

# **New Features**

Updated: August 1<sup>st</sup>, 2022



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### 1. Data Plotting – Invert Marked Channels:

### Updated August 1<sup>st</sup>, 2022

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.

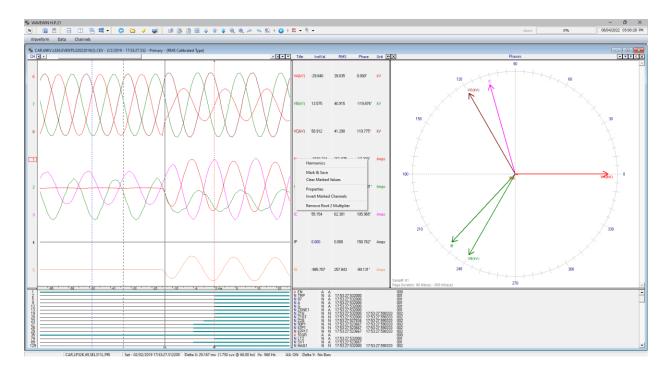


Figure-1: Invert Marked Channels Popup Menu

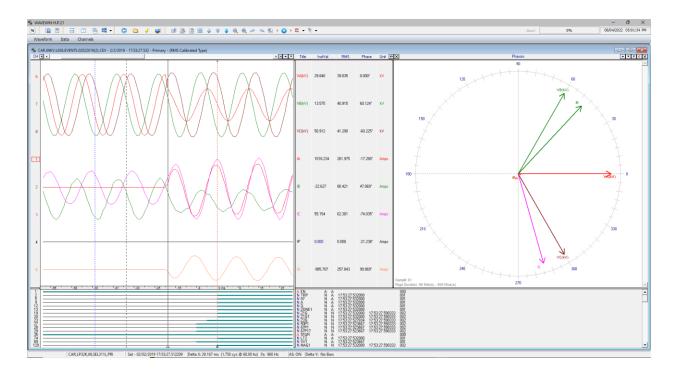


Figure-2: Inverted Channels

### 2. File Manager/Data Plotting – Save As:

Updated April 3<sup>rd</sup>, 2022

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.

	×
ne the Destination Path and Enter a File Name Excluding the File Ext	ension
C:\FaultLib\Long File Names	<u>0</u> K
	<u>C</u> ancel
✓ Use the ComNames Naming Convention to Name the File(s).	Show Help
CSV-Vector Values (RMS & Ang)	
Files: Selected O All O Marked	
	✓ Use the ComNames Naming Convention to Name the File(s). CSV-Vector Values (RMS & Ang) ▼ Files:

Figure-3: Save As from the File Manager

Save As		×
Def	fine the Destination Path and Enter a File Name Excluding the File Exte	ension
Path:	C:\FaultLib\Long File Names	<u>0</u> K
File Name:		<u>C</u> ancel
	Use the ComNames Naming Convention to Name the File(s).	Show Help
Save As Type:	CSV-Vector Values (RMS & Ang)	

#### Figure-4: Save As from the Data Plotting Window

#### 3. Data Plotting – Restore Original View:

Updated February 2<sup>nd</sup>, 2022

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.

Viev	v Values Window Help				
~	Channel Information				
~	Phasor/Circular Chart Window				
	All Digital Channels F9				
	Analog Combined View F4				
	Reference Vectors >				
	Vector Harmonics				
	Harmonics Table F11				
	Horizontal Bars				
~	Auto Set Data Bar				
	Move Reference Bar to Data Bar Ctrl-A				
	Move RMS Bar to Reference Bar Ctrl-Z				
	Set Sliding Window Size				
	Select Views				
	Save View				
	Restore Original View				
W	aveform Data Channels				
-	Appen - Apalog Table Append - Save Properties Properties	All Digital	Horz Bars Sliding Win + Set RMS Bar + Set Data Bar Save	Restore Mark	irks 🔛 💥 Mark Peaks
Aug- D	Arge - As Summary File	w <sup>™</sup> + Ref Vectors →	Ic> Set REF Bar     Select View     View       View     View		ks Scan Mark Change Values
<b>_</b>		10015 0102 02 051 D	(DMC Collinated Taxa)	Restore Original View	

Figure-5: Restore Original View Menu Options

### 4. Data Plotting – Sort Digital Channels:

Updated December 1<sup>st</sup>, 2021

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 Channel tab under the Arrange section.

View Values Window	Help							
ftware Analog Channels	F5 iles		ations 🥠					
oftware Digital Channels		47, C, C,	€> ¢					
Search Digital Channels								
Mark/Unmark All	F8	NEDISON,,100.000, \$\$\$\$.	SS, TRIG,LO					
Analog Mark/Unmark All	-							
Digital Mark/Unmark All								
View Mark(s)	Cr	77						
Hide Mark(s)	Del	Y						
Show All Hidden	Esc	1						
Restore Mark(s)	Ins							
Shift Marks Up	"+"							
Shift Marks Down	n_n		1					
Reorder Analog Channels								
Sort Digital Channels	>	Ascending						
Align Channel Data		Descending						
Group Marked Analog Channels		Restore Original Orde	r					
Clear Analog Colors								
Adjust Offsets								
Semi F47 Voltage Sag Chart								
Draw 3D Plot								
Waveform Data Ch	annels							
		🔮 Reorder	n Shift Up		😳 SDCs 🛛 🥪	Mark/UnMark All		
> View Mark(s)	Hide Mark(s)	Croup Marks	Shift Down			Analog Un/Mark		000
Show all Views	Restore Mark(s)			Sort SACs	Align A		Clear Analog	SEMI
Lines 👻		Adjust Offsets	Search Digitals	Digital 👻	IM PNRF	Digital Un/Mark	Colors	F47-0706
Zoom		1	Arrange	V	rtual		Clear	



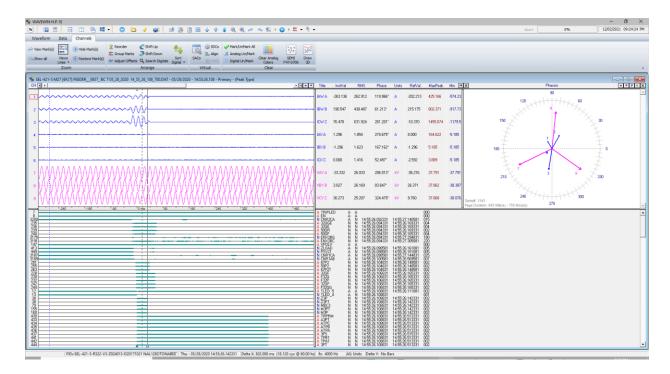


Figure-7: Sort Digital Channels in Ascending Order

#### 5. Data Plotting – Append Files:

Updated December 1<sup>st</sup>, 2021

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.

#### 6. Data Plotting - Sequence Components Calculator:

Updated December 1<sup>st</sup>, 2021

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.

Sequence Components: test sec	q components.CFF			
test seq components.CFF				90
Chan RMS	Angle	Magnitude	Angle	120 111 6 60
5 💌 VA: 66.445	0.004	V0: 1.4566	64.2126	A HITTHAK
6 💌 VB: 62.613	239.291	V1: 65.1224	359.5759	150 VC 30
7 VC: 66.312	119.416	V2: 1.0759	309.9429	
1 ▼ IA: 0.522	180.138	10: 0.3795	343.1192	180
2 💌 IB: 1.205	16.662	I1: 0.7802	160.8617	
3 💌 IC: 0.815	304.105	12: 0.2085	224.7750	210 330
Rotation:	9	Values:	RMS 💌	240 YB
Voltage Ratio = 79680.0 / 66.	4 Current Ratio	o = 2000.0 / 5.0	Comtrade	270 270
				AS: OFF Multiplier: 1 Scale: 91
<u>R</u> efresh <u>C</u> lose	Vectors: Show All	• <u>\$</u>	쇼 - 주	🔽 Always Use Displayed Channels

Figure-8: Always Use Displayed Channels in the Sequence Components Calculator

### 7. Data Plotting – Digital Channel Titles:

Updated December 17<sup>th</sup>, 2020

Increased the Digital Channel title characters from 80 to 90.

#### 8. Data Plotting – Auto Process Templates:

Updated December 17<sup>th</sup>, 2020

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.

### 9. File Manager – Automatically Rename Files:

Updated March 1<sup>st</sup>, 2021

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.

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.

Auto Rename Files		×
	matically rename waveform/load files to the IEEE Comnames format, to setup the automatic process then press Start Rename button.	
Rename Files:		
Source Path: C:\FaultLi	b\Long File Names (	<u>e</u>
	e Sub Folders	
Destination Path: C:\FaultLi	b\long names\Destination (	0
Archive Path: C:\FaultLi	b\long names\Archive	<u>6</u>
File Extensions: *.DAT,*.C	FF,*.CEV,*.EVE,*.SEL	
Scan Period: 5	minute(s)	
Status:		
Last Scan:		
Status:		
Source File:		
Renamed File:		
Next Scan In: minu	utes	
Automatically Start Auto Rei	name Files at Run Time.	
	Start Rename Close Cancel	

Figure-9: Automatically Rename Files Dialog

### 10. File Manager/Process Templates – SER Reports:

Updated June 14<sup>th</sup>, 2021

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. If the original file is not in the IEEE Comnames format then it uses the information from the first line in the Comtrade .CFG file.

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.

Create SER Files		×
Plea	This dialog is used for creating a SER file for each Event file located in the source path defined below. ase define the fields below then click on the Start Create button.	
SER Fields:		
Source Path:	::\FaultLib\Long File Names	<u>6</u>
	✓ Include Sub Folders	
File Extensions:	*.sel,*.cev,*.dat	
Scan Period:	5 minute(s)	
	✓ Create a combined SER File with the Filename and Path below.	
Combined Path:	C: \FaultLib \SEL \BPA	<u></u>
Combined Filename:	wavewin.dtb	
Status:		
Last Scan:		
Status:		
Source File:		
Create SER File:		
Next Scan In:	minutes	
Automatically Start	t Create SER Files at Run Time.	
	Start Create Close Cancel	

#### Figure-10: Create SER File Dialog

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.

To create an SER file with all the digital activity from all processed Waveform files click on the Create a Combined SER File check box. Select or enter the path of the Combined file and enter its filename. This allows for adding the SER information into a database from one single file.

To create the SER files for each file being processed by the Auto Process Templates add a /SER to each line in the Format files being processed.

#### 11. Data Plotting – Auto Process Templates:

Updated: June 15<sup>th</sup>, 2020

Added a few new checks and features to the auto process template engine.

- 1. When Comtrade files are automatically collected using the device manager the Comtrade .DAT file maybe collected first before the .CFG file is collected. If this happens then Wavewin will see the .DAT file as a Replay Plus file which causes an error in the system. To remedy this Wavewin will not process a Comtrade .DAT file until the .CFG file is collected.
- Again, when files are automatically collected using the device manager it may be possible that Wavewin will try to process the file before the full file is collected. To fix this, files are only processed if they have a save time greater than one minute from the current time. This was added to avoid conflict with reading files when they are being written to.
- 3. In previous versions Wavewin would process 256 files at a time. Before the process begins Wavewin would bin into memory all the information needed to process each file including renaming the file with a WWD added to the last field in the filename. Renaming the file with the WWD tag indicates the file has been processed. This was done to ensure the filename added to the DIG processed file's information matched the filename on disk. This was causing a problem if Wavewin was shut down during a process session. All of the files that were not processed but were renamed never got reprocessed. To avoid this, renaming of the file occurs after the file is processed.
- 4. Corrected a problem when opening waveform files from the processed DIG file. Since the filename is now marked as processed (adds a WWD in the last field in the filename) after the file is processed then it's not writing the correct filename into the table at process time. To correct this when a double click occurs in the DIG file, the system checks if the file exists, if it does not exist it adds the WWD to the filename in the DIG file and tries to open that file.
- 5. Added a new way to process files. In the past Wavewin would add a WWD to the last field in the filename to indicate a file has been processed. When using third party backup software to move files from one folder to another the third party's software was constantly copying back files that were previously processed. It was doing this because it could not find the files since they were renamed by Wavewin. A second option was added to process files according to the file's save date. In the System Settings dialog under the Data Plotting tab a new field was added to specify the process type, see Figure 1. If Rename with ,WWD is selected in the Process Type drop down field then the field to the right of the Process Type field changes to Batch Files. The batch Files

drop down allows for selecting New Files (Files that do not have a WWD as the last field) or All Files. If the By Save Date drop down option is selected then the field to the right of the Process Type field changes to Start DT. The Start DT allows for setting what Date and Time to start at when processing the files. For example, to process just the last 30 days of files set the date and time to 30 days prior to the current date and time.

- 6. Another field was added to give control over how many files get processed during a single session. The Process # field allows for selecting 1 to 256 files per session.
- 7. Softstuf supplies a Fault Report template to process waveform files for fault information. In the Fault Report template there is a field for producing PDF files that gives a fault summary and a screen dump of the faulted area, refer to Appendix A. These PDF files were being produced for all fault files collected and processed. A large number of PDF files were being created that were not necessary. An option was added to select what files would produce a PDF. The new field is in the System Settings dialog under Data Plotting tab in the Process File section. The available options are All Files, No Files or Breaker Opt Files. In the fault report template there are 4 columns used to monitor up to 4 breaker digital channels. If one of the 4 breakers operated then a PDF will be saved.

System Settings ×
Use the Tabs below to define each Setting.
File Columns General Table Settings Data Plotting Device Manager Help Files
General Settings:
Open View: No 💌 Digital Toggled Channels: No 💌
Analog Table Font Size 8 💌 Open Files w/ Primary Values: No 💌
Process Files:
Process Type: By Save Date 💌 Start DT: 01 /01 /1970 00:00:00
Versioning: Rename with ,WWD By Save Date Process #: 256
PDF Files: All Files
Duration Calculation:
Current: If 1st Prefault RMS Value< 100 Then Trigger Value = 500
else Trigger Value = Prefault RMS * 5
Voltage: If 1st Prefault RMS Value > 40 Then Trigger at 15 %.
Append Files:
Append ComName Files: No 💌 within 5 💌 minute
ShortCuts <u>O</u> k <u>C</u> ancel

Figure-11: Auto Process Template Fields

### 12. Data Plotting – Digital Channel Groups:

#### Updated: June 15<sup>th</sup>, 2020

In the Save View dialog a new section was added to create digital channel 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.

Save View						Х
Save View File:	Channels	;				
🔽 Save a View Profile	Analog C	Channels:				
	Chan #		Color	Super Impose	^	
View File Path: C:\FaultLibWiews	1	IAW A IBW B	Blue Blue	No No		<u> </u>
View Name: DAT	3	ICW C	Blue	No		Move <u>U</u> p
, (An extension is not needed. The extension is automatically assigned.)	4	IAX A	Blue	No		
	5	IBX B ICX C	Blue Blue	No No		Move <u>D</u> own
Print Profile	7	VAY A	Fuchsia	No		
Flink Flohie	8	VBY B	Fuchsia	No		Delete
Save a Print Profile	9	VCY C VAZ A	Fuchsia Fuchsia	No No		
	11	VBZ B	Fuchsia	No		<u>R</u> eset
Orientation	12	VCZ C	Fuchsia	No	v	
O Portrait     O Short	<			>		
C Landscape G Advanced	Digital C	hannels:				
V Lanuscape V Auvanceu	Chan #	Channel Title	1		^	
	7	TRIPLED			-	New Group
Digital Groups	8	EN				
	12	TLED_5 TLED_4				
Digital Group Name	17	TLED_16				Delete
Group Name No# Chan Save	30	Z3P				
Group Name Not Chan Save	38	Z3PT MCA3				Re <u>s</u> et
	79	MBC3				
	147	VPOLV				
	155 160	M3PT M3P				
	209	LD DPF3			<b>.</b>	
	1.010					
				1	ок	X Cancel

Figure-12: Save View: Digital Groups

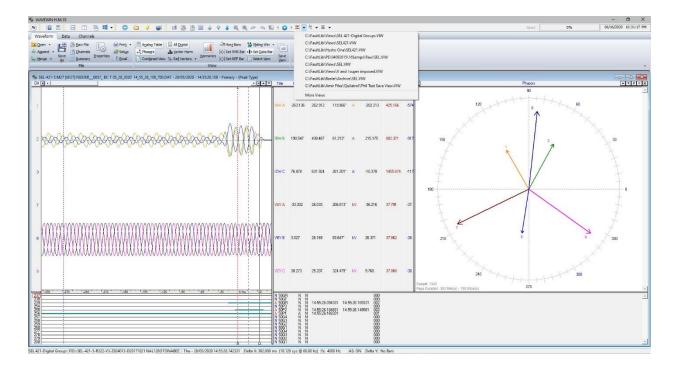


Figure-13: Select View

	) \$ @ @ ~ ~ % 1 <b>O</b>	▶ ﷺ ▼ ∜ ▼ TLED Group	
All Digital	Hor <u>z</u> Bars Win ↓ Set RMS Bar ↓ Set Data Bar ↓ Set REF Bar Select View View	Mark	cs pge
View		Values	

Figure-14: Digital Group Drop Down Menu

In the Data Plotting window select the View that was saved with the Digital Groups. A new drop down button is added to the Data Plottting 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.

A View can also be selected from the Select View Dialog. Click on the Select View ribbon item under the Waveform tab. When the view is selected under the View Files section a new list is displayed next to the Digital Channel list box. It lists all the Digital Group Names and if the digital group is compatible with the displayed file. The group is compatible if it's digital number and name in the group match the digital channels name and number in the file.

iew Files:				Analog C						177
Select a View bel	ow. To Change the View	Path use the Drop Down L	ist or the Browse button.	Chan #	Chan	Color	Super Impos	e   SAC Op	perators	
iew Path: C:\Fault	LibWéowe		- 6	1	IAW A	Orange Green	Yes [1-3] Yes [1-3]			
iow r dur. jc. v auto	LID WIEWS			3	ICW C	Blue	Yes [1-3]			
EL 421 Digital Grou EL VIW	ips.VIW			7	VAY A VBY B	Maroon Navy	Yes [7-3] Yes [7-3]			
EL-VIW EL421.VIW and I super impose &I superimposed.VI				9	VCY.C	Fuchsia	Yes [7-3]			
				Analog Ch			Digita	l Groups-	-	
				Digital Cl	n <b>annels:</b> Channel	-	∧ Grou	p Name	Comp	atible
3.530				Digital Cl Chan # 7 8 9 10 11 12	Channels: Channel TRIPLED EN TLED_8 TLED_7 TLED_6 TLED_5		∧ Grou	p Name Group up pup	Comp Yes Yes Yes Yes Yes	atible
<b>'indow Settings</b> : Description	Setting	Description	Setting	Digital Cl Chan # 7 8 9 10 11 11 12 13	Channels: Channel TRIPLED EN TLED_8 TLED_7 TLED_6 TLED_5 TLED_4		Grou TLED Z-Gro M-Gro	p Name Group up pup	Yes Yes Yes	atible
<b>findow Settings:</b> Description ne Scale: ult Bar: asor Window: annel Table: asor X Position:	Setting 2 Sample(s)/Pixel Show No Change Show 62 %	Description Sample X Spacing: Auto Scale: Window Contents: Silding Window Size: Table X Position:	Setting 1 Pixel(s) Between Scale ON Phasors 67 Pixels 39 %	Digital Cl Chan # 7 8 9 10 11 12	Channels: Channel TRIPLED EN TLED_8 TLED_7 TLED_6 TLED_5		Grou TLED Z-Gro M-Gro	p Name Group up pup	Yes Yes Yes	atible

Figure-15: Select View Dialog

### 13. Data Plotting – Auto Play Waveform:

Updated: June 15<sup>th</sup>, 2020

A feature to auto play the analog and digital channels has been added to Wavewin. In the ribbon system three new buttons were added to the data plotting's main toolbar along with a new Replay section in the Ribbon under the data tab. In the menu system there are 3 new menu options under the data tab. The new options will auto play the displayed analog and digital channels. 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 used 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 items increase/decrease to control the speed of the waveforms.

All values in the tables are the values at the data bar.

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.

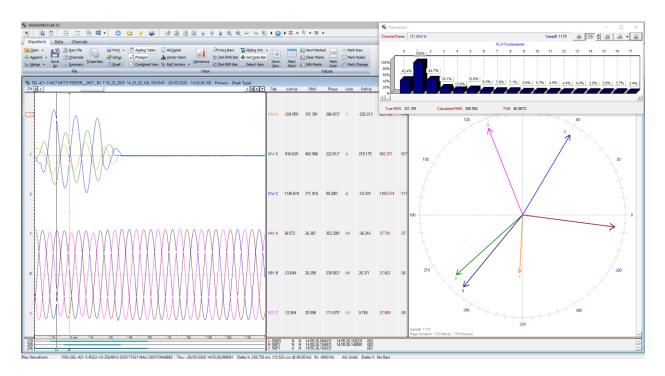


Figure-16: Auto Play Waveform



Figure-17: Auto Play Waveform Menu Buttons

### 14. Data Plotting – Digital Channels:

Updated: June 15<sup>th</sup>, 2020

Increased the number of digital channels from 2048 to 4096.

#### 15. File Manager – Change Filename:

#### Updated: June 15<sup>th</sup>, 2020

A new feature was added that allows for changing the contents of a long filename. It can add or remove information from the marked files in the active folder or all the files in the active folder. The add feature adds the entered information as a new field to the right of the existing last field. This feature is helpful for adding the Company name to long filenames if it did not exist.

It also allows for removing information from long filenames. This feature is helpful for processing waveform files that have already been processed by the Wavewin process temple feature. If the process template use the Rename with, WWD then to reprocess the files the ,WWD added to the end of each filename can easily be removed using the Remove check box.

To add or remove information from long filename in a folder, first checked the desired checkbox, Remove or Add. Next enter the information to remove or add in the File String field. Next select what file to act on, Marked Files or All Files. If there are no marked files in the active folder then the Marked Files radio button is disabled. Click the OK button to activate.

🀝 Change Filenames 🛛 —	
Change Filenames This Dialog allows for Adding or Removing information from the Marked or All Filenames.	<u>O</u> k <u>C</u> ancel
File String: Filenames to Change:	

Figure-18: Change Filenames Dialog

### 16. File Manager – Rename Files to ComName Format:

Updated: June 15<sup>th</sup>, 2020

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.

### 17. File Manager – Auto Convert to Comtrade:

Updated: June 15<sup>th</sup>, 2020

When the auto convert to Comtrade copies waveform files to the destination path it was not copying 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.

### 18. File Manager – Auto Convert to Comtrade:

Updated: October 28th, 2019

The Auto Convert to Comtrade feature converts all files with extensions matching the ones specified in the File Extensions field.

The converted files are saved following the Comtrade Revision specified in the Properties Dialog under the Comtrade tab. All revisions of the Standard are supported including the latest single file format (CFF) which has helped solve many of the problems associated with managing very large volumes of Comtrade records.

Auto Convert to Comtrade	2		×			
Automatic Convert to Co	omtrade					
		ce Path to the IEEE Comtrade Format. Fill in archive path and the file extension types to				
Source Path:	C:\FaultLib\EPB Chatt\J	C:\FaultLib\EPB Chatt\Job_843\INTELLIRUPTER				
Destination Path:	C:\FaultLib\EPB Chatt\J	ob_843\Destination				
Archive Path:	C:\FaultLib\EPB Chatt\J	ob_843\Archive				
File Extensions:	*.PRO					
Scan Period:	5	minute(s)				
SEL Voltage Sag/Swell/I	nterruption Properties:					
Minimum # of Cycles:	2					
Milliseconds Difference:	50					
Status:						
Last Scan:						
Status:						
Source File:						
Comtrade File:						
Convert to Peak:						
Next Scan In:	minutes					
Automatically Start Co	onvert to Comtrade at Run	Time.				
		Start Convert	<u>C</u> lose			

Figure-19: Auto Convert to Comtrade Dialog with New Advanced Setting Button

In addition, a new Advanced Settings feature allows for including subfolders and for automatically appending files from the same device which enables long term displays of both transient and periodic data.

The new Advanced Settings feature also allows for automatically renaming the converted files to the standard IEEE Comname format. Setting details are provided in the following sub sections.

Data Display Configuration	×
Use this dialog to change the order of the Analog channel columns, the display positions in the Analog Combination view and to set general features of the display.	ŧ
Display Settings Append / Merge Driver Data Type Filters	
Analog Table Analog Combination View Comtrade Colors	П,
Save As Comtrade Setting:	
Save Using Comtrade Version: 2013 - Single File (CFF)	
Show Date in (US/European/Japan) Format: Default	
Convert UTC Time to Local Time: No	
Convert RMS Calibrated Data to Peak Data: No	
This feature is valid for formats that save the data as RMS Calibrated.	
Selecting "Yes" will save the RMS Calibrated samples that are Current or Voltage as Peak samples by adding a Root 2 multiplier to the "A" factor in the "CFG" Comtrade File.	
<u> </u>	

### Figure-20: Data Display Properties Dialog with CFF 2013 Revision Selected

Convert to Comtrade - Advanced Settin	igs	×				
This dialog is used for defining the	advanced settings for the Auto Convert to Comtrade dialog.					
Source Path: Include Sub-Folders Include all sub folders under the Source path when converting files to Comtrade.	Destination Path: Automatically Rename to IEEE Long File Naming Format Automatically save the converted Comtrade file to the IEEE long file naming format in the destination path.					
	Archive Path:					
	When archiving the orginal files rename them to the IEEE long file naming format.					
Once a file is archived append it to the same file type per year. For the append to work the rename option for the Archive path must be set. The long naming format determines what files match.						
After the files are appended they are deleted from the Archive path.						
	Close					

Figure-21: New Advanced Setting Dialog

#### Advance Settings:

The Advanced Settings dialog has 3 sections, one for the Source path, one for the Destination Path and one for the Archive path. The Source path section allows for including Sub-folders when scanning for files to convert to Comtrade. The Destination and Archive sections allow for renaming to the Comname format. The Archive section also allows for appending all like files into one Comtrade file per year. If the append is checked then after each append the original archive files are deleted.

#### Source Path:

If Include Subfolders is selected, then the system reads all of the subfolders and their subfolders under the source path and puts them into a string list (the source path is included on top of the list). When scanning for new files, it starts at the first path in the list and then repeats for each subsequent path (multiple nests deep) (the number of nests is limited by the length of the path name, maximum allowable length is 128 characters).

#### **Destination Path:**

When a new file is found, it is first copied to the archive path and then it is converted to Comtrade and saved to the destination path. If the original file name is not based on a unique and readable naming scheme then the file name can be renamed to Comname in the destination path.

#### Archive Path:

The file names in the archive path can also be renamed to Comname. If Rename is selected, then the renamed files can be automatically appended (1 file/device/year) by selecting the Append option.

The appending process starts after the Conversion process is complete (for all of the paths in the list). This ensures that the conversion process is not delayed. The appending process scans the archive path and appends all of the files that have the same year, station, and device fields in the file name.

The appended files are saved in the selected Comtrade version and are also named following the Comname format. After all of the files have been appended, the originating files are deleted from the archive path.

### 19. Appending files from the File Manager and Data Display:

#### Updated: October 28th, 2019

The append engine is invoked from the file manager, from the data display, and now from the auto Convert to Comtrade feature. In support of the new features, the append engine was upgraded to allow for appending up to 400 files at a time (previous limit was 100). For periodic data, the 400 limit is just right because typically up to 366 files may be collected per year per device. For oscillography files, the 400 limit provides large margins. Care must be taken when appending large numbers of files because of memory limitations. Typically each byte on disk corresponds to 10 bytes in memory.

In addition, the file name in the data display window header was revised to show the number of appended files along with the name of the first appended file. For example, if 28 files were appended then the appended file name in the window header would look like:

28 Appended Files – The first file's original name – Date and time – Values – (File type)

#### 20. File Manager – Options Menu Item, Display Option, System Settings Dialog:

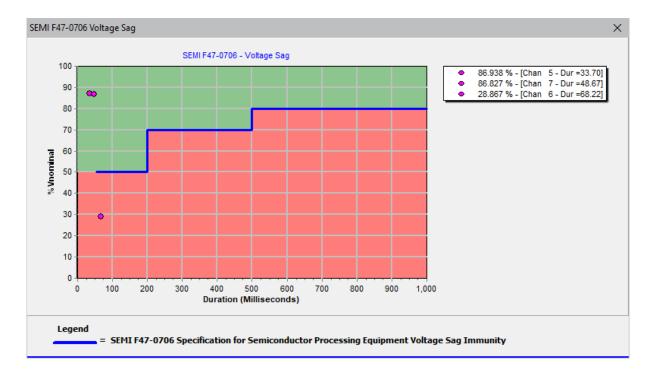
System Settings	×
Use the Tabs below to define each Setting.	
File Columns   General Table Settings [Data Plotting] Device Manager   Help Files	;]
General Settings:	
Open View: No 💌 Digital Toggled Channels No 💌	
Analog Table Font Size 8  Open Files w/ Primary Values: No	
Process Files:	
Batch Files: All Files	
Versioning: Yes	
Duration Calculation:	
Current: If 1st Prefault RMS Value< 100 Then Trigger Value = 500	
else Trigger Value = Prefault RMS * 5 (Units in Amps)	
Voltage: If 1st Prefault RMS Value > 40 Volts Then Trigger at 15 %.	
Append Files:	
Append ComName Files: No 💌 within 1 💌 minute	
ShortCuts <u>D</u> k <u>C</u> ancel	

Figure-22: System Settings Dialog with New Data Plotting Settings

Updated: October 28th, 2019

A number of new fields have been added to the System Settings dialog under the Data Plotting tab. The first feature is the ability to change the size of the font of the measurements shown in the data display. A drop down list is provided for selecting up to 16 font size (the default is 8).

The second feature is a new, change detection algorithm to automatically measure duration and magnitude of evolving fault conditions within the same record (maximum/minimum over/under voltage and current magnitude and duration are calculated). The ability to set triggers for seeding the algorithm is provided under the Duration Calculation section. When a file is open a true RMS value is calculated at each sample using a running, recursive RMS calculation. After the first full cycle is processed, the algorithm kicks in and compares the calculated RMS values to the specified trigger values.



### 21. Data Plotting – New Semi F47-0706 Voltage Sag Chart:

#### Figure-23: SEMI F47 0706 Voltage Sag Chart

Updated: October 28th, 2019

The SEMI F47-0706 Voltage Sag display shows the sag immunity chart. The chart depicts the required voltage sag ride-through capability curve. The unaffected region is the green area, and the miss operation region is the red area.

To view the chart, first mark the voltage channels then click on the SEMI F47 option from the Channels menu.

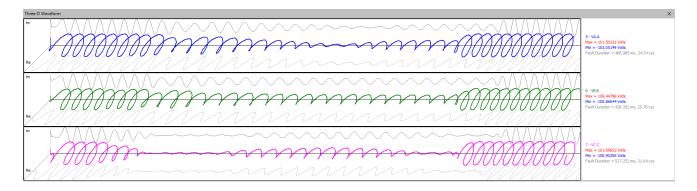
To the right of the chart is the sag percentage which is calculated for each voltage channel using the following equation: (Nominal RMS \*100) / (Lowest Sag RMS). Each displayed percentage is followed by the channel number and the duration in milliseconds.

The trigger value for the duration calculation is set in the System Settings dialog (refer to Figure-4). The default setting is 15% of nominal.

### 22. Data Plotting - 3-D Plots:

#### Updated: October 28th, 2019

The Plot 3-D feature plots a maximum of 3 channels. To plot in 3-D, first mark the channels then click on the Draw 3-D icon under the Channels menu.



#### Figure-24: Plot 3-D Window

To the right of each channel is the channel number, the channel title, the instantaneous maximum and minimum values of the entire channel and the duration of the fault in cycles and milliseconds.

The trigger values for the duration calculation are set in the System Settings dialog. The default setting is 15% of nominal for the voltage channels, and times 5 of nominal per unit for the current channels.

### 23. Data Plotting – Rose Charts:

Updated: October 28th, 2019

The Rose charts feature plots the waveform signal using the circular charts. To plot a rose chart, first mark the channels to plot then hit enter to isolate the channels. Next, click on the C button above the phasor diagram. The rose charts displays a small circle the same color as the signal color if the value is a negative value. To return to the phasor display click on the P button above the rose chart.

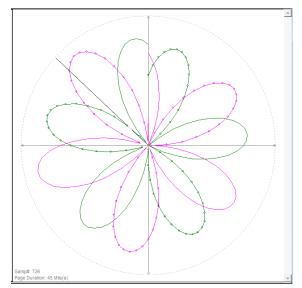


Figure-25: Rose Charts

### 24. Data Plotting – Power Calculator:

Updated: October 28th, 2019

The Power Calculator measures the harmonics for a voltage and current channel. To open the power calculator first mark a voltage and current channel in the data plotting window. Next select the Power Calculator menu option under the Data tab in the menu system. In the ribbon system select the Power Calculator under the Data tab. A table is displayed listing the Voltage harmonics, Current harmonics, the angle difference between the current and voltage, the calculated MWatts and MVars. The MWatts and MVars calculations are below:

MWatts =  $(V*I) * Cos(\emptyset_V - \emptyset_I)$ 

MVars =  $(V^*I) * Sin(\emptyset_V - \emptyset_I)$ 

Sample Number:	87					
		01-G POT (kVolt)		_		
Volatge Channel:	1 - 115KV BUS 1	01-G POT (KVOIt)				
Current Channel:	11 - UNIT 4 01 A	MPS - (Amp)				
Harmonic	Voltage (kV)	Current (A)	Angle Diff	MWatts	MVars	1
1	64.02392	173.87355	92.170	-0.42142488	11.12408684	
2	0.37086	3.57452	143.376	-0.00106391	0.00079083	
3	0.32233	0.84491	-40.247	0.00020787	-0.00017596	
4	0.16242	1.75248	218.862	-0.00022163	-0.00017859	
5	0.16429	1.90364	175.541	-0.00031181	0.00002431	
6	0.09665	2.30900	241.569	-0.00010625	-0.00019624	
7	0.20629	1.42925	160.671	-0.00027822	0.00009759	
8	0.07221	0.34300	258.315	-0.00000502	-0.00002425	
9	0.05488	2.11600	47.863	0.00007791	0.00008611	
10	0.03054	1.36666	-54.723	0.00002410	-0.00003407	
11	0.09918	0.24636	222.486	-0.00001802	-0.00001650	
12	0.04358	2.31134	289.273	0.00003324	-0.00009508	
13	0.05459	0.61756	126.048	-0.00001984	0.00002726	
14	0.04676	1.67584	13.317	0.00007625	0.00001805	
15	0.02262	1.89807	215.162	-0.00003510	-0.00002473	
16	0.02756	1.53681	78.669	0.0000832	0.00004153	
17	0.02577	2.00950	2.569	0.00005172	0.00000232	
18	0.04161	2.46311	232.478	-0.00006242	-0.00008128	
19	0.03997	1.03800	-9.147	0.00004096	-0.00000660	
20	0.02769	1.22752	51.515	0.00002115	0.00002661	
21	0.03115	0.42098	32.996	0.00001100	0.00000714	
22	0.02868	2.06190	294.112	0.00002416	-0.00005397	
23	0.03397	0.66608	122.212	-0.00001206	0.00001914	
24	0.05125	3.24892	20.662	0.00015580	0.00005875	
25	0.02439	1.98336	31.346	0.00004131	0.00002516	
26	0.03388	1.51217	80.426	0.0000852	0.00005052	
27	0.03472	1.98545	-25.562	0.00006219	-0.00002974	
28	0.03026	4.16533	251.010	-0.00004102	-0.00011919	
29	0.01413	1.84780	-165.343	-0.00002526	-0.00000661	
30	0.01928	1.03153	263.647	-0.00000220	-0.00001976	

#### Figure-26: Power Calculator

### 25. Data Plotting – RMS Calibrated Channels:

Updated: October 28th, 2019

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.

	ia(a) ib(a) ic(a)	5996.081 4261.694	8445.637	119.435*	-4241.226		
	IB(A)	4261.694				-4239.812	8481.842
	IC(A)		-6026.606	344.253*	5755.849	6018.893	7396.442
		4227.059	-5943.090	254.112*	-1513.209	-1774.838	7566.750
	IG(A)	3.561	-5.657	278.128*	1.414	5.657	9.045
	VA[kV]	69.502	-98.260	186.077*	-97.848	-98.373	98.907
	VB(kV)	74.264	104.923	69.279*	37.222	36.359	105.355
	VC(kV)	74.672	-105.560	304.443*	59.707	61.617	106.888
	VS1(kV)	0.020	0.028	90.000°	0.000	0.000	0.028
	VS2(kV)	0.030	-0.042	340.885*	0.041	0.041	0.042
	V1MEM(kV)	72.769	-102.839	186.601°	-102.246	-102.982	103.684
	FREQ(Hz)	59.958	59.950	N/A	59.960	59.950	60.100
	IAL	3.003	4.223	27.086*	3.746	3.620	4.236
	IBL	2.137	-3.022	252.206°	-0.905	-0.819	3.698
	ICL	2.130	3.017	161.814*	-2.857	-2.813	3.780
	IQL	1.886	2.642	27.374*	2.332	2.417	2.902
	IGL		Harmonics		1	0.000	0.014
	IAR1	0. N	Mark & Save			0.000	0.000
	IBR1	0.	Clear Marked \	Values		0.000	0.000
	ICR1	0.			_	0.000	0.000
	IQR1	0. P	properties			0.000	0.000
	0.000		Remove Root a			0.000	0.000
	IAR2	0.000	0.000	0.000	0.000	0.000	0.000
	IBR2 ICR2	0.000	0.000	0.000° 0.000°	0.000	0.000	0.000
	IOR2	0.000		0.000*			0.000
	IGR2	0.000	0.000	0.000*	0.000	0.000	0.000
	IAR3	0.000	0.000	0.000*	0.000	0.000	0.000
	IBR3	0.000	0.000	0.000*	0.000	0.000	0.000
	ICR3	0.000	0.000	0.000*	0.000	0.000	0.000
	IOR3	0.000	0.000	0.000*	0.000	0.000	0.000
	IGR3	0.000	0.000	0.000*	0.000	0.000	0.000
	DIA	0.000	0.000	0.000 N/A	0.000	0.000	0.000
1 1.70 1.75 1.25 1.25 1.25 1.70 1.70 1.105 1.140 1.175 1.175 1.1210 1.1245 1.1		0.000	0.000	cores.	0.000		0.000

Figure-27: Remove Root 2 Multiplier

In RMS Calibrated files a new menu option was added to the analog table popup menu to Remove Root 2 Multiplier from the marked analog channels.

	vewin new\wwfull\Test Softw 👝 🔲 🎫
Channel Title Information for	or Device: 250
Station: East 179 St Subst	ation
->Analog Titles	Full Scale Value
*001 IA(A)	0.00100000
*002 IB(A)	0.00100000
*003 IC(A)	0.00100000
*004 IG(A)	0.00100000
*005 VA(kV)	0.00100000
*006 VB(kV)	0.00100000
*007 VC(kV)	0.00100000
*008 VS1(kV)	0.00100000
*009 VS2(kV)	0.00100000
*010 V1MEM(kV)	0.00100000
011 FREQ(Hz)	0.00100000
*012 IAL	0.00100000
*013 IBL	0.00100000
*014 ICL	0.00100000
*015 IQL	0.00100000
*016 IGL	0.00100000
*017 IAR1	0.00100000
*018 IBR1	0.00100000
*019 ICR1	0.00100000
*020 IQR1	0.00100000
*021 IGR1	0.00100000
*022 IAR2	0.00100000
*023 IBR2	0.00100000
*024 ICR2	0.00100000
*025 IQR2	0.00100000
*026 IGR2	0.00100000
*027 IAR3	0.00100000
*028 IBR3	0.00100000
*029 ICR3	0.00100000
*030 IQR3	0.00100000
*031 IGR3	0.00100000
032 DIA	0.00100000
033 DIB	0.00100000
034 DIC	0.00100000
035 DIQ	0.00100000
036 DIG	0.00100000
037 DIA2M	0.00100000

### Figure-28: Mark Channel's when root 2 Multiplier applied

In the Channel Window a star is placed in front of the analog channel number if has a root 2 multiplier applied.

### 26. Data Plotting – Search Digital Channels:

Updated: October 28th, 2019

Modified the search digital channels option to mark and move the digital channels found to the top of the digital channels list.

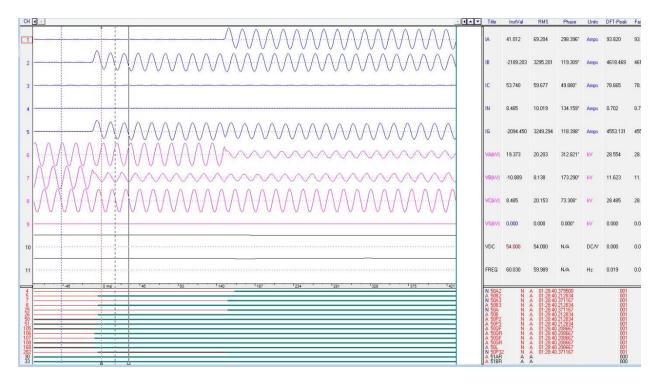


Figure-29: Mark and Move Search Digital Channels

#### 27. Data Plotting – Save View Path:

Updated: October 28th, 2019

Defaulted the save view path to be the path where the file is located. In the past versions it would be the last path a view was saved in.

**Prepared By:** Maria Rothweiler August 1<sup>st</sup>, 2022 Revision: 16

#### Appendix A - Fault Report

```
> Fault Report:
```

```
Station: South Arkey
         Fault Time: 03/08/2017 03:57:42.006317
          Equipment: Feeder 1202
  Breakers Operated: Breaker 2 Closed
         Fault Type: A, N
Fault Duration(Cycs): 3.893
    Fault Mag(Amps): 14851.230
     Voltage Dip(%): NA
          V2(Volts): 18883.702
           I2(Amps): 5226.823
          VA(Volts): 26949.568 @0.000°
          VB(Volts): 76249.703 @-106.062°
          VC(Volts): 84881.925 @133.488°
           IA(Amps): 14851.230 @-55.586°
           IB(Amps): 1374.458 @99.968°
           IC(Amps): 375.488 @41.528°
           IN(Amps): 13622.515 @-51.698°
```

> Event Report:

Start Time	Duration(ms)	Description
03:57:42.009	NA	Breaker 2 Closed
03:57:41.972	99	R3-Any Trip
03:57:41.971	66	Diff Trip A
03:57:41.996	29	Zone 1 A Trip
03:57:41.996	29	Zone 1 N Trip
03:57:41.984	70	Diff InterTrip
03:57:41.993	767	86-1 Operated

> Location Report:

```
Line Length: 11.12 Miles

Z1(Ohms): 2.600 @75.499°

Z0(Ohms): 10.001 @52.500°

SE Radial: 3.851 Miles

SE Reactance: 4.022 Miles

DE Sequence: NA
```

