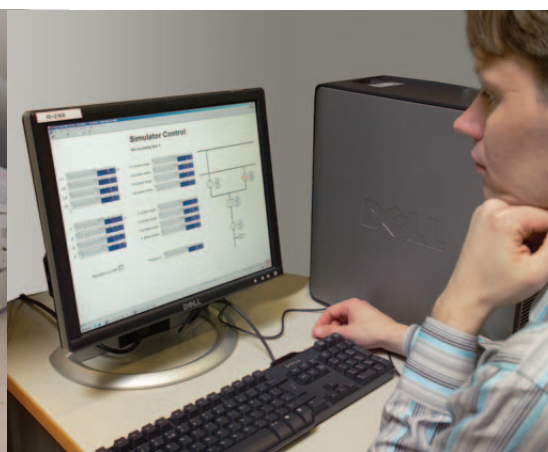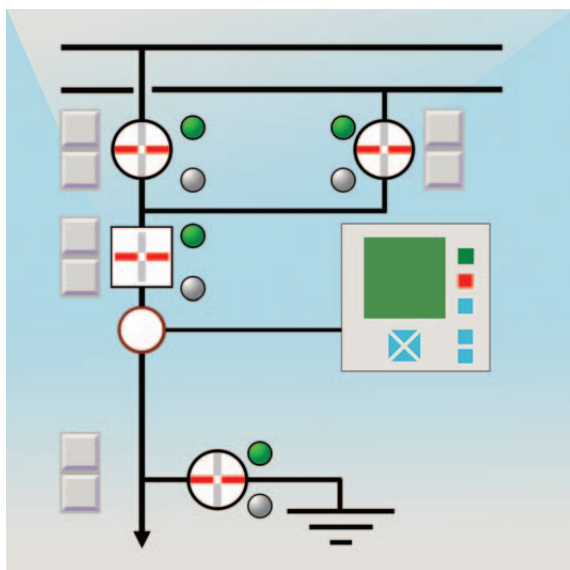# Protection System Simulator
SIM600

Protection and control from ABB

Universal simulator
for modern power system
protection and control equipment.

Scope

SIM600 is a general-use simulation and visualization appliance for protection relay and control systems. Enhanced with optional voltage and current amplifiers, the appliance forms a complete simulation solution for protection relay systems.

Application

The programmable Protection System Simulator SIM600 is designed for functional testing of power system protection and control IEDs and for simulating and visualizing protection schemes and applications. Analog and digital signals needed to simulate the function of your substation configuration, switchgear system and protection scheme can conveniently be generated with SIM600.

SIM600 is a microprocessor-based stand-alone appliance which also can be used in combination with a PC. The computer serves as a programming tool for SIM600, and at the same time as a user interface for the simulator.

The programmability makes SIM600 a flexible tool for simulation of complex protection and control schemes. It is a dedicated tool for training engineers. It is also a convenient tool for creating demonstrations of the capability and functionality of modern power system protection and control devices.

The function of SIM600 is based on the IEC 61131-3 PLC programming language which is used for creating the desired functions and logics for controlling the analog and digital signals needed for functional testing and simulation of protection and control systems.

In addition to the basic system simulation functionality, the SIM600 appliance is an appropriate tool for running sequential tasks for simulation of complex logics such as the relay interlocking schemes of various substation configurations, parallel power transformer voltage regulators and tap-changers, and multi-shot auto-reclose systems.


With ten adjustable analog outputs the SIM600 tool is well suited also for functional testing of three-phase relays, e.g. transformer differential protection relays.
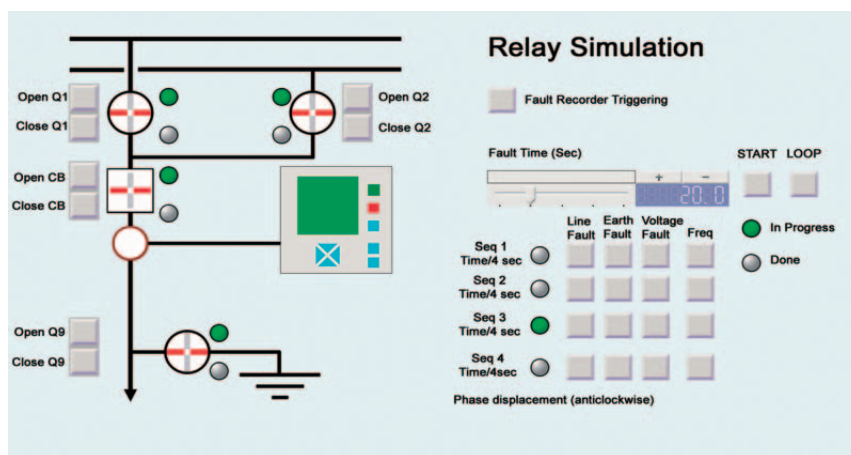
SIM600 provides

- Increased understanding of protection relay schemes and solutions
- Increased operational safety and reliability of the control system
- Portability, repeatability and reusability of simulation programs
- Verification of protection and control system functionality
- Complete simulation of complex relaying systems
- Easy set-up and execution of real-world relaying applications

Visualization of a sectionalizer and circuit breaker simulation.
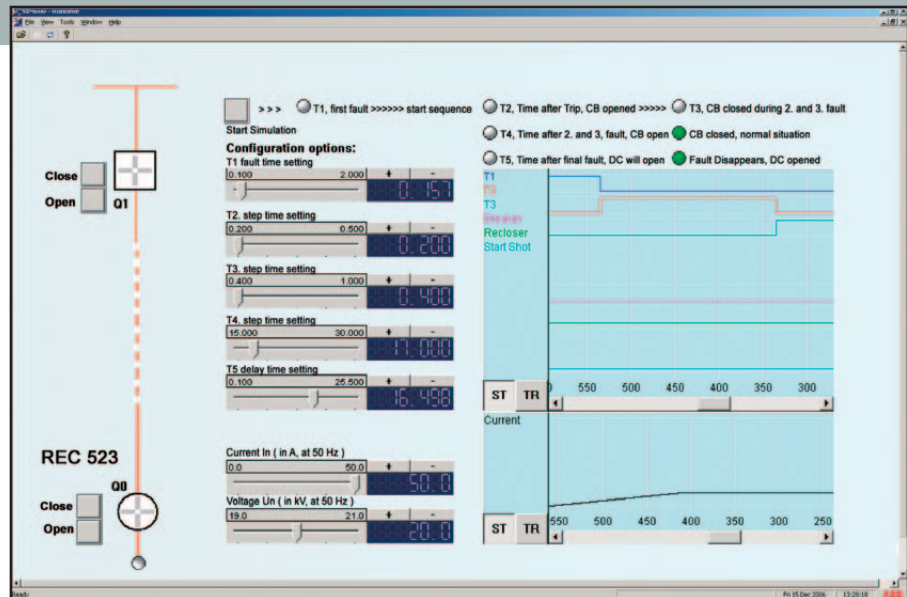
The SIM600 Editor software is an easy-to-use power system modeling tool for creation of the required simulation programs. The above application shows a monitoring and control unit type REC 523 controlling a sectionalizer on a rural network branch.

In the figure below the co-operation between the circuit breaker and the sectionalizer during a fault downstream of the sectionalizer is illustrated. The sectionalizer is opened after the second reclosure, the faulty branch is isolated and the circuit breaker remains closed when the feeder is reenergized.

Sequence diagram of the co-operation between the circuit breaker and the sectionalizer during a network fault.

T1 = 0.1 - 0.2 s
T2 = 0.2 - 0.5 s
T3 = 0.4 - 1.0 s
T4 = 15 - 30 s
T5 = 0.1 - 25.5 s
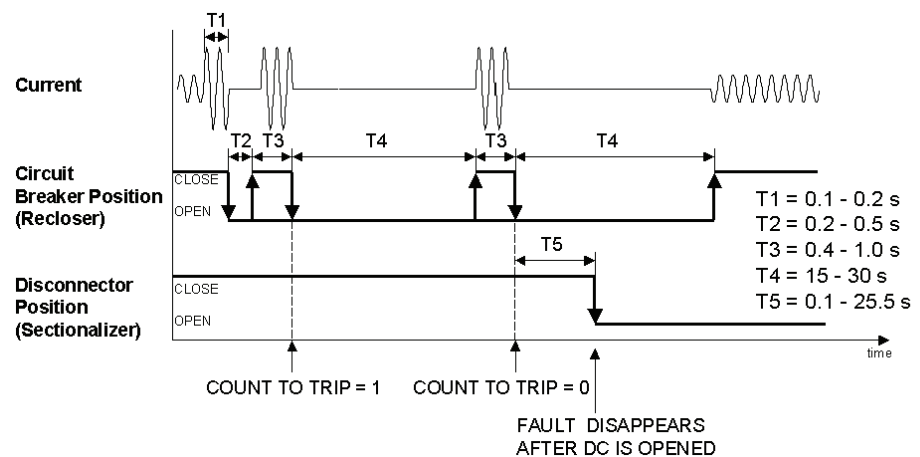
Technology summary:

General specifications

- Ten sine-wave generators for simulating combinations of current and voltage signals
- Via the HMI or the application program the amplitude and phase angle are separately adjustable for each analog output signal
- Adjustable common analog output signal frequency within the range 45 Hz to 65 Hz
- Two programmable standard mA outputs for simulation of RTD sensors
- The generated signals can be dynamically controlled during running
- The 48 V relay auxiliary supply can be switched on and off by the simulation
- Relay auxiliary power and field contact supply from an internal 48 V dc source or from a galvanically isolated external source, if U> 60 V dc
- Sequence simulation of logic and interlocking arrangements
- Programmable digital I/Os and analog outputs (AO)
- PLC type programming based on IEC 61131-3 standard elements
- Drag and drop elements for creation of graphical user interfaces or sizable application programs
- jpg, bmp, gif and wmf image format compatibility for creation of background pictures

Additional amplifiers

- Current amplifier for supply of 0.5 A, 1 A or 2 A relay energizing current, 5 A on request
- Voltage amplifier for supply of $100/\sqrt{3}$ V ac, $110/\sqrt{3}$ V ac or $120/\sqrt{3}$ V ac relay energizing voltage

The information in this document is subject to change without notice.

Hardware specifications

- 16 binary inputs
- 16 binary outputs
- 8 push-buttons
- 8 yellow LEDs for user selectable indication purposes
- 8 red/green LEDs for object status indications
- 10 analog sine-wave signal outputs, 10 V ac peak value in 10000 steps
- 2 standard analog mA signal outputs
- Auxiliary power unit, U_{aux} = 110-240 V ac
- Auxiliary power output for relay supply, U_{out} = 48 V dc
- PC interface type USB 2.0

Software specification

- Software compatible with MS Windows 2000/XP
- SIM600 Editor (I/O editor)
- SIM600 Runtime

Case dimensions

- 224 mm (w) x 266 mm (h) x 83 mm (d)
- Weight 2.4 kg

ABB Oy
Distribution Automation
P.O. Box 699
FI-65101 VAASA, Finland
Phone: +358 10 22 11
Fax: +358 10 22 41094
www.abb.com/substationautomation