

**PowerPC™ Open Firmware
Quick Start Guide
Release 2.0**

PPCOFWQSA/UG2

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Preface

The *PowerPC Open Firmware Quick Start Guide* provides the general information and procedures required to test and initialize the system hardware, determine the hardware configuration, and to boot the operating system.

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General Information

Overview

This guide introduces you to the basic features of the PowerPC Open Firmware and the tasks you need to perform using the Graphical User Interface.

The primary tasks of PowerPC Open Firmware are to test and initialize the system hardware, determine the hardware configuration, and boot the operating system.

Scope

The PowerPC Open Firmware Quick Start Guide quickly steps you through the procedures for booting and resetting the system, customizing the logo, displaying and modifying the configuration variables, running the self tests, and updating the firmware ROM.

This guide does not provide conceptual or detailed technical information.

PowerPC Implementation

The PowerPC implementation of Open Firmware is based on the PowerPC Binding to Open Firmware.

Hardware Requirements

A Motorola PowerPC system. Currently, PowerPC Open Firmware is supported on the PowerStackII Series E, Series EX, Pro2000/200, Pro3000/200, Pro4000/166, Pro4000/200, Net4000/166, Net4000/200 and the RISC PC and RISC PC Plus.

Display Device

For display on a graphics terminal, a VGA display and a firmware-supported PCI graphics card are required. Please refer to the *PowerPC Open Firmware Supported PCI Cards Quick Reference* for a listing of supported devices.

For display on a serial terminal, an ANSI-compatible 80x24 terminal or terminal emulator is required.

Memory Requirements

The amount of memory in the system is dynamically identified by PowerPC Open Firmware and does not require user intervention. Special modifications are required only if EDO (Extended Data Out) memory is used.

Refer to the System Installation Guide for details regarding the physical memory requirements of the system.

EDO Memory Configuration

For systems that do not support EDO memory, the default state of the **edo-memory?** variable is *false* and must always be false.

For systems supporting EDO memory, Pro2000/200 and Pro3000/200, PowerPC Open Firmware must be configured to use the timing values for EDO memory. The default state of the **edo-memory?** variable must be set to *true*.

To set the NVRAM variable, at the **ok** prompt type:

setenv edo-memory? true and press **RETURN**.

Reset the system to use the new value.

System Setup

The PowerPC Open Firmware is installed by Motorola at the factory when your PowerPC system or board is manufactured. Refer to your PowerPC board or system installation manual and verify that the necessary hardware preparation has been properly completed.

System Power-Up

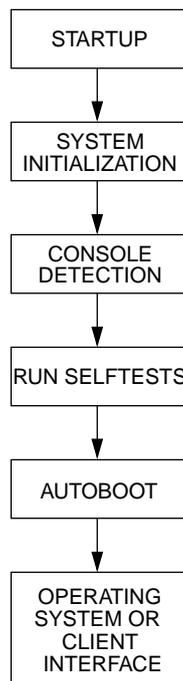
Refer to your PowerPC board or system installation manual for steps on powering up your system.

Initialization Process

The MPU, hardware, and firmware initialization process is performed by the PowerPC Open Firmware power-up or system reset. The firmware initializes the devices on the computer motherboard in preparation for booting your operating system.

The firmware is shipped from the factory with an appropriate set of defaults. In most cases there isn't a need to modify the configurations in the firmware prior to booting your operating system.

This flowchart shows the basic initialization process which occurs during PowerPC system startup.



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Figure 1. PowerPC Open Firmware System Startup

Your PowerPC Open Firmware has been configured to automatically initialize your system, detect your console (VGA or serial), run system selftests, and autoboot your operating system.

If	Then
Your operating system has already been installed on your PowerPC system	The PowerPC Open Firmware automatically detects the installed operating system and autoboots it.
The operating system has not been installed on your PowerPC system	Refer to the installation instructions that came with your operating system. You may be instructed to interrupt the PowerPC Open Firmware startup sequence so you can install the operating system. This step would require you to make a keystroke prior to the autoboot step that occurs in the startup sequence.

PowerPC Open Firmware Console Detection

Typically, the console is either the combination of a text/graphics display device (VGA type terminal) and a keyboard or an ASCII terminal connected to a serial port.

This table shows how PowerPC Open Firmware determines whether it should be displayed on the VGA terminal or the serial port during the power-up/reset sequence.

KBD Connected	Firmware Supported VGA Device/Card Exists	Firmware is Displayed On
yes	yes	VGA terminal
no	yes	Serial (COM1)
no	no	Serial (COM1)
yes	no	Serial (COM1)

The PCI video cards in the “plug-in” slots are checked first, and then a check is made for an “on-board” video device. The slots are checked from top to bottom.

Keystroke and Mouse Introduction

Menu Level Keystrokes

The following keystrokes are used in the menu interface to easily navigate through the task selection process:

Key Action	Description
<ENTER>	Executes the highlighted menu option. This may bring up another submenu or start an execution window.
Up/Down Arrow	Moves the highlight bar to the next or previous selection.
<ESC>	Closes the current submenu and returns you to the previous menu

Execution Window Keystrokes

An execution window is created for some of the menu options to provide input at the Command Line Interface (**ok** prompt) or to display output.

Key Action	Description
Page Up/Down	Moves the visible portion of the display up or down one page. Up to 10 pages are available in an execution window.
Spacebar	Pauses or unpauses the output.
<ENTER>	Displays a single field.
<ESC >	Closes the execution window and returns control to the menu which started it.
menu <ENTER>	Returns from the ok prompt to the menu.
Right /Left Arrow	Moves the cursor to the right or to the left.

Mouse Operation

PowerPC Open Firmware has two levels of mouse support.

- ❑ Menu level
- ❑ Execution window

Note that the mouse is not available at the Command Line Interface (**ok** prompt). Mouse support requires a VGA display device.

Menu-Level Mouse

Moving the mouse over a menu or submenu item causes the menu highlight bar to change position and help text to appear in the context-sensitive help window at the bottom of the screen.

Action	Description
Right click	The right click functions the same as the <ESC> keystroke and the minus button in the upper left corner of the menu window. Any of these actions may be used to close down the current submenu window.
Left click	To execute an icon or menu item with the mouse, either single or double click on the icon or menu item. To close a submenu window, click on the minus button in the upper left corner of the menu window. Note that you cannot close the main menu window.

Execution Window Mouse

Action	Description
Right click	The right click may be used to close down an execution window when the message "Press the <ESC> key to return to the menu" is displayed after execution.

Note Although icon context-sensitive help is available from within an execution window, you cannot execute icons in this window. You must return to the menu system in order to execute an icon.

The Graphical User Interface

The Main Menu lists the major options that you most commonly execute. Menu selection and execution is made by using the Up or Down arrow keys and pressing **ENTER**, or by clicking on the option with the left mouse button.

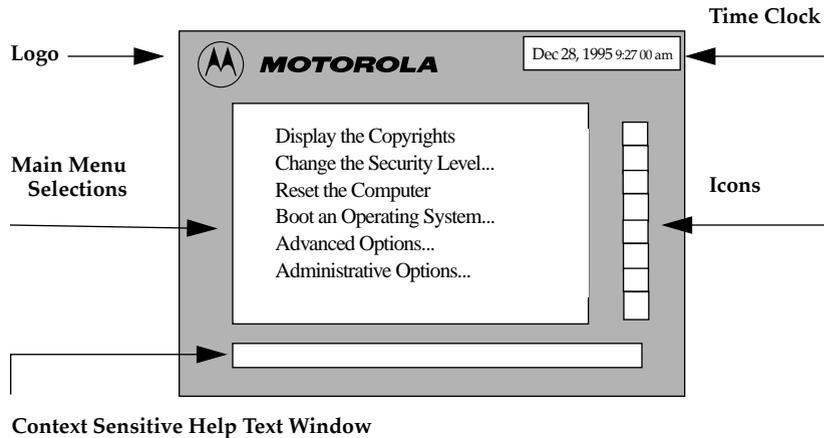


Figure 2. Main Menu Components

Motorola or OEM Logo

The upper left corner of the Main Menu displays an OEM logo. A mouse click on the logo displays the copyrights. The Motorola logo is the default.

Time Clock

The time clock feature displays the current date, time, and year in your local time while you are navigating the menu. A mouse click on the time clock display produces an execution window that allows you to change the date and time. A security check is also run to ensure that you have administrative privileges. When the system is busy or executing a command, the message, "Clock is Unavailable" is displayed.

Submenu

This lower-level menu offers detailed options in the subject category specified by the parent menu. Submenus are displayed in a cascading formation.

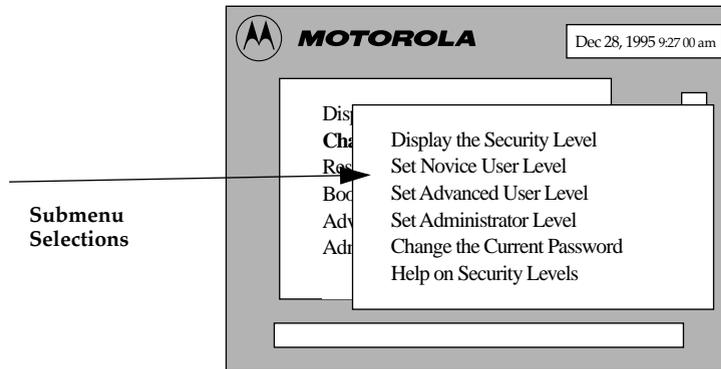


Figure 3. Example of a Submenu

Context Sensitive Help Text Window

The context sensitive help text window at the bottom of the screen displays additional information about the currently highlighted menu selection. This window is updated as the cursor or mouse is moved within a menu or submenu.

Context sensitive help is also displayed for each of the icons by placing the mouse pointer over the top of the icon. Context sensitive help is also displayed for the OEM logo, time window, and context sensitive help window when the mouse pointer is placed over these regions.

Execution Window

An execution window is displayed for some of the menu options to provide input and/or output. An execution window is also provided when using the **ok** prompt.

```
Board (PWA) Serial Number = "1954499"  
Board Identifier = "bh "  
Artwork (PWA) Identifier = "01-W3107f02g"  
MPU Clock Speed = "100"  
BUS Clock Speed = 067"  
Ethernet Address = "08003E303433"  
Local SCSI Identifier - "07"  
System serial Number = "MOTRISC1954499"  
System Identifier = "MOT RISC PC (e0)"  
  
...  
Press the <ESC> key to return to the main menu
```

Icons

Along the right-hand side of the menu are several icons, each representing a commonly executed task. The icons are available only in the Graphical User Interface (GUI) and are not available from the Serial User Interface, which is strictly an 80x24 ASCII interface.

Icons and Context Sensitive Help

Moving the mouse across the top of an icon displays a corresponding context sensitive help message in the help box.

Executing an Icon

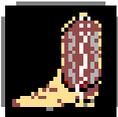
An icon may be executed by clicking on it either once or twice with the left mouse button.

Display and Security of Icons

There is security attached to each of the icons in PowerPC Open Firmware. Executing an icon is like executing a menu option, first a security check is done prior to actual execution of the item if **security?** = *true*. There are eight icons, however, the number of icons displayed on your VGA screen depend on your security settings in the firmware. By default, your PowerPC system is shipped with **security?** = *false* (the security system in the firmware is disabled).

The Graphical User Interface is configured in the factory with **security?**=*false* which displays only the first four icons. It doesn't matter what the NVRAM configuration variable **security-mode** is in this case.

If security is desired and you wish to display all eight icons, you must set **security?** = *true* and choose new passwords for each level using the **Change the Security Level** menu option. Also, the NVRAM configuration variable **security-mode** must be set to *administrator*.

Icon	Description
	<p>Click this icon to boot an operating system or client interface.</p> <p>This option may be executed by any level of user regardless of the security? value.</p>
	<p>Click this icon to look at the computer system components. A graphical display showing the PowerPC processor type, memory size, and L2 cache size will appear in the execution window. A list of attached boot-related devices is also displayed.</p> <p>If security? = <i>false</i> any user level can execute this option.</p> <p>If security? = <i>true</i>, security-mode must be set at novice or higher</p>

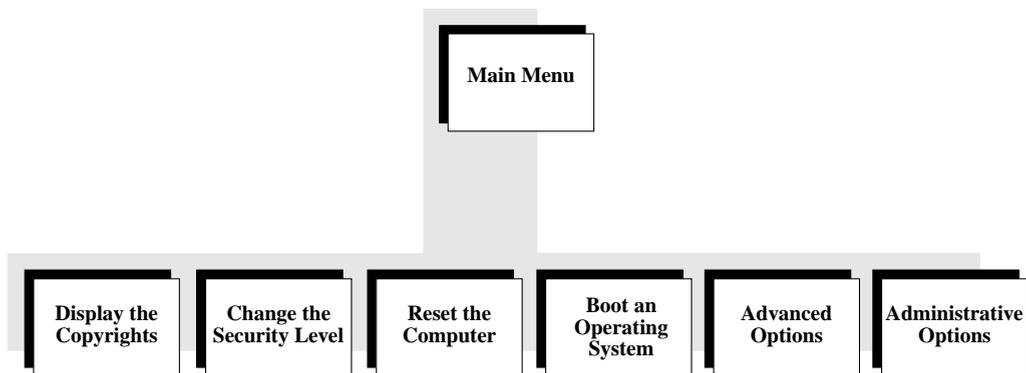
Icon	Description
	<p>Click this icon to run the extended selftests on your PowerPC system or board.</p> <p>If security? = <i>false</i> any user level can execute this option.</p> <p>If security? = <i>true</i>, security-mode must be set at advanced or higher.</p>
	<p>Click this icon to reset your PowerPC system.</p> <p>This option may be executed by any level of user regardless of the security? value.</p>
	<p>Click this icon to reset your NVRAM variables to their original default setting. Warning: Use this icon with caution as you may lose user-specific NVRAM settings when you choose to return to the default settings.</p> <p>If security? = <i>false</i> this icon does not display.</p> <p>If security? = <i>true</i>, security-mode must be set at administrative level.</p>
	<p>Click this icon to go to the Command Line Interface (ok prompt).</p> <p>If security? = <i>false</i> this icon does not display.</p> <p>If security? = <i>true</i>, security-mode must be set at administrative level.</p>
	<p>Click this icon to modify any of the configuration NVRAM variables.</p> <p>If security? = <i>false</i> this icon does not display.</p> <p>If security? = <i>true</i>, security-mode must be set at administrative level.</p>
	<p>Click this icon to modify any of the boot-related NVRAM variables.</p> <p>If security? = <i>false</i> this icon does not display.</p> <p>If security? = <i>true</i>, security-mode must be set at administrative level.</p>

Main Menu

The PowerPC Open Firmware GUI is accessed after power-up or restart if these conditions are true:

- ❑ The auto-boot is disabled **auto-boot?**=*false*
- ❑ You manually interrupt the auto-boot countdown

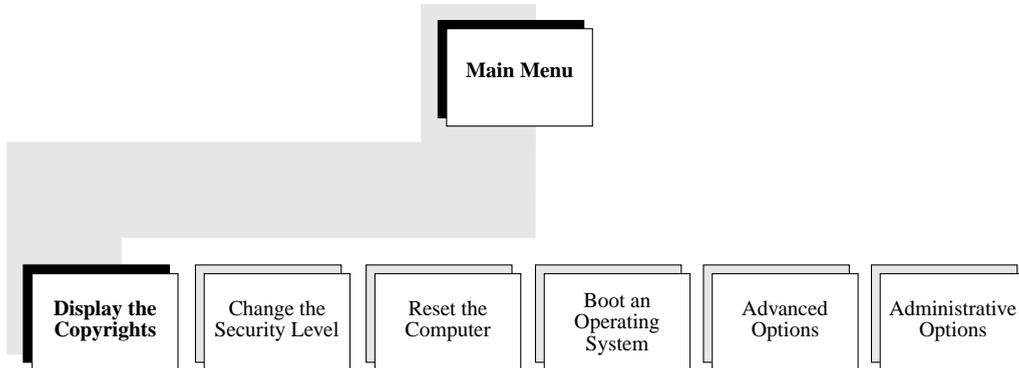
The intuitive GUI is designed to provide easy access to the most commonly used firmware features, as shown below.



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Copyright Information

Copyright information is automatically displayed during power-up and reset but can also be viewed by clicking on the logo area or selecting the appropriate option from the Main Menu.



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Using the keyboard or mouse, select **Display the Copyrights** to view the copyrights.

The copyrights remain on the screen for several seconds and are then cleared. The Motorola, Inc. and the Firmworks copyrights are always displayed and cannot be removed.

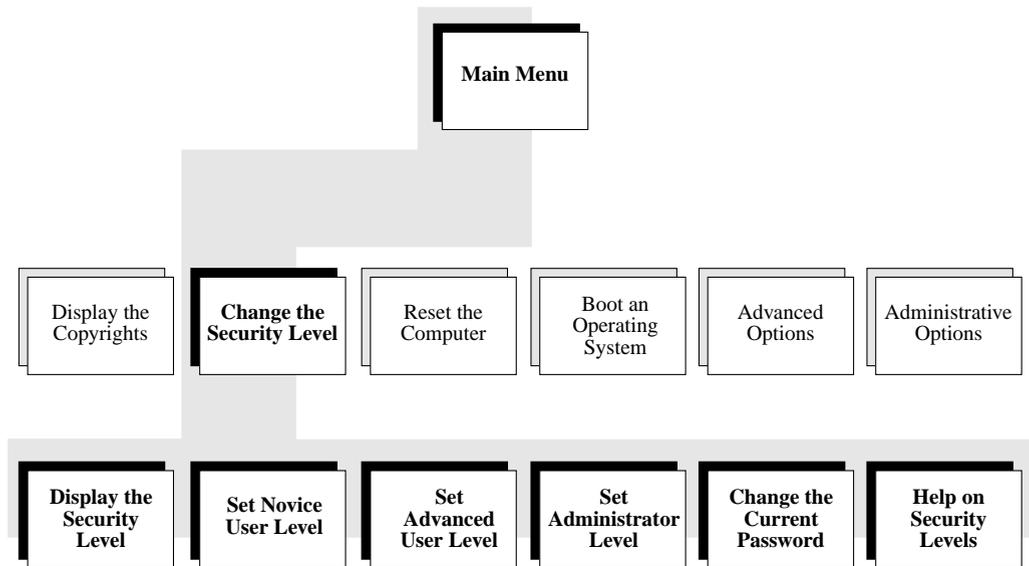
Change the Security Level

Access to the PowerPC Open Firmware GUI and Command Line Interface is controlled by one of three security-mode settings, Novice, Advanced, and Administrator. Each mode provides a different level of available commands at the interface.

Menu- and Boot-Level Security

Each one of the three security levels requires a different password that must be between one and eight characters long. In order to access a particular security level, the user needs to login as that level or higher. A submenu exists which allows users to login to different levels and to change the password of the current security level.

The administrative-level boot-time options are explained in detail in the *PowerPC Open Firmware User's Manual, Volume 1*.



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Display the Security Level

This option gives you information on the current security mode setting. Use the keyboard or mouse to:

1. Select **Display the Security Level** to see what the current setting is.

2. Press <ESC> or click the right mouse button to return to the previous menu.

Set Novice User Level

The Novice level allows you to redisplay copyright messages, boot the operating system, and reset the computer. Use the keyboard or mouse to:

1. Select the **Set Novice User Level** option from the **Change Security Level** menu.
2. At the prompt, type in the Novice level password (provided by your Administrator) and press **ENTER**.
A message appears confirming that the security level is set to Novice.
3. Press <ESC> or click the right mouse button to return to the previous menu.

Set Advanced User Level

In addition to performing the novice-level tasks, the Advanced level allows you to run system diagnostics, reconfigure the keyboard, and display hardware and software configuration information. Use the keyboard or mouse to:

1. Select the **Set Advanced User Level** option from the **Change Security Level** menu.
2. At the system prompt type the required password (provided by your Administrator) and press **ENTER**.
A message appears confirming that the security level is set to Advanced.
3. Press <ESC> or click the right mouse button to return to the previous menu.

Set Administrator Level

The Administrator level allows setting of date and time, modification of configuration settings, updating the firmware ROM, and invoking the Command Line Interface. Use the keyboard or mouse to:

1. Select the **Set Administrator Level** option from the **Change Security Level** menu.
2. At the prompt, type in the administrator password and press **ENTER**.
A message appears confirming that the security level is set to Administrator.
3. Press **<ESC>** or click the right mouse button to return to the previous menu.

If you are logged in at the Administrative level, you may also modify the security modes from the Command Line Interface. This is discussed in detail in the *PowerPC Open Firmware User's Manual*, Volumes 1 and 2.

Change the Current Password

This option allows you to change the password for your current level of security. For example, if you are a novice you can change the novice password.

To change your password, use the keyboard or mouse to:

1. Select the **Change the Current Password** option on the **Change Security Level** menu.
The system prompts you to type in a new password.
2. Type your new password and press **ENTER**, you are then prompted to re-enter your password.
3. Retype the password for verification.

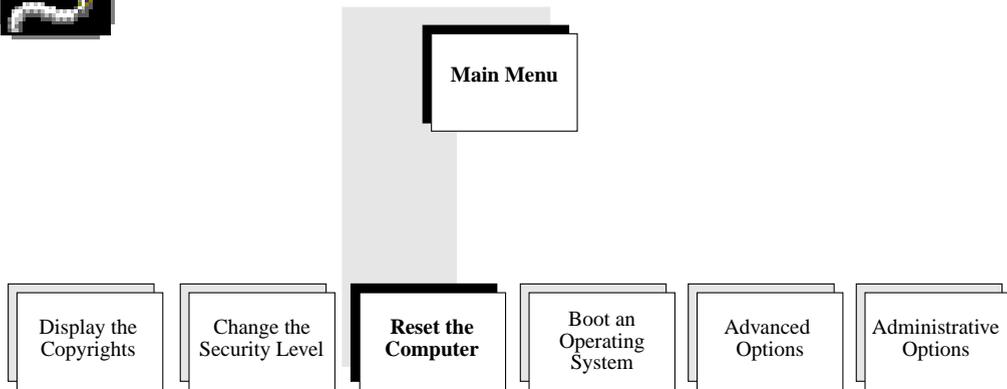
If the retyped password doesn't match the new password, an error message displays and the old password remains in effect. See your administrator if you receive an error.

Help on Security Levels

Select the **Help on Security Levels** option to access the online help provided for each of the security selections.



Reset the Computer



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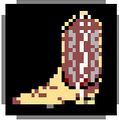
Occasionally, you may need to do a software or a hardware reset to your system. This can be done by selecting the **Reset Computer** option on the Main Menu or by clicking on the reset icon.

To reset the system, use the keyboard or mouse to:

1. Select the **Reset the Computer** option from the Main Menu.

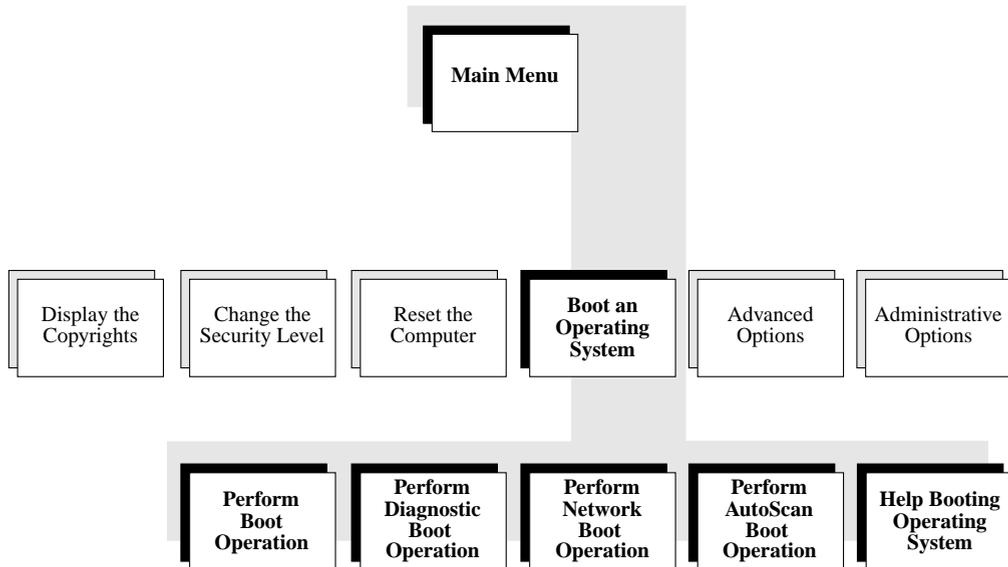
The system proceeds through the normal power-up/reset sequence as described on [page 5](#).

Refer to [Figure 1. PowerPC Open Firmware System Startup](#) on [page 4](#) for the default power-up/reset configuration. The default sequence can vary if certain NVRAM variables such as **run-self-test?** and **auto-boot?** are modified.



Boot the Operating System

PowerPC Open Firmware allows easy booting at the menu level.



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The Booting Process

For the **Boot**, **Diagnostic Boot** and **AutoScan Boot** operations, the NVRAM variables: **boot-device**, **diag-device**, and **pboot-device-default** are parsed from left to right. The boot operation then performs an **open-dev** on each parsed device. If the **open-dev** is successful, a boot is performed on the successfully opened device to the filename in the NVRAM variable: **boot-file**, **diag-file**, or **boot-file**.

The **Network Boot** operation creates a string using the **net-cfg-method**, **serveripaddr**, **clientipaddr**, **gatewayipaddr**, and **boot-file**. The process then invokes a **boot net:** command using the created string.

Perform Boot Operation

To boot your operating system, use the keyboard or mouse to:

1. Select the **Boot an Operating System** from the Main Menu.
2. Select **Perform Boot Operation** from the submenu.
3. A message similar to this appears:

```
Please wait while the system is booting
Boot device: boot File and args: ~smp\carloss.elf
```

Perform Diagnostic Boot Operation

To perform a diagnostic boot, use the keyboard or mouse to:

1. Select the **Boot an Operating System** from the Main Menu.
2. Select **Perform Diagnostic Boot Operation** from the submenu.

A message similar to this appears:

```
Please wait while the system is booting
Boot device: boot File and args: ~smp\carloss.elf
```

Perform Network Boot Operation

To boot from the network, use the keyboard or mouse to:

1. Select the **Boot an Operating System** from the Main Menu.
2. Select **Perform Network Boot Operation** from the submenu.

A display similar to this appears:

```
Please wait while the system is booting
Boot device: /pci/ethernet@e:144.191.24.252,~sr
mp\carloss.elf,144.191.24.76,0
.0.0.0 boot File and args: ~smp\carloss.elf
/
```

Perform Auto-Scan Boot Operation

To do an auto-scan boot, use the keyboard or mouse to:

1. Select the **Boot an Operating System** from the Main Menu.
2. Select **Perform Auto-scan Boot Operation** from the submenu.

```
Trying..., boot Failed
Trying..., fdisk0 Failed
Trying..., cdrom0 Failed
Trying..., tape0 Can't rewind tape
Failed

Trying..., enet0 Booting
Please wait while the system is booting
Boot device: /pci/ethernet@e:144.191.24.252, ~sr
mp\carloss.elf,144.191.24.76,0

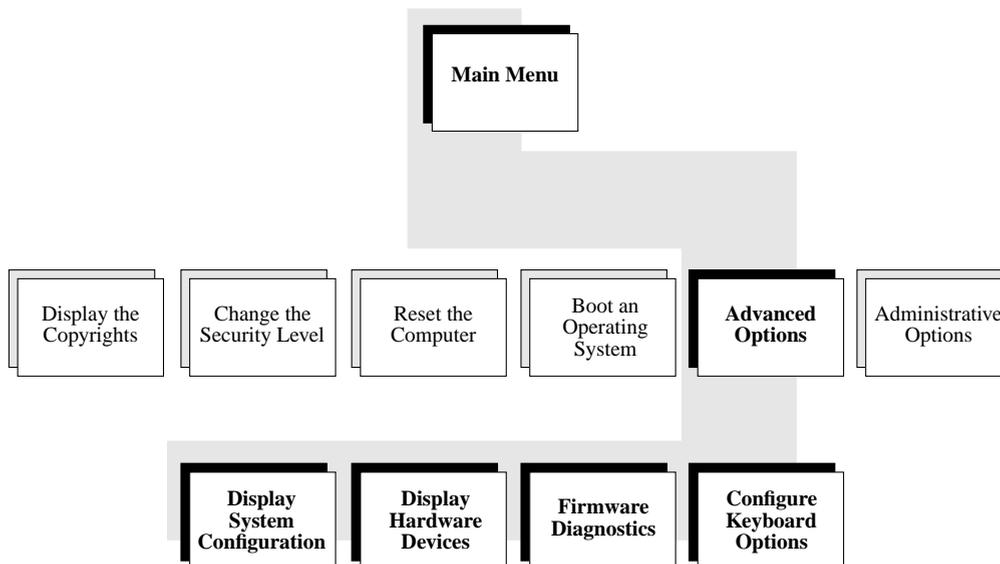
.0.0.0 File and args: ~smp\carloss.elf
-
```

Help on Booting the Operating System

Selecting this menu option gives you general help on the boot process for your operating system. See the documents that came with your current operating system for further details.

Advanced Options

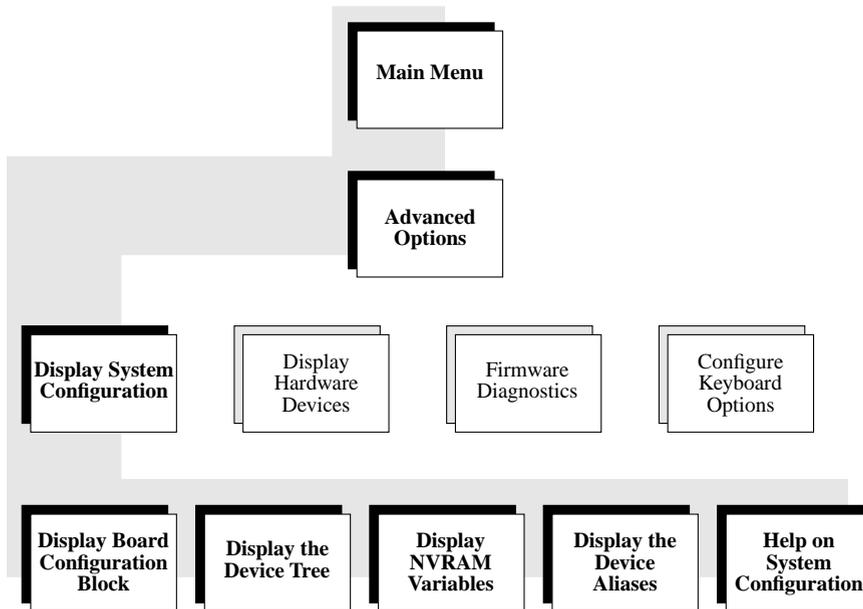
These options are for the person who needs to display system information and run diagnostics. Select the **Advanced Options** from the Main Menu. A submenu appears that offers several options to choose from.



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Display the System Configuration

By selecting this option you are presented with a submenu offering many selections that display important configuration information.



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To view the submenu, use the keyboard or mouse to:

1. Select the **Advanced Options** from the **Main Menu**.
2. Select the **Display System Configuration** option.

Display the Board Configuration Block

To view information about your PowerPC system or board, use the keyboard or mouse to:

1. Select the **Display Board Configuration Block** option from the **Display System Configuration** menu.

A display similar to the following appears:

```
Board (PWA) Serial Number = "MOT1954496 "  
Board Identifier = "Blackhawk Ultra "  
Artwork (PWA) Identifier = "01-W3107F02G "  
MPU Clock Speed = "100"  
BUS Clock Speed = "067"  
Ethernet Address = "08003E30344B"  
Local SCSI Identifier = "07"  
System Serial Number = "MOT123 "  
System Identifier = "RISC PC  
License Identifier = "12345678"
```

2. Press <ESC> or click the right mouse button to return to the previous menu.

The configuration information is configured in the factory. There is no need to modify these values unless the NVRAM gets corrupted.

Display the Device Tree

This option allows you to view the individual device tree nodes that make up your system. Use the keyboard or mouse to:

1. Select the **Display the Device Tree** option from the **Display System Configuration** menu.
2. Use the Page Up/Page Down keys or mouse to scroll the list of device tree nodes, or press any key to halt the device tree display.

A display similar to the following appears:

```
/PowerPC,603  
/Planar-ID  
/abort-sw  
/led@800008c0  
/pci
```

```

/mmu
/memory@0
/aliases
/menu./packages
/pci/DEC,ethernet@e
/pci/scsi@c

```

Press <ESC> or click the right mouse button to return to the previous menu.

Display the NVRAM Variables

To display the variable names, values, and default values, use the keyboard or mouse key to:

1. Select the **Display the NVRAM Variables** option from the **Display System Configuration** menu.

The screen displays the current NVRAM information.

Variable Name	Value	Default Value
mot-oem-logo?	true	true
24-hour-time?	false	false
concurrent-mode?	false	false
concurrent-device	com1	com1
debug-device com1	screen	screen
menu?	false	true
serial-mouse		
pci-probe-list	10,11,12,13,d,c,e,f	0,11,12,13,d,c,e,f
.		
.		
.		

2. Press <ESC> or click the right mouse button to return to the previous menu.

Note To change a value, you must be logged in as an Administrative user. The **Edit Configuration Variables** icon or menu option can be used to modify the Configuration NVRAM variables. The **Edit Boot Variable** icon or menu option can be used to modify the boot-related NVRAM variables.

Display the Device Aliases

The device aliases provide a shorthand version of a device path, that makes it easier to access or refer to the devices on your system.

1. Select the **Display the Device Aliases** option from the **Display System Configuration** menu.

The screen displays the current Device Aliases information.

```
screen      /pci/viper@12
a           /floppy
ntdisk      /pci/scsi@/disk@0,0:\vener.exe
com3        /pci/isa/85230@i840:A
com4        /pci/isa/85230@i840:B
disk        /pci/scsi@/disk@0,0:1
cdrom       /pci/scsi@/disk@5,0
disk2       /pci/scsi@/disk@2,0:1
disk1       /pci/scsi@/disk@1,0:1
disk0       /pci/scsi@/disk@0,0:1
scsi        /pci/scsi@
.
.
.
```

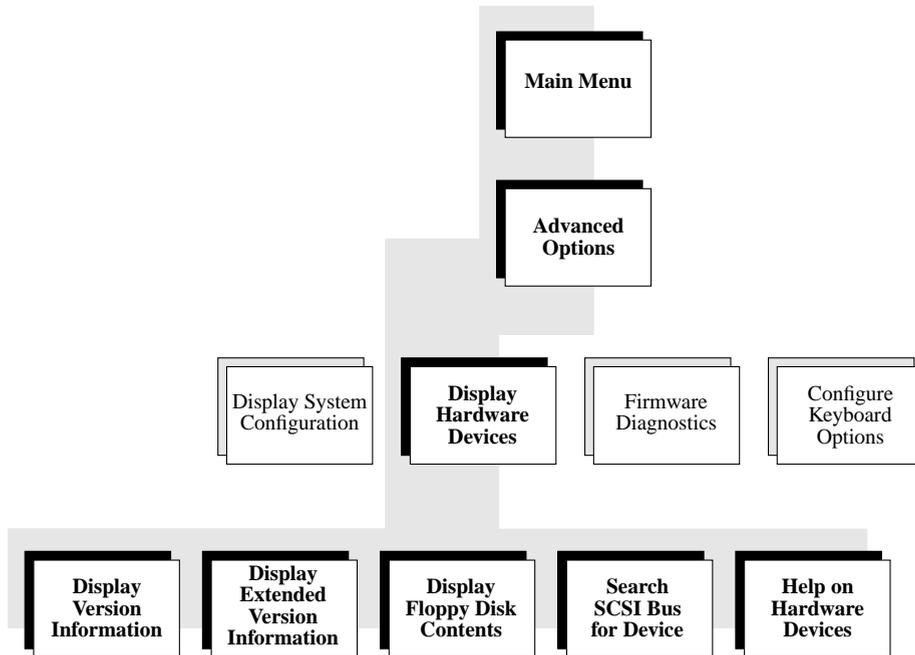
2. Press <ESC> or click the right mouse button to return to the previous menu.

Help on System Configuration

Choose this option for descriptions and explanations of each selection under the **Display System Configuration** menu option.

Display Hardware Devices Menu

Select this option to check your hardware version, view the contents of your floppy disk, and search the SCSI bus for devices.



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Display the Hardware Version Information

To see what version hardware your system is currently running, use the keyboard or mouse to:

1. Select the **Display Hardware Devices** option.
2. Select the **Display Hardware Version Information**.

The screen displays the current version information similar to the following.

```
...  
Open Firmware Revision ID.....1.0  
Open Firmware Revision...Date.Tues Jan 30 14:46:31 MST 1996  
CPU Type.....PowerPC,604  
MicroProcessor Internal Clock Speed (MHZ).....100  
Local Memory Size.....4000000 (64MB)  
...
```

3. Press <ESC> or click the right mouse button to return to the previous menu.

Display the Extended Hardware Version Information

With this option you receive the same information that **Display the Hardware Version** Information provides, but also additional information on PCI class and subclass, and register content. Using the keyboard or mouse:

1. Select the **Display Hardware Devices** option.
2. Select the **Display Extended Hardware Version Information**.

A display similar to the following appears:

```
...  
Open Firmware Revision ID.....1.0  
Open Firmware Revision...Date.Tues Jan 30 14:46:31 MST 1996  
CPU Type.....PowerPC,604  
MicroProcessor Internal Clock Speed (MHZ).....100  
Local Memory Size.....4000000 (64MB)  
...
```

```

0 01 00 06 01 80 20 24 00 00 06 00 00 00PCI Bus Bridge Device Registers
Base+$0000 57 10 01 00 06 01 80 20 24 00 00 06 00 00 00 00
Base+$0010 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Base+$0020 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
.
.
.
/pci/cirrus@f
Device ID/Revision . . . . . =a81013/8e
Class: Display Controller Subclass:VGA-compatible Controller
Base+$0000 13 10 Base+$0010 00 00 00 02 00 00 00 00 00 00 00 00 00 00
00 00
Base+$0020 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Base+$0030 00 00 00 03 00 00 00 00 00 00 00 00 0b 01 00 00
...

```

3. Press <ESC> or click the right mouse button to return to the previous menu.

Display the Floppy Disk Contents

To view a listing of directories and files resident on your floppy drive, use the keyboard or mouse to:

1. Select the **Display Hardware Devices**.
2. Select the **Display the Floppy Disk Contents**.

The screen displays the floppy disk information.

```

----rwxrwxrwx 32 12/05/95 14:30:24 file1
----rwxrwxrwx 32 12/05/95 14:30:54 file2
----rwxrwxrwx 32 12/05/95 14:31:30 file3

```

3. Press <ESC> or click the right mouse button to return to the previous menu.

Search the SCSI Bus for Devices

To view the SCSI devices connected to your system, use the keyboard or mouse to:

1. Select the **Display Hardware Devices** option.
2. Select the **Search the SCSI Bus for Devices**.

The screen displays the current device information.

```
/pci/scsi@  
Target 0  
Unit 0 Disk SEAGATE ST31230W 0465  
Target 5  
Unit 0 Removable Read Only device TOSHIBA CD-ROM XM-4101TA1084
```

3. Press <ESC> or click the right mouse button to return to the previous menu.

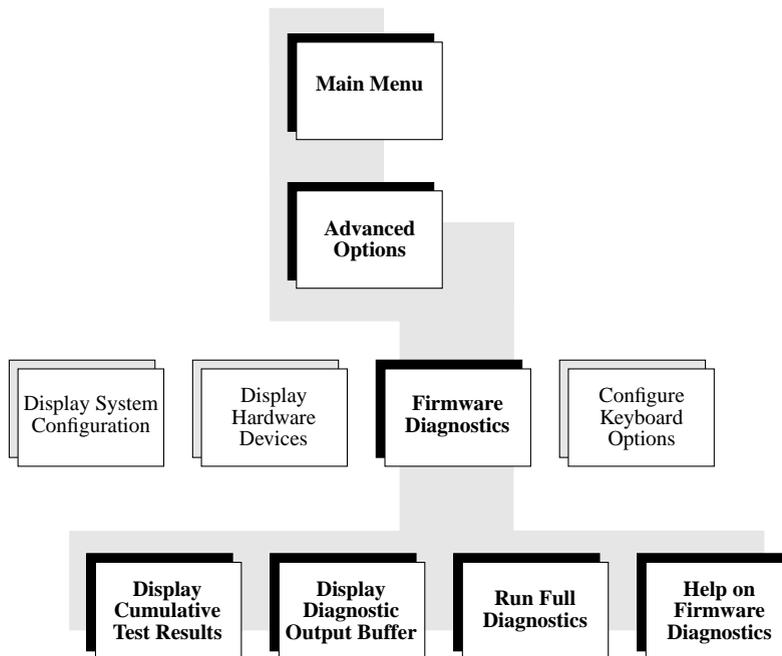
Help on Hardware Devices

Selecting the **Help on Hardware Devices** provides you with further detail and usage tips for the **Display Hardware Devices** options.



Firmware Diagnostics

PowerPC Open Firmware provides several built-in diagnostics that you can use to verify the correct operation of various aspects of the board operation.



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Display Cumulative Test Results

Select this option to display a summary of the test results since the last reset or power-up. Using the keyboard or mouse:

1. Select **Display Cumulative Test Results** from the Firmware Diagnostics menu.

A display similar to the one below appears:

```
Total Tests Run: 18
Total Passed: 18
Total Failed: 0
```

2. Press <ESC> or click the right mouse button to return to the previous menu.

Display the Diagnostic Output Buffer

This display is a cumulative log of ALL tests which have been run since the last reset/power-up.

For example, if the **Run the Full Diagnostics** option has been run twice since the last rest or power-up, then two sets of test results are included in the diagnostics buffer.

If no diagnostics have been run since the last reset or power-up, then a dialog box displays the following message:

```
The diagnostic output buffer is empty.
```

To view the test results, use the keyboard or mouse to:

1. Select **Display the Diagnostic Output Buffer** from the **Firmware Diagnostics** menu.

A screen similar to this one is displayed:

```
Testing /memory@0
Testing /pci/scsi@c
Testing /pci/viper@12
Testing /pci/isa@b/floppy@i3f0
Testing /pci/isa@b/lpt@i3bc
Testing /pci/isa@b/com@i2f8
Testing /pci/isa@b/com@i3f8
Testing /pci/isa@b/nvram@i74
Testing /pci/isa@b/rtc@i74
```

2. Press <ESC> or click the right mouse button to return to the previous menu.

Run the Full Diagnostics

These onboard diagnostic test routines check devices such as the network controller, the floppy disk system, memory, PCI cards, SCSI devices and the system clock.

To run the diagnostic tests, use the keyboard or mouse to:

1. Select **Run the Full Diagnostics** from the **Firmware Diagnostics** menu.

A screen similar to this one is displayed:

```
Testing /memory@0
Testing /pci/scsi@c
Testing /pci/viper@12
Testing /pci/isa@b/floppy@i3f0
Testing /pci/isa@b/lpt@i3bc
Testing /pci/isa@b/com@i2f8
Testing /pci/isa@b/com@i3f8
Testing /pci/isa@b/nvram@i74
Testing /pci/isa@b/rtc@i74
```

All of the device selftests passed, since no error messages were displayed.

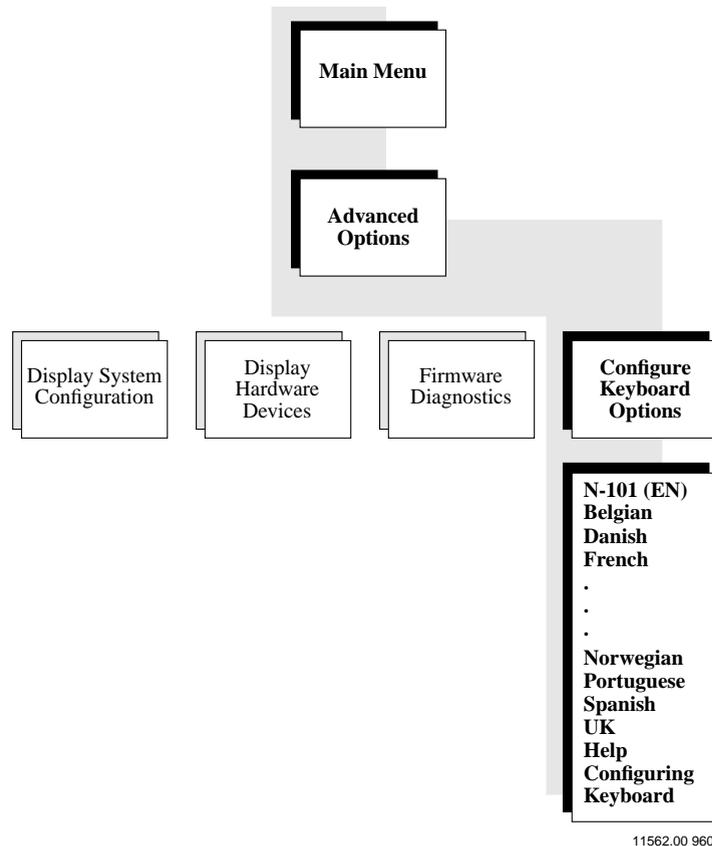
2. Press <ESC> or click the right mouse button to return to the previous menu.

Help on Firmware Diagnostics

Selecting the **Help on Firmware Diagnostics** option provides descriptions on each of the selections for running the PowerPC Open Firmware diagnostics.

Configure Keyboard Options

PowerPC Open Firmware provides support for the United States and some European style keyboards.



To modify the international keyboard, use the keyboard or mouse to:

1. Select **Advanced Options**.
2. Select the **Configure Keyboard Options**.

A submenu displays listing the supported keyboard styles.

3. Using the Up/Down arrow keys or the mouse, select the language that you require.

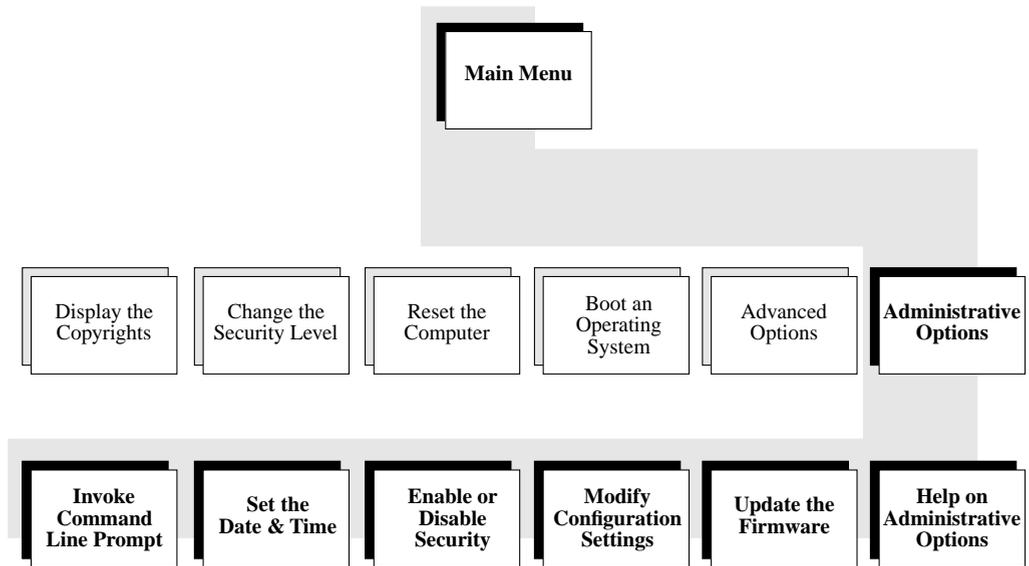
That country's keyboard is immediately activated and remains as the set variable whenever the system is powered up.

Help on Advanced Options

Select this option to get more detail on system configuration, hardware devices, running diagnostics, and keyboard configurations.

Administrative Options

The Administrative Options selection is for the user who is responsible for setting the date and time, modifying the system, and updating the firmware.

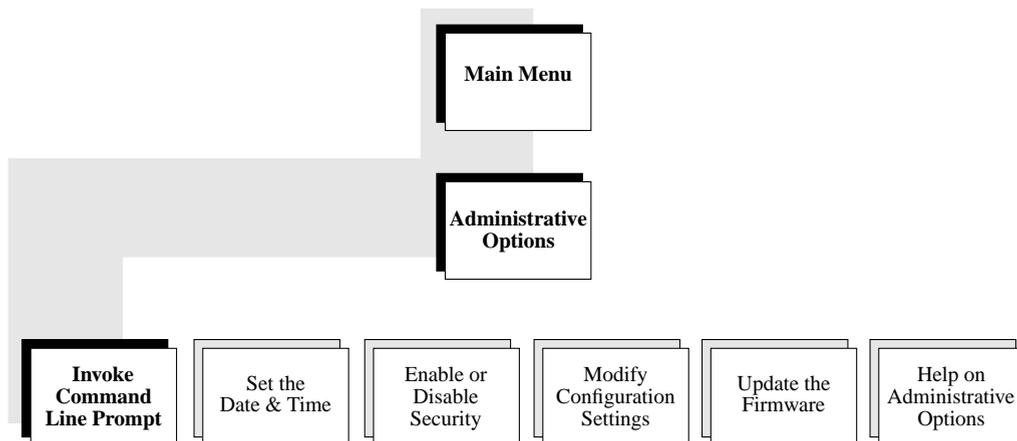


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Invoke the Command Line Prompt

The Command Line Prompt (**ok** prompt) is an interactive command interpreter that gives you access to an extensive set of functions for hardware and software development, fault isolation, and debugging.



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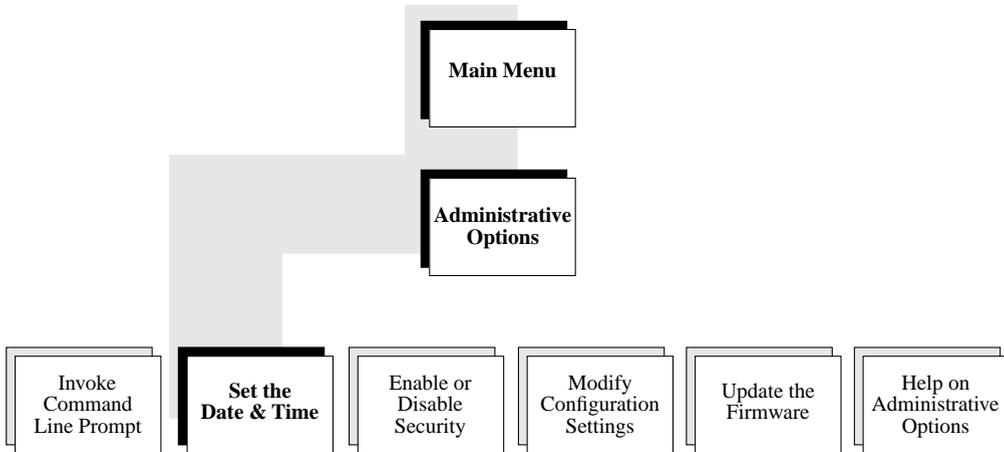
To access the Command Line Prompt, use the keyboard or mouse to:

1. Select the **Invoke Command Line Prompt** option from the **Administrative Options** menu.
2. An execution screen similar to this displays:

```
Type 'menu' to return to the menu.  
ok
```
3. When you have finished using the Command Line Interface, type **menu** and press **ENTER** to go back to the **Administrative Options** main menu.

Set the Date and Time

Selecting **Set the Date and Time** results in a series of prompts that help you set the system's date and time. The default format for the time portion of the display is in AM/PM style. The values you enter will be in local 24-hour-time format.



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To set your current date and time, use the keyboard or mouse to:

1. Select **Administrative Options** from the Main Menu.
2. Select the **Set the Date and Time** option from the submenu.

When you select the **Set the Date and Time** option, the display is cleared and the currently set date and local time are displayed.

A series of prompts for setting the date appear sequentially as you provide the information.

```
Enter the year (xxxx)
Enter the month (1-12)
Enter the day (1-30)
Enter the hour (0-23)
Enter the minute (0-59):
```

3. Type in the current year, month, day, hour, and minute as prompted and press **ENTER**.

If you enter a value outside of the range it is discarded and you are prompted to enter the value again.

After entering the values, a message displays showing the date and time which you entered and you are asked if it is correct.

4. Respond with a **Y** or **N** and press **ENTER** or press the **<ESC>** key to go to the previous menu.

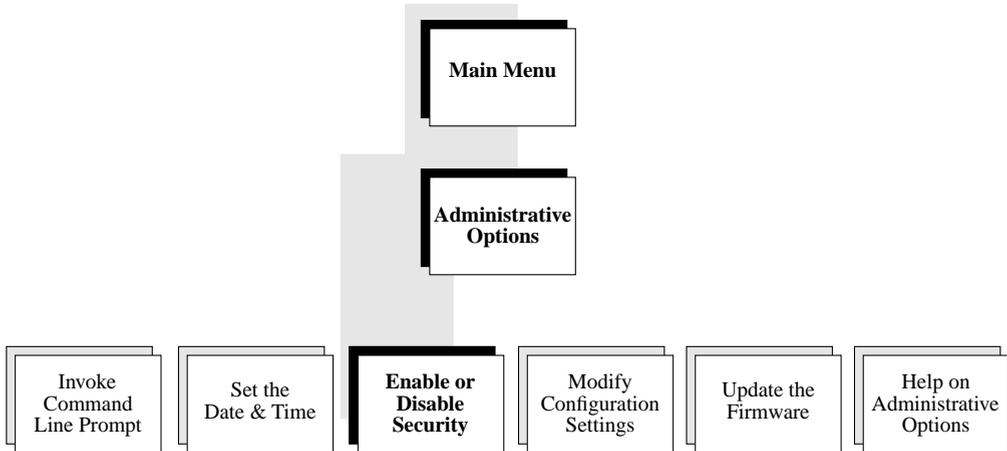
Note The time is changed only if you answer yes (**Y**). If you answer no (**N**), the new date and time is discarded and the message "Update Aborted" is displayed. Typing **q** or **Q** in response to the date and time prompts also aborts the update.

Modifying the Time Display

The default format for the time portion of the display is in AM/PM style. PowerPC Open Firmware provides the option to change the time display to 24-hour time format. To do this create the NVRAM variable **24-hour-time?** and set its value to *true*. If the variable **24-hour-time?** is *false* or nonexistent, the time is displayed in AM/PM style.

Enable or Disable Security

Choosing this option allows the administrator to enable or disable security.



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Using the keyboard or mouse:

1. Select the **Enable or Disable Security** option from the **Administrative Options** menu.

A dialog box is displayed with the message:

```
Would you like to enable security?
```

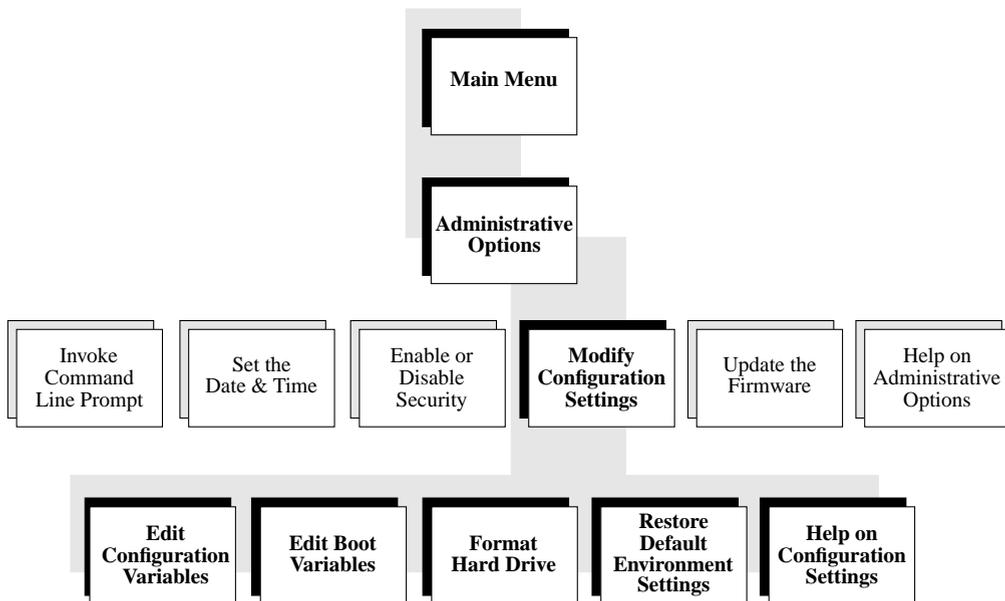
2. Respond with a **Y** or **N** and press **ENTER**, or click the desired response with the mouse.

Choosing **Y** enables the security system in the firmware (**security?** = *true*). Choosing **N** disables the security system in the firmware (**security?**= *false*).



Modify the Configuration Settings

System configuration variables are stored in the system NVRAM. These variables determine the start-up machine configuration and related communication characteristics. You can modify the values of the configuration variables and any changes you make remain in effect even after a power cycle. Configuration variables should be adjusted cautiously.



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Using the keyboard or mouse:

1. Select **Administrative Options** from the Main Menu.
2. Select **Modify Configuration Settings** menu option.

A submenu with five selections is displayed.

Edit the Configuration Variables

Using the keyboard or mouse:

1. Select the **Edit the Configuration Variables** option.

The NVRAM variables are presented one-at-a-time, similar to this example:

```
Press <ENTER> to use the existing value.  
Type =<ENTER> to use the default value.  
Type .<ENTER> to exit and save changes.
```

Variable Name	Current Value	Default Value
mot-oem-logo?	true	true
24-hour-time?	false	false
concurrent-mode?	false	false
concurrent-device	com1	com1
debug-device	screen	screen
menu?	false	true

New Value:

The responses are:

Press <ENTER> to accept the existing NVRAM variable

Press = <ENTER> to set the NVRAM variable to the default value

Press . <ENTER> to exit, save, and return to the menu

Type *newvalue* <ENTER> to replace the existing NVRAM value

2. To return to the previous menu at any time:

Press **q** <ENTER> to exit

All changes are dynamic and immediately saved to NVRAM. You may rerun this option or reset the default values if you want to restore a variable that was accidentally modified.

3. Press the <ESC> key or click the right mouse button to return to the previous menu.

Refer to the *PowerPC Open Firmware User's Manual, Volume 2* for further information on editing these variables.



Edit the Boot Variables

This option allows you to interactively modify the NVRAM boot related variables.

1. Select the **Edit the Boot Variables** option.

The **ok** prompt appears where you can use the Command Line Interface to edit and change the variables.

As each line is displayed, you may skip to the next variable by pressing the **ENTER** key. To exit, type:

. <ENTER> or
q <ENTER>

2. To set a variable to its default condition, type:

= <ENTER>

In cases without a default condition, this erases that particular variable.

3. To change a variable to a new, nondefault condition, type the new contents at the prompt and press **ENTER**.

All changes made are immediately saved to NVRAM. You may rerun this option or reset the default values if you would like to restore something that was accidentally modified.

4. Press the <ESC> key or click the right mouse button to return to the previous menu.

Format the Hard Drive

Choosing this option allows you to format a SCSI hard drive and place a single, FAT file system partition on the drive.

1. Select the **Format the Hard Drive** option.

The available SCSI devices are displayed for you to select from, similar to this example:

```
Scanning for devices, please wait.
```

```
/pci/scsi@c
```

```
a) target 0 Unit 0 Disk SEAGATE ST32430W 0660
```

```
/pci/scsi@11
```

```
/pci/pci@13/scsi@6
```

```
b) target 0 Unit 0 Disk SEAGATE ST12400N ST324300456
```

2. You are prompted to select the drive you want to format. Enter the corresponding letter of the drive and press **ENTER**, or press **q** to quit.

```
Enter the letter of the drive you wish to format. (q)uit
```

```
b (b = drive selected)
```

3. The following prompt appears. If you wish to continue with the format option, enter **y**.

```
Initializing device, please wait.
```

Should you decide to format the disk, a destructive low-level format will be performed and a FAT file partition placed on the disk. This partition will be the only defined partition on the disk.

```
Do you want to continue? (y/n)
```

If you wish to abort the procedure, enter **n** and press **<ESC>** to return to the previous menu. Otherwise, enter **y** to continue.

4. You are then asked to enter the size of the FAT partition.

Enter FAT partition size in MB. (default = 20 = enter)

Partition Region	Boot	Format	Size (MB)
1	Primary	Yes	FAT-16 20
done			

**Restore Default Environment Settings**

Choosing this option forces the default NVRAM configuration variable settings.

Warning: Use this icon with caution as you may lose user-specific NVRAM settings when you choose to return to the default settings.

Using the keyboard or mouse:

1. Select the **Restore Default Environment Settings** option.

A pop-up window displays and you are prompted to set the NVRAM variables. If you decide not to change the variables, return to the submenu by pressing the <ESC> key. Refer to the NVRAM edit options above for further NVRAM editing information.

2. A dialog box is displayed which asks:

Are you sure you want to reset the NVRAM variables?

3. Enter **Y** or **N** at the keyboard or click the desired button.

Choosing the **N** button aborts the NVRAM to the defaults options and automatically returns you to the menu.

Choosing the **Y** button sets the NVRAM variables to their defaults. Another dialog box displays which asks:

Do you want to reset the local system (CPU)?

4. Enter a **Y** or **N** or click the desired response with the mouse.

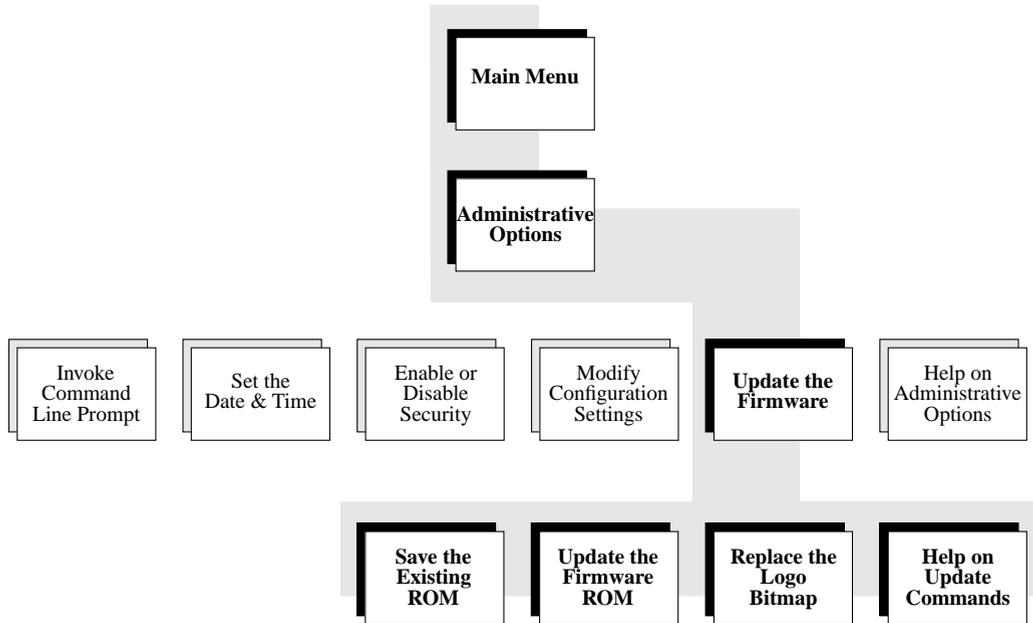
Choosing **Y** resets the system and settings take affect immediately. Choosing **N** does not reset the system which defers the effect of the defaults until the next power-up or reset. Select **N** to return to the menu.

Help on Configuration Settings

Select this option for further details on default values and modifying the configuration variables.

Update Your Firmware

If your system is currently running the PPC1Bug firmware and you are updating to the new PowerPC Open Firmware, please read the following information.



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Using the keyboard or mouse:

1. Select the **Administrative Options** from the Main Menu.
2. Select **Update the Firmware**.

Save the Existing ROM

You can save the current ROM resident firmware out to disk so it can be reinstalled at a later date.

-
1. Using the keyboard or mouse, select the **Save the Existing ROM** option and respond to the prompt by removing all tapes and disks from the system.

Disks and tapes should be removed from the system since the ROM image is saved to the first formatted disk or tape found.

2. Insert a DOS formatted disk or tape on which to store the saved ROM image.

Note No special formatting of the disk is required if a preformatted (IBM format) high density floppy disk is used. Otherwise, format the floppy disk using a FAT (File Allocation Table) format, such as AIX's **dosformat** command.

3. If the disk needs to be formatted at this time, enter an **N** to return to the **Update The Firmware** menu.

Since PowerPC Open Firmware does not provide formatting capabilities, an operating system that supports DOS formatting needs to be booted, or you may format at another system that provides the DOS format capability. Format the disk and restart the **Save the Existing ROM** process.

4. Insert the formatted disk or tape and respond by answering **Y** to the prompt.

If the firmware is running on a MVME2600/3600 Series product, continue with step 5. For all other products skip to step 6.

5. Firmware running on a MVME2600/3600 Series product displays the following prompt:

```
Select Flash Bank:
```

- ```
(A) Bank A
(B) Bank B
```

```
Bank? (A/B)
```

Make your selection by entering either A or B.

---

**Note** Because MVME2600/3600 Series products provide two distinct flash memory banks, selection of a bank is required. Only the first megabyte is saved to disk due to the limitations of the floppy disk medium.

6. The following prompt appears next:

```
Firmware Selection:
```

```
(B)PPC1BUG
```

```
(O)Open Firmware
```

```
Which Firmware Do You Currently Have in ROM? (B/O)
```

7. Select the firmware type that is currently in ROM: PPC1BUG or Open Firmware.

With the selection entered, a probe for a formatted floppy disk is performed. If no floppy disk is found or if a floppy drive is not attached, the following prompt appears:

```
No Floppy Drive/Disk Found
```

```
Search SCSI Bus? (Y/N)
```

8. Search the SCSI bus by entering **Y** to the query. Enter **N** to bypass a SCSI bus search and return to the main **Update The Firmware** menu.

9. Select **Y** to search the SCSI bus for devices with removable, writable media installed. It chooses the first one found as the selected device. If the SCSI search mode is inadvertently entered, simply press the escape key, **<ESC>**, to break out and return to the **Update The Firmware** menu.

---

When a formatted disk or tape is located, the following prompt appears:

```
Formatted Disk/Tape Found At /pci/cxx/ddd
Save To This Device? (Y/N)
```

10. Type a **Y** if you desire to save the ROM image at this time to the indicated device and disk or tape. If you type an **N**, the save process halts and returns you to the **Update The Firmware** menu. (Note: cxx = controller string, ddd = device string)

Saving the ROM image takes approximately 1 to 2 minutes.

## Update the Firmware ROM

Updating to PowerPC Open Firmware can be performed from either of the following firmware images loaded in ROM and running in the system:

- PPC1BUG (to update to PowerPC Open Firmware)
- PowerPC Open Firmware (to update to the current revision)

### To Open Firmware Starting From PPC1BUG

1. Go to the PPC1-Bug> prompt.
2. Perform a **pboot** from the PPC1Bug command line and select the bootable disk or tape as follows.

```
PPC1-Bug> pboot 1,0
```

This initiates a **pboot** from controller 1 (typically the floppy disk controller) device 0. See the **pboot** and **ioi** commands in the *PPCBUG Firmware Package User's Manual* for further details.

Executing the **pboot** command loads a RAM image of PowerPC Open Firmware and passes control to it. The contents of ROM have not yet been altered.

3. Continue with the steps in the following section to update the firmware image in ROM.

---

## To PowerPC Open Firmware From Open Firmware

Follow these steps to update to PowerPC Open Firmware from an earlier version of Open Firmware.

1. Using the keyboard or mouse, enter the **Administrative Options** menu.
2. Select **Update The Firmware** option.
3. Select **Update The Firmware ROM** option.

The following prompt appears:

```
Insert Bootable Disk or Tape with Firmware Upgrade
Proceed? (Y/N)
```

4. Insert the bootable floppy disk or tape into the appropriate drive and enter a **Y** to continue the update process. Enter an **N** to return to the **Update the Firmware** menu.
5. If you enter a **Y** and the firmware is running on a MVME2600/3600 Series product, continue with step 6. For all other products skip to step 7.
6. Firmware running on a MVME2600/3600 Series product displays the following prompt:

```
Select Flash Bank:
(A) Bank A
(B) Bank B
Bank? (A/B)
```

Make your selection by entering either A or B.

**Note** Because MVME2600/3600 Series products provide two distinct flash memory banks, selection of a bank is required. Only the first megabyte is updated to flash memory due to the limitations of the floppy disk medium.

- 
7. If you responded with a **Y** in step 4, a probe for a bootable floppy disk is performed. If no floppy disk is present or if no floppy drive is attached, the following prompt appears:

```
No Floppy Drive/Disk Found
Search SCSI Bus? (Y/N)
```

8. To bypass a SCSI bus search and return to the main **Update The Firmware** menu, enter **N** and press **<ENTER>**.
9. To search the SCSI Bus, enter **Y** and press **<ENTER>**.

The SCSI bus search looks for devices with removable, writable media installed and chooses the first one found as the selected device. If the SCSI search mode is inadvertently entered, press the escape key, **<ESC>** to break out and return to the main **Update The Firmware** menu.

Once a disk or tape containing the bootable image is located, the new firmware image is loaded into RAM and verified. During this process the following messages are displayed:

```
Loading From Floppy Drive /pci/ccc/ddd (or "Loading From
SCSI Device /pci/ccc/ddd")
Validating Firmware Image ...
```

After validation is complete, the results are displayed as one of the following:

```
Not A Valid Load Image
```

10. Enter an **N** to bypass the process and return to the **Update the Firmware** menu.
- If the image is not valid, the update process is terminated.
11. Press the **<ESC>** key or click the right mouse button to return to the main **Update the Firmware** menu.

or

```
Ready To Update ROM Update Process Can Take Several Minutes
To Complete
Proceed? (Y/N)
```

---

**Note** If the image is valid and you wish to proceed, you must remove the floppy disk from the disk drive before selecting **Y**.

12. Enter a **Y** to load the image into ROM and overwrite the existing firmware. Once the ROM is updated, the system is automatically reset. During the process the following is displayed:

```
Updating ROM
Erasing ...
Programming ...
Verifying ...
```

This update process can take up to several minutes to complete. If after three minutes, the system has not rebooted, the ROM(s) have been corrupted and need to be replaced.

---

## Replace the Logo Bitmap

You may flash an OEM logo bitmap into ROM in order to supersede the default Motorola logo bitmap. The NVRAM variable **mot-oem-logo?** is used to choose between the default logo and the OEM logo. This variable defaults to false.

The bitmap file must be in the standard (uncompressed) 256-color Microsoft Windows .bmp format. The image should be 300 pixels wide by 75 pixels high. If this area is too large, fill in the unused pixels with the background color (index \$13).

Choose this option to add a user-defined logo to PowerPC Open Firmware.

1. Have a floppy disk ready that contains the new logo bitmap file. The file must be properly formatted and stored on a DOS-formatted floppy disk with the filename **oemlogo.bmp**.
2. Using the keyboard or mouse, select the **Replace the Logo Bitmap** from the **Update the Firmware** menu.
3. The following prompt is displayed:

```
Insert Floppy Disk Containing New Logo Bitmap
Proceed? (Y/N)
```

4. To proceed, insert the floppy disk containing the new logo into the floppy drive, enter **Y** and press **<ENTER>**, or enter **N** to bypass the process and return to the **Update the Firmware** menu.
5. If you enter a **Y** and the firmware is running on a MVME2600/3600 Series product, continue with step 6. For all other products skip to step 7.
6. Firmware running on a MVME2600/3600 Series product displays the following prompt:

```
Select Flash Bank:
(A) Bank A
(B) Bank B
Bank? (A/B)
```

---

Make your selection by entering either A or B.

**Note** Because MVME2600/3600 Series products provide two distinct flash memory banks, selection of a bank is required.

7. Enter **Y** and press **<ENTER>** to proceed with the replacement. A search for the file **oemlogo.bmp** is performed. When the file is found, the following prompt is displayed:

```
Update the OEM Bitmap Logo in ROM Using This File? (Y/N)
```

8. If no floppy disk is present or if a floppy drive is not attached the following prompt is displayed and the bitmap update process is terminated.

```
No Floppy Drive and/or Disk Found
```

Press **<ESC>** to return to the **Update the Firmware** menu.

9. Enter **Y** to store the new image into ROM. During this process the following is displayed:

```
Loading Image Into ROM ...
Erasing ...
Programming ...
Verifying ...
```

Once the ROM is updated the following prompt is displayed:

```
New Logo Added
```

```
Set mot-oem-logo? Flag (This Will Enable New Logo)?
(Y/N)
```

10. Enter **Y** and press **<ENTER>** to enable the new bitmap logo.
11. Enter **N** and press **<ENTER>** to select the default Motorola logo.

---

## Color Indexes

The following VGA standard color indexes are available for use in the bitmap:

|      |                        |                               |
|------|------------------------|-------------------------------|
| \$00 | dark black             | \$08 light black (light gray) |
| \$01 | dark red               | \$09 light red                |
| \$02 | dark green             | \$0A light green              |
| \$03 | dark yellow            | \$0B light yellow             |
| \$04 | dark blue              | \$0C light blue               |
| \$05 | dark violet            | \$0D light violet             |
| \$06 | dark cyan              | \$0E light cyan               |
| \$07 | dark white (dark gray) | \$0F light white              |

The following extended color indexes are also available. All other color indexes are reserved by Motorola.

|      |                                     |
|------|-------------------------------------|
| \$10 | dark border black (0,0,0)           |
| \$11 | medium border gray (\$5A,\$5A,\$5A) |
| \$12 | light border gray (\$87,\$87,\$87)  |
| \$13 | background gray (\$B3,\$B3,\$B3)    |

## Help Option for Updating Your Firmware

To view online help for each of the Update the Firmware options, select **Help on Update Commands** and press **ENTER**.

## Help on Administrative Options

Select this option to get more detail on using the Command Line Interface, setting the date and time, enabling security, modifying the configuration settings, and updating your firmware.