INSTRUCTION & INSTALLATION

GCP5000 GRADE CROSSING PREDICTOR FOR ELECTRIFIED TERRITORY (GCE)

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DOCUMENT HISTORY

Version	Release Date	Sections Changed	Details of Change
A	MAY 2022	- - -	Preliminary Release
B	JUN 2022	- - -	Initial Release
B.1	SEP 2022	9.2 10.1	Pg 9-3,Table 9-1 and Pg. 9-15,Table 9-4 Add Sec 10.1.2.2.1, Pg. 10-5

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NOTES, CAUTIONS, AND WARNINGS

Throughout this manual, notes, cautions, and warnings are frequently used to direct the reader's attention to specific information. The use of the three terms is defined as follows:

⚠ WARNING	**WARNING** **INDICATES A POTENTIALLY HAZARDOUS SITUATION THAT, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY. WARNINGS ALWAYS TAKE PRECEDENCE OVER NOTES, CAUTIONS, AND ALL OTHER INFORMATION.**

⚠ CAUTION	**CAUTION** REFERS TO PROPER PROCEDURES OR PRACTICES WHICH IF NOT STRICTLY OBSERVED, COULD RESULT IN A POTENTIALLY HAZARDOUS SITUATION AND/OR POSSIBLE DAMAGE TO EQUIPMENT. CAUTIONS TAKE PRECEDENCE OVER NOTES AND ALL OTHER INFORMATION, EXCEPT WARNINGS.

NOTE	**NOTE** Generally used to highlight certain information relating to the topic under discussion.

If there are any questions, contact Siemens Industry, Inc. Application Engineering.

ELECTROSTATIC DISCHARGE (ESD) PRECAUTIONS

Static electricity can damage electronic circuitry, particularly low voltage components such as the integrated circuits commonly used throughout the electronics industry. Therefore, procedures have been adopted industry-wide which make it possible to avoid the sometimes invisible damage caused by electrostatic discharge (ESD) during the handling, shipping, and storage of electronic modules and components. Siemens Industry, Inc. has instituted these practices at its manufacturing facility and encourages its customers to adopt them as well to lessen the likelihood of equipment damage in the field due to ESD. Some of the basic protective practices include the following:

- Ground yourself before touching card cages, assemblies, modules, or components.
- Remove power from card cages and assemblies before removing or installing modules.
- Remove circuit boards (modules) from card cages by the ejector lever only. If an ejector lever is not provided, grasp the edge of the circuit board but avoid touching circuit traces or components.
- Handle circuit boards by the edges only.
- Never physically touch the circuit board or connector contact fingers or allow these fingers to come in contact with an insulator (e.g., plastic, rubber, etc.).
- When not in use, place circuit boards in approved static-shielding bags, contact fingers first. Remove circuit boards from static-shielding bags by grasping the ejector lever or the edge of the board only. Each bag should include a caution label on the outside indicating static-sensitive contents.
- Cover workbench surfaces used for repair of electronic equipment with static dissipative workbench matting.
- Utilize only anti-static cushioning material in equipment shipping and storage containers.

For information concerning ESD material applications, please contact the Technical Support Staff at 1-800-793-7233. ESD Awareness Classes and additional ESD product information are also available through the Technical Support Staff.

GLOSSARY

AF	Audio Frequency
AFO	Audio Frequency Overlay
AND:	AND circuits require all inputs to be energized for the output to be energized.
AND ENABLE:	An internal function that can be used to ‘connect’ an input to an AND circuit.
AND 1 XR:	The AND function that controls the local crossing. Is equivalent to the XR relay.
AND 2 thru 8:	Internal functions that are used to combine inputs.
AREMA	American Railway Engineering and Maintenance-of-way Association
ATCS	Advanced Train Control System – An industry standard used in the GCP5000 (GCE) for communications.
CCN:	Configuration Check Number – The 32-bit CRC of the configuration data.
CDL:	Control Descriptor Language – The programming language used by application engineers to customize the operation, settings, and behavior of a SEAR II/IIi.
CIC:	Chassis Identification Chip – A non-volatile memory chip that is installed adjacent to the ECD on the GCP backplane. Stores site-specific information for both Main and Standby operations.
CP:	Communications Processor – One of two microprocessors on the CPU III module, processes external communications for the GCP 5000 (GCE).
CRC:	Cyclical Redundancy Check - Used to determine that data has not been corrupted.
CRTU:	Cellular Remote Telemetry Unit
dB	Decibels
DIAG:	Diagnostic
Directional Stick Logic	The logic function used to determine the direction of train movement. The output of this function is used to activate/deactivate associated signal systems.
DOT Number:	Department Of Transportation crossing inventory number assigned to every highway-railroad crossing that consists of six numbers with an alpha suffix.
Drop Delay	An internal delay time between when a function is ordered off and when it de-energizes.
DT:	Diagnostic Terminal – The Diagnostic Terminal (DT) is a Siemens developed Windows® based software that can run on the Display Module or on a PC, which allows the user to perform programming, calibration, and troubleshooting.
DTMF:	Dual Tone Multi-Frequency - The tones on a telephone or radio keypad.
ECD:	External Configuration Device – The non-volatile memory device on the GCP backplane used for storing the module configuration file.
Echelon:	A Local Area Network, LAN, used by the GCP5000 (GCE).

EGOM	Exit Gate Operating Mode – A dynamic mode in which the exit gate operation is based on the presence and detection of vehicles between the stop bar or entrance gate and the exit gate.
Entrance Gate:	A gate used at the entrance to a highway-railroad grade crossing, which is designed to release and lower by gravity from the full vertical position to the horizontal position under a loss of power condition or when the control energy (GC) is removed.
Exit Gate:	A gate used at the exit from a highway-railroad grade crossing with Four Quadrant Gates to restrict wrong direction vehicular movements, which is designed to raise by gravity from the horizontal position to a vertical position great enough to allow vehicle clearing under a loss of power condition or when the control energy (GC) is removed.
FAR GATE:	On the same surge panel, the ‘far gate’ is the flashing light signal or gate with the largest voltage drop in the cable circuit. In general, if both signals have the same number and type of lamps and the same size cable conductors, the ‘far gate’ is the location with the longest cable run. The ‘far gate’ circuit on the surge panel does not have an adjustable resistor in series with L1 and L2 that provides voltage adjustment.
Field Password	The password set that allows field maintenance personnel access to field editable parameters.
Flash Memory	A type of non-volatile memory that can be reprogrammed in-circuit via software.
FLASH SYNC:	The two-wire circuit that synchronizes the alternating flash of an external crossing controller with the internal crossing controller, SSCC IIIi, or the external crossing controller, SSCC IV.
Gate Delay Period	The programmable time period from when the lights begin to flash until the gates begin to descend.
GC:	Gate Control
GCE	Grade Crossing for Electrified Territory – A track occupancy detection system suitable for electrified territory, based upon the GCP5000, that supplies track occupancy information for crossing warning devices and other train or vehicle detection systems.
GCP:	Grade Crossing Predictor – A train detection device used as part of a highway-railroad grade crossing warning system to provide a relatively uniform warning time.
GD:	Gate Down, input energized when gate arm is horizontal.
GFT:	Ground Fault Tester (GFT-II) – An optional external device connected to the Echelon LAN that constantly monitors up to two batteries for ground faults and indicates battery status to the SEAR IIi.
GP:	Gate Position – Input energized when the gate is vertical.
GU:	Gate Up – Used in a user-defined SEAR IIi application program, (the same as GP).

Highway-Railroad Grade Crossing Advance Warning Sign:	A traffic control sign (round yellow sign with RR and a black X) placed by the highway agency in advance of many highway-railroad grade crossings
Healthy:	The GCP system, modules, and track circuit are operating as intended. Health is generally indicated by a yellow LED flashing at 1 Hz (approximately the same flash rate as the FLASH SYNC on a controller or a flashing light signal). Unhealthy conditions are indicated by faster flash rates (2 Hz and 4 Hz) or a dark Health LED.
Hz:	Hertz – Common reference for cycles per second or flashes per second.
iLOD:	Intelligent Light Out Detector – used for measuring lamp current.
Interconnection:	The electrical connection between the railroad active warning system and the traffic signal controller for the purpose of preemption.
IO or I/O:	Input/Output
ISL:	Island
ISL CAL:	Island calibration
kHz:	Kilohertz – 1000 Hz or 1000 cycles per second.
LAMP 1 VOLTAGE:	The voltage on 1L1 or 2L1 lamp output of the crossing controller module, SSCC IIIi.
LAMP 2 VOLTAGE:	The voltage on the lamp 1L2 or 2L2 lamp output of the crossing controller module, SSCC IIIi.
LAN:	Local Area Network – A limited network where the data transfer medium is generally wires or cable.
LOS:	Loss of Shunt – Commonly due to rust and/or rail contamination. LOS timers provide a pick up delay function.
MAIN:	The primary GCP Modules (CPU, PSO, and RIO Modules) that are in a dual GCP chassis.
MBT	Abbreviation for Master Boot file.
MCF:	Module Configuration File – The GCP application logic file.
MEF:	Module Executable File – The GCP executive software program.
Module	Physical package including PCBs and input/output terminals for connecting to external devices and equipment.
MTSS:	Mini Trackside Sensor – A device located in the gate mechanism that combines input information from gate contacts, bell, and gate tip sensor and sends the information to the SEAR IIi.

NEAR GATE:	On the same surge panel, the 'near gate' is the flashing light signal or gate with the lowest voltage drop in the cable circuit. In general, if both signals have the same number and type of lamps and the same size cable conductors, the 'near gate' is the location with the shortest cable run. The 'near gate' circuit on the surge panel has an adjustable resistor in series with L1 and L2 that provides additional voltage adjustment.
NVRAM	Non-Volatile Random Access Memory
OCCN:	Office Configuration Check Number – The 32-bit CRC of the configuration data, excluding items that are protected by the Field Password.
OCE:	Office Configuration Editor – The PC version of the DT that can be used to create configuration package files (Pac files) for the GCP 4000 system.
Out Of Service:	The process for taking one or more GCP approach circuits and/or approach and island circuits out of service.
Pac File:	A GCP5000 (GCE) configuration Package File that can either be created in the office using the OCE or downloaded from a GCP5000 (GCE) system via the CP.
PCB	Printed Circuit Board
PCN	PSO Check Number (PCN) is used to track changes due to re-calibration and adjustments made to key PSO setup variables.
Pick Up Delay:	An internal delay time between when an input receives the signal to pickup and when it actually responds.
POK:	Power Off Indication
PSO	Phased Shift Overlay Module
PSO II, PSO III, PSO 4000	Different models of Siemens's Phase Shift Overlay – a track circuit (transmitter at one location and receiver at another location) that supplies track occupancy information for crossing warning devices and other train or vehicle detection systems.
RailFusion:	An office-based application that communicates with and receives data from specially equipped crossings.
RIO:	Relay Input Output Module
RS232:	Industry-standard serial port.
RTU:	Remote Telemetry Unit
RX:	Receive
SEAR IIi Application Program:	Programming for SEAR IIi that controls alarms.
SIN:	Site (Subnode) Identification Number - A twelve-digit ATCS address representing the module as a subnode on the network.
Spread Spectrum:	A method of radio transmission in which the transmitted energy is evenly spread over the complete bandwidth of the radio, resulting in a low RF profile.

SSCC:	Solid State Crossing Controller
SSR:	Spread Spectrum Radio – A radio that utilizes spread spectrum transmission.
Supervisor Password	The password set that allows application design personnel access to office editable parameters.
Track Speed Train	A train that proceeds through the approach at the maximum authorized speed.
True RMS AC+DC:	A scale on a multimeter that measures the effective combined AC and DC portions of the total voltage. Used to measure the pulsed output of a crossing controller. Measured as VRMS.
TX:	Transmit
USB Port:	Universal Serial Bus Port
USB Drive:	Types of memory devices that plug into a USB port. These devices are commonly called flash drives or memory sticks.
VHF Communicator:	Communications device used for remote operations and calibration as well as data communications.
VLP:	Vital Logic Processor – One of two microprocessors on the CPU III module, processes GCP vital system logic.
VRMS	Volt Root Mean Square – See True RMS AC + DC above.
WAG	Wayside Access Gateway – The Siemens A53457 assembly converts Echelon® messages to Ethernet messages allowing Siemens equipment to use Ethernet Spread Spectrum radios A53325 for communications. WAG assembly A53457 also converts Echelon received messages to RS232 messages allowing the system to use modems for communication between Siemens equipment.
WAMS:	See RailFusion.
WCM:	Wayside Control Module – The Siemens A53105 assembly that centrally controls the functions of a Wayside Communications Package (WCP).
Wrap:	A common reference for a track circuit, or combination of track circuits that extend to or beyond the limits of a GCP approach, which provides train detection. Used to signify that a certain system function is being overridden based upon the state of a vital input.

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SECTION 1
OVERVIEW

1 OVERVIEW

1.1 System Configuration

The GCP5000 For Electrified Territory, referred to as GCP5000 (GCE), is a modular microprocessor-controlled track occupancy overlay system that is deployed to continually monitor the approach(es) to railroad grade crossings and to control the lamps, gates, and bells associated with those crossings. It also has provision for an optional plug-in SEAR IIi event recorder.

1.2 Standard Features

The GCP5000 (GCE) can have up to 5 PSO Modules for track occupancy overlay, with each PSO Module having the functionality to act either as a PSO Transmitter/Receiver or in Crossing Mode utilizing two PSO receivers and the Island track circuit. Each PSO Module has three vital outputs and two vital inputs.

Using internal crossing controller(s), the GCE can control the bells and gates of a crossing and up to 40 amps of lights. Each SSCC IIIi module has 5 vital outputs. The GCE can utilize RIO modules to extend I/O capability via the RIO's four vital inputs and four vital outputs.

The GCE can perform independent event recording, using the SEAR IIi. The SEAR IIi options include programmable alarms and automated performance of crossing test functions. The GCE generates test result reports in several formats. The GCE also interfaces with RailFusion.

The GCE can utilize Echelon or Ethernet communications for Vital Link communications to other locations. The GCE has a display module for configuration, monitoring, and troubleshooting the system.

The GCP5000 (GCE) system is based upon the GCP5000 system and shares the majority of components with it. The only differences are:

- GCP5000 uses A80418 GCP Track Modules where as the GCE uses A80428 PSO module
- The GCP uses a different MCF from the GCE.

1.2.1 GCE Case Configuration

The Model GCP5000 (GCE) uses the A80905 Track Configuration, as shown in, Figure 1-1.

The features of the A80905 configuration are given in Table 1-1.

Table 1-1 Case Configurations

FEATURE	80905 CASE CONFIGURATON
PSO Modules	1 to 5 tracks
Main/ Standby Transfer System	No
Internal SSCC IIIi Crossing Control[1]	0, 1 or 2
Internal SEARIIi Recorder	Yes
I/O Expansion[2]	0 - 3
Echelon® LAN Functions	Yes

[1] SSCC IIIi module controls Gates, Flashing Light Signals, and Bells

[2] Relay Input Output (RIO) Module can be used in place of the PSO Module in the 2nd, 4th, and/or 5th track slot.

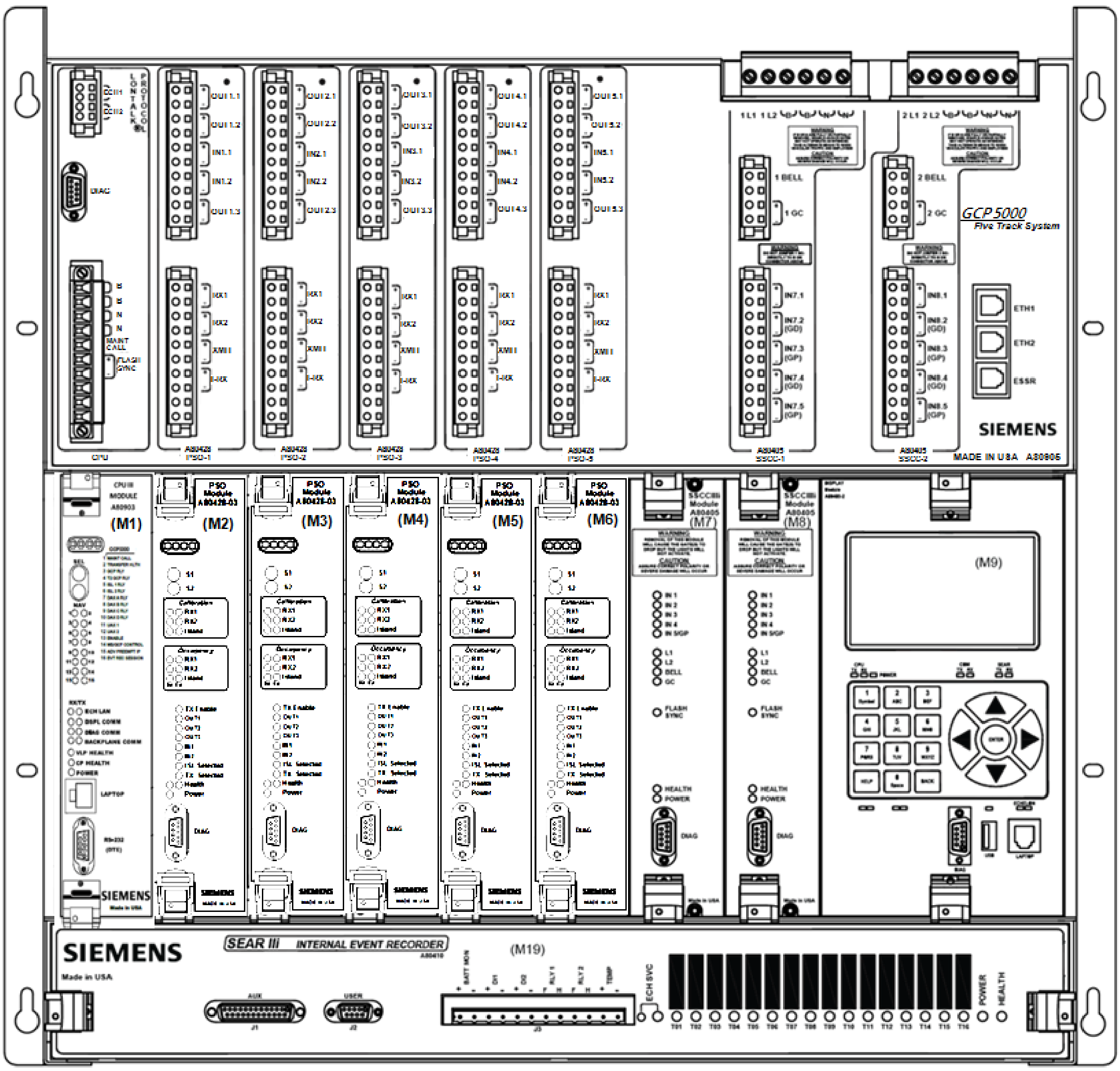

Figure 1-1   80905 Five-Track System

1.3 GCE Operational Parameters

The GCP5000 (GCE) is a versatile integrated system for detecting trains and controlling the crossing which permits use in a wide variety of complex applications.

The PSO Module has many features:

- Vital processor based
- Multiple PSO frequencies and codes are provided
- Provides internal logging of PSO Module operation

Configuration menus are available on the Display Module which provides field selectable options such as:

- PSO transmitter, receiver, and island frequencies
- PSO transmit power
- Up to five unique modulation address codes
- Configurable inputs and outputs for an application
- Configurable receiver, island, and input pickup delays
- Drop Delay Timer, Internal Directional Stick Logic, and Stick Cancel Timer when configured as a Crossing unit
- Taking units Out of Service
- Advance Preemption and Gate Down Logic
- Configurable vital logic
- Customer Defined Logic Equations
- AND gates
- OR gates

The PSO Module is functionally compatible with the PSO 4000 and PSO+ Modules, the PSO III receiver and transmitter as well as the PSO II receiver and PSO II transmitter when using an A or C address.

The Transmitter generates a modulated audio-frequency track signal. It sends a coded, 8-bit address code through the rails using an audio frequency signal as a carrier. The rail connections for the coupling unit delimit the other end of the track circuit. The modulated signal is detected by the receiver where it is decoded and processed. The Receiver responds only to signals of the proper frequency, address, and amplitude. The ability of the PSO Module to differentiate between its operating signal and all other signals present on the track is due to the nonsymmetrical coded modulation and receiver decoding techniques which ensure that the system is immune to most foreign AM, FM, and beat signals. The receiver decodes the signal and, if it qualifies the signal as valid, the receiver produces an output to energize a vital relay or logic state. The receiver is connected to the track via a Tuned Receiver Coupler, which is a separate piece of equipment.

No insulated joints are needed to confine the signal because the coupling units have low impedance at the operating frequency of the track circuit, and high impedance at all other frequencies. The PSO Module can also be used on the same track used for coded or non-coded DC or AC track circuits, Grade Crossing Predictors (GCPs), motion detectors, and other audio frequency track circuits.

The GCE application’s crossing functionality includes two receivers plus a combination transmitter/receiver Island Track Circuit that is incorporated into the Module. In a crossing application, the Module is capable of performing the Directional Stick Logic, drop delay, and Stick Cancel functionality. The Module provides configurable receiver and island pickup delays. The Module has the flexibility to use external inputs instead of or in addition to the internal PSO receivers and island. For instance, if the installation already has a track circuit in place (e.g., a DC track circuit), this could be used in place of one of the approach receivers. Either of the PSO receivers and/or the Island may be enabled or disabled. The Island function supplies a limited distance audio frequency track circuit with an effective range between 120 to 500 ft. (36.6 to 152.4 m). The island circuit performs a similar function as Siemens Rail’s Model 71150 Intelligent Processor Island Track Circuit (IPITC) and Intelligent Processor Island Track Circuit II

(IPITC II). While designated primarily for use as the island track circuit at highway crossings, the system satisfies any application requiring a short, high-definition, audio frequency track circuit.

The PSO Module is configurable to use up to five different address codes and a wide variety of carrier frequencies. Sixteen PSO Module carrier frequencies, ranging from 156 Hz to 4000 Hz, are available for use in non-electrified territory and an additional 31 common frequencies, ranging from 500 Hz to 10200 Hz, typically used by non-Siemens equipment, are also available for use. For electrified territory, ten frequencies are available ranging from 645 Hz to 4000 Hz. Fourteen standard island frequencies are available for the Island functionality and range from 2.14 kHz to 20.2 kHz; an additional 15 alternate island frequencies, used by non-Siemens equipment that range from 2.3 kHz to 10.2 kHz are also available. For installations where multiple circuits are required on the same track, the PSO Module has two sets of eight frequencies (five for electrified territory) each that can be connected as required with negligible interference.

The GCP5000 (GCE) can communicate to other GCE units via vital ATCS messages sent from between the CPUs in each system via Ethernet or Echelon.

The integrated SEAR IIi Internal Event Recorder records 180,000 events and is expandable to 390,000, controls non-vital I/O, and can optionally issue alarms.

1.4 Frequencies Available for Use with PSO Module

WARNING

WARNING

NEVER USE AN APPROACH FREQUENCY THAT IS THE SAME AS THE ISLAND FREQUENCY.

The standard Siemens PSO frequencies depicted in Table 1-2 are available for use with GCE when utilized as a PSO transmitter or receiver. The alternate frequencies depicted in Table 1-3 are those typically used by other equipment and are available for use with the PSO module. The standard Siemens PSO Island frequencies depicted in Table 1-2 are available for use with GCE when utilized as a Crossing. The alternate frequencies depicted in Table 1-3 are those typically used by other equipment and are available for use with the PSO module. However, the alternate frequencies use Siemens modulation patterns and are not directly compatible with non-Siemens transmitters or receivers. When PSO module Receiver-Transmitter pairs are deployed, they can be substituted for other non-PSO II/III legacy overlay equipment operating on the same channel.

NOTE

NOTE

When mixing standard and alternate frequencies, several frequencies may not be compatible due to harmonic content.

Table 1-2 Frequencies Available for Use with PSO Module

APPLICATION TYPE	FREQUENCIES UTILIZED
PSO Module Standard Frequencies (Hz)	156, 211, 285, 348, 430, 525, **645**, **790**, **970**, **1180**, **1450**, **1770**, **2140**, **2630**, **3240**, **4000**
PSO Module Alternate I (Harmon AFTAC II) Frequencies (Hz)	500, 700, **900**, 1100, **1300**, 1600, 1640, **2300**, 2800, **3100**, 3500, **4000**, 4900, 5400, 5900, 6400, 7100, 7700, 8300, 8900, 9500, 10200
PSO Module Alternate II (US&S AFO) Frequencies (Hz)	1000, 1100, 1125, 1250, 1375, 1500, 1640, 1750, 1875, 2175, 2300, 2675, 2800

(Frequencies in **Bold** text are recommended for use in electrified territories)

Table 1-3 Island Frequencies Available for Use with PSO Module

APPLICATION TYPE	FREQUENCIES UTILIZED
PSO Module Standard Island Frequencies (Hz)	**2.14 kHz**, **2.63 kHz**, **3.24 kHz**, **4.00 kHz**, 4.90 kHz, 5.90 kHz, 7.10 kHz, 8.30 kHz, 10.0 kHz, 11.5 kHz, 13.2 kHz, 15.2 kHz, 17.5 kHz, 20.2 kHz
PSO Module Alternate I (Harmon AFTAC II) and Alternate II (US&S AFO) Island Frequencies (Hz)	**2.3 kHz**, **2.8 kHz**, **3.1 kHz**, **3.5 kHz**, **4.0 kHz**, 4.9 kHz, 5.4 kHz, 5.9 kHz, 6.4 kHz, 7.1 kHz, 7.7 kHz, 8.3 kHz, 8.9 kHz, 9.5 kHz, 10.2 kHz

(Frequencies in **Bold** text are recommended for use in electrified territories)

1.5 System Specifications

Table 1-4 Input Power Specifications

PARAMETER	RANGE OF VALUES
Battery Voltage	
On CPU Connector:	9.0-16.5 VDC
On SSCC IIIi Connector:	9.0-16.5 VDC
Maximum Ripple:	1.0V p-p

Table 1-5 Model GCP5000 (GCE) Input Current Requirements

COMPONENT	CPU BATTERY CONNECTOR @12.5V	CPU BATTERY CONNECTOR @13.2V	CPU BATTERY CONNECTOR @16.5V
CPU III:	0.7 A	0.6 A	0.6 A
PSO	1.4 A @ low transmit power 1.5 A @ high transmit power Current increases by 100 mA for each energized output when the outputs are connected to 250 ohm relays.	1.4 mA @ low transmit power 1.5 mA @ high transmit power Current increases by 100 mA for each energized output when the outputs are connected to 250 ohm relays.	1.2 mA @ low transmit power 1.1 mA @ high transmit power Current increases by 70 mA for each energized output when the outputs are connected to 250 ohm relays.
RIO:	760 mA with no relay output Current increases by 750 mA for each energized output when the outputs are connected to 500 ohm relays.	740 mA with no relay output Current increases by 700 mA for each energized output when the outputs are connected to 500 ohm relays.	660 mA with no relay output Current increases by 550 mA for each energized output when the outputs are connected to 500 ohm relays.
SSCC IIIi current draw from CPU battery connector:	0.020A	0.015 A	0.015 A
SSCC IIIi current draw from SSCC IIIi battery connector:	0.680A (with no load) When crossing activated add lamp, bell, and gate control currents.	0.660 A (with no load) When crossing activated add lamp, bell, and gate control currents.	0.580 A (with no load) When crossing activated add lamp, bell, and gate control currents.
Display (A80485-1):	1.95 A @ Startup 1.34 A @ Operational 1.34 A @ Standby	1.87 A @ Startup 1.31 A @ Operational 1.29 A @ Standby	1.86 A @ Startup 1.18 A @ Operational 1.17A @ Standby
SEAR IIi:	1.13A	1.09 A	0.93 A
Five Track Chassis with 5 PSO transmitters	4.4A	4.1A	3.8A
Five Track Chassis with 2 PSO in Crossing mode and 3 PSO transmitters	5A	4.75A	3.9A

Table 1-6 Model GCP5000 (GCE) General Parameters

PARAMETER	VALUES	
System Response Time	2 seconds	
Relay Drive Outputs (VO):	400 to 1000-ohm load	
Minimum Output Current @ low transmit power	200 mA	
Minimum Output Current @ High transmit power:	400 mA	
Surge Protection:	Built-in secondary surge protection for all connections. Requires external arresters and equalizers on track wires as primary surge protection. Surge panels or their electrical equivalent are required. Refer to paragraph 2.18 for battery and external cable surge protection.	
Typical Monitoring and Storage:	Display	SEAR IIi
IO State Changes:	250, 000 minimum	180,000 minimum
Train Moves:	50 minimum	1,800 minimum
Mounting:	The chassis can be wall, rack, or shelf mounted	
Temperature Range:	-40 °F to +160 °F (-40 °C to 70 °C)	

Table 1-7 Physical Dimension Data

Table 1-7: Physical Dimension and Weight Data		
PARAMETER	VALUES	
Chassis Dimensions:		
Five Track (A80905)		
Width:	23.25 In.	(59.055 cm)
Depth:	12.38 In.	(31.445 cm)
Height:	22.15 In.	(56.261 cm)
Chassis Weight:		
	Empty	Full Module Complement
Five Track (80905)	26.01 lbs (11.7 kg)	48.6 lbs (21.87 kg)
Module Weight:		
CPU III (A80903)	1.15 lbs (0.51 kg)	
PSO (A80428)	1.00 lbs (0.45 kg)	
RIO (A80413)	1.13 lbs (0.51 kg)	
SSCC IIIi (A80405)	3.63 lbs (1.63 kg)	
Display (A80485-1)	3.88 lbs (1.76 kg)	
SEAR IIi (A80410)	5.25 lbs (2.36 kg)	

Table 1-8 Crossing Controller Module Specifications

PARAMETER	RANGE OF VALUES
Environmental	
Temperature Range:	-40 °F to +158 °F (-40 °C to +70 °C)
Humidity:	95% non-condensing
Connector Wire Size Requirements	
Battery Wires:	Double 10 AWG wire for B and N
Lamp Wires:	10 AWG
Gate Control, Bell, and Input Wires:	16 to 12 AWG
External Battery Charger (customer supplied):	As required by the application
Maximum Ripple Voltage:	1.0V peak-to-peak
Power Requirements	
Input Voltage:	13.2 to 16.5 VDC Nominal.
Operating Current	540 to 600 mA
Maximum Lamp Current:	20 amps (eight 25-watt lamps)
Gate Control (GC)	
Gate Isolated DC Output Drive Voltage:	12 VDC nominal
Gate Isolated DC Drive Current:	10 amps Initial current dropping to 6 amps after 10 seconds
Programmable Gate Delay:	3 to 20 seconds programmable in 1-second increments
Crossing Control Vital Inputs	
Input Voltage:	20.0 VDC maximum; 12 VDC Nominal
Input States:	Energized at voltages of 7.5 VDC and above; de-energized when input voltage drops below nominal 4.0 VDC
Impedance:	1kΩ nominal
Bell Output	
Duration	Continuous upon activation
Voltage:	12 VDC nominal
Current:	2 amperes maximum
Built-in Isolation:	2000 VAC

Table 1-9 GCP5000 (GCE) PSO Module System Specifications

PARAMETER	RANGE OF VALUES
Frequency Stability:	±0.01% (Hz) of the selected frequency
Modulation	Frequency Modulation with an 8-bit serial address
Receiver Selectivity	Minimum 60 dB down on adjacent channels
Track Circuit Shunt	Typical values are between 0.06 ohm and 0.5 ohm sensitivity, other values are application dependent
Track Transmitter Load	25 Ohm
Track Receiver Load	250 Ohm
Relay Coil Resistance	400 to 1,000 Ohms
Input Power Supply	9.0 VDC to 16.5 VDC, 12.0 VDC nominal (via GCE case)

1.6 Ordering Information

The following page has the ordering information for the GCP5000 (GCE).

NYK:8XXX – 80905 - XXXXX

TABLE 1

COMBINATION OF CPU III CARD, FILLER PANELS, AND ECHELON® TERMINATION

DASH NO.	SLOT FOR CPU CARD M1	Echelon® Termination 80078-01
0	D39325-01 FILLER PANEL	W/O
1	A80903-2021 CPU III	W/O
2	NOT VALID	W/O
3	D39325-01 FILLER PANEL	WITH
4	A80903-2021 CPU III	WITH
5	NOT VALID	WITH
6	A80903-2021 CPU III	*

* Order 80078-01 Echelon® Termination Device Separately

TABLE 2

COMBINATION OF PSO TRACK, RIO, AND FILLER PANELS
P = FOR (M2-M6) A80428-03
B = D39325-01 BLANK FILLER INSTALLED
R = RIO CARD A80413 INSTALLED FOR (M3/M5/M6) INCLUDES OVERLAY D39589-05

	DASH NO.	SLOTS FOR TRACK CARDS AND FILLER PANELS				
		M2	M3	M4	M5	M6
1 PSO NO RIO	20	P	B	B	B	B
2 PSO NO RIO	21	P	P	B	B	B
3 PSO NO RIO	22	P	P	P	B	B
4 PSO NO RIO	23	P	P	P	P	B
5 PSO NO RIO	24	P	P	P	P	P
1 PSO 1 RIO	25	P	R	B	B	B
1 PSO 2 RIO	26	P	R	B	R	B
1 PSO 3 RIO	27	P	R	B	R	R
2 PSO 1 RIO	28	P	P	B	R	B
2 PSO 2 RIO	29	P	P	B	R	R
3 PSO 1 RIO	2A	P	P	P	R	B
3 PSO 2 RIO	2B	P	P	P	R	R
4 PSO 1 RIO	2C	P	P	P	P	R
EMPTY CHASSIS	NN	-	-	-	-	-

TABLE 5

COMBINATION OF DISPLAY, SEAR IIi, AND FILLER PANELS

DASH NO.	SLOT FOR DISPLAY M9	SLOT FOR SEAR IIi M19	USB FLASH DRIVE
00	D39326-01	D39359-01	W/O
E5	A80485-01	A80410-0X7X	W/O

TABLE 4

COMBINATION OF SSCC IIIi FILLER PANELS, ISO AND NON ISO SURGE PANELS, AND MULTIMETER

DASH NO.	SLOTS FOR SSCC IIIi FILLER PANELS		SURGE PANELS ISO		SURGE PANELS NON ISO		MULTI METER
	M7	M8	A91181-01	A91181-02	A91170-01	A91170-02	MODEL 187
0	D29325-01	D39325-01	W/O	W/O	W/O	W/O	W/O
1	A80405-01	D39325-01	W/O	W/O	W/O	W/O	W/O
2	A80405-01	A80405-01	W/O	W/O	W/O	W/O	W/O
3	A80405-01	A80405-01	WITH	WITH	W/O	W/O	W/O
4	A80405-01	A80405-01	WITH	WITH	W/O	W/O	WITH
5	A80405-01	A80405-01	W/O	W/O	WITH	WITH	W/O
6	A80405-01	A80405-01	W/O	W/O	WITH	WITH	WITH
7	A80405-01	D39325-01	WITH	W/O	W/O	W/O	W/O
8	A80405-01	D39325-01	WITH	W/O	W/O	W/O	WITH
9	A80405-01	D39325-01	W/O	W/O	WITH	W/O	W/O
A	A80405-01	D39325-01	W/O	W/O	WITH	W/O	WITH
B	A80405-01	D39325-01	W/O	W/O	W/O	W/O	WITH
C	A80405-01	A80405-01	W/O	W/O	W/O	W/O	WITH

TABLE 3

TYPE OF MODULE CONFIGURATION FILE (MCF) AND ASSEMBLY CASE

DASH NO.	MCF TYPE	NOTES	ASSEMBLY CASE TYPE	CASE PART NO.
P1	9VE48-A01	ALLOWS OPTONS IN TABLE 2 & 5	GCP5000 FIVE TRACK SYSTEM	NYK:800080906002

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SECTION 2
GENERAL GCP5000 (GCE) APPLICATION INFORMATION

2 GENERAL GCE APPLICATION INFORMATION

2.1 General

The PSO track circuit applications should conform to the guidelines found in this section to ensure proper operation and trouble-free performance. The PSO track circuit is capable of operation without insulated joints at either end or at both ends of the track circuit. Guidelines are provided for electrified and/or light rail operations as well as heavy rail applications. For special applications requiring additional information, contact Siemens Applications Engineering. Information describing the following functions is contained in this section:

Maximum Operating Distances and Frequency Grouping

Frequency Usage and Compatibility Guidelines

Requirements For Over Rail Non-Shunting Applications

Application Programming Guidelines

NOTE

NOTE

When using PSO Transceivers to extend approach lengths- System response time/ approach length additions need to be considered once you have more than 2 transceivers for one approach. Add 1 second for each transceiver over 2 for the same approach.

2.1.1 Maximum Operating Distances and Frequency Groupings

2.1.1.1 PSO Module Standard Frequency Data

Table 2-1, Table 2-2, and Table 2-3 provide maximum operating distance and standard frequency grouping data for Siemens PSO Modules.

The maximum operating distances shown, are between transmitter and receiver track wire connections for end-fed track circuits. For center-fed track circuits, double the distances given to obtain the maximum receiver-to-receiver distance. Table 2-1, Table 2-2, and Table 2-3 assume 0.06 ohm shunt sensitivity and moderate levels of interference. Distances can be modified based on the application and desired performance. Siemens Application Engineering should be consulted

Table 2-1 Maximum Operating Distances at 0.06-Ohm Shunting Sensitivity for PSO Module Standard Frequencies

APPLICATION	GROUP	FREQUENCY (HZ)	BALLAST		
			2 Ω/1,000 FT. OPERATING DISTANCE (FT./M)	3 Ω/1,000 FT. OPERATING DISTANCE (FT./M)	4 Ω/1,000 FT. OPERATING DISTANCE (FT./M)
PSO MODULE STANDARD FREQUENCIES	1	156	9000/2743	10750/3276	12500/3810
		285	6900/2103	8350/2545	9800/2987
		430	5800/1768	6900/2103	8000/2438
		645	4700/1433	5650/1722	6600/2012
		970	3900/1189	4700/1433	5500/1676
		1,450	3300/1006	3950/1204	4600/1402
		2,140	2600/792	3200/975	3800/1158
		3,240	2100/640	2550/777	3000/914
	2	211	7900/2408	9500/2896	11100/3383
		348	6300/1920	7650/2332	9000/2743
		525	5300/1615	6350/1935	7400/2255
		790	4300/1311	5200/1585	6100/1859
		1,180	3700/360	4450/1356	5200/1585
		1,770	3000/914	3600/1097	4200/1280
		2,630	2400/731	2850/869	3300/1006
		4,000	2000/610	2400/731	2800/853

2.1.1.2 PSO Module Alternate I (Harmon AFTAC II) Frequency Data

Table 2-2 provides maximum operating distance and frequency grouping data for frequencies used by Harmon AFTAC II units.

The maximum operating distances shown, are between transmitter and receiver track wire connections for end-fed track circuits. For center-fed track circuits, double the distances given to obtain the maximum receiver-to-receiver distance.

NOTE

NOTE

The alternate frequencies depicted in Table 2-2 are those typically used by Harmon equipment and are available for use with GCE. However, the alternate frequencies use Siemens modulation patterns and are not directly compatible with non- Siemens transmitters or receivers.

Table 2-2 Maximum Operating Distances at 0.06-Ohm Shunting Sensitivity for PSO Module Alternate I (Harmon AFTAC II) Frequencies

APPLICATION	GROUP	FREQUENCY (HZ)	BALLAST		
			2 Ω/1,000 FT. OPERATING DISTANCE (FT./M)	3 Ω/1,000 FT. OPERATING DISTANCE (FT./M)	4 Ω/1,000 FT. OPERATING DISTANCE (FT./M)
PSO MODULE ALTERNATE I (HARMON AFTAC II) FREQUENCIES	1	500	5100/1554	6000/1829	6900/2103
		900	4200/1280	4700/1433	5200/1585
		1300	3500/1067	3900/1189	4300/1311
		2300	1400/427	2100/540	2800/853
		3100	1250/945	1600/488	2150/655
		4000	900/274	1426/435	1950/594
		5400	700/213	1150/350	1600/488
		6400	500/152	1000/305	1500/457
		7700	500/152	850/259	1200/366
		8900	500/152	750/229	1000/305
		10200	500/152	650/198	800/244
	2	700	4400/1341	5150/1570	5900/1798
		1100	3800/1158	4200/1280	4600/1402
		1600	2000/610	2600/792	3200/975
		2800	1100/335	1650/503	2200/670
		3500	1000/305	1525/465	2050/625
		4900	700/213	1200/366	1700/518
		5900	600/183	1075/328	1550/472
		7100	500/152	950/289	1400/427
		8300	500/152	800/244	1100/335
		9500	500/152	700/213	900/274

2.1.1.3 PSO Module Alternate II (US&S AFO) Frequency Data

Table 2-3 provides maximum operating distance and frequency grouping data for frequencies used by US&S AFO units.

The maximum operating distances shown, are between transmitter and receiver track wire connections for end-fed track circuits. For center-fed track circuits, double the distances given to obtain the maximum receiver-to-receiver distance.

NOTE

NOTE

The alternate frequencies depicted in Table 2-3 are those typically used by US&S equipment and are available for use with GCE. However, the alternate frequencies use Siemens modulation patterns and are not directly compatible with non- Siemens transmitters or receivers.

Table 2-3 Maximum Operating Distances at 0.06-Ohm Shunting Sensitivity for PSO Module Alternate II (US&S AFO) Frequencies

APPLICATION	GROUP	FREQUENCY (HZ)	BALLAST		
			2 Ω/1,000 FT. OPERATING DISTANCE (FT./M)	3 Ω/1,000 FT. OPERATING DISTANCE (FT./M)	4 Ω/1,000 FT. OPERATING DISTANCE (FT./M)
PSO MODULE ALTERNATE II (US&S AFO) FREQUENCIES	1	1000	4000/1219	4300/1311	4600/1402
		1250	3500/1067	3950/1204	4400/1341
		1500	3300/1006	3700/1128	4100/1250
		1750	2900/884	3250/991	3600/1097
		2300	2600/792	2950/899	3300/1006
		2800	2400/732	2700/823	3000/914
	2	1125	3800/1158	4150/1265	4500/1372
		1375	3400/1036	3800/1158	4200/1280
		1640	3000/914	3300/1006	3600/1097
		1875	2800/853	3150/960	3500/1067
		2175	2700/823	3050/930	3400/1036
		2675	2500/762	2800/853	3100/945

2.1.2 AFO Frequency and 3000/4000 Family GCP Frequency Compatibility

Audio Frequency Overlay (AFO) equipment such as Siemens's PSO Module, Harmon's AFTAC II units, and Union Switch and Signal's AFO units can be utilized within Model 3000/4000 GCP approaches. The tables below detail the compatibility of each manufacturer's equipment.

2.1.2.1 PSO Module Standard Frequency Compatibility

Table 2-4 depicts the frequency compatibility of the PSO Module Standard frequencies with the frequencies used by Model 3000 or Model 4000 families of Grade Crossing Predictors.

Table 2-4 PSO Module Standard Frequency and Model 3000/4000 Family GCP Frequency Compatibility

			Model 3000/4000/5000 GCP Frequencies (Hz)										
			86	114	156	211	285	348	430	525	645	790	970
PSO Module Standard Frequencies	Group 1 Frequencies	156					▨	▨	▨	▨	▨	▨	▨
		285		▨	▨						▨	▨	▨
		430		▨	▨		▨						▨
		645	▨	▨	▨		▨						
		970	▨	▨	▨	▨	▨	▨					
		1450	▨	▨	▨	▨	▨	▨					
		2140	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	
		3240	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
	Group 2 Frequencies	211						▨		▨		▨	▨
		348										▨	
		525	▨	▨	▨	▨							
		790	▨	▨		▨	▨	▨					
		1180	▨	▨	▨	▨	▨	▨	▨				
		1770	▨	▨	▨	▨	▨	▨	▨	▨			▨
		2630	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		4000	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨

	▨	**Compatible**		**INCOMPATIBLE**

2.1.2.2 Harmon AFTAC II Unit

Table 2-5 depicts the frequency compatibility of the PSO Module Alternate I (Harmon AFTAC II) frequencies with the frequencies used by Model 3000 or Model 4000 families of Grade Crossing Predictors.

Table 2-5 PSO Module Alternate I (Harmon AFTAC II) Frequency and 3000/4000 Family GCP Frequency Compatibility

			Model 3000/4000/5000 GCP Frequencies (Hz)										
			86	114	156	211	285	348	430	525	645	790	970
PSO Module Alternate I (Harmon AFTAC II) Frequencies	Group 1 Frequencies	500	▨	▨	▨	▨	▨	▨	□	□	▨	▨	▨
		900	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	□
		1300	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		2300	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		3100	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		4000	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		5400	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		6400	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		7700	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		8900	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		10200	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
	Group 2 Frequencies	700	▨	▨	▨	▨	▨	▨	▨	▨	□	□	▨
		100	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		1600	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		2800	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		3500	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		4900	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		5900	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		7100	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		8300	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
		9500	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨

▨	Compatible	□	INCOMPATIBLE

NOTE

> **NOTE**
>
> In some cases, AFTAC II unit compatibility with Model 3000/4000 GCP frequencies can be affected by Island Frequency, when that frequency is too close to the selected AFTAC II frequency. Changing the Island Frequency can sometimes enable the use of a given AFTAC II unit frequency.

2.1.2.3 Union Switch and Signal AFO Unit

Table 2-6 depicts the frequency compatibility of the PSO Module Alternate II (US&S AFO) frequencies with the frequencies used by Model 3000 or Model 4000 families of Grade Crossing Predictors.

Table 2-6 PSO Module Alternate II (US&S AFO) Frequency and 3000/4000 Family GCP Frequency Compatibility

			Model 3000/4000 GCP Frequencies (Hz)										
			86	114	156	211	285	348	430	525	645	790	970
PSO Module Alternate II (US&S AFO) Frequencies	Group 1 Frequencies	1000											
		1250											
		1500											
		1750											
		2300											
		2800											
	Group 2 Frequencies	1125											
		1375											
		1640											
		1875											
		2175											
		2675											

(hatched) Compatible; (blank) INCOMPATIBLE

NOTE

> **NOTE**
>
> In some cases, AFTAC II unit compatibility with Model 3000/4000 GCP frequencies can be affected by Island Frequency, when that frequency is too close to the selected AFO unit frequency. Changing the Island Frequency can sometimes enable the use of a given AFO unit frequency.

2.1.3 0.2-Ohm Shunting Sensitivity and No Impendence Bonds

The maximum PSO operating distance with 0.2-ohm shunting sensitivity and no impedance bonds in the circuit is 75% of the operating distance in Table 2-4, Table 2-5, and Table 2-6 for each frequency based on 2 ohms per 1000 ft. (304.8 m) of ballast resistance.

2.1.4 Impedance Bonds in Electrified Territory

CAUTION

CAUTION

USE OF INSULATED JOINT BYPASS COUPLERS ON ELECTRIFIED TRACK IS NOT RECOMMENDED DUE TO SURGE DAMAGE CONCERNS.

Impedance bonds used in electric propulsion territory should provide a minimum of 2 ohms of impedance at all PSO Module frequencies in operation.

NOTE

NOTE

In some site-specific applications where the GCP and PSO approaches overlap, the use of Transmitter Line-to-Rail Coupler, 7A399-f, and Tuned Receiver Coupler, 7A355-f may be required to resolve EX loading issues on the GCP.

All frequencies within a group are compatible and may be intermixed without restriction on the same rails without insulated joint separation.

2.1.5 0.2-Ohm and 0.06-Ohm Shunting Sensitivity with Impendence Bonds

NOTE

NOTE

In electrified and/or light rail applications, frequencies less than 645 Hz and associated distances greater than 2000 feet (609.6 m) are possible with certain limitations. An engineering review of usable frequencies below 645 Hz should be conducted to determine the proper operation and coverage.

Where there is a mixture of both electrified and non-electrified trains in operation, in general use 0.2 Ohm shunting sensitivity. The maximum GCE operating distance with 0.2-ohm shunting sensitivity, with impedance bonds in the circuit, is 2000 ft. (609.6 m) based on ballast resistance of 2 ohms per 1000 ft. (304.5 m). Usable GCE frequencies under these conditions are 645 through 4000 Hz. An engineering review of usable frequencies below 645 Hz must be performed to ensure proper operation and coverage.

Typically, this represents PSO applications in Light Rail (Trolley) Electrified Territory. All frequencies can be used after an engineering study on interfering harmonics is conducted. Operating distance is generally 50% of the distances in Table 2-4, Table 2-5, and Table 2-6, based on ballast resistance of 2 ohms per 1000 ft (304.5 m) for frequencies 1180 Hz and below. Use 2000 ft for frequencies 1450 Hz and above for 2 ohms per 1000 ft applications.

The maximum PSO operating distance with 0.06-ohm shunting sensitivity and with impedance bonds in the circuit is 65% 0f the operating distance in Table 2-4, Table 2-5, and Table 2-6, for each frequency based on ballast resistance of 2 ohms per 1000 ft (304.5 m).

2.2 Frequency Usage and Compatibility Guidelines Warning

⚠ WARNING

WARNING

NEVER USE AN APPROACH FREQUENCY THAT IS THE SAME AS THE ISLAND FREQUENCY.

⚠ WARNING

WARNING

ENSURE THAT OTHER EQUIPMENT CONNECTED TO THE TRACK IS AREMA COMPLIANT AND COMPATIBLE WITH THE PSO AND ISLAND FREQUENCIES USED.

⚠ WARNING

WARNING

IF A SWITCH IS PRESENT IN THE PSO APPROACH ADDITIONAL CIRCUITRY MAY BE REQUIRED TO ENSURE THE SHUNT IS DETECTED THROUGH ALL OF THE TRACK SECTIONS.

NOTE

NOTE

Avoid using adjacent channel frequencies on the same track. This is generally accomplished by separating the frequencies into two groups, as depicted in Table 2-1, Table 2-2, and Table 2-3. When mixing standard and alternate frequencies, several frequencies may not be compatible due to harmonic content.

The PSO Module Standard frequencies depicted in Table 2-1 are available for use with the PSO Module when utilized as a PSO transmitter or receiver. The Alternate I and Alternate II frequencies depicted in Table 2-2 and Table 2-3 are those typically used by other equipment and are available for use with the PSO module. However, the alternate frequencies use Siemens modulation patterns and are not directly compatible with non-Siemens transmitters or receivers. When PSO module Receiver-Transmitter pairs are deployed, they can be substituted for other non-PSO II/III legacy overlay equipment operating on the same channel.

2.2.1 Non-Electrified Track

All PSO operating frequencies (156 through 10200 Hz) are available for use on non-electrified track.

2.2.2 Electrified Track

The PSO 4000 system may be used in either AC or DC electrified track providing all other application requirements are met. PSO 4000 operating frequencies 645 through 4000 Hz should be used on electrified track.

WARNING

WARNING

INCORRECT SETTING OF RECEIVER THRESHOLD CAN CAUSE BROKEN RAIL DETECTION TO NOT OPERATE.

NOTE

NOTE

An engineering study should be conducted to eliminate interfering harmonics.

Applications requiring broken rail detection are possible. In these applications use of the Receiver Threshold may be required.

2.2.3 Frequency Selection

The application of PSO frequencies is generally accomplished by separating the frequencies into two groups with one channel separation between frequencies in each group as follows. Table 2-1, Table 2-2, and Table 2-3 reflect these groups. Avoid using adjacent frequencies in the same block.

One channel separation between frequencies is provided by dividing the 16 PSO frequencies into two groups of eight frequencies each as follows.

Table 2-7 Track Frequency Groups

Group 1 (Hz)	Group 2 (Hz)
156	211
285	348
430	525
645	790
970	1,180
1,450	1,770
2,140	2,630
3,240	4,000

NOTE

NOTE

All frequencies within a group are compatible and may be intermixed without restriction on the same rails without insulated joint separation. See 2.1.2.2 for AFTAC II unit frequency groupings and 2.1.2.3 for AFO unit frequency groupings.

2.2.3.1 Like Address Code Frequency Repetition

For PSO Modules with like addresses (A, C, D, E, or F), frequencies can be repeated on the same track when separated by at least 10,000 ft. (3048 m) and one set of non-bypassed insulated joints (no type of insulated joint couplers used around the insulated joints).

2.2.3.2 Different Address Code Frequency Repetition

Identical frequencies may be used on either side of non-bypassed insulated joints (end – to - end track circuits) provided different address codes are used.

2.2.3.3 Like Address Code Frequency Repetition Using Non-Bypassed Insulated Joints

For PSO Modules with like addresses (A, C, D, E, or F), frequencies can be repeated without restriction on the same track when separated by two sets of non-bypassed insulated joints providing each set of insulated joints is separated by a minimum of 3,000 ft. (914.4 m).

2.2.3.4 Frequency Assignments in Multiple Track Territories

Normal caution must be exercised in assigning and setting multiple track addresses and frequencies. In multiple track territory frequency assignments must follow a pattern that avoids using the same frequency on adjacent tracks.

Since it is not possible to meet this requirement in three- and four-track territory with available PSO frequencies, the address coding scheme described in Section 2.2.3.3 can be employed here as well. Each track uses a separate frequency with alternating track circuits assigned different address codes and separated by a set of non-bypassed insulated joints.

2.2.3.5 Multiple Track Highway Crossings

Multiple track highway crossing approaches can use group 1 frequencies on one track (track number 1) and group 2 frequencies on the other track (track number 2). Since two frequencies from each group are required at each crossing when all frequencies have been used, the same frequencies may be repeated but this time using the group 2 frequencies on track number 1 and group 1 frequencies on track number 2. Continue to alternate this pattern as required. For further details, contact Siemens Application Engineering.

2.2.4 Island and Crossing Receiver Frequencies

The PSO Module receivers and Island frequencies used in the Crossing Assembly are fully compatible; however, the same frequency must not be used in a receiver approach and the island.

2.3 Requirements for Over Rail Non-Shunting Applications

PSO systems are frequently used as a medium to transmit information from one location to another over the rail. A common use is to indicate the position of a hand throw switch. When applied in this manner the PSO system is not required to shunt down when a train is present.

Even though the PSO is not required to shunt with a train, application rules are still necessary to avoid interference between transmitters and receivers, which are not of the same pair. "Separation Distance" refers to the distance between a receiver of one circuit and a transmitter of the same frequency and address that is intended for a different circuit. The rules for this non-shunting application are as follows:

- PSO Module frequencies may be repeated with one set of unbypassed insulated joints and a separation distance of 10,000 ft. (3048 m). The essential point is that no coupling device can bypass the insulated joint.
- PSO Module frequencies may be repeated with two sets of unbypassed insulated joints and at least 3000 ft. (914.4 m) separation distance.
- When unbypassed joints are not available, identical frequencies can still be reused on the same track. When repeating frequencies of like addresses the following rules still apply:
    - For frequencies 156Hz thru 525Hz, the separation must be at least 50,000 ft. (15240 m).
    - For frequencies 625Hz thru 1450Hz, the separation must be at least 30,000 ft. (9144 m).
    - For frequencies 1770 and above, the separation must be at least 20,000 ft. (6401 m).
- If the separation distances for each frequency are not available, repeating is still possible but alternative addresses (A and C) must be used. When using this application both receivers should be between the transmitter locations. In any case, there should be at least 5,000 ft. (1,524 m) between any transmitter and unassociated receiver.
- PSO Module circuit lengths can be 30% longer than the distances published for 0.06 Ohm Shunting. If shunt overrun (pre-shunting) is a concern, distances and calibration should revert to applications required for a shunting application.

2.4 Island Circuits

The GCP5000 (GCE) provides a high-frequency island track circuit with excellent cutoff and shunting characteristics under varying ballast conditions.

2.4.1 Island Circuit Approach Length

Siemens recommends that the minimum length of an island track circuit should be 120 feet (36.6 meters) between track connections, or longer if required to ensure island circuit shunting for the operating car fleet and to comply with the operating practices of the railroad.

2.4.2 Track Circuit Compatibility

The GCP5000 (GCE) Island is compatible with most track circuits, including DC and AC coded track.

2.4.3 Island Frequencies

Table 2-8 GCP5000 (GCE) Island Frequencies

2.14	3.24	4.90	7.10	10.00	13.20	17.50
2.63	4.00	5.90	8.30	11.50	15.20	20.20

WARNING

WARNING

AT MULTIPLE TRACK INSTALLATIONS, USE DIFFERENT FREQUENCIES FOR EACH ISLAND CIRCUIT.

IN THE SAME TRACK SECTION, DO NOT REPEAT ISLAND FREQUENCIES WITHIN 5000 FEET (1524.0 METERS) UNLESS SEPARATED BY INSULATED JOINTS. ON ADJACENT TRACKS, DO NOT REPEAT ISLAND FREQUENCIES WITHIN 1500 FEET (457.2 M).

WARNING

WARNING

IF A SWITCH IS PRESENT IN THE ISLAND ADDITIONAL CIRCUITRY MAY BE REQUIRED TO ENSURE THE SHUNT IS DETECTED THROUGH ALL OF THE TRACK SECTIONS.

NOTE

NOTE

Use frequencies of 10.0 kHz and lower when the required island length is over 200 feet (61.0 meters), or lumped ballast loading at the street is anticipated.

2.4.4 Island Shunting Sensitivity

The island can be calibrated to respond to a shunting sensitivity of 0.12, 0.3, 0.4, or 0.5 ohms. A hardwire shunt is used for calibration.

NOTE

NOTE

The island circuit shunting sensitivity adjustment procedure is described in section 6.2.3.

Island track circuit calibration is generally performed using 0.12 ohm shunting sensitivity. In an area where poor shunting is experienced or anticipated, a minimum of 0.3-ohm shunting sensitivity is recommended.

In areas of passenger operation, a minimum of 0.3-ohm shunting sensitivity is recommended.

2.4.5 Island Circuit Wiring

Use #6 AWG for track wires. Use twisted-pair wires with at least two turns per foot for connections between the track and the GCP bungalow. Provide as much separation between transmit and receive wire pairs as practical. The total wire length from the bungalow to transmit wire rail connections and bungalow to receive wire connections should not exceed 600 ft. (182.9m).

⚠ CAUTION

CAUTION

USE PROPER PRIMARY SURGE PROTECTION ON THE TRACK WIRES, GCP5000 BATTERY WIRES, AND ALL GCP5000 LINE CIRCUITS.

2.5 Ancillary Equipment Application Guidelines

NOTE

NOTE

In some AC/DC coded/CAB applications, additional filters may be required. Contact Siemens Applications Engineering.

2.5.1 AC Track Circuit/Cab Signal Filter, 7A417-X

⚠ WARNING

WARNING

VERIFY PROPER SIGNAL SYSTEM OPERATION PER RAILROAD INSTRUCTIONS AFTER INSTALLATION OF THE 7A417-X.

NOTE

NOTE

Verify proper Signal System operation per railroad instructions after installation of the 7A417-X.

Cab Signal Filter, 7A417-X is designed for use in AC track circuit territory where 60, 90, 100, or 200-Hz frequencies are used. The filter should be installed on the primary side of the track transformer as shown in Figure 3-13.

For Cab Signal Filter, 7A417-X equipment description, see Section 3.4.1; for mounting dimensions, see Section 3.4.2 and Figure 3-14; and for application installation drawings, see Section 3.4.3 and Figure 3-13. Correct frequency and relay mounting base type must be specified in the railroad's written instructions and the couplers should be installed per the railroad's written instructions.

2.5.2 Transmitter Line Applications

When it is desirable to transmit signals over dedicated line wire or buried cable to the track, a Line to Receiver Coupler, 7A388 (See Section 3.3.3 and Figure 3-8), must be used to couple the transmitter to the line and a Transmitter Line to Rail Coupler, 7A399-f (See Section 3.3.5 and Figure 3-11), must be used to couple the line to the rail (for application drawings see Figure 9-11 and Figure 9-12). Correct frequency information must be specified in the railroad's or agency's written instructions and the couplers should be installed per those written instructions. A typical application is when the distance from the transmitter to the rail is between 300 – 2000 ft. (91.4 – 609.6 m) (based on using 14AWG, increasing the diameter of the wire will proportionally increase the potential distance from 2000 ft./609.6 m). See Section 7.2.3 for further information regarding maximum distances for track wiring).

2.5.3 Receiver Line Applications

When the receiver is connected to the track via dedicated line wire or buried cable a pole-mounted Receiver Line to Rail Coupler, 7A377-1-f (See Section 3.3.4.1 and Figure 3-9), or the shelf-mounted Receiver Line to Rail Coupler, 7A377-2-f (See Section 3.3.4.4 and Figure 3-10) is required to couple the track to the line. A Line to Receiver Coupler, 7A388 (See Section 3.3.3 and Figure 3-8) is used to couple the line to the receiver (see Figure 9-8, Figure 9-9, and Figure 9-11 for typical application drawings). Correct frequency information must be specified in the railroad's or agency's written instructions and the couplers should be installed per those written instructions. A typical application is when the distance from the receiver to the rail is between 300 – 2000 ft. (91.4 – 670.6 m) (based on using 14AWG, increasing the diameter of the wire will proportionally increase the potential distance from 2000 ft./609.6 m).

2.5.4 Insulated Joint Bypass Couplers (Non-Electrified Rail Only)

⚠ WARNING

WARNING

WHEN GRADE CROSSING PREDICTOR (GCP) OR MOTION SENSOR FREQUENCIES ARE ALSO BYPASSED AROUND INSULATED JOINTS, ALONG WITH PSO FREQUENCIES, ALWAYS FOLLOW THE INSTRUCTIONS GOVERNING THE GCE OR MOTION SENSOR APPLICATION AND INSTALLATION.

NOTE

NOTE

The A62776 MS/GCE Termination Shunt Burial Kit is designed to protect shunts while they are buried. For additional information, refer to Section 9, Auxiliary Equipment.

Two types of insulated joint bypass couplers are used with the PSO:

1. PSO Insulated Joint Bypass Coupler (Tuned), 7A422-f (See Figure 3-13), is used with PSO circuits only in DC track circuits where there are no predictors used (for description, see Section 3.3.7; for application installation drawing, see Figure 3-14).
2. AC Shunt, Wide Band, 8A076A (See Figure 3-19) is acceptable for PSO operation when PSOs are being bypassed around insulated joints with wideband shunts. For description, see Section 3.6.1; for application installation drawing, see Figure 3-20.

When using the 7A422-f coupler, insulated joint coupler connections should be made with #6 AWG. Track wire should not exceed 25 ft. (7.62 m) in length, since the shorter the wire lengths and the larger the wire diameters, the less PSO signal loss will occur at each insulated joint. Correct frequency information must be specified in the railroad's written instructions and the couplers should be installed per the railroad's written instructions.

When installing wide band shunts and tuned couplers to bypass insulated joints, connect the devices directly to the rails with leads as short as practical and encase the devices in a protective enclosure or buried at an appropriate depth as shown in Figure 2-1.

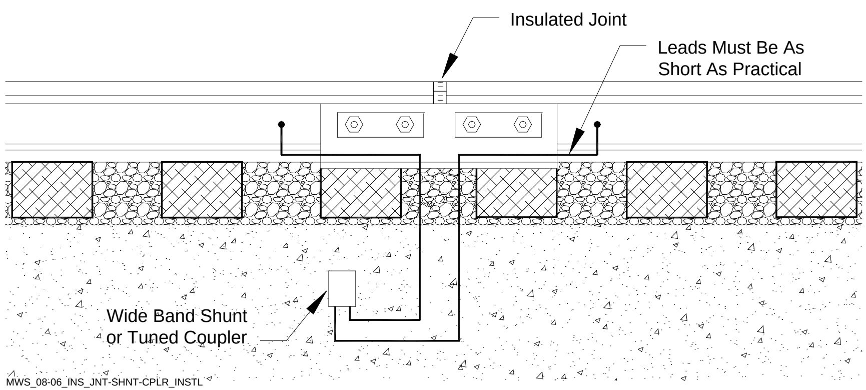


Figure 2-1 Insulated Joint, Shunt, or Coupler Installation

2.5.5 Battery Choke

WARNING

WARNING
IF A BATTERY CHOKE IS INSTALLED WITHIN A MODEL 300 OR 400 GCE APPROACH, THE 8A065A CHOKE MUST BE USED.
WHEN GRADE CROSSING PREDICTOR (GCP) OR MOTION SENSOR FREQUENCIES ARE ALSO BYPASSED AROUND INSULATED JOINTS, ALONG WITH PSO 4000 FREQUENCIES, ALWAYS FOLLOW THE INSTRUCTIONS GOVERNING THE GCE OR MOTION SENSOR INSTALLATION.

In some AC/DC coded/CAB applications, additional filters may be required. Contact Siemens Applications Engineering.

When the PSO track circuit includes a DC track circuit track battery or a track battery is located within 500 ft. (152.4 m) of a PSO track circuit that is not isolated by insulated joints, PSO Battery Choke, 7A360 (See Figure 7-1), is connected in series with the track battery. When GCPs or motion sensors are installed within PSO track circuits, Battery Choke, 8A065A, or Battery Choke, 62648 (See Figure 7-2), must be used in place of the 7A360 battery choke (for description, see Section 7.2.1.1). See Figure 3-3 for a typical application installation.

2.5.6 Surge Protection

The PSO incorporates built-in surge protection. However, primary surge protection must be installed on all AC power, battery, line, and track leads as described in Section 7. A typical battery surge protection application drawing is presented in Section 2.6 In electrified territory, track wire surge protection must be installed.

.

2.5.7 Use of GCE with PSO II, PSO III, PSO 4000, and PSO+ Equipment

The GCE PSO receiver and transmitter units are compatible with the signal format and track levels of Siemens' PSO II, PSO III, PSO 4000, and PSO+ receiver and transmitter units using the same address format. This means that a PSO II, PSO III, PSO 4000, or PSO+ transmitter is capable of driving a track circuit containing a GCE receiver and that PSO II, PSO III, PSO 4000, or PSO+ receivers are capable of receiving and decoding a signal emanating from a PSO 4000 transmitter (A or C address only).

NOTE

NOTE

When PSO applications overlap with MS/GCP track circuits, additional filtering may be required.

2.6 Typical Application Drawings

This section provides drawings to show each of the following GCP5000 (GCE) applications:

- Primary Battery Surge Protection (Figure 2-2)
- Track Wire Connections in Electrified Territory (Figure 2-3)

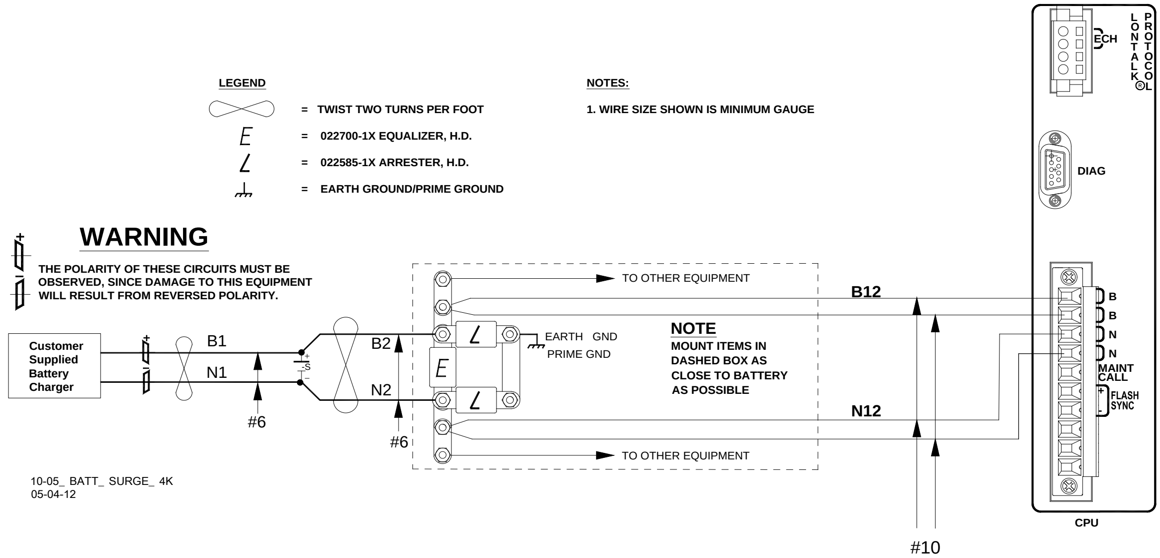


Figure 2-2 Primary Battery Surge Protection

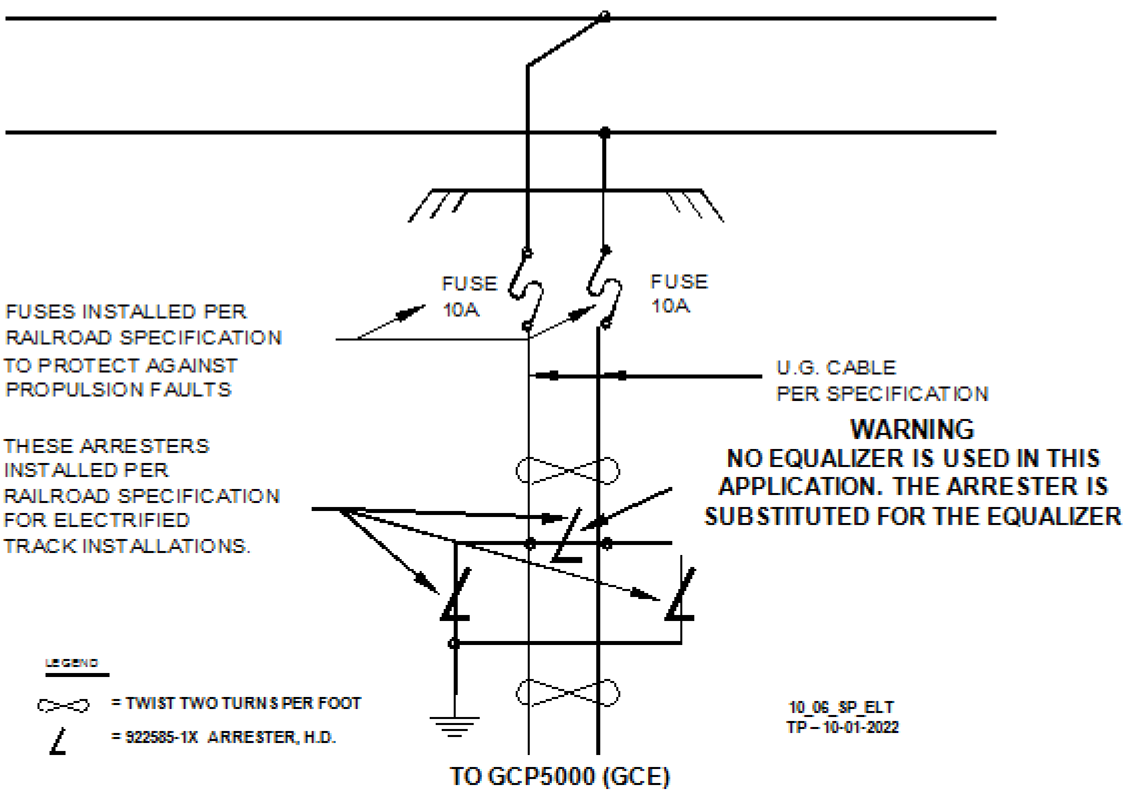


Figure 2-3 Track Wire Connections in Electrified Territory

SECTION 3
DISPLAY MODULE AND OFFICE CONFIGURATION EDITOR

3 DISPLAY MODULE AND OFFICE CONFIGURATION EDITOR

3.1 Display Menu Screens

3.1.1 Display Module (A80485)

The display provides the user interface that allows:

- GCP5000 (GCE) configuration:
  - Upload a configuration package (PAC) file to the CPU III from the Display's USB drive or from the Web User Interface (Web U/I).
  - Download the configuration package (PAC) file from the CPU III and save it on the Display's USB drive or to the user's PC via the Web User Interface (Web U/I).
- Software Installation, to include the following types of software:
  - Master Configuration File (MCF) to the CPU III module.
  - Master Executive Files (MEF) to the various cards.
  - Non-Vital Executive Files to the Display.
  - SEAR IIi software.
    - Executive
    - Application – CDL (Control Description Language) files specific to individual railroads and agencies.
- Generate, present, and copy the following reports:
  - Configuration (Config) Report
  - Version Report
  - Program Report
  - Minimum Program Report
  - Templates Report
  - SEAR Incident Reports
- Generate, present, and copy the following logs:
  - Event Log
  - Display Log
  - Diagnostic Log
  - CPU-Card IO Logs
  - Maintenance Log
  - Train Log
  - SEAR Event Log
  - SEAR Application Log
  - SEAR CDL Log

3.1.2 Display Module Screens

The Display portrays five top-level menu screens. They are navigated by using the left (◄) and right (►) arrows found on the front of the display:

- System View
- IO & Logic View
- Diags & Reports
- USB Menu (When USB Stick is inserted in the slot on Display Module)
- Program View

3.1.2.1 System View Screen

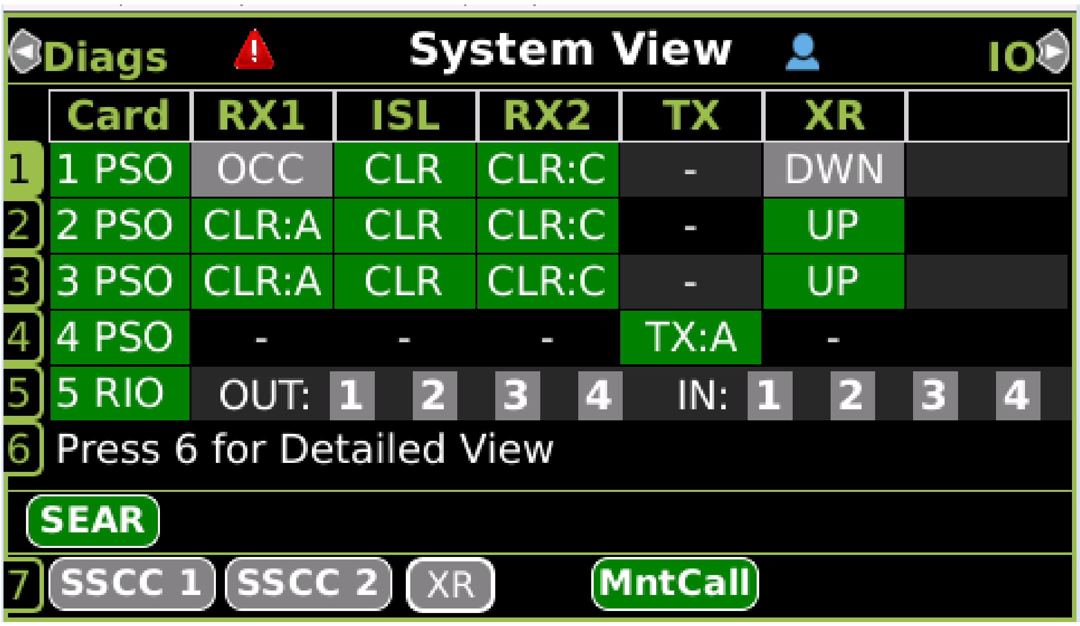


Figure 3-1 System View Screen

The System View screen provides information regarding the status of:

- Each active PSO track and RIO in the module.
- SEAR and Vital Comms Link Status
- Each active SSCC module as well as the status of the XR Relay on the bottom line of the screen (SSCC Data section).

3.1.2.1.1 Module Data Section

The Module Data section provides the following indicators and information:

- Item number e.g., 1 – 5, pressing the key with this number on the Display will bring up the submenus for this module, see Figure 3-1
- Card – this shows the slot number in the chassis and module type (PSO or RIO)
- RX1 – this shows the status of PSO receiver 1
  - CLR:X (green) –PSO receiver is unoccupied and receiving code X (where X is one of A,C,D,E,F) (note: if the PSO receiver is external the code Is not shown)
  - OCC (grey) - PSO receiver is occupied
  - CAL (red) -calibration required
  - HLTH (red) – the receiver is unhealthy
  - OOS (blue) – the receiver is out of service
  - WRAP (yellow) – a wrap is being applied to the receiver
  - STICK (yellow) – a Stick is being applied to the receiver
  - TWRAP (yellow) – a timed wrap is being applied to the receiver, for example, it is running a drop delay or the advance preempt timer is running
  - '-' (dash) - receiver 1 is not used
- ISL – this shows the status of the island
  - CLR: (green) –the island is unoccupied
  - OCC (grey) – the island is occupied
  - CAL (red) -calibration required
  - HLTH (red) – the island is unhealthy
  - OOS (blue) – the island is out of service
  - '-' (dash) - the island is not used
- RX2 – this shows the status of PSO receiver 2, the indications are the same as RX1
- TX – this shows the status of the status if the PSO transmitter
  - TX:X (green) –PSO transmitter is transmitting code X (where X is one of A,C,D,E,F)
  - NOTX (grey) - PSO transmitter is not transmitting
  - HLTH (red) – transmitter is unhealthy
  - '-' (dash) - transmitter is not used
- XR – this shows the status of the XR for this PSO, this is only used when PSO Mode is set to Crossing
  - UP (green) – XR is energized for this PSO
  - DWN (grey) – XR is energized for this PSO
  - '-' (dash) - XR is not used for this PSO (Not in crossing mode)

When a RIO module is used, the display will show the status of the 4 RIO inputs and outputs.

3.1.2.1.2 Comms Section

This shows the communication status of the SEAR. The icon is not shown if the SEAR IIi is not used.

- Green - SEAR IIi in session
- Red - SEAR IIi out of session

This shows the communication status of the vital comms links. The icons are only shown for the used vital comms links.

- Green – VCOM(x) in session (x=1..4)
- Red - VCOM(x) out of session (x=1..4)

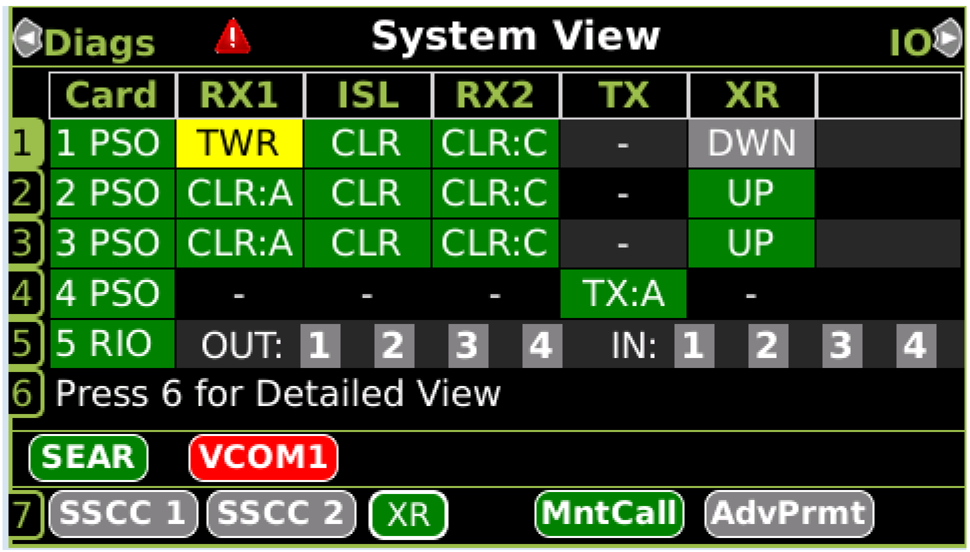


Figure 3-2 System View Screen Showing VCOM Icons

3.1.2.1.3 System State Section

The SSCC Data section shows the status of SSCC1 and SSCC2. The icon is only shown if indicated SSCC module is used

- Red – SSCC unhealthy
- Grey – SSCC activated
- Green – SSCC unactivated

The display also shows the status of AND 1 XR (shown as XR):

- Green – energized
- Grey - de-energized

Maintenance Call output

- Green – healthy
- Red – unhealthy (for example GCE is out of service, SSCCs are unhealthy or low battery detected)

AdvPrmt – Advance preemption output (shows is Preempt Logic set to Advance)

- Green – energized
- Grey – de-energized

When the user selects the number next to a PSO module using the keyboard, the following options are available:

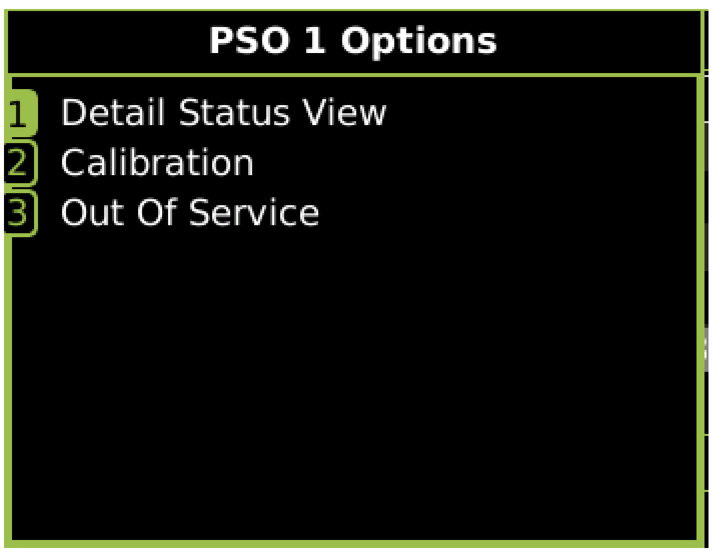
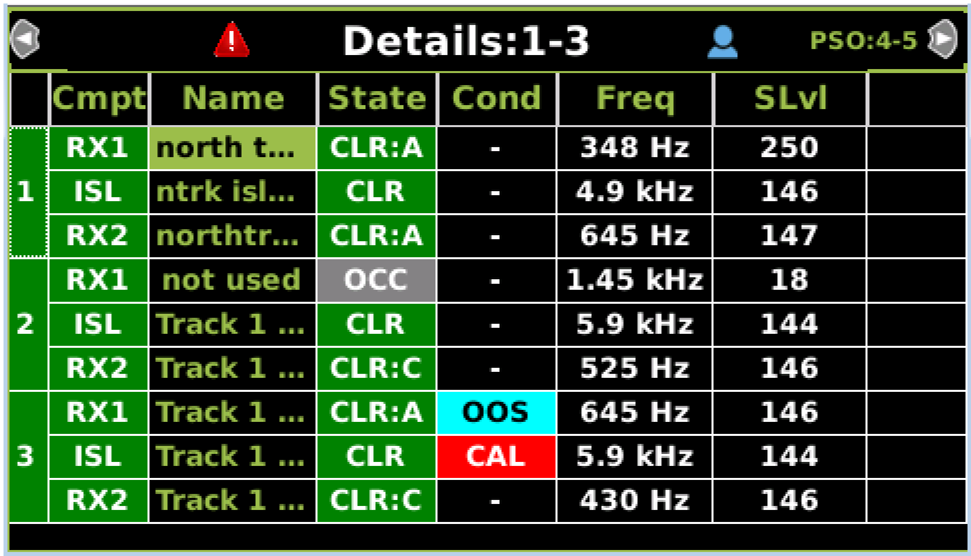


Figure 3-3 PSO Module Options

3.1.2.1.4 PSO Detailed View

The Display provides a detailed status view for the PSOs that shows signal levels and frequency. To see this view, press the 6 button on the Display.

If more than 3 PSO modules are used, press the left arrow on the Display to see PSO 4 and 5.

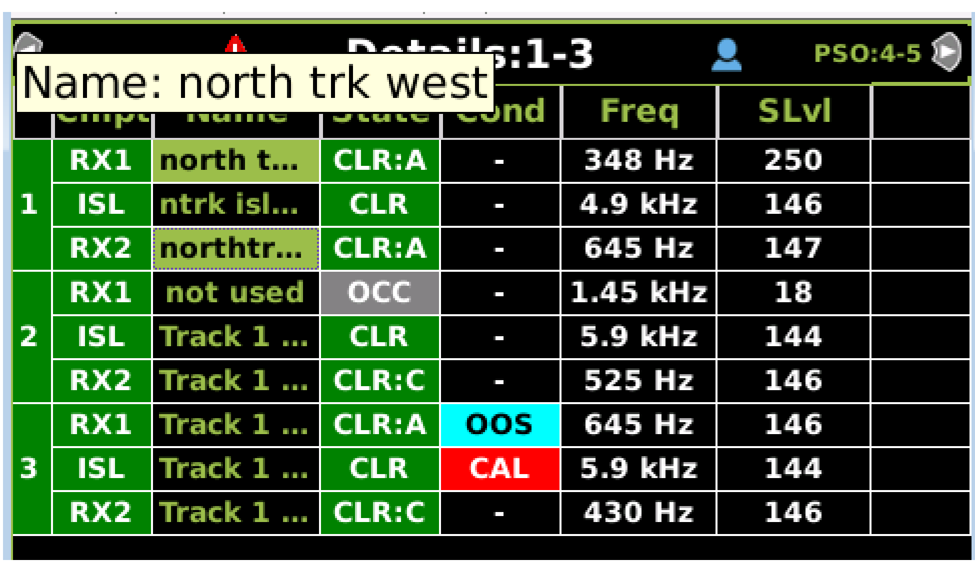


Details:1-3 PSO:4-5

	Cmpt	Name	State	Cond	Freq	SLvl
1	RX1	north t...	CLR:A	-	348 Hz	250
	ISL	ntrk isl...	CLR	-	4.9 kHz	146
	RX2	northtr...	CLR:A	-	645 Hz	147
2	RX1	not used	OCC	-	1.45 kHz	18
	ISL	Track 1 ...	CLR	-	5.9 kHz	144
	RX2	Track 1 ...	CLR:C	-	525 Hz	146
3	RX1	Track 1 ...	CLR:A	OOS	645 Hz	146
	ISL	Track 1 ...	CLR	CAL	5.9 kHz	144
	RX2	Track 1 ...	CLR:C	-	430 Hz	146

Figure 3-4 Detail View

To see the full track name, use the up and down arrow to select the required PSO and component then press the enter key on the display.



Name: north trk west

	Cmpt	Name	State	Cond	Freq	SLvl
1	RX1	north t...	CLR:A	-	348 Hz	250
	ISL	ntrk isl...	CLR	-	4.9 kHz	146
	RX2	northtr...	CLR:A	-	645 Hz	147
2	RX1	not used	OCC	-	1.45 kHz	18
	ISL	Track 1 ...	CLR	-	5.9 kHz	144
	RX2	Track 1 ...	CLR:C	-	525 Hz	146
3	RX1	Track 1 ...	CLR:A	OOS	645 Hz	146
	ISL	Track 1 ...	CLR	CAL	5.9 kHz	144
	RX2	Track 1 ...	CLR:C	-	430 Hz	146

Figure 3-5 Detailed View Showing Full Track Name

3.1.2.1.5 Calibration

The calibration screen shows the calibration status of the receiver and island along with the current RX Signal Level and Code received.

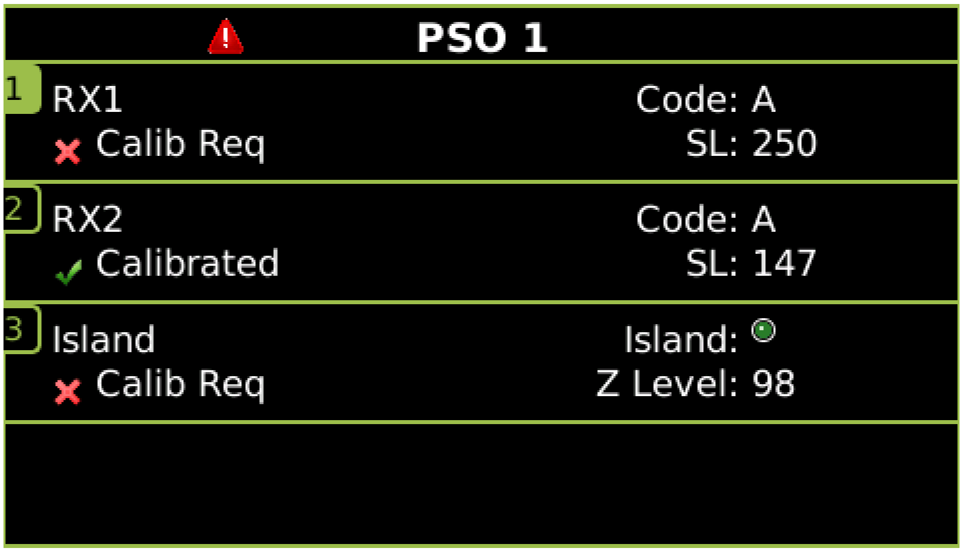


Figure 3-6 Calibration Screen

Follow the instructions in Section 6 of this manual on how to calibrate the receivers and island.

3.1.2.1.6 Out of Service

The out-of-service screen will show the current service status of the PSO receivers and Island along with the current RX Signal Level and Code received. See Section 5 of this manual for details on how to take a PSO receiver and island out of service.

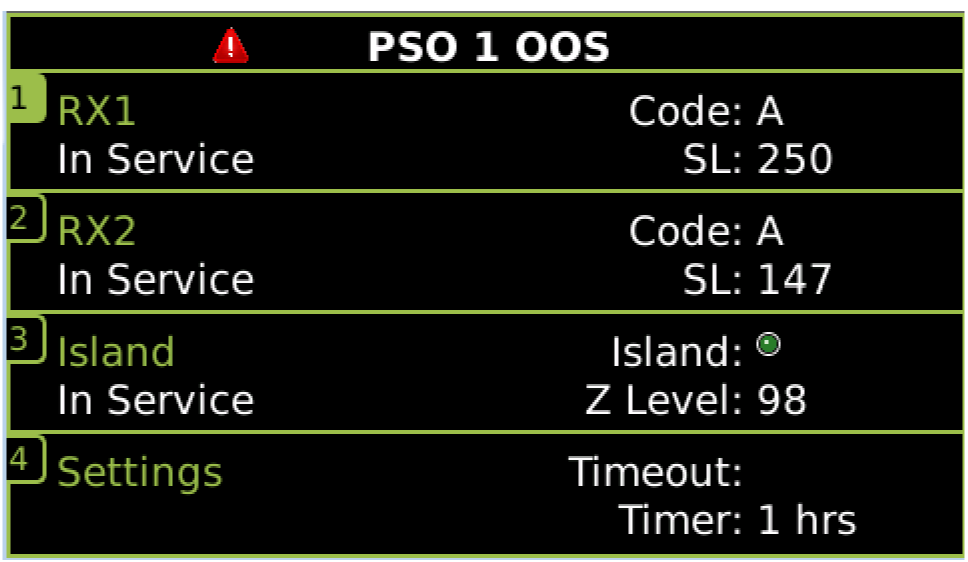


Figure 3-7 Out of Service Screen

3.1.2.2 SSCC Menus

3.1.2.2.1 Lamp Voltage

If the user presses [7] from the System View shown in Figure 3-8, the SSCC menu options in Figure 3-9 are shown.

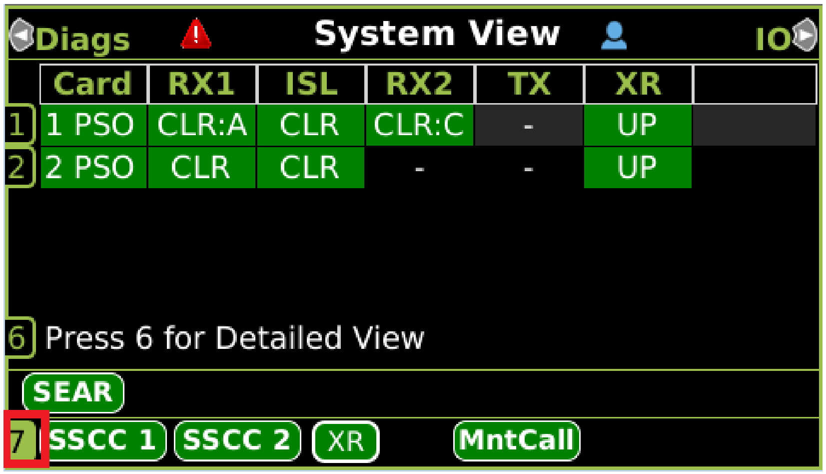


Figure 3-8 Selecting SSCC Menus

Figure 3-9 SSCC Menu Options

If the user selects [1] to adjust the lamps, the screen shown in Figure 3-9 is shown. The user selects the lamp voltage to be adjusted, then presses enter. Provided the crossing was not active, the selected lamp will be turned on steady, and the user can type in a new lamp voltage. Note the lamp voltages shown here are in decivolts (Volts x 10).

The user can also press the up or down arrow keys to increment or decrement the lamp voltage by 0.1V (1 decivolts).

The actual voltage at the lamp should be measured as detailed in section 4.9.

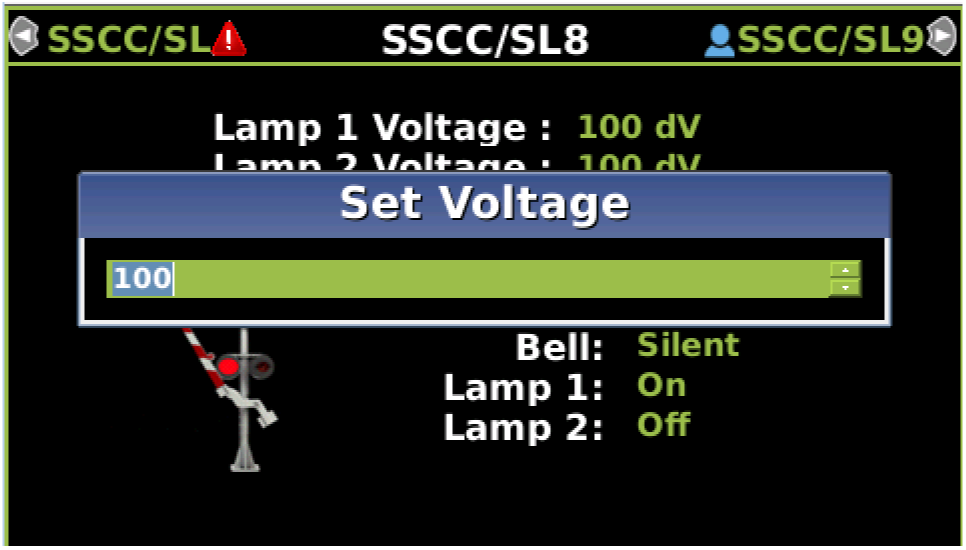


Figure 3-10 SSCC Lamp Voltage Adjustment

3.1.2.2.2 Lamp Tests

If the user presses [2] from the SSCC options screen, the lamp test screen shown in Figure 3-11 is shown. The menu title SSCC/SL8 (which corresponds to SSCC-1) indicates which SSCC module is being selected. Press the right arrow to navigate to SSCC/SL9 (SSCC-2)

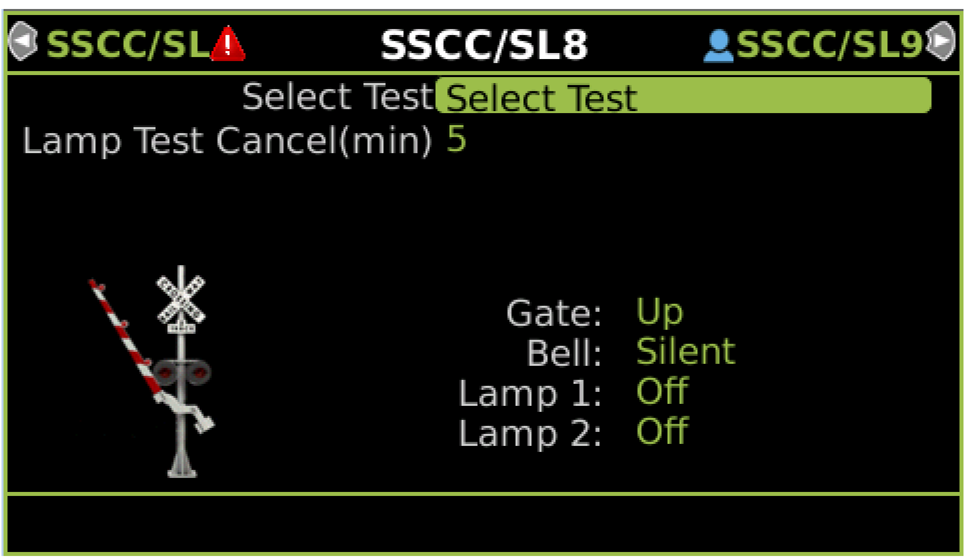


Figure 3-11 SSCC Lamp Test

The user can press Enter to select the test. The tests are shown in Figure 3-12.

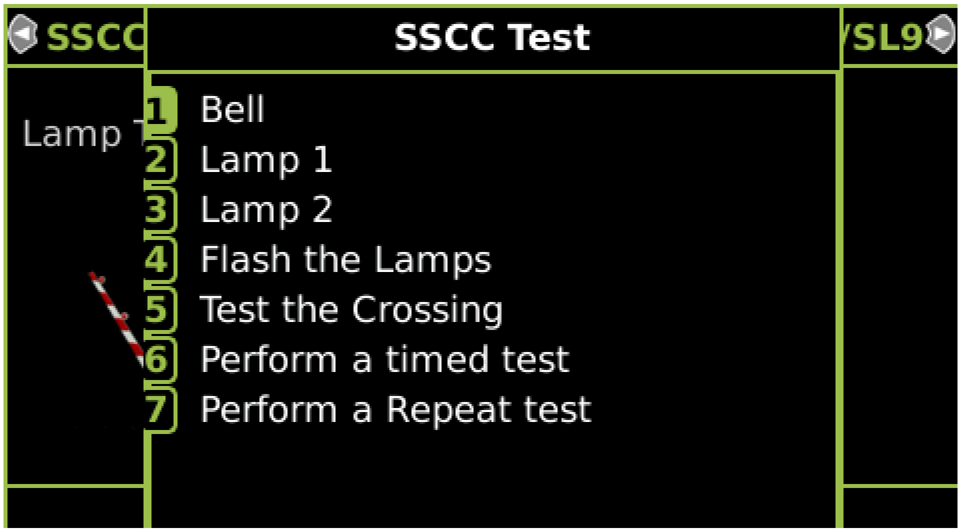


Figure 3-12 SSCC Lamp Test Options

Once the test is selected, press the '5' key to start the test as shown in Figure 3-13. Pressing '5' again will stop the test.

The test will also automatically stop once the configured Lamp Test Cancel time has expired, or if the crossing is activated

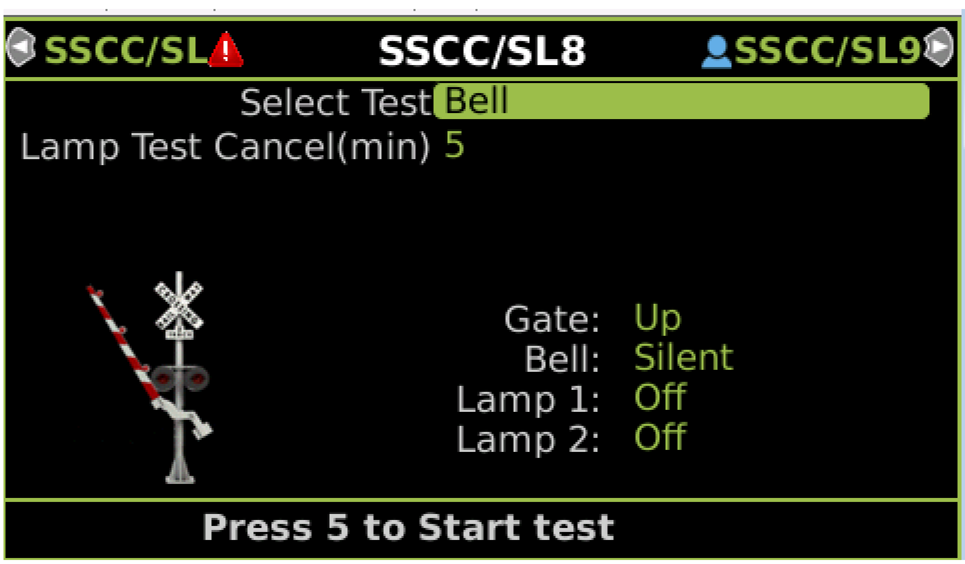


Figure 3-13 SSCC Lamp Test Start

Option 1: Bell – this will turn the Bell on.

Option 2: Lamp 1– this will turn the lamp 1 on steady

Option 3: Lamp 2– this will turn the lamp 2 on steady

Option 4: Flash the lamps – this will flash the lamps on the selected SSCC module. Note that if GPs coupled is yes, the lamps on both modules will flash (see Section 4.11.5 for details)

Option 5: Test the Crossing. This will flash the lamps, and run the gate delay time, then when that expires, drop the gate.

Option 6: Perform a timed test. When this is selected the user can edit the values for Lamp Test On (default 15s), and Lamp Test Delay (default 30s). When the test is started, the lamps remain off for the configured Lamp Test Delay time, and then the lamps flash for the configured Lamp Test On time, then they go off and the test is complete.

Option 7: Perform a repeat. When this is selected the user can edit the values for Lamp Test On (default 15s), and Lamp Test Delay (default 30s). When the test is started, the lamps remain off for the configured Lamp Test Delay time, and then the lamps flash for the configured Lamp Test On time, then they go off for the Lamp Test Delay, then flash again for the Lamp Test On Time, then go off, and then the test is complete.

3.1.2.3 IO & Logic View Screen

The IO & Logic View screen provides users with the status of all IO and logic conditions set in the system as shown in Figure 3-14

Figure 3-14 IO & Logic View Screen

3.1.2.3.1 Logical View

The Logical View screen allows the user to see the status of the states used in the logic as shown in Figure 3-15.

NOTE

NOTE
Green indicates energized Grey indicates de-energized White indicates not used Red indicates unhealthy

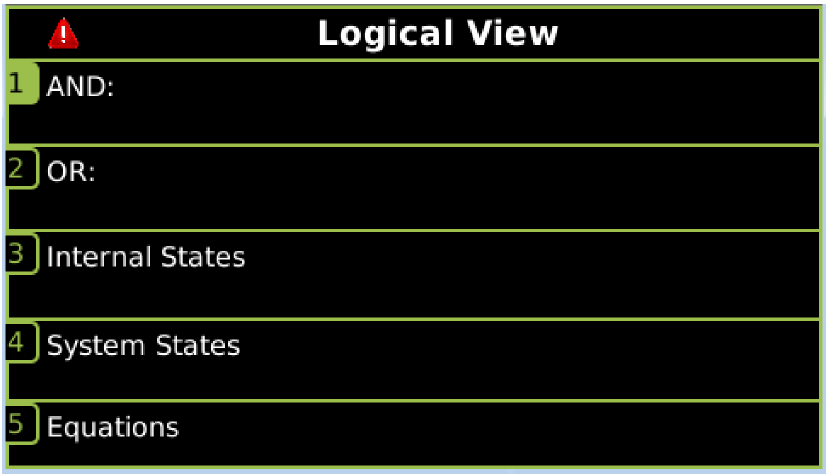


Figure 3-15 Logical View Menu

3.1.2.3.2 Logic Details – AND Screen

The Logic Details – AND screen depicts the status of all ANDs and their Enables and Wraps. Scrolling to the individual AND (for AND 2 to 8) and selecting ENTER will open a screen depicting the components for that AND. The Logic Detail – AND screen shows the state of the AND outputs.

The color convention used on these screens are:

- Green indicates energized
- Grey indicates de-energized
- White indicates not used
- Red indicates unhealthy

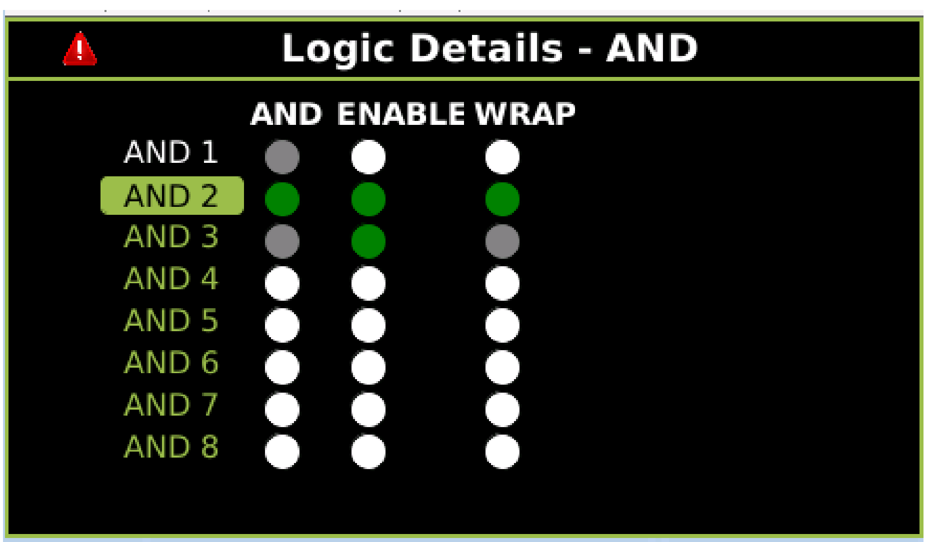


Figure 3-16 Logic Details - AND

Use the arrow keys on the Display module to select the AND and press **Enter**, this will bring up the logic diagram that shows what terms contribute to the selected AND output as shown in Figure 3-17. If a component of the AND is negated in the configuration this is shown with the '!' prefix, so in this case, the NWP is on, so when negated is off, the LED will indicate the state of !NWP.

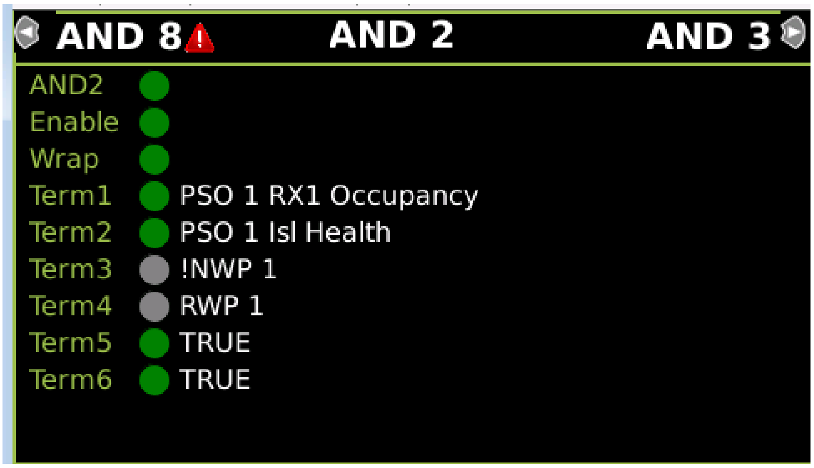


Figure 3-17 Logic Details – AND 2 Details

3.1.2.3.3 Logic Details – OR Screen

The Logic Details – OR screen depicts the status of the four ORs (OR 1 – OR 4). Scrolling to the individual OR and selecting **ENTER** will open a screen depicting the terms used in the OR.

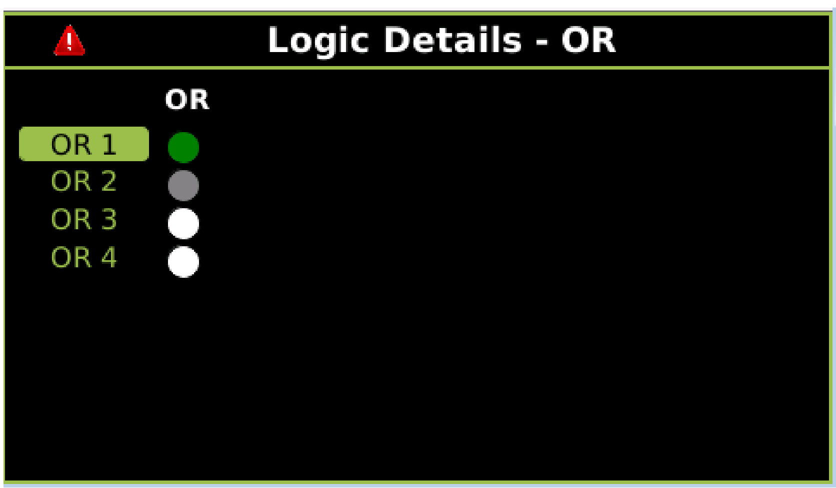


Figure 3-18 Logic Details – OR

Use the arrow keys on the Display module to select the OR and press **Enter**, this will bring up the logic diagram that shows what terms contribute to the selected OR output. If a component of the OR is negated in the configuration this is shown with the '!' prefix, so in this case, the RWP1 is de-energized, so its negated state is shown as on (green).

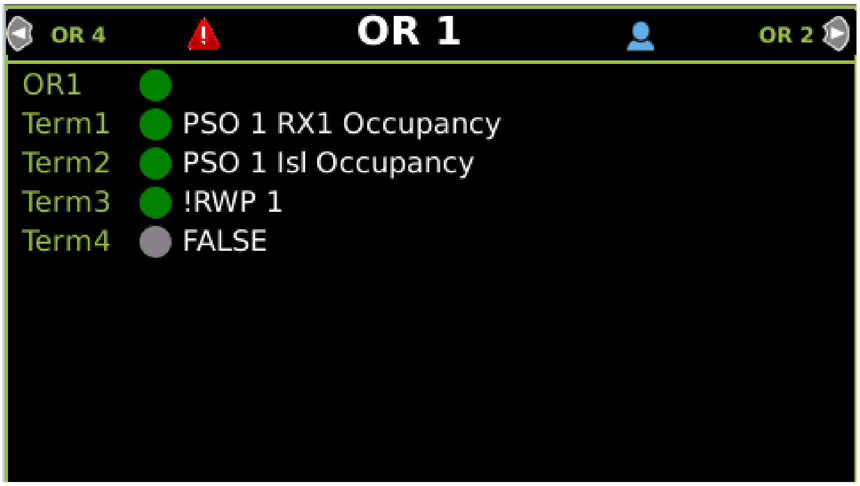


Figure 3-19 Logic Details – OR 1

3.1.2.3.4 Internal States Screen

The Internal States screen depicts the status of all internal logic currently set in the system. It provides a list by Internal Logic number (1 – 16) stating Int.X:(Set by Parameter) Sets (Parameter set by logic action) e.g., Int1:T3 Prime Sets T2 AND Enable.

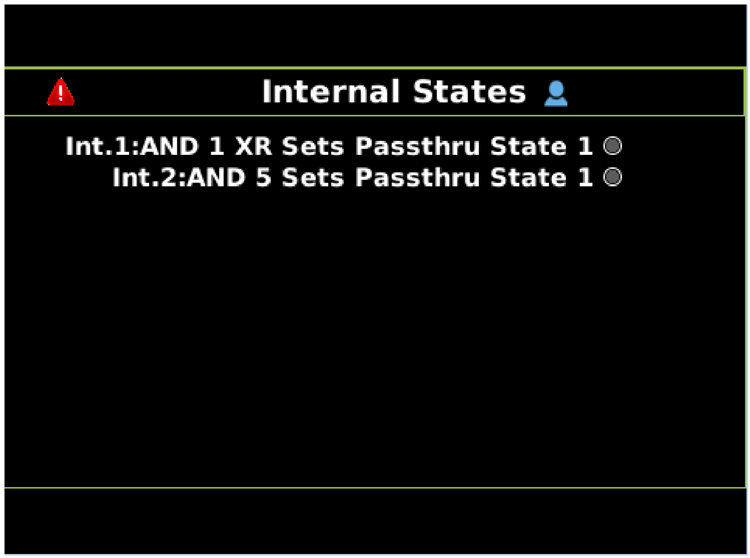


Figure 3-20 Internal States Screen

3.1.2.3.5 System States Screen

The System States Screen depicts the status of all system-level states. Only states that are currently used will be displayed.

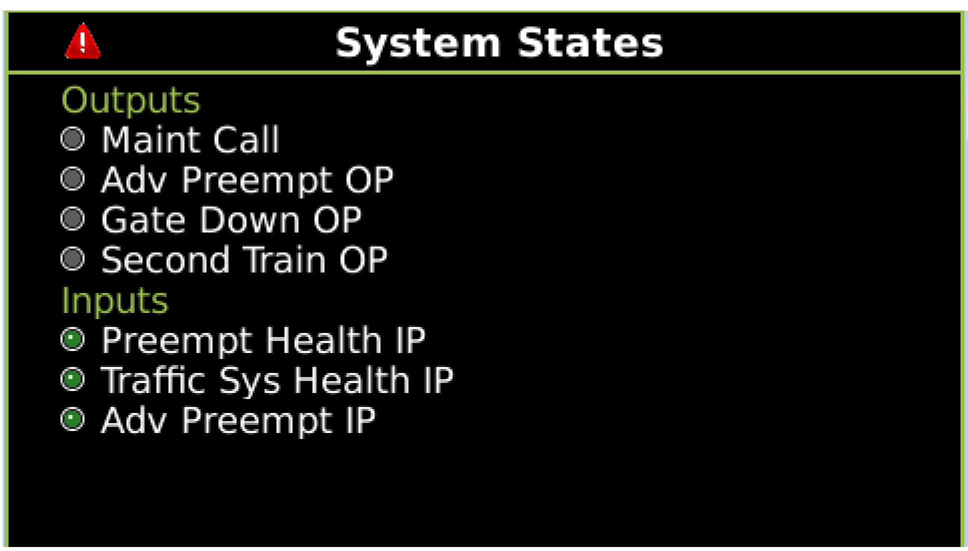


Figure 3-21 System States Screen

3.1.2.3.6 IN Details Screen

The IN Details screen depicts the states of all inputs with their assigned parameter names.

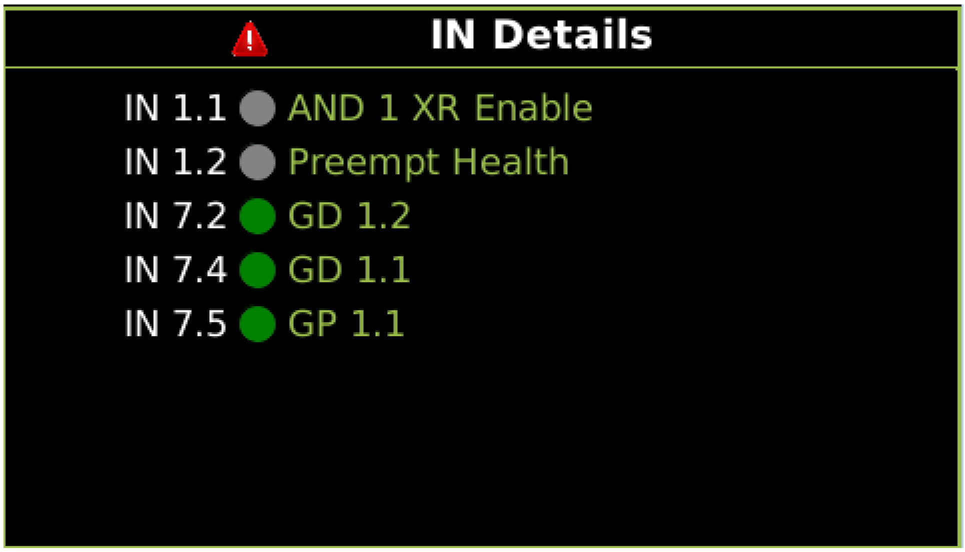


Figure 3-22 IN Details Screen

3.1.2.3.7 OUT Details Screen

The OUT Details screen depicts the states of all outputs with their assigned parameter names.

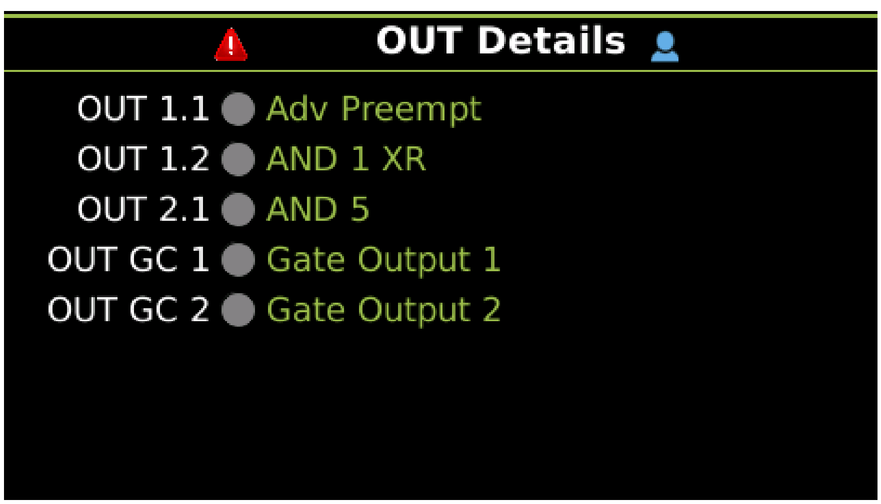


Figure 3-23 OUT Details Screen

3.1.2.3.8 Equations Details Screen

The Logic Details – Equations screen depicts the status of the ten Equations (E1 – E10). Scrolling to the individual Equation and selecting ENTER will open a screen depicting the components of that Equation.

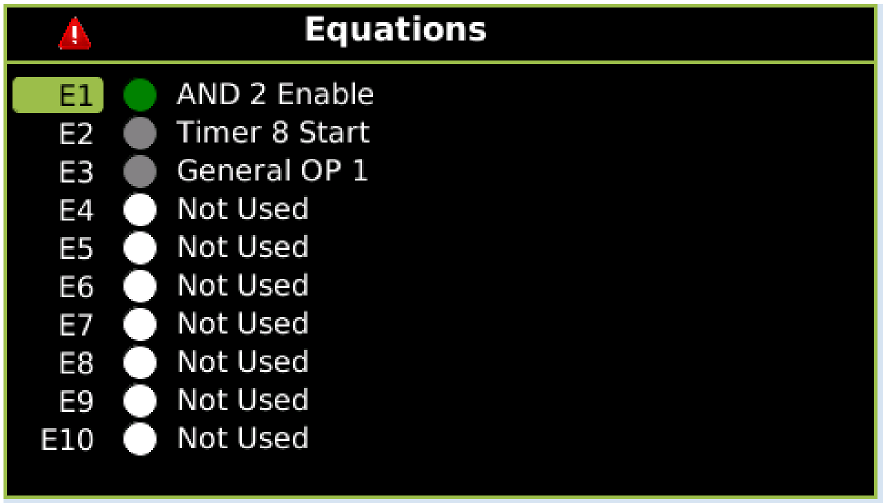


Figure 3-24 Equation Screen

Use the arrow keys on the Display module to select the Equation and press **Enter**, this will bring up a screen that shows what terms contribute to the selected equation. If a component of the equation is negated in the configuration this is shown with the '!' prefix, and the LED state will show the state of the negated term, for example, if General IP 11 is on, the !General IP 11 is off, so LED is grey. The screen also shows which logic template is used for the equation.

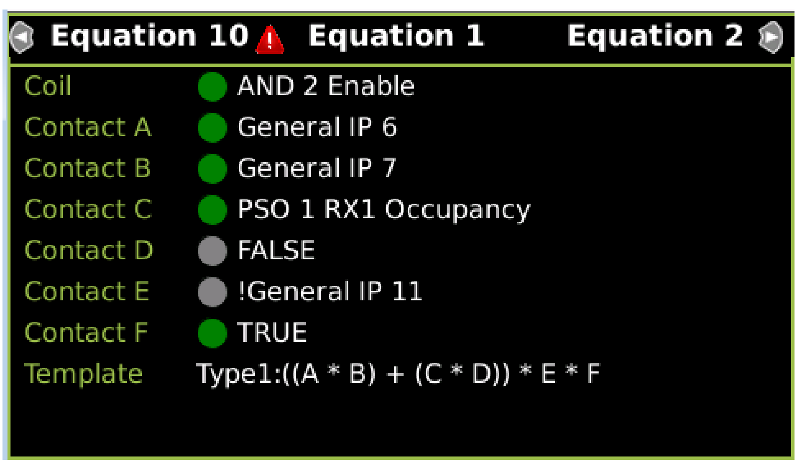


Figure 3-25 Equation 1 Detail Screen

3.1.2.3.9 SEAR I/O Screen

The SEAR I/O screen details the status of the SEAR I/O. The Inputs and Outputs are listed by Channel, Name, and State/Value, and are divided as follows:

- SEAR I/O Digital Input 1 – 16
- SEAR I/O Digital Input 17 – 32
- SEAR I/O Digital Input 33 – 48
- SEAR I/O Digital Input 49 – 63
- SEAR I/O Analog Input monitors the following analog inputs:
  - Case Battery Monitor
  - SSCC 1 Battery Monitor
  - SSCC 2 Battery Monitor
  - Internal Temperature
  - External Temperature
  - External Battery Monitor
- SEAR I/O Digital Output monitors the following digital outputs:
  - Aux. Outputs 1 – 6
  - Relay Outputs 1 & 2
- SEAR I/O LEDs, Channels 1 – 16
- SEAR I/O MTSS
- SEAR I/O GFT
- SEAR I/O SEAR Module Status

For further information concerning the SEAR and SEAR I/O, see section 3.5.1.3 of this manual.

NOTE

NOTE

The SEAR IIi is not able to monitor the state of OUT 1.3 (3rd output on the PSO Module 1).

3.1.2.3.10 GCP ATCS COMM Screen

The GCP ATCS COMM screen shows the ATCS Communication status of ATCS Vital communications links

The left side shows the state of the 15 bits that are transmitted out of the vital comms link. These may show green (energized) or grey (de-energized).

The right side shows the state of the 15 bits that are received from the neighboring system on this vital comms link. These may show green (energized) or grey (de-energized).

If the comms link is not in session (grey icon on System View), the Rx bits will all be grey. The Tx bits may still be green when the link is out of session.

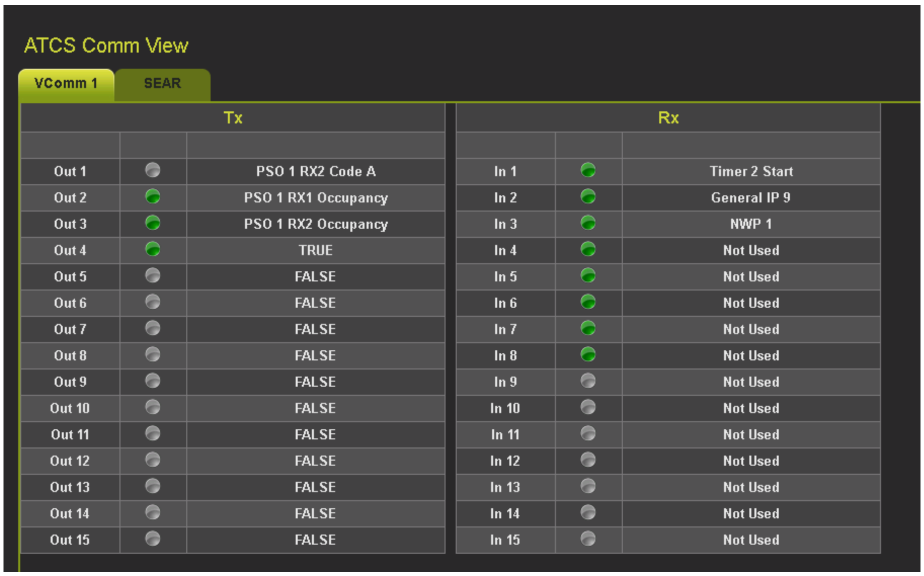


Figure 3-26 ATCS Comms Vital Link Screen

The SEAR tab shows the status of bit received from the SEAR.

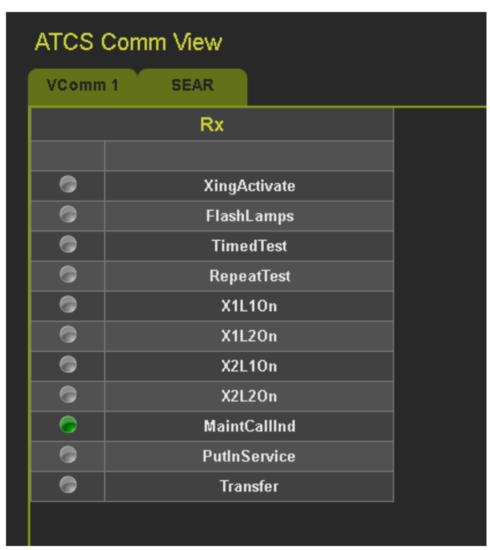


Figure 3-27 ATCS Comms SEAR Screen

3.1.2.4 Program View Screen

The Program View screen is where the parameters required for maintenance of the GCE are viewed and modified, it has the 4 submenus shown in Figure 3-28.

The OCCN and CCN are displayed top right.

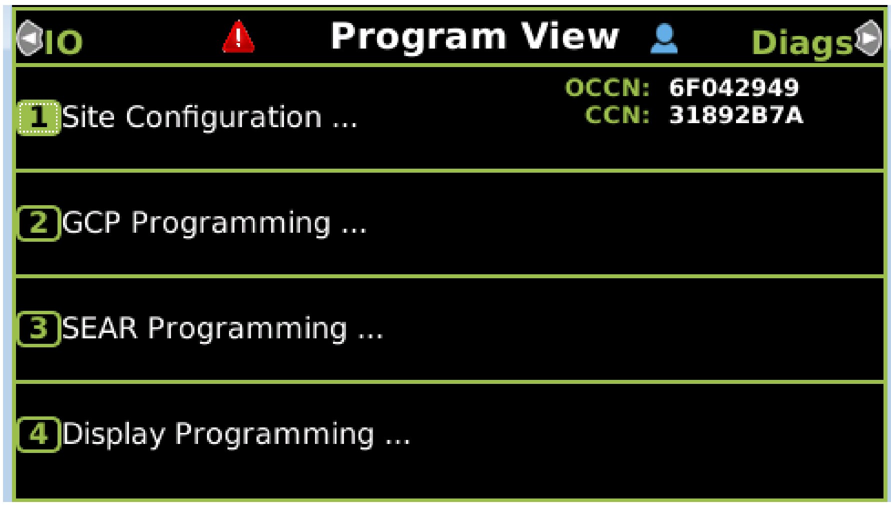


Figure 3-28 Program View Screen

3.1.2.4.1 Site Configuration Screen

The Site Configuration screen is used to set the values of the following parameters:

- Site Name
- DOT Number
- Mile Post
- Time Zone
- ATCS – Railroad
- ATCS – Line
- ATCS – Group
- ATCS – Display Subnode
- ATCS – CPU III Subnode
- ATCS – SEAR Subnode
- SEAR Temp. Format
- SEAR Date Format
- Units of Measure
- Date
- Time

3.1.2.4.2 GCP Programming Screen

The majority of GCP Programming parameters affect the logic for the crossing, these are not visible or editable on the local user interface. These are generally set using OCE and then saved to a PAC file which can be loaded via the Web UI or USB interface. They can also be edited using the Web UI. The top-level GCP Programming menu is shown in Figure 3-29.

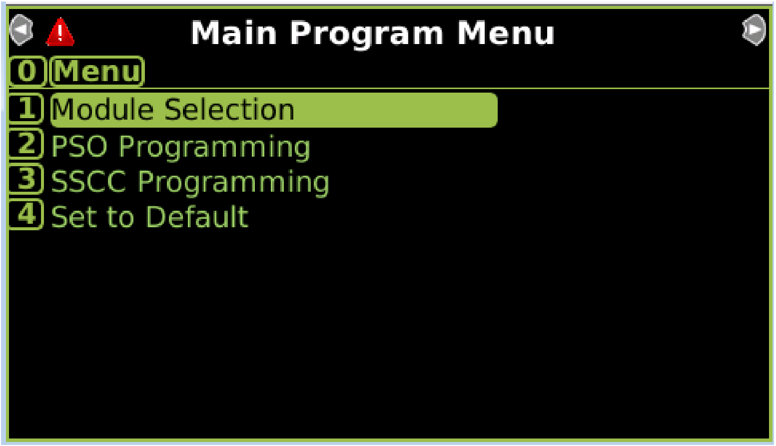


Figure 3-29 GCP Programming: Main Program Menu

3.1.2.5 SEAR Programming Screen

The top-level SEAR Programming menu is shown in Figure 3-30. See Section 5 for the description of SEAR programming.

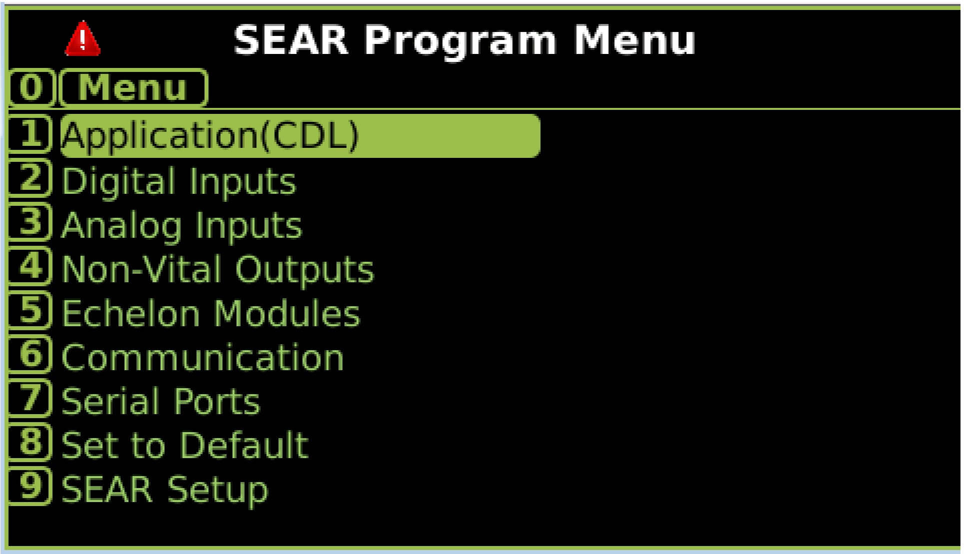


Figure 3-30 SEAR Programming Menu

3.1.2.6 Display Programming Screen

The Display Programming screen shown in Figure 3-41 is used to set parameters on the display or web access, security, and communication to other sites.

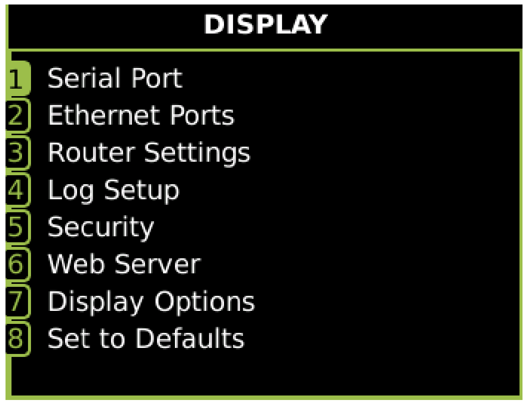


Figure 3-31 Display Programming Options Screen

Serial Port Screen

The Serial Port screen is used to set the values of the following parameters for Serial Port 1:

- Baud Rate
- Data Bits
- Parity
- Stop Bits
- Flow Ctrl
- Path Type
- Protocol

Ethernet Ports Screen

The Ethernet Ports screen is used to set the values of the following submenus:

- DNS Configuration, which sets the IP address of Servers 1 – 3.
- Laptop Eth Port, which has two screens, Configure and Status:
- Configure determines whether the system is configured as Disabled, as a Client, or as a DNS Server.
- Status provides Ethernet Connection data regarding IP address, Subnet Mask, BCast Address, and MAC Address for the Laptop Port, Ethernet 1, and Ethernet 2.
- Ethernet Port 1, which sets values for the Ethernet Port 1 parameters DHCP Configuration (either Disabled or Client), IP Address, Network Mask, Default Gateway, Path Type, and Protocol.
- Ethernet Port 2, which sets values for the Ethernet Port 1 parameters DHCP Configuration (either Disabled or Client), IP Address, Network Mask, Default Gateway, Path Type, and Protocol.

Router Settings Screen

The Router Settings screen enables the user to set the parameter Route Table Entry Timeout, measured in milliseconds.

Log Setup Screen

The Log Setup screen has the following submenus. These are used to set various levels of diagnostic level message tracing and debugging and are generally for Siemens personnel use:

- Consolidated Logging, which sets the Event and Diagnostic Log IP Addresses of the target system to send log events to.
- Diagnostic Options, which opens, setting the following parameters of the Diagnostic Log:

The following parameters are for Siemens use, for message tracing. These should be set to disabled unless specifically advised by Siemens. Setting them to enabled can slow down the performance of the system:

- Message Processing (Layer 7)
- Routing (Layer 3)
- Serial Port 1 TX/RX (Layer 2)
- Ethernet Laptop Port RX/TX (layer2)
- Ethernet Port 1 RX/TX (layer2)
- Ethernet Port 2 RX/TX (layer2)
- Echelon® RX/TX
- CPU III RX/TX

Logging Verbosity

Display Diagnostic Log Verbosity:

- Basic
- Error
- Warning
- Info
- Debug

The following parameters are available for changing the granularity of logging messages. Value 1 is the lowest level of logging and should be used unless advised otherwise by Siemens for a specific diagnostic purpose:

- CP Log Verbosity : 1-2
- VLP Log Verbosity : 1-5
- Slot 2 Log Verbosity: 1-5
- Slot 3 Log Verbosity: 1-5
- Slot 4 Log Verbosity: 1-5
- Slot 5 Log Verbosity: 1-5
- Slot 6 Log Verbosity: 1-5
- Slot 7 Log Verbosity: 1-5
- SSCC IIIi-1 Log Verbosity: 1-5
- SSCC IIIi-2 Log Verbosity: 1-5

Security Screen

The Security Screen enables the user to enable the password using the Security Enabled setting which has the values None, Maintainer Only, Supervisor Only, or Maintenance or Supervisor.

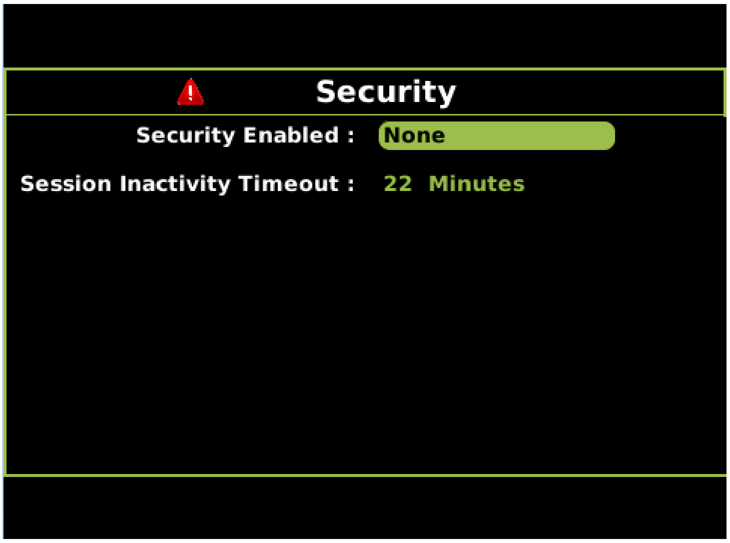


Figure 3-32 Security Screen

When a value is selected the user can enter the appropriate password.

Figure 3-33 Security Screen with Passwords Enabled

The Session Inactivity Timeout parameter may also be set here. This controls how long the configuration is unlocked after the password has been set.

Web Server Screen

The Web Server screen allows the user to select between using http or the more secure https mode of option for the web browser. The default value is http.

> ***NOTE***
>
> **NOTE**
>
> The GCE Web UI is not compatible with most recent web browsers updates when used in https mode. It is recommended to use http at this time.

Display Options Screen

The Display Options screen enables the user to set the Display Hibernation Time and Display Buzzer Enable parameters

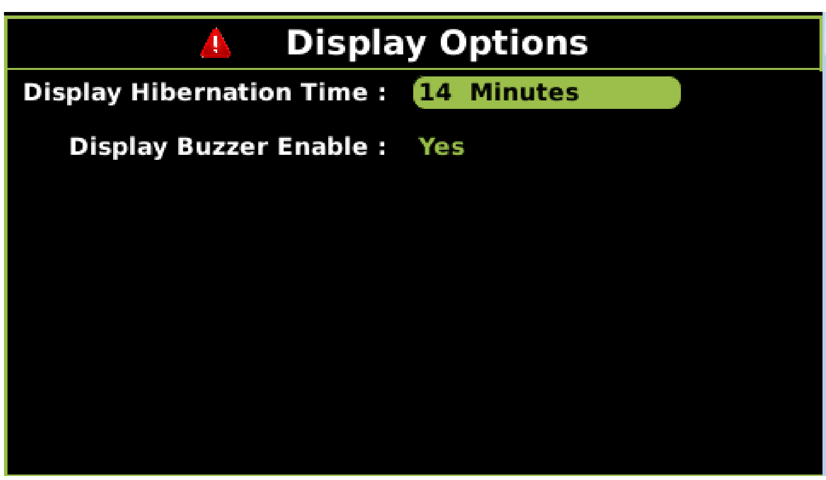


Figure 3-34 Display Options Screen

Set to Defaults Screen

The Set to default under the Display Menu is used to set the display options back to default, **the Site Configuration, GCP programming, and SEAR programming are unaffected.**

When the Set to Defaults screen is selected the user sees the following message:

- GCP DISPLAY Site Setup Restore Defaults?
- Press Enter to Confirm and Continue OR Press Back to Cancel Request.

Selecting ENTER will initiate the Set to Defaults process, selecting BACK will exit the option.

3.1.2.7 Diags & Reports Screen

The Diags and Reports screen shown in Figure 3-35 allows the user to view various reports.

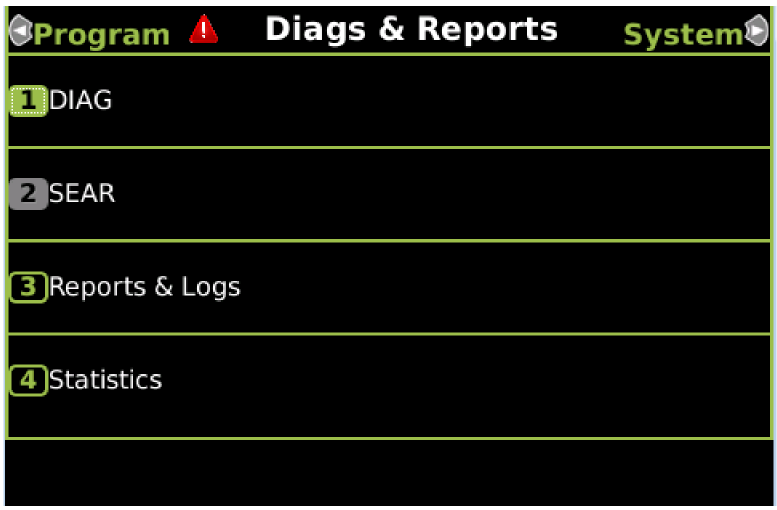


Figure 3-35 The Diags & Reports Screen

3.1.2.7.1 DIAG Screen

The DIAG Screen depicts all the Diagnostic Messages currently present in the system. If the system is healthy and there are no messages the screen will show “No Diag Msgs present!”.

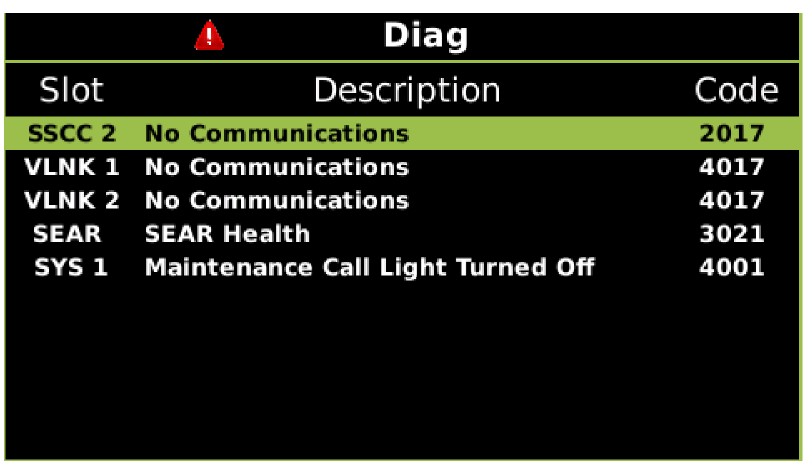


Figure 3-36 Diag Screen

The user can select a diagnostic message using the keypad and press ‘Enter’ to see details about the diagnostic message, as shown in Figure 3-37.

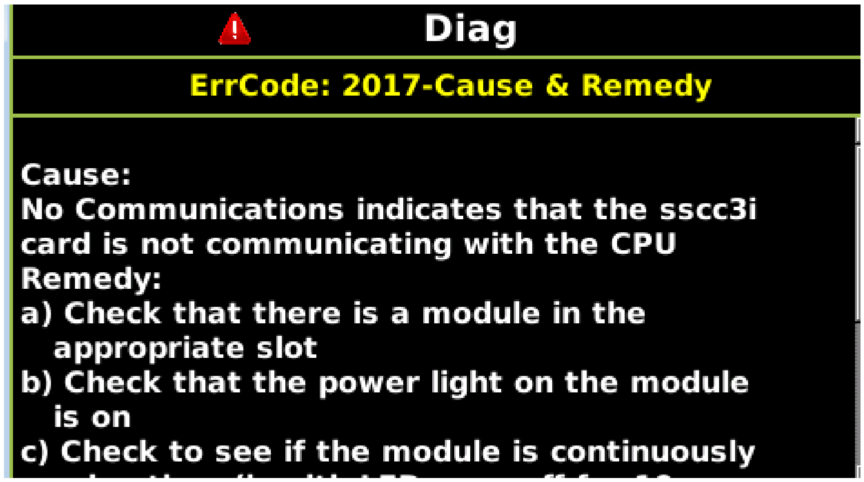


Figure 3-37 Details of Diag Message

3.1.2.7.2 SEAR Screen

The SEAR Maint screen depicts the following parameters:

- The Maint On Site screen has the following parameters:
  - CDL Engine
  - MOS Mode Currently:
  - Time Remaining
  - Time Duration
  - Reset Time
  - Enable MOS
- The CDL Messages screen, depicts all current CDL Messages one after another or reports “No CDL Messages found!”.
- The WAMS Test Message Screen depicts the status of the WAMS Test Message. The function executes automatically when the screen is opened.
- The Clear Alarms screen enables the user to clear alarms from the system. The function executes automatically when the screen is opened.
- The SEAR Reset screen enables the user to reset the SEAR. The function executes automatically when the screen is opened.

3.1.2.7.3 Reports & Logs Screens

Figure 3-38 shows the main menu for the Reports & Logs available.

Figure 3-38 Reports & Logs Selection

The following reports are available (see applicable descriptions in section 3.5.5).

Figure 3-39 Available Reports

The following logs are available (see applicable descriptions in section 3.5.5)

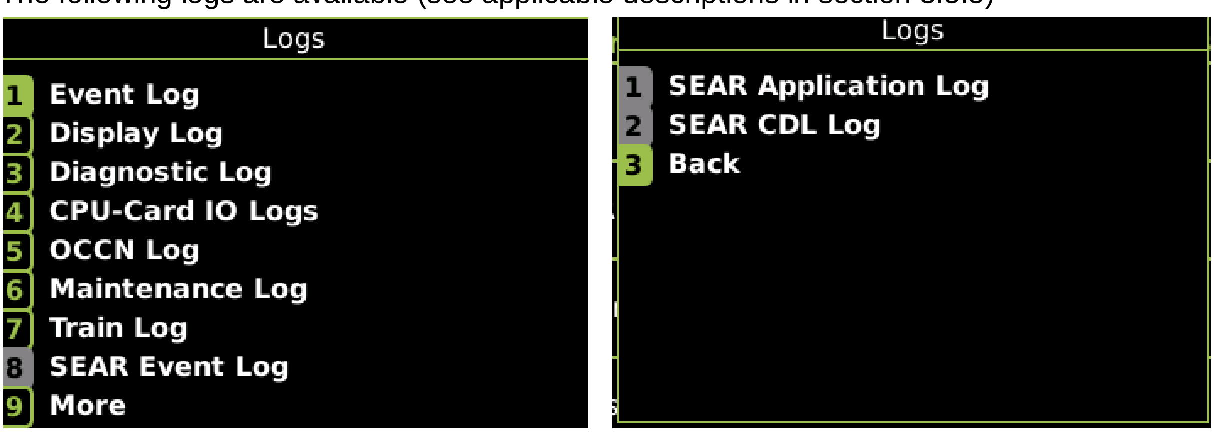


Figure 3-40 Available Logs

3.1.2.8 Statistics Screen

The GCP Statistics screen shows statistics for the item, as shown in Figure 3-41. These statistics are primarily for the use of Siemens Personnel.

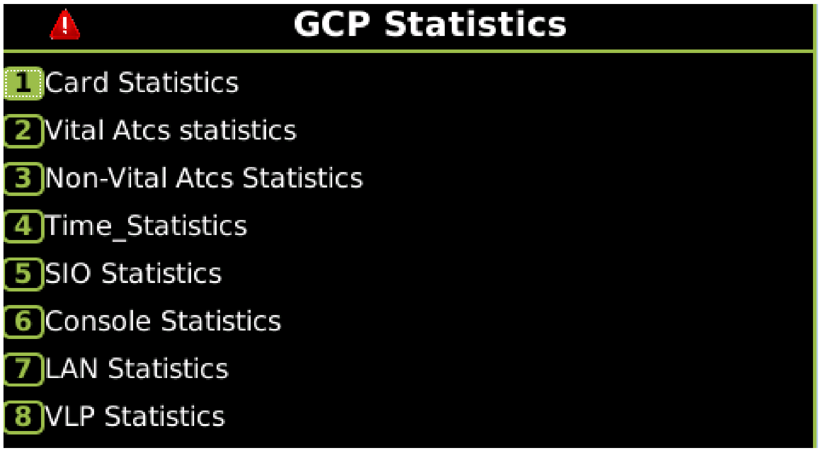


Figure 3-41 GCP Statistics

3.1.2.9 USB Menu Screen

Figure 3-42 shows the USB Menu Screen. USB devices can be used to download or upload software, configuration files, reports, and logs. The following section details the use of USB devices on the GCP.

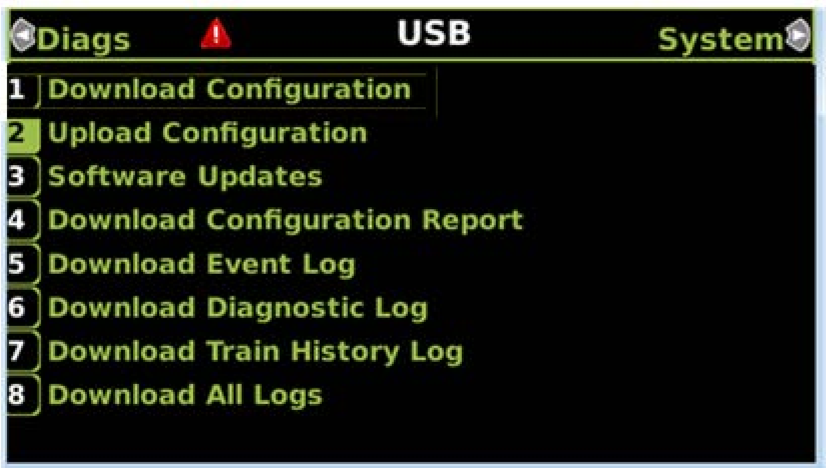


Figure 3-42 USB Menu Screen

3.2 USB File Structure

3.2.1 Setting Up a USB Device

New software issued by Siemens Mobility, Inc for the GCP5000 (GCE) is installed via the A80485-1 Display Module using a USB Device.

⚠ WARNING

WARNING

UPLOADING A NEW CONFIGURATION, MEF, OR MCF WILL PLACE THE GCE IN A RESTRICTIVE STATE AND ACTIVATE THE CROSSING WARNING SYSTEM.

BEFORE UPLOADING BEGINS, TAKE ADEQUATE PRECAUTIONS TO WARN ANY PEDESTRIANS, PERSONNEL, TRAINS, AND VEHICLES IN THE AREA UNTIL PROPER SYSTEM OPERATION IS VERIFIED.

DURING MODULE CHANGE OUT, SOFTWARE REVISION, REBOOT, AND CALIBRATION PROCEDURES, WARNING DEVICES MAY NOT OPERATE AS INTENDED. TAKE ALTERNATE MEANS TO WARN VEHICULAR TRAFFIC, PEDESTRIANS, AND EMPLOYEES.

TESTS MUST BE PERFORMED TO VERIFY THE PROPER OPERATION OF THE GCE BEFORE PLACING THE SYSTEM BACK IN SERVICE.

⚠ CAUTION

CAUTION

TO MINIMIZE THE TIME THAT THE CROSSING IS ACTIVE, IF THE EXISTING CONFIGURATION NEEDS TO BE SAVED, SAVE IT BEFORE SELECTING “UPLOAD CONFIGURATION” FROM THE USB WIZARD MENU.

NOTE

NOTE

Due to software commonality issues, the USB Display device utilizes folders titled GCP4000 rather than GCP5000.

Follow railroad-specific procedures for installing software in vital signal equipment. Companies may restrict who may install software and what additional documentation and operational checks are required.

Updating executive software on I/O modules requires installing a serial cable with a null modem adapter between the A80485-1 Display’s DIAG connector and the DIAG connector on the individual modules. When installing software on CPU III, an Ethernet cable is required to either connect the display to the CPU III module or to connect a laptop directly to the CPU III module for use with the WebUI.

When working with transferring files, the following definitions apply:

- Download – The transfer of data from GCP to USB.
- Upload – The transfer of data from USB to GCP.

Future software revisions will be issued with instructions that describe which module the software is to be loaded into. Such software instructions may supersede portions of this manual.

The following file types can be uploaded from a USB drive connected to the Display Module:

- Module Configuration Files (MCF)
- Module Executable Files (MEF)
- Configuration Files (PAC)

3.2.1.1 Creating the USB Device File Structure

Uploading or downloading files between the GCP and the USB Device requires that a specific file structure be created on the USB Device. The system looks for specific file folders to find or place Application, Executive, Configuration or Report files.

The file structure is as follows for downloads:

- SAFETRAN
  - o DOT-SITENAME
    - ▪ GCP4000
      - ▪ CONFIGURATIONS
        - .PAC FILES
      - ▪ REPORTS
        - <YYYY><MON>

The file structure is as follows for uploads:

- SAFETRAN
    - ▪ GCP4000
      - ▪ APPLICATIONS
        - .MCF
        - .PAC
      - ▪ EXECUTIVES
        - .MEF
        - .TGZ

PAC files or MCFs to be uploaded should be placed under the GCP4000\Applications.

Executive software to be uploaded should be placed under the GCP4000\Executives.

Downloaded files are placed under the Safetran\DOT-SITENAME\GCP4000 folder.

NOTE

NOTE
The following section describes uploading and downloading software and reports from all GCP Modules onto the USB Drive.

NOTE

NOTE
If a PAC file has been downloaded from the system, and the user wants to upload it back to the system, it will need to be moved from the Safetran\DOT-SITENAME\GCP4000 folder to the GCP4000\Applications folder.

3.3 Download/Upload Configuration (PAC) Files via USB Device

3.3.1 Download Configuration File to USB Drive

Perform the following actions:

1. Insert the USB Drive in the USB slot on the front of the Display
2. If Maintainer security has been enabled, enter the password. The password is case sensitive. If security is not enabled, proceed to step 3.
3. Select **1) Download Configuration**.

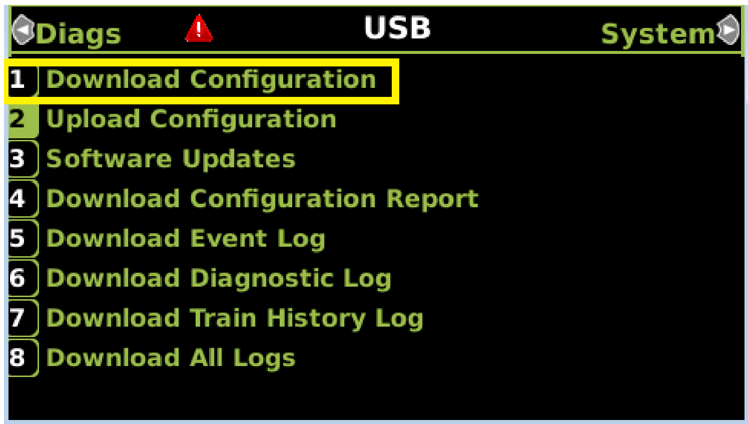


Figure 3-43 Select Download Configuration

4. The Download configuration window opens, stating:
   Download PAC File…Please do not Remove USB.

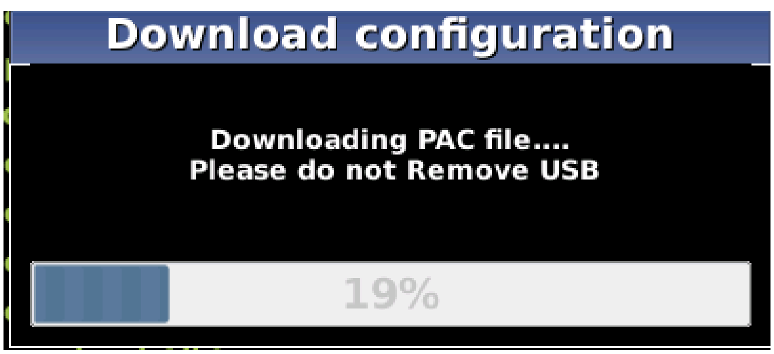


Figure 3-44 Download Progress

5. When the file has been downloaded from the Display to the USB Drive, the PAC File Download window opens, stating: **Download Completed**. The file is saved at (the actual file location on the USB Drive). Press any key to continue.

Figure 3-45 PAC File Download Complete

The PAC file name is created from the combination of the DOT number and date and time, e.g. CONFIG – {DOT#}-PAC-{date}-{time}.PAC.

The downloaded PAC file will be stored on the USB stick under a folder called:

Safetran\DOT-SITENAME \GCP4000\Configurations

WARNING
UPLOADING A NEW CONFIGURATION, MEF, OR MCF WILL PLACE THE GCP IN A RESTRICTIVE STATE AND ACTIVATE THE CROSSING WARNING SYSTEM.
BEFORE UPLOADING BEGINS, TAKE ADEQUATE PRECAUTIONS TO WARN ANY PEDESTRIANS, PERSONNEL, TRAINS, AND VEHICLES IN THE AREA UNTIL PROPER SYSTEM OPERATION IS VERIFIED.
TESTS MUST BE PERFORMED TO VERIFY THE PROPER OPERATION OF GCP BEFORE PLACING THE SYSTEM BACK IN SERVICE.

CAUTION
TO MINIMIZE THE TIME THAT THE CROSSING IS ACTIVE, IF THE EXISTING CONFIGURATION NEEDS TO BE SAVED, SAVE IT BEFORE SELECTING “UPLOAD CONFIGURATION” FROM THE USB WIZARD MENU.

NOTE
Due to software commonality issues, the USB Display device utilizes folders titled GCP 4000 rather than GCP5000.

3.3.2 Upload Configuration File to GCP

The PAC file to be loaded first needs to be put on the USB stick in a folder called Safetran\GCP4000\Applications as described in Section 3.2.1.1.

Perform the following actions:

1. Insert USB Drive in the USB slot on the front of the Display
2. If Maintainer security has been enabled, enter the password. The password is case sensitive. If security is not enabled, proceed to step 3.
3. Select **2) Upload Configuration**.

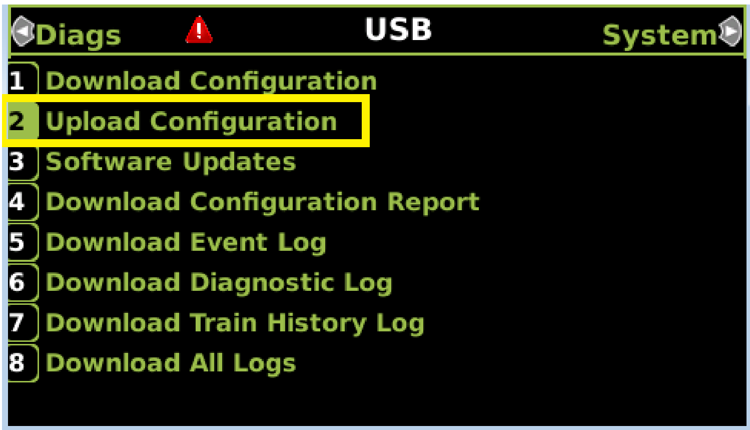


Figure 3-46 Upload Configuration

4. The **Unlock Warning** window opens, displaying the message shown in Figure 3-47.

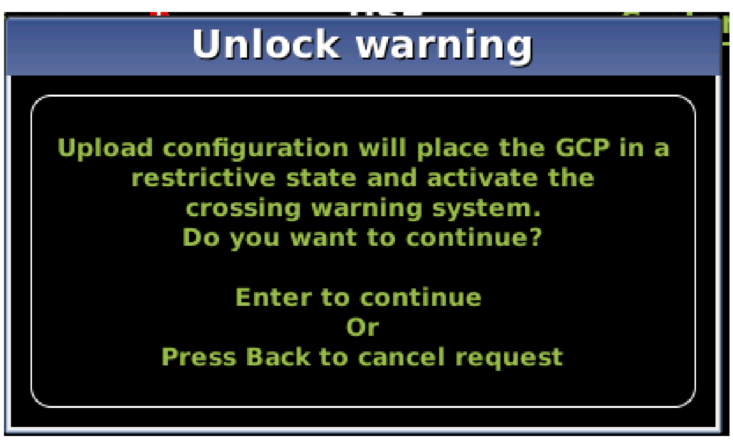


Figure 3-47 Unlock Warning Message Window

NOTE

NOTE

Selecting the BACK button on the Save Configuration window skips saving the current configuration but does continue with the process of uploading the new configuration.

5. The Save Configuration window opens, displaying the message shown in the figure below.

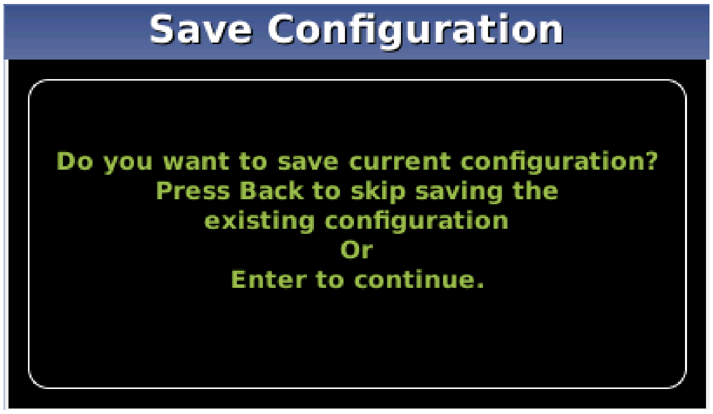


Figure 3-48 Save Configuration

6. Select **Enter**. The **Download Configuration** window opens, displaying the message shown in the figure below. This may take a few minutes. While the file is downloading, progress will be indicated on the bottom line of the window.

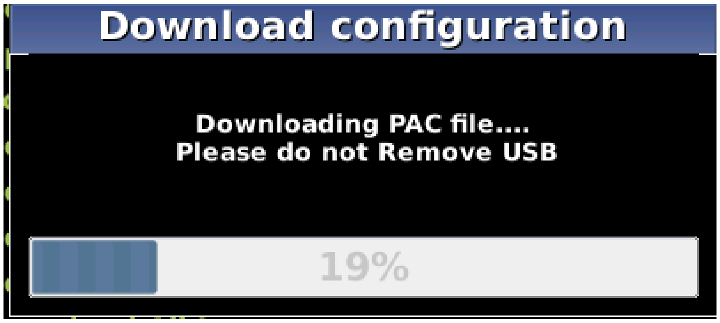


Figure 3-49 Download Configuration

7. When the file has downloaded from the Display to the USB Drive, the **PAC File Download** window opens, stating: **Download Completed. File is saved at (the actual file location on the USB Drive)**. Press any key to continue.
8. The **Select File** window opens. Scroll down to select the correct PAC file. Select **Enter**.

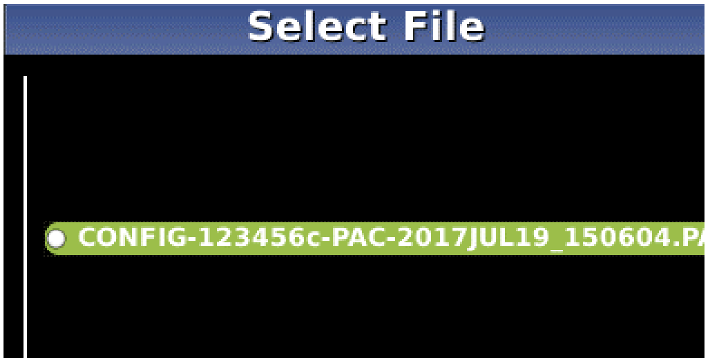


Figure 3-50 Select PAC File

9. The Upload Configuration window opens, stating: **Uploading configuration**.

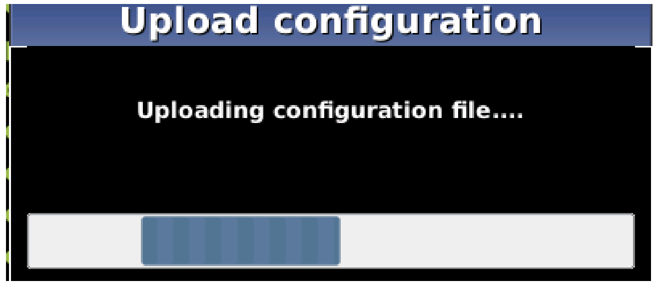


Figure 3-51 Uploading Configuration

10. The **Save** window opens, stating: **Press the SEL or NAV button and then select Enter to save parameters**. The File name, Dot Number, Mile Post, Site Name, SIN, and CCN data then appear.

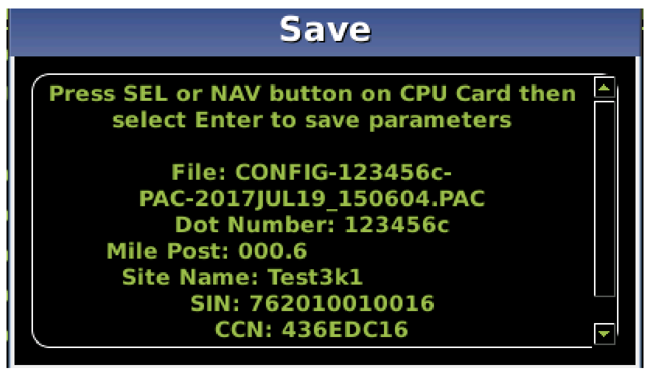


Figure 3-52 Save Window

11. Press the **SEL** or **NAV** buttons on the CPU Card and then select **Enter**.
12. The Upload configuration window opens, stating:
    System will now reboot to load the new settings. Press any key to continue.

NOTE

NOTE
The display module will reboot as well as the CPU.

3.3.3 Checking CCN and OCCN

After uploading a new Configuration (PAC file) or manually programming the system via the Program Menu, verify that the OCCN matches what is on the prints by scrolling to the Program menu and checking the OCCN in the top right of the screen as shown in Figure 3-53.

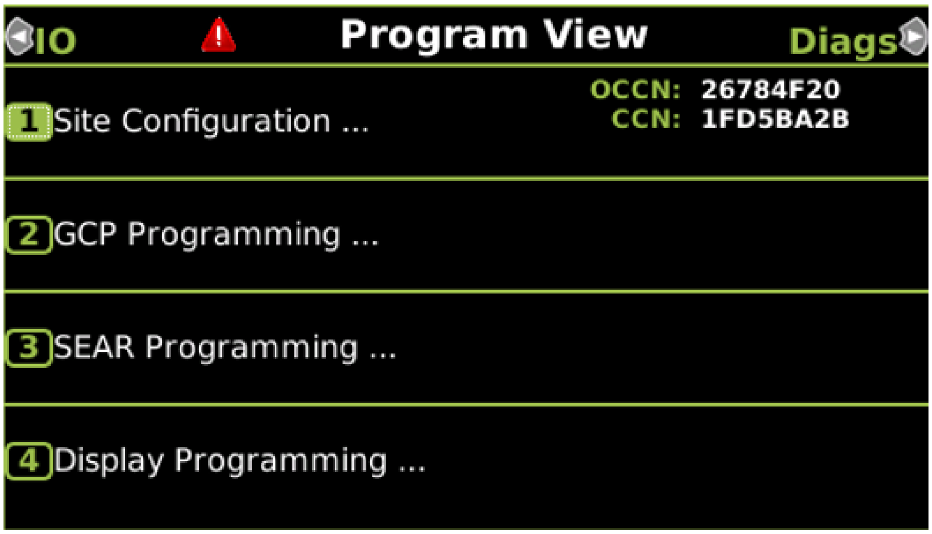


Figure 3-53 Checking the OCCN

3.4 Software Updates

3.4.1 Installing Software Using a USB Drive

Insert the USB drive in the USB port on the Display Module to automatically open the USB menu.

A USB Detected window opens, stating **USB detected**. Press **Back** to continue or **Enter** for USB Menu. The USB window opens. To return to the USB Menu, press the **Back** button at any time, providing the USB drive is still inserted into the port.

3.4.2 Installing Software on the CPU III Module

WARNING	**WARNING** **UPLOADING A NEW CONFIGURATION, MEF, OR MCF WILL PLACE THE GCP IN A RESTRICTIVE STATE AND ACTIVATE THE CROSSING WARNING SYSTEM.** **BEFORE UPLOADING BEGINS, TAKE ADEQUATE PRECAUTIONS TO WARN ANY PEDESTRIANS, PERSONNEL, TRAINS, AND VEHICLES IN THE AREA UNTIL PROPER SYSTEM OPERATION IS VERIFIED.** **TESTS MUST BE PERFORMED TO VERIFY THE PROPER OPERATION OF GCP BEFORE PLACING THE SYSTEM BACK IN SERVICE.**

CAUTION	**CAUTION** TO MINIMIZE THE TIME THAT THE CROSSING IS ACTIVE, IF THE EXISTING CONFIGURATION NEEDS TO BE SAVED, SAVE IT BEFORE SELECTING "UPLOAD CONFIGURATION" FROM THE USB WIZARD MENU.

The examples in this section are used to explain how to install software via a USB and Ethernet cable connecting the Display to the CPU III or via the WebUI using an Ethernet cable to connect directly to the CPU III. The software and version names may not be the same as seen in an actual GCP. The example will also assume the GCP is a Dual unit and the main modules are loaded first. The procedure is repeated for the standby modules.

There is no specified order when installing/updating software in the GCP5000. If replacing the CPU MEFs and the MCF as part of the same upgrade; the order of installation is immaterial; however, the MEFs must be loaded before attempting to place the GCP back into operation.

In this example, the following files will be loaded into the indicated modules:

- CPU III Module
  - o DIAG (CP) File: GCPNCP3_MEF_1.1.32r.tgz (CPU III CP executive software begins with GCP)
  - o VLP File: 9VC72-V3H00_02.010.MEF
  - o VLP MCF: – File: GCP3K-01-00.mcf, CRC= 2CF3E617

The files should be copied to the GCP4000/Executive folder of the USB drive if a USB drive is being used instead of the WebUI.

3.4.2.1 Replace CP MEF on CPU III via USB Drive

Perform the following actions:

1. Insert USB Drive in the USB slot on the front of the Display
2. If Maintainer security has been enabled, enter the password. The password is case sensitive. If security is not enabled, proceed to step 3.
3. Install an Ethernet cable from the Laptop port on the Display to the Laptop port on the CPU III unit. Verify that the Ethernet cable is well seated on both ends, then press any key.
4. You will need to verify that the Display is set up as a Client instead of a Server, to do so, access the Laptop Ethernet Port menu Program View > 3) Display Settings > Laptop Ethernet Port.

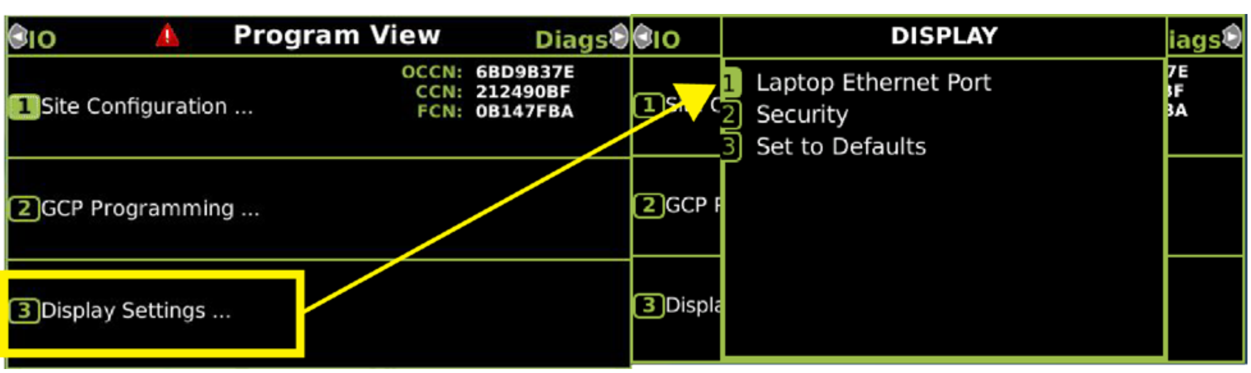


Figure 3-54 Ethernet Menu

5. Select **Client** if Display is configured as Server.

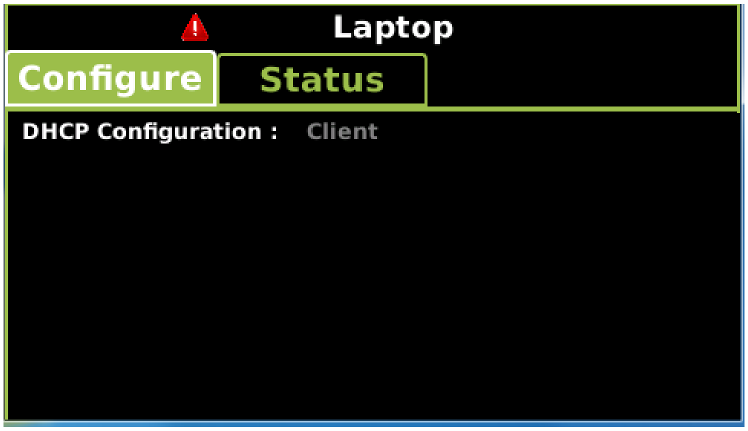


Figure 3-55 DHCP Configuration

6. From the USB menu, select **3) Software Updates** > **3) CPU-III Update**

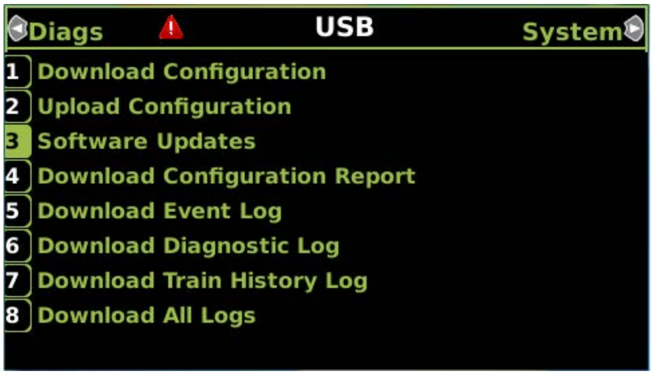


Figure 3-56 Select Software Updates

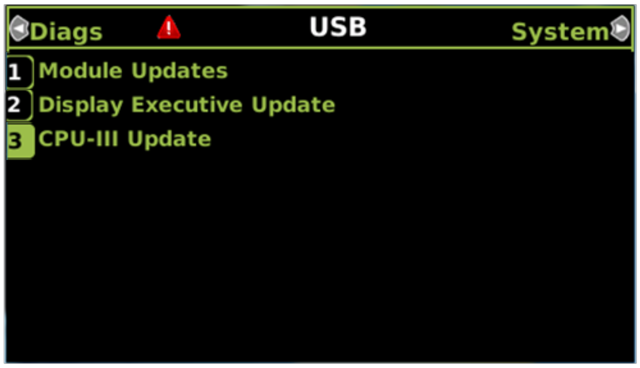


Figure 3-57 Select CPU-III Update

7. Verify that the Ethernet cable is well seated on both ends, then press any key.
8. Select **1) Change CP MEF**.

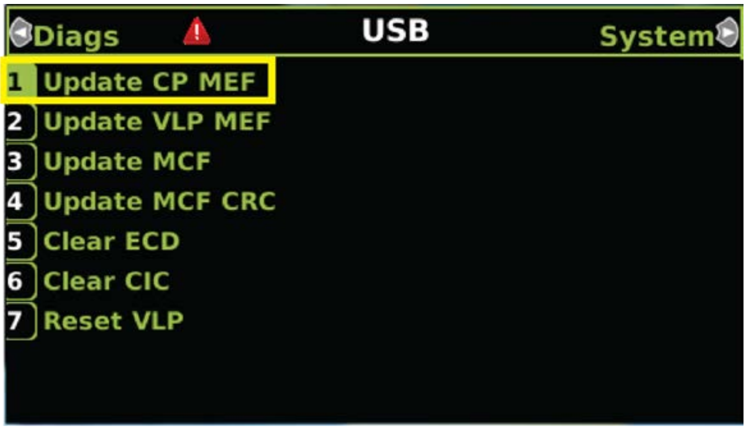


Figure 3-58 Change CP MEF

9. When asked by the Setup program to Erase the MEF, select **1) Yes**.
10. The **Select File** window opens.

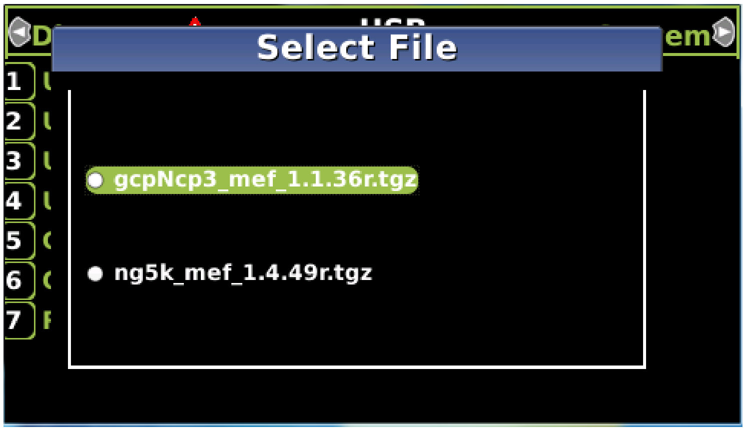


Figure 3-59 Select File Window

11. Scroll down to select the file to be installed, in this example: gcpNcp3_mef_1.1.36r.tgz. Press **Enter**.
12. The new MEF begins loading. This may take a few minutes. While the file is uploading, progress will be indicated on the bottom line of the window.
13. When complete, the Display text provides all of the module update options. If a new MCF needs loading, go to step 6 in the next section, otherwise select **0) Exit Setup**.
14. The **Upload to System** window opens and states: **Exit software finished rebooting the module**.
15. Press the Back button. The USB SW Updates menu is shown (as per Figure 3-56 Step 6).

3.4.2.2 Replace CP MEF on CPU III via WebUI

1. Connect Ethernet cable from laptop to Laptop port on the front of the CPU III unit
2. Locate the IP address of the GCP5000 unit via the selector buttons on the front of the CPU III unit. Type https:// or http:// (depending on the method selected in the Web Server Configuration) followed by the IP address.
3. Log into the WebUI using the appropriate User Name and Password. The default password is GCP5000 (case sensitive)

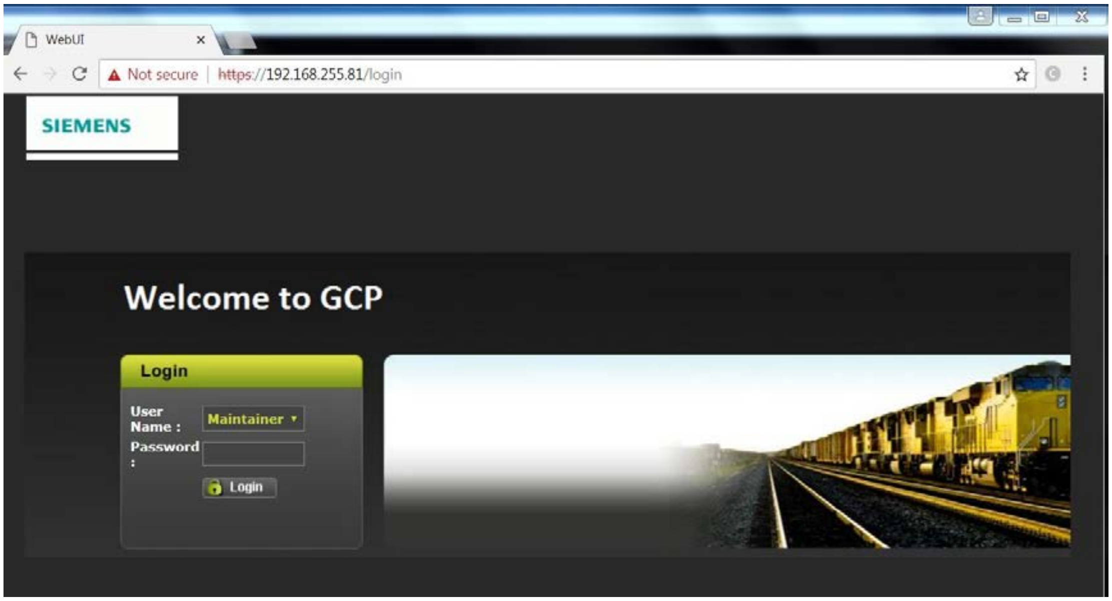


Figure 3-60 WebUI, GCP Login Screen

4. From the menu on the left, select **CP MEF**, then click **Unlock**.

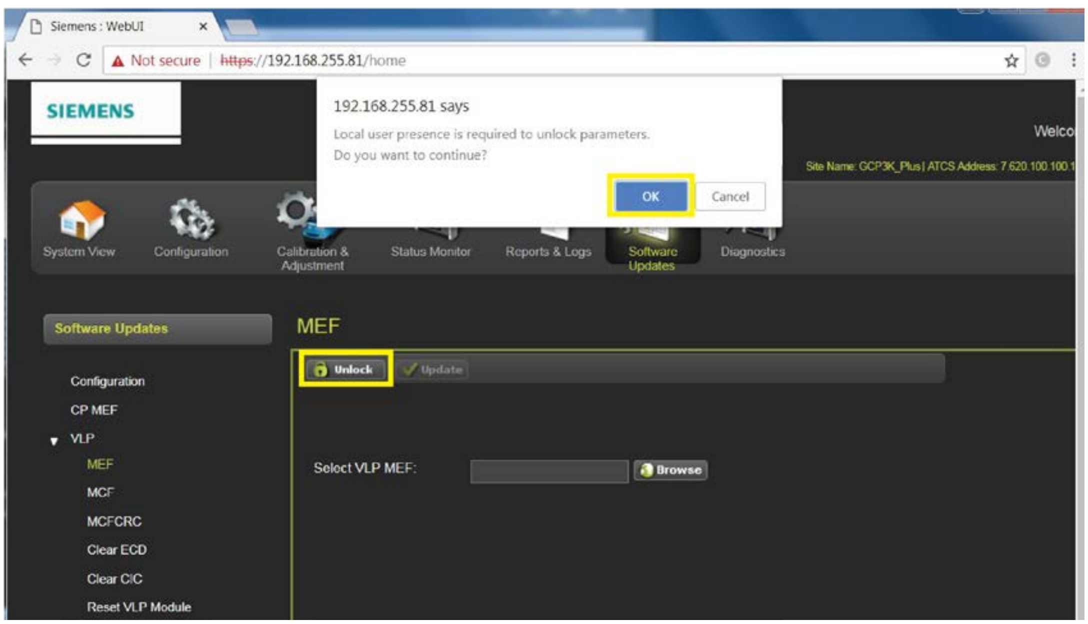


Figure 3-61 WebUI, GCP Menu – VLP MCF Unlock

5. Confirm user presence with the button on the front of the CPU module, click **OK** on the pop-up window, then select **Browse** to locate the desired file.
6. Once the correct file is selected, click the **Update** button (located next to the **Unlock** button).
7. The uploading status will show until complete. Once complete the message **MEF file uploaded successfully** will display.

3.4.2.3 Replace VLP MEF on CPU III via USB drive

Perform the following actions:

1. Insert USB Drive in the USB slot on the front of the Display.
2. If Maintainer security has been enabled, enter the password. The password is case sensitive. If security is not enabled, proceed to step 3.
3. Connect an Ethernet cable between the Laptop port on the Display and the Laptop port of the CPU III module.
4. You will need to verify that the Display is set up as a Client instead of a Server, to do so, access the Laptop Ethernet Port menu Program View > 3) Display Settings > Laptop Ethernet Port.

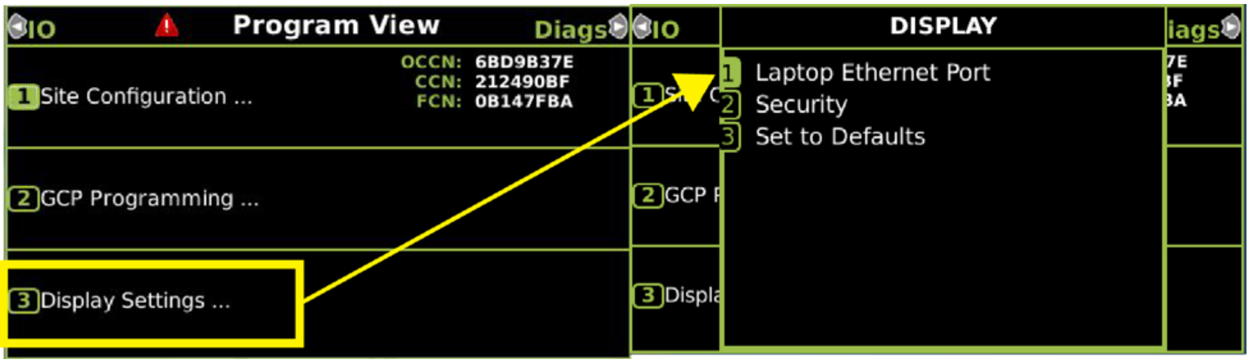


Figure 3-62 Ethernet Menu

5. Select **Client** if Display is configured as Server

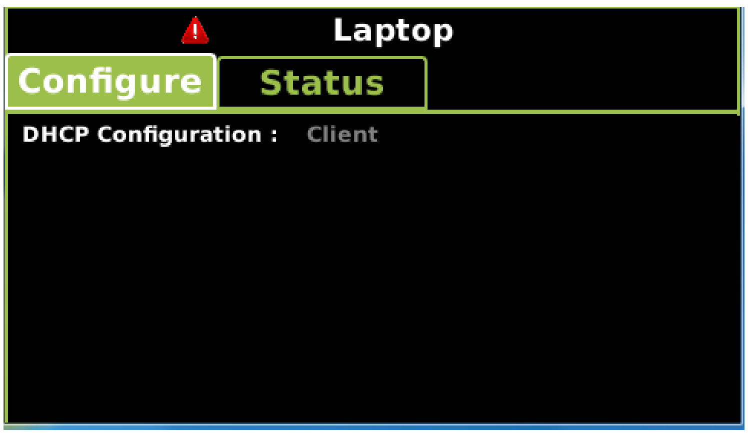


Figure 3-63 DHCP Configuration

6. From the USB menu Select **1) Software Updates** > **3) CPU-III Update.**

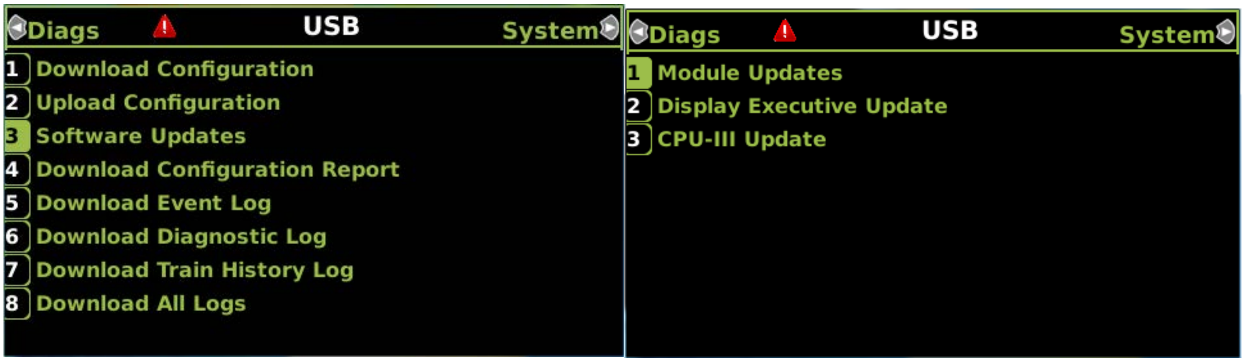


Figure 3-64 Software Update Menu

7. Verify that the Ethernet cable is well seated on both ends.
8. Select **2) Update VLP MEF**

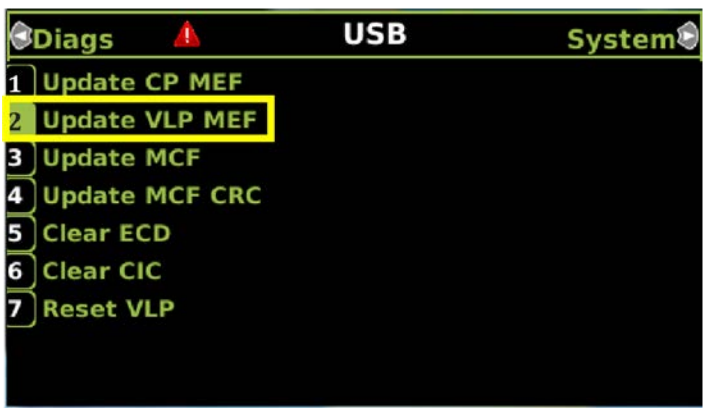


Figure 3-65 Change MEF

9. When asked by the Setup program to Erase the MEF, select **1) Yes**.
10. The **Select File** window opens.

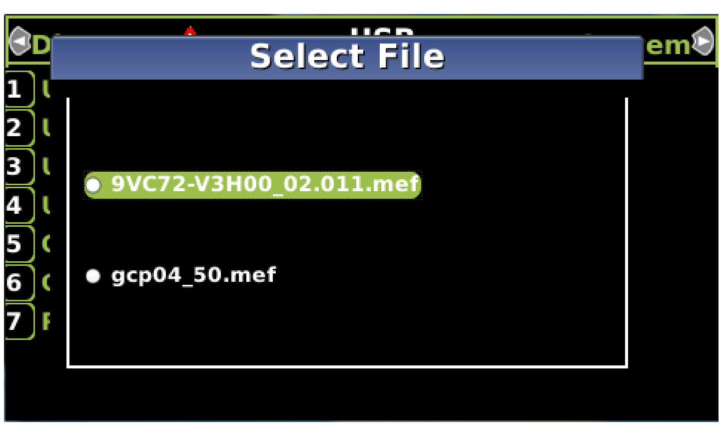


Figure 3-66 Select File Window

11. Scroll down to select the file to be installed, in this example 9VC72-V3H00_02.010. Select **Enter**.
12. The new MEF begins loading. This may take a few minutes. While the file is uploading, progress will be indicated on the bottom line of the window.
13. When complete, the Display text provides all of the module update options. Select **0) Exit Setup**.
14. The Upload to System window opens and states: **Exit software finished rebooting the module**.

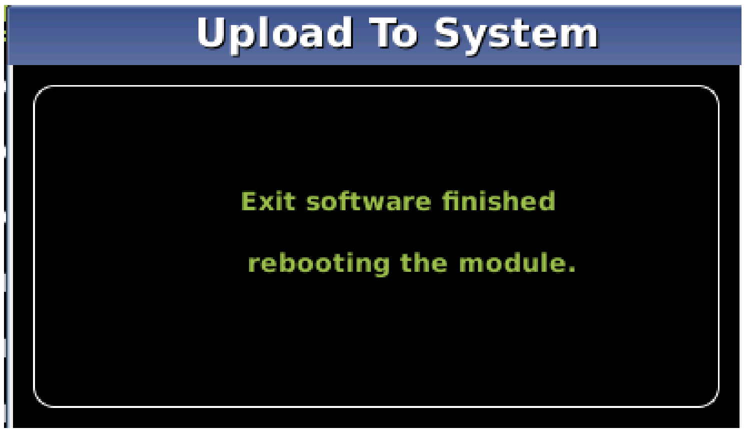


Figure 3-67   Exit Software

15. Press the **Back** button.

3.4.2.4   Replace VLP MEF on CPU III via WebUI

1. Locate the IP address of the GCP5000 unit via the selector buttons on the front of the CPU III unit. Type https:// or http:// (depending on the method selected in the Web Server Configuration) followed by the IP address
2. Login to the WebUI using the appropriate User Name and Password.

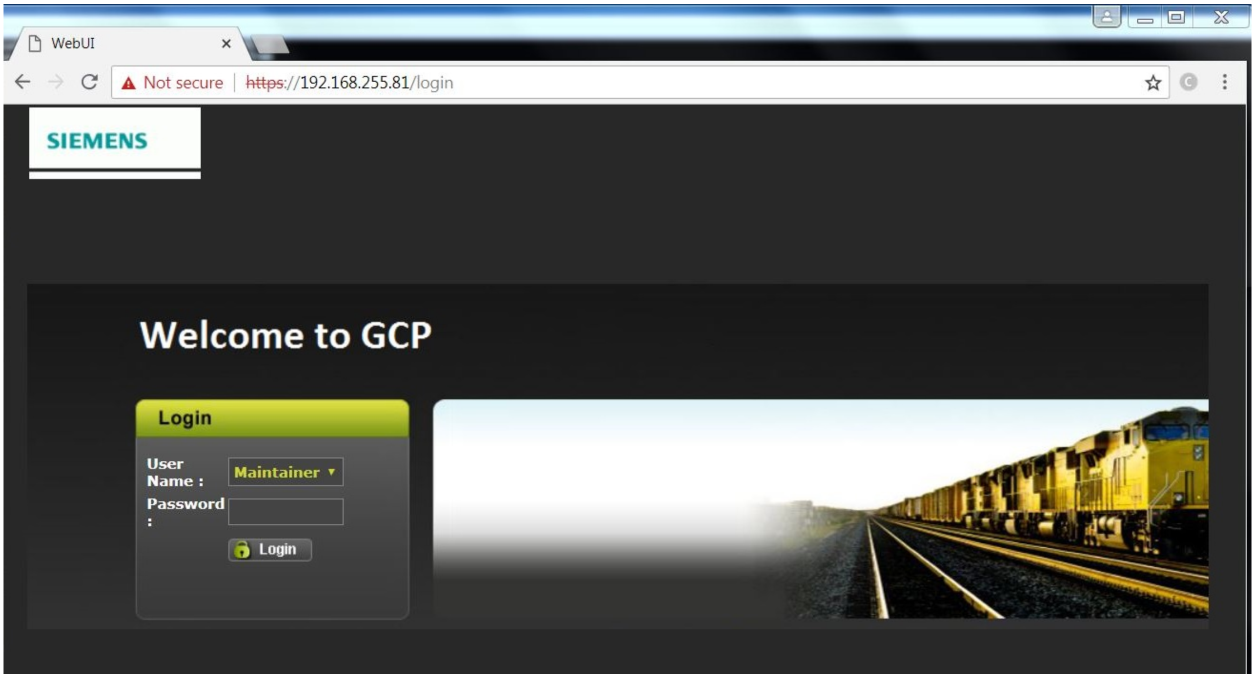


Figure 3-68 WebUI, GCP Login Screen

3. From the menu on the left, select **VLP MEF**, then click **Unlock**.

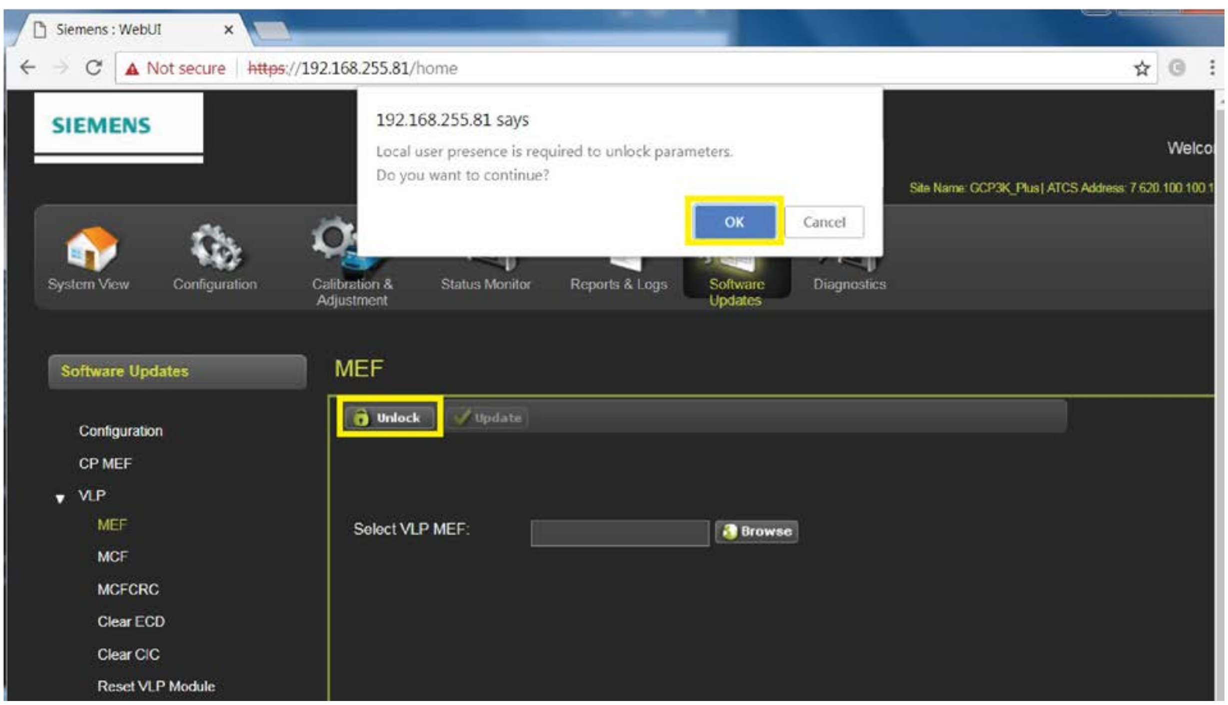


Figure 3-69 WebUI, GCP Menu – VLP MEF Select

4. Confirm user presence by pressing the button on the front of the CPU III module, click **OK**, then select **Browse** and locate the desired file.
5. Click the **Update** button located next to the **Unlock** button.

6. The uploading status will show until complete. Once complete, the message **MEF file uploaded successfully** will display.

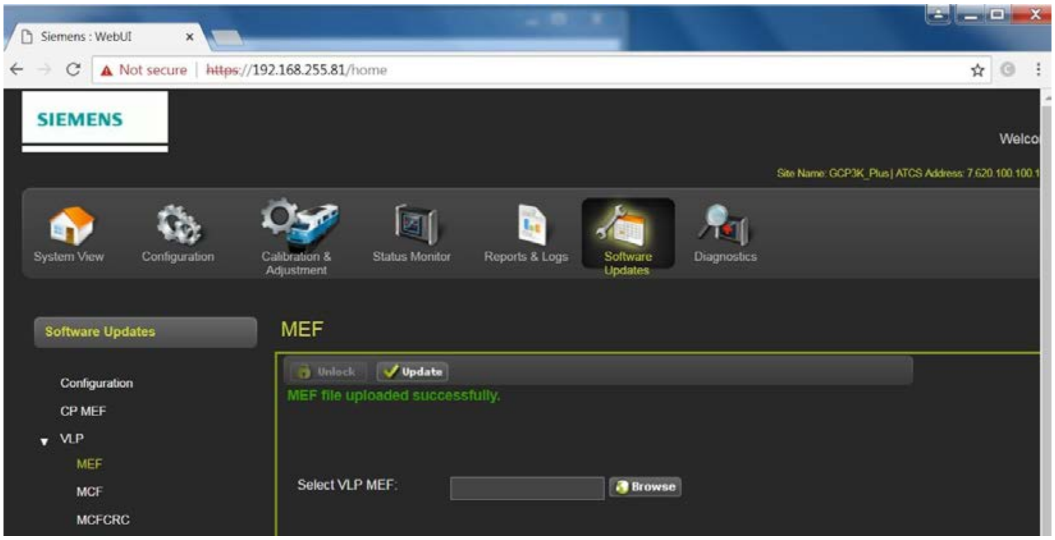


Figure 3-70 WebUI, GCP Menu – Upload Status

3.4.2.5 Change the MCF on CPU III via USB

Perform the following actions:

1. Insert USB Drive in the USB slot on the front of the Display.
2. If Maintainer security has been enabled, enter the password. The password is case sensitive. If security is not enabled, proceed to step 3.
3. Connect an Ethernet cable between the Laptop port on the Display and the Laptop port of the CPU III module.
4. You will need to verify that the Display is set up as a Client instead of a Server, to do so, access the Laptop Ethernet Port menu Program View > 3) Display Settings > Laptop Ethernet Port.

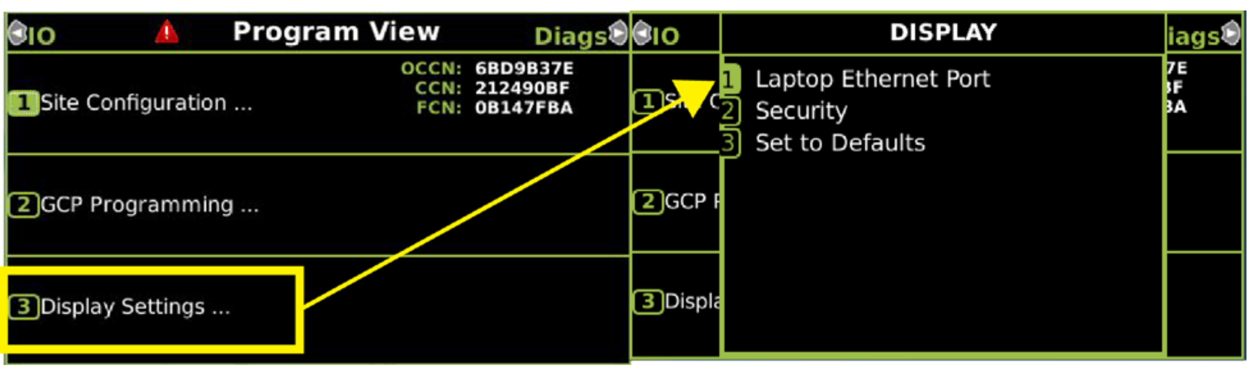


Figure 3-71 Ethernet Menu

5. Select **Client** if Display is configured as Server.

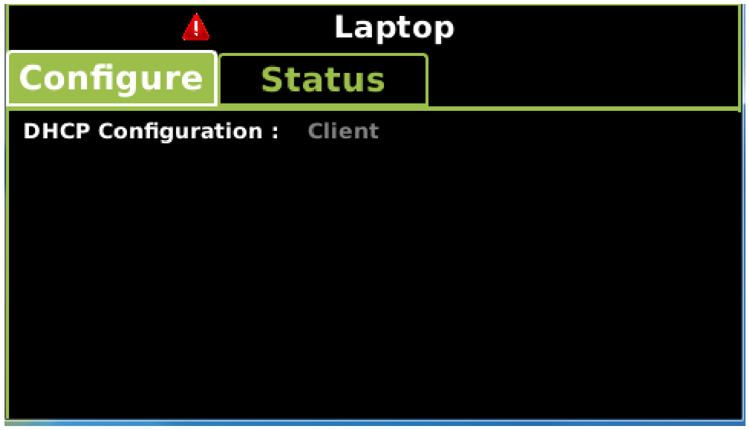


Figure 3-72 DHCP Configuration

6. From the USB menu Select **1) Software Updates** > **3) CPU-III Update**.

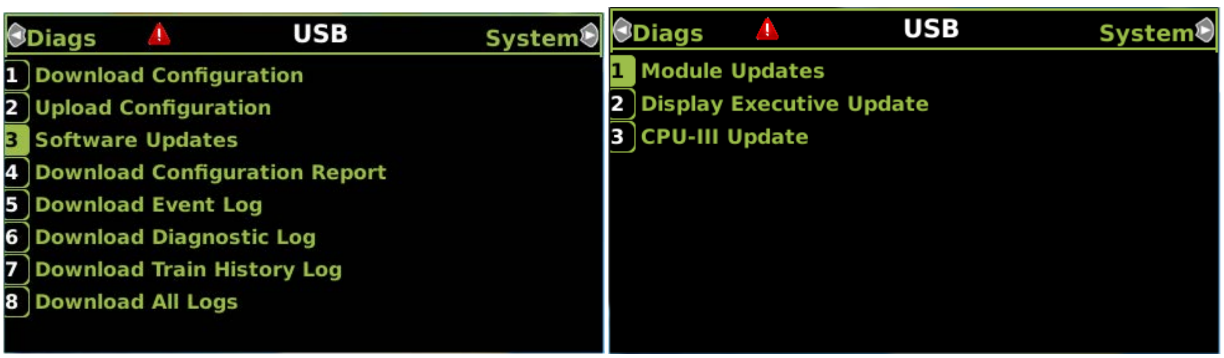


Figure 3-73 Software Update Menu

7. Verify that the Ethernet cable is well seated on both ends.
8. Select **3) Update MCF**.

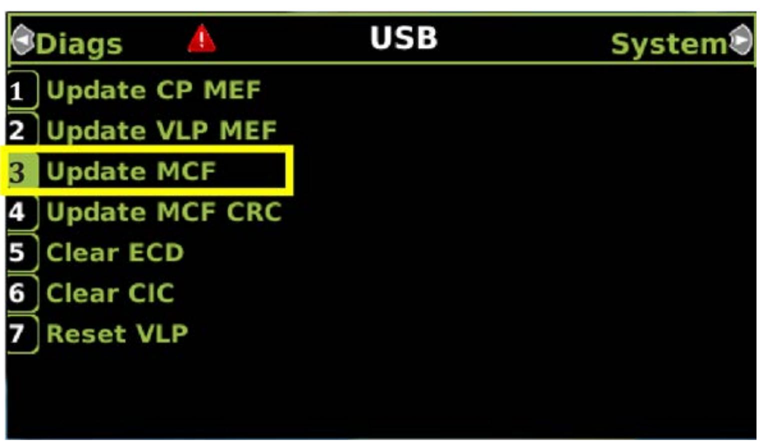


Figure 3-74 Update MCF

9. When asked by the Setup program to Erase the MCF Flash, select **1) Yes**.
10. The **Select File** window opens.

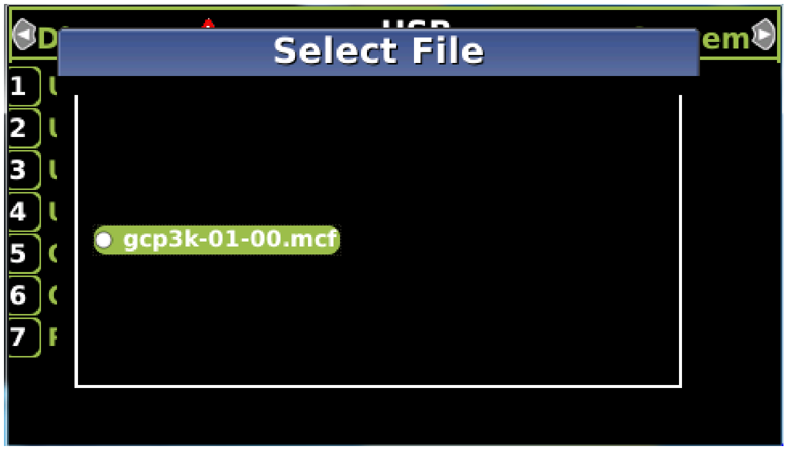


Figure 3-75 Select File Window

11. Scroll down to select the file to be installed, in this example gcp3k-01-00.mcf. Select **Enter**.
12. The new MCF begins loading. This may take a few minutes. While the file is downloading, progress will be indicated on the bottom line of the window.

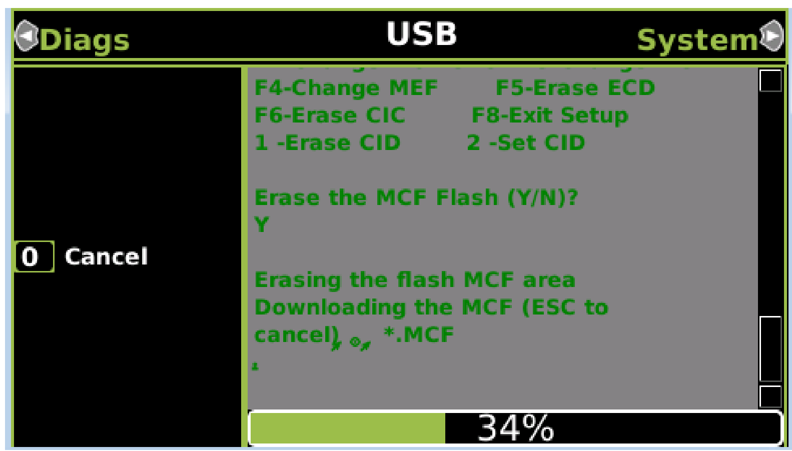


Figure 3-76 Loading Progress Bar

NOTE

NOTE
After the progress bar reaches 100% and stops, the CPU loads a copy of the file to the ECD on the chassis. This will be indicated on the display screen by the field turning to a grey background and on the 4-character display on the CPU as DOWNLOADING MCF then COPYING MCF TO ECD. Wait until this process completes and the text field has a black background before proceeding, the 4-character display shows SETUP.

3.4.2.5.1 Change the MCFCRC

1. Select **1) Change MCFCRC**.

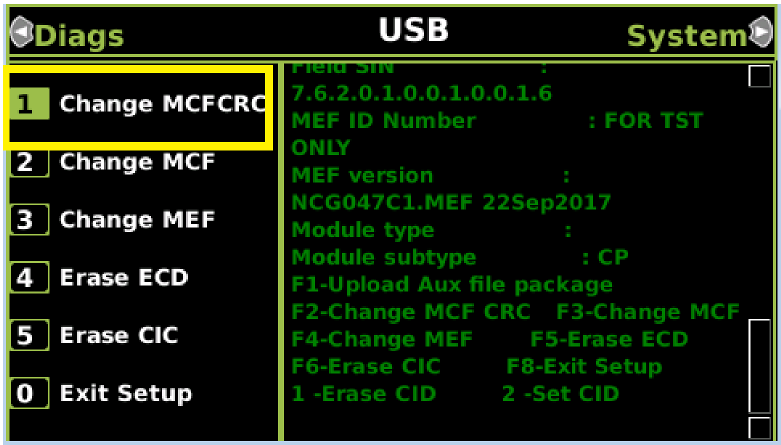


Figure 3-77 Change MCFCRC

2. The **Enter MCF CRC for GCP** window opens.

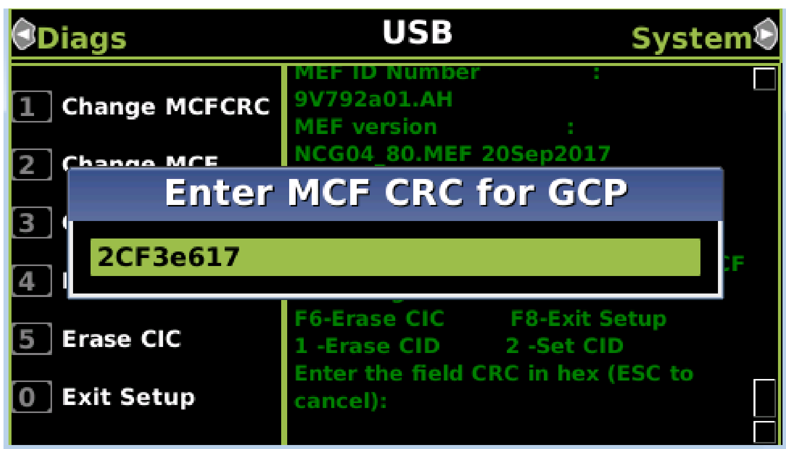


Figure 3-78 Enter MCF CRC for GCP

3. Use the back arrow to clear the number that appears in the window, then use the keypad to enter the CRC issued with the software revision instructions. The CRC will always be 8 characters consisting of 0 through 9 and A through F. Once the number has been entered and verified correct, select **Enter**.
4. When complete, the Display text provides all of the module update options. Select **0) Exit Setup**. The **Upload to System** window opens and states: Exit software finished rebooting the module.
5. Press the Back button. Select 0) Exit View.

3.4.2.6 Change the MCF on CPU III via WebUI

1. Locate the IP address of the GCP5000 unit via the selector buttons on the front of the CPU III unit. Type https:// or http:// (depending on the method selected in the Web Server Configuration) followed by the IP address into the web browser.

2. Login to the WebUI using the appropriate User Name and Password.

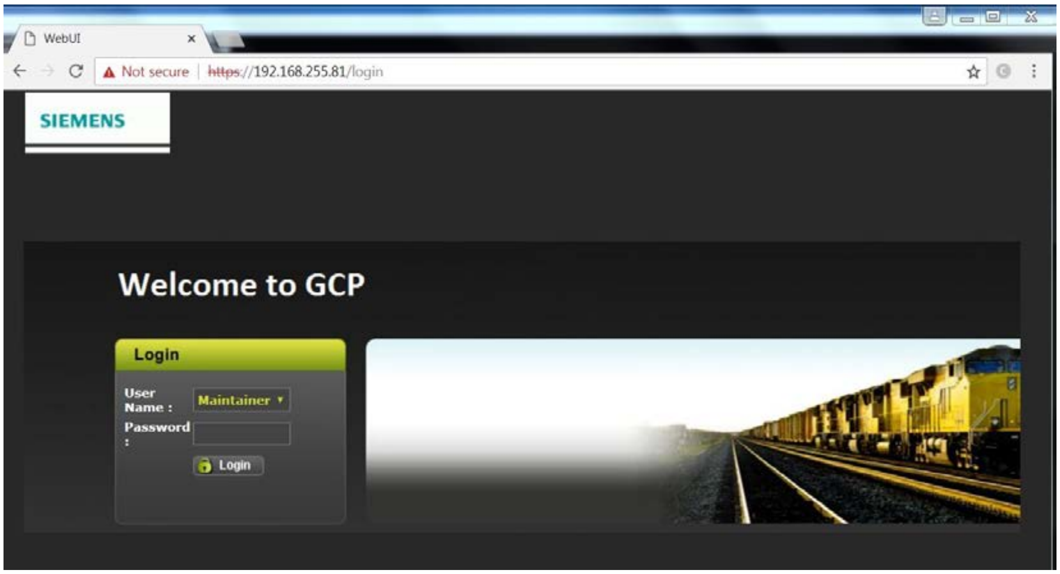


Figure 3-79 WebUI, GCP Login Screen

3. From the menu on the left, select **VLP MCF**, then click **Unlock**.

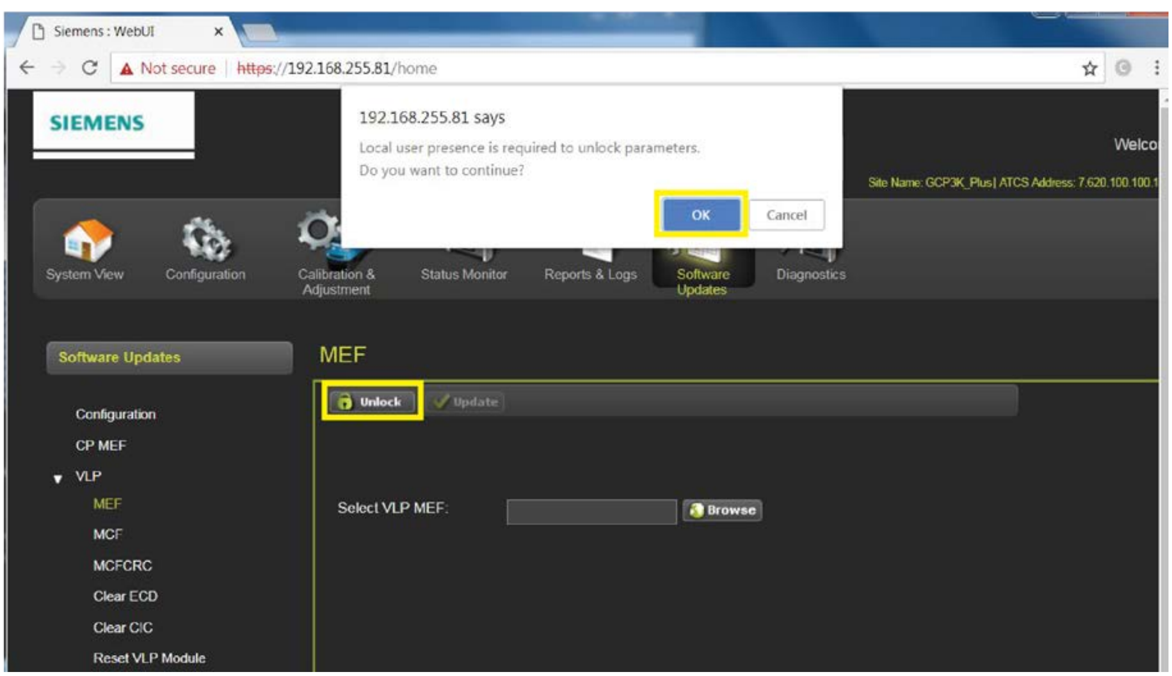


Figure 3-80 WebUI, GCP Menu – VLP MCF UNLOCK

4. Click the **Browse** button and select the correct file. (Note the MCFCRC for entry into the **Enter MCFCRC** field as well).

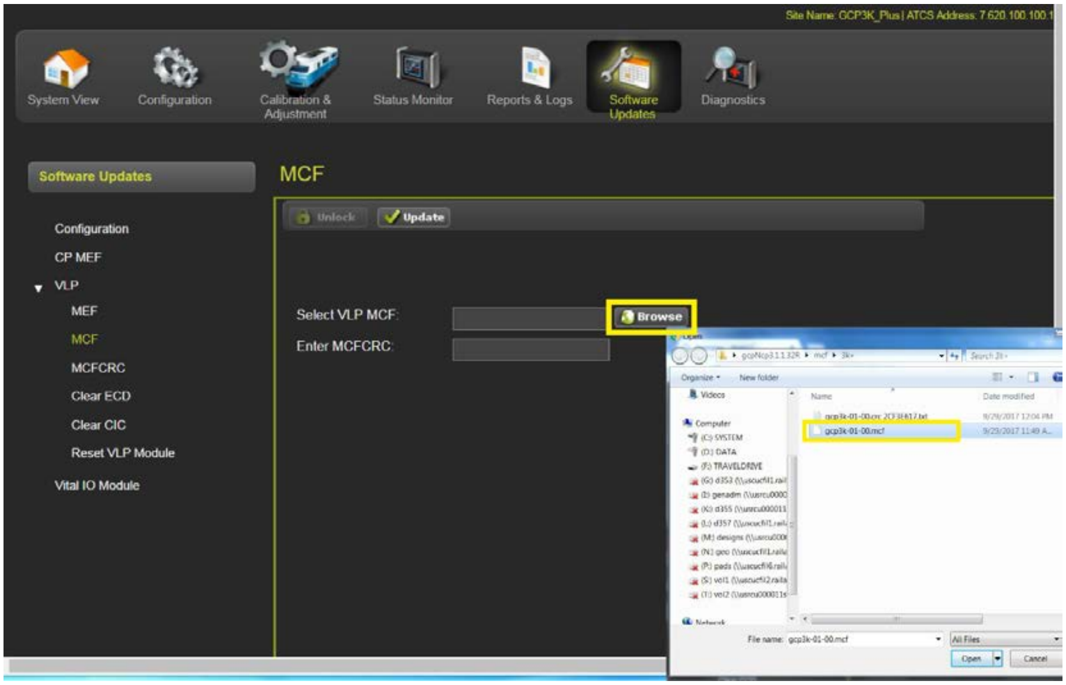


Figure 3-81 WebUI, GCP Menu – Browse

5. Select the **Update** button. Once the file has finished loading the message **MCFCRC uploaded successfully and MCF file uploaded successfully.**

Figure 3-82 WebUI, GCP Menu – Update Status

This completes **Installing Software on the CPU Card**.

3.4.3 Installing Software on PSO Module

To install the MEF files on the PSO Modules.

Perform the following actions:

1. Insert USB Drive in the USB slot on the front of the Display
2. If Maintainer security has been enabled, enter the password. The password is case sensitive. If security is not enabled, proceed to step 3.
3. Connect the serial cable between the Diag port on the Display and the DIAG port of the Track module to be updated.
4. From the USB menu, select **1) Software Updates > 1) Module Updates**.
   The Upload to System window opens stating:
   Please check the serial cable connection before uploading.
5. Verify that the serial cable is well seated on both ends, then press any key. The Setup program begins loading.
6. Select **1) Change MEF**.

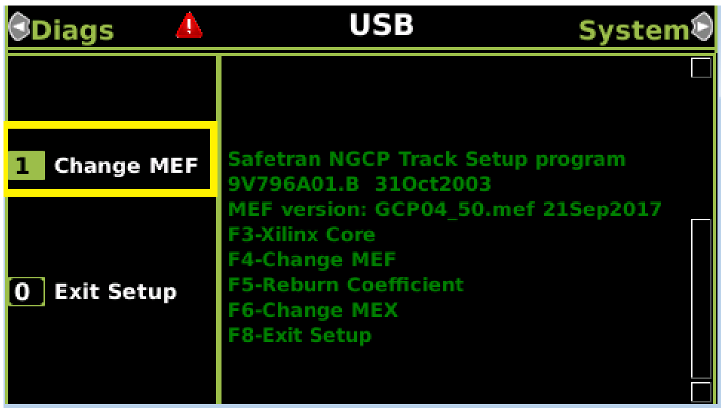


Figure 3-83 Change MEF

NOTE

NOTE
The setup code menu shows more menu options that are available on the left. These options are for Siemens R&D use only and are not available using the Display module.

7. When asked by the Setup program to Erase the MEF, select **1) Yes**.

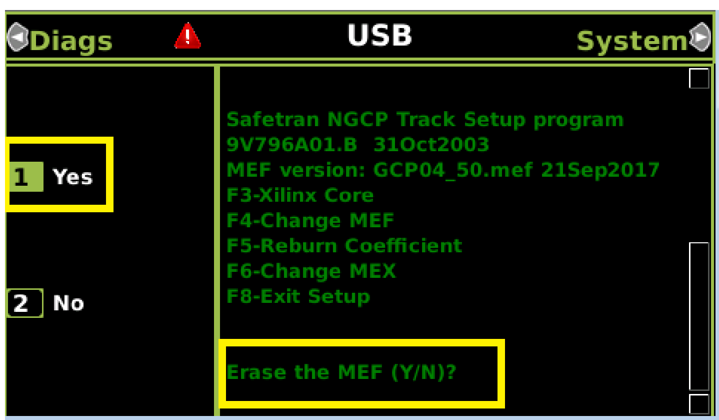


Figure 3-84 Erase MEF

8. The **Select File** window opens. Scroll down to select the file to be installed, in this example GCP04_50.MEF. Select **Enter**.

Figure 3-85 Select File Window

9. The new MEF begins loading. This may take a few minutes. While the file is downloading, progress will be indicated on the bottom line of the window.

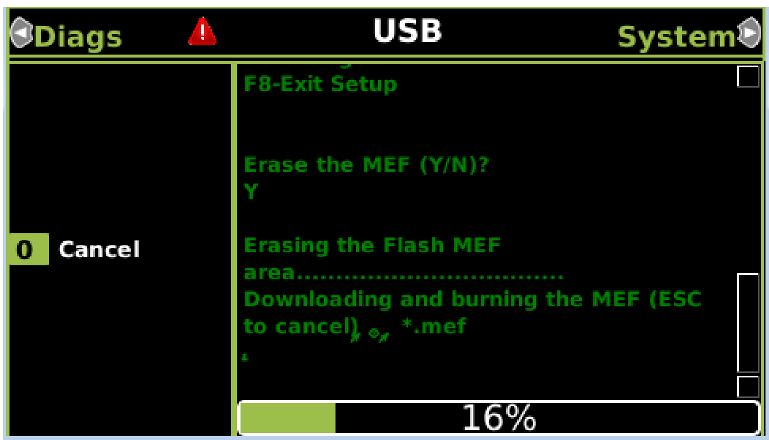


Figure 3-86 MEF Loading

10. When complete, the Display text provides all of the module update options. Select **0) Exit Setup**. The **Upload to System** window opens and states: **Exit software finished rebooting the module**.
11. Press the **Back** button.
12. If there are other PSO modules in the system, repeat the procedure for those modules as well.

3.4.4 Installing Software on RIO Module

To install the MEF files on the RIO Modules.

Perform the following actions:

1. Insert USB Drive in the USB slot on the front of the Display.
2. If Maintainer security has been enabled, enter the password. The password is case sensitive. If security is not enabled, proceed to step 3.
3. Connect the serial cable between the Diag port on the Display and the DIAG port of the RIO module to be updated.

4. From the USB menu select **1) Software Updates > 1) Module Updates**.
   The **Upload to System** window opens stating:
   Please check the serial cable connection before uploading.
5. Verify that the serial cable is well seated on both ends, then press any key. The Setup program begins loading.
6. Select **1) Change MEF**.
7. When asked by the Setup program to Erase the MEF, select **1) Yes**.
   The **Select File** window opens.
8. Scroll down to select the file to be installed, in this example RIO01_07.MEF. Select **Enter**.
9. The new MEF begins loading. This may take a few minutes. While the file is downloading, progress will be indicated on the bottom line of the window.
10. When complete, the Display text provides all of the module update options. Select **0) Exit Setup**.
    The Upload to System window opens and states:
    Exit software finished rebooting the module.
11. Press the **Back** button.

3.4.5 Installing Software on Display Module

To install the Non-Vital MEF files on the A80485-1 Display Module.

Perform the following actions:

1. Insert USB Drive in the USB slot on the front of the Display
2. If Maintainer security has been enabled, enter the password. The password is case sensitive. If security is not enabled, proceed to step 3.
3. Select **1) Software Updates > 2) Display Executive Update**.

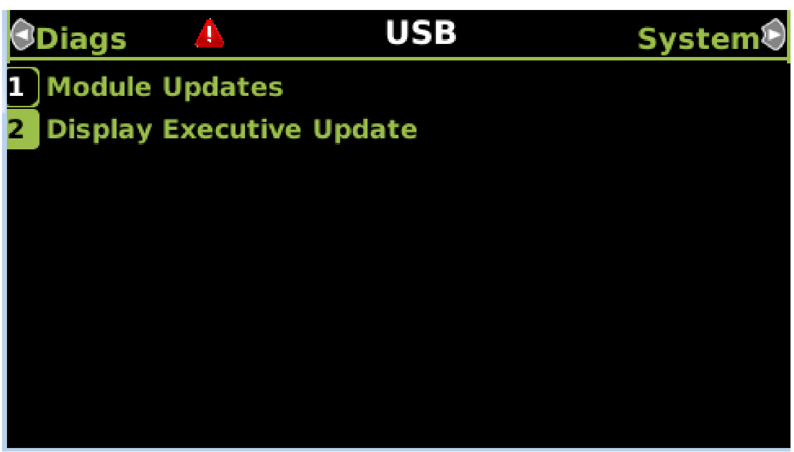


Figure 3-87 USB Update Window

4. The **Select File** window opens. Select the correct file to load, in this example NG5K_MEF_1.4.47R.TGZ. Select **Enter**.

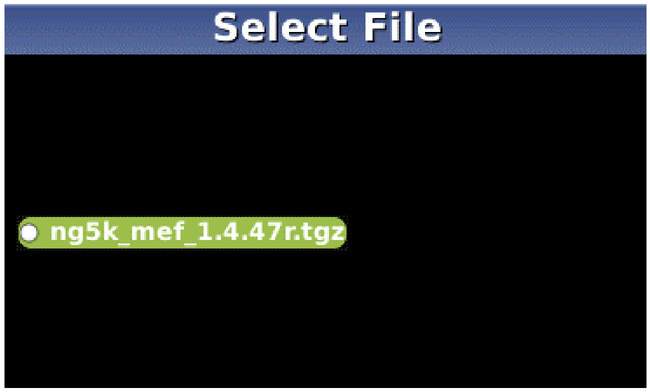


Figure 3-88   Select File Window

5. The Upload NV Executive window opens, stating:
   Please wait. **Request sent to Executive**…
   The new MEF begins loading. This may take a few minutes. While the file is downloading, progress will be indicated on the bottom line of the window.
6. When complete, the **Upload to NV Executive** window opens and states**:**
   Uploaded NV Executive. Press Enter to Reboot or Back to Reboot later.
7. Select **Enter**. The Display reboots.
8. Press the **Back** button. Select **0) Exit View**.

3.5 Web User Interface Screens

The Display Module provides a Web Interface that enables the user to configure the GCP5000 model locally as well as remotely through the Laptop/Ethernet Port (RJ-45) on the front of the Display Module. The Display Laptop Port default protocol is set as DHCP Server (http) protocol. The Display DHCP Server protocol will assign the laptop an IP address and connect the user to the GCP. The Display supports the following web browsers:

- Firefox (version 46.x)
- Chrome (version 55.x)

Open the correct web browser and type in the IP address of the display. The default IP is http://192.168.255.81. The browser may display the following screens regarding the connection:

NOTE

NOTE

The SSL certificates in Edge, Chrome, and Firefox were updated around Feb 2022, and are no longer compatible with the https: mode in the GCE. If these Browsers are used, the GCE must be set to use http://

Chrome Desktop Version: 99.0.4844.45 for Mac ,Windows and Linux
FireFox Version: 97
Edge Version: 98.0.1108.43

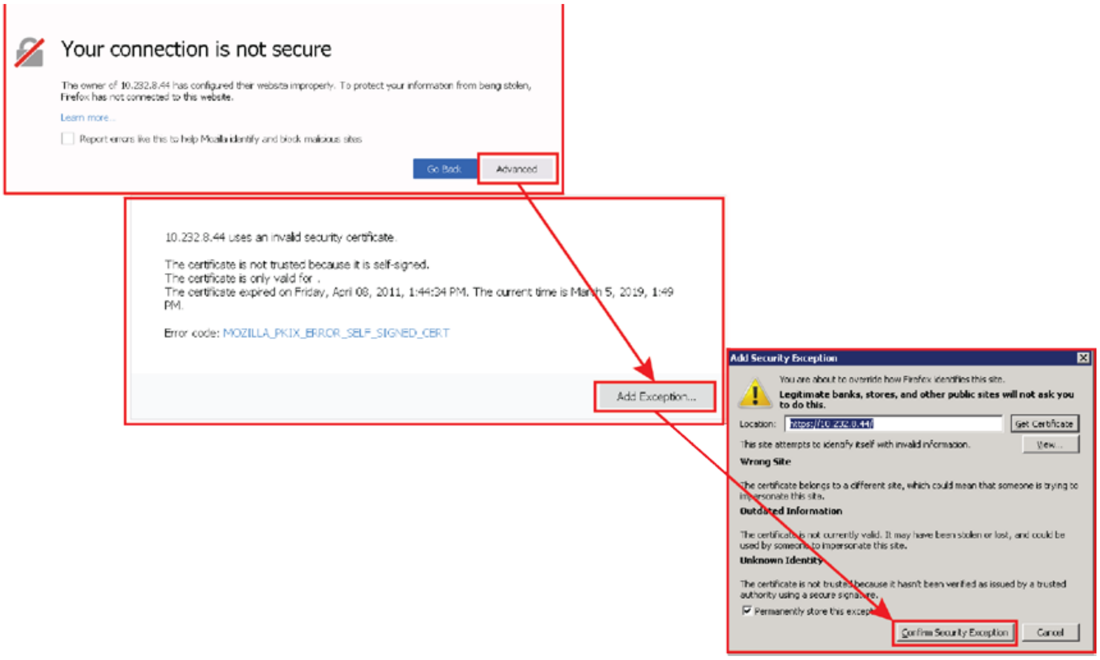


Figure 3-89 Unsecure Connection Warning

The display WebUI will then appear. Select the username “Maintainer” (default). The Admin user is for Siemens personnel use only.

The default password is GCP5000 (case sensitive) to open the session. If security has not been set to enable a maintainer password, the default will allow all regular user functions of the WebUI to be accessed. If a specific maintainer password has been set, enter this. The default GCP5000 may still be used to access the WebUI, but the user will be unable to change GCP Programming parameters.

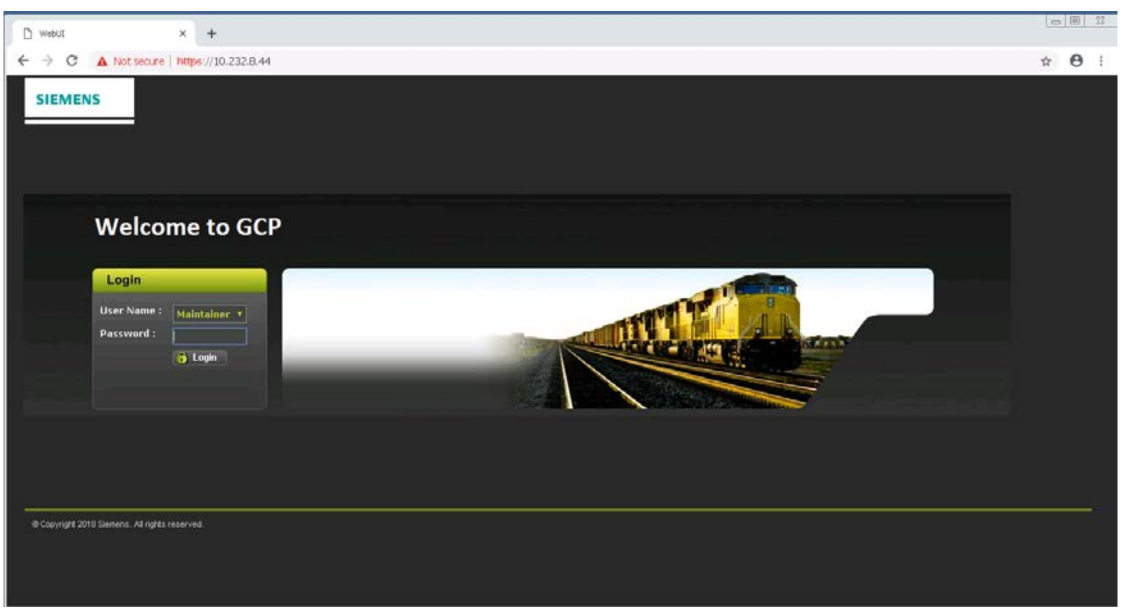


Figure 3-90 WebUI Login Screen

CAUTION

CAUTION

IF THE EQUIPMENT IS TO BE CONNECTED TO A NETWORK, IT WILL BE NECESSARY FOR THE USER TO SET THE ETHERNET PORT AS A DHCP CLIENT.

FAILURE TO DO SO WILL CAUSE AN INTERRUPTION OF THE NETWORK SINCE TWO DHCP SERVERS WILL BE INTRODUCED ONTO THE NETWORK.

NOTE

NOTE

The WebUI has a 1-minute session timeout. If the web browser is closed without selecting **Logout** the user will not be able to log back in for 1 minute.

The WebUI has buttons at the top of the window allowing the user to select various functions.

Figure 3-91 WebUI Tool Bar

3.5.1 System View

The System View is the main screen, showing an overview of the GCP status. If there are diagnostic messages present, the System View will show a red exclamation mark at the top right.

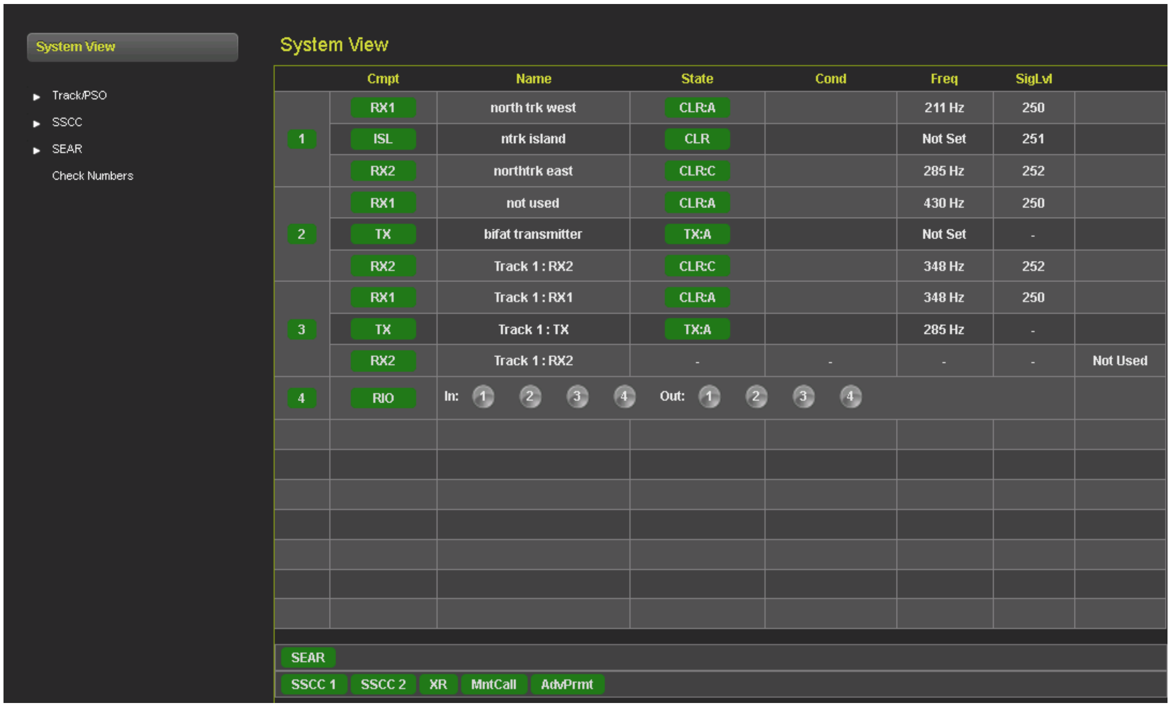


Figure 3-92 Web UI System View

The left column shows the card number in the chassis (not including CPU card)

- Green – card in session with CPU
- Red – card not in session with CPU

The Name column shows the used configurable name of this component. The GCE allows the user to set names for track components, see the Office Configuration Editor (OCE) manual, document number: SIG-00-11-15, Section 4.5.

The state column shows the following:

- PSO receiver:
  - o Green CLR :X – PSO receiver is unoccupied and receiving code X, where X=A,C,D,E,F (when the receiver is external, the Code X Is not shown)
  - o Grey - PSO receiver is occupied
  - o Red CAL – PSO recover required calibration
  - o Red HLTH - PSO receive is unhealthy
  - o Blue OOS – the PSO receiver is out of service
  - o Yellow WRAP – wrap is being applied to the receiver
  - o Yellow STICK – stick is being applied to the receiver
  - o Yellow TWR – a timed wrap is being applied to the receiver, this indicates the track circuit is occupied but it is not activating the crossing yet as a drop delay is running or the advance preemption timer is running
- PSO transmitter :
  - o Green TX :X – transmitter is sending code X, X=A,C,D,E,F
  - o Grey- occupied
  - o Red - unhealthy
- Island:
  - o Green CLR – unoccupied
  - o Grey OCC – occupied
  - o Red CAL – island requires calibration
  - o Red HLTH – Island is unhealthy
  - o Blue OOS – the Island receiver is out of service

3.5.1.1 System View - Track / PSO

The Track/PSO tab can be expanded to show the following options for the Track modules.

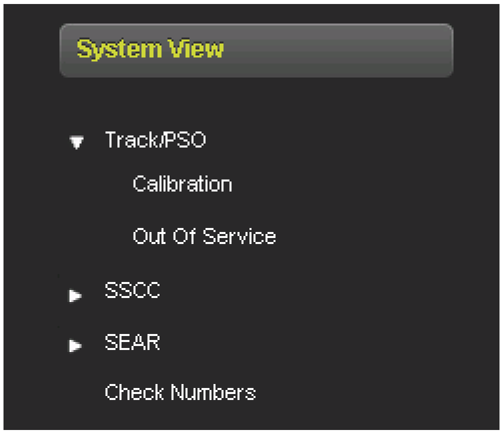


Figure 3-93 Web UI Track Options

When Calibration is selected the Web UI will show the same as with the 'Calibration and Adjustment' see section 6.

When Out of Service is selected the Web UI shows the following screen that allows the user to take the PSO receiver or island out of service. Before options can be selected on the screen, it has to be unlocked and local user presence confirmed.

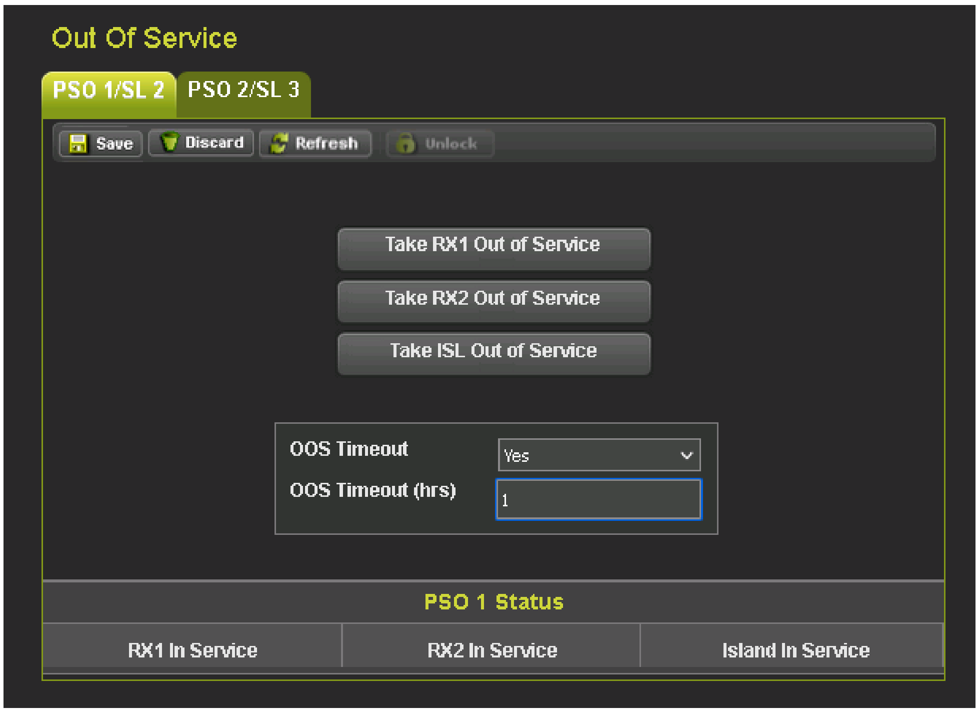


Figure 3-94 Web UI Out of Service

3.5.1.2 System View – SSCC

The SSCC menu under the System View provides the options shown in Figure 3-95.

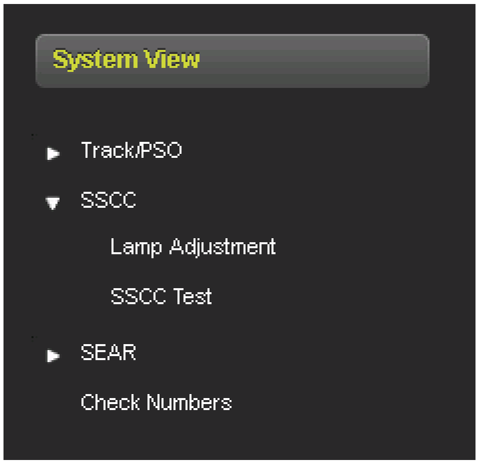


Figure 3-95 Web UI System View SSCC Menu Options

The Lamp Adjustment menu allows the user to turn the lamps on and adjust their voltages. If a train approaches, the lamp on command will be overridden and the lamps will flash.

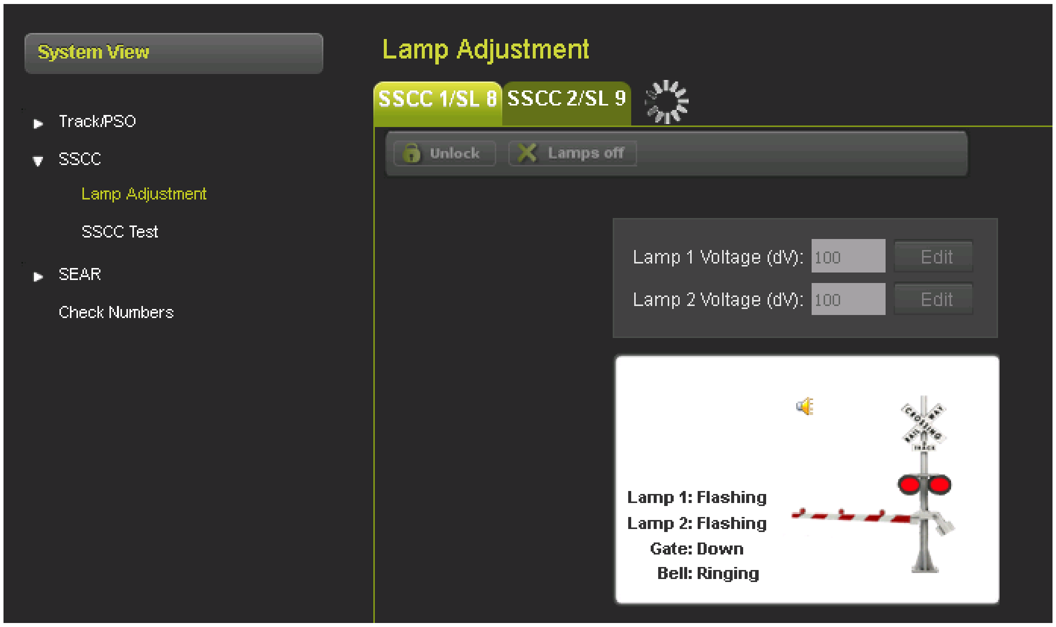


Figure 3-96 Web UI SSCC Lamp Adjustment

The SSCC Test menu allows the perform various tests on the crossing, provided it is not already activated, these include:

- Flash the lamps
- Timed test (delay, flash lamps, turn lamps off)
- Repeat test (delay, flash lamps, delay, flash lamps again, turn lamps off)
- Activate crossing
- Ring Bell
- See Section 3.1.2.2 for further details

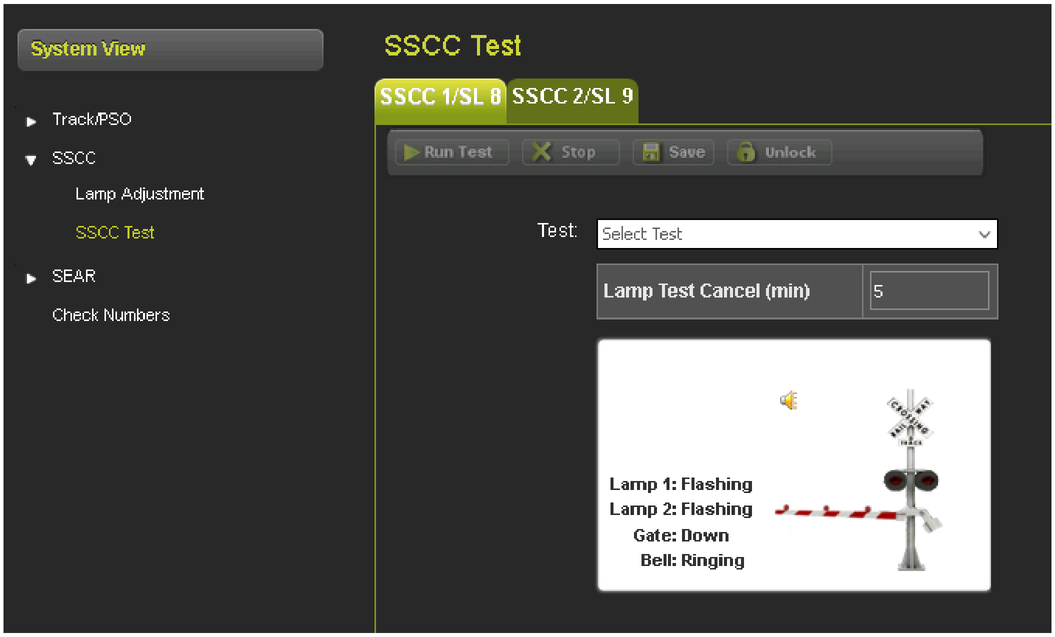


Figure 3-97 Web UI SSCC Test

3.5.1.3 System View – SEAR

The SEAR menu under the System View provides the menu options shown in Figure 3-98.

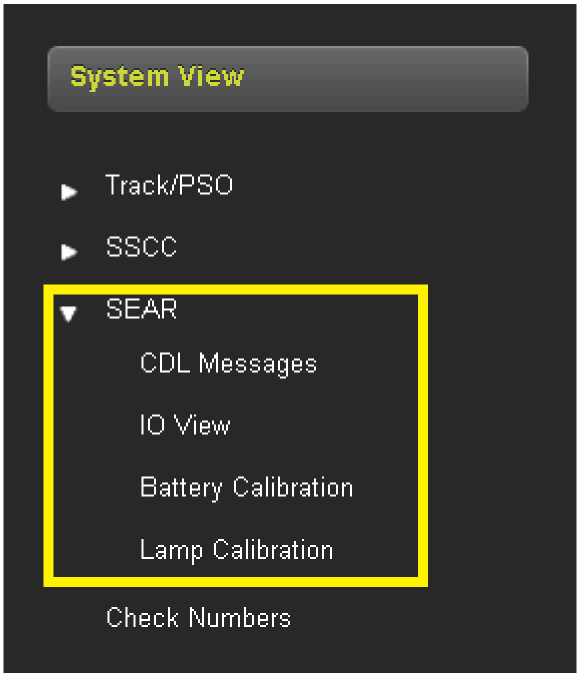


Figure 3-98 Web UI SEAR Menu

3.5.1.4 SEAR CDL Messages

The SEAR CDL Message Screen will show any messages that are generated when the CDL is executing.

3.5.1.5 SEAR IO View

The IO View allows the user to see the states of the SEAR IIi inputs. Figure 3-99 shows the Web UI screen displaying the SEAR IIi digital input connector designator, the connection name, and the current status of the connection. The analog input is also displayed showing the VBN and SSCC input voltages, the internal and external temperature, and the monitored battery voltage if the battery monitoring option is activated.

Figure 3-99 Web UI SEAR IO View

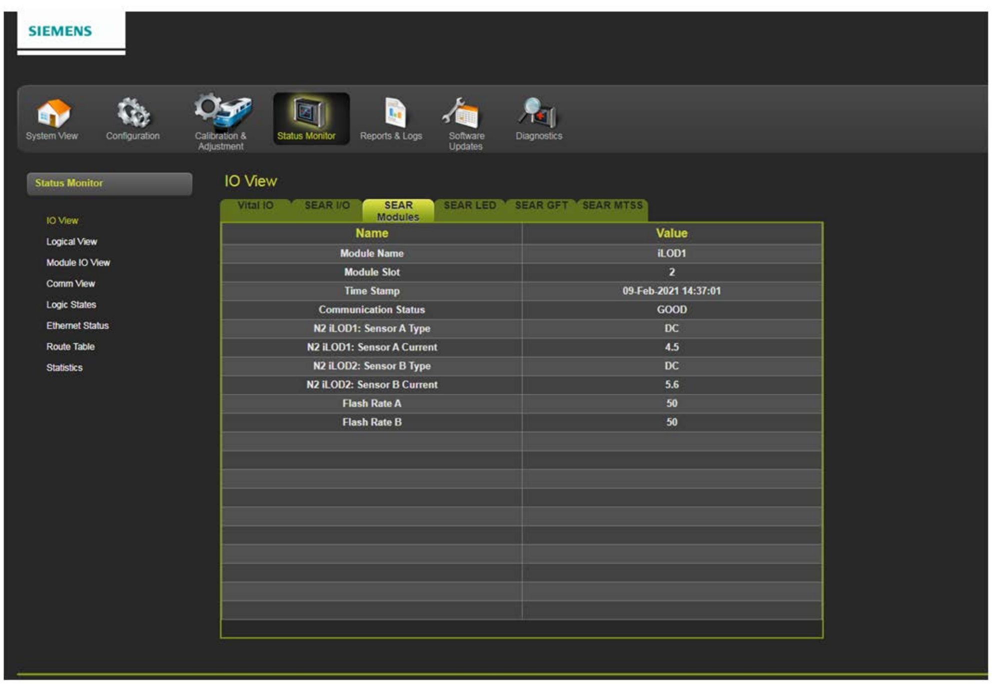
3.5.1.6 SEAR Module View

Figure 3-100 displays the SEAR status monitor IO view of the SEAR Modules. The user can select the individual module using the blue arrow,

#	Time Stamp	Type	Node	Name	Status
1	29-Apr-2022 12:15:52	iLOD	0	Module 1	BAD
2	29-Apr-2022 12:15:52	None	0	Module 2	Unconfigured
3	29-Apr-2022 12:15:52	None	0	Module 3	Unconfigured
4	29-Apr-2022 12:15:52	None	0	Module 4	Unconfigured
5	29-Apr-2022 12:15:52	None	0	Module 5	Unconfigured
6	29-Apr-2022 12:15:52	None	0	Module 6	Unconfigured
7	29-Apr-2022 12:15:52	None	0	Module 7	Unconfigured
8	29-Apr-2022 12:15:52	None	0	Module 8	Unconfigured
9	29-Apr-2022 12:15:52	None	0	Module 9	Unconfigured
10	29-Apr-2022 12:15:52	None	0	Module 10	Unconfigured
11	29-Apr-2022 12:15:52	None	0	Module 11	Unconfigured
12	29-Apr-2022 12:15:52	None	0	Module 12	Unconfigured
13	29-Apr-2022 12:15:52	None	0	Module 13	Unconfigured
14	29-Apr-2022 12:15:52	None	0	Module 14	Unconfigured
15	29-Apr-2022 12:15:52	None	0	Module 15	Unconfigured
16	29-Apr-2022 12:15:52	GCP5000	0	GCP4K	BAD
17					

Figure 3-100 SEAR Modules List and Status

The module selection will be displayed as in the example shown in Figure 3-101.



Name	Value
Module Name	iLOD1
Module Slot	2
Time Stamp	09-Feb-2021 14:37:01
Communication Status	GOOD
N2 iLOD1: Sensor A Type	DC
N2 iLOD1: Sensor A Current	4.5
N2 iLOD2: Sensor B Type	DC
N2 iLOD2: Sensor B Current	5.6
Flash Rate A	50
Flash Rate B	50

Figure 3-101 SEAR Modules View

3.5.1.7 SEAR Battery Calibration

If battery monitoring is included in the installation, the battery calibration function will be active. Select the Battery Calibration option from the SEAR menu, a window will come up as shown in Figure 3-102. Click on the Start icon to start the internal calibration process.

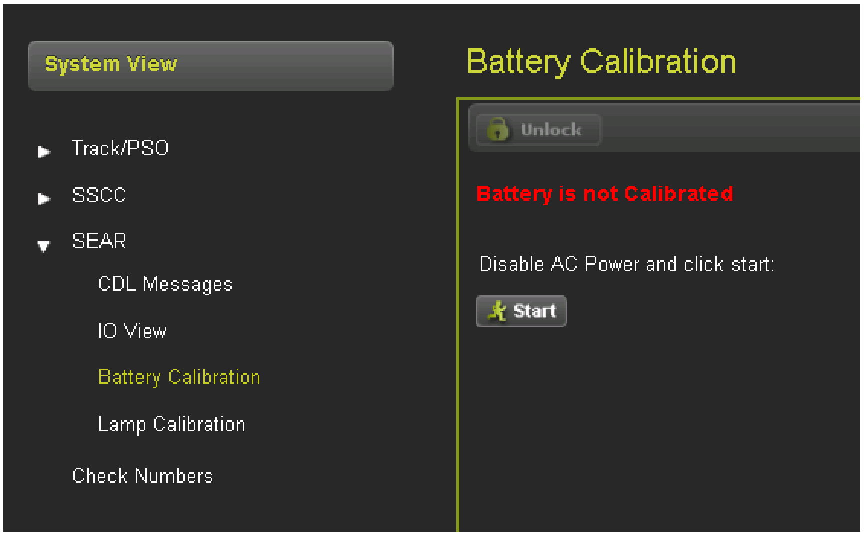


Figure 3-102 Battery Calibration Screen

After pressing the start button, the battery calibration screen will appear as shown in Figure 3-103. A countdown tally displays the calibration progress. The battery voltage and calibrated value are displayed. The Status column displays the current voltage state of each component.

Figure 3-103 Battery Calibration Screen after pressing Start

3.5.1.7.1 Lamp Calibration

The lamp calibration process for an iLOD sets the internal threshold levels used by the iLOD software to detect flashing lamp current. These levels are site-specific. It also is used by the application program to determine the number of lamps and the current draw that is present for a properly operating crossing. This process is not the same as factory calibration. Factory calibration is performed on the iLOD units before shipment.

The Web UI is used to illustrate the calibration, it can also be done from the Local UI on the Display Module.

If there is an application program loaded into the SEAR, enter the number of flashing lamps for each iLOD sensor when requested.

If the site has Gate Tip Sensors installed, when asked to flash the lamps, make sure the gates are level before pressing Enter.

The current reading is allowed to “settle” for 15 seconds.

Depending on the configuration of the crossing, it may be necessary to repeat this process with AC power to the crossing turned off. At some installations, the process may be repeated more times depending on configuration (split tracks, etc.).

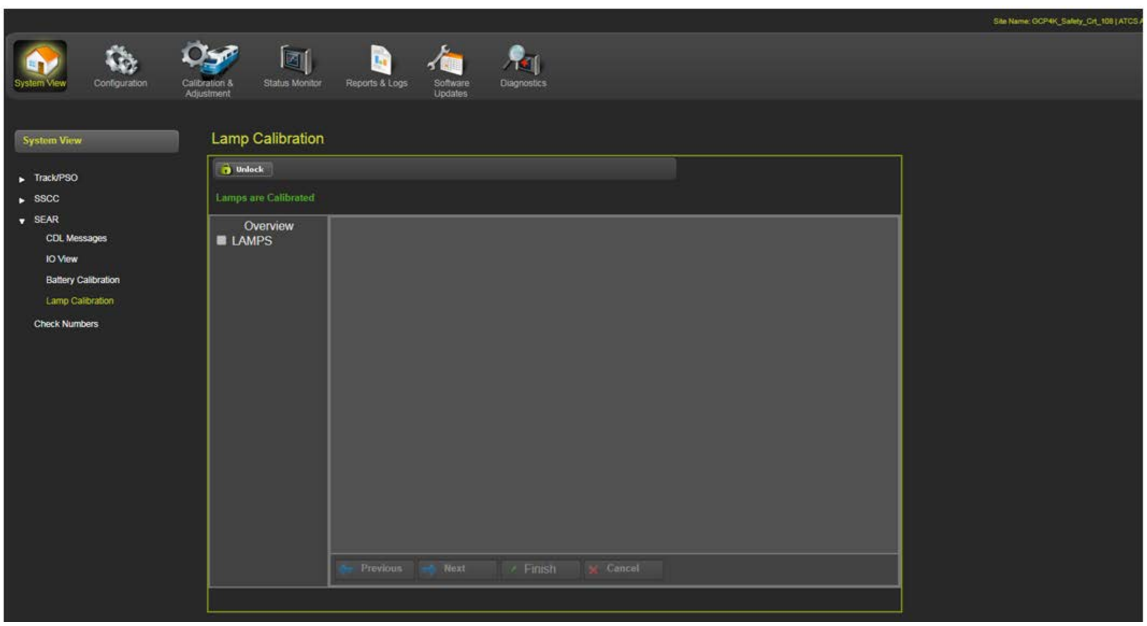


Figure 3-104 Lamp Calibration Opening Screen

To continue, the parameters need to be unlocked. To unlock the parameters click on the Unlock button. A warning screen will pop up, and click OK to continue.

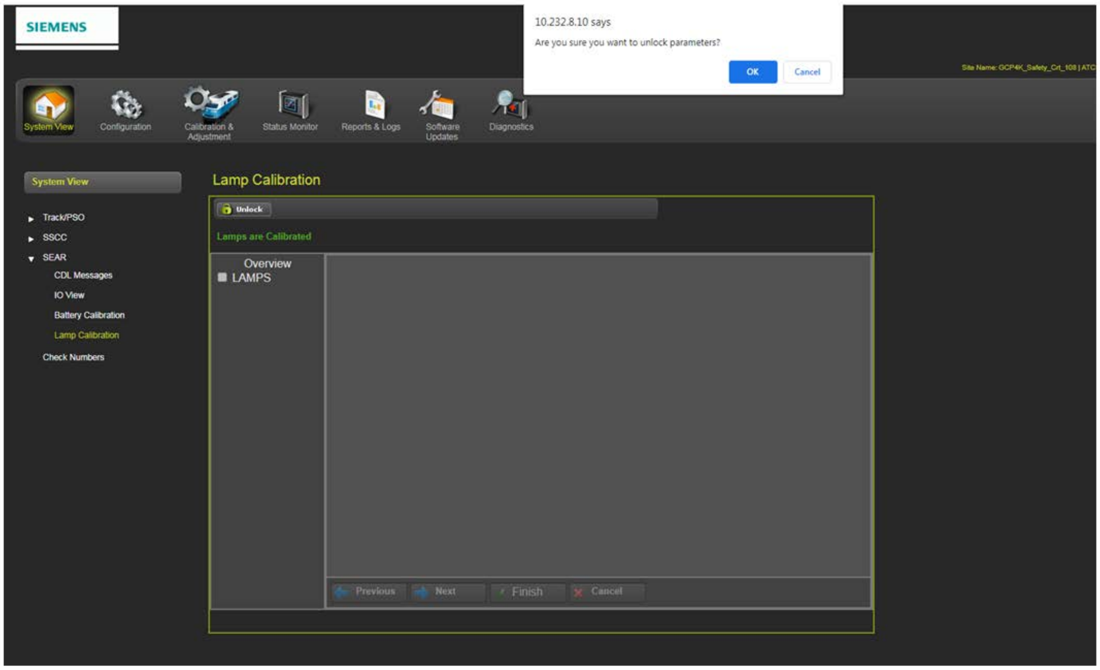


Figure 3-105   Lamp Calibration – Unlocking Parameters

Select the calibration type, in Figure 3-106, Manual has been selected, click Next to continue.

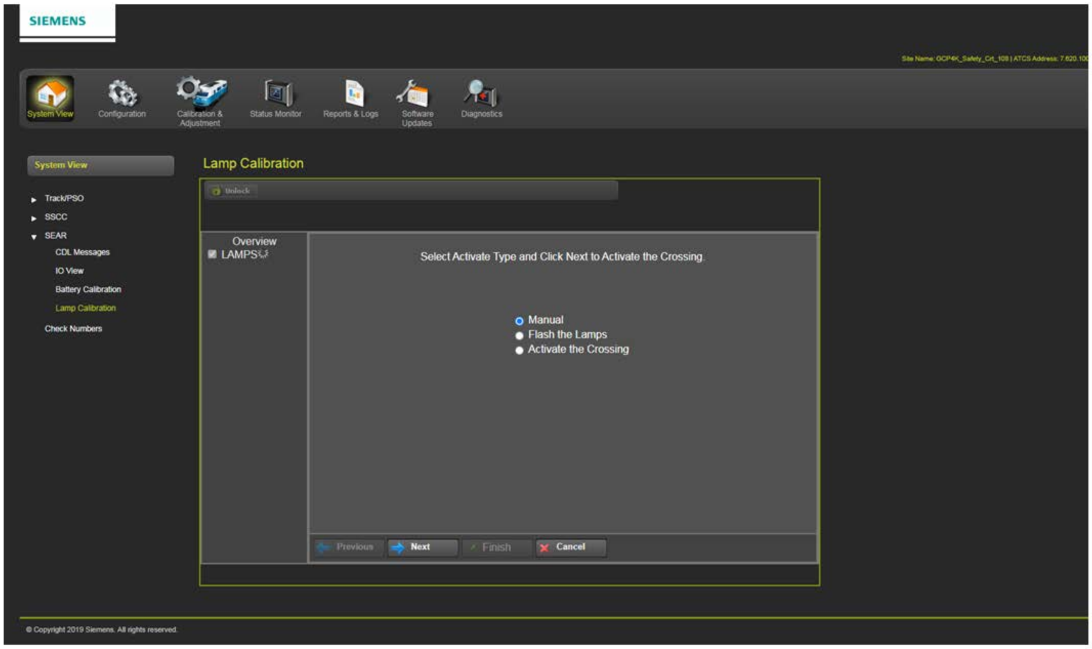


Figure 3-106   Lamp Calibration – Manual

A progress bar will be displayed with a countdown number indicating the progress of the calibration.

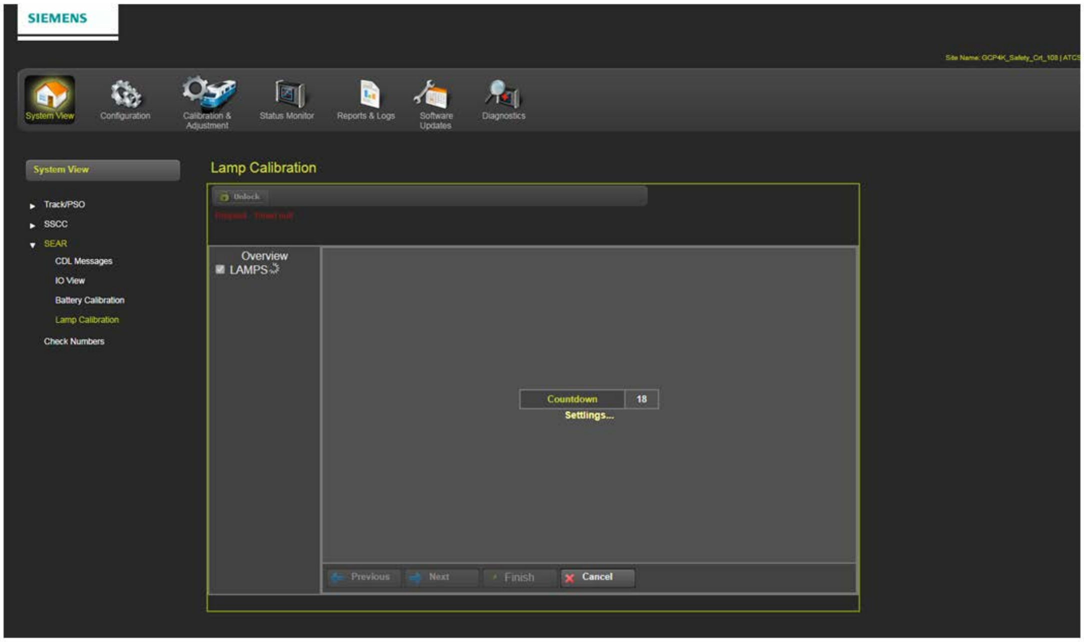


Figure 3-107 Lamp Calibration – Calibration Progress

In the event the iLOD(s) is inoperative or not installed, a message will be displayed advising to install the iLOD(s) and restart the lamp calibration.

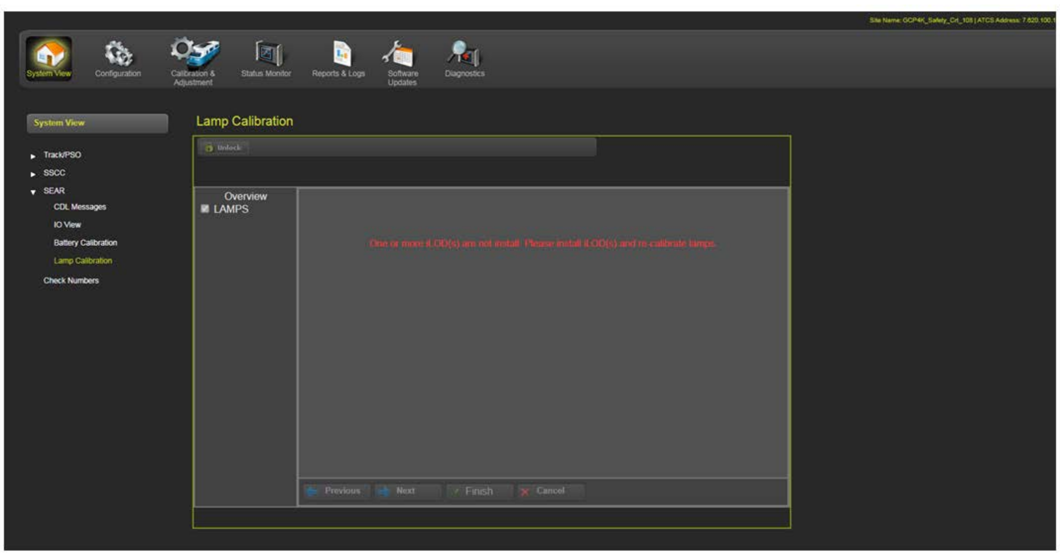


Figure 3-108 Lamp Calibration – iLOD Not Installed Warning

The next screen in the calibration process requires entering the number of bulbs being used. After entering the bulb count, click on the Next button to continue as shown in Figure 3-109.

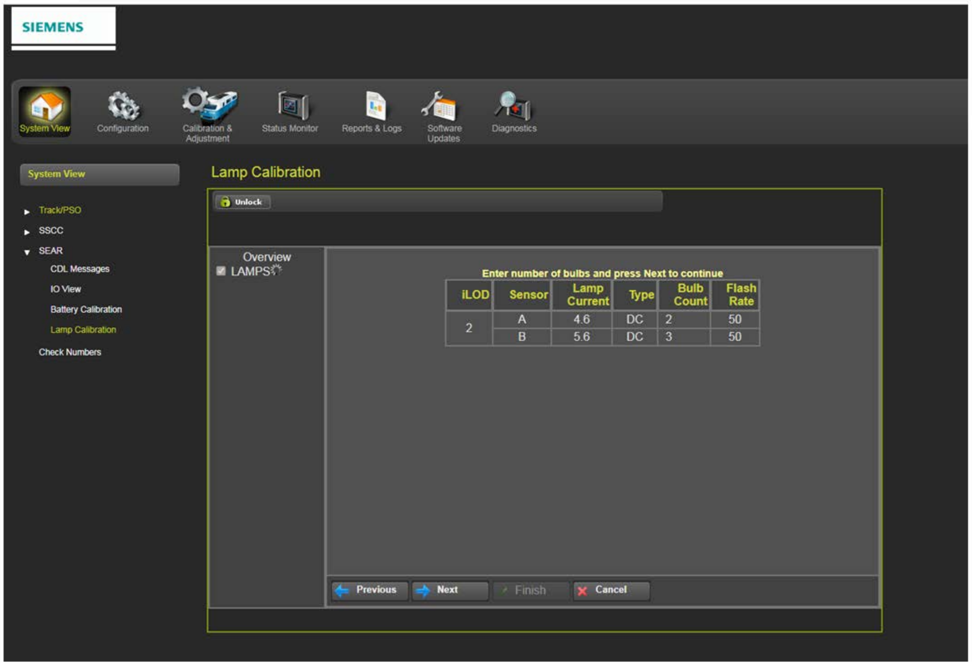


Figure 3-109   Lamp Calibration – Number of Bulbs

The next step is to deactivate the crossing and click on the Finish button to complete the calibration.

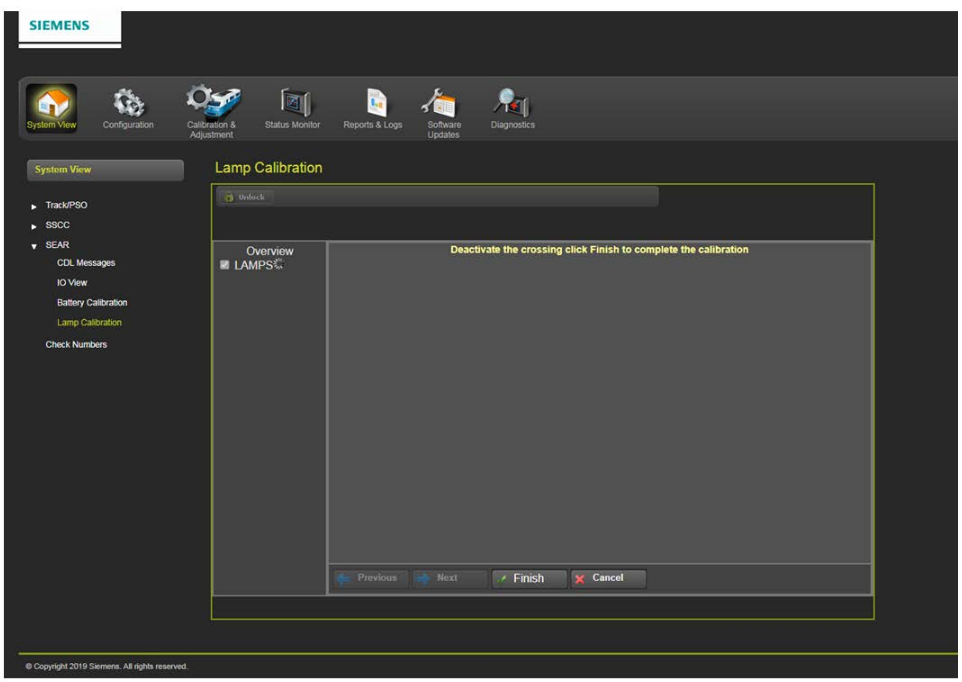


Figure 3-110   Lamp Calibration – Deactivate Crossing Finish Calibration

When the process is finished, the screen will display Calibration complete.

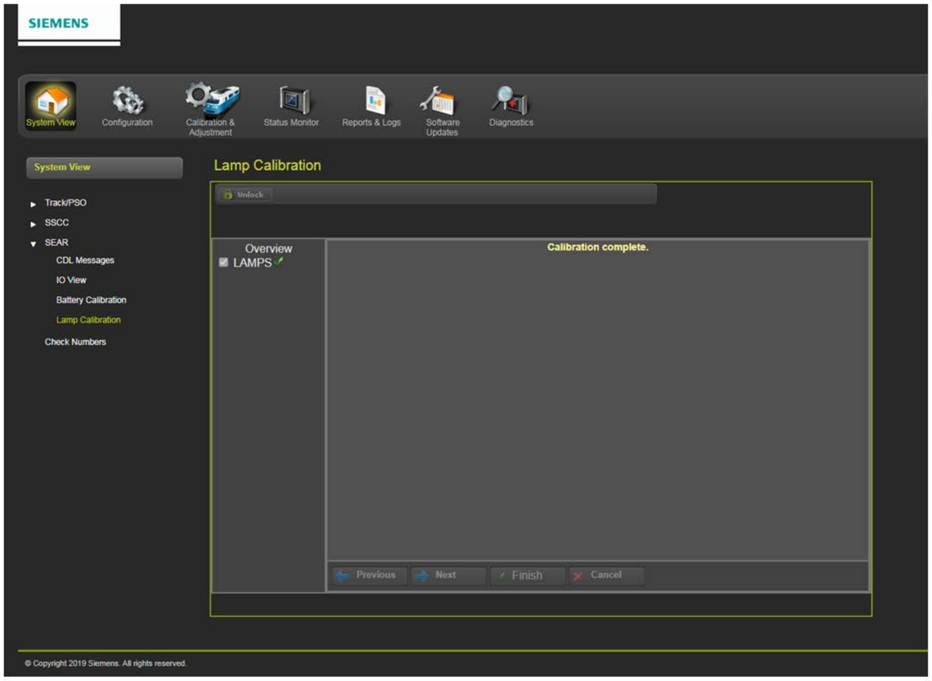


Figure 3-111 Lamp Calibration – Calibration Complete

The second type of activation is Flash the Lamps. Click on the Flash the Lamps button and click on the Next button as shown in Figure 3-112

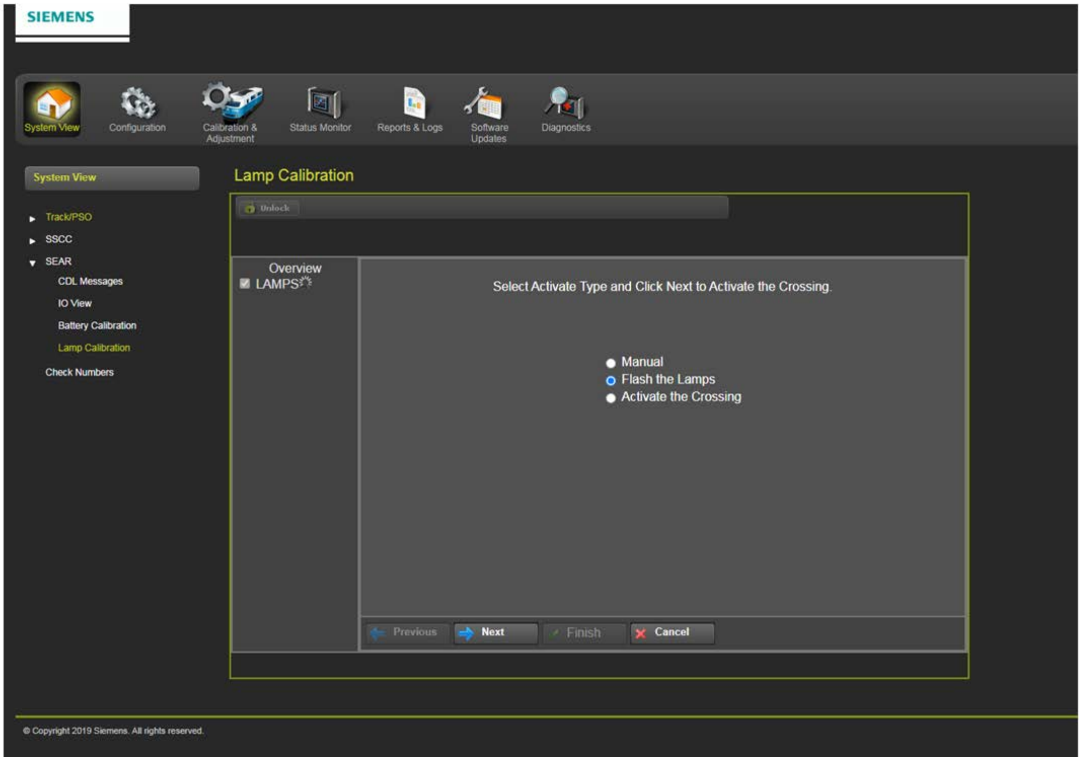


Figure 3-112 Lamp Calibration - Flash the Lamps

The next screen shows activating of SSCC 1.

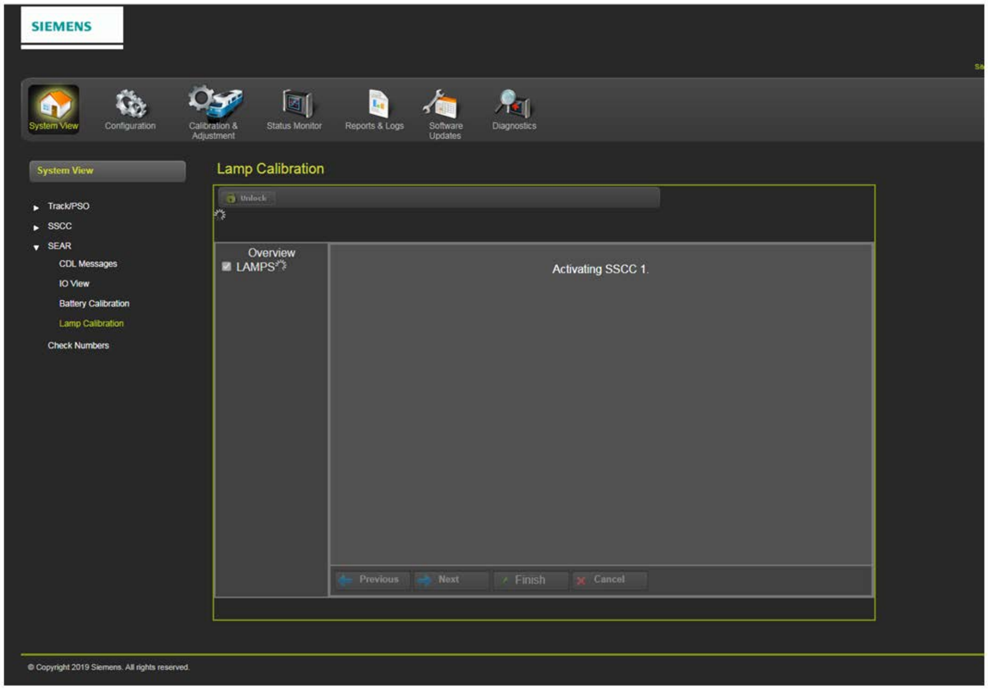


Figure 3-113 Lamp Calibration – Activating SSCC 1

The next screen in the calibration process requires entering the number of bulbs being used. After entering the bulb count, click on the Next button to continue as shown in Figure 3-114.

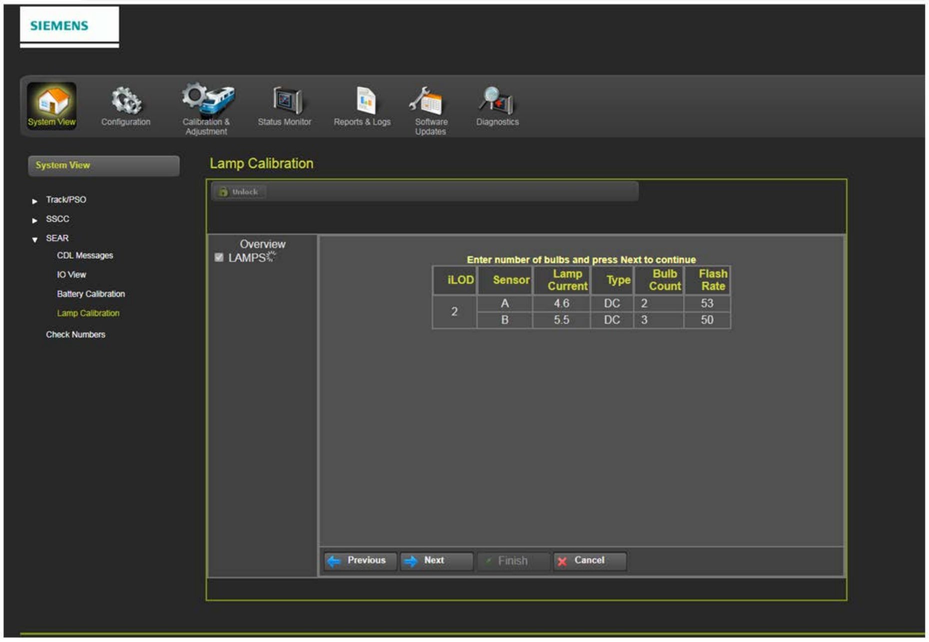


Figure 3-114 Lamp Calibration – Number of Bulbs

The next screen shows the deactivation of SSCC 1 and the completion of the calibration.

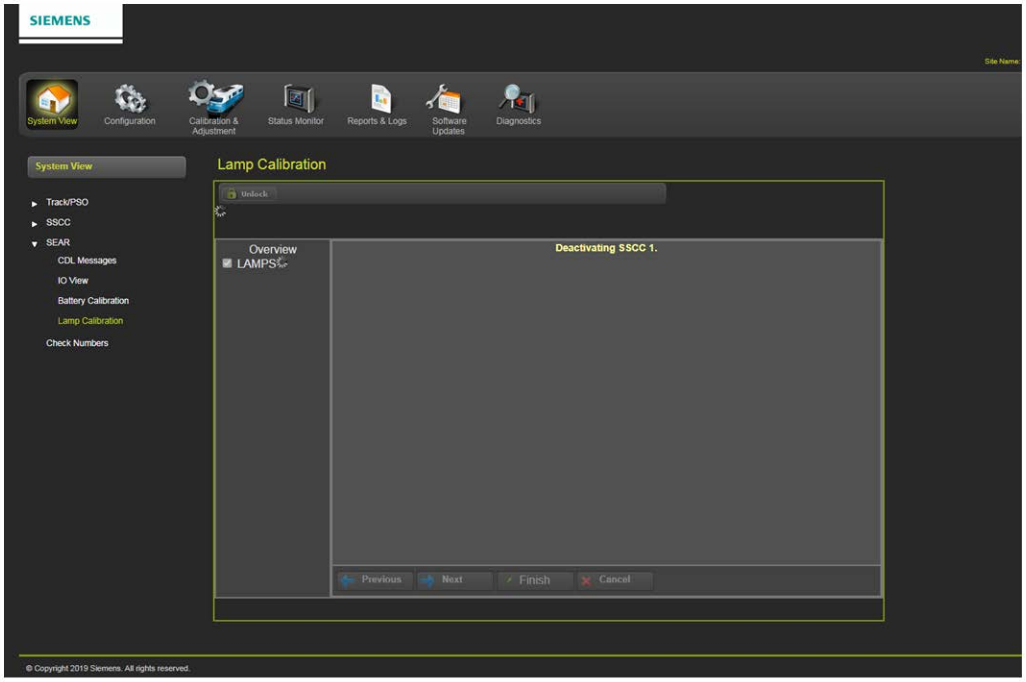


Figure 3-115 Lamp Calibration – Deactivating SSCC 1

The next activation type is Activating the Crossing. Select the Activating the Crossing button and click on the Next button to continue.

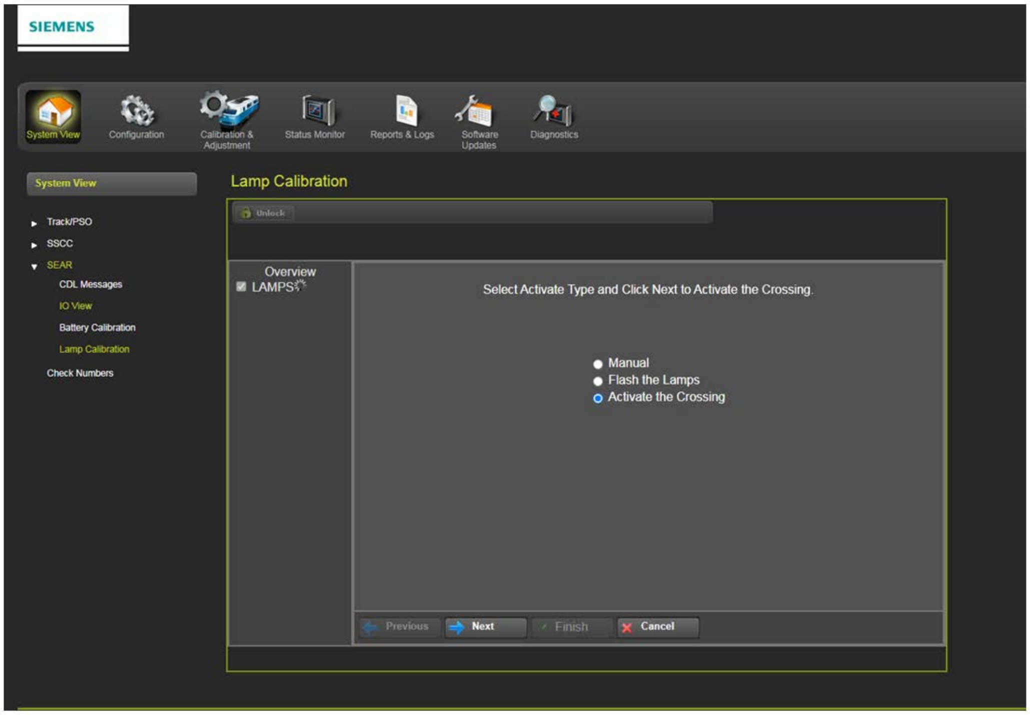


Figure 3-116 Lamp Calibration – Activating the Crossing

The next screen shows the activation of SSCC 1.

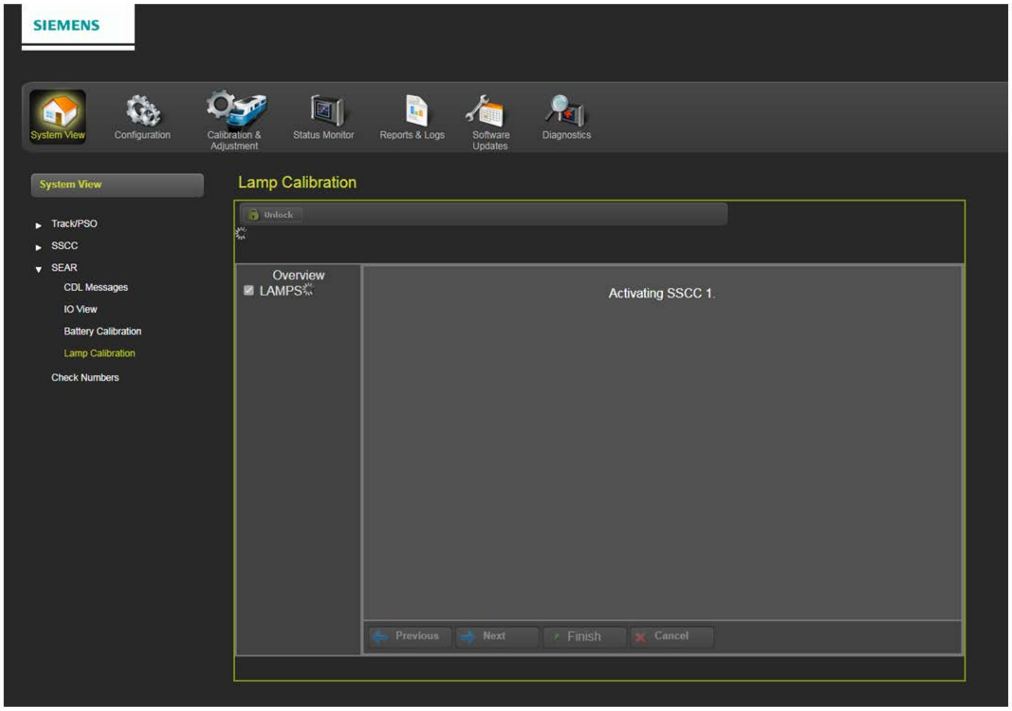


Figure 3-117 Lamp Calibration – Activating SSCC 1

A progress bar will be displayed with a countdown number indicating the progress of the calibration.

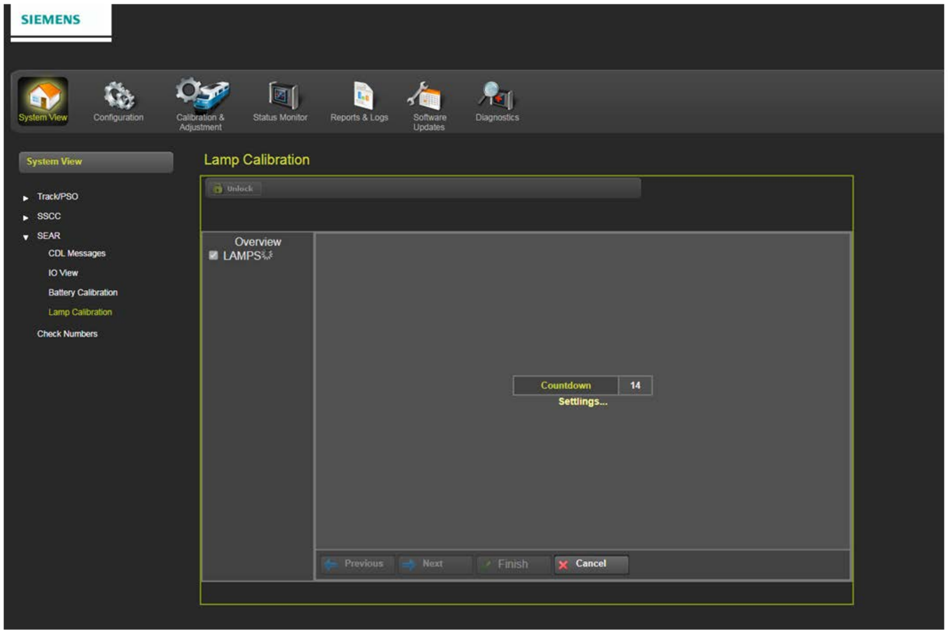


Figure 3-118 Lamp Calibration – Calibration in Progress

The next screen in the calibration process requires entering the number of bulbs being used. After entering the bulb count, click on the Next button to continue as shown in Figure 3-118.

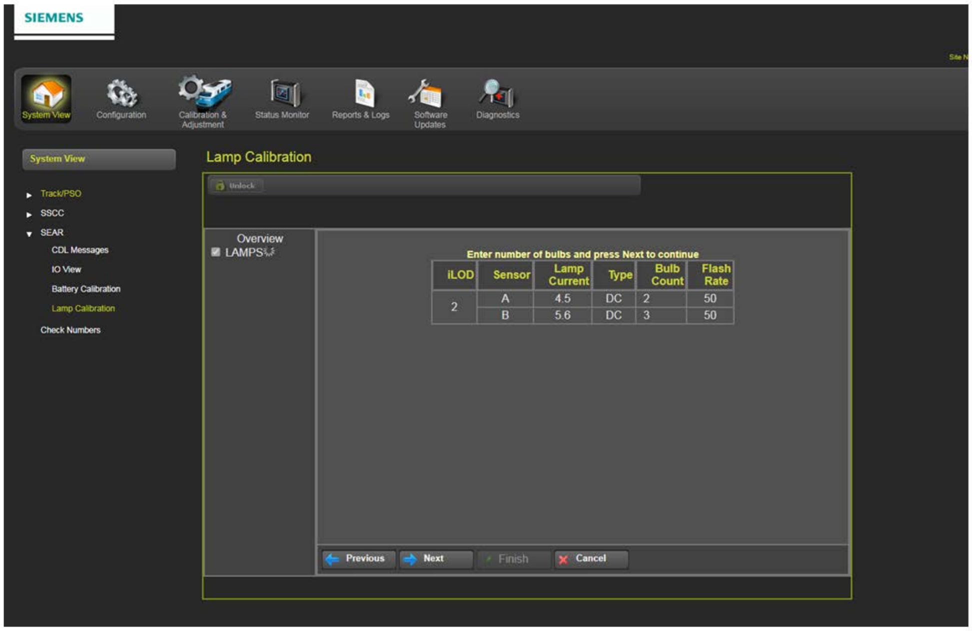


Figure 3-119 Lamp Calibration – Number of Bulbs

The next screen shows the deactivation of SSCC 1 and the completion of the calibration.

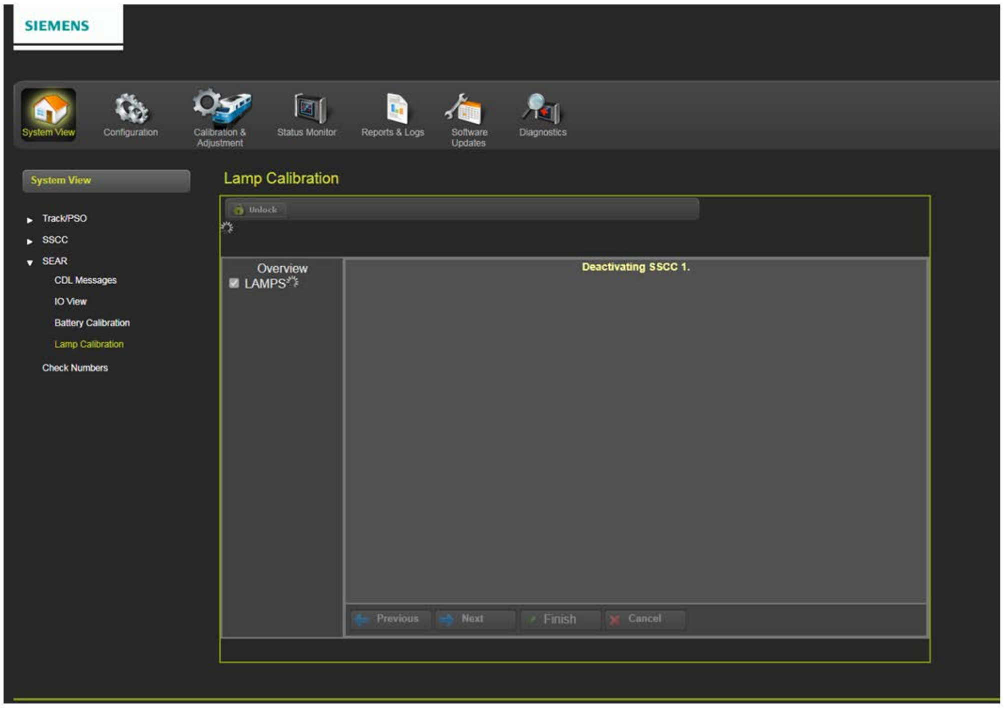


Figure 3-120 Lamp Calibration – Deactivating SSCC1

The final screen shows the calibration process is completed.

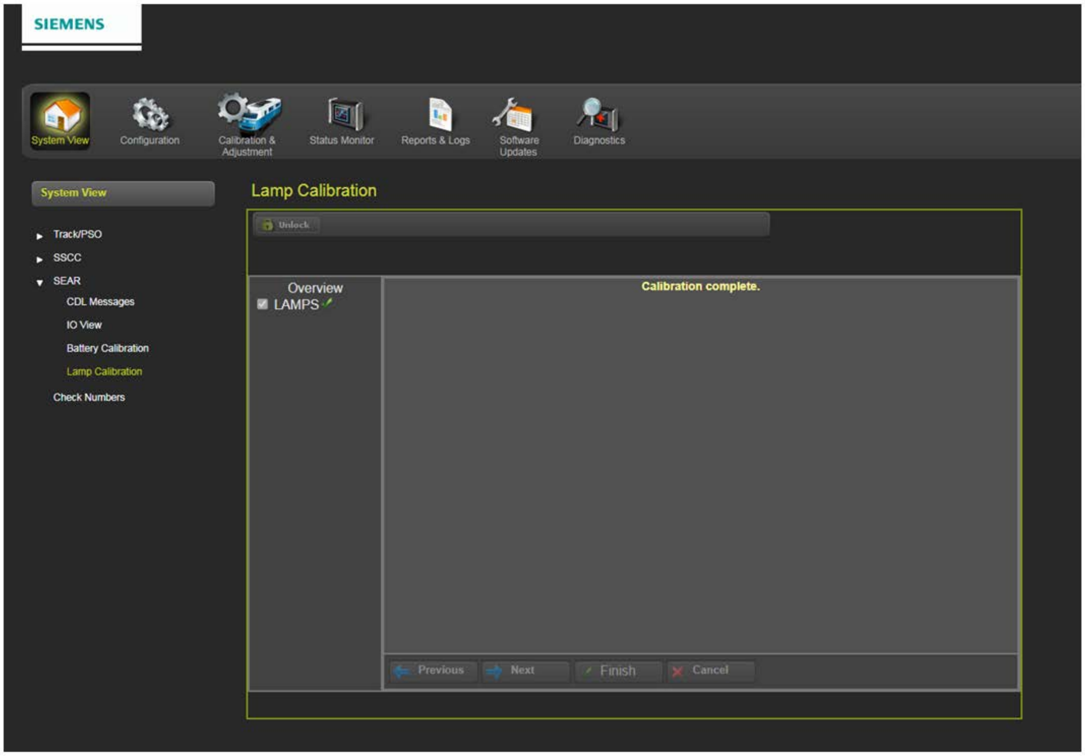


Figure 3-121   Lamp Calibration – Calibration Complete

3.5.1.8 System View - Check Numbers

The check numbers screen has been updated to show the PSO Check Numbers (PCNs) and Field Check Numbers (FCNs).

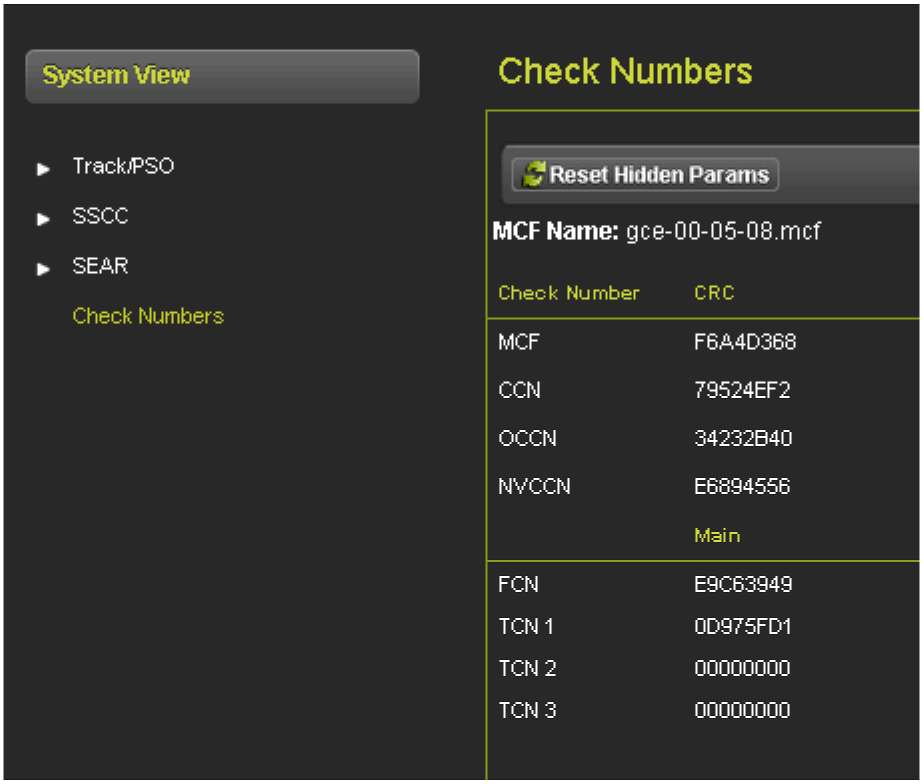


Figure 3-122 Web UI Check Numbers Screen

The TCN and FCN will show a value of 0 if the PSO module is not fully configured and calibrated and in session with the CPU (for the powered side).

When only a transmitter is used on the PSO module, the TCN will show 0.

The TCN will change whenever the PSO module receiver or island is recalibrated.

If a parameter is changed which causes the PSO receiver or island to require calibration, then the TCN will show zero.

.

NOTE

NOTE

If a parameter that affects the TCN is changed, so calibration is required, but then it is changed back to its original value, the PSO will no longer require calibration, but the TCN is updated to a new value, as the TCN is recalculated when the PSO goes from an uncalibrated to a calibrated state.

The FCN is an overall check number covering the PCNs for all used PSO Modules and the crossing controller lamp voltage settings. It will also show 0 if any PSO receiver or island is not calibrated.

The configuration report lists the TCNs and FCNs.

3.5.2 Configuration

The configuration menu has four sections, Site Configuration, GCP Programming, SEAR Programming, and Display Programming.

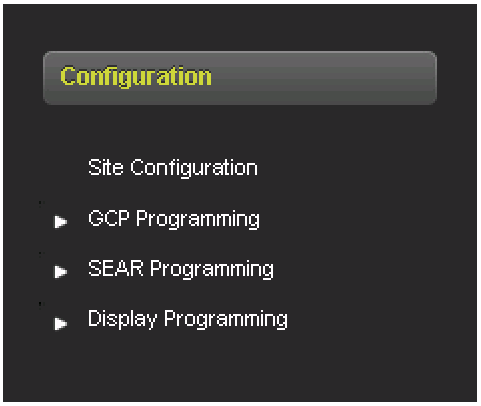


Figure 3-123 Web UI Main Configuration Menu Options

NOTE

NOTE

To change configuration parameters via the Web User interface that affect the safe operation of the GCE, someone must be physically present at the site to confirm local user presence before a parameter can be changed.

3.5.2.1 Site Configuration

The site configuration menu allows the user to set the information shown in Figure 3-124.

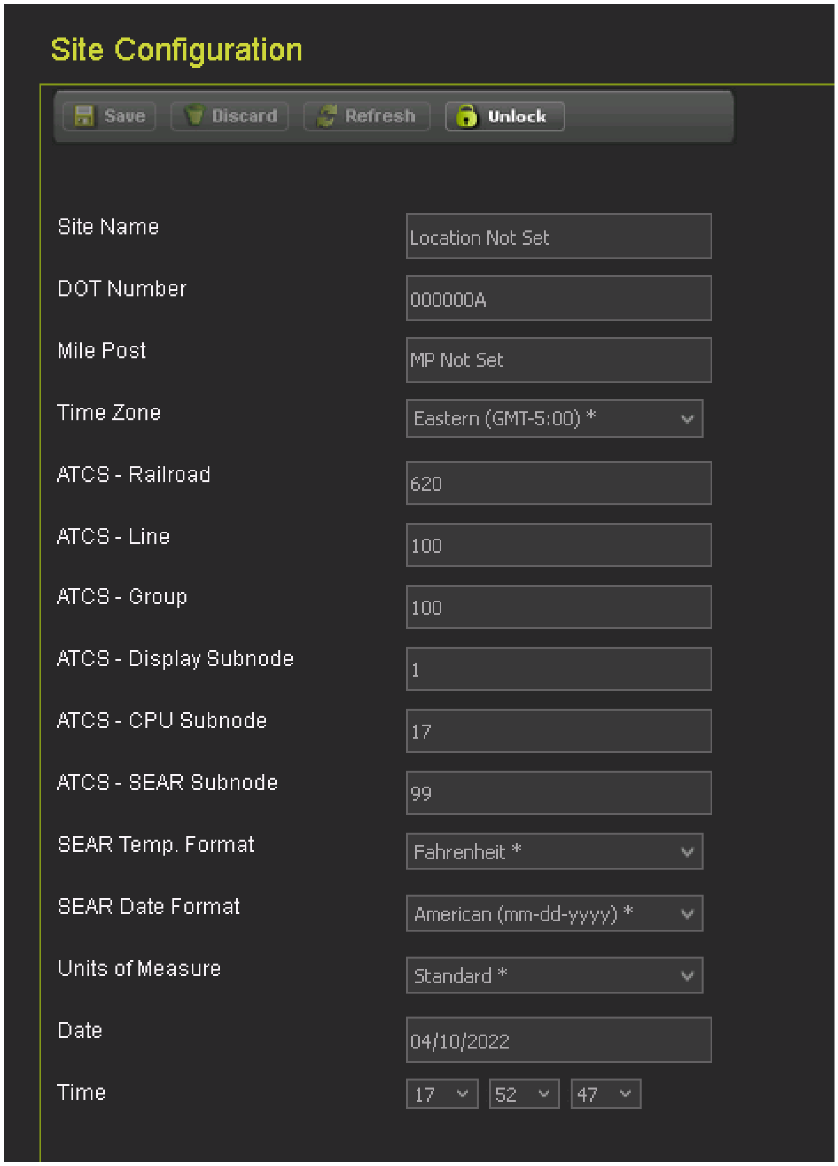


Figure 3-124 Web UI Site Configuration

3.5.2.2 GCP Programming

The majority of GCP Programming parameters affect the logic for the crossing and are editable in the Web UI or by loading a PAC file. The top-level GCP Programming menu is shown in Figure 3-125. See Sections 6 and 10.1 for details of GCP Programming

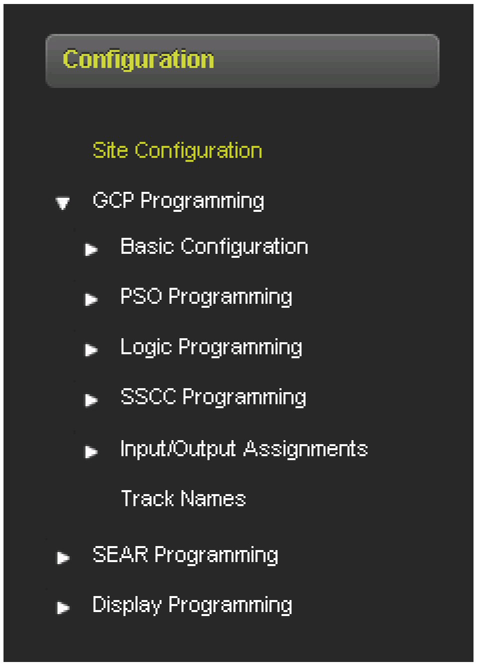


Figure 3-125 Web UI GCP Programming

3.5.2.3 SEAR Programming

In the GCP5000 (GCE) the SEAR IIi is programmed via the A80485 Display Web UI or Local UI menu. In the GCP5000 (GCE) the configuration data for the SEAR is stored in the USB ECD by the Display, this means that if the SEAR IIi is replaced it will not require reprogramming.

The GCP5000 (GCE) also allows the SEAR IIi programming to be done offline using the OCE. The PAC file created by the OCE contains the SEAR IIi configuration settings.

When the OCE has been used to completely program the SEAR IIi and the CDL questions have been answered, the following steps should be done to complete the setup on the GCP5000 (GCE):

1. Load CDL,
2. Load PAC file,
3. Install SEAR IIi Echelon modules,
4. Perform the Lamp Calibration procedure,
5. Perform the Battery Calibration procedure.

If the PAC file already had CDL questions answered, it is not necessary to reperform the CDL Q&A on the GCP5000 (GCE) provided that no other configuration is changed.

In some cases, the SEAR IIi programming may not be complete when the PAC file was created, if so, the following steps should be done to complete the setup on the GCP 5000:

1. Load CDL,
2. Load PAC file,
3. Configure any remaining SEAR IIi settings (that were not specified in the PAC file),
4. Run through the CDL Q&A,
5. Install SEAR IIi Echelon modules,
6. Perform the Lamp Calibration procedure,
7. Perform the Battery Calibration procedure.

Figure 3-126 shows the SEAR IIi programming available or the Web UI of the A80485 Display Module. Similar menus are available on the local user interface of the Display Module.

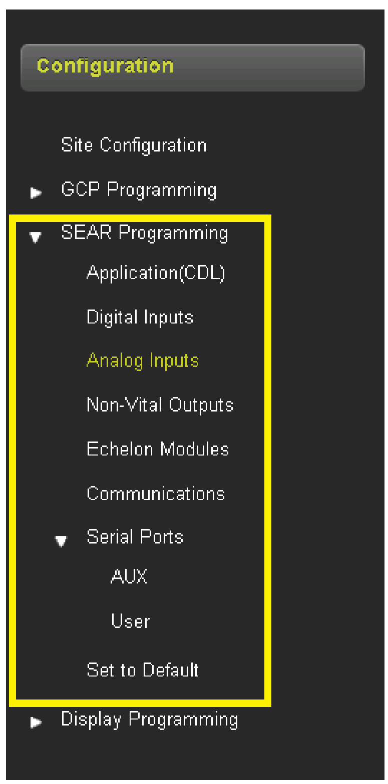


Figure 3-126 SEAR Program Menus

3.5.2.3.1 Application (CDL)

As part of the SEAR programming, the user can select a CDL file

Figure 3-127 SEAR CDL Selection

Once the CDL has been loaded, the user can answer the CDL questions by clicking on the Start button and then click on Next to move to the next question as shown in Figure 3-128.

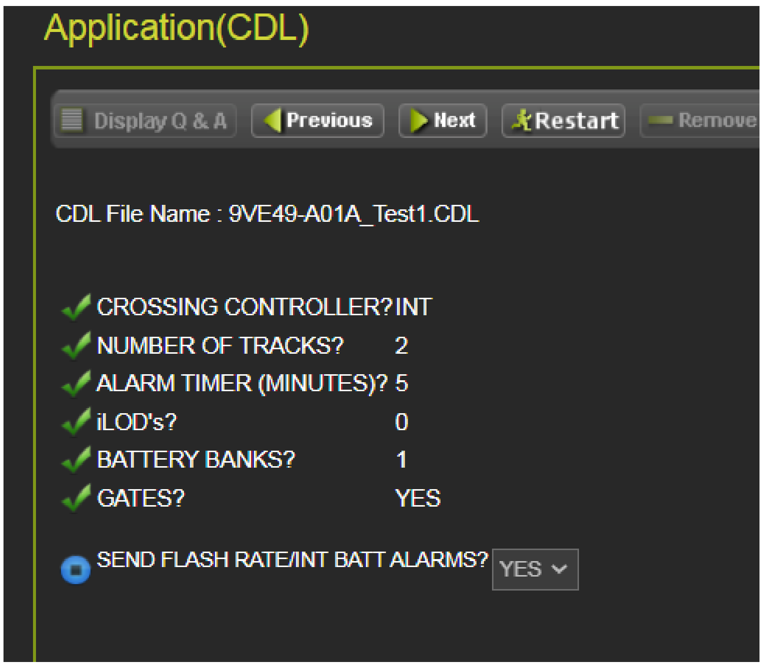


Figure 3-128 SEAR CDL Questions

Once all the questions have been answered, the user can compile, the CDL, shown in Figure 3-129 and Figure 3-130.

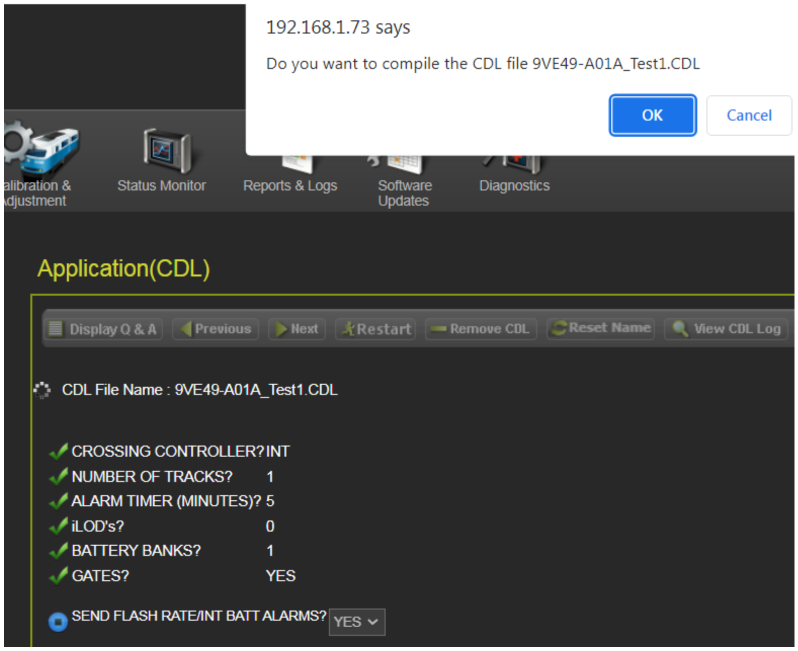


Figure 3-129 SEAR CDL Compile Message

Figure 3-130 SEAR CDL Compile Complete

NOTE

NOTE

The SEAR application will not run unless CDL Setup is completed.

CDLs are specific to the crossing applications.

3.5.2.4 Digital Inputs

On the GCP5000 (GCE), the Web UI allows the user to set the values for digital inputs on the SEAR.

The SEAR IIi has 63 digital inputs, two of these are accessible on the front of the SEAR IIi. The remaining 61 are connected to traces on the back plane of the chassis that allows the SEAR IIi to monitor the GCP I/O without requiring any external wiring.

The left column shows the type of module in the slot, or empty if there is no module. The Label column indicates the name on the GCP chassis terminals. The names shown in the Label column depend on what type of module is defined in the GCP programming module configuration. Thus, it is important to program the vital parameters and I/O assignments in the GCP before doing the SEAR programming, see Section 4.12.5 regarding the order of programming.

If a PSO module is defined, the Web UI will show the label relating to what is seen on the Mylar for each I/O point on the chassis, for example for PSO 1 four channels are potentially available: OUT 1.1, OUT 1.2, and IN 1.1, IN 1.2 are listed as shown in Figure 3-131 (the SEAR IIi does not connect to the PSO connections or the OUT 1.3 connection for PSO). For PSO 2 to 5, eight channels are potentially available corresponding to OUT x.1, OUT x.2 IN x.1 IN x.2, OUT x.3and the 3 track connections: PSO x 1 RCV, PSO x 2 RCV, and PSO TX.

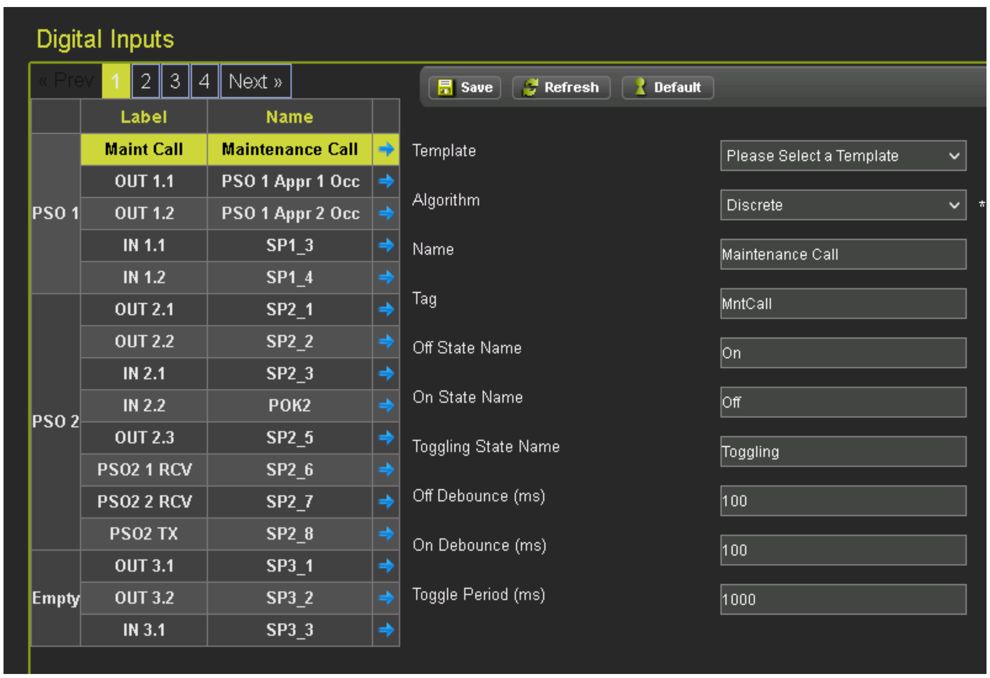
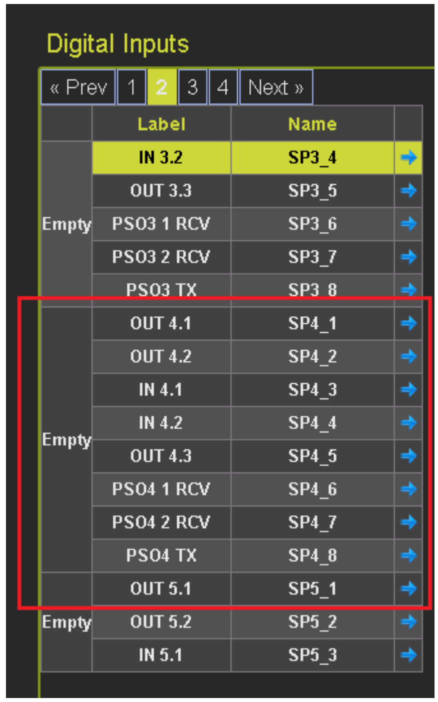


Figure 3-131 SEAR Digital Inputs – Tracks 1 and 2

If no module is allocated to the slot in the module configuration, the Labels are named as they would for empty PSO slots (i.e., they have the PSO labels seen on the chassis). If the SEAR digital input has not been allocated a function it will have the Name: SPx_y. (SP = spare).



Digital Inputs

« Prev 1 2 3 4 Next »

	Label	Name
Empty	IN 3.2	SP3_4
	OUT 3.3	SP3_5
	PSO3 1 RCV	SP3_6
	PSO3 2 RCV	SP3_7
	PSO3 TX	SP3_8
Empty	OUT 4.1	SP4_1
	OUT 4.2	SP4_2
	IN 4.1	SP4_3
	IN 4.2	SP4_4
	OUT 4.3	SP4_5
	PSO4 1 RCV	SP4_6
	PSO4 2 RCV	SP4_7
	PSO4 TX	SP4_8
Empty	OUT 5.1	SP5_1
	OUT 5.2	SP5_2
	IN 5.1	SP5_3

Figure 3-132 SEAR Digital Inputs Channel for an empty slot

The SEAR digital inputs corresponding to SSCC IIIi modules are labeled as shown in Figure 3-133 which illustrates the first SSCC module and part of the second one.

Digital Inputs

« Prev 1 2 3 4 Next »

	Label	Name
Empty	IN 5.2	SP5_4
	OUT 5.3	SP5_5
	PSO5 1 RCV	SP5_6
	PSO5 2 RCV	SP5_7
	PSO5 TX	SP5_8
SSCC 1	IN 7.1	SSCC1 VI-1
	IN 7.2	GD 1.2
	IN 7.3	SSCC1 VI-3
	IN 7.4	GD 1.1
	IN 7.5	GP 1.1
	1GC	Gate Output 1
	1BELL	SSCC1 Bell
SSCC 2	IN 8.1	SSCC2 VI-1
	IN 8.2	SSCC2 VI-2
	IN 8.3	SSCC2 VI-3
	IN 8.4	SSCC2 VI-4

Figure 3-133 SEAR Digital Inputs Channel for SSCC IIIi

The SEAR digital inputs corresponding to a RIO module are labeled as shown in Figure 3-134 which illustrates a RIO in slot 5.

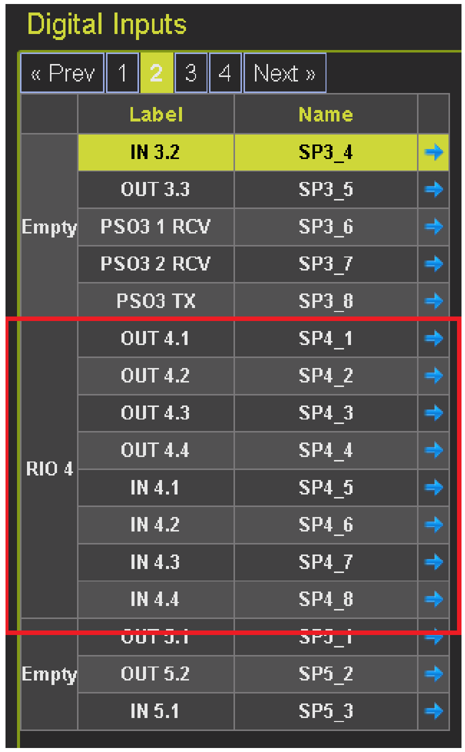


Figure 3-134 SEAR Digital Inputs Channel for RIO

The Name column indicates the function the digital input is being used for and is the name used in SEAR IIi event log entries when the digital input changes state. If the GCP programming has already assigned an input or output function for this channel, the Web UI will show this channel as pre-assigned and show the function assigned in the GCP programming in the Name column, as shown in Figure 3-135. When the GCP programming has assigned the input or output, the corresponding SEAR digital input algorithm is automatically selected as a Discrete input and most properties associated with the preassigned input are locked, as shown. The debounce times are still editable.

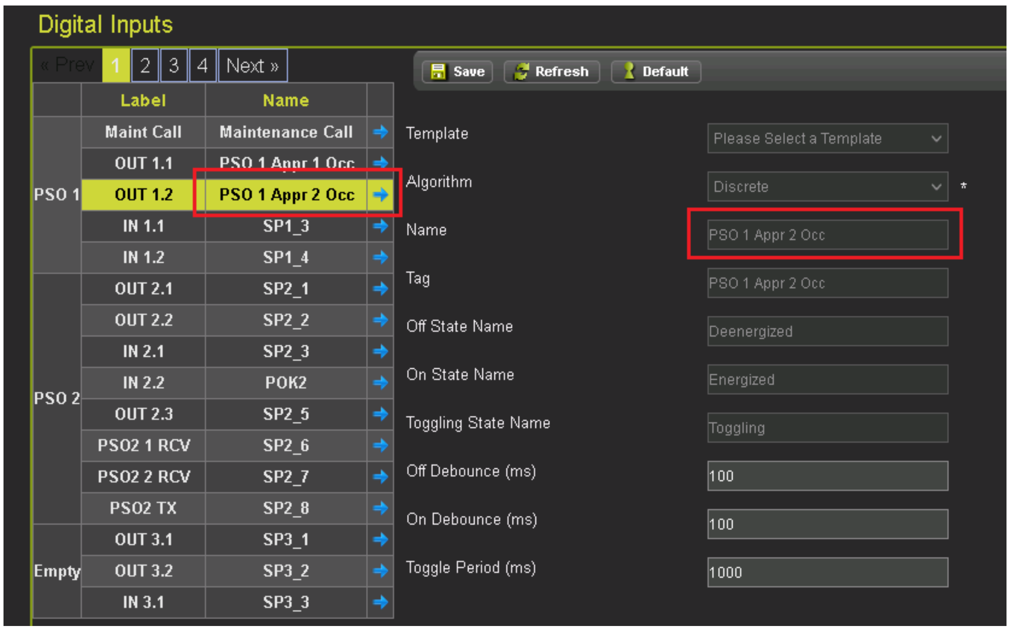


Figure 3-135   Digital Inputs GCP Assigned Vital I/O

The CDL program may also have already assigned an input, in which case it will be shown as locked here.

When the slot is used for a PSO module, the SEAR digital inputs corresponding to PSO track connections are automatically set to unused and are not available to be used for other purposes, for example, Figure 3-136. If the slot is empty, the digital inputs labeled with track connections are available, since no module is present and using these connections.

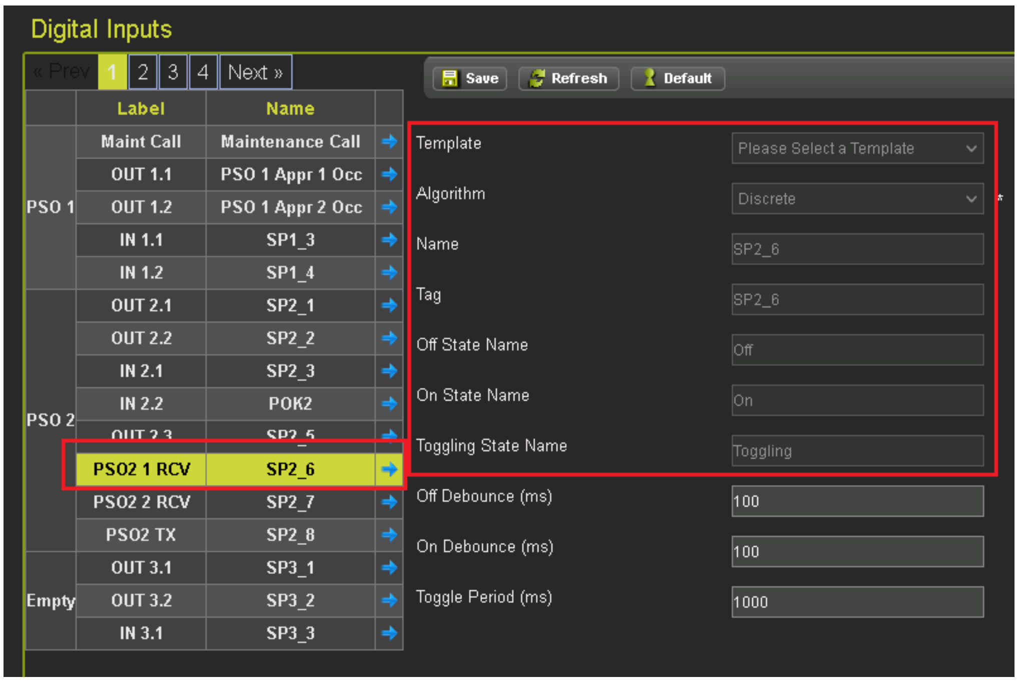


Figure 3-136   SEAR Digital Inputs GCP Track Connections

SEAR digital inputs that are not being used by the GCP programming and are not track connection inputs can be used to monitor outputs from other sources that can be wired into the GCP I/O connectors. It is not necessary to have a module in a slot, an empty slot can be used to monitor digital inputs by wiring to the GCP I/O connectors for that slot.

To configure a digital input use the Template parameter to choose one of the predefined input types as shown in Figure 3-137.

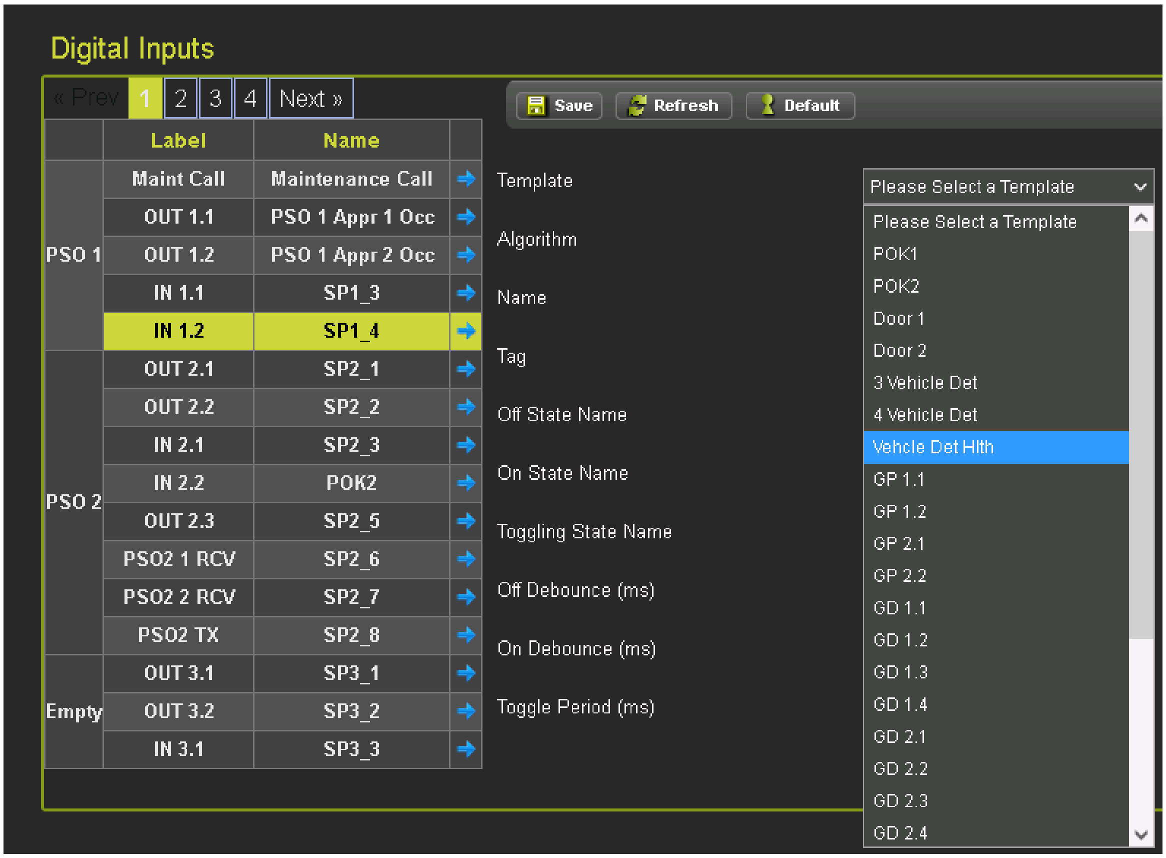


Figure 3-137   SEAR Digital Input Template

The available templates that set up the input as a discrete input are shown in Table 3-1, the table also shows the default tag names for the template type.

When one of these templates is selected the Name is set automatically to that of the template and a tag (used by the CDL) is automatically generated. The on and off and toggle states names default to de-energized, energized and toggle and the debounces to 100ms, and toggle period 1000ms as shown in Figure 3-138.

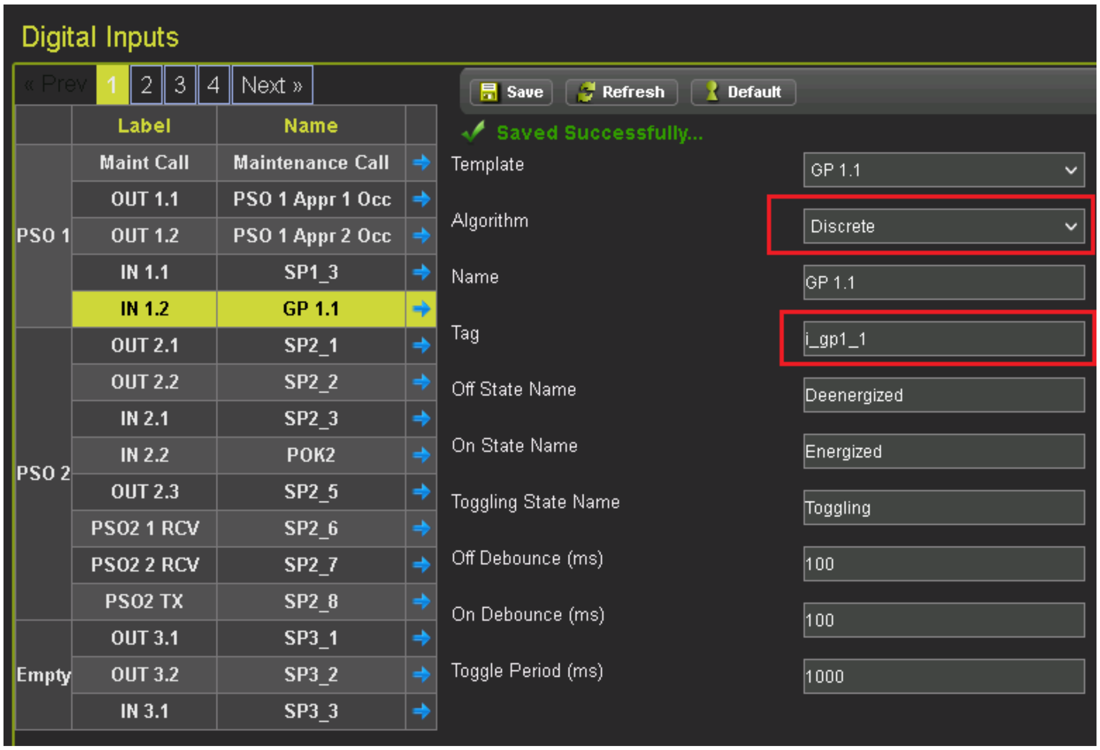


Figure 3-138 SEAR Digital Inputs Discrete

Table 3-1 Discrete Template Options

Template/Name	Default Tag
POK1	POK1
POK2	POK2
Door1	DOOR1
Door 2	DOOR2
3 Vehicle Det	i_3_vdet
4 Vehicle Det	i_4_vdet
Vehicle Det Hlth	i_vdet_h
GP 1.1	i_gp1_1
GP 1.2	i_gp1_2
GP 2.1	i_gp2_1
GP 2.2	i_gp2_2
GD 1.1	i_gd1_1
GD 1.2	i_gd1_2
GD 1.3	i_gd1_3
GD 1.4	i_gd1_4
GD 2.1	i_gd2_1
GD 2.2	i_gd2_2
GD 2.3	i_gd2_3
GD 2.4	i_gd2_4
General 1	GEN1
General 2	GEN2
General 3	GEN3
General 4	GEN4
Ext Island 1	ExtIsl1
Ext Island 2	ExtIsl2
Ext Island 3	ExtIsl3
TXGI	TX

The user is free to edit the tag names, state names, or debounce times as needed.

Only certain inputs are available which can be configured as Ground fault test inputs or MTSS inputs. These correspond with the top input of the lower PSO I/O connector for the PSO and RIO slots, the 5 inputs for each SSCC module, and the two inputs on the front of the SEAR. The labeling of these will depend on whether a module is present in the slot and what type it is, as shown in Table 3-2.

Table 3-2 Connections allowing TSS and Gnd Fault Tester

PSO Card Present	RIO Present	Empty Slot
OUT 2.3	IN 2.1	OUT 2.3
OUT 3.3		OUT 3.3
OUT 4.3	IN 4.1	OUT 4.3
OUT 5.3	IN 5.1	OUT 5.3

The SSCC inputs on SSCC Module 1 (SSCC1 VI-1 thru SSCC1 VI-5) and SSCC Module 2 (SSCC2 VI-1 thru SSCC2 VI-5) are also available to be used for Ground fault tester and MTSS inputs provided that they are not being used by the GCP Programming.

The two inputs on the front of the SEAR (DI1 (J3) and DI2 (J3)) are also available to be used for the Ground fault tester and MTSS.

When an input is selected with algorithm MTSS, the options shown in Figure 3-139 are available.

.

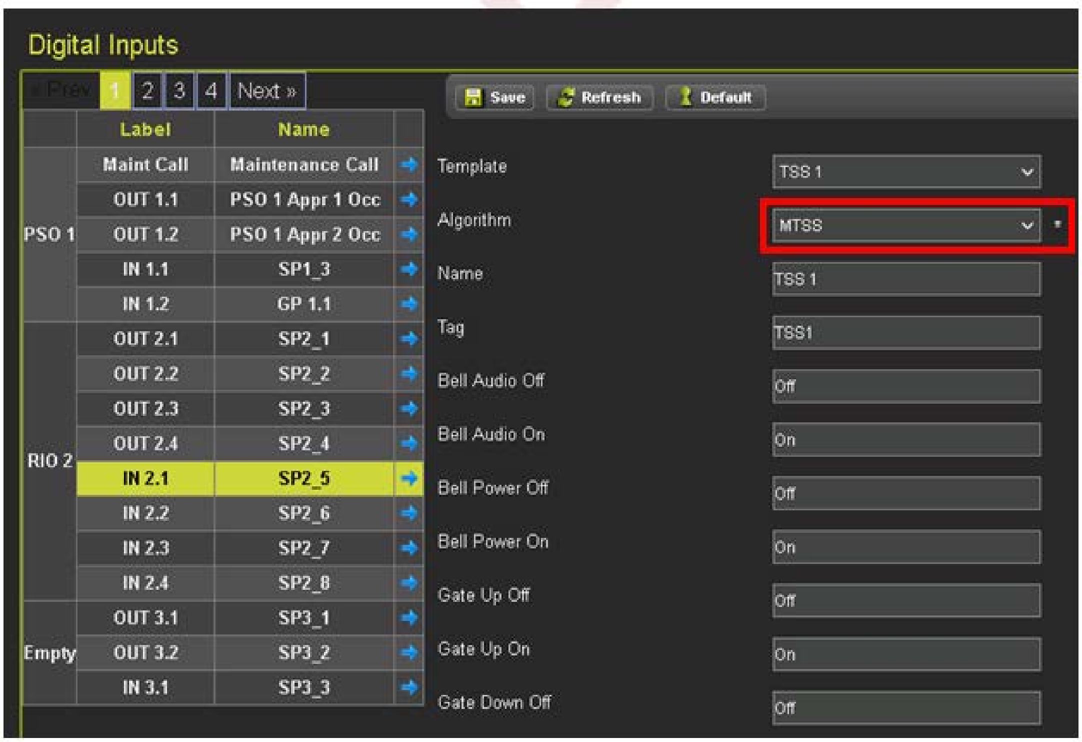


Figure 3-139 SEAR Digital Inputs TSS Options

When an input is selected with algorithm GFT (Ground fault tester) the options shown in Figure 3-140 are available.

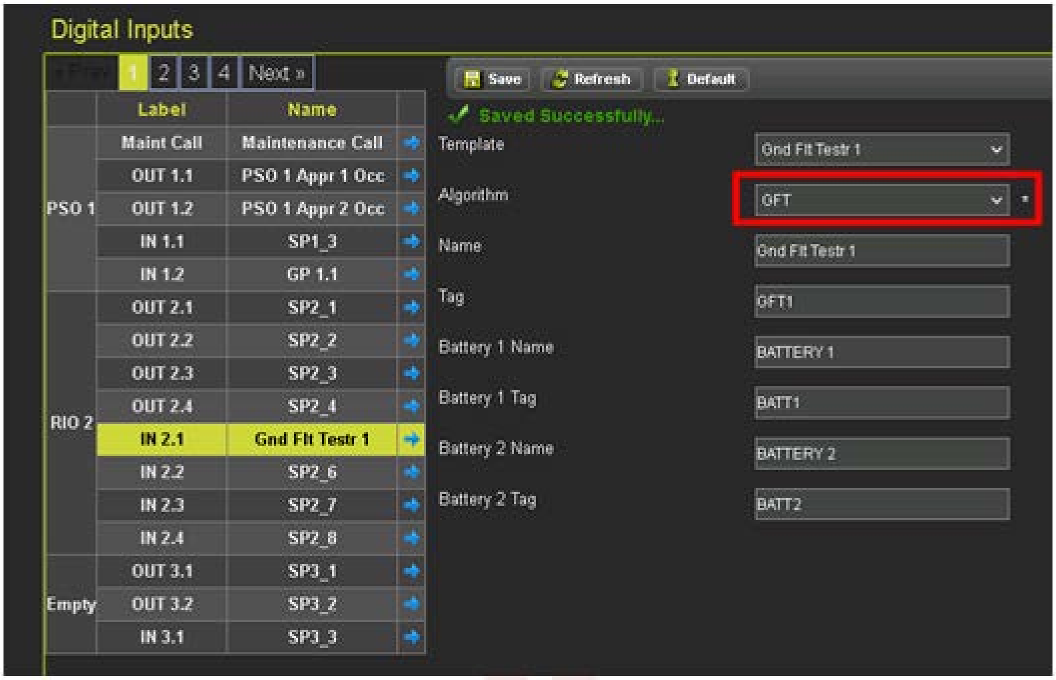


Figure 3-140 SEAR Digital Inputs GFT Options

NOTE

> **NOTE**
>
> The terminal interface is still available on the SEAR in the GCP5000, but the user should use the Display Module as the primary way of configuring the SEAR.

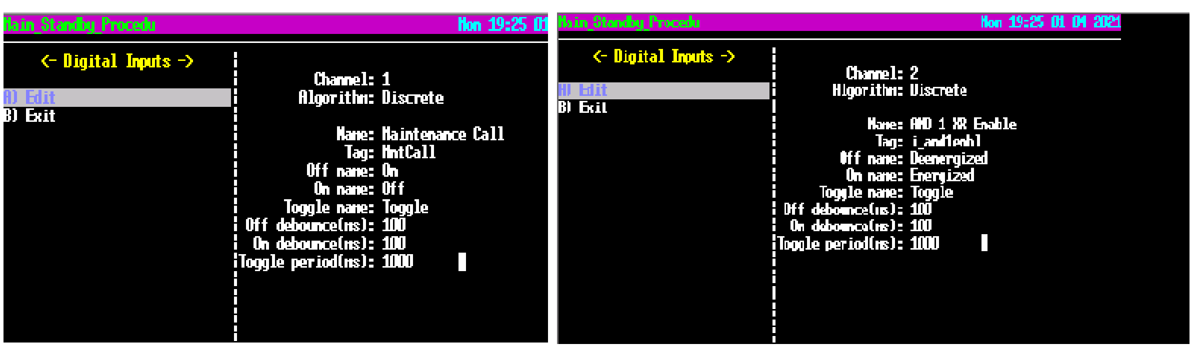


Figure 3-141 SEAR Terminal interface

3.5.2.5 Analog Inputs

The analog inputs can be used to monitor the voltage on standard 12 VDC and 24 VDC batteries. They may also be used to monitor any DC voltage from 0 VDC to 36 VDC. There are six battery monitor channels which are used as follows:

- General-purpose one on the front of the SEAR (BATT MON (J3)).
- Monitoring the GCP CPU and I/O module power (VBN).
- Monitoring each SSCC IIIi module power (SSCC1 and SSCC2).
- Monitoring the internal system temperature (Int. Temp).
- Monitoring the external system temperature (TEMP (J3)).

Note the J3 indicates the connector number on the front of the SEAR IIi for the external ones.

Table 3-3 Battery Input Settings

Setting	Description
Name	Up to 20 characters long and used to describe the input but not used in event reports.
Tag	Up to 10 characters long and used to identify the input in event reports and local menus.
Sample Period	The number of milliseconds between the processing of the input. Events for the input can be logged on this interval only. Internally, the SEAR IIi samples the inputs every 10 milliseconds regardless of this setting.
Resolution	Specifies the change in volts (or degrees Fahrenheit) required before an event will be logged into the SEAR IIi event buffer.
Samples to Average	Specifies the number of consecutive 10-millisecond samples to average together to determine the voltage present on the input. This value can be set to no averaging, 2 samples, 4 samples, 8 samples, 16 samples, or 32 samples.

Note that the SEAR IIi samples the input every 10 milliseconds, regardless of the ‘Sample Period’ setting. The ‘Sample Period’ setting determines how often the SEAR IIi will average the samples to determine if an event is logged. The number of 10-millisecond samples that are averaged is determined by the ‘Samples to Average’ setting.

If this calculated average results in a quantity that differs by more than the amount defined in ‘Resolution’ from the previously logged value, then a new event is logged.

For example, the battery inputs can be configured:

Resolution = 0.5 V

Sample Period =100 ms

Samples to Average = 32 samples

In this case, every 100 milliseconds the SEAR IIi averages the last 32 samples of 10 milliseconds each (a period of 320 milliseconds) and compares it to the last logged value of battery voltage on the input. If the new average value is different by 0.5 V or more from the last logged value, an event is logged. If the input's voltage changes rapidly, an event could be logged every 100 milliseconds.

The Analog inputs on the SEAR can be configured from the Analog Input tab shown in Figure 3-142.

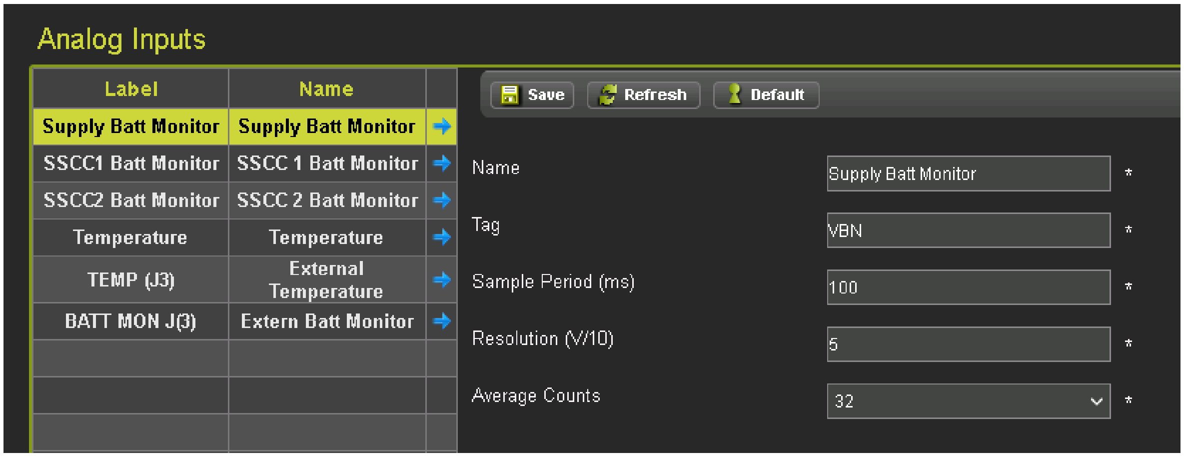


Figure 3-142 Analog Inputs

3.5.2.6 Non-Vital Outputs

Non-Vital outputs can be controlled to the OFF state, ON state, TOGGLING state, or PULSED state. In the OFF state, the relay contacts are open. in the ON state, the relay contacts are closed. In the TOGGLING state, the relay contact is opening and closing at the user-specified duty cycle and period.

The settings for each relay output are described in Table 3-4.

Table 3-4 Relay Output Settings

Setting	Description
Name	Up to 20 characters long and used to describe the relay but not used in event reports.
Tag	Up to 10 characters long and used to identify the relay in event reports and local menus.
State names	Up to 12 characters in length and displayed in event reports and local menus.
Toggle period	Specifies the time between cycles of toggling the relay output from off to on, and back to off in seconds.
Duty cycle	Specifies the percentage of time the relay is in the ON state when toggling.

The Non-Vital outputs on the SEAR can be configured from the Non-Vital Output tab shown in Figure 3-143. The Label shows the connector the output is available on and for the RTUs the specific pin number on the DB25 AUX connector.

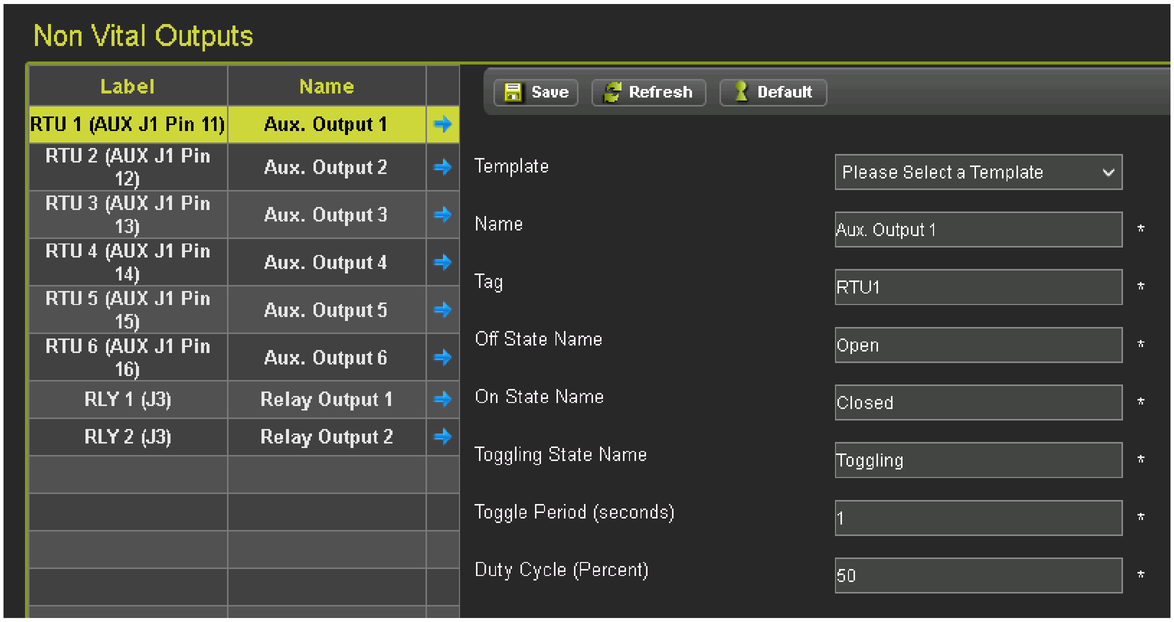


Figure 3-143 Non-Vital Outputs

To choose one of the predefined outputs, select a template from the list as shown in Figure 3-144.

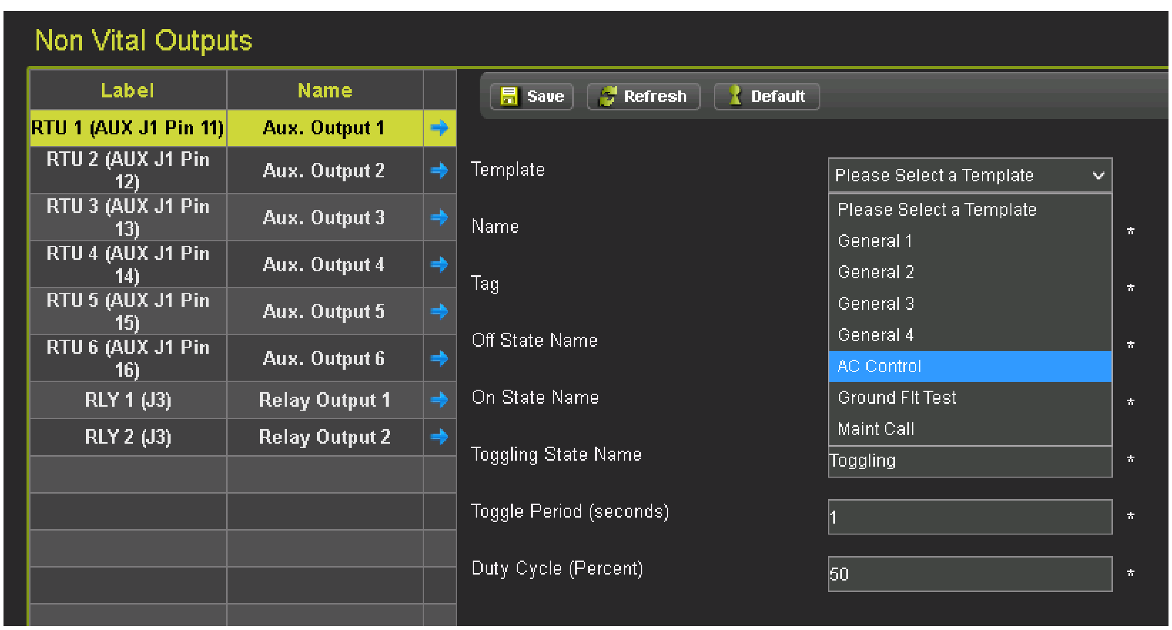


Figure 3-144 Non-Vital Output Templates

Selecting the template will automatically fill in the Name and Tag. The defaults for all outputs are shown in Figure 3-145.

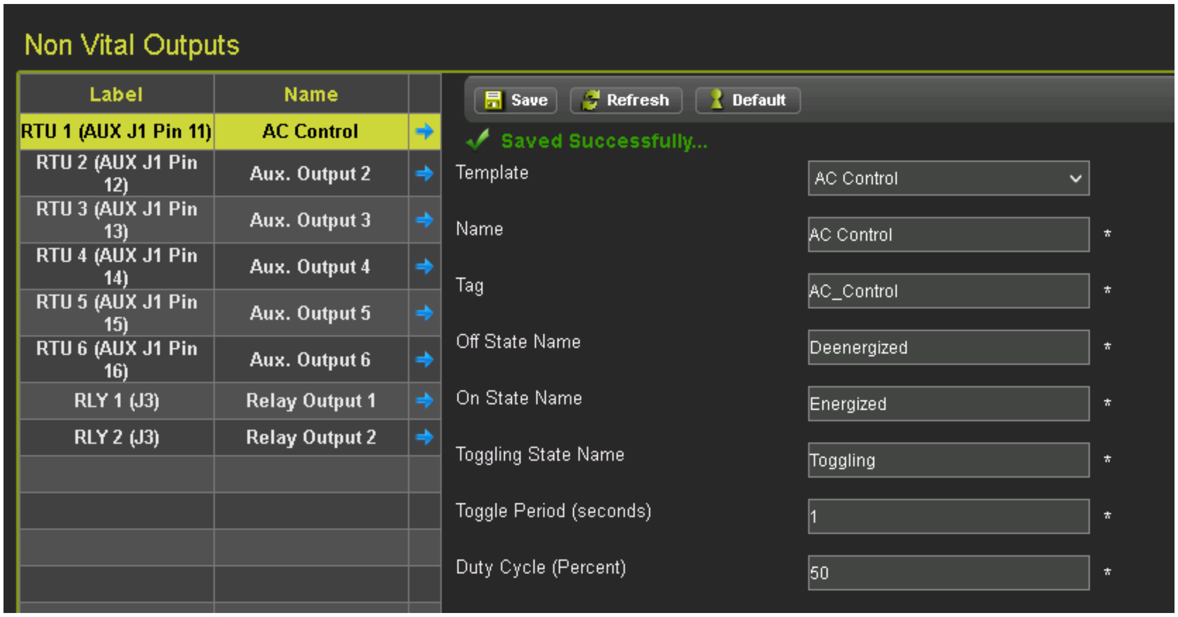


Figure 3-145 Non-Vital Output Defaults

Even when a template has been used, the user can still edit the properties for the output to their own values.

If there is no suitable template, the user can fill in their own values.

3.5.2.7 Echelon® Modules

The user can add Echelon® based modules such as the iLOD or SSCC from the Echelon® Modules Tab.

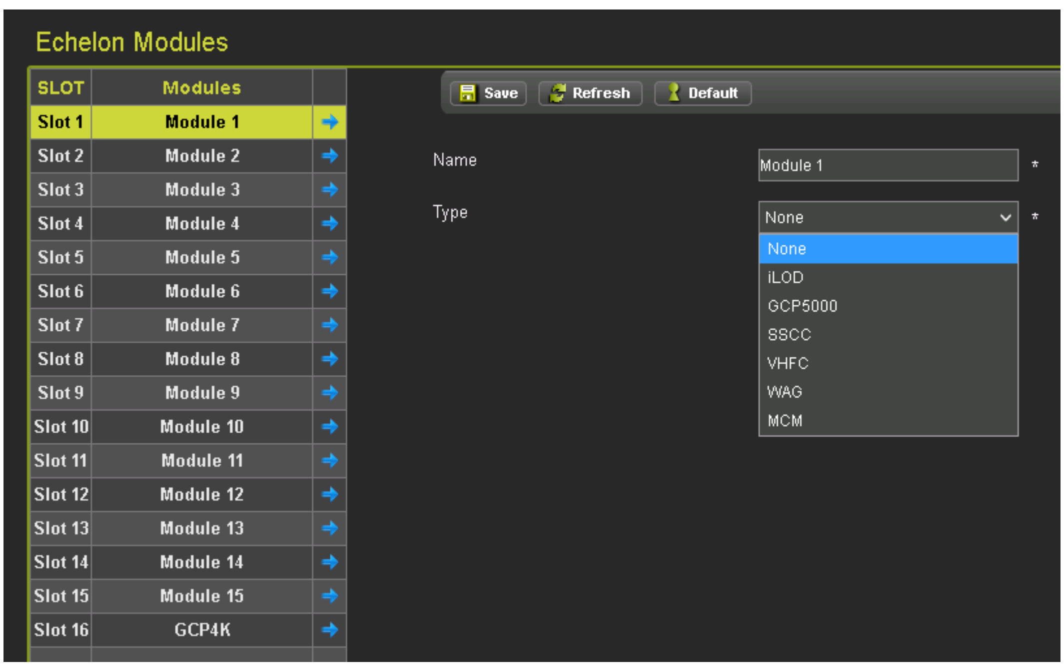


Figure 3-146 Echelon® Modules

3.5.2.7.1 iLOD Module

When an iLOD module is selected the following parameters are available.

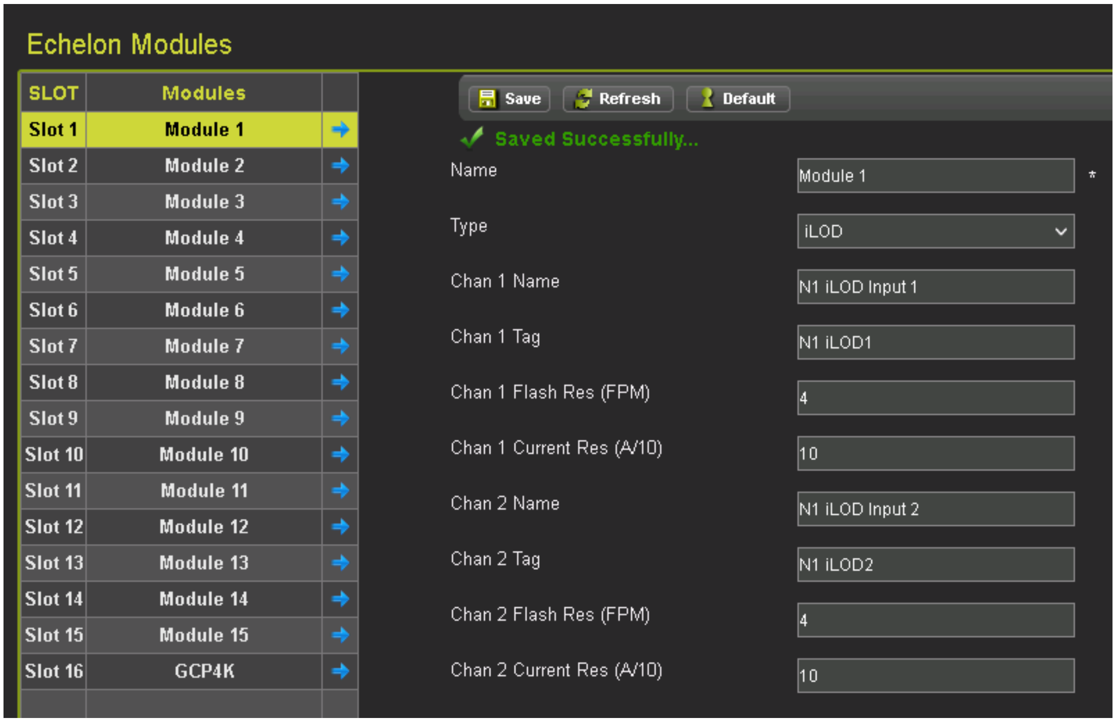


Figure 3-147 Echelon® Modules: iLOD

The flash rate in Flashes per Minute sets the message resolution for the lamps being monitored. This means that if the flash rate varies by as much as this number per minute, then an event message will go from the iLOD to the SEAR IIi.

The current resolution determines how much of a shift in current will generate a message to the SEAR IIi

See iLOD, A80271 user guide, SIG-00-03-05 for more details.

3.5.2.7.2 SSCC

The SEAR IIi can be used to monitor an external SSCC module. When SSCC is selected the parameters shown in Figure 3-148 are available. The user needs to configure the ATCS address of the SSCC module and the Echelon node (which should correspond to the Subnode fields in the ATCS Address).

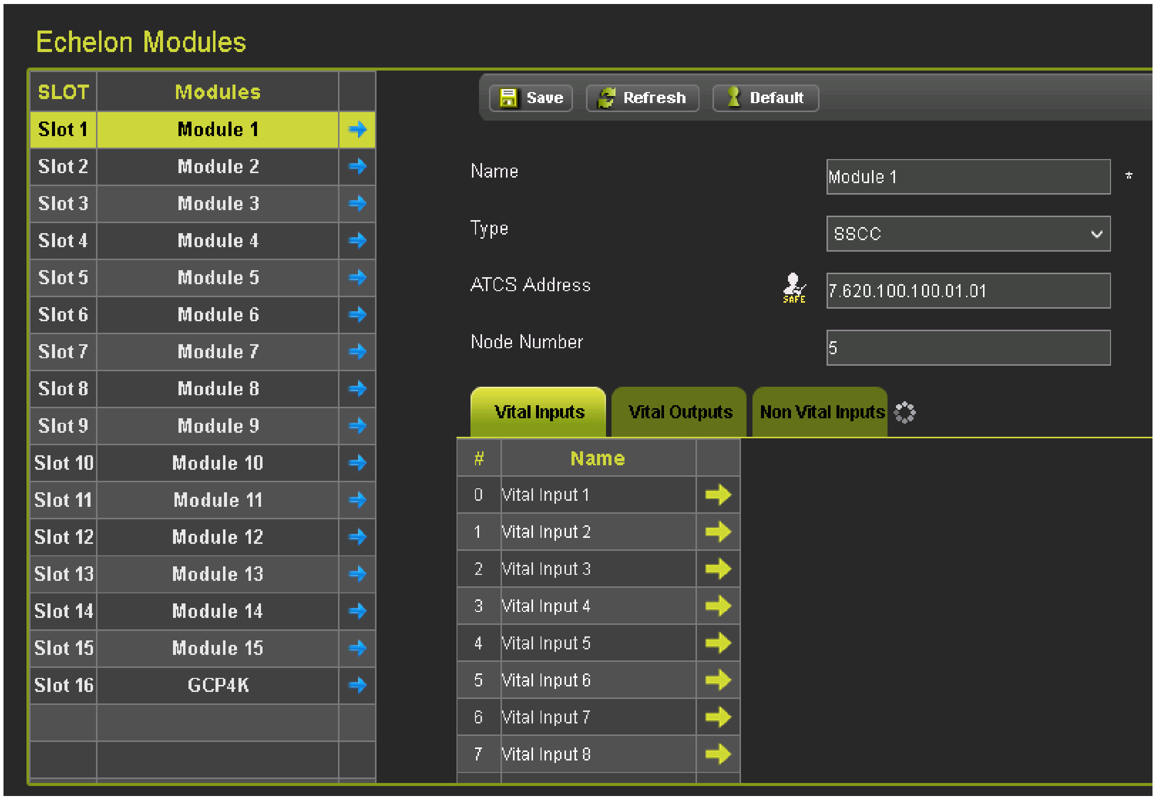


Figure 3-148 Echelon® Modules: SSCC

The user can specify the following:

- Vital Inputs 1 – 8:
    - Name, default Vital Input x (where = 1..8),
    - Tag, default VIx (where = 1..8)
    - Off State Name, default Off
    - On State Name, default On
- Vital Outputs Bank A
    - Lamp 1 Name, default 1 Lamp Output 1
    - Lamp 1 Tag, default 1 L1
    - Lamp 1 Burned Out Name, default Burned Out
    - Lamp 1 Flashing Name, default Flashing
    - Lamp 1 Off State Name, default Off
    - Lamp 1 On State Name, default On
    - Lamp 2 Name, default 1 Lamp Output 2
    - Lamp 2 Tag, default 1 L2
    - Lamp 2 Burned Out Name, default Burned Out
    - Lamp 2 Flashing Name, default Flashing
    - Lamp 2 Off State Name, default Off
    - Lamp 2 On State Name, default On
    - Bell Name, default 1 Bell Output
    - Bell Tag, default 1 Bell

    - Bell Off State Name, default Off
    - Bell On State Name, default ON
    - Gate Ctrl Name, default 1 Gate Control
    - Gate Ctrl Tag, default 1 GC
    - Gate Ctrl Off State Name, default De-energized
    - Gate Ctrl On State Name, default Energized
- Vital Outputs Bank B
    - Lamp 1 Name, default 2 Lamp Output 1
    - Lamp 1 Tag, default 2 L1
    - Lamp 1 Burned Out Name, default Burned Out
    - Lamp 1 Flashing Name, default Flashing
    - Lamp 1 Off State Name, default Off
    - Lamp 1 On State Name, default On
    - Lamp 2 Name, default 2 Lamp Output 2
    - Lamp 2 Tag, default 2 L2
    - Lamp 2 Burned Out Name, default Burned Out
    - Lamp 2 Flashing Name, default Flashing
    - Lamp 2 Off State Name, default Off
    - Lamp 2 On State Name, default On
    - Bell Name, default 2 Bell Output
    - Bell Tag, default 2 Bell
    - Bell Off State Name, default Off
    - Bell On State Name, default ON
    - Gate Ctrl Name, default 2 Gate Control
    - Gate Ctrl Tag, default 2 GC
    - Gate Ctrl Off State Name, default De-energized
    - Gate Ctrl On State Name, default Energized
- Non-Vital Inputs:
    - Flash Sync
        - Name, default Flash Sync
        - Tag, default Flash Sync
        - Off State Name, default De-energized
        - On State Name, default Energized
    - Maint Call Sync
        - Name, default Maint Call
        - Tag, default Maint Call
        - Off State Name, default De-energized
        - On State Name, default Energized

3.5.2.7.3 VHFC

When a VHF Communicator is selected, the parameters shown in Figure 3-149 are available.

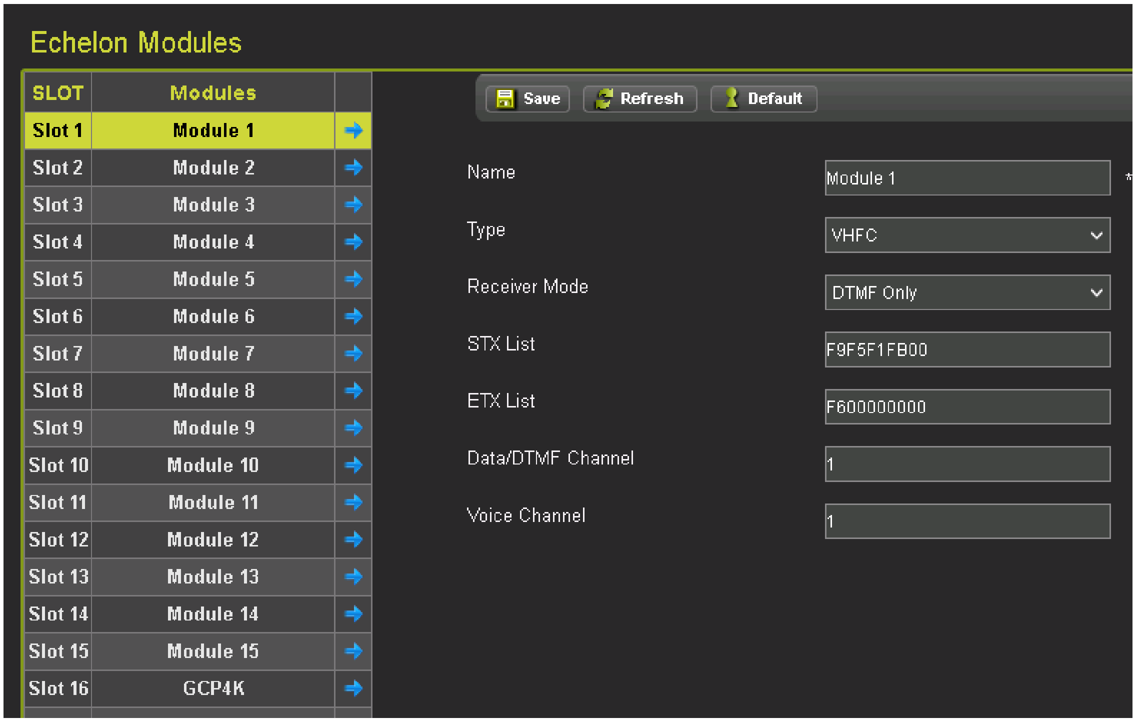


Figure 3-149 Echelon® Modules: VHFC

Table 3-5 VHF Communicator/SEAR II Configurable Settings

Setting	Possible Values	Default Value	Description
Receiver Mode	DTMF Only Framed Stream	DTMF Only	Determines the method the VHF Communicator will use to packetize the incoming data. See descriptions of types below. In DTMF only mode, no data will be received.
STX List	0 – FF (hex) for each of 5 values	F5 F9 FB F1 00	This setting is only applicable if Rx Type is set to Framed. List of up to 5 possible byte values that can represent the start of a valid frame of data. An entry with a value of zero is not used.
ETX List	0 – FF (hex) for each of 5 values	F6 00 00 00 00	This setting is only applicable if Rx Type is set to Framed. List of up to 5 possible byte values that can represent the end of a valid frame of data. An entry with a value of zero is not used.

Setting	Possible Values	Default Value	Description
Data/DTMF Channel	1 – 8	1	Specifies the channel of the radio that will be used to send and receive data packets and DTMF tones.
Voice Channel	1 - 8	1	Specifies the channel of the radio that will be used to transmit digitized speech.

For more details regarding the VHFC see SIG-00-03-002, VHF Communicator, A80276 User Guide.

3.5.2.7.4 WAG

When a WAG is selected the Node number is available, range 1-99, this is the Subnode on the Echelon® of the WAG. By default, this is 1.

The user may give the WAG a name, which the SEAR will use when logging entries related to this module.

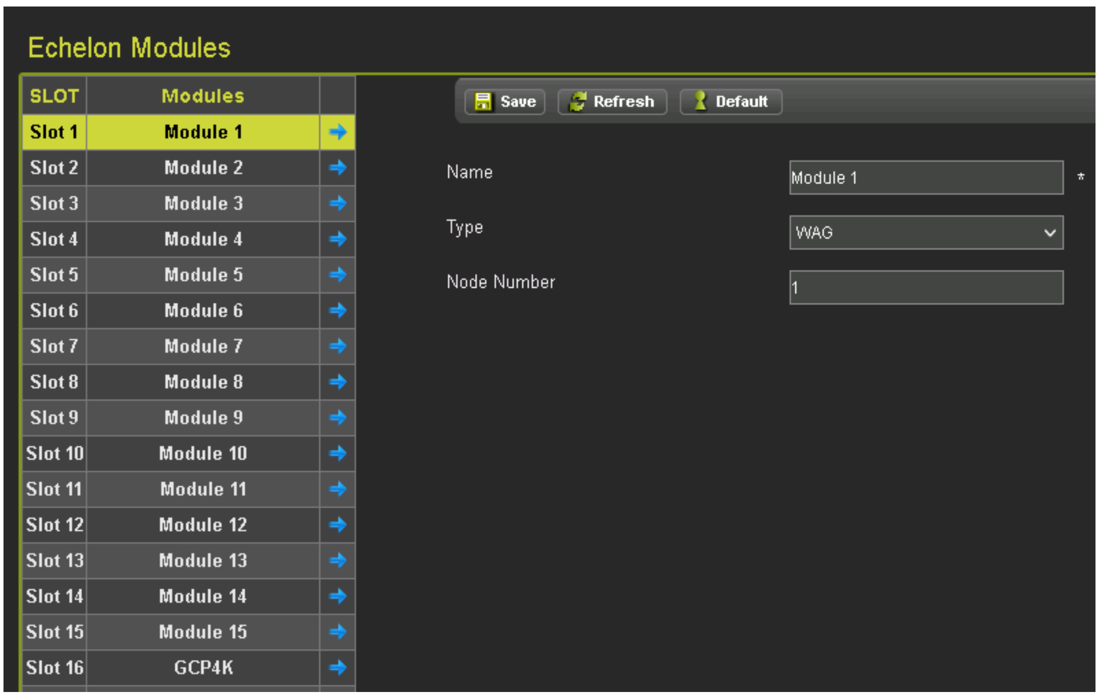


Figure 3-150 Echelon® Modules: WAG

3.5.2.7.5 MCM

When an MCM is selected the Node number is available, range 1-99, this is the Subnode on the Echelon of the MCM. By default, this is 1.

The user may enter a name for the MCM, which the SEAR will use when logging entries related to this module.

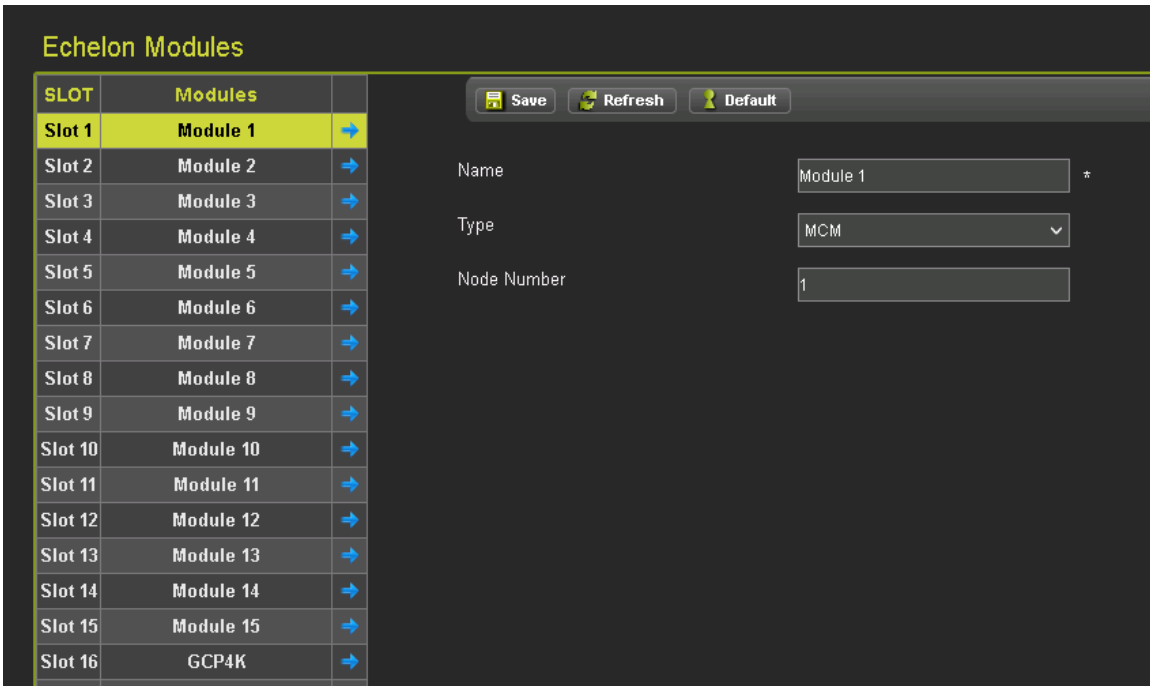


Figure 3-151 Echelon® Modules: MCM

3.5.2.7.6 GCP5000

When a GCP5000 is selected the Node number is available, this is the Subnode on the Echelon of the GCP CPU. By default, this should be set to 16. This corresponds to the ATCS – CPU Subnode number of the GCPs ATCS address set on the Site Configuration page. If the node number is changed here, the ATCS – CPU Subnode must also be changed to match. Note that this setting also applies when a CPU III is used, it is not specific to CPU II+.

Module 16 is assigned by default to be a GCP5000 and will have Node number 16.

NOTE

NOTE

The default name for module 16 is GCP4K, not GCP5K. The reason for this is to be backward compatible with CDL programs written for the GCP4000. If the name is changed here the CDL must be changed to match.

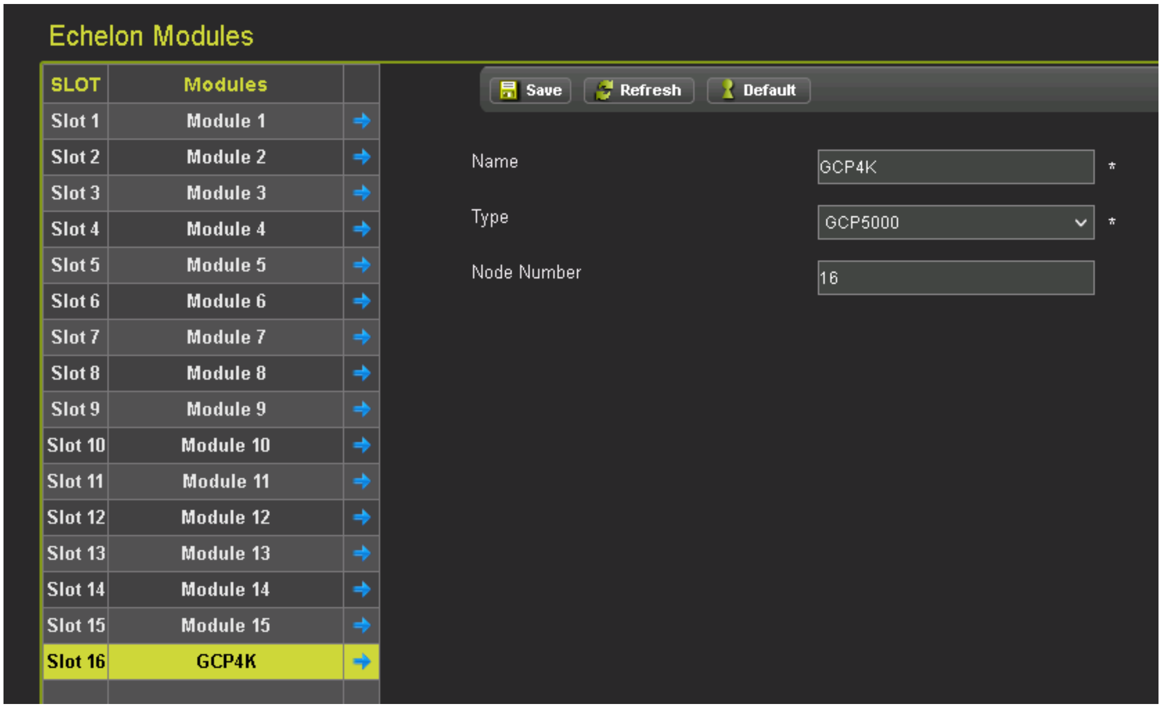


Figure 3-152 Echelon® Modules: GCP5000

3.5.2.8 Communications

The Sear Iii may be configured to operate with external communication devices. For more details on communication networks see the Event Analyzer Recorder (SEAR II) A80273, SIG-00-02-07 manual.

The communications parameters are configured on the Communication tab shown in Figure 3-153.

Figure 3-153 SEAR Communications

The user defined settings for each device are described in Table 3-6.

Table 3-6 Communications Settings

Site Type	Settings
No Communication	N/A
Bullhorn/MODBUS	POLL ID
NODE	Site address, office address, office site, backup site 1, backup site 2, field device
Collector	Site address, office address, poll ID, office device, office port, field device
CDS-902X (Cellular Modem)	none
Dial-up	Modem init string

3.5.2.8.1 Node

A SEAR IIi module with the site type set to Node is a slave unit in the ATCS enhanced routing protocol used to “hop” alarms to a Collector. Messages may hop from one Node to the next until they reach a collector where they will be forwarded to the office system. A Node has the following settings.

Table 3-7 Node Settings

Setting	Description
Site Address	ATCS address of this site. The address is a type 7 field address with the following format: 7.RRR.LLL.GGG.SS.DD.
Office (WAMS) ATCS Addr	ATCS address of the Wayside Alarm Management System software. The address is a type 2 office address with the following format: 2.RRR.NN.DDDD.
Primary Hop ATCS Addr	ATCS address of the primary site to send messages bound for the office system. This site may be the Collector or another Node that is closer to the Collector. The address is a type 7 field address with the following format: 7.RRR.LLL.GGG.SS.DD.
Backup1 Hop ATCS Addr	ATCS address of the first site to route messages through if communication is lost with the Office Site. The address is a type 7 field address with the following format: 7.RRR.LLL.GGG.SS.DD.
Backup2 Hop ATCS Addr	ATCS address of the second site to route the message through if communication is lost with both the Office Site and Backup Site 1. The address is a type 7 field address with the following format: 7.RRR.LLL.GGG.SS.DD.
Field Device	The device is used to communicate with other SEAR II sites in the network. This setting can be any of the following: • VHFC Comm (Echelon) • SSR (Spread Spectrum Radio) (RS232) • WAG (Echelon) • VHF Comm (RS232) • None

Figure 3-154 SEAR Communications: Node

When configuring communications, if the user picks an Echelon device such as the VHF communicator for the communications medium, the user must also add that module to the Echelon configuration.

3.5.2.8.2 No Communication

A SEAR IIi with the site type set to No Communication has no link to an office system and no alarms or messages are handled by the unit.

3.5.2.8.3 Collector (Master)

A SEAR IIi with the site type set to Collector is the master unit in the ATCS enhanced routing protocol that has a direct link to the office system. SEAR IIi modules configured as Nodes report their alarms and status to this site. The unit then forwards the messages to the office system.

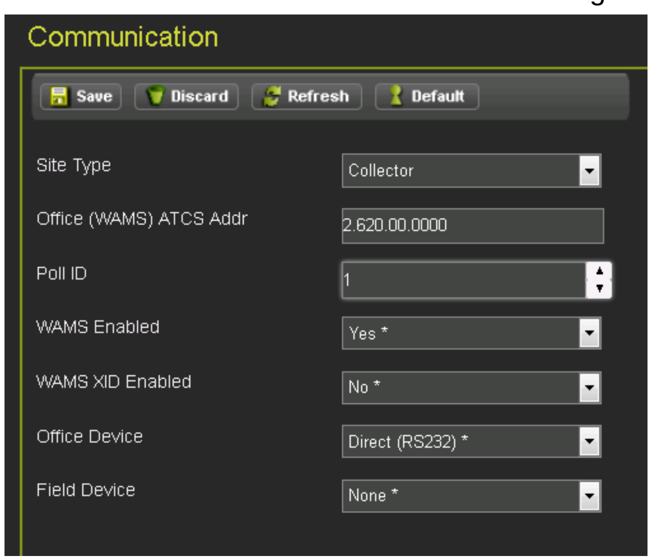


Figure 3-155 SEAR Communications Collector

A Collector site has the following settings.

Table 3-8 Collector Settings

Setting	Description
Office (WAMS) ATCS Address	ATCS address of the Wayside Alarm Management System software. The address is a type 2 office address with the following format: 2.RRR.NN.DDDD.
Poll ID	The Genisys protocol poll ID of this site.
WAMS Enabled	Enables or disables communication with the back-office Wayside Alarm Management System
WAMS XID Enabled	Enables or disables the WAMS XID messages. Typically, this can be left to No and is not used.
Office Device	The device used to communicate with the office. This setting can be any of the following: • Direct (RS232) • MCM (RS232) • WAG (Echelon) • MCM (Echelon) • Dial Modem (RS232)
Modem Phone Number	If the selected office device is Dial Modem (RS232), the phone number for the office system must be specified.
Modem Init String	If the selected office device is Dial Modem (RS232), an initialization string for the modem may be specified. NOTE: Auto answer for the modem must be disabled. The SEAR IIi handles phone answering.
Field Device	The device used to communicate with Node SEAR IIi sites in the network. This setting can be any of the following: • VHFC Comm (Echelon) • SSR (Spread Spectrum Radio) (RS232) • WAG (Echelon) • VHF Comm(RS232) • None

3.5.2.8.4 CDS-902X

A SEAR IIi configured with a site type of CDS-902X sends alarm messages to the office system using the Data remote CDS-902X cellular modem. The messages are sent to the office using the Short Message Service (SMS) or the phone system. There are no additional settings.

3.5.2.8.5 Bullhorn/Modbus

A SEAR IIi configured with a site type of Bullhorn/Modbus communicates with the office using a Bullhorn cellular unit and the Modbus protocol. A Bullhorn/Modbus site has the following settings.

Table 3-9 Bullhorn/Modbus Settings

Setting	Description
Poll ID	Modbus protocol poll identifier. 1-255

3.5.2.9 Serial Port

The SEAR IIi has two serial ports, the USER port, and the AUX port, these are configured from the Serial Port tab.

Table 3-10 Serial Port Settings

Setting	Description
Baud Rate	300, 600,1200,2400,4800,9600 (default),19200,38400, 57600
Data Bits	7,8 (default)
Parity	None (default), odd, even
Stop Bits	1 (default), 2
Flow Ctrl	None, Hardware, Radio

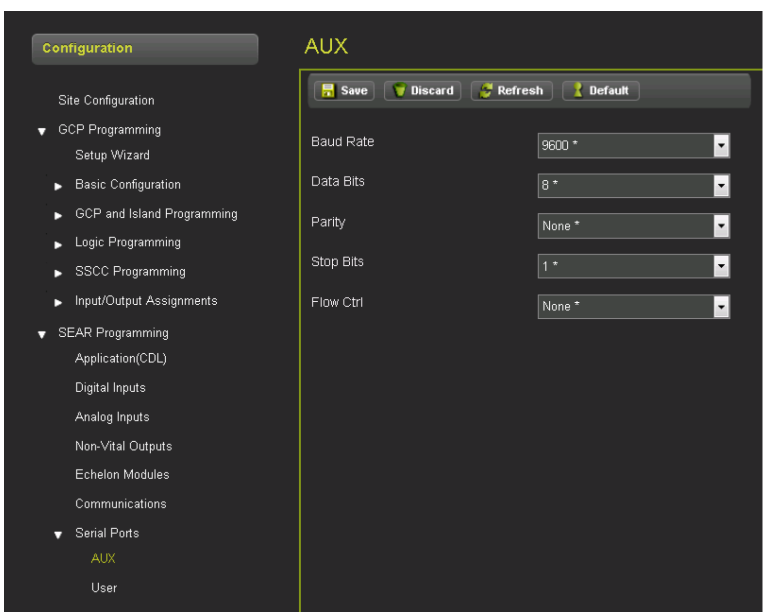


Figure 3-156 SEAR Serial Ports: AUX Port

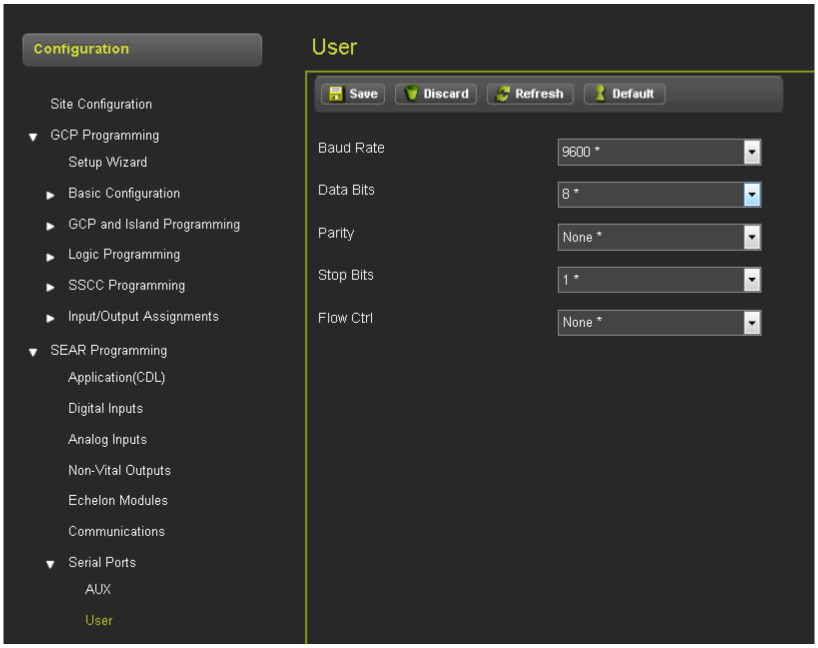


Figure 3-157 SEAR Serial Ports: User Port

3.5.2.10 Set to Default

Used to set the SEAR configuration back to default.

3.5.2.11 Display Programming

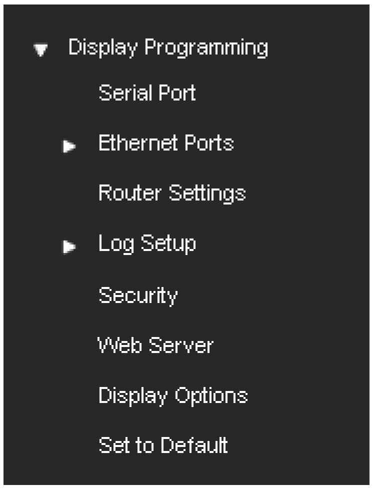


Figure 3-158 Web UI Display Programming

3.5.2.11.1 Serial Port

The serial port menu allows the user to configure the serial port connected to the DIAG connector on the chassis. The DIAG port on the front of the Display module is not user-configurable.

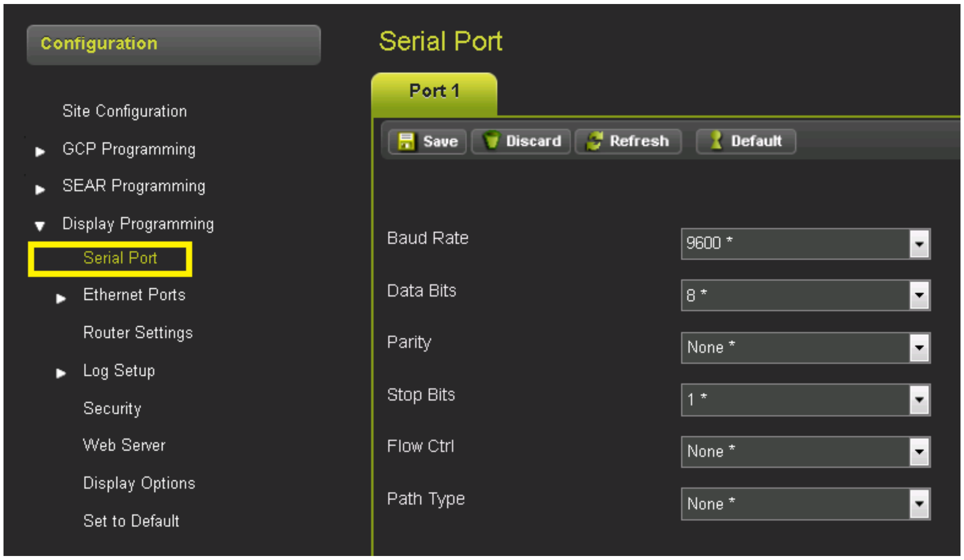


Figure 3-159 Display Programming Serial Port

3.5.2.11.2 Ethernet Ports

The Display Module has three Ethernet ports. The laptop port should be accessed from the front of the Display Module. Ethernet ports 1 and 2 should be accessed from the RJ45 connectors on the GCP Chassis.

NOTE	NOTE For Ethernet ports 1 and 2 use the appropriate RJ45 connections on the GCP5000 chassis. Do not use the RJ45 connections on the front of the display module, these are only used in a GCP4000.

Laptop Ethernet Port:

This menu allows the user to select between Disabled, DHCP Server, or DHCP Client mode. The default setting is as a DHCP Server with IP Address 192.168.255.81.

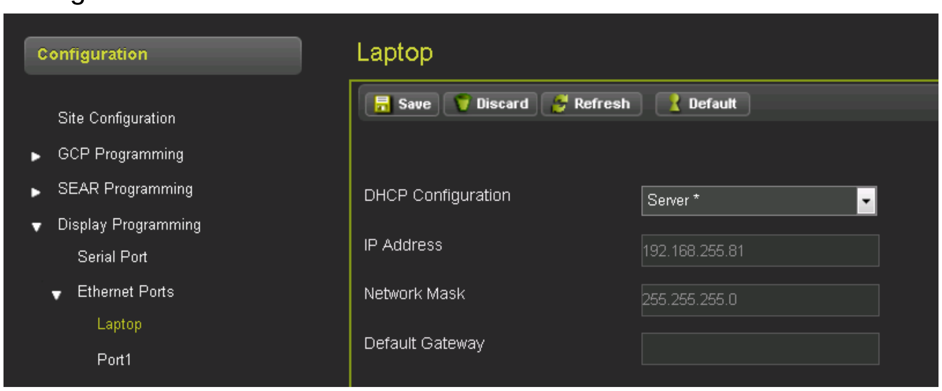


Figure 3-160 Display Programming: Laptop Ethernet Port

Ethernet Port 1:

This menu allows the user to select options for Ethernet port 1. The user can choose between Disabled and DHCP Client mode. When Disabled, the port has the fixed IP address as default as shown below. The screen also allows the user to check the status of the connection.

This port would typically be used when connecting the GCP5000 to a cell modem for remote monitoring.

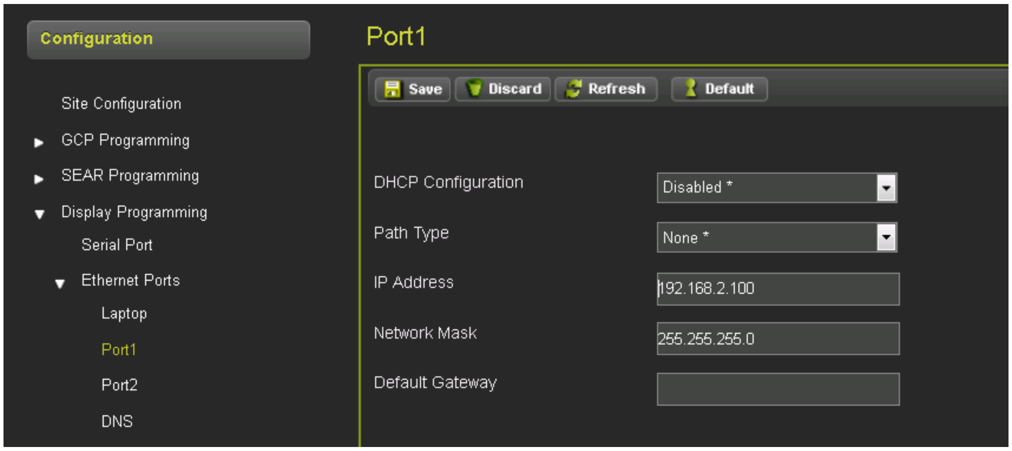


Figure 3-161 Display Programming: Port 1 Ethernet Port

Ethernet Port 2:

This menu allows the user to select options for Ethernet port 2. The user can choose between Disabled and DHCP Client mode. When Disabled, the port has the fixed IP address as default as shown in Figure 3-162.

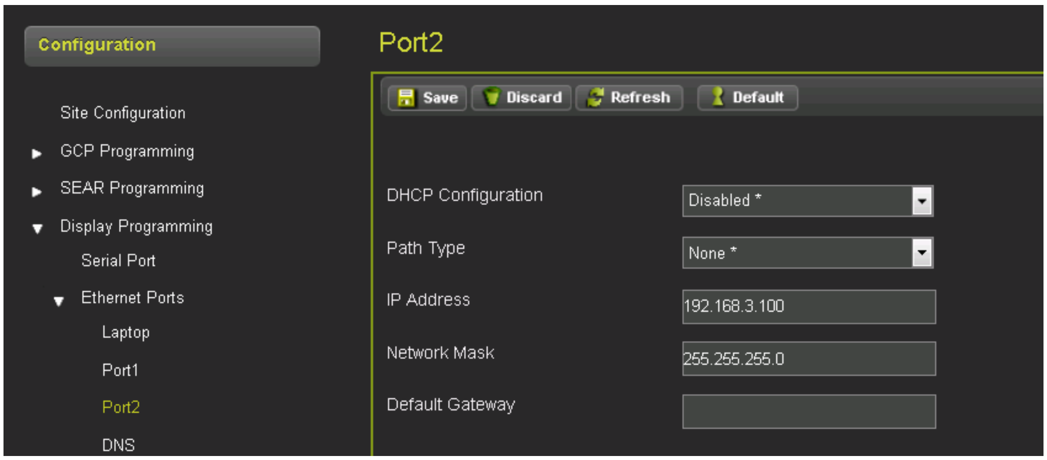


Figure 3-162 Display Programming: Port 2 Ethernet Port

DNS

The DNS menu allows the user to set the IP address of name servers used for the domain name system.

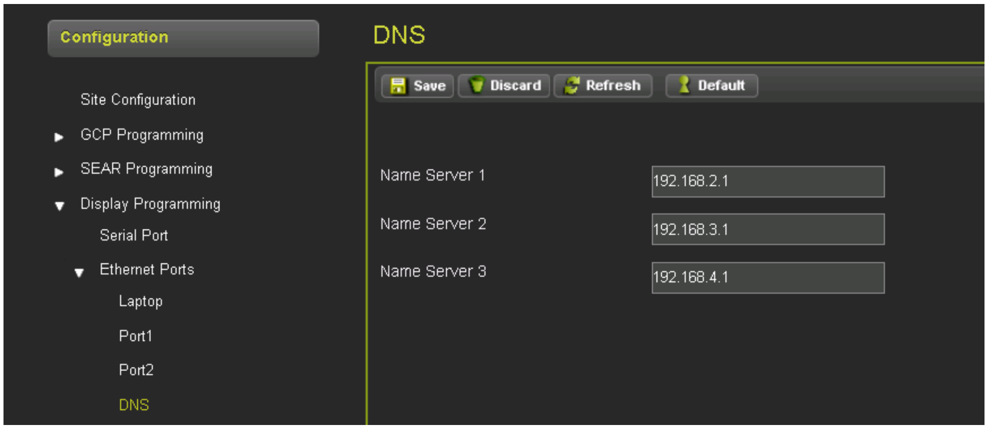


Figure 3-163 Display Programming: DNS

3.5.2.11.3 Router Settings

The Router Settings page is used when there is a CPU III in the system. This controls the routing of vital ATCS messages from the CPU III when vital communication links are used. When the parameter is set here, it is sent to the CPU III and then stored in the CIC, so that the CPU III can read it on boot up, regardless of whether the Display module is present.

ATCS IP Field Interface has options of None, Echelon, and Ethernet, default Echelon. This controls the routing of vital ATCS messages. If it is set to Echelon the CPU III will send vital messages out of the Echelon port. If it is set to Ethernet, the CPU III will send vital messages out of the CPU III laptop port.

ATCS IP Field UDP Port Number is the Ethernet port number used when the Field interface is set to Ethernet. Default 13000.

The **Route Table Entry timeout** is used by the display module to delete ATCS route entries in the route table if they are no longer used, range 0 -172800s, default 400s.

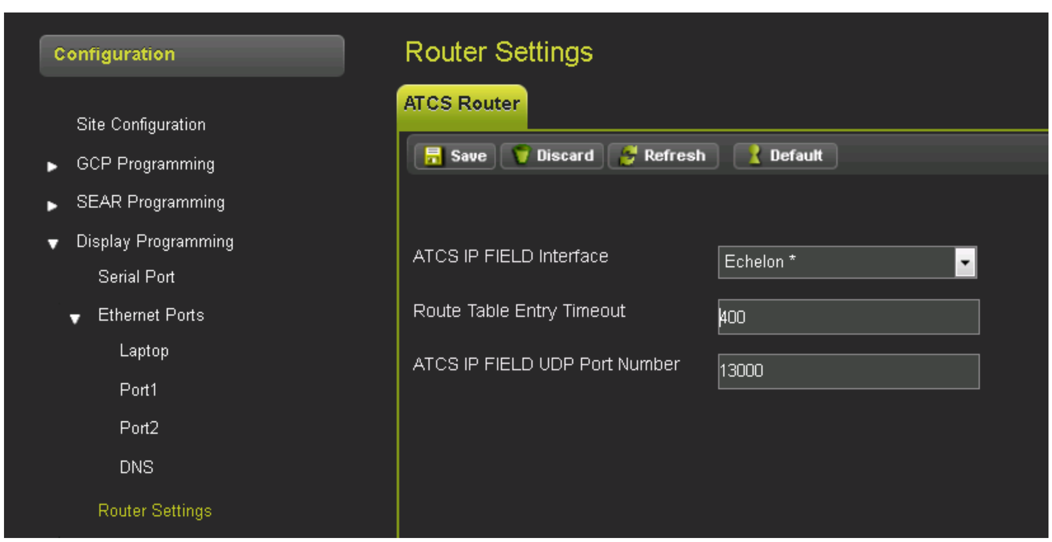


Figure 3-164 Display Programming: Router Settings

3.5.2.11.4 Log Setup

Consolidated Logging

If multiple GCPs are present at a site, the Display can consolidate the logs for all these into one. On the screen shown in Figure 3-165 enter the IP address of the Display where the Event log and Diagnostic log are to be stored. These may be stored on separate Display Modules.

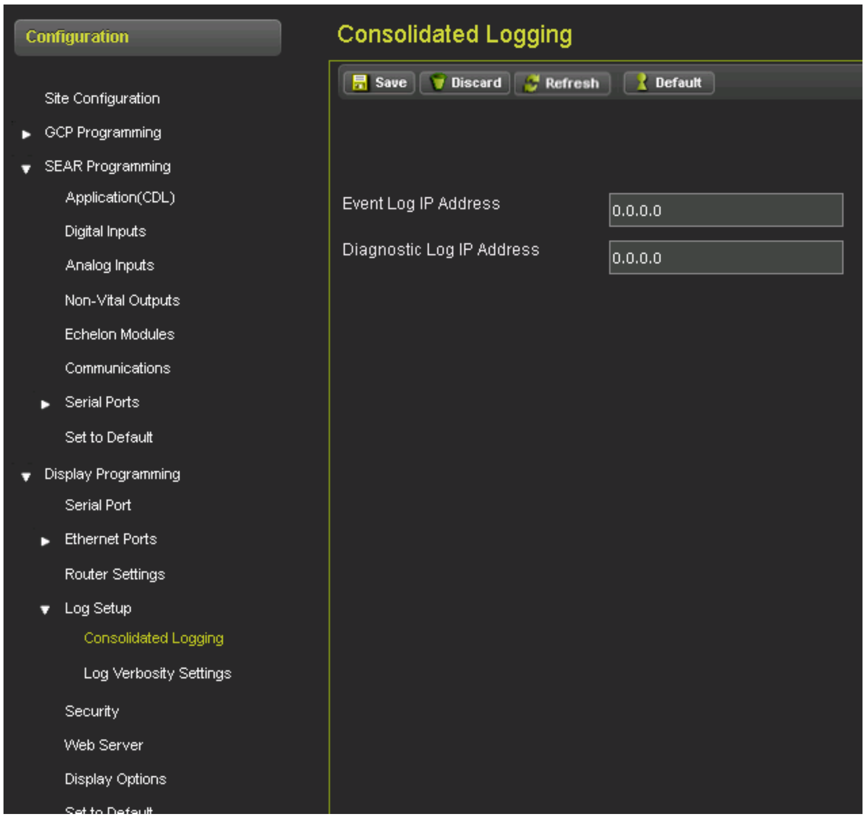


Figure 3-165 Display Programming Consolidated Logging

Log Verbosity Settings

This page is used to set the verbosity (the detail of the logging) of the Diagnostics, CPU, and I/O module logs.

For the CP and I/O modules, the default verbosity is 1, the value should be kept at this unless Siemens requires more detailed log information to diagnose a specific problem.

CP Verbosity: range 1-2, default 1

VLP, Slot 1-6, SSCC IIIi Verbosity: range 1-5, default 1

The Display Diagnostic Log Verbosity controls the detail of logging to the Display module’s display log. Range Basic, Error, Warning, Info, Debug, default: Info

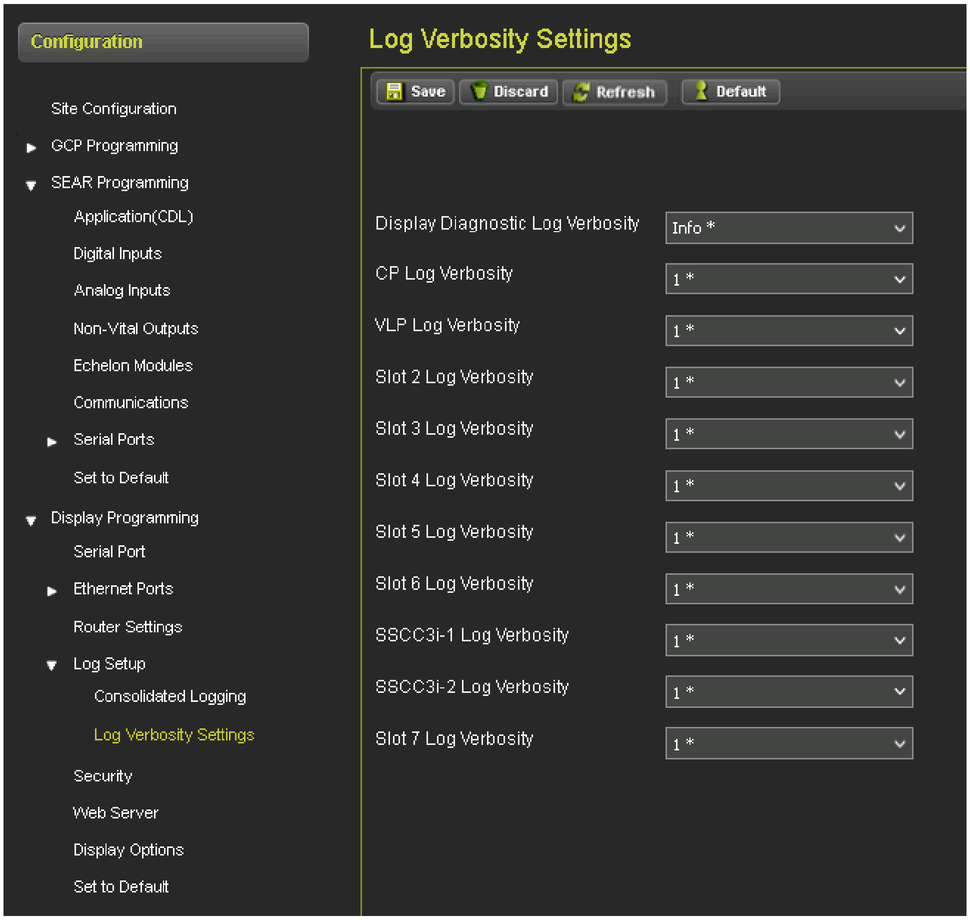


Figure 3-166 Display Programming Log Verbosity Settings

3.5.2.11.5 Security

The security page allows the user to enable or disable the Maintainer password protection using the **Security Enabled** field. This defaults to **None**. When the **Security Enabled** is set to Maintainer the Maintainer Password field appears and the user can type in the required password.

On returning to this screen, the password cannot be edited unless the correct password is entered. See Section 3.1.2.6 for details.

If security has been enabled, the user will need to enter this password on the local user interface to be able to edit GCP MCF parameters. Also, the user will need to log into the Web UI with this password to be able to edit GCP MCF parameters. The user can still log into the Web UI using the default GCP5000 password, but the configuration will be read-only.

Session Inactivity Timeout: 5 to 60 mins, the default is 20min. This is used to timeout the WebUI if there is no activity on the GCP for the configured time.

NOTE

NOTE

Be sure to have the password handy, in the event the Security function is enabled.

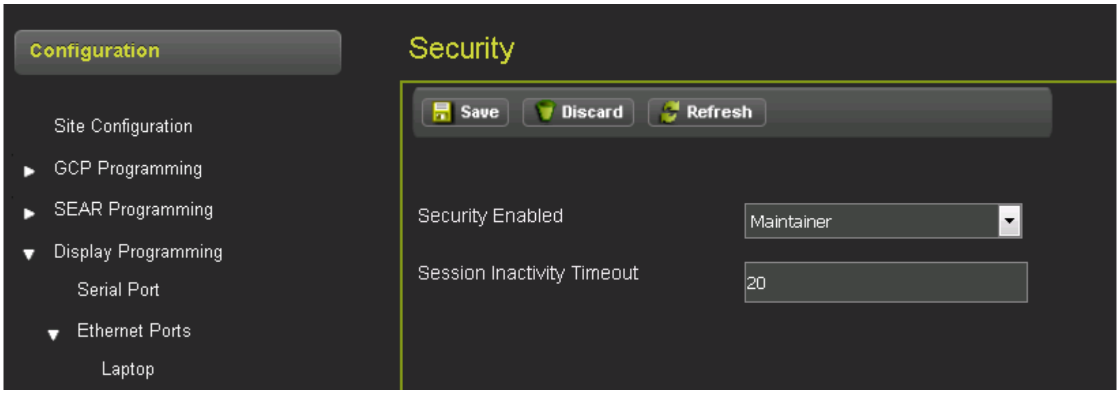


Figure 3-167 Display Programming: Security

3.5.2.11.6 Web Server

This is used to control whether the Web UI uses secure (https) or non-secure (http) access. The default is non-secure access (http).

Note that most web browsers are not compatible with the GCP5000 (GCE) secure access mode.

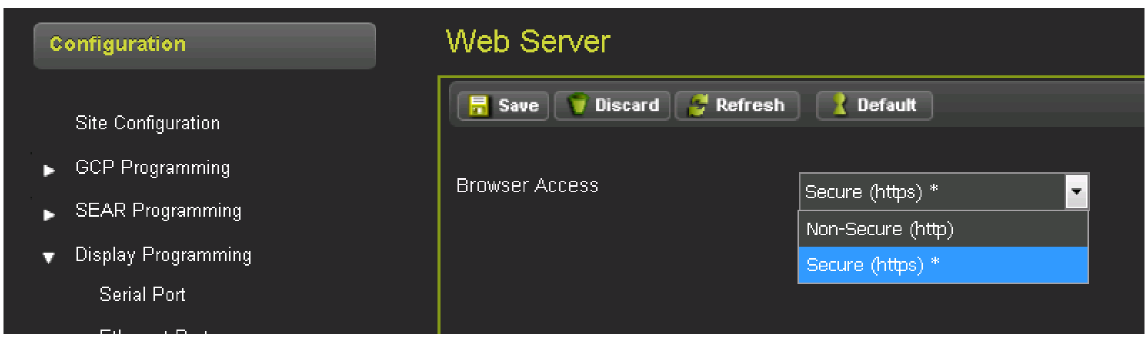


Figure 3-168 Display Programming: Web Server

3.5.2.11.7 Display Options

Display Buzzer Enable: range Yes, No, default Yes. This is used to enable or disable the buzzer on the Display

Display Hibernation Time (minutes): range 5-60, default 15. This is used to darken the display when there has been no activity.

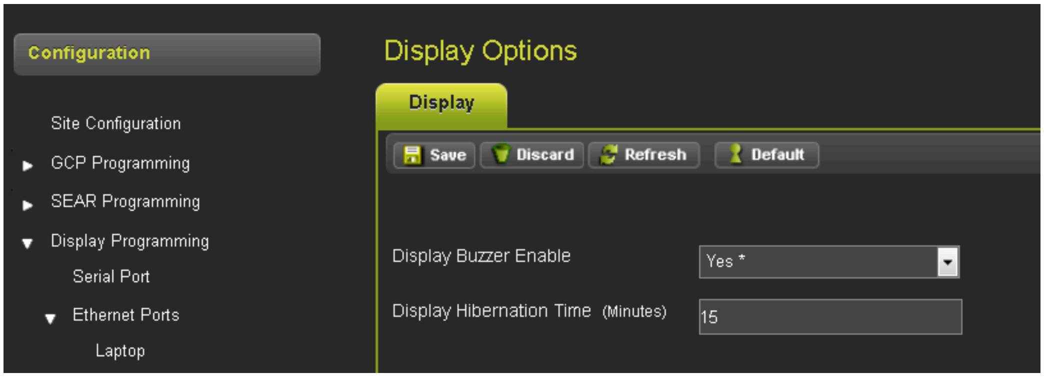


Figure 3-169 Display Programming: Display Options

3.5.2.11.8 Set to Defaults

This is used to set the Display parameters back to defaults. The parameters under GCP Programming are unaffected.

3.5.3 Calibration and Adjustment

The Calibration and Adjustment page has 3 submenus as shown in Figure 3-170. The Web UI will bring up the Track/PSO one by default.

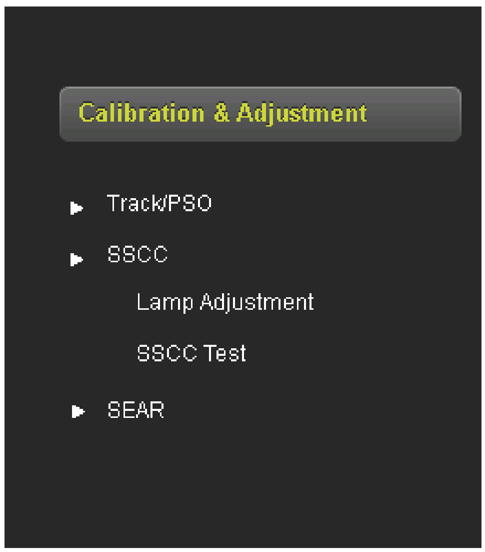


Figure 3-170 Web UI Calibration and Adjustment Menus

The Web UI will show the following screen that allows the user to calibrate the PSO or island. Before options can be selected on the screen, it has to be unlocked and local user presence confirmed. See section 6.2 for details on how to calibrate PSO.

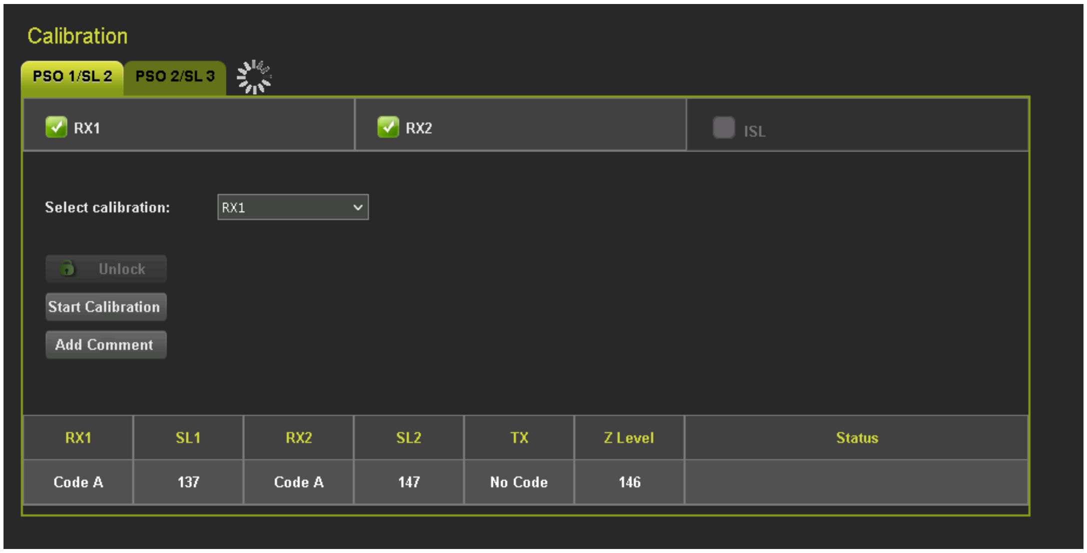


Figure 3-171 Web UI PSO Calibration View

3.5.4 Status Monitor

The Status monitor screen will show the submenus on the left as shown in Figure 3-172, by default the IO View is shown.

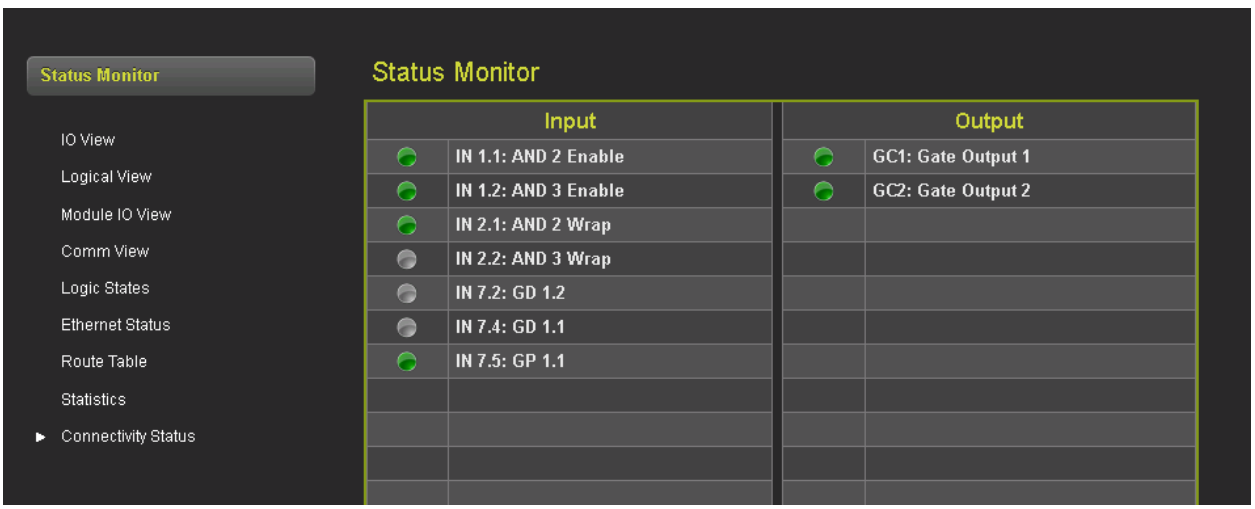


Figure 3-172 Web UI IO View

3.5.4.1 IO View

The default view shows the IO of the system, as shown in Figure 3-172.

3.5.4.2 Logical View

The logical view as shown in Figure 3-173 shows the states of the AND gates, OR gates, Equations, and Internal channels. To see internal channels 17 to 24, select the 'Next ' button.

If a logic term is unused it is shown in white. Grey represents a de-energized term and green is an energized term.

Key used system states are shown at the bottom of the view, these include:

- Maintenance Call output
- Advance Preempt OP
- Gate Down OP
- Second Train OP

Figure 3-173 Web UI Logical View

If the blue arrow next to the logic term is selected this will show a detailed view of each AND, OR or Equations as shown in figures: Figure 3-174, Figure 3-175, and Figure 3-176.

If a term is negated, then its LED will show green when the underlying term is off, e.g., NWP1 is on, so the !NWP is off, so the LED is grey.

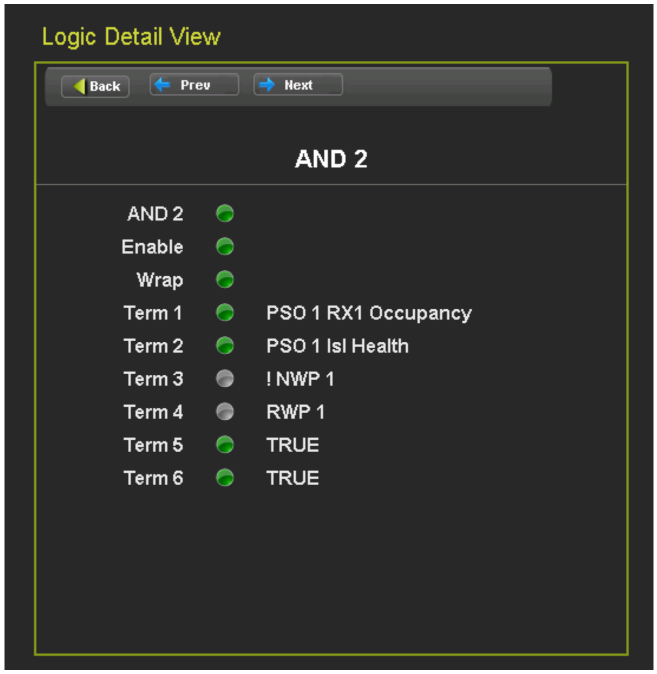


Figure 3-174 Web UI AND Detail

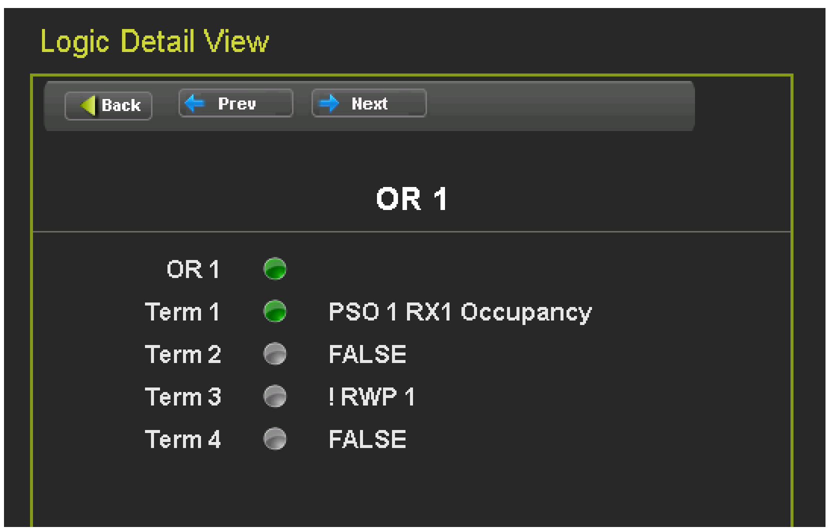


Figure 3-175 Web UI OR Detail

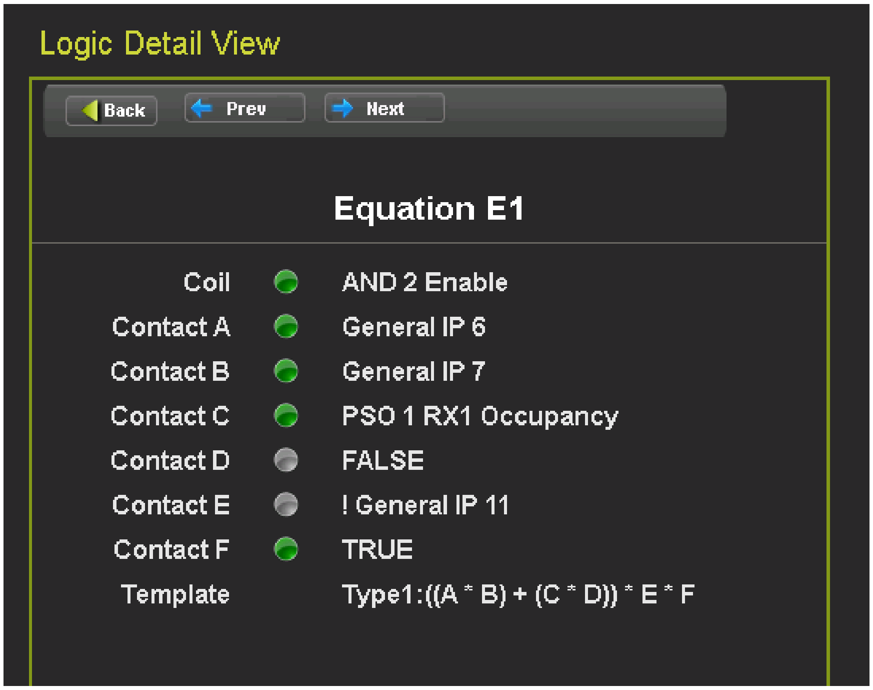


Figure 3-176 Web UI Equation Detail

3.5.4.3 Comms View

The Comms View will show the states of the transmitted and received bits for each vital comms link, for example as shown for VComm 1 in Figure 3-177.

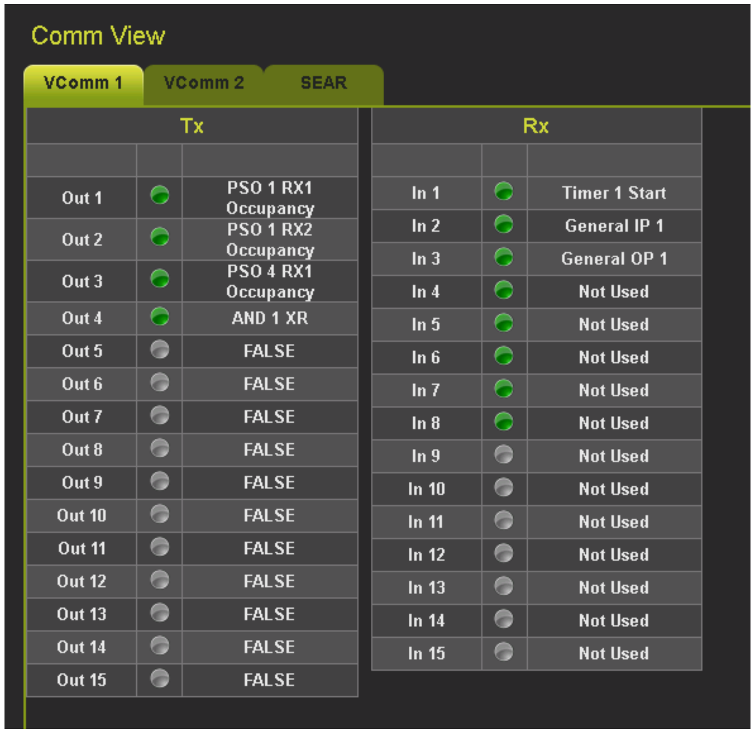


Figure 3-177 Web UI Comms View: VComm 1

The SEAR tab shows the states of the bits received from the SEAR IIi that are used to control logic functions as shown in Figure 3-178.

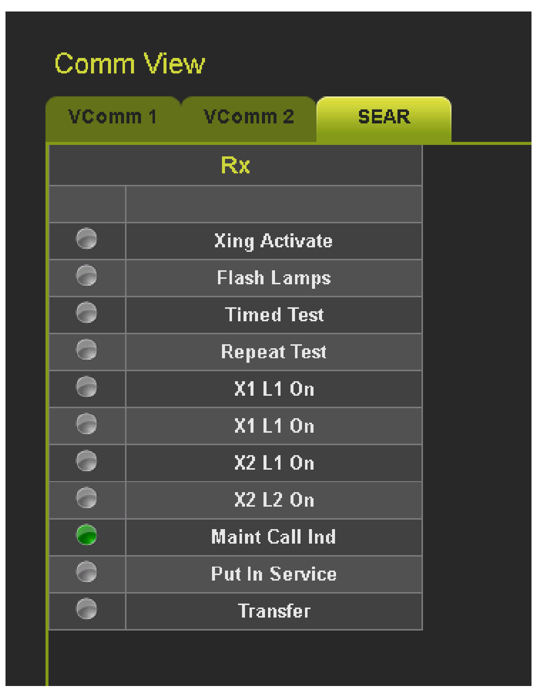


Figure 3-178 Web UI Comms View: SEAR

3.5.4.4 Logic States

For Siemens use only

3.5.4.5 Ethernet Status

The Ethernet status screen shows the IP addresses and connection status of the Ethernet ports on the Display.

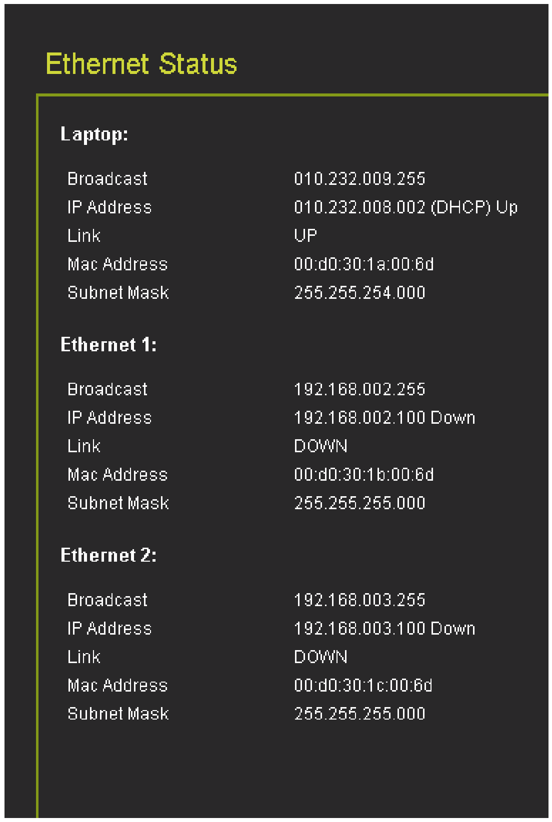
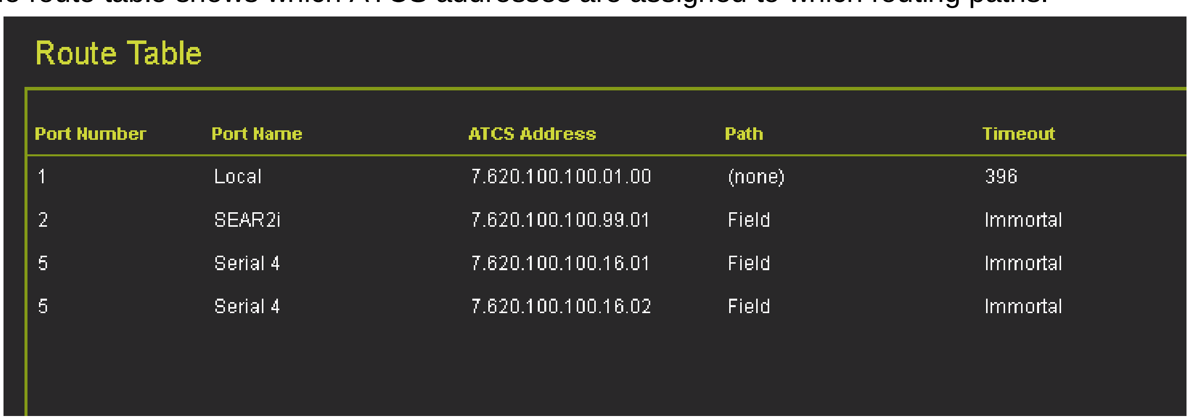


Figure 3-179 Web UI Ethernet Status

3.5.4.6 Route Table

The route table shows which ATCS addresses are assigned to which routing paths.


Route Table

Port Number	Port Name	ATCS Address	Path	Timeout
1	Local	7.620.100.100.01.00	(none)	396
2	SEAR2i	7.620.100.100.99.01	Field	Immortal
5	Serial 4	7.620.100.100.16.01	Field	Immortal
5	Serial 4	7.620.100.100.16.02	Field	Immortal

Figure 3-180 Web UI Route Table

3.5.5 Reports & Logs

Selecting the **Reports and Logs** icon will result in the WebUI showing the following menu selections.

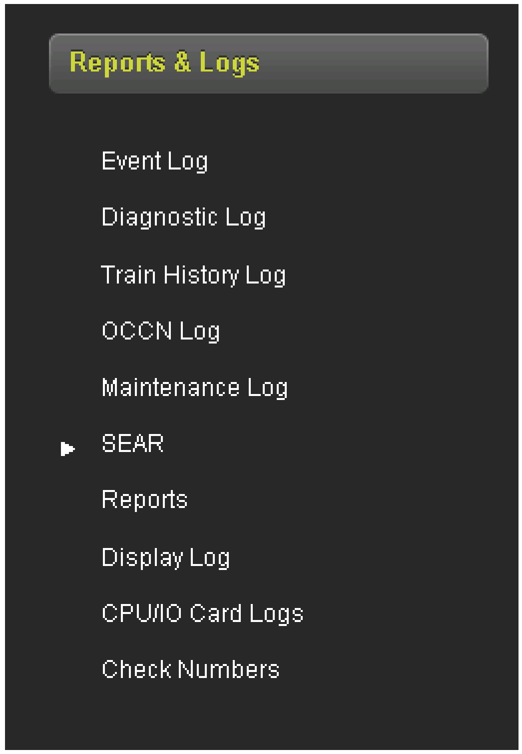


Figure 3-181 Reports & Logs - SEAR

3.5.5.1 Event Log

The display contains the main event log for the system. The events in it are generated by the CPU and sent to the display where they are time-stamped and added to the log.

The WebUI event log page allows the user to page through the event, download all or part of the log, or turn on a real-time trace so new events get displayed as they are logged.

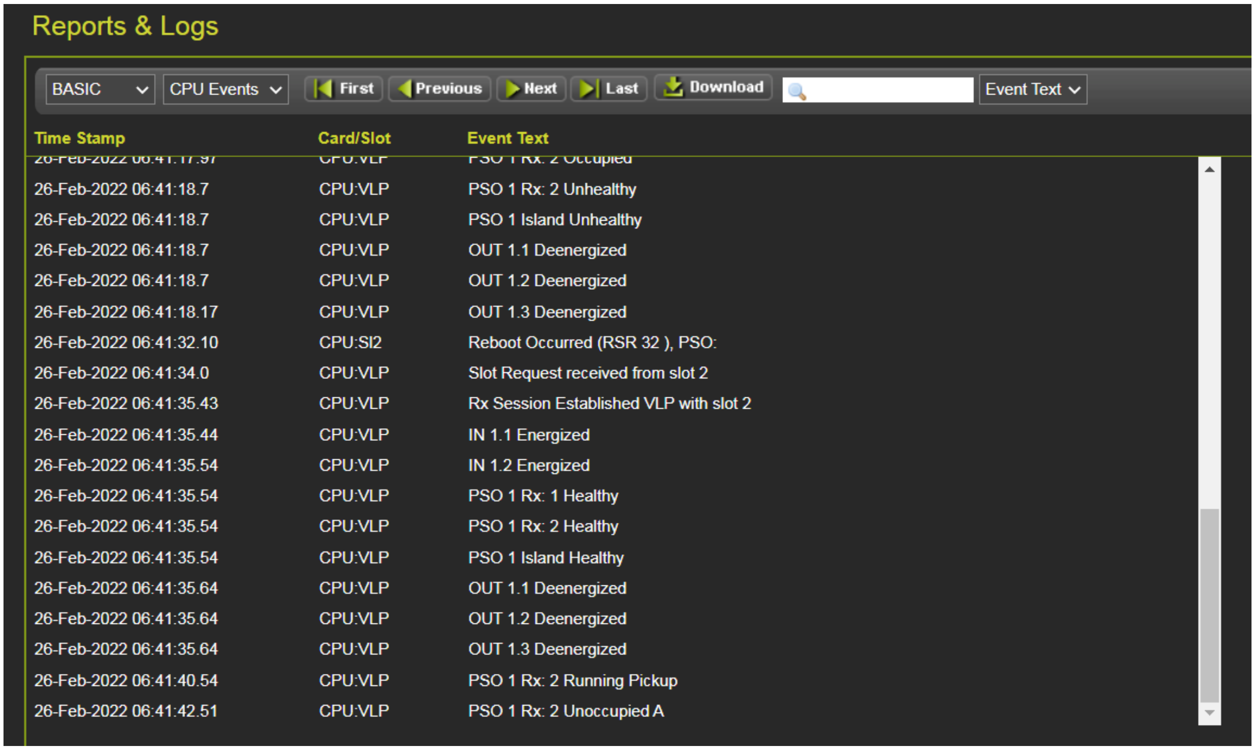


Figure 3-182 WebUI: Event Log

Use the buttons as follows:

- First – show the oldest page of events in the log
- Last – show the newest page of events in the log
- Previous – move back a page in the log
- Next– move forward a page in the log

50 events are shown per page, use the scroll bar on the right to see all the events on the page.

The Download button provides the following selections:

- Displayed – download the current page displayed
- Last 24 hours – downloads the events that occurred in the last 24hrs
- All – downloads the whole event log

The screen provides a filter box so events that match the entered text are the only ones shown. Enter the text to be filtered, then press enter.

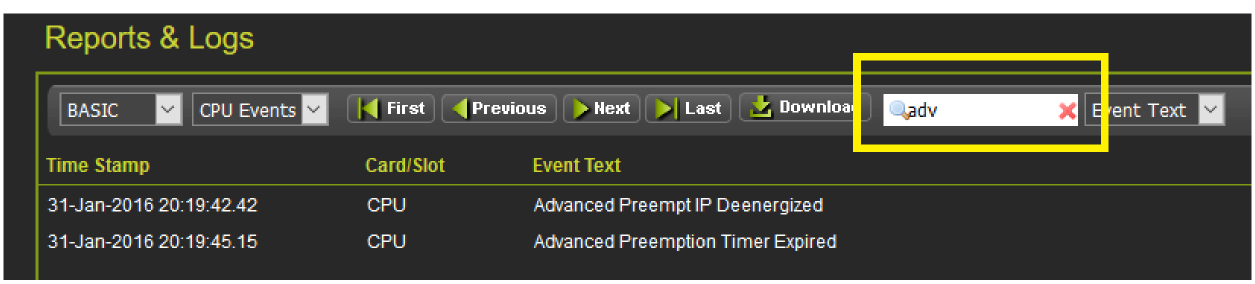


Figure 3-183 WebUI: Event Log Text Filter

To clear the filter, either delete the text in the box and press **Enter** or press the red **X**.

The events log contains both the CPU events and also the Diagnostic events. To see the Diagnostic events, either change the log filter to Diagnostic or select the Diagnostic Log menu item from the left menus.

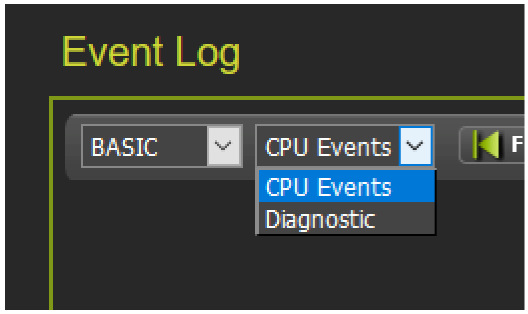


Figure 3-184   WebUI: Log Selection Filter

The first drop-down menu on the Event Log page allows the selections shown in Figure 3-185 with **BASIC** as the default.

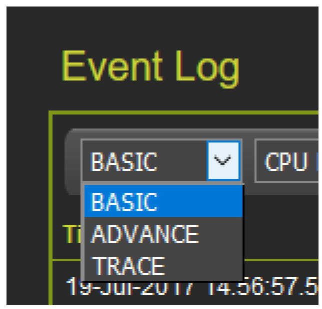


Figure 3-185   WebUI: Event Log Mode

If **ADVANCE** is selected, the WebUI allows the user to choose a range of dates to view. Enter the required date range. The **First** button will now show events from the start date and time. The **Last** button will now show events up to the selected end date and time. The **Download** button now has the option to download a selected range.

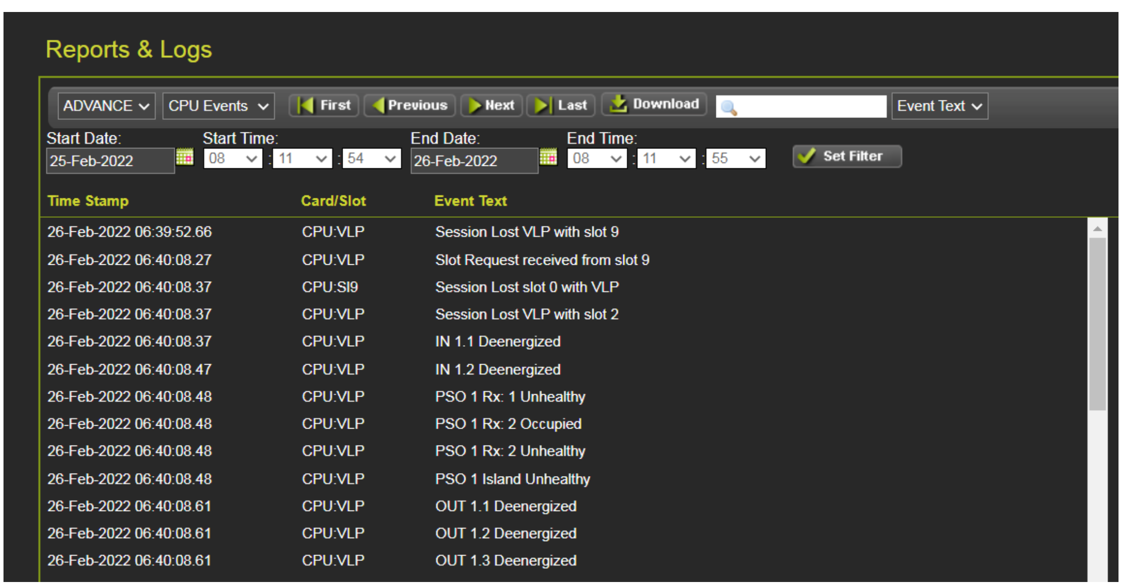


Figure 3-186   WebUI: Event Log ADVANCE Mode

If **TRACE** is selected, the WebUI will go into Trace mode and add events to a text buffer as they are received in real-time. To pause the trace, press the **Stop** button. To restart tracing, press the **Start** again. To clear the trace buffer press the **Clear** button. Press the back button to exit **TRACE** mode and return to the **BASIC** mode.

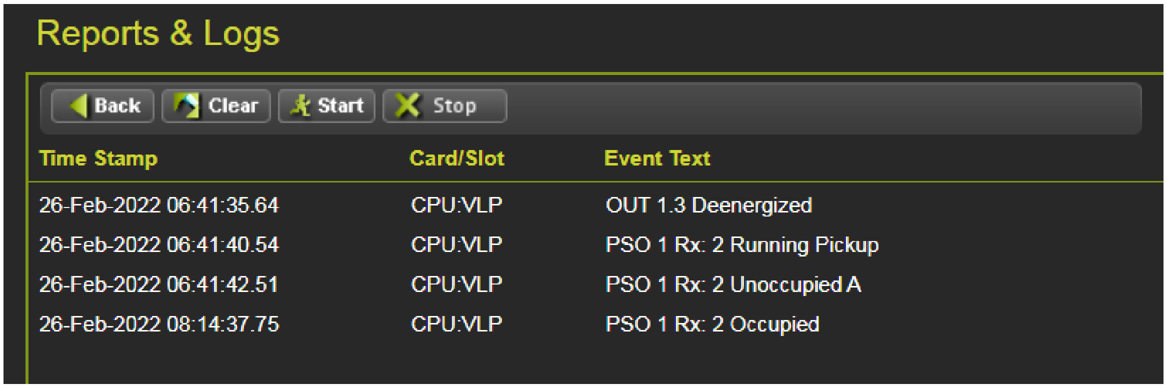


Figure 3-187 WebUI: Event Log TRACE Mode

3.5.5.2 Diagnostic Log

The Diagnostic log contains entries for whenever a diagnostic message is generated or cleared. The events here are generated by the CPU and sent to the display where they are time-stamped and added to the log.

The WebUI diagnostic log page allows the user to page through the events, download all or part of the log, or turn on a real-time trace so new events get displayed as they are logged.

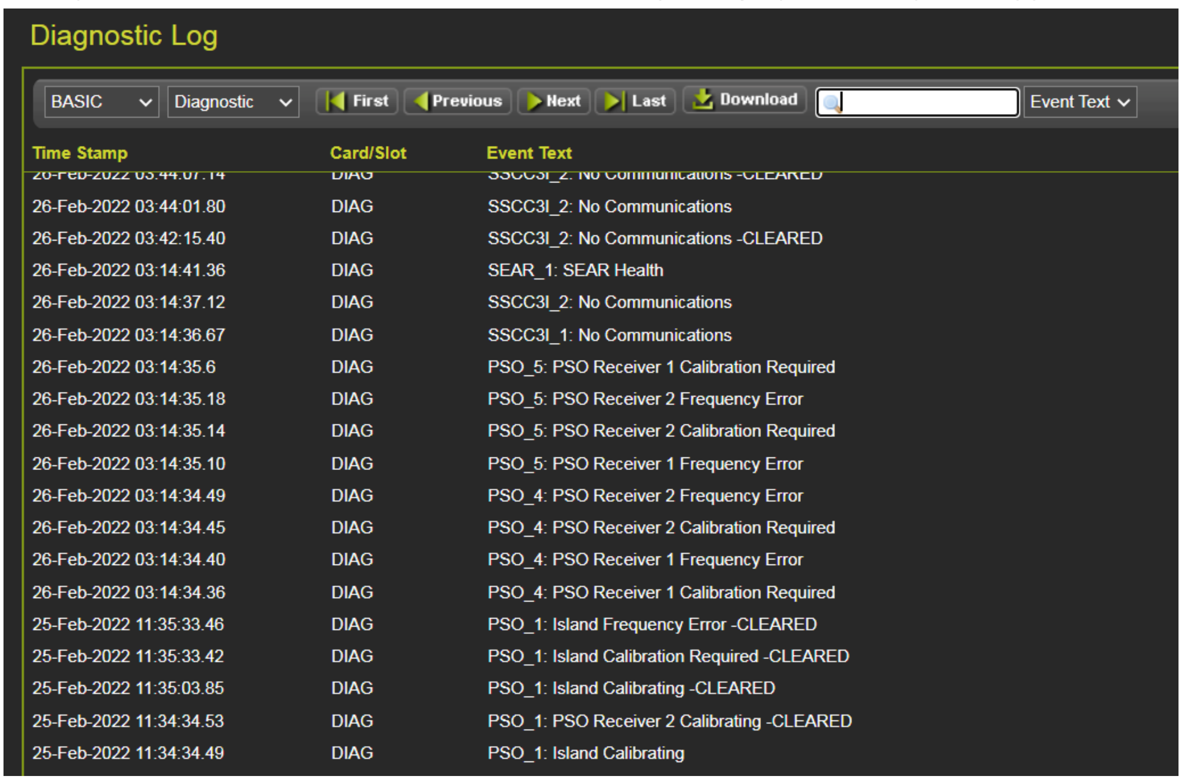


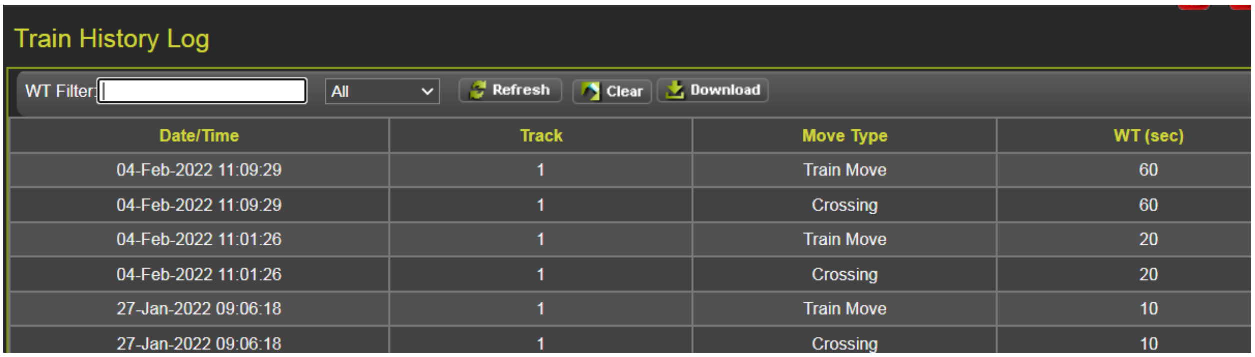
Figure 3-188 WebUI: Diagnostic Log

The menu bar allows navigation of the log and downloading is the same as for the Event Log. See the Event Log Section 3.5.5.1 for details.

3.5.5.3 Train History Log

The train history log contains a log of the last 100 train moves. The log shows the following:

- Trk - which track the train was detected on.
- Move Type
    - o Crossing – indicates whether that is the warning time for the crossing as a whole,
    - o Train Move – indicates the warning time seen by just one PSO. For example, if there is a cross-over in the approach the crossing warning time may be ok, but the train move warning time may appear short, as the train was only on the second track for a fraction of the whole warning time.

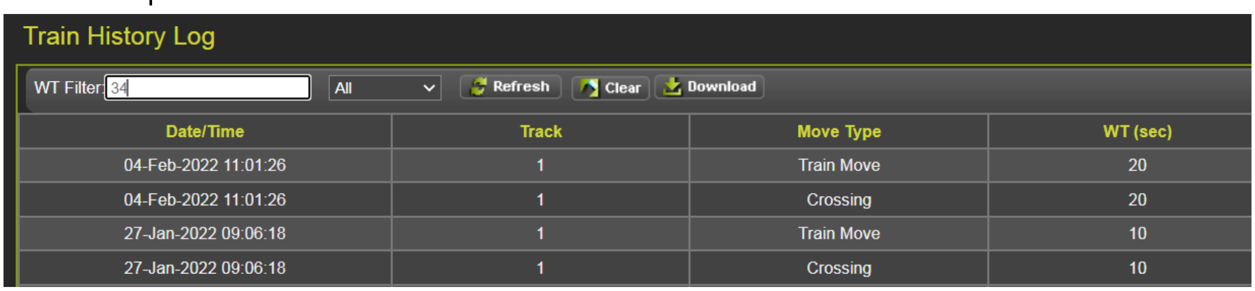


Date/Time	Track	Move Type	WT (sec)
04-Feb-2022 11:09:29	1	Train Move	60
04-Feb-2022 11:09:29	1	Crossing	60
04-Feb-2022 11:01:26	1	Train Move	20
04-Feb-2022 11:01:26	1	Crossing	20
27-Jan-2022 09:06:18	1	Train Move	10
27-Jan-2022 09:06:18	1	Crossing	10

Figure 3-189 WebUI: Train History Log

Select the **Clear** button to clear the event in the train history.

The WT filter is used to filter the train moves with warning times below or equal to this value. The value entered has to be between 23 and 99s. Enter the value and press equal, or refresh, and the WebUI will show the train moves that meet this criterion. To cancel the filter, delete the value then press enter.



Date/Time	Track	Move Type	WT (sec)
04-Feb-2022 11:01:26	1	Train Move	20
04-Feb-2022 11:01:26	1	Crossing	20
27-Jan-2022 09:06:18	1	Train Move	10
27-Jan-2022 09:06:18	1	Crossing	10

Figure 3-190 WebUI: Train History Log WT Filter

To download the train history log, press the **Download** button.

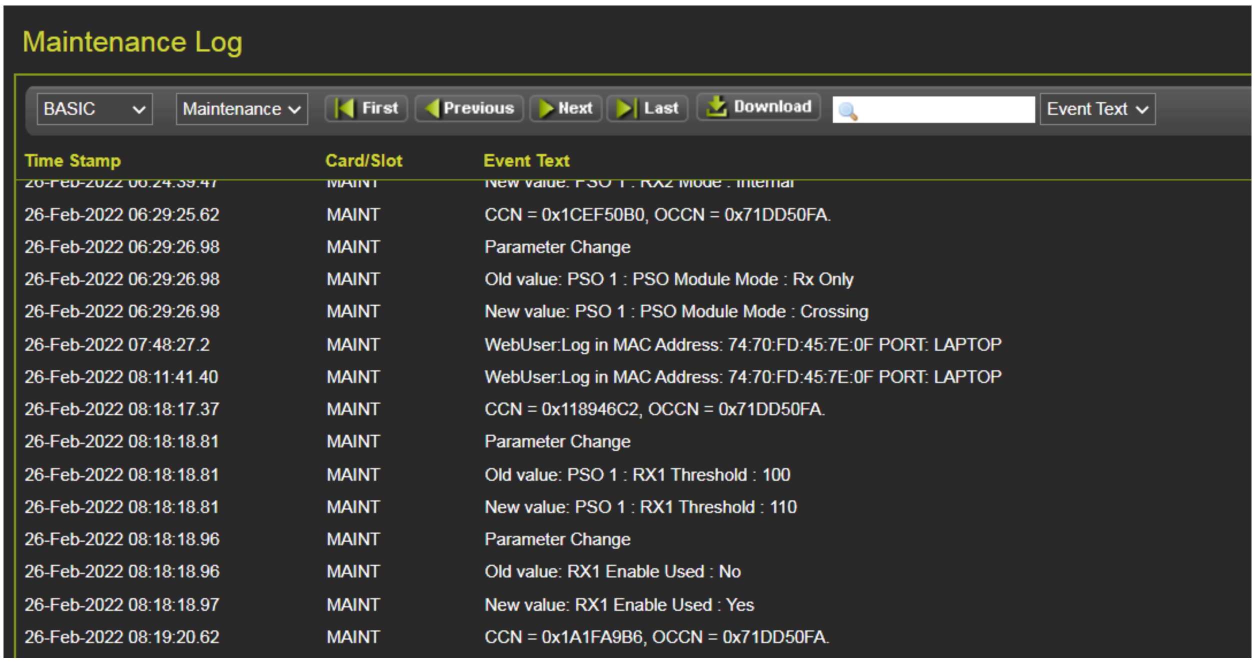
NOTE

> **NOTE**
> The download button will download the events shown on the screen. Clear the warning time filter first to download all events.

3.5.5.4 Maintenance Log

The Maintenance log contains events related to maintenance activities. The following events may be displayed:

a) GCP programming configuration changes, for these, the old and new value is shown along with the resulting CCN and OCCN value
b) PSO receiver or island calibration
c) User login from Web UI, including the port the user logs in and the MAC address of the computer logging in.



Time Stamp	Card/Slot	Event Text
26-Feb-2022 06:24:39.47	MAINT	New value: PSO 1 : RX2 Mode : Internal
26-Feb-2022 06:29:25.62	MAINT	CCN = 0x1CEF50B0, OCCN = 0x71DD50FA.
26-Feb-2022 06:29:26.98	MAINT	Parameter Change
26-Feb-2022 06:29:26.98	MAINT	Old value: PSO 1 : PSO Module Mode : Rx Only
26-Feb-2022 06:29:26.98	MAINT	New value: PSO 1 : PSO Module Mode : Crossing
26-Feb-2022 07:48:27.2	MAINT	WebUser:Log in MAC Address: 74:70:FD:45:7E:0F PORT: LAPTOP
26-Feb-2022 08:11:41.40	MAINT	WebUser:Log in MAC Address: 74:70:FD:45:7E:0F PORT: LAPTOP
26-Feb-2022 08:18:17.37	MAINT	CCN = 0x118946C2, OCCN = 0x71DD50FA.
26-Feb-2022 08:18:18.81	MAINT	Parameter Change
26-Feb-2022 08:18:18.81	MAINT	Old value: PSO 1 : RX1 Threshold : 100
26-Feb-2022 08:18:18.81	MAINT	New value: PSO 1 : RX1 Threshold : 110
26-Feb-2022 08:18:18.96	MAINT	Parameter Change
26-Feb-2022 08:18:18.96	MAINT	Old value: RX1 Enable Used : No
26-Feb-2022 08:18:18.97	MAINT	New value: RX1 Enable Used : Yes
26-Feb-2022 08:19:20.62	MAINT	CCN = 0x1A1FA9B6, OCCN = 0x71DD50FA.

Figure 3-191 Maintenance Log

3.5.5.5 Reports

The Reports menu allows the user to select the following from the Reports drop-down menu:

- Configuration Report
- Program Report
- Min Program Steps
- Template Report
- Version Report

The configuration report contains the full configuration and version, the other report listed above are all included in the configuration report.

The Program Report contains just the GCP Programming.

The Min Program Report contains only the parameters that have been changed from their default value. This provides a simple means where the user can manually program a system from scratch as they can easily identify just the parameters that need to be changed from their default settings. Note the recommended way to program the system is to download a PAC file as described in section 3.3.

The Template Report is not used in the GCE.

The Version Report contains the software and hardware versions for all components of the system.

To obtain a report select it from the Reports Menu then press the **Create** button to create the report.

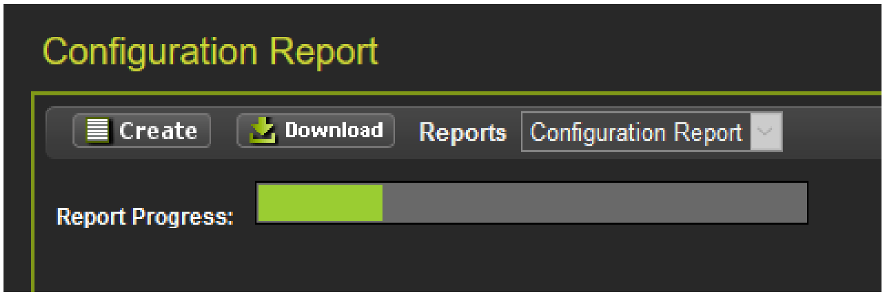


Figure 3-192 WebUI: Configuration Report Progress

After the report has been created, it will show up as illustrated in Figure 3-193 Use the scroll bars to navigate it. Select the download button to save the report to the PC or open it in a separate file.

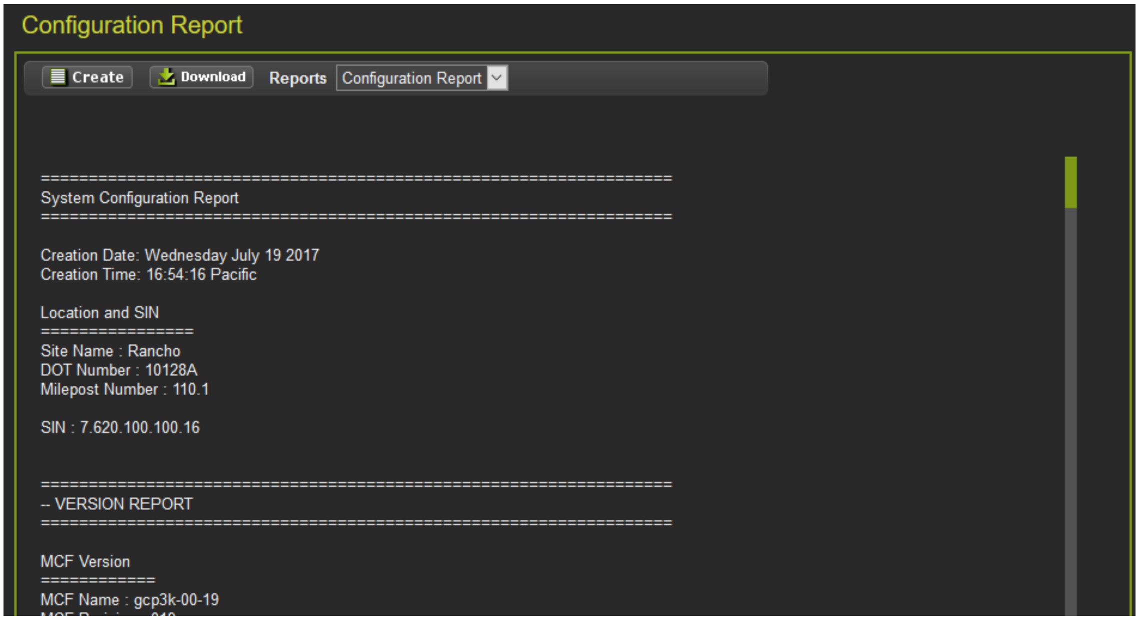


Figure 3-193 WebUI: Configuration Report

3.5.5.6 CPU/IO Card Logs

This allows the user to see and download the individual logs from the I/O modules.

This menu was previously used to allow the user to see the log from the CPU II+. This log is no longer available to be viewed from the display when a CPU III module is used.

3.5.5.7 Check Numbers

This shows the same Check Numbers information as the link on the System Menu, see section 3.5.1.8.

3.5.6 Software Updates

The Display provides the following options on the Software Update Menu

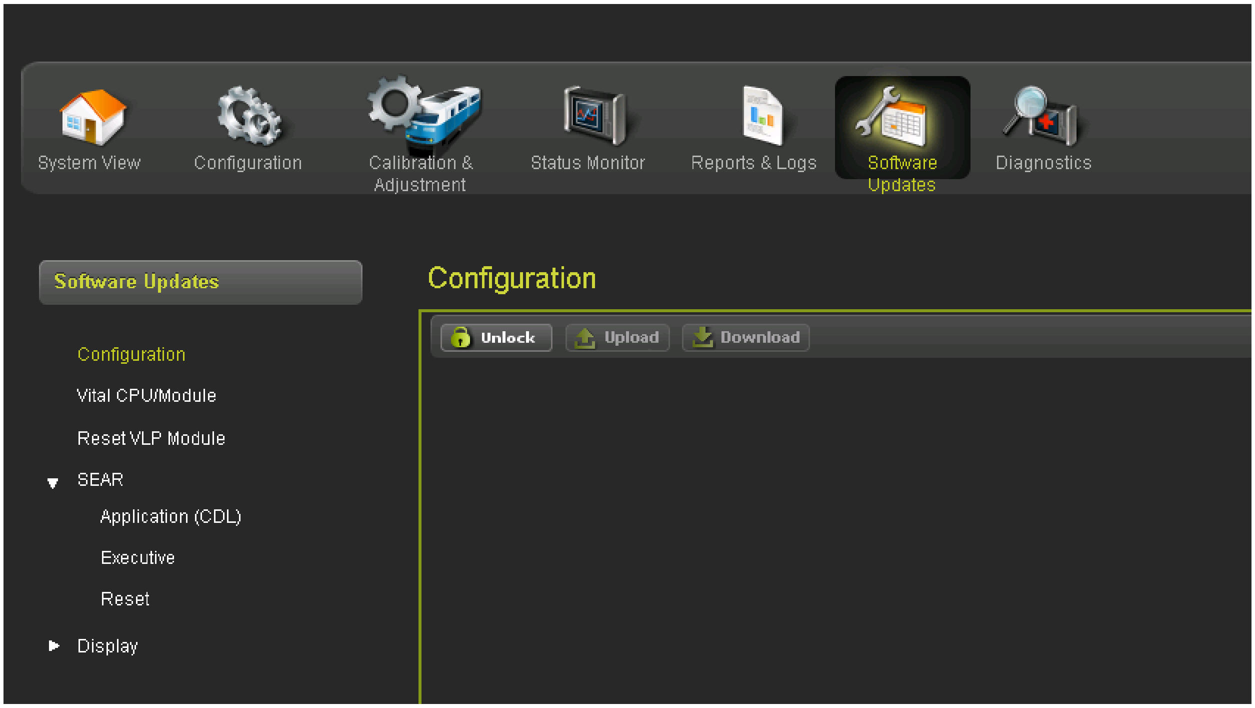


Figure 3-194 WebUI: Software Updates Configuration

The Configuration selection is used to load the PAC file generated by the OCE – see section 3.6.

The Vital CPU/Module selection is used to:

a) Load software into the CPU III – an Ethernet connection is needed between the CPU III and Display for this
b) load new software into the I/O modules, a serial cable is required for this operation - see section 3.3.

Note: an alternative, more convenient, way to load new software or the MCF into the CPU III is to connect directly to its laptop Ethernet port and use its Web UI.

The SEAR selection is used to:

a) load new executive software into the SEAR IIi
b) load a new CDL into the SEAR IIi
c) Reset the SEAR IIi

The Display section is used to load new Display software, see Section 3.3.

3.5.7 Diagnostics

When Diagnostics is selected the Web UI shows any diagnostic messages currently present in the system.

Figure 3-195: Web UI Diagnostics View

When a specific diagnostic message is selected, the Web UI will show the cause and suggested remedy.

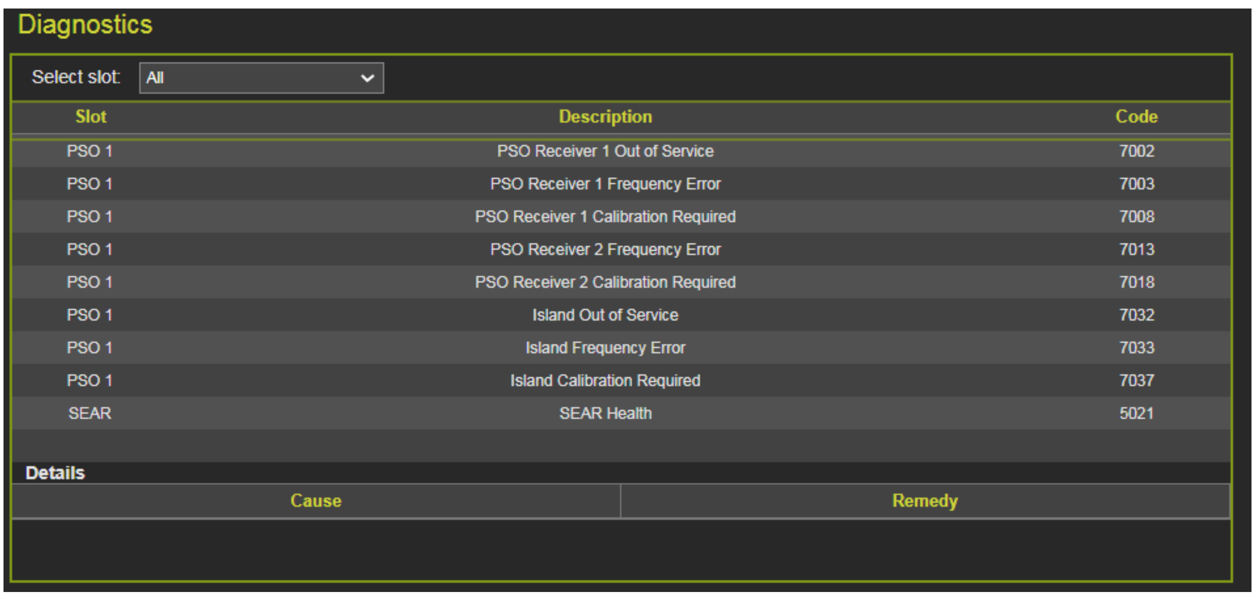


Figure 3-196: Web UI Detailed Diagnostics View

To show diagnostic messages for just a specific module in the system select the drop-down menu labeled ‘select slot’.

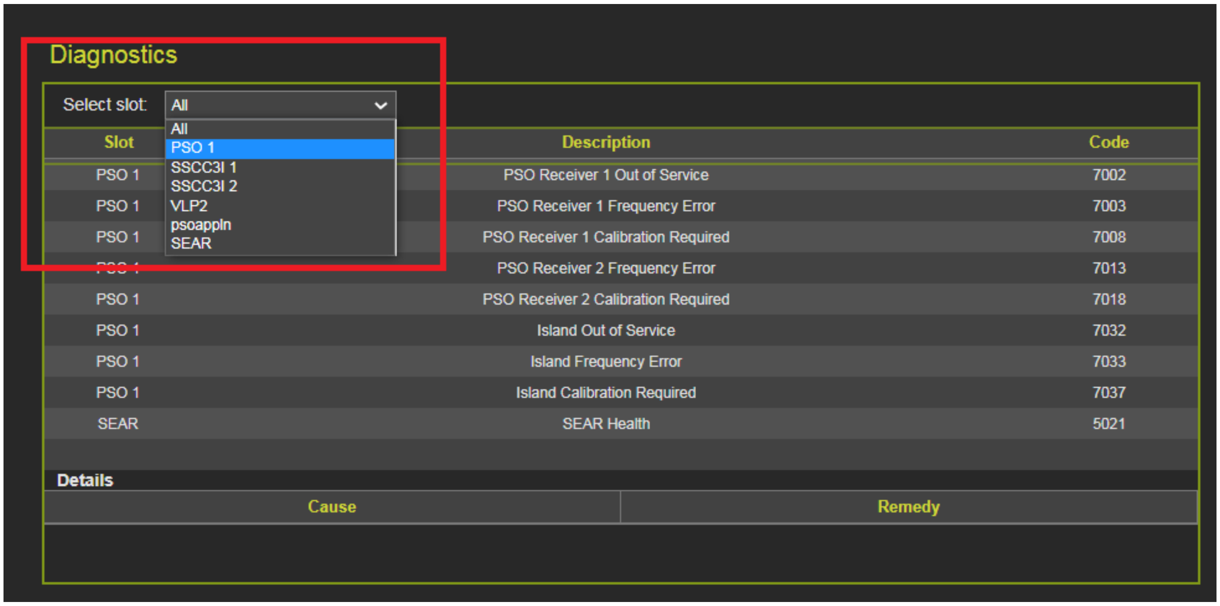


Figure 3-197: Web UI Diagnostics View – Module Selection

Then the Web UI only shows diagnostic messages for that slot as shown in Figure 3-198.

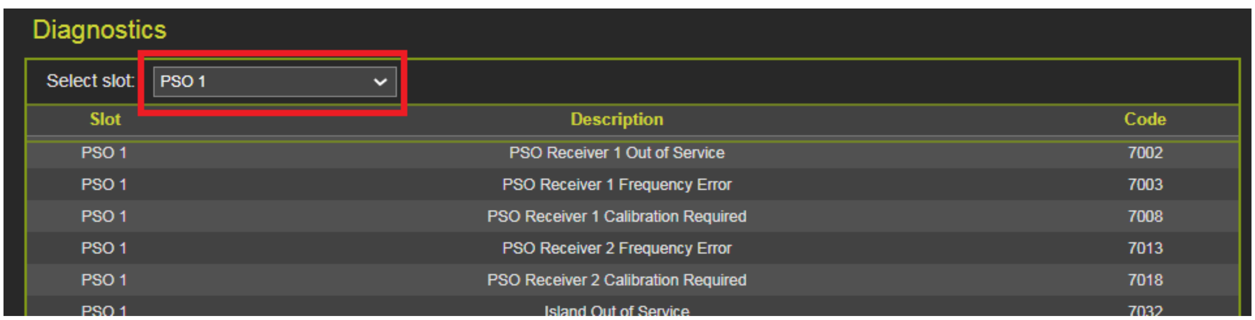


Figure 3-198: Web UI Diagnostics View Track

3.5.8 CPU III Web User Interface

The CPU III on the GCE provides a Web User Interface that allows the user to perform a subset of the functionality of the Display Module. The main System View is only available on the display, the CPU III Web UI will show the message as per Figure 3-199

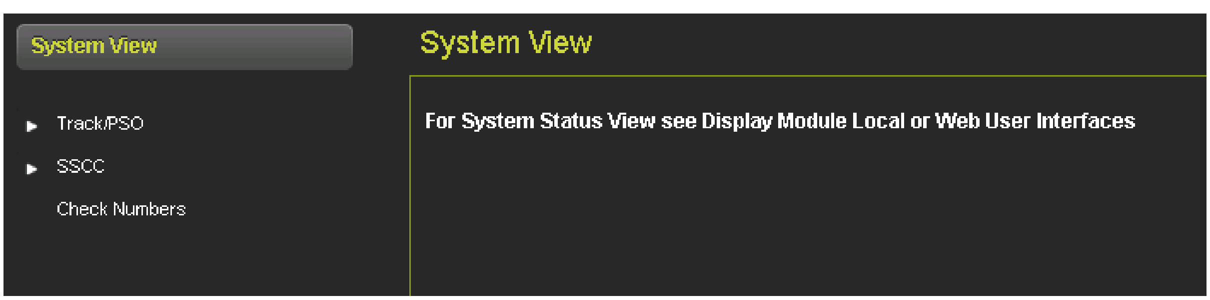


Figure 3-199 CPU III Web UI System View

The CPU III allows PSO module calibration as shown in Figure 3-200.

The Threshold adjustment is not available from this screen.

Figure 3-200: CPU III Web UI Calibration

The CPU III does not support the Out of Service option, the message shown in Figure 3-201 will be displayed.

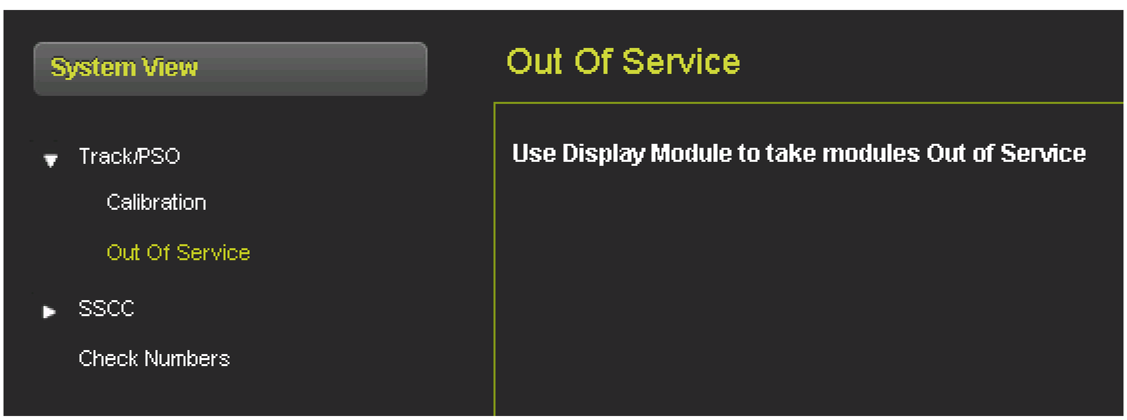


Figure 3-201: CPU III Web UI Out of Service

The CPU III supports the configuration options shown in Figure 3-202.

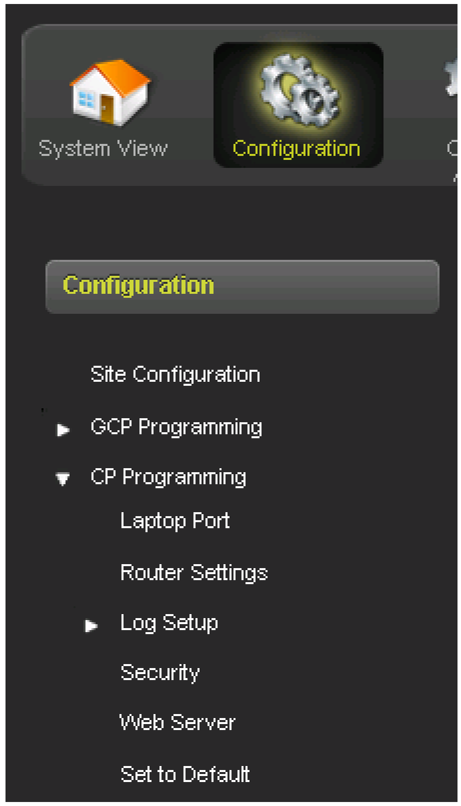


Figure 3-202: CPU III Web UI Configuration

If the Display is in session, the user is not permitted to edit the Site parameters from the Display, as shown in Figure 3-203.

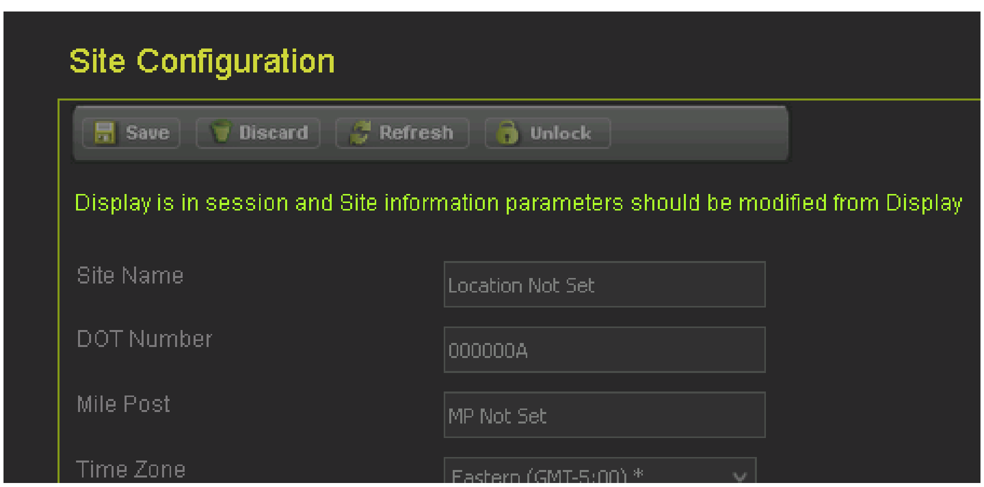


Figure 3-203: CPU III Web UI Site Configuration

The majority of the configuration parameters available from the previous menus are the same ones available in the Display module. The exceptions are the following that are changed from the CPU III:

- CP Programming – Laptop Port, see Figure 3-204
- Web Server – see Figure 3-205

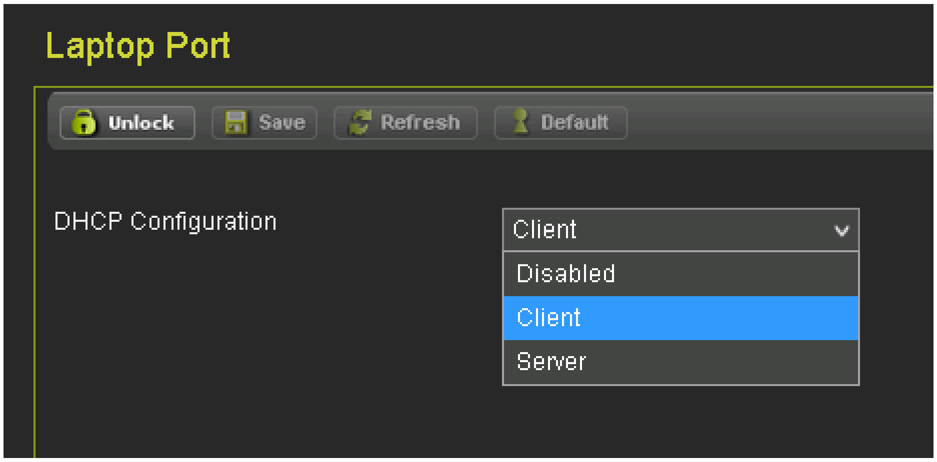


Figure 3-204 CPU III Web UI Site Laptop Port Configuration

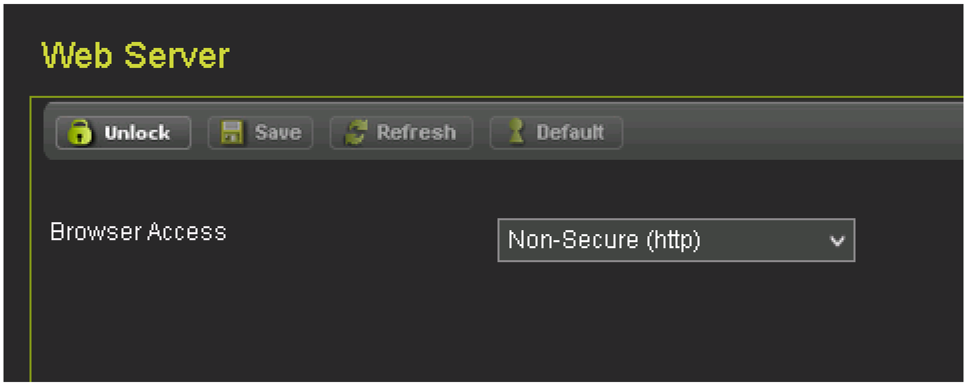


Figure 3-205 CPU III Web UI Web Server Configuration

The CPU III supports the Status Monitor options shown in Figure 3-206.

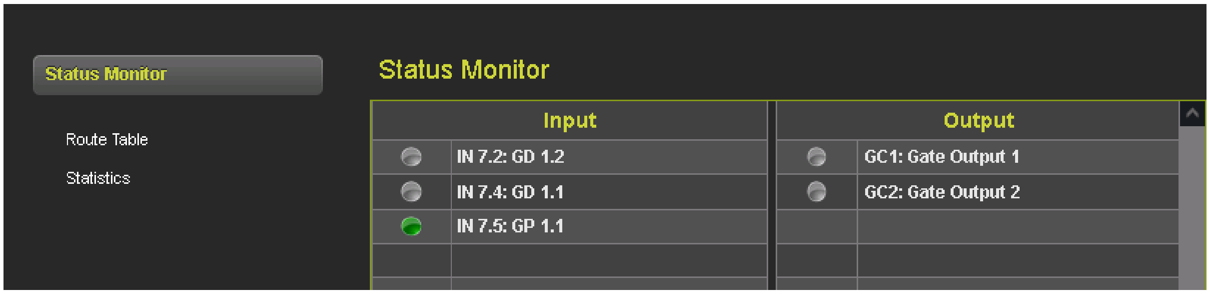


Figure 3-206: CPU III Web UI Status Monitor

The CPU III supports the Reports and Logs options shown in Figure 3-207. Note that if the version or configuration report is obtained from here it will not contain Display or SEAR IIi information.

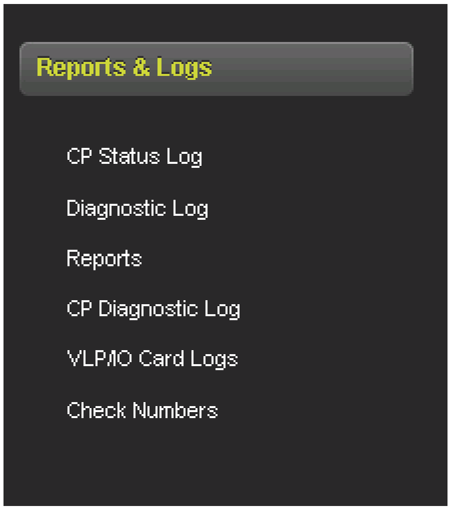


Figure 3-207 CPU III Web UI Report and Logs

The CPU III supports the Software Updates options shown in Figure 3-208.

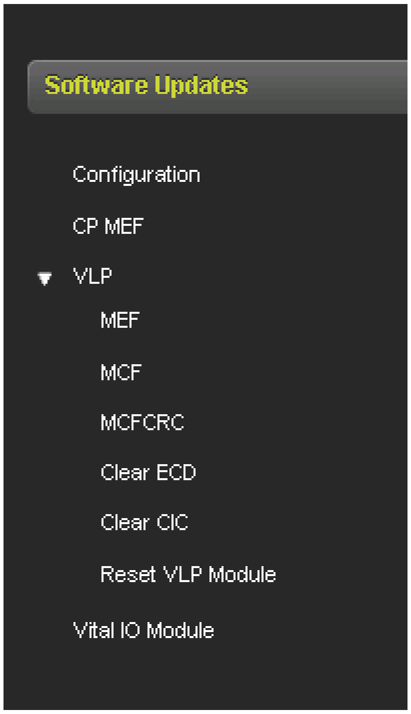


Figure 3-208 CPU III Web UI Software Updates

If the Display is currently in session, the CPU III does not allow the PAC File to be loaded, see Figure 3-209.

Note, if it is expected that there will be a Display and SEAR IIi in the system, the PAC files should be loaded via the Display. If the PAC files are loaded via the CPU III, the Display and SEAR IIi will not be programmed.

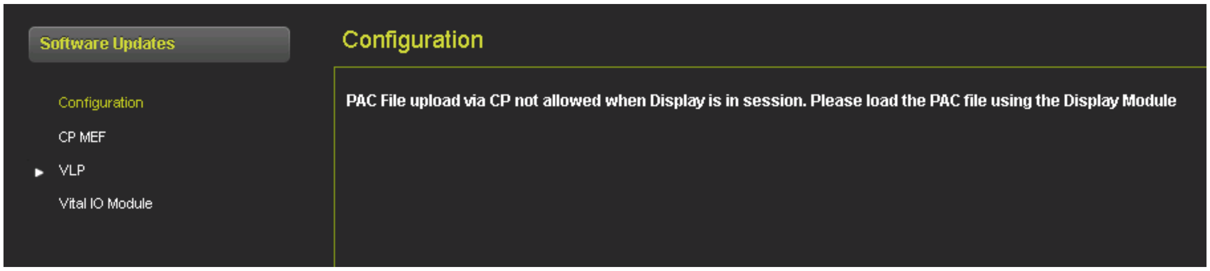


Figure 3-209 CPU III Web UI Configuration

The CPU III Web UI can be used to load new CP MEF, VLP MEF, or the MCF as shown in Figure 3-210

These can only be done from the Display Web UI if an Ethernet cable is connected between the Display and CPU III laptop port. So connecting directly to the CPU III laptop is more convenient in this case.

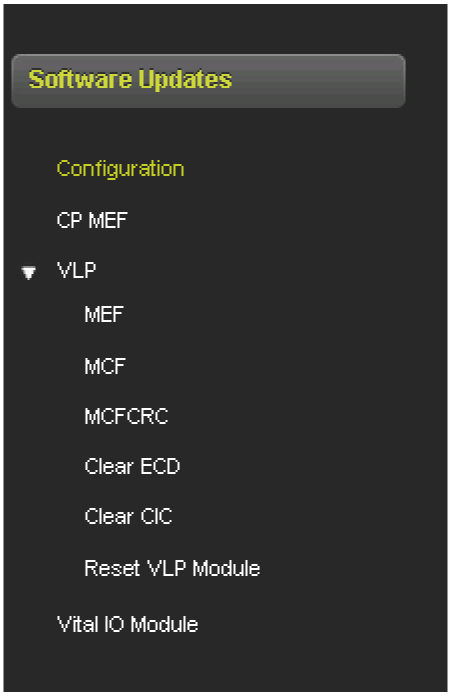


Figure 3-210 CPU III Web Software Update Options

3.6 Office Configuration Editor (OCE)

The Office Configuration Editor allows the user to capture the configuration for the GCP5000 (GCE) offline and save this to a file known as the PAC file. The OCE allows the user to set the GCP programming options, the SEAR programming including answering the CDL site setup questions, and also the display programming options.

The PAC file can then be loaded into the GCP5000 (GCE) via the Display module.

NOTE

> **NOTE**
>
> When uploading files to a GCP5000, the MCF must be loaded before loading the PAC file.

NOTE

> **NOTE**
>
> When uploading files to a GCP5000, the CDL must be loaded before loading a PAC file containing the CDL settings. If this order is not observed, the site setup will have to be restarted and completed a second time in the correct order.

These features allow the circuit designers to create a configuration package file (PAC file) for a specific GCP unit. The PAC file can be uploaded to the GCP5000 using a USB drive connected to the display. Loading the PAC file is an efficient method of programming office design into a field GCP5000 unit, as it minimizes the field programming steps and eliminates field errors in transferring programming from plans to the unit.

Utilization of the Office Configuration Editor features dramatically reduces the number of parameters that must be entered in the field. This allows the designer to designate most configuration parameters in the office. Only site-specific parameters must be determined and entered in the field.

See the Office Configuration Editor manual, SIG-00-11-15 for more details.

The Office Configuration Editor (OCE) can create a configuration package file (PAC file) and allows the user to save it to a USB drive. The OCE also computes the configuration check number (CCN), which is a 32-bit CRC of each configuration record for each card in the MCF. The CCN is stored in the PAC file and is present in various reports.

The OCE also computes the Office Configuration Check Number (OCCN), which is a 32bit CRC that includes the configuration record for each MCF card, but with certain parameters excluded. Specifically excluded are those values intended to be changed by the maintainer in the field. The purpose of the OCCN is to create a configuration check over the properties that the office sets and exclude the properties that the user sets in the field.

3.7 Configuration Check Number (CCN) and the Office CCN (OCCN)

The software used in the GCP5000 generates a 32-bit Cyclical Redundancy Check (CRC) number to determine that the software data has not been corrupted. Corrupted data would display a different CRC value. The GCP5000 takes the CRC of all configuration data and derives a Configuration Check Number (CCN) from that. Since there are values that are set in the field, the software derives an Office Configuration Check Number (OCCN), which is the 32-bit CRC of the configuration data, excluding items that are protected by the Field Password.

3.7.1 Parameters Excluded From OCCN

The following values have been excluded from OCCN and are covered by the Field Password:

Table 3-11: Field Password Values

PSO RX 1 Freq Category	PSO RX 2 Freq Category
PSO Island Freq Category	PSO TX Level
PSO RX1 Threshold	PSO RX2 Threshold
SSCC 1 / 2 Low Battery Detection	
SSCC 1 / 2 Low Battery Level	
SSCC 1 / 2 Lamp Neutral Test	

SECTION 4
SSCC APPLICATIONS & PROGRAMMING GUIDELINES

4 SSCC APPLICATIONS & PROGRAMMING GUIDELINES

4.1 SSCC Application Guidelines

The A80405 Solid-State Crossing Controller IIIi (SSCC IIIi), is a plug-in module for the GCP5000 (GCE). The case can accommodate up to two A80405 modules. Each module provides:

up to 20 amperes of lamp drive

gate and bell control

The A80405 module Interface is through GCE front-panel connectors. The A80405 module generally operates from a separate battery than the GCE portion of the system.

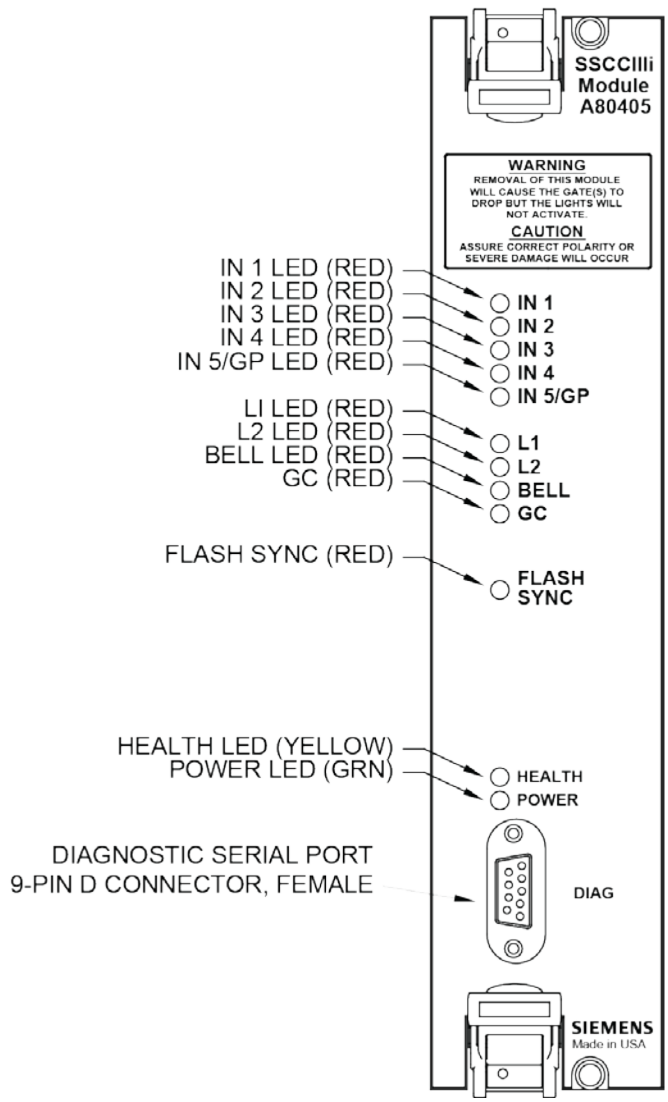


Figure 4-1 A80405 Solid-State Crossing Controller IIIi

The SSCC IIIi modules are integrated into the GCP5000 (GCE) system (wiring between the GCP, the SSCC IIIi, and the SEAR IIi is eliminated) and are not redundant.

4.2 Unit Overview

The A80405 module is programmed, calibrated, and tested from the Display module of the GCE. It is activated by internal logic from the GCE MCF, and monitors gate position inputs from the crossing gate mechanism as well as provides activation for the bell, lamps, and gates of a crossing warning system.

4.2.1 Module Function Control

The following A80405 module functions may be programmed:

- Lamp flash rate
- Gate control delay
- Low battery threshold indication
- Control maintenance call output
- Test timer intervals
- Crossing and lamp tests
- Lamp flashing synchronization between the A80405 modules of multiple GCP5000s
- Disabling of crossing bells while the gates are rising
- Disabling of crossing bells while the gates are down
- Requires gate down inputs to be energized

4.2.2 Crossing Controller Features

The circuits of the A80405 incorporate heavy-duty solid-state switches and have regulated lamp voltage. It is user-programmable. It minimizes lamp voltage dropping below acceptable limits when the AC power is interrupted for short periods and eliminates seasonal adjustment of lamp voltages when using temperature compensated battery chargers. The Crossing Controller Lamp Voltage uses pulse width modulation regulation, with the pulsed output frequency is approximately 500 Hz. The peak voltage of the pulse is approximately 1 volt below the battery input voltage. Depending on the voltage input, the pulse width is automatically varied to give a regulated output. The following examples in Figure 4-2 assume the desired output is 10 volts:

Example 1: 16 volts in, the pulse is 15 volts and on 66% of the cycle.

Example 2: 13 volts in, the pulse is 12 volts and on 83% of the cycle.

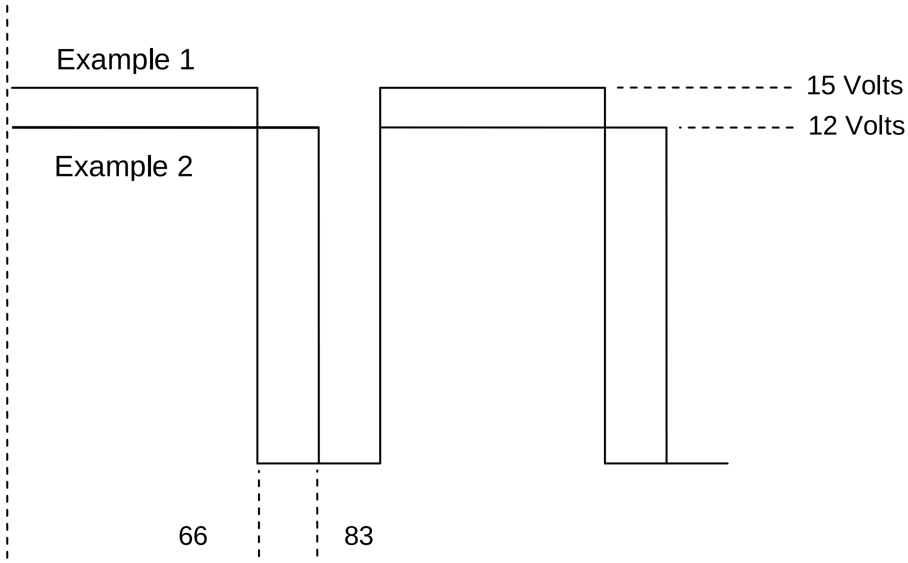


Figure 4-2 Pulse Width Modulation - Examples

NOTE

NOTE
The regulated lamp drive is a pulse-width modulated voltage with an AC component and a DC component. A True RMS AC+DC meter is required to accurately read the pulse-modulated lamp voltage, e.g., Agilent U1252A Conventional multimeters may be used; however, the voltage reading will vary from the true rms value. The variance is not a set percentage and is dependent on battery voltage.

4.2.3 Module Health

The A80405 module provides an output that controls the HEALTH LED on the module front panel.

- Yellow HEALTH LED reflects the health of the module:
- Flashes at 1 Hz rate when module fully operational.
- Flashes at 2 Hz rate when module not communicating with CPU module.
- Flashes at 8 Hz rate when a fault is detected within the module.

4.3 Battery Surge Protection and Power Wiring

Battery surge protection for the SSCC is shown in Figure 4-3. The Primary surge protection for SSCC modules is provided on the SSCC battery (see inside dotted line). The Primary surge protection for I/O interconnect is provided on lighting surge panels (see paragraph 4.3.1). Provide power wiring to A80405 SSCC IIIi modules:

- via **B** and **N** contacts of the respective crossing controller connectors on the GCP5000 (GCE) front panel.
- using poly-jacketed #10 AWG wire (recommended) for DC power and return between battery surge protection and the GCP5000 (GCE) crossing controller connectors.

Provide power wiring to the lighting surge panels:

- using poly-jacketed #6 AWG wire (recommended) for DC power and return between the –1 lighting surge panel (A91170-1 or A91181-1) and the crossing gate battery posts.
- using poly-jacketed #10 AWG wire (recommended) for DC power and return between the –1 lighting surge panel (A91170-1 or A91181-1) and the –2 lighting surge panel (A91170-2 or A91181-2).

CAUTION

CAUTION
PROPER BATTERY SURGE PROTECTION REQUIRES THAT THE BATTERY CHARGER OUTPUT BE WIRED DIRECTLY TO THE OPERATING BATTERY POSTS WHILE A SEPARATE PAIR OF WIRES RUN FROM THE BATTERY POSTS TO THE SSCC SURGE PROTECTION (ACROSS THE EQUALIZER) AS SHOWN IN Figure 4-3.

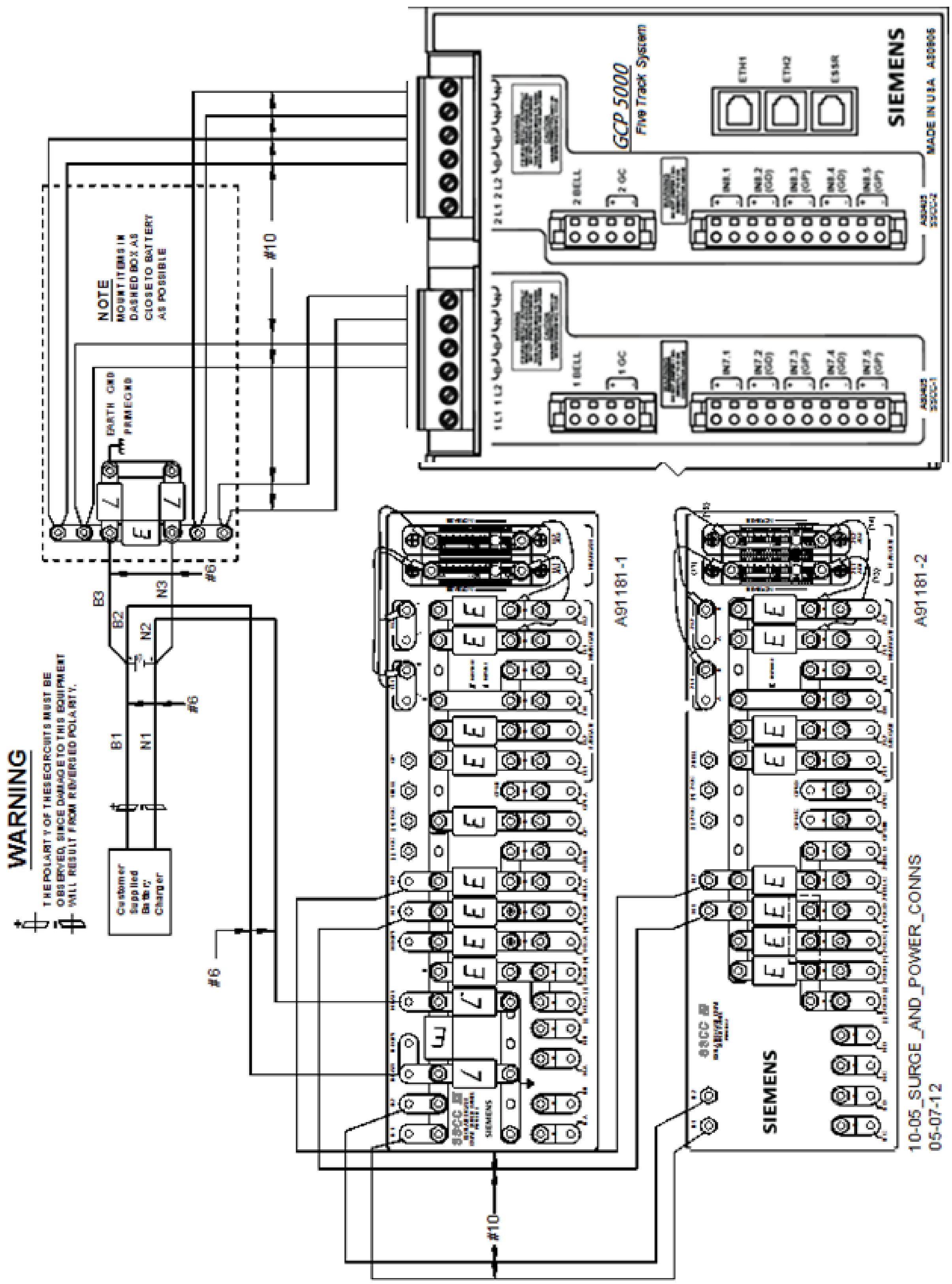


Figure 4-3 Surge & Power Connections to SSCC Modules & Lighting Surge Panels

4.3.1 Lighting Surge Panels

The A80405 modules use either of two SSCC III Lighting Surge Panel configurations to provide external I/O primary surge protection.

- A91170-1, -2 common return gate control, Figure 4-4A and Figure 4-4B
- A91181-1, -2 isolated gate control, Figure 4-5A and Figure 4-5B

Both Surge Panel configurations provide surge protection on all external I/O interconnects. The SSCC III Lighting Surge Panels provide:

- arresters and equalizer for surge protection from transients on underground-cable battery voltage
- protection on all other I/O underground cable connections
- standard AREMA binding posts for connections to the flashing lights, gates, and bells
- insulated links in the underground cable connections allow quick circuit isolation for testing and measurements without site cabling removal
- adjustable resistors in the **NEAR GATE** Lamp 1 (**1 L1**) and Lamp 2 (**1 L2**) circuits provide compensation for different lengths of cabling to the crossing flashing lamps allows the system to compensate for unequal voltage drops between the two cables
- steering diodes for the Crossing Controller Gate Control output to provide isolation between the two crossing gate controls (see Figure 4-6)

For common return gate control, a single A91170-1 panel (Figure 4-4A) is used for up to 20-ampere operation, and both an A91170-1 and an A91170-2 panel (Figure 4-4B) are generally used for 21 to 40-ampere operation. Refer to Figure 4-5A for typical common return gate control wiring.

For isolated gate control, a single A91181-1 panel (Figure 4-5A) is used for 20-ampere operation and both an A91181-1 and an A91181-2 panel (Figure 4-5B) are generally used for 21 to 40-ampere operation. Refer to Figure 4-5B for typical isolated gate control wiring.

⚠ WARNING

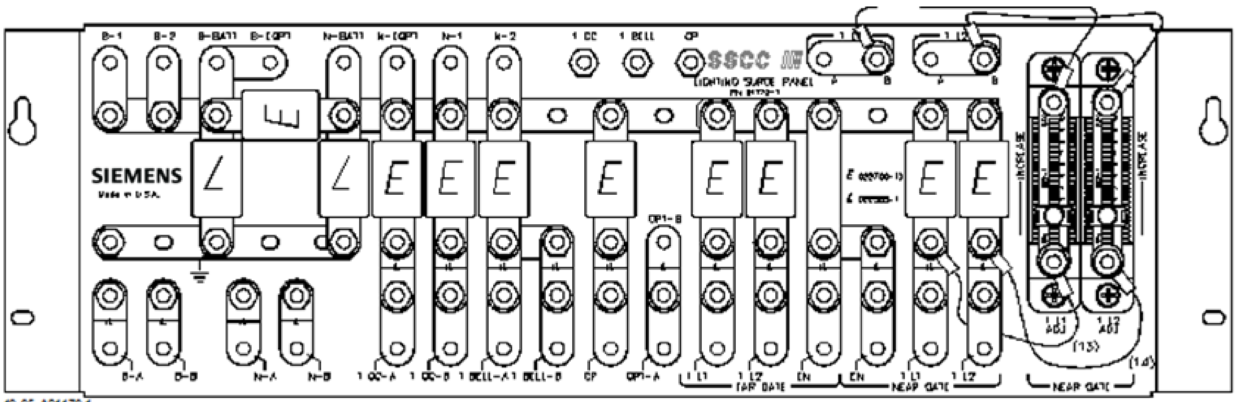
WARNING

WHEN 91170 OR 91180 PANELS ARE NOT USED WITH THE SSCC, EQUIVALENT SURGE PROTECTION MUST BE PROVIDED WITH THE ADDITION OF STEERING DIODES IN THE GATE CONTROL (GC) OUTPUTS AS SHOWN IN FIGURE 4-6A AND FIGURE 4-6B.

NOTE

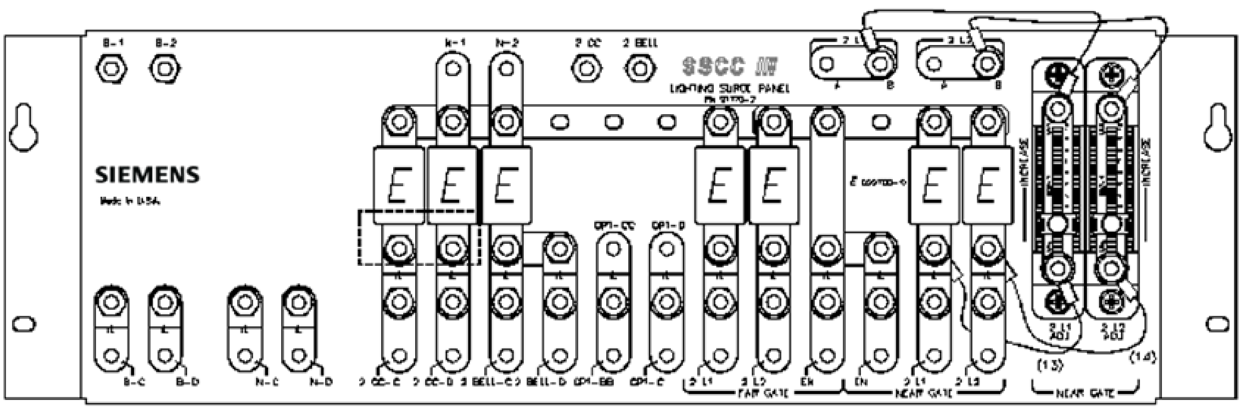
NOTE

For information on the selection and installation of the 91170-1 and 91181-1 SSCC III Lighting Surge Panels, refer to Section 9, Auxiliary Equipment.



10-05_A91170-1
05-07-12

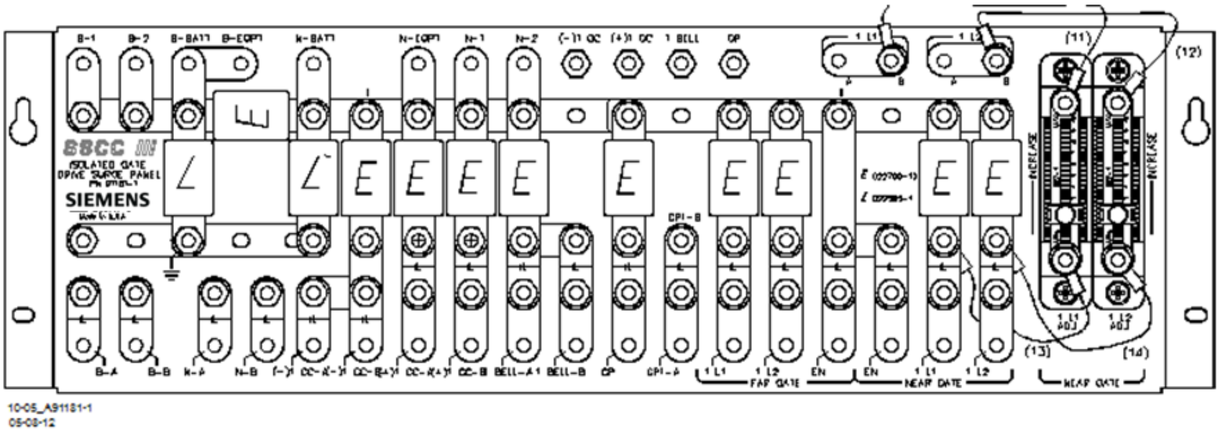
A
A91170-1



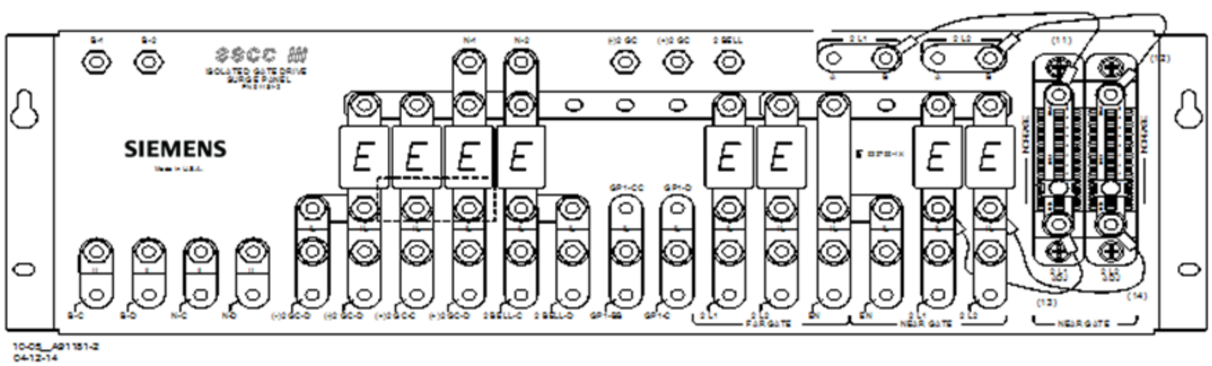
10-05_A91170-2
05-07-12

B
A91170-2

Figure 4-4 Common Return Lighting Surge Panels, A91170-1 & A91170-2

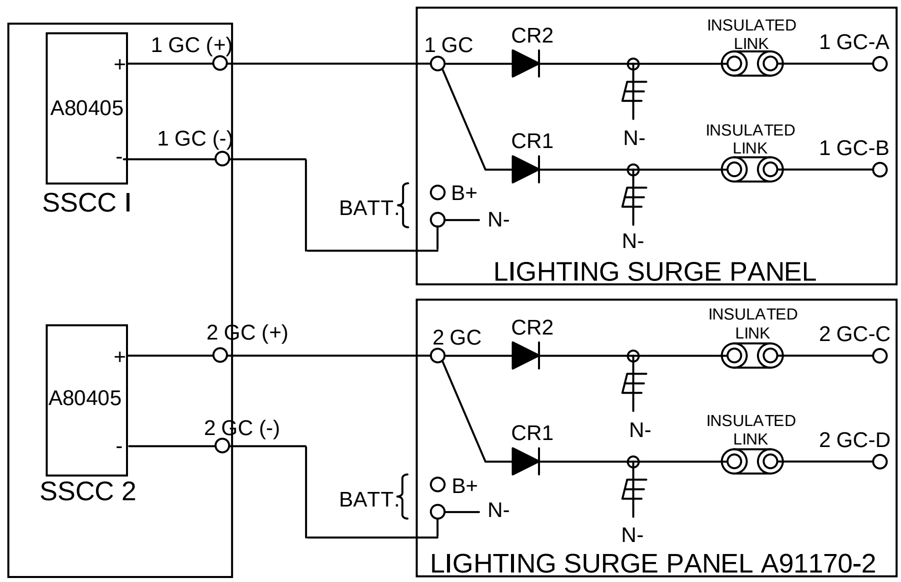


A
A91181-1



B
A91181-2

Figure 4-5 Isolated Return Lighting Surge Panels, A91181-1 & A91181-2



A: Typical Common Return Gate Control

B: Typical Isolated Gate Control

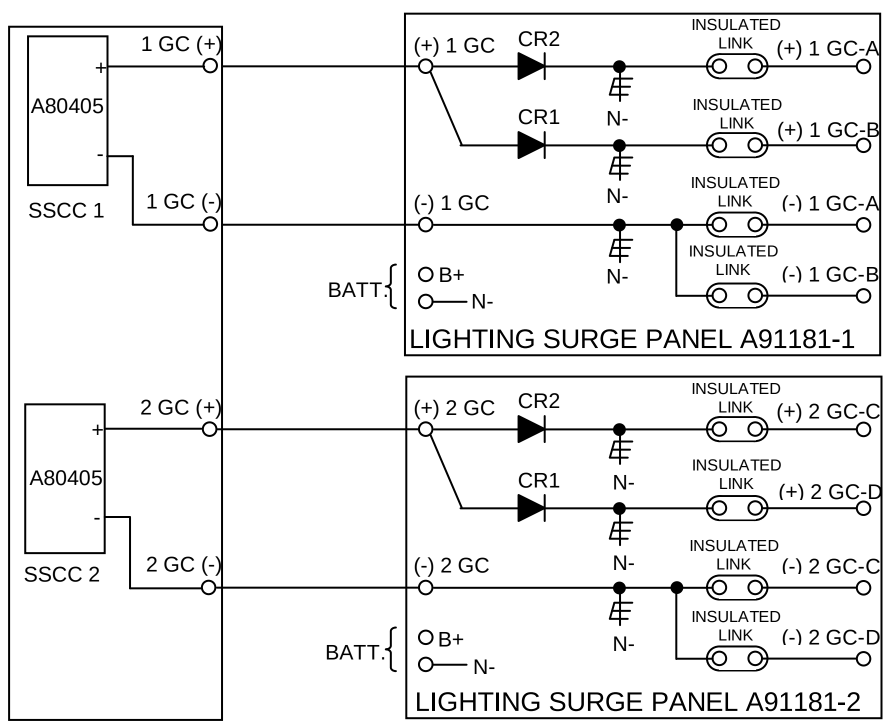


Figure 4-6 Typical Gate Control Options

4.4 Crossing Controller Operation

The A80405 module provides the drive for up to 20 amps of lamp current. The A80405 module continually performs self-diagnostic tests that result in complete on-line testing of module operation. If a critical failure is detected, the appropriate signal states are generated to immediately flash the crossing lamps and bring down the gates.

WARNING

WARNING

REMOVING INPUT POWER FROM THE A80405 MODULE CAUSES THE GATES TO DROP BUT THE LAMPS ARE NOT ACTIVATED.

IF B OR N ARE FULLY OR PARTIALLY REMOVED, SIGNALS AND/OR GATES MAY NOT OPERATE AS INTENDED. TAKE ALTERNATE MEANS TO WARN VEHICULAR TRAFFIC, PEDESTRIANS, AND EMPLOYEES.

Table 4-1 A80405 Module Operating Parameters

PARAMETER	VALUE
System Reaction Time:	Nominal 700 ms
Power-Up Time:	40 seconds maximum
Lamp Flash Rate:	Can be programmed for 30 to 70 flashes per minute in 5 flashes-per-minute increments. 50 flashes per minute default
Lamp Duty Cycle:	50% each flashed lamp
Lamp Voltage Adjustment:	Gate lamps are programmable, with regulated set points from 9.0 to 15.0 volts in 0.1 increments The lamp output voltage at the SSCC connector is limited to 1.5 volts under the battery voltage. Variable resistors on the Near Gate output of the Lighting Surge panel are provided for voltage drop compensation as required (see Figure 4-8 and Figure 4-9).
Test Modes:	
Static Lamp & Bell Tests:	Selected lamps lit steady. All lamps flashing Bell ON Steady
Activate Crossing:	Crossing activates according to normal operation
Timed Lamp Test:	Automatically delayed & timed.
Repeated Lamp Test:	Timed lamp test repeated after twice the initial delay.

4.5 Installation

4.5.1 Crossing Controller Module Installation

Two non-redundant A80405 Solid-State Crossing Controller IIIi (SSCC IIIi) modules can be installed in the GCP5000 (GCE) as shown in Figure 4-7. Crossing Controller lamp and bell circuit wiring include:

- Installation of wiring between the GCP5000 (GCE) Crossing Controller connectors and the SSCC III Lighting Surge Panels
- Installation of underground wiring between the SSCC III Lighting Surge Panels and the crossing Mast Junction Boxes
- Use of SSCC III Lighting Surge Panel(s)

Where one signal is controlled by each Controller Module, one surge panel may be used for both modules as shown in Figure 4-8.

⚠ WARNING

WARNING

WHEN ONE FLASHING LIGHT SIGNAL IS CONTROLLED BY EACH SSCC MODULE, A SINGLE SURGE PANEL MAY BE USED AS SHOWN IN FIGURE 4-8. JUMPER LINKS FROM A TO B MUST BE REMOVED IN TWO PLACES.

WHERE TWO SIGNALS ARE CONTROLLED BY A SINGLE CROSSING CONTROLLER MODULE, ONE SURGE PANEL MAY BE USED AS SHOWN IN FIGURE 4-9

NOTE

NOTE

Where multiple signals are controlled by each Crossing Controller Module, an additional –2 surge panel is required and is wired and jumper links installed similar to Figure 4-9, but connected to the second SSCC module connector.

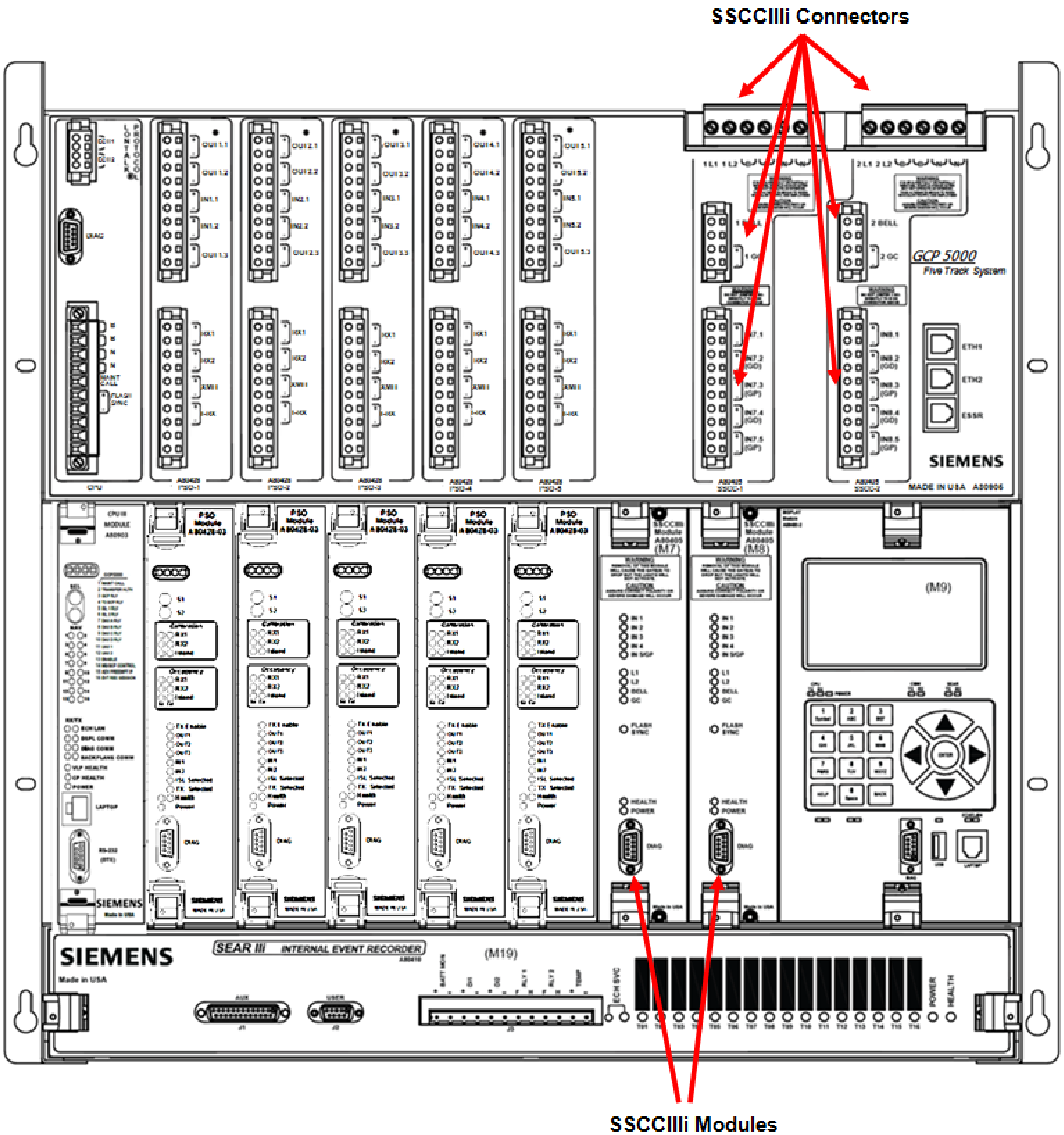


Figure 4-7   GCP5000 (GCE) Crossing Controller Module and Connector Locations

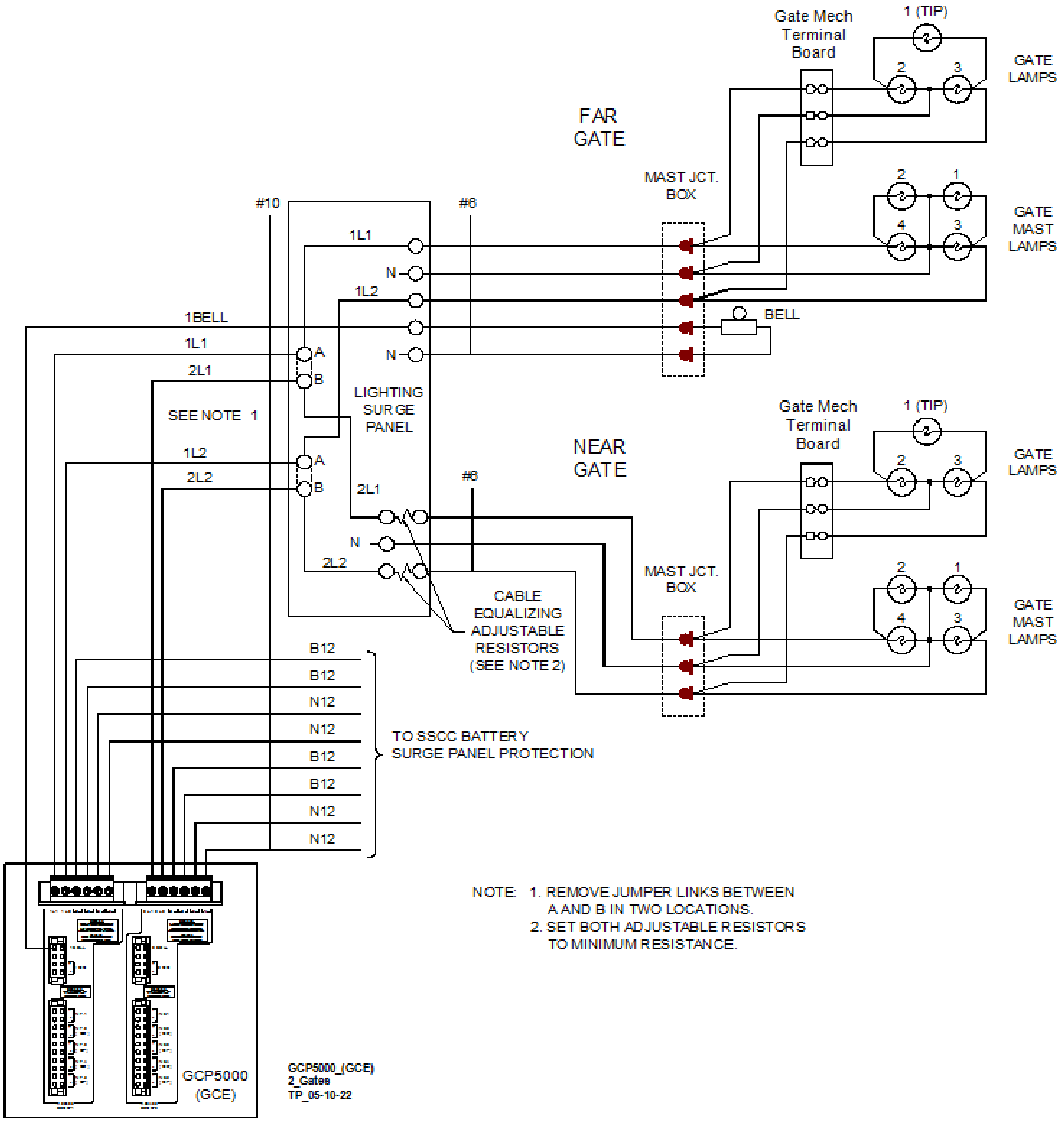


Figure 4-8 Two Crossing Controller Modules Controlling One Gate Each

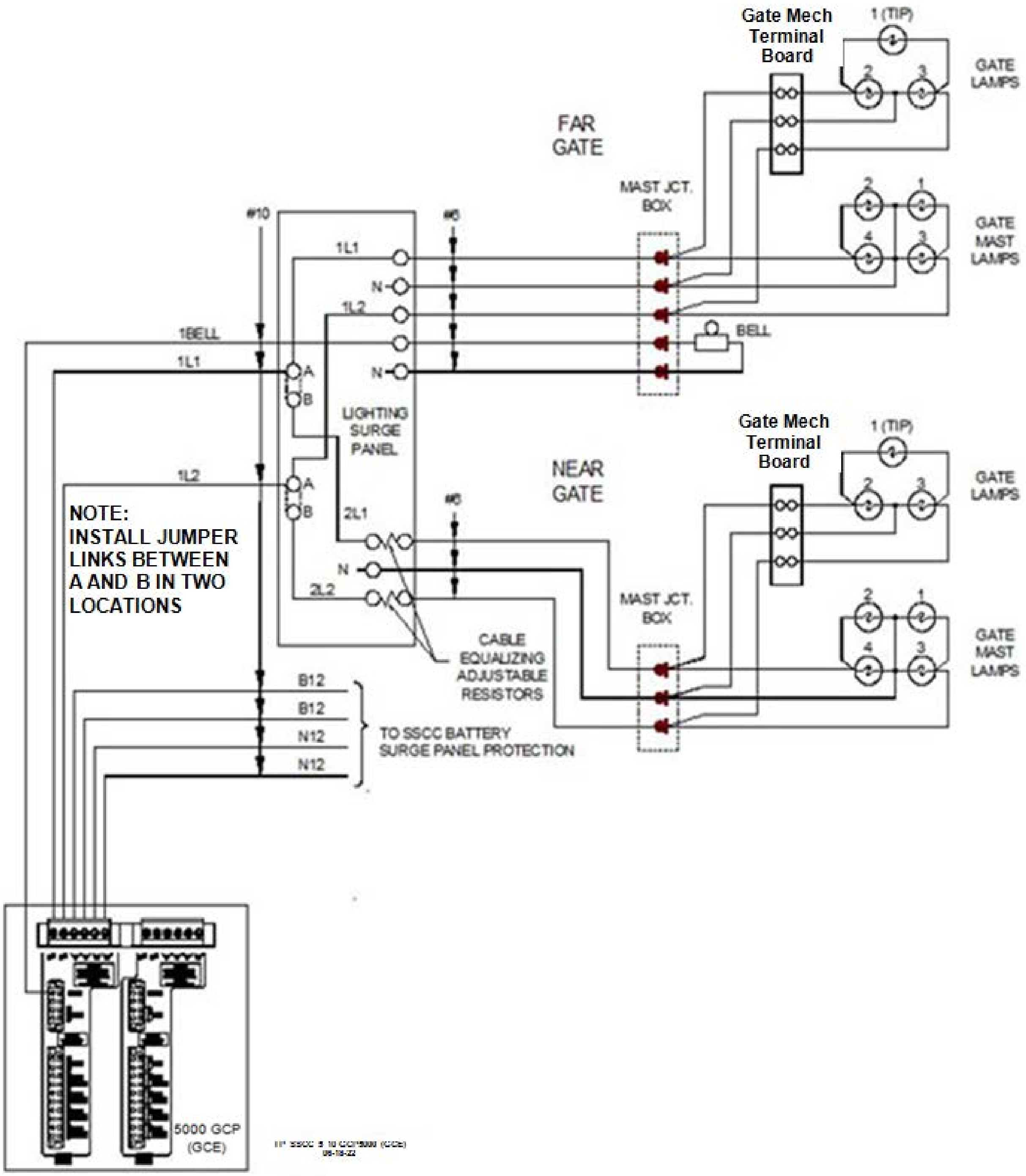


Figure 4-9 One Crossing Controller Module Controlling Two Gates

4.5.2 Crossing Controller Connectors

The GCP5000 (GCE) Crossing Controller connectors accommodate all wiring between the A80405 module(s) and the 91170 or 91181 SSCC III Lighting Surge Panel(s). Recommended crossing controller connector wire sizes are listed in Table 4-2. The use of stranded wire is recommended.

Table 4-2 Minimum Recommended Crossing Controller Wire Sizes

EXTERNAL WIRING CONNECTOR	PIN	CONNECTOR TYPE	WIRE SIZE
SSCC-1	1L1	6-pin screw terminal	10AWG
	1L2	6-pin screw terminal	10AWG
	B	6-pin screw terminal	10AWG
	N	6-pin screw terminal	10AWG
	1BELL	4-pin cage clamp	16AWG
	+1GC	4-pin cage clamp	16AWG
	-1GC	4-pin cage clamp	16AWG
	+1IN7.1	10-pin cage clamp	16AWG
	-1IN7.1	10-pin cage clamp	16AWG
	+IN7.2 (GD)	10-pin cage clamp	16AWG
	-IN7.2 (GD)	10-pin cage clamp	16AWG
	+IN7.3 (GP)	10-pin cage clamp	16AWG
	-IN7.3 (GP)	10-pin cage clamp	16AWG
	+IN7.4 (GD)	10-pin cage clamp	16AWG
	-IN7.4 (GD)	10-pin cage clamp	16AWG
	+IN7.5 (GP)	10-pin cage clamp	16AWG
	-IN7.5 (GP)	10-pin cage clamp	16AWG
SSCC-2	2L1	6-pin screw terminal	10AWG
	2L2	6-pin screw terminal	10AWG
	B	6-pin screw terminal	10AWG
	N	6-pin screw terminal	10AWG
	2BELL	4-pin cage clamp	16AWG
	+2GC	4-pin cage clamp	16AWG
	-2GC	4-pin cage clamp	16AWG
	+IN8.1	10-pin cage clamp	16AWG
	-IN8.1	10-pin cage clamp	16AWG
	+IN8.2 (GD)	10-pin cage clamp	16AWG
	-IN8.2 (GD)	10-pin cage clamp	16AWG
	+IN8.3 (GP)	10-pin cage clamp	16AWG
	-IN8.3 (GP)	10-pin cage clamp	16AWG

EXTERNAL WIRING CONNECTOR	PIN	CONNECTOR TYPE	WIRE SIZE
	+IN8.4 (GD)	10-pin cage clamp	16AWG
	-IN8.4 (GD)	10-pin cage clamp	16AWG
	+IN8.5 (GP)	10-pin cage clamp	16AWG
	-IN8.5 (GP)	10-pin cage clamp	16AWG

⚠ CAUTION

CAUTION

CROSSING WIRING MUST CONFORM TO APPROVED RAILROAD SCHEMATICS.
WHEN INSTALLING B AND N PIN WIRES, OBSERVE CORRECT POLARITY OR SEVERE DAMAGE TO THE A80405 MODULE WILL OCCUR.
USE THE CORRECT SCREWDRIVER BLADE SIZE TO AVOID CONNECTOR DAMAGE. FOR WIRE PREPARATION AND INSERTION INSTRUCTIONS, REFER TO PARAGRAPH 10.1.

4.5.3 Lamp and Bell Wiring to the Lighting Surge Panel

AREMA binding posts connect wiring to the Lighting Surge panel. Simplified Lighting Surge Panel Lamp and Bell wiring diagrams for typical crossings are shown in Figure 4-8 and Figure 4-9. A typical crossing lamp configuration is shown in Figure 4-10. Recommended wire size for L1 and L2 between the Lighting Surge Panel and the GCP5000 (GCE) SSCC power connector is number 10 AWG. Recommended wire size between the Lighting Surge Panel and the Mast Junction Box is number 6 AWG. The Lighting Surge Panel should be mounted as close as practical to the GCP5000 (GCE).

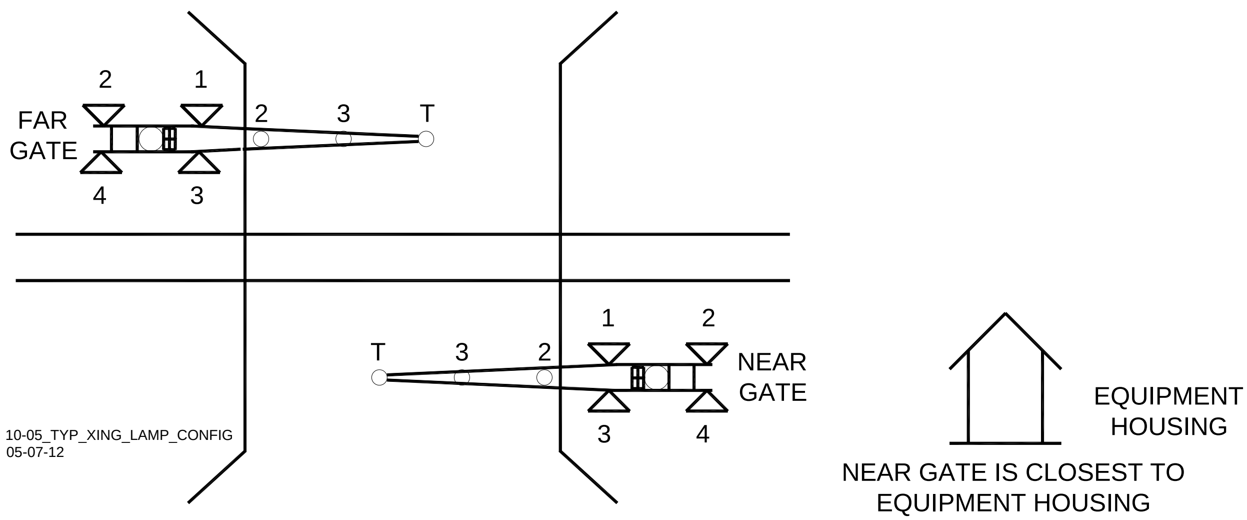


Figure 4-10 Typical Crossing Lamp Configuration

WARNING

WARNING

FAILURE TO FOLLOW THE RAILROAD'S OR AGENCY'S APPROVED WIRING OR INSTALLATION GUIDELINES MAY LEAD TO POSSIBLE UNSAFE OPERATION OF THE SYSTEM.

NOTE

NOTE

For a crossing without gates, disable the GP input to the A80405 module by programming the Gates Used to NO.

4.5.4 Lamp Wire Length Limitations

The maximum single wire length between the Lighting Surge Panel and the Mast Junction Box is determined by the:

- Gauge of the wire
- Total lamp current
- Type of battery used

4.5.5 Maximum Lamp Wire Length

The maximum recommended lamp wire length for a crossing is listed in Table 4-3.

The designated load current is based on 9.5 volts supplied to lamps.

Generally, 18-watt bulbs draw 1.8 amps per bulb lit at the same time and 25-watt bulbs draw 2.5 amps per bulb lit at the same time.

NOTE

NOTE

If a lamp wire between the surge Panel and the Mast Junction Box is too long, its resistance can prevent the full required voltage from being applied to the lamps.

The effective resistance of a wire can be reduced and/or its maximum length increased by using two wires of the same gauge in parallel as indicated in Table 4-3.

The A80405 module maintains a constant lamp output voltage provided:

- The battery voltage to the SSCC remains 1.5 volts higher than the lamp voltage measured at the SSCC L1 and L2 outputs.
- The maximum lamp wire length is not exceeded.

When the battery voltage supply cannot supply the requested lamp voltage, a lamp voltage limited message will be displayed.

Table 4-3 Maximum Recommended Crossing Lamp Wire Length

BATTERY			WIRE LENGTH (FT./M)			
LOAD CURRENT	TYPE	CELLS	#9 AWG	DUAL #9 AWG	#6 AWG	DUAL #6 AWG
5.0 Amp	Pb	6	225/68.6	450/137.2	450/137.2	900/274.3
	NiCd	9	175/53.3	350/106.7	350/106.7	700/213.4
7.5 Amp	Pb	6	117/35.7	234/71.3	234/71.3	469/143.0
	Pb	7[1]	260/79.2	520/158.5	500/152.4	1000/304.8
	NiCd	10	200/61.0	400/121.9	400/121.9	800/243.8
	NiCd	11[1]	260/79.2	520/158.5	500/152.4	1000/304.8
10.0 Amp	Pb	6	88/26.8	176/53.6	175/53.3	350/106.7
	Pb	7[1]	213/64.9	426/129.8	375/114.3	750/228.6
	NiCd	10	150/45.7	300/91.4	300/91.4	600/182.9
	NiCd	11[1]	213/64.9	426/129.8	375/114.3	750/228.6

Pb = Lead acid
NiCd = Nickel-cadmium
Note 1: Do not exceed 16.5 volts on the power terminals of the controller.

4.5.6 Crossing Controller DC Power Connections

The A80405 modules receive power via the Lighting Surge panel and the **CROSSING CONTROLLER** connectors as shown in Figure 4-11:

The surge panel provides primary battery surge protection.

Secondary surge protection provided by each A80405 module

Make power connections to each A80405 module via the **B** and **N** contacts of the respective **CROSSING CONTROLLER** connectors:

Poly-jacketed 10AWG wire is recommended for DC power and return between the lighting surge panel and the GCP5000 (GCE).

Poly-jacketed 6 AWG wire is recommended for DC power and return between the lighting surge panel and the crossing battery.

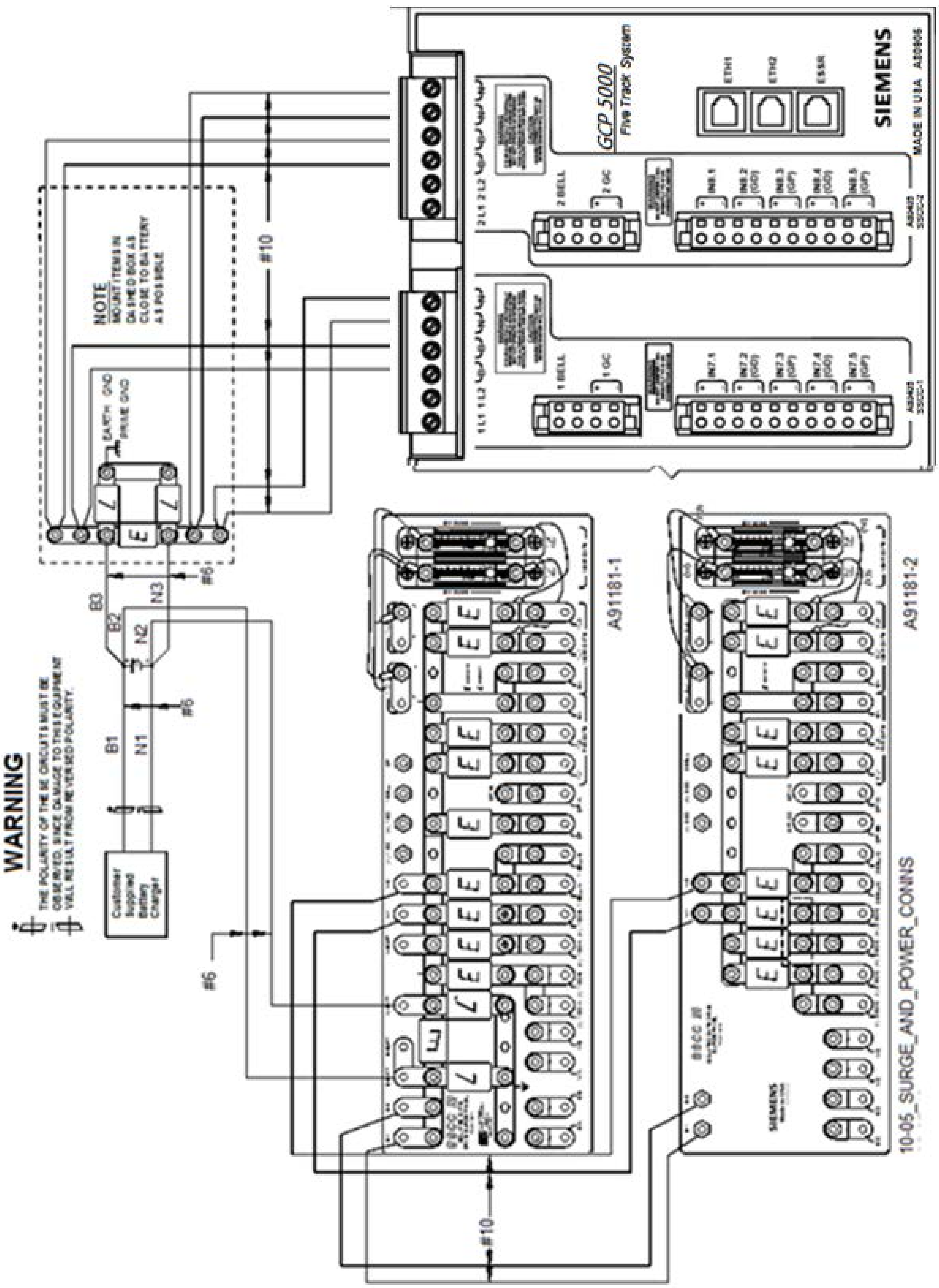


Figure 4-11 Typical Crossing Controller Module Battery Connections

CAUTION

CAUTION

WHEN USING TEMPERATURE COMPENSATED BATTERY CHARGERS:
EXCEEDING 16.5 VDC ON CROSSING CONTROLLER POWER TERMINALS MAY RESULT IN INTERMITTENT FALSE ACTIVATIONS.
EXCEEDING 18 VDC WILL RESULT IN CONTROLLER DAMAGE.
OBSERVE CORRECT POLARITY WHEN CONNECTING BATTERY POWER TO THE B AND N CONTACTS ON THE CROSSING CONTROLLER CONNECTOR(S). INCORRECT POLARITY WILL RESULT IN SEVERE DAMAGE TO THE A80405 MODULE(S).

4.5.7 Flash Sync Connections to External Controllers

NOTE

NOTE

Effective with Revision D of the SSCC IIIi, FLASH SYNC is an isolated two-wire output. If two Revision D or later SSCC IIIi units in the same chassis are operated by separate batteries, the FLASH SYNC returns are connected internally and no additional connection is required.

Revision D SSCC IIIi Modules can be identified by:

- “D” located at end of the Part Number / Bar Code tag.
- Large metal bracket located on the component side of the module.

When using Revision C SSCC IIIi or earlier, or when external SSCC units are connected to a master SSCC IIIi and operated from a different battery, the following wiring must be provided for FLASH SYNC Return:

If two Revision C SSCC IIIi units in the same chassis are operated by separate batteries, the N pins of the SSCC IIIi power and lamp connectors must be wired together.

If an external SSCC IIIA, SSCC III PLUS, or SSCC IV is connected to a master SSCC IIIi:

- If the SSCC IIIi is Revision C or earlier, the negative terminals of the master SSCC IIIi and external SSCC must be wired together.
- If the SSCC IIIi is Revision D or later, the SSCC IIIi FLASH SYNC return (-) must be connected to N on the external SSCC.

The terminology for flash sync control differs between a GCP5000 and an external SSCC device. The GCP5000 terms Master and Slave SSCC, are called “Flash Sync Out” and “Flash Sync In” respectively in an external SSCC (Slave = Flash Sync In).

The SSCC IIIi flash sync connection to an external SSCC is located on the CPU connector.

4.6 External Crossing Controllers

An external crossing controller may be used with the GCP5000 (GCE) to replace the internal crossing controllers or to supplement the lamp current provided by the internal crossing controllers. An appropriate crossing controller such as the SSCC IIIA, SSCC III Plus, or SSCC IV may be used.

4.7 Configuration Software

NOTE

NOTE

Where only LED lamps are used, a false lamp-neutral-wire-open condition may be detected when Lamp Neutral Test is set to On (see paragraph 7.1.4.9).

To avoid a false error indication, set the Lamp Neutral Test status entry for each active crossing controller to Off.

4.8 Connecting Power at Initial Cutover

Once the system has booted up, the SSCC IIIi module has internal short circuit protection for lamp, bell, and gate control outputs. Therefore, at the initial cutover, it is important to boot up the system before connecting external loads. After external wiring is complete, the connectors must be applied as instructed in the following CAUTION before applying power to the GCP5000 (GCE) SSCC IIIi module(s).

WARNING

WARNING

DURING THE SSCC BOOT-UP PROCESS AND AFTER ALL WIRING IS CONNECTED:

- THE CROSSING GATES WILL BE DOWN WITH CROSSING LAMPS FLASHING AND BELLS RINGING.
- A80405 MODULE(S) WILL NOT BE RESPONSIVE TO CROSSING CONTROL INPUT FROM THE GCP5000 (GCE).

TAKE ADEQUATE PRECAUTIONS TO WARN ANY PEDESTRIANS, PERSONNEL, TRAINS, AND VEHICLES IN THE AREA UNTIL PROPER SYSTEM OPERATION IS VERIFIED.

CAUTION

CAUTION

THE WIRING AND CONNECTORS MUST BE APPLIED IN THE FOLLOWING SEQUENCE TO AVOID DAMAGE:

1. OPEN THE LAMP, GATE GC CONTROL, GP INPUTS, GD INPUTS, AND BELL CIRCUITS AT THE SURGE PANEL(S).
2. VERIFY POLARITY ON POWER CONNECTOR(S).
3. CONNECT THE SCREW-LOCK POWER CONNECTOR FOR EACH SSCC IIIi MODULE AND LOCK BY TIGHTENING SCREWS.
4. WAIT APPROXIMATELY 40 SECONDS FOR SSCC IIIi MODULE(S) TO BOOT UP.
5. CONNECT THE GC/BELL AND GP/GD CAGE–CLAMP CONNECTORS FOR THE APPROPRIATE SSCC IIIi.
6. CLOSE THE LAMP, GATE CONTROL, GP/GD INPUTS, AND BELL CIRCUITS ON THE SURGE PANEL(S).

4.9 Measuring Crossing Lamp Voltage using a Conventional Multimeter

WARNING

WARNING

TO PREVENT AN OVERVOLTAGE CONDITION AT THE LAMPS, USE A VOLTMETER WITH A "TRUE RMS AC + DC" SCALE AND MAKE ALL MEASUREMENTS USING THAT SCALE.

To accurately read the crossing lamp voltages, a "true RMS AC + DC" multimeter (e.g., Agilent U1252A digital multimeter) must be used. Conventional multimeters may be used, however, the voltage read on the meter will vary from "true RMS AC + DC". The variance is not a set percentage and is dependent on battery voltage. A conversion table cross-referencing several conventional meters is in the following paragraph.

WARNING

WARNING

IF MAINS POWER IS OFF AND THE BATTERY VOLTAGE IS LOW, THE LAMPS WILL DIM. THE RAILROAD SHOULD ENSURE ADEQUATE BATTERY IS PROVIDED. TECHNIQUES TO MONITOR THE BATTERY REMOTELY SHOULD BE EMPLOYED, SUCH AS A LOW BATTERY ALARM FROM THE SEAR.

NOTE

NOTE

To measure the lamp voltage, the user can use the Display Module to turn the lamps on steady as described in section 6.4.2.2.

4.10 Meter Reading Conversion Examples

Following are two examples of how to measure the lamp voltages using a conventional meter. In both examples:

The battery bank voltage is 14.7 volts

Multimeters are set to read DC

Table 4-4 Multimeter Reading Variance from Actual Lamp Voltages

Battery Voltage	Regulated Lamp Drive Voltage Range	Measurement Below Actual Drive Voltage	
		Using Digital Multimeter (Agilent U1252 or Equivalent)	Using Analog Multimeter (TS111)
13.3	9.0 to 12.0	1.3 volts	0.6 volt
	>12.0	0.91 volt	0.42 volt

Battery Voltage	Regulated Lamp Drive Voltage Range	Measurement Below Actual Drive Voltage	
		Using Digital Multimeter (Agilent U1252 or Equivalent)	Using Analog Multimeter (TS111)
14.7	9.0 to 12.0	2.2 volts	1.1 volts
	>12.0	1.54 volts	0.77 volts
15.8	9.0 to 12.0	2.6 volts	2.0 volts
	>12.0	1.82 volts	1.4 volts

Lamp voltage measurement examples follow.

4.10.1 Lamp Voltage Measurement Example 1

When setting crossing lamp voltages to 9.5 volts, the conventional meter reading is determined by subtracting the meter variance given in Table 4-4 from the desired lamp voltage.

When using a **digital multimeter** (e.g. Agilent U1252A):

Desired lamp voltage = 9.5

Meter variance for 14.7 volt battery = -2.2

Meter reading = **7.3**

When using an **analog multimeter** (e.g. TS111):

Desired lamp voltage = 9.5

Meter variance for 14.7 volt battery = -1.1

Meter reading = **8.4**

4.10.2 Lamp Voltage Measurement Example 2

In this example, it is desired to check that the lamp voltage is greater than 8.5 volts and the battery voltage is 13.3 volts.

When verifying that the lamp voltages are greater than 8.5 VDC, the conventional meter reading is determined by subtracting the meter variance given in Table 4-4 from the minimum lamp voltage threshold.

When using a **digital multimeter** (e.g. Agilent U1252A):

Minimum lamp voltage threshold = 8.5

Meter variance for 13.3 volt battery = -1.3

Minimum meter reading = **7.2**

When using an **analog multimeter** (e.g. TS111):

Minimum lamp voltage threshold = 8.5

Meter variance for 13.3 volt battery = -0.6

Minimum meter reading = **7.9**

4.11 SSCC IIIi Programming Guidelines

The GCP5000 (GCE) can be configured to use up to two Solid State Crossing Controller IIIi (SSCC IIIi) modules. Crossing controller modules directly control the gates, lights, and bells for a crossing. Each crossing controller module includes:

- a gate drive output
- a bell output
- 2 lamp outputs that can drive up to 20A of lamp current
- 5 vital Inputs

The GCP5000 (GCE) programming for the SSCC IIIi modules allows flexibility in the use of the SSCC IIIi modules.

Generally, the SSCC IIIi modules use a separate set of batteries from the GCP5000 (GCE) battery to provide lamp, gate, and bell drive.

⚠ CAUTION

CAUTION

EXCEEDING 16.5 VDC ON CROSSING CONTROLLER POWER TERMINALS MAY RESULT IN INTERMITTENT FALSE ACTIVATIONS. EXCEEDING 18 VDC WILL RESULT IN CONTROLLER DAMAGE.

4.11.1 Program Parameters

The program configuration parameters for the SSCC IIIi modules are shown in Figure 4-12**.** The following general options are available for crossing operation:

Gates Used

Specifies whether gates are used at the crossing.

Set to **Yes** when gates are used

Default: **Yes**

SSCC1+2 GPs coupled

Set to **Yes** to allow a de-energized GP (gate position) input of one crossing controller to flash the lamps of the other crossing controller.

Set to **No** to allow the two crossing controllers to function independently. When GP's are not coupled in the main menu, the GP's coupled parameter will not display in the template menu.

Default: **Yes**.

Min Activation

Specifies the minimum crossing controller activation period when the crossing is activated and then immediately deactivated.

Range: 0 – 100 seconds. Default: **0**

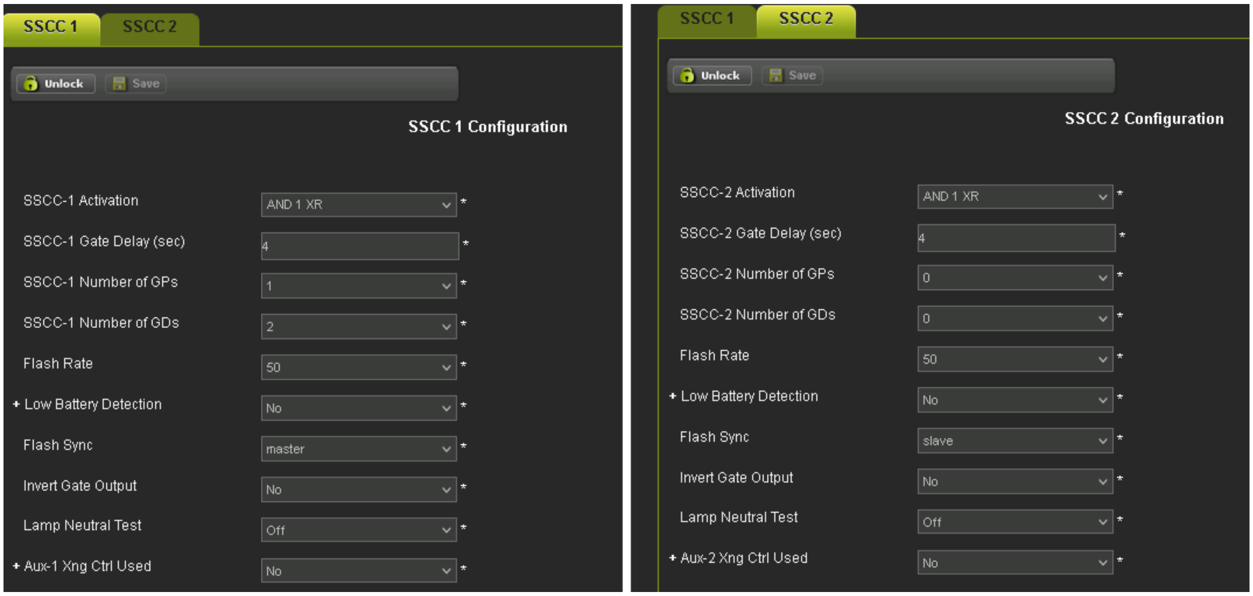


Figure 4-12 SSCC 1 and 2 Configuration Menus

Rmt (Remote) Activation Cancel:

Specifies the maximum length of time that the crossing will remain active when activated remotely via a command from the SEAR.

Range: 1 – 5 minutes. Default: **2 Min.**

Bell On Gate Rising:

When set to **Yes**, the bell rings while the gates are rising.

Default: **No**

Mute Bell on Gate Down:

Specifies whether the bell outputs are turned off when all the gate down inputs (GDs) are energized.

Default: **No**

4.11.2 Gate Down Inputs

Gate Down inputs (GDs) are used for various applications:

- When the GDs are connected to the SSCC inputs, they are monitored by the SEAR and can be used to generate alarm conditions and monitor crossing operations.
- Can be used to control Preemption Gate Down Logic.
- Can be used to control Traffic Control Clear Out Interval.

4.11.3 Crossing Control Health Reporting

When a crossing controller module detects an internal health problem, it activates the crossing, causing the:

- Lights to flash
- Gates to drop
- Bells to sound
- Maintenance Call (MC) to drop

The internal health problem is also detected by the CPU. This causes the CPU to activate the other Crossing Controller Module if used.

4.11.4 Crossing Controller Programming

Figure 4-13 shows the menus specific to each SSCC IIIi.

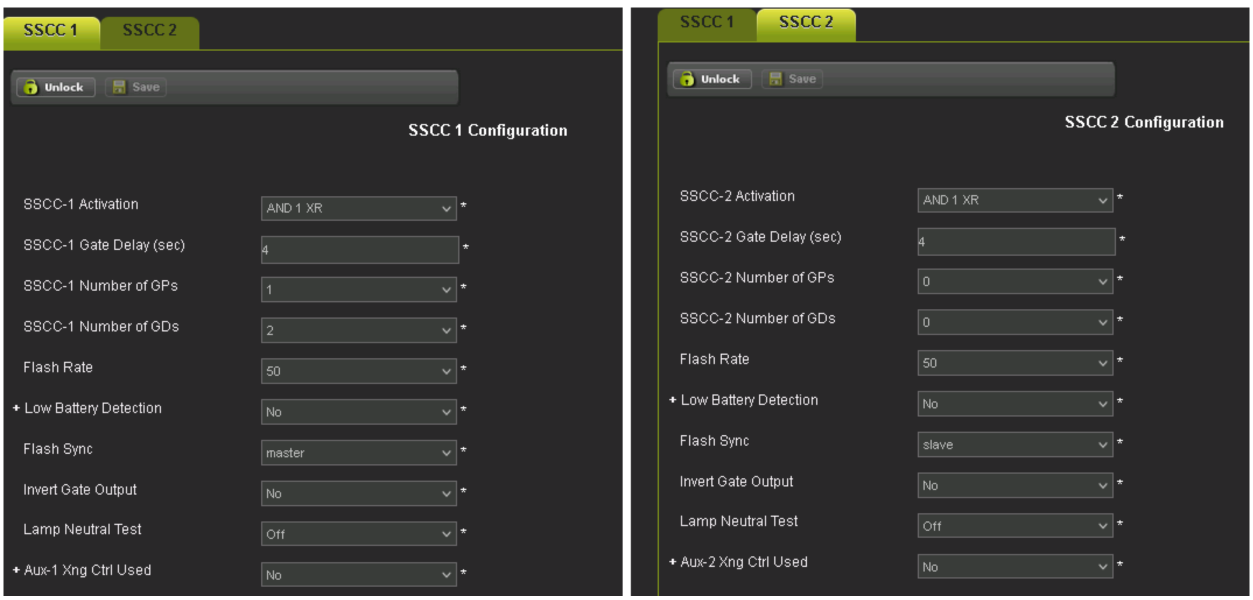


Figure 4-13 SSCC 1 and 2 Configuration Menus

4.11.4.1 SSCC-1 and SSCC-2 Activation

- The controller can be activated by either AND 1 XR, AND 2, AND 3, or AND 4.
- The default is AND 1 XR.
- Use **AND 2** for applications where the controllers are activated independently.

4.11.4.2 SSCC-1 and SSCC-2 Gate Delay

- The gate delay time is measured from the time the signals begin to flash to the time the gate output of the crossing controller de-energizes (the gates start down).
- Range: 3 – 100 seconds. Default: **4 sec.**

4.11.4.3 SSCC-1 and SSCC-2 Number of GPs

Modifies the available SSCC gate position inputs available to be mapped to vitals inputs or logic.

- Set to **1** when the gate output drives one or more gates, and the gate positions of these gates are daisy-chained together externally with only one gate position brought back into the controller.
- Set to **2** when the gate output drives two gates and each gate position can be brought into separate GP (Gate Position) inputs.

The functions that may be assigned to each SSCC vital input relative to the number of GPs selected are shown in Table 4-5. The default settings are as follows:

- SSCC 1 Default: **1**
- SSCC 2 Default: **0**

Table 4-5 SSCC GP Input Selection

NUMBER SELECTED IN CORRESPONDING GPs FIELD	SSCC-1 VITAL INPUT SELECTION AVAILABLE	SSCC-2 VITAL INPUT SELECTION AVAILABLE
0	Not Used	Not Used
1	Not Used GP 1.1	Not Used GP 2.1
2	Not Used GP 1.1 GP 1.2	Not Used GP 2.1 GP 2.2

4.11.4.4 SSCC-1 and SSCC-2 Number of GDs

Modifies the available SSCC GD (gate down) input selections in the INPUT: assignment SSCC window. The functions that may be assigned to each SSCC vital input relative to the number of GDs selected are shown in Table 4-6.

SSCC 1 Default: **2**

(There is no requirement to change this value or strap the input low if this feature is not used)

SSCC 2 Default: **0**

Table 4-6 SSCC GD Input Selection

NUMBER SELECTED IN CORRESPONDING GDs FIELD	SSCC-1 VITAL INPUT SELECTION AVAILABLE	SSCC-2 VITAL INPUT SELECTION AVAILABLE
0	Not Used	Not Used
1	Not Used GD 1.1	Not Used GD 2.1
2	Not Used GD 1.1 GD 1.2	Not Used GD 2.1 Gd 2.2
3	Not Used GD 1.1 GD 1.2 GD 1.3	Not Used GD 2.1 GD 2.2 GD 2.3
4	Not Used GD 1.1 GD 1.2 GD 1.3 GD 1.4	Not Used GD 2.1 GD 2.2 GD 2.3 GD 2.4

4.11.4.5 Flash Rate

- The rate in flashes per minute at which the lamps flash.
- The range is 30 to 70 flashes per minute, in steps of 5 flashes.
- Default: **50**

4.11.4.6 Low Battery Detection

- When set to Yes the controller monitors its battery.
- The maintenance call output drops when a low battery condition is detected.
- Default: **No**

4.11.4.6.1 Low Battery Level

- Displays when Low Battery Detection is set to **Yes**
- Sets the low battery detection level.
- If the controller detects a battery voltage lower than this value it will log a low battery detected and activate the maintenance call output.
- Range: 90 – 150dV (9.0 – 15.0 volts DC). Default: **90dV** (9.0 volts)

4.11.4.7 Flash Sync

- Used to synchronize all flashing lights.
- External controllers can be synchronized with the flash sync output of the CPU connector.
- A crossing controller can be designated as either master or slave.

SSCC1Default: **master**

SSCC2 Default: **slave**

4.11.4.8 Invert Gate Output

- Used to invert the on-off state of the GC output for exit gate mechanisms. When set to **Yes:**

  The output energizes after the Gate Delay timer expires.

  The output is de-energized when no train movement is detected

- When set to **No**:

  The output de-energizes after the Gate Delay timer expires.

  The output is energized when no train movement is detected

- Default: **No**

4.11.4.9 Lamp Neutral Test

NOTE

NOTE
The power supplies in many LED signals adversely affect the Open Lamp Neutral circuitry. Disable DETECT LAMP NEUTRAL WIRE when LEDs are used on any lamp output.

Used to enable or disable the testing for the open lamp neutral wire on the SSCC. If set to **Off** the SSCC Module will not perform the test for open lamp neutral wires.

If set to **On** the SSCC Module will perform the test for open lamp neutral wires. Default: **Off**

4.11.4.10 Aux-(#) Xng Ctrl Used

This function is used to interface the GCP5000 (GCE) with external crossing controllers such as the SSCC IIIA, the SSCC III+, and the SSCC IV. It can be used in interconnected railroad applications. When set to **Yes** the two controls become available to be assigned to an external output: In addition, one input becomes available.

Aux-(#) Xng Control

> De-energizes when the SSCC-(#) Module activates due to de-energized assigned **SSCC Activation** input (AND 1 XR, AND 2, 3, or 4) or there is an unhealthy SSCC-1 or SSCC-2
>
> May be assigned to a physical output to control the external crossing controller or to drop the gates and flash the lamps of an interconnected adjacent crossing in concert with those of the local crossing

Aux-(#) Lmp Control

> De-energizes when the SSCC-(#) Module activates due to: de-energized assigned **SSCC Activation** input (AND 1 XR, AND 2, 3 or 4); unhealthy SSCC-1 or SSCC-2; de-energized SSCC-(#) Module gate position input
>
> May be assigned to a physical output to; control an external crossing controller; synchronize lamps of an interconnected adjacent crossing with the local crossing

Aux-(#) Xng Ctrl Hlth IP

> Displays when Aux-(#) Xng Ctrl Used set to Yes. This function is used to select whether an **Aux-(#) Xng Ctrl Hlth** input is used. **Aux-(#) Xng Ctrl Hlth** receives the health status

signal from an external crossing controller or the corresponding SSCC-(#) of an interconnected adjacent crossing.

If the input is low SSCC-1 and SSCC-2 will activate, flash lamps, and drop gates.

NOTE

NOTE
If no health output is available from the external equipment, Aux-(1) Xng Ctrl Hlth still must be assigned to a physical input and strapped high.

4.11.5 Crossing Controller Gate Position Configuration Examples

Five examples are provided to show how to use the GP and GP Coupled status fields:

Example 1 – One Gate position input

Example 2 – Two gate position inputs

Example 3 – Single gate position input to each crossing controller

Example 4 – Single gate position input to each crossing controller with independent gate position

Example 5 – Crossing flashers only

4.11.5.1 Example 1 - Crossing Configured With One GP Input

In the SSCC Configuration window set **SSCC1+2 GP Coupled** to **Yes**. This will cause the lamps on both crossing controllers to flash if the GP input goes low

In the SSCC 1 Configuration window set **SSCC-1 Number of GPs** to 1 (default)

In the SSCC 2 Configuration window set **SSCC-2 Number of GPs** to 0 (default)

4.11.5.2 Example 2 - Crossing Configured With Two GP Inputs

To configure the crossing to respond to two gate position (GP) inputs to the same crossing controller (this allows both gates to have their GPs wired individually to two SSCC GP inputs):

Set **GP Coupled** of the **SSCC** window to **Yes.**

This causes the lamps on both crossing controllers to flash if either GP input goes low.

Set the parameters for each crossing controller. The two GP inputs are automatically combined internally, which allows the SEAR to independently monitor each gate position input.

Set the inputs to the crossing controllers.

The gate position wires are connected to IN 7.3 and IN 7.5 of SSCC-1.

4.11.5.3 Example 3 - Crossing Configured for Two GP Inputs (One to Each SSCC)

This example is the same as example 2 except that one GP input is assigned to each SSCC Module. To configure the crossing to respond to a gate position (GP) input to each crossing controller:

- In the SSCC Configuration window set **SSCC1+2 GP Coupled** to **Yes**. This will cause the lamps on both crossing controllers to flash if either GP input goes low
- In the SSCC 1 Configuration window set the **SSCC-1 Number of GPs** to 1 (default).
- In the SSCC 2 Configuration window set the **SSCC-2 Number of GPs** to 1.
- Assign GP 1.1 to an input, by default this is already assigned to IN 7.5.
- Assign GP 2.1 to an input, for example IN 8.5.

4.11.5.4 Example 4 - Crossing Configured With GP Inputs To Independent SSCCs

The crossing controllers may be configured to function with minimum interaction, thus allowing each SSCC module to independently control lamp activation. This typically may be used on divided highways where a single gate malfunction does not affect opposing traffic. To configure the crossing controllers for independent operation:

In the SSCC Configuration window set **SSCC1+2 GP Coupled** to **No**.

In the SSCC 1 Configuration window set the **SSCC-1 Number of GPs** to 1 (default).

In the SSCC 2 Configuration window set the **SSCC-2 Number of GPs** to 1.

Assign GP 1.1 to an input, by default this is already assigned to IN 7.5.

Assign GP 2.1 to an input, for example IN 8.5.

When the GP input to SSCC 1 de-energizes, only the lamps controlled by SSCC-1 flash. When the GP input to SSCC 2 de-energizes, only the lamps controlled by SSCC-2 flash

4.11.5.5 Example 5 - Crossing Configured for Flashers Only Using One SSCC Module

The crossing controllers may be configured to only operate the crossing flashers. To configure the crossing controllers for this function:

- On the Module Selection menu set **SSCC-2 Slot** to **Not Used**
- On the SSCC Configuration menu set the **Gates Used** to **No**

4.12 External Crossing Controllers

An external crossing controller may be used with the GCP5000 (GCE) to replace the internal crossing controllers or to supplement the lamp current provided by the internal crossing controllers. An appropriate crossing controller such as the SSCC IIIA, SSCC III Plus, or SSCC IV may be used.

4.12.1 External Crossing Controller Or Relay Based Control

To accommodate an external crossing controller or relay-based crossing control the AND 1 XR signal of the GCP5000 (GCE) must be mapped to an external output as shown in Figure 4-14.

- The external output can be connected to an XR relay.
- The external output can be connected to the appropriate activation input of the crossing controller.

For additional information, see Section 4.6, External Crossing Controllers, of this manual.

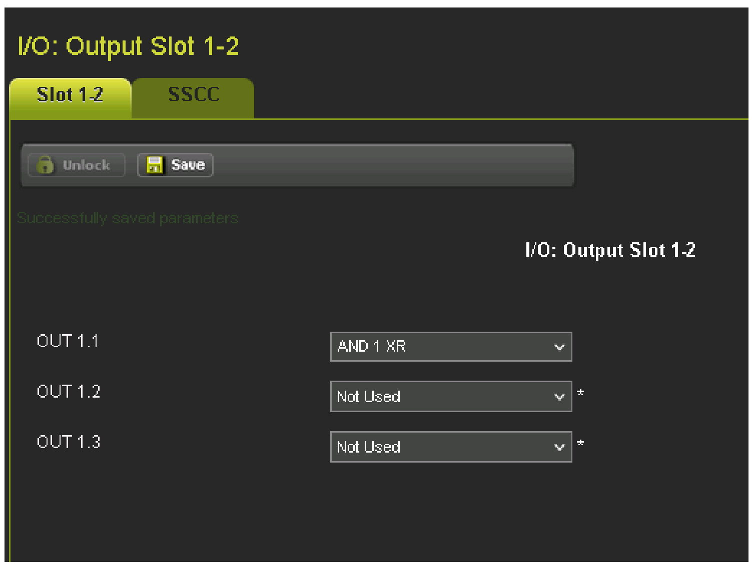


Figure 4-14 Assigning Inputs For External Crossing Controller

4.12.2 External Crossing Controller For Additional Lamp Current

Where the lamp current requirements of the crossing exceed the 40 Amp combined capacity of the two internal crossing controller modules, an external controller may be used to provide supplemental lamp current. Either SSCC-1 or SSCC-2 may be used to activate the external controller. The setup to enable activation by SSCC-1 is as follows:

- On the SSCC 1 Configuration menu set **Aux-1 Xng Ctrl Used** to **Yes** and the **Aux-1 Xng Ctrl Hlth IP** to **Yes**.
- When the Aux-1 Xng Ctrl Used is set to Yes, this enables two additional outputs, **AUX-1 Xng Control** and **AUX-1 Lmp Control**.

Map **Aux-1 Lmp Control** to an output and set an input as **Aux-1 Xng Ctrl Hlth** as shown in Figure 4-15. Connect this output to the appropriate gate position input of the external crossing controller. Connect this input to the gate output of the external SSCC.

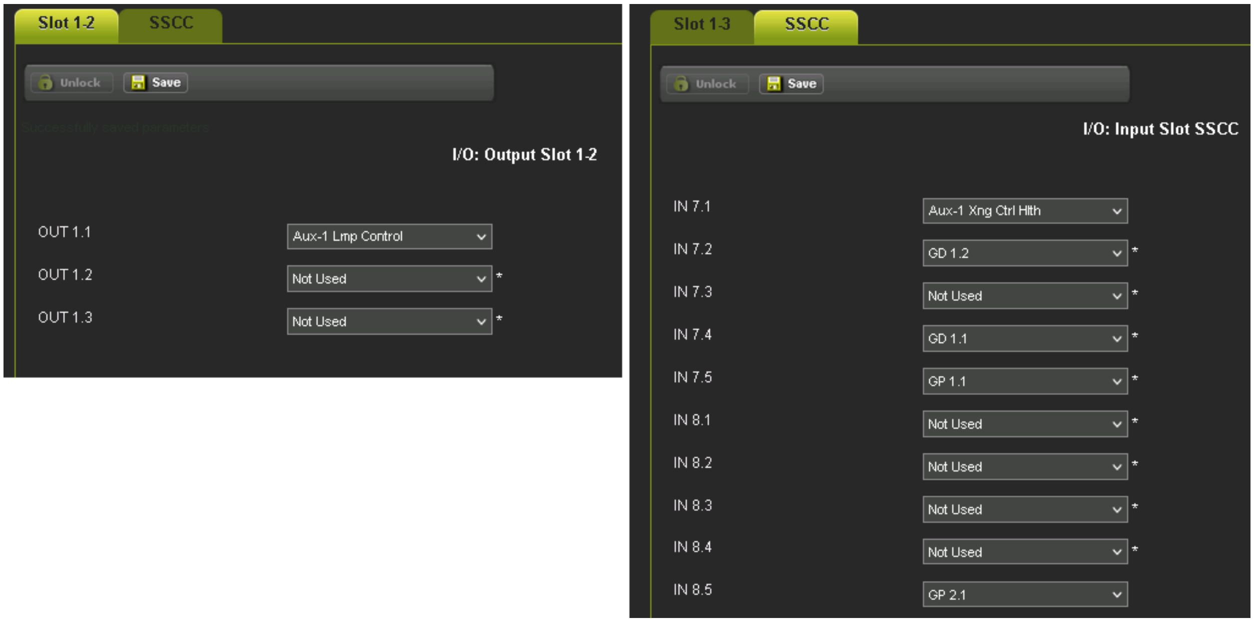


Figure 4-15 External Crossing Controller IO Assignment

To sync the lamps on the external controller:

- Connect the flash sync output of the GCE to the flash sync I/O of the external crossing controller as follows:
- Connect the **FLASH SYNC +** output of the GCE chassis to the **FLASH SYNC I/O** on the external crossing controller.
- Connect the **FLASH SYNC -** output of the GCE to **N** of the external crossing controller. (The power returns for the GCE and the external crossing controller do not have to be connected.)
- When used, connect **MAINT CALL** of the GCE with **MAINT CALL** of the external crossing controller as described in paragraph 6.12.

NOTE

NOTE

SSCC IIIi Modules Rev D and later have an isolated flash sync output.

Where battery isolation must be maintained and SSCC IIIi Modules of Rev C or earlier are used, contact Siemens Technical Support for application information.

The Aux-1 Lmp Control output de-energizes whenever the lamps on SSCC-1 flash, either due to activation, gate position, or SSCC health.

If the external controller fails, its gate output will de-energize, causing the Aux-1 Xng Ctrl Hlth to de-energize and the internal crossing controllers to activate.

4.12.3 Installation of iLOD Module

To install the iLOD using the GCP5000 Display module:

1. use the following path: **Program View > 3) SEAR Programming > 9) SEAR Setup 3) Module Install.**

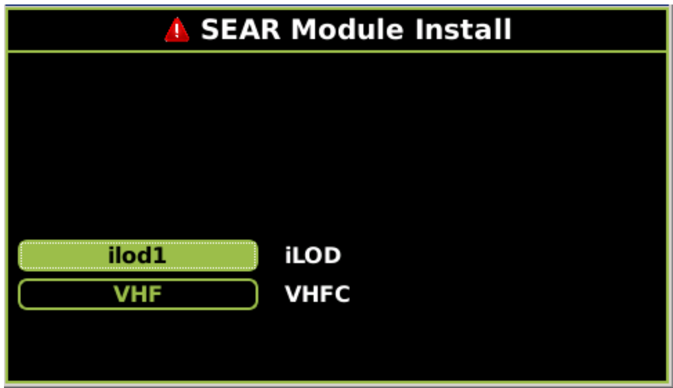


Figure 4-16 Installing an iLOD

2. Select the iLOD module to install. The Display module will then indicate Module install is in Progress…The Display will indicate **Waiting for service msg…** when the message appears, the user needs to press the Echelon® Service button on the iLOD, and the Display will indicate when the process is successful.
3. The Display module will indicate once the installation process is complete.

To install the iLOD using the GCP5000 WebUI:

1. Locate the IP address of the GCP5000 unit via the Display module (**Program View > 4) Display Programming > 2) Ethernet Ports > 1) Laptop > Status**) Type into a compatible web browser with https:// in front of it, if the display module is set for a secure connection. The web browser will warn that the connection is not private. Select Advanced then Proceed to https://192.168.255.81.
2. Log into the WebUI using the appropriate User Name and Password.
3. Access the **Configuration** icon from the top menu bar, then select **SEAR Programming > Echelon Modules**.

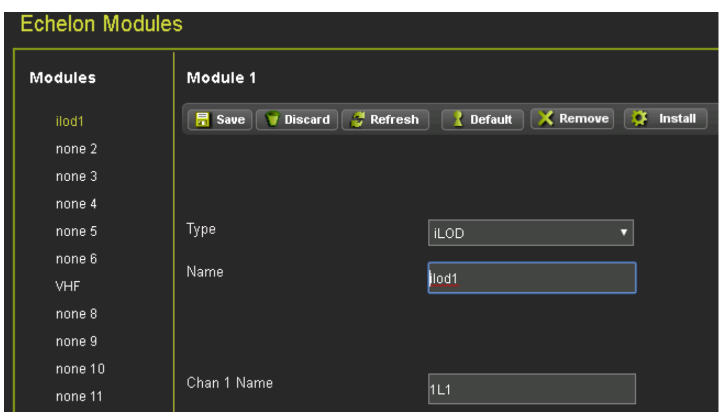


Figure 4-17 Installing iLOD via Web UI

4. Select the Type of module via the drop down, then select **Install.**
5. The WebUI will indicate **Waiting for service msg…** when the message appears, the user needs to press the Echelon® Service button on the iLOD, and the Web UI will indicate when the process is successful.

4.12.4 Lamp Calibration of iLOD

The lamp calibration process for an iLOD sets the internal threshold levels used by the iLOD software to detect flashing lamp current. These levels are site-specific. It also is used by the application program to determine the number of lamps and the current draw that is present for a properly operating crossing. This process is not the same as factory calibration. Factory calibration is performed on the iLOD units before shipment.

NOTE

NOTE

All key presses in the following procedure are done from the front panel keypad on the GCP5000 Display module.

1. To access Lamp Calibration, select: **Program View > 3) SEAR Programming > 9) SEAR Setup 2) Lamp Calibration** on the Display module, OR access the WebUI (see preceding iLOD installation procedure) and select **System View > SEAR > Lamp Calibration**.
2. If there is an application program loaded into the SEAR, enter the number of flashing lamps for each iLOD sensor when requested.

NOTE

NOTE

If the site has Gate Tip Sensors installed, when asked to flash the lamps, make sure the gates are level before pressing **Enter**. The current reading is allowed to “settle” for 15 seconds.

3. Depending on the configuration of the crossing, it may be necessary to repeat this process with AC power to the crossing turned off. At some installations, the process may be repeated more times depending on configuration (split tracks, etc.).

NOTE

NOTE

A pair of flashing lamps count as one lamp and each tip light counts as one flashing lamp. Count only the lamps that go through that sensor. The lamp count may be on the site plans.

4. When the process is complete, the Display module will return to the SEAR Program Menu.

4.12.5 SEAR Setup

Review the program in the GCP5000 (GCE) by using the left or right arrows on the Display module and scrolling to the Program View screen, then scrolling down to or selecting **3) SEAR Programming** menu

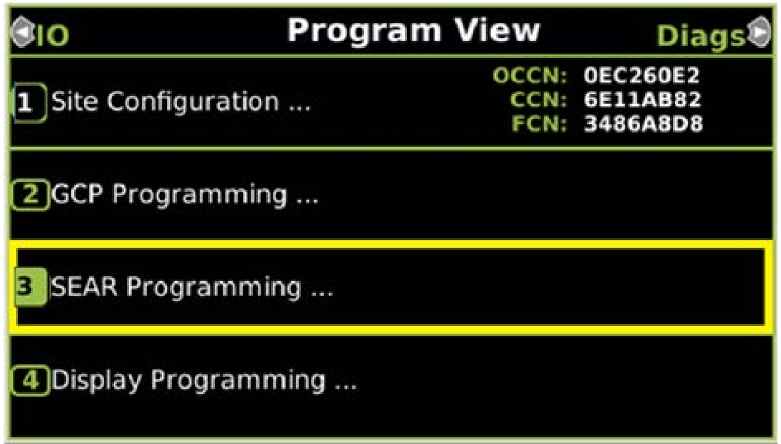


Figure 4-18 Program View – SEAR

NOTE

NOTE

The Control Descriptor Language (CDL) used to customize the SEAR's operation, settings, and behavior can differ between railroads.

Refer to the specific SEAR IIi Configuration Summary document for details of the application CDL program, LEDs, and Alarms. The ATCS address must be entered before the SEAR IIi communicates with the CPU Module.

Before beginning the SEAR IIi setup procedure, have circuit plans showing the SEAR IIi setup page available for reference.

Site Setup must be run in its entirety. Setup may be accomplished either using the Display module or the WebUI.

The first nine (9) parameters, appearing on the first page of the SEAR Program Menu, are as follows:

0) Menu
1) Application(CDL)
2) Digital Inputs
3) Analog Inputs
4) Non-Vital Outputs
5) Echelon Modules
6) Communication
7) Serial Ports
8) Set to Defaults
9) SEAR Setup

Select **1) Application(CDL) > 1) CDL Setup**. Step through the first group of parameters of SEAR Programming by answering each question as indicated by the SEAR Program Menu setup page in the crossing's circuit plans

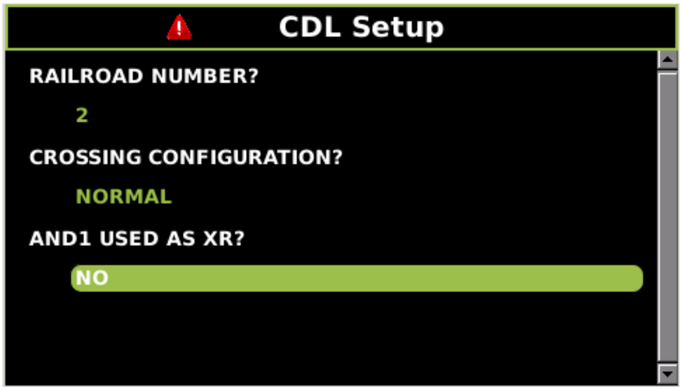


Figure 4-19 CDL Setup Screen

4.12.6 SEAR IIi Operation

Now that site setup is complete, peripheral devices, as well as items onboard the SEAR IIi will be checked for proper operation. This ensures that the SEAR IIi is receiving all the information it needs for proper alarming and execution of the SEAR Application Program. All items in this section can be done through similar menus on the GCP5000 (GCE) WebUI.

All peripheral equipment on the Echelon® network will need to be checked for good communication with the SEAR IIi. All of those modules can be checked on one screen by scrolling to **IO & Logic View > 4) SEAR**. This opens the SEAR I/O submenus. The submenus are displayed in the following order when the right arrow is pressed:

- Digital Inputs 1..16 (includes iLOD and VHF)
- Digital Inputs 17..32
- Digital Inputs 33..48
- Digital Inputs 49..63
- Analog Input
- Digital Outputs
- LEDs
- MTSS (If installed, otherwise message "No MTSS Data Found in Database!!" appears)
- GFT (If installed, otherwise message "No GFT Data Found in Database" appears)
- SEAR Module Status

The type of module will be shown on the left and the communication status will be on the right. The status of each module should be "GOOD."

4.12.7 Verify Operation Of MTSS/Gate Tip/Bell Sensor:

The MTSS can be monitored via the following path: **IO & Logic View > 4) SEAR** then scroll to the left twice (or right seven times) as per the bulleted menu list in the preceding section. If the input shows STUCK LOW, then the data wire between the MTSS and SEAR IIi is open and will need to be repaired.

If the data connection is good, the following would be displayed for TSS1:

- TSS1: U=1 D=0 T=0 A=0 P=0
- U=Gate Up
- D=Gate Down
- T=Gate Tip Sensor
- A=Bell Audio
- P=Bell Power

NOTE

NOTE

These items can be either 1 or 0. In the example, U=1 so the gate up contact is energized. The other items are all de-energized. Dropping the gates to horizontal will activate the tip sensors and de-energize the gate up contact, changing the MTSS data to U=0 and T=1. Activating the bell will check the bell sensor; A & P should both equal 1 when the bell is on.

4.12.8 Verify Operation of Ground Fault Testers (GFTs):

All LEDs on the GFT units should be on steady. If the BAT 1 Fault or BAT 2 Fault LEDs are slow-flashing then they have detected a ground condition.

The GFT can be monitored at **IO & Logic View > 4) SEAR** and then press the left arrow keys once to display the GFT input. If the input shows STUCK LOW, that indicates the data wire between the GFT and SEAR IIi is open and will need to be repaired.

If the data connection is good, the following would be displayed for GFT1

- GFT1: HL=G MD=N B1=0 B2=0.
- HL=G indicates that the GFT health is good.
- MD=N indicates that test mode=no.
- B1 & B2 = 0 shows that there are no ground faults on BAT 1 or BAT 2.

A ground can be simulated on those inputs by running a wire from the ground input of the GFT to each BAT input, one at a time. The state of each BAT input will change to ‘1’ if a ground is present.

The SEAR IIi relays must function properly in order to run automated inspection tests. These outputs are most easily tested using the SEAR menu on the GCP5000 (GCE) Display module.

- Verify SEAR IIi relays:
- Go to MENU>DIAG/MONITOR>RELAYS>GndFltTest and press ENTER.
- Then press ‘1’ to energize the relay output. Both Ground Fault Testers’ BAT FAULT LEDs should be flashing.
- Now press ‘0’ to de-energize the relay. The LEDs should go on steady.
- Press EXIT and then ENTER to get back into the RELAYS menu.
- Select AC Control. Press ‘1’ to energize the relay output. AC power to the chargers should go off, or Press ‘0’ to de-energize the relay and be sure that AC power to the chargers is restored
- Press “exit” until the date/time main screen is visible.

4.12.9 Verify Operation of iLOD

Once good communication is verified, further checks of the iLOD can verify that it is seeing normal amperage/flash rates.

To view these values in real-time, select **IO & Logic View > 4) SEAR** and then scroll to choose the iLOD unit to view. It is under SEAR I/O > Digital Inputs 1..16 in that screen both sensors are shown, the first iLOD unit will show EB1, EN1. When the lamps are flashed, both sensors should display that the lamps are on, the amperage reading, and the flash rate in flashes per minute.

These values are shown in real-time; they should be steady and not fluctuate. If the value fluctuates, the lighting circuit will need to be checked for intermittent operation.

NOTE

NOTE

iLODs must have been installed in the network and field-calibrated before verifying operation.

4.12.10 SEAR IIi Communication

Testing communications to the office can be accomplished using a menu function to generate a test alarm and by creating events that generate alarms. Before testing the SEAR IIi by sending alarms to the office, the unit must be configured for communications in the Site Setup. Once a SEAR IIi is configured through Site Setup and communication is established, the location will register itself with the WAMS office.

Test Communications with SEAR option on the Display module menu.

- Access the WAMS Test Message via Diags & Reports > 2) SEAR > 3) WAMS Test Message.
- Once you select WAMS Test Message, it will automatically start the process.
- Under **Status,** it will display the message “In Progress” until the process is complete, either with a successful test, or when the system times out.
- Enter the ATCS address of the other crossing.
- To send a test packet to the WAMS office:
- Press 5
- Enter railroad-specific office address.
- Refer to circuit plans for office address.

Typically, the office ATCS address is 2.RRR.00.0000, where RRR is the ATCS number assigned to the railroad.

4.12.11 SEAR IIi Alarms

Alarm Generation is the final step in checking out the SEAR IIi/WAMS interface. The following procedure tests the wiring of the various components in the SEAR/ WAMS sub-system.

Ground Fault Alarm

- A ground fault can be simulated on those inputs by running a wire from the ground input of the GFT to each BAT input, one at a time.
- Each Battery's LED will flash when a ground fault is detected and a "Ground Fault Detected on xxx" alarm will be generated where xxx represents the Battery name.

Ground Fault Clear

- Removing the wire that simulates the ground will generate a Ground Fault Cleared message.

Analyzer Failure Alarm

- Remove the connector that powers the GFT or that MTSS unit inside the gate mechanism. Doing so on either unit will cause an "Analyzer Failure" alarm.

Analyzer Normal

- Restoring the connector will generate an Analyzer Normal message.

4.13 Crossing Monitoring by SEAR IIi

The SEAR IIi can be used to monitor the operation of the crossing as described in the following sections.

NOTE

NOTE

To prevent issues due to the failure of the Crossing Warning system, Siemens recommends the use of the SEAR IIi in the GCE to detect and send alarms on detection of:

a) Ground faults
b) Burned out lamps
c) Faulty or broken Gates
d) Mains Power off
e) Low Battery

NOTE

NOTE

The SEAR IIi is a non-vital component of the system, its ability to detect any problems and send alarms cannot be guaranteed.

SECTION 5
BASIC APPLICATION GUIDELINES & PROGRAMMING

5 BASIC APPLICATION GUIDELINES AND PROGRAMMING

5.1 Introduction and Overview

The PSO Module has many features:

- Vital processor based
- Many PSO frequencies (standard and alternate) are provided
- Provides internal logging of PSO Module operation
- Programmed via the Display Module

Menus provide field selectable options such as:

- PSO transmitter, receiver, and island frequencies
- PSO transmit power
- Up to five unique modulation address codes as well as Dynamic Addressing
- Configurable inputs and outputs for an application
- Configurable receiver, island, and input pickup delays
- Drop Delay Timer, Internal Directional Stick Logic, and Stick Cancel Timer when configured as a Crossing unit
- Taking units Out of Service

Section 8.3.2.1 describes PSO the front panel indications for the PSO module.

The PSO Module is functionally compatible with the PSO 4000 Module, the PSO III receiver and transmitter as well as the PSO II and PSO+ receiver and PSO II and PSO+ transmitter when using an A or C address.

The Transmitter generates a modulated audio-frequency track signal. It sends a coded, 8-bit address code through the rails using an audio frequency signal as a carrier. The rail connections for the coupling unit delimit the other end of the track circuit. The modulated signal is detected by the receiver where it is decoded and processed. The Receiver responds only to signals of the proper frequency, address, and amplitude. The ability of the PSO Module to differentiate between its operating signal and all other signals present on the track is due to the nonsymmetrical coded modulation and receiver decoding techniques which ensure that the system is immune to most foreign AM, FM, and beat signals. The receiver decodes the signal and, if it qualifies the signal as valid, the receiver produces an output to energize a vital relay. The receiver is connected to the track via a Tuned Receiver Coupler, which is a separate piece of equipment.

No insulated joints are needed to confine the signal because the coupling units have low impedance at the operating frequency of the track circuit, and high impedance at all other frequencies. The PSO Module can also be used on the same track used for coded or non-coded DC or AC track circuits, Grade Crossing Predictors (GCPs), motion detectors, and other audio frequency track circuits.

The PSO Module’s crossing functionality includes two receivers plus a combination transmitter/receiver Island Track Circuit that is incorporated into the Module. In a crossing application, the Module is capable of performing the Directional Stick Logic, drop delay, and Stick Cancel functionality. The Module provides configurable receiver and island pickup delays. The Module has the flexibility to use external inputs instead of or in addition to the internal PSO receivers and island. For instance, if the installation already has a track circuit in place (e.g. a DC track circuit), this could be used in place of one of the approach receivers. Either of the PSO receivers and/or the Island may be enabled or disabled. The Island function supplies a limited distance audio frequency track circuit with an effective range between 120 to 500 ft. (36.6 to 152.4 m). The island circuit performs a similar function as Siemens's Model 71150 Intelligent Processor Island Track Circuit (IPITC) and the Intelligent Processor Island Track Circuit II. While designated primarily for use as the island track circuit at highway crossings, the system satisfies any application requiring a short, high-definition, audio frequency track circuit.

The PSO Module is available with up to five address codes and a wide variety of carrier frequencies. Sixteen PSO Module carrier frequencies, ranging from 156 Hz to 4000 Hz, are available for use in non-electrified territory and an additional 31 common frequencies, ranging from 500 Hz to 10200 Hz, typically used by non-Siemens equipment, are also available for use. For electrified territory, ten frequencies are available ranging from 645 Hz to 4000 Hz. Fourteen standard island frequencies are available for the Island functionality and range from 2.14 kHz to 20.2 kHz; an additional 15 alternate island frequencies used by non-Siemens equipment that range from 2.3 kHz to 10.2 kHz are also available. For installations where multiple circuits are required on the same track, the PSO Module has two sets of eight frequencies (five for electrified territory) each that can be connected as required with negligible interference.

In applications requiring broken rail detection, a Receiver Threshold adjustment is available. This allows for adjustments to be compatible with the leakage paths associated with propulsion return circuits. With specialized coupling units, the PSO 4000 units may also provide line overlay applications

5.2 PSO Application and Programming

WARNING

WARNING

THE GCP5000 (GCE) SHOULD ONLY BE UTILIZED IN APPROPRIATE APPLICATIONS REQUIRING THE USE OF PHASE SHIFT OVERLAY TRACK CIRCUITS. ANY OTHER APPLICATIONS SHOULD USE REGULAR GCP4000 IN MOTION SENSOR OR PREDICTOR MODES.

WHEN USING PSO RECEIVERS IN NON-CROSSING APPLICATIONS, VERIFY THAT NO UNITS OF THE SAME FREQUENCY ARE WITHIN TWO ADJACENT TRACKS OR HAVE INSULATED JOINT PROTECTION.

RAILROADS OR AGENCIES ARE RESPONSIBLE FOR ENSURING THAT ONLY PROPERLY TRAINED AND/OR AUTHORIZED PERSONNEL HAS ACCESS TO THE MODEL GCP5000 (GCE).

VERIFY THAT GCE IS PROGRAMMED AS SPECIFIED BY THE RAILROAD'S OR AGENCY'S APPROVED WIRING OR INSTALLATION DIAGRAM. FAILURE TO DO SO MAY LEAD TO INCORRECT OR UNSAFE OPERATION OF THE TRACK CIRCUIT.

INSTALLATIONS WHERE POOR SHUNTING MAY BE EXPECTED ADD FIVE SECONDS TO THE DESIGNATED RECEIVER PICKUP DELAY.

NOTE

NOTE

A minimum 2-second receiver pickup delay is recommended.

5.2.1 Introduction And Overview

The PSO Module allows many application functions to be configured in software, reducing the equipment and wiring needed by older generation track occupancy information systems. The following application programming guidelines are provided to assist in planning PSO Module usage. In this section, the following items are addressed:

- Logic programming (see Section 5.2.2)
- External controlling of the PSO Module by use of Inputs (see Section 5.2.2.3)
- External track circuit replacing a Crossing Assembly component (see Section 5.2.3)
- Out of Service (OOS) operations (see Section 5.2.6)

5.2.2 Logic Programming

The PSO Module provides programming options that reduce the need for external crossing relays and timers, wiring between inputs and outputs, and wiring to external relays. The logic programming controls Directional Stick Logic and Stick Cancel Timers.

WARNING

WARNING
A FAILURE OF THE EXIT TRACK WHEN THE STICK IS SET CAN RESULT IN A FAILURE TO ACTIVATE THE CROSSING.
THE STICK CANCEL TIMER VALUE SHOULD BE CHOSEN TO CANCEL THE STICK BEFORE ANOTHER TRAIN CAN APPROACH.
THE STICK CANCEL INPUT SHOULD BE USED WHERE APPROPRIATE TO CANCEL THE STICK.

5.2.2.1 Directional Stick Logic and Stick Cancel Timer

Directional Stick Logic drives the AND 1 XR function which, when selected to an output, enables the Crossing Assembly to activate the crossing signals on the approach of a train and deactivate the crossing signals when the train leaves the island circuit.

5.2.2.2 Stick Cancellation Timer

A Stick Cancellation Timer is used to cancel the Directional Stick in case the approach receiver being overridden by the Stick does not energize after the train has left its PSO circuit. The timer begins to run time when the island circuit energizes and the Directional Stick is set as the train departs the exit track. Therefore, the stick cancellation time is not affected by train length. A latch prevents an intermittent island circuit from resetting the Stick Cancellation Timer. The Stick Cancellation time range of values is from 0 to 60 minutes in 1-minute increments, with a default setting of 15 minutes.

5.2.2.3 Typical Stick Operation and Logic

The GCE utilizes a three-circuit Directional Stick Logic for proper crossing activation and deactivation. This functionality is only applicable when the **PSO Module Mode** is set to **Crossing** on the PSO ‘n’ Transmitter menu.

For example, the crossing location is set up and programmed as follows:

- PSO 1 and 3 are configured as transmitters
- PSO 2 is configured as a Crossing Module
- The West Approach is enabled and programmed as RX1
- The Island is enabled and programmed as ISL
- The East Approach is enabled and programmed as RX2

The typical operation of the stick logic is as follows:

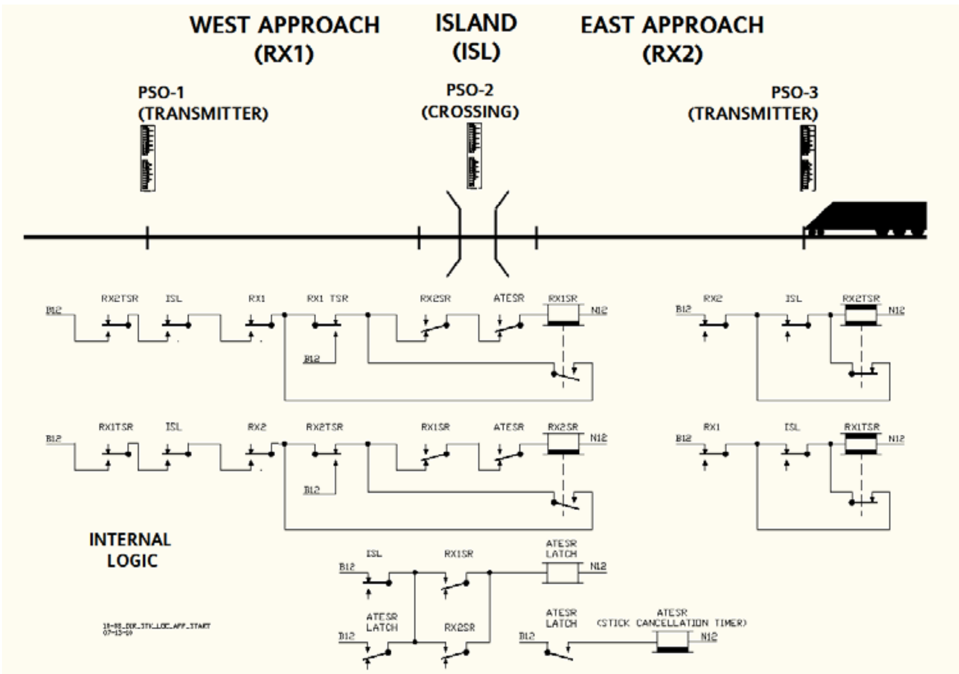


Figure 5-1 Directional Stick Example – Train Not Yet in Approach.

Before entering RX2, the PSO 2 RX 1 and PSO 2 RX 2 Stick is not set. The XR is up (green) and SSCC1 and SSCC 2 are not activated (green) and the PSO 2 receivers show CLR and receiving code A and C.

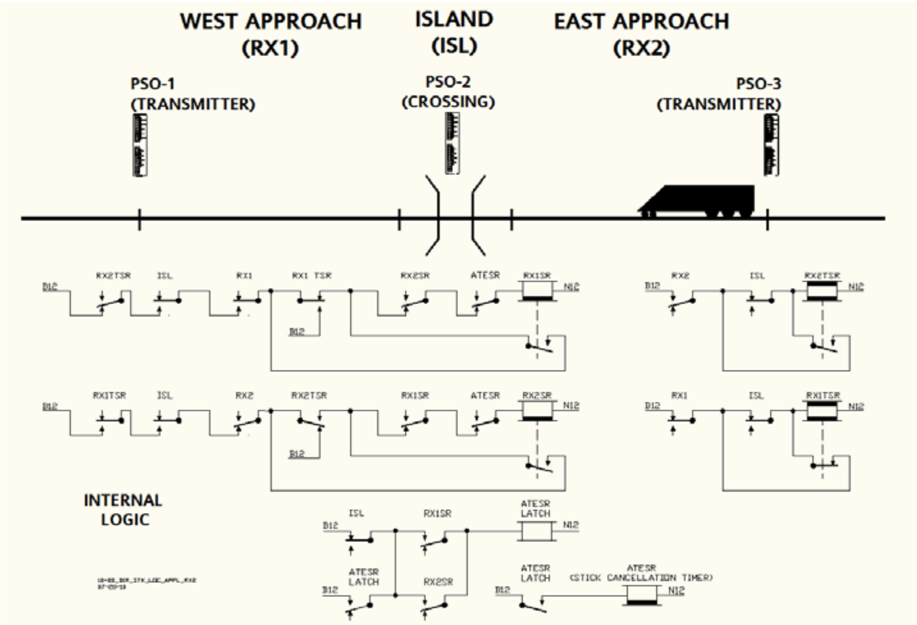


Figure 5-2   Directional Stick Example – Train Enters RX2

The train enters RX2: RX2 shows occupied, XR de-energizes (grey), and the SSCC modules activate (grey). No stick has been set yet.

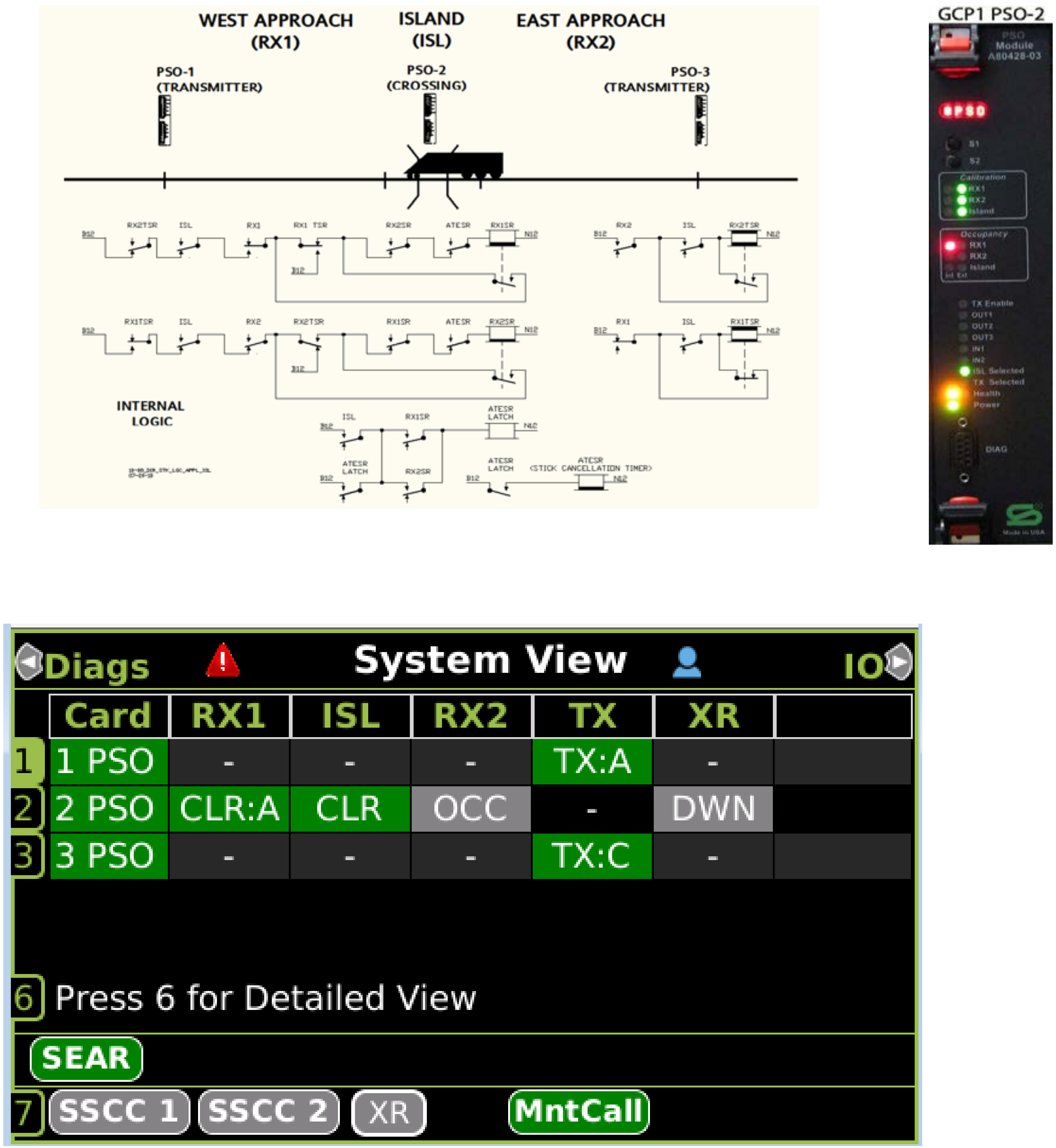


Figure 5-3 Directional Stick Example – Train Enters Island

The train enters the Island circuit: the Island de-energizes and shows OCC(grey). XR remains de-energized and the SSCC modules are activated. No stick has been set

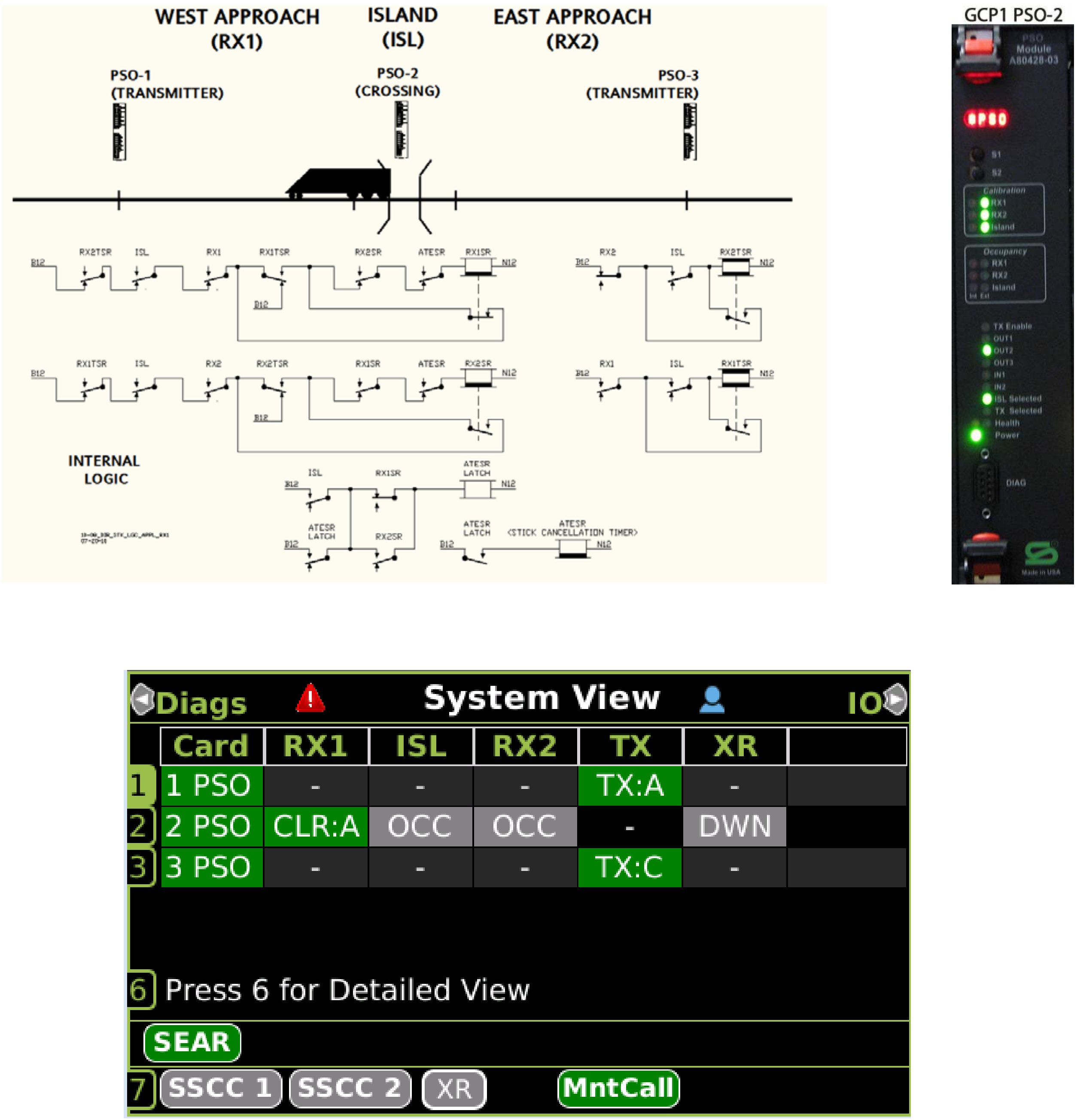


Figure 5-4 Directional Stick Example – Train Enters RX1, Stick 1 Set

The train enters RX1: RX1 initially shows OCC, and then the stick is set and the Display shows RX1 as STICK (yellow). XR remains de-energized(grey) and SSCC modules activated (grey).

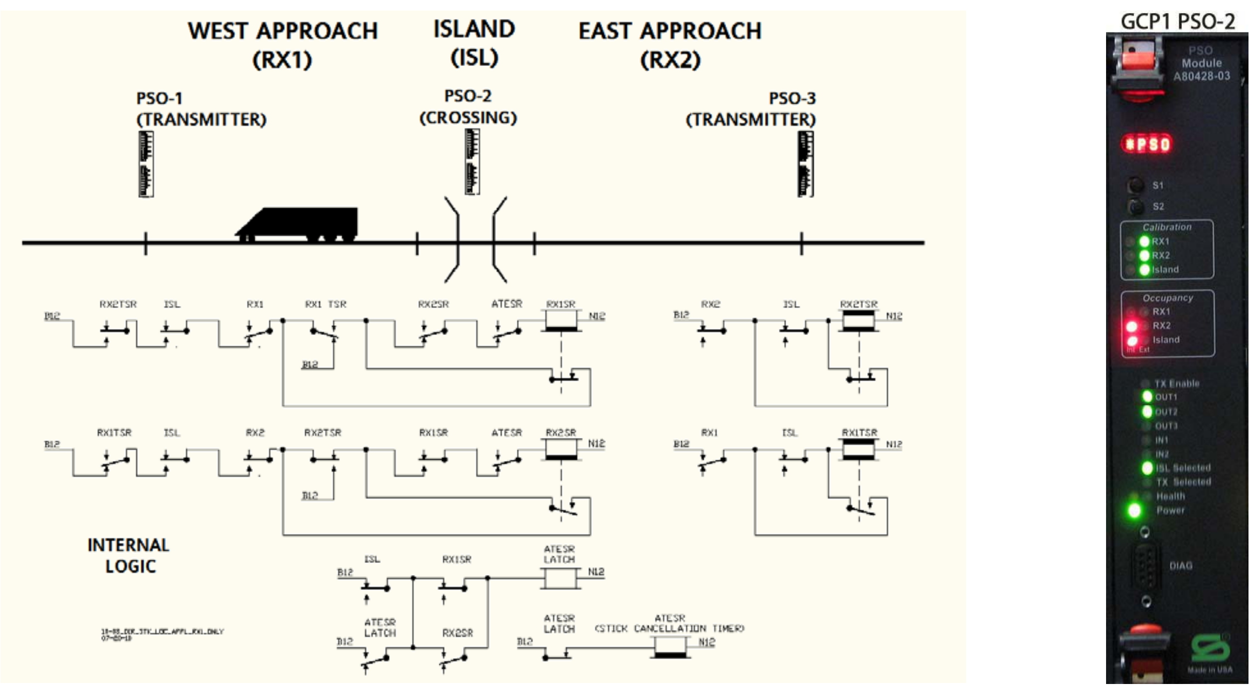


Figure 5-5 Directional Stick Example – Train Exits RX2 and Island

The train clears the RX2 & ISL circuits: RX2 and ISL pickup delays (LOS/programmed time delays) start as the train exits each respective track circuit (LOS time running will be indicated as a flashing LED). Once LOS expires the XR, RX2, and Island energize. The XR, RX2, and Island LEDs light. OUT1 energizes, OUT2 remains de-energized, and OUT3 remains energized. Stick 1 remains set in the Event Log and the Stick 1 indicator LED remains lit.

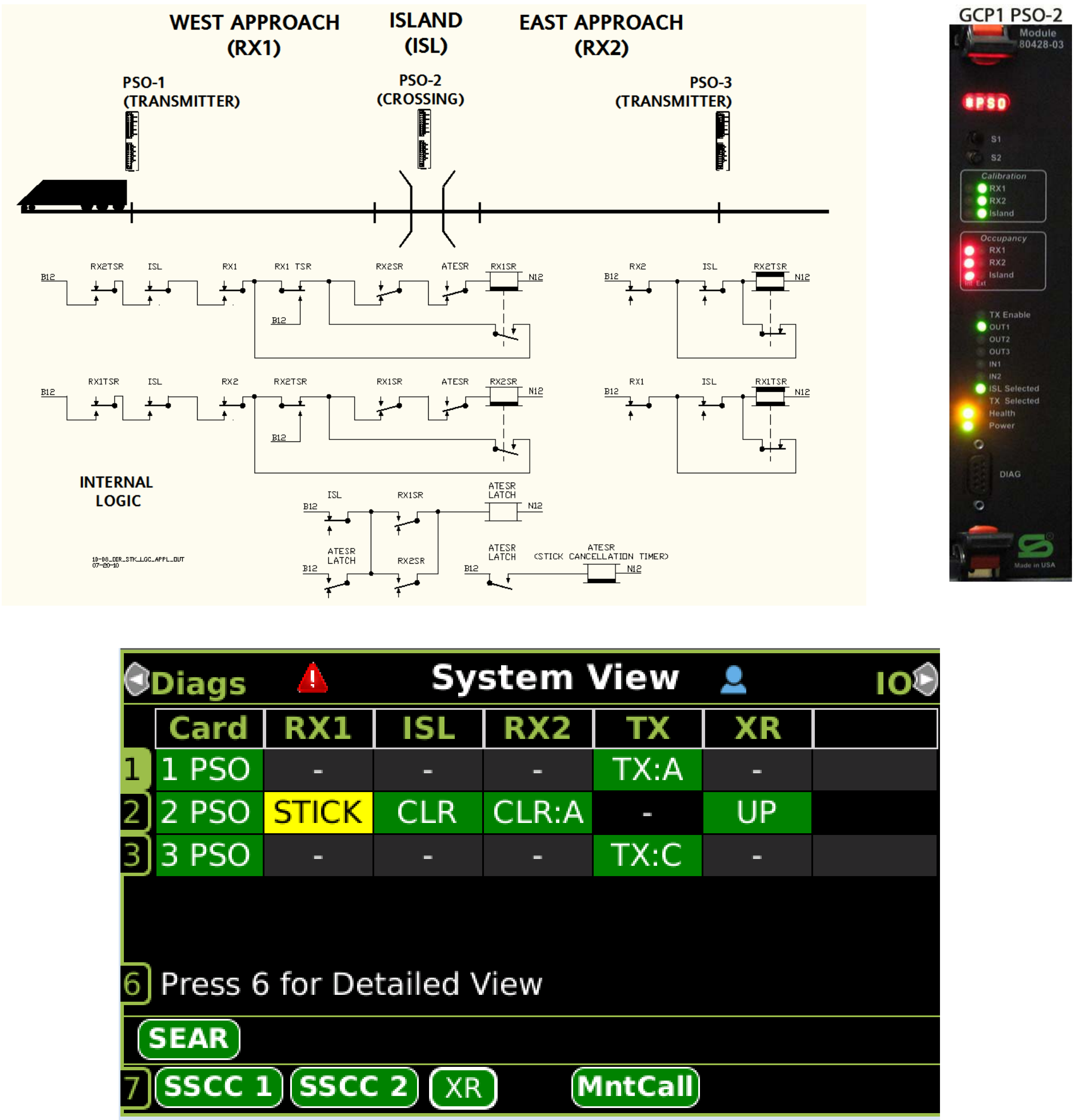


Figure 5-6   Directional Stick Example – Train Exits RX1

When the train clears the RX1 circuit: the RX1 pickup delay (LOS/programmed time delay) starts as the train exits RX1 (LOS time running will be indicated as a flashing LED). Once LOS expires RX1 energizes and Stick1 de-energizes. The Stick1 indicator LED goes out and the RX1 LED lights. OUT1 remains energized, OUT2 de-energizes, and OUT3 remains de-energized. Stick 1 is cleared in the Log.

See Section 5.2.3 for information regarding external track circuit substitutes.

The GCE can receive vital inputs from external sources that affect the operation of the PSO receivers and island as described in the following section:

⚠ CAUTION

CAUTION

IT IS RECOMMENDED TO SET PICKUP DELAY TO TWO SECONDS FOR ALL RECEIVER/XR OUTPUTS. THIS PROVIDES A 2 SECOND LOSS OF SHUNT TIME.

5.2.3 External Track Circuit Replacing an Internal Receiver or Island

An external track circuit such as a preexisting audio overlay or DC track circuit may be used in place of either an approach receiver or an island in the Crossing Assembly. This is done by setting:

- RX1 Receiver Mode to External on PSO ‘n’ Receiver Menu
- RX2 Receiver Mode to External on PSO ‘n’ Receiver Menu
- Island Mode to External on PSO ‘n’ Island menu

Then assign the external receiver or island to a vital input on a module, for example,

- IN 1.1 PSO 1 RX1 External
- IN 1.2 PSO 1 External Isl
- IN 2.1 PSO 1 RX2 External

5.2.4 Multiple Track Circuits Used to form an Approach

The approach to the crossing may consist of multiple track circuits, some or all of these may be PSOs

PSO ‘n’ RX 1 and 2 are viewed as the main track circuit to the left and right of the crossing. Additional track circuits can be combined with these by using the PSO Enable. For example,

- Set RX1 Enable Used to Yes on the PSO ‘n’ menu.

Then an additional external track circuit can be added to the RX1 approach by assigning the RX1 Enable to an input and wiring the track circuit to this input, for example:

- IN 1.1 PSO 1 RX 1 Enable.

The additional track circuits associated with the RX 1 approach may be monitored by other PSO receivers in the GCP5000 (GCE), for example, let’s assume there are 2 other track circuits monitored by PSO 4 RX1 and PSO 5 RX1 that need to be combined with PSO 1 RX1. This can be done by using Internal channels, for example, got the Internal I/O 1-4 page and set:

- Int.1 Sets PSO 1 RX1 Enable
- Int.1 Set by PSO 4 RX1 Occupancy
- Int.2 Sets PSO 1 RX1 Enable
- Int.2 Set by PSO 5 RX1 Occupancy

Note that assigning an internal channel multiple times effectively ANDs the terms setting it, so in the case above either PSO 4 or 5 RX1 Occupancy de-energizing will de-energize PSO 1 RX 1 Enable.

5.2.5 Stick Cancel Input

NOTE

NOTE

The Stick Cancel input should "normally" be energized. De-energizing the input will cancel and set sticks and not allow another stick to be set.

The GCP5000(GCE) allows an external input to be used to cancel a stick. To use this

- Set the Stick Cancel Input Used to Yes on the PSO 'n 'Transmitter menu
- Assign the Stick Cancel input to an input (or it can be set by internal logic) for example,
- IN 7.1 PSO 1 Stick Cancel.

De-energizing the input causes the stick to be canceled.

NOTE

NOTE

If a PSO Enable input is used and wired to an external PSO 4000, the Health output from this PSO can be wired to a Stick Cancel output on the GCE, this will prevent a failure of the external PSO resulting in the Stick for the exit track remaining set.

5.2.6 Out Of Service (OOS) Operations

WARNING

WARNING
THE RAILROAD PROCEDURES GOVERNING HOW TO TAKE A TRACK CIRCUIT OUT OF SERVICE SHALL BE FOLLOWED. THE INSTRUCTIONS IN THIS SECTION MAY BE FOLLOWED ONLY IF ALLOWED BY THE RAILROAD.
OUT OF SERVICE TRACKS WILL NOT RESPOND TO TRAIN OPERATION. TAKE ALTERNATE MEANS TO WARN VEHICULAR TRAFFIC, PEDESTRIANS, AND EMPLOYEES.
REQUIRED OPERATIONAL TESTS SHOULD BE PERFORMED IN ACCORDANCE WITH RAILROAD PROCEDURES WHEN RESTORING TRACKS TO SERVICE.
THE RAILROAD PROCEDURES FOR APPLYING TEMPORARY JUMPERS MUST BE FOLLOWED WHEN ENERGIZING THE "OUT OF SERVICE" INPUT(S).
INPUTS FOR "OUT OF SERVICE" SHOULD BE WIRED IN A PERMANENT MANNER PER CIRCUIT PLANS.
DO NOT USE TEST TERMINALS OR SWITCHES THAT CAN VIBRATE CLOSED TO ENERGIZE OOS INPUTS.

When a crossing is taken out of service, the crossing outputs remain energized (no crossing activation). The receiver and island LEDs remain ON during train movements. The island is ignored when the island is set OOS. Directional Stick Logic will not operate the crossing when OOS. The Display shows OOS by highlighting the PSO receiver or island in blue as shown in Figure 5-7

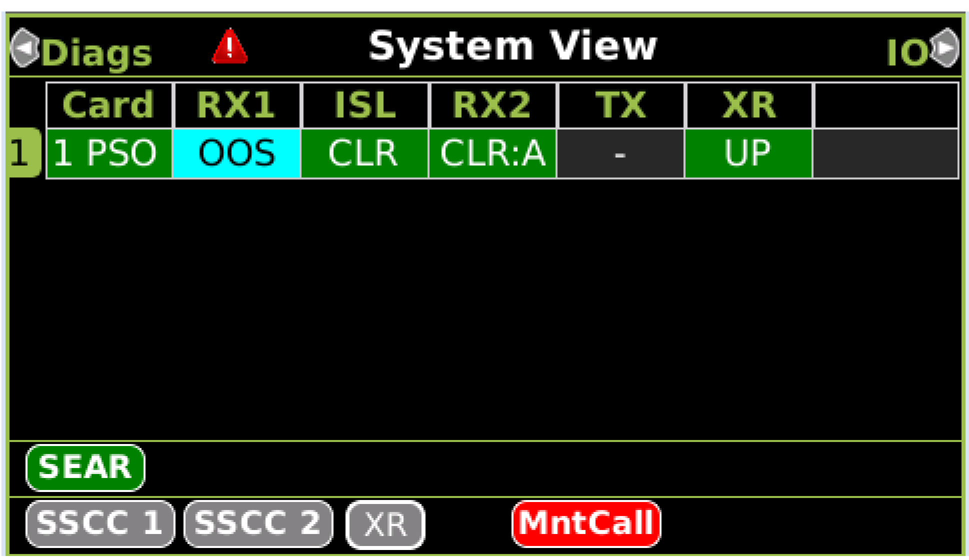


Figure 5-7 Display OOS Indication

5.2.6.1 Component OOS Options

NOTE

NOTE

If a component is Out of Service and one of the following occurs, the component is put back In Service:

- The Out of Service Timer expires
- The Out of Service input is energized
- The user puts the component back into service using the user interface
- The CPU module reboots

There is one method available for the PSO module Out of Service (OOS). This is set by default in the Out of Service Menu using the OOS Control parameters which is set to:

- Display +OOS IP (Display plus Out of Service Input)

NOTE

NOTE

When any of the Crossing Assembly functions are taken Out of Service (OOS), the directional stick logic does not operate.

OOS Timeout enables and OOS Timeout may be set via the Out Of Service window.

To configure the GCE to use Display and inputs for OOS:

- OOS Control is set to Display + OOS IPs by default
- Set whether the OOS Timeout is used, Yes or No, default Yes
- Set the default OOS Timeout: range 1hrs to 23hrs, default 1hr

WARNING

WARNING

THE OUT-OF-SERVICE TIMEOUT PROVIDES A DEFENSE AGAINST ACCIDENTALLY LEAVING THE CROSSING OUT OF SERVICE. IT SHOULD BE USED AND ITS VALUE NOT SET EXCESSIVELY LONG

- Set which out of service inputs are used to take which PSO modules out of service, one input could be used to take multiple PSOs out of service, or a separate one can be used for each
  - o PSO ‘n’ OOS Control: range OOS Input 1 to OOS Input 6
- Then assign the OOS Inputs to vital inputs, for example:
  - o IN 7.1 OOS Input 1
  - o IN 7.2 OOS Input 2

⚠ WARNING

WARNING
INCORRECT DESIGN AND/OR CONFIGURATION OF OUT-OF-SERVICE INPUTS MAY RESULT IN NO ACTIVATION OF THE CROSSING WARNING DEVICES.

Then the maintainer can take the PSO out of service as follows:

To take Receiver 1 or 2 Out of Service:

Press Enter when the Out Of Service confirmation window appears

1. On the System View window, select the PSO track module by pressing a number 1 to 5 on the keypad. Then press 3 on the keypad to select the Out Of Service option

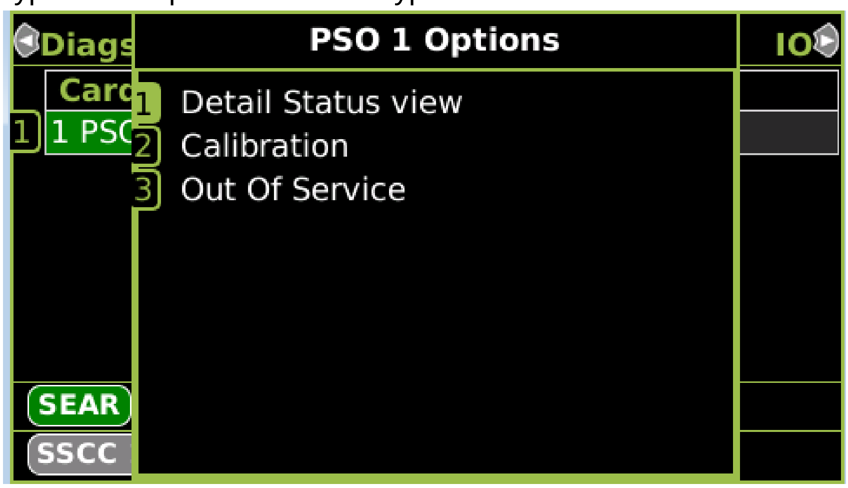


Figure 5-8 PSO 1 Options

2. Select 1] or 2] to take RX1 or RX2 Out of Service

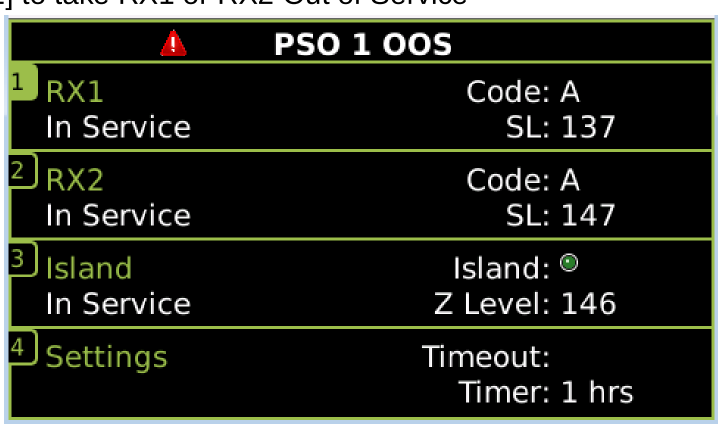


Figure 5-9 Select Receiver to Put Out of Service

3. Energize the configured Out of Service input
4. Select 1] when the Out Of Service window appears

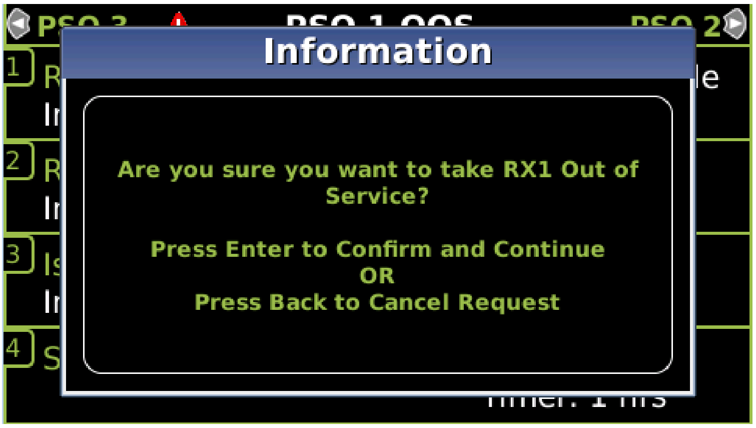


Figure 5-10 Out of Service Election and Confirmation Window

5. If the input is not energized the Display will give the following error

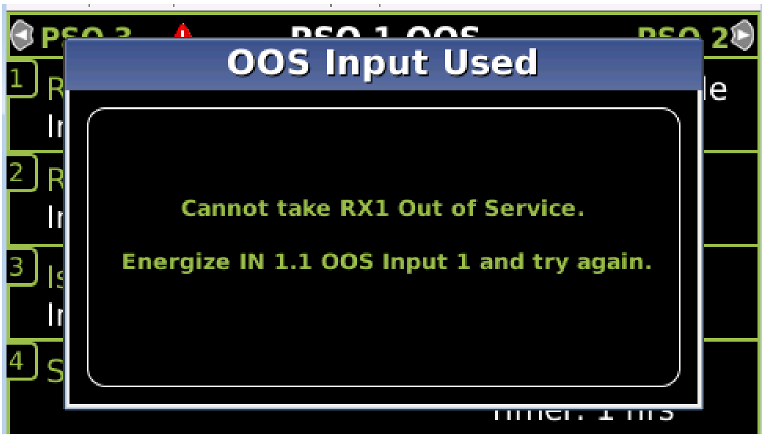


Figure 5-11 Out of Service OOS Input not Energized

6. Press Enter when the Out Of Service confirmation window appears
7. RX1 will now be marked as out of service.
8. The system view will show the PSO RX1 as OOS with a blue background

To take the Island (ISL) Out of Service:

1. On the System View window, select the PSO track module by pressing a number 1 to 5 on the keypad. Then press 3 on the keypad to select the Out Of Service option.
2. Select 3] to take Island Out of Service
3. Energize the configured Out of Service input
4. Select 1] when the Out Of Service window appears
5. Press Enter when the Out Of Service confirmation window appears
6. The Out Of Service window will display with a blue background and the statement “Put RX1 Back in Service” in the window. On the Track View, that PSO will display with a flashing blue background

WARNING

WARNING

THE OOS INPUTS MUST NOT BE LEFT ENERGIZED, THEY SHOULD BE SET BACK TO THE DE-ENERGIZED STATE.

5.2.6.2 Returning an OOS Function to Service

To return an OOS module or component to service, either select the 'Put PSO x (RX1, RX2, or ISL) Back in Service' option or de-energize the input.

WARNING

WARNING

THE OOS INPUTS MUST NOT BE LEFT ENERGIZED, THEY SHOULD BE SET BACK TO THE DE-ENERGIZED STATE.

5.2.7 Wrap Circuits

NOTE

NOTE

To facilitate in-service testing of WRAP logic, designers should consider using an input to de-energize the AND "N" Wrap that is being wrapped.

This programming option allows a PSO module's function to be bypassed by the use of a "wrap circuit". The wrap circuit provides the train detection for a track circuit, or combination of track circuits, which generally extend to or beyond the limits of a GCE approach. Front contacts of these track relays energize a physical wrap input when the wrap circuits are not occupied.

5.2.8 Wrapped PSO module Operation

PSO modules, while wrapped, do not activate the crossing. A PSO module becomes wrapped as soon as its physical wrap input is energized by track circuit relay contacts. A PSO module becomes unwrapped by de-energizing the wrap input when a train is present in any part of the PSO module approach. Each PSO module can be individually wrapped by the user. Wrap track circuits may be signal track circuits or modulated audio overlay circuits such as PSO. Each PSO module wrap has a programmable loss of shunt timer provided. Wrap Pickup Delay time default is 5 seconds (recommended minimum time).

WARNING

WARNING

INCORRECT DESIGN AND/OR CONFIGURATION OF WRAP CIRCUITS MAY RESULT IN LATE OR NO ACTIVATION OF THE CROSSING WARNING DEVICES.

5.2.8.1 When a Track is Wrapped

PSO module occupancy outputs remain energized (no crossing activation), provided the PSO receiver is healthy. Module input LEDs show de-energized when inputs de-energize but are ignored. Wrapped tracks are indicated on the Display Module with a yellow “WRAP” indication when the track is wrapped as shown in Figure 5-12.

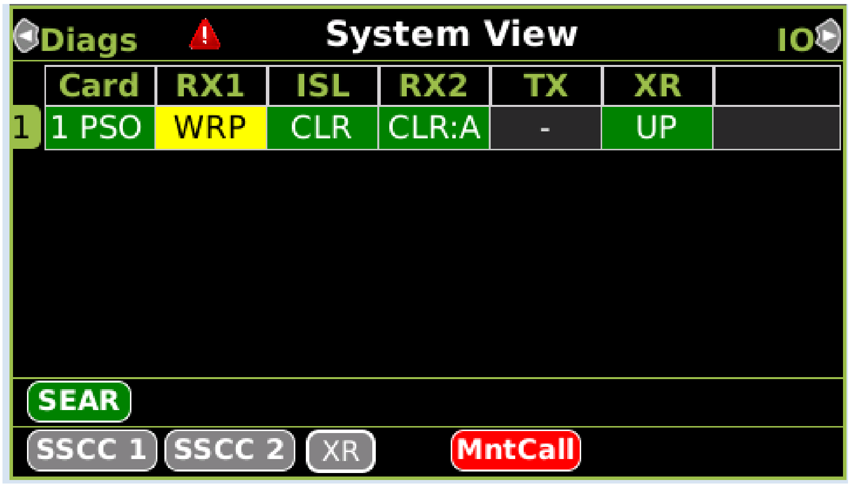


Figure 5-12 Display Wrap Indication

The wrap on PSO ‘n’ RX 1(2) will also override the PSO ‘n’ RX 1 (2) Enable input.

If Emergency Activation (EA) is programmed ON and its physical input is de-energized, wrapped tracks will change to unwrapped. Once EA is energized, tracks previously wrapped will return to wrapped if no trains are present.

The crossing will activate while wrapped if the AND 1 XR Enable is programmed ON and the AND 1 XR input is de-energized.

If the PSO receiver fails while the wrap input is energized, the warning devices are immediately activated.

5.3 Logic Programming

The GCP5000 (GCE) provides programming options to do some enhanced logic functions (compared with GCP5000). These options include:

- 8 Programmable AND gates
- option Enable
- option Wrap
- optional NOT on some terms
- 4 Programmable OR gates
- 10 Programmable Logic Equations
- Programmable pickup and drop delays on ANDs or AND enables
- Programmable OR gates
- Internal I/O states

The logic configuration is intended to be programmed by the designer using the OCE and loaded into the GCE via a PAC file (See section). The logic configuration is viewable and editable via the Web UI if subsequent design changes are needed. The logic configuration is not however visible or configurable on the Display's local user interface under the GCP Programming Menus. If necessary, the maintainer can obtain download a configuration report or look at the System Status /Logical View screens to see how these are programmed.

⚠ WARNING

WARNING

INCORRECT DESIGN AND/OR CONFIGURATION OF GCE LOGIC AND/OR PICKUP AND DROP DELAYS MAY RESULT IN LATE OR NO ACTIVATION OF THE CROSSING WARNING DEVICES.

BEFORE BEING PLACED IN SERVICE OR IF CHANGES ARE MADE, THE GCP5000 (GCE) LOGICAL OPERATION MUST BE TESTED TO ENSURE PROPER WARNING SYSTEM OPERATION.

5.3.1 Logic: PSO ANDing

Figure 5-13 shows the Logic: AND 1 XR menu. This is used to select which PSOs (with PSO Module Mode set to Crossing) are used in the control AND 1 XR. Note: AND 1 XR is the default control for controlling the SSCC IIIi module. Normally all modules in Crossing Mode should be included.

- AND 1 XR Used, range Yes, No, default Yes
- AND 1 XR PSO 1 Used, range Yes, No, default Yes
- AND 1 XR PSO 2 Used, range Yes, No, default Yes
- AND 1 XR PSO 3 Used, range Yes, No, default Yes
- AND 1 XR PSO 4 Used, range Yes, No, default Yes
- AND 1 XR PSO 5 Used, range Yes, No, default Yes
- AND 1 Enable Used, range Yes, No, default No
- AND 1 Enable Pickup, range 0-500 sec, default 5 sec
- AND 1 Enable Drop, range 0-500 sec, default 0 sec

If a PSO module is being used as an island only, with no receivers being used, it will still be included in the AND 1 XR equation as the PSO Module Mode is set to Crossing.

⚠ WARNING

WARNING

IF A PSO MODULE MODE IS NOT SET TO CROSSING IT WILL NOT AUTOMATICALLY ACTIVATE THE CROSSING IF ITS RECEIVER IS OCCUPIED.

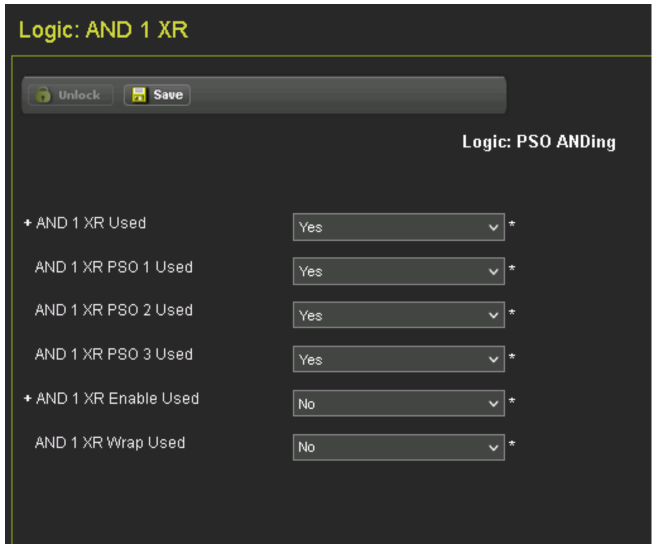


Figure 5-13 Logic: AND 1 XR

If the AND 1 Enable Used is set to *Yes*, then a pickup and drop delay can be configured as shown in Figure 5-14 and the AND 1 XR Enable is available in the S*ystem Inputs* which can be assigned to a vital input or via internal logic.

When the AND 1 XR Wrap Used is set, the AND 1 XR Wrap is available in the S*ystem Inputs* which can be assigned to *a* vital input or via internal logic.

Not that that AND 1 XR Wrap will override the PSOs and the Enable input.

Figure 5-14 Logic: AND 1 XR Enable Used

5.3.2 Logic: Features

The GCE MCF provides various logic capability features. Figure 5-15 selecting these features.

- ANDs Used controls whether the Logic: AND 2- 8 menu options are available
- Ors Used controls whether the Logic: OR 1 – 4 menu options are available
- Equations Used controls whether the Logic: Equation 1-10 menu options are available
- User Timer controls whether the Logic: User Timers menu options are available and whether the User Timer 1-10 options show up in the *System Inputs, System Output* and *System I/O* list.
- Switch Inputs Used controls whether the NWP 1-4 and RWP 1-4 options show up in the *System Inputs*, Output and I/O list.
- General I/O Used controls whether the General IP 1 – 16 and General OP 1- 8 option show up in the *System Inputs, System Output* and *System I/O* list.
- Maint Call Rpt I/O Used controls whether the Maint Call Rpt IP and Maint Call OP show up in *System Inputs, System Output* and *System I/O* list. The Maint Call OP repeats the state of the Maintenance call output on the chassis. The Maint Call Rpt IP provides a way of providing an external input or extra logical control via internal logic that can drop the maintenance call output. If the Maint Call Rpt I/O Used is set to yes, the Maint Call Rpt IP must be set to TRUE if not used. This can be done via an internal channel, for example:
  - Int.1 Sets Maint Call Rpt IP
  - Int.1 Set by TRUE
- Emergency Activate IP can be set to yes to provide an Emergency Activate input that can be mapped to an external vital input. When this input is de-energized it will override all wraps and out of service conditions and de-energize all outputs and activate the crossing.

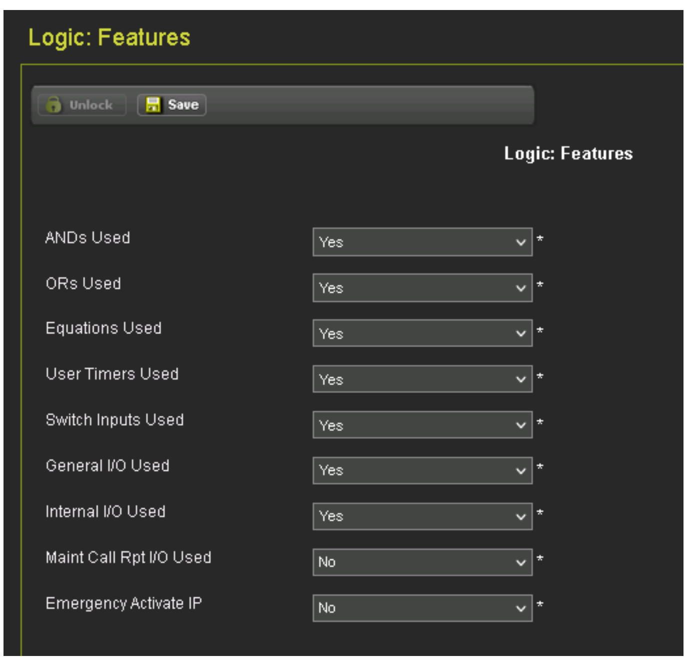


Figure 5-15 Logic Features

5.3.3 Logic: AND Gates

The GCE MCF provides 7 general purpose configurable AND gates. Figure 5-16 shows the menu for assigning terms to AND 2.

The AND 2 Term ‘n’ can be any available System I/O value. For AND Gates 2- 6 terms 3 and 4 can be negated by setting the Not OR Term to Yes. For AND Gates 7 and 8 terms 2, 3, and 4 can be negated.

The term 1 is set FALSE and the remaining terms are set to TRUE by default, leaving any Term at FALSE will result in the AND gate always being de-energized. When any Term is set to a value other than FALSE, this AND will be available for use in the available *System I/O* and *System Outputs* (see Section 10.1.6).

If not all 6 Terms are needed, and unused terms must be set to TRUE.

The AND gate also provides an optional Enable and Wrap function. If the AND ‘n’ Enable is set to Yes, the AND ‘n’ Enable can be assigned as a *System Input*, e.g., mapped to a vital input on a module. The Enable input has configurable pickup and drop delays, range 0-500 sec, default 0 sec.

If the AND ‘n’ Wrap is set to Yes, the AND ‘n’ Wrap can be assigned as a *System Input*, e.g., mapped to a vital input on a module.

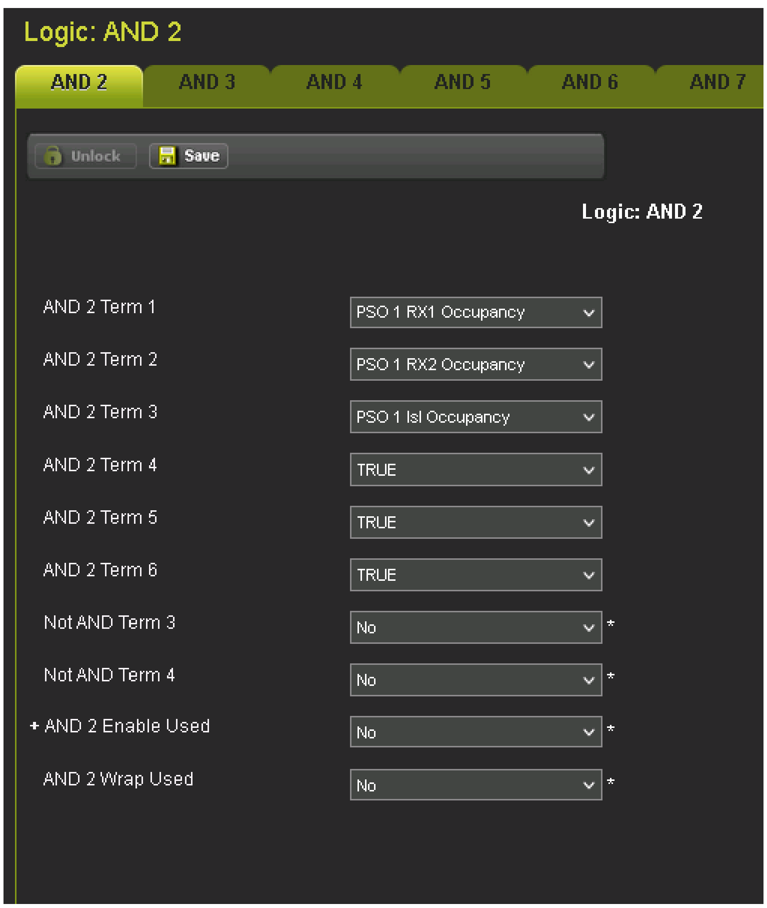


Figure 5-16 AND 2 Gate

AND gate 5 to 8 differ from AND 2-4 slightly. With AND 5 to 8 The Pickup and Drop delays are not associated with the AND enable, but rather they are applied directly to the AND output.

Figure 5-17 AND 5 Gates

5.3.4 Logic: OR Gates

The GCE MCF provides 4 configurable OR gates. Figure 5-18 shows the menu for assigning terms to OR 1.

The OR 1 Term ‘n’ can be any available System I/O value. Terms 3 and 4 can be negated by setting the Not OR Term to Yes.

The terms are all set to FALSE by default. When any Term is set to a value other than FALSE, this OR will be available for use in the available *System Outputs* and *System I/O*. See Section 10.1.6

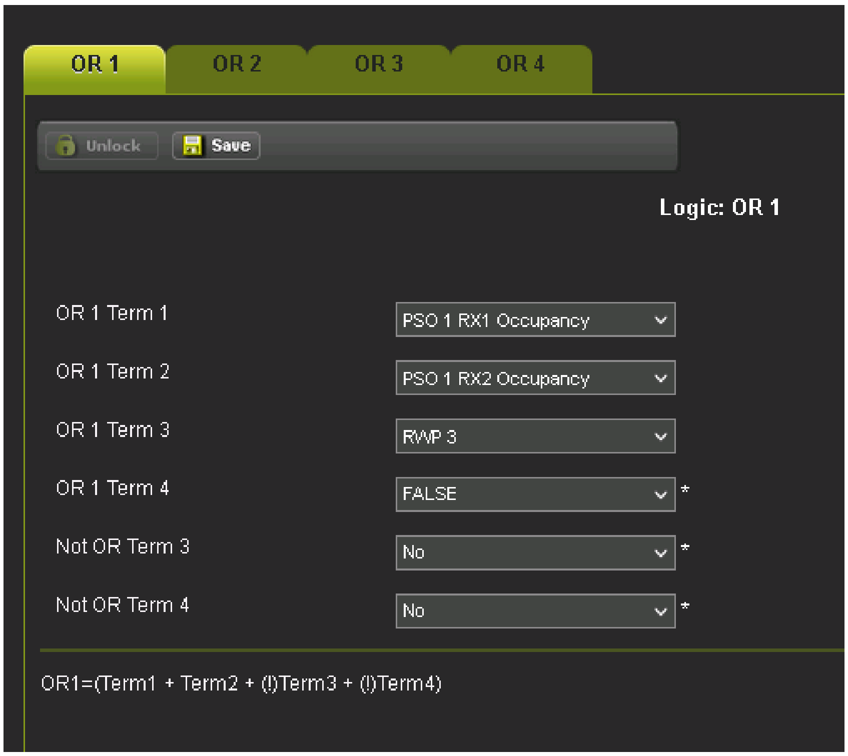


Figure 5-18 Logic: OR Gates

5.3.5 Logic: Equation

The GCE MCF provides 10 general purpose configurable logic Equations. Figure 5-19 shows the menu for assigning terms to Equation 1.

There logic format of the equation is determined by setting the Template. There are 5 different templates available:

- Type 1: ((A * B) + (C * D)) * E * F
- Type 2: ((A + B) * (C + D)) * E * F
- Type 3: (A + B) * (C + D) * (E + F)
- Type 4: (A * B * C) + (D * E * F)
- Type 5: (A + B + C) * (D + E + F)

The Coil E1 can be any available *System Input*.

The Contacts A – F can be any available System I/O value.

Various contacts can be inverted by setting Not A, B, C, or E.

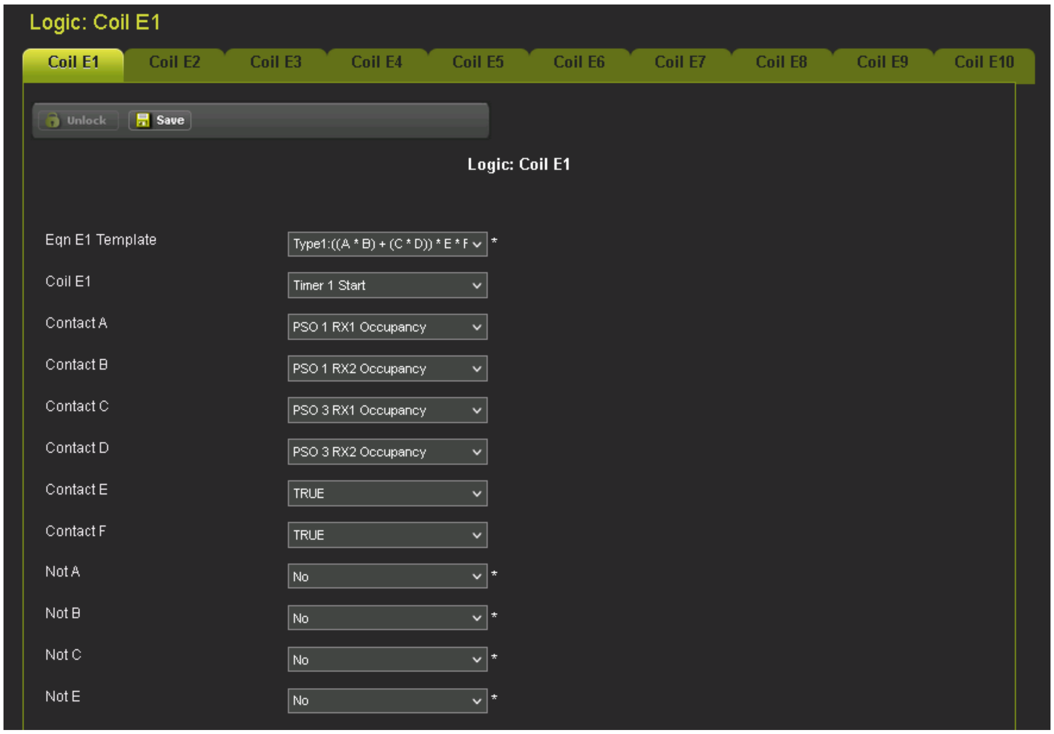


Figure 5-19 Logic: Equations

5.3.6 Logic Timers

Figure 5-20 shows the parameters that are used to set the duration of the user timers.
Range 0-500 sec, default 0 sec
When the timers are used, the following inputs are available to be set as a *System Input*:

- Timer 1 Start .. Timer 10 Start

The timer expiry is available as a *System Output* or *System I/O* function*:*

- Timer 1 Expired .. Timer 10 Expired

The Timer Start and Expired states can be referenced as System I/O functions in AND, Ors, or Equation Contacts.
To Start the timer set Timer ‘n’ Start to true. When the timer has expired Timer ‘n’ Expired will go true.

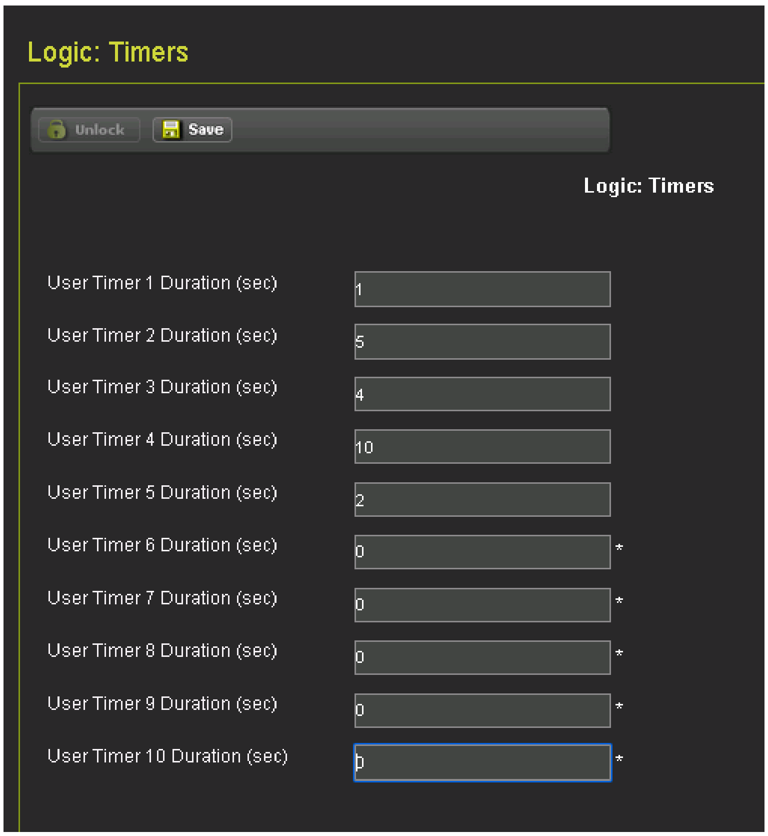


Figure 5-20 Logic Timers

5.3.7 Logic: Internal I/O

The GCE provides 24 Internal I/O channels. Figure 5-21 shows the first Internal I/O menu where the user can assign channels 1 to 4, there are 3 more similar menus to assign the other Internal channels.

The Not function is only available on Internal channels 1 to 8.

The purpose of the internal channel is to let the user assign a system I/O function to a *System Input*. See Section 10 for the list of available *System Input* and *System I/O* functions.

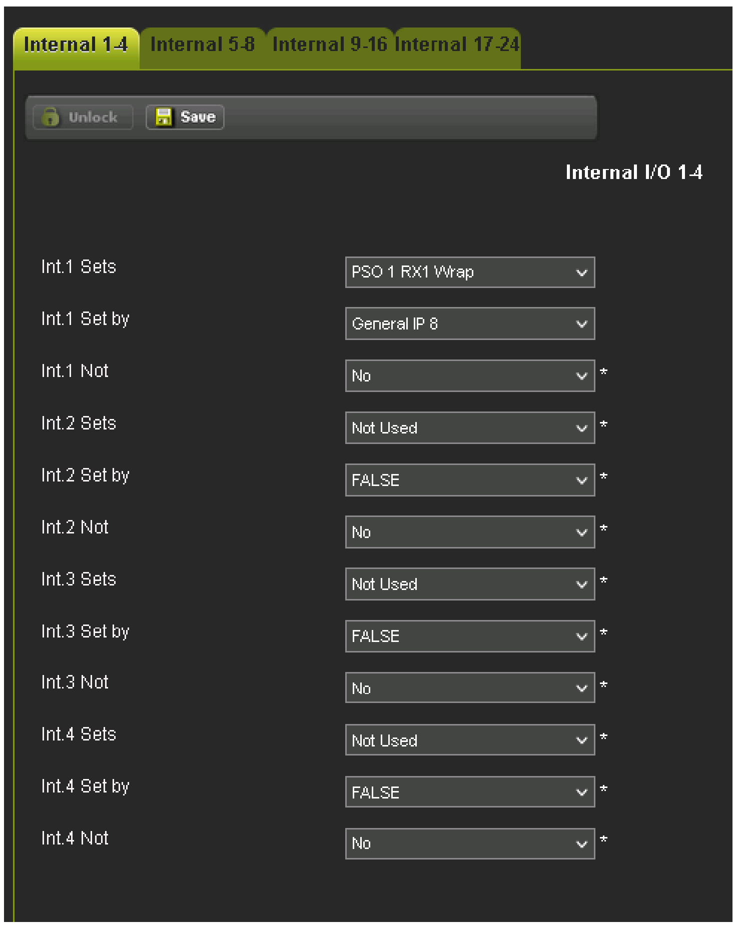


Figure 5-21 Logic: Internal Channels

For example, let's say IN 7.5 is assigned to its normal default function of GP 1.1, but we want to also start a timer when GP 1.1 picks, then set:

- Int.1 Sets Timer 1 Start
- Int.1 Set byGP 1.1
- Int.1 Not False

If we want to start the timer when GP drops, then set

- Int.1 Sets Timer 1 Start
- Int.1 Set byGP 1.1
- Int.1 Not True

The timer 1 expiry is available as Timer 1 Expired, this can be used in the logic equations or assigned to an output.

Note that the internal channels also provide an alternate way to AND together terms. When a *System Input* is used multiple times in either the Input Assignments, Equations, Vital Comms Rx, or Internal I/O channels, the controlling inputs are all ANDed so all need to be energized to energize the *System Input* for example, if the following were all used to set AND 2 Enable, then if any of IN 1.1, IN 1.2, General IP 1 or General IP 2 was de-energized, the AND 2 Enable would be de-energized.

- IN 1.1 AND 2 Enable
- IN 1.2 AND 2 Enable
- Int.1 Sets AND 2 Enable
- Int.1 Set by General IP 1
- Int.2 Sets AND 2 Enable
- Int.2 Set by General IP 2

An internal channel can be used to negate a state, for example, if NOT AND 1 XR is required, set:

- Int.1 Sets General OP 1
- Int.1 Set by AND 1 XR Enable
- Int.1 Not Yes

5.3.8 General Purpose Logic Inputs and Outputs

The GCE provides a variety of general-purpose inputs and outputs that can be used in the logic equations:

The following are considered as *System Inputs,* they can be assigned in Equations or have their value set by a Vital Input, they can also be referenced in Equations.

- General IP 1 .. General IP 16
- NWP 1 .. NWP4
- RWP 1 .. RWP4
- Second Train OP
- General OP 1 .. General OP 8
- Timer 1 Start .. Timer 10 Start

The following are considered as *System Outputs,* they can be referenced in Equations or used to set a Vital Output state.

- Second Train OP
- General OP 1 .. General OP 8
- Timer 1 Expired.. Timer 10 Expired

The NWP and RWP are intended to be used for bringing in switch positions, but they can be used for any function.

If a User Timer is used with a zero value, then the logic can set the Timer Start and the resulting Timer Expired will reflect instantly the state of the Timer Start and can be mapped to an output

The General OP state is in the list of *System Inputs*, as it needs to be set by an equation, which results in the system output of the same name being set.

5.4 Spread Spectrum Radio

Spread spectrum radio may be used to send vital ATCS messages between locations without the use of physical cables. The ATCS messages sent to GCP5000 (GCE) unit contain the internal logic states of the tracks at that unit. The crossing unit evaluates the ATCS messages to determine the real-time state of the outputs at the sending unit. Based on this evaluation, the crossing unit determines when the crossing should be activated.

GCP5000 (GCE) units can communicate using the Ethernet to the eSSR without the use of the WAG. The Laptop port of the CPU III is connected via an Ethernet cable to the eSSR as shown in Figure 5-22. Note that if access is required to the laptop port for the CPU III Web UI then it is advisable to connect the CPU to the eSSR via an Ethernet Switch.

If the GCE units are in the same bungalow, then the CPU IIIs can communicate directly via the Ethernet, again it is advisable to use an Ethernet Switch so the Web UI can still be accessed. Note that for units in the same bungalow, the CPU III could communicate using Echelon, the advantage of this is that the laptop port can still be accessed via the Web UI.

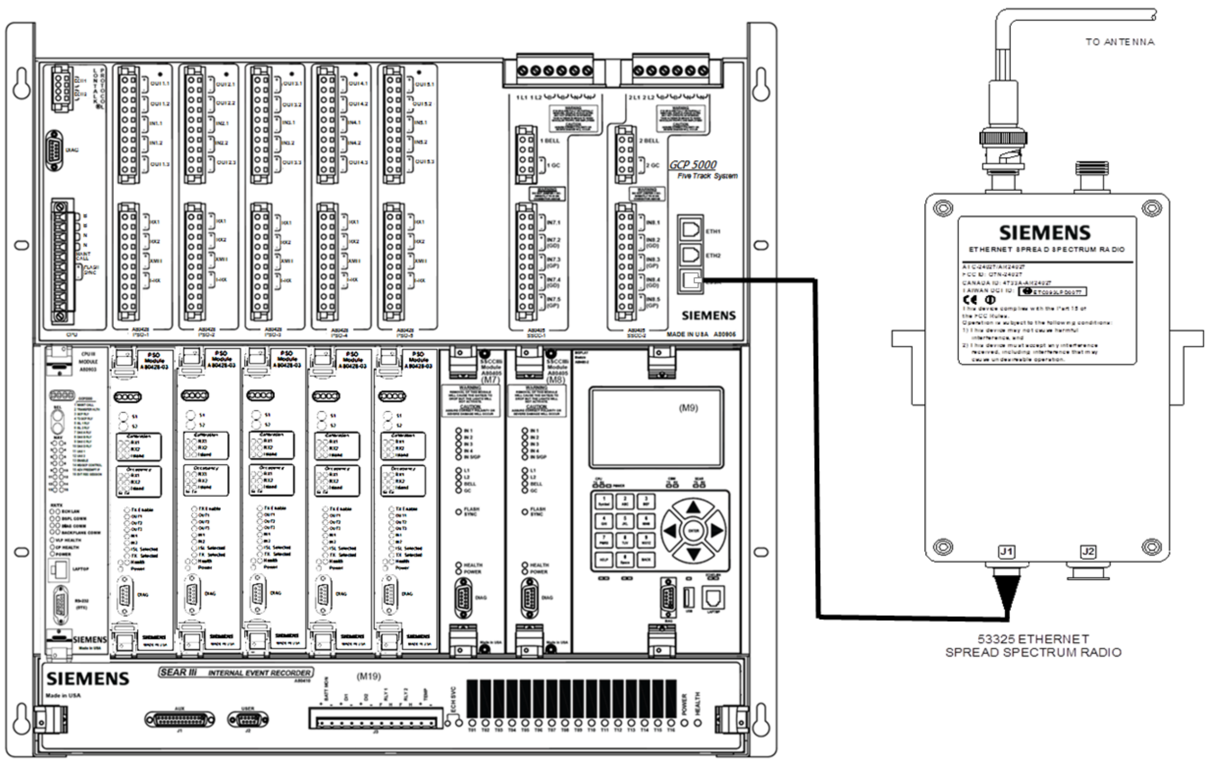


Figure 5-22 Spread Spectrum Radio Connection

If an Ethernet network is available linking the GCE units in different locations, then the GCE CPU III can communicate directly via the Ethernet, again it is advisable to use an Ethernet switch so the Web UI can still be accessed.

The choice of communication network is selected from the CPU III Web UI on the Router Settings page.

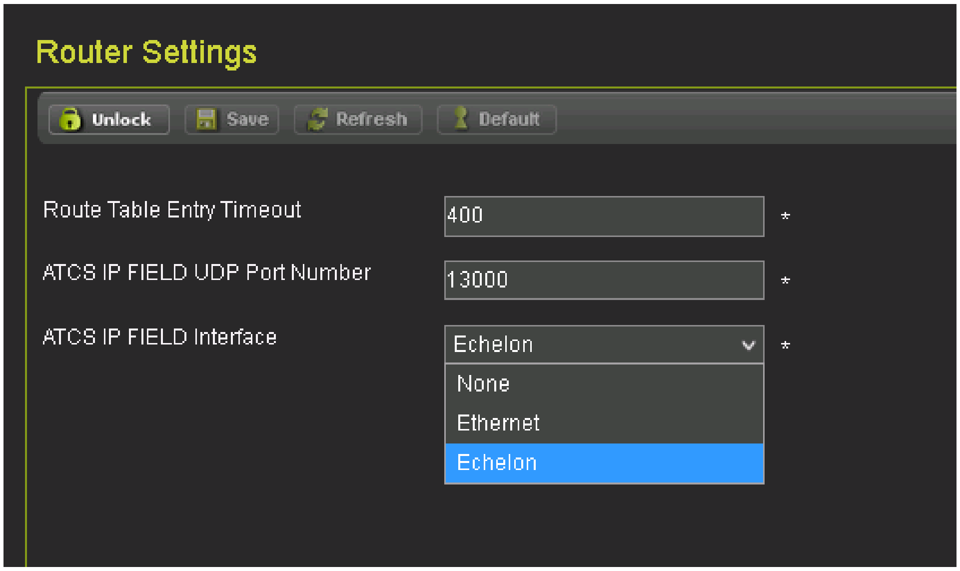


Figure 5-23 Router Settings

5.5 Vital Link Communications

An Ethernet or Echelon connection may be used to send vital ATCS messages between GCP5000 (GCE) units. The ATCS messages sent between the GCP5000 (GCE) units contain 15 general-purpose input and output bits. The GCE provides 4 separate vital communication links, which can be used to communicate with 4 other GCE units. If more than 15 bits are required between GCE units more than one vital comms link can be used between 2 units.

5.5.1 ATCS Addressing and ATCS Offsets

NOTE

NOTE

ATCS Subnode offset number 02 (SS 02) is reserved for the use of the Spread Spectrum Radio, A53308; SS 16 is reserved for the GCP; and SS 99 is reserved for the SEAR IIi. All other numbers between 03 and 98 may be selected and used as desired.

Because the GCP5000 (GCE) uses ATCS messages for communication, each site must be programmed with a unique ATCS address (known as the Site Identification Number, or SIN). The railroad design office usually assigns the ATCS address.

WARNING

WARNING

GCP5000 (GCE) SYSTEM USING VITAL ATCS COMMUNICATIONS MUST BE ASSIGNED A UNIQUE ATCS ADDRESS.

ATCS addresses consist of twelve digits in the format: **7.RRR.LLL.GGG.SS** where:

11 is the wayside equipment type

RRR is the railroad number (this number is assigned by the ATCS committee for each Railroad)

LLL is the line number

GGG is the group number (all equipment at one location has the same group number)

SS is the subnode number

Each unit at a location has a different subnode number. By default:

16 is assigned to the GCP5000 (GCE) CPU

99 is assigned to the SEAR IIi

03 and higher (03, 04, 05, etc.) is assigned to other collocated GCEs in the same ATCS group

When GCE units are in the same location (locally connected) they should have the same railroad (**RRR**), line (**LLL**), group (**GGG**), and different subnode (**SS**) numbers.

When GCE units are in different bungalows, the GCE units should have the same railroad (**RRR**), line (**LLL**) numbers, but different group (**GGG**) numbers. The subnode (**SS**) numbers, may or may not be different.

The ATCS address is set in the Site Configuration menu as separate ATCS Railroad (**RRR**), line (**LLL**), Group (**GGG**), and Subnode (**SS**) numbers. The CPU subnode is that used by the CPU III.

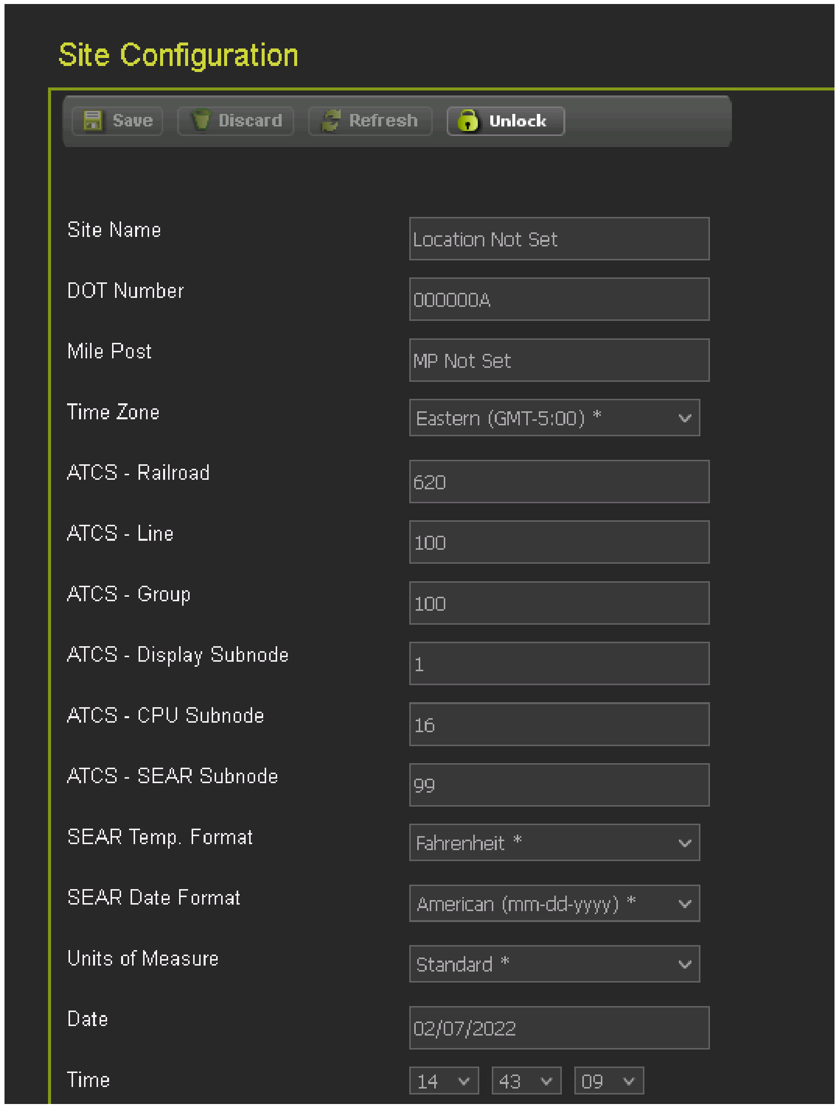


Figure 5-24 Site Configuration Menu

5.5.1.1 Setting the ATCS Address of the Remote Site

When a vital Comms link is set to used, the ATCS address of the neighboring GCE can be set by either:

- entering the ATCS offset values for the neighbor, and the Remote SIN will automatically be updated to show the address of the neighbor
- entering the Remote SIN the offsets will automatically be updated (SIN should be entered as shown below with leading 0's)

NOTE

NOTE

The SIN should be entered with leading zero's if the field is less than 3 digits, e.g., 002, 012, or for the last subnode field, 1 leading zero, e.g., 03.

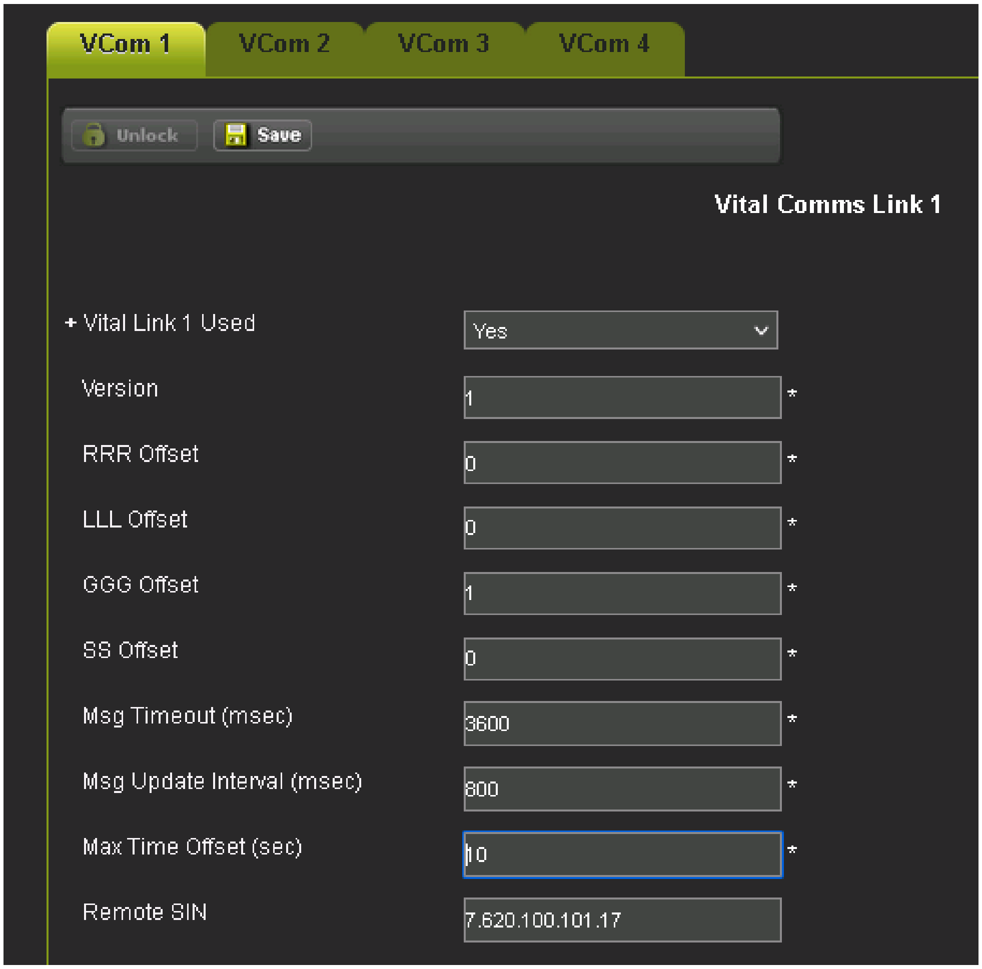


Figure 5-25 Entering Neighbor's ATCS Address

⚠ WARNING

WARNING

INCORRECTLY SETTING THE ATCS OFFSETS OR REMOTE SIN OF THE VITAL COMMS LINK OF THE NEIGHBORING GCP5000 SYSTEM MAY RESULT IN THE GCP COMMUNICATING WITH THE WRONG SYSTEM. CHECK THAT THESE ARE SET CORRECTLY.

5.5.2 Message Update and Timeouts

The link timing parameters for each Vital Comms link are set in the Vcomms Link menu as shown in Figure 5-25.

The interval between message transmissions is set by the **Msg Update Interval** field. This specifies how often a repeat ATCS message is sent.

The message is also sent immediately when a state change occurs (energized to de-energized or vice versa).

If the receiving unit does not get a valid message from its neighbor in the time specified by the **Msg Timeout** then the receiver will revert the received bits on this link to the de-energized state.

For example, when the **Msg Timeout** field is set to the default setting of 3600ms and a new message is not received within 3.6 seconds of the last message, the GCP5000 (GCE):

- designates the link as failed
- defaults to a restrictive set of states for the message data on the failed link
- de-energizes the Vital Comms Outputs

The default setting for the **Message Update** parameter is 800ms. At this default value, approximately 4 messages can be lost on the radio link without the link failing.

5.5.3 Version

The Version field is used to check the consistency of the interface; if the version is inconsistent on either side of the Vital Comms link, the Vital Comms link will remain out of session. For example, consider the case of a system that is already installed in the field with two GCE systems communicating via Vital Comms Link 1 and using a Version of 1. If a change is made to the interface, for example changing what the message bits are used for, it is recommended to update the version. This will then avoid any compatibility issues where one side of the link has been updated but the other side hasn't been updated.

5.5.4 Assigning Transmit and Receive Bits

When the Vital Comms Link has been enabled, two more menus are enabled which allow the user to assign the bits received on the link as shown in Figure 5-26 and set the state of the transmitted bits as shown in Figure 5-27.

The Vital Comms Link Rx menu allows the user to directly assign the state of the received bit to a *System Input*. For example, if the approach circuit consists of multiple PSO track circuits and one of these is remotely located. Then its state could be sent via a comms link to the GCE at the crossing and used to set the PSO 1 RX 1 Enable as shown in Figure 5-26.

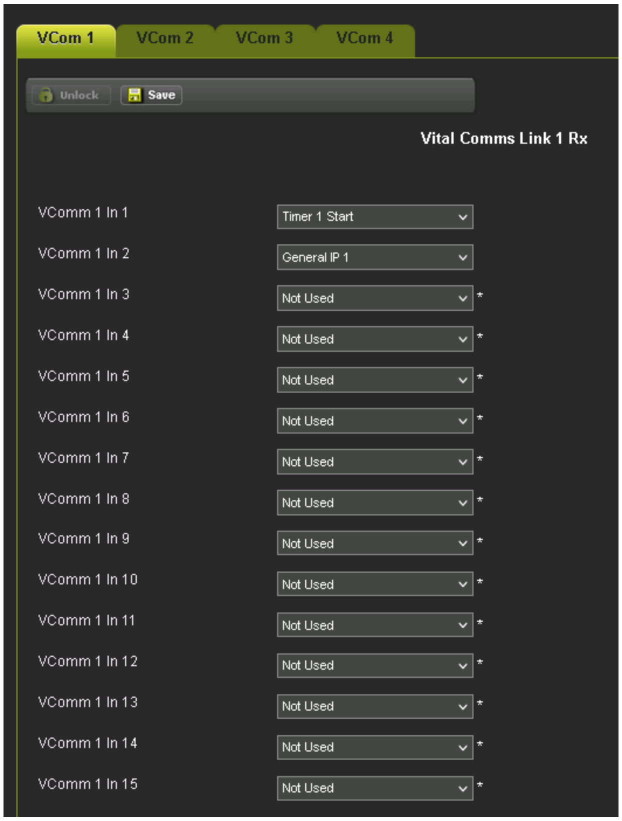


Figure 5-26 Vital Comms Link 1 Rx

The vital comms ‘n’ link also sets the input names Remote ‘n’ Input 1 to Remote ‘n’ Input 15. These can then be used by the Internal channel and Equations, for example:

- Int.1 Sets Timer 1 Start
- Int.1 Set by Remote 1 Input 1

The bits to be transmitted over the link can be directly assigned in the Vital Comms Link ‘n’ Tx menu as shown in Figure 5-27.

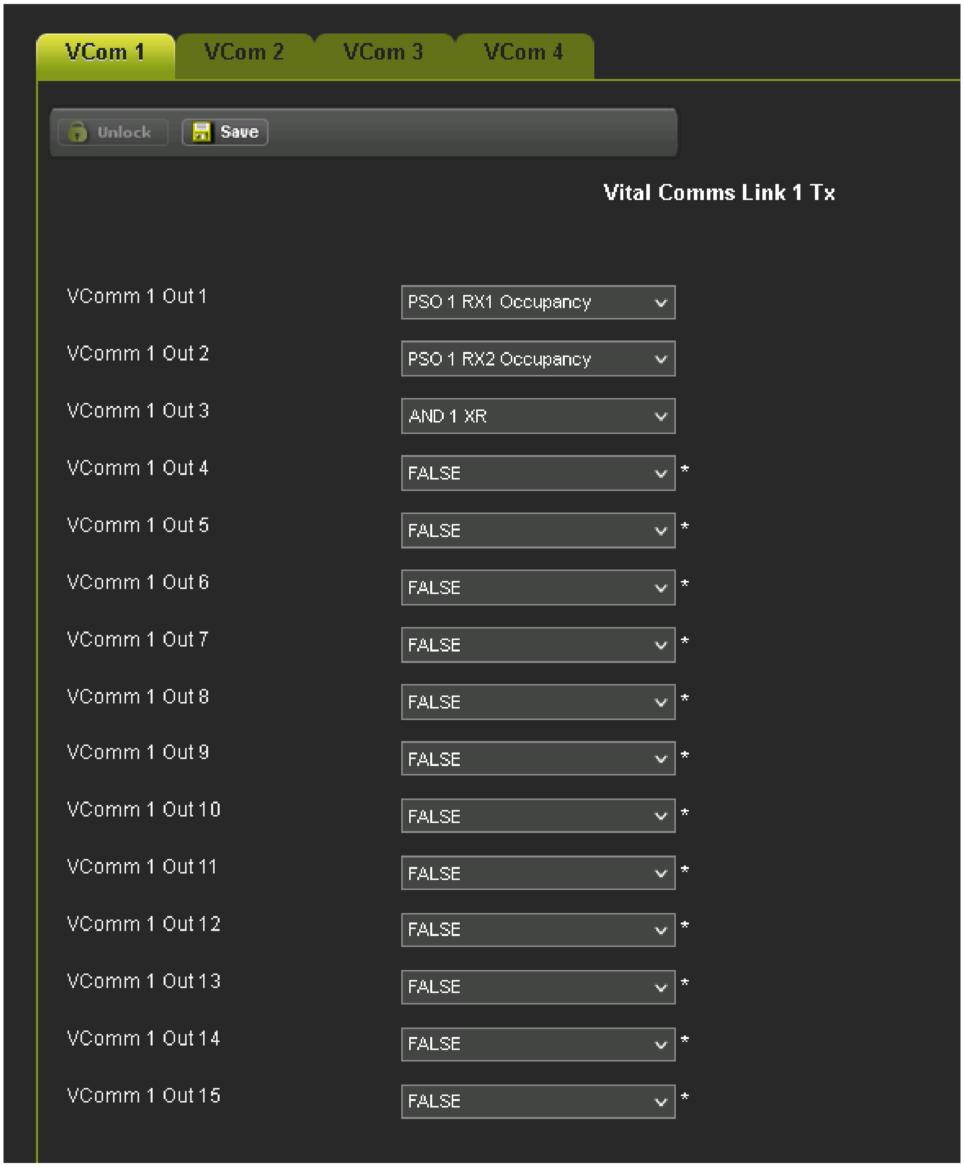


Figure 5-27   Vital Comms Link 1 Tx

⚠ WARNING

WARNING

IF THE VITAL COMMS TX OR RX BITS ARE UPDATED ON A SYSTEM IN THE FIELD, CARE MUST BE TAKEN TO ENSURE THAT AN UNSAFE CONDITION IS NOT CREATED IF ONLY ONE SYSTEM IS UPDATED AND THE OTHER SYSTEM IS NOT UPDATED YET WITH THE CHANGE.

UPDATING THE VERSION PARAMETER WILL PREVENT A PARTIAL UPDATE FROM CAUSING A HAZARD.

5.6 Maintenance Call Output

The maintenance call output can be controlled by the GCP5000 (GCE).

The maintenance call output is deactivated by the GCP5000 (GCE) if:

a) An unhealthy state is detected within either SSCC Module
b) The Aux-1 (or 2) Xng Ctrl Health IP is used and is de-energized
c) The SSCC Low Battery Detection is on and the crossing controllers are low
d) The SEAR IIi is used but not in session
e) The SEAR IIi is used and its CDL is commanding the Maintenance call low (usually due to POK being off)
f) Any PSO receiver or PSO Island is out of service
g) Any out of service input is energized (even if the GCE is in service)
h) The Maintenance Call Rpt IP is used and is de-energized

5.6.1 Deactivation by an External SSCC

To have an external SSCC III+ / IIIA or IV be able to control and de-energize the maintenance call, connect the Maint Call Rpt Input of the GCE to the Maint Call Output of the external crossing controller as shown in Figure 5-28. Also, connect the Aux-1 Xng Ctrl Health input of the GCE to the 1GC output of the external crossing controller and connect the FLASH SYNC output of the GCE to the FLASH SYNC I/O of the external crossing controller.

With this configuration, the state of the external equipment is reflected in the maintenance call output of the GCP5000 (GCE).

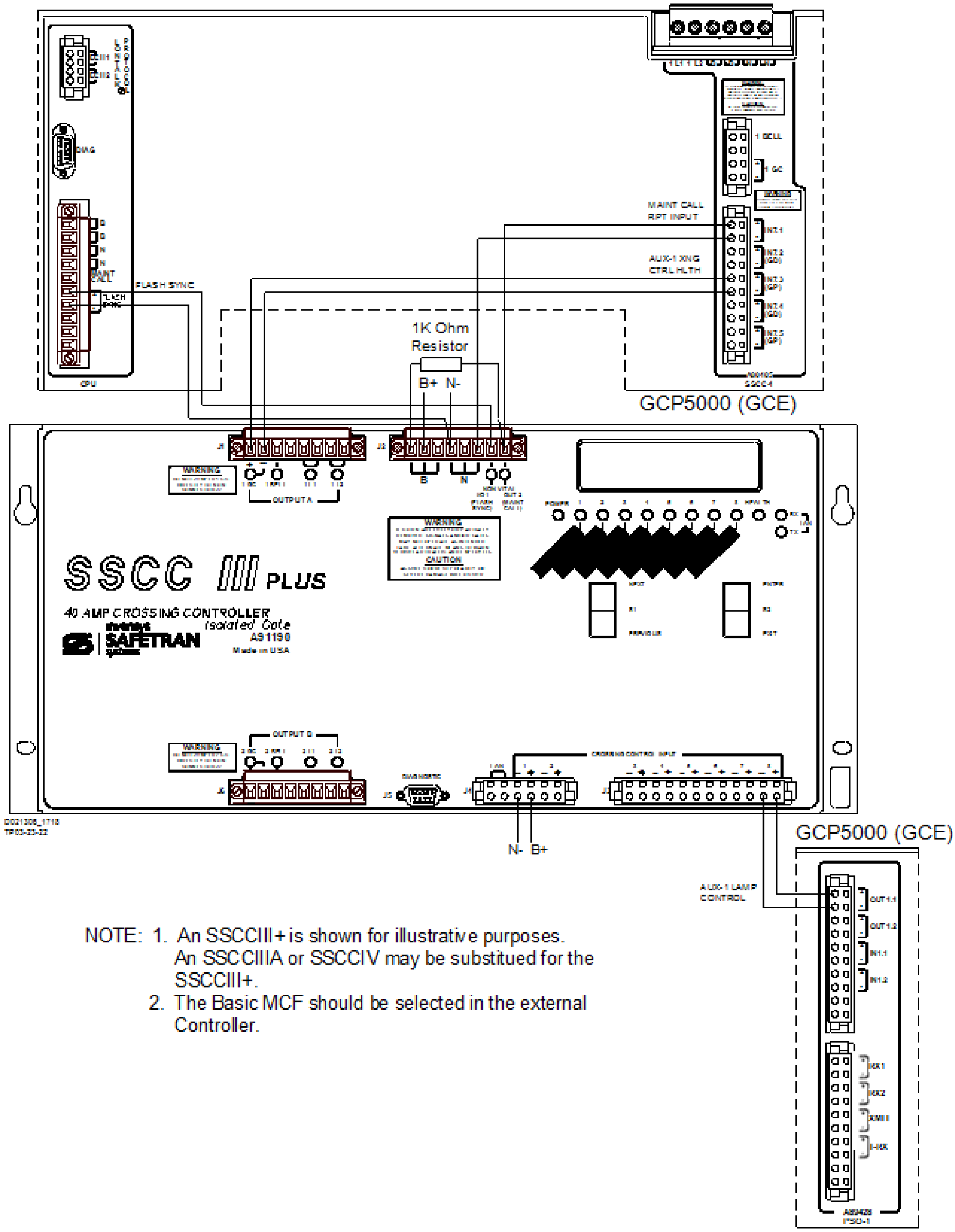


Figure 5-28 Connection Between GCP5000 (GCE) and External SSCC For Additional Lamp Load

5.7 Wiring Requirements

WARNING

WARNING

FAILURE TO FOLLOW THE RAILROAD'S OR AGENCY'S APPROVED WIRING OR INSTALLATION GUIDELINES MAY LEAD TO POSSIBLE UNSAFE OPERATION OF THE SYSTEM.

5.7.1 Battery Wiring

Battery wiring to the GCE should be #10 AWG stranded minimum and twisted in pair. The wires are connected to the shelter battery surge suppression panel. For proper battery surge protection, the battery surge suppression panel should be wired as shown in Figure 2-2.

5.7.2 Case Wiring

Case wiring to the GCE should be #16 AWG stranded. See Section 2 for further information.

5.7.3 Track Wiring

Table 5-1 Maximum Distances for Track Wire by AWG Size

WIRE SIZE	DIAMETER (INCH)	DIAMETER (MILLIMETER)	MAXIMUM DISTANCE (FT./M)
14 AWG	0.0641	1.628	2000/609.6
13 AWG	0.0720	1.828	2500/762.0
12 AWG	0.0808	2.053	3100/944.9
11 AWG	0.0907	2.305	4000/1219.2
10 AWG	0.1019	2.588	5000/1524.0

Equipment connections to the rails should be as short as practical (preferably less than a 100 ft. {30.5 m} pair) and should be #9 AWG or #6 AWG. For lengths of 100 – 300 ft. (30.5 – 91.4 m), use #6 AWG. If the lengths exceed 300 ft. (91.4 m), Receiver Rail to Line Coupler, 7A377-1-f, Receiver Rail to Line Coupler, 7A377-2-f, or Transmitter Rail to Line Coupler, 7A399-f, should be used. The 7A377-1-f, 7A377-2-f, or 7A399-f couplers must be emplaced in a weatherproof shelter that is positioned as close as possible to the track, but no more than 100 ft. (30.5 m) from the track. Track wires should be plug connected or welded to the rails.

Typically, the maximum distance between the Line to Receiver Coupler, 7A388 and the Receiver Line-to-Rail Coupler, 7A377-1-f or 7A377-2-f, or the Line to Receiver Coupler, 7A388 and the Transmitter Line-to-Rail Coupler, 7A399-f is 2000 ft. (609.6 m), when using #14 AWG stranded wire. Table 7-1 provides the maximum distance possible between the Couplers for 10 AWG through 14 AWG, inclusive.

SECTION 6
GCP5000 (GCE) INSTALLATION, CALIBRATION, AND SYSTEM OPERATIONAL CHECK

6 GCP5000 (GCE) INSTALLATION, CALIBRATION, & SYSTEM OPERATIONAL CHECK

6.1 Installation Procedure

Perform the following steps to install the GCP5000 (GCE):

1. Install and connect all GCE equipment in the wayside signaling location per the railroad's or agency's approved wiring or installation diagram.
2. Connect all required leads per the railroad's or agency's approved wiring or installation diagram.
3. Program the unit beginning by:
    a. Loading the correct GCP5000 (GCE) MCF as specified on the plans
    b. Loading the correct approved software into the modules
    c. Either:
        i. Load the approved PAC file into the GCE as specified on the plans
        ii. or if no PAC file is provided, program the unit using the Minimum Program Step report
    d. Calibrate the PSO and Island Modules

WARNING

WARNING

INCORRECT CONFIGURATION OF THE GCE MAY RESULT IN LATE OR NO ACTIVATION OF THE CROSSING WARNING DEVICES. VERIFY THAT THE CORRECT MCF IS LOADED.

IF A PAC FILE IS LOADED, VERIFY IT IS THE CORRECT ONE FOR THE GCE LOCATION.

VERIFY THAT THE CONFIGURATION MATCHES THE SITE PLANS.

VERIFY THAT THE OCCN MATCHES THE PLANS.

6.2 Calibration Procedures

6.2.1 Transmitter Calibration

WARNING

WARNING

VERIFY THAT THE TRANSMITTER FREQUENCY AND ADDRESS FORMAT ARE AS SPECIFIED BY THE RAILROAD'S APPROVED WIRING OR INSTALLATION DIAGRAM. FAILURE TO DO SO MAY LEAD TO INCORRECT OR UNSAFE OPERATION OF THE TRACK CIRCUIT.

The Transmitter does not require calibration.

6.2.2 Receiver Calibration

WARNING

WARNING

VERIFY THAT FOLLOWING ARE AS SPECIFIED BY THE RAILROAD'S OR AGENCY'S APPROVED WIRING OR INSTALLATION DIAGRAM. FAILURE TO DO SO MAY LEAD TO INCORRECT OR UNSAFE OPERATION OF THE TRACK CIRCUIT.

1. **PSO MODULE SOFTWARE**
2. **TRANSMITTER FREQUENCY AND ADDRESS FORMAT**
3. **RECEIVER PICKUP AND DROP DELAYS**
4. **RECEIVER FREQUENCY AND ADDRESS FORMAT**

IF ANY RECEIVER IS CALIBRATED IN POOR BALLAST CONDITIONS, IT MUST BE RE-CALIBRATED WHEN BALLAST CONDITIONS IMPROVE.

DO NOT ATTEMPT TO CALIBRATE WITH CAB SIGNAL TRANSMITTING.

FAILURE TO FOLLOW THE RAILROAD'S OR AGENCY'S APPROVED WIRING OR INSTALLATION GUIDELINES REGARDING RECEIVER SETTINGS AND CALIBRATION MAY LEAD TO POSSIBLE UNSAFE OPERATION OF THE TRACK CIRCUIT.

PRIOR TO TESTING FOR, AND SETTING RECEIVER THRESHOLD (BROKEN RAIL DETECTION), ENSURE THERE ARE NO TRAINS IN THE SUBSTATION BLOCK AND ALL IMPEDANCE BONDS, CROSSBONDS, AND TRACTION RETURN ARE CONNECTED PER DESIGN.

AFTER CALIBRATION, VERIFY THAT THE PSO CIRCUIT DE-ENERGIZES WHEN SHUNTED WITH THE APPROPRIATE CALIBRATION RESISTANCE (0.06, 0.2, 0.3, 0.4, OR 0.5 OHMS). FAILURE TO DO SO MAY LEAD TO INCORRECT OR UNSAFE OPERATION OF THE TRACK CIRCUIT.

FOLLOWING INSTALLATION OR AFTER ANY RECEIVER MENU CHANGES HAVE BEEN MADE, RECALIBRATE THE RECEIVER AND TEST FOR PROPER OPERATION PER THE REQUIREMENTS SPECIFIED IN TABLE 6-2 AND TABLE 6-3.

Calibration is used to set signal threshold values (SIG LVL=100) for Receivers and Island Receivers. In Broken Rail Detection applications, the receiver threshold may be adjusted to a value higher than 100 as detailed in the procedure below.

The following procedure assumes the user is using the local Display keypad to calibrate the unit.

With the PSO Module properly installed and programmed per railroad instructions, Calibrate the receiver (RX1 or RX2) as follows:

When the track ballast is good, connect a track test shunt (hardwire, 0.06-ohms, 0.2-ohms, or as required) across the track at the receiver track connections of the approach. When the ballast is poor, connect the shunt across the track at a point 30 ft. (9.14 m) beyond the receiver track connections of the approach. Ensure that the shunt has solid connections to each rail.

NOTE

NOTE

The shunt position can be moved according to application and desired drop-out point for the circuit. For example, with crossovers, shunt the farthest crossover point from the receiver.

1. On the keypad, press the number corresponding to the PSO to be calibrated (1 to 5). Then press the ‘2’ key for calibration.

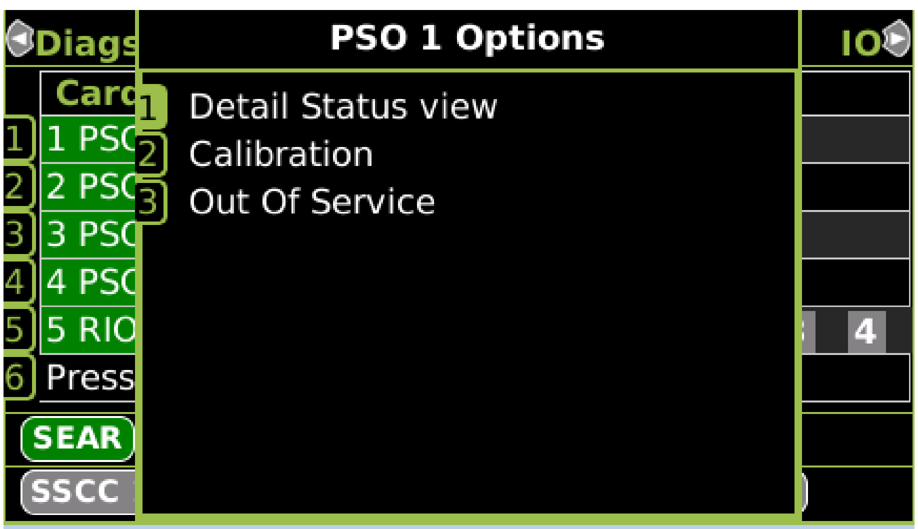


Figure 6-1 Calibration Selection

2. Select the receiver to calibrate by pressing 1 or 2 on the keypad.

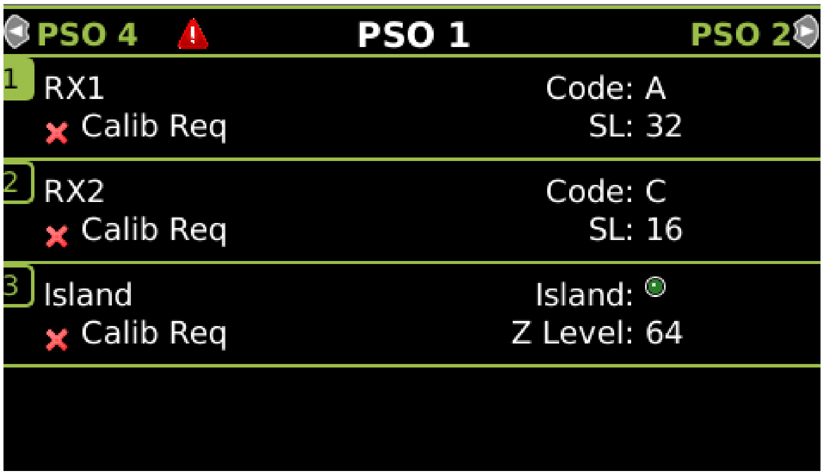


Figure 6-2 Selecting Receiver to be Calibrated

3. To start the calibration press the 1 Key.

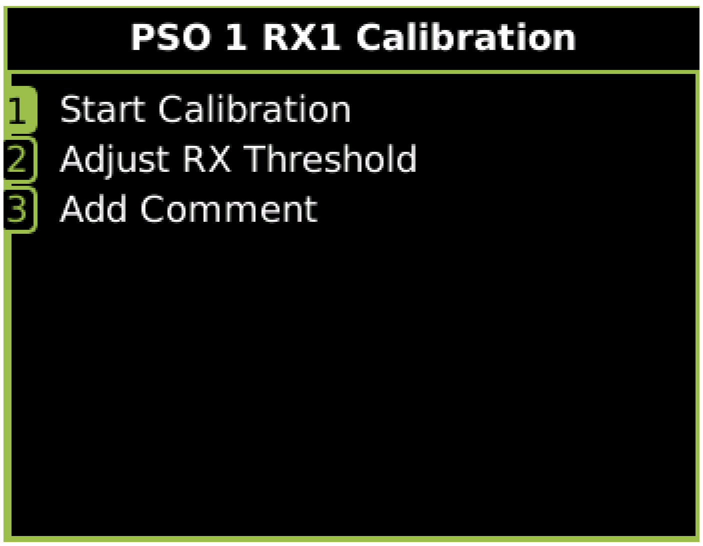


Figure 6-3 Start Calibration

The Display will show the following asking the user to press the S1 button on the PSO module to be calibrated. After pressing the button on the module, press OK on the display to continue (within 60 sec).

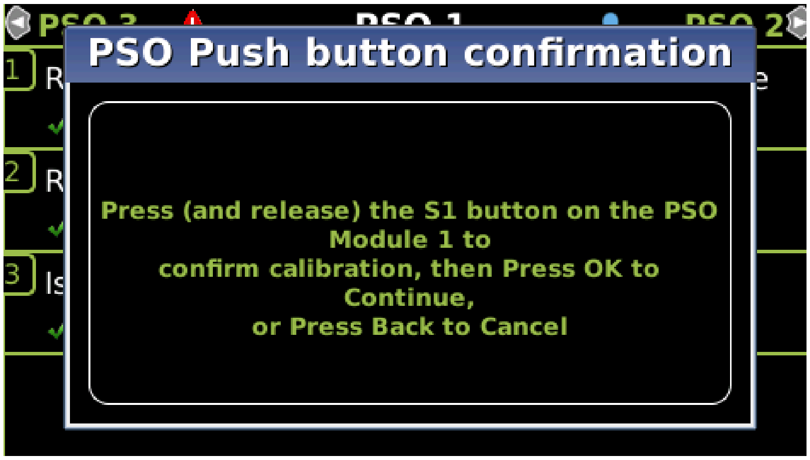


Figure 6-4   Calibration Confirmation Screen

4. The display will show:
   Initiating …

   In Progress ….

   Passed or Failed displays for 30s when calibration is complete

   Calibrated (if Passed)

   When Passed or Calibrated appears, continue to Step 5. If Failed appears, see the WARNING.

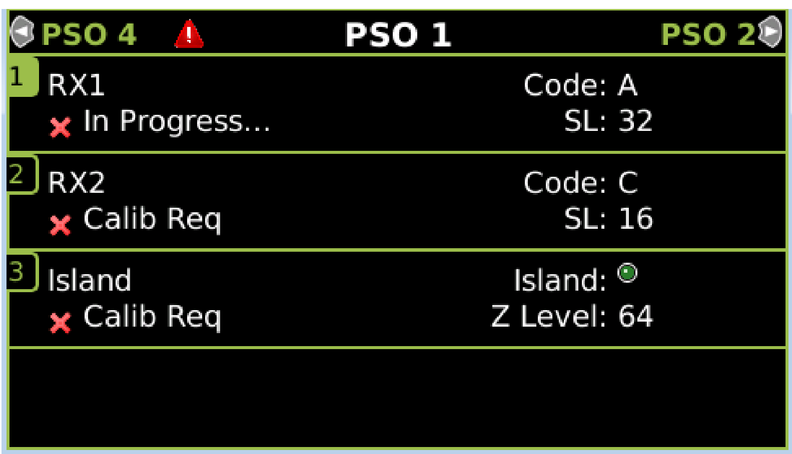


Figure 6-5   Calibration In Progress

WARNING

WARNING

IF “FAIL” APPEARS ON THE DISPLAY, THE CALIBRATION REQUIRED LED (LEFT COLUMN) REMAINS LIT, OR THE CALIBRATED LED (RIGHT COLUMN) DOES NOT LIGHT, THE CALIBRATION PROCESS DID NOT COMPLETE. SHOULD THIS HAPPEN, CYCLE THE UNIT POWER AND THEN REPEAT STEPS 2 – 4 ABOVE. IF “FAIL” APPEARS AGAIN, FURTHER TROUBLESHOOTING IS REQUIRED.

5. Remove the track test shunt. The Display should show a signal level over 110 and a code received (as shown in Figure 6-6). The Occupancy LED on the module should light. If the Occupancy LED lights proceed to Step 6. If the Occupancy LED fails to light, the calibration process has failed (refer to the previous WARNING). Inspect all equipment and connections and repeat steps 1 through 5. If the calibration fails again, further troubleshooting is required.

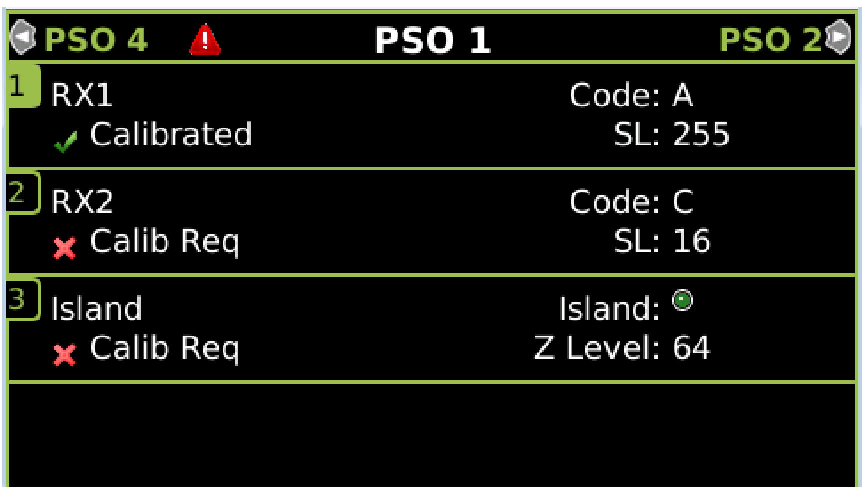


Figure 6-6 Calibration Completed

6. If broken Rail Detection is required by this application proceed to Step 7, otherwise, the receiver is calibrated.
7. Simulate a broken rail by removing one side of the TX circuit from the rail.
8. Record the receiver’s signal level as shown on the Display calibration screen (see SL in Figure 6-6)
9. Reconnect the TX circuit wire that was just removed.
10. After the PSO circuit recovers, remove the TX circuit from the other rail.
11. Record the receiver’s signal level value displayed.
12. Reconnect the TX circuit that was just removed.
13. Select the receiver menu again by pressing the 1 (or 2) key, now select the Threshold Adjust menu by pressing the 3 key.

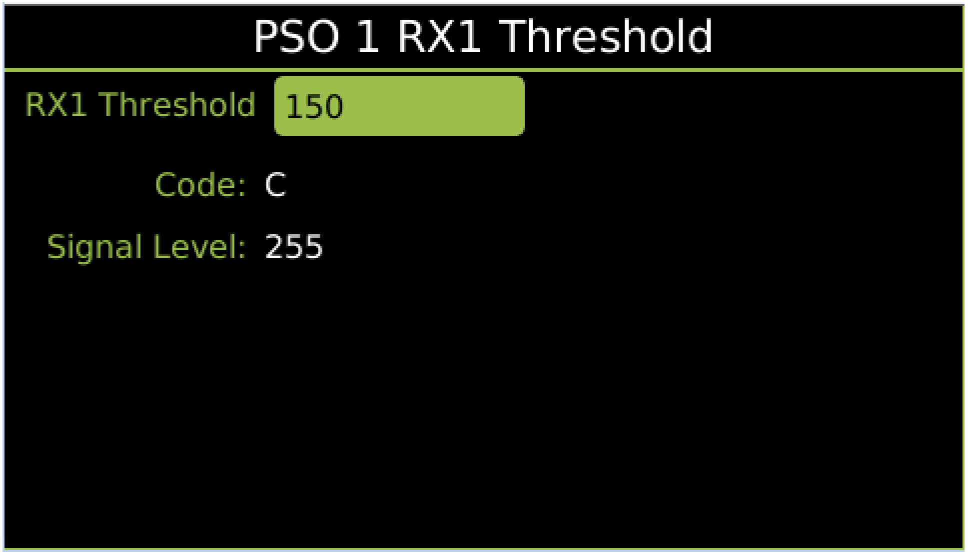


Figure 6-7 Threshold Adjustment

14. Enter a value for the Threshold that is 10% higher than the highest value in Step 8 or Step 11 of the previous procedure.
15. Conduct a broken rail simulation for both rails (steps 7 through 14 of the previous procedure). Ensure that the receiver registers occupied (Signal Level Drops below that used in Step 14).
16. If it does not, adjust the RX Threshold level to reflect the simulated broken rail value. Record the final RX Threshold level on the Program Sheet.

⚠ WARNING

WARNING

ENTERING AN INCORRECT THRESHOLD VALUE IN STEP 14 OR FAILURE TO COMPLETE VERIFICATION IN STEPS 15 AND 16 CAN RESULT IN FAILURE TO DETECT BROKEN RAIL.

6.2.3 Island Calibration

Table 6-1 Hardwire Shunt Placement Distances in Feet/Meters

ISLAND FREQUENCY	0.12 Ω SENSITIVITY SHUNT DISTANCE	0.3 Ω SENSITIVITY SHUNT DISTANCE	0.4 Ω SENSITIVITY SHUNT DISTANCE	0.5 Ω SENSITIVITY SHUNT DISTANCE
2.14	20/6.10	50/15.24	67/20.42	84/25.60
2.3	17/5.18	43/13.11	58/17.68	72/21.95
2.63	13/3.96	33/10.06	44/13.41	55/16.76
2.8	10.5/3.20	27/8.23	36/10.97	45/13.72
3.1	9.0/2.74	23/7.01	31/9.45	39/11.89
3.24	7.5/2.29	19/5.79	26/7.92	32/9.75
3.5	6.5/1.98	17/5.18	23/7.01	29/8.84
4.0	6.0/1.82	15/4.57	20/6.10	25/7.62
4.9	5.0/1.50	13/3.96	18/5.49	22/6.71
5.4	4.5/1.37	12/3.66	16/4.88	20/6.10
5.9	4.0/1.22	10/3.20	14/4.27	17/5.18
5.4	3.5/1.07	9/2.74	12/3.66	15/4.57
7.1	3.0/0.91	8/2.44	11/3.35	14/4.27
7.7	3.0/0.91	8/2.44	11/3.35	14/4.27
8.3	20/6.10	50/15.24	67/20.42	84/25.60
8.9	17/5.18	43/13.11	58/17.68	72/21.95
9.5	13/3.96	33/10.06	44/13.41	55/16.76
10.0	10.5/3.20	27/8.23	36/10.97	45/13.72
10.2	9.0/2.74	23/7.01	31/9.45	39/11.89
11.5	7.5/2.29	19/5.79	26/7.92	32/9.75
13.2	6.5/1.98	17/5.18	23/7.01	29/8.84
15.2	6.0/1.82	15/4.57	20/6.10	25/7.62
17.5	5.0/1.50	13/3.96	18/5.49	22/6.71
20.2	4.5/1.37	12/3.66	16/4.88	20/6.10

⚠ WARNING

WARNING

VERIFY THAT THE FOLLOWING ARE AS SPECIFIED BY THE RAILROAD'S OR AGENCY'S APPROVED WIRING OR INSTALLATION DIAGRAM. FAILURE TO DO SO MAY LEAD TO INCORRECT OR UNSAFE OPERATION OF THE TRACK CIRCUIT.

1. **ISLAND FREQUENCY**
2. **ISLAND PICKUP DELAY**
3. **PSO MODULE SOFTWARE VERSION**

ENSURE THERE ARE NO OTHER SHUNTS (OR TRAIN, TRACK EQUIPMENT) CLOSE TO THE ISLAND OTHER THAN THE REQUIRED CALIBRATION SHUNT BEFORE PERFORMING CALIBRATION.

AFTER CALIBRATION, VERIFY THAT THE TRACK CIRCUIT DE-ENERGIZES WHEN THE ISLAND CIRCUIT IS SHUNTED WITH THE APPROPRIATE CALIBRATION RESISTANCE ACCORDING TO RAILROAD PROCEDURES AND APPLICABLE FRA RULES. FAILURE TO DO SO MAY LEAD TO INCORRECT OR UNSAFE OPERATION OF THE TRACK CIRCUIT.

IF THE ISLAND IS CALIBRATED IN POOR BALLAST CONDITIONS, IT MUST BE RE-CALIBRATED WHEN BALLAST CONDITIONS IMPROVE.

AFTER INSTALLATION OR AFTER ANY ISLAND MENU CHANGES HAVE BEEN MADE, RECALIBRATE THE ISLAND CIRCUIT AND TEST FOR PROPER OPERATION.

FOR ALL ISLAND INSTALLATIONS WHERE POOR SHUNTING HAS BEEN EXPERIENCED OR IS ANTICIPATED, PROGRAMMING A 4-SECOND ISLAND PICKUP DELAY AND UTILIZING A 0.3 OHM SHUNTING SENSITIVITY CALIBRATION ARE RECOMMENDED.

IN AREAS OF PASSENGER OPERATION, A MINIMUM OF 0.3 OHM SHUNTING SENSITIVITY IS RECOMMENDED.

NOTE

NOTE

Table 6-1 provides hardwire shunt distance values for shunting sensitivities of 0.12, 0.3, 0.4, and 0.5 ohms for areas where poor island shunting may be a problem. Proper shunt distance is shown on the display, providing the shunt distance for the specified frequency.

With the PSO Module properly installed and programmed per railroad instructions, Calibrate the Island as follows:

1. When the track ballast is good, connect a track test shunt (hardwire) across the track at the point specified in. Ensure that the shunt has solid connections to each rail. Note that the Display screen will show the distance to locate the shunt

NOTE

NOTE

A test shunt of the desired shunting value (for example 0.25 Ohms) may be placed directly on the RX feed wires instead of a hard wire shunt with an offset.

2. On the keypad, press the number corresponding to the PSO to be calibrated (1 to 5). Then press the '2' key for calibration.

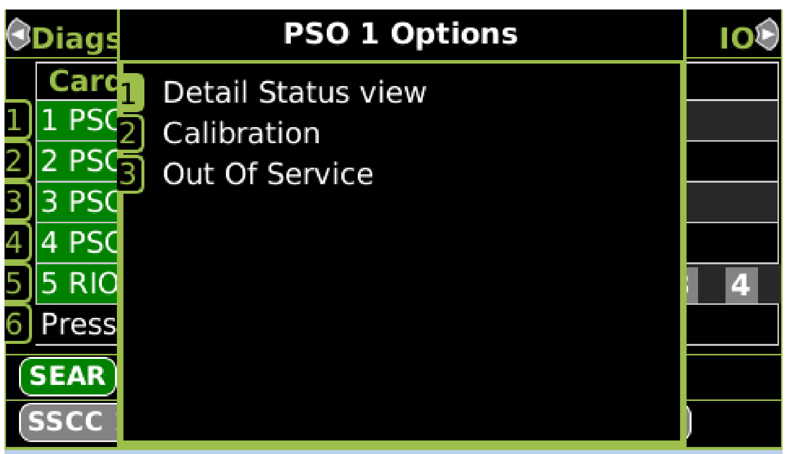


Figure 6-8 Calibration Selection

3. Select the island by pressing 3 on the keypad

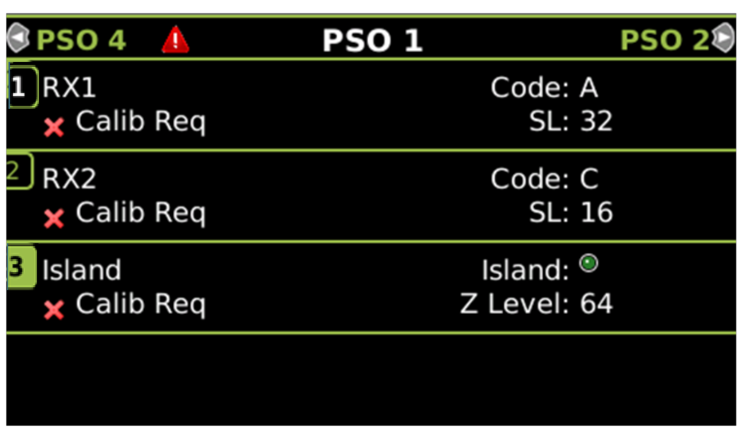


Figure 6-9 Island Selection

4. To start the calibration press the “1” key.

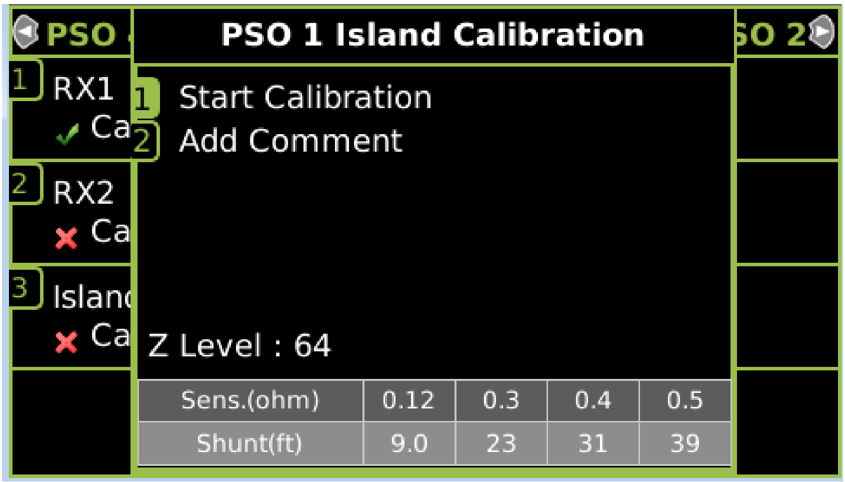


Figure 6-10 Start Calibration

5. The Display will show the following asking the user to press the S1 button on the PSO module to be calibrated. After pressing the button on the module, press OK on the display to continue (within 60s)

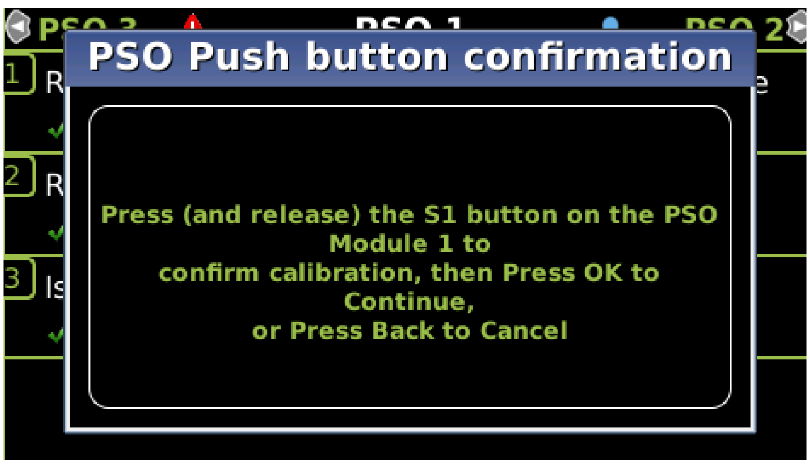


Figure 6-11 Calibration Confirmation Screen

6. The display will show:
   - Initiating …
   - In Progress ….
   - Passed or Failed displayed for 30s when the island calibration is complete
   - Calibrated (if Passed)
   - When Passed or Calibrated appears, continue to Step 3. If Failed appears, see the following WARNING.

⚠ WARNING

WARNING

IF "FAIL" APPEARS ON THE DISPLAY, THE CALIBRATION PROCESS DID NOT COMPLETE. SHOULD THIS HAPPEN, CYCLE THE MODULE POWER AND THEN REPEAT STEPS 2 – 5 ABOVE. IF "FAIL" APPEARS AGAIN, REPLACE THE UNIT.

7. Remove the hardware island shunt. The Island Signal level should show a large value way over 110. The Island Occupancy LED should light. If the Island Occupancy LED fails to light, the calibration process has failed (refer to the previous **WARNING**). Inspect all equipment and connections and repeat steps 2 – 5. If the calibration fails again, further troubleshooting is required.

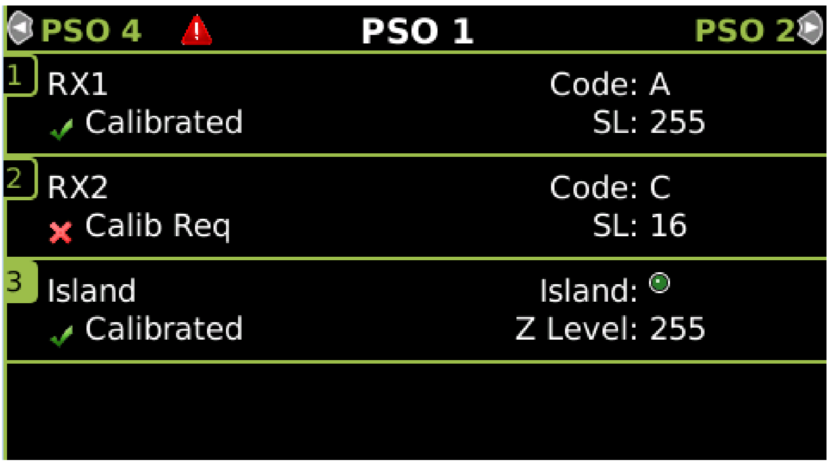


Figure 6-12 Island Calibration Completed

8. Once the Island has been calibrated, proceed to the Crossing Checkout Procedures.

6.2.4 PSO Module Checkout Procedures

WARNING

WARNING

VERIFY THAT FOLLOWING ARE AS SPECIFIED BY THE RAILROAD'S OR AGENCY'S APPROVED WIRING OR INSTALLATION DIAGRAM. FAILURE TO DO SO MAY LEAD TO INCORRECT OR UNSAFE OPERATION OF THE TRACK CIRCUIT.

1. **PSO MODULE SOFTWARE**
2. **TRANSMITTER FREQUENCY AND ADDRESS FORMAT**
3. **RECEIVER PICKUP AND DROP DELAYS**
4. **RECEIVER FREQUENCY AND ADDRESS FORMAT**

IF ANY RECEIVER IS CALIBRATED IN POOR BALLAST CONDITIONS, IT MUST BE RE-CALIBRATED WHEN BALLAST CONDITIONS IMPROVE.

FAILURE TO FOLLOW THE RAILROAD'S OR AGENCY'S APPROVED WIRING OR INSTALLATION GUIDELINES REGARDING RECEIVER SETTINGS AND CALIBRATION MAY LEAD TO POSSIBLE UNSAFE OPERATION OF THE TRACK CIRCUIT.

AFTER CALIBRATION, VERIFY THAT THE TRACK CIRCUIT DE-ENERGIZES WHEN THE TRACK CIRCUIT IS SHUNTED WITH THE APPROPRIATE CALIBRATION RESISTANCE (0.06, 0.2, 0.3, 0.4, OR 0.5 OHMS). FAILURE TO DO SO MAY LEAD TO INCORRECT OR UNSAFE OPERATION OF THE TRACK CIRCUIT.

FOLLOWING INSTALLATION OR AFTER ANY RECEIVER MENU CHANGES HAVE BEEN MADE, RECALIBRATE THE RECEIVER AND TEST FOR PROPER OPERATION PER THE REQUIREMENTS SPECIFIED IN SECTION 6.3.

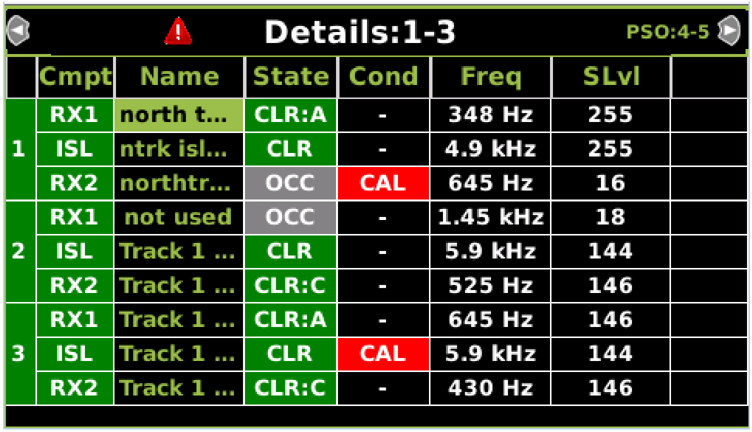
6.2.4.1 Receiver Checkout Procedures

Review the Signal Level (SL1 for receiver 1 and SL2 for receiver 2).

NOTE

NOTE

The PSO and island signal levels can be seen in either the calibration menus as shown previously, in the Detailed view on the Display (press 6 on the keypad from the main System View) or the 4-character display on the PSO module, press the s1 button once, then press the s2 button 1 or more times to see the appropriate RX1 Signal level



Details:1-3 PSO:4-5

	Cmpt	Name	State	Cond	Freq	SLvl
1	RX1	north t...	CLR:A	-	348 Hz	255
	ISL	ntrk isl...	CLR	-	4.9 kHz	255
	RX2	northtr...	OCC	CAL	645 Hz	16
2	RX1	not used	OCC	-	1.45 kHz	18
	ISL	Track 1 ...	CLR	-	5.9 kHz	144
	RX2	Track 1 ...	CLR:C	-	525 Hz	146
3	RX1	Track 1 ...	CLR:A	-	645 Hz	146
	ISL	Track 1 ...	CLR	CAL	5.9 kHz	144
	RX2	Track 1 ...	CLR:C	-	430 Hz	146

Figure 6-13 PSO and Island Signal Levels

1. Take note of the Signal Level
2. Remove the Transmitter signal for RX by removing the TX wires from the surge panel.
3. Take note of the Signal Level. If the Signal Level is greater than 20, an unassociated signal of like frequency is present.

WARNING

WARNING

THE CONDITION DETERMINED IN STEP 3 MUST BE RESOLVED. DO NOT PROCEED TO STEP 4 AND BEYOND UNTIL THE UNASSOCIATED SIGNAL OF LIKE FREQUENCY IS NO LONGER PRESENT.

4. Verify that the TX wires are removed from the surge panel.
5. On the Display, verify that a Code is not shown in the RX'N' or SL'N' lines. If a code or signal value is shown, replace the PSO Module.
6. Replace the Transmitter signal to the track by reconnecting the TX leads to the surge panel.
7. Verify that the code appears in the RX'N' line and that the SL'N' value is shown on those lines on the Display. If the no code or signal level appears, replace the PSO Module.
8. Verify proper operation of the track circuit equipment before placing it in service per railroad procedures and applicable FRA rules.
9. Verify proper PSO Module operation by observing train moves, per railroad or agency policy.
10. The system is now ready for operation.

6.2.4.2 Island Checkout Procedures

Remove the Transmitter signal for RX by removing the I-TX wires from the surge panel.

1. Look at the ISL SL: value (on Display calibration menus, Display Details, or 4 char display, see the previous section for details). If the Signal Level is greater than 20, an unassociated signal of like frequency is present.

⚠ WARNING

WARNING **THE CONDITION DETERMINED IN STEP 1 MUST BE RESOLVED. DO NOT PROCEED TO STEP 2 AND BEYOND UNTIL THE UNASSOCIATED SIGNAL OF LIKE FREQUENCY IS NO LONGER PRESENT.**

2. Verify that the Island indicator on the Display module shows the island as occupied (OCC in grey) and that the XR indicator shows XR as down (grey). If the island is not shunted, replace the PSO module. If the island is occupied and XR is not down, check that this PSO is included in the AND 1 XR logic.
3. Reconnect the transmitter signal by reconnecting the I-TX wire on the surge panel.
4. Verify that the Island indicator on the Display module shows the island as unoccupied (CLR in green) and the XR is energized (green).
5. Verify proper operation of the track circuit equipment before placing it in service per railroad or agency procedures and applicable FRA rules.
6. Verify proper PSO Module operation by observing train moves, per railroad or agency policy.
7. The system is now ready for operation**.**

6.3 Recalibration and Reprogramming

6.3.1 Recalibration/Reprogramming Requirements Due to Programming Changes

Table 6-2 indicates the receiver and island recalibration requirements that result from any of the indicated programming changes. For example, if the transmit power is changed from low to high, only the receiver must be recalibrated; the island calibration does not change.

⚠ WARNING

WARNING **FAILURE TO RECALIBRATE OR RESET THE RECEIVER THRESHOLD CAN RESULT IN IMPROPER SYSTEM OPERATION.**

Table 6-2 Recalibration/Reprogramming Requirements Due to Programming Changes

PROGRAMMING CHANGES REQUIRING RECALIBRATION	RECEIVER CALIBRATION REQUIRED?	ISLAND CALIBRATION REQUIRED?
PSO Module Frequency Changed	Yes[1] – including receiver threshold	No
Island Frequency Changed	No	Yes[2]
Transmit Level Changed From: Low to High Or High to Low	Yes	No
Approach Length Changed	Yes – including receiver threshold	No
Island Length Changed	No	Yes
PSO Module Software Changed	No[3],[4]	No[3],[4]
Other Module Software changed	No	No
PSO Module moved to a different slot in the chassis	Yes[5] – including receiver threshold	Yes[5]
PSO Module replaced in chassis	Yes[5] – including receiver threshold	Yes[5]
GCE Programming set to default	Yes[6] – including receiver threshold	Yes[6]
MCF Changed	Yes[6] – including receiver threshold	Yes[6]

[1] If the PSO receiver frequency is changed the PSO receiver status will automatically revert to a restrictive state and will the text 1CAL (or 2CAL) on its 4-character display, the Display module will also indicate that receiver calibration is required on its system status screen and Diagnostic view.

[2] If the island frequency is changed the Island status will automatically to a restrictive state and the module will show the text ICAL on its 4-character display, the Display module will also indicate that receiver calibration is required on its system status screen and Diagnostic view.

[3] In general, the PSO and Island calibration is not required when the software is updated. However, in some cases due to the nature of the change, it may be necessary to force a recalibration. The module will automatically detect whether calibration is required and display diagnostic data as per notes [1] and [2].

[4] Calibration may be required for a specific software update as detailed in the Product Release Bulletin (PRN) associated with the new software.

[5] The PSO Module will detect that it is not in the slot or chassis that it was calibrated for and automatically detect calibration is required and display diagnostic data as per notes [1] and [2].

[6] When the programming is set to default or a new MCF is loaded, the PSO and island frequencies will revert to Not Set, this will cause the PSO module to report that calibration is required. If the PSO or Island frequency is then set and the value is the same as that which was previously programmed into the module for this receiver or island, then it will stop reporting that calibration is required. It is up to the user to remember to calibrate it. If the new frequency is different from the old one, the module will report calibration is required.

6.3.2 Recalibration/Reprogramming Requirements Due to Track Equipment Changes

Table 6-3 indicates the recalibration required when any changes are made to the existing track equipment. For example, when an existing Tuned Insulated Joint Coupler, 7A422-f in an installation is replaced or moved to a different location, the receiver must be recalibrated, but not the island.

⚠ WARNING

WARNING

FAILURE TO RECALIBRATE OR RESET THE RECEIVER THRESHOLD CAN RESULT IN IMPROPER SYSTEM OPERATION.

Table 6-3 Recalibration/Reprogramming Requirements Due to Track Equipment Changes

TRACK EQUIPMENT CHANGES REQUIRING RECALIBRATION	RECEIVER CALIBRATION REQUIRED?	ISLAND CALIBRATION REQUIRED?
Termination Shunts of Other Frequencies Added, Removed From, or Moved Within GCE Approach(es)	Yes – including receiver threshold	No
Wideband Insulated Joint Coupler (8A076) Replaced in GCE Approach(es)	Yes – including receiver threshold	No
Tuned Insulated Joint Couplers (7A422-f) Replaced in GCE Approach(es)	Yes – including receiver threshold	No
GCE Track Wire(s) Replaced	Yes – including receiver threshold	Yes

6.4 GCP5000 (GCE) Operational Checks

Before placing a system in service, tests must be performed to verify proper system operation and I/O wiring. Proceed to the next step if a feature is not used.

⚠ WARNING

WARNING

AFTER INITIAL PROGRAMMING OR PROGRAMMING CHANGES, TESTS MUST BE PERFORMED TO VERIFY THE PROPER OPERATION OF THE GCP PRIOR TO PLACING THE SYSTEM IN SERVICE.

⚠ WARNING

WARNING

AFTER PROGRAM CHANGES, CHECK:

THAT THE OCCN MATCHES THAT ON THE REVISED SITE PLANS.

THE CONFIGURATION SHOWN IN THE CONFIGURATION REPORT MATCHES THE REVISED SITE PLANS.

The GCE can be set up so that the SEAR can send an alarm when an OCCN-protected parameter is changed. This will help detect any erroneous or unauthorized changes. This is option is set in the CDL logic for the SEAR IIi.

6.4.1 SSCC IIIi Test Mode

⚠ WARNING

WARNING
THE SSCC TEST MODE WILL NOT PREEMPT TRAFFIC SIGNALS. VERIFY THAT VEHICLES ARE CLEAR OF THE WARNING DEVICES BEFORE ACTIVATING THE SIGNALS.

NOTE

NOTE

While in Test Mode, if a train approaches (XR input logic de-energizes), the test is canceled and the crossing activates normally. When the train departs, the system remains in normal operation.

Step 1	From the System View menu, select the number that appears to the left of the SSCC line at the bottom of the screen (System View > SSCC > SSCC Test). • The SSCC Menu appears
Step 2	Select **2) SSCC Test** • The SSCC/SL8 window appears

The operation of each Solid State Crossing Controller (SSCC IIIi) can be tested from this window.

Select the Crossing controller using the right or left arrow to scroll to either

- Slot 8 SSCC IIIi
- Slot 9 SSCC IIIi

The SSCC/SL8 Menu appears with the Select Test field highlighted. When the Enter button is selected, the SSCC Test menu opens

6.4.1.1 SSCC Test Menu

The following SSCC tests may be performed:

- Bell: Turn on the bell output
- Lamp 1: Turn on Lamp 1 output
- Lamp 2: Turn on Lamp 2 output
- Flash the Lamps: Test the lamp outputs on both controllers
- Test the crossing: Flash the lights, ring the bell, run the gate delay, and then drop the gate.
- Perform a Timed Test
- Perform a Repeat Test
- See Section 3.1.2.2.2 for details on how to select these from the Display.

6.4.1.2 Types of Tests

Timed Tests: When the Timed Test is started, the GCP performs the following sequence:

- Pauses for the programmed Lamp Test Delay time
- Flashes the lamps for the programmed Lamp Test On-time
- Turns the lamps off
- Stops the test.

Repeat Tests: When the Repeat Test is started, the GCP performs the following sequence:

- Pauses for the programmed Lamp Test Delay time
- Flashes the lamps for the programmed Lamp Test On-time
- Turns the lamps off three times the programmed Lamp Test Delay Time
- Flashes the lamps for the programmed Lamp Test On-time
- Turns the lamps off
- Stops the test.

6.4.1.3 Parameters for Timed Tests

Parameters for each SSCC timed test are set in the fields below the Select Test: field.

The Lamp Test On field designates the duration of the Lamp On test.

Select the **Enter** button to the right of the field to open the Lamp Test On (sec) dialog box. This Lamp Test On (sec) dialog box allows the test duration timer to be modified.

- Default value: 15 sec
- Valid entry range: 15 to 60 seconds

The Lamp Test Delay field designates the time between test selection and test start. Select the **Enter** button to the right of the field to open the Lamp Test Delay (sec) dialog box. This Lamp Test Delay (sec) dialog box allows the Lamp Test Delay timer to be modified.

- Default value: 30 sec
- Valid entry range: 30 to 120 seconds

The Lamp Test Cancel field designates the automatic test termination time following test initiation. Select the **Enter** button to the right of the field to open the Lamp Test Cancel (min) dialog box. The Lamp Test Cancel (min) dialog box allows the Lamp Test Cancel timer to be modified.

- Default value: 5 min
- Valid entry range: 1 to 15 minutes

6.4.1.4 Test Status Indications

The status of the SSCC IIIi module appears in the gate display field at the bottom of the window during tests.

Four status notations appear during operational tests:

- **Off** indicates that the SSCC IIIi lamp drive outputs are off.
- **Ringing** indicates that the SSCC IIIi module bell output is energized.

- **Flashing** indicates that the SSCC IIIi module lamp outputs are alternately energizing (flashing).
- **Failed** indicates that a bell, lamp, or crossing gate output failure has been detected.

6.4.2 GCP5000 (GCE) Operational Test Mode

Before placing a system in service, tests must be performed to verify proper system operation and I/O wiring. Proceed to the next step if a feature is not used.

⚠ WARNING

WARNING
AFTER INITIAL PROGRAMMING OR SUBSEQUENT PROGRAMMING, MODULE, TRACK, OR WIRING CHANGES, TESTS MUST BE PERFORMED TO VERIFY THE PROPER OPERATION OF THE GCE PRIOR TO PLACING THE SYSTEM IN SERVICE.

⚠ WARNING

WARNING
ANY TIME THE TRAIN IS MOVING WITHIN THE APPROACH LIMITS, TRACK DISCONTINUITY CAUSED BY A HIGH RESISTANCE BOND OR A DEFECTIVE COUPLER IS INDICATED. LOCATE AND CORRECT THE PROBLEM IMMEDIATELY.

THE RAILROAD PROCEDURES GOVERNING HOW TO TAKE A TRACK CIRCUIT OUT OF SERVICE SHALL BE FOLLOWED ONLY IF ALLOWED BY THE RAILROAD

Table 6-4 GCP5000 (GCE) Operational Tests

Step 1	Check PSO for: Open receive wire Crossing activates
Step 2	PSO Enables & AND 1 Enable input(s), if these features are used: Crossing activates when each PSO Enable input or AND 1 Enable input (controlling the crossing) is de-energized or opened from the far end of the circuit. Pickup Delay time is correct when input closes.
Step 3	“Vital Comms” operation using Spread Spectrum Radio or Ethernet link, if these features are used: Expected behavior occurs when Vital Comms message bits are de-energized
Step 4	Wrap logic, if this feature is used: Wrap logic WRP is displayed on the Main status screen for each corresponding wrapped track (when Wrap inputs are energized as seen on the system I/O view). WRP is removed from the corresponding track on Main status screen when: Corresponding PSO with wrap is shunted or Corresponding wrap input is de-energized Measure Wrap pick-up delay from the time the wrap input is energized until the WRP is displayed on corresponding PSO status screen. Verify the Pickup Delay time (minimum of 5 seconds).
Step 5	Traffic Signal Preemption, if this feature is used: The preempt output de-energizes: If using Simultaneous Preemption: When the PSO receiver is occupied the crossing activates. If using Advance Preemption: When the PSO receiver is occupied the crossing activates after the programmed advance preemption delay. . When used, Advance Preempt IP input open causes Advance Preempt Output to de-energize and activates the warning devices after the Advance Preempt Delay Timer times out. (Observe input on I/O view). When used, Preemption Health IP input open activates warning devices immediately (without advance preempt Delay time interval). (Observe input on I/O view). When used, Traffic Signal Health open initiates simultaneous preemption, rather than advance preemption, upon train detection.

Step 7	Island detection: When used, observe the Island symbol on tracks on the Main Status display. Place a 0.06 ohm or 0.2 ohm shunt (per railroad or agency requirements) on island track wires Island show OCC Observe the Island LED on the PSO module as the shunt is removed and while Island Pickup Delay is timing Island LED is flashing: After the island pickup delay time expires, the island LED on the PSO module is illuminated steady. The Island symbol on the Display shows CLR, and warning devices are deactivated.

Finishing Step 8 completes the GCP5000 (GCE) operational checks/tests. Proceed to SSCC IIIi Operational Tests for SSCC calibration and operational checks/tests.

6.4.2.1 SSCC IIIi Operational Tests

After the system has been programmed, GCP calibrated and the lamp voltages have been adjusted, tests must be performed to verify the operation of the SSCC before placing the system in service. In addition to the operational tests required by the maintaining railroad, the SSCC operation should be further tested and verified as described in the SSCC Operational Tests procedure.

⚠ WARNING

WARNING
AFTER INITIAL PROGRAMMING OR SUBSEQUENT PROGRAMMING, MODULE, TRACK, OR WIRING CHANGES, TESTS MUST BE PERFORMED TO VERIFY PROPER OPERATION OF THE SSCC IIIi PRIOR TO PLACING THE SYSTEM IN SERVICE.

NOTE

NOTE

While in Test Mode, if a train approaches (XR input logic de-energizes,) the test is canceled and the crossing activates normally. When the train departs, the system remains in normal operation.

If advance preemption is used, the preemption output and warning devices will operate as follows for the indicated method of activation:

- For a train move:
  Preemption Output de-energizes at the preempt warning time.
  Activation of the warning devices will be delayed until the Advance Preempt Timer times out.
- Advance Preempt Input de-energized:
  Preemption Output de-energizes
  Activation of the warning devices will be delayed until the Advance Preempt Timer times out.
- AND 1 Enable Input de-energized:
  Preemption Output de-energizes
  Activation of the warning devices occurs simultaneously (no advance preempt time).

- “Test the Crossing” Test Mode;
  Preemption Output de-energizes
- Activation of the warning devices occurs simultaneously (no advance preempt time).

Table 6-5 SSCC Operational Tests

Step 1	Verify that the light/gate battery is charged.
Step 2	Verify that all connectors on the SSCC have been properly positioned, seated, and secured.
Step 3	Verify that all the electrical connections in the Bell, Lamp, and Gate circuits are properly assembled, tightened, and secured.
Step 4	Verify that all flashing lamps light and none are burned out.
Step 5	Verify that all lights have been aligned.
Step 6	Verify that the gates are properly adjusted and operational.
Step 7	Verify that the bells are operational.
Step 8	Verify that all SSCC programming is correct (program and configure menus).
Step 9	Verify that all lamp voltages have been set.
Step 10	Momentarily turn on the flashers from the Test menu and verify that the battery charger is operational and providing current to the lamps and battery.
Step 11	Verify that the gate delay time is correct.
Step 12	Verify that the lights continue to flash while the gates are rising.

6.4.2.2 Lamp Calibration of iLOD

The lamp calibration process for an iLOD sets the internal threshold levels used by the iLOD software to detect flashing lamp current. These levels are site-specific. It also is used by the application program to determine the number of lamps and the current draw that is present for a properly operating crossing. This process is not the same as factory calibration. Factory calibration is performed on the iLOD units before shipment.

NOTE

NOTE

All key presses in the following procedure are done from the front panel keypad on the GCP5000 Display module.

1. To access Lamp Calibration, select: **Program View > 3) SEAR Programming > 9) SEAR Setup 2) Lamp Calibration** on the Display module, OR access the WebUI (see preceding iLOD installation procedure) and select **System View > SEAR > Lamp Calibration**.

2. If there is an application program loaded into the SEAR, enter the number of flashing lamps for each iLOD sensor when requested

NOTE

NOTE

If the site has Gate Tip Sensors installed, when asked to flash the lamps, make sure the gates are level before pressing **Enter**. The current reading is allowed to “settle” for 15 seconds.

3. Depending on the configuration of the crossing, it may be necessary to repeat this process with AC power to the crossing turned off. At some installations, the process may be repeated more times depending on configuration (split tracks, etc.).

NOTE

NOTE

A pair of flashing lamps count as one lamp and each tip light counts as one flashing lamp. Count only the lamps that go through that sensor. The lamp count may be on the site plans.

4. When the process is complete, the Display Module will return to the SEAR Program Menu.

6.4.2.3 SEAR IIi Setup

Review the program in the GCP5000 (GCE) by using the left or right arrows on the Display module and scrolling to the Program View screen, then scrolling down to or selecting **3) SEAR Programming** menu.

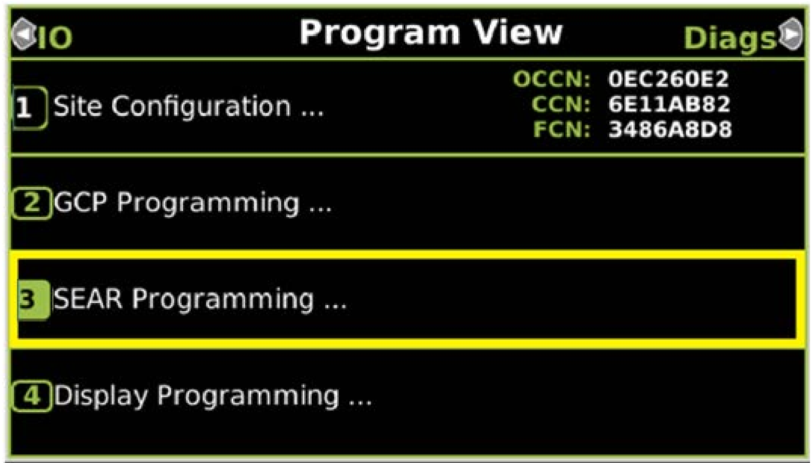


Figure 6-14 Program View – SEAR Programming

NOTE

NOTE

The Control Descriptor Language (CDL) used to customize the SEAR's operation, settings, and behavior can differ between railroads.

Refer to the specific SEAR IIi Configuration Summary document for details of application CDL program, LEDs, and Alarms. The ATCS address must be entered prior to the SEAR IIi communicating with the CPU Module.

Prior to beginning the SEAR IIi setup procedure, have circuit plans showing the SEAR IIi setup page available for reference.

Site Setup must be run in its entirety. Setup may be accomplished either using the Display module or the WebUI.

The first nine (9) parameters, appearing on the first page of the SEAR Program Menu, are as follows:

0) Menu
1) Application(CDL)
2) Digital Inputs
3) Analog Inputs
4) Non-Vital Outputs
5) Echelon Modules
6) Communication
7) Serial Ports
8) Set to Defaults
9) SEAR Setup

Select **1) Application(CDL) > 1) CDL Setup**. Step through the first group of parameters of SEAR Programming by answering each question as indicated by the SEAR Program Menu setup page in the crossing's circuit plans.

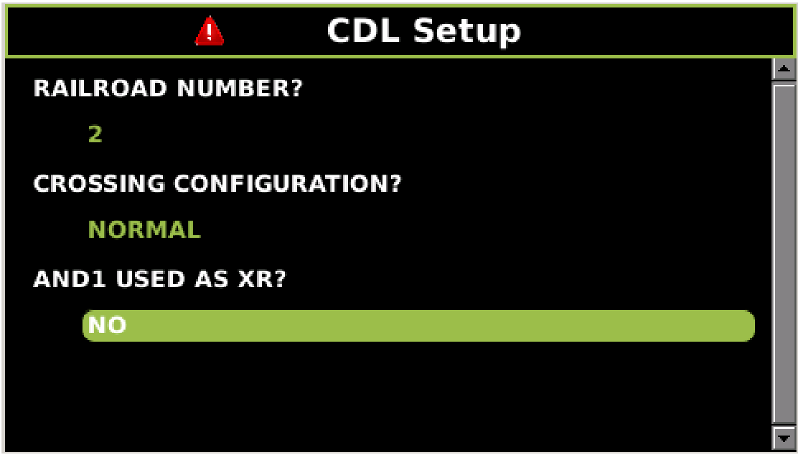


Figure 6-15 CDL Setup Screen

6.4.2.4 SEAR IIi Operation

Now that site setup is complete, peripheral devices, as well as items onboard the SEAR IIi will be checked for proper operation. This ensures that the SEAR IIi is receiving all the information it needs for proper alarming and execution of the SEAR Application Program. All items in this section can be done through similar menus on the GCP5000 (GCE) WebUI.

All peripheral equipment on the Echelon® network will need to be checked for good communication with the SEAR IIi. All of those modules can be checked on one screen by scrolling to **IO & Logic View > 4) SEAR**. This opens the SEAR I/O submenus. The submenus are displayed in the following order when the right arrow is pressed:

- Digital Inputs 1..16 (includes iLOD and VHF)
- Digital Inputs 17..32
- Digital Inputs 33..48
- Digital Inputs 49..63
- Analog Input
- Digital Outputs
- LEDs
- MTSS (If installed, otherwise message "No MTSS Data Found in Database!!" appears)
- GFT (If installed, otherwise message "No GFT Data Found in Database" appears)
- SEAR Module Status

The type of module will be shown on the left and the communication status will be on the right. The status of each module should be "GOOD."

6.4.2.5 Verify Operation of MTSS/Gate Tip/Bell Sensor

The MTSS can be monitored via the following path: **IO & Logic View > 4) SEAR** then scroll to the left twice (or right seven times) as per the bulleted menu list in the preceding section. If the input shows STUCK LOW, then the data wire between the MTSS and SEAR IIi is open and will need to be repaired.

If the data connection is good, the following would be displayed for TSS1:

- TSS1: U=1 D=0 T=0 A=0 P=0
    - U=Gate Up
    - D=Gate Down
    - T=Gate Tip Sensor
    - A=Bell Audio
    - P=Bell Power

NOTE

NOTE

These items can be either 1 or 0. In the example, U=1 so the gate up contact is energized. The other items are all de-energized. Dropping the gates to horizontal will activate the tip sensors and de-energize the gate up contact, changing the MTSS data to U=0 and T=1. Activating the bell will check the bell sensor; A & P should both equal 1 when the bell is on.

6.4.2.6 Verify Operation of Ground Fault Testers (GFTs)

All LEDs on the GFT units should be on steady. If the BAT 1 Fault or BAT 2 Fault LEDs are slow-flashing then they have detected a ground condition.

The GFT can be monitored at **IO & Logic View > 4) SEAR** and then press the left arrow keys once to display the GFT input. If the input shows STUCK LOW, that indicates the data wire between the GFT and SEAR IIi is open and will need to be repaired

If the data connection is good, the following would be displayed for GFT1

- GFT1: HL=G MD=N B1=0 B2=0.
- HL=G indicates that the GFT health is good.
- MD=N indicates that test mode=no.
- B1 & B2 = 0 shows that there are no ground faults on BAT 1 or BAT 2.

A ground can be simulated on those inputs by running a wire from the ground input of the GFT to each BAT input, one at a time. The state of each BAT input will change to ‘1’ if a ground is present.

The SEAR IIi relays must function properly in order to run automated inspection tests. These outputs are most easily tested using the SEAR menu on the GCP5000 (GCE) Display module.

- Verify SEAR IIi relays:

  Go to MENU>DIAG/MONITOR>RELAYS>GndFltTest and press ENTER.

  Then press ‘1’ to energize the relay output. Both Ground Fault Testers’ BAT FAULT LEDs should be flashing.

Now press ‘0’ to de-energize the relay. The LEDs should go on steady.

Press EXIT and then ENTER to get back into the RELAYS menu.

Select AC Control. Press ‘1’ to energize the relay output. AC power to the chargers should go off, or Press ‘0’ to de-energize the relay and be sure that AC power to the chargers is restored.

Press “exit” until the date/time main screen is visible.

6.4.2.7 Verify Operation of iLOD

Once good communication is verified, further checks of the iLOD can verify that it is seeing normal amperage/flash rates.

To view these values in real-time, select **IO & Logic View > 4) SEAR** and then scroll to choose the iLOD unit to view. It is under SEAR I/O > Digital Inputs 1..16

On that screen both sensors are shown, the first iLOD unit will show EB1, EN1. When the lamps are flashed, both sensors should display that the lamps are on, the amperage reading, and the flash rate in flashes per minute.

These values are shown in real-time; they should be steady and not fluctuate. If the value fluctuates, the lighting circuit will need to be checked for intermittent operation

NOTE

NOTE

iLODs must have been installed in the network and field-calibrated before verifying operation.

6.4.2.8 SEAR IIi Communication

Testing communications to the office can be accomplished using a menu function to generate a test alarm and by creating events that generate alarms. Before testing the SEAR IIi by sending alarms to the office, the unit must be configured for communications in the Site Setup. Once a SEAR IIi is configured through Site Setup and communication is established, the location will register itself with the WAMS office.

Test Communications with SEAR option on the Display module menu.

- Access the WAMS Test Message via Diags & Reports > 2) SEAR > 3) WAMS Test Message.

Once you select WAMS Test Message, it will automatically start the process.

Under **Status,** it will display the message “In Progress” until the process is complete, either with a successful test, or when the system times out.

Enter the ATCS address of the other crossing.

- To send a test packet to the WAMS office:

Press 5

Enter railroad-specific office address.

Refer to circuit plans for office address.

Typically, the office ATCS address is 2.RRR.00.0000, where RRR is the ATCS number assigned to the railroad

6.4.2.9 SEAR IIi Alarms

Alarm Generation is the final step in checking out the SEAR IIi/WAMS interface. The following procedure tests the wiring of the various components in the SEAR/ WAMS sub-system.

Ground Fault Alarm

- A ground fault can be simulated on those inputs by running a wire from the ground input of the GFT to each BAT input, one at a time.
- Each Battery's LED will flash when a ground fault is detected and a "Ground Fault Detected on xxx" alarm will be generated where xxx represents the Battery name.

Ground Fault Clear

- Removing the wire that simulates the ground will generate a Ground Fault Cleared message.

Analyzer Failure Alarm

- Remove the connector that powers the GFT or that MTSS unit inside the gate mechanism. Doing so on either unit will cause an "Analyzer Failure" alarm.

Analyzer Normal

- Restoring the connector will generate an Analyzer Normal message.

⚠ WARNING	**WARNING** **TAKE ALTERNATE MEANS TO WARN VEHICULAR TRAFFIC, PEDESTRIANS, AND EMPLOYEES. REMOVAL OF A SSCC IIIi WILL CAUSE GATES TO DESCEND IMMEDIATELY (WITHOUT GATE DELAY), HOWEVER, THE LIGHTS WILL NOT ACTIVATE.**

Crossing Controller Failure Alarm

- Temporarily remove an SSCC IIIi to generate a Crossing Controller Failure alarm
- Restore SSCC IIIi for a Crossing Controller Normal message.

False Detection Alarm

- Activate the crossing using a test switch (or other method shown on plans) allowing the gates to drop and then cancel the activation.
- After 30 minutes a False Detection alarm will be generated.
- If a normal train move occurs before the 30 minutes, a Pre-Ring alarm will be generated.

AC Power Off For 20 Minutes Alarm

- Turn off AC power for at least 20 minutes and this alarm will be generated.
- AC Power Back On
- Restore power and wait at least 1 minute.

This completes the SEAR IIi operational tests.

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SECTION 7
AUXILIARY EQUIPMENT

7 AUXILIARY EQUIPMENT

7.1 General

The equipment described in the following paragraphs may be used with the GCP5000 GCE. Refer to Section 2 for application diagrams illustrating the use of these items.

CAUTION

CAUTION

THE DEVICES DESCRIBED HERE MUST BE MOUNTED IN WEATHERPROOF ENCLOSURES UNLESS STATED OTHERWISE.

Table 7-1 PSO Only Application Auxiliary Equipment

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7.2 Battery Chokes and Filters

⚠ WARNING

WARNING

WHERE GCPS OR MOTION SENSORS ARE INSTALLED WITH THE GCP5000 (GCE), THE 7A360 CHOKE MUST NOT BE USED. INSTEAD, USE THE 8A065A OR 62648 CHOKES (8A065A MUST BE USED WITHIN MODEL 300 OR 400 GCP APPROACHES).

PSO Battery Choke, 7A360, (see Figure 7-1) connects in series to the rail of any track battery within the track circuit. Suitable substitutions for the PSO Battery Choke, 7A360 are the Battery Choke, 62648, and Battery Choke, 8A065A (see Figure 7-2).

Each of the battery chokes consists of a large inductor and a set of AREMA binding posts on a mounting base (see Figure 7-1 and Figure 7-2 for mounting dimensions).

7.2.1 Mounting Dimensions

7.2.1.1 PSO Battery Choke, 7A360

Mounting Dimensions for the PSO Battery Choke, 7A360 are as follows:

Dimensions:

5.0 inches (12.70 centimeters) wide

5.5 inches (13.97 centimeters) deep

3.4 inches (8.64 centimeters) high

Weight:

6 pounds, 8 ounces (2.95 kilograms) (approximate)

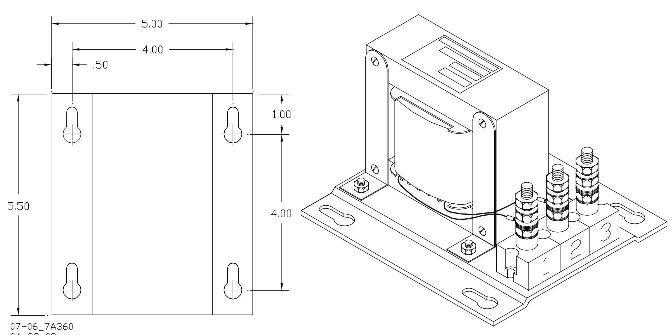

Figure 7-1 PSO Battery Choke, 7A360 With Mounting Dimensions

7.2.1.2 Battery Choke 62648 and Battery Choke 8A065A

Mounting Dimensions for the Battery Choke, 62648 and Battery Choke, 8A065A are as follows:

Dimensions:

4.5 inches (11.43 centimeters) wide

5.0 inches (12.70 centimeters) deep

8.5 inches (21.59 centimeters) high (to top of terminal studs)

Weight:

17 pounds (7.72 kilograms) (approximate)

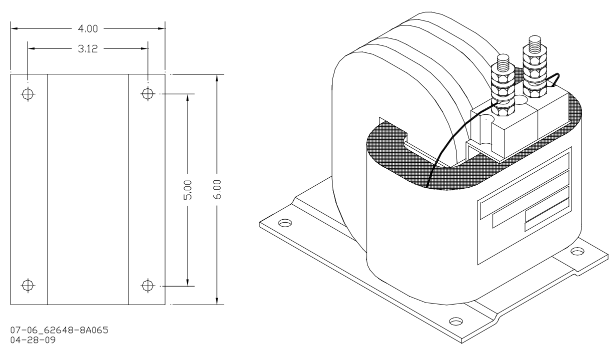

Figure 7-2 Battery Choke, 62648 & Battery Choke, 8A065A with Mounting Dimensions

7.2.2 Application Installation, 7A360, 62648 & 8A065A

Application installation of a Battery Choke is as depicted in Figure 7-3.

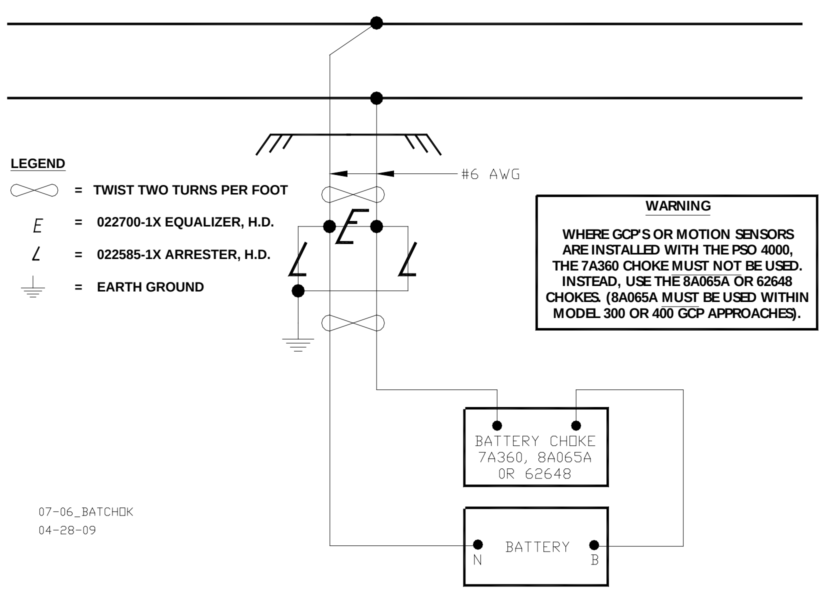

Figure 7-3 Typical Battery Chokes 8A065A, 62648, or PSO Battery Choke, 7A360 Application Installation

7.2.3 PSO Battery Line Filter, 7A418

7.2.3.1 Equipment Description, 7A418

The PSO Battery Line Filter, 7A418 assembly consists of a large choke coil, a capacitor, and a set of AREMA binding posts on a mounting base.

7.2.3.2 Mounting Dimensions, 7A418

Mounting Dimensions for the 7A418 Battery Line Filter assembly are as follows:

Dimensions:

5.0 inches (12.70 centimeters) wide

9.0 inches (22.86 centimeters) deep

3.75 inches (9.53 centimeters) high

Weight:

7 pounds, 2 ounces (3.23 kilograms) (approximate)

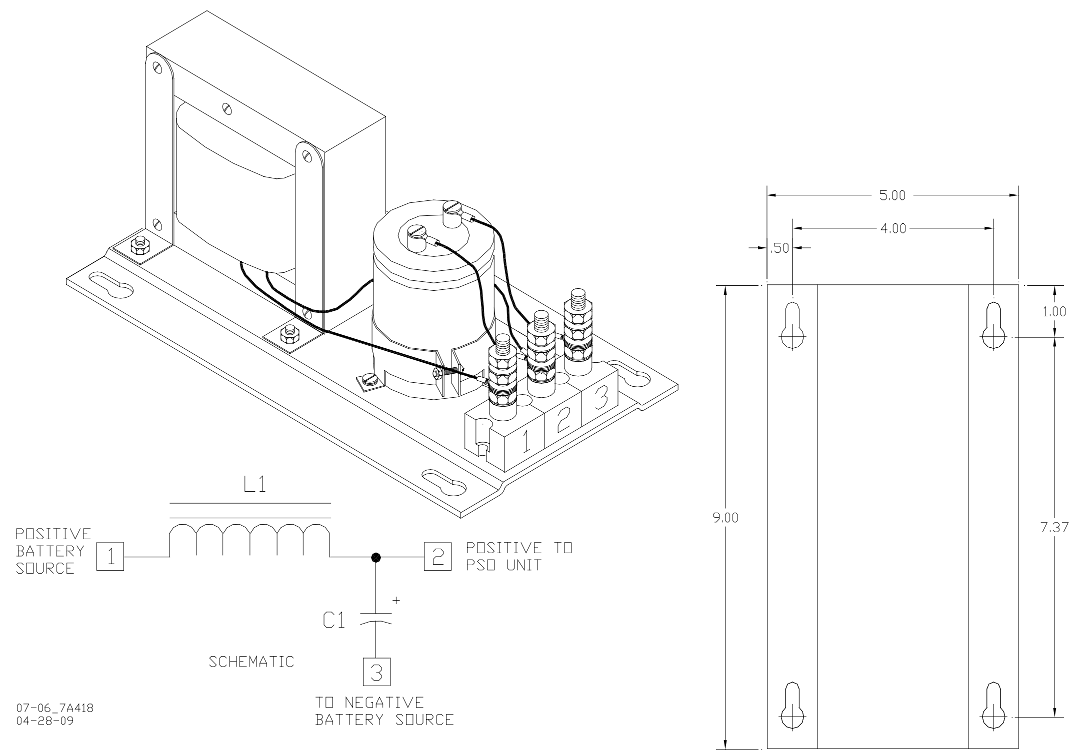

Figure 7-4 PSO Battery Line Filter, 7A418, With Mounting Dimensions

7.2.3.3 Application Installation, 7A418

PSO Battery Line Filter, 7A418, is recommended for use in providing decoupling between the battery and those standalone PSO Assemblies utilizing the same frequency.

In track circuits where the transmitters and receivers are powered from the same battery, install the filter between the battery and each transmitter and the battery and each receiver of the same frequency (see the following examples).

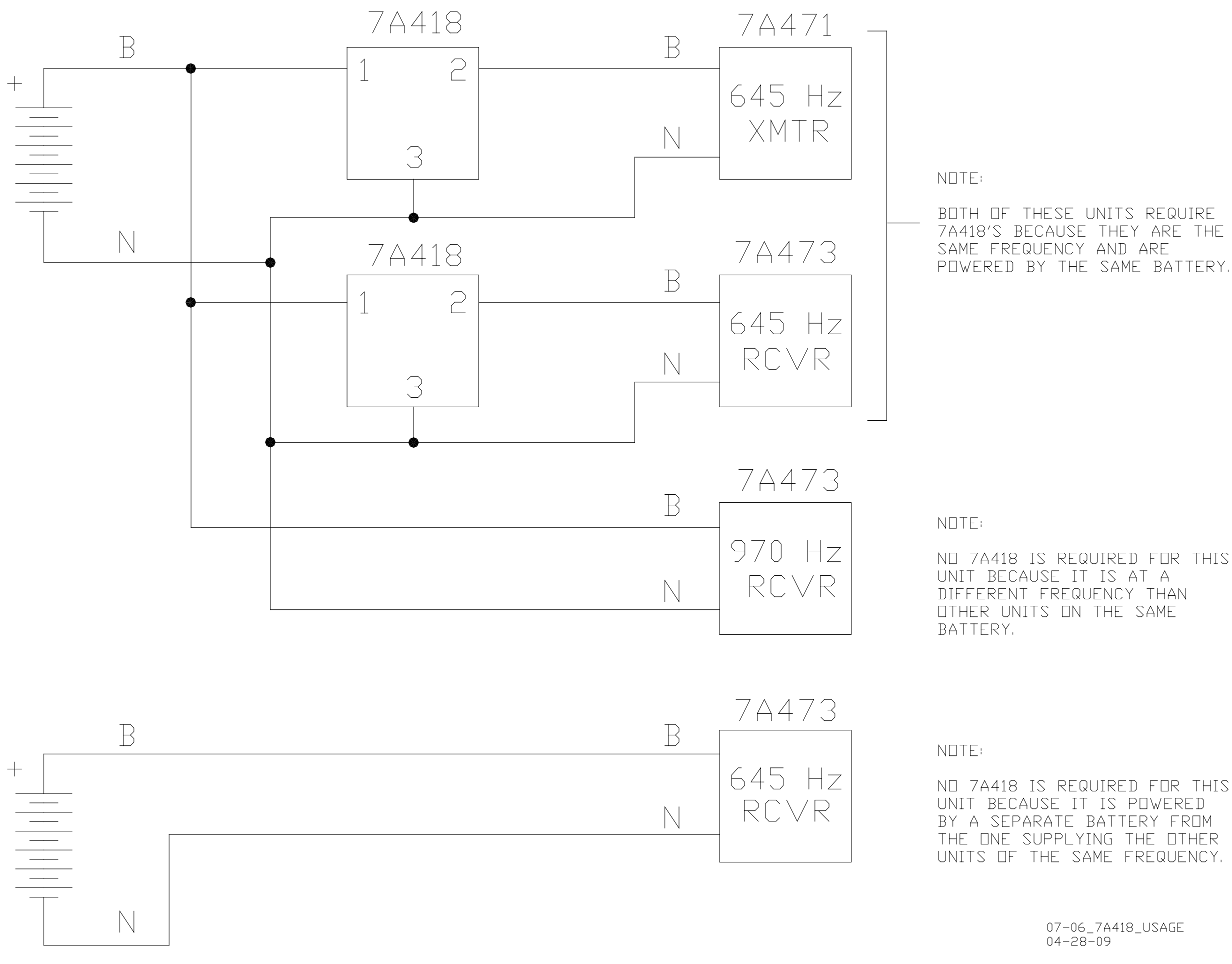

Figure 7-5 Battery Line Filter Usage Guidelines

7.3 PSO Couplers

NOTE

> **NOTE**
>
> PSO Couplers (7A355-f, 7A366-f, 7A377-X-f, & 7A399-f) are available for use for the 16 standard GCE carrier frequencies, as well as for the 31 common frequencies typically used by non-Siemens equipment.

7.3.1 Tuned Receiver Coupler, 7A355-f

7.3.1.1 Equipment Description, 7A355-f

The Tuned Receiver Coupler, 7A355-f couples the phase shift overlay signal from the track to the receiver. The 7A355-f coupler provides a low (approximately 1 ohm) impedance to the receiver from the track. However, the coupler does not shunt other signals from the track since a low impedance is produced only at the specified frequency. The coupler must always be of the same frequency as that set on the GCE transmitter and receiver.

The coupler assembly consists of a tubular PVC plastic enclosure with mounting brackets at the base. There are four AREMA binding posts on the top of the assembly that provide connections to the circuits housed within the sealed unit (see Figure 7-6).

7.3.1.2 Mounting Dimensions, 7A355-f

Mounting Dimensions for the Tuned Receiver Coupler, 7A355:

Dimensions:

3.50 inches (8.89 centimeters) in diameter

7.75 inches (19.69 centimeters) high (to top of AREMA binding posts)

Weight:

3.5 pounds (1.59 *kilograms)* approximate

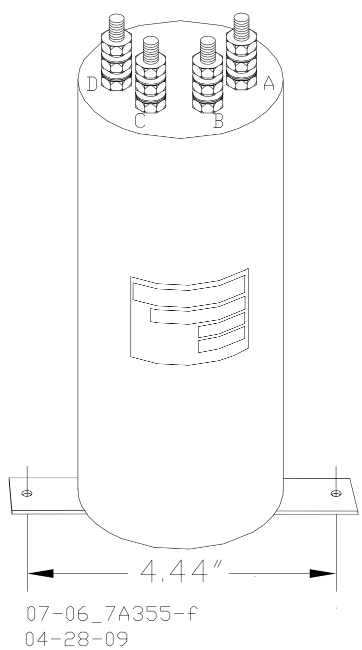

Figure 7-6 Tuned Receiver Coupler, 7A355-f

7.3.1.3 Application Installation, 7A355-f

See Figure 7-6 for Tuned Receiver Coupler, 7A355-f application installation drawings. The coupler terminals are connected as follows:

Terminals A & B connect to the wire leads that are connected to the shelter surge equipment terminals which are in turn connected to the appropriate gauge twisted pair track leads that connect to the rails.

Terminals C & D connect to the wire leads connected to “RX –“ and “RX +” on the GCE Lower 10-pin Connector

Twisted pair track wires running from the shelter surge equipment that is connected to the Tuned Receiver Coupler, 7A355-f to the rails via may be #9 AWG for distances of up to 100 ft. (30.5 m). For distances between 100 – 300 ft. (30.5 – 91.4 m) in length, track wires should be #6 AWG.

For distances greater than 300 ft. (30.52 m) but less than 2000 ft. (609.6 m), the Tuned Receiver Coupler, 7A355-f should be replaced by the Line to Receiver Coupler, 7A388. The 7A388 should be used in conjunction with either the Receiver Line to Rail Coupler, 7A377-1-f, or the Receiver Line to Rail Coupler, 7A377-2-f (see paragraphs 7.3.4.1 and 7.3.4.4, respectively).

7.3.2 Tuned Receiver Coupler, Hi Z, 7A366-f

7.3.2.1 Equipment Description, 7A366-f

NOTE

NOTE

Maximum track distances will be reduced by at least 30% in applications using the Tuned Receiver Coupler, Hi Z, 7A366-f.

The Tuned Receiver Coupler, Hi Z, 7A366-f couples the phase shift overlay signal from the track to the receiver. The 7A366-f coupler provides an input impedance of 5 ohms, enabling other receivers on the track to be operated from the same transmitter. The coupler must always be of the same frequency as that set on the GCE transmitter and receivers.

The coupler assembly consists of a tubular PVC plastic enclosure with mounting brackets at the base. There are four AREMA binding posts on the top of the assembly that provide connections to the circuits housed within the sealed unit (see Figure 7-7).

7.3.2.2 Mounting Dimensions, 7A366-f

Mounting Dimensions for the Tuned Receiver Coupler, Hi Z, 7A366:

Dimensions:

3.50 inches (8.89 centimeters) in diameter

7.75 inches (19.69 centimeters) high (to top of AREMA binding posts)

Weight:

3.5 pounds (1.59 kilograms) approximate

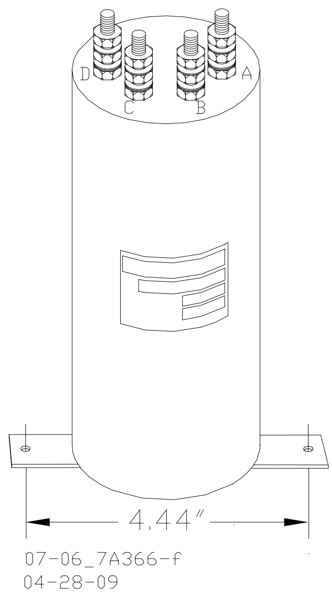

Figure 7-7 Tuned Receiver Coupler, Hi Z, 7A366-f

7.3.2.3 Application Installation, 7A366-f

See Figure 7-8, for Tuned Receiver Coupler, Hi Z, 7A366-f application installation drawings. The coupler terminals are connected as follows:

Terminals A & B connect to the wire leads that are connected to the shelter surge equipment terminals which are in turn connected to the appropriate gauge twisted pair track leads that connect to the rails.

Terminals C & D connect to the wire leads connected to “RX –“ and “RX +” on the GCE Lower 10-pin Connector

There must be a minimum of 500 ft. (152.4 m) separating the track connections of the Tuned Receiver Coupler, Hi Z, 7A366-f from the track connections of the GCE Transmitter, 7A471.

Track wires connecting the Tuned Receiver Coupler, Hi Z, 7A366-f to the rails may be #9 AWG for distances between the coupler and the track of up to 100 ft. (30.5 m). When the distances are between 100 – 300 ft. (30.5 – 91.4 m) in length, track wires should be #6 AWG.

For distances greater than 300 ft. (30.52 m) but less than 2000 ft. (609.6 m), the Tuned Receiver Coupler, Hi Z, 7A366-f should be replaced by the Line to Receiver Coupler, 7A388. The 7A388 should be used in conjunction with either the Receiver Line to Rail Coupler, 7A377-1-f, or the Receiver Line to Rail Coupler, 7A377-2-f (see paragraphs 7.3.4.1 and 7.3.4.4, respectively).

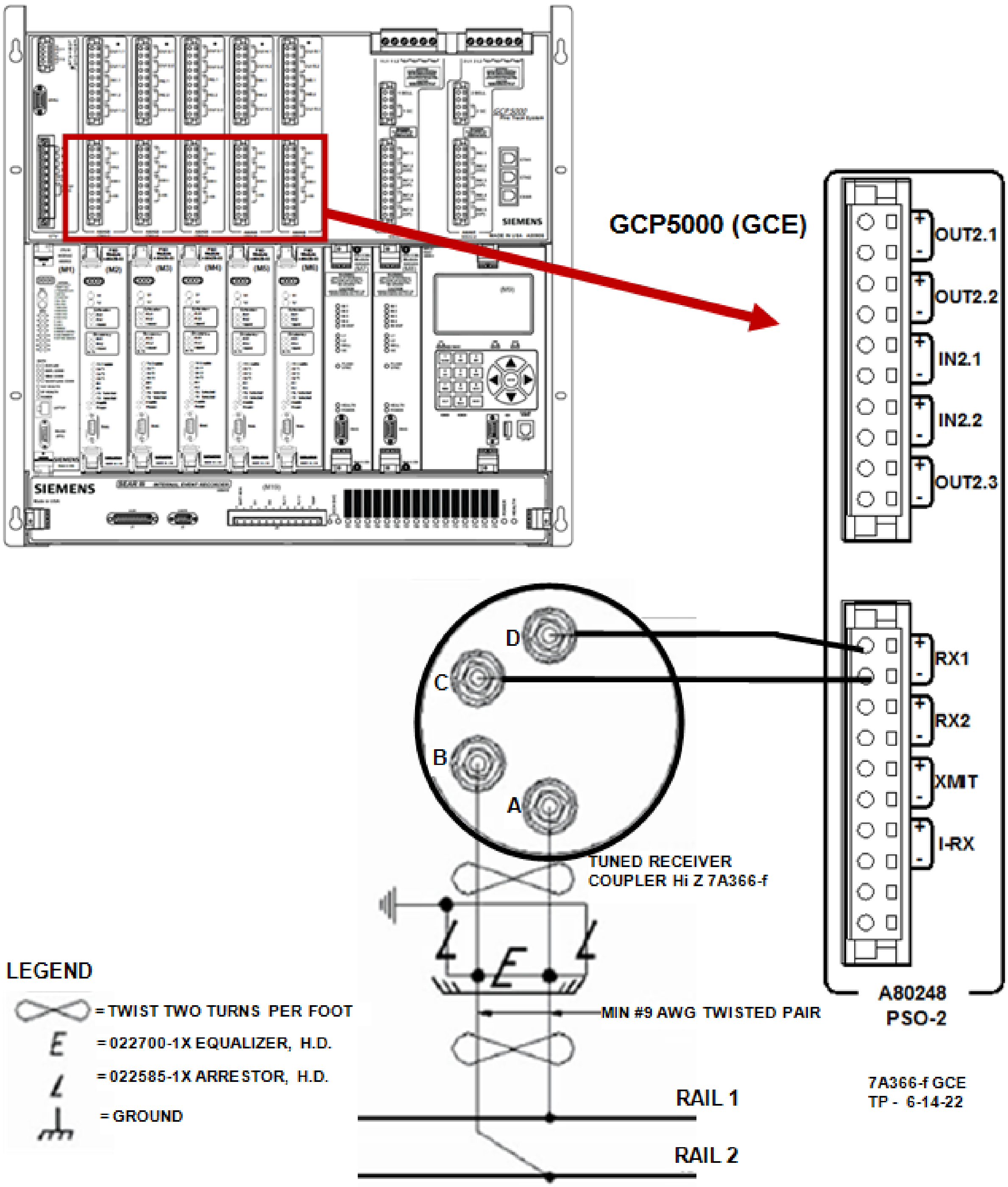

Figure 7-8 7A366-f Tuned Receiver Coupler Installation Example

7.3.3 Line to Receiver Coupler, 7A388

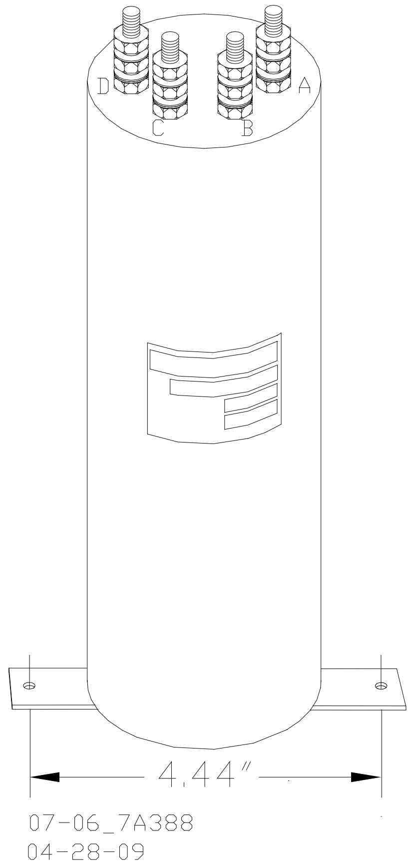

Figure 7-9 Line to Receiver Coupler, 7A388

7.3.3.1 Equipment Description, 7A388

The Line to Receiver Coupler, 7A388 is non-tuned and provides transmitter-to-line coupling or line-to-receiver impedance matching. The 7A388 coupler assembly consists of a tubular PVC plastic enclosure with mounting brackets at the base. There are four AREMA binding posts on the top of the assembly that provide connections to the circuits housed within the sealed units (see Application Installation.

7.3.3.2 Mounting Dimensions, 7A388

Mounting Dimensions for the Line to Receiver Coupler, 7A388 are as follows:

Dimensions:

3.5 inches (8.89 centimeters) in diameter

10.75 inches (27.31 centimeters) high (to top of AREMA binding posts)

Weight:

5.25 pounds (2.38 kilograms) (approximate)

7.3.3.3 Application Installation, 7A388

See Figure 2-6 for Line to Receiver Coupler, 7A388 application installation drawings. The coupler terminals are connected as follows:

7.3.3.3.1 Connecting Line to Rec Coupler 7A388 to Rec Line to Rail Coupler, 7A377-1-f

Terminals A & B connect to the wire leads connected to the shelter surge equipment terminals that are connected to the #14 AWG twisted pair of line wires which are connected to the equalizer that is connected to the #10 AWG leads on the 7A377-1-f, (See Figure 9-8 for exact wiring)

Terminals C & D connect to the wire leads connected to "RX –" and "RX +" on the GCE Lower 10-pin Connector

7.3.3.3.2 Connecting Line to Rec Coupler 7A388 to Rec Line to Rail Coupler, 7A377-2-f

Terminals A & B connect to the wire leads that are connected to the shelter surge equipment terminals which are connected to the #14 AWG twisted pair of line wires that are connected to the equalizer which is connected to the wire leads connected to Terminals C & D on the 7A377-2-f, (See Figure 9-9 for exact wiring)

Terminals C & D connect to the wire leads connected to "RX –" and "RX +" on the GCE Lower 10-pin Connector

7.3.3.3.3 Connecting Line to Rec Coupler 7A388 to Trans Line to Rail Coupler, 7A399-f

Terminals A & B connect to the wire leads that are connected to the shelter surge equipment terminals which are connected to the #14 AWG twisted pair of line wires that are connected to the equalizer that is connected to the wire leads connected to Terminals C & D on the 7A399-f (See Figure 9-10 for exact wiring).

Terminals C & D connect to the wire leads connected to "TX –" and "TX +" on the GCE Lower 10-pin Connector.

The Line to Receiver Coupler, 7A388 should be used when the distance from the rails to the transmitter or receiver to the track is between 300 ft. (30.52 m) but less than 2000 ft. (609.6 m) (based on using 14AWG; increasing the diameter of the wire will proportionally increase the potential distance from 2000 ft./609.6 m). The Line to Receiver Coupler, 7A388 is used in conjunction with either the Receiver Line to Rail Coupler, 7A377-1-f for a pole-mounted configuration or the Receiver Line to Rail Coupler,7A377-2-f for a shelf-mounted configuration (see paragraphs 7.3.4.1 and 7.3.4.4, respectively) or the Transmitter Line to Rail Coupler, 7A399-f.

7.3.4 Rec Line to Rail Coupler, 7A377-1-f and Rec Line to Rail Coupler, 7A377-2-f

NOTE

NOTE

The Receiver Line to Rail Couplers, 7A377-1-f or 7A377-2-f, are tuned couplers and should be mounted in a weatherproof shelter located within 100 ft. (30.5 m) of the track connection. The track wire which connects the Receiver Line to Rail Coupler, 7A377-1-f or 7A377-2-f to the rails should be #6 AWG.

The Receiver Line to Rail Coupler, 7A377-1-f (see) and the Receiver Line to Rail Coupler, 7A377-2-f (see Figure 7-11), provide line to rail coupling when the receiver is remotely located from the rail connections as depicted in Figure 9-8 and Figure 9-9.

7.3.4.1 Equipment Description, 7A377-1-f

The 7A377-1-f coupler assembly consists of a tubular PVC plastic enclosure with mounting plates extending from each end suitable for pole mounting. There are two #6 AWG wires marked “Rail” and two #10 AWG wires marked “Line” (see Figure 7-10). When ordering, specify part number 7001-7A377-ffff (ffff = the assigned frequency for the coupler).

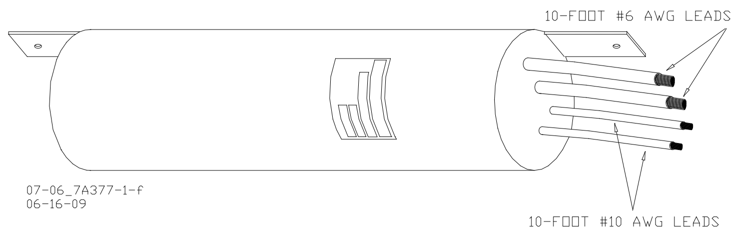

Figure 7-10 Receiver Line to Rail Coupler, 7A377-1-f

7.3.4.2 Mounting Dimensions, 7A377-1-f

Mounting Dimensions for the Receiver Line to Rail Coupler, 7A377-1-f are as follows:

Dimensions:

3.50 inches (8.89 centimeters) O.D. in diameter

9.50 inches (24.13 centimeters) in length (mounting brackets not included)

13.00 inches (33.02 centimeters) in length (mounting brackets included)

Weight:

8 pounds (3.63 kilograms) (approximate)

Leads:

Stranded, black, 10 ft. (3.05 m) length; two #6 AWG (marked Rail) and two #10 AWG (marked Line)

7.3.4.3 Application Installation, 7A377-1-f

The coupler wires are connected as follows:

- The two 10-foot (3.05 m) long, #6 AWG leads (marked “Rail”) are connected to the sealed equalizer that is connected to the appropriate gauge twisted pair track wires connected to the rails
- The two 10-foot (3.05 m) long, #10 AWG leads (marked “Line”) are connected to the sealed equalizer that is connected to the #14 AWG twisted pair of line wires that are connected to equipment shelter surge panel terminals that are in turn connected to Terminals A & B of the 7A388 (see Figure 9-8 for exact wiring)

The Receiver Line to Rail Coupler, 7A377-1-f should be used when the distance from the receiver to the track is between 300 ft. (30.52 m) but less than 2000 ft. (609.6 m) (based on using 14AWG; increasing the diameter of the wire will proportionally increase the potential distance from 2000 ft./609.6 m). The Receiver Line to Rail Coupler, 7A377-1-f is used in conjunction with the Line to Receiver Coupler, 7A388 (see paragraph 7.3.3).

7.3.4.4 Equipment Description, Receiver Line-to-Rail Coupler 7A377-2-f

The 7A377-2-f coupler assembly consists of a tubular PVC plastic enclosure with mounting plates extending across the base suitable for shelf mounting. It is similar to the 7A377-1-f, but rather than having four wires protrude from the top of the assembly, the top of the 7A377-2-f has four AREMA binding posts that provide terminal connections for interface wiring (see Figure 7-11). When ordering, specify part number 7002-7A377-ffff (ffff = the assigned frequency for the coupler).

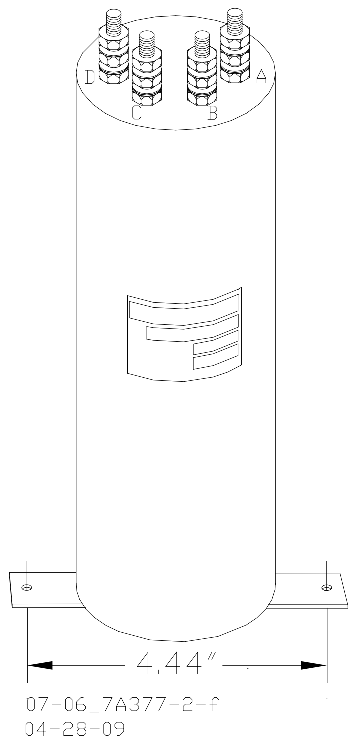

Figure 7-11 Receiver Line to Rail Coupler, 7A377-2-f

7.3.4.5 Mounting Dimensions, 7A377-2-f

Mounting Dimensions for the 7A377-2-f Receiver Line to Rail Coupler are as follows:

Dimensions:

3.5 inches (8.89 centimeters) O.D. in diameter

10.75 inches (27.31 centimeters) in height (to top of binding posts)

Weight:

8 pounds (3.63 kilograms) (approximate)

7.3.4.6 Application Installation, 7A377-2-f

The coupler terminals are connected as follows:

Terminals A & B are connected to the wire leads that are connected to the equalizer that is connected to the appropriate gauge twisted pair track wires, which are connected to the rails.

Terminals C & D are connected to the wire leads that are connected to the sealed equalizer that is connected to the #14 AWG twisted pair of line wires that are connected to equipment shelter surge panel terminals that are in turn connected to Terminals A & B of the 7A388

The Receiver Line to Rail Coupler, 7A377-2-f should be used when the distance from the receiver to the track is between 300 ft. (30.52 m) but less than 2000 ft. (609.6 m) (based on using 14AWG, increasing the diameter of the wire will proportionally increase the potential distance from 2000 feet). The Receiver Line to Rail Coupler, 7A377-2-f is used in conjunction with the Line to Receiver Coupler, 7A388.

7.3.5 Transmitter Line to Rail Coupler, 7A399-f

7.3.5.1 Equipment Description, 7A399-f

The Transmitter Line to Rail Coupler, 7A399-f couples the transmitter line to the track (see Figure 9-6). The 7A399-f coupler assembly consists of a tubular PVC plastic enclosure with mounting brackets at the base. There are four AREMA binding posts on the top of the assembly that provide connections to the circuits housed within the sealed units (see Figure 7-12).

NOTE

NOTE

The Transmitter Line to Rail Coupler, 7A399-f should be mounted in a weatherproof shelter located within 100 ft. (30.5 m) of the track connection. The track wire connecting the Transmitter Line to Rail Coupler, 7A399-f to the track should be #6 AWG.

7.3.5.2 Mounting Dimensions, 7A399-f

Mounting Dimensions for the Transmitter Line to Rail Coupler, 7A399-f are as follows:

Dimensions:

3.50 inches (8.89 centimeters) in diameter

7.75 inches (19.69 centimeters) high (to top of AREMA binding posts)

Weight:

4 pounds. (1.81 kilograms) (approximate)

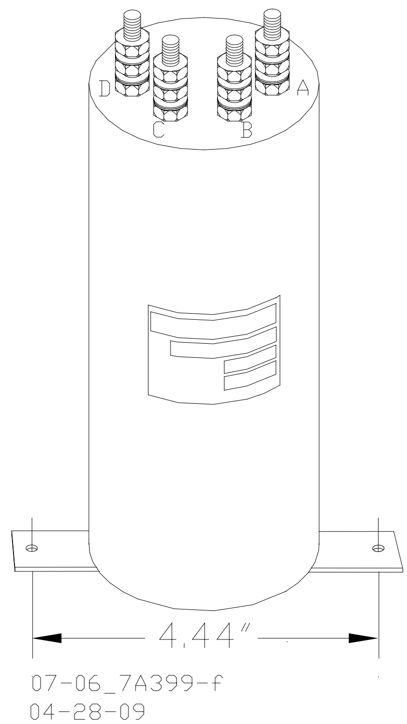

Figure 7-12 Transmitter Line to Rail Coupler, 7A399-f

7.3.5.3 Application Installation, 7A399-f

See Figure 2-6 for Transmitter Line to Rail Coupler, 7A399 application installation drawings. The coupler terminals are connected as follows:

- Terminals A & B are connected to the wire leads that are connected to the equalizer that is connected to the appropriate gauge twisted pair track wires, which are connected to the rails.
- Terminals C & D are connected to the wire leads that are connected to the sealed equalizer that is connected to the #14 AWG twisted pair of line wires that are connected to equipment shelter surge panel terminals that are in turn connected to Terminals A & B of the 7A388

The Transmitter Line to Rail Coupler, 7A399-f should be used when the distance from the receiver to the track is between 300 ft. (30.52 m) but less than 2000 ft. (609.6 m), (based on using 14AWG, increasing the diameter of the wire will proportionally increase the potential distance from 2000 feet). The Transmitter Line to Rail Coupler, 7A399-f is used in conjunction with the Line to Receiver Coupler, 7A388.

7.3.6 PSO Insulated Joint Bypass Coupler (Tuned), 7A422-f

WARNING

WARNING

WHEN ADDING OR REPLACING INSULATED JOINT COUPLERS, APPROPRIATE TESTS MUST BE MADE TO DETERMINE THAT THE INSULATED JOINT COUPLER DID NOT ADVERSELY AFFECT OTHER HIGHWAY CROSSING WARNING SYSTEMS OR WAYSIDE SIGNAL SYSTEM TRACK CIRCUITS.

THE 7A422-F MUST NOT BE USED TO PASS GCP OR MOTION SENSOR FREQUENCIES.

CAUTION

CAUTION

THE PSO INSULATED JOINT BYPASS COUPLER (TUNED), 7A422-F, SHOULD BE CONNECTED AS CLOSE AS PRACTICABLE TO THE INSULATED JOINTS, GENERALLY NO MORE THAN 25 FT. (7.62 M) FROM THE RAILS AND, TO AFFORD MAXIMUM PROTECTION FROM PHYSICAL DAMAGE, BE ENCASED IN A PROTECTIVE ENCLOSURE.

NOTE

NOTE

The track wire connecting the PSO Insulated Joint Bypass Coupler (Tuned), 7A422-f, to the rails should be #6 AWG as a minimum.

7.3.6.1 Equipment Description, 7A422-f

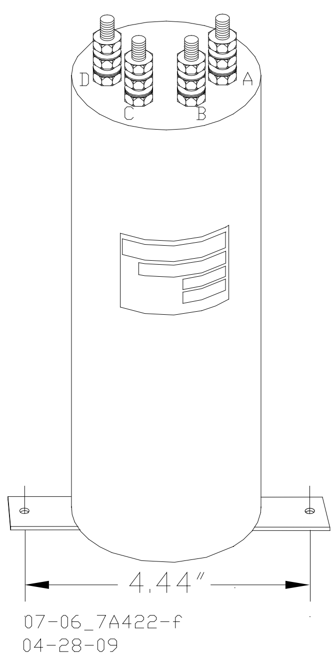

Figure 7-13 PSO Insulated Joint Bypass Coupler (Tuned), 7A422-f

The PSO Insulated Joint Bypass Coupler (Tuned), 7A422-f, passes a specific GCE frequency around an insulated joint in the non-electrified territory.

The coupler assembly consists of a tubular PVC plastic enclosure with mounting brackets at the base. There are four AREMA binding posts on the top of the assembly that provide connections to the circuits housed within the sealed unit (see Figure 7-13.

7.3.6.2 Mounting Dimensions, 7A422-f

Mounting Dimensions for the PSO Insulated Joint Bypass Coupler (Tuned), 7A422-f are as follows:

Diameter:

3.5 inches (8.89 centimeters) O.D. in diameter

9.75 inches (24.77 centimeters) in height (to top of AREMA binding posts)

Weight:

5 pounds (2.27 kilograms) (approximate)

Generally, the distance from the weatherproof enclosure enclosing the Tuned Joint Coupler, 7A422-f to the rails should not exceed 25 ft. (7.62 m).

The track wire connecting the Tuned Joint Coupler, 7A422-f to the rails should be #6 AWG.

7.3.6.3 Application Installation, 7A422-f

Application installation of the Tuned Joint Coupler 7A422-f is as described in Section 4.5.4 and as depicted in Figure 7-14. The coupler terminals are connected as follows:

Terminal A connects to Rail 1 on the east side of the insulated joint

Terminal B connects to Rail 2 on the east side of the insulated joint

Terminal C connects to Rail 2 on the west side of the insulated joint

Terminal D connects to Rail 1 on the west side of the insulated joint

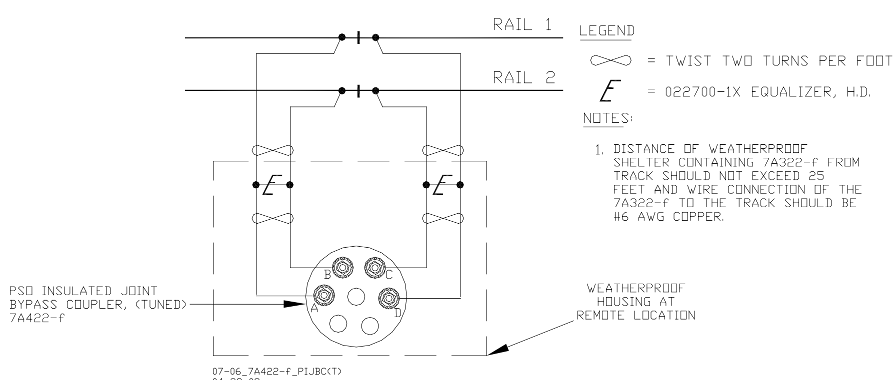

Figure 7-14 Typical 7A422-f Tuned Joint Bypass Coupler Application

7.4 AC Track Circuit/Cab Signal Filter, 7A417-X

7.4.1 Equipment Description, 7A417-X

The Cab Signal Filter, 7A417-X, is designed for use in a territory where 60, 90, 100, or 200-Hz cab signal or AC Track Circuits are used.

7.4.2 Mounting Dimensions, 7A417-X

The 7A417-X filter assembly can be configured according to signal frequency and relay mounting base type as indicated in Table 7-2 For mounting dimensions see Table 7-3. Due to the multiplicity of configurations and dimensions, refer to the different mounting dimensions.

Table 7-2 Cab Signal Filter Relay Base Manufacturer-Frequency Cross-Reference

7A417-X DASH NUMBER TAB CHART				
RELAY BASE CONFIGURATION	FREQUENCY			
	100 HZ	60 HZ	200 HZ	90 HZ
Transcontrol	-01	-11	-21	-31
U. S. & S. (Ansaldo)	-02	-12	-22	-32
Safetran™	-03	-13	-23	-33

Mounting Dimensions for the Cab Signal Filter, 7A417-X assembly are delineated in Table 7-3:

Table 7-3 Cab Signal Filter Dimensions

Dash Number	Dimensions
-01, -02, -03, -11, -12, -13, -31, -32, -33	7.75 inches (19.69 centimeters) high
-21, -22, -23	5.0 inches (12.70 centimeters) high
-01, -11, -21, -31	6.75 inches (17.15 centimeters) wide 9.0 inches (22.86 centimeters) deep
-02, -12, -22, -32	4.94 inches (12.55 centimeters) wide 8.00 inches (20.32 centimeters) deep
-03, -13, -23, -33	4.94 inches (12.55 centimeters) wide 9.4375 inches (23.97 centimeters) deep

Weight: 4 pounds, 8 ounces (2.04 kilograms) (average)

7.4.3 Application Installation, 7A417-X

The filter should be installed on the primary side of the track transformer as described in Section 4 and as depicted in Figure 7-15.

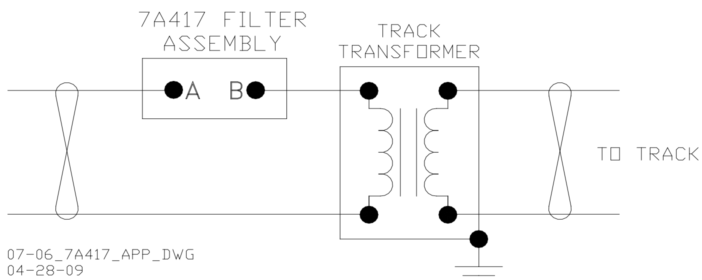

Figure 7-15 Cab Signal Filter Installation

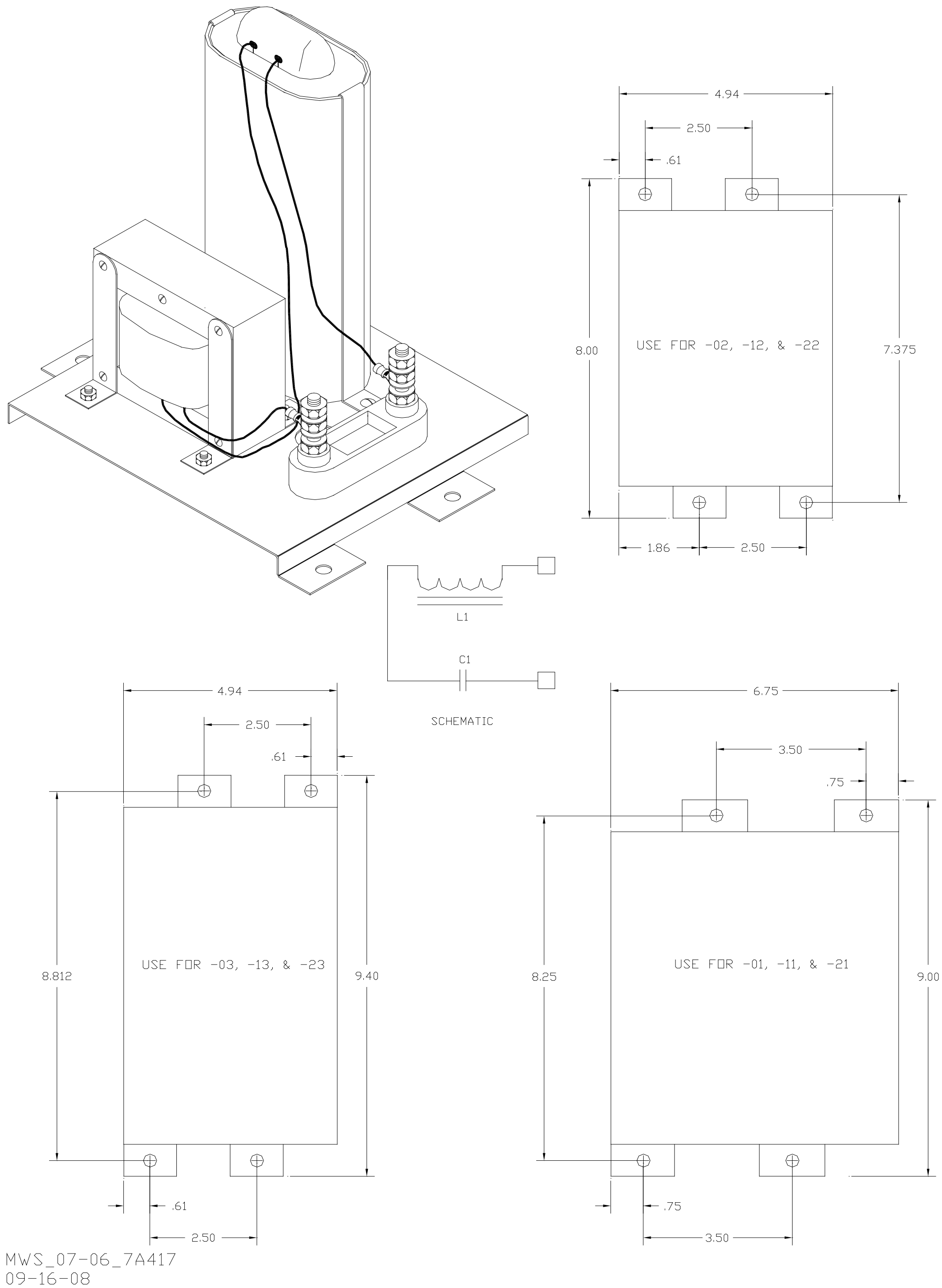

Figure 7-16 Cab Signal Filter, 7A417-X, with Mounting Dimensions

7.5 Surge Protection Requirements

7.5.1 Battery Surge Application Installation

The GCE incorporates built-in surge protection. However, primary surge protection must be installed on all power supply/battery as shown in Figure 7-17.

. Track wire surge protection is shown on application drawings in Section 2.

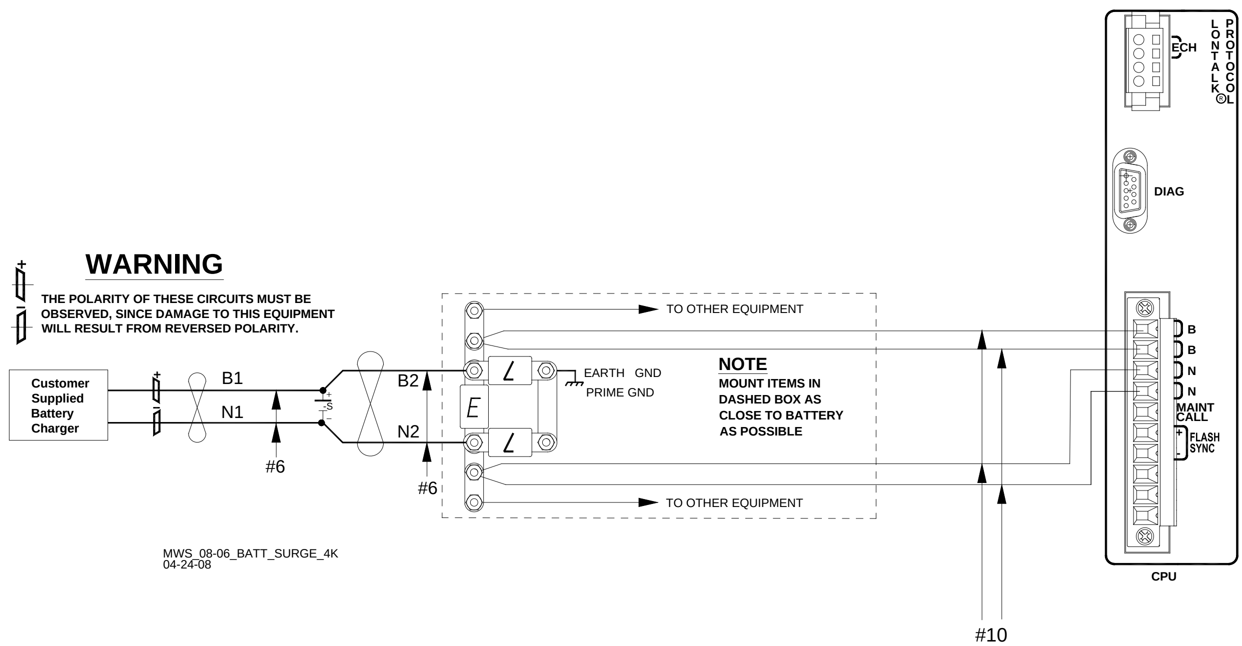

Figure 7-17 Primary Battery Surge Protection

7.5.2 Surge and Track Wire Protection for Electrified Track

⚠ WARNING	WARNING **IN ELECTRIFIED TERRITORY, ENSURE THAT THE EQUALIZER IN THE TRACK SURGE PANEL IS REPLACED BY A THIRD ARRESTOR.**

In electrified territory, fuses and arresters must be installed on track leads as shown in Figure 7-18.

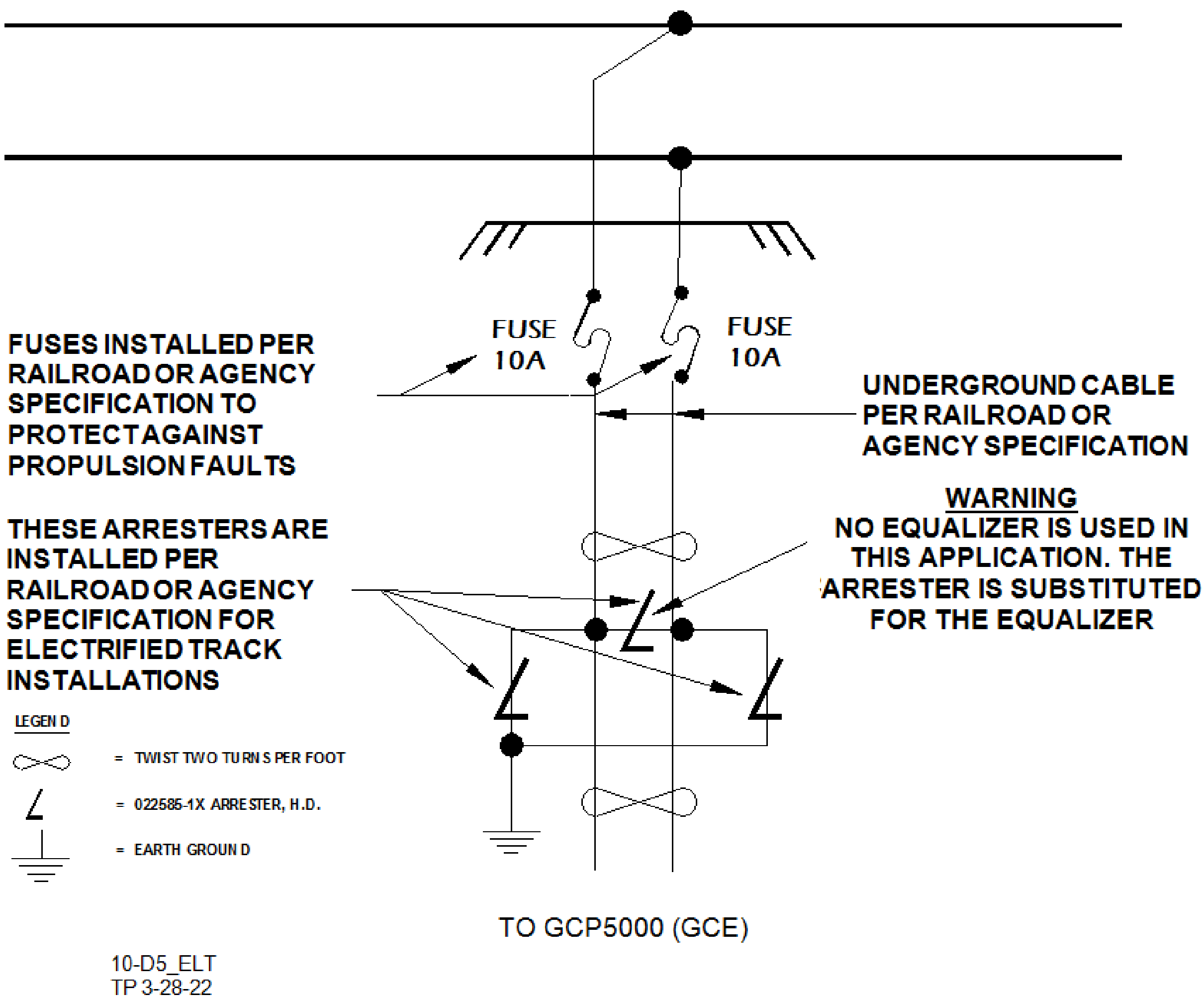

Figure 7-18 Surge and Fused Track Wire Protection in Electrified Track

7.6 AC Shunt, Wide-Band, 8A076A

WARNING

WARNING

THE 8A076A WIDEBAND SHUNT MUST NOT BE USED TO BYPASS INSULATED JOINTS IN DC CODED TRACK CIRCUITS, WHERE AC OR CODED AC CIRCUITS EXIST, OR AT FEED POINT JOINTS OF UNIDIRECTIONAL GCP APPROACHES.

WHEN ADDING OR REPLACING BYPASS SHUNTS, APPROPRIATE TESTS MUSTS BE MADE TO DETERMINE THAT THE BYPASS SHUNT DID NOT ADVERSELY AFFECT OTHER HIGHWAY CROSSING WARNING SYSTEM OR WAYSIDE SIGNAL SYSTEM TRACK CIRCUITS.

CAUTION

CAUTION

THE SHUNT SHOULD BE CONNECTED AS CLOSE AS PRACTICABLE TO THE RAILS (WITHIN THE #6 AWG WIRE LEAD LENGTH) AND, TO AFFORD MAXIMUM PROTECTION FROM PHYSICAL DAMAGE, BE ENCASED IN A PROTECTIVE ENCLOSURE OR BURIED (EITHER VERTICALLY OR HORIZONTALLY IN A TERMINAL SHUNT BURIAL KIT, 62776) AT AN APPROPRIATE DEPTH. IT IS NOT NECESSARY TO BURY THE SHUNT BELOW THE FROST LINE.

7.6.1 Equipment Description, 8A076A

The AC Shunt, Wide Band, 8A076A (see Figure 7-19), provides an effective short circuit to AC but presents an open circuit to DC. This shunt is used to bypass insulated joints in DC track circuits.

The AC Shunt, Wide Band, 8A076A, is housed in a hermetically sealed, cylindrical case with a pair of 10 ft. (3.05 m) leads extending from one end.

7.6.2 Mounting Dimensions, 8A076A

Dimensions:

3.35 inches (8.5 centimeters) in diameter

7.5 inches (19.1 centimeters) in height

Weight:

7 pounds (3.18 kilograms) (approximate)

Leads:

10 ft. (3.04 m); #6 AWG, stranded, black PVC

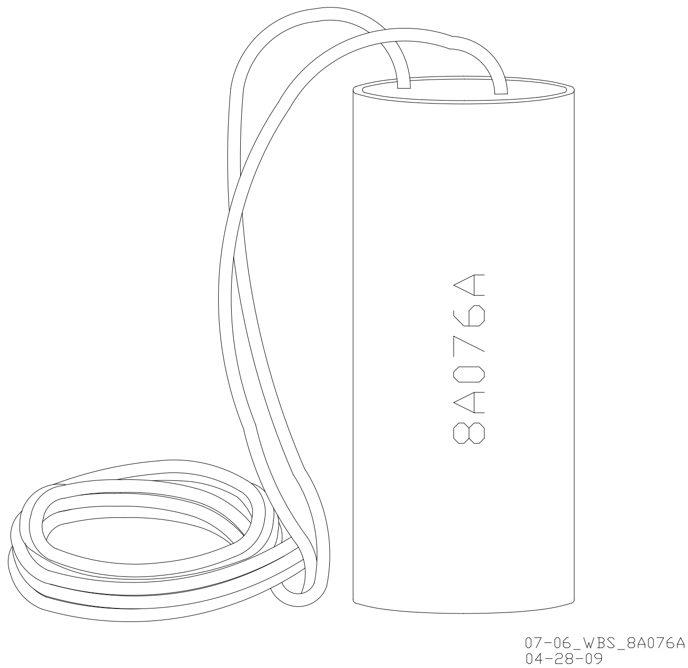

Figure 7-19 AC Shunt, Wide Band, 8A076A

7.6.3 Application Instruction, 8A076A

The AC Shunt, Wide Band, 8A076 is placed as shown in Figure 7-20

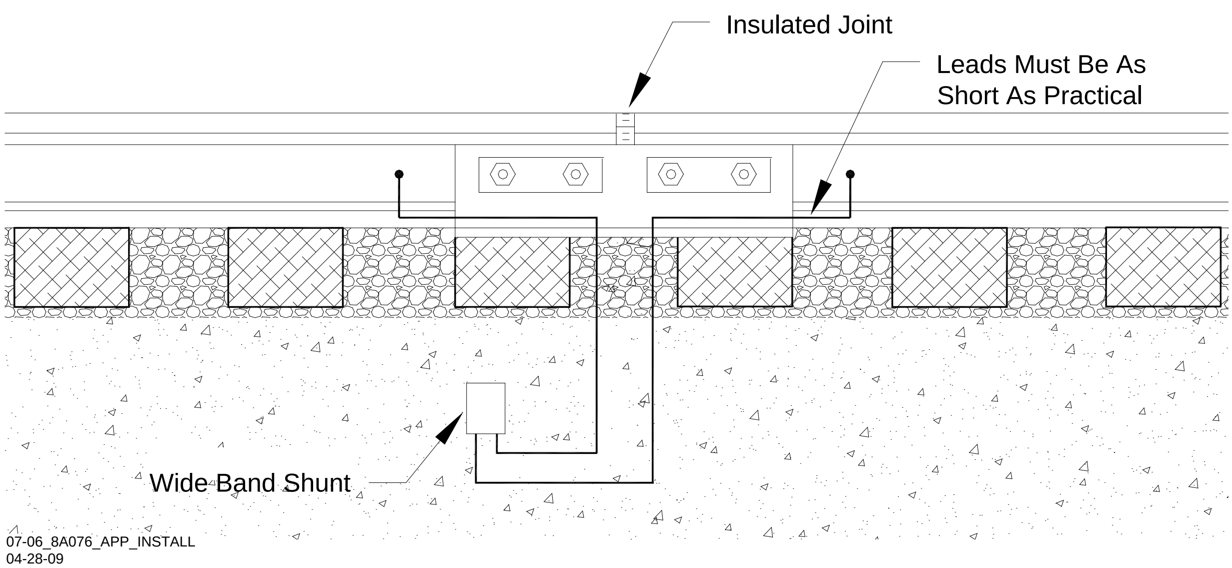

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Figure 7-20 Insulated Joint Coupler Installation

7.7 Spread Spectrum Radios, 53325

Siemens Spread-Spectrum Radios may be used to provide a vital RF communications link between GCP5000 (GCE) installations.

For information about the 53325 series of Ethernet Spread Spectrum Radios (ESSRs), refer to Installation & Operation Document, COM-00-05-05.

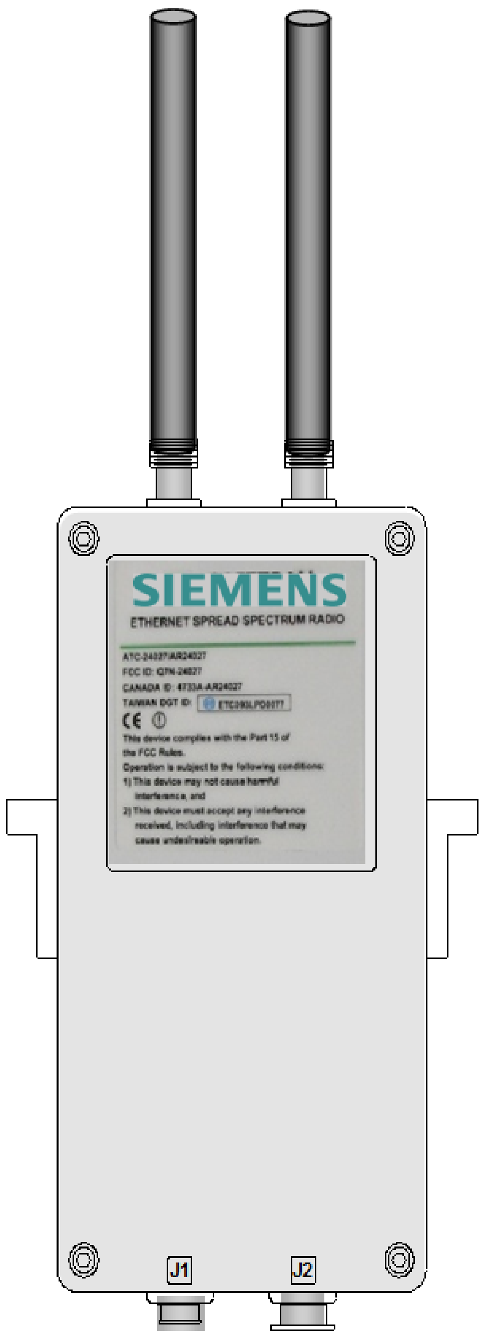


Figure 7-21 Ethernet Spread Spectrum Radios, 533XX

7.8 Surge Panels, 80026-XX

The 80026-XX Surge Panels are available in a combination of equalizers and arresters to provide protection for the battery and/or track circuits.

WARNING	WARNING **ANY ALTERNATIVE SURGE PROTECTION DEVICE MUST BE ANALYZED TO ENSURE THAT FAILURE MODES OF THE DEVICE DO NOT COMPROMISE THE SAFETY OF GCP5000 GCE SYSTEM I.E., UNINTENTIONAL EARTH GROUNDS ON CONTROL CIRCUITS OR SHORTS ON TRACK CIRCUITS.**

7.8.1 Surge Panel Configurations

Surge Panel units are provided in a variety of configurations to meet specific customer requirements. Wall-mounted Surge Panel applications are listed in Table 7-4. Rackmount Surge Panel applications are listed in Table 7-5.

NOTE	NOTE For surge protection requirements not listed or for custom-designed Surge Panels, contact Siemens Technical Support.

7.8.2 Surge Panel Nomenclature and Mounting Dimensions

Surge panel nomenclature and mounting dimensions are provided in the figures identified in Table 7-16 and Table 7-17

7.8.3 Surge Panel Arresters

WARNING	WARNING **DO NOT MOUNT THE ARRESTER WITH ELECTRODES POINTED IN THE DOWN POSITION TO MINIMIZE THE POTENTIAL OF A SHORT CIRCUIT.**

A typical Surge Panel arrester is shown in Figure 7-38

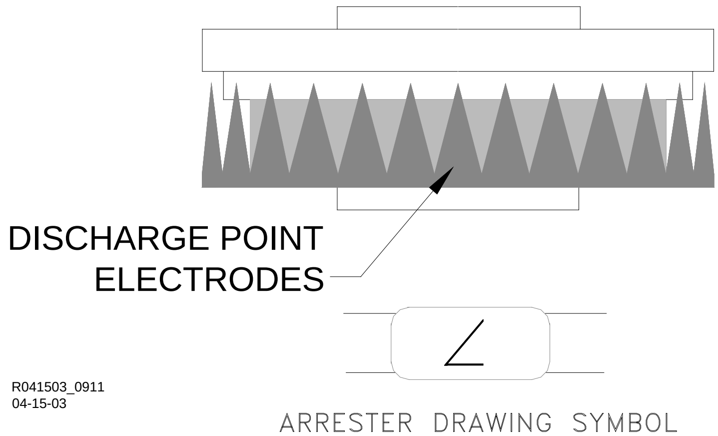


Figure 7-22 Typical 80026 Surge Panel Arrester Mounting Position

Table 7-4 Wall Mount Surge Panels

PART NO.	FIG.	DESCRIPTION	DIMENSIONS	WEIGHT
80026-01	3-35	Protects 1 battery and 1 track circuit.	Height: 13.5 in (34.29 cm) Width: 5.69 in (14.45 cm) Depth: 3.625 in (9.21 cm)	6.00 lb. (2.72 kg) (approximate)
80026-02	3-35	Protects 1 track circuit. Use with –1 panel for subsequent track protection.	Height: 8.75 in (22.23 cm) Width: 5.69 in (14.45 cm) Depth: 3.625 in (9.21 cm)	4.00 lb. (1.82 kg) (approximate)
80026-22	3-35	Protects 1 track circuit. Use for six-wire applications.	Height: 5.44 in (13.82 cm) Width: 5.69 in (14.45 cm) Depth: 3.625 in (9.21 cm)	3.00 lb. (1.36 kg) (approximate)

Table 7-5 Rack Mount Surge Panels

PART NO.	FIG.	DESCRIPTION	DIMENSIONS	WEIGHT
80026-31	3-36	Protects 1 track and 1 battery circuit.	Height: 4.96 in (12.60 cm) Width: 23.00 in (58.42 cm) Depth: 4.535 in (11.52 cm)	5.00 lb. (2.26 kg) (approximate)
80026-32	3-36	Protects 1 track and 1 battery circuit. Use with –31 panel for subsequent track and battery circuit protection.	Height: 4.96 in (12.60 cm) Width: 23.00 in (58.42 cm) Depth: 4.535 in (11.52 cm)	6.00 lb. (2.72 kg) (approximate)
80026-33	3-37	Protects 1 battery circuit. Use with –31 panel for subsequent battery circuit protection.	Height: 4.96 in (12.60 cm) Width: 23.00 in (58.42 cm) Depth: 4.535 in (11.52 cm)	7.00 lb. (3.18 kg) (approximate)

PART NO.	FIG.	DESCRIPTION	DIMENSIONS	WEIGHT
80026-34	3-37	Protects 1 track circuit. Use with –31 panel for subsequent track circuit protection.	Height: 4.96 in (12.60 cm) Width: 23.00 in (58.42 cm) Depth: 4.535 in (11.52 cm)	6.00 lb. (2.72 kg) (approximate)
80026-35	3-38	Protects 2 track circuits.	Height: 4.96 in (12.60 cm) Width: 23.00 in (58.42 cm) Depth: 4.535 in (11.52 cm)	7.00 lb. (3.18 kg) (approximate)
80026-36	3-38	Protects 1 track circuit. Use with –31 panel for subsequent track circuit protection. Used with six-wire applications for transmit, receive, and check receive lead protection	Height: 4.96 in (12.60 cm) Width: 23.00 in (58.42 cm) Depth: 4.535 in (11.52 cm)	6.00 lb. (2.72 kg) (approximate)
80026-37	3-39	Protects 1 battery circuit.	Height: 4.96 in (12.60 cm) Width: 23.00 in (58.42 cm) Depth: 4.535 in (11.52 cm)	6.00 lb. (2.72 kg) (approximate)
80026-38	3-39	Protects 2 track circuits. Used in applications with six wires on one track and four on the other	Height: 4.96 in (12.60 cm) Width: 23.00 in (58.42 cm) Depth: 4.535 in (11.52 cm)	8.00 lb. (3.64 kg) (approximate)
80026-39	3-40	Protects 4 battery circuits. Battery input/output line protection for two DAX start or two UAX circuits. Normally used with second battery when line circuit protection is required	Height: 4.96 in (12.60 cm) Width: 23.00 in (58.42 cm) Depth: 4.535 in (11.52 cm)	6.00 lb. (2.72 kg) (approximate)
80026-47	3-41	Protects 2 battery circuits and 1 track circuit. Used with GCE battery and second battery	Height: 4.96 in (12.60 cm) Width: 23.00 in (58.42 cm) Depth: 4.535 in (11.52 cm)	7.00 lb. (3.18 kg) (approximate)
80026-50	3-41	Protects 4 vital Input/output circuits Generally used for UAX inputs or DAX start outputs	Height: 4.96 in (12.60 cm) Width: 23.00 in (58.42 cm) Depth: 4.535 in (11.52 cm)	7.00 lb. (3.18 kg) (approximate)

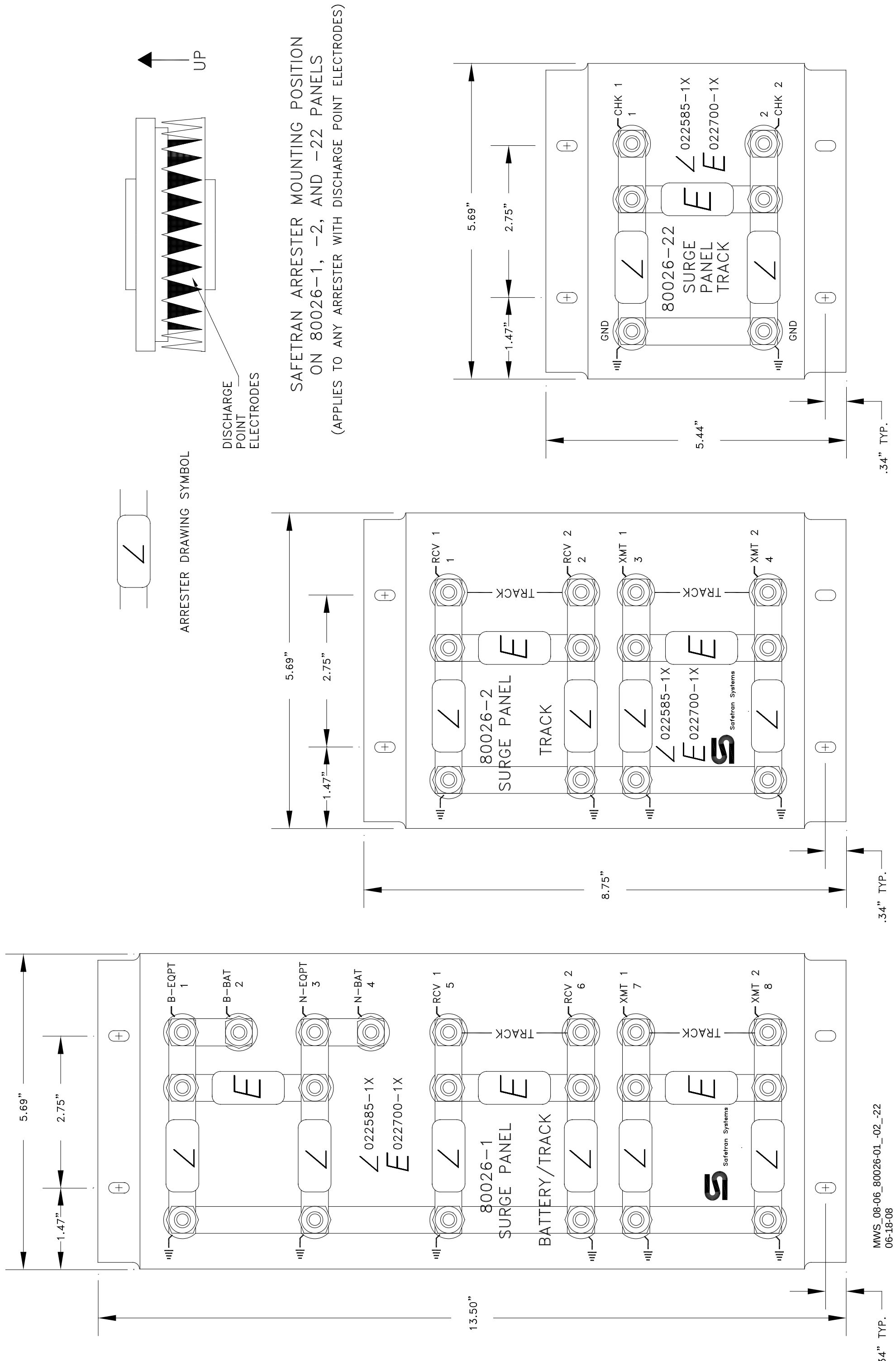


Figure 7-23 Wall Mount Surge panels, 80026-01, -02, and -22

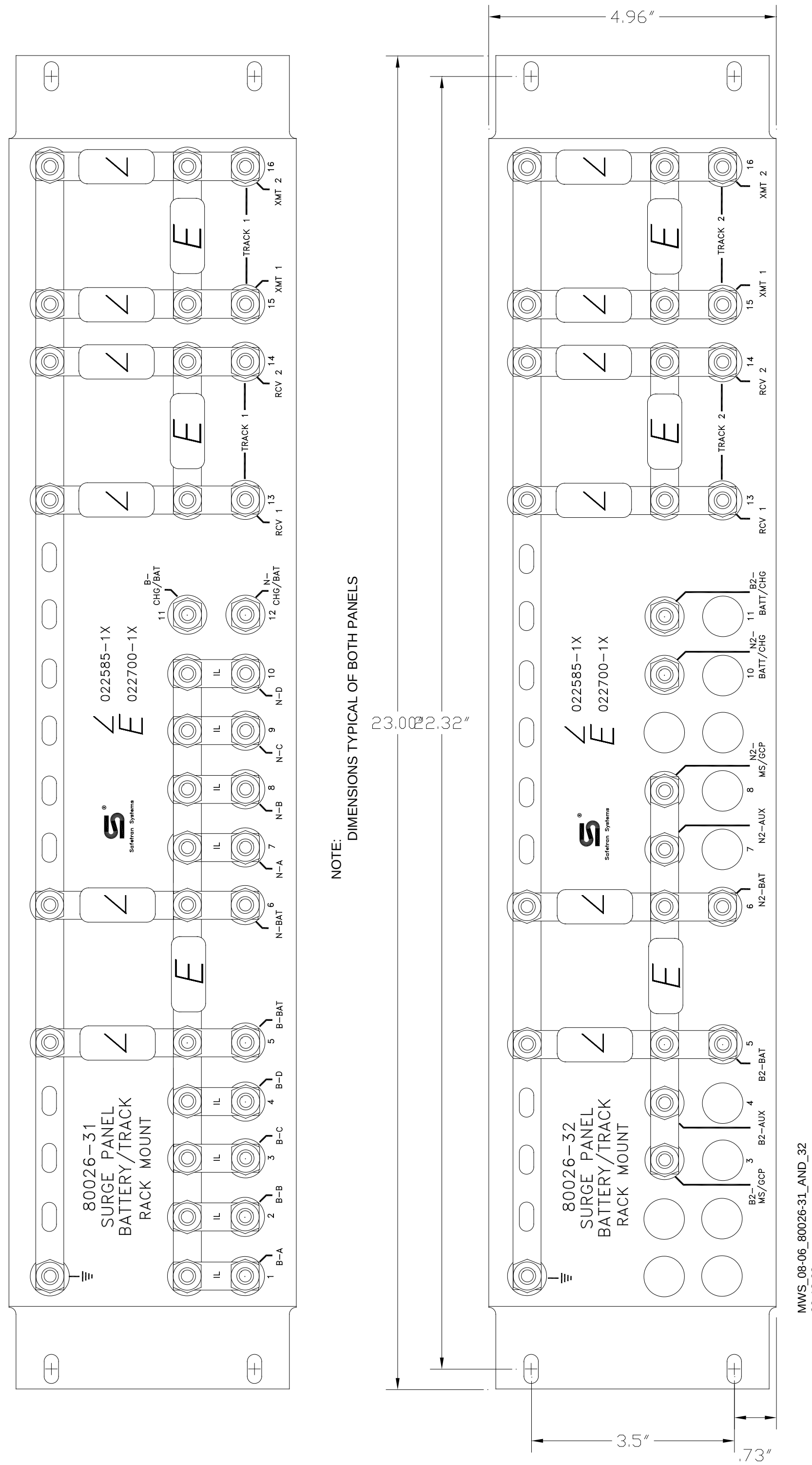


Figure 7-24   Rack Mounted Surge Panels, 80026-31 and -32

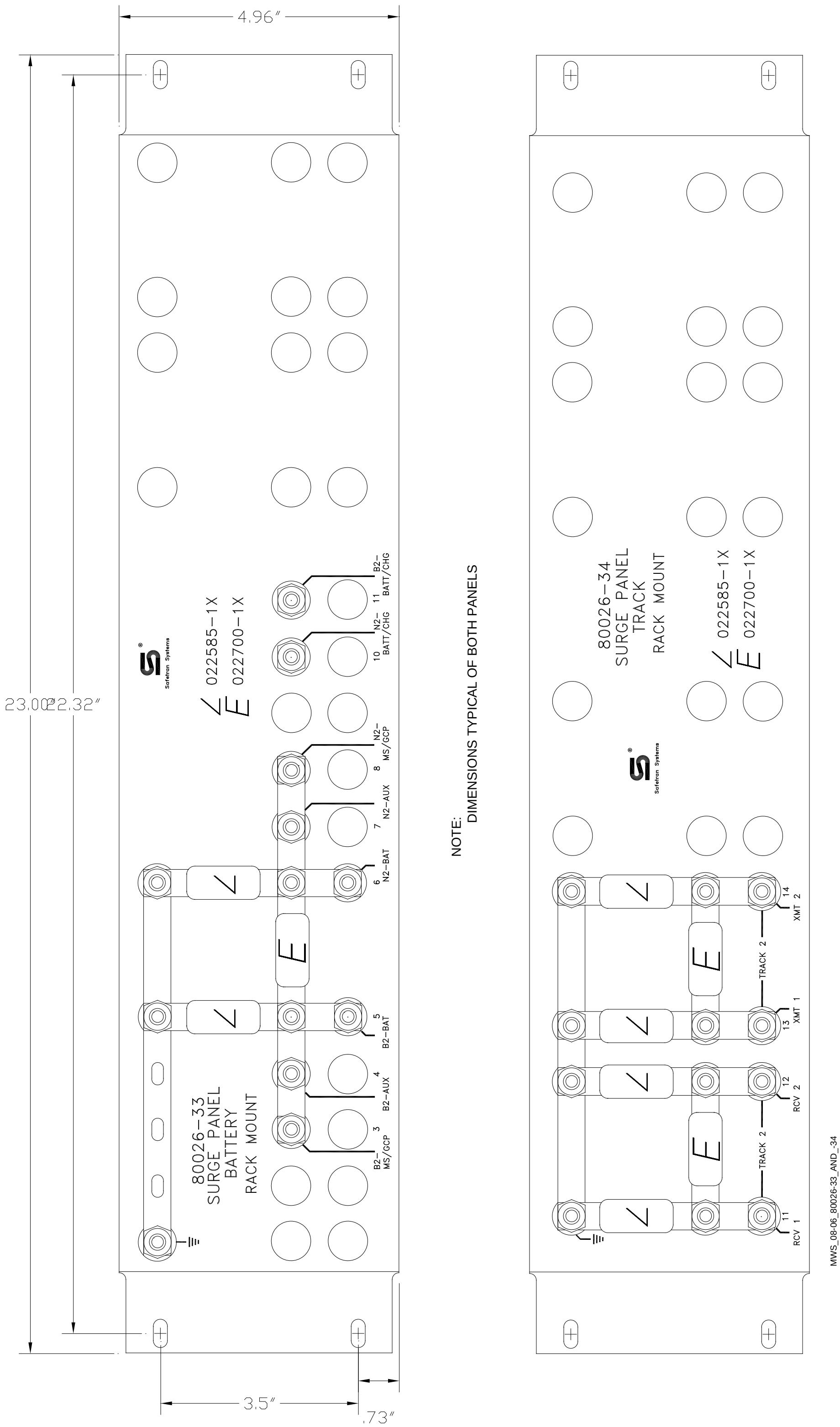


Figure 7-25 Rack Mounted Surge Panels, 80026-33 And -34

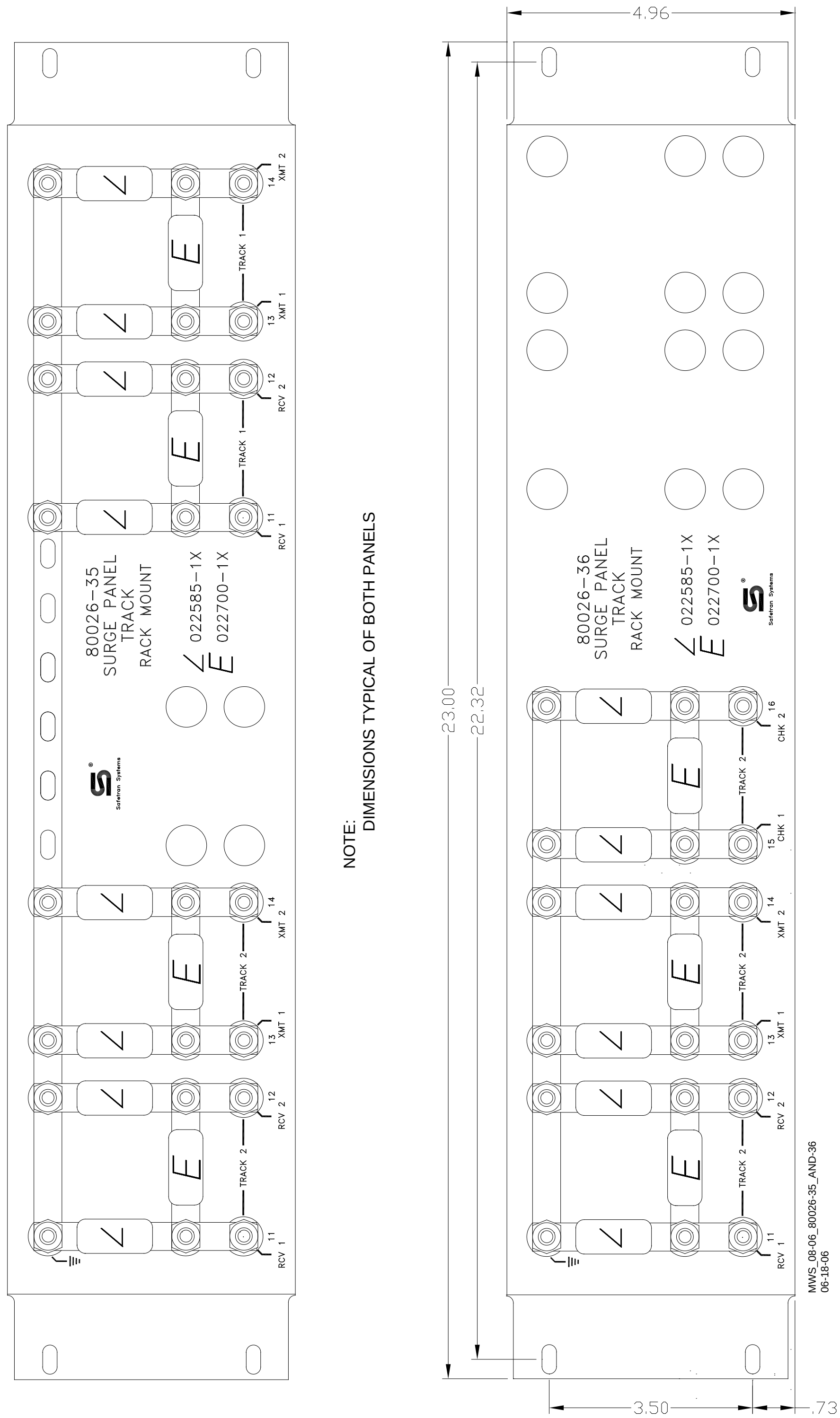


Figure 7-26 Mounted Surge Panels, 80026-35 and -36

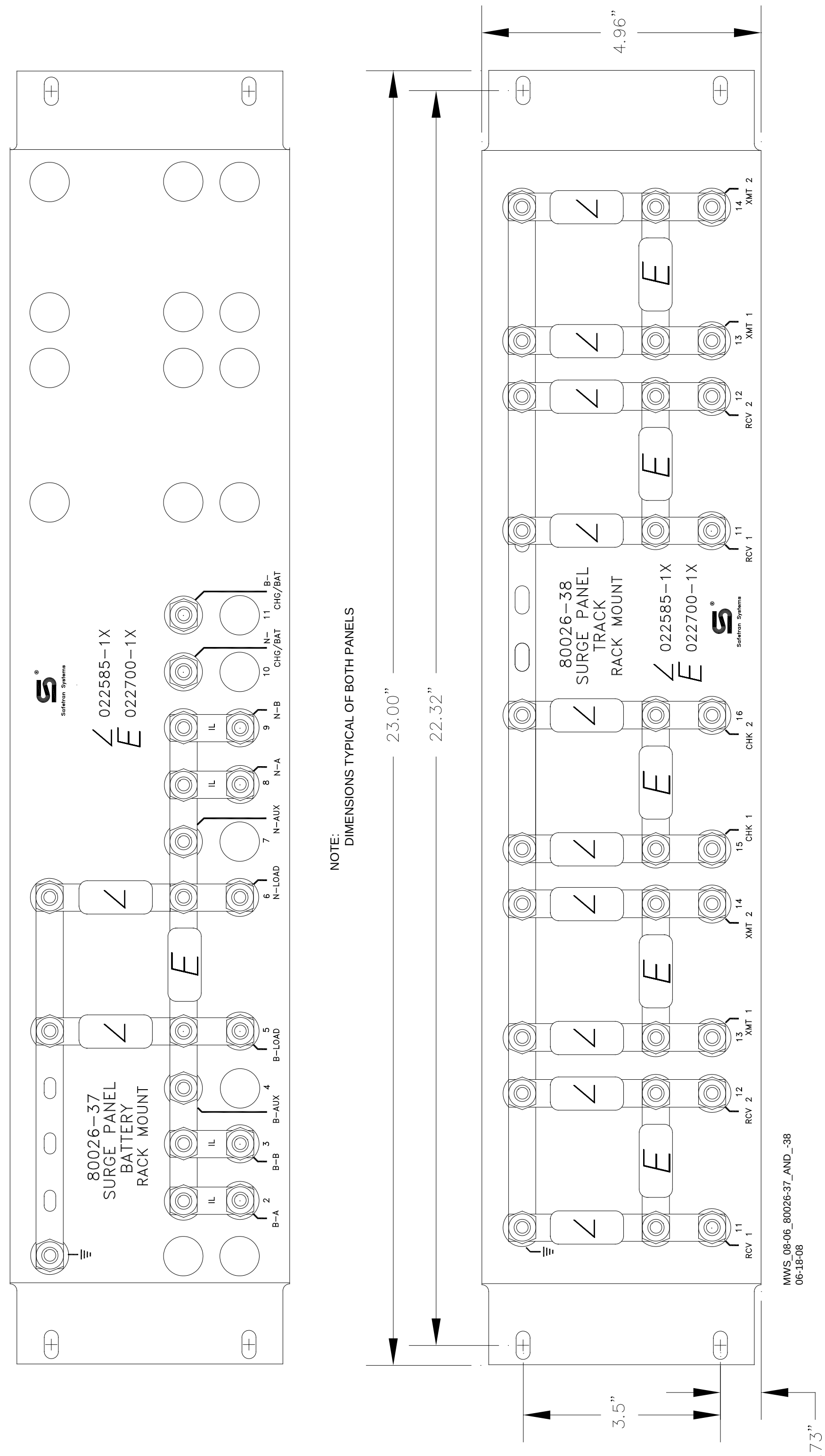


Figure 7-27 Rack Mounted Surge Panels, 80026-37 And -38

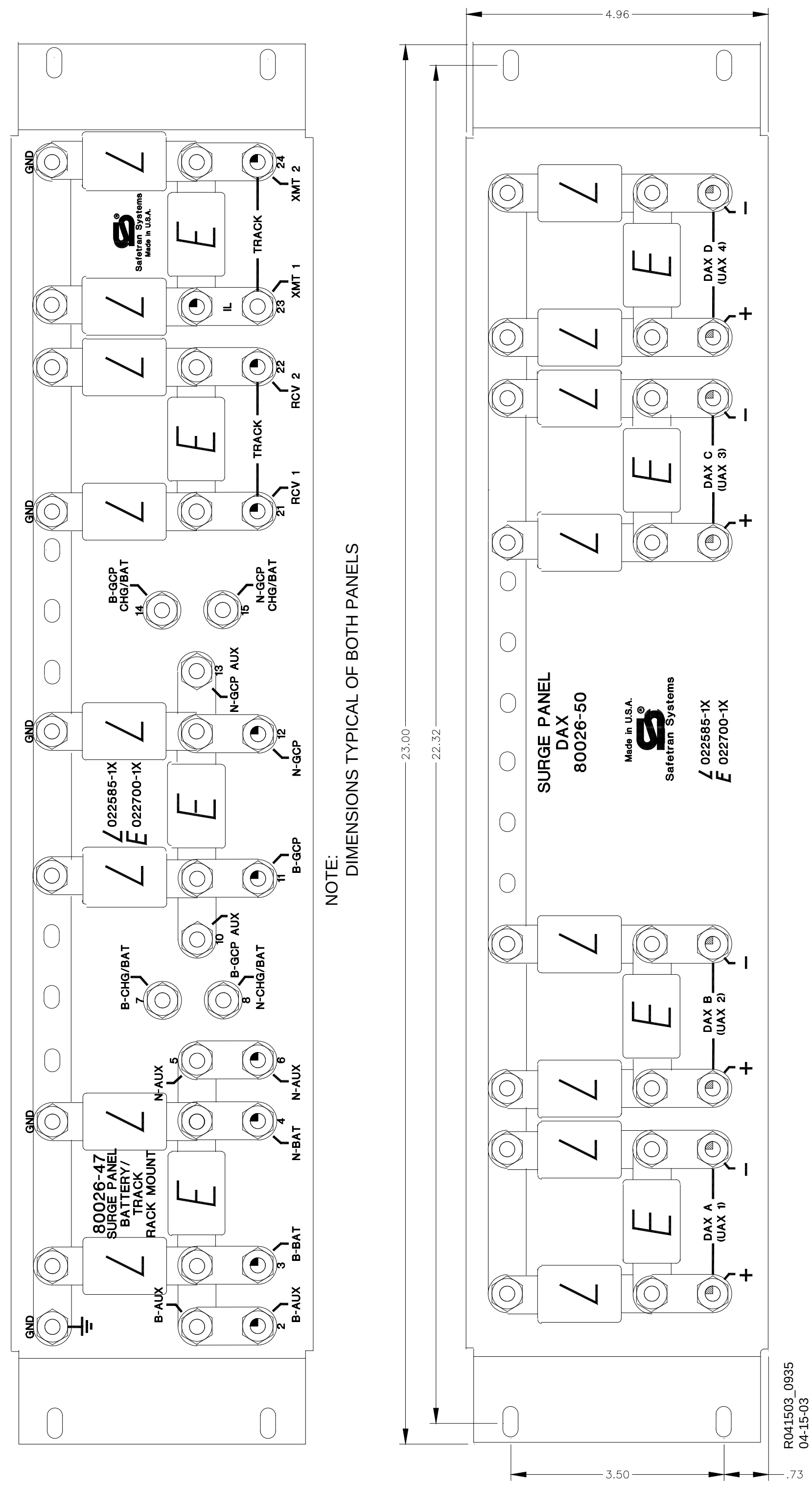


Figure 7-28   Rack Mounted Surge Panels 80026-47 and 80026-50

7.9 Rectifier Panel Assembly, 80033

The 80033 Rectifier Panel Assembly is equipped with equalizers and arresters to provide surge protection on the B (+) and N (-) connections to the battery and the GCP. Mounting holes are provided for a battery charger, as required.

7.9.1 Rectifier Panel Assembly Nomenclature and Mounting Dimensions

Rectifier Panel Assembly, 80033 nomenclature, and mounting dimensions are provided in Figure 7-29.

Table 7-6 Rectifier Panel Assembly, 80033 Specifications

PARAMETER	VALUE
Height	10.46 in. (26.57 cm)
Width	23.00 in. (58.42 cm)
Depth	2.75 in. (6.99cm)
Weight	7 pounds (3.18 kg) (approximate)

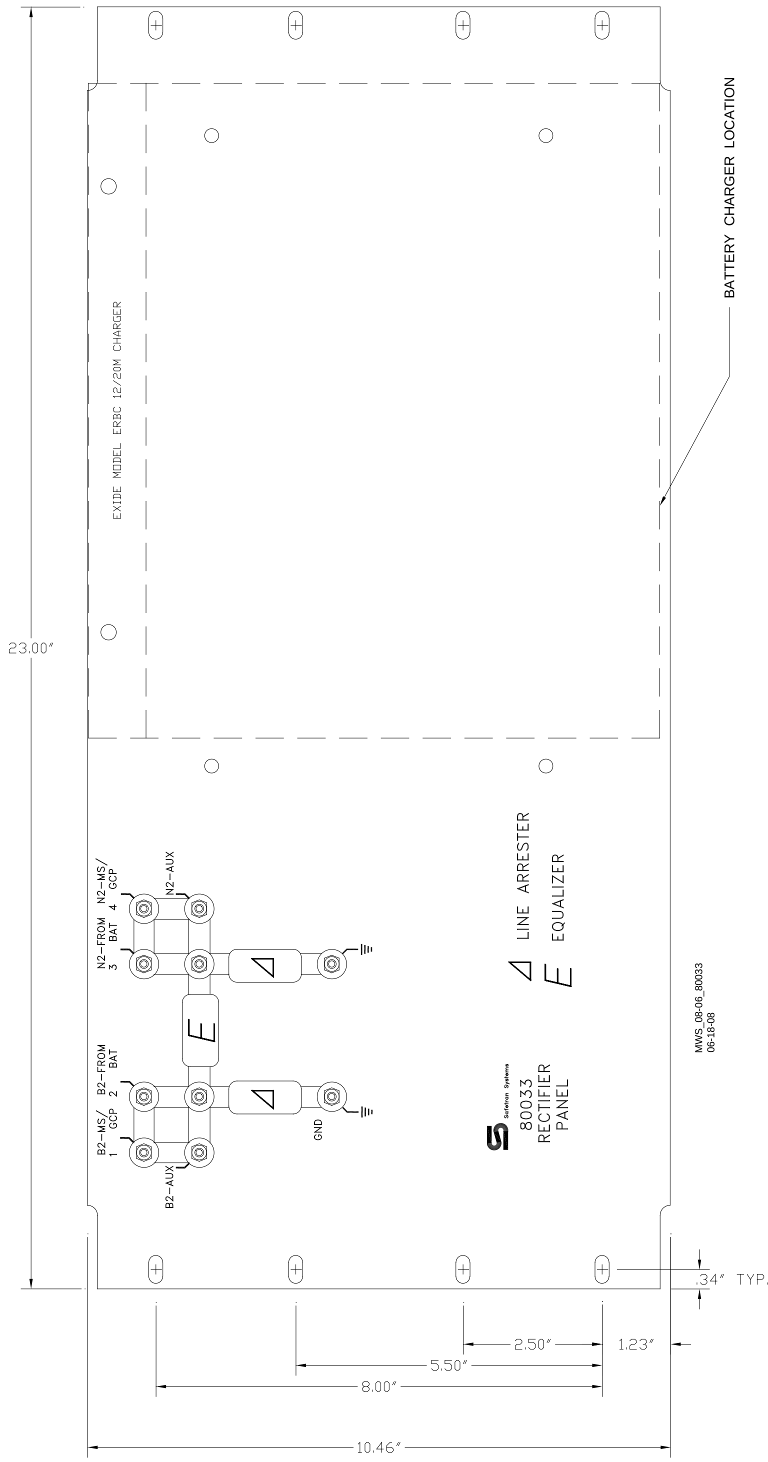


Figure 7-29 Rectifier Panel assembly, 80033

7.10 Cable Termination Panel Assembly, 91042

The Cable Termination Panel Assembly, 91042 is a universal-mounting panel that can be ordered with from 1 to 19 pairs of strapped AREMA binding posts.

Cable Termination Panel Assembly Mounting Dimensions-91042 Cable Termination Panel Assembly mounting dimensions are provided in Figure 7-30.

Table 7-7 Cable Termination Panel Assembly, 91042 Specifications

PARAMETER	VALUE
Height	3.96 in. (10.06 cm)
Width	23.00 in. (58.42 cm)
Depth	2.25 in. (5.72cm)
Weight	7 pounds (3.18 kg) (approximate)

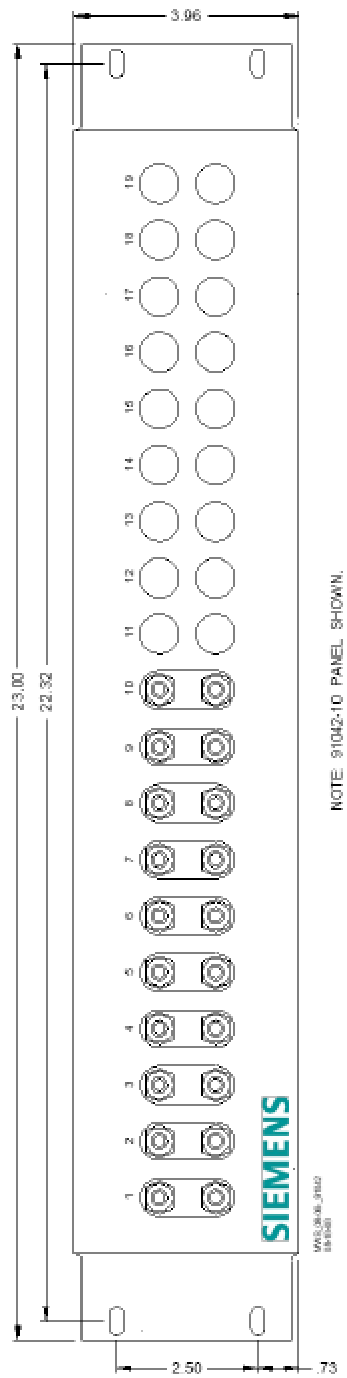


Figure 7-30 Cable Termination Panel Assembly, 91042

7.11 SSCC III Lighting Surge Panels, 91170-1 and 91181-1

WARNING

WARNING

ANY ALTERNATIVE SURGE PROTECTION DEVICE MUST BE ANALYZED TO ENSURE THAT FAILURE MODES OF THE DEVICE DO NOT COMPROMISE THE SAFETY OF GCP5000 GCE SYSTEM, I.E., CROSSES & GROUNDS.

The SSCC IIIi Lighting Surge Panels provide external I/O primary surge protection for the 80405 Solid State Crossing Controller IIIi (SSCC IIIi) module and grade crossing gate controller circuitry.

The 91170-1, Figure 7-31 provides common return gate control. The 91181-1, Figure 7-32 provides isolated gate control Both Surge Panels have built-in secondary surge protection for all external I/O.

7.11.1 Lighting Surge Panel Description

The SSCC III Lighting Surge Panels provide:

- Arresters and equalizers for surge protection
- Standard AREMA binding posts for cable connections to the flashing lights, gates, and bells
- Gate battery circuit protection
- Insulated links in the underground cable connections. These allow quick circuit isolation for testing and measurements without disarranging cable circuits
- Adjustable resistors in the **NEAR GATE** Lamp 1 (**L1**) and Lamp 2 (**L2**) circuits. These provide compensation for different wire lengths (cabling) to the crossing flashing lamps as well as compensate for unequal voltage drops between the two lamp cables
- Steering diodes for the Crossing Controller Gate Control output to provide gate control circuit isolation.

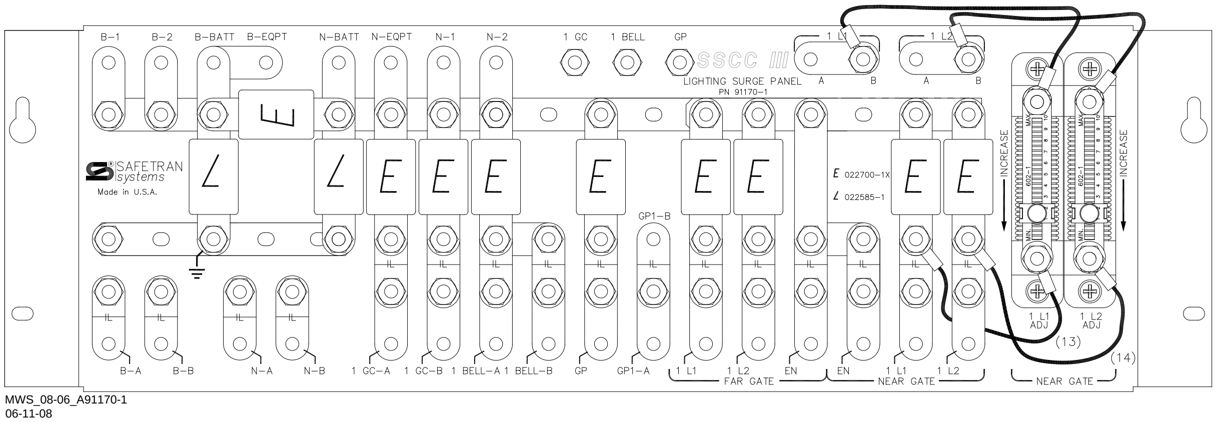


Figure 7-31 SSCC III Lighting Surge Panel, 91170-1

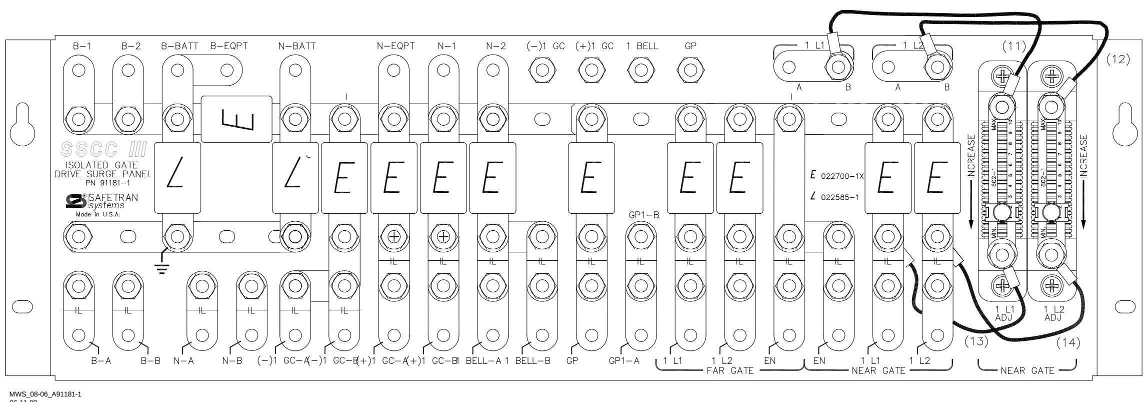


Figure 7-32 SSCC III Lighting Surge Panel, 91181-1

7.11.2 Insulated Test Links

Insulated testing links, , are provided to allow crossing wires to be isolated for test purposes.

The insulated testing link contains an integral insulating washer.

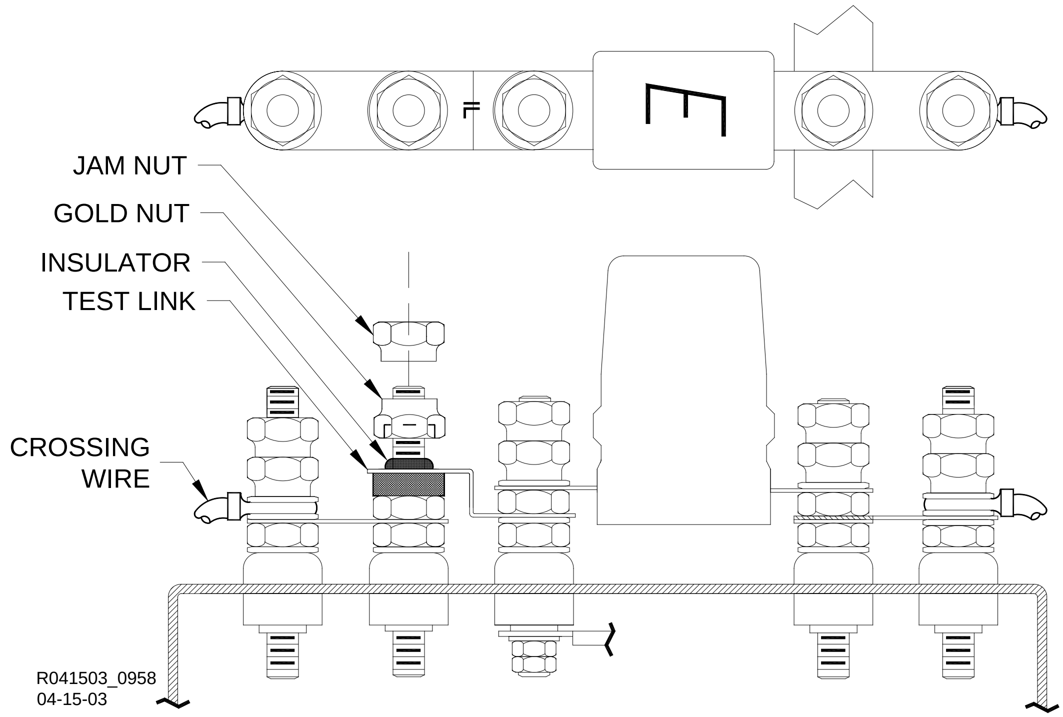
Contact between the insulated testing link and the AREMA binding post is accomplished using a gold plated nut.

The gold-plated nut is secured on the binding post using a standard jam nut.

The gold-plated nut has a recess for the insulator.

Loosening the gold nut until contact between it and the test link is lost opens the link.

When the gold plated nut is tightened the link is closed.



SHOWN IN OPEN POSITION

Figure 7-33 Insulated Test Link

7.11.3 Surge Panel I/O Interface

Table 7-8 SSCC III Lighting Surge Panels, 91170-18, 91181-1 Interfaces

PARAMETER	VALUE
I /O Interface Type:	Standard AREMA binding posts
Lamp Cable Compensation:	Adjustable resistors for Near Gate Lamp 1 and Lamp 2
Test/Measurement:	Special insulated links on all connections to the crossing for quick circuit isolation.
Surge Protection:	Surge protection is provided on the following gate interface terminals: L1 (lamp 1 output for Near and Far Gates) L2 (lamp 2 output for Near and Far Gates) En (lamp common for Near and Far Gates) GP (gate position input) 1 BELL (bell outputs for Near and Far Gates) 1 GC (gate controls for Near and Far Gates) B (battery + input) N (battery return)

7.11.4 SSCC III Lighting Surge Panels, 91170-1& 91181-1 Specifications

Table 7-9 SSCC III Lighting Surge Panels, 91170-1& 91181-1 Specifications

PARAMETER	VALUE
Height	6.97 in. (17.70 cm)
Width	23.00 in. (58.42 cm)
Depth	3.56 in. (9.04cm)
Weight	10 pounds (4.41 kg) (approximate)

7.11.5 SSCC III Lighting Surge Panels, 91170-1& 91181-1Mounting Dimensions

The 91170-1 SSCC III Lighting Surge Panel is housed in a Black powder-coat metal panel designed for wall, backboard, or rack mount. The unit mounting dimensions are provided in Figure 7-34.

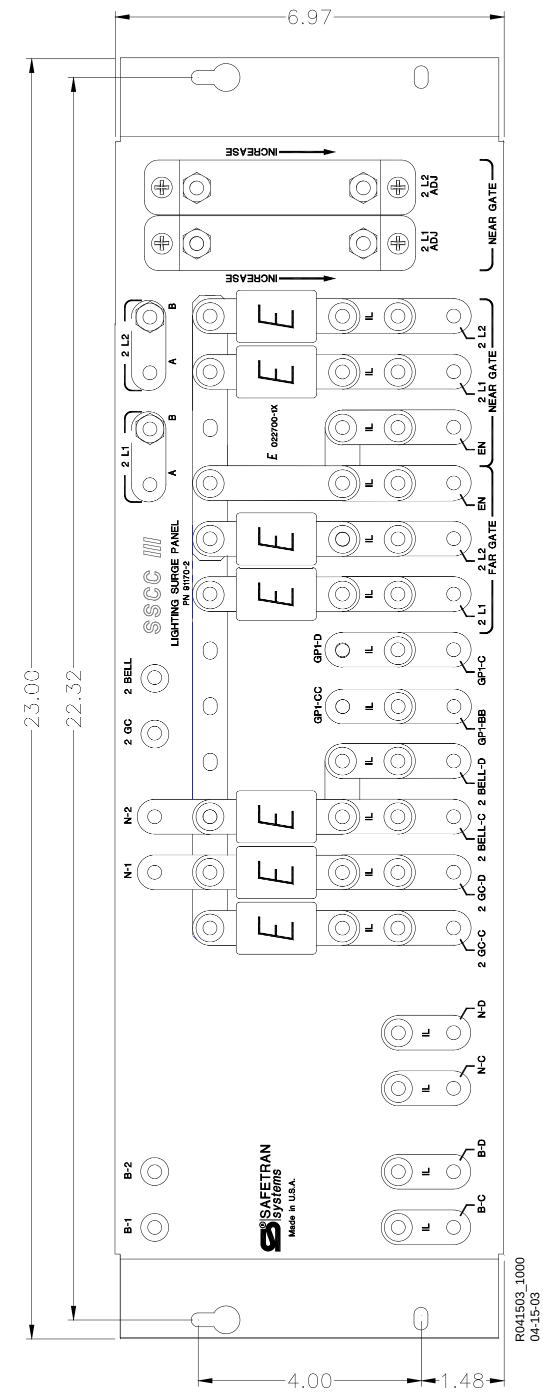


Figure 7-34 SSCC III Lighting Surge Panel Mounting Dimensions

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SECTION 8
DETAILED CASE AND MODULE DESCRIPTION

8 DETAILED CASE AND MODULE DESCRIPTION

The GCP5000 (GCE) consists of:

- a case assembly
- a motherboard
- plug-in circuit modules
- plug-in external wiring connectors

8.1.1 Case Assemblies

Each GCP5000 (GCE) case assembly consists of a powder-coated steel case with a backplane-mounted motherboard.

The A80905 contains:

- A80903-2021 CPU III
- Up to five A80428 PSO modules
- Up to two A80405 SSCC IIIi internal crossing controller modules
- Up to three, A80413 RIO Modules. These can be used in place of the PSO modules in Slots 2,4, and 5 (named as M3, M5, and M6 in Figure 8-3)
- A80410 SEAR IIi module
- A80485 Display Module

8.1.2 Motherboard

The Motherboard for each assembly provides:

- GCE unit wiring
- Circuit module connectors
- External Configuration Device Connector(s)
- Chassis Identification Chip socket(s)
- Interface connectors for external wiring connectors
- Echelon LONTALK® PROTOCOL LAN connector (See Siemens Echelon Configuration Handbook, COM-00-07-09).
- The RJ-45 Ethernet connectors

8.1.3 Plug-In Circuit Modules

Each GCP5000 (GCE) plug-in circuit module is equipped with:

- A dual 43-pin connector on one edge that plugs into a corresponding edge connector on the motherboard.
- Locking ejector levers at the top and bottom of each module to facilitate removal from the case.
- SSCC IIIi and CPU III Modules include a screw locking mechanism for securing modules.

WARNING

WARNING

SSCC IIII MODULES MUST BE SECURED IN PLACE BY A SCREW LOCKING MECHANISM. ACCIDENTAL REMOVAL OF THE SSCC IIII MODULE WILL CAUSE THE GATES TO DROP WITHOUT GATE DELAY AND FLASHING LIGHTS WILL NOT ACTIVATE.

8.1.4 External Wiring Connectors & Wire Size

All external wiring to a GCP5000 (GCE) is by means of plug-in connectors. The orange cage-clamp connectors for the signal circuits should use 16 to 12 AWG wire. The orange cage-clamp connector for the Echelon Lon Talk should use communication-grade twisted wires of at least 20 AWG. The green Screw-Lock connectors for the CPU and the SSCC should use 10 AWG wire.

NOTE

NOTE

Generic spare connectors that are not keyed for specific modules may be ordered. Refer to the catalog for ordering information.

8.1.5 Wire Preparation

Strip insulation from the end of the wire as follows:

Table 8-1 Wire Preparation Standards

CONNECTOR TYPE	STRIP LENGTH
Screw terminal	0.28” (7 mm)
Cage clamp	0.32” – 0.35” (8 – 9 mm)

NOTE

NOTE

Use a stripping tool to accurately set the strip length.

The addition of ferrules is not required.

8.1.6 Screw-terminal Connector Wire Insertion

Wires are secured to the screw-terminal connector as follows:

- Insert the stripped end of a wire into the wire receptor of the connector until it stops
- Tighten the screw to a torque of 4.5 inch pounds (0.508 Newton meters)

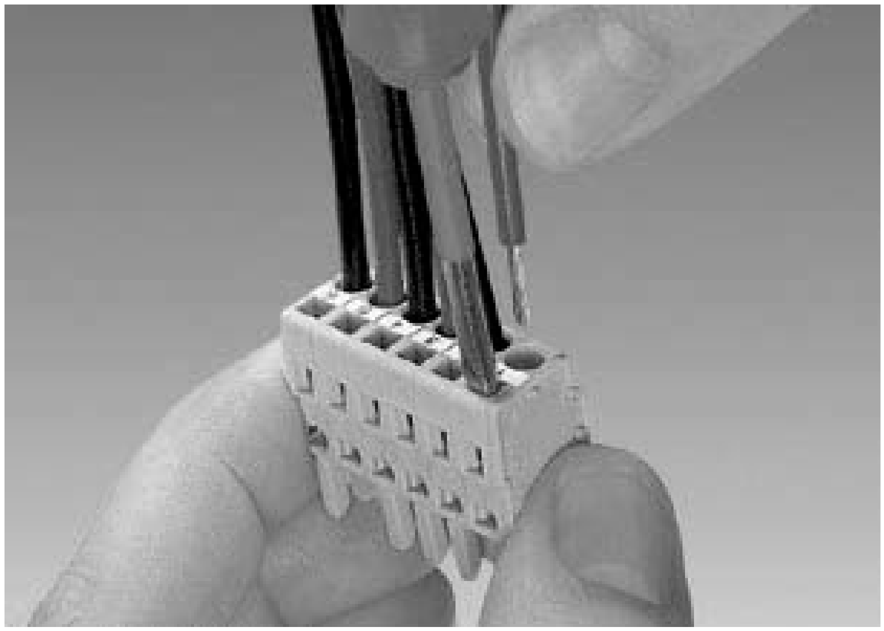

Figure 8-1 Insertion of Wire into Cage-clamp Connector

8.1.7 Cage-clamp Connector Wire Insertion

Wires are secured to the cage-clamp connector as follows:

- Place a flat-bladed screwdriver in the rectangular slot in the connector next to the wire receptor (see Figure 8-1).
- Use a screwdriver blade 0.10 in. wide and 0.020 in. thick (2.5mm x 0.5mm)
- Lever the wire cage clamp open by pressing straight down on the screwdriver
- Insert the stripped end of a wire into the fully-open wire receptor until it stops
- Hold the wire in place and release the screwdriver blade pressure
- The wire receptor closes on the stripped end of the wire

8.2 Five Track Case, A80905

The Five Track Case, A80905 is shown in Figure 8-2.

NOTE

NOTE

The module slot allocations shown below the module connectors are assigned for discussion purposes only and do not appear on the actual case assembly.

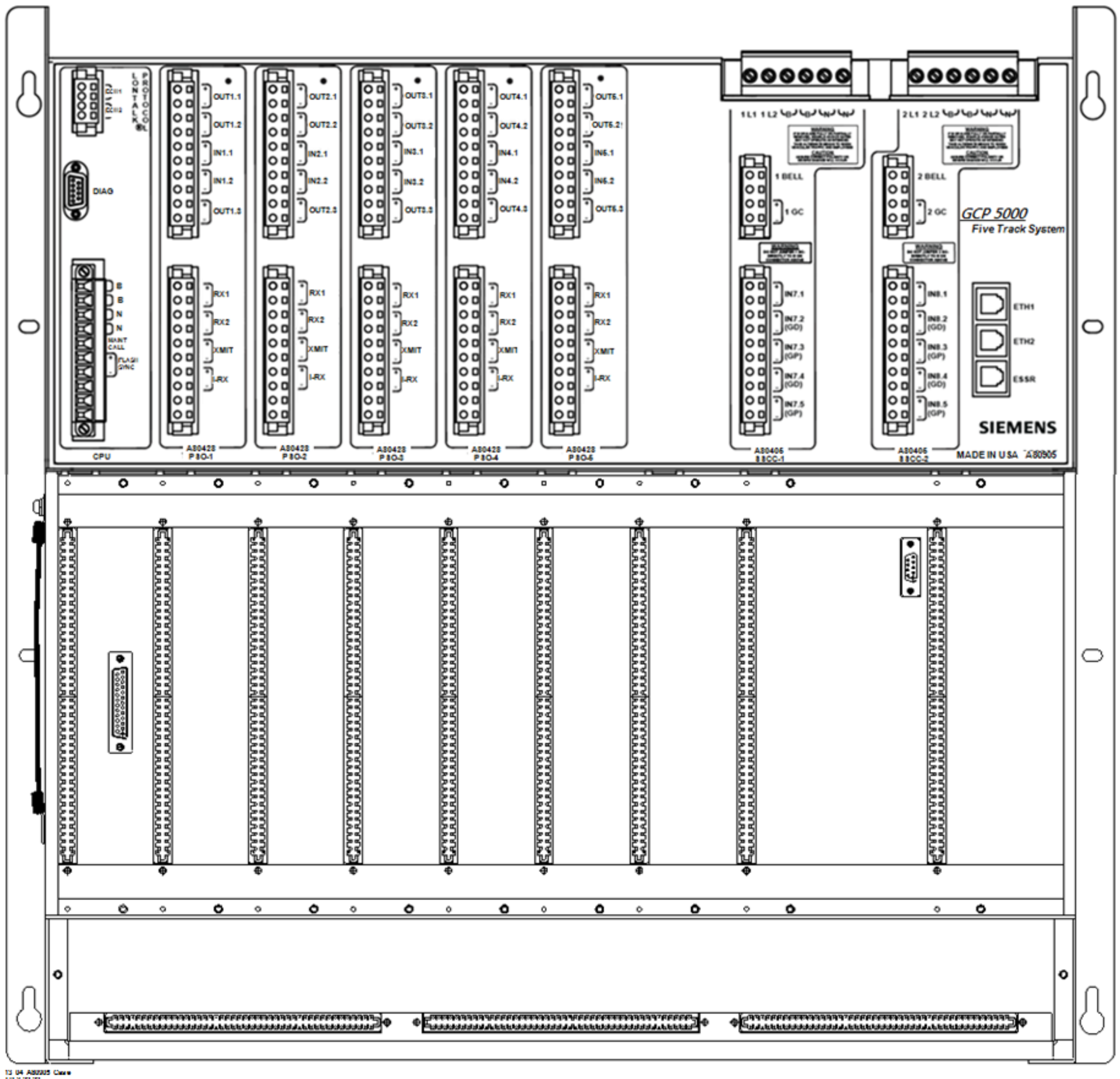

Figure 8-2   Five Track Case, A80905

8.2.1   Five Track Case, A80905 Modules and Subassembly

The A80905 Five Track case with the following modules installed is shown in Figure 8-3

- A80903 Central Processor Unit III (CPU III) module in slot position M1.
- Five A80428 PSO modules in slot positions M2 through M6.
- Two A80405 Solid State Crossing controller Modules in slot positions M7 and M8
- A80485-1 Display Module in slot position M9
- A80410 Siemens Event Analyzer Recorder IIi (SEAR IIi) subassembly in the bay below modules

NOTE

NOTE

The A80413 RIO module may be used in place of the PSO module in slot positions M3, M5, and M6.

8.2.2 Five Track Case, A80905 Interface Connector to Module Relationship

The relationship between the interface connectors and the Five Track Case, A80905 modules is shown in Figure 8-3.

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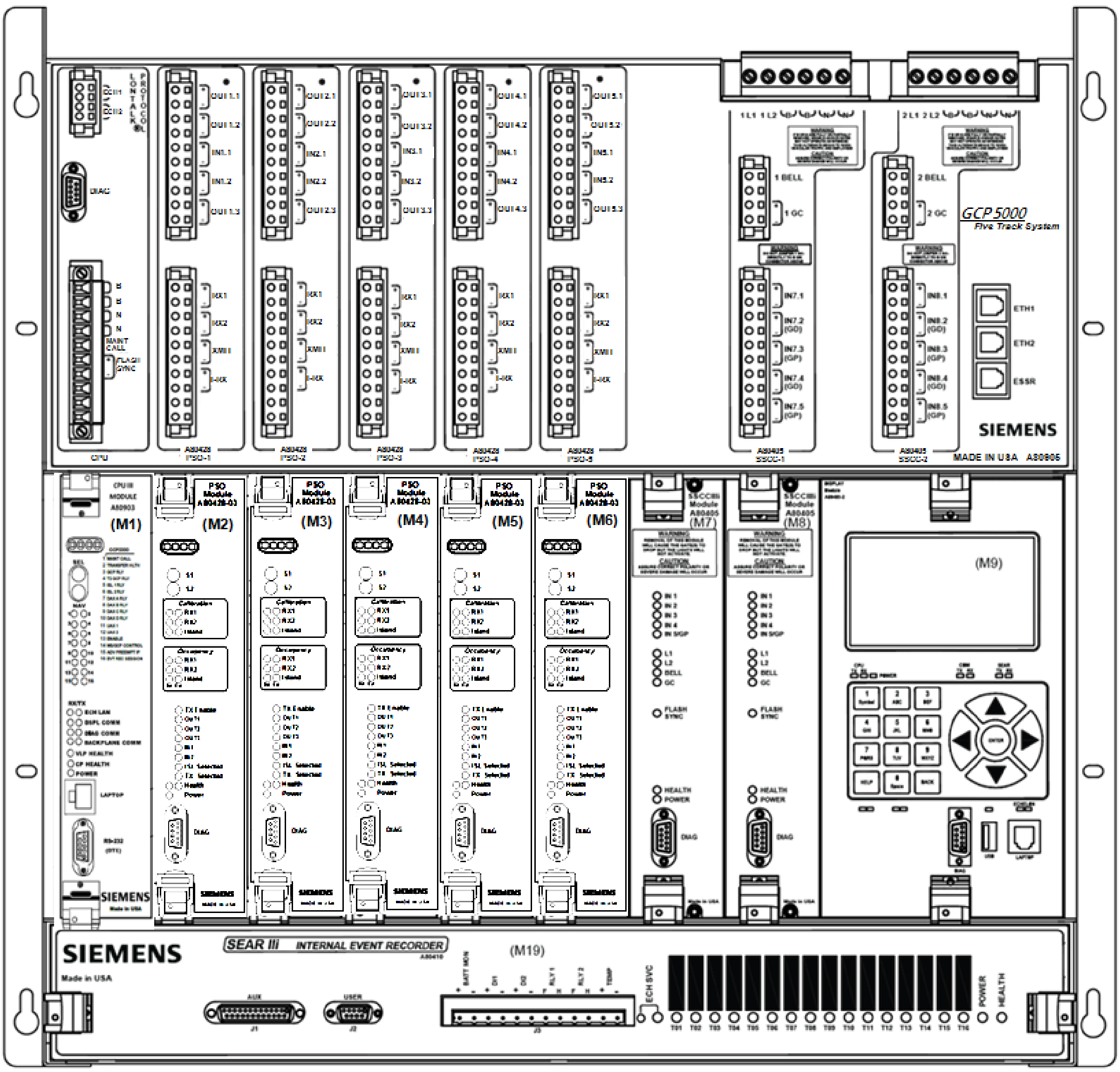

Figure 8-3 Five Track Case, A80905 With Modules and SEAR IIi Installed

Table 8-2 Five Track Case, A80905 Module to Interface Connector Relationship

Module	Slot Position	Interface Connector
A80903-2021	M1	CPU III
A80428-03	M2	PSO-1
A80428-03 or A80413	M3*	PSO-2 / RIO-1
A80428-03	M4	PSO-3
A80428-03 or A80413	M5*	PSO-4 / RIO-2
A80428-03 or A80413	M6*	PSO-5 / RIO-2
A80405	M7	SSCC-1
A80405	M8	SSCC-2
A80485	M9	Display

*Note: A80413 RIO may be used in slots M3, M5, and M6

8.2.3 Five Track Case, A80905 External Wiring Connectors

The external wiring connectors of the Five Track Case, A80905 are shown in Figure 8-4 and described in Table 8-3.

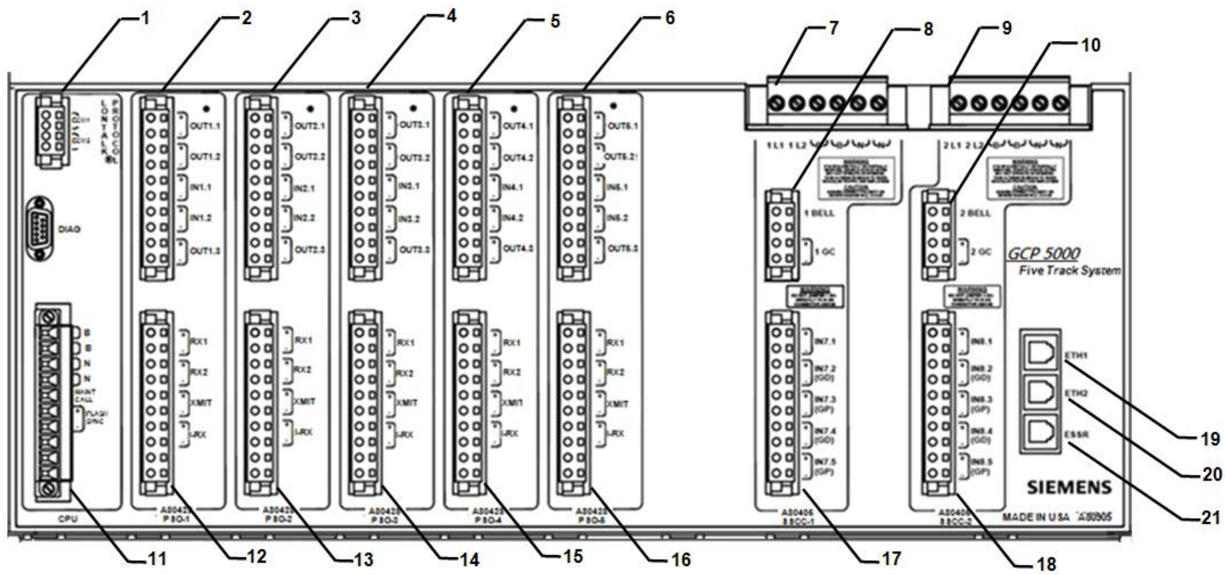

Figure 8-4 Five Track Case, A80905 External Wiring Connectors

Table 8-3 Five Track Case, A80905 External Wiring Connectors

REF. NO.	CONNECTOR DESCRIPTION	CONNECTOR DESIGNATION	SIEMENS PART NUMBER
1	4-pin cage clamp, female	LONTALK® PROTOCOL	Z715-09099-0000
2	Keyed 10-pin cage clamp, female	Upper TRACK-1	Z715-02101-0001
3	Keyed 10-pin cage clamp, female	Upper TRACK-2	Z715-02101-0002
4	Keyed 10-pin cage clamp, female	Upper TRACK-3	Z715-02101-0003
5	Keyed 10-pin cage clamp, female	Upper TRACK-4	Z715-02101-0004
6	Keyed 10-pin cage clamp, female	Upper TRACK-5	Z715-02101-0005
7	6-pin screw terminal, male	SSCC-1 power and lamp	Z715-02118-0001
8	Keyed 4-pin cage clamp, female	Upper SSCC-1	Z715-02106-0001
9	6-pin screw terminal, male	SSCC-2 power and lamp	Z715-02118-0002
10	Keyed 4-pin cage clamp, female	Upper SSCC-2	Z715-02106-0002
11	10-pin cage clamp, female	CPU	Z715-02101-0007
12	Keyed 10-pin cage clamp, female	lower TRACK-1	Z715-02101-0008
13	Keyed 10-pin cage clamp, female	lower TRACK-2	Z715-02101-0009
14	Keyed 10-pin cage clamp, female	lower TRACK-3	Z715-02101-0010
15	Keyed 10-pin cage clamp, female	lower TRACK-4	Z715-02101-0011
16	Keyed 10-pin cage clamp, female	lower TRACK-5	Z715-02101-0012
17	Keyed 10-pin cage clamp, female	Lower SSCC-1	Z715-02101-0014
18	Keyed 10-pin cage clamp, female	Lower SSCC-2	Z715-02101-0015

8.3 Plug-in Modules and Assemblies

8.3.1 CPU III Module, A80903-2021

The A80903-2021 CPU III Module is a central processing unit that provides all vital logic processing functions for all GCP5000 (GCE) chassis that control GCE LAN and vital and non-vital serial communications interfaces with front panel CPU connectors.

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8.3.1.1 CPU III Module, A80903 User Interface

The CPU III front panel is shown in Figure 8-5. The CPU III user interface is described in Table 7-5.

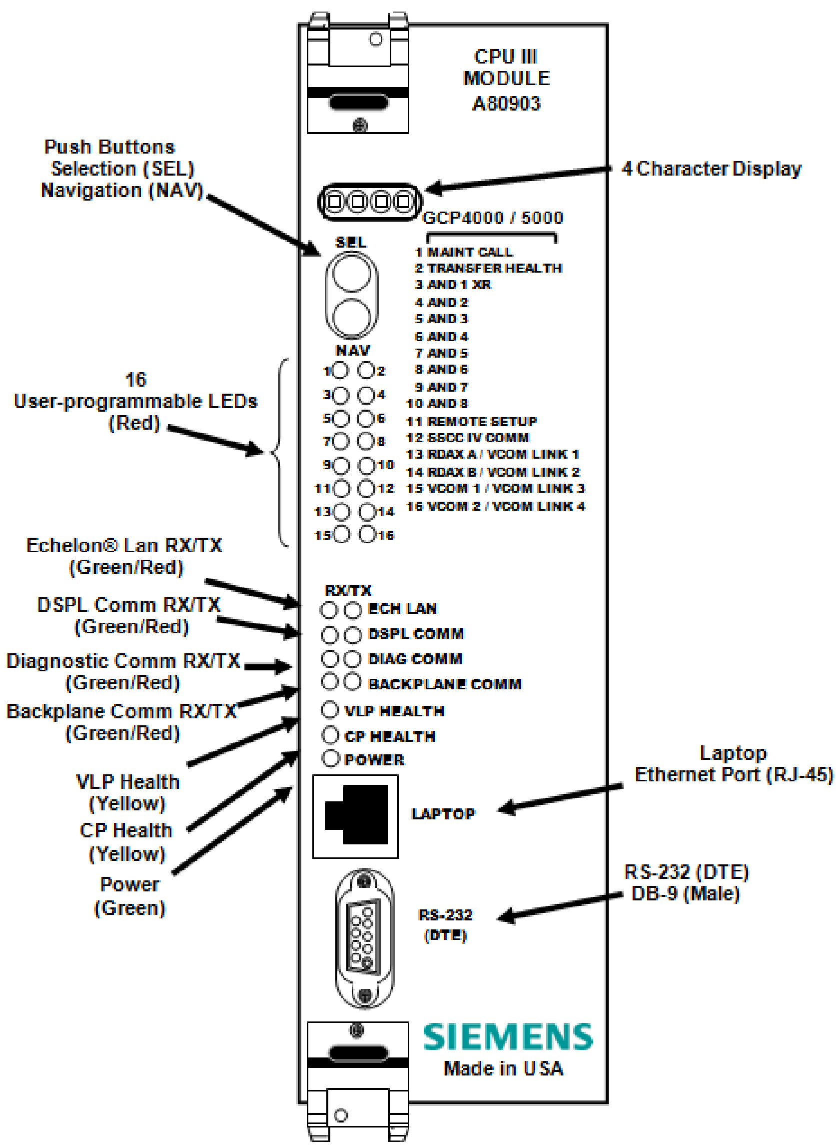


Figure 8-5 CPU III Module, A80903 Front Panel

Table 8-4 CPU III Indicators, Controls, and Connectors

Item	Name	Function
Displays	4-character display	Used with the SEL and NAV push buttons to provide a maintainer interface.
Controls	2-Push Button Select/Navigate	Select (SEL) button steps through each menu The Navigate (NAV) button steps through each submenu of the selected menu.
Indicators	16 LEDs (red)	See Figure 8-5
Connectors	RS-232 (DTE) Serial Port (DB-9)	RS-232 (DTE) is used to interface the CPU III Communication Processor externally to other modules in the GCP chassis to program the modules
	LAPTOP Ethernet (RJ-45)	RJ-45 Ethernet port used to interface the CPU Vital Communication Processor with a laptop / personal computer. Provides access to external communication configuration files via the Web User Interface (Web UI)

Table 8-5 CPU III LED Indicators

LED		Function	Description
Name	**Color**		
1 Maint Call	Red	Maintenance Call	On – maintenance call output on (system healthy, Maintenance Lamp Call is off) Off – maintenance call output off (system unhealthy, Maintenance Lamp Call is on)
2 Transfer Health	Red	Transfer Health	On – transfer signal is being generated Off – transfer signal is not being generated.
3 (AND 1 XR)	Red	AND 1 XR	On – AND 1 XR is energized Off – AND 1 XR is Deenergized
4 thru 10 AND 2 to AND 8	Red	AND 2 through AND 8	On – AND 2-8 is Energized Off – AND 2-8 is Deenergized or Not Used
11 Remote Setup	Red	Not Used	Not Used
12 SSCC IV Comm	Red	Vital Comms Status for indicated link	SSCC IV in vital session with CPU III
13: RDAX A/ VCOM LINK1	Red	Vital Comms Status for indicated link	VComms Link 1 is in session with another GCP system
14: RDAX B/ VCOM LINK2	Red	Vital Comms Status for indicated link	VComms Link 2 is in session with another GCP system
15: VCOM 1/ VCOM LINK3	Red	Vital Comms Status for indicated link	VComms Link 3 is in session with another GCP system
16: VCOM2/ VCOM LINK4	Red	Vital Comms Status for indicated link	VComms Link 4 is in session with another GCP system
ECH LAN RX	Grn	Echelon Message Received	Flashes when the CPU is receiving an ATCS message via the Echelon LAN.
ECH LAN TX	Red	Echelon Message Sent	Flashes when the CPU is transmitting an ATCS message via the Echelon LAN.
DSPL COMM RX	Grn	Display Port Message Received	Flashes when the CPU is receiving data from the display module.
DSPL COMM TX	Red	Display Port Message Sent	Flashes when the CPU is sending data to the display module.
DIAG COMM (CP) RX	Grn	Diag Port Message Received	Flashes when the CPU is receiving data from the communications processor diagnostic (DIAG CP) serial port.
DIAG COMM (CP) TX	Red	Diag Port Message Sent	Flashes when the CPU is transmitting data on the communications processor diagnostic (DIAG CP) serial port.
BACK-PLANE COMM RX	Grn	Backplane Message Received	Flashes when the VLP is receiving data from the serial bus.
BACK-PLANE COMM TX	Red	Backplane Message Sent	Flashes when the VLP is sending data onto the serial bus.
VLP HEALTH	Yel	VLP Health Status	Flashes slowly (1Hz) when the CPU VLP is functioning normally. Flashes fast (4Hz) when the VLP is unhealthy
CP HEALTH	Yel	CP Health Status	Flashes slowly (1Hz) when the CP is functioning normally.
POWER	Grn	Power Indication	On steadily when power is applied to the module.

Table 8-6 CPU III GCP Display Messages

Display	Mode	Meaning	System State
GCP5000	Scrolling	VLP is healthy	CPU is healthy.
BOOT	Steady	CPU is booting up.	CPU is booting up. Crossing is activated.
CRC*	Steady	MCF CRC is incorrect for the current MCF	Entered CRC does not match the CRC of MCF. Crossing is activated.
MCF*	Steady	CPU is not healthy because the MCF is not valid.	Reboot CPU or reload MCF. Crossing is activated.
SIN*	Steady	The site Identification Number is invalid.	Enter valid SIN. Crossing is activated.
VLP UCFG	Scrolling	VLP is unconfigured.	No comm to I/O modules. Crossing is activated.
VLP INITIAL	Scrolling	The CP is transferring the configuration from NVRAM to the VLP.	No comm to I/O modules. Crossing is activated.
BURNING MCF	Scrolling	The CP is copying the MCF from the ECD into flash memory.	No comm to I/O modules. Crossing is activated.
NO VLP COMMS	Scrolling	The CP is not communicating with the VLP. VLP could be rebooting or performing its initial configuration checks	No comm to I/O modules. Crossing is activated.
ERASING THE ECD	Scrolling	Erasing its flash memory in preparation for copying the MCF from the ECD into flash memory.	No comm to I/O modules. Crossing is activated.
ADR*	Steady	The Vital comms neighbor ATCS address is invalid	Address of Vital comms session cannot be computed. Enter valid SIN
INI*	Steady	Rebooting	System Reboot - Crossing is activated.
Exxx	Steady	Internal error, System will reboot. xxx is 3 digit hex number	Reload MCF - Crossing is activated.
LMCF	Steady	Rebooting	System Reboot - Crossing is activated.
ICHK	Steady	Rebooting	System Reboot - Crossing is activated.

The following table shows the diagnostic messages generated by the CPU III.

Table 8-7 Diagnosing CPU Module Problems

Diag Display / Description	Cause	Remedy
ADR **ATCS Session address invalid (Diag3015)** / The neighbor ATCS VCom address is invalid.	Usually occurs when the ATCS Site Address (SIN) is not entered correctly	Reenter ATCS Site Address (SIN)
CAP **MCF Capability Error (Diag3016)** / The CPU is not capable of running this MCF	Usually occurs when using a recent MCF on an old CPU	Obtain an MCF requiring a lower capability CPU, or update the MEF on the existing CPU to work with the desired MCF.
CCN **CCN Incorrect (Diag3021)** / The CCN is incorrect for the configuration.	After loading a configuration file, the CCN is incorrect.	Reload the configuration file and repower the CPU card. If the error continues, perform Set to Default and reprogram the unit.
CIC **CIC Access Error (Diag3022)** / CPU unable to access data stored in CIC	If CIC access error is on the MAIN CPU	1. Replace the CPU with a known good spare, Original CPU is defective. 2. If an error does not clear, CIC is bad; replace GCP chassis.
CRC **MCF/MEF CRC** Incorrect / The MCF/MEF CRC is incorrect for the current MCF	MCF CRC entered is incorrect (Diag 3004)	Reload MCF CRC.
	MCF is corrupt (Diag 3003)	Reload the MCF.
	The executive (MEF) file is corrupt. (Diag 3014)	Reload the MEF.
CRPT **MCF Checksum Incorrect (Diag3003)** / The MCF did not load correctly.	The MCF is corrupt	Reload MCF

Diag Display / Description	Cause	Remedy
DFT **Default Values set (DIAG3001)** / Operating parameters have been set to default.	New MCF has been loaded	Set the operating parameters to the required values
DFT **Vital Cfg Parms set to default (DIAG3002)** / Vital Cfg parameters have been set to default.	New MCF has been loaded or UCN changed	Set the Vital Cfg parameters to the required values
DFT **Configuration set to default (DIAG3017)** / Configuration set to default.	The configuration parameters have been set back to default due to either: • MCF change • Template change • User setting default	Wait. The error will clear itself.
INIT **No VLP Comms (DIAG3020)** / The VLP/CP LED on the CPU card does not light	The VLP is rebooting or is in its Initial State and performing its initial checks. This may occur after a VLP reset, or after changing templates.	Wait for a minute for the VLP to power up. If the VLP does not power up, check to see if it is continuously rebooting by checking the VLP Health LED.
MCF **MCF Checks failed (DIAG3005)** / Verification of MCF data failed.	The MCF is invalid.	Obtain and load a valid MCF.
MCF **MCF Compatibility incorrect (DIAG3013)** / MCF and MEF are incompatible	The installed MCF is incompatible with the MEF software	Obtain compatible MCF or MEF software
MOD **Module Type Error (DIAG3006)** / The MEF software is incompatible with the module hardware.	The MEF is incompatible with this hardware.	Reload a valid MEF for this hardware.

Diag Display / Description	Cause	Remedy
UCFG **VLP Unconfigured (Diag3018)** / VLP is unconfigured and not communicating with I/O modules	Usually due to: • Incorrect MCF CRC; • MCF not loaded • MCF not stored in ECD (ECD replaced); • No ATCS Site ID (SIN) entered for Vital Comms application	Check other diagnostic message for the exact cause.

The normal sequence of messages seen on the four-character display when a CPU III is booting up (4000 MCF shown here) is shown below:

CPU3 > Boot > Init > E087 > ICHK > CP MEF > VLP MEF > GCP 4k MCF

If a CPU III is inserted into a system that does not have the MCF loaded it will need to load the MCF from the ECD, in this case, the boot up message sequence is shown below:

CPU3 > Boot > Init > E087 > ICHK > CRC UCFG > NRBT > Loading MCF > Burning MCF > DONE > Boot > IP : Laptop > Init > ICHK > CP MEF > VLP ME > GCP 4k MCF

Note the E087 may or may not be present in the sequence above.
If the CPU III has been unpowered for more than a week and then it is inserted into a system, the boot up sequence may show the following:

CPU3 > Boot > Init > E087 > ICHK > CRC.. UCFG.. ERR ..ECD

In this case, leave the CPU III installed in the system with power on for 1 minute, then remove the CPU III module and reinsert it and it should boot up normally showing one of the first two sequences shown above.

NOTE

NOTE

If the CPU III has been unpowered for more than a week and then it is inserted into an existing system it may show UCFG ERR ECD.

In this case, leave the CPU III installed in the system with power on for 1 minute, then remove the CPU III module and reinsert it and it should boot up normally showing one of the first two sequences.

8.3.2 Phase Shift Overlay (PSO) Module, A80428-03

The GCP5000 (GCE) Phase Shift Overlay (PSO) Module, A80428-03, provides

- A PSO transmitter or Island (both transmitter and receiver)
- 2 PSO receivers
- 2 isolated vital inputs
- 3 isolated vital outputs

8.3.2.1 PSO Module, A80428-03 Front Panel

The PSO module front panel is shown in Figure 8-6. The user interface is described in Table 8-8.

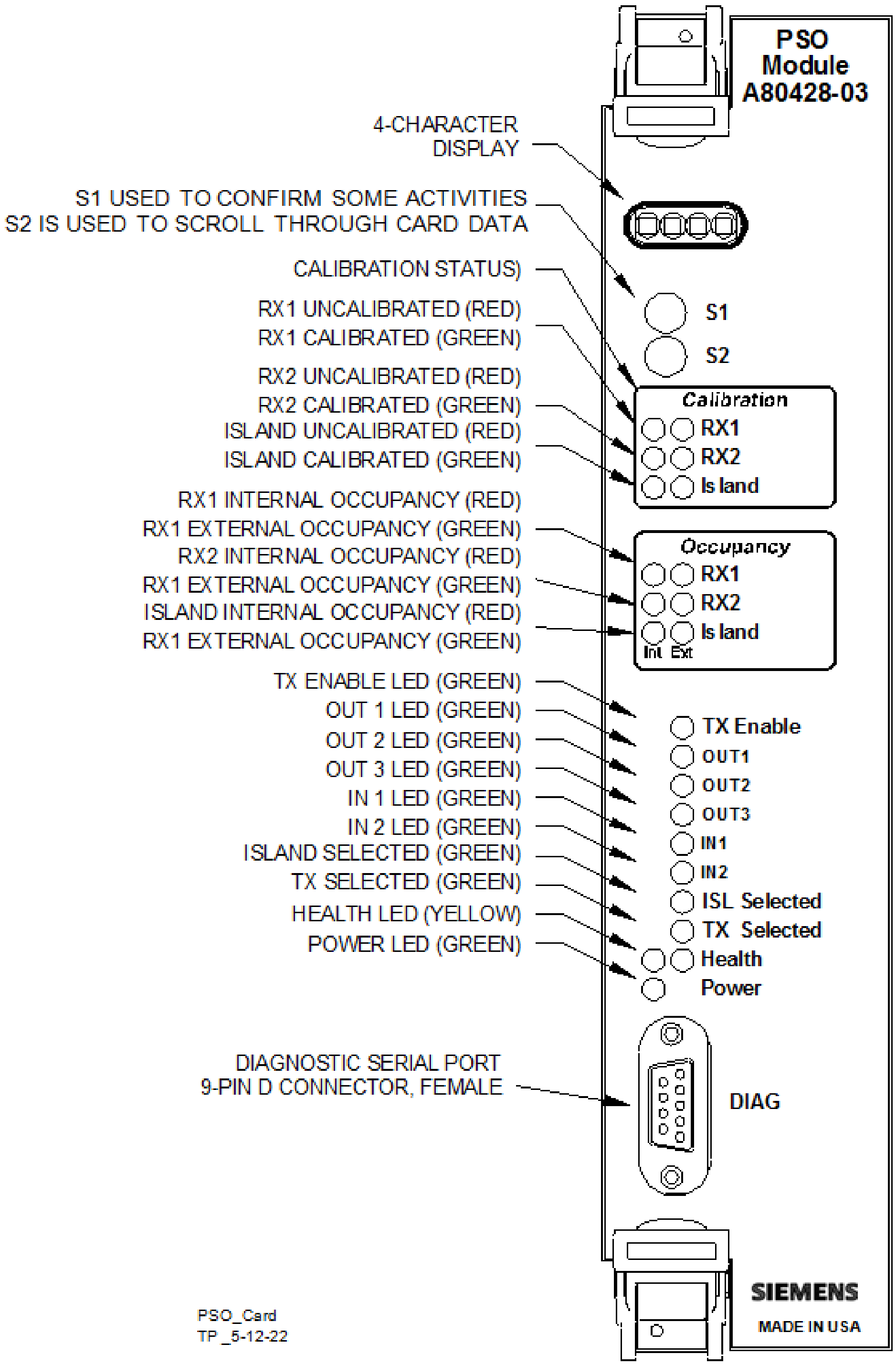


Figure 8-6 PSO Module, A80428-03 Front Panel

Table 8-8 PSO Module, A80428-03 User Interface

LEDS		DESCRIPTION
NAME	COLOR	
RX1	Red	RX1 not calibrated
RX1	Green	RX1 is calibrated
RX2	Red	RX2 not calibrated
RX2	Green	RX2 is calibrated
Island	Red	Island not calibrated
Island	Green	Island is calibrated
RX1 (Int)	Red	On – RX1 Internal track circuit is unoccupied Off – RX1 Internal track circuit is occupied Flashing – RX1 Internal track circuit is running its pickup delay
RX1 (Ext)	Green	On – RX1 External track circuit is unoccupied Off – RX1 External track circuit is occupied Flashing – RX1 External track circuit is running its pickup delay
RX2 (Int)	Red	On – RX2 Internal track circuit is unoccupied Off – RX2 Internal track circuit is occupied Flashing – RX2 Internal track circuit is running its pickup delay
RX2 (Ext)	Green	On – RX2 External track circuit is unoccupied Off – RX2 External track circuit is occupied Flashing – RX2 External track circuit is running its pickup delay
Island (Int)	Red	On – Island Internal track circuit is unoccupied Off – Island Internal track circuit is occupied Flashing – Island1 Internal track circuit is running its pickup delay
Island (Ext)	Green	On – Island External track circuit is unoccupied Off – Island External track circuit is occupied Flashing – Island External track circuit is running its pickup delay
TX Enable	Green	On – TX is enabled Off – TX is disabled
OUT 1	Red	On – output energized Off – output de-energized or failed
OUT 2	Red	On – output energized Off – output de-energized or failed
OUT 3	Red	On – output energized Off – output de-energized or failed
IN 1	Red	On – input energized Off – input de-energized or failed
IN 2	Red	On – input energized Off – input de-energized or failed
HEALTH	Yellow	Slow (1Hz) – module is healthy and communicating with CPU. Fast (2Hz) – module is healthy but not communicating with CPU. Very Fast (4Hz) – module is unhealthy and communicating with CPU.
POWER	Green	On steadily when power is applied to the module

When the PSO is healthy and has no Diagnostic messages it will show the following as scrolling text:

Table 8-9 PSO Scrolling Text Messages

Mode	Display
Crossing mode	RX1/ISL/RX2 f1/f/2/f3 c1/c2 Where: f1 is frequency of RX1 f2 is frequency of island f3 is frequency of RX2 c1 is code received by RX1. N means no code c2 is code received by RX2. For example: RX1/ISL/RX2 348/4000/430 A/C
TX/RX mode	TX/RX1/RX2 f1/f/2/f3 c1/c2/c3 Where: f1 is frequency of TX f2 is frequency of RX1 f3 is frequency of RX2 c1 is code transmitted by TX. N means no code c2 is code received by RX1. C3 is code received by RX2. For example: TX/RX1/RX2 348/285/430 A/C/N
RX mode with 2 receivers	RX1/RX2 f1/f/2 c1/c2 Where: f1 is frequency of RX1 f2 is frequency of RX2 c1 is code received by RX1. N means no code c2 is code received by RX2. For example: RX1/RX2 348/430 A/C
RX mode with 1 receiver	RX1 f1/c1 Where: f1 is frequency of RX1 c1 is code received by RX1. N means no code For example: RX1 348/A

The PSO module provides a menu system that will allow the user to see the received signal levels and calibrate the receivers or inland

When crossing mode with 2 receivers and an island

Press S1 to enter the menu system, the press S2 to move to the next item

- ISL SIG LVL = 9200 (signal level shown)
- RX1 SIG LVL = 1000/A (signal level and received code shown)
- RX2 SIG LVL = 920/C (signal level and received code shown)
- ISL CAL 4000 (ISL frequency shown)
- RX1 CAL 430 (RX1 frequency shown)
- RX2 CAL 285 (RX2 frequency shown)

If on the ISL CAL menu, pressing the S1 will change the text to

CAL ISL?

To start the island calibration, hold down the S1 button for 2s, the display will show *CAL / CAL, and start the calibration process. When calibration is finished it will show PASS or FAIL.

If on the RX1 CAL menu, pressing the S1 will change the text to

CAL RX1?

To start the RX1 calibration, hold down the S1 button for 2s, the display will show *CAL / CAL and start the calibration process. When calibration is finished it will show PASS or FAIL.

RX2 CAL is similar.

On startup, the display will show the following if there are no diagnostic messages present.

- BOOT
- INIT
- scrolling MEF name (e.g., GPP01_03.MEF)
- ISTB – may be shown briefly
- RX1/ISL/RX2 348/4000/430 A/C

If there are diagnostic messages present the display will scroll round and show which DIAG messages are present.

Table 8-10 Diagnostic Messages

Diag Text	Description
1CAL	Calibration required for RX1
2CAL	Calibration required for RX2
ICAL	Calibration required for Island
1FRQ	Frequency not set for RX1
2FRQ	Frequency not set for RX2
IFRQ	Frequency not set for the island
1OOS	RX1 is out of service
2OOS	RX2 is out of service
IOOS	Island out of service
1COD	RX1 receiving unexpected code
2COD	RX2 receiving unexpected code
1RCV	RX1 receiver unhealthy
2RCV	RX2 receiver unhealthy
IXMT	Island transmitter error
PXMT	PSO transmitter error
PXFR	PSO frequency error
RECV	PSO recovering from an unhealthy state
UCFG	No comms to the CPU module

Table 8-11 Diagnosing PSO Module Problems

The following table shows the diagnostic messages generated by the PSO Module.

Diag Display / Description	Cause	Remedy
PSO Receiver 1 Recovering (Diag7001)	PSO Receiver 1 Out of Service	The PSO Receiver runs a 30s recovery timeout after an error has cleared
PSO Receiver 1 Out of Service (Diag7002)	PSO Receiver 1 Out of Service	If the PSO receiver is not meant to be out of service, use the display module or out of service inputs (if used) to put the PSO receiver back into service
PSO Receiver 1 Recovering (Diag7001)	PSO receiver 1 is recovering from a health error	Wait for 30s, if the error does not reoccur, then this will clear
PSO Receiver 1 Out of Service (Diag7002)	PSO Receiver 1 is out of service	Information only.
PSO Receiver 1 Frequency Error (Diag7003)	The PSO Receiver 1 frequency has not been set	Select the frequency specified on the site plans from the GCP Programming menu
PSO Receiver 1 Calibrating (Diag7004)	PSO Receiver 1 is currently calibrating	Wait a minute for calibration to complete.
PSO Receiver 1 Calibration Error (Diag7005)	PSO Receiver 1 failed calibration	a) Check that the receiver is configured properly in the Program menu. b) Check the physical connections. c) Replace the module.
PSO Receiver 1 Sample Error (Diag7006)	PSO Receiver 1 hardware error in the receiver	If the problem persists replace the module
PSO Receiver 1 Wrong Code (Diag7007)	PSO Receiver 1 receiving an unexpected code	PSO Receiver 1 is detecting a code it is not configured to accept check plans and field wiring.

Diag Display / Description	Cause	Remedy
PSO Receiver 1 Calibration Required (Diag7008)	PSO Receiver 1 Calibration Required	Check that the Receiver is programmed correctly, and then calibrate it as described in the manual.
PSO Receiver 2 Recovering (Diag7011)	PSO receiver 2 is recovering from a health error	Wait for 30s, if the error does not reoccur, then this will clear
PSO Receiver 2 Out of Service (Diag7012)	PSO Receiver 2 is out of service	If the PSO receiver is not meant to be out of service, use the display module or out of service inputs (if used) to put the PSO receiver back into service
PSO Receiver 2 Frequency Error (Diag7013)	The PSO Receiver 2 frequency has not been set	Select the frequency specified on the site plans from the GCP Programming menu
PSO Receiver 2 Calibrating (Diag7014)	PSO Receiver 2 is currently calibrating	Wait a minute for calibration to complete.
PSO Receiver 2 Calibration Error (Diag7015)	PSO Receiver 2 failed calibration	a) Check that the receiver is configured properly in the Program menu. b) Check the physical connections. c) Replace the module.
PSO Receiver 2 Sample Error (Diag7016)	PSO Receiver 2 hardware error in the receiver	If the problem persists replace the module
PSO Receiver 2 Wrong Code (Diag7017)	PSO Receiver 2 receiving an unexpected code	PSO Receiver 2 is detecting a code it is not configured to accept check plans and field wiring.
PSO Receiver 2 Calibration Required (Diag7018)	PSO Receiver 2 Calibration Required	Check that the Receiver is programmed correctly, and then calibrate it as described in the manual.
PSO Transmitter Recovering (Diag7021)	The PSO Transmitter runs a 30s recovery timeout after an error has cleared	Wait for 30s, if the error does not reoccur, then this will clear

Diag Display / Description	Cause	Remedy
PSO Transmitter Out of Service (Diag7022)	The PSO Transmitter is currently Out of Service	If the PSO transmitter is not meant to be out of service, use the display module or out of service inputs (if used) to put the PSO transmitter back into service
PSO Transmitter Frequency Error (Diag7023)	PSO Transmitter frequency has not been set	Select the frequency specified on the site plans from the GCP Programming menu
PSO Transmitter Error (Diag7024)	The PSO Transmitter is detecting an error.	a) Check that the transmit wires are connected properly. b) Check for open terminations, open couplers, or open bonds.
Island Self Test Error (Diag7030)	The Island is detecting large variations in the Island receive signal.	a) Check for interfering signals on the track b) Change IPI frequencies c) Replace the module
Island Recovering (Diag7031)	The Island runs a 30s recovery timeout after a health error has cleared	Wait for 30s, if the error does not reoccur, then this will clear
Island Out of Service (Diag7032)	The island is currently Out of Service	If it is not meant to be out of service, use the display module or out of service inputs (if used) to put the island back into service
Island Frequency Error (Diag7033)	The Island frequency has not been set	Select the frequency specified on the site plans from the GCP Programming menu
Island Calibrating (Diag7034)	The Island is currently calibrating.	Please wait a minute for the calibration to complete.
Island Calibration Error (Diag7035)	The Island failed calibration.	a) Check that the island is configured properly in the Program menu. b) Check the physical connections. c) Replace the module.
Island Sample Error (Diag7036)	Island hardware error in the receiver	If the problem persists, replace the module

Diag Display / Description	Cause	Remedy
Island Calibration Required (Diag7037)	The Island requires calibration.	Check that the Island is programmed correctly, and then calibrate it as described in the manual.
Island Transmit Error (Diag7038)	The Island is detecting a fault in the connections.	a) Check that the transmit wires are connected properly. b) Check for open terminations, open couplers, or open bonds.
Island Stabilizing (Diag7039)	On startup, the Island output stabilizes for about 10s.	Waits 10s for the message to clear
Low-level Hardware Error (Diag7041)	The hardware on this module has a failure.	Replace the module.
Unconfigured (Diag7042)	The module is not communicating properly with the CPU.	a) Check the MCF supports this module in this slot. b) Check the card is set to Used in the programming. c) Ensure the CPU is fully operational. d) Replace this module. e) Replace the CPU.
Output State Error (Diag7051)	The module is detecting the state of an output is incorrect.	a) check that the output is not shorted. b) replace the module.
Command/Configuration Incompatibility (Diag7052)	The module is being commanded to a state that is contrary to its programming.	Please check that the configured parameters match the desired operation.

8.3.3 RIO Module, A80413

The RIO Module, A80413 provides four vital inputs and four vital outputs. The I/O functions are selected by the user. There are four isolated vital inputs and four isolated vital outputs.

8.3.3.1 RIO Module User Interface

The RIO module front panel is shown in Figure 8-7. The user interface is described in Table 8-12.

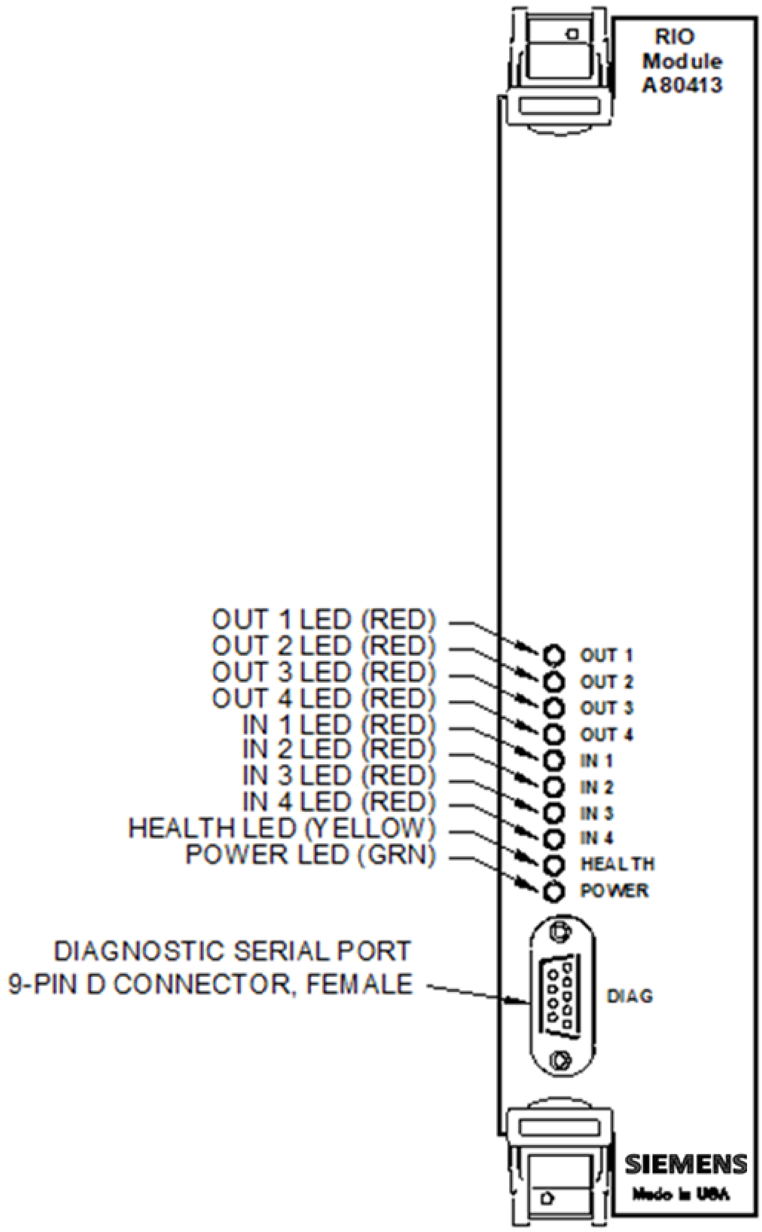


Figure 8-7 RIO Module, A80413 Front Panel

Table 8-12 RIO Module, A80413 User Interface

Component	Function
OUT 1 LED	Lights red when vital Output 1 is energized.
OUT 2 LED	Lights red when vital Output 2 is energized.
OUT 3 LED	Lights red when vital Output 3 is energized.
OUT 4 LED	Lights red when vital Output 4 is energized.
IN 1 LED	Lights red when vital Input 1 is energized.
IN 2 LED	Lights red when vital Input 2 is energized.
IN 3 LED	Lights red when vital Input 3 is energized.
IN 4 LED	Lights red when vital Input 4 is energized.
HEALTH LED	Lights yellow. Flashes approximately 1 pulse per second when a module is fully operational, 2 pulses per second when a module is not communicating with the CPU, and approximately 8 pulses per second when a fault is detected within the module.
POWER LED	Lights green to indicate that power is applied to the RIO module.
DIAG Diagnostic Serial Port	9-pin diagnostic serial port for RIO module.

Table 8-13 Diagnosing RIO Module Problems

The following table shows the diagnostic messages generated by the RIO Module

Diag Display / Description	Cause	Remedy
No Communications (Diag4017)	No Communications indicates that the RIO card is not communicating with the CPU	a) Check that there is a module in the appropriate slot b) Check that the power light on the module is on c) Check to see if the module is continuously rebooting, (health LED goes off for 10s, then on for 10s), if it is, then replace the module d) If the module is not continuously rebooting, then check to see if the module is unconfigured (health LED is flashing fast). If only this module is UCFG, then replace it, if all modules are unconfigured then replace the CPU

8.3.3.2 Solid State Crossing Controller IIIi, A80405 (SSCC IIIi)

The Solid State Crossing Controller IIIi, A80405 (SSCC IIIi), is activated by crossing activation logic from the GCP CPU module and provides operational control for the following grade crossing equipment:

- gates, including gate delay.
- lamps.
- bells.

⚠ WARNING

WARNING

TAKE ALTERNATE MEANS TO WARN VEHICULAR TRAFFIC, PEDESTRIANS AND EMPLOYEES IF:

- **THE SSCC IIII MODULE OR B OR N ARE FULLY REMOVED. THE SIGNALS WILL BE DARK AND GATES WILL LOWER IMMEDIATELY WITHOUT GATE DELAY TIME.**
- **B OR N ARE FULLY OR PARTIALLY REMOVED. SIGNALS AND/OR GATES MAY NOT OPERATE AS INTENDED**

⚠ CAUTION

CAUTION

ENSURE CORRECT POLARITY OF B AND N OR SEVERE DAMAGE WILL OCCUR TO THE MODULE.

REFER TO SECTION 3 FOR DETAILED INSTRUCTIONS ON THE SSCC BEFORE APPLYING POWER TO THE SSCC IIIi POWER CONNECTOR(S).

8.3.4 SSCC IIIi User Interface

The SSCC IIIi module front panel is shown in Figure 8-8.

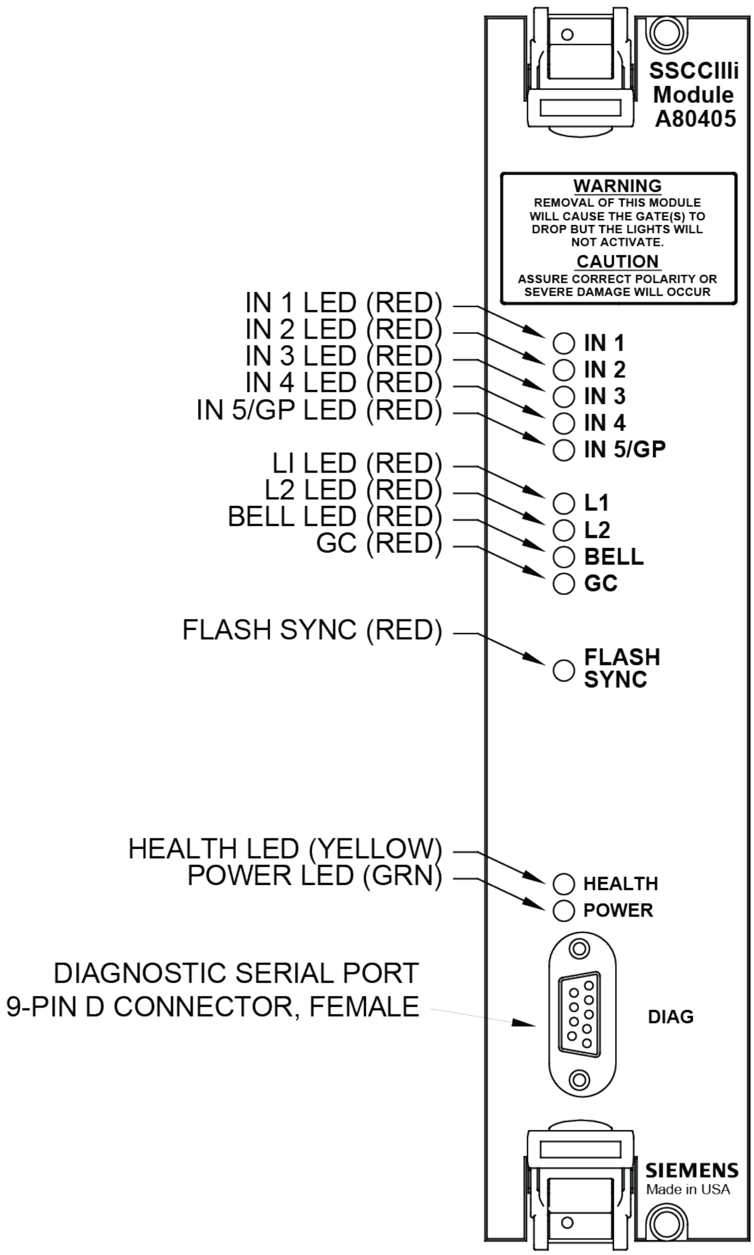


Figure 8-8 SSCC IIIi Front Panel

Table 8-14 describes the SSCC IIIi user interface.

Table 8-14 SSCC IIIi Module User Interface

Component	Function
IN 1 LED	Lights red when crossing input to 1 is energized.
IN 2 LED	Lights red when crossing input to 2 is energized.
IN 3 LED	Lights red when crossing input to 3 is energized.
IN 4 LED	Lights red when crossing input to 4 is energized.
IN 5/GP LED	Lights red when crossing input to 5 is energized.
L1 LED	Lights red when Lamp Output L1 is on.
L2 LED	Lights red when Lamp Output L2 is on.
BELL LED	Lights red when bell output is on.
GC LED	Lights red when gate control (GC) output is energized.
FLASH SYNC LED	Flashes red when sync pulse is present at FLASH SYNC input/output.
HEALTH LED	Lights yellow. Flashes approximately 1 pulse per second when a module is fully operational, 2 pulses per second when a module is not communicating with the CPU, and approximately 4 pulses per second when a fault is detected within the module.
POWER LED	Lights green to indicate that power is applied to the SSCC IIIi module.
DIAG Diagnostic Serial Port	9-pin diagnostic serial port for the SSCC IIIi module.

Table 8-15 Diagnosing SSCC IIIi Module Problems

The following table shows the diagnostic messages generated by the SSCC IIIi Module.

Diag Display / Description	**Cause**	**Remedy**
Crossing Lamp Failure (Diag2001)	Lamp driver has failed	Replace the module
Lamp Neutral Wire Open (Diag2002)	The SSCC IIIi has detected that the lamp neutral wire is open LED Lamps are being driven by the SSCC	Check the neutral wire to the lamps Turn off Lamp Neutral Test in SSCC programming
Low Battery Warning (Diag2003)	The battery voltage has dropped below the Low Battery Detection level set in the program	If the Low Battery Detection Level is set correctly, then the battery requires maintenance or replacement
Lamp Voltage Limited (Diag2005)	The user tried to set the lamps above the battery voltage	Reduce the lamp voltages to be less than the battery voltage
No Communications (Diag2017)	No Communications indicates that the SSCC IIIi module is not communicating with the CPU	a) Check that there is a module in the appropriate slot b) Check that the power light on the module is on c) Check to see if the module is continuously rebooting, (health LED goes off for 10s, then on for 10s), if it is, then replace the module) If the module is not continuously rebooting, then check to see if the module is unconfigured (the health LED is flashing fast). If only this module is UCFG, then replace it, if all modules are unconfigured then replace the CPU

8.3.5 Display, A80485-1

The Siemens A80485-1 Display Module is the next generation display module replacing the A80407 Display Module, offering enhanced features and improved speed and responsiveness. A restructured menu reduces programming and maintenance time in the field. The addition of Ethernet ports offers connectivity to a network or Ethernet devices. A powered Ethernet port is available for devices deriving their power from an Ethernet connection. The Laptop port enables the user to connect a laptop computer to the display to configure parameters, update software, and download logs. The display screen and keypad provide a local user interface, allowing operation without the need for a computer.

Figure 8-9 Display Module, A80485-1

NOTE

NOTE
Eth 1 and Eth2 on the Display Module are disabled in the GCE application as these ports are available on the chassis.

8.3.5.1 GCP Display Module Controls, Indicators, Connectors, and Display

The GCP Display module controls, indicators, connectors, and display are shown in Figure 8-10 and described in Table 8-16.

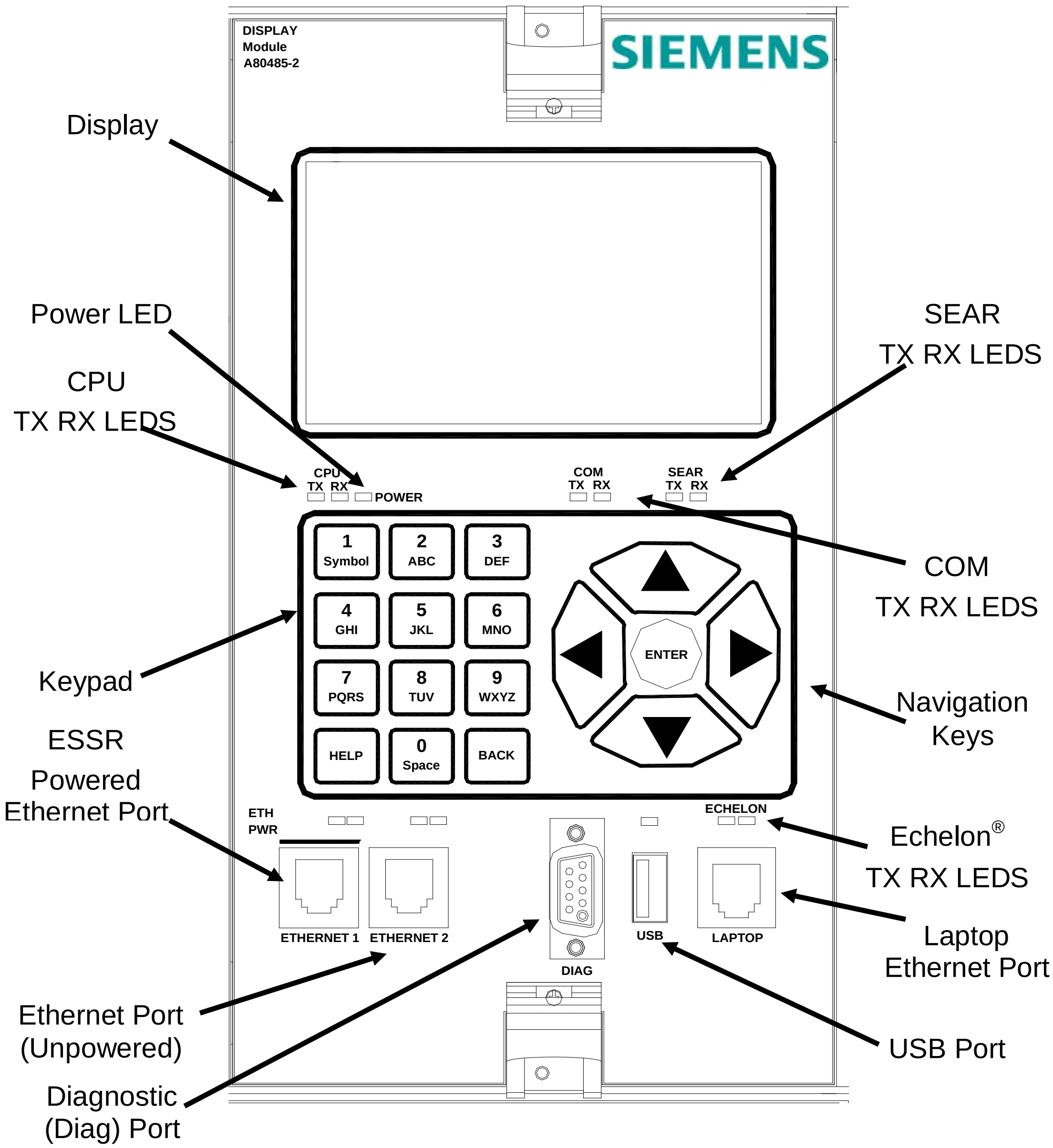


Figure 8-10 A80485 GCP Display Module Controls, Indicators, and Display

Table 8-16 Display Module Controls, Indicators, Connectors, and Display Descriptions

ITEM	DESCRIPTION
DISPLAY	2 ½ x 4 inch OLED Color Display
CONTROLS	
Keypad	12-key membrane keypad
Navigation	5-key membrane navigational cluster
INDICATORS	
Power	LED (Green)
CPU TX/RX	CPU data stream indicators TX LED (Green) RX LED (Yellow)
COM TX/RX	Communications data stream indicators TX LED (Green) RX LED (Yellow)
SEAR TX/RX	SEAR data stream indicators TX LED (Green) RX LED (Yellow)
Echelon® LAN	Echelon® LAN data indicators TX LED (Green) RX LED (Yellow)
Ethernet 1 (powered)[1]	Ethernet Power indicator LED (Green) Ethernet 1 data indicators (embedded in connector) Data: TX LED (Green) RX LED (Yellow)
Ethernet 2[1]	Ethernet 2 data indicators (embedded in connector) TX LED (Green) RX LED (Yellow)
CONNECTORS	
Ethernet 1	RJ-45 powered connector (See note)
Ethernet 2	RJ-45 connector
Diag (Diagnostics)	DB-9, Female Serial connector, RS-232
USB	USB 2.0 Type A connector
Laptop	RJ-45 connector

NOTE

NOTE

The Ethernet 1 powered connector is designed specifically for Siemens Ethernet Spread Spectrum Radios and may not power other Power-Over-Ethernet (POE) devices.

8.3.6 Siemens Event Analyzer Recorder IIi (SEAR IIi), A80410

The Siemens Event Analyzer Recorder IIi (SEAR IIi), A80410 provides continuous real-time status monitoring and event recording of the GCP5000 (GCE) and the grade crossing devices controlled by the GCP (see GCP5000 Field Manual, SIG-00-13-03 and SEAR IIi Field Manual SIG 00-08-13).

8.3.7 SEAR IIi User Interface

The SEAR IIi module front panel is shown in Figure 8-11. The user interface is described in Table 8-17.

NOTE

> **NOTE**
>
> Specific mylars are available corresponding to the CDL used for each user. See Section 1.6 for ordering information.

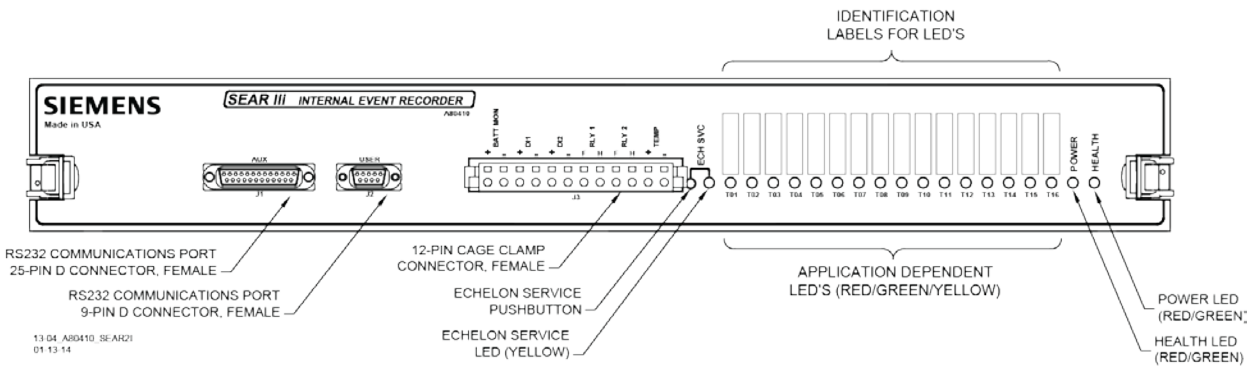


Figure 8-11 SEAR IIi Front Panel

Table 8-17 SEAR IIi Module User Interface

Component	Function
Identification Labels For User Programmable LEDs T01 through T16	Each label corresponds to a User Programmable LED and may be inscribed to identify a user-defined event.
ECH SVC LED	Flashes red until SEAR IIi is initialized.
ECH SVC Push button	Not used
POWER LED	Lights green when power is applied to SEAR IIi
HEALTH LED	Flashes green if backup battery output is within the acceptable voltage range. Flashes yellow if the backup battery is below minimum acceptable voltage. Remains off when SEAR IIi is inoperative.
User Programmable LEDs T01 through T16	Each LED illuminates to Identify the occurrence of a user-defined event. LED color (red, green, or yellow) is determined by programming.
AUX J1	Female DB-25 connector for RS232/RS422 serial interface to radio or telephone modem
USER J2	Female DB-9 connector for RS232 serial interface to printer or PC
J3	12-pin male I/O connector, providing the following functions: Two isolated digital inputs (DI1, DI2) Each input may be used to monitor up to 120V AC/DC Two isolated contact relay outputs (RLY 1, RLY 2) Temperature monitor input (TEMP) Battery monitor input (BATT MON)

8.3.8 A80435 External Configuration Device (ECD)

The ECD is a factory-installed plug-in device on the GCP5000 (GCE) backplane (see Figure 8-12) that stores the module configuration file (MCF) and the application program for the GCP5000 (GCE). The CPU Module copies the MCF from the ECD, as it is used for vital system operation.

⚠ WARNING

WARNING

IF AN ECD IS REPLACED WITH AN ECD CONTAINING A DIFFERENT MCF, THE GCP5000 (GCE) WILL COPY THE NEW MCF INTO THE FLASH ON THE CPU MODULES AND SET THE SYSTEM BACK TO DEFAULT VALUES.

8.3.9 Display USB External Configuration Device (USB ECD) A53555

The display stores its configuration data in a USB-based ECD device which plugs in behind the display module on the GCP5000 (GCE) backplane (Figure 8-12). The USB ECD stores the display's non-vital configuration data for the GCP5000 (GCE). This is used for non-vital functions only.

8.3.10 Chassis Identification Chip (CIC)

⚠ WARNING

WARNING
IF THE CIC IS REPLACED, THE USER MUST SET THE SYSTEM BACK TO DEFAULT AND REPROGRAM THE SYSTEM. FAILURE TO DO THIS COULD RESULT IN THE SYSTEM RUNNING WITH THE WRONG CONFIGURATION FOR THE SITE.

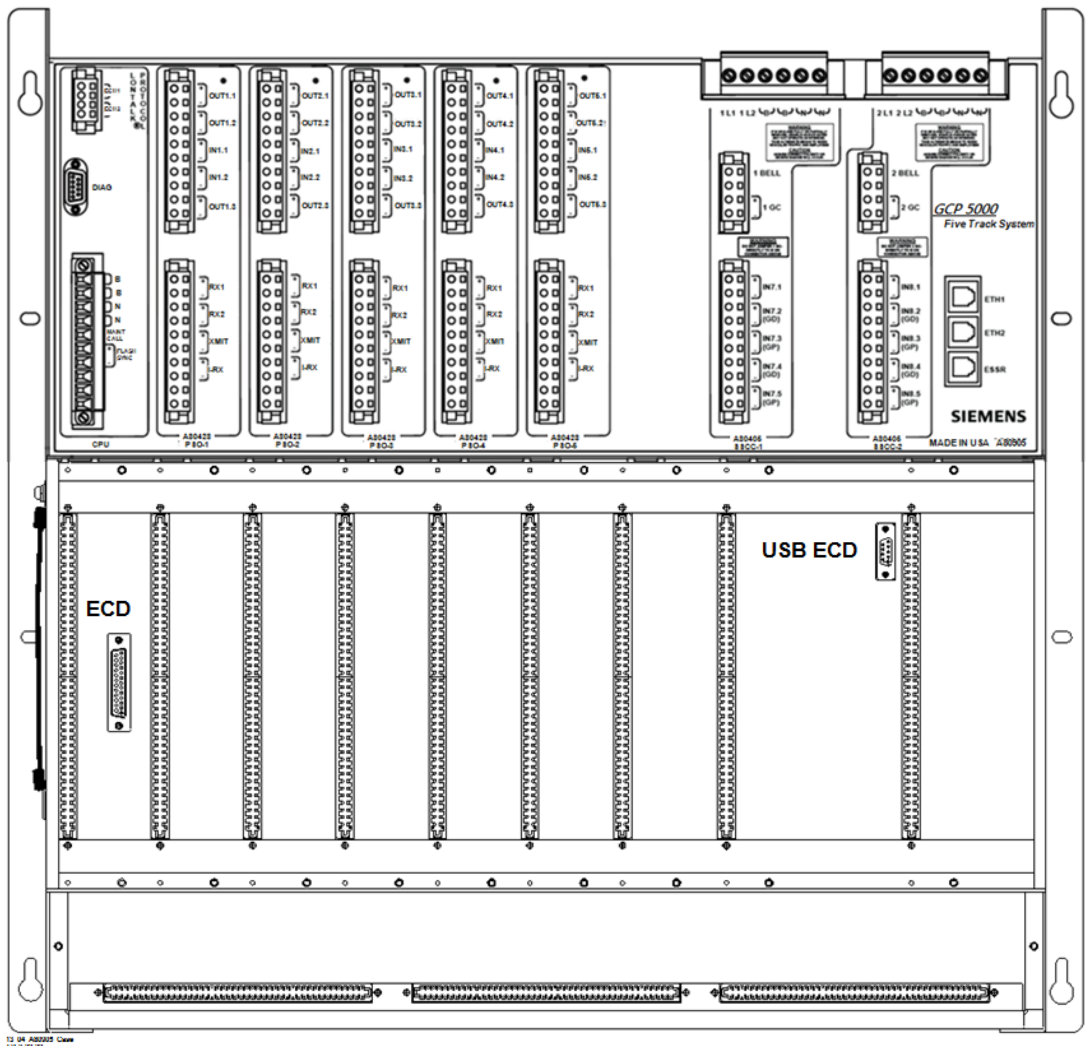
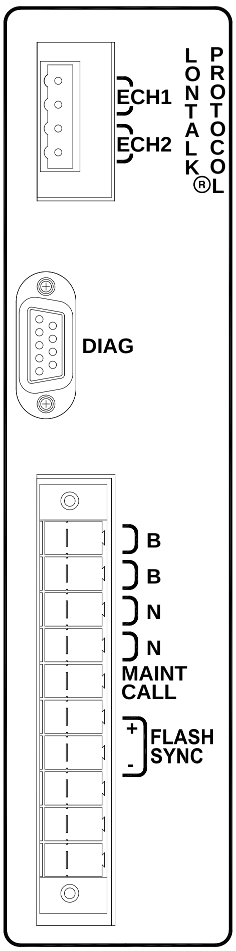


Figure 8-12 Typical ECD Locations On Backplane

8.4 Interface Connector Functions

The GCP5000 (GCE) interface connector functions are described in Table 8-18 through Table 8-21.

8.4.1 CPU Connectors



R111804_0822
01-24-04

Table 8-18 CPU Connectors

CONNECTOR	PINOUT	FUNCTION
LONTALK® PROTOCOL	ECH1	LAN Twisted pair
	ECH2	LAN Twisted pair
DIAG (not used)	2	DT_TX (not used)
	3	DT_RX (not used)
	4	GROUND (not used)
CPU	B	Battery B input to GCP
	N	Battery N input to GCP
	MAINT CALL	Output to Maintenance Call lamp in crossing bungalow. When no problem is detected within the system, the maintenance call output is held at the Battery N voltage level, causing the lamp to light. When a problem is detected within the system, the voltage is removed and the lamp is extinguished.
	FLASH SYNC	Crossing Controller lamp flash rate synchronizing signal. Used to synchronize the flash sequence and rate of multiple external controllers.

NOTE

NOTE

Effective with Revision D of the SSCC IIIi, FLASH SYNC is an isolated two-wire output.

If two Revision D or later SSCC IIIi units in the same chassis are operated by separate batteries, the FLASH SYNC returns are connected internally and no additional connection is required.

Revision D SSCC IIIi Modules can be identified by either a “D” located at end of the Part Number / Bar Code tag or by the large metal bracket located on the component side of the module.

When external SSCC units are connected to a master SSCC IIIi and operated from a different battery, the following wiring must be provided for FLASH SYNC Return:

If an external SSCC IIIA, SSCC III PLUS, or SSCC IV is connected to a master SSCC IIIi:

If the SSCC IIIi is Revision D or later, the SSCC IIIi FLASH SYNC return (-) must be connected to N on the external SSCC.

The terminology for flash sync control differs between a GCP5000 (GCE) and an external SSCC device. The GCP5000 (GCE) terms Master and Slave SSCC, are called “Flash Sync Out” and “Flash Sync In” respectively in an external SSCC (Slave = Flash Sync In)

8.4.2 PSO Connectors

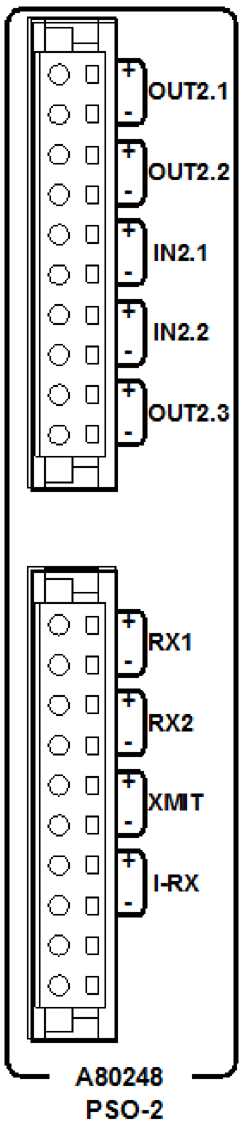


Table 8-19 PSO Connectors

CONNECTOR	PINOUT*		FUNCTION
PSO-1 PSO-2 PSO-3 PSO-4 PSO-5	+	OUT2.1	Vital output 1
	-		
	+	OUT2.2	Vital output 2
	-		
	+	IN2.1	Vital input 1
	-		
	+	IN2.2	Vital input 2
	-		
	+	OUT2.3	Vital output 3
	-		
	RX1 +		Receiver 1 input from track
	RX1 -		
	RX2 +		Receiver 2 input from track
	RX2 -		
	XMIT +		Transmit output to track
	XMIT -		
	I-RX +		Island receiver input from track
	I-RX -		

* See the following Note

NOTE

NOTE

The digit preceding the decimal point in input and output connector labels indicates the track number; e.g., OUT2.1 designates vital output 1 of the PSO-2 connector.

8.4.3 RIO Connectors

RIO Modules and their associated front panel connector groups provide additional Vital I/O.

If a RIO Module is installed in place of a PSO module, the corresponding RIO Mylar overlay should be affixed over the existing PSO module connector position to reflect proper connector nomenclature. The mylar is shown in Figure 8-13 with its Siemens part number.

Mylar Part Number:Z610-39589-0005

Table 8-20 RIO Connectors

CONNECTOR	FUNCTION		
RIO	+	OUT1	Vital output 1
	-		
	+	OUT2	Vital output 2
	-		
	+	OUT3	Vital output 3
	-		
	+	OUT4	Vital output 4
	-		
	+	IN2	Vital input 2
	-		
	+	IN3	Vital input 3
	-		
	+	IN4	Vital input 4
	-		

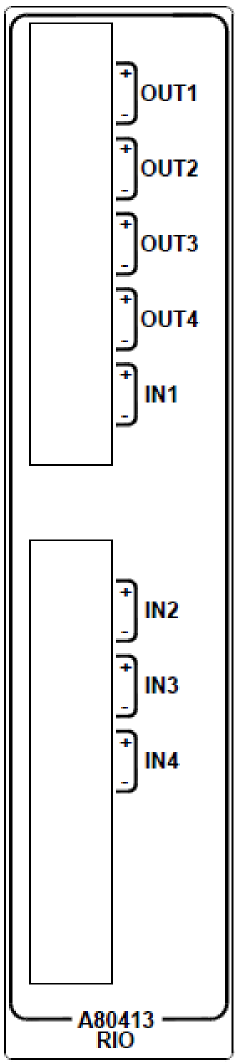
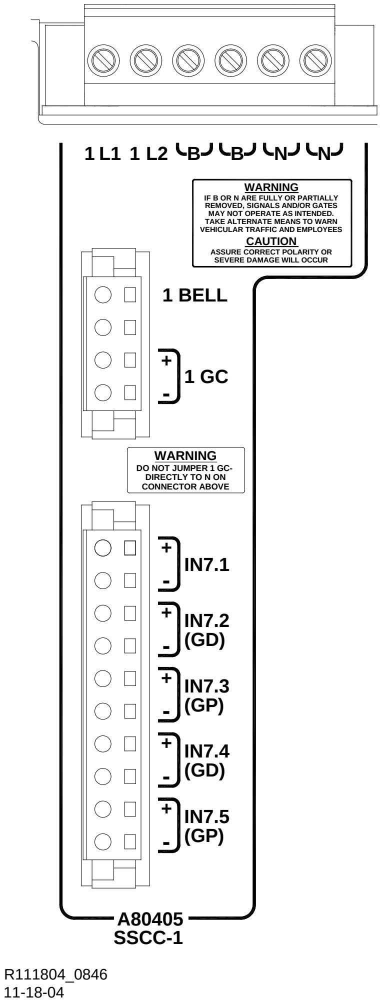


Figure 8-13 RIO Mylar Overlay Ordering Information

8.4.4 Crossing Controller Connectors

Table 8-21 Crossing Controller Connectors



CONNECTOR	PINOUT*		FUNCTION
SSCC-1 SSCC-2	1L1		Lamp output 1
	1L2		Lamp output 2
	B		Battery positive input
	B		Battery positive input
	N		Battery negative input
	N		Battery negative input
	1 BELL		Bell output
	+	1 GC	Gate output
	-		
	+	IN7.1	Vital crossing input 1
	-		
	+	IN7.2 (GD)	Vital crossing input 2 (gate down input)
	-		
	+	IN7.3 (GP)	Vital crossing input 3 (gate position input)
	-		
	+	IN7.4 (GD)	Vital crossing input 4 (gate down input)
	-		
	+	IN7.5 (GP)	Vital crossing input 5 (gate position input)
	-		

* See the following Note

NOTE

NOTE

The number preceding the lamp output connector labels indicates the SSCC associated with the connector; e.g., 1L1 is associated with SSCC-1.

The digit preceding the decimal point in input connector labels indicates the chassis SSCC slot; e.g., IN8.1 is associated with SSCC-2.

8.5 LAN Communications

Each GCP5000 (GCE) may communicate with other Siemens equipment via LONTALK® LAN (Echelon®) For further information, see Siemens's Echelon Configuration Handbook, COM-00-07-09.

8.5.1 ATCS Communication

The ATCS communication window displays a real-time view of in and out vital messages for each vital serial communications link. Vital link sessions are shown on the face of the active CPU III Module as follows:

- LED #13 – Vital Link 1
- LED #14 – Vital Link 2
- LED #15 – Vital Link 3
- LED #16 – Vital Link 4

CAUTION

CAUTION

BECAUSE THE ECHELON® INTERFACE IS NOT SURGE PROTECTED, NETWORK CONNECTIONS MUST BE RESTRICTED TO THE EQUIPMENT CONTAINED INSIDE A SIGNAL CASE OR A BUNGALOW

NOTE

NOTE

For additional information concerning the Echelon® LAN, refer to Siemens Mobility, Inc. Echelon® Configuration Handbook, COM-00-07-09. If further questions persist, contact Siemens Mobility, Inc. Technical Support.

The Wayside Access Gateway is no longer required to communicate with the GCP5000 (GCE). The communication functionality has been incorporated into the GCP5000 (GCE) hardware and software.

Vital ATCS serial protocol data may be incorporated with the LONTALK® protocol to facilitate:

- crossing control functions
- remote prediction operations via Ethernet Spread Spectrum Radio (ESSR) with the ESSR connected directly to the GCP5000 (GCE) case.
- vital communications with other Siemens Mobility, Inc. vital controllers

The following rules apples when using the Echelon LAN:

- Wire size is from #22 AWG to #16 AWG, stranded twisted pair.
- Each connection (node) must be wired in a daisy-chained bus configuration, no drops allowed (see Figure 8-15).
- The maximum wiring length of LAN bus wiring is 425 ft. (129.5 m) within a signal case or bungalow, but wiring should be kept as short as practical.

- A maximum of 8 connections (nodes) is recommended within 53 ft. (15.2 m) of cable. If necessary additional cable may be added so that no more than 8 nodes are located within any 53 ft./15.2 m length (see Figure 8-15).
- If additional connections are required, contact Siemens Mobility, Inc. Technical Support for assistance.
- In general, the Echelon® network requires a terminator for proper data transmission performance to be connected at each end of the daisy-chained bus configuration (see Figure 8-14).
- The Echelon network can be connected to ECH1 on the 5000 GCP and the Echelon terminator can be connected to ECH2 on the GCP5000 (GCE).
- Order Network Echelon Termination Unit, part number 8000-80078-001
- For further information, see Siemens Mobility, Inc. Echelon Configuration Handbook, COM-00-07-09.

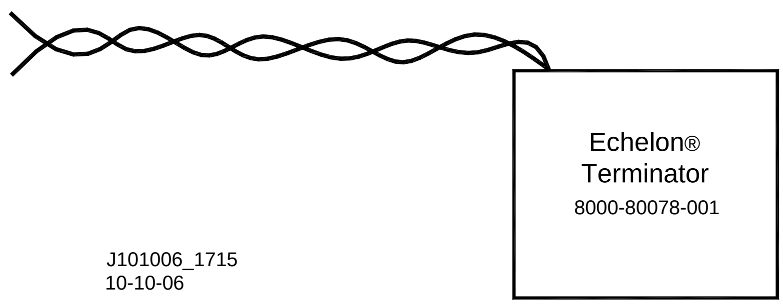


Figure 8-14 Siemens Echelon® Terminator

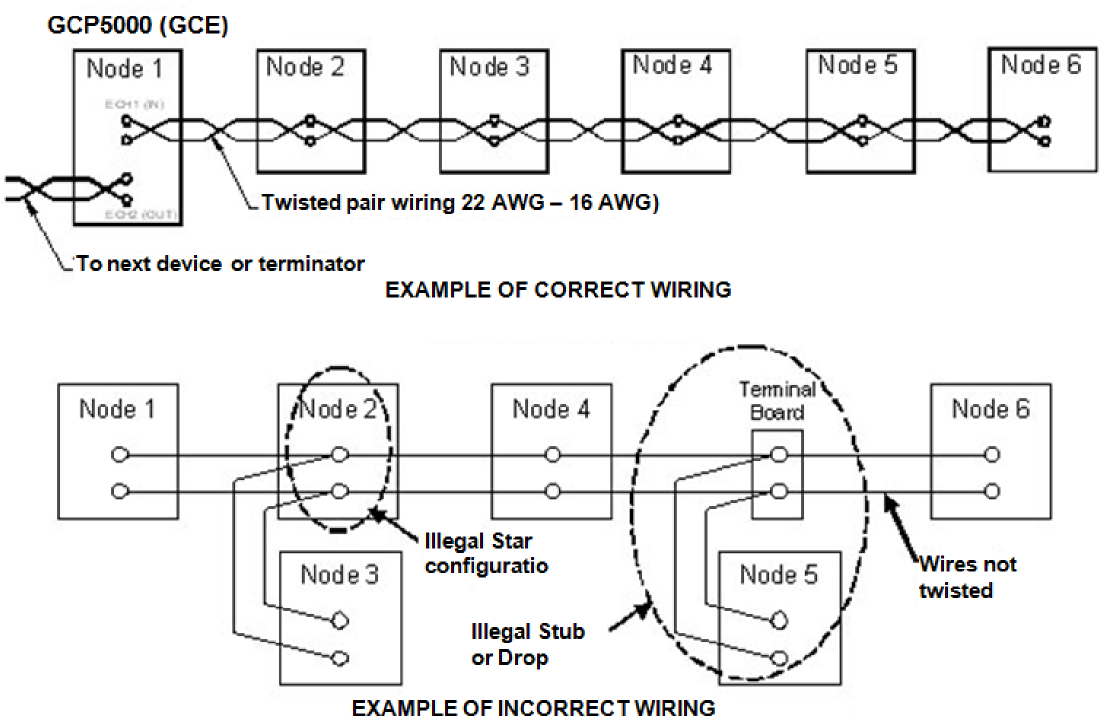


Figure 8-15 Echelon® LAN Wiring Examples

8.5.2 ATCS Vital Protocol

Vital ATCS serial protocol data may be incorporated with either the Ethernet or Echelon LONTALK® protocol to allow communication to another GCP5000 unit.

When Ethernet is selected, the Laptop port on the CPU III will be used to route the vital ATCS messages. It is recommended to connect the Laptop port to an Ethernet Switch. So the user can still access the Web UI. This can be changed from either the Display or the CPU III Web UI.

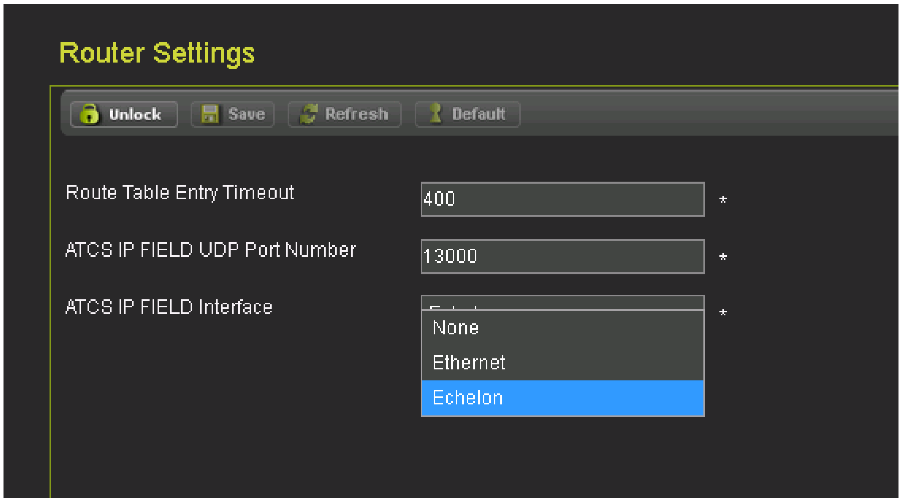


Figure 8-16 Laptop Port Router Settings ATCS IP Field Interface

When the laptop Ethernet port is used for vital ATCS comms, it should no longer be set as Server in the DHCP configuration. The usual setting will be to use set to Disabled and use a fixed IP address. Note that this has to be set from the CPU III Web UI.

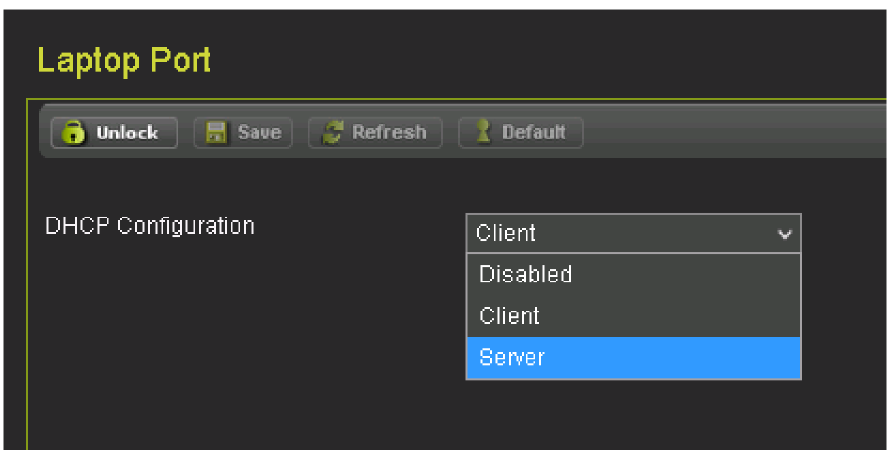


Figure 8-17 Laptop Port DHCP Configuration

SECTION 9
I/O FUNCTIONS AND ASSIGNMENTS

9 I/O FUNCTIONS AND ASSIGNMENTS

GCP5000 (GCE) PSO and RIO module physical outputs are user programmable, but not dedicated to specific output terminals on the GCP5000 (GCE) chassis. The user may select any active output for any required parameter.

9.1 General Guidelines for Using Output Functions

Any output function can be assigned to any of the available GCP5000 (GCE) physical outputs. For an output function to be included in the output selection list for a particular physical output, the output function must be enabled. For example, for **PSO 2 RX1 Occupancy** to appear in the list, the **PSO 2** Module must be used and the **RX1 Mode** must be not be set to **No**.

When an output function is enabled; i.e., **PSO 2 RX1 Occupancy** it does not have to be assigned to a physical output; it can be used solely as an internal function to the system or used in logic equations, AND gates, OR gates, or Internal Channel.

When a function is assigned to a physical output, and the enabling condition is turned off, the output is de-energized but the function remains assigned to the output. For example, when **PSO 2 RX1 Occupancy** is mapped to **OUT 1.2** and the **PSO 2/RIO 1 Slot** is set to **Not Used** the **OUT 1.2** assignment field is still set to **PSO 2 Health.** The user should manually set these back to Not Used to make troubleshooting easier. The same function may be mapped (allocated) to multiple physical outputs. For example, **PSO 2 Health** can be assigned to both **OUT 1.1** and **OUT 1.2**.

9.2 Tables Overview

Table 9-1 describes the system outputs.

Table 9-3 describes the GCP 5000 (GCE) Physical Outputs.

Table 9-4 describes the System Input Functions.

Table 9-5 describes the GCP5000 (GCE) Physical Inputs.

Table 9-6 describes the GCP 5000 (GCE) Physical Inputs SSCC.

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Table 9-1 System Outputs

Name Output	Condition for Output to be Available	Found on Menu	Description
AND 1 XR	AND 1 XR Used = *Yes*	Logic Programming/ Logic: PSO ANDing/ Logic: AND 1 XR	By default, this is the state used to control the activation of the crossing.
AND ‘n’ (n = 2..8)	Any of the AND ‘n’ Term ‘m’ /= *FALSE* (m=1..6)	Logic Programming/ Logic: AND Gates/ Logic: AND 2 .. Logic: AND 8	This is the output of the AND ‘n’ logic gate.
OR ‘n’ (n = 1..4)	Any of the OR ‘n’ Term ‘m’ /= *FALSE* (m=1..4)	Logic Programming/ Logic: OR Gates/ Logic: OR 1 .. Logic: OR 4	This is the output of the OR ‘n’ logic gate.
Adv Preempt OP	Preempt Logic = *Advance*	Basic Configuration/ Adv Preemption	This is used to drive the Advance preemption relay. It is de-energized when any PSO configured as Mode = Crossing and used in AND 1 XR becomes occupied or the Advance Preempt IP is used and is de-energized
Gate Down OP	Preempt Logic = *Advance* and Gate Down Lgc Used = *Yes*	Basic Configuration/ Adv Preemption	This is used to drive the Gate Down output that is used as an input to the traffic control system. It is energized when the advance preempts output is de-energized and either all gates selected as used in the logic have their GDs energized or an Internal Island is de-energized.
Second Train OP	Second Train OP Used = *Yes*	Basic Configuration/ Adv Preemption	This is used to drive a second train marker. The system does not provide any default to drive this, the user has to use an Equation to create logic for it.

Name Output	**Condition for Output to be Available**	**Found on Menu**	**Description**
PSO ‘n’ XR	PSO ‘n’ Slot = *PSO* and PSO ‘n’ PSO Module Mode = *Crossing*	PSO Programming / PSO ‘n’ / PSO ‘n’ Transmitter	This output indicates the crossing activation state for PSO ‘n’. It is de-energized when and PSO or island is occupied (and not override or OOS) and the stick is not set on the exit track.
PSO ‘n’ Appr 1 Occ	PSO ‘n’ Slot = *PSO* and PSO ‘n’ RX1 Mode /= *No*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 1	This represents the occupancy of the whole approach track that includes PSO ‘n’ RX1 and all the tracks that set the PSO ‘n’ RX1 Enable. The output will be energized when RX1 is unoccupied and its Enable is energized, or PSO ‘n’ RX1 has been wrapped or is out of service.
PSO ‘n’ Appr 2 Occ	PSO ‘n’ Slot = *PSO* and PSO ‘n’ RX2 Mode /= *No*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 2	This represents the occupancy of the whole approach track including PSO ‘n’ RX2 and all the tracks that set the PSO ‘n’ RX2 Enable. The output will be energized when RX2 is unoccupied and its Enable is energized, or PSO ‘n’ RX2 has been wrapped or is out of service.

Name Output	**Condition for Output to be Available**	**Found on Menu**	**Description**
PSO ‘n’ RX 1 Occupancy	PSO ‘n’ Slot = *PSO* and PSO ‘n’ RX1 Mode /= *No*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 1	This represents the occupancy of just the RX1 track circuit and is not de-energized by the Enable. This allows the user to just look at the occupancy of this part of the approach in, for example, second train logic. When the receiver is internal: this output is energized when Receiver 1 is unoccupied and healthy and calibrated or Wrapped or Out of Service. When the receiver is external: This output is energized when Receiver 1 input is energized or Wrapped or Out of Service. The state is not affected by PSO ‘n’ RX1 Enable.
PSO ‘n’ RX 2 Occupancy	PSO ‘n’ Slot = *PSO* and PSO ‘n’ RX2 Mode /= *No*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 2	This represents the occupancy of just the RX2 track circuit and is not de-energized by the Enable. This allows the user to just look at the occupancy of this part of the approach in, for example, second train logic. When the receiver is internal: this output is energized when Receiver 2 is unoccupied and healthy and calibrated or Wrapped or Out of Service. When the receiver is external: This output is energized when Receiver 2 input is energized or Wrapped or Out of Service. The state is not affected by PSO ‘n’ RX2 Enable.

Name Output	**Condition for Output to be Available**	**Found on Menu**	**Description**
PSO ‘n’ Isl Occupancy	PSO ‘n’ Slot = *PSO* and PSO ‘n’ PSO Module Mode = *Crossing*	PSO Programming / PSO ‘n’ / PSO ‘n’ Island	This output is energized when the PSO island is unoccupied (and healthy and calibrated) (regardless of whether the island is internal or external)
PSO ‘n’ RX 1 Stick	PSO ‘n’ Slot = *PSO* and PSO ‘n’ PSO Module Mode = *Crossing* PSO ‘n’ RX1 Mode /= No	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 1	This output is energized when the stick is set for PSO ‘n’ receiver 1.
PSO ‘n’ RX 2 Stick	PSO ‘n’ Slot = *PSO* and PSO ‘n’ PSO Module Mode = *Crossing* PSO ‘n’ RX2 Mode /= No	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 1	This output is energized when the stick is set for PSO ‘n’ receiver 2.
PSO ‘n’ RX 1 Code ‘x’ (x=A,C,D,E,F)	PSO ‘n’ Slot = *PSO* and PSO ‘n’ RX1 Mode = *Internal*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 1	This output is energized when PSO ‘n’ receiver 1 is receiving the specific code. The state is not affected by PSO ‘n’ RX1 Enable or PSO ‘n’ RX1 Wrap.
PSO ‘n’ RX 2 Code ‘x’ (x=A,C,D,E,F)	PSO ‘n’ Slot = *PSO* and PSO ‘n’ RX2 Mode = *Internal*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 2	This output is energized when PSO ‘n’ receiver 2 is receiving the specific code. The state is not affected by PSO ‘n’ RX2 Enable or PSO ‘n’ RX2 Wrap.
PSO ‘n’ RX 1 Health	PSO ‘n’ Slot = *PSO* and PSO ‘n’ RX1 Mode = *Internal*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 1	This output is energized when PSO ‘n’ receiver 1 is healthy.
PSO ‘n’ RX 2 Health	PSO ‘n’ Slot = *PSO* and PSO ‘n’ RX2 Mode = *Internal*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 2	This output is energized when PSO ‘n’ receiver 2 is healthy.

Name Output	Condition for Output to be Available	Found on Menu	Description
PSO ‘n’ Isl Health	PSO ‘n’ Slot = *PSO* and PSO ‘n’ PSO Module Mode = *Crossing* and PSO ‘n’ Island Mode = *Internal*	PSO Programming / PSO ‘n’ / PSO ‘n’ Island	This output is energized when PSO ‘n’ island is healthy.
PSO ‘n’ Health	PSO ‘n’ Slot = *PSO*	Basic Configuration / Module Selection	This output is energized when all the used internal receiver, transmitter, or island components are healthy.
PSO ‘n’ Tx Health	PSO ‘n’ Slot = *PSO* and PSO ‘n’ PSO Module Mode = *Rx/Tx*	PSO Programming / PSO ‘n’ / PSO ‘n’ Transmitter	This output is energized when the PSO transmitter is used and healthy.
Gate Output ‘n’ (n=1..2)	SSCC-‘n’ Slot = *SSCC3i* and Gate Used = *Yes*	SSCC Programming / SSCC Configuration	When SSCC-‘n’ Invert Gate Output = No: This is energized when the crossing is not active. This de-energized after the programmed gate delay expires. When SSCC-‘n’ Invert Gate Output = Yes: This is de-energized when the crossing is not active. This energized after the programmed gate delay expires.
Bell Output ‘n’ (n=1..2)	SSCC-‘n’ Slot = *SSCC3i*	SSCC Programming / SSCC ‘n’ Configuration	This is energized when the gate drop. If Bell On Gate Rising is No, the bell is turned off when the gate is rising If Mute Bell on Gate Down = Yes the Bell is turned off once all Gates are down.

Name Output	Condition for Output to be Available	Found on Menu	Description
Aux-n Lmp Control (n=1..2)	SSCC-'n' Slot = *SSCC3i* and Aux-'n' Xng Ctrl Used = *Yes*	SSCC Programming / SSCC 'n' Configuration	This can be used to control the flashing of lamps on an external controller. The output will de-energize when the lamps on SSCC-'n' are flashing.
Aux-n Xng Control (n=1..2)	SSCC-'n' Slot = *SSCC3i* and Aux-'n' Xng Ctrl Used = *Yes*	SSCC Programming / SSCC 'n' Configuration	This can be used to control the activation of an external controller based upon the activation of SSCC-'n'. The output will de-energize when the lamps on SSCC-'n' are activated.
Timer 'n' Expired (n=1..10)	User Timers Used = *Yes*	Logic Programming/ Logic: Features	This will be de-energized when timer 'n' has not expired and will be energized when the timer expires.
General OP 'n (n=1..8)	General I/O Used = *Yes*	Logic Programming/ Logic: Features	This is a general output state that can be set by internal logic.
Maint Call OP	Maint Call Rpt I/O Used = *Yes*	Logic Programming/ Logic: Features	This output repeats the state of the maintenance call output on the chassis.

Table 9-2 shows other system I/O terms available to be read in equation contacts, AND and OR gates, etc., but these are not available to be assigned to vital outputs.

Table 9-2 System I/O States

Name Output	**Condition for Output to be Available**	**Found On Menu**	**Description**
Remote ‘n Input ‘m’ (where n=1..4, m=1..15)	Vital Link ‘n’ Used = *Yes*	Basic Configuration / Vital Comms Links / Vital Comms Link ‘n’	These are the states of the input bits received from the vital comms session ‘n’. These can be read as contacts in equations or uses n AND gate, OR gate, or Internal Channels.
PSO ‘n’ RX1 Act Occ (n=1..5)	PSO ‘n’ Slot = *PSO* and PSO ‘n’ RX1 Mode /= *No*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 1	This reflects the actual occupancy of the PSO receiver 1. This is not affected by drop delay, but it does include the pickup delay. Thus, it will de-energize as soon as the track circuit becomes occupied. It is not affected by RX1 Wrap or RX1 Enable.
PSO ‘n’ RX2 Act Occ (n=1..5)	PSO ‘n’ Slot = *PSO* and PSO ‘n’ RX2 Mode /= *No*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 2	This reflects the actual occupancy of the PSO receiver 2. This is not affected by drop delay, but it does include the pickup delay. Thus, it will de-energize as soon as the track circuit becomes occupied. It is not affected by RX2 Wrap or RX2 Enable.

Table 9-3 GCP5000 (GCE) Physical Outputs

OUTPUT NAME	CONDITION FOR OUTPUT TO BE AVAILABLE	FOUND IN MAIN PROGRAM MENU (SPECIFIC MENU)	DESCRIPTION
OUT 1.1 OUT 1.2 OUT 1.3	PSO 1 Slot **PSO**	BASIC: module configuration	Vital outputs from PSO slot 1
OUT 2.1 OUT 2.2 OUT 2.3	PSO 2/RIO 1 Slot**PSO**	BASIC: module configuration	Vital outputs from PSO slot 2
OUT 3.1 OUT 3.2 OUT 3.3	PSO 3 Slot **PSO**	BASIC: module configuration	Vital outputs from PSO slot 3
OUT 4.1 OUT 4.2 OUT 4.3	PSO 4 Slot **PSO**	BASIC: module configuration	Vital outputs from PSO slot 4
OUT 5.1 OUT 5.2 OUT 5.3	PSO 5/RIO2 Slot **PSO**	BASIC: module configuration	Vital outputs from PSO slot 5
OUT 2.1 OUT 2.2 OUT 2.3 OUT 2.4	PSO 2/RIO 1 Slot**RIO**	BASIC: module configuration	Vital outputs from RIO in slot 2

OUTPUT NAME	CONDITION FOR OUTPUT TO BE AVAILABLE		FOUND IN MAIN PROGRAM MENU (SPECIFIC MENU)	DESCRIPTION
OUT 4.1	PSO 4/RIO 2 Slot	**RIO**	BASIC: module configuration	Vital outputs from RIO in slot 4
OUT 4.2				
OUT 4.3				
OUT 4.4				
OUT 5.1	PSO 5/RIO 3 Slot	**RIO**	BASIC: module configuration	Vital outputs from RIO in slot 5
OUT 5.2				
OUT 5.3				
OUT 5.4				
Out GC 1	SSCC 1 Slot	SSCC IIIi	IO: assignment SSCC	The Out GC 1 is located on the SSCC IIIi module in SSCC slot 1. The default is Gate Output 1. Other selections are the same as a PSO output.
	Gates Used	Yes		
Out GC 2	SSCC 2 Slot	SSCC IIIi	IO: assignment SSCC	The Out GC 2 is located on the SSCC IIIi module in SSCC slot 1. The default is Gate Output 2. Other selections are the same as a PSO output.
	Gates Used	Yes		

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9.3 Input Functions and Physical Input Assignments

GCP 5000 (GCE) PSO, RIO module, and Crossing Controller physical inputs are user programmable and are dedicated to specific input terminals on the GCP5000 (GCE) chassis. The functions of those specific terminals are programmable and are not dedicated to a specific function.

9.3.1 Turning on Inputs

When a physical input is required to perform a specific application function the function must first be enabled using the appropriate configuration menu. For example, when **PSO RX1 Enable** for PSO 1 is to be used, **PSO RX1 Enable** must be enabled using the PSO 1 Receiver 1 menu. The physical input must then be assigned (mapped) to the function using the Input Assignment menu. For example, **PSO RX1 Enable** mapped to **IN 1.1**

9.3.1.1 General Guidelines for Using Input Functions

In general, any input function can be assigned to any of the available GCP 5000 (GCE) physical inputs. The same input function can be allocated to multiple physical inputs. As a result, the allocated input function will de-energize when either input is de-energized. For example, with **PSO RX1 Enable** allocated to both IN 1.1 and IN 1.2, **PSO RX1 Enable** will de-energize if **IN 1.1** and **IN 1.2** are de-energized.

This ANDing also occurs if you set the same input function from a Logic Equation or a physical input.

⚠ WARNING

WARNING

THE ANDING DOES NOT OCCUR IF YOU SET THE INPUT FROM A VITAL COMMS RECEIVE CHANNEL. DO NOT ALLOCATE THE SAME INPUT FUNCTION TO BOTH A VITAL COMMS RECEIVE CHANNEL AND A VITAL INPUT OR EQUATION.

For an input function to appear in the selection list for a particular physical input, the input function must be enabled. For example, for **AND 2 Enable** to appear in the list:

- **AND 2** must be used, by setting some its terms so they are not FALSE and
- AND 2 Enable Used set to Yes

If an input function is enabled but is not assigned to a physical input, it is treated as de-energized. For example, when the **AND 2 Enable** function is enabled but not assigned to a physical input.

If an input function is assigned to a physical input and the enabling condition is turned off, the input is ignored but the function remains assigned to the output. For example, when **AND 1 XR Enable** is mapped to **IN 1.1** and the **AND 2 Enable Used** status field is returned to **No**. the **IN 1.1** assignment field is still set to **AND 1 XR Enable**. However, the input is de-energized.

The physical input does not have to be wired high, as returning the input assignment field to **Not Used** removes the assignment and makes troubleshooting easier.

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Table 9-4 System Input Functions

Name Input	Condition for Input to be Available	Found on Menu	Description
Adv Preempt IP	Preempt Logic = *Advance* and Adv Preempt IP Used = *Yes*	Basic Configuration/ Adv Preemption	Used to start advance preemption from an external source.
Preempt Health	Preempt Logic = *Advance* and Preempt Health IP Used = *Yes*	Basic Configuration/ Adv Preemption	Used check the advance preemption relay is energized when it is meant to be.
Traffic Sys Health	Preempt Logic = *Advance* and Traffic System Health IP Used = *Yes*	Basic Configuration/ Adv Preemption	Used monitor health of traffic system. GCE switches from Advance preemption to Simultaneous preemption with traffic system health input de-energized.
Second Train OP	Second Train OP Used = *Yes*	Basic Configuration/ Adv Preemption	This is not an external input. It appears in the list of system inputs so it can be set to be an equation. This can then be mapped as a System Output to a vital output.
AND 1 XR Enable	AND 1 XR Used = *Yes* and AND 1 XR Enable Used = *Yes*	Logic Programming/ Logic: PSO ANDing	Used to de-energize AND 1 XR via an input or internal logic
AND 'n' Enable (n= 2..8)	AND 'n' XR Enable Used = *Yes*	Logic Programming/ Logic: AND Gates/ Logic: AND 2 .. Logic: AND 8	Used to de-energize AND 'n' via an input or internal logic
AND 1 XR Wrap	AND 1 XR Used = *Yes* and AND 1 XR Wrap Used = *Yes*	Logic Programming/ Logic: PSO ANDing	Used to wrap AND 1 XR via an input or internal logic.
AND 'n' Wrap (n= 2..8)	AND 'n' Wrap Used = *Yes*	Logic Programming/ Logic: AND Gates/ Logic: AND 2 .. Logic: AND 8	Used to wrap AND 'n' via an input or internal logic.

Name Input	Condition for Input to be Available	Found on Menu	Description
PSO ‘n’ RX 1 Enable (n = 1..5)	PSO ‘n’ Slot = *PSO* and (PSO ‘n’ RX1 Mode = *Internal* or PSO ‘n’ RX1 Mode = *External*) and PSO ‘n’ RX1 Enable Used = *Yes*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 1	Used to de-energize PSO ‘n’ RX1 Occupancy based upon via an input or internal logic.
PSO ‘n’ RX 2 Enable (n = 1..5)	PSO ‘n’ Slot = *PSO* and (PSO ‘n’ RX2 Mode = *Internal* or PSO ‘n’ RX2 Mode = *External*) and PSO ‘n’ RX2 Enable Used = *Yes*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 2	Used to de-energize PSO ‘n’ RX2 Occupancy based upon via an input or internal logic.
PSO ‘n’ RX 1 Wrap (n = 1..5)	PSO ‘n’ Slot = *PSO* and (PSO ‘n’ RX1 Mode = *Internal* or PSO ‘n’ RX1 Mode = *External*) and PSO ‘n’ RX1 Wrap Used = *Yes*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 1	Used to wrap PSO ‘n’ RX1 Occupancy based upon an input or internal logic. Note that when the Wrap is energized it will not override an unhealthy receiver
PSO ‘n’ RX 2 Wrap (n = 1..5)	PSO ‘n’ Slot = *PSO* and (PSO ‘n’ RX2 Mode = *Internal* or PSO ‘n’ RX2 Mode = *External*) and PSO ‘n’ RX2 Wrap Used = *Yes*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 2	Used to wrap PSO ‘n’ RX2 Occupancy based upon via an input or internal logic. Note that when the Wrap is energized it will not override an unhealthy receiver
PSO ‘n’ TX Code A	PSO ‘n’ Slot = *PSO* and PSO ‘n’ PSO Module Mode = *Rx/Tx* and (PSO ‘n’ TX Address = *Dynamic* or PSO ‘n’ TX Address = *Code A*)	PSO Programming / PSO ‘n’ / PSO ‘n’ Transmitter	Used to select whether transmitter sends code A based upon via an input or internal logic.
PSO ‘n’ TX Code C	PSO ‘n’ Slot = *PSO* and PSO ‘n’ PSO Module Mode = *Rx/Tx* and (PSO ‘n’ TX Address = *Dynamic* or PSO ‘n’ TX Address = *Code C*)	PSO Programming / PSO ‘n’ / PSO ‘n’ Transmitter	Used to select whether transmitter sends code C based upon via an input or internal logic.
PSO ‘n’ TX Code D	PSO ‘n’ Slot = *PSO* and PSO ‘n’ PSO Module Mode = *Rx/Tx* and (PSO ‘n’ TX Address = *Dynamic* or PSO ‘n’ TX Address = *Code D*)	PSO Programming / PSO ‘n’ / PSO ‘n’ Transmitter	Used to select whether transmitter sends code D based upon via an input or internal logic.

Name Input	Condition for Input to be Available	Found on Menu	Description
PSO ‘n’ TX Code E	PSO ‘n’ Slot = *PSO* and PSO ‘n’ PSO Module Mode = *Rx/Tx* and (PSO ‘n’ TX Address = *Dynamic* or PSO ‘n’ TX Address = *Code E*)	PSO Programming / PSO ‘n’ / PSO ‘n’ Transmitter	Used to select whether transmitter sends code E based upon via an input or internal logic.
PSO ‘n’ TX Code F	PSO ‘n’ Slot = *PSO* and PSO ‘n’ PSO Module Mode = *Rx/Tx* and (PSO ‘n’ TX Address = *Dynamic* or PSO ‘n’ TX Address = *Code F*)	PSO Programming / PSO ‘n’ / PSO ‘n’ Transmitter	Used to select whether transmitter sends code F based upon via an input or internal logic.
PSO ‘n’ RX 1 External	PSO ‘n’ Slot = *PSO* and PSO ‘n’ RX1 Mode = *External*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 1	Used to bring in the state of an external track circuit if an external track circuit is used instead of the internal PSO.
PSO ‘n’ RX 2 External	PSO ‘n’ Slot = *PSO* and PSO ‘n’ RX2 Mode = *External*	PSO Programming / PSO ‘n’ / PSO ‘n’ Receiver 2	Used to bring in the state of an external track circuit if an external track circuit is used instead of the internal PSO receiver.
PSO ‘n’ External Isl	PSO ‘n’ Slot = *PSO* and PSO ‘n’ PSO Module Mode = *Crossing* and PSO ‘n’ Island Mode = *External*	PSO Programming / PSO ‘n’ / PSO ‘n’ Island	Used to bring in the state of an external island if an external island track circuit is used instead of the internal island on the PSO module.
PSO ‘n’ Isl Enable	PSO ‘n’ Slot = *PSO* and PSO ‘n’ PSO Module Mode = *Crossing* and PSO ‘n’ Isl Enable Used = *Yes*	PSO Programming / PSO ‘n’ / PSO ‘n’ Island	When the island enable input is de-energized, the island will be treated as occupied.
OOS Input ‘n’ (n = 1..5)	PSO ‘n’ Slot = *PSO* and OOS Control =*Display+OOS IPs*	Basic Configuration/ Adv Preemption	When OOS Control =Display+OOS IPs used in conjunction with the Display Module to take a PSO receiver or island out of service.
GP ‘n’.1 (n=1..2)	SSCC-‘n’ Slot = *SSCC3i* and SSCC-‘n’ Number of GPs > 0	SSCC Programming / SSCC ‘n’ Configuration	Used to monitor the Gate Position input.
GP ‘n’.2 (n=1..2)	SSCC-‘n’ Slot = *SSCC3i* and SSCC-‘n’ Number of GPs = 2	SSCC Programming / SSCC ‘n’ Configuration	Used to monitor a Gate Position input from a second gate.

Name Input	Condition for Input to be Available	Found on Menu	Description
GD ‘n’.1 (n=1..2)	SSCC-‘n’ Slot = *SSCC3i* and SSCC-‘n’ Number of GDs > 1	SSCC Programming / SSCC ‘n’ Configuration	Used to monitor the Gate down input contact from a Gate.
GD ‘n’.2 (n=1..2)	SSCC-‘n’ Slot = *SSCC3i* and SSCC-‘n’ Number of GDs > 2	SSCC Programming / SSCC ‘n’ Configuration	Used to monitor the Gate down input contact of another Gate.
GD ‘n’.3 (n=1..2)	SSCC-‘n’ Slot = *SSCC3i* and SSCC-‘n’ Number of GDs > 3	SSCC Programming / SSCC ‘n’ Configuration	Used to monitor the Gate down input contact of another Gate.
GD ‘n’.4 (n=1..2)	SSCC-‘n’ Slot = *SSCC3i* and SSCC-‘n’ Number of GDs = 4	SSCC Programming / SSCC ‘n’ Configuration	Used to monitor the Gate down input contact of another Gate.
Aux-‘n’ Xng Ctrl Health (n=1..2)	SSCC-‘n’ Slot = *SSCC3i* and Aux-‘n’ Xng Ctrl Used = *Yes* and Aux-‘n’ Xng Ctrl Hlth IP = *Yes*	SSCC Programming / SSCC ‘n’ Configuration	Used to monitor health or an external crossing controller.
Timer ‘n’ Start (n=1..10)	User Timer Used = *Yes*	Logic Programming/ Logic: Features	Used to start a user-defined logic timer.
General IP ‘n’ (n=1..16)	General I/O Used = *Yes*	Logic Programming/ Logic: Features	This is a general-purpose input state that can be monitored by the system and used in the internal logic.
General OP ‘n’ (n=1..8)	General I/O Used = *Yes*	Logic Programming/ Logic: Features	This is intended for use as a general-purpose output. It is in the list of *System Input*s so it can be set by the internal logic. This will be used to drive the equivalent General OP ‘n’ *System Output*
NWP n (n=1..4)	Switch Inputs Used = *Yes*	Logic Programming/ Logic: Features	This is a general-purpose input state that can be monitored by the system and used in the internal logic. It is intended for monitoring the normal contact of a switch circuit controller, however, it is not restricted to this and can be used for any type of input that is required to be used in the logic.

Name Input	Condition for Input to be Available	Found on Menu	Description
RWP n (n=1..4)	Switch Inputs Used = *Yes*	Logic Programming/ Logic: Features	This is a general-purpose input state that can be monitored by the system and used in the internal logic. It is intended for monitoring the reverse contact of a switch circuit controller, however, it is not restricted to this and can be used for any type of input that is required to be used in the logic
Emergency Activate	Emergency Activate IP = *Yes*	Logic Programming/ Logic: Features	This input can be used to put the system into a safe state with the crossing activated and all output de-energized.
Maint Call Rpt IP	Maint Call Rpt I/O Used = Y*es*	Logic Programming/ Logic: Features	This input can be used to cause the maintenance call output to turn off based on some external inputs.

Table 9-5 GCP5000 (GCE) Physical Inputs

INPUT NAME	CONDITION FOR INPUT TO BE AVAILABLE	FOUND IN MENU	DESCRIPTION
IN 1.1 IN 1.2	PSO 1 Slot **PSO**	BASIC: module configuration	Vital inputs to PSO slot 1
IN 2.1 IN 2.2	PSO 2 Slot / RIO 1 Slot **PSO**	BASIC: module configuration	Vital inputs to PSO slot 2
IN 2.1 IN 2.2 IN 2.3 IN 2.4	PSO 2/ RIO 1 Slot **RIO**	BASIC: module configuration	Vital inputs to RIO slot 2 (RIO 1)
IN 3.1 IN 3.2	PSO 3 Slot **PSO**	BASIC: module configuration	Vital inputs to PSO slot 3
IN 4.1 IN 4.2	PSO 4 Slot/ RIO 2 Slot **PSO**	BASIC: module configuration	Vital inputs to PSO slot 4
IN 4.1 IN 4.2 IN 4.3 IN 4.4	PSO 4/ RIO 2 Slot **PSO**	BASIC: module configuration	Vital inputs to RIO slot 4 (RIO 2)
IN 5.1 IN 5.2	PSO 5/ RIO 3 Slot **PSO**	BASIC: module configuration	Vital inputs to PSO slot 5
IN 5.1 IN 5.2 IN 5.3 IN 5.4	PSO 5/ RIO 3 Slot **RIO**	BASIC: module configuration	Vital inputs to RIO Slot 5 (RIO 3)

Table 9-6 GCP5000 (GCE) Physical Inputs SSCC

SSCC1 IN 7.1	SSCC 1 Slot **SSCC IIIi**	BASIC: module configuration (TEMPLATE: module configuration	Vital inputs to SSCC IIIi in slot 7
SSCC1 IN 7.2			
SSCC1 IN 7.3			
SSCC1 IN 7.4			
SSCC1 IN 7.5			
INPUT NAME	**CONDITION FOR INPUT TO BE AVAILABLE**	**FOUND IN MENU**	**DESCRIPTION**
SSCC2 IN 8.1	SSCC 2 Slot **SSCC IIIi**	BASIC: module configuration (TEMPLATE: module configuration	Vital inputs to SSCC IIIi in slot 8
SSCC2 IN 8.2			
SSCC2 IN 8.3			
SSCC2 IN 8.4			
SSCC2 IN 8.5			

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SECTION 10
MENU MAPS

10 MENU MAPS

10.1 Web UI Menu Maps

The OCE and Display Web UI provides a different set of menus from the local UI. Only a subset of the parameters are visible on the Local UI, these local UI menus will be shown in section 10.2

Figure 10-1 Configuration Menu

10.1.1 GCP Programming

This section lists the submenu and parameters found under the GCP Programming menu under the Configuration Tab on the Web UI or Program View > 2) GCP Programming menu on the local UI. The local UI is restricted to only showing 10 parameters per menu page, so in some instances, menus are split over multiple pages in the local UI and are visible all on one page in the web UI, the descriptions below will describe where this occurs.

On the Web UI the choices under the GCP Programming are:

- Basic Configuration
- PSO Programming
- Logic Programming
- SSCC Programming
- Input/Output Assignments
- Track Names

10.1.2 Basic Configuration

Selecting **1) Basic Configuration** provides access to the following configuration menu windows:

- 1) Module Selection
- 2) Preemption
- 3) MS/Restart
- 4) Vital Comms Links
- 5) Out of Service
- Set to Default

10.1.2.1 Module Selection

Figure 10-2 shows the Module Selection menu. This is used to select which modules are used in the GCE.

Slots 1 and 3 can be set to *PSO* or *Not Used*.

Slots 2,4 and 5 set to *PSO*, *RIO,* or *Not Used.*

SSCC-1 Slot selects whether the first SSCC IIIi module is used.

SSCC-2 Slot selects whether a second SSCC IIIi module is used.

SEAR Used selects whether the SEAR IIi is used.

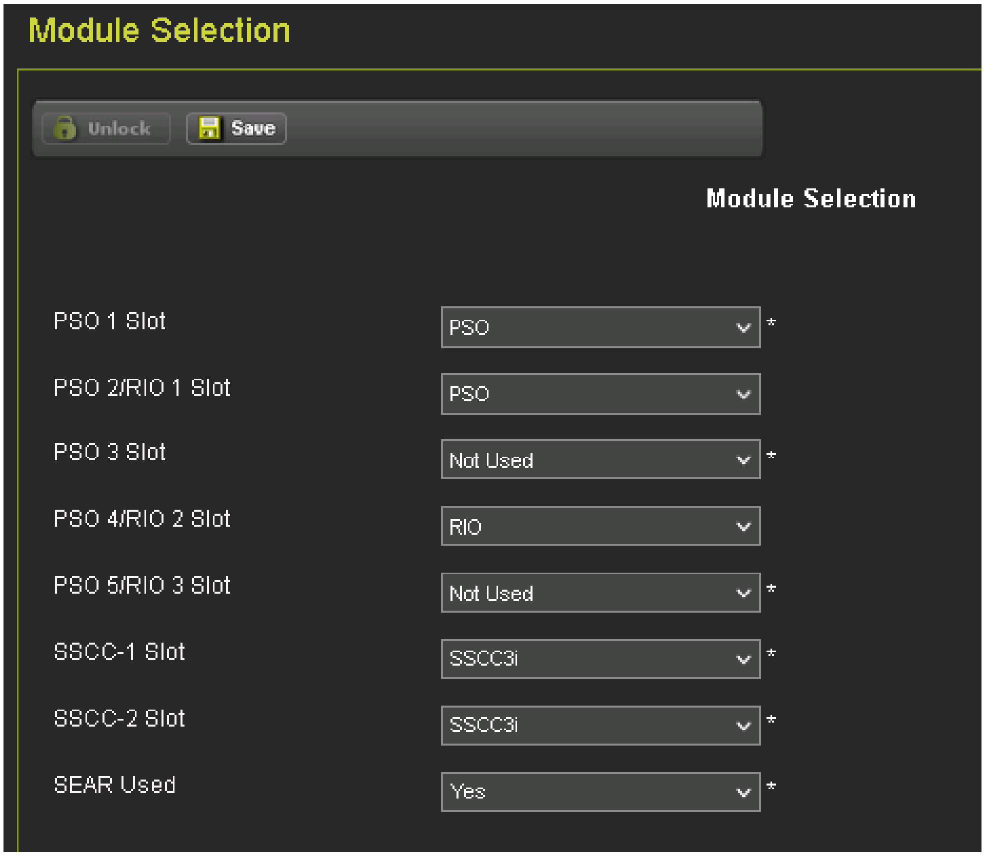

Figure 10-2 Module Selection

10.1.2.2 Adv Preemption

Preempt Logic: range None, Advance, Simult, default None.

When Preempt Logic is *None* the following is visible:

- **Second Train Logic Used:** range Yes, No, default Yes
- **Second Train OP Used:** range Yes, No, default No

Figure 10-3 shows the Advance Preemption menu when Preempt Logic has been set to *Advance* and Gate Down Lgc Used set to *Yes*.

When Preempt Logic is *Advance* the following options are visible:

- **Adv Preempt Delay:** range 0-100 sec, default 10 sec.
- **Adv Preempt IP Used**: range Yes, No, default No
- **Preempt Health IP Used**: range Yes, No, default Yes
- **Traffic Sys. Health IP Used**: range Yes, No, default No
- **Gate Down Lgc Used**: range Yes, No, default No
- When **Gate Down Lgc Used** is *Yes* the following are visible (which ones are visible depends on the setting of SSCC-1 Number of GDs and SSCC-2 Number of GDs):
    - **GDown Lgc Uses GD 1.1:** range Yes, No, default Yes
    - **GDown Lgc Uses GD 1.2:** range Yes, No, default Yes
    - **GDown Lgc Uses GD 1.3:** range Yes, No, default Yes
    - **GDown Lgc Uses GD 1.4:** range Yes, No, default Yes
    - **GDown Lgc Uses GD 2.1:** range Yes, No, default Yes
    - **GDown Lgc Uses GD 2.2:** range Yes, No, default Yes
    - **GDown Lgc Uses GD 2.3:** range Yes, No, default Yes
    - **GDown Lgc Uses GD 2.4:** range Yes, No, default Yes
- **Second Train Logic Used:** range Yes, No, default Yes
- **Second Train OP Used:** range Yes, No, default No

When Preempt Logic is *Simult* the following options are visible:

- **Preempt Health IP Used**: range Yes, No, default Yes
- **Second Train Logic Used:** range Yes, No, default Yes
- **Second Train OP Used:** range Yes, No, default No

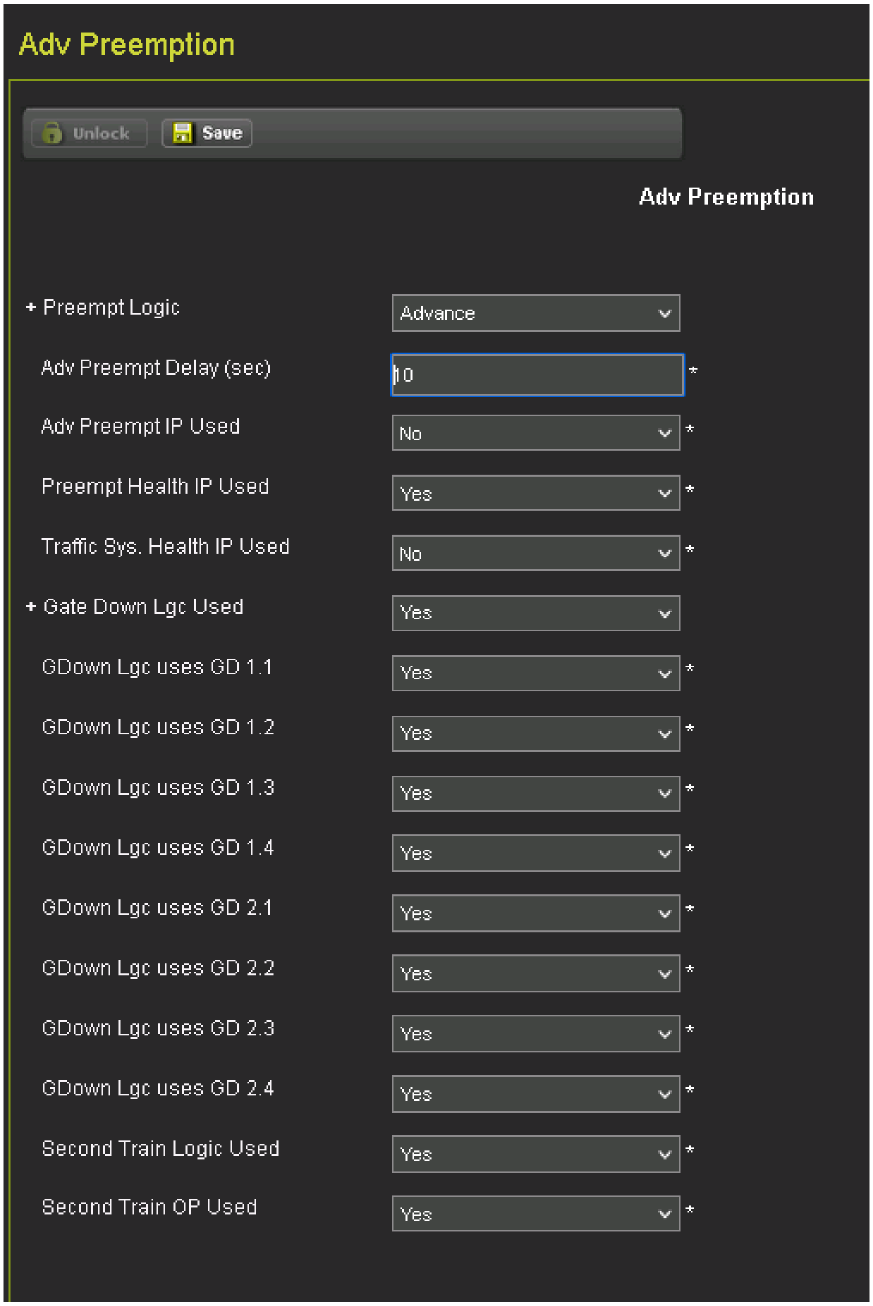

Figure 10-3 Advance Preemption

10.1.2.2.1 Second Train Logic Used

When Second Train Logic Used is set to Yes, this is used to prevent the crossing recovering when one train leaves the island and if a second train is approaching on a second track and has not caused activation yet. There are two reasons for this a) advance preemption is used, and the advance preemption timer has not expired for the second train, or b) the PSO has a drop delay and the drop delay has not expired.

10.1.2.2.2 Second Train Output

When Second Train Output Used is set to *Yes*, the Second Train OP is enabled so it can be set by a logic equation and assigned to an output. Note, that there is no internally controlled Second Train Output provided, the user has to configure the Second Train Output function through equations, for example, if AND 2 was used to define one set of track circuits associated with PSO 1 and AND 3 defines ones associated with PSO 1.

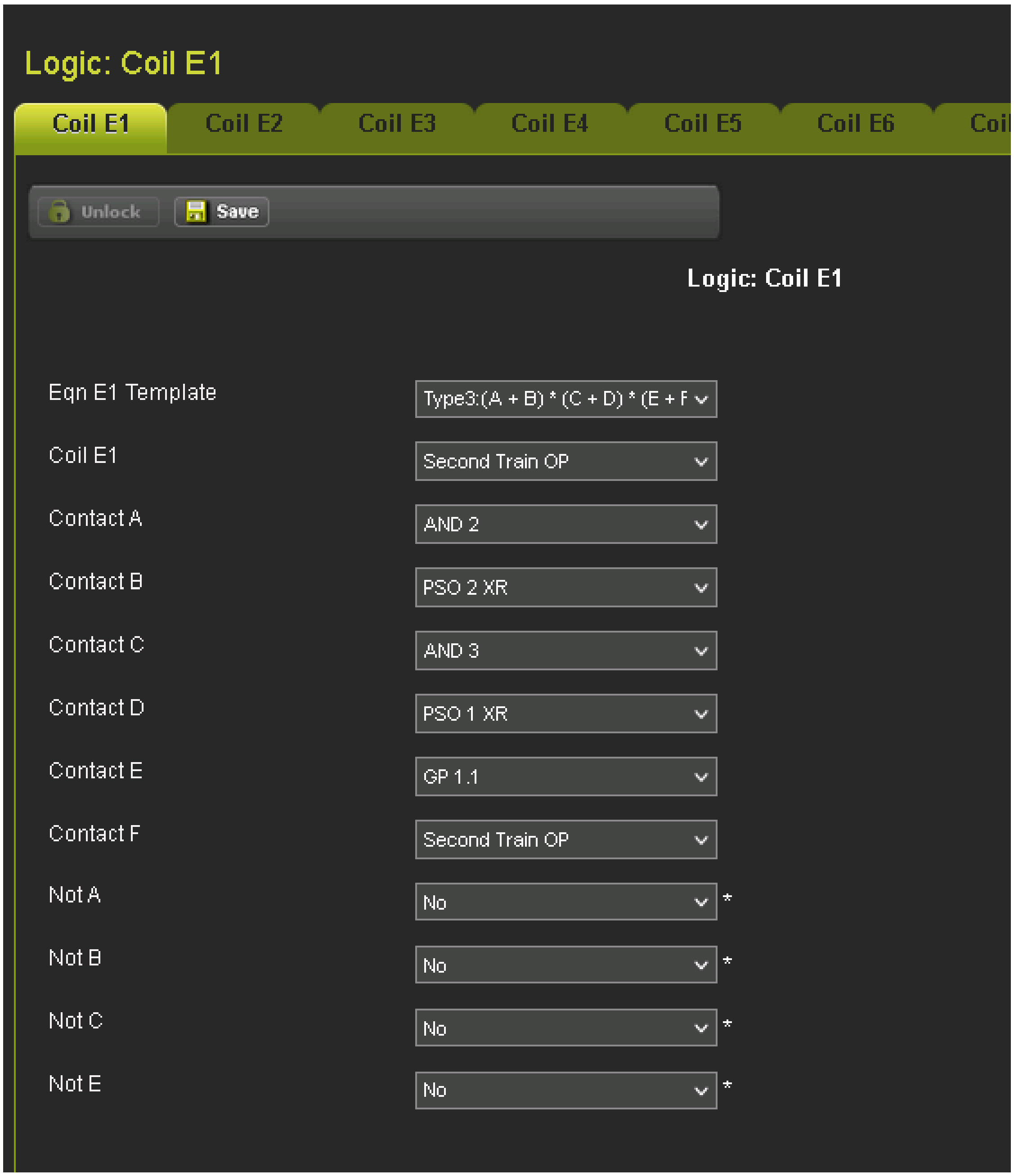

Figure 10-4 Setting Second Train OP

10.1.2.2.3 Advance Preemption

When advance preemption is used in the GCE, when the PSO becomes occupied, it will start the Advance preempt timer. When the advance preempt timer expires this will activate AND 1 XR and thus activate the crossing (assuming SSCC-1 and 2 are controlled by AND 1 XR). In order to prevent a loss of shunt causing the advance preemption delay to be applied multiple times, it is not allowed to run again until the PSO receiver that dropped and started the timer has been unoccupied for at least 30s. The advance preemption will only affect PSO modules that are:

- set to PSO Module Mode = Crossing and (see PSO Transmitter section)
- Included in AND 1 XR, e.g., AND 1 XR PSO 1 Used = Yes (see Logic: PSO Anding section)

⚠ WARNING

WARNING

INCORRECT DESIGN AND/OR CONFIGURATION OF ADVANCE PREEMPTION MAY RESULT IN LATE OR NO ACTIVATION OF THE CROSSING WARNING DEVICES OR FAILURE OF THE TRAFFIC CONTROLLER TO START ITS CLEAR OUT CYCLE.

NOTE

NOTE

If the PSO receiver is configured with a drop delay, when the PSO becomes occupied, it will first run the drop delay, then once the drop delay has expired, the advance preemption timer will start.

When advance preemption is used, the Adv Preempt OP is available in the list of *System Outputs.*

In order to detect a fault where the traffic controller detects that the advance preempt is falsely down due to a broken wire on the circuit between the vital out on the GCE and the Adv Preempt Relay a contact of the Adv Preempt relay can be fed back into the GCE to an input configured as Preempt Health. This function is enabled when Preempt Health IP Used is set *Yes*. If the GCE detects that it is driving the Adv Preempt Output, but the Preempt Health IP is down, then it will activate the crossing.

If the Adv Preempt IP Used is set to *Yes*, then the Adv Preempt IP is available in the list of *System Inputs.* This can be assigned to a vital input. When the Adv Preempt IP is de-energized, it will start the Advance Preemption delay timer. Note if the Adv Preempt IP is energized while the delay timer is still running, it will not cancel the timer, the time will run to completion and activate the crossing.

⚠ WARNING

WARNING

SOME FAILURE MODES OF THE GCE MAY RESULT IN THE GCE DROPPING THE ADV PREEMPT OUTPUT AND ACTIVATING THE CROSSING AT THE SAME TIME (SIMULTANEOUS PREEMPTION), THESE INCLUDE BUT ARE NOT LIMITED TO: REBOOT OF THE CPU, FAILURE OF A SSCC IIII MODULE, OR BROKEN TRAFFIC SYSTEM HEALTH WIRE

10.1.2.2.4 Traffic System Health IP Used

If the Traffic Sys. Health IP Used is set to *Yes*, then the Traffic Sys Health is available in the list of *System Inputs.* This can be assigned to a vital input. When the Traffic Sys Health is de-energized, it will switch the system from advance preemption to simultaneous preemption. Thus, when the PSO circuit becomes occupied, the advance preempt OP will drop immediately (assuming no PSO drop delay).

10.1.2.2.5 Gate Down Logic

When Gate Down Logic is used the user can select which of the gate down contact (GDs) are to be used in the gate logic. The number of GDs shown will depend on how many are configured in the SSCC-1 and SSCC-2 with the Number of GDs parameter. The Gate Down OP will be made available in the *System Outputs* so it can be assigned to a vital output.

The Gate Down Output will be energized when:

a) The Adv Preempt OP is de-energized and
b) (All selected gates have their GDs energized or
c) Any internal island used in AND 1 XR reports occupied and is healthy)

WARNING

WARNING

INCORRECT DESIGN AND/OR CONFIGURATION OF GATE DOWN MAY RESULT IN INCORRECT TERMINATION OF CLEAROUT CYCLE IN TRAFFIC CONTROLLER

NOTE

NOTE

The external island that is brought in via a vital input is not included in this logic, as their health cannot be proved.

10.1.2.2.6 Simultaneous Preemption

When simultaneous preemption is used in the GCE, when the PSO becomes occupied, it will drop the Simult Preempt OP and drop AND 1 XR and thus activate the crossing (assuming SSCC-1 and 2 are controlled by AND 1 XR) at the same time. The simultaneous preemption will only affect PSO modules that are:

- set to PSO Module Mode = Crossing and (see PSO Transmitter section)
- Included in AND 1 XR, e.g., AND 1 XR PSO 1 Used = Yes (see Logic: PSO ANDing section)

NOTE

NOTE

If the PSO receiver is configured with a drop delay, when the PSO becomes occupied it will first run the drop delay, then once the drop delay has expired, the Simult Preempt OP will drop.

When simultaneous preemption is used, the Sim Preempt OP is available in the list of *System Outputs.*

The preempt health input can be used with Simultaneous Preemption in the same manner as with Advance preemption.

10.1.2.3 Vital Comms Links

Figure 10-5 shows the Vital Comms menu for Vital Comms Link 1. When the vital comms link is turned on, the user can set the ATCS address of the neighboring GCE using either offsets to the ATCS railroad (RRR), line (LLL), group (GGG), or subnode (SS) fields (note the OCE allows the user to directly enter the ATCS address of the neighboring system).

The communication timing parameters are shown at their default values below. These should be fine for any reasonable speed comms link. When the vital comms link is used, the messages will be sent either by the CPU III echelon network or via the CPU III laptop Ethernet port, depending on the setting of the ATCS IP Field Interface (Echelon / Ethernet) which is set in the CPU III CP programming.

When Vital Comms links are used the GCE **must** be set with unique ATCS addresses, a failure to set a unique ATCS address may result in a hazardous condition.

The Version field is used to check the consistency of the interface; if the version is inconsistent on either side of the Vital Comms link, the Vital Comms link will remain out of session. For example, consider the case of a system that is already installed in the field with two GCE systems communicating via Vital Comms Link 1 and using a Version of 1. If a change is made to the interface, for example changing what the message bits are used for, it is recommended to update the version. This will then avoid any compatibility issues where one side of the link has been updated but the other side hasn't been updated.

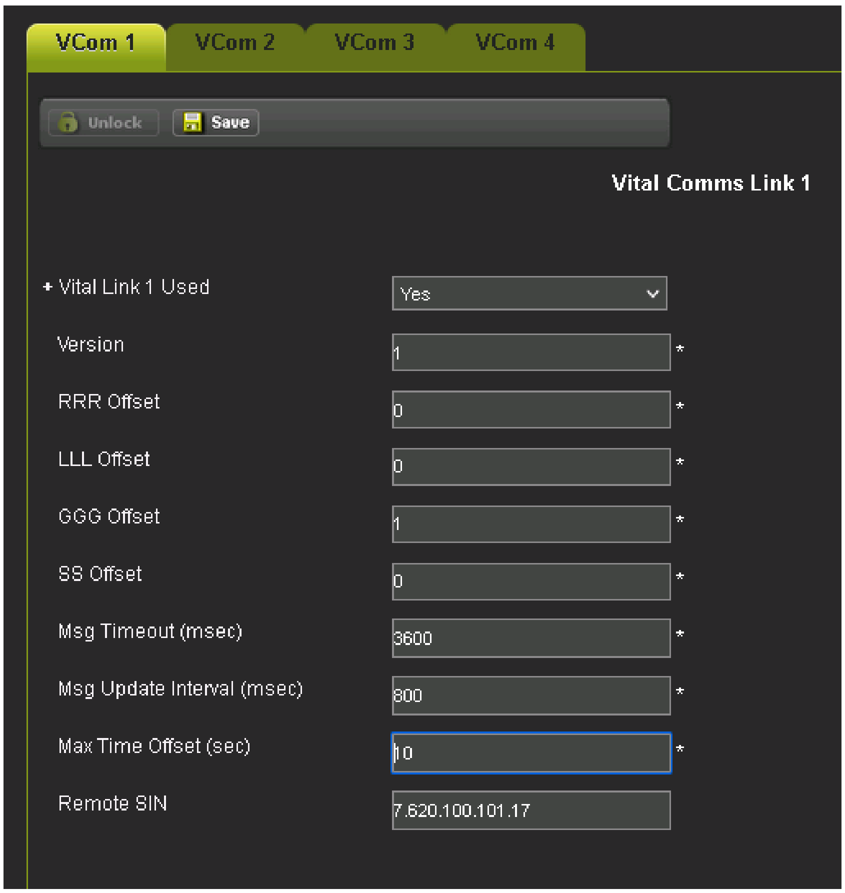

Figure 10-5 Vital Comms Links

When the Vital Comms Link has been enabled, the two more menus are enabled which allow the user to assign the bit received on the link as shown in Figure 10-6 and set the state of the transmitted bits as shown in Figure 10-7.

The Vital Comms Link Rx menu allows the user to directly assign the state of the received bit to a *System Input*. For example, if the approach circuit consists of multiple PSO track circuits and one of these is remotely located. Then its state could be sent via a comms link to the GCE at the crossing and used to set the PSO 1 RX 1 Enable as shown in Figure 10-6.

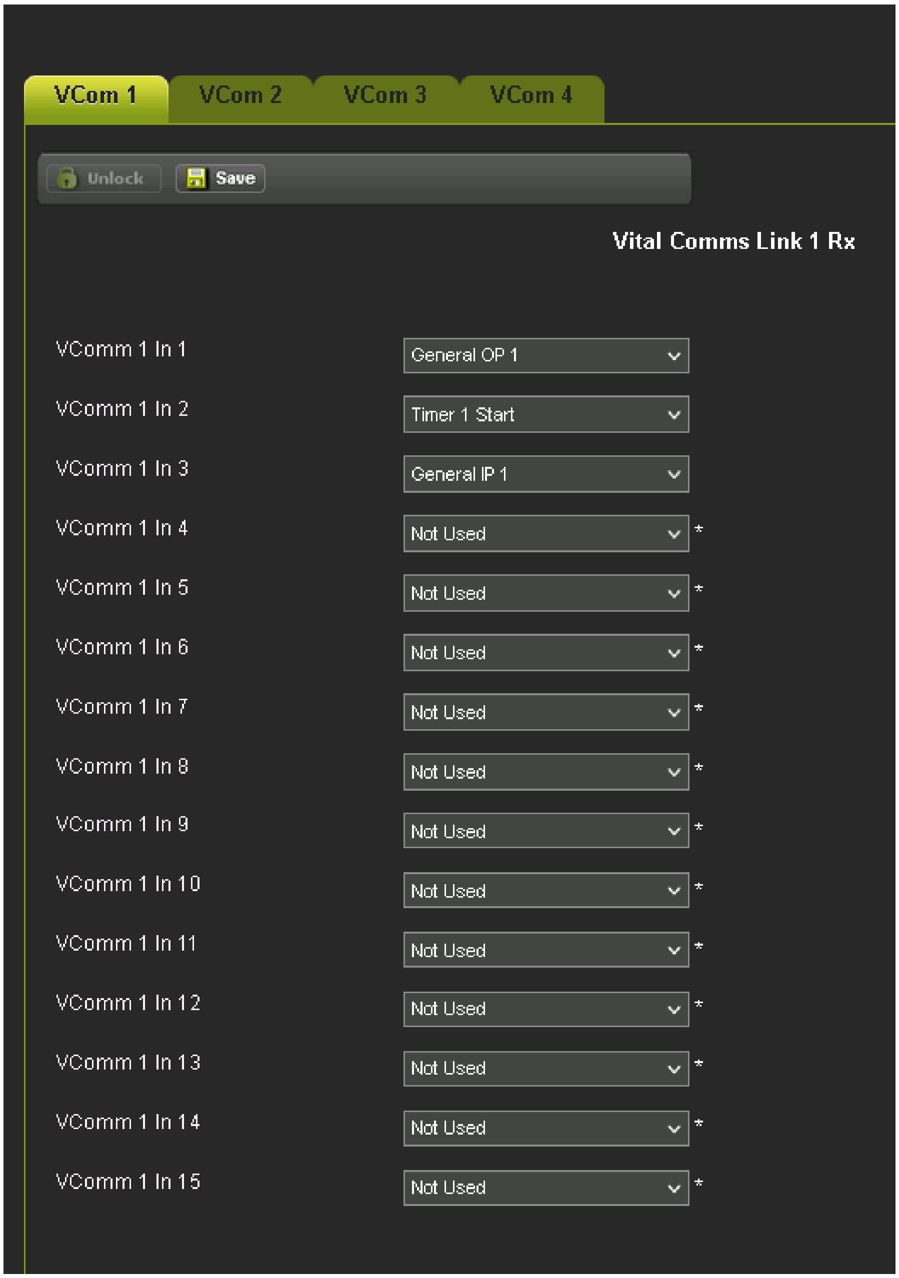

Figure 10-6   Vital Comms Link 1 Rx

The vital comms 'n' link also sets the input's names Remote 'n' Input 1 to Remote 'n' Input 15. These can then be used in Internal channel and Equations, for example:

- Int.1 Sets Timer 1 Start
- Int.1 Set by Remote 1 Input 1

The bits to be transmitted over the link can be directly assigned in the Vital Comms Link 'n' Tx menu as shown in Figure 10-7.

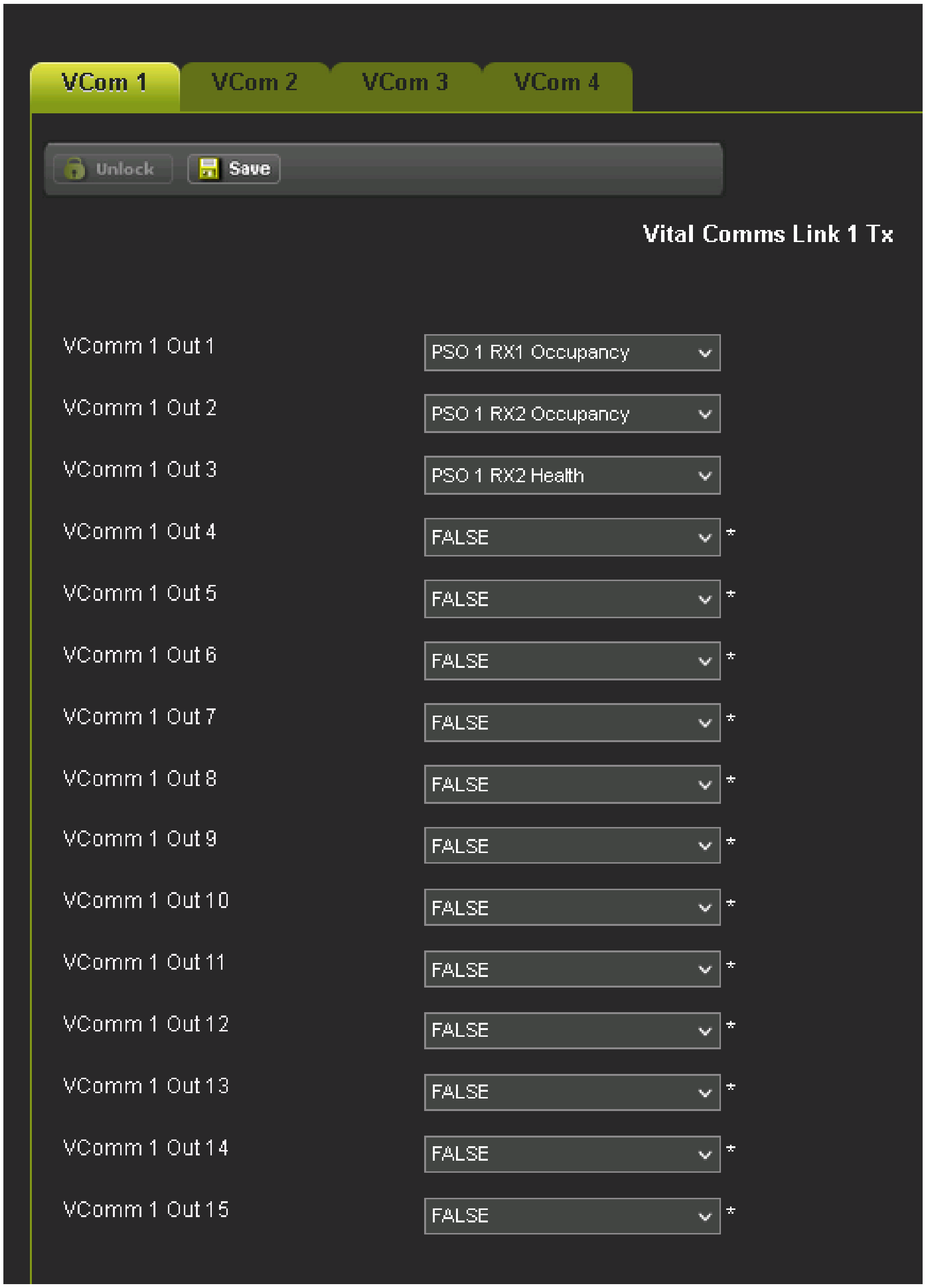

Figure 10-7 Vital Comms Link 1 Tx

10.1.2.4 Out of Service

The GCP5000 (GCE) supports Out of Service Operation using the Display + OOS IPs option.

Figure 10-8 shows the options available for the *Display + OOS IPs* option mode. The designer selects which OOS inputs are associated with each PSO. The Out of Service1.. 5 selections will be available in the *System Inputs* so that they can be assigned to vital inputs.

To take a PSO out of service the maintainer will need to energize the Out of Service input and then using the display select which component to take out of service. When any component is OOS or an OOS input is energized the maintenance call light will be turned off. Thus, if the maintainer forgets to de-energize the OOS Inputs the maintenance call will remain off.

The maintainer can select a new OOS timeout at the time when they set the unit out of service.

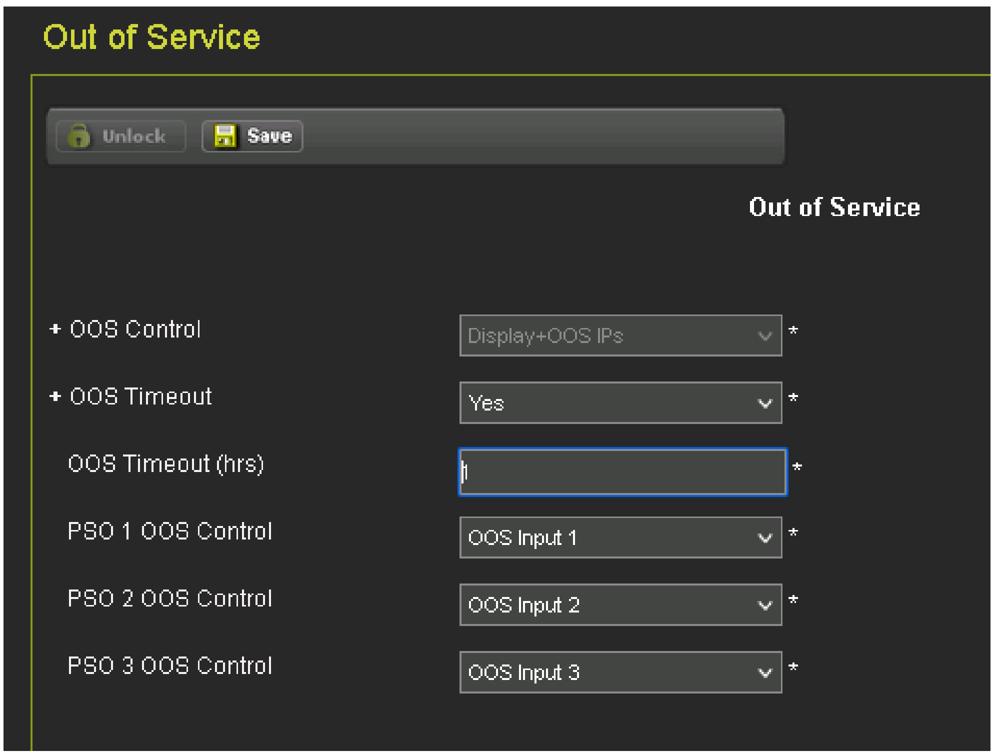

Figure 10-8 Out of Service, Display + OOS IPs

10.1.2.5 Set to Default

Figure 10-9 shows the Set to Default menu. This is used to set all the MCF GCP Programming parameters back to default.

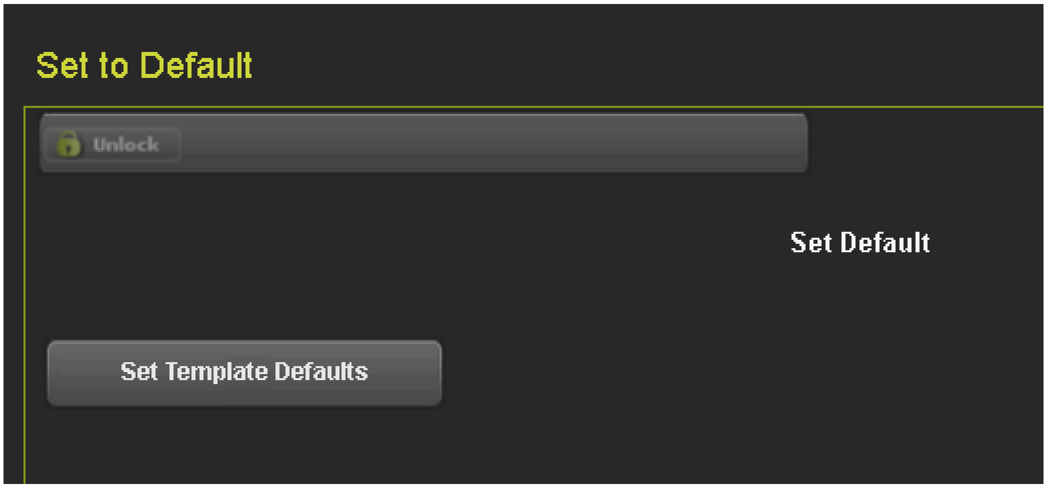

Figure 10-9 Set to Default

10.1.3 PSO Programming

10.1.3.1 PSO 'N' Transmitter

Figure 10-10 shows the PSO Transmitter menu when the PSO Module Mode is set to Crossing.

- **PSO Module Mode**: range Crossing, Rx Only, Rx/Tx
- **Stick Cancel Time**: range 1-60 mins, default 15 min
- **Stick Cancel Input Used**: range Yes No, default No
- **Wrap Pickup Delay**: range 0-10 sec, default 5 sec

The PSO Module mode is used to select the main function of the PSO. When it is set to *Crossing*, it is assumed that the PSO will be used at the crossing with the island being used and the two PSO receivers used, one for each approach. In this mode, the user can set the parameters shown in Figure 10-10. In the crossing mode, the PSO must be set up so one receiver is on one approach to the island, and the other PSO is on the opposite approach with the island in the middle. In this mode directional stick logic is used so that the crossing will deactivate after the train leaves the island while the exit approach is still occupied. This stick is applied when the 1st approach and island have picked up. While the stick is set an occupancy of the exit track is ignored. When the exit track becomes unoccupied the stick is cleared. The failure of the exit track to pick up presents a hazard, since if the stick is not cleared and a train enters the track circuit with the stick set, the crossing will not activate.

The GCP5000 (GCE) provides three methods of protecting against this scenario:

a) if any of the PSO receivers or island become unhealthy the stick will be cleared on this PSO,
b) the stick will be cleared when the stick cancel timer expires,
c) an optional stick cancel input can be used, this is normally energized, and when de-energized cancels the stick.

The stick cancel timer is used to cancel the stick if it remains set for more than the configured time.

The user can select an external input (or internal logic) to cancel the stick. When Stick Cancel Input Used is set to *Yes*, the PSO 'n' Stick RX'm' Cancel Input (e.g., PSO 1 Stick RX1 Cancel Input) is available to be used in the *System Inputs.*

If an external PSO module (e.g., a PSO4000) is used at the crossing to provide additional PSO receivers to extend the approaches and these are fed into a PSO receiver enable input, then a failure of these receivers can result in the stick not being cleared. This can be mitigated by wiring the PSO health output from the external PSO module into the stick cancel input of the PSO in the GCE system.

WARNING

WARNING

A FAILURE OF THE EXIT TRACK WHEN THE STICK IS SET CAN RESULT IN A FAILURE TO ACTIVATE THE CROSSING.

THE STICK CANCEL TIMER VALUE SHOULD BE CHOSEN TO CANCEL THE STICK BEFORE ANOTHER TRAIN CAN APPROACH.

THE STICK CANCEL INPUT SHOULD BE USED WHERE APPROPRIATE TO CANCEL THE STICK.

The Wrap Pickup Delay Time is used to provide pickup delay when using track wrap on the PSO receivers. A common value is used for both receivers on the PSO.

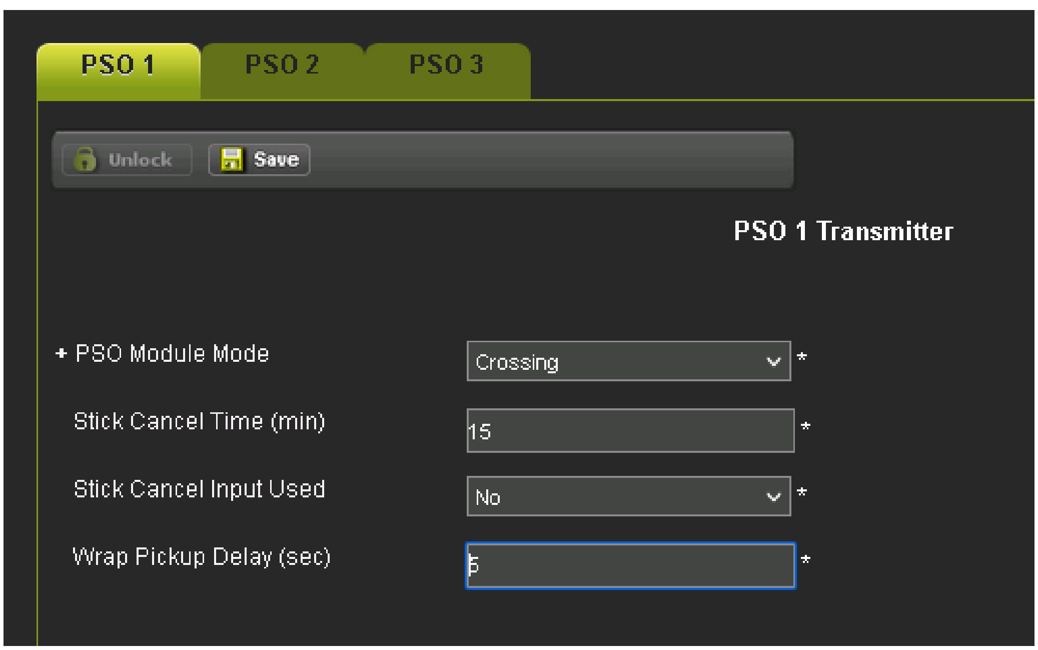

Figure 10-10 PSO Transmitter when in Mode = Crossing

When the PSO Module Mode is set to Rx/Tx, then the PSO transmitter is used and the 2 receivers can optionally be used as shown in Figure 10-13. In this mode, this PSO is logically independent of other PSO crossing logic used in the GCE system. Occupancy of these receivers will not automatically activate the crossing. If they are required to be part of the crossing logic they need to be tied in with the receivers used on the PSO module set in crossing Mode, or fed into the crossing logic in another manner (see Section 10.1.2.1 regarding PSO receiver Enable)

The following additional parameters are available on this screen in this mode:

- **TX Freq Category**: range Standard, Alternate, default Standard
- **TX Frequency**: range see below, default Not Set
- **TX Transmit Level**: range Low, High, default Low
- **TX Address**: range A, C, D, E, F, Dynamic, default A
- **Tx Enabled Used**: range Yes, No, default No
- **Wrap Pickup Dela**y: range 0-10 sec, default 5 sec, as described previously.

The following standard Siemens frequencies can be selected when the Tx Freq Category is set to standard:

156 Hz	211 Hz	285 Hz	348 Hz	430 Hz	525 Hz	645 Hz
790 Hz	970 Hz	1.18 kHz	1.45 kHz	1.77 kHz	2.14 kHz	2.63 kHz
4.0 kHz						

The following alternate Siemens frequencies can be selected when the Tx Freq Category is set to alternate:

500 Hz	700 Hz	900 Hz	1.0 kHz	1.125 kHz	1.3 kHz	1.37 kHz
1.5 kHz	1.64 kHz	1.75 kHz	1.875 kHz	2.175 kHz	2.3 kHz	2.675 kHz
2.8 kHz	3.1 kHz	3.5 kHz	4.0 kHz	4.9 kHz	5.4 kHz	5.9 kHz
6.4 kHz	7.1 kHz	7.7 kHz	8.3 kHz	8.9 kHz	9.5 kHz	10.2 kHz

See the PSO 4000 manual (SIG-00-07-06) for instructions on frequency selection and transmit level settings.

The transmitter can be set up to send a fixed code of *A, C, D, E,* or I or it can be set to *Dynamic* mode where the code transmitted is set vital inputs (or logic). When TX Address is set to *Dynamic* the following inputs are available in the set of *System Inputs* (where n = 1..5):

- PSO n TX Code A
- PSO n TX Code C
- PSO n TX Code D
- PSO n TX Code E
- PSO n TX Code F

When Dynamic mode is used a configured pickup delay is available as shown in Figure 10-12.

- **Tx Enable Pickup Delay**: range 0-30 sec, default 0 sec

When a TX Address used a fixed code, the Tx Enable Used option is available. When this is set to *Yes*, one of the PSO n TX Code A .. F inputs can be mapped to an input, which one depends upon the fixed code selected.

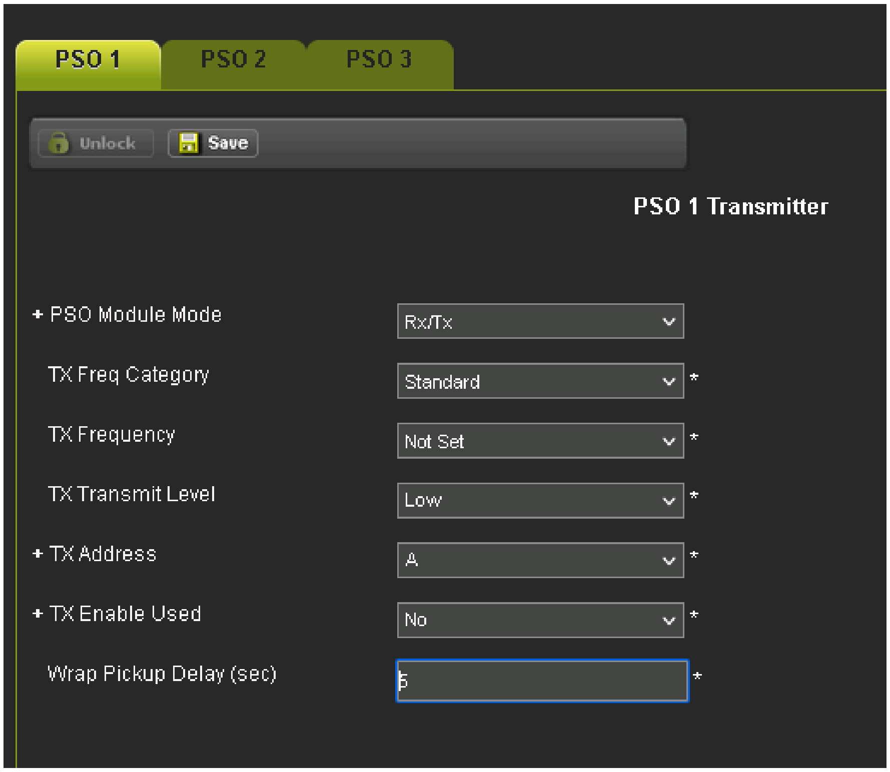

Figure 10-11 PSO Transmitter when mode=Rx/Tx

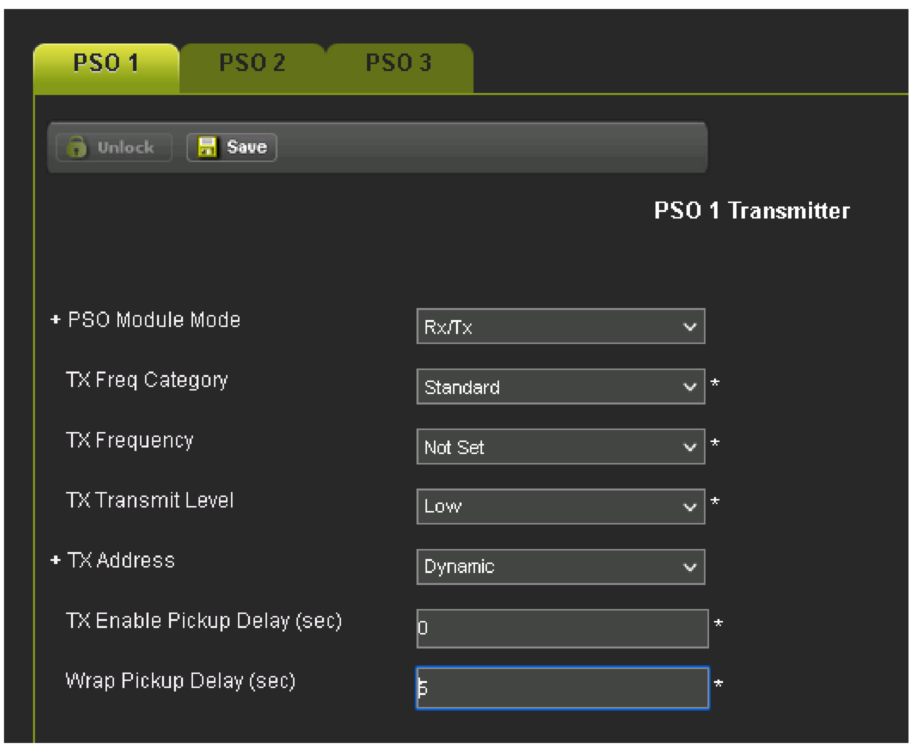

Figure 10-12 PSO Transmitter when mode=Rx/Tx and Dynamic Mode

The PSO may be used in receiver mode only. Here the 2 receivers can optionally be used. In this mode, the PSO receivers are logically independent of other PSO crossing logic used in the GCE system. Occupancy of these receivers will not automatically activate the crossing. If they are required to be part of the crossing logic they need to be tied in with the receivers used on the PSO module set in crossing Mode, or fed into the crossing logic in another manner (see section 10.1.2.1 regarding PSO receiver Enable).

In this mode, the Wrap Pick Delay time is still available.

Figure 10-13 PSO Transmitter when mode=Rx Only

10.1.3.2 PSO ‘N’ Island

Figure 10-14 shows the PSO Island menu when the internal island is used. The island menu is only visible when the PSO Module Mode is to Crossing.

- **Island Mode**: range Internal, External, default Internal
- **Isl Freq Category**: range Standard, Alternate, default Standard
- **Isl Frequency**: range see below, default Not Set
- **Isl Pickup Delay Time**: range 2 to 30 sec, default 2 sec.
- **Isl Enable Used**: range Yes, No, default No

The following standard Siemens frequencies can be selected when the Tx Freq Category is set to standard:

2.14 kHz	2.63 kHz	4.0 kHz	4.9 kHz	5.9 kHz	7.1 kHz	8.3 kHz
10.0 kHz	11.5 kHz	13.2 kHz	15.2 kHz	17.5 kHz	20.2 kHz	

The following alternate Siemens frequencies can be selected when the Tx Freq Category is set to alternate:

2.3 kHz	2.8 kHz	3.1 kHz	3.5 kHz	4.0 kHz	4.9 kHz	5.4 kHz
5.9 kHz	6.4 kHz	7.1 kHz	7.7 kHz	8.3 kHz	8.9 kHz	9.5 kHz
10.2 kHz						

See the PSO 4000 manual (SIG-00-07-06) for instructions on island frequency selection.

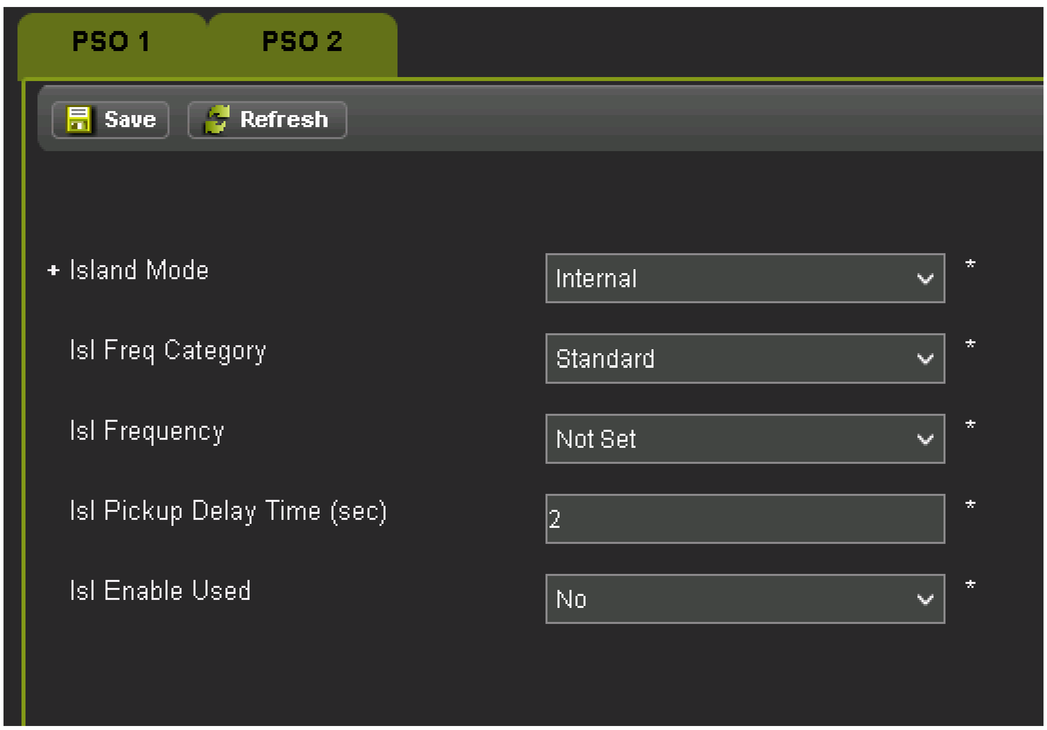

Figure 10-14 PSO Island (internal)

NOTE

NOTE

The PSO Module may be used for Island Only operation with no PSO receiver used, by setting the PSO Receiver Mode to No.

An external island track circuit can be used in place of the internal one. When set to *External* the external pickup delay can be selected.

- External Island Pickup Delay: range 2 to 30 sec, default 2 sec.

When set to *External* the PSO 'n' External Isl selection is available in the list of *System Inputs* to be mapped to a vital input on a module.

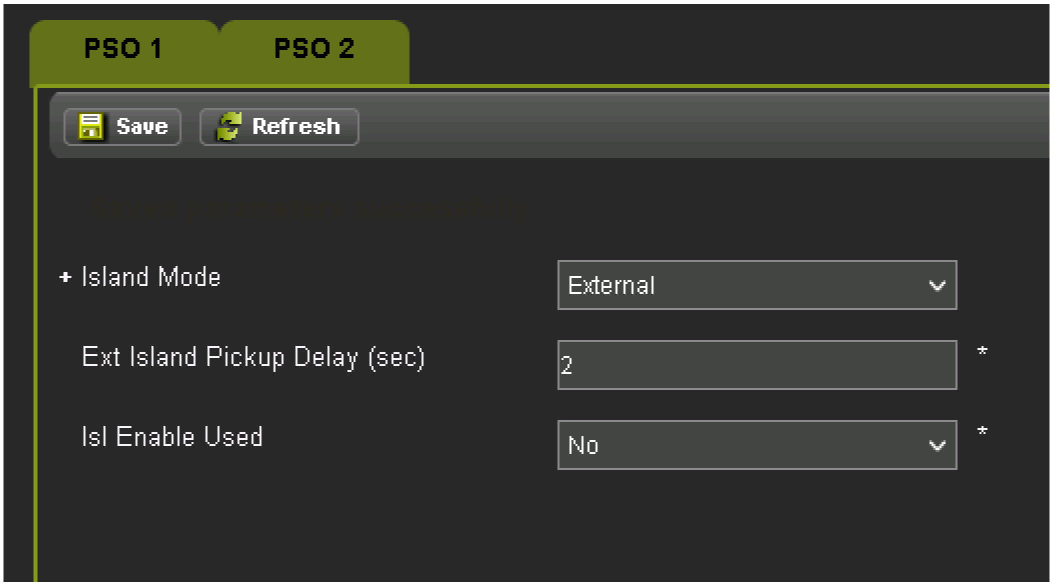

Figure 10-15 PSO Island (External)

The Isl Enable Used option is available for Internal and External Islands. When Isl Enable Used is set to yes, the PSO 'n' Isl Enable selection is available in the list of *System Inputs* to be mapped to a vital input on a module. When the Isl Enable input is de-energized, it will cause the island to act as if it is occupied.

10.1.3.3 PSO 'N' Receiver 1 and 2

Figure 10-16 PSO Receiver shows the PSO Receiver menu for Receiver 1 (Receiver 2 is similar). The Receiver menu is available in all PSO Module Modes. The following are available when the module RX 1 Mode is set to *Internal*.

- **Rx1 Mode**: range Internal, External, No, default Internal
- **RX1 Freq Category**: range Standard, Alternate, default Standard
- **RX1 Frequency**: range see TX Frequency list in section 2.1.1, default Not Set
- **RX1 Pickup Delay:** range 2-30 sec, default 2 sec
- **RX1 Threshold**: range 100-9999, default 100
- **RX1 Enable Used:** range Yes, No, default No
- **RX1 Wrap Used:** range Yes, No, default No

When the PSO Module Mode is Crossing, the receivers can be turned off by setting the Mode to No, so that the PSO module can be used just for its island function.

The RX1 Threshold can be used to adjust the sensitivity of the receiver, see Section 6.2.2.

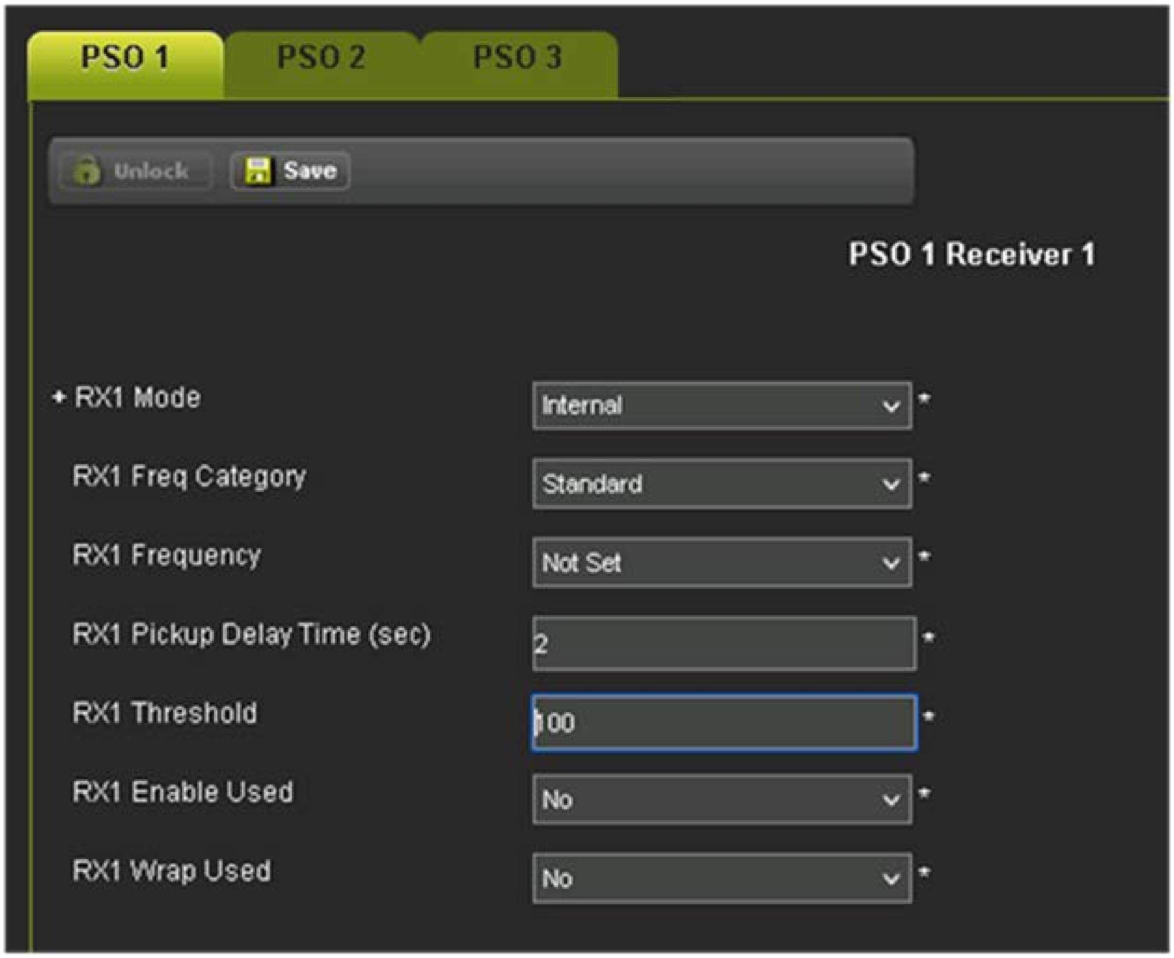

Figure 10-16 PSO Receiver

When the RX1 Enable Used is set to *Yes*, the PSO 1 RX 1 Enable input is available in the System Inputs. This input is used if the approach to the crossing consists of multiple separate PSO receiver sections. The occupancy of these outer PSO receiver circuits can be fed into the PSO Rx Enable input.

For example, Figure 10-17 shows how the receivers from two other PSO modules in the GCP5000 (GCE) can be used to set the Enable Input for the receiver at the crossing.

If the PSO RX Enable input is assigned to a vital input and an external PSO or other track circuit is being used, then it is worth considering bringing in the health of this external equipment, if it is available, in order to cancel the stick in the event of the external track circuit going unhealthy.

Note that when a wrap is applied to a receiver at the crossing, its receiver enable input is also wrapped. Thus, allowing a single wrap input to be used to wrap the whole approach. Similar to when the receiver at the crossing is taken out of service, its enable input is also taken out of service.

PSO 1 Appr 1 Occ is available in the *System Outputs,* this represents the occupancy of the whole approach for PSO 1 RX 1 including tracks circuits that are used to set its Enable.

PSO 1 RX1 Occupancy is also available in the *System Outputs,* this represents the occupancy of just the PSO 1 RX 1 track circuit and does not include tracks circuits that are used to set its Enable. This term is available as it may be needed when programming second train logic.

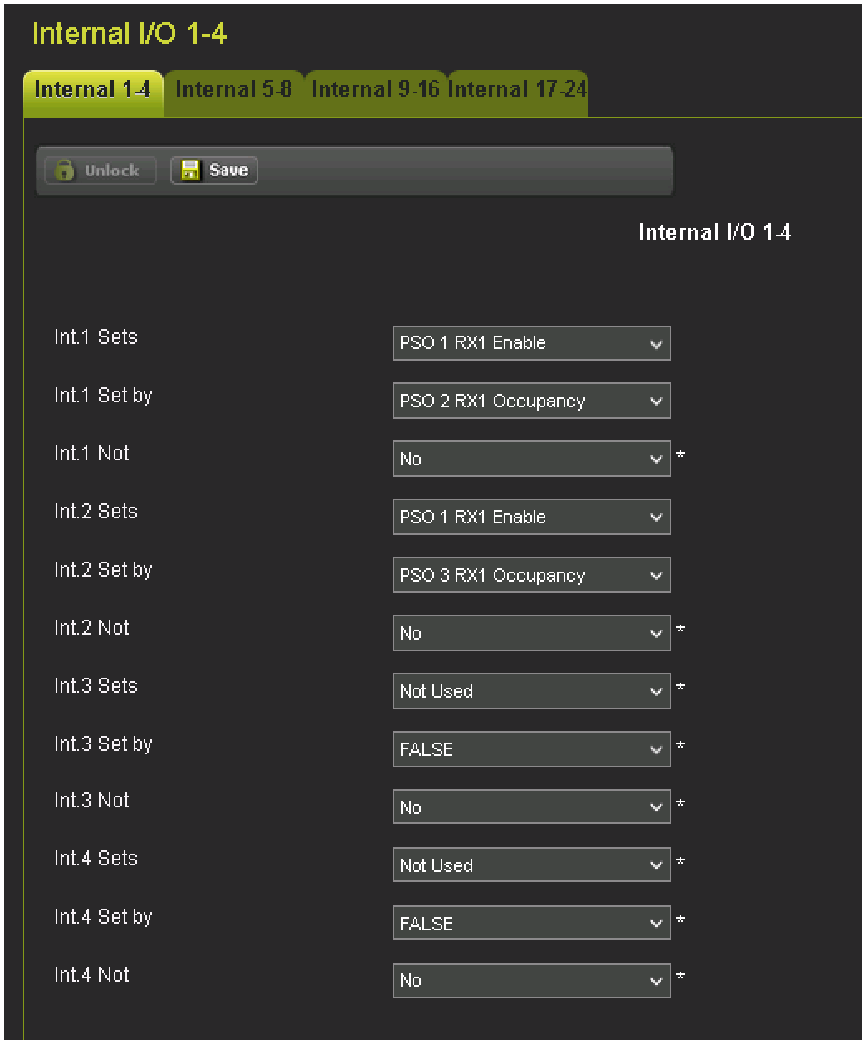

Figure 10-17 Setting PSO Receiver Enable inputs

When the PSO 1 RX1 Wrap Used is set to *Yes*, the PSO 1 RX1 Wrap is available in the *System Inputs* and can be assigned to a vital input or set via internal logic. The Wrap Pickup Delay described in Section 5 will be applied to the input.

An external track circuit can be used in place of the internal PSO by setting RX1 Used to External as shown in Figure 10-18.

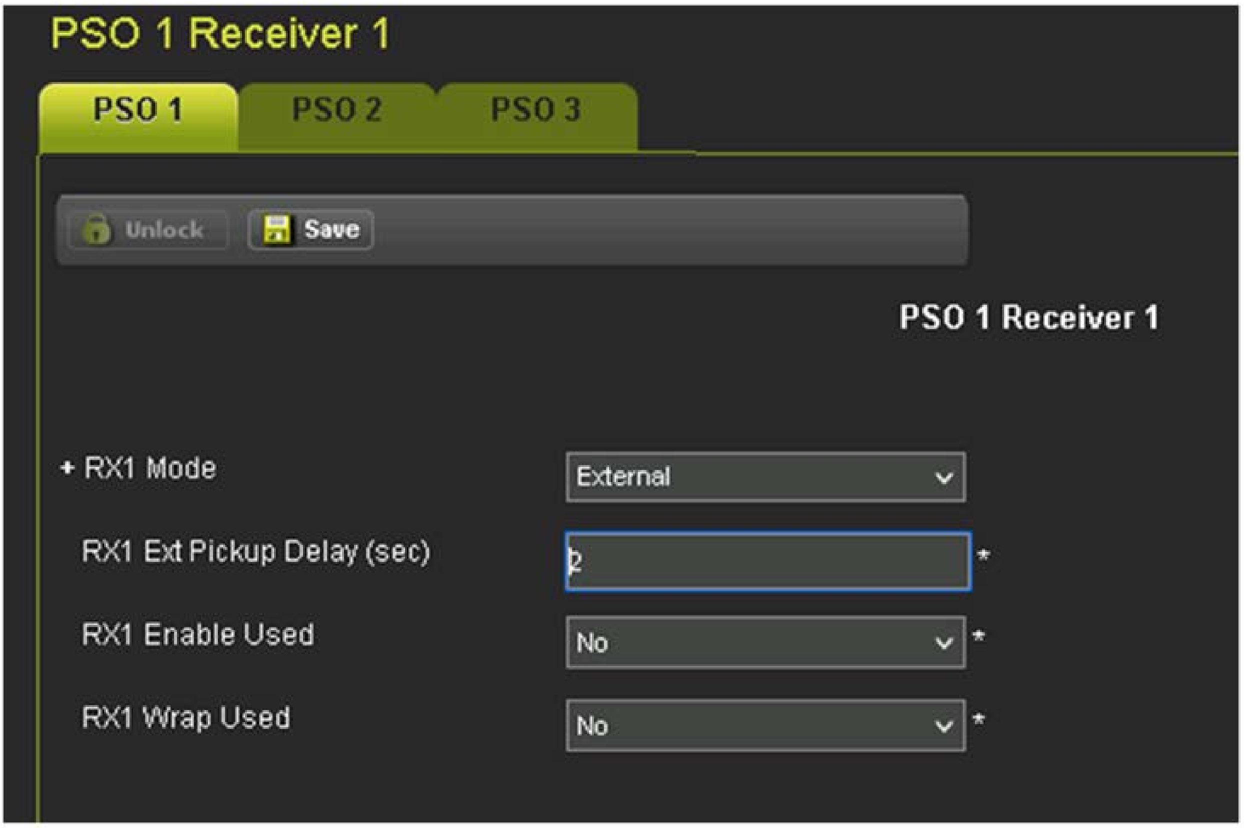

Figure 10-18 External PSO Receiver

10.1.3.4 PSO 'N' Rx1 and 2 Codes

Figure 10-19 PSO Codes shows the PSO Receiver Code menu for Receiver 1 (Receiver 2 is similar). This is used to select which code the receiver can accept. This menu is only available when the internal PSO receiver is used.

- **Rx1 Code A Valid**: range Yes, No, default Yes
- **RX1 Code A Drop Delay**: range 0 – 99 sec, default 0 sec
- **Rx1 Code C Valid**: range Yes, No, default No
- **RX1 Code C Drop Delay**: range 0 – 99 sec, default 0 sec
- **Rx1 Code D Valid**: range Yes, No, default No
- **RX1 Code D Drop Delay**: range 0 – 99 sec, default 0 sec
- **Rx1 Code E Valid**: range Yes, No, default No
- **RX1 Code E Drop Delay**: range 0 – 99 sec, default 0 sec
- **Rx1 Code F Valid**: range Yes, No, default No
- **RX1 Code F Drop Delay**: range 0 – 99 sec, default 0 sec

In general, to reduce the risk of accepting a false PSO signal, the PSO receiver should be set up to receive only one code. Multiple codes can be used when used in conjunction with a transmitter that is set to Dynamic mode.

A unique drop delay can be set for each code. If a drop delay is set, the PSO receiver will not declare the circuit occupied until the drop delay has expired. To prevent a loss of shunt causing a short warning time, the PSO receiver will not allow the drop delay to be reapplied until the PSO receiver has been continuously unoccupied for 30 sec. If Advance Preemption is used, the advance preemption timer will start once the drop delay has expired, see section 0.

PSO 1 Appr 1 Act Occ is available in the *System Outputs,* this represents the actual occupancy of the PSO 1 RX 1 track circuit without the drop delay. This de-energizes as soon as the track circuit is occupied without waiting for the drop delay to expire.

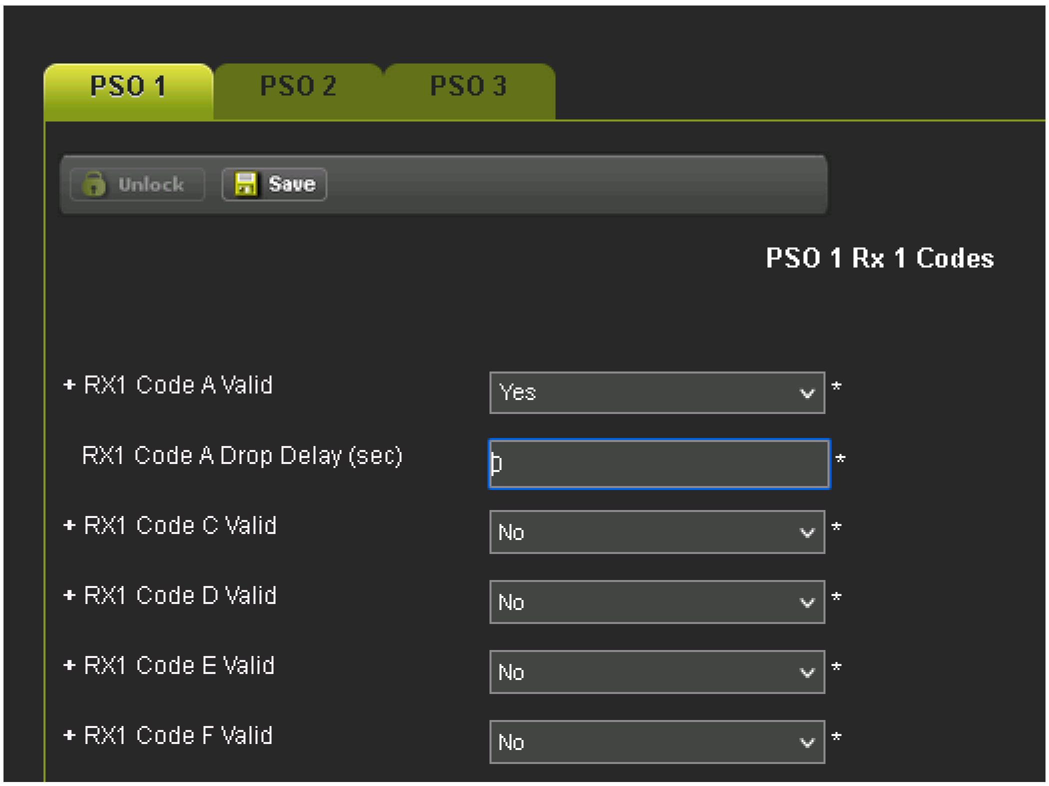

Figure 10-19   PSO Codes

10.1.4 Logic Programming

10.1.4.1 Logic: PSO ANDing

Figure 10-20 shows the Logic: AND 1 XR menu. This is used to select which PSOs that are set with PSO Module Mode as Crossing are used in the control AND 1 XR. Note: AND 1 XR is the default control for controlling the SSCC IIIi module. Normally all PSO modules set to Crossing Mode should be included, regardless of whether they have the PSO receiver used.

- AND 1 XR Used, range Yes, No, default Yes
- AND 1 XR PSO 1 Used, range Yes, No, default Yes
- AND 1 XR PSO 2 Used, range Yes, No, default Yes
- AND 1 XR PSO 3 Used, range Yes, No, default Yes
- AND 1 XR PSO 4 Used, range Yes, No, default Yes
- AND 1 XR PSO 5 Used, range Yes, No, default Yes
- AND 1 Enable Used, range Yes, No, default No
- AND 1 Enable Pickup, range 0-500 sec, default 5 sec
- AND 1 Enable Drop, range 0-500 sec, default 0 sec

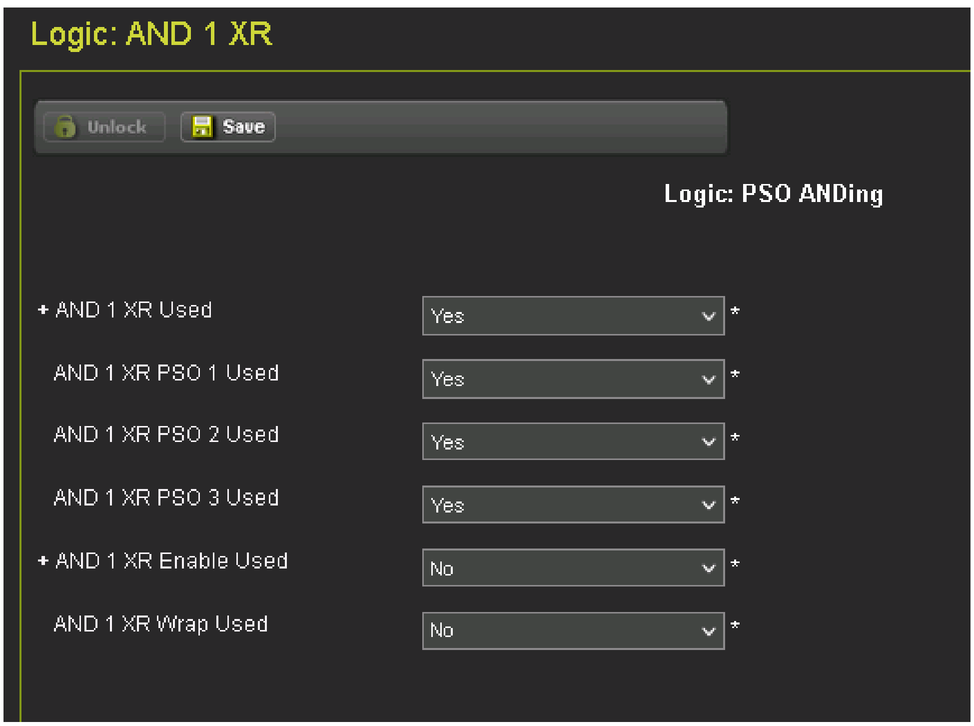

Figure 10-20 Logic: AND 1 XR

If the AND 1 Enable Used is set to *Yes*, then a pickup and drop delay can be configured as shown in Figure 10-21 and the AND 1 XR Enable is available in the S*ystem Inputs* which can be assigned to a vital input or via internal logic.

When the AND 1 XR Wrap Used is set, the AND 1 XR Wrap is available in the S*ystem Inputs* which can be assigned to *a* vital input or via internal logic.

Note that that AND 1 XR Wrap will override the PSOs and the Enable input.

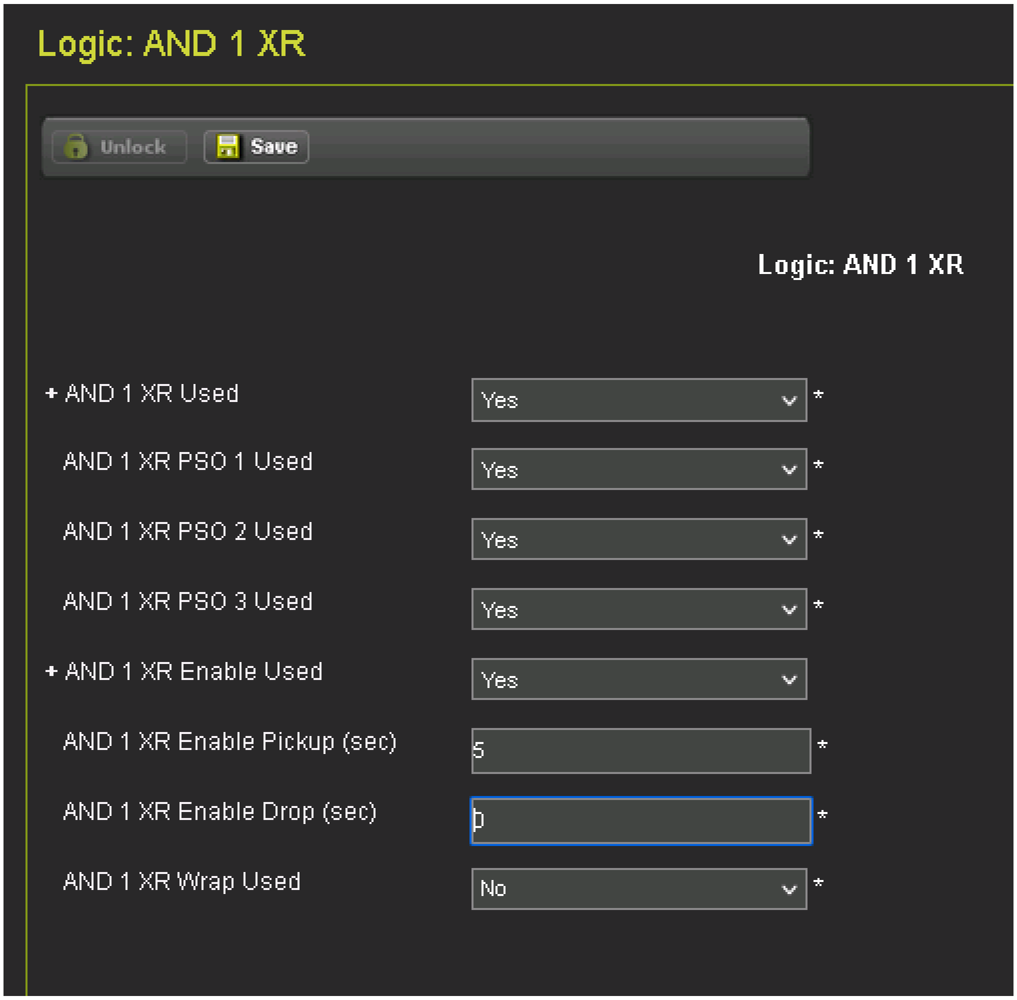

Figure 10-21 Logic: AND 1 XR Enable Used

10.1.4.2 Logic: Features

The GCE MCF provides various logic capability features. Figure 10-22 shows the selection of these features.

- ANDs Used controls whether the Logic: AND 2- 8 menu options are available
- ORs Used controls whether the Logic: OR 1 - 4 menu options are available
- Equations Used controls whether the Logic: Equation 1-10 menu options are available
- User Timer controls whether the Logic: User Timers menu options are available and whether the User Timer 1-10 options show up in the *System Inputs, System Output* and *System I/O* list.
- Switch Inputs Used controls whether the NWP 1-4 and RWP 1-4 options show up in the *System Inputs*, Output and I/O list.
- General I/O Used controls whether the General IP 1 – 16 and General OP 1- 8 option show up in the *System Inputs, System Output* and *System I/O* list.
- Maint Call Rpt I/O Used controls whether the Maint Call Rpt IP and Maint Call OP show up in *System Inputs, System Output* and *System I/O* list. The Maint Call OP repeats the state of the Maintenance call output on the chassis. The Maint Call Rpt IP provides a

way of providing an external input or extra logical control via internal logic that can drop the maintenance call output. If the Maint Call Rpt I/O Used is set to yes, the Maint Call Rpt IP must be set to TRUE if not used. This can be done via an internal channel, for example:
    - Int.1 Sets Maint Call Rpt IP
    - Int.1 Set by TRUE
- Emergency Activate IP can be set to yes to provide an Emergency Activate input that can be mapped to an external vital input. When this input is de-energized it will override all wraps and out of service conditions and de-energize all outputs and activate the crossing.

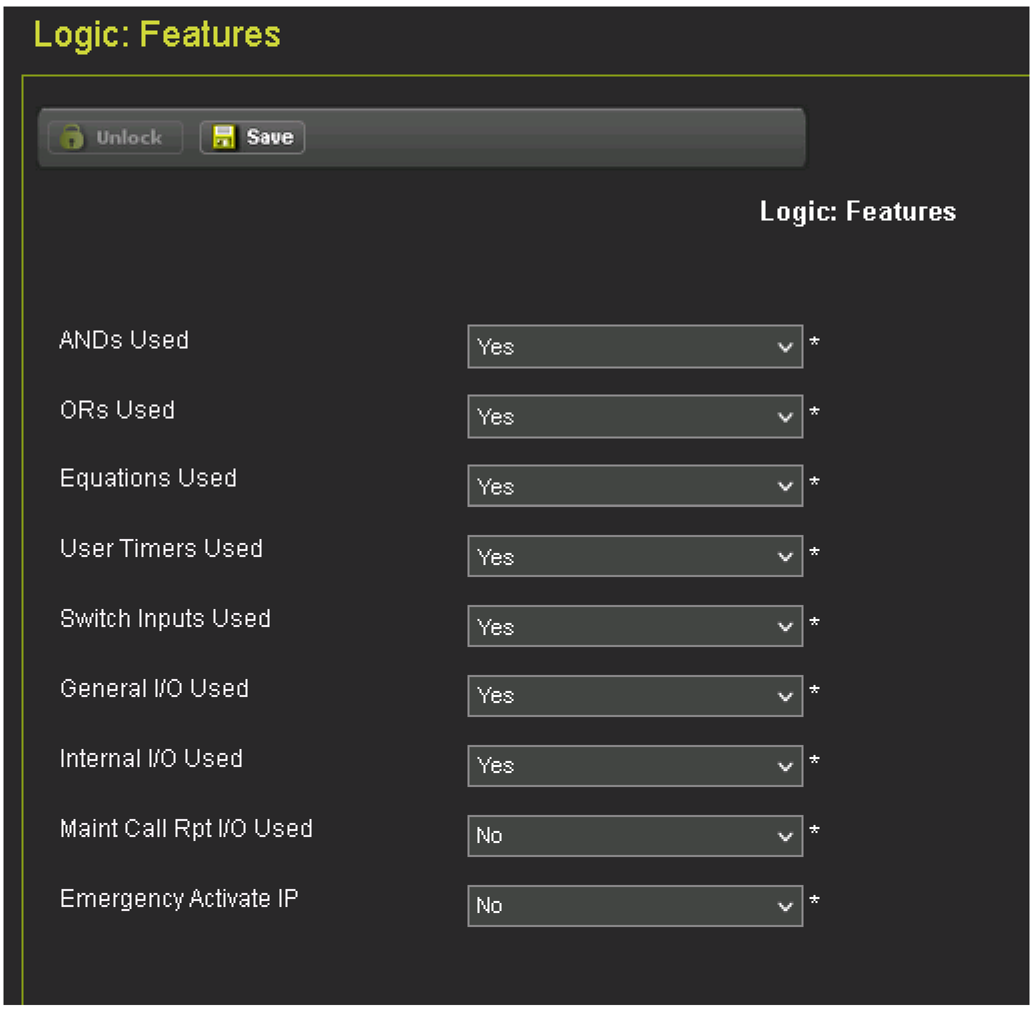

Figure 10-22 Logic Features

10.1.4.3 Logic: AND Gates

The GCE MCF provides 7 general purpose configurable AND gates. Figure 10-23 shows the menu for assigning terms to AND 2.

The AND 2 Term ‘n’ can be any available System I/O value. For AND Gates 2- 6 terms 3 and 4 can be negated by setting the Not OR Term to Yes. For AND Gates 7 and 8 terms 2, 3, and 4 can be negated.

The terms are all set to FALSE by default. When any Term is set to a value other than FALSE, this AND will be available for use in the available *System I/O* and *System Outputs*. See Section 10.1.6.

If not all 6 Terms are needed, and unused terms must be set to TRUE.

The AND gate also provides an optional Enable and Wrap function. If the AND ‘n’ Enable is set to Yes, the AND ‘n’ Enable can be assigned as a *System Input*, e.g., mapped to a vital input on a module. The Enable input has configurable pickup and drop delays, range 0-500 sec, default 0 sec.

If the AND ‘n’ Wrap is set to Yes, the AND ‘n’ Wrap can be assigned as a *System Input*, e.g., mapped to a vital input on a module.

The logical equation for AND 2 is shown at the bottom of Figure 10-23.

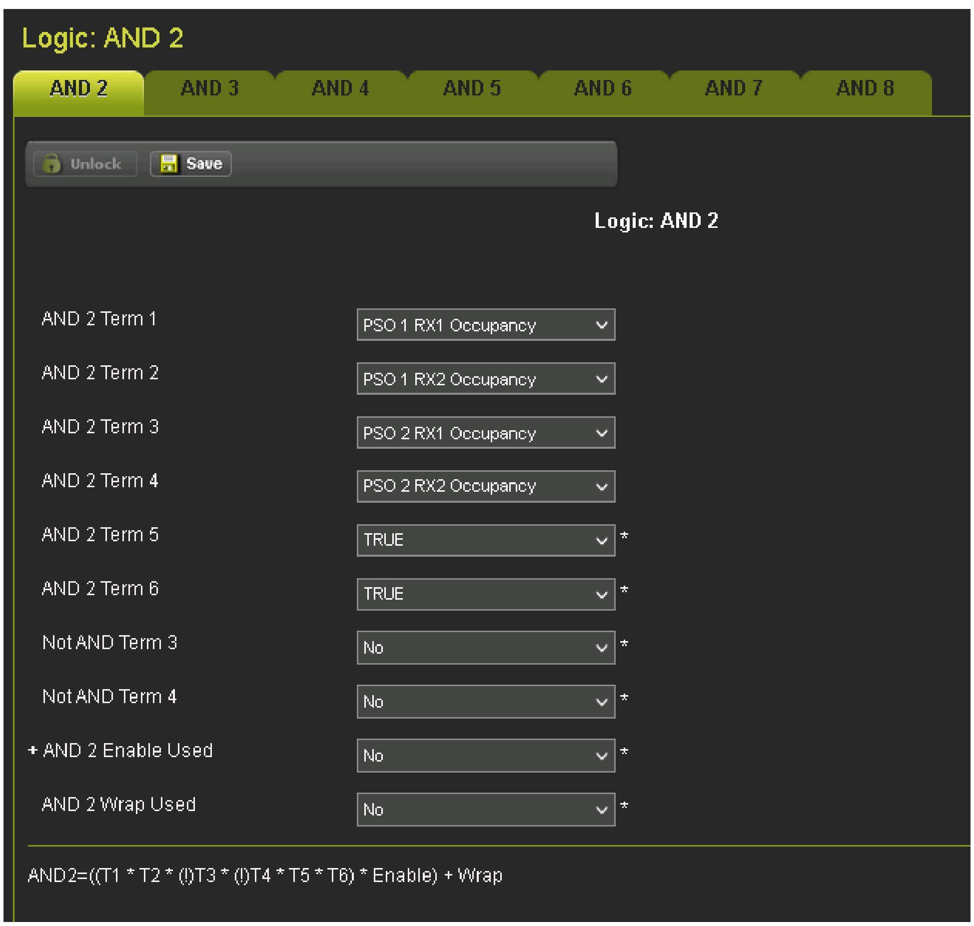

Figure 10-23 AND 2 Gate

AND gate 5 to 8 differ from AND 2-4 slightly. With AND 5 to 8 The Pickup and Drop delays are not associated with the AND enable, but rather they are applied directly to the AND output.

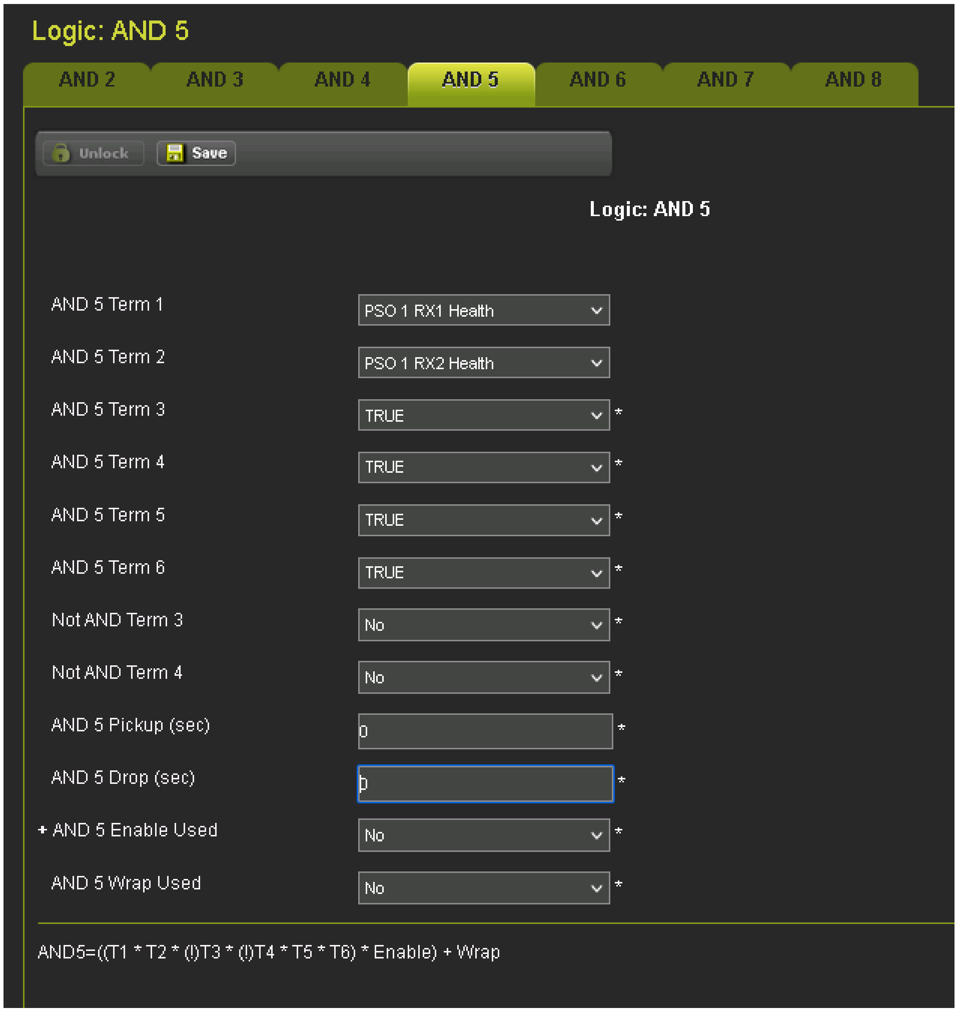

Figure 10-24 AND 5 Gates

10.1.4.4 Logic: OR Gates

The GCE MCF provides 4 configurable OR gates. Figure 10-25 shows the menu for assigning terms to OR 1.

The OR 1 Term ‘n’ can be any available System I/O value. Terms 3 and 4 can be negated by setting the Not OR Term to Yes.

The terms are all set to FALSE by default. When any Term is set to a value other than FALSE, this OR will be available for use in the available *System Outputs* and *System I/O*. See Section 10.1.6.

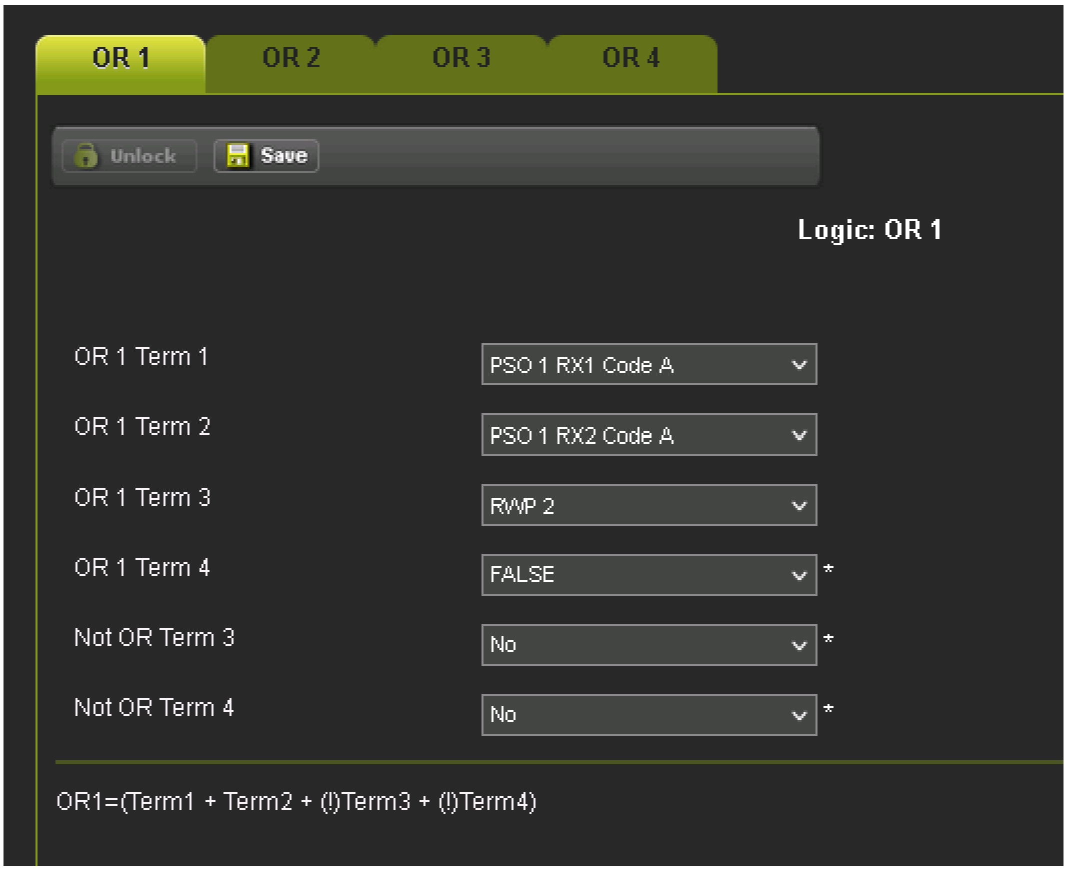

Figure 10-25 Logic: OR Gates

10.1.4.5 Logic: Equation

The GCE MCF provides 10 general purpose configurable logic Equations. Figure 10-26 shows the menu for assigning terms to Equation 1.

There logic format of the equation is determined by setting the Template. There are 5 different templates available:

- Type 1: ((A * B) + (C * D)) * E * F
- Type 2: ((A + B) * (C + D)) * E * F
- Type 3: (A + B) * (C + D) * (E + F)
- Type 4: (A * B * C) + (D * E * F)
- Type 5: (A + B + C) * (D + E + F)

The Coil E1 can be any available *System Input*.

The Contacts A – F can be any available System I/O value.

Various contacts can be inverted by setting Not A, B, C, or E.

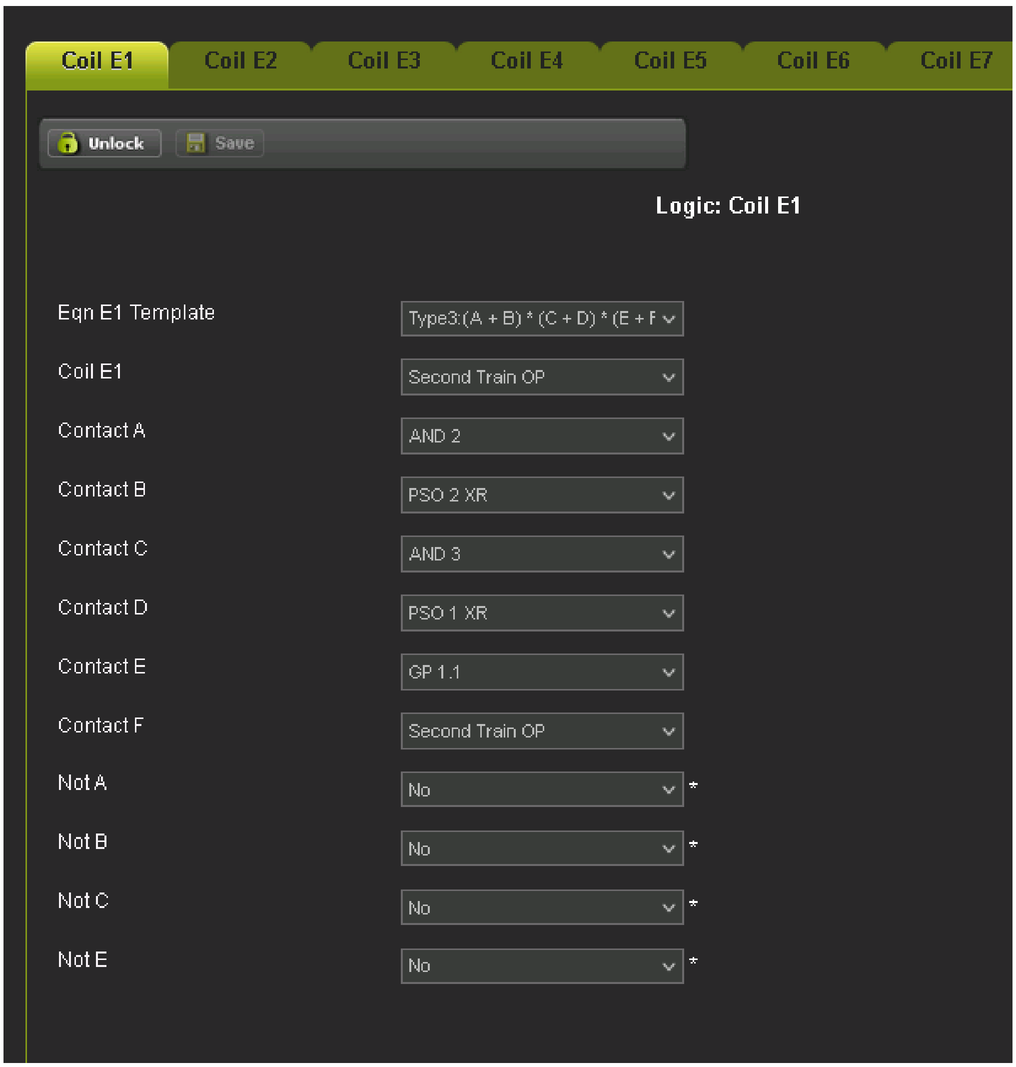

Figure 10-26 Logic: Equations

10.1.4.6 Logic: Timers

Figure 10-27 shows the parameters that are used to set the duration of the user timers.

Range 0-500 sec, default 0 sec

When the timers are used, the following inputs are available to be set as a *System Input*:

- Timer 1 Start .. Timer 10 Start

The timer expiry is available as a *System Output* or *System I/O* function*:*

- Timer 1 Expired .. Timer 10 Expired

The Timer Start and Expired states can be referenced as System I/O functions in AND, ORs, or Equation Contacts.

To Start the timer set Timer 'n' Start to true. When the timer has expired Timer 'n' Expired will go true.

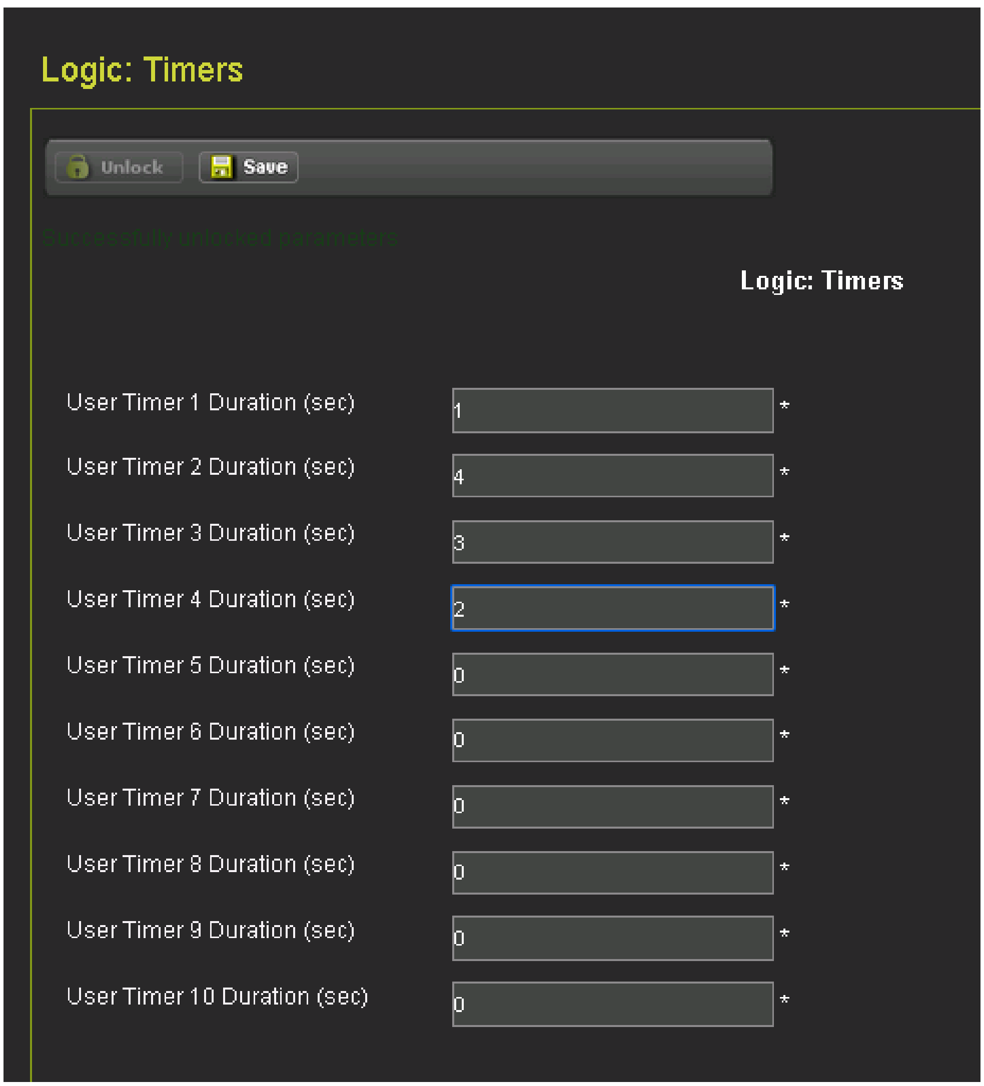

Figure 10-27 Logic: Timers

10.1.4.7 Logic: Internal I/O

The GCE provides 24 Internal I/O channels. Figure 10-28 shows the first Internal I/O menu where the user can assign channels 1 to 4, there are 3 more similar menus to assign the other Internal channels.

The Not function is only available on Internal channels 1 to 8.

The purpose of the internal channel is to let the user assign a system I/O function to a *System Input*.

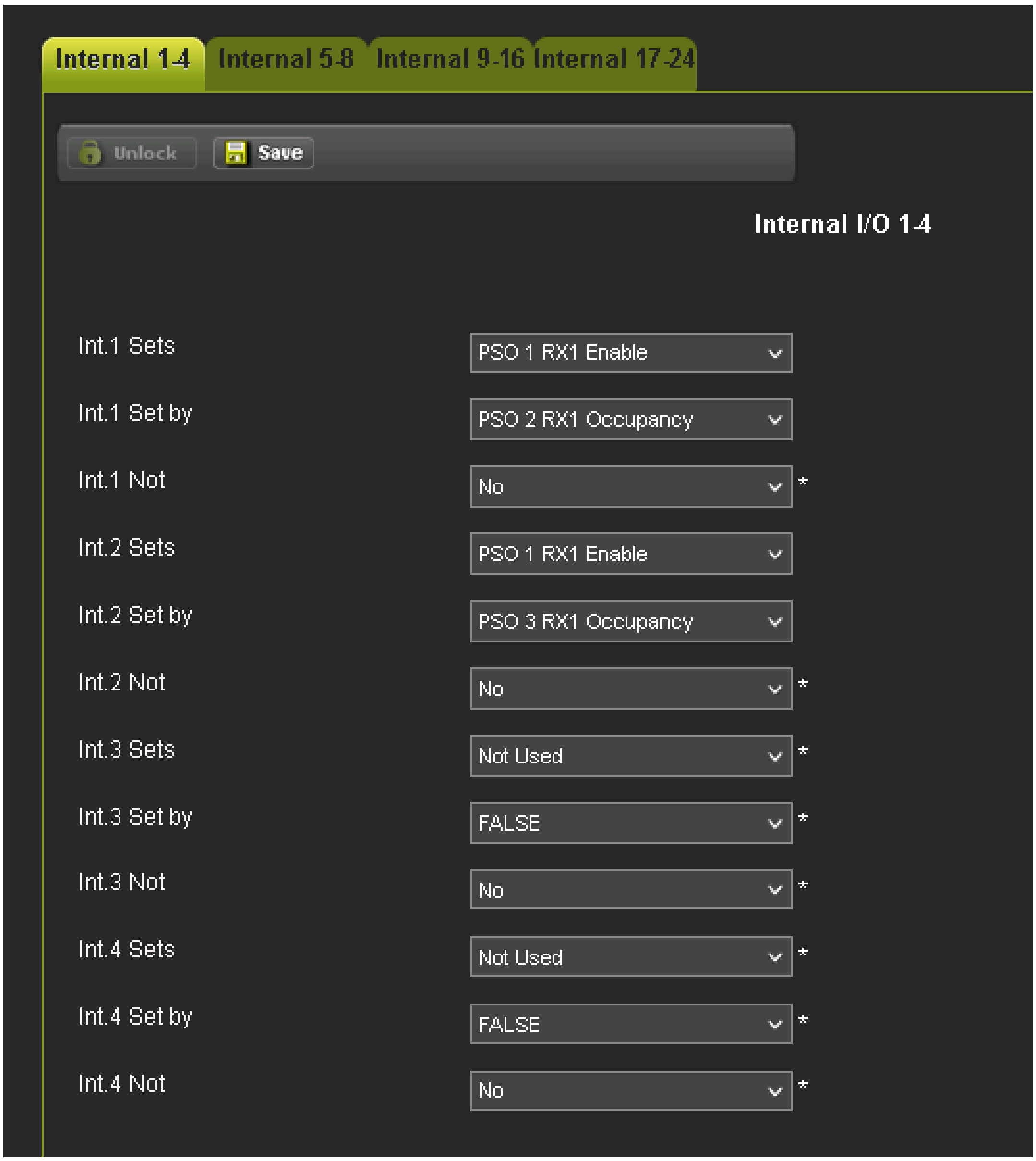

Figure 10-28 Logic: Internal Channels

For example, let's say IN 7.5 is assigned to its normal default function of GP 1.1, but we want to also start a timer when GP 1.1 picks, then set:

- Int.1 Sets Timer 1 Start
- Int.1 Set byGP 1.1
- Int.1 Not False

If we want to start the timer when GP drops, then set

- Int.1 Sets Timer 1 Start
- Int.1 Set byGP 1.1
- Int.1 Not True

Note that the internal channels also provide an alternate way to AND together terms. When a *System Input* is used multiple times in either the Input Assignments, Equations, Vital Comms Rx, or Internal I/O channels, the controlling inputs are all ANDed so all need to be energized to energize the *System Input* for example, if the following were all used to set AND 2 Enable, then if any of IN 1.1, IN 1.2, General IP 1 or General IP 2 was de-energized, the AND 2 Enable would be de-energized.

- IN 1.1AND 2 Enable
- IN 1.2 AND 2 Enable
- Int.1 Sets AND 2 Enable
- Int.1 Set byGeneral IP 1
- Int.2 Sets AND 2 Enable
- Int.2 Set byGeneral IP 2

10.1.5 SSCC Programming

10.1.5.1 SSCC Configuration

Figure 10-29 shows the parameters that are common to both SSCC modules.

- **Gate Used**: range: Yes, No, default Yes. This can be set to No if no gates are used at the crossing.
- **SSCC1 + 2 GPs Coupled**: range Yes, No, default Yes. When this is set to *Yes*, the SSCC module are coupled such that if the GP of one module drops, it will cause the lamps on both SSCCs' to flash. Similarly, if there is a health error on 1 module, the lamps on both modules will flash, and both gates drop. If this is set to No, the SSCC modules will act independently, and different AND's can be used to activate them at different times.
- **Min Activation**: range 0-100 sec, default 0 sec. This is used to control the minimum activation time for the crossing.
- **Rmt Activation Cancel:** range 1-5 min, default 2 min. This is used to control how long the crossing will remain active if it was commanded to be activated by the SEAR IIi. This is used to protect against a loss of communication to non-vital equipment keeping the crossing active.
- **Bell On Gate Rising:** range Yes, No, default No. If set to *No*, the bell will be turned off after activation while the gate is still rising. If set to *Yes*, the bell will remain on after activation while the gate is still rising.
- **Mute Bell on Gate Down:** range, Yes, No, default No. If set to Yes, then the bell will be turned off when all the gates are proved to be down, i.e., all GDs assigned to inputs are energized.

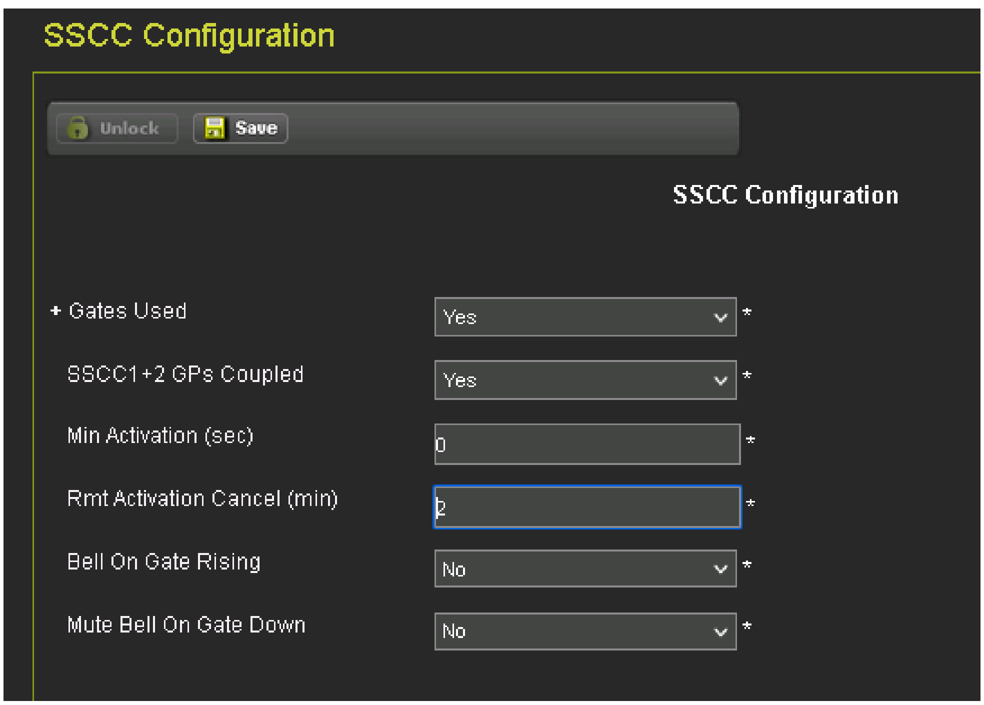

Figure 10-29 SSCC Configuration

10.1.5.2 SSCC 1 Configuration

Figure 10-30 shows the parameters for the SSCC-1 module.

- **SSCC-1 Activation:** Range AND 1 XR, AND 2, AND 3 AND 4, default AND 1 XR. In some applications, it is required to control the SSCC modules independently. This is done by selecting different ANDs to control them (not SSC1+2 GPs coupled should be set to No in these cases).
- **SSCC-1 Gate Delay**: Range 3-20s, default 4s. This is used to control the gate delay after an activation.
- **SSCC-1 Number of GPs**: Range 1-2, default 1. This is used to set how many independent GPs are available to be assigned to inputs for SSCC-1 (GP 1.1, GP 1.2). This is used for logging purposes only, for logical purposes GP 1.1 could be assigned to multiple inputs if more than GP is required.
- **SSCC-1 Number of GDs**: Range 1-4, default 2. This is used to set how many independent GDs are available to be assigned to inputs for SSCC-1 (GD 1.1, GD 1.2, GD 1.3, GD 1.4). This is used for logging purposes only, for logical purposes GD 1.1 could be assigned to multiple inputs if more than GD is required.
- **Flash Rate:** Range 30-70 in steps of 5, default 50 fpm. This is used to control the flash rate of the lamps. Not that SSCC-2 must be configured to the same value as SSCC-1.
- **Low Battery Detection:** range Yes No, default No. This is used to turn on the battery monitoring function in the SSCC module.
- **Low Battery Level:** range 90-150 dV, default 90dV (9.0V). When Low battery detection is on, this is used to set the low battery threshold. When a low battery is detected it will turn off the maintenance call light.
- **Flash Sync:** master, slave, default master. This is used to synchronize flashing between SSCC modules. It can also be used to synchronize external SSCC modules, via the Flash Sync connector on the chassis. Only one SSCC in the system should be set to master.
- **Invert Gate Output:** range Yes, No, default No. This is used to control an exit gate. When the output is turned on in order to drive the gate down.
- **Lamp Neutral Test:** range Yes, No, default No.
- **Aux-1 Xng Ctrl Used:** range Yes, No, default No. This is used in interconnected railroad applications. When this is set to *Yes*, two outputs are available to be mapped to vital outputs: Aux-1 Xng Control and Aux-1 Lmp Control. Aux-1 Xng Control will reflect the state of the activation for SSCC-1. Aux-1 Lmp Control will reflect the lamp flash control of SSCC-1, i.e., if lamps are off, this is energized, and when lamps are flashing this is de-energized.
- **Aux-1 Xng Ctrl Hlth IP:** range Yes, No, default No. When this can be set to *Yes*, the Aux-1 Xng Ctrl Hlth input is available to be mapped to a vital input. This can be used to bring the health of an external controller into the GCE so that if the external ones fail, it causes the SSCC-1 to activate.

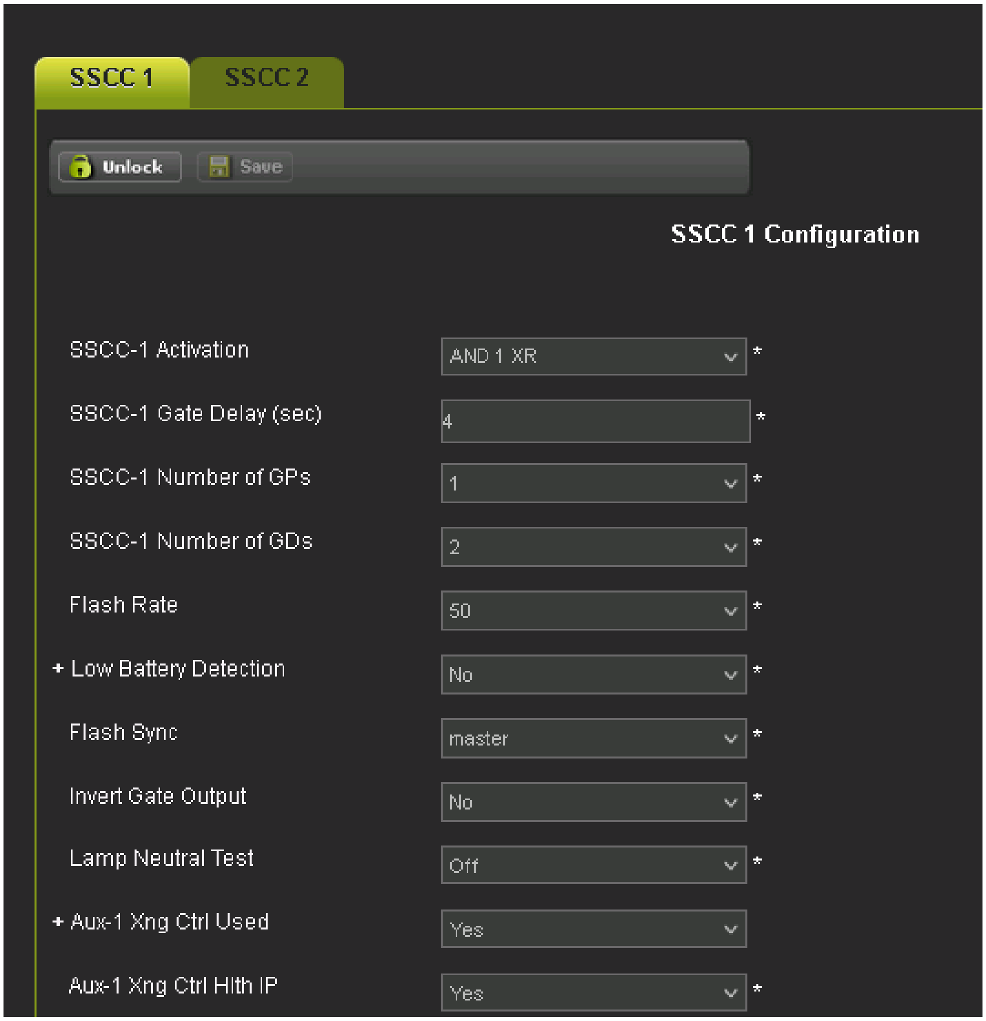

Figure 10-30 SSCC 1 Configuration

WARNING

WARNING

WHEN THE CROSSING IS ACTIVATED THE GATES WILL NOT DROP UNTIL THE CONFIGURED GATE DELAY TIMER HAS EXPIRED.

10.1.5.3 SSCC 2 Configuration

Figure 10-31 shows the parameters for the SSCC-2 module. These are similar to those of SSCC-1. The only difference is:

- **SSCC-2 Number of GPs**: default 0.
- **SSCC-2 Number of GDs**: default 0.
- **Flash Sync:** default slave.

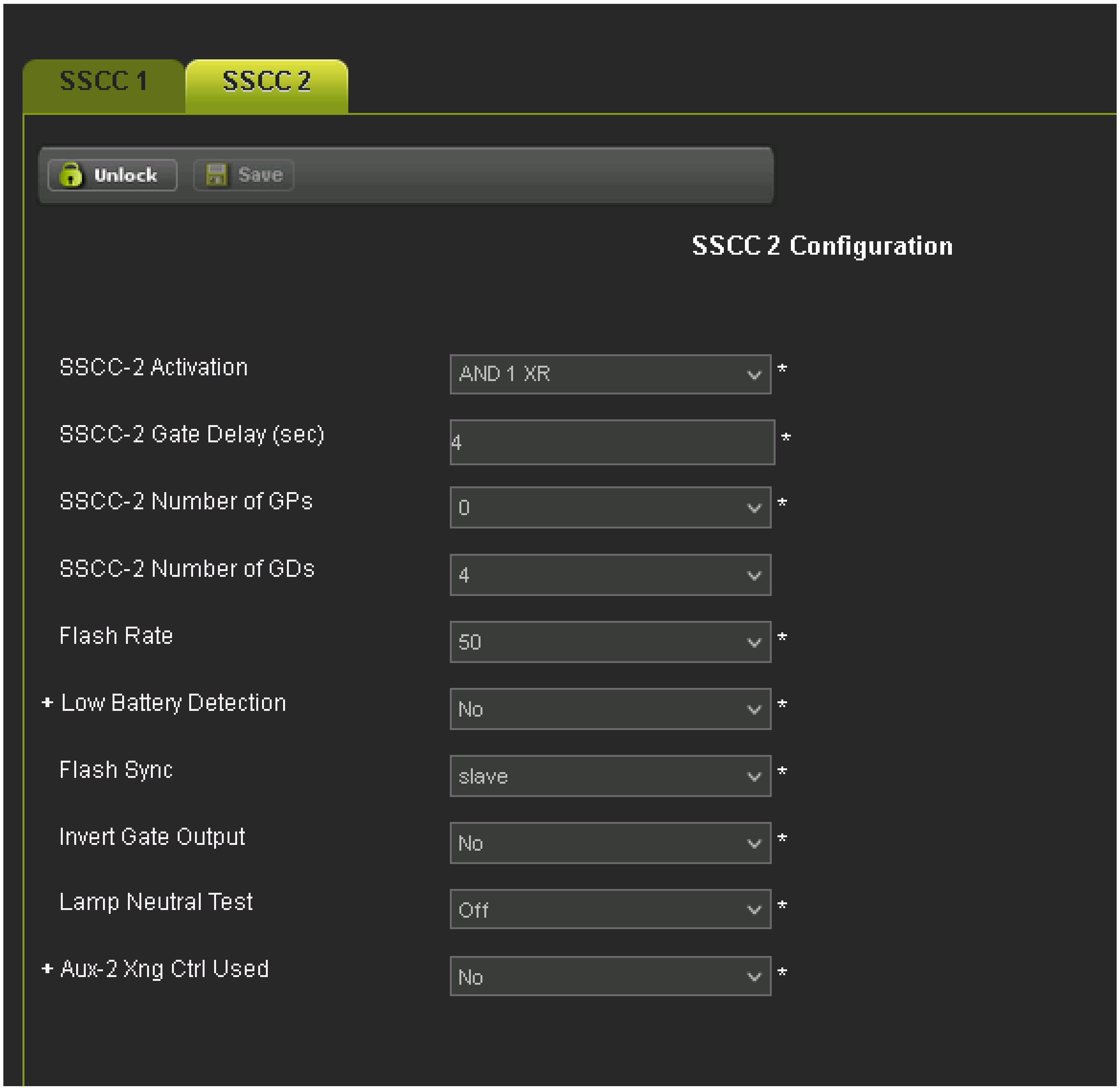

Figure 10-31 SSCC 2 Configuration

10.1.6 Input/Output Assignments

10.1.6.1 Output Assignments

10.1.6.1.1 I/O: Output Slot 1-2

Figure 10-32 shows the menu that allows the assignment of outputs to the modules in slots 1 to 2. The exact outputs that show up depend on the modules that have been allocated in the Module Selection screen. The figure below shows an example where there is a PSO in slot 1 and slot 2.

By default, all outputs are set to *Not Used*.

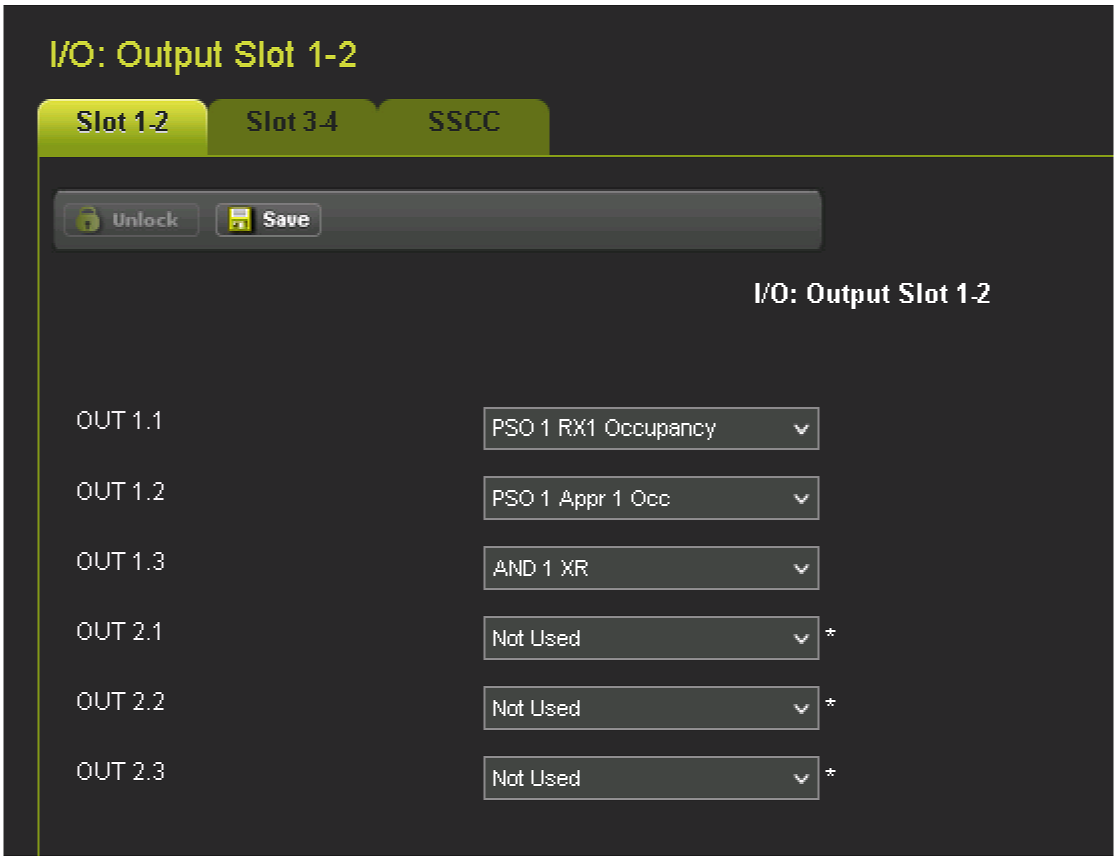

Figure 10-32 Output Assignments slots 1-2

The selections available depend on which features have been turned on in the other menus.

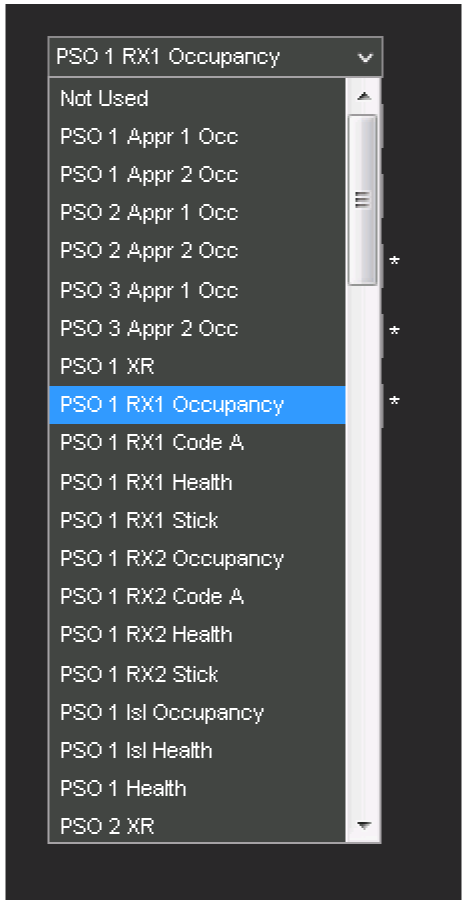

Figure 10-33 Output Assignment Selections

10.1.6.1.2 I/O Output Slot 3-4

Figure 10-34 shows the menu that allows the assignment of outputs to the modules in slots 3 to 4. The exact outputs that show up depend on the modules that have been allocated in the Module Selection screen. The figure below shows an example where there is a PSO in slot 3 and a RIO in slot 4.

By default, all outputs are set to *Not Used*.

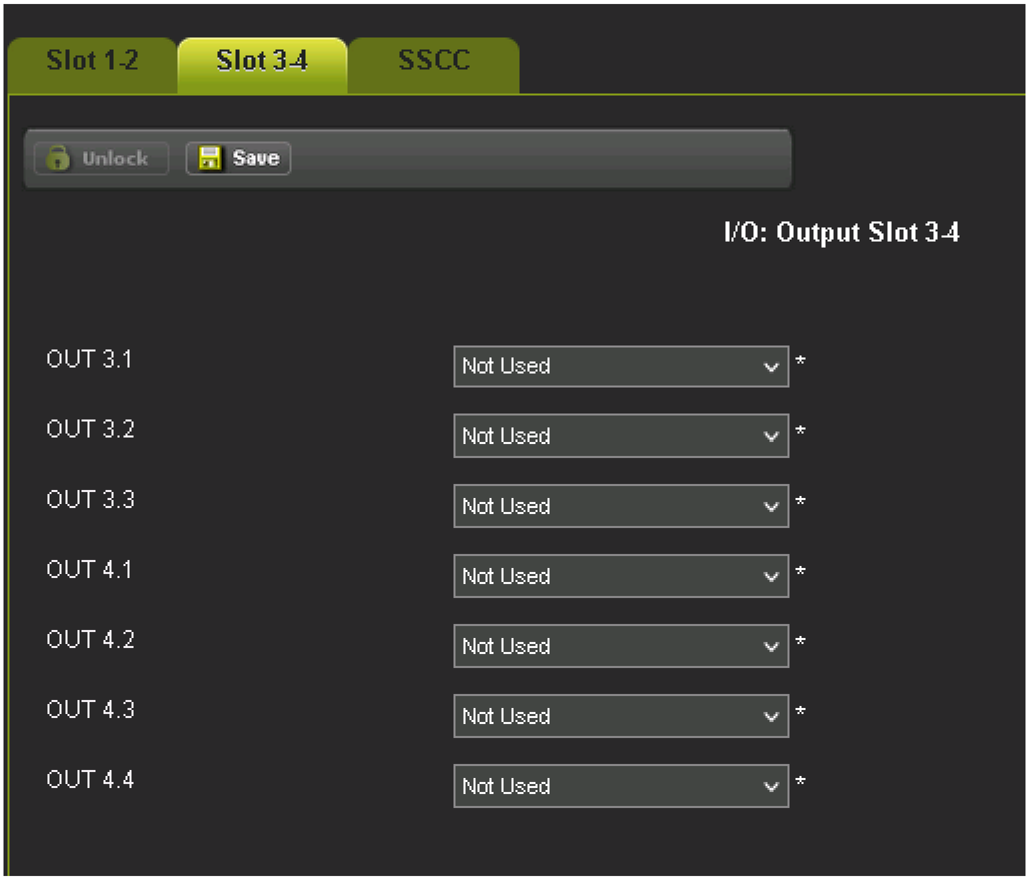

Figure 10-34 Output Assignments slots 3-4

10.1.6.1.3 I/O Output Slot 5

Figure 10-35shows the menu that allows the assignment of outputs to the module in slot 5. The exact outputs that show up depend on the type of modules that have been allocated in the Module Selection screen. The figure below shows an example where there is a RIO in slot 5.

By default, all outputs are set to *Not Used*.

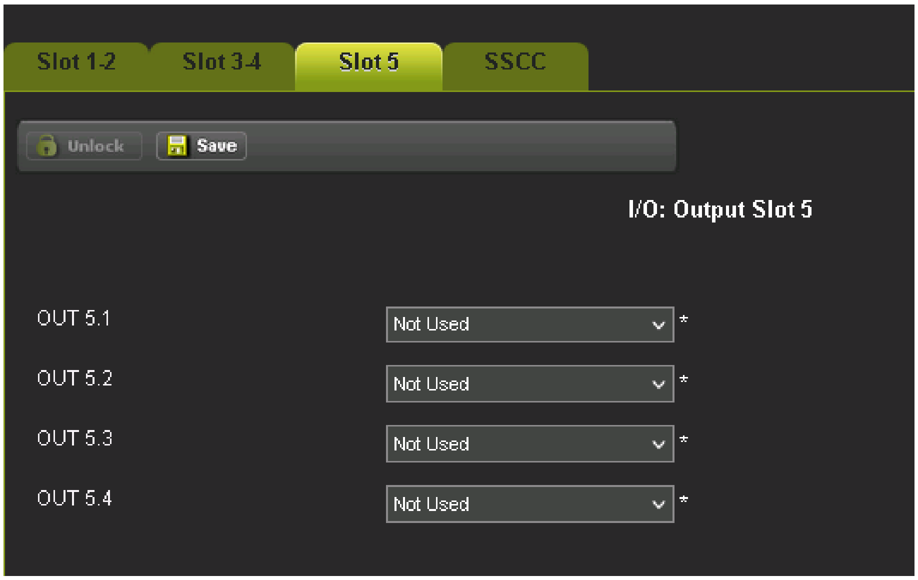

Figure 10-35 Output Assignments Slot 5

10.1.6.1.4 I/O Output Slot SSCC

Figure 10-36 shows the menu that allows the assignment of the function of the Gate Output (GC) on the SSCC modules. By default, these are set to control *GC1* and *GC2*. However, they are available to be used for other functions if there are no gates to control.

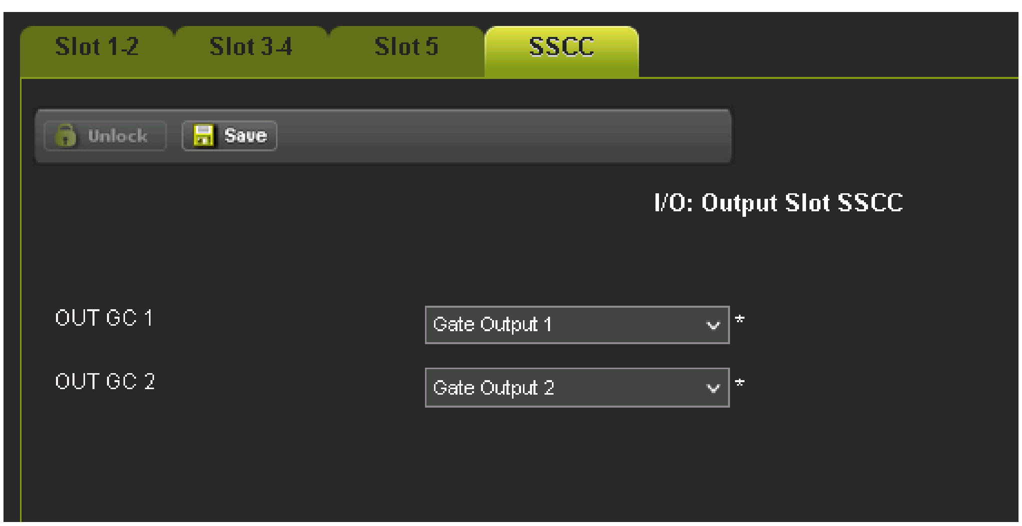

Figure 10-36 Output Assignments slots SSCC

10.1.6.2 Input Assignments

10.1.6.2.1 I/O: Input Slot 1-3

Figure 10-37 shows the menu that allows the assignment of inputs to the modules in slots 1 to 3. The exact inputs that show up depend on the modules that have been allocated in the Module Selection screen. The figure below shows an example where there are PSOs in slots 1, 2, and 3.

By default, all inputs are set to *Not Used*.

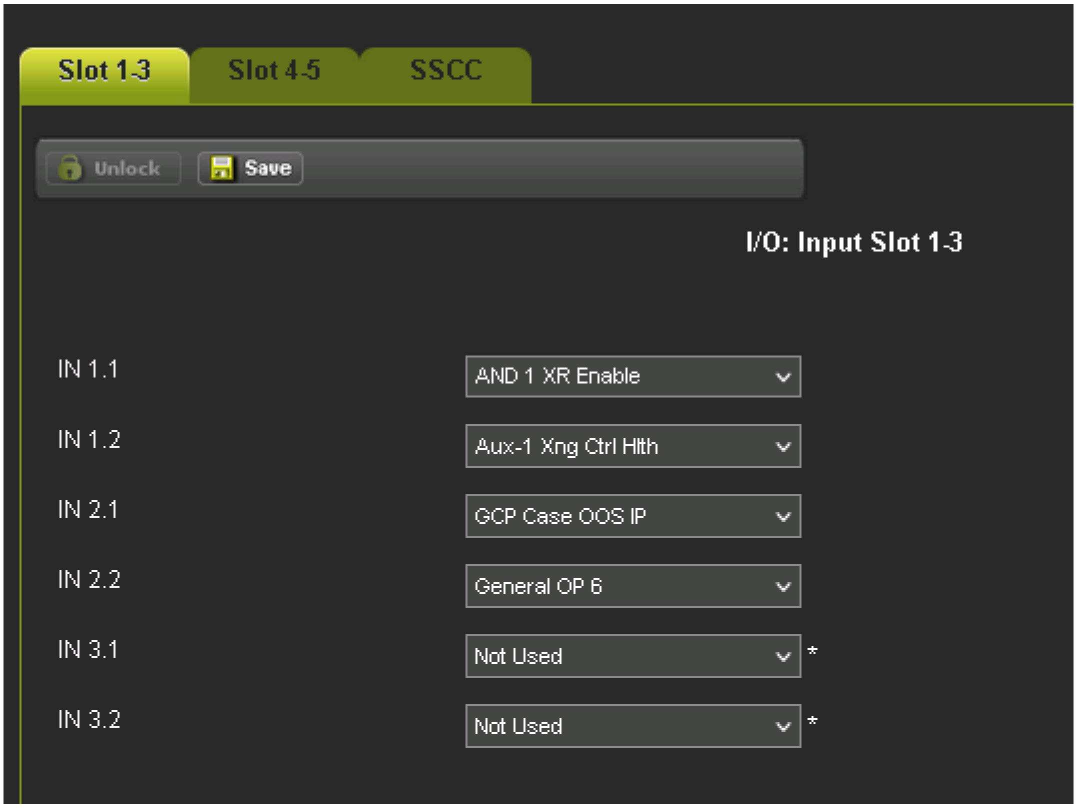

Figure 10-37 Input Assignments slots 1-3

The selections available depend on which features have been turned on in the other menus.

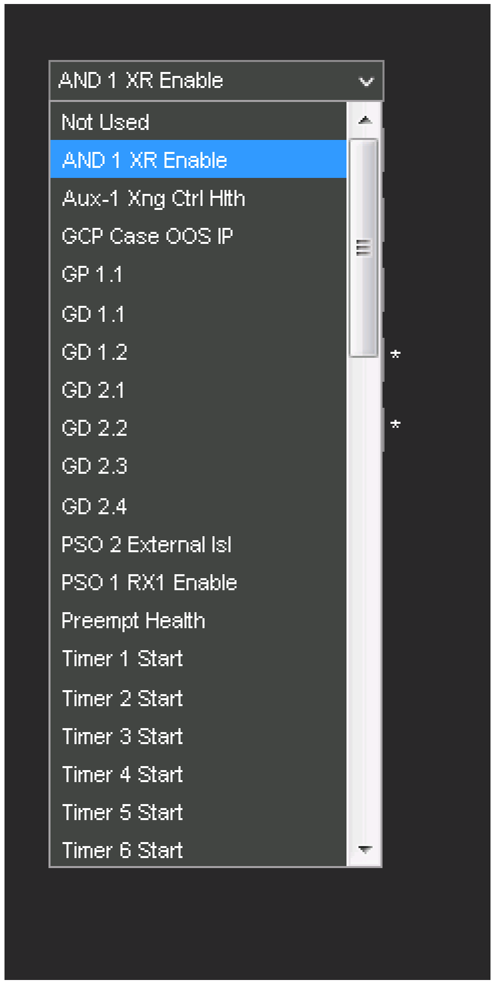

Figure 10-38   Input Assignment Selections

10.1.6.2.2 I/O: Input Slot 4-5

Figure 10-39 shows the menu that allows the assignment of inputs to the modules in slots 4 to 5. The exact inputs that show up depend on the modules that have been allocated in the Module Selection screen. The figure below shows an example where there is a PSO in slot 4 and a RIO in slot 5.

By default, all inputs are set to *Not Used*.

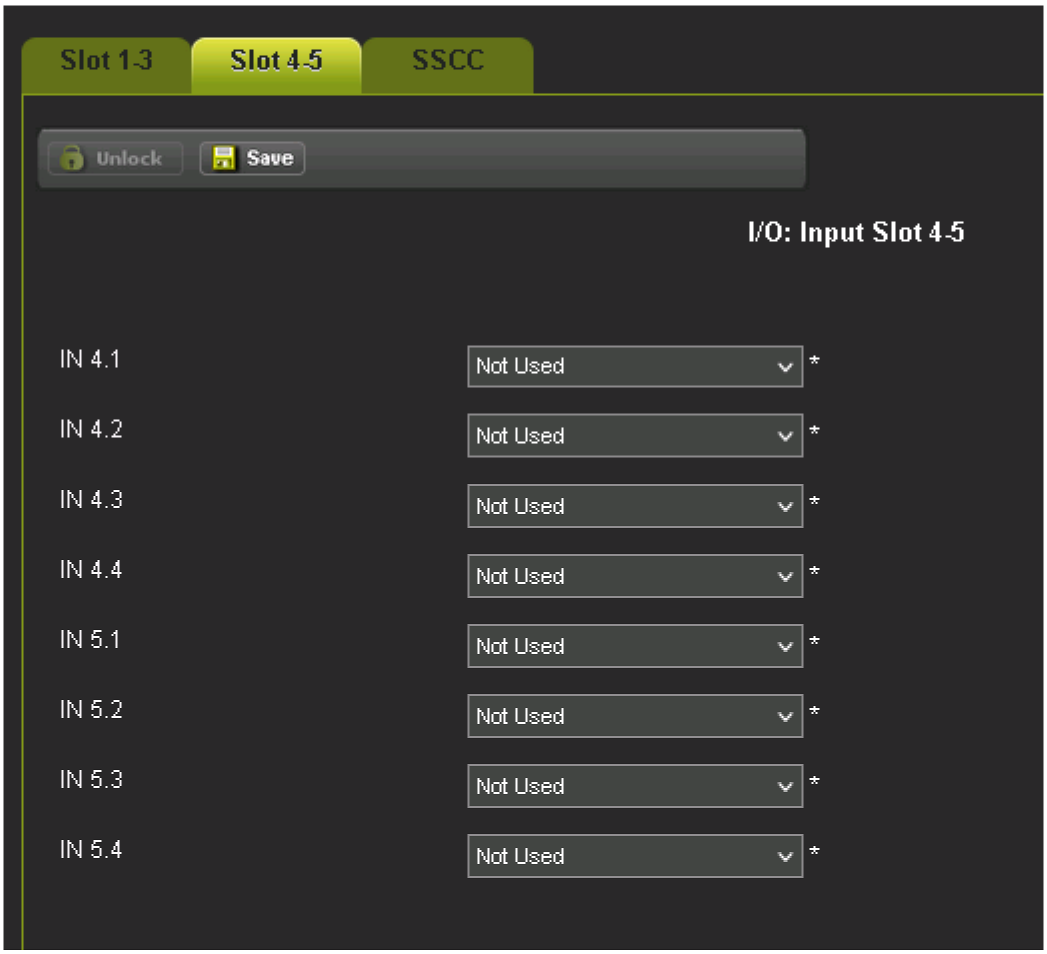

Figure 10-39 Input Assignments Slots 4-5

10.1.6.2.3 I/O: Input Slot SSCC

Figure 10-40 shows the menu that allows the assignment of inputs to the SSCC IIIi modules. The figure below shows an example where both SSCC-1 and 2 are used.

By default:

- GD 1.2 is assigned to 7.2
- GD 1.1 is assigned to 7.4
- GP 1.1 is assigned to 7.5

Figure 10-40 Input Assignments Slots SSCC

10.2 Local UI GCP Programming Menus

The local User interface on the Display allows editing and viewing of a limited number of configuration parameters, these are the ones the maintainer may need to change as part of maintenance. The majority of GCE parameters are set by the designer, and should not need modifying by the maintainer. These can be edited via the Web User interface as described in the previous section.

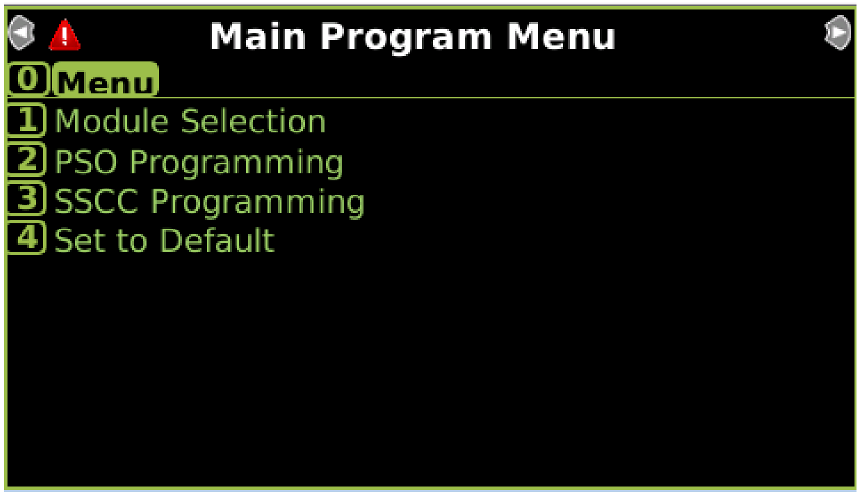

Figure 10-41 Local UI Main Program Menu

The only maintainer editable field is SEAR Used.

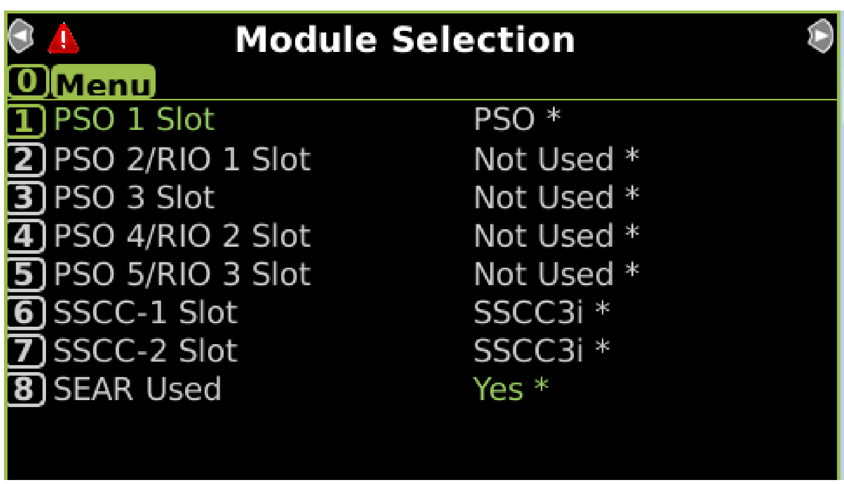

Figure 10-42 Local UI Module Selection Menu

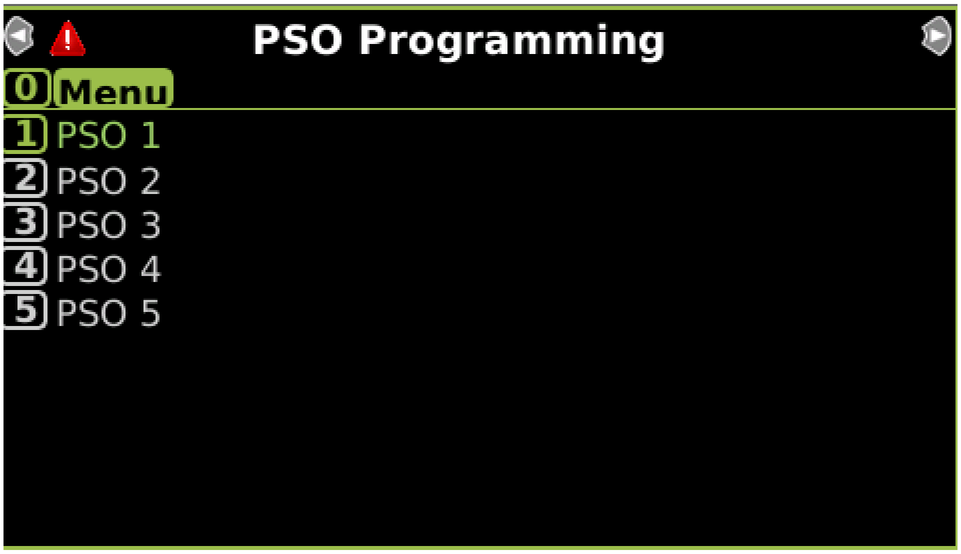

Figure 10-43 Local UI: PSO Programming Menu

When the PSO Module Mode is Crossing no fields are editable.

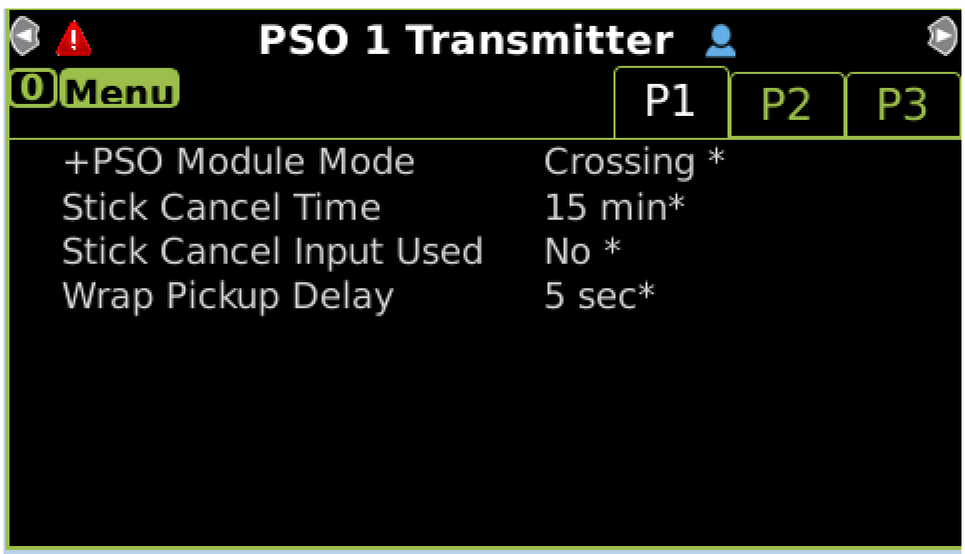

Figure 10-44 Local UI: PSO Transmitter Menu, Crossing Mode

When the Mode is Rx/Tx the user can modify the transmitter parameters shown in Figure 10-45.

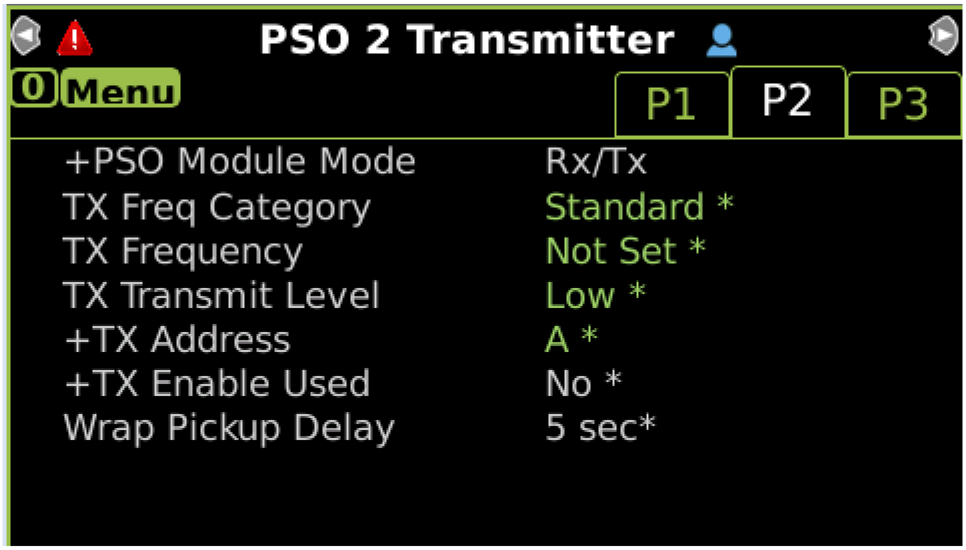

Figure 10-45 Local UI: PSO Transmitter Menu

The fields shown in Figure 10-46 are enabled for the Island.

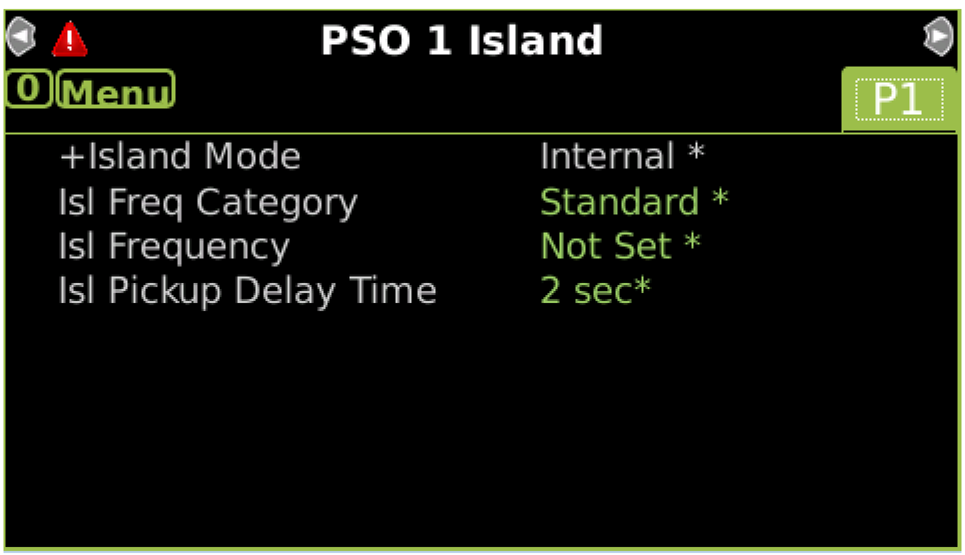

Figure 10-46 Local UI: PSO Island Menu

When internal Receiver 1 is used, the user can modify the receiver parameters shown in Figure 10-47.

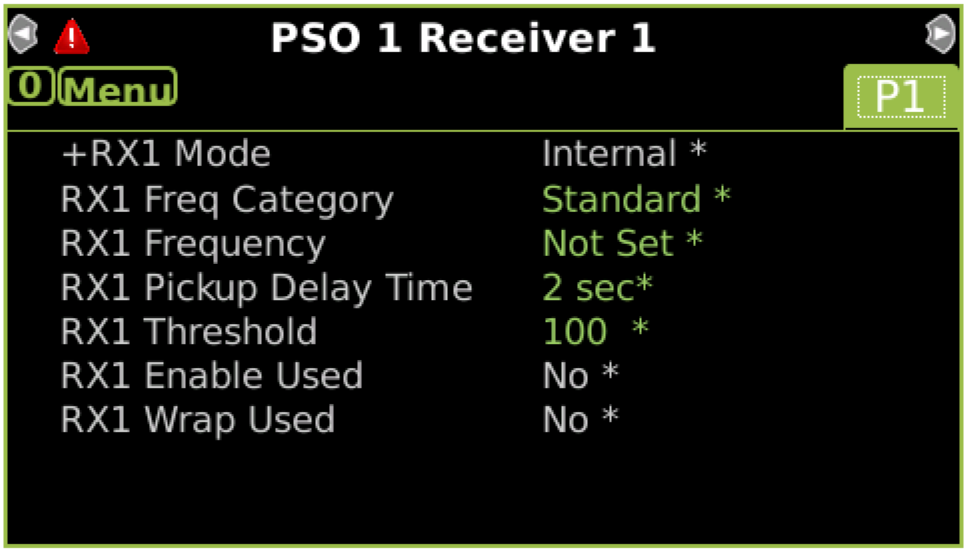

Figure 10-47 Local UI: PSO Receiver 1 Menu

The Rx 1 Codes menu allows the user to view the Codes and delays, but they are not editable here.

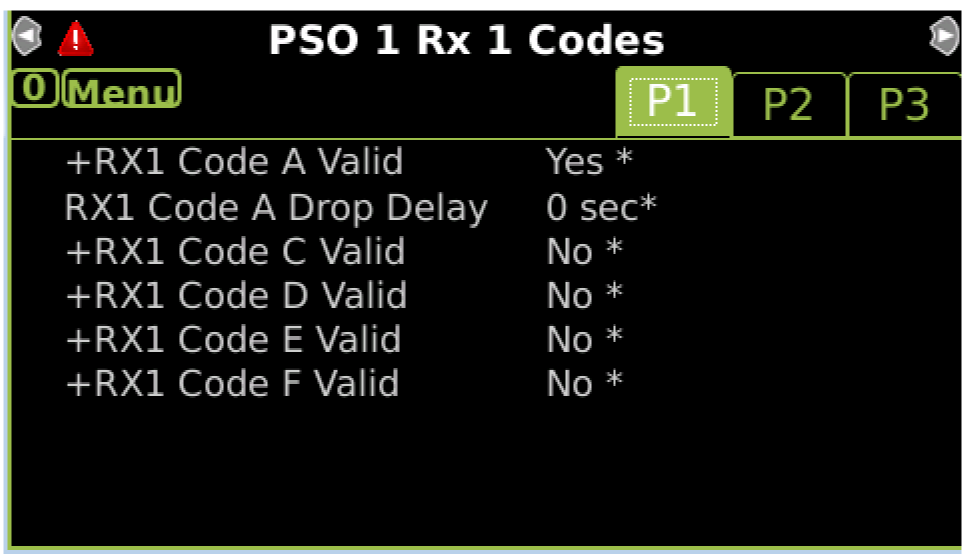

Figure 10-48 Local UI: PSO Receiver 1 Codes Menu

When internal Receiver 2 is used, the user can modify the receiver parameters shown in Figure 10-49.

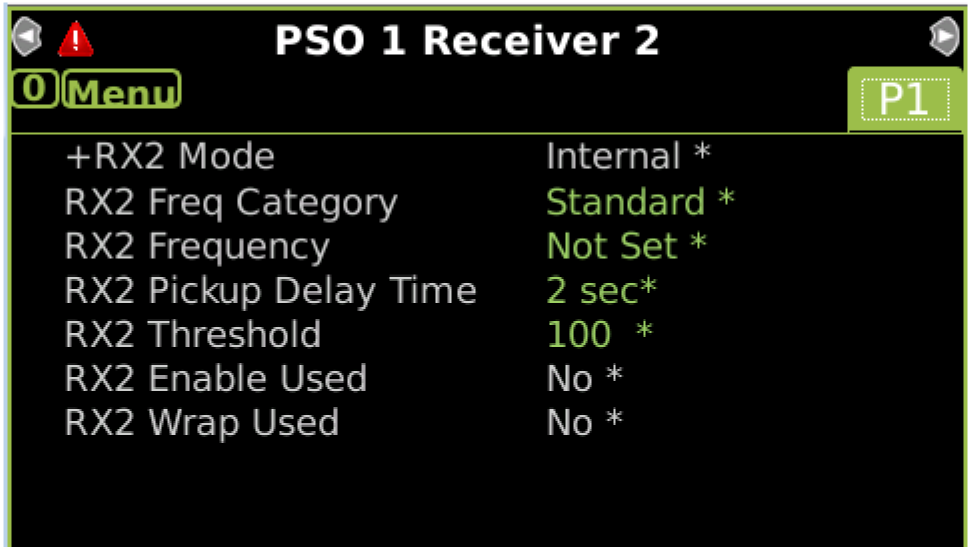

Figure 10-49 Local UI: PSO Receiver 2 Menu

The Rx 2 Codes menu allows the user to view the Codes and delays, but they are not editable as shown in Figure 10-50.

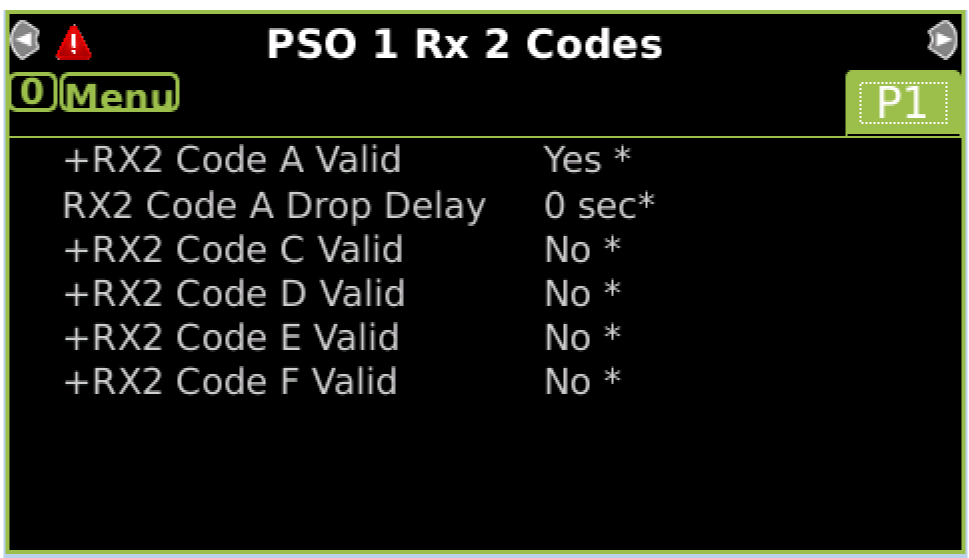

Figure 10-50 Local UI: PSO Receiver 2 Codes Menu

When parameters common to both SSCCs can be viewed, but not modified.

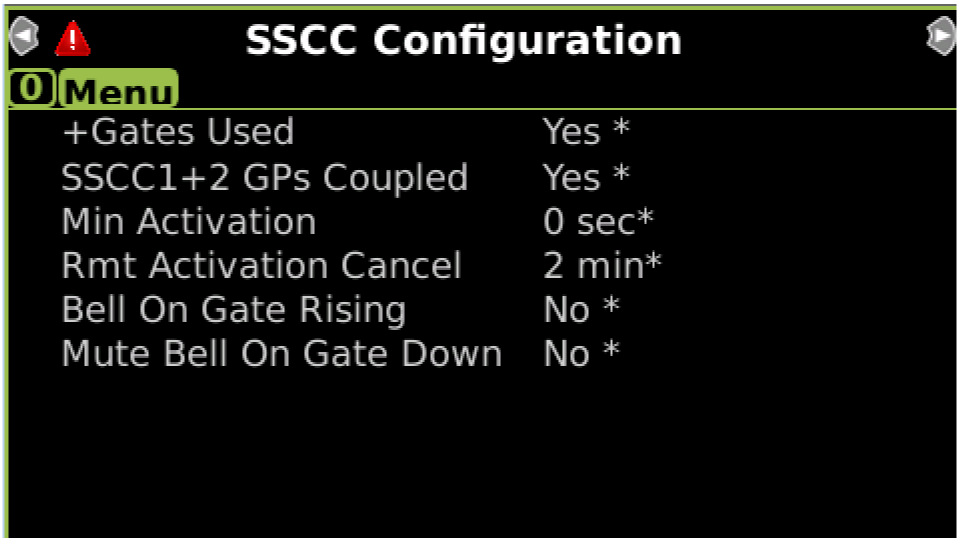

Figure 10-51 Local UI: SSCC Configuration Menu

Some of the SSCC 1 specific parameters can be modified, others are read-only as shown in Figure 10-52.

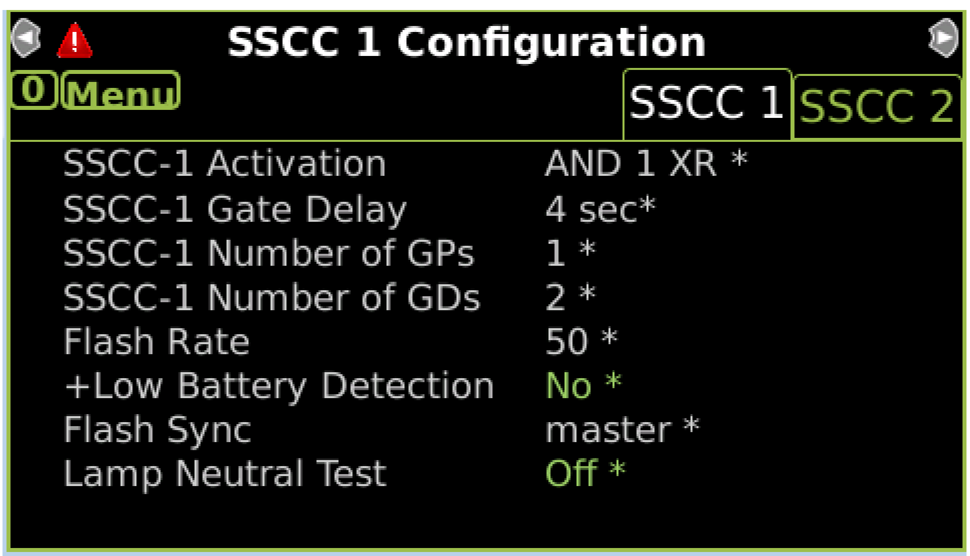

Figure 10-52 Local UI: SSCC-1 Configuration Menu

Some of the SSCC 2 specific parameters can be modified, others are read-only as shown below.

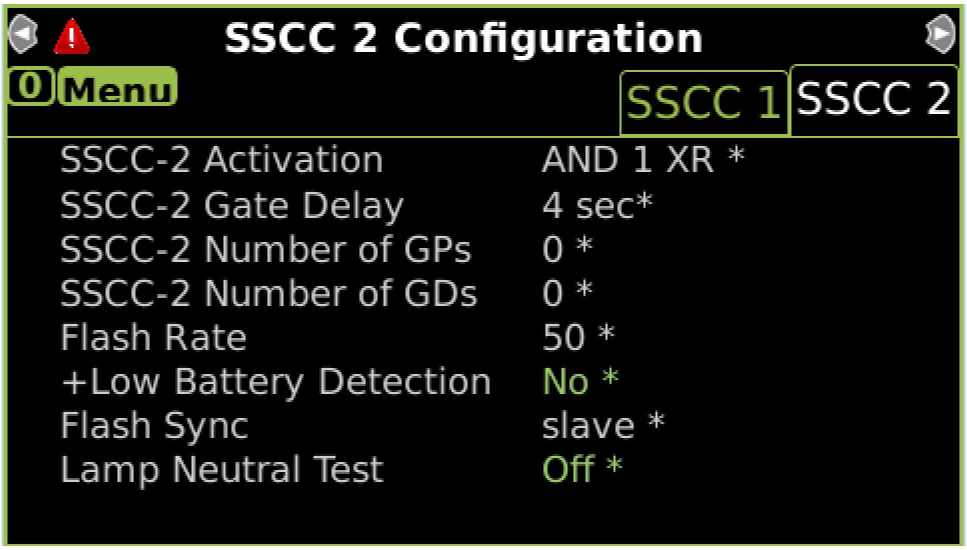

Figure 10-53 Local UI: SSCC-2 Configuration Menu

The Set to default menu can be used to set the GCP configuration back to defaults.

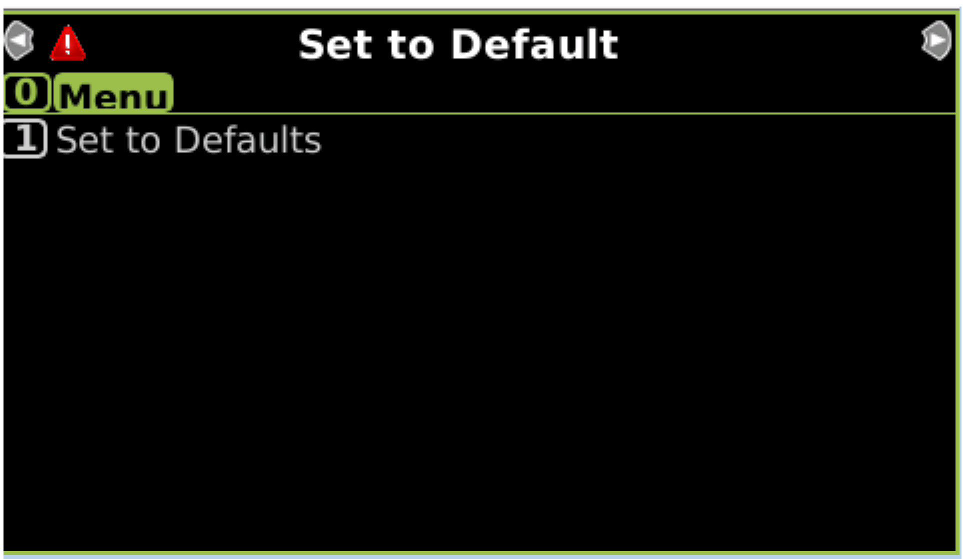

Figure 10-54 Local UI: Set to Default Menu

The GCP5000 (GCE) provides a quick way of navigating the Local UI Main Program Menu to find a specific configuration parameter listed in the configuration report. The configuration reports show a number in parenthesis in front of each menu name. This is the number of the menu in the local user interface.

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Minimum Program Steps Report
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(1) Module Selection
 PSO 2/RIO 1 Slot = RIO   (OCCN) * |

PSO 1 Island
 Isl Frequency = 3.24 kHz   (OCCN,TCN) *
 Isl Pickup Delay Time = 4 sec   (OCCN) *

PSO 1 Receiver 1
 RX1 Frequency = 1.45 kHz   (OCCN,TCN) *

PSO 1 Receiver 2
 RX2 Frequency = 1.18 kHz   (OCCN,TCN) *
```

Figure 10-55   Configuration Report

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