COMPAQ

AlphaServer ES40
Release Notes

Part Number: EK–ES240–RN. C01

October 1999

This document supplies the hardware release notes for the *Compaq AlphaServer* ES40 system and is intended for anyone operating, managing, or maintaining the system.

This document covers the hardware release notes for the *AlphaServer* ES40. Sections in this document include:

- Operating System Support

- Memory Performance Considerations

- Memory Allocation

- Installing Disk Cages

- OpenVMS Configuration Restriction

- OpenVMS Galaxy Support

- Tru64 UNIX Configuration Restriction

- Booting Linux

- Console_memory_allocation Environment Variable

- Fibre Channel Support

- Miscellaneous Errata

Operating System Support

The *AlphaServer* ES40 system supports the Tru64 UNIX, Linux, and OpenVMS operating systems. The Microsoft Windows NT operating system is not supported. Information about Windows NT in the hardware documentation does not apply to this system.

Memory Performance Considerations

Interleaved operations reduce the average latency and increase the memory throughput over non-interleaved operations. With one memory option (4 DIMMs) installed, memory interleaving will not occur. With two identical memory options (8 DIMMs) installed, memory read-write operations are two-way interleaved. With four identical memory options (16 DIMMs) installed, memory read-write operations are four-way interleaved, maximizing memory throughput.

The output of the **show memory** command provides the memory interleaving status of the system.

```
P00>>>show memory
  Array       Size       Base Address      Intlv Mode
 ---------  ----------  ----------------   ----------
     0         256Mb     0000000060000000    2-Way
     1         512Mb     0000000040000000    2-Way
     2         256Mb     0000000070000000    2-Way
     3        1024Mb     0000000000000000    2-Way

    2048 MB of System Memory
```

Memory Allocation

The SRM console allocates enough memory for most configurations. If you installed options that require more memory than the SRM console has allocated, the console dynamically resizes itself to provide additional memory to support the new configuration. The following crash/reboot cycle can occur several times until the console has allocated enough memory. An abbreviated example of the output to a serial console screen is shown on the next page.

1. The console powers up.
2. Drivers try to allocate more "heap space" (space for more memory) but cannot.
3. The console displays a message similar to the following:

```
CPU0: insufficient dynamic memory for a request of 4592 bytes
Console heap space will be automatically increased in size by 64KB
```

4. The console takes an exception.
5. The console allocates more heap space and restarts with memory set to the required size.

After the console completes its final reinitialization, the console banner is displayed, followed by the P00>>> prompt. Enter the **show heap_expand** command to verify that the console has allocated more memory. You can then boot the operating system. No other action is required, and the crash/reboot cycle should not occur again.

If you subsequently change your configuration, enter the following command to reset the heap space to its default before you boot the system:

```
P00>>> set heap_expand none
```

Resizing may or may not occur again, depending on whether the console requires additional heap space.

```
initialized idle PCB
initializing semaphores
initializing heap
initial heap 200c0
memory low limit = 15e000
heap = 200c0, 17fc0
initializing driver structures
initializing idle process PID
initializing file system
initializing hardware
initializing timer data structures
lowering IPL
CPU 0 speed is 500 MHz
create dead_eater
create poll
create timer
create powerup
access NVRAM
Memory size 2048 MB
testing memory
......
probe I/O subsystem
probing hose 1, PCI
bus 0, slot 1 -- pka—NCR 53C895
bus 0, slot 3 -- mca—DEC PCI MC
```

```
bus 0, slot 4 -- mcb—DEC PCI MC
.
.
.
starting drivers
entering idle loop
initializing keyboard
starting console on CPU 1
initialized idle PCB
initializing idle process PID
lowering IPL
CPU 1 speed is 500 MHz
create powerup
.
.
.
Memory Testing and Configuration Status
  Array       Size        Base Address
---------  ----------  ----------------
    0        512Mb      0000000040000000
    1       1024Mb      0000000000000000
    2        256Mb      0000000060000000
    3        256Mb      0000000070000000

     2048 MB of System Memory
Testing the System
CPU0: insufficient dynamic memory for a request of 4592 bytes
Console heap space will be automatically increased in size by 64KB
   PID       bytes   name
--------  ----------  ----
00000000     27360 ????
00000001     23424 idle
00000002       800 dead_eater
00000003       800 poll
00000004       800 timer
00000005    499584 powerup
00000031    129536 pwrup_diag
00000013       896 ????
00000016      1056 ????
00000026       128 ????
00000017       512 ????
00000006      2880 tt_control
00000007       800 mscp_poll
00000008       800 dup_poll
00000012      2336 shell_0
0000000A     13920 ????
0000000D     13920 ????
00000010     13920 ????
0000000B      2336 shell_1
0000000E      2336 shell_2
00000011      2336 shell_3
00000029       128 ????
00000014       992 rx_ewa0
00000018       512 ????
0000001F       992 rx_eib0
0000001C       992 rx_eia0
0000001D       160 ????
00000025      1024 rx_eie0
00000021       992 rx_eic0
0000002C       160 ????
00000023       992 rx_eid0
0000002F       160 ????
00000024       128 ????
00000028       992 rx_eif0
00000027       160 ????
0000002B      1024 rx_eig0
0000002E       992 rx_eih0
0000002D       160 ????
0000002A       128 ????
00000030       128 ????
00000038      2080 ????
```

```
0000003D      22848 sh_cmdsub
00000040       5696 show
00000041        800 setmode


SYSFAULT CPU0 - pc = 0014faac
exception context saved starting at 001FD7B0
GPRs:
  0: 00000000 00048FF8  16: 00000000 0000001E
  1: 00000000 00150C80  17: 00000000 EFEFEFC8
  2: 00000000 001202D0  18: 00000000 001FD2F8
  3: 00000000 000011F0  19: 00000000 00000025
  4: 00000000 0010C7B8  20: 00000801 FC000000
  5: 00000000 00000020  21: 00000000 0008A8B0
  6: 00000000 00000000  22: 00000000 0010ACB8
  7: 00000000 00038340  23: 00000000 00000001
  8: 00000000 00000000  24: 00000000 00000000
  9: 00000000 00000000  25: 00000000 00000001
 10: 00000000 00000000  26: 00000000 0014FAAC
 11: 00000000 3FFFF520  27: 00000000 00150C90
 12: 00000000 001254D0  28: 00000000 00038518
 13: 00000000 0013BB20  29: 00000000 001FD8F0
 14: 00000000 0010C7C0  30: 00000000 001FD8F0
 15: 00000000 00000001
dump of active call frames:
PC  =   0014FAAC
PD  =   001202D0
FP  =   001FD8F0
SP  =   001FD7B0


.
.
.
initialized idle PCB
initializing semaphores
initializing heap
initial heap 200c0
memory low limit = 15e000
heap = 200c0, 17fc0
initializing driver structures
initializing idle process PID
initializing file system
initializing hardware
initializing timer data structures
lowering IPL
CPU 0 speed is 500 MHz
create dead_eater
create poll
create timer
create powerup
access NVRAM
Memory size 2048 MB
testing memory
......
probe I/O subsystem
probing hose 1, PCI
bus 0, slot 1 -- pka—NCR 53C895
bus 0, slot 3 -- mca—DEC PCI MC
.
.
.
bus 0, slot 15 -- dqb—Acer Labs M1543C IDE
starting drivers
entering idle loop
initializing keyboard
starting console on CPU 1
initialized idle PCB
initializing idle process PID
lowering IPL
CPU 1 speed is 500 MHz
create powerup
.
.
.
```

```
Memory Testing and Configuration Status
  Array        Size        Base Address
---------    ----------    ----------------
    0          512Mb       0000000040000000
    1         1024Mb       0000000000000000
    2          256Mb       0000000060000000
    3          256Mb       0000000070000000

     2048 MB of System Memory
Testing the System
Testing the Disks (read only)
Testing the Network
Partition 0, Memory base: 000000000, size: 080000000
initializing GCT/FRU at offset 1dc000
AlphaServer ES40 Console V5.5-3059, built on May 14 1999 at 01:57:42

P00>>>show heap_expand
heap_expand              64KB
P00>>>
```

Installing Disk Cages

The following procedure replaces Section 5.15 (pages 5-38 to 5-40) of the *Compaq AlphaServer ES40 Owner's Guide*. Before starting this procedure, refer to the *Owner's Guide* for instructions on the following:

- Removing enclosure panels (Section 5.1)
- Removing covers from the system chassis (Section 5.2)

WARNING: To prevent injury, access is limited to persons who have appropriate technical training and experience. Such persons are expected to understand the hazards of working within this equipment and take measures to minimize danger to themselves or others.
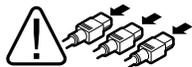
WARNING: To prevent injury, unplug the power cord from each power supply before installing components.

NOTE: Install the first cage as the right cage in a pedestal or rackmount system or as the top cage in a tower system.

Shut down the operating system before starting the procedure.

1. Remove enclosure panels and remove the cover from the PCI card cage as described in Sections 5.1 and 5.2 of the *Compaq AlphaServer ES40 Owner's Guide*.

2. Install the SCSI controller ❶ in the PCI backplane.

3. Unscrew the four screws securing the disk cage filler plate ❷ and set them aside. Discard the filler plate.

4. When installing the first disk cage, set the jumper (J10) to the parked position (one pin only).

5. When installing the second disk cage, set the jumper (J10) to the on position (across both pins).

6. Slide the cage ❸ part way into the system chassis.

7. Pull out the fans blocking access to the cabling.

8. Connect the power source cable ❹ to the storage backplane.

9. Plug one end of the 68-conductor SCSI cable ❺ (17-04867-01) into the SCSI controller ❶. Route it through the opening ❻ in the PCI cage. Snap open the cable management clip ❿, route the cable through, and close the clip. Plug the other end ❼ of the cable into the storage backplane.

10. When installing the first disk cage, plug the 16-position end ❽ of the 29-inch cable (17-04914-01) into the PCI backplane. Route the cable through the opening in the PCI cage and plug the 14-position end into the J2 connector on the storage cage.

    When installing a second cage, plug the end of the 6-inch cable ❾ (17-04960-01) marked "out" into the J9 connector on the back of the first cage, and plug the end marked "in" into the J2 connector on the second cage.

    NOTE: Cable 17-04914-01 and cable 17-04960-01 are mutually exclusive.

11. Slide the cage the rest of the way into the system chassis and replace the four screws set aside previously.

12. Replace the fans.

13. Replace the PCI card cage cover and enclosure covers.

14. Install hard drives as described in Section 5.6 of the *Compaq AlphaServer ES40 Owner's Guide*.

Verification

1. Turn on power to the system.

2. When the system powers up to the P00>>> prompt, enter the SRM **show device** command to determine the device name. For example, look for dq, dk, ew, and so on.

Labels in figure: 3, 6, 8, 1, 5, 10, 2, J10, 7, J2, 4, J9, 9, J2, First Cage, Second Cage, J2
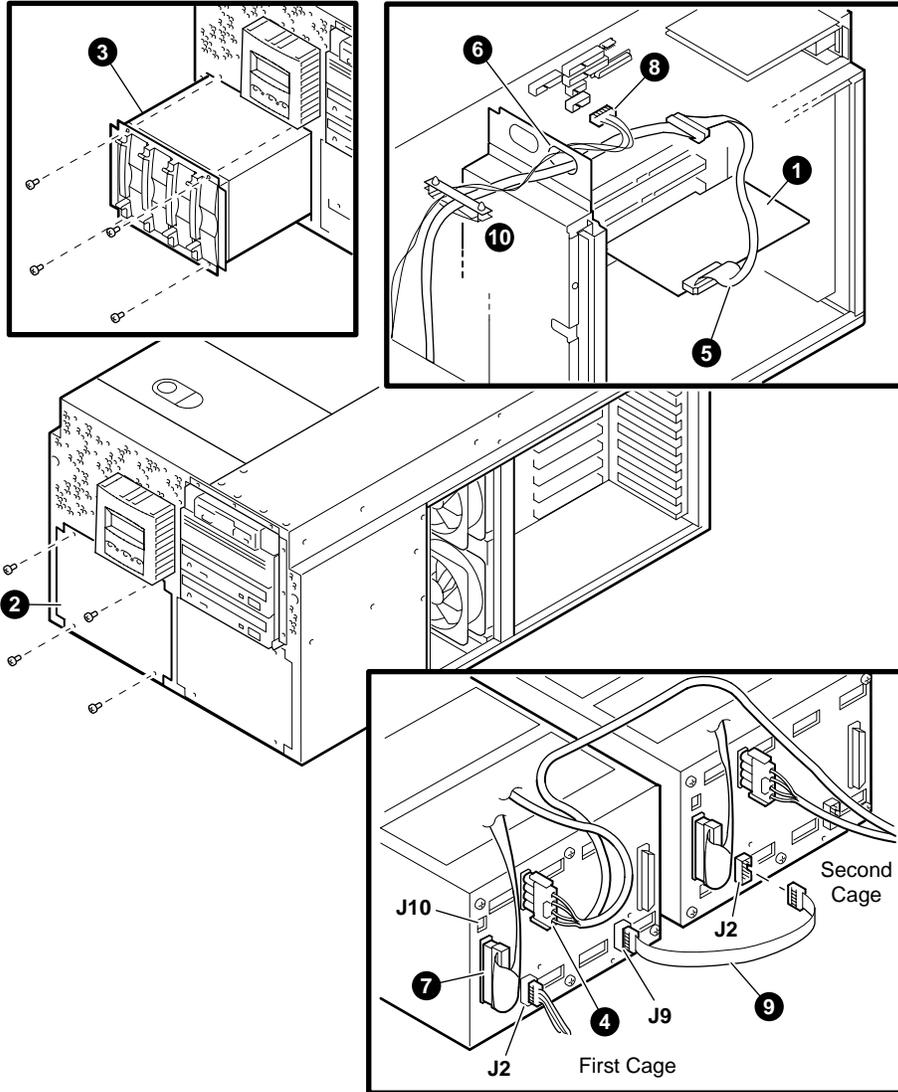
PK0299

OpenVMS Configuration Restriction

If you have a KZPAC RAID controller, it must be installed in a slot on PCI bus 1. It cannot be installed on PCI bus 0. See Section 5.12 of the *AlphaServer ES40 Owner's Guide* for PCI slot locations.

OpenVMS Galaxy Support

OpenVMS Galaxy is now supported on AlphaServer ES40 systems.

The Galaxy Software Architecture on OpenVMS uses adaptive partitioned multiprocessing (APMP) to execute multiple instances on OpenVMS in a single computer. Software logically partitions CPUs, memory, and I/O ports by assigning them to individual instances of OpenVMS. Each individual instance is a complete system with the resources it needs to execute independently. Resources such as CPUs can be dynamically reassigned to different instances of OpenVMS.

Documentation for creating an OpenVMS Galaxy computing environment on the ES40 is available on the remedial kit that supports this functionality:

Kit name: DEC-AXPVMS-VMS721-DS20E_ES40-V0100--4.PCSI
URL: http:/www.service.digital.com/patches

The documentation will also be included in the *OpenVMS Alpha Galaxy Guide*, available at http://www.openvms.digital.com:8000/.

To create an OpenVMS Galaxy environment on an *AlphaServer* ES40 system, you must download the V5.5-107 console firmware from the following location.

http://ftp.digital.com/pub/Digital/Alpha/firmware/interim/es40/
BOOTP or MOP file: v55b_clupdate.exe
MOP file: v55b_clupdate.sys

Information for creating bootable floppies of the firmware image is at:
http://ftp.digital.com/pub/Digital/Alpha/firmware/interim/es40/updateConsole.htm

The VMS721_LAN kit must also be installed, as documented in the kit cover letter.

Tru64 UNIX Configuration Restriction

Multifunction PCI options cannot be installed in PCI bus 0, slot 1 or slot 2. Multifunction options currently include:

- KZPCM–DA dual Ultra SCSI differential/10/100 MB Ethernet combo
- DE504–BA PCI-based 10/100 Mbit quad channel Ethernet adapter

See Section 5.12 of the *Compaq AlphaServer ES40 Owner's Guide* for PCI slot locations.

Booting Linux

The procedure for installing Linux on an AlphaServer ES40 is documented in the *Linux Installation and Configuration Guide for AlphaServer DS10, DS20, ES40, and AlphaStation XP1000 Computers.* You can obtain the installation document from the following URL:

http://www.digital.com/alphaserver/linux/install_guide.html

1. Power up the system to the SRM console and enter the **show version** command.

    ```
    P00>>> show version
    version              V5.4-2 May  19  1999 14:53:22
    P00>>>
    ```

    You need V5.4-2 or higher of the SRM console to install Linux. If you have an lower version of the firmware, you will need to upgrade. For instructions, see the *AlphaServer ES40 Owner's Guide* or the following URL. You can also download the latest images from this URL.

    http://ftp.digital.com/pub/DEC/Alpha/firmware/.

2. Before booting Linux, enter the **show device** command to determine the unit number of the drive for your boot device. In the following example DKA300 is a hard disk, DKA500 is a CD, and DVA0 is a floppy drive.

    ```
    P00>>>show device
    dka300.3.0.7.1           DKA300                          RZ1CF-CF  1614
    dka500.5.0.7.1           DKA500      TOSHIBA CD-ROM XM-5701TA  0557
    dva0.0.0.0.0             DVA0
    pka0.7.0.7.1             PKA0                      SCSI Bus ID 7  5.57
    .
    .
    .
    ```

3. Set the following SRM environment variables to configure boot parameters. This example shows configuration commands to boot the floppy created by the Linux installation.

    ```
    P00>>>set bootdef_dev dva0
    P00>>>set boot_file vmlinux.gz
    P00>>>set boot_osflags "root=/dev/hda"
    P00>>>show boot*
    boot_dev              dva0.0.0.0.0
    boot_file            vmlinux.gz
    boot_osflags         root=/dev/hda
    boot_reset           OFF
    bootdef_dev          dva0.0.0.0.0
    booted_dev
    booted_file
    booted_osflags
    ```

4. Insert the boot floppy and enter the **boot** command. The following example shows abbreviated **boot** output:

```
P00>>>b
(boot dkb0.0.0.3000.0 -file boot/vmlinux.gz -flags root=/dev/hda)
block 0 of dkb0.0.0.3000.0 is a valid boot block
reading 152 blocks from dkb0.0.0.3000.0
bootstrap code read in
base = 200000, image_start = 0, image_bytes = 13000
initializing HWRPB at 2000
initializing page table at 3ff8e000
initializing machine state
setting affinity to the primary CPU
jumping to bootstrap code
Linux version 2.2.12 (jestabro@linux04.mro.dec.com) (gcc version egcs-
2.90.29 980515 (egcs-1.0.3 release)) #21 Fri Sep 10 16:55:01 EDT 1999
Booting on Tsunami variation Clipper using machine vector Clipper
Command line: root=/dev/hda bootdevice=scd0 bootfile=boot/vmlinux.gz
setup_smp: 2 CPUs probed, cpu_present_map 0x3, boot_cpu_id 0
Console: colour VGA+ 80x25
Calibrating delay loop... 996.15 BogoMIPS
Memory: 1033720k available
POSIX conformance testing by UNIFIX
Entering SMP Mode.
secondary_console_message: on 0 from 1 HALT_REASON 0x0 FLAGS 0x1ee
secondary_console_message: on 0 message is 'P01>>>START  P01>>>'
smp_boot_cpus: Total of 2 Processors activated (1992.29 BogoMIPS).
start_secondary: commencing CPU 1 current fffffc003ffe0000
Alpha PCI BIOS32 revision 0.04
PCI: Probing PCI hardware
Linux NET4.0 for Linux 2.2
.
.
.
  General self-test: passed.
  Serial sub-system self-test: passed.
  Internal registers self-test: passed.
  ROM checksum self-test: passed (0x24c9f043)
.
.
.

Red Hat Linux release 6.0 (Hedwig)
Kernel 2.2.12 on an alpha

peng1 login:
```

Console_memory_allocation Environment Variable

The **console_memory_allocation** environment variable determines which memory locations the SRM console will allocate for its private use.

- If you are running Tru64 UNIX, set this environment variable to **old**.

- If you are creating an OpenVMS Galaxy environment, set this environment variable to **new**. For more information on OpenVMS Galaxy, see the section entitled "OpenVMS Galaxy Support."

Fibre Channel Support

The Fibre Channel adapter (KGPSA-BC) is supported on V5.5 or higher of the SRM console firmware. Refer to the *WWIDMGR User's Manual*, which is included on the Alpha Systems Firmware Update CD, V5.5 (and higher). The file wwidmgr_v10.pdf can be found in the [.DOC] subdirectory on the V5.5 CD. The V5.6 CD will contain .pdf, .doc, and .ps versions of the file.

Miscellaneous Errata

- The "Fan 5, 6 failed" message in Table 7-2 of the *AlphaServer ES40 Owner's Guide* should be amended to read as follows:

  Main fan (6) **and** redundant fan (5) failed.

- The **pk*0_soft_term** environment variable, described in Section 2.24.22 of the *AlphaServer ES40 User Interface Guide*, does not support differential mode.

- Section 5.6 of the *Owner's Guide* states that hard drives can be hot swapped (removed and replaced while the system is running). That information should be amended. Disk drive hot swap is not currently supported within the internal drive cages. Support for disk drive hot swap within the internal drive cages is a planned future enhancement.