



# Alpha Motherboards Software Developer's Kit

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## Read Me First

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# 1 Alpha Motherboards Software Developer's Kit

Version 4.0 of the Alpha Motherboards Software Developer's Kit (SDK) enables system designers and developers to create and customize software and firmware for Alpha motherboards. The SDK contains source code, examples, and tools that support the development of new firmware for original Alpha microprocessor designs.

## 1.1 Compact Disc Contents

The SDK compact disc contains the following directories and files.

Directory or File	Description
Doc	This directory contains the following online documentation in .PDF format: <ul style="list-style-type: none"><li>• <i>Alpha Motherboards SDK Read Me First</i> (this document)</li><li>• <i>Alpha Motherboards Debug Monitor User's Guide</i></li><li>• <i>Alpha Motherboards Software Design Tools User's Guide</i></li><li>• <i>Alpha Motherboards SRAM Mini-Debugger User's Guide</i></li></ul> It also contains associated documentation, such as the <i>Alpha Architecture Handbook</i> and user manuals for Alpha motherboards.
Ebsdk	This directory contains SDK software, tools, and source files for use on both the Windows NT and Tru64 UNIX operating systems.
Acroread-osf-301.tar.gz	Adobe Acrobat Reader for Tru64 UNIX, which you can use to view and print the documentation in .PDF format.
Ar302.exe	Adobe Acrobat Reader for Windows NT, which you can use to view and print the documentation in .PDF format. Windows NT also requires Compaq FX!32 (Fx32V1-4.exe), available on this CD-ROM.
Ebsdk-nt.zip	The notepad editor on Windows NT requires text files to contain the CR-LF end-of-line format. Therefore, the SDK tools and source files in this directory contain specially modified text files with the CR-LF end-of-line format.
Ebsdk_unix.tar.z	A compressed tar file containing the SDK tools and source files.
Fx32V1-4.exe	Compaq FX!32, used to run Adobe Acrobat Reader for Windows NT (Ar302.exe).

Directory or File	Description
License.txt	Alpha Motherboards SDK Software License.
Archive	Directory containing old SDK software, tools, and source files. These are made available for convenient reference, but are unsupported in this kit.
Readme.txt	Contains additional information about the contents and installation of the SDK.
Sdksetup	Setup file for Tru64 UNIX.
Setup.exe	Setup file for Windows NT.

## 1.2 Source Code and Tools in SDK Kit

The SDK source code supports the following motherboards:

- AlphaPC 264DP
- AlphaPC 164SX
- AlphaPC 164LX

### 1.2.1 Debug Monitor

The Debug Monitor command line interface:

- Downloads and executes programs
- Examines and deposits locations in I/O and memory subsystems
- Performs instruction-level debugging
- Performs remote source-level debugging using the DIGITAL Ladebug debugger

### 1.2.2 SROM Power-Up Code

SROM provides hardware initialization. The SROM power-up code:

- Provides initial bootstrap code
- Initializes the memory subsystem
- Runs from the Icache of the CPU
- Runs in PALmode
- Loads and executes higher-level firmware

### **1.2.3 SROM Mini-Debugger**

The SROM Mini-Debugger provides basic hardware debugging of an Alpha microprocessor. The SROM Mini-Debugger:

- Communicates through a special SROM RS-232 interface with autobaud detection
- Operates independently of the memory and I/O subsystems

### **1.2.4 Sample PALcode**

PALcode is the privileged architecture library code for the Alpha architecture. The sample PALcode provides a standard programming interface to the Alpha microprocessor and is modeled after the Tru64 UNIX PALcode. It is adaptable for embedded system designs and other UNIX-type operating systems.

### **1.2.5 Software Design Tools**

The SDK tools complement the compilers and debuggers shipped with the Windows NT and Tru64 UNIX operating systems. For example, included in the SDK are a GNU-based assembler and associated utilities, a compression utility, a formatting utility, and a tool that validates PALcode.

### **1.2.6 Firmware Images**

The following precompiled Debug Monitors are available in the Ebsdk/Ebfw/Obj/... directory:

- dp264 (AlphaPC 264DP)
- sx164 (AlphaPC 164SX)
- lx164 (AlphaPC 164LX)

## 2 Installing the SDK on Windows NT

This section contains instructions for installing the SDK on Windows NT systems. Section 3 contains equivalent information for Tru64 UNIX systems.

### 2.1 Windows NT System Requirements

To install the SDK on Windows NT systems, you need the following:

- 65MB of free disk space
- Windows NT V4.0 with Service Pack 3
- Microsoft Visual C++ V5.0 or later

### 2.2 Windows NT Installation

To install the Alpha SDK on an Alpha system running Windows NT, follow this procedure:

1. Insert the Alpha SDK compact disc into the CD-ROM drive.
2. Run Setup by clicking on Start and then on Run. Enter the path name for setup.exe. For example, if your CD-ROM device is drive E, enter the following command:  

```
E:\setup.exe
```
3. The setup procedure displays the SDK license agreement. To proceed, accept the license agreement.
4. The setup procedure checks to see if you have Adobe Acrobat Reader installed. If you do not, it offers to install Adobe Acrobat Reader. (You need this to view and print the documentation, which is in .PDF format.)
5. The setup procedure checks whether you have Compaq FX!32 installed; if you do not, the setup procedure offers to install it. If Adobe Acrobat Reader is installed, you also need Compaq FX!32 on Windows NT systems.
6. If FX!32 is installed, the setup procedure prompts you to reboot your system, which is necessary to run FX!32. Reboot your system.
7. The setup procedure prompts for the location where you want to install the SDK. The default location is c:\ebsdk.
8. The setup procedure unpacks the SDK to the specified directory.

## 2.3 Windows NT – Building Components and Tools from Sources

This section describes how to build the SDK components and tools from sources on Windows NT.

### 2.3.1 Building SDK Components on Windows NT

To build the SDK components, follow this procedure.

1. Open a Windows NT command window by clicking on Start → Programs → Command Prompt.
2. Change the working directory to the directory where the SDK is installed.

```
C:\> cd \ebsdk
```

3. If you wish to delete files from previously built components, run the SDK clean utility.

```
C:\ebsdk> .\clean
```

4. Run the SDK configuration utility, as the following example shows. The utility asks a series of questions with default answers shown in square brackets. Press Enter to accept the default, or specify a different answer. You need to run the configuration utility only when the SDK is first installed, or when you wish to use directories or supported platforms different from those originally specified.

```
C:\ebsdk> .\configure
===== EBSDK configuration =====
cfdir = C:\ebsdk
Location of build directory:
 [C:\ebsdk/ebfw]: <Enter>
Location of build tools directory:
 [C:\ebsdk/eertools/ntalpha]: <Enter>
Location of bootable image directory:
 [C:\ebsdk/ebboot]: <Enter>
Select which targets you would like to build
lx164 <Y/N> [Y]:y
sx164 <Y/N> [Y]:y
dp264 <Y/N> [Y]:y
```

5. Change directory to the ebfw subdirectory of the SDK tree.

```
C:\ebsdk> cd ebfw
```

6. Issue the build command.

```
C:\ebsdk\ebfw> .\build
```

### 2.3.2 Building SDK Tools on Windows NT

The SDK tools come prebuilt and require no rebuilding. However, full sources and build procedures enable you to modify and rebuild the tools, if you wish.

Use the following instructions to rebuild the tools.

1. If you wish to delete files from previously built tools, run the SDK clean utility.

```
C:\ebsdk> .\clean
```

2. If you have not already done so, configure the SDK components as described in Section 2.3.1.

3. Change your working directory to the top-level tools source directory.

```
C:\ebsdk> cd ebttools\src
```

4. Issue the build command.

```
C:\ebsdk\ebtools\src> .\build
```

## 3 Installing the SDK on Tru64 UNIX

This section contains instructions for installing the SDK on Tru64 UNIX systems. Section 2 contains equivalent information for Windows NT systems.

### 3.1 Tru64 UNIX System Requirements

To install the SDK on Tru64 UNIX systems, you need the following:

- 65MB of free disk space
- An Alpha-based system running Tru64 UNIX V4.0A or later
- DEC C++ V5.7 or later

### 3.2 Tru64 UNIX Installation

To install the Alpha SDK on an Alpha system running Tru64 UNIX, follow this procedure:

1. Make sure that your system is configured with the CD-ROM enabled and that you know the device name and mount point for the CD-ROM drive.
2. Insert the Alpha SDK compact disc into the CD-ROM drive.
3. Change directory to the mount point of the CD-ROM. (Depending on your system configuration, you may need user privileges for this.)  

```
% cd/cdrom
```
4. Issue the following command to run `sdksetup.exe`:  

```
% ./sdksetup
```
5. The setup procedure displays the SDK license agreement. To proceed, accept the license agreement.
6. The setup procedure checks to see if you have Adobe Acrobat Reader installed. If you do not, it offers to install Adobe Acrobat Reader. (You need this to view and print the documentation, which is in .PDF format.)
7. The setup procedure prompts for the location where you want to install the SDK. Choose a directory to which you have write permission.
8. The setup procedure unpacks the SDK to the specified directory.

## 3.3 Tru64 UNIX – Building Components and Tools from Sources

This section describes how to build the SDK components and tools from sources on Tru64 UNIX.

### 3.3.1 Building SDK Components on Tru64 UNIX

To build the SDK components, follow this procedure.

1. At the UNIX shell prompt, change the working directory to the directory where the SDK is installed.

```
% cd ebsdk
```

2. If you wish to delete files from previously built components, run the SDK clean utility.

```
% ./clean
```

3. Run the SDK configuration utility, as the following example shows. The utility asks a series of questions with default answers shown in square brackets. Press Enter to accept the default, or specify a different answer. You need to run the configuration utility only when the SDK is first installed, or when you wish to use directories or supported platforms different from those originally specified.

```
% ./configure
===== EBSDK configuration =====
Location of build directory:
[/users/joe/ebsdk/ebfw]: <Enter>
Location of build tools directory:
[/users/joe/ebsdk/eftools/unix]: <Enter>
Location of bootable image directory:
[/users/joe/ebsdk/ebboot]: <Enter>
Select which targets you would like to build
lx164 <Y/N> [Y]:y
sx164 <Y/N> [Y]:y
dp264 <Y/N> [Y]:y
```

4. Change directory to the ebfw subdirectory of the SDK tree.

```
% cd ebfw
```

5. Issue the build command.

```
% ./build
```

### 3.3.2 Building SDK Tools on Tru64 UNIX

The SDK tools come prebuilt and require no rebuilding. However, full sources and build procedures enable you to modify and rebuild the tools, if you wish.

Use the following instructions to rebuild the tools.

1. If you wish to delete files from previously built tools, run the SDK clean utility from the ebsdk directory.

```
% ./clean
```

2. If you have not already done so, configure the SDK components as described in Section 3.3.1.

3. Change your working directory to the top-level tools source directory.

```
% cd ebttools/src
```

4. Issue the build command.

```
% ./build
```

## 4 Support

This section contains information about how to order firmware updates and obtain more information about Alpha development tools and products.

### 4.1 Ordering SRM Console Firmware Updates

Alpha SRM Console firmware images that were formerly supplied in the SDK are now available on the following separate CD-ROM from COMPAQ:

**Alpha Systems Firmware Update CD-ROM: QY-003AA-A8**

### 4.2 Ordering Windows NT Firmware Updates

Windows NT firmware images and Windows NT HAL images are available on the Alpha OEM website at the following URL:

<http://ftp.digital.com/pub/Digital/info/semiconductor/alpha/dsc-software-alpha.html>

### 4.3 Additional Information

The Alpha OEM website provides the following information for customer support.

URL	Description
<a href="http://www.digital.com/alphaoem">http://www.digital.com/alphaoem</a>	Contains the following links: <ul style="list-style-type: none"><li>• <b>Developers' Area:</b> Development tools, code examples, driver developers' information, and technical white papers</li><li>• <b>Motherboard Products:</b> Motherboard details and performance information</li><li>• <b>Microprocessor Products:</b> Microprocessor details and performance information</li><li>• <b>News:</b> Press releases</li><li>• <b>Technical Information:</b> Motherboard firmware and drivers, hardware compatibility lists, and product documentation library</li><li>• <b>Customer Support:</b> Feedback form</li></ul>

### 4.3.1 Alpha Documentation

The following table lists some of the available Alpha documentation. You can download Alpha documentation from the Alpha OEM World Wide Web Internet site:

<http://www.digital.com/alphaoem>

Click on **Technical Information**.

Then click on **Documentation Library**.

<b>Title</b>	<b>Order Number</b>
Alpha Architecture Reference Manual <sup>1</sup>	EY-W938E-DP
Alpha Architecture Handbook <sup>2</sup>	EC-QD2KC-TE
Alpha 21164 Microprocessor Hardware Reference Manual	EC-QP99C-TE
Alpha 21164 Microprocessor Data Sheet	EC-QP98C-TE
21164PC Alpha Microprocessor Hardware Reference Manual	EC-R2W0A-TE
AlphaPC 264DP Product Brief	EC-RBD0A-TE
AlphaPC 264DP User's Manual	EC-RB0BA-TE
AlphaPC 264DP Technical Reference Manual	EC-RB0DA-TE
AlphaPC 164SX Motherboard Product Brief	EC-R57CA-TE
AlphaPC 164SX Motherboard Windows NT User's Manual	EC-R57DB-TE
AlphaPC 164SX Motherboard DIGITAL UNIX User's Manual	EC-R8P7B-TE
AlphaPC 164SX Motherboard Technical Reference Manual	EC-R57EB-TE
AlphaPC 164LX Motherboard Product Brief	EC-R2RZA-TE
AlphaPC 164LX Motherboard Windows NT User's Manual	EC-R2ZQF-TE
AlphaPC 164LX Motherboard Tru64 UNIX User's Manual	EC-R2ZPC-TE
AlphaPC 164LX Motherboard Technical Reference Manual	EC-R46WC-TE
Alpha Motherboards Software Developer's Kit Product Brief	EC-QXQKD-TE

<b>Title</b>	<b>Order Number</b>
Alpha Microprocessors Motherboard Debug Monitor User's Guide	EC-QHUVG-TE
Alpha Microprocessors Motherboard Software Design Tools User's Guide	EC-QHUWE-TE
Alpha Microprocessors SROM Mini-Debugger User's Guide	EC-QHUXD-TE

<sup>1</sup> This manual is not available on the Alpha OEM website. To purchase the hard-copy *Alpha Architecture Reference Manual*, contact your local sales office or call Butterworth-Heinemann (DIGITAL Press) at 1-800-366-2665.

<sup>2</sup> This manual is already included in the SDK CD-ROM.