WAVEWIN

DEVICE MANAGER &
FAULT DATA MANAGER

QUICK START

Last Update: August 2024

Acknowledgments

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Preface

This document contains information about data collection with Wavewin.

This document also contains information about the Wavewin Fault Data Manager application.

This document is intended for use by individuals working in protection, engineering, and system operations.

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System Requirements & Installation

This chapter lists the system requirements needed for installing and running the Wavewin software. It also describes the installation procedures and provides technical support information.

System Requirements

The system minimum requirements are listed below.

- An IBM or compatible PC with an 80486 microprocessor or higher.
- 1 gigabyte of memory.
- 2 gigabytes of available hard disk space.
- A VGA, 8514/A, or compatible graphics adapter.
- Microsoft Windows version 7 or higher, Windows Server 2012.

Installation

The system files are distributed in a compressed format. To install the software, follow the instructions for the type of storage media distributed with this manual.

Web: To install the software from the Web, access the www.wavewin.net web site. Under the "Wavewin Upgrades" link click on the Wavewin application to download. Enter your username and password to get access to the download page. The username and password are case sensitive. Click on the software link to download the latest system's zip file. Unzip the contents of the downloaded zip file to a directory off the computer's root drive, c:\Wavewin32.

USB: To install the software using a USB drive, place the USB drive into the USB port. Navigate to the installed drive using Windows Explorer and copy all the files to a directory off the computer's root drive, c:\Wavewin32.

The installation is now complete.

Starting the Software

After you have installed the software on your computer, you are ready to begin. How you begin depends on your own style. If you like to dive right in and learn by doing the system provides on-line help to assist you. If you prefer a structured learning approach, read the quick start chapters to get familiar with the software.

To run the software, navigate to the Wavewin install path and double click on the Wavewin32 shortcut.

Pass Parameters

To start the polling process when Wavewin is ran use the following pass parameters ports mid.

Ports will open the Device Manager.
Mid opens the MID polling window.
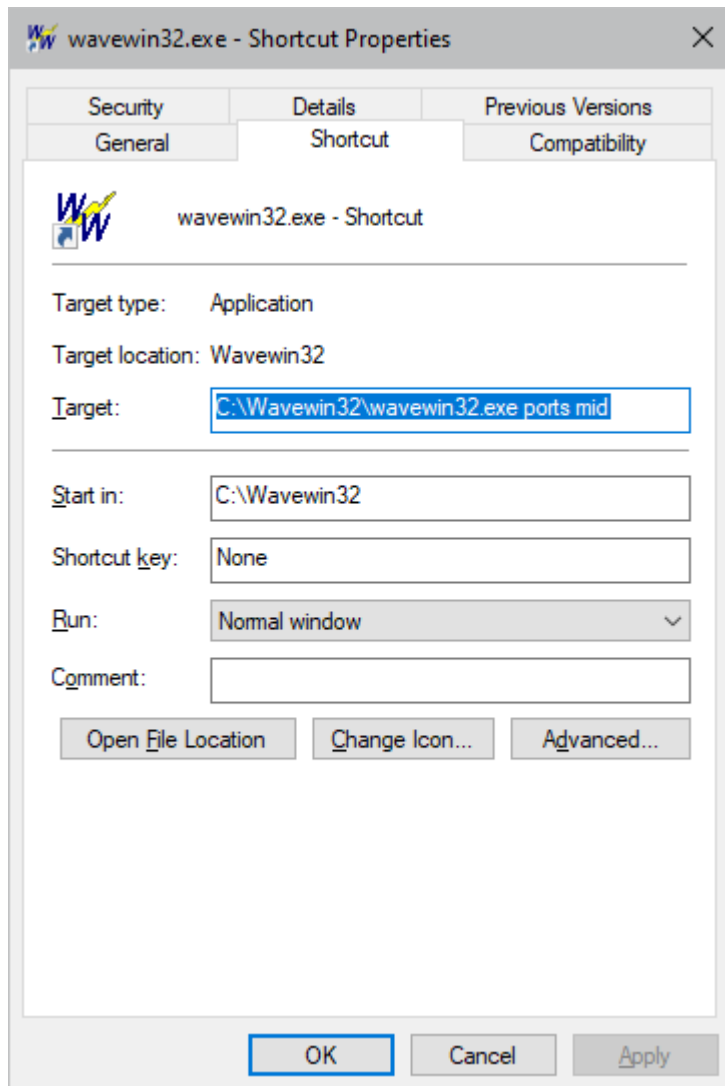
Figure 1.1 Passed Parameters

Technical Support

Although this system is easy to use and understand, at some point you may encounter a technical question, feel that the system has improperly operated, or have suggestions for future improvements. In either case, contact Softstuf using one of the following methods:

Phone: 800-818-3463, 215-922-6880, hours are from 9:00 a.m. to 6:00 p.m. Mon- Fri, (EST).
Fax: 215-625-2497, response time is 24 hours.
E-mail: support@softstuf.com, response time 24 hours.

C H A P T E R   2

Device Manager Quick Start

This chapter shows an example of a typical utility's digital devices and how they are configured in the Wavewin Device Manager. The example uses the different network and device topologies available in the device manager.

Configuration Example
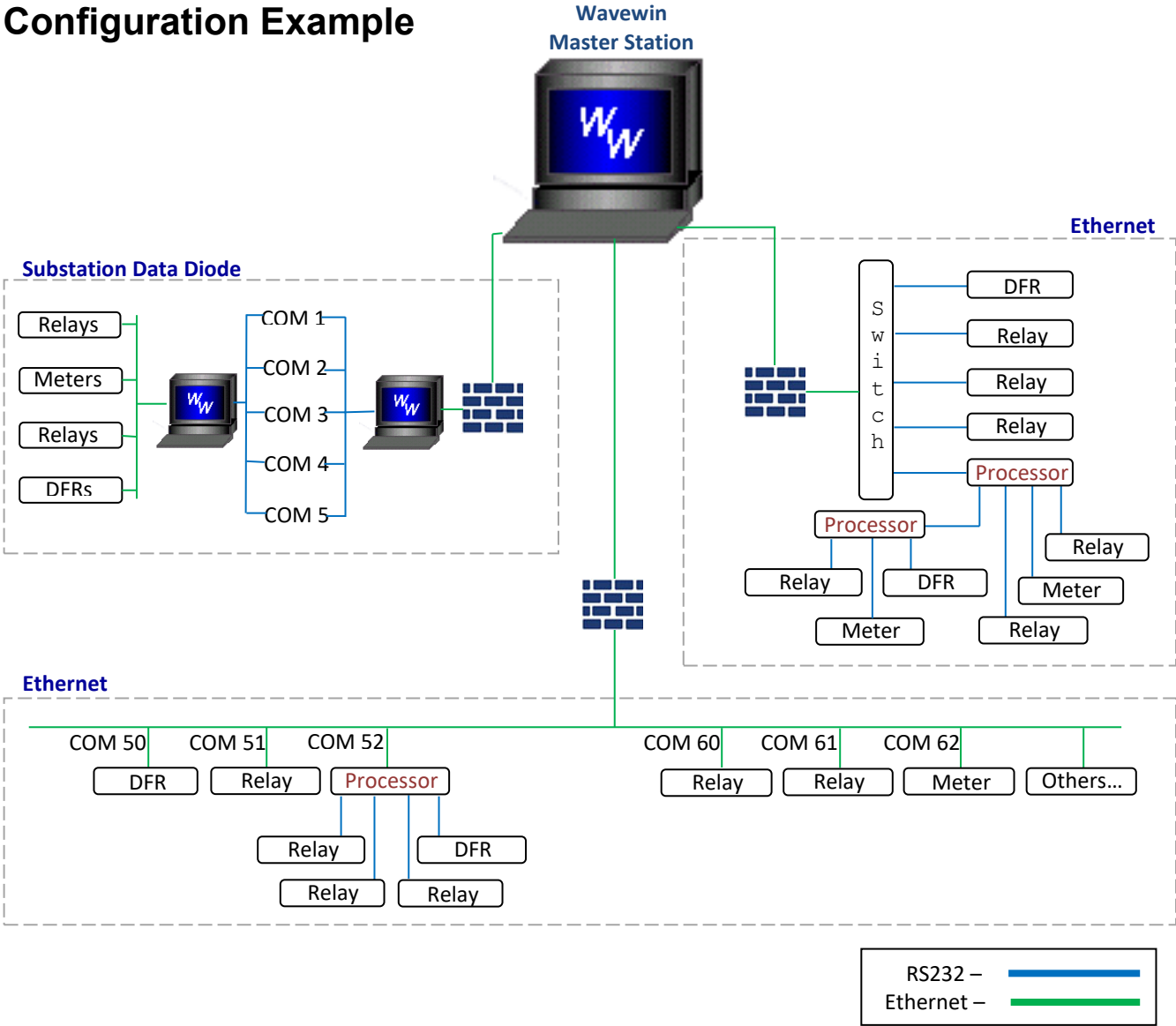
Figure 2.1 Example Digital Devices

Device Manager Table

OPEN THE DEVICE MANAGER

The device manager table lists all the configured devices to poll using either Ethernet or Serial connections. To open the device manager table click on the Devices menu button located on the main system toolbar or select the Device Manager Menu option under the File Manager's Options menu
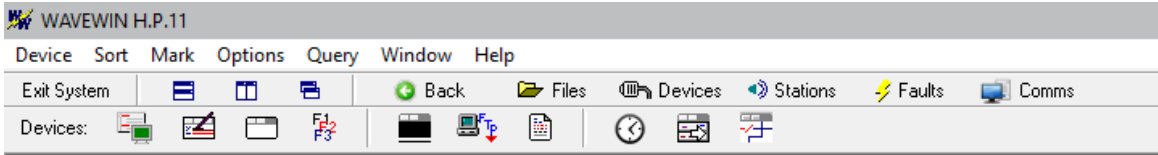
Figure 2.2 Devices Menu Button

When the device manager table is first opened a message box is displayed stating that no devices are defined in the table.
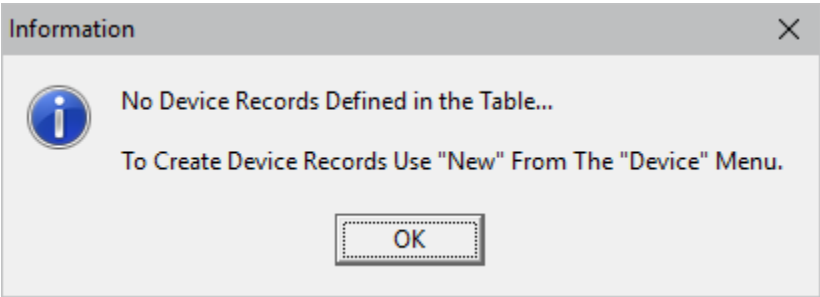
Figure 2.3 No Devices Defined

Click OK to continue. A blank table will be displayed. The next sections explain the main system features.
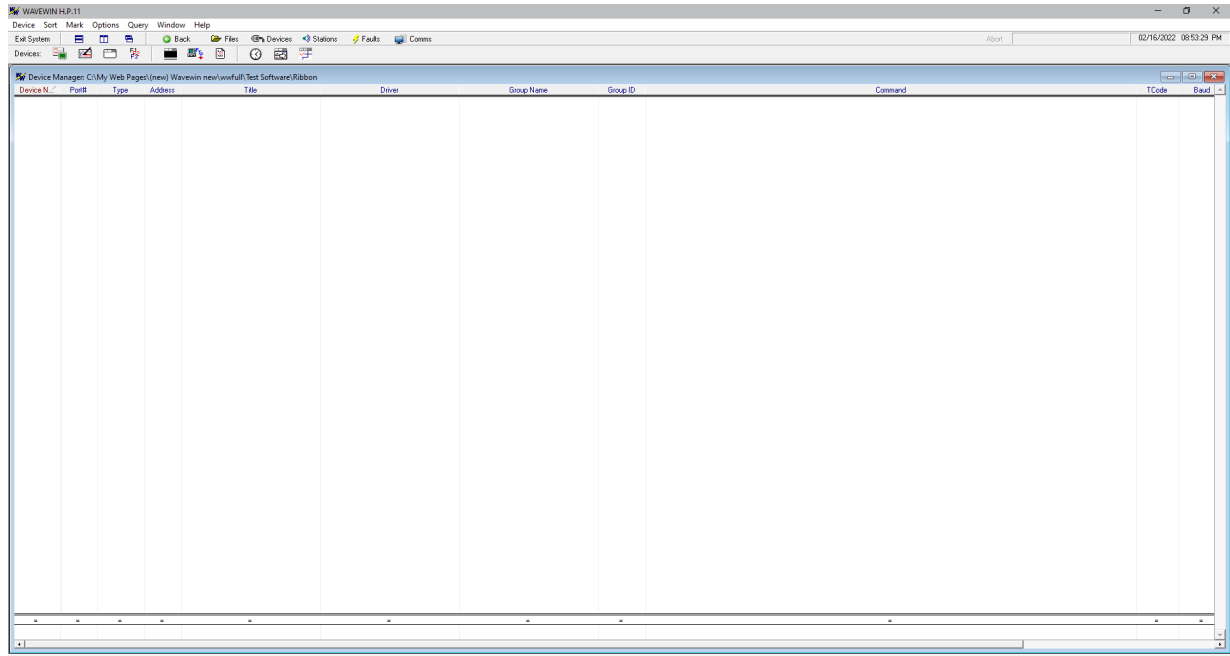
Figure 2.4 Example Device Manager Table

When the Device Manager is opened with devices configured in the table all the devices defined in the table are automatically initialized. If the Connection type is defined as Serial then the port is opened when the device manager table is opened and closed when the device manager table is closed. A message dialog reports on the state of each connection. If an error occurs while initializing a serial port then all other serial devices are disabled. The device manager consists of a table and a query bar.

Open Ports

Initializing Defined System Ports

Please Wait...

Number of Ports Defined =   9
Number of Ports Reported =   9
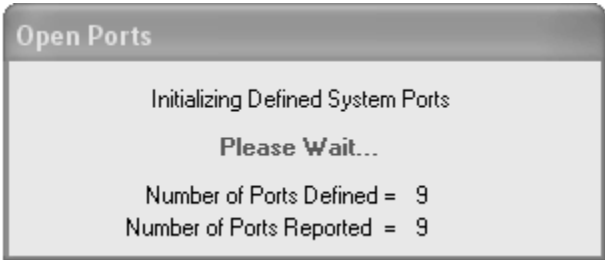
Figure 2.5 Initialize Configured Devices

The first step in setting up the system to poll devices is to define the main system fields. The main system fields include securing the system, setting the polling properties and defining the Start System polling device. The following sections describe each part in detail. The Save and Archive (Polling Properties) dialog defines the main system fields. To open the Polling Properties dialog click on the first toolbar button or select the Polling Properties Dialog option under the Options tab.

SYSTEM SECURITY

To protect the information contained in the device manager table a user ID and password can be set to ensure the users of the system "Logs In" before accessing the features of the device manager. Communications with devices require either an IP address or a phone number and passwords. To ensure this information is displayed for valid users the User ID and password must be entered into the Log In dialog before viewing the secured information. The Log In button is located on the device manager's tool bar. Once logged in the button name will change to Log Out. If there is no activity for 15 minutes or longer the system will automatically log out.

The user ID and password are set in the Save and Archive dialog. If the user ID and password field are blank then the system will not require a log on/log off.

Figure 2.6 Security – Log In
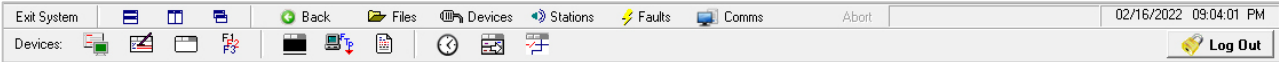
Figure 2.7 Security – Log Out

POLLING TIMERS

The first device defined in the table starts the polling process. The polling is always performed in a sequential manner according to the device numbers. The start system entry can either poll the devices one time only, periodically, upon demand or at a given time during the day. The polling type is defined in the Polling Properties dialog. To open the Polling Properties dialog click on the Polling Properties button.

Refer to the table below for information on each field in the Polling Properties dialog.

Field	Description
System Settings	
Station ID	The station number where the system is running.
Station Name	The station name where the system is running.
Time Code	The time code where the system is located.
Company Name	The company name.
Password Settings	
User ID	The user's ID to gain access to the device manager features.
Password	The user's password to gain access to the device manager features. The Log In/Off buttons will be displayed when a user ID and password is entered. If these fields are blank then it is not required to Log In to use the device manager table features.
Confirm Password	Confirm the user's password.
Lock Saving	Lock the user from changing the fields in the save and archve dialog and from editing the device log files.
Poll Settings	
Events Path	Path where the event files are saved to disk. Enter up to 80 characters/digits.
Message / Logs Path	Path where the received data DTB files are saved to disk. Enter up to 80 characters/digits.
Drivers Path/Name	The path and name of the Driver file to use during polling.
Poll Type	The type of poll (none, periodic or upon demand). When periodic is selected the period field will be displayed.
Period	Poll all the devices every xxx seconds or enter a military time precedded by the letter "T". For example, to poll all the devices at 2:00 AM every day enter T0200.
Events to Extract	The maximum number of events to extract for each device during a single poll.
% Disk Used Limit	Stop the polling process if the disk used space exceeds the selected percentage. The default is 90%.
Primary SysLog Host	To log all commands issued to a device from a user enter the Primary System Log IP address or Host name.
P-SysLog Port	If the Primary System Log is defined enter the Primary's System Log port number.
Backup SysLog Host	To have all commands logged to the Backup System Log enter the Backup System Log IP address or Host name.
B-SysLog Port	If the Backup System Log is defined enter the Backup's System Log port number.

Field	Description
Log Settings	
Save Rx Data	Save all data received from the polled devices to a separate DTB file. Select "Yes" to keep a record of all data received from the devices or "No" to discard all received data. This feature is used for troubleshooting the commincations with devices.
Delete/Archive	Action to take when the duration field is exceeded. Select archive to rename the DTB file using the IEEE long file naming format or select delete to delete the files from disk.
Archive Duration (After)	The duration when to rename or delete the received data stored in the database files (DTB). Enter up to 99999 minutes or 0 to turn this feature off. A military time can also be specified using the T indicator (T2359 = One minute before midnight).
Name	The database files (DTB) are named: DEV_####.DTB. This field defines what number to use in the #### section of the file name. To use the Device number select Device #. To use the Group number select the Group # option. To use the Stateion name select Station. The default is the Device #.

Use the tab key to navigate between fields, the **Save** button to save the data, and the **Cancel** button to close the dialog without saving any changes.

Save & Archive Dialog ✕

System Settings

Station ID:	0001	Station Name:	Softstuf Main Office
Time Code:	-5S	Company Name:	Softstuf Inc

Password Settings

User ID: [ ]

Password: [ ]

Confirm Password: [ ]

Lock Saving: No ▼

The password should be at least 8 characters in length and should contain at least three of the following:
> Upper Case Alphabetic Characters.
> Lower Case Alphabetic Characters.
> One Special Character.
> One Numeric Character

Poll Settings

Events Path: C:\FaultLib\SDCSAVE 📁

Message/Log Path: C:\FaultLib\SDCMess 📁

Drivers Path/Name: C:\Wavewin-Main\DTBS\TESTS\Hackney\DRIVERS.INI 📁

Poll Type: Periodically ▼　　Period: 1200 seconds

Events to Extract: 1 ▼　　% Disk Used Limit: 90 ▼

Primary SysLog Host: [ ]　　P-SysLog Port: [ ]

Backup SysLog Host: [ ]　　B-Syslog Port: [ ]

RX Settings

Save Rx Data: Yes ▼　Delete ▼　After 1440 minutes.　Name: Device # ▼

[Save]　[Close]

Figure 2.8 Polling Timers – Periodically
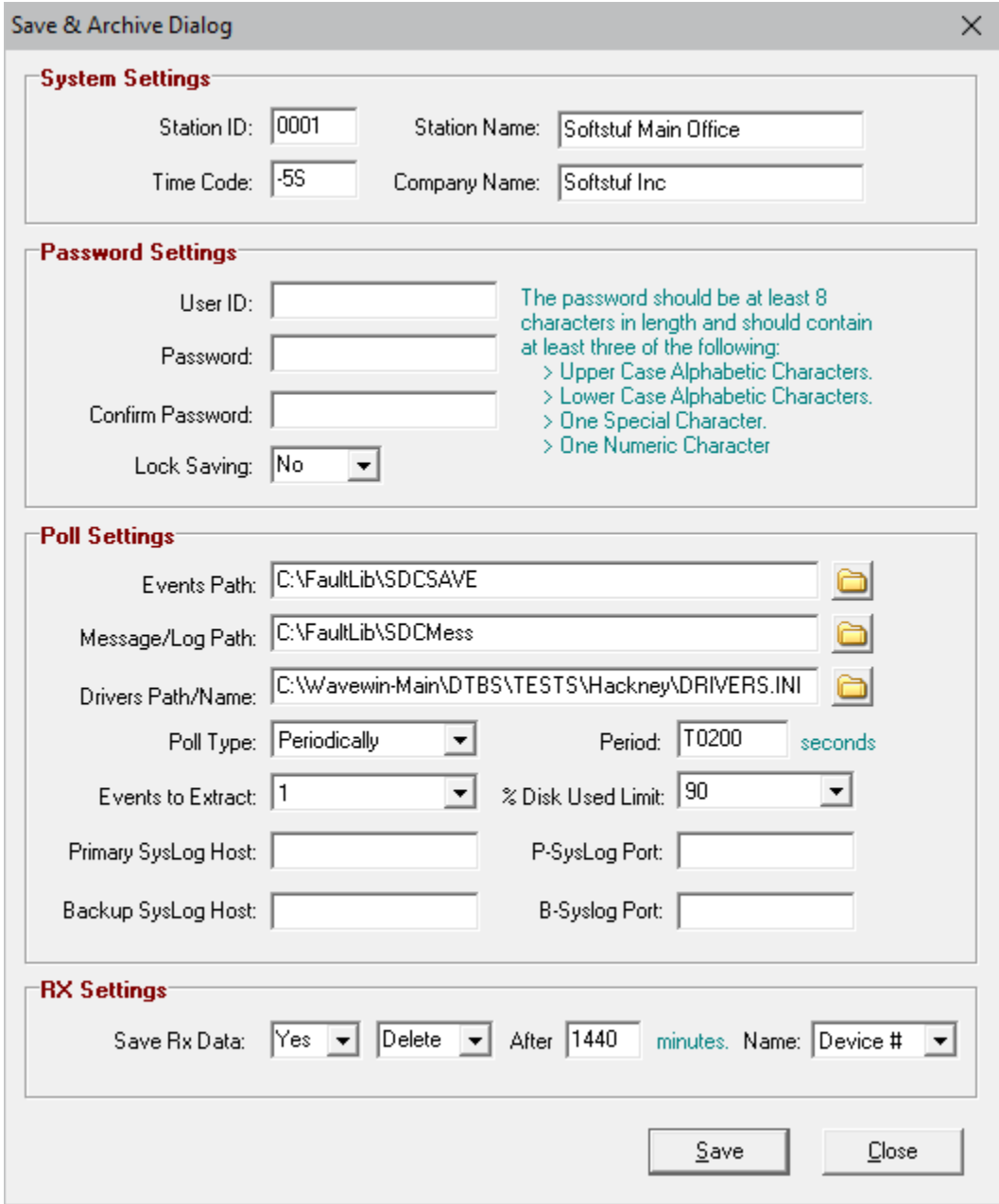
Figure 2.9 Polling Timers – Military Time

CREATE A NEW DEVICE

To create a new device, press F4 or click the New [ ] toolbar button or select the New option under the Devices menu. A new configuration dialog will be displayed. The connection type displayed under the communication information section is defaulted to Ethernet.
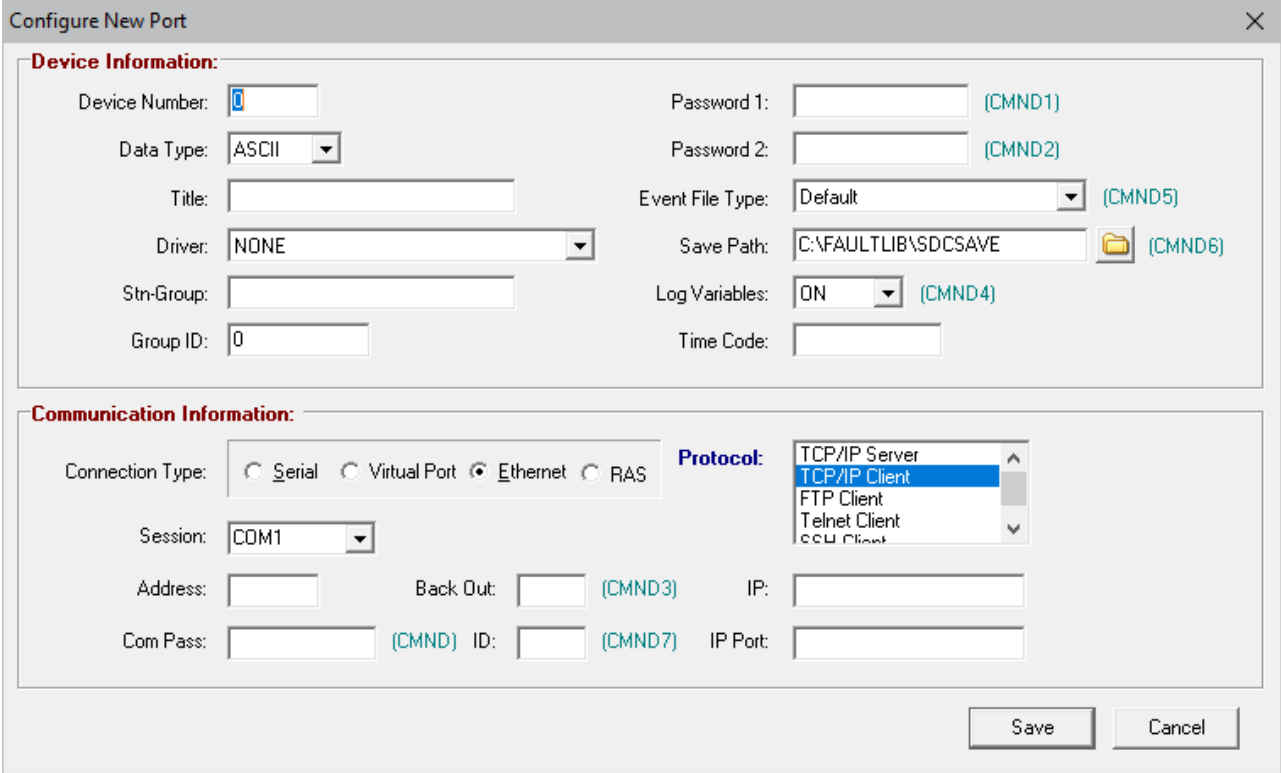
Figure 2.10 Create a new Device

Click Save to save the device to the table or Cancel to close the dialog without saving. If an error occurs when opening a serial COM port a message is displayed and all device I/O is aborted for that device.

To edit an existing record select the device in the table and press F2 or click the Edit button.

The title and stn-group fields are used to compose the IEEE long file name. Refer to IEEE Long File Naming Format section for more information. Below are the characters not permitted in a filename:

> : ? " / \ < > * | @ #

An error message will be displayed if these characters are entered into the title or stn-group fields.

CREATE THE START SYSTEM POLLING DEVICE

The first device defined in the device manager is required to start the polling process. The start system device issues a message to all of the devices in the table or just the marked devices telling them to run. The devices that have a unique session number will be polled in parallel and devices that have the same session number will be polled in sequence. Only devices that have a driver assigned will be binned for polling.

To poll specific devices first mark the devices. Marked devices are displayed in red. To mark a device, use the mouse or the spacebar. When the polling window is open all of the devices will be displayed in the polling window or if devices are marked only the marked devices will be displayed.

Refer to the following table for information on each field defined in the Start System device.
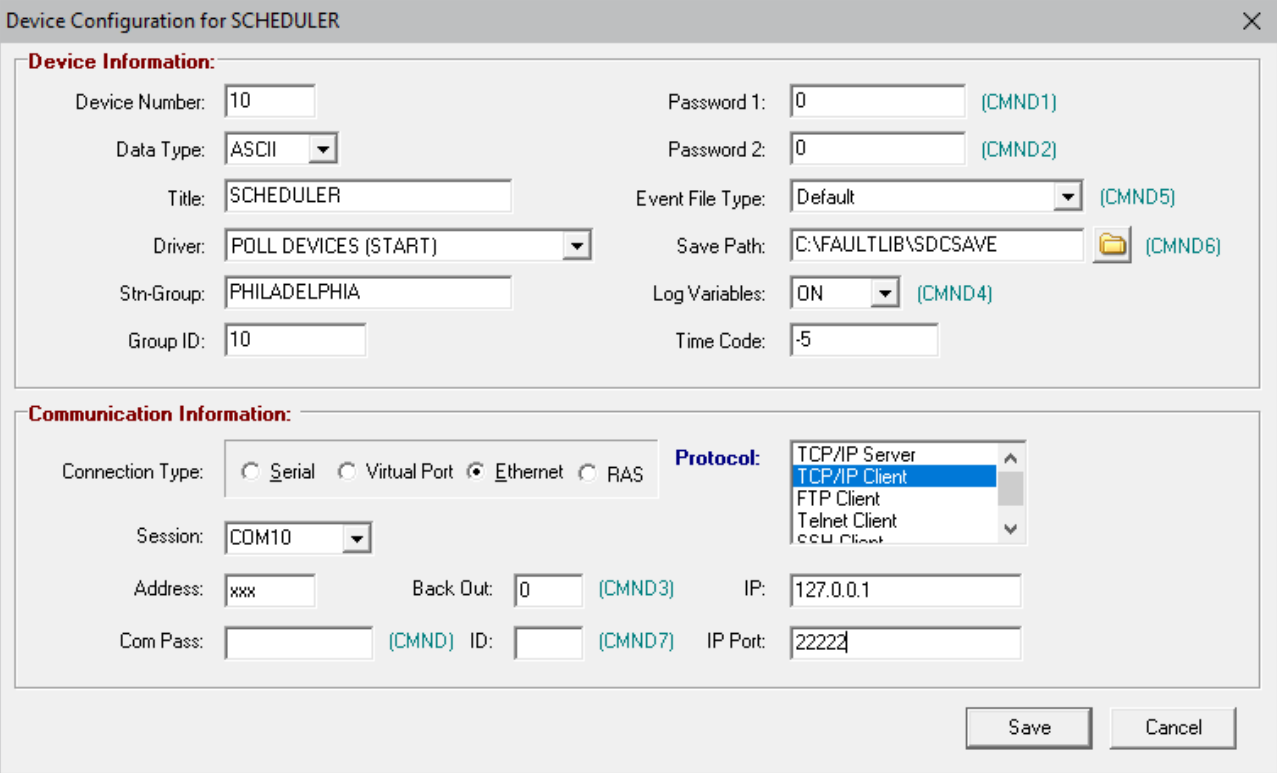
Figure 2.11 Start System

Field	Description
Device Information	
Device Number	The start system device number. The start system device must always be the first device in the table so this device will always be set to device number 1. Each device in the table must have a unique device number. If device numbers are duplicated a message will be displayed.
Data Type	The start system device uses the ASCII protocol.
Title	The title of the device.
Device Driver	Select the System Timer (Start) Device Driver from the drop down list.
Group Name	The group name for the device. The group name can be any name assigned by the user.
Group ID	The group number for the device. The group number can be used to group a number of devices. If no group number is needed follow the device number. For example if the device number is 1 enter 1 for the group number.
Password 1	No password 1 is needed for the Start System device. Leave blank or enter 0 for no password.
Password 2	No password 2 is needed for the Start System device. Leave blank or enter 0 for no password.

Field	Description
Event File Type	No events are extracted using the Start System device. Select Default.
Save Path	No event files are extracted using the Start System device. This field will automatically be defaulted to the entered Events Path field located in the Save and Archive dialog
Log Variables	Turn On/Off logging of the polling status. Default = On.
Time Code	The Time Code where the Wavewin software is running.
Communication Information	
Connection Type	The Start System device uses the Ethernet connection type.
Session	The polling session is used to run devices in parallel or in series. If each device has a different session number then all the devices will be polled in parallel. If the devices use the same session number then the devices will be polled in series. The session number is also used to define what COM Port to use when communicating using a serial connection. The session list first displays the physical COM Ports on the machine then lists the systems virtual ports. For Ethernet connection the session numbers should start at COM10 and forward. The Start System is assigned to session number COM10.
Address	The address field is used to define the slave address of the device off a multi-drop connection. The Start System is not on a multi-drop connection, so it is defaulted to xxx.
Back Out	The back out command is used to define what control character is used to back out of a device that is connected to a communication processor. The Start System does not use the back out command, so it is defaulted to 0.
Phone Number/Com Pass	The Phone Number field is displayed if a serial connection is defined and displayed as Com Pass (Communication Processor Password) for Ethernet connections.
ID	Communication processor ID.
IP Address	The Start System device uses the local computers IP Address, 127.0.0.1.
IP Port	The Start System uses IP Port number 22222.

DEVICE CONNECTION TYPES

SERIAL

In Wavewin serial devices can be polled in two ways. The first is to have the serial port opened when the device manager is opened and closed when the device manager is closed. To have the serial device open and locked during the duration of the device manager select the Serial connection in the Connection Type box under the Communication Information section in the Device Configuration dialog.

The second is to have the serial port closed at all times except when polling the device. The serial port will be opened before connecting to the device and immediately closed when the polling process is

complete for the specific device. This allows for other applications to connect to the device when the device is not being polled by Wavewin. To have the serial device open only during the polling session select the Virtual Port connection in the Connection Type box under the Communication Information section in the Device Configuration dialog.

ETHERNET

Ethernet devices can be polled using three different protocols: TCP/IP, FTP/SFTP, SSHClient and Telnet. The TCP/IP, SSHClient and Telnet protocols communicate with the devices in a similar way as a serial communication connection. Commands are sent and received from a client to a server. The difference between TCP/IP, SSHClient and Telnet is the TCP/IP and SSHClient protocols use a non-blocking communications (event based). Non-blocking communications sends commands from the client to the server without waiting for a response. The response is sent to the client's event method and processed as it comes in. Telnet use a blocking connection, normally used in terminal mode. When a command is sent from the client to the server the application is halted waiting for the response from the server.

FTP

The FTP Client protocol uses an FTP Client component to communicate with the FTP server. The FTP component uses non-blocking communications (event based) when extracting files from the server. Devices configured to communicate with an FTP Server will use the configuration defined below. The following table describes each field in detail.
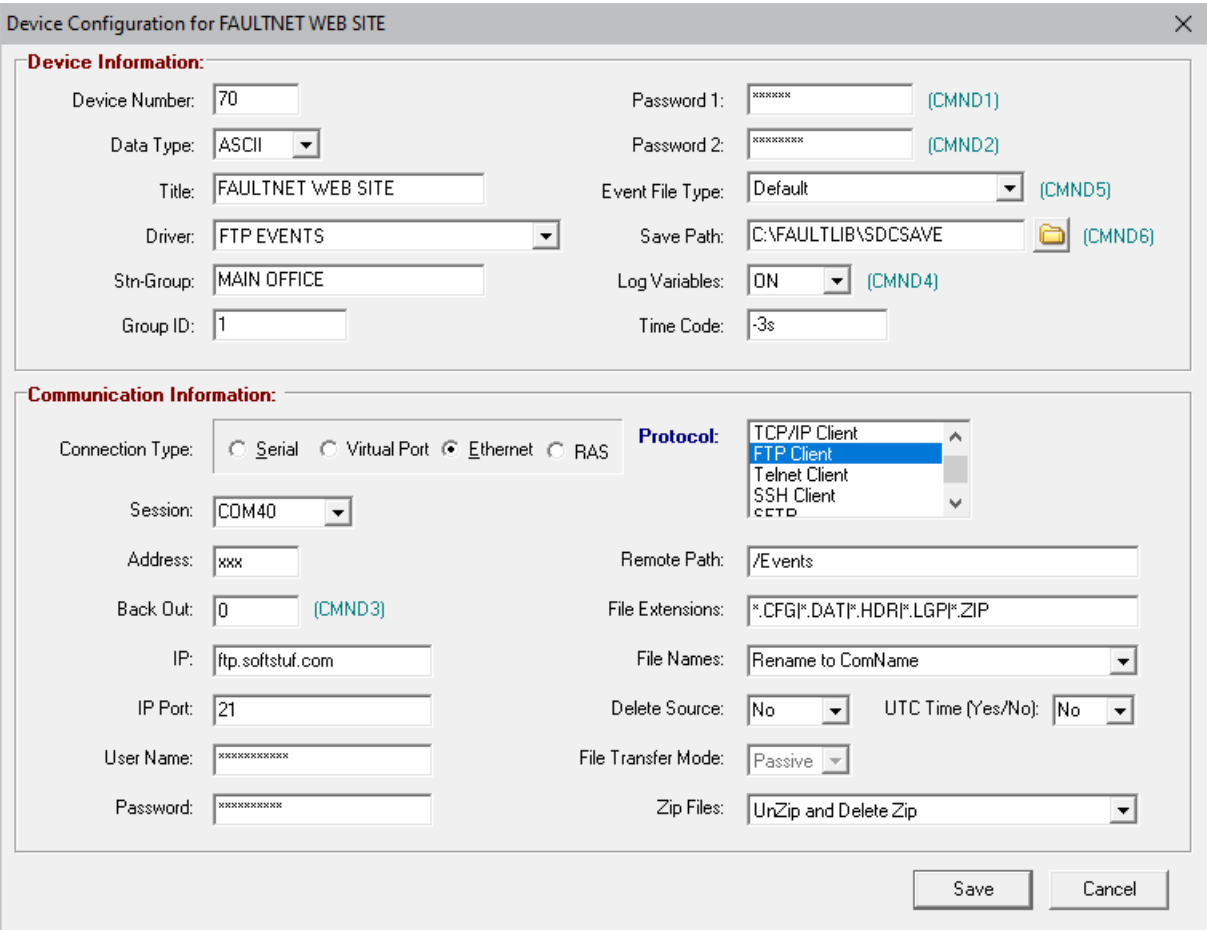

Figure 2.12 FTP Client Device Configuration

Field	Description
Device Information	
Device Number	The device number must be unique for each device defined in the device manager table. The device number can be a number between 2 and 2000. Device number one is reserved for the Start System polling device.
Data Type	The FTP Client communicates using the ASCII protocol.
Title	The device title can be a maximum of 24 characters. The device title is used when naming the extracted waveform and disturbance files. The following characters are not allowed in Microsoft filenames: **: ? " / \ < > * |** Avoid using the above characters when assigning a title to a device. Refer to the long File Naming Format section for more information.
Device Driver	The **LAN, FTP-EVENTS** driver is selected. The LAN drivers are used to communicate with a device connected using Ethernet. This driver issues the following commands: ▪ Connect to the FTP server. ▪ Request a directory listing on the FTP server's remote path. ▪ Download all new event files. ▪ Disconnect the from the FTP server.
Group Name	The group name can be a maximum of 24 characters. The group name is used when naming the extracted waveform and disturbance files. The following characters are not allowed in Microsoft filenames: **: ? " / \ < > * |** Avoid using the above characters when assigning a group name to a device. Refer to the long File Naming Format section for more information.
Group ID	The group number allows for grouping a number of devices. If there are a number of devices located in the same station then they can be assigned the same group ID.
Password 1	A password is not required, defaulted to 0.
Password 2	A second level password is not required, defaulted to 0.
Event File Type	The default event files are retrieved.
Save Path	Path location where to save the retrieved files.
Log Variables	Turn On/Off logging of the polling status. Default = On.
Time Code	The Time Code is -5 for eastern US.
Communication Information	
Connection Type	The FTP Client connection type is Ethernet.
Protocol	The FTP Client uses the FTP Client protocol to transfer files from the

Field	Description
	FTP Server to the Save Path.
Session	The polling session assigned is COM78. The polling session is used to run devices in parallel or in series. If each device has a different session number then all the devices will be polled in parallel. If the devices use the same session number then the devices will be polled in series. For Ethernet connections the session numbers should start at COM10 and forward.
Address	The Address is not used for the FTP Client.
Port Back Out	The port back out field does not apply; it is defaulted to 0.
IP	The IP Address to the FTP Server.
IP Port	The FTP Port number is 21.
Username	Username to get access to the FTP Server.
Password	Password to get access to the FTP Server.
Remote Path	The remote path on the FTP server where the event files are located. The Remote Path field can also be used to extract a single file once a day. The single file and the Remote Path are separated by a pipe sign. For example to extract a log file once a day add the following to the end of the remote path: |/Wavewin Events Log/SEOLOG.TXT The full remote path will be: /Wavewin Events|/Wavewin Events Log/SEOLOG.TXT The text before the pipe sign is the remote path to extract the files with the extension in the file extensions path and the text after the pipe sign is the path and filename of the single file to extract once a day.
File Extensions	The file extensions to retrieve, blank = all files. File extensions are separated by a pipe | sign. Example: *.CFG|*.DAT|*.HDR Wild cards can also be used in the file extension field. To extract just the file that have a C8_ in the filename added the following to the file extension field: *.CFG|*.DAT|*.HDR|*C8_*.TXT.
File Names	How to name the files once they are retrieved. There are 3 types of naming conventions, Maintain the Original name, Rename to the IEEE long file naming convention and Rename to the IEEE long file naming convention with the TLR extension.
Delete Source	Delete the source files once they are retrieved, Yes or No.
UTC Time (Yes/No)	Change the file's time from UTC to local time, Yes or No.
File Transfer Mode	Select the type of FTP file transfer mode, Passive or Active
Zip Files	If the files retrieved are zip files then select what action to take after the file is retrieved: No = No Action.

Field	Description
	Unzip = Unzip the file and keep the original zip file. Unzip and Delete = Unzip the file and delete the downloaded zip file from the save path.

The FTP Client supports the following DIR format received from the FTP Server:

```
Permissions    Owner    Group      Size    Date & Time    Filename
-r--r--r--   1 user     group         0 Jul 25   2016 HR_10597.CFG
-r--r--r--   1 user     group         0 Jul 25   2016 HR_10597.DAT
-r--r--r--   1 user     group         0 Jul 25   2016 HR_10597.HDR
-r--r--r--   1 user     group       527 Jul 25   2016 HR_10598.CFG
-r--r--r--   1 user     group     35840 Jul 25   2016 HR_10598.DAT
-r--r--r--   1 user     group       250 Jul 25   2016 HR_10598.HDR
-r--r--r--   1 user     group       529 Jan 11 11:11 HR_10599.CFG
-r--r--r--   1 user     group     45690 Jan 11 11:11 HR_10599.DAT
-r--r--r--   1 user     group       150 Jan 11 11:11 HR_10599.HDR
-r--r--r--   1 user     group       528 Jan 11 12:57 HR_10600.CFG
-r--r--r--   1 user     group     37450 Jan 11 12:57 HR_10600.DAT
```

The FTP Client connects to the FTP Server using the username and password defined in the device configuration dialog. Once the connection is established the FTP Client requests a DIR list for the specified remote path. The format of the DIR is stored in a Device#.LST file saved in the Wavewin path. Use this file to confirm the format of the list coming from the FTP server.

It then parses each file in the list. All files that have a date and time greater than the Current date and time displayed in the Change Polling Start Date & Time dialog are marked for retrieval. If there is no time displayed for a file then that file is ignored. FTP directories will only include a date and time if the file is within the last 6 months.

If the File Names field in the device configuration dialog is set to Rename to ComNames then each file extracted will be assigned a date and time in the first 2 fields of the filename. If the files being extracted are Comtrade files then the fault date and time listed in the CFG file is used for the files date and time. If they are not Comtrade Files then the date and time listed in the DIR from the FTP server is used. For files that have the same date and time in the FTP Dir then the seconds are changed by adding a second counter. The table below shows how the seconds are incremented.

Date from the FTP Server	Date and Time Assigned by the Software
Jul 25 01:45	07 / 25 / 2023 01:00:00.000
Jul 25 01:45	07 / 25 / 2023 01:00:01.000
Jul 25 01:45	07 / 25 / 2023 01:00:02.000
Jul 25 01:45	07 / 25 / 2023 01:45:03.000

The seconds are incremented to avoid overwriting a file when using the IEEE long file naming convention to name the files.

The SDC-HIS.INI file is located in the Wavewin path. The last retrieved date and time is on the line number equal to the device number plus 1. For example, if the FTP Client is set to device number 20 then the last retrieved date and time is on line 21.

If the number of files to retrieve is greater than the number of files to extract per polling session (Refer to Figure 2.13) then a DEV_###.FTP file is created in the path where the current device manager configuration is located. The ### is the device number and the path where the current device manager configuration path is displayed in the header of the device manager window. The FTP file cuts down on requesting the DIR list every time a polling session is processed. The first line in the DEV_###.FTP file is the IP address of the FTP server and the second line is the latest date and time retrieved in Japan

format, yyymmddhhmmsszzz. The remaining lines list the filename, date and time and file size. Following is an example of an FTP file.

```
216.164.167.20
20170513030100000
DR2_0427.ZIP,05/08/2017 10:01:00.000,1028586,
DR1_0424.ZIP,05/07/2017 19:01:00.000,1021970,
DR2_0428.ZIP,05/08/2017 12:02:00.000,1124366,
DR1_0425.ZIP,05/07/2017 21:01:00.000,1023072,
WR1_0012.ZIP,04/27/2017 15:31:00.000,160531,
DR1_0426.ZIP,05/07/2017 23:02:00.000,1021880,
DR2_0430.ZIP,05/08/2017 16:02:00.000,1102389,
DR1_0427.ZIP,05/08/2017 01:01:00.000,1018406,
DR2_0431.ZIP,05/08/2017 18:02:00.000,1104647,
DR1_0428.ZIP,05/08/2017 03:02:00.000,1022149,
DR2_0432.ZIP,05/08/2017 20:01:00.000,1054516,
WR1_0022.ZIP,05/08/2017 05:44:00.000,157755,
```

A number of FTP Servers list the file size for each file as 0. If this is the case then the software will automatically assign a file size of 10 in the FTP file.

If the latest date and time is changed using the Set Poll Date and Time dialog then the FTP file is deleted from the configuration path, It is also deleted if the IP Address defined in the device configuration dialog is different than the IP Address listed on the first line of the FTP file.
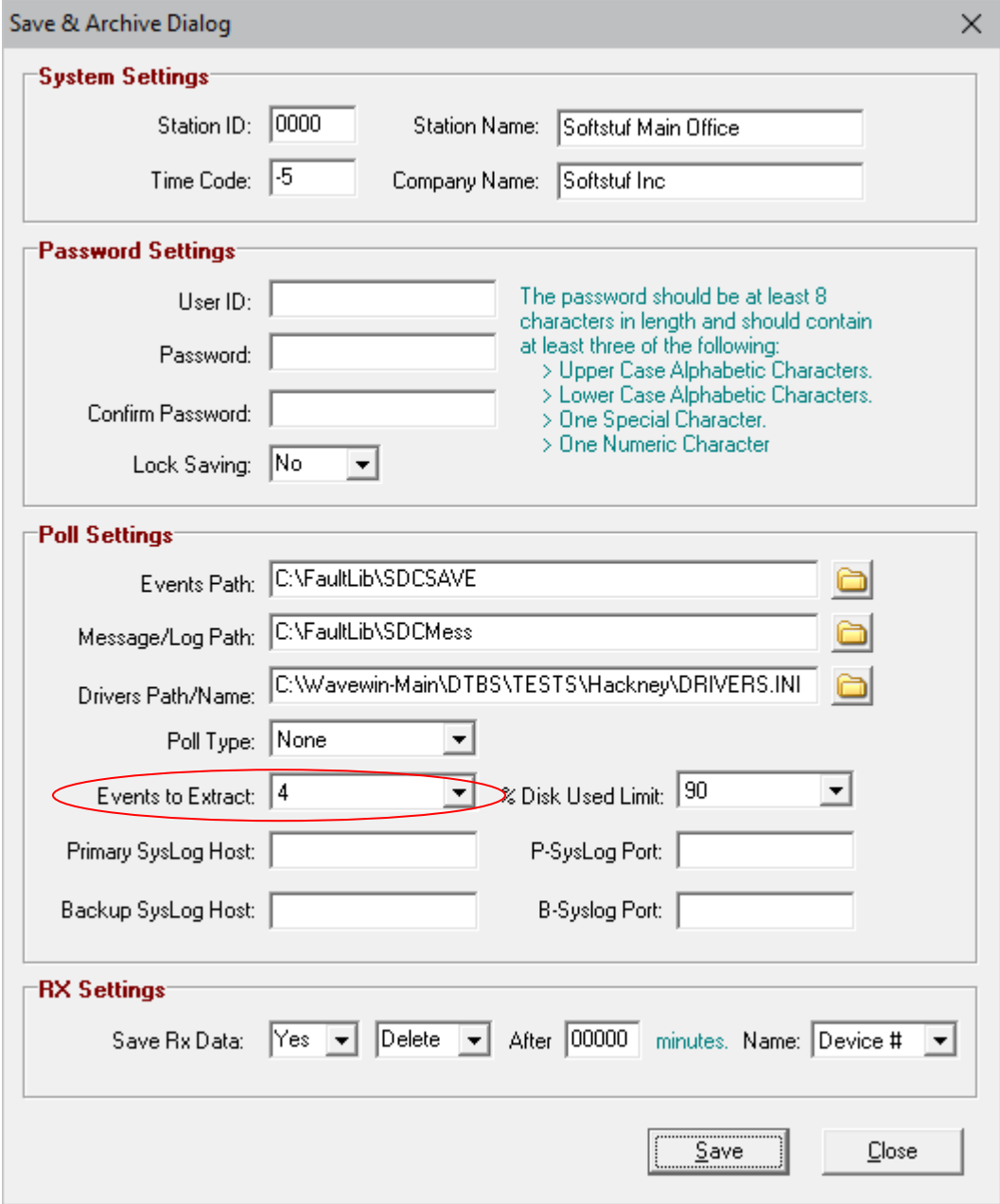
Figure 2.13 Polling Properties Dialog

SFTP

The SFTP Client protocol uses an SFTP component to communicate with the SFTP server. The SFTP component uses non-blocking communications (event based) when extracting files from the server. Devices configured to communicate with an SFTP Server will use the configuration defined below. The following table describes each field in detail.

Figure 2.14 SFTP Client Device Configuration

Field	Description
Device Information	
Device Number	The device number must be unique for each device defined in the device manager table. The device number can be a number between 2 and 2000. Device number one is reserved for the Start System polling device.
Data Type	The SFTP Client communicates using the ASCII protocol.
Title	The device title can be a maximum of 24 characters. The device title is used when naming the extracted waveform and disturbance files. The following characters are not allowed in Microsoft filenames: **: ? " / \ < > * |** Avoid using the above characters when assigning a title to a device. Refer to the long File Naming Format section for more information.
Device Driver	The **LAN, SFTP-EVENTS** driver is selected. The LAN drivers are used to communicate with a device connected using Ethernet. This driver issues the following commands: ▪ Connect to the SFTP server.

Field	Description
	▪ Request a directory listing on the SFTP server's remote path. ▪ Download all new event files. ▪ Disconnect the from the SFTP server.
Group Name	The group name can be a maximum of 24 characters. The group name is used when naming the extracted waveform and disturbance files. The following characters are not allowed in Microsoft filenames: **: ? " / \ < > * |** Avoid using the above characters when assigning a group name to a device. Refer to the long File Naming Format section for more information.
Group ID	The group number allows for grouping a number of devices. If there are a number of devices located in the same station then they can be assigned the same group ID.
Password 1	A password is not required, defaulted to 0.
Password 2	A second level password is not required, defaulted to 0.
Event File Type	The default event files are retrieved.
Save Path	Path location where to save the retrieved files.
Log Variables	Turn On/Off logging of the polling status. Default = On.
Time Code	The Time Code is -5 for EST.
Communication Information	
Connection Type	The SFTP Client connection type is Ethernet.
Protocol	The SFTP Client uses the SFTP protocol to transfer files from the SFTP Server to the Save Path.
Session	The polling session assigned is COM220. The polling session is used to run devices in parallel or in series. If each device has a different session number then all the devices will be polled in parallel. If the devices use the same session number then the devices will be polled in series. For Ethernet connections the session numbers should start at COM10 and forward.
Address	The Address is not used for the SFTP Client.
Port Back Out	The port back out field does not apply; it is defaulted to 0.
IP	The IP Address to the SFTP Server.
IP Port	The SFTP Default Port number is 22.
Username	Username to get access to the SFTP Server.
Password	Password to get access to the SFTP Server. The password is used for

Field	Description
	authentication access to the SFTP server.
Remote Path	The remote path on the SFTP server where the event files are located. The Remote Path field can also be used to extract a single file once a day. The single file and the Remote Path are separated by a pipe sign. For example to extract a log file once a day add the following to the end of the remote path: |/Wavewin Events Log/SEOLOG.TXT The full remote path will be: /Wavewin Events|/Wavewin Events Log/SEOLOG.TXT The text before the pipe sign is the remote path to extract the files with the extension in the file extensions path and the text after the pipe sign is the path and filename of the single file to extract once a day.
File Extensions	The file extensions to retrieve, blank = all files. File extensions are separated by a pipe | sign. Example: *.CFG|*.DAT|*.HDR Wild cards can also be used in the file extension field. To extract just the file that have a C8_ in the filename added the following to the file extension field: *.CFG|*.DAT|*.HDR|*C8_*.TXT.
File Names	How to name the files once they are retrieved. There are 3 types of naming conventions, Maintain the Original name, Rename to the IEEE long file naming convention and Rename to the IEEE long file naming convention with the TLR extension. The TLR extension is used for extracting files from a Tesla DFR.
Delete Source	Delete the source files once they are retrieved, Yes or No.
UTC Time (Yes/No)	Change the file's time from UTC to local time, Yes or No.
File Transfer Mode	Select the type of FTP file transfer mode, Passive or Active. This fields does not apply to the SFTP transfer.
Zip Files	If the files retrieved are zip files then select what action to take after the file is retrieved: No = No Action. Unzip = Unzip the file and keep the original zip file. Unzip and Delete = Unzip the file and delete the downloaded zip file from the save path.

The SFTP Client connects to the SFTP Server using the username and password defined in the device configuration dialog. Once the connection is established the SFTP Client requests a DIR list for the specified remote path. It then parses each file/folder in the list. All files that have a date and time greater than the Current date and time displayed in the Change Polling Start Date & Time dialog are marked for retrieval.

If the File Names field in the device configuration dialog is set to Rename to ComNames then each file extracted will be assigned a date and time in the first 2 fields of the filename. If the files being extracted are Comtrade files then the fault date and time listed in the CFG file is used for the files date and time. If they are not Comtrade Files then the date and time listed in the DIR from the SFTP server is used.

If the number of files to retrieve is greater than the number of files to extract per polling session (Refer to Figure 2.13) then a DEV_###.FTP file is created in the path where the current device manager configuration is located. The ### is the device number and the path where the current device manager

configuration path is displayed in the header of the device manager window. The *.FTP file cuts down on requesting the DIR list every time a polling session is processed. The first line in the DEV_###.FTP file is the IP address of the SFTP server and the second line is the latest date and time retrieved in Japan format. The remaining lines list the filename, date and time and file size. Following is an example of an FTP file.

```
216.164.167.20
20170513030100000
DR2_0427.ZIP,05/08/2017 10:01:00.000,1028586,
DR1_0424.ZIP,05/07/2017 19:01:00.000,1021970,
DR2_0428.ZIP,05/08/2017 12:02:00.000,1124366,
DR1_0425.ZIP,05/07/2017 21:01:00.000,1023072,
WR1_0012.ZIP,04/27/2017 15:31:00.000,160531,
DR1_0426.ZIP,05/07/2017 23:02:00.000,1021880,
DR2_0430.ZIP,05/08/2017 16:02:00.000,1102389,
DR1_0427.ZIP,05/08/2017 01:01:00.000,1018406,
DR2_0431.ZIP,05/08/2017 18:02:00.000,1104647,
DR1_0428.ZIP,05/08/2017 03:02:00.000,1022149,
DR2_0432.ZIP,05/08/2017 20:01:00.000,1054516,
WR1_0022.ZIP,05/08/2017 05:44:00.000,157755,
```

If the latest date and time is changed using the Set Poll Date and Time dialog then the devices *.FTP file is deleted from the configuration path, It is also deleted if the IP Address defined in the device configuration dialog is different than the IP Address listed on the first line of the FTP file.

DEVICE CONFIGURATION FIELDS

The device manager table lists the configuration fields for each device. To configure a new device select the New option under the Devices menu or click the New [ ] toolbar button. To edit an existing device select the Edit option under the Device menu or click the Edit [ ] button in the toolbar or right click on the device and select the Edit Device option from the popup menu.

The configuration fields are described in the following table. Not all fields may be applicable for all devices. Use the fields that are associated with the device being configured.

Device Information:

Field	Description	Range
Device Information		
Device Number	Each device must have a unique device number. If a device number is duplicated the system will prompt a message box asking to change the device number.	1.. Maximum Number of Devices (2000)
Data Type	The data type field defines the type of communication protocol. .	ASCII / Binary
Title	The Title field is the device name. This field is used when composing the IEEE long file name for waveform files. Microsoft does not allow a number of characters in a file name. Do not use the comma and the list of illegal characters displayed in the IEEE long file name section.	24 Characters

Field	Description	Range
Driver	The driver is selected from a drop down list. Select the driver associated with the configured device.	Selectable
Stn-Group	The Stn-Group field is the name of the station and or group the device is associated with. This field is used when composing the IEEE long file name for the waveform files. Microsoft does not allow a number of characters in a file name. Do not use the comma and the list of illegal characters displayed in the IEEE long file name section. To specify a station along with the group name separate them with a dash "-". For example West-River Street specifies that West is the station and River Street is the group name.	24 Characters
Group ID	The group ID defines what group the device is associated with.	4 Byte Number 1..214748364
Password 1	The first level password to gain access to the event files in the device.	24 Characters
Password 2	The second level password.	24 Characters
Event File Type	The type of files to retrieve.	Default, Short, Long, Raw or Compressed
Save Path	The path where all retrieved files are saved.	255 Characters
Log Variables	Turn On/Off logging of the polling status. Default = On.	On / Off
Time Code	The Time Code defines the time offset from GMT time.	4 Characters

Serial Communications:

Field	Description	Range
Communication Information		
Connection Type	Specifies a Serial or Virtual Port connection to the device. Serial connections open and locked the COM port during the duration of the device manager. Virtual Port connections keep the COM port closed at all times except when polling the device.	Serial / Ethernet/ Virtual Port
Session	The Session field defines the physical or virtual COM port used for connecting to the device. Serial communications use a physical connection. The drop down list displays all the physical COM ports available on the computer along with the	Selectable

Field	Description	Range
	session COM ports used to poll the devices. If it is not a physical COM port on the machine then it is used to schedule the polling of the devices. If devices have a unique COM port session then each device is polled in parallel. If devices have the same COM port session number then they are polled in sequence. Devices that have the same COM port session number must be of the same connection type and protocol.	
Address	The address field can define the port number the device is connected to off a communication processor or the relay's communication number for 485 multi-drop topologies or a slave address for modbus communications.	4 Characters
Back Out	The command used to back out of a relay and return to a communication processor.	5 Characters
Phone Number	The phone number for the device if connected using a modem.	20 Characters
Baud Rate	Select the Baud Rate. The baud rate must be an exact match of the baud rate set on the device.	Selectable
Parity	Select the Parity. The parity must be an exact match of the parity set on the device. Default = None.	None, Odd, Even
Data Bits	Select the Data Bits. The data bits must be an exact match of the data bits set on the device. Default = 8.	7, 8
Stop Bits	Select the Stop Bits. The stop bits must be an exact match of the stop bits set on the device. Default = 1.	1, 2
Flow Control	Select the Flow Control. The flow control must be an exact match of the flow control set on the device. Default = None.	None, Software, Hardware

Ethernet Communications (TCP/IP and Telnet):

Field	Description	Range
Communication Information		
Connection Type	Specifies an Ethernet connection to the device.	Serial / Ethernet / Virtual Port
Protocol	Select TCP/IP Client or Telnet Client. The TCP/IP protocol uses non-blocking communications (event based). Non-blocking communications sends commands from the client to the server	TCP/IP Server, TCP/IP Client, FTP Client or Telnet Client

Field	Description	Range
	without waiting for a response. The response is sent to the client's event method and processed as it comes in. Telnet uses a blocking connection. When a command is sent from the client to the server the application is halted waiting for the response from the server.	
Session	The Session field defines the physical or virtual COM port used for connecting to the device. Ethernet communications use a virtual connection. The drop down list first lists all the physical COM ports available on the computer followed by the virtual COM ports. For Ethernet connections the session numbers will be defined starting a COM10. The COM port session number is used to schedule the polling of the devices. If devices have a unique COM port session then each device is polled in parallel. If devices have the same COM port session number then they are polled in sequence. Devices that have the same COM port session number must be of the same connection type and protocol.	Selectable
Address	The address field can define the port number the device is connected to off a communication processor or the relay's communication number for 485 multi-drop topologies or a slave address for modbus communications.	4 Characters
Back Out	The command used to back out of a relay and return to a communication processor.	5 Characters
Com Pass	The Password for the communication processor.	24 Characters
ID	The communication processor ID.	12 Characters
IP	The IP address to the device.	15 Characters
IP Port	The IP Port number. Standard IP port number for different type of servers is: Telnet = 23, FTP = 21, SFTP = 22 and TCP/IP = 23.	20 Characters

Ethernet Communications (FTP/SFTP):

Field	Description	Range
Communication Information		
Connection Type	Specifies an Ethernet connection to the device.	Serial / Ethernet / Virtual Port
Protocol	Select FTP Client or SFTP.	TCP/IP Server, TCP/IP Client, FTP Client or Telnet Client
Session	The Session field defines the physical or virtual	Selectable

Field	Description	Range
	COM port used for connecting to the device. Ethernet communications use a virtual connection. The drop down list first lists all the physical COM ports available on the computer followed by the virtual COM ports. For Ethernet connections the session numbers will be defined starting a COM10. The COM port session number is used to schedule the polling of the devices. If devices have a unique COM port session then each device is polled in parallel. If devices have the same COM port session number then they are polled in sequence. Devices that have the same COM port session number must be of the same connection type and protocol.	
Address	The FTP/SFTP protocol does not use the address field. This field can be left blank.	4 Characters
Back Out	The FTP/SFPT protocol does not use the Back Out field. This field can be left blank.	5 Characters
IP	The IP address to the server.	15 Characters
IP Port	The IP Port number. Standard IP port number for FTP is 21 and for SFPT is 22.	20 Characters
Username	The username to gain access to the server.	20 Characters
Password	The Password to gain access to the server.	20 Characters
Remote Path	The remote path on the device where the waveform files are located.	255 Characters
File Extensions	Specifies the type of files to retrieve according to the file extension. Example: *.DAT|*.CFG|*.HDR. Multiple extensions must be separated by a pipe sign.	25 Characters
File Names	Specifies how to name the event files that are retrieved from the device and saved in the Save Path. There are 3 options: Maintain the Original Filename, this option will not change the name. Rename to IEEE Long Filename, this option will name the file using the IEEE long file naming format. The Group name and title fields are used when composing the long filename. Rename to IEEE Long Filename w/ .TLR Ext, this option will name the file using the IEEE long file naming format and assign a .TLR extension. The TLR extension is used when extracting files from a Tesla DFR.	Selectable
Delete Source	Delete the files from the server after retrieving them.	Yes / No

Field	Description	Range
UTC Time (Yes/No)	Convert the event file's date and time from UTC time to local time.	Yes / No
File Transfer Mode	The type of FTP File Transfer Protocol to use. This field is not applicable to the SFTP connection.	Passive / Active
Zip Files	Specifies how to handle retrieved zip files. There are 3 options: No, this option will not change the name and will not unzip the file. Unzip, this option will unzip the contents of the file and keep the original zip file. Unzip and Delete Zip, this option will unzip the contents of the file and delete the zip file from disk.	

POLL THE DEVICES

The Multiport Interrogation Display (MID) contains window panels for each device. A maximum of 2000 device panels can be opened at one time.

MID executes the device's assigned drivers and updates the parsed information into the device panel. To open the MID window, for a one time only poll click the poll one time only toolbar button . To open the MID window, for a periodic poll click the poll periodic poll toolbar button . When the poll periodic is set the start system device will run immediately but all other devices will not run until the period defined in the polling properties dialog has expired.

If no devices are marked all devices assigned a driver are displayed and polled. If there are marked devices then only the marked devices assigned a driver are displayed and polled.

Use the up, down, page up, and page down keys to view the device panels. When the MID window is opened the device's TXCOMMAND assigned in the DRIVERS.INI file is periodically sent to the device. The response data is parsed by the RXSTRIP commands and updated on screen. Each panel displays the device title (Hdr), the assigned active device drive (Drv), the device number (Dev#), the number of times the driver executed (Cycle) and the group name (Group).

To view the data coming in from the device during a polling process click on the header section of the panel to display the terminal window. To view the devices log file opposite click on the header section.
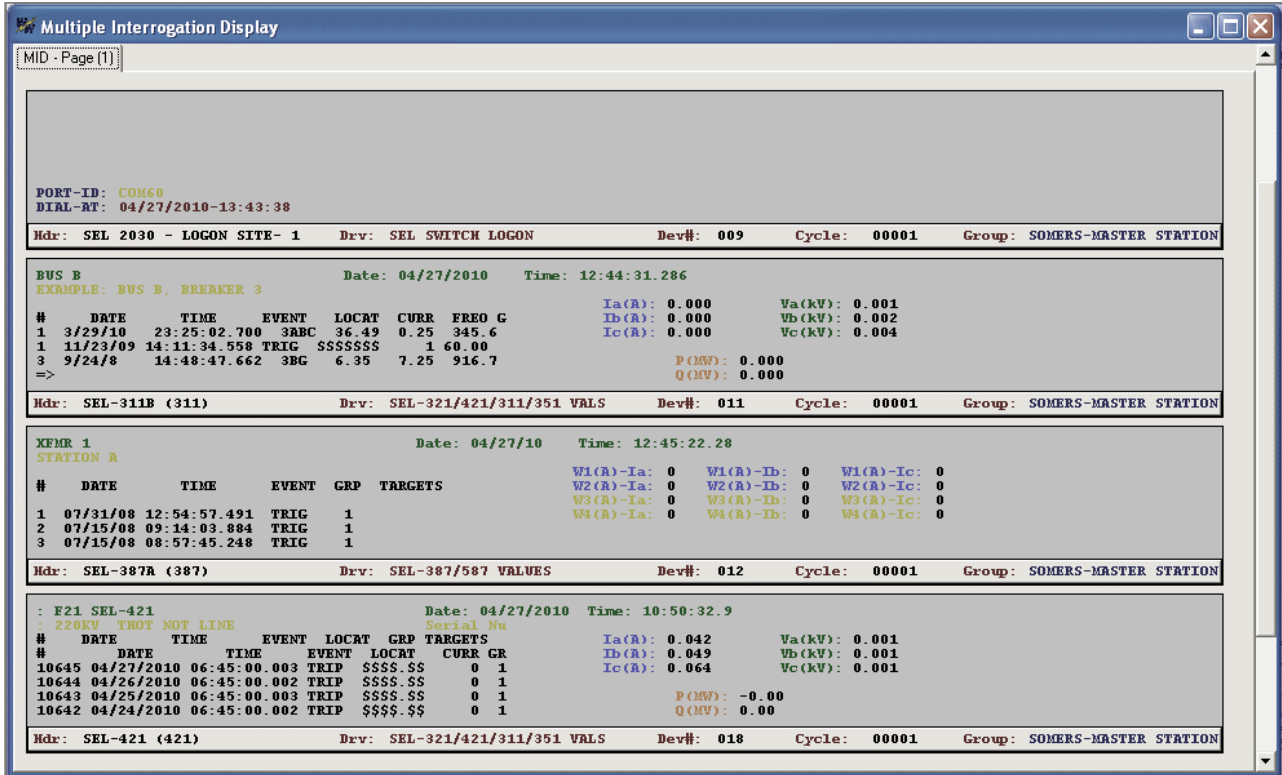
Figure 2.15 Multiport Interrogation Display (MID)

LONG FILE NAMING FORMAT (COMNAMES - C37.232)

All the files downloaded from the connected devices are saved to files using the IEEE long file naming format except when specified in the FTP or SFTP configurations. The IEEE long file naming format is a PSRC format used to name time sequenced data files. The file name contains the following six fields stored in a comma-delimited format.

The title and group fields in the Device Configuration dialog are used to compose the IEEE long file name. Below are the characters not permitted in the filename:

> : ? " / \ < > * | @ #

An error message will be displayed if these characters are entered into the title or station fields.

Example: 000112,123433234,-5S,South Arkey,Device X,Sun Power.DAT

Field Definitions:

Field	Example	Displayed	Definition
Date	040112	01/12/2004	The Date field defines the trigger date of the file. The date fields are stored as: year (2 characters), month and day.
Time	123433234	12:34:33.234	The time field defines the trigger time of the file. The Time fields are defined as: hour, minutes, seconds and milliseconds.
Tcode	-5S	-5S	The Time Code defines the time offset from GMT time. -5s would be specified for US

Field	Example	Displayed	Definition
			Eastern Standard Time. If the start time is expressed in UT, this field is coded 0z. Note: GMT is the international abbreviation for Greenwich Mean Time.
Substation	South Arkey	South Arkey	The substation name or code where the originating device is located. This field is the Stn-Group field entered in to the Device Configuration dialog.
Device	Device X	Device X	The device name or code that generated the file.This field is the Title field entered in to the Device Configuration dialog.
Company	Sun Power	Sun Power	The company of the specifed substation. This field is the Company field entered in to the Save and Archive (Polling Properties) dialog.

CREATE/EDIT DEVICES

To create a new device, press F4 or click the New [ ] toolbar button. The new dialog defaults the connection type to Ethernet. To switch from Serial, Ethernet or Virtual Port click on the Connection Type radio buttons.

To duplicate a device refer to the Duplicate Device section.

To edit an existing device, select the device and press F2 or click the Edit [ ] toolbar button or right click on the device and select the Edit Device option. Use the tab key to navigate between fields. Fields that are followed by a down arrow button are selectable fields. Use the up and down arrow keys to view the selectable options or click the down arrow button.

For a description of each field in the dialog refer to the Device Configuration Fields section.

Click Save to save the record or Cancel to close the dialog without saving. If an error occurs when opening a serial COM port a message is displayed and all I/O is aborted for that device. If an error occurs connecting to an Ethernet port then the last device that reported an error is displayed in the device table's status bar. The polling drivers will try to reopen the Ethernet connection on each poll.

The title and group fields are used to compose the IEEE long file name. Refer to IEEE Long File Naming Format section for more information. Below are the characters not permitted in the filename:

   : ? " / \ < > * | @ #

An error message will be displayed if these characters are entered into the title or station fields.

DUPLICATE A DEVICE

To duplicate an existing device record, place the cursor on the desired device and select the Duplicate menu option under the Devices menu or right click on the device and select the Duplicate Device option. When duplicating an existing device the device number must be changed. If the device number is duplicated or out of range message box is display requesting to correct the error.

EXPORT DEVICES

The export feature exports device records from the active configuration table to a comma delimited ASCII file. The Export option is under the Devices menu. All devices or only the marked devices can be exported,

This feature is useful for changing common information for all devices quickly. For example if a COM port number has changed for a number of devices then those devices can be exported. The export file can be opened in Windows Excel and all of the Com port fields can be changed easily. To import the changes back into the device configuration table use the Import option under the Devices menu.
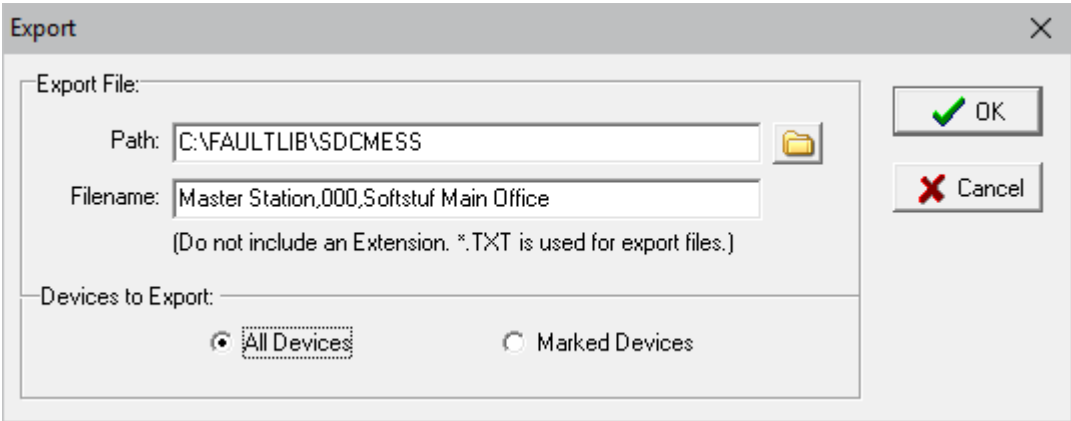
Figure 2.16 Export Dialog

IMPORT DEVICES

The import feature imports all device information from a comma delimited ASCII file. It is advisable to always keep a backup of the existing Device Configuration files before using the import feature. This allows for a quick recovery if any of the changes made to the device ASCII comma delimited file were incorrect. The 3 files to backup are the CFG_DEVS.DTB, CFG_SHOT.DTB & DRIVERS.INI files. The location of the device configuration files are listed in the header of the device manager table.

To import an ASCII comma delimited file select the Import option under the Devices menu. Enter the imported file's path and filename or use the Browse button to select the file. Also, select the type of import: overwrite the existing devices or append all the devices in the ASCII comma delimited text file to the end of the table. All device information contained in the imported file will be updated in the device manager table.
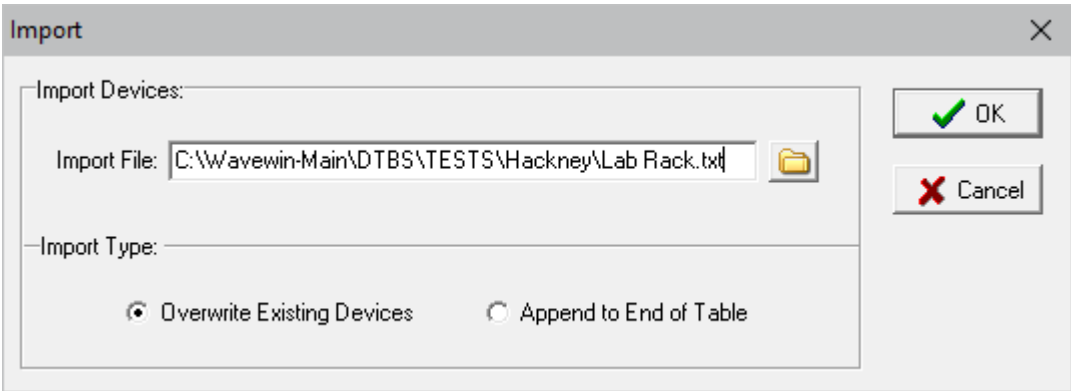
Figure 2.17 Import Dialog

NAVIGATE THE TABLE COLUMNS

To navigate the device records in the table use the up, down, page up, page down, ctrl+home, and ctrl+end keys, or the vertical scroll bar. To navigate the columns use the right, left, home, and end keys or

the horizontal scroll bar. Use the tab key to move the cursor from the device table to the query fields and the up arrow to return to the table.

MARK/UNMARK DEVICES

Devices are marked and unmarked through the Mark options in the Mark menu, the spacebar, or the mouse. Use the shift+mouse click button to mark a group of devices or the ctrl+mouse click button to randomly mark devices. Marked devices are displayed in red and can be deleted (Del), copied, grouped, sorted, printed or polled in the multiport interrogation display (MID) window.

DELETE DEVICES

Devices must be marked in order to delete them from the table. To delete a device, mark the device and press the delete key or select the Delete option under the Devices menu. The software prompts for confirmation, click Yes to continue or No to Cancel.

SORT DEVICES

The column headers displayed at the top of the table are used to sort the device records in ascending or descending order. Clicking on the column header sets the active sort field. The active sort field is displayed in the status bar at the bottom of the window. The active sort column header displays the sort order .

CUSTOMIZE THE DEVICE TABLE

The columns displayed in the table can be repositioned through the Display menu option under the Options menu. In the File Columns tab use the Move Up and Move Down buttons to change the position of a columns. The table columns can also be resized. Position the mouse over the column separator in the table and drag the mouse to the desired location or double click on a column separator to resize the column to the largest display.

In the General Table Setting tab the size of the font displayed in the table can also be increased or decreased. Use the Table Font Size drop down list to select the desired font. The way a device is selected (marked) in the table is defined in the File Marking field. To follow the Window's convention, select the Windows- Ctrl-Click selection. To have a file selected, using a single mouse click, select the Single Mark Click selection. The Single Mark Click toggles a device from selected (marked) or unselected.

The Device Manager tab allows for selecting the background color of the Duplicate configuration dialog to distinguish between a duplicate request and an edit request. The passwords displayed in the Device Manager table, the configuration dialog and the command dialog can be starred out using the Star All Passwords field.

To include the original filename in the IEEE long filename when extracting files from an FTP connection select Yes for the FTP Include Original Name in Long Name field.

When a long name is composed for incoming files the device # and station # is added at the end of the device and substation sections in the file. To remove the numbers select no for the Include Device # in Long name and Include Station # in Long name fields or select the _Device Number and _Station Number.

Figure 2.18 Device Display Dialog

QUERY DEVICES

The query fields are used to search for specific information in the device table. Query fields are located below the table. Use the tab key to move the cursor from the device table to the query fields and up arrow to return to the table. Use the Ctrl-Left/Right arrow keys to move between the query fields. Each field contains a criteria and an operator. The criterion is directly entered from the keyboard and may include the "*" and "?" wild cards. Operators are located above the criteria fields and can be changed by clicking the mouse button on the operator symbol or by pressing the F9 key. The selectable options include equal to (=), less than (<), and greater than (<).

Figure 2.19 Query Fields

When a query is launched, the engine numerically compares the specified criteria with the information in the table. If numerical comparison is not possible then it symbolically compares them. When multiple fields are defined, the engine searches for a match on the first field "AND" on the second field "AND" on the third field and so on.

Three query options are available: Query All Devices, Query Marked Devices, or Query Unmarked Devices. Devices that meet the specified query requirements are marked, grouped, and displayed at the top of the table. Use the tab and Ctrl-Left/Right arrow keys to navigate through the query fields and the <enter> key to execute the query.

CREATE FUNCTION KEYS

Programmable function keys allow for a string of ASCII characters or hexadecimal values to be transmitted to the output device through a single keystroke. The function keys are active in ASCII and Binary terminal emulators. Each device contains up to nine function keys. To create a function key, select the device and press F5 or click the Terminal Keys button .

Each function key is composed of two fields: name and transmit (TX). The name fields are used as key descriptors and the transmit fields are used to assign a string of ASCII characters, hexadecimal values, escape sequences, or other transmit strings. When the associated key is pressed in the terminal emulator the assigned transmit string is sent to the output device one character at a time. For example:

ASCII   F1:name   Request Meter Information
     TX: meter ^[13;10]

Binary   F1:name   Request RTU SOE Points
     TX: 7E 01 01 03 A0 8A 20 C4 A6

The term "meter" specifies an ASCII command and the instruction "^[" initiates an escape sequence that represents a series of decimal codes separated by semicolons and terminated by a closed bracket, "]". In the Binary case only hex characters (0..9,A..F) are allowed. A transmit string may also include other transmit strings. For example:

F1:TX   acc^[13;10]password^[13;10]
F2:TX   %F1%meter^[13;10]

When F2 is pressed the transmit command defined in F1 is sent to the output device followed by the ASCII command "meter" and the escape sequence, defined in F2. Up to eight transmit strings can be included in a single string. To save the function keys click the Save button or click Cancel to terminate the command. The function keys names are displayed at the bottom of the terminal mode window.

VIEW EVENT DATA

If Save RX Data is turned on in the Polling Properties dialog then all data received from a device is archived in a Dev_###.DTB file in the Message/Log Path folder defined in the Polling Properties dialog. The number defined in the filename is defined in the Name field (Device # or Group ID).
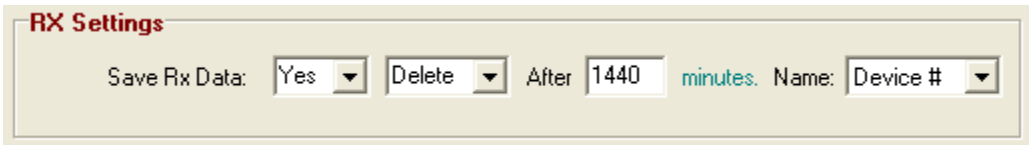
Figure 2.20 RX Settings

To view or modify the data saved in the device DTB file, select the device and press F6 or select the View Log File option under the Options menu or click on the View Log File button ▣. If a message folder is not defined in the Polling Properties dialog, then the DTB files are saved in the Wavewin installation directory.

Use the up arrow, down arrow, page up, page down, ctrl+page up, ctrl+page down, left arrow, right arrow, home, and end keys to browse the data. The Cut (shift+del), Copy (ctrl+ins), and Paste (shift+ins) options are used to edit the file and the Save As command to save the file under a new name. Press <esc> or click the Close button to exit the window.
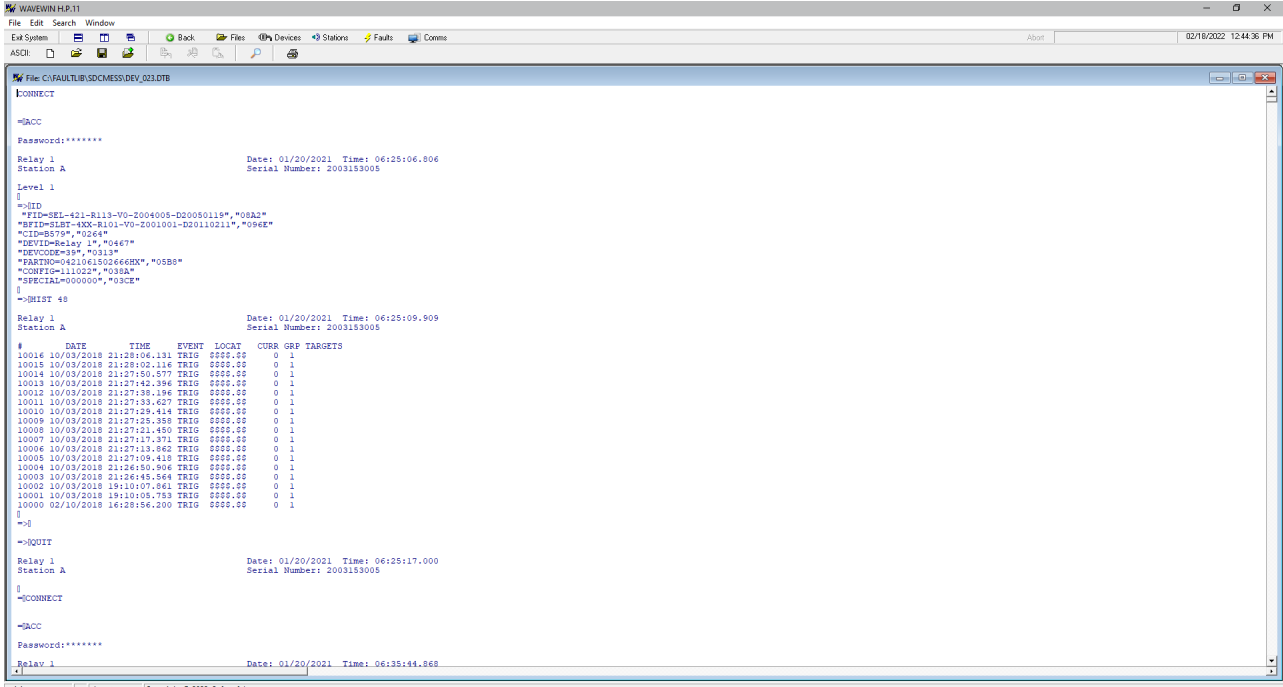
Figure 2.21 View Device Event Data

Capturing Data

The Device Manager offers both unsolicited and solicited data captures. When the device table is open, the system captures any unsolicited data received from the devices. The captured data is buffered, processed, and saved to the device's database file (DEV_####.DTB) in the Message/Log path specified in the Polling Properties dialog. The database filename indicates either the device number or the Group ID in which the data was received. All data is saved in the original form it was received and can be viewed or modified in the ASCII or Binary editors.

Devices that do not speak on their own can be periodically polled for analog, digital, summary and history information. A number of pre-canned drivers are supplied for report by exception commands and building load profile files. For devices not supported, the scripting language can be used to create script routines (device drivers) that periodically interrogate a device, parse values from the response, and display the values in the Multiport Interrogation Display (MID) device panels.

Set the Polling Start Date and Time

When a device is first polled for event files it will extract all event files currently saved in the device. If there are a large number of events in the device then the polling process could be time consuming. To start the event polling at a specific date and time set the polling start date and time through the Set Polling Date Time dialog. To open the Set Polling Date Time dialog right click in the Device Manager table and

select the Set Poll Date & Time option or select the Start Polling Date Time menu option under the Options menu.

Once the polling date and time is set then the polling process will only extract the event files that have a date and time greater than the set date and time.

Figure 2.22 Set Poll Date and Time

Select the date from the drop down calendar and enter the time in military time. If all devices need the start date and time set then click on the All Devices radio button. If only a number of devices need their start date and time set then first mark the devices before opening the dialog and click the Marked Devices radio button.

All the start date and times are saved to the SDC-HIS.INI file located in the Wavewin install path. A device's start date and times are located on the line of the device number +1. For example, device number 10's start date and time will be on line 11.

SET EVENTS SAVE PATH

To quickly set or change a device's event save path right click in the Device Manager table and select the Set Events Save Path option or select the Set Events Save Path menu option under the Options menu.

Enter the new save path or select the path using the browse button. To change the save path for all devices click the All Devices radio button. To change the save path for a select number of devices first mark the devices before opening the dialog then click the Marked Devices radio button.

Each device's Save Path field located in the Device Configuration dialog will be updated and saved with the new save path.

Figure 2.23 Set Events Save Path

SOE MANAGER

The SOE Manager is available under the Option menu in the File Manager. There are two options, SOE List and SOE Summary. Each is explained in the following 2 sections. The SOE Manager monitors an Event path for new transient files. When a new file is detected all the change of states in the digital channels are added to the SOE table. When the SOE Manager is first opened the SOE Configuration dialog is displayed.
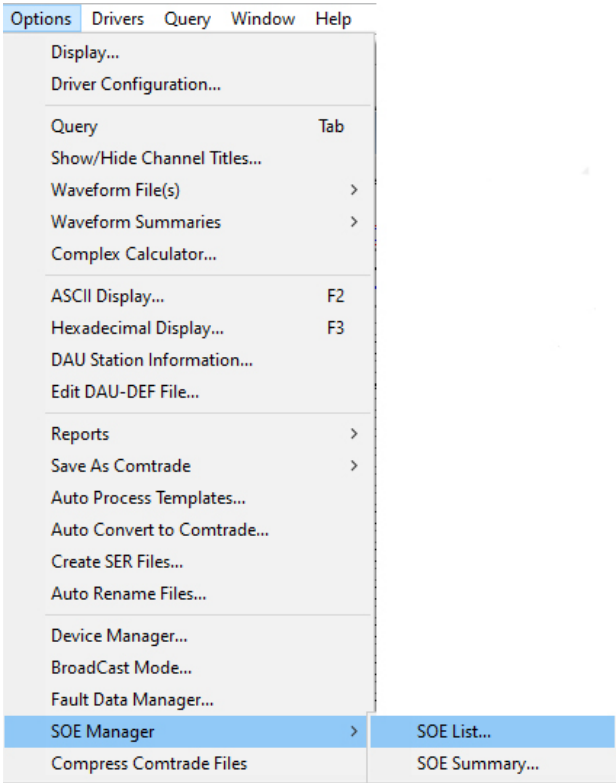
Figure 2.24 SOE Manager Options
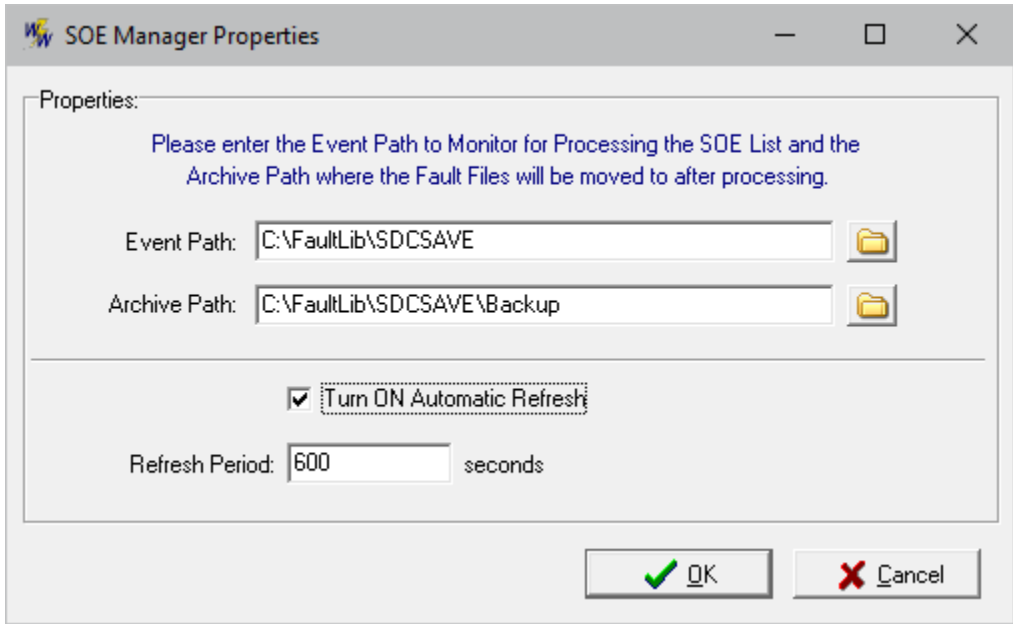
Figure 2.25 SOE Manager Configuration Dialog

The SOE Configuration dialog fields are defined below:

Field	Definition
Event Path	Enter or browse for the event path that will be monitored for Transient files.
Archive Path	Enter or browse for the path where the transient files will be moved to after they are processed.
Turn on Automatic Refresh	Check this box if the monitoring of the event path occurs on a periodic bases.
Refresh Period	Enter the number of seconds for the automatic refresh.

After all the fields are entered click the OK button. Depending on the option selected the appropriate SOE Manager table is opened. After the dialog is setup all recurring selections of the SOE Manager's options will open the appropriate SOE table directly. To make modifications to the SOE Manager's configuration fields select the properties dialog toolbar button inside the SOE Manager table .

Below is a description of each button option in the SOE Manager table:

Field	Definition
	Save the SOE table to the pipe delimited file located in the Event path defined in the configuration dialog. The SOE List file is named SOEDTB.DTB and the SOE Summary is named SOESUM.DTB.
	Save the existing SOE table to a comma delimited file.
	Mark/UnMark all rows.
	Run a query on the table columns.
	Manually refresh the table.
	Open the SOE Configuration dialog.

SOE LIST

When open, the SOE List manager first reads the SOEDTB.DTB file, populates the rows then runs a poll on the Events path for new transient files. The SOEDTB.DTB file is saved to the Event Path defined in the configuration dialog. The table is sorted according to the trigger date and time or the last selected sort column. The columns listed in the table include:

State: The state on the event/sensor at the displayed date and time (A=Abnormal, N=Normal).
Trigger Date: The date the event/sensor triggered or cleared.
Trigger Time: The time the event/sensor triggered or cleared.
Chan: The channel number of the event/sensors in the file from which it was read.
Channel Title: The channel title of the event/sensors.
Device: The device from which the event/sensors originated.
Substation: The substation from which the event/sensors originated.
File: The filename from which the event/sensors originated.

The Query section at the bottom of the table allows for searching events from specific substations, devices, and channels. To plot the specific events press <enter> or double click on the event.

Figure 2.26 SOE List Manager Table

To have the SOE List Manager automatically open when the software is ran pass SOELIST to the software.
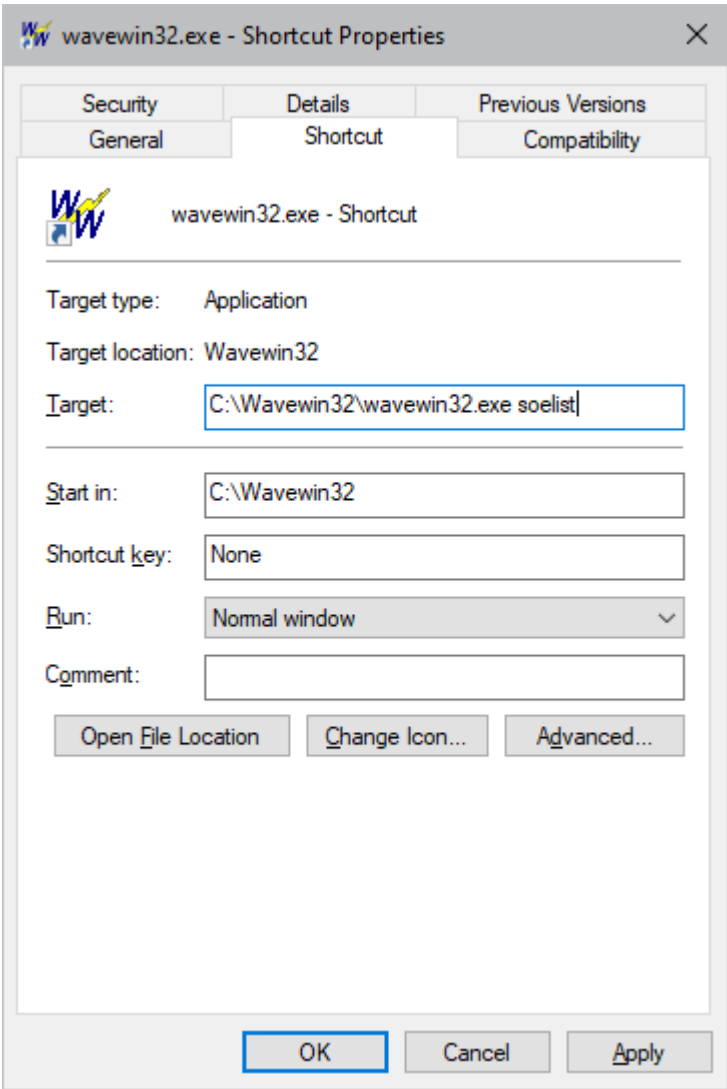
Figure 2.27 SOE List Manager Passed Parameter

SOE SUMMARY

When open, the SOE Summary manager first reads the SOESUM.DTB file, populates the rows then runs a poll on the Events path for new transient files. The SOESUM.DTB file is saved to the Event Path defined in the configuration dialog. The table is sorted according to the trigger date and time or the last selected sort column. The columns listed in the table include:

Substation: The substation that triggered the event/sensor.
Device: The device that triggered the event/sensor.
Fst-State: State the channel started at, A=alarm and N=normal.
Lst-State: State the channel ended at, A=alarm and N=normal.
Fst-Change Date: Date the channel first changed state.
Fst-Change Time: Time the channel first changed state.
Lst-Change Date: Date the channel last changed state.
Lst-Change Time: Time the channel last changed state.
Changes: Number of times the channel changed state.
Chan #: Channel number in the file.
Channel Title: The channel title of the event/sensor.

File: The filename from which the event/sensors originated.

The Query section at the bottom of the table allows for searching events from specific substations, devices, and channels. To plot the specific events press <enter> or double click on the event.

Figure 2.28 SOE Summary Manager Table

SEARCH FILE CONTENTS

The Search File Contents dialog allows for searching ASCII files for key words and displaying the results in a table format. To open the dialog select the Search File Contents option under the File menu.

This dialog allows for selecting the Start Date, End Date, Search Path, the file extensions to search, the key strings to search for and the path where the results will be saved. Refer to the following table for more details on each field:

Field	Definition
Start Date:	Select the Month Day and Year from the Start Date drop down list boxes. This defines what files to search in the the defined Search Path and Included Sub Folder if specified. If the files save date is equal to or greater than the selected start date and less then or equal to the selected end date then that file is searched for the entered search strings.
End Date:	Select the Month Day and Year from the End Date drop down list boxes.
Search Path:	Enter the Search Path or use the Browse button to the select the path.
Include Sub Folders:	To include all sub folders under the Search Path click the Include Sub Folder check box.
Extensions:	Enter the file extensions to search separated by commas, for example: *.DTB,*.TXT,*.CSV.
Search Strings	Enter the search string to look for. For multiple search strings separate each string by a comma, for example: password, logon.

Field	Definition
Report Path:	Enter the Report Path or use the Browse button to the select the path.

The Start Date and End Date define what files to search. If a file's save date is within the start and end dates than that file is included in the search.
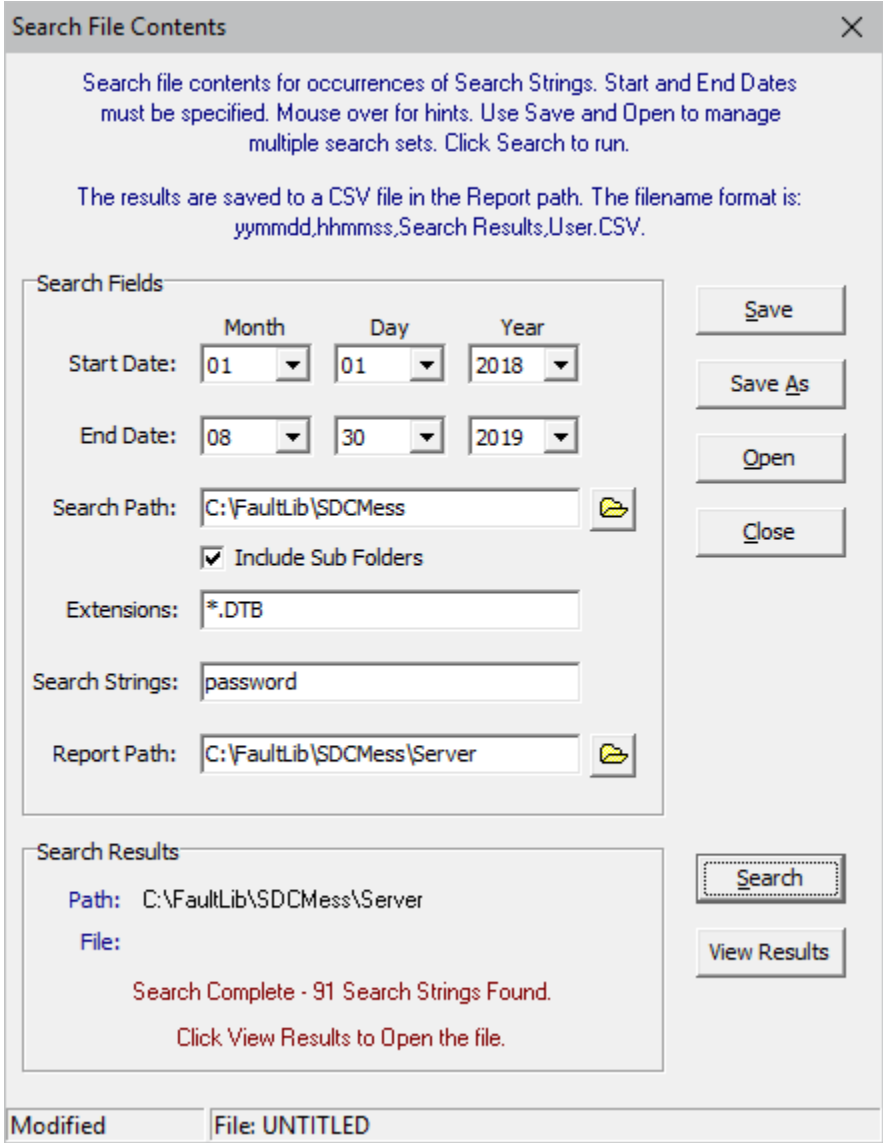

Figure 2.29 Search File Contents Dialog

The dialog also allows for saving the search fields to an ASCII txt file and for opening existing search files. Use the Save, Save As and Open buttons to save the active search to the active file listed in the status field, save the search fields under a new file name or for opening an existing search file. The file fields are saved to the ASCII text file in an INI file format:

[START DATE]
01\01\2016
[END DATE]
01\01\2018
[SEARCH PATH]

C:\FaultLib\SDCMess
[INCLUDE SUBFOLDERS]
1
[SEARCH FILES]
*.DTB
[SEARCH STRING]
password
[REPORT PATH]
C:\FaultLib\SDCMess\Backup

To start the search, click the Search button. If results are found then the results are saved to a CSV file with the following file name: yymmdd,hhmmss,Search Results,User.CSV. The User field in the file name is the username defined in the Save and Archive (Properties) dialog or from the Window Active Directory logon dialog.

The Search Results window section displays the search path, each file being searched, and the number of search items found.

To view the search results click the View Results button. A table is displayed with the following columns:

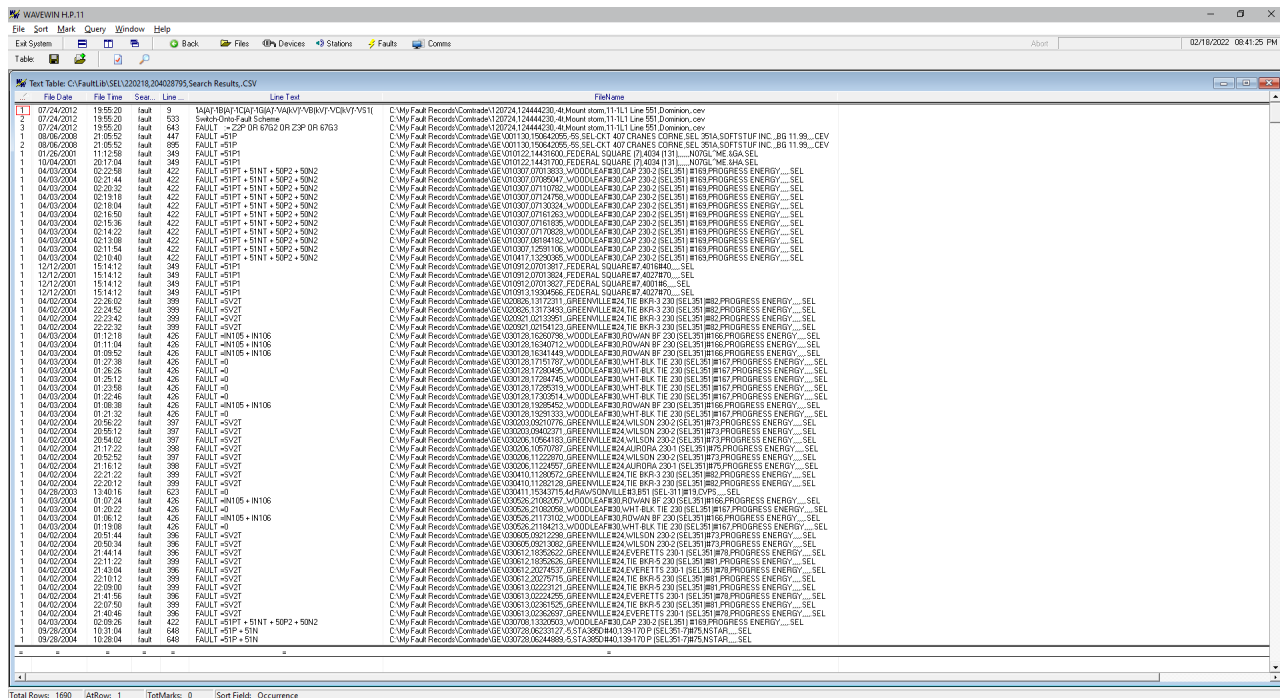| Field	Definition
Occurance	The occurance number in the listed filename.
File Date	The save date of the file.
File Time	The save time of the file.
Search String	The search string found.
Line Number	The line number where the search string was found in the file.
Line Text	The text of the line number number.
FileName	The path and filename where the search string exists.

Figure 2.30 Search File Results

To view the file and line number of the search results double click on the table row of the desired search item. The file will be displayed in an ASCII editor at the specified line number.

C H A P T E R 3

Fault Data Manager Quick Start

The Fault Data Manager is used to manage fault files named using the IEEE Long File Naming Format (C37.232). The Wavewin Master Station polls the connected devices for event, summary and history files. All files extracted from the devices (DFRs, Relays, Meters and more) are saved using the IEEE Long File Naming Format (C37.232). The fault data manager also allows for requesting an immediate poll of all marked devices. The device table located in the top right section of the window sends messages to the Wavewin master station requesting to poll all the marked devices for the latest event, summary and history files. The Status, Poll Requested At and Poll Completed At columns list the current state of a poll request.
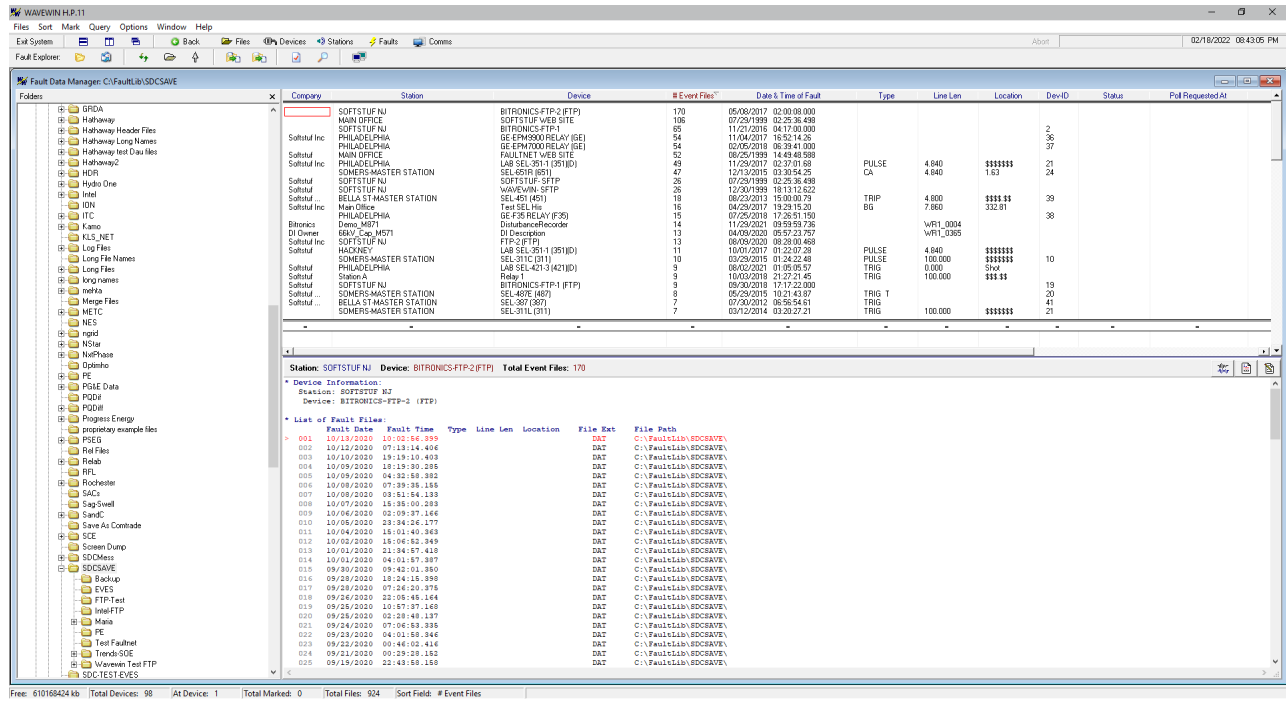

Figure 3.1 Fault Data Manager

The folder tree located on the left side of the window allows for navigating the local drives and all networked drives. When the window is first displayed the folder tree points to the active folder in the File Manager. To change the active folder click on the desired folder/drive listed in the folder tree. The table displayed in the top right section of the window lists all the devices that have long file naming event files located in the active folder and sub-folders (if selected). When the folder is scanned the device table compiles a list of unique devices according to the information listed in the long filenames. For more information on the IEEE C37.232 format refer to the Long File Naming Format section. If there are no files, named using the long file naming format, in the active folder then "No Items To View" is displayed in the device table.

Fault Data Manager Windows

The Fault Data Manager window has 4 sections: the Folder Tree, the Device Table, the Query Bar and the Device Summary Information section. The Tab key toggles between the 4 sections.

The 4 window sections are described in the following sections:

FOLDER TREE

Summary:

The Folder Tree is used to navigate through all folders on the local drives and networked drives. The active folder is displayed in the window's header. To change the active folder click on the desired folder node in the tree. If the subfolders are not displayed, click on the "+" icon to open the folder.

Functions	
Change Folder	To change the active folder click on the folder in the tree or click on the UP menu button to change to the parent folder or select the Change option under the Files tab to specify the desired folder.
Create a New Folder	To create a new folder under the active folder select the New Folder option under the File tab or opposite click in the tree and select the New Folder option from the popup menu. A new folder will be created under the active folder with the named defaulted to New Folder. Type the new folders name and press enter.
Rename a Folder	To rename the selected folder Rename option under the File tab or opposite click in the tree and select the Rename option from the popup menu. The edit box for the active folder is activated, type the new name and press enter.
Delete a Folder	To delete the active folder opposite click in the tree and select the Delete option from the popup menu. The folder and all files and sub-folders will be moved to the recycle bin.
Refresh Tree	To refresh the tree select the Refresh option under the Files tab or opposite click in the tree and select the Refresh option from the popup menu. The tree and device table will be refreshed with the latest information in the folders.
Close Tree	Close the Folder tree. To reopen the tree Folder Tree option under the Files tab or click on the Refresh toolbar button.

DEVICE TABLE

Summary:

The Device Table lists all devices that have event files located in the active folder and its sub-folders, if the option is selected. If a Wavewin master station is installed then poll upon demand commands can be sent directly to the master station from the device table. To set up the poll upon demand from the device table select the Fault Manager Properties option under the Options menu. Enter the shared Messages & Logs folder into the Messages & Logs Path field.

The Device Table columns are populated from the fields in the IEEE Long event filenames (Company, Station, Device, Type, Line Length, Location, Dev-ID and Latest Event), and from the message files stored in the "Messages & Logs" folder (Status, Poll Requested At and Poll Completed At). The table fields are described below:

Table Columns:

Company	The company that owns the device. The company name is stored in the 6th field in the long file name.
Station	The station name. The station is stored in the 4th field in the long file name.
Device	The device name. The device name is in the 5th field in the long file name.
# Event Files	The number of event files located in the active folder and sub-folders (if selected) for the device.

Date & Time of Fault	The date and time of the latest event. The date and time of the fault is the first and second fields in the filename.
Type	The type of fault from the latest event file. The fault type is stored in the filename's tenth field (if available in the file).
Line Len	The length of the line read from the device's latest event file. The line length information is stored in the filename's eighth field (if available during polling).
Location	The fault location from the device's latest event file. The fault location is stored in the filename's ninth field (if available in the file).
Dev-ID	The device number assigned to the device at the master station.
Status	The current status of the poll.
Poll Requested At	The date and time the last request for polling.
Poll Completed At	The date and time the last poll was completed.
Latest Event	The filename of the latest event.

When the Enter key (Cr) or the Left Mouse Double Click is detected, the table inspects the device at the cursor position, and executes the driver type associated with that device and plots the latest event for that device. The name and location of the latest event is displayed in the Latest event column,

Functions	
Mark	To mark/unmark a device in the device table use the space bar or Ctrl+left mouse button. To mark/unmark multiple devices use the shift+left mouse button, shift+up arrow, shift+down arrow or use the mark options under the Files tab.
Sort	The column headers displayed at the top of the table are used to sort all the devices in the table. Click the header buttons to toggle between ascending and descending The active sort field is displayed in the status bar at the bottom of the window.
Plot	To open the latest event file from a device double click on the device.
Copy	To copy all the event files from the marked device(s) to a new folder click on the copy toolbar button or select the Copy To option under the Files tab. Enter or select the destination folder and click OK.
Move	To move all the event files from the marked device(s) to a new folder click on the move toolbar button or select the Move To option under the Files tab or drag the marked devices to a folder displayed in the tree.

QUERY BAR

Summary:

The Query Section allows for searching for devices in the active device table. A query field is provided at the bottom of each table column.

A query field is composed of two items: a query value or criteria, and a query operator. The query criteria is directly entered from the keyboard and may include wild cards: "*", and "?". The query editor is activated by clicking the left mouse button over the desired query criteria box. The query operators can be changed from the Query/Change Operator option under the Query menu, or by using the (F9) key or the left mouse button positioned over the desired query operator box. The action of each available operator is explained below:

- (=) Search for files that match the set query.
- (<) Search for files that are less than the set query.
- (>) Search for files that are greater than the set query.

The query mechanism numerically compares the specified query with the available data columns. If numerical comparison is not possible then it will symbolically compare the columns. When multiple query fields are specified, it will search for a match on the first field "AND" on the second field "AND" on the third. After a query is executed the rows that match the specified query are marked and grouped at the top of the table. Use the Ctrl-left/right arrows to move between query fields or left click on the desired query criteria field.

Functions	
All Files	Query All Devices in the Device table.
Marked Files	Query only the marked devices in the Device table.
Unmarked Files	Query only the unmarked devices in the Device table.
Clear Query Area	Clear the entire query area.
Change Operator	Change the operator at the active column.

DEVICE INFORMATION

Summary:

The Device Information section lists a history of the event files for the device selected in the device table. The maximum number of event files listed can be changed by opening the Fault Manager Properties dialog under the Options menu. Change the # of Event Files field to the desired number to display. The events files are listed from the latest to the oldest.

The station name, device title and the total number of events files stored in the active folder for the selected device is displayed in the header section of the summary window. If the devices are being polled by Wavewin then the last meter reading is displayed under the history list.

Each file listed in the history can be plotted, viewed/edited and summarized. To plot one of the files use the tab key to activate the device information section or click in the section. The up arrow, down arrow, page up and page down keys are used to move the cursor. The enter key will plot the highlighted file, F2 will display the contents of the file and the F3 will show a summary. Double clicking on the file will also plot the file.

There are 3 buttons displayed in header section that will plot, summarize or view/edit the selected file.

Functions	
Navigate	Move the cursor, up arrow, down arrow, page up, page down or default mouse click.
Plot	Plot the file at the cursor, enter key or double click on the file or click on the plot button.
View/Edit	View the contents of the file, F2 key or click on the view/edit button.
Summarize	View a summary of the file, F3 key or click on the summary button.

LONG FILE NAMING FORMAT (COMNAMES - C37.232)

All the data downloaded from the connected devices are saved to a file using the IEEE long file naming format. The IEEE long file naming format is a PSRC format used to name time sequenced data files. The file name contains the following ten fields stored in a comma-delimited fashion:

Example: 000112,123433234,-5S,South Arkey,DLP1,Sun Power,T,123.22,+34,60,AG T.OCS

Field Definitions:

Field	Example	Displayed	Definition
Date	040112	01/12/2004	The Date field defines the start date of the file.

Field	Example	Displayed	Definition
			The date fields are stored as: year (2 characters), month and day.
Time	123433234	12:34:33.234	The time field defines the start time of the file. The Time fields are defined as: hour, minutes, seconds and milliseconds.
Tcode	-5S	-5S	The Time Code defines the time offset from GMT time. -5s would be specified for US Eastern Standard Time. If the start time is expressed in UT, this field is coded 0z. Note: GMT is the international abbreviation for Greenwich Mean Time.
Substation	South Arkey	South Arkey	The substation name or code where the originating device is located.
Device	DLP1	DLP1	The device name or code that generated the file.
Company	Sun Power	Sun Power	The company of the specifed substation.
File Tag	T	T	The fault type or contents type of the file.
Line Length	123.22	123.22	The line length extracted from the event file. This field applies to certain relays.
Fault Location	+34.60	+34.60	The fault location extracted from the event file. This field applies to certain relays.
Fault Type	AG T	AG T	The fault type extracted from the event file. This field applies to certain relays.

Open the Fault Data Manager

To open the Fault Data Manager select the Fault Explorer option under the Options menu. The command line option is described in the next section.

To setup polling of the devices from the fault data manager open the Fault Manager Properties dialog from the Options menu. Enter the shared path between the device manager polling station and the fault data manager in the Messages & Log Path. This folder must be the same folder defined in the Save & Archive dialog in the device manager.

The fault data manager also has an automatic refresh option that will automatically refresh the event and status information. To turn the automatic refresh option on, click on the Turn ON Automatic Refresh checkbox. Checked = ON. Also, enter the automatic refresh period. The period is specified in seconds. The default is 60 seconds.

To include all subfolders when composing the Device list check the Include Sub Folders option.
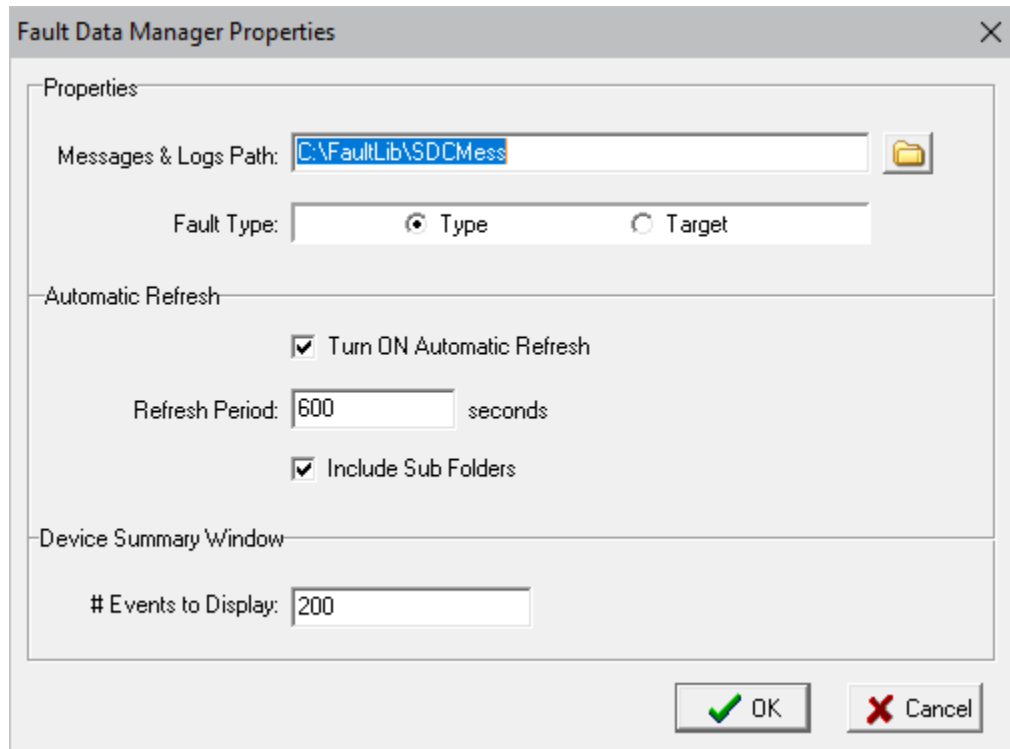
Figure 3.2 Fault Data Manager Properties Dialog

COMMAND LINE PARAMETER

The Fault Data Manager can be automatically opened when Wavewin runs using the command line parameter, Fault. To add the **fault** command line parameter opposite click on the Wavewin icon or shortcut. Add **fault** after the Wavewin folder and filename in the target field.
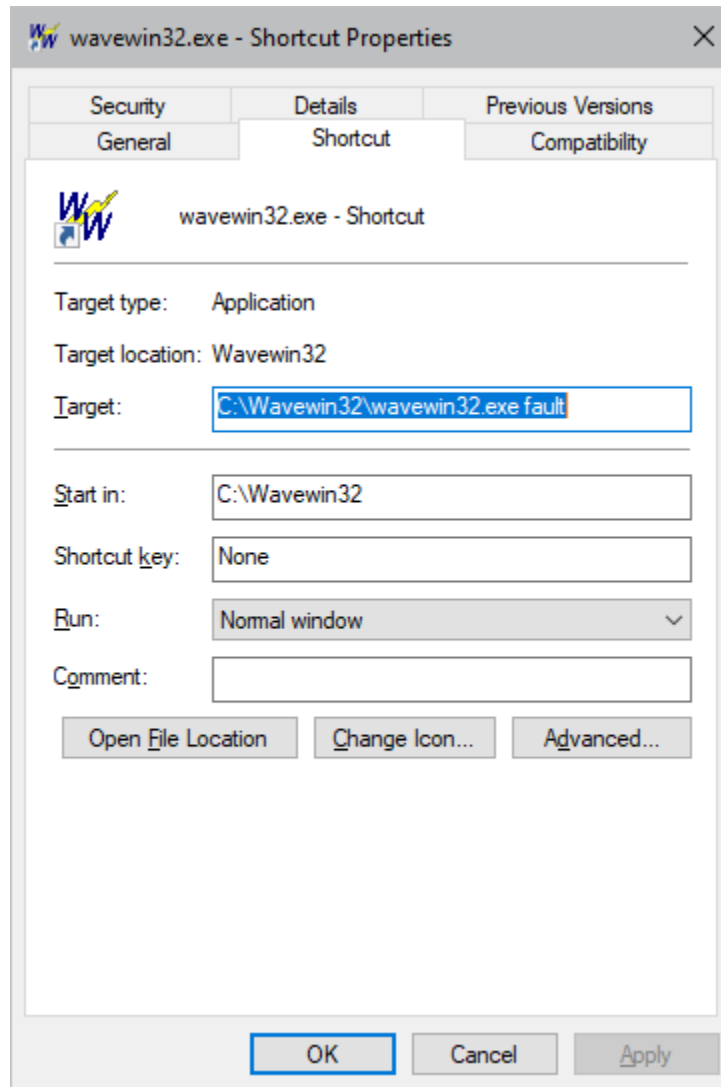
Figure 3.3 Fault Data Manager – Command Line Parameter

Fault Data Manager Polling

Polling of the devices is initiated from the Device table. To request a poll first mark all the devices to poll.

Marked devices are displayed in red. Next, click on the Poll Request button [icon] in the button. A message dialog is displayed listing the current status of each device requested.
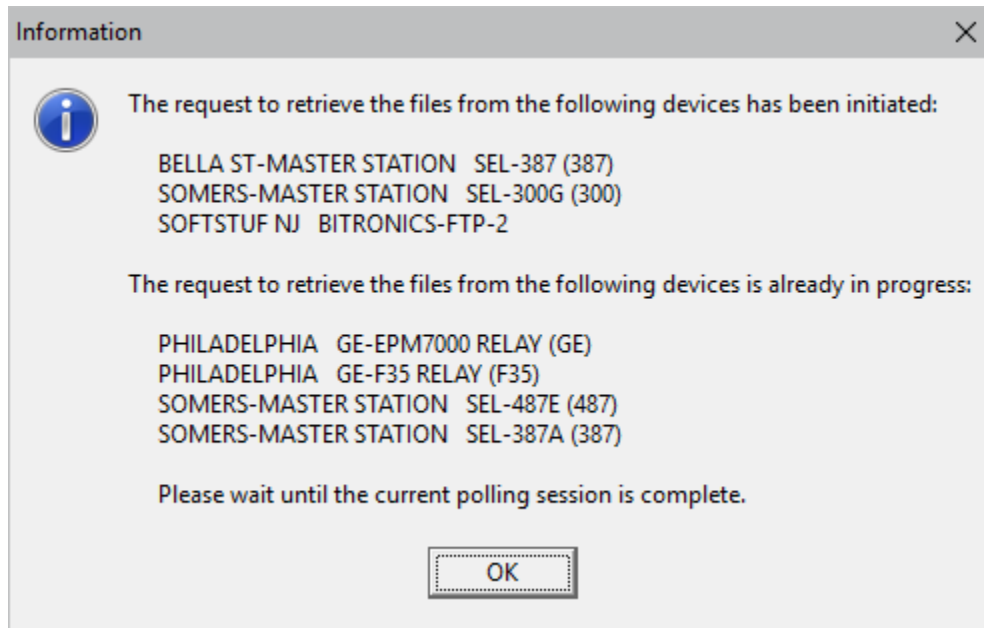
Figure 3.4 Poll Status Message

The devices that can be polled are listed under the initiated list and the devices that are already scheduled to be polled are listed under the already in progress list. The Status, Poll Requested At and Poll Completed At columns display the status of the poll. The Status column has the following updates:

- **Poll Requested:** When a poll is requested the device table saves a POL message in the messages & logs folder for each device marked. The Status column is updated with Poll Requested and the Poll Requested At column is updated with the date and time the poll was requested.

- **Poll in Progress:** The device manager monitors the message folder for POL files. Once it sees a POL file it starts the polling process and renames the POL file to a CAL file indicating the poll is in progress. The fault data manager also monitors the message folder. When it sees a CAL file it updates the Status column to Poll in Progress.

- **New Files:** During the polling process the fault data manager checks if new event files were downloaded. At each automatic refresh period the fault data manager will count the number of event files in the active folder. If the number of event files counted is greater than the number of events listed in the # Event Files column then the Status column is updated with New Files and the date time in the system toolbar blinks red.

- **Poll Complete:** When a poll is successfully completed the device manager will rename the CAL file to a DON file. The fault data manager will update the Status column with Poll Complete and update the Poll Completed At column with the date and time the poll completed.

- **Unable to Connect:** When the device manager encounters a problem connecting to the device the CAL file is renamed to an NCR file. The fault data manager will update the Status column with Unable to Connect and update the Poll Completed At column with the date and time the poll completed.

LIST DEVICES

If event files are not currently listed in the Fault Data Manager's device table for a specific device then the device can be polled using the List/Poll Devices dialog. This will occur if a new device was added to the device manager polling station and it has not been polled yet or all the device's events files where

archived to an archive path. To open the List/Poll Devices dialog select the List/Poll Devices option under the Options menu.
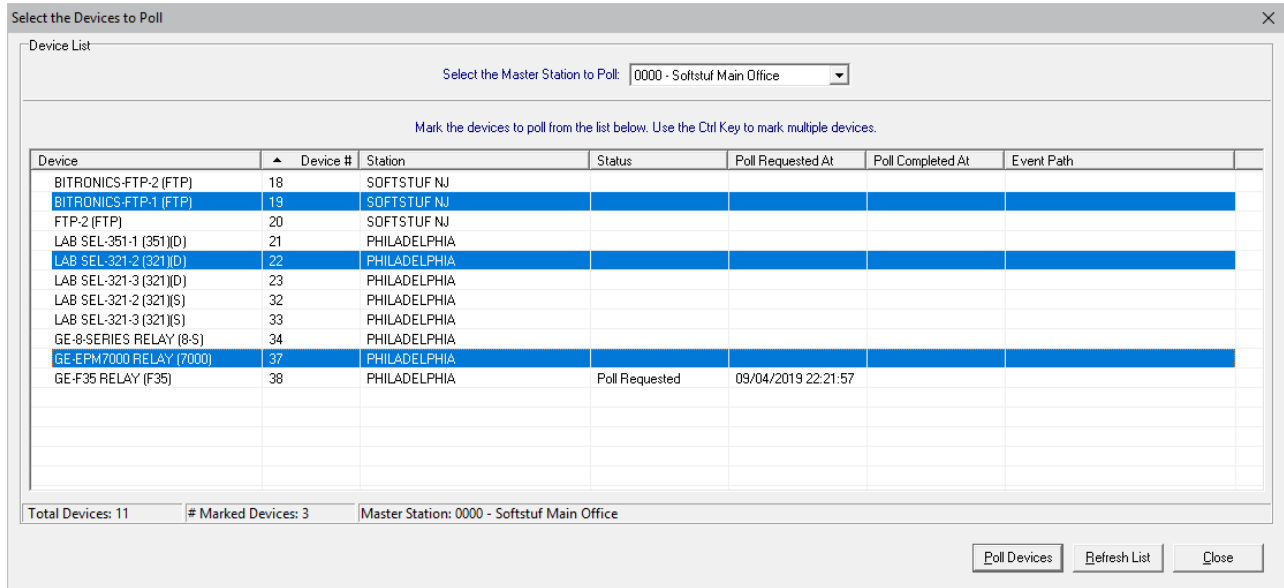
Figure 3.5 List/Poll Devices Dialog

To poll devices from the List/Poll Devices dialog first marked the devices using the Ctrl mouse click on all devices to poll then click on the Poll Devices button. The Status and Poll Requested At columns in the device table and the dialog are updated with the polling information.

Table Features

The following sections describe the main features in the Fault Data Manager's device table.

REQUESTING A POLL

To request a poll first mark the devices to poll. Next, click the poll request button in the button toolbar . To poll the devices from the Poll/List Devices dialog mark the devices then click the Poll Devices button.

The status of the poll is displayed in the Status, Poll Requested At and Poll Completed At columns. The Status column updates when the poll is started and when it is completed. It also indicates if new event files have been downloaded. The Poll Requested At displays the date and time the last poll was requested. The Poll Completed At is updated once the poll has been completed. The time difference between the Poll Requested At and the Poll Completed At shows how long it took to complete the poll.

DISPLAYING EVENT HISTORY

All the events downloaded from the devices are saved to the events folder using the IEEE long file naming format. A history list of the event files are displayed in the Device Information section. To plot, view/edit or view a summary of the events tab to the device information section and move the event cursor to the desired event file. To plot a file press the enter key or double click on the event file or click on the Plot button displayed in the upper right corner. To view a summary of the event, click on the Summary button . To view/edit the event's raw file click on the Edit button .

Figure 3.6 Event History List

REFRESH THE TABLE

The device table columns can be manually or automatically refreshed. To have the table automatically refreshed open the Fault Manager Properties dialog under the Options menu and click on the Turn ON Automatic Refresh checkbox. If the box is checked the automatic refresh is ON. Also, enter the refresh period. The period is measured in seconds. The default is 60 seconds. The automatic refresh will update the event and status columns.

To manually refresh the table click on the Refresh button [icon] in the toolbar. All of the columns in the table are updated.

Figure 3.7 Automatic Refresh

CUSTOMIZING THE FAULT DATA MANAGER

The columns displayed in the device table can be repositioned through the Table Properties option under the Options menu. Use the Move Up and Move Down buttons to change the position of a column. The table columns can also be resized. Position the mouse over the column separator in the table and drag the mouse to the desired location or double click on a column separator to resize the column to the largest display.

The size of the font displayed in the table can also be changed. Use the Table Font Size drop down list to select the desired font.

The way a device is selected (marked) in the table is defined in the File Marking field. To follow the Window's convention, select the Windows- Ctrl-Click selection. To have a file selected, using a single mouse click, select the Single Mark Click selection. The Single Mark Click toggles a device from selected (marked) or unselected.
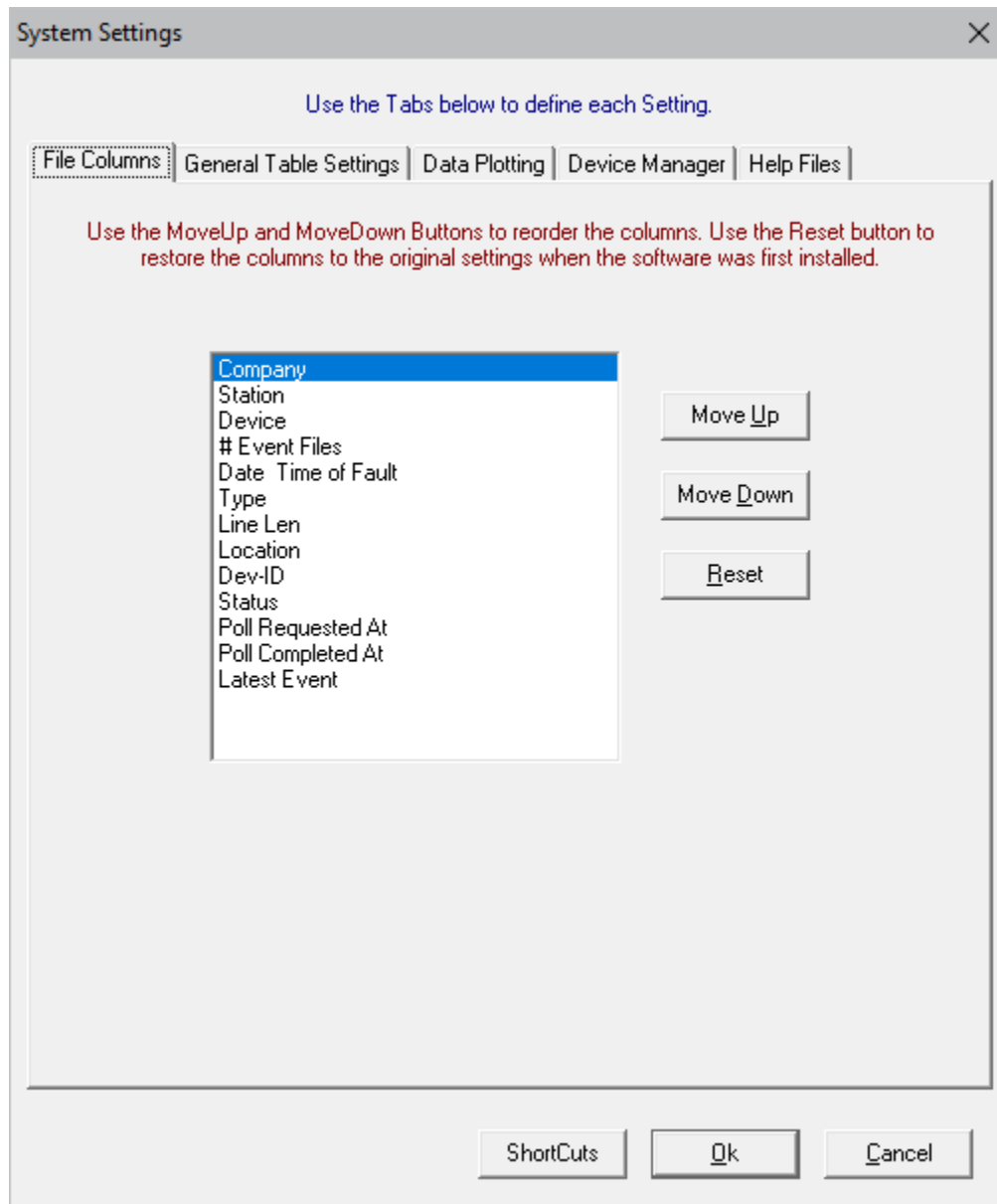

Figure 3.8 Device Display Dialog

QUERYING DEVICES

The query fields are used to search for specific information in the device table. Query fields are located below the table. Use the tab key to move the cursor from the device table to the query fields and the up arrow to return to the table. Use the Ctrl-Left/Right arrow keys to move between the query fields. Each field contains a criteria and an operator.

The criterion is directly entered from the keyboard and may include the "*" and "?" wild cards. Operators are located above the criteria fields and can be changed by clicking the mouse button on the operator symbol or by pressing the F9 key. The selectable options include equal to (=), less than (<), and greater than (<).

=	=	=	=	=	=	=	=	=	=	=
						08/12/2009				

Figure 3.9 Query Fields

When a query is launched, the engine numerically compares the specified criteria with the information in the table. If numerical comparison is not possible then it symbolically compares. When multiple fields are defined, the engine searches for a match on the first field "AND" on the second field "AND" on the third field and so on.

Three query options are available: Query All, Query Marked, or Query Unmarked. Devices that meet the specified query requirements are marked, grouped, and displayed at the top of the table. Use the tab and Ctrl-Left/Right arrow keys to navigate through the query fields and the <enter> key to execute the query.

SORTING DEVICES

The column headers displayed at the top of the table are used to sort the devices in ascending or descending order. The active sort field is displayed in the status bar at the bottom of the window. The active sort column header displays the sort order Dev-Name.

MARKING/UNMARKING DEVICES

Devices are marked and unmarked through the Mark menu, the spacebar, or the mouse button. Use the shift+mouse click button to mark a group of devices or the ctrl+mouse click button to randomly mark devices. Marked devices are displayed in red and can be grouped (Alt+M,G), sorted (Alt+S), printed (Alt+P,P) or polled (Alt+O,R).

A   P   P   E   N   D   I   X   A

Device Drivers

The DRIVERS.INI file, located in the Device's configuration directory is used to create device drivers. The driver consists of script commands that periodically interrogate a device, parse information from the response, display the parsed response in a text window or graphical display, activate automatic triggers, generate reports, and/or archive the data. The drivers are created in the DRIVERS.INI file and assigned in the device configuration dialog.

File Locations

To change where the files are saved on the connected server open the Drivers.ini file located in the Wavewin32 directory. Navigate to drivers 96 & 97. Below are the driver fields.

```
[XMIT RELAY-FILES BRIDGE]
DRIVER#=96
TYPE=ASCII
TXFILE=*.SLH W:\FAULTLIBRARY\HISTORY /M
TXFILE=*.3EH W:\FAULTLIBRARY\HISTORY /M
TXFILE=*.3TH W:\FAULTLIBRARY\HISTORY /M
TXFILE=*.SLS W:\FAULTLIBRARY\SUMMARY /M
TXFILE=*.DLS W:\FAULTLIBRARY\SUMMARY /M
TXFILE=*.30S W:\FAULTLIBRARY\SUMMARY /M
TXFILE=*.SOP W:\FAULTLIBRARY\SUMMARY /M
TXFILE=*.SLP W:\FAULTLIBRARY\SUMMARY /M
TXFILE=*.SEL W:\FAULTLIBRARY\EVENT /M
TXFILE=*.OSC W:\FAULTLIBRARY\EVENT /M
TXFILE=*.30X W:\FAULTLIBRARY\EVENT /M
TXFILE=*.DFR W:\FAULTLIBRARY\EVENT /M
TXFILE=*.EOP W:\FAULTLIBRARY\EVENT /M
TXFILE=*.FLP W:\FAULTLIBRARY\EVENT /M
TXFILE=*.DAT W:\FAULTLIBRARY\EVENT /M
TXFILE=*.CFG W:\FAULTLIBRARY\EVENT /M
TXFILE=*.HDR W:\FAULTLIBRARY\EVENT /M
TXFILE=*.DXF W:\FAULTLIBRARY\STATIONS /M
TXFILE=*.DN* W:\FAULTLIBRARY\STATIONS /M
TXFILE=*.OK* W:\FAULTLIBRARY\STATIONS /M
TXFILE=*.BSV W:\FAULTLIBRARY\LOADPROFILE /M
TXPERIOD=120
TXDELAY=-114

[XMIT DFR-FILES BRIDGE]
DRIVER#=97
TYPE=ASCII
TXFILE=*.X01 W:\FAULTLIBRARY\EVENT /M
TXFILE=*.MEH W:\FAULTLIBRARY\EVENT /M
TXFILE=*.TLR W:\FAULTLIBRARY\EVENT /M
TXPERIOD=120
TXDELAY=-118
```

The destination drive for the files on the server can be changed. Change the drive letter (W:\) to the mapped driver letter for the connected server. All files with the listed extensions are moved from the polling computers C:\SDCSAVE directory to the specified directories on the server.

NOTE: Make sure the above directories exist on the server before starting the polling process.

SCRIPT COMMAND DEFINITIONS

All available script commands are defined below. In the definitions below there are references to Escape Sequence Commands. The escape sequence commands are used to access system and user variables. The "^", "[" and "]" characters specify the use of an escape sequence command. To insert a carriage return and a line feed after an ASCII TXCOMMAND insert ^[13;10] after the ASCII characters to transmit to the device. For example to transmit an SEL meter command, insert the following command in the drivers TXCOMMAND field: meter^[13;10].

ESCAPE CODE COMMANDS

Available Escape Code Commands. The following commands are reserved system variables. Their names cannot be used for user variables.

- 13: Carriage Return
- 10: Line Feed
- Y: 2 Digit Year (Current Date & Time from the System Clock)
- YR: 4 Digit Year
- MON: Month
- DAY: Day
- HR: Hour
- MIN: Minute
- SEC: Second
- HSEC: Hundredth of a Second
- ID: Device Number
- PID: Port Number
- HDR: Device Name
- ADDR: Device Address
- SID: Station Number
- STN: Station Name
- TC: Is the "time code" field assigned to each device.
- CMP: Is the "company name" assigned in the "save and archive" dialog.
- VER: Program's Version Number
- CRCSATEC: Proprietary SATEC Meter 8-Bit Checksum
- CRCMDAR: Proprietary ABB MDAR Relay 16-Bit CRC Checksum
- CRCBI: Proprietary BiTRONICS Meter 8-Bit Checksum
- CRCDLP: Proprietary DLP Relay 16-Bit CRC Checksum
- CRCHYDRAN: Proprietary Hydran CRC Checksum
- CRCHATH: Proprietary Hathaway DFR I, II and IIB CRC Checksum
- CRCDPU: Proprietary DPU Modbus CRC Checksum
- CRCPASS: Creates a 6 character random password.
- CRCROCH Proprietary Rochester DFR checksum
- P#: Pause # of Seconds (Maximum Delay is 99 Seconds)
- #: Any 1 Byte integer Number in Decimal (0 to 255)
- ^X^Y: The Variable Name "X" From Device# "Y"
- %#:N: The text # will be left justified with blanks to the length specified in N.
- $FILE:N: Read Nth line in the file specified in "FILE" and insert in the command. The file specified in the "FILE" field must be in the Wavewin directory.
- CMND: The phone number field in the device configuration dialog.
- CMND1: The password 1 field in the device configuration dialog.
- CMND2: The password 2 field in the device configuration dialog.
- CMND3: The back out field in the device configuration dialog.
- CMND4: The log header field in the device configuration dialog.

- CMND5: The event type field in the device configuration dialog.
- CMND6: The save path field in the device configuration dialog.
- CMND7: Reserved for future use.
- CMND8: Reserved for future use.
- CMND9: Reserved for future use.
- CMND10: Reserved for future use.
- CMND11: Reserved for future use.
- F1…F9: The function keys assigned to each device in the device manager table.
- EXIT: Close the Wavewin application.
- WAIT: Wait until all scheduled polling is complete.
- CONNECT: Connect to the device using the specified Ethernet protocol (ETHERNET).
- DISCONNECT: Disconnect from the device's Ethernet connection (ETHERNET).

DRIVER DEFINITION COMMANDS

[...]:

The "Driver Name" is assigned between brackets. Each driver must be assigned a unique name. The driver name is displayed in the device record's "Driver" drop down list. A maximum of 24 characters is permitted. Up to 255 drivers is supported.

DRIVER#:

Each driver must have a unique ID number assigned (range 1 to 255). A driver is used to automatically transmit a predefined sequence of characters or bytes ("TXSTART"+"TXCOMMAND"+"TXEND") to an external device, then capture the response, parse and display the response (RXSTRIP) and/ or save the parsed data (LOGCOMMAND).

If a unique driver number is assigned then the driver is loaded into memory and the driver's name is added to the driver drop down list in the device record dialog.

Other drivers can also be included by using the "&" character followed by the driver number. For example: "DRIVER#=2 &7 &1" will cause drivers 2, then 7 then 1 to execute. The maximum number of included drivers is 64. Included drivers can also include other drivers. Below is an example where included drivers can be used, there are 5 driver defined:

SEL **Logon** driver defined at Driver # 1.
SEL **History** driver defined at Driver # 2.
SEL **Events** driver defined at Driver 3.
SEL **Meter** driver defined at Driver # 4.
SEL **Logout** driver defined at Driver # 5.

To execute each driver for an SEL device create and new driver at Driver # 5 and include the top five drivers: **DRIVER#=6, &1, &2, &3, &4, &5**. Below is an example of Driver #6.

[SEL, POLL SEL-351/311]
DRIVER#=6 &1 &2 &3 &4 &5

Drivers are executed in the order that they are included. In general there are six different ways to execute a driver:

- PERIODICALLY: "TXPERIOD=4" will execute once every 4 seconds.
- 2) DAILY: "TXPERIOD=T1830" will execute once @ 6:30 p.m.
- 3) WEEKLY: "ONDOW=7" will execute on Sunday @ the defined "TXPERIOD".
- 4) MONTHLY: "ONDAY=14" will execute on the 14th @ the defined "TXPERIOD".
- 5) CONDITIONALLY: Using "SETMESSAGE", "ATMESSAGE" and "M" commands.

Periodically executed drivers are called interrogation drivers and are executed when the "TXPERIOD elapses.

TYPE:

Defines the type of data specified in the "TX" & "LOG" commands. The two available types are "ASCII" or "Hexadecimal".

SYSTEM COMMANDS

REPORTIF:

A sequence of characters to search for (ASCII or Hex) in the captured data. If the sequence is found then the captured data is saved to a file using the IEEE long file naming convention and transmitted to a remote computer. A file transmit driver must exists for the reportif file to be sent. The maximum Reportif length is 255 characters. The reportif can also include escape sequence commands.

SETPORT:

A command used to reinitialize the port configuration dynamically. Use this command to reinitialize a port's baud rate, byte size, parity and stop bits before the driver is executed. This feature is useful when switching between different devices connected via the same port. For example if 2 SEL 2030 with different port configurations are being polled from the same modem or direct connection then setport will insure the proper port configuration for both SEL 2030s.

SETSYSVAR:

An internal command use to change the value of any one of the 7 EscSeq internal variables. The EscSeq variables are defined in the device record. The command sequence is SETSYSVAR=ExistingVarName NewVarName. This feature was created for the "Change Password" feature but can be used for any one of the EscSeq variables defined. The example below changes the password defined in the 3rd EscSeq variable defined in the device record with a randomly generate 6 character password. The "CRCPASS" Escape Code Command creates a 6 character randomly generated string. The device record in the database (CFG_SHOT.DTB) and on screen is updated with the variable string. The maximum length is 80 characters and escape code sequence commands are allowed.

Example: SETSYSVAR ^[^CMND2] ^[CRCPASS]

LOG COMMANDS

LOGPERIOD:

The save cycle in seconds (an integer number up to 2 million). For example, if "LOGPERIOD=90" was specified in a driver then the variables and text that are specified in the "LOGCOMMAND" will be saved to disk once every 90 seconds. The saved data is stored in text format in the filename specified in the "LOGFILE=" command to the save directory defined in the "Save and Archive" dialog. If "LOGPERIOD=0" was specified then these actions will not occur unless "LOGDELAY>0" was specified in which case the driver will execute one time only. If "LOGPERIOD=T0800" was specified then the driver will execute at 08:00 am every day. T commands are specified in military time.

LOGDELAY:

The duration in seconds to wait before the Log cycle begins. For example, if "LOGDELAY=3" was specified then only the first occurrence of "LOGPERIOD" is delayed by 3 seconds (LOGPERIOD+LOGDELAY). In the previous example the first period will occur after 93 seconds, all others will occur 90 seconds apart. To have the log cycle begin immediately set "LOGPERIOD=-89 (90+-89). If "LOGPERIOD=0" was specified than specifying "LOGDELAY" will cause the driver to execute one time only (this is useful for writing headers to the log file).

LOGFILE:

The path and file name of the text file that will contain the outputs of the "LOGCOMMAND=". If the path is not specified than the default save path (save path specified in the "Save & Archive" dialog) is used. If the command "LOGFILE" is not included than the system will automatically assign an IEEE long file name with a ".CSV" extension. The maximum length is 255 character and escape code commands are allowed.

LOGRENAME:

Automatically renames the specified "LOGFILE=" file to an IEEE long file name with a ".CSV" extension. The specified file must exist in the specified path (path defined in the "LOGFILE" command or the save path define din the "Save & Archive" dialog). If the path is not specified in the "LOGFILE=" command than the default save path is used. This command is required in order to transfer files that are being periodically appended. LOGRENAME occurs upon TXPERIOD and not upon LOGPERIOD. The maximum length is 255 characters and escape code commands are allowed.

LOGCOMMAND:

Specifies a sequence of characters to save (ASCII OR BINARY) to the "LOGFILE=" when the "LOGPERIOD" command expires. The maximum length is 1024 characters and escape code commands are allowed. For example the following LOGCOMMAND:

    ^[10;13;YR;MON;DAY;HR;MIN;SEC;HSEC;ID;HDR;ADDR;SID;STN;VER;^TOTMW^2]

Will cause a carriage return, line feed, 4 digit year, month, day, hour, minute, second, hundredth of second, device number, device name, device address, station number, station name, version and the values of the user variable "TOTMW" from device # 2, to be saved to the log file.

WARNING: Using a Pause command in this escape sequence will generate errors. Pause commands are mainly used in TXCOMMANDS

LOGHEADER:

Specifies a sequence of characters to save as the first line upon, creation of the log file specified in the "LOGFILE" COMMAND. The maximum length is 1024 characters and escape code commands are allowed.

Example driver with LOG commands defined:

```
[GE-DLP VALUES]
DRIVER#=125
TYPE=ASCII
ATMESSAGE=^[^STN],^[^SID],RUN
RXSTAY=2
;SCAN
RXSTRIP=N00, C00, X52, Y1, H6, "     Scan GE-DLP Relay"
RXSTRIP=N00, C06, X52, Y3, H1, "             Time:", %^DTM
RXSTRIP=N00, C14, X52, Y4, H1, "            Status:", %^STS
RXSTRIP=N00, C02, X52, Y6, H0, "Total to Download:", %^TOT
RXSTRIP=N00, C01, X52, Y7, H0, "          At Event:", %^ATF
;METER
RXSTRIP=N00, C14, X01, Y1, H1, "    DLP METER: ", %^DDT
RXSTRIP=N00, C14, X01, Y2, H1, "  -------------------------"
RXSTRIP=N00, C14, X05, Y3, H1, "IA: ",        %^IA
RXSTRIP=N00, C14, X15, Y3, H1, "Angle: ",     %^AIA
RXSTRIP=N00, C14, X05, Y4, H1, "IB: ",        %^IB
RXSTRIP=N00, C14, X15, Y4, H1, "Angle: ",     %^AIB
RXSTRIP=N00, C14, X05, Y5, H1, "IC: ",        %^IC
```

```
RXSTRIP=N00, C14, X15, Y5, H1, "Angle: ",    %^AIC
RXSTRIP=N00, C14, X05, Y6, H1, "IN: ",       %^IN
RXSTRIP=N00, C14, X15, Y6, H1, "Angle: ",    %^AIN
RXSTRIP=N00, C14, X28, Y3, H1, "VA: ",       %^VA
RXSTRIP=N00, C14, X40, Y3, H1, "Angle: ",    %^AVA
RXSTRIP=N00, C14, X28, Y4, H1, "VB: ",       %^VB
RXSTRIP=N00, C14, X40, Y4, H1, "Angle: ",    %^AVB
RXSTRIP=N00, C14, X28, Y5, H1, "VC: ",       %^VC
RXSTRIP=N00, C14, X40, Y5, H1, "Angle: ",    %^AVC
RXSTRIP=N00, C14, X05, Y7, H1, "P(MWatt): ", %^PW
RXSTRIP=N00, C14, X05, Y8, H1, "Q(MVar): ",  %^QV
;DUN FILE
LOGFILE=C:\SDCSAVE\^[^STN].ZNN
LOGHEADER=STATION#(6/INFO), DEVICE#(6/INFO), HDRONOFF(6/INFO),
LOGHEADER= DATE(0/DATE), TIME(1/TIME), (4/DATE), (4/PORT),
LOGHEADER= Va(4/kV), Vb(4/kV), Vc(4/kV),
LOGHEADER= Ia(4/Amp), Ib(4/Amp), Ic(4/Amp),
LOGHEADER= P(4/Mwatt), Q(4/Mvars), (4/EVENTS), (4/STATUS),
TITLE(6/INFO)^[13;10]
LOGCOMMAND=^[^SID], ^[ID], ^[^CMND1],
LOGCOMMAND= ^[MON]/^[DAY]/^[YR], ^[HR]:^[MIN]:^[SEC], ^[^DTM], ^[^PID],
LOGCOMMAND= ^[^VA], ^[^VB], ^[^VC],
LOGCOMMAND= ^[^IA], ^[^IB], ^[^IC],
LOGCOMMAND= ^[^PW], ^[^QV], ^[^TOT], ^[^STS], ^[HDR]^[13;10]
```

**Multiple LOGHEADER and LOGCOMMAND fields are concatenated together to form one LOGHEADER and one LOGCOMMAND.

FILE COMMANDS

RENFILE:

Automatically renames an existing file to a new name. The command sequence is RENFILE=path+existing file name | new file name. The specified file must exist in the specified path. The pipe sign is used as a separator between the old path & filename and the new path & file name. RENFILE executes upon a "TXPERIOD" command or upon an "ATMESSAGE" command. The maximum length is 255 characters and escape code commands are allowed.

Example: RENFILE=C:\TEMP\^[^CMND].CSV | C:\TEMP\^[^CMND1].CSV

DELFILE:

Automatically deletes the specified file. The command sequence is DELFILE=path+filename. DELFILE executes upon a "TXPERIOD" command or upon an "ATMESSAGE" command. The maximum length is 255 characters and escape code commands are allowed.

Example: DELFILE=C:\TEMP\^[^CMND].CSV

RUNFILE:

Runs the specified file and passes the defined command line parameters to the specified application. The command sequence is RUNFILE=path+existing file name | command line parameters. If the path is not in the system environment then the path is required. If command line parameters are used then they must have a pipe sign preceding the command line parameters. RUNFILE executes upon a "TXPERIOD" command or upon an "ATMESSAGE" command. The maximum length is 255 characters and escape code commands are allowed.

Example: RUNFILE=C:\TEMP\FTP_SCRIPT.EXE | "C:\TEMP\ACTIVE_SCRIPT"

DUNRENAME:

Automatically renames all files with a ".ZUN" extension to the same file name with a ".DUN" extension. Also, all files with a "*.ZN*" extension are renamed with a "*.DN*" extension. The command sequence is DUNRENAME=path. The path is the file path where all *.ZUN" and "*.ZN*" are located on disk. DUNRENAME executes upon a "TXPERIOD" command or upon an "ATMESSAGE" command. The maximum length is 255 characters and escape code commands are allowed.

Example: DUNRENAME=C:\SDCSAVE\^[^STN]

MESSAGE COMMANDS

SETMESSAGE:

Sequence of characters sent as a message to all loaded drivers. All drivers that have an "ATMESSAGE=" command matching the sent message will be executed in the order defined in the device manager table. The maximum length is 255 characters. The system can handle up to 32 messages per second. For example the command "SETMESSAGE=DIAL,LOGON,HANGUP^2" will send the messages 'DIAL' & 'LOGON' to all loaded drivers and will send the message 'HANGUP' to the drivers on device #2 only. The maximum length for each message in the sequence is 24 characters.

ATMESSAGE:

Sequence of characters that will cause the driver to execute if it is equal to the received "SETMESSAGE=" command string. The "SETMESSAGE=" and "ATMESSAGE=" commands can appear together in the same driver as long as they are not equal. This is useful for organizing drivers in a link list and executing them in order. If the "SETMESSAGE=" and "ATMESSAGE=" are equal in the same driver than the system will fall into and endless loop. The maximum length for each "ATMESSAGE" is 24 characters.

Example drivers with "SETMESSAGE=" and "ATMESSAGE=" commands defined:

```
[INITIATE SDC POLLING]
DRIVER#=143
TYPE=ASCII
SETMESSAGE=RUN
TXPERIOD=300
TXDELAY=-250

[SEL SWITCH LOGON]
DRIVER#=10 &127
TYPE=ASCII
ATMESSAGE=^[^STN],^[^SID],RUN
TXCOMMAND=^[P2]ACC^[13;P3;^CMND1;13]
RXSTAY=30
RXEND=*>
RXWAIT=4
RXQUIT=SDCEND^[^SID]
;CHK
RXSTRIP=N00, %NoRsp, @STS
RXSTRIP=N01, B01, X01, Y03, D00, C07, H07, "", V=ACC, P0, JC0, J01
RXSTRIP=N00, %Done, @STS
;MID
RXSTRIP=N01, S01, T40, X01, Y04, D00, C14, H11, "", @D3
RXSTRIP=N02, S01, T40, X01, Y05, D00, C08, H11, "", @D4
RXSTRIP=N00, C14, H01, X01, Y07, "PORT-ID:", %^PID, @PORT
```

```
RXSTRIP=N00, C06, H01, X01, Y08, "DIAL-AT:", %^[MON]/^[DAY]/^[YR]-,
%^[HR]:^[MIN]:^[SEC], @CALL
;LOG
LOGFILE=PORT-^[^PID].SOE
LOGCOMMAND=^[Mon]/^[Day]/^[Yr]-^[Hr]:^[Min]:^[Sec]> ^[^STN](^[^SID]),
SEL-SWITCH LOGON, STS=^[^STS;13;10]
```

DIRMESSAGE:

The name of a directory path for the system to monitor. If any "*.MSG" files are detected then the name portion of the filenames will be used as messages to the system as in "SETMESSAGE".

TRANSMIT (TX) COMMANDS

TXFILE:

Copies or moves one or more files from a specified source folder to a destination folder. The format is "TXFILE=SOURCE_PATH\WHICH_FILES DESTINATION_PATH /MOVE (optional)".

All specified file names must include fully qualified path strings. When the "TXFILE" command is used the "TXCOMMAND" is ignored. The ";" character is reserved and should not be used in this command, the software uses the ";" to separate between multiple "TXFILE" commands. All of the listed "TXFILE" commands are concatenated to a single data buffer of 1024 characters maximum length.

FILE TRANSFER PROTOCOL:

The protocol is very simple, designed to be quick and highly dependent on the quality of the communication link. First, the transmit end sends: (START BLOCK)+(FILE CONTENTS)+(END BLOCK) and then upon "END BLOCK" the received-end sends: (ACK BLOCK).

In the event that the "END BLOCK" terminator was not received then the receive-end will terminate and reset in 30 seconds from the time that the last byte was received. The block formats are as follows (all values, messages and parameters are enclosed by parenthesis and all messages are case sensitive):

Start Block:

```
    BYTE  1-2:       The values (TEN)+(ELEVEN)
    BYTE  3-23:      The message (File Transfer Enable:)
    BYTE   24:       The value (TEN)
    BYTE  25--:      The parameters (DESTINATION PATH)+(;)+
                     (FILE NAME)+(;)+
                     (SIZE)+(;)+
                     (PACKED FILE-DATE&TIME BORLAND FORMAT)+(;)+
                     (ASCII TRANSMIT-DATE&TIME)+(;)+
                     (OPTIONAL FIELD=LONG TSD FILE NAME)
    BYTE  LAST:      The values (TEN)+(ELEVEN)
```

File Contents:

The actual file contents starting from the first to the last byte.

End Block:

```
    BYTE   1:        The value (SEVEN)
    BYTE  2-7:       The message (Crc:= )
    BYTE  8-11:      The parameter (16-bit CRC calculated for the file contents block only.
```

The mask is 8408 hex and the CRC is shipped in ASCII hex format where 4 characters make a word - HI Byte first - The CRC is initialized to FFFF and is not flipped at the end and must be in uppercase HEX notation).

BYTE 12-13:   The values (SEVEN)+(TEN)

Ack Block:

BYTE 1-2:	The values (TEN)+(ELEVEN)
BYTE 3-21:	The message (File Transfer Done:)
BYTE 22:	The value (TEN)
BYTE 23-27:	The message (Crc:)
BYTE 28-31:	The parameter (16-bit CRC calculated for the received file block only. The mask is 8408 hex and the CRC is shipped in ASCII hex format where 4 characters make a word - HI byte first – the CRC is initialized to FFFF and is not flipped at the end and must be in uppercase hex notation.
BYTE 32:	The value (TEN)
BYTE 33--:	A duplicate of the "Byte 25--" section of the received "START BLOCK".
BYTE LAST:	The values (TEN)+(ELEVEN)

Example:

For example the exact protocol to transfer a 2 byte file named HELLO.TXT containing the word "HI" is as follows (the skipped lines are transmitted line feeds (VALUE=10)):

```
TX ->|
     | File Transfer Enable:
     | C:\TEMP;HELLO.TXT;000000002;645175976;4/10/2001 19:54:50;
     | HICrc:= A7DB
     |
RX <-|
     | File Transfer Done:
     | Crc: A7DB
     | C:\TEMP;HELLO.TXT;000000002;645175976;4/10/2001 19:54:50;
     |
```

TXDIAL:

This command is only valid when "TXFILE" is specified. If "TXFILE" finds files to transfer then the sequence of characters specified in "TXDIAL" will be transmitted first. The maximum sequence length is 255 characters. Example: TXDIAL=^[13;P1]ATDT 1,123-456-7899^[13;P60].
Note: The "P60" (pause 60 seconds) above will be aborted when "CONNECT" is detected.

TXHANGUP:

This command is only valid when "TXFILE" is specified. When "TXFILE" file transfer is complete the sequence of characters in the "TXHANGUP" command will be transmitted. The maximum sequence length is 255 characters.

Example driver with "TXDIAL", "TXFILE" and "TXHANGUP" commands defined:

```
[TRANSMIT FILES EXAMPLE]
DRIVER#=11
TYPE=ASCII
TXDIAL=AT^[13;10;P2]ATDT 1,700-555-1234^[13;10;P45]
TXFILE=C:\FAULTLIB\MEHTA\SHIP\*.SCF S:\SYSPROT\RECORDS\DFR
TXFILE=C:\FAULTLIB\MEHTA\SHIP\*.X01 S:\SYSPROT\RECORDS\DFR
TXHANGUP=^[P2]+++^[P2]ATH0^[13;10;P3]AT&F^[13;10;P2]ATS0=1^[13;10;P2]
TXPERIOD=900
TXDELAY=5
```

If no files are present in the source directory then the driver is not executed.

TXSTART:

Sequence of characters to transmit (ASCII OR BINARY) before "TXCOMMAND" and "TXLOGON" ("TXSTART" is inserted at the beginning of these commands). The "TXSTART" + "TXLOGON" + 'TXCOMMAND" definitions are concatenated together to form the final transmit command sent to the device upon a "TXPERIOD" or upon "ATMESSAGE". The maximum length for TXSTART is 1024 characters and escape code commands are allowed.

TXLOGON:

A sequence of characters to transmit (ASCII or Binary) when the driver is loaded for the first time. The maximum sequence length is 255 characters. TXLOGON will only work from the parent driver. Escape code sequences are allowed.

TXCOMMAND:

A sequence of characters to transmit (ASCII or Binary) upon "TXPERIOD" or upon "ATMESSAGE". The maximum length is 1024 characters and escape code commands are allowed. For example, to request a meter command from a DLP relay use the following driver to transmit the TXCOMMAND:

    02^[ADDR]35CA00^[CRCDLP;P1]05FA^[P1]06F9^[P1]06F9

```
[DLP METER]
DRIVER#=69
TYPE=HEX
ATMESSAGE=^[^STN],^[^SID],RUN
TXCOMMAND=02^[ADDR]35CA00^[CRCDLP;P1]05FA^[P1]06F9^[P1]06F9
RXSTAY=5
RXEND=04FB
RXWAIT=3
RXSTRIP=N01, S11,  T20, D0, C8, X01, Y1, H8,"    DLP METER: ", @DDT
RXSTRIP=N00,            D0, C8, X01, Y2, H8,"  ------------------------"
RXSTRIP=N01, S31,  T6,  D0, C8, X05, Y3, H8, "IA: ",       @IAV
RXSTRIP=N01, S37,  T4,  D0, C8, X15, Y3, H8, "Angle: ",   @AIA
RXSTRIP=N01, S41,  T6,  D0, C8, X05, Y4, H8, "IB: ",       @IBV
RXSTRIP=N01, S47,  T4,  D0, C8, X15, Y4, H8, "Angle: ",   @AIB
RXSTRIP=N01, S51,  T6,  D0, C8, X05, Y5, H8, "IC: ",       @ICV
RXSTRIP=N01, S57,  T4,  D0, C8, X15, Y5, H8, "Angle: ",,  @AIC
RXSTRIP=N01, S61,  T6,  D0, C8, X05, Y6, H8, "IN: ",       @INV
RXSTRIP=N01, S67,  T4,  D0, C8, X15, Y6, H8, "Angle: ",   @AIN
RXSTRIP=N01, S71,  T5,  D0, C8, X28, Y3, H8, "VA: ",       @VAV
RXSTRIP=N01, S76,  T4,  D0, C8, X40, Y3, H8, "Angle: ",   @AVA
RXSTRIP=N01, S80,  T5,  D0, C8, X28, Y4, H8, "VB: ",       @VBV
RXSTRIP=N01, S85,  T4,  D0, C8, X40, Y4, H8, "Angle: ",   @AVB
RXSTRIP=N01, S89,  T5,  D0, C8, X28, Y5, H8, "VC: ",       @VCV
RXSTRIP=N01, S94,  T4,  D0, C8, X40, Y5, H8, "Angle: ",   @AVC
RXSTRIP=N01, S98,  T6,  D0, C8, X05, Y7, H8, "P:(MWatt): ",@PMW
RXSTRIP=N01, S104, T6,  D0, C8, X05, Y8, H8, "Q:(MVar): ", @QMV
```

The DLP meter TXCOMMAND will transmit a hex 02 byte, the address stored in the device's record, the hex values 35 CA 00, and the DLPCRC values. It will then pause for 1 second then transmit the hex values 05 FA pause again for 1 second then transmit the 06 F9, pause for 1 second and transmit the 06 F9 again.

Another example is the terminate modem connection command:

```
^[10;13;P1]+++^[P3]ATH0^[13;10]
```

There are a number of pre-canned drivers used for downloading events, summaries, histories, RTU-SOE points, DNP status points, and for time synchronizing the devices. The pre-canned drivers are called via the "TXCOMMAND". Refer to the following on how to call the pre-canned drivers.

"TXCOMMAND=RTU-SOE"

The RTU-SOE command executes the precoded SES-92 binary protocol for reading SOE points from the RTU. The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=BINARY
RXSTAY=2
Use the "D0" data type with the "RXSTRIP" commands.

"TXCOMMAND=RTU-ANALOG"

The RTU-ANALOG command executes the precoded SES-92 binary protocol for reading analog dumps from the RTU. The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=BINARY
RXSTAY=2
Use the "D0" data type with the "RXSTRIP" commands.

"TXCOMMAND=RTU-STATUS"

The RTU-STATUS command executes the precoded SES-92 binary protocol for reading status dumps from the RTU. The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=BINARY
RXSTAY=2
Use the "D0" data type with the "RXSTRIP" commands.

"TXCOMMAND=SEL-351FM"

The SEL-351FM (fast meter) command executes the precoded SEL-351 binary protocol for fast meter operations. The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=BINARY
RXSTAY=2
Use the "D0" data type with the "RXSTRIP" commands.

"TXCOMMAND=SEL-EVENTS"

The SEL-EVENTS command executes the precoded SEL EVE ASCII protocol for automatic event capture. The latest raw events files are downloaded and saved in separate files using the IEEE long file naming convention with the extension ".SEL". Summary files for each event is also saved in separate files using the IEEE long file naming convention with the extension ".SLS" and a history file is created if there are new events to download. The history file is also saved using IEEE long file naming convention with the extension ".SLH". The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=ASCII
RXSTAY=30
RXEND==>
RXWAIT=4

Example Summary File:
```
        SEL FAULT REPORT
   --------------------------
```

```
     Date =  06/25/02
     Time =  17:25:59.18
  Station =  SEAVILLE SW
   Device =  A-521
    Event =  AG
 Location =  +1.76
  LineLen =  4.70
  Targets =  COMM ZONE2 EN G 50
```

Example History File:
```
=>HIST 12

 SEAVILLE SW  A-521                   Date: 12/05/02    Time: 12:29:47.012

 #    DATE        TIME       EVENT  LOCAT   GRP  TARGETS

 1  12/04/02 14:50:42.202 CG     +22.90   1    EN
 2  11/25/02 17:10:03.189 CG 64    1     EN
 3  07/20/02 09:12:28.082 AG     +21.84   1    EN
 4  07/20/02 09:12:27.874 AG     +40.53   1    EN
 5  07/02/02 17:01:51.200 BG     +22.09   1    EN
 6  07/02/02 16:57:56.713 BG     +34.93   1    EN
 7  06/25/02 17:25:59.180 AG      +1.76   1    INST ZONE1 EN A G
 8  04/01/02 04:43:19.558 ER     $$$$$$   1    EN
 9  03/14/01 00:28:36.139 BG      +4.85   1    EN
10  00/00/01 00:03:11.753 BG      -0.02   1    INST ZONE1 EN B G
11  00/00/01 00:03:07.501 BG     +16.05   1    EN
12  00/00/01 00:03:03.062 BG     +16.00   1    EN
```

"TXCOMMAND=SYNC-ARB"
   The STNC-ARB command executes the precoded ARBITRAR ASCII protocol for reading the
   GPS clock's time and sets the PC'S system clock. The command executes upon a
   "TXPERIOD" or "ATMESSAGE".
   REQUIREMENTS:
   TYPE=ASCII
   RXSTAY=4
   RXEND
   RXPLUS in this case are reserved for internal use.

"TXCOMMAND=SYNC-TRUE"
   The SYNC-TRUE command executes the precoded TRUE TIME ASCII protocol for reading the
   GPS clock's time and sets the PC'S system clock. The command executes upon a
   "TXPERIOD" or "ATMESSAGE".
   REQUIREMENTS:
   TYPE=ASCII
   RXSTAY=4
   RXEND
   RXPLUS in this case are reserved for internal use.

"TXCOMMAND=DNP-ANALOG"
   The DNP-ANALOG command executes the precoded DNP 3.0 protocol for reading analog
   values from the connected devices. The analog values can be referenced by line number in the
   RXSTRIP commands. For example, analog value 1 is located in line 1, analog value 2 is in line
   2 and so on. The line values are stored as ASCII characters. The command executes upon a
   "TXPERIOD" or "ATMESSAGE".

REQUIREMENTS:
TYPE=BINARY
RXSTAY=4
Use the "D0" data type with the "RXSTRIP" commands.

"TXCOMMAND=HATH-DFR"
The HATH-DFR command executes the precoded HATHAWAY DFR-II protocol for downloading the latest records and saving them to separate files using the IEEE long file naming convention with the extension ".DFR". The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=BINARY
RXSTAY=15
RXEND=1B 03 FF
RXPLUS=1

"TXCOMMAND=REL-30X"
The REL-30X command executes the precoded ABB REL30X protocol for downloading the latest event records, target files and history files for the events and targets. All downloaded data is saved to separate files using the IEEE long file naming convention. The event files have the extension ".30X", the summary files have the extension ".30S" and the event history files have the extension ".3EH" and targets history files have ".3TH". The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=HEX
RXSTAY=4
RXPLUS in this case is reserved for internal use.

Example Target File:
```
REL 301/302 FAULT REPORT
 --------------------------
      MODEL =  REL 301/302
 STATION ID =  SEAVILLE SW
    LINE ID =  B43 (REL-302)
       DATE =  09/04/03 03:14:11.830
 FAULT TYPE =  BG Fault
     TARGET =  Z3 Pickup


  BK1 =  NO      SEND =  NO
  BK2 =  NO       RX1 =  NO
  Z1G =  NO       RX2 =  NO
  Z1P =  NO       WFT =  NO
  Z2P =  NO       ITP =  NO
  Z2G =  NO       ITG =  NO
  Z3P =  NO       CIF =  NO
  Z3G =  NO       LLT =  NO
 PLTG =  NO        GB =  NO
 PLTP =  NO


    Z =  7.04 Ohms
 FANG =  68°
  DMI =  30.00 Miles
  DKM =  48.20 kilometers


 PFLC =  1.50 Amps
 PFLV =  68.00 Volts
   LP =  3°
```

```
VPA =   63.20 Volts      ANG = 0°
VPB =   55.20 Volts      ANG = -117°
VPC =   62.80 Volts      ANG = 128°
 V1 =   60.30 Volts      ANG = 3.69°
 V2 =   5.11 Volts       ANG = -51.15°
3V0 =   0.10 Volts       ANG = 0°
IPA =   5.90 Amps        ANG = -21°
IPB =   8.00 Amps        ANG = 176°
IPC =   3.10 Amps        ANG = 33°
 I1 =   5.14 Amps        ANG = -53.50°
 I2 =   3.11 Amps        ANG = 39.38°
3I0 =   0.18 Amps        ANG = 46.01°
IPN =   0.00 Amps        ANG = 0°
```

Example Target History File:
```
--  REL TARGET HISTORY  --
---------------------------

 STATION ID =  SEAVILLE SW
    LINE ID =  115 (REL-302)
       DATE =  05/13/2004 01:06:18 PM

#    TRIG DATE    TRIG TIME    F-TYPE     TRIGGER     DIST   EVENT#
------------------------------------------------------------------
10  10/31/2003  19:48:06.100  BG Fault   Z3 Pickup   279    210
09  06/24/2003  10:05:42.900  CA Fault   Z3 Pickup   340    1
08  05/25/2003  09:04:34.990  AG Fault   Trip        128    15
07  05/25/2003  09:04:34.970  AG Fault   Z2 Pickup   128    223
06  05/25/2003  09:03:46.100  AG Fault   Trip        1      14
05  05/25/2003  09:03:42.720  AG Fault   Trip        1      253
04  05/25/2003  09:03:16.560  AG Fault   Trip        128    76
03  05/25/2003  09:03:16.550  AG Fault   Z2 Pickup   128    172
02  05/25/2003  09:02:51.670  AG Fault   Trip        174    219
01  05/25/2003  09:00:02.730  AG Fault   Trip        174    10
16  05/25/2003  08:59:46.990  AG Fault   Trip        175    169
15  05/25/2003  08:53:55.620  AG Fault   Trip        175    216
14  05/25/2003  08:53:43.840  AG Fault   Trip        174    7
13  05/25/2003  08:51:44.750  AG Fault   Trip        174    246
12  05/25/2003  08:51:34.800  AG Fault   Trip        172    5
11  05/25/2003  08:51:21.200  AG Fault   Trip        174    20
```

Example Event History File:
```
--  REL EVENT HISTORY  --
---------------------------

 STATION ID =  SEAVILLE SW
    LINE ID =  B43 (REL-302)
       DATE =  05/13/2004 01:18:05 PM

#    EVE-DATE     EVE-TIME      COUNTER      TRIGGER
-------------------------------------------------------
09  05/07/2004   10:23:19.100   0000      N / A
08  04/23/2004   18:28:19.450   0008      Trip
07  04/23/2004   18:28:18.970   0007      Z3 Pickup
06  04/01/2004   19:17:02.240   0006      Z3 Pickup
05  02/28/2004   15:25:57.580   0005      Z3 Pickup
04  10/15/2003   16:53:15.370   0004      Z3 Pickup
```

```
03  09/04/2003    03:14:12.100   0003        Z3 Pickup
02  09/04/2003    03:14:11.840   0002        Z3 Pickup
01  09/04/2003    03:14:11.710   0001        Z3 Pickup
16  00/00/2000    00:00:00.000   0000        N / A
15  00/00/2000    00:00:00.000   0000        N / A
14  00/00/2000    00:00:00.000   0000        N / A
13  00/00/2000    00:00:00.000   0000        N / A
12  00/00/2000    00:00:00.000   0000        N / A
11  00/00/2000    00:00:00.000   0000        N / A
10  00/00/2000    00:00:00.000   0000        N / A
```

"TXCOMMAND=REL-30X-M"

The REL-30X-M command executes the precoded ABB REL30X-M protocol for downloading the latest meter values. The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=HEX
RXSTAY=4
RXPLUS in this case is reserved for internal use.

Meter Values Extracted:
```
Date and Time
LOP – Loss of Potential
LOI – Loss of Current
IA and Angle
IB and Angle
IC and Angle
VA and Angle
VB and Angle
VC and Angle
```

"TXCOMMAND=DLP-EVENTS"

The DLP-EVENTS command executes the precoded GE DLP-EVENTS protocol for downloading the latest event records and summaries. All downloaded data is saved to separate files using the IEEE long file naming convention. The event files have the extension ".OSC" and the summary files have the extension ".DLS". The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=HEX
RXSTAY=10
RXPLUS in this case is reserved for internal use.

Example Summary File:
```
DLP FAULT REPORT
 -----------------
      MODEL: DLP1512GC
 STATION ID: SEAVILLE SW
    LINE ID: X2250 (DLP)

 TRIP DATE: 6/27/04    TRIP TIME: 14:33:55.890

 FAULT TYPE:  AG       DISTANCE: 003.2
  TRIP TYPE:  Z1       OPERATING TIME: 00023

 PREFAULT            FAULT
 Ia: 548.00 A        Ia: 4380.0 A
 Ib: 012.00 A        Ib: 008.00 A
```

```
Ic: 012.00 A          Ic: 012.00 A
In: 372.00 A          In: 4368.0 A

                      Va: 000.4 KV
                      Vb: 134.0 KV
                      Vc: 134.0 KV
```

"TXCOMMAND=DPU-MODBUS "
The DPU-MODBUS command executes the precoded ABB DPU-MODBUS protocol for downloading the latest event records. All downloaded data is saved to separate files using the IEEE long file naming convention. The event files have the extension ".DPU". The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=HEX
RXSTAY=10
RXEND=^[13;10]
RXPLUS in this case is reserved for internal use.

"TXCOMMAND=ROCH-DFR"
The ROCH-DFR command executes the precoded Rochester DFR protocol for downloading the latest event records. All downloaded data is saved to separate files using the Rochester naming convention. The event files have the extension ".0##". The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=HEX
RXSTAY=8
RXPLUS in this case is reserved for internal use.

"TXCOMMAND=GE-D60"
The GE-D60 command executes the precoded GE-D60 protocol for downloading the latest event records. All downloaded data is saved to separate files using the IEEE long file naming convention. The event files are in the Comtrade format and have the extension ".CFG", ".DAT". The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=HEX
RXSTAY=8
RXPLUS in this case is reserved for internal use.

"TXCOMMAND=FTP-EVENTS"
The FTP-EVENTS command executes the standard FTP protocol for downloading the latest event records from the connected FTP server. All downloaded data is saved to separate files using either the IEEE long file naming convention or maintaining the original file name. The event files are in the manufacturer allocated format. The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=ASCII
RXSTAY=4
RXPLUS in this case is reserved for internal use.

"TXCOMMAND=FTP-SEND"
The FTP-SEND command executes the standard FTP protocol for sending event files to the connected FTP server. The command executes upon a "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=ASCII
RXSTAY=4
RXPLUS in this case is reserved for internal use.

"TXCOMMAND=TIS-RECORDER"

The TIS-RECORDER internal driver executes the pre-coded standard TIS protocol upon "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=ASCII
RXSTAY=4
RXEND
RXPLUS in this case are reserved for internal use.

"TXCOMMAND=TIS-CONFIG"

The TIS-CONFIG internal driver executes the pre-coded TIS-CONFIG protocol upon "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=ASCII
RXSTAY=4
RXEND and RXPLUS in this case are reserved for internal use.
;

"TXCOMMAND=TIS-BINARY"

The TIS-BINARY internal driver executes the pre-coded TIS-BINARY protocol upon "TXPERIOD" or "ATMESSAGE".
REQUIREMENTS:
TYPE=BINARY
RXSTAY=4
RXEND and RXPLUS in this case are reserved for internal use.
;

"TXCOMMAND=ERL-RELAYS"

The ERL-RELAYS internal driver executes the pre-coded ERLPHASE relay protocol for extracting the latest event records from the TPRO, BPRO, LPRO and FPRO relays using the VT100 terminal mode and zmodem protocol. The command executes upon "TXPERIOD" or; "ATMESSAGE".
REQUIREMENTS:
TYPE=BINARY
RXSTAY=4
RXEND and RXPLUS in this case are reserved for internal use.

TXEND:

A sequence of characters to transmit (ASCII OR BINARY) after the "TXCOMMAND" and "TXLOGON" commands ("TXEND" is inserted at the end of these commands). The maximum length is 1024 characters and escape code commands are allowed.

TXPERIOD:

The transmit cycle in seconds (an integer number integer number up to 2 to 2 million). For example, if "TXPERIOD=4" was specified then the "TXSTART", "TXCOMMAND", and "TXEND" strings are concatenated and transmitted once every 4 seconds. If "TXPERIOD=0" was specified then these actions will not occur unless "TXDELAY>0" was specified in which case the driver will execute one time only. If "TXPERIOD=T0800" was specified then the driver will execute at 08:00 am. All "T" periods are defined in military time.

TXDELAY:

The duration in seconds to wait before the transmit cycle begins. For example, if "TXDELAY=3" was specified then only the first occurrence of "TXPERIOD" is delayed by 3 seconds. In the previous example the first period occurs after 7 seconds (TXPERIOD+TXDELAY) and all others will occur 4 seconds apart. If "TXPERIOD=0" was specified then specifying "TXDELAY" will cause the driver to execute only one time (useful for logon procedures).

TXBREAK:

    This command sends a number of break signals to the connected device. The sequence runs by first calling the WinAPI SetCommBreak function to suspend character transmission for the specified communications device and places the transmission line in a break state until the ClearCommBreak function is called. It then waits the specified break time then calls the WinAPI ClearCommBreak function to restore character transmission for the specified communications device and places the transmission line in a non-break state. It then pauses the specified pause time before repeating the sequence. This sequence is repeated the number of times specified in the command break parameters. The calling scheme is TXBREAK=# of times to repeat sequence, time interval in milliseconds between SetCommBreak and ClearCommBreak, time interval between sequence calls.

    Example: TXBREAK=2,500,250

SENDCR:

    This command will send a carriage return to the connected device every x seconds to ensure the device does not time out during a polling session. Some devices have settings that will time out after a specified number of minutes if no characters are received.

    Example: SENDCR=20

ONDAY:

    The driver commands will be processed on the specified day of each month for the duration of that day or once during that day. The range of values is 1 to 31. Use this command in combination with the military time "TXPERIOD" command to perform monthly functions.

ONDOW:

    The driver commands will be processed on the specified day of each week for the duration of that day or once during that day. The range of values is 1 to 7 (1=Monday to 7=Sunday). Use this command in combination with the military time "TXPERIOD" command to perform weekly functions.

RECEIVE (RX) COMMANDS

RXSTART:

    A sequence of characters received from the device that indicates the "Start of Response" (STX). The maximum length for "RXSTART" is 255 characters. This string is used to synchronize with the start of a response. For example, the numeric value 2 (02 Hex) is used by some devices to indicate the start byte of the response. In this case use "RXSTART=^[02]" for "TYPE=ASCII", or "RXSTART=02" for "TYPE=HEX".

RXEND:

    A sequence of characters received from the device indicating "End the Response" (ETX). The maximum length for "RXEND" is 255 characters. This string is used to indicate that the driver has received the full response. Upon "RXEND" the system will process the "RXSTRIP" commands to parse and display the data and when complete the driver is unloaded so other drivers (that are defined at the same port) can execute. Also upon "RXEND" the "RXSTAY" delay is aborted.

    For example: the numeric value 3 (03 Hex) is used by some devices to indicate the end of a response. In this case use "RXEND=^[03]". for "TYPE=ASCII", or "RXEND=03" for "TYPE=HEX".

    Another example is connecting to a modem. The connection is established when the modem sends a connect signal (CONNECT 14400/ARQ). For modem connection drivers set "RXEND=Connect".

RXPLUS:

Some devices transmit a check sum or CRC code after "RXEND". In this case, the "RXEND" no longer indicates the physical end of the response. Use "RXPLUS" to define the total number of bytes received beyond "RXEND". For example, if "RXEND=1B 03 FF" is set and the actual response end in "1B 03 FF 83" then use "RXPLUS=1".

RXSTAY:

There is a delay between the time that a command is transmitted and the time the response arrives. Also, there are breaks during transmission where the responding device may pause and then continue to transmit. Such delays and pauses should be timed using terminal mode to study the response time of a device. Use the "RXSTAY" command to record the largest delay encountered. If "RXSTAY=4" is defined the system will initiate an internal counter to count up to 4 seconds from the time that last byte was received. If new bytes arrive during the "RXSTAY" counter then the internal counter is initialized. The default value is "RXSTAY=3". Once the internal counter reaches "RXSTAY" then the system will unload the driver so other driver (on the same port) can execute. When "RXEND" is encountered, "RXSTAY" aborts.

RXWAIT:

If "RXEND" is known and the number of bytes received after the defined "RXEND" is unknown use "RXWAIT" to wait a number of seconds before ending the driver. For example, when a modem connects it sends a "Connect" signal. The number of bytes it sends after the "Connect" signal varies. Set "RXWAIT=" to delay the driver from being unloaded. This ensures that all the data remaining to be received goes to the proper device file "DEV_###.DTB". Refer to the example modem driver below.

RXQUIT:

If "RXEND" is not detected set "RXQUIT" to send message commands. For example, in the modem driver below if the "Connect" signal is not detected then the RXQUIT can be used to set a message "REDO" to execute the driver again.

RXCLEAR:

The receive buffer will not be cleared upon TXPERIOD and will be allowed to build up to the total number of fields (RXSTRIP Lines). Use "RXCLEAR" to hold only the last polled values. The range of values for RXCLEAR is 0 or 1 (default=0). This is useful for creating scrollable information.

RXSAVE:

The receive data is buffered into link list with 256 characters per link. To save the buffered data to a text or binary file (depends on the type setting) use RXSAVE=filename. For example, the Optimho driver buffers the data then when complete it saves the buffered data to a file. The maximum length is 255 characters and escape code commands are allowed. The following example saves the received data to a text file called RX-Device#.BUF (RX-2.BUF) in the c:\SDCSave directory.

```
RXSAVE=C:\SDCSAVE\RX-^[ID].BUF
```

Examples: The following drivers use the **RXSTAY, RXEND, RXWAIT, RXQUIT** and **RXPLUS** commands.

```
[HATHAWAY DFR PROTOCOL]
DRIVER#=71
TYPE=BINARY
TXCOMMAND=HATH-DFR
TXPERIOD=0
TXDELAY=1
RXSTAY=15
RXEND=1B 03 FF
RXPLUS=1
```

```
RXSTRIP=N00,                          X1,Y1,H6,"      Scan Hathaway DFR"
RXSTRIP=N00,%^ADDR,                   X1,Y2,H1,"     DAU ID:"
RXSTRIP=N00,%^[MON]/^[DAY]/^[YR], X1,Y3,H1,"      Date:"
RXSTRIP=N00,%^[HR]:^[MIN]:^[SEC], X1,Y4,H1,"      Time:"
RXSTRIP=N03,S1,T40,D0,C14,            X1,Y5,H1,"     LstRsp:"
RXSTRIP=N04,S1,T40,D0,C02,            X1,Y6,H1,"    NxtCmnd:"
RXSTRIP=N01,S1,T40,D0,C01,            X1,Y7,H0,"   LstFault:"
RXSTRIP=N02,S1,T40,D0,C01,            X1,Y8,H0,"       Time:"


[DIAL MODEM]
DRIVER#=2
TYPE=ASCII
ATMESSAGE=^[^STN],^[^SID],RUN
TXCOMMAND=^[P2]ATDT ^[^CMND;13;10;P4]
RXSTAY=90
RXEND=CONNECT
RXWAIT=4
RXQUIT=SDCEND^[^SID],REDO^[^STN]
RXSTRIP=N01, S01, T40, X01, Y01, D00, C08, H11, "", @D1
RXSTRIP=N03, S01, T40, X01, Y02, D00, C14, H11, "", @D2
```

RXSTRIP:

Sequence of characters or bytes to strip from the received data and displayed on screen [up to 512 RXSTRIP commands per driver]. The RXSTRIP commands are executed following the sequence in which they appear. Also, the RXSTRIP commands are the last commands executed when the driver is complete.

N#   = Line number to strip or block number for binary [positive #]
       If "N0" is specified then the field is a header field only.
       Header fields can be used to display variables defined or calculated using the @, +, -, *, /, &, |, >, or < commands.

S#   = Starting character or byte number to strip [from 1 to 512].

T#   = Total number of characters or bytes to strip [ASCII=1 to 75, Binary=1 to 4].

B#   = The Nth non-blank sequence of characters to strip.
       For example, to strip "Viny" from "My name is Viny" use the "B4" command.

BC#   = The Nth comma sequence of characters to strip.
       For example to strip "Viny" from "My,,name,is,,,Viny" use the "BC7" command.

D#   = Type of data to display. The available types are:
       0: ASCII (read each byte as an ASCII code),
       1: INTEGER (convert 1, 2 or 4 bytes to an integer string),
       2: HEX (convert 1 byte to a hexadecimal string),
       3: REAL (4 byte IEEE single float to a real string),
       4: ASCII-HEX (convert 1, 2 or 4 hex characters to decimal),
       5: ASCII-DECIMAL (read ASCII string as decimal).
       6: ASCII-CODED-DECIMAL (convert hex string to ASCII code).

""   = Contains the header to display ahead of the stripped data [max 24 characters].

H#   = Color to display the header [from 0 to 15].

X#   = X column offset to display the header and the stripped data [from 1 to 75].

Y#   = Y row offset to display the header and the stripped data [from 1 to 8].

C#   = Color to display the stripped data [from 0 to 15].

V#   = Compare the parsed data with a string/value and show the defined header if equal.

V=#   = Compare the parsed data with a string/value and show the defined header if equal.

V>#   = Compare the parsed data with a string/value and show the defined header if greater.

V<#   = Compare the parsed data with a string/value and show the defined header if less).

V~#   = Compare the parsed data with a string/value and show the defined header if not equal.

U# = Upper offset for the V trigger (V+U Hysteresis (default=0)).
L# = Lower offset for the V trigger (V-L Hysteresis (default =0))
P# = Persistence (# of true readings before trigger (default=1, disable=0)).
M"" = If the V command triggered then set a message in for all drivers "".
MF"" = If the V command triggered then set the message to the forward drivers only.
JC# = If V triggered bypass the next # of RXSTRIPS (jump conditional).
J# = Bypass the next # of RXSTRIP COMMANDS (JC# overrides J#).
*# = Multiply the parsed data by a constant value (ASCII-DECIMAL).
/# = Divide the parsed data by a constant value (ASCII-DECIMAL).
+# = Add a constant value to the parsed data (ASCII-DECIMAL).
-# = Subtract a constant value from the parsed data (ASCII-DECIMAL).
&# = And the parsed data (1 byte) with a hex value (Hex = 00 to FF).
|# = Or the parsed data (1 byte) with a hex value (Hex = 00 to FF).
<# = Shift left (1 byte) a number of bits (ASCII-DECIMAL 1 to 8).
># = Shift right (1 byte) a number of bits (ASCII-DECIMAL 1 to 8).
= = Set a variable to a defined value.
FE = Exponential of the parsed data.
FL = Logarithm of the parsed data.
FS = Sin in radians of the parsed data.
FC = Cos in Radians of the parsed data.
FA = Arc Tangent in radians of the parsed data.
FQ = Square of the parsed data.
FR = Square root of the parsed data.
FT = Truncate the parsed data to an integer values.
%# = Set data to a constant text string.
@NAME = Put the parsed data in a variable named "NAME" (maximum length is 12 characters).
     The reserved system variable defined in the beginning of this Appendix names cannot be used. System and user variables can be accessed using the "^NAME^DEVICE" commands.
^NAME = Get the parsed data (maximum 80 characters) stored in the variable name.
(@/^)NAME^# = Applies only to the variable "NAME" attached to the device# "#".
     If "@" was in place instead of the # then the number of the parent device will be used.
E"" = Same as "", but for the DXF display only [maximum 24 characters].
ES# = Same as S#, but for the DXF display only [from 1 to 512].
ET# = Same as T#, but for the DXF display only [same range as T#].
EH# = Same as H#, but for the DXF display only [from 0 to 15].
EX# = Same as X#, but for the DXF display only [from -255 to 255].
EY# = Same as Y#, but for the DXF display only [from -255 to 255].
EC# = Same as C#, but for the DXF display only [from 0 to 15].

NOTES:

The "," comma is reserved as the separator between the RXSTRIP commands.
The maximum number of variables allowed per file is 10,000.

    * Available Colors:
- 00: Black
- 01: Blue
- 02: Green
- 03: Cyan
- 04: Red
- 05: Magenta
- 06: Brown

- 07:   Lightgray
- 08:   Darkgray
- 09:   Lightblue
- 10:   Lightgreen
- 11:   Orange
- 12:   Lightred
- 13:   Lightmagenta
- 14:   Yellow
- 15:   White

EXAMPLES:

```
[SEL-LOGON EXAMPLE]
DRIVER#=1
TYPE=ASCII
TXSTART=^[13;10]
TXCOMMAND=acc^[13;10]OTTER
TXEND=^[13;10]
TXPERIOD=0
TXDELAY=1

[ASCII RESPONSE EXAMPLE]
DRIVER#=2 &1
TYPE=ASCII
TXSTART=^[13]
TXCOMMAND=^[02;10;10;10;10;10]
TXCOMMAND=METER
TXEND=^[13;03]
TXPERIOD=8
TXDELAY=1
RXSTART=2
RXEND=3
RXSTRIP=X1, Y1, "Any Label For The Window", H1
RXSTRIP=N06,S1,T49,D0,C08,X1,Y3,H1,"N06: "
RXSTRIP=N08,S1,T49,D0,C07,X1,Y4,H6,"N08: "
RXSTRIP=N09,S1,T49,D0,C12,X1,Y5,H6,"N09: "
RXSTRIP=N10,S1,T49,D0,C07,X1,Y6,H6,"N10: "
RXSTRIP=N12,S1,T24,D0,C10,X1,Y7,H1,"N12: "
RXSTRIP=N13,S1,T24,D0,C10,X1,Y8,H1,"N13: "
RXSTRIP=ES12,ET3,EC12,EX-15,EY2,EH12,E" I(A):"
RXSTRIP=ES12,ET3,EC10,EX-15,EY3,EH10,E"P(kV):"
RXSTRIP=ES12,ET3,EC10,EX-15,EY4,EH10,E"Q(kV):"

[TRANSMIT FILES EXAMPLE]
DRIVER#=3
TYPE=BINARY
TXFILE=C:\EVENTS\TEMP\*.* J:\EVENT\MASTER1 /MOVE
TXFILE=C:\SDCSAVE\*.OK C:\SDCHOLD /MOVE
TXFILE=C:\PECO\DATABASE\*.* C:\TEMP
TXFILE=C:\BP\BIN\DATAPORT\CREATE.HLP C:\TEMP
TXFILE=C:\SDCSAVE\PORT_001.DTB C:\TEMP
TXDIAL=^[13]ATDT 1,123-456-7899^[13]
TXHANGUP=+++ATH0^[13]
TXPERIOD=0
```

```
TXDELAY=5

[RTU-SOE POINTS DUMP]
DRIVER#=4
TYPE=HEX
TXCOMMAND=RTU-SOE
TXPERIOD=5
TXDELAY=0
RXSTRIP="FIN ",        H1, X41, Y1, T1, D0, C8
RXSTRIP="ALE ",        H1, X41, Y2, T1, D0, C8
RXSTRIP="ATT ",        H1, X41, Y3, T1, D0, C8
RXSTRIP="ERR ",        H1, X41, Y4, T1, D0, C8
RXSTRIP="SOE ",        H4, X41, Y5, T1, D0, C8
RXSTRIP="ACC ",        H1, X41, Y6, T1, D0, C8
RXSTRIP="ALG ",        H1, X41, Y7, T1, D0, C8
RXSTRIP="STS ",        H1, X41, Y8, T1, D0, C8
RXSTRIP="SYNC-BYTE ", H1, X48, Y1, T2, D0, C8
RXSTRIP="   RTU-ID ", H1, X48, Y2, T2, D0, C8
RXSTRIP=" GROUP-ID ", H1, X48, Y3, T2, D0, C8
RXSTRIP="FRAME-LEN ", H1, X48, Y4, T2, D0, C8
RXSTRIP="  MESSAGE ", H1, X48, Y5, T2, D0, C8
RXSTRIP=" FUNCTION ", H4, X48, Y6, T2, D0, C8
RXSTRIP=" DATA-LEN ", H4, X48, Y7, T2, D0, C8
RXSTRIP=" END-FLAG ", H1, X48, Y8, T2, D0, C8
RXSTRIP="CRC-HI ",    H1, X63, Y7, T2, D0, C8
RXSTRIP="CRC-LO ",    H1, X63, Y8, T2, D0, C8
RXSTRIP=X1, Y1, T38, D0, C1, N1, S2
RXSTRIP=X1, Y2, T38, D0, C7, N2, S2
RXSTRIP=X1, Y3, T38, D0, C7, N3, S2
RXSTRIP=X1, Y4, T38, D0, C7, N4, S2
RXSTRIP=X1, Y5, T38, D0, C7, N5, S2
RXSTRIP=X1, Y6, T38, D0, C7, N6, S2
RXSTRIP=X1, Y7, T38, D0, C7, N7, S2
RXSTRIP=X1, Y8, T38, D0, C7, N8, S2
```

A P P E N D I X   B

System Keys

This section lists the function keys, cursor keys, and menu buttons available in the device manager, query fields and DXF display.

Device Manager

Function Keys	Description
F1	Display the device manger's help file.
F2	Edit the device record at the cursor position.
F3	Test the device's port at the cursor positon using the loop back plug detection test.
F4	Create a new device.
F5	Create or edit the terminal function keys for the device at the cursor position.
F6	View the data stored in the device buffer.
F7	Run the MID interrogration interface for all or marked devices assigned a device driver.
F8	Run the DXF interrogration interface for all devices assigned a device driver.

Cursor Keys	Description
Left Arrow	Move the cursor bar to the left one position.
Right Arrow	Move the cursor bar to the right one position.
Up Arrow	Move the cursor bar up one position.
Down Arrow	Move the cursor bar down one position.
Page Up	Display the devices on the previous page.
Page Down	Display the devices on the next page.
Home	Move the cursor to the first column in the port table.
End	Move the cursor to the last column in the port table.
Ctrl+Home	Move the cursor to the first device in the table.
Ctrl+End	Move the cursor to the last device in the table.
Tab	Move the cursor from the device table to the query fields.
Delete	Delete all the marked devices in the table.
Enter	Run the terminal display for the selected device.

Menu Buttons	Description
Tile Vertical	Tile all open windows vertical.
Tile Horz	Tile all open windows horizontal.
Cascade	Tile all open windows in a cascading order.
Back	Move back one window.
Files	Open or bring to front the file manager.
Device Manager	Open or bring to front the device manager.
Stations	Open or bring to front the stations manager.

⚡ Faults	Open or bring to front the Fault Data manager.
🖥️ Communications Manager	Open or bring to front the communications manager.
🖥️ Polling Properties	Open the Polling Properties (Save Archive) dialog.
✏️ Edit Device	Edit the Device at the cursor position.
New Device	Create a new device.
F1 F2 F3 TermKeys	Create or edit the terminal function keys for the device at the cursor position.
⬛ Terminal	Run the terminal display for the selected device.
FTP	Open the test FTP stand alone application.
Log File	View the data stored in the device log file.
🕐 Poll Perodic	Run the MID interrogation display for all or marked devices assigned device drivers perodically.
Poll One Time	Run the MID interrogation display for all or marked devices assigned device drivers one time only.

Query Fields

Function Keys	Description
F1	Display the query help file.
F5	Query all the marked devices in the active configuration.
F6	Query all the devices in the active configuration.
F7	Query all the unmarked devices in the active configuration.
F8	Clear the query criteria and set all the query operators to "=".
F9	Toggle through the available query operators for the active query field.

Cursor Keys	Description
Up Arrow	Return the cursor to the device table.
Ctrl-Right Arrow	Move the cursor one position to the right, wraps to next field at the end.
Ctrl-Left Arrow	Move the cursor one position to the left, wraps to next field at the beginning.
Tab	Move the editor to the next section (file tree).
Shift+Tab	Move the editor to the previous section (device table).
Enter	Process the query criteria for all devices in the active configuration.

Menu Button	Description
🔍 Query	Query all devices in the active configuration.

Fault Data Manager Table

Cursor Keys	Description
Left Arrow	Move the cursor bar to the left one position.
Right Arrow	Move the cursor bar to the right one position.
Up Arrow	Move the cursor bar up one position.
Down Arrow	Move the cursor bar down one position.
Page Up	Display the devices on the previous page.
Page Down	Display the devices on the next page.
Home	Move the cursor to the first column in the port table.
End	Move the cursor to the last column in the port table.
Ctrl+Home	Move the cursor to the first device in the table.
Ctrl+End	Move the cursor to the last device in the table.
Tab	Move the cursor from the device table to the query fields.
Enter	Display the event, summary and history files for the selected device.

Menu Buttons	Description
Tile Vertical	Tile all open windows vertical.
Tile Horz	Tile all open windows horizontal.
Cascade	Tile all open windows in a cascading order.
Back	Move back one window.
Files	Open or bring to front the file manager.
Device Manager	Open or bring to front the device manager.
Stations	Open or bring to front the stations manager.
Faults	Open or bring to front the Fault Data manager.
Folder Tree	Show/Hide the Folder Tree.
Email	Email the Device Information Section.
Refresh	Refresh the Folder Tree and Device table.
Change Drive or Path	Change to a new driver or path.
Up Dir	Change to the previous directory.
Copy	Copy the marked device files to the destination path.
Move	Move the marked device files to the destination path.
Mark	Mark/Unmark all devices.
Query	Query the devices.
Request Poll	Request a poll for all of the marked devices.

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