

GCP 4000 Grade Crossing Predictor from Safetran

The Model 4000 Grade Crossing Predictor is the rail industry's only fully integrated crossing warning system combining the following features without requiring inter-connected wiring:

- Up to six GCP track circuits (including Intelligent Processor Island and DAXes)
- 2 SSCC 3i modules capable of providing up to 40 amps of lamp energy and controlling up to 4 gates
- A SEAR III Event Recorder/Analyzer with automated inspection and reporting capability
- Built-in vital ATCS communications protocol for advanced application such as RF DAXing
- Multiple Vital Timers and Vital AND Gates
- Embedded color PC Display for configuring, calibrating, diagnostics and troubleshooting
- Built-in support for configuration management (including hardware information)



Redundant 6-Track GCP 4000

The GCP4000 comes in a variety of packaging configurations, from fully redundant 6-track systems, to redundant 2-track systems, and through to single 5-track and 1-track non-redundant systems. These packages are designed to optimize space requirements for different applications without compromising on capability.

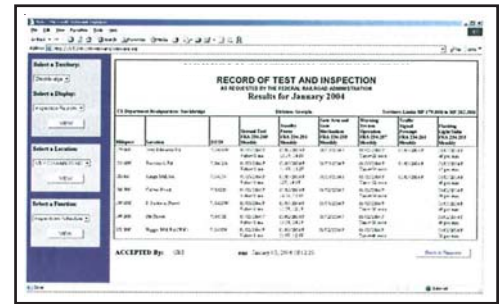
The system is comprised of the following modules (which are all hot swappable):

- CPU (includes vital ATCS communications capability)
- Track (complete with island, 2 vital inputs, 2 vital outputs, 9 prediction processes)
- PSO 4000 Track Card Configurable with 2 Receiver Track Inputs and 1 Transmit Track Output for use in Bidirectional DAX applications
- Relay input/output (RIO) module (4 vital inputs, 4 vital outputs)
- SSCC IIIi Crossing Controller (20amps per module, lamp outputs, bell, gate, 5 vital inputs, up to 2 modules per chassis)
- SEAR IIIi Internal event/analyzer/recorder (monitors motherboard backplane to record all system I/O, serial interfaces, 2 non-vital inputs, 6 non-vital outputs, 2 non-vital relay outputs, battery and temperature sensors)
- Touch screen color display module (AREMA temperature specification compliant)
- Transfer module for redundant operation (CPU, Track and RIO modules)



Redundant 2-Track GCP 4000

The GCP4000 interfaces to a variety of external sensors in order to perform automated crossing inspection. These sensors collect information regarding gate tip position, gate position, bell status (sensor is built in to Safetran's Electronic Bell), lamp status, battery status, and ground fault status. This information is analyzed and communicated to Safetran's Wayside Alarm Management System (WAMS) web-based office system. WAMS produces the required FRA reports, schedules and stores the inspection results, and processes any crossing alarms.

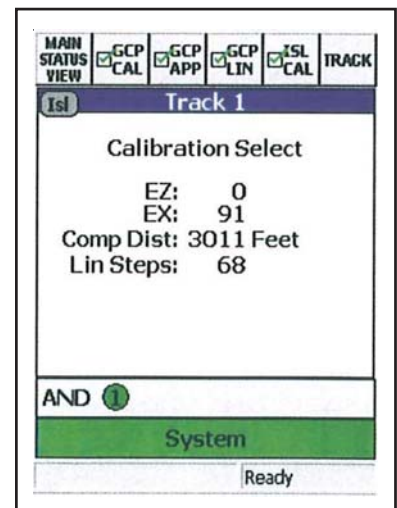


The SEAR III incorporates enough inputs to monitor all of the I/O for a fully loaded 6 track redundant GCP4000 without the need for additional wiring (this is accomplished via the motherboard). The SEAR III internal recorder module implements, via the GCP4000 display module, the same user interface as the SEAR II external unit, so anyone familiar with the SEAR II will be able to use the SEAR III.



The vital ATCS communications protocol capability built-in to the GCP4000 CPU provides a similar capability to that of the HD/Link allowing vital data to be sent from one GCP4000 to another, without having to use the HD/Link modules. GCP4000's can be connected directly to each other via the Echelon LAN, or may communicate via Safetran's Spread Spectrum Radio or other communications medium that may be available. An external Wayside Access Gateway product from Safetran can be used to convert the GCP4000 Echelon LAN to a variety of other media, such as Ethernet, RS232, RS485 etc. This feature allows for "Radio DAXing" operations (up to 9 DAXes x 6 Tracks can be sent), as well as transmission of other vital data pertinent to crossing operation. The vital communications links are field programmable - an office-based compiler is no longer needed.

The GCP4000 system has a unique feature that allows a single person to safely calibrate, test and troubleshoot a crossing. Using a VHF Communicator module attached to the GCP4000, a maintainer can use a standard handheld VHF radio to calibrate the GCP track circuit (GCP, approach, linearization and island) without having to have a second maintainer by the GCP equipment. A single maintainer may also calibrate lamp voltages, as well as obtain readings of EZ, EX and island condition via radio. The process is protected by a priming function, and use of a one-time randomly generated password. The maintainer will hear voice menu prompts, and respond back with DTMF key sequences. The VHF Communicator can also be used to hop alarm and test data between crossings, as well as to "key down" the crossing via a VHF handset (e.g. from a hi-rail vehicle or maintenance truck).

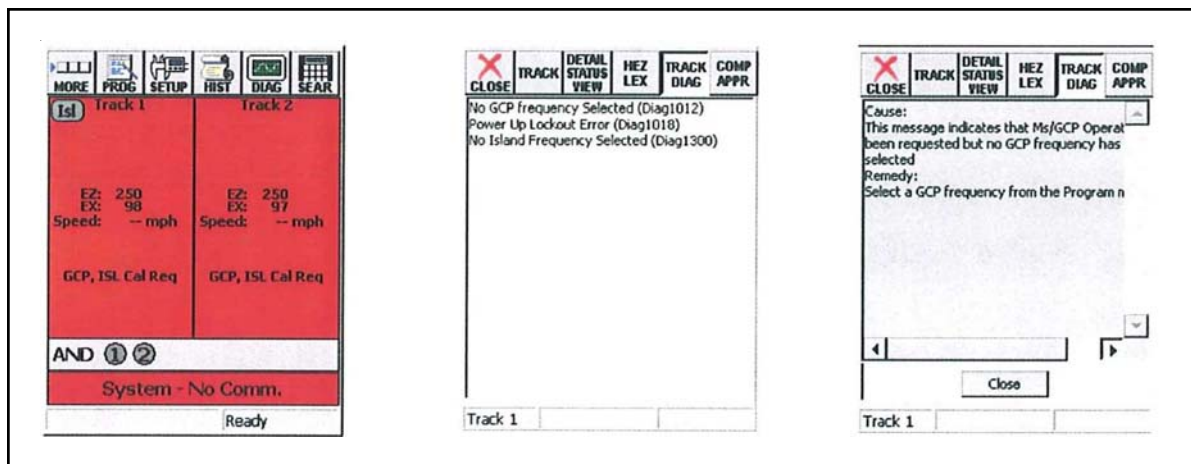
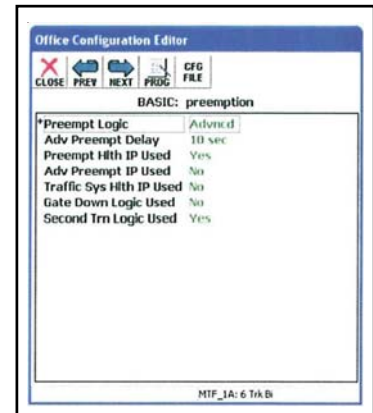


The GCP4000 eliminates the need for external vital AND gates and timers by providing flexible built-in AND gates and timers (pick-up delays, loss-of-shunt, gate delay timers). Multiple functions are also provided to interface to the signaling and traffic systems (such as AND enables, MS restart, wraps, predictor overrides etc).

Advanced and simultaneous traffic signal preemption are provided, with capabilities for correspondence checking the preemption relay, as well as bringing in an optional traffic system health indication. Gate down logic and second train logic are also integrated into the system.

The GCP4000 may also be used in conjunction with Safetran's SSCC IIIA, SSCC III Plus and SSCC IV crossing controllers for additional lamp and/or gate control (e.g. 4 quad gate crossings, pedestrian gates, etc). Separate lamp and crossing control output functions are provided by the GCP4000, as well as mechanisms for bringing health and maintenance call information from the external controllers into the GCP4000. Flash synchronization is also provided.

The system incorporates a powerful Display module that provides access to all of the programming features and provides advanced troubleshooting and diagnostics. Errors are indicated by a red screen. Next, the diagnostics tool provides a list of the errors and, then, further detail, complete with cause and remedy. The complete error list can be viewed without having to refer to a manual. The diagnostic tool interactively shows when errors have been corrected. The display can also show the status for up to 6 tracks simultaneously (including EZ, EX. train speed, island status).



The system incorporates options to take the approach or the approach and island of each track out of service. An optional vital timer is provided to force the track back into service. An optional vital input may be selected to require use of an external strap to enable the out of service capability. Multiple test modes are provided, including steady and flashing lamps, timed lamp tests, and crossing activation. Tests can be performed from the display or from a VHF handset if the VHF Communicator is used.

The GCP4000 uses a concept called template programming to simplify programming. The designer selects a crossing template that most closely matches the application, and then adjusts the programming as necessary. Only the exceptions to the template defaults need to be programmed, rather than every parameter. For a large system, this reduces potentially over 600 parameters to 20 to 40 parameters. The programming can also be confirmed via a CRC.

The software that runs on the display module is also available to run on a Laptop or a PC under the Windows operating system. This software can be connected to the GCP4000, allowing real-time access to all of the programming and diagnostic features. The software can also be run in a stand-alone mode, called the Office Configuration Editor, which allows designers to select all of the programming options and then produce the exceptions report (the minimum set of programming steps needed to program the unit). This report is incorporated into the site plans,



Most recently Safetran released three new features to further enhance the GCP 4000. These include exclusive Bidirectional DAX capability, Track Check Number implementation and an Express Menu for configuring most applications. Bidirectional DAXing has the potential to provide the biggest initial cost saving initiative since introduction of the GCP 4000, itself, in 2003 because the need for additional insulated joints and other signaling material is greatly reduced compared to previous DAXing installations. Likewise, implementation of a Track Check Number has the potential to significantly reduce maintenance cost by providing the final CRC necessary for full verification of all vital parameter, configuration and calibration values over time allowing maintenance personnel to quickly and easily verify equipment status from one inspection to the next. The GCP 4000's Express Menu was developed to speed and simplify the configuration of most GCP 4000's applications, thus, allowing the unit to go into service in the field more quickly.

Summary of GCP4000 Major Features

- The rail industry's only fully integrated, field-proven crossing warning system:
 - Field-proven operation since January 2003, over 5000 systems in revenue service!
 - Up to 6 GCP track circuits, with each track module having:
 - 1 GCP prime predictor (may also be configured as a motion sensor)
 - 7 discrete DAXes
 - Prime and preempt predictors may also be used as DAXes for a total of 9 DAXes per track, a maximum of 54 DAXes per GCP4000
 - Bidirectional DAXing Capability
 - 1 preempt
 - 1 Intelligent Processor Island
 - Two vital inputs and two vital outputs that are all user configurable
 - Up to 40amps of Crossing Controller (lamps, bell, gate), with 5 user configurable vital inputs, includes inverted gate output for exit gate control, and support for external Safetran crossing controller modules for additional lamp and/or gate control
 - Recorder/Analyzer with automated inspection capability:
 - External sensors monitor the gate mechanism; bell and lamp circuits; gate tip position; battery status; temperature levels and multiple ground fault testing modules
 - Powerful CDL application language provides advanced alarm capabilities
 - RS232/RS422 Serial interface to radio modems and cRTU
 - Hyperterminal interface
 - Built-in, field-programmable, vital ATCS communications protocol capability (radio DAXing function for up to 54 DAXes - no HD/Link required)
 - Up to 3 relay input/output (RIO) modules for an additional 4 vital inputs and 4 vital outputs per RIO (RIOs can be used in place of Track modules 2, 5 or 6)
 - Multiple, built-in, user configurable vital AND gates and vital timers
- Significantly reduced wiring due to system integration and the internal SEAR Ili event analyzer/recorder - a single track system reduces house wiring costs by 30%.
- Reduced size (compared to discrete components) has the potential for a smaller equipment house, or for more equipment to be housed in same sized equipment house
- Full integration with Safetran's web-based Wayside Alarm Management System (WAMS) office system including single-person remote test, setup, diagnostics and calibration using the VHF Communicator module, including DTMF "key-down" and alarm/recorder data hopping capabilities
- Flexible interface to the signaling and traffic systems, including preemption logic, enable, wrap and override functions, field selectable LOS timers and pick-up delays

- Track out-of-service capability, with optional vital timer and optional vital external strap
- Multiple test modes, including steady and flashing lamps, timed tests, and crossing tests
- Regular line-wire DAXing can typically be accomplished without the need for adding extra I/O modules as each Track module has two vital outputs built-in
- Color, touch-screen display module with advanced maintenance suite:
 - Simultaneous display of the status of up to 6 tracks (including EZ, EX, train speed, island status, activation status)
 - Directed troubleshooting, with interactive diagnostic log and with cause and remedy displays for each error (no need to refer to manual)
 - Maintainers log with trend history recording
 - Diagnostic history log of previous errors and train move history log
 - Utilizes same display interface as the external SEAR II
- Office Configuration Editor allowing minimum programming steps to be specified by design
- Simple field programmability with template programming (parameters are programmed by exception and can be confirmed with a CRC) -yet the system still provides very powerful programming capabilities, with a large number of options and control mechanisms
- Multiple packaging configurations, utilizing common modules
- Hot swappable modules (modules can be removed under power without damage)
- Transfer module can be removed and a strap can be used to force either main or standby operation without the transfer module present
- Supports Federal requirements for configuration management with the extensive configuration management information built-in to each module, electronically. Each module can be queried for software and hardware information and the system can be queried for programming information – an "electronic history card."
- Reduced module count from a GCP3000 (recorder, display, SSCC III) not duplicated in a redundant unit, plus integration of Track, Island and I/O)