Fault and Disturbance Data Management and Analysis

Wavewin^{tm} Universal
(Product Description, October 10th, 2010)

I - Executive Summary

1) Product: Wavewin^{tm}, with over 20 years of proven performance, is a universal program for management and analysis of digital fault records (waveform signatures resulting from real or simulated power system fault and disturbance conditions). The program supports formats from many types of protection and monitoring devices such as numerical relays, digital fault recorders, and power quality meters (hereinafter, smart devices). The program is equipped with powerful analysis routines designed for close inspection of fault signatures from various types of major substation equipment such as breakers, transformers, phase angle regulators, capacitor banks, and so forth.

2) Uniqueness: The universal nature of the program is unique in the power industry. It is the only known program that can manage and analyze fault records from most types of smart devices used today. The program has acquired a large user base including a considerable number of utilities in the United States and was cited by the North American Electric Reliability Commission (NERC) as being "indispensable in the blackout investigation of August 14th, 2003".

3) Benefits: Utilities spend considerable amounts of manpower and financial resources upgrading and maintaining their smart devices. The program provides enhancements in these areas that are extra ordinary. It helps equipment and protection engineers expose failures and root causes in a timely and accurate manner and form a common platform, and it provides the benefit of helping catch potential failures before they occur (predictive maintenance). Such benefits help utilities increase power system reliability, reduce engineering and maintenance time, extend the service life of major substation equipment, and restore services faster.

4) Implementation: Deployment is by design user friendly. A copy of the program is installed on each user computer and a shared drive on the company network is used to store and maintain fault records. High level descriptions of the basic program interfaces and installation requirements are provided in the following sections along with a detailed listing of the available support services.

II - Program Interfaces

The program is composed of two integrated systems: the analysis interfaces, and the fault records database interfaces. The following subsections provide a high level description of these systems:

1) Analysis Interfaces: The interfaces are used by equipment and protection engineers to analyze digital fault records from both real and/or simulated events (transient and steady state conditions). The program provides multiple types of interfaces, a select subset of these interface is shown in Figures 1 thru 4.
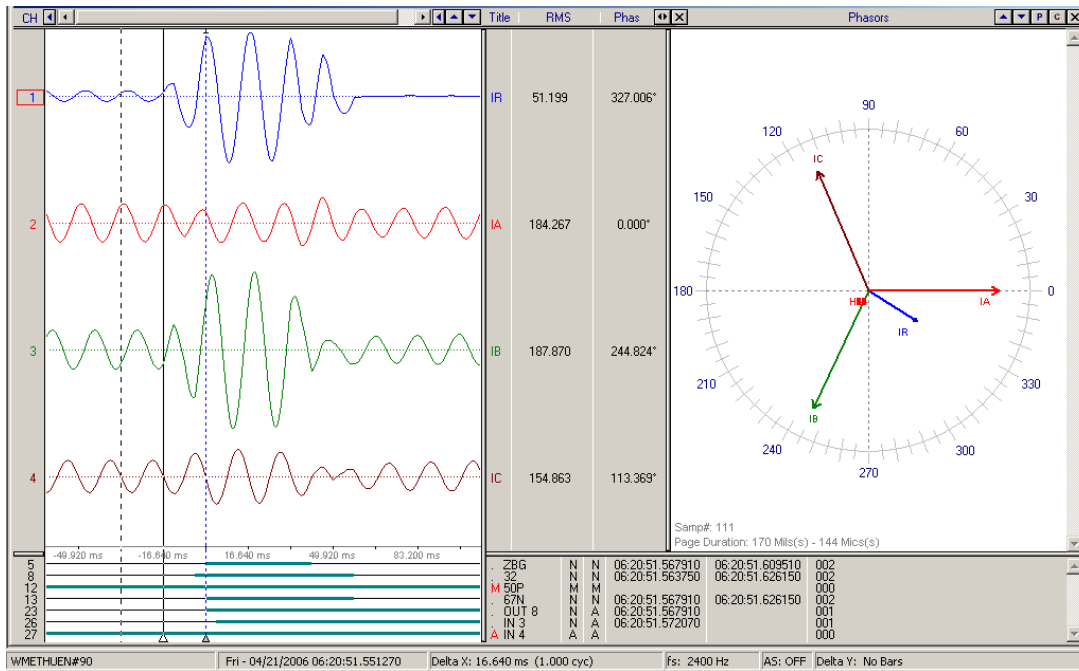
Figure-1, Fault & Disturbance Analysis Interface (Transient Data)
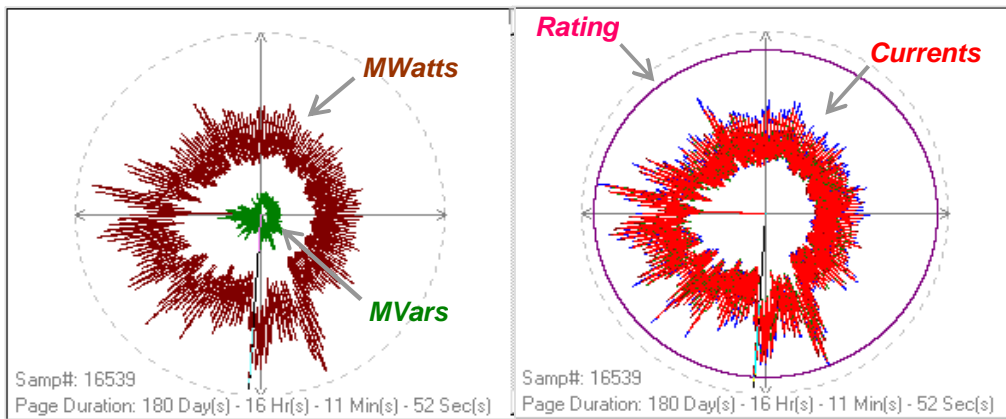
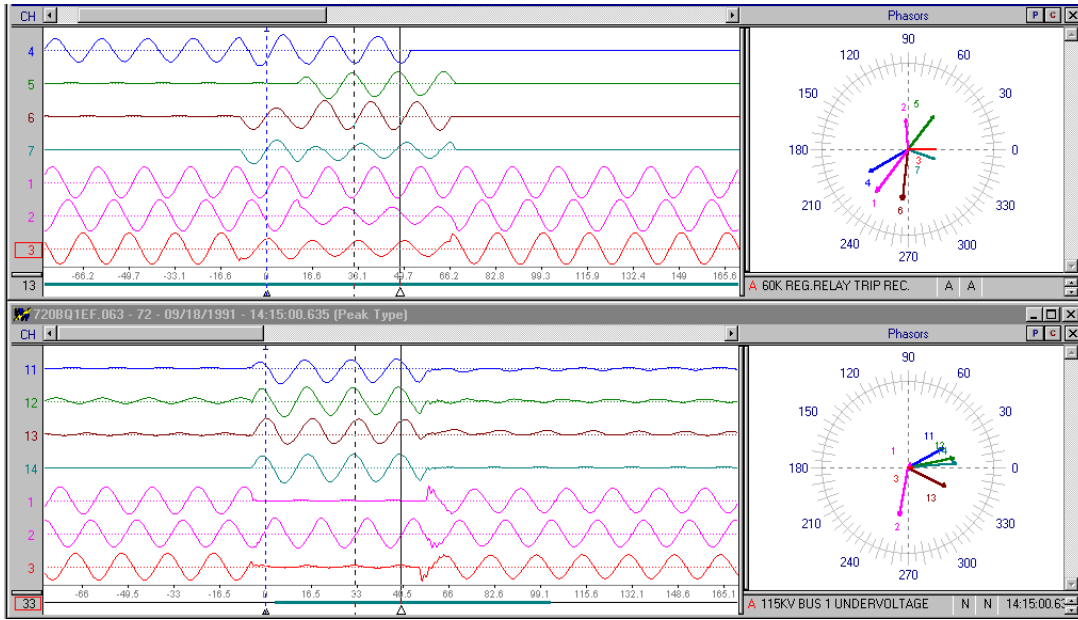***Figure-2, Evolving Loads & Seasonal Averages (Steady State Data)***

Figure-3, End to End Analysis (Data Synchronization)

Figure-4, Fault Summaries (Type, Location, and Sequence of Events)

2) *Fault Records Database:* The program is designed to maintain large numbers of fault data records on a shared drive on the company network. The fault data records are considered legal data records and are always maintained in their original proprietary formats. Immediate and secure access to the fault records is concurrently available to all users on the network.

Fault records have complex inter-relationships (multiple events can be in one record, or one event can span multiple records). Fault records are also generated using various types of data formats and naming conventions. To that extent, the program uses a specialized browser equipped with an inference engine for identifying date/time of fault occurrence and type of originating device. The inference engine is supported with fast search, sort, and query engines that operate based on both required and/or optional fields as defined in IEEE Std. C37.232-2007. The database browser is depicted in Figure-5.

Figure-5, Fault and Disturbance Database Browser (IEEE Std. C37.232)

III - Program Requirements

Each user needs a copy of the program installed on his/her computer. The program is a compact application that requires minimal installation and is designed to maximize reliability and availability. It is non-intrusive in nature meaning it does not modify any operating system files or registries. The minimum requirements are:

- Windows 2003, NT, XP, Vista, 7, or embedded NT/XP operating systems
- 16 Mbytes of available hard-disk space
- 512 Mbytes of available RAM

- Read/Write access to local and shared drives.

IV - Support Services

1) Technical Support: Toll free numbers and web addresses are provided to answer questions and as needed provide data sheets, quick start manuals, tutorials, and any other type of documentation that is necessary for the proper operation of the program.

2) Web Support: Unlimited access to a password protected web site (www.wavewin.net) is provided for downloading the latest upgrades and documentation. New upgrades are made available at a frequency of about once per quarter.

3) Field Support: Softstuf has a qualified team of developers, engineers, and technicians that are willing and ready to travel to field locations as specified and provide installation, configuration, and/or troubleshooting services.

4) Training: Softstuf provides classes for hands-on training on acquisition, collection, management, and analysis of fault data records. The classes can be offered at the Softstuf training facility in Philadelphia, PA or at field locations as specified or can be provided electronically via the web.

5) Customization & Development: Softstuf will work closely with users to make sure that all of the available features are up to standards and will add newly requested features and functions in a timely manner. New features are normally developed based on a mutual time frame that is in line with the natural evolution of the program.

6) Warranties: Softstuf provides full coverage for as long as the users continue to use the program. Deficiencies, if any, will be corrected by Softstuf in a reasonable time frame and without charge.

7) Users Group: Softstuf provides all users with access to the user group forms and the minutes of the annual meetings.

V – Additional Information

For additional information please visit www.softstuf.com, or contact:

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