

V460 Series

WinXP Embedded User's Manual

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V460 Series

WinXP Embedded User's Manual

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Thank you for purchasing Moxa's V460 series of x86 ready-to-run embedded computers. This manual introduces the software configuration and management of V460 computers running the Windows XP Embedded operating system. For hardware installation, connector interfaces, setup procedures, and upgrading the BIOS, please refer to the V460 Series Hardware User's Manual.

Microsoft Windows XP Embedded is a specialized operating system consisting of componentized Windows XP Professional features that allows you to build a wide range of innovative, small footprint devices. Windows developers will find Moxa's V460 computer plus Windows XP Embedded operating system to be the right solution for a wide range of applications.

In this chapter, we cover the following topics:

- ❑ **Overview**
- ❑ **Product Features**
- ❑ **Software Specifications**
 - Application Development Environment
 - Networking and Communication Capabilities
 - Supporting Services and Daemons
- ❑ **How to Determine Firmware Build Versions**
- ❑ **Inserting a USB Mass Storage Device into the Computer**
- ❑ **Installing a CompactFlash in the Computer**

Overview

The x86 ready-to-run embedded computers in the V460 series are designed around the AMD LX800 and Geode chipsets, which exhibit low power consumption and high reliability. In addition to the usual computer peripherals, the V460 integrates dual or quad LAN ports, 4 USB 2.0 hosts, and 4 serial ports, making the V460 into an ideal industrial embedded computer for handling communication tasks and applications that require advanced computing power. In addition, all output and information can be displayed onscreen through the built-in VGA interface. The V460 series offers a variety of I/O options for use in a variety of applications and vertical markets. The on-board CompactFlash and DDR SDRAM provide ample storage capacity, and the Windows-based operating system comes pre-installed and ready-to-run, providing a Windows-like environment for easy software development. Software written for desktop PCs can be easily ported to the V460 using a common compiler, which means that programmers do not need to spend a lot of time modifying existing software code. In addition, the operating system, device drivers, and user-developed software can all be stored in the pre-installed Industrial DOM to enhance system reliability.

Product Features

The V460-XPE embedded computers have the following features:

- AMD Geode LX 800@0.9W CPU, 500 MHz
- Built-in 512 MB DDR SDRAM
- Built-in 1GB Industrial DOM to store OS
- 256KB of SRAM backed up by battery
- 2 RS-232 and 2 RS-232/422/485 serial ports
- Serial port 3 and port 4 support non-standard baudrates
- 2 or 4 10/100 Mbps Ethernet ports for network redundancy
- 8 unmanaged switch ports
- 8 + 8 DI/DO with 3 KV isolation protection
- CompactFlash socket for storage expansion
- 4 USB 2.0 hosts that support system boot up
- LED indicators for power, battery, and storage
- Ready-to-run XP embedded platform
- DIN-rail and wall mount installation supported
- Robust, fanless design

Software Specifications

The software features of the V460-XPE embedded computers are listed below:

Application Development Environment

The V460-XPE embedded computers provide the following common, popular application development features to make the Windows XP Embedded with SP2 environment into an easy and convenient programming tool.

Applications that run under Windows XP can also run on the V460-XPE, meaning that no additional cost is required to migrate from XP to XPE.

Windows XP Embedded is based on the same binary files as Windows XP Professional; Windows XP Embedded enables you to speed up your development of reliable and full-featured connected devices.

- **Microsoft .Net Framework 2.0 with service pack 2**—This component includes the common language runtime (CLR) and the .NET Framework class library.
- **Active Directory Service Interface (ADSI) Core**—Provides the basic functionality for ADSI. This component routes any requests to the corresponding provider according to the path it is provided.
- **Active Template Library (ATL)**—Supports ATL applications.
- **ASP.NET 2.0**—A unified Web application platform that provides the services necessary to build and deploy enterprise-class Web applications.
- **Certificate Request Client & Certificate Autoenrollment**—This component includes the common language runtime (CLR) and the .NET Framework class library.
- **COM Base**—Component Object Model (COM) includes a programming model and a set of application programming interfaces (APIs), and does not include a dedicated user interface.
- **Common Control Libraries**—(Side by Side) the component provides common user interface (UI) controls.
- **Common File Dialogs**—Support for common dialog boxes.
- **Direct3D**—Infrastructure for using two-dimensional and three-dimensional graphics.
- **DirectPlay**—Provides a networking API that can enable any application to operate over both a peer-to-peer and client/server topology.
- **DirectShow**—Base filter graph and device enumeration support for all DirectShow applications. This component also provides most DirectShow filters.
- **Distributed Transaction Coordinator (MSDTC)**—A distributed transaction facility for Microsoft Windows systems, which uses transaction-processing technology. MSDTC exploits loosely coupled systems to provide scalable performance.
- **Enhanced Write Filter**—An upper filter in the storage device driver stack that redirects disk write operations to DRAM.
- **Event Log**—A dynamic-link library (DLL) that runs as part of Services.exe. This component stores and retrieves events that can be viewed in the event viewer.
- **Internet Explorer**—The Internet Explorer Web browser that allows customers to connect to the Internet or to an intranet (see properties via inetctl.cpl).
- **Mapi32 Libraries**—The infrastructure for e-mail support.
- **Message Queuing (MSMQ) Core**—Message Queuing is a messaging infrastructure and a development tool for creating distributed messaging applications for Microsoft Windows operating systems; it provides guaranteed message delivery, efficient routing, increased security, support for sending messages within transactions, and priority-based messaging.
- **Microsoft Visual C++ Run Time Libraries**—The Microsoft C++ Runtime Library.
- **NTFS**—The NTFS File System driver (NT File System). Use NTFS instead of FAT for optimum file system security.
- **Power Management**—This component includes a dynamic-link library for power management features in the xpepm.dll file, and a command-line tool for using power management on a run-time image in the xpepm.exe file. Note: Instead of using this component, Shutdown.exe is the preferred method to shut down the system..
- **Registry Editor**—The Registry Editor (regedit.exe, regedt32.exe).

- **RPC**—Facilitates local remote procedure calls (RPCs) using the ncalrpc and ncacl_np protocol sequences, and provides support for dynamic endpoint resolution. The RPC name service provides remote procedure call (RPC) named services functionality, such as the RPC Locator. The RPC Named Service component exposes all RpcNs* RPC functions. The RPC server provides a variety of RPC and Component Object Model (COM) services, including RPC Endpoint Mapper, COM Service Control Manager (SCM) and COM Object Resolver.
- **Smart Card Cryptographic Service Providers**—Supports features such as smart card logon and improved e-mail security. Smart cards must be capable of certain RSA public key cryptographic operations. These functions are exposed by using CryptoAPI and, specifically, through a CSP. Typically, each type of smart card requires a CSP, which is provided by the card vendor.
- **USB 2.0**—The core drivers needed to communicate with an Enhanced Host Controller Interface (EHCI) that is compliant with The USB .95 or 1.0.
- **Windows API**—Provides the user-mode component of the Windows operating system API.
- **Windows Media Player 10**—Playback functionality for digital media that includes music, videos, CDs, DVDs, and Internet Radio for end users and developers.
- **Windows Script Engines**—A complete scripting environment for Windows, including command-line scripting, script languages, and the ability to host script engines within your applications.
- **WMI**—Bundles the features that combine to create the Windows Management Instrumentation (WMI) technologies.

Networking and Communication Capabilities

The V460-XPE embedded computers provide powerful hardware communication interfaces for network-centric embedded applications, including 4 Ethernet and 4 serial ports, and also support the networking and communications capabilities that are built into Windows XP Embedded with SP2 OS. The following features are supported:

- **DHCP Client Service**—Registers and updates Internet Protocol (IP) addresses and Domain Name System (DNS) records for your target system.
- **IP Security Services**—This component provides IP Security (IPsec) services for all IP traffic.
- **Dial-Up Networking**—Provides the infrastructure necessary to implement a Remote Access Service (RAS) client.
- **Microsoft-Windows-HTTP**—Services that implement the functionality of the HTTP protocol on a server.
- **TCP/IP Networking**—Implements the core TCP/IP protocol stack, which includes the IPv4 version for the following protocols: Transmission Control Protocol (TCP), User Datagram Protocol (UDP), raw, Internet Control Message Protocol (ICMP), Internet Group Membership Protocol (IGMP), and Address Resolution Protocol (ARP). The component also includes WshTCPip.dll, which is the Winsock provider for TCP/IP to enable socket-level communication over TCP/IP.
- **TAPI**—A Telephony API (TAPI) Telephony Service Provider (TSP).
- **Simple Network Management Protocol (SNMP)**—SNMP is an agent service that provides management systems with information about activities that occur at the Internet Protocol (IP) network layer. The SNMP agent monitors network traffic, and retrieves and updates local management information based on the requests from the SNMP manager. The agent also notifies registered managers with traps when significant events occur.

- **Time Service Core**—Synchronizes a workstation's clock with other computers using the Network Time Protocol (NTP) version 3. For increased accuracy, this component also incorporates algorithmic enhancements from NTP 4.
- **Windows Firewall/Internet Connection Sharing (ICS)**—Windows Firewall provides a barrier between your device and network connections to help reduce attacks by hackers, viruses, and worms across networks. Strongly recommended..
- **Wireless Zero Configuration**—Support for the Windows implementation of the IEEE 802.11 standard. This component performs automatic configuration and authentication for IEEE 802.11 wireless network adaptors.
- **Unimodem**—Provides the infrastructure necessary for applications to communicate with a modem.

Supporting Services and Daemons

In addition to development and communication capability, the V460-XPE embeds the services and daemons shown below. These common and easy-to-use application servers help users migrate industrial communication applications to the V460-XPE embedded computer very easily and conveniently.

- **COM+ Services**—The next evolution of Microsoft Component Object Model (COM) and Microsoft Transaction Server (MTS).
- **Computer Browser Service**—Computer browsing functionality exposed by Windows through Microsoft Networking. It allows a client machine to browse its network neighborhood for available computers, exposing file and print sharing services.
- **Disk Management Services**—Support for disk and volume management operations. The component implements a Component Object Model (COM) interface that can be used to query and configure disks and volumes (both basic and dynamic). The component also monitors disk arrivals and removals and other changes in the storage subsystem.
- **IIS Web Server**—Allows you to create and manage Web sites.
- **Terminal Server**—Microsoft Terminal Server client application (mstsc.exe).
- **Remote Registry Service**—Enables remote users to modify registry settings on this computer.
- **Telnet Server**—Allows users to connect to Telnet servers from remote computers.

How to Determine Firmware Build Versions

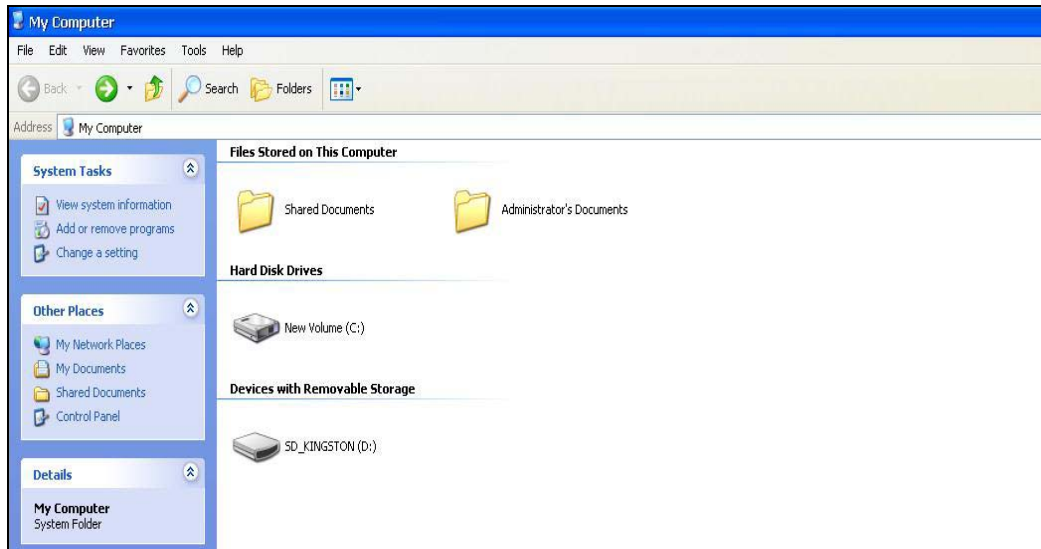
Use the `mxver` command to obtain the firmware version of the V460-XPE embedded computer. This information is particularly important for identifying which features your embedded computer supports.

- Execute the **mxver.exe** command line utility.

```
C:\> mxver
Model Name: V460-XPE
Build Date: 08021812
Version: V1.0
```


Inserting a USB Mass Storage Device into the Computer

Inserting a USB mass storage device will generate a new drive on the V460-XPE. The new drive should be visible in the File Explorer.



Installing a CompactFlash in the Computer

The V460-XPE has a type II CompactFlash slot that supports cards of both types I and II. The CompactFlash slot is designed as a secondary IDE device. It **does not** support “Plug and Play” or “Hot Swap.”

Some CompactFlash storage disks are not compatible with V460-XPE. The following table lists the CompactFlash cards that are compatible with the V460-XPE (these cards were all tested successfully).

Brand	Size
Afaya	256 MB
Afaya	1 GB
Transcend	512 MB (80x)
Transcend	4 GB (120x)
SILICON POWER	1 GB (Industrial)
SILICON POWER	2 GB (Industrial)
SanDisk	1 GB (Ultra II)

NOTE: The Transcend 2 GB CompactFlash card is not compatible with the V460-XPE.



ATTENTION

You must remove the power source first before inserting or removing the CompactFlash card. The operating system could crash if you insert or remove the CompactFlash card when the power is ON. This is because the V460-XPE does not support the CompactFlash “Hot Swap” and “Plug and Play” functions.

2

Software Configuration

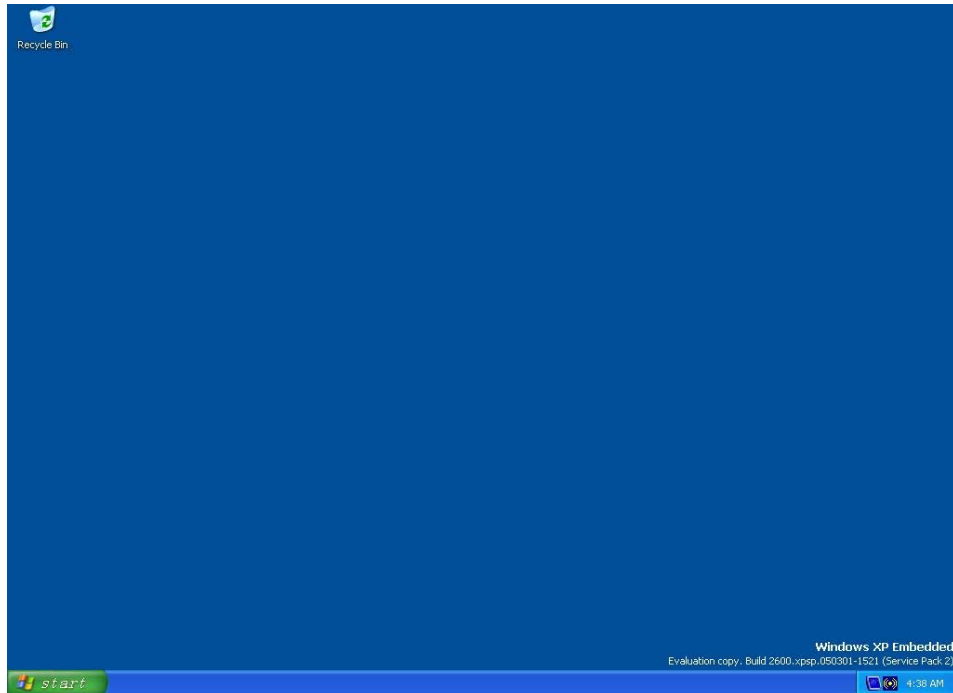
In this chapter, we explain how to operate a V460-XPE computer directly or from a PC. Instructions are given on how to adjust the system time, troubleshoot network connectivity, and manage other functions. Some of these operations can be done with system commands after gaining access to the computer, and others can be done from the “Control Panel,” which is described in a later chapter.

In this chapter, we cover the following topics:

- ❑ **Starting Your V460-XPE Computer**
- ❑ **Resetting Your V460-XPE Computer**
- ❑ **Changing the Network Settings**
- ❑ **Operating Your V460-XPE Computer with a Telnet Client**
- ❑ **Adjusting the System Time**
- ❑ **Starting and Stopping Services**
- ❑ **Simple Network Management Protocol (SNMP)**
- ❑ **Serial Ports**
- ❑ **Enhanced Write Filter**
- ❑ **Using the Battery Backed-up SRAM**
 - Writing Data to SRAM
 - Reading Data from SRAM

Starting Your V460-XPE Computer

Connect the CRT monitor or LCD monitor to the target computer, and then power it up by connecting it to the power adaptor. It takes about 30 to 40 seconds for the system to boot up. Once the system is ready, the Desktop will appear on your monitor.

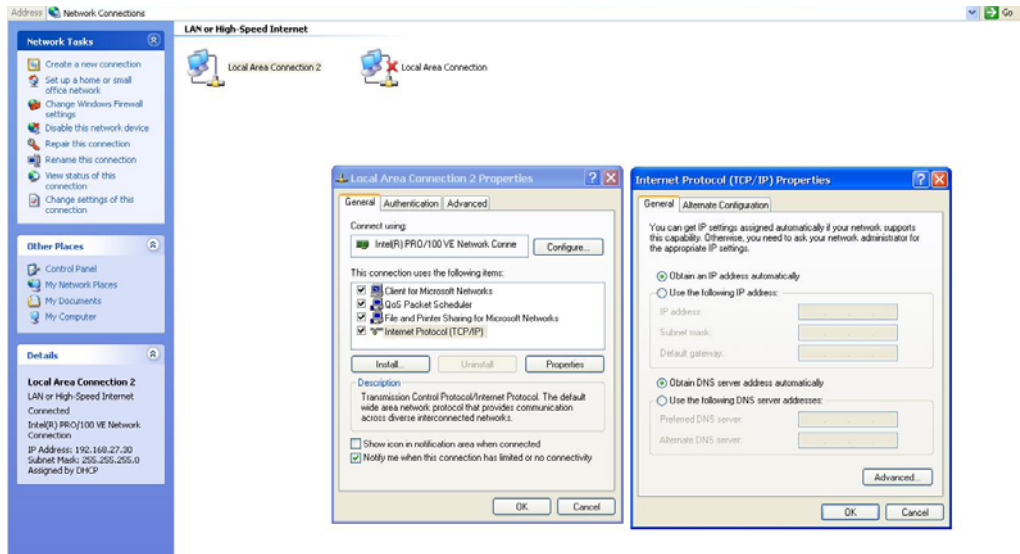


Resetting Your V460-XPE Computer

- **Reset Button**
A **Reset** button is located on the front panel of V460-XPE. Press the reset button to shut down your V460, just as you would do with a standard PC.
- **Software Shutdown / Reboot**
Click **Start** → **Shutdown** to reboot or shutdown the V460-XPE computer.

Changing the Network Settings

The V460-XPE computer comes with two network interfaces. Both of the default IP addresses are DHCP. Choose **My Device** → **Control panel** → **Network Connections** to enter the network settings page. Select the connection and choose an option on the pop-up menu by right-clicking. You can specify the IP address manually or by DHCP. In addition, you can disable or enable either one or both connections with the pop-up menu.



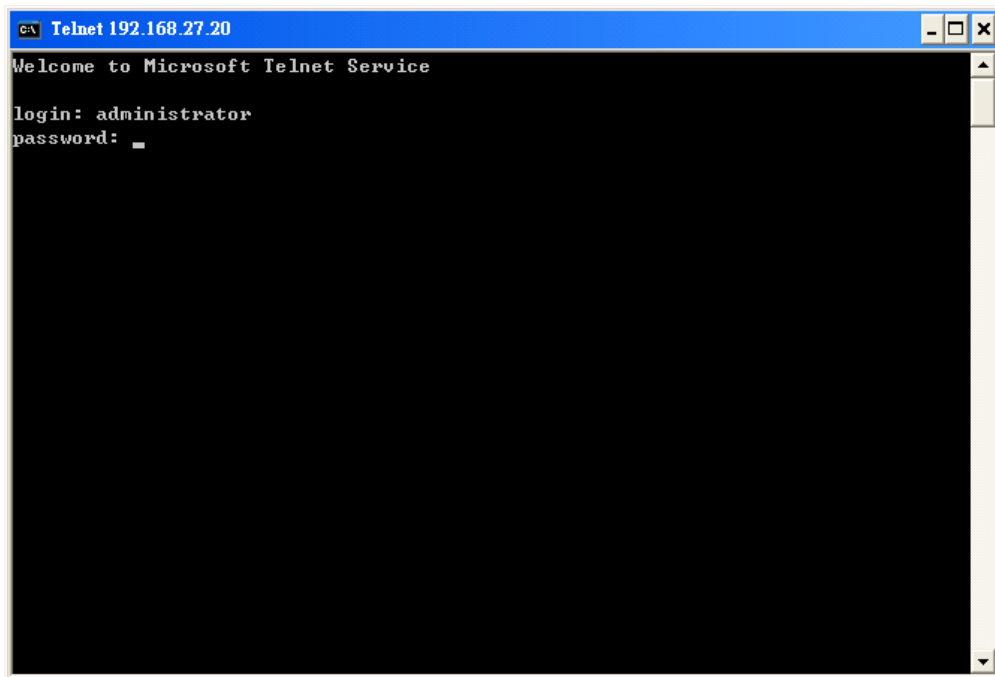
Operating Your V460-XPE Computer with a Telnet Client

Use a crossover Ethernet cable to connect your development workstation directly to the target computer, or use a straight-through Ethernet cable to connect the computer to a LAN hub or switch. Next, use a telnet client on your development workstation to connect to the Telnet console utility of the target computer. After a connection has been established, type the login name and password as requested to log on to the computer.

After logging in through the Telnet client, a list of commands will be available for operating the computer. Use **HELP** to display all of the commands, or type **HELP [command name]** to display extended help for the selected command. Some of these commands, such as **DATE** and **TIME**, are very useful for managing the computer's system time. Other commands, such as **DIR** and **MKDIR**, are good utilities for file management. For example, to inspect the file structure of the root directory, type **DIR**.

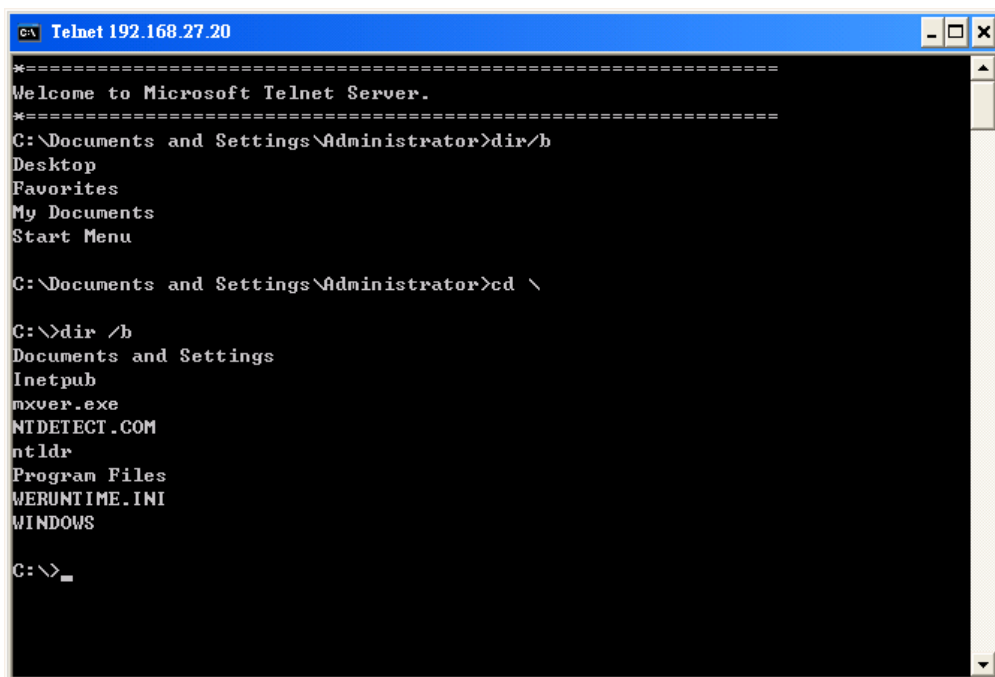
NOTE: The default user id is "administrator" and the default password is not set; you need to create a new password for this account to use this telnet client.

NOTE: There is a connection limitation on using Telnet clients. You are only allowed to create connections with two Telnet clients at the same time.



```
c:\ Telnet 192.168.27.20
Welcome to Microsoft Telnet Service

login: administrator
password: _
```



```
c:\ Telnet 192.168.27.20
*=====
Welcome to Microsoft Telnet Server.
*=====
C:\Documents and Settings\Administrator>dir /b
Desktop
Favorites
My Documents
Start Menu

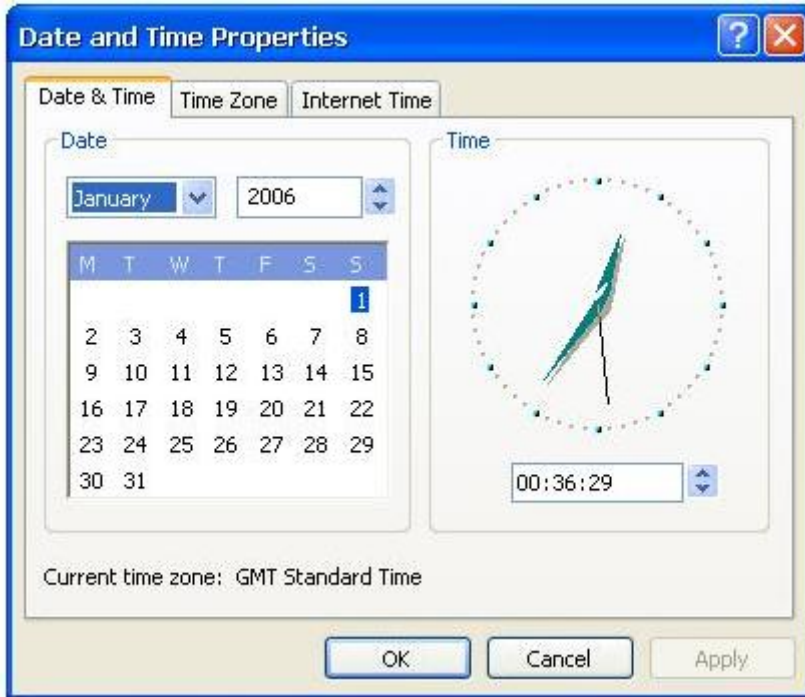
C:\Documents and Settings\Administrator>cd \

C:\>dir /b
Documents and Settings
Inetpub
mxver.exe
NTDETECT.COM
ntldr
Program Files
SERVICES.INI
WINDOWS

C:\>_
```

Adjusting the System Time

- **Setting the System Time Manually:** Use the **date/time** command line utility to query the current system date/time or set a new system date/time.
- **Date/Time Control panel:** Go to the Control Panel and double click the **Date/Time** icon.

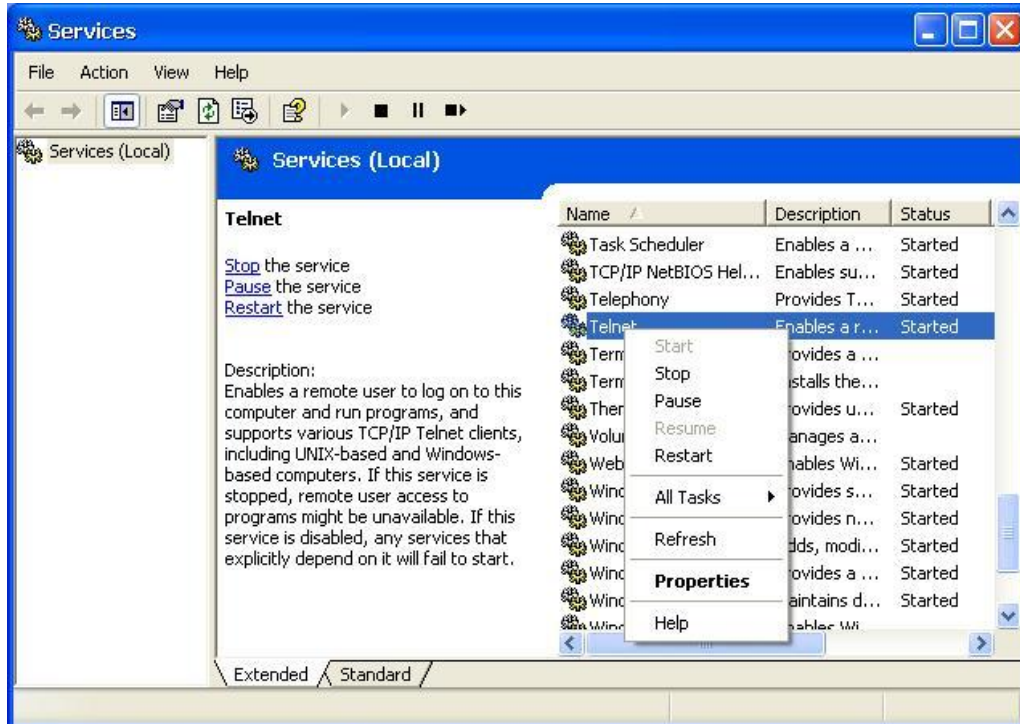


- **SNTP:** In the Date/Time properties window, you can see the NTP server setting.



Starting and Stopping Services

Select **Start** → **Control Panel** → **Administrative Tools** and double click **Services**.



Simple Network Management Protocol (SNMP)

To check SNMP agent capabilities on a target V460-XPE (e.g., suppose the network IP is 192.168.3.127) computer, log on to the workstation computer on which the SNMP manager resides and then type:

```
\> snmpwalk -v 2c -c public 192.168.3.127 system
```

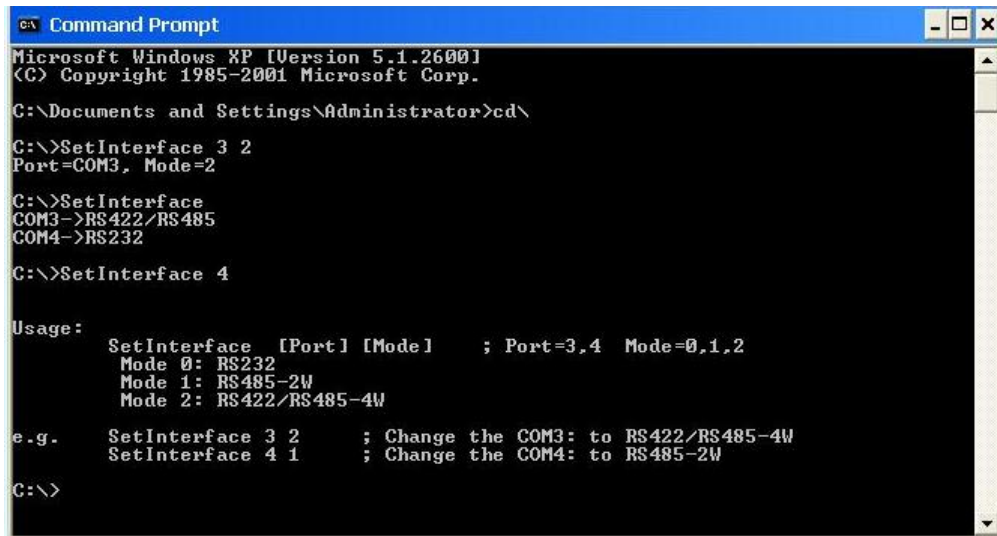
You will see a series of messages from the SNMP agent on the V460-XPE computer that allow you to monitor and manage the computer.

Serial Ports

V460-XPE embedded computers have 4 serial ports on the back panel. Ports 3 and 4 are designed to provide reliable, high-speed, 3-in-1 (RS-232, RS-422, and RS-485) operation. Each of the ports supports baudrates up to 921,600 bps.

Ports 1 and 2 are the embedded serial ports of the CPU chipset. They are standard 16550 UART ports, and support a baudrate maximum Baudrate of 115,200 bps. Note that these two ports do not support **Hardware Flow Control**.

The command line utility "SetInterface.exe" is for users to view and set the current operation mode.



```

C:\Documents and Settings\Administrator>cd\
C:\>SetInterface 3 2
Port=COM3, Mode=2
C:\>SetInterface
COM3->RS422/RS485
COM4->RS232
C:\>SetInterface 4

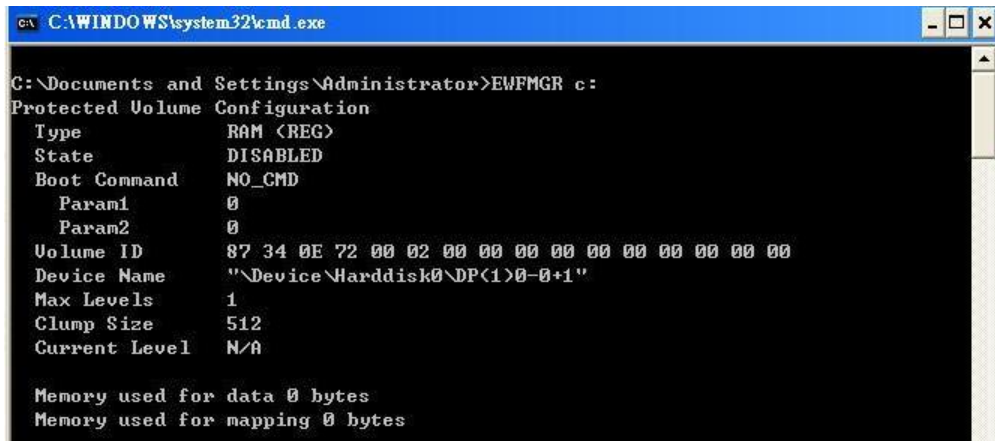
Usage:
SetInterface [Port] [Mode] ; Port=3,4 Mode=0,1,2
Mode 0: RS232
Mode 1: RS485-2W
Mode 2: RS422/RS485-4W
e.g. SetInterface 3 2 ; Change the COM3: to RS422/RS485-4W
SetInterface 4 1 ; Change the COM4: to RS485-2W
C:\>

```

Enhanced Write Filter

The “Enhanced Write Filter” protects the contents of a volume on the target media volume by redirecting all writes to another storage location called on overlay. Use the following steps to enable the Enhanced Write Filter.

1. Type **EWFMGR C:** to check if the state of the Enhanced Write Filter is **Disabled**.
2. To enable the filter, type **EWFMGR C: -enable**.
3. Reboot the system to activate the change.
4. Delete a file on your protected volume and reboot the system; the file you just deleted will appear.



```

C:\WINDOWS\system32\cmd.exe
C:\Documents and Settings\Administrator>EWFMGR c:
Protected Volume Configuration
Type          RAM <REG>
State         DISABLED
Boot Command  NO_CMD
  Param1      0
  Param2      0
Volume ID     87 34 0E 72 00 02 00 00 00 00 00 00 00 00 00
Device Name   "\\Device\Harddisk0\DP<1>0-0+1"
Max Levels    1
Clump Size    512
Current Level N/A

Memory used for data 0 bytes
Memory used for mapping 0 bytes

```


Using the Battery Backed-up SRAM

The V460 embedded computer has a 256 KB SRAM backed up by a battery for users to keep important data, and provides a robust design to prevent unstable power sources from damaging your system or your data. The data stored in this SRAM is available until the battery runs out of power. You can use the standard file IO API to read and write data. Sample source code is given below:

Writing Data to SRAM

```
// Persisted_SRAM_Write.cpp : Defines the entry point for the console application.
//
#include "stdafx.h"
#include <windows.h>

int _tmain(int argc, _TCHAR* argv[])
{
    DWORD dwBackSize = 0;
    HANDLE hSRAM = NULL;

    // open the SRAM device driver
    hSRAM = CreateFile(L"\\\\.\\Sram",  GENERIC_READ | GENERIC_WRITE,
        0, // exclusive access, until the handle is closed
        NULL, // no security
        OPEN_EXISTING,
        FILE_ATTRIBUTE_NORMAL, // no overlapped I/O
        NULL); // null template

    if (hSRAM == INVALID_HANDLE_VALUE)
    {
        printf("Can't open SRAM\n");
        return 1;
    }

    // preparing data for write
    char *data = "This is persisted data xxxxxx1234567";
    DWORD nLen = strlen(data);

    // write data into SRAM
    WriteFile( hSRAM, data, nLen, &dwBackSize, NULL);

    // close device driver handle
    CloseHandle(hSRAM);

    printf("*** Done! You can now reboot your device, and try the Persisted_SRAM_Read program
    to verify the data that is still can be read.\n");
    return 0;
}
```

Reading Data from SRAM

```
// Persisted_SRAM_Read.cpp : Defines the entry point for the console application.
//

#include "stdafx.h"
#include <windows.h>

int _tmain(int argc, _TCHAR* argv[])
{
    DWORD dwBackSize = 0;
    HANDLE hSRAM = NULL;

    // open the SRAM device driver
    hSRAM = CreateFile(L"\\\\.\\Sram",  GENERIC_READ | GENERIC_WRITE,
        0, // exclusive access, until the handle is closed
        NULL, // no security
        OPEN_EXISTING,
        FILE_ATTRIBUTE_NORMAL, // no overlapped I/O
        NULL); // null template

    if (hSRAM == INVALID_HANDLE_VALUE)
    {
        printf("Can't open SRAM\n");
        return 1;
    }

    char recvBuf[100];
    memset( recvBuf, 0, sizeof(recvBuf));

    // read data from SRAM
    ReadFile( hSRAM, recvBuf, sizeof(recvBuf), &dwBackSize, NULL);

    printf("read from SRAM: %s\n", recvBuf);

    // close device driver handle
    CloseHandle(hSRAM);

    return 0;
}
```

Management Tools

The V460-XPE ready-to-run embedded computers are shipped with the Windows XP Embedded operating system already installed. This network-centric platform is designed to serve as a front-end for data acquisition and industrial control applications. A set of Windows XP management tools are installed on the V460-XPE computer to resolve management issues.

In this chapter, we cover the following topics:

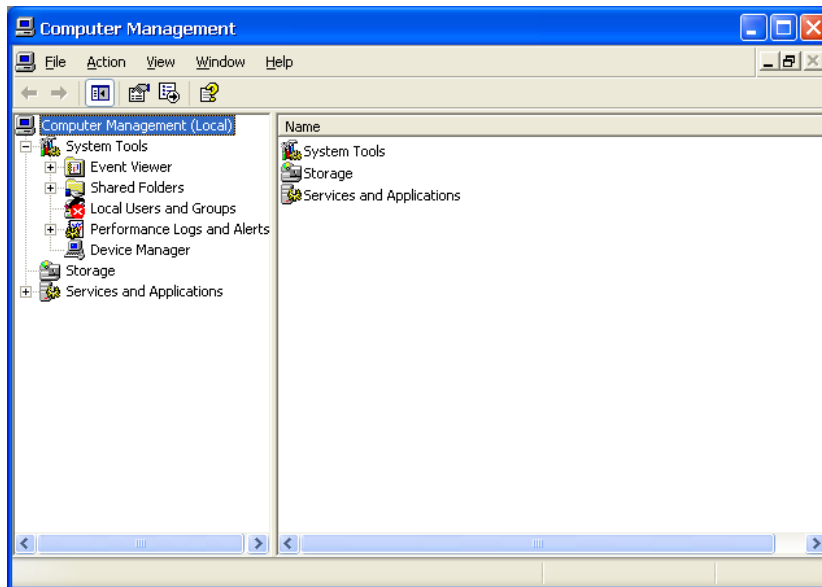
- Computer Management**
- Component Services**
- Event Viewer**
- Internet Information Services (Web/FTP)**
- ODBC Data Source Administrator**
- Performance Monitor**
- Services**

Computer Management

[Control Panel] → [Administrative tools] → Computer Management.

You can use the tools for a variety of tasks, such as disk partition, disk mount/dismount, and create/remove users.

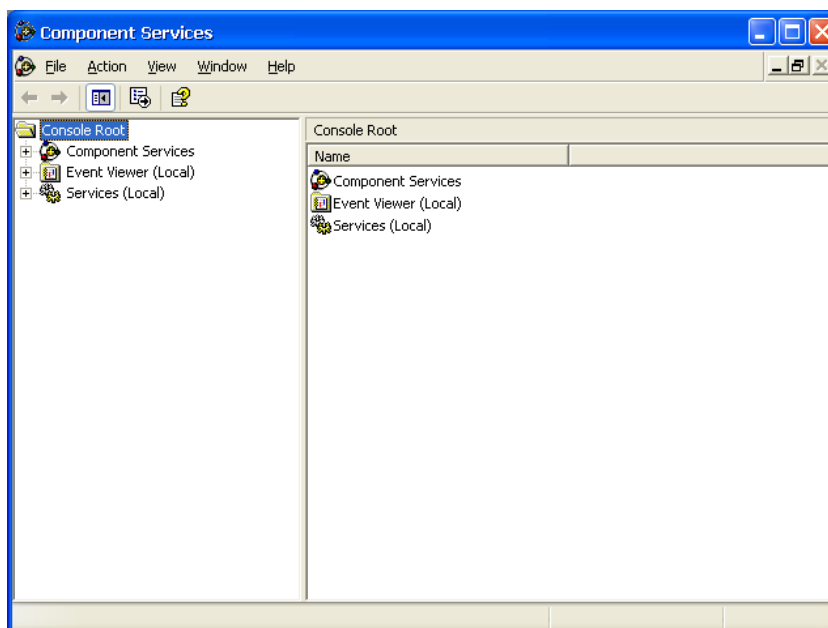
You can also check services in the Computer Management window.



Component Services

[Control Panel] → [Administrative tools] → Component Services.

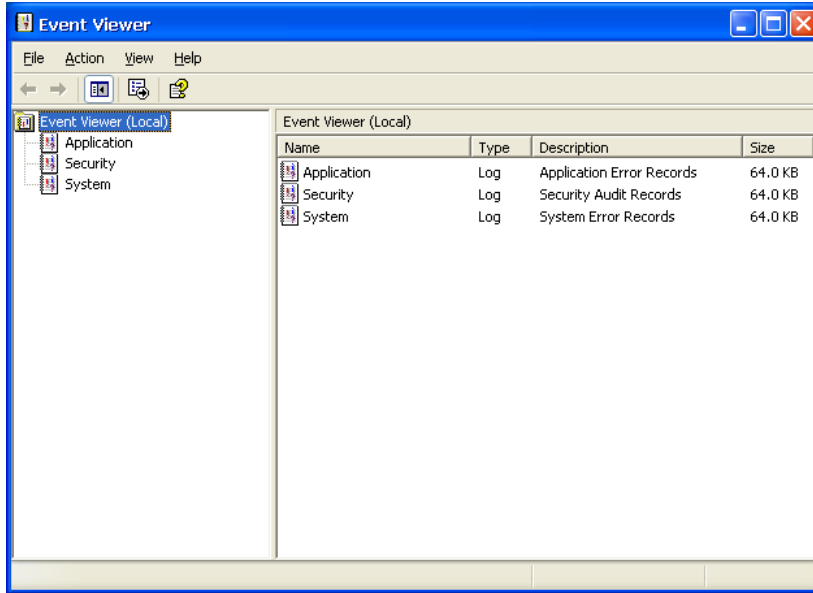
You can install/view/remove COM components with this tool.



Event Viewer

[Control Panel] → [Administrative tools] → Event Viewer.

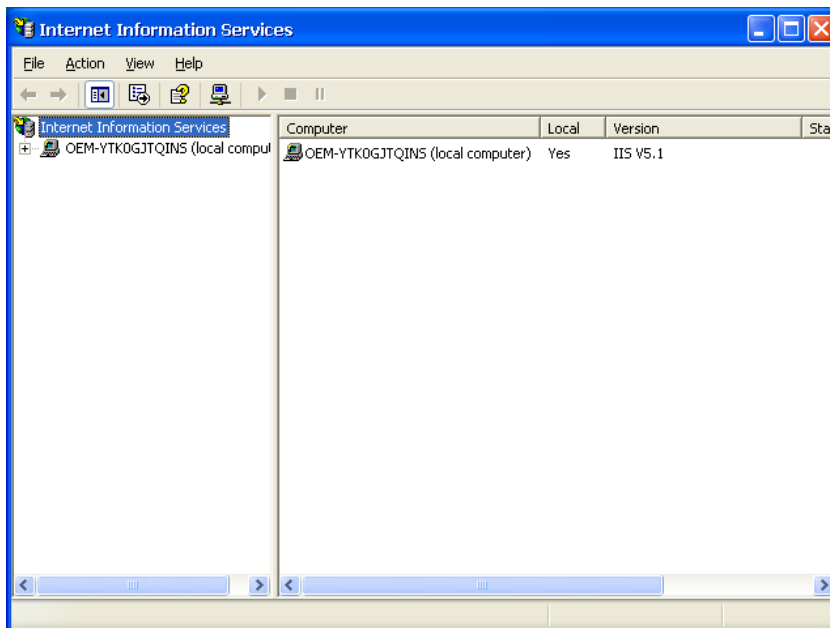
Every V460-XPE event, including system, applications, and security events are logged in this event database.



Internet Information Services (Web/FTP)

[Control Panel] → [Administrative tools] → Internet Information Services.

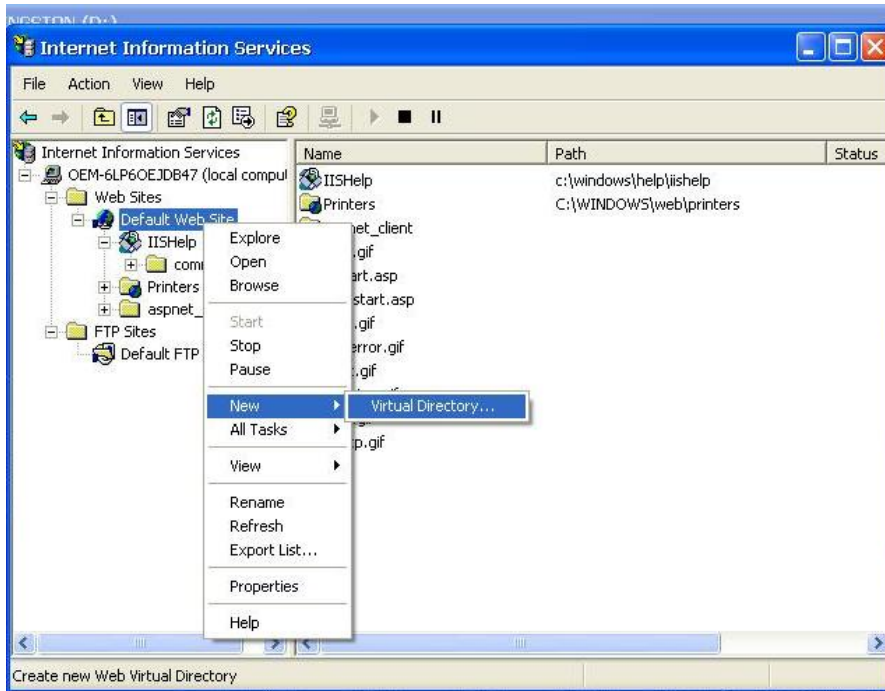
If you need to set up Web or FTP, you must use this tool for configuration purposes, and you can also start/stop HTTP/FTP services.



A default web page is located in the directory **c:\inetpub**. Use this default page to test your web server.

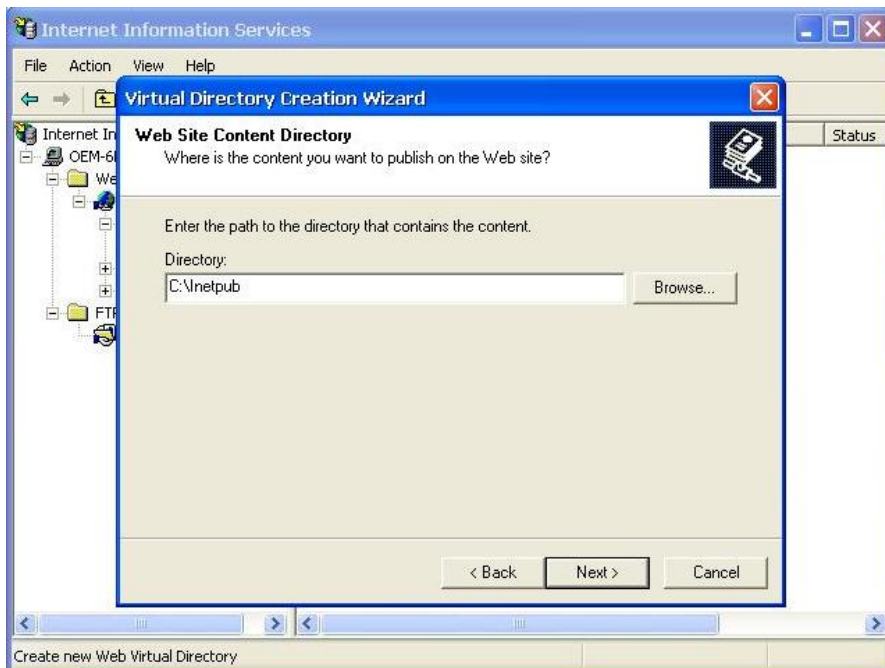
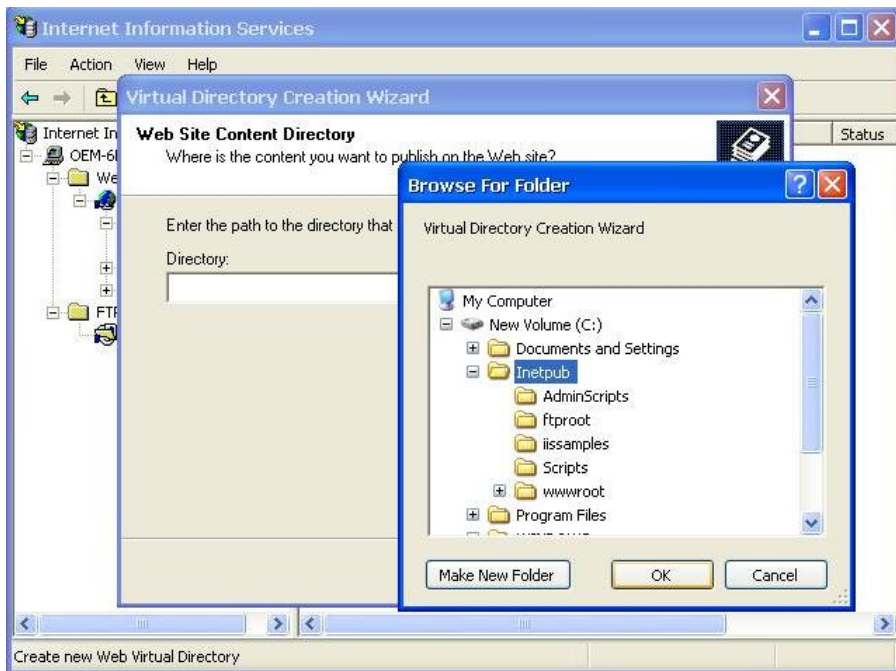
Follow the steps shown below to create the virtual directory.

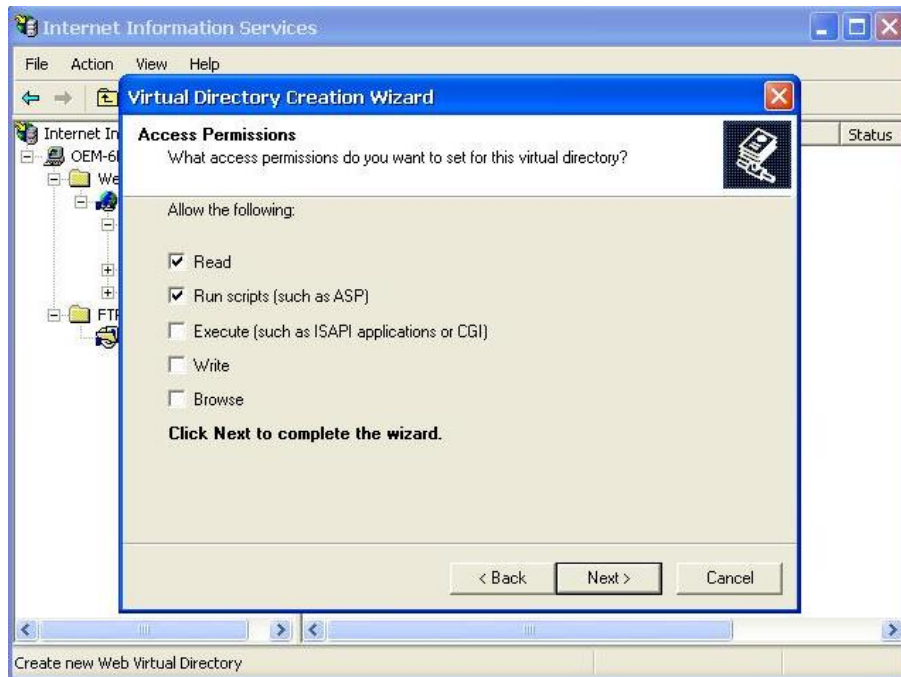
1. Create a virtual directory by selecting **Default Web Site → New → Virtual Directory**.

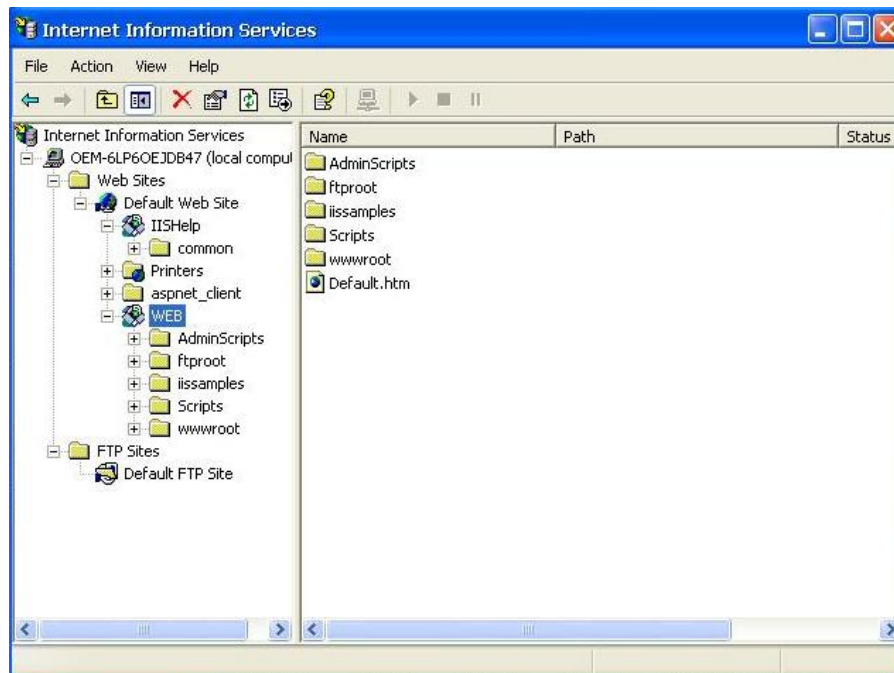


2. Follow the virtual directory creation wizard and complete the steps to create the virtual directory **c:\inetpub**.





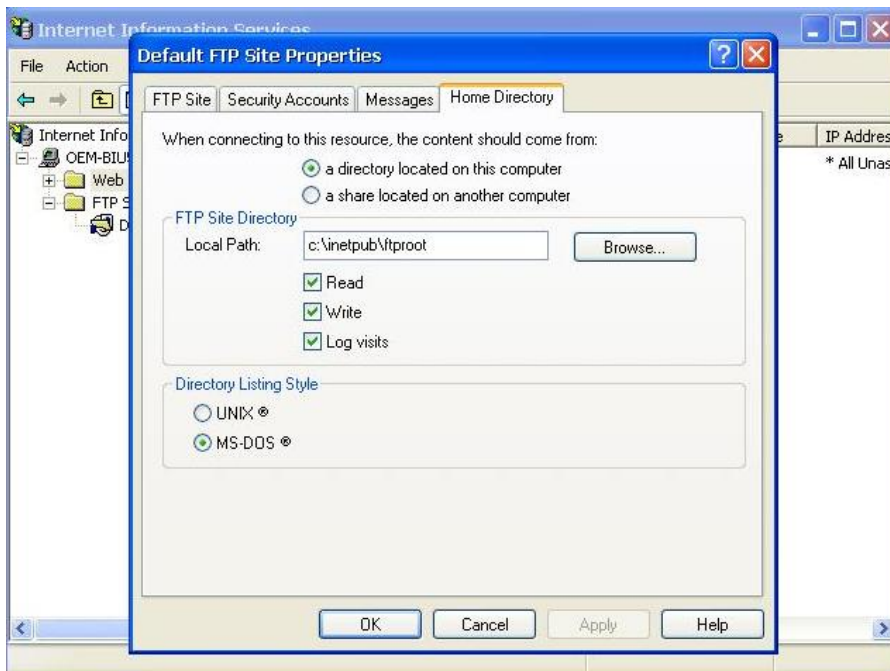
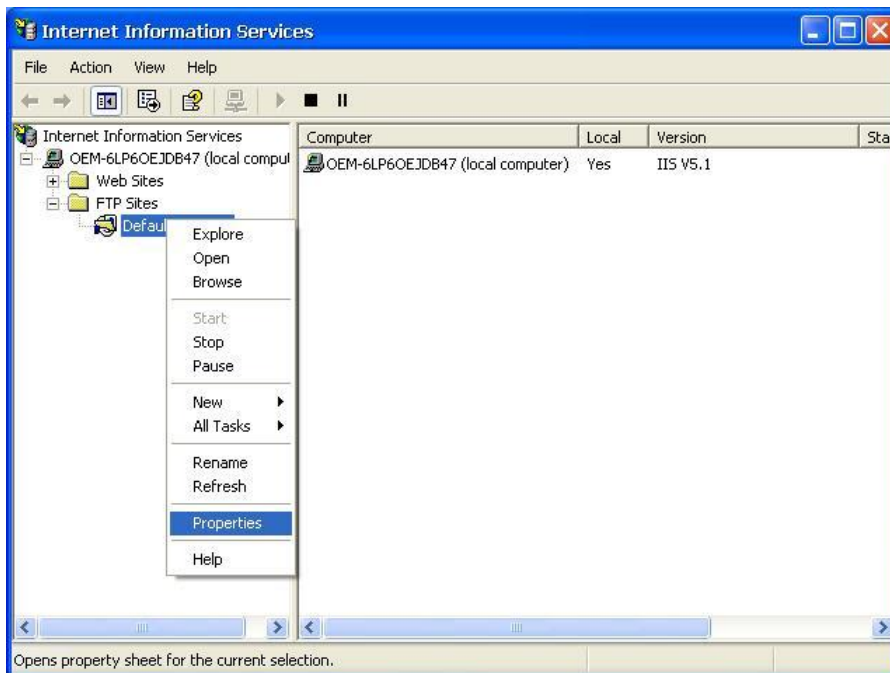




3. When you complete the steps, the virtual directory **WEB** will appear under **Default WEB Site**.
4. On your desktop, type **[IP Address]/WEB/Default.htm** (e.g., 192.168.3.127/WEB/Default.htm). The following message will appear. The steps are indicated in the following sequence of diagrams.

IIS server is started!

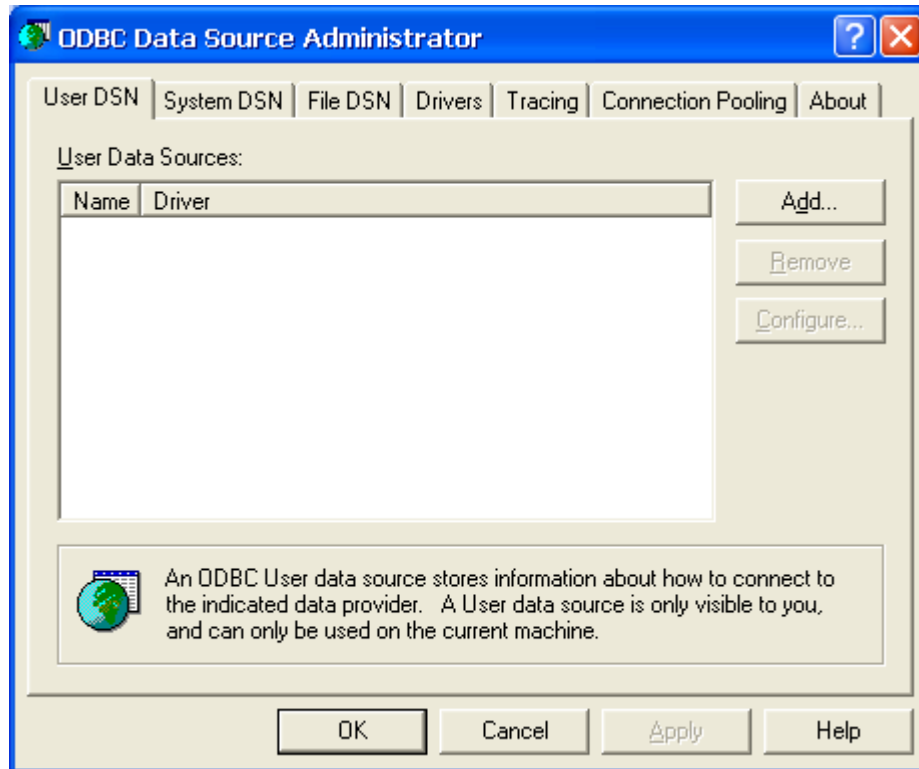
If you need to use the FTP server, you must create the default password for your account and turn on the write permission on your home directory located in **c:\intepub\ftproot**. Select **FTP Sites → Default FTP Site → Properties → Home Directory**, and checkmark the **Write** checkbox. You should now be able to transmit files through the ftp server.



ODBC Data Source Administrator

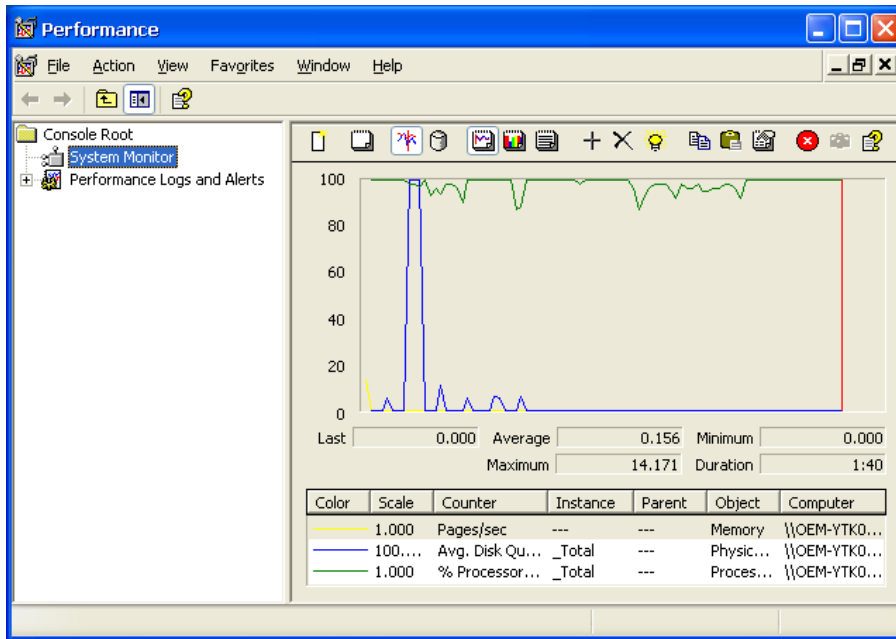
[Control Panel] → [Administrative tools] → ODBC.

This database source configuration tool is for users to add, delete, or set up the data source, and then display information about the installed ODBS drivers. You can create a new data source or trace the calls to ODBC functions.



Performance Monitor

[Control Panel] → [Administrative tools] → Performance You can use this tool to monitor system and network resources.

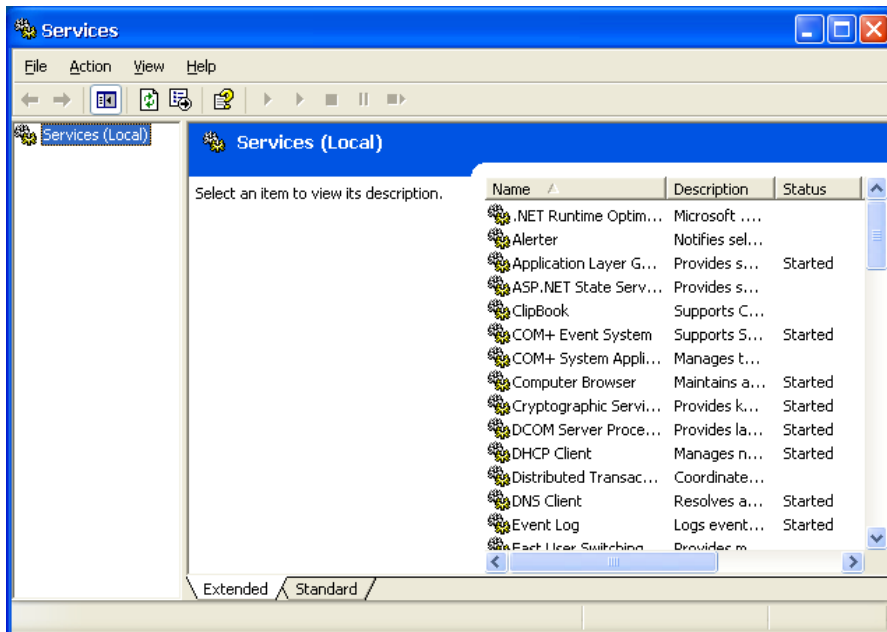


Services

[Control Panel] → [Administrative tools] → Services

You can use this utility to start/stop/restart services.

(e.g. If you do not need telnet service you can stop it and set the “startup option” to “manual”).



4

System Recovery

The V460-XPE Series ready-to-run embedded computers run the Windows XP Embedded operating system. This chapter describes the recovery process in the event of system instability.

The following topics are covered in this chapter:

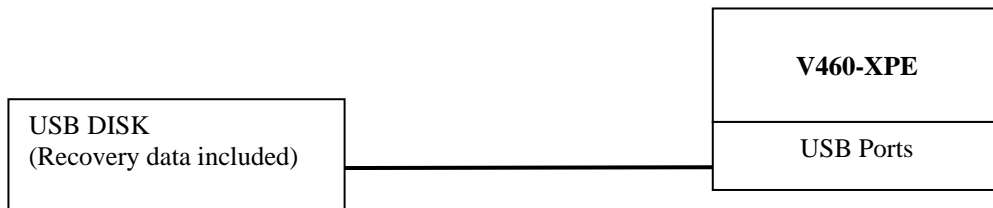
- Recovery Environment
- Recovery Procedure

Recovery Environment

The environment includes a V460-XPE embedded computer and a bootable USB disk with the recovery programs and system image file.

Hardware

The hardware used includes a PC, a V460-XPE computer and a USB disk with the recovery programs. (**Note: The USB disk should have at least 2 GB of memory space.**)



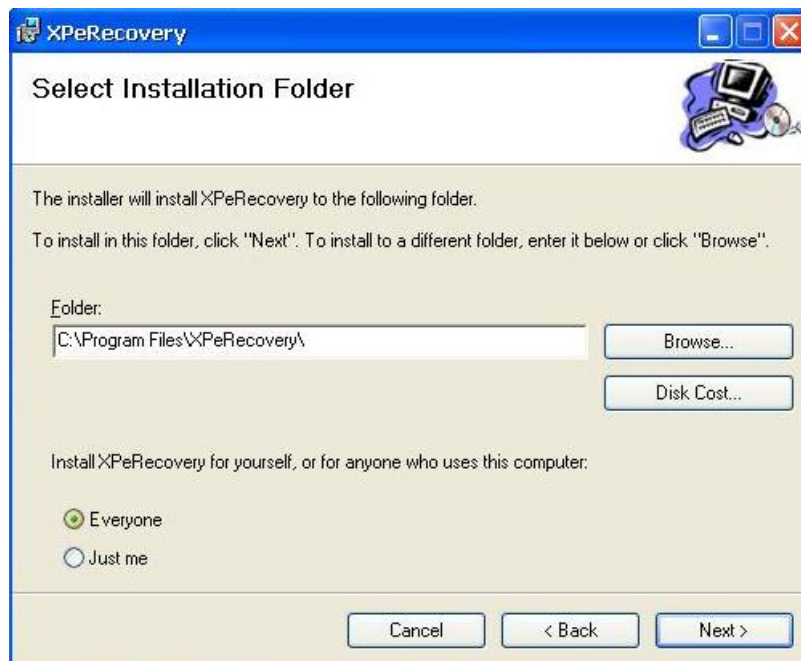
Recovery Procedure

Step 1: Install XPE Disk Recovery

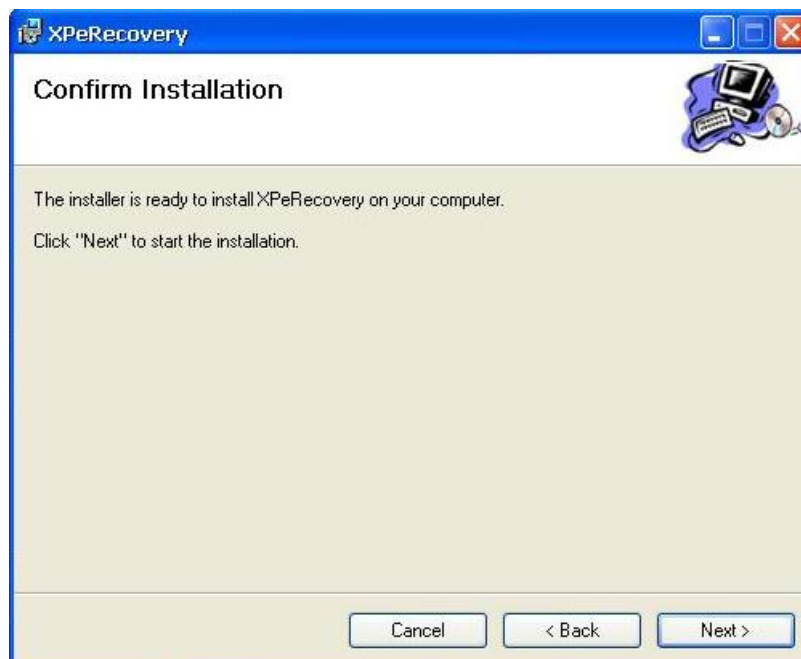
Insert the software CD (in your package) into your computer and find **XPeRecovery.msi** in the **recovery** folder. Double-click **XPeRecovery.msi** to start the setup process and click **Next**.



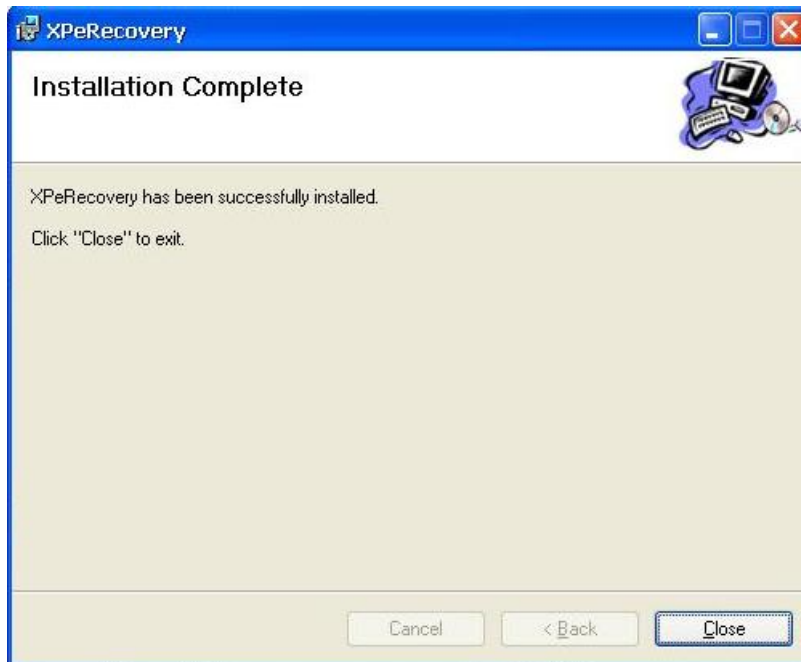
Click **Browse** and select the folder you wish to install to and then click **Next**.



Click **Next** to start the installation.

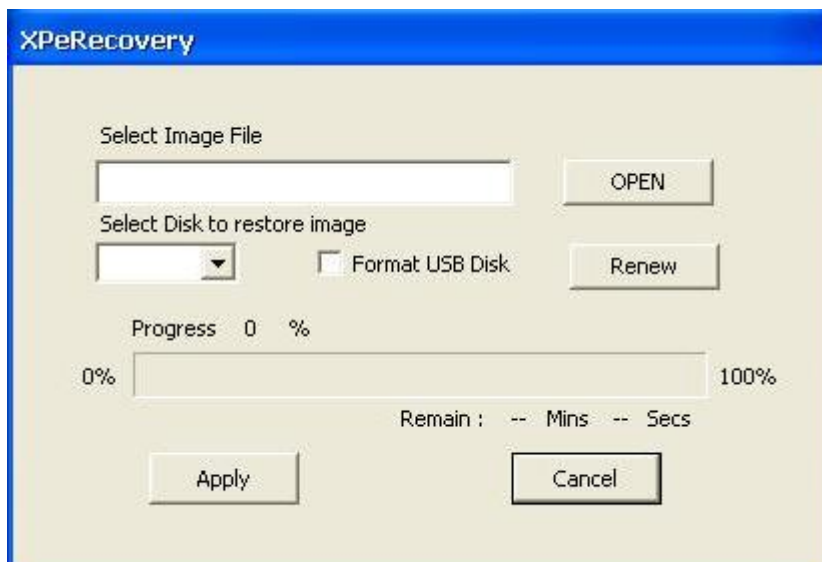


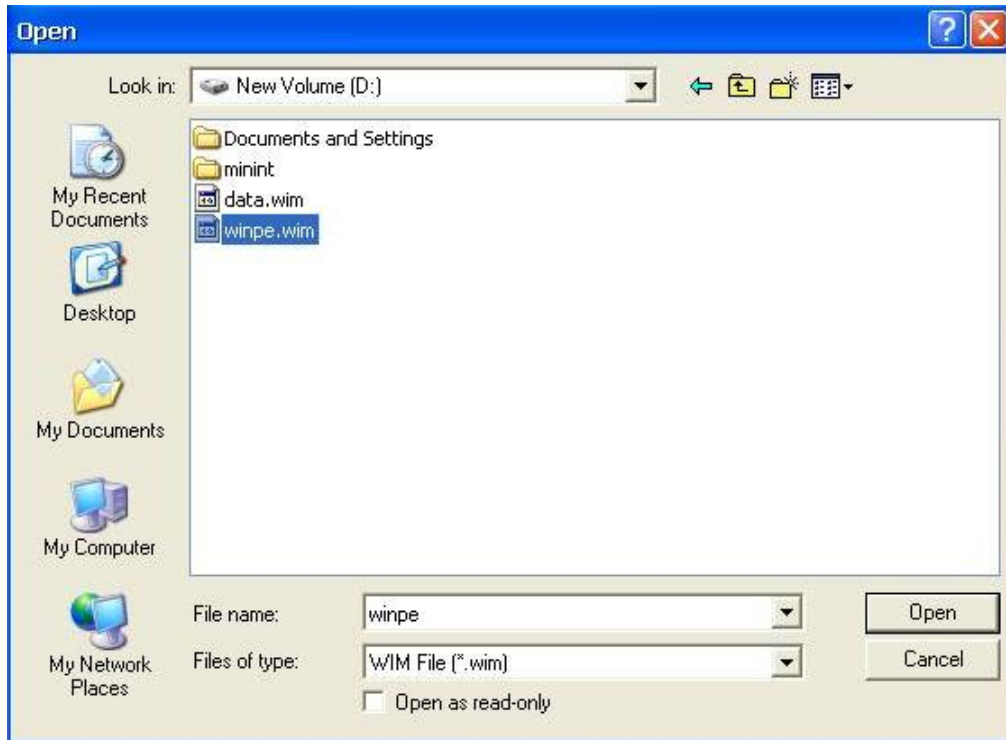
Click **Close** to finish.



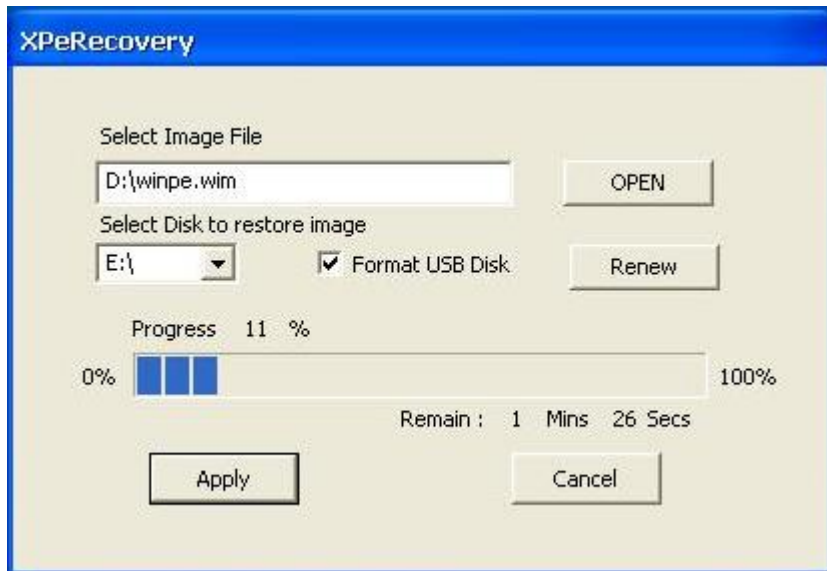
Step 2: Extract Recovery Image from PC to USB disk

After the installation is complete, you will see the **XPeRecovery** shortcut on your desktop. You can start the USB disk recovery utility by opening this shortcut. Double-click the shortcut and then click **OPEN** to select the image file. This file is located on the software CD in the **recovery** folder; the filename is **winpe.wim**. You may also copy this file to your PC. In the following example, we have already copied the image file to the D drive of the PC.

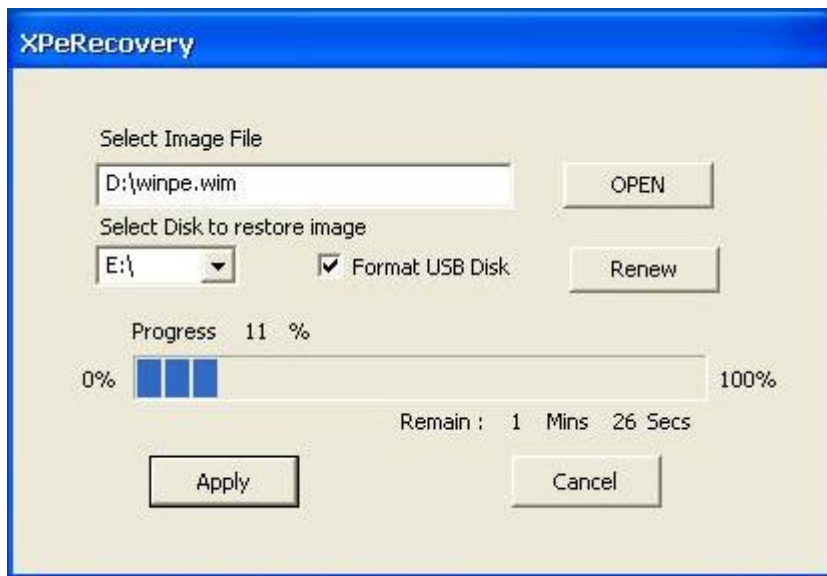




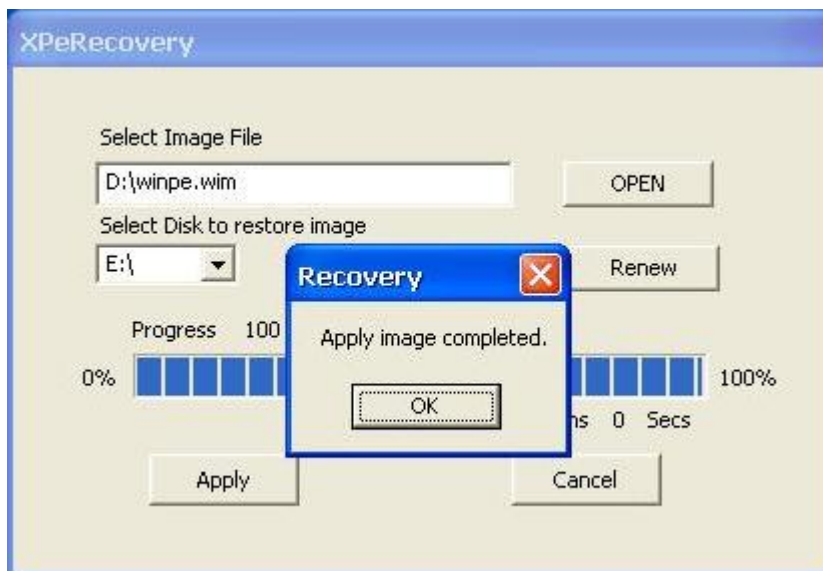
Click the drop-down list and select your USB disk drive letter (in this example, it is the E drive), and check **Format USB Disk**.



Click **Apply** to start the process; the utility will display the progress and time remaining

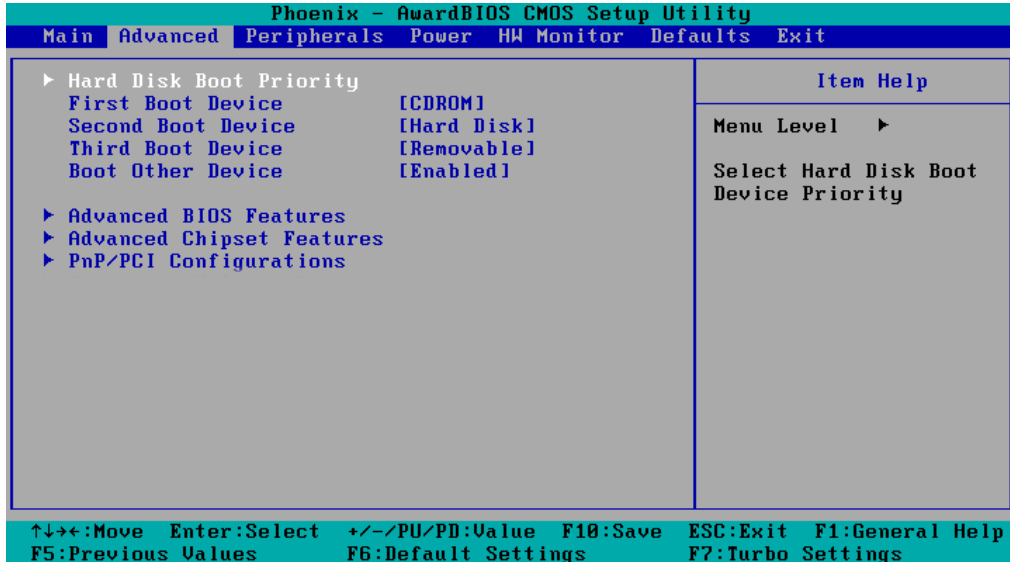


This message will appear when the process is complete. Click **OK**.

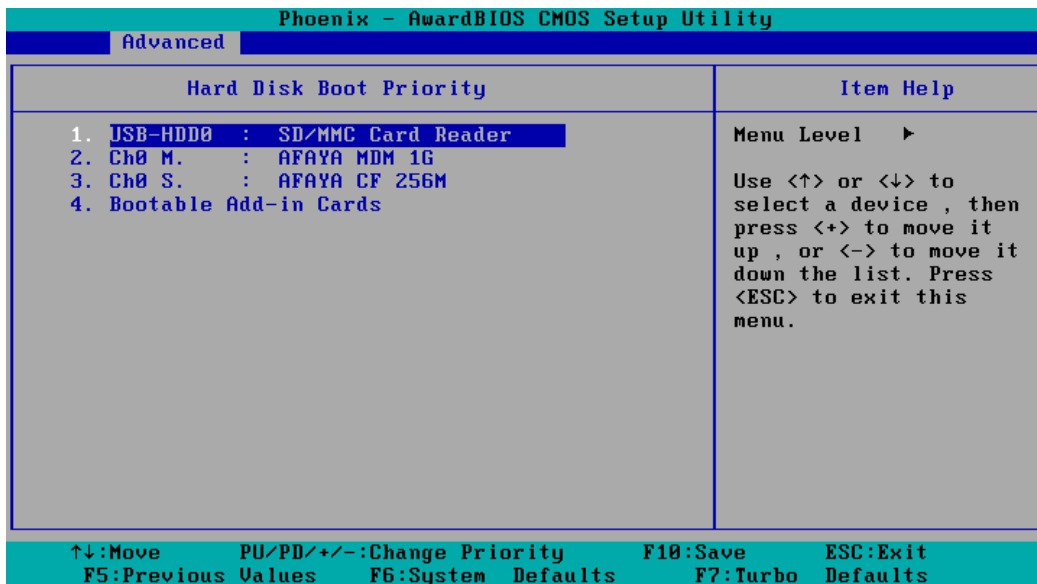


Step 3: Change the BIOS Settings

On the V460-XPE computer, you need to change the BIOS settings to boot from USB disk. Turn on the computer and press **DEL** to enter the BIOS setup menu. Select **Hard Disk Boot Priority** and press **Enter**.



Select USB disk and then press “+” to make it the first boot device. **Warning: Incorrect boot disk priority will lead to recovery failure.**



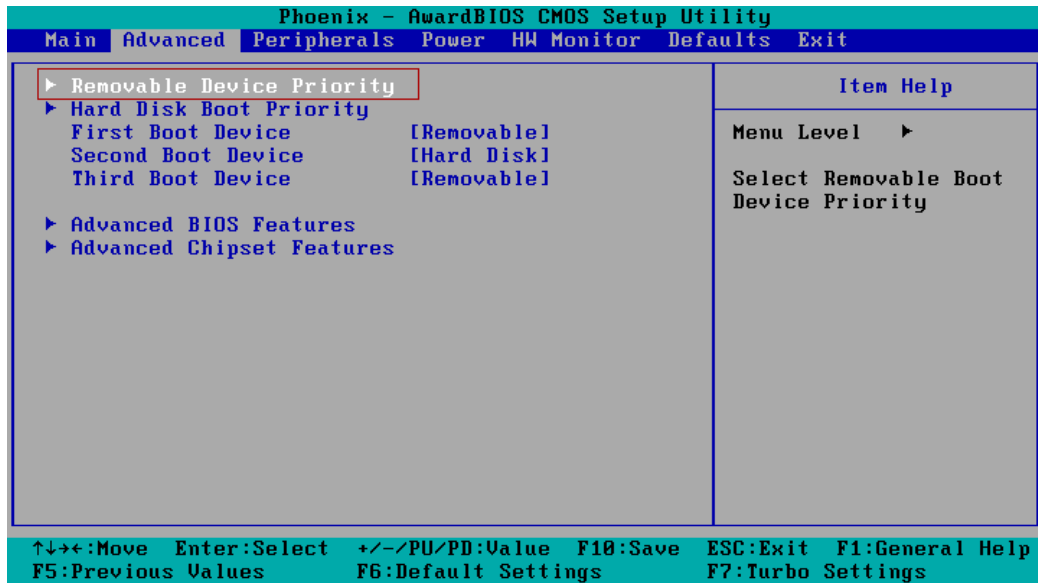
Press **F10** and then press **Enter** to save and leave the BIOS setup.



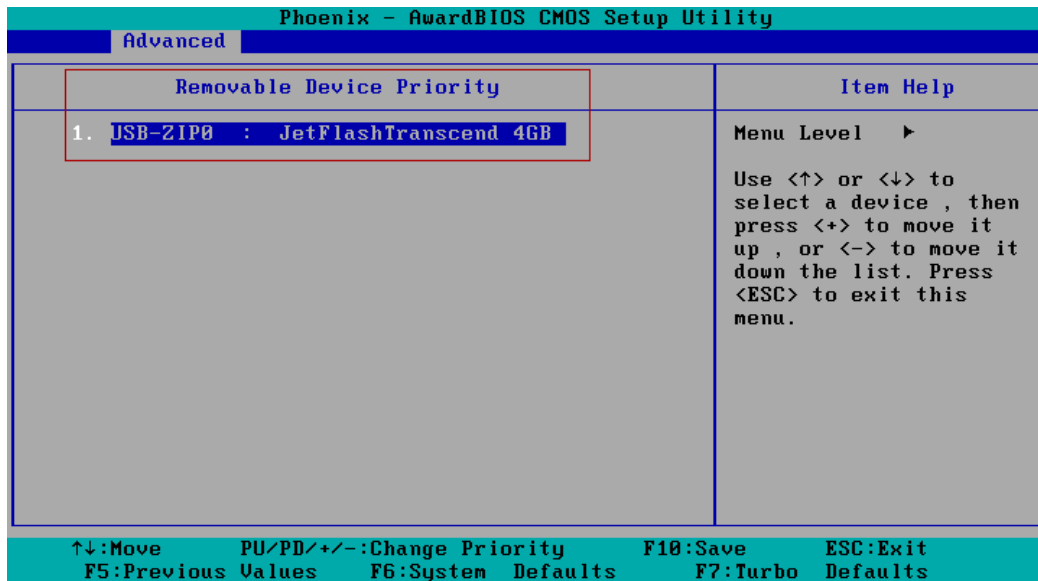
ATTENTION

Please note that some USB disks will be regarded as the **Removable Device**. If this happens, take the following steps.

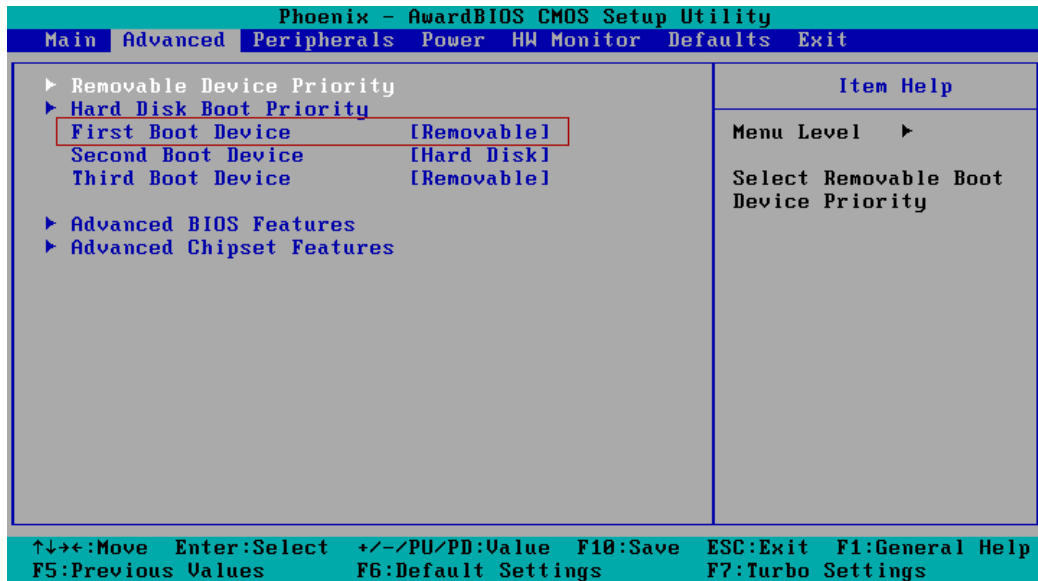
- a. Select **Removable Device Priority**.



- b. Make sure that the USB disk has been detected. Press **Esc** to exit.



- c. Make sure that the **First Boot Device is Removable**. If not, select **First Boot Device**, press **Enter**, and then select it from the list.



- d. Select **Exit → Save & Exit Setup** and then press **Enter**.
- e. Choose **Y** to save to the CMOS and then exit.

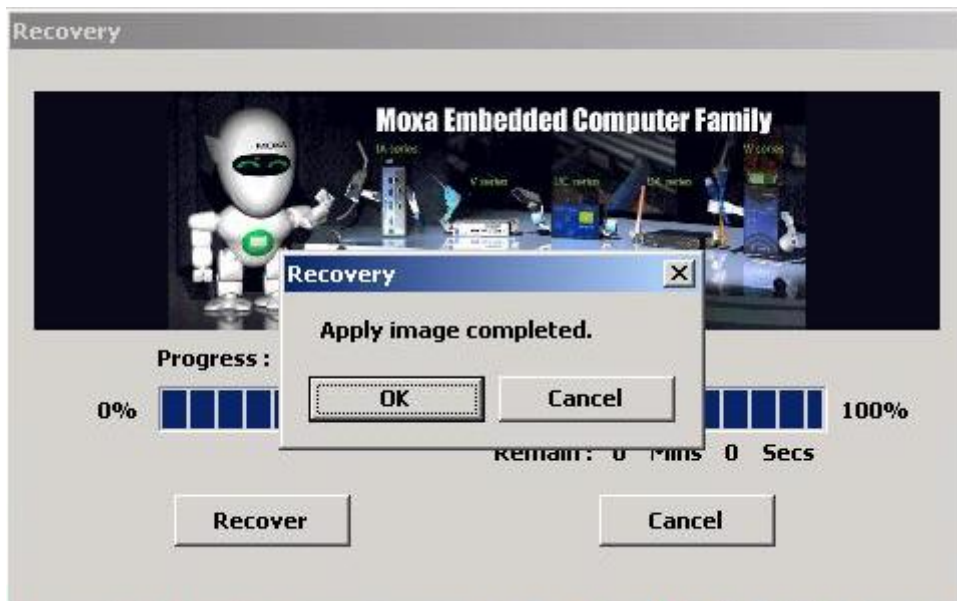
Step 4: Reboot the Computer and Start Recovery

Insert the USB disk into any USB port of the V460-XPE, and then reboot the computer. The system will boot from the USB disk and the Windows Pre-installation Environment and the recovery utility will appear. Click **Recover** to start system recovery.



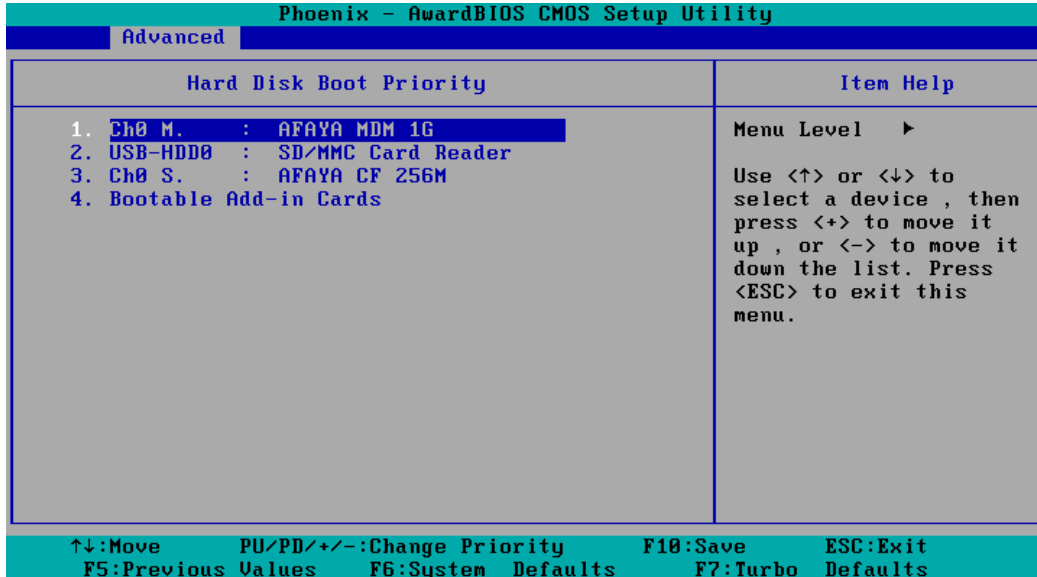


Click **OK** when the recovery process is complete; the system will reboot.



Step 5: Change the BIOS Setting to Boot from Original Disk.

At this point, you will need to change the boot priority so that it can boot from the original disk. As the system reboots, press **DEL** to enter the BIOS setup menu. Select **Hard Disk Boot Priority** and press **Enter**. Make sure the hard disk has first boot priority.



Press **F10** and then press **Enter** to save and leave the BIOS settings.

Step 6: Reboot the Computer.

Remove the USB disk from the USB port before restarting and rebooting the V2101-XPE. You will need to wait ten to fifteen minutes while the system recovers. **DO NOT power off or shut down the computer** during this time or the IIS service will be terminated. When the operating system has successfully launched, you will need to restart your computer to activate the new settings.

