Application Description
Acquiring communications and data in an electromechanical substation typically requires a utility to perform a wholesale upgrade of the entire panel to microprocessor relays, which can be very costly. The cost to upgrade a substation includes extensive engineering time, new relays and panels, complete rewiring of the substation, and in some cases, additional real estate. ABB now offers a time and cost saving solution - Intelligent Data Sensor technology. This technology allows a utility to automate its electromechanical substations without the high cost of a microprocessor panel upgrade. By simply attaching a small, non-intrusive, clamp-on AC/DC sensor to the relay wires and connecting its Cat5 cable to the supplied recording switch, real-time analog and digital information is readily available for analysis. The sensor is highly sensitive to a resolution of 10 microseconds and is capable of sensing millisecond transients with a 2% accuracy range. This clamp-on sensor, coupled with our waveform data analysis, is capable of fast line restoration, fault and disturbance analysis, and real time monitoring of evolving loads - all without the costs involved in upgrading to microprocessors.

SER605 Receiver
The data acquisition is performed by a purpose built device using fast A/D conversion, with continuous streaming and a resolution up to 22 bits (typical 16 bit). It has a programmable gain option feature for improved accuracy, individual channel sampling rates of 2 KHz., and a fast Ethernet interface for real time data transfers. It requires 24 VDC power. (See Figure 1)

SEI601 Sensor
The sensor is a small, non-intrusive, clamp-on device that uses Hall Effect technology to sense current flow through a #12 AWG or #10 AWG wire. The chip is a single-axis, integrated, magnetic, field sensor based on the Hall Effect. The circuit is fabricated using a conventional CMOS technology, with an additional ferromagnetic layer. The ferromagnetic layer is used as a magnetic flux concentrator, providing a high magnetic gain. Therefore, the circuit features very high magnetic sensitivity, a low offset, and low noise. The clip enclosure contains a small mu-metal strip for additional shielding against external fields and for amplifying internal fields. It is capable of sensing microsecond transients (AC & DC). (See Figure 1)

Sensor Specifications
- Signal Output: 2.5 +/- 2.5 VDC
- Supply Voltage: 5 VDC
- Supply Current: 16 mA
- Sensitivity Range: 0.2 to 40 Amps Secondary
- Maximum Conductor: 12 AWG
- Response Time: 10 microseconds
- Bandwidth: DC to 10 KHz
- Dimensions (L x W x H): 1.56 x 0.78 x 0.41 (inches)
- Accuracy: 2 % nominal (See Note A)
- Temperature Range: - 40 to 85 DegC
- Humidity Range: 0 to 90% non-condensing
- Cable Length: 10 ft
- Cable Connector Type: RJ45 Male

Note A: Calibration, current levels on conductors, spacing between sensors and significant temperature variations may affect accuracy.
Figure 1: SER605-8 Eight Channel Receiver and SEI601 Sensor

Figure 2: Receiver Configuration Display
Figure 3: Transient Data Display

Figure 4: Directional Harmonics Display