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Relay Testing Feature in OneLiner

The relay-testing feature in *OneLiner*[™] helps you test relays with computed fault currents and voltages. *OneLiner* has had a relay-testing tool since 2001. The first relay-testing tool was in the form of a *PowerScript*[™] program. (See article in *ASPEN Leaflet*, Vol. 17, No.3.) Many of you have used this tool successfully for testing single relays and for end-to-end tests.

Because of the growing popularity of the relay-testing tool, we decided to create an improved tool within the main executable file of *OneLiner* version 10. The major improvements are these:

• Test files can be generated for any number of relays at multiple locations. For the first time, you can create files for end-to-end test of 3-terminal lines. Previous version can generate at most two test files.

• The user can associate each test file with a relay object in *OneLiner*. Previously, there was no association between test files and relays, and the user had to enter the PT and CT ratios manually.

• The user can specify the prefault load current for each relay. This is new.

IN THIS ISSUE

Relay Testing Feature in OneLiner Cover
Locating Fault with OneLiner Cover
Relay Database Scripting 2
Price Increase 2
Upcoming Events 2
New Users

A S P E N 34 North San Mateo Dr., San Mateo, CA 94401 Phone: (650)347-3997 • FAX: (650)347-0233

info@aspeninc.com • www.aspeninc.com

• The user can compose a sequence of events and their duration using a click-and-drop interface. In addition to the prefault condition, each event can be a fault, a breaker opening, or a quiet "no fault" period.

• For the COMTRADE format, you can specify optional digital channels to be created in the test file.



Fig. 1: Dialog box for relay-testing tool.

• New options include (1) single-pole switching, (2) opening breakers at current zero crossings (COMTRADE files only), and (3) having PT on any bus in the vicinity of the relay location.

• The new relay-test command is much faster because it is implemented in C++.

Figure 1 shows the main dialog box for the Create Relay Test File command.

The relays to be tested are listed in the top listbox. The events to be simulated are in the bottom listbox. *OneLiner* generates the test files when you press the Write Test Files button.

The output of the relay-test tool can be one of these formats: COMTRADE, Doble SS1, CSV (for spreadsheets), and tab-delimited text file. Support for Omicron and other test sets are being worked on and will be available soon.

Locating Fault with OneLiner

The fault locator in *OneLiner* is designed

to pinpoint the location of a fault on a line, given the currents and/or voltages measured at one end of the fault line or at a nearby branch. *OneLiner* does a better job in locating faults than modern digital relays because, unlike relays, *OneLiner* has access to the complete network model.

Prior to OneLiner V10, the fault locator was available



as a *PowerScript* program. In version 10, we sped up the fault locator by implementing it as a command within the main *OneLiner* executable. We also added some new features: • The observed currents and voltages need not be those of the faulted line. The user can specify one end of a nearby branch as the point of observation.

• The user has greater flexibility in entering the observed voltages and currents. For example, the user can enter phase 'a' voltage and omit entering phase 'b' and 'c' voltages.

The fault-location algorithm is quite simple: The program simulates a large number of intermediate faults on the faulted line, with different fault impedances, and see which fault best matches the observed currents and/or voltages. For most networks, *OneLiner* can check thousands of possible faults and give you the result in a matter of seconds.

For best results, you should enter as many observed voltages and currents as possible and allow the fault locator to try a number of different fault impedances. We encourage you to report to us your experience in using this tool.

Relay Database Scripting

ASPEN Relay Database[™] Version 9 comes with a powerful built-in scripting engine that you can use to tailor and enhance many of the relay-database program commands. The scripting engine also allows Administrators to implement new program capabilities, such as workflow management.

Script programmers can directly manipulate data in relay database tables by means of the classes and functions supported by the scripting engine. For each data table, there is a script class with attributes and methods for locating, modifying, deleting and adding data records.

A special set of script commands is available for user implementation of workflow capabilities in the relay database. For example you can use a script program to highlight items in a form that require user action. You can also create a script program to automatically generate email messages to notify certain people when a setting request has been signed for release.

Script programs can run from the built-in script editor or installed as the relay-database program triggers. Triggers, as the name implies, are executed automatically in conjunction with various database commands in the client software or the web interface. There are many possible applications. For instance, the trigger OnNewRelay can be programmed to acquire a unique item numbers from SAP. Another trigger BeforeUpdateRelay can be programmed to make sure that certain character identifier entered by the user is not blank and is unique system wide.

Scripts can be written in the syntax of several modern programming languages, including Object Pascal, Visual Basic, Java and C++. The program's built-in script editor and interactive debugger provide a powerful platform for developing and testing script programs.

Price Increase

Effective February 1, 2006, the license fee for *OneLiner* and *Power Flow*[™] will go up by 15%, and the license fee for *DistriView*[™] will go up by 25%. This is the first ever price increase for these programs. You can save money on licensee fees and maintenance fees by placing your order before then.

Upcoming Events

• *OneLiner* class in Salvador, BA, Brazil, on December 13-15. This class will be taught in Portuguese. • *OneLiner* class in Redondo Beach, California, on March 7-9. Redondo Beach is 7 miles (10 km) south of Los Angeles International Airport, LAX.

The schedule and signup sheets for the classes are available on our web site.

New Users

OneLiner

- AREVA T&D Inc., Paris, France
- City Public Service, San Antonio, TX
- Consultoria de Ingenieria Electrica, Buenos Aires, Argentina
- Hatch Acres, Inc., Niagara Falls, Canada
- Henville Consulting, Delta, BC, Canada
- Hestco, Inc., Benton, AR
- ICPE, Midvale, UT
- ISO New England, Holyoke, MA
- Lee County Electric Coop., N. Ft. Meyers, FL
- Orion Technical Services, LLC, Reading, PA
- Pterra, LLC, Albany, NY

Power Flow

- Central Lincoln PUD, Newport, OR
- Consultoria de Ingenieria Electrica, Buenos Aires, Argentina

DistriView

- City of Holyoke, Massachusetts
- EnergyAustralia, Wallsend, NSW, Australia
- Rex D. Brown Consulting Engineers, Battle Ground, WA

Relay Database

City of Holyoke, Massachusetts

Line Constants Program[™]

- Eugene Water & Electric Board, Oregon
- Relay Application Innovations, Pullman, WA
- Ulteig Engineers, Inc.
- Western Farmers Electric Coop.

