TC-6110 Windows Embedded Standard 7 Software Manual

Second Edition, June 2013

www.moxa.com/product

TC-6110 Windows Embedded Standard 7 Software Manual

Copyright Notice

Trademarks

Disclaimer

Information in this document is subject to change without notice and does not represent a commitment on the part of Moxa.

Moxa provides this document as is, without warranty of any kind, either expressed or implied, including, but not limited to, its particular purpose. Moxa reserves the right to make improvements and/or changes to this manual, or to the products and/or the programs described in this manual, at any time.

Information provided in this manual is intended to be accurate and reliable. However, Moxa assumes no responsibility for its use, or for any infringements on the rights of third parties that may result from its use.

This product might include unintentional technical or typographical errors. Changes are periodically made to the information herein to correct such errors, and these changes are incorporated into new editions of the publication.

Technical Support Contact Information

www.moxa.com/support

Moxa Americas

Toll-free:	1-888-669-2872
Tel:	+1-714-528-6777
Fax:	+1-714-528-6778

Moxa Europe

Tel:	+49-89-3 70 03 99-0
Fax:	+49-89-3 70 03 99-99

Moxa India

Tel:	+91-80-4172-9088
Fax:	+91-80-4132-1045

Moxa China (Shanghai office)

Toll-free:	800-820-5036
Tel:	+86-21-5258-9955
Fax:	+86-21-5258-5505

Moxa Asia-Pacific

Tel:	+886-2-8919-1230
Fax:	+886-2-8919-1231

Table of Contents

1

Introduction

Thank you for buying Moxa’s TC-6110 train computer. It comes with the Windows 7 Embedded software platform, providing a simple and familiar development environment for on-board train applications.

- ❐ **Software Components**

Software Components

Refer to the following content for the software components of the Windows Embedded Standard 7 pre-installed on the TC-6110 computers.

Windows Embedded Standard 7

Core OS:

- 32-bit support
- Remote Client
- Remote Procedure Call

Applications and Services Development:

- .Net Framework 4.0
- Remote Desktop Protocol 7.1
- COM OLE Application Support
- COM+ Application Support
- MSMQ

Internet Services:

- Internet Explorer 8.0
- IIS 7.0

File Systems and Data Store:

- Windows Data Access Components
- Windows Backup and Restore

Diagnostics:

- Common Diagnostic Tools
- Problem Reports and Solutions

Fonts: Chinese (Trad. and Simp.), Western, Middle Eastern, South East Asian, and South Asian Fonts

Graphics and Multimedia:

- MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
- MPEG Layer-3 Audio Codecs(MP3)
- MPEG4 Decoders
- Windows Media Video VC-1 (WMV) Codecs
- DirectX and Windows Device Experience
- Windows Media Player 12

International:

- IME Simplified Chinese Support
- IME Traditional Chinese Support

Management:

- Group Policy Management
- Windows Management Instrument (WMI)
- Windows Update

Networking:

- Extensible Authentication Protocol (EAP)
- Internet Authentication Service
- Telnet Server
- Bluetooth
- Domain Services
- Network Access Protection
- Network and Sharing Center
- Quality of Service
- Remote Access Service (RAS)
- Telephony API Client
- Windows Firewall
- Wireless Networking

Security:

- Credential Roaming Service
- Credentials and Certificate Management
- Windows Authorization Manager (AZMAN)
- Windows Security Center
- Active Directory Rights Management
- Security Base
- Encrypted File System (EFS)

Embedded Features:

- Enhanced Write Filter (EWF)
- File-Based Write Filter (FBWF)
- Message Box Default Reply
- Registry Filter
- WSDAPI for .NET

Embedded Self-Health Diagnostic Software: SNMP-based remote scripting layer for monitoring, reporting, and control

2

System Initialization

This chapter describes how to initialize the system settings on TC-6110 computer when you boot up the computer at first time.

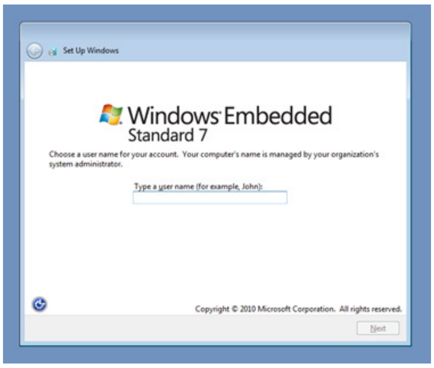
The following topics are covered in this chapter:

❒ **Create a New User Account**

Create a New User Account

1. When you boot into the TC-6110 for the first time you will need to create a user account for this computer.

2. Type the password, and then retype the password below. In addition, you may also type a password hint in case you forget your password. If you do not want to set a password for the account, leave the entry box blank and click Next.

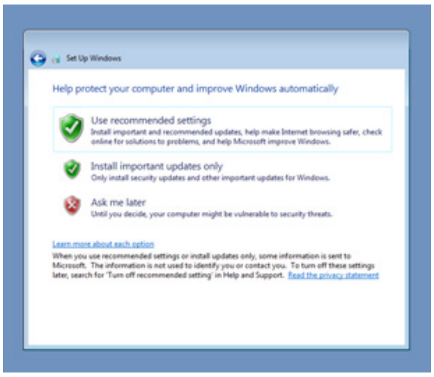


Choose a user name for your account. Your computer's name is managed by your organization's system administrator.

Type a user name (for example, John):

Copyright © 2010 Microsoft Corporation. All rights reserved.

3. Select the windows update option, and then select your time zone and whether you will use daylight savings time.



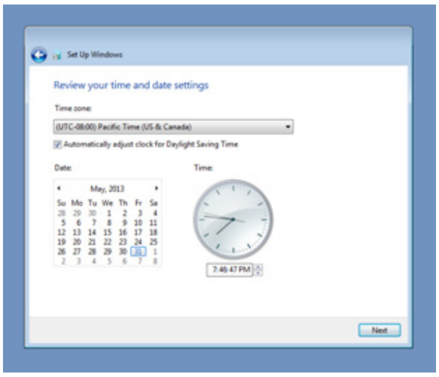
Help protect your computer and improve Windows automatically

Use recommended settings
Install important and recommended updates, help make Internet browsing safer, check online for solutions to problems, and help Microsoft improve Windows.

Install important updates only
Only install security updates and other important updates for Windows.

Ask me later
Until you decide, your computer might be vulnerable to security threats.

Learn more about each option
When you use recommended settings or install updates only, some information is sent to Microsoft. The information is not used to identify you or contact you. To turn off these settings later, search for 'Turn off recommended setting' in Help and Support. Read the privacy statement



Review your time and date settings

Time zone:
(UTC-08:00) Pacific Time (US & Canada)

☑ Automatically adjust clock for Daylight Saving Time

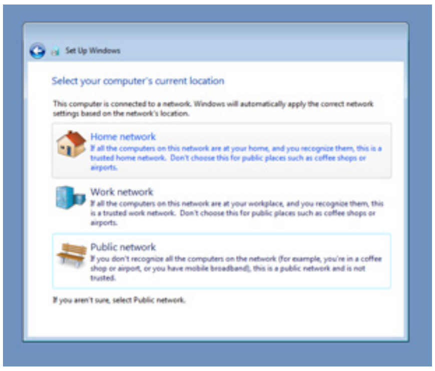
Date:

May, 2013

Su	Mo	Tu	We	Th	Fr	Sa
28	29	30	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1
2	3	4	5	6	7	8

Time:
7:46:47 PM

4. Next, select the usage environment. Windows will automatically apply a preset bundle of security settings based on the network environment in which it is located. Most restrictive is public, least restrictive is home.



Select your computer's current location

This computer is connected to a network. Windows will automatically apply the correct network settings based on the network's location.

Home network
If all the computers on this network are at your home, and you recognize them, this is a trusted home network. Don't choose this for public places such as coffee shops or airports.

Work network
If all the computers on this network are at your workplace, and you recognize them, this is a trusted work network. Don't choose this for public places such as coffee shops or airports.

Public network
If you don't recognize all the computers on the network (for example, you're in a coffee shop or airport, or you have mobile broadband), this is a public network and is not trusted.

If you aren't sure, select Public network.

5. Now you can start to use TC-6110 embedded computer.

3

Enabling Windows 7 Write Protections

This chapter describes how to set up and configure Windows 7 bit-level and file-level write protections on the TC-6110 storage drives.

The following topics are covered in this chapter:

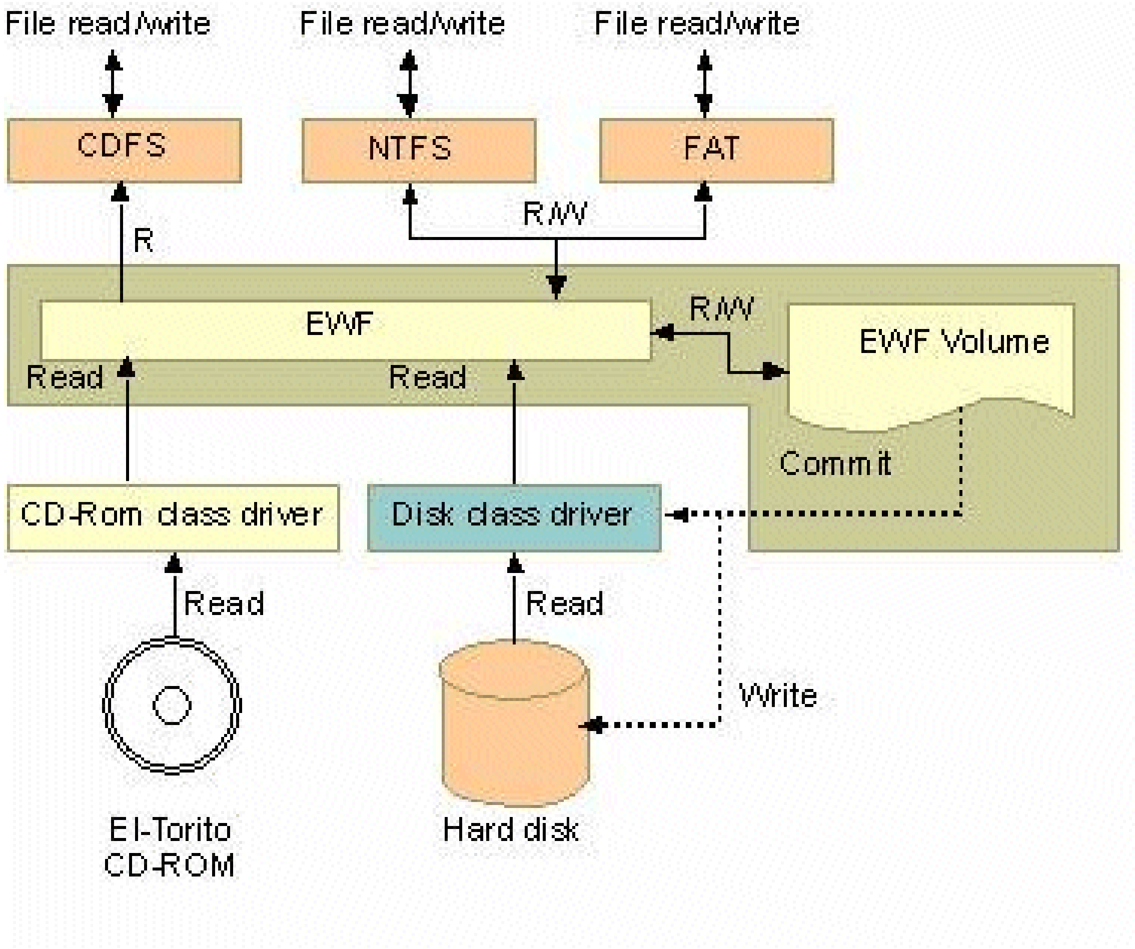
❒ Enhanced Writer Filter

❒ File-Based Write Filter

Enhanced Write Filter

Overview

Enhanced Write Filter (EWF) allows Windows 7 users to protect their all information on their storage drive from permanent changes of any sort, at the lowest level of hardware protection available: the bit level. **EWF** allows the operating system (OS) to boot from the hard disk, but protects the system by creating a virtual file system called an **overlay**. All writes to an EWF-protected volume (the **hard disk**, in Fig. 1) are only recorded on this virtual overlay (the **EWF Volume**, in Fig. 1), which is stored independently in random access memory (RAM). Because EWF does not write data directly to the hard disk but instead only records system writes to this virtual RAM overlay, any data that is "written" during system operation will disappear upon the next re-boot. This approach allows the system to operate as if it is writeable when in reality all OS and user-space file systems are stored in a permanent, read-only state. If desired, the data written to the overlay may be committed to the protected volume, but this requires additional effort. Refer to the following figure (from Microsoft) for an overview of the EWF structure.



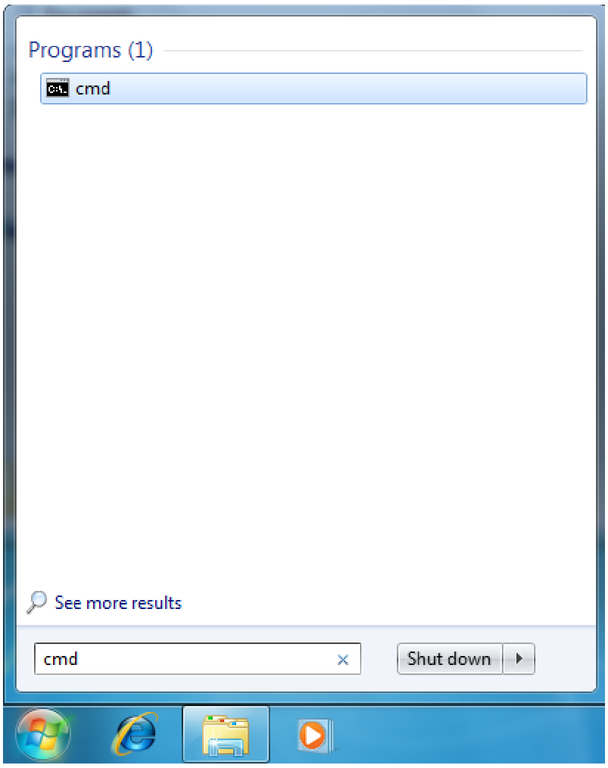
To get more details about EWF configuration and usage, you may:

- Visit Microsoft's EWF Volume Configuration help pages.
- Visit Microsoft's EWF overview on the official Microsoft EWF help pages.
- Visit Microsoft's detailed description of EWF modes on the EWF help pages.
- Visit Microsoft's detailed description of the EWF API.

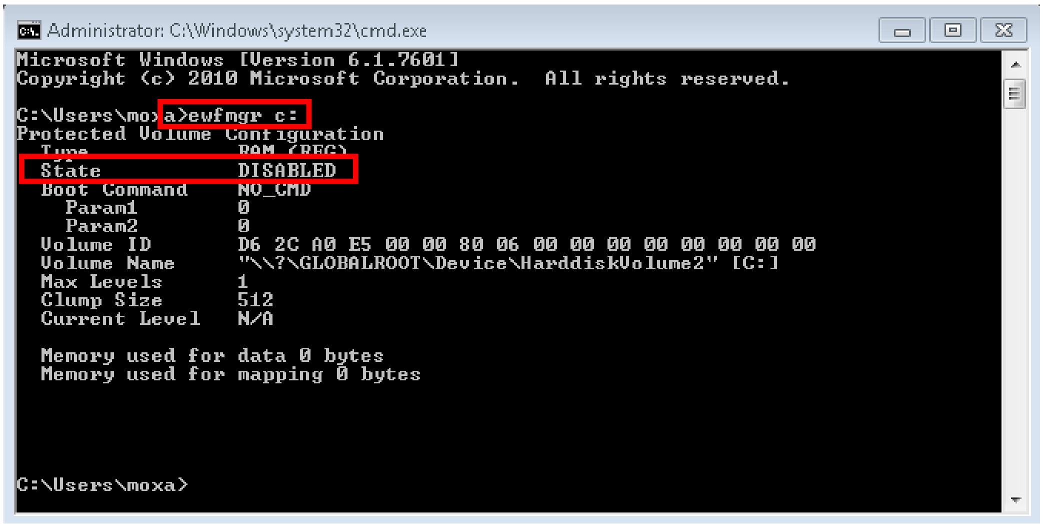
Enabling Enhanced Write Filter

Follow these steps to enable the Enhanced Write Filter

1. First open the console by running **cmd.exe**.

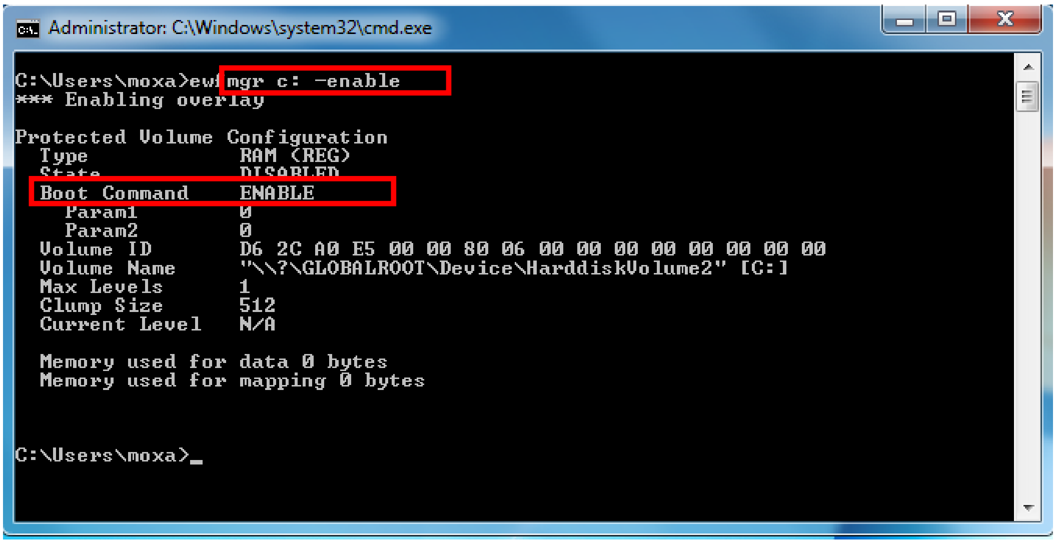


2. To verify that Enhanced Write Filter is disabled, type `C:\....>ewfmgr c:`.



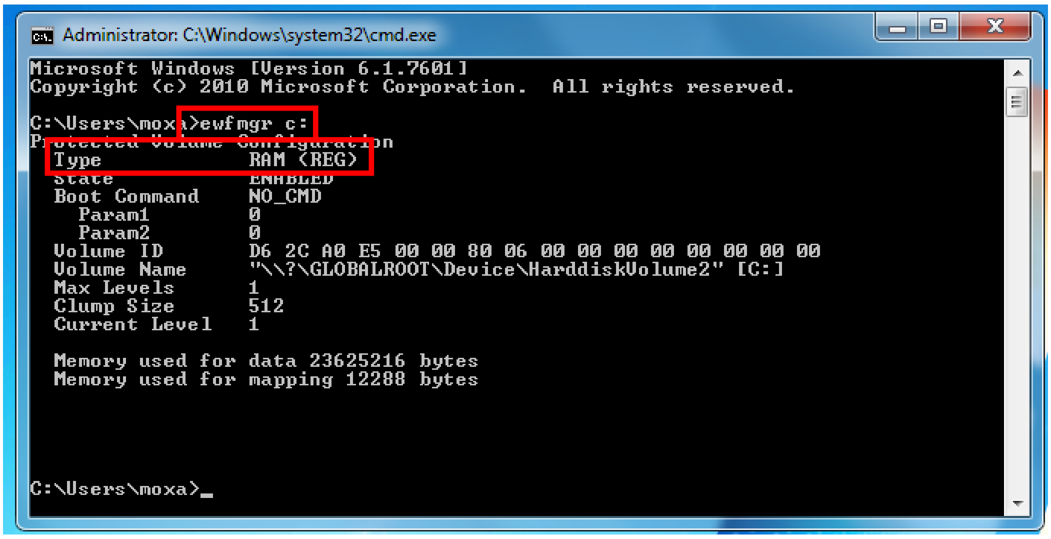
```
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2010 Microsoft Corporation.  All rights reserved.

C:\Users\moxa>ewfmgr c:
Protected Volume Configuration
  Type                RAM (REG)
  State               DISABLED
  Boot Command        NO_CMD
    Param1            0
    Param2            0
  Volume ID           D6 2C A0 E5 00 00 80 06 00 00 00 00 00 00 00 00
  Volume Name         "\\?\GLOBALROOT\Device\HarddiskVolume2" [C:]
  Max Levels          1
  Clump Size          512
  Current Level       N/A

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



C:\Users\moxa>
```

3. To enable the Enhanced Write Filter, type `C:\....>ewfmgr c: -enable`.



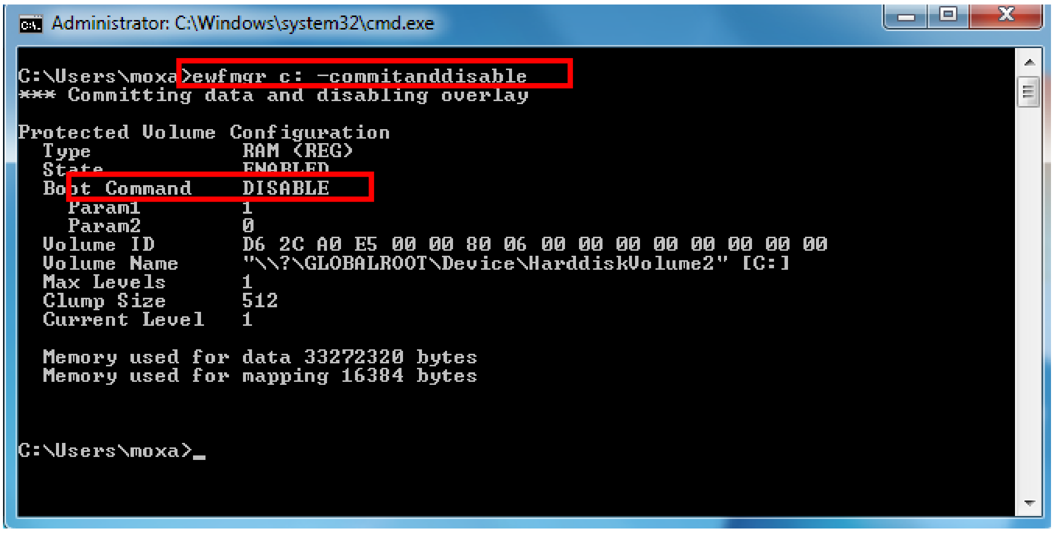
```
C:\Users\moxa>ewfmgr c: -enable
*** Enabling overlay

Protected Volume Configuration
  Type              RAM (REG)
  State             DISABLED
  Boot Command      ENABLE
    Param1          0
    Param2          0
  Volume ID         D6 2C A0 E5 00 00 80 06 00 00 00 00 00 00 00 00
  Volume Name       "\\?\GLOBALROOT\Device\HarddiskVolume2" [C:]
  Max Levels        1
  Clump Size        512
  Current Level     N/A

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


C:\Users\moxa>_
```

4. Reboot the system so the changes may take effect, and then verify that Enhanced Write Filter has been enabled at boot by typing `C:\....>ewfmgr c:`



```
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2010 Microsoft Corporation.  All rights reserved.

C:\Users\moxa>ewfmgr c:
Protected Volume Configuration
  Type              RAM (REG)
  State             ENABLED
  Boot Command      NO_CMD
    Param1          0
    Param2          0
  Volume ID         D6 2C A0 E5 00 00 80 06 00 00 00 00 00 00 00 00
  Volume Name       "\\?\GLOBALROOT\Device\HarddiskVolume2" [C:]
  Max Levels        1
  Clump Size        512
  Current Level     1

  Memory used for data 23625216 bytes
  Memory used for mapping 12288 bytes



C:\Users\moxa>_
```

5. To disable the Enhanced Write Filter, type `C:\....>ewfmgr c: -commitanddisable`.



```
C:\Users\moxa>ewfmgr c: -commitanddisable
*** Committing data and disabling overlay

Protected Volume Configuration
  Type              RAM (REG)
  State             ENABLED
  Boot Command      DISABLE
    Param1          1
    Param2          0
  Volume ID         D6 2C A0 E5 00 00 80 06 00 00 00 00 00 00 00 00
  Volume Name       "\\?\GLOBALROOT\Device\HarddiskVolume2" [C:]
  Max Levels        1
  Clump Size        512
  Current Level     1

  Memory used for data 33272320 bytes
  Memory used for mapping 16384 bytes


C:\Users\moxa>_
```

File-Based Write Filter

Overview

File-Based Write Filter (FBWF) is similar to **EWF**, but is enforced at the file level rather than at the hardware (bit) level. This means it is slightly less secure, but this allows it to provide more user features than is possible with EWF.

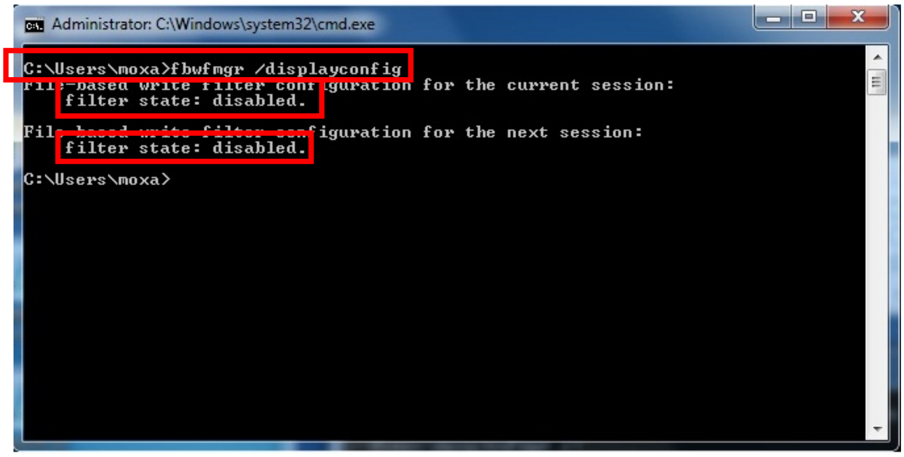
> *File-Based Write Filter (FBWF) allows the Windows Embedded platform to maintain the appearance of read and write access on write-sensitive or read-only storage. FBWF makes read and write access transparent to applications.*
>
> *Writing to storage media may be undesirable or impossible in embedded devices. FBWF redirects all writes targeted for protected volumes to a RAM cache called an overlay. Used in this context, an overlay is similar to a transparency overlay on an overhead projector. Any change made to the overlay affects the picture as seen in the aggregate, but if the overlay is removed, the underlying picture remains unchanged.*

One of FBWF's more advanced features allows the user to specify a directory where data may be more conveniently written to the data drive than is possible with EWF. The TC-6110's default settings have already configured a default directory for this; you may use the `c:\temp` directory for files which require write access.

Enabling File-Based Write Filter

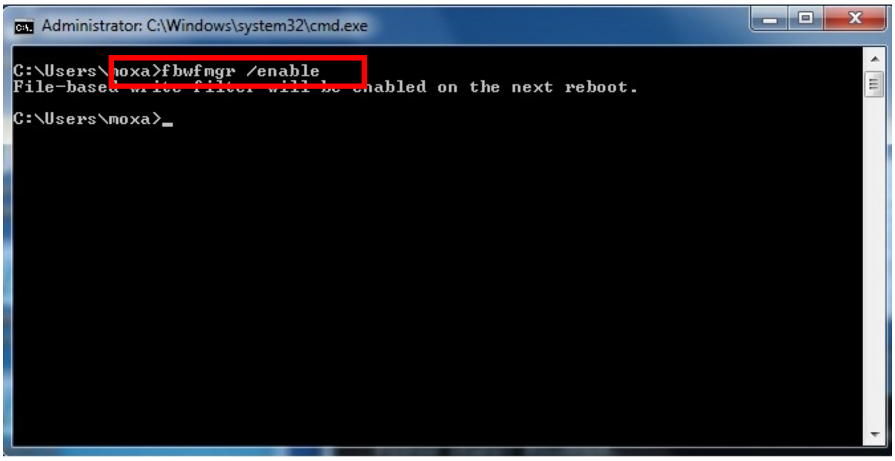
To enable file-based write filtering, do the following:

1. To check if FBWF is enabled or disabled, type `C:\...\>fbwfmgr /displayconfig`:



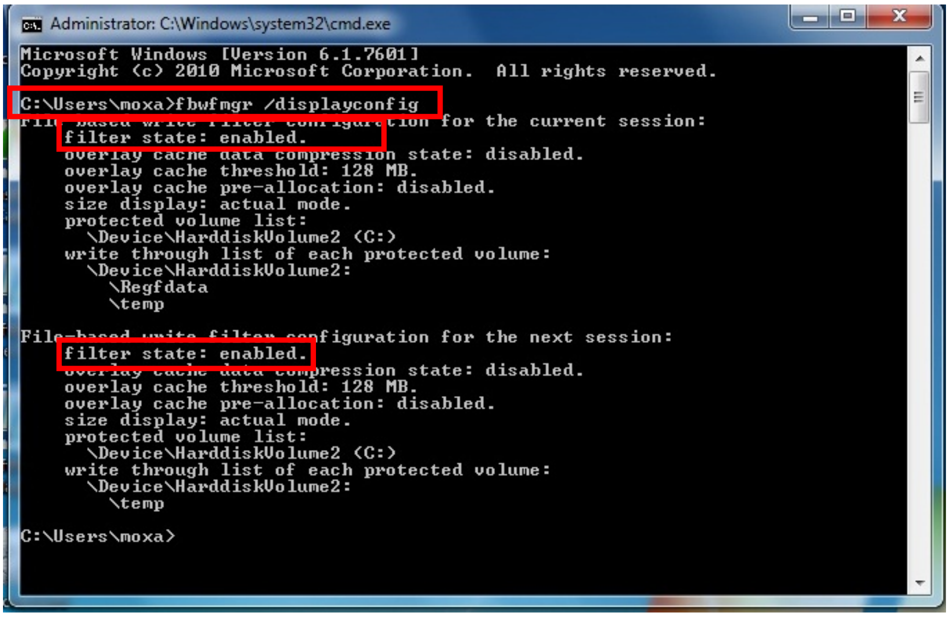
```
C:\Users\moxa>fbwfmgr /displayconfig
File-based write filter configuration for the current session:
    filter state: disabled.

File-based write filter configuration for the next session:
    filter state: disabled.

C:\Users\moxa>
```

2. To enable the FBWF, type `C:\...\>fbwfmgr /enable` and then reboot the system to take effect.



```
C:\Users\moxa>fbwfmgr /enable
File-based write filter will be enabled on the next reboot.

C:\Users\moxa>_
```

3. After the system has rebooted, type `C:\...\>fbwfmgr /displayconfig` again to check if the status has been changed to enabled and will start at boot-time.



```
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2010 Microsoft Corporation.  All rights reserved.

C:\Users\moxa>fbwfmgr /displayconfig
File-based write filter configuration for the current session:
    filter state: enabled.
    overlay cache data compression state: disabled.
    overlay cache threshold: 128 MB.
    overlay cache pre-allocation: disabled.
    size display: actual mode.
    protected volume list:
      \Device\HarddiskVolume2 (C:)
    write through list of each protected volume:
      \Device\HarddiskVolume2:
        \Regfdata
        \temp

File-based write filter configuration for the next session:
    filter state: enabled.
    overlay cache data compression state: disabled.
    overlay cache threshold: 128 MB.
    overlay cache pre-allocation: disabled.
    size display: actual mode.
    protected volume list:
      \Device\HarddiskVolume2 (C:)
    write through list of each protected volume:
      \Device\HarddiskVolume2:
        \temp

C:\Users\moxa>
```

To get more details about EWF configuration and usage, you may:

Go to Microsoft’s FBWF Installation and Configuration help pages.

Go to Microsoft’s FBWF overview on the official Microsoft EWF help pages.

Go to Microsoft’s detailed description of FBWF features on the EWF help pages.

Go to Microsoft’s detailed description of the FBWF API.

4

Installing Moxa Software

This chapter describes how to configure and install the bundled Moxa software that comes with the TC-6110. Moxa software allows users to build scripts and custom software to automatically or remotely control and monitor the TC-6100 for both process- and infrastructure-level needs.

The following topics are covered in this chapter:

mxhtsp: Hot Swapping for Hard Drives

Overview

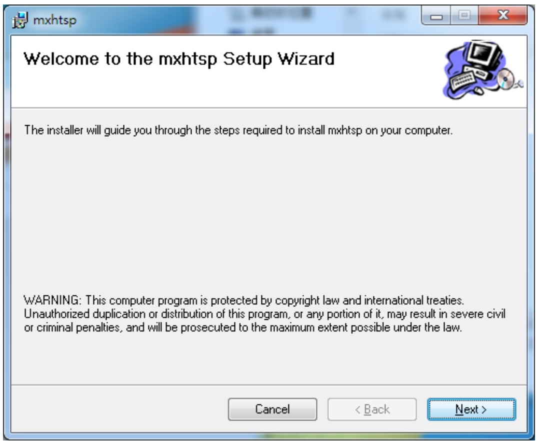
The TC-6110 comes with an eight gigabyte CompactFlash card specifically included as permanent storage space for the operating system and system software. The TC-6110 also comes with two removable modules that each support a single SATA 2.5 inch HDD/SSD interface; additionally, the TC-6110 comes with two empty modules for further memory drive expansion, if so desired. The **mxhtsp** software package makes these modules hot swappable, so they may be safely removed during computer operation without powering down. To enable the TC-6110's hot swap feature, users must install mxhtsp by following the instructions below.

Installing mxhtsp

Follow these steps to install **mxhtsp** and enable the TC-6110's hot swap capabilities.

1. Navigate to the Utility folder, located on the software DVD under `<software DVD>\utility\1.mxhtsp\`. Double click **`mxhtsp_setup.msi`**.

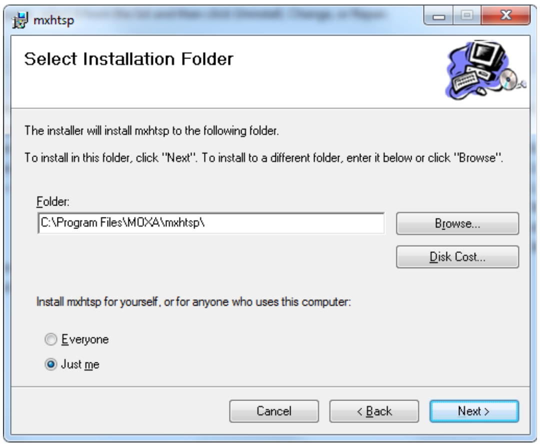
2. When the software setup wizard appears, click **Next** to continue. In the next dialog, click **Browse** to select the folder where you want to install the package, or simply click Next to continue if you want to use the default folder.



Welcome to the mxhtsp Setup Wizard

The installer will guide you through the steps required to install mxhtsp on your computer.

WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.



Select Installation Folder

The installer will install mxhtsp to the following folder.

To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".

Folder: C:\Program Files\MOXA\mxhtsp\

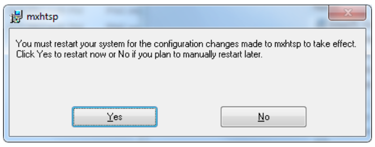
Install mxhtsp for yourself, or for anyone who uses this computer:

○ Everyone

● Just me

3. The wizard will tell you the installer is ready to install mxhstp. Click **Next** to continue, and after the installation has completed, click **Close** to exit the wizard and end the installation.

4. After the wizard closes a dialog will appear (seen at right) asking you if you want to restart the system. Click **Yes** to restart the computer and start the hot swap daemon, or click **No** if you prefer to continue installing other software before restarting.



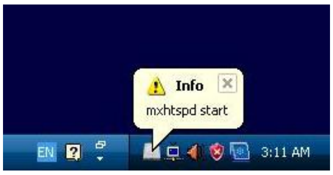
You must restart your system for the configuration changes made to mxhtsp to take effect. Click Yes to restart now or No if you plan to manually restart later.

Hot Swap Configuration and Usage

Once the system has re-initialized you may follow the directions below to configure hot swap for your needs.

Starting Hot Swap

When Moxa's hot swap daemon (mxhtspd) has automatically started at boot time users will be notified by a message delivered in the Windows system tray. Once **mxhtspd** is active, it will monitor the removable drives. Two features are provided by mxhtspd, described below.



Info

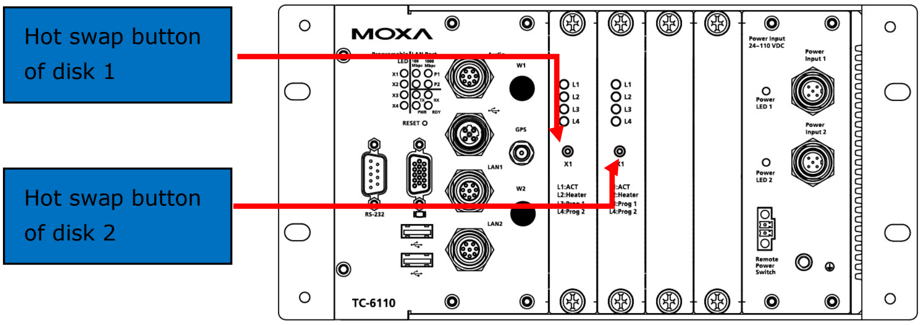
mxhtspd start

Unmounting and Removing the Storage Drives

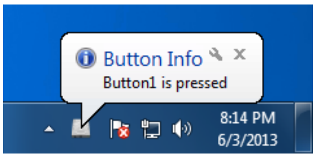
1. On the spine of each module there is an inset button labeled X1; this button may be custom-configured, but by default it signals the OS to un-mount the hard drive so that the module may be safely removed. Users should use a small screwdriver or other sharply tipped instrument to gently depress the X1 button.

WARNING

Do not remove the memory modules without first unmounting the memory drive. Removing the memory modules prematurely could permanently corrupt any or all stored data, and force a full reformatting of the memory drive. Follow the steps described here to ensure that your memory drive is removed safely and securely, without damaging your data.



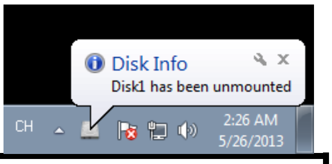
2. Once the system recognizes the button has been depressed, a notification box will appear in the Windows system tray (shown at right) informing the user that the button has been pressed.



Button Info

Button1 is pressed

3. Once the system has successfully un-mounted the hard drive, another notification window will appear (shown at right) in the Windows system tray, informing the user that the disk has been successfully unmounted. ***Only now is it safe to remove the memory drive module***.



Disk Info

Disk1 has been unmounted

WARNING

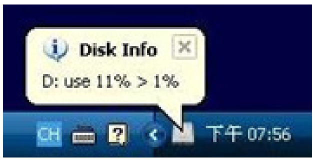
Do not remove memory drives until the system has posted notification that they drive has been successfully unmounted. Removing the drives without first ensuring they have been unmounted will result in corrupted data that may cause the loss of the entire drive.

Drive Usage Notifications

Administrators may set a notification to signal when a specified amount of memory space on a drive has been filled. For configuration procedures that describe how to set the drive usage notification, see the **Configuring Drive Settings Using mxhtspd: Hot Swap** section, just below. Once the memory drive has been filled to the level configured by the administrator, two notifications will appear.

1. On the spine of the module itself, the array of LEDs will uniformly blink three times in succession, and will continue to do so at approximately one minute intervals for as long as the drive continues to increase its data storage beyond the configured parameter.

2. On the user's desktop, a Disk Info notification will appear in the Windows system tray, telling you what percentage of the disk is currently used, and how much this is greater than the configured notification level. The notification will be in the format **`[total percentage of drive used] > [user-defined percentage of drive capacity]`**. The notification should be read as if it were saying **"Currently your total usage is** [total percentage of drive used]**; this has exceeded the**

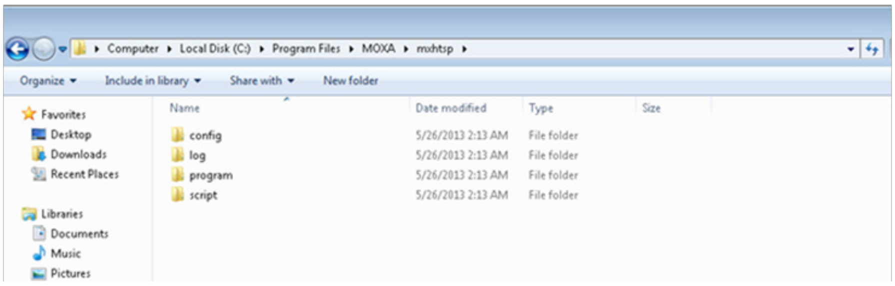


Disk Info

D: use 11% > 1%

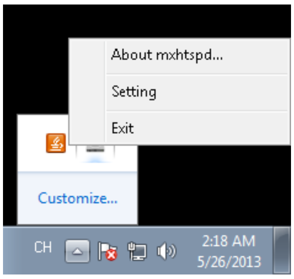
configured parameter of [user-defined percentage of drive capacity]**.”**

In addition to these two default responsibilities of the Moxa Hot Swap (mxhtspd) daemon, users may also execute their own actions by creating and storing scripts in the `C:\Program Files\MOXA\mxhtsp\script` folder, which is shown in the screenshot below.



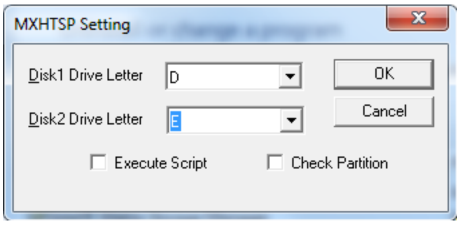
Name	Date modified	Type	Size
config	5/26/2013 2:13 AM	File folder	
log	5/26/2013 2:13 AM	File folder	
program	5/26/2013 2:13 AM	File folder	
script	5/26/2013 2:13 AM	File folder	

Configuring Hot Swap Settings



The default drive volumes monitored by `mxhtspd` are the D: and E: drive volumes. If the administrator would like to change these settings by adding or cancelling volumes, then this may be done by accessing the `mxhtspd` configuration menu from the hot swap icon located in the Windows system tray. .

1. To access the setup menu for the Moxa Hot Swap daemon, right-click on the `mxhtspd` icon located in the systray (Windows at the bottom right of the screen and then select Setting.



Disk1 Drive Letter: D

Disk2 Drive Letter: E

□ Execute Script □ Check Partition

When the **MXHTSP Settings** dialog appears, admins must select the drive letters under which the storage drives will be mounted. If the drives have been partitioned, select only the first available drive letter; selecting anything else will cause trouble when mounting the device. Windows will mount the drive volumes under the identifiers you assign here. Once assigned, these values will be associated with the device’s hardware address, so that if the modules are removed and then immediately replaced in a different order (i.e., drive 1 is placed in the Disk 2 slot, and drive 2 is placed in the Disk 1 slot) they will continue to be mounted under their original volume name (i.e., drive 1 will continue to be volume D:, even though it is now mounted in slot 2, and similarly Disk 2 will be mounted as volume E:, even though it is now in slot 1). If admins wish to change this behavior, they may also do by creating a new entry in the Windows registry. There are several online tutorials that explain how to do this.

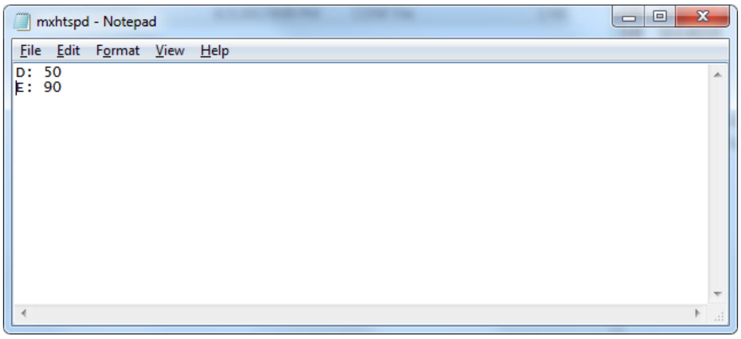
WARNING

If the storage drive is partitioned into multiple volumes, then when configuring `mxhtspd` you must specify only the first volume listed in the setting dialog. This volume will correspond to the drive’s first partition. **DO NOT** select any other partitions, otherwise the drive will not mount and unmount properly. Additionally, checking **Execute Script** and **Check Partition** will only affect the first partition and may not be used on the subsequent partition(s). ***For these reasons, Moxa recommends against partitioning the drives used in the TC-6110 SATA modules.***

WARNING

If you tick the **Check Partition** box in the hot swap **Settings** dialog you *must* configure a notification threshold for each partition in the `C:\Program Files\MOXA\mxhtsp\config` file (see below, pg. 4-4). If you do not, `mxhtspd` will fail to read the partition and throw an error by notifying the user that ***Disk X does not exist*** (with **X** representing the volume identifier that Windows is using to mount the drive).

2. Admins may configure `mxhtspd` to automatically check remaining drive capacity by ticking the **Check Partition** option. To set the threshold at which `mxhtspd` will notify the user about remaining drive capacity, the administrator will need to edit the mxhtsp configuration script (seen in the screenshot just below), located at `C:\Program Files\MOXA\mxhtsp\config`.

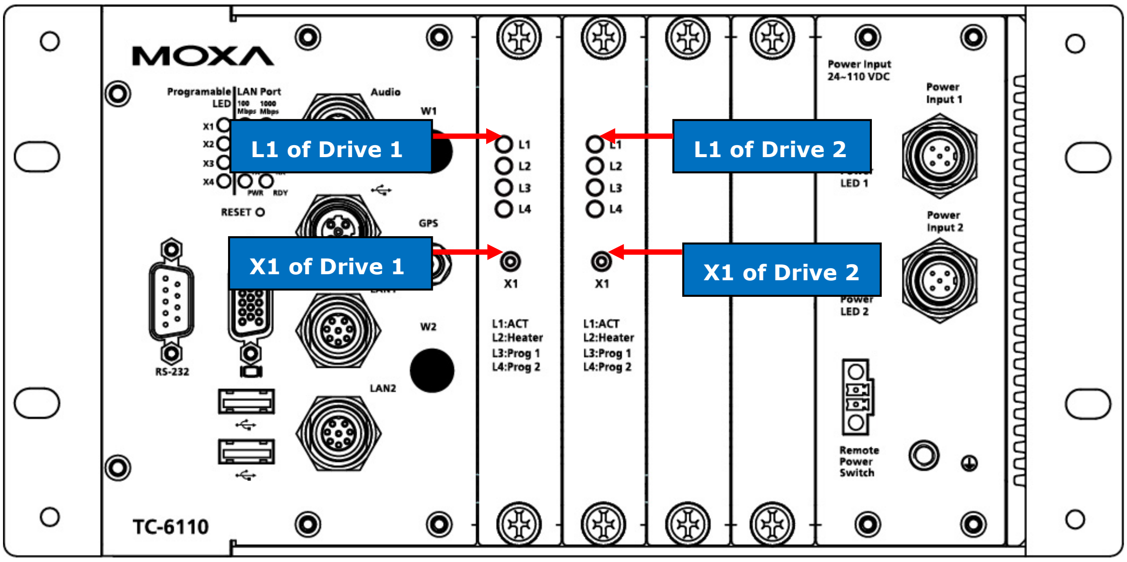


```
D: 50
E: 90
```

This is a very simple ascii configuration file; to set the target drive capacity, simply note the volume mount point and the percentage of drive capacity that must be filled for mxhtspd notifications to begin, with the two values separated by a colon. A screenshot of the configuration file is shown above. For example, if you wish to set the system to notify you when the D: drive is 50% full and the E: drive is 90% full, then you would enter `D: 50` on the first line, and `E: 90` on the second, as shown in the screenshot. When storage space on the drive has been filled beyond these thresholds, the **L1 LED** on the module spine (visible on the front face of the TC-6110) will blink repeatedly, and a notification will appear on the desktop, in the Windows 7 system tray.

WARNING

If you have ticked the **Check Partition** box in the hot swap **Settings** dialog (see above, pg. 4-3), you *must* configure a notification threshold for each partition in the `C:\Program Files\MOXA\mxhtsp\config` file. If you do not, `mxhtspd` will fail to read the partition and throw an error by notifying the user that the drive in question "does not exist."

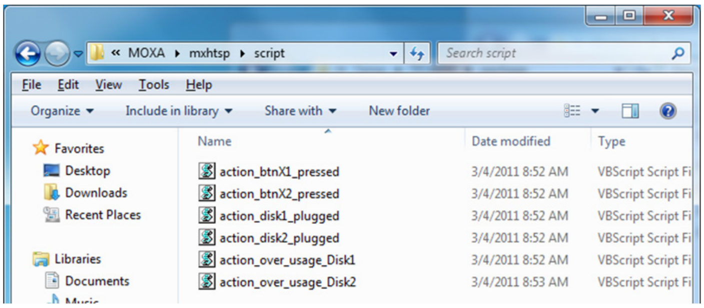


Moxa Hot Swap (mxhtsp) Scripts

There are three Visual Basic scripts provided for customizing the Moxa hot swap feature. The hot swap customization scripts are stored as files in the `C:\Program Files\MOXA\mxhtsp\config\script\` folder. Each file is associated with either module one (X1/disk1) or module two (X2/disk2). The three scripts are described below:

- **action_btnX*_press.vbs**: This script is executed whenever the X1 button (located on the spine of the SATA storage module) is depressed. The default action is to unmount the hard disk1.

- **action_disk*_plugged.vbs**: This script is executed whenever the SATA module is mounted by the TC-6110. The default action of this script is to flash LED 1 three times just after the drive has been successfully mounted.
- **action_over_usage_disk*.vbs**: This script is executed whenever the storage quota (as set in **mxhtspd.conf**; see above, **Configuring Hot Swap Settings**) for the drive in question is reached. The default action of this script is for LED 1 to flash 3 times, approximately once every minute.

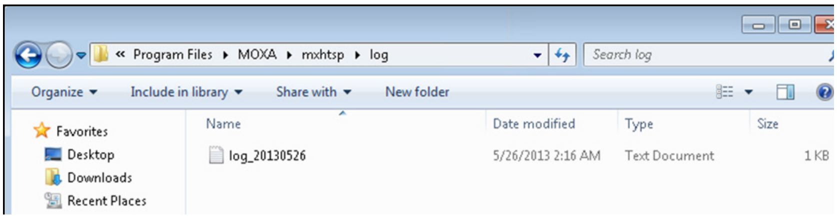


Name	Date modified	Type
action_btnX1_pressed	3/4/2011 8:52 AM	VBScript Script Fi
action_btnX2_pressed	3/4/2011 8:52 AM	VBScript Script Fi
action_disk1_plugged	3/4/2011 8:52 AM	VBScript Script Fi
action_disk2_plugged	3/4/2011 8:52 AM	VBScript Script Fi
action_over_usage_Disk1	3/4/2011 8:52 AM	VBScript Script Fi
action_over_usage_Disk2	3/4/2011 8:53 AM	VBScript Script Fi

All of these scripts are authored in Visual Basic and may be freely modified by the user. For instance, if a systems administrator wishes to modify how storage quota notifications are delivered, s/he may edit the **action_over_usage** script that corresponds to the appropriate drive.

Hot Swap (mxhtsp) Logs

Hot swap events and errors log files are found at `C:\Program Files\MOXA\mxhtsp\log`. Each log file is automatically updated every 24 hours at midnight, and tagged with the date it is created. Inside, file events are logged with the date and time the events occurred.


« Program Files ▸ MOXA ▸ mxhtsp ▸ log
Search log
Organize ▾ Include in library ▾ Share with ▾ New folder
Favorites
Desktop
Downloads
Recent Places

Name	Date modified	Type	Size
log_20130526	5/26/2013 2:16 AM	Text Document	1 KB

Moxa Predictive Maintenance Diagnostic Tools

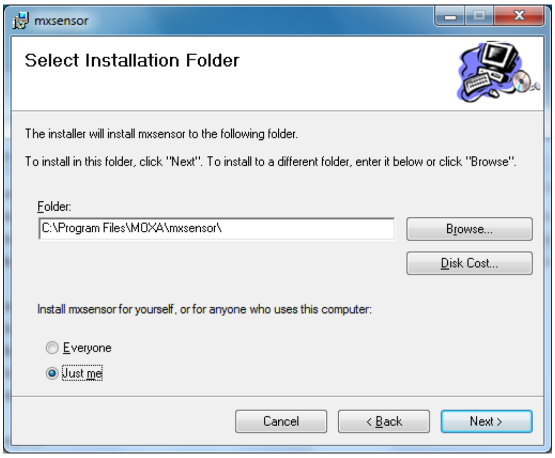
Overview

TC-6110 computers come with Moxa's predictive maintenance (PdM) diagnostic utilities software; this package includes two tools: the **G-sensor charting tool**, and the **hardware monitor interface**. The G-Sensor charting tool allows you to monitor and record the vibrations that the system experiences over time, allowing administrators to anticipate and take precautions against conditions that might damage the system (particularly hard disks). The hardware monitor interface allows administrators to view hardware information like CPU frequency, drive temperature, and many other system parameters.

Installing the PdM Diagnostics Package

Follow these steps to install the G-sensor (vibration) package.

1. Double click **mxsensor_setup.msi** in `<software DVD>\utility\2.mxsensor\Utility\`.
2. Click **Next** to continue.
3. Select the folder you want to install the package to, or simply click **Next** to continue if you want to use the default folder. When the next dialog appears, click **Next** to continue.


mxsensor

Select Installation Folder

The installer will install mxsensor to the following folder.

To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".

Folder: C:\Program Files\MOXA\mxsensor\

Install mxsensor for yourself, or for anyone who uses this computer:

○ Everyone

● Just me

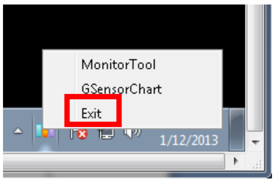
4. When the installation is finished, click **Close** to complete the installation. Please remember that the PdM diagnostics package will not be available until the computer is rebooted. You may restart the computer at this point, if you wish.

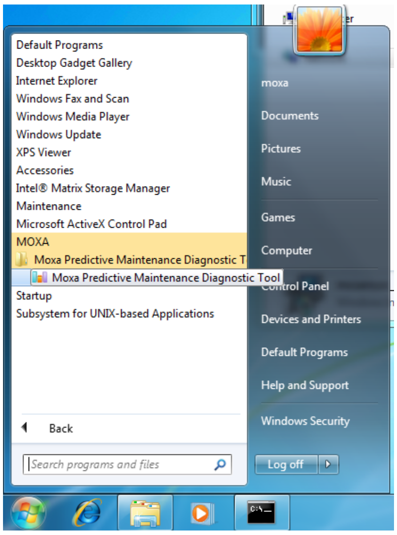
Configuring and Using the G-Sensor Tool

Launching the Charting Application

Follow these steps to launch and check the sensor tool.

1. To launch the G sensor charting utility, right-click on the tricolor icon in the system tray and select **GSensorChart** from the pop-up menu. Please note that if you select **Exit** you will shut down the Moxa PdM utilities package. If this happens and you want to re-launch the utility, navigate to the **Windows Start Menu** and select **Moxa Predictive Maintenance Diagnostic Tool** from the software listed there.

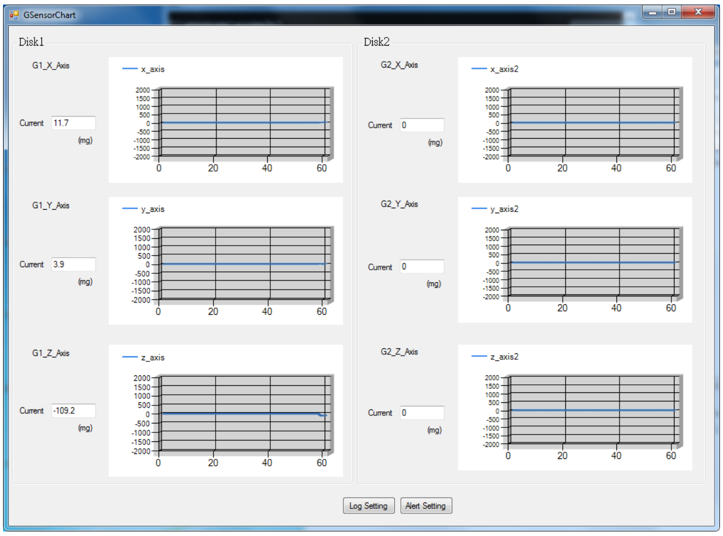




ATTENTION

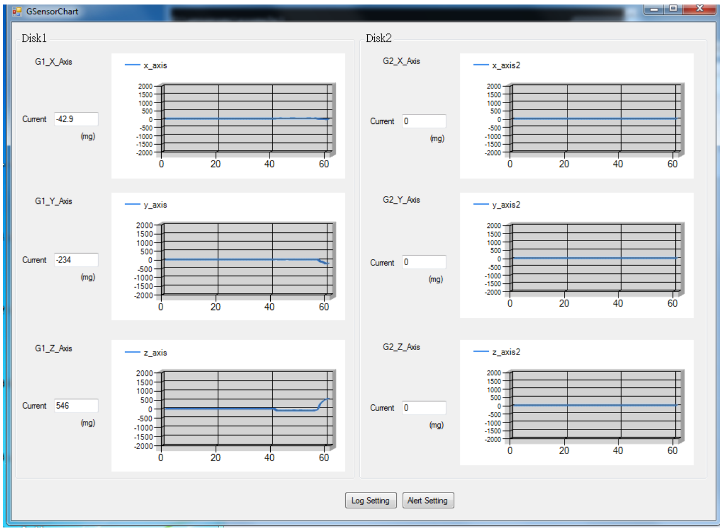
Users are advised that the accelerometer script returns vibration readings in milligravities (mG). The G-sensor’s raw values, however, are returned in an unconverted hexadecimal form. If you would like to directly access the G-sensor data in a human-readable form, then you should access G-sensor data from the GUI, using the log file.

2. Next, verify that each initial value (X-axis, Y-axis, Z-axis) is close to 0 (+-100). The X-axis represents front-to-back motion (relative t to the sensor), the Y-axis is left-to-right, and the Z-axis is up-and-down. A good target threshold to start off with is 1000 mG.



G1_X_Axis Current 11.7 (mg)
G1_Y_Axis Current 3.9 (mg)
G1_Z_Axis Current -109.2 (mg)
G2_X_Axis Current 0 (mg)
G2_Y_Axis Current 0 (mg)
G2_Z_Axis Current 0 (mg)

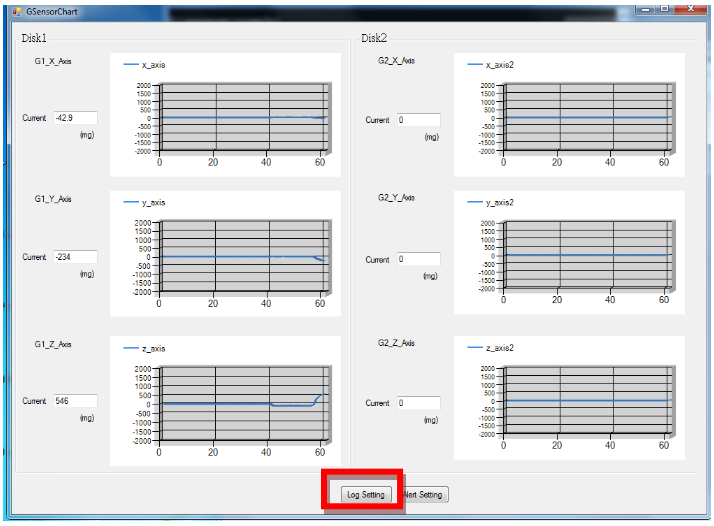
3. Finally, vigorously shake the computer and check if the vibration registers on the charts.



G1_X_Axis Current -42.9 (mg)
G1_Y_Axis Current -234 (mg)
G1_Z_Axis Current 546 (mg)
G2_X_Axis Current 0 (mg)
G2_Y_Axis Current 0 (mg)
G2_Z_Axis Current 0 (mg)

Configuring the Sensor Logs

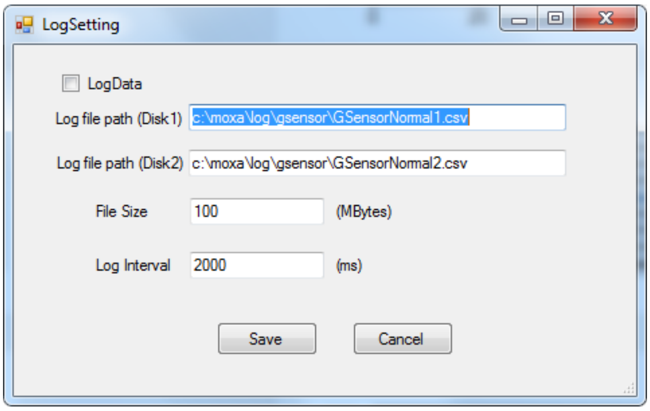
1. To configure log settings for the G-sensor, select **Log Setting** from the bottom of the G-sensor charting interface.



G1_X_Axis Current -42.9 (mg)
G1_Y_Axis Current -234 (mg)
G1_Z_Axis Current 546 (mg)
G2_X_Axis Current 0 (mg)
G2_Y_Axis Current 0 (mg)
G2_Z_Axis Current 0 (mg)

2. The **LogSetting** interface allows you to turn the G-sensor's data logger on and off. To turn on the G-sensor, enter the file path where you want the log saved, set the maximum file size (after which a new log file is

created), and set the sampling interval (how often the vibration data will be sampled and recorded). When finished, click **Save** to complete the setup. ***Note: Disk1 refers to slot 1, and Disk2 to slot 2***.



□ LogData

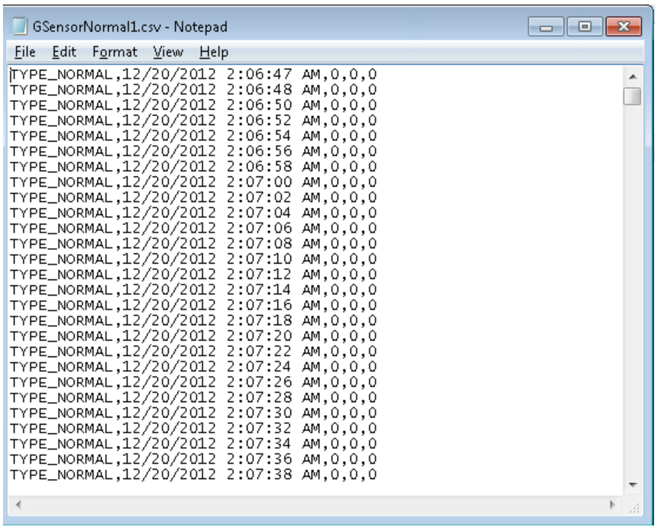
Log file path (Disk1) c:\moxa\log\gsensor\GSensorNormal1.csv

Log file path (Disk2) c:\moxa\log\gsensor\GSensorNormal2.csv

File Size 100 (MBytes)

Log Interval 2000 (ms)

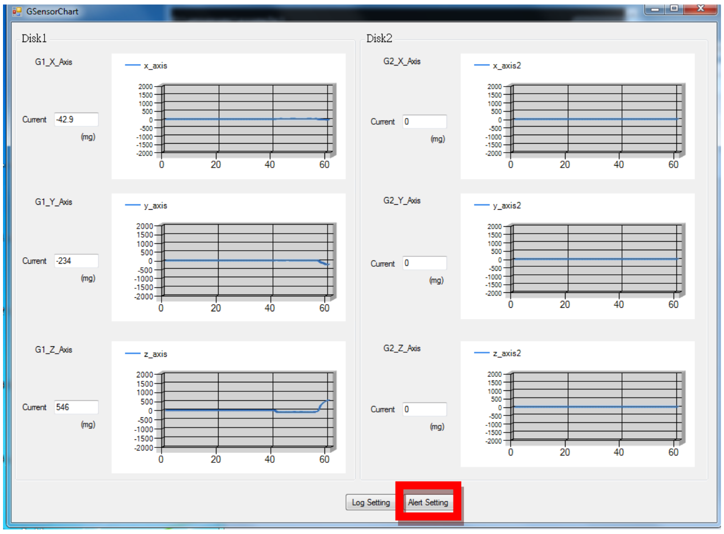
3. Wait for about 1 minute for the logger to start, and open the log in a simple ASCII editor (e.g.: Windows Notepad) to verify it is logging information to the indicated path.



```
TYPE_NORMAL,12/20/2012 2:06:47 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:06:48 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:06:50 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:06:52 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:06:54 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:06:56 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:06:58 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:00 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:02 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:04 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:06 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:08 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:10 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:12 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:14 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:16 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:18 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:20 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:22 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:24 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:26 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:28 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:30 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:32 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:34 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:36 AM,0,0,0
TYPE_NORMAL,12/20/2012 2:07:38 AM,0,0,0
```

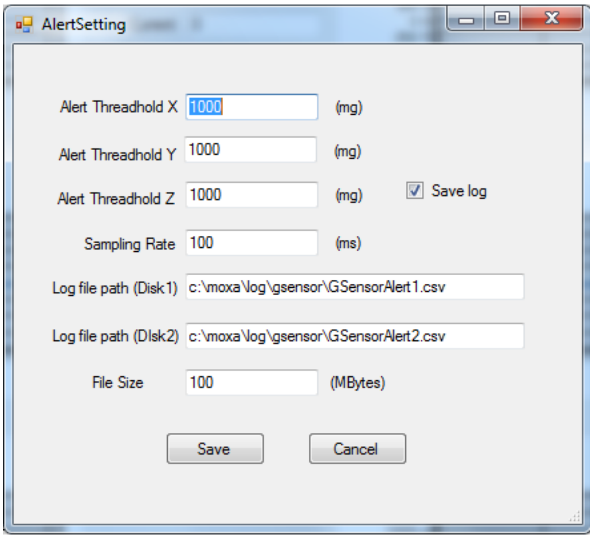
Configuring the G-Sensor to Signal an Alarm

1. To set an alert, select **Alert Setting** from the bottom of the G-sensor charting interface.



2. When the **AlertSetting** interface appears, it will look like the screenshot below. Generally, for industrial hard drives built with high tolerance for vibration and shock, a good point to begin with is 1000 mG (1 G)

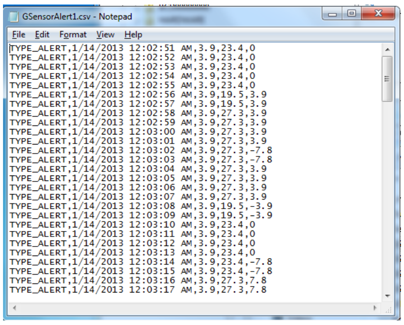
although many drives can go as high as 20,000 mG (20 G). A suitable sampling rate to start off with is 100 ms. To get the best performance, check the drive specifications provided by the manufacturer and then experiment to get the best results.


AlertSetting

Alert Threadhold X 1000 (mg)
Alert Threadhold Y 1000 (mg)
Alert Threadhold Z 1000 (mg) ☑ Save log
Sampling Rate 100 (ms)
Log file path (Disk1) c:\moxa\log\gsensor\GSensorAlert1.csv
Log file path (DIsk2) c:\moxa\log\gsensor\GSensorAlert2.csv
File Size 100 (MBytes)

3. Click **Save** to finish the setup. ***Note**: **Disk1 refers to slot 1, and Disk2 to slot 2***.

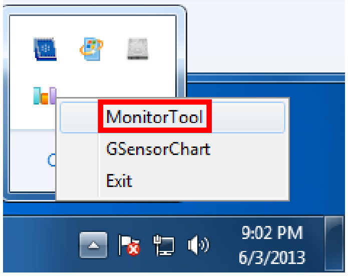
4. Wait for about 1 minute for the G-Sensor alert utility to restart, then shake the computer. Check the log in a simple ASCII editor (i.e.: Notepad) to verify it is logging stats to the indicated path. If no events are logged (or the file does not exist), then try adjusting the alert threshold to a smaller value (e.g.: 500) and do it again.



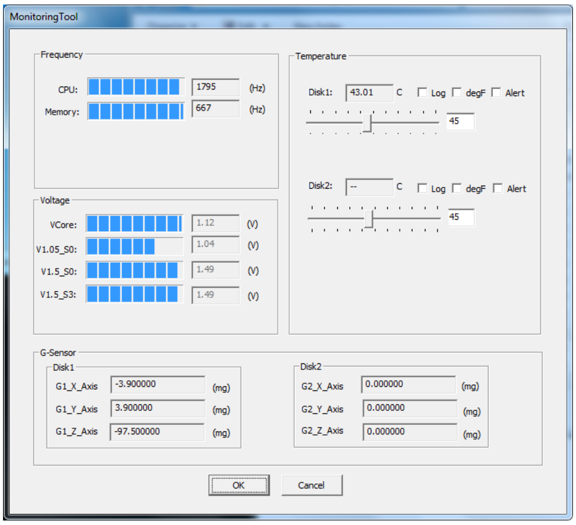
```
TYPE_ALERT,1/14/2013 12:02:51 AM,3.9,23.4,0
TYPE_ALERT,1/14/2013 12:02:52 AM,3.9,23.4,0
TYPE_ALERT,1/14/2013 12:02:53 AM,3.9,23.4,0
TYPE_ALERT,1/14/2013 12:02:54 AM,3.9,23.4,0
TYPE_ALERT,1/14/2013 12:02:55 AM,3.9,23.4,0
TYPE_ALERT,1/14/2013 12:02:56 AM,3.9,19.5,3.9
TYPE_ALERT,1/14/2013 12:02:57 AM,3.9,19.5,3.9
TYPE_ALERT,1/14/2013 12:02:58 AM,3.9,27.3,3.9
TYPE_ALERT,1/14/2013 12:02:59 AM,3.9,27.3,3.9
TYPE_ALERT,1/14/2013 12:03:00 AM,3.9,27.3,3.9
TYPE_ALERT,1/14/2013 12:03:01 AM,3.9,27.3,3.9
TYPE_ALERT,1/14/2013 12:03:02 AM,3.9,27.3,-7.8
TYPE_ALERT,1/14/2013 12:03:03 AM,3.9,27.3,-7.8
TYPE_ALERT,1/14/2013 12:03:04 AM,3.9,27.3,3.9
TYPE_ALERT,1/14/2013 12:03:05 AM,3.9,27.3,3.9
TYPE_ALERT,1/14/2013 12:03:06 AM,3.9,27.3,3.9
TYPE_ALERT,1/14/2013 12:03:07 AM,3.9,27.3,3.9
TYPE_ALERT,1/14/2013 12:03:08 AM,3.9,19.5,-3.9
TYPE_ALERT,1/14/2013 12:03:09 AM,3.9,19.5,-3.9
TYPE_ALERT,1/14/2013 12:03:10 AM,3.9,23.4,0
TYPE_ALERT,1/14/2013 12:03:11 AM,3.9,23.4,0
TYPE_ALERT,1/14/2013 12:03:12 AM,3.9,23.4,0
TYPE_ALERT,1/14/2013 12:03:13 AM,3.9,23.4,0
TYPE_ALERT,1/14/2013 12:03:14 AM,3.9,23.4,-7.8
TYPE_ALERT,1/14/2013 12:03:15 AM,3.9,23.4,-7.8
TYPE_ALERT,1/14/2013 12:03:16 AM,3.9,27.3,7.8
TYPE_ALERT,1/14/2013 12:03:17 AM,3.9,27.3,7.8
```

Configuring and Using the Temperature Sensor

1. To launch the temperature monitor, right-click on the tricolor icon in the system tray and select the Monitor Tool from the pop-up menu. This will open the monitoring utility user interface, as shown at right.
   Please note that if you select Exit you will shut down the entire Moxa PdM utilities package. If this happens and you want to re-launch the utility software, navigate to the Windows Start Menu and select Moxa Predictive Maintenance Diagnostic Tool from the software listed there.



2. The monitoring utility interface will appear as the screenshot below.


MonitoringTool

Frequency
CPU: 1795 (Hz)
Memory: 667 (Hz)

Voltage
VCore: 1.12 (V)
V1.05_S0: 1.04 (V)
V1.5_S0: 1.49 (V)
V1.5_S3: 1.49 (V)

Temperature
Disk1: 43.01 C □ Log □ degF □ Alert 45
Disk2: -- C □ Log □ degF □ Alert 45

G-Sensor
Disk1
G1_X_Axis -3.900000 (mg)
G1_Y_Axis 3.900000 (mg)
G1_Z_Axis -97.500000 (mg)

Disk2
G2_X_Axis 0.000000 (mg)
G2_Y_Axis 0.000000 (mg)
G2_Z_Axis 0.000000 (mg)

The Synmap™ Virtualization Layer: Full Interoperability with Any Moxa Device

Overview

Synmap™ is Moxa's revolutionary software virtualization, an evolutionary advance in network device control that adapts solid, reliable SNMP into a fully portable remote procedure interface. Synmap allows engineers to automate remote processes using SNMP object identifiers (OIDs) rather than device- or OS-specific API addressing, making a scripted Synmap procedure fully interoperable with any other Synmap device. This means that a script created for one Synmap device may be directly copied to another, immediately conferring the same functionality. This eliminates the need for rewriting and compiling code for newly configured devices, significantly reducing maintenance and deployment times.

SNMP is lightweight and easy-to-configure, and is already long-popular with IT professionals; it also enjoys comprehensive native support in high-level languages like .NET, Java, Python, or Ruby. For these reasons, the Synmap framework has re-imagined SNMP as a universal configuration and control interface for remote procedures, adapting it to not only monitor and control device internals like temperature, BIOS parameters, and local interfaces, but also to report on and automate tasks at the process layer, as well. Easily integrated into any existing Network Management System (NMS), Synmap devices are a flexible and cost-effective upgrade that returns obvious benefits to any IA network.

Synmap currently allows you to use SNMP for remote monitoring and control of a select set of computer processes, but its list of features is rapidly growing. Using Synmap's fully portable scripts, engineers will soon be able to:

- Access, monitor, control, and report on digital I/O at both the process and hardware layers
- Use OIDs to monitor, configure, and give process control over serial ports and other interfaces
- Monitor and control system attributes and process events via any NMS
- Build automated remote procedures using Synmap OIDs called by simple shell scripts, or a preferred high-level language like Python, Perl, or VBScript—all without any need for low-level APIs, or platform-specific libraries
- Significantly simplify and reduce development times for custom utilities and automated executables
- Gain scripting and automation independence from OS-dependent libraries

All of this may be achieved using simple, reliable, and familiar SNMP, the easily accessible standard that IT engineers are already familiar with.

The Synmap Design Concept

Synmap is a software design concept that offers programmers a wholly unique and superior conception of infrastructure development for IA control. Instead of using low level APIs, Synmap adapts the higher level SNMP protocol to serve as a universal API across all machines. With Synmap, application developers gain several benefits, the two biggest being a significantly reduced learning curve for control APIs and remarkable code portability. For example, if a user wants to control GPIO in a Linux environment, an application developer needs to generate code that follows the pseudo code shown below:

1. Open() the device node
2. Read() the file descriptor
3. Read() the return value, and make a logical decision
4. Perform an ioctl function on the file descriptor
5. Close() the file descriptor

The above example shows how this is done in a *NIX environment. In a Windows environment, it looks a little different, but the process is essentially the same, and of equal complexity:

1. Open a required file handle using **`mxgpio_open`**
2. Get data using the file handle, an assigned port, and **`mxgpio_get_data`**
3. Evaluate the returned data, and make a logical/control decision
4. Use **`mxgpio_set_data`** with the file handle to set a value
5. Use **`mxgpio_close`** to close the file handle

These examples show, in concise form, the difficulties application developers face when dealing with low level APIs. Developers must understand each system's API and track down various device node IDs from within the user manual, the sample code, or the general system. Synmap significantly simplifies this situation. In comparison to the example just shown, the pseudo code that replaces it will look something like this:

- GET an OID using SNMP and the localhost connection (127.0.0.1)
- Evaluate the returned data, make a logical decision
- SET an OID using SNMP and the localhost connection (127.0.0.1)

The benefits of using SNMP in this way should be clear.

- First, the code is easily migrated across different computers and even different operating systems, because Moxa's SNMP libraries are supported on both Windows XPE and Linux, as well as a host of other platforms.
- Second, the program can just as easily be ported to the network for remote operations simply by changing the localhost connection (127.0.0.1) to the target IP address and hostname.
- Third, the time needed to learn how to control a peripheral is drastically cut; all one needs to do is understand how to use an SNMP OID, and start scripting.
- Fourth, Developers are free to choose any kind of programming languages or utilities with which they might be familiar, so long as they are apropos to the platform(s) on which they will be used. For example, in place of the C API, Microsoft developers might want to use the SNMP libraries in .NET or Java to control remote Linux devices, or it can be flipped around so that Linux developers use Net-SNMP libraries to control remote Windows XPE machines.

All of these things mean that the Synmap virtualization makes the work of programming custom applications much faster and simpler, and dramatically increases code interoperability. Complex controls such as USB notify, mounting information, and BIOS settings have been integrated into the Synmap engine, so that creating a customized monitoring or control application now only requires the coordination of a few SNMP SET/GET calls, potentially allowing developers to save on hundreds of lines of code when authoring new applications.

Moxa Synmap OIDs List

The following table shows the OIDs currently supported on the TC-6110. For a full review of all Moxa Synmap OIDs, check the Appendix section.

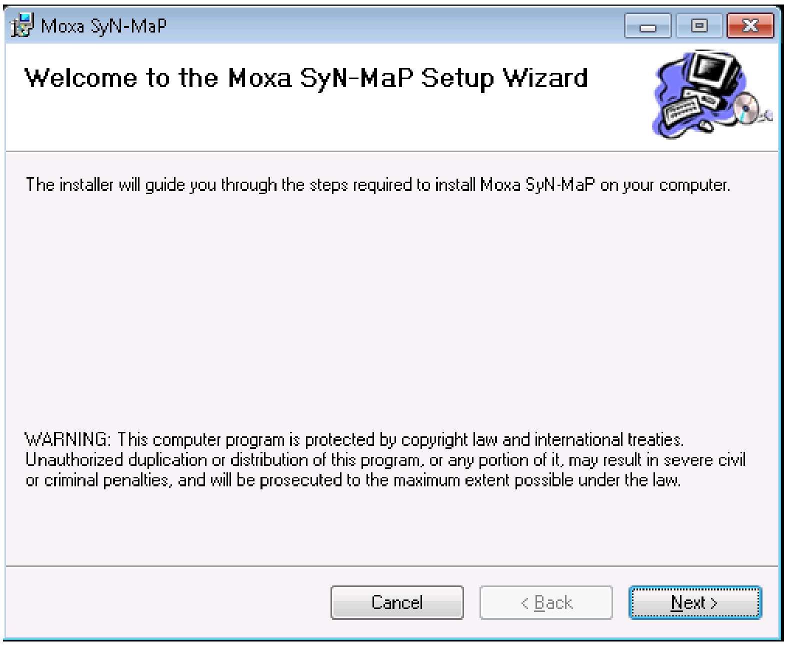
Item Name	OID	Access	Description
productName	1.3.6.1.4.1.8691.17.1.1.1	read-only	Returns the product name
productDesc	1.3.6.1.4.1.8691.17.1.1.2	read-only	Returns a short device description
productVersion	1.3.6.1.4.1.8691.17.1.1.3	read-only	Returns product version
productBuildDate	1.3.6.1.4.1.8691.17.1.1.4	read-only	Returns the last software build date, YYMMDDHH format
tempSensorsIndex	1.3.6.1.4.1.8691.17.1.5.1.1.1.1	read-only	Reference index showing all available temperature sensors; starts from 1
tempSensorsDevice	1.3.6.1.4.1.8691.17.1.5.1.1.1.2	read-only	Returns a list of the unique string values that the database associates with a temperature sensor index value. May be used with

			tempSensorIndex to identify temperature sensors by name/position, and to subsequently call them in scripts
tempSensorsValue	1.3.6.1.4.1.8691.17.1.5.1.1.1.3	read-only	The reading returned by the thermometer, in degrees Celsius Note: On the TC-6110, temp. is currently represented as the current reading truncated to its base integer, without rounding
accelerometerIndex	1.3.6.1.4.1.8691.17.1.5.1.3.1.1	read-only	Reference index showing all available accelerometers; starts from 1
accelerometerAxis	1.3.6.1.4.1.8691.17.1.5.1.3.1.2	read-only	Shows the format in which accelerometer's axial values will be returned. This will always be in X_n Y_n Z_n form, with *n* the index number of the accelerometer with which the axis is associated
accelerometerValue	1.3.6.1.4.1.8691.17.1.5.1.3.1.3	read-only	Returns a block of the last hundred recorded values for all three axes of a particular accelerometer, taken from the log file; this will be g-force in micro gravities (μG). Note: this OID requires the accelerometer's log file to be activated and up-to-date. If the log file is unreadable for any reason, this OID will not return data.
accelerometerTimestamp	1.3.6.1.4.1.8691.17.1.5.1.3.1.4	read-only	Returns the accelerometer timestamp
usbDeviceProductID	1.3.6.1.4.1.8691.17.1.6.4.1.3.1.3	read-only	Returns the USB's hexadecimal product ID
usbDeviceActiveClass	1.3.6.1.4.1.8691.17.1.6.4.1.3.1.4	read-only	Returns the USB device class for any connected device
watchdogPeriod	1.3.6.1.4.1.8691.17.1.6.6.2.1	read-write	Sets the watchdog's timeout interval, in seconds: • Entering 0 disables the watchdog • Entering an integer from 1 to 255 configures the timeout interval to that number of seconds
watchdogStatus	1.3.6.1.4.1.8691.17.1.6.6.2.2	read-write	Returns the watchdog's current status and timeout interval
powerPolicy	1.3.6.1.4.1.8691.17.1.7.2	read-write	Returns the system's current power policy, as configured by the Windows 7 Embedded OS

Installing the Synmap Virtualization Layer

The following steps will install Synmap.

1. Double click `mxSynmap_setup.msi`, found in the **Utility** folder located on the software DVD under `\utility\3.mxSynmap\`. Then click **Next** to start the Synmap setup wizard.



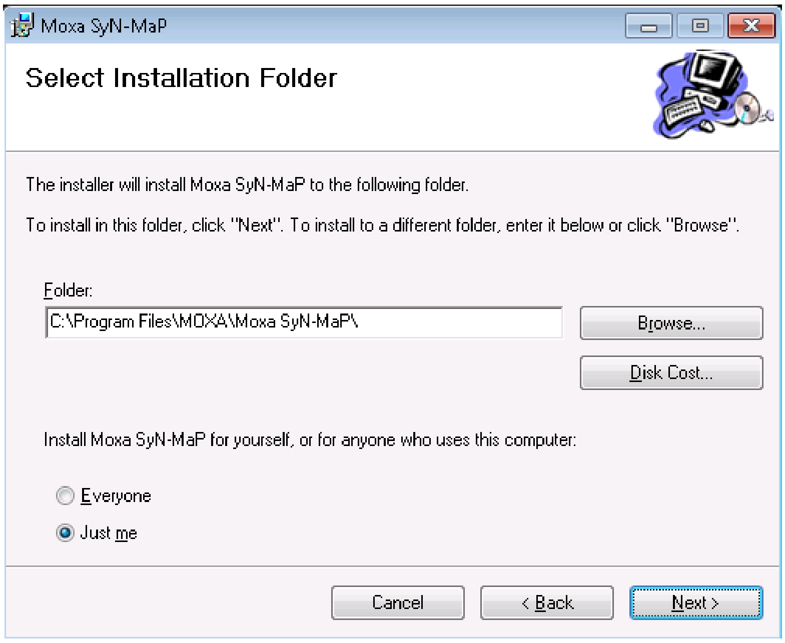
Moxa SyN-MaP

Welcome to the Moxa SyN-MaP Setup Wizard

The installer will guide you through the steps required to install Moxa SyN-MaP on your computer.

WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.

2. In the middle of the dialog, the button **Disk Cost** will display how much space the Synmap software package will occupy on your storage drive, as well as the remaining storage space on the drive where the system is stored.
   At the bottom of the dialog, select whether Synmap will be installed for every user across the entire system, or just for the current user account. Above that (in the text dialog), you may click the **Browse** button to browse the file tree and select the folder where you want to install the package, or simply click **Next** to install Synmap to the default folder.



Moxa SyN-MaP

Select Installation Folder

The installer will install Moxa SyN-MaP to the following folder.

To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".

Folder: C:\Program Files\MOXA\Moxa SyN-MaP\

Install Moxa SyN-MaP for yourself, or for anyone who uses this computer:

○ Everyone

● Just me

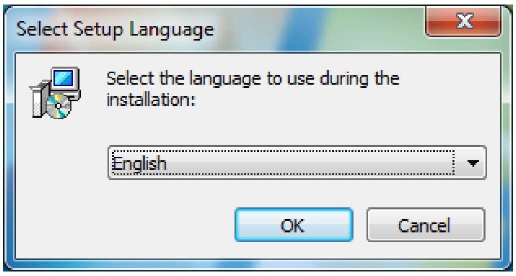
3. Click through the next few dialogs to complete the installation of the Net-SNMP agent. The SNMP agent will not begin working until you reboot the TC-6110 computer.

Installing and Using an NMS

For full implementation, Synmap requires (like any SNMP-based system) an NMS to become fully functional; an NMS with an MIB browser also makes using SNMP a far simpler task. If you already have your own MIB browser, you can skip this section. However, if your network is lacking an NMS then you may install a free version of Moxa's **MXview** to get Synmap up and running. MXview provides an MIB browser and an interface that will allow you to monitor and control any Synmap enabled device. This section will walk you through a basic MXview installation, and show you how to use the MXview MIB browser to start working with the TC-6110's MIB.

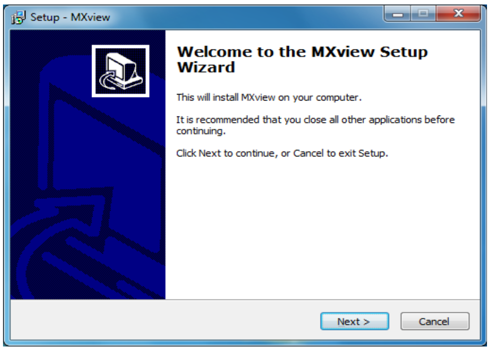
Installing Moxa MxView

1. MXview is included on your TC-6110 software DVD. Double click **`mxView_Trial_V2.3.msi`** in the Utility folder, which you can find on the software DVD in **`\utility\4.mxViewTrial`**. Select **OK** to choose the language, and when the next dialog appears click **Next** to continue.


Select Setup Language

Select the language to use during the installation:

English



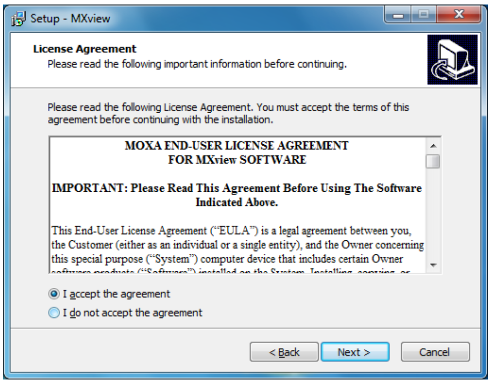
Welcome to the MXview Setup Wizard

This will install MXview on your computer.

It is recommended that you close all other applications before continuing.

Click Next to continue, or Cancel to exit Setup.

2. Accept the licensing agreement and click **Next** to move to the licensing dialog.



License Agreement

Please read the following important information before continuing.

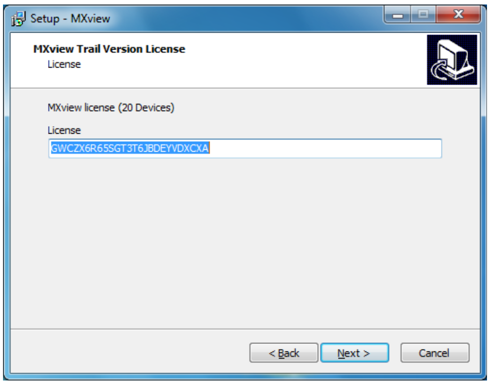
Please read the following License Agreement. You must accept the terms of this agreement before continuing with the installation.

MOXA END-USER LICENSE AGREEMENT
FOR MXview SOFTWARE

IMPORTANT: Please Read This Agreement Before Using The Software Indicated Above.

This End-User License Agreement ("EULA") is a legal agreement between you, the Customer (either as an individual or a single entity), and the Owner concerning this special purpose ("System") computer device that includes certain Owner

● I accept the agreement
○ I do not accept the agreement



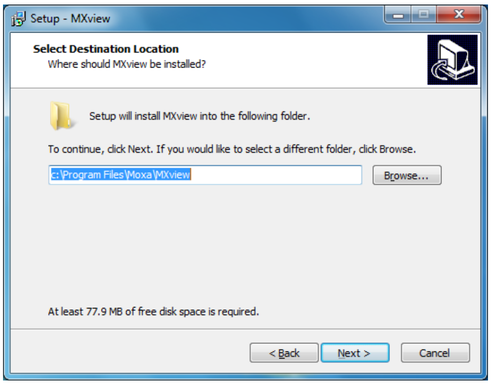
MXview Trail Version License

License

MXview license (20 Devices)

License: GWCZX6R65SGT3T6JBDEYVDXCXA

3. On the next dialog you may change the folder and path where MXview will be installed. On the next, you may select where MXView shortcuts will be stored in the Windows Start Menu.



Select Destination Location

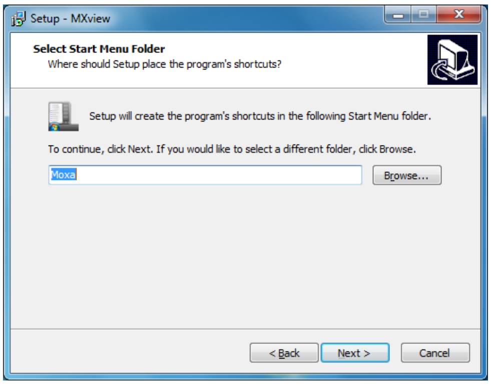
Where should MXview be installed?

Setup will install MXview into the following folder.

To continue, click Next. If you would like to select a different folder, click Browse.

c:\Program Files\Moxa\MXview

At least 77.9 MB of free disk space is required.



Select Start Menu Folder

Where should Setup place the program's shortcuts?

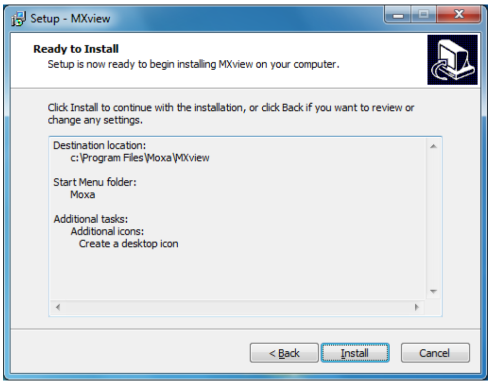
Setup will create the program's shortcuts in the following Start Menu folder.

To continue, click Next. If you would like to select a different folder, click Browse.

Moxa

4. Next, you may register MXview as a Windows service and create a **desktop shortcut**.

5. After you have completed the pre-install configuration, click **Install** to transfer MXview to disk and wind up the installation.



Setup - MXview

Ready to Install

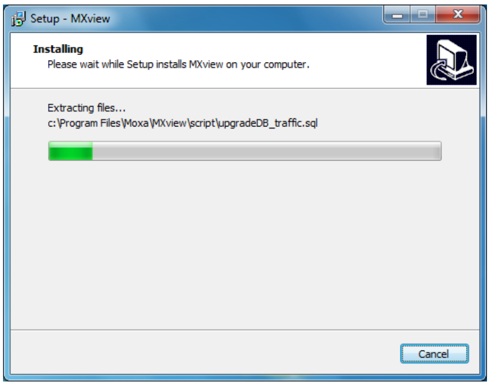
Setup is now ready to begin installing MXview on your computer.

Click Install to continue with the installation, or click Back if you want to review or change any settings.

Destination location:
c:\Program Files\Moxa\MXview

Start Menu folder:
Moxa

Additional tasks:
Additional icons:
Create a desktop icon



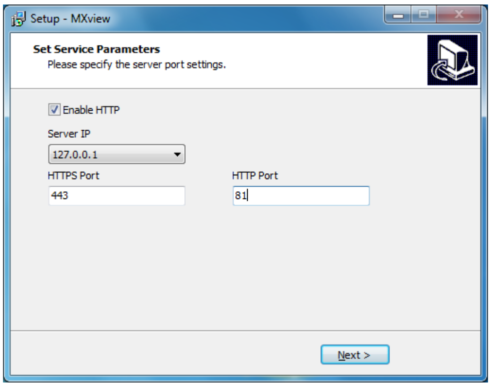
Setup - MXview

Installing

Please wait while Setup installs MXview on your computer.

Extracting files...
c:\Program Files\Moxa\MXview\script\upgradeDB_traffic.sql

6. After MXview has installed, you must enter the IP address of the machine on which it is located. This may be the **localhost** address, **127.0.0.1**, or if you are connecting to MXview over a LAN it will be a remote IP address. Additionally, you must configure the ports which MXview will use for HTTP and HTTPS communications. Once the installation is complete, you may choose to restart the computer to get MXview up and running



Setup - MXview

Set Service Parameters

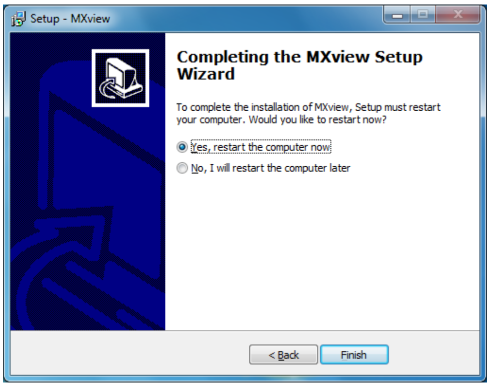
Please specify the server port settings.

☑ Enable HTTP

Server IP: 127.0.0.1

HTTPS Port: 443

HTTP Port: 81



Setup - MXview

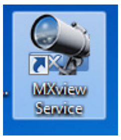
Completing the MXview Setup Wizard

To complete the installation of MXview, Setup must restart your computer. Would you like to restart now?

● Yes, restart the computer now

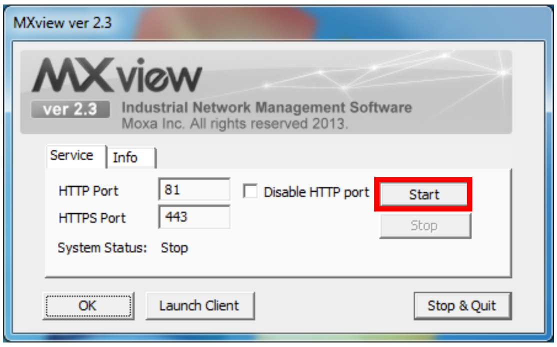
○ No, I will restart the computer later

7. After rebooting, the MXview shortcut will appear on your desktop (shown at right). Click on the shortcut to continue on to the next section and begin the MxView setup.



Basic Configuration of MxView

1. Open MXview (see step 7 of the last section, immediately above) and select **Start** to initialize the MXview NMS; wait for the **System Status** notification to change to **Running**, then click **Launch Client**.



MXview ver 2.3

MXview
ver 2.3
Industrial Network Management Software
Moxa Inc. All rights reserved 2013.
Service
Info

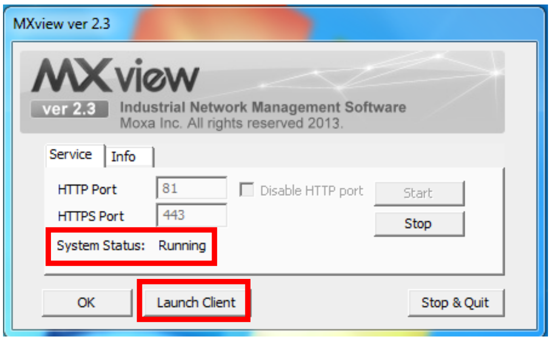
HTTP Port: 81

HTTPS Port: 443

☐ Disable HTTP port

System Status: Stop

Start
Stop
OK
Launch Client
Stop & Quit



MXview ver 2.3

MXview
ver 2.3
Industrial Network Management Software
Moxa Inc. All rights reserved 2013.
Service
Info

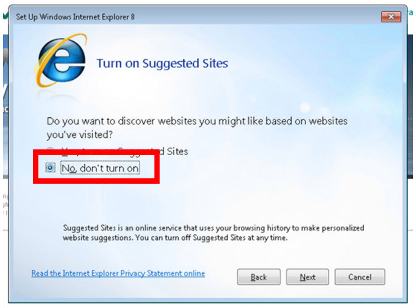
HTTP Port: 81

HTTPS Port: 443

☐ Disable HTTP port

System Status: Running

Start
Stop
OK
Launch Client
Stop & Quit



Set Up Windows Internet Explorer 8

Turn on Suggested Sites

Do you want to discover websites you might like based on websites you've visited?

○ Yes, turn on Suggested Sites
● No, don't turn on

Suggested Sites is an online service that uses your browsing history to make personalized website suggestions. You can turn off Suggested Sites at any time.

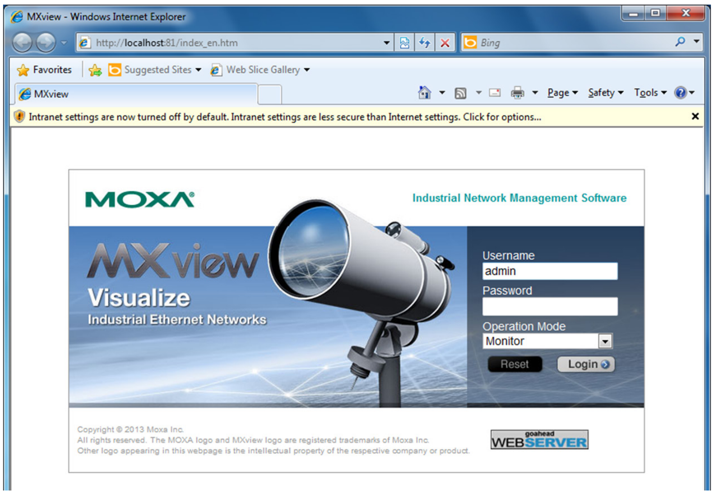
2. If opening Microsoft Internet Explorer for the first time, make sure to turn off the **suggested sites** feature (shown at right). If you wish to use another browser you may, and IE's other settings may be configured to your own preferences.

3. The IP address for MXview will be 127.0.0.1 followed by a colon and the HTTP port you configured MXview to communicate over (in **step 6 of MXview**). If you have used the suggested settings above, then to login using HTTP would be 127.0.0.1:81, and using HTTPS you would use 127.0.0.1:443.

   For the login, the default username is **admin**, with a blank password.

WARNING

For security's sake, Moxa strongly recommends resetting the password to a strongly secure password of at least 8 characters, mixing numbers and symbols in a non-word series.



MXview - Windows Internet Explorer

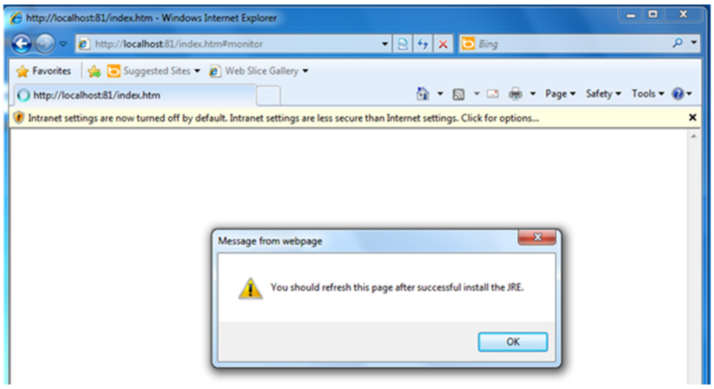
http://localhost:81/index_en.htm

Intranet settings are now turned off by default. Intranet settings are less secure than Internet settings. Click for options...

Username: admin
Password:
Operation Mode: Monitor

Copyright © 2013 Moxa Inc.
All rights reserved. The MOXA logo and MXview logo are registered trademarks of Moxa Inc.
Other logo appearing in this webpage is the intellectual property of the respective company or product.

4. When opening your browser for the first time, a warning message will pop up telling you to install the Java runtime environment. Click **OK** to continue.



http://localhost:81/index.htm - Windows Internet Explorer

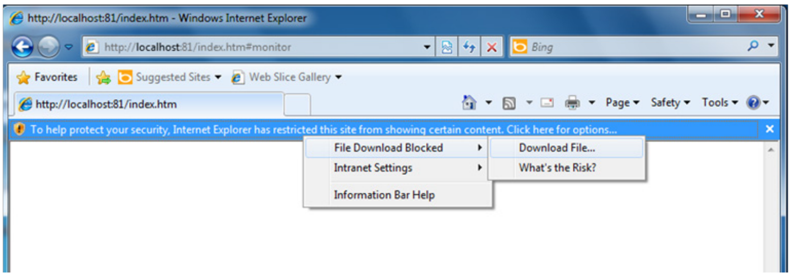
http://localhost:81/index.htm#monitor

Intranet settings are now turned off by default. Intranet settings are less secure than Internet settings. Click for options...

Message from webpage

You should refresh this page after successful install the JRE.

5. Click the title bar, and select **File Download Blocked-->Download File** to continue.

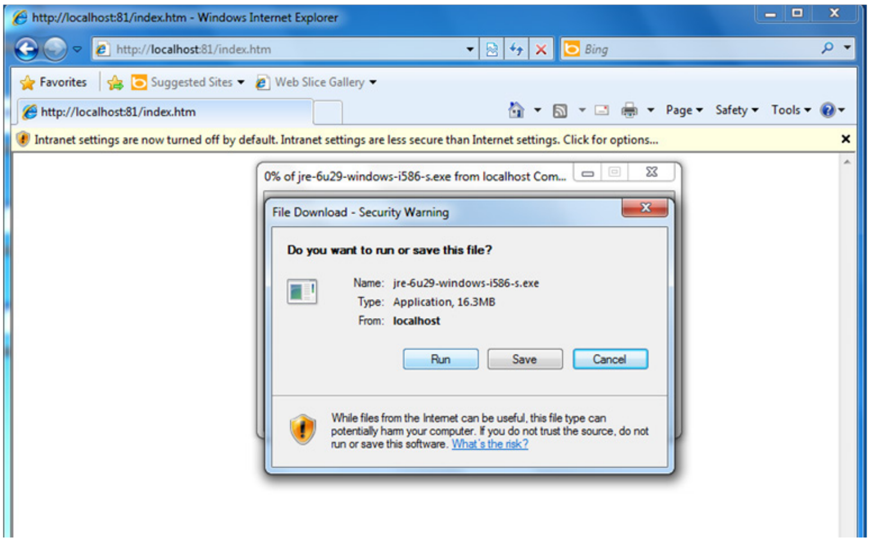


http://localhost:81/index.htm - Windows Internet Explorer

http://localhost:81/index.htm#monitor

To help protect your security, Internet Explorer has restricted this site from showing certain content. Click here for options...

6. Select **Run** to download and install the Java Runtime Environment (JRE), and when Windows posts a security warning asking if you wish to run the installer, click **Run** again.


http://localhost:81/index.htm - Windows Internet Explorer
http://localhost:81/index.htm
Bing
Favorites
Suggested Sites
Web Slice Gallery
Page
Safety
Tools
0% of jre-6u29-windows-i586-s.exe from localhost Com...
File Download - Security Warning
Run
Save
Cancel

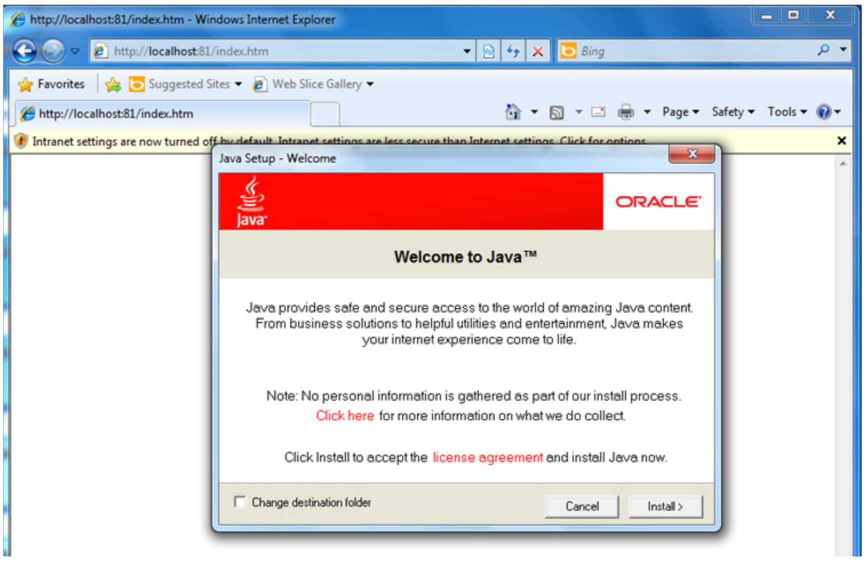
Intranet settings are now turned off by default. Intranet settings are less secure than Internet settings. Click for options...

Do you want to run or save this file?

Name: jre-6u29-windows-i586-s.exe
Type: Application, 16.3MB
From: localhost

While files from the Internet can be useful, this file type can potentially harm your computer. If you do not trust the source, do not run or save this software. What's the risk?

7. Click **Install** to continue.



Welcome to Java™

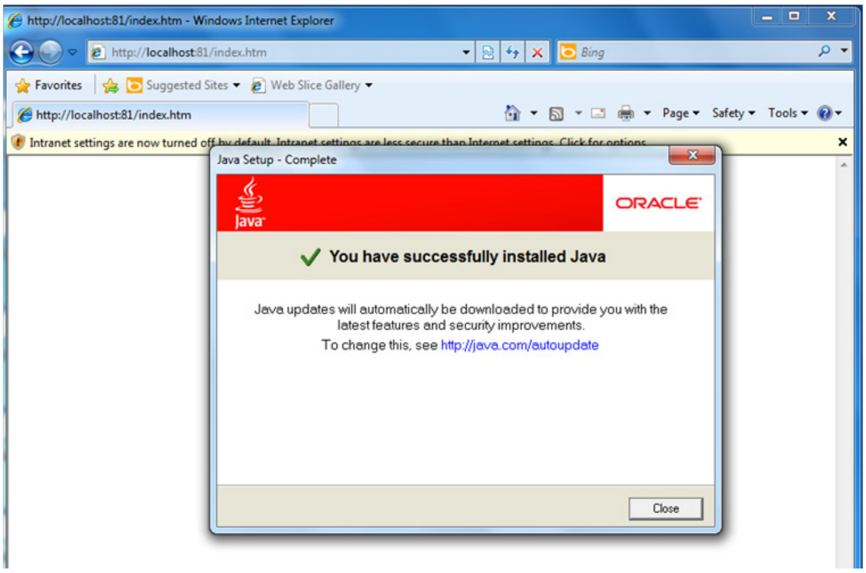
Java provides safe and secure access to the world of amazing Java content. From business solutions to helpful utilities and entertainment, Java makes your internet experience come to life.

Note: No personal information is gathered as part of our install process. Click here for more information on what we do collect.

Click Install to accept the license agreement and install Java now.

□ Change destination folder

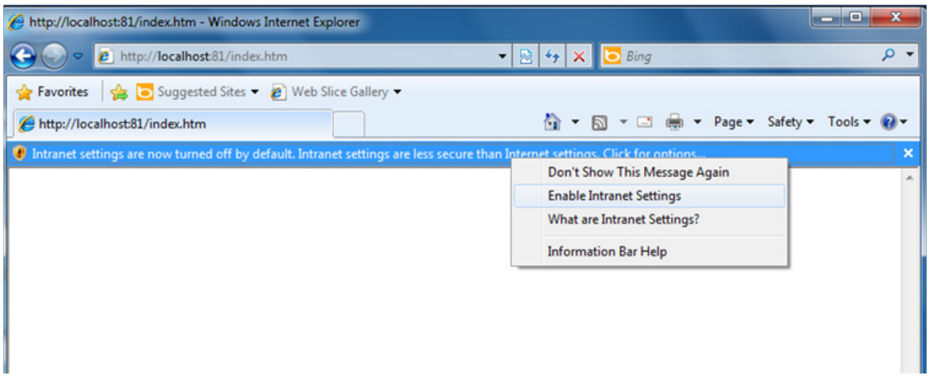
8. Click **Close** to complete.



You have successfully installed Java

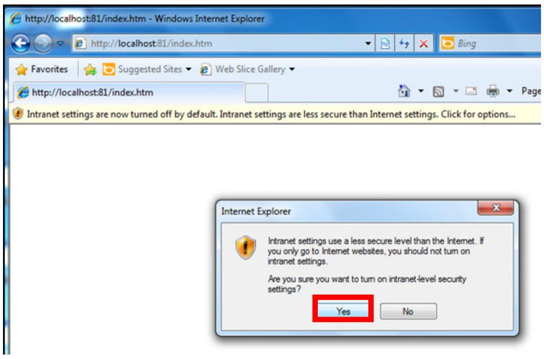
Java updates will automatically be downloaded to provide you with the latest features and security improvements.
To change this, see http://java.com/autoupdate

9. In Windows IE, a banner will appear at the top of the browser window. Click the message and select **Enable Intranet Settings**.


http://localhost:81/index.htm - Windows Internet Explorer
http://localhost:81/index.htm
Bing
Favorites
Suggested Sites
Web Slice Gallery
Page
Safety
Tools
Don't Show This Message Again
Enable Intranet Settings
What are Intranet Settings?
Information Bar Help

Intranet settings are now turned off by default. Intranet settings are less secure than Internet settings. Click for options...

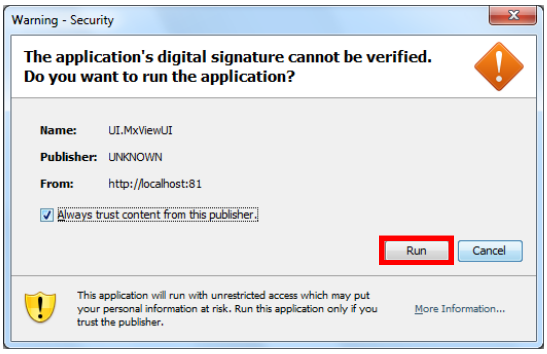
10. A security warning will appear, telling you that intranet settings are not secure enough for the open Internet. Click **Yes** to ignore this, and when another security warning appears telling you that the application's digital signature is not recognized, click **Run**.



Intranet settings are now turned off by default. Intranet settings are less secure than Internet settings. Click for options...

Intranet settings use a less secure level than the Internet. If you only go to Internet websites, you should not turn on intranet settings.

Are you sure you want to turn on intranet-level security settings?



The application's digital signature cannot be verified.
Do you want to run the application?

Name: UI.MxViewUI

Publisher: UNKNOWN

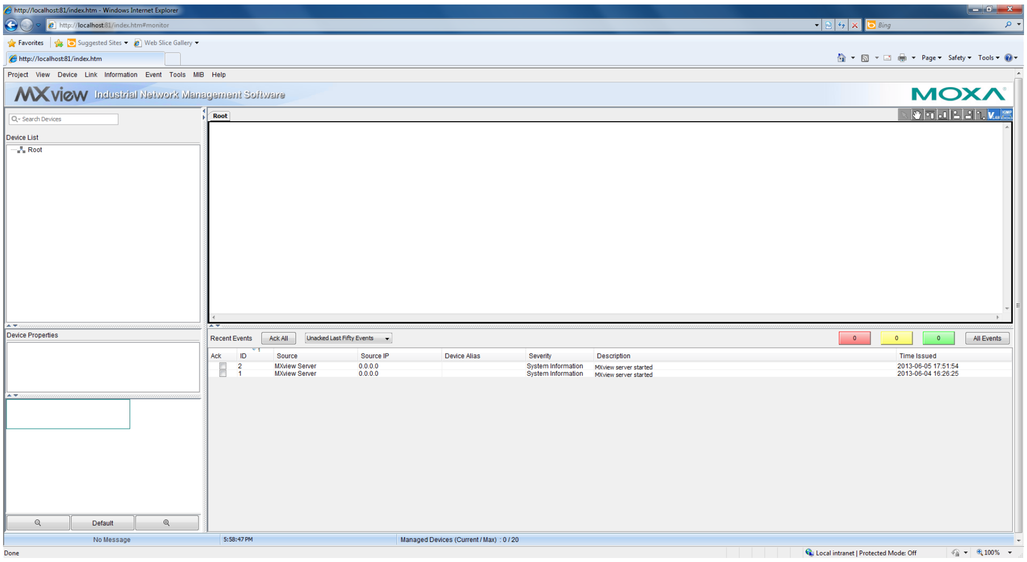
From: http://localhost:81

☑ Always trust content from this publisher.

This application will run with unrestricted access which may put your personal information at risk. Run this application only if you trust the publisher.

11. The **Moxa MXview Setup Wizard** will now appear. You may click **Next** if you wish to enter the setup routine, or select **Cancel** to launch the program immediately.

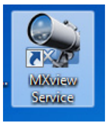
If you click **Cancel**, The program will be launched. It should look like the screenshot below.


MXview Industrial Network Management Software
MOXA
Project View Device Link Information Event Tools MIB Help
Search Devices
Device List
Root
Device Properties
Recent Events
Ack All
Unacked Last Fifty Events
All Events
Default
No Message
Managed Devices (Current / Max) : 0 / 20
Local intranet | Protected Mode: Off
100%

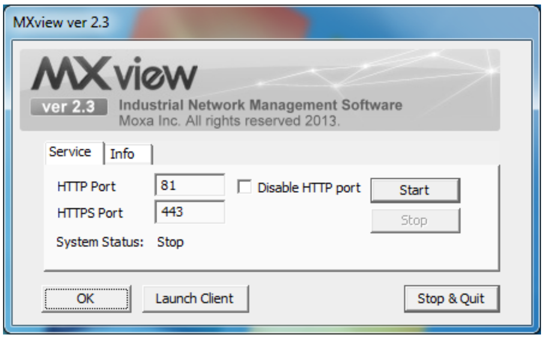
Loading the Synmap MIB File

To load the Synmap MIB file you must first have a running NMS; if you do not have an NMS, you may install the free version of MXview included with your TC-6110 computer software. If you have already started MXview, go directly to step 5 of this section.

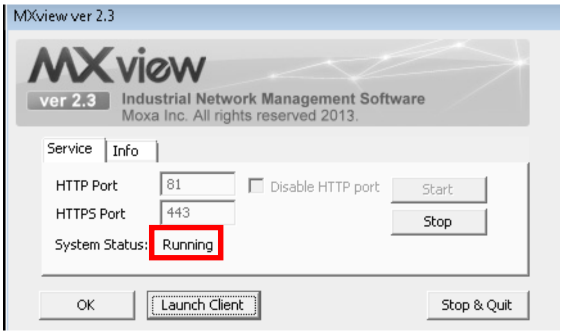
1. Click the MxView Service shortcut on the desktop.



2. Click **Start**, wait for the **System Status** indicator to show **Running**, and then select Launch Client. When the MXview Setup Wizard appears, click Cancel to skip the setup process and directly open the MXview interface.

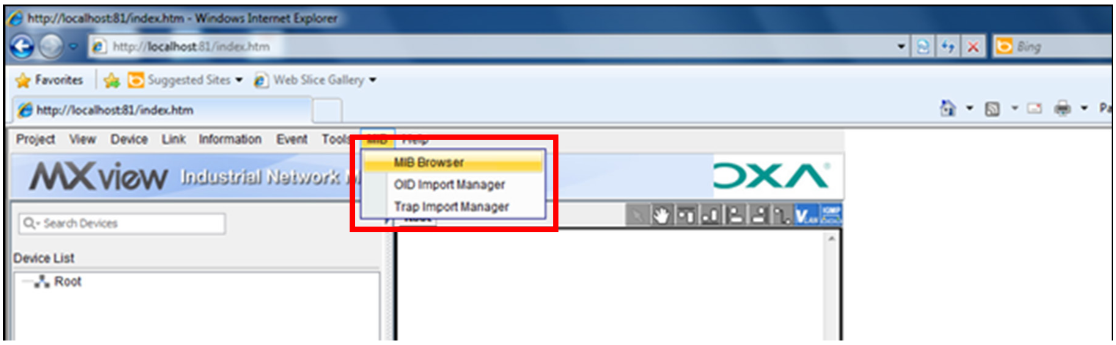


HTTP Port 81
HTTPS Port 443
System Status: Stop

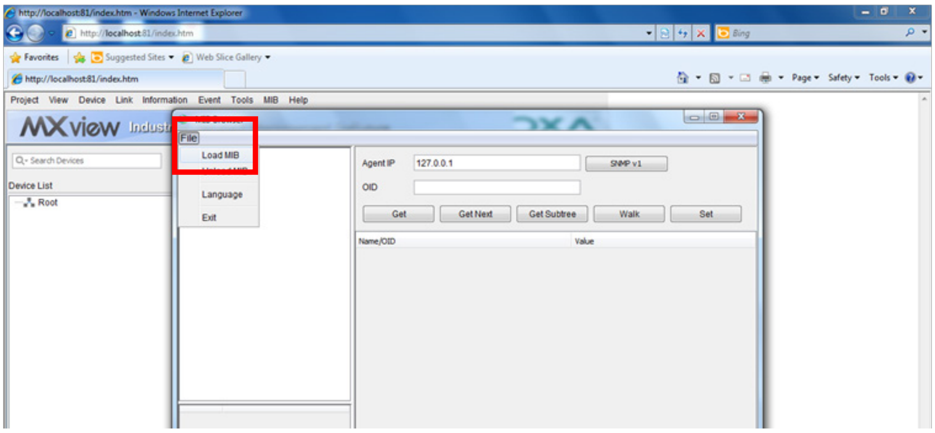


HTTP Port 81
HTTPS Port 443
System Status: Running

3. Select MIB-->MIB Browser.

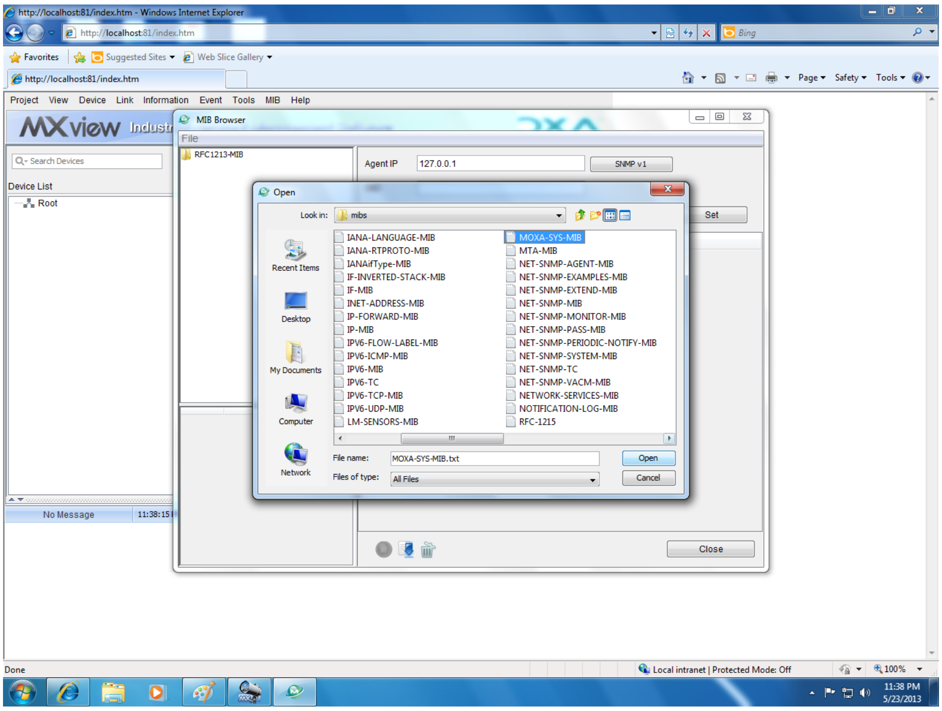


4. After the MIB browser has opened, select **File** from the browser's upper left corner, and then **Load MIB**.



(Instructions continue on next page)

5. Navigate to **c:\usr\share\snmp\mibs\** and select **MOXA-SYS-MIB.txt**.



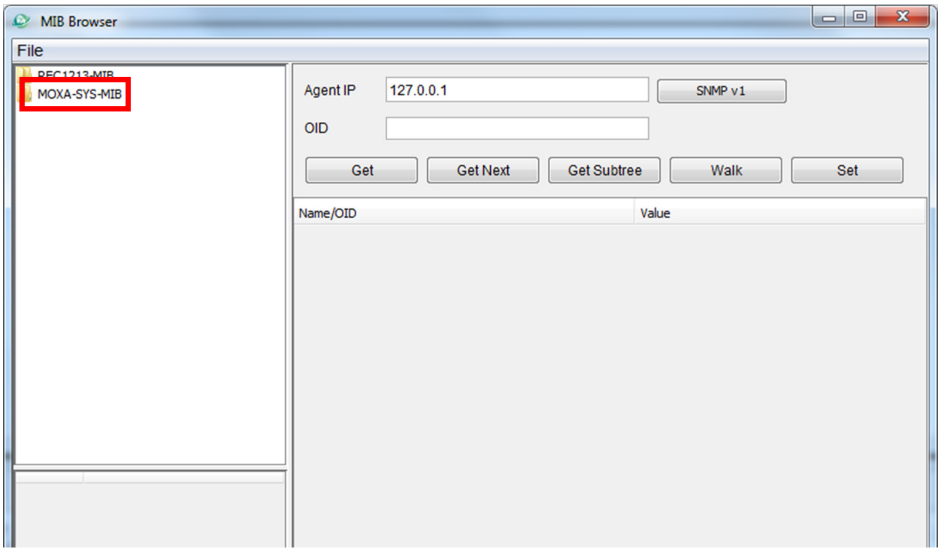
Look in: mibs

File name: MOXA-SYS-MIB.txt

Files of type: All Files

Agent IP 127.0.0.1

6. After opening the Synmap MIB in the browser, check that it appears in the **File** window. If it is not, then it is likely because the MIB file is corrupted. To remedy this, re-copy the MIB file from the software DVD, and re-load the MIB file following the instructions above.



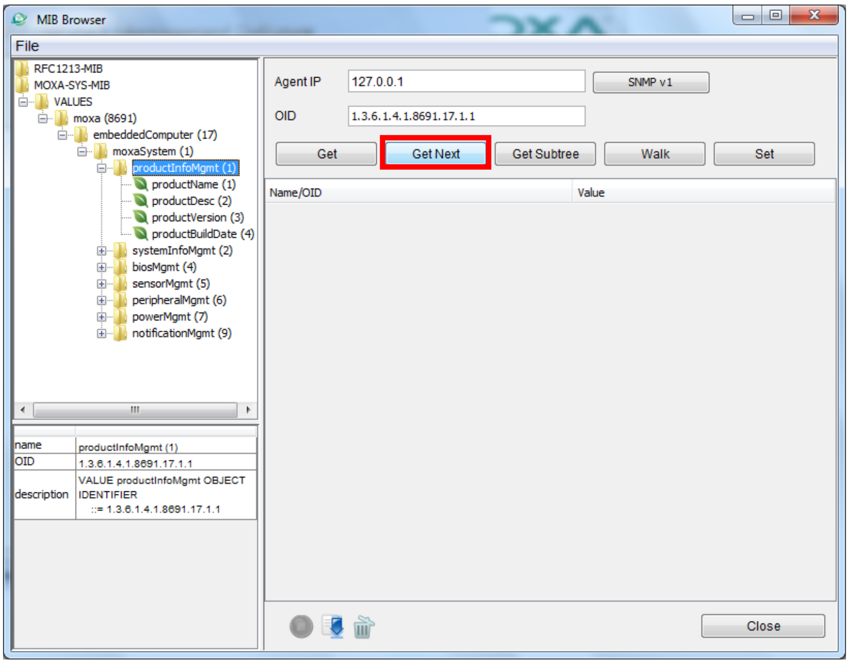
Agent IP 127.0.0.1

Using Synmap OIDs to Control the TC-6110

Follow these steps to use Moxa Synmap to read the MIB and set up controls for the TC-6110.

Retrieving Basic Device Information

1. In this first step, we will use Synmap to retrieve specific device information about the TC-6110. First, use the **Get Next** button to navigate the OID tree by clicking through these items: **`MOXA-SYS-MIB\VALUES\Moxa\embeddedComputer\MoxaSystem\productInfoMgmt`**

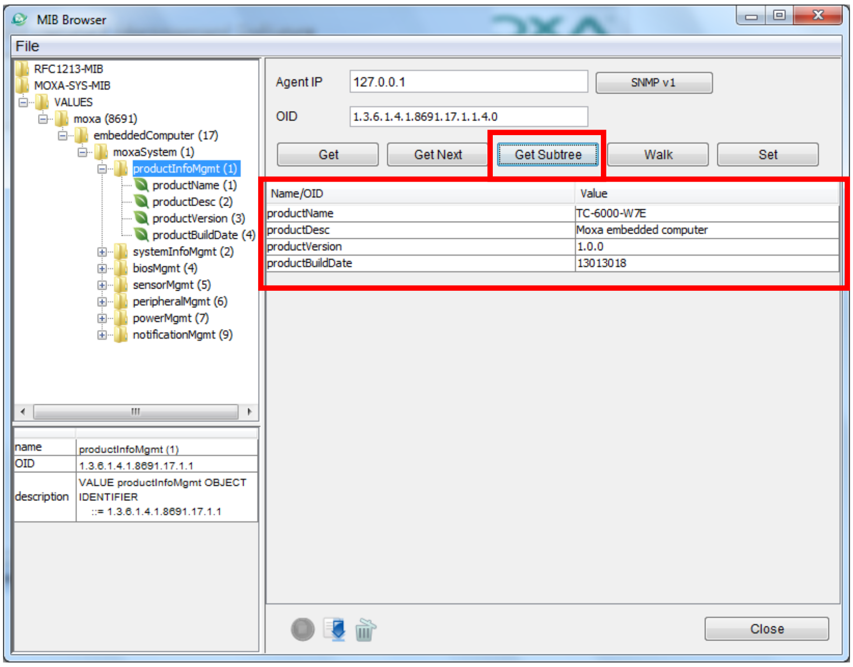


Agent IP: 127.0.0.1

OID: 1.3.6.1.4.1.8691.17.1.1

name	productInfoMgmt (1)
OID	1.3.6.1.4.1.8691.17.1.1
description	VALUE productInfoMgmt OBJECT IDENTIFIER ::= 1.3.6.1.4.1.8691.17.1.1

2. When you reach the final layer of OIDs, you will need to select **GetSubTree** to display the available information. When you use the MIB viewer to select the **productInfoMgmt** OID, you will see the following information displayed in the MIB viewer's information window: **Product Name** (TC-6110), **Product Description** (Moxa embedded computer), **Product Version** (1.0.0), and **Product Build Date** (13013018).



Agent IP: 127.0.0.1

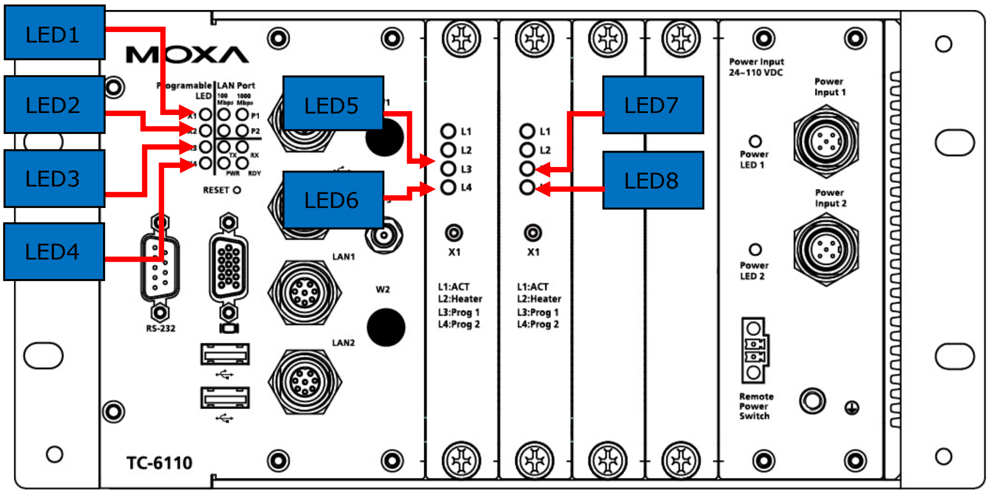
OID: 1.3.6.1.4.1.8691.17.1.1.4.0

Name/OID	Value
productName	TC-6000-W7E
productDesc	Moxa embedded computer
productVersion	1.0.0
productBuildDate	13013018

name	productInfoMgmt (1)
OID	1.3.6.1.4.1.8691.17.1.1
description	VALUE productInfoMgmt OBJECT IDENTIFIER ::= 1.3.6.1.4.1.8691.17.1.1

Using Synmap to Control the Programmable LEDs

The following figure shows the locations of the LED indicators on the TC-6110 computer. Using custom scripts, you can set these LEDs to be used as indicators for your own applications.



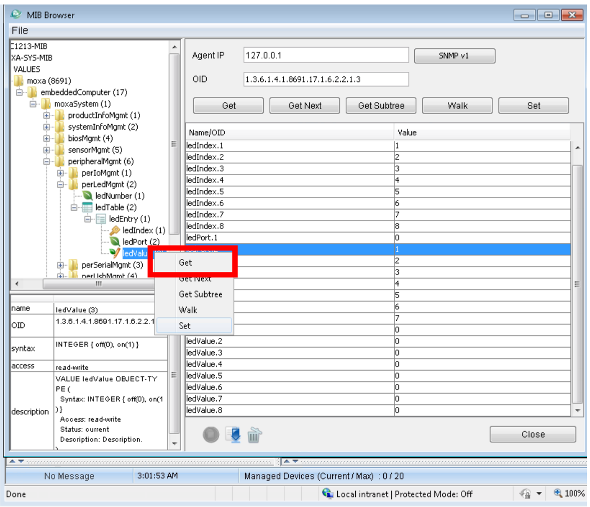
The following table shows the available OIDs for the TC-6110 LEDs.

Item Name	OID	Access	Values	Description
ledNumber	1.3.6.1.4.1.8691.17.1.6.2.1	read-only	N/A	Returns the total number of LEDs
ledIndex	1.3.6.1.4.1.8691.17.1.6.2.2.1.1	read-only	N/A	Returns a list of numbers that correspond with the LEDs, used by SNMP to identify the LEDs; begins with 1
ledPort	1.3.6.1.4.1.8691.17.1.6.2.2.1.2	read-only	N/A	Returns the names by which the index of LEDs may be called when used in scripts; begins with 0
ledValue	1.3.6.1.4.1.8691.17.1.6.2.2.1.3	read-write	0(off), 1(on)	Returns/sends a value indicating/changing the LED state

Follow these steps to configure the programmable LED indicators on the TC-6110 computer.

1. Start up MXview (or some other NMS) and open the MIB browser. For detailed instructions on loading MXview, you may refer to **Loading the Synmap MIB File**, steps 1 to 3.

2. In the MIB browser, navigate the OID tree to `MOXA-SYS-MIB\VALUES\Moxa\embeddedComputer\MoxaSystem\peripheralMgmt\perLedMgmt\ledTable\ledEntry\ledValue`. To change the state of an LED from on to off (or vice versa) click **Set** on the corresponding **ledValue** OID (shown in the figure at right). This will open a dialog called the **Set Value** dialog.



Agent IP 127.0.0.1

OID 1.3.6.1.4.1.8691.17.1.6.2.2.1.3

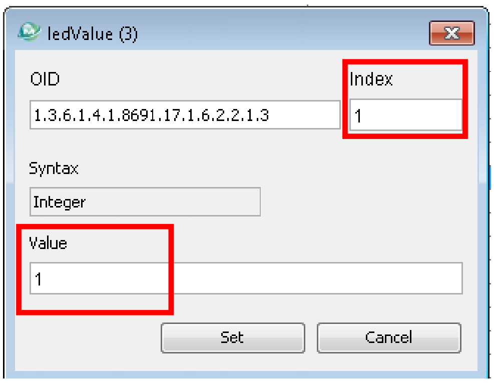
name	ledValue (3)
OID	1.3.6.1.4.1.8691.17.1.6.2.2.1
syntax	INTEGER { off(0), on(1) }
access	read-write
description	VALUE ledValue OBJECT-TYPE (Syntax: INTEGER { off(0), on(1)} Access: read-write Status: current Description: Description.

Name/OID	Value
ledIndex.1	1
ledIndex.2	2
ledIndex.3	3
ledIndex.4	4
ledIndex.5	5
ledIndex.6	6
ledIndex.7	7
ledIndex.8	8
ledPort.1	0
	1
	2
	3
	4
	5
	6
	7
	0
ledValue.2	0
ledValue.3	0
ledValue.4	0
ledValue.5	0
ledValue.6	0
ledValue.7	0
ledValue.8	0

No Message 3:01:53 AM Managed Devices (Current / Max) : 0 / 20

Done Local intranet | Protected Mode: Off 100%

3. The **Set Value** dialog has four fields: one for the OID that is being called; another called **Index**, that identifies the LED being manipulated; and a third called **Value**, to set the state of the LED. The fourth field (**Syntax**) informs you of the type of character to be used to set the value. In this case, we are using the integers 0 and 1: 0 turns the LED off, and 1 turns it on. After entering the correct information into the fields (as shown at right), click on the **Set** button and check if the **LED1** indicator has lit up (LED 1 is shown in the figure at the top of this section, Using Synmap to Control the Programmable LEDs).



OID: 1.3.6.1.4.1.8691.17.1.6.2.2.1.3

Index: 1

Syntax: Integer

Value: 1

4. Next, set the value to 0 and click **Set** to turn off the LED, then visually verify that the LED has successfully turned off. If you experience problems at this point, please review the instructions above and if the problem persists, contact Moxa technical support or visit our .

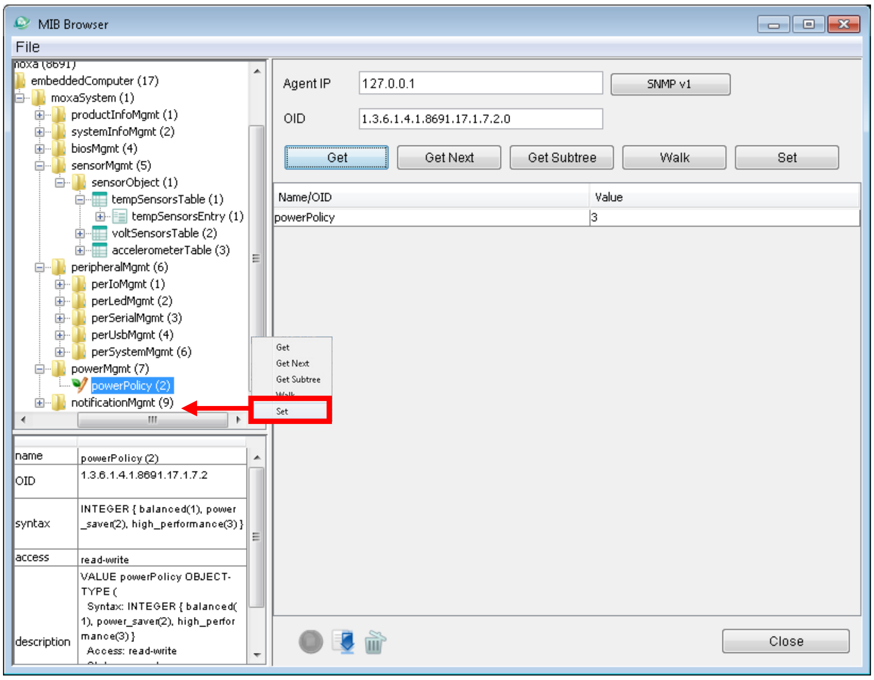
Using Synmap to Set the OS Power Policy

The following table shows the OID power policy control, read/write option and available values.

Item Name	OID	Access	Value to set

powerPolicy	1.3.6.1.4.1.8691.17.1.7.2	read-write	1(Balanced)
			2(Power Saver)
			3(High Performance)

The **powerPolicy** OID allows you to change the Windows 7 power policy. **Balanced** may be considered normal operations, and except in extreme circumstances of exceptionally high CPU use or where strict energy conservation must be maintained, this option will provide satisfactory performance. **Power Saver** will conserve power usage to the maximum extent possible, restricting the CPU to around 36% capacity. **High Performance** maximizes CPU cycles for all applications at all times; generally, **High Performance** is not recommended, and in many (perhaps most) circumstances where the TC-6110 is used, **Power Saver** mode may be adequate to the system's needs. Sysadmins should carefully review the needs of the system and do some quick tests to make the most informed decision. These settings may be further fine-tuned with advanced choices in the Windows 7 OS.



Agent IP: 127.0.0.1

OID: 1.3.6.1.4.1.8691.17.1.7.2.0

Name/OID	Value
powerPolicy	3

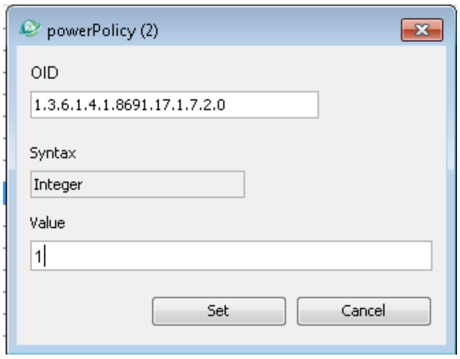
name	powerPolicy (2)
OID	1.3.6.1.4.1.8691.17.1.7.2
syntax	INTEGER { balanced(1), power_saver(2), high_performance(3) }
access	read-write
description	VALUE powerPolicy OBJECT-TYPE (Syntax: INTEGER { balanced(1), power_saver(2), high_performance(3) } Access: read-write

To use Synmap to set the power policy:

1. Start up MXview (or some other NMS) and open the MIB browser. For detailed instructions on loading MXview, you may refer to **Loading the Synmap MIB File**, steps 1 to 3.

2. In the MIB browser, navigate to `MOXA-SYS-MIB\VALUES\Moxa\embeddedComputer\MoxaSystem\powerMgmt\powerPolicy`. To change the Windows 7 power policy settings, highlight the powerPolicy OID and click **Set**. This will open a dialog called the **Set Value** dialog.

3. The **Set Value** dialog for the **powerPolicy** OID has two variable fields: one showing the OID that is being called and a second called **Value**, to indicate which power management policy should be used. Use the integer 1 to indicate the **Balanced**, 2 for the **Power Saver**, and 3 for the **High Performance** policy. After entering the value, close the dialog by clicking **Set**.

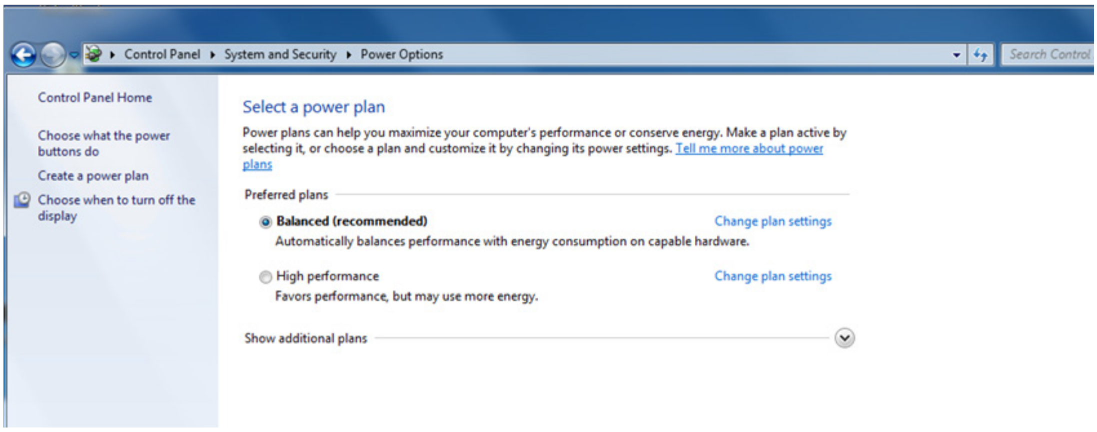


OID: 1.3.6.1.4.1.8691.17.1.7.2.0

Syntax: Integer

Value: 1

4. To check if the policy has been changed, navigate to the Windows 7 Control Panel, and open the **Power Options** tab, located under **Control Panel ➔ System Security**.


Control Panel ▸ System and Security ▸ Power Options
Search Control
Control Panel Home
Choose what the power buttons do
Create a power plan
Choose when to turn off the display
Change plan settings
Change plan settings

Select a power plan

Power plans can help you maximize your computer's performance or conserve energy. Make a plan active by selecting it, or choose a plan and customize it by changing its power settings. Tell me more about power plans

Preferred plans

● Balanced (recommended)
Automatically balances performance with energy consumption on capable hardware.

○ High performance
Favors performance, but may use more energy.

Show additional plans

ATTENTION

For more detailed information on the advanced settings of Windows 7 power management policies, you may refer to Microsoft's online Windows support pages, which are currently (Jul. 2013) found at this link:
http://windows.microsoft.com/en-us/windows7/change-create-or-delete-a-power-plan-scheme

Using Synmap to Read the Temperature Sensor

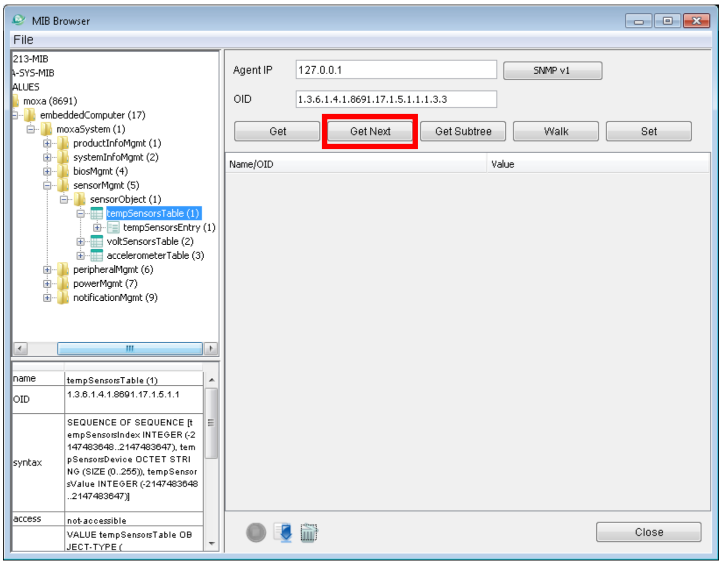
The following table shows the temperature sensor OIDs.

Item Name	OID	Access	Description
tempSensorsIndex	1.3.6.1.4.1.8691.17.1.5.1.1.1.1	read-only	Returns a list of numbers (beginning with 1) that corresponds with the available T-sensors; these identifiers are used by SNMP and for system scripts.
tempSensorsDevice	1.3.6.1.4.1.8691.17.1.5.1.1.1.2	read-only	Returns a list of string values identifying the temperature

			sensors by name/location. Possible values are SATA1, SATA2, or CPU, for the CPU's internal thermometer.
tempSensorsValue	1.3.6.1.4.1.8691.17.1.5.1.1.1.3	read-only	The reading returned by the thermometer, in degrees Celsius. Note: On the TC-6110, temp. is currently represented as the current reading truncated to its base integer, without rounding.

To use Synmap to check the temperature sensor (T-sensor) of the TC-6110 computer, follow the steps below.

1. Start up MXview (or some other NMS) and open the MIB browser. For detailed instructions on loading MXview, you may refer to **Loading the Synmap MIB File**, steps 1 to 3.
2. Navigate to `MOXA-SYS-MIB\VALUES\moxa\embeddedComputer\moxaSystem\sensorMgmt\sensorObject\tempSensorTable` in the MIB Browser, and then select **Get Subtree** to open the T-sensor's OID tree.

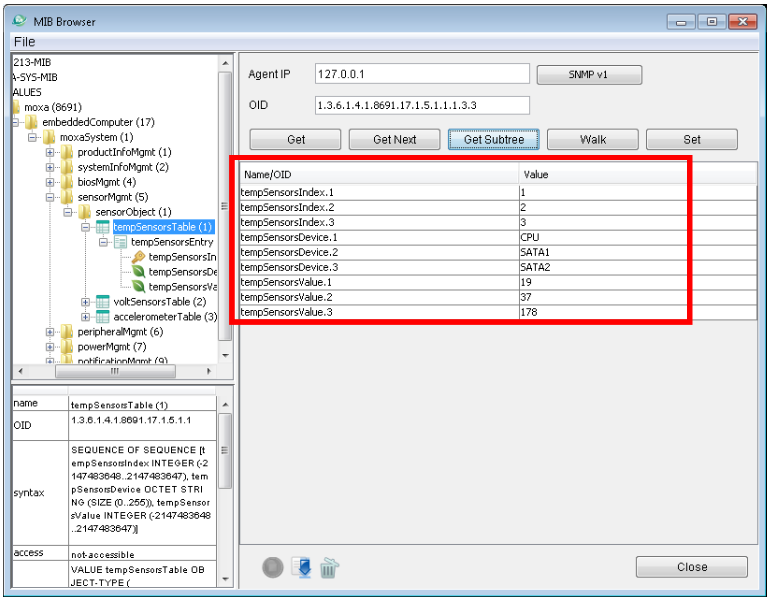


Agent IP: 127.0.0.1

OID: 1.3.6.1.4.1.8691.17.1.5.1.1.1.3.3

name	tempSensorsTable (1)
OID	1.3.6.1.4.1.8691.17.1.5.1.1
syntax	SEQUENCE OF SEQUENCE {tempSensorsIndex INTEGER (-2147483648..2147483647), tempSensorsDevice OCTET STRING (SIZE (0..255)), tempSensorsValue INTEGER (-2147483648..2147483647)}
access	not-accessible
	VALUE tempSensorsTable OBJECT-TYPE (

3. All of the T-sensor information should now be displayed in the MIB browser; if it is not, then there is a problem with your SNMP/Synmap configuration or a malfunction in the T-sensor. The temperatures are all displayed in Celsius. In the screenshot below, the temperature of disk 1 (SATA1) is 37 degrees. If the SATA module is not mounted, the temperature value will be shown as 178 degrees. Thus, in the screenshot at right, the disk 2 (SATA2) is showing 178 degrees because there is no disk mounted in slot 2



Agent IP: 127.0.0.1

OID: 1.3.6.1.4.1.8691.17.1.5.1.1.1.3.3

Name/OID	Value
tempSensorsIndex.1	1
tempSensorsIndex.2	2
tempSensorsIndex.3	3
tempSensorsDevice.1	CPU
tempSensorsDevice.2	SATA1
tempSensorsDevice.3	SATA2
tempSensorsValue.1	19
tempSensorsValue.2	37
tempSensorsValue.3	178

name	tempSensorsTable (1)
OID	1.3.6.1.4.1.8691.17.1.5.1.1
syntax	SEQUENCE OF SEQUENCE {tempSensorsIndex INTEGER (-2147483648..2147483647), tempSensorsDevice OCTET STRING (SIZE (0..255)), tempSensorsValue INTEGER (-2147483648..2147483647)}
access	not-accessible
	VALUE tempSensorsTable OBJECT-TYPE (

of the computer.

Using Synmap to Read the G-Sensor

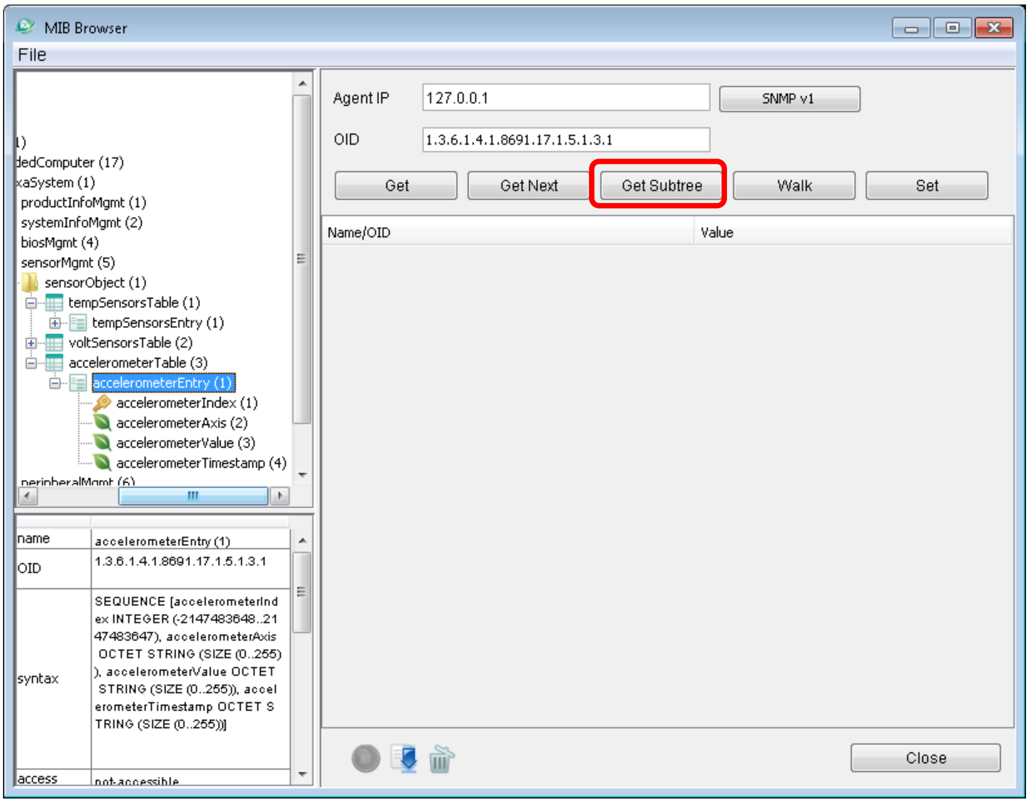
The following table lists the accelerometer OIDs.

Item Name	OID	Access	Description
accelerometerIndex	1.3.6.1.4.1.8691.17.1.5.1.3.1.1	read-only	Returns a list of numbers (beginning with 1) that corresponds with the available G-sensors; these identifiers are used by SNMP and for scripting
accelerometerAxis	1.3.6.1.4.1.8691.17.1.5.1.3.1.2	read-only	Returns the format in which accelerometer axial values will be returned. This will always be X_n Y_n Z_n
accelerometerValue	1.3.6.1.4.1.8691.17.1.5.1.3.1.3	read-only	Returns the accelerometer value associated with a particular axis; this will be g-force in micro gravities (μG).
accelerometerTimestamp	1.3.6.1.4.1.8691.17.1.5.1.3.1.4	read-only	Returns the G-sensor's current timestamp.

To use Synmap to read the vibration sensor (accelerometer, or G-sensor), follow these steps.

1. Start up MXview (or some other NMS) and open the MIB browser. For detailed instructions on loading MXview, you may refer to **Loading the Synmap MIB File**, steps 1 to 3.

2. Navigate to `MOXA-SYS-MIB\VALUES\moxa\embeddedComputer\moxaSystem\sensorMgmt\sensorObject\accelerometerTable` in the MIB Browser, and then select **Get Subtree** to open the accelerometer's OID tree.

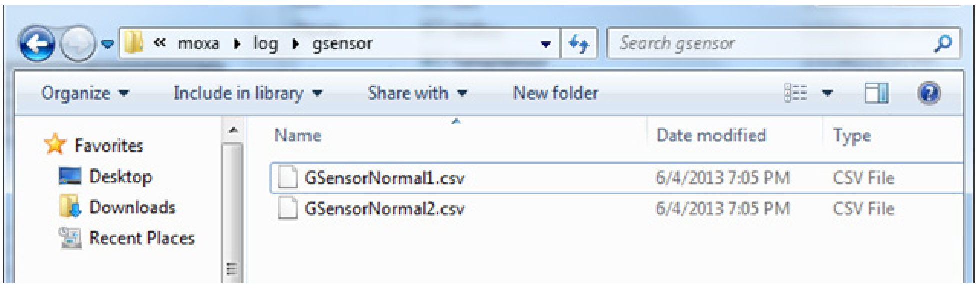


Agent IP 127.0.0.1

OID 1.3.6.1.4.1.8691.17.1.5.1.3.1

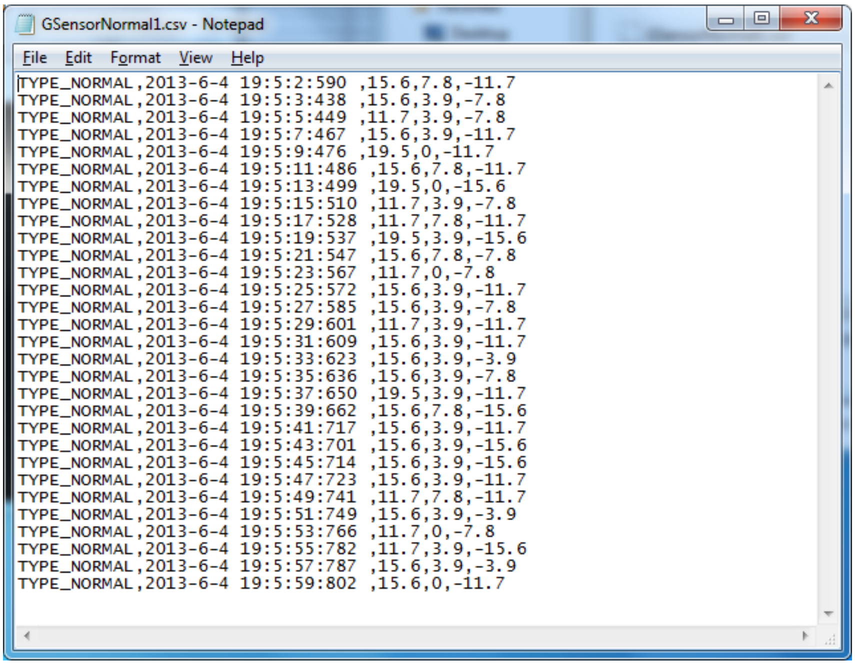
name	accelerometerEntry (1)
OID	1.3.6.1.4.1.8691.17.1.5.1.3.1
syntax	SEQUENCE [accelerometerIndex INTEGER (-2147483648..2147483647), accelerometerAxis OCTET STRING (SIZE (0..255)), accelerometerValue OCTET STRING (SIZE (0..255)), accelerometerTimestamp OCTET STRING (SIZE (0..255))]
access	not-accessible

3. Check to verify if logs for both GSensor1 and GSensor2 exist.



Name	Date modified	Type
GSensorNormal1.csv	6/4/2013 7:05 PM	CSV File
GSensorNormal2.csv	6/4/2013 7:05 PM	CSV File

4. Open the logs to verify they are logging correctly.



```
TYPE_NORMAL,2013-6-4 19:5:2:590 ,15.6,7.8,-11.7
TYPE_NORMAL,2013-6-4 19:5:3:438 ,15.6,3.9,-7.8
TYPE_NORMAL,2013-6-4 19:5:5:449 ,11.7,3.9,-7.8
TYPE_NORMAL,2013-6-4 19:5:7:467 ,15.6,3.9,-11.7
TYPE_NORMAL,2013-6-4 19:5:9:476 ,19.5,0,-11.7
TYPE_NORMAL,2013-6-4 19:5:11:486 ,15.6,7.8,-11.7
TYPE_NORMAL,2013-6-4 19:5:13:499 ,19.5,0,-15.6
TYPE_NORMAL,2013-6-4 19:5:15:510 ,11.7,3.9,-7.8
TYPE_NORMAL,2013-6-4 19:5:17:528 ,11.7,7.8,-11.7
TYPE_NORMAL,2013-6-4 19:5:19:537 ,19.5,3.9,-15.6
TYPE_NORMAL,2013-6-4 19:5:21:547 ,15.6,7.8,-7.8
TYPE_NORMAL,2013-6-4 19:5:23:567 ,11.7,0,-7.8
TYPE_NORMAL,2013-6-4 19:5:25:572 ,15.6,3.9,-11.7
TYPE_NORMAL,2013-6-4 19:5:27:585 ,15.6,3.9,-7.8
TYPE_NORMAL,2013-6-4 19:5:29:601 ,11.7,3.9,-11.7
TYPE_NORMAL,2013-6-4 19:5:31:609 ,15.6,3.9,-11.7
TYPE_NORMAL,2013-6-4 19:5:33:623 ,15.6,3.9,-3.9
TYPE_NORMAL,2013-6-4 19:5:35:636 ,15.6,3.9,-7.8
TYPE_NORMAL,2013-6-4 19:5:37:650 ,19.5,3.9,-11.7
TYPE_NORMAL,2013-6-4 19:5:39:662 ,15.6,7.8,-15.6
TYPE_NORMAL,2013-6-4 19:5:41:717 ,15.6,3.9,-11.7
TYPE_NORMAL,2013-6-4 19:5:43:701 ,15.6,3.9,-15.6
TYPE_NORMAL,2013-6-4 19:5:45:714 ,15.6,3.9,-15.6
TYPE_NORMAL,2013-6-4 19:5:47:723 ,15.6,3.9,-11.7
TYPE_NORMAL,2013-6-4 19:5:49:741 ,11.7,7.8,-11.7
TYPE_NORMAL,2013-6-4 19:5:51:749 ,15.6,3.9,-3.9
TYPE_NORMAL,2013-6-4 19:5:53:766 ,11.7,0,-7.8
TYPE_NORMAL,2013-6-4 19:5:55:782 ,11.7,3.9,-15.6
TYPE_NORMAL,2013-6-4 19:5:57:787 ,15.6,3.9,-3.9
TYPE_NORMAL,2013-6-4 19:5:59:802 ,15.6,0,-11.7
```

Using Synmap to Enable and Configure the Watchdog Timer

The TC-6110 comes with a default watchdog timer (a Computer Operating Properly/COP timer) that will initiate a soft reboot whenever the system or a specific program freezes for a specified time period. The watchdog timer has only two Synmap OIDs associated with it: **watchdogPeriod** and **watchdogStatus**. The value for **watchdogPeriod** sets the countdown interval during which the watchdog timer must receive a COP notification from the OS kernel; if it does not receive a COP notification during this interval, the watchdog will reboot the system.

The default value of **watchdogPeriod** is 0, which leaves the watchdog disabled. To enable the watchdog timer, you need to set the scanning interval to a non-zero integer between 1 and 255; this number will set the number of seconds that will pass following a system (or application) hang before the watchdog reboots the platform.

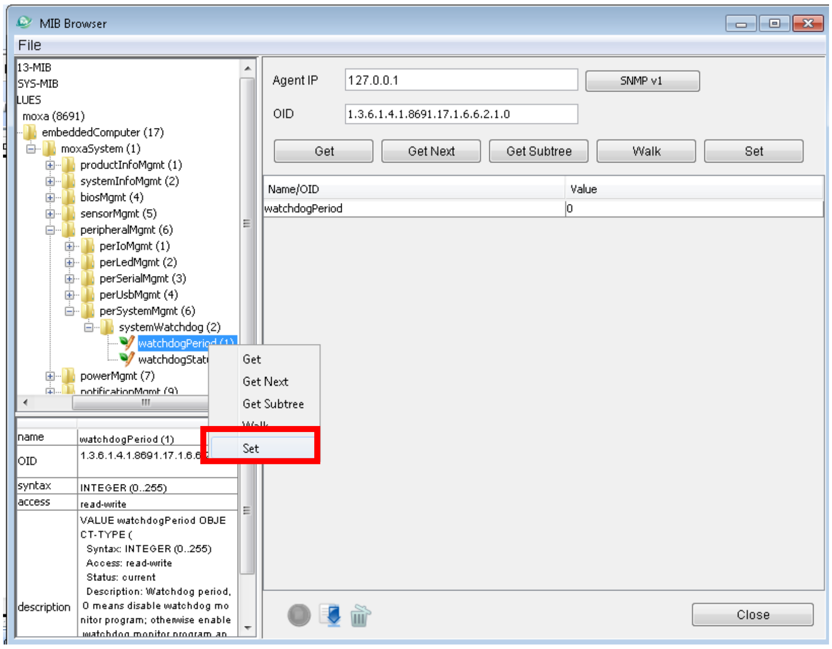
After setting a time interval for the watchdog, the OID **watchdogStatus** will automatically change to 1, to indicate that the watchdog timer is enabled. Once enabled, whenever the kernel fails to deliver a COP signal during the specified time period the watchdog will automatically initiate a soft reboot.

The following table shows the watchdog OIDs.

Item Name	OID	Access	Value
watchdogPeriod	1.3.6.1.4.1.8691.17.1.6.6.2.1	read-write	An integer between 1 and 255 representing the timeout period in seconds (E.g. 30 = 30 seconds)
watchdogStatus	1.3.6.1.4.1.8691.17.1.6.6.2.2	read	0 represents Off, 1 represents On

To enable the watchdog via Synmap, follow the instructions below.

1. Navigate to `MOXA-SYS-MIB\VALUES\Moxa\embeddedComputer\MoxaSystem\peripheralMgmt\systemWatchdog\watchdog period` and select **Set**.



Agent IP 127.0.0.1

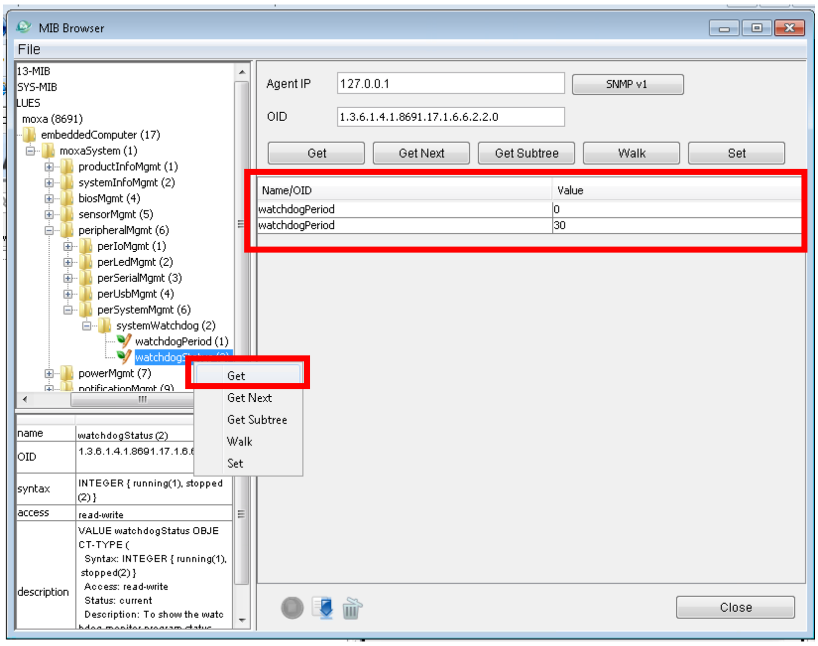
OID 1.3.6.1.4.1.8691.17.1.6.6.2.1.0

Name/OID	Value
watchdogPeriod	0

name	watchdogPeriod (1)
OID	1.3.6.1.4.1.8691.17.1.6.6
syntax	INTEGER (0..255)
access	read-write
description	VALUE watchdogPeriod OBJECT-TYPE (Syntax: INTEGER (0..255) Access: read-write Status: current Description: Watchdog period, 0 means disable watchdog monitor program; otherwise enable watchdog monitor program an

2. In the **Set Value** dialog for **watchdogPeriod**, the refresh time can be entered as a number between 1 and 255 seconds in the **Value** field. Enter the desired value and click **Set**. Click **OK** when a dialog appears indicating that the watchdog has been successfully set.

3. Right-click `MOXA-SYS-MIB\VALUES\Moxa\embeddedComputer\MoxaSystem\peripheralMgmt\perSystemMgmt\watchdogStatus` and select **Get**. Note that in the screenshot below, the watchdog is currently disabled.



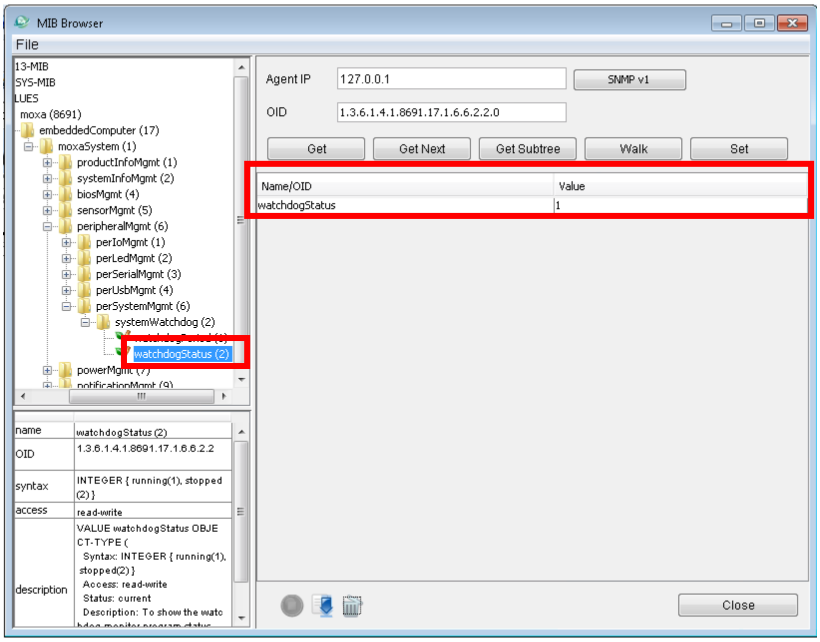
Agent IP 127.0.0.1

OID 1.3.6.1.4.1.8691.17.1.6.6.2.2.0

Name/OID	Value
watchdogPeriod	0
watchdogPeriod	30

name	watchdogStatus (2)
OID	1.3.6.1.4.1.8691.17.1.6.6
syntax	INTEGER { running(1), stopped (2) }
access	read-write
description	VALUE watchdogStatus OBJECT-TYPE (Syntax: INTEGER { running(1), stopped(2) } Access: read-write Status: current Description: To show the watchdog monitor program status

4. Since you have just changed the value of the **watchdogPeriod** OID, check to verify that the value of the **watchdogStatus** OID has changed to 1. This means that the watchdog is now activated and running.



Agent IP 127.0.0.1

OID 1.3.6.1.4.1.8691.17.1.6.6.2.2.0

Name/OID	Value
watchdogStatus	1

name	watchdogStatus (2)
OID	1.3.6.1.4.1.8691.17.1.6.6.2.2
syntax	INTEGER { running(1), stopped (2) }
access	read-write
description	VALUE watchdogStatus OBJECT-TYPE (Syntax: INTEGER { running(1), stopped(2) } Access: read-write Status: current Description: To show the watchdog monitor program status

5

Customizable Sample Code

This chapter uses sample code to show how scripting may be used to add customized capabilities to the TC-6110 computing platform.

The following topics are covered in this chapter:

❒ LED

  ➢ Checking Programmable LED

❒ Checking Vibration Status (SMBUS)

❒ Enabling Watchdog Function

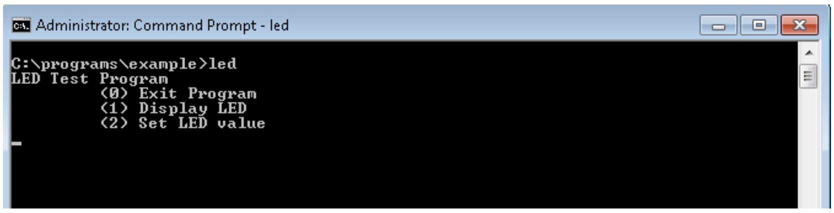
Sample Code for Customizing the TC-6110

The TC-6110 computer comes with several pieces of sample code that users may use to customize its behavior for LED notifications; temperature, vibration and GPS events; or to initiate emergency reboots when critical system applications come to a halt.

The LED Control Walkthrough

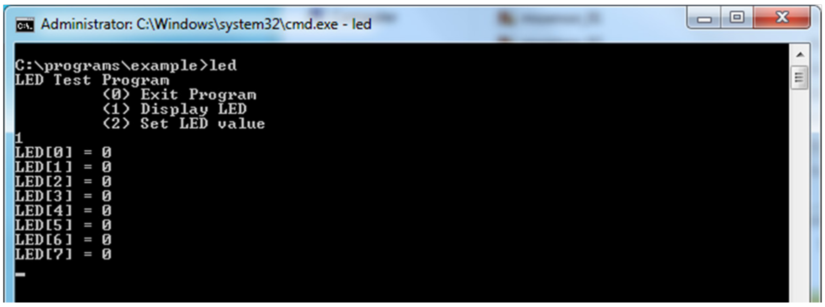
The TC-6110 is designed with 8 programmable LEDs that integrators and system administrators may customize for their notification needs. The source code for controlling LED behavior is located in the folder `<Software DVD>\examples\project\LED\`, while the compiled executable **LED.exe** is located under `<Software DVD>\examples\TC6000Release`. You can follow the steps below to test the LED control script, or you may freely modify the control script to create customized patterns that are associated with specific system events. To review the LED control code, see **The LED Control Script** section in Appendix B of this manual.

1. Create the `c:\programs\examples` folder and copy **LED.exe** into that folder. Run **LED.exe**.
2. You will be presented with a menu of three choices; first, select **1** to display the LED's current status.



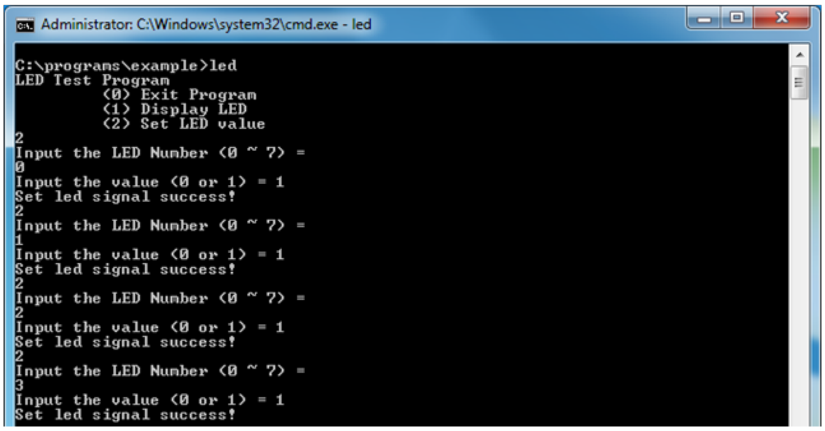
```
C:\programs\example>led
LED Test Program
         (0) Exit Program
         (1) Display LED
         (2) Set LED value
_
```

3. In the screenshot below, the user has selected **1** and is viewing the current status of all LEDs. The value **0** shown next to each entry indicates that all of the LEDs are currently turned off. Visually verify this by examining the TC-6110's front panel.



```
C:\programs\example>led
LED Test Program
         (0) Exit Program
         (1) Display LED
         (2) Set LED value
1
LED[0] = 0
LED[1] = 0
LED[2] = 0
LED[3] = 0
LED[4] = 0
LED[5] = 0
LED[6] = 0
LED[7] = 0
_
```

4. You may now run **LED.exe** again, but this time select **2**. At the next prompt, enter the ID number (0 to 7) of an LED to activate, and when prompted enter either **1** (to turn it on), or **0** (to turn it off). The LEDs on the main TC-6110 panel correspond to 0 through 3; 4 and 5 correspond to those on the first module; and 6 and 7 to those on the second.



```
C:\programs\example>led
LED Test Program
         (0) Exit Program
         (1) Display LED
         (2) Set LED value
2
Input the LED Number (0 ~ 7) =
0
Input the value (0 or 1) = 1
Set led signal success!
2
Input the LED Number (0 ~ 7) =
1
Input the value (0 or 1) = 1
Set led signal success!
2
Input the LED Number (0 ~ 7) =
2
Input the value (0 or 1) = 1
Set led signal success!
2
Input the LED Number (0 ~ 7) =
3
Input the value (0 or 1) = 1
Set led signal success!
```

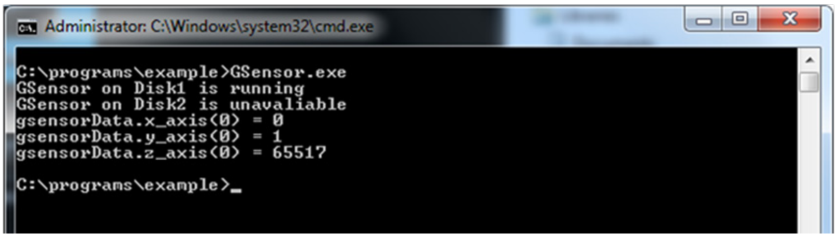
G-Sensor/Accelerometer Control Code

The TC-6110 computer comes with 2 independent accelerometers that may be used to monitor external vibrations affecting the computer. The accelerometers are located on the board of each of the two SATA expansion modules. The basic accelerometer control code is included under the title **G-Sensor.exe**, and it may be found on the software DVD under `\examples\TC6000Release`. The source code itself may be found under `\examples\project\GSensor\`. To review the accelerometer control code you may refer to Appendix B of this manual, under **The Accelerometer Control Script**.

You can follow the steps below to test the accelerometer. Please remember that the X-axis represents front-to-back motion (relative to the sensor), the Y-axis is left-to-right, and the Z-axis is up-and-down. A good target threshold to start off with is 1000 milligravities (mG), which is the basic tolerance threshold for many industrial-quality hard drives.

Accelerometer Control Walkthrough

1. If you haven't yet, create the folder `c:\programs\examples`, then copy over **GSensor.exe**.
2. Insert the TC-6110 SATA expansion module into slot 1. Leave slot 2 empty.
3. Run **GSensor.exe** and check to see if the G-sensor is registering raw vibration measurements. In the screenshot below, because only the slot 1 SATA module has been inserted, the program is only showing information for that accelerometer; this is indicated by the message ***GSensor on Disk1 is running***. Similarly, because no module is mounted in slot 2, the message ***GSensor on Disk 2 is unavailable*** is displayed.
4. Following the two sensor messages indicating sensor operation, information for each available sensor is shown; the origin of the raw data is indicated by the number in parentheses at the end of the label, just before the equal sign. **(0)** indicates the accelerometer in slot 1; **(1)** indicates slot 2.
5. Data for each of the three axes is displayed separately, on a single line. The number shown is a raw two's complement notation binary data value, displayed in base ten form. This raw value must be converted before it represents milligravities (mG). In the screenshot above, the only axis indicating vibration is the z axis, which is showing 65517. To convert this number into milligravities, we must first convert it from two's complement representation and then multiply that result by a conversion ratio of 3.9 (base ten). Using the number 65517, above, we first convert it to hexadecimal value. $65,517_{10}$ = 1111111111101101_2, which is equal to FFED_{16}. The left-most bit is a 1, so this means the number is a negative value and we must convert from two's complement notation. To do this, (-1)*(0xFFFF-0xFFED +1) = -13_{16}, or -19 in base ten (-19_{10}). We then multiply this number by 3.9_{10} to get the value in milligravities: -19 * 3.9 = -74.1. To review the conversion code, check Appendix B, **Accelerometer Conversion Code**.



```
C:\programs\example>GSensor.exe
GSensor on Disk1 is running
GSensor on Disk2 is unavaliable
gsensorData.x_axis(0) = 0
gsensorData.y_axis(0) = 1
gsensorData.z_axis(0) = 65517

C:\programs\example>_
```

ATTENTION

G-sensor / accelerometer values are base 10 representations of raw binary data, and must first be converted using bitwise operations before they can be read as milligravities (mG). The formula for conversion is to first convert the binary number from two's complement notation into base 10, then multiply the result by 3.9. For sample code, check Appendix B, **Accelerometer Conversion Code**.

Watchdog Control Code

The code for controlling the watchdog/COP timer is the simplest and least-customizable of the included sample scripts. The code itself is provided on the software DVD, under `\examples\project\WatchDog\`, and the executable file **Watchdog.exe** is on the software DVD `\examples\TC6000Release`. This sample code may be modified to integrate the watchdog timer with specific applications

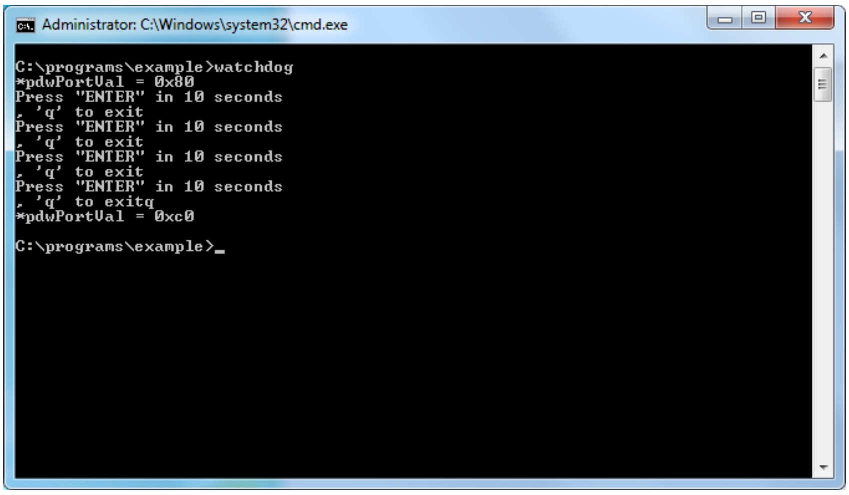
Using this code any program may be set up so that the watchdog timer will provide a last-line failsafe against application crashes. For instance, the TC-6110 may be set up so that whenever a mission-critical application fails the watchdog timer will send a message to a system administrator and then initiate an automatic reboot. To test the watchdog executable, follow the steps below.

The Watchdog Control Code Walkthrough

1. If you haven't yet, create the folder `c:\programs\examples`, then copy over **Watchdog.exe** and run the script.

2. The program will return `*pdwPortVal = 0x80`; this means the watchdog function is enabled and counting down. To keep the system from rebooting, the user will need to press **Enter** at least once every 10 seconds, otherwise the system will automatically reboot.

3. To stop the watchdog, press **q** to exit the program. The watchdog timer control will return `*pdwPortVal = 0xc0`, indicating that the watchdog timer is now disabled.



```
C:\programs\example>watchdog
*pdwPortVal = 0x80
Press "ENTER" in 10 seconds
, 'q' to exit
Press "ENTER" in 10 seconds
, 'q' to exit
Press "ENTER" in 10 seconds
, 'q' to exit
Press "ENTER" in 10 seconds
, 'q' to exitq
*pdwPortVal = 0xc0

C:\programs\example>_
```

T-Sensor Control Code

The TC-6110 computer comes with built-in, independent temperature sensors that may be customized for automated responses. The temperature sensor sample code may be found on the software DVD under `\examples\project\TempSensor\`, and the executable file **TempSensor.exe** will be under `\examples\TC6000Release`.

Follow the steps below for a walkthrough on using **TempSensor.exe** to return thermometer values.

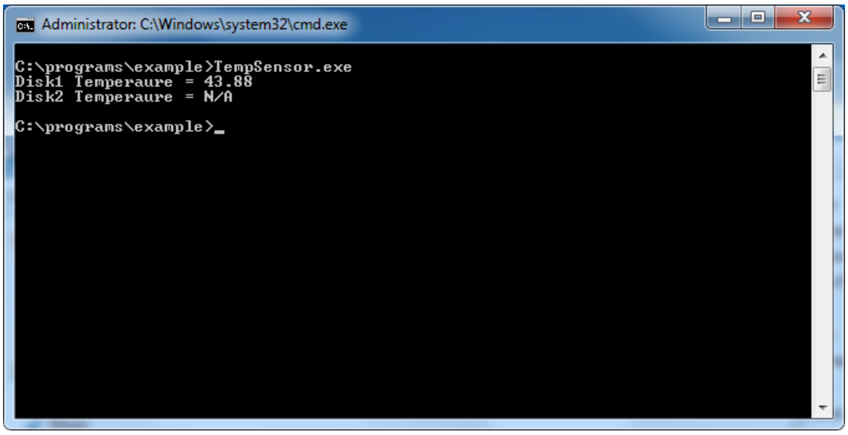
The sample code for reading temperatures is included in Appendix B of this manual, under **The Temperature Sensor Control Script**.

Walkthrough for Reading Temperature Values

1. If you haven't yet done so, create the folder `c:\programs\examples` then copy over **TempSensor.exe**.

2. Insert the TC-6110 SATA expansion module into slot 1. Leave slot 2 empty.

3. Run **TempSensor.exe**. The console should show the immediate values for the temperature sensors on the SATA expansion module in slot 1 (43.88˚C, in the screenshot below) and slot 2. In this case, we have inserted only one SATA module in slot 1, so the program only shows a value for **Disk1**; for slot 2 (**Disk2**, below) it shows **N/A** (for **Not Applicable**), indicating that slot 2 is empty or the T-sensor is not operating.



```
C:\programs\example>TempSensor.exe
Disk1 Temperaure = 43.88
Disk2 Temperaure = N/A

C:\programs\example>_
```

GPS Control Code

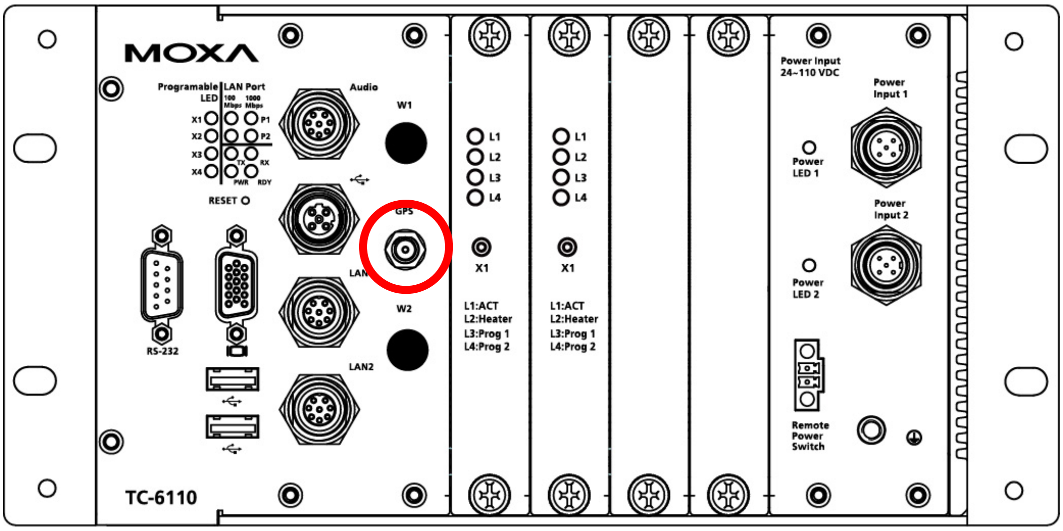
A GPS module for the TC-6110 may be purchased from Moxa as an accessory. Moxa's GPS receivers communicate using the NMEA specification. This section describes how to build control scripts that automate actions for particular GPS events. During this installation, we will use Moxa's **PCommLite** serial communications development environment to install and configure the GPS module. However, any serial port terminal emulator (such as HyperTerminal, Tera Term, or PuTTY) may be used.

For more details about PCommLite, check the help menu that comes with the program. This help menu is the full PComm manual, reproduced digitally and packaged with program.

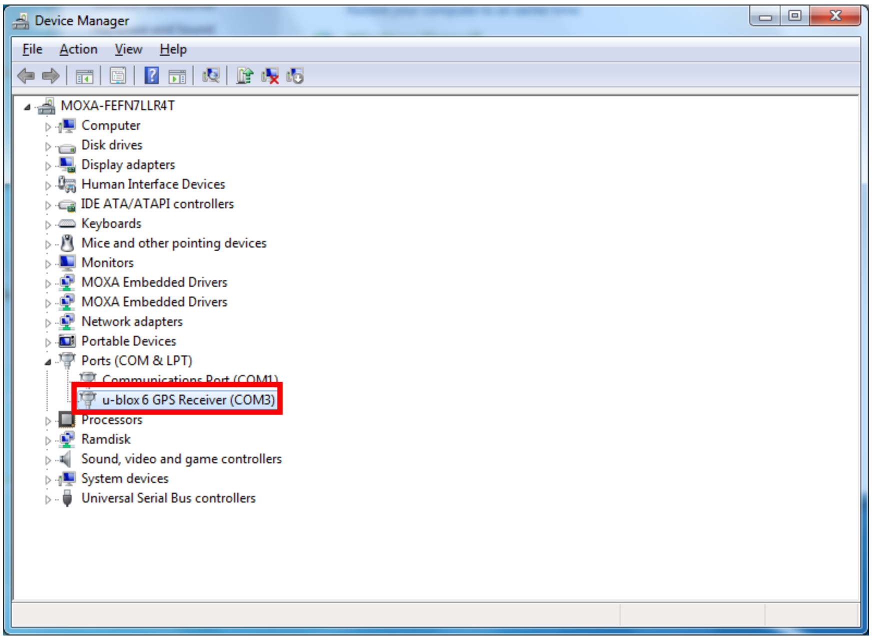
Retrieving GPS Data

To receive GPS data, follow the steps below:

1. Connect the GPS antenna to the GPS antenna port on the TC-6110 front panel.

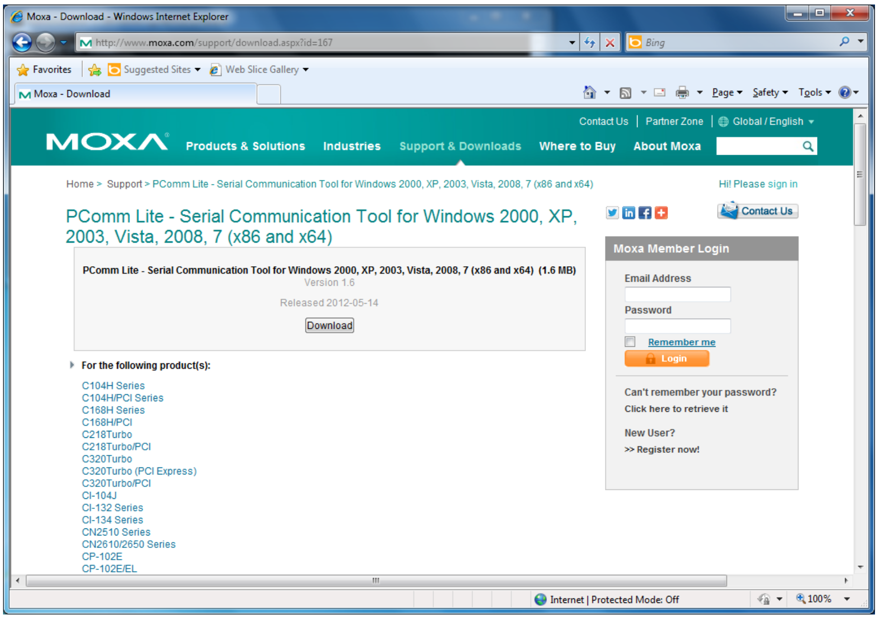


2. Identify the COM port number of the GPS in the device manager (the default port is COM3)



MOXA-FEFN7LLR4T
- Computer
- Disk drives
- Display adapters
- Human Interface Devices
- IDE ATA/ATAPI controllers
- Keyboards
- Mice and other pointing devices
- Monitors
- MOXA Embedded Drivers
- MOXA Embedded Drivers
- Network adapters
- Portable Devices
- Ports (COM & LPT)
  - Communications Port (COM1)
  - u-blox 6 GPS Receiver (COM3)
- Processors
- Ramdisk
- Sound, video and game controllers
- System devices
- Universal Serial Bus controllers

3. Download **PCommLite** from http://www.Moxa.com/support/download.aspx?id=167.



Home > Support > PComm Lite - Serial Communication Tool for Windows 2000, XP, 2003, Vista, 2008, 7 (x86 and x64)

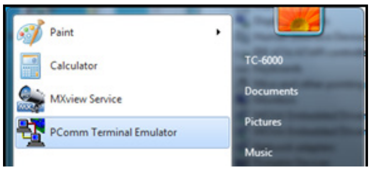
PComm Lite - Serial Communication Tool for Windows 2000, XP, 2003, Vista, 2008, 7 (x86 and x64)

PComm Lite - Serial Communication Tool for Windows 2000, XP, 2003, Vista, 2008, 7 (x86 and x64) (1.6 MB)
Version 1.6
Released 2012-05-14
Download

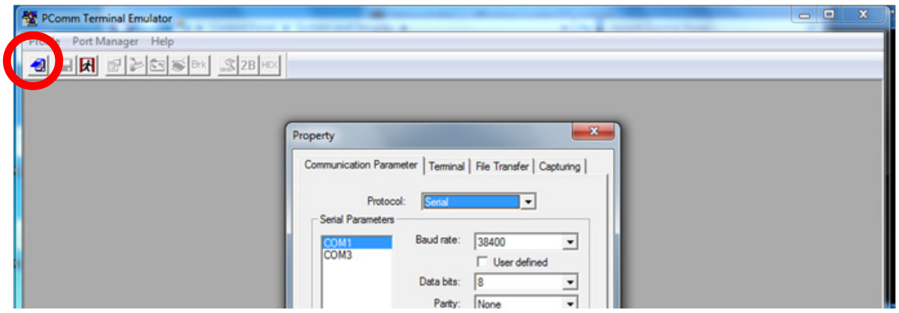
For the following product(s):
C104H Series
C104H/PCI Series
C168H Series
C168H/PCI
C218Turbo
C218Turbo/PCI
C320Turbo
C320Turbo (PCI Express)
C320Turbo/PCI
CI-104J
CI-132 Series
CI-134 Series
CN2510 Series
CN2610/2650 Series
CP-102E
CP-102E/EL

Moxa Member Login
Email Address
Password
□ Remember me
Login
Can't remember your password?
Click here to retrieve it
New User?
>> Register now!

4. Install the program, and then call it from the **Windows Start Menu.**

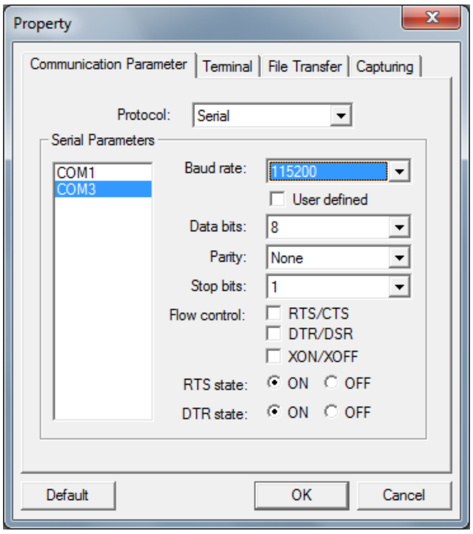


5. Click the top left button (under **Profile**) to open the terminal's port configuration dialog.



Protocol: Serial
Serial Parameters
COM1
COM3
Baud rate: 38400
□ User defined
Data bits: 8
Parity: None

6. Open the GPS port in the terminal by first setting the COM port to the value you tracked down in **step 2** of this section, just above. Next, set the basic communication properties in the **Communication Parameter** tab. In the example below we are using the default port for the Moxa GPS module, **COM3**, at **115,200 baud**. You should not need to change the other properties (Data Bits, Parity, etc), but if you do (perhaps you are using another terminal that requires it) then refer to the figure below for details.



Protocol: Serial

Serial Parameters

COM1
COM3

Baud rate: 115200

□ User defined

Data bits: 8

Parity: None

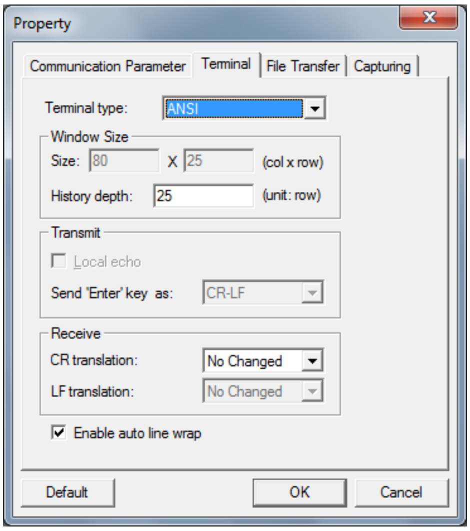
Stop bits: 1

Flow control: □ RTS/CTS □ DTR/DSR □ XON/XOFF

RTS state: ● ON ○ OFF

DTR state: ● ON ○ OFF

7. Next, open the dialog's **Terminal** tab and set the terminal type to **ANSI** (you may want to increase the **history depth** to 500 lines, as well), then click **OK** to finish the configuration and open the port.



Terminal type: ANSI

Window Size

Size: 80 X 25 (col x row)

History depth: 25 (unit: row)

Transmit

□ Local echo

Send 'Enter' key as: CR-LF

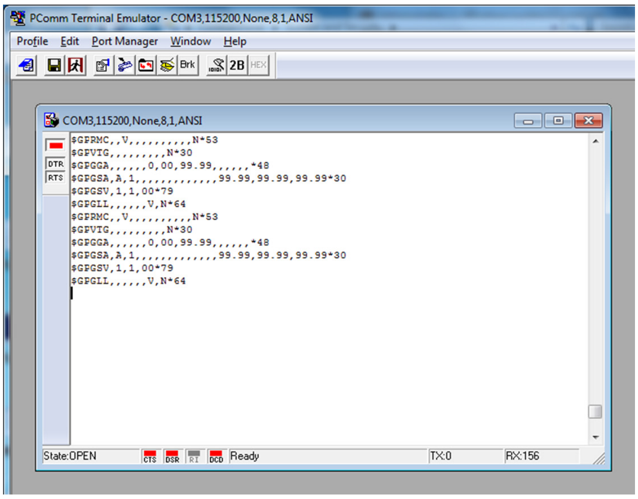
Receive

CR translation: No Changed

LF translation: No Changed

☑ Enable auto line wrap

8. At this point, a terminal should open showing GPS data; if not, then you probably need to change the port (see **step 6**, above). Once the data is displayed, you may start writing code for the GPS module.


PComm Terminal Emulator - COM3,115200,None,8,1,ANSI
Profile
Edit
Port Manager
Window
Help
Brk
2B
HEX
COM3,115200,None,8,1,ANSI
DTR
RTS

```
$GPRMC,,V,,,,,,,,,,N*53
$GPVTG,,,,,,,,,N*30
$GPGGA,,,,,,0,00,99.99,,,,,,*48
$GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,99.99*30
$GPGSV,1,1,00*79
$GPGLL,,,,,,V,N*64
$GPRMC,,V,,,,,,,,,,N*53
$GPVTG,,,,,,,,,N*30
$GPGGA,,,,,,0,00,99.99,,,,,,*48
$GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,99.99*30
$GPGSV,1,1,00*79
$GPGLL,,,,,,V,N*64
```

State:OPEN CTS DSR RI DCD Ready TX:0 RX:156

9. To allow the GPS to communicate with other programs, follow these steps:

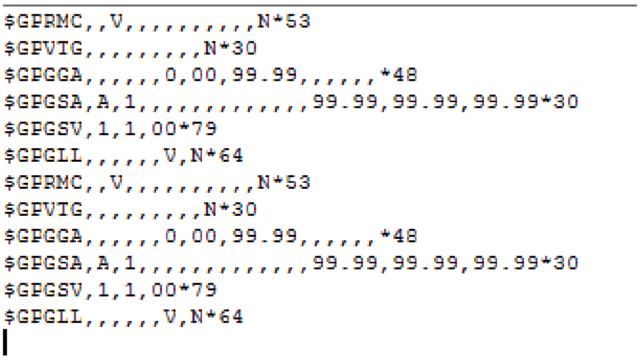
Step1: Use the **`CreateFile()`** API to open the GPS COM port (in the example below, we are using the default port, **COM3**).

```
HANDLE handlePort = CreateFile("COM3",
                     GENERIC_READ | GENERIC_WRITE,
                     0,
                     NULL,
                     OPEN_EXISTING,
                     0,
                     NULL);
```

Step2: Use the **`ReadFile()`** API to read GPS data from the COM port.

```
ReadFile(handlePort,
    inputData,
    inputDataSize,
   gpsData,
    &gpsDataSize,
    NULL);
```

Step3: To parse the GPS data into another program, use the **gpsData** variable that was created in **Step 2**. The data should look something like the example provided below:



```
$GPRMC,,V,,,,,,,,,,N*53
$GPVTG,,,,,,,,,N*30
$GPGGA,,,,,,0,00,99.99,,,,,,*48
$GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,99.99*30
$GPGSV,1,1,00*79
$GPGLL,,,,,,V,N*64
$GPRMC,,V,,,,,,,,,,N*53
$GPVTG,,,,,,,,,N*30
$GPGGA,,,,,,0,00,99.99,,,,,,*48
$GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,99.99*30
$GPGSV,1,1,00*79
$GPGLL,,,,,,V,N*64
```

Step4: Use the **`CloseHandle()`** API to close the GPS COM port.

6

System Recovery

The TC-6110 ready-to-run embedded computers are a Windows Embedded Standard 7 platform. This chapter describes the recovery process in the event of system instability.

The following topics are covered in this chapter:

Overview: Setting Up the Recovery Environment

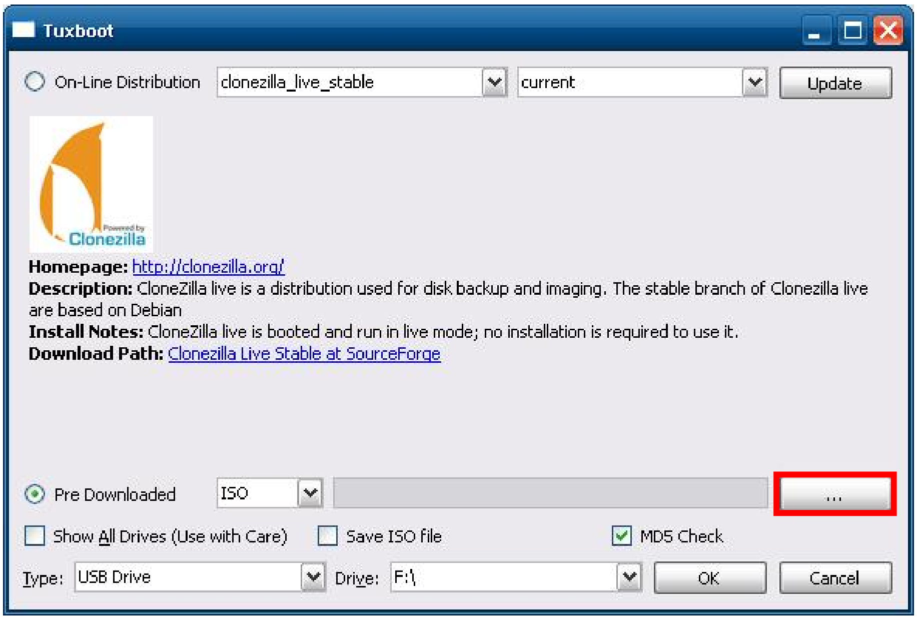
A TC-6110 computer, a 2 GB (min.) USB drive, and a copy of the recovery suite are all required to set up the TC-6110's system recovery environment.
The recovery procedure itself requires only a TC-6110 computer and a bootable USB drive.

The following procedure describes the basic process of setting up the system recovery environment.

1. First, the recovery programs and system image file will be copied over to the USB drive, and the drive will be set up to provide a system boot process by copying an ISO image of the boot environment to the USB.
2. The system will be re-booted, and BIOS will be manually configured to boot the system from the USB port.
3. An image of the current software system will be created on the USB drive, for the recovery environment to use when restoring the system.
4. The system will be re-booted again, and the BIOS returned to its original state.

Step 1: Prepare the USB drive

1. Load the software DVD that came with your TC-6110 computer and execute `tuxboot-windows-23.exe` from the software DVD `\recovery\TC6110W7E` folder, select **Pre-Downloaded**, and click the button marked with an ellipsis (**...**) to browse the file system and find the location of the boot environment's ISO image.

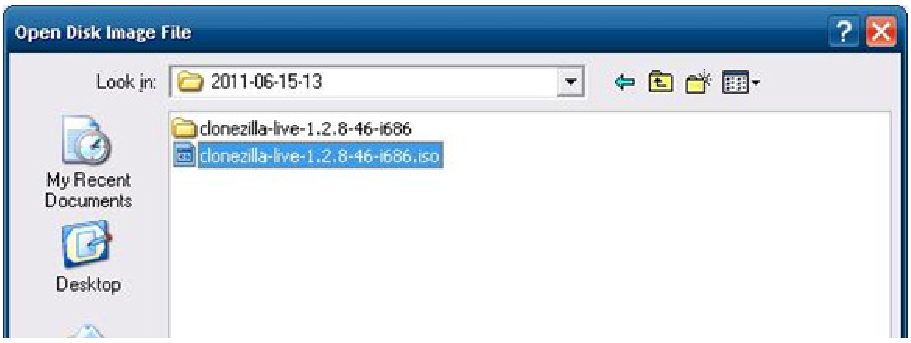


○ On-Line Distribution clonezilla_live_stable current

Homepage: http://clonezilla.org/
Description: CloneZilla live is a distribution used for disk backup and imaging. The stable branch of Clonezilla live are based on Debian
Install Notes: CloneZilla live is booted and run in live mode; no installation is required to use it.
Download Path: Clonezilla Live Stable at SourceForge

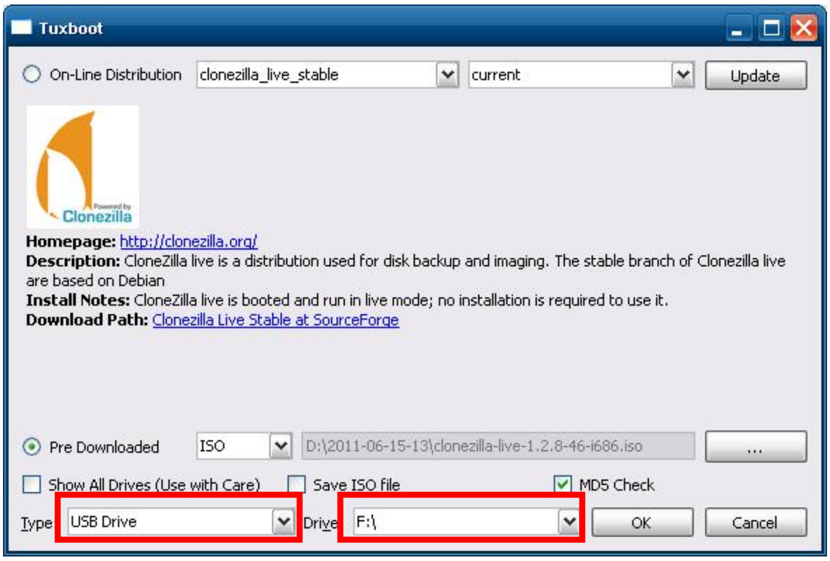
● Pre Downloaded ISO
□ Show All Drives (Use with Care) □ Save ISO file ☑ MD5 Check
Type: USB Drive Drive: F:\

2. Navigate to `\recovery\TC6110W7E\ClonezillaFactory_2013-02-21-14\` on the software DVD and select the boot environment's ISO image.



Look in: 2011-06-15-13
clonezilla-live-1.2.8-46-i686
clonezilla-live-1.2.8-46-i686.iso

3. Set the device **Type** (lower left-hand corner) as **USB Drive**, then set the **Drive** dialog to the letter under which the USB is currently mounted.



Tuxboot

○ On-Line Distribution: clonezilla_live_stable, current

Homepage: http://clonezilla.org/
Description: CloneZilla live is a distribution used for disk backup and imaging. The stable branch of Clonezilla live are based on Debian
Install Notes: CloneZilla live is booted and run in live mode; no installation is required to use it.
Download Path: Clonezilla Live Stable at SourceForge

● Pre Downloaded: ISO, D:\2011-06-15-13\clonezilla-live-1.2.8-46-i686.iso

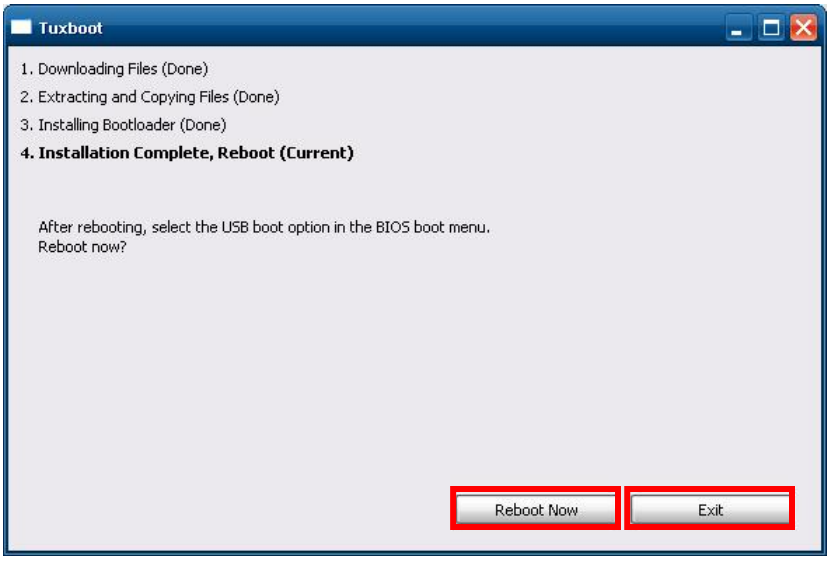
□ Show All Drives (Use with Care) □ Save ISO file ☑ MD5 Check

Type: USB Drive Drive: F:\

4. Click **OK**, and the boot environment and bootloader will be copied to your USB drive.
5. Because of the file system naming conventions used, for any given computer only a single recovery image may be used on any given USB drive. Consequently, ***at this point, users need to make a decision about which sort of system recovery is preferred***:
   A. a basic recovery of the root OS, or
   B. a recovery image of the fully configured OS, with all user-installed software applications and scripts.

A. To configure the recovery environment to boot into **a fully configured system**, users should click **Reboot Now** to close the installation environment and restart the computer. They should then proceed to the next section, **Step 2: Setting the BIOS to Boot via USB** and continue the installation of the recovery environment by continuing to **Step 3 (opt.): Creating a Custom System Image**.

B. To configure the recovery environment to boot into a clean OS image with no applications, users should instead click **Exit** here to complete the installation and return to the OS. From within the desktop environment, the user should then manually copy the directory containing the base OS from the software DVD over to the USB drive. To do this, copy **`#:\<Software DVD>\TC6110W7E\recovery\os_image`** over to the partition image directory, **`F:\home\partimag\`**. At this point, **Step 1** has been completed, and you should proceed to **Step 2: Setting the BIOS to Boot via USB**.



Tuxboot

1. Downloading Files (Done)
2. Extracting and Copying Files (Done)
3. Installing Bootloader (Done)
4. Installation Complete, Reboot (Current)

After rebooting, select the USB boot option in the BIOS boot menu.
Reboot now?

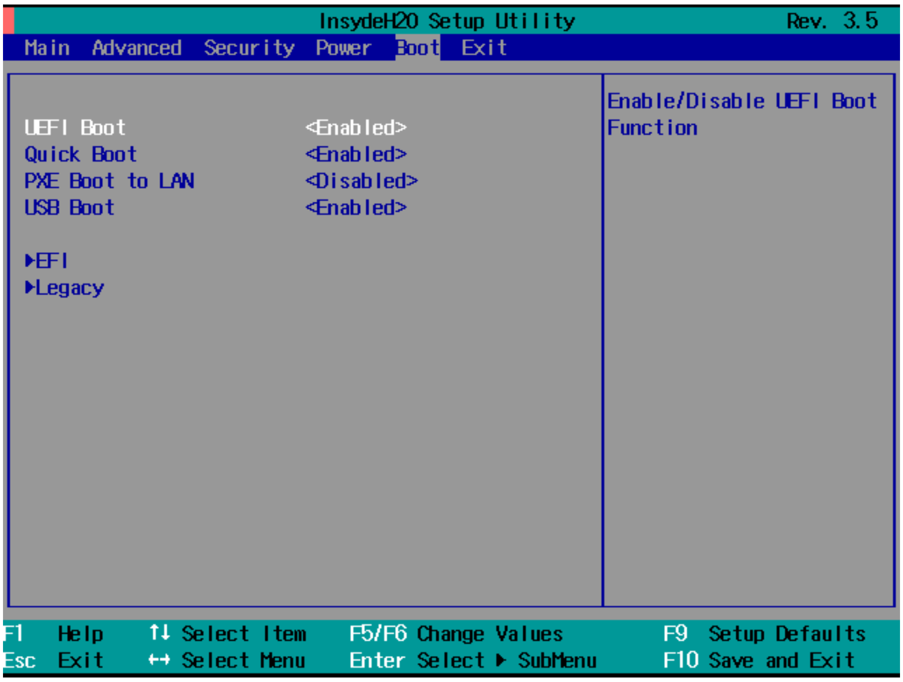
ATTENTION

Because of the peculiarities of the file tree naming, it is not possible to include both the base OS image and a fully configured system image on the same USB stick. If users wish to configure both, then two USB drives must be used, each configured according to the two different alternatives offered here.

Step 2: Setting the BIOS to Boot via USB

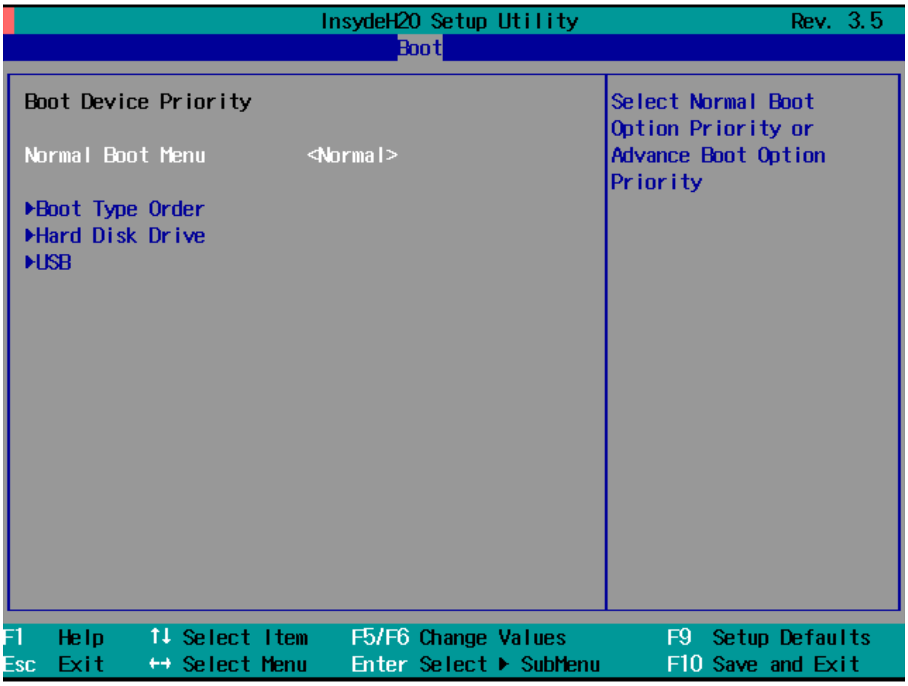
At this stage, users will reset the BIOS so that the system boots directly from the USB. This must be done before the rest of the system recovery environment may be configured

1. Turn on the computer and, during the POST process, press F2 until you hear a long beep. You should then enter the BIOS setup menu. Use the arrow keys to navigate to the **Boot** tab, and then press **Enter**.



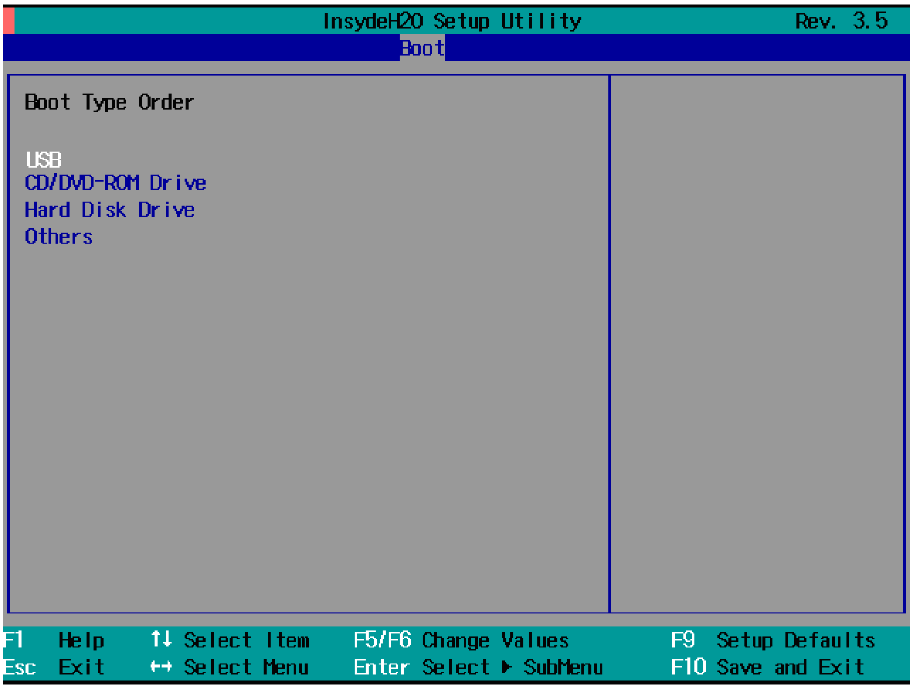
```
                       InsydeH20 Setup Utility                      Rev. 3.5
 Main  Advanced  Security  Power  Boot  Exit

 UEFI Boot                 <Enabled>                Enable/Disable UEFI Boot
 Quick Boot                <Enabled>                Function
 PXE Boot to LAN           <Disabled>
 USB Boot                  <Enabled>

 ▶EFI
 ▶Legacy

F1   Help   ↑↓ Select Item   F5/F6 Change Values      F9  Setup Defaults
Esc  Exit   ↔ Select Menu    Enter Select ▶ SubMenu   F10 Save and Exit
```

2. Select **Boot Type Order** to open the dialog that will allow you to set the boot priority for the system drives.



```
                       InsydeH20 Setup Utility                      Rev. 3.5
                                Boot

 Boot Device Priority                               Select Normal Boot
                                                    Option Priority or
 Normal Boot Menu          <Normal>                 Advance Boot Option
                                                    Priority
 ▶Boot Type Order
 ▶Hard Disk Drive
 ▶USB

F1   Help   ↑↓ Select Item   F5/F6 Change Values      F9  Setup Defaults
Esc  Exit   ↔ Select Menu    Enter Select ▶ SubMenu   F10 Save and Exit
```

3. Use the arrow keys to highlight **USB** and then press the plus key (**+**) to move it to the first position, or (if you want to take the long way around) select the other options above it and use the dash key [**–**] to move them down.



```
InsydeH2O Setup Utility                          Rev. 3.5
                         Boot

Boot Type Order

USB
CD/DVD-ROM Drive
Hard Disk Drive
Others

F1   Help    ↑↓ Select Item   F5/F6 Change Values        F9  Setup Defaults
Esc  Exit    ↔ Select Menu    Enter Select ▸ SubMenu     F10 Save and Exit
```

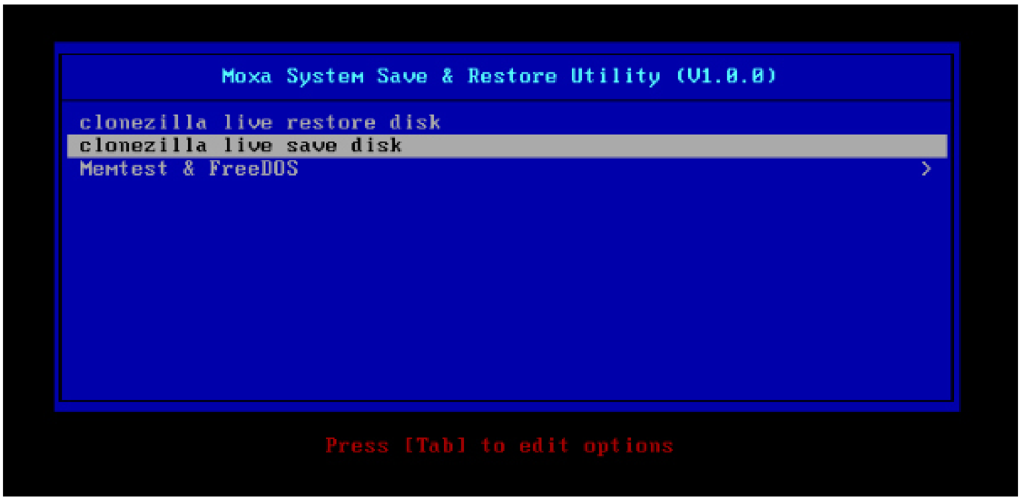
4. Press F10 and then press **Enter** to save and exit the BIOS configuration interface. This should initiate the next reboot, during which your system should now boot from the USB drive.

Step 3 (opt.): Create a Custom System Image

The instructions which follow are only to be used if you decided in **Step 1** of this process ***to create a full copy of an already-configured system***. If you have not yet installed any software on your system, then return to **section 5b** of **Step 1: Preparing the USB Drive** and follow the instructions to create a clean OS image.

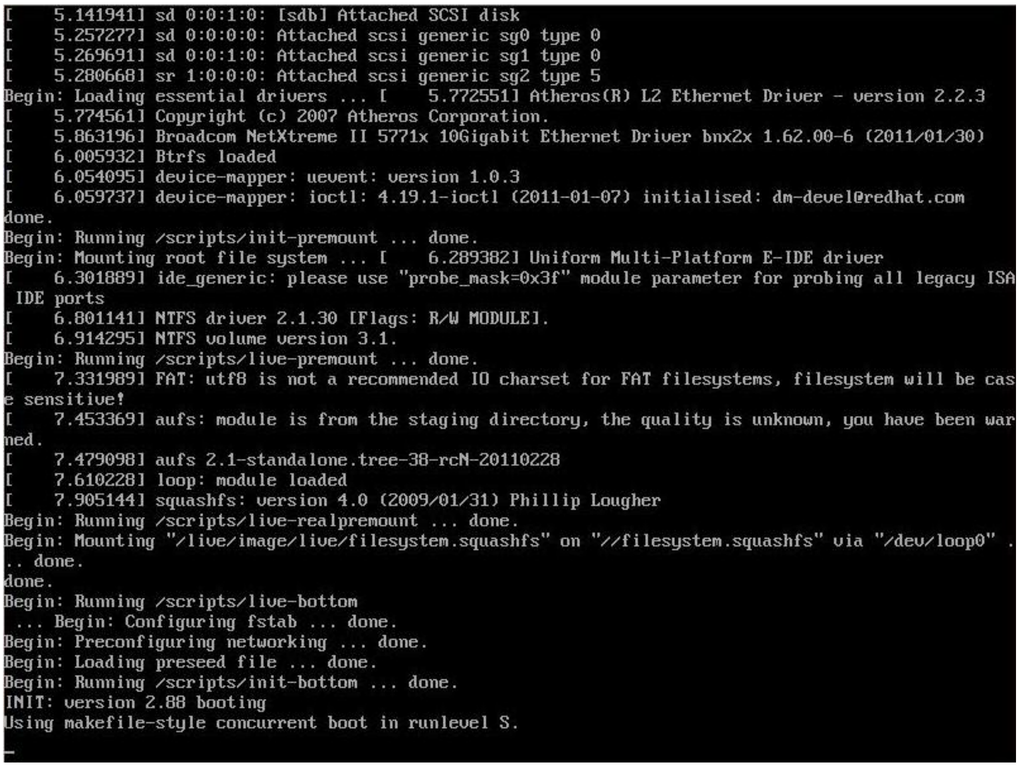
Using this procedure, you will save to the USB drive a copy of the entire system **as it is currently configured** to be used as a **full system recovery image** should the system crash. ***All files under*** `F:\home\partimag\` ***will be overwritten***. Additionally, you should have already changed the BIOS settings to make the USB drive the first boot priority. If you have not yet reset the boot priority, first return to **Step 2: Setting the BIOS to Boot via USB**, just above, and follow the directions there.

1. Once the system has launched and the TC-6110 has booted the recovery environment from the USB drive, navigate to the entry **Clonezilla Live Save Disk**, and select it by pressing **Enter**. This will take you into the **recovery image creation environment**, allowing you to copy your full system setup to the USB drive.



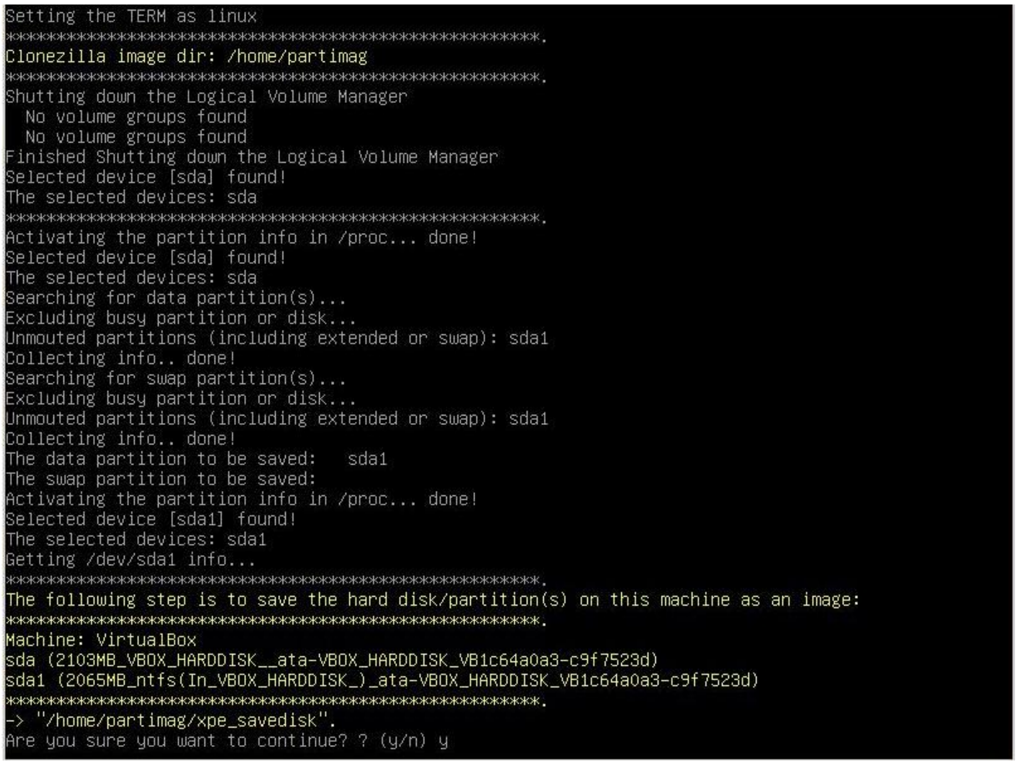
```
Moxa System Save & Restore Utility (V1.0.0)

clonezilla live restore disk
clonezilla live save disk
Memtest & FreeDOS                                      >

Press [Tab] to edit options
```

2. The TC-6110 will now boot into the image creation environment. Wait for the boot process to finish.



```
[    5.141941] sd 0:0:1:0: [sdb] Attached SCSI disk
[    5.257277] sd 0:0:0:0: Attached scsi generic sg0 type 0
[    5.269691] sd 0:0:1:0: Attached scsi generic sg1 type 0
[    5.280668] sr 1:0:0:0: Attached scsi generic sg2 type 5
Begin: Loading essential drivers ... [    5.772551] Atheros(R) L2 Ethernet Driver - version 2.2.3
[    5.774561] Copyright (c) 2007 Atheros Corporation.
[    5.863196] Broadcom NetXtreme II 5771x 10Gigabit Ethernet Driver bnx2x 1.62.00-6 (2011/01/30)
[    6.005932] Btrfs loaded
[    6.054095] device-mapper: uevent: version 1.0.3
[    6.059737] device-mapper: ioctl: 4.19.1-ioctl (2011-01-07) initialised: dm-devel@redhat.com
done.
Begin: Running /scripts/init-premount ... done.
Begin: Mounting root file system ... [    6.289382] Uniform Multi-Platform E-IDE driver
[    6.301889] ide_generic: please use "probe_mask=0x3f" module parameter for probing all legacy ISA
 IDE ports
[    6.801141] NTFS driver 2.1.30 [Flags: R/W MODULE].
[    6.914295] NTFS volume version 3.1.
Begin: Running /scripts/live-premount ... done.
[    7.331989] FAT: utf8 is not a recommended IO charset for FAT filesystems, filesystem will be cas
e sensitive!
[    7.453369] aufs: module is from the staging directory, the quality is unknown, you have been war
ned.
[    7.479098] aufs 2.1-standalone.tree-38-rcN-20110228
[    7.610228] loop: module loaded
[    7.905144] squashfs: version 4.0 (2009/01/31) Phillip Lougher
Begin: Running /scripts/live-realpremount ... done.
Begin: Mounting "/live/image/live/filesystem.squashfs" on "//filesystem.squashfs" via "/dev/loop0" .
.. done.
done.
Begin: Running /scripts/live-bottom
 ... Begin: Configuring fstab ... done.
Begin: Preconfiguring networking ... done.
Begin: Loading preseed file ... done.
Begin: Running /scripts/init-bottom ... done.
INIT: version 2.88 booting
Using makefile-style concurrent boot in runlevel S.

_
```

3. Once the image creation environment has completed booting up, you will be given a warning and asked if you wish to continue. Please keep in mind that if you create the recovery image, then ***any residual files currently copied to the*** `/home/partimag` ***directory will be deleted***. If there are any files remaining in the USB **partition image** directory and you wish to save them, you must exit the recovery environment and copy these files to another disk. If you wish to continue with the image creation, press **Y** (case insensitive) to continue.

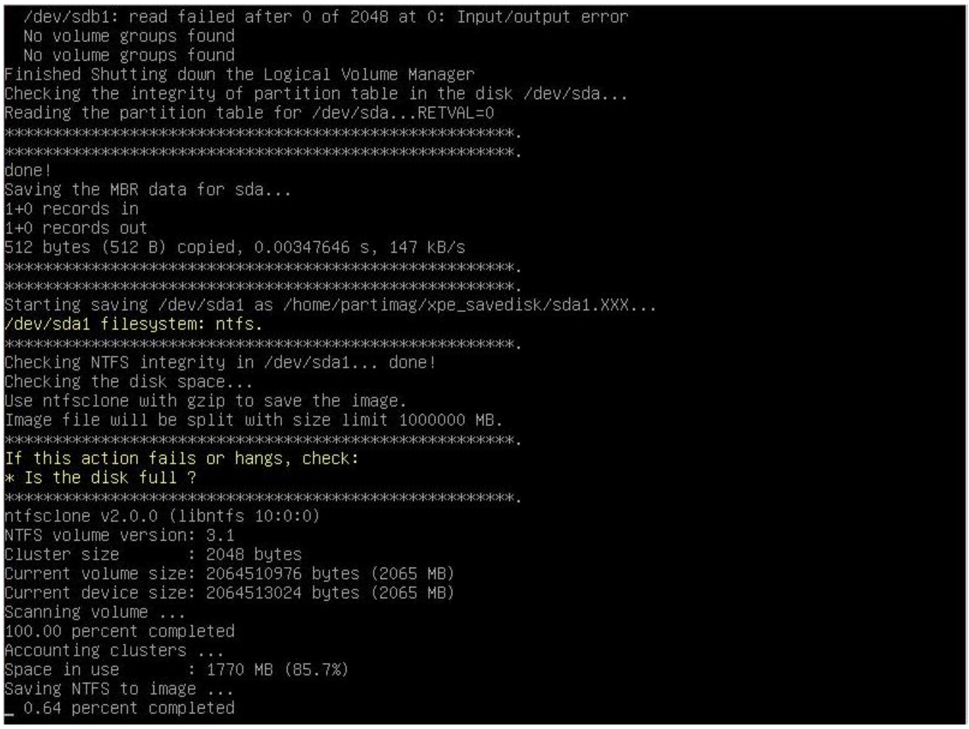


```
Setting the TERM as linux
*****************************************************.
Clonezilla image dir: /home/partimag
*****************************************************.
Shutting down the Logical Volume Manager
  No volume groups found
  No volume groups found
Finished Shutting down the Logical Volume Manager
Selected device [sda] found!
The selected devices: sda
*****************************************************.
Activating the partition info in /proc... done!
Selected device [sda] found!
The selected devices: sda
Searching for data partition(s)...
Excluding busy partition or disk...
Unmouted partitions (including extended or swap): sda1
Collecting info.. done!
Searching for swap partition(s)...
Excluding busy partition or disk...
Unmouted partitions (including extended or swap): sda1
Collecting info.. done!
The data partition to be saved:   sda1
The swap partition to be saved:
Activating the partition info in /proc... done!
Selected device [sda1] found!
The selected devices: sda1
Getting /dev/sda1 info...
*****************************************************.
The following step is to save the hard disk/partition(s) on this machine as an image:
*****************************************************.
Machine: VirtualBox
sda (2103MB_VBOX_HARDDISK__ata-VBOX_HARDDISK_VB1c64a0a3-c9f7523d)
sda1 (2065MB_ntfs(In_VBOX_HARDDISK_)_ata-VBOX_HARDDISK_VB1c64a0a3-c9f7523d)
*****************************************************.
-> "/home/partimag/xpe_savedisk".
Are you sure you want to continue? ? (y/n) y
```

WARNING

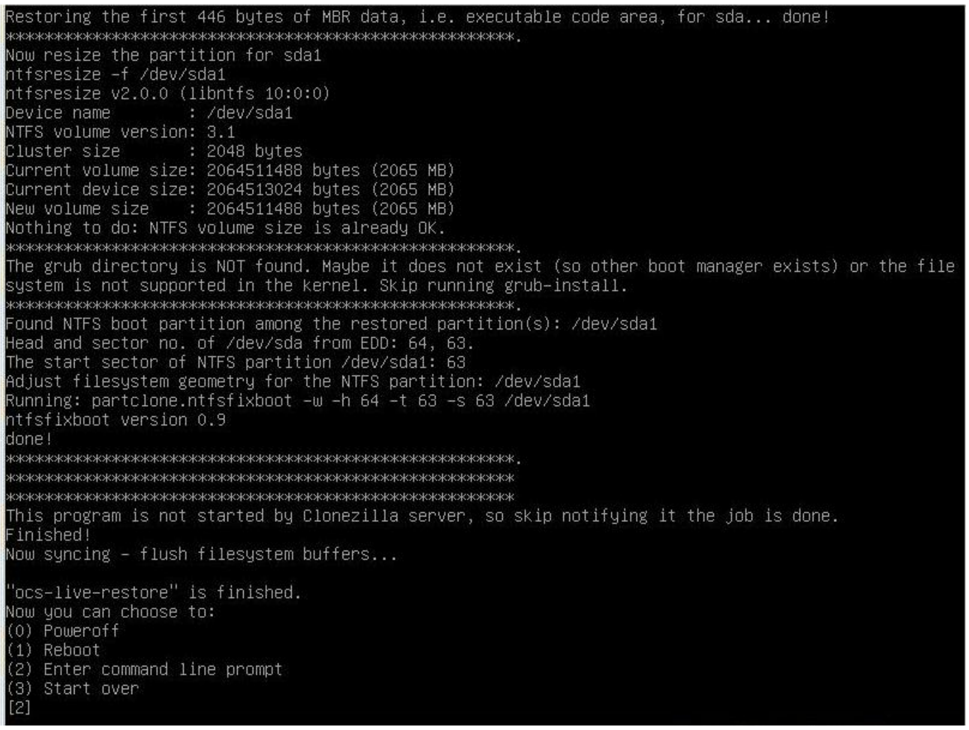
The same filename is used for all recovery images, whether for the full system backup or for the clean OS image installation. This means that currently, it is impossible to have more than one system image per USB drive.

4. At this point, the recovery environment will copy of the entire hard drive to your USB drive. This will likely take several minutes, and perhaps as long as half an hour. Do not remove the USB drive during this time; wait patiently for the process to finish. Depending on the speed of your USB drive, this may be a good time to get a cup of coffee, or take a nap.



```
  /dev/sdb1: read failed after 0 of 2048 at 0: Input/output error
  No volume groups found
  No volume groups found
Finished Shutting down the Logical Volume Manager
Checking the integrity of partition table in the disk /dev/sda...
Reading the partition table for /dev/sda...RETVAL=0
*****************************************************.
*****************************************************.
done!
Saving the MBR data for sda...
1+0 records in
1+0 records out
512 bytes (512 B) copied, 0.00347646 s, 147 kB/s
*****************************************************.
*****************************************************.
Starting saving /dev/sda1 as /home/partimag/xpe_savedisk/sda1.XXX...
/dev/sda1 filesystem: ntfs.
*****************************************************.
Checking NTFS integrity in /dev/sda1... done!
Checking the disk space...
Use ntfsclone with gzip to save the image.
Image file will be split with size limit 1000000 MB.
*****************************************************.
If this action fails or hangs, check:
* Is the disk full ?
*****************************************************.
ntfsclone v2.0.0 (libntfs 10:0:0)
NTFS volume version: 3.1
Cluster size       : 2048 bytes
Current volume size: 2064510976 bytes (2065 MB)
Current device size: 2064513024 bytes (2065 MB)
Scanning volume ...
100.00 percent completed
Accounting clusters ...
Space in use       : 1770 MB (85.7%)
Saving NTFS to image ...
_ 0.64 percent completed
```

5. At this point you may choose to power down the computer (press **0**), reboot (press **1**), enter a console terminal (access a console TTY -- press **2**), or re-initiate the entire procedure (press **3**). ***Do not remove the USB drive until you have rebooted or powered down the system.***



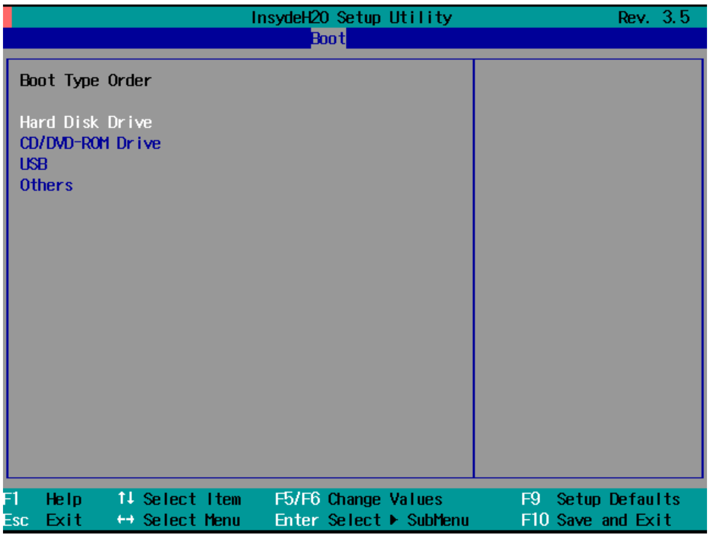
```
Restoring the first 446 bytes of MBR data, i.e. executable code area, for sda... done!
*****************************************************.
Now resize the partition for sda1
ntfsresize -f /dev/sda1
ntfsresize v2.0.0 (libntfs 10:0:0)
Device name        : /dev/sda1
NTFS volume version: 3.1
Cluster size       : 2048 bytes
Current volume size: 2064511488 bytes (2065 MB)
Current device size: 2064513024 bytes (2065 MB)
New volume size    : 2064511488 bytes (2065 MB)
Nothing to do: NTFS volume size is already OK.
*****************************************************.
The grub directory is NOT found. Maybe it does not exist (so other boot manager exists) or the file
system is not supported in the kernel. Skip running grub-install.
*****************************************************.
Found NTFS boot partition among the restored partition(s): /dev/sda1
Head and sector no. of /dev/sda from EDD: 64, 63.
The start sector of NTFS partition /dev/sda1: 63
Adjust filesystem geometry for the NTFS partition: /dev/sda1
Running: partclone.ntfsfixboot -w -h 64 -t 63 -s 63 /dev/sda1
ntfsfixboot version 0.9
done!
*****************************************************.
*****************************************************
*****************************************************
This program is not started by Clonezilla server, so skip notifying it the job is done.
Finished!
Now syncing - flush filesystem buffers...

"ocs-live-restore" is finished.
Now you can choose to:
(0) Poweroff
(1) Reboot
(2) Enter command line prompt
(3) Start over
[2]
```

6. Once you have powered down the system and removed the USB drive, you have finished configuring the recovery environment. The USB drive should be clearly labeled and stored in a safe place. You may now continue to the next section, where you will return the BIOS to its original state (Step 4) and test the recovery procedure for successful configuration (Step 5).

Step 4: Reset BIOS to Original State

Now you will need to return the boot priority to its original configuration so that the system will boot from the original disk. This is done for two reasons; the first is security, so that the machine may not be rebooted from unauthorized USB drives The second, however, is functional: currently, if the TC-6110 is set to boot from the USB drive, then ***the TC-6110 will hang any time a USB data drive (i.e.: non-bootable image) is inserted in the machine at boot time***. The TC-6110 does not currently have the capacity to distinguish between simple USB data drives and boot-capable OS drives.

1. Reboot the system, and press F2 to enter the BIOS setup menu.
2. Select **Hard Disk** and shift it to the top boot priority by using the + key, then press **Enter**. Make sure the hard disk has first boot priority.



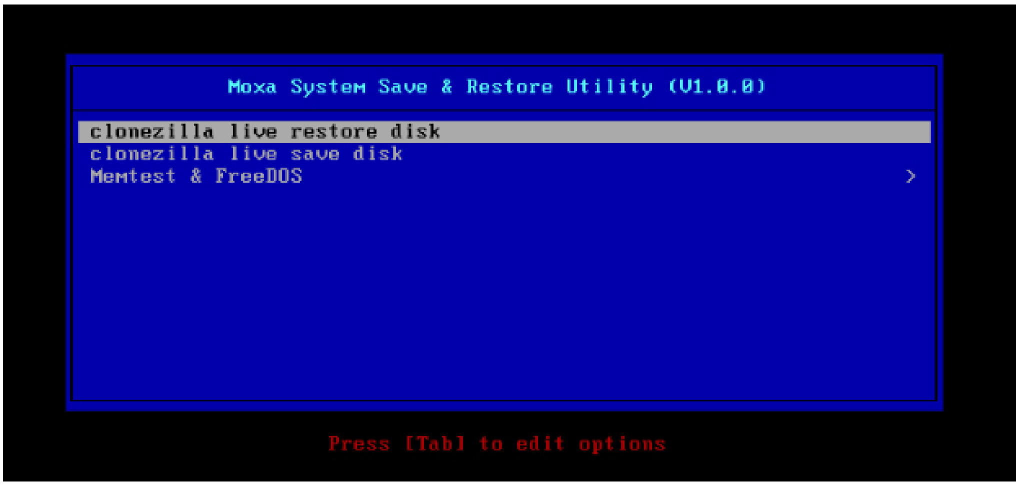
```
InsydeH20 Setup Utility                                   Rev. 3.5
                              Boot

 Boot Type Order

 Hard Disk Drive
 CD/DVD-ROM Drive
 USB
 Others

F1   Help   ↑↓ Select Item   F5/F6 Change Values        F9   Setup Defaults
Esc  Exit   ↔  Select Menu   Enter Select ▶ SubMenu     F10  Save and Exit
```

3. Press F10 and then press **Enter** to save and exit the BIOS settings dialog.

Step 5: Perform a Test Restoration

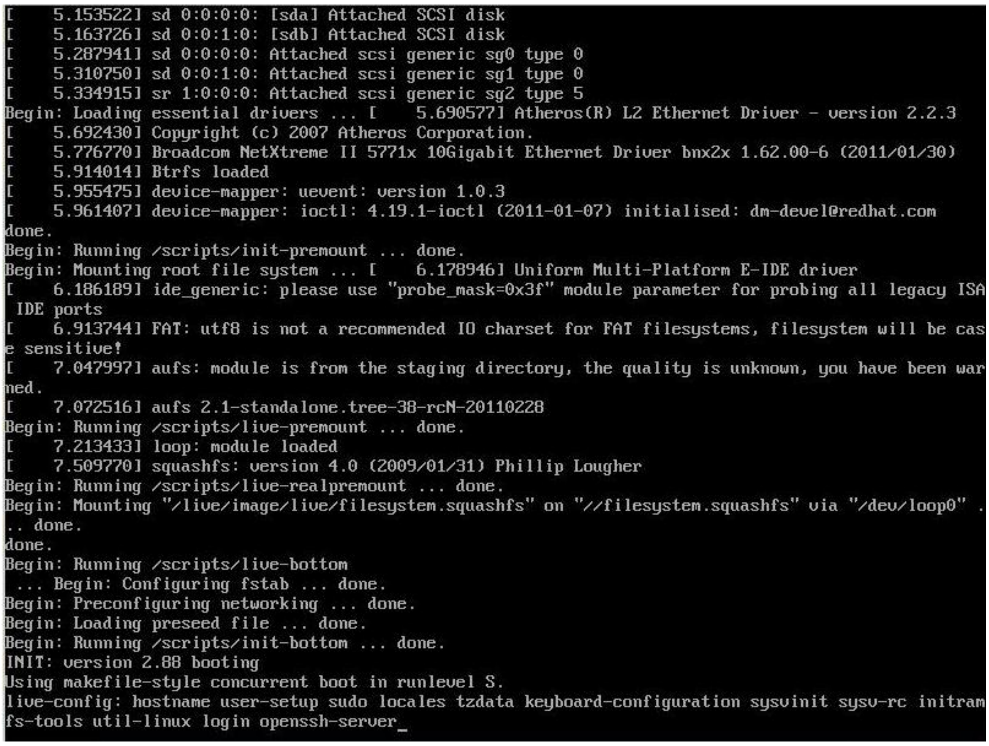
Connect the USB drive to any of the TC-6110's USB ports and then reboot the computer. The system will boot from the USB into the Clonezilla boot loader.

1. Select **Clonezilla Live Restore Disk** to boot into the system restoration environment.



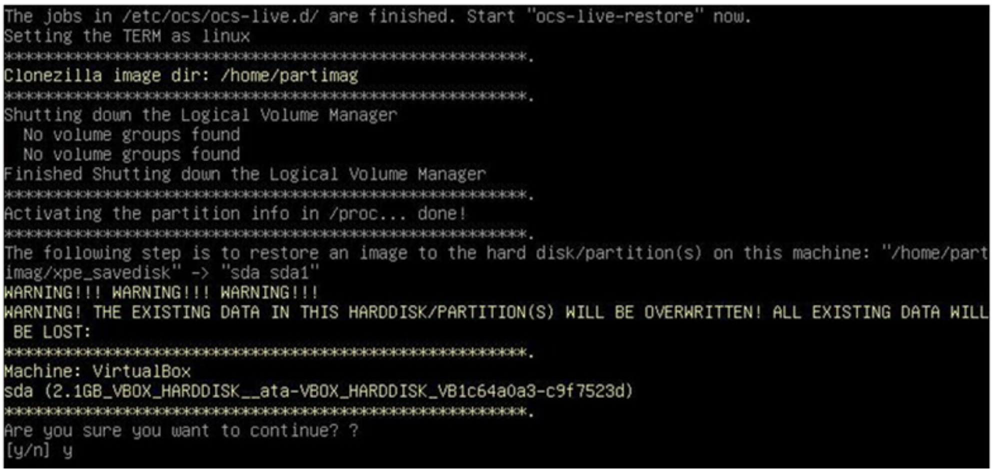
```
        Moxa System Save & Restore Utility (V1.0.0)

 clonezilla live restore disk
 clonezilla live save disk
 Memtest & FreeDOS                                    >

              Press [Tab] to edit options
```

2. Wait for the boot process to finish.



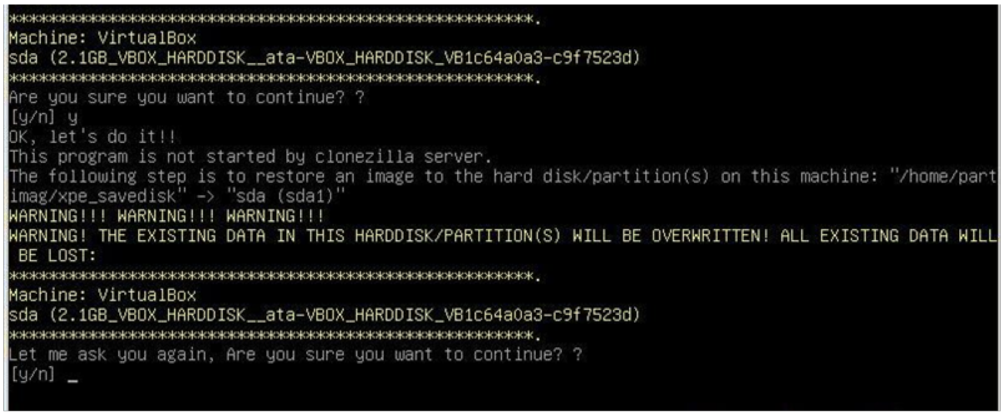
```
[    5.153522] sd 0:0:0:0: [sda] Attached SCSI disk
[    5.163726] sd 0:0:1:0: [sdb] Attached SCSI disk
[    5.287941] sd 0:0:0:0: Attached scsi generic sg0 type 0
[    5.310750] sd 0:0:1:0: Attached scsi generic sg1 type 0
[    5.334915] sr 1:0:0:0: Attached scsi generic sg2 type 5
Begin: Loading essential drivers ... [    5.690577] Atheros(R) L2 Ethernet Driver - version 2.2.3
[    5.692430] Copyright (c) 2007 Atheros Corporation.
[    5.776770] Broadcom NetXtreme II 5771x 10Gigabit Ethernet Driver bnx2x 1.62.00-6 (2011/01/30)
[    5.914014] Btrfs loaded
[    5.955475] device-mapper: uevent: version 1.0.3
[    5.961407] device-mapper: ioctl: 4.19.1-ioctl (2011-01-07) initialised: dm-devel@redhat.com
done.
Begin: Running /scripts/init-premount ... done.
Begin: Mounting root file system ... [    6.178946] Uniform Multi-Platform E-IDE driver
[    6.186189] ide_generic: please use "probe_mask=0x3f" module parameter for probing all legacy ISA
 IDE ports
[    6.913744] FAT: utf8 is not a recommended IO charset for FAT filesystems, filesystem will be cas
e sensitive!
[    7.047997] aufs: module is from the staging directory, the quality is unknown, you have been war
ned.
[    7.072516] aufs 2.1-standalone.tree-38-rcN-20110228
Begin: Running /scripts/live-premount ... done.
[    7.213433] loop: module loaded
[    7.509770] squashfs: version 4.0 (2009/01/31) Phillip Lougher
Begin: Running /scripts/live-realpremount ... done.
Begin: Mounting "/live/image/live/filesystem.squashfs" on "//filesystem.squashfs" via "/dev/loop0" .
.. done.
done.
Begin: Running /scripts/live-bottom
 ... Begin: Configuring fstab ... done.
Begin: Preconfiguring networking ... done.
Begin: Loading preseed file ... done.
Begin: Running /scripts/init-bottom ... done.
INIT: version 2.88 booting
Using makefile-style concurrent boot in runlevel S.
live-config: hostname user-setup sudo locales tzdata keyboard-configuration sysvinit sysv-rc initram
fs-tools util-linux login openssh-server_
```

3. At this point, the system will remind you that you are about to overwrite your entire operating system with a new drive image, and ask you if you want to continue. When prompted, enter **Y** (case insensitive) from the keyboard to start the system restoration process. Any other letter or Ctrl-C will cancel it and exit Clonezilla.



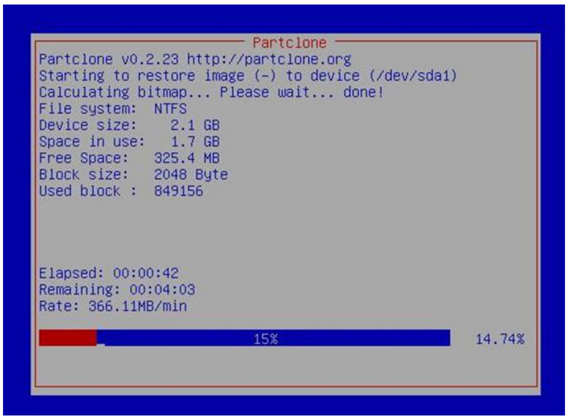
```
The jobs in /etc/ocs/ocs-live.d/ are finished. Start "ocs-live-restore" now.
Setting the TERM as linux
*****************************************************.
Clonezilla image dir: /home/partimag
*****************************************************.
Shutting down the Logical Volume Manager
  No volume groups found
  No volume groups found
Finished Shutting down the Logical Volume Manager
*****************************************************.
Activating the partition info in /proc... done!
*****************************************************.
The following step is to restore an image to the hard disk/partition(s) on this machine: "/home/part
imag/xpe_savedisk" -> "sda sda1"
WARNING!!! WARNING!!! WARNING!!!
WARNING! THE EXISTING DATA IN THIS HARDDISK/PARTITION(S) WILL BE OVERWRITTEN! ALL EXISTING DATA WILL
 BE LOST:
*****************************************************.
Machine: VirtualBox
sda (2.1GB_VBOX_HARDDISK__ata-VBOX_HARDDISK_VB1c64a0a3-c9f7523d)
*****************************************************.
Are you sure you want to continue? ?
[y/n] y
```

4. The system will give you another warning that you are about to overwrite your hard drive, and erase all data on the partition listed (**sda1**, in the example below). If you wish to continue, enter **Y** (case insensitive).



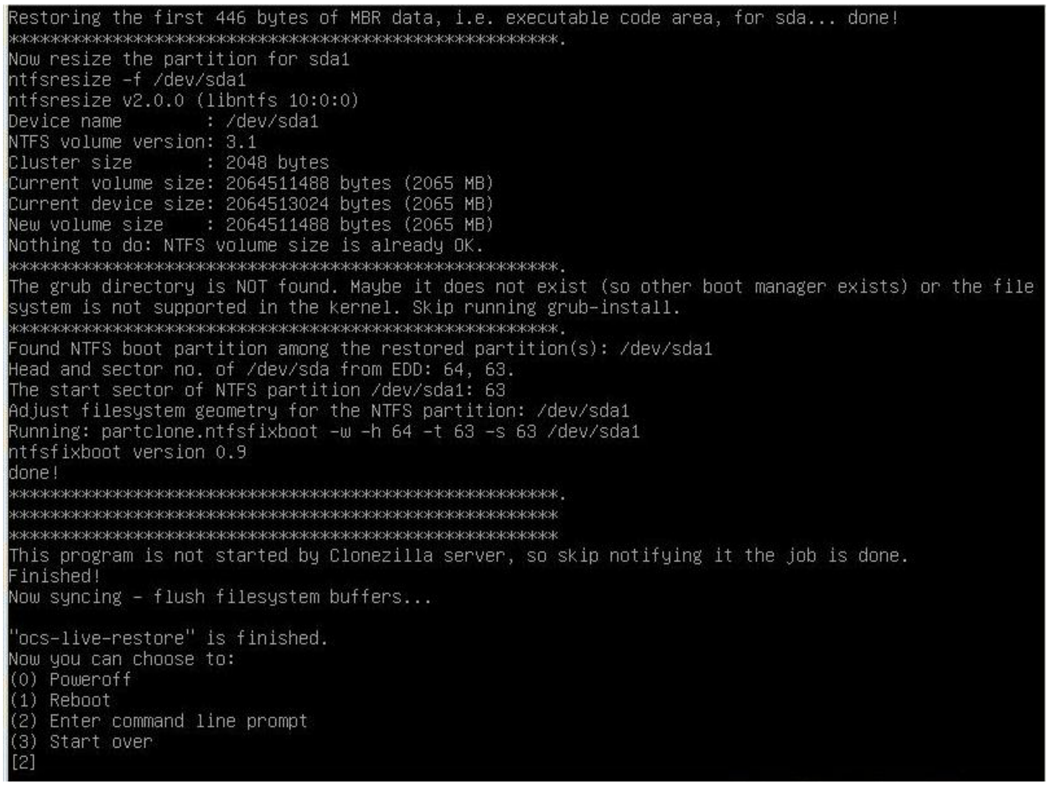
```
*****************************************************.
Machine: VirtualBox
sda (2.1GB_VBOX_HARDDISK__ata-VBOX_HARDDISK_VB1c64a0a3-c9f7523d)
*****************************************************.
Are you sure you want to continue? ?
[y/n] y
OK, let's do it!!
This program is not started by clonezilla server.
The following step is to restore an image to the hard disk/partition(s) on this machine: "/home/part
imag/xpe_savedisk" -> "sda (sda1)"
WARNING!!! WARNING!!! WARNING!!!
WARNING! THE EXISTING DATA IN THIS HARDDISK/PARTITION(S) WILL BE OVERWRITTEN! ALL EXISTING DATA WILL
 BE LOST:
*****************************************************.
Machine: VirtualBox
sda (2.1GB_VBOX_HARDDISK__ata-VBOX_HARDDISK_VB1c64a0a3-c9f7523d)
*****************************************************.
Let me ask you again, Are you sure you want to continue? ?
[y/n] _
```

5. Wait for the process to finish.



```
Partclone
Partclone v0.2.23 http://partclone.org
Starting to restore image (-) to device (/dev/sda1)
Calculating bitmap... Please wait... done!
File system:  NTFS
Device size:    2.1 GB
Space in use:   1.7 GB
Free Space:   325.4 MB
Block size:   2048 Byte
Used block :  849156



Elapsed: 00:00:42
Remaining: 00:04:03
Rate: 366.11MB/min

                         15%                      14.74%
```

6. At this point, complete the restoration by selecting (**0**) Poweroff. This will shut down the computer; however, if the **Power Switch** remains inserted in the front panel of the computer and is left in the **ON** position, then the system fail to shutdown and will immediately initiate a soft reboot, instead. To avoid this, users may use the switch to cut power to the computer immediately following the shutdown, or may simply remove the power switch from the front panel and then use the console to shut down the computer by pressing **0**.



```
Restoring the first 446 bytes of MBR data, i.e. executable code area, for sda... done!
*****************************************************.
Now resize the partition for sda1
ntfsresize -f /dev/sda1
ntfsresize v2.0.0 (libntfs 10:0:0)
Device name        : /dev/sda1
NTFS volume version: 3.1
Cluster size       : 2048 bytes
Current volume size: 2064511488 bytes (2065 MB)
Current device size: 2064513024 bytes (2065 MB)
New volume size    : 2064511488 bytes (2065 MB)
Nothing to do: NTFS volume size is already OK.
*****************************************************.
The grub directory is NOT found. Maybe it does not exist (so other boot manager exists) or the file
system is not supported in the kernel. Skip running grub-install.
*****************************************************.
Found NTFS boot partition among the restored partition(s): /dev/sda1
Head and sector no. of /dev/sda from EDD: 64, 63.
The start sector of NTFS partition /dev/sda1: 63
Adjust filesystem geometry for the NTFS partition: /dev/sda1
Running: partclone.ntfsfixboot -w -h 64 -t 63 -s 63 /dev/sda1
ntfsfixboot version 0.9
done!
*****************************************************.
*****************************************************
*****************************************************
This program is not started by Clonezilla server, so skip notifying it the job is done.
Finished!
Now syncing - flush filesystem buffers...

"ocs-live-restore" is finished.
Now you can choose to:
(0) Poweroff
(1) Reboot
(2) Enter command line prompt
(3) Start over
[2]
```

7. After the computer has powered down, remove the USB drive and store it in a safe place.

A

The 2013 Synmap OID Table

This appendix describes the full Synmap OID table as of July, 2013.

The following topics are covered in this appendix:

Moxa Synmap: The Full OID Table

The following table shows the full list of the Moxa Synmap OID.

Item Name	OID	Access	Description	Supported
productName	1.3.6.1.4.1.8691.17.1.1.1	read-only	Returns product name.	■
productDesc	1.3.6.1.4.1.8691.17.1.1.2	read-only	Returns product short description.	■
productVersion	1.3.6.1.4.1.8691.17.1.1.3	read-only	Returns product version.	■
productBuildDate	1.3.6.1.4.1.8691.17.1.1.4	read-only	Returns product last build date, the format is YYMMDDHH.	■
systemCpuUsage	1.3.6.1.4.1.8691.17.1.2.1.1	read-only	Show CPU usage rate (0-100 %).	
systemMemUsage	1.3.6.1.4.1.8691.17.1.2.1.3	read-only	Show memory usage rate (0-100 %).	
systemUptime	1.3.6.1.4.1.8691.17.1.2.1.5	read-only	The amount of time since this host was last initialized.	
systemTotalUptime	1.3.6.1.4.1.8691.17.1.2.1.6	read-only	The amount of time from total boot up time.	
systemMemorySize	1.3.6.1.4.1.8691.17.1.2.3.1	read-only	The amount of physical main memory contained by the host.	
systemVolumeCount	1.3.6.1.4.1.8691.17.1.2.3.2	read-only	Show total volume count.	
systemVolumeIndex	1.3.6.1.4.1.8691.17.1.2.3.3.1.1	read-only	Reference index for each observed device.	
systemVolumeName	1.3.6.1.4.1.8691.17.1.2.3.3.1.2	read-only	The name of the volume.	
systemVolumeLabel	1.3.6.1.4.1.8691.17.1.2.3.3.1.3	read-only	The label of the volume.	
systemVolumeSize	1.3.6.1.4.1.8691.17.1.2.3.3.1.4	read-only	The total size of the volume.	
systemVolumeAvail	1.3.6.1.4.1.8691.17.1.2.3.3.1.5	read-only	The available size of the volume.	
biosVersion	1.3.6.1.4.1.8691.17.1.4.1	read-only	Returns the BIOS version.	
biosSaveSetting	1.3.6.1.4.1.8691.17.1.4.2	read-write	Write 1 to save bios setting, and read 0 mean setting had been applied.	
biosSettingStatus	1.3.6.1.4.1.8691.17.1.4.3	read-only	Returns compare of bios CMOS setting and bios new setting.	
bootDeviceStatus	1.3.6.1.4.1.8691.17.1.4.4.1	read-only	Returns the current support boot device.	
firstBootDevice	1.3.6.1.4.1.8691.17.1.4.4.2	read-write	read show current first boot device, write set	

			boot device.	
pwrOnAfterPwrFail	1.3.6.1.4.1.8691.17.1.4.8.1	read-write	Select power on after power fail behavior.	
pwrLanWakeUp	1.3.6.1.4.1.8691.17.1.4.8.3	read-write	Enable/Disable wake on LAN functionality.	
tempSensorsIndex	1.3.6.1.4.1.8691.17.1.5.1.1.1.1	read-only	Reference index for each observed device.	■
tempSensorsDevice	1.3.6.1.4.1.8691.17.1.5.1.1.1.2	read-only	The name of the temperature sensor we are reading.	■
tempSensorsValue	1.3.6.1.4.1.8691.17.1.5.1.1.1.3	read-only	The temperature of this sensor in mC.	■
voltSensorsIndex	1.3.6.1.4.1.8691.17.1.5.1.2.1.1	read-only	Reference index for each observed device.	
voltSensorsDevice	1.3.6.1.4.1.8691.17.1.5.1.2.1.2	read-only	The name of the device we are reading.	
voltSensorsValue	1.3.6.1.4.1.8691.17.1.5.1.2.1.3	read-only	The voltage in mV.	
accelerometerIndex	1.3.6.1.4.1.8691.17.1.5.1.3.1.1	read-only	Reference index for each observed device.	■
accelerometerAxis	1.3.6.1.4.1.8691.17.1.5.1.3.1.2	read-only	The name of the accelerometer axis we are reading.	■
accelerometerValue	1.3.6.1.4.1.8691.17.1.5.1.3.1.3	read-only	The accelerometer value in mG.	■
accelerometerTimestamp	1.3.6.1.4.1.8691.17.1.5.1.3.1.4	read-only	The timestamp when accelerometer measured.	■
ioDiNumber	1.3.6.1.4.1.8691.17.1.6.1.1.1	read-only	Number of digital input pin in current system.	
diIndex	1.3.6.1.4.1.8691.17.1.6.1.1.2.1.1	read-only	Reference index for each digital input pin.	
diPort	1.3.6.1.4.1.8691.17.1.6.1.1.2.1.2	read-only	The port number of digital input pin.	
diValue	1.3.6.1.4.1.8691.17.1.6.1.1.2.1.3	read-only	The digital input status, 0 is low, 1 is high.	
diTrapEnable	1.3.6.1.4.1.8691.17.1.6.1.1.2.1.4	read-write	Agent will send trap message when digital input pin status changed and this object enbeled.	
ioDoNumber	1.3.6.1.4.1.8691.17.1.6.1.1.3	read-only	Number of digital output pin in current system.	
doIndex	1.3.6.1.4.1.8691.17.1.6.1.1.4.1.1	read-only	Reference index for each digital output pin.	
doPort	1.3.6.1.4.1.8691.17.1.6.1.1.4.1.2	read-only	The port number of digital output pin.	

doValue	1.3.6.1.4.1.8691.17.1.6.1.1.4.1.3	read-write	The digital output status, 0 is low, 1 is high.	
ledNumber	1.3.6.1.4.1.8691.17.1.6.2.1	read-only	Number of LED in current system	
ledIndex	1.3.6.1.4.1.8691.17.1.6.2.2.1.1	read-only	Reference index for each LED.	
ledPort	1.3.6.1.4.1.8691.17.1.6.2.2.1.2	read-only	The port number of LED.	
ledValue	1.3.6.1.4.1.8691.17.1.6.2.2.1.3	read-write	The LED status, 0 is low, 1 is high.	
uartNumber	1.3.6.1.4.1.8691.17.1.6.3.1	read-only	Number of internal UART in current system.	
uartIndex	1.3.6.1.4.1.8691.17.1.6.3.2.1.1	read-only	Reference index for each UART port.	
uartType	1.3.6.1.4.1.8691.17.1.6.3.2.1.2	read-write	The UART mode, 0 is RS232, 1 is RS485 2 wires, 2 is RS422, 3 is RS485 4 wires.	
usbNumber	1.3.6.1.4.1.8691.17.1.6.4.1.1	read-only	The number of ports regardless of their current state in the usb general port table.	■
usbDeviceIndex	1.3.6.1.4.1.8691.17.1.6.4.1.3.1.1	read-only	The index is dentical to usbPortIndex for the correspondent USB port.	■
usbDeviceVendorID	1.3.6.1.4.1.8691.17.1.6.4.1.3.1.2	read-only	The USB device port vendor HEX-formatted string as it is provided to the USB host by the USB device.	■
usbDeviceProductID	1.3.6.1.4.1.8691.17.1.6.4.1.3.1.3	read-only	The product ID HEX-formatted string as it is provided to the USB host by the USB device.	■
usbDeviceActiveClass	1.3.6.1.4.1.8691.17.1.6.4.1.3.1.4	read-only	This object returns USB Device Class type of the active configuration	■
usbPlugTrapEnable	1.3.6.1.4.1.8691.17.1.6.4.1.4	read-write	Agent will send trap message when USB device inserted or removed and this object enabled.	
watchdogPeriod	1.3.6.1.4.1.8691.17.1.6.6.2.1	read-write	Watchdog period, 0 means disable watchdog monitor program; otherwise enable watchdog monitor program and configure	■

			the expired time.	
watchdogStatus	1.3.6.1.4.1.8691.17.1.6.6.2.2	read-write	To show the watchdog monitor program status.	■
powerPolicy	1.3.6.1.4.1.8691.17.1.7.2	read-write	Current system power policy.	■
moxaSystemTrapIP	1.3.6.1.4.1.8691.17.1.9.1	read-write	Set Trap IP address.	
moxaSystemTrapCommunity	1.3.6.1.4.1.8691.17.1.9.2	read-write	Trap community.	

B

Sample Code for TC-6110 Customization

This section gives you a hard copy of the sample code included with the TC-6110. These short programs are intended to be used either as standalone scripts, or to be included in scripts created to build custom features for end users.

The following topics are covered in this appendix:

- ❒ **The LED Control Script**
- ❒ **The Accelerometer Control Script**
- ❒ **Accelerometer Conversion Code**
- ❒ **The Watchdog Control Script**
- ❒ **The Temperature Sensor Control Script**

The LED Control Script

Below we reproduce the LED control code. This is a simple script that users may freely modify this code to suit their needs.

```
/*  Copyright (C) MOXA Inc. All rights reserved.
   This software is distributed under the terms of the
   MOXA License.  See the file COPYING-MOXA for details.
*/
#include "stdafx.h"
#include <windows.h>
#include <commctrl.h>
#include "devices.h"
/*
    index[n]: 0  ; BIT 0
              1  ; BIT 1
             2  ; BIT 2
             3  ; BIT 3
              ....
    data[n]: 0  ; Digital LOW
            1  ; Digital HIGH

*/

#define LED_NUMBER 8

int LEDMap[8] = {0, 1, 2, 3, 6, 7, 9, 10};

int _tmain(int argc, _TCHAR* argv[])
{
    HANDLE  hGPIO;
    int led_no;
    int data;
    int nLED = 0;
    int nRet = 0;
    int n = 0;

    WCHAR sin,smode;
    printf("LED Test Program\n");
   printf("\t (0) Exit Program\n");
   printf("\t (1) Display LED\n");
   printf("\t (2) Set LED value\n");

    sin = getwchar();
    n = _wtoi(&sin);

    do
   {
      switch (n)
      {
         // if char == '1', display the digital input
         case 1:
               //Open dio
               hGPIO = mxgpio_open();
```

```
                for(int i = 0; i<LED_NUMBER; i++)
                {
                    //Get digital input
                    led_no = i;
                    nLED = mxgpio_get_data(hGPIO, LEDMap[led_no]);
                    printf("LED[%d] = %d\n", led_no, nLED);
                }

                //Close LED
             mxgpio_close(hGPIO);
             break;

          // if char == '3', Set the digital output
          case 2:

                //Get Port Number
                getwchar();
                printf("Input the LED Number (0 ~ %d) = \n",LED_NUMBER-1);
                smode = getwchar();
                led_no = _wtoi(&smode);

                //Get Value
            getwchar();
            printf("Input the value (0 or 1) = ");
                smode = getwchar();
                data = _wtoi(&smode);

                //Open LED
                hGPIO = mxgpio_open();

                //Set LED
                nRet = mxgpio_set_data(hGPIO, LEDMap[led_no], data);

                if(nRet==-1)
                {
                    printf("Set led signal fail!\n");
                }
                else
                {
                    printf("Set led signal success!\n");
                }

                //Close GPIO
                mxgpio_close(hGPIO);
             break;
       }
         getwchar();
       sin = getwchar();
       n = _wtoi(&sin);
   } while (n != 0);

    return 0;
}
```

The Accelerometer Control Script

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

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

#define GSENSOR_DATA_LENGTH 6

int _tmain(int argc, _TCHAR* argv[])
{
    UINT32          smbusBaseAddr = 0;
    GSENSORDATA     gsensorData;
    SMBUSSETTING    smbusSetting[2];
    int             sensorStatus[2];

    smbusSetting[0].address = 0x1D;
    smbusSetting[0].bw_rate = 0xA;
    smbusSetting[0].data_format = 0xB;
    smbusSetting[0].power_control = 0x8;
    smbusSetting[1].address = 0x53;
    smbusSetting[1].bw_rate = 0xA;
    smbusSetting[1].data_format = 0xB;
    smbusSetting[1].power_control = 0x8;

    /* Open MxGeneralIo and get SMBus address */
    smbusBaseAddr = mxaccelerometer_open();

    /* Check if GSensor 1 is available */
    sensorStatus[0] = mxaccelerometer_get_state(smbusBaseAddr, &smbusSetting[0]);
    if(sensorStatus[0] == -1)
    {
        printf("GSensor on Disk1 is unavaliable\n");
    }
    else
    {
        printf("GSensor on Disk1 is running\n");
    }

    /* Check if GSensor 2 is available */
    sensorStatus[1] = mxaccelerometer_get_state(smbusBaseAddr, &smbusSetting[1]);
    if(sensorStatus[1] == -1)
    {
        printf("GSensor on Disk2 is unavaliable\n");
    }
    else
    {
        printf("GSensor on Disk1 is running\n");
    }

    /* Set GSensor 1 parameter */
    if(sensorStatus[0] != -1)
    {
        mxaccelerometer_set_state(smbusBaseAddr, &smbusSetting[0]);
    }

    if(sensorStatus[1] != -1)
    {
        mxaccelerometer_set_state(smbusBaseAddr, &smbusSetting[1]);
    }

    /* Calibrate GSensor */
    if(sensorStatus[0] != -1)
    {
        /* Set parameter of Gsensor #1 */
        mxaccelerometer_calibrate(smbusBaseAddr, &smbusSetting[0]);
    }
    if(sensorStatus[1] != -1)
    {
        /* Set parameter of Gsensor #2 */
        mxaccelerometer_calibrate(smbusBaseAddr, &smbusSetting[1]);
    }

    /* Close GSensor devie*/
    mxaccelerometer_close(smbusBaseAddr);

    /* Open GSensor device */
    smbusBaseAddr = mxaccelerometer_open();

    if(sensorStatus[0] != -1)
    {

        /* Get G-Sensor data */
        mxaccelerometer_read(smbusBaseAddr, &smbusSetting[0], &gsensorData,
GSENSOR_DATA_LENGTH);

        printf("gsensorData.x_axis(0) = %d\n",gsensorData.x_axis);
        printf("gsensorData.y_axis(0) = %d\n",gsensorData.y_axis);
        printf("gsensorData.z_axis(0) = %d\n",gsensorData.z_axis);
    }

    if(sensorStatus[1] != -1)
    {
        /* Get G-Sensor data */
        mxaccelerometer_read(smbusBaseAddr, &smbusSetting[0], &gsensorData,
GSENSOR_DATA_LENGTH);

        printf("gsensorData.x_axis(1) = %d\n",gsensorData.x_axis);
        printf("gsensorData.y_axis(1) = %d\n",gsensorData.y_axis);
        printf("gsensorData.z_axis(1) = %d\n",gsensorData.z_axis);
    }

    /* Close GSensor device*/
    mxaccelerometer_close(smbusBaseAddr);

    return 0;
}
```

Accelerometer Conversion Code

```
if (z_axis > 0x8000)
{
    z_axis = 0xFFFF - z_axis + 1;
       z_axis *= (-1);
       z_axis_mg = z_axis * 0.0039;
       z_axis_mg = z_axis_mg * 1000;
}
else
{
       z_axis_mg = z_axis * 0.0039;
       z_axis_mg = z_axis_mg * 1000;
}
```

The Watchdog Control Script

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

int _tmain(int argc, _TCHAR* argv[])
{
    int fd;
// Handle to device, obtain from mxwdg_open //
    ULONG   time;

    // This section calls the watchdog timer//
    time=10;
    fd = mxwdg_open(time);

   while ( TRUE )
    {
        //This section is just a UI provided for debugging. //
        //This section should be removed or commented out//
        //when using this code when integrating particular programs//
        //with the watchdog. //
        printf( "Press \"ENTER\" in 10 seconds\n, 'q' to exit");
        WCHAR ch = getwchar();
        if ( ch == (WCHAR)'q' )
        {
            break;
        }
        //This section is the automated timer admins should //
        //include to ensure a program is “kicking the dog” //
        mxwdg_refresh(fd);
    }

    // stops watchdog timer
    mxwdg_close(fd);
    return 0;
}
```

The Temperature Sensor Control Script

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

#include "stdafx.h"
#include <windows.h>
#include <commctrl.h>
#include <WTypes.h>
#include "devices.h"

int _tmain(int argc, _TCHAR* argv[])
{
    double dCPUTemp, dSATA1Temp, dSATA2Temp;
    BOOL bRet = FALSE;

    /* Open the sensor object */
    mxsensor_open();

    /* Get the SATA1 temperature */
    bRet = mxsensor_get_sata1_temp(&dSATA1Temp);
    if(bRet !=FALSE)
    {
        printf("Disk1 Temperaure = %.2f\n", dSATA1Temp);
    }
    else
    {
        printf("Disk1 Temperaure = N/A\n");
    }

    /* Get the SATA2 temperature */
    bRet = mxsensor_get_sata2_temp(&dSATA2Temp);
    if(bRet !=FALSE)
    {
        printf("Disk2 Temperaure = %.2f\n", dSATA2Temp);
    }
    else
    {
        printf("Disk2 Temperaure = N/A\n");
    }

    /* Close the sensor object */
    mxsensor_close();

    return 0;
}
```