Chapter 13
DEC 3000 AXP

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If you have any suggestions as to what you would like to see in this chapter or any comments please let me know.

13.1 First Generation Alpha Products

13.1.1 DEC 3000 Model 300L AXP - Pelica

- 100 MHz CPU, 32-256 MB memory
- No Turbo channel, Integral HX (8 plane)
- Graphics can not be upgraded as turbo slots cannot be used

13.1.2 DEC 3000 Model 300 AXP - Pelican

- 150 MHz CPU, 32-256 MB memory, ECC Protected
- Two Turbo Channel slots (50 MB/sec), Integral HX (8 plane)
- TX (24 plane), PXG+ (8/24 plane)
- Cache 1st level 8 Kb I-cache-8 Kb D-cache, 2nd level 256 Kb
- Memory is expandable in 16 or 64MB increments, each simm being 8 or 32 MB, memory can be of mixed simms, as long as each bank contains the same size of simm. 32 Mb simms must be installed first. There are 4 banks each of 2 slots, hence 8 memory slots in total. Memory bus speed 114 MB/sec.
- Monitor video port
- Internal storage upto two 3.5-inch drives (rz26) or one rx26 and a rz26. IE: One removeable device.
- One SCSI-2 bus, (50 way Honda connection)
- 10BASE-T network port, (adapter for AUI or thinwire)
- ISDN port, audio Port, serial rs232 Port (asyn/sync)
- Keyboard/mouse port, Halt button, Audio port
- Diagnostic display leds

13.1.3 DEC 3000 Model 400/400S AXP (S for Server) - Sandpiper

- Available as desktop and deskside pedestal. Both configurations are available as a server or as a Workstation
- 133 MHz, 32-512 MB memory,ECC Protected
- Cache 1st level 8 Kb I-cache-8 Kb D-cache, 2nd level 512 Kb
- Memory bus speed 106 MB/sec
- Three Turbo Channel slots (90 MB/sec)
- Internal storage upto two 3.5-inch drives (rz26) or one
- rx26/rrd42/tlz06/tzk10 and a rz26. IE: one removeable device
- External storage upto seven devices (centronics connector)
- Two SCSI-2 buses, One internal, One External
- Ethernet AUI, ISDN port, 10BASE-T port
- Serial rs232 port (asyn/sync), Keyboard/mouse port, Audio port
- Halt button, Alternate console switch
- Alternate console/Printer port
- Diagnostic display leds

13.1.4 DEC 3000 Model 500/500S AXP(S for Server) - Flamingo, DEC 3000 Model 500X - Hotpink

- Available as workstation or server packages, Both configurations can be deskside pederstal or rack mounted
- The 500/500S have a 150 MHz CPU, 6 Turbo slots
- The 500X have a 200 MHz CPU, 5 Turbo slots
- Cache 1st level 8 Kb I-cache-8 Kb D-cache, 2nd level 512 Kb
- Memory bus speed 114 MB/sec, Memory 32Mb-1GB
- Internal storage upto four 3.5-inch devices (rz26) or two 5.25-inch half-height removable device rx26/rrd42/tzk10, not tz30
- External storge upto seven devices. (centronics connector)
- Integral HX (8 plane) hence monitor video port
- Video refresh switch
- Ethernet AUI, ISDN port, 10BASE-T port
- Serial rs232 port (asyn/sync), Keyboard/mouse port, Audio port
- Halt button, Alternate console switch
- Alternate console/Printer port

13.1.5 Prestoserve

A Prestoserve option which uses one turbochannel slot is available for all of the above machines except the 300L.

13.1.6 Workstation Specifics

- HX graphics one turbo slot, (8 plane) 1280 by 1024 resolution
- TX graphics one turbo slot, (24 plane)
- PXG+ graphics two turbo slots. (8 or 24 plane with 24 plane Z)
- PXG Turbo graphics three turbo slots, (See graphics doc's)

Open VMS AXP only supports the HX graphics option without additional layered products (PHIGS, GKS, or PEX).

DEC OSF/1 supports all of the graphic options listed above.

13.2 Second Generation Alpha Products

Require OpenVMS AXP V1.5 or DEC OSF/1 AXP version 1.3A. Same enclosures and features as previous products.

13.2.1 DEC 3000 Model 300X and 300LX - Pelica Plus

- Follow on products to the 300 and 300L
- 300LX has 125 Mhz/8ns cpu
- 300X has 175 Mhz/6.6ns cpu

13.2.2 DEC 3000 Model 600 and 600S - Sandpiper Plus

- Follow on products to the 400 and 400S.
- 175 Mhz/5.7ns cpu
- The 400/400S may be upgraded to a model 600/600S by replacement of the system module and I/O module.

13.2.3 DEC 3000 Model 800 and 800S - Flamingo II

- Follow on products to the 500 and 500X
- 200 Mhz/5.0ns
- The 500 can be upgraded by module replacement, (presumably cpu and I/O board). The 500X is apparently a box swap !!

13.3 Console commands

Table 13–1: Set/Show: (for environmental variables)

auto_action	"boot/halt"	Specifies the action the console should take any time the system is turned on
bootdef_dev	"dka300"	Sets the default boot device
boot_osflags	"e,0"	Sets the boot flags, this environment variable is usually operating system dependant
boot_reset	"on/off"	Determines if system init performed before boot
diag_loe	"on/off"	Allows diag to loop on error
diag_quick	"on/off"	Set the diagnostic startup to normal or fast
diag_section	"1/2"	Sets dignostic mode, (Do not use 3!!!)
enable_audit	"1/2"	Enables boot audit trail, default is on
langauge	" "	3 is english see docs
mop	"on/off"	Enables/disables network listener
password	"pass"	Sets password (must be 16 characters)
radix	"0/10/16"	Defines base radix default is 0
scsi_reset	"0-7"	Causes a time delay after scsi reset see docs
secure	"on/off"	Enables security feature see docs
trigger	"on/off"	Sets the remote trigger on/off
server	"on/off"	Set to on if server †
scsi_a	"6 or 7"	Sets the host scsi id for bus a, scsi_b for b

†NB: For server Systems (hence no graphics) if the server environment variable is set to off the system will fail POST with SCC error on LK401 keyboard. Systems are leaving Manufacturing with this parameter incorrectly set.

13.3.1 Other commands

- show (device, config, memory or error)
- boot qualifier(s) device_name
  where device_name is the device
  qualifier is -fl for boot flags, -fi for boot file
- start, continue , test
- deposit, examine, repeat
- halt, initialise, login
- help, help advanced

13.3.2 Examples

13.3.2.1 Booting Open VMS AXP

Conversational	boot -fl 0,1 device
Booting from sys3	boot -fl 3,0 device
Booting standalone	boot -fl e,0 device
Solicited Boot	boot -fl 0,80 device

For solicited boot enter directory and filename ie [dec3000]m300_v3_0.exe

13.3.2.2 Booting DEC OSF/1

Booting to single user mode	boot -fl s device (a for multiuser)
Booting alternate kernel	boot -fl i device

System will prompt for kernel image etc.

13.3.2.3 Testing

test mem,nvr	(tests memory and nvr ram)
test mem:nvr	(test memory first, then other tests, finish with nvr test)
test device ?	for listing

13.4 Diagnostics

Three different diagnostic environments:

13.4.1 Powerup console environment

This mode only applies when power is first applied to the system, and before the system reaches console mode.

13.4.2 Customer (console) mode diagnostic environment

Select this mode as follows:

Shutdown operating system, press halt, and type:

set diag_s 1

From this environment single diagnostic testing is possible. IE: test mem.

13.4.3 Service (console) mode diagnostic environment

To select this mode:

set diag_s 2 return,

Special loopback connectors may be required to run certain tests. Multiple tests can be run. IE: test mem,nvr.

13.5 Testing

The test command lets you test the entire system, a portion of the system (or subsystem), or specific device. If you do not specify a parameter, the system will test all components.

- test test_device optional_parameters
  where test_device = the device name of the device or subsystem
  optional_par= optional parameters accepted by a subsystem

If the action performed will destroy data, an OK? prompt is given requiring confirmation before the test will continue. The confirmation is ok.

Table 13–2: Available tests

asic	scatter/gather registers
mem	Performs ECC testing of memory
nvr	NVR and integrity of TOY/NVR
scc	serial communication controller/mouse/chip
ni	lance chip functionality
tcn	turbo channel option at slot n
scsi	controller chips SCSI ASIC scsi bus and DMA
isdn	isdn and audio subsystem
cxt	cxt graphics
tcx	where x is turbo channel slot

Table 13–3: Additional parameters

test	scsi	erase	spins up and erases a rx disk
test	scsi	format	formats a rx26
test	scsi	verify	verifies that all blocks on a fixed disk can be read
test	scsi	?	for list of available scsi tests
test	tcx	?	to view turbo channel tests

See docs for further additional parameters.

13.6 PALcode - An Explanation

A Privileged Architecture Library (PALcode) is a set of subroutines that are specific to a particular Alpha operating system implemmentation. These subroutines provide operating system primitives for context switching, interrupts, exceptions and memory management. PALcode is similiar to the BIOS libraries that are provided in personal computers.

There is a set of PALcode for each implementation of Alpha. The 21064 is the first implementation. PALcode can be unique for an operating system. For instance OpenVMS AXP and DEC OSF/1 have different sets of PALcode, which is included in the system firmware.

PALcode has the following Properties:

1. Implementation

   PALcode is a set of machine code routines (21064)
   In the DEC 3000 range the routines are kept in the System Firmware FEROMS.
   On powerup the PALcode is loaded into main memory
   The firmware contains PALcode for Open VMS AXP and DEC OSF/1

2. Atomicity

   Once a PALcode routine is started it cannot be preempted or interupted
   The routines are considered as one instruction that cannot be divided into parts

3. Privileged

   PALcode routines run in a privileged environment, enabling them to have control over all aspects of the hardware.

4. Physical Memory References

   PALcode runs with instruction stream mapping disabled (IE: uses physical addresses), and can reference the data stream using virtual or physical addresses.

13.7 Firmware

The System board ROM contains the following firmware components:

VMS AXP PALcode version ie X5.41
OSF PALcode version ie X1.14
Console Program
SCC Boot Driver
CXT Console Port Driver
TOY/NVR Self Test
ASIC Self Test
Firmware Run Time Library Routines

The I/O board ROM contains the following firmware components:

Memory Self Test
CXT Graphics Self Test and Utilities
NI Driver
NI Self Test
SCC Self Test
ISDN/Audio Self Test
SCSI Self Test and Utilities
MIPS emulator

The following table shows the compatibility between firmware revisions and revisions of Open VMS AXP and DEC OSF/1.

Table 13–4: Operating System version vs Firmware revision

Firmware Rev	OpenVMS AXP	DEC OSF/1
DEC 3000 Model 300/300L AXP:		
2.1	Not Supported	1.2A
2.2	T1.5-FT4	Not Supported
2.3	Not Supported	1.2A
2.4	1.5	1.2A,1.3
3.0	1.5-1H1,1.5	1.3A,1.3
DEC 3000 Model 400/400S AXP and Model 500/500S/500X AXP:		
1.0	1.0	not supported
1.1	1.0	BL10
2.1	1.0	1.2
2.2	T1.5-FT4	Not Supported
2.4	1.5	1.2
3.0	1.5-1H1,1.5,1.0	1.3A,1.3
DEC 3000 Model 600/600S AXP and 800/800S AXP:		
3.0	1.5-1H1	1.3A

The Alpha AXP system firmware update kit comes on CD-ROM, but can also be copied from TIMA tools.

Table 13–5: Firmware part numbers

Part No's	Order NO	Part NO
External Firmware kit	QZ-003AA-E8.2.5	
Internal Firmware kit	QZ-003AA-F8.2.5	
Release Notes		AA-PW8YE-TE
CD-ROM		AG-PTMWG-BE
License Letter		AV-PYWAB-TE

13.7.1 Firmware Update Procedure

Always refer to the latest release notes before attempting to upgrade the console firmware. All of the DEC 3000 series have a ROM update jumper which enables the flash rom, this jumper is normally installed in the enable position at the factory.

13.7.1.1 Via CDrom

boot -fl 0,80 dka400

The Console Firmware CD has a VMS file structure hence the VMS syntax of boot_osflags. Enter the file name of the Firmware update utility that you wish to run, as follows:

BOOTFILE:[DEC3000]M300_V3_0.EXE

After the boot process completes, the Firmware update utility menu is displayed, the available commands are:

update	Updates the current firmware to the new version
verify	Verifies that the firmware in flash ROM is the same as the firmware on the Update utility disc
list	Lists the devices that the update utility can update
show	Shows the current version of the firmware installed on your system
set	Sets the current system type
?	Provides help on each of the update utility functions

After loading the new firmware a hard system reset must be performed.

Also on the Firmware update CD are firmware flash rom images for turbo channel options, ie PMAGB-BA, PMAZB-AA and PMAZC-AA.

13.7.1.2 Over the Network from an Ultrix system

The firmware can also be upgraded via the network from a VMS, Ultrix or infoserver.

On the AXP system:

```
>>>set password
PSWD0>>>
PSWD1>>>
>>>set mop on
>>>set trigger on
```

On the ultrix system using the root account:

Copy the boot image from tape or over the network to /usr/lib/mop/m300_v3_0.sys

Also check the process /etc/mop_mom is running with ps -aux | grep mop_mom. If not start it with /etc/mop_mom.

addnode "node" -p sva-0 "password" -h 08-00-2b-xx-xx-xx -l /usr/lib/mop/ m300_v3_0.sys.

Now boot the AXP system with boot esa0 and follow instructions in the firmware update release notes.

13.7.1.3 From a tape - under Open VMS AXP

First copy firmware from tape to a disk:

```
$ mount mka500:/over=id
$ copy/log/contig mka500:m300_v3_0.exe sys$system:m300_v3_0.exe
```

To boot new firmware:

```
>>>boot -fl 0,80 dka200
Bootfile:[sys0.sysexe]m300_v3_0.exe
```

Follow firmware update procedure.

Alternatively the firmware update utility can be made bootable from a data disk using writeboot.exe. For example:

```
$ mount dka100: disk_1/system
$ set def dka100:[000000]
$ create/dir [.system_firmware]
$ copy/log/contig source:m300_v3_0.exe dka100:[system_firmware]*.*
$ run sys$system:writeboot.exe
    Update VAX portion of boot block (default is Y) : n
    Update AXP portion of boot block (default is Y) : Y
    Enter Alpha boot file : dka100:[system_firmware]m300_v3_0.exe
```

To boot firmware, boot dka100.

13.7.1.4 From a tape - under DEC OSF/1

To be supplied.

13.8 FCOs and problems

13.8.1 FCO History

The following tables list FCOs for DEC 3000 models 400 and 500. There are none for the model 300 so far.

Table 13–6: DEC 3000-400 FCOs

KN15-BA-O001 EQ-01660-01	Replaced System board and I/O board of early ship units CPU board Part no 51-21149-02 Minimum rev E09, I/O board Part no 54-21813-01 Minumum rev D07
KN15-BA-O002	Same Problem discription as KN15-AA-O002, see below New System board required Part no 54-21149-02 being rev H09 for D etch and H10 for F etch modules

Please report any occurrence's of this problem as this FCO is currently under review

Table 13–7: DEC 3000-500 FCOs

KN15-AA-O001 EQ-01659-01	Replaced System board and I/O board of early ship units CPU board Part no 54-21149-01 Minimum rev F05, I/O board Part no 54-21147-01 Minimum rev E07
KN15-AA-O002 EQ-01676-01	As needed FCO for interaction problem between Turbochannel DMA reads and conflicted I/O writes, results in the possibility of a system hanging forever. The system will require a hard reset to clear this system hang. All of this is invisible to the software, since conflicts on the turbochannel are purely a hardware fault New System board required Part no 54-21149-01 being rev J05 for D etch and J06 for F etch modules

Please report any occurrence's of this problem as this FCO is currently under review

KN15-AA-O003 EQ-01677-01	Replacement internal Power Supply Harness Part no 70-30004-01 rev B01

13.8.2 Lost Keys for DEC 3000 Model 500 and 800

Early DEC 3000 model 500 systems used a mechanical lock assembly with one of 50 unique key combinations, 2201-2250. The lock and key assembly (Part no 12-36437-02) has changed to a common lock but the part no remains the same. Visual verification of the common lock spindle (body) for the key code 2201.

Keys are not stocked separately and must be ordered through logistics as a lock assembly (Part no 12-36437-02) which contains the lock and two keys. The 50 unique key codes 2201-2250, were stamped on the customer's key.

Unique customers keys can only be ordered through the vendor, CAMLOCK, using the vendor part no PTK10-xxxx where xxxx is one of the key code numbers 2201 through 2250.

Customers are responsible for their unique keys. Lost keys are to be addressed by service on a Time and Materials basis for all customers including warranty and contract customers.

First try the common DEC 3000 key, keycode 2201.

While it is possible to pry the door loose with minimum damage, the cost of replacing damaged doors and procuring replacement keys and locks should be charged to the customer.

A common lock, key code 2201, can then be obtained to replace the unique lock.

13.8.3 DEC 3000 Model 400 Problem with RZ25-E

When replacing faulty RZ25-E disk drives in the 3000-400 check that the replacement drive has a serial no of SH332XXXXX or higher. Replacement drives with a serial no of SH331XXXXX and earlier need to be checked to ascertain whether a Texas Instrument (TI) IC is installed in location U40. The chip in question is marked with 31142KT and 7406, if there is a small Texas emblem with the letter "i" in it in the top left corner then return the drive to logistics for a replacement. Any other emblem in that corner then the drive will be ok.

Systems leaving the factory will not contain these faulty drives, only drives in the logistic loop need to be checked. The faulty drives may not always come ready on system powerup, succesive power-up cycles may cause this problem to be intermittant.

13.9 Software Installation on DEC 3000 series Alpha Systems

As I've been asked many times how to install VMS on various platforms I thought it might not be a bad idea to provide a few notes. These notes apply to OpenVMS AXP only, at present.

Reference Material available on TIMA tools.

OpenVMS AXP version 1.5 Upgrade and Installation Manual (Part no AA-PV6XA-TE) explains all one needs to know about installing OpenVMS AXP but here is an abbreviated explanation.

The CDrom containing the OpenVMS AXP software will be marked with the relevant version, currently v1.5. The operating system is not present on any of the layered product CD's.

On the AXP system boot standalone backup from the CD drive. If the Cd drive is assumed to be dka400.

IE: boot -fl 0,0 dka400

Note, Standalone backup resides in the sys0 root and not in sysE as was the case on older CD's.

Now restore the OpenVMS saveset to the new system disk using the following command:

$ BACKUP/VERIFY/IMAGE DKA400:OPENVMSALPHA015.B/save_set target:

When the above command has completed halt the machine and boot the new system disk.

IE: boot -fl 0,0 dka0

* Enter the volume label for this system disk [OPENVMSALPHA015]:

Select optional software you wish to have installed. You can choose to install one or more of the following OpenVMS alpha components.

o HELP MESSAGE	- 8000 blocks
o UETP	- 1500 blocks
o DECwindows workstation support	- 41000 blocks
o DECwindows base support	- 3500 blocks

If you are installing this kit on a workstation or on a VMScluster that includes workstations, you must choose the DECwindows workstation support option.

If you are installing this kit on a system that does not include workstations, but does include Xterminals then you may want to choose the DECwindows workstation support option to provide needed font files.

If you plan to run DECwindows software you MUST choose the DECwindows base support option.

Note:

This kit does NOT contain full DEcwindows support. It includes only the DECwindows base and workstation support components. To obtain full DECwindows support you must also install the seperate DECwindows Mtif for OpenVMS AXP layered product.

* Enter the location of the OpenVMSAlpha kit:
* Is the OpenVMSAlpha media ready to be mounted? [N]

Answer password information for system, systest and filed accounts.
Answer cluster information for system.

After the software has been restored from the CD, the machine will run Autogen and reboot.

13.9.1 Post installation tasks

Install licenses using @SYS$UPDATE:LICENSE Decompress Library files, check with customer using @SYS$UPDATE:LIBDECOMP Build standalone backup, @SYS$UPDATE:STABACKIT

To install DECwindows Motif you need the layered product CD's. Currently the DECwindows Motif saveset is located on CD one.

$ MOUNT/OVER=ID DKA400:
$ @SYS$UPDATE:VMSINSTAL DECW$MOTIF_AXP011 DKA400:[DECW$MOTIF_AXP011.KIT]

After installing the above and rebooting you will have successfully installed OpenVMS AXP and Motif version 1.1. The system will now come up running the windowing software.