SEL-RTS Relay Test System

SEL-AMS Adaptive Multichannel Source
SELTEST™ Software (DOS)
SEL-5401 Test System Software (Windows®95, Windows®NT)

Overview

The SEL-RTS Relay Test System is designed for testing protective relays having low-level test capabilities. The system consists of the SEL-AMS Adaptive Multichannel Source and either the SEL-5401 or SELTEST software.

SEL-AMS Adaptive Multichannel Source

- 12 analog output channels (±5 volts peak)
- Replays downloaded waveforms or generates sinosoids with 16-bit precision
- Six sense inputs for monitoring relay contacts
- 10 contact outputs for driving relay logic inputs
- Includes 50 VA source of 24, 48, 125, 250 Vdc

⚠WARNING
Exceeding 50 VA or output short circuit may damage the unit.

- Buffered outputs for monitoring analog and digital signals

SEL-5401 and SELTEST Software

- SELTEST for DOS and SEL-5401 for Windows 95 and Windows NT
- Multistate capability supports simulating power system changes
- Amplitude ramping allows relay element threshold tests
- Programmable inputs and outputs simulate circuit breakers, communications, etc.
- COMTRADE file support for signal defenition, including EMTP simulations
- System frequency ramping

General Feature Description

Overall System

The SEL-RTS consists of the SEL-AMS Adaptive Multichannel Source, PC-based SEL-5401 or SELTEST software, and a personal computer supplied by the user.

Low-Level Test Philosophy

The SEL-RTS bypasses digital relay input transformers (figu). Testing from the secondary side of the relay input transformers eliminate large amplifiers.

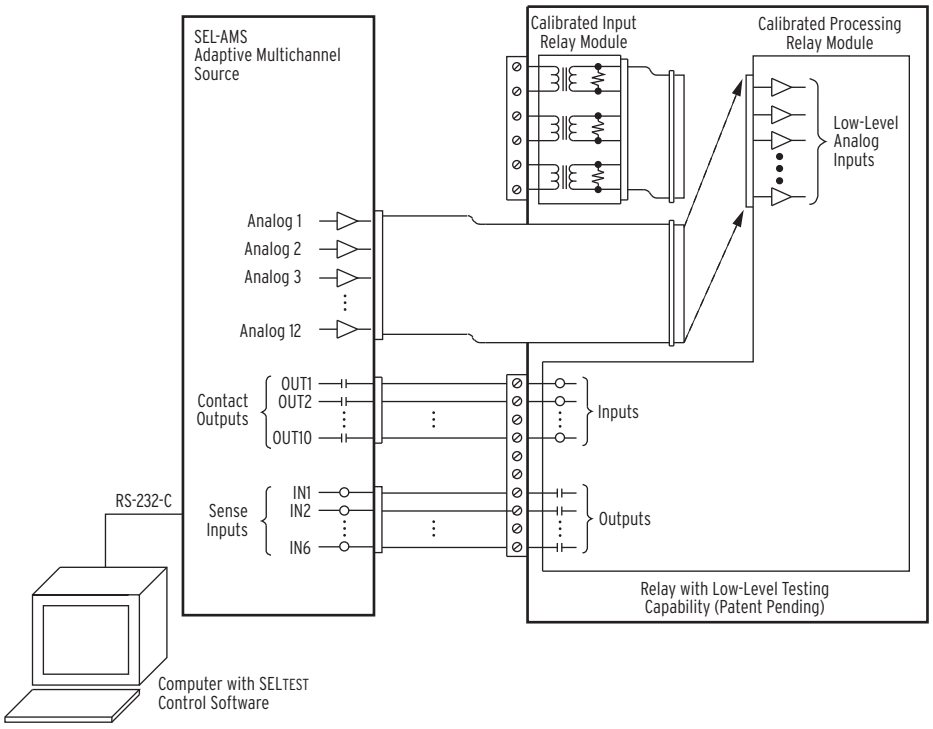

Figure 1 Low-Level Digital Relay Test

SEL-AMS Features

- **Analog Outputs.** 12 analog outputs can simulate voltage and/or currents. Test one or more simple relays or two distance relays simultaneously.
- **Sense Inputs and Contact Outputs.** The six sense inputs, 10 contact outputs, and programmable logic are available to measure operating times and to simulate circuit breaker and communications schemes.
- **Front-Panel LEDs.** These LEDs indicate the state of each sense input and contact output.
- **Front-Panel Monitor Points.** Two 25-pin connectors on the front panel make the 12 analog outputs and 16 contact I/O points available for monitoring and recording.
- **Serial Port.** One EIA-232 serial port provides computer communications.
- **DC Power Source.** Two 125 Vdc outputs and two 24 Vdc outputs are available for wetting sense inputs and powering relays. These may be connected for 24, 48, 125, or 250 Vdc, and can supply up to 50 VA.

⚠WARNING
Exceeding 50 VA or output short circuit may damage the unit.

SEL-5401 and SELTEST Software Features

- **Testing with States.** Define a test as a sequence of up to 255 states (three show in *Figure 2*). Link states together to create a test file. Run the tests from a menu or directly from the operating system prompt. View test results through a Results window, or examine the test results by reading automatically created ASCII files.

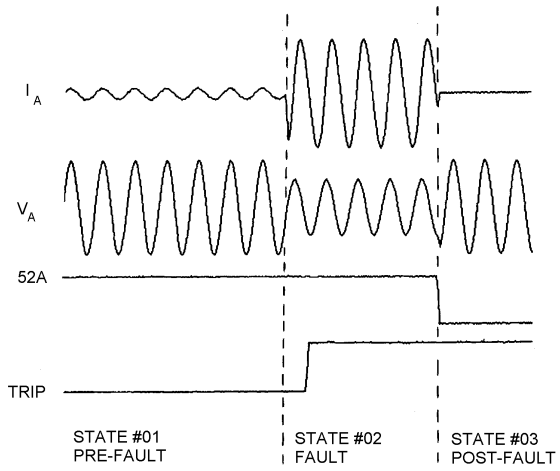

Figure 2 Example of Pre-Fault, Fault, and Post-Fault States

- **Programmable Test Lengths.** Run tests of virtually any length. Select time periods in individual test states from 0.5 ms to days. Test states may loop to repeat indefinitely.
- **Programmable States.** Design test sequences using menus and windows. State changes and terminations can occur at selected times or when selected inputs assert.

  The Standard State window (*Figure 3* and *Figure 4*) defines or shows the most important information for three states simultaneously.

  The Extended State window (*Figure 5* and *Figure 6*) adds more choices to state definition, including selection of next state to run, ramping of analog signals, and ramping of system frequency.

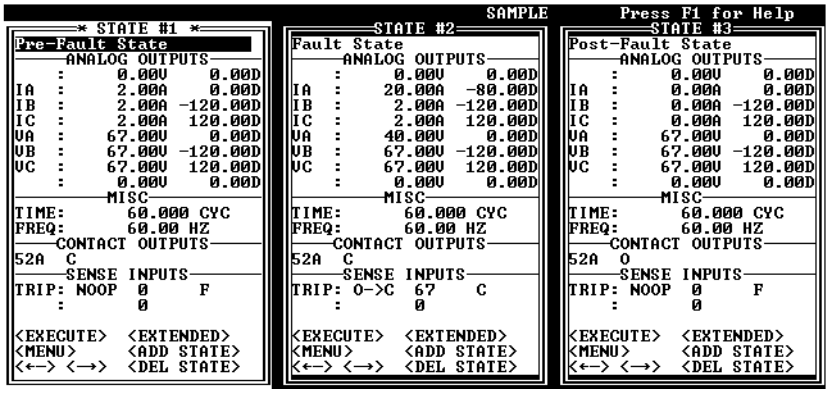

Figure 3 SELtest Software (DOS) Standard State Window Handles Most Important Information for Three States

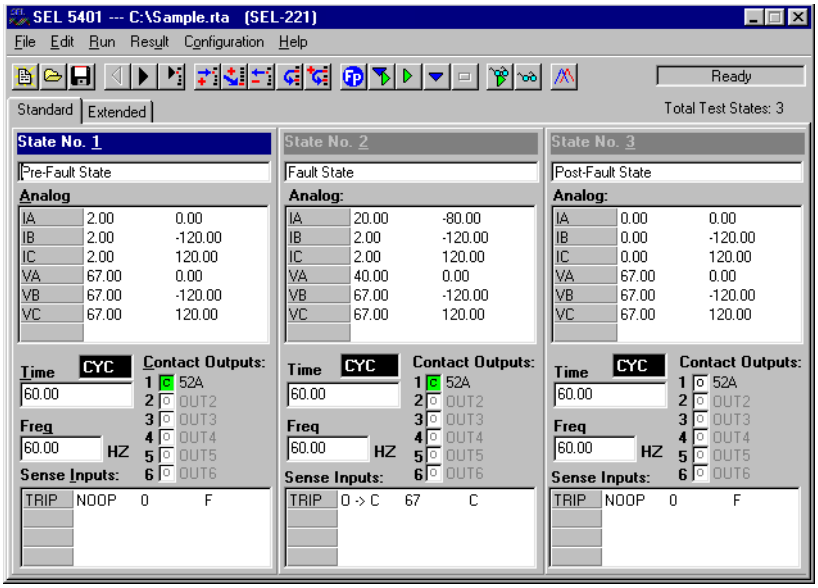

Figure 4 SEL-5401 Standard State Window Handles Most Important Information for Three States

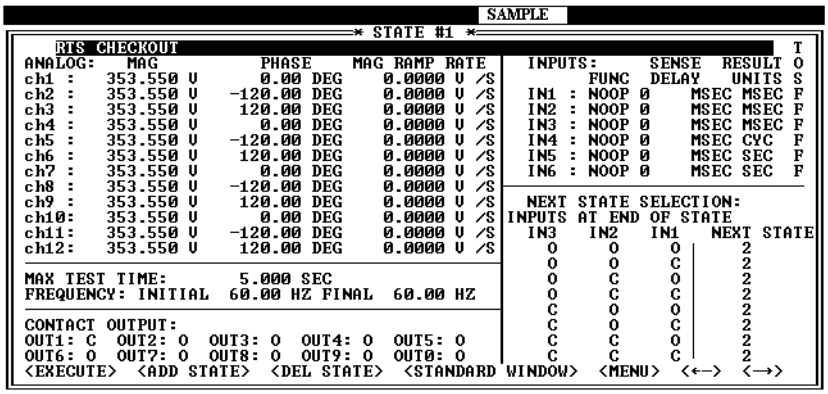

Figure 5 SELtest Software (DOS) Extended State Window Includes Amplitude and Frequency Ramping and Next-State Programming

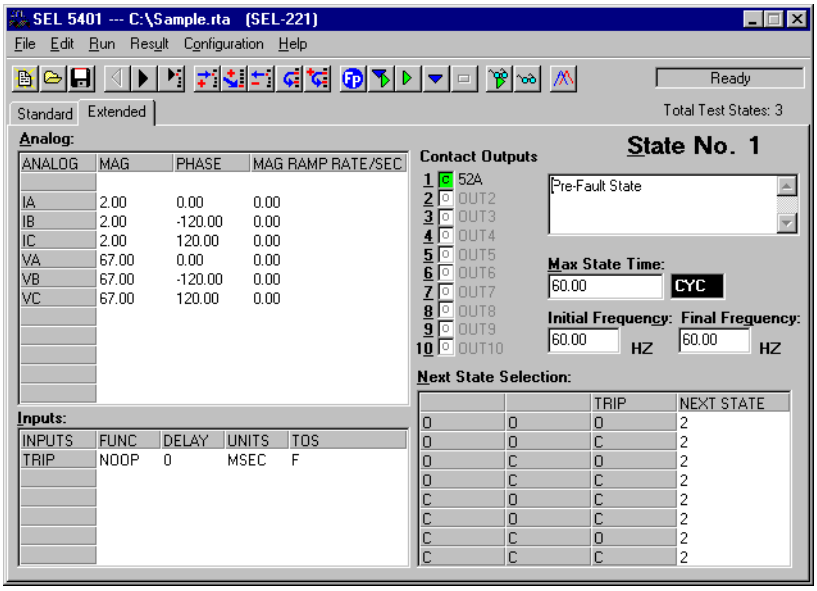

Figure 6 SEL-5401 Extended State Window Includes Amplitude and Frequency Ramping and Next-State Programming

- **Automatic Scaling.** Automatically scales analog signals for relay types you select, or you can provide your own scaling.
- **Frequencies.** Select frequencies between 10.0 Hz to 300 Hz.
- **Frequency Ramping.** Ramp frequencies between –100.0 and 100.0 Hz/sec in approximately 0.1 Hz/second resolution.
- **Ramp Analog Outputs.** Ramp the signal on each analog output channel individually.
- **COMTRADE® Files.** Use COMTRADE format files within test states to define transient analog waveforms. Relay fault data from event recorder or EMTP simulations.

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