**Tool to create and test the PSLF and PowerWorld TIOCRS model records**

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Here is a short description of the files included in this tool:

Note: This tool is intended to provide the framework for creating and testing your own data.

**TIOCRS\_OCRelayModelTool\_v0.xlsm**

This is an excel tool for converting inverse time overcurrent relay settings to PSLF tiocrs dyd records and PowerWorld Auxiliary tiocrs records. This sheet is setup to represent 17 inverse time-overcurrent curves (i.e. IEEE, US, IEC, IAC). This spreadsheet also provides the frame work for adding a tab for creating the PSSE dyr model.

User’s enter data on the “OC Relay Input Data” Tab and the “PSLF tiocrs Models” Tab of the spreadsheet.

The remaining tabs provide calculated relay operating times for each relay curve type.

Note: I found in PSLF that I had to repeat the Circuit ID (i.e. tiocrs 2 "T1HV" 500 "1 " 3 "T1LV" 230 "1 " "1 " : #9 "mode" 1 "curvtype" 1 "pickup" 150 "tcb" 0.0833 "tdm" 0.5 "treset" 0 "p" 2 "a" 28.2 "b" 0.1217 "c" 0 "d" 0 "e" 0 "t3trip" 1 ) for parallel transformers in order for PSLF to correctly apply the tiocrs model to a parallel transformer with different ID’s.

**Example\_TIOCRS.dyd and Example\_PW\_TIOCRS**

The “Write DYD File” macro buttons located on the “PSLF tiocrs Models” tab and “PowerWorld tiocrs Aux” tab creates a dyd and/or aux files for the tiocrs data records entered in the tool in the default save directory set in your Excel Options. An example files are included with this tool.

**Powerflow Test Cases**

Two sets of PSLF files are provided as example model validation cases for testing the timing of your relay settings data.

The first set includes an example powerflow and associated dynamics data files for simulations of the 17 transformers curves represented in the spreadsheet. The PSLF simulation results at 1.5xpickup setting are shown in Table 1. The second set of files provides the framework for testing a single transformer.

**Table 1: TIOCRS Model Simulation Results**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Transformer Name** | **Curve Type** | **TAP** | **TD** | **CTR** | **Calculated****OP Time (s)** | **PSLF Simulation OP Time (s)** |
| T17 | IAC Short Inverse | 1.5 | 0.5 | 100 | 0.0716 | 0.0708 |
| T13 | IEC Short-Time Inverse | 1.5 | 0.05 | 100 | 0.1529 | 0.1542 |
| T8 | US U5 Short-Time Inverse | 1.5 | 0.5 | 100 | 0.2113 | 0.2125 |
| T16 | IAC Inverse | 1.5 | 0.5 | 100 | 0.5776 | 0.5750 |
| T4 | US U1 Moderately Inverse | 1.5 | 0.5 | 100 | 0.6499 | 0.6501 |
| T9 | IEC Inverse | 1.5 | 0.05 | 100 | 0.8597 | 0.8584 |
| T10 | IEC Very Inverse | 1.5 | 0.05 | 100 | 1.3500 | 1.3459 |
| T15 | IAC Very Inverse | 1.5 | 0.5 | 100 | 1.4506 | 1.4459 |
| T6 | US U3 Very Inverse | 1.5 | 0.5 | 100 | 1.6002 | 1.5960 |
| T14 | IAC Extreme Inverse | 1.5 | 0.5 | 100 | 1.6989 | 1.6960 |
| T7 | US U4 Extremely Inverse | 1.5 | 0.5 | 100 | 2.2182 | 2.2627 |
| T5 | US U2 Inverse | 1.5 | 0.5 | 100 | 2.4700 | 2.4627 |
| T11 | IEC Extremely Inverse | 1.5 | 0.05 | 100 | 3.2000 | 3.1919 |
| T3 | IEEE Moderately Inverse | 1.5 | 0.5 | 100 | 3.2195 | 3.2128 |
| T2 | IEEE Very Inverse | 1.5 | 0.5 | 100 | 8.0895 | 8.0716 |
| T1 | IEEE Extremely Inverse | 1.5 | 0.5 | 100 | 11.3409 | 11.3132 |
| T12 | IEC Long-Time Inverse | 1.5 | 0.05 | 100 | 12.000 | 11.9757 |