HP BIOS Serial Console User Guide

Part Number 306147-002
March 2003 (Second Edition)

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Contents

Index

List of Figures

About This Guide

This guide provides step-by-step instructions for installation. It also can be used as a reference for operation and troubleshooting. It is intended for use with all servers and is generic in nature.

Audience Assumptions

This guide is for the person who installs, administers, and troubleshoots servers. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

⚠ Important Safety Information

Before installing this product, read the *Important Safety Information* document included with the server.

Symbols on Equipment

The following symbols may be placed on equipment to indicate the presence of potentially hazardous conditions:

WARNING: This symbol, in conjunction with any of the following symbols, indicates the presence of a potential hazard. The potential for injury exists if warnings are not observed. Consult your documentation for specific details.

This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

This symbol indicates the presence of electric shock hazards. The area contains no user or field serviceable parts. Do not open for any reason.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure.

This symbol on an RJ-45 receptacle indicates a network interface connection.

WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.

These symbols, on power supplies or systems, indicate that the equipment is supplied by multiple sources of power.

WARNING: To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

Weight in kg
Weight in lb

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

Rack Stability

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- **The leveling jacks are extended to the floor.**
- **The full weight of the rack rests on the leveling jacks.**
- **The stabilizing feet are attached to the rack if it is a single-rack installation.**
- **The racks are coupled together in multiple-rack installations.**
- **Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.**

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents essential information to explain a concept or complete a task.

NOTE: Text set off in this manner presents additional information to emphasize or supplement important points of the main text.

Related Documents

For additional information on the topics covered in this guide, refer to the server user guide.

Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

Technical Support

In North America, call the HP Technical Support Phone Center at 1-800-652-6672. This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored. Outside North America, call the nearest HP Technical Support Phone Center. Telephone numbers for worldwide Technical Support Centers are listed on the HP website, www.hp.com.

Be sure to have the following information available before you call HP:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP Website

The HP website has information on this product as well as the latest drivers and flash ROM images. You can access the HP website at www.hp.com.

Authorized Reseller

For the name of the nearest authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the HP website for locations and telephone numbers.

Reader's Comments

HP welcomes your comments on this guide. Please send your comments and suggestions by e-mail to `ServerDocumentation@hp.com`.

1

Console Redirection Overview

Purpose

The purpose of console redirection is to provide the capability to remotely manage a server in a headless environment. Through BIOS Serial Console redirection, you can see POST messages, navigate option ROM (such as Option ROM Configuration for Arrays utility, or ORCA) set up menus, and use RBSU (ROM-Based Setup Utility) through a serial connection to the server COM port. The local keyboard and monitor are no longer required to set up or configure the system. The remote server setup and configuration can also be performed remotely through the terminal server, Integrated Lights-Out (iLO) Management Processor, or Remote Insight Lights-Out Edition (RILOE) board. Some OSs support console redirection as well.

IMPORTANT: For the purposes of this guide, the **local** machine refers to the one that you are remotely configuring. Though this system does not require a local keyboard and monitor, you will need a keyboard and monitor on the system you are using to enter BIOS Serial Console commands.

NOTE: This guide is designed to provide information for BIOS Serial Console on any compatible server. It is generic in nature and therefore may contain options not valid on all servers.

Introduction

Two separate technologies enable console redirection. The first, BIOS Serial Console, which is the focus of this guide, can be enabled in the ROM. The other is console redirection through the OS, such as Emergency Management Services (EMS) support, which requires OS support and ROM support.

BIOS Serial Console Overview

BIOS Serial Console, which is the focus of this guide, can be enabled in RBSU. By default, BIOS Serial Console is disabled.

EMS Support Overview

Emergency Management Services (EMS) support is a Microsoft® feature for the Windows® Server 2003 OS, which is enabled by default in the OS, but which also must be enabled in the system ROM. Refer to "Operating System Support" in Chapter 2 for more information about using supported OSs. By default, EMS support is disabled for ML and DL servers, and is enabled for BL servers.

Initialization

BIOS Serial Console initialization occurs during power-up or system reset, before the first message is displayed on the screen.

Connectivity

A null modem cable should be connected to one of the serial ports on the server for console redirection. Be sure to connect the cable to the serial port that corresponds to the correct COM port on which BIOS Serial Console is enabled. Refer to "RBSU and BIOS Serial Console Configuration" in Chapter 2 for COM port settings. The default COM port is COM 1 for systems with BIOS Serial Console enabled by default. This setup can be configured in RBSU.

Console Redirection Features

The following console redirection features are discussed in further detail in Chapter 2:

- RBSU and BIOS Serial Console Configuration
  - — Terminal Emulation Support
  - — Baud Rate
  - — Port Settings
- Keystroke Emulation
  - — Escape Sequences
  - — Character Translation in VT100 Mode
- Operating System Support
  - — Emergency Management Services
  - — Linux Red Hat
- Terminal Emulation Programs
  - — Microsoft HyperTerminal

2

HP BIOS Serial Console/EMS Support Settings and Configuration

RBSU and BIOS Serial Console Configuration

BIOS Serial Console supports console redirection of POST error messages and configuration utilities, and is disabled in the ROM by default. Emergency Management Services (EMS) support is enabled in the OS by default, but also requires system ROM support. This chapter takes you through RBSU configuration, basic OS initialization, and terminal emulation for console redirection.

HP ROM-Based Setup Utility (RBSU) displays and modifies the system configuration settings of a server. The figures in this section show settings for BIOS Serial Console options on the RBSU menu. Except for Figure 2-3 and Figure 2-4, these screens are shown with ANSI emulation.

Press the **Enter** key while BIOS Serial Console is selected on the RBSU main menu to display the options.

IMPORTANT: Settings take effect on the next RBSU-prompted reboot, but you must disconnect and then reconnect for new settings to take effect on both local and remote machines.

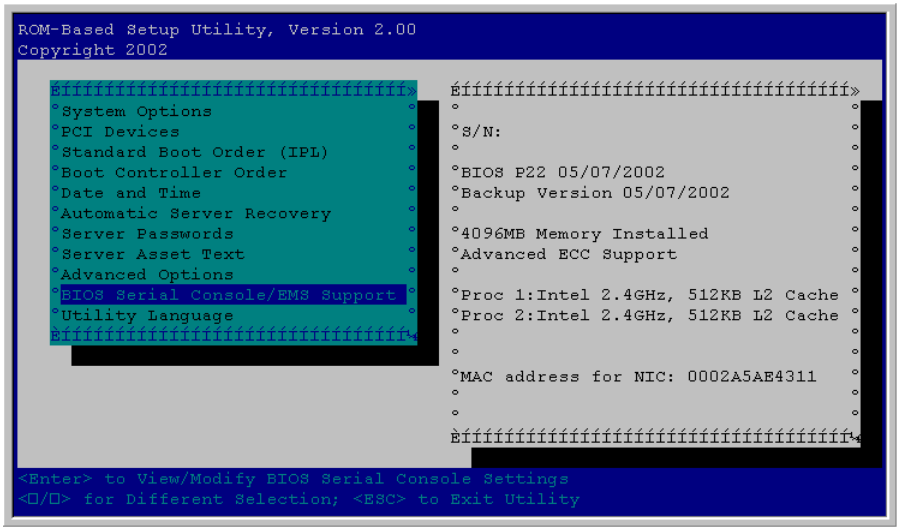

Figure 2-1: RBSU main menu

Terminal Emulation Support

BIOS Serial Console supports ANSI and VT100 terminal emulation. Although the screens displayed in this guide show the ANSI console for clarity, VT100 is supported by all terminal emulation programs. It should be chosen if the terminal emulation program is running in VT100 mode. BIOS Serial Console will support a Command Line Interface (CLI) for RBSU and other embedded ROM utilities on select new servers for faster, more compatible display with VT100 and compatible terminals. On these newer servers, BIOS Serial Console support will default to Enabled/VT100/9600 Baud for maximum compatibility with VT100 users. ANSI emulation and the menu-based RBSU interface may not be supported when BIOS Serial Console is enabled or in use due to limited compatibility with VT100. The menu-based RBSU interface will continue to be supported automatically in modes in which BIOS Serial Console is disabled or not in use. Refer to the "HP ROM-Based Setup Utility User Guide," available at www.hp.com, for more information on CLI.

Press the **Enter** key while **Terminal Emulation Mode** is selected to display the emulation mode options. Select the option that matches the terminal emulation program being used.

BIOS Serial Console is designed to support most terminal emulation programs. No special version of a terminal emulation program is required, although the emulation modes supported may vary by vendors. To avoid compatibility problems, only the core set of VT100 and ANSI terminal emulation is used in BIOS Serial Console. Although this limits some capabilities, this protocol guarantees the maximum compatibility across different platforms and vendors.

NOTE: On select newer servers, emulation will be limited to VT100 compatibility.

Default settings for terminal emulation and baud rate can be changed through the ProLiant BL e-Class Integrated Administrator for the current session only. Refer to the *ProLiant BL e-Class Integrated Administrator User Guide* for more information.

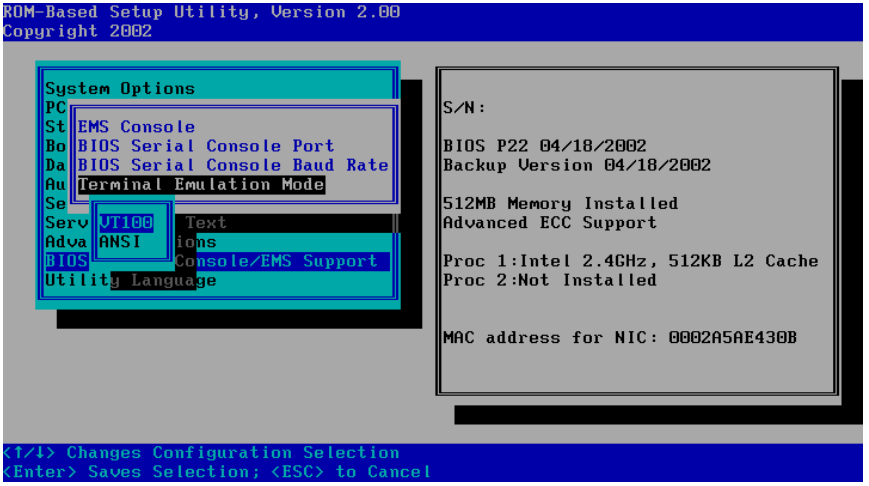

Figure 2-2: Terminal Emulation Mode options from the RBSU menu

Select new servers, which use Command Line Interface (CLI) and are configured using BIOS Serial Console, will display a command prompt screen similar to Figure 2-3.

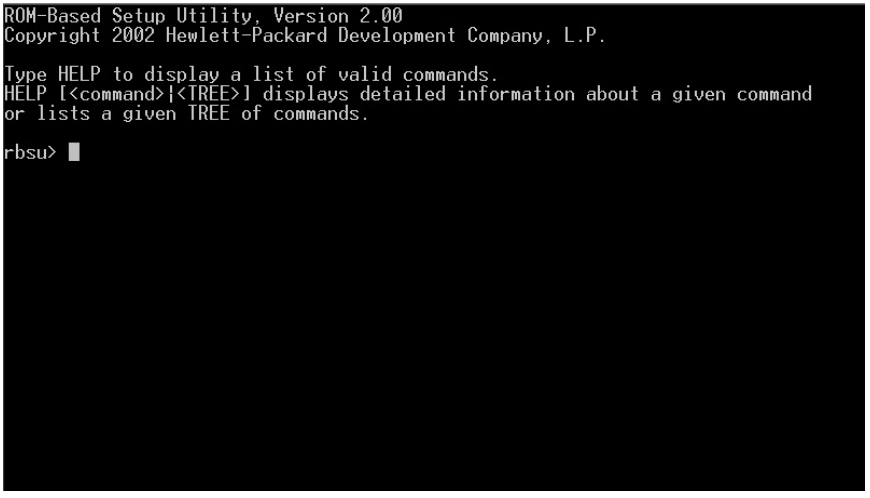

Figure 2-3: CLI RBSU screen using CLI through BIOS Serial Console

Figure 2-4 illustrates the RBSU main menu in VT100 mode.

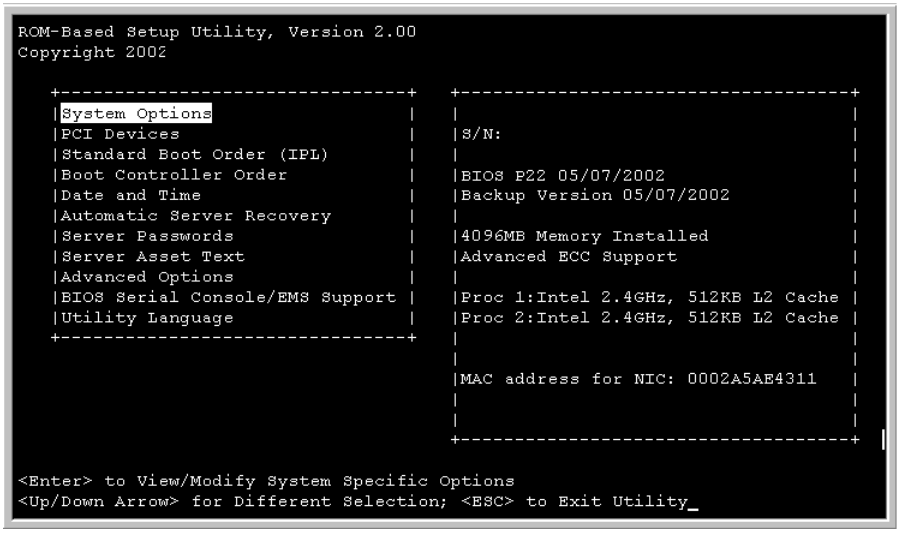

Figure 2-4: RBSU main menu in VT100 mode

Baud Rate

Press the **Enter** key while **BIOS Serial Console Baud Rate** is selected to display the baud rate. The default setting is 9600 when BIOS Serial Console is enabled by default. This setting can be configured in RBSU.

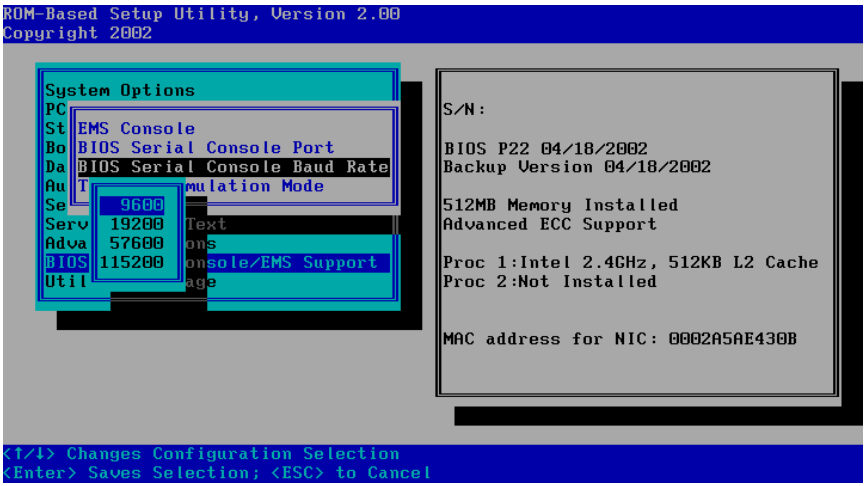

Figure 2-5: Baud Rate settings from the RBSU menu

Port Settings

Press the **Enter** key while **BIOS Serial Console Port** is selected to display the port settings. When BIOS Serial Console is enabled by default, the default port setting is COM1. BIOS Serial Console is disabled by default. To enable port settings, select the COM port used for serial console redirection.

IMPORTANT: Enabling port settings enables console redirection only at POST commands and configuration utilities. For information on console redirection of the OS, refer to "Operating System Support."

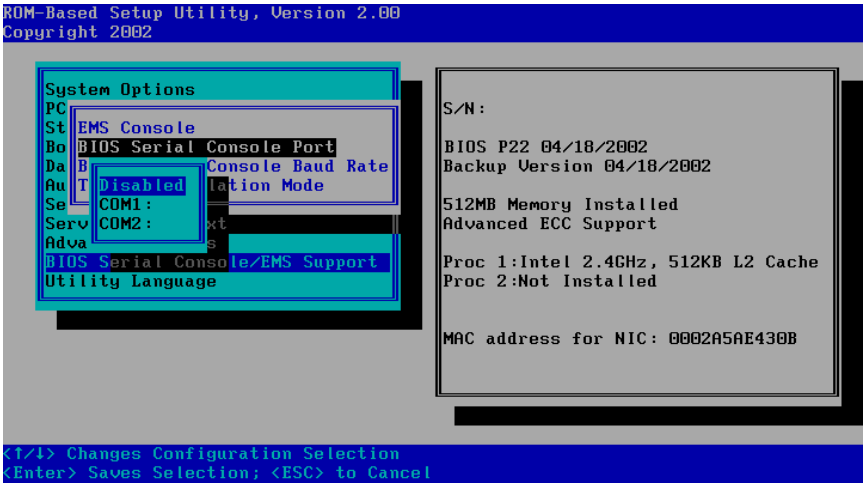

Figure 2-6: Port settings from the RBSU menu

NOTE: Systems with Integrated Lights-Out (iLO) require version 1.05 iLO firmware or greater in order to run BIOS Serial Console.

Keystroke Emulation

Because not all terminal emulation programs support function keys or special characters, certain keystroke sequences are required for some commands.

Escape Sequences

BIOS Serial Console enables you to manually input unsupported keystrokes by entering escape sequences. The escape sequences are defined in Table 2-1, Table 2-2, and Table 2-3. Each character must be entered within 2 seconds of pressing and holding down the **Esc** key to emulate the escape sequence.

NOTE: You must use escape sequences if the emulation program does not support function keys, but they also work if the emulation program does support function keys. Refer to the terminal emulation guide to be sure that you may use function keys.

Table 2-1: BIOS Serial Console Function Keys

Keyboard Entry	Defined As
<ESC>1	F1
<ESC>2	F2
<ESC>3	F3
<ESC>4	F4
<ESC>5	F5
<ESC>6	F6
<ESC>7	F7
<ESC>8	F8
<ESC>9	F9
<ESC>0	F10
<ESC>!	F11
<ESC>@	F12

Table 2-2: BIOS Serial Console Control Keys

Keyboard Entry	Defined As
<ESC>h	Home
<ESC>k	End
<ESC>+	Insert
<ESC>-	Delete
<ESC>?	Page Up
<ESC>/	Page Down

Table 2-3: BIOS Serial Console Reset Key

Keyboard Entry	Defined As
<ESC>R<ESC>r<ESC>R	System Reset

Character Translation in VT100 Mode

The VT100 protocol does not support special characters such as line draw characters. These characters are translated so that they can be displayed on the VT100 screen. Character translation is used for improved VT100 screen display and has no effect on functionality of BIOS Serial Console.

Currently, the special characters listed in Table 2-4 are translated into VT100 characters using VT100 protocol.

Table 2-4: BIOS Serial Console Character Translations

Special Character	Translated Into
Line draw character left upper corner	+
Line draw character left lower corner	+
Line draw character right upper corner	+
Line draw character right lower corner	+
Line draw character horizontal line	-
Line draw character vertical line	|

Operating System Support

Some OSs offer console redirection within the OS. Microsoft Windows Server 2003 and Linux can be configured for console redirection.

When **Enable Local** is selected, the OS redirects through the local serial port. When **Enable Remote** is selected, the OS redirects through iLo or RILOE II. Data becomes available through the browser configured for iLo instead of through the serial port. Enabling remotely requires iLO 1.10 firmware or later.

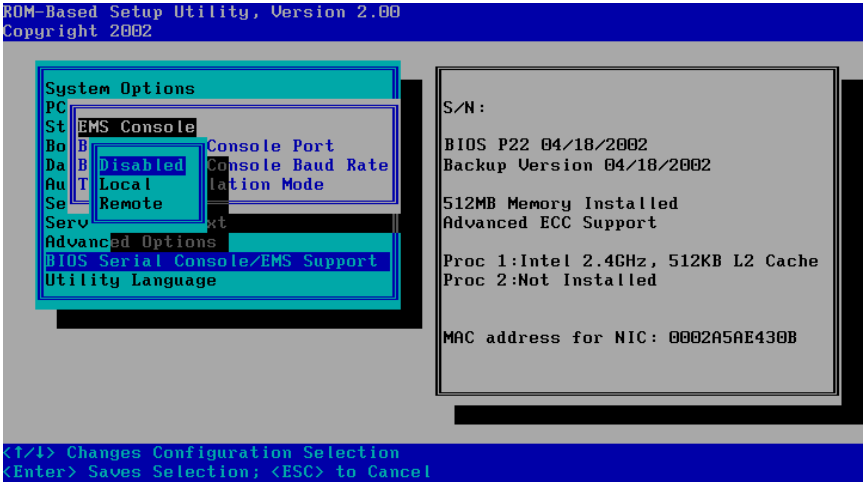

Figure 2-7: EMS Console settings from the RBSU menu

NOTE: Currently, Microsoft Windows Server 2003, Linux, and FreeBSD are the only OSs with console redirection support. Linux and FreeBSD allow for generic Serial Console sessions, and Windows Server 2003 includes EMS.

NOTE: The Japanese character set (multi-byte character set) does not display on BIOS Serial Console screens. Do not select Japanese as the selected language display.

Emergency Management Services

Emergency Management Services (EMS) support provides input/output support for all Windows kernel components: the loader, setup, recovery console, OS kernel, blue screens and the Special Administration Console. The Special Administration Console is a text mode management console available after Windows Server 2003 OS has initialized. For more information on EMS support, go to www.microsoft.com/hwdev/headless.

Microsoft enables EMS support in the OS, but EMS support also requires ROM support. EMS support, when enabled, assumes the serial port for redirection and may cause interference with other devices attached to the serial port. To avoid interference, EMS is disabled in the system ROM by default on ML and DL servers. To enable this feature, **Enable Local** or **Enable Remote** must be selected under the **BIOS Serial Console/EMS Support** menu in RBSU before installing Windows Server 2003. If you install Windows Server 2003 with EMS disabled, and later decide to enable it, perform the following steps to update the boot.ini file:

1. Enable EMS in RBSU.
2. Run `bootcfg/ems on/id 1`.
3. Reboot.

Linux Red Hat 7 Serial Console Settings

If you are using a ProLiant BL e-Class server, each blade maintains a connection to COM 1, so they are primarily used remotely through the Integrated Administrator. To enable BIOS Serial Console for Linux Red Hat 7 OS:

1. Remove the line

   ```
   message=/boot/message from /etc/lilo.conf
   ```

   Since it is graphical, LILO must run in text mode.
2. Add the following line to the Linux image specification in /etc/lilo.conf:

   ```
   Append="console=tty0 console=ttyS0,115200"
   ```
3. Run /sbin/lilo to make the changes take effect.

4. Add the following line to the end of /etc/inittab to enable agetty on COM1 (ttyS0):

```
7:12345:respawn:/sbin/agetty 115200 ttyS0 vt100
```

5. Set `SAFE=yes` in the file /etc/sysconfig/kudzu, so it does not probe the serial port during initialization.
6. Add the following line to /etc/securetty to allow root to log in on the ttyS0:

```
ttyS0
```

7. Reboot the blade with these new settings.

Linux Red Hat 7 ATA Driver Settings

By default, Linux Red Hat 7.1 OS uses only the ATA driver in PIO mode for the blades ATA controller. Use the following change to set the driver to use DMA and higher speeds (66 MHz/100 MHz):

1. Add `ide0=ata66` to the LILO append line described in step 2 in "Linux Red Hat 7 Serial Console Settings":

```
Append="console=tty0 console=ttyS0,115200 ide0=ata66"
```

2. Run /sbin/lilo to make the changes take effect.

Linux Red Hat 7 NIC Driver Settings

By default, Linux Red Hat 7.1 OS uses the eepro100 driver. HP has tested the Intel® e110 driver and recommends changing to this driver. To change the default driver, change the lines `eepro100` in /etc/modules.conf to `e100`.

For example, networking lines in modules.conf are:

```
alias eth0 e100
alias eth1 e100
```

This change takes effect at the next reboot.

Linux Red Hat 7 Services Configuration

Change the runlevel configuration of the following services (if installed) since they are not needed on ProLiant BL e-Class server blades:

```
Chkconfig --level 0123456 apmd off
Chkconfig --level 0123456 gpm off
```

Terminal Emulation Programs

Console redirection is supported using many terminal emulation programs. Any terminal emulation program can be used with BIOS Serial Console and with OS console redirection.

Microsoft HyperTerminal Setup

Because Microsoft HyperTerminal is a widely used terminal emulation program, examples of HyperTerminal 6.3 setup screens follow to aid in the initialization process. Be sure that the remote terminal screen settings match the screens in this section. If using an emulation program other than HyperTerminal, refer to the software reference material for settings information.

NOTE: For information on additional settings through Windows Server 2003, go to www.microsoft.com/hwdev/headless.

NOTE: HyperTerminal settings must match BIOS Serial Console settings. Access the OS terminal settings or ROM-Based Setup Utility (RBSU) to change the default settings.

1. To access the font screen, select the **View** menu from the HyperTerminal main screen, and then click **Font**. Select **Terminal**.

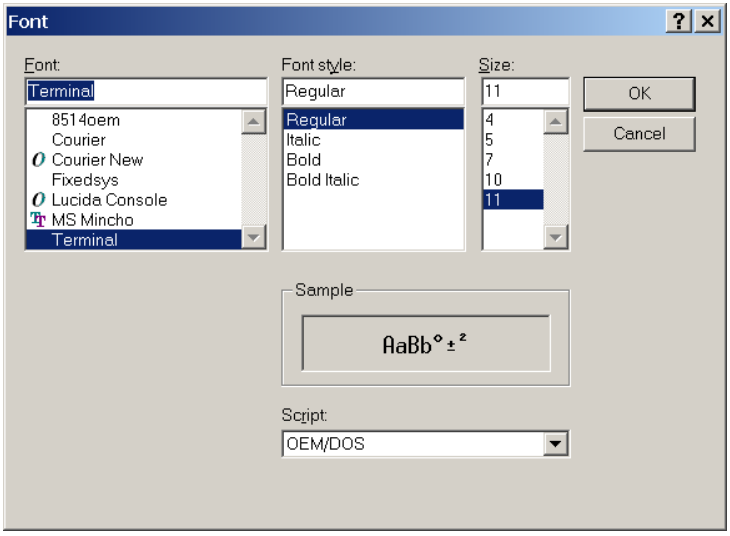

Figure 2-8: HyperTerminal font settings

2. Access connection settings from the HyperTerminal main screen by selecting the **File** menu, and then clicking **Properties**.
3. On the **Connect To** tab, click **Configure** to display the **Port Settings** tab.

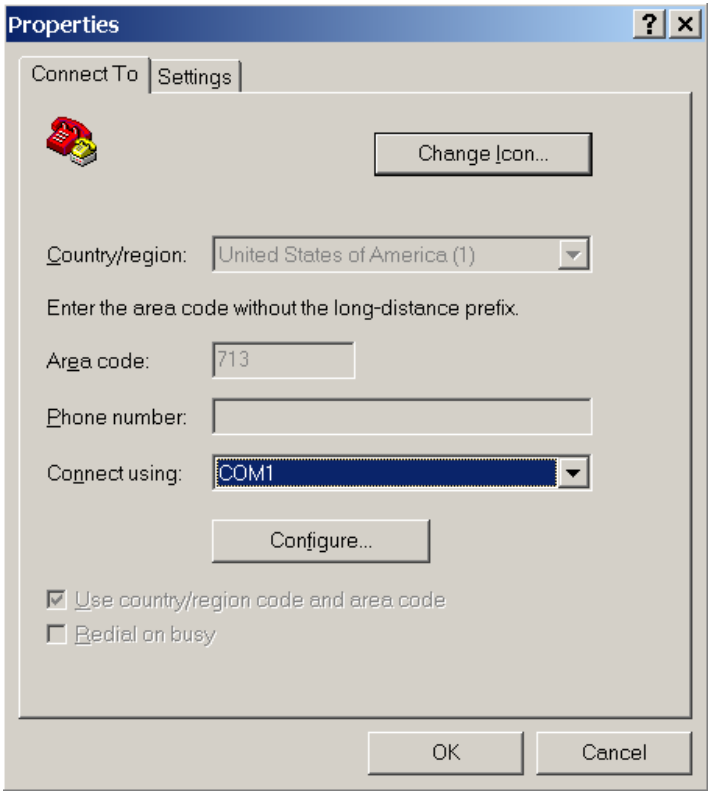

Figure 2-9: HyperTerminal connection settings

NOTE: The **Connect using** field should be set to COM1 or COM2, depending on which you are configured to, if using a notebook computer. COM 1 is the HP default setting.

4. Select **Port Settings**. Then, click **OK** to return to the **Properties** screen.

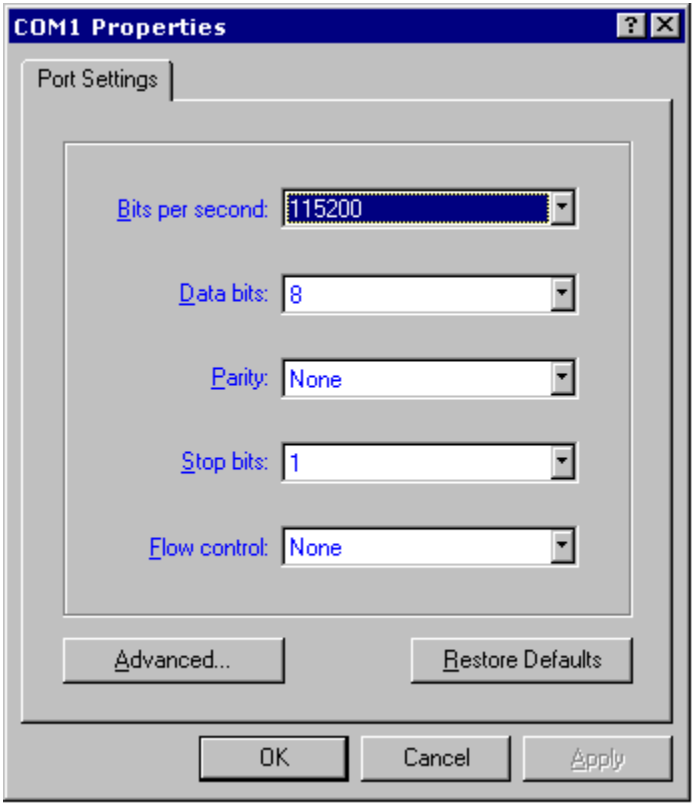

Figure 2-10: HyperTerminal port settings (default)

5. On the **Properties** screen, click the **Settings** tab.

6. If using ANSI emulation, click **Terminal Setup** and select **ANSI** (If you are using VT100 emulation, then refer to step 9). ANSI is the default setting.

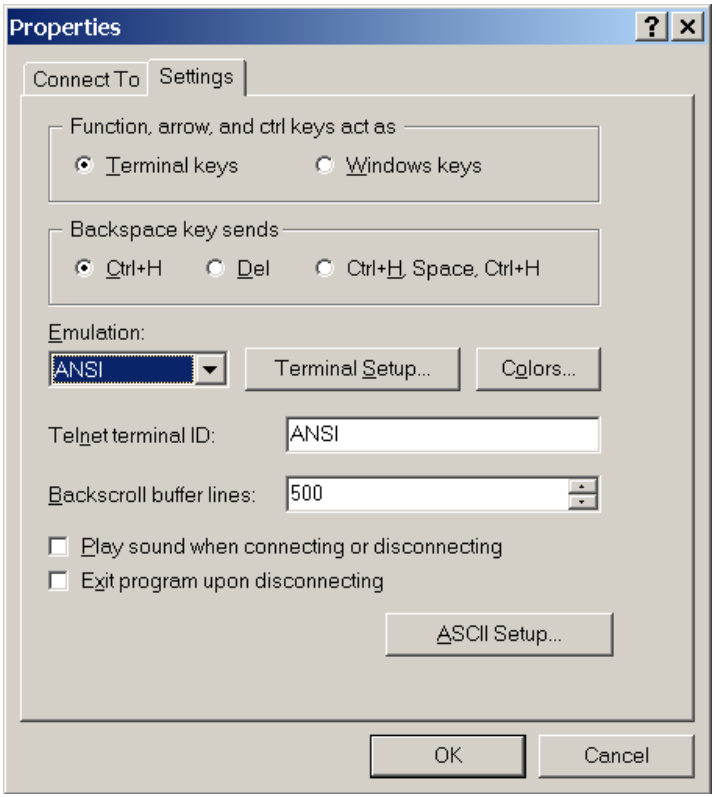

Figure 2-11: HyperTerminal ANSI emulation settings

IMPORTANT: Both the remote and local machines must be set to the same emulation.

7. Select **Terminal Settings**.

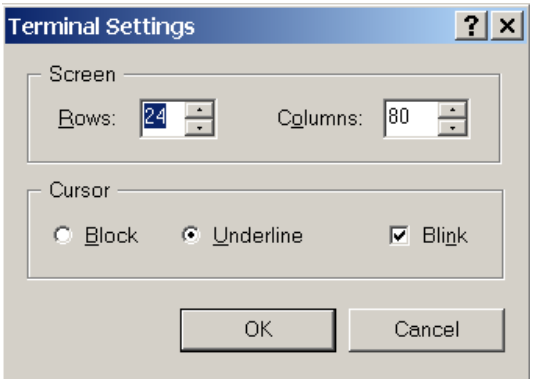

Figure 2-12: ANSI Terminal Settings

8. Click **OK** to return to the **Settings** tab, and then click **OK** again to complete the HyperTerminal setup process.

9. If using VT100 emulation, click **Terminal Setup** and select **VT100**.

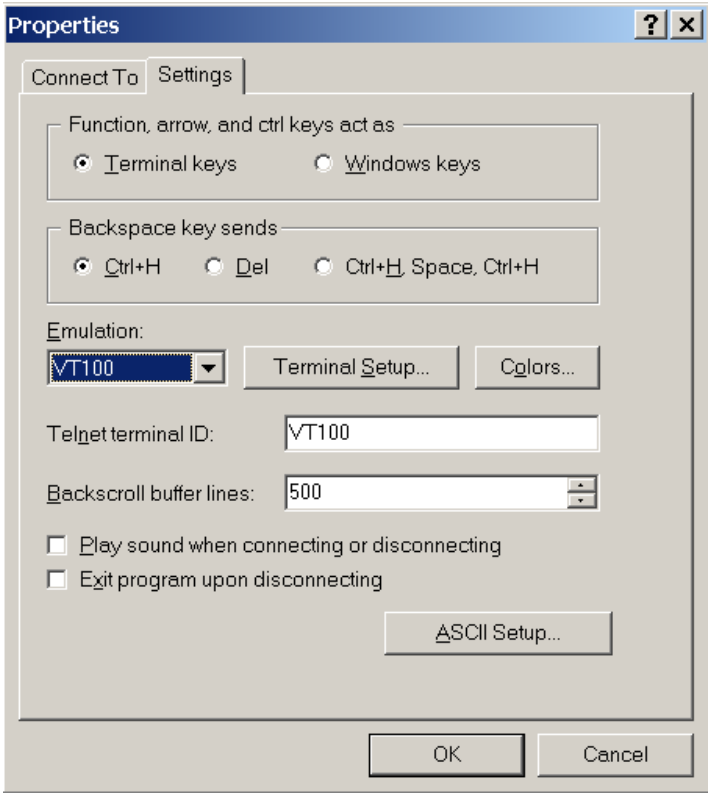

Figure 2-13: HyperTerminal VT100 emulation settings

IMPORTANT: If using VT100 emulation, the setting must be changed from the default ANSI setting in RBSU.

10. Select **Terminal Settings**. Click **OK** to return to the **Settings** tab.

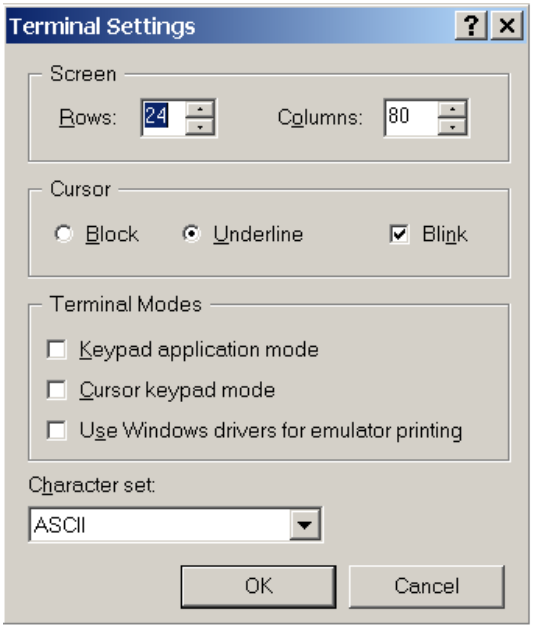

Figure 2-14: HyperTerminal terminal setup for VT100 emulation

11. On the **Settings** tab, click **ASCII Setup**.

12. Deselect **Wrap lines that exceed terminal width**. Click **OK** to return to the **Settings** tab. Then, click **OK** to complete the HyperTerminal setup process.

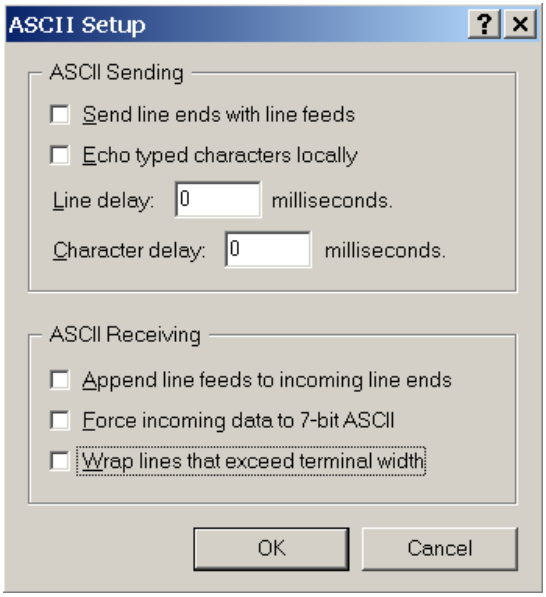

Figure 2-15: ASCII settings

Index

O

P

R

S

T

V

W