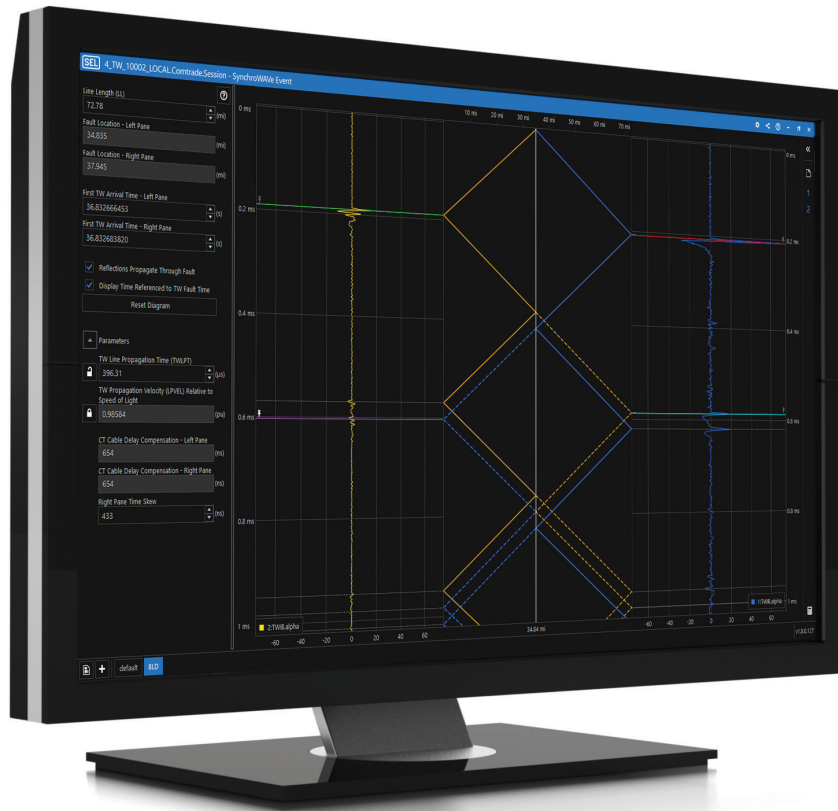


SYNCHROWAVE[®] Event Software



Powerfully simple event analysis software

- Diagnose relay behavior during a power system fault.
- Time-align event reports from multiple relays for comparison and analysis.
- Create custom calculations, and plot the results for immediate analysis feedback. Use calculations with the complex chart to create advanced analysis tools.
- Gain insight into relay protection performance with an advanced mho circle diagram and alpha plane.
- Perform refinements to traveling-wave fault locating with the Bewley diagram.



Analyze relay event data.

Plot relay oscillography, display phasor magnitudes and angles, and monitor the status of digital elements. Navigate through events with integrated zoom and pan functionality.

Compare measurements.

Drag cursors throughout the event report to compare measurements.

Additional Features

- Frequency Spectral Analysis
- Customizable Layouts
- Data Export to .CSV
- Relay Settings Viewing
- Screen Capture Printing
- Harmonic Analysis
- Alpha Plane



Search for signals.

Quickly add analog and digital signals to charts by filtering signals as you type in the search bar.

Add event records.

Load a new event record, or add records to the current analysis session. Report formats including COMTRADE (including those used for viewing and analyzing traveling waves), SEL ASCII event report (.EVE), compressed ASCII (.CEV), comma-separated values (.CSV), motor start report (.MSR) and Sequential Events Recorder (.SER) file formats are supported.

Time-align event reports.

Easily coordinate event report times for accurate comparison and analysis of signals from multiple relays or past event reports.

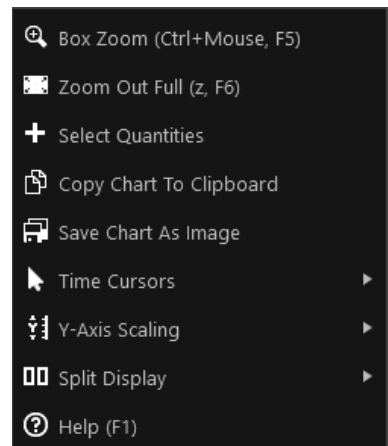
Learn quickly.

Easily access all SYNCHROWAVE Event features with the right-click menu.



Perform calculations.

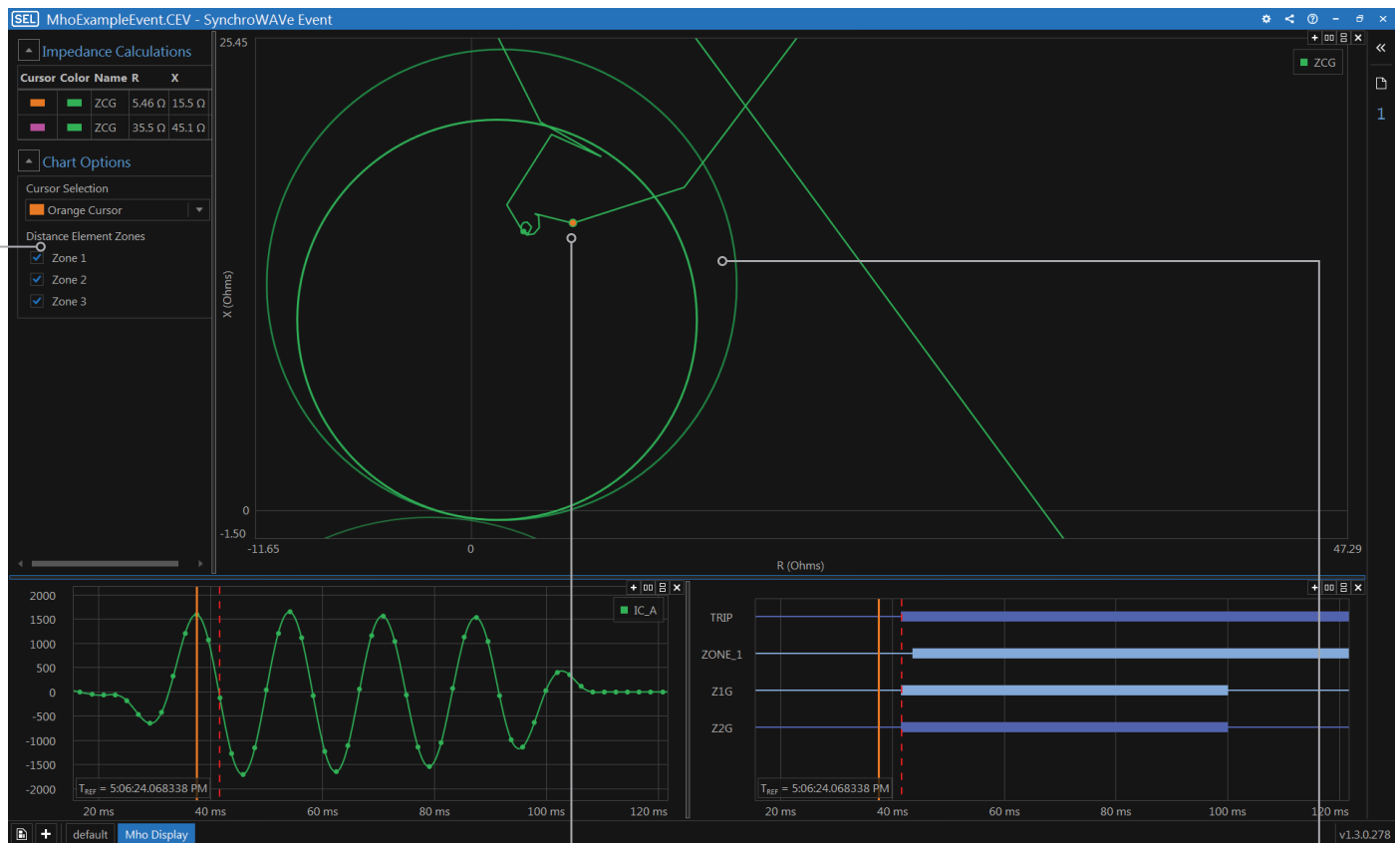
Create equations to analyze specific trip conditions. Instantly plot calculation results for quick event analysis. The built-in function library creates endless calculation possibilities.



Visualize Distance Elements

Mho Circle Analysis

Analyze distance element operation with the mho circle diagram. The mho circle diagram provides an impedance plane on which to plot apparent impedance and distance element characteristics.



Choose your zone. Quickly turn on and off each of the distance element zones.

Pinpoint the impedance. Drag the cursor throughout the event to see the apparent impedance. The yellow dot indicator shows you where the impedance is on the plane.

See the mho characteristic move. See the distance element as the relay sees it. Observe how the mho circle characteristic moves in response to changes in the polarizing voltage.

Supported Relays

SEL-411L Advanced Line Differential Protection, Automation, and Control System

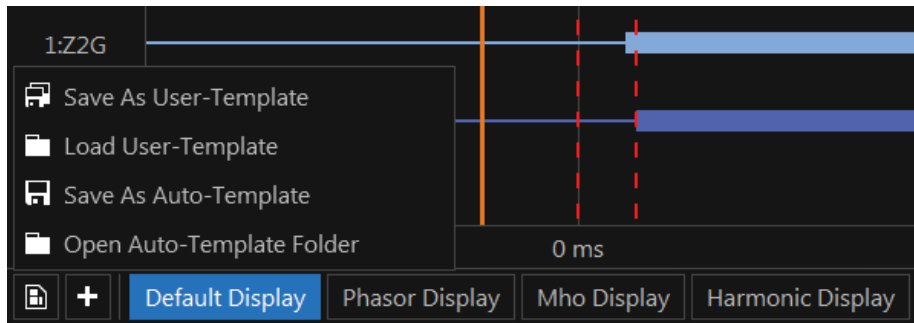
SEL-421 Protection, Automation, and Control System

SEL-311C Transmission Protection System

SEL-311L Line Current Differential System

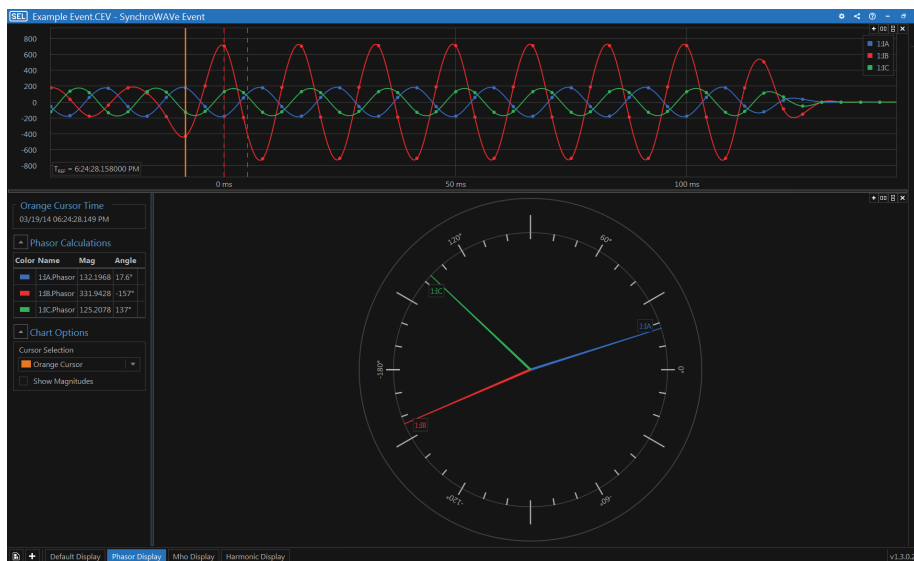
SEL-321 Phase and Ground Distance Relay

Build Relay Analysis Templates



Simplify Event Analysis Setup

Create one or many custom layouts for performing analysis. Save layouts as general or relay-specific templates. Relay-specific templates automatically load when opening a new event report from that type of relay.



Create More Analysis Space

Build analysis layouts that complement the default layout.



Begin Analysis From Where You Left Off

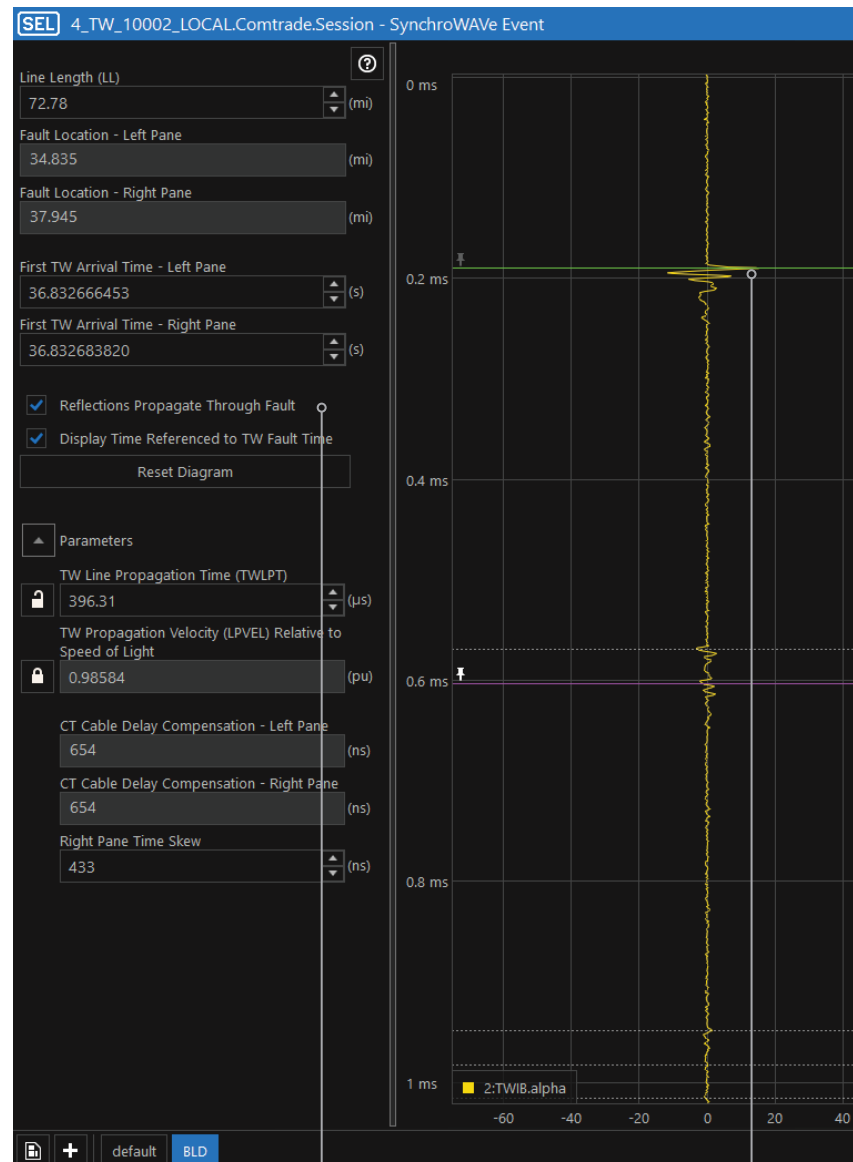
Reopen a relay event report, and SYNCHROWAVE Event will bring that prior event analysis session back to its previous state.

See Traveling Waves

Advanced Fault Location Visualization

The SEL-T401L Ultra-High-Speed Line Relay, SEL-T400L Time-Domain Line Protection, and SEL-411L can record traveling-wave data in order to provide highly accurate fault locating. SYNCHROWAVE Event generates a Bewley lattice diagram from the traveling-wave data to enable visualization, analysis, and understanding of the traveling waves recorded for an event.

For more information on traveling-wave fault locating, see the technical paper "Locating Faults by the Traveling Waves They Launch," available at selinc.com.

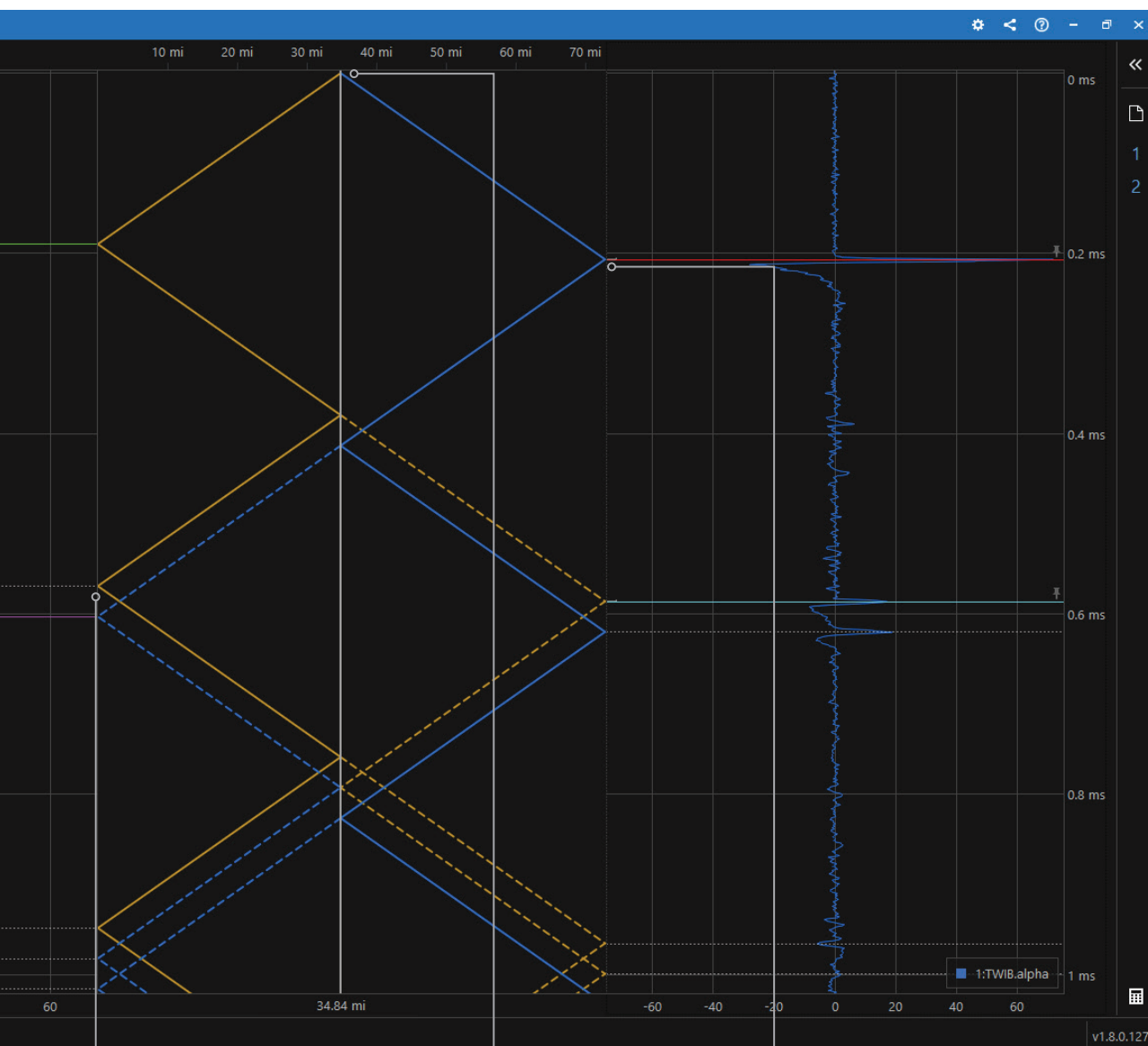


Refine parameters.

Easily adjust the line length based on updates from the field. Use multiple peak locations to adjust the wave propagation speed or wave propagation travel time to compensate for line sag, air temperature, and humidity. Feed this information back into relay settings for improved relay operation.

Pinpoint the reflection.

See the traveling-wave arrivals detected by the SEL-T401L, SEL-T400L, or SEL-411L at the terminal. The Bewley diagram shows the traveling wave's propagation path along the transmission line and reflections from fault and line terminals.



Locate faults with a single-ended method.

Visualize the traveling-wave propagation through the fault after reflecting off a terminal. The difference in arrival times between the initial traveling wave at the local terminal and the first traveling wave that was reflected from the fault can be used to locate the fault using a single-ended method. The arrival time of a traveling wave that reflected off the remote terminal and propagated through the fault enables the adjustment of either the traveling-wave propagation speed or propagation time.

Identify the fault point.

The fault location is represented by the vertical grey bar. From this point, traveling waves are launched in each direction.

Locate faults with a double-ended method.

Easily import event records that contain traveling-wave data from SEL-T401L, SEL-T400L, or SEL-411L relays at both ends of the line. Slide the time cursors to line up with the peak of the initial traveling wave that arrived at each line terminal to obtain a highly accurate fault location. Optionally, fine-tune the results by placing additional time cursors on traveling waves that arrived at each terminal after reflecting from the fault or opposite terminal.

Software Specifications

| General | |
|----------------------------|---|
| Supported Operating System | Microsoft Windows 10, 64-bit |
| Supported File Type | COMTRADE (including those used for viewing and analyzing traveling waves) Compressed ASCII (.CEV) Event report (.EVE) Motor start report (.MSR , .CMSR) Sequential Events Recorder (.SER, .CSER) Comma-separated values (.CSV) |

Product Comparison

| SYNCHROWAVE Event | Advanced | Basic |
|--|------------------------------|--------------------|
| License | Full and during 60-day trial | After 60-day trial |
| COMTRADE | • | • |
| Enhanced GUI | • | • |
| Analog Oscillography | • | • |
| Digital Display | • | • |
| Phasor Diagram | • | • |
| Custom Calculation Engine | • | |
| Multiple Event Report Analysis | • | |
| Harmonic Analysis | • | • |
| Spectral Analysis | • | • |
| Bewley Diagram (Traveling Wave) | • | |
| Mho Circle Diagram (specific relays) | • | |
| Saved Configurations | • | • |
| Alpha Plane Analysis (specific relays) | • | |
| Complex Chart (freeform analysis) | • | |

