Wavewin Upgrades List - 10/21/2024

Below is a list of all the addition and changes.

Wavewin H.R - 10/08/2024

1. Data Plotting (Process Templates): Corrected a problem computing a 3 phase fault when the Line Impedance and line length are not available.

Wavewin H.Q.39 - 09/20/2024

1. Data Plotting (Process Templates – Analog Average): Corrected a problem when computing the average for a software analog channel. The final value was not being divided by the total number of samples.

2. Data Plotting (Process Templates - /PDF Passed Parameter): When processing templates using a .RUN batch file different file types require different PDF types. A new passed parameter was added in the .RUN file to specify the type of PDF to create for certain file types.
   The new parameter is /PDF=#. The number to specify is below:

   /PDF=0 – Create a PDF for all files/line processed.
   /PDF=1 – Do not create any PDF files.
   /PDF=2 – Create a PDF file if a breaker operated and there is a fault type.
   /PDF=3 – Create a PDF file if there is a fault type.

Wavewin H.Q.38 - 09/06/2024

1. Data Plotting (Process Templates – Digital Channels): Improved adding the digital channels when using a view for processing files. The system will only allocate the digital channel in the view as an event if it triggered.

Wavewin H.Q.37 - 08/30/2024

1. Data Plotting (Process Templates – View Files): Added support to the process templates engine to process digital channels in a view file. The system reads the digital channels defined in the view and assigns the triggered channels as Events.

Wavewin H.Q.36 - 08/20/2024

1. Data Plotting (ComNames Rename): Added a new option inside the ComName rename properties dialog to select the time used in the renamed files, microseconds or milliseconds. The default is microseconds.

Wavewin H.Q.34 - 07/19/2024

1. Device Manager (Export Device Manager): When the Device Manager table is open, it exports the device manager table to the defined Message/Log Path under the WWPDM-List,Station ID,Station Name.txt file. The Message/Log Path, Station ID and Station Name is from the fields in the Device Manager's Properties dialog. It also exports the table after a device is edited and saved. A check was added to this export backup to ensure the device table has records before exporting. This ensures that the backup is not overwritten if the table is lost in memory.

2. File Manager (Rename Files, COMNAME): Made more improvements to renaming SEL files. When searching the SEL file it looks for the following to pick up the station name and relay name: SID, RID, TID, RELID, TRMID. When found on a line it then checks if an = sign also exists in the same line. If it does, it copies all characters after the = sign until the end of the line or 4 consecutive blanks. This was causing a problem if any of the above search's exit in a station or relay name. If now includes a blank after each search name and ensures the equal sign is after the search string.

3. Data Plotting (Channel Fault Inception Point): Improved the position of the system detected fault for each channel. The faut position for each channel is calculated according to the variables entered into the Display dialog's Data Plotting tab. If Show Channel Fault is activated from the data plotting's Property dialog then a red dot is displayed at each channel's fault detection point.

Wavewin H.Q.32 - 06/27/2024

1. Data Plotting (Rename to Long Filenames): Corrected a parsing problem when the SEL SID and RID are are on the same line. The previous version was parsing the wrong start character in the string.

Wavewin H.Q.31 - 06/24/2024

1. Data Plotting (Rename to Long Filenames): When renaming SEL files do not use the fields in the filename, always use the SID and RID inside the file. Corrected a parsing problem when the SEL SID and RID are are on the same line. Added the first user field after the company field when renaming SEL files.

2. File Manager (Process Templates - Average): Added a new template field to the process template engine.

   A. Average <^1:A:7> Will display the average of all the samples in the channel.

3. File Manager (Rename): In the menu system added the Rename menu option to the File Manager's opposite click popup menu.

Wavewin H.Q.30 - 06/05/2024

1. Data Plotting (Process Templates): Added a new option to move all data files that do not have a a line group to a sub directory named No LineGroups. To activate this new option, open the Display dialog from the File Manager Option menu, select the Data Plotting tab. Select Yes to move files to a sub directory field.

2. File Manager (Rename to Long Filenames): Added an option when renaming files that checks the device name for FID=. If FID= exists in the device name, then search the Comtrade's HDR file for the SEL "RID". If "RID" is found, then use that for the file's device name.

Wavewin H.Q.29 - 04/25/2024

1. Data Plotting (Process Templates): When determining if the Voltage channels have a fault for the Sag Swell report Wavewin was using the fault durations to calculate the fault type. It now uses the Voltage dip percentage (%V command) to determine the fault type.

Wavewin H.Q.28 - 04/19/2024

1. Data Plotting (Process Templates): Added 2 new template fields to the process template engine.

   A. Data <DATA> Indicates if the data in the Comtrade file is valid or corrupted. If the number of samples exceed the number of samples defined in the CFG file and the sample number is not sequential in the data file will be marked as BAD data.
      Both the [] and <> brackets apply since it is general to the file.

   B. RMS for the last sample in the file, C command <1^:C:7> Displays the RMS value for the last sample in the file.

Wavewin H.Q.27 - 04/11/2024

1. Data Plotting (DIG Files): When opening the fault report from inside the DIG file and when requesting a double ended plot using the 2 menu buttons (5th and 6th buttons from the left) the system reads the remote station, device and line name from the selected line then goes through the table looking for the remote end. If the remote end is found and the date and time between the two are within 50 milliseconds, then the double ended fault location results are shown in the report file and the double ended dialog is displayed when requesting a plot. If the current station name and the remote station name are the same, then a double ended is ignored.

2. Data Plotting (Process Templates - Digital): When writing the triggered digital channels to the DIG file the channels are written back-to-back not adhering to the channel assignments inside the FMT file. This reduces the gap when the channels are not triggered.

Wavewin H.Q.26 - 03/31/2024

1. Data Plotting (Process Templates - Default.VIW): Improved the scaling of the analog channels when opening the Default.viw. Also, ignore the view setting that defines the number of samples between the Data bar and the RMS bar. This is ignored when processing data files because the files being processed have difference sampling frequencies.

Wavewin H.Q.25 - 03/12/2024

1. Data Plotting (Process Templates - PDF Files): Process template will create a PDF file if the conditions defined in the Display dialog are meet when processing a line. If a PDF file is created it will write the path and name of the file to the last column in the DIG file. If a PDF file is not created, then the last column was left blank. A blank column was causing problems in SQL Server. If a PDF file is not created then it now populates the last column with a None.

3. Data Plotting (Process Templates): Added support to have a Default.VIW instead of the Default.LNG. The Default.viw allows for superimposing channels and other features of a view.

Wavewin H.Q.24 - 03/08/2024

1. Data Plotting (Sag-Swell): The Sag-Swell PDF report was improved to include the %Vnominal in the F47 Plot and it added the units for each section in the Summary report.

2. Data Plotting (Process Templates): Corrected a problem when processing SEL and Emax files when using the Process Template menu option under the File Manager s Option menu. The command Line designation /Line=All was included for the SEL and Emax files.

3. Data Plotting (Process Templates - Default.txt): The Default.txt file lists the station name, device name, line length, line impedance values, remote station, and remote device. It is used to populate the Comtrade device s line length, impedance values, remote station, and remote device for Comtrade files that use the Default.LNG line group. When searching for a device in the Default.txt file the station name and device name from the Comtrade long filename is used. The device name and remote device name in the Default.txt has only the circuit name. Added support to extract the circuit name from the device name in the Comtrade file and search the Default.txt using only the circuit name.

4. Data Plotting (DIG-Double Ended): Inside the DIG files a double end fault location can be displayed by clicking on the Waveform toolbar button for the highlighted device. This button will search the table for the remote station and device. If the Default.txt file is used to populate the device s remote information then the circuit name must be extracted from the device s name to find the correct remote device. Added support to extract the device s circuit name when looking for the remote end.

Wavewin H.Q.23 - 02/20/2024

1. Data Plotting (F47 Plot): Expanded the Semi F47 Sag Swell plot to display more than one second of data. The plot will now show the full time period of the faulted duration.

2. Data Plotting (Sag-Swell): Created a PDF report that includes the Waveform signals, the F47 Plot and a Summary report on the Sag Swell information. The PDF is created during the process templates. It can create a PDF for all processed files or just files that have a duration on one of the 3 voltage channels.

3. Data Plotting (Process Templates): During the process templates the system will not create a PDF file if the line length and line impedance values are not available for the Fault Report template.

Wavewin H.Q.22 - 02/04/2024

1. Data Plotting (Process Templates): Added support to read a line s impedance values, line length and remote end station and line name for the Default.LNG file. Since one line group file is used for all devices a Default.TXT file is created to list each lines information. The fields in the default.txt file are listed below. The Default.TXT must be saved in the path where Wavewin is running. Wavewin will read the file when it runs.

   Station, Device, Nominal, PosSeqR, PosSeqX, ZeroSeqR, ZeroSeqX, LineMiles, RemoteDME, RemoteName

2. Data Plotting (Channel Fault Inception): Wavewin calculates each channels fault inception when a file is read. To mark each channel s fault inception with a red dot activate the Chan Fault field inside the properties dialog under the display settings tab.

Wavewin H.Q.19 - 01/17/2024

1. Data Plotting (DIG - Convert From UTC to Local): Modified the convert from UTC to local time in the DIG file from using the Win API SystemTimetoTxSpecificLocalTime to using the add hour function in the compiler. It will add the specified Time Code to the time listed in the DIG file. The Time Code is specified in the Display dialog under the Data Plotting tab. If the time code is -4 then the Add Hour function will minus 4 from the time listed in the DIG file.

Wavewin H.Q.18 - 01/04/2024

1. Data Plotting (Process Templates): Added 4 new template fields to the process template engine.

   A. LFREQ <LFREQ> Displays the Line Frequency
      Both the [] and <> brackets apply since it is general to the file.

B. SFREQ <SFREQ> Displays the Samling Frequency
   Specify the sampling frequency at the reference bar [] or the data bar <>. In the Comtrade CFG file the sampling frequency can be defined as 0. This means the sampling frequency will change.

C. Secondary Ratio <^#:X> Displays the specified channels Secondary Ratio.
   Both the [] and <> brackets apply since it is general to a channel not to a sample.

D. Primary Ratio <^#:Y> Displays the specified channels Primary Ratio.
   Both the [] and <> brackets apply since it is general to a channel not to a sample.

2. Data Plotting (Process Templates): If the fault date and time is less than or equal to the start date and time then do not process Voltage Dip, Duration and Triggers. This indicates a continuation fault.

3. Data Plotting (Process Templates): Added the Emax RCD files to the process templates engine. It now processes Comtrade files using Line Group Files, SEL Files using VIW files and Exam Files using the internal Line Groups defined in the Emax CTL files.

4. Data Plotting (File Header): Corrected a problem with displaying the file's header information after opening the properties dialog and clicking OK. The file name and date and time was disappearing.

Wavewin H.Q.17 - 12/18/2023

1. Data Plotting (SEMI F47 Plot): Does not require to have the 3 voltage channels marked when opening the F47 plot. It now automatically selects the first 3 visible voltage channels without marking them to keep the channel colors.

Wavewin H.Q.16 - 12/04/2023

1. Data Plotting (Process Templates): Optimized the processing of the template files by not reading all of the files in the File Allocation Table. It now stops when the specified number of files to process is reached.

2. Data Plotting (Process Templates): Corrected the PDF fault report filenames. The previous version was using the date format yyddmm for the first field in the file name. It now uses yymmdd.

3. Data Plotting (SEMI F47 Plot): Corrected not showing all 3 voltage channels in the F47 Plot window.

4. Data Plotting (SEMI F47 Plot): Added a new option to open the SEMI F47 window when the Comtrade File is open. The new option is in the Display dialog under the Options menu in the File Manager. Select the Data Plotting tab, under the General Setting section select Yes for the Open the F47 Plot field. The SEMI F47 plot will be displayed when the Comtrade file is opened.

Wavewin H.Q.15 - 11/28/2023

1. File Manager (Auto Rename): Removed the directory exists checks when reading and writing to the Wavewin.INI file for the Source Path, Archive Path, and Destination Path. Added a check to the start of the auto rename that makes sure all 3 paths exist before starting the rename process.

Wavewin H.Q.11 - 10/08/2023

1. DIG File (Open CFG File): Added a new feature to open the CFG file from inside the DIG file. To open the CFG file select the line in the table and click the Open CFG file icon on the button menu.

2. Data Plotting (Open CFG File): Added a new feature to open the CFG file from inside the data plotting window. To open The CFG file select the Open CFG file menu option under the File menu.

3. Process Templates (Default.LNG): Supported applying the Default.LNG file to the processed Comtrade files when the Default.LNG file is located in a different directory than where the Comtrade files are located.

4. Data Plotting (F47 Voltage Sag Swell): Added the Duration in Cycles to the F47 Voltage Sag Swell Plot.

5. Data Plotting (F47 Voltage Sag Swell): If no channels are selected before opening the F47 Voltage Sag Swell plot then the first 3 Voltage channels displayed will be automatically selected.

Wavewin H.Q.10 - 09/25/2023

1. File Manager (Export File Table): Added a new feature to export the contents of the file manager to a comma delimited CSV file. To export the table select the Export File Table menu option under the Files menu/tab. A dialog is displayed, enter the filename, and select to export the marked files or all files. After the export is complete navigate to the path where the file was saved and double click to open the file in Excel.

Wavewin H.Q.9 - 09/06/2023

1. Data Plotting (Print PDFs): Corrected a problem with the waveform files being printed as straight lines. The equations to calculate the scale for each waveform was using integer values resulting in a 0 scale factor. It now uses floating point values for the calculation.

2. File Manager & Data Plotting (Save As Comtrade): When converting an SEL compressed or ASCII file to Comtrade the settings section of the SEL file is saved to the Comtrade .HDR file/section if specified by the user.

2. File Manager (Auto Convert to Comtrade): Added a drop down list to select the Comtrade file type to convert the specified file extensions. Also, added a checkbox to include the SEL settings in the converted Comtrade .HDR file/section.

Wavewin H.Q.8 - 07/24/2023

1. Line Group Builder (Edit and Clear): Added the ability to open a line group file without having a CFG file open. This allows for editing a line group and saving it when there is no CFG file open. Added a button to clear all fields in the Line Group builder. This will allow for easily switching between line group files and CFG files.

2. Data Plotting (Line Groups - Illegal Characters): Replaced all illegal characters from the station and device fields read from the Comtrade CFG file with an underscore before looking for the Comtrade Line Group File.

3. File Manager (Popup Menu - Rename): In the Ribbon system the File Manager's rename popup menu option was not displaying the rename dialog. The Rename name displayed in the popup menu was different than the name in the popup menu code.

Wavewin H.Q.7 - 06/26/2023

1. Data Plotting (Process Templates – Phase Rotation): Added support to read the phase rotation from the line group and calculate the proper sequence components. If the phase rotation is ABC negative sequence is calculated and if the rotation is ACB then positive sequence is calculated.

2. Data Plotting (Invert Analog Channel): Corrected a problem when channels are inverted and the properties dialog is opened and saved. The channel scale factors were reverted back to their original values.

3. Data Plotting (Calculated Trigger Position): Added a new option in the data plotting window to show a purple dotted line with a fuchsia triangle at the bottom showing the calculated trigger position in the file. The new option is in the Properties dialog under the Display Settings tab.

4. Data Plotting (Number of Cycles from Trigger): Added a new option in the process template engine. The new option allows for selecting the number of cycles the data bar is positioned from the trigger position. The select cycle option is in the File Manager Display dialog under the data plotting tab. The four options are 1, 1.25, 1.75 or 2.00 cycles.

5. Data Plotting (Process Templates – Invert Neutral Channel): Added a check on the neutral channel when calculating the reactance fault location on a line in the process templates engine. If the faulted phase angle minus the neutral angle is greater than 45 then make the neutral angle equal to the faulted phase angle before running the reactance fault location.

6. Data Plotting (Harmonic Analysis Report): Corrected a problem with the harmonic analysis report with

Comtrade files that have the sampling frequency set to 0. When the sampling frequency is set to 0 in the CFG file the sampling frequency is calculated using the time at each sample. This causes the sampling frequency to change across cycles. Instead of using the maximum harmonic to calculate the 0 harmonic it now uses 0 for the calculation.

Wavewin H.Q.6 - 02/07/2023

1. Data Plotting (Process Templates – Rename DIG Files): Added a new option to rename all DIG files before processing a new batch of waveform files for the process templates feature. To rename the DIG files there are four new fields in the Display dialog under the Data Plotting Tab. The first field called Rename After allows for selecting what to do with the DIG files before processing new files. The two options are, No – do not rename and Yes, rename the files. All DIG files will be renamed using the long file naming format (Comnames). The three remaining fields are used to rename the files. Enter the timecode where the files are located along with the station name and device name.

Wavewin H.Q.5 - 01/17/2023

1. Data Plotting (Process Templates – Delete Files): Added two new options to the process templates. To save on disk space there is two new drop down options in the Display dialog under the Data Plotting Tab. The first is Delete After processing a file. The 3 options are: No, Yes and Only Non Fault files. The second option is Delete No Line Group. There are two options: No and Yes. This will delete any files that do not have a line group or encounter an error opening the file.

2. Data Plotting (Line Groups): When reading lines from a line group file spaces after the Positive and Zero Sequence values was causing errors when converting to a real value. All spaces before and after are deleted before the conversion.

3. Data Plotting (Process Templates - PDF): Added a new option for creating Fault Location PDF files. The new option will create a PDF if a Fault Type is detected. The four options for creating a fault location PDF are: All Files, No Files, Breaker Operated & Fault Type or just Fault Type.

4. Data Plotting (Process Templates - Digital): Replaced all illegal characters with a - from the digital channel titles before writing to the DIG file. The illegal characters was causing separator issues.

Wavewin H.Q.3 - 11/07/2022

1. Data Plotting (Process Templates – PDF): Only create PDF files if a breaker operated and there is a valid fault type.

Wavewin H.Q.2 - 10/24/2022

1. Data Plotting (Process Templates - Duration): Corrected a problem when calculating the duration of the faulted phases. Defining SAC channels inside a line group was causing the duration to be added every time a SAC channel was calculated. Instead of adding the duration the software now keeps a pointer to the beginning of the fault and a pointer to the end of the fault. The duration is calculated from the difference in samples from the two pointers.

3. Data Plotting (Process Templates - PDF): When processing files a PDF file can be created. The function to produce the PDF file is also the same function that displays the summary file inside the DIG table. When a Summary is requested inside the DIG table a single ended fault location is performed depending on the fault type. It also looks for the far end of the line and performs a double ended fault location. When processing files it was trying to find the far end of the line which is not available during the file processing and was causing an access violation error. The function has been modified to only call the double ended fault location from inside the DIG table.

4. Data Plotting (Process Templates - Negative & Positive Sequence Values): Added the unit prefix to the negative & positive sequence value calculations for the process templates. In previous versions the prefix was not being applied for channels that have a prefix equal to kilo.

Wavewin H.Q.1 - 09/25/2022

1. Data Plotting (Process Templates): Added the Three-Phase and Multi-Phase single ended fault location engines to the DIG summary window.

2. Data Plotting (TimeAdjustment): Read the time adjustment field from the line group file if it exists. Apply the time adjustment to the files time before the file is opened.

Wavewin H.Q - 09/01/2022

1. Data Plotting (Process Templates): Added a new command to the Templates to define the phase rotation of the channels. In the Line Group builder a new field was added to the Line Information tab called Phase Rotation. This field is saved to the line group as PhaseRotation=ACB. The line rotation can be ABC or ACB. In the template the new command is called <PHSROT>. This command will write the Phase Rotation to the DIG files.

2. Data Plotting (Process Templates): Added a new command to the Templates to define the Remote Device name. In the Line Group builder a new field was added to the Line Information tab called Remote Device. This field is saved to the line group as RemoteDevice=. In the template the new command is called <RDev>. This command will write the Remote Device name to the DIG files.

3. Data Plotting (Invert Channels): Added a new option from the data plotting’s right click popup menu to automatically invert all the marked analog channels. To activate first marked the desired analog channels using the spacebar or mouse, next right click on the analog channel table and select the Invert Marked Channels menu option.

All of the marked channels scale factor will be multiplied by -1. To restore the original mark the channels again and select the popup menu option Invert again.

4. Data Plotting (Process Templates): Added the Three-Phase and Multi-Phase single ended fault location engines to the DIG summary window.

5. Data Plotting (TimeAdjustment): Read the time adjustment field from the line group file if it exists. Apply the time adjustment to the files time before the file is opened.

Wavewin H.P.21 - 07/20/2022

1. File Manager (Append CSV Files): Changed the Append Log File command to append all marked like CSV files on the active path from the file manager. To append a number of CSV files first mark the files then select the Append CSV Files from the Options/Report menu.

Wavewin H.P.20 - 06/17/2022

1. Data Plotting (Mark and Save): Added a new analog command to the Mark and Save window and the Process Templates. The new Z commands extracts and saves the Frequency calculated from the 3rd to the 4th cycle. To extract the Frequency use the following command: <^1:F:8>. The ^1 specifies the first visible channel.

Wavewin H.P.19 - 06/12/2022

1. Data Plotting (Auto Process Templates): Added 5 new command to write the DME fault location variables parsed out of the DME Comtrade *.INF file. The Z1 and Z0 Magnitude and Angle Line Impedance values and Fault Location and Line Length are parsed out of the INF file if they exist in the file. The 5 new template command are:

   -> DME-LINELEN, DME-FAULTLOC, DME-Z1MAG, DME-Z1ANG, DME-Z0MAG, DME-Z0ANG
      <DMELL:8>, <DMEFL:8>, <DMEZ1M:8>, <DMEZ1A:8>, <DMEZ0M:8>, <DMEZ0A:8>

Wavewin H.P.17 - 05/24/2022

1. Data Plotting (Mark and Save): Added 2 new analog commands to the Mark and Save window and the Process Templates. The W and V extracts and saves the MWatts and MVars at the data bar or the reference bar. To extract the MWatts and MVars specify the Voltage and Current Channels first followed by a W or V. For example <^1,^4:W> or <^1,^4:V>.

Wavewin H.P.16 - 05/15/2022

1. Data Plotting (Auto Process Templates): When a Comtrade file is processed using the Auto Process Templates feature it first checks to see if a line group file exists for the file. If a line group file does not exist then it will skip the file. Support was added to the check for line group file feature to include the device name in the file. In previous versions the line group file only contained the station name in the filename, such as Station-A.LNG. To expand to multiple devices per station the Device name was added, such as Station-A,Device-A.LNG. The Station name and the Device name are read from the Comtrade's .CFG file. The first line in the CFG file list the station name, device name, Comtrade version number. The Station-A.LNG and the Station-A,Device-A.LNG are both supported.

Wavewin H.P.15 - 05/04/2022

1. Data Plotting (Up Sample): Added up sampling to the Auto Convert to Comtrade and the /Comtrade passed parameter. Up Sampling is specified in the Change Frequency dialog. If the Always Open Frequency check box is checked then before saving the converted file to Comtrade it will change the frequency to the specified frequency in the Always Open Frequency edit box.

Wavewin H.P.14 - 04/20/2022

1. Data Plotting (Analog Channel Titles): Increased the maximum characters per analog channel title from 50 to 80.

2. Data Plotting (Line Groups): Added support to have the station,devicename.LNG as the devices line group filename. In previous versions the Line Group file was named station.LNG. Expanding the name to include the device name allows for supporting multiple devices in the same substation. The station name is read from the first field in the first line of the Comtrade .CFG file or section. The device name is read from the second field in the first line of the Comtrade .CFG file or section. The fields on the first line in the CFG file are separated by a comma.

Wavewin H.P.12 - 04/03/2022

1. Data Plotting (Process Templates): Added a new feature that will write the digital channel title to the report file using Breaker or Event script codes, example [B01:H] or [E02:H]. The H after the colon indicates to write out the digital channel header.

2. Data Plotting (Process Templates): Added a new feature that will write the digital channel status to the report file using Breaker or Event script codes, example [B01:S] or [E02:S]. The S after the colon writes an "A" if the digital channel had a change of state or an "N" if there was no change of state.

3. File Manager (Save As): Changed the Save As Comtrade in the File Manager to a generic Save As feature. The Save As Comtrade menu option under the Options menu has been changed to Save As. The new Save As dialog allows for directly selecting the Save As format (Comtrade 1991, 1999, 2013 Ascii or Binary, RMS, Instantaneous Values, Vector Values and Summaries). Also added a Save As menu option under the File menu. The new Save

As dialog has a drop down list box to select the format and radio buttons to select the files to process.

4. Data Plotting (Process Templates): Added protection from having duplicate templates added to the process templates when using the batch mode processing or using the Process Template dialog.

Wavewin H.P.11 - 02/02/2022

1. Data Plotting (Restore Original View): Added a new feature that will restore the analog channels, digital channels, phasors, and the analog table back to the original view when the file was first opened. To restore the original view select the Restore Original View menu option under the View menu in the Menu based system or click the Restore Original View icon in the View section under the Waveform tab in the Ribbon System.

2. Data Plotting (Line Groups): Increased the number of lines contained in a Line group file from 25 to 50.

Wavewin H.P.10 - 12/01/2021

1. Data Plotting (Append Files): When Appending files only the files that have matching analog and digital channel titles are appended. The scale factor has been added as an additional check to make sure all analog channels appended have matching scale factors as well.

2. Data Plotting (Sort Digital Channels): Added a new feature that will sort the Digital Channels according to the change of state. This new feature will sort the first change in state in Ascending order or sort the first change in state in Descending order. There is also an option to restore the order of the Digital Channels when the file was first opened. In the menu system there is a new submenu under the Channels menu called Sort Digital Channels and in the ribbon system a new drop down menu was added to the Channels tab under the Arrange section.

3. Data Plotting (Sequence Components Calculator): Added an option inside the Sequence Components calculator to always use the displayed channels that are selected in the voltage and current drop down lists. A new checkbox has been added under the phasor diagram to specify that the channels selected in the drop down boxes be preselected when opening the sequence components calculator.

4. Data Plotting (Fast SACs): Changed the name of the positive and negative sequence components Fast SACs titles to be Time Pos Sequence and Time Neg Sequence. This will clarify that these Fast SACs are time based equations.

Wavewin H.P.8 - 06/14/2021

1. File Manager (IEEE Comnames): Added support to handle the IEEE Comnames long name format from SEL devices. The SEL devices are formatting the IEEE Comnames as:
   20210610,11.35.37.289,-6,PORTSMALL 345,XYZ_420NE,X POWER.dat

The format is including the 4 digital year in the first field and adding dots between the time fields. Wavewin now checks if the date field is greater than 6 fields. If it is greater than it reads the date starting at the 3rd character. It also checks if dots are in the time field, if yes then it ignores the dots. These files are now displayed correctly in the File Manager.

3. Create SER Files (Substation and Device Columns): When creating the SER files it now takes the Station and Device fields directly from the IEEE Comnames files instead of from the CFG files for Comtrade files.

2. Device Manager (Baud Rate and Passwords): Added an option to quickly change the baud rate and level 1 password for multiple devices. There is a new option in the Device Manager right click popup menu called Set Password and Baud Rate. When the dialog is displayed there are two options on what devices to change, All Devices or Marked Devices. If there are marked devices in the table then the Marked Devices radio button is automatically checked. If there are no marked devices in the table then the Marked Devices option is disabled. The Baud Rate field is defaulted to no selected option and the password field empty. If there is no change need to the baud rate field leave the selection as empty. Same with the password field if it is empty then no changes will occur.

Wavewin H.P.7 - 05/18/2021

1. File Manager (Create SER Files): Added code to populate the Time Code field inside the SER report file with the Time Code located inside the ComNames Property dialog only if the time code is not available in the original waveform filename.

Wavewin H.P.5 - 04/09/2021

1. File Manager (Auto Create SER Files): Modified the Auto Create SER file to create the SER table to conform with the NERC PRC-002 SER Format. The previous versions were creating the following table columns in the SER file:
   Substation, Device, State, Trigger Date, Trigger Time, Chan. #,Channel Title
   The new table columns are:
   Date, Time, Local Time Code, Substation, Device, Channel Title, State
   The local time code column will only be populated in the SER file if the original file is in the IEEE ComName filename format. The 3rd field in the ComName filename contains the Time Code. If the time code exists in the original file then it is used to populate the time code column in the SER file.

Wavewin H.P.4 - 03/29/2021

1. File Manager (Auto Rename Files): Activated the Auto Rename Files when Wavewin is ran if include sub-folders is not selected. The Auto Rename was only activated if include sub-folders was checked.

2. Data Plotting (RMS Calibrated Channels): Corrected a problem when selecting RMS calibrated data type

from the Properties dialog inside the data plotting window. It was relying on the setting defined in the Driver Configuration dialog located in the File Manager table.

Wavewin H.P.3 - 03/09/2021

1. File Manager (Auto Rename Files): Added more support to avoid runtime errors when the file format is not correct or incomplete. Also, if the station name and device name cannot be found in the file then it is marked as unable to rename.

Wavewin H.P.2 - 03/04/2021

1. File Manager (Auto Rename Files): Added a 4th directory for moving all files that have encountered errors when trying to rename a file. The new path is called the Error path. This prevents from trying to rename the files every time the process is ran.

Wavewin H.P.1 - 03/01/2021

1. File Manager (Auto Rename Files): Added support to replace all filename illegal characters in the station and device names with a dash (-) before renaming the files. Also, removed all non-printing ASCII characters from the station and device names. Added more protection to the SEL display driver to avoid access violation errors when the file format is not correct. When renaming the files it now checks to see if the file already exists in the destination folder, if it exist then the file is deleted in the source folder and the rename is bypassed.

Wavewin H.P - 02/17/2021

1. File Manager (Auto Rename Files): Added support to bypass all error message boxes being displayed during the rename process. Also, changed the way the rename process works. In previous versions it would first move the files from the source path to the archive path then copy the files to the destination path. It would then rename the files in the destination path. A number of requests ask to leave the files in the source path if an error occurred reading the files. So it now copies the files from the source path to the destination path and if the rename is successful it then moves the files from the source path to the archive path and deletes any files that encountered errors from the destination path. This way all files that were not successfully renamed remain in the source path.

Wavewin H.N.4 - 12/17/2020

1. Data Plotting (Digital Channels): Increased the Digital Channel title characters from 80 to 90.

2. File Manager (Process Templates): Added 2 new fields in Display dialog under the Data Plotting tab.

These 2 new fields are called PDF Width and PDF Height. When running Wavewin as a service the monitor coordinates for the PDF are not exact. These fields allow for changing the width and height to fit the PDF report properly.

Wavewin H.N.3 - 12/02/2020

1. File Manager (Copy Files): Corrected a problem when coping files using the Opposite click popup Menu. The system was activating the move drag and drop. This problem has been corrected in this Version.

2. File Manager (Process Templates): When Wavewin reads a Comtrade file it composes the analog channels titles from the 2nd, 3rd, and 4th fields (ch_id, ph and ccbm) in the Comtrade CFG file. For example if the first 4 fields in analog channel information in the CFG file for channel 1 is:
   1,A1,A,Feeder 780M - A Phase
   Then the channel title will be: A1 A Feeder 60M - A Phase
   The three field are separated by a space.
   Some DME equipment are changing the information in the first two fields from one fault file to another. If a line group is setup to look for channel titles using a string then some channels are not being found because of the changes. Wavewin now deletes the first 2 fields in the name when searching for the 3 Voltage and 4 Current channels for the line group.
   Also, the same is true for the digital channels. Wavewin uses 2nd, 3rd and 4th fields to compose the name. The same was applied to the digital channels when searching for Breaker and Event channels.

3. File Manager (Process Templates): Added debug information when a channel defined in a line group cannot be found in the file. The Channel name, the line group and the line group filename is written to a Debug.fil file located in the Wavewin Folder. This works for both analog and digital channel.

4. Data Plotting (Analog Channels): Increased the Analog Channel title characters from 40 to 50.

Wavewin H.N.2 - 11/25/2020

1. File Manager (Process Templates): When Wavewin reads a Comtrade file it composes the analog channels titles from the 2nd, 3rd, and 4th fields (ch_id, ph and ccbm) in the Comtrade CFG file. For example if the first 4 fields in analog channel information in the CFG file for channel 1 is:
   1,A1,A,Feeder 780M - A Phase
   Then the channel title will be: A1 A Feeder 60M - A Phase
   The three field are separated by a space.
   Some DME equipment are changing the information in the first two fields from one fault file to another. If a line group is setup to look for channel titles using a string then some channels are not being found because of the changes. Wavewin now deletes the first 2 fields in the name when searching for the 3 Voltage and 4 Current channels for the line group.
   Also, the same is true for the digital channels. Wavewin uses 2nd, 3rd and 4th fields to compose the name. The same was applied to the digital channels when searching for Breaker and Event channels.

Wavewin H.N.1 - 11/11/2020

1. File Manager (Process Templates): Added code to remove all begin and end blanks from the Station name inside the Comtrade CFG file. If blanks are included in the station name then the line group file will not match.

2. File Manager (Process Templates): Added code to look for the first Breaker or Events that triggered In the line group rather than looking directly adding the digital channel information in the DIG file.

Wavewin H.N - 10/30/2020

1. File Manager (Create SER Files): Corrected an error where the digital data being binned into memory was not being freed which caused a memory leak.

Wavewin H.M.17 - 09/17/2020

1. File Manager (Automatically Rename Files): Added a new feature to Automatically rename waveform/load files to the IEEE ComNames format. This new feature monitors a folder for waveform/load files with user defined extensions. When a file is detected in the source path or in its included folders it will first move the original file to the Archive path then read the file's configuration information and rename the file to the destination path. To activate this feature select the Auto Rename Files option under the Options menu/tab. A dialog will be displayed. Enter the Source Path, click the Include Sub Folders check box if needed. Enter the Destination and Archive Paths. Enter all file extensions (*.DAT,*.CEV,*.CFF) and the scan period. If this feature needs to start when Wavewin runs click the Automatically Start Auto Rename Files at Run Time checkbox. The bottom section of the dialog gives a status update on the activity of the process. It displays the last scan time, the original and Renamed filenames and when the next scan will start in minutes. To start the process click the Start Rename button.

Wavewin H.M.16 - 08/29/2020

1. File Manager (Create SER Files): Added a new feature to create SER files for each waveform file. This new feature monitors a folder for waveform files with user defined extensions. When a file is detected it will read the file and create a comma delimited SER file from the digital channel activity. The SER file will have the same name as the original waveform file. To activate this feature select the Create SER Files option under the Options menu/tab. A dialog will be displayed. Enter the Source Path, click the Include Sub Folders check box if needed, enter the file extensions (*.DAT,*.CEV,*.CFF) and the scan period. If this feature needs to start when Wavewin runs click the

Automatically Start Create SER File at Run Time checkbox. The bottom section of the dialog gives a status update on the activity of the process. It displays the last scan time, the original and SER filename being processed and when the next scan will start in minutes. To start the process click the Start Create button.

2. File Manager (Zip Marked Files): Updated the zip compression components. This upgrade now allows including folders in the zip file and for adding a password to the zip file.

Wavewin H.M.10 - 07/06/2020

1. Data Plotting (Auto Play Waveform): Added three new buttons to the Ribbon and 3 new menu options to the menu system. The new options will auto play the displayed analog and digital channels. The Ribbon's new buttons are located in the Data plotting's main toolbar and the menu options are under the Data menu. This new feature will move the channels to the left keeping the data cursor fixed at one cycle from the beginning of the display. In the Ribbon system the button to the left of the auto play button is a button to slow the speed of the waveform movement and to the right is a button to increase the speed of the waveform. In the Menu system use the menu options to increase or decrease the speed of the waveform.
   The auto play Waveform does extensive drawing to the screen. To minimize flicker and slow drawing select a maximum of 7 channels and expand the time scale to see a smooth transition when the analog channels are played. The drawing is done in the background. This allows for marking, deleting, expanding, contrasting, scaling channels and more while the Waveform is being played.

2. Data Plotting (Digital Groups): Added an option inside the Save View dialog to create digital groups. When a record is open, Wavewin will only display the digital channels that changed state. When creating digital groups all of the digital channels may have to be displayed prior to opening the Save View dialog. Before opening the Save View dialog select the All Digital ribbon item in the Waveform tab. This will include all of the digital channels in the Save View dialog. The new Digital Groups section is disabled until the New Group button is clicked. To create a digital group use the Mouse to select the digital channels in the Digital Channel's list box. Next, click on the New Group button. Once the New Group button is clicked the Digital Group section will be enabled and the Digital Group Name field will have the focus. Type in the name of the new group and hit enter or click the Save button. The table below the Digital Group Name field will be populated with the name of the digital groups in the first column and the number of channels in that group in the second column. When a view is selected with Digital Group defined in the view a new drop down button is added to the Data Plotting main toolbar. The new drop down lists all the Digital Groups in the View. To display a digital group select the group from the drop down menu. By default Wavewin only displays the triggered digital channels for each group. To view all the digital channels in the group click on the All Digital ribbon item in the Waveform tab.

3. Data Plotting (Digital Channels): Increased the maximum number of digital channels from

2048 to 4096.

4. File Manager (Auto Convert to Comtrade/ComName Rename): Removed a 14 character limitation for the station and device names in the ComName format when renaming files to the long format either directly from the File Manager or through the Auto Convert to Comtrade.

5. File Manager (Auto Convert to Comtrade): When the auto convert to Comtrade tries to copy waveform files to the destination path it was not coping the support files with the data file. This applied to Comtrade files, Emax files, Transcan file and Rochester files. It now copies all support files to the destination path.

6. File Manager (Change Filename): Added a new option in the File Manager to change the names of the marked files in a path or all the files in a path. The new option is under the File menu in the menu system and under the File tab in the ribbon. The new option is called Change Filenames. This new feature allows for adding new information to the end of a filename or removing characters from a filename. For example if there are pound signs in a number of file that need to be removed open the dialog select the Remove option, type # in the File String edit field then select Marked Files or All Files and click OK. If there are no marked file in the path then the Marked Files radio button is grayed out.

Wavewin H.M.6 - 10/28/2019

1. File Manager (Auto Convert to Comtrade): Added support to perform a number of tasks for the Source Path, Destination Path and Archive Path. There is a new button in the Auto Convert to Comtrade dialog called Advance. The Advance button displays the Advance Settings dialog. This dialog has 3 sections, one for the Source path, one for the Destination Path and the last one is for the Archive path. The Source path section allows for including Sub-folders when scanning for files to convert to Comtrade. The Destination path section allows for renaming the destination files to be named using the IEEE long file naming format. The Archive path section allows for renaming the archive files to the IEEE long file Naming format. It allows for appending all like files into one Comtrade file for an entire year. If append is selected then the drop down list will be enabled asking what to do with the files that have been appended: Delete the files or Backup the files. If Backup is selected an edit box is displayed to define the path where the files are to be moved to.

2. File Manager / Data Plotting (Append Files): After appending files the number of appended files is added to the data plotting's window header. For example, if 28 files were successfully appended the final result will be displayed in the data plotting window and the window header will look like:
   28 Appended Files – the first file's original name – date and time – Values – (file type)
   Also, the maximum number of files that can be appended was increased from 100 to 400.

3. Data Plotting (SEMI F47-0706 Chart): Added a new option under the Channels tab called SEMI F47 Voltage Sag Chart. This chart is for Voltage channels only. First mark the

desired voltage channels in the data plotting window then select the new option. In the chart each channel is display at the voltage sag level on the y-axis and the duration of the sag on the x-axis. Each channel's dot is colored the same color as it is plotted in the data plotting window.

4. Data Plotting (3-D Drawing): Added a new option under the Channels tab called Draw 3-D Plot. This Draw 3-D plot will draw a maximum of 3 channels. First mark the desired channels in the data plotting window then select the new option. In the plot each channel's number, title, maximum and minimum values for the entire signal along with the channel's fault duration in cycles and milliseconds. Each channel's 3-D plot is colored the same color as it is plotted in the data plotting window.

5. File Manager (Display Dialog – Analog Table Font Size): Added a new option in the File Manager's Display setting dialog under the data plotting tab. The new feature allows for setting the Analog Table font size. The options are Sizes: 8, 9 , 10, 11, 12, a4 and 16.

6. File Manager (Display Dialog – Duration): Added a new section in the File Manager's Display dialog under the data plotting tab. The new section is called Duration Calculation. There are two calculations used when determining the fault duration and sag duration. This section allows for modifying these calculations. When a file is open an RMS value is calculated at each sample using a running RMS calculation. After the first full cycle the duration equations are run on each sample using the RMS values.

7. Data Plotting (Harmonic Power Calculator): Added a new power calculator to the data plotting window. The Power calculator requires 1 marked voltage channel and 1 marked current channel. First marked the required channels then select the Power Calculator option under the Data tab. The calculator displays MWatts and MVars for all harmonics of the signal. The following calculations are used:
   - MWatts = (V * I) O Cos(Øv - ØI)
   - MVars = (V * I) O Sin(Øv - ØI)

8. Data Plotting (Digital Search): Modify the search digital channels feature to mark and move the found channels to the top of the digital channels.

9. Data Plotting (Save View): Defaulted the Save View path to be the path where the file is located.

10. Data Plotting (RMS Calibrated Channels): In RMS Calibrated Files added an option in the analog table popup menu to remove the root 2 multiplier from all of the marked analog channels. In the Channel display window added a * in front of each analog channel's number to show the channel is multiplied by root 2.

Wavewin H.M.4 - 05/20/2019

1. Data Plotting (Default.LNG): Added support for a Default Line Group to Process Template files for same types of files that have the same analog channel layout but have

different station names, such as processing all SEL 311 files. Create a Line Group file called Default.LNG and save the file to the path where all the same types of files are located.

2. Data Plotting (Line Impedance Comtrade): When saving a file as Comtrade Wavewin will save the line impedance values in the Comtrade header file. When the Comtrade file is read it will pick up the Line Impedance values and use them in the Fault Location Dialogs.

3. Data Plotting (Wave Driver): Updated the Wave Audio driver to support the latest format.

4. Data Plotting (Circular Chart): Added support to show negative values in the Circular Chart diagram. All negative values are marked with a small circular at the negative value.

5. Data Plotting (Synchro-phasor Comtrade Files): Added support to read Synchro-phasor (real and imaginary) data saved in the Comtrade file. Wavewin checks the CFG file analog channels for a R or I in the Phase column. If they exist then it will calculate the Phasor from the real and imaginary values and plot the phasors in the Phasor diagram.

6. Data Plotting (Mark and Save): Added two new commands to the template file, + and -. The + command writes the channels maximum value to the values files, and the - command writes the channels minimum value to the values file. Also added the L and G commands for the + and – command to indicate alarm or normal if the value following the L or G is Less than or Greater than.
   Example: [^1:+:7] for maximum values and [^1:-:7] for minimum values.

7. File Manager (Save As Comtrade): Corrected a problem saving a file from the file manager as Comtrade. The CFG file information was missing the digital channel information.

8. File Manager and Data Plotting (Save As Comtrade): Added support to remove all commas from the Station and Device names before saving the information in the first line in the Comtrade CFG file.

Wavewin H.M.3 - 03/15/2019

1. Data Plotting (Automatically Append Files): Corrected the auto append when a Comtrade .CFG file is double clicked on. The system was trying to append all common files instead of opening the file in the ASCII Editor.

2. Data Plotting (Mark & Save): Added the Less than (L) and Greater than commands

for the new % operator.

Wavewin H.M.1 - 02/22/2019

1. Data Plotting (Automatically Append Files): Added support to automatically append a device files within a selected time frame. In the Display Dialog off the File Manager's Option menu there is a new option under the Data Plotting tab to turn on the automatic appending and to specify the time period in minutes. When the automatic appending is On the file manager will scan all IEEE long filenames in the same path and include any files that match the time period, the substation, device and company names. All matching file will be plotted in the same window appended by time.

2. Data Plotting (Digital Toggled Channels): Added support to show only the digital channels that toggled state. In the Display Dialog off the File Manager's Option menu there is a new option under the Data Plotting tab to turn on/off showing only the digital channel's that toggled.

3. Data Plotting (Primary Values): Added support to always open waveform files with Primary values. In the Display Dialog off the File Manager's Option menu there is a new option under the Data Plotting tab to turn on/off showing Primary values when a file is open.

4. Data Plotting (Mark & Save): Added two new template items: F for Harmonic data and % for change in Nominal. Please refer to the help for specific details.

Wavewin H.M - 02/03/2019

1. Data Plotting (Move Digital Channels): Added support to move the digital channels using the plus (+) and minus (-) keys. To move digital channels first mark the channels then use the plus key to move them up and the minus key to move them down.

2. Data Plotting (Search Digital Channels): Added support to search for digital channels. To search for certain digital channels select the Search Digital Channels option under the Channel menu. For a single channel search enter the channel title in the search box then press enter. If found the digital channel will be displayed.
   To search for multiple digital channels enter the channel title in the search box then press the Add button to add it to the Search List. Once all titles are entered press Search. The star Wildcard (*) is accepted in each search.

Wavewin H.L.7 - 09/09/2018

1. File Manager (Auto Process Templates): Added the ability to process TIS files.

2 File Manager (Auto Process Templates): Corrected a problem when entering a single line group for the /Line= field inside the Template files.

3. Data Plotting (Line Groups - Versioning): Added a new option in the File Manager's Display dialog under the Data Plotting tab to turn On/Off creating a version of the line group files when a file is opened. The default is Off.

Wavewin H.L.2 - 07/03/2018

1. File Manager/Data Plotting (Email): Added support to email files from Wavewin using Outlook 2016.

Wavewin H.L - 05/29/2018

1. Data Plotting (Adjust File Time): Added an option to adjust the displayed files date to the existing Adjust File's Time dialog.

Wavewin H.K - 03/20/2018

1. Data Plotting (Digital Channels): Corrected a problem displaying the digital channels after marked digital channels are deleted. This problem occurred when there are more digital channels listed then displayed.

Wavewin H.J - 02/25/2018

1. File Manager (SOE Manager): Add the path to filename column. Clear the SOE Manager before a refresh if the SOEDTB.DTB file does not exist in the source path.

2. Data Plotting (Mark and Save): The last template and Values file is maintained in the dialog if the Auto Process Template was processed or the Mark and Save dialog is opened from the Data Plotting window.

Wavewin H.I - 10/25/2017

1. Data Plotting (Single Ended FL - Three-Phase): Added a new tab to the Single Ended Fault Location Dialog to calculate a Three-Phase Fault Location. The Three-Phase calculator requires 3 faulted voltage channels and 3 faulted current channels. Select the faulted channels from the drop down lists and enter the positive line

impedance magnitude and angle. Click the Calculate button to see the result at the data bar.

2. Data Plotting (Double Ended FL): Added the results of the double ended fault location for Positive, Negative and Zero Sequence to the Report. Click the Report button to see all 3 fault locations.

Wavewin H.H - 10/01/2017

1. Data Plotting (Single Ended FL - Multi-Phase): Added a new tab to the Single Ended Fault Location Dialog to calculate a Multi-Phase Fault Location. The Multi-Phase calculator requires 2 faulted voltage channels and 2 faulted current channels. Select the faulted channels from the drop down lists and enter the positive line impedance magnitude and angle. Click the Calculate button to see the result at the data bar.

Wavewin H.G.18 - 05/01/2017

1. Data Plotting (Change Line Frequency): Added a new dialog to change the Line Frequency of the active data plotting window. The new dialog is accessed from the Data menu under the the Change Line Frequency menu option.

Wavewin H.G.14 - 03/27/2017

1. Data Display (Email File): Corrected emailing the wrong file when selecting the email file option inside the data plotting window.

Wavewin H.G.13 - 03/20/2017

1. Batch Report (Data Bar): Set the data bar 1.5 cycles from the first RMS trigger in the current channels.

Wavewin H.G.10 - 02/14/2017

1. Batch Report (/Template=): Added support for multiple Template files defined on each line in a Batch Mode configuration file.

2. Batch DIG Report (Double Ended): Flipped the order of the Data Plotting Windows when requesting a Double Ended Display.

Wavewin H.G.9 - 01/24/2017

1. Fault Report (Comma Delimited Table): Added specific functionality to the comma delimited table to automatically open fault location reports that have the .DIG extension. The table also allows for viewing a fault location report for each entry in the table. It also allows for automatically opening both ends of a line and displaying the double ended fault location dialog.

Wavewin H.G.8 - 12/12/2016

1. Data Plotting (Mark and Save): Added a new template command to calculate the maximum value minus the minimum value divided by 2 ((max-min)\2), example <^3:M>. The new M command works on the entire channel not on a sample bases. The <> or [] brackets can be used.

2. Data Plotting (Mark and Save): Improved the trigger capabilities for the :B, :M, :N and :S commands. The trigger now requires a L or G before the value. L is for less than and G is greater than, <^1,^2,^3:NG5000>. If the result of the :M, :B, :S or :N command is true then Alarm is written to the Values file else Normal is written.

Wavewin H.G.7 - 12/02/2016

1. Data Plotting (Mark and Save): Added a new template command to calculate the negative sequence magnitude of 3 analog channels, <^1,^2,^3:N>.

2. Data Plotting (Mark and Save): Added a new template command to set a trigger for the :B. :S and :N commands, <^1,^2,^3:N5000>. If the result of the :B, :S or :N command is greater than the trigger then Alarm is written to the Values file else Normal is written.

Wavewin H.G.4 - 10/07/2016

1. Data Plotting (Harmonics): Modified the Harmonics window to not show the mirrored Harmonics. To display the mirrored harmonics open the properties dialog select the Display Settings tab and select ON for the Mirrored Harms field.

Wavewin H.G.3 - 09/14/2016

1. Data Plotting (Line Groups): Added support to plot up to 10 Software Analog Channels (SAC) per line group. The SAC channels are calculated when the line group is selected.

Wavewin H.G.2 - 09/06/2016

1. Data Plotting (Single Ended FL): Added support to select the values to plot in the Single Ended Fault Location. A drop down list was added next to the Fault Location results to select either the Fault Location values or Fault Impedance.

2. Data Plotting (Single Ended FL): Added support to always display the fault location results in miles.

3. System (Wavewin Display Coordinates): Added support to display Wavewin maximized if Wavewin was previously displayed in a connected monitor that was removed from the list of connected monitors.

Wavewin H.F - 06/16/2016

1. Data Plotting (LNG Line Groups): Removed the re-processing of the SAC channels when the Adjust Offset is called in the line group .LNG that has the setting Offset=Y.

2. Data Plotting (LNG Line Groups): Added a new feature in the line group .LNG files called Offset=Y. This new feature will automatically apply the adjust offset to the line group channels when the line group is selected.

3. Data Plotting (Digital Channel Spacing): Added a new feature to allow for changing the spacing between the digital channels. The new option is available in the data plotting properties dialog under the Display Setting tab. To increase or decrease the spacing between the digital channels select a number from the Digital Height drop down list.

4. Data Plotting (Digital Channel Color): Added a new feature to allow for changing the triggered color portion of the digital channels. The new option is available in the data plotting properties dialog under the Colors tab. To change the color of the triggered portion of the digital channels select a color from the Digital Triggers Colors drop down list.

Wavewin H.B - 04/04/2016

1. Reports (SOE List): Added support to save the Trigger date and time fields as two separated columns when using the Save and Save As menu options. The day, month, year, hour, minute, seconds and milliseconds in the table are separated as single columns for easy search and sort.

Wavewin H.8 - 10/25/2015

1. Date Plotting (Adjust Offsets): Added a new menu option called Adjust Offsets under the Options menu. The Adjust Offsets feature finds the maximum and minimum values between the data bar and RMS bar and

applies the following equation to each sample: (max-min)/2)+min. The adjust offsets is applied to the marked analog channels. If no channels are marked then it is applied to all visible channels.

Wavewin H.7 - 10/12/2015

1. Date Plotting (Mark and Save: Unbalance): Added a new template command to calculate the unbalance of 3 analog channels using the DFT magnitude, <^1,^2,^3:B>. The unbalance command finds the largest and smallest magnitude of the 3 channels, the result is the difference between the largest and smallest.

2. Date Plotting (Mark and Save: Skew): Added a new template command to calculate the skew of 3 analog channels using the angles, <^1,^2,^3:S>. The skew command adds the angles for the 3 specified channels. One of the 3 analog channels must be marked as a reference channel.

3. Date Plotting (Mark and Save: Header): Added a new template command to add a header to the Values file. To add a header to the Values file, define the first line in the template file with <Header>= followed by the header information. For example, the following two lines define the header and the data of the Values file:

   ```
   <Header>=  Station, Device, Date, Time, RMS, Angle
   <Station>, <Device>, <Date>, <Time>, <^1:R>, <^1:P>
   ```

4. Date Plotting (Mark and Save: Use Default): Added a new check box in the template section to Use the Default save. The Use Default check box will automatically write the visible analog channel columns separated by commas for all visible analog channels in the Values notepad. The header for each column is added to the values file on the first line.

Wavewin H.6 - 09/30/2015

1. Date Plotting (Passed Parameters-Prefault Report): Added two new passed parameters /Line= and /Template="".
   The /Line= parameter specifies what line group to apply when a file is open using the passed parameters. /Line= can specify a specific line group or ALL which indicates to open all line groups. The /Template="" specifies what template file to use when creating automatic reports.

   Example passed parameter: "c:\files*.DAT" /Line=All /Template="c:\template\create-report.txt" /Exit

   The above example will open each file with an extension of .DAT, select the first line group then apply the template. It then selects the next line group and applies the template and so on until all line groups have been selected. After all line groups have been selected and the template applied to each line group the software will close using the /Exit command.

   The template report is saved to the same path where the template file is located.

2. Date Plotting (Passed Parameters-On Demand DEFL): Added a new passed parameter to automatically do a double ended fault location. The new passed parameter is FLAuto.RUN. When the software sees the FLAuto.RUN file it opens the file, reads the two fault files path and filename and line groups (if needed). It opens the two files, applies the line groups, tile the two files, opens the double ended fault location window, requests a report then closes Wavewin.

   Example FLAuto.RUN File:

   "C:\Faultlib\041002,130008523800,,Near Side,Transcan1991,.CFF" /Line=F35
   "C:\Faultlib\041002,130008531157,,Far Side,USI_2002,.CFF" /Line=S23

   The fault report is saved to the same path where the near side file is located.

Wavewin H.5 - 09/21/2015

1. Date Plotting (Line Frequency): Allowed for the line frequency to be specified as a real number with 2 decimal digits of accuracy.

2. Date Plotting (SAC Angle Calculations): Added phase angle conversion equations to mitigate discontinuity in the plotted traces by ensuring that all angles are represented between -180 and 180 degrees.

Wavewin H.4 - 09/05/2015

1. Date Plotting (Edit Mark Analog Scans): Added a new dialog to edit the Marked Scans. The new dialog is accessed from the Edit Marked Scans menu option under the Values menu. The Edit Marked Scans dialog allows for adding comments to each scan and for deleting existing scans. Each comment has a maximum of 40 characters. To add a comment double click on the comment fields in the table, the editor will be displayed. The up and down arrow keys will move the editor to the next or previous comment fields. To exit the editor press the Escape key. To view the comments for each scan in the data plotting window mouse over the marked scan tick marked displayed above each marked scan. To delete scans from the list check the box next to the scans then click the Delete button.

2. Date Plotting (Double Ended Fault Location): Added a new button to view and save an ASCII report for the fault location. The new button is called Report. The report button will save and display an ASCII report for the current fault location. The report is saved to the same folder where the open files are located and is named in the following format:
       Current Date, Current Time, Near Side Station, Near Side Line, Far Side Station, Far Side Line, Fault Location.TXT
   After the file is saved the report is displayed in a rich text editor. The editor allows for adding information to the report.

3. Date Plotting (Single Ended Fault Location): Added a button to view and save an ASCII report for the fault location. The new button is called Report. The report button will save and display an ASCII report

for the current fault location.
The report is saved to the same folder where the open file is located and is named in the following format:
    Current Date, Current Time, Station, Line, Fault Location.TXT
After the file is saved the report is displayed in a rich text editor. The editor allows for adding information to the report.

4. Date Plotting (Double Ended Fault Location): Added more logic to the units selection for the line length. If the line length units are selected as percentage then the line length is automatically defaulted to 100.

5. Date Plotting (Sequence Components): Corrected the header information for the Sequence Components dialog.

Wavewin H.3 - 08/05/2015

1. Date Plotting (Mark Analog Scans): Added a menu option and shortcut key to easily mark Analog scans. The new menu option is under the Values menu called Mark Scan. The shortcut key is Ctrl-S.

2. Date Plotting (Navigate to Marked Analog Scans): Added a menu option and shortcut key to easily navigate to the marked Analog scans. The new menu option is under the Values menu called Next Mark Scan. The shortcut key is Ctrl-X.

Wavewin H.2 - 06/15/2015

1. Date Plotting (Mark and Save): Improved the Mark and Save Sample date window. Below is a list of changes:

   A. Changed the Mark and Save menu option under the Values menu to open the Mark and Save Window.
   B. Added a Template Section to view the contents of the template and to select the active template from a drop down menu. New Template files can be added to the drop down list by using the Browse button.
   C. Added a Mark button inside the Mark and Save window to add sample data to the Values window.

Wavewin H.1 - 06/05/2015

1. ASCII Editor (CR/LF): Added support to read an ASCII file with any combination of the CR LF at the end of a line.

2. Date Plotting (VFT Data): Added a new display driver to read VFT Data files.

3. Data Plotting (Auto Scale ++ Mode): Added a new setting in the properties dialog to switch between Dynamic mode and fixed mode for the ++ Auto Scale. Dynamic scales each channel to the maximum display for each channel. Fixed mode scales each channel to the average value for all

displayed channels.

4. Data Plotting (Pick, Mark and Save): Added new fields that can be defined in the Format files. The new fields are:

   <Device> - Writes the Device name in the Values file.
   <Cycles> - Writes the number of cycles from the fault bar to the data bar in the Values file.
   <DeltaX> - Writes the Deltax value from the fault bar to the data bar in the Values file.

5. Data Plotting (Pick, Mark and Save): Corrected a data type problem when writing the date and time at the cursor position to the Values file.

Wavewin G.Z - 05/05/2015

1. Data Plotting (Phasors): Updated the phasor scaling after isolating channels in a view.

2. Data Plotting (Double Ended Fault Location): Added Fault Resistance to the double ended calculator. Also added the ability to select the units for the line length.

3. Data Plotting (SEL Driver): Added support to read SEL's CT and PT ratios from the CEV header section.

4. Data Plotting (Comtrade Driver): Added support to default the Scale Factor and B factor inside the CFG file if there is no value defined. A message box is displayed indicating that the values have been defaulted.

5. Data Plotting (Single Ended FL): Added a check that prevents a division by zero when the Z1 and Z0 angles are set to 0.

6. File Manager (ASCII Editor): Increased the buffer to support line lengths greater than 1024 characters.

Wavewin G.Y - 04/16/2015

1. File Manager (ASCII Editor): Added support to read the tab ($09) command in the ASCII editor.

Wavewin G.W - 02/23/2015

1. Data Plotting (Double Ended Fault Location): Added a graphical interface to show the fault location on the line from both the near and far ends of the line.

2. Data Plotting (Double Ended Fault Location): Create a text file report when the fault location is

calculated. The report file is saved to the Wavewin path and is called WAVEDEFL.DTB.

3. Data Plotting (SAC H=0): Added support to plot the DC Offset of a channel using the SACs. Example to plot the DC Offset of Channel 3 enter +3/H=0/u=Amps/ or +3H=0/u=Amps/ in the Channels Operators field.

4. Data Plotting (Append Open Files): Corrected a problem when Appending Open Data Files. The process of copying the existing data plotting variables to the new appended window was causing an exception error.

Wavewin G.V - 01/28/2015

1. System (/Comtrade passed parameter): Added a new option to the /Comtrade passed parameter. The /Comtrade=3 option will open the specified event files, select the default view then save only the channels in the default view to a Comtrade 1999 Binary file format.

Wavewin G.U - 12/29/2014

1. Data Plotting (SACs in Views): Added support to save SAC channel names and operators in a User defined view. The SAC operator is saved next to the Channels name surrounded by brackets.

```
20,Add Channels 1 2 3[+1/+2/+3/u=A/]
21,Add Channels 5 6 7[+5/+6/+7/u=V/]
```

   The SAC channels are calculated when the view is selected.

2. Data Plotting (Open View Automatically): Added an option to have a default view automatically displayed when a specific file type is opened. To create a default view open the desired event file, select the analog and digital channels for the view and press enter to show only the selected channels. Next select the Save View menu option under the View menu. Enter the path were the event is located. The View's file name is automatically defaulted to the extension of the displayed file (keep the default name). Click OK to save the view. Close the data plotting window. In the file manager select the Display menu option under the Options menu. Select yes for the Open View field under the Data Plotting settings section. Click OK to save. Open one of the event files that has the same extension as the view's filename. The view is saved with the .VIW extension.

3. System (/Comtrade passed parameter): Added a new option to the /Comtrade passed parameter. The /Comtrade=2 option will open the specified event files, select the default view then save only the channels in the default view to a Comtrade file. The Comtrade file is in the 1991 ASCII format and is saved to the same path where the event file is located and named using the same name as the event file.

Wavewin G.S - 10/22/2014

1. Data Plotting (Save As Comtrade): Corrected a problem with Saving RMS calibrated data values when the "Convert RMS calibrated date to peak type is set to yes. The conversion during saving to Comtrade will be applied in the data plotting window only and the data type must be set to RMS Type.

Wavewin G.R - 09/03/2014

1. Data Plotting (Harmonics Window): Display the percentage of DC Offset in a channel as Harmonic 0. Harmonic 0 is displayed as the first harmonic in the table and in the histogram view.

2. Data Plotting (Reference Vector): Added a new menu option under the View menu to display the phasor vector at the Reference Bar to measure Neutral Shifts. The new menu option is called Reference Vector. The new menu is an On/Off feature defined by a check next to the menu option. Checked equals display vector and unchecked hides the vector.

3. Data Plotting (LPG and R Line Groups): Added support to read the channel colors from the line groups defined in the Comtrade .DAT file corresponding .LPG files and from the R***.inf files.

4. Data Plotting (Set Data Bar): Added a new menu option under the View menu to automatically set the Data Bar position to 2 cycles from the Fault bar. If this option is turned on the data bar is automatically positioned 2 cycles from the fault bar when opening files. The new menu option is called Auto Set Data Bar. The new menu is an On/Off feature defined by a check next to the menu option. Checked equals automatically set the data bar to 2 cycles from the fault bar and unchecked sets the data bar one cycle from the first sample.

5. Data Plotting (Single Ended FL): Added support to automatically fill in the V,I and N channels drop down list from the first 3 marked channels in the active data plotting window.

6. Data Plotting (Double Ended FL): Added support to automatically reference VA as the referenced channel for both near end and far end windows if no analog channels are marked in the displayed windows.

Wavewin G.Q - 08/04/2014

1. Data Plotting (Scale by Units): Added a new Auto Scale mode to Scale channels according to the channel units. Current channels are scaled with respect to each other and Voltage channels are scaled with respect to each other.

2. Data Plotting (Super Impose): Added support to have multiple super imposes in the analog channel plot screen.

3. Data Plotting (Plot Single Ended FL): Added support to plot the Single Ended Fault Location in the Data Plotting window. A new button was added to the Single Ended Radial and Reactance tabs to

plot the FL for the whole record or between bars.

4. Data Plotting (Plot Double Ended FL): Added support to plot the Double Ended Fault Location in the Data Plotting window. A new button was added to the Double Ended dialog to plot the FL for the whole record or between bars.

Wavewin G.P - 07/20/2014

1. Data Plotting (Scale Table Column): Added support to increase or decrease the Scale column value when a channels Amplitude is increased or decreased.

Wavewin G.M - 04/10/2014

1. Data Plotting (Fast SAC): Corrected a problem with the + and - sequence equations being flipped.

Wavewin G.3 - 03/25/2013

1. Data Plotting (Y Scaling): Changed the PixDisp column to display the number of Volts or Amps per inch in the current view/print according to the number of pixels per inch of the screen or printer.

Wavewin F.Z - 02/07/2013

1. Data Plotting (Comtrade 2013): Added support to read the new Comtrade 2013 format. Also added the save as Comtrade to support the Comtrade 2013 format.

Wavewin F.Y - 01/14/2013

1. File Manager (Passed File Parameter): When a file is passed as a passed parameter to Wavewin it use to first open the file manager then open the passed file. It now just directly opens the file. Directories that have thousands of file takes allot of time to load. This version speeds up the display of passed files.

2. Data Plotting (Drag and Drop Analog Channels): Added the ability to drag and drop mark analog channels to a new position in the analog trace section.

Wavewin F.X - 12/17/2012

1. File Manager (Append Logs): Modified the append logs engine to sort the marked logs file according to the fault date and time. In previous version is was sorting them by save date and time.

Wavewin F.W - 11/28/2012

1. Data Plotting (Bitronics RAW Files): Added a display driver to plot the Bitronics RAW Trend files.

Wavewin F.T - 10/10/2012

1. File Manager (Networked Drives): Improved the reading of the drive letter from the network drive name. In previous versions the network drive was read from the information between the last ( ) symbols in the string. In some cases the information between last ( ) symbols is not the network drive. It now looks for the ':' between the ( ). If not found then go to the next () symbols.

2. Data Plotting (Mark & Save): Corrected a problem with the mark and save not reading the selected format file correctly from the menu option.

Wavewin F.Q - 08/20/2012

1. File Manager (User Shortcuts): Added user defined shortcuts to menu options in the File Manager and Data Plotting windows. To define shortcuts open the File Manager's Display dialog (located under the Options menu). Click the Shortcuts button. Two tabs are displayed below the dialog definition "File Table" and "Data Plotting". To add shortcuts click the menu options under the "Actions" list and click the Move button (green arrow). Shortcuts can be deleted, moved up and moved down in the list. A drop down menu button is displayed in the button menu bar with the selected shortcuts.

Wavewin F.P - 08/03/2012

1. Data Plotting (Fast SACs): Added support to add new SAC header and operators to the Fast SAC file by the users. The Fast SAC file (SacList.FMT) is not included with the downloaded zip file. When the system is ran Wavewin will look for the SacList.FMT file if it is found it will read and bin the contents into memory. If it is not found it will create it with the 16 default SAC header and operators.

2. Data Plotting (Save As Comtrade): Added support to clean all illegal filename characters, carriage return and line feeds from the station and device names before saving to Comtrade using the IEEE long file naming format. In previous versions the Emax station information read from the Emax CTL file contained carriage returns and was causing a problem saving the files as Comtrade.

3. Windows 7 (Dialogs): Adjusted the dialog sizes to accommodate the screen size. If a dialog is larger than the screen then scroll bars are displayed to scroll through the dialog. Also, automatically size the dialog according to the dialog fields and not as default values.

4. Windows 7 (ASCII Editor): Adjusted the ASCII text marking to mark the text with reference to the font character width and not the default width. Some Windows 7 systems have character sizes that are different from the defined default width.

5. Windows 7 (Date and Time Blinking): Minimized the date and time blinking in the systems main menu bar by turning off the Transparent field.

Wavewin F.N - 06/04/2012

1. Data Plotting (Fast SACs): Added a drop down list to the SACs operator fields. The drop down list allows for selecting predefined Fast SACs. The position of the channel number is replaced with a pound sign #. If there are marked channels in the data plotting window then the pound sign is replaced with the marked channels number. If no channels are marked the user will have to replace the pound sign with the desired channel numbers. To have the Fast SAC header automatically copied to the SAC title fields click on the check box located at the bottom of the Fast SAC drop down list.

Wavewin F.F - 10/10/2011

1. Data Plotting (Reference Angles Across Windows): Allow for referencing angles across open windows when not in Sync mode. In previous versions it was required to have sync mode on to see angles referenced across windows. To reference angles across windows open the Windows Properties dialog click on the "Display Settings" tab. The last field on this tab allows for activating referenced angles across windows.

Wavewin F.D - 07/05/2011

1. File Manager (Default Path): Added support to define the default path the file manager will always open in. To define the file manager's default path, select the "Display" menu option under the "Options" menu. Enter or browse to select the desired path in the "Default Path" field. When the file manager is opened it will attempt to display the folders and files in the default path, if it cannot connect to the default path then the Wavewin path is displayed.

2. Data Plotting (Sequence Calculator): Added the display of the phasor chart to the sequence calculator. Also, added support to display the sequence calculator for a single end or if two files are open display the sequence calculator for both end to end files. Also, added the selection drop down lists to define the channels for VA, VB, VC, IA, IB and IC.

3. Data Plotting (Fault Calculator: Double Ended): Simplified the Double End Fault Calculator. The new Double Ended Calculator displays the input fields: Z1 (Mag and Angle) and the Line Length on the left side of the window and the Fault location Output fields (Zero Sequence - FL0, Positive Sequence - FL1, Negative Sequence - FL2) in the middle of the window. To display more details such as the data values, the channels for VA, VB, VC, IA, IB and IC and the sequence components magnitude and angles

click on the "Show Details" button.

Wavewin F.C - 06/12/2011

1. Data Plotting (Merge Open Files): Corrected a scale factor conversion when merging open files that have been converted from the original values to primary or secondary quantities.

2. Data Plotting (Save As): Corrected a typo in the Save As menu under the CSV menu.

Wavewin F.A - 04/10/2011

1. Data Plotting (Digital Channel Original State): Added the default view to view all digital channels when there are no original state values defined in the Comtrade CFG file. Also, set the digital channel state at the cursor position to a red "D" in the digital channel table to define that the channels original states where defaulted to 0.

2. Data Plotting (Analog Channel Zero Axis Dotted Line): Corrected a problem when plotting the zero x-axis dotted line. The previous version was plotting the zero x-axis as a solid line when in a compressed view.

3. Data Plotting (Under and Over Triggers in SACs): Modified the way the under and over trigger checking is performed in the SACs.

Wavewin E.Y - 12/07/2010

1. File Manager (Move Files): Added the ability to drag and drop files into the folder tree for moving files to a new folder. Mark the files to move in the file table then drag them to the desired folder displayed in the folder tree.

Wavewin E.V - 08/23/2010

1. System (Passed Parameter): Added a new passed parameter to automatically convert a file to the IEEE C37.111 Comtrade ASCII 1999 format. The new passed parameter is /Comtrade. To retain the original file name of the source file use the /Comtrade passed parameter. To have the file automatically named using the IEEE C37.232 file naming format use the /Comtrade=1 passed parameter. The /Comtrade command line parameter can also be used in batch files. The converted Comtrade files are saved in the same directory as the source file. The new passed parameter will convert the source file to Comtrade then display the converted Comtrade file in the data plotting window.

   Below are some examples:

Examples:

1.) Passed Parameter: "c:\faultlib\shipdir\SEL-421.CEV" /Comtrade=1
Comtrade Filename: 011207,145119291000,-5,Station A,Relay 1,SOFTSTUF,TRIP,,
SOTF B_PHASE C_PHASE GROUND 50,60.00.DAT
2.) Passed Parameter: "c:\faultlib\shipdir\DATA1068.RCD" /Comtrade
Comtrade Filename: c:\faultlib\shipdir\DATA1068.DAT

Wavewin E.U - 08/17/2010

1. Data Plotting (Save Sample Values): Added a new menu option to the "Save As CVS" option. The new option will Save the Vector values in RMS and Angle. The four Save As options are now:
   1.) Save As CSV - RMS Values: Save the RMS Values in a comma delimited format.
   2.) Save As CSV - Instantaneous Values: Save the Instantaneous Values in a comma delimited format.
   3.) Save As CSV - Vector Values (Mag & Ang): Save the DFT Magnitude and Angle in a comma delimited format.
   4.) Save As CSV - Vector Values (RMS & Ang): Save the RMS Value and Angle in a comma delimited format.

2. Data Plotting (Harmonics): Increased the number of harmonics displayed from Samples/Cycle div 2 to the number of Samples/Cycle. Allows to see the mirror image of Nyquist harmonics.

Wavewin E.T - 08/05/2010

1. Data Plotting (Save Sample Values): Added a new menu option "Save As" to the "File" menu. There are two sub-menus under the "Save As" option: "Comtrade" and "CSV Format". The "Comtrade" option saves the displayed channels in either the ASCII or Binary format. The "CSV Format" will save the RMS, Instantaneous or Vector (Magnitude and Angle) values to comma delimited text file. The first line in the CSV file is the header information for each channel. All the analog channels that can be displayed in the active data plotting are saved. A dialog box is displayed to enter the destination path and the filename. The destination path is automatically defaulted to the active path in the file manager. The filename can be directly entered into the "File Name" field or the file can be automatically named using the IEEE long file naming format. To have the file automatically named click on the "ComNames" check box. If the "ComNames" check box is checked then the File Name field will be disabled. To enter a file name make sure the "ComNames" check box is unchecked.

Wavewin E.R - 06/27/2010

1. Data Plotting (Sequence Calculator): Added a Sequence Components calculator. The sequence calculator works off the active (highlighted) data plotting record. The channels in the active record must be

organized as follows: The first 3 visible channels are the Voltage channels, VA, VB and VC. The next 3 visible channels are the Current channels, IA, IB and IC. To reposition the analog channels first mark the channels then use the plus key to move the channels up one position and the minus key to move the channels down one position. The values populated in the dialog are read at the data bar position in the active record. The sequence calculator dialog is a stay on top window. This allows for repositioning the data bars without closing the dialog. To refresh the Voltage and Current values in the dialog use the Refresh button. Use the Calculate button to calculate the sequence components. To increment the voltage and current angles enter an increment value in the Angle Rotation fields and click on the Rotate button.
To open the sequence calculator dialog select the "Sequence Calculator" menu option under the "Data" menu.

2. Data Plotting (Primary/Secondary Ratios): Added the ability to change the primary and secondary ratio values for the analog channels in the open record. To change the ratio values open the "Window's Properties" dialog by selecting the "Window's Properties" menu option under the "File" menu. Click on the "Driver Data Type" tab then click on the "Edit Ratio Values" button under the "Analog Values" section.
In the Ratio Values dialog move the cursor to the specific Primary/Secondary values and change the displayed value. To apply the modified ratios click on the "OK" button. The modified ratio values are Not saved to the original file on disk. To save the ratios values to disk use the "Save As Comtrade" option listed under the "File" menu.

3. Data Plotting (Peak/RMS Type): All analog channels displayed are viewed as Peak type. To change the type of values displayed, open the "Window's Properties" dialog by selecting the "Window's Properties" menu option under the "File" menu. Click on the "Driver Data Type" tab then select the Data Multiplier type from the drop down list under the Analog Data Type section. To always have the driver specific files displayed as RMS type (Root 2 Multiplier) open the "Driver Configuration" dialog from the File Manager's "Option" menu. The Driver Configuration dialog lists all display drivers supported, click on the driver in the "Drivers" list then change the Driver's Data Type to RMS calibrated.

4. Data Plotting (Data Cursors): Corrected a problem with displaying the data bar in non-active data windows.

Wavewin E.L - 04/26/2010

1. System Tables (Mark Files): Removed the new single click marking. This feature is now an option in the "Display" dialog. The default is the Window's marking convention. To set the marking/unmarking using a single mouse click open the "Display" dialog under the table's option menu and select "Single Mark Click" in the "File Marking" drop down list.

Wavewin E.J - 04/21/2010

1. System Tables (Mark Files): Changed the way files are marked in the system tables. A single click on

a row will mark the row. To unmark the row click on the row again. The single click now works as a toggle between marked and unmarked.

Wavewin E.H - 04/14/2010

1. Data Plotting (Print Profile): Added the ability to save a print profile file when saving a view file. The print profile fields where added to the "Save View" dialog. The "Save View" dialog is a menu option under the "View" menu. The "Save View" dialog now has the ability to manipulate the channels in the view and to specify the print orientation and the type of ASCII Summary information to print Short=General Information, Advanced=General Information plus Channel Information.

Wavewin E.F - 01/14/2010

1. System (System): Allow strings with 10 characters to be converted to an integer value. In previous version the conversion to integer allowed only 9 character strings.

Wavewin E.E - 12/22/2009

1. Data Plotting (International Date Time): Added support to handle international date and time settings in the Window's Regional and Language settings. Previous versions where using the US date and time settings which was causing problems converting the date and time stored in some files.

Wavewin E.D - 12/10/2009

1. System (Data Plotting Print): Added support to print a file using a specific user defined view via the command line parameters. To print a view use the /PROFILE= "File path and name" along with the /PRINT command line parameter. Example:
   "c:\faultlib\comtrade\em files\DR1_0006.DAT" /Print
      /Profile= "c:\faultlib\comtrade\em files\Average Channels-D.VIWD"

Wavewin E.C - 11/30/2009

1. Data Plotting (Phasors): Added support to display the phasors using a common convention for showing polarity.

Wavewin E.7 - 10/12/2009

1. Data Plotting (SACs): Added 2 new SAC operators: "s" (Sin) & "c" (Cos). The "s" operator is used to compute the sin "c" is cos. These two new operators allow for calculating Power factor, Active and

Reactive Power. Refer to the SAC help window for application examples.

2. Data Plotting (Harmonics): Added a white background behind the harmonic values in the histogram display. This make the numbers more readable.

Wavewin E.6 - 09/28/2009

1. Data Plotting (Change Frequency): Added support for Changing the Frequency for Comtrade files that have a zero defined as the Sampling Rate. The change frequency engine calculates the fractional difference between the old frequency and new frequency once before performing the change frequency for each sample. Added the fractional difference for each sample.

2. Data Plotting (Primary/Secondary): Added resizing to the analog table column's width when changing the type of data displayed, primary and secondary.

3. Data Plotting (Save As Comtrade): Corrected a problem Saving a File As Comtrade from the data window when the File Manager table is closed. The Save As Comtrade engine was trying to access the File Manager's translate strings.

4. Data Plotting (Phase Angles): Added an option to toggle between showing the Cos Convention (0 Deg at Positive Peak) and the Sin Convention (0 Deg at Zero Crossing) for the phase angles. The new option is in the Window Properties dialog under the Display Settings tab.

Wavewin D.Z - 06/12/2009

1. Data Plotting (Syncrophasor Support): Modified the phasor displays to follow the syncrophasor convention (+Peak=0 Degrees).

2. Data Plotting (SACS): Added a set of fast recursive engines for calculating RMS, Phase, Magnitude, Real, Imaginary and frequency components for each channel.

3. Data Plotting (SACS): Added 8 new SAC operators using the values calculated from the recursive engines. The new SACS operators are:

   "x": real component
   "y": imaginary component
   "m": magnitude
   "d": angle
   "r": true rms
   "f": cyclic frequency
   "q": instantaneous frequency
   "t": delta time frequency

4. Data Plotting (SACS): Added a number of examples in the SAC help window describing how to use the new and existing operators.

5. Data Plotting (Time Discontinuity): Added a new engine to detect discontinuities in time. If a time discontinuity is encountered then a green dotted line is displayed at the sample where the discontinuity occurred. A mouse over the small gray triangle displayed at the bottom of the green line will show the duration. To turn off this feature set the "Show Event Separator Bars" field to "No" (in the properties dialog).

6. Data Plotting (Harmonics): Changed the displayed Total Harmonic Distortion value from RMS to Instantaneous (for compliance with IEEE notation).

7. Data Plotting (Summary): Revised the Summary Window to show: Max, Min & Max Min Difference for both Instantaneous and RMS values.

8. Data Plotting (Navigate Peaks): Revised navigate peaks to navigate the DFT peaks instead of the instantaneous peaks.

9. Data Plotting (Print): Added the time line and ruler to the print engines.

10. Data Plotting (Append): Corrected a problem appending log files. The time difference between the selected append files was being calculated to the microsecond. It is now calculating the difference according to seconds.

Wavewin D.N - 06/24/2008

1. File Manager (Show/Hide Channel Titles): Added a new dialog to give the ability to show/hide analog and digital channels via the channel title. To open the dialog select the "Show/Hide Channel Titles" option under the "Options" menu. All titles listed that have a check in the checkbox are automatically hidden when the file is displayed. To show the title uncheck the checkbox next to the title. To remove a title from the list use the "Remove" button. To add a new title type the new title in the edit box and click the "Add" button. The new title is automatically added to the end of the list and the checkbox is defaulted to checked.

Wavewin D.M - 06/12/2008

1. Data Plotting (Print Window): Added a new print option to print the contents of the window. The new option is called "Window" and is located under the "Print" submenu.

2. Data Plotting (Print All & Page): Corrected a problem printing the analog table. The columns where being resized improperly.

Wavewin D.L - 06/11/2008

1. Data Plotting (User Views): Added a new feature to automatically open all user views in a separate window when a request is made to open a data plotting file. A maximum of 10 views/windows can be displayed at one time.

Wavewin D.K - 05/29/2008

1. Data Plotting (Print): Included the Waveform Summary as part of the data plotting print.

2. Data Plotting (Analog Table): Added automatic column sizing according to the largest max & min values. Previous versions were using a fixed size which was causing values to overlap into neighboring columns.

Wavewin D.H - 04/02/2008

1. Data Plotting (User Views): Improved the user views by allocating separate extensions for each type of file. WR files have a ".VIW" extension, DR files have a ".VIWD" extension and TR files have a ".VIWT" extension. The extension is automatically added to the view filename when saving the view.

2. Data Plotting (User Views): Defaulted the save view and select view directory to be the directory where the currently displayed file is located. The default directory will change when the user either selects a different directory in Save View dialog or if the directory is changed in the Select View dialog.

Wavewin D.C - 01/21/2008

1. Data Plotting (User Views): Improved the user views by including the following information in the view: sampling frequency, time scale, sliding window size, phasor window size, table window size, red fault bar, auto scale and phasor or circular chart displayed.

Wavewin D.C - 01/03/2008

1. Data Plotting (Digital Channels): Increased the number of digital channel title characters displayed from 40 to 80.

Wavewin D.B - 12/13/2007

1. Data Plotting: Added the trigger information from the 1st line in the Comtrade HDR file to the data plotting window in the Phasor display section. The TRIGGER= is no longer needed to be defined. If TRIGGER= exists then TRIGGER= will be deleted.

Wavewin D.A - 12/03/2007

1. Data Plotting: Added the trigger information from the 1st line in the Comtrade HDR file to the data plotting window in the Phasor display section. The trigger information is displayed if there is TRIGGER= on the first line in the HDR file.

Wavewin D.9 - 11/05/2007

1. Data Plotting (Save Views): Added a new option to save analog and digital channel views to an ASCII text file. To save a view mark the desired analog and digital channels and press <enter>. Select the "Save View" menu option under the "View" menu. Enter the views filename and path and press enter. The saved view will be added to the views drop down list on the menu button bar. The views drop down menu list displays the last 15 saved or selected views.

2. Data Plotting (Select Views): Added a new option to select saved views. To display a saved view select the view file from the "Views" drop down list displayed in the menu button bar. If the desired view is not displayed in the drop down menu list select more views to navigate to the saved view. Views can also be selected using the "Select Views" menu option under the "View" menu. The "Select Views" dialog list all the view files in the active view path. To change the view path select a path from the "View Path:" drop down list or use the browse button to select a new path. The analog and digital table displays the properties of the selected view.

Wavewin D.4 - 09/09/2007

1. Data Plotting: Fixed a problem with the Primary and Secondary values not being added to the Comtrade files created during a command line merge operation. The primary and secondary values are now added to the Comtrade .CFG files.

2. File Manager: Fixed a problem in the file tree when directory names are 1 character only. Previous version were causing a access violation error when a directory was 1 character in length.

3. Data Plotting: Corrected a problem when using the command line to merge trend files.

4. Data Plotting: Fixed a problem with updating the file's date and time in the window's header when the automatic Adjust Files Time is implemented. The files time was adjusted after the window's header was updated.

5. Data Plotting: Upgraded all of the time calculations from the old 32 bit, integer infrastructure to a new 64 bit, floating point structure. This upgrade has eliminated the errors that were caused by accumulated truncations.

Wavewin C.V - 03/29/2007

1. System: Added support to always save the Comtrade file in the 1999 format for merge via the command line parameters.

Wavewin C.T - 03/23/2007

1. System: Added support to merge files via the command line parameters.

2. System: Added support for more then 4 languages. Increased the number of languages to 20.

Wavewin C.S - 03/12/2007

1. Data Plotting: Finalized the fault location dialog.

Wavewin C.R - 02/27/2007

1. System: Did more work on resizing more of the dialogs and windows to handle the Microsoft Monitor 120 DPI setting.

2. System: Added the advanced captions, hint and strings to the translation files.

Wavewin C.Q - 02/02/2007

1. Fault Location: Rearranged the fault location dialog according to Pete Vivers email dated 01/24/2007. Added an Advanced button to allow users to change the Phase Selection mode and for editing the Z1 and Z2 % of line, R0 and Rg division factors and the threshold fields.

2. Fault location: Added the automatic display of the change frequency dialog box when the file's current sampling frequency is not set to 24 samples/cycle.

3. Data Plotting: Fixed an error in the change frequency engine when changing from a high frequency to a low frequency. The previous algorithm was not taken the fraction portion of the difference between the old and new frequencies. This has been corrected and is now working.

4. Data Plotting: Added support to handle the comma as a decimal separator in the fault location dialog and in the change frequency dialog.

Wavewin C.P - 01/22/2007

1. System: Added resizing to a number of dialogs and windows to handle the Microsoft Monitor 120 DPI setting.

Wavewin C.O - 01/07/2007

1. Data Plotting: Fixed a problem with calculating the total number of samples sent to the SingleEndFaultLocation.dll. The previous version was using the fault trigger position defined in the Comtrade CFG file to calculate the total number of samples to send to the DLL. This problem has been corrected, it now uses the reference bar position to calculate the total samples.

2. Data Plotting: Included all Fault location message strings to the SIL & SIB files.

3. Data Plotting: Added a call to Get Last Error for all function calls in the fault location dialog. Also increased the length of the output fields to fit the Fault time information.

4. Data Plotting: Changed the fault reference position to the Reference bar (blue dotted line). This allows the user to change the fault position by right clicking in the trace window.

5. Data Plotting: Added a print button to screen dump the contents of the fault location dialog.

Wavewin C.N - 12/20/2006

1. Data Plotting: Added a Fault Location dialog to interface to Areva's fault location DLL (SingleEndFaultLocation.dll). To open the new dialog select the Fault Location menu option under the Data menu. Before opening change the sampling frequency to insure 24 samples per cycle. Enter all of the Input fields in secondary quantities. An error message will be displayed if there is a problem with the input settings. Select the proper channels in the Analog Channel section then press the Start button. The results will be displayed in Output section. Any errors or warnings will be displayed in the Errors & Warning text box. The fault location dialog sends all samples values in secondary quantities. The number of samples sent depends on the values defined in the pre and post reference bar fields in the Analog Channels section. The start sample and the number of samples sent is displayed in the status bar.

2. Data Plotting: Added support to read Comtrade ASCII *.DAT files that include blanks between the data values and the comma separator. The complier method used for converting the string to integer values was returning an error because of the included blanks. Added support to delete all blanks before converting the string to an integer.

3. Data Plotting (Properties Dialog): Added a new button in the "Windows Properties" dialog under the "Driver Data Type" tab. The "Analog Values" section allows for viewing each channels Primary & Secondary ratio values. Click on the "View Ratio Values" button to display all of the analog channels Primary & Secondary values.

Wavewin Areva C.J - 08/04/2006

1. Data Plotting: Added a new selection option to switch between Primary and Secondary values. The following drivers supply the CT and PT ratio values in the files to perform the calculation from Primary to Secondary and from Secondary to Primary: Comtrade, Transcan DFR, Faxtrax/Director DFRs, SEL Relays & DLP Relays. To change the analog values open the Windows Properties dialog by clicking on the "P" menu button, or select the "Window Properties" menu option from the "File" menu. Click on the "Driver Data Type" tab and select Primary or Secondary from the "Analog Values" section then press <Enter> or click OK. The type of analog values displayed is defined in the Data Plotting's Window header after the Fault Date & Time.

2. Data Plotting (Printing): Fixed a problem with the print engine. When an ASCII Comtrade text file uses a Line feed (OA) only for the line separator the Comtrade ASCII read engine was not reading the last sample in the file. The number of samples plotted did not equal the total number of samples defined in the Comtrade CFG file. This was causing the print engine to issue an endless number of blank pages because it was never getting to the total number of samples defined in the CFG file.

Wavewin Areva C.I - 07/10/2006

1. System: Added support to process Batch files through the passed parameters. The Batch passed parameter must be passed for the batch processing to successfully be implemented. The Batch file can contain file to print and files to view. Wavewin can display a maximum of 10 data plotting windows and a maximum of 10 ASCII text files at one time. When using the Batch command for viewing files have no more than 10 data plotting files and 10 ASCII text files specified in the batch file.
   Below are examples of the contents of batch files:

   Printing:

```
"c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
   Waveform\WR1_000004.dat" /print /exit
"c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
   Waveform\WR1_000007.dat" /print /exit
"c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
   Waveform\WR1_000009.dat" /print /exit
"c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
   Waveform\WV006.dat" /print /exit
"c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
   SOE\084873_2954.txt" /print /exit
"c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
   SOE\162407_2950.txt" /print /exit
"c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
   Disturbance\DR1_000003.dat" /print /exit
"c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
   Disturbance\DR1_0008.dat" /print /exit
"c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
```

```
        Disturbance\DR1_0009.dat" /print /exit

    Viewing:
      "c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
         Waveform\WR1_000004.dat"
      "c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
         Waveform\WR1_000007.dat"
      "c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
         Waveform\WR1_000009.dat"
      "c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
         Waveform\WV006.dat"
      "c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
         SOE\162407_2950.txt"
      "c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
         Disturbance\DR1_000003.dat"
      "c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
         Disturbance\DR1_0010.dat"
      "c:\program files\Areva T&D\Win DR Manager\Storage\M571 - Ied 3  67.137.195.220\
         Trend\TR1_a.DAT"
```

2. Data Plotting (SACs): Added more protection to avoid Access Violation Errors when improper information is entered in the operator fields.

3. File Manager: Fixed a problem when trying to access directories using networked computer names: \\other machine\fault files.

Wavewin Areva C.H - 06/15/2006

1. Data Plotting: Fixed a problem with the F9 function key for files with digital channels only. Made available on the beta page.

2. Data Plotting (SAC Window): Added 4 new buttons in the SAC window to save / open SAC files. The new "Save" and "Save As" buttons allow for saving the current SAC information into an ASCII text file. The new "Open" button allows for reloading previously saved SAC files. The "New" button allows for creating new SAC files.

Wavewin Areva C.G - 05/19/2006

1. System: Fixed a problem with the /print passed parameter. In previous versions it was required that the contents of the window be fully painted on screen before the print occurred. When too many prints were issued close together a range check error was generated because the screen information was not fully painted. We modified the print to work with a virtual graphics handle instead of using the window's graphics handle.

2. File Manager: Corrected a problem with the unzip components used to unzip the .ZAT files. Frederic reported that a message box was displayed from the ZipTV components stating that the components were not registered. We corresponded with ZipTV and have corrected the problem. The components on Softstuf's development stations were not properly registered.

3. Data Plotting: Harmonics, added a check to avoid the bar width going under 1.

Wavewin Areva C.F - 04/14/2006

1. System: Fixed a number of problems and made some changes to the passed parameters:
   a. Changed the /X1 and /Y1 passed parameters to /X and /Y. There was no need for the 1 indicator since we changed /X2 and /Y2 to /W and /H.
   b. Fixed a problem with the /Print passed parameters on slower machines. The print function was being called before the paint method for the window.
   c. Corrected a problem with viewing files.
   d. Corrected a problem with the /TopMost passed parameter.

2. Data Plotting: Added an option in the Harmonics window to change the bar size to show as many harmonics as possible in one screen.

3. Data Plotting: Changed the units for the time bar and Delta X status bar to show time in a readable format. We also added a unit and color indicator according to the time displayed.

Wavewin Areva C.E - 03/22/2006

1. System: Added more resizing for the dialogs to support the Spanish and German languages.

2. System: Added Frederics suggestions for passed parameters and also fixed a few problems with the new passed parameters.

3. Data Plotting: Added a fixed dotted light red fault bar, also added an option in the properties dialog to show or hide the fault bar.

4. Data Plotting: Added resizing to the harmonics window to view as much information as needed.

Wavewin Areva C.D - 02/21/2006

1. System: Added support to view Wavewin Areva in different languages. First language added was French. All remaining languages can be added to the SIL and SIB files without further coding in the software. Also all menu items have been added to the SIL and SIB files. To change the active language select the "Display" option under the "Options" menu in the File Manager. Select the desired language from the "Languages" drop down list.

2. File Manager: Moved the last active directory to the Wavewin.ini File. In previous versions the last

active directory was saved to the Template database that has a limit of 80 characters. The Wavewin.ini eliminates the 80 character limit.

3. Data Display: For files that have digital channels only made sure that all digital channels are displayed if there are no triggered channels in the file.

Wavewin Areva C.A 11/28/2005

1. File Manager: Added sorting to the table folder tree.

2. File Manager: Always open Wavewin's folder tree to the last active directory.

3. Data Plotting: Fixed a problem with the boundary check for Comtrade ASCII digital channels.

4. Data Plotting: Fixed a problem with calculating the sampling frequency for Comtrade files that define a zero for the sampling frequency.

5. Data Plotting: Increased the maximum number of harmonics displayed in the harmonics table from 100 to 200.

Wavewin Areva C.7 09/12/2005

1. Data Plotting: Added a histogram view in the harmonics window. Click the change view button in the upper right corner of the window to toggle between the table and the histogram. The histogram view allows for selecting the column of data to show. Click on the "Select Bar Values" drop down menu to change the values displayed. The "% of Fundamental" is the default view.

Wavewin Areva C.6 - 08/15/2005

1. Data Plotting: Improved the Harmonics window to display the number of harmonics according to the number of samples per cycle for the open file.

2. Data Plotting: Fixed a problem with the Comtrade read engine. The last analog channel's data values were not being read therefore the sample values were defaulted to zero. The Comtrade engine was modified so that a maximum of 255 analog channels can be displayed in the data plotting window. The maximum analog channel boundary was not being checked properly and the last analog channel was not being read.

Wavewin Areva C.5 - 08/14/2005

1. Data Plotting: Added two new columns to the Analog table. DFTMag = Displays the DFT Magnitude calculated

between the RMS bar (black dotted line) and the data bar (solid data bar). Crest = Displays the DFTMag column divided by the RMS column.

2. Data Plotting: Added a new field in the harmonics dialog called "Total Harmonic Distortion". The "Total Harmonic Distortion" field displays the ((square root of the summation of the squares of DFT Magnitudes from harmonics 2 to 7) divided by square root of 2) and that quantity divided by the DFT Magnitude of the Fundamental.

3. File Manager: Fixed a problem with the status bar fields not updating when navigating via the tree.

4. File Manager: Modified the table sort engine to always sort the columns in upper case. The previous sort engine was sorting the column data as is. This was causing a problem when files are named with upper case and lower case.

5. Data Plotting: Fixed a problem with reading multiple binary Comtrade files. The Comtrade binary read multiple files was not reading the files in proper sequence.

6. Data Plotting (SACS): Fixed a problem with the SACS returning an error when calculating an Envelope using the "A" and "E" script commands.

7. Data Plotting: A number of requests have been made to change the way the expand and condense time displays the waveform signals. In versions previous to C.3 the expand and condense would display the first sample out of the group of samples to condense or expand. To better show the peaks we changed that functionality in version C.3 to pick the highest value in the group of samples to condense/expand. This still did not show all the information. In this version Wavewin now displays all of the samples in the file. When the signals are condensed the samples are plotted over each other.

8. Data Plotting: Added a feature to hop the data bar by one cycle for waveform files and one day for load files. This feature is keyboard activated, use the Shift+Ctrl+Right/Left Arrows to move the data bar one cycle/day from the previous position.

9. File Manager: Added Cut, Copy and Paste to easily move files from one directory to another. The new Cut, Copy and Paste features work in the same fashion as Window's Explorer. Use the following menu items or short-cut keys to activate the added file features: Cut:(Edit Menu: Cut Option, Ctrl+X, Shift+Del), Copy:(Edit Menu: Copy Option, Ctrl+C, Ctrl+Ins), Paste:(Edit Menu: Paste Option, Ctrl+V, Shift+Ins).

   Drag and Drop coming soon.

10. File Manager: Added shortcuts in the file table right click pop-up menu for Cut, Copy and Paste files and for the Zip, Email and Refresh features.

11. File Manager (Save As Comtrade): Fixed a problem with Save As Comtrade for the 1991 and 1999 formats. The 1991 format was defining 3 fields (substation,device ID,version #) for the first line in the CFG file. The proper format is substation,version #. Wavewin now puts the substation -

Device ID,version#. For the 1999 format the last line in the CFG file is the time multiplier for the sample times in the .DAT file. Wavewin was only adding the time multiplier field to the CFG if it was greater than 1. Now it always adds the time multiplier field.

12. File Manager: Fixed a problem with reading the line frequency from the Comtrade ".CFG" file. The line frequency was always defaulting to 60.

13. File Manager: Fixed a problem with the list of child windows being displayed under the wrong menu item.

14. Data Display: Added a medium display to the Auto Scale (F6, Atl-D, A) toggle feature. Auto Scale toggles between (Off, On and ++). ++ plots the signal using the number of maximum pixels allowed for the channel. The highest value is plotted at the maximum position allowed and the smallest value is plotted at the lowest position allowed. This feature was added to clearly show the profile of frequency, Vdc and load data channels.

15. Data Display: Added a new option in the properties dialog under the Comtrade tab called: "Show Date in (US/European/Japan) Format. This new option allows for selecting a fixed date format for the Comtrade files.

16. Data Display: Fixed a problem with the fault time line.

17. File Manager: Added a Directory Tree for easy navigation.

18. File Manager (Delete Files): Changed the way the delete files engine works. It will now send files that reside on the computer to the Recycle Bin all others are permanently deleted.

19. File Manager (Rename Files/Folders): To rename a folder in the tree click on the folder name twice to display the edit box. To rename files select the rename option from the Files menu.

20. File Manager: Added the ability to email marked files directly from the file table. Click on the email menu button to activate. All support files are automatically attached to the email message.

21. File Manager: Added the ability to zip marked files directly from the file table. To activate, open the "File" menu and select "Zip Marked Files" option. All support files are automatically added to the zip file upon confirmation.

22. Data Plotting: Added the ability to email the active event file. All support files are automatically attached to the email message. To activate, click on the Email menu button.

23. Data Display: Added "Analog Input" & "External Input" as a non used channel. Wavewin does not show analog and digital channels that contain the following strings:
    UNUSE
    UNDEF
    NOT D

NOT U
NOT I
NOT A
{
N/A
ANALOG INPUT
ANALOG CHANNEL
EXTERNAL INPUT
EVENT CHANNEL
CHANNEL:
DIGITAL TRACE #
SPARE

24. Data Display: Fixed the data display in the Windows XP display mode. The last digital channel was being overwritten by the window's border. Also fixed the sizing of the Wavewin main application window to size around the desk top toolbars.

Wavewin Areva B.X - 01/24/2005

1. Data Plotting: Increased the number of analog channels per window from 128 to 256.

2. Data Plotting (Load Files): Added a new column "AvgWin" to the Analog Table located between the traces and the circular chart. The "AvgWin" column averages all the sample values between the RMS bar (black dotted vertical bar) and the data bar (black solid vertical bar).

3. Data Plotting: Added a new option to resize the RMS sliding window (area between the black dotted vertical bar and the black solid bar). The size of the sliding window can be changed by clicking on the resize sliding window menu speed button to bring up a dialog or by selecting a fixed number from the drop down menu list. The window in Load files is changed according to hours or days and in transient files according to cycles. To bring up the resize dialog from the menu select the "View" menu then select the "Set Sliding Window" option.

4. System Speed Bar Menu: Added a new "Back" button to go back to the previous window.

5. File Manager: Added a new feature to save summary files. The "Waveform Summaries" submenu option under the "Options" menu has a new item called "Save summaries". Save Summaries generates a summary file for each marked or selected file and saves it as an ASCII text file to the specified destination path. The file is named with the filename specified or by using the IEEE PSRC long file naming convention. The summary file extensions are "*.txt".

6. Data Plotting: Added 2 new buttons to the phasor/circular chart window (up-arrow/down-arrow). The new up arrow and down arrow buttons allow for increasing/decreasing the phasor/circular chart scale independent of the traces.

7. Data Plotting: Added 2 new buttons to the trace window (up-arrow/down-arrow). The new up arrow and down arrow buttons allow for increasing/decreasing the trace's amplitude independent of the phasor/circular chart.

8. Data Plotting: Added 2 new buttons to the trace window (left arrows). The left arrow to the left of the scrollbar shifts the sample at the databar (vertical solid black line) to the beginning of the window. The left arrow to the right of the scrollbar shifts the separator bar between the traces and the analog table to the databar.

9. Data Plotting: Corrected a problem in the "Save As Comtrade" feature when saving the sampling rate information to the ".CFG" File. The problem was occurring after a displayed file was modified by, Change Frequency, Truncate Cycles, Duplicate Cycles, Append and Merge. Older versions wrote the original sample rate information to the new Comtrade file.

10. Data Plotting: Added a feature that will not display a phase angle in the analog table or in the phasor diagram if the channel is DC or Frequency (Hertz).

11. Data Plotting: Added a limit for analog channels (256 analog channels/display) for the Waveform Merge & Append features. Can not Append/Merge waveforms if the combined exceeds 256 analog channels or exceeds 1024 digital channels.

12. Data Plotting: Fixed a problem with reading load data times from a Comtrade file that specifies the data in seconds.

Wavewin Areva B.R - 10/12/2004

1. Data Plotting: Improved the SAC harmonic calculations to include the magnitude and angle. Previous calculations were storing the magnitude value only.

2. Data Plotting: Fixed a problem with the DC units in a Comtrade File not showing up in the Analog Table.

3. Data Plotting: Took out the display of the phasors in the phasor diagram for analog channels that are not Volts, Amps, Watts and Vars. Also, now displays "N/A" in the Phasor Analog table column for channels that are not Volts, Amps, Watts and Vars.

Wavewin Areva B.P - 08/21/2004

1. Data Plotting: Upgraded the "Save As Comtrade" engine to handle the older 1991 version and the newer 1999 version.

2. Data Plotting: Added a new field in the "Properties" dialog to select the Comtrade version for the "Save As Comtrade" engine. The new field is in the "Comtrade" tab and is called "Save Using Comtrade Version:". Select 1991 for the older version and 1999 for the newer version. The default version is

the newer 1999 version.

Wavewin Areva B.P - 06/16/2004

1. File Manager: Added a new feature to open multiple waveform files from the file table. Mark the files desired and select the "Open Marked Files" menu option under the Options/Waveform File(s) menu. The files will be tiled horizontally and the file manage will be minimized.

2. File Manager: Append Waveform Files: The two features available under the Options/Waveform File(s)/Append menu will append all the marked waveform files in time either by deleting the common times between files (Discard Common Times) or appending all marked files back to back (Back to Back), sorted oldest to latest.

   The files must be of the same type.

3. File Manager: Merge Waveform Files: The two features available under the Options/Waveform File(s)/Merge menu will merge different types of files into one display.
   By Time: Merge channel samples if they have a common time segment. The reference time is from the file with latest start date and time. The file with the least amount of samples determined the length of the new merged file.
   By Sample: Merge regardless of time stamps. The reference time is from the first marked file. And the file with the least amount of samples determines the length of the file.

   When files with different sampling frequencies are merged a dialog will be displayed. The dialog contains a list of all the sampling frequencies in the marked files. Select the frequency for the merged file or enter a new frequency.

   To identify the merged channels the station name for each file is added to the beginning of the analog and digital channel names. To turn off this feature open the Properties dialog in the data-plotting window. Click on the Append/Merge tab and uncheck the “Add the File’s Station Name to Beginning of the Analog/Digital Channels” field.

4. Data Plotting: Added a new feature Append Open Files. There are two options available under the Append Open Files Menu (same feature as the file manager’s Append):
   Discard Common Times: Any common times found in the open files will be deleted from the oldest file.
   Back to Back: The files are appended back to back. No samples are deleted.

   The files must be of the same type.

5. Data Plotting: Added a new feature Merge Open Waveform Files. There are three options available under the Merge Open Files Menu:
   By Time: Merge channel samples if they have a common time segment. The reference time is from the file with latest start date and time. The file with the least amount of samples determined the length of the new merged file.

Manually: Use the data bars to highlight where the common sample time is in each window. Merge manually will then line up the data bars and adjust the time stamps accordingly. This option is used when the file times are not synchronized. The active window determines the time stamp of the new merged file and the open window with smallest number of samples determines the length of the new merged file.

By Sample: Merge regardless of time stamps and/or data bar positions. The reference time is from the active window. And the file with the least amount of samples determines the length of the file.

When files with different sampling frequencies are merged a dialog will be displayed. The dialog contains a list of all the sampling frequencies in the opened files. Select the frequency for the merged file or enter a new frequency.

Merging Open Files allows for flexibility of what channels are merged. Merge Open Files will merge either the marked channels only or if there are no marked channels then it will merge the visible channels.

To identify the merged channels the station name for each file is added to the beginning of the analog and digital channel names. To turn off this feature open the Properties dialog. Click on the Append/Merge tab and uncheck the
"Add the File's Station Name to Beginning of the Analog/Digital Channels" field.

6. Data Plotting: Added a menu button to gain easy access to the driver's data type setting. The data type setting specifies if the samples for the active driver are saved in RMS values or in instantaneous values.

7. Data Plotting: Modified setting the sample time stamps in the Comtrade reader. If the sampling frequency is set in the .CFG file then the time stamp is calculated from the sampling frequency. If the sampling frequency is 0 then the time stamp is set from the time stamp in the .DAT file.

8. Data Plotting: Fixed a problem with displaying the waveform data and analog table when switching between open windows. The system was losing the window handles when a left mouse click was encountered.

9. File Manager: Added a new feature in the File Menu called "ComName(s) Rename". This feature will rename all the marked waveform files (file entries displayed in red) using the IEEE long file naming convention (ComNames). The format for the ComName Files are:
   fault date,fault time,time code,station,device,company,duration,type,latitude,longitude,
      user field.ext

   All files associated with the marked waveform files will be renamed.
   Comtrade files: the ".CFG", ".INF", ".HDR", ".DAT" and "*.D##" files will be renamed.

10. File Manager: Added a new feature in the File Menu called "ComName Properties". There are 4 fields in the ComName format that can not be extracted from the waveform files: "Company Name", "Time Code",

"Latitude" and "Longitude". The "ComName Properties" allows for entering these fields prior to renaming.

11. File Manager & Data Plotting: Added a new feature in the "Save As Comtrade" option to use the ComNames long file naming convention for the Comtrade Name. There is a new check box inside the "Save As Comtrade" dialog called: "Use the ComNames Naming Convention to Name the Comtrade File(s)". If checked the system will automatically assign a ComName filename to all Comtrade files saved. If unchecked then the files will be named using the name entered into the "File Name" field.

Wavewin Avera B.L - 04/01/2004

1. Data Plotting: Added support to read Comtrade files that are distributed into multiple data files.

2. Data Plotting: Fixed a problem with displaying SAC values when operating with RMS calibrated data.

3. File Manager: Added a new feature to Append like waveform files in time. A new sub menu has been added to the "Options" menu called "Waveform File(s)". Use the "Open Selected Waveform File" option to display the traces in the selected file. Use the "Append Marked Waveform Files" option to append like waveform files in time. The marked file's analog and digital channels must match.

4. File Manager: Added a new feature to set up certain parameters for the append feature. Select the "Waveform Properties" option under the "Waveform File(s)" menu option. To throw out samples with common times check the "Discard Common Times" option. Next, select what file will have the times discarded from: the new file being created or the files being appended.

5. Data Plotting: Added a new setting to set the Opening frequency for each supported driver. To setup this parameter open the desired waveform file, next select the "Change Frequency" option from the "Data" menu and check the "Always Open" box. The frequency entered into the New Frequency" field will be the frequency displayed for all the files for the active driver.

6. Data Plotting: Added a new feature to Show/Hide the event separator bars for multiple event files. The new field is in the "Properties" dialog under the "Display Settings" tab.

7. Data Plotting: Fixed a problem with displaying leading zeros for the fault time in the Waveform Summary window.

8. Data Plotting: Added a new feature to the data plotting's "Data" menu to Truncate cycles. Truncate can be applied to remove cycles from the beginning of the data, the end of the data and from the middle of the data.

9. Data Plotting: Added a new feature to the data plotting's "Data" menu to Duplicate the cycle of data between the RMS bar and the data bar. A dialog box allows for specifying the number of cycles to add.

10. Data Plotting: Added two new features to the data plotting's "Data" menu to change and restore the sampling frequency.

    a.) Change sampling frequency: This feature allows for changing the sampling frequency of the displayed record. If Sync mode is active then Change Sampling Frequency will change all open windows to the entered frequency.
    b.) Restore Original Data: This feature is active only after the sampling frequency is changed. It allows for restoring the original raw data of the displayed record. If Sync mode is active then Restore Original will restore all the open windows to their original raw data.

11. Data Plotting: Added 3 new options to the "Values" menu.

    a.) Mark Raw Samples - Draws a small circle at all the original raw samples.
    b.) Mark Peak Values - Draws a small square at all the peaks.
    c.) Mark Change in Sign Values - Draw a small triangle at all samples where a change in sign occurs.

12. Data Plotting: Modified the Channel Information, Summary and Raw Data menu buttons to indicate an ASCII display with the corresponding character signifying the type of data.

13. Data Plotting: Added a new menu button to open new files or to open one of the last 14 files opened.

14. Data Plotting: The data plotting window's menu has been arranged to be more windows compliant.
    A large number of requests from Wavewin users asked to improve the menu.
    Below are the additions:
    - Added a new "File" menu. The "File" menu handles all commands directly related to the waveform file.
    - Added a new "Open" command under the "File" menu to open new waveform files.
    - The "Data" menu handles all commands relating to the data such as: Expand & Contract Time, Increase & Decrease amplitude, auto scale...
    - Added a new "Channel" menu. The "Channel" menu handles all commands directly related to the Analog and Digital channels.

15. Data Plotting: The "Display" dialog used for setting up the properties of the window has been moved to the new "File" menu and is now called "Properties".

16. Data Plotting: The "Displayed Device's Data Type" field in the "Properties" dialog (formally the "Display" dialog) has been moved from the "General" tab to the "Display Settings" tab.

17. File Manager: Improved the speed of read engine for the File manager. Enhanced the way the memory is allocated when reading the file allocation table.

Wavewin Areva B.F - 01/19/2004

1. Data Plotting: Fixed a problem reading the sampling frequency in the Comtrade driver.

The driver was defaulting the sampling frequency to 0 if it was >32768 or <32768. Took out the limit and open ended the sampling frequency value.

2. Data Plotting: Added a new feature to save RMS Calibrated data as Peak data for the Save As Comtrade option. This feature is optional. Change the "Convert RMS Calibrated Data" field in the "General" tab of the "Display dialog" to "Yes" to activate.

3. Data Plotting: Fixed a problem with the "Software Analog Channel" menu disappearing.

4. Data Plotting: Took out the gray background for the digital channels in the print outs.

Wavewin Areva B.A - 10/14/2003

1. Data Plotting: Allowed for Comtrade Files to be displayed if the digital channels have no original states set.

2. Data Plotting: Added two new buttons in the phasor/circular chart window title: "P" to display the phasors at the data bar and "C" to display the circular chart.

3. Data Plotting: Fixed a problem reading Comtrade CFG files that use a line feed only as an end-of-line marker.

4. Data Plotting: Added support to display Comtrade files that have digital channels only.

5. Data Plotting: Modified the equation for the fault time bar to have more resolution.

Wavewin Areva B.9 - 09/04/2003

1. Data Plotting: Took out multiplying the sample values by -1 in the ABB TPU Cap files.

Wavewin Areva B.7 - 08/03/2003

1. Data Plotting: Improved the error checking on Comtrade files.

2. Data Plotting: Increased maximum zoom factor for auto-scale mode from 99999 to 999999999 to allow for further magnification.

3. Data Plotting: Fixed a problem with the auto scale feature for Log files.

4. Data Plotting (Save Displayed Values): Added a new extension "*.mac" for the Save Displayed Values Feature.

5. Data Plotting (Save Displayed Values): Allowed for the Display Save Values File and Format File Window to be independent of the data plotting window. Does not close the Save Values File and Format File Window when closing the data plotting window.

6. Data Plotting: Enhanced the Fault time bar locator to look for the closes match defined by the selected format. Prior versions looked for an exact match.

7. Data Plotting: Enhanced the Sync Time feature to look for the closes match. Previous versions looked for an exact match.

8. Data Plotting: Corrected the Sampling Frequency for Comtrade Files that specify a time scale multiplier.

9. Data Plotting: Enhanced the Sync Manual Mouse Click to displace the mouse according to time difference. Previous versions displaced according to click position.

10. Data Plotting: Corrected the Fault Time displayed in the Waveform Summary Window.

11. Data Plotting: Added a Prompt to ask to overwrite existing Comtrade files for the Save As Comtrade feature.

12. Data Plotting: Corrected the Save As Comtrade feature to save only the digital channels that are visible. Previous versions were saving the digital channels when the digital section was hidden using the drag mouse.

Wavewin Areva B.6

1. Data Plotting: Fixed a problem with the scale factors for the print engine.

Wavewin Areva B.5

1. Data Plotting: Advanced the Save Display Values option. Added user defined Templates.
   Refer to the Data Plotting help window "Save Displayed Values" section for more information.

2. Data Plotting: Added and new menu option "Values". Allows for saving Values displayed
   in the Analog Table to a text file (Mark & Save) in the default format or in the format
   defined in the selected Template file. Provides "Open", "New" and "Clear" features for
   the active Values file and provides "New" and "Open" features for the Template Files.
   Refer to the Data Plotting help window "Save Displayed Values" section for more information.

3. Data Plotting: Added the Horizontal Bars to the print engine.

4. Data Plotting: Fixed a time scale problem with Comtrade files that specify a time scale multiplier.

Wavewin Areva B.4

1. Data Plotting: New time based display. New field "Trace Display Type" added to the "Display" dialog under the "General" tab. Allows for toggling between a sample base display and the time based display.

2. Data Plotting: New Fault reference time bar. Shows the time difference from the fault time.

3. Data Plotting: New Close button for the Phasor/Circular Chart window.

4. Data Plotting: New Close button for the Channel Information Table.

Wavewin Areva B.3

1. File Manager: Fixed a problem with the SOE table when displaying files with SACs defined.

2. Data Plotting: Fixed a problem with scaling the harmonic values in the Harmonics window.

Wavewin Areva B.2

1. Data Plotting: Allowed for the Constants in the SACs to be real values.

2. Data Plotting: Changed the way the digital bits are displayed: a value of 1 = thick green line, a values of 0 = thin black line. The A and N status next to the digital titles stay the same. They are set according to the bit compared to the original state, A = different then original state, N = same as original state.

3. Data Plotting: Added in the SAC window divide and multiply operators:
   division = ':'
   multiplication = '*'

   example: +1/*2/ - multiply channel 1 to channel 2
   +1/+2/+3/*^12 - multiply the addition of channel 1,2 and 3 to a constant of 12
   +1/:2/ - divide channel 1 by channel 2
   +1/+2/+3/:^12 - divide the addition of channel 1,2 and 3 by a constant of 12

4. Data Plotting: Added in the SAC window the ability to use a constant value for the "+", "-",":" and "*" operators.

   example: -12/*^15 - reverse channel 12 and multiply with a constant of 15
   +2/+3/+4/*^5 - added channel 2,3 and 4 and multiply with a constant of 5
   +2/+3/+4/:^5 - added channel 2,3 and 4 and divide by a constant of 5

5. Data Plotting: Added phase shifts to the SAC operators mainly for + and - sequence components:

```
example: +1/+2@120/+3@240/:^3/  - (+)Seq
         +1/+2@240/+3@120/:^3/  - (-)Seq
         +1/+2/+3/:^3/          - (0)Seq
```