SIEMENS

GEO®
Geographic Signaling System

Rail Automation

Vital Signal Control System

The Geographic Signaling System (GEO®) is a vital microprocessor-controlled system that generates an electronic DC coded track circuit and operates intermediate signal locations and single or multiple switch interlocking.

GEO® is available as a color-light or search-light system and will operate in cab signal territory. GEO® is compatible with Electro Code 4, Electro Code 4/4 Plus, Electro Code 2, Genrakode™, and E-Code™. With the addition of a Siemens SEAR II and a WCP module, the GEO® unit will interface with all of the major codeline protocols including ATCS.

GEO® supports coded track applications, coded line applications, and vital radio based signaling. Vital network applications are supported via spread-spectrum radio, Echelon®, RS-232, and RS-422.

The GEO® system can be configured for all intermediate and interlocking applications; Simply insert the appropriate module(s), load software, and connect the wiring. The system automatically verifies the safety and compatibility of the software and hardware and assures the integrity of the installed signal logic.

Operating logic can be fully distributed throughout a GEO® signal system. By pairing a CPU card with one or more I/O modules, the designer can distribute switch logic, signal logic, track circuit logic, etc. as the application requires. Each application is stand-alone vital.

All modules are interchangeable between units and all modules are designed to be "hot-swappable."

Features

I. Using Standard Boolean Logic with the GEO® Configuration Suite (GCS)

This new version of GCS has been enhanced to provide users with the option to write their own signaling logic equations in Boolean format. Users may also produce a relay diagram plot of the Boolean logic and print this as a PDF file. Users no longer need to use the existing GEO® libraries and geographic signaling logic; they can now write their own logic in traditional Boolean format and print the relay equivalent circuits. The resulting MCF will run with the existing GEO® CPU2+ MEFs.

II. Object based logic with the GEO® Configuration Suite (GCS)

The GEO® Configuration Suite is a Windows® based design tool used to program the GEO® unit for specific applications. GCS is available on CD-ROM. System design can be performed by the user or can be supplied by Siemens Rail Automation.

In the GCS, each signal function (signal head, turnout, etc.) is represented by a unique icon or Geographic Signaling "Object". Each object represents the rules of signaling for that object. The complete signal system is assembled by the CPU based on which "objects" are used and how they are interconnected. The designer builds the track layout using drag-and-drop technology, eliminating the need to write Boolean equations and construct ladder-logic equations. Design time is sharply reduced compared to the traditional manual process, and the use of standardized signaling objects minimizes the chance of design errors in these complex logic systems.

The GCS design tool also allows for complete simulation and office testing of the signal system after the track and signal la yout is complete. The GCS produces cut-over test documents, wiring diagrams, and the Bill of Material for the signal system being designed.

Specifications

Battery/Operating
Voltage: 9.0 - 16.5 VDC

Current (for typical intermediate):
1.6 A to 12.0 A nominal
(actual current depends on lamp load and track load)

Configuration

GEO® Chassis - 6 Modules
CPU:	1 each
Track:	2 each
Application:	3 each

GEO® Chassis - 8 Modules
CPU:	1 each
Track:	3 each
Application:	4 each

GEO® Distribution Network
GEO® Cab Unit, CPU not required
GEO® Track Unit, Includes CPU and Track Modules
GEO® Lamp I/O Unit, Includes CPU and one application module
Application modules include:
Vital Input, Vital Output, Colorlight, Searchlight, and VitalRelay I/O

Track Length
18,000 ft @ 3 ohms ballast and .06 ohm shunting sensitivity and broken rail detection

In the above representation, a designer uses signal "objects" (signal heads, turnouts, etc.) to create a track diagram of the signaling system or location.

Application Modules

CPU Module (Single, Dual)
One module included in each GEO® system
The CPU controls the GEO® operating system. It includes the I/O manager, communications manager, and bus manager. Internal vitality provides crosschecks and insures the integrity of data flow through the system.

Single CPU
- Real-time clock
- Battery backed event recorder memory
- 4-digit display with 2 push-button menu system for simple configuration
- RS-232 diagnostic port

Dual CPU
Same features as Single CPU, plus added Echelon® and communications capabilities

Track Module
The track module communicates the track status to the GEO® unit and transmits coded information onto the track. Digital displays on the front panel indicate code-in and code-out. The input and output of this module is Electro Code 4/4 Plus compatible.

- Drives up to 4.0 VDC into a track load at 10 A
- Numeric display for received and transmitted codes
- Directional stick indicator LED

Line Card Module
The line interface module communicates coded information to the GEO® unit and transmits coded information from the GEO® unit to other locations via cable. The input and output of this module are Electro Code 4/4 Plus compatible.

Drives standard track codes via line wire
Output Voltage: 2 V min to 14.5 V max Field Adjustable
Input sensitivity: 2 V min to 14.5 V max Field Adjustable
Input Impedance: 1.3k ohm

Vital Output Module
The vital output module has six general purpose isolated outputs which can drive a steady state output or cab rates. It provides the equivalent security of a double break circuit. A single output can drive a neutral line relay, combine two outputs to drive a polar relay, or drive a code following relay or cab signal gener ator at one of the following rates: 75, 120, 180, 270, or 420.

Number of outputs: 6 isolated, vital
Output Voltage: 12 VDC into 500 ohms
Relay loads: 100-2000 ohms
Cab rates: 75, 120, 180, 270,420
Isolation: 2000 VAC

Vital Input Module
The vital input module provides eight opto-isolated parallel inputs for communication to the CPU with the equivalent security of a double break circuit. The module also has two opto-isolated analog inputs.

Number of inputs: 8 opto-isolated, vital, 2 opto-isolated, analog, non-vital
Isolation: 2000 VAC

Vital Relay Input/Output (RIO) Module
This module combines four isolated vital relay outputs and four opto-isolated vital relay inputs for use with the many signal installations where four or fewer I/Os are required. Outputs on this module can drive a neutral line relay, combine two outputs to drive a polar relay, or drive a code following relay or cab signal generator at one of the following rates: 75, 120, 180, 270, or 420.

Number of outputs: 4 isolated, vital
Output Voltage: 12 VDC into 500 ohms
Relay loads: 100-2000 ohms
Cab rates: 75, 120, 180, 270,420
Number of inputs: 4 opto-isolated, vital
Isolation: 2000 VAC

Colorlight (Lamp Driver) Module
Both Color-light and Search-light lamp driver modules are available. The module has sufficient inputs/outputs to drive two signal heads.

Requires NO current limiting resistors
Number of lamp drivers: 6 each @ 25 watts
Total module output: 100 watts
Adjustable output
    Voltage, regulated: 9.5-13.0 VDC
Vital inputs: 2 each opto-isolated
Vital Output: 1 each isolated
Cab rates: 75, 120, 180, 270,420
Input voltage: 9.0-16.0 VDC 13.6 VDC Nominal
Isolation: 2000 VAC

Searchlight (Lamp Driver) Module
Requires NO current limiting resistors
Number of lamp drivers: 2 each @ 25 watts
Adjustable output
    Voltage, regulated: 9.5-13.0 VDC
Mechanisms: 2 each
Mechanism feedback inputs: 3 each per mechanism
Vital inputs: 2 each opto-isolated
Vital Output: 1 each isolated
Cab rates: 75, 120, 180, 270,420
Input voltage: 9.0-16.0 VDC 13.6 VDC Nominal
Isolation: 2000 VAC

Cab Module
Code input: 1 or 2 wire
Voltage: 5 VRMS @ 5 A across 1 ohm load
Chassis used: GEO® Distributed/Network
Cab rates: 75, 120, 180, 270,420

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