ALTERA®

MAX+PLUS® II   GETTING STARTED

MAX+PLUS® II

Programmable Logic Development System

Getting Started

Contents

Section 2   MAX+PLUS II—A Perspective

Section 3   MAX+PLUS II Tutorial

Illustrations

Tables

Preface

MAX+PLUS II Fundamentals

This section describes the MAX+PLUS II manual and on-line help documentation and conventions. You should be familiar with this information before using MAX+PLUS II documentation.

MAX+PLUS II Documentation

MAX+PLUS® II documentation is designed for the novice as well as for the experienced user. It includes manuals and extensive, illustrated Help.

MAX+PLUS II Documents

MAX+PLUS II systems include the following documents:

MAX+PLUS II Getting Started	Contains step-by-step instructions on how to install MAX+PLUS II hardware, software, and licenses on PCs and UNIX workstations. It also provides an overview of the entire MAX+PLUS II system, and a tutorial that takes you from design entry to device programming. In addition, it contains information about MAX+PLUS II command-line operation and Altera's support services. Free electronic copies of this manual are also available from Altera's world-wide web site at **http://www.altera.com**.
MAX+PLUS II AHDL	Contains complete information on the Altera Hardware Description Language (AHDL™), including a detailed *How to Use AHDL* section with many examples.
MAX+PLUS II VHDL	Provides information on how to use the Very High Speed Integrated Circuit (VHSIC) Hardware Description Language (VHDL) with MAX+PLUS II, including a *How to Use MAX+PLUS II VHDL* section with many examples.
MAX+PLUS II Verilog HDL	Provides information on how to use the Verilog Hardware Description Language (HDL) with MAX+PLUS II, including a *How to Use MAX+PLUS II Verilog HDL* section with many examples.
MAX+PLUS II Help Poster	Provides handy and colorful descriptions of how to use on-line help in MAX+PLUS II.

MAX+PLUS II also includes the following Software Interface Guides, which are available in the **\lit** directory of the MAX+PLUS II CD-ROM as Adobe Portable Document Format (PDF) files. These guides provide detailed step-by-step examples and important guidelines:

- *Cadence & MAX+PLUS II Software Interface Guide*
- *Mentor Graphics & MAX+PLUS II Software Interface Guide*
- *Synopsys & MAX+PLUS II Software Interface Guide*
- *Viewlogic Powerview & MAX+PLUS II Software Interface Guide*

These Software Interface Guides are also available from Altera's world-wide web site at **http://www.altera.com**.

☞   The MAX+PLUS II CD-ROM also includes the Adobe Acrobat Reader 3.0, which you can install on your hard drive in order to read the PDF files. Go to "Installing the Adobe Acrobat Reader" on page 51 for more information.

MAX+PLUS II Help

Your primary source of information on MAX+PLUS II is the complete on-line help. All of the information necessary to enter, compile, and verify a design and to program an Altera device is available in MAX+PLUS II Help.

Help also provides introductions to all MAX+PLUS II applications, guidelines for designing circuits with MAX+PLUS II, pin and logic cell numbers for each Altera device package, and summaries of other Altera documents, such as application notes, that can assist you with logic design.

How to Use MAX+PLUS II Documentation

How you use MAX+PLUS II documentation depends on your level of expertise and your approach to learning how to use a new tool.

If you are a novice user, you should take time to read the *MAX+PLUS II Getting Started* manual and complete the *MAX+PLUS II Tutorial* on page 155. Once you begin using MAX+PLUS II applications, you will find that the easy-to-use, extensive on-line help can quickly turn you into an expert MAX+PLUS II user. For basic information on using on-line help, refer to the *MAX+PLUS II Help Poster*. More detailed information on using Help is available in *MAX+PLUS II — A Perspective* on page 73.

If you are an experienced circuit designer or one who prefers to learn by experimenting, you will find the on-line help invaluable. Context-sensitive and menu-driven help give instant access to all MAX+PLUS II information.

Regardless of your level of expertise, you must follow the installation instructions provided in *MAX+PLUS II Installation* on page 1. Before you install the MAX+PLUS II hardware and software, you should also read the **read.me** file, located in the top-level directory of the MAX+PLUS II CD-ROM. Once you have installed MAX+PLUS II, you can open the **read.me** file through the Help menu in MAX+PLUS II.

If you are using EDA tools from Cadence, Mentor Graphics, Synopsys, or Viewlogic (Powerview), you should read the Software Interface Guide provided in the **\lit** directory of the MAX+PLUS II CD-ROM.

Altera Applications Engineers are also available to answer your questions. For more information about Altera's technical support services, see *Appendix A: Altera Support Services* on page 281.

Documentation Conventions

MAX+PLUS II manuals and MAX+PLUS II Help use the following conventions to make it easy for you to find and interpret information.

Terminology

The following terminology is used throughout MAX+PLUS II Help and manuals:

Term:	Meaning:
Button 1	Left mouse button.
Button 2	Right button on a two-button mouse, or middle and right buttons on a three-button mouse.
"point to"	Indicates that you should move the mouse so that the pointer is over the specified item.
"press"	Indicates that you must hold down a mouse button or key.
"click"	Indicates a quick press and release of a mouse button.
"double-click"	Indicates two clicks in rapid succession.
"choose"	Indicates that you need to use a mouse or key combination to start an action. For example, when you use the mouse to choose a button, you point to the button and click Button 1. When you use the keyboard to choose a command, you press Alt and then type letters that are underlined in the menu bar and menu.
"select"	Indicates that you need to highlight text and/or objects or an option in a dialog box with a key combination or the mouse. A selection does not start an action. For example: Select the AND2 primitive, then choose **Delete** from the Edit menu.
"turn on" / "turn off"	Indicates that you must click Button 1 on a checkbox or choose a menu command to turn a function on or off.

Typographic Conventions

MAX+PLUS II documentation uses the following typographic conventions:

Visual Cue:	Meaning:
Bold Initial Capitals	Command names, dialog box titles, and button names are shown in bold, with initial capital letters. For example: **Find Text** command, **Save As** dialog box, and **Start** button.
bold	Directory names, project names, disk drive names, filenames, filename extensions, and software utility names are shown in bold. Examples: **\maxplus2** directory, **d:** drive, **chiptrip.gdf** file. These items are not case-sensitive in the Windows environment; however, they are case-sensitive in the UNIX workstation environment. MAX+PLUS II Help shows these items in the case appropriate to the workstation environment.
Initial Capitals	Keyboard keys, user-editable application window fields, and menu names are shown with initial capital letters. For example: Delete key, the Start Time field, the Options menu.
"Subheading Title"	Subheadings within a manual section are enclosed in quotation marks. In manuals, titles of help topics are also shown in quotation marks.
Italic Initial Capitals	Help categories, section titles in manuals, application note and brief names, checkbox options, and options in dialog boxes are shown in italics with initial capital letters. For example: *Text Editor Procedures,* the *Check Outputs* option, the *Directories* box in the **Open** dialog box.
italics	Variables are enclosed in angle brackets (< >) and shown in italics. For example: *<filename>,* *<project name>***.acf** file.
Bold Italics	Manual titles are shown in bold italics with initial capital letters. For example: *MAX+PLUS II Getting Started.*

Visual Cue:	Meaning:
`Courier font`	Anything that must be typed exactly as it appears is shown in Courier. For example: `c:\max2work\tutorial\chiptrip.gdf`. Also, sections of an actual file, such as a Report File, references to parts of files (e.g., the AHDL keyword `SUBDESIGN`), and logic function names (e.g., `DFF` and `16cudslr`) are shown in Courier.
`Bold Courier font`	In syntax descriptions, bold Courier may be used to help distinguish literal text from variables.
1., 2., 3.,…, a., b., c.,…, *and* i., ii., iii.,…	Numbered steps are used in a list of items when the sequence of the items is important, such as the steps listed in a procedure.
■	Bullets are used in a list of items when the sequence of the items is not important.
v	The checkmark indicates a procedure that consists of one step only.
☞	The hand points to information that requires special attention.
👣	In MAX+PLUS II manuals, the feet show you where to go for more information on a particular topic.
👆	In MAX+PLUS II Help, the upward-pointing hand indicates that you can click Button 1 (the left mouse button) on any portion of the illustration that follows it to get help on that item. The mouse pointer changes to an upward-pointing hand when it is over a picture or word for which help is available.
Special symbols	Special symbols are used for these items:

    ↵   Enter key
    ⌐   Low-to-high transition
    ⌐   High-to-low transition

Key Combinations

Key combinations and sequences appear in the following format:

Format Cue:	Meaning:
Key1+Key2	A plus (+) symbol indicates that you must hold down the first key when you press the second key. For example: Ctrl+L means that you must hold down Ctrl while pressing L, then release both keys.
Key1,Key2	A comma (,) indicates that you must press the keys sequentially. For example: Alt,F1 means that you must press the Alt key and release it, then press the F1 key and release it.

Backus-Naur Form

The Backus-Naur Form (BNF) defines the syntax of the text file formats and message variables. BNF uses the following notation:

Characters:	Meaning:
::=	"is defined as"
<...>	Identifiers (i.e., variables)
[...]	Optional items
{ ... }	Repeated items (zero or more times)
... | ...	Indicates a choice between items
:n:n	Suffix indicates a range (e.g., *<name char>:1:8* means "from 1 to 8 name characters")
italics	Variables in syntax descriptions
`Courier font`	Literal text in syntax descriptions. Bold Courier font is sometimes used to help distinguish literal text from *italic variables* in syntax descriptions.

MAX+PLUS II Help Updates

MAX+PLUS II Help is updated whenever the MAX+PLUS II software is updated; therefore, the on-line information is always current.

☞ If you find a discrepancy between a MAX+PLUS II manual and the MAX+PLUS II on-line Help, you should rely on the MAX+PLUS II Help information.

You can get information on changes to MAX+PLUS II software and Help by choosing **New Features in this Release** (Help Menu) in MAX+PLUS II. Late-breaking news on Help and software is also available with the **READ.ME** command (Help menu).

☞ Between MAX+PLUS II software releases, check the Altera world-wide web page for additional news and information, including help from the Atlas solutions database. Go to **http://www.altera.com**.

Sample Files

A variety of sample design files are copied to your hard disk when you install MAX+PLUS II. The installation procedure automatically creates subdirectories for these files.

☞ The pathnames below are shown using the PC pathname convention of backslash (\) characters, but UNIX pathnames use forward slash (/) characters. On a UNIX workstation, the **/max2work** directory is a subdirectory of the **/usr** directory. Otherwise, the file and directory organization is identical.

■ The **\max2work\chiptrip** directory contains all files for the **chiptrip** tutorial project that is described in *MAX+PLUS II Getting Started*.

■ The **\max2work\ahdl** directory contains all sample files used to illustrate AHDL features in MAX+PLUS II Help and in the *MAX+PLUS II AHDL* manual.

■ The **\max2work\vhdl** directory contains all sample files used to illustrate VHDL features in MAX+PLUS II Help and in the *MAX+PLUS II VHDL* manual.

■ The **\max2work\verilog** directory contains all sample files used to illustrate Verilog HDL features in MAX+PLUS II Help and in the *MAX+PLUS II Verilog HDL* manual.

■ The **\max2work\edif** directory contains all sample files used to illustrate EDIF features in MAX+PLUS II Help.

Go to for more information about MAX+PLUS II directory structure.

Go to the Altera-provided Software Interface Guide for your third-party environment for information on the directory structure and sample files installed for third-party interfaces to MAX+PLUS II.

About *MAX+PLUS II Getting Started*

MAX+PLUS II Getting Started contains the following sections:

Section 1: MAX+PLUS II Installation gives hardware, software, and license installation instructions for PCs and UNIX workstations.

Section 2: MAX+PLUS II—A Perspective is an introduction to MAX+PLUS II software. It describes the on-line help and all MAX+PLUS II applications.

Section 3: MAX+PLUS II Tutorial takes you step-by-step through all facets of designing logic with MAX+PLUS II. It demonstrates three design entry methods and shows how to compile and simulate a project, analyze timing performance, and program an Altera device.

Appendix A: MAX+PLUS II Command-Line Mode describes how to operate the MAX+PLUS II Compiler, Timing Analyzer, and Simulator in batch mode from the command prompt under UNIX, Microsoft Windows NT, and Microsoft Windows 95.

Appendix B: Altera Support Services explains how to contact Altera's user support services.

Appendix C: Additional UNIX Workstation Configuration Information describes how to change additional UNIX workstation configuration items that control the appearance of MAX+PLUS II windows, serial port configuration, screen height and width, and printer and screen fonts.

Glossary

Index

Section

1

MAX+PLUS II Installation

This section describes how to install MAX+PLUS II software and programming hardware on PCs and UNIX workstations.

Installing MAX+PLUS II on PCs

If you are installing MAX+PLUS II on one or more PCs, read the instructions in the following sections:

Installing MAX+PLUS II on UNIX Workstations

If you are installing MAX+PLUS II on one or more UNIX workstations, read the instructions in the following sections:

☞ If you have any unanswered questions about MAX+PLUS II installation after reading this section or the **read.me** file, contact the Altera Applications Department:

Altera Corporation
Applications Department
101 Innovation Drive
San Jose, CA 95134
Telephone: (800) 800-EPLD (6:00 a.m. to 6:00 p.m. Pacific Time)
or (408) 544-7000 (7:30 a.m. to 5:30 p.m. Pacific Time)
Fax: (408) 544-6401

Go to *Appendix B: Altera Support Services* on page 281 for more information about contacting Altera for technical support, literature, and non-technical customer service.

The read.me File

The MAX+PLUS II **read.me** file provides up-to-date information on installation and operating requirements, including disk space and memory. You should read the **read.me** file before installing the software or hardware.

The **read.me** file is available in the top-level directory of the MAX+PLUS II CD-ROM. After installation, you can open the **read.me** file from the MAX+PLUS II Help menu.

Registering MAX+PLUS II Software

Registering your MAX+PLUS II software is necessary in order to receive future update information. In addition, for some MAX+PLUS II development systems, you must register your software in order to receive an authorization code that allows you to use the software.

You can register your MAX+PLUS II software in one of four ways, depending on the features included in your system and the hardware platform:

■ Visit the Altera world-wide web site at **http://www.altera.com**.

■ Register the first time you run the MAX+PLUS II software: a Fax Registration Form appears automatically to allow you to register. You can also access this form at any later time by choosing the **Register** button in the **Authorization Code** dialog box (Options menu) in MAX+PLUS II.

■ Fill out the registration card attached to the "STOP, PLEASE READ THIS FIRST" card that is included with your MAX+PLUS II system.

■ Fill out the "Workstation Registration and License File Request Form" included with your software to both register your software and obtain the license file required to install and run MAX+PLUS II for UNIX workstations.

This form asks you for the ID of the license server. The license server is the computer that will run the two Altera license daemons (**lmgrd** and **alterad**).

To determine the ID of the license server, type one of the following commands:

License Server Platform:	Command:
Sun SPARCstation running SunOS 4.1.3+	# /usr/bin/hostid ↵
Sun SPARCstation running Solaris 2.5+	# /usr/ucb/hostid ↵
HP 9000 Series 700/800 workstation running HP-UX 10.20+ (transpose the resulting value into hexadecimal to determine your license server ID)	# /usr/bin/uname -i ↵

License Server Platform:	**Command:**
IBM RISC System/6000 workstation running AIX 4.1+ (ignore the last two digits of the ID that is displayed and use the remaining 8 digits as the license server ID)	# /usr/bin/uname -m ↵

The FLEXlm licensing scheme allows either one or three license servers on a network. A single PC or UNIX workstation can function as the file server, license server, and user computer. The file server, license server, and user computer can also be separate UNIX workstations or PCs.

Go to "Configuring Network Licensing" on page 33 for more information about configuring the license server.

Go to *Appendix B: Altera Support Services* on page 281 for more information about contacting Altera technical support services.

Installing MAX+PLUS II on a PC

The following instructions describe the requirements and procedures for installing the MAX+PLUS II software on a PC or compatible computer running Microsoft Windows 95 or Windows NT. This section covers the following topics:

■ System requirements for PCs
■ Installing MAX+PLUS II software
■ Additional Windows NT Installation Steps
■ Additional NEC 9801 Installation Steps

Go to the *User's Guide* for your version of Microsoft Windows for information on optimizing your system to run MAX+PLUS II.

Go to the MAX+PLUS II **read.me** file for information on installing MAX+PLUS II software on PCs running other versions of the Windows operating system.

System Requirements for PCs

Your system must meet the following minimum requirements:

■ Pentium class or higher- (recommended) or 486-based PC
■ Microsoft Windows NT version 3.51 or 4.0 (recommended) or Microsoft Windows 95
■ Microsoft Windows-compatible graphics card and monitor
■ CD-ROM drive
■ Microsoft Windows-compatible 2- or 3-button mouse
■ Full-length 8-bit slot for the programming card
■ Parallel port

Go to the **read.me** file for specific information about disk space and memory requirements in the current version of MAX+PLUS II.

Go to the *User's Guide* for your version of Microsoft Windows for more information about fonts.

Installing MAX+PLUS II Software

The following instructions guide you through the installation of
MAX+PLUS II on the PC. The following topics are covered:

Determining Free Disk Space

The **Install** program calculates whether you have enough free disk space for
installation. The actual space required depends on the allocation unit size on
your hard disk, which you can determine by typing chkdsk ↵ at a DOS
prompt. Refer to the **read.me** file for precise information on the amount of
hard disk space required for installation.

Regardless of which drive you select for installing the MAX+PLUS II
software, the **Install** program requires at least 500 Kbytes of free hard disk
space on your **c:** drive.

Installing the Software

The following steps describe first-time installation with the Altera **Install**
program. Once you have completed the following installation procedure,
you can run MAX+PLUS II programs directly from your hard disk.

☞   Do not install MAX+PLUS II by copying files directly from the
      CD-ROM. The installation files are in compressed format and
      must be decompressed by the **Install** program.

These installation instructions assume the following conditions:

- Your hard disk drive is **c:**.
- You have already installed Windows NT 3.51 or 4.0 or Windows 95 in
  the **windows** directory.

☞   During installation, an internal error can occur if the portion of the PATH variable in your **autoexec.bat** file that specifies the location of your Windows directory does not include a disk drive letter. For example, a path of **\windows** will cause an internal error. You must edit the PATH variable to avoid this error.

To install the software, perform the following steps:

1.   If you are using anti-virus software packages such as the **vsafe.com** anti-virus software provided with MS-DOS version 6.2 or the **Disk Protect** anti-virus software provided with Norton Utilities, Altera recommends that you disable these and other similar software packages in your **autoexec.bat** file before installing MAX+PLUS II.

2.   Boot the computer from the hard disk and start Windows.

3.   Insert the MAX+PLUS II CD-ROM into a caddy if necessary, insert it into your CD-ROM drive, and perform one of the following:

    ✓   (For Windows NT 3.51) Choose **Run** from the Windows Program Manager File menu and type *<CD-ROM drive>*:\pc\maxplus2\install ↵ in the *Command Line* box.

    or:

    ✓   (For Windows NT 4.0 or Windows 95) Choose **Run** from the Windows Start menu and type *<CD-ROM drive>*:\pc\maxplus2\install ↵ in the *Open* box.

The MAX+PLUS II **Install** program starts. This program prompts you for all information needed to install MAX+PLUS II. You should install MAX+PLUS II in a separate directory from any previous MAX+PLUS II version. If your DOS path includes an existing MAX+PLUS II directory, the **Install** program will default to installing in that directory, so be sure to override the default directory during installation.

☞   Because improvements and other changes in the latest version of MAX+PLUS II software may fit projects differently from other versions, you may wish to finish existing projects with the earlier version. Altera also recommends that you archive a project before upgrading the latest version of MAX+PLUS II so that you can return it to an earlier version, if necessary.

4. Follow the directions provided on-screen. To get help on any step in the installation process, choose the **Help** button.

   ☞ You can abort the installation procedure at any time by choosing the **Exit** button.

5. If you wish, you can choose to leave the MAX+PLUS II Help files on the CD-ROM and have MAX+PLUS II access them from there. To have MAX+PLUS II access the Help files from the CD-ROM, follow these steps during installation:

   a. Choose **Custom Installation** in the **MAX+PLUS II Installation Options** dialog box.

   b. Turn off *MAX+PLUS II Help* under *Optional MAX+PLUS II Features*, and choose **Install**.

   c. After the **Install** program has finished, insert the following line in the [`system`] section of the **maxplus2.ini** file in your MAX+PLUS II system directory:

      `HELP_FILE_DIR=`<*CD-ROM drive*>`:\help` ↵

6. During installation of MAX+PLUS II on a PC running Windows 95, you may receive an error message that states that the file **a.azp** was not extracted. To correct this error, disable write caching for SmartDrive by typing the following command at a DOS prompt, then reinstall MAX+PLUS II:

   `smartdrv /x` ↵

7. If you receive an application error message while installing MAX+PLUS II on a Novell network, perform the following steps:

   a. Reboot the computer, but do not log onto the network.

   b. Reinstall MAX+PLUS II according to the installation instructions.

   c. Reboot the computer and log onto the network.

8. Once you have successfully installed MAX+PLUS II, the **read.me** file appears automatically. You should check the **read.me** file for important information on the MAX+PLUS II software. After checking the **read.me** file, exit from Windows.

9.   If you are using Windows 95, edit the setting for the `files` variable in your **config.sys** file, which is usually located in the top-level directory of your **c:** drive, as follows:

`files=50` ↵

10.   The **Install** program may modify your **autoexec.bat** file, which also is usually in the top-level directory of your **c:** drive, to make MAX+PLUS II run properly. You should examine this file to check whether it is compatible with other software on your system. The **Install** program saves the original file as **autoexec.bak**.

11.   Remove the CD-ROM from the drive and reboot your computer before starting MAX+PLUS II.

☞   See "MAX+PLUS II File Organization" on page 69 for a description of the directories and subdirectories created during installation.

You can uninstall MAX+PLUS II by following these steps, beginning with step 1 and choosing the **Uninstall** button instead of the **Install** button.

Go to "Installing the Adobe Acrobat Reader" on page 51 for information on installing the Adobe Acrobat Reader that is needed to read the Altera-provided Software Interface Guides for Cadence, Mentor Graphics, Synopsys, and Viewlogic (Powerview) EDA tools.

Additional Windows NT Installation Steps

The following sections guide you through additional steps for installing MAX+PLUS II on the PC. The following topics are covered:

■   Installing Windows NT Drivers
■   Disabling Floating-Point Emulation
■   Using MAX+PLUS II with NTFS

Installing Windows NT Drivers

On computers running Windows NT 3.51 or 4.0, you must install Windows NT drivers to support MAX+PLUS II after you run the **Install** program. The Sentinel driver is required for all MAX+PLUS II systems, and is automatically installed with MAX+PLUS II. The Altera Programmer driver

is required for systems that include the LP6 Logic Programmer Card; and the Altera ByteBlaster driver is required for systems that include the ByteBlaster. Both the Altera Programmer driver and the Altera ByteBlaster driver must be installed separately from MAX+PLUS II.

☞   You do not need to install the Logic Programmer Card or the ByteBlaster before installing the Altera Programmer or Altera ByteBlaster drivers.

To install the Altera Programmer driver, follow these steps:

1.   (Windows NT 3.51 only) Double-click Button 1 on the **Drivers** icon in the Control Panel, then choose the **Add** button to open the **Add** dialog box.

    or:

    (Windows 4.0 only) Double-click Button 1 on the **Multimedia** icon in the Control Panel, click Button 1 on the **Devices** tab, and choose the **Add** button to open the **Add** dialog box.

2.   Select *Unlisted or Updated Driver* from the *List of Drivers* list box and choose **OK**. The **Install Driver** dialog box opens.

3.   Type or select \<*MAX+PLUS II system directory*>\drivers in the text box, and choose **OK**. The **Add Unlisted or Updated Driver** dialog box opens.

4.   Select *Altera Programmer* from the list box and choose **OK**. The **Altera Programming Hardware Setup** dialog box opens.

5.   Select the appropriate bus type from the *Bus Type* list box. If you do not know the correct bus type, select *(E)ISA.*

6.   Select an unused I/O base address in your PC for your LP6 Logic Programmer Card from the *Physical Address* drop-down list box. The Programmer Card uses 16 contiguous I/O addresses, starting at the selected base address. Altera Programmer Cards are shipped with the default address 280 hex. For more information about changing the I/O address of the Programmer Card, see "Changing the LP6 Card Address Location" on page 56.

7.   To install the driver at the current address, choose **OK**. The **System Setting Change** dialog box is displayed.

Your Logic Programmer Card will operate only at the specified address.

If necessary, you can change the driver's I/O address.

To change the driver's I/O address in Windows NT 3.51, follow these steps:

a.   Double-click button 1 on the **Drivers** icon in the Windows NT Control Panel. The **Drivers** dialog box opens.

b.   Select *Altera Programmer* from the *Installed Drivers* list box, then choose the **Setup** button to open the **Altera Programmer Driver Setup** dialog box and edit the driver's I/O address.

To change the driver's I/O address in Windows NT 4.0, follow these steps:

a.   Double-click Button 1 on the **Multimedia** icon in the Windows NT 4.0 Control Panel. The **Multimedia Properties** dialog box opens.

b.   Click Button 1 on the **Devices** tab, select *Altera Programmer* under *Other Multimedia Devices*, and then choose the **Properties** button. The **Altera Programmer Properties** dialog box opens.

c.   Choose **Settings** to open the **Altera Programming Hardware Setup** dialog box and edit the driver's I/O address.

8.   If you wish to install another driver (e.g., for the ByteBlaster), choose the **Don't Restart Now** button in the **System Setting Change** dialog box and repeat the steps above to install another driver. Otherwise, choose the **Restart Now** button in the **System Setting Change** dialog box to reboot your computer.

To install the Altera ByteBlaster driver in Windows NT 3.51 or NT 4.0, follow these steps:

1.   Repeat steps 1 through 3 above.

2.   Select *Altera ByteBlaster* from the list box and choose **OK**.

3. To install the driver at the current address, choose **OK**. The **System Setting Change** dialog box is displayed.

4. Repeat step 8 above.

Disabling Floating-Point Emulation

If you are running MAX+PLUS II under Windows NT 3.51 or 4.0, Altera recommends that you turn floating-point emulation off to improve timing Simulator Netlist File (**.snf**) extraction time. Type the following command at the command prompt:

```
pentnt -o ↵
```

If you do not have the **pentnt.exe** program, contact Microsoft. (In Windows NT 3.51, the **pentnt.exe** program is normally located in the **system32** subdirectory of your Windows NT directory.)

If you are running MAX+PLUS II under another Windows operating system, there is no user control over floating-point emulation.

Using MAX+PLUS II with NTFS

If MAX+PLUS II is installed on a PC running Windows NT 3.51 or 4.0 with NTFS, the **maxplus2.ini** file should be readable and writable by all users, or each user should have his or her own copy of the file. Each user must use the **System** control available in the Windows NT Control Panel to set the MAXPLUS2_INI environment variable equal to the drive and directory containing the appropriate **maxplus2.ini** file. See "Creating & Using a Local Copy of the **maxplus2.ini** File" on page 67.

Additional NEC 9801 Installation Steps

On NEC 9801 computers, you must modify the **\windows\system.ini** file after you run the **Install** program for MAX+PLUS II. Add the following lines to the **\windows\system.ini** file:

```
[sentinel] ↵
MACHINE=NEC9800 ↵
```

Installing MAX+PLUS II on a UNIX Workstation

The following instructions describe the requirements and procedures for installing the MAX+PLUS II software on Sun SPARCstations running SunOS 4.1.3+ or Solaris 2.5.+, HP 9000 Series 700/800 workstations, and IBM RISC System/6000 workstations. This section covers the following topics:

System Requirements for UNIX Workstations

The hardware and software system requirements listed here and in the **read.me** file must be met before you can install MAX+PLUS II on a UNIX workstation.

Hardware Requirements for UNIX Workstations

MAX+PLUS II for UNIX workstations requires the following minimum hardware configuration:

- One of the following workstations:
  - Sun Microsystems SPARCstation or compatible workstation
  - HP 9000 Series 700/800 workstation
  - IBM RISC System/6000 workstation
- ISO 9660-compatible CD-ROM drive
- Color monitor

Software Requirements for UNIX Workstations

MAX+PLUS II for UNIX workstations requires the following minimum software configuration:

Table 1-1. UNIX Workstation Software Requirements

System Type	Software Requirements
Sun SPARCstation	SunOS 4.1.3 or higher OpenWindows 3.0 or higher
	Solaris 2.5 or higher
HP 9000 Series 700/800	HP-UX 10.20 or higher
IBM RISC System/6000	AIX 4.1 or higher

Installing the Software & Third-Party Interfaces

MAX+PLUS II installation must be performed by a System Administrator with superuser or "root" privileges. The following steps describe first-time installation with the Altera **install.cd** program.

The installation procedure consists of two phases:

1. Installing the software on the file server
   a. Installing the software and third-party interface files
   b. Configuring the file server and user environments
2. Setting up the licensing software and server

You can complete phase 2 separately, if necessary. When you install an update to MAX+PLUS II, only the first phase of the installation process is required.

The installation instructions assume the following conditions:

- The UNIX environment is case-sensitive. You must enter directory names, filenames, and filename extensions exactly as shown.
- You are logged in as a superuser and you install MAX+PLUS II from a local CD-ROM drive. If not, your System Administrator must provide access to a remote CD-ROM drive.

- The default CD-ROM directory is **/cdrom**.
- MAX+PLUS II will be installed in the **/usr/maxplus2** directory. The installation procedure creates the **maxplus2** directory if it does not already exist.

If you use a different CD-ROM directory or MAX+PLUS II system directory name, substitute the appropriate name in the installation steps.

☞ **Boldface** text represents text that appears on screen; Courier font indicates text you must type. The % character indicates the UNIX C-shell prompt; the # character indicates the superuser prompt. Commands that do not fit on a single line in this manual are indicated by indentations of subsequent lines.

Mounting the CD-ROM

Before installing the software, you must mount the CD-ROM. The commands to do so vary depending on the workstation.

1. Insert the MAX+PLUS II CD-ROM into a caddy if necessary and insert the caddy into your CD-ROM drive.

2. Locate your workstation in Table 1-2 and type the corresponding commands.

Table 1-2. Commands for Mounting the CD-ROM (Part 1 of 2)

Workstation & Operating System	Commands to type

Sun SPARCstation SunOS 4.1.3+	```# mkdir /cdrom ↵```
	 ```# mount -t hsfs -o ro /dev/sr0 /cdrom ↵```
	 ```# cd /cdrom ↵```

Sun SPARCstation Solaris 2.5+	If you are running Volume Manager, the CD-ROM will be mounted automatically as **/cdrom/cdrom0**, and only the last command below is needed. Otherwise, type all three of the following commands:
	 ```# mkdir /cdrom/cdrom0 ↵```
	 ```# mount -F ufs -r /dev/dsk/c0t6d0s2 /cdrom ↵```
	 ```# cd /cdrom/cdrom0 ↵```

Table 1-2. Commands for Mounting the CD-ROM (Part 2 of 2)

Workstation & Operating System	Commands to type
HP 9000 Series 700/800	`# mkdir /cdrom` ↵ `# /etc/mount -t cdfs /dev/dsk/<SCSI ID of the CD-ROM drive>s0 /cdrom` ↵ `# cd /cdrom` ↵
IBM RISC System/6000	`# mkdir /cdrom` ↵ `# crfs -v cdrfs -p ro -dcd0 -m /cdrom -Ano -tn` ↵ `# mount -v cdrfs -r /dev/cd0 /cdrom` ↵ `# cd /cdrom` ↵

Running the Installation Program

The installation program has several phases, each of which can be completed separately. These phases are as follows:

■   Starting the installation program
■   Installing the network licensing file
■   Installing the third-party interface files

You can run the installation program as many times as necessary to complete your installation.

Starting the Installation Program

To start the MAX+PLUS II installation program, type
`./install.cd` ↵ at the # prompt.

or:

If you mounted the CD-ROM on an HP 9000 Series 700/800 workstation, type `./INSTALL.CD\;1` ↵ at the # prompt.

☞   You can quit the installation procedure at any time by typing Ctrl+C ↵.

The following text is displayed:

MAX+PLUS II Workstation Installation
Copyright (c) Altera Corporation 1997

Type Ctrl+C <Return> to quit installation at any time.

Type the full pathname of the directory where the MAX+PLUS II
CD-ROM is mounted (default: /cdrom):

> Press ↵ if the MAX+PLUS II CD-ROM is mounted in the default
> directory. Otherwise, type the correct directory name, then press ↵.

Would you like to install the MAX+PLUS II system files (y/n):

> Type n ↵ to skip installation of the system files. Type y ↵ to install the
> MAX+PLUS II system files. The following prompt is displayed:

Type the full pathname of the system directory where MAX+PLUS II will
be installed (default: /usr/maxplus2):

> Press ↵ to accept the default directory. Otherwise, type the name of
> the desired directory and press ↵.

You may install MAX+PLUS II on one or more of the following platforms:

Platform	System Type	Operating System
sunos	Sun SPARCstation	SunOS 4.1.3+ (Solaris 1.x)
solaris	Sun SPARCstation	Solaris 2.5+ (SunOS 5.5+)
hp	HP 9000 Series 700/800	HP-UX 10.20+
rs6000	IBM RISC System/6000	AIX 4.1+

Enter one or more of the platform names listed above
(choices are: sunos, solaris, hp, rs6000)
(default: solaris):

> Press ↵ to accept the default platform. Otherwise, type the name(s) of
> the desired platform(s), then press ↵. To install MAX+PLUS II for
> multiple platforms simultaneously, type multiple platform names
> separated by spaces, e.g., `solaris hp` ↵.

> If you type multiple platform names at the prompt, the following
> prompt appears:

**Enter license server platform type
(choose one of: solaris sunos)
(default: solaris):**

> Press ↵ to accept the default platform. Otherwise, type the name of the desired license server platform, then press ↵.

The MAX+PLUS II Help files are available on the installation CD-ROM in the /cdrom/help directory, although Altera recommends installing the Help files in your MAX+PLUS II system directory.

Would you like to install the MAX+PLUS II Help files? (y/n):

> Type y ↵ to install the Help files. If you want to leave the Help files on the CD-ROM and run them from there, type n ↵.

> ☞   If you type n ↵, the installation program inserts the following line in the `[system]` section of your **/usr/maxplus2/maxplus2.ini** file to allow MAX+PLUS II to access the Help files from the CD-ROM:

>   HELP_FILE_DIR=*<CD-ROM path>*:/help ↵

Would you like to install or modify your network license file? (y/n)

> If you type y ↵, you will be prompted for license file information during the installation phase. If you type n ↵, the installation program skips the license file installation. You can also install a network license file manually, as described in "Installing the Network Licensing File" on page 21.

Would you like to install the MAX+PLUS II Sample/Tutorial files? (y/n)

> Type n ↵ to skip installation of the MAX+PLUS II Sample/Tutorial files.

> Type y ↵ to install the sample files and the files for the **chiptrip** tutorial described in *Section 3: MAX+PLUS II Tutorial.*

> If you type y ↵, the following prompt is displayed:

Type the full pathname of the working directory where the MAX+PLUS II Sample/Tutorial files will be installed (default: /usr/max2work):

> Press ↵ to accept the default directory. Otherwise, type the name of the desired directory and press ↵.

Would you like to install third-party interfaces? (y/n)

> If you selected multiple platforms at the earlier prompt and type y ↵, the following prompt is displayed:

Enter third-party installation platform type
(choose one of: solaris sunos)
(default: solaris):

> Press ↵ to accept the default platform. Otherwise, type the name of the desired third-party installation platform, then press ↵.

> Some or all of the following information is displayed:

CD-ROM directory:	*<CD-ROM directory name>*
Install system files:	*<yes or no>*
MAX+PLUS II system directory:	*<system directory name>*
Platforms to install:	*<selected platform(s)>*
License server platform:	*<selected platform>*
Install Help:	*<yes or no>*
Install/modify license file:	*<yes or no>*
Install sample/tutorial files:	*<yes or no>*
MAX+PLUS II working directory:	*<working directory name>*
Install third-party interfaces:	*<yes or no>*
Third-party interface platform:	*<selected platform>*

Is this information correct? (y/n):

> Type y ↵ if the information is correct. Type n ↵ to change any incorrect item(s). You will be given the option to restart the installation program.

> If you type y ↵, the installation program deletes any existing files from the specified MAX+PLUS II system and working directories, checks to see that disk requirements are met, and then installs the items you selected.

If you chose to install the network licensing file, go to "Installing the Network Licensing File," next. If you chose to install the third-party interfaces, go to "Installing the Third-Party Interface Files" on page 24 and "Installing the Adobe Acrobat Reader" on page 51 for information on installing the Adobe Acrobat Reader that is needed to read the Altera-provided Software Interface Guides for Cadence, Mentor Graphics, Synopsys, and Viewlogic (Powerview) EDA tools. Otherwise, go to "Unmounting the CD-ROM" on page 25.

Go to "MAX+PLUS II File Organization" on page 69 for information about the directory structure of the files installed for MAX+PLUS II.

Installing the Network Licensing File

You can install the **license.dat** file needed for network licensing in one of two ways:

- Manually create a copy of the **license.dat** file
- Run the **install.cd** program

When you register your MAX+PLUS II system, Altera provides you with a "Node Authorization" form that includes the license file required to run MAX+PLUS II on your workstation. Go to "Registering MAX+PLUS II Software" on page 4 for instructions.

Figure 1-1 shows a sample license file.

Figure 1-1. Sample License File

```
                Server          Server ID       Optional port
                name            number          number
                  |               |               |
                  |               |               |
                  |               |               |
SERVER alice 08000917ae82 1800
SERVER king 08000926ab6f 1800
SERVER queen 08000913b4c2 1800
DAEMON alterad /usr/maxplus2/adm/alterad
FUTURE maxplus2 alterad 0.000 01-dec-97 1 3B2A134641C57735B618 "ALTERA"
        |          |           |           |          |
        |          |           |           |          |
     Feature    Daemon      Expiration  Number of  Authorization
     name       name        date        licenses   code
                                        requested
```

If you receive a **license.dat** file from Altera, go through the following steps:

✓ Type or save the file as **/***<MAX+PLUS II system directory>***/adm/ license.dat**. If you already have a **license.dat** file, edit the existing file to add the new Altera-provided information.

or:

✓ When the installation program displays the following prompt, type y ↵.

Would you like to install or modify your network license file? (y/n)

The installation program displays the following prompt:

MAX+PLUS II License File Installation
Copyright (c) Altera Corporation 1997

Type the full pathname of the system directory where MAX+PLUS II has been installed (default:/usr/maxplus2)

Press ↵ to accept the default directory. Otherwise, type the name of the desired directory and press ↵.

Choose one of the following options:

1. **Create a new license**
2. **Update an existing license**

If you type 1 ↵, the following prompt is displayed (if you type 2 ↵, a shortened version of the same prompt is displayed):

The following information is required to install the network licensing file:

1. **The number of license servers at your site**
2. **The host name and host ID for each license server**
3. **The MAX+PLUS II product being licensed**
4. **The maximum number of users that MAX+PLUS II will support concurrently**
5. **The license expiration date**
6. **The authorization code from Altera Customer Service**

Do you want to continue? (y/n)

> If you type y ↵, you are prompted to enter the licensing information provided by Altera. To quit license installation, type n ↵.

> You can read the information from the Altera-provided **license.dat** file to obtain the information needed to respond to the installation program prompts on the features, expiration date, number of licenses, and authorization code.

Enter the number of license servers: (1/3) *<number of license servers>* ↵

> You are asked for the host name and ID for each license server:

Enter the host name for the license server: *<host name for license server>* ↵

Enter the host ID for the license server: *<host ID number>* ↵

Which feature do you wish to install? Choose one:

1.   **maxplus2**   **(MAX+PLUS II Base System)**
2.   **maxplus2vhdl**   **(VHDL Synthesis)**
Q.   **Quit**

(Choose 1, 2, or Q):

> *<feature number>* ↵

Enter the software expiration date [*<default expiration date>***]:**

> *<expiration date>* ↵

Enter the maximum number of users: *<number of users>* ↵

Enter the authorization code: *<authorization code>* ↵

Is the information correct? (y/n/q)

> If you think the information you entered may not be correct, type n ↵. The license file installation starts again from the beginning, to allow you to accept or change each of your original responses.

> To quit the license installation, type q ↵.

To accept the information as correct, type y ↵. The following messages are displayed:

Your license file has been created. It is located in
/*<MAX+PLUS II system directory>***/adm/license.dat.**

The MAX+PLUS II license installation is complete.

If you chose to install the third-party interfaces, go to "Installing the Third-Party Interface Files," next. Otherwise, go to "Unmounting the CD-ROM" on page 25.

Installing the Third-Party Interface Files

If you chose to install the third-party interface files, the installation program displays the following prompt:

Third-Party Interfaces Installation:

1.	**Cadence-Composer**	**x**	**Mbytes**
2.	**Cadence-Concept**	**x**	**Mbytes**
3.	**Mentor Graphics**	**x**	**Mbytes**
4.	**Synopsys**	**x**	**Mbytes**
5.	**Viewlogic**	**x**	**Mbytes**
6.	**All**		
7.	**Quit**		

Enter one or more numbers:

For example, to install both Synopsys and Viewlogic files, you must type 4 , 5 ↵ or 4 5 ↵. To quit installation, type 7 ↵.

Once the installation of the third-party interface files is complete, the following message is displayed:

Third-party interface installation is complete.

Go to "Installing the Adobe Acrobat Reader" on page 51 for information on installing the Adobe Acrobat Reader that is needed to read the Altera-provided Software Interface Guides for Cadence, Mentor Graphics, Synopsys, and Viewlogic (Powerview) EDA tools. Otherwise, if you have finished installing MAX+PLUS II software, go to "Unmounting the CD-ROM," next.

Go to the Altera-provided Software Interface Guide for your third-party environment for information on the directory structure of the files installed for third-party interfaces to MAX+PLUS II.

Unmounting the CD-ROM

To unmount the CD-ROM, type `umount /cdrom` ↵ at the # prompt.

Go to "Configuring the File Server & User Environment," next, to continue the installation process.

Configuring the File Server & User Environment

You now must set up the file server and user environment to run MAX+PLUS II. The installation steps vary depending upon the computer platform.

For each platform you are configuring, follow these steps:

1. Configure the file server environment so that the MAX+PLUS II software installed on the file server is available to other computers on the network.

2. Configure the user (client) environment so that users can find the MAX+PLUS II software installed on the file server, and the MAX+PLUS II software can find the license server.

Continue to one of the following sections for instructions:

Configuring a SPARCstation Running SunOS 4.1.3+

This section describes the steps necessary to configure a Sun SPARCstation running SunOS 4.1.3 or higher.

Configuring the File Server

If a single workstation functions as the file server, license server, and user workstation, skip this section and go to "Configuring the User Workstation," next.

If the file server, license server, and user workstations are separate workstations, use the Network File System (NFS) to export the directory that contains MAX+PLUS II. To export the directory, follow these steps:

1. If a higher-level directory in the partition is not already exported, add the line `/usr/maxplus2` ↵ to the **/etc/exports** file on the file server.

2. Save the changes.

3. Export the file by typing `/etc/exportfs -a` ↵ at the # prompt.

Configuring the User Workstation

To configure the user workstation, follow these steps:

1. If the file server and user workstations are separate workstations, mount the **/usr/maxplus2** directory on the user workstation with NFS by typing the following commands:

    ```
    # mkdir /usr/maxplus2 ↵
    # /etc/mount <file server name>:/usr/maxplus2 /usr/
       maxplus2 ↵
    ```

2. Update the `PATH` and `LM_LICENSE_FILE` variables that are specified in the **.cshrc** file located in each user's home directory. You must edit this file for each user, or provide clear instructions that describe which lines need to be entered or edited.

    a. Update each user's `PATH` environment variables to include **/usr/maxplus2/bin**:

        ```
        set path = (/usr/local/bin /usr/maxplus2/bin) ↵
        ```

b. Each user must have an `LM_LICENSE_FILE` variable that is set to the full directory pathname of the license file. To update this variable, add the following line to the **.cshrc** file for each user:

```
setenv LM_LICENSE_FILE /usr/maxplus2/adm/
    license.dat ↵
```

If more than one application uses this environment variable, separate the different paths with a colon (:). For example:

```
setenv LM_LICENSE_FILE /usr/maxplus2/adm/
    license.dat:/tmp/license.xyz ↵
```

3. After saving the changes to each user's **.cshrc** file, type the following commands:

```
# cd ↵
# source .cshrc ↵
```

Go to for information about configuring the license server.

Configuring a SPARCstation Running Solaris 2.5+

This section describes the steps necessary to configure a Sun SPARCstation running Solaris 2.5 or higher.

Configuring the File Server

If a single workstation functions as the file server, license server, and user workstation, skip this section and go to "Configuring the User Workstation," next.

If the file server, license server, and user workstations are separate workstations, use the Network File System (NFS) to export the directory that contains MAX+PLUS II.

To export the directory, follow these steps:

1. If a higher-level directory in the partition is not already exported, add the following line to the **/etc/dfs/sharetab** file on the file server:

```
/usr/maxplus2 "MAX+PLUS II" nfs rw "MAX+PLUS II
    System Directory" ↵
```

2. Save the changes.

3. Export the file by typing shareall ↵ at the # prompt.

Configuring the User Workstation

To configure the user workstation, follow these steps:

1. If the file server and user workstations are separate workstations,
    mount the **/usr/maxplus2** directory on the user workstation with NFS
    by typing the following commands:

    ```
    # mkdir /usr/maxplus2 ↵
    # /etc/mount <file server name>:/usr/maxplus2 /usr/
        maxplus2 ↵
    ```

2. Update the PATH and LM_LICENSE_FILE variables that are specified
    in the **.cshrc** file located in each user's home directory. You must edit
    this file for each user, or provide clear instructions that describe which
    lines need to be entered or edited.

    a. Update each user's PATH environment variables to include **/usr/
        maxplus2/bin**:

        ```
        set path = (/usr/local/bin /usr/maxplus2/bin) ↵
        ```

    b. Each user must have an LM_LICENSE_FILE variable that is set
        to the full directory pathname of the license file. To update this
        variable, add the following line to the **.cshrc** file for each user:

        ```
        setenv LM_LICENSE_FILE /usr/maxplus2/adm/
            license.dat ↵
        ```

        If more than one application uses this environment variable,
        separate the different paths with a colon (:). For example:

        ```
        setenv LM_LICENSE_FILE /usr/maxplus2/adm/
            license.dat:/tmp/license.xyz ↵
        ```

3. After saving the changes to each user's **.cshrc** file, type the following
    commands:

    ```
    # cd ↵
    # source .cshrc ↵
    ```

Go to "Configuring Network Licensing" on page 33 for information about configuring the license server.

Configuring an HP 9000 Series 700/800 Workstation

This section describes the steps necessary to configure an HP 9000 Series 700/800 workstation.

Configuring the File Server

If a single workstation functions as the file server and user workstation, skip this section and go to "Configuring the User Workstation."

If the file server and user workstations are separate workstations, use the Network File System (NFS) to export the directory that contains MAX+PLUS II. To export the directory, follow these steps:

1. Type sam ↵ at the # prompt to bring up the System Administration Manager (SAM).

2. Choose **NFS (Network File Systems) Configuration** from the File Systems Management menu.

3. Set options to allow remote (NFS) file systems access to the local file system's **/usr/maxplus2** directory.

4. In order to process large projects, Altera recommends configuring the file server to allow processes to use more than 64 Mbytes of memory.

    ✓   If you are using SAM, follow these steps:

        a. Double click Button 1 on the **Kernel Configuration** icon. The **Kernel Configuration** window opens.

        b. Double-click Button 1 on the **Configurable Parameters** icon. The **Configurable Parameters** list box appears.

        c. Double-click Button 1 on maxdsize to select it from the list. The **Modify Configuration Parameter** *<machine name>* dialog box opens.

        d. Specify a value in the *Formula/Value* box and choose **OK**.

e. In the **Kernel Configuration** window, choose **Create a New Kernel** (Actions menu) and choose **Yes** or **No** in the **Confirmation** dialog box.

If you choose **Yes**, SAM creates the new kernel based on the specified project size and then prompts you to reboot your workstation.

or:

✓ Refer to the documentation on **maxdsize** under *System Parameters* in the *HP System Administration Tasks Manual* for information on configuring the file server.

Configuring the User Workstation

To configure the user workstation, follow these steps:

1. If the file server and user workstations are separate workstations, mount the **/usr/maxplus2** directory on the user workstation with NFS by typing the following commands:

```
# mkdir /usr/maxplus2 ↵
# /etc/mount <file server name>:/usr/maxplus2 /usr/
    maxplus2 ↵
```

2. Update the PATH and LM_LICENSE_FILE variables that are specified in the **.cshrc** file located in each user's home directory. You must edit this file for each user, or provide clear instructions that describe which lines need to be entered or edited.

a. Update each user's PATH environment variables to include **/usr/maxplus2/bin**:

```
set path = (/usr/local/bin /usr/maxplus2/
    bin...) ↵
```

b. Each user must have an LM_LICENSE_FILE variable that is set to the full directory pathname of the license file. To update this variable, add the following line to the **.cshrc** file for each user:

```
setenv LM_LICENSE_FILE /usr/maxplus2/adm/
    license.dat ↵
```

If more than one application uses this environment variable, separate the different paths with a colon (:). For example:

```
setenv LM_LICENSE_FILE /usr/maxplus2/adm/
    license.dat:/tmp/license.xyz ↵
```

3. After saving the changes to each user's **.cshrc** file, type the following commands:

```
# cd ↵
# source .cshrc ↵
```

Go to "Configuring Network Licensing" on page 33 for information about configuring the license server.

Configuring an IBM RISC System/6000 Workstation

This section describes the steps necessary to configure an IBM RISC System/6000 workstation.

Configuring the File Server

If a single workstation functions as the file server and user workstation, skip this section and go to "Configuring the User Workstation," next.

If the file server and user workstations are separate workstations, use the Network File System (NFS) to export the directory that contains MAX+PLUS II. To export the directory, follow these steps:

1. If a higher-level directory in the partition is not already exported, add the line /usr/maxplus2 ↵ to the **/etc/exports** file on the file server.

2. Save the changes. The directory will be exported automatically.

Configuring the User Workstation

To configure the user workstation, follow these steps:

1. If the file server, license server, and user workstations are separate workstations, mount the **/usr/maxplus2** directory on the user workstation with NFS by typing the following commands:

```
# mkdir /usr/maxplus2 ↵
# /etc/mount <file server name>:/usr/maxplus2 /usr/
   maxplus2 ↵
```

2.   Update the PATH and LM_LICENSE_FILE variables that are specified in the **.cshrc** file located in each user's home directory. You must edit this file for each user, or provide clear instructions that describe which lines need to be entered or edited.

   a.   Update each user's PATH environment variables to include **/usr/maxplus2/bin**:

```
set path = (/usr/local/bin /usr/maxplus2/
   bin...) ↵
```

   b.   Each MAX+PLUS II user must have an LM_LICENSE_FILE variable that is set to the full directory pathname of the license file. To update this variable, add the following line to the **.cshrc** file for each user:

```
setenv LM_LICENSE_FILE /usr/maxplus2/adm/
   license.dat ↵
```

   If more than one application uses this environment variable, separate the different paths with a colon (:). For example:

```
setenv LM_LICENSE_FILE /usr/maxplus2/adm/
   license.dat:/tmp/license.xyz ↵
```

3.   After saving the changes to each user's **.cshrc** file, type the following commands:

```
# cd ↵
# source .cshrc ↵
```

Go to "Configuring Network Licensing" on page 33 for information about configuring the license server.

Refer to "Configuring an IBM RISC System/6000 Workstation Serial Port for Programming" on page 64 for information on the special steps needed to configure an IBM RISC System/6000 workstation to use the BitBlaster.

Configuring Network Licensing

This section provides instructions for configuring network licensing for MAX+PLUS II. This section discusses the following topics:

Configuring the License Server

The FLEXlm licensing scheme allows either one or three license servers on a network. A single UNIX workstation can function as the file server, license server, and user workstation. The file server, license server, and user workstations (or user PCs) can also be separate computers.

To configure the license server, follow these steps:

1. If a single workstation functions as the file server and license server, skip this step and go to step 2.

   If the file server and license server are separate computers, mount the **/usr/maxplus2** directory on the license server with NFS by typing the following commands:

   ```
   # mkdir /usr/maxplus ↵
   # /etc/mount <file server name>:/usr/maxplus2 /usr/
       maxplus2 ↵
   ```

2. Start the license manager daemon on all license servers before starting MAX+PLUS II. Type the following command on each license server:

   ```
   # /usr/maxplus2/adm/max2protd /usr/maxplus2 ↵
   ```

   To invoke the license manager daemon automatically during start-up, add the following lines to the **/etc/rc.local** file on each license server:

```
if [-f /usr/maxplus2/adm/max2protd]; then ↵
su <username> -c "umask 022 ; /usr/maxplus2/adm
/max2protd /usr/maxplus2" ↵
echo -n max2protd ↵
fi ↵
```

3.   Type the following command to make the file executable:

```
# chmod +x /etc/rc.local ↵
```

4.   If you are configuring an IBM RISC System/6000 as the license server, add the following command to the **/etc/inittab** file after the lines that invoke networking:

```
rclocal:2:wait:/etc/rc.local > /dev/console 2>&1 ↵
```

Troubleshooting License Installation

Most installation errors are caused by improperly installed license daemons (**lmgrd** and **alterad**). If you have completed the procedures described for the software and license installation but the daemons have not started, you must verify that the daemons can be located and have the correct permissions. This section lists the most common error messages that can occur during installation, provides information on possible causes, and suggests corrective actions.

For help with error messages not described here and further assistance with troubleshooting license administration, contact the Altera Applications Department. Go to *Appendix B: Altera Support Services* for more information about technical support.

Message:`/usr/maxplus2/max2protd: Command not found`

Cause: The **max2protd** script or the **lmgrd** or **alterad** daemons cannot be located when you try to start them manually or at system start-up. The **/usr/maxplus2** directory has not been properly mounted with NFS.

Action: Verify that the **/usr/maxplus2** directory, which is exported by the file server with NFS, has been successfully mounted by the license server. This directory should have been mounted when you set up the file server environment, as described in the "Configuring the File Server & User Environment" section for your computer. To

verify that the directory has been mounted correctly, type the following commands on the license server:

```
# cd /usr/maxplus2/adm ↵
# ls -l ↵
```

The **ls** command output must include the following lines, which list the **max2protd**, **lmgrd**, and **alterad** daemons:

```
-rwxr-xr-x 1 root 278528 jun 01 13:03 alterad
-rwxr-xr-x 1 root  81920 jun 01 13:04 lmgrd
-rwxr-xr-x 1 root    568 jun 01 11:02 max2protd
```

The dates and file sizes may be different, but the three named files must be present. If the named files are not displayed, the directory has not been mounted correctly. Refer to the "Configuring the File Server & User Environment" section for your computer for instructions on how to mount the **/usr/maxplus2** directory.

Message: `license daemon: execl failed`

Cause: The **alterad** daemon does not exist or cannot be executed.

Action: Verify the existence of the **alterad** daemon by typing the following commands:

```
# cd /usr/maxplus2/adm ↵
# ls -l ↵
```

The output of the `ls` command must include the following lines, which list the **max2protd**, **lmgrd**, and **alterad** daemons:

```
-rwxr-xr-x 1 root 278528 Jun 01 13:03 alterad
-rwxr-xr-x 1 root  81920 Jun 01 13:04 lmgrd
-rwxr-xr-x 1 root    568 Jun 01 11:02 max2protd
```

If the MAX+PLUS II software cannot find the **alterad** daemon in this directory, reinstall the MAX+PLUS II software as described in "Installing the Software & Third-Party Interfaces" on page 15.

If the **alterad** daemon exists, verify that it can be executed by typing `chmod 755 alterad` ↵.

Message: `Retrying socket bind (address in use)`

Cause: The license daemons are not running because another **lmgrd**
          license manager daemon is running and using the same TCP/IP
          port address.

Action: Terminate the daemon processes:

1. Ask all users who use **lmgrd**-based applications to log off.

2. If MAX+PLUS II is installed on a Sun SPARCstation (SunOS
   4.1.3 or higher) or an IBM RISC System/6000 workstation,
   type the following command to determine the license
   daemon process IDs:

   `# ps waux | grep lmgrd | grep -v grep` ↵

   The response includes the entries for active license manager
   daemons. For example:

   ```
   root   14803 0 0 0 2 60 76 ? S Jun 01 0:03
      /usr/maxplus2/adm/lmgrd -c /usr/maxplus2
      /adm/license.dat
   ```

   or:

   If MAX+PLUS II is installed on an HP 9000 Series 700/800
   workstation or a Sun SPARCstation running Solaris 2.5 or
   higher, type the following command to determine the
   license daemon process IDs:

   `# ps -e | grep lmgrd | grep -v grep` ↵

   The response includes the entries for active license manager
   daemons. For example:

   ```
   11478 ttyp2 0:00 lmgrd
   ```

3. Terminate the license daemons with the following
   command:

   `kill` *<pid>* ↵

The *<pid>* variable is the process ID number that corresponds to the license daemon. In the example shown in step 2, *<pid>* would be `14803`.

☞ Do not use the `-9` option with the `kill` command.

4. Edit the **/usr/maxplus2/adm/license.dat** file and replace `1800` with a unique four-digit port address that is not used elsewhere on your system and does not conflict with other applications that use **lmgrd**. To replace the port address, change the third field in the `SERVER` line in the **license.dat** file.

In the following example, you would replace `1800` with a unique four-digit number:

```
SERVER artoo 54321234 1800 ↵
```

5. Save the changes to **/usr/maxplus2/adm/license.dat**, then restart the Altera daemon by typing `/usr/maxplus2/adm/max2protd` ↵ at the # prompt.

You should also restart the daemons for other applications.

Message: `Starting Altera License daemons`
`Cannot locate the license manager daemon (lmgrd)`

Cause: The **max2protd** script or the **lmgrd** or **alterad** daemons cannot be executed from the UNIX prompt or at start-up with the **/etc/rc.local** start-up command on a Sun SPARCstation or IBM RISC System/6000 workstation or with the **/etc/rc** command on an HP 9000 Series 700/800 workstation.

Action: Verify that the **/usr/maxplus2** directory, which is exported by the file server with NFS, has been successfully mounted by the license server. This directory should have been mounted when you set up the file server and the license server environments, as described in the "Configuring the File Server & User Environment" section for your computer. To verify that the directory has been mounted correctly, type the following commands on the license server:

```
# cd /usr/maxplus2/adm ↵
# ls -l ↵
```

The **ls** command output must include the following lines, which list the **max2protd**, **lmgrd**, and **alterad** daemons:

```
-rwxr-xr-x 1 root 278528 Jun 01 13:03 alterad
-rwxr-xr-x 1 root  81920 Jun 01 13:04 lmgrd
-rwxr-xr-x 1 root    568 Jun 01 11:02 max2protd
```

The dates and file sizes may be different, but the three named files must be present. If the named files are not displayed, the directory has not been mounted correctly. Refer to the "Configuring the File Server & User Environment" section for your computer for instructions on how to mount the **/usr/maxplus2** directory.

If the files exist, you must verify that they have the permissions `-rwxr-xr-x`. If the executable bit is not set for **lmgrd** and **alterad**, type the following commands:

```
# cd /usr/maxplus2/adm ↵
# chmod 755 max2protd lmgrd alterad ↵
```

License Administration Options File

The entries in the options file control the operating parameters of the FLEXlm utility. The System Administrator can use these options to reserve licenses, restrict the use of licenses, and define user groups for use with license reservations. The options file can be edited with any text editor. The following options are available:

Option:	Action:
RESERVE	Reserves licenses for a user, host, display, or group of users.
INCLUDE	Includes a user, host, display, or group of users in a list of users who are allowed to use a software feature.
EXCLUDE	Excludes a user, host, display, or group of users from a list of users who are allowed to use a software feature.
GROUP	Defines a user group for use with the RESERVE, INCLUDE, and EXCLUDE options.

Option:	Action:
TIMEOUT	Specifies the time after which an inactive license is returned to the free pool, for use by someone else.
NOLOG	Causes messages of the specified type to be filtered out of the log output for **lmgrd**.

To set any number of options, you must create an options file and list its pathname as the fourth field on the DAEMON line for **alterad**.

An options file consists of lines in the following format:

```
RESERVE <number> <feature> {USER | HOST | DISPLAY | GROUP}
    <name>
INCLUDE <feature> {USER | HOST | DISPLAY | GROUP} <name>
EXCLUDE <feature> {USER | HOST | DISPLAY | GROUP} <name>
GROUP <name> <list of users>
TIMEOUT <feature> <timeout in seconds>
NOLOG {IN | OUT | DENIED | QUEUED}
```

Lines in an options file that begin with the pound character (#) are ignored and can be used as comments.

In the following example, the options file, called **local.options**, reserves a copy of the compile feature for user robert, three copies for user dalia, and a copy for anyone on a computer with the hostname mainline. The file also causes QUEUED messages to be omitted from the logfile and prevents user lori from using the compile feature.

```
RESERVE 1 compile USER robert
RESERVE 3 compile USER dalia
RESERVE 1 compile HOST mainline
EXCLUDE compile USER lori
NOLOG QUEUED
```

If these options are included in the file **/usr/local/flexlm/options/local.options**, the license file DAEMON line must be specified as follows:

```
DAEMON alterad /usr/maxplus2/adm/alterad
   /usr.local.flexlm/options/local.options ↵
```

License Administration FLEXlm Utilities

The following FLEXlm utilities help the System Administrator manage the licensing activities on the network:

- **lmgrd**
- **lmstat**
- **lmdown**
- **lmremove**
- **lmreread**
- **lmver**
- **lmhostid**

lmgrd

The **lmgrd** utility is the main daemon program for FLEXlm. When it is active, it looks for a license file containing all required feature information.

Usage:

```
lmgrd [-2] [-b] [-c <license file>] [-d] [-l <log file>] [-p]
      [-s <interval>] [-t <timeout value>] [-i <feature>]
```

Option:	Action:
-2	Specifies V2 start-up arguments. The -2 option is the opposite of the -b option and is required if you intend to use the -p option.
-b	Specifies backward compatibility mode. The -b option is the default.
-c <license file>	Uses the specified license file. If this option is not specified, **lmgrd** looks for the environment variable LM_LICENSE_FILE. If the environment variable is not set, **lmgrd** looks for **/usr/local/flexlm/ licenses/license.dat**.
-d	Specifies that hostnames that are read from the license file should have the local domain name appended to them before sending to a client. This option is useful when clients are accessing licenses from another domain.

Option:	Action:
-l *<log file>*	Specifies the output log file.
-p	Specifies that the **lmdown** and **lmremove** utilities can only be run by a "license administrator." A "license administrator" is a member of the **lmadmin** group, or if the **lmadmin** group does not exist, "license administrator" is a member of group 0.
-s *<interval>*	Specifies the log file time-stamp interval, in minutes. The default is 360 minutes.
-t *<timeout value>*	Specifies the timeout interval during which daemons must complete their connections to each other. The default is 10 seconds. You can use a larger value if the daemons are running on busy systems or networks.
-i *<feature>*	Displays information about the named feature, or, if no feature name is given, displays information about all features.

☞ Altera recommends that you use the -p option when starting the **lmgrd** utility to provide security.

See also "**lmdown**" on and "**lmstat**" on .

lmstat

The **lmstat** utility helps monitor the status of all network licensing activities, including:

■ Active daemons
■ Users of individual features
■ Users of features served by a specific daemon

Usage:

```
lmstat [-a] [-S <daemon>] [-f <feature>] [-s <server>]
    [-t <timeout value>] [-c <license file>] [-A]
    [-l <regular expression>]
```

Option:	**Action:**
`-a`	Displays information about all features.
`-S` *<daemon>*	Lists all users of the specified daemon's features.
`-f` *<feature>*	Lists all users of the specified feature(s).
`-s` *<server>*	Displays the status of the specified server node(s).
`-t` *<timeout value>*	Specifies the timeout interval during which daemons must complete their connections to each other. The default is 10 seconds. You can use a larger value if the daemons are running on busy systems or networks.
`-c` *<license file>*	Uses the specified license file. If this option is not specified, **lmstat** looks for the environment variable `LM_LICENSE_FILE`. If the environment variable is not set, **lmstat** looks for **/usr/local/flexlm/licenses/license.dat**.
`-A`	Lists all active licenses.
`-l` *<reg. expression>*	Lists all users of the features matching the given regular expression.

See also "**lmgrd**" on .

lmdown

The **lmdown** utility instructs **lmgrd** and **alterad** to shut down. The license daemons write out their last messages to the log file, close the file, and exit. All licenses that have been given out by those daemons are rescinded, so that the next time a program verifies the license, the license is not valid.

Usage:

```
lmdown [-c <license file>]
```

The correct license file is in **/usr/maxplus2/adm/license.dat**. The System Administrator should protect the execution of **lmdown**, since shutting down the servers will cause loss of licenses.

Option:	Action:
-c *<license file>*	Uses the specified license file. If this option is not specified, **lmdown** looks for the environment variable LM_LICENSE_FILE. If the environment variable is not set, **lmdown** looks for **/usr/local/flexlm/licenses/license.dat**. In addition, **lmdown** accepts the -c *<license file>* argument that specifies the license file location.

See also "**lmgrd**" on , "**lmstat**" on , and "**lmreread**" on .

lmremove

The **lmremove** utility allows the System Administrator to remove a single user's license for a specified feature. This utility is required if the licensed user was running the software on a node that subsequently crashed, causing the license to become unusable. The **lmremove** utility allows the license to return to the pool of available licenses.

Usage:

```
lmremove [-c <license file>] <feature> <user> <host> [<display>]
```

Option:	Action:
-c *<license file>*	Uses the specified license file. If a license file is not specified, **lmremove** looks for the environment variable LM_LICENSE_FILE. If no -c option is specified, **lmreread** looks for the environment variable LM_LICENSE_FILE to find the license file. If the environment variable is not set, **lmremove** looks for **/usr/local/flexlm/licenses/license.dat**.

See also "**lmstat**" on and "**lmremove**" on .

lmreread

The **lmreread** utility allows the System Administrator to tell the license daemon to reread the license file and start any new daemons that have been added. This utility is useful if the data in the license file has changed. The new data can be loaded into the license daemon without shutting it down and restarting it. In addition, all pre-existing daemons will be signaled to reread the license file for changes in licensing information.

The **lmreread** utility uses the license filename from the command line (or the default filename, if no license filename is specified) to find the **alterad** daemon. The **lmreread** utility then gives **alterad** the command to reread the license file because the data in the file has changed. The **alterad** daemon always rereads the original file that it loaded. If the path to the license file read by **alterad** must be changed, the System Administrator must shut down **alterad** and restart with the new license file path.

The System Administrator cannot use **lmreread** if the SERVER node names or port numbers have been changed in the license file. In this case, the daemon must be shut down and restarted for the changes to take effect.

The **lmreread** utility does not change any option information specified in an options file. If the new license file specifies a different options file, the information is ignored. If the options file needs to be reread, the System Administrator must shut down the daemon and restart it.

Usage:

lmreread [-c *<license file>*]

Option:	Action:
–c *<license file>*	Uses the specified license file. If a license file is not specified, **lmreread** looks for the environment variable, LM_LICENSE_FILE. If no –c option is specified, **lmreread** looks for the environment variable LM_LICENSE_FILE to find the license file. If the environment variable is not set, **lmreread** looks for **/usr/local/flexlm/licenses/license.dat**.

See also "**lmdown**" on .

lmver

The **lmver** utility reports the FLEXlm version of a library or binary file.

Usage:

```
lmver <filename>
```

lmhostid

The **lmhostid** utility reports the host ID of a system.

Usage:

```
lmhostid
```

The following lines show sample output of **lmhostid**:

```
lmhostid-Copyright(C)1989,1990 Highland Software, Inc.
The FLEXlm host ID of this machine is "69021c89"
```

Installing the PC Software Guard

To run MAX+PLUS II software on a PC, you must install the MAX+PLUS II Software Guard and/or the authorization code provided with your development system. If your development system includes a Software Guard, you must install the guard before you can enter the authorization code successfully.

☞   If you are installing MAX+PLUS II software using an ES Site License, you do not need a Software Guard. Go to "Specifying the Authorization Code for a Software Guard Installation" on page 48 for more information.

To install the Software Guard on a PC or compatible computer, follow these steps:

1.   Locate a parallel printer port (i.e., an LPT port) on the computer. If you have a printer connected to this port, disconnect it temporarily.

2.   Insert the 25-pin male connector end of the Software Guard into the 25-pin female connector of the parallel printer port, as shown in Figure 1-2.

     ☞   1.   Do not connect the MAX+PLUS II Software Guard to either end of an Iomega Zip or Ditto drive. Iomega Zip and Ditto drives can destroy a Software Guard by drawing more power than the guard is capable of handling.

             2.   Disconnect the Software Guard before using the parallel port with the Interlink file transfer program. Failure to do so can cause damage to the Software Guard.

Figure 1-2. Attaching the Software Guard to a PC

*Parallel printer port
25-pin female connector*

*Software Guard
25-pin female
connector*
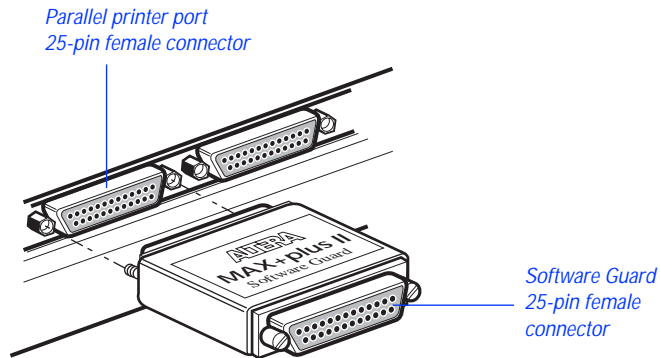
3.   If necessary, re-insert the printer cable connector into the female connector of the Software Guard.

4.   If you move the MAX+PLUS II Software Guard to a different port, you may need to update the **maxplus2.ini** file to include the name and location of the new port if MAX+PLUS II cannot locate the guard. For example, if you change the Software Guard port to LPT2, ensure that your **maxplus2.ini** file contains the following line:

```
GUARD_PORT=2
```

If you suspect that your Software Guard is faulty or damaged, contact the Altera Applications Department. Go to *Appendix B: Altera Support Services* for more information about technical support.

Specifying the Authorization Code or License File

Most development system configurations require you to enter an authorization code when you run MAX+PLUS II for the first time. When you start MAX+PLUS II for the first time, the **Authorization Code** dialog box (Options menu) appears automatically. See Figure 1-3.

Figure 1-3. MAX+PLUS II Authorization Code Dialog Box

The steps required to specify the authorization code depend on whether you have a Software Guard or license file-based MAX+PLUS II system installation.

Specifying the Authorization Code for a Software Guard Installation

To specify the authorization code for an installation that includes a Software Guard, follow these steps:

1. In the **Authorization Code** dialog box, select *Software Guard ID* under *Method*, and verify that the ID number displayed matches the number printed on your Software Guard.

2. Type your authorization code, using upper- and lower-case letters exactly as provided by Altera.

3. Choose **Validate** to confirm your authorization code. Available features will be listed in the *Available Features* box.

4. Choose **OK**.

Specifying the License File for a License File Installation

To specify the license file that contains your authorization code, follow these steps:

✓   In the **Authorization Code** dialog box, select *Network License File* under *Method*. Available features will be listed in the *Available Features* box.

If the dialog box indicates that MAX+PLUS II cannot locate the **license.dat** file, choose **Browse** to open the **License File** dialog box and locate a suitable **license.dat** file.

MAX+PLUS II Site License Information

When you purchase a MAX+PLUS II development system for a single-user PC, it includes a site license to install an unlimited number of copies of the PLS-ES feature set. Feel free to pass MAX+PLUS II software along to your colleagues. The additional MAX+PLUS II systems on the site license have only one requirement: after installation, each individual user must contact Altera for an authorization code (at no cost). For details on getting an authorization code, go to "Registering MAX+PLUS II Software" on page 4.

Specifying Authorization Codes for MegaCore & AMPP Licenses

To specify authorization codes for Altera-provided MegaCore megafunctions or AMPP-provided megafunctions, follow these steps:

1. In the **Authorization Code** dialog box, choose **MegaCore/AMPP Licenses**. The **MegaCore/AMPP Licenses** dialog box is displayed.

2. Type the megafunction ID number provided by Altera or an AMPP vendor in the *Megafunction ID* box.

3. Type the authorization code for your megafunction using upper- and lower-case letters, exactly as provided by Altera or the AMPP vendor, in the *License Authorization Code* box.

4. Choose **Add** to add the megafunction ID number and authorization code to the list of *Existing IDs/Authorization Codes* without closing the dialog box.

    or:

    Choose **OK**.

Once you enter the appropriate information and choose **OK**, you can fully compile the megafunction in MAX+PLUS II to generate output netlist files and programming files.

Installing the Adobe Acrobat Reader

The Altera-provided Software Interface Guides for EDA tools from Cadence, Mentor Graphics, Synopsys, and Viewlogic (Powerview) are provided in the **\lit** directory on the MAX+PLUS II CD-ROM in the Adobe Portable Document File (PDF) format. These files are readable with the Adobe Acrobat Reader 3.0, which requires 4 Mbytes of application RAM. If you do not already have a copy of the Adobe Acrobat Reader, you can install it from the MAX+PLUS II CD-ROM.

To install the Adobe Acrobat Reader on a PC running Windows NT or Windows 95, follow these steps:

1. Insert the MAX+PLUS II CD-ROM into your CD-ROM drive.

2. Choose **Run** (Start menu) and type *<CD-ROM drive>*:\acroread\
   win\32bit\setup.exe ↵.

3. Follow the instructions in the setup program.

To install the Adobe Acrobat Reader on a UNIX workstation, follow these steps:

1. Refer to the **/acroread/instguid.txt** file on the MAX+PLUS II CD-ROM for information on system requirements and compatibility.

2. Ensure that you are logged on as a superuser.

3. Mount the MAX+PLUS II CD-ROM as described in Table 1-2 on page 16.

4. If you have an HP 9000 Series 700/800 workstation, type the following commands:

   ```
   # cd /cdrom/cdrom0/ACROREAD/UNIX ↵
   # ./INSTALL\;1 ↵
   ```

   On other supported UNIX workstation platforms, type the following commands:

   ```
   # cd /cdrom/cdrom0/acroread/unix ↵
   # ./install ↵
   ```

5. Follow the instructions in the install program.

6.   To run the Adobe Acrobat Reader, type the following command:

    `#  /`*<installation directory>*`/bin/acroread` ⏎

Once you have installed the Adobe Acrobat Reader, you can read the
following Software Interface Guide files in the **\lit** directory:

Document:	Filename:
Cadence & MAX+PLUS II Software Interface Guide	**ac_sig.pdf**
Mentor Graphics & MAX+PLUS II Software Interface Guide	**am_sig.pdf**
Viewlogic Powerview & MAX+PLUS II Software Interface Guide	**av_sig.pdf**
Synopsys & MAX+PLUS II Software Interface Guide	**as_sig.pdf**

Go to the MAX+PLUS II **read.me** file for information on other supported
platforms for the Adobe Acrobat Reader.

Installing the Programming Hardware

Table 1-3 shows the programming hardware configurations that are available for use with MAX+PLUS II.

Table 1-3. MAX+PLUS II Programming Hardware Configurations

Platform	Hardware/Application
PC	The LP6 Programmer Card and the Master Programming Unit (MPU) base unit and its adapters.
PC	The FLEX Download Cable, which is used in conjunction with the LP6 Logic Programmer Card, MPU, and a Configuration EPROM programming adapter to download configuration data to FLEX 10K, FLEX 8000, FLEX 6000, and MAX 7000S devices in-system.
PC or UNIX workstation	The BitBlaster Serial Download Cable, which is connected to a serial port to download configuration data to FLEX 10K, FLEX 8000, and FLEX 6000 devices or to program MAX 9000 and MAX 7000S devices in-system.
PC	The ByteBlaster Parallel Download Cable, which is connected to a parallel port to download configuration data to FLEX 10K, FLEX 8000, and FLEX 6000 devices or to program MAX 9000 and MAX 7000S devices in-system.

This section covers the following topics:

Installing PC-Based Programming Hardware

If you have purchased a system with an LP6 Logic Programmer card, you should follow the installation instructions in the order described here.

1. Install the LP6 card by following the instructions that begin on page 54.

2.   Assemble the Master Programming Unit (MPU) and connect it to the Logic Programmer Card in your PC by following the instructions below.

3.   Optionally connect the FLEX Download Cable to your PC by following the instructions that begin on page 60.

If your MAX+PLUS II system does not include an LP6 card, depending on which programming or configuration technique you plan to use, go through one of the following steps:

■   Connect the BitBlaster Serial Download Cable to your PC by following the instructions that begin on page 61.
■   Connect the ByteBlaster Parallel Download Cable to your PC by following the instructions that begin on page 65.

Installing the LP6 Logic Programmer Card

Follow these steps to install the LP6 card in Pentium- and 486-based PCs:

1.   Be sure the computer's power is turned off.

2.   Remove the cover of your computer. Refer to the documentation accompanying the computer for instructions.

3.   Ensure that all four dipswitches on the LP6 card are turned on, as shown in Figure 1-4.

☞   The default I/O address of the LP6 card is 280 hex. If you must change this address because of an addressing conflict, refer to "Changing the LP6 Card Address Location" on page 56 for dipswitch settings for other I/O addresses.

Figure 1-4. Default Switch Settings on the LP6 Card
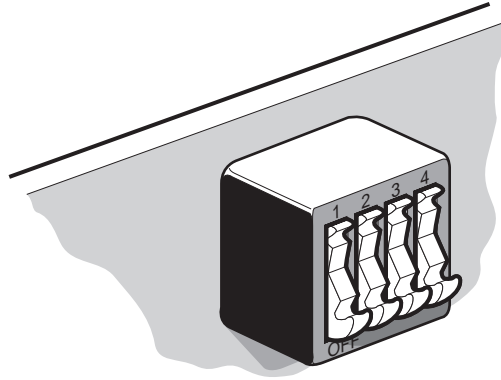
4. Select any convenient empty expansion slot for the LP6 card. If the expansion slot is covered, remove the screw that holds the expansion slot cover and remove the cover. See Figure 1-5.

Figure 1-5. Removing the Expansion Slot Cover
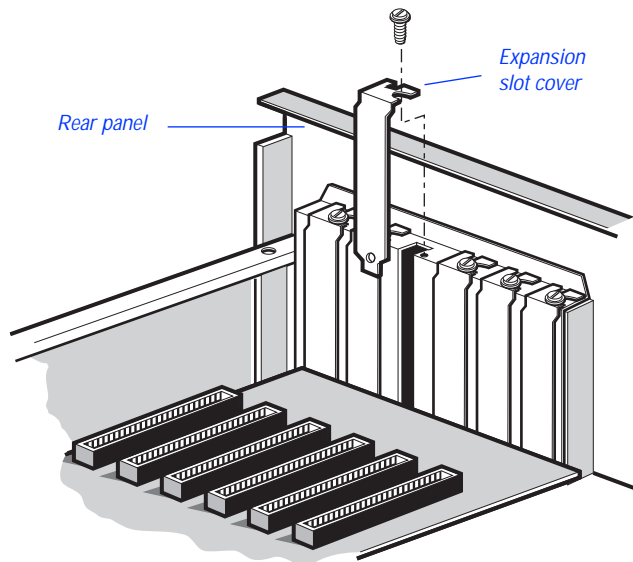
5. Insert the card into the expansion slot and fasten the retaining bracket with the screw from the slot cover. See Figure 1-6.

Figure 1-6. Locking the Board in Place

Rear panel
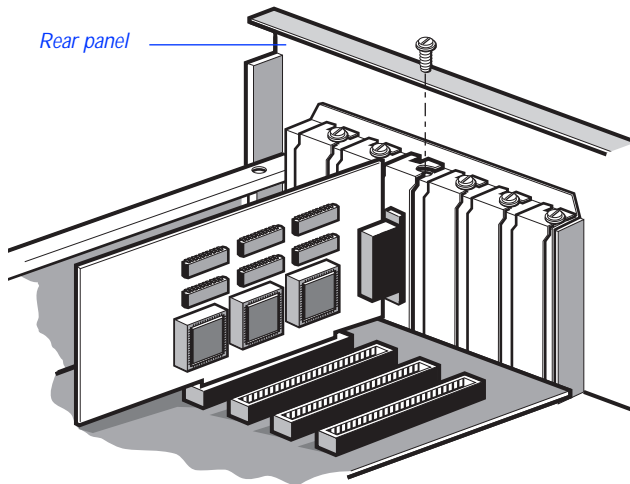
6.   Tighten all the locking screws on all connectors.

Changing the LP6 Card Address Location

You can configure the LP6 card for different I/O addresses. Table 1-4 lists the available I/O addresses and corresponding dipswitch settings. If you use an address other than 280 hex, you must update your hardware setup in MAX+PLUS II. Go to "Changing the Hardware Setup" in MAX+PLUS II Help for instructions.

Table 1-4. LP6 Card I/O Addresses

Base I/O Address (hex)	Dipswitch Setting			
Required Address Space 16 locations	(1=ON; 0=OFF)			
	1	2	3	4
270	0	0	0	0
260	1	0	0	0
250	0	1	0	0
240	1	1	0	0
230	0	0	1	0
220	1	0	1	0
210	0	1	1	0
200	1	1	1	0
2F0	0	0	0	1
2E0	1	0	0	1
2D0	0	1	0	1
2C0	1	1	0	1
2B0	0	0	1	1
2A0	1	0	1	1
290	0	1	1	1
280 (default)	1	1	1	1

Installing the Master Programming Unit

The Master Programming Unit (MPU) consists of a base unit and one or more adapters that program MAX+PLUS II-supported Altera devices. The PL-MPU programming unit is shipped with all PC-based development systems that include programming hardware.

☞ MAX+PLUS II also supports an older programming unit, the PLE3-12A. The PLE3-12A programs some devices from the Classic and MAX 5000 device families.

Figure 1-7 shows an assembled PL-MPU Master Programming Unit.

Figure 1-7. Master Programming Unit
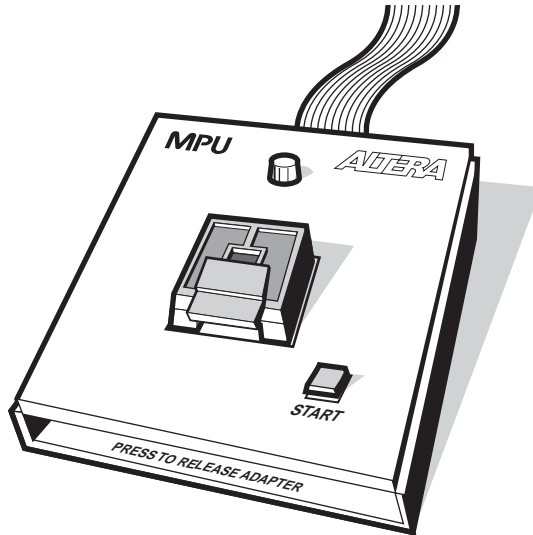
To install the MPU, follow these steps:

1.   On the rear panel of your PC, connect the 25-pin flat ribbon cable of
      the PL-MPU base unit to the Logic Programmer card.

      ☞   Do *not* plug the PL-MPU ribbon cable into the parallel
            printer port.

2.   Install the adapter by sliding the two tabs at the top of the adapter into
      the slots provided on the base unit. Be sure to use the appropriate
      adapter for the device you want to program. See Figure 1-8.

3.   Carefully lower and align the other end of the adapter, so that the
      connector in the adapter is inserted into the socket on the base unit.
      Press down firmly.

4.   Open the MAX+PLUS II Programmer or Simulator. Choose the
      Hardware Setup command (Options menu), and select
      LP6 + PL-MPU in the *Hardware Type* drop-down list box. Choose **OK**.

Figure 1-8. Installing the Adapter
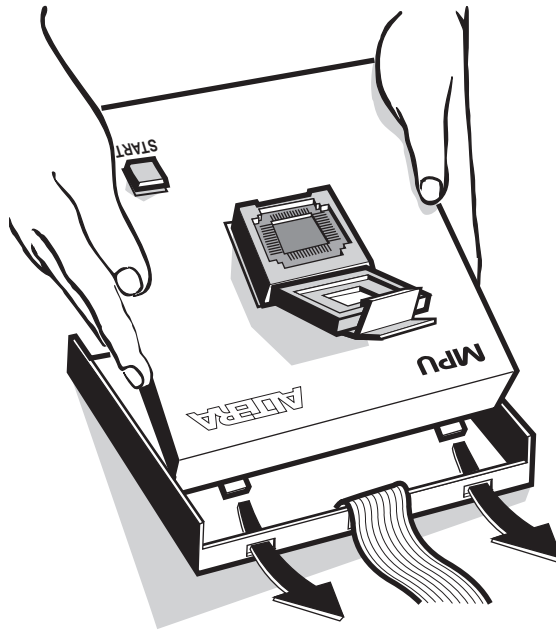
To release an adapter from the base unit:

1.   Press down on the front of the unit, while holding down the other end. See Figure 1-9.

2.   Lift out the adapter.

Figure 1-9. Releasing the Adapter
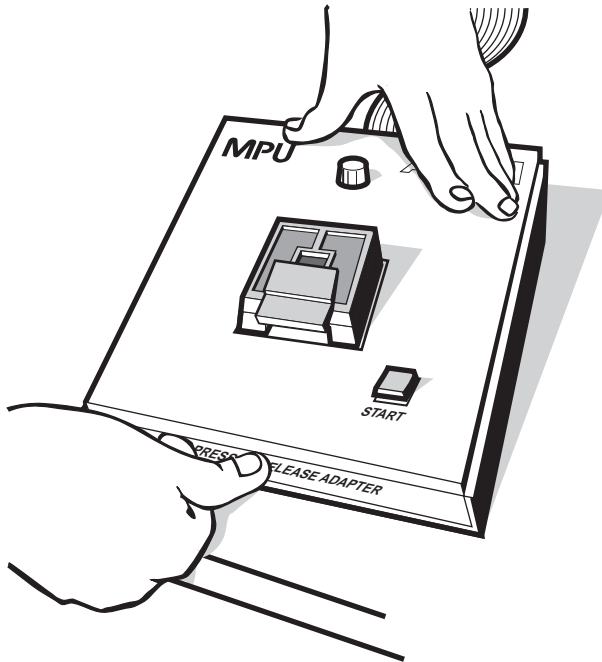
Installing the FLEX Download Cable on a PC

You can install an optional cable that allows you to download configuration data to configure FLEX 6000, FLEX 8000, and FLEX 10K devices in-system.

To set up the FLEX Download Cable for configuration:

1. Insert a Configuration EPROM programming adapter (e.g., PLMJ1213 or PLMT1064) into the PL-MPU base unit.

2. Connect the FLEX Download Cable to the 9-pin D-type connector on the Configuration EPROM programming adapter, as shown in Figure 1-10.

Figure 1-10. Connecting the FLEX Download Cable

9-Pin Connector
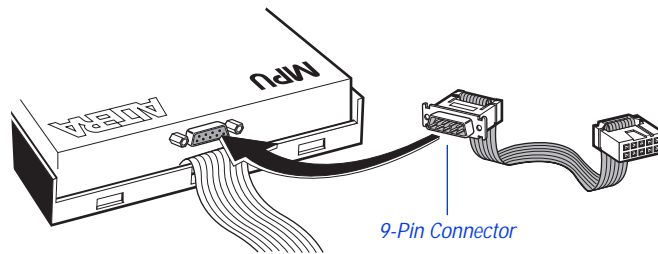
3.   Connect the other end of the FLEX Download Cable to the 10-pin male header on the target printed circuit board.

Go to *Application Note 87 (Configuring FLEX 6000 Devices)*, *Application Note 33 (Configuring FLEX 8000 Devices)*, *Application Note 38 (Configuring Multiple FLEX 8000 Devices)*, and *Application Note 59 (Configuring FLEX 10K Devices)* for instructions on how to configure FLEX 6000, FLEX 8000, and FLEX 10K devices.

Installing the BitBlaster on a PC or UNIX Workstation

The BitBlaster can be used with a PC or UNIX workstation RS-232 serial port (called a "COM port" on a PC). To set up the BitBlaster for device configuration or programming follow these steps:

1.   Connect the BitBlaster to the serial port on the computer. Figure 1-11 shows a typical serial port on a PC.

Figure 1-11. Connecting the BitBlaster to the Serial Port on the Computer
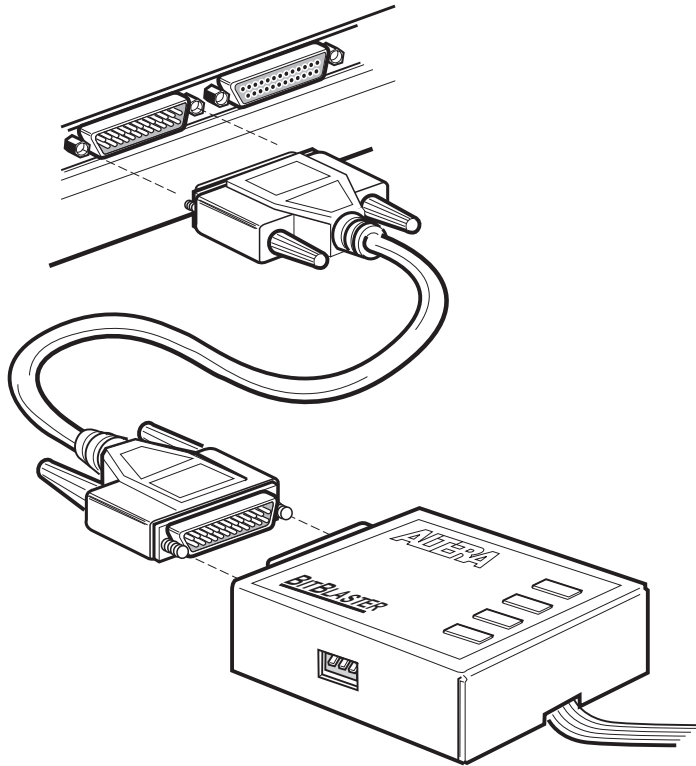
2.   Connect the other end of the BitBlaster to the 10-pin male header on the target printed circuit board. See Figure 1-12.

Figure 1-12. BitBlaster and 10-Pin Female Connector
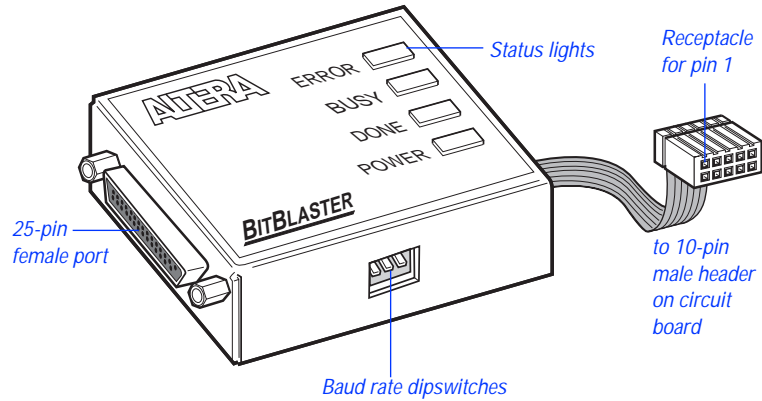
3.   Open the MAX+PLUS II Programmer or Simulator. Choose the **Hardware Setup** command (Options menu), and select *BitBlaster* in the *Hardware Type* drop-down list box. Choose **OK**.

4.   You must ensure that the baud rate of the BitBlaster, your computer's serial port, and the baud rate set in MAX+PLUS II are the same. If necessary, you can change the BitBlaster's baud rate by setting the dipswitches on the side panel. Dipswitch settings are listed in Table 1-5.

☞   You should set the baud rate as high as possible to accelerate configuration time. However, some PC-based systems cannot use baud rates higher than 9600 bps.

Table 1-5. BitBlaster Baud Rate Dipswitch Settings

Baud Rate (bps)	Dipswitches 1 through 3 (1 = ON; 0 = OFF)		
9,600	1	1	1
14,400	0	1	1
19,200	1	0	1
38,400	0	0	1
57,600	1	1	0
76,800	0	1	0
115,200	1	0	0
230,400	0	0	0

Go to "Changing the Hardware Setup" in MAX+PLUS II Help for more information on setting baud rates.

Configuring an IBM RISC System/6000 Workstation Serial Port for Programming

You can use the MAX+PLUS II Programmer and the BitBlaster to program and configure devices with an IBM RISC System/6000 workstation. In order to use the Programmer, you must turn off the Carrier Detect feature on the workstation's serial port to ensure that it will not block the programming signals.

To turn off the Carrier Detect feature:

1. Become root.

2. Start the **smit** system management tool.

3. Choose the following options in order:

    a.   **Devices**

    b.   **TTY**

    c.   **Change/Show Characteristics of a TTY**

    d.   **tty0** or **tty1** (the name of the serial port you are currently using)

    e.   **Change/Show TTY Program**

4. Select the Entry Field for **STTY attributes for RUN TIME**.

5. Append `,clocal` to the end of the text string in the Entry Field.

6. Select the Entry Field for **STTY attributes for LOGIN**.

7. Append `,clocal` to the end of the text string in the Entry Field.

8. Press ↵.

Installing the ByteBlaster on a PC

The ByteBlaster Parallel Download Cable is designed to be used with a PC parallel port (i.e., a printer port). You can connect the ByteBlaster directly to your PC's parallel port, or through the MAX+PLUS II Software Guard.

To install and set up the ByteBlaster for device configuration or programming, follow these steps:

1. If you are running the Windows NT 3.51 or 4.0 operating system, ensure that the Altera ByteBlaster driver is installed. Go to "Installing Windows NT Drivers" on page 10 for instructions.

2. Attach the ByteBlaster to a parallel port on your PC and insert the 10-pin female plug into the prototype system containing the target device, as shown in Figure 1-13.

    ☞   The board must supply power to the ByteBlaster.

Figure 1-13. ByteBlaster Parallel Port Download Cable
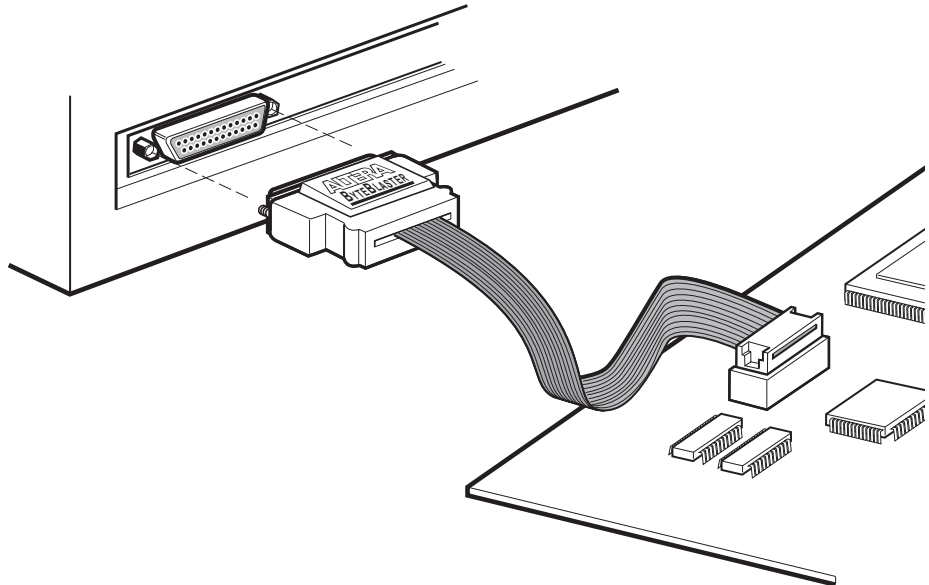
3.   Open the MAX+PLUS II Programmer or Simulator. Choose the **Hardware Setup** command (Options menu), select *ByteBlaster* in the *Hardware Type* drop-down list box, and select the appropriate LPT port in the *Parallel Port* drop-down list box. Choose **OK**.

Go to "Changing the Hardware Setup" in MAX+PLUS II Help for more information on setting up the ByteBlaster.

Creating & Using a Local Copy of the maxplus2.ini File

The **maxplus2.ini** file is a software initialization file created during installation. It contains both Altera- and user-specified parameters that control the way MAX+PLUS II applications operate.

The **maxplus2.ini** file stores essential information for running MAX+PLUS II. For example, this file stores the pathnames of the Altera-provided primitive, megafunction, and macrofunction libraries and the default colors for your application windows.

☞   If you delete this file, you must reinstall MAX+PLUS II.

The **maxplus2.ini** file can be stored in one of several locations: for a single-user PC installation, it is stored in the MAX+PLUS II system directory (**maxplus2**); on a UNIX workstation, it is stored in your home directory. If you use a network copy of MAX+PLUS II, or if a single computer is used by several engineers, you must create a local copy of the **maxplus2.ini** file. You must then set up an environment variable that specifies the location of the file.

To set up a local copy of the **maxplus2.ini** file on a PC:

1. Copy the existing **maxplus2.ini** file to the desired drive and directory. You can also open the file in MAX+PLUS II with the **Open** command (File menu) and save it to the desired drive and directory with the **Save As** command (File menu).

2. Specify the drive and directory of your **maxplus2.ini** file in your Windows environment:

    ✓   If you are using Windows NT 3.51 or 4.0, go through the following steps:

    a. Double-click Button 1 on the **System** icon in the Windows Control Panel. If you are using Windows NT 4.0, select the **Environment** tab.

    b. In the *Variable* box, type the following text:

    ```
    MAXPLUS2_INI
    ```

    c.   In the *Value* box, type the drive and directory name, e.g., `d:\maxplus2`.

    d.   Choose **Set**, then **OK**.

or:

✓   If you are using Windows 95, go through the following steps:

    a.   Edit the **autoexec.bat** file that is used to boot up your computer to include the following line:

    `set MAXPLUS2_INI=`*<drive and directory name>* ↵

    b.   Save the changes to **autoexec.bat** and reboot your computer.

To set up a local copy of the **maxplus2.ini** file on a UNIX workstation:

✓   Copy the existing **/usr/maxplus2/maxplus2.ini** file to your home directory with UNIX workstation commands. If you need to store the **maxplus2.ini** file in a different location, perform the following additional steps:

    ✓   If you are running a C shell, add the line `setenv MAXPLUS2_INI` <d*irectory name>* ↵ to the **.cshrc** file in your **/usr/maxplus2** directory, then type the command `source .cshrc` ↵ at the C shell prompt.

    or:

    ✓   If you are running a Bourne shell, add the line `set MAXPLUS2_INI=`*<directory name>* ↵ to the **.profile** file in your home directory, then type the command `source .profile` ↵ at the Bourne shell prompt.

MAX+PLUS II File Organization

During MAX+PLUS II installation, two directories are created: **\maxplus2** and **\max2work**. The **\maxplus2** directory contains system software and data files and includes the subdirectories described in Table 1-6:

☞ The pathnames below are shown using the PC pathname convention of backslash (\) characters, but UNIX pathnames use forward slash (/) characters. On a UNIX workstation, the **max2work** and **maxplus2** directories are subdirectories of the **/usr** directory. Otherwise the file and directory organization is identical on PCs and UNIX workstations, except where noted.

Table 1-6. MAX+PLUS II System Directory Structure (Part 1 of 2)

Directory	Description
.\adm	Contains FLEXlm license manager daemon, license files, and license manager executable files (UNIX workstation and network installations only).
.\bin	Contains the executable software program files (UNIX workstation installations only).
.\common	Contains common UNIX files (UNIX workstation installations only).
.\drivers	Contains Windows NT device drivers (PC installations for Windows NT only).
.\edc	Contains Altera-provided EDIF Command Files (**.edc**) that customize EDIF Output Files (**.edo**) for specific third-party simulation environments.
.\fonts	Contains Altera, Arial, and MS Sans Serif fonts (UNIX workstation installations only).
.\hp	Contains platform-specific files for HP 9000 Series 700/800 UNIX workstation installations.
.\lmf	Contains Altera-provided Library Mapping Files (**.lmf**) that map third-party logic functions to equivalent MAX+PLUS II logic functions.
.\max2inc	Contains Include Files (**.inc**) with Function Prototypes for Altera-provided macrofunctions. Function Prototypes list the ports (pinstubs) for macrofunctions that can be implemented in Altera Hardware Description Language (AHDL) Text Design Files (**.tdf**).
.\max2lib\edif	Contains primitives and macrofunctions used for third-party EDIF interfaces.

Table 1-6. MAX+PLUS II System Directory Structure (Part 2 of 2)

Directory	Description
.\max2lib\mega_lpm	Contains megafunctions, including Library of Parameterized Modules (LPM) functions, and the corresponding Include Files that contain their AHDL Function Prototypes.
.\max2lib\mf	Contains old-style 74-series and custom macrofunctions.
.\max2lib\prim	Contains Altera-provided primitives.
.\rs6000	Contains platform-specific files for IBM RISC System/6000 UNIX workstation installations.
.\solaris	Contains platform-specific files for Solaris UNIX workstation installations.
.\sunos	Contains platform-specific files for SunOS UNIX workstation installations.
.\vhdl*nn*\altera *Note (1)*	Contains the **altera** library with the maxplus2 package. This package includes all MAX+PLUS II primitives, megafunctions, and macrofunctions supported by VHDL.
.\vhdl*nn*\ieee *Note (1)*	Contains the **ieee** library of VHDL packages, including std_logic_1164, std_logic_arith, std_logic_signed, and std_logic_unsigned.
.\vhdl*nn*\std *Note (1)*	Contains the **std** library with the standard and textio packages defined in the *IEEE Standard VHDL Language Reference Manual*.
Note: (1) *nn* represents "87" or "93," indicating VHDL 1987 or 1993 support.	

The **\max2work** directory contains tutorial and sample files and includes the subdirectories described in Table 1-7:

Table 1-7. MAX+PLUS II Working Directory Structure

Directory	Description
.\ahdl	Contains the sample files used to illustrate "How to Use AHDL" topics in MAX+PLUS II Help and in the *MAX+PLUS II AHDL* manual.
.\chiptrip	Contains all files for the **chiptrip** tutorial project described in this manual.
.\edif	Contains all sample files used to illustrate EDIF features in MAX+PLUS II Help.
.\tutorial	Contains the **read.me** file for the **chiptrip** tutorial. You should create the files for the **chiptrip** project in this subdirectory.

Table 1-7. MAX+PLUS II Working Directory Structure

Directory	Description
.\vhdl	Contains the sample files used to illustrate "How to Use VHDL" topics in MAX+PLUS II Help and in the ***MAX+PLUS II VHDL*** manual.
.\verilog	Contains the sample files used to illustrate "How to Use Verilog HDL" topics in MAX+PLUS II Help and in the ***MAX+PLUS II Verilog HDL*** manual.

Go to the Altera-provided Software Interface Guide for your third-party environment for information on the directory structure of the files installed for third-party interfaces to MAX+PLUS II.