

MCN
Monitoring and Control Network
System Performance Toolkit Software
(SPT)
Installation and Operator Manual

S2-61477-10.9.xx



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Manual Revisions

S2-61477-100	Initial Release
S2-61477-110	Revision for Version 6.x Support for: Windows 7 MCN Advanced Server 6.x and 7.x MCN Server 8000 version 7.x
S2-61477-611	Updated for Version 6.11 software Including export to .xlsx files without the need for Excel present on the PC Added Open-Source Licensing (Appendix D: Open-Source Software)
S2-61477-820	Updated for Version 7.26 & 8.20 software.
S2-61477-1009	Updated for Version 10.09.xx software. Updated with New installation method. Added Troubleshooting support Section.

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1 Introduction and Overview

The *MCN System Performance Toolkit (SPT)* is a set of programs used along with the MCN Server, MCN Advanced Server, or MCN Server 8000 Software to provide enhanced system performance monitoring and statistical data collection for equipment connected to the Monitoring and Control Network (MCN) system.

(This manual may use the term "MCN Server" software to refer to either the MCN Server software, MCN Advanced Server software, or the MCN Server 8000 software unless it is important to differentiate between the two versions).

The SPT software can help the system manager or technician to:

- Monitor overall system performance,
- Identify receivers that may have coverage issues.,
- Gather system statistics,
- Monitor the radio system for long-term performance changes.

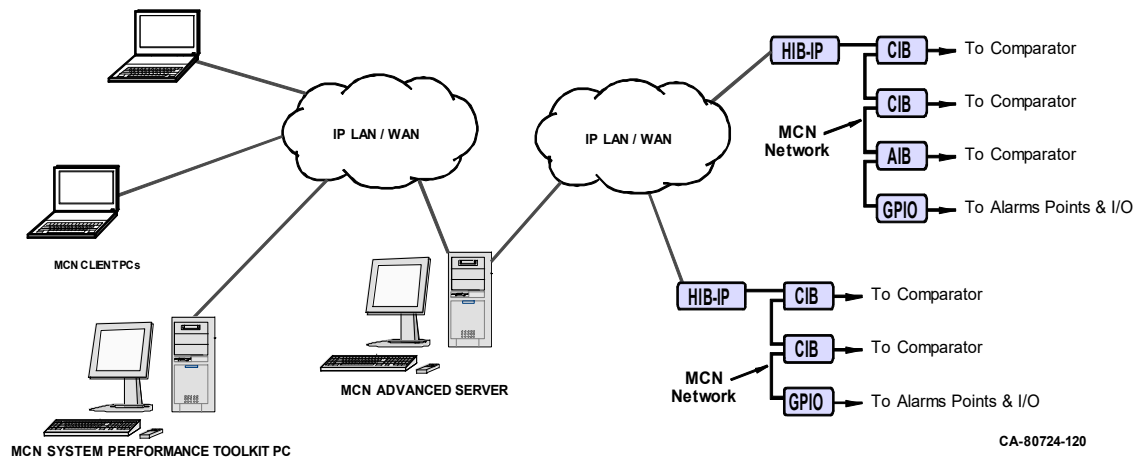


Figure 1 MCN Server & System Performance Toolkit

1.1 Software Overview

1.1.1 The MCN Server Software

The MCN Server monitors the operation of comparators and other Input/Output devices. It can then report device statuses like 'Disable' and 'Fail' as receiver errors. However, since the comparator provides only limited indications despite the wider possibilities of failure, there could still be other causative voting system problems that are undetectable by the comparator such as:

- Signal Quality Modules (SQMs) (for Motorola comparators) or Receiver Modules (Ericsson/GE/MA-Com) that are removed from the comparator card cage.
- CIB modules that are disconnected from the comparator card cage.
- Receivers that never receive. (This can be caused by problems with the receivers or the antenna system)
- Receivers that never vote. (This can be caused by very noisy telephone lines, a bad receiver, or a bad input module on the comparator.)

1.1.2 The System Performance Toolkit Software

The *System Performance Toolkit's (SPT)* software can detect receiver inactivity caused by the problems above and can alert the technician or system manager. The program works on the assumption that in any system, all receivers should show some Receive (and/or Vote) activity every so often. In addition, the System Performance Toolkit can monitor other types of Watchdog Statuses defined in the MCNRCD database.

Likewise, the *SPT* can report other potential system problems that are indicated by status points being stuck in one condition for too long. For example:

- A generator that does not start for its weekly test.
- A generator that runs for an extended period
- A Standby T1 path or another standby device that remains selected for too long.

1.2 Available System Performance Toolkit Software Levels

There are three levels of the System Performance Toolkit available based on the MCN system size.

Product	Part Number	Maximum Receiver or I/O Points	Servers Monitored
SPT Level 1	S1-61434	128	1
SPT Level 2	S1-61435	512	1
SPT Level 3	S1-61436	Unlimited (Limited only by MCN Server Capability)	1



The "Number of Receivers or I/O Points" in the table above relates to the total number of Receivers or I/O Points in the Receiver Window of the MCN Configuration program. You must have an option level of System Performance Toolkit that is large enough to cover all the Receivers and I/O Points in the Receiver Window; (whether or not you have assigned a function or Watchdog status to them).

The *MCN System Performance Toolkit* program should be installed on a PC different from the MCN Server PC.

1.3 Software Compatibility

The System Performance Toolkit software is compatible with the following MCN Server versions and Windows Operating System versions:

System Performance Toolkit Version	MCN Server Version	32-Bit Windows XP	64 Bit Windows 7,10,11
7.26	7.26	✓	✓
8.20	8.20	Not supported	✓
10.09	10.09	Not supported	Win 10/11

Notes:

1. For MCN Server versions 8.0x and 8.1x, upgrade to MCN Server version 8.2x.
2. Version 7.26 is a 32-bit only software package, but it can be installed and is also operational on 64-Bit Windows.
3. The System Performance Toolkit software is not compatible with the MCN Standard (non-server) software package.

Due to the 32-Bit Windows 4 GB memory restriction, the 64-Bit Version 8.2 System Performance Toolkit is recommended to be used for large systems.

The 32-bit version is limited to approximately:

- 3000 Receivers with up to 6 Watchdog states each distributed across up to
- 80 Radio Channels

1.4 The Software package

Three main programs make up the MCN System Performance Toolkit software package. They are:

- **System Watchdog Setup** (WdSetup.exe) :
The System Watchdog Setup allows configuration of the Watchdog Server and configuration data.

- **System Watchdog Service** (SysWDogService.exe):
The System Watchdog Service acts as a Client to the MCN Server software and gathers radio system activity data from the server.

- **Data Miner** (DataMiner.exe):
The DataMiner program connects to the System Watchdog Service and is the user interface program that gives alerts when radio system resources have been inactive for too long. It also allows viewing and exporting of historic radio system activity.

1.5 System Requirements

Components required for the *MCN System Performance Toolkit* include:

1. A PC to run the *MCN System Performance Toolkit* program with the following minimum system configuration:
 - ❖ Hardware required for the System Performance Toolkit software:
 - HDD with 200 GB free disk space for application and log files.
 - USB Type A (for use with Flash Drive and HASP Dongle Key)
 - Monitor
 - Mouse
 - Sound Card & Speakers
 - Ethernet network
 - Must also include one of the following options:
 - a. For Version 7.26.
 - OS; Windows XP Pro Service Pack 3
 - CPU; Pentium IV – 2 GHz processor or better
 - Memory; 4 GB RAM
 - b. For Version 8.20:
 - OS; Win 7 Pro 64 Bit or newer.
 - CPU; Intel I3 – 2.9 GHz dual-core processor or better.
 - Memory; At least 8 GB RAM
 - c. For Version 8.20:
 - OS; Win 10 Pro 64 Bit or newer.
 - CPU; Intel I3 – 3.0 GHz quad-core processor or better.
 - Memory; At least 8 GB RAM

2. An MCN Server PC connected to the MCN network (MCN Server) with the following minimum system configuration:
 - a. MCN Server software meeting the version requirements outlined in Section 1.3.
 - b. License for System Performance Toolkit (Level 1, 2, or 3, as appropriate) and corresponding Hardware & Software Keys on the MCN Server PC.
 - c. MCN Database is properly configured for Watchdog status (See **Configuring the MCN Server for SPT** Section 3.2 later in this manual).
3. IP Infrastructure to connect the MCN Advanced Server to the System Performance Toolkit PC.
4. Microsoft Excel 2010 or newer to read and modify exported data files.

1.6 Reference Documents

- Monitoring and Control Network System Manual
Part Number S2-60425
- MCN Server Manual
Part Number S2-61170
- MCN Server 8000 Manual
Part Number DDN 1290 / S2-61600

2 Installation

This section outlines and discusses important steps and processes when installing the *MCN System Performance Toolkit*.

2.1 Installation Overview

This manual assumes that you have the appropriate MCN Server (with the minimum version required) and your MCN Monitoring & Control Network system running.

To ease the installation and operation of the System Performance Toolkit, perform the following steps:



1. **Read and refer to this manual.**
2. Install the System Performance Toolkit software on the desired PC. See Section 2, Installation.
3. If the PC beeps with the letters "SWD" in Morse code every 8-10 seconds, it means that the System Watchdog Service cannot communicate with the MCN Server software or the MCN Server does not have a system loaded that is configured for the System Performance Toolkit. Turn off the System Watchdog Service until you get the MCN Server software configured properly. See **Section 3.3.1, Starting & Stopping System Watchdog Service**.
4. If you need to install an updated version of the MCN Server software for compatibility with the System Performance Toolkit software, install it and test it with your current database.
5. Configure the MCN Database on your MCN Server to add the appropriate Watchdog information. See Section 5, Configuring the Database -- MCN Config.
6. If your MCN Server has restricted Client Permissions, Use MCN Config Server to add the appropriate access rights for the PC running the System Performance Toolkit software. See the MCN Server Manual.
7. Start the System Watchdog Service. Verify that it connects to the MCN Server. See Section 3.3.1, Starting & Stopping System Watchdog Service.
8. Let the System Watchdog Service gather some data, for an hour or two.
9. Run the DataMiner program to view the data that was collected. See Section 3.4, **The DataMiner Program (DataMiner.exe)**.

2.2 Software Operation Awareness

The *MCN System Performance Toolkit* program can monitor a single MCN Server, however, it is not all-knowing and all-seeing. It cannot determine *why* a particular receiver is not receiving or voting, but it can alert the technician that it has seen no activity for an extended period. The technicians' responsibility is to find and repair the root problem.

The System Performance toolkit will **not** work with the MCN Standard Software version.



The System Watchdog Service cannot run simultaneously with the ClientRCD application on the same PC.

Both the System Watchdog Service and ClientRCD programs run as clients to the MCN Server software. However, there can be **only one** Client application running on a PC at a time. Windows won't prevent you from running both programs, but one or both programs will not run properly if both are operating at the same time.

You can install both programs on the same PC, but only one can run at a time. Installing ClientRCD on the PC is recommended so you can test the client connection to the Server PC. To run ClientRCD, you must first disable the System Watchdog Service.

If you must install the Client software on the SPT PC, it is best to delete any shortcut icons for the MCN Client (ClientRCD), so someone doesn't accidentally try to start it.

2.3 Choosing the Best PC

System Performance Toolkit Software Levels 1 & 2 can cohabitate on the MCN Server PC or may be installed on a separate PC. However, System Performance Toolkit Software Level 3 should always be installed on a separate PC to reduce the loading on the server.



Note: If you run the System Performance Toolkit software on a separate PC, you will need an IP connection between the MCN Server and the System Performance Toolkit PC. That IP connection will need to support IP Multicast from the Server to the System Performance Toolkit PC.

2.4 Enabling the SPT Options

The System Performance Toolkit software is licensed to connect to a single server based on a licensing option in the Software Key on that Server PC. If the System Performance Toolkit software is ordered at the same time as the MCN Server software, the option will be added to that Software Key before shipment.

If the System Performance Toolkit option is ordered separately after purchasing the MCN Server, the existing MCN Server Hardware Key ID (a 4 or 5-digit number) must be submitted with the order to CTI Products so that the factory will be able to generate the correct Software Key to match the Server's Hardware Key.

2.4.1 MCN Server Client Permissions

If you are using Client Permissions in your MCN Server, you must enable permissions for the PC running the System Performance Toolkit software.

2.4.2 Enabling Watchdog Status in MCN Server

Watchdog statuses must be configured in the MCN Server configuration files. Use the MCN Config Server.exe program to do this. See section 5, **Configuring the Database -- MCN Config**.

2.5 Installing the MCN System Performance Toolkit software

The MCN System Performance Toolkit was previously provided on CD with an **InstallShield installer**. Version 10.09 and newer is delivered as a **signed Advanced Installer executable**, though the installation steps are mostly the same.

Before installing the software, verify that your PC has a compatible software package with the appropriate version of the MCN Server software running.



If you are installing an updated version of the System Performance Toolkit over an existing installation, **you must remove the previous version first**. Follow the steps outlined in **Appendix A -- Re-Installing the System Performance Toolkit software**

To install the software:

1. Ensure you have **Administrator privileges** on the PC.
2. Temporarily **turn off any anti-virus software**.
3. Plug in the USB Media Drive supplied by CTI Products.
4. If Autoplay **is enabled**, File Explore should open and you can do one of the following:
 - a. In **File Explorer**, double-click “**System Performance Toolkit Install.exe**” on the flash drive.
5. If Autoplay **is not enabled**, do one of the following:
 - a. Open **File Explorer**, Select the USB flash drive.
 - b. Double-click “**System Performance Toolkit Install.exe**” on the Flash drive.
6. Follow the instructions in the **Advanced Installer setup program**.
 - The System Watchdog Setup program (**WdSetup.exe**) will run automatically to configure the MCN System Watchdog Service. See Section 3.3, *System Watchdog Setup*.
 - The setup program installs the MCN System Watchdog Service to run automatically at system startup.
7. After installation is completed, **restart your PC**.
8. Re-enable your anti-virus software if you disabled it.

3 Using the System Performance Toolkit software

3.1 How it Works

The System Watchdog Service runs as a Service on a PC running the Windows Operating system. It acts as a Client to the MCN Server PC and performs the following tasks:

- Monitors the system activity from the MCN Server,
- Detects inactive receivers and sends alerts to the Dataminer software,
- Creates hourly system activity summary files for the receivers and I/O points that are reconfigured with Watchdog statuses in the MCN Server PC.

1) After the System Performance Toolkit software is installed and you restart your PC, the System Watchdog Setup program (WdSetup.exe) is automatically run, and the *MCN System Watchdog Service* will try to connect to the MCN Server PC.



2) If the System Watchdog Service fails to connect to the MCN Server PC or the MCN Server does not have a database with a valid Watchdog configuration, the System Watchdog Service (SysWdService.exe) will send the letters "SWD" (System WatchDog) in Morse code every 8 to 10 seconds. To stop the beeping, stop the SysWdDog Service. See Section 3.3.1, **Starting & Stopping System Watchdog Service**.

3.2 Configuring the MCN Server for SPT

- 1) On the MCN Server PC, run the MCN Config Server program to set up Watchdog conditions and select which receivers and/or I/O points need to be monitored. See Section 5, Configuring the Database. Then load the new database into the MCN Server program. (If you have kept the same name for the database, you must first load a different database and then re-load the proper database.)
- 2) If you previously did stopped the **SysWdDog Service**, re-start it. See Section 3.3.1 Starting & Stopping System Watchdog Service. Verify that it is configured for Automatic Start.

After the SysWdDog Service connects properly to the MCN Server, it will stop beeping.

To verify proper connection, you can also select **View / Client Status** from the menu in the MCN Server to verify that the System Performance Toolkit PC is connected.

- 3) Run the Dataminer program. System performance data will be displayed on an hourly basis when the System Watchdog Service writes it.

3.3 System Watchdog Setup (WdSetup.exe)

The System Watchdog is used to configure the NIC & IP address for the SPT PC and the IP address of the MCN Server. The WdSetup program can also be run later if there is a need to modify any parameter.

The System Watchdog Setup program opens with the following screen:

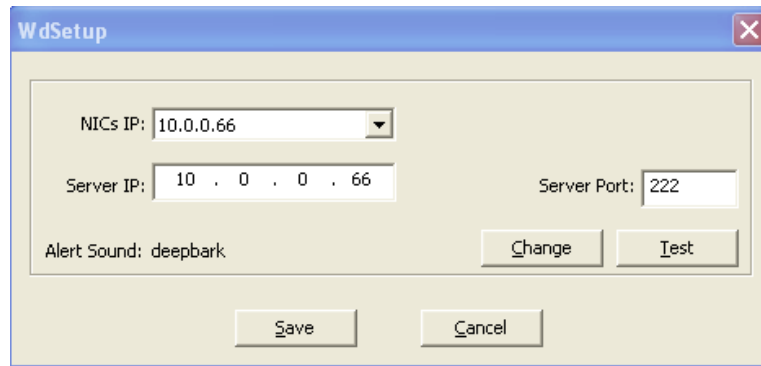


Figure 2 WdSetup Window

NICs IP:

Select the proper IP address for the System Performance Toolkit PC. Normally the PC will have only one IP address. However, if your PC has multiple network cards or a special configuration, you will see multiple IP addresses in the drop-down box. Select the proper IP address to use.

Server IP

Enter the proper IP address for the MCN Server PC.

Server Port

Enter the proper Port for the MCN Server PC.

(The example above shows how to set up the System Watchdog service to run on the same PC as the MCN Server. It has the same IP address for both the NIC and the Server.)



The proper Server settings to use are determined by the IP Configuration screen in the MCN Server software window. Additionally, if the MCN Server PC is running within a Motorola Radio Network Infrastructure (RNI), its settings must adhere to Motorola standards. For older systems not running within an RNI, the user organization’s IT department will typically determine the settings.

Parameter	Old System (Non-RNI) Defaults	New System (RNI) Defaults (Subject to change)
IP Address	TBD	TBD
Server Port	222	49xxx
Multicast IP Address	231.31.31.31	228.x.y.z
Multicast Port	333	49xxxx

Check the settings in your specific MCN Server software.

Select: **Options / IP Settings** from the MCN Server menu. The Server IP Address and Port are shown in the following figure.

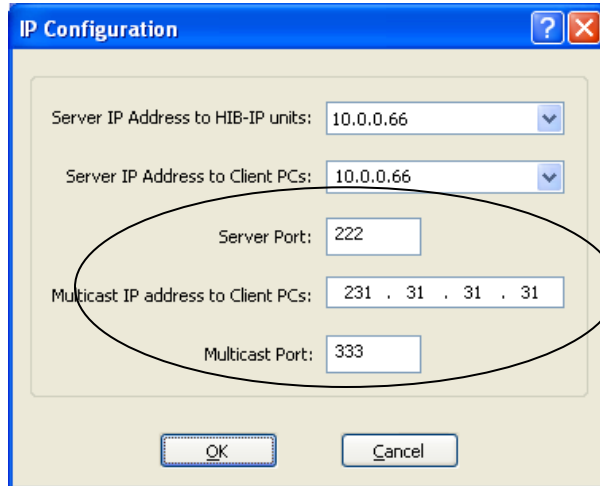


Figure 3 Older (Non-RNI) MCN Server IP Configuration Window



Note that the above port settings in Figure 3 are the defaults that are shipped for older versions, which do not follow the same port restrictions as required for newer Motorola hardened PC systems. Your values may be different.

The following Server settings in Figure 4 are for the newer versions of the MCN Server & Advanced Server. Actual values will depend upon your system.

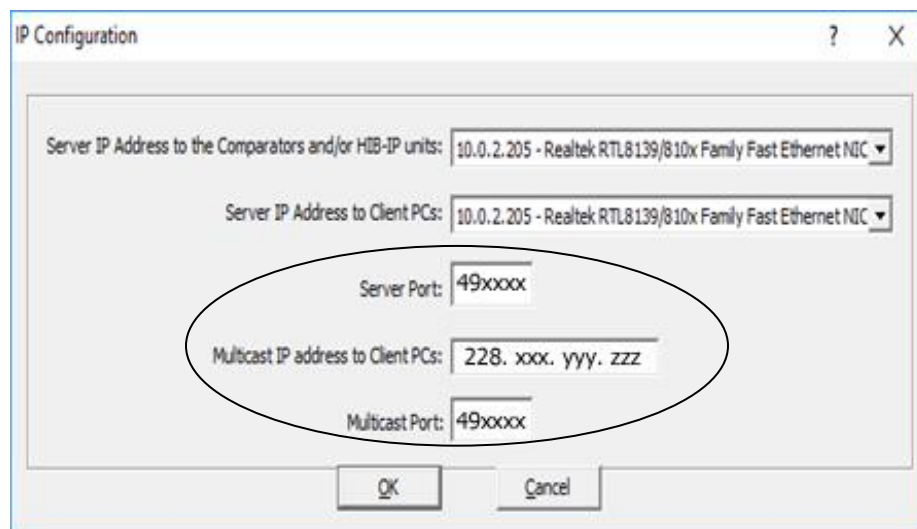


Figure 4 Newer (RNI) MCN Server IP Configuration Window

Alert Sound

This shows the current sound to be used when a watchdog event occurs.

- 1) Hit the Test button to test the sound.
- 2) Hit the Change button if you want to change the sound. Navigate to the desired '.wav' file.

Figure XXX provides a screenshot of the available prepackaged installed sound options. The default location for those wav files is typically *C:\Program Files\CTI Products Inc\System Performance Toolkit\Wav*.

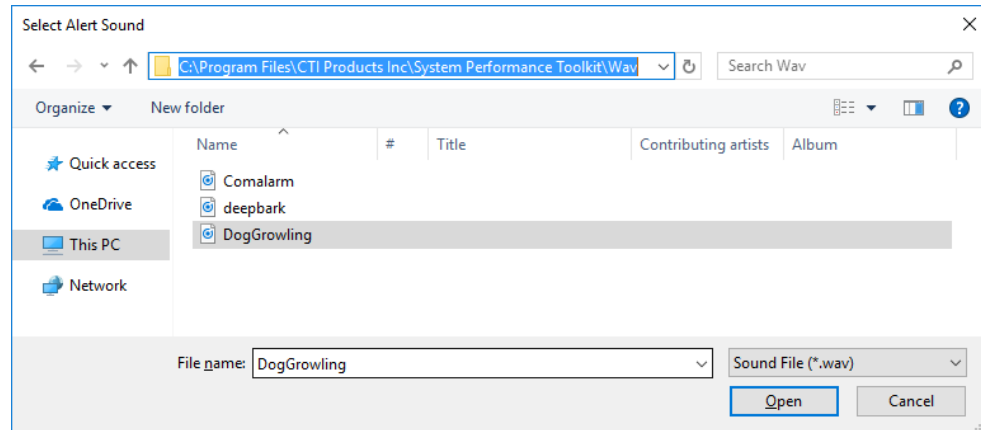


Figure 5 Alarm Sound Options

- 3) Hit <OK> after you have all the parameters set up properly.

(The example above shows how to set up the System Watchdog service to run on the same PC as the MCN Server. Note that it has the same IP address for both the NIC and the Server.)



Note: Changes made in WdSetup take effect only when the *System Watchdog* Service is restarted. If you change the configuration while the *System Watchdog* Service is running, you must Stop and Re-Start the *System Watchdog* Service for the changes to take effect.

3.3.1 Starting & Stopping System Watchdog Service

The installation program should set up the System Watchdog Service (SysWDogService) to run automatically whenever Windows starts.

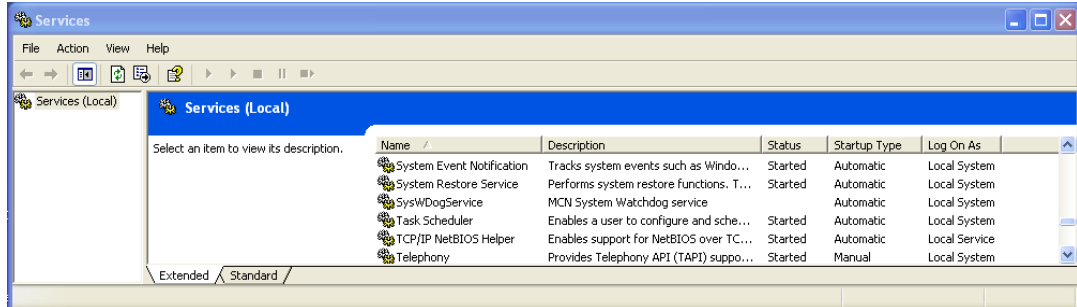


Figure 6 SysWDogService

As shown above, the SysWDog Service is configured to start automatically when the PC reboots.

At times, you may need to manually stop or restart the System Watchdog Service (for example, when changing IP settings). To do this, use the Windows Services tool:

Windows XP:

*Start / Control Panel / Administrative Tools / Component Services
Select: Services (Local)*

Windows 7,8,10,11:

Start / Control Panel / Administrative Tools / Services

Run command:

Windows Key + R (Run) Services.msc

Alternately, you could also create a shortcut in your CTI Products folder.

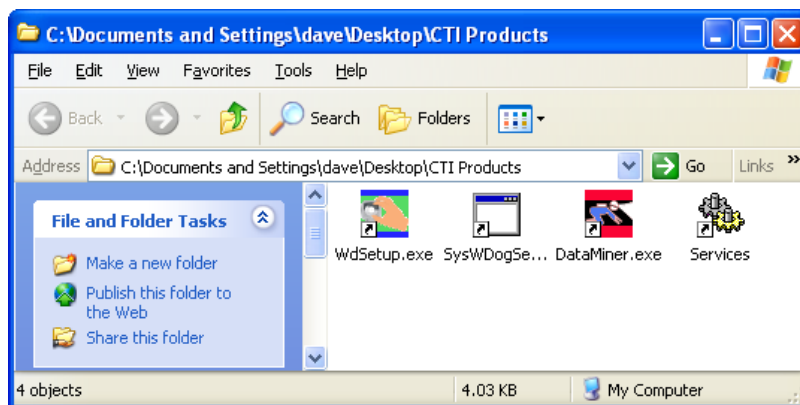


Figure 7 Custom created Services shortcut.

When the **SysWDogService** is running, it will be displayed on the Services applet with a status of "Started" as shown below:

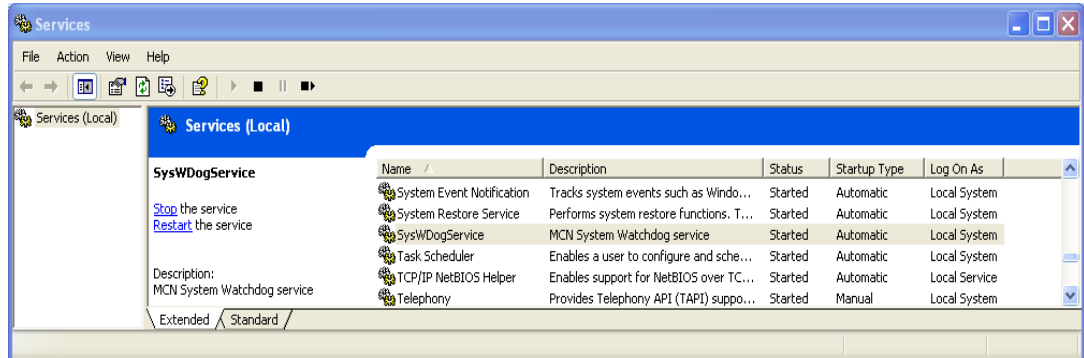


Figure 8 SysWDogService in Windows Services

Note that if you leave the Services applet open, it may not reflect the current state of all the services. To refresh the state of the services, select **Action / Refresh** from the applet's menu.

3.3.1.1 System Watchdog Service Interface

The **SysWDogService** runs automatically as a background service and attempts to connect to the MCN Server. It does not display any interface on the PC. If it cannot connect to the server, it emits an audible "SWD" error signal in Morse code every 8–10 seconds. Once a connection is established, the beeping stops.



Note: *Hearing the previously mentioned error tones will require a legacy onboard PC speaker. This speaker allows software and hardware to generate pre-boot audible feedback to alert users to system faults and errors.*

3.3.2 Server Display of the System Watchdog Service

The System Watchdog Service is a Client of the MCN Server. When **SysWDogService** is fully connected to the Server, its status is shown on the Server's Client Status window. To see this, select the View / Client Status menu item in the MCN Server.

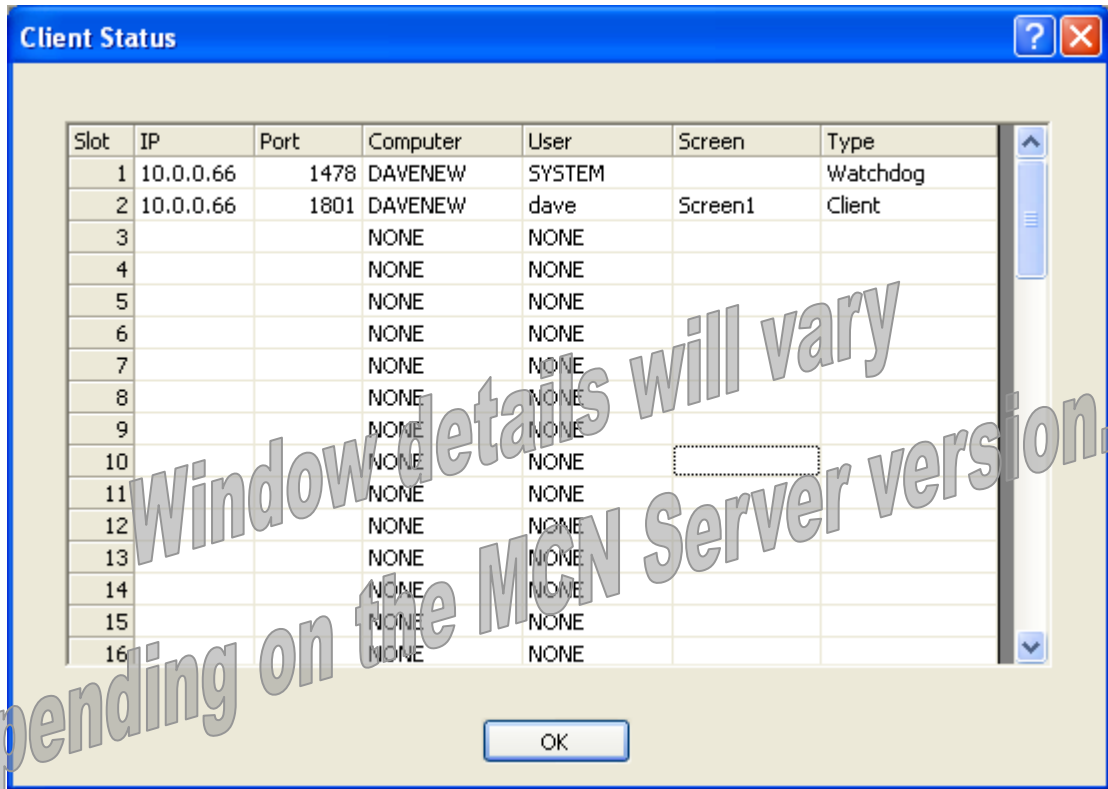


Figure 9 MCN Server display of System Watchdog Service Status

The above shows the following differences between the System Watchdog Service and the standard client:

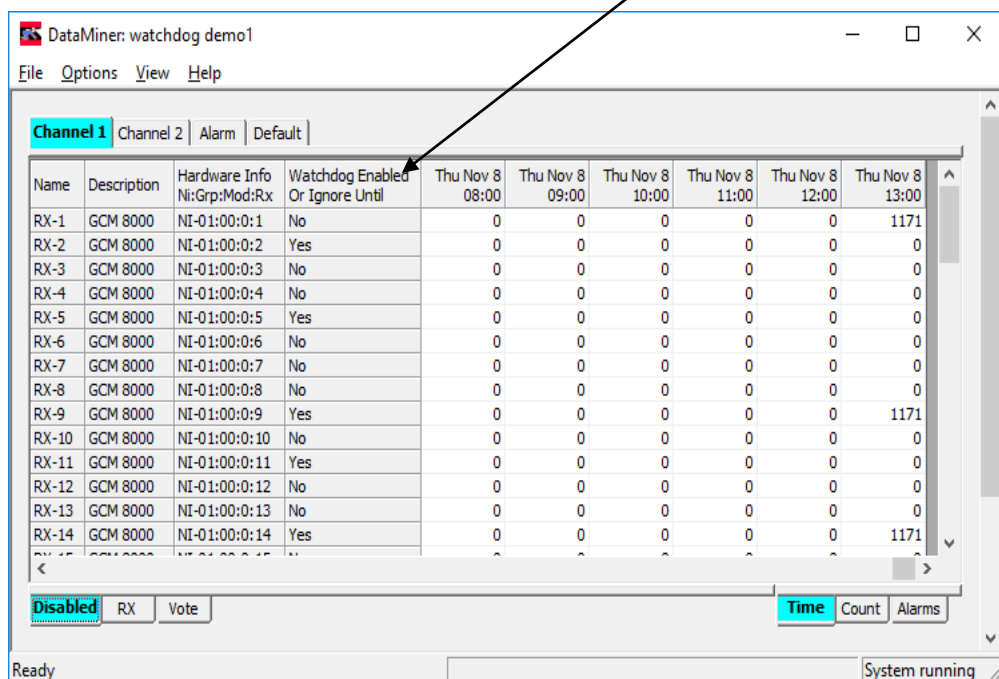
- The **Type** field shows either Client (for the standard client) or Watchdog (for the System Watchdog Service).
- The **User** field will show SYSTEM for the System Watchdog Service. It will show the Windows username for standard clients.
- The **Screen** field will show the selected screen for the standard client. It will be blank for the System Watchdog Service.

3.4 The DataMiner Program (DataMiner.exe)

The DataMiner program lets you:

- See the status of the System Watchdog Service
- Receive notification of Watchdog Alerts from the System Watchdog Service
- Selectively enable or disable the Watchdog alarms for receivers or channels.
- View History Summary Files
- Export Summary File data to Excel.
- Hide Rows which are not WatchDog Enabled

WatchDog On/Off Timer



Details will vary depending on your system configuration.

System Status

3.4.1 Title Bar

The program's Title Bar indicates the program name and the name of the current database being viewed (in either OnLine or OffLine mode).

3.4.2 System Status – Status Bar

The Status Bar located at the **bottom right** of the DataMiner window provides a current system status.

Typical normal OnLine system states include:

- Contacting the Server
- Configuring System
- Registered with the server
- Loading data
- System running

When the DataMiner program is running in the OffLine mode (typically to view the history of an old database), the Status Bar will indicate:

- Off-Line

If the System Watchdog Service is not running (or terminates), the following statuses will be displayed:

- Service Terminated
- Service Not Running
- Socket Failure

The following states indicate problems connecting to the MCN Server:

- Incorrect software version
- Connection Failed
- Initialization Failure

Initialization Failure may also indicate that the database for the MCN Server does not have Watchdog information properly configured.

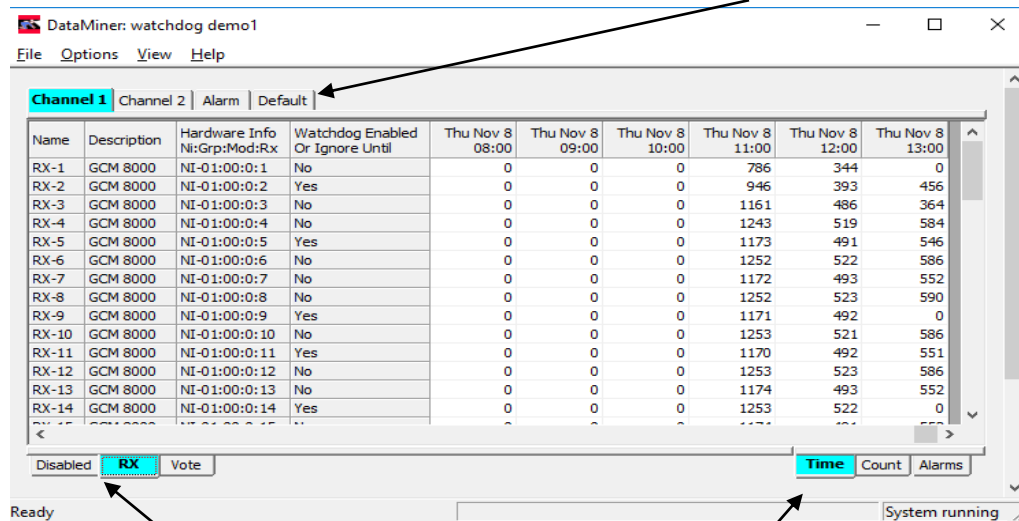
3.4.3 System History Grid

The main part of the DataMiner program window is the System History Grid. It shows the past system history, as recorded by the System Watchdog Service in Summation Files.

The display of data in the System History Grid is controlled by three sets of tabs:

- Channel tabs (on the top)
- Watchdog State tabs (on the bottom left)
- Time/Count tabs (on the bottom right).

Channel tabs



Watchdog State tabs

Time/Clear/Alarm tabs

The System History Grid has a list of receivers or I/O points for a channel. It includes the following fields:

- Name Receiver Site Name or I/O Point name
(as defined in the MCN Database).
- Description Receiver Site Name or I/O Point Description
(as defined in the MCN Database).
- Ni:Grp:Mod: Rx Hardware Identifier
Network Interface,
MCN Group, MCN Module
and Receiver (or Point Number)
- Watchdog Enabled or Ignore Until Watchdog indication.
Yes Watchdog is enabled for this receiver.
No Watchdog Disabled in MCN Config
Date/Time Watchdog Disabled until that time
Forever Watchdog permanently Disabled in DataMiner
- History Data The columns with the white background are history data,
arranged in hourly totals.

These columns indicate either **Time** (in seconds) or **Counts**, depending on whether the **Time** or **Count** The tab is selected at the bottom right of the grid.

If a Receiver or I/O Point does not have the selected Watchdog State is associated with it, it will have an "X" in these fields.

If there is a missing hourly Summary file, there will be a dash "-" in that column the History Data field.

The System History Grid will have an entry for each receiver and/or I/O point in the selected channel (whether or not it has any Watchdog states assigned to its Native Display Table).

Introduced in 10.09 the default setting hides receivers/rows which do not have watchdog states assigned. Toggle this feature by clicking "View" > "View Enabled Rows Only."

*The **Native Display Table** is the Display Table that is assigned to a receiver or I/O point in the Receiver window in the system database in the MCN Config Server program.*

The System History Grid will also have a horizontal blue line separating MCN Modules (CIBs, AIBs, etc.) from each other.

3.4.3.1 Channel Tabs

Channel **tabs** let you select which channel to view in the System History Grid.

There are Channel Tabs for all defined Channels in the MCN database. The System History Grid will have an entry for each receiver and/or I/O point in that channel (whether or not it has any Watchdog states assigned to its Native Display Table).

In addition to all the defined Channels, there may be a "Default" channel tab (as shown on the left in the example above. The Default Channel tab is a catch-all tab that includes all receivers and I/O points for MCN Modules that do not have Channels assigned to them.

3.4.3.2 Watchdog State Tabs

The **Watchdog State tabs** let you select which Watchdog State hourly data to view in the System History Grid.

There will be tabs for each Watchdog State for the selected channel. As you change Channel Tabs, you may see the number of Watchdog State tabs change, since different channels may have different Watchdog States defined for their receivers or I/O points.

For example, normal radio channels will normally have just the Vote, Receive, Disable, and Fail the Watchdog States associated with them. Different types of I/O points will have different types of Watchdog States associated with them.

3.4.3.3 Time / Count / Alarm tab

The **Time / Count / Alarm tabs** let you change between viewing the total time or number of counts in the System History Grid. They also let you look at the currently outstanding Watchdog Alerts.

When “**Time**” is selected, the System History Grid will show the total time (in seconds) for each of the receivers or I/O points for each hour. (Ex: Site #X received for 137 seconds in the last hour).

When “**Count**” is selected, the System History Grid will show the total event counts for each of the receivers or I/O points for each hour. (Ex: Site #X received 12 times in the last hour).

When “**Alerts**” is selected, it changes the display of the System History Grid. It changes from a History Grid to an Alarms Grid. It will show the active Watchdog Alarms as described in section **3.5, Current Watchdog Status – Alarm Tab** below.

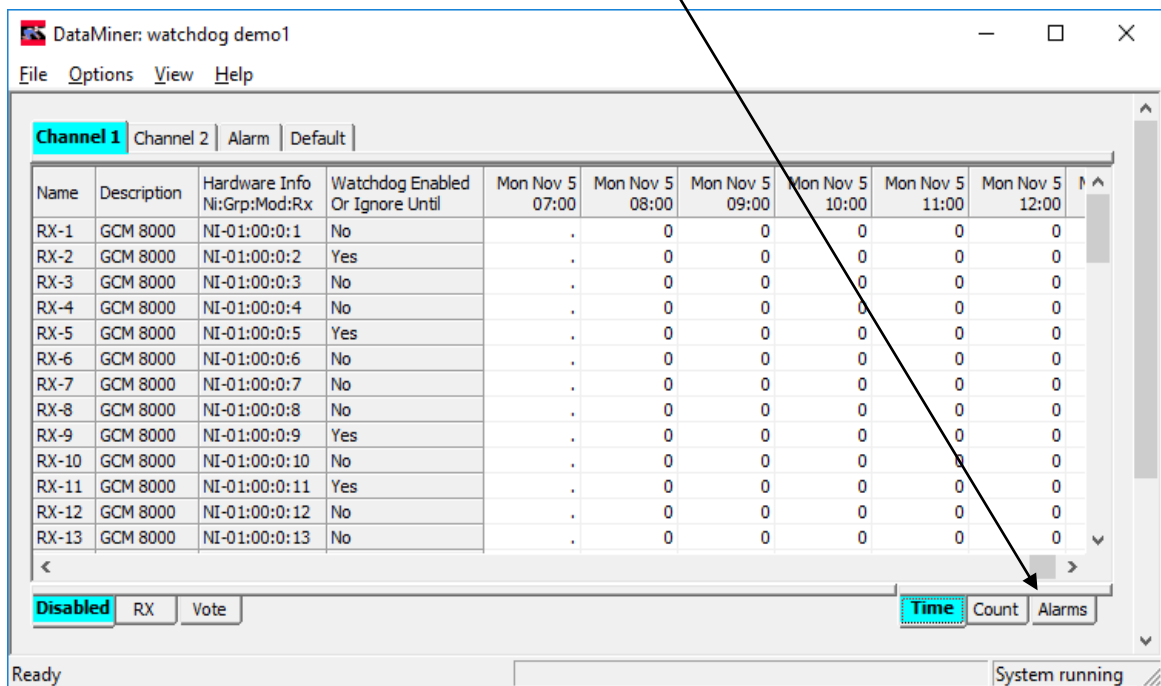
The alarm tab turns off the *Channel & Watchdog States Tabs*

When you select the Alarm tab, the System History Grid changes into an Alarms Grid and you will see the active Watchdog Alarms for all Channels and Watchdog States. As a result, the *Channels* tabs and *Watchdog States* tabs will not appear on the screen in this mode.

To go back to the System History Grid (and to get your Channels and Watchdog States tabs back), just select the Time or Count tab on the bottom right.

3.5 Current Watchdog Status – Alarm Tab / Alarm Grid

You can see the current status of the Watchdog Alarms by selecting the Alarm tab on the bottom right of the DataMiner window.



This changes the grid to an Alarms Grid. It shows which Watchdog States are in alarm state for Watchdog Alarms it has received when it is running. These fields are similar to the fields in the Alert window.

Watchdog Alarms are shown for all Watchdog States on all Channels. Channel and Watchdog States tabs are turned off when the Alarms Grid is displayed.

The Alarms Grid is different from the Alerts Window in the following ways:

Function	Alert Window	Alarm Grid
Alerts	Shows transitions <i>into</i> or <i>out of</i> Watchdog Alarm state	Shows only <i>currently active</i> Watchdog Alarms. Line gets deleted when Watchdog Alarm returns to normal.
Display	Automatic when a new Watchdog Alert is received	Manually selected with the Alarm tab
Closing Window or Grid	Deletes all entries (Minimizing window will keep entries)	Current Alarms are kept

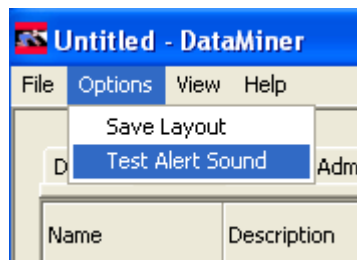
We recommend that you keep the DataMiner program running continuously.

The DataMiner will only display Watchdog Alarms for alarms it receives from the System Watchdog Service when DataMiner is running. If you close the DataMiner program, you will not get Watchdog alerts, and the current alarms will be lost.

3.6.1 Watchdog Alert Sound

When a new Watchdog Alert is displayed, the DataMiner program will also generate an audio Watchdog Alert Sound. (This sound is configured in the Watchdog Setup program.)

You can test the Watchdog Alert Sound in the DataMiner program by selecting the **Options / Test Alert Sound** from the menu as shown below:



3.6.2 Enabling and Disabling Alarms

In software versions before 7.26, the only way to disable the Watchdog Alarms was to re-configure the system in the MCN server PC by using the MCN Config Server program.

Note: Starting in Version 10.09 row filtering must be disabled to Enable and Disable Alarms. To disable, uncheck “View Enabled Rows Only” under the “View” menu dropdown.

NOW versions 7.26 and 8.20 of the System Performance Toolkit include a feature that allows the user to enable & disable the Watchdog alarms from the Data Miner window. It includes the following features:

- Enabling or Disabling on a per-receiver or per-point basis
- Enabling or Disabling on a per-channel basis
- Disabling for a user-selectable time with automatic re-enabling after a time-out
- Disabling permanently.

This feature is especially useful for the following types of situations:

- Disabling alarms for receivers at a site that will be offline for maintenance or reconstruction.
- Disabling alarms for entire channels when moving them from one set of legacy comparators to another.

3.6.2.1 Disabling Watchdog Alarms in DataMiner

Watchdog alarms can be disabled and enabled from the Data miner window.

They can be controlled on a per-receiver or per-channel basis.

Watchdog alarms can be disabled for specific time periods or forever.

To Disable a Watchdog Alarm:

1. Select the appropriate radio channel tab.

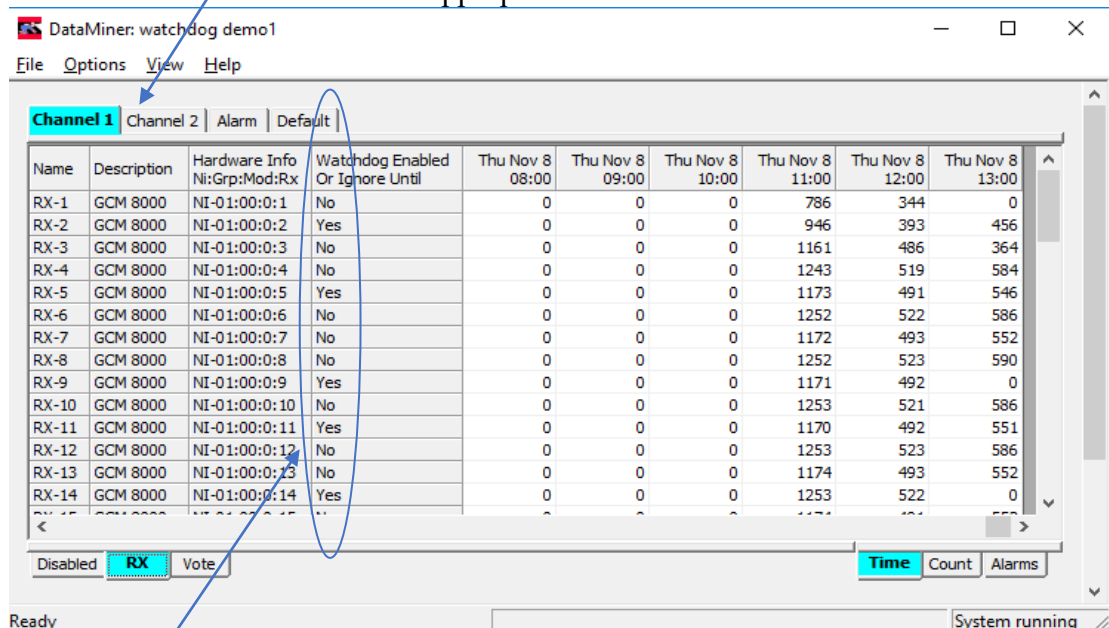


Figure 10 DataMiner Screen

2. Right-click on the desired receiver in Column 4.
Choose any receiver if you want to disable Watchdog alarms for the entire channel.
3. In the Ignore Watchdog window, use the “Ignore this” drop-down to select either “Receiver” or the “Channel.”

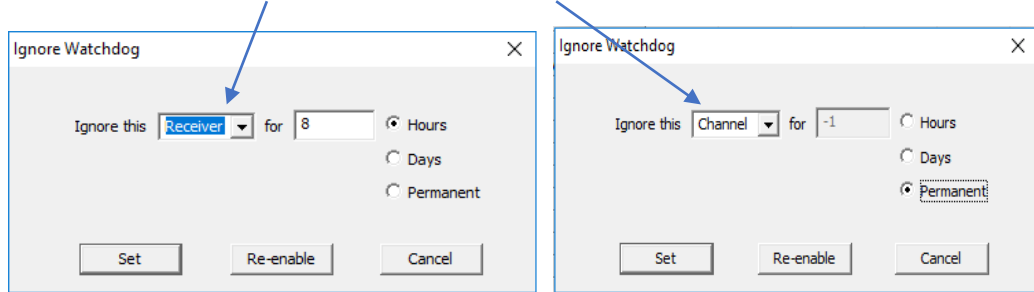


Figure 11 Ignore Watchdog Window – Receiver or Channel Selection

4. To disable the Watchdog alarm for a fixed period of time, select **Hours** or **Days** and enter a number (1-999).
5. To disable the Watchdog alarm permanently, select **Permanent**.
6. Hit the **Set** button.
7. The results will be shown in the Watchdog window.

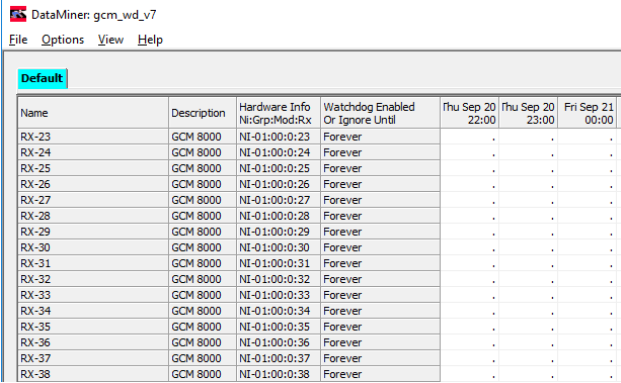
DataMiner: gcm_wd_v7

File Options View Help

Default

Name	Description	Hardware Info Ni:Grp:Mod:Rx	Watchdog Enabled Or Ignore Until	Thu Sep 20 22:00	Fri Sep 20 23:00	Fri Sep 21 00:00	Fr
RX-23	GCM 8000	NI-01:00:0:23	No	.	.	.	.
RX-24	GCM 8000	NI-01:00:0:24	No	.	.	.	.
RX-25	GCM 8000	NI-01:00:0:25	No	.	.	.	.
RX-26	GCM 8000	NI-01:00:0:26	No	.	.	.	.
RX-27	GCM 8000	NI-01:00:0:27	No	.	.	.	.
RX-28	GCM 8000	NI-01:00:0:28	No	.	.	.	.
RX-29	GCM 8000	NI-01:00:0:29	No	.	.	.	.
RX-30	GCM 8000	NI-01:00:0:30	No	.	.	.	.
RX-31	GCM 8000	NI-01:00:0:31	Yes	.	.	.	.
RX-32	GCM 8000	NI-01:00:0:32	Yes	.	.	.	.
RX-33	GCM 8000	NI-01:00:0:33	Yes	.	.	.	.
RX-34	GCM 8000	NI-01:00:0:34	Yes	.	.	.	.
RX-35	GCM 8000	NI-01:00:0:35	Forever	.	.	.	.
RX-36	GCM 8000	NI-01:00:0:36	Yes	.	.	.	.
RX-37	GCM 8000	NI-01:00:0:37	Yes	.	.	.	.
RX-38	GCM 8000	NI-01:00:0:38	Thu, Nov 22, 13:31:07	.	.	.	.
RX-39	GCM 8000	NI-01:00:0:39	Yes	.	.	.	.
RX-40	GCM 8000	NI-01:00:0:40	Yes	.	.	.	.

Figure 12 Watchdog Alarms Ignored for Selected Receivers



The screenshot shows the DataMiner gcm_wd_v7 application window. It features a menu bar with 'File', 'Options', 'View', and 'Help'. Below the menu is a 'Default' tab. The main area contains a table with the following columns: Name, Description, Hardware Info (Ni:Grp:Mod:Rx), Watchdog Enabled Or Ignore Until, Thu Sep 20 22:00, Thu Sep 20 23:00, and Fri Sep 21 00:00. The table lists channels RX-23 through RX-38, all with 'Forever' in the Watchdog Enabled column.

Name	Description	Hardware Info Ni:Grp:Mod:Rx	Watchdog Enabled Or Ignore Until	Thu Sep 20 22:00	Thu Sep 20 23:00	Fri Sep 21 00:00
RX-23	GCM 8000	NI-01:00:0:23	Forever	.	.	.
RX-24	GCM 8000	NI-01:00:0:24	Forever	.	.	.
RX-25	GCM 8000	NI-01:00:0:25	Forever	.	.	.
RX-26	GCM 8000	NI-01:00:0:26	Forever	.	.	.
RX-27	GCM 8000	NI-01:00:0:27	Forever	.	.	.
RX-28	GCM 8000	NI-01:00:0:28	Forever	.	.	.
RX-29	GCM 8000	NI-01:00:0:29	Forever	.	.	.
RX-30	GCM 8000	NI-01:00:0:30	Forever	.	.	.
RX-31	GCM 8000	NI-01:00:0:31	Forever	.	.	.
RX-32	GCM 8000	NI-01:00:0:32	Forever	.	.	.
RX-33	GCM 8000	NI-01:00:0:33	Forever	.	.	.
RX-34	GCM 8000	NI-01:00:0:34	Forever	.	.	.
RX-35	GCM 8000	NI-01:00:0:35	Forever	.	.	.
RX-36	GCM 8000	NI-01:00:0:36	Forever	.	.	.
RX-37	GCM 8000	NI-01:00:0:37	Forever	.	.	.
RX-38	GCM 8000	NI-01:00:0:38	Forever	.	.	.

Figure 13 Watchdog Permanently Ignored for Entire Channel

3.6.2.2 Re-enabling Watchdog Alarms in DataMiner

To Re-enable Watchdog Alarms:

1. Follow Steps 1-5 above.
2. Press the **Re-enable** button. The Watchdog alarms will be re-enabled.

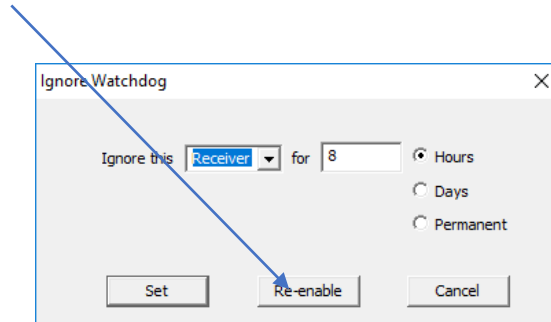


Figure 14 Re-enabling Watchdog Alarms

3.6.3 Automatic Re-enabling of Watchdog Alarms

Watchdog alarms that have been disabled for a fixed period of time will have a Date & Time shown in Column 4 of the Watchdog window. When that time is reached, the RFM program will re-enable the Watchdog for all receivers that have the same Date Time shown.

3.6.4 OnLine & OffLine Modes

The DataMiner program has two operational modes:

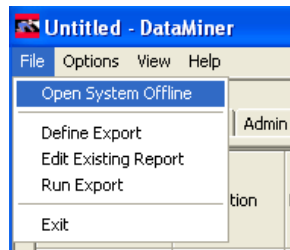
- OnLine Mode
- and OffLine Mode.

Online Mode

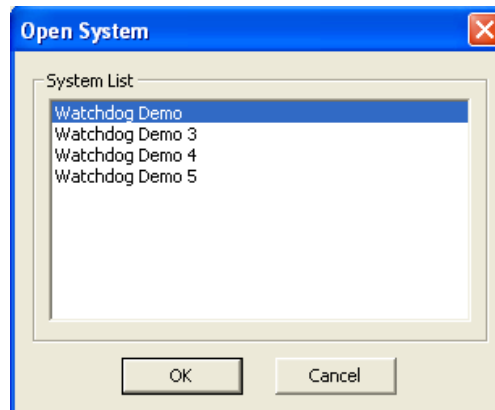
When the program is in the OnLine mode, it will connect to the System Watchdog Service to watch the state of the current system. It will receive Watchdog Alerts from the service.

Offline Mode

If you want to review historical data from an older MCNRCD database, use the OffLine mode. Select **File / Open System OffLine** from the menu as shown below:

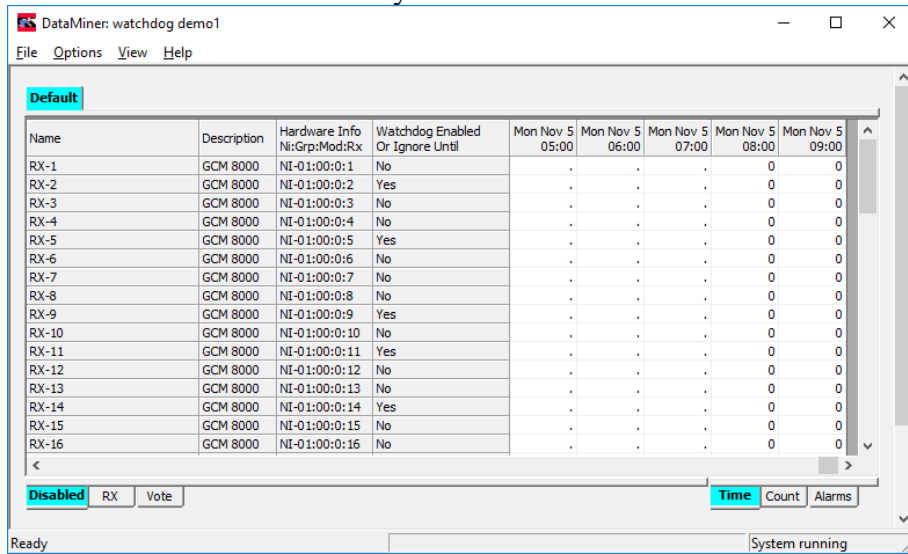


This will open an Open System window that will allow you to select an older database.



Select the desired database and hit OK.

The receiver names and history will be loaded for that database.

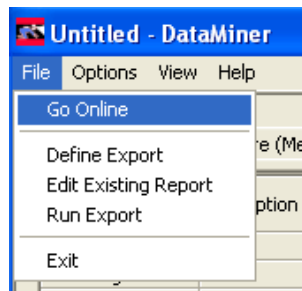


OffLine mode will be indicated in the Status Bar on the bottom of the screen.

You can then review the data, or you can export data to Excel.

Returning to OnLine Mode

When you want to return to OnLine mode, select **File / Go OnLine** from the menu as shown below:



The program will proceed to re-connect to the System Watchdog Service.

3.7 Exporting Data

Excel on PC:

For the System Performance Toolkit **prior to Version 6.11**, you must have Microsoft Excel loaded on the same PC that is running the DataMiner program to export data to Excel; Files are saved in an “.xls” format.

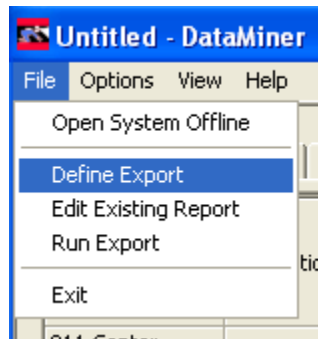


For **Version 6.11 and up**, Excel does not have to be present on the PC to export data. Files are saved in an .xlsx format. (Note that screenshots and instructions may still refer to the .xls format.)

The exports will look somewhat like the History window for selected Channels and States. You can then post-process the exported data with Excel and generate totals, graphs, etc.

3.7.1 Defining an Export Definition File

You must define an Export Definition File (*.McnEdf) before you can export the data. Select **File / Define Export** from the menu:



This will open a Define Export window:

Use the Define Export window to define what you want to export.

Export Selection List

The Export Selection List shows all the Channels and all the Watchdog States for each channel. For each Watchdog State in each Channel, you can select the Time and/or count to export. Select which items you want to support. You can also use the *Set All Selected* and *Clear All Selected* buttons to set or clear all states.

Entry Selection

Select whether you want to export totals by Hour or by

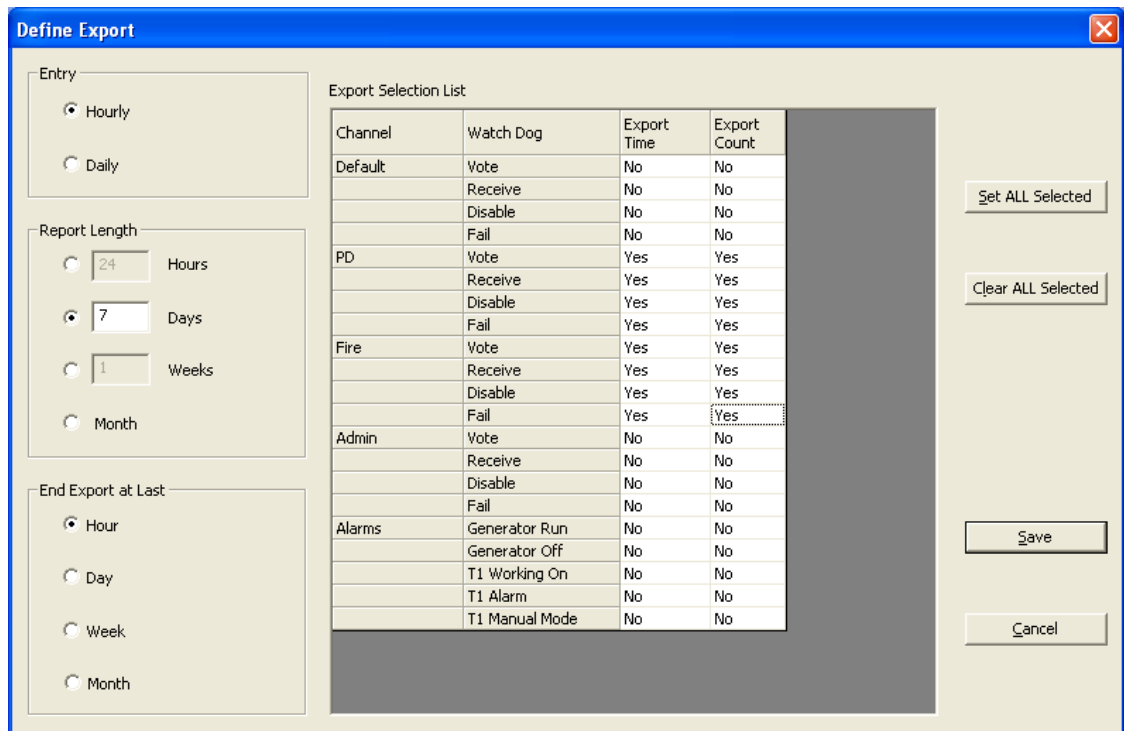
Report Length

Select the length of the report. The length of the report is restricted to a maximum of 1024 hours. This corresponds to a total of 42 days if you are using hourly data.

End of Report

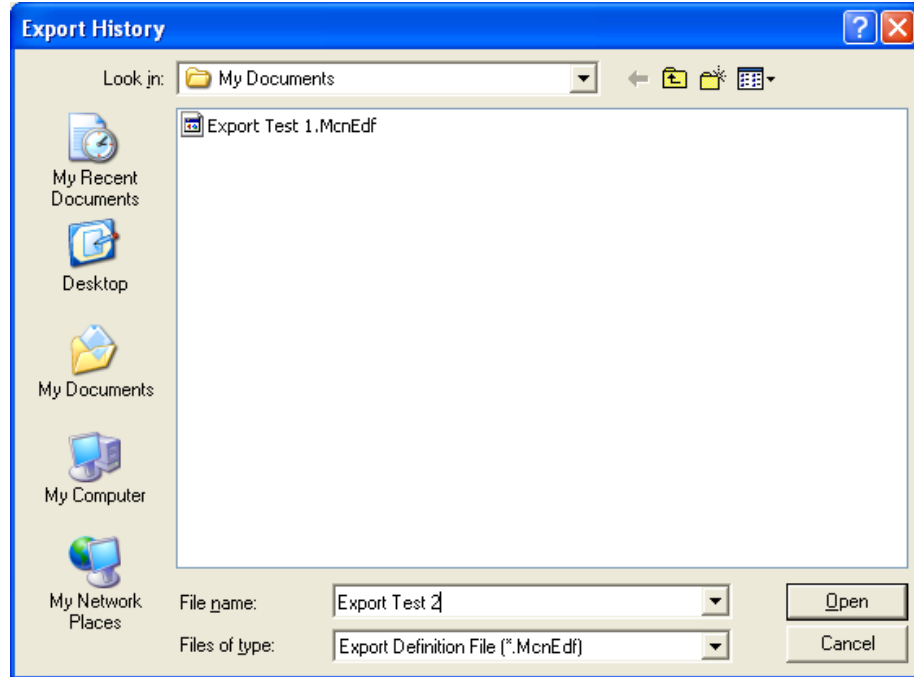
Select when you want the report to end. Choices include at the end of the last:

- Hour
- Day
- Week
- Month



In the example above, we have selected hourly reports of all states in the PD channel.

After you have made your selection, hit the Save button. Give the file a name.

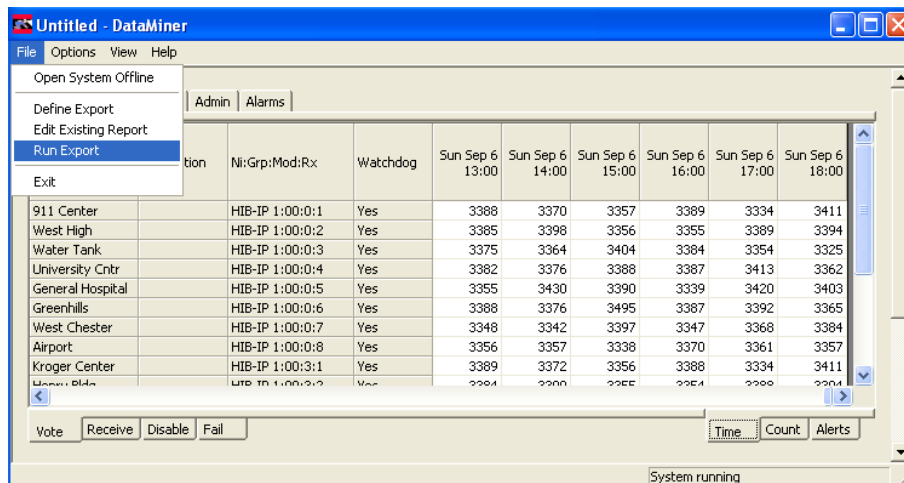


Directory / Folder Selection

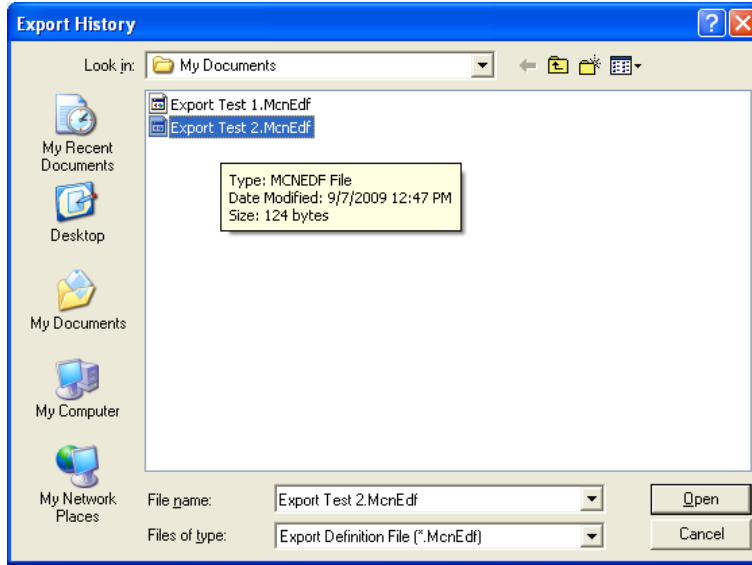
You can select a directory other than My Documents if you wish. When you run an export, the program will put the exported reports in the same directory as the McnEdf file.

3.7.2 Running an Export

Once you have defined an Export Definition File, you can run the report. Select the **File / Run Export** command from the menu.



Select the desired Export Definition File



The result would look similar to the following:

	A	B	C	D	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ
1					09/07/09	09/07/09	09/07/09	09/07/09	09/07/09	09/07/09	09/07/09	09/07/09	09/07/09	09/07/09	09/07/09	09/07/09
2	Name	Description	Ni Grp Mod Rx	Watchdog	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	
3	911 Center	HIB-IP 1:00:0:1	Yes		3386	3397	3396	3397	3369	3375	3389	3376	3343	-2E+09	3386	
4	West High	HIB-IP 1:00:0:2	Yes		3429	3339	3387	3417	3343	3366	3372	3368	3391	-2E+09	3368	
5	Water Tank	HIB-IP 1:00:0:3	Yes		3351	3369	3389	3310	3462	3399	3348	3357	3337	-2E+09	3357	
6	University Cntr	HIB-IP 1:00:0:4	Yes		3380	3378	3364	3365	3367	3386	3356	3387	3389	-2E+09	3375	
7	General Hospital	HIB-IP 1:00:0:5	Yes		3408	3370	3376	3384	3384	3375	3413	3357	3452	-2E+09	3431	
8	Greenhills	HIB-IP 1:00:0:6	Yes		3373	3382	3356	3368	3373	3392	3382	3380	3368	-2E+09	3448	
9	West Chester	HIB-IP 1:00:0:7	Yes		3364	3354	3423	3362	3404	3352	3404	3370	3359	-2E+09	3328	
10	Airport	HIB-IP 1:00:0:8	Yes		3339	3396	3363	3360	3346	3365	3385	3369	3368	-2E+09	3351	
11	Kroger Center	HIB-IP 1:00:3:1	Yes		3386	3397	3396	3398	3368	3377	3388	3375	3349	-2E+09	3385	
12	Henry Bldg	HIB-IP 1:00:3:2	Yes		3429	3339	3386	3417	3341	3365	3372	3369	3391	-2E+09	3367	
13	Music Hall	HIB-IP 1:00:3:3	Yes		3352	3368	3389	3311	3463	3398	3350	3357	3337	-2E+09	3357	

The number of tabs will vary, depending on how many Watchdog states you have selected in your Export Definition File.

3.7.3 Export Report File Structure

As shown in the previous example, the exported report file is typically a multi-tab (multi-sheet) file. One file is exported per channel.

- On tab (worksheet) per watchdog Time and
- One tab (worksheet) per watchdog Count

The first four columns of each worksheet contain fixed data identifying the receiver or I/O point. The history data follows in the columns to the right.

The first two rows are header rows.

Date and Time fields are the Date/Time of the beginning of the hour that is displayed (ex: 12:00 is the hour from 12:00 Noon to 1:00 PM.).

Total times are in seconds.

Counts are events.

3.7.4 Export Report File Names

The Export Report Files have the following name structure (software version 6.11 and later will generate .xlsx files.):

MCNSystemName_EDFName_yyyymmddhh_Channel.xls

Where:

MCNSystemName	Name of the MCN database file being evaluated.
EDFName	Export Definition File Name
yyyy	Year of last recording in the export
mm	Month of last recording in the export
dd	Day of last recording in the export
hh	Hour of last recording in the export
Channel	Channel being exported.

For example, you might have the following export files for a two-channel system:

XYZCounty_Monthly_2009083123_Police.xls and
XYZCounty_Monthly_2009083123_Fire.xls

You might have different weekly Export Definition Files that would generate:

XYZCounty_Weekly_2009083123_Police.xls and
XYZCounty_Weekly_2009083123_Fire.xls

The Export Report files are saved in the same directory as the Export Definition Files.

4 Troubleshooting Problems & Scenarios

This section outlines common issues, their causes, and recommended solutions to help you quickly troubleshoot the MCN System Performance Toolkit.

4.1 Installation Issues (Section 2.5)

❖ **Problem:** Installation fails or errors occur during setup.

➤ **Solution:**

1. Ensure you have administrator privileges on the PC.
2. Verify that the PC meets the minimum system requirements (**Section 1.5**).
3. Disable antivirus software temporarily before installation.
4. Check that the installation media (CD or executable file) is not corrupted.
5. If Autorun is disabled, manually run the setup.exe file from the installation media.
6. Restart the PC after installation and verify that the System Watchdog Service is running.

4.2 Configuration Issues (Section 4)

❖ **Problem:** Watchdog States are not triggering alarms.

➤ **Solution:**

1. Verify that Watchdog States are properly configured in the MCN Config program (**Section 5.1.1**).
2. Ensure that Display Table inputs are correctly mapped to Watchdog States (**Section 5.2**).
3. Confirm that the WD Alarm field is set to "Yes" for the receivers and I/O points you want to monitor (**Section 5.3**).
4. Check the timeout values and alarm polarity settings for each Watchdog State (**Section 5.1.3**).

4.3 Connectivity Issues (Section 3.3)

❖ **Problem:** System Watchdog Service emits "SWD" error tones.

➤ **Solution:**

1. Verify that the MCN Server is running and properly configured (**Section 3.2**).
2. Check the IP address and port settings in the System Watchdog Setup program (WdSetup.exe) (**Section 3.3**).
3. Ensure the IP infrastructure supports multicast communication between the MCN Server and the System Performance Toolkit PC (**Section 2.3**).
4. Test the network connection using the ping command to verify connectivity.
5. Restart the System Watchdog Service (**Section 3.3.1**).

4.4 Operational Issues (Section 3.4)

❖ **Problem:** DataMiner program does not display alerts or history data.

➤ **Solution:**

1. Verify that the System Watchdog Service is running and connected to the MCN Server (**Section 3.3.1.1**).
2. Check the Client Status in the MCN Server to ensure the System Performance Toolkit PC is connected (**Section 3.3.2**).
3. Confirm that the activity summary files are being generated in the correct directory (**Section 6**).
4. Ensure the database is properly configured with Watchdog information (**Section 5**).
5. Verify that the DataMiner program is running in **Online Mode** (**Section 3.6.4**).

4.5 Symptoms & Error Messages

MCN System Performance Toolkit: Error Messages, Descriptions, and Solutions (for Online Data Miner):

Symp/Error Message	Description	Solution
Connection Failed	Unable to connect to MCN Server	Verify IP Address, port settings, and network connectivity. Restart service.
Off-Line	Missing Watchdog configuration in server	Configure Watchdog States in MCN Config program. Restart service.
Partially Running	Missing activity summary files	Check file path and ensure System Watchdog Service is running.

4.6 SPT Operational Troubleshooting Checklist

The MCN System Performance Toolkit (SPT) is only as dependable as the system it monitors. When performance issues occur, a clear and methodical troubleshooting process is needed to determine whether the cause is related to services, network connectivity, database performance, licensing, or system resources. This checklist provides a structured approach to help technicians identify root causes efficiently and minimize downtime:

4.6.1 Is The MCN Server Configured and Running?

- Confirm the **MCN Server service** is running in (*Services.msc*).
 - Verify the correct configuration file is loaded.
 - Check for startup errors in Windows Event Viewer → Windows → Application Log.
 - Confirm no recent service crashes or unexpected restarts.
-

4.6.2 Are IP Addresses and Port Settings Configured?

- Open **System Watchdog Setup**.
 - Verify the configured **IP address matches the MCN Server IP**.
 - Confirm the **port number matches the MCN Server listening port**.
 - Validate there are no firewall rules blocking this port.
 - Confirm no duplicate IP conflicts on the Local Area Network.
-

4.6.3 Is System Watchdog Service Running and Connected?

- Confirm the **System Watchdog Service** (*SysWDogService*) is running.
- Verify the service is configured to start automatically.
- Confirm successful connection to the MCN Server (no communication errors).
- Check logs for authentication or timeout errors.
- Restart service if no connection is active.

4.6.4 Are Watchdog States Properly Configured

- Open **MCN Config Program**.
 - Verify all required **Watchdog States are defined**.
 - Confirm states are enabled.
 - Check correct state mapping to receivers and I/O.
 - Validate alarm thresholds are properly set.
-

4.6.5 Are Activity Summary Files Generated?

- Confirm activity summary files are being generated.
 - Verify files are written to the correct directory.
 - Check that the directory path exists.
 - Confirm proper '**write permissions**' for the service account.
 - Ensure disk space is sufficient > 100GB.
-

4.6.6 WD Alarm Flags Enabled For Relevant Receivers & I/Os?

- Verify WD Alarm flags are enabled for relevant receivers.
- Confirm WD Alarm flags are enabled for required I/O points.
- Validate alarm triggers function during test conditions.
- Confirm alarm (*if configured*) notifications are properly routed.

4.7 Scenario 1: Missing Activity Summary Files.

❖ **Symptoms:** DataMiner shows "-" for certain hours in the System History Grid.

➤ **Possible Causes:**

- The System Watchdog Service is not running.
- The activity summary files are missing or corrupted.
- The database configuration has changed, and the new database name does not match the cached files.

➤ **Solution:**

1. Check the System Watchdog Service status in the Windows Services tool (**Section 3.3.1**).
2. Verify the file path for activity summary files (**Section 6**).
3. Ensure the MCN Server database name matches the cached files (**Section 6.1**).

4.7.1 Scenario 2: Watchdog Alarms Not Triggering.

❖ **Symptoms:** Watchdog alarms are not being generated for inactive receivers or I/O points.

➤ **Possible Causes:**

- Watchdog States are not properly configured in the MCN Config program.
- Timeout values or alarm polarity settings are incorrect.
- WD Alarm flags are not enabled for the receivers or I/O points.

➤ **Solution:**

1. Verify Watchdog State configurations (**Section 5.1.1**).
2. Check timeout values and alarm polarity settings (**Section 5.1.3**).
3. Ensure WD Alarm flags are set to "Yes" for the relevant receivers and I/O points (**Section 4.6.6**).

4.7.2 Scenario 3: Watchdog Service Connection Issue with MCN Server.

❖ **Symptoms:** System Watchdog Service emits "SWD" error tones every 8–10 seconds.

➤ **Possible Causes:**

- Incorrect IP address or port settings.
- Network connectivity issues.
- MCN Server is not running or properly configured.

➤ **Solution:**

1. Verify the IP address and port settings in the System Watchdog Setup program (**Section 3.3**).
2. Test the network connection using the ping command.
3. Check the MCN Server status and configuration (**Section 3.2**).
4. Restart the System Watchdog Service (**Section 3.3.1**).

4.8 Maintenance and Management Tips

The MCN System Performance Toolkit will function at its best when the following management/maintenance measures are followed:

- ✓ Monitor System Resources regularly, i.e., check disk space, memory, and CPU usage.
- ✓ Regularly back up the MCN database and activity summary files (**Section 6.2**).
- ✓ Periodically test Watchdog alarms and alert sounds especially after configuration changes (**Section 3.6.1**).
- ✓ Verify system and version compatibility before installing any updates (**Section 1.3**).
- ✓ Ensure the System Watchdog Service is set to automatically start on system reboot (**Section 3.3.1**).
- ✓ Document All Changes i.e. *Keep records of updates, configuration changes, and maintenance.* (**Section 6.2**)

By implementing these management measures, you can improve the MCN System Performance Toolkit's efficient operation, minimize downtime, and provide reliable system monitoring and alerts.

5 Configuring the Database -- MCN Config Program

The configuration program for the MCN Server is:

- MCN Config Server.exe (for MCN Server or Advanced Server software) or
- MCN Config Server 8000 (for MCN Server 8000 software).

For simplicity, it will be referred to as "MCN Config".

Use the MCN Config program to configure the data gathering and watchdog functions of the System Performance Toolkit. There are a few things that you will need to configure:

- Conditions to Monitor (Watchdog States)
- Mapping for Display Tables Inputs to the appropriate Watchdog States
- Which Receivers and I/O Points to Monitor
- Channel Timing

5.1 Conditions to Monitor (Watchdog States)

The MCN Server is extremely flexible and can monitor many types of devices, each with different status displays. You'll need to decide what types of statuses you want the System Performance Toolkit to monitor. You'll need to set up Watchdog Conditions for:

- Statistics Gathering and
- Watchdog Alerts

Conditions for **Statistics Gathering** maybe things like:

- Receiver Vote
- Receiver Receive (Unsquench)
- Receiver Disable
- Receiver Fail
- Generator Run
- Alarm State

Conditions for **Watchdog Alerts** maybe things like:

- Receivers not Voted for some time.
- Receiver not Receiving for a period of time.
- Receiver Disabled for too long.
- Generator is not running regularly.

Note that the Watchdog Alerts shown above are based upon some of the Statistics Gathering conditions. They have two additional conditions:

- In or out of a state
- Time period

More discussion on configuring the Watchdog Alerts will follow later.



You must configure a Watchdog State in the MCN Config Server program for any state for which you need to:

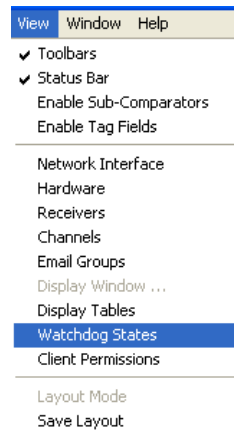
- *Gather statistics or*
- *Generate a Watchdog Alarm.*

Don't confuse the Watchdog States with Display Table entries. There may be a "Vote" entry in the Display Table, but if there is not a "Vote" Watchdog State (with the appropriate linkage), the Vote state will not be logged to the System Performance Toolkit.

5.1.1 Setting up Watchdog States

In the MCN Config Server, load the database.

From the Menu, select **View / Watchdog States**



This will open a blank Watchdog States window.

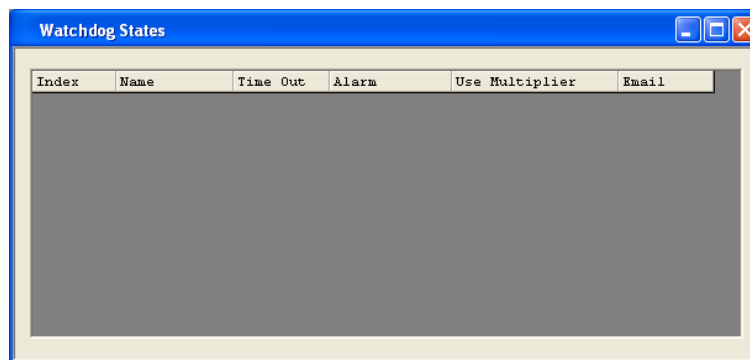
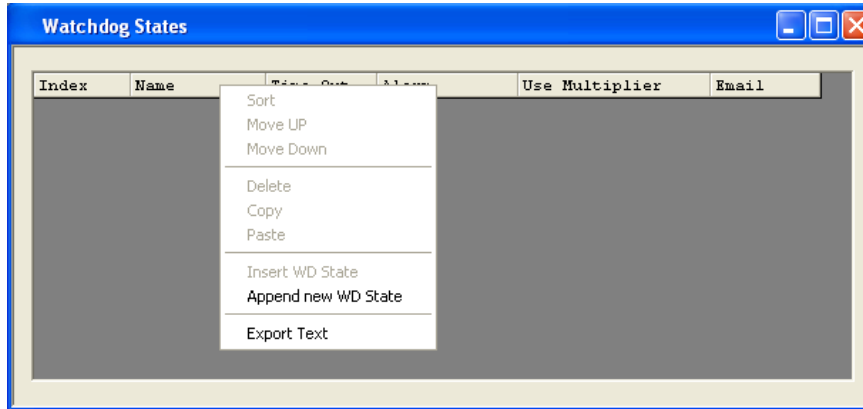
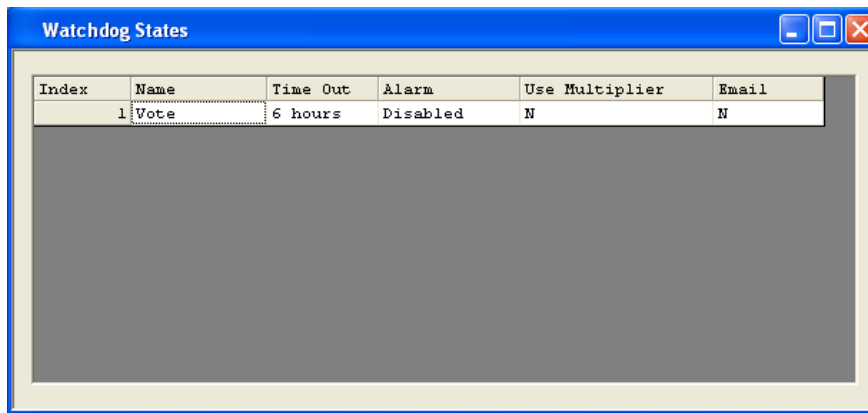


Figure 15 Blank Watchdog StatesWindow

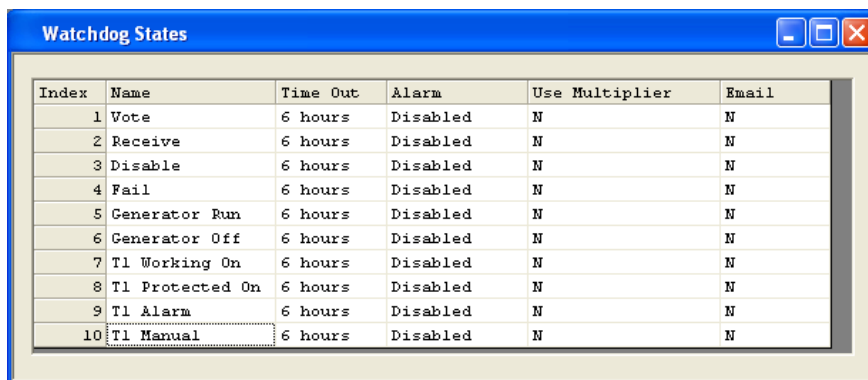
To add a Watchdog State, Right-Click on the header line and select *Append New WD State* from the drop-down menu.



Label the Watchdog state appropriately. Fill in the Name field for now; we'll come back to the rest of the fields in the following section.



Repeat the above to add the names of the remainder of the Watchdog States that you want to monitor:



The System Performance Toolkit program will gather data on those Watchdog States.

5.1.2 Watchdog States Fields

Each Watchdog State includes the following fields:

Name	Name of the Watchdog State
Time Out	Time out value (in hours) for Watchdog Alarms The timeout value is not used if the Alarm field shows <i>Disabled</i> .
Alarm	Alarm Type. This field can have the following values: <i>Disabled</i> This state does not generate a Watchdog Alarm. (But statistics are still collected for this State.) <i>Enabled</i> Trigger an alarm if this state has been Active for the Time Out Time . <i>Inverted</i> trigger an alarm if this state has been Inactive for the Time Out Time .
Use Multiplier	This field indicates whether or not to use the WD Multiplier value in the Channel Window for receivers or I/O points using this Watchdog State .

Normally you would use a short Watchdog **Time Out** value (maybe 1 or 2 hours) for the Main channels. The system will then alert you quickly when a receiver has shown no activity for that time.

However, if you use a short Watchdog **Time Out** value on secondary channels that are used infrequently, it will result in nuisance alarms when the channel has not been used.

The **WD Multiplier** (Watchdog Multiplier) lets you set a short **Time Out** value for the main radio channels and use a longer value for secondary channels.

The Channel window includes a **WD Multiplier** value for each radio channel. This allows you to extend the **Time Out** time for secondary channels.

When the **Use Multiplier** is set to "Y", the effective Watchdog Time Out value is:

Time Out x WD Multiplier (from Channel window)

Thus, you can tailor the watchdog timeouts per radio channel. (Note that you must have the proper **Channels** set for each CIB or AIB module in the **Hardware** window.)

5.1.3 Setting Watchdog Alarm Conditions

In the previous section, we left all the Alarms in Disabled mode. We will now see how to set up the Watchdog Alarm Conditions.

Each Watchdog State can be set to generate a Watchdog Alarm. Watchdog Alarm Conditions have five attributes shown in the table:

- State Name
- Timeout Time (in hours)
- Alarm Polarity (Disabled, Enabled, Inverted)
- Channel Multiplier
- Email Flag (MCN Server 8000 does not support email.)

Let's look at some Watchdog Alarm examples:

5.1.3.1 Bad Receiver or Comparator – No Receive

Use this to set a Watchdog Alarm if a receiver has not had any **Receive** activity in 8 hours.

Name	Timeout	Alarm	Use Multiplier	Email
Receive	8 Hours	Inverted	Yes	As Desired

Timeout

Timeout has been set to 8 Hours. This would be used for a fairly busy channel on which we would expect that all receivers would receive during **each** 8-hour period. It would alert you once per 8-hour shift if the receivers weren't receiving. Keep in mind that the System Performance Toolkit will be monitoring the system 24 hours a day, 7 days a week. Be sure to anticipate traffic (or lack thereof) during evenings, late nights, and weekends. If you set this time too short, the system may generate nuisance alarms during those times.

Set this time for your busiest channel. You can use the Channel Multiplier with quieter channels.

Alarm Field

The Receive condition is a desired state, so we use the "**Inverted**" entry in the **Alarm** field. The System Performance Toolkit will generate an alarm then this state is NOT seen for a period of time.

Use Multiplier

Once we have enabled the **Use Multiplier** field, this will let you delay reporting on quieter channels. You would set a multiplier in the **Channel Window** for those channels.

Email

Set as desired. (MCN Server 8000 does not support email.)

5.1.3.2 Bad Receiver or Comparator – No Vote

Use this to set a Watchdog Alarm if a receiver has not had any **Vote** activity within a period of time. This is similar to the above example.

Name	Timeout	Alarm	Use Multiplier	Email
Vote	16 Hours	Inverted	Yes	As Desired

Time Out

We have set the **Time Out** to 16 Hours. We have done this assuming that, even if all receivers Receive once per 8-hour shift, some of them may only Vote once per 16 hours. (Possibly some receivers are located in a small geographic area and would only vote when the field users were close to them.)

Set this time for your busiest channel. You can use the Channel Multiplier with quieter channels.

We have set the remaining fields the same as in the previous example.

5.1.3.3 Generator Long Run

Use this to set a Watchdog Alarm if a generator runs continuously for a predetermined time. This would be an indication that someone should check the fuel levels.

Name	Timeout	Alarm	Use Multiplier	Email
Generator Run	4 Hours	Enabled	No	As Desired

Time Out

We have set the **Time Out** to 4 Hours of continuous run time.

Alarm Field

Unlike the previous examples, this Watchdog Alarm uses the "**Enabled**" **Alarm** field. The System Performance Toolkit will generate an alarm then this state is continuously ACTIVE for a period of time.

Email

Set as desired. (MCN Server 8000 does not support email.)

5.1.3.4 Generator Fails to Start for Weekly Test

Use this to set a Watchdog Alarm if a generator fails to run once a week.

Name	Timeout	Alarm	Use Multiplier	Email
Generator Off	169 Hours	Enabled	No	As Desired

Time Out

We have set the **Time Out** to 169 Hours. This corresponds to one week plus one hour. You may need the extra hour during time changes, depending on what devices trigger your generator tests.

Alarm Field

The Generator Off State will be active when the Generator is off. It will be the opposite of the Generator Run state. This Watchdog Alarm uses the "**Enabled**" **Alarm** field. Thus, the System Performance Toolkit will generate an alarm then the generator is in the Off state continuously for 169 hours. This will indicate that it didn't start for its weekly test.

5.1.3.5 Setting Multiple Alarms based on the same inputs

Note that we generated two different Watchdog Alarms that are both based on the Run state of the generator. If you need to generate two different alarms, enter two Watchdog States with different names to use. In our examples, we made the following Watchdog States:

- **Generator Run** and
- **Generator Off**.

The states are inverted from each other. (We'll see how the inversion happens in section 0.)

Alternately, we could have duplicated the Watchdog States and given them slightly different names such as:

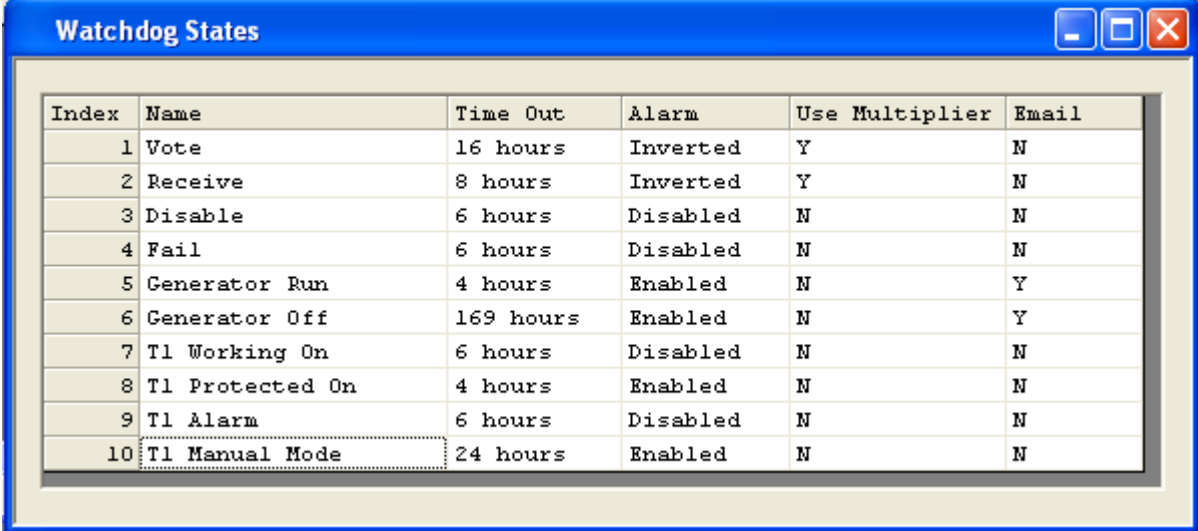
- **Generator Run** and
- **Generator Run 2**.

In that case, we would have had to use the **Inverted** entry in the **Alarm** field for the **Generator Fails to Start Watchdog State**.

5.1.3.6 Finished Example – Watchdog States

The following screenshot shows the finished **Watchdog States** window for the above examples.

We've added two additional alarm conditions for the Watchdog States. Can you figure out what they do?



The screenshot shows a window titled "Watchdog States" with a table containing 10 rows of data. The table has six columns: Index, Name, Time Out, Alarm, Use Multiplier, and Email. The data is as follows:

Index	Name	Time Out	Alarm	Use Multiplier	Email
1	Vote	16 hours	Inverted	Y	N
2	Receive	8 hours	Inverted	Y	N
3	Disable	6 hours	Disabled	N	N
4	Fail	6 hours	Disabled	N	N
5	Generator Run	4 hours	Enabled	N	Y
6	Generator Off	169 hours	Enabled	N	Y
7	T1 Working On	6 hours	Disabled	N	N
8	T1 Protected On	4 hours	Enabled	N	N
9	T1 Alarm	6 hours	Disabled	N	N
10	T1 Manual Mode	24 hours	Enabled	N	N

5.2 Mapping Display Table Inputs to Watchdog States

After we've set up the **Watchdog States** to monitor, we must then specify which combination of inputs from the I/O modules corresponds to each **Watchdog State**. We do that with the **Display Table Window**.

So why do we have to take another step to link the Input Bits to the Watchdog States? Why can't we just get them from the screen display? There are four reasons:

1. **Mapping different types of I/O devices to the same Watchdog Status.**

You might have two different brands of generators with slightly different status bits that display differently on the MCNRCD screen, but you want to map them to common Generator Watchdog States.

Alternately, you could have multiple types of Comparator Display Tables (Comparator, Sub-Comparator, etc.) with different input bits that show up differently on the MCNRCD screen, but you want to map them to the same Watchdog States (Vote, receive, Disable, Fail).

2. **Mapping similar display statuses to different Watchdog States.**

Both a Generator and a Receiver may have a **Fail** state when they are displayed on the MCNRCD screen, but you want to have explicit *Generator Fail* and *Receiver Fail* states for statistics and Watchdog Alarms.

3. **We need to consolidate the Display States into a manageable number of Watchdog States.**

Typically, many MCN systems contain a large number of Display Table entries. Logging all of them would generate highly fragmented data that would not be useful to the system manager.

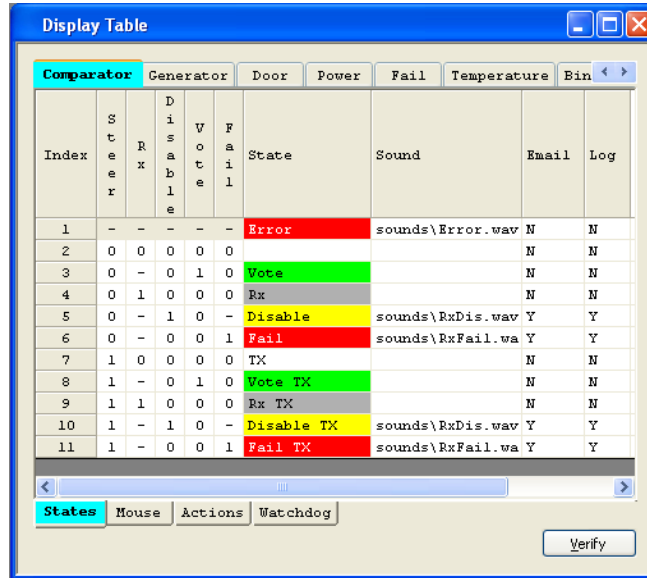
4. **Dealing with IP Comparators or other devices with complicated Display Tables**

IP comparators may have multiple Display Table lines for the same display state (ex: Vote or Rx).

5.2.1 Step by Step Mapping

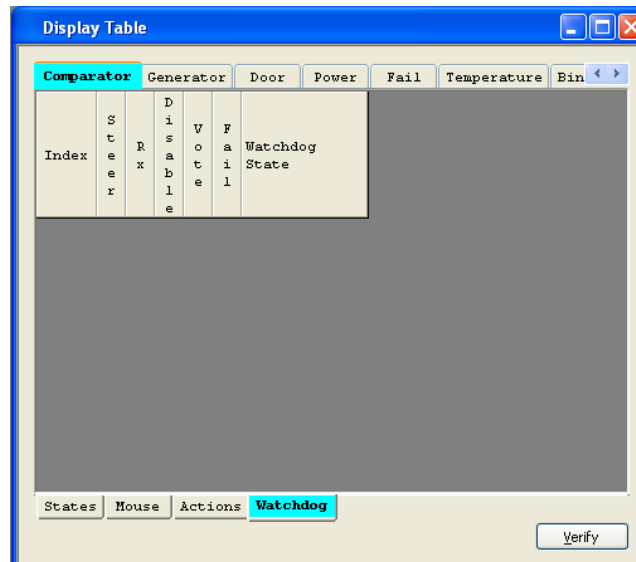
To map the Display Table inputs to the Watchdog States, open the **Display Tables** window. (From Menu, select *View / Display Tables*.)

Select the tab for the desired Display Table on the top of the window.

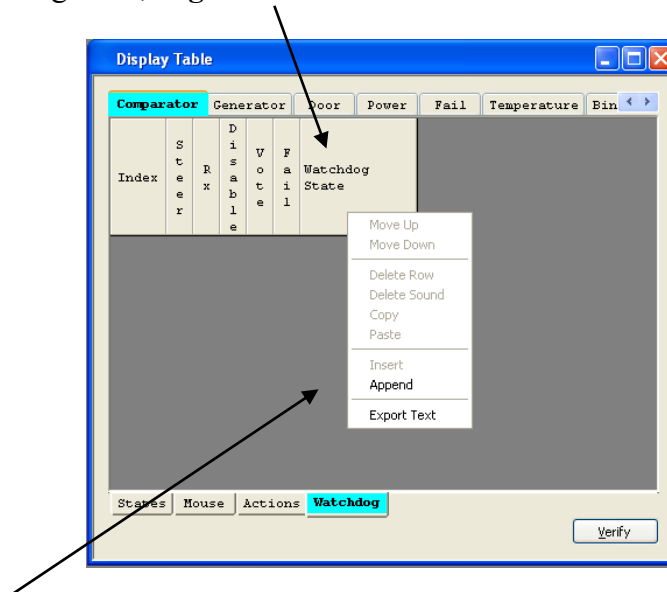


Note the tabs on the bottom of the Display Table. (You might not have the "Actions" tab.) The **States** tab shows how the inputs are displayed on the MCNRCD screen.

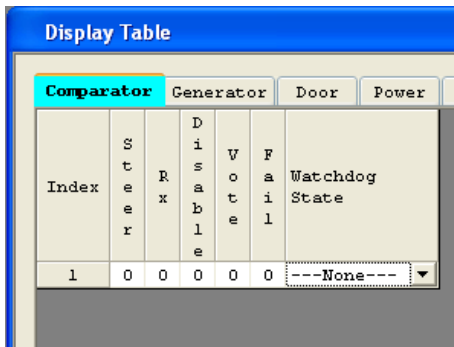
Select the **Watchdog** tab. It shows the linkage between the input bits and the Watchdog States.



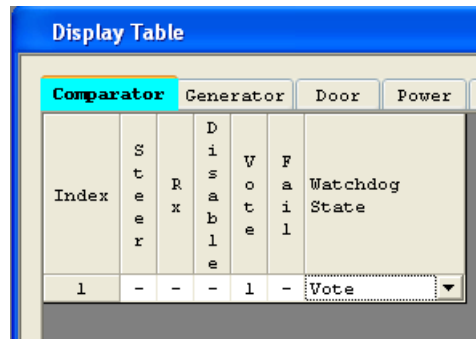
There are no linked states yet.
 To add a Watchdog State, **Right-Click** on the Header:



Select **Append** to add a Watchdog definition line.



A blank entry will be created.



Select a **Watchdog State** using the Drop-down box and enter the inputs corresponding to that state:

The input bit definition is the same for the Watchdog State as for the Display States:

- 0 Inactive
- 1 Active
- Don't Care

Repeat the above steps until you have all the proper **Watchdog States** associated with this **Display Table**.

Comparator example:

The screenshot shows a software interface titled "Display Table" with a blue header. Below the header are four tabs: "Comparator" (highlighted in cyan), "Generator", "Door", and "Power". The main area contains a table with the following data:

Index	S t e r	R e x	D i s a b l e	V o t e	F a i l	Watchdog State
1	-	-	-	1	0	Vote
2	-	1	-	-	0	Receive
3	-	-	1	-	-	Disable
4	-	-	-	-	1	Fail

Select the remaining Display Tables one at a time using the top tabs and enter the Watchdog States for those Display Tables.

Sub-Comparator example:

The screenshot shows a software interface titled "Display Table" with a blue header. Below the header are four tabs: "Binary Table", "Sub Comparator" (highlighted in cyan), "Sub AB", and "Sub". The main area contains a table with the following data:

Index	M a s t e r	S t e r	R e x	D i s a b l e	V o t e	F a i l	Watchdog State
1	1	-	-	-	1	0	Vote
2	-	-	1	-	-	0	Receive
3	-	-	-	1	-	-	Disable
4	-	-	-	-	-	1	Fail

Note that the Sub-Comparator is similar to the Comparator, but it has an additional **Master** (Master Vote) bit. The **Vote** state is active when both the **Vote** bit on the Sub-Comparator and its associated **Master** Vote bit is active. Note also that the **Fail** bit must be inactive for the **Vote** Watchdog condition to be valid.

The **Receive** state, however, does not need to have an active **Master** bit.

Generator Example:

A typical set of Watchdog States for a generator is shown below.

Index	Run	Stop	Start	Fault	Watchdog State
1	1	-	-	-	Generator Run
2	0	-	-	-	Generator Off

Note that in the Generator Display Table, the *Generator Run* and *Generator Off* use inverted versions of the Run bit to define their states.

(If we instead used *Generator Run* and *Generator Run 2* Watchdog States, they both would have used the same bit fields.)

Note on Native Display Tables

Some **Display Tables** are **Native Display Tables**, and some are used just for **Display Override**. The System Performance Toolkit determines the **Watchdog States** based upon a receiver's or I/O point's **Native Display Table**.

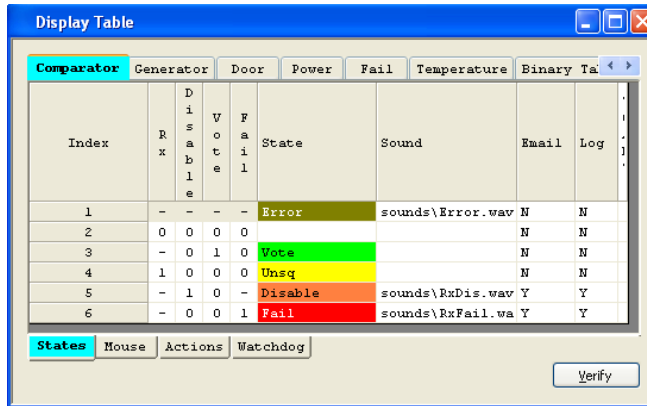
The **Native Display Table** for a receiver or I/O point is the **Display Table** chosen in the **Receiver Window** in MCN Config, as shown in the following section. Be sure to enter the **Watchdog States** in all the appropriate **Native Display Tables**.

If a **Display Table** is used simply for **Display Table Override**, you don't have to enter the **Watchdog States** for it.

5.2.2 Watchdog States vs. Display Table States

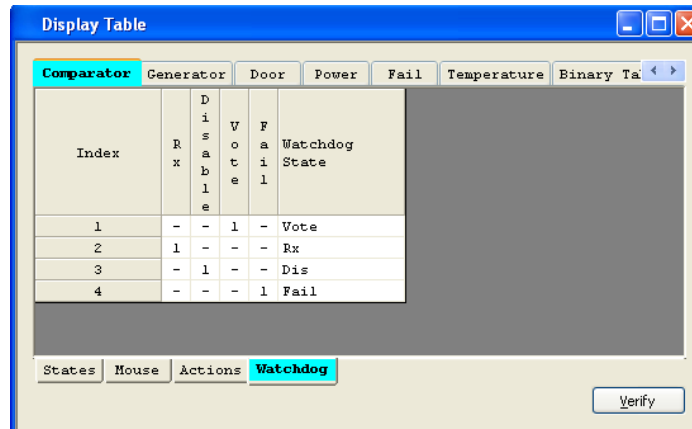
The Watchdog States and the Display Table States can have similar (or identical) names, but their definition may be different.

Consider the case of an Unsnquelled (or receiving) indication. The Display Table State is shown below.



The Vote and Unsnquelled States in the Display Table both have multiple bits used to define them. When a receiver is voted, the MCN Server (and Clients) will show it as Voted and not Unsnquelled (or receiving) even though it has both the Vote and Rx bits active.

The Watchdog State is a bit different:



The System Performance Toolkit will log time to the Rx Watchdog State whenever the receiver is receiving (unsnquelled) – whether it is voted or not.

Since single bits are used for both the Vote and Rx Watchdog states, a receiver that is voted (Rx & Vote bits active) will have time logged to both the Vote and Rx Watchdog States.

5.2.3 Watchdog States for IP Comparators

The MCN Server 8000 software supports GCM 8000 and MLC 8000 IP and GRV 8000 (in Version 8.2) comparators from Motorola Solutions, Inc. These comparators have more complicated Display Tables with multiple lines for the same displayed state (for example, multiple "Vote" or "Receive" indications. Those states are present to catch transient conditions when the comparator changes from one state to another.

5.2.3.1 Version 7.25 and older

System Performance Toolkit Versions prior to 7.26 can only support a single line for each Watchdog state defined with any Display Table.

For example, you can assign only one definition line in the Watchdog Tab for a "Vote" or "Rx" watchdog state in the MLC 8000 Display Table.

Nothing in the MCN Config program would prohibit you from assigning the same watchdog definition for multiple comparator statuses. However, duplicated watch dog definitions (which would be required at this version level if watching IP Comparators), can cause the data mining and watchdog functions to operate erratically.

Contact CTI Products, Inc. for recommendations on Watchdog states with these IP comparators.

5.2.3.2 Version 7.26 and newer

System Performance Toolkit versions 7.26 and later overcame the previous limitation of single-line definition. You can now specify multiple bit field definition lines for the same monitored Watchdog state.

If, for example, there are three "Rx" entries in the Display Table, add three empty lines in the Watchdog tab and individually copy the bit fields for each state into an empty line in the Watchdog tab and tag all three with the "Rx" Watchdog state.

5.3 Selecting Receivers and I/O Points to Monitor

The System Performance Toolkit will log and generate Watchdog Alarms only for receivers & I/O points that have the Watchdog States set up in their Native Display Table (see definition above). However, you may not want the System Performance Toolkit to monitor or alarm all those receivers or I/O points. Specifically, you would want to exclude:

- Receivers or I/O points that are not connected.
- Receivers that are out of service for an extended period.
- Receivers in very complex systems that are connected through multiple Network Interfaces. (This is a rare situation but may occur in Master-Sub comparator systems with multiple dispatch locations and multiple Master comparators.) In these cases, you would want to enable only one instance of the receiver so that you wouldn't get duplicate logs or duplicate Watchdog Alarms.

5.3.1 Step by Step Selection

Open up the **Receiver Window**. (From Menu, select *View / Receivers*.)

Index	NI	GRP:MOD	Type	Channel	RX	Name	Description	Tag-1	Tag-2	WD Alarm	Display Table
1	LTA LG	00:0	CIB	PD (Busy)	1	911 Center				Yes	Comparator
2	LTA LG	00:0	CIB	PD (Busy)	2	West High				Yes	Comparator
3	LTA LG	00:0	CIB	PD (Busy)	3	Water Tank				Yes	Comparator
4	LTA LG	00:0	CIB	PD (Busy)	4	University Cntr				Yes	Comparator
5	LTA LG	00:0	CIB	PD (Busy)	5	General Hospital				Yes	Comparator
6	LTA LG	00:0	CIB	PD (Busy)	6					No	Comparator
7	LTA LG	00:0	CIB	PD (Busy)	7					No	Comparator
8	LTA LG	00:0	CIB	PD (Busy)	8					No	Comparator
9	LTA LG	00:1	CIB	Fire (Medium)	1	911 Center				Yes	Comparator
10	LTA LG	00:1	CIB	Fire (Medium)	2	West High				Yes	Comparator
11	LTA LG	00:1	CIB	Fire (Medium)	3	Water Tank				Yes	Comparator
12	LTA LG	00:1	CIB	Fire (Medium)	4	University Cntr				Yes	Comparator
13	LTA LG	00:1	CIB	Fire (Medium)	5	General Hospital				Yes	Comparator
14	LTA LG	00:1	CIB	Fire (Medium)	6					No	Comparator
15	LTA LG	00:1	CIB	Fire (Medium)	7					No	Comparator
16	LTA LG	00:1	CIB	Fire (Medium)	8					No	Comparator
17	LTA LG	00:2	CIB	Admin (Quiet)	1	911 Center				Yes	Comparator
18	LTA LG	00:2	CIB	Admin (Quiet)	2	West High				Yes	Comparator
19	LTA LG	00:2	CIB	Admin (Quiet)	3	Water Tank				Yes	Comparator
20	LTA LG	00:2	CIB	Admin (Quiet)	4	University Cntr				Yes	Comparator
21	LTA LG	00:2	CIB	Admin (Quiet)	5	General Hospital				Yes	Comparator
22	LTA LG	00:2	CIB	Admin (Quiet)	6					No	Comparator
23	LTA LG	00:2	CIB	Admin (Quiet)	7					No	Comparator
24	LTA LG	00:2	CIB	Admin (Quiet)	8					No	Comparator

Select "Yes" in the **WD Alarm** field for each receiver you want to monitor with the System Performance Toolkit. Select "No" for receivers and I/O points that you don't want to monitor with the System Performance Toolkit.

The configuration program will automatically set the field to "Y" when you enter a new receiver name. If you delete a receiver or I/O point, be sure to set the field to "N".

The MCN Config program will let you select "Y" even if the Native **Display Table** does not have any **Watchdog States** associated with it. That's okay since the System Performance Toolkit will ignore any of the **WD Alarm** flags for **Display Tables** without the **Watchdog States**.

5.4 Setting up Channel Timing

The example below shows three channels with different channel activities. They are listed in order of busiest first.

Index	Channel	Email Group	WD Multiplier
1	PD (Busy)	None	1
2	Fire (Medium)	None	2
3	Admin (Quiet)	None	4

The System Watchdog Service uses the entry in the WD Multiplier to calculate effective Watchdog timeouts for all receivers and I/O points in that channel.

It calculates the effective time-out by the following formula:

$$\text{Effective Timeout} = \text{Time Out} \times \text{WD Multiplier}$$

Each Watchdog State can have its own time-out time.

For example, if the basic Vote timeout were set for 8 hours, the above channels would have the following Effective Time-Outs:

PD	8 Hours
Fire	16 Hours
Admin	32 Hours

Be sure to select the proper channel for each hardware module (CIB, AIB, etc.) in the Hardware window as shown below:

Index	Group	Module	Type	Banks	Location	Name	Channel
1	00	0	CIB	1	911 Center	PD Digitac	PD (Busy)
2	00	1	CIB	1	911 Center	FD Digitac	Fire (Medium)
3	00	2	CIB	1	911 Center	Admin Spectra-TAC	Admin (Quiet)

6 Activity Summary Files

The System Watchdog Service program generates hourly activity files.

They are stored in the Windows Program Data directory/folder:

For Windows XP, the location is typically:

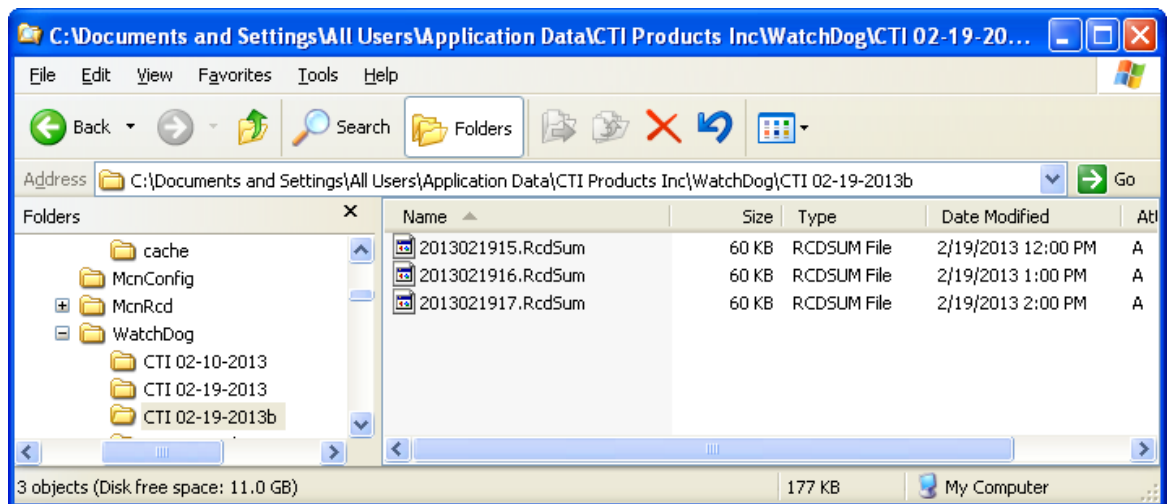
C:\Documents and Settings\All Users\Application Data
 \CTI Products Inc\WatchDog\SystemName\

For Windows 7 the location is typically:

C:\ProgramData\
 \CTI Products Inc\WatchDog\SystemName\

(Where *SystemName* is the MCNRCD Database name.)

(Note that these folders are sometimes hidden in Windows Explorer.)



Each system is saved in its own folder with the following files.

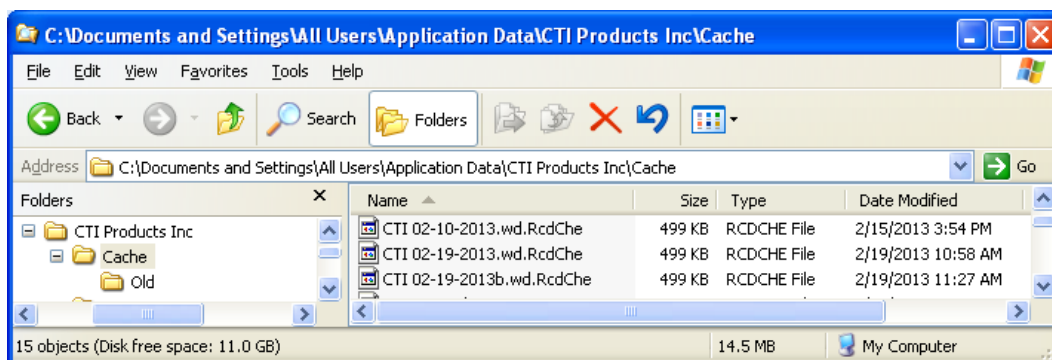
- **RcdSum** files are Hourly summary files
(Used by DataMiner for hourly sums).
File name format:
YYYYMMDDHH.RcdSum
 YYYY Year
 MM Month
 DD Day
 HH Hour of logging (GMT).

If a RcdSum file is missing, the DataMiner shows "-" for that hour.

6.1 Cache Files

The system will keep cached copies of the system configurations. The System Watchdog Service will load the configuration data from them if they are up to date. If the Server has a newer configuration, the System Watchdog Service will re-load the configuration from the Server and re-cache it.

Cache files are saved in the Windows Application Data \ CTI Products Inc directory/folder. The exact location varies depending on Windows operating system version.



For Windows XP, the location is typically:

C:\Documents and Settings\All Users\Application Data
 \CTI Products Inc\Cache\

For Windows 7 the location is typically:

C:\ProgramData\
 CTI Products Inc\Cache\

Cache file names are of the form:

SystemName.wd.RcdChe (Prior to Version 7.26)
SystemName.wd32.RcdChe (Version 7.26)
SystemName.wd64.RcdChe (Version 8.20)

(Where *SystemName* is the MCNRCD Database name.)

These folders are sometimes hidden in Windows Explorer.

Note that these files are separate from the ClientRCD cache files.

6.2 MCNRCD Database Revision Tracking

We recommend keeping backups of MCNRCD System Databases and tracking them with revision numbers. This will enable you to revert to an older database in case you make an error when changing a database. Revision tracking can be done in either of two ways:

1. Add a revision number to the database name:
MCN PD 01
MCN PD 02
MCN PD 03, etc.
2. Keep each database in a separate folder with a revision number in the folder:
Rev 01\MCN PD
Rev 02\MCN PD
Rev 03\MCN PD

You could even add a description of the changes in the folder name:

Rev 01 Initial\MCN PD
Rev 02 Added Detectives\MCN PD
Rev 03 Changed East Zone\MCN PD

6.3 Working Database Names – Minor Database Changes

The System Watchdog Service keeps these files in a directory with the MCNRCD System Database Name in it. If you update an MCNRCD System Database and change its name, the new data will be put in a separate directory.

No matter which method you use for tracking changes, for minor database changes (like adding CIB modules, changing receiver names or descriptions, etc.), we suggest that you save a copy of the revised database with a system name that stays the same so that you keep your summation files.

You'll just have to keep in mind that the DataMiner program will display the data with the currently cached version of the MCN Database. If you have changed receiver names, for example, the receiver names in the DataMiner will be the new receiver names.

6.4 Working Database Names – Major Database Changes

For major database changes like changing channel assignments, re-addressing CIB modules, adding channels, etc. we suggest that you save a copy of the revised database with a new system name.

This will allow you to keep the cached MCNRCD database for the old activity files. You can view them OffLine in the DataMiner program.

The activity data for the new database will be stored in its own file, and DataMiner will use the new cached MCNRCD database to view the activity data.

7 Appendix A -- Re-Installing the System Performance Toolkit software

Installing a new version over an existing one is generally safe, as long as both versions use the same installer package. Registry settings are typically preserved and automatically applied to the new version.

However, for the **MCN System Performance Toolkit**, we do not recommend installing newer versions over an existing one. Instead, back up all important data beforehand, as a precaution and rule of good practice. Then uninstall the previous version before installing an updated one.

Follow these steps for proper uninstallation:

1. Close the MCN DataMiner program.
2. Open the **Services** console and stop the **SysWDog Service**. See Section 3.3.1, *Starting & Stopping System Watchdog Service*, for details.
3. Using File Explorer, navigate to the working directory (typically C:\Program Files\CTI Products Inc\System Performance Toolkit).
4. Create a folder named **Backup** within the working directory.
5. Copy all files in the working directory (except the newly created Backup folder) into the Backup folder.
6. Uninstall the previous version of the MCN System Performance Toolkit:
 - Open **Control Panel** → **Programs and Features** (or **Apps & Features** in newer versions of Windows, e.g., Win 11).
 - Select **System Performance Toolkit**.
 - Click **Uninstall** and follow the prompts.
7. Install the newer version of the MCN System Performance Toolkit by following the instructions in Section 2.5, *Installing the MCN System Performance Toolkit Software*.
8. If file conversion is required, refer to the update instructions included with the software release.

8 Appendix B - Customer Support

If you need help in setting up your system, call and talk to one of our Engineers or Product Support specialist at:

(513) 595-5900.

Ask to speak to a CTI Products, Inc. Engineer or Support Specialist
Available between the 8:00 to 4:30 Eastern time.

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The latest modifications were made by Pavel Akimov. Added port into UNIX-based systems. The Windows version didn't change. In the UNIX port, only the compressing files functionality is available.

THIS FILE is largely based upon code by info-zip. It has been modified by Lucian Wischik. The modifications were a complete rewrite of the bit of code that generates the layout of the zip file, and support for zipping to/from memory or handles or pipes or pagefile or disk files, encryption, and Unicode. The original code may be found at <http://www.info-zip.org>.
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XML Writer Acknowledgement

Based partially on an article and code:
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