# ASPEN OneLiner™
Version 14.8 Update

This maintenance release contains fixes for all known bugs to date, plus some program improvements. This is a maintenance release. (The differences between a maintenance release and a major release are explained on the last page.)

You have been given a link to download the setup program OneLinerV14.8Setup.exe. You can run this setup to update an existing installation or to create a new *OneLiner v14* installation. Please write to support@aspeninc.com in English (suporte@aspeninc.com in Spanish and Portuguese) or call us (650-347-3997) if you have questions.

Note: For users that are using the **Workstation Setup**: *Please read the notice on the last page.*

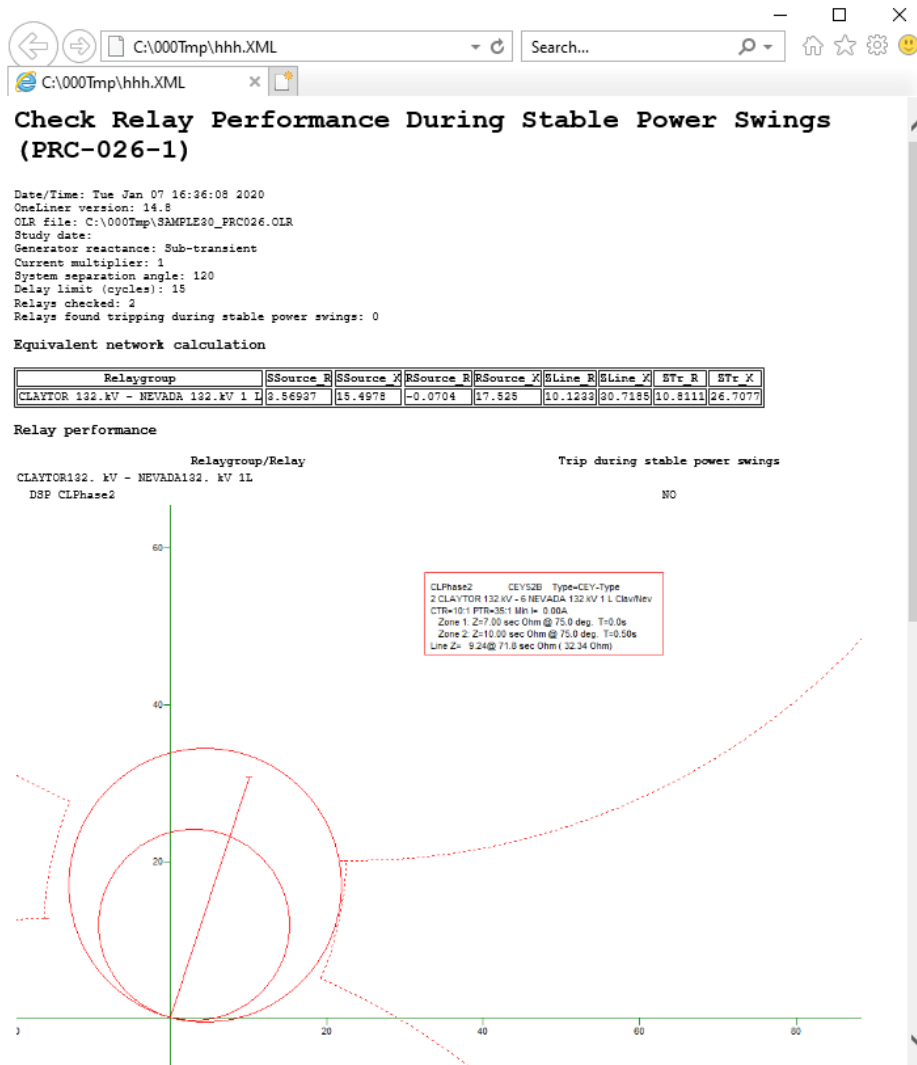## Program Improvements between Versions 14.7 and 14.8

- **New options in the Add | Unstable Power Swing Limit command in the OC Curves Window and the DS Relays Window.**
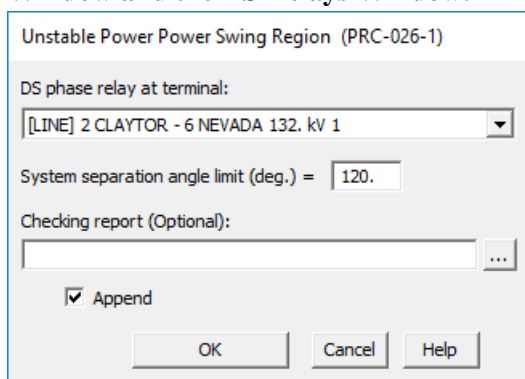
The new options include the relay group's terminal type, which, depending on where the relay group resides, can be a line, a transformer or a generator. There is also a "checking report" option. When it is blank, the power-swing limit is shown on the relay windows as before. If you enter a file name, OneLiner will, in addition, create a XML report file that can be viewed using the Internet Explorer Browser. A sample report file for a distance relay is shown on the next page.

- **New command Check | Relay Performance during Stable Power Swings in Main Window:** This command helps you determine quickly if any of the phase distance relays and phase overcurrent relays in the network will trip in stable power swing condition as defined in Standard PRC-026-1 Attachment B. An output for a distance relay is shown below.

  Each report contains the checking results of one or more relays. For each relay checked, the program will display graphically the unstable power swing region per PRC-026-1 Attachment B Criteria A and B. For distance relays, it shows the R-X plot of distance relay characteristic superimposed on the unstable power swing region. For overcurrent relays, it shows the time overcurrent relay curve with the calculated unstable power swing current region. The report also states for each relay whether it will trip during stable power swings. In short, it gives you the documentation for compliance.

Check Relay Performance During Stable Power Swings (PRC-026-1)

Date/Time: Tue Jan 07 16:36:08 2020
OneLiner version: 14.8
OLR file: C:\000Tmp\SAMPLE30_PRC026.OLR
Study date:
Generator reactance: Sub-transient
Current multiplier: 1
System separation angle: 120
Delay limit (cycles): 15
Relays checked: 2
Relays found tripping during stable power swings: 0

Equivalent network calculation

Relaygroup	SSource_R	SSource_X	RSource_R	RSource_X	SLine_R	SLine_X	STr_R	STr_X
CLAYTOR 132. kV – NEVADA 132. kV 1 L	3.56937	15.4978	-0.0704	17.525	10.1233	30.7185	10.8111	26.7077

Relay performance

Relaygroup/Relay	Trip during stable power swings
CLAYTOR132. kV – NEVADA132. kV 1L	
DSP CLPhase2	NO

CLPhase2   CEYS2B   Type=CEY-Type
2 CLAYTOR 132 kV - 6 NEVADA 132 kV 1 L Clav/Nev
CTR=10:1 PTR=35:1 Min I= 0.00A
    Zone 1: Z=7.00 sec Ohm @ 75.0 deg. T=0.0s
    Zone 2 Z=10.00 sec Ohm @ 75.0 deg. T=0.50s
    Line Z= 9.24@ 71.8 sec Ohm (32.34 Ohm)

- **The Check | Relay Settings command now works for both 2- and 3-terminal lines.** Checking of relay settings on 3-terminal lines is available for the first time. Before using this command, we recommend that you (1) make sure that the center tap bus of each 3-terminal line has the "3-terminal-tap bus" attribute, (2) review the documentation in the on-line help, and (3) set the two new options for 3-terminal lines below in the Check | Relay Checking Parameters dialog box:
  - Check reach of zone 1 on both remote legs of 3-terminal line. 'Y' is the default. In which case, zone-1 reach is checked on a line that consists of the local leg plus the two remote legs, one at a time. If your choice is 'N', the program will check the zone-1 reach on a line that consists of the local leg plus the shorter of the two remote legs only. ("Shorter" here means less in line impedance.)
  - Check reach of zone 1 only with the outage of the 3rd leg of 3-terminal lines. 'Y' is the default. This means whenever zone-1 reach is being calculated for relays on the local leg plus a remote leg, the remaining leg is always outaged. If your choice is "No", zone-1 reach is calculated for the case when both remote legs are in service, and for the outage of the third leg.

- **User feedback has led to many refinements in the Check | Relay Settings command.** For instance, OneLiner no longer complains about zone-1 overreaching the far end of a line if either (1) there are no branches connected to the far end of the line, or (2) there are only transformers connected to the remote bus. In the report, the zone-1 percent reach is shown as ">100", and the zone-2 checking is omitted. In the case when there are transformers at the remote end, OneLiner simulates a fault at the far terminal of each transformer and checks to see if it trips any relay zones. If so, the tripping zone and the trip time are shown in the report. Otherwise the trip time is shown as "N.A."

- **New options in the Check | Relay Checking Parameters command for the Check | Relay Operations using Stepped Events command.**
  - *Fault-current threshold below which fault is considered cleared.* If the total fault current exceeds this value after stepped events came to an end, you will get an additional warning message "The fault is not cleared". This current could be caused by line shunts (G+jB of lines) or network anomalies. Increasing this threshold will eliminate these messages.
  - *Disconnect true ends of line when a mutual line segment is outaged.* This parameter affects the simulation results only if you directed OneLiner to "Outage mutually coupled lines" and/or "Outage and ground ends of mutually coupled lines". This setting is "Yes" by default, meaning that the program disconnects the true ends of a line that has the mutually coupled segment -- and ground the true ends if you asked to ground the ends of mutually coupled. The default option was in use in previous versions of OneLiner. Set this parameter to "No" if the "line" outaged at both ends is causing some ground relays to trip when it its ends are grounded.

- **Enhancements in the Fault Locator command:**
  - **New dialog box** to let you select additional options that enhance the fault location results: 1) Selection of relay quantities in pre-fault; 2) Option to simulate remote line end open in fault location search; 3) Options to use specific fault location calculation method(s);
  - **Read event recording in binary COMTRADE format**. Previous program versions supported COMTRADE files in text format only.
  - **New report in CSV format** with fault location results and calculation details.
  - **Ability to run the fault locator command from a PowerScript program.**

- **Enhanced the Show Relay Curve and Logic Schemes command** to lets you retain existing curve(s) already being displayed in the DS Relays Window when a new relay is being shown. Previous versions of the program always removed all existing curves in the window before showing the selected relay.

- **Enhanced the DS Relays Window's Add Relay Characteristic command** to automatically calculate the characteristic-origin coordinates and orientation of the relay being displayed. In previous program versions, this calculation was carried out only when the option "Relay on remote bus" is selected in the Add Distance Relay dialog box.

- **New Mho and Quad shape types in the DS Relays Window**: These shape types will simplify the task of adding to the R-X diagram some distance-relay functions, such as out-of-step and loss-of-field characteristics.

- **New support for Data Mapping Tables in the relay setting import logic library editor:** Data mapping scripts have been in used in prior OneLiner versions. With his new approach, even users with no script programming skills will be able to extend their program library to import settings of custom relay types from ASPEN Relay Database, *PowerBase,* and manufacturer setting files.
- **New Relay Database Link Wizard in the Relay Datalink Dashboard:** This wizard let you import relays from ASPEN Relay Database to OneLiner and automatically link the database records to the relay objects in OneLiner. It utilizes a custom mapping table to correlate OneLiner buses, lines and transformers to relay data fields in the database to identify relay group locations of the imported relays. Data links saved with the imported relay will enable the Retrieve and Store relay settings commands in OneLiner to keep relay setting data in sync between the two programs.
- **New commands** in the PowerScript function Run1LPFCommand():
  - SIMULATEFAULT: Runs the Fault | Batch Command and Fault Spec. | Execute command
  - FAULTSOLUTIONREPORT: Runs the Fault | Solution report command
  - FAULTLOCATOR: Runs the Fault | Fault locator command

  The PowerScript Run1LPFCommand( ) function is designed to simplify the task of executing supported OneLiner program commands in a PowerScript program. The input for the Run1LPFCommand( )is an easy-to-understand XML-formatted string that user can compose using a text editor.

Bug Fixes in *OneLiner* between Version 14.7 and 14.8

- Fixed a bug in the PowerScript Run1LPFCommand ARCFLASHCALCULATOR2018: the BOXD input was not processed correctly
- Fixed a bug in the Check | Relay operation using stepped event analysis that caused program crashes when there are too many line combinations to outage.
- Fixed error in calculating PRC-026-1 Attachment B Criterion B current limit.
- Fixed a bug in the Snap to State Plane Coordinate command that hangs the program in some cases.
- Fixed a labeling typo in TTY report of the Add Unstable Power Swings Region command in DS and OC windows. Also fixed an error in per-unit impedance calculation that caused incorrect report of the impedance Ze when relay is located on a transformer with off-nominal tap kV or in a relay group on the tertiary winding of a 3-wingind transformer.
- Fixed a bug in the Stepped Event Analysis command that caused problems when the breaker is located on the tertiary bus of a 3-winding transformer.
- Fixed a bug in the DS Relays Window's Add Load Region command dialog box: The maximum allowed value did not match the size of the RX diagram axes.
- Fixed a memory management bug that caused random program crashes.
- Fixed a numerical error in kV level logic of the arc flash hazard calculator that caused the program to mis-categorize low voltage equipment (600V or lower) in some cases.
- Fixed a bug in the logic for reading SEL relays' event file with EVE extension that caused reading failure in some cases.
- Fixed typos in the current angle output of the ground current calculator report.
- Fixed a bug that causes a "Fault not clear" error in the Check | Relay Coordination using Stepped Events command report when two segments of the study line are mutually coupled to each other.

- Fixed the Read Change File's bus-name-comparison logic to match that of the Case Comparison Program.
- Bug fix in the SIR calculator: relay current for 1LG should be IA + 3*k*Io instead of 3Io*(1+k)
- Fixed a calculation error, which caused incorrect display of the line impedance in the RX diagram in some cases.
- Fixed a bug in the report logic of the Check Network for Study Date command that caused error in the report sections for load, shunt and generating units.
- Added logic to display an error message when voltage sag analysis's fault simulation fails.
- Fixed a bug in the Data Browser apply tag command.
- In PTI-Export logic, wye-delta transformer with very high grounding impedance on the wye side was translated to PTI type 14 (for delta-delta transformers). We have changed the logic such that wye-delta transformer is always be converted to PTI type 12 (for wye-delta transformer) regardless of fault impedance.
- Fixed a bug in the Arc Flash Hazard command. The lower kV limit was incorrectly entered as 0.28 instead of the correct value of 0.208 per IEEE-1584-2018
- In the DS relays Window, after the user changed the parameters of a relay, we added logic to refresh the main one-line window in case it is showing the zone reach. This general approach is already in use in the OC Curves window.
- Fixed a bug in the SIR Calculator. If you run the SIR on a line, then perform one or more fault simulations outside of the SIR calculator, and then run the SIR calculator again on the same line, you get different results.
- Fixed a memory error in bus search logic that caused program to hang in some cases.
- Fixed a bug in the arc flash hazard 1584-2018 output report.
- Fixed a bug that hangs the program when you try to edit a relay with the Edit Monitored Relays command in the Time-Distance (TD) Window.
- Fixed a bug in the TD window that failed to remove a relay group from the time-distance diagram after you deleted the relay group from the main one-line window.
- Fixed a bug in the TD window that failed to show a relay group on the TD diagram after you have created a new relay group and added relays to it.
- Fixed a bug that caused the program to fail to show a relay group on the TD diagram after you pasted a relay group with relays to it.
- Fixed two bugs that caused the message "Only 1 of the 3 ends of the study line opened." or "Only 2 of the 3 ends of the study line opened." to appear when checking relays on 3-terminal lines, when it is not true.
- Fixed bugs in the monitored branch report logic.
- Fixed a bug in the logic for determining whether a line belong to a certain zone number.
- Fixed a bug in the Check | Relay Operation Using Stepped Events command that always caused some lines to be omitted whenever the checking option is set to "By Area", "By Zone" or "All lines in the network".
- Bug fixed: The Check | Relay Settings complains about "Time element may not trip reliably" when the current is high enough.
- Fixed a bug in the mutual pair data handling logic, which caused incorrect time stamp record and dead-weight data in the OLR file.
- Fixed a bug in the Journal report: MUPAIR data were missing.
- Bug fix in the Journal report

- Added logic in the Data Link Dashboard to apply query rule to selected data links.
- Fixed bug in Add | Transformer Damage Curve command, that caused program crashes.
- Fixed typo in setting import scripts for L60 and L90 relays
- Fixed typo mistake in translation logic in setting import scripts for SEL 4xx relays.
- Fixed mistake in signal-only flag logic in setting import scripts for SEL 221G, 221F, GE L60 and 90 relays.
- Fixed a bug in the setting import script for SEL 321 ground overcurrent element.
- Updated setting import logic to handle setting with comment in setting value that start with #
- Updated SEL relay import scripts: process TR setting with free-form logic; process directional control add word bit F32V, F32QG, R32V, R32QG.
- Added setting import script for Areva P142 relay.
- Added logic to GE L90 import script to show message when no voltage or current source setting exist in the setting file.
- Enhanced setting import scripts for GE relays.
- Fix a bug in setting import script for zone number. Also assign 0 to the signal only parameter as default.
- Bug fix in SEL321 setting import script.
- Bug fix in SEL-311, 411, 421 setting import scripts: the ORDER setting must always be processed.
- Bug fix in SEL-311 import script: E21P values of 1C, 2C, 3C and 4C were not supported.

New and Updated Overcurrent Relay Curves

- **EATON.RLY**
  - AB DE-ION circuit breakers Series C F-frame circuit breakers. Catalog Types: ED, EHD, FDB, FD, HFD and FDC 30A circuit breakers. Curve Number: TC012039EN Ref. Time Current Curves TC01200002E

- **ABB.RLY**
  - ABB Feeder Protection Relay REF610

- **SIEMENS.RLY**
  - 7UT61 Relay

- **S&C.RLY**
  - S&C Trip Saver II cutout mounted recloser

New and Updated Distance Relay Type

- Generic Mho curves for loss of excitation elements in SEL-700G and GE-G60 relays.

New features and bug fixes in the Case Comparison program

- Fixed error in the binary file read logic for 3-terminal line tap bus flag
- Fixed change file header to include missing option flags
- Fixed a memory bug in the logic for DS relay data comparison that caused program crashes in some cases.
- Added logic to avoid reporting differences in values of relay parameters that are not being used.
- Fixed a typo in the breaker interrupting time label in difference report.

- Cosmetic fix in impedance correction table check logic to avoid false negative comparison report.
- Fixed an array dimension mismatch between this and the OneLiner program, which caused problem in reading some OLR files
- Fixed error in the import DXT logic for Generators, Loads, Shunts
- Fixed memory bug in the logic for reading and comparing relay data
- Fixed bug in the logic for checking parallel switches.

New features and bug fixes in PTI PSS/E-to-ASPEN Data Conversion Program since version 14.6

- Added support for PSS/E V34 format.
- New logic to detect comment lines in version-34 raw and seq files. The old logic looked for @! in the first 2 columns. The new logic look for @! in the first 2 non-blank columns.
- Added logic to convert type-9 transformer -- wye connected, 2-winding auto-transformer with 3-leg core. The transformer is converted to a wye-wye-delta transformer in OneLiner so the T-circuit model for the zero sequence can be duplicated.
- Fixed a bug in v34 switch status and normal status logic.
- Fixed a bug in the switched shunt data export logic.
- The winding code 133 for 3-winding transformer apparently was probably our own invention. PTI's code for wye-delta-delta transformer is 313, with the wye as the second winding. We have modified OneLiner v14.6 and v14.7 to recognize the code 313. The code for converting code 133 is still there.
- A zero-impedance line is converted into a switch immediately when we encountered it in the raw file. In the read-seq-file logic, we changed the logic to not complain about the switches not having positive-sequence counterpart.
- For certain 3-winding codes that require the windings to be swapped, the program neglected to also swap the voltage-tap ratios. This problem has been fixed.
- Fixed several bugs in the export of transformer data to v32 and v33 of PTI PSS/E raw and sequence files.

Explanation of Maintenance Release and Major Release

OneLiner's version number consists of two integers separated by a period, such as 14.8. The first integer "14" is the major release number, and the second integer "8" is the minor release number.

There are relatively few differences in program features between minor releases, e.g., between version 14.7 and version14.8. Also, no new parameters are introduce for any network or relay objects in minor releases. Most of the changes between minor releases are bug fixes. *This means that the data files generated by different minor releases are 100% compatible.*

Major changes in program features and network and relay models happen only between major releases.

Backward and Forward Compatibility of OLR files

Backward compatibility: *OneLiner* can read olr data files generated by previous versions (3.1 or later) with no loss of information. Version 3.1 was released in 1990.

Forward compatibility: *OneLiner* can read olr files generated by future versions. For example, *OneLiner* v12 can read olr files generated by v14, except new objects and new parameters not available in v12 will be omitted by the v14's read-file logic.

Backward and Forward Compatibility of DXT files

Text data files with extension DXT were intended to be a medium of data transfer between data conversion programs and *OneLiner* of the same major version. Due to popular demand, *OneLiner* v14 can read DXT files generated by *OneLiner* v12. This is the only exception.

File-Server-Setup/Workstation-Setup No Longer Supported

One of the methods of setting up the OneLiner software at a company with multiple users is to:
- Perform a File Server Setup at a file server.
- Perform a Workstation Setup at each workstation.

Some users think that the File-Server-Setup/Workstation-Setup provides the benefits of a client/server configuration in which the OneLiner software runs at the server's CPU. That is not true. Regardless of the method you used to setup the program, OneLiner always runs at each workstation's CPU.

The only benefit of the File-Server-Setup/Workstation-Setup method is the ease of updating the program. This benefit, however, is dwarfed by the method's complexity and the long delay in getting the system to work properly. We at ASPEN learned this only through experience.

We have stopped supporting the File-Server-Setup/Workstation-Setup method in the fourth quarter of 2019.

Users of version 14 who are currently using the File-Server-Setup/Workstation-Setup method can upgrade their server installation using the v14.8 setup program. However, no new workstation can be added. We urge you to switch to the simpler method of installing the software at each workstation now because you will have to do this sooner or later.