Cache Test LW**

**Bank 3, Cache Test**

**Bank 4, Memory Test, Cache Disabled**

**Bank 5, Memory Test, Cache Enabled**

Note: J1 selects **BANK 0 - BANK 7**. You can only select one bank at a time.

## 5.2.5 SROM Memory Power-Up Tests, Bank 2

Bank #	Test Description	Test Results
2	<b>Cache Test: Tests backup cache.</b>	Test status displays on OCP: cache test start ....done.  If the tests takes longer than a few seconds to complete, there is a problem with the backup cache---replace the CPU daughter board.

## 5.2.6 SROM Memory Power-Up Tests, Bank 3

Bank #	Test Description	Test Results
3	<b>Backup Cache Test: Test backup cache alternatively with data cache enabled then disabled.</b>	<p>Test status displays on OCP: Bcache test start D 12345.done. D 12345.done. D 12345.done. D 12345.done.</p> <p>If an error is detected, the bank and failing SIMM position are displayed. The following OCP message indicates a failing SIMM at bank 0, SIMM position 2.</p> <p>FAIL B:0 S:2</p> <p>Test duration: Approximately 2 seconds per 8 megabytes of memory.</p> <p>Replace the bad SIMM after determining its position.</p> <p>Note: The memory tests do not test the ECC SIMMs. If the operating system logs five or more single-bit correctable errors, swap the suspected ECC SIMMs with good SIMMs and repeat the memory tests.</p>

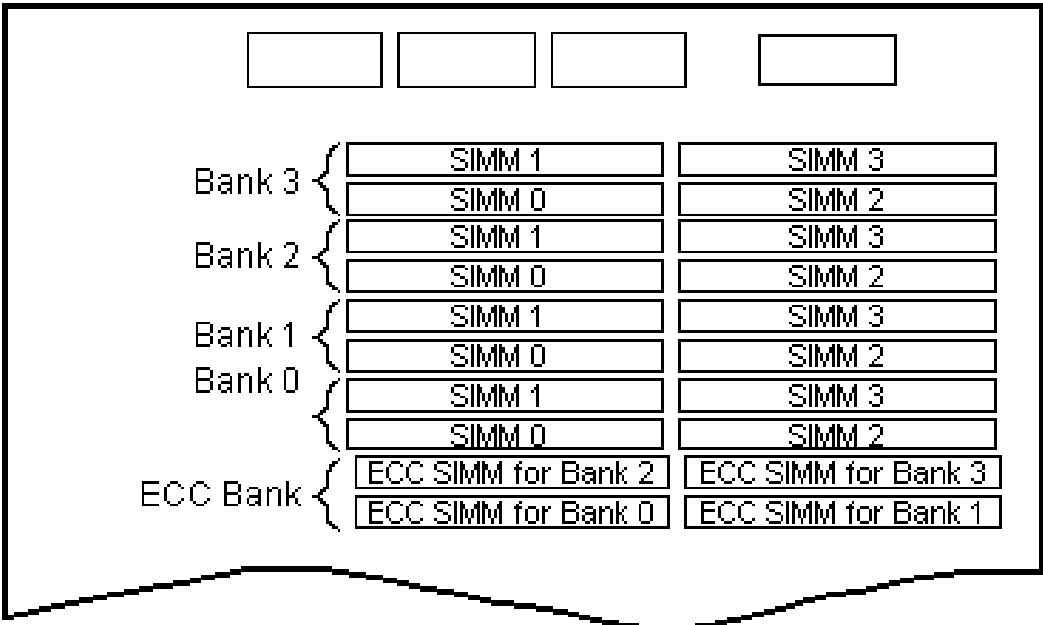
## 5.2.7 SROM Memory Power-Up Tests, Bank 4

Bank #	Test Description	Test Results
4	<b>Memory Test: Tests memory with backup and data cache disabled.</b>	<p>Test status displays on OCP: Memtest nocache 12345.done.</p> <p>If an error is detected, the bank and failing SIMM position are displayed. The following OCP message indicates a failing SIMM at bank 0, SIMM position 2.</p> <p>FAIL B:0 S:2</p> <p>Test duration: Approximately 10 seconds per 8 megabytes of memory.</p> <p>Replace the bad SIMM after determining its position.</p> <p>Note: The memory tests do not test the ECC SIMMs. If the operating system logs five or more single-bit correctable errors, swap the suspected ECC SIMMs with good SIMMs and repeat the memory tests.</p>

## 5.2.8 SROM Memory Power-Up Tests, Bank 5

Bank #	Test Description	Test Results
5	<b>Memory Test, Cache Enabled: Tests memory with backup and data cache enabled.</b>	<p>Test status displays on OCP: Memtest cache on 12345.done.</p> <p>If an error is detected, the bank and failing SIMM position are displayed. The following OCP message indicates a failing SIMM at bank 0, SIMM position 2.</p> <p>FAIL B:0 S:2</p> <p>Test duration: Approximately 2 seconds per 8 megabytes of memory.</p> <p>Replace the bad SIMM after determining its position.</p> <p>Note: The memory tests do not test the ECC SIMMs. If the operating system logs five or more single-bit correctable errors, swap the suspected ECC SIMMs with good SIMMs and repeat the memory tests.</p>

5.2.9 AlphaServer 1000(A) Memory Layout



**Note:** When system is configured with EV4 processor and 1 (the only) bank of memory and ECC SIMM is not present or in the wrong position, the system is dead, that is: *no OCP display and no beeps*.

## 5.3 Troubleshooting Information

### 5.3.1 Correctable Read Data (CRD) Analysis (EV5)

*Note: this information is copied from AS1000(A) and AS800 21164/21164A based systems pfms (rev 2.1)*

The memory subsystem is much simpler than larger servers like TurboLaser and Sable. When a correctable read data (CRD) error occurs, very little information is required in order to identify the failing FRU.

#### 5.3.1.1 Data Required for CRD Analysis

Obviously the faulting physical address and the syndrome of the fault are required. By knowing the faulty physical address, the number of memory banks actually present in the system, and the base address of each bank, it is possible to determine the exact memory bank that experienced the CRD error.

The physical address, syndrome, and memory bank number, together with information identifying which longword is associated with the syndrome, form sufficient information for an analysis tool such as DECevent to identify the failing SIMM.

The faulting physical address is provided in the machine check frame as the fill address, FILL\_ADDR.

Bit 0 of the eight memory configuration CSRs, MBA0-MBAE identifies whether or not there are memory modules installed in their respective memory base address. Thus, if MBA2<0> is set, then there is memory installed in bank 2. The memory bank address is derived from MBAx<25:16>, these bits correspond to PA<33:24>. By comparing the physical address of the CRD error with the base address of each bank, it is easy to determine which of the four banks of memory experienced the CRD error.

The FILL\_SYN register is used to determine which bits caused the error. Unlike it's EV4 cousins, EV5 based machines use quadword ECC vs longword ECC. Thus there is a one-to-one mapping for the syndrome fields to the correct bit. FILL\_SYN<15:8> maps to DATA<127:64> and CHECK<15:8>. FILL\_SYN<7:0> maps to DATA<63:0> and CHECK<7:0>.



## 6 ISA, EISA and PCI Configuration

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### 6.1 Exercizes and Labs

#### 6.1.1 LAB 6.1 Configure ISA/EISA boards

1. Insert ECU floppy and type >>>**runecu**
2. Study the information obtained from step 1.
3. Install and configure some ISA, EISA and PCI options, whatever options are available at the moment.
4. Remove an installed option and power up the system. Note that the system complains about the removed option.

#### 6.1.2 LAB 6.2 Set and Show the bus\_probe\_algorithm

*The bus\_probe\_algorithm specifies a bus probe algorithm for the systems. **Not applicable for systems running Windows NT.***

- |   |  |
|---|--|
| 1. (boot operating system)                | Check version Digital UNIX and OpenVMS.                  |
| 2. >>> <b>show bus_probe_algorithm</b>    | Check setting bus_probe_algorithm.                       |
| 3. >>> <b>set bus_probe_algorithm new</b> | Eventually change setting from old to new or vice versa. |
| 4. >>> <b>init</b>                        | Initialize the system.                                   |

Qualifier	Meaning
old	Systems running <b>OpenVMS V6.1 or earlier</b> must set the bus probe algorithm to <b>old</b> ---failure to do so could result in bugcheck errors when booting from an EISA device.
new	Systems running <b>Digital UNIX V3.0B or later or OpenVMS V6.2 or later</b> should be set to <b>new</b> . This setting improves the bus sizing and configuration for Digital UNIX systems.

## 6.2 Theory

### 6.2.1 General information on ECU

- ◆ ECU stores configuration in NVRAM.
- ◆ You have to use **different versions ECU for OpenVMS/Digital Unix and Windows NT**.

**Note:** Problems in the field when installing UNIX are sometimes caused by the fact that machines have been configured before with ECU for NT.

- ◆ You have to run ECU:
  1. After a **firmware update** (which may change NVRAM organisation).
  2. After a **configuration change**.

Note: **Use a graphical console**, else the function keys displayed in the bottom bar for step 2,3,4 are not working.

1. Insert ECU floppy.
2. >>> **runecu**
3. ECU loads the ARC console (message “Loading ARC”).
4. Menu on display.

Step 1 *Info screens*

Can also be invoked by pressing F1

Step 2 *Add or remove boards*

(ISA only)

Step 3 *View or edit details, check or change memory, printerports, IRQ, etc*

(ISA only)

Step 4 *Examine required switches, verify the correct switch and jumpersettings*

(ISA only)

Step 5 *Add or remove boards*

**For EISA options only step 5 is required.**

**For ISA step 2,3,4 and 5 are required.**

EISA slots accept both ISA and EISA options.

EISA boards have 2 rows of contacts and several gaps.

ISA boards have just 1 row of contacts and only 1 gap.

ISA is configured manually.

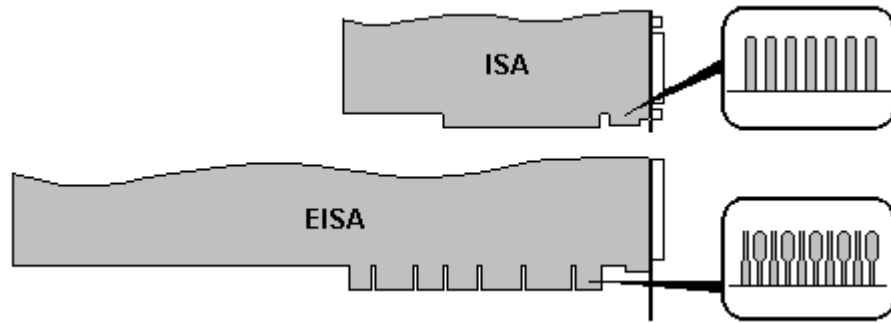
EISA is configured automatically.

(PCI is configured automatically).

ECU automatically detects and configures EISA boards.

ECU assists in configuring ISA boards by determining the necessary switch and jumpersettings.

## 6.2.2 Physical difference ISA and EISA options



## 6.2.3 Setting Up a Serial Terminal to Run ECU

You can run the ECU from either a VGA-compatible graphics monitor or from a serial terminal (VT200 or higher, or equivalent). Graphics is the default. To use a serial terminal with the ECU, do the following:

1. Invoke the terminal setup utility as described in the documentation for the serial terminal and change settings as follows:
  - ◆ From the General menu, set the terminal mode to Vtxxx, 8-bit controls.
  - ◆ From the Comm menu, set the character format to 8 bit, no parity, and set receive XOFF to 128 or greater.

2. Enter the following commands at the SRM console prompt to set the console terminal to receive in serial mode.

```
>>> set console serial  
>>> init
```

Now switch to the serial terminal.

```
>>> show console  
console serial
```

### 6.2.3.1 Serial Line Keyboard Commands

Graphics Line Commands	Serial Line Commands
F1	CTRL +A
F2	CTRL +B
F3	CTRL +C
F4	CTRL +D
F5	CTRL +E
F6	CTRL +F
F7	CTRL +P
F8	CTRL +R
F9	CTRL +T
F10	CTRL +U
Insert	CTRL +V
Delete	CTRL +W
Backspace	CTRL +H
ESC	CTRL +[

## 6.2.4 Remote Console Monitoring (RCM) Support

The AS1000 series systems support RCM functionality through an optional module, the KCRCM. This module must be installed into an EISA/ISA slot on the managed system. As part of the installation, the password of the managed server must be set and remote access to the modem port must be enabled on the managed server. To order a KCRCM module, consult the Digital Systems and Options Catalog.

*Note: Detailed RCM information is included in the AS1200 and AS4x00 Student Guide.*

## 6.2.5 Summary of Procedure for Configuring EISA Bus (EISA Options Only)

Step	Explanation
Install EISA option.	Use the instructions provided with the EISA option.
Power up the system and run ECU.	If the ECU locates the required CFG configuration files, it displays the main menu. The CFG file for the option may reside on a configuration diskette packaged with the option or may be included on the system configuration diskette. It is not necessary to run Step 2 of the ECU, Add or remove boards option. (EISA boards are recognized and configured automatically.)
View or Edit Details (optional).	The "View or Edit Details" ECU option is used to change user-selectable settings or to change the resources allocated for these functions (IRQs, DMA channels, I/O ports, and so on). This step is not required when using the board's default settings.
Save your configuration and restart the system.	The "Save and Exit" ECU option saves the configuration information to the system's nonvolatile memory.
Return to the SRM console (DEC OSF/1 and OpenVMS systems only) and restart the system.	Refer to step 4 of Starting the ECU for operating system specific instructions.

## 6.2.6 Summary of Procedure for Configuring EISA Bus with ISA Options

Step	Explanation
Install or move EISA option. Do not install ISA boards.	Use the instructions provided with the EISA option. ISA boards are installed after the configuration process is complete.
Power up system and run ECU.	If you have installed an EISA option, the ECU will need to locate the CFG file for that option. The CFG file for the option may reside on a configuration diskette packaged with the option or may be included on the system configuration diskette.
Add the ISA board to the configuration list.	<p>Use the "Add or Remove Boards" ECU option to add the CFG file for the ISA option and to select an acceptable slot for the option. The CFG file for the option may reside on a configuration diskette packaged with the option or may be included on the system configuration diskette.</p> <p>If you cannot find the CFG file for the ISA option, select the generic CFG file for ISA options from the configuration diskette.</p>
View or Edit Details (optional).	The "View or Edit Details" ECU option is used to change user-selectable settings or to change the resources allocated for these functions (IRQs, DMA channels, I/O ports, and so on). This step is not required when using the board's default settings.
Examine and set required switches to match the displayed settings.	<p>The "Examine Required Switches" ECU option displays the correct switch and jumper settings that you must physically set for each ISA option. Although the ECU cannot detect or change the settings of ISA boards, it uses the information from the previous step to determine the correct switch settings for these options.</p> <p>Physically set the board's jumpers and switches to match the required settings.</p>
Save your configuration.	The "Save and Exit" ECU option saves your configuration information to the system's nonvolatile memory.
Return to the SRM console (DEC OSF/1 and OpenVMS systems only) and turn off the system.	Refer to step 4 of the Starting the ECU for information about returning to the SRM console.
Install ISA board and turn on the system.	Use the instructions provided with the ISA option.

## 6.3 Troubleshooting Information

### 6.3.1 EISA Bus Problems Indicated at Power-Up

EISA bus failures at power-up are usually indicated by the following messages displayed during power-up:

EISA Configuration Error. Run the EISA Configuration Utility.

Run the EISA Configuration Utility (ECU) when this message is displayed. Other problems are indicated by EISA devices missing from the show config display.

Use the EISA troubleshooting table below to troubleshoot EISA bus problems that continue after you run the ECU.

Step	Action
1	Confirm that the EISA module and any cabling are properly seated.
2	Run the ECU to: <ul style="list-style-type: none"><li>• Confirm that the system has been configured with the most recently installed controller.</li><li>• See what the hardware jumper and switch setting should be for each ISA controller.</li><li>• See what the software setting should be for each ISA and EISA controller.</li><li>• See if the ECU deactivated (&lt;&gt;) any controllers to prevent conflict.</li><li>• See if any controllers are locked (!), which limits the ECU's ability to change resource assignments.</li></ul>
3	Confirm that hardware jumpers and switches on ISA controllers reflect the settings indicated by the ECU. Start with the last ISA module installed.
4	Run ROM-based diagnostics for the type of option: <ul style="list-style-type: none"><li>• Storage adapter - Run <b>test</b> to exercise the storage devices off the EISA controller option.</li><li>• Ethernet adapter - Run <b>netew</b> or <b>network</b> to exercise an Ethernet adapter.</li></ul>
5	Check for bad slot by moving the last installed controller to a different slot.
6	Call option manufacturer or support for help.

## 6.3.2 Additional EISA Troubleshooting Tips

The following tips can aid in isolating EISA bus problems.

- ◆ Peripheral device controllers need to be seated (inserted) carefully, but firmly, into their slots to make all necessary contacts. Improper seating is a common source of problems for EISA modules.
- ◆ Be sure you run the correct version of ECU for the operating system. For Windows NT, use ECU diskette DECpc AXP (AK-PYCJ\*-CA); for DEC OSF/1 and OpenVMS, use ECU diskette DECpc AXP (AK-Q2CR\*-CA).
- ◆ The CFG files supplied with the option you want to install may not work on AS1000 systems. Some CFG files call overlay files that are not required on this system or may reference inappropriate system resources, for example, BIOS addresses. Contact the option vender to obtain the proper CFG file.
- ◆ Peripherals cannot share direct memory access (DMA) channels. Assignment of more than one peripheral to the same DMA channel can cause unpredictable results or even loss of function of the EISA module.
- ◆ Systems running Windows NT can assign shared interrupt lines (IRQs). DEC OSF/1 and OpenVMS do not allow shared interrupts.
- ◆ Not all EISA products work together. EISA is an open standard, and not every EISA product or combination of products can be tested. Violations of specifications may matter in some configurations, but do not in others.

Manufacturers of EISA options often test the most common combinations and may have a list of ISA and EISA options that do not function in combination with particular systems. Be sure to check the documentation or contact the option vender for the most up-to-date information.

- ◆ EISA systems will not function unless they are first configured using the ECU.
- ◆ The ECU will not notify you if the configuration program diskette is write-protected when it attempts to write the system configuration file (**system.sci**) to the diskette.



### 6.3.3 PCI Bus Problems Indicated at Power-Up

PCI bus failures at power-up are usually indicated by the inability of the system to see the device. Use the PCI Troubleshooting Table below to diagnose the likely cause of the problem.

**Note:** Some PCI devices do not implement PCI parity, and some have a parity-generating scheme in which parity is sometimes incorrect or is not compliant with the PCI Specification. In such cases, the device functions properly as long as parity is not checked. The **pci\_parity** environment variable for the SRM console, or **the DISABLEPCIPARITY CHECKING** for the ARC console, allow you to turn off parity checking so that false PCI parity errors do not result in machine check errors.

When you disable PCI parity, no parity checking is implemented for any PCI device, even those that produce correct, compliant parity.

Step	Action
1	Confirm that the PCI module and any cabling are properly seated.
2	Run ROM-based diagnostics for the type of option: <ul style="list-style-type: none"><li>• Storage adapter - Run test to exercise the storage devices off the PCI controller option.</li><li>• Ethernet adapter - Run netew or network to exercise an Ethernet adapter.</li></ul>
3	Check for bad slot by moving the last installed controller to a different slot.
4	Call option manufacturer or support for help.

### 6.3.4 Option Restrictions AS1000 (EV4 and EV5)

- ◆ **KFESA** (EISA single DSSI controller) not supported as a boot device and maximum 2 DSSI devices installed in system when one is a KFESA.
- ◆ **KFESA/KFESB** (EISA single DSSI controllers) DSSI adapters require two option slot openings when used as a middle node.
- ◆ Most **tape loaders** require DECNSR under UNIX and 3rd party application under NT to function as loaders.
- ◆ **DEFEA-xA/DEFPA-xA** (EISA/PCI FDDI controllers) are supported as data devices only with versions of UNIX earlier than V3.2d-2 or versions of OpenVMS earlier than V6.2. DEFPA-DA requires two slot openings.
- ◆ **DEFPA-DA** requires two slot openings.
- ◆ **CXI01-xx** support in VMS requires drivers from Digiboard International BBS.
- ◆ **PBXDA-AC** not supported.
- ◆ **PBXGI-AD** not supported.

### 6.3.5 Option Restrictions AS1000A (EV4)

- ◆ **KFESA** EISA single DSSI controller. Not supported as a boot device.
- ◆ **KFESB-AA** EISA single DSSI controller. Requires two option slot openings when used as a middle node.
- ◆ **KZPBA-DB** Dual channel PCI to UltraSCSI Adapter is supported only in the Primary PCI Bus slots [slot 11, 12 or 13].
- ◆ **KFPSA-AA** PCI-DSSI adapter. Requires two option slot openings when used as a middle node.
- ◆ **KZPSA-BB** PCI to SCSI FWD storage adapter. Supported only on the primary PCI bus on systems running Windows NT. May be installed on either the primary or secondary PCI bus on systems running DIGITAL UNIX or OpenVMS, including when you are running ARC firmware utilities.
- ◆ **KZPSC-xA** PCI RAID controller. Supported only on the primary PCI bus on systems running DIGITAL UNIX or OpenVMS. May be installed on either the primary or secondary PCI bus on systems running Windows NT.
- ◆ **KZPSM-AA** FWSE SCSI Ethernet PCI-PCI bridge combination controller. Requires cable kit PB7HA-AA (narrow) or PB7HA-BA (wide) for the internal backplane. Booting from InfoServer with VMS V6.2-1H3 is not supported in PCI slots 4 -7. Booting from LAVC is supported in PCI slots 4 -7.
- ◆ **DJ-ML200-xA** PCI Prestoserve NVRAM. Supported only on the primary PCI bus.
- ◆ **DE500-XA** and **DGLPB-xx**: restricted to primary bus only due to performance considerations. This is NOT a functional restriction.
- ◆ **DE500-AA**: restricted to primary bus only due to performance considerations. This is NOT a functional restriction. OpenVMS V6.2-1H3 requires TIMA kits: ALPBOOT07\_062.A;1 and ALPLAN04\_062.A;1.
- ◆ **PBXGA-xA** PCI ZLXp-En graphics accelerator. Supported in multihead configurations only on DIGITAL UNIX V3.2F, V3.2G, and V4.0B.
- ◆ **PBXGB-xA** PCI PowerStorm graphics accelerator. OpenVMS requires Open 3D.
- ◆ **PBXDA-AC**: Secondary PCI slots only.
- ◆ **PBXGI-AD**: Primary PCI bus slots only.

### 6.3.6 Option Restrictions AS1000A (EV5)

- ◆ **CXI01-xx** asynchronous multiport mux. Not supported with OpenVMS V7.1.
- ◆ **KFPRA-Ax**: Supported only on ADP configurations.
- ◆ **PBXDA-Ax**: Not supported with OpenVMS V7.1.
- ◆ **CCMAA-AA/BA** Memory Channel adapter. Supported only on the primary PCI bus.
- ◆ **KFESA-AA** EISA single channel DSSI controller. Not supported as a boot device.
- ◆ **KFESB-AA** EISA single channel DSSI controller. Requires two option slot openings when used as a middle node.
- ◆ **KZPBA-DB** Dual channel PCI to UltraSCSI Adapter is supported only in the Primary PCI Bus slots [slot 11, 12 or 13].
- ◆ **KFPSA-AA** PCI-DSSI adapter. Requires two option slot openings when used as a middle node.
- ◆ **KZPSA-BB** PCI to SCSI FWD storage adapter. Supported only on the primary PCI bus on systems running Windows NT. May be installed on either the primary or secondary PCI bus on systems running DIGITAL UNIX or OpenVMS, including when you are running ARC firmware utilities.
- ◆ **KZPSC-xA** PCI RAID controller. Supported only on the primary PCI bus on systems running DIGITAL UNIX or OpenVMS. May be installed on either the primary or secondary PCI bus on systems running Windows NT.
- ◆ **DJ-ML200-xA** PCI Prestoserve NVRAM. Supported only on the primary PCI bus.
- ◆ **PBXCS-xx** Supported only on ITA (Integrated Telephony Applications) Rackmount configurations.
- ◆ **DE422-SA** EISA Digital Etherworks Network Adapter. Supported as a data device only.
- ◆ **DE450-CA** PCI to Ethernet adapter. Driver kit QB-4NZAA-SA required for Windows NT V3.51.
- ◆ **DE500-AA** PCI 10/100 Fast Ethernet NIC:
  - ◇ *restricted to primary bus only due to performance considerations. This is NOT a functional restriction.*
  - ◇ *OpenVMS V6.2-1H3 requires TIMA kits: ALPBOOT07\_062.A;1 on lightly loaded systems and ALPLAN04\_062.A;1*
- ◆ **DE500-XA and DGLPB-xx**: restricted to primary bus only due to performance considerations. This is NOT a functional restriction.
- ◆ **DS-TL89x-BA** Not supported with KZPAA and KZPSM controllers.
- ◆ **TKZx-xx** Windows NT requires QB-4STAA kit and license. Not supported on Windows NT V4.0.
- ◆ **TKZ9E-VA** Supported only on ADP system configurations.
- ◆ **TSZ07-xx** Windows NT requires QB-4STAA kit and license. Not supported on Windows NT V4.0.
- ◆ **PB2GA-JC and PB2GA-JD** S3 Trio64 V+ graphics adapter. Supported only on the primary PCI bus with Windows NT. Boot\_reset must be set OFF.
- ◆ **PBXGB-xx** PCI PowerStorm graphics accelerator:
  - ◇ *OpenVMS requires Open 3D kit and license.*
  - ◇ *DIGITAL UNIX systems: Option must be installed on the primary PCI bus and VGA Enable jumper set to "ON" in order to use the PBXGB as the console device. Multihead configurations are supported on DIGITAL UNIX. Refer to the AlphaServer 1000A Multihead Configuration document.*
- ◆ **PBXDA-AC**: No restrictions.
- ◆ **PBXGI-AD**: Primary PCI bus slots only.

### 6.3.7 BLITZ: AS1000A 5/xxx - PB2GA S3 PCI Slot Restriction

Blitz number: TD 2263  
Date: 25-mar-1997

**Problem:**

The PB2GA - S3 Trio Graphics Option must be installed in a PCI slot in front of the PCI-to-PCI Bridge.

**Resolution/Workaround:**

The slot restriction is removed when the Alpha firmware V4.0 is available from CD and from the Web in June 1997.

## 6.3.8 BLITZ: Digital UNIX Patches for PB2GA-JC/JD S3 TRIO64 V+

Blitz number: TD 2336  
Date: 15-aug-1997

### Problem description

The PB2GA-JC/JD S3 TRIO64 V+ graphics adapters have replaced the EOL S3 TRIO64 graphics adapters, but were only supported by Digital UNIX V4.0B and later releases. This created a problem for customers who need to run earlier versions of Digital UNIX.

### Resolution

Patches are now available which provide support for the PB2GA-JC/JD S3 TRIO64 V+ graphics adapters under Digital UNIX V3.2G and V4.0A.

The patch kits are available to all DIGITAL customers from the World Wide Web at the following URL address for FTP access:

[ftp://ftp.service.digital.com/public/Digital\\_UNIX/](ftp://ftp.service.digital.com/public/Digital_UNIX/)

v3.2g/  
duv32g21800-bl8er.CHKSUM  
duv32g21800-bl8er.README  
duv32g21800-bl8er.tar.Z

v4.0a/  
duv40a28800-bl7er.CHKSUM  
duv40a28800-bl7er.README  
duv40a28800-bl7er.tar.Z

### Adapters

PB2GA-JC S3 TRIO64 V+ 1MB DRAM	30-48118-01
PB2GA-JD S3 TRIO64 V+ 2MB DRAM	30-48118-02

### Digital UNIX versions

V3.2G  
V4.0A

### Systems that have been qualified

AS300, AS400, AS800, AS1000A, AS2100A, AS4x00

### Restrictions

For AS1000/AS1000A platforms, manufacturing/customer must ensure that the console value of BOOT\_RESET is set to OFF for all operating systems.

### Additional Problems

The S3 TRIO64 V+ graphics adapters have also been found to be the source of PCI parity error failures during system initialization and intermittent boot hang problems on systems that have PCI parity set to ON.

These problems have been resolved by the vendor modifying the BIOS on the S3 TRIO64 V+ graphics adapters. The BIOS has now changed from 2.16.07 (1 MB board) and 2.36.07 (2 MB board) to 2.16.08 and 2.36.08, respectively.

## 6.3.9 BLITZ: Problems with AS1000A using PB2GA Graphics Card

Blitz number: TD 2469-A (*This BLITZ supersedes TD 2469 dated 13-MAY-1998.*)  
Date: 13 may 1998

### Problem statement

Performing a soft initialization to the AS1000A (via the console init command or due to the console environment variable boot\_reset being set to on) can cause the PB2GA BIOS to become confused and set the PB2GA controller for VL-Bus operations instead of the PCI Bus.

### Symptom

The failure symptoms observed while booting OpenVMS when using the PB2GA in an AS1000A have been Machine Checks in PAL Mode halts, system crashes due to a Machine Checks in Kernel Mode or the loss of the mouse pointer in the graphics windows. These symptoms have been seen on the following revisions of PB2GA:

PB2GA-JC

PB2GA-JD

When using the PB2GA in an AS1000A running UNIX the failure symptom observed has been the loss of the mouse pointer in the graphics windows.

When using the PB2GA in an AS1000A running WindowsNT the symptom observed has been the failure to reload the OS after a reboot.

In all of the observed cases a reset VIA the OCP has cleared the condition and once the systems have been booted the PB2GA has operated correctly.

### Solution/Workaround

In the majority of the cases setting the console environmental variable boot\_reset to off and performing the system initialization via the OCP reset switch or by power cycling the system will clear the condition and allow the PB2GA BIOS to set the card for PCI bus operation.

If the above workaround is not acceptable to the customer or if there are circumstances where setting boot\_reset to off does not completely resolve the problem then the only alternative solution is to replace the PB2GA card with another graphics card like the PBXGB-AA PowerStorm 3D30 (TGA2 2MB) graphics adapter.

Note: For OpenVMS the Open3D layered products needs to be loaded to get the correct drivers, software licenses are not needed for 2D operation.

### 6.3.10 BLITZ: AS1000A - ISA/EISA Options may not Work Properly

Blitz number: TD 2305  
Date: 20 may 1997

**Description of service activity requested (if applicable):**

When problems are observed on an on-board VGA(54-23499-01) at ARC console or during NT operation or any ISA/EISA adapter causes problems with floppy disk operation on 54-23499-02.

1. Verify on:

- a) the Main Logic Board (MLB) **54-23499-01** is **Cxx** or earlier  
or
- b) the Main Logic Board **54-23499-02** is **Axx**

2. Verify the markings of E7 as follows:

If the part is marked as a Batch lot L1, go to step 4).

eg: S82374SB  
L1B9744

If the part is marked as indicated below, MLB's do not need to be replaced.

S82374SB  
SZ892

- 3. At SRM console run the FLOPPY TEST command for 10 minutes. If no failures the MLB does not need to be replaced for -02 MLB. If FLOPPY TEST fails or if color problems are still observed on the -01 MLB, go to step 4.
- 4. Then the MLB should be replaced with one of a later revision
  - 5. MLB 54-23499-01 Rev Dxx or greater
  - 6. MLB 54-23499-02 Rev Cxx or greater

**Symptom:**

When an ISA or EISA option is installed in an AS600 or AS1000A system which contains an LSI foundry ESC chip (E7) failures may be seen. These failures are commonly Floppy disk failures under the console TEST command for the 54-23499-02 MLB and onboard VGA color problems in ARC console or under Windows NT operating system on the 54-23499-01 MLB.

(continued)

**Solution:**

The LSI version of the ESC chip (E7) can be detected by an "L1" prefix on the batch number as follows:

S82374SB	Vendor part number
L1B9744	L1 prefix on batch number
NNM 9634	
N628024P .1	
WE15079	

The Revision on susceptible modules is:

54-23499-01	Rev CXX or earlier
54-23499-02	Rev AXX

**Verification:**

To not require action, markings on E7 should be non L1 or tested as indicated above or revision should be:

54-23499-01	Rev Dxx or greater
54-23499-02	Rev Bxx or greater

**Problem Statement:**

The signals (IO\_Read and IO\_Write) out of the LSI foundry version of the ESC chip (21-40884-01) creates a new signal integrity issue resulting in above described symptoms. AS1000A or AS600 family system exhibiting erratic behaviour of the Floppy Disk or the onboard VGA should be visually checked for the presence of these LSI ESC chips.

**LARS Information: (Supplied by MCS)**

Attention Service Personnel: Begin the comment field of your LARS with the word "BLITZ" when you perform an activity associated with a BLITZ Type "Service Action Requested".



## 6.3.11 BLITZ: AS1000A - PBXGA-AA/-BA/-CA, Potential DMA Write Problem

Blitz number: TD 2118  
Date: 20 aug 1996

### Problem statement:

Under certain conditions on a AS1000A running UNIX and using a PBXGA-AA, PBXGA-BA, or PBXGA-CA graphics adapter, the system can machine check when moving windows or depressing Mouse Button 3. The crash behavior we have observed occurs when one or more of the graphics options is installed on a secondary PCI bus.

### Solution:

Turning graphics generated DMA writes off is the solution of choice for this and any other graphics related DMA problem where it can be determined that this solution is appropriate. There is no performance degradation when DMA is disabled. PBXGA using Programmed I/O is virtually the same as PBXGA using DMA. To avoid the above mentioned problem the following steps should be taken:

1. Go to file /usr/lib/X11/xdm/Xservers.

```
cd /usr/lib/X11/xdm
vi Xservers
```

2. In the file /usr/lib/X11/xdm/Xservers, comment out the existing line so that it looks like the following:

```
# :0 local /usr/bin/X11/X -nice -2
```

3. Add the following line to the file:

```
:0 local /usr/bin/X11/X -I -ffbDoDMA 4 -nice -2
```

4. Perform a shutdown and reboot operation to invoke the new line.

```
shutdown -r now
```

# 7 SCSI Configuration and Troubleshooting

## 7.1 Theory

To configure a RAID controller for the internal storage bay, you need a special SCSI cable set: **BC25S-2F**.

If you make the mistake of using a “normal” flatcable SCSI cable, you will experience problems like: not being able to access RCU, not seeing any disks connected, etc.

### 7.1.1 SCSI Storage configuratons AS1000(A)

SCSI Buses	Configuration
<b>Single</b>	The native Fast SCSI-2 controller on the backplane provides 8-bit SCSI support for up to four StorageWorks drives in the internal StorageWorks shelf.
<b>Dual</b>	Split StorageWorks Backplane: The native Fast SCSI-2 controller on the backplane provides 8-bit SCSI support for the removable-media bus; and 16-bit support for up to four StorageWorks drives in the internal StorageWorks shelf. An additional option card provides 16-bit support for the remaining StorageWorks drives in the internal StorageWorks shelf.
<b>Triple</b>	Split StorageWorks Backplane: The native Fast SCSI-2 controller on the backplane provides 8-bit SCSI support for the removable-media bus. Two additional option cards provide support for the StorageWorks drives in a split StorageWorks backplane configuration.

#### External SCSI Expansion:

External SCSI-2 devices, such as tabletop or rackmounted storage devices, can be connected to the system using EISA- or PCI-based SCSI adapters. Use the following rules to determine if a particular device can be used:

- ◆ The device must be **supported by the operating system**. Consult the software product description or hardware vendor.
- ◆ A **maximum of seven devices** can be on any one SCSI-2 controller.
- ◆ Each device on the bus must have a **unique SCSI ID**. You may need to change a devices default SCSI ID in order to make it unique. All removable-media device bus node IDs are set via switches on the device. For information about setting a devices ID, refer to the guide for that device.
- ◆ The entire SCSI bus length, from end-to-end, terminator to terminator must **not exceed 3 meters for Fast SCSI-2 at 10 MB/sec (6 meters at 5 MB/sec)**.
- ◆ Ensure that the SCSI bus is **properly terminated** and that **no devices in the middle of the bus are terminated**.

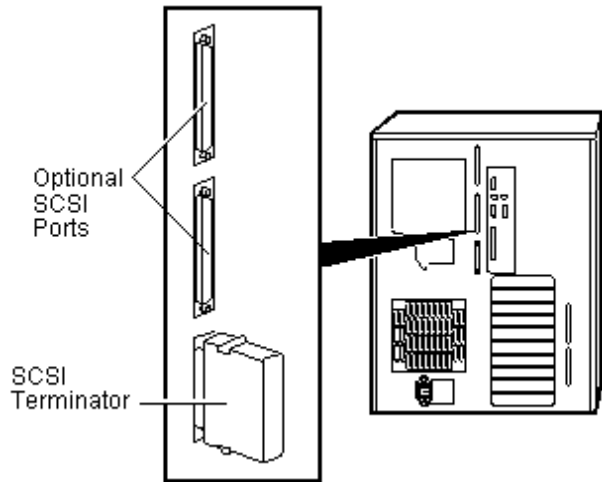
### 7.1.2 Difference BA350 versus AS1000(A) Storage Shelf

Note that the storage shelf of the AS1000(A) is different from the BA350. Refer to the figures related to this chapter.

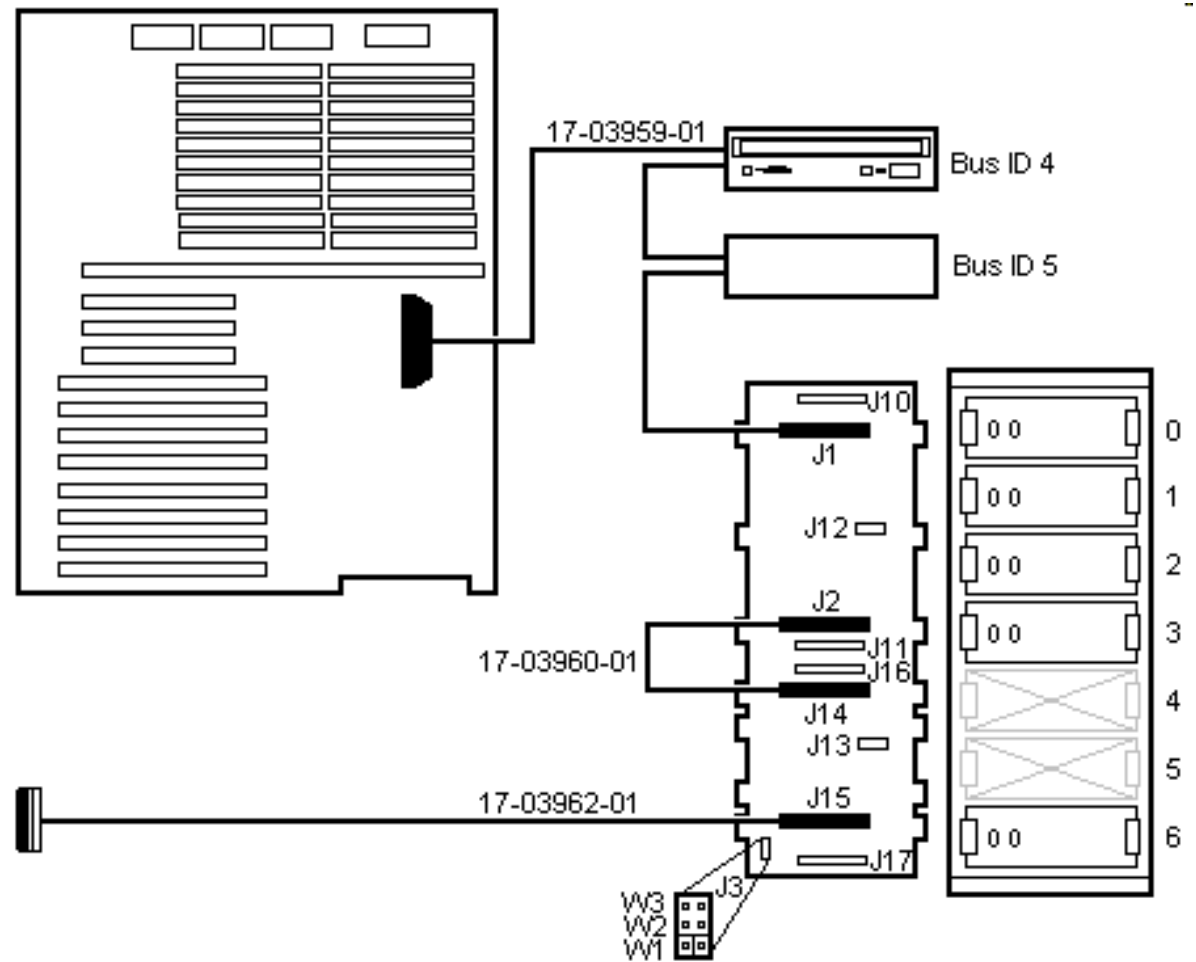
BA350			
Physical Slot	Single Bus ID	Split Bus ID	
		Bus A	Bus B
0	0	0	
1	1		0
2	2	1	
3	3		1
4	4	2	
5	5		2
6	6/Power Supply		3
7	Power Supply		

AS1000(A) Shelf			
Physical Slot	Single Bus ID	Split Bus ID	
		Bus A	Bus B
0	0	0	
1	1	1	
2	2	2	
3	3	3	
4	4		0
5	5		1
6	6		2
7			

### 7.1.3 SCSI Termination at Rear Port

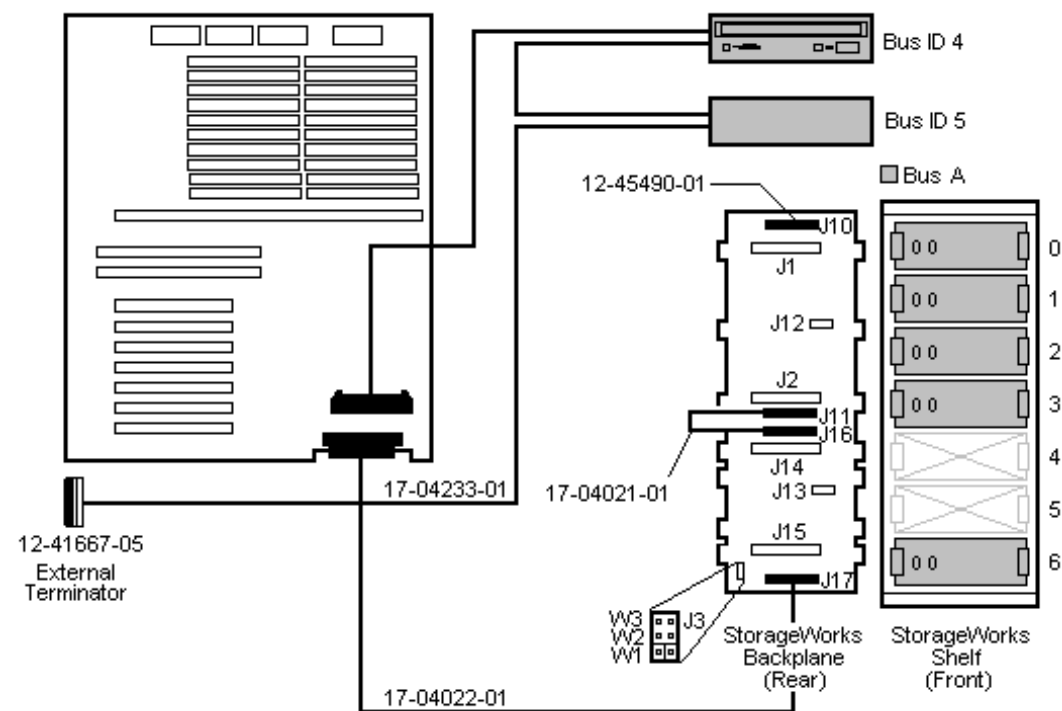


7.1.4 Single Controller Configuration with Single Bus StorageWorks Shelf AS1000



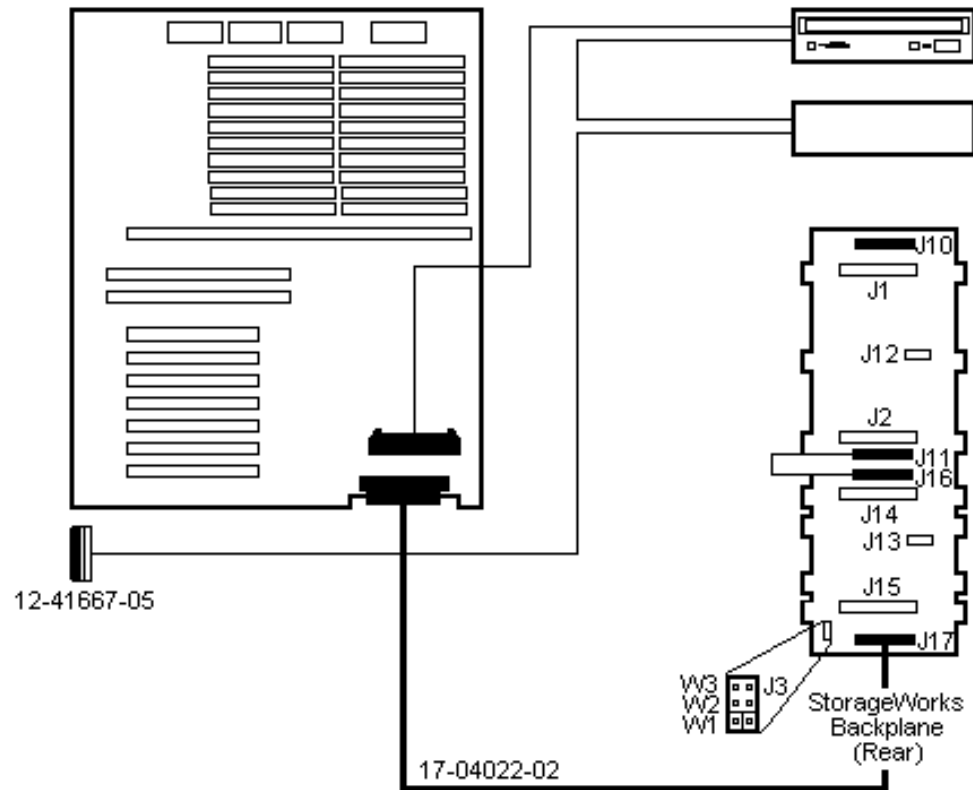
*Note: Only narrow drives (RZxx-VA) work in this configuration. When J10 is terminated, also wide drives (RZxx-VW) may be used.*

7.1.5 Single Controller Configuration AS1000A



**Note:** The 50-pin narrow SCSI connector should not be used in combination with the 68-pin wide SCSI connector (as shown in the picture above). Refer to the troubleshooting information at the end of this section.

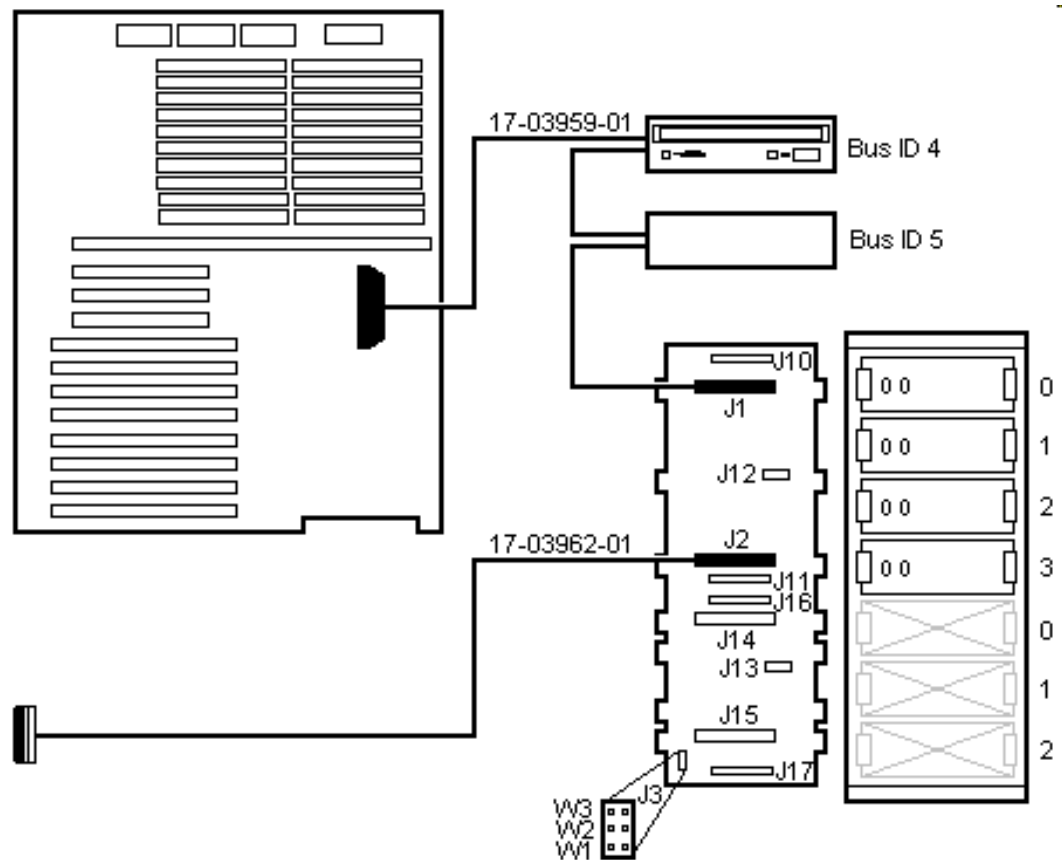
## 7.1.6 Wide-SCSI (Native Controller to StorageWorks Shelf) Cable (68-pin) AS1000A



Note: Terminator J10 (p/n: 12-45490-01) is missing in the figure.

**Note:** The 50-pin narrow SCSI connector should not be used in combination with the 68-pin wide SCSI connector (as shown in the picture above). Refer to the troubleshooting information at the end of this section.

### 7.1.7 Single Controller Configuration with Dual Bus StorageWorks Shelf AS1000



# AS1000

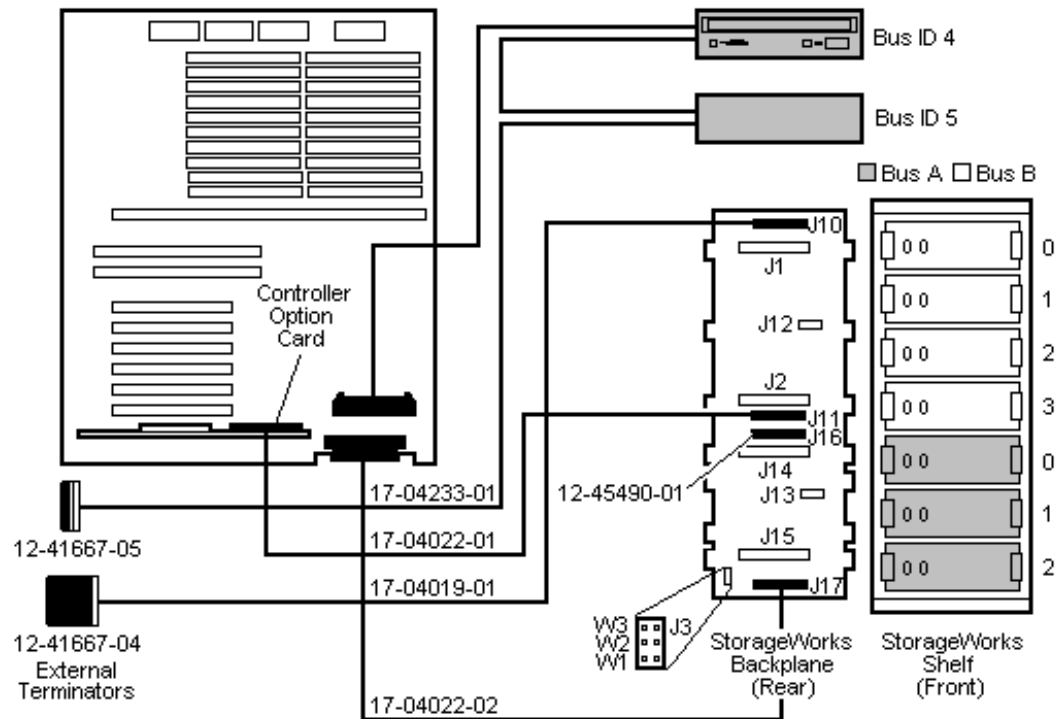




# AS1000

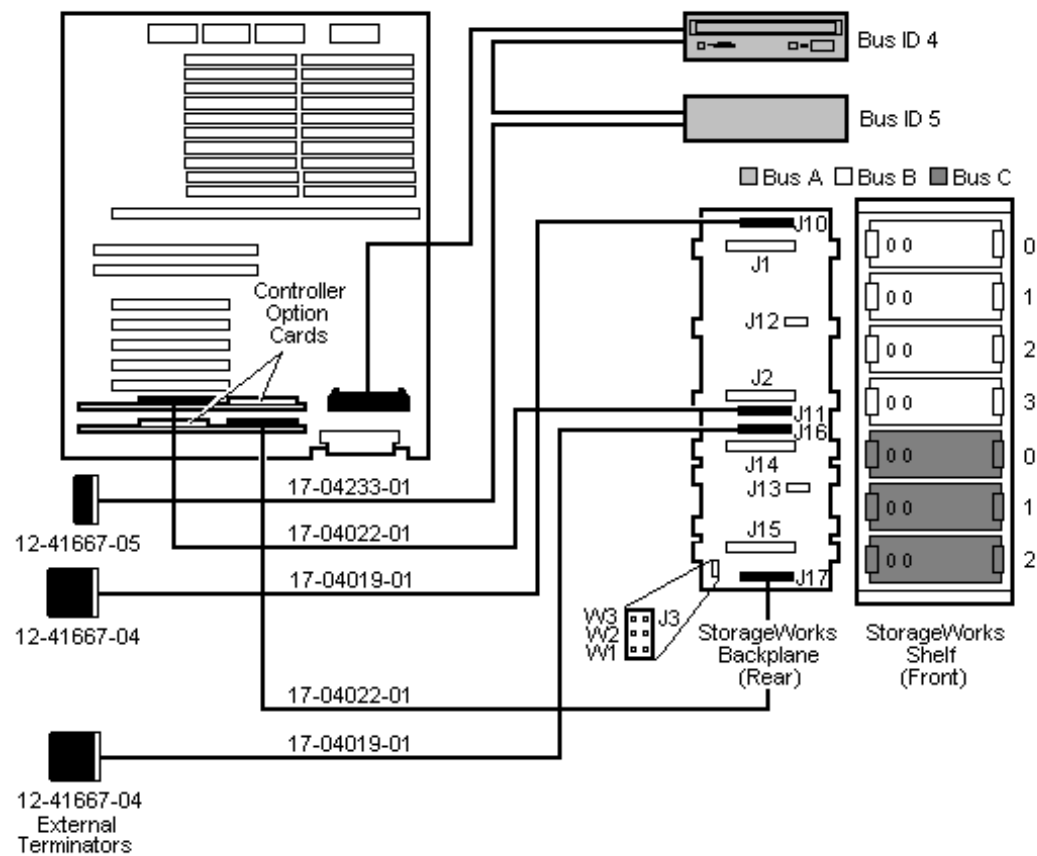


### 7.1.10 Dual Controller Configuration with Split StorageWorks Backplane AS1000A



**Note:** The 50-pin narrow SCSI connector should not be used in combination with the 68-pin wide SCSI connector (as shown in the picture above). Refer to the troubleshooting information at the end of this section.

7.1.11 Triple Controller Configuration with Split StorageWorks Backplane  
AS1000A



## 7.2 Troubleshooting Information

### 7.2.1 Mass Storage Troubleshooting Table

Problem	Symptom	Corrective Action
Drive failure	<b>Fault LED</b> for drive is on (steady).	Replace drive.
Duplicate SCSI IDs	Drives with duplicate SCSI IDs are missing from the show config display.	Correct SCSI IDs. May need to reconfigure internal StorageWorks backplane. [jump]
SCSI ID set to 7 (reserved for host ID)	Valid drives are missing from the show config display. One drive may appear seven times on the configuration screen display.	Correct SCSI IDs.
Duplicate host IDs on a shared bus	Valid drives are missing from the show config display. One drive may appear seven times on the configuration screen display.	Change host ID through the <code>pk*0_host_id</code> environment variable, using set <b><code>pk*0_host_id</code></b> .
Missing or loose cables. Drives not properly seated on StorageWorks shelf	Activity LEDs do not come on. Drive missing from the show config display.	Remove device and inspect cable connections. Reseat drive on StorageWorks shelf.
SCSI bus length exceeded	Drives may disappear intermittently from the show config and show device displays.	A SCSI bus extended to the internal StorageWorks shelf with the backplane configured as a single bus, cannot be extended outside of the enclosure. A SCSI bus extended to the internal StorageWorks shelf with the backplane configured as a dual bus, can be extended 1 meter outside of the enclosure.  The entire SCSI bus length, from terminator to terminator, must not exceed 5 meters for single-ended SCSI-2 at 5 MB/sec, or 3 meters for single-ended SCSI-2 at 10 MB/sec.
Terminator missing or wrong terminator used	Read/write errors in the console event log; storage adapter port may fail.	Attach appropriate terminators as needed (external SCSI terminator for use with the SWXCR-xx RAID controller, <b>12-41667-02</b> ; external SCSI terminator for native controller, <b>12-37004</b> or <b>12-41667-02</b> ). Note: The SCSI terminator jumper ( <b>J49</b> ) on the motherboard should be set to on to enable the onboard SCSI termination.

*Mass Storage Troubleshooting Table (continued)*

<b>Problem</b>	<b>Symptom</b>	<b>Corrective Action</b>
Extra terminator	Devices produce errors or device IDs are dropped.	Check that bus is terminated only at beginning and end. Remove unnecessary terminators. Note: The SCSI terminator jumper ( <b>J49</b> ) on the motherboard should be set to on to enable the onboard SCSI termination.
SCSI storage controller failure	Problems persist after eliminating the problem sources.	Replace the failing EISA or PCI storage adapter module (or motherboard for the native SCSI controller).

## 7.2.2 SCSI Related Option Restrictions AS1000

- ◆ **Storage controllers** require either PB7HA-AA (narrow), PB7HA-BA (wide) or PB7HA-BB (narrow controller with wide drives) when connected to internal StorageWorks backplane.
- ◆ Any devices supported in standard StorageWorks Expansion Boxes are supported in those Expansion Boxes on the AS1000. Not all these devices are supported in the internal StorageWorks backplane. Check Systems and Options Catalog (SOC).

## 7.2.3 SCSI Related Option Restrictions AS1000A (EV4)

- ◆ **KZESC-xA** EISA RAID controller. Requires cable kit PB7HA-AA (narrow) or PB7HA-BA (wide) for the internal backplane.
- ◆ **KZPDA-AA** PCI 32 FWSE SCSI adapter. Requires cable kit PB7HA-AA (narrow) or PB7HA-BA (wide) for the internal backplane.
- ◆ **KZPSM-AA** FWSE SCSI Ethernet PCI-PCI bridge combination controller. Requires cable kit PB7HA-AA (narrow) or PB7HA-BA (wide) for the internal backplane. Booting from InfoServer with VMS V6.2-1H3 is not supported in PCI slots 4 -7. Booting from LAVC is supported in PCI slots 4 -7.
- ◆ **DS-RZ1xB-VW** (Ultra 16-bit Wide) SCSI disk drive SBB are not supported in a BA356 shelf on the same SCSI bus with 5 1/4" devices.
- ◆ **DS-RZ26N-VZ** and **DS-RZ28M-VZ** Hawk2XL wide SCSI disk SBB. No restrictions with Rev B01 or higher.
- ◆ **RZ26N-VA** and **RZ28M-VA** Hawk2XL narrow SCSI disk drive. No restrictions with Rev E01 or higher.
- ◆ **BA353-AA** narrow StorageWorks desktop enclosure. Not supported with RAID controllers.

## 7.2.4 SCSI Related Option Restrictions AS1000A (EV5)

- ◆ **KZESC-xA** EISA RAID controller. Requires cable kit PB7HA-AA (narrow) or PB7HA-BA (wide) for the internal backplane.
- ◆ **KZPDA-AA** PCI 32 FWSE SCSI adapter. Requires cable kit PB7HA-BA (wide) for the internal backplane.
- ◆ **KZPAC-AA, -CA, -CB**: UltraSCSI drives running at UltraSCSI speed are supported externally, only, and require the new UltraSCSI components; personality card, 180w power supply, BA356 shelf and associated cabling to run at Fast-20 speed. TIMA kits are required for OpenVMS systems with greater than 1GB RAM to run SWXCRMGR Utility.
  - ◇ *OpenVMS V6.2 Kit: ALPDRIV04\_062*
  - ◇ *OpenVMS V7.1 Kit: ALPDRIV01\_071*
- ◆ **KZPSM-AA** FWSE SCSI Ethernet PCI-PCI bridge combination controller.
  - ◇ *Requires cable kit PB7HA-BA (wide) for the internal backplane.*
  - ◇ *OpenVMS V6.2-1H3: Supported as a data device, only on the secondary PCI bus. Supported as a boot on the primary PCI bus, only.*
- ◆ **DS-RZ26N-VZ** and **DS-RZ28M-VZ** Hawk2XL wide SCSI disk SBB. No restrictions with Rev B01 or higher.
- ◆ **PBXRW-xB** Supported only on Rackmount system configurations.
- ◆ **RZ26N-VA** and **RZ28M-VA** Hawk2XL narrow SCSI disk drive. No restrictions with Rev E01 or higher.

## 7.2.5 BLITZ: AS1000 Split Bus Intermittent Fault

Blitz number: TD 2093  
Date: 08 july 1996

### **Problem**

The AS1000 with a split bus, internal shelf, with a wide SCSI may show random yellow drive fault leds, even though the system is operating correctly. With various drive combinations, these fault leds will randomly come on and stay on; especially if more than four drives are present.

### **Resolution/Workaround**

If you have this problem with the wide SCSI bus, substitute the 12-41667-04 (68 pin) SCSI bus terminator with the pull up 12-41768-03 terminator. If you are not connected to an external SCSI box, you will need to install two of these; one on each bus.

### **Additional comments**

With higher speed drives (such as the RZ29B, which consume more current); this problem is seen to occur more often. An additional precautionary measure that will help keep all drives cooler, on the internal SCSI bus is; to add the second power supply. Not only will this provide additional cooling for the drives, but it now becomes a fail safe power source for this worksystem.

## 7.2.6 New Configuration of Internal SCSI on AS1000A

Source: Z-help (Jan Visser)

### Problem:

The AS1000A uses an onboard SCSI controller chip to connect both the internal storage box and removable media drives. The mainboard offers an 68-pin wide connector and an 50-pin narrow connector to attach the different devices.

In the "AS1000A Owner's Guide Supplement" from May 1997 (EK-1000A-CL.A01) it is said that it's no longer supported to use both the 50-pin and the 68-pin connector of the onboard SCSI controller at the same time!

Note: The configuration guidelines on PROSIC (<http://sawhorse.cxo.dec.com/SYSTEMS/ALPHA/ASRV1000A> - components, SCSI configuration, single controller) still show the old config with both connectors used.

### Description:

Based on a hardware problem with signal integrity on the internal SCSI bus the configuration guidelines have been changed. The only supported configuration at this time is to use only one connector of the onboard SCSI. This applies to both A1000A mainboards, 54-23499-01 with onboard VGA and 54-23499-02 without onboard VGA.

### Solution:

Order a PB7HA-BC cable kit.

Included in this kit are two cables.

1. **17-04009-01** this is a 50 pin cable that attaches to the internal CD-ROM and tape and attaches to the 68-pin cable. The cable converts from 68-pin to 50-pin.
2. **17-04671-01** this is a 68-pin cable with a built in terminator and attaches to the top rear port on the internal storage shelf.

You use the existing wide SCSI cable from the system module to the internal storage backplane. Remove the terminator from the rear of the storage shelf and install the 17-04671-01 to this connector. The 17-04671-01 cable has three connectors. The first attaches to the storage backplane and the two other connectors would go to a possible CDROM and tape drive. The 17-04009-01 cable is a short 68-pin to 50-pin converter that connects the 68-pin cable to the 50-pin connector on the CDROM etc. The kit comes with documentation on other possible cable configurations. The 17-04671-01 cable does not have a external SCSI port on the cable.

Note:

1. There will be no external SCSI port coming from the system module.
2. The 50-pin port on the system will not be used.



## 8 Cache Options

---

### 8.1 Exercizes and Labs

Refer to memory tests and exercizes described in chapter 6

### 8.2 Theory

2 Mb backup cache is standard available on the daughterboards. No separate cache options are available.

Note that EV5 CPU boards have 3 Levels of cache:

Cache on-chip:	<b>I-cache:</b> 16 KB, <b>D-cache:</b> 16 KB, write-through
	<b>S-cache:</b> 96 KB, 3-way set associative, write-back
External:	<b>B-cache:</b> 2 MB, direct mapped, write-back

# 9 Console Commands

---

## 9.1 Exercizes and Labs

### 9.1.1 LAB 9.1 Get help from the System

- |                          |                               |
|--------------------------|-------------------------------|
| 1. >>> <b>help</b>       | Lists all available commands. |
| 2. >>> <b>man</b>        | Idem.                         |
| 3. >>> <b>help ls ps</b> | Get help on ls and ps.        |

### 9.1.2 LAB 9.2 Get information from the System

Make sure you are familiar with the following commands:

- |                              |   |
|------------------------------|---|
| 1. >>> <b>show version</b>   | Displays Console Program version.   |
| 2. >>> <b>show pal</b>       | Displays PALcode version.   |
| 3. >>> <b>show console</b>   | Output info to graphical or serial console (nothing to do with the console program).  |
| 4. >>> <b>show config</b>    | Combination of show version, show pal, show memory and show device.   |
| 5. >>> <b>show device</b>    | Displays devices and controllers as seen by the palcode.  |
| 6. >>> <b>show device dk</b> | Displays dk devices only.   |
| 7. >>> <b>show memory</b>    | Displays memory configuration.  |
| 8. >>> <b>ps</b>             | Displays process status of all present processes.<br>Create some (>>>memtest -p 0 &) and display the processes with >>>ps   grep memtest. |
| 9. >>> <b>cat el</b>         | Displays the console event log information. To stop the screen display from scrolling, enter Ctrl/S. To resume scrolling, enter Ctrl/Q.   |
| 10. >>> <b>more el</b>       | Displays the console event log information one page at a time.  |
| 11. >>> <b>show_status</b>   | Shows status of currently diagnostics (start up some memory tests (>>>memory &, >>>test &) to check this command).                        |

*Optional information commands:*

- |                             |   |
|-----------------------------|---|
| 12. >>> <b>show hwrpb</b>   | Displays base address of HW register parameter block.                           |
| 13. >>> <b>show cluster</b> | Displays open virtual circuits.   |
| 14. >>> <b>show map</b>     | Displays system virtual memory map.   |
| 15. >>> <b>show iobq</b>    | Displays I/O counter blocks (start up some memory tests to check this command). |

### 9.1.2.1 LAB 9.2A Displaying and Clearing the Eventlog

Pxx>>> **init**  
Pxx>>> **abcdef**  
Pxx>>> **cat el**

Initialize the system.  
Type a nonsense command.  
Check that the unknown command (abcdef) is logged in the eventlog. All information above is generated during initialization.  
Initialize the system.  
Check that the line referring to the unknown command has disappeared. The information present is related to the latest initialization.

### 9.1.3 LAB 9.3 Exercizers and Tests

1. >>>**test**
2. >>>**test lb**
3. >>>**memory**
4. >>>**memtest**
5. >>>**exer -sb 100 -eb 200 -p 1000 dka100**

Tests the core system. Use >>>**show\_status** to display the test results. As the test runs indefinitely, use >>>**kill\_diags** to stop the test.  
No destructive tests are performed. You need to install floppy, tape etc. to test these devices.  
Runs Loopback tests (COM2 and parallel port) in addition of core system tests. Insert loopback connectors.  
Runs memory exercises each time the command is entered. The tests are run in the background. Make the processes visible with >>>**ps**. Show results with >>>**show\_status**. Kill the processes with >>>**kill\_diags**.  
Memory test  
Exercizer: **-sb**: start-block, **-eb**: end-block, **-p**: passcount  
Check with >>>**man** or >>>**help** what other operators may be useful.

*Install a network option (do not forget: >>>**runecu**) and insert the required terminators and loopback plugs. Status information is displayed with >>>**show\_status**.*

6. >>>**nettest <params>**
7. >>>**net -ic ewa0**
8. >>>**net -s ewa0**
9. >>>**netew ewa0**
10. >>>**network era0**
11. >>>**kill\_diags**

Network test  
Initializes the MOP counters for the specified Ethernet port.  
Displays the MOP counters for the specified Ethernet port.  
Runs external mop loopback tests for specified EISA- or PCI-based ew\* (DECchip 21040, TULIP) Ethernet ports. The command can also be used to test a port on a "live" network.  
Runs external mop loopback tests for specified EISA- or PCI-based er\* (DEC 4220, LANCE) Ethernet ports. The command can also be used to test a port on a "live" network.  
A serial loopback connector (12-27351-01) must be installed on the COM2 serial port for the kill\_diags command to successfully terminate system tests.

(continued)

*The following command string is useful for periodically displaying diagnostic status information for diagnostics running in the background:*

12. **>>> while true;show\_status;sleep n;done**

Where n is the number of seconds between show\_status displays.

## 9.1.4 LAB 9.4 Testing the Disks in the System

1. Pxx>>> **show dev**

Build device table and lists all available devices.

2. Pxx>>> **exer -a ?r-Rc -sec 900 DK\* &**

This is a non-destructive read-only test of all SCSI disks attached to the system. *Refer to the topic on the use of exer later in this chapter for details on the parameters used.*

3. Pxx>>> **chmod +rw dka200.2.0.1**

Write-enable dka200. This enables exer to perform write tests on this disk.

4. Pxx>>> **exer -a ?r-w-Rc -sec 900 dka200 &**

This is theoretically a non-destructive read-write test of dka200. Therefore use with great care. *Refer to the topic on the use of exer later in this chapter for details on the parameters used.*

5. Pxx>>> **show\_status**

Monitor the status of the exercizer.

6. Pxx>>> **ps**

Monitor the processes started by the exercizer.

## 9.1.5 LAB 9.5 Running Commands in the Background

*Handy to put heavy load with random activity on the system.*

1. >>>**show device**

See what device can be used for the following command.

2. >>>**exer dka100 -sb 100 -p 0 &**

Read block 100 (-sb 100) forever (-p 0) in the background (&).

3. >>>**memtest -p 0 &**

Start up a memory test.

4. >>>**memtest -p 0 &**

And one more. When you add too many processes the system will crash.

5. >>>**show\_status**

Check the status of all test processes running.

6. >>>**ps**

Get an overview of all processes.

7. >>>**ps | grep memtest**

Look only at the memory tests. For the next command, look at the process ID's.

8. >>>**kill 5c**

Kill the first memory test (use proper ID).

9. >>>**kill 59**

Kill the other one (use proper ID).

## 9.1.6 LAB 9.6 Building Scripts

- |   |   |
|---|---|
| 1. >>>>echo e pmem:3fff000 > exam   | Write "e pmem:3fff000" to file "exam".  |
| 2. >>>>cat exam   | Display contents of "exam".   |
| 3. >>>>exam   | Run the script "exam".  |
| 4. >>>>echo 'd 3fff010 deadbeef ; e 3fff010' >> exam  | Append "d 3fff010 deadbeef" to file "exam", then add "e 3fff010" to the file. Note the use of ' ' to prevent the command separator ; from prematurely terminating the echo command. |
| 5. >>>>cat exam   | Display contents of "exam".   |
| 6. >>>>exam   | Run the script "exam".  |
| 7. >>>>echo > test 'd 3fff000 123456789<br>_>e 3fff000<br>_>d 3fff010 987654321<br>_>e 3fff010' | Build a script using a string which contains many lines. Note that the prompt indicates that the commands are still part of the string. Type <CR> to continue to the next line.     |
| 8. >>>>cat test   | Display contents of "test".   |
| 9. >>>>test   | Run the script "test".  |

## 9.1.7 LAB 9.7 Building a Script in NVRAM

Build a script which tests the system using a number of tests and exercizers in the background. Make sure that any output generated by the system is redirected into a file "results", so you can check what happened.

*You can also write a script in NVRAM. This script is run at the end of the powerup script.*

- |                   |  |
|-------------------|--|
| 1. >>>>cat pwrup  | At the end of the powerup script you can see that the nvram script is executed when present. |
| 2. >>>>edit pwrup | Won't work, the powerup script is write protected.   |

*Here we go. The editor is a BASIC-type of line editor.*

- |                   |   |
|-------------------|---|
| 3. >>>>cat nvram  | See if something is already written in NVRAM.                 |
| 4. >>>>edit nvram | Create or modify a NVRAM script.                              |
| *list             | If anything there, you will see it complete with line-number. |
| *10 show device   | Gives you device info when initializing the system.           |
| *20 ps            | You may add a whole list of commands.                         |
| *list             | See what you did.   |
| *exit             | Leave the editor.   |
| >>>>              |   |

**Note:** If you use the **init** command in the *nvram* script, you will loop forever. To overcome this problem, invoke the Floppy Loader by inserting a jumper at position 7 of J1.

Since CD **V3.7** firmware latches the haltswitch in SW. If haltswitch is pressed during power-up no NVRAM scripts are executed.

## 9.1.8 LAB 9.8 Changing from SRM to ARC and vice-versa (EV4 only)

*From SRM to ARC:*

1. `>>>arc` Invokes the ARC console. After power cycle, the (default) SRM console comes up again.
2. `>>>set os_type NT` Does not invoke ARC console until after power cycle. Note that NT is not case sensitive, however the rest of the command is.

*Note: When you still come into the SRM console after power-up, although os\_type has been set to NT, you must make sure that the console is not set to graphics when no graphics console is connected. Use >>> set console serial.*

*From ARC to SRM:*

1. From **Boot Menu** select: **Supplementary Menu**
2. Select: **Set up the System**
3. Select: **Switch to Open VMS or Digital UNIX**
4. Select: **Open VMS or Digital UNIX**
5. `<CR>`
6. Power cycle the system

## 9.1.9 LAB 9.9 Changing from SRM to AB and vice-versa (EV5 only)

EV5 machines use the **AlphaBIOS** console instead of ARC.

*Note: When the system hangs before the AlphaBIOS picture is displayed (EV5, Pinnacle) after typing >>>arc or >>>runecu check that J27 (video) is NOT inserted when using a graphics option card.*

*From SRM to AlphaBIOS:*

1. `P0x>>>alphabios` Invokes the AlphaBIOS console. After power cycle, the (default) SRM console comes up again. Note `>>>arc` also works.
2. `P0x>>>set os_type NT` Does not invoke AlphaBIOS console until after power cycle. Note that NT is not case sensitive, however the rest of the command is.

*From AlphaBIOS to SRM:*

1. Press **F2** to select the AlphaBIOS Setup menu
2. Select: **CMOS Setup** (use arrow keys)
3. Press **F6** (Advanced)
4. Select: **Console Selection** (use `<tab>` key to move up and down)
5. Change Console selection to: **OpenVMS and Digital UNIX Console** (use arrow up/down keys)
6. Press **F10** (Save Changes)
7. Press **F10** again (Save Changes)
8. `<CR>`
9. Power cycle the system or press init switch.

## 9.1.10 LAB 9.10 Setting Boot and System Parameters

1. >>>**set bootdef\_dev ewa0**  
Set default boot device. Note that you may specify more than one boot device. The system will try to boot from the boot devices in the order given.
2. >>>**show bootdef\_dev**  
Check.
3. >>>**set boot\_osflags A**  
Set default boot os flags.  
Digital UNIX command: >>>**set boot\_osflags bootflag**.  
OpenVMS Command: >>>**set boot\_osflags root number,bootflag**.  
Check.
4. >>>**show boot\_osflags**
5. >>>**set auto\_action halt**  
Set default auto-action to HALT. Causes the system to remain in console mode after the system is powered up or it crashes.
6. >>>**set auto\_action boot**  
Set default auto-action to BOOT. Causes the system to boot automatically when it is turned on. Causes the system to halt after a system failure.
7. >>>**set auto\_action restart**  
Set default auto-action to RESTART. Causes the system to boot automatically when it is turned on or after it fails.
8. >>>**show auto\_action**  
Check.
9. >>>**set os\_type vms**  
Sets the default operating system to OpenVMS; boots SRM firmware.
10. >>>**set os\_type osf**  
Sets the default operating system to Digital UNIX; boots SRM firmware.
11. >>>**set os\_type nt**  
Sets the default operating system to Windows NT; boots ARC\_firmware.
12. >>>**set console\_graphics**  
Sets the power-up output to be displayed at a graphics monitor or a device that is connected to the VGA module at the rear of the system (default setting).
13. >>>**set console serial**  
Sets the power-up output to be displayed on the device that is connected to the COM1 port at the rear of the system.
14. >>>**show console**  
Check the setting.
15. >>>**set tt\_allow\_login 0**  
Disables login on alternative console ports.
16. >>>**set tt\_allow\_login 1**  
Enables login on alternative ports (default setting).  
If the console output device is set to serial, allows you to log in on the primary COM1 port, or alternate COM2 port, or the graphics monitor.  
If the console output device is set to graphics, allows you to log in through either the primary graphics monitor or the alternate COM1 or COM2 console port.
17. >>>**init**  
For most parameters, you must initialize the system to invoke the parameter.

## 9.1.11 LAB 9.11 Save and Restore Environmental Data to/from Floppy

Since CD V3.9 (console V4.8) it is possible to save and restore nvram data (environmental parameters and configuration info) to/from floppy.

1. Boot firmware CD.
2. Insert FAT-formatted floppy in floppy drive.
3. UPD> **save\_nvram**
4. UPD> **restore\_nvram**

Refer to chapter 10 (release notes CD V3.9) for a detailed procedure.

## 9.1.12 LAB 9.12 Redirecting Console Output to a File

*Redirecting output to a file is sometimes handy when for instance some tests or exercizers are running during the night and you want to be able to check the results the next morning (use append >> in that case).*

- |                             |  |
|-----------------------------|--|
| 1. >>>ls bob                | See if the file bob exists. It should not.   |
| 2. >>>e 3fff000 -n 20 > bob | Create some output and dump it in bob (the file, that is).                               |
| 3. >>>ls bob                | Check if bob has been created.   |
| 4. >>>cat bob               | Check if it contains data.   |
| 5. >>>e pc >> bob           | Create some more output and append it to the file (> would overwrite the previous data). |
| 6. >>>cat bob               | See if it worked.  |
| 7. >>>rm bob                | Get rid of bob (remove the file).  |
| 8. >>>ls bob                | See if it is gone.   |

## 9.1.13 LAB 9.13 Redirecting Console Output to Floppy

*Note: You need console V4.8 or later for this lab.*

- |   |   |
|---|---|
| >>> <b>show config &gt; fat:showconfig.fat/dva0</b> | Write the output of show config to a file showconfig.fat on a FAT-formatted floppy in dva0. |
| >>> <b>cat fat:showconfig.fat/dva0   more</b>       | Read the showconfig.fat file from floppy (page by page).                                    |
| >>> <b>cat el &gt; fat:cat_el.fat/dva0</b>          | Store the power-up sequence to a FAT-formatted floppy.                                      |

## 9.1.14 LAB 9.14 Identifying Commands and Scripts

*Useful tools to distinguish commands and scripts in a particular image or version of the console.*

- |                         |                             |
|-------------------------|-----------------------------|
| 1. >>>show version      | Check the version.          |
| 2. >>>ls -l   grep r-xb | List all built in commands. |
| 3. >>>ls -l   grep r-x- | List all built in scripts.  |



## 9.1.15 LAB 9.15 Changing the OCP Message

*For old firmware:*

```
>>> echo -n "good morning" > mikasa_ocp
```

Write some text in mikasa\_ocp. Add this line in the *nvr* script so it appears in the OCP after each initialization or power cycle.

*Currently:*

```
>>> set ocp_text "hello there"
```

This is now a non-volatile parameter.

## 9.1.16 LAB 9.16 Testing Network Cards

This test requires two DE435 or similar network options, a crossed thinwire cable (BN26N or BN24F) to make a point-to-point connection and a thinwire BNC cable with two terminators.

### *Internal loopback test:*

1. Pxx>>> **net -sa ewa0** Lists the Enet HW address (eg: 08-00-2b-e7-f7-38).
2. Pxx>>> **net -start ewa0** Start the port drivers.
3. Pxx>>> **net -cm au1 ewa0** Select the 10base5 (thickwire) or 10base2 (thinwire,BNC) port.
4. Pxx>>> **net -cm in ewa0** Select internal loopback testing.
5. Pxx>>> **net -ic ewa0** Clear the MOP counters.
6. Pxx>>> **net -l0 -da 08-00-2b-e7-f7-38 ewa0** Start the internal loopback test. Use the Enet HW address of the system to be tested. Note that the system must indicate that it gets response from the node (itself). If the system comes back in the >>> prompt without any further notification, the test has not been performed, possibly due to a hardware error.
7. Pxx>>> **net -s ewa0** Check the test results (by looking at the MOP counters).

### *External loopback test (with one system):*

Connect COAX thinwire cable with both ends terminated.

1. Pxx>>> **net -sa ewa0** Lists the Enet HW address (eg: 08-00-2b-e7-f7-38).
2. Pxx>>> **net -start ewa0** Start the port drivers.
3. Pxx>>> **net -cm au1 ewa0** Select the 10base5 (thickwire) or 10base2 (thinwire,BNC) port.
4. Pxx>>> **net -cm ex ewa0** Select external loopback testing.
5. Pxx>>> **net -l0 -da 08-00-2b-e7-f7-38 ewa0** Start the internal loopback test. Use the Enet HW address of the system to be tested. Note that the system must indicate that it gets response from the node (itself). If the system comes back in the >>> prompt without any further notification, the test has not been performed, possibly due to a hardware error.
6. Pxx>>> **net -s ewa0** Check the test results (by looking at the MOP counters).

*(Continued)*

*Enet communication test (with two systems):*

1. Pxx>>> **net -sa ewa0** Lists the Enet HW address on both systems (eg: 08-00-2b-e7-f7-38 and 08-00-2b-e7-0d-a2).
2. Pxx>>> **net -start ewa0** Start the port drivers on both systems.
3. Pxx>>> **net -cm aui ewa0** Select the 10base5 (thickwire) or 10base2 (thinwire,BNC) port on both systems. Use -cm tp when you want to use twisted pair (10baseT).
4. Pxx>>> **net -cm ex ewa0** Select external loopback testing on both systems.
5. Pxx>>> **net -l0 -da 08-00-2b-e7-0d-a2 ewa0** Start the internal loopback test. Use the Enet HW address of the other system. Note that the system must indicate that it gets response from the node (itself). If the system comes back in the >>> prompt without any further notification, the test has not been performed, possibly due to a hardware error.
6. Pxx>>> **net -s ewa0** Check the test results (by looking at the MOP counters).

## 9.1.17 LAB 9.17 Examining and Depositing

*This is more or less nice to have stuff, as it will be not often usable at a customers site.  
Therefore only to be done when time left.*

1. **>>>alloc 10000** Allocates 10000 bytes in memory that we can safely use for experiments. The command returns the start-address of this memory chunk, say 03FF F000
2. **>>>deposit -physical 3FFF000 -n 100 deadbeef** Deposit a pattern (“deadbeef”) at 3FFF000 and the next 100 locations.
3. **>>>examine 3FFF000 -n 100** See if it worked.
4. **>>>d 3FFF200 11112222** Write some pattern at address 3FFF200.
5. **>>>e 3FFF000 -n 500 | grep 11112222** Handy if you know the pattern, not the address.
6. **>>>e 3FFF080 -n 100 | grep DEADBEEF** The same idea. Note that “grep” is case-sensitive.
7. **>>>e -gpr 4** Examine General Purpose Register 4.
8. **>>>e \*** And again.
9. **>>>e -** And the previous.
10. **>>>e +** And the next.
11. **>>>e +** And the next.
12. **>>>e PC** Examine Program Counter.
13. **>>>e PS** Examine Processor Status longword.
14. **>>>e SP** Examine Stack Pointer.
15. **>>>e -ipr 16** Examine WHAMI register.
16. **>>>hd pmem:3FFF000 -sb 100 -eb 101** Hexdump of the first 100 bytes from 3FFF000 (-sb = startblock, -eb = endblock).
17. **>>>e eerom: -n 16** Examine environment variable NVRAM.
18. **>>>e toy: -n 7** Examine clock chip and NVRAM.
19. **>>>e pmem:8000** Examine some PALcode.
20. **>>>e -d \*** Decode the code.

## 9.1.18 LAB 9.18 Make a Script available using NVRAM

*Optional LAB, only useful in specific situations. Skip when lab time is an issue.*

This script is useful to install at a customer machine so the customer is able to save information for screening / troubleshooting.

1. P00>>> **edit nvram**

```
*10 echo "echo \" enter FAT formatted floppy in drive \" > testscript
*20 echo "echo \" ----- EVENTLOG START -----\" >> testscript
*30 echo "cat el > event" >> testscript
*40 echo "echo \" ----- SHOW DEVICE ----- \" >> testscript
*50 echo "show device >> event" >> testscript
*60 echo "echo \" ----- SHOW FRU ----- \" >> testscript
*70 echo "show fru >> event" >> testscript
*80 echo "echo \" ----- SHOW CONFIG ----- \" >> testscript
*90 echo "show config >> event" >> testscript
*100 echo "echo \" ----- SHOW ENVIRONMENT ----- \" >> testscript
*110 echo "show >> event" >> testscript
*120 echo "cat event > fat:event.log/dva0" >> testscript
*exit
```

2. P00>>> **nvram**

Run the nvram script in order to create a script called testscript in memory.

3. P00>>> **testscript**

Run testscript to see if it works. It should prompt you to insert a floppy, then the output of cat el and a number of show commands will be copied onto that floppy.

## 9.2 Theory

### 9.2.1 AS1000(A) Console Commands

Command	Description
<b>alloc</b> <size> [<modulus>] [<remainder>] [-flood] [-z <heap_address>]	Allocate a block of memory from the heap. The alloc command returns the address of the allocated block. <b>&lt;byte block&gt;</b> - the number of bytes to be allocated.
<b>alphabios</b> [-g]	Transfer control to the AlphaBIOS console. <b>-g</b> - Force the AlphaBIOS output to the graphics display.
<b>arc</b>	Transfer control to the AlphaBIOS console.
<b>b[oot]</b> [-file <filename>] [-flags <value>] [-halt] [-protocols <enet_protocol>] [<boot_dev>]	Boot the operating system. <b>-file</b> - boot from the file <filename> (overrides the boot_file environment variable). <b>-fl[ags]</b> - Specifies additional information to the loaded image or operating system. In DIGITAL UNIX, specifies boot flags. In OpenVMS, specifies system root number and boot flags. This qualifier overrides the setting of the boot_osflags environment variable. <b>-halt</b> - Forces the bootstrap operation to halt and invoke the console program once the bootstrap image is loaded and page tables and other data structures are set up. Console device drivers are not shut down. Transfer control to the image by entering the <b>continue</b> command. <b>-protocols&lt;enet_protocol&gt;</b> - Either <b>mop</b> (default) or <b>bootp</b> . This qualifier overrides the setting of the ew*0_protocols environment variable. <b>&lt;boot_dev&gt;</b> - A device path or list of devices from which the console program attempts to boot, or a saved boot specification in the form of an environment variable. This qualifier overrides the setting of the bootdef_dev environment variable. Use the bootdef_dev environment variable to define the default boot device string.
<b>bpt</b>	Invoke the console XDELTA debugger. (Refer to SRM Console CLI for details.)
<b>break</b> <break_level>	Break out of a <i>for</i> , <i>while</i> or <i>until</i> loop.
<b>cat</b> [-length <num>] [-block <size>] [-start <offset>] [-quiet][<file>...]	Concatenates files that you specify to standard output. If you do not specify files on the command line, cat copies standard input to standard output. <b>-length &lt;num&gt;</b> - Specifies the number of bytes in hex of each input file to copy. <b>-start &lt;offset&gt;</b> - Specifies the offset to seek to in hex. If the file(s) are not seekable (eg pipelines), then this qualifier has no effect. <b>-block &lt;size&gt;</b> - Size of the internal buffer cat uses to copy files, in hex. By default this is DEF_ALLOC (2048 bytes). For performance in copying disks, a number such as 10000 can be used. <b>-quiet</b> - Use silent mode on fopens.

Command	Description
<b>cdp</b> <b>[-{i,n,a,u,o}]</b> <b>[-sn]</b> <b>[-sa&lt;allclass&gt;]</b> <b>[-su&lt;unitnum&gt;]</b> <b>[&lt;dssi_device&gt;]</b>	<p>The cdp command permits the modification of DSSI device parameters from the console without explicit connection to a node's DUP server.</p> <p><b>-i</b> - Selective interactive mode, set all parameters.</p> <p><b>-n</b> - Set device node name, NODENAME (up to 16 characters).</p> <p><b>-a</b> - Set device allocation class, ALLCLASS</p> <p><b>-u</b> - Set device unit number, UNITNUM.</p> <p><b>-o</b> - Override warning messages.</p> <p><b>-sn</b> - Set the nodename (NODENAME) for all DSSI devices in the system to either RFhscn or TFhscn, where "h" is the device hose number (0), "s" is the device slot number (0), "c" is the device channel number (0..3), and "n" is the device node ID number (0..6).</p> <p><b>-sa &lt;allclass&gt;</b> - Set the allocation class (ALLCLASS) for all DSSI devices in the system to a value specified.</p> <p><b>-su &lt;unitnum&gt;</b> - Set the starting unit number (UNITNUM) for the first DSSI device in the system to the value specified. The unit number for subsequent DSSI devices will be incremented from this base.</p>
<b>check</b> <b>[-{f,r,w,x,b}]</b> <b>[!]</b> <b>[&lt;string&gt;]</b>	Evaluate a string or attributes of a inode.
<b>chmod</b> <b>[{- + =}{r,w,x,b,z}]</b> <b>[&lt;file&gt;...]</b>	<p>Changes the specified attributes of a file.</p> <p><b>r</b> - Set or clear the read attribute.</p> <p><b>w</b> - Set or clear the write attribute.</p> <p><b>x</b> - Set or clear the execute attribute.</p> <p><b>b</b> - Set or clear the binary attribute.</p> <p><b>z</b> - Set or clear the expand attribute.</p>
<b>cl[ear] &lt;envar&gt;</b>	<p>Removes an unprotected environment variable.</p> <p><b>&lt;envar&gt;</b> - name of the environment variable.</p>
<b>cl[ear] password</b>	<p>The clear password will clear the password in console secure mode operations. There must be a valid password and the console must be logged in for the clear password command to function. The clear password command is used in conjunction with the <i>set secure</i>, <i>set password</i> and <i>login</i> commands.</p>
<b>c[ontinue]</b>	Resumes processing at the point where it was interrupted by <b>Ctrl/P</b> .
<b>cra[sh]</b> <b>[&lt;device&gt;]</b>	<p>Forces a crash dump to the selected device for DIGITAL UNIX and OpenVMS systems. Use this command when an error has caused the system to hang and can be halted by the Halt button or the RMC <b>halt</b> command. The crash command restarts the operating system and forces a crash dump to the selected device.</p> <p><b>&lt;device&gt;</b> - The device name of the device to which the crash dump is written.</p>

Command	Description
<b>cre[ate]</b> <b>&lt;envar&gt;</b> <b>&lt;value&gt;</b> <b>[-nv]</b> <b>[-integer]</b> <b>[-string]</b>	<p>Creates an environment variable.</p> <p><b>&lt;envar&gt;</b> - The environment variable to be assigned with a new value.</p> <p><b>&lt;value&gt;</b> - Optional variable value. This is an ASCII string.</p> <p><b>-nv</b> - Create the EV in the EEPROM.</p> <p><b>-integer</b> - Creates an EV as an integer.</p> <p><b>-string</b> - Creates an EV as a string.</p>
<b>da[te]</b> <b>[&lt;yyyymmddhhmm.ss&gt;]</b>	<p>Sets or displays the system date and time.</p> <p><b>yyyy</b> - year; <b>mm</b> - month; <b>dd</b> - day;</p> <p><b>hh</b> - hour; <b>mm</b> - minutes; <b>ss</b> - seconds</p>
<b>d[eposit]</b> <b>[-{b,w,l,q,o,h}]</b> <b>[-{physical,virtual,gpr,fpr,ipr}]</b> <b>[-n &lt;count&gt;]</b> <b>[-s &lt;step&gt;]</b> <b>[&lt;device&gt;:]</b> <b>&lt;address&gt;</b> <b>&lt;data&gt;</b>	<p>Writes data to a specified address: a memory location, a register, a device, or a file.</p> <p><b>-b, -w, -l, -q, -o, -h</b> - Data type is respectively: byte, word, longword, octaword or hexaword.</p> <p><b>-physical</b> - Address space is physical memory.</p> <p><b>-virtual</b> - Address space is virtual memory.</p> <p><b>-gpr</b> - Address space is general purpose registers.</p> <p><b>-fpr</b> - Address space is floating point registers.</p> <p><b>-ipr</b> - Address space is internal processor registers.</p> <p><b>-n &lt;count&gt;</b> - Specifies the number of consecutive locations (hex) to modify.</p> <p><b>-s &lt;step&gt;</b> - Specifies the address increment size (hex). Normally this defaults to the data size, but is overridden by this qualifier. This qualifier is not inherited.</p> <p><b>[&lt;device&gt;:]</b> - Optional device name (or address space) selects the device to access.</p> <p><b>pmem:</b> - Physical memory</p> <p><b>vmem:</b> - Virtual memory. All access and protection checking occur. If memory mapping not enabled, virtual addresses are equal to physical addresses.</p> <p><b>gpr:</b> - General purpose register set, R0 - R31. Data size defaults to -q.</p> <p><b>fpr:</b> - Floating point register set, R0 - R31. Data size defaults to -q.</p> <p><b>pt:</b> - PAL temporary register set, R0 - R31. Data size defaults to -q.</p> <p><b>&lt;address&gt;</b> - An address that specifies the offset within a device into which data is deposited. The address may be any valid hex offset in the devices address space.</p> <p><i>(Continued on next page)</i></p>



Command	Description																
<b>d[eposit]</b> (continued)	<p>The following forms are valid symbolic addresses:</p> <p><b>gpr-name:</b> R0-R31, AI, RA, PV, FP, SP and RZ.  <b>fpr-name:</b> F0-F31  <b>pt-name:</b> PT1- PT31  <b>PC</b> - Program Counter  <b>"+"</b> - Location immediately following the last address referenced in a deposit or examine.  <b>"-"</b> - Location immediately preceding the last address referenced in a deposit or examine.  <b>"*"</b> - Location last referenced in a deposit or examine.  <b>"@"</b> - Location last addressed by the last location referenced in a deposit or examine.  <b>&lt;data&gt;</b> - Data to be deposited.</p>																
<b>dynamic</b> [-h] [-v] [-c] [-r] [-p] [-extend <byte_count>] [-z <heap_address>]	Show the state of dynamic memory.																
<b>echo</b> [-n] <args>...	<p>Echo the text entered on the command line.</p> <p><b>-n</b> - Suppress newlines from output.  <b>&lt;args&gt;</b> - Specify any arbitrary set(s) of character strings.</p>																
<b>ecu</b> [-g]	<p>Transfer control to ECU via AlphaBIOS firmware.</p> <p><b>-g</b> - Force the AlphaBIOS output to the graphics display.</p>																
<b>edit</b> <file>	<p>Invoke the console BASIC-like line editor on a file.</p> <p><b>&lt;file&gt;</b> - The name of the file to be edited.</p> <p>Editing commands are:</p> <table> <tr> <td><b>help</b></td><td>Displays the brief help file</td></tr> <tr> <td><b>list</b></td><td>Lists the current file prefixed with the line numbers</td></tr> <tr> <td><b>renumber</b></td><td>Renumbers the lines of the file in increments of 10</td></tr> <tr> <td><b>exit</b> (or <b>^Z</b>)</td><td>Leaves the editor and closes the file, saving all changes</td></tr> <tr> <td><b>quit</b></td><td>Leaves the editor and closes the file, without saving changes</td></tr> <tr> <td><i>nn</i></td><td>Deletes line number <i>nn</i></td></tr> <tr> <td><i>aa-bb</i></td><td>Deletes line number <i>aa</i> to <i>bb</i></td></tr> <tr> <td><i>nn text</i></td><td>Adds or overwrites line number <i>nn</i> with <i>text</i></td></tr> </table>	<b>help</b>	Displays the brief help file	<b>list</b>	Lists the current file prefixed with the line numbers	<b>renumber</b>	Renumbers the lines of the file in increments of 10	<b>exit</b> (or <b>^Z</b> )	Leaves the editor and closes the file, saving all changes	<b>quit</b>	Leaves the editor and closes the file, without saving changes	<i>nn</i>	Deletes line number <i>nn</i>	<i>aa-bb</i>	Deletes line number <i>aa</i> to <i>bb</i>	<i>nn text</i>	Adds or overwrites line number <i>nn</i> with <i>text</i>
<b>help</b>	Displays the brief help file																
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<b>quit</b>	Leaves the editor and closes the file, without saving changes																
<i>nn</i>	Deletes line number <i>nn</i>																
<i>aa-bb</i>	Deletes line number <i>aa</i> to <i>bb</i>																
<i>nn text</i>	Adds or overwrites line number <i>nn</i> with <i>text</i>																
<b>eval</b> [-{ib,io,id,ix}] [-{b d o x}] <postfix_expression>	<p>Evaluates a specified arithmetic expression and displays the results. Default input and output are decimal. (Refer to SRM Console CLI for details.)</p>																

Command	Description
<b>e</b> [ <b>xamine</b> ] [-{ <b>b,w,l,q,o,h</b> }] [-{ <b>physical,virtual,gpr,fpr,ipr</b> }] [- <b>n</b> < <b>count</b> >] [- <b>s</b> < <b>step</b> >] [< <b>device</b> >:] < <b>address</b> >	<p>Displays the contents of a memory location, register, device or file.</p> <p><b>-b, -w, -l, -q, -o, -h</b> - Data type is respectively: byte, word, longword, octaword or hexaword.</p> <p><b>-physical</b> - Address space is physical memory.</p> <p><b>-virtual</b> - Address space is virtual memory.</p> <p><b>-gpr</b> - Address space is general purpose registers.</p> <p><b>-fpr</b> - Address space is floating point registers.</p> <p><b>-ipr</b> - Address space is internal processor registers.</p> <p><b>-n</b> &lt;<b>count</b>&gt; - Specifies the number of consecutive locations (hex) to modify.</p> <p><b>-s</b> &lt;<b>step</b>&gt; - Specifies the address increment size (hex). Normally this defaults to the data size, but is overridden by this qualifier. This qualifier is not inherited.</p> <p>[&lt;<b>device</b>&gt;:] - Optional device name (or address space) selects the device to access.</p> <p><b>pmem:</b> - Physical memory</p> <p><b>vmem:</b> - Virtual memory. All access and protection checking occur. If memory mapping not enabled, virtual addresses are equal to physical addresses.</p> <p><b>gpr:</b> - General purpose register set, R0 - R31. Data size defaults to -q.</p> <p><b>fpr:</b> - Floating point register set, R0 - R31. Data size defaults to -q.</p> <p><b>pt:</b> - PAL temporary register set, R0 - R31. Data size defaults to -q.</p> <p>&lt;<b>address</b>&gt; - An address that specifies first location to examine within the current device. The address may be any valid hex offset in the devices address space.</p> <p>The following forms are valid symbolic addresses:</p> <p><b>gpr-name:</b> R0-R31, AI, RA, PV, FP, SP and RZ.</p> <p><b>fpr-name:</b> F0-F31</p> <p><b>pt-name:</b> PT1- PT31</p> <p><b>PC</b> - Program Counter</p> <p>"+" - Location immediately following the last address referenced in a deposit or examine.</p> <p>"-" - Location immediately preceding the last address referenced in a deposit or examine.</p> <p>"*" - Location last referenced in a deposit or examine.</p> <p>"@" - Location last addressed by the last location referenced in a deposit or examine.</p>

Command	Description
<b>exer</b> <b>[-sb&lt;start_block&gt;]</b> <b>[-eb&lt;end_block&gt;]</b> <b>[-p&lt;pass_count&gt;]</b> <b>[-l&lt;blocks&gt;]</b> <b>[-bs&lt;block_size&gt;]</b> <b>[-bc&lt;block_per_io&gt;]</b> <b>[-d1&lt;buf1_string&gt;]</b> <b>[-d2&lt;buf2_string&gt;]</b> <b>[-a&lt;action_string&gt;]</b> <b>[-sec&lt;seconds&gt;]</b> <b>[-m][-v][-delay&lt;milliseconds&gt;]</b> <b>&lt;device_name&gt;...</b>	<p>Exercise one or more devices by performing specified read, write, and compare operations.</p> <p>The exer command uses two buffers, buffer1 and buffer2, to carry out the operations.</p> <p><b>-sb&lt;start_block&gt;</b> - Specifies the starting block number (hex) within a filestream. Default is 0.</p> <p><b>-eb&lt;end_block&gt;</b> - Specifies the ending block number (hex) within a filestream. Default is 0.</p> <p><b>-p&lt;pass_count&gt;</b> - Specifies the number of passes to run the exercizer. If 0, then run forever or until ^C. Default is 1.</p> <p><b>-l&lt;blocks&gt;</b> - Specifies the number of blocks to exercise. -l has precedence over -eb. If only reading then specifying neither -l nor -eb defaults to read till eof. If writing and neither -l or -eb are specified then exer will write for the size of the device. Default is 1.</p> <p><b>-bs&lt;block_size&gt;</b> - Specifies the block size (hex) in bytes. Default is 200.</p> <p><b>-bc&lt;block_per_io&gt;</b> - Specifies the number of blocks per I/O. On devices without length (tape) use the specified packet size or default to 2048. The maximum block size allowed with variable length block reads is 2048 bytes. Default is 1.</p> <p><b>-d1&lt;buf1_string&gt;</b> - String argument for evaluation to generate buffer1 data pattern from. Buffer1 is initialized only once and that is before any I/O occurs. Default is all bytes set to 5A's.</p> <p><b>-d2&lt;buf2_string&gt;</b> - String argument for evaluation to generate buffer2 data pattern from. Buffer2 is initialized only once and that is before any I/O occurs. Default is all bytes set to 5A's.</p> <p><b>-a&lt;action_string&gt;</b> - Specifies an exercizer 'action' string, which determines the sequence of reads, writes, and compares to various buffers. The default string is '?r'. The action string characters are:</p> <ul style="list-style-type: none"> <li>• <b>r</b> - Read into buffer1</li> <li>• <b>w</b> - Write from buffer1</li> <li>• <b>R</b> - Read into buffer2</li> <li>• <b>W</b> - Write from buffer2</li> <li>• <b>n</b> - Write without lock from buffer1</li> <li>• <b>N</b> - Write without lock from buffer2</li> <li>• <b>c</b> - Compare buffer1 with buffer2</li> <li>• <b>-</b> - Seek to file offset prior to last read or write</li> <li>• <b>?</b> - Seek to random block offset within the specified range of blocks.</li> <li>• <b>s</b> - Sleep for a number of milliseconds specified by the delay qualifier.</li> <li>• <b>z</b> - Zero buffer1</li> <li>• <b>Z</b> - Zero buffer2</li> <li>• <b>b</b> - Add constant to buffer1</li> <li>• <b>B</b> - Add constant to buffer2</li> </ul> <p>(Continued on next page)</p>

Command	Description
<b>exer</b> (continued)	<p><b>-sec&lt;seconds&gt;</b> - Specifies to terminate the exercise after the number of seconds have elapsed.</p> <p><b>-m</b> - Specifies metrics mode. At the end of the exercizer a total throughput line is displayed.</p> <p><b>-v</b> - Specifies Verbose mode, data read is also written to Standard output.</p> <p><b>-delay&lt;milliseconds&gt;</b> - Specifies the number of milliseconds to delay when 's' appears as a character in the action string.</p> <p><b>&lt;device_name&gt;</b> - Specifies the name(s) of the device(s) or filestream(s) to be exercised.</p>
<b>exit</b> <b>&lt;exit_value&gt;</b>	<p>Exit the current shell.</p> <p><b>&lt;exit_value&gt;</b> - Specifies the exit code to be returned by the shell.</p>
<b>false</b>	Return failure status, always.
<b>find_field</b> <b>&lt;field_number&gt;</b> <b>[-d&lt;delimiter&gt;]</b>	Extract a field from each input line and write it.
<b>free</b>	Return an allocated block of memory to the heap.
<b>grep</b> <b>[-{c i n v}]</b> <b>[-f&lt;file&gt;]</b> <b>[&lt;expression&gt;]</b> <b>[&lt;file&gt;...]</b>	<p>Globally search for regular expressions and print matches.</p> <p><b>-c</b> - Print only the number of lines matched.</p> <p><b>-i</b> - Ignore case in the search. By default grep is case sensitive.</p> <p><b>-n</b> - Print the line numbers of the matching lines.</p> <p><b>-v</b> - Print all lines that don't contain the expression.</p> <p><b>-f&lt;file&gt;</b> - Specifies to take regular expressions from a file, instead of command.</p> <p><b>&lt;expression&gt;</b> - Specifies the target regular expression. If any regular expression metacharacters are present, the expression should be enclosed with quotes to avoid interpretation by the shell.</p> <p><b>&lt;file&gt;...</b> - Specifies the file(s) to be searched. If none are present, then stdin is searched.</p>
<b>halt</b> <b>[-drivers[&lt;device_prefix&gt;]]</b> <b>[&lt;processor_num&gt;]</b>	<p>Halt the specified processor or device.</p> <p><b>-drivers</b> - Specifies the name of the device or device class to stop. If no device prefix is specified, then all drivers are stopped.</p> <p><b>&lt;processor_num&gt;</b> - Specifies the number of the processor to stop.</p>
<b>hd</b> <b>[-{byte word long quad}]</b> <b>[-{sb eb}]</b> <b>&lt;file&gt;...</b>	<p>Dump the contents of a file in hexadecimal and ASCII.</p> <p><b>-byte, -word, -long, -quad</b> - Print out data by resp. byte, word, longword or quadword.</p> <p><b>-sb</b> - Start block.</p> <p><b>-eb</b> - End block.</p> <p><b>&lt;file&gt;</b> - Specifies the file or files to be displayed.</p>
<b>he[lp]</b> <b>[&lt;command&gt;]</b>	Provides information on console commands.
<b>i[nitialize]</b> <b>[-driver &lt;device_or_phase&gt;]</b>	Initialize the system.

Command	Description
<b>isp1020_edit</b> [-sd] [-offset] [-id] [-allids] [-value] [-bit] [-set] [-clear] [<isp1020_controller_name>]	Edit ISP1020 NVRAM parameters.  <TBD>
<b>kill</b> [<pid>...]	Stop and delete a process. <pid>... - Specifies the PID(s) as shown by the 'ps' command of the process(es) to be killed.
<b>kill_diags</b>	Kill the processes running specific diagnostics. These are: memtest, exer and nettest.
<b>line</b>	Read a line from standard input and write it to standard output.
<b>login</b>	The login command is part of the secure features for the console. The command will prompt the user for a password, which will be compared to the current password stored in NVRAM. If the user enters the current password, then the global variable "secure" will be set to 0 and the console will be unsecure; that is, the user will have access to all console commands. If there is no valid password stored in NVRAM, then the user will be notified that the console has no valid password.
<b>ls</b> [-l] [<file>...]	List files or inodes in file system. -l - Specifies to list in long format. <file> - Specifies the file(s) or inode(s) to be listed.
<b>man</b> [<command>]	Provides information on console commands.
<b>mc_cable</b>	A diagnostic to check MC cable connections. The program will report all established connections to all MC adapters. It will then report any changes in status on any of the connections. If the MC module is present and the cable is either not present or not good, the command will not output anything. Either way the user is required to exit this routine by typing ^C.
<b>mc_diag</b> [-d]	A diagnostic for testing the PCI MC hardware. The command performs two tests. The first test performs a sequential PCT read/write test. The second test enables up to 1MB of MC pages which are loopback- tested using varying data patterns. The command simply displays a "passed" or "failed device" with a MC module present. With no MC module present, nothing is displayed and console returns to the prompt. -d - Dump data flag; test is not run and the register contents are displayed for LCSR, MCERR, MCPOR, PRBAR and CFG04.

Command	Description
<b>memexer</b> [number]	<p>The <b>memexer</b> command tests memory by running a specified number of memory exercisers. The exercisers are run in the background and nothing is displayed unless an error occurs. Each exerciser tests all available memory in twice the backup cache size blocks for each pass.</p> <p>To terminate the memory tests, use the <b>kill</b> command to terminate an individual diagnostic or the <b>kill_diags</b> command to terminate all diagnostics. Use the <b>show_status</b> display to determine the process ID when terminating an individual diagnostic test.</p> <p><b>number</b> - The number of exercisers to start. The default is 1. The number of exercisers, as well as the length of time for testing, depends on the context of the testing. Generally, running three to five exercisers for 15 minutes to 1 hour is sufficient for troubleshooting most memory problems.</p>
<b>memtest</b> [-sa<start_address>] [-ea<end_address>] [-l<length>] [-bs<block_size>] [-i<address_inc>] [-p<pass_count>] [-d<data_pattern>] [-rs<random_seed>] [-ba<block_address>] [-t<test_mask>] [-se<soft_error_threshold>] [-g<group_name>] [-rb] [-f] [-m] [-z] [-h] [-mb]	<p>Exercise/test a section of memory.</p> <p><b>-sa</b> - Specifies the start address. Default is first free space in memory zone.</p> <p><b>-ea</b> - Specifies the end address. Default is start address plu length size.</p> <p><b>-l</b> - Length of section to test in bytes. Default is the zone size with the -rb option and the block size for all other tests. -l has precedence over -ea.</p> <p><b>-bs</b> - Block (packet) size in bytes (hex). Default is 8192 bytes. This is only used for the random block test. For all other tests the block size equals the length.</p> <p><b>-p</b> - Passcount. If 0, then run forever or until ^C. Default is 1.</p> <p><b>-t</b> - Test mask. Default runs all tests in selected group.</p> <p><b>-g</b> - Group name.</p> <p><b>-se</b> - Soft error threshold.</p> <p><b>-f</b> - Fast. If -f is included in the command line the data compare is omitted. This will only detect ECC/EDC errors.</p> <p><b>-m</b> - Timer, will printout the runtime of the pass. Default is OFF.</p> <p><b>-z</b> - Will test the specified memory address without allocation. This bypasses all checking but will allow testing in addresses outside of the main memory heap. It will also allow unalligned input. <b>WARNING: this flag can trash anything and everything!!!</b></p> <p><b>-d</b> - Used only for march test (2), it will use this pattern as a test pattern. Default is 5's.</p> <p><b>-h</b> - Allocate test memory from the firmware heap.</p> <p><b>-rs</b> - Used for random test (3), it will use this data as the random seed in order to vary random patterns generated. Default is 0.</p> <p><b>-rb</b> - Randomly allocate and test all of the specified memory address range. Allocations are done of block_size.</p> <p><b>-mb</b> - Memory barrier flag. This flag is only used in the Alpha -f graycode test. When set a memory barrier will be done after every memory access. This will guarantee serial access to memory.</p> <p><b>-ba</b> - Used only for block test (4). It will use the data stored at this address to write each block.</p>

Command	Description
<b>more</b> [-<pagesize>] [<file>...]	Display output one screen at a time. -<pagesize> - Specifies the number of lines to print before waiting for a prompt. Default is 23. <file>... - Specifies the file to be displayed. This argument is optional. If no file is specified, input is from stdin.
<b>net</b> [-s] [-sa] [-rsa] [-env] [-ri] [-ic] [-l0] [-l1] [-rb] [-csr] [-els] [-kls] [-start] [-stop] [-cm<mode_string>] [-da<node_address>] [-l<file_name>] [-lw<wait_in_secs>] [-sv<mop_version>] <port_name>	Using the specified port, perform some maintenance operations. If no port is specified, the default port is used. The net command performs basic MOP operations, such as loopback, request IDs and remote file loads. The net command also provides the means to observe the status of a network port. Specifically, the 'net -s' will display the current status of a port, including the contents of the MOP counters. This is useful for monitoring port activities and trying to isolate network failures. -s - Display port status info including MOP counters. -sa - Display the port's Ethernet station address (enet format). -rsa - Display TMS380 station address in "bit reversed" format (fddi format). -env - Display file2dev() device name drivers. -start - Start the port drivers. -stop - Stop the port drivers. -ic - Initialize (clear) the MOP counters. -id - Send a MOP request ID to the specified node. Use -da to specify the destination address. -l0 - Send an Ethernet loopback to the specified node. Use -da to specify the destination address. -l1 - Do a MOP loopback requester. -rb - Send a MOP V4 boot message to remote boot a node. Use -da to specify the destination address. -csr - Displays values of the Ethernet port CSRs. -els - Enable the extended DVT loop service. -kls - Kill the extended DVT loop service. -cm <mode_string> - Change the mode of the port device. The mode string may be any one of the following abbreviations: <ul style="list-style-type: none"> <li>• <b>nm</b> = normal mode</li> <li>• <b>in</b> = internal loopback</li> <li>• <b>ex</b> = external loopback</li> <li>• <b>nf</b> = normal filter</li> <li>• <b>pr</b> = promiscious</li> <li>• <b>mc</b> = multicast</li> <li>• <b>ip</b> = internal loopback and promiscious</li> <li>• <b>tp</b> = twisted pair</li> <li>• <b>fd_tp</b> = full duplex, twisted pair</li> <li>• <b>aui</b> = AUI (or thinwire on DE435 card)</li> </ul>

(Continued on next page)

Command	Description
<b>net</b> (continued)	<p><b>-da&lt;node_address&gt;</b> - Specifies the destination address of a node to be used with -i0, -id or -rb options.</p> <p><b>-l&lt;file_name&gt;</b> - Attempt a MOP load of the file name.</p> <p><b>-lw&lt;wait_in_secs&gt;</b> - Wait the number of seconds specified for the loop messages from the -il option to return. If the messages don't return in the time period, an error message is generated.</p> <p><b>-sv&lt;mop_version&gt;</b> - Set the preferred MOP version number for operations. Legitimate values are 3 or 4.</p>
<b>nettest</b> <b>[-f&lt;file&gt;]</b> <b>[-mode&lt;port_mode&gt;]</b> <b>[-p&lt;pass_count&gt;]</b> <b>[-sv&lt;mop_version&gt;]</b> <b>[-to&lt;loop_time&gt;]</b> <b>[-w&lt;wait_time&gt;]</b> <b>[&lt;port&gt;]</b>	<p>Generic network exercizer. It can test the ez ports in internal loopback, external loopback or live network loopback mode. Nettest contains the basic options to allow the user to run MOP loopback tests. It is assumed that nettest will be included in a script for most applications. Many variables can be set to customize nettest. These may be set from the console before nettest is started.</p> <p><b>-f&lt;file&gt;</b> - Specifies the file containing the list of network station addresses to loop messages to. The default file name is lp_nodes_eza0 for port eza0. The default file name is lp_nodes_ezb0 for port ezb0. The files by default have their own station address.</p> <p><b>-mode&lt;port_mode&gt;</b> - Specifies the mode to set the port adapter (TGEC). The default is 'ex', external loopback.</p> <ul style="list-style-type: none"> <li>• <b>nm</b> = normal mode</li> <li>• <b>in</b> = internal loopback</li> <li>• <b>ex</b> = external loopback</li> <li>• <b>nf</b> = normal filter</li> <li>• <b>pr</b> = promiscious</li> <li>• <b>mc</b> = multicast</li> <li>• <b>ip</b> = internal loopback and promiscious</li> <li>• <b>fc</b> = force collisions</li> <li>• <b>nofc</b> = don't force collisions</li> <li>• <b>df</b> = default, use environment variable values</li> <li>• <b>nc</b> = do not change mode</li> </ul> <p><b>-p&lt;pass_count&gt;</b> - Specifies the number of times to run the test. If 0, then run forever. The default is 1. Each pass will send the number of loop messages as set by the EV, eza*_loop_count.</p> <p><b>-sv&lt;mop_version&gt;</b> - Specifies which MOP version protocol to use. If 3, then MOP V3 (DECNET Phase IV) packet format is used. If 4, then MOP V4 (DECNET Phase V IEEE 802.3) format is used.</p> <p><b>-to&lt;loop_time&gt;</b> - Specifies the time in seconds allowed for the loop messages to be returned. The default is 2 seconds.</p> <p>(Continued on next page)</p>



Command	Description
<b>nettest</b> (continued)	<p><b>-w&lt;wait_time&gt;</b> - Specifies the time in seconds to wait between passes of the test. The default is 0 (no delay). The network device can be very CPU intensive. This option will allow other processes to run.</p> <p><i>ENVIRONMENT VARIABLES:</i></p> <p><b>eza*_loop_count</b> - Specifies the number (hex) of loop requests to send. The default is 0x3E8 loop packets.</p> <p><b>eza*_loop_inc</b> - Specifies the number (hex) of bytes the message size is increased on successive messages. The default is 0xA bytes.</p> <p><b>eza*_loop_patt</b> - Specifies the data pattern (hex) for the loop messages. The following are legitimate values:</p> <p><b>0xffffffff</b> = all patterns</p> <p><b>0</b> = all zero's</p> <p><b>1</b> = all one's</p> <p><b>2</b> = all fives</p> <p><b>3</b> = all A's</p> <p><b>4</b> = incrementing</p> <p><b>5</b> = decrementing</p> <p><b>loop_size</b> - Specifies the size (hex) of the the loop message. The default packet size is 0x2E.</p>
<b>ps</b>	Print process status and statistics.
<b>rm &lt;file&gt;...</b>	<p>Remove files from the file system.</p> <p><b>&lt;file&gt;...</b> - Specifies the file(s) to be deleted.</p>
<b>runecu</b> [-n] <args> ...	Invokes the EISA Configuration Utility. (check)
<b>sa</b> <process_id> <affinity_mask>	<p>Set process affinity mask. The process may execute on any processors specified by the mask.</p> <p><b>&lt;process_id&gt;</b> - Specifies the PID of the process to be modified.</p> <p><b>&lt;affinity_mask&gt;</b> - Specifies the new affinity mask which indicates which processors the process may run on. Bits 0 and 1 of the mask correspond to processors 0 and 1, respectively.</p>
<b>semaphore</b>	Show system semaphores.
<b>se[t]</b> <envar> <value> [-default] [-integer] [-string]	<p>Modifies an environment variable.</p> <p><b>-default</b> - Restores an environmental variable to its default value.</p> <p><b>-integer</b> - Creates an EV as an integer.</p> <p><b>-string</b> - Creates an EV as a string.</p>
<b>se[t] h[ost] &lt;device_adapter&gt;</b> or <b>se[t] h[ost] &lt;-dup&gt; &lt;-bus b&gt; node</b> [task]	<p>Connects to another console or service.</p> <p><b>-dup</b> - Specifies connection to an MSCP DUP server. The DUP service may be used to examine and modify parameters of a DSSI device.</p> <p><b>-task&lt;task_name&gt;</b> - Specifies which DUP service utility to invoke.</p>

Command	Description
<b>se[t] pass[word]</b>	<p>The set password command sets the console password for the first time or changes an existing password. It is necessary to set the password only if the system is going to operate in secure mode.</p> <p>If a password has not been set and the set password command is issued, the console prompts for a password and verification.</p> <p>If a password has been set and the set password command is issued, the console prompts for the new password and verification, then prompts for the old password. The password is unchanged if the validation password entered does not match the existing password in the NVRAM.</p> <p>The password length must be between 15 and 30 alphanumeric characters. Any characters entered after the 30th character are not stored.</p>
<b>se[t] secure</b>	<p>The set secure command enables secure mode without requiring a restart of the console. If the password has been set, the console will be secured and only a small subset of commands can be performed. If a password has not been set, you are prompted to do so.</p> <p>When the console is in secure mode, the only commands recognized are <b>boot</b>, <b>login</b>, <b>continue</b>, and <b>start</b>.</p> <p>The boot command does not accept command line parameters in secure mode. The console boots using the environment variables stored in NVRAM (boot_file, bootdef_dev, boot_flags). After a successful boot, the console is secured if there is a valid password.</p> <p>The start and continue commands are valid on a secure console. After either command is executed, the console is secured if there is a valid password. This prevents an intruder from accessing the system.</p>
<b>shell</b> [-{v x}] [<arg>...]	<p>Create a new shell process. Each shell process implements most of the Bourne shell.</p> <p>-v - Specifies to print lines as they are read from the input file.</p> <p>-x - Specifies to show commands just before they are executed. Internal only.</p>
<b>show cluster</b>	Displays open virtual circuits.
<b>sh[ow] c[onfiguration]</b>	Displays the last configuration seen at system initialization.
<b>sh[ow] dev[ice]</b> [<dev_name>]	<p>Displays device information for any disk or tape adapter or group of adapters.</p> <p>&lt;dev_name&gt; - any adapter name; wild-carding is allowed. If blank, information is given for all devices in the system.</p>
<b>sh[ow] &lt;envar&gt;</b> <i>or</i> <b>show *</b>	<p>Displays the current state of the specified environment variable.</p> <p>&lt;envar&gt; - an environment variable name.</p>
<b>show hwrpb</b>	Displays the Alpha HWPRB.
<b>show iobq</b>	Displays IO block queue.

Command	Description
<b>show map</b>	Displays system virtual memory map.
<b>sh[ow] m[emory]</b>	Displays memory module information.
<b>show_status</b>	Shows the status of any currently executing diagnostics. It reports one line of information on each running diagnostic. The info includes error counts, passes completed and bytes read/written to the device being tested. The source of each line of info is IOB, IO block.
<b>sleep</b> [-v] <time_in_secs>	Suspend execution for a time. -v - Specifies that the value supplied is in milliseconds. By default this is 1000 (1 second). <time_in_secs> - Specifies the number of seconds to sleep. The default is 1 second.
<b>sp</b> <process_id> <new_priority>	Set process priority. Changing the priority will change the behaviour of the process and the rest of the system. <process_id> - Specifies the PID of the process to be modified. <new_priority> - Specifies the new priority of the process. Priority values range from 0 (lowest) to 7 (highest).
<b>s[tart]</b> [-drivers [<device_prefix>]] [<address>]	Begins execution of an instruction at the address specified. Does not initialize the system.
<b>sto[p]</b> [-drivers [<device_prefix>]] <processor_number>	Halts a specified processor. Does not control the running of diagnostics and does not apply to adapters or memories. <processor_number> - the logical CPU number (displayed by the show cpu command).
<b>test</b> [-lb]	The tests are run in the following order: (1) Memory tests (one pass). (2) Read-only tests: DK* disks, DR* disks, DU* disks, MK* tapes, DV* floppy. (3) Console loopback tests if <b>-lb</b> argument is specified: COM2 serial port and parallel port. (4) VGA/TGA console tests. These tests are run only if the <b>console</b> environment variable is set to <b>serial</b> . The VGA/TGA console test displays rows of the word "digital". (5) Network external loopback tests for E*A0. This test requires that the Ethernet port be terminated or connected to a live network or the test will fail. <b>-lb</b> - The loopback option includes console loopback tests for the COM2 serial port and the parallel port during the test sequence.
<b>true</b>	Return success status, always.

Command	Description
<b>update</b> [-{c p r s f e}] [-{arc,g,modify,b}<src_address>] [<device_list>]	<p>Manufacturing utility for updating flash roms on the system. Used only for Manufacturing and console development purposes.</p> <p><i>The normal update mechanism is to use LFU.</i></p> <p>&lt;device_list&gt; - List of processor modules to update defaults to currently selected CPU.</p> <p><b>-arc src_address</b> - Specifies the address of the AlphaBIOS image to be updated.</p> <p><b>-e</b> - Specifies to update the EEPROM section from one CPU to another.</p> <p><b>-f</b> - Specifies to update the entire flash code section.</p> <p><b>-g src_address</b> - Specifies the address of the console GROM image to be updated. If not specified then it will use the default CPU as input.</p> <p><b>-modify src_address</b> - specifies the address of the custom console GROM image to be updated.</p> <p><b>-c</b> - Updates only console section of flash.</p> <p><b>-p</b> - Updates only PAL section of flash.</p> <p><b>-r</b> - Updates only the flashROM recover program section of flash.</p> <p><b>-s</b> - Updates only SROM section of flash.</p>
<b>wc</b> [-{l w c}] [<file>...]	<p>Count bytes, words and lines and report totals.</p> <p><b>-l</b> - Specifies to count lines and display the number of lines.</p> <p><b>-w</b> - Specifies to count words and display the number of words.</p> <p><b>-c</b> - Specifies to count bytes and display the number of characters.</p>
<b>xcmd</b>	Load a file via serial port 1.

## 9.2.2 Control Characters and Special Keys

Control Character or Special Key	Function
<CR>	Terminates command line input. No action is taken on a command until after it is terminated by a <CR>.
\ <CR>	Line continuation. Allows continuation across line in scripts and from the terminal. The \ must be the last character on the line to be continued, otherwise it is treated as the literal character specifier.
<Backspace>	Deletes the character preceding the cursor.
^A	Toggle insert/overstrike mode for command line editing. Insert mode is default.
^B or Up/Down arrow	Recall previous commands. ^B and Up arrow scroll back, the Down arrow scrolls forward in the history buffer.
^C	Terminate the foreground process and echoes ^C. Control is returned to the shell which invoked it. On the command line, ^C behaves the same as ^U.
Left/Right arrow	Moves cursor Left/Right one position.
^E	Move the cursor to the end of a line.
^H	Move the cursor to the beginning of a line.
^J	Deletes the preceding word.
^O	Suppress output to the console terminal until the next ^O is entered. Output is reenabled if the console prints an error message or if it prompts for a command from the terminal.
^Q	Resume output to the console terminal suspended by ^S.
^S	Suspend output to the console terminal until ^Q is typed.
^T	Display the current console process status on the console terminal. This is similar to using the <b>ps</b> command.
^U	Delete the entire line and echo "^U".
^R	Redisplay the current command line.
^P	Halt the processor and enter console I/O mode, if the environment variable <b>controlp</b> is set to <b>on</b> and the operating system is running. Implementation of ^P is both platform and OS dependent.
^X	Spawn a new foreground shell process. If a foreground process is running, ^X can be used to spawn a new foreground process to get to the console prompt. The original shell process and command are not terminated, but are running in the background. However, it is possible to execute other commands at the new shell, for instance, killing the original shell or command. To return to the state of the previous shell process, enter the <b>exit</b> command.
^Z	Signifies "end of file" for input that is multi-line. ^Z will terminate line continuation.

## 9.2.3 Console Shell Operators

Operator	Name	Form	Description
	Pipe	cmd1   cmd2	Pipe output of the first command to input of second command.
>	Output creation	> destination	Write output to destination.
>>	Output append	>> destination	Append output to destination.
<	Input redirection	< source	Read input from source.
<b>\$n</b>	Shell parameter substitution		The value of the shell parameter "n" where n is 0..9 is substituted to the command line.
<b>\$string</b>	Environment parameter substitution		The string is treated as a legal environment variable and translated.
<b>'cmd'</b>	Command substitution		Treat the string as a command string, execute it, and substitute in the resulting output.
#	Line comment	# text	The text following the # is ignored. This is useful for embedding comments in command scripts or logs.
;	Sequence	cmd1 ; cmd2	Run first command to completion before running second command.
\	Literal character specifier		The character directly following the backslash is passed as is.
<b>'xxx'</b>	String with no substitution		The string is passed untouched.
<b>"string"</b>	String with substitution		The string is passed after wildcards and environmental variables are expanded.
\	Line continuation	cmd1 \ _> cmd2	Continue command on the next line. The command line prompt changes to "_>", until the command is completed.
( )	Grouping		Used to override precedence of pipe, sequence and background operators. Commands specified within the parenthesis are executed first within their own subprocess.
<b>&amp;</b>	Background	cmd &	Run command in background, don't wait for command to complete.
<b>&amp;p</b>	Affinity	cmd &pn	Run a command on processor "n". Sets the processor affinity mask for a process to have it run on the CPU defined by number "n".
<b>*,?,[...]</b>	Pattern specifiers		Characters used to form a regular expression for pattern matching. Where * matches on any character, character or none, ? matches on any single character, and [...] matches on any of the enclosed characters.

## 9.2.4 AS1000(A) - Environment Variables

An environment variable is a name and value association maintained by the console program. The value associated with an environment variable is an ASCII string (up to 127 characters) or an integer. Some environment variables are typically modified by the user to tailor the recovery behavior of the system on power-up and after system failures. Volatile environment variables are initialized by a system reset; others are nonvolatile across system failures.

Environment variables are created, modified, displayed, and deleted using the **create**, **set**, **show**, and **clear** commands. A default value is associated with any variable that is stored in the EEPROM area.

Note: Not all parameters listed below are necessarily known by the system.

Note: **Variable attributes:**

NV = non-volatile; the last value is preserved accross system initializations, cold bootstraps and long power outages.

W = warm non-volatile; the last value is preserved accross warm bootstraps and restarts.

RO = read only; the variable cannot be modified by system software or console commands.

Variable	Attribute	Function
<b>adv_diag</b>	NV	Not used any longer. See notes at the end of this chapter.
<b>auto_action</b>	NV,W	Specifies the action the system will take following an error halt. Values are: <b>restart</b> - Automatically restart. If restart fails, boot the operating system. <b>boot</b> - Automatically boot the operating system. <b>halt</b> (default) - Enter console mode.
<b>bootdef_dev</b>	NV	The default device or device list from which booting is attempted when no device name is specified by the boot command.
<b>boot_dev</b>	W	The device or device list from which booting is attempted. This variable may be a boot search list. The console derives the value from the <i>boot</i> command if a device or string is specified, otherwise from the <i>bootdef_dev</i> variable.
<b>booted_dev</b>	RO	The device from which booting actually occurred.
<b>boot_file</b>	NV,W	The default file name used for the primary bootstrap when no file name is specified by the boot command. Default value when the system is shipped is NULL..
<b>booted_file</b>	RO	The file name used for the primary bootstrap during the last boot. The value is NULL if <i>boot_file</i> is NULL and no bootstrap filename was specified by the <i>boot</i> command.

Variable	Attribute	Function
<b>boot_osflags</b>	NV,W	<p>Additional parameters to be passed to the system software during booting if none are specified by the boot command with the -flags qualifier.</p> <p>On the OpenVMS AXP operating system, these additional parameters are the root number and boot flags. Default when the system is shipped is NULL.</p> <p>The following parameters are used with the Digital UNIX operating system:</p> <p><b>a</b> Autoboot. Boots /vmunix from <i>booted_dev</i>, goes to multi-user mode. Use this for a system that should come up automatically after a power failure.</p> <p><b>s</b> Stop in single_user mode. Boots /vmunix to single_user mode and stops at the # (root) prompt.</p> <p><b>i</b> Interactive boot. Request the name of the image to boot from the specified boot device. Other flags, such as <b>-kdebug</b> (to enable the kernel debugger) may be entered using this option.</p> <p><b>D</b> Full dump, implies "s" as well. By default, if Digital UNIX panics, it completes a partial memory dump. Specifying "D" forces a full dump at system panic.</p> <p>Common settings are <b>a</b>, autoboot, and <b>Da</b>, autoboot, but create full dump when the system panics.</p>
<b>booted_osflags</b>	RO	Additional parameters, if any, specified by the last boot command that are to be interpreted by the system software. Default when the system is shipped is NULL.
<b>boot_reset</b>	NV,W	<p>Indicates whether a full reset is performed in response to an error halt or boot command.</p> <p><b>ON</b> Cold boot, a full reset is performed.</p> <p><b>OFF</b> Warm boot, no full reset is performed. (Default)</p>
<b>bus_probe_algorithm</b>	NV	Defines which algorithm to use for probing the PCI bus, and naming detected devices. Must be set to <b>NEW</b> when running OpenVMS V6.2 or later, or Digital UNIX V3.0b or later. Supported values are: <b>NEW</b> (default) and <b>OLD</b> .



Variable	Attribute	Function
<b>char_set</b>	NV,W	Indicates the character set encoding currently selected to be used for the console terminal. <b>0</b> = ISO-LATIN-1 character encoding (default).
com1_baud com2_baud	NV	Specifies the baud set by com1 or com2. The default speed is <b>9600</b> . Supported speeds are: 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, 19200, 38400, 57600.
com1_flow com2_flow	NV	Specifies how the serial flow control is set. <b>NONE</b> = flow control is not set <b>SOFTWARE</b> = flow control is done by software <b>HARDWARE</b> = flow control is done by hardware <b>BOTH</b> = flow control is done by both hardware and software
com1_modem com2_modem	NV	These variables are used to indicate the presence of a modem on the serial ports COM1 and COM2. <b>ON</b> = modem present <b>OFF</b> = no modem present (default)
<b>console</b>	NV	The type of terminal being used for the console. <b>SERIAL</b> = standard video terminal (default) <b>GRAPHICS</b> = graphics display  If the terminal is a graphics display, the system must have a PCI with a standard I/O module and a TGA graphics controller. If that hardware is not available, the variable remains set to serial.
<b>d_bell</b>	NV	Specifies whether or not to bell on error. <b>OFF</b> is default.
<b>d_cleanup</b>	NV	Specifies whether or not cleanup code is executed at the end of a diagnostic. <b>ON</b> is default.
<b>d_complete</b>	NV	Specifies whether or not to display the diagnostic completion message. <b>OFF</b> is default.
<b>d_eop</b>	NV	Specifies whether or not to display end-of-pass messages. <b>OFF</b> is default.
<b>d_group</b>	NV	Specifies the diagnostic group to be executed. <b>FIELD</b> (default) <b>MFG</b> other (32 characters)
<b>d_harderr</b>	NV	Determines action taken following a hard error. Values are <b>halt</b> (default) and <b>continue</b> . Applies only when using the test command.
<b>d_loghard</b>	NV	Specifies whether or not hard errors are logged to EEPROM. <b>ON</b> is default.
<b>d_logsoft</b>	NV	Specifies whether or not soft errors are logged to EEPROM. <b>OFF</b> is default.
<b>d_omit</b>	NV	<TBD>
<b>d_oper</b>	NV	Specifies whether or not an operator is present. <b>OFF</b> is default.
<b>d_passes</b>	NV	Specifies the number of passes to run a diagnostic module. <b>1</b> is default. <b>0</b> = run indefinitely.
<b>d_quick</b>	NV	Specifies whether or not abbreviated mode of tests should be run. <b>OFF</b> is default.
<b>d_report</b>	NV	Determines level of information provided by the diagnostic reports. Values are <b>summary</b> and <b>full</b> (default). Applies only when using the test command.
<b>d_runtime</b>	NV	<TBD>

Variable	Attribute	Function
<b>d_softerr</b>	NV	Determines action taken following a soft error. Values are <b>continue</b> (default) and <b>halt</b> . Applies only when using the test command.
<b>d_startup</b>	NV	Specifies whether or not to display the diagnostic startup message. <b>OFF</b> is default.
<b>d_status</b>	NV	Specifies whether or not diagnostic status reports should be enabled. <b>OFF</b> is default.
<b>d_trace</b>	NV	Specifies whether or not to display test trace messages. <b>OFF</b> is default.
<b>d_verbose</b>	NV	<TBD>
<b>dump_dev</b>	NV,W	Complete device specification of the device or device list to which the dump file is written if system crashes, if supported by the operating system.
<b>enable_audit</b>	NV,W	Indicates whether audit trail messages are to be generated during bootstrap. If set to <b>on</b> (default), enables the generation of audit trail messages. If set to <b>off</b> , audit trail messages are suppressed.
enable_servers	NV	Allows a diskless storage bus to respond as if it contains a DSSI disk drive (for use in DSSI loopback testing). <b>OFF</b> is default.
e**0_arp_tries	NV	Sets the number of transmissions that are attempted before the ARP protocol fails. Values less than 1 cause the protocol to fail immediately. Default is <b>3</b> , which translates in an average of 12 seconds before failing. Interfaces on busy networks may need higher values.
e**0_bootp_file	NV	Supplies the file name in the BOOTP request. The file name must be a valid file on the BOOTP server otherwise tftp will report an error. Tftp is the second stage of the BOOTP process to download to the client the file image. The BOOTP server will return a fully qualified file name for booting. This variable can be left empty.
e**0_bootp_server	NV	Supplies the server name in the BOOTP request. This can be set to the name of the server from which the machine is to be booted, or can be left empty.
e**0_bootp_tries	NV	Sets the number of BOOTP requests that are attempted before the BOOTP protocol fails. Values less than 1 cause the protocol to fail immediately. Default is <b>3</b> , which translates in an average of 12 seconds before failing. Interfaces on busy networks may need higher values.
e**0_def_ginnetaddr	NV	Supplies the IP address of the gateway in the BOOTP request when the interface's internal internet database is initialized from nvram (i.e. e**0_inet_init is set to " <b>nvram</b> ").
e**0_def_inetaddr	NV	Supplies the IP address of the client in the BOOTP request when the interface's internal internet database is initialized from nvram (i.e. e**0_inet_init is set to " <b>nvram</b> ").
e**0_def_inetfile	NV	Supplies the filename in the BOOTP request when the interface's internal internet database is initialized from nvram (i.e. e**0_inet_init is set to " <b>nvram</b> ").

Variable	Attribute	Function
e**0_def_ sinetaddr	NV	Supplies the IP address of the server in the BOOTP request when the interface's internal internet database is initialized from nvram (i.e. e**0_inet_init is set to " <b>nvram</b> ").
e**0_inet_init	NV	Determines whether the interface's internal internet database is initialized from nvram or from a network server (via the BOOTP protocol). Legal values are " <b>nvram</b> " and " <b>bootp</b> " (default).
e**0_loop_ count	NV	Specifies the number of times each message is looped.
e**0_loop_inc	NV	Specifies the amount the message size is increased from message to message.
e**0_loop_patt	NV	Specifies the type of data pattern to be used when doing loopback. Current patterns are accessed by the following: <b>0xffffffff</b> = All the patterns <b>0</b> = all zero's <b>1</b> = all one's <b>2</b> = all fives <b>3</b> = all A's <b>4</b> = incrementing <b>5</b> = decrementing
e**0_loop_size	NV	Specifies the size of the loop data to be used.
e**0_lp_msg_ node	NV	Specifies the number of messages originally sent to each node.
e**0_mode	NV	Specifies the value for the ethernet port mode when it is started. Allowed values are: <b>Auto-Sensing</b> <b>AUI</b> <b>Fast</b> <b>Twisted-Pair</b> <b>Full Duplex, Twisted Pair</b> <b>BNC</b> <b>FastFD (Full Duplex)</b> <b>Auto-Negotiate</b>
e**0_protocols	NV	Determines which network protocols are enabled for booting and other functions. Defined values are: <b>BOOTP</b> <b>MOP</b> <b>BOOTP,MOP</b> (a null value is equivalent)
e**0_tftp_tries	NV	Sets the number of transmissions that are attempted before the TFTP protocol fails. Values less than 1 cause the protocol to fail immediately. Default is <b>3</b> , which translates in an average of 12 seconds before failing. Interfaces on busy networks may need higher values.
kbd_hardware_ _type	NV	Specifies the video keyboard hardware type. <b>PCXAL</b> = PC style 101 key keyboard (default) <b>LK411</b> = Digital 108 key keyboard (VT terminal)

Variable	Attribute	Function																																								
language	NV,W	<p>The default language to display critical system messages. Default value is 36.</p> <table><tr><td>00</td><td>None (cryptic)</td><td>42</td><td>Italiano</td></tr><tr><td>30</td><td>Dansk</td><td>44</td><td>Nederlands</td></tr><tr><td>32</td><td>Deutsch (DLD, Osterreich)</td><td>46</td><td>Norsk</td></tr><tr><td>34</td><td>Deutsch (Schweiz)</td><td>48</td><td>Portugues</td></tr><tr><td>36</td><td>Englisch (American)</td><td>4A</td><td>Suomi</td></tr><tr><td>38</td><td>Englisch (British, Irish)</td><td>4C</td><td>Svenska</td></tr><tr><td>3A</td><td>Espanol</td><td>4E</td><td>Vlaams (Belgish-Nederlands)</td></tr><tr><td>3C</td><td>Francais</td><td></td><td></td></tr><tr><td>3E</td><td>Francais (Canadian)</td><td>50</td><td>Japanese (JIS)</td></tr><tr><td>40</td><td>Francais (Suisse Romande)</td><td>52</td><td>Japanese (ANSI)</td></tr></table>	00	None (cryptic)	42	Italiano	30	Dansk	44	Nederlands	32	Deutsch (DLD, Osterreich)	46	Norsk	34	Deutsch (Schweiz)	48	Portugues	36	Englisch (American)	4A	Suomi	38	Englisch (British, Irish)	4C	Svenska	3A	Espanol	4E	Vlaams (Belgish-Nederlands)	3C	Francais			3E	Francais (Canadian)	50	Japanese (JIS)	40	Francais (Suisse Romande)	52	Japanese (ANSI)
00	None (cryptic)	42	Italiano																																							
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3A	Espanol	4E	Vlaams (Belgish-Nederlands)																																							
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3E	Francais (Canadian)	50	Japanese (JIS)																																							
40	Francais (Suisse Romande)	52	Japanese (ANSI)																																							
language_name	NV	<TBD>																																								
license	NV,RO	<p>Specifies the type of software license in effect. System software can choose to ignore this variable. Console initialization fill this variable in with a value derived by an implementation-dependent mechanism. The storage of the license value in the implementation-dependent mechanism likewise varies among implementations.</p> <p><b>MU</b> - Multi-user system</p> <p><b>SU</b> - Single-user system</p>																																								
mopv3_boot	NV	Specifies whether to use MOP version 3 format messages first in the boot requests sequence instead of MOP version 4.																																								
os_type	NV	<p>Specifies the operating system that will be booted on the machine.</p> <p><b>NT</b>: on reset control is passed to ARC/AlphaBIOS</p> <p><b>OpenVMS</b></p> <p><b>UNIX</b></p>																																								
pal	RO	Specifies the versions of OpenVMS and Digital UNIX PALcode available in the firmware.																																								
pci_parity	NV	<p>Specifies the type of PCI parity error detection to be done.</p> <p><b>OFF</b> - specifies no PCI parity detection wanted.</p> <p><b>ON</b> - full PCI parity detection wanted.</p> <p><b>SNIFF</b> - PCI parity detection wanted, but disabled if specific PCI devices found.</p>																																								
pka0_disconnect	NV	<TBD>																																								
pka0_fast	NV	<p>Specifies the mode of the onboard SCSI adapter.</p> <p><b>0</b> - normal SCSI mode.</p> <p><b>1</b> - fast SCSI mode.</p>																																								
pka0_host_id	NV	Specifies the host ID of the SCSI adapter(s). Valid values are <b>0 to 7</b> , default is 7.																																								
pka0_soft_term	NV	Note: no internal termination available. This parameter has no function.																																								
scsi_poll	NV	<TBD>																																								
sys_serial_num	NV	The system serial number. Set in manufacturing.																																								
tga_sync_green	NV	<p>Used to synchronize monitors using the high-performance turbo graphics adapter card (PBXGA).</p> <p><b>00</b> = sets all graphics cards to synchronize on a separate vertical SYNC line, as required by some monitors. See the monitor documentation for all other information.</p>																																								

Variable	Attribute	Function
<b>tt_allow_login</b>	NV	Turned off at manufacturing during console loopback testing. Enables or disables login to the SRM console firmware on alternative console ports. The COM2 port is an example of an alternative port. <b>1</b> = (default), login enabled via alternative ports. <b>0</b> = allows console loopback tests to run, login disabled via alternative ports.
tta0_baud	NV	Sets the console terminal baud rate. Allowable values are <b>300, 600, 1200, 2400, 4800, and 9600</b> .
tta0_type	NV	Specifies the type of terminal device attached to the console port. Defined values are: <b>Video</b> <b>Hardcopy</b>
<b>tty_dev</b>	NV,W,RO	Specifies the current console terminal unit. Indicates which entry of the CTB table corresponds to the actual console terminal. The default value is "0" 30 (hex).
<b>version</b>	RO	Specifies the version of the console code in the firmware.

## 9.2.5 Differences between ARC and AlphaBIOS

### 9.2.5.1 Revamped User Interface

Many of the Microsoft Windows navigational and selection keystrokes are implemented in AlphaBIOS. Also, information and selections are grouped more logically.

### 9.2.5.2 Hard-Disk Setup

Using ARC firmware, initial hard-disk partitioning and formatting was accomplished using a utility called ARCINST.EXE. This utility is distributed on the Windows NT CD-ROM. This utility was run in a manner similar to how a maintenance program is run with AlphaBIOS; that is, from a command line. Under AlphaBIOS, hard-disk functionality is integrated into the menu-based interface.

*New functionality:*

- ◆ With one keystroke, express disk setup configures your first hard-disk with the recommended partition arrangement.
- ◆ AlphaBIOS uses the same path descriptions as Windows NT Disk Administrator, rather than the path names used in ARCINST. For example:  
ARC path name: **scsi(0)disk(0)rdisk(0)partition(1)**  
AlphaBIOS path name: **Disk 0, Partition 1**
- ◆ All partitions of all disks can be seen at the same time.
- ◆ Disk administration is integrated into AlphaBIOS rather than being a maintenance program.
- ◆ No menu hierarchy to navigate.
- ◆ Detailed display of disk and partition configuration.
- ◆ Windowed interface.

### 9.2.5.3 Changing CMOS and NVRAM Values

With ARC firmware, a number of settings stored in CMOS and NVRAM are set using several separate ARC firmware selections. With AlphaBIOS these settings are more logically arranged by being integrated into the CMOS Setup program.

The following table summarizes the differences between ARC and AlphaBIOS in this regard:

Functionality	ARC menu	AlphaBIOS menu
<i>Set date/time</i>	Set System Time	CMOS Setup
<i>SCSI Termination and PCI Parity checking</i>	Machine Specific Setup	CMOS Setup
<i>Floppy and Keyboard</i>	Set default configuration	CMOS Setup
<i>Default system partition</i>	Set environment variables	N/A (handled automatically by hard-disk setup)
<i>SCSI host ID</i>	Set default configuration	N/A
<i>Automatic OS startup</i>	Setup Autoboot	CMOS Setup
<i>Edit environment variables</i>	Edit environment variables	N/A (handled automatically by AlphaBIOS)
<i>Set monitor resolution</i>	Set default configuration	N/A

#### **9.2.5.4 Working with Operating Systems**

With ARC firmware, the group of values associated with a particular Windows NT installation are collectively known as a "*boot selection*". With AlphaBIOS, these values are known as "*operating system selection*".

With ARC firmware, working with boot selections is difficult because the various pieces of information necessary are located on separate screens displayed by using the *Manage Boot Selections* menu. In addition, the interface provides no way to easily see the alternatives available for a given item.

With AlphaBIOS, working with operating selections has been greatly simplified by virtue of the revamped user interface. All the functionality available under the ARC firmware has been integrated into a single *Operating System Selection Setup* screen.

Alternative choices for values, such as disk and partition numbers, are available with drop-down list boxes, and only valid values are displayed.

In addition, a new feature, copying operating system selections, makes creating new operating system selections even easier by making it possible to use an existing selection as a template for a new one.

#### **9.2.5.5 Running a Program from AlphaBIOS**

The procedure for running configuration programs remains essentially unchanged with AlphaBIOS. With ARC firmware, the menu selection to run a program was located on the *Boot menu*, whereas, with AlphaBIOS, you can select *Utilities* from the main *AlphaBIOS Setup* screen to run configuration programs.

Note that the selection name has changed from "*Run a program*" to "*Run a maintenance program*" under AlphaBIOS.

#### **9.2.5.6 Differences in System Configuration Display**

The system configuration display in ARC firmware provides general information about system setup. In contrast, the system configuration display in AlphaBIOS displays detailed information categorized by major subsystem. In addition, for many of the elements listed, you can select the element and obtain additional detailed information.

#### **9.2.5.7 Resetting to Factory Defaults**

With ARC firmware, the option to reset the system to factory defaults is located on the *Setup* screen. With AlphaBIOS, the equivalent function is performed by pressing **F7** in the *CMOS Setup* screen.

#### **9.2.5.8 Multilingual Support**

Support for multiple languages, which was recently added to ARC firmware, is not currently a feature of AlphaBIOS.

### 9.2.5.9 AlphaBIOS Option Key Mapping

AlphaBIOS Key	VTxxx Key
F1	Ctrl/A
F2	Ctrl/B
F3	Ctrl/C
F4	Ctrl/D
F5	Ctrl/E
F6	Ctrl/F
F7	Ctrl/P
F8	Ctrl/R
F9	Ctrl/T
F10	Ctrl/U
Insert	Ctrl/V
Delete	Ctrl/W
Backspace	Ctrl/H
Escape	Ctrl/[

## 9.2.6 How to Run a Program from CD under ARC

When you need to run a program from CD, for instance EEROMCFG from firmware CD, you have to use the following procedure and syntax:

1. Use ARC to check the HW configuration to find the path to CDROM
2. Select "Run a program"
3. Program to run: **scsi(0)cdrom(4)fdisk(0)\utility\eeromcfg**

Note that cdrom(4) is the most likely part to change.



## 9.2.7 SRM naming Convention

dka0.0.0.1.0

**dk**            **Driver ID:** Two letter port or class driver designator  
PK = SCSI port, DK = SCSI disk, MK = SCSI tape, PU = DSSI port,  
DU = DSSI disk, MU = DSSI tape, ER = Ethernet port (LANCE chip),  
EW = Ethernet port (TULIP chip), DV = Floppy Controller  
DR = RAID set device

**a**            **Controller ID:** One letter controller designator (a,b,c,...)

**0**            **Device Unit #:** Devices unique system unit number, SCSI unit numbers are  
forced to 100 x Node ID (0, 100, 200...)

**0**            **Bus node #:** Devices bus ID (i.e. SCSI node ID)

**0**            **Channel #:** Used for multi-channel devices (0 = PCI\_0 (32-bit PCI\_), 1 = EISA,  
2 = PCI\_1)

**1**            **Slot #:** 0 = Ethernet adapter, 1 = SCSI controller on I/O backplane, 2 = EISA to  
PCI bridge, 3-5 = reserved, 6-8 correspond to PCI card cage slots  
(PC10,PC11, PC12)  
bus 1 (EISA devices) are reported as 1000, 1001 and 1002  
bus 2 (PCI devices) are reported as 2000, 2001, 2002 and so on

**0**            **Bus #:** 0 = internal PCI bus

## 9.2.8 Boot Flags - Description

Boot flags contain information that is read and used by the operating system to determine some aspects of a system bootstrap. Under normal circumstances, the default boot flag settings will suit your environment.

To change the boot flags for the current boot only, you can pass boot flags to the operating system on the boot command line with the -flags option.

The interpretation of the boot flags is operating system dependent.

- ◆ The DEC OSF/1 operating system takes only one boot flag argument, the boot flag.
- ◆ The OpenVMS operating system takes two boot flag arguments, root number and boot flags. If you specify only one argument, the argument designates the boot flag.

## 9.2.9 Boot Flags (Digital UNIX)

Possible boot flag settings and their meanings for DEC OSF/1 systems are:

Flag Setting	Meaning
<b>a</b>	Load operating system software from the specified boot device (autoboot). Boot to multi-user mode.
<b>i</b>	Prompt for the name of a file to load and other options (boot interactively). Boot to single user mode.
<b>s</b>	Stop in single-user mode. Boots /vmunix to single-user mode and stops at the # (root) prompt.
<b>D</b>	Full dump, implies "s" as well. By default, if DEC OSF/1 crashes, it completes a partial memory dump. Specifying "D" forces a full dump at system crash.

## 9.2.10 Root Number Settings (OpenVMS)

The root number is the directory number on the system disk on which OpenVMS files are located. For instance:

File Location	Corresponding Root Number
[SYS0.SYSEXEXE]	0 (default)
[SYS1.SYSEXEXE]	1
[SYS2.SYSEXEXE]	2
[SYS3.SYSEXEXE]	3

## 9.2.11 Boot Flags (OpenVMS)

Possible boot flags settings and their meanings for OpenVMS systems are:

Flag Setting	Bit Number	Meaning
1	0	Bootstrap conversationally (enables you to modify SYSGEN parameters in SYSBOOT).
2	1	Map XDELTA to running system.
4	2	Stop at initial system breakpoint.
8	3	Perform diagnostic breakpoints.
10	4	Stop at the bootstrap breakpoints.
20	5	Omit header from secondary bootstrap image.
80	7	Prompt for the name of the secondary bootstrap file.
100	8	Halt before secondary bootstrap.
10000	16	Display debug messages during booting.
20000	17	Display user messages during booting.

Note: Using **logical ORing**, you can identify multiple boot flags.

## 9.2.12 Alternative boots

>>>boot -fi genvmunix	Boot from a file
>>>boot -protocols mop -fi loadtest.sys ewa0	Boot from a file via the network

### 9.2.13 Listing ARC Firmware Boot Device Names

Step	Action	Result
1	If necessary, access the <b>Supplementary menu</b> .	The system displays the Supplementary menu.
2	Choose the <b>List available boot devices...</b> menu item and press Enter.	The system displays the Available boot devices display.

### 9.2.14 ARC Firmware Boot Device Names

Note: The available hardware devices display does not list tape drives or network devices.

Name	Description
multi(0)key(0)keyboard(0) multi(0)serial(0) multi(0)serial(1)	The multi() devices are located on the system module. These devices include the keyboard port and the serial line ports.
eisa(0)video(0)monitor(0) eisa(0)disk(0)fdisk(0)	The eisa() devices are provided by devices on the EISA bus. These devices include the monitor and the diskette drive.
scsi(0)disk(0)rdisk(0) scsi(0)cdrom(5)fdisk(0)	The scsi() devices are SCSI disk or CD-ROM devices. These examples represent installed SCSI devices. The disk drives are set to SCSI ID 0 and the CD-ROM drive is set to SCSI ID 5. The devices have logical unit numbers of 0.

## 9.2.15 Set Default Environment Variables (ARC)

**Caution:** Do not edit or delete the default firmware ARC environment variables. Editing the values of the default ARC firmware environment variables could result in corrupted data, or make the system inoperable. To modify the values of the environment variables, use the menu options on the Setup the system menu.

Variable	Description
A:	The default floppy drive. The default value is eisa()disk()fdisk().
AUTOLOAD	The default startup action, either YES (boot) or NO or undefined (remain in ARC firmware).
CONSOLEIN	The console input device. The default value is multi()key()keyboard()console().
CONSOLEOUT	The console output device. The default value is eisa()video()monitor()console().
COUNTDOWN	The default time limit in seconds before the system boots automatically when AUTOLOAD is set to yes. The default value is 10.
DISABLEPCIPARITY CHECKING	Disables parity checking on the PCI bus in order to prevent machine check errors that can occur if the PCI devices has not properly set the parity on the bus. The default value is FALSE---PCI parity checking is enabled.
FLOPPY	The capacity of the default floppy drive, either 1 (1.2 MB), 2 (1.44 MB), or 3 (2.88 MB).
FLOPPY2	The capacity of an optional second floppy drive, either N (not installed), 1, 2, or 3.
FWSEARCHPATH	The search path used by the ARC firmware and other programs to locate particular files. The default value is the same as the SYSTEMPARTITION environment variable value.
KEYBOARDTYPE	The keyboard language. The default is U.S. (English).
TIMEZONE	The time zone in which the system is located. This variable accepts ISO/IEC9945-1 (POSIX) standard values.

The operating system or other programs, for example, the ECU, may create either temporary or permanent environment variables for their own use. Do not edit or delete these environment variables.

### 9.2.15.1 Example ARC Hardware Configuration Display

Wednesday, 8-31-1994 10:51:32 AM

Devices detected and supported by the firmware:

(1)	(2)	(3)
eisa(0)video(0)monitor(0)		
multi(0)key(0)keyboard(0)		
eisa(0)disk(0)fdisk(0)	(Removable)	
multi(0)serial(0)		
multi(0)serial(1)		
scsi(0)disk(0)rdisk(0)	(1 Partition)	DEC RZ26L (C)DEC440C
scsi(0)cdrom(5)fdisk(0)	(Removable)	DEC RRD43 (C)DEC 0064

Alpha AXP Processor and System Information:

Processor ID	21064
Processor Revision	3
System Revision	0
Processor Speed	200 Mhz
Physical Memory	48 MB
Backup Cache Size	2 MB

Video Option detected:

BIOS controlled video card

EISA slot information:

Slot	Device	Identifier
0	Other	DEC2A01
1	Disk	ADP0001
2	Network	DEC4220
5	Network	DEC3002
6	Network	DEC4250
7	Display	CPQ3011
0	Disk	FLOPPY

PCI slot information:

Bus	Virtual Slot	Function	Vendor	Device	Revision	Device type
0	6	0	1000	1	1	SCSI
0	7	0	8086	482	3	EISA bridge
0	7	0	1011	2	23	Ethernet

Extended Firmware Information:

Version: 4.1-19950117.1606

NVRAM Environment Usage: 32%  
(330 of 1024 bytes)

## 9.2.16 Example Show Config Display

```
>>> show config
```

### Firmware

```
SRM Console:      V1.1-1
ARC Console:      3.5-14
PALcode:          VMS PALcode X5.55, OSF PALcode X1.35-53
Serial Rom:       1.1
```

### Processor

```
DECchip (tm) 21064-2
```

### MEMORY

```
48 Meg of System Memory
```

```
Bank 0 = 16 Mbytes(4 MB Per Simm) Starting at 0x00000000
```

```
Bank 1 = 16 Mbytes(4 MB Per Simm) Starting at 0x01000000
```

```
Bank 2 = 16 Mbytes(4 MB Per Simm) Starting at 0x02000000
```

```
Bank 3 = No Memory Detected
```

### PCI Bus

```
Bus 00 Slot 06: NCR      810 Scsi Controller
                        pka0.7.0.6.0          SCSI Bus ID 7
                        dka400.4.0.6.0        RRD43
```

```
Bus 00 Slot 07: Intel   8275EB PCI to Eisa Bridge
```

```
Bus 00 Slot 13: Compaq 1280/P
```

### EISA Bus

```
Slot 2 DEC4220          era0.0.0.2.1          08-00-2B-BC-93-7A
```

```
>>>
```

## 9.2.17 Example Show Device Display

```
>>> show device
```

```
dka400.4.0.6.0          DKA400                RRD43    2893
dva0.0.0.0.1            DVA0                RX26
dka100.1.0.1.0          DKA100                RZ25L    0006
era0.0.0.2.1            ERA0                  08-00-2B-3B-42-FD
pka0.7.0.6.0            PKA0                  SCSI Bus ID 7
```

## 9.2.18 Console Event Log Example

```
>>> cat el
```

```
*** keyboard not plugged in
ff.fe.fd.fc.fb.fa.f9.f8.f7.f6.f5.
ef.df.ee.f4.ed.ec.eb.ea.e9.e8.e7.e6.port pka0.7.0.6.0 initialized,
scripts are at 4f7faa0
resetting the SCSI bus on pka0.7.0.6.0
port pkb0.7.0.12.0 initialized, scripts are at 4f82be0
resetting the SCSI bus on pkb0.7.0.12.0
e5.e4.e3.e2.e1.e0.
V1.1-1, built on Nov 4 1994 at 16:44:07
device dka400.4.0.6.0 (RRD43) found on pka0.4.0.6.0
>>>
```

## 9.2.19 Example show\_status with no errors

```
>>> memory
>>> memory
>>> memory
>>> show_status
```

ID	Program	Device	Pass	Hard/Soft	Bytes Written	Bytes Read
00000001	idle	system	0	0 0	0	0
0000006b	memtest	memory	1	0 0	53477376	53477376
00000071	memtest	memory	1	0 0	31457280	31457280
00000077	memtest	memory	1	0 0	24117248	24117248

```
>>> kill diags
>>>
```

Another example:

ID	Program	Device	Pass	Hard/Soft	Bytes Written	Bytes Read
00000001	idle	system	0	0 0	0	0
0000006f	memtest	memory	1	0 0	35651584	35651584
00000070	memtest	memory	1	0 0	35651584	35651584
00000077	memtest	memory	1	0 0	37748736	37748736
0000007e	exer_kid	dka0.0.0.1.0	0	0 0	0	69120
0000007f	exer_kid	dka600.6.0.1	0	0 0	0	66560
00000093	exer_kid	dva0.0.0.0.1	0	0 0	0	0
000000d5	nettest	era0.0.0.2.1	13	0 0	308672	308672

Example with a memory compare error indicating bad SIMMs

```
>>> memory
>>> memory
>>> memory
```

\*\*\* Hard Error - Error #44 - Memory compare error

Diagnostic Name	ID	Device	Pass	Test	Hard/Soft	1-JAN-1995
memtest	000000c8	brd0	1	1	1 0	12:00:01
Expected value:	00000004					
Received value:	80000001					
Failing addr:	800001c					

\*\*\* End of Error \*\*\*

```
>>> kill diags
```

## 9.2.20 er\*0\_protocols, ew\*0\_protocols

Determine which network protocols are enabled for booting and other functions. These environment variables apply to systems with a Digital Ethernet controller (**er\*** for the LANCE chip, DEC 4220; **ew\*** for the TULIP chip, DECchip 21040).

**set ew\*0\_protocols qualifier**

**set er\*0\_protocols qualifier**

When entering this command, replace "\*" with the adapter ID for the Ethernet controller for which you are setting the default.

To get a list of Ethernet controllers on the system, enter the show config command. A list of all system devices is displayed. The Ethernet controllers for which this command setting is pertinent start with the letters "ew" or "er." The third letter is the adapter ID for the Ethernet controller.

Qualifier	Meaning
<b>mop</b>	Sets the network protocol to mop: the setting typically used for systems using the OpenVMS operating system.
<b>bootp</b>	Sets the network protocol to bootp: the setting typically used for systems using the DEC OSF/1 operating system.
<b>bootp,mop</b>	When the settings are used in a list, the mop protocol is attempted first, followed by bootp.

### Example 1

The network protocol is set to mop.

```
>>> set ewa0_protocols mop
>>> show ewa0_protocols
ewa0_protocols      MOP
```

### Example 2

The network protocol is set to bootp.

```
>>> set ewa0_protocols bootp
>>> show ewa0_protocols
ewa0_protocols      BOOTP
```

### Example 3

The network protocol is set to mop or bootp.

```
>>> set ewa0_protocols bootp,mop
>>> show ewa0_protocols
ewa0_protocols      BOOTP,MOP
```



## 9.2.21 set tga\_sync\_green

The tga\_sync\_green environment variable set the location of the SYNC signal generated by the ZLX-p-E PCI graphics accelerator card. The correct setting, displayed with the show command, is:

```
>>> show tga_sync_green
tga_sync_green 0
```

If the monitor does not synchronize, set the parameter as follows:

```
>>> set tga_sync_green 00
```

This command sets all graphics cards to synchronize on a separate vertical SYNC line, as required by some monitors. See the monitor documentation for all other information.

## 9.2.22 netew - Description

When the netew command is entered, the following script is executed:

```
net -sa ew*0>ndbr/lp_nodes_ew*0
set ew*0_loop_count 2 2>nl
set ew*0_loop_inc 1 2>nl
set ew*0_loop_patt ffffffff 2>nl
set ew*0_loop_size 10 2>nl
set ew*0_lp_msg_node 1 2>nl
net -cm ex ew*0
echo "Testing the network"
nettest ew*0 -sv 3 -mode nc -p 0 -w 1 &
```

The script builds a list of nodes for which to send MOP loopback packets, sets certain test environment variables and tests the Ethernet port by using the following variation of the nettest exerciser:

```
nettest ew*0 -sv 3 -mode nc -p 0 -w 1 &
```

### 9.2.22.1 Example - Testing an Ethernet Port: (netew)

```
>>> netew
>>> show_status
```

ID	Program	Device	Pass	Hard/Soft	BytesWritten	BytesRead
00000001	idle	system	0	0 0	0	0
000000d5	nettest	ewa0.0.0.0.0	13	0 0	308672	308672

```
>>> kill_diags
>>>
```

### 9.2.22.2 Example - Testing an Ethernet Port: (network)

```
>>> network
>>> show_status
```

ID	Program	Device	Pass	Hard/Soft	BytesWritten	BytesRead
00000001	idle	system	0	0 0	0	0
000000d5	nettest	era0.0.0.0.0	13	0 0	308672	308672

```
>>> kill_diags
>>>
```

## 9.2.23 >>>nettest - Description

When the nettest command is entered, the following script is executed:

```
echo "setting up the network test, this will take about 20 seconds"
net -stop er*0
net -sa er*0>ndbr/lp_nodes_er*0
net ic er*0
set er*0_loop_count 2 2>nl
set er*0_loop_inc 1 2>nl
set er*0_loop_patt ffffffff 2>nl
set er*0_loop_size 10 2>nl
set er*0_lp_msg_node 1 2>nl
net -start er*0
echo "Testing the network"
nettest er*0 -sv 3 -mode nc -p 0 -w 1 &
```

The script builds a list of nodes for which to send MOP loopback packets, sets certain test environment variables and tests the Ethernet port by using the following variation of the nettest exerciser:

```
nettest er*0 -sv 3 -mode nc -p 0 -w 1 &
```

### 9.2.23.1 Example net -s

```
>>> net -ic ewa0
>>> net -s ewa0
```

Status counts:

```
ti: 72 tps: 0 tu: 47 tjt: 0 unf: 0 ri: 70 ru: 0
rps: 0 rwt: 0 at: 0 fd: 0 lnf: 0 se: 0 tbf: 0
tto: 1 lkf: 1 ato: 1 nc: 71 oc: 0
```

MOP BLOCK:

Network list size: 0

MOP COUNTERS:

Time since zeroed (Secs): 42

TX:

Bytes: 0 Frames: 0

Deferred: 1 One collision: 0 Multi collisions: 0

TX Failures:

Excessive collisions: 0 Carrier check: 0 Short circuit: 71

Open circuit: 0 Long frame: 0 Remote defer: 0

Collision detect: 71

RX:

Bytes: 49972 Frames: 70

Multicast bytes: 0 Multicast frames: 0

RX Failures:

Block check: 0 Framing error: 0 Long frame: 0

Unknown destination: 0 Data overrun: 0 No system buffer: 0

No user buffers: 0

```
>>>
```

## 9.2.24 Test Command - Description

The test script tests devices in the following order:

1. Console loopback tests if lb argument is specified: COM2 serial port and parallel port.
2. Network external loopback tests for E\*A0. This test requires that the Ethernet port be terminated or connected to a live network; otherwise, the test will fail.
3. Memory tests (one pass).
4. Read-only tests: DK\* disks, DR\* disks, DU\* disks, MK\* tapes, DV\* floppy.
5. VGA console tests. These tests are run only if the console environment variable is set to "serial." The VGA console test displays rows of the letter "H".

### 9.2.24.1 Examples of the TEST command

#### Example 1

*The system is tested, and the tests complete successfully.*

#### >>> test

Requires diskette and loopback connectors on COM2 and parallel port

type kill\_diags to halt testing

type show\_status to display testing progress

type cat el to redisplay recent errors

Testing COM2 port

Setting up network test, this will take about 20 seconds

Testing the network

48 Meg of System Memory

Bank 0 = 16 Mbytes(4 MB Per Simm) Starting at 0x00000000

Bank 1 = 16 Mbytes(4 MB Per Simm) Starting at 0x01000000

Bank 2 = 16 Mbytes(4 MB Per Simm) Starting at 0x02000000

Bank 3 = No Memory Detected

Testing the memory

Testing parallel port

Testing the SCSI Disks

Non-destructive Test of the Floppy started dka400.4.0.6.0 has no media present or is disabled via the RUN/STOP switch

file open failed for dka400.4.0.6.0

Testing the VGA(Alphanumeric Mode only)

Printer offline

file open failed for para

#### >>> kill\_diags

>>>

(continued)

### Example 2

*The system is tested, and the system reports an error message. No network server responded to a loopback message. Ethernet connectivity on this system should be checked.*

>>> **test**

Requires diskette and loopback connectors on COM2 and parallel port

type kill\_diags to halt testing

type show\_status to display testing progress

type cat el to redisplay recent errors

Testing COM2 port

Setting up network test, this will take about 20 seconds

Testing the network

\*\*\* Error (era0), Mop loop message timed out from: 08-00-2b-3b-42-fd

\*\*\* List index: 7 received count: 0 expected count 2

>>>

## 9.2.25 Advanced Diagnostics

The following comments can be found in the notes-files regarding the **ADV\_DIAG** flag:

LANDO::CLEMENCE

28 lines 19-JUN-1996 15:01

*It appears that the diagnostic flag adv\_diag is not used anymore... If noone objects then I'll retire it.....*

LANDO::CLEMENCE

18 lines 19-JUN-1996 14:37

*>What does adv\_diag really do and controll. How do you change it, and do you save the change, and why would you want >to change it?*

*It was suppose to control if a diagnostic was to go into it advanced diagnosticstate. I looked through and none of the diagnostics look at this indicator.*

*to change the you would use:*

>>>**set adv\_diag on**                      < turn on

>>>**set adv\_diag off**                    < turn off

*It is not saved through a powerfail or init condition. There is no reason to change it and if I can't find anyone here with a reason to keep it it will be removed from a future console release.*

## 9.2.26 Console Password (and how to hack your way out)

To set the console password enter the following command:

P0x>>> **set password**

Please enter the password: <password>

Password must be between 15 and 30 characters.

Please enter the password again: <password>

P0x>>>

The only commands that still work are:  
**start, continue, boot**  
(using default parameters) and **login**.

When the console password has been set and you forgot it (or the customer):

1. Make sure the Halt button is in the "out" position (not lit).
2. Enter the login command:
3. P0x>>> **login**
4. When the *enter password:* prompt is displayed, **press the Halt button** (the button should light up).
5. Press <CR>
6. Press the Halt button to the out position (not lit). The password is now cleared and the console cannot be put into secure mode unless you set a new password.

## 9.3 Troubleshooting

### 9.3.1 How to Use the Exercize Command

Exer is the basic diagnostic for many of the I/O tests. Exer takes parameters such as blocksize, actions to take, and duration for example.

When used in a read/write mode with devices connected, these must be write-enabled by means of the chmod command, e.g. **Pxx>>> chmod +w dkc100\*** will set the write attribute for the console device file dkc100\*.

Exer makes use of two buffers, BUF1 and BUF2. The action string parameter (-a) specifies how these should be used. When reading and writing to a disk it is important to realise where the exercizer is operating on the media so that disk corruptions may be eliminated.

A **non-destructive read-only** test of all SCSI disks attached to a system can be performed by the following example:

```
Pxx>>> exer -a ?r-Rc -sec 900 DK* &
```

The parameters have the following meaning:

- a** Action-string.
- ?** Perform a seek to a random block on the disk.
- r** Read into buffer 1 from the block pointed to by the random seek. This means that the exercizer is then pointing to the next block on the disk.
- Seek back to the start of the block just read.
- R** Read the same block into buffer 2.
- c** Compare buffer 1 with buffer 2 and report any errors.
- sec 900** Run the exercizer for 900 seconds (15 minutes).
- DK\*** Perform the exercizer on all SCSI (DK) disks simultaneously.
- &** Perform the exercizer in background mode.

A **read/write** example that is **theoretically non-destructive** is shown below:

```
Pxx>>> chmod +w DK* Write enable all SCSI disks.  
Pxx>>> exer -a ?r-w-Rc -sec 900 DK* &
```

The parameters have the following meaning:

- a** Action-string.
- ?** Perform a seek to a random block on the disk.
- r** Read into buffer 1 from the block pointed to by the random seek. This means that the exercizer is then pointing to the next block on the disk.
- Seek back to the start of the block just read.
- w** Write the contents of buffer 1 back to the same block it was read from.
- Seek back to the block just written.
- R** Read the same block into buffer 2.
- c** Compare buffer 1 with buffer 2 and report any errors.
- sec 900** Run the exercizer for 900 seconds (15 minutes).
- DK\*** Perform the exercizer on all SCSI (DK) disks simultaneously.
- &** Perform the exercizer in background mode.

### 9.3.2 Diagnostic Flow for Problems Getting to Console Mode

Symptom	Action
Power-up screen is not displayed.	<p>Interpret the error beep codes at power up for a failure detected during self-tests.</p> <p>Check that keyboard and monitor are properly connected and powered on.</p> <p>If the power-up screen is not displayed, yet the system enters console mode when you press the Return key, check that the console environment variable is set correctly. If you are using a VGA console terminal, the console variable should be set to graphics. If you are using a serial console terminal, the console variable should be set to serial.</p> <p>If a VGA controller other than the standard on-board VGA controller is being used, make sure the CIRRUS VGA option is disabled.</p> <p>If console is set to serial, the power-up screen is routed to the COM1 serial communication port and cannot be viewed from the VGA monitor.</p> <p>Try connecting a console terminal to the COM1 serial communication port. If necessary use an MMJ-to-9-pin adapter (<b>H8571-J</b>). Check the baud rate setting for the console terminal and system. <b>The system baud rate setting is 9600.</b> When using the COM1 port, you must set the console environment variable to "serial."</p> <p>For certain situations, power up using the fail-safe loader to load new console firmware from a diskette.</p>

# 10 Firmware Updates, Revisions and Fail Safe Loader

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## 10.1 Exercizes and Labs

*Note: J50 (flash enable) must be inserted (default).*

### 10.1.1 LAB 10.1 Firmware Update CDROM V3.7 or higher

>>>**boot dka400**

Read the “read-me-first” information.

Select the default bootfile.

menu:	Display	Displays system configuration table
	Exit	Exit LFU and restart system
	List	Lists current and update revisions
	Update	Replaces current firmware with loadable data image
	Verify	Verifies ROM’s image against loaded image
	Help	

Try the different menu options.

Also:   UPD>**help verify**  
          UPD>**verify arc**

Update firmware:

UPD>**update**  
UPD>**update \*srm\***  
UPD>**update \*arc\***

Exit from the Loadable Firmware Utility:

UPD>**exit**

### 10.1.2 LAB 10.2 Using the Floppy Loader

You can update corrupted firmware via the Floppy Loader (also referred to as FSL).

Note that you need different bootable floppies for EV4 and EV5 as well as for AS1000 and AS1000A.

1. Insert Bootable Floppy in floppy drive.
2. Set jumper **J1 to position 7** (last position).
3. Init system and watch OCP.  
You will come into the UPD> prompt.
4. Update the firmware from floppy (actually memory at this point of time)
5. Load new firmware from CD when necessary.



### 10.1.3 LAB 10.3 Saving and Restoring NVRAM Data to/from Floppy

Note: you need to run console **V4.8** or later to do this lab.

Use the scripts **save\_nvram** and **restore\_nvram** as described later in this chapter.

## 10.2 Theory

### 10.2.1 What Version Firmware is on which CD

System Type	Filename	SRM Firmware Rev.	NT Firmware Rev.	CD Version
<b>AlphaServer 1000 EV4</b>	as1000_e4_v5_3	5.3-89	4.57	5.3
	as1000_e4_v5_2	5.2-101	4.56	5.2
	as1000_e4_v5_1	5.1-190	4.56	5.1
	as1000_e4_v5_0	5.0-92	4.54	5.0
	as1000_e4_v4_9	4.9-155	4.54	4.0
	as1000_e4_v4_8	4.8-65	4.52	3.9
	as1000_e4_v4_7	4.7-160	4.49	3.8
	as1000_e4_v4_6	4.6-218	4.47	3.7
	as1000_e4_v4_5	4.5-69	4.47	3.6
	as1000_v5_5	3.1	4.44	3.5
	as1000_v5_3	3.0-19	4.42	3.4
	as1000_v5_1	3.0-15	4.26	3.3
	as1000_v5_0	3.0-12	4.26	3.2
	as1000_v4_0	2.0-3	4.1-19	3.1
<b>AlphaServer 1000 EV5</b>	as1000_e5_v5_3	5.3-92	5.66	5.3
	as1000_e5_v5_2	5.2-104	5.64	5.2
	as1000_e5_v5_1	5.1-193	5.64	5.1
	as1000_e5_v5_0	5.0-95	5.31	5.0
	as1000_e5_v4_9	4.9-158	5.31	4.0
	as1000_e5_v4_8	4.8-68	5.28	3.9
	as1000_e5_v4_7	4.7-163	5.23	3.8
	as1000_e5_v4_6	4.5-78	5.13	3.7
<b>AlphaServer 1000A EV4</b>	as1000a_e4_v5_3	5.3-95	4.57	5.3
	as1000a_e4_v5_2	5.2-107	4.56	5.2
	as1000a_e4_v5_1	5.1-196	4.56	5.1
	as1000a_e4_v5_0	5.0-98	4.54	5.0
	as1000a_e4_v4_9	4.9-161	4.54	4.0
	as1000a_e4_v4_8	4.8-71	4.52	3.9
	as1000a_e4_v4_7	4.7-166	4.49	3.8
	as1000a_e4_v4_6	4.6-224	4.49	3.7
	as1000a_e4_v4_5	4.5-72	4.47	3.6
	as1000a_v1_1	3.1-15	4.46	3.5
<b>AlphaServer 1000A EV5</b>	as1000a_e5_v5_3	5.3-98	5.66	5.3
	as1000a_e5_v5_2	5.2-110	5.64	5.2
	as1000a_e5_v5_1	5.1-199	5.64	5.1
	as1000a_e5_v5_0	5.0-101	5.31	5.0
	as1000a_e5_v4_9	4.9-164	5.31	4.0
	as1000a_e5_v4_8	4.8-74	5.28	3.9
	as1000a_e5_v4_7	4.7-169	5.23	3.8
	as1000a_e5_v4_6	4.6-227	5.21	3.7
	as1000a_e5_v4_5	4.5-80	5.13	3.6

## 10.2.2 Notes on firmware CD V3.7

### 10.2.2.1 Revision Matrix CD V3.7

	AS1000 4/266	AS1000 5/300	AS1000A 4/266	AS1000A 5/300
OpenVMS	V6.2-1H3	V6.2-1H3	V6.2-1H3	V6.2-1H3
Digital UNIX	V4.0A	V4.0A	V4.0A	V4.0A
Windows NT	V3.51	V3.51	V3.51	V3.51
SRM Firmware	V4.6-218	V4.6-221	V4.6-224	V4.6-227
ARC Firmware	V4.49	V5.21	V4.49	V5.21
VMS PAL	V5.56-4	V1.18-2	V5.56-4	V1.18-2
OSF PAL	X1.45-9	V1.21-4	X1.45-9	V1.21-4

### 10.2.2.2 General Info on CD V3.7

Starting with this release of the Alpha Systems Firmware Update CD, it is much easier for the user to boot the latest Console firmware update utility for their system. Previously, the user was required to consult the firmware release notes for their particular system model, to determine the correct bootflags and bootfile specification. Now the user simply has to insert the CD in the drive and type:

>>>**boot dka400**

at the console prompt. The system will respond with system-specific “read me first” information on the screen, followed by the default firmware update utility bootfile name, and the prompt:

**bootfile:**

At this point the user may hit the return key to load the latest (current) update, or they may type type a specific bootfile name to load a previous (older) version.

EV4 is **ARC** based.

EV5 is **AlphaBIOS** based

### 10.2.2.3 Functional changes CD V3.7

- ◆ Console: with >>>**show config** and >>>**show memory** now also the SIMM size is displayed.
- ◆ **SRM** passes failing memory SIMM information to SRM console (displayed on screen and logged in errorlog).
- ◆ **Halt-button** is now latched in SW. If halt button is pressed during powerup no NVRAM scripts are executed.
- ◆ For EV5: >>test does not exist anymore, now >>>**sys\_exer**.

**LFU scripts:**

- ◆ EV4 to EV5: **cpu\_upgrade**
- ◆ EV5 to EV4: **cpu\_downgrade**
- ◆ To read the release-notes from CD: **read\_rel\_notes**

## 10.2.3 Notes on firmware CD V3.8

The procedure to perform a firmware update is identical to those for firmware CD V3.7.

### 10.2.3.1 Revision Matrix CD V3.8

	AS1000 4/266	AS1000 5/300	AS1000A 4/266	AS1000A 5/300
<b>OpenVMS</b>	V7.1	V7.1	V7.1	V7.1
<b>Digital UNIX</b>	V4.0B	V4.0B	V4.0B	V4.0B
<b>Windows NT</b>	V4.0	V4.0	V4.0	V4.0
<b>SRM Firmware</b>	V4.7-160	V4.7-163	V4.7-166	V4.7-169
<b>ARC Firmware</b>	V4.49	V5.23	V4.49	V5.23
<b>VMS PAL</b>	V5.56-6	V1.19-2	V5.56-6	V1.19-3
<b>OSF PAL</b>	X1.45-12	V1.21-4	X1.45-12	V1.21-5

### 10.2.3.2 Functional changes CD V3.8

- ◆ Generation of the **V4 FRU Table in the HWRPB** (HardWare Register Parameter Block) is now supported. This is latent support for future DECevent V2.3 (or greater) with up-to-date knowledge base, not yet supported in UNIX V4.0B or VMS V7.1. By default the non-volatile environment variable (EV) is set to OFF, to enable this feature: >>> **set fru\_table on**.
- ◆ AlphaServer 1000A **Environmental Monitoring**. Power, fan and temperature failure detecting/reporting are now supported in UNIX PALcode and later supported in OpenVMS. On the AS1000A this feature is enabled whenever the environmental monitoring jumper is enabled.
- ◆ LFU **CPU\_UPGRADE** script is still available. To upgrade from EV4 to EV5: UPD> **cpu\_upgrade**, then replace EV4 CPU module with EV5 CPU module.
- ◆ LFU **CPU\_DOWNGRADE** script is still available. To downgrade from EV5 to EV4: UPD> **cpu\_downgrade**, then replace EV5 CPU module with EV4 CPU module.
- ◆ **BOOT\_RESET** non-volatile environment variable is now referenced to modify the boot behaviour. By default BOOT\_RESET is OFF, if BOOT\_RESET is set to ON (>>> **set boot\_reset on**), then as a result of a command-line boot or OS initiated reboot, the system is reset prior to boot. Useful to bring the system in a known state before the boot.
- ◆ **COM Port environmental variables** (only used by Digital UNIX V4.0B. The following variables are available: **com1\_baud** (50-57600, default: 9600), **com1\_flow** (none, software, hardware, both, default: software), **com1\_modem** (on, off, default: off), **com2\_baud**, **com2\_flow** and **com2\_modem**.
- ◆ Enhancements to make SCSI drivers to make **tape boot** more reliable.
- ◆ VMS PALcode fix for **REMOTIQ** (V1.19 PAL).
- ◆ Proper **PCI Emulex** module device recognition.
- ◆ Support for changing **COM1\_BAUD** rate from operating system without masking interrupts.
- ◆ **FRU table fixes** for DECevent memory descriptor and removal of additional PCI FRU entries.
- ◆ Support for the **DE500-AA** Fast EtherWORKS Adapter.
- ◆ Additional support for **Japanese keyboard**

## 10.2.4 Notes on firmware CD V3.9

The procedure to perform a firmware update is identical to those for firmware CD V3.7 and CD V3.8.

### 10.2.4.1 Revision Matrix CD V3.9

	AS1000 4/266	AS1000 5/300	AS1000A 4/266	AS1000A 5/300
<b>OpenVMS</b>	V7.1	V7.1	V7.1	V7.1
<b>Digital UNIX</b>	V4.0B	V4.0B	V4.0B	V4.0B
<b>Windows NT</b>	V4.0	V4.0	V4.0	V4.0
<b>SRM Firmware</b>	V4.8-65	V4.8-68	V4.8-71	V4.8-74
<b>ARC Firmware</b>	V4.52	V5.28	V4.52	V5.28
<b>VMS PAL</b>	V5.56-7	V1.19-3	V5.56-7	V1.19-4
<b>OSF PAL</b>	X1.45-12	V1.21-5	X1.45-12	V1.21-6

### 10.2.4.2 Functional changes CD V3.9

- ◆ Console support for AS800 Systems.
- ◆ New ARC and AlphaBIOS consoles.
- ◆ New firmware for the DEFPA (EISA-to-FDDI) option. The firmware is on the Alpha Firmware CD.
- ◆ Support for the DE500-AA Fast EtherWorks Adapter (also available in Console V4.7). The DE500-AA supports auto-negotiation which is a mechanism to determine the speed of the ethernet and adjust the DE500-AA speed to the fastest available speed of the ethernet that was negotiated.  
When the ethernet supports auto\_negotiation you may use the following command to set the DE500-AA in auto-negotiate mode:  
>>> **set ewa0\_mode auto-negotiate**
- ◆ SRM Console:
  - ◇ New LFU commands to save NVRAM data to a FAT-formatted floppydiskette or to restore NVRAM data from a FAT-formatted floppy.
  - ◇ Ability to redirect console output to a FAT-formatted floppy.
  - ◇ EV4 PALcode updates to support Environmental Management Monitoring.
  - ◇ FRU table modifications for DECevent.
  - ◇ Enhancements for KFESA and KFESB drivers.
- ◆ ARC console V4.52
  - ◇ Fix GPXSC setting for Mikasa and Noritake.
  - ◇ Add a hook in the PCI configurator for ATI cards.
  - ◇ Update the Qlogic driver in the firmware to support 1040B.

#### 10.2.4.3 New LFU Commands (*save\_nvram*, *restore\_nvram*)

The *save\_nvram* and *restore\_nvram* are useful if upgrading a system's motherboard and you wish to restore the system's previous NVRAM context.

##### **save\_nvram**

Save the system data from 8KB EEROM and last 50 TOY RAM bytes onto a write-unlocked FAT-formatted floppy to a file.

You may use one of the following arguments: *all* (default), *arc*, *srm* and *toy*.

Example:

<Boot firmware update CD>

UPD> **save\_nvram**

Save all NVRAM data to file fat:allnvram.sav/dva0.0.0.1000.0.

If file already exists, first copy original to a .bak file.

Please insert a write-UN-locked, FAT formatted floppy...

...and enter "y" to continue.

**y**

Checking for a FAT formatted floppy...

...Found it.

Checking for existing fat:allnvram.sav/dva0.0.0.1000.0...

...Found one.

Copying fat:allnvram.sav/dva0.0.0.1000.0 to .bak file...

...Succeeded.

Copying all NVRAM to fat:allnvram.sav/dva0.0.0.1000.0...

...Succeeded.

UPD>

##### **restore\_nvram**

Restore the system NVRAM data to 8KB EEROM and/or last 50 TOY RAM bytes from a floppy containing the NVRAM save file(s). By default, if no script argument is specified, all NVRAM is restored from the file allnvram.sav.

Example:

UPD> **restore\_nvram arc**

Restore arc NVRAM data from the file fat:arcnvram.sav/dva0.0.0.1000.0.

Please insert the floppy containing this file...

...and enter "y" to continue.

**y**

Looking for file fat:arcnvram.sav/dva0.0.0.1000.0...

...Found it.

Restoring system NVRAM data...

...Succeeded.

UPD>

#### ***10.2.4.4 New Command: Redirect Console Output to FAT-Formatted Floppy***

You can redirect the console output to floppy disk. You can also take the contents of the file saved on floppy and display onto the console screen.

Format: >>> **console-command** > **fat:filename/dva0**

This example stores the systems configuration to a floppy file:

>>>>> **show config > fat:showconfig.fat/dva0>>>**

This command displays the content of a floppy file to your console screen:

>>>>> **cat fat:showconfig.fat/dva0 | more...**

This example stores the system power-up sequence:

>>>>> **cat el > x>>> cat x > fat:cat\_el.fat/dva0>>>**

This example combines the above two commands into one:

>>>>> **cat el > fat:cat\_el.fat/dva0>>>**

## 10.2.5 Notes on firmware CD V4.0

The procedure to perform a firmware update is identical to those for firmware CD V3.7 and later releases.

### 10.2.5.1 Revision Matrix CD V4.0

	AS1000 4/xxx	AS1000 5/xxx	AS1000A 4/xxx	AS1000A 5/xxx
<b>OpenVMS</b>	V7.1	V7.1	V7.1	V7.1
<b>Digital UNIX</b>	V4.0B	V4.0B	V4.0B	V4.0B
<b>Windows NT</b>	V4.0	V4.0	V4.0	V4.0
<b>SRM Firmware</b>	V4.9-155	V4.9-158	V4.9-161	V4.9-164
<b>ARC Firmware</b>	V4.54	V5.31	V4.54	V5.31
<b>VMS PAL</b>	V5.56-7	V1.19-4	V5.56-7	V1.19-4
<b>OSF PAL</b>	V1.45-12	V1.21-5	V1.45-12	V1.21-6

### 10.2.5.2 Functional changes CD V4.0

- ◆ PCI slot restriction for the KZPBA-DB on AlphaServer1000A systems
- ◆ Support for the DE500-BA Fast EtherWORKS PCI 10/100-TX Adapter
- ◆ Latent console support for OpenVMS and DIGITAL Unix to change console password
- ◆ Support to "silently update" console firmware (described later in this chapter)
- ◆ New ARC console V4.54 - highlights include:
  - ◇ *Change QLOGIC and NCR display strings.*
  - ◇ *Update EV5 revision table.*
  - ◇ *Fix TGA8 problem that causes ARC machines to boot with different colors.*
  - ◇ *Save correct SCSI ID when saved in ARC*
- ◆ New AlphaBIOS console V5.30/V5.31 - highlights include:
  - ◇ *Add error reporting for Power-up test and CPU start*
  - ◇ *Add platform error reporting hooks*
  - ◇ *Detect TGA on all Hardware buses.*
  - ◇ *Fix support for 16 or more SCSI adapters.*
- ◆ Console Support for DE500-BA Fast EtherWORKS PCI 10/100-TX Adapter V4.9 SRM console supports the DE500-BA Fast EtherWORKS PCI 10/100-TX Adapter as a boot device
- ◆ Latent Support to Change Console Password under OpenVMS or Digital Unix The console has enabled changing the console password while under the operating system. Details will be available in the next release of OpenVMS and Digital Unix.



### ***10.2.5.3 Bug Fixes Console V4.9***

- ◆ PCI slot restriction removed for the PB2GA Graphics card in AlphaServer 1000A systems. The PB2GA Graphics card is now supported in PCI secondary slots on AlphaServer 1000A systems. This slot restriction was isolated to V4.8 console firmware.
- ◆ Power Supply 2 Failure Interrupt fixed.

The V4.8 SRM console had a bug in that would not dismiss the Power Supply 2 failure interrupt. The system would appear to hang because it was continually trying to dismiss the interrupt. This is an environment fault that is now correctly handled by the console.

### ***10.2.5.4 Known Anomalies, Restrictions and Workarounds***

- ◆ DE500 in auto-negotiate mode (OpenVMS and Digital Unix Systems)  
Auto-negotiation mode is NOT RECOMMENDED on systems with more than one DE500 because of possible considerable when booting or when restarting the operating system. This is because the OpenVMS operating system starts/stops drivers several times during a boot or reboot. It is recommended that you set the DE500 to the line speed of the ethernet wire instead of using auto-negotiate mode.
- ◆ DSSI Devices not seen under OpenVMSThe following anomaly is not console related and is noted here for informational purposes. A new OpenVMS driver may be needed for AlphaServer Systems with KFESA's [DSSI to EISA Storage Adapters]. The symptom is that data-disks off the KFESA may not be seen nor displayed by the OpenVMS "show device" command. The OpenVMS driver, which fixes this anomaly, is available from TIMA.
- ◆ PB2GA-JC/JD and the BOOT\_RESET Console Environment VariableThe console environment variable BOOT\_RESET must be set to OFF if you are using the PB2GA-JC or -JD graphic card. The default value for this console environment variable is OFF.

#### ***10.2.5.5 Console Support for Silently Update Console Firmware (CD V4.0)***

The console now supports a mechanism to update SRM and ARC/AlphaBIOS console firmware without user intervention. The mechanism updates the console firmware then resets the system. This mechanism does not check firmware revision before updating firmware from CD. You must have an Alpha Firmware CD to perform a noninteractive or "silent update" of SRM and ARC/ALPHABIOS firmware.

To perform a silent update, do the following:

- ◆ Install Alpha Firmware CD into CD-ROM driver
- ◆ Set console environment variable `boot_reset` to on
- ◆ At the SRM console prompt, set `boot_osflags` to LFU then boot Alpha Firmware CD [V4.0 or greater]
- ◆ Set console environment variable `boot_reset` to off after firmware has been updated

```
>>> set boot_reset ON
```

```
>>> set boot_osflags LFU>>> boot dk400(firmware update and system then resets)>>>  
set boot_reset OFF
```

### 10.2.5.6 Console (V4.9) Notes for the DE500-AA/DE500-BA Fast EtherWorks Adapters

V4.9 console supports the DE500-BA Fast EtherWORKS PCI 10/100-TX Adapter as a boot device. The console has supported the DE500-AA Fast EtherWORKS PCI 10/100-TX Adapter as a boot device since the V4.7 console firmware release. The DE500-BA is similar in function as the DE500-AA which supports:

- ◆ 10BaseT half and full duplex
- ◆ 100BaseTx half and full duplex
- ◆ auto-negotiation

Auto-negotiation is a mechanism to advertise, to detect, and to negotiate line speed abilities of auto-negotiate-supported devices on an ethernet wire. In auto-negotiation mode the user does not need to know the line speed of auto-negotiation-supported devices on the other end of an ethernet wire.

Note: Auto-negotiation mode is NOT RECOMMENDED if know the speed of your ethernet because of possible considerable delay when booting or when restarting the OpenVMS operating system. This is because an operating system starts/stops device drivers three times before the operating systems is on-line. Use auto-negotiate ONLY if the DE500-\*A is connected to an ethernet which supports auto-negotiation. Otherwise the DE500-\*A will respond to default to 100Base TX full-duplex.

*Example to set the DE500-AA or DE500-BA into auto-negotiate mode:*

```
>>> set ewa0_mode auto-negotiate
```

The DE500-\*A advertises its abilities on the ethernet wire by sending a link code word. If the DE500-\*A does not get a response (a link code word by another auto-negotiation supported device, the DE500-\*A will set its line speed to 100BaseTx full-duplex.

It will take several seconds before you see the console prompt >>> to get the DE500-\*A into auto-negotiate mode.

*Example when setting auto-negotiate mode on a system where the ethernet does not support auto-negotiate or there is no response from the ethernet.*

From the console you see the following response:

```
>>> set ewc0_mode auto-negotiate (this takes several seconds)ewc0: link failed: Using 100BaseTX full duplex
```

In the above case change ewc0\_mode to Twisted to use the DE500-\*A in a 10BaseTx environment.

*Behavior Note on Systems with Multiple DE500's on OpenVMS Systems*

Operating Systems may take longer than average to reboot when the systems have multiple DE500's that are all enabled for auto-negotiate mode. This is because of the time it may take for auto-negotiation mode to stabilize for each ethernet adapter. Auto-negotiation mode is not recommended on OpenVMS systems with more than one DE500

## 10.2.6 Notes on firmware CD V5.0

The procedure to perform a firmware update is identical to those for firmware CD V3.7 and later releases.

### 10.2.6.1 Revision Matrix CD V5.0

	AS1000 4/xxx	AS1000 5/xxx	AS1000A 4/xxx	AS1000A 5/xxx
<b>OpenVMS</b>	V7.1	V7.1	V7.1	V7.1
<b>Digital UNIX</b>	V4.0B	V4.0B	V4.0B	V4.0B
<b>Windows NT</b>	V4.0	V4.0	V4.0	V4.0
<b>SRM Firmware</b>	V5.0-92	V5.0-95	V5.0-98	V5.0-101
<b>ARC Firmware</b>	V4.54	V5.31	V4.54	V5.31
<b>VMS PAL</b>	V5.56-7	V1.19-4	V5.56-7	V1.19-4
<b>OSF PAL</b>	V1.45-12	V1.21-5	V1.45-12	V1.21-6

### 10.2.6.2 Functional changes Console V5.0

Qlogic Firmware V5.27 which supports UltraSCSI devices.

### 10.2.6.3 Bug Fixes Console V5.0

None.

### 10.2.6.4 Known Anomalies, Restrictions and Workarounds

- ◆ DE500 in auto-negotiate mode (OpenVMS and Digital Unix Systems)  
Auto-negotiation mode is NOT RECOMMENDED on systems with more than one DE500 because of possible considerable delay when booting or when restarting the operating system. This is because the OpenVMS operating system starts/stops drivers several times during a boot or reboot. It is recommended that you set the DE500 to the line speed of the ethernet wire instead of using auto-negotiate mode.
- ◆ DSSI Devices not seen under OpenVMS  
The following anomaly is not console related and is noted here for informational purposes. A new OpenVMS driver may be needed for AlphaServer Systems with KFESA's [DSSI to EISA Storage Adapters]. The symptom is that data-disks off the KFESA may not be seen nor displayed by the OpenVMS "show device" command. The OpenVMS driver, which fixes this anomaly, is available from TIMA.
- ◆ PB2GA-JC/JD and the BOOT\_RESET Console Environment Variable  
The console environment variable BOOT\_RESET must be set to OFF if you are using the PB2GA-JC or -JD graphic card. The default value for this console environment variable is OFF.

## 10.2.7 Notes on firmware CD V5.1

The procedure to perform a firmware update is identical to those for firmware CD V3.7 and later releases.

### 10.2.7.1 Revision Matrix CD V5.1

	AS1000 4/xxx	AS1000 5/xxx	AS1000A 4/xxx	AS1000A 5/xxx
<b>OpenVMS</b>	V7.1 1H1	V7.1 1H1	V7.1 1H1	V7.1 1H1
<b>Digital UNIX</b>	V4.0D	V4.0D	V4.0D	V4.0D
<b>Windows NT</b>	V4.0	V4.0	V4.0	V4.0
<b>SRM Firmware</b>	V5.1-190	V5.1-193	V5.1-196	V5.1-199
<b>ARC Firmware</b>	V4.56		V4.56	
<b>AlphaBIOS</b>		V5.64		V5.64
<b>VMS PAL</b>	V5.56-7	V1.20-4	V5.56-7	V1.20-4
<b>OSF PAL</b>	V1.45-12	V1.22-6	V1.45-12	V1.22-6

### 10.2.7.2 Functional changes Console V5.1

- ◆ New revision of Qlogic firmware - V5.53
- ◆ New revision of AlphaBios Console - V5.64
- ◆ New revision of ARC console - V5.56
- ◆ Support for DE500-FA - 100Mb/s MultiFiber Fast EtherWorks Adapter
- ◆ Support for PBXDA-AC - 16 port high performance asynchronous multiplexer controller
- ◆ Support for PBXGI-AD - POWERSTORM Advanced 3D Graphics Accelerator
- ◆ Support for CCMAB-AA - Memory Channel 2 Adapter

#### CCMAB-AA Memory Channel 2

Console V5.1 includes latent support of LFU updates for the CCMAB-AA Memory Channel 2 [MC2] adapter. In this release, the LFU utility will list the Memory Channel adapter as an updatable device. However, there is no firmware file present to perform the update. This is indicated by the "missing file" text which appears for MC2 under the UPD> **list** command.

Attempting to update the adapter will cause an expected failure that is not fatal. A future CD release will include the necessary firmware file to successfully update memory channel firmware from the LFU.

Important: The LFU ability to update memory channel firmware is only supported for Memory Channel 2 adapters. Prior generations, including Memory Channel 1 and 1.5, cannot be updated via LFU.

### 10.2.7.3 Known Anomalies, Restrictions and Workarounds

- ◆ **bus\_probe\_algorithm**

The default value for bus\_probe\_algorithm is "new" for all systems running OpenVMS V6.2 and later and all systems running Digital Unix and Windows NT.

- ◆ **PCI Bus Slot Restrictions**

- ◆ **KZPBA-DB**

- The Dual Channel PCI to UltraSCSI Adapter is restricted to primary PCI bus slots - slot 11, 12 or 13.

- ◆ **PBXDA-AC**

- No Restrictions on AS1000A Model 5/xxx systems.

- Restricted to SECONDARY PCI BUS slots on AS1000A Model 4/xxx systems.

- NOT Supported on AS1000 systems.

- ◆ **PBXGB-AA/CA**

- The PBXGB-AA/CA graphics cards are restricted to primary PCI bus slots - slot 11,12 or 13.

- ◆ **PBXGI-AD**

- AS1000A 4/xxx - PRIMARY PCI Bus slots ONLY

- AS1000A 5/xxx - PRIMARY PCI Bus slots ONLY

- AS1000 x/xxx - Not Supported

- ◆ **OpenVMS and DIGITAL UNIX Systems**

- ◆ **DE500-AA/BA**

- The DE500-AA/BA in Auto-negotiation mode may cause delay when booting or when restarting the operating system. This is because the operating system may start/stop device drivers before the OS is on-line when booting or before the OS relinquishes control to the console on a shut down.

- ◆ **OpenVMS Systems**

- ◆ **DSSI Devices not seen under OpenVMS**

- The following anomaly is not console related and is noted here for informational purposes. A new OpenVMS driver may be needed for AlphaServer Systems with KFESA's [DSSI to EISA Storage Adapters]. The symptom is that data-disks off the KFESA may not be seen nor displayed by the OpenVMS "show device" command. The OpenVMS driver, which fixes this anomaly, is available from TIMA.

- ◆ **Digital Unix Systems**

- ◆ **PB2GA-JC/JD**

- The console environment variable BOOT\_RESET must be set to OFF if you are using the PB2GA-JC or -JD graphics card. The default value is OFF for BOOT\_RESET.

## 10.2.8 Notes on firmware CD V5.2

The procedure to perform a firmware update is identical to those for firmware CD V3.7 and later releases.

### 10.2.8.1 Revision Matrix CD V5.2

	AS1000 4/xxx	AS1000 5/xxx	AS1000A 4/xxx	AS1000A 5/xxx
<b>OpenVMS</b>	V7.1 1H1	V7.1 1H1	V7.1 1H1	V7.1 1H1
<b>Digital UNIX</b>	V4.0D	V4.0D	V4.0D	V4.0D
<b>Windows NT</b>	V4.0	V4.0	V4.0	V4.0
<b>SRM Firmware</b>	V5.2-101	V5.2-104	V5.2-107	V5.2-110
<b>ARC Firmware</b>	V4.56		V4.56	
<b>AlphaBIOS</b>		V5.64		V5.64
<b>VMS PAL</b>	V5.56-7	V1.20-4	V5.56-7	V1.20-4
<b>OSF PAL</b>	V1.45-12	V1.22-6	V1.45-12	V1.22-6

### 10.2.8.2 Functional changes Console V5.2

- ◆ ISP1020/1040 firmware V5.54.
- ◆ Console support for the PCI-to-Cardbus adapter.
- ◆ Console recognition of PBXDA-AA/AB/AC and SN-PBXNP-AA/AC.

#### CCMAB-AA Memory Channel 2

Console V5.1 includes latent support of LFU updates for the CCMAB-AA Memory Channel 2 [MC2] adapter. In this release, the LFU utility will list the Memory Channel adapter as an updatable device. However, there is no firmware file present to perform the update. This is indicated by the "missing file" text which appears for MC2 under the UPD> **list** command.

Attempting to update the adapter will cause an expected failure that is not fatal. A future CD release will include the necessary firmware file to successfully update memory channel firmware from the LFU.

Important: The LFU ability to update memory channel firmware is only supported for Memory Channel 2 adapters. Prior generations, including Memory Channel 1 and 1.5, cannot be updated via LFU.

### 10.2.8.3 Known Anomalies, Restrictions and Workarounds

- ◆ **bus\_probe\_algorithm**

The default value for bus\_probe\_algorithm is "new" for all systems running OpenVMS V6.2 and later and all systems running Digital Unix and Windows NT.

- ◆ **PCI Bus Slot Restrictions**

- ◆ **KZPBA-DB**

- The Dual Channel PCI to UltraSCSI Adapter is restricted to primary PCI bus slots - slot 11, 12 or 13.

- ◆ **PBXDA-AC**

- No Restrictions on AS1000A Model 5/xxx systems.

- Restricted to SECONDARY PCI BUS slots on AS1000A Model 4/xxx systems.

- NOT Supported on AS1000 systems.

- ◆ **PBXGI-AD**

- AS1000A 4/xxx - PRIMARY PCI Bus slots ONLY

- AS1000A 5/xxx - PRIMARY PCI Bus slots ONLY

- AS1000 x/xxx - Not Supported

- ◆ **OpenVMS, Digital Unix and Windows NT Systems**

- ◆ **PB2GA-JC/JD**

- The console environment variable BOOT\_RESET must be set to OFF if you are using the PB2GA-JC or -JD graphics card. The default value is OFF for BOOT\_RESET.

- ◆ **OpenVMS and DIGITAL UNIX Systems**

- ◆ **DE500-AA/BA**

- The DE500-AA/BA in Auto-negotiation mode may cause delay when booting or when restarting the operating system. This is because the operating system may start/stop device drivers before the OS is on-line when booting or before the OS relinquishes control to the console on a shut down.

- ◆ **OpenVMS Systems**

- ◆ **DSSI Devices not seen under OpenVMS**

- The following anomaly is not console related and is noted here for informational purposes. A new OpenVMS driver may be needed for AlphaServer Systems with KFESA's [DSSI to EISA Storage Adapters]. The symptom is that data-disks off the KFESA may not be seen nor displayed by the OpenVMS "show device" command. The OpenVMS driver, which fixes this anomaly, is available from TIMA.



## 10.2.9 Notes on firmware CD V5.3

The procedure to perform a firmware update is identical to those for firmware CD V3.7 and later releases.

### 10.2.9.1 Revision Matrix CD V5.3

	AS1000 4/xxx	AS1000 5/xxx	AS1000A 4/xxx	AS1000A 5/xxx
<b>OpenVMS</b>	V7.1 1H1	V7.1 1H1	V7.1 1H1	V7.1 1H1
<b>Digital UNIX</b>	V4.0D	V4.0D	V4.0D	V4.0D
<b>Windows NT</b>	V4.0	V4.0	V4.0	V4.0
<b>SRM Firmware</b>	V5.3-89	V5.3-92	V5.3-95	V5.3-98
<b>ARC Firmware</b>	V4.57		V4.57	
<b>AlphaBIOS</b>		V5.66		V5.66
<b>VMS PAL</b>	V5.56-7	V1.20-4	V5.56-7	V1.20-4
<b>OSF PAL</b>	V1.45-12	V1.22-6	V1.45-12	V1.22-6

### 10.2.9.2 Functional changes Console V5.3

- ◆ AlphaBIOS Console V5.66.
- ◆ ARC Console V4.57.
- ◆ ISP1020/1040 firmware V5.57.
- ◆ PCI Sparce Space expanded to 496Mb - EV5 platforms only.
- ◆ Console Environment Variable - pka0\_soft\_term - no longer supports "diff" mode.
- ◆ Device recognition of the PBXDP-AB and PBXDP-AC multi-port sync. controller.
- ◆ Device recognition of the DEGPA-SA Gigabit EthernetAdapter.
- ◆ Changes were made to allow the DMA window to be enlarged as needed.
- ◆ Qlogic driver was fixed so that NT HCT CD audio certification would pass.

### 10.2.9.3 ISP1020/1040 V5.57 Highlights

- ◆ Added a Literal Pointer definition for the literal that corresponds to the interrupt status register Interrupt Pending bit.
- ◆ Found a problem with checking user flags set by the SXP firmware when an Interrupt is pending from the SXP to the RISC. The user flags register was latched when the interrupt was set and any new user flag bits are in the second rank of the register. Testing the bits tests the value in the latch but not the flags set in the second rank.
- ◆ Found a problem in the routine Process\_WDTR\_Msg where the target would never went to Message Out phase and subsequently never went to the Message Out Handler where it would send the number of message bytes. If the CDB has not been sent to the target, we need to command the SXP to set attention so that the target goes to Message Out phase.

#### **10.2.9.4 KZPCM-DA PCI-slot Restriction Removed**

V5.3 console firmware removes the PCI bus slot restriction for the KZPCM-DA on AlphaServer 800 platforms. The 64-bit PCI bus slot was previously restricted to single-function PCI devices. The KZPCM-DA is a multifunction PCI device with 4 ports.

#### **10.2.9.5 Console EV - *pka0\_soft\_term***

The console environment variable [EV] *pka0\_soft\_term* no longer supports differential mode. This EV enables or disables SCSI terminators for option SCSI controllers. Newer Qlogic SCSI controller chips no longer provide a console accessible register bit for differential mode. You can still set this EV to other modes [off, on {default} etc.]. This information supersedes information contained in the AS800 User's Guide and other manuals that may describe the use of this particular EV.

#### **10.2.9.6 CCMAB-AA Memory Channel 2**

Console V5.1 and later includes latent support of LFU updates for the CCMAB-AA Memory Channel 2 [MC2] adapter. In this release, the LFU utility will list the Memory Channel adapter as an updatable device. However, there is no firmware file present to perform the update. This is indicated by the "missing file" text which appears for MC2 under the UPD> list command.

Attempting to update the adapter will cause an expected failure that is not fatal. It is unclear at this time whether a future CD release will include the necessary firmware file to successfully update memory channel firmware from the LFU. However if this ability becomes supported, then support will be for only Memory Channel 2 adapters.

#### **10.2.9.7 Known Anomalies, Restrictions and Workarounds**

Not changed since console V5.1.

#### **10.2.9.8 Notes on DE500**

The minimum console firmware version for the following devices are:

- ◆ DE500-FA - Console V5.1
- ◆ DE500-BA - Console V4.9
- ◆ DE500-AA - Console V4.7

The DE500-FA supports the following modes. Use the console command shown below to select the appropriate mode.

- ◆ 100BaseFx half duplex - set ew\*0\_mode fast
- ◆ 100BaseFx full duplex - set ew\*0\_mode fastfd

The DE500-FA does not support auto-negotiation mode.

The DE500-BA and DE500-AA support the following modes: Use the console command shown below to select the appropriate mode.

- ◆ 10BaseT half duplex - set ew\*0\_mode twisted
- ◆ 10BaseT full duplex - set ew\*0\_mode full
- ◆ 100BaseTx half duplex - set ew\*0\_mode fast
- ◆ 100BaseTx full duplex - set ew\*0\_mode fastfd
- ◆ auto-negotiation - set ew\*0\_mode auto-negotiation

Auto-negotiation is a mechanism to advertise, to detect, and to negotiate line speed abilities to auto-negotiate-supported devices on an ethernet wire. In auto-negotiation mode, the user does not need to know the line speed of auto-negotiation-supported devices on the other end of an ethernet wire. In auto negotiate mode, the DE500-AA or -BA advertises its abilities by sending a link code word on the ethernet wire. If the DE500-\*A does not get a response (a link cord word from another auto-negotiation supported device), the DE500-\*A will set its line speed to the default value of 100BaseTx full-duplex.

## 10.2.10 How to Locate the Files on CDROM

### *Windows and Windows NT*

Use the file manager to locate the directory (V3.6: ALPHA1000.DIR) which contains the update files. All release notes can be found in the DOC directory, both in .PS and .TXT format.

### *OpenVMS*

Up to V3.5 the CD contained both the cdfs and the F11 file-system. V3.6 only has the release notes accessible via F11, not the update files (probably because of space constraints).

To access the release notes:

```
$ show dev dk
$ mount/over=id dka500
$ dir dka500:[000000]
$ dir dka500:[doc]
$ list dka500:[doc]xxxxxx.txt
```

### *Digital UNIX*

Use the following procedure to locate the desired update files:

```
# /drv/MAKEDEV rz5
# mount -rt cdfs -o noversion /dev/rz5c
# cd /mnt
# ls alpha1000
# cd alpha1000
```

## 10.2.11 How to Create Bootable Floppies using OpenVMS

Bootable floppies to use with the Floppy Loader have the F11 file system.

*Suppose you have a floppy drive DVA0 and a local disk DKA200. Use the following procedure to copy a bootable floppy (under VMS):*

First copy the bootable file (AS1000A\_E4\_V4\_5.EXE for example) to disk (DKA200:[000000.FLOPPY] for example).

```
$init/density=double DVA0: firmware
$mount DVA0: firmware
$copy DKA200:[000000.FLOPPY]AS1000A_E4_5.EXE DVA0:[000000]*.*
$mc writeboot
  Update vax portion of bootblock? N
  Update axp portion of bootblock? Y
  Enter axp bootfile: DVA0:[000000]AS1000A_E4_5.EXE
$dismount DVA0:
```

## 10.2.12 How to Create Bootable Floppies on your PC (MKBOOT.EXE)

To create bootable floppies on your PC you may use a program called **MKBOOT.EXE**. This program is developed by Wim Lemmers and currently not available on the net. However, it may be copied onto your PC or notebook during the Alpha Midrange course.

The procedure is as follows:

1. Copy **mkboot.exe** into a directory on your PC or notebook.
2. Copy the firmware update file from CD or from the net into the same directory.  
Example: **as1000a\_e5\_v5\_0.exe**.
3. Go into DOS mode.
4. Change default to the directory containing mkboot.exe.
5. Type **>dir**. The abbreviated filename listed on the left side of the display is the filename to be used as source file.
6. Type **>mkboot as1000~1.exe a:** (example).
7. The program will prompt you to insert a fat formatted floppy. Press any key to continue. After less then 5 minutes the bootable floppy is ready and you return to the DOS prompt.

## 10.2.13 How to Copy Bootable Floppies using MSDOS

You may copy bootable floppies on your PC using the following command:

C:/WINDOWS> **diskcopy a: a:**

## 10.2.14 Fail-Safe Loader

The fail-safe loader (FSL) allows you to attempt to recover when one of the following is the cause of a problem getting to the console program under normal power-up:

- ◆ A power failure or accidental power down during a firmware upgrade
- ◆ A checksum failure or flash ROM header error while the SROM code is trying to load the SRM/ARC console firmware.

Note: The fail-safe loader should be used only when a failure at power-up prohibits you from getting to the console program. You cannot boot an operating system from the fail-safe loader.

If a checksum error is detected when the SRM/ARC console is loading at power-up (AS1000(A): **error beep code 1-1-4**), you need to activate the fail-safe loader and reinstall the firmware.

From the FSL program, you can update or load new console firmware.

## 10.2.15 Activating the Fail-Safe Loader (Floppy Boot)

To activate the FSL:

- ◆ Install the jumper at **bank 7 of the J1 jumper** on the CPU daughter board. The jumper is normally installed in the standard boot setting (bank 0 for AS1000 or bank 1 for AS1000A).
- ◆ Install the console firmware floppy diskette and turn on the system.
- ◆ Reinstall the console firmware using the floppy diskette.
- ◆ When you have finished, power down and **return the J1 jumper to the standard boot setting (bank 0 or bank 1)**.

Two messages are displayed on the operator control panel (OCP) when the FSL program loads the diskette:

OCP Message	Meaning
<b>Floppy Loader</b>	FSL firmware is executing
<b>Starting CPU</b>	FSL firmware found a valid boot block, loaded the program into memory, and is attempting to transfer control to the loaded program.

**Note 1:** When floppy boot does not seem to work although the OCP displays **FSL**, it may be that you have to connect a serial console to COM1.

**Note 2:** I/O drivers may be copied from CD when doing a floppy boot. You are prompted for that when a CD is detected in the CDROM drive.

## 10.3 Troubleshooting

### 10.3.1 Some Things to Check when you can not Boot the Firmware CD

1. Check that when you are using a serial console, you are using COM1 (not COM2). When you happen to be plugged into COM2, you will be able to do most things under SRM, but >>> boot dka400 will stop after the line:  
*"jumping to bootstrap code"*.
2. Check that console is set to "serial" when you use a serial console (and no graphics monitor is connected). If the EV CONSOLE is set to "graphics", you will be able to do most things under SRM, but >>> boot dka400 will stop after the line:  
*"jumping to bootstrap code"*.

### 10.3.2 System cannot determine Processor Speed (OCP displays 5/???)

The following symptoms have been seen on a 1000A with 500 MHz CPU:

- ◆ OCP displays 5/??? instead of 5/500
- ◆ No floppy boot (with SRAM jumper)
- ◆ Not possible to update firmware with FW update CD (release notes not displayed, no default update file, update file not found)

#### Possible solutions:

1. This may be caused by corrupt NVRAM structure. Given that you have saved the NVRAM dat with save\_nvram, you may try to recover from this by running the script **restore\_nvram** from the **UPD>** prompt.
2. Update firmware from floppy (Used bootable floppy with as1000a\_e5\_v4\_7 firmware), >>>**boot dva0**.

### 10.3.3 FW CD can be Booted but Verification after Update Fails

The firmware update CD can be booted, but the LFU verification stage fails for both Alphabios and SRM, when performing an update.

#### Possible cause:

Check jumper J50. It must be installed when performing a firmware update. It provides +12V programming power to the flashROMs.

# 11 Powerup Sequence, Selftest Strategy and Error Handling

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## 11.1 Exercizes and Labs

### 11.1.1 LAB 11.1 Power-up countdown messages

Interpret the power-up countdown messages when switching on the system (use the tables later in this chapter).



## 11.2 Theory

### 11.2.1 Power-up sequence

#### 11.2.1.1 AC Power-up sequence

AC power is applied to the system

1. Front end of the PSU begins operation and energizes
2. PSU waits for the DC power to be applied

Top cover and side panels must be installed (**interlock**) **Cables** must be properly installed, eventually for two PSU's

The **fans** must be working properly, else the system shuts down in a few seconds

#### 11.2.1.2 DC Power-up sequence

DC power is applied to the system with DC On/Off button on the OCP

1. PSU checks for POK\_H condition
2. 12V, 5V, 3.3V and -12V outputs are energized and stabilized

If the outputs do not come into regulation the system aborts power-up

#### 11.2.1.3 Serial ROM Diagnostics

The serial ROM diagnostics are loaded into the CPU's instruction cache from the serial ROM on the CPU daughter board. The diagnostics test the system in the following order:

1. Test the **CPU and backup cache** located on the CPU daughterboard.
2. Test the CPU module's **system bus interface**.
3. Test the **system bus to PCI bus bridge** and **system bus to EISA bus bridge**. If the PCI bridge fail or EISA bridge fails, an **audible error beep code** sounds.. The power-up tests continue despite these errors.
4. **Configure the memory** in the system and test only the **first 4 MB** of memory. If there is more than one memory module of the same size, the lowest numbered memory module (one closest to the CPU) is tested first.  
If the memory test fails, the failing bank is mapped out and memory is reconfigured and re-tested. Testing continues until a good memory is found. If good memory is not found, an error beep code (**1-3-3**) is generated and power-up tests are terminated.
5. Check the **data path to the FEPROMs** on the motherboard.
6. The **console program is loaded into memory from the FEPROM** on the motherboard. A checksum test is executed for the console image. If the checksum test fails, an error beep code (**1-1-4**) is generated and the power-up tests are terminated.

If the checksum test passes, control is passed to the console code, and the console firmware-based diagnostics are run.

#### ***11.2.1.4 Console Firmware-Based Diagnostics***

Console firmware-based tests are executed once control is passed to the console code in memory. They check the system in the following order:

1. Perform a complete check of system memory.

Steps 2--5 may be completed in parallel.

2. **Start the I/O drivers for mass storage devices and tapes.** At this time a complete functional check of the machine is made. After the I/O drivers are started, the console program continuously polls the bus for devices (approximately every 20 or 30 seconds).
3. **Check that EISA configuration information is present in NVRAM** for each EISA module detected and that no information is present for modules that have been removed.
4. **Run exercisers on the drives** currently seen by the system.

**Note:** This step does not ensure that all disks in the system will be tested or that any device drivers will be completely tested. Spin-up time varies for different drives, so not all disks may be on line at this point in the power-up. To ensure complete testing of disk devices, use the **test** command.

5. **Enter console mode or boot the operating system.** This action is determined by the **auto\_action** environment variable.

If the **os\_type** environment variable is set to NT, the ARC console is loaded into memory, and control is passed to the ARC console.

## 11.2.2 Interpreting Error Beep Codes AS1000 (EV4)

If errors are detected at power-up, audible beep codes are emitted from the system. For example, if the SROM code could not find any good memory, you would hear a 1-3-3 beep code (one beep, a pause, a burst of three beeps, a pause, and another burst of three beeps).

The beep codes are the primary diagnostic tool for troubleshooting problems when console mode cannot be accessed. Use the table below to interpret error beep codes.

Beep Code	Problem	Corrective Action
<b>1-1-4</b>	The SROM code is unable to load the console code: Flash ROM header area or checksum error detected.	<ol style="list-style-type: none"><li>1. Use the Fail-Safe Loader to load new ARC/SRM console code.</li><li>2. If successfully loading new console firmware does not solve the problem, replace the motherboard.</li></ol>
<b>3-3-1</b>	Generic system failure. Possible problem sources include the following motherboard components: native SCSI controller (NCR 53C810), remote I/O chip (Intel 87312), or NVRAM chip (position E14).	<ol style="list-style-type: none"><li>3. Replace the NVRAM chip (E14) on system motherboard.</li><li>4. If replacing the NVRAM chip did not solve the problem, replace the motherboard.</li></ol>
<b>1-2-1</b>	TOY NVRAM failure.	Replace the TOY NVRAM chip (E78) on motherboard.
<b>1-3-3</b>	No usable memory detected.	<ol style="list-style-type: none"><li>1. Verify that the memory modules are properly seated and try powering up again.</li><li>2. Swap bank 0 memory with known good memory and run SROM memory tests at power-up.</li><li>3. If populating bank 0 with known good memory does not solve the problem, replace the CPU daughter board.</li><li>4. If replacing the CPU daughter board does not solve the problem, replace the motherboard.</li></ol>

### 11.2.3 Interpreting Error Beep Codes AS1000A (EV4)

Beep Code	Problem	Corrective Action
<b>1-1-2</b>	ROM data path error detected while loading the ARC/SRM console code.	<ol style="list-style-type: none"> <li>1. Use the Fail-Safe Loader to load new ARC/SRM console code.</li> <li>2. If successfully loading new console firmware does not solve the problem, replace the motherboard.</li> </ol>
<b>1-1-4</b>	The SROM code is unable to load the console code: Flash ROM header area or checksum error detected.	<ol style="list-style-type: none"> <li>1. Use the Fail-Safe Loader to load new ARC/SRM console code.</li> <li>2. If successfully loading new console firmware does not solve the problem, replace the motherboard.</li> </ol>
<b>1-2-1</b>	TOY NVRAM failure.	Replace the TOY NVRAM chip (E78) on motherboard.
<b>1-3-3</b>	No usable memory detected.	<ol style="list-style-type: none"> <li>1. Verify that the memory modules are properly seated and try powering up again.</li> <li>2. Swap bank 0 memory with known good memory and run SROM memory tests at power-up.</li> <li>3. If populating bank 0 with known good memory does not solve the problem, replace the CPU daughter board.</li> <li>4. If replacing the CPU daughter board does not solve the problem, replace the motherboard.</li> </ol>
<b>3-1-2</b>	J1 jumper on the CPU daughter board set incorrectly or failure of native SCSI controller (Qlogic 1020A).	<ol style="list-style-type: none"> <li>1. Check that the J1 jumper on the CPU daughter board is set at bank 1 for AlphaServer 1000A systems, as opposed to bank 0, reserved for AlphaServer 1000 systems.</li> <li>2. If the J1 jumper setting is not the problem, replace the motherboard. .</li> </ol>

<b>Beep Code</b>	<b>Problem</b>	<b>Corrective Action</b>
<b>3-3-1</b>	Generic system failure. Possible problem sources include the TOY NVRAM chip (Dallas DS1287A) or PCI-to-EISA bridge chipset (Intel 82375EB).	<ol style="list-style-type: none"><li>1. Replace the TOY NVRAM chip (E78) on system motherboard.</li><li>2. If replacing the TOY NVRAM chip did not solve the problem, replace the motherboard.</li></ol>
<b>3-3-2</b>	J1 jumper on the CPU daughter board set incorrectly or failure of the PCI-to-PCI bridge (DECchip 21050).	<ol style="list-style-type: none"><li>1. Check that the J1 jumper on the CPU daughter board is set at bank 1 for AlphaServer 1000A systems, as opposed to bank 0, reserved for AlphaServer 1000 systems.</li><li>2. If the J1 jumper setting is not the problem, replace the motherboard.</li></ol>
<b>3-3-3</b>	Failure of the native SCSI controller (Qlogic 1020A) on the motherboard.	Replace the motherboard.

## 11.2.4 Interpreting Console Power-Up Countdown messages (EV4)

Countdown Number	Description	Likely FRU
<b>ff</b>	Console initiation started	Non-specific/Status message
<b>fe</b>	Initialized idel PCB	Non-specific/Status message
<b>fd</b>	Initializing semaphores	Non-specific/Status message
<b>fc,fb,fa</b>	Initializing heap	Non-specific/Status message
<b>f9</b>	Initializing driver structures	Non-specific/Status message
<b>f8</b>	Initializing idle process PID	Non-specific/Status message
<b>f7</b>	Initializing file system	TOY chip (E78)
<b>f6</b>	Initializing timer data structures	Non-specific/Status message
<b>f5</b>	Lowering IPL	Non-specific/Status message
<b>f4</b>	Entering idle loop	TOY chip (E78)
<b>ef</b>	Start memory configuration (heap)	SIMM memory or backplane
<b>df</b>	Configure PCI and EISA bus	PCI or EISA option
<b>ee</b>	Start phase 1 drivers: NVRAM and PCICFG drivers	NVRAM chip (E14) or PCI option
<b>ed</b>	Start phase 2 drivers: IIC and OCP drivers	Non-specific/Status message
<b>ec</b>	Start phase 3 drivers (console select): tt serial line class, TGA graphics, VGA graphics, and keyboard drivers	Keyboard, VGA or TGA option, or backplane
<b>eb</b>	Run power-up memory test	SIMM memory
<b>ea</b>	Start phase 4 drivers	Non-specific/Status message
<b>e9</b>	Phase 4 drivers complete	Non-specific/Status message
<b>e8</b>	Initialize environment variables	Non-specific/Status message
<b>e7</b>	Start SCSI class driver	Backplane (on-board Qlogic 1020A)
<b>e6</b>	Start phase 5 drivers: I/O drivers	PCI or EISA option
<b>e5</b>	Restore timers	TOY chip (E78)

### 11.2.5 Interpreting Error Beep Codes (EV5, Pinnacle)

Beep Code	Related to OCP code:	Description
<b>1</b>	<b>CB</b>	Done execution, jumping to console code
<b>1-1-2</b>	<b>F1</b>	ROM datapath error
<b>1-1-4</b>	<b>E0</b>	ROM checksum error
<b>1-2-1</b>	<b>E9</b>	Real-time clock error
<b>1-2-4</b>	<b>F4, F3, F2</b>	B-cache error
<b>1-3-3</b>	<b>FA</b>	No usable memory detected
<b>3-1-2</b>	<b>E8</b>	NCR810 error
<b>3-3-1</b>	<b>E6, E2, F8</b>	E6: NVRAM, E2: Super I/O, F8: PCI data error
<b>3-3-2</b>	<b>EA</b>	PCI to PCI bridge error
<b>3-3-3</b>	<b>E4</b>	Qlogic error

### 11.2.6 Interpreting SROM OCP Codes (EV5, Pinnacle)

OCP will display: srom V1.0 XX (XX is status/error code as found below)

SROM Status Code	Description
<i>Pinnacle Status Codes</i>	
<b>DF</b>	SROM program entered, beginning to initialize EV5 CPU
<b>DE</b>	Initialize CPU/System interface
<b>DD</b>	Sizing CPU speed
<b>DC</b>	Sizing S-cache
<b>DB</b>	Init and test the PCI bus
<b>DA</b>	Sizing B-cache
<b>D9</b>	Sizing memory
<b>D8</b>	Configuring memory
<b>D7</b>	B-cache initialization in progress
<b>D6</b>	Memory test in progress
<b>D5</b>	B-cache bits test in progress
<b>D4</b>	Memory bits test in progress
<b>D3</b>	B-cache address test in progress
<b>D2</b>	Memory address test in progress
<b>D1</b>	B-cache cell test in progress
<b>D0</b>	Memory cell test in progress
<b>CF</b>	Initialize memory
<b>CE</b>	Loading diagnostic ROM code (not applicable)
<b>CD</b>	Loading flashROM code
<b>CC</b>	Re-init CPU/system interface
<b>CB</b>	Done execution <i>Note: System hangs here when EV4 code in flashROM !!</i>

SROM Status Code	Description
<b>Nonfatal Error Codes</b>	
<b>EF</b>	Reserved
<b>EE</b>	Reserved
<b>ED</b>	Reserved
<b>EC</b>	Reserved
<b>EB</b>	CPU speed detected error
<b>EA</b>	PCI to PCI Bridge (PPB) data path error (Noritake motherboard)
<b>E9</b>	No Real-Time Clock (RTC)
<b>E8</b>	NCR810 data path error (Mikasa motherboard)
<b>E7</b>	Reserved
<b>E6</b>	EISA Config NVRAM
<b>E5</b>	Memory test detected an error in the Main Memory Data Path Test. Memory will be resized and reconfigured with the bank containing the offending memory configured out. Of course, when there is a problem with the data path or address lines to Main Memory, this process will repeat until all banks have been configured-out. At that point a trap will be made to the SROM console reporting no usable memory. (FA)
<b>E4</b>	Qlogic SCSI data path error. (Noritake motherboard)
<b>E3</b>	Memory test detected an error in the Main Memory Address Lines Test. Memory will be resized and reconfigured with the bank containing the offending memory configured out. Of course, when there is a problem with the data path or address lines to Main Memory, this process will repeat until all banks have been configured-out. At that point a trap will be made to the SROM console reporting no usable memory. (FA)
<b>E2</b>	Super I/O error
<b>E1</b>	Memory test detected an error in the Main Memory Cell Test. Memory will be resized and reconfigured with the bank containing the offending memory configured out. Of course, when there is a problem with the data path or address lines to Main Memory, this process will repeat until all banks have been configured-out. At that point a trap will be made to the SROM console reporting no usable memory. (FA)
<b>E0</b>	FlashROM checksum discrepancy
<b>Fatal Error Codes</b>	
<b>FF</b>	No S-cache bits set in sc_ctl register
<b>FE</b>	No B-cache size bits detected (not applicable)
<b>FD</b>	Floppy load error (bad/wrong floppy disk)
<b>FC</b>	Reserved
<b>FB</b>	Reserved
<b>FA</b>	No usable memory was detected
<b>F9</b>	Sys init failure
<b>F8</b>	PCI data path error
<b>F7</b>	CIA/pceb io register init failure
<b>F6</b>	A bad CIA Memory csr was detected
<b>F5</b>	Reserved



SROM Status Code	Description
<i>Fatal Error Codes</i>	
<b>F4</b>	B-cache data path error
<b>F3</b>	B-cache address line error
<b>F2</b>	B-cache cell error
<b>F1</b>	FlashROM data path read error
<b>F0</b>	Reserved

## 11.2.7 PALcode Exception Handling

Generally, PALcode handles exceptions as follows:

- ◆ The PALcode determines the cause of the exception.
- ◆ If possible, it corrects the problem and passes control to the operating system for reporting before returning the system to normal operation.
- ◆ If error/event logging is required, control is passed through the system control block (SCB) to the appropriate exception handler.

The PAL machine check handler is invoked for the following reasons:

- ◆ I-Cache Data Parity Error
- ◆ I-Cache Tag Parity Error
- ◆ D-Cache Data Parity Error
- ◆ D-Cache Tag Parity Error
- ◆ S-Cache Data Parity Error
- ◆ S-Cache Tag Parity Error
- ◆ B-Cache Uncorrectable ECC Errors
- ◆ B-Cache Correctable ECC Errors
- ◆ B-Cache Tag Parity Errors
- ◆ Fill Time-out
- ◆ IBOX Time-out
- ◆ PCI Address Parity Error
- ◆ PCI Bus Parity Error
- ◆ PCI Master Abort
- ◆ PCI Target Abort
- ◆ PCI System Error
- ◆ Scatter/Gather TLB Invalid Entry
- ◆ PCI IO Time-out
- ◆ Non-existent Memory Reference

Most of these errors ultimately result in a system crash. A few are recoverable, notably I stream read errors, or are informative. PAL code must sort out which error handler should be invoked for each error, build the machine check logout frame as appropriate, and invoke the handler. In addition, most correctable ECC errors require PAL code to scrub the B-cache and/or memory location to ensure that the single-bit error is eliminated at the source.

## 11.2.8 Machine Check / Interrupts

The exceptions that result from hardware system errors are called **machine check/interrupts**. They occur when a system error is detected during the processing of a data request. There are four types of machine check/interrupts related to system events:

1. Processor Machine Check (**SCB 670**)
2. System Machine Check (**SCB 660**)
3. Processor-Corrected Machine Check (**SCB 630**)
4. System-Corrected Machine Check (**SCB 620**)

Note: The system control block (SCB) vector through which PALcode transfers controls to the operating system is shown in parentheses.

During the error handling process, errors are first handled by the appropriate PALcode error routine and then by the associated operating system error handler.

## 11.2.9 Processor Machine Check (SCB: 670)

### 11.2.9.1 EV4 Systems

Processor machine check errors are fatal system errors that will result in a system crash. The error handling code for these errors are common across all platforms using the DECchip 21064 and DECchip 21064A microprocessors.

- ◆ The DECchip 21064 or DECchip 21064A microprocessor detected one or more of the following uncorrectable data errors:
  - ◇ *Uncorrectable B-cache data error*
  - ◇ *Uncorrectable memory data error*
- ◆ A B-cache tag or tag control parity error occurred
- ◆ Hard error was asserted in response to:
  - ◇ *Double-bit Istream ECC error*
  - ◇ *Double-bit Dstream ECC error*
  - ◇ *System transaction terminated with CACK\_HERR*
  - ◇ *I-cache parity errors*
  - ◇ *D-cache parity errors*

### 11.2.9.2 EV5 Systems

The DECchip 21164 microprocessor detected one or more of the following conditions:

- ◆ I-Cache Data or Tag Parity Error
- ◆ S-Cache Data Parity Error - I-stream
- ◆ S-Cache Tag Parity Error - I-stream
- ◆ S-Cache Data Parity Error - D-stream Read/Read, READ\_DIRTY
- ◆ S-Cache Tag Parity Error - D-stream or Systems Command
- ◆ D-Cache Data or Tag Parity Error
- ◆ I-stream Uncorrectable ECC Data Parity Errors (B-Cache or Memory)
- ◆ D-stream Uncorrectable ECC Data Parity Errors (B-Cache or Memory)
- ◆ B-Cache Tag Parity Errors - I-stream
- ◆ B-Cache Tag Parity Errors - D-stream
- ◆ System Command/Address Parity Error

## 11.2.10 System Machine Check (SCB: 660)

### 11.2.10.1 EV4 Systems

A **system machine check** is a system detected error, external to the DECchip 21064 microprocessor and possibly not related to the activities of the CPU. These errors are specific to AlphaServer 1000(A) systems.

Fatal errors:

- ◆ System overtemperature failure
- ◆ System complete power supply failure
- ◆ System fan failure
- ◆ I/O read/write retry timeout
- ◆ DMA data parity error
- ◆ I/O data parity error
- ◆ Slave abort PCI transaction
- ◆ DEVSEL not asserted
- ◆ Uncorrectable read error
- ◆ Invalid page table lookup (scatter gather)
- ◆ Memory cycle error
- ◆ B-cache tag address parity error
- ◆ B-cache tag control parity error
- ◆ Non-existent memory error
- ◆ ESC NMI:IOCHK

### 11.2.10.2 EV5 Systems

- ◆ CIA-detected noncorrectable ECC error
- ◆ CIA-detected command/address parity error
- ◆ CIA-detected nonexistent memory reference
- ◆ PCI bus parity error
- ◆ PCI command/address parity error
- ◆ PCI master abort
- ◆ PCI target abort
- ◆ Scatter/gather invalid translations table entry
- ◆ I/O timeout
- ◆ System overtemperature (event)
- ◆ Complete Power Supply Failure (event)
- ◆ Unexpected IPL 23 interrupt request

## 11.2.11 Processor-Corrected Machine Check (SCB: 630)

### *11.2.11.1 EV4 Systems*

**Processor-corrected machine checks** are caused by B-cache errors that are detected and corrected by the DECchip 21064 or 21064A microprocessor. These are nonfatal errors and result in an error log entry. The error handling code for these errors are common across all platforms using the DECchip 21064 and 21064A microprocessors.

- ◆ Single-bit I-stream ECC error
- ◆ Single-bit D-stream ECC error
- ◆ System transaction terminated with CACK\_SERR

### *11.2.11.2 EV5 Systems*

630 errors are generic 21164 correctable errors.

- ◆ Single-bit I-stream ECC error
- ◆ Single-bit D-stream ECC error

## 11.2.12 System-Corrected Machine Check (SCB: 620)

System-corrected machine check errors are AS1000(A)-specific correctable errors. These errors result in the generation of the correctable machine check logout frame:

- ◆ DMA read errors
- ◆ Power supply failure in redundant mode (event)
- ◆ High temperature warning (event)
- ◆ Fan Warning/Failure (event)

## 11.2.13 Operator System Error Handling

The primary responsibility of the OS error handlers is to log all pertinent information about an error, so that the system can later be diagnosed and repaired.

## 11.2.14 670/660 Machine Check Frame Format (EV5)

Address	Mnemonic	Comments
bb+0000	r_byte_count	
bb+0008	sys_proc\$\$offset	processor offset
bb+0010	mchk_code	machine check ID
bb+0018	sr8	Shadow Register 8
bb+0020	sr9	Shadow Register 9
bb+0028	sr10	Shadow Register 10
bb+0030	sr11	Shadow Register 11
bb+0038	sr12	Shadow Register 12
bb+0040	sr13	Shadow Register 13
bb+0048	sr14	Shadow Register 14
bb+0050	sr25	Shadow Register 25
bb+0058	pt0	PAL Temp Register 0
bb+0060	pt1	PAL Temp Register 1
bb+0068	pt2	PAL Temp Register 2
bb+0070	pt3	PAL Temp Register 3
bb+0078	pt4	PAL Temp Register 4
bb+0080	pt5	PAL Temp Register 5
bb+0088	pt6	PAL Temp Register 6
bb+0090	pt7	PAL Temp Register 7
bb+0098	pt8	PAL Temp Register 8
bb+00A0	pt9	PAL Temp Register 9
bb+00A8	pt10	PAL Temp Register 10
bb+00B0	pt11	PAL Temp Register 11
bb+00B8	pt12	PAL Temp Register 12
bb+00C0	pt13	PAL Temp Register 13
bb+00C8	pt14	PAL Temp Register 14
bb+00D0	pt15	PAL Temp Register 15
bb+00D8	pt16	PAL Temp Register 16
bb+00E0	pt17	PAL Temp Register 17
bb+00E8	pt18	PAL Temp Register 18
bb+00F0	pt19	PAL Temp Register 19
bb+00F8	pt20	PAL Temp Register 20
bb+0100	pt21	PAL Temp Register 21
bb+0108	pt22	PAL Temp Register 22
bb+0110	pt23	PAL Temp Register 23
bb+0118	EXC_ADDR	Exception Address Register
bb+0120	EXC_SUM	Exception Summary Register
bb+0128	EXC_MASK	Exception Mask Register
bb+0130	PAL_BASE	PAL Base Register
bb+0138	ISR	Interrupt Summary Register
bb+0140	ICSR	IBOX Control and Status Register
bb+0148	ICPERR_STAT	Icache Parity Error Status Register
bb+0150	DCPERR_STAT	Dcache Parity Error Status Register
bb+0158	VA	Faulting Virtual Address
bb+0160	MM_STAT	Dstream Memory Management Fault Status Register
bb+0168	SC_ADDR	Scache Address Register
bb+0170	SC_STAT	Scache Status Register
bb+0178	BC_TAG_ADDR	Bcache Tag Address Register
bb+0180	EI_ADDR	External Interface Address Register
bb+0188	FILL_SYN	Fill Syndrome Register
bb+0190	EI_STAT	External Interface Status Register
bb+0198	LD_LOCK	Last LD_LOCKed Address Register
bb+01A0	CPU_ERR0	CPU Error Information Register 0
bb+01A8	CPU_ERR1	CPU Error Information Register 1
bb+01B0	CIA_ERR	CIA Error Register
bb+01B8	CIA_STAT	CIA Status Register
bb+01C0	CIA_ERR_MASK	CIA Error Mask Register
bb+01C8	CIA_SYN	CIA Syndrome Register
bb+01D0	MEM_ERR0	CIA Memory Port Status Register 0
bb+01D8	MEM_ERR1	CIA Memory Port Status Register 1
bb+01E0	PCI_ERR0	PCI Error Register 0
bb+01E8	PCI_ERR1	PCI Error Register 1
bb+01F0	Reserved	Reserved
bb+01F8	PCI_ERR2	PCI Error Register 2

### 11.2.15 630/620 Machine Check Frame Format (EV5)

Address	Mnemonic	Comments
bb+0000	r_byte_count	
bb+0008	sys_proc\$\$offset	processor offset
bb+0010	mchk_code	machine check ID
bb+0018	EI_ADDR	External Interface Address Register
bb+0020	FILL_SYN	Fill Syndrome Register
bb+0028	EI_STAT	External Interface Status Register
bb+0030	ISR	Interrupt Summary Register
bb+0038	CIA_SYN	CIA Syndrome Register
bb+0040	MEM_ERR0	CIA Memory Port Status Register 0
bb+0048	MEM_ERR1	CIA Memory Port Status Register 1
bb+0050	CIA_STAT	CIA Status Register
bb+0058	CIA_ERR	CIA Error Register



## 11.2.16 Machine Check Codes (EV5)

### 11.2.16.1 CPU Errors

MCHK	Mnemonic	Comments	Vector	Indication	FRU
0x86	mchk\$c_ecc_c	A correctable ECC was detected by the processor. Not fatal. PAL code will scrub memory location. Informational only.	630	ISR<CRD> = 1	CPU card: med Memory SIMM: med Motherboard: low
0x96	mchk\$c_retryable_ird	An uncorrectable ECC error occurred on a I-stream reference. The OS may restart the instruction in an attempt to recover.	630	EI_STAT <FIL_IRD> = 1	CPU card: med Memory SIMM: med Motherboard: low
0x98	mchk\$c_proc_hrd_error	The EV5 detected an internal state in the chip that is fatal. An example is IBOX Time-out or cfail/no ack error.	670	MC code and ICPERR_STAT <TMR> = 1	CPU card: high

### 11.2.16.2 CIA Specific Codes

MCHK	Mnemonic	Comments	Vector	Indication	FRU
0x201	mchk_corr_ecc	CIA detected correctable ECC error. Informational only.	620	CIA_ERR <COR_ERR> = 1	Memory SIMM: med CPU card: med Motherboard: low
0x203	mchk_unc_ecc	CIA detected non-correctable ECC error. Relevant registers: <ul style="list-style-type: none"> <li>CIA_SYN</li> <li>PCI_ERR&lt;2,0&gt; if DMA Read in Progress</li> </ul> Possible cause: <ul style="list-style-type: none"> <li>DMA R/W data ECC error</li> <li>Scatter/Gather TLB Miss PTE ECC error</li> <li>ECC error on CPU-IO write data from CPU</li> </ul>	660	CIA_ERR <UN_COR_ERR> = 1	Memory SIMM: high CPU card: med Motherboard: low
0x205	mchk_cpu_pe	CIA detected Addr/Cmd bus parity error on the CIA-CPU bus. Always fatal. Possible cause: <ul style="list-style-type: none"> <li>Manufacturing defect on the CPU module.</li> </ul>	660	CIA_ERR <CPU_PE> = 1	CPU card: high Motherboard: low I/O option: low
0x207	mchk_mem_nem	CIA detected non-existent memory reference. The CPU made a request to an address in memory that does not exist. This is usually a software problem, either in privileged software or bad PTE mapping. Always fatal.	660	CIA_ERR <MEM_NEM> = 1	Software: high CPU card: low Motherboard: low I/O option: low
0x20B	mchk_pci_perr	PCI bus parity error. The PCI_PERR line was asserted by some member of the PCI bus. Either by bad DMA R/W parity or CPU-IO R/W data parity being placed on the PCI bus. Relevant registers: PCI_ERR<2,0>	660	CIA_ERR <PCI_PERR> = 1	PCI option: high Motherboard: med CPU card: low Memory: none
0x20D	mchk_pci_adr_pe	PCI Cmd/Addr parity error. Some PCI option detected bad parity during a CMD/ADDR cycle on the PCI bus. Relevant registers: PCI_ERR<2,0>	660	CIA_ERR <PCI_ADDR_PE> = 1	PCI option: high Motherboard: med CPU card: low Memory: none

*CIA Specific Codes (continued)*

<b>MCHK</b>	<b>Mnemonic</b>	<b>Comments</b>	<b>Vector</b>	<b>Indication</b>	<b>FRU</b>
<b>0x20F</b>	mchk_m_abort	PCI master abort. A PCI master issued a PCI address that no device responded to (no DEVSEL). Relevant registers: PCI_ERR<2,0>	660	CIA_ERR <RCVD_MAS_ABT> = 1	PCI option: high Software: med Motherboard: low CPU card: low Memory: none
<b>0x211</b>	mchk_t_abort	PCI target abort. A PCI agent detected an address parity error and terminated the transaction with a target abort. Relevant registers: PCI_ERR<2,0>	660	CIA_ERR <RCVD_TAR_ABT> = 1	PCI option: high Motherboard: med CPU card: low Memory: none
<b>0x213</b>	mchk_pa_pte_inv	Scatter/Gather invalid TLB entry. The longword scatter/gather map entry being accessed is invalid. This error is usually associated with incorrect values in the Window Map registers or incorrect PTEs. Relevant registers: PCI_ERR<2,0>	660	CIA_ERR <PA_PTE_INV> = 1	Software: high PCI option: med CPU card: med Motherboard: low
<b>0x217</b>	mchk_ioa_timeout	A PCI IO timeout occurred. The CIA contains a timer that detects that the PCI bus hangs. Relevant registers: PCI_ERR<2,0>	660	CIA_ERR <IO_TIMEOUT> = 1	PCI option: high Motherboard: low CPU card: low

**11.2.16.3 EISA System Component Codes**

<b>MCHK</b>	<b>Mnemonic</b>	<b>Comments</b>	<b>Vector</b>	<b>Indication</b>	<b>FRU</b>
<b>0x219</b>	mchk_esc_iochk	ESC IOCHK# error. A parity error or some other catastrophic error occurred on an EISA add-in board; the board indicated this failure by asserting IOCHK# on the bus.	<TBD>	ESC_NMI_STAT<6> = 1	EISA option: high Motherboard: low CPU card: low

**11.2.16.4 System Level Codes**

<b>MCHK</b>	<b>Mnemonic</b>	<b>Comments</b>	<b>Vector</b>	<b>Indication</b>	<b>FRU</b>
<b>0x220</b>	mchk\$c_tempfail	Over temp failure. The system has detected that the internal cabinet temperature has exceeded the programmed limit. Check airflow of system box or ambient temperature of the room that contains the machine.	660	AS1000: SVR_MGR<3> = 1 AS1000A: PCI_IR3<4> = 0	Motherboard: low
<b>0x221</b>	mchk\$c_psfail	Complete power supply failure. The system detected that the power supply (or both power supplies in redundant configuration) have failed. The OS should make all attempts to write back the caches and close any files in the remaining time before the power fails.	660	AS1000: SVR_MGR<4> = 0 and SVR_MGR<5> = 0 AS1000A: PCI_IR3<2> = 0 and PCI_IR3<3> = 0	Power Supply: high Motherboard: low
<b>0x223</b>	mchk\$c_fan1_fail	Fan 1 failure. The system has detected a failure in fan 1 or both of the fans. Either by obstruction or hardware failure. This event is delivered thru the correctable path (620) to allow the OS to gracefully attempt to shut itself down.	620	AS1000: SVR_MGR<6> = 1 AS1000A: PCI_IR3<7> = 0	Fan Unit: high Motherboard: low

*System Level Codes (continued)*

<b>MCHK</b>	<b>Mnemonic</b>	<b>Comments</b>	<b>Vector</b>	<b>Indication</b>	<b>FRU</b>
<b>0x224</b>	mchk\$c_fan2_fail	Fan 2 failure. The system has detected a failure in fan 2 or both of the fans. Either by obstruction or hardware failure. This event is delivered thru the correctable path (620) to allow the OS to gracefully attempt to shut itself down.	620	AS1000: SVR_MGR<7> = 1 AS1000A: PCI_IR3<6> = 0	Fan Unit: high Motherboard: low
<b>0x225</b>	mchk\$c_ps1_fail	Power Supply 1 failure (Redundant Mode).	620	AS1000: SVR_MGR<4> = 0 and SVR_MGR<5> = 1 AS1000A: PCI_IR3<3> = 0	Power Supply: high Motherboard: low
<b>0x226</b>	mchk\$c_tempwarn	System High temp warning. The system has detected that the internal cabinet temperature has exceeded the programmed limit and will result in an Over Temp failure if the condition is not corrected. Check airflow of system box or ambient temperature of the room that contains the machine.	620	AS1000: PCI_IR<14> = 1 AS1000A: PCI_IR3<5> = 0	Motherboard: low
<b>0x227</b>	mchk\$c_ps2_fail	Power Supply 2 failure (Redundant Mode).	620	AS1000: SVR_MGR<4> = 1 and SVR_MGR<5> = 0 AS1000A: PCI_IR3<2> = 0	Power Supply: high Motherboard: low
<b>0x230</b>	mchk_unexp_int23	Unexpected IPL 23 Interrupt. The PAL code determined that an IPL 23 interrupt path was initiated. This is an unused IPL for AS1000 and AS1000A.	660	Machine Check occurred	System SW: med Motherboard: med CPU card: med

## 11.2.17 System Specific Registers

### 11.2.17.1 PCI to EISA Bridge Chip (PCEB) Registers

Mnemonic	Comments
pceb_vid	82420/82430 PCIset ISA and EISA bridges
pceb_did	82420/82430 PCIset ISA and EISA bridges
pceb_revision	82420/82430 PCIset ISA and EISA bridges
pceb_command	82420/82430 PCIset ISA and EISA bridges
pceb_status	82420/82430 PCIset ISA and EISA bridges
pceb_latency	82420/82430 PCIset ISA and EISA bridges
pceb_control	82420/82430 PCIset ISA and EISA bridges
pceb_arbcon	82420/82430 PCIset ISA and EISA bridges
pceb_arbpri	82420/82430 PCIset ISA and EISA bridges

### 11.2.17.2 ESC to EISA Controller Chip Registers

Mnemonic	Comments
esc_id	82420/82430 PCIset ISA and EISA bridges
esc_revision	82420/82430 PCIset ISA and EISA bridges
esc_int0	82420/82430 PCIset ISA and EISA bridges (IntCntlr-1)
esc_int1	82420/82430 PCIset ISA and EISA bridges (IntCntlr-2)
esc_elcr0	82420/82430 PCIset ISA and EISA bridges (IntCntlr-1)
esc_elcr1	82420/82430 PCIset ISA and EISA bridges (IntCntlr-2)
esc_last_eisa	82420/82430 PCIset ISA and EISA bridges
esc_nmi_stat	82420/82430 PCIset ISA and EISA bridges

### 11.2.17.3 AS1000 Specific Registers

Mnemonic	Comments
pci_ir	PCI Interrupt Register
pci_imr	PCI Interrupt Mask Register
svr_mgr	Server Management Register

### 11.2.17.4 AS1000A Specific Registers

Mnemonic	Comments
pci_ir1	PCI Interrupt Register 1
pci_ir2	PCI Interrupt Register 2
pci_ir3	PCI Interrupt Register 3
pci_imr1	PCI Interrupt Mask Register 1
pci_imr2	PCI Interrupt Mask Register 2
pci_imr3	PCI Interrupt Mask Register 3
ppb_pstatus	PCI-PCI Bridge Primary Bus Status Register
ppb_sstatus	PCI-PCI Bridge Secondary Bus Status Register
svr_mgr	Server Management Register

## 11.2.18 Fault Detection and Reporting

Component	Fault Detection/Correction Capability
<b>KN22A Processor Module</b>	
DECchip 21064 and 21064A microprocessors	Contains error detection and correction (EDC) logic for data cycles. There are check bits associated with all data entering and exiting the 21064(A) microprocessor. A single-bit error on any of the four longwords being read can be corrected (per cycle). A double-bit error on any of the four longwords being read can be detected (per cycle).
Backup cache (B-cache)	EDC check bits on the data store; and parity on the tag address store and tag control store.
<b>Memory Subsystem</b>	
Memory SIMMs	EDC logic protects data by detecting and correcting data cycle errors. A single-bit on any of the four longwords can be corrected (per cycle). A double-bit error on any of the four longwords being read can be detected (per cycle).
<b>System Motherboard</b>	
SCSI controller EISA-to-PCI bridge chip	SCSI data parity is generated. PCI data parity is generated.

## 11.2.19 Using DECEvent

DECEvent produces bit-to-text ASCII reports derived from system event entries or user-supplied event logs. The format of the reports is determined by commands, qualifiers, parameters, and keywords appended to the command. The maximum command line length is 255 characters.

DECEvent allows you to do the following:

- ◆ Translate event log files into readable reports
- ◆ Select alternate input and output files
- ◆ Filter input events
- ◆ Select alternative reports
- ◆ Translate events as they occur
- ◆ Maintain and customize your environment with the interactive shell commands

To access on-line help:

### *OpenVMS*

\$ **HELP DIAGNOSE** or  
\$ **DIA /INTERACTIVE**

DIA> **HELP**

### *Digital UNIX*

> **man dia** or  
> **dia hlp**

Privileges necessary to use DECEvent:

- ◆ SYSPRV for the utility
- ◆ DIAGNOSE to use the /CONTINUOUS qualifier

### ***11.2.19.1 Translating Event Files***

To produce a translated event report using the default event log file, **SY\$ERRORLOG:ERRLOG.SYS**, enter the following command:

***OpenVMS***  
**\$ DIAGNOSE**

***Digital UNIX***  
**> dia -a**

The DIAGNOSE command allows DECevent to use built-in defaults. This command produces a full report, directed to the terminal screen, from the input event file, **SY\$ERRORLOG:ERRLOG.SYS**. The /TRANSLATE qualifier is understood on the command line.

### ***11.2.19.2 How to Select an Alternate Input File***

***OpenVMS***  
**\$ DIAGNOSE ERRORLOG.OLD**

***Digital UNIX***  
**> dia -a -f syserr-old.hostname**

These commands select an alternate input file (ERRORLOG.OLD or syserr-old) as the event log to translate. The file name can contain the directory or path, if needed. Wildcard characters can be used.

### ***11.2.19.3 How to Send Reports to an Output File***

***OpenVMS***  
**\$ DIAGNOSE/OUTPUT=ERRLOG\_OLD.TXT**

***Digital UNIX***  
**> dia -a > syserr-old.txt**

These commands direct the output of DECevent to ERRLOG\_OLD.TXT or syserr -old.txt.

### ***11.2.19.4 How to Reverse the Order of the Input Events***

***OpenVMS***  
**\$ DIAGNOSE/TRANSLATE/REVERSE**

***Digital UNIX***  
**> dia -R**

These commands reverse the order in which events are displayed. The default order is forward chronologically.

### 11.2.19.5 Filtering Events

**/INCLUDE** and **/EXCLUDE** qualifiers allow you to filter input event log files. The **/INCLUDE** qualifier is used to create output for devices named in the command.

#### *OpenVMS*

```
$ DIAGNOSE/TRANSLATE/INCLUDE=(DISK=RZ,DISK=RA92,CPU)
```

#### *Digital UNIX*

```
> dia -i disk=rz disk=ra92 cpu
```

The commands shown here create output using only the entries for RZ disks, RA92 disks, and CPUs.

The **/EXCLUDE** qualifier is used to create output for all devices except those named in the command.

#### *OpenVMS*

```
$ DIAGNOSE/TRANSLATE/EXCLUDE=(MEMORY)
```

#### *Digital UNIX*

```
> dia -x mem
```

Use the **/BEFORE** and **/SINCE** qualifiers to select events before or after a certain date and time.

#### *OpenVMS*

```
$ DIAGNOSE/TRANSLATE/BEFORE=15-JAN-1996:10:30:00
```

or

```
$ DIAGNOSE/TRANSLATE/SINCE=15-JAN-1996:10:30:00
```

#### *Digital UNIX*

```
> dia -t s:15-jan-1996 e:20-jan-1996
```

If no time is specified, the default time is 00:00:00, and all events for that day are selected.

The **/BEFORE** and **/SINCE** qualifiers can be combined to select a certain period of time.

#### *OpenVMS*

```
$ DIAGNOSE/TRANSLATE/SINCE=15-JAN-1996/BEFORE=20-JAN-1996
```

If no value is supplied with the **/SINCE** or **/BEFORE** qualifiers, DECEvent defaults to TODAY.



### 11.2.19.6 Selecting Alternative Reports

Report formats are mutually exclusive. No combinations are allowed. The default format is /Full.

Format	Description
/Full	Translates all available information for each event
/Brief	Translates key information for each event
/Terse	Provides binary event information and displays register values and other ASCII messages in a condensed format
/Summary	Produces a statistical summary of the events in the log
/Fsterr	Produces a one-line-per-entry report for disk and tape devices

The syntax is:

#### *OpenVMS*

\$ **DIAGNOSE/TRANSLATE/<format>**

#### *Digital UNIX*

> **dia -o <format>**

## 11.3 Troubleshooting Information

### 11.3.1 Diagnostic Flow for Problems Reported by the Console Program

Symptom	Action
Power-up tests do not complete.	Interpret the error beep codes at power-up and check the power-up screen for a failure detected during self-tests. <b>If the power-up display stops on e6, an EISA or PCI board is causing the system to hang.</b>
Console program reports error: <ul style="list-style-type: none"><li>• Error beep codes report an error at power-up.</li><li>• Power-up screen includes error messages.</li></ul>	<p>Use the error beep codes and/or console terminal to determine error.</p> <p>Examine the console event log (enter the <b>cat el</b> command) or power-up screen to check for embedded error messages recorded during power-up.</p> <p>If power-up screen or console event log indicate problems with mass storage devices, or if storage devices are missing from the show config display, use the mass storage troubleshooting table to determine the problem.</p> <p>If power-up screens or console event log indicate problems with EISA devices, or if EISA devices are missing from the show config display, use the EISA troubleshooting table to determine the problem.</p> <p>If power-up screens or console event log indicate problems with PCI devices, or if PCI devices are missing from the show config display, use the PCI troubleshooting table to determine the problem.</p> <p>Run RBD tests to verify problem.</p>

# 12 Typical Problems and Solutions

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## 12.1 Theory

### 12.1.1 Malfunctioning COM ports

Diagnose tip for **malfunctioning COM ports**:

Use multimeter to measure pin 3 (+12V) and pin 4 (-12V) of J21 (the top left power connector on the motherboard). These voltages are exclusively used for the EIA drivers/receivers associated with the COM ports, and also deliver power without a load.

When this power is not present with the cable connected, you may disconnect the cable to find out if the Power Supply or the motherboard is broken.

### 12.1.2 Using a VGA Controller Other than the Standard, On-Board VGA

When the AS1000(A) system is configured to use a PCI- or EISA-based VGA controller instead of the standard on-board VGA (CIRRUS), consider the following:

- ◆ The on-board CIRRUS VGA option must be set to **disabled** through the ECU.
- ◆ The **VGA jumper (J27)** on the upper left corner of the motherboard must then be set to disable (off).
- ◆ The console environment variable should be set to **graphics**.
- ◆ If there are multiple VGA controllers, the system will direct console output to the first controller that finds it.

### 12.1.3 Fan Speed unregular

It appears that in some cases the fan speed changes during operation. This has been found at several AS1000(A) machines.

No explanation yet, as the fans (both FAN1 and FAN2) are not speed-controlled.

#### Temperature sensors

**E85:** High temperature warning, warns the system when the temperature measured exceeds **45 degrees Celsius**

**E87:** High temperature shutdown, shuts down the system when temperature measured exceeds **50 degrees Celsius**. The signal drops at 45 degrees. High temperature shutdown may be disabled by setting **J52** ("Temp Fail") from position 1-2 (factory setting) to 2-3.

## 12.1.4 WNT Issues related to AS1000 5/xxx and AS1000A 5/xxx

### 12.1.4.1 Version Conflict CPU revision, AlphaBIOS fw and WNT HAL files

There is a version conflict between certain revisions of the CPU module, AlphaBIOS firmware, and Windows NT HAL files that can cause the system to malfunction. Therefore, when running Windows NT on an AS1000 5/xxx or AS1000A 5/xxx, you must upgrade your AlphaBIOS firmware and Windows NT HAL files.

The methods you use to update the firmware and HAL are different depending on whether:

- ◆ Windows NT 3.51 or 4.0 is already installed
- ◆ You are performing a fresh install of Windows NT 3.51 or 4.0
- ◆ You are upgrading from Windows NT 3.51 to 4.0
- ◆ You have just upgraded your CPU module from a 4/xxx to a 5/xxx, or, replaced your 5/xxx CPU module with a new 5/xxx CPU module, and your system will not boot AlphaBIOS

Please observe that:

- ◆ If you are already running AlphaBIOS revision 5.23 or later, you can skip the steps in the instructions related to upgrading AlphaBIOS. The AlphaBIOS version currently installed in your system is displayed on the AlphaBIOS Boot screen, as well as in the About AlphaBIOS screen.
- ◆ If you are running AlphaBIOS 5.23 or later, do not downgrade to an earlier revision.

#### Notes about the KZPSA SCSI Adapter

On the AlphaServer 1000A, the KZPSA SCSI controller is only supported in the top 3 PCI slots. Also, note that you will need either a Digital-provided driver or the Windows NT Service Pack 4 or later for the KZPSA SCSI controller to operate with Windows NT 3.51. For Windows NT 4.0, the driver is included on the Windows NT 4 CD-ROM - a separate driver disk is not necessary.

#### 12.1.4.1.1 Upgrading the HAL and Firmware on Systems with Windows NT Already Installed

If you already have Windows NT 3.51 or 4.0 installed (but you are not upgrading Windows NT), follow these steps to upgrade the HAL and AlphaBIOS files.

You will need a blank formatted diskette for this procedure.

1. On the WWW, go to the URL: **<http://www.windows.digital.com/support/sysoft.asp>**
2. Select either the AS1000 5/300 or AS1000A 5/300 link as appropriate.
3. Download the AlphaBIOS 5.23 or later .ZIP file, as well as the Windows NT 3.51 and/or Windows NT 4.0 HAL.ZIP file(s), depending on whether you are running just one or both of the operating systems.
4. Unzip the AlphaBIOS files into an empty temporary directory on your hard disk.
5. Unzip the HAL files for your primary operating system into a separate empty temporary directory on your hard disk.
6. Open File Manager or Explorer, and select the OS directory on your system partition. The system partition is usually drive D:.
7. Within the OS directory, select the WINNT351 or WINNT40 directory, whichever is your primary operating system.  
If you do not see any files in the righthand pane, change the File Manager or Explorer settings as appropriate to show all files and file extensions. These file normally have the hidden, system, and read-only attributes set.
8. In your OS\WINNT351 or OS\WINNT40 directory rename the HAL.DLL file to HAL.OLD.
9. Copy the .DLL file from the temporary directory on your hard disk into the directory containing the HAL.OLD file, and rename the file you copied to HAL.DLL.
10. If you have a second version of Windows NT installed, delete all files from the temporary directory you were just using, unzip the files from the second HAL .ZIP file you downloaded into the temporary directory, and repeat the process of replacing the HAL.DLL in the second operating system directory with the updated HAL.DLL file.
11. Copy the .ROM file from the temporary directory containing the unzipped AlphaBIOS 5.23 files to an empty formatted diskette.
12. Shutdown and restart your system.
13. At the AlphaBIOS boot screen, press F2 to enter Setup.
14. Follow the steps in the Upgrading AlphaBIOS section of the AlphaBIOS Users Guide to complete the upgrade process.

Your upgrade is now complete.

#### 12.1.4.1.2 Installing the Upgraded HAL and AlphaBIOS Files on a Fresh Install of WNT 3.51 or 4.0

If you performing a first time installation of Windows NT 3.51 or 4.0, follow these steps to install the updated HAL and AlphaBIOS Files.

You will need a blank formatted diskette for this procedure.

1. On the WWW, go to the URL: **<http://www.windows.digital.com/support/sysoft.asp>**
2. Select either the AlphaServer 1000 5/300 or AlphaServer 1000A 5/300 link as appropriate.
3. Download the AlphaBIOS 5.23 or later .ZIP file, as well as the Windows NT 3.51 and/or Windows NT 4.0 HAL zip file(s), depending on which operating system you are installing.
4. Unzip the AlphaBIOS files into an empty temporary directory on your hard disk.
5. Unzip the HAL files into a separate empty temporary directory on your hard disk.
6. Copy the .ROM file from the temporary directory containing the unzipped AlphaBIOS 5.23 files to an empty formatted diskette.
7. Copy the files from the temporary directory containing the unzipped HAL files to a blank formatted diskette.
8. Shutdown and restart your system.
9. At the AlphaBIOS boot screen, press F2 to enter Setup.
10. Follow the steps in the Upgrading AlphaBIOS section to complete the AlphaBIOS upgrade process.
11. Your AlphaBIOS upgrade is now complete. When prompted, restart AlphaBIOS.
12. Begin Windows NT installation. When prompted for your system type, select "Other" and insert the diskette containing the updated HAL files (that you copied in step 7) into the disk drive.  
Press Enter twice to select and confirm that you want to install the files from the diskette.
13. Proceed with the remainder of the Windows NT installation normally.

#### 12.1.4.1.3 Installing the Upgraded HAL and AlphaBIOS Files When Upgrading from WNT 3.51 to 4.0

If you already have Windows NT 3.51 or 4.0 installed, and are upgrading Windows NT, follow these steps to upgrade the HAL and AlphaBIOS Files:

You will need a blank formatted diskette for this procedure.

1. On the WWW, go to the URL: **/support/sysoft.asp**
2. Select either the AlphaServer 1000 5/300 or AlphaServer 1000A 5/300 link as appropriate.
3. Download the AlphaBIOS 5.23 or later zip file, as well as the Windows NT 4.0 HAL zip file.
4. Unzip the AlphaBIOS files into an empty temporary directory on your hard disk.
5. Unzip the HAL files into a separate empty temporary directory on your hard disk.
6. Copy the files from the temporary directory containing the unzipped HAL files to a blank formatted diskette.
7. Copy the .ROM file from the temporary directory containing the unzipped AlphaBIOS 5.23 files to an empty formatted diskette.
8. Shutdown and restart your system.
9. At the AlphaBIOS boot screen, press F2 to enter Setup.
10. Follow the steps in the Upgrading AlphaBIOS section of the AlphaBIOS Users Guide to complete the upgrade process.
11. Your AlphaBIOS upgrade is now complete. When prompted, restart AlphaBIOS.
12. Begin Windows NT 4.0 installation. When prompted for your system type, select "Other" and insert the diskette containing the updated HAL files into the disk drive. Press Enter twice to select and confirm that you want to install the files from the diskette.
13. Proceed with the remainder of the Windows NT 4.0 installation normally.

#### 12.1.4.1.4 Installing the Upgraded HAL and AlphaBIOS Files if You Have a System That Will Not Boot After a CPU Module Replacement/Upgrade

**Note:** You will need a second, working Alpha system to complete these steps.

**Note:** The firmware upgrade procedure also applies if you replace your motherboard, and your system will not boot.

You will need 2 blank formatted diskettes for this procedure.

#### *Resuscitating an AS1000 5/xxx or AS1000A 5/xxx System After a CPU Board Replacement*

##### **Obtaining the needed files:**

1. On the WWW, go to the URL: <http://www.windows.digital.com/support/sysoft.asp>
2. Select either the AS1000 5/300 or AS1000A 5/300 link as appropriate.
3. Download AlphaBIOS 5.23 or later, as well as the Windows NT 3.51 or Windows NT 4.0 HAL, depending on which version of the operating system you are running. If you are running both versions of the operating system, download both files.

##### **Preparing the firmware update disk:**

4. Unzip the AlphaBIOS files to a temporary directory on your hard disk.
5. Open a command window, and switch the temporary directory into which you unzipped the AlphaBIOS files.
6. Label a blank diskette "Firmware Update" and insert the disk into the diskette drive.
7. At the command prompt type `makeboot -f fwupdate.exe`.

This creates a bootable diskette. Leave the command window open, you will be using it again.

##### **Preparing the HAL update disk:**

8. Unzip the HAL files for your Primary Operating System onto a blank formatted floppy disk. Label the floppy Updated Windows NT HAL 3.51 or 4.0 as appropriate.
9. In the command window, type `copy a:halpinna.dll a:hal.dll` and press Enter.



*(continued)*

**Preparing the system to update the firmware:**

10. Open the system and move the jumper on J4 to the leftmost pair of pins (this assumes the motherboard connectors on the CPU module are facing away from you). This enables the system to boot from a floppy disk.

Leave the system open, as you will be moving this jumper back to its original location later in this procedure.

11. Insert the firmware update diskette into the disk drive of the non-working system.
12. Power up the non-working system.

The firmware update image is automatically loaded.

13. Once the firmware update image has been loaded, you will be prompted with the following query, "If you have a floppy containing option firmware, Please insert it now and hit <return> when ready." Press Enter.

14. At the UPD> prompt, type update and press Enter.

You will be prompted to confirm the update. Type y and press Enter.

The update proceeds, and the UPD> prompt appears once the update is complete.

15. Power off your system.
16. Return the jumper on J4 to the rightmost pair of pins (this assumes the motherboard connectors on the CPU module are facing away from you) and close your system.
17. Power on your system. AlphaBIOS should now load properly.

*(continued)*

**Updating the HAL file:**

18. At the AlphaBIOS boot screen, press F2 to enter AlphaBIOS Setup.
19. At the Setup screen, select then select OS Selection Setup and press Enter.
20. Select the Primary boot selection (the first one listed) and press Enter.

Write down the values of the both boot file fields. You will need them later.

21. Tab to the Boot File field and change the location to the A: drive.
22. Tab to the Directory field and delete everything except OSLOADER.EXE.
23. Press Enter, and then F10 to save the changes. Press Enter to confirm the changes, then press ESC twice to return to the Boot screen.
24. Insert the appropriate updated Windows NT HAL disk into the disk drive, and press Enter to boot Windows NT.

Windows NT boots using the system files on the floppy disk. The boot process is slower than normal because the system files are being read from the diskette drive.

25. Open File Manager or Explorer, and select the OS directory on your system partition. The system partition is usually drive D:.
26. Within the OS directory, select the WINNT351 or WINNT40 directory, whichever is your primary operating system.

If you do not see any files in the righthand pane, change the File Manager or Explorer settings as appropriate to show all files and file extensions.

27. Rename the HAL.DLL file to HAL.OLD.
28. Copy the HAL.DLL from the floppy disk you prepared into the directory containing the HAL.OLD file.
29. Shutdown and restart your system.

*(continued)*

**Restoring the AlphaBIOS OS Selection Setup:**

30. At the AlphaBIOS boot screen, press F2 to enter AlphaBIOS Setup.
31. At the Setup screen, select Utilities then select OS Selection Setup and press Enter.
32. Select the Primary boot selection and press Enter. Restore the values you wrote down for the Boot file and Directory fields.
33. Press Enter, and then F10 to save the changes. Press Enter to confirm the changes, then press ESC twice to return to the Boot screen.

The upgrade is now complete. The Primary Operating System will boot properly, but if you have another version of Windows NT installed, you must update the HAL.DLL for that version before attempting to boot that version.

Note: The firmware upgrade procedure also applies if you replace your motherboard, and your system will not boot.

## 12.2 Troubleshooting Information

### 12.2.1 Power Problems

Symptom	Action
System does not power on.	Check the power source and power cord.
	Check that the system's top is properly secured. A safety interlock switch shuts off power to the system if the top cover is removed.
	If there are two power supplies, make sure both power supplies are plugged in.
	Check the On/Off switch setting on the operator control panel.
	Check that the ambient room temperature is within environmental specifications (10-40°C, 50-104°F).
	Check that internal power supply cables are plugged in at both the power supply and system motherboard.
Power supply shuts down after a few seconds (fan failure).	Using a flashlight, look through the front (to the left of the internal StorageWorks shelf) to determine if the fans are spinning at power-up. A failure of either fan causes the system to shut down after a few seconds.

## 12.2.2 Power Supply Configuration Rules

The power supplies for AlphaServer 1000(A) systems support two different modes of operation. In addition, UPS options are available.

Power supply modes of operation:

1. **Single power supply**---Supports systems with:
2. **Dual power supply (redundant mode)**---Provides redundant power ( $n + 1$ ).

In redundant mode, the failure of one power supply does not cause the system to shut down. Normal operation continues with no impact on the system.

No jumper needs to be installed to activate redundant mode power.

Note: Total combined power of all outputs per supply cannot exceed 400 watts.

- ◆ 36 A or less of 3.3 V power
- ◆ 52 A or less of 5.0 V power
- ◆ 11 A or less of +12.0 V power
- ◆ 0.2 A or less of -12.0 V power
- ◆ 0.2 A or less of -5.0 V power
- ◆ The combination of 3.3 V power and 5.0 V power cannot exceed 335 watts.

## 12.2.3 Redundant PSU failure

When a redundant power supply fails the processor is interrupted. A **SCB 620** non fatal interrupt will be logged in the Error Log. The operating system may be set up to notify the system-manager.

## 12.2.4 Diagnostic Flow for Boot Problems

Symptom	Action
System cannot find boot device.	<p>Check system configuration for correct device parameters (node ID, device name, and so on).</p> <p>For DEC OSF/1 and OpenVMS:</p> <p><b>show config</b> <b>show device</b></p> <p>For Windows NT:</p> <p><b>Display hardware configuration</b> <b>Set default variables</b></p> <p>Check the system configuration for correct environment variable settings.</p> <p>For DEC OSF/1 and OpenVMS:</p> <p><b>auto_action</b> <b>bootdef_dev</b> <b>boot_osflags</b> <b>os_type</b></p> <p>For problems booting over a network, check the <b>ew*0_protocols</b> or <b>er*0_protocols</b> environment variable settings: Systems booting from a DEC OSF/1 server should be set to <b>bootp</b>; systems booting from an OpenVMS server should be set to <b>mop</b>.</p> <p>For Windows NT:</p> <p><b>FWSEARCHPATH</b> <b>AUTOLOAD</b> <b>COUNTDOWN</b></p>
Device does not boot.	<p>For problems booting over a network, check the <b>ew*0_protocols</b> or <b>er*0_protocols</b> environment variable settings: Systems booting from a DEC OSF/1 server should be set to <b>bootp</b>; systems booting from an OpenVMS server should be set to <b>mop</b>.</p> <p>Run device tests to check that boot device is operating.</p>

### 12.2.5 Diagnostic Flow for Errors Reported by the Operating System

Symptom	Action
System is hung or has crashed.	<p>Examine the crash dump file.</p> <ul style="list-style-type: none"><li>• Refer to OpenVMS AXP Alpha System Dump Analyzer Utility Manual for information on how to interpret OpenVMS crash dump files.</li><li>• Refer to the Guide to Kernel Debugging (AA-PS2TA-TE) for information on using the DEC OSF/1 Crash Utility.</li></ul>
Errors have been logged and the operating system is up.	<p>Examine the operating system error log files to isolate the problem.</p> <p>If the problem occurs intermittently, run an operating system exerciser, such as DEC VET, to stress the system.</p>

## 12.2.6 BLITZ: AS1000A - Problem with Digital UNIX Pack

Blitz number: TD 2216  
Date: 24 jan 1997

### **Problem:**

Console firmware V4.7 does not place the correct system values used by the operating system for the operating system to recognize the AS1000A Model 4/233 type. This prevents user a from installing an application pack that requires a license. Console firmware V4.7 is on the Alpha Firmware V3.8 CD

### **Resolution/Workaround:**

Use V4.8 console firmware or later which is available from the Alpha Firmware V3.9 and higher.



## 12.2.7 BLITZ: No Updates for TruCluster 1.4 only 1.4A

Blitz number: TD 2302  
Date: 5 jun 1997

### **Introduction:**

Recently DIGITAL started shipping version 1.4A of the TruCluster product. This version contains an important patch for all systems that are using the MEMORY CHANNEL revision 11 (CCMAA-AA) boards. Additionally, version 1.4A adds support for the AS1000A.

### **Problem:**

If you, or any of your customers, have CCMAA-AA MEMORY CHANNEL hardware, or are planning to have AS1000A systems in a TruCluster Production Server or TruCluster MEMORY CHANNEL environment, you must upgrade all nodes to version 1.4A.

Further, version 1.4A supersedes version 1.4 of the TruCluster product. All future patches will be for version 1.4a only. This change does not affect patches for DECsafe ASE versions 1.2A and 1.3, and TruClusterversion 1.0.

### **Resolution/Workaround:**

Customers using version 1.4 TruCluster Available Server software are not required to upgrade to version 1.4A. However, since no patches will be issued for any TruCluster version 1.4 software, all customers should upgrade their software.

## 12.2.8 BLITZ: Floppy Data Read Problems AS1000(A)

Blitz number: TD 2528  
Date: 16 sept 1998

### **Problem statement:**

A dimensioning error in the sheet metal of the chassis used for the AS1000, AS1000A, AS1200, and DS5300 systems causes the floppy drive bezel to contact and be compressed against the system front bezel on the left-hand side.

### **Problem symptom:**

This has caused floppy data read problems in some systems.

### **Solution/Workaround:**

An ECO is in progress to correct this problem at the chassis supplier. The floppy is held in place with two screws on the left side of the chassis. As a workaround for Manufacturing and for those systems impacted in the field the screws that is toward the front of the floppy drive should be removed.

## Appendix A Useful Information Sources

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Responsible JGO engineer for Mikasa: **Wim Lemmers**.

### Related Documentation

Document	Order Number
AlphaServer 1000/1000A Series User Information English Spanish Italian German French Dutch Japanese	EK-PCDSA-UI EK-PCDSS-UI EK-PCDSI-UI EK-PCDSG-UI EK-PCDSP-UI EK-PCDSH-UI EK-PCDSY-UI
AlphaServer 1000/1000A Series CPU Module Information English German Spanish French Italian Dutch	EK-PCDSA-CI EK-PCDSG-CIEK-PCDSS-CI EK-PCDSP-CI EK-PCDSI-CI EK-PCDSH-CI
AlphaServer 1000/1000A Series Installation Information English	EK-PCDSA-II
KCRCM AlphaServer Remote Console Module Installation and User's Guide	EK-KCRCM-IN

### Where to find Blitzes, Specs, etc. (ProSIC)

An easy-to-use internet source, also known as ProSIC, for technical information, specs, blitzes, etc for all Alpha Server systems can be found at the following address:

**<http://sawhorse.cxo.dec.com>**

Search engine for Stars, Notes, etc.:

**<http://encke.alf.dec.com>**

## Where to Find Option Information

The Digital Systems and Options Catalog describes all options for AS1000(A) systems. In addition, Digital maintains a list of the latest supported options on the Internet, which you can access as follows.

Using a Worldwide Web browser (such as Mosaic or Netscape), follow links from URL:  
**<http://www.digital.com/info/alphaserver/tech.docs/alphasrv1000a/docs/>**

## Where to Find Firmware Updates

Firmware for all AlphaServer systems is available for download from the Internet. You can access the firmware as follows.

Using ftp, copy the file:  
**<ftp://ftp.digital.com/pub/Digital/Alpha/firmware/>**

Using a Worldwide Web browser (such as Mosaic or Netscape), follow links from URL:  
**<http://www.service.digital.com/alpha/server/firmware/>**

The files are structured as those on the firmware CD and are separated by CD release. For example, the contents of the V3.3 firmware CD are located at:  
**<ftp://ftp.digital.com/pub/Digital/Alpha/firmware/v3.3/>**

The latest firmware (if released since the last firmware CD) is located at:  
**<ftp://ftp.digital.com/pub/Digital/Alpha/firmware/interim/>**

## StorageWorks Information Source

For support on StorageWorks configurations, problems, etc, on the different platforms, you can contact the StorageWorks Support Group in Nijmegen. Different languages are spoken. When you call outside office hours, leave your telephone number at the answering machine. These people are known for their rapid and adequate response.

**DTN:** 889-9985  
**Tel:** +31 24 3529985  
**exchange:** StorageWorks-Europe@Digital.com

## Where to get Z-Help for Storage Products

Z-Help is a very handy information and configuration tool for Storage products, developed by Jan Visser. It is updated on a regular base. A self-extracting file may be copied from:

**<ftp://gouda.gwo.dec.com/download/zhhelp>**

Use the readme.txt file for installation information.

Note: Jan Visser cannot be held responsible for any problems as a result of incorrect information or incorrect use of the information provided by this tool.

## Partnumber Information Source

Both Digital and Vendor partnumbers can be found at the following location:

<http://www.jgo.dec.com/orion/orion.html>

## Technical and Logistics Support (ENGQA)

What does ENGQA do?

ENGQA coordinates, registers and monitors all Engineering related Service Calls.

All calls are screened and assigned to Subject Area:

- ◆ Technical questions/problems
- ◆ Documentation orders
- ◆ Hardware replication orders
- ◆ Questions about the Document Retriever system
- ◆ Questions about Internet/Intranet

ENGQA can be reached by Mail, Answering Machine and FAX 365 days a year, 24 hours a day. You can reach the people from the Service Desk directly during office hours (Amsterdam time zone), from Monday till Friday.

Mail addresses/Telephone/Fax:

**engqa@mail.dec.com** (Internet & Exchange)

Phone **+31 243529666**, DTN **889-9666**.

FAX **+31 243529625**, DTN **889-9625**.

## Training Information and Enrollment

All GSO Training (Nijmegen) course descriptions and the schedule are available on Intranet.

<http://gsoeng.jgo.dec.com/ozone/training/>

Click on Schedule

## Windows NT Support Information, HAL and AB Files

For Windows NT installation and support information as well as HAL and AlphaBIOS update files you may visit the following site:

<http://www.windowsnt.digital.com/support/>

To get around some hidden options you may search for **as1000note.asp** to get to as1000 specific release notes.

# Handy Tools for SCSI Termination Checking

You can order SCSI termination testers which have been developed in Nijmegen.  
Order the following partnumbers:

STT	<b>FE-ZZZOF-01</b>	Narrow SCSI tester
STT-W	<b>FE-08101-01</b>	Wide SCSI tester

Both are cheap but very handy tools to see how many terminators are present on a certain SCSI bus.

## Appendix B      Partnumbers, Cables, etc.

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### Partnumbers AS1000

#### Cables

17-03970-02	Floppy drive cable (34-pin)
17-03971-01	OCF module cable (10-pin)
17-00083-09	Power cord
17-03964-01	Power supply current sharing cable (3-pin)
17-31346-01	Power supply DC cable assembly (signal/misc, 15-pin), (+5V, 24-pin), (+3.3V, 20-pin)
17-03969-01	Power supply storage harness (12-pin)
70-32283-01	Interlock/Server management cable (2-pin)
17-03960-01	Internal StorageWorks jumper cable (50-pin)
17-03962-01	SCSI (J15 StorageWorks shelf to bulkhead connector or bulkhead to multinode) cable (50-pin)
17-03962-02	SCSI (J1 or J14 StorageWorks shelf to bulkh con) cable (50-pin)
17-03959-01	SCSI (embedded 8-bit) multinode cable (50-pin)
17-03960-02	SCSI RAID internal cable (50-pin)

#### CPU Modules

54-23297-01	200 MHz CPU daughter board
54-23297-03	233 MHz CPU daughter board
54-23297-04	266 MHz CPU daughter board
54-24719-01	300 MHz CPU daughter board

#### Fans

70-31350-01	99 mm fan
70-31351-01	120 mm fan

#### Internal StorageWorks

RZnn - VA	StorageWorks disk drive
54-23365-01	Internal StorageWorks backplane
17-03960-01	Internal StorageWorks jumper cable

#### Memory Modules

ME524-DE	1 x 4MB SIMM
ME534-DE	1 x 8MB SIMM
ME644-DE	1 x 16MB SIMM
ME654-DE	1 x 32MB SIMM
ME664-DE	1 x 64MB SIMM
PB7MA-AA	Memory Kit, 16MB *4xME524-DE
PB7MA-AB	Memory Kit, 32MB *4xME534-DE
PB7MA-AC	Memory Kit, 64MB *4xME644-BE
PB7MA-AE	Memory Kit, 256MB *4xME664-DE

**Other Modules and Components**

70-31348-01	Interlock switch
54-23308-01	Motherboard
21-29631-02	NVRAM chip (E14)
54-32423-01	NVRAM TOY clock chip
54-23302-02	OCP module
30-41976-01	Power supply
70-31349-01	Speaker
12-41297-01	External SCSI terminator
12-41667-02	External SCSI terminator (for use with SWXCR controller)
12-27351-01	Serial port loopback connector (9-pin)
12-35619-01	Ethernet twisted-pair loopback connector
H8223	Ethernet BNC T connector
H8225	Ethernet BNC terminator (2)
74-50062-01	Key for door

**Removable Media**

RRDnn -CA	CD-ROM drives
TLZnn -LG	Tape drives
TZKnn -LG	Tape drives
RXnn -AA	Floppy drive



# Partnumbers AS1000A

## Cables

17-03970-02	Floppy drive cable (34-pin)
17-03971-01	OCP module cable (10-pin)
17-00083-09	Power cord
17-04195-01	Power supply current sharing cable (3-pin)
17-31346-01	Power supply DC cable assembly: Signal/misc, (15-pin) 17-03965-01, +5V harness (24-pin), 17-03966-01, +3.3V harness (20-pin) 17-03968-01
17-03969-01	Power supply storage harness (12-pin)
70-32283-01	Interlock/Server management cable (2-pin)
17-04021-01	Internal StorageWorks jumper cable (68-pin)
17-04022-01	Wide-SCSI (option data to StorageWorks shelf) cable (68-pin)
17-04022-02	Wide-SCSI (native controller to StorageWorks shelf) cable (68-pin)
17-04019-01	Wide-SCSI (J10 to bulkhead connector) cable (68-pin)
17-04233-01	SCSI (embedded 8-bit) removable-media cable (50-pin)

## CPU Modules

54-23297-03	233 MHz CPU daughter board
54-23297-04	266 MHz CPU daughter board
54-24719-01	300 MHz CPU daughter board
54-24799-01	333 MHz CPU daughter board
54-24799-02	400 MHz CPU daughter board
54-24799-03	500 MHz CPU daughter board

## Fans

70-31350-01	99 mm fan
70-31351-01	120 mm fan

## Internal StorageWorks

RZnn - VW	StorageWorks disk drive (16-bit SCSI)
54-23365-01	Internal StorageWorks backplane
12-45490-01	Internal SCSI terminator
17-04021-01	Internal StorageWorks jumper cable (68-pin)

## Memory Modules

ME524-DE	1 x 4MB SIMM
ME534-DE	1 x 8MB SIMM
ME644-DE	1 x 16MB SIMM
ME654-DE	1 x 32MB SIMM
ME664-DE	1 x 64MB SIMM
PB7MA-AA	Memory Kit, 16MB *4xME524-DE
PB7MA-AB	Memory Kit, 32MB *4xME534-DE
PB7MA-AC	Memory Kit, 64MB *4xME644-BE
PB7MA-AE	Memory Kit, 256MB *4xME664-DE

**Other Modules and Components**

70-31348-01	Interlock switch
54-23499-01	System Motherboard (on-board VGA, supports EV4 and EV5)
54-23499-02	System Motherboard (no on-board VGA, supports EV5 only)
21-29631-02	NVRAM chip (E14)
54-32423-01	NVRAM TOY clock chip (E78)
54-23302-02	OCP module
30-43120-02	Power supply (H7290-AA)
70-31349-01	Speaker
12-41667-05	External SCSI terminator (50-pin, removable-media bus)
12-41667-04	External SCSI RAID terminator (68-pin)
12-41667-02	External SCSI RAID terminator (50-pin)
12-27351-01	Serial port loopback connector (9-pin)
12-35619-01	Ethernet twisted-pair loopback connector
H8223	Ethernet BNC T connector
H8225	Ethernet BNC terminator (2)
74-50062-01	Key for door

**Removable Media**

RRDnn -CA	CD-ROM drives
TLZnn -LG	Tape drives
TZKnn -LG	Tape drives
RXnn -AA	Floppy drive

**Power Cord Numbers**

<b>Country</b>	<b>Power Cord BN Number</b>	<b>Digital Number</b>
U.S., Japan, Canada	BN09A-1K	17-00083-09
Australia, New Zealand	BN019H-2E	17-00198-14
Central European (Aus, Bel, Fra, Ger, Fin, Hol, Nor, Swe, Por, Spa)	BN19C-2E	17-00199-21
U.K., Ireland	BN19A-2E	17-00209-15
Switzerland	BN19E-2E	17-00210-13
Denmark	BN19K-2E	17-00310-08
Italy	BN19M-2E	17-00364-18
India, South Africa	BN19S-2E	17-00456-16
Israel	BN18L-2E	17-00457-16