

Ametek's Platinum 2.5K Dynamic Disturbance Recorder and Synchronized Phasor Measurements

NASPI Workgroup Meeting
October 8, 2009

Charlie Childs
Product Manager



What is a Dynamic Disturbance Recorder?

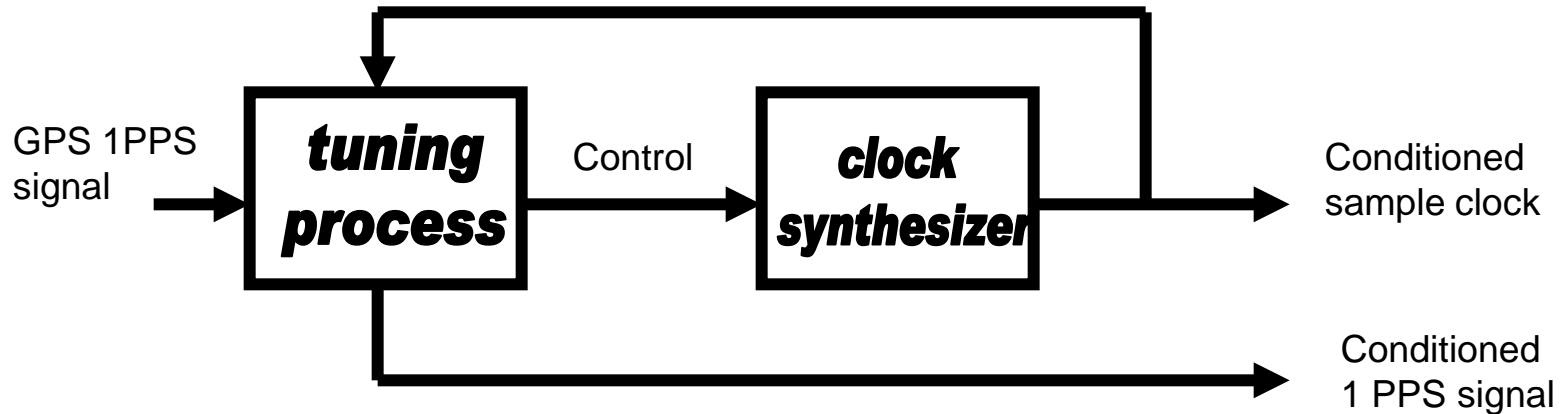
- Multi-Function Device
 - Hi Speed Fault Recording
 - Swing/Disturbance recording
 - Continual Disturbance logger
 - Phasor Measurement Unit (C37.118)
 - Sequence of Events recorder
 - Power Quality Monitor
 - On-line switchgear and battery monitor
 - Fault location
 - ...

How does it work?

- High Speed data acquisition
 - 23KHz sample rate (384 samples/cycle)
 - True Anti-Aliasing filter
 - Bandwidth of $\frac{1}{2}$ programmed sample rate
- Calculations made twice per cycle
 - Frequency, RMS values, Phasor Magnitude, Phasor angle
 - All calculations corrected for true frequency

How does it work? (cont.)

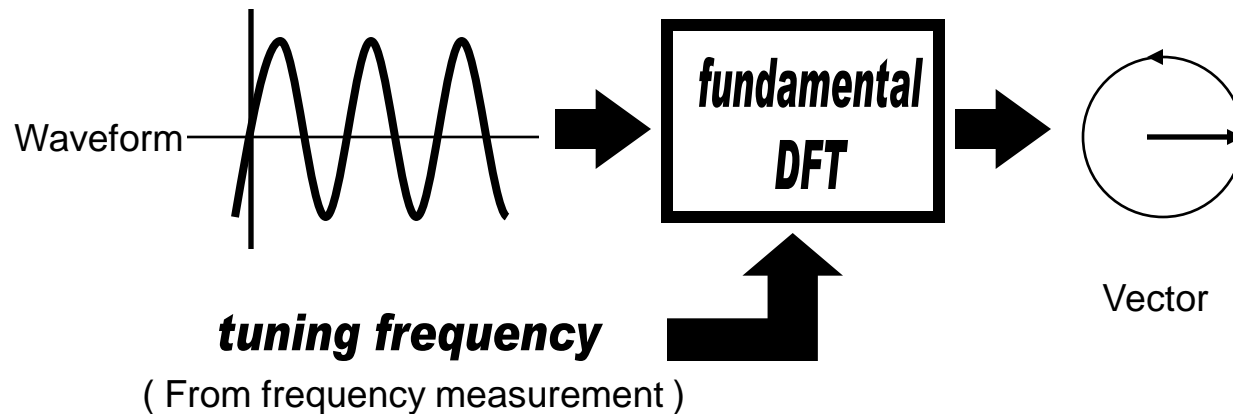
- Synchronized Data Acquisition



- Sample clocks on ALL P2.5K's are synchronized
 - Eliminates long-term drift by periodic setting against GPS time-source.
 - Control loop runs once a second, short-term drift is contained.

How does it work? (cont.)

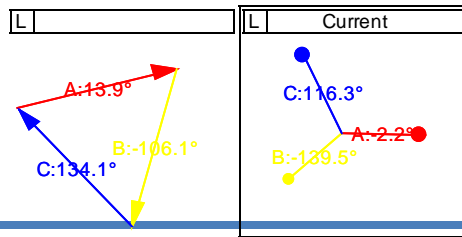
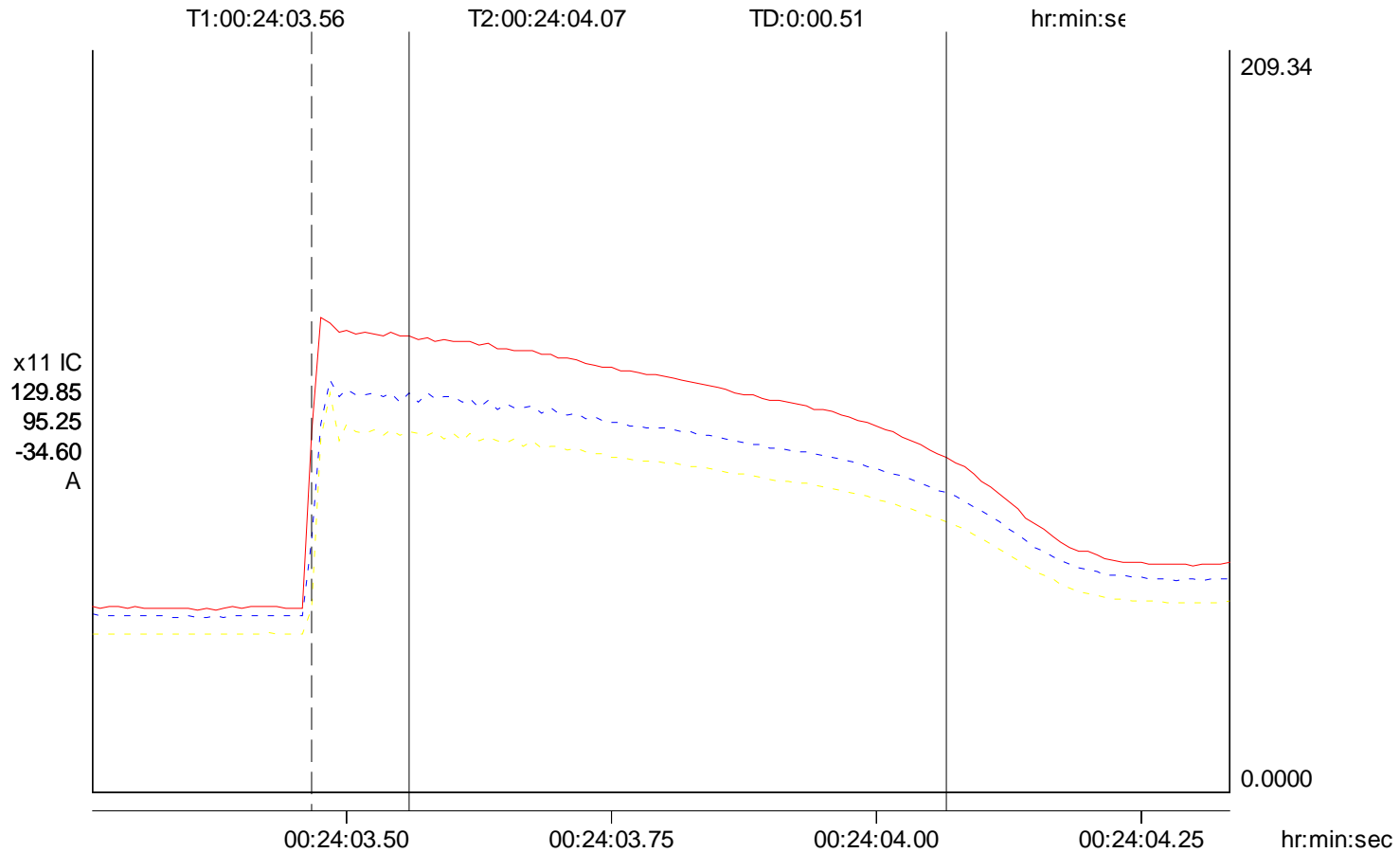
- Fundamental System Vectors

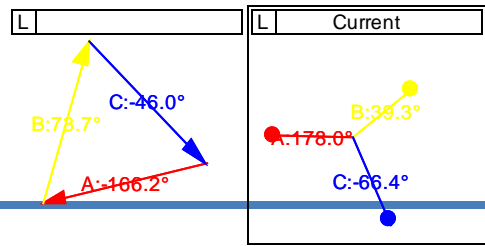
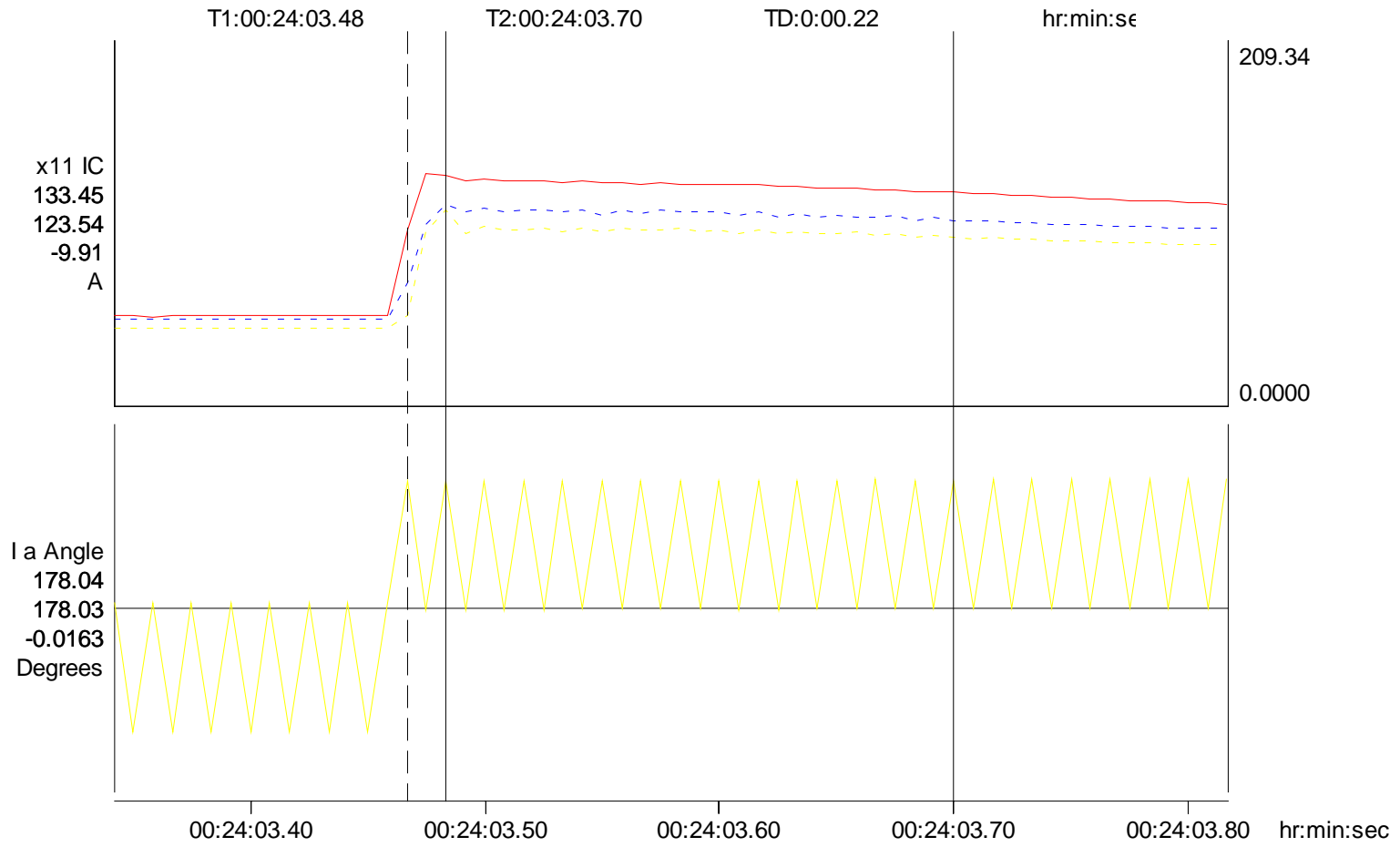


- P2.5K corrects Vector measurements
 - Frequency measurement used to determine window sizing adjustments on-line
 - User assigns either of 2 frequency channels to each analog channel

Disturbance Recording

- Longer term records, up to 30 minutes
- 2 samples per cycle (120 Hz)
 - 600 cycles to 10 minutes pre trigger
 - 30 seconds to 5 minutes post trigger
 - Maximum 30 minutes
 - Voltage & Current RMS, **phasor magnitude and angle** on every channel, Frequency (2) channels
- Uses independent triggers to start the recording
 - Cross trigger from transient fault recording
 - Trigger on: O, U, R/C of fundamental, **frequency oscillation, Power oscillation**, O, U, R/C of W, VAR, VA, Voltage imbalance, O, U, R/C of pf (fund. and displacement) and O, U, R/C of impedance; differential phasor





Disturbance Recorder

- Oscillatory Triggers



- **4 sub-bands per trigger**
 - Range of interest spans from 0.1Hz to 15Hz.
 - (0.1Hz - 0.3Hz) (0.3Hz - 0.7Hz) (0.7Hz - 3Hz) (3Hz - 15Hz)
- **User defined trigger criteria**
 - Each band has Threshold and corresponding dwell time.

Disturbance Recorder

Disturbance Trigger Settings

Voltage imbalance	Power factor	Impedance	Phase Difference
Analogue Fundamental	Frequency oscillation	Power oscillation trigger	Power

Line Group Channel : 1 Line group 1

Band 0.1 - 0.3 Hz
 ON/OFF 3.00 % 4.32 kW 10.00 Seconds

Band 0.3 - 0.7 Hz
 ON/OFF 3.00 % 4.32 kW 5.00 Seconds

Band 0.7 - 3.0 Hz
 ON/OFF 5.00 % 7.20 kW 2.00 Seconds

Band 3.0 - 15.0 Hz
 ON/OFF 5.00 % 7.20 kW 1.00 Seconds

OK Cancel

Disturbance Trigger Settings

Voltage imbalance	Power factor	Impedance	Phase Difference
Analogue Fundamental	Frequency oscillation	Power oscillation trigger	Power

Frequency channel 1 oscillation triggers
Channel 1 : 9 V A-B

Band 0.1 - 0.3 Hz
 ON/OFF 0.01 Hz 1 Seconds

Band 0.3 - 0.7 Hz
 ON/OFF 0.01 Hz 1 Seconds

Band 0.7 - 3.0 Hz
 ON/OFF 0.01 Hz 1 Seconds

Band 3.0 - 15.0 Hz
 ON/OFF 0.01 Hz 1 Seconds

Frequency channel 2 oscillation triggers
Channel 2 : 10 V B-C

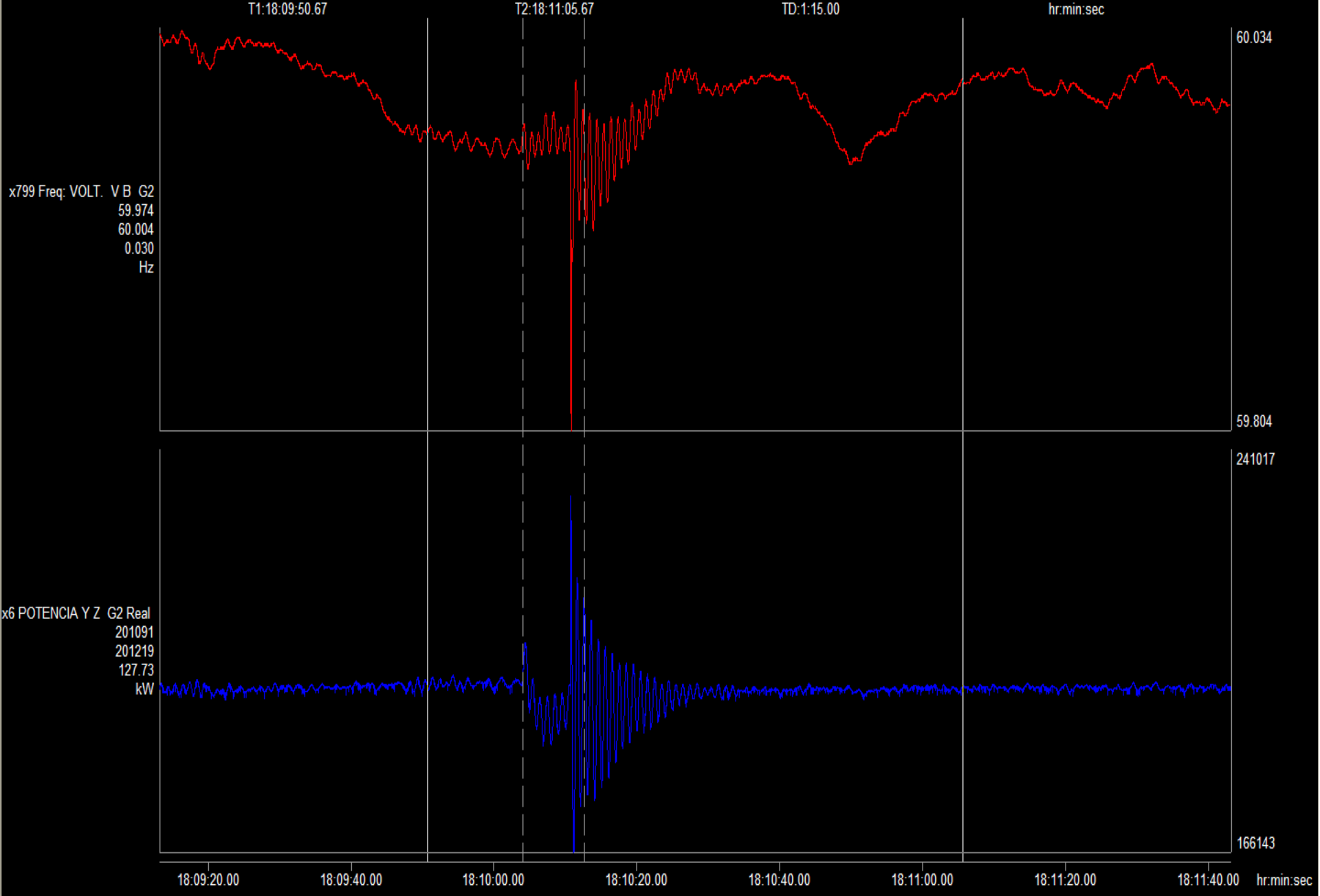
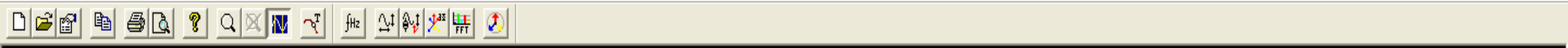
Band 0.1 - 0.3 Hz
 ON/OFF 0.01 Hz 1 Seconds

Band 0.3 - 0.7 Hz
 ON/OFF 0.01 Hz 1 Seconds

Band 0.7 - 3.0 Hz
 ON/OFF 0.01 Hz 1 Seconds

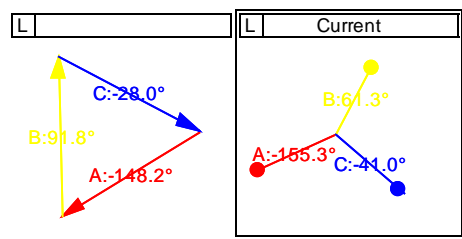
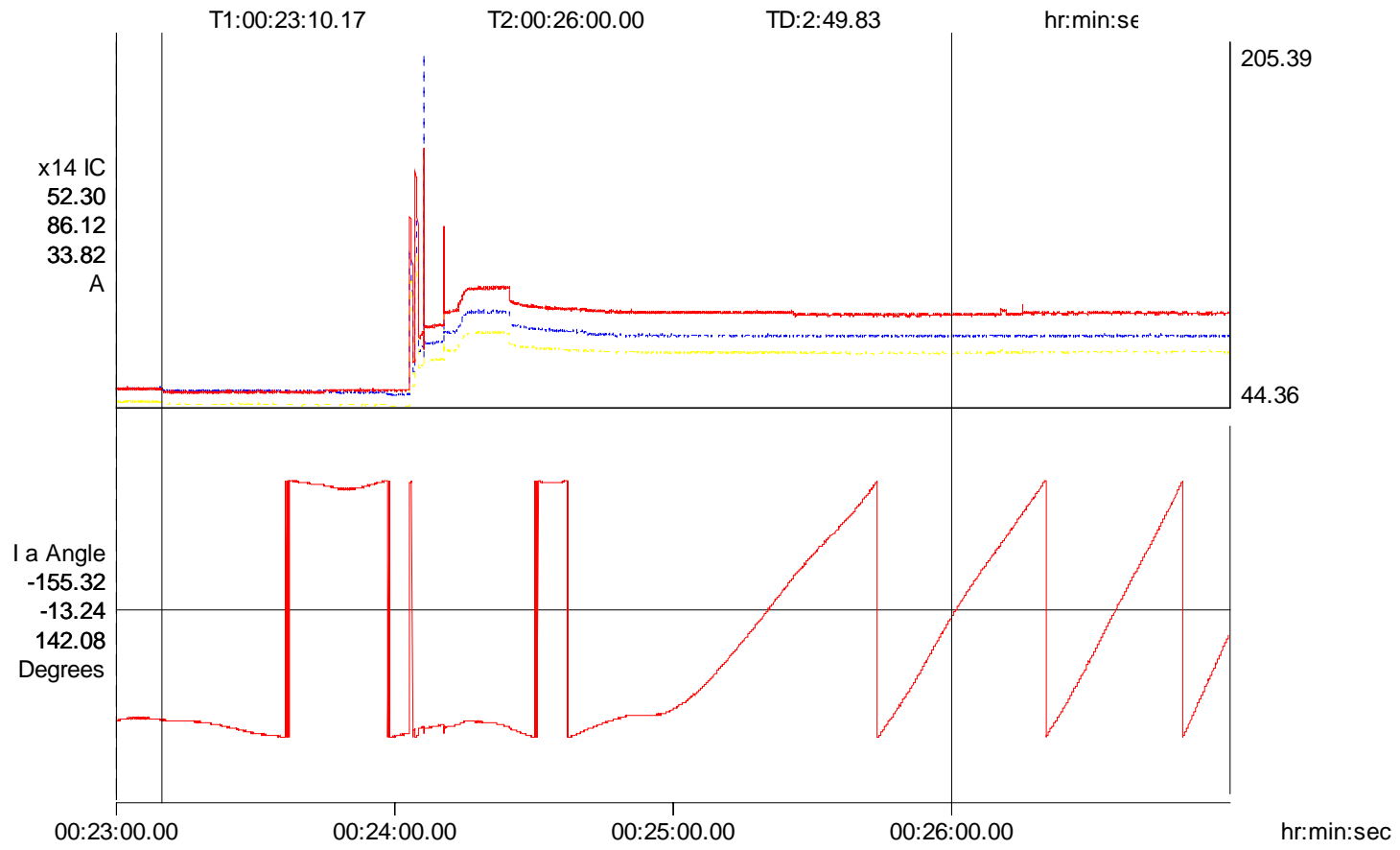
Band 3.0 - 15.0 Hz
 ON/OFF 0.01 Hz 1 Seconds

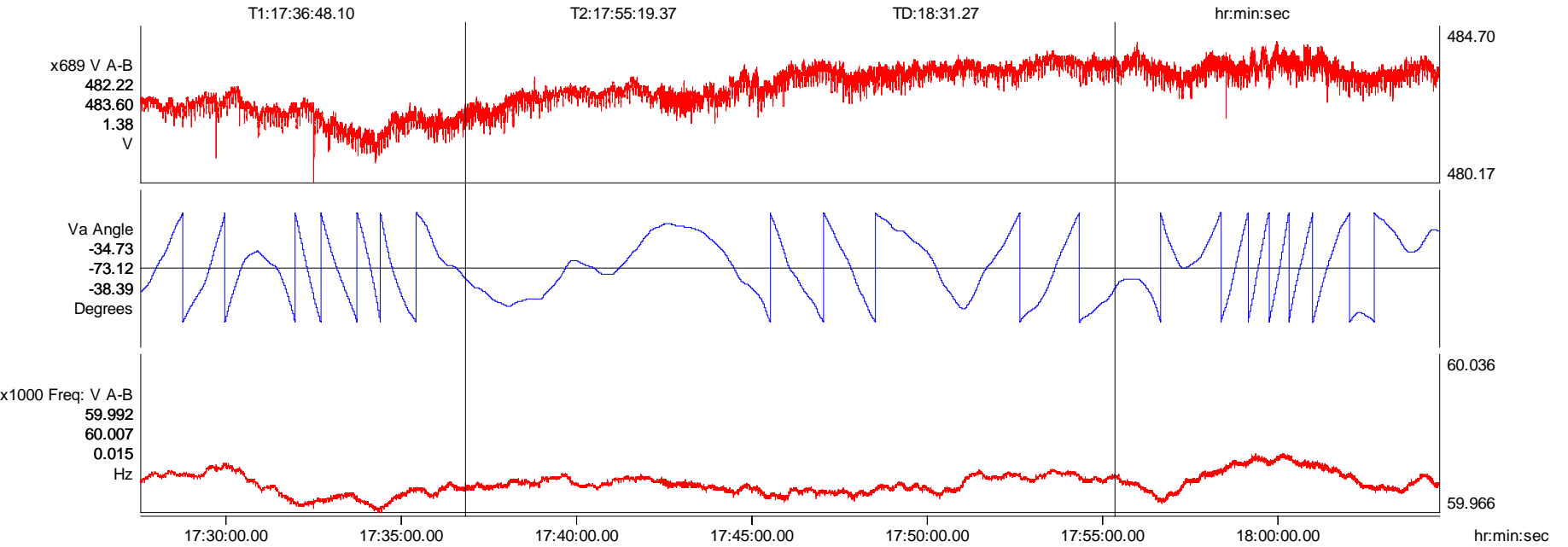
OK Cancel Apply Help



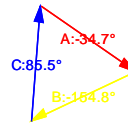
Disturbance Logger

- Continuous recording, No triggers
- Disturbance
 - 30 samples/second recording
 - Voltage & Current RMS, **phasor magnitude and angle** on every channel, Frequency (2) channels
- Continual circular buffer (FIFO) log
 - 2 week recording
- Required by NERC





L



Data Retrieval

- Automated Wide Area Retrieval

Immediate disturbance logger polling

Disturbance logger start and end

Start date: 7/2009 Start time: 10:02:00 PM

End date: 10/ 7/2009 End time: 10:07:00 PM

Reduced data: ON/OFF

Auto poll site list

Region: Rochester

Auto poll selections: Default

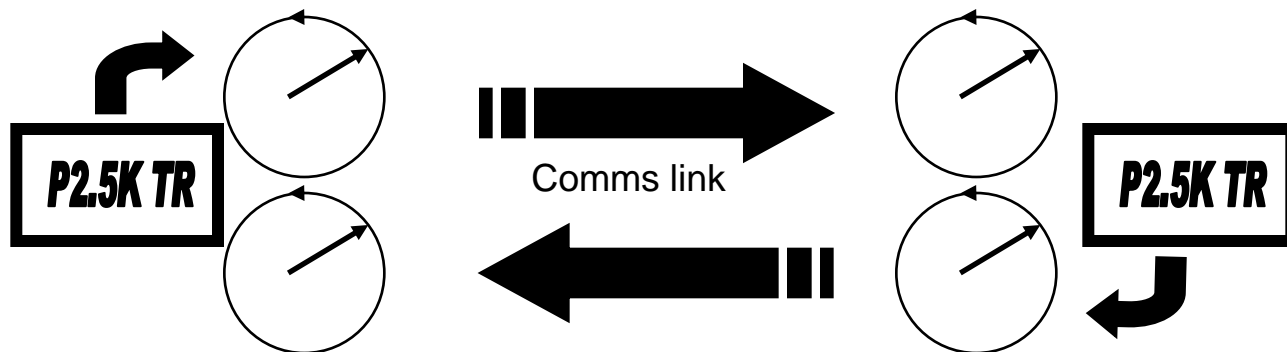
Select all Deselect all

Recorder	Location	Region
480 Service (4.61)	AMETEK	Rochester
old acq old input (4.61)	AMETEK	Rochester
IEC61850 test unit	Charles' office	Rochester
32Analog/64Digital	Default Site Name	Rochester
JD-TR2100	Service-1	Rochester

OK Cancel Help

Synchrophasor Data

- IEEE C37.118-2005 Synchrophasor
 - Streaming to data concentrators
 - Up to 60 frames per second
 - + Sequence components, RMS values and Contact state
 - Real time view of transmission network stability
 - Triggering
 - Platinum 2.5K can receive phasor quantities from other P2.5K's or other Phasor Measurement Units and subsequently trigger of phase angle drift



Thank You!

Questions?

