SIEMENS

INSTRUCTION AND INSTALLATION MANUAL

GRADE CROSSING PREDICTOR MODEL 3000+

NOVEMBER 2017 (REVISED JULY 2018)

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Siemens Mobility
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The equipment covered in this manual has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

DOCUMENT HISTORY

Version	Release Date	Sections Changed	Details of Change
A	11/13/2017	N/A	Initial Release
A.1	7/31/2018	Several	Added Configuration (Table 1-2) Information for CPU III Added Table 1-4 for Surge Panels Updated Figures 2-2 and 2-3 with new Chassis (A80740) Added Figure 2-6 CPU III Front Panel and information on CPU III ports. Modified 3.2 Bidirectional Simulation Coupler. Section 4.3 Added information in about using a USB and WebUI to load software on the CPU III. Updated throughout Section 4.6 with references on using CPU III with the WebUI. Removed Section 6.1.3 Out of Service Recalibration. Updated Table 6-8 Island Calibration Procedure to incorporate content clarified by Field Service. Added Figure 7-2 (CPU III Module). Added Section 4.6.10 on using WebUI with CPU III and which menus are available.

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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. Use of the three terms is defined as follows:

WARNING	**WARNING** **INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, 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 Mobility, 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 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.
- Use integrated circuit extractor/inserter tools designed to remove and install electrostatic-sensitive integrated circuit devices such as PROM's (OK Industries, Inc., Model EX-2 Extractor and Model MOS-40 Inserter, or equivalent, are highly recommended).
- 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

TERM	DESCRIPTION
AAR:	Association of American Railroads – An organization that establishes uniformity and standardization among different railroad systems.
AREMA:	American Railroad Equipment Manufacturing Association – An organization that supersedes AAR.
ATCS:	Advanced Train Control System – A set of standards compiled by the AAR for controlling all aspects of train operation.
ECD:	External Configuration Device – A serial EEPROM (Flash Memory) device mounted inside the chassis of the GCP unit. The ECD is used to store site-specific configuration data (MCF, SIN, and configuration parameters) for the CPU.
EX Value	Is the phase of the received signal, which is the measure of the impedance of the track ballast. This measurement identifies how much current is leaking from one rail to another.
EZ Value	Is the measure of the received signal level.
MEF:	Module Executable File – The executive software running in the CPU or I/O Modules. The user can download the MEF through the Diag port to update the software.
MCF:	Module Configuration File – The GCP application logic file.
SIN:	Site Identification Number – The 12-digit ATCS address for the site. The SIN has the form 7.RRR.LLL.GGG.SS stored in binary coded decimal, with each digit in one nibble. The digit 0 is represented by “A” and 0 is used as a null byte.
Site Location:	The location where GCP unit is installed.
VPI:	Vital Parallel Input – A module input circuit the function of which affects the safety of the crossing operation.
VRO:	Vital Relay Output – A module output circuit the function of which affects the safety of the crossing operation.

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SECTION 1 **INTRODUCTION**

1.0 GENERAL INFORMATION

This manual provides installation information and detailed operating instructions for the Model 3000+ Grade Crossing Predictor. The information is essential to proper system operation and problem diagnosis. It is strongly recommended that each system operator/maintainer become familiar with the information provided herein before attempting to program, calibrate, or troubleshoot the Model 3000+ GCP system.

1.1 ORDER OF CONTENT

The following headings detail the organization of the material contained in this manual.

1.1.1 Section 1 – Introduction

The Introduction contains a brief overview of system operation, equipment specifications, and typical application drawings.

1.1.2 Section 2 – Primary Equipment Description

This section provides a brief description of the Model 3000+ GCP case and plug-in modules, including indicators and controls.

1.1.3 Section 3 – Auxiliary Equipment Description

This section provides a brief description of the auxiliary equipment available for use in conjunction with the Model 3000+ GCP system. Also provided are installation and adjustment procedures for this equipment, where applicable.

1.1.4 Section 4 – Display Menu Screens

This section describes the functions and menus available on the display module and the web user interface.

1.1.5 Section 5 – System Application Programming

This section provides step-by-step system programming instructions.

1.1.6 Section 6 – System Calibration and Operational Checks

This section provides step-by-step instructions for system calibration (required following programming) and operational checks to be performed immediately prior to placing the system in operation.

1.1.7 Section 7 – Diagnostics and Troubleshooting

This section includes procedures for utilizing self-diagnostic capabilities of the Model 3000+ GCP. Diagnostic message code listings are also provided.

1.1.8 Appendix A – Installation of Ferrite Beads

This appendix contains information for installation of Ferrite Beads on the Transmit and Receive wires of a Model 3000+ GCP installation.

1.2 OPERATIONAL OVERVIEW

The 3000+ Grade Crossing Predictor (GCP) is a microprocessor-controlled system that is deployed to continually monitor the approaches to railroad grade crossings. In operation, the Model 3000+ GCP may function either in the Predictor or Motion Sensor (MS) modes.

In the Predictor mode, the Model 3000+ GCP:

- detects approaching trains
- computes train speed and distance
- predicts train arrival time at the crossing
- activates crossing-warning equipment at a set (programmed) time prior to the predicted arrival of the train at the crossing

In the Motion Sensor mode, the Model 3000+ GCP:

- detects the motion of an approaching train when its speed exceeds the motion detection threshold of approximately 2 mph at the crossing
- activates crossing-warning equipment at time of train detection

NOTE

NOTE

The recorded speed information is intended solely as a maintenance tool. The speed values are relative and may be affected by track parameters that include: Insulated joint proximity, Insulated joint couplers, Overlapping termination shunts, and Lumped ballast loads.

The speed values are only intended to assist maintenance personnel in: Identifying slow versus fast train movements, distinguishing between accelerating, decelerating, and relatively constant speed train movements.

The primary function of the recording is to document warning time. Speed values are secondary and may not be consistent with recordings made by devices specifically designed to record train speed.

1.2.1 3000+ Track Signal Sensing

During operation, the Model 3000+ GCP applies a constant current AC signal to the track and measures the level of the resulting voltage.

- The voltage level (EZ) varies with approach track impedance, which, in turn, corresponds to the distance of the train from the crossing.
  - When unoccupied, the approach circuit has maximum impedance.
  - When a train enters the approach and moves towards the crossing, the low-resistance shunt created by the train's wheels causes the track circuit impedance to decrease, thereby decreasing the EZ level.
  - When a train reaches the crossing, the approach circuit is reduced to minimum impedance.
- The EZ value and its rate of change are sensed by the Model 3000+ GCP and are used to:
  - calculate train speed
  - calculate train arrival time at the crossing
  - activate the crossing-warning equipment at the programmed time prior to the trains arrival at the crossing

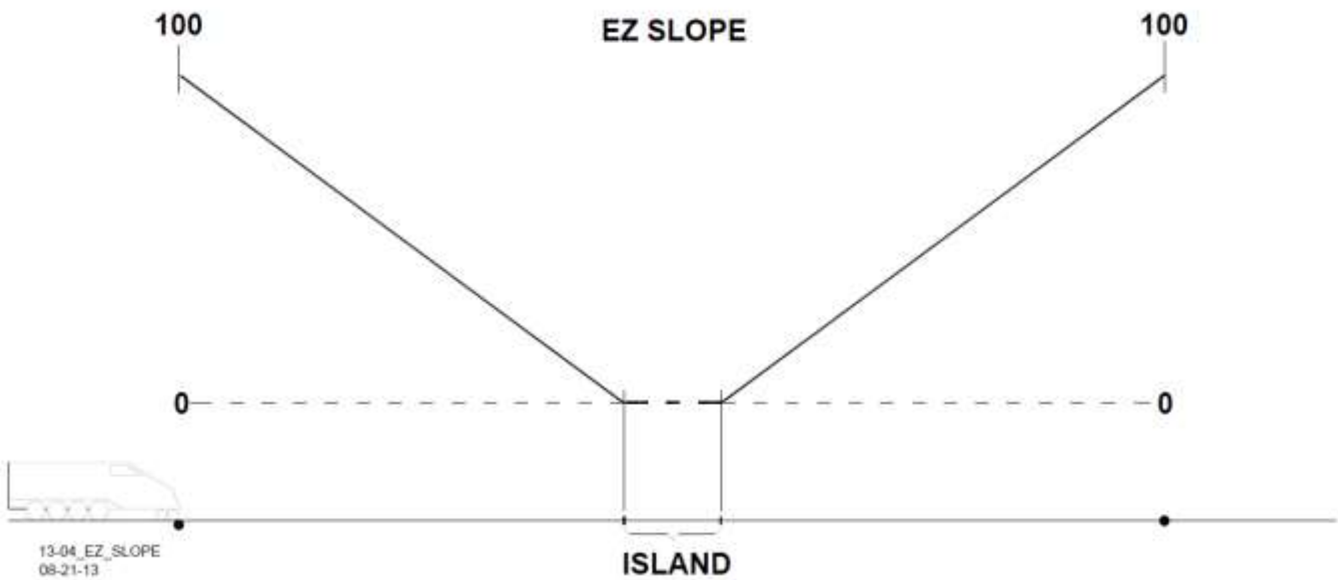


Figure 1-1 Diagram of EZ Level Compared to Train Location

- Once the train exits the Island Circuit, the impedance level will begin to increase, raising the EZ level back up to its highest resting value. The figure above illustrates this process.

1.2.2 Termination Shunts

A shunt is connected across the rails to terminate the Model 3000+ GCP approach circuit. This device presents a low impedance at the Model 3000+ GCP operating frequency, and may consist of any of the following:

- Hardwire shunt - used when no other signals (AC or DC) are present on the rails.
- Wideband shunt - used when only non-coded DC track circuits are present.
- Narrow band shunt - used when other AC or DC coded track circuits are present.

CAUTION

WHEN ADDING OR REPLACING TERMINATION SHUNTS, APPROPRIATE TESTS MUST BE MADE TO DETERMINE THAT THE TERMINATION SHUNT DID NOT ADVERSELY AFFECT OTHER HIGHWAY CROSSING WARNING SYSTEM OR WAYSIDE SIGNAL SYSTEM TRACK CIRCUITS.

NOTE

The use of dual wideband shunts, part number 8A077, is not recommended for Model 3000+ GCP applications.

1.2.3 Insulated Joint Bypass Couplers

Insulated joints are placed in the rails to electrically isolate adjacent signal circuits.

In non-coded DC track circuits, the insulated joints within an approach may be bypassed by wideband shunts as required for signaling purposes.

In DC coded track circuits, the insulated joints within an approach may be bypassed using the Siemens 62785-F Tunable Insulated Joint Bypass Coupler, provided the minimum distances specified in Table 1-8 are observed.

WARNING

WHEN A MODEL 3000+ GCP IS INSTALLED IN A UNIDIRECTIONAL OR A SIMULATED BIDIRECTIONAL CONFIGURATION, THE INSULATED JOINTS OF THE APPROACH MUST NOT BE BYPASSED WITH FREQUENCY COUPLING DEVICES AT THE FEED POINT (ISLAND) IN ANY WAY.

CAUTION

WHEN ADDING OR REPLACING TUNED JOINT COUPLERS, APPROPRIATE TESTS MUST BE MADE TO DETERMINE THAT THE TUNED JOINT COUPLERS DID NOT ADVERSELY AFFECT OTHER HIGHWAY CROSSING WARNING SYSTEM OR WAYSIDE SIGNAL SYSTEM TRACK CIRCUITS.

NOTE

The use of dual wideband shunts, part number 8A077, is not recommended for Model 3000+ GCP applications.

For a discussion of the 62785-F Tunable Insulated Joint Bypass Coupler, refer to Section 3.12

For a discussion of simulated bidirectional configuration, refer to Section 3.12.1.

1.2.4 Extending Approach Length with a Remote 3000 DAX

When insulated joints limit GCP approach distances and these joints may not be bypassed using frequency-coupling devices, the approach length may in effect be extended by electrically transferring prediction information from a remote Model 3000+ GCP located upstream beyond the insulated joints. This may be accomplished through use of either of the following functions:

- Prime Prediction Offset
- Downstream Adjacent Crossing (DAX)

1.2.4.1 Prime Prediction Offset

The prime prediction offset function, as illustrated below, allows the prime relay (GCP RLY) output of a Model 3000+ GCP to control a crossing from an upstream remote location other than a crossing. This is accomplished by:

- Electrically transferring the GCP RLY output of the upstream unit to the Upstream Adjacent Crossing (UAX) input of the downstream unit.
- Programming the upstream unit to delay prime prediction to compensate for the offset distance between the insulated joints and the downstream crossing feed points.

WARNING

WARNING

ENTERING AN INCORRECT DAX AND/OR PRIME PREDICTION OFFSET DISTANCE MAY RESULT IN SHORT OR NO WARNING TIME. WHEN A GCP TRACK CIRCUIT INCLUDES AN ISLAND, DO NOT USE PRIME PREDICTION OFFSET (PPO) WHEN A PPO DISTANCE (OTHER THAN 0) IS ENTERED, THE ISLAND CIRCUIT DOES NOT DE-ENERGIZE THE PRIME OUTPUT. THE WARNING SYSTEM WILL RECOVER WITH A TRAIN OCCUPYING THE ISLAND CIRCUIT AFTER THE PRIME PICKUP TIMER RUNS.

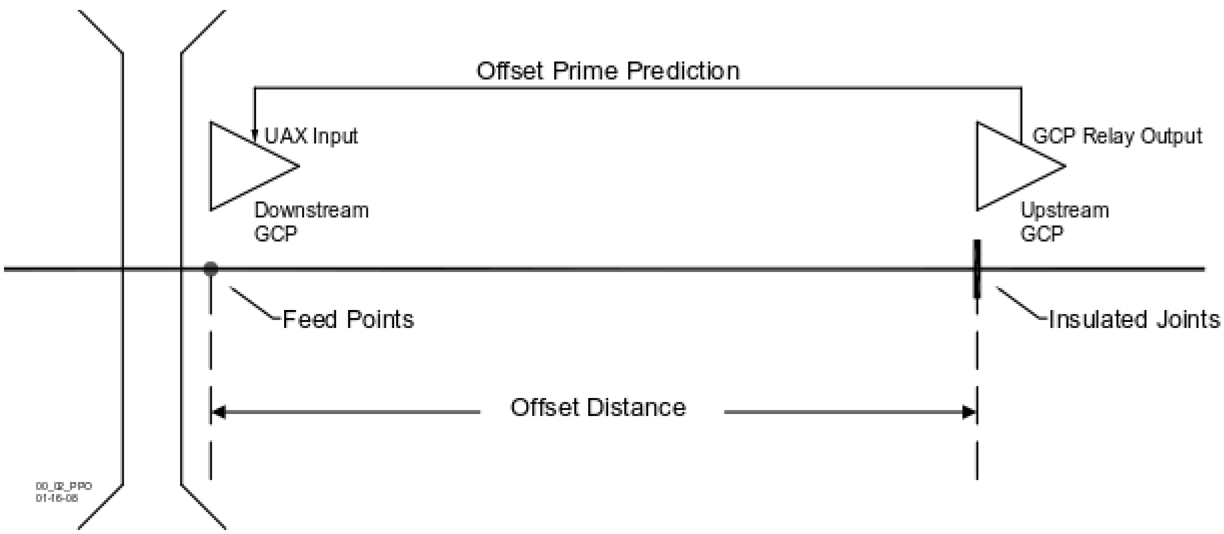


Figure 1-2 Prime Prediction Offset

1.2.4.2 DAX Functions

WARNING

ENTERING A NON-ZERO VALUE FOR THE DAX OFFSET DISTANCE DISABLES THE PREEMPT FUNCTION SO THAT THE ISLAND AND UAX DO NOT AFFECT THE DAX RELAY DRIVE.

Where a crossing is protected by a unidirectional Model 3000+ GCP, and the approach distance between that crossing and the adjacent upstream crossing is insufficient to provide the required warning time, the approach may, in effect, be extended by means of the DAX function illustrated below. This function allows the GCP at the downstream crossing to operate in response to a DAX-start input received from the upstream crossing. This is accomplished by:

- Electrically transferring the DAX RLY output of the upstream unit to the Upstream Adjacent Crossing (UAX) input of the downstream unit.
- Programming the upstream unit to delay the DAX start to compensate for the offset distance between the insulated joints and the downstream crossing feed points.

NOTE

For DAX applications, refer to the 3000+ GCP Application Guidelines manual (SIG-00-17-04). To implement the DAX function, the RIO module (Part# A80413) must be installed in the upstream GCP.

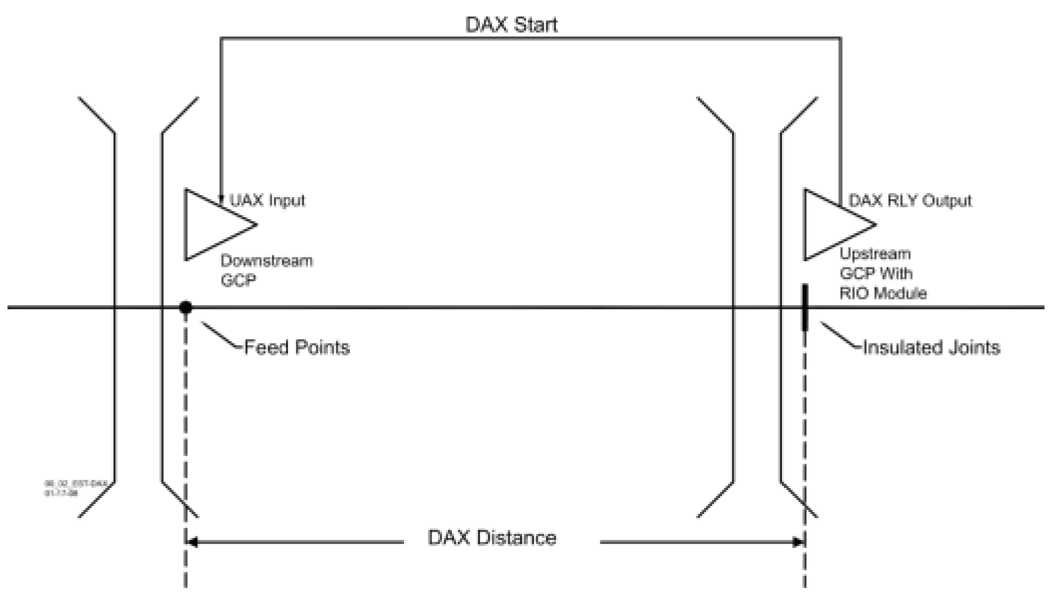


Figure 1-3 Establishing Downstream Adjacent Crossing (DAX)

1.2.5 Traffic Signal Preemption

A Model 3000+ DAX Preempt output may be interconnected to traffic signal equipment. This interconnection is used to initiate a preemption sequence that systematically clears vehicular traffic from the crossing area. A preemption cycle can be initiated either in advance of crossing signal activation using Advance Preemption, or, at the same time as crossing signal activation using Simultaneous Preemption.

Traffic signal preemption can be performed using an output from the RIO module. The front contacts of a DAX Relay are routed to the local traffic signal control equipment where they are used to control operation of the traffic signal lights at the crossing.

Where only the DAX preempt and prime predictors are used at a crossing (no Advanced Preemption Timer used), the time between the start of the traffic signal preemption cycle and the start of the crossing signals is determined by the:

- DAX preempt predictor warning time
- Prime predictor warning time
- Train speed variation following preempt prediction

For example, with the DAX preempt predictor warning time set to 40 seconds, the prime warning time set to 30 seconds, and the advance preempt delay set to 10 seconds, a train traveling at a constant speed through the approach will result in an advance traffic preemption interval of 10 seconds.

WARNING

IF NO PREEMPTION TIME INTERVAL DELAY IS USED, A TRAIN THAT SLOWS AFTER THE PREEMPT PREDICTION COULD RESULT IN AN ADVANCE TRAFFIC PREEMPTION INTERVAL THAT IS GREATER THAN THAT OF THE CONSTANT SPEED TRAIN. THIS LONGER-THAN-DESIRED TIME INTERVAL COULD ALLOW THE TRAFFIC SIGNAL TO CHANGE BACK TO RED BEFORE THE CROSSING SIGNALS ACTIVATE. IF THIS HAPPENED, VEHICLES COULD PROCEED ON THE TRACKS AND BE STOPPED BY THE RED TRAFFIC SIGNAL. THE “ADVANCE PREEMPTION TIMER” SHOULD BE USED TO PREVENT THIS POSSIBILITY.

If the Advance Preempt timer was not used and a train decelerated after the preempt prediction, this would result in an advance traffic preemption interval longer than that of the constant speed train.

The advance preemption timer ensures that the time between the start of the traffic signal preemption cycle and the start of the crossing signals is never longer than the programmed interval. When a train slows after the preempt prediction, the expired advance preempt timer will activate the crossing prior to the prime predicting.

When a train accelerates while the preempt timer is running, the prime will predict prior to the advance preemption timer expiring, causing the crossing to activate slightly ahead of the timer. For example, an advance preemption timer set at 10 seconds might run for only 8 seconds before the prime predictor predicts, overriding the preempt timer and activating the crossing.

When the advance preemption timer is used and the preempt controlling the traffic signals drops, it will start the advance preemption timer. When the advance preemption timer expires, this will drop the GCP RLY and any other DAX PREEMPT outputs.

The Model 3000+ GCP may also incorporate an Advanced Preempt Timer feature as described in Section 5.3.2; paragraph 4.

NOTE

> **NOTE**
>
> The 3000+ GCP assumes that the 1st DAX assigned for each track and set with a zero offset distance will be used to control the traffic signals.

The following table provides examples of the Traffic Signal Preemption. The Traffic Preempt column shows which DAX needs to be wired to the traffic preemption relay.

Table 1-1 Traffic Signal Preemption

Example	Number Daxes	DAX	Offset	Track	Traffic Preempt	Notes
1	1	A	0	1	Yes	1st used preempt on T1
2	2	A	0	1	Yes	1st used preempt on T1
		B	0	1	No	
3	2	A	0	1	Yes	1st used preempt on T1
		B	500	1	No	
4	4	A	0	1	Yes	1st used preempt on T1
		B	500	1	No	
		C	0	2	Yes	1st used preempt on T2
		D	500	2	No	
5	4	A	1000	1	No	
		B	500	2	No	
		C	0	1	Yes	1st used preempt on T1
		D	0	2	Yes	1st used preempt on T2

This scheme allows the 3000+ GCP to be configured with preempts containing different warning times.

When two tracks are used, either track may need to be able to start the traffic signals, therefore, the preempt outputs for each track will need ANDing externally.

Advance preemption can be initiated from a GCP at a remote location by using the MS/GCP CTL input. When the Advance Preempt Timer is set to a non-zero value, the MS/GCP CTL will be used as an advance preemption start input rather than its normal use of the switching between predictor and motion sensor.

When the Advance Preempt input de-energizes it will:

- De-energize the DAX Preempts associated with traffic system (1st used Preempt for each track as explained in preceding section)
- Start the advance preemption timer for each track

When the advance preemption timer expires, it will de-energize the GCP RLY and any other DAX Preempt in a similar manner as if it was started by the DAX preempt de-energizing.

NOTE

If the Advance Preemption Input (MS/GCP_CTL) is de-energized then immediately energized, it will start the Advance Preemption timer. When this timer starts, it has to run to completion, so when the timer expires, it will de-energize the GCP RLY, then the GCP RLY will re-energize after 10 seconds or Pick Up Delay.

1.2.6 Island Circuit

An island circuit is a short track circuit that enables the Model 3000+ GCP to provide train detection for limited distances on both sides of a highway crossing.

- The Model 3000+ GCP Track Module (A80418) supports a built-in island transmitter and receiver.
- The length of the island circuit is established by the location of the track connections on either side of the crossing
- A transmitter is placed on one side of the crossing and a receiver is placed on the other
- A train located at any point within the island circuit will activate the Model 3000+ GCP, which, in turn, activates the Crossing Warning system.
- The island circuit does not de-energize DAX outputs or Prime outputs with non-zero offset distances.

1.2.7 Intermittent or Poor Track Shunting

The low-resistance shunt created by the wheels of a train is dependent on solid physical contact with the track. Because of this, certain track conditions can result in intermittent or poor track shunting. Although poor track shunting can occur just about anywhere due to numerous causes, it generally is due to:

- infrequent track usage
- lightly weighted cars
- passenger and transit operation
- spillage from railcars
- rail contamination

In addition, little or no track shunting may occur in dark territory where no DC or AC track circuits exist and few trains run per week.

NOTE

The Siemens 80049 DC Shunting Enhancer Panel provides a very simple and cost effective solution for improving shunting in dark territory, thus enabling the 3000+ Enhanced Detection software to function properly. The panel applies a nominal 6 volts DC to the track at the crossing to break down the film on the rails. For a discussion of the 80049 DC Shunting Enhancer Panel, refer to Section 3.3.

The Model 3000+ GCP incorporates an Enhanced Detection feature as described in Section 5.3.6.

When poor shunting conditions are anticipated at a remote unidirectional DAX or prime prediction offset application, an island circuit is used to ensure correct reverse train move logic.

- When there is a remote Model 3000+ GCP installed back-to-back and there is DAX control from both sides of a set of insulated joints, only one island circuit is required.
- Track wire spacing for the remote island must be a minimum of 80 feet (transmit to receive wires).
- When de-energized, the remote island does not affect DAX or Prime Prediction offset relay drive outputs.

1.2.8 Display Module

Application parameters, including warning time, are programmable via either the A80485 Display Module Local User Interface (see Section 2.3.4) or the Web User Interface and a computer running a compatible web browser (see Section 4.6).

1.2.9 Self Checking and Troubleshooting

The self-checking processes in the Model 3000+ GCP continually test the unit to ensure continued safe and reliable operation. Module status LED indicators combined with microprocessor-controlled diagnostic messages presented on the display permit rapid trouble-shooting.

1.3 MODEL 3000+ GCP MODELS

The Model 3000+ GCP operates from battery power to ensure continued operation in the event of AC power failure. There is one single Model 3000+ GCP chassis with optional plug-in modules, this allows options for:

- Non-redundant Single-track systems (control single-track circuits)
- Non-redundant Double-track systems (control two-track circuits)
- Redundant Single-track systems (control single-track circuits)
- Redundant Double-track systems (control two-track circuits)

Redundant Systems have transfer modules and two identical sets of modules.

- One module set serves as the primary system and the other as the backup.
- In the event of a system failure, control automatically switches to the backup system.

The following tables show some of the ordering options and the equivalent Model 3000+ GCP part number.

Table 1-2 Part Number Configuration Chart - CPU

Dash No.	Combination of CPU Cards, B=D39325-01, Filler	
	Slots for CPU Card 8**X**XX-80740-XXXX	
	M1	**M2**
0	A80403-06	B
1	A80403-06	A80403-06
2	A80903-2021	B
3	A80903-2021	A80903-2021
4	A80903-2022	B
5	A80903-2022	A80903-2022
6	A80903-4021	B
7	A80903-4021	A80903-4021
8	A80903-4022	B
9	A80903-4022	A80903-4022

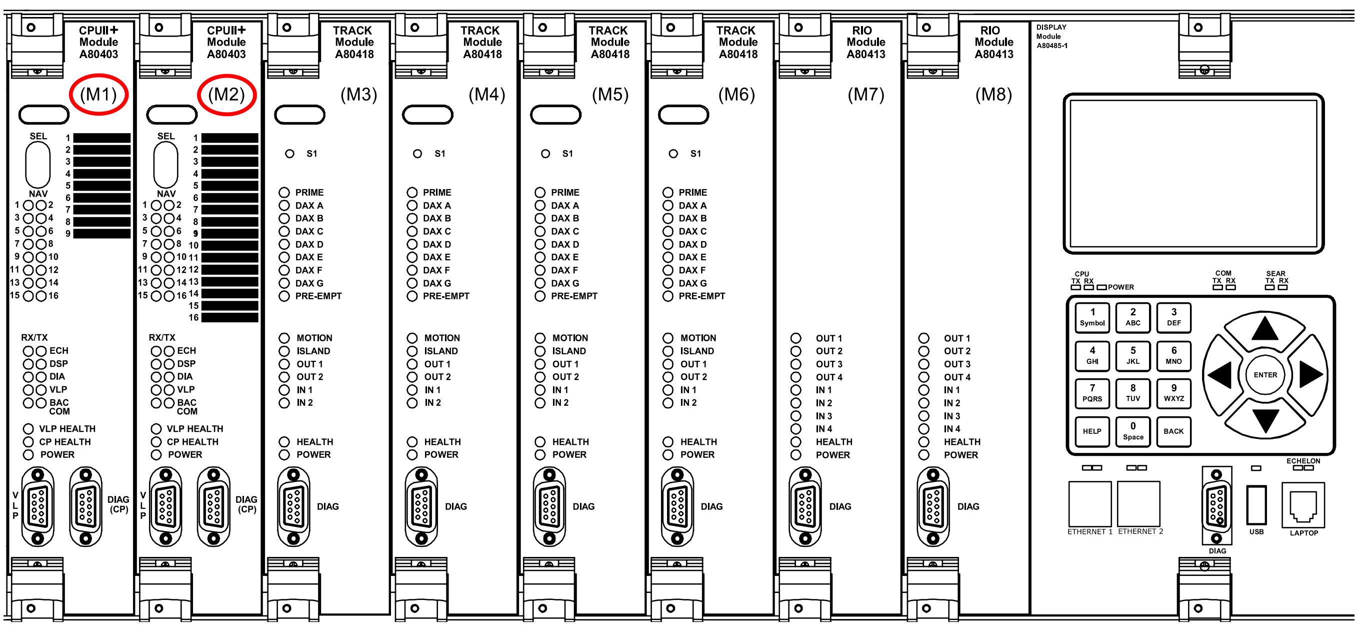


Table 1-3   Part Number Configuration Chart - Track and RIO Cards

	Combination of Track Cards, RIO Cards, Mylars and Filler Panels T= For Main (M2-M3) A80418 and A8K004 T= For Standby (M5-M6) A80418 R= A80413-01 RIO Card Installed B= D39325-01 Blank Filler Installed					
	Slots for Track Cards and Filler Panels 8X**XX**-80740-XXXX					
	Main			**Standby**		
Dash No.	**M3**	**M5**	**M7**	**M4**	**M6**	**M8**
00	B	B	B	B	B	B
01	T	B	B	T	B	B
02	T	T	B	T	T	B
03	T	T	R	T	T	R
04	T	B	B	B	B	B
05	T	T	B	B	B	B
06	T	T	R	B	B	B

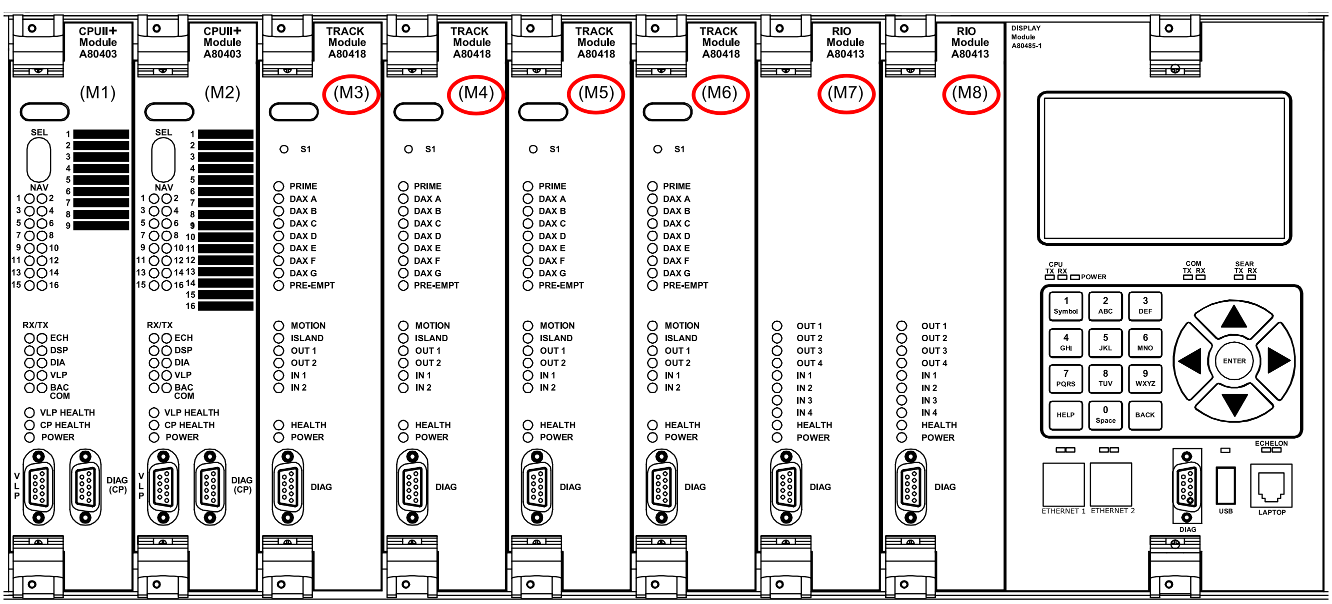


Table 1-4 Part Number Configuration Chart - Surge Panels

Dash No.	Surge Panels Non ISO 8XXX-80740-**X**XXX	
	A91170-01	A91170-02
0	W/O	W/O
1	WITH	WITH
2	WITH	W/O

Table 1-5 Part Number Configuration Chart - Display

Dash No.	M9 Display A80485-01 - WITH 8XXX-80740-X**X**XX
0	WITH
1	W/O

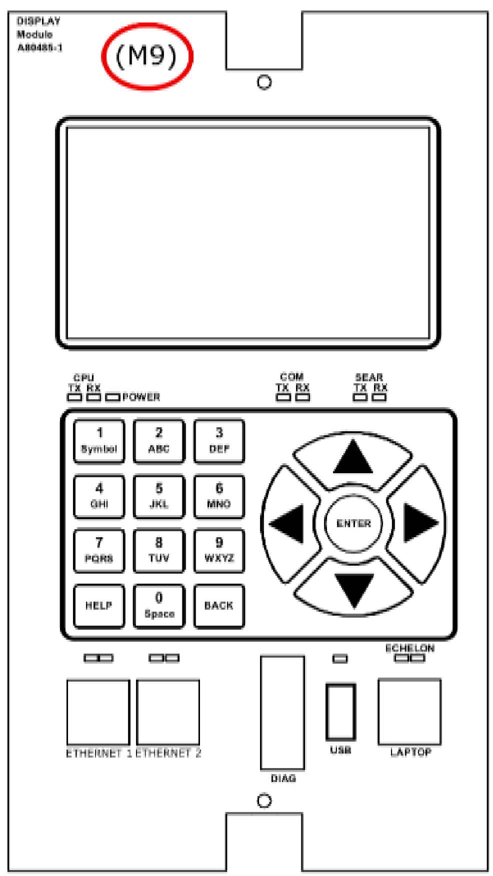


Table 1-6 Part Number Configuration Chart - Transfer Module

Dash No.	M11 Transfer Module 8XXX-80740-XX**X**X
0	WITH
1	W/O

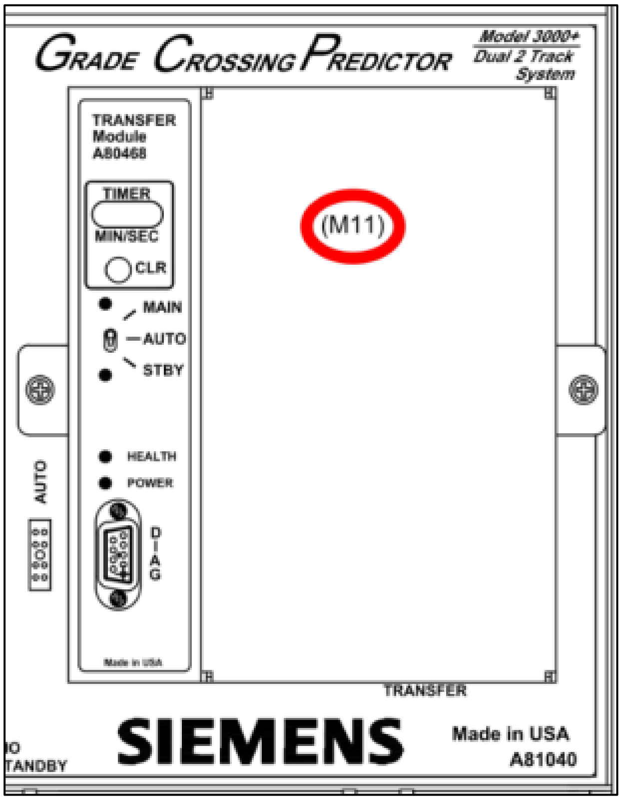


Table 1-7 Part Number Configuration Chart – USB Flash Drive

Dash No.	USB Flash Drive 8XXX-80740-XXX**X**
0	WITH
1	W/O

1.4 SYSTEM SPECIFICATIONS

1.4.1 Input Power

Battery Voltage

On CPU Connector:	9.0-16.5 VDC
Maximum Ripple:	1.0 V p-p

Module Current

	CPU Battery Connector @10 V	CPU Battery Connector @13.2 V	CPU Battery Connector @ 16.5 V
CPU II+ (A80403)	0.28 A	0.21 A	0.188 A
CPU III (A80903)	0.74 A	0.62 A	0.55 A
Track	1140 mA @ medium transmit power 1190 mA @ high transmit power *Current increases by 90 mA when one 250 ohm relay output is energized	830 mA @ medium transmit power 870 mA @ high transmit power *Current increases by 50 mA when one 250 ohm relay output is energized	660 mA @ medium transmit power 720 A @ high transmit output *Current increases by 40 mA when one 250 ohm relay output is energized
Minimum Output Current @ medium transmit power:	180 mA	180 mA	180 mA
Minimum Output Current @ high transmit power:	260 mA	260 mA	260 mA
RIO	740 mA with no relay output *Current increases by 50 mA when one 500 ohm relay output is energized	530 mA with no relay output *Current increases by 40 mA when one 500 ohm relay output is energized	490 mA with no relay output *Current increases by 40 mA when one 500 ohm relay output is energized
Display:	770 mA 740 mA hibernating	660 mA 640 mA hibernating	600 mA 590 mA hibernating
Transfer:	190 mA on Main 430 mA on Standby	200 mA on Main 500 mA on Standby	210 mA on Main 510 mA on Standby

3000+ GCP with Full Complement of Modules: **CPU** **Track (2 each)** **RIO** **Display** **Transfer**	4.3 A (Main) 4.5 A (Standby)	3.3 A (Main) 3.6 A (Standby)	2.8 A (Main) 3.1 A (Standby)

GCP Frequencies Available:	Siemens Standard Frequencies: 86, 114, 156, 211, 285, 348, 430, 545, 645, 790, and 970 Hz Offset frequencies: 85.5, 86.5, 87, 113, 113.5, 114.5, 115, 155, 155.5, 156.5, 157, 210, 212, 284, 286, 347, 349, 429, 431, 523, 527, 643, 647, 788, 792, 968, and 972 Hz Other frequencies: 44, 45, 46, 141, 149, 151, 237, 239, 250, 267, 326, 392, 452, 522, 560, 630, 686, 753, 816, 881, 979, and 999 Hz
Frequency Stability	±0.01 percent
Track Module Island Frequencies Available	2.14, 2.63, 3.24, 4.0, 4.9, 5.9, 7.1, 8.3, 10.0, 11.5, 13.2, 15.2, 17.5, or 20.2 kHz (frequencies are programmable)
Island Circuit Length	120 feet (36.58 meters) (minimum) to 350 feet (106.68 meters) (maximum)
MS/GCP Response Time	5 seconds
Relay Drive Outputs (VO)	100 to 1000-ohm load
Surge Protection	Built-in secondary surge protection for all connections. • Requires external arresters and equalizers on track wires as primary surge protection. o Surge panels or their electrical equivalent are required.
Typical Monitoring and Storage	CPU II+
I/O State Changes	3000 minimum
Train Moves	Up to 20
Mounting	All 3000+ GCP chassis can be wall, rack, or shelf mounted.

Chassis Dimensions

	A80740	
Width:	23.2 Inches	(59.0 centimeters)
Depth:	11.2 Inches	(28.4 centimeters)
Height:	19.1 Inches	(48.5 centimeters)

Chassis Weight

A80740	
Empty	**Full Module Complement**
19 pounds (8.6 kilograms)	32 pounds (14.5 kilograms)

Module Weight

CPU II+ (A80403)	1.25 pounds (0.56 kilograms)
CPU III (A80903)	1.25 pounds (0.56 kilograms)
Track (A80418)	1.00 pounds (0.45 kilograms)
RIO (A80413)	1.13 pounds (0.51 kilograms)
Display (A80407)	3.88 pounds (1.75 kilograms)
Transfer (A80468)	1.50 pounds (0.68 kilograms)

Temperature Range -40 °F to +160 °F (-40 °C to 70 °C)

LonTalk™ Protocol (Echelon®) LAN Interface

Data Transfer Rate 1.25 Mbps

Transmission Medium

- For normal installations within the same signal case or bungalow, use stranded twisted pair, conductor size #22 AWG (0.3 mm²) to #16 AWG (1.3 mm²).
- Communication grade twisted pair cable NEMA Level 4 is recommended.

Topology Bus (direct daisy-chain)

Number of Nodes

Maximum of:

- 8 nodes in any 16-meter (53 feet) length of transmission cable
- 16 nodes per network segment

Termination

One Network Echelon Termination Unit, p/n 8000-80078-001, is recommended per network segment. Refer to Echelon manual (COM-00-07-09) for further information.

Network Length

53 feet (16 meters)

- 426 feet (130 meters) maximum per network segment

CAUTION

ALL DEVICES CONNECTED TO THE LAN SHOULD BE CONTAINED ENTIRELY WITHIN THE SAME SIGNAL CASE OR BUNGALOW.

Table 1-8 Ballast Resistance vs. Approach Length by Frequency, Bidirectional Applications*

MODEL 3000+ GCP OPERATING FREQUENCY (HZ)	BIDIRECTIONAL APPROACH DISTANCE IN FEET (METERS)					
	2 OHMS/1,000' (304.8M) DISTRIBUTED BALLAST		4 OHMS/1,000' (304.8M) DISTRIBUTED BALLAST		6 OHMS/1,000' (304.8M) DISTRIBUTED BALLAST	
	MIN	MAX	MIN	MAX	MIN	MAX
86	1,000 (304.8)	5,350 (1,630.7)	1,000 (304.8)	7,950 (2,423.2)	1,000 (304.8)	9,280 (2,362.2)
114	750 (228.6)	4,525 (1,379.2)	750 (228.6)	6,450 (1,966.0)	750 (228.6)	7,448 (2,270.2)
156	600 (182.9)	3,925 (1,196.3)	600 (182.9)	5,550 (1,691.6)	600 (182.9)	6,349 (1,935.2)
211	475 (144.8)	3,350 (1,021.1)	475 (144.8)	4,800 (1,463.0)	475 (144.8)	5,494 (1,674.6)
285	400 (121.9)	2,950 (899.2)	400 (121.9)	4,225 (1,287.8)	400 (121.9)	4,762 (1,451.5)
348	400 (121.9)	2,625 (800.1)	400 (121.9)	3,675 (1,120.1)	400 (121.9)	4,151 (1,265.2)
430	400 (121.9)	2,300 (701.0)	400 (121.9)	3,350 (1,021.1)	400 (121.9)	3,785 (1,153.7)
525	400 (121.9)	2,150 (655.3)	400 (121.9)	3,150 (960.1)	400 (121.9)	3,541 (1,179.3)
645	400 (121.9)	1,950 (594.4)	400 (121.9)	2,800 (853.4)	400 (121.9)	3,175 (967.7)
790	400 (121.9)	1,725 (525.8))	400 (121.9)	2,475 (753.4)	400 (121.9)	2,807 (855.9)
970	400 (121.9)	1,550 (472.4)	400 (121.9)	2,175 (662.9)	400 (121.9)	2,472 (753.5)

*Based upon use of hardwire or wideband shunts

Table 1-9 Ballast Resistance vs. Approach Length by Frequency, Unidirectional Applications*

MODEL 3000+ GCP OPERATING FREQUENCY (HZ)	UNIDIRECTIONAL APPROACH DISTANCE IN FEET (METERS)					
	2 OHMS/1,000' (304.8M) DISTRIBUTED BALLAST		4 OHMS/1,000' (304.8M) DISTRIBUTED BALLAST		6 OHMS/1,000' (304.8M) DISTRIBUTED BALLAST	
	MIN	MAX	MIN	MAX	MIN	MAX
86	700 (213.4)	4,375 (1,333.5)	700 (213.4)	6,175 (1,882.1)	700 (213.4)	7,080 (2,158.0)
114	525 (160.0)	3,850 (1,173.5)	525 (160.0)	5,550 (1,691.6)	525 (160.0)	6,360 (1,938.5)
156	420 (128.0)	3,325 (1,013.5)	420 (128.0)	4,875 (1,485.9)	420 (128.0)	5,520 (1,682.5)
211	400 (121.9)	2,750 (838.2)	400 (121.9)	4,100 (1,249.7)	400 (121.9)	4,680 (1,426.5)
285	400 (121.9)	2,250 (686.8)	400 (121.9)	3,500 (1,066.8)	400 (121.9)	3,960 (1,207.0)
348	400 (121.9)	1,925 (586.7)	400 (121.9)	3,025 (922.0)	400 (121.9)	3,420 (1,042.4)
430	400 (121.9)	1,725 (525.8)	400 (121.9)	2,650 (807.7)	400 (121.9)	3,000 (914.4)
525	400 (121.9)	1,500 (457.2)	400 (121.9)	2,275 (693.4)	400 (121.9)	2,580 (786.4)
645	400 (121.9)	1,300 (396.2)	400 (121.9)	1,950 (594.4)	400 (121.9)	2,220 (676.7)
790	400 (121.9)	1,125 (342.9)	400 (121.9)	1,650 (502.9)	400 (121.9)	1,860 (566.9)
970	400 (121.9)	1,050 (320.0)	400 (121.9)	1,550 (472.4)	400 (121.9)	1,710 (521.2)

*Based upon use of hardwire or wideband shunts

1.5 TRACK LEADS

1.5.1 Four Track-Wire Hookup

Track wire (lead) connection requirements are based on the track circuit configuration and the distance between the Model 3000+ GCP bungalow and the transmitter lead connections at the track.

WARNING

WARNING

WHEN ANY EXTERNAL TRACK CIRCUIT EQUIPMENT OR AUXILIARY TRACK CIRCUIT EQUIPMENT SHARES TRACK WIRES WITH A GCP/MS TRACK CIRCUIT THAT DOES NOT HAVE AN ACTIVE INTERNAL ISLAND FOR THAT TRACK CIRCUIT OR OUTPUT, SUCH AS A DAX OR PRIME PREDICTION OFFSET, THEN THE TRACK CIRCUIT EQUIPMENT MUST BE CONNECTED IN ACCORDANCE WITH PARAGRAPH 1.5.8.

1.5.2 Four-Wire Connections for Bidirectional Applications

In most installations where a Model 3000+ GCP is operating at a crossing, four track leads (wires) connect the GCP to the track.

- Two transmit leads are connected on the side of the crossing nearest the instrument bungalow. The transmitter leads must be as short as possible and not exceed the maximum lengths specified in Table 1-10.
- Two receiver leads are connected to the rails on the opposite side of the crossing.
- Two check channel receiver leads are routed to the surge panel where they are connected to the corresponding transmitter leads as shown in Figure 1-4.

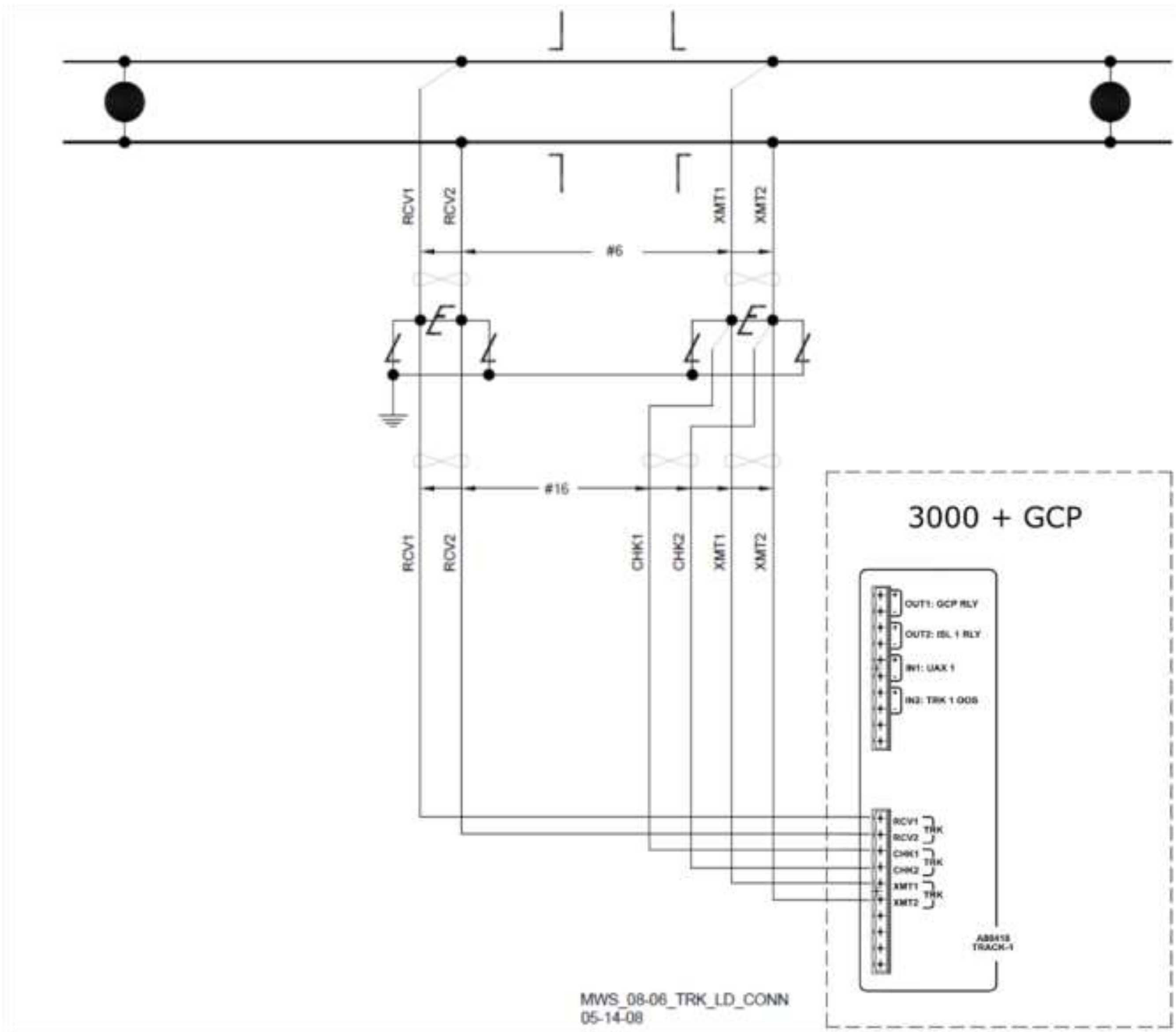


Figure 1-4 Track Lead Connections

CAUTION

THE MAXIMUM TRANSMITTER LEAD LENGTHS SPECIFIED IN Table 1-10 ARE FOR THE TRANSMITTER PAIR OF WIRES MEASURED BETWEEN THE BUNGALOW AND THE RAIL CONNECTIONS. FAILURE TO DO SO MAY RESULT IN CHECK RECEIVER ERRORS AND FALSE ACTIVATION.

NOTE

In unidirectional and simulated bidirectional track installations, the transmitter leads should be located adjacent to the insulated joints. In track configurations where an Island circuit is not involved, all track leads may be placed at one location.

NOTE

When individual lead lengths exceed the distances specified in Table 1-10, a six-wire application should be considered. For a discussion of simulated bidirectional installations, refer to Section 3.2.1.

Table 1-10 Maximum Transmit Wire Lengths (Four-wire Applications)

STANDARD SIEMENS GCP FREQUENCY (HZ)	MAXIMUM TRANSMIT LEAD LENGTH IN FEET (METERS)
86	100 (30.5)
114	125 (38.1)
156	150 (45.7)
211	200 (61.0)
285-970	250 (76.2)

1.5.3 Four Track Wire Unidirectional and Simulated Bidirectional Application Rail Connections

In unidirectional or simulated bidirectional installations, locate the transmitter leads adjacent to the insulated joints wherever possible.

1.5.4 Track Lead Routing

Track wires are routed between the GCP track connectors on the 3000+ front panel and the Surge Panel and between the Surge Panel and the rails as shown in Figure 1-4. The leads between the Model 3000+ GCP and the Surge Panel must use twisted number 16 AWG to 12 AWG wire. The transmitter and receiver leads between the Surge Panel and the rails must be twisted and have a minimum wire size of number 6 AWG.

NOTE

> **NOTE**
> When using an island circuit, physically separate the GCP transmitter pair as far as practical from the receiver pair, both below ground and within the bungalow. Use a crimped or welded splice when splicing track wire connections.

1.5.5 Track Lead Length

In general, limit the total track lead length of a 4-wire circuit to 600 feet (182.9 meters), where possible. This includes the actual length of the transmitter and the receiver twisted pairs added together. Twist each pair of wires at least two turns per foot. Track lead length is measured from the bungalow to the rail connections.

1.5.6 Six-Wire Connections

When transmit wires must exceed the maximum length specified in the Table 1-10, a six-wire track hookup must be used. In a six-wire hookup, the maximum wire length allowed is 3500 feet (1067 meters).

1.5.7 Six-Wire Transmitter and Check Receiver Track Connection Requirements

In a six-wire application, there must be a six-wire to four-wire conversion near the rail connection so that only two transmitter wires and two receive wires are actually connected to the track. Each of the two check wires must be connected to the corresponding transmitter wire:

- Within 25 feet (7.62 meters) of the rail connections
- Outside the ballast line or area damaged by track machinery
- Both transmitter/check pairs are connected to the rail by single wires
- A typical Model 3000+ GCP six-wire to four-wire conversion operating in unidirectional mode is shown in Figure 1-5

In a six-wire application, two check wires are connected to the corresponding transmitter track wires in the underground (within 25 [7.62 meters] feet of the transmit feed point, but not at the rail connection and not where the connection can be damaged by track machinery or dragging equipment) to provide remote sensing of the transmit signal.

The corresponding XMT and CHK wires must be connected together as shown in Figure 1-5.

Ensure that the corresponding XMT and RCV wires are not connected together or open track wire detection will not operate correctly.

The location of the transmitter/check connection should be situated away from the track and in a manner that minimizes the risk of the check and receive wires being damaged simultaneously by track machinery or dragging equipment.

When any external track circuit equipment or auxiliary track circuit equipment shares track wires with a GCP/MS track circuit that does not have an active internal island for that track circuit or output, such as a DAX or prime prediction offset, then the track circuit equipment must be connected in accordance with paragraph 1.5.8.

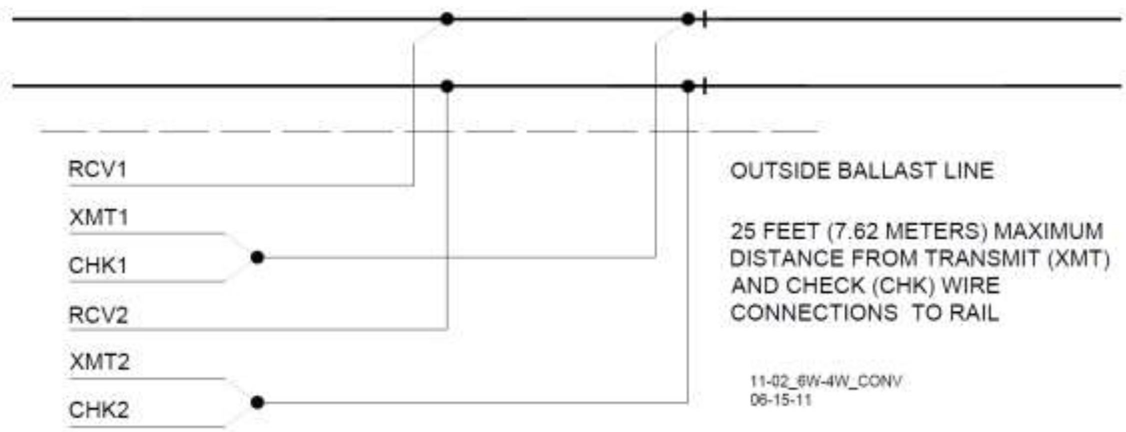


Figure 1-5 Six-Wire to Four Wire Conversion

NOTE

When splicing track connections, welded splices should be used. Use of Kearney connectors should be avoided.

1.5.8 Sharing Track Wires with External Track Circuit Equipment

When any external track circuit equipment or auxiliary track circuit equipment shares track wires with a GCP/MS track circuit that does not have an active internal island for that track circuit or output, such as a DAX or Prime Prediction Offset, then the track circuit equipment must be connected in one of two ways:

- The external track circuit equipment or auxiliary track circuit equipment may be connected across the receiver wires directly, or
- When connected to the Transmitter/Check Receiver wires, the external track circuit equipment or auxiliary track circuit equipment must be connected as identified in paragraphs 1.5.8.1 and 1.5.8.2.

1.5.8.1 Six-Wire Connections

The external equipment must be connected to the Check Receiver wires only.

WARNING

FOR SIX-WIRE CONNECTIONS DO NOT CONNECT ANY EXTERNAL TRACK CIRCUIT EQUIPMENT ACROSS THE TRANSMITTER WIRES.

1.5.8.2 Four-Wire Connections

The Check Channel Receiver wires may connect either to the Transmitter wires at the same point or prior to connecting to the other track circuit equipment (refer to Figure 1-6), or the Check Channel Receiver wires may connect to the external track circuit equipment prior to connecting to the transmitter track wires (refer to Figure 1-7).

WARNING

DO NOT CONNECT ANY EXTERNAL TRACK CIRCUIT EQUIPMENT ACROSS THE TRANSMITTER PRIOR TO CONNECTING IT TO THE CHECK CHANNEL RECEIVER WIRES.

CONNECTIONS MUST BE ARRANGED SO THAT AN OPEN WIRE OR OPEN CONNECTION WILL NOT RESULT IN THE TRANSMITTER WIRES BEING CONNECTED TO THE AUXILIARY TRACK CIRCUIT EQUIPMENT UNLESS THE CHECK RECEIVER IS ALSO CONNECTED (REFER TO Figure 1-6)

NOTE

External track circuit equipment includes, but is not limited to, 80049 DC Exciter Panels, Electronic Coded Track, AFO Track circuits, Track batteries or relays, surge suppressors (not including air gap arrestors) or Bidirectional Simulation Couplers.

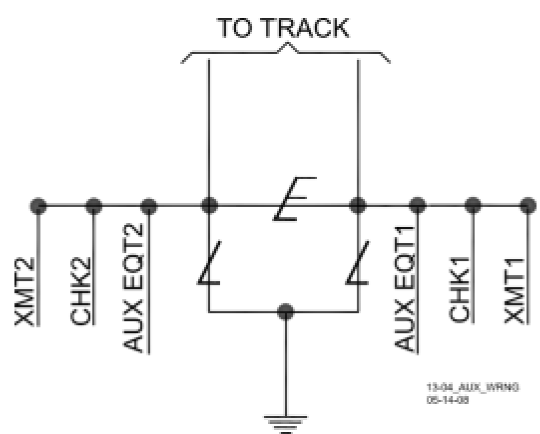


Figure 1-6 Proper Connection of Track Leads

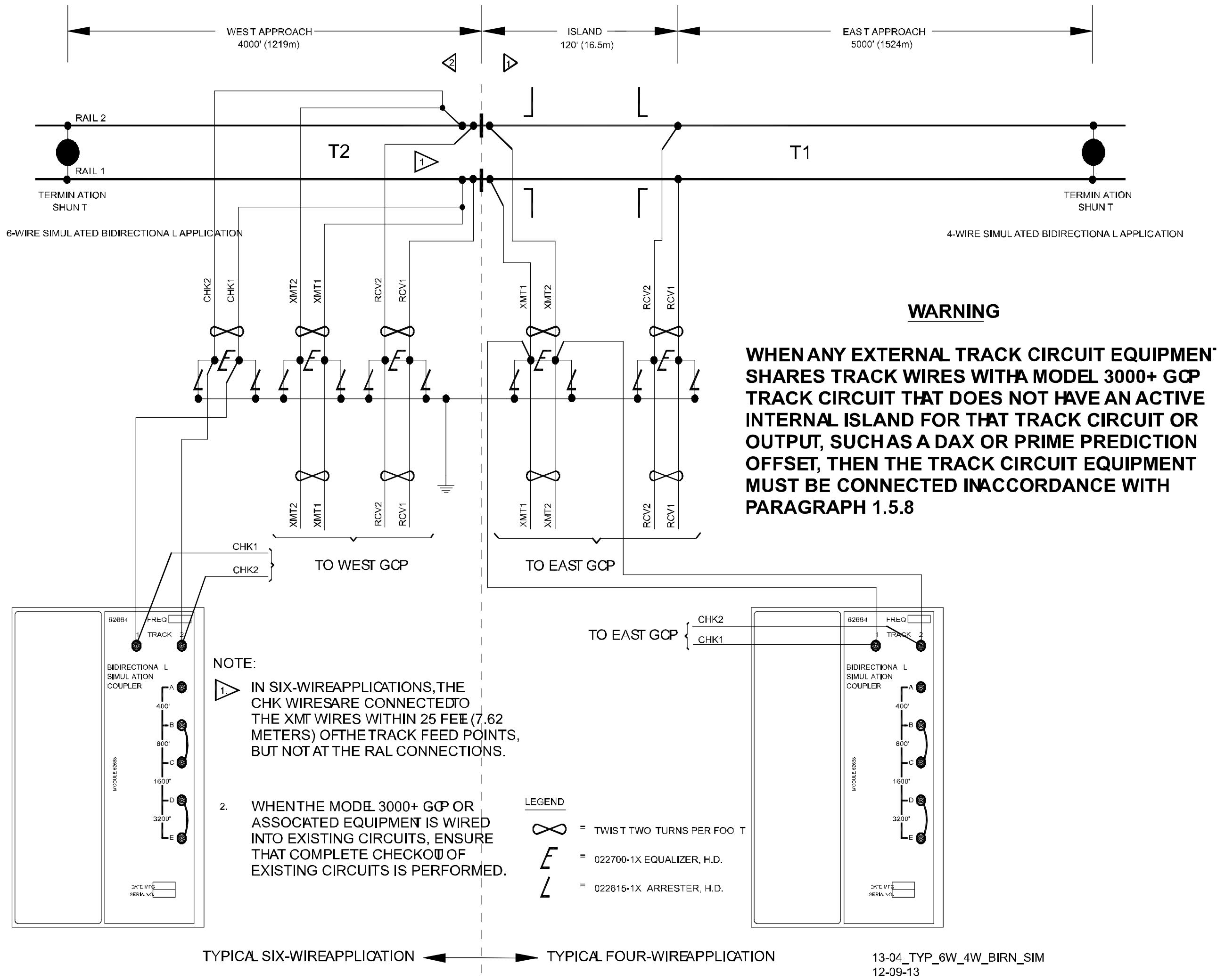


Figure 1-7 Proper 4-Wire and 6-Wire Connections when Using Auxiliary Track Circuit Equipment

1.6 MINIMUM APPROACH LENGTH

The shortest approach distance at which a Model 3000+ GCP will provide reliable operation is determined by:

- the GCP operating frequency
- the gauge and length of the transmit wires connected to the rails
- the length of the Island
- Ballast conditions in street and approach

NOTE

NOTE

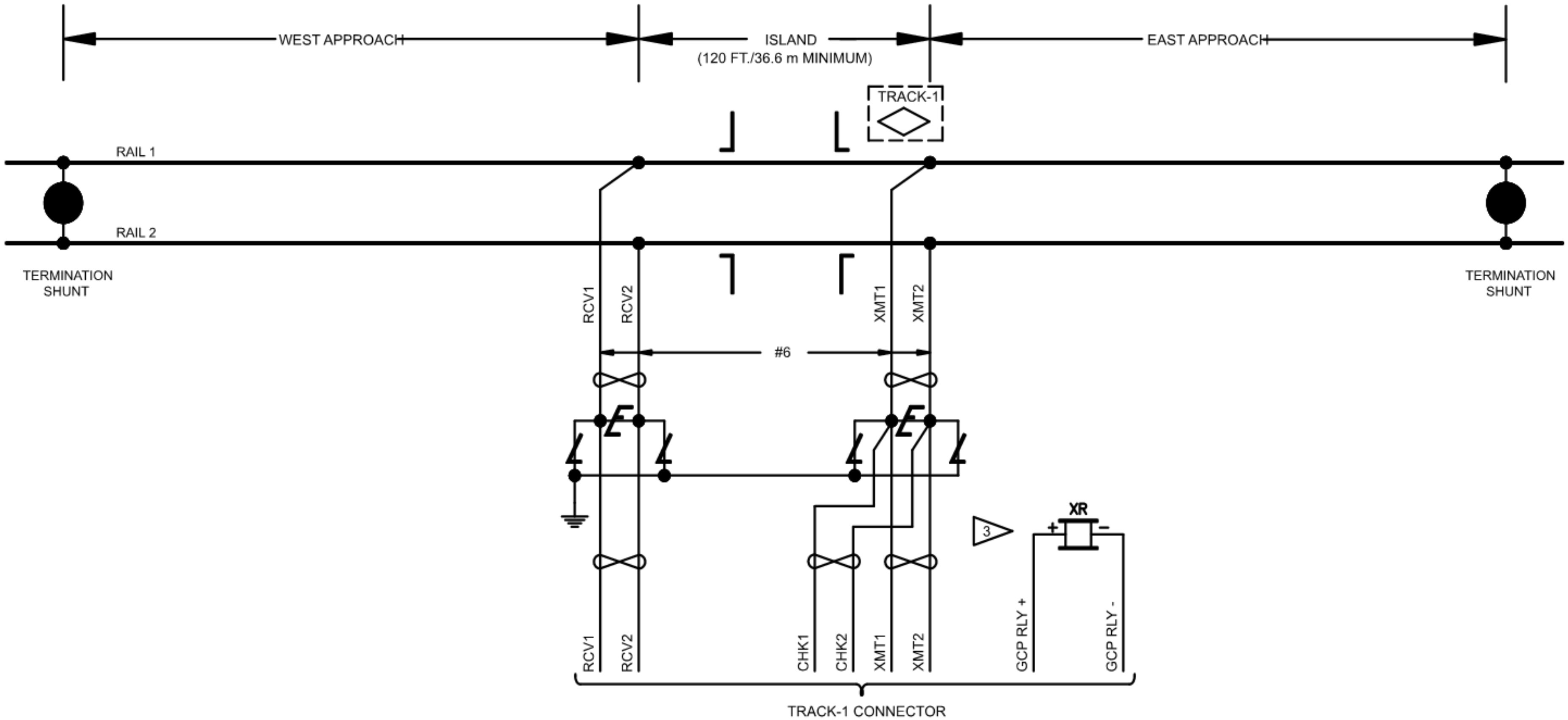
In certain applications, shorter approach distances can be achieved by the use of a six-wire connection.

1.7 TYPICAL APPLICATION DRAWINGS

The following figures illustrate a variety of typical Model 3000+ GCP applications.

Table 1-11 Table of Typical Application Drawings

FIGURE	TITLE
Figure 1-8	Single Track, Bidirectional
Figure 1-9	Two Track, Bidirectional
Figure 1-10	Single Track, Back-to-Back, Unidirectional
Figure 1-11	Single Track, Bidirectional, and Remote Single Track, Unidirectional
Figure 1-12	Single Track, Bidirectional, and Remote Single Track (Six Wire), Unidirectional, In Single GCP Case
Figure 1-13	Single Track, Back-to-Back, Unidirectional, In Simulated Bidirectional Operation
Figure 1-14	Single Track, Back-to-Back, Unidirectional, in Simulated Bidirectional Six Track Wire Operation
Figure 1-15	Single Track, Two Overlapping Crossings, Using Remote Prediction
Figure 1-16	Single Track, Two Overlapping Crossings, Using Shunting Enhancer Panels
Figure 1-17	Single Track, Remote Prediction with Advanced Preemption
Figure 1-18	Single Track, Remote Prediction for Two Overlapping Bidirectional Crossings
Figure 1-19	Typical Track Wire Surge Protection for 4 and 6 Wire Track Connections
Figure 1-20	Typical Surge Protection Requirements When Cabling Between Remote DAX Unit and Crossing Unit
Figure 1-21	Recommended Battery Surge Protection Wiring for Model 3000+ GCP



NOTES

1. ALL WIRING #16 AWG MINIMUM UNLESS OTHERWISE NOTED. WIRE SIZES SHOWN ARE MINIMUM GAUGE.
2. TERMINATION SHUNTS MAY BE HARDWARE, WIDEBAND, OR NARROW-BAND DEPENDING ON TYPE OF TRACK CIRCUIT IN USE.
3. XR SHOWN FOR ILLUSTRATION ONLY.
4. WHEN THE 3000+ GCP OR ASSOCIATED EQUIPMENT ARE WIRED INTO EXISTING CIRCUITS ENSURE THAT COMPLETE CHECKOUT OF THE EXISTING CIRCUITS ARE PERFORMED.

LEGEND

= TWIST TWO TURNS PER FOOT

= 02270-1X EQUALIZER, H.D.

= 02585-1X ARRESTER, H.D.

= BIDIRECTIONAL GCP

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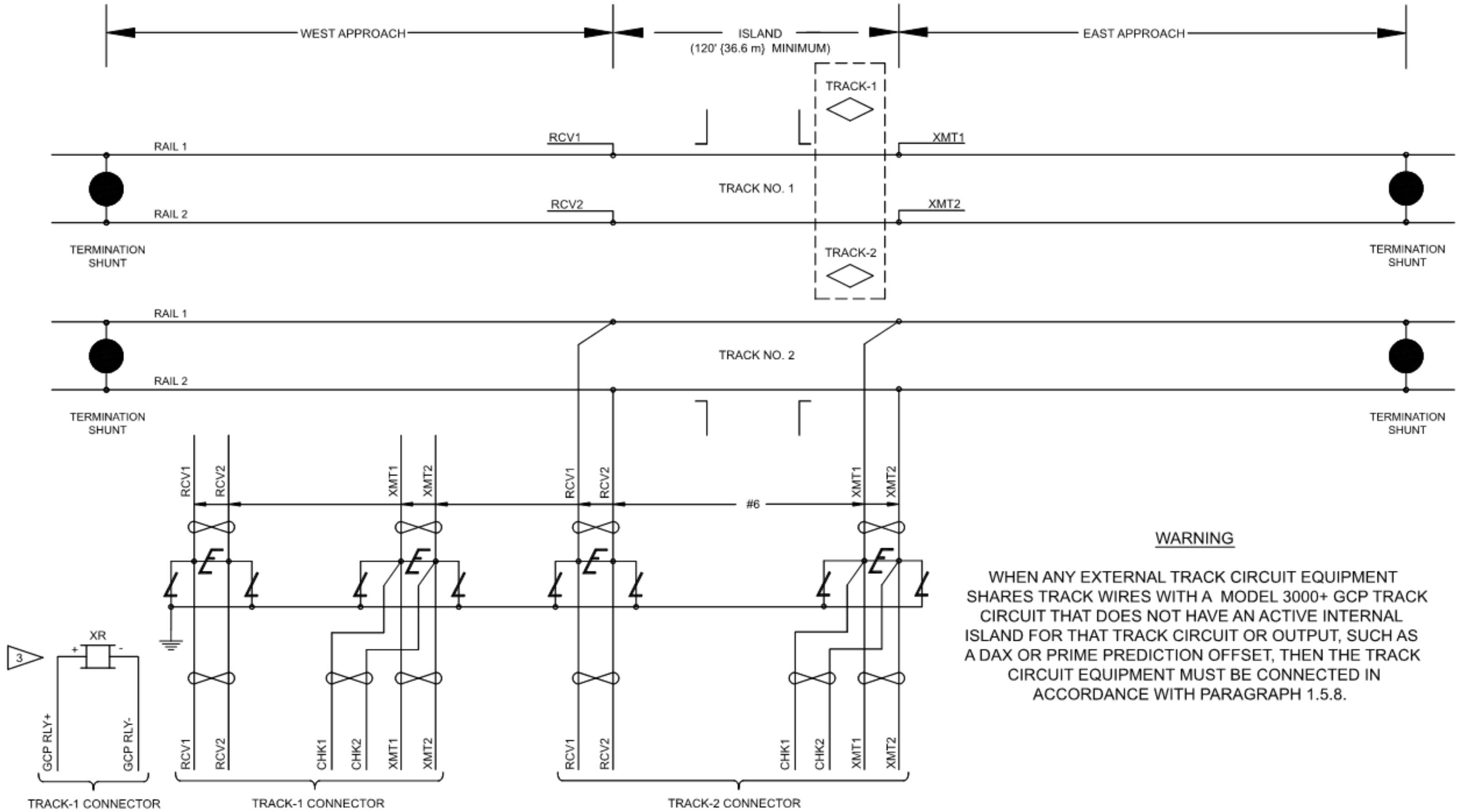
09-21-04

Figure 1-8 Typical Single Track Bidirectional Application



NOTES

1. ALL WIRING #16 AWG MINIMUM UNLESS OTHERWISE NOTED. WIRE SIZES SHOWN ARE MINIMUM GAUGE.
2. TERMINATION SHUNTS MAY BE HARDWARE, WIDEBAND, OR NARROW-BAND DEPENDING ON TYPE OF TRACK CIRCUIT IN USE.
3. XR SHOWN FOR ILLUSTRATION ONLY.
4. WHEN THE MODEL 3000+ GCP OR ASSOCIATED EQUIPMENT IS WIRED INTO EXISTING CIRCUITS ENSURE THAT COMPLETE CHECKOUT OF THE EXISTING CIRCUITS IS PERFORMED.

LEGEND

= TWIST TWO TURNS PER FOOT

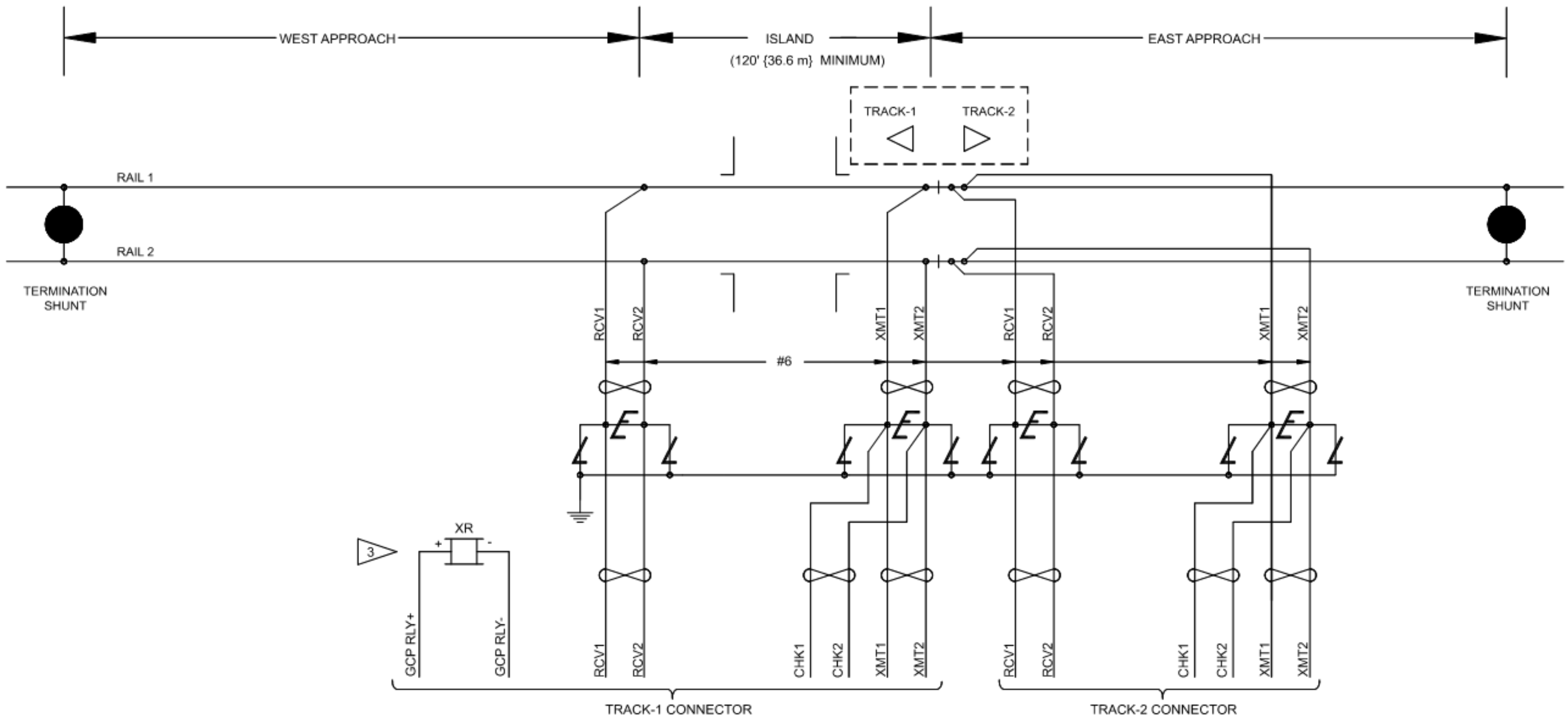
= 02270-1X EQUALIZER, H.D.

= 02585-1X ARRESTER, H.D.

= BIDIRECTIONAL GCP

13-04_TYP_2T_BIDRN_APP
09-10-13

Figure 1-9 Typical Two Track Bidirectional Application



NOTES

1. ALL WIRING #16 AWG MINIMUM UNLESS OTHERWISE NOTED. WIRE SIZES SHOWN ARE MINIMUM GAUGE.
2. TERMINATION SHUNTS MAY BE HARDWARE, WIDEBAND, OR NARROW-BAND DEPENDING ON TYPE OF TRACK CIRCUIT IN USE.
3. XR SHOWN FOR ILLUSTRATION ONLY.
4. WHEN THE MODEL 3000+ GCP OR ASSOCIATED EQUIPMENT IS WIRED INTO EXISTING CIRCUITS ENSURE THAT COMPLETE CHECKOUT OF THE EXISTING CIRCUITS IS PERFORMED.

13-04_TYP_1T_B2B_UNI_APPL
09-10-13

LEGEND

= TWIST TWO TURNS PER FOOT

= 02270-1X EQUALIZER, H.D.

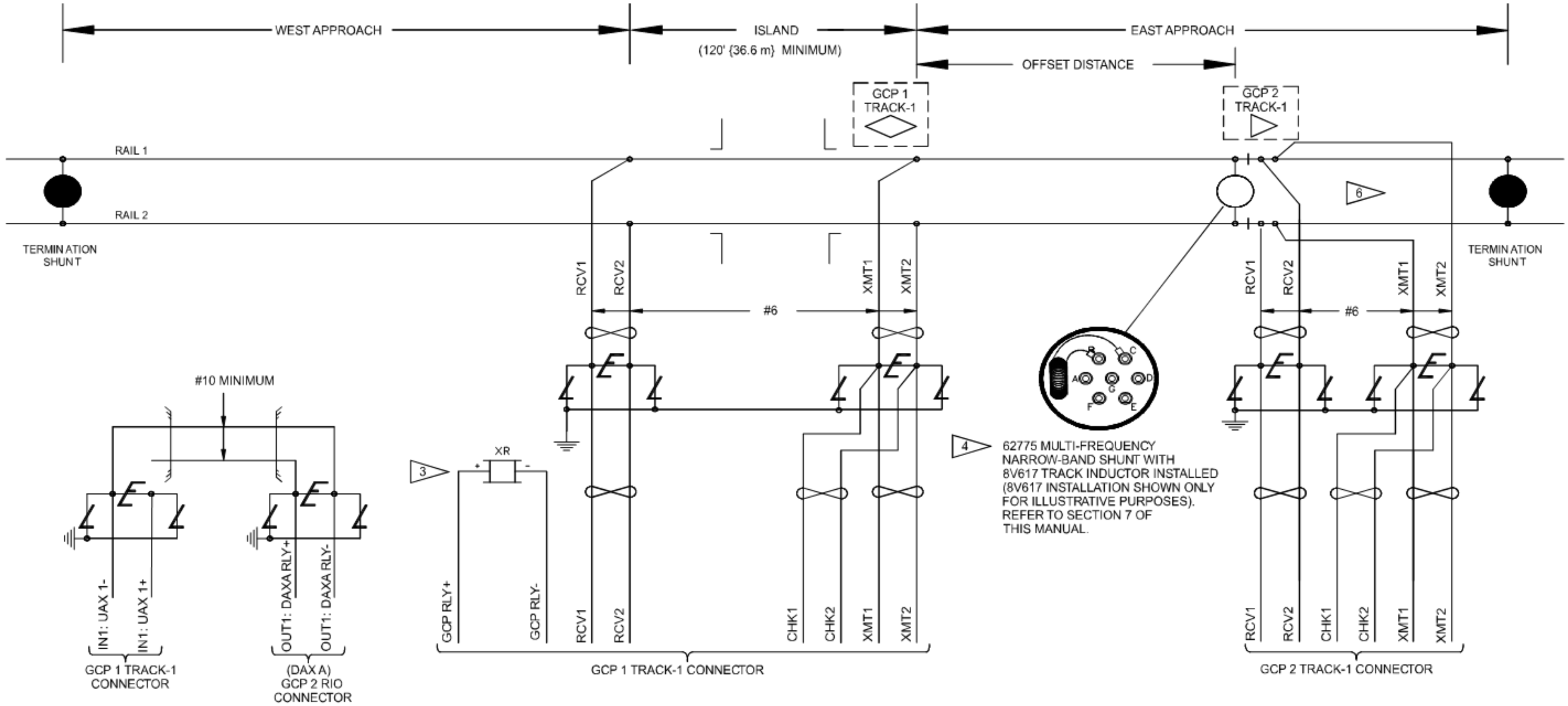
= 02585-1X ARRESTER, H.D.

OR = UNIDIRECTIONAL GCP

WARNING

WHEN ANY EXTERNAL TRACK CIRCUIT EQUIPMENT SHARES TRACK WIRES WITH A MODEL 3000+ GCP TRACK CRCUIT THAT DOES NOT HAVE AN ACTIVE INTERNAL ISLAND FOR THAT TRACK CIRCUIT OR OUTPUT, SUCH AS A DAX OR PRIME PREDICTION OFFSET, THEN THE TRACK CIRCUIT EQUIPMENT MUST BE CONNECTED IN ACCORDANCE WITH PARAGRAPH 1.5.8

Figure 1-10 Typical Single Track, Back-to-Back, Unidirectional Application



NOTES

1. ALL WIRING #16 AWG MINIMUM UNLESS OTHERWISE NOTED. WIRE SIZES SHOWN ARE MINIMUM GAUGE.
2. TERMINATION SHUNTS MAY BE HARDWARE, WIDEBAND, OR NARROW-BAND DEPENDING ON TYPE OF TRACK CIRCUIT IN USE.
3. XR SHOWN FOR ILLUSTRATION ONLY.
4. 8V617 SIMULATED TRACK INDUCTOR IS REQUIRED ONLY IF DISTANCE TO THE INSULATED JOINTS (OFFSET DISTANCE) IS 90 PERCENT OR LESS OF WEST APPROACH DISTANCE.
5. WHEN THE MODEL 3000+ GCP OR ASSOCIATED EQUIPMENT ARE WIRED INTO EXISTING CIRCUITS ENSURE THAT COMPLETE CHECKOUT OF THE EXISTING CIRCUITS IS PERFORMED.
6. MINIMUM APPROACH DISTANCE FOR REMOTE DAX IS 1000 FEET (304.8 METERS).

WARNING

WHEN ANY EXTERNAL TRACK CIRCUIT EQUIPMENT SHARES TRACK WIRES WIHT A MODEL 3000 GCP+ TRACK CIRCUIT THAT DOES NOT HAVE AN ACTIVE INTERNAL ISLAND FOR THAT TRACK CIRCUIT OR OUTPUT, SUCH AS A DAX OR PRIME PREDICTION OFFSET, THEN THE TRACK CIRCUIT EQUIPMENT MUST BE CONNECTED IN ACCORDANCE WITH PARAGRAPH 1.5.8

LEGEND

= TWIST TWO TURNS PER FOOT
= 02270-1X EQUALIZER, H.D.
= 02585-1X ARRESTER, H.D.
= BIDIRECTIONAL GCP
= UNIDIRECTIONAL GCP

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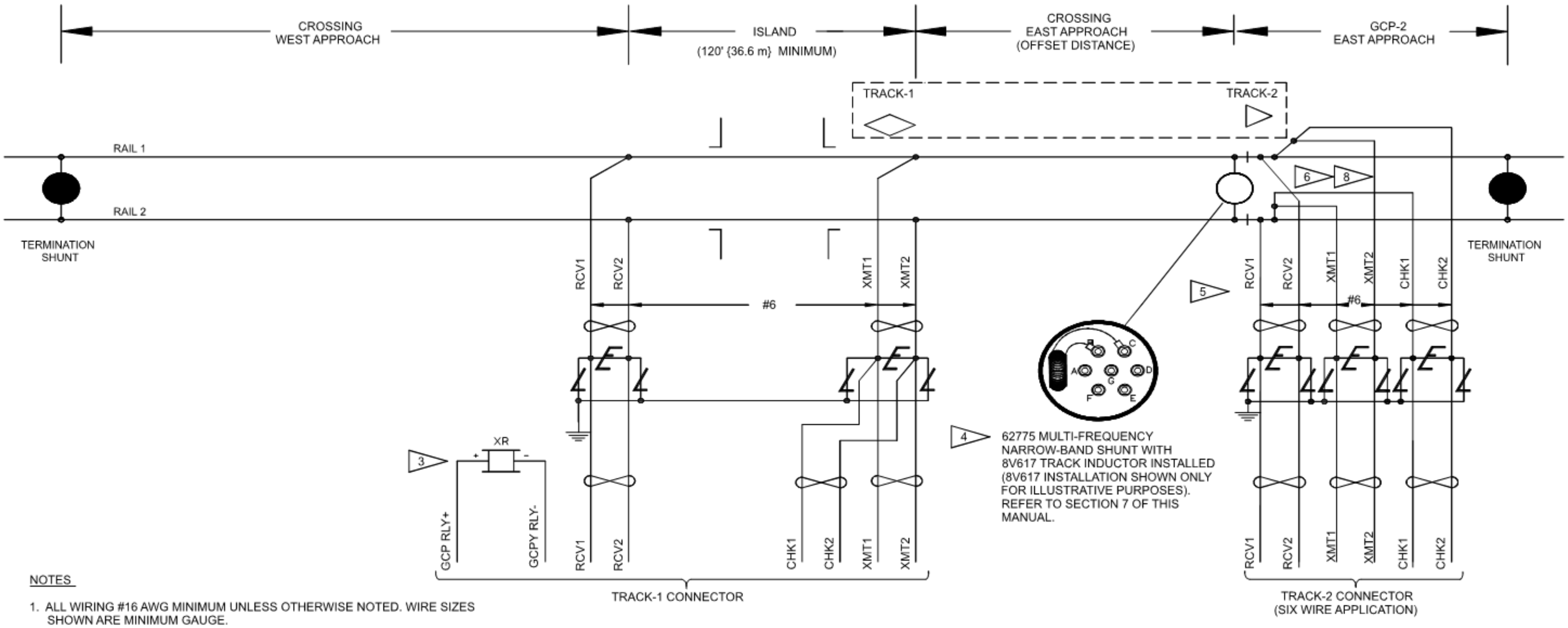
11-22-13

Figure 1-11 Typical Single Track, Bidirectional, and Remote Single Track, Unidirectional Application



NOTES

1. ALL WIRING #16 AWG MINIMUM UNLESS OTHERWISE NOTED. WIRE SIZES SHOWN ARE MINIMUM GAUGE.
2. TERMINATION SHUNTS MAY BE HARDWARE, WIDEBAND, OR NARROW-BAND DEPENDING ON TYPE OF TRACK CIRCUIT IN USE.
3. XR SHOWN FOR ILLUSTRATION ONLY.
4. 8V617 SIMULATED TRACK INDUCTOR IS REQUIRED ONLY IF DISTANCE TO THE INSULATED JOINTS (OFFSET DISTANCE) IS 90 PERCENT OR LESS OF THE WEST APPROACH DISTANCE.
5. THE MAXIMUM LENGTH OF EACH CONDUCTOR IN SIX-WIRE WIRE APPLICATIONS IS 3500 FEET.
6. FOR 6 WIRE TO 4 WIRE CONVERSION, THE CHK WIRES ARE CONNECTED TO THE XMT WIRES UNDERGROUND WITHIN 25 FEET (7.62 METERS) OF THE TRACK FEET POINTS, BUT NOT AT THE RAIL CONNECTIONS.
7. WHEN THE MODEL 3000+ GCP OR ASSOCIATED EQUIPMENT IS WIRED INTO EXISTING CIRCUITS, ENSURE THAT COMPLETE CHECKOUT OF THE EXISTING CIRCUITS IS PERFORMED.
8. MINIMUM APPROACH DISTANCE FOR REMOTE DAX IS 1000 FEET (304.8 METERS).

WARNING

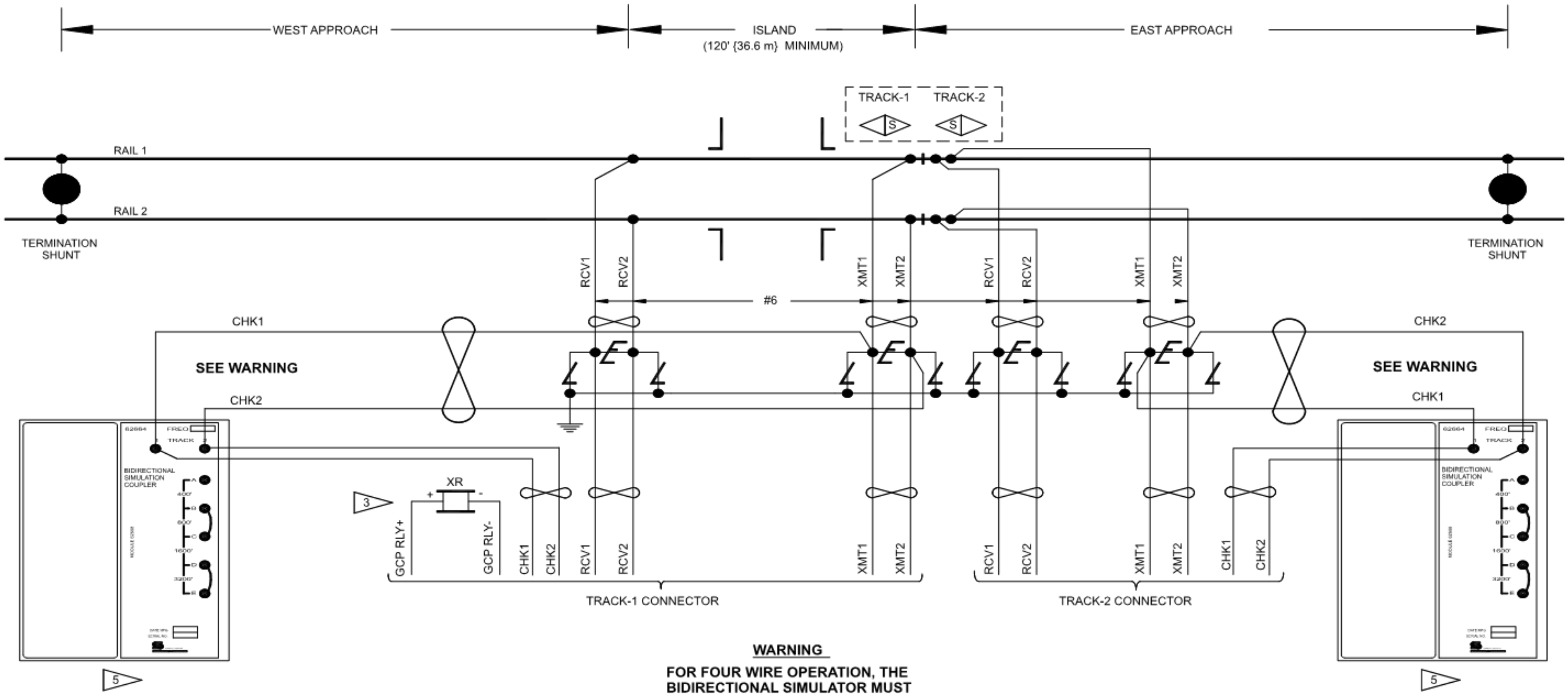
WHEN ANY EXTERNAL TRACK CIRCUIT EQUIPMENT SHARES TRACK WIRES WIHT A MODEL 3000+ GCP TRACK CIRCUIT THAT DOES NOT HAVE AN ACTIVE INTERNAL ISLAND FOR THAT TRACK CIRCUIT OR OUTPUT, SUCH AS A DAX OR PRIME PREDICTION OFFSET, THEN THE TRACK CIRCUIT EQUIPMENT MUST BE CONNECTED IN ACCORDANCE WITH PARAGRAPH 1.5.8.

LEGEND

= TWIST TWO TURNS PER FOOT
= 02270-1X EQUALIZER, H.D.
= 02585-1X ARRESTER, H.D.
= BIDIRECTIONAL GCP
= UNIDIRECTIONAL GCP

13-04_1T_BIDRN_RST6W_UNI_APPL_1CASE
11-22-13

Figure 1-12 Typical Single Track, Bidirectional, and Remote Single Track (Six Wire), Unidirectional Application, In Single GCP Case



WARNING

FOR FOUR WIRE OPERATION, THE BIDIRECTIONAL SIMULATOR MUST BE WIRED PER PARAGRAPH 3.2

NOTES

1. ALL WIRING #16 AWG MINIMUM UNLESS OTHERWISE NOTED. WIRE SIZES SHOWN ARE MINIMUM GAUGE.
2. TERMINATION SHUNTS MAY BE HARDWARE, WIDEBAND, OR NARROW-BAND DEPENDING ON TYPE OF TRACK CIRCUIT IN USE.
3. XR SHOWN FOR ILLUSTRATION ONLY.
4. WHEN THE MODEL 3000+ GCP OR ASSOCIATED EQUIPMENT ARE WIRED INTO EXISTING CIRCUITS ENSURE THAT COMPLETE CHECKOUT OF THE EXISTING CIRCUITS IS PERFORMED.
5. BIDIRECTIONAL COUPLERS MUST BE THE SAME FREQUENCY AS THE GCP AND ARE FIELD ADJUSTED TO APPROXIMATE THE GCP APPROACH DISTANCE.

WARNING

WHEN ANY EXTERNAL TRACK CIRCUIT EQUIPMENT SHARES TRACK WIRES WITH A MODEL 3000+ GCP TRACK CIRCUIT THAT DOES NOT HAVE AN ACTIVE INTERNAL ISLAND FOR THAT TRACK CIRCUIT OR OUTPUT, SUCH AS A DAX OR PRIME PREDICTION OFFSET, THEN THE TRACK CIRCUIT EQUIPMENT MUST BE CONNECTED IN ACCORDANCE WITH PARAGRAPH 1.5.8

LEGEND

= TWIST TWO TURNS PER FOOT

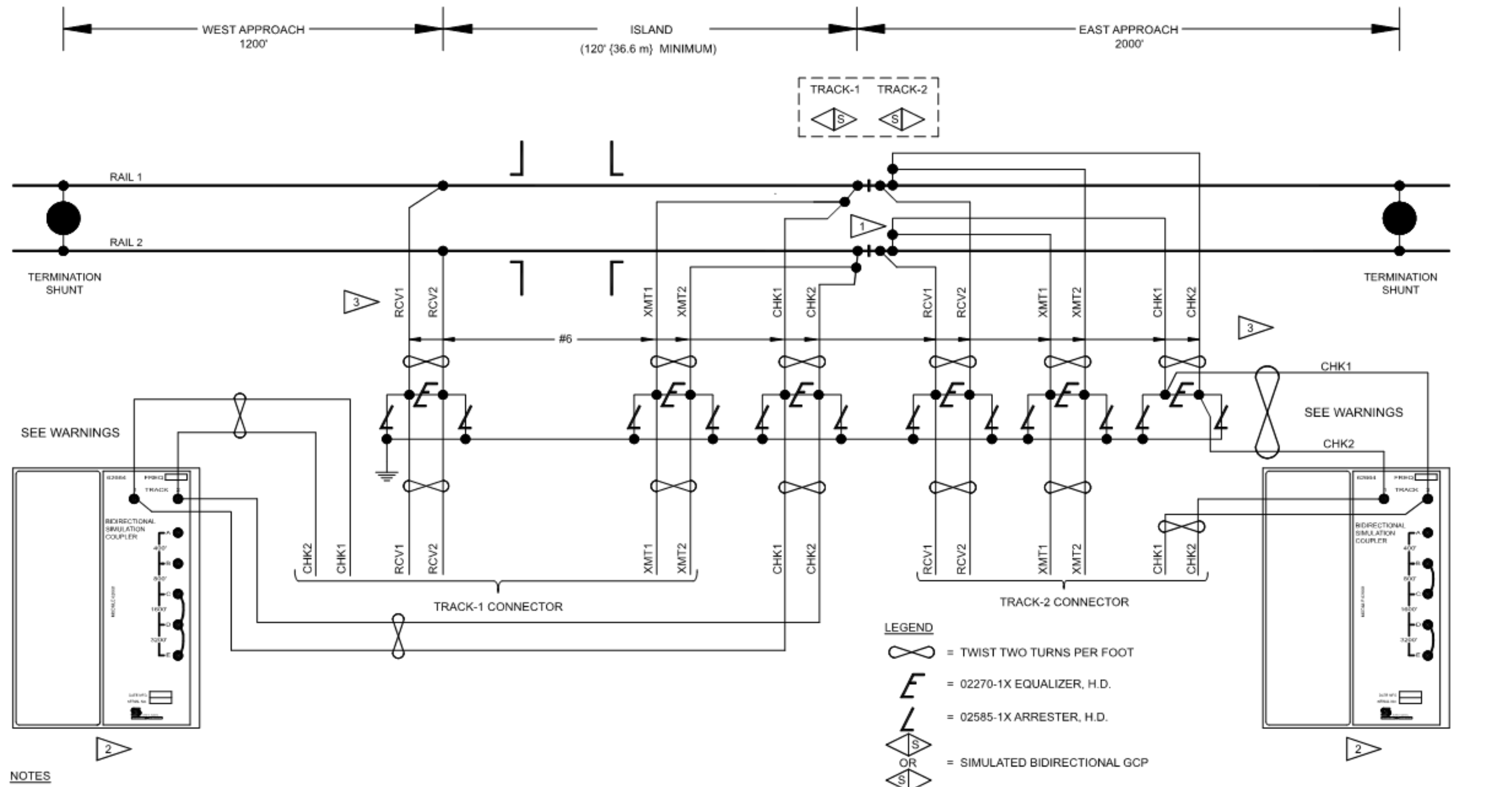
= 02270-1X EQUALIZER, H.D.

= 02585-1X ARRESTER, H.D.

OR = SIMULATED BIDIRECTIONAL GCP

13-04_TYP_1T_B2B_UNI_SIMBIRDN_OPS_APPL
11-22-13

Figure 1-13 Typical Single Track, Back-to-Back, Unidirectional, In Simulated Bidirectional Operation Application



NOTES

1. IN SIX-WIRE APPLICATIONS, THE CHK WIRES ARE CONNECTED TO THE XMT WIRES WITHIN 25 FEET (7.62 METERS) OF THE TRACK FEED POINTS, BUT NOT AT THE RAIL CONNECTIONS.
2. BIDIRECTIONAL COUPLERS MUST BE THE SAME FREQUENCY AS THE APPROACH FREQUENCY AND ARE FIELD ADJUSTED TO APPROXIMATE THE APPROACH DISTANCE.
3. ALL WIRING #16 AW MINIMUM UNLESS OTHERWISE NOTED. WIRE SIZES SHOWN ARE MINIMUM GAUGE.
4. TERMINATION SHUNTS MAY BE HARDWIRE, WIDE-BAND, OR NARROW-BAND DEPENDING UPON THE TRACK CIRCUIT IN USE.
5. WHEN THE MODEL 3000+ GCP OR ASSOCIATED EQUIPMENT ARE WIRED INTO EXISTING CIRCUITS, ENSURE THAT COMPLETE CHECKOUT OF THE EXISTING CIRCUITS IS PERFORMED.

13-04_TYP_1T_B2B_UNI_SIMBI_6T_WIRE
11-22-13

WARNING

FOR 6-WIRE OPERATION, THE BIDIRECTIONAL COUPLERS MUST BE CONNECTED TO CHECK WIRES.

THE MODEL 3000+ GCP MUST BE PROGRAMMED FOR BIDIRECTIONAL OR SIMULATED BIDIRECTIONAL APPROACH.

WHEN ANY EXTERNAL TRACK CIRCUIT EQUIPMENT SHARES TRACK WIRES WITH A GCP 3000+ TRACK CIRCUIT THAT DOES NOT HAVE AN ACTIVE INTERNAL ISLAND FOR THAT TRACK CIRCUIT OR OUTPUT, SUCH AS A DAX OR PRIME PREDICTION OFFSET, THEN THE TRACK CIRCUIT EQUIPMENT MUST BE CONNECTED IN ACCORDANCE WITH PARAGRAPH 1.5.8

Figure 1-14 Typical Single Track, Back-to-Back, Unidirectional, in Simulated Bidirectional, Six Track Wire Operation

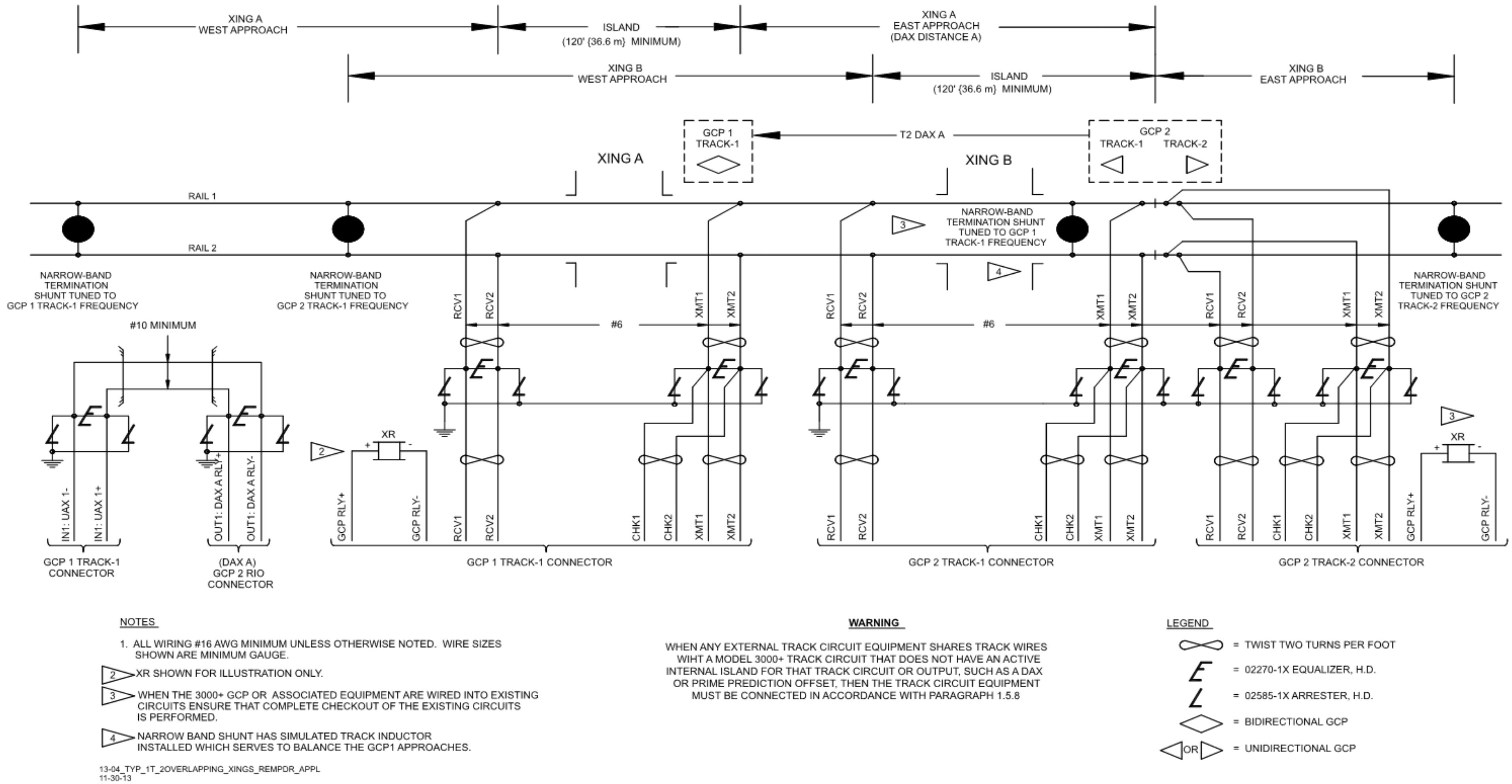


Figure 1-15 Typical Single Track, Two Overlapping Crossings, Using Remote Prediction Application

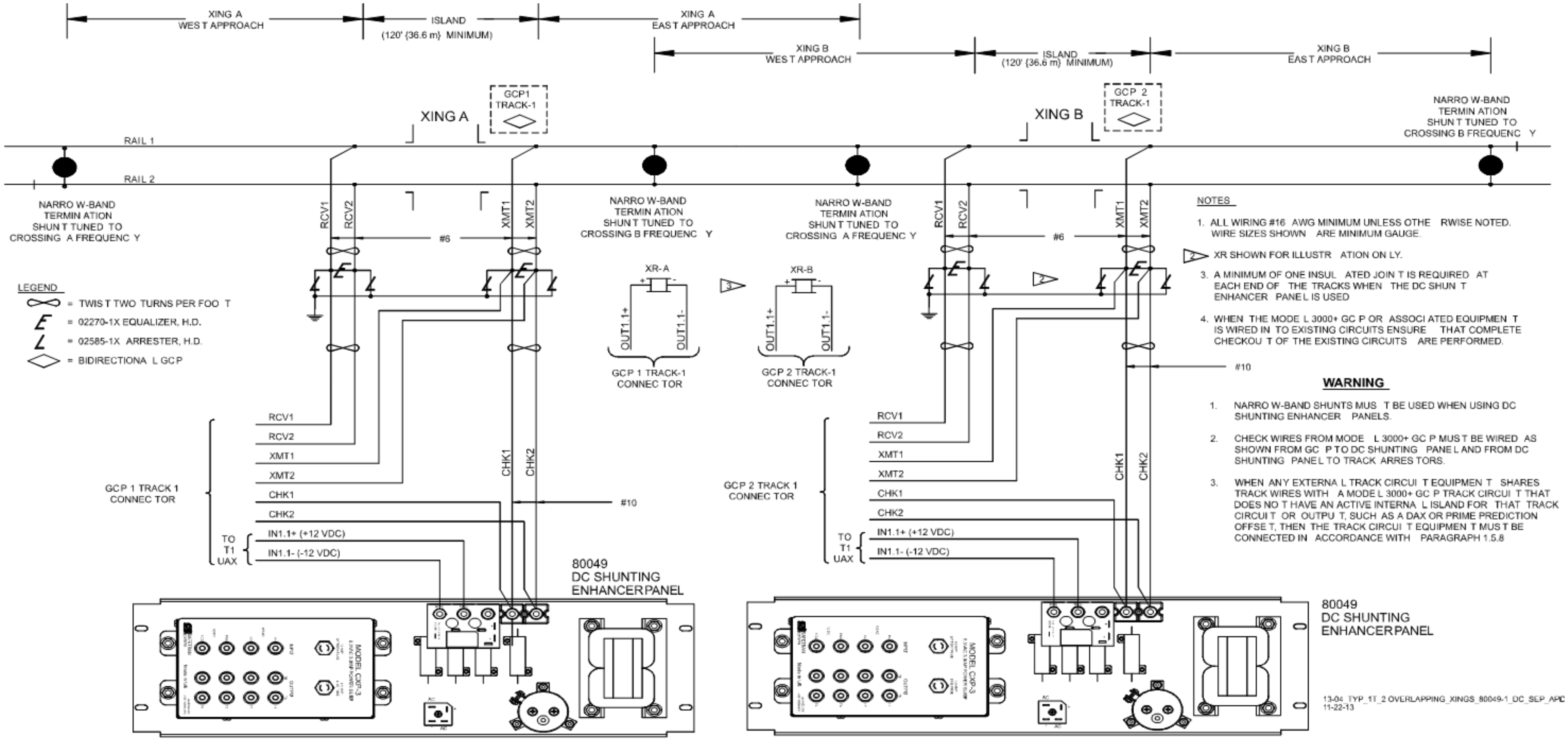
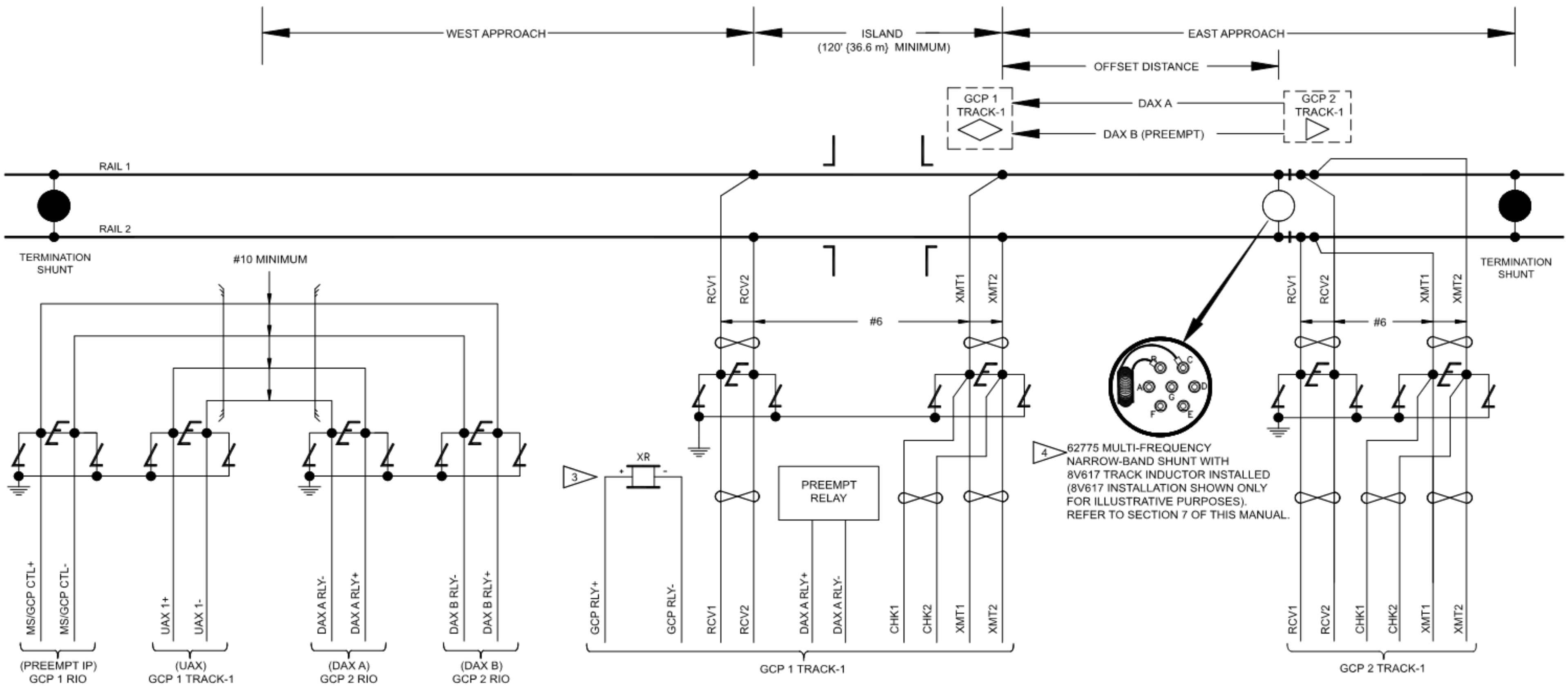


Figure 1-16   Typical Single Track, Two Overlapping Crossings, Using Shunting Enhancer Panels, Application



NOTES

1. ALL WIRING #16 AWG MINIMUM UNLESS OTHERWISE NOTED. WIRE SIZES SHOWN ARE MINIMUM GAUGE.
2. TERMINATION SHUNTS MAY BE HARDWARE, WIDEBAND, OR NARROW-BAND DEPENDING ON TYPE OF TRACK CIRCUIT IN USE.
3. XR SHOWN FOR ILLUSTRATION ONLY.
4. 8V617 SIMULATED TRACK INDUCTOR IS REQUIRED ONLY IF DISTANCE TO THE INSULATED JOINTS (OFFSET DISTANCE) IS 90 PERCENT OR LESS OF EAST APPROACH DISTANCE.
5. WHEN THE MODEL 3000+ GCP OR ASSOCIATED EQUIPMENT IS WIRED INTO EXISTING CIRCUITS ENSURE THAT COMPLETE CHECKOUT OF THE EXISTING CIRCUITS IS PERFORMED.

WARNING

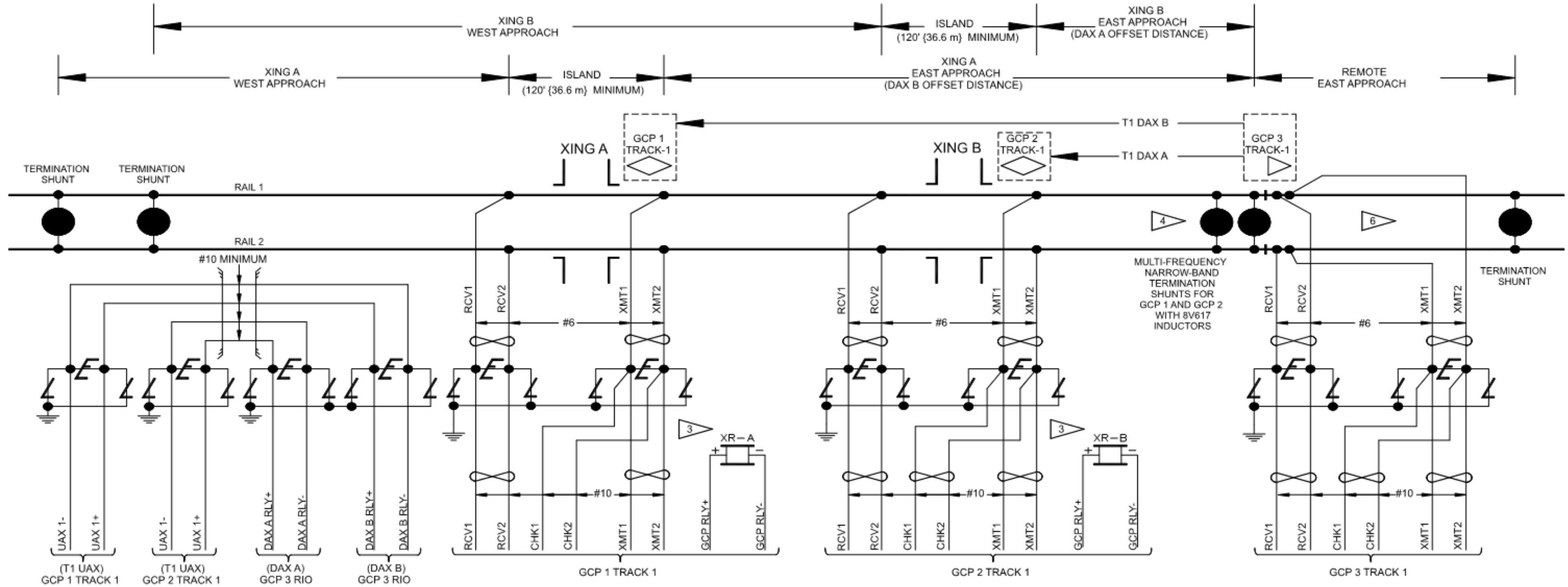
WHEN ANY EXTERNAL TRACK CIRCUIT EQUIPMENT SHARES TRACK WIRES WITH A MODEL 3000+ GCP TRACK CIRCUIT THAT DOES NOT HAVE AN ACTIVE INTERNAL ISLAND FOR THAT TRACK CIRCUIT OR OUTPUT, SUCH AS A DAX OR PRIME PREDICTION OFFSET, THEN THE TRACK CIRCUIT EQUIPMENT MUST BE CONNECTED IN ACCORDANCE WITH PARAGRAPH 1.5.8

LEGEND

= TWIST TWO TURNS PER FOOT
= 02270-1X EQUALIZER, H.D.
= 02585-1X ARRESTER, H.D.
= BIDIRECTIONAL GCP
= UNIDIRECTIONAL GCP

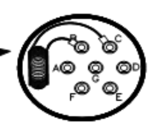
13-04_1TR_REM_PRDN_W_ADV_PREEPMTION
11-22-13

Figure 1-17 Single Track, Remote Prediction with Advanced Preemption



NOTES

1. ALL WIRING #16 AWG MINIMUM UNLESS OTHERWISE NOTED. WIRE SIZES SHOWN ARE MINIMUM GAUGE.
2. TERMINATION SHUNTS MAY BE HARDWARE, WIDEBAND, OR NARROW-BAND DEPENDING ON TYPE OF TRACK CIRCUIT IN USE.
3. XR SHOWN FOR ILLUSTRATION ONLY.
4. A SEPARATE 62775 MULTI-FREQUENCY NARROW-BAND SHUNT MUST BE INSTALLED FOR EACH CROSSING FREQUENCY. AN 8V617 SIMULATED TRACK INDUCTOR MUST BE INSTALLED WITHIN THE NARROW-BAND SHUNT WHEN THE THE EAST APPROACH DISTANCE FOR THE CROSSING IS 90 PERCENT OR LESS OF CROSSING A WEST APPROACH DISTANCE.
5. WHEN THE MODEL 3000+ GCP OR ASSOCIATED EQUIPMENT IS WIRED INTO EXISTING CIRCUITS ENSURE THAT COMPLETE CHECKOUT OF THE EXISTING CIRCUITS IS PERFORMED.
6. MINIMUM APPROACH DISTANCE FOR REMOTE DAX IS 1000 FEET (304.8 METERS).



62775 MULTI-FREQUENCY NARROW-BAND SHUNT WITH 8V617 TRACK INDUCTOR INSTALLED (8V617 INSTALLATION SHOWN ONLY FOR ILLUSTRATIVE PURPOSES). REFER TO SECTION 7 OF THIS MANUAL.

WARNING

WHEN ANY EXTERNAL TRACK CIRCUIT EQUIPMENT SHARES TRACK WIRES WITH A MODEL 3000+ GCP TRACK CIRCUIT THAT DOES NOT HAVE AN ACTIVE INTERNAL ISLAND FOR THAT TRACK CIRCUIT OR OUTPUT, SUCH AS A DAX OR PRIME PREDICTION OFFSET, THEN THE TRACK CIRCUIT EQUIPMENT MUST BE CONNECTED IN ACCORDANCE WITH PARAGRAPH 1.5.8.

LEGEND

- = TWIST TWO TURNS PER FOOT
- = 02270-1X EQUALIZER, H.D.
- = 02585-1X ARRESTER, H.D.
- = BIDIRECTIONAL GCP
- = UNIDIRECTIONAL GCP

13-04_1T_REM_PRDN_2OVERLAPPING_BIRDN_XINGS_APPL
11-22-13

Figure 1-18 Typical Single Track, Remote Prediction for Two Overlapping Bidirectional Crossing Application

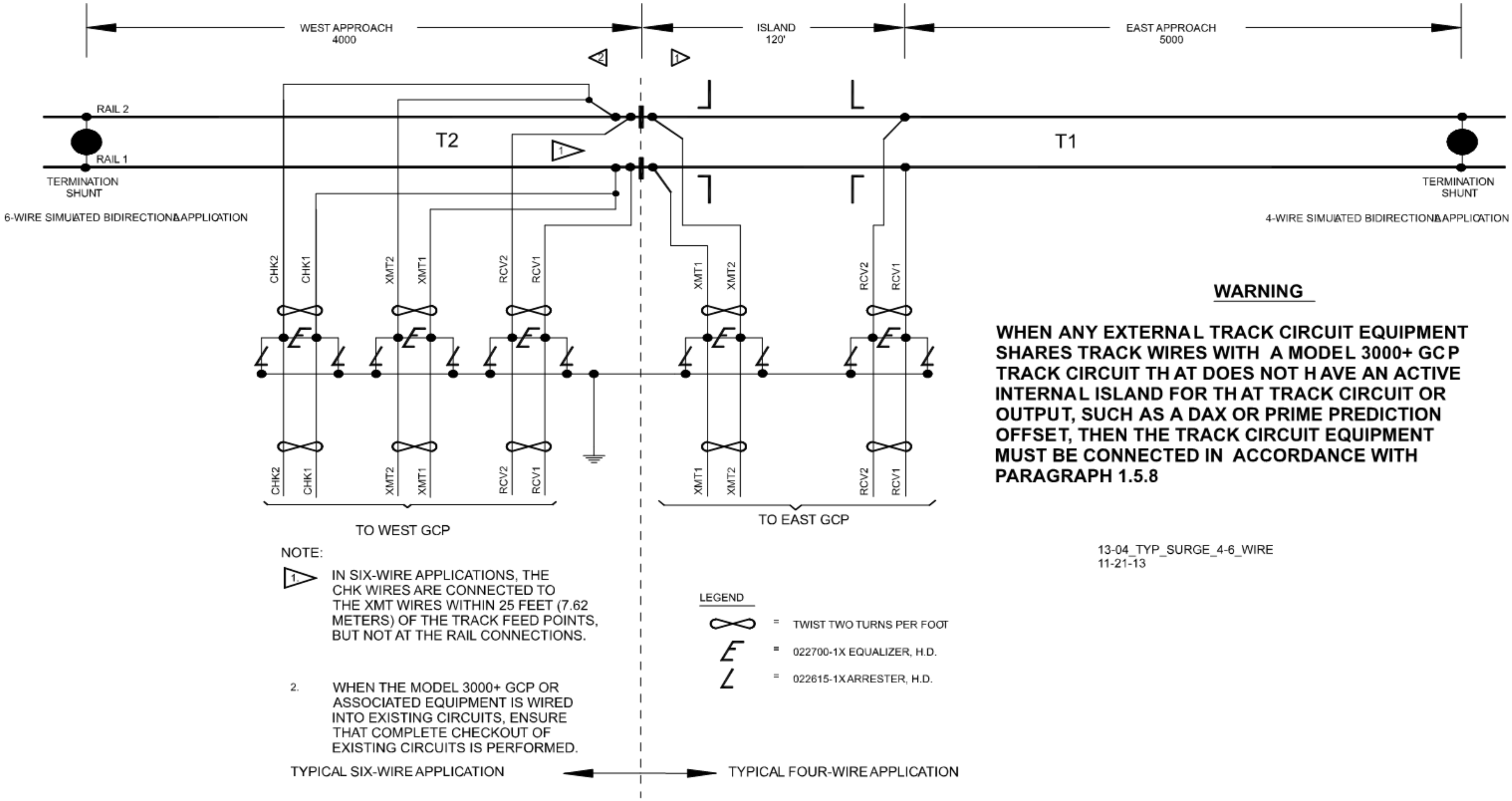


Figure 1-19   Typical Track Wire Surge Protection for 4 and 6 Wire Track Connections

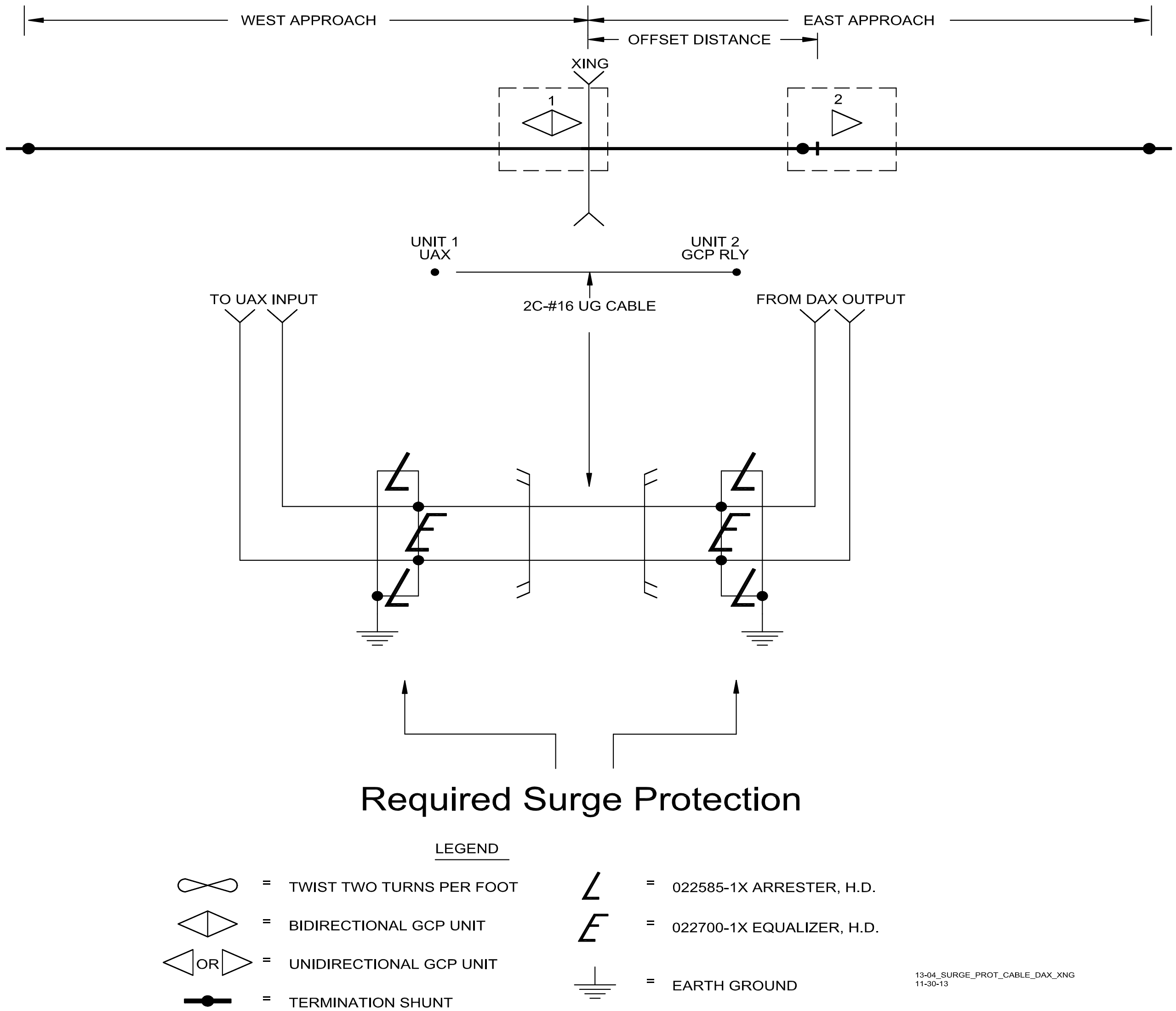


Figure 1-20 Typical Surge Protection Requirements When Cabling Between Remote DAX Unit and Crossing Unit

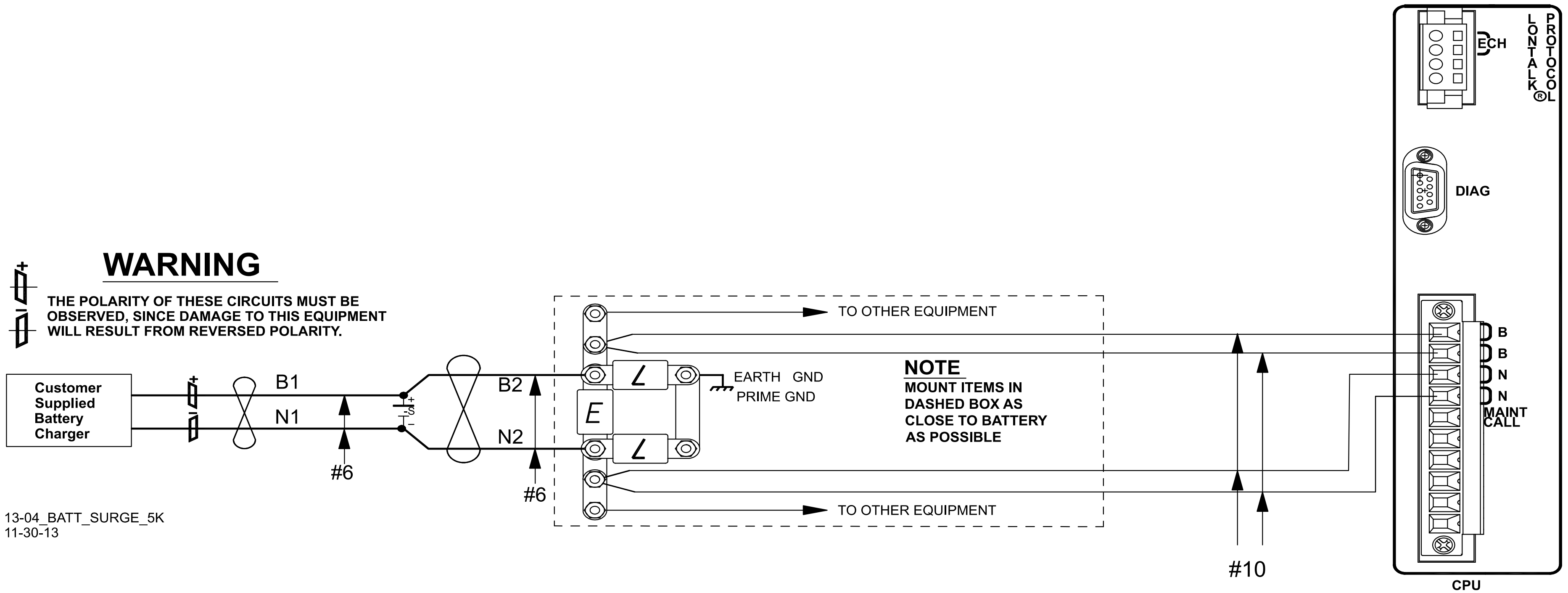


Figure 1-21   Recommended Battery Surge Protection Wiring for Model 3000+ GCP

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SECTION 2 **PRIMARY EQUIPMENT DESCRIPTION**

2.0 PRIMARY EQUIPMENT DESCRIPTION

This section contains information pertaining to the primary components that make up the Model GCP 3000+.

2.1 GENERAL PHYSICAL DESCRIPTION

Each 3000+ GCP consists of:

- a case assembly
- a motherboard
- plug-in circuit modules
- plug-in external wiring connectors

2.1.1 Case Assemblies

Each 3000+ GCP case assembly consists of:

- powder-coated steel case
- backplane-mounted motherboard

Refer to Table 2-1 for key features of each case configuration.

Table 2-1 3000+ GCP Case Feature Overview

CASE PART NO.	FEATURE				Ref Paragraph
	No. of Track Modules	Main/Standby Transfer Sys	I/O (RIO) Module	Echelon LAN Functions	
A80740	1 or 2 tracks	Yes	0, 1	Yes	2.5

2.1.2 Motherboard

The motherboard for each assembly provides:

- GCP unit wiring
- Circuit module connectors
- External Configuration Device Connector(s)
- Chassis Identification Chip socket(s)
- **DIAG** (diagnostic) port connector
- Interface connectors for external wiring connectors
- Echelon **LONTALK® PROTOCOL** LAN connector
- Ethernet connection

2.1.3 Plug-In Circuit Modules

Each 3000+ GCP plug-in circuit module is equipped with:

- dual 43-pin connector on one edge which 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

2.1.4 External Wiring Connectors and Wire Size

All external wiring to a 3000+ GCP Assembly 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 LONTALK® LAN (Echelon®) should use communication grade twisted wires of at least 20 AWG. Refer to Echelon manual (COM-00-07-09) for further information.

NOTE

NOTE
Generic spare connectors that are not keyed for specific modules may be ordered. Refer to the catalog for ordering information.

2.1.5 Wire Preparation

Strip insulation from the end of the wire as follows:

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.

2.1.6 Screw-terminal Connector Wire Insertion

Wires are secured to the screw-terminal connector as follows:

1. Insert the stripped end of a wire into the wire receptor of the connector until it stops
2. Tighten the screw to a torque of 4.5 inch pounds (0.508 Newton meters)

2.1.7 Cage-Clamp Connector Wire Insertion

Wires are secured to the cage-clamp connector as follows:

1. Place a flat bladed screwdriver in the rectangular slot in the connector next to the wire receptor (see figure below).
2. Use a screwdriver blade 0.10 in. wide and 0.020 in. thick (2.5mm x 0.5mm)
3. Lever the wire cage clamp open by pressing straight down on the screwdriver
4. Insert the stripped end of a wire into the fully-open wire receptor until it stops
5. Hold the wire in place and release the screwdriver blade pressure
6. The wire receptor closes on the stripped end of the wire

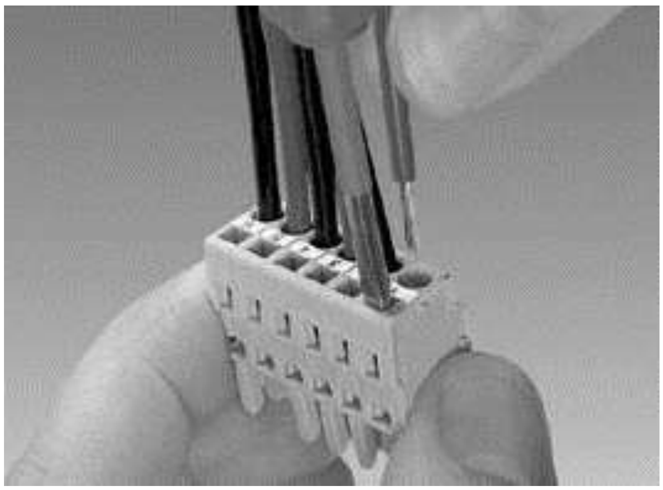


Figure 2-1 Inserting Wires

2.2 A80740 3000+ GCP CASE

The 3000+ GCP Track case is shown in Figure 2-2.

> **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.

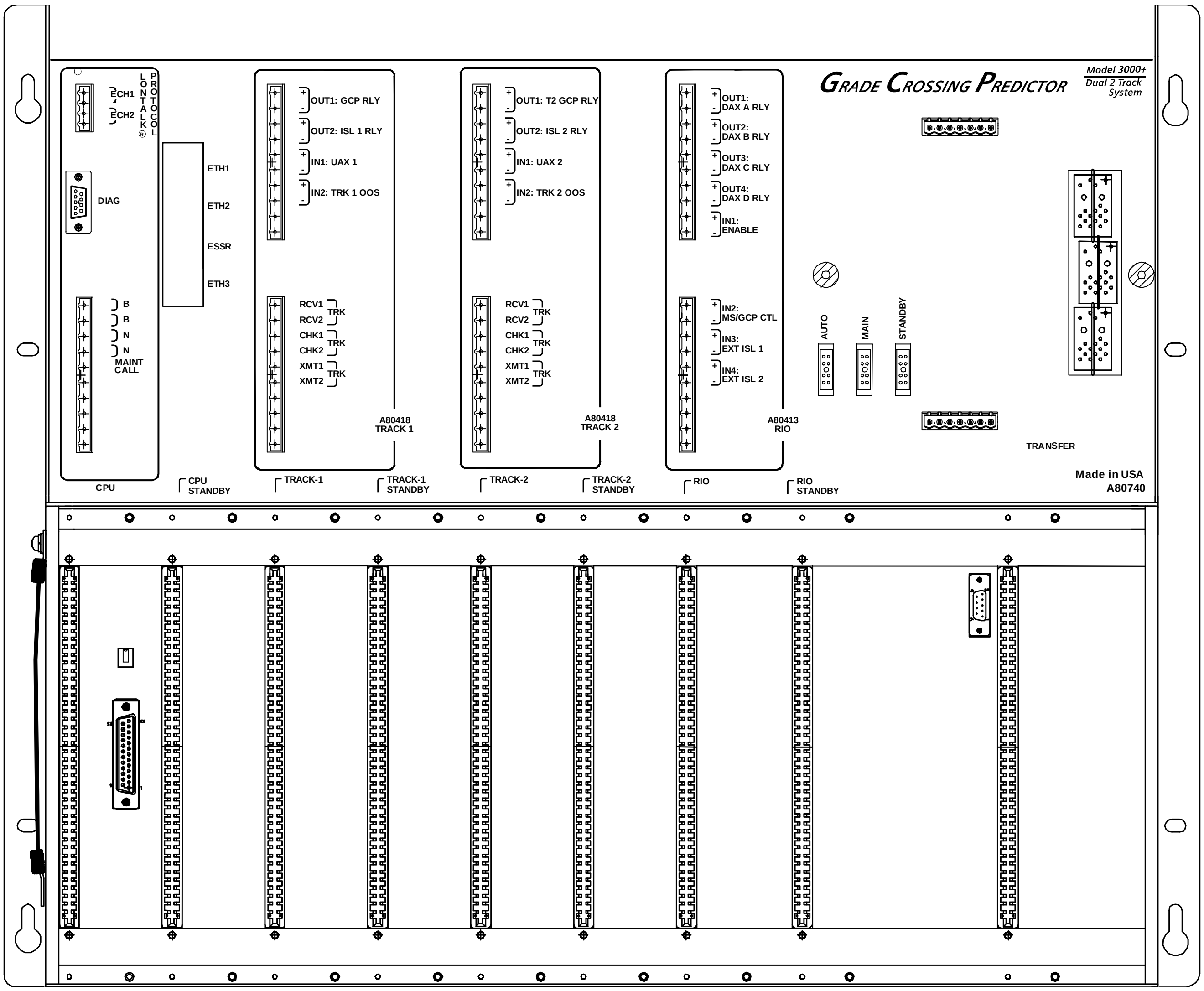


Figure 2-2 A80740 Dual Two Track Case

2.2.1 3000+ Case Modules and Subassembly

The A80740 case with the following modules installed is shown in Figure 2-3:

- Two Central Processor Unit modules in slot positions M1 and M2
- Four A80418 Track modules in slot positions M3 – M6
- Two A80413 RIO modules in slot positions M7 and M8
- A80485 Display Module in slot position M9
- A80468 Transfer module located in the center of the top connector interface panel (slot position M11)

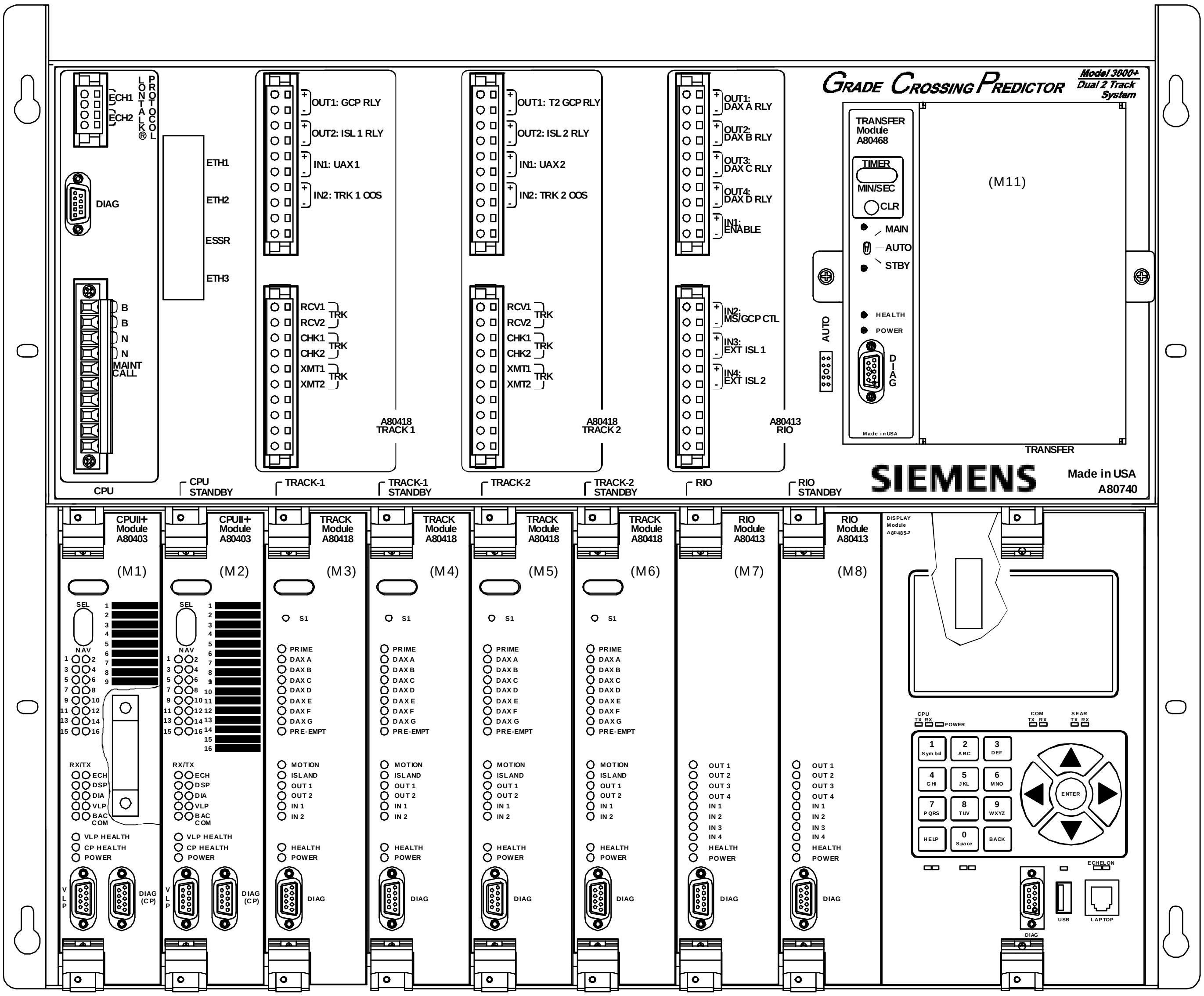


Figure 2-3 A80740 Case with Modules Installed

During normal operation, power is applied to the module set selected from the A80468 Transfer assembly (see paragraph 2.3.5).

Power is applied to the main module set when the A80468 is set to MAIN.

Power is applied to the standby module set when the A80468 is set to STBY.

Power is initially applied to the main modules when the A80468 is set to AUTO and is automatically transferred to the standby modules when a main module failure is detected.

Refer to paragraph 2.3.6 for selecting Transfer Interval Time and section 2.3.7 for details on how to use the 3000+ GCP without the transfer module.

Backup (standby) modules are not provided for the:

1. A80485 Display module assembly
2. A80468 Transfer assembly

2.2.2 Interface Connector to Module Relationship

The relationship between the interface connectors and the modules is shown in Table 2-2.

Table 2-2 Module to Interface Connector Relationship

MODULE	SLOT POSITION	INTERFACE CONNECTOR
A80403 or A80903	M1	CPU
A80403 or A80903	M2	CPU Standby
A80418	M3	Track-1
A80418	M4	Track-1 Standby
A80418	M5	Track-2
A80418	M6	Track-2 Standby
A80413	M7	RIO
A80413	M8	RIO Standby
A80485	M13	Display
A80468	M11	Transfer

2.2.3 External Wiring Connectors

The external wiring connectors for the case are shown in Figure 2-4 and described in Table 2-3.

Table 2-3 External Wiring Connectors

Ref No.	Connector Description	Connector Designation	Siemens Part No.
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		Upper **Track-2**	Z715-02101-0002
4	Keyed 10-pin cage clamp, female	Upper RIO	
5	Keyed 10-pin cage clamp, female	CPU	Z715-02101-0007
6	Keyed 10-pin cage clamp, female	Lower **Track-1**	Z715-02101-0008
7		Lower **Track-2**	Z715-02101-0009
8	Keyed10-pin cage clamp, female	Lower RIO	

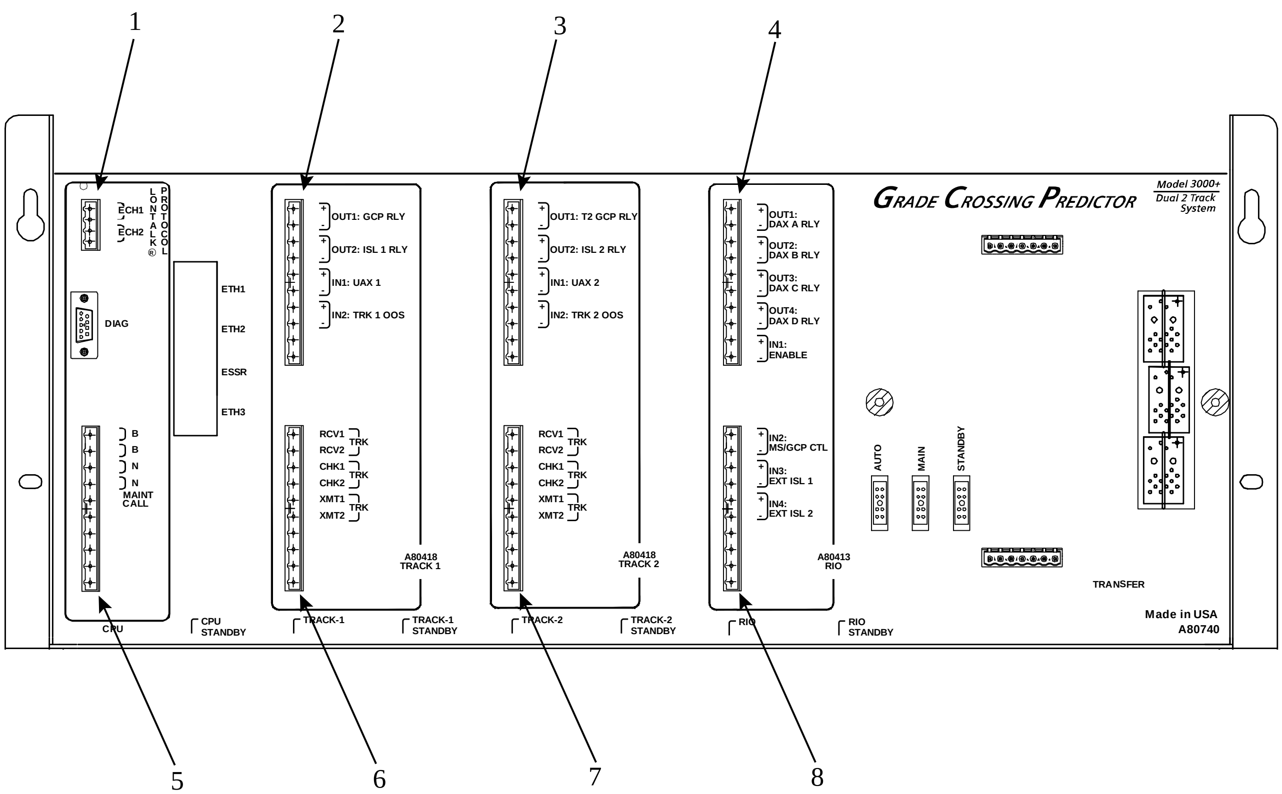


Figure 2-4 External Wiring Connectors

2.3 PLUG-IN MODULES AND SUBASSEMBLIES

2.3.1 CPU Modules, A80403 (CPU II+) and A80903 (CPU III)

The A80403 CPU II+ or A80903 CPU III modules are central processing units that:

- provide all vital logic processing functions for all 3000+ GCP chassis
- control GCP LAN and non-vital serial communications
- interface with front panel CPU connectors

2.3.1.1 CPU II+ Module User Interface

The CPU II+ front panel is shown in Figure 2-5. The CPU II+ user interface is described in Table 2-4. (Refer to Section 7.1 for diagnostics and troubleshooting).

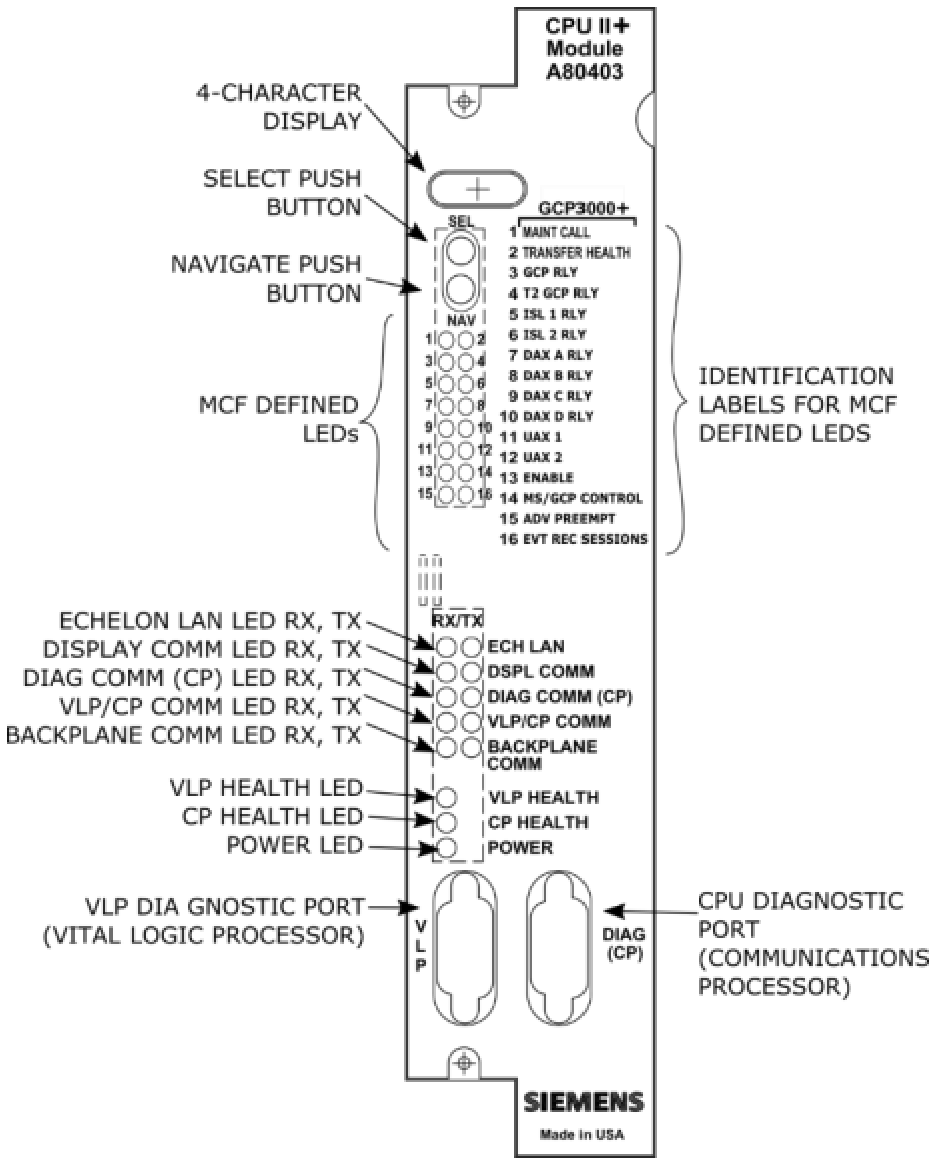


Figure 2-5 CPU II+ Front Panel

2.3.1.2 CPU III Module User Interface

The CPU III front panel is shown in Figure 2-6. The CPU III user interface is described in Table 2-4. (Refer to Section 7.1 for diagnostics and troubleshooting).

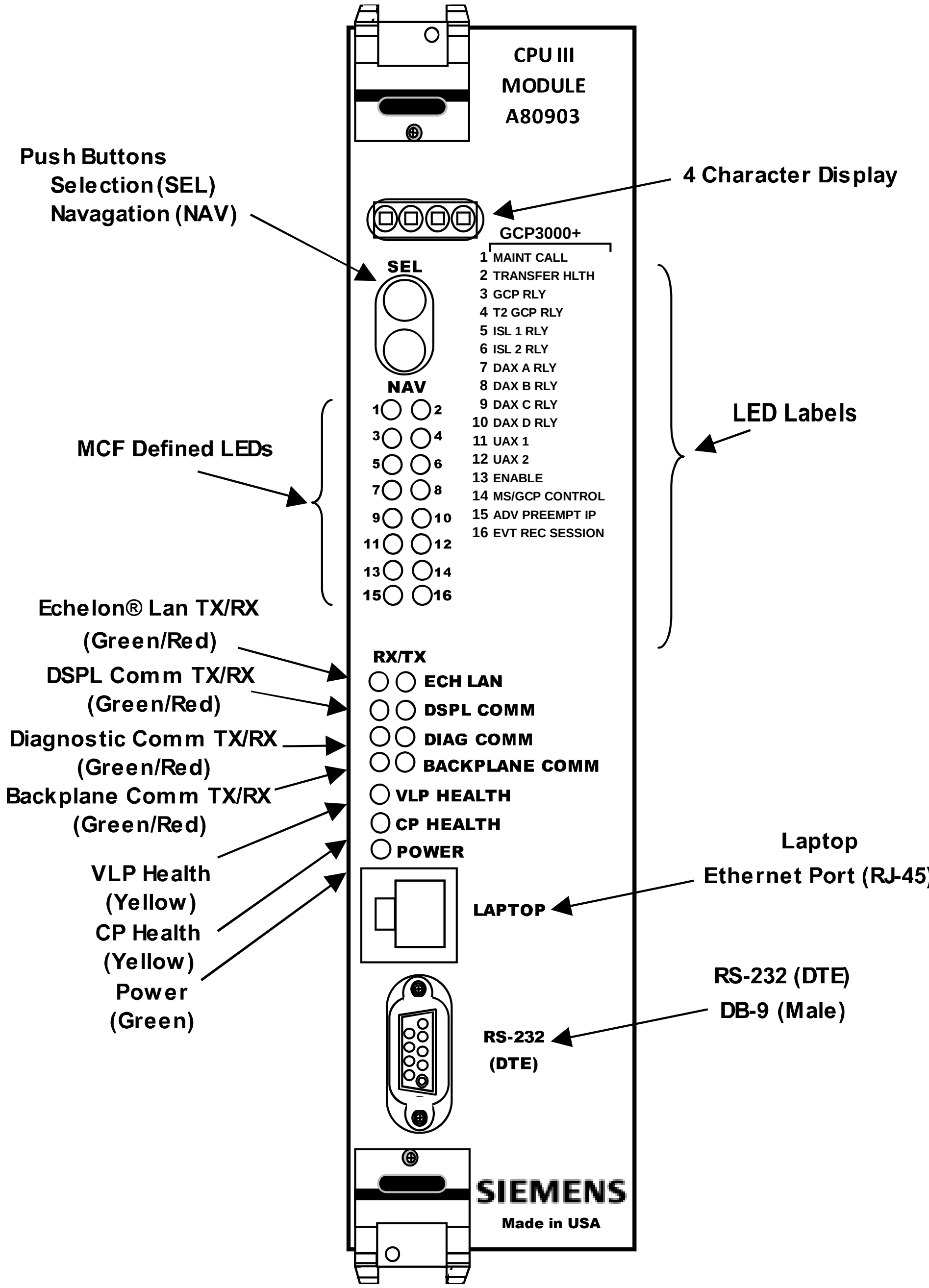


Figure 2-6 CPU III Front Panel

Table 2-4 CPU User Interface

Component	Function		
4-Character Display	Displays alphanumeric representation of currently selected function menu item. (Refer to Table 7-9 for diagnostic messages.)		
Select Push Button (SEL)	Used to select menu items displayed on 4-Character Display.		
Navigate Push Button (NAV)	Used to select an available function menu.		
16 MCF Defined LEDs	**Color**	**Function**	**Indication**
1 (MAINT CALL)	Red	Maintenance Call: see maintenance call logic section	On – maintenance call output on Off – maintenance call output off
2 (TRANSFER HEALTH)	Red	Transfer Output: see transfer output section	On – transfer signal is being generated, transfer cards should not be counting down Off- transfer signal is not being generated, if transfer card is in AUTO it should be counting down
3 (GCP RLY)	Red	GCP RLY output state	On – GCP RLY is energized Off – GCP RLY is de-energized
4 (T2 GCP RLY)	Red	Track 2 GCP RLY output state	On – Track 2 GCP RLY output is energized Off – Track 2 GCP RLY output is de-energized or Not Used
5 (ISL 1 RLY)	Red	Island 1 Relay output state	On – Island 1 is unoccupied or Island 1 is not used Off – Island 1 is occupied
6 (ISL 2 RLY)	Red	Island 2 Relay output state	On – Island 2 is unoccupied or Island 2 is not used Off – Island 2 is occupied
7 (DAX A RLY)	Red	DAX A Relay output state	On – DAX A RLY output is energized or DAX A RLY is not used Off – DAX A RLY output is de-energized
8 (DAX B RLY)	Red	DAX B Relay output state	On – DAX B RLY output is energized or DAX B RLY is not used Off – DAX B RLY output is de-energized

16 MCF Defined LEDs	Color	Function	Indication
9 (DAX C RLY)	Red	DAX C Relay output state	On – DAX C RLY output is energized or DAX C RLY is not used Off – DAX C RLY output is de-energized
10 (DAX D RLY)	Red	DAX D relay output state	On – DAX D RLY output is energized or DAX D RLY is not used Off – DAX D RLY output is de-energized
11 (UAX 1)	Red	Track 1 UAX input state	On – Track 1 UAX input is energized or Track 1 UAX input is not used Off – Track 1 UAX input is de-energized
12 (UAX 2)	Red	Track 2 UAX input state	On – Track 2 UAX input is energized or Track 2 UAX input is not used Off – Track 2 UAX input is de-energized
13 (ENABLE)	Red	Enable input state	On – Enable input is energized or not used (i.e. RIO not used) Off – Enable input is de-energized
14 (MS/GCP CONTROL)	Red	MS/GCP Control input state	On – MS/Control input is energized or not used (i.e. RIO not used or Advance Preemption used) Off – MS/Control input is de-energized
15 (ADV PREEMPT IP)	Red	ADV Preempt Control Input state	On – Advance Preemption input is energized or not used (i.e. RIO not used or Advance Preemption input is de-energized and Advance Preemption is used
16 (EVT REC SESSION)	Red	External Event recorder session state	On – external event recorder is in session or no external event record used Off – external event recorder is used but not in session

Component	Function
ECH LAN LEDs	**TX** flashes red when the CPU is transmitting an ATCS message via the **LONTALK® LAN**. **RX** flashes green when the CPU is receiving an ATCS message via the **LONTALK® LAN**.
DSPL COMM LEDs	**TX** flashes red when the CPU is transmitting data to the Display Panel. **RX** flashes green when the CPU is receiving data from the Display Panel.

Component	Function
DIAG COMM (CP) LEDs	**TX** flashes red when the CPU is transmitting data on the communications processor diagnostic (**DIAG CP**) serial port.
	RX flashes green when the CPU is receiving data from the communications processor diagnostic (**DIAG CP**) serial port.
VLP/CP COMM LEDs (CPU II+ Only)	**TX** flashes red when the Vital Logic Processor (VLP) is transmitting data to the Communications Processor (CP).
	RX flashes green when the Vital Logic Processor (VLP) is receiving data from the Communications Processor (CP).
BACKPLANE COMM LEDs	**TX** flashes red when the Vital Logic Processor (VLP) is sending data onto the serial bus.
	RX flashes green when the Vital Logic Processor (VLP) is receiving data from the serial bus.
VLP HEALTH LED	Flashes yellow to indicate that the Vital Logic Processor is functioning normally.
CP HEALTH LED	Flashes yellow to indicate that the Communications Processor is functioning normally.
POWER LED	Illuminates green to indicate that power is applied to the CPU module.
VLP Serial Port (CPU II+ Only)	9-pin diagnostic serial port for Vital Logic Processor.
DIAG (CP) Serial Port (CPU II+ Only)	9-pin diagnostic serial port for Communications Processor.
LAPTOP (CPU III Only)	Ethernet port for WebUI access, or for communication via Ethernet cable from Display Laptop port.
RS-232 (DTE) (CPU III Only)	9-pin serial port for configuration management of modules via WebUI.

NOTE

NOTE

The state of LEDs 1-16 are chosen so that in a normal healthy 3000+ GCP, with the GCP RLY output energized, all 16 LEDS will be on. If an LED is off, it will either represent an input or output that is currently in use is de-energized, or an unhealthy condition exists.

2.3.2 Track Module, A80418

The A80418 Track module performs the predictor and island train detection functions.

GCP frequency can be any frequency listed in Table 2-5.

Island circuit frequency can be any of fourteen frequencies listed in Table 2-5.

Vital I/O functions:

- Two isolated vital inputs
- Two isolated vital outputs

Table 2-5 Frequencies

Standard Track Frequencies:	86, 114, 156, 211, 285, 348, 430, 525, 645, 790, and 970 Hz
Offset Track Frequencies:	85.5, 86.5, 87, 113, 113.5, 114.5, 115, 155, 155.5, 156.5, 157, 210, 212, 284, 286, 347, 349, 429, 431, 523, 527, 643, 647, 788, 792, 968, and 972 Hz
Other Track Frequencies: **(for compatibility with other manufacturer's equipment and for areas where power line interference is a problem)**	44, 45, 46, 141, 149, 151, 237, 239, 249, 250, 267, 326, 392, 452, 522, 560, 630, 686, 753, 816, 881, 979, 999 Hz
Island Frequencies:	2.14, 2.63, 3.24, 4.0, 4.9, 5.9, 7.1, 8.3, 10.0, 11.5, 13.2, 15.2, 17.5, or 20.2 kHz

2.3.2.1 Track Module Front Panel

The Track module front panel is shown is Figure 2-7. The user interface is described in Table 2-6.

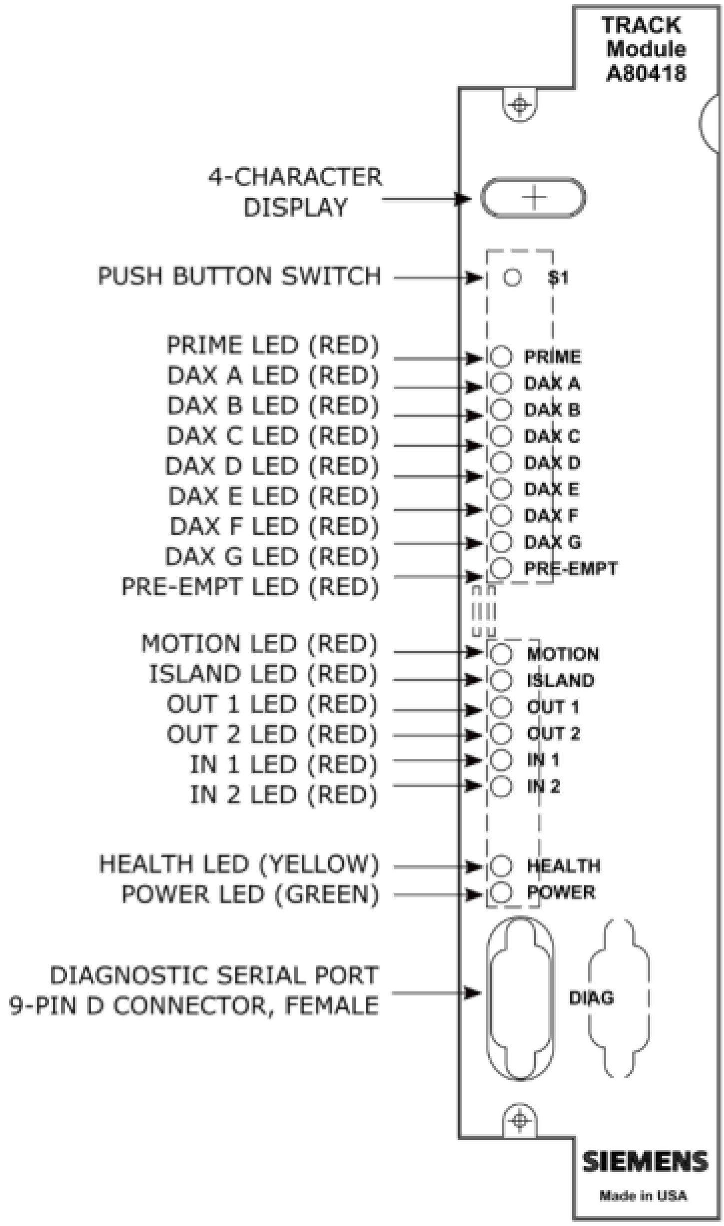


Figure 2-7 Track Module Front Panel

NOTE

NOTE
The track module is common with 4000 GCP, MS4000 and 5000 GCP systems. Some functions are not applicable when used in the 3000+ GCP.

Table 2-6 Track Module User Interface

Component	Function
4-Character Display	Displays module, track status, and diagnostic messages. Refer to: Table 7-7, Normal Messages Table 7-8, Calibration Messages Table 7-9, Diagnostic Messages
S1 Push Button Switch	Freezes scrolling parameters.
PRIME LED (red)	On – Prime predictor is energized Off – Prime predictor is de-energized or not used Flashing – Prime predictor is running the programmed pickup delay See note [1]
DAX A – DAX D LEDS (red)	On – DAX A predictor is energized Off – DAX A predictor is de-energized or not used Flashing – DAX A predictor is running its pickup delay See note [2]
DAX E – DAX G LEDS (red)	These are not used in the 3000+ GCP and will be off
PRE-EMPT LED (red)	This is not used in the 3000+ GCP and will be off
MOTION LED (red)	On – GCP has not detected motion Off – GCP has detected motion
ISLAND LED (red)	On – Internal Island is used and unoccupied Off – Internal Island is not used or Internal Island is occupied Flashing – Island is running its pickup delay See note [3]
OUT 1 LED (red)	On – output energized Off – output de-energized Flashes – output unhealthy
OUT 2 LED (red)	On – output energized Off – output de-energized Flashes – output unhealthy

Component	Function
IN 1 LED (red)	On – input energized Off – input de-energized or not used
IN 2 LED (red)	On – input energized Off – input de-energized or not used
HEALTH LED (yellow)	Slow (1Hz) – module is healthy and communicating with CPU Fast (2Hz) – module is healthy but not communicating with the CPU Very Fast (4Hz) – module is unhealthy and communicating with CPU
POWER LED (green)	LED is on steady when power is applied to the module
DIAG Serial Port	9-pin diagnostic serial port for Track module

NOTE

The Prime predictor LED on a track module represents the state of the Prime prediction process from that track module. It does not represent the state of the final GCP RLY (or T2 GCP RLY) output. The track's Prime prediction process is an input into the final GCP RLY / T2 GCP RLY output state. To see the actual state of the GCP RLY / T2 GCP RLY output look at CPU Module LEDs 3 and 4 respectively.

NOTE

The DAX predictor LED on a track module represents the state of the DAX prediction process from that track module. They do not represent the state of the final DAX RLY output. The track's DAX prediction process is an input into the final DAX RLY output state. To see the actual state of the DAX RLY output look at CPU Module LEDs 7-10.

NOTE

The ISLAND LED on a track module represents the occupancy state from the internal island on that module. It does not represent the state of the final ISL RLY output. If the internal island is not being used the ISLAND LED will be off. To see the actual state of the ISL RLY output look at CPU Module LEDs 5-6.

2.3.3 RIO Module, A80413

The A80413 RIO module provides four isolated vital inputs and four isolated vital outputs.

The I/O functions have predefined functions in the 3000+ GCP.

2.3.3.1 RIO Module User Interface

The RIO module front panel is shown in Figure 2-8 and the user interface is described in Table 2-7.

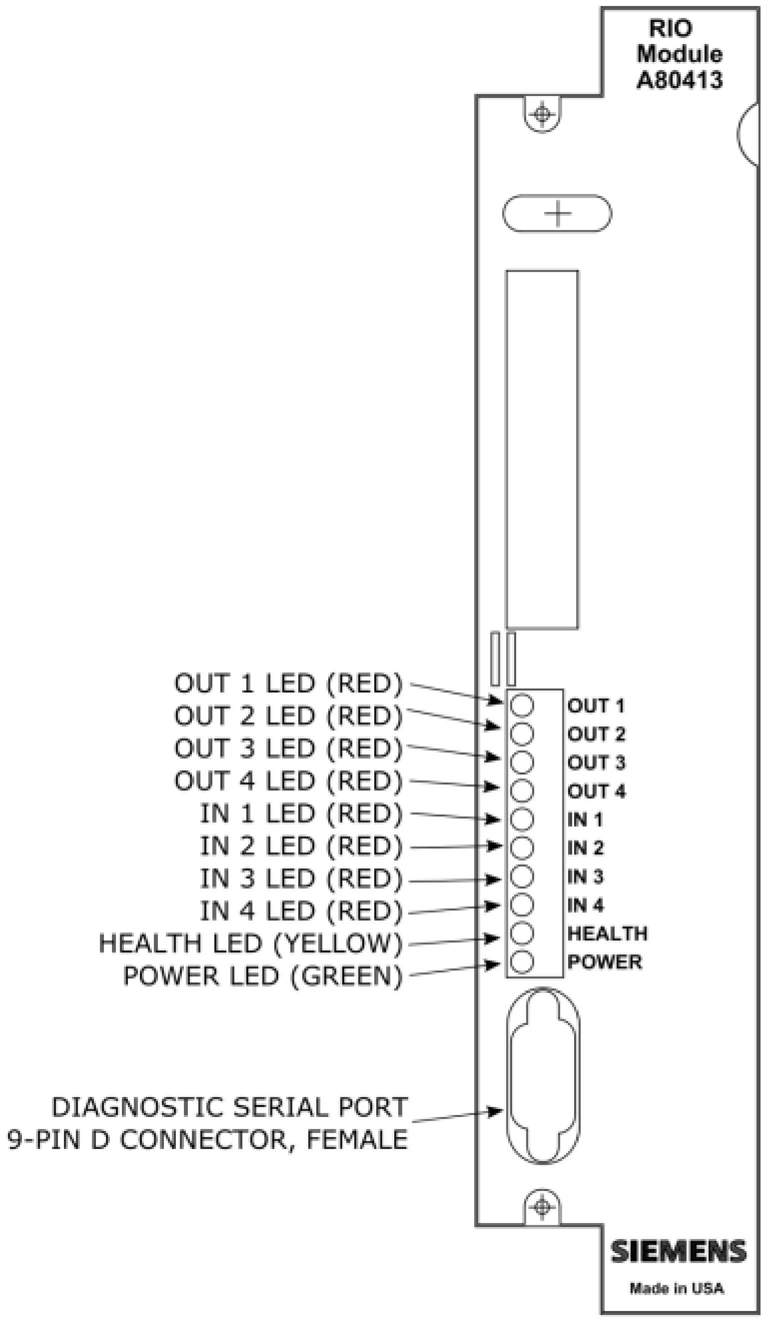


Figure 2-8 RIO Module Front Panel

Table 2-7 RIO Module User Interface

Component	Function
OUT 1 LED (red)	On – DAX A RLY output is energized. Flashes when output is unhealthy.
OUT 2 LED (red)	On – DAX B RLY output is energized. Flashes when output is unhealthy.
OUT 3 LED (red)	On – DAX C RLY output is energized. Flashes when output is unhealthy
OUT 4 LED (red)	On – DAX D RLY output is energized. Flashes when output is unhealthy.
IN 1 LED (red)	On – ENABLE input is energized.
IN 2 LED (red)	On – MS/GCP Control input is energized.
IN 3 LED (red)	On – External Island 1 input is energized.
IN 4 LED (red)	On – External Island 2 input is energized.
HEALTH LED (yellow)	Slow (1Hz) – module is healthy and communicating with CPU Fast (2Hz) – module is healthy but not communicating with the CPU Very Fast (4Hz) – module is unhealthy and communicating with CPU
POWER LED (green)	LED is on steady when power is applied to the module.
DIAG Diagnostic Serial Port	9-pin diagnostic serial port for RIO module.

2.3.4 Display Module, A80485-1

The A80485-1 display module, Figure 2-9, provides a touch-screen display to allow:

- Configuration programming
- Application programming
- Calibration programming
- System diagnostics
- System parameter display
- Track status display

The display module is reset by actuation of the RESET push button switch.

NOTE

NOTE

Refer to Section 7.6, for detailed instructions on the Display module.

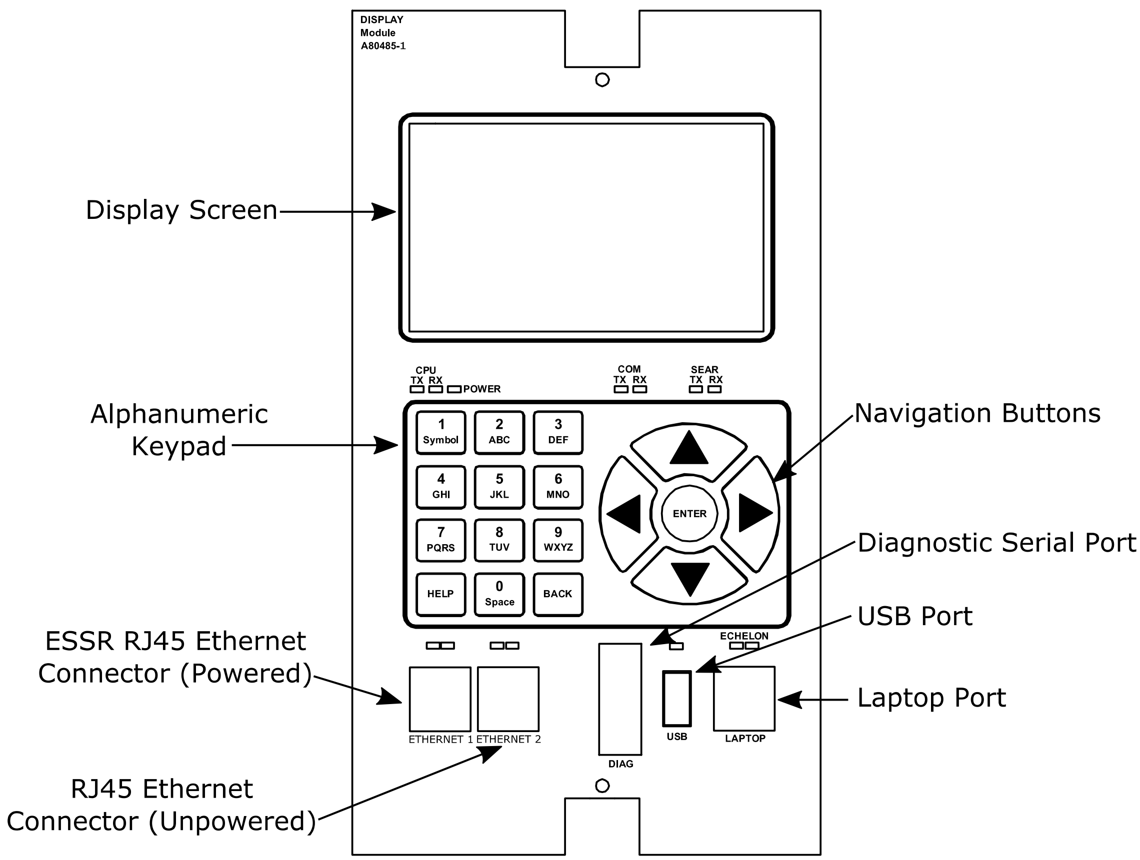


Figure 2-9 Display Module

2.3.5 Transfer Assembly, A80468

The A80468 Transfer assembly provides operational switchover from the main modules to the standby GCP modules when main module failure is detected. Switchover occurs after a set transfer delay interval.

NOTE

NOTE

The standby modules are powered off and disconnected from the interface connectors until switchover occurs.

2.3.5.1 Transfer Assembly User Interface

The Transfer assembly front panel is shown in Figure 2-10. The user interface is described in Table 2-8.

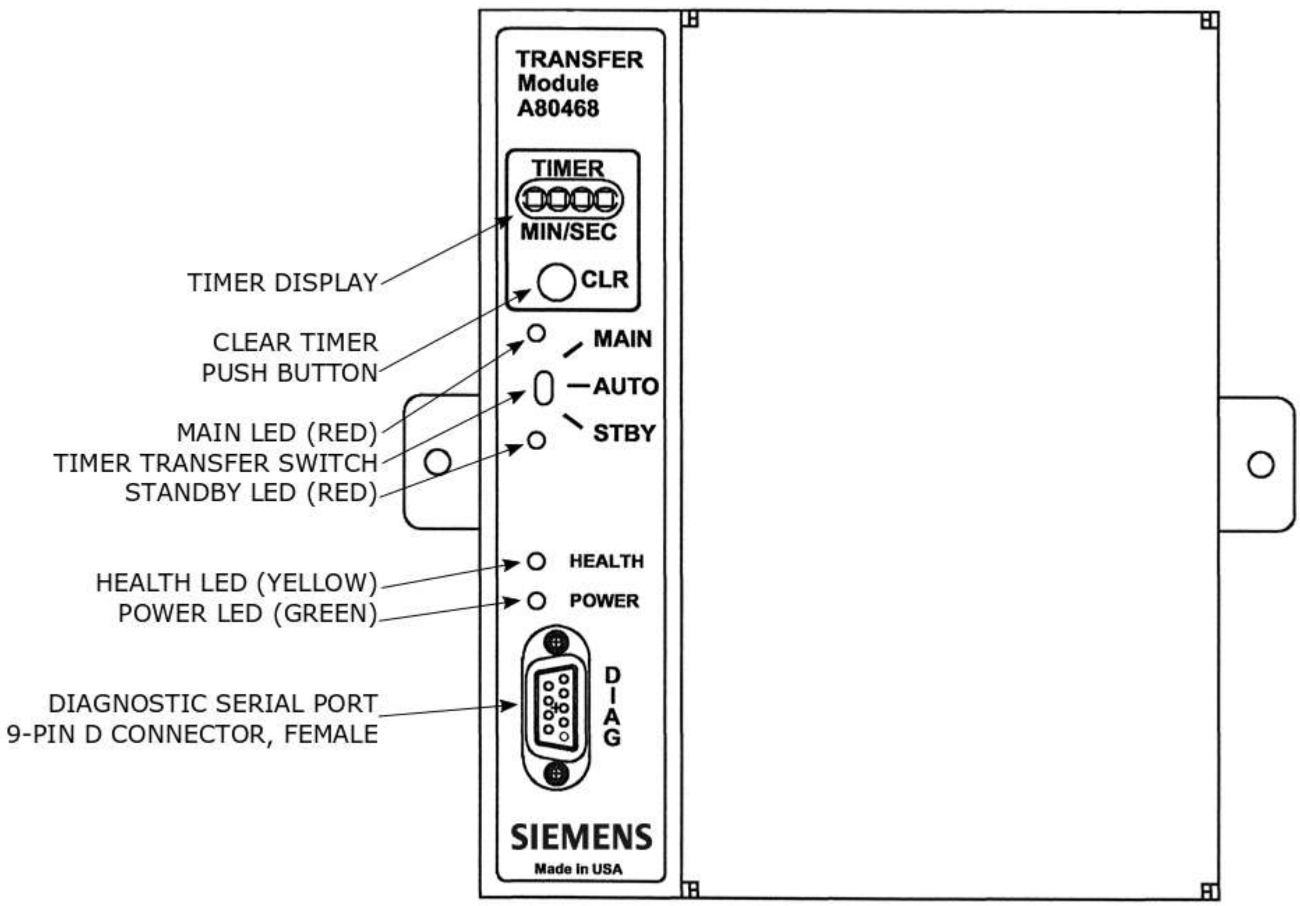


Figure 2-10 Transfer Assembly Front Panel

Table 2-8 Transfer Module User Interface

<table>
<tr><th>Component</th><th>Function</th></tr>
<tr><td>Timer Display</td><td>When transfer delay is set using the DIP switch (S3), the TIMER Display:
1. Shows the set transfer delay in minutes and seconds
2. Shows transfer timer delay count down in one second increments</td></tr>
<tr><td>CLR (Clear Timer) push button</td><td>Clears transfer delay time from the counter. When pressed during timer countdown:
• Sets the timer to the selected Transfer Delay Interval
• Initiates immediate transfer of GCP operation to opposite modules</td></tr>
<tr><td>MAIN LED (red)</td><td>On when:
• Main modules are enabled while the Transfer Timer Switch is set to AUTO
• Or Timer Transfer Switch is set to MAIN position</td></tr>
<tr><td>Time Transfer Switch</td><td>Three-position toggle switch:
• MAIN position enables only main module operation and will not automatically transfer.
• AUTO position enables automatic switch over to opposite set of modules:
    o Transfers from main modules to standby modules when main module failure is detected, or transfers from standby modules to main modules when standby module failure is detected.
• STBY position enables only standby module operation and will not automatically transfer. To switch from one set of modules (MAIN or STBY) to the other set of modules <u>when the transfer time is not counting down</u>, move the switch from AUTO to the desired position (MAIN or STBY) then return switch to AUTO.</td></tr>
<tr><td>STANDBY LED (red)</td><td>On when:
Standby modules are enabled while Transfer Timer Switch is set to AUTO
Timer Transfer Switch is set to STBY position</td></tr>
<tr><td>HEALTH LED (yellow)</td><td>Flashes to indicate that the Transfer module is functioning normally</td></tr>
<tr><td>POWER LED (green)</td><td>LED is on steady when power is applied to the Transfer module.</td></tr>
<tr><td>DIAG Diagnostic Port</td><td>9-pin diagnostic serial port for Transfer module</td></tr>
</table>

NOTE

NOTE

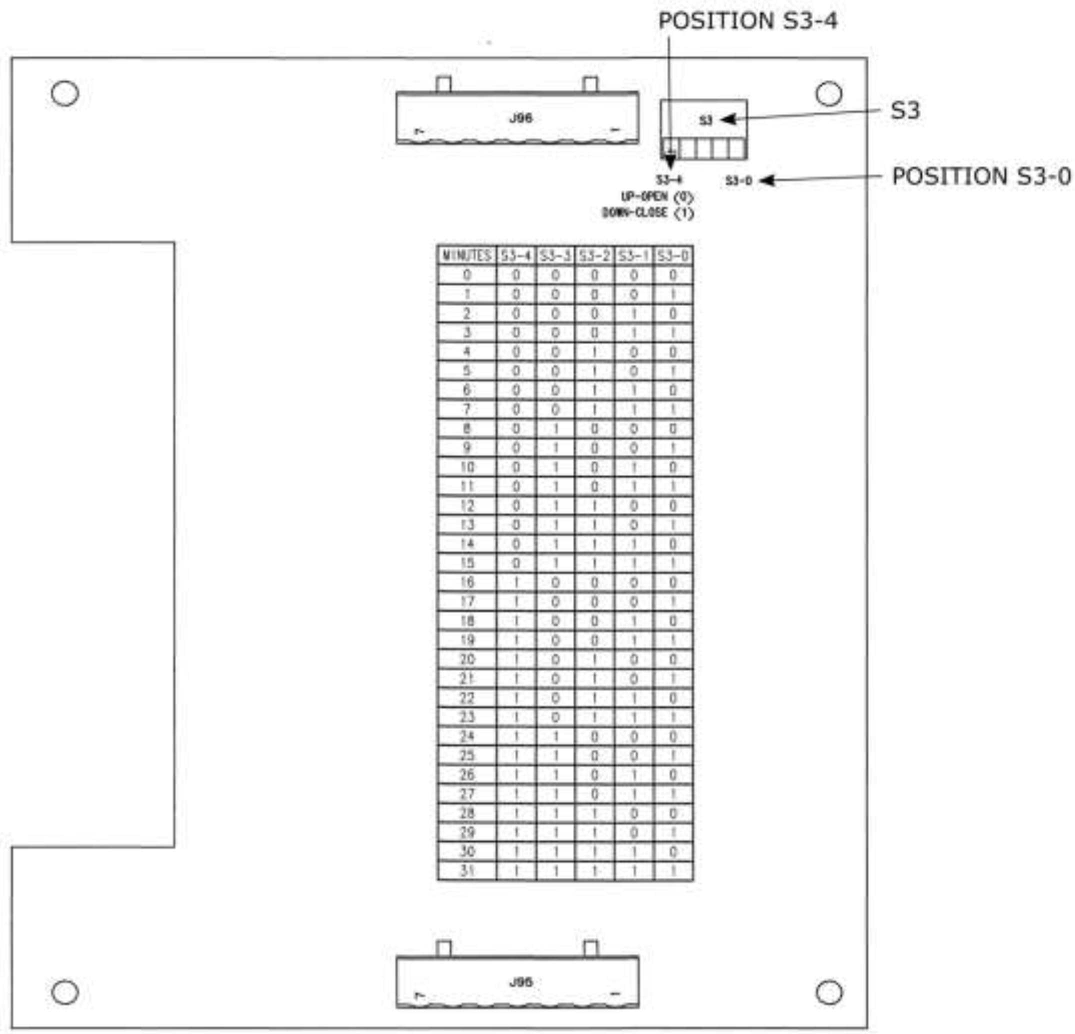
1. A switchover interval ranging from 1 to 31 minutes is selectable from the Transfer module.
   a. The module is set at the factory for a switchover delay of three minutes.
2. During the switchover period, the crossing gates, lights, and bells are activated.

2.3.6 Transfer Interval Selection

The transfer time interval is preset in the factory for three minutes and normally does not require any change. A shorter time than three minutes is not recommended. If a longer time is desired, the interval time is selected by means of DIP switch S3 located on the Transfer Module.

The transfer timer interval is selected by means of DIP switch S3 located on the back of the A80468 Transfer Module as shown in Figure 2-11.

- The module is accessible by removing the mounting screws on either side of the A80468 assembly and unplugging the unit from the front of the Model +3000 GCP case.
- The switch levers of S3 are set to the positions designated in Table 2-9 to obtain the required delay time (see Figure 2-11).



MINUTES	S3-4	S3-3	S3-2	S3-1	S3-0
0	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
4	0	0	1	0	0
5	0	0	1	0	1
6	0	0	1	1	0
7	0	0	1	1	1
8	0	1	0	0	0
9	0	1	0	0	1
10	0	1	0	1	0
11	0	1	0	1	1
12	0	1	1	0	0
13	0	1	1	0	1
14	0	1	1	1	0
15	0	1	1	1	1
16	1	0	0	0	0
17	1	0	0	0	1
18	1	0	0	1	0
19	1	0	0	1	1
20	1	0	1	0	0
21	1	0	1	0	1
22	1	0	1	1	0
23	1	0	1	1	1
24	1	1	0	0	0
25	1	1	0	0	1
26	1	1	0	1	0
27	1	1	0	1	1
28	1	1	1	0	0
29	1	1	1	0	1
30	1	1	1	1	0
31	1	1	1	1	1

Figure 2-11   Transfer Module Assembly, A80468, S3 Switch Position

Table 2-9 Transfer Delay Interval Table (for S3 on A80468 Module Assembly)

MINUTE S S3-0	S3-0	S3-1	S3-2	S3-3	S3-4
0	0	0	0	0	0
1	1	0	0	0	0
2	0	1	0	0	0
3	**1**	**1**	**0**	**0**	**0**
4	0	0	1	0	0
5	1	0	1	0	0
6	0	1	1	0	0
7	1	1	1	0	0
8	0	0	0	1	0
9	1	0	0	1	0
10	0	1	0	1	0
11	1	1	0	1	0
12	0	0	1	1	0
13	1	0	1	1	0
14	0	1	1	1	0
15	1	1	1	1	0
16	0	0	0	0	1
17	1	0	0	0	1
18	0	1	0	0	1
19	1	1	0	0	1
20	0	0	1	0	1
21	1	0	1	0	1
22	0	1	1	0	1
23	1	1	1	0	1
24	0	0	0	1	1
25	1	0	0	1	1
26	0	1	0	1	1
27	1	1	0	1	1
28	0	0	1	1	1
29	1	0	1	1	1
30	0	1	1	1	1

0 = OPEN

1 = CLOSED

Bold = DEFAULT

2.3.7 Operation without Transfer Module Assembly, A80468

To disable the A80468 Transfer Module Assembly, remove the module from the chassis, then move the fuse from the terminal labeled AUTO and insert it into the fuse terminal for the side that is to be powered, either MAIN or STANDBY (see Figure 2-12).

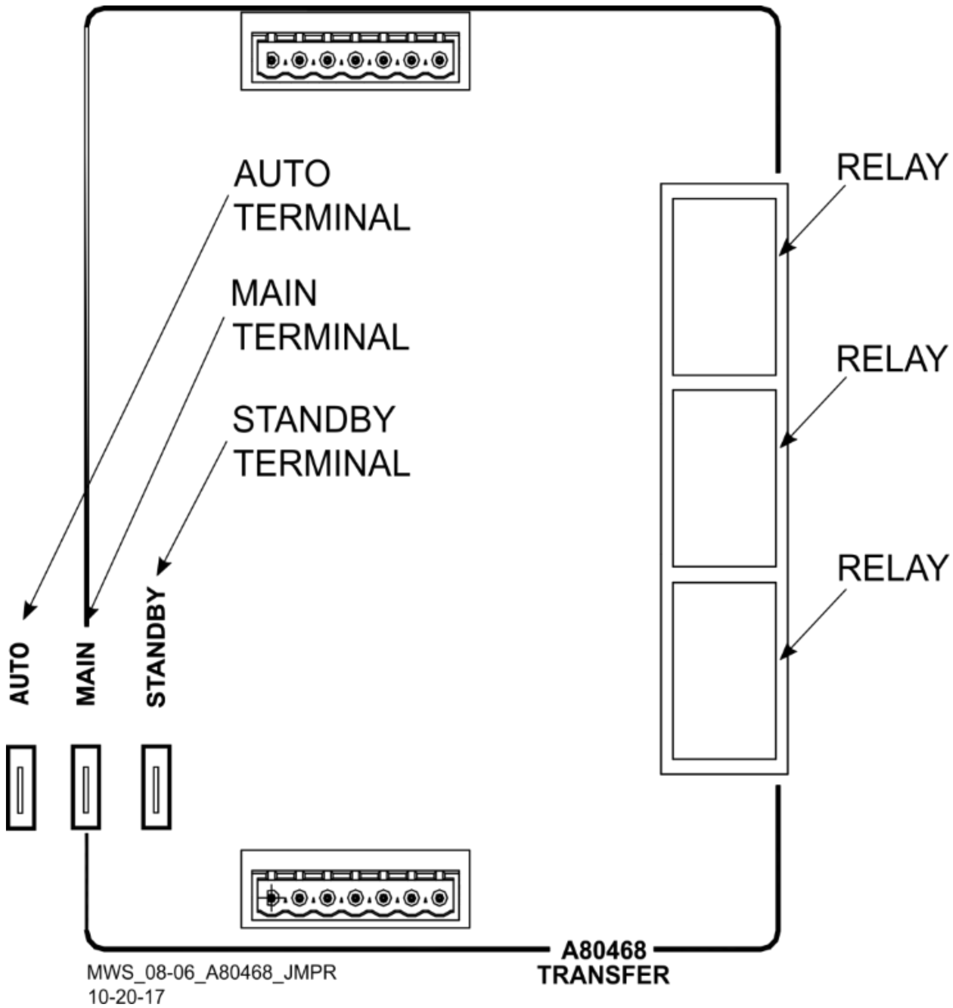


Figure 2-12 Transfer Module (A80468) Jumper Positions

2.3.8 External Configuration Device (ECD) A80435

The ECD is a factory installed plug-in device on the 3000+ GCP backplane (see Figure 2-13). The ECD stores the module configuration file (MCF) application program for the 3000+ GCP. Both the Main and the Standby CPU Modules copy the MCF from the ECD. Used for vital system operation.

WARNING

IF AN ECD IS REPLACED WITH AN ECD CONTAINING A DIFFERENT MCF, THE GCP WILL COPY THE NEW MCF INTO THE FLASH ON THE CPU MODULES AND SET THE SYSTEM BACK TO DEFAULT VALUES.

2.3.9 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 3000+ GCP backplane (Figure 2-13). The USB ECD stores the display's non-vital configuration data for the 3000+ GCP. This is used for non-vital functions only.

2.3.10 Chassis Identification Chip (CIC)

The CIC is:

- A non-volatile memory chip
- Installed adjacent to the ECD on the GCP backplane (see Figure 2-13).

Each CIC stores site specific information for both Main and Standby vital operations.

WARNING

IF THE CIC IS REPLACED, THE USER MUST SET THE SYSTEM BACK TO DEFAULTS AND REPROGRAM THE SYSTEM. FAILURE TO DO THIS COULD RESULT IN THE SYSTEM RUNNING WITH THE WRONG CONFIGURATION FOR THE SITE.

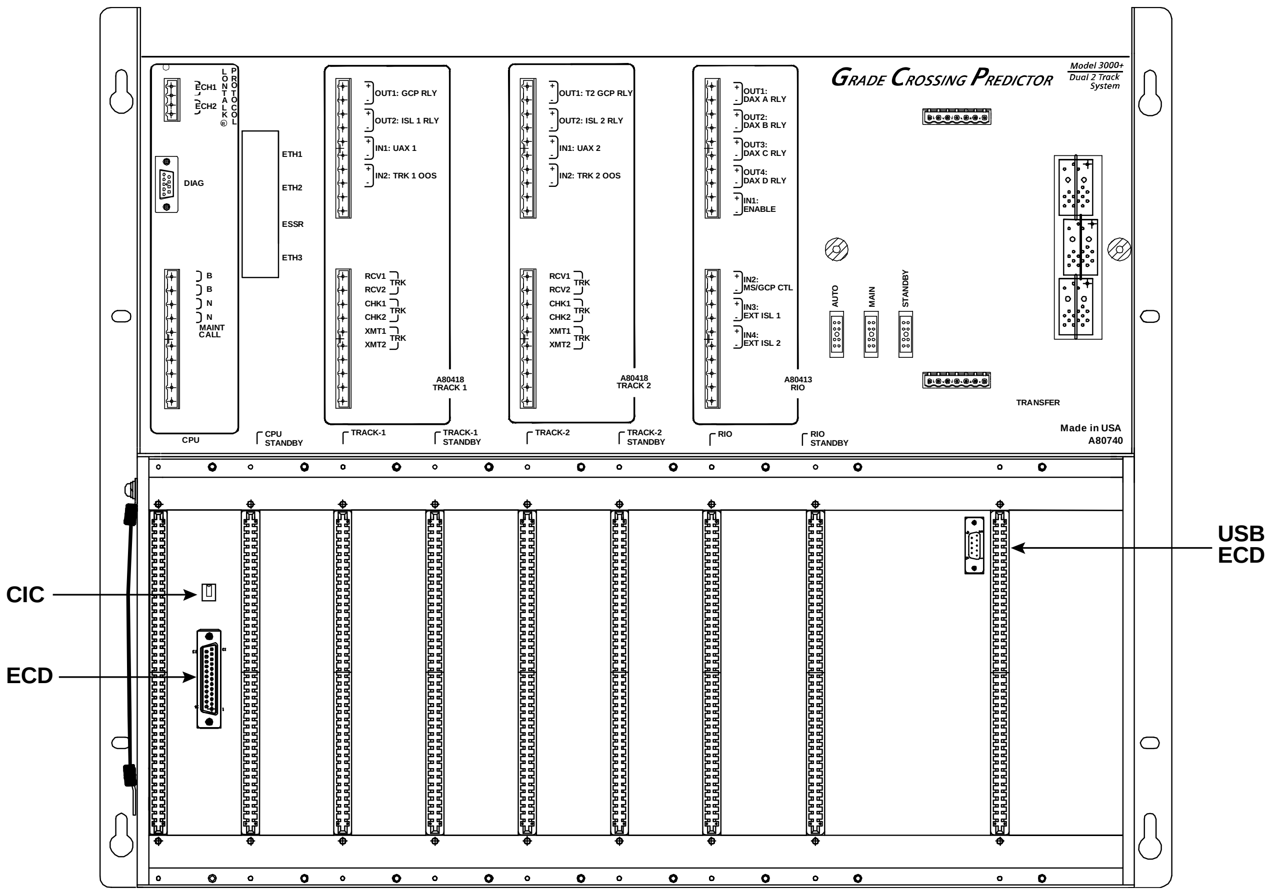


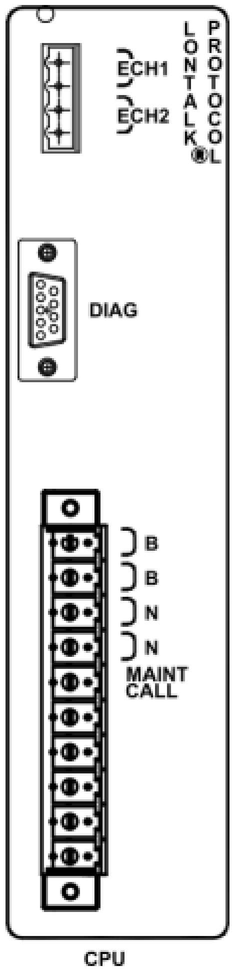
Figure 2-13 Typical ECD & CIC Locations on Backplane

2.3.11 Interface Connector Functions

The Model 3000+ GCP interface connector functions are described in Table 2-10 through Table 2-13.

2.3.11.1 CPU Connectors

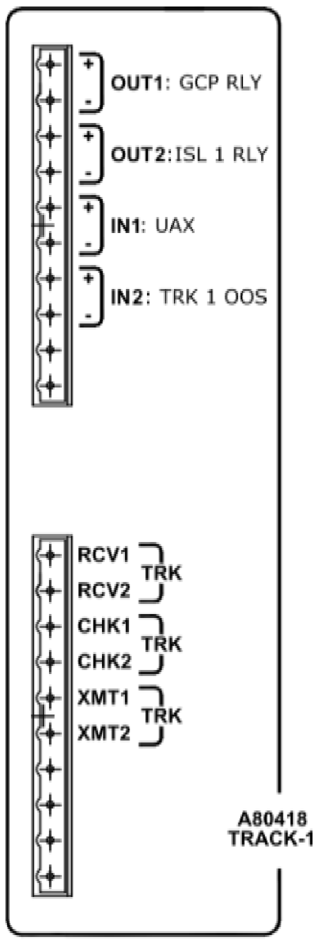
Table 2-10 CPU Connectors



Connector	Pinout	Function
LONTALK® PROTOCOL	**ECH1**	LAN Twisted pair
	ECH2	LAN Twisted pair
DIAG	**2**	DT_TX
	3	DT_RX
	5	GROUND
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 GCP, the maintenance call output is held at the Battery N voltage level, causing the lamp to light. • When a problem is detected within the GCP, the voltage is removed and the lamp is extinguished.

2.3.11.2 Track 1 Connectors

Table 2-11 Track 1 Connectors



TRACK-1

Connector	Pinout*		Function
TRACK-1	+	GCP RLY	GCP RLY for 3000+ (see note)
	-		
	+	ISL 1 RLY	Island relay output for track 1
	-		
	+	UAX 1	UAX input for track 1
	-		
	+	TRK 1 OOS	Out of service input for track 1
	-		
	+		Not used in 3000+ GCP
	-		
	TRK RCV1		Receiver input from track
	TRK RCV2		
	TRK CHK1		Check input from track
	TRK CHK2		
	TRK XMT1		Transmit output to track
	TRK XMT2		

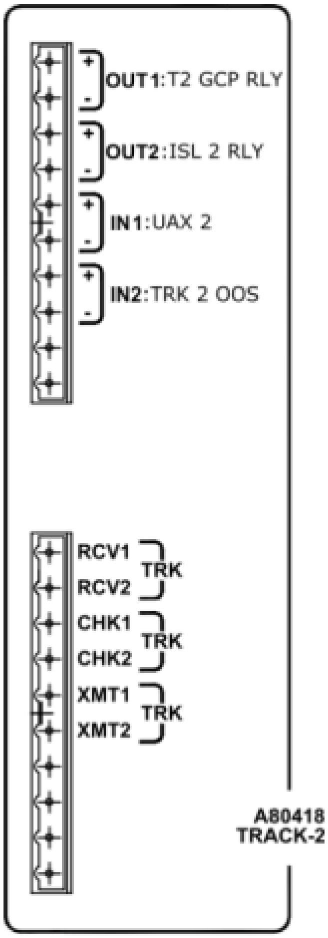
NOTE

NOTE

The GCP RLY output combines the track prime predictors from both track 1 and track 2 (if track 2 is used).

2.3.11.3 Track 2 Connectors

Table 2-12   Track 2 Connectors



TRACK-2

Connector	Pinout*		Function
TRACK-2	+	T2 GCP RLY	Track 2 GCP RLY for 3000+ (see note)
	-		
	+	ISL 2 RLY	Island relay output for track 2
	-		
	+	UAX 2	UAX input for track 2
	-		
	+	TRK 2 OOS	Out of service input for track 2
	-		
	+		Not used in 3000+ GCP
	-		
	TRK RCV1		Receiver input from track
	TRK RCV2		
	TRK CHK1		Check input from track
	TRK CHK2		
	TRK XMT1		Transmit output to track
	TRK XMT2		

NOTE

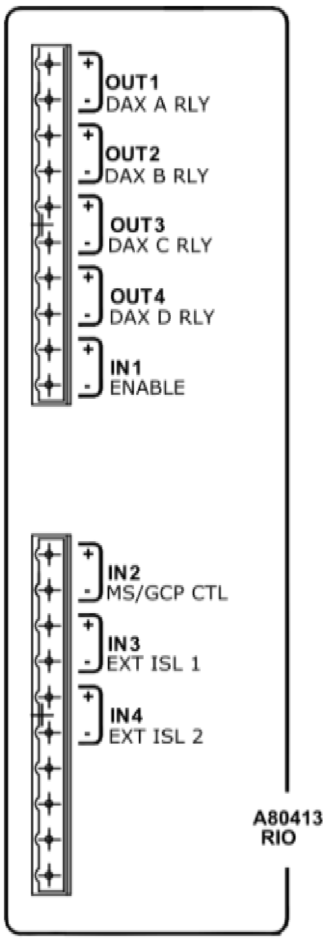
NOTE

The T2 GCP RLY output is the prime output for just track 2.

2.3.11.4 RIO Connectors

The RIO Modules is an optional module on the 3000+ GCP and provides additional vital inputs and outputs. This module is required if DAX or DAX Preempt outputs, Enable, MS/GCP control, or external islands are used in the application.

Table 2-13 RIO Connectors



RIO

Connector	Pinout*		Function
RIO	+	**DAX A RLY**	DAX A Relay output
	-		
	+	**DAX B RLY**	DAX B Relay output
	-		
	+	**DAX C RLY**	DAX C Relay output
	-		
	+	**DAX D RLY**	DAX D Relay output
	-		
	+	**ENABLE**	Enable input
	-		
	+	**MS/GCP CTRL**	MS/GCP CTRL input
	-		
	+	**EXT ISL 1**	External island 1 input
	-		
	+	**EXT ISL 2**	External island 2 input
	-		

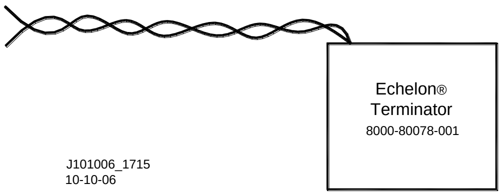
2.4 LAN COMMUNICATIONS

Each 3000+ GCP communicates with other Siemens equipment, such as the SEAR or Argus, via the LONTALK® LAN (Echelon®). Refer to Echelon manual (COM-00-07-09) for further information.

2.4.1 Rules for Using Echelon® LAN

- Wire size required is from #22AWG to #16AWG, in a stranded twisted pair.
- Each connection (node) must be wired in a daisy chained bus configuration, no drops allowed (see Figure 2-14).
- Maximum wiring length of LAN bus wiring is 425 feet (130m) 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 feet (16m) of cable. If necessary, additional cable may be added so that no more than 8 nodes are located within any 53 foot length. If additional connections are required, contact Siemens Technical Support for assistance.
- In general, the Echelon® network requires a terminator for proper data transmission



- The Echelon network can be connected to ECH1 on the 3000+ GCP
- The Echelon terminator can be connected to ECH2 on the 3000+ GCP
- Order Network Echelon Termination Unit, P/N: 8000-80078-001

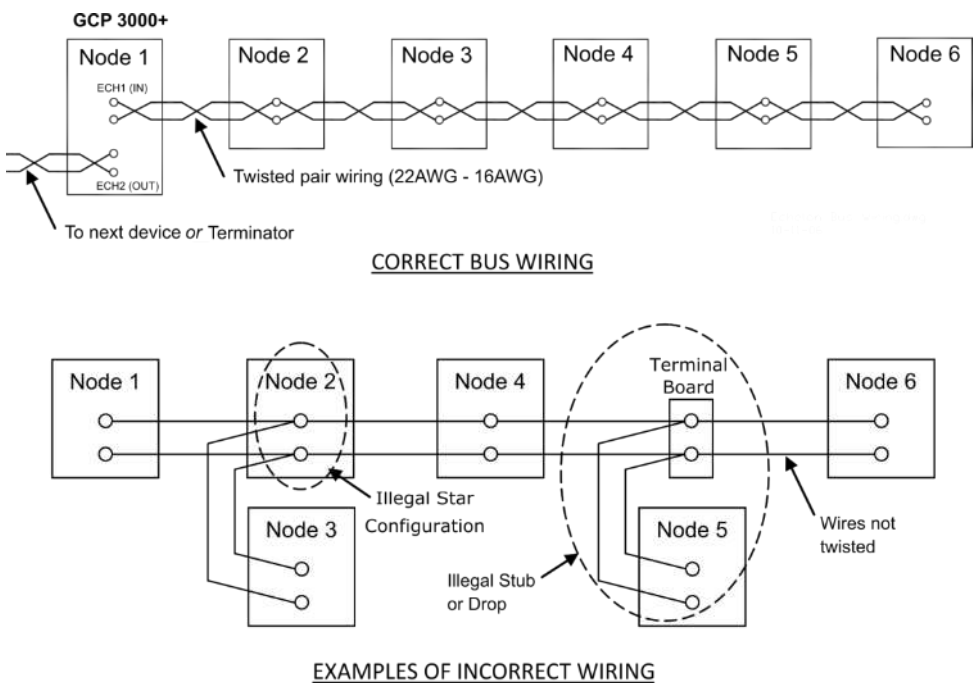


Figure 2-14   LAN Bus Wiring

CAUTION
BECAUSE THE ECHELON® INTERFACE IS NOT SURGE PROTECTED, NETWORK CONNECTIONS MUST BE RESTRICTED TO THE EQUIPMENT CONTAINED INSIDE A SIGNAL CASE OR BUNGALOW.

NOTE
For additional information concerning the Echelon® LAN, contact Siemens Technical Support.

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SECTION 3 **AUXILIARY EQUIPMENT**

3.0 GENERAL

The equipment described in this section can be used with the Model 3000+ GCP. Where applicable, installation and adjustment information is provided.

3.1 AUXILIARY EQUIPMENT COVERED

The following equipment is covered in this section:

- Bidirectional Simulation Coupler, 62664-Mf
- DC Shunting Enhancer Panel, 80049
- Narrow-band Shunt, 62775-f
- Narrow-band Shunt, 62780-f
- Multi-frequency Narrow-band Shunt, 62775-XXXX
- Multi-frequency Narrow-band Shunt, 62780-XXXX
- Wideband Shunt, 8A076A
- Simulated Track Inductor, 8V617
- Adjustable Inductor Assembly, 8A398-6
- Track Circuit Isolation Device
- Steady Energy DC Track Circuits
- Battery Chokes, 62648 & 8A065A
- Siemens GEO Electronic DC Coded System
- ElectroCode Genrakode™ Electronic DC Coded Track System
- Relay Coded DC Track
- DC Code Isolation Unit, 6A342-1
- DC Code Isolation Unit, 6A342-3
- AC Code Isolation Units
- 60 Hz AC Code Isolation Unit, 8A466-3
- 100 Hz AC Code Isolation Unit, 8A470-100
- 180 Hz AC Code Isolation Unit, 8A471-180
- Tunable Insulated Joint Bypass Coupler, 62785-f
- MS/GCP Termination Shunt Burial Kit, 627767-46
- Surge Panels, 80026-XX
- Rectifier Panel Assembly, 80033
- Cable Termination Panel Assembly, 91042

CAUTION

THE DEVICES DESCRIBED HERE MUST BE MOUNTED IN WEATHERPROOF ENCLOSURES UNLESS STATED OTHERWISE.

NOTE

NOTE

Some equipment shown may no longer be available and is displayed for informational purposes only.

3.2 BIDIRECTIONAL SIMULATION COUPLER, 62664-MF

Bidirectional Simulation allows the Model 3000+ GCP to use bidirectional rules while connected to a set of non-bypassed insulated joints.

WARNING

WARNING

When a Model 3000+ GCP is connected in a six-wire configuration (two receiver wires, two transmit wires, and two check wires) as shown in Figure 3-2, the bidirectional simulation coupler must be connected to the check (CHK) wires, not to the transmit (XMT) wires. If the coupler is connected to the transmit wires, an open transmitter track wire cannot be detected and can, therefore, adversely affect the GCP operation; however, in standard four-wire simulated bidirectional installations; it is permissible to connect the coupler to the two transmitter track leads as shown.

This condition exists for six-wire applications using bidirectional simulation equipment which is located in the case/bungalow (not at the tracks) regardless of which of the following types of simulated track load is used:

1. bidirectional simulation coupler (62664 mf),
2. single-frequency narrow-band shunt (62775 mf) used in conjunction with adjustable inductor (8a398 6), or
3. multi-frequency narrow-band shunt (62775 or 62780) equipped with simulated track inductor (8v617 distance).

In standard four-track wire simulated bidirectional installations, it is permissible to connect the simulated bidirectional load to the two transmitter track leads in the bungalow as shown in Figure 3-2.

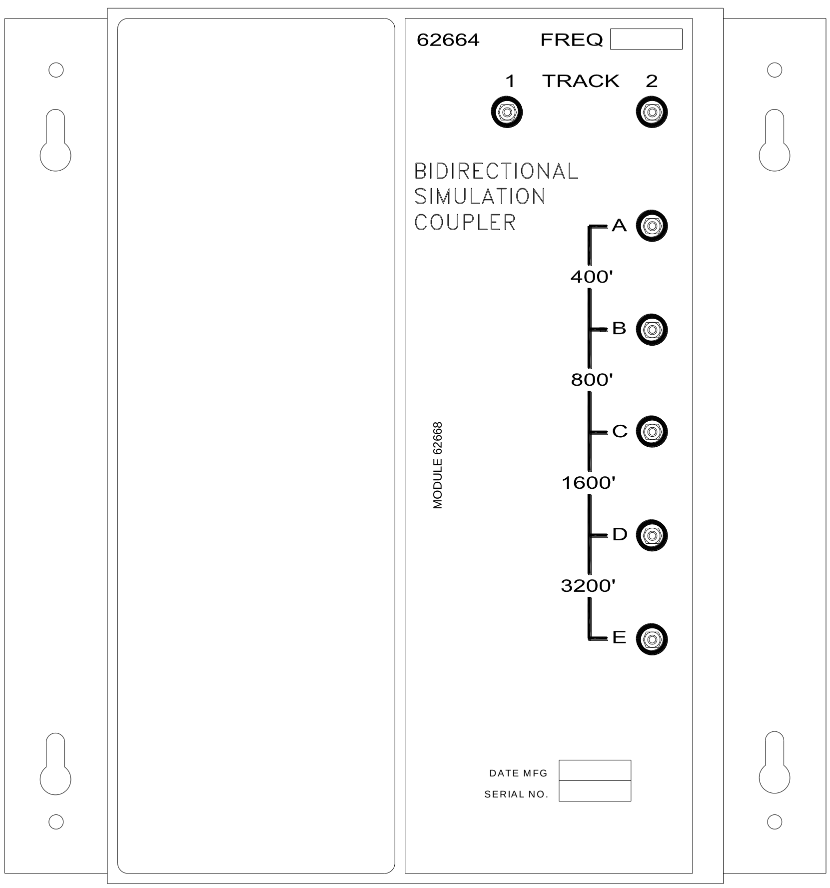
Low ballast resistance effectively reduces approach distances to a greater degree in unidirectional Model 3000+ GCP installations than in bidirectional installations.

- Although the Model 3000+ GCP is operated unidirectionally while DAXing, a technique referred to as bidirectional simulation can be applied to a unidirectional installation to obtain the operating benefits of a bidirectional application.
- A unidirectional Model 3000+ GCP can provide a DAX start for an adjacent street, as well as other unidirectional functions, while operating as a simulated bidirectional GCP (GCP must be programmed for bidirectional operation).

The 62664 bidirectional simulation coupler must not be used as a termination shunt.

The 62664 plug-in module frequency must be the same as the GCP frequency.

When the coupler is used, the corresponding GCP track must be programmed for “Bidirnl.”



13-04_BIRDN_SIM_CPLR
12-09-13

Figure 3-1   Bidirectional Simulation Coupler, 62664-MF

3.2.1 Simulated Bidirectional Coupler Configuration

The 62664 Bidirectional Simulation Coupler (Figure 3-1) is a convenient, compact, shelf- or backboard-mounted unit containing:

- A narrow-band Shunt of the same frequency as the GCP
- An adjustable inductor (simulated track)

The Bidirectional Simulation Coupler is housed in a brushed aluminum case and consists of:

- A single plug-in type printed circuit board that is available in 12 fixed frequencies (Hz)
- Four series-connected, toroid-wound inductors. Each inductor simulates a specific track length and is tapped and connected to the front panel terminals.

The front panel terminals allow simulated approach distances to be selected that closely match the actual track approach:

- Approach distances ranging from 400 to 6,000 feet (122 – 1829 meters) may be selected using terminal shorting straps.
- The available simulated approach distances and the corresponding shorting strap terminal positions for the 62664 are shown in Table 3-1.

Table 3-1 Approach Distance Selection Strapping For Bidirectional Simulation Coupler, 62664-MF

DISTANCE (FT/M)	STRAP TERMINALS	DISTANCE (FT/M)	STRAP TERMINALS
400/122	B-C, C-D, D-E	3,600/1098	B-C, C-D
800/244	A-B, C-D, D-E	4,000/1220	A-B, C-D
1,200/366	C-D, D-E	4,400/1342	C-D
1,600/488	A-B, B-C, D-E	4,800/1464	A-B, B-C
2,000/610	B-C, D-E	5,200/1585	B-C
2,400/732	A-B, D-E	5,600/1707	A-B
2,800/854	D-E	6,000/1829	No Straps
3,200/976	A-B, B-C, C-D		

When a Model 3000+ GCP is connected in a six-wire configuration, the bidirectional simulation coupler must be connected to the check (CHK) wires as shown in Figure 3-2.

When a Model 3000+ GCP is connected in a standard four-wire configuration, the bidirectional simulation coupler is connected to the two transmit leads as shown in Figure 3-2.

Mounting dimensions for the bidirectional simulation coupler are provided in Figure 3-3. Specifications for the bidirectional simulation coupler are as depicted in Table 3-2:

Table 3-2 Bidirectional Simulation Coupler, 62664-MF

PARAMETER	VALUE
Environmental	-40°F to +160°F (-40°C to +71°C)
Dimensions	8.75 inches (22.225 centimeters) high 8.50 inches (21.590 centimeters) wide 9.25 inches (23.495 centimeters) deep
Weight	5 pounds (2.27 kilograms) (approximate)
Adjustment Range	400 to 6,000 feet (122 – 1829 meters)
Loading Effect	Loading effects of the internal narrow-band Shunt are equivalent to that of the 62775 narrow-band Shunt.

NOTE

NOTE

The adjustment range must be within ± 10% of actual approach distance.

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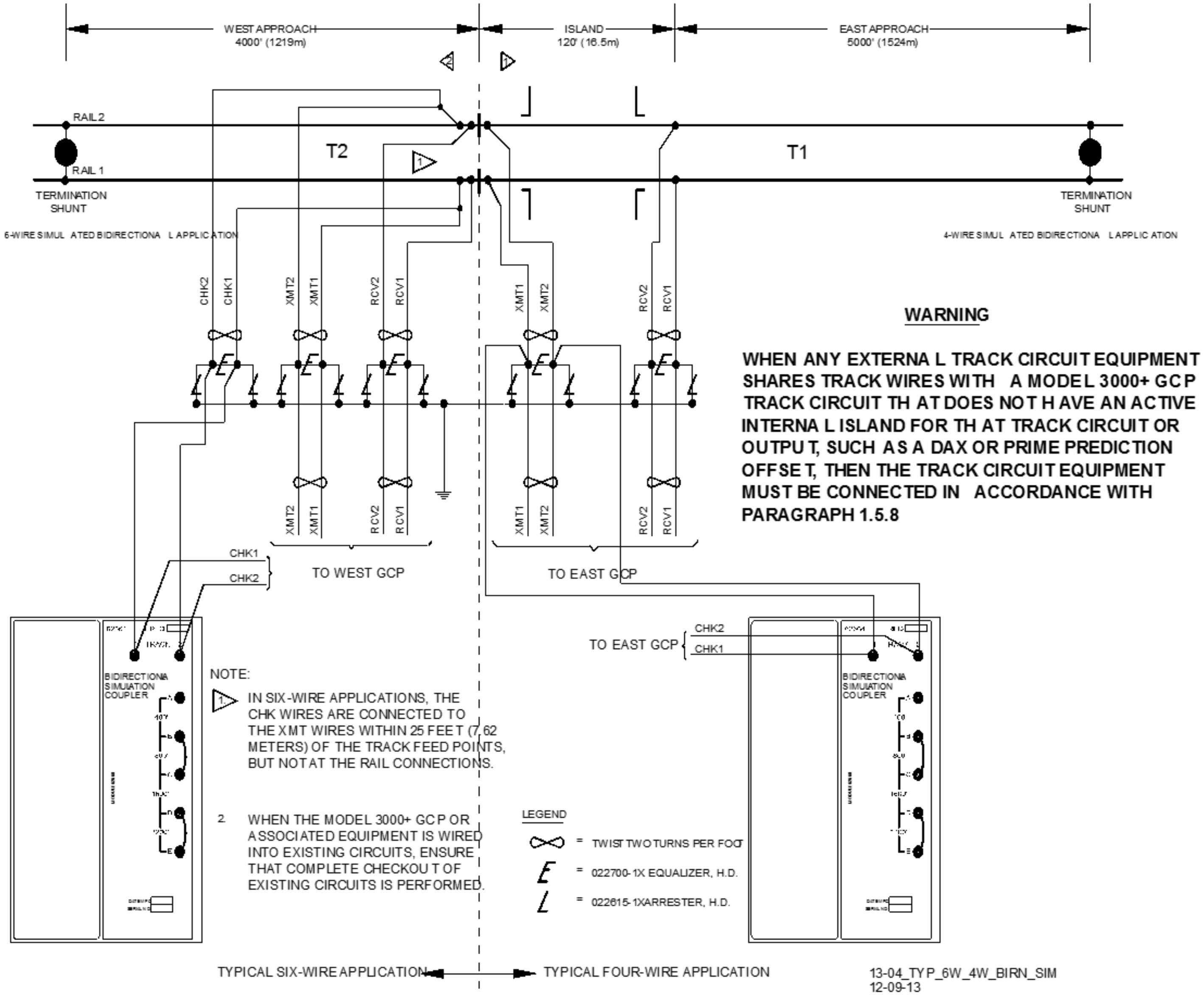

Figure 3-2 4-wire & 6-wire Connections Using Bidirectional Simulation Coupler on Model 3000+ GCP Operating in Bidirectional Simulation mode

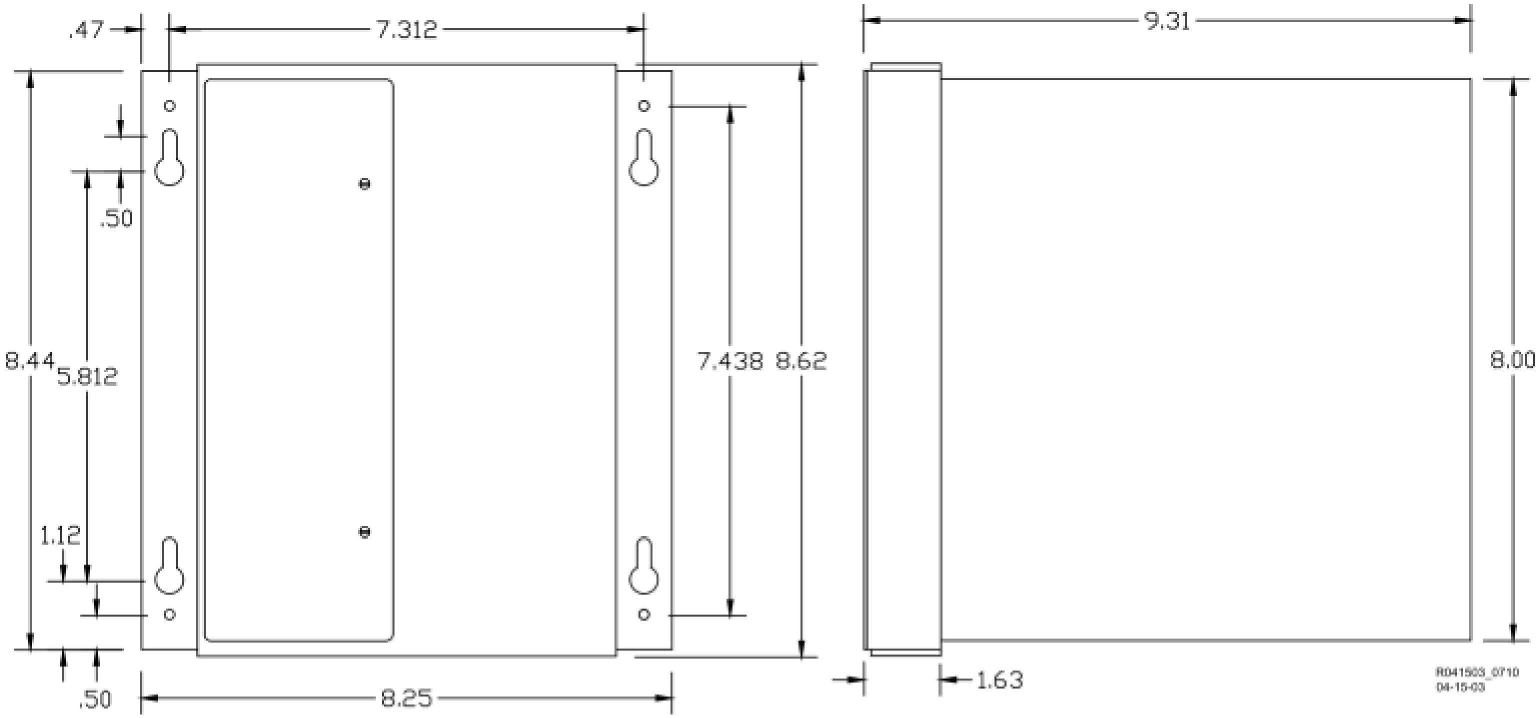

Figure 3-3 Bidirectional Simulation Coupler Assembly Mounting Dimensions

3.3 DC SHUNTING ENHANCER PANEL, 80049

Intermittent poor shunting can occur in any location due to numerous causes, but generally happens due to:

- infrequent track usage
- lightly weighted cars
- passenger and transit operation
- spillage from rail cars
- rail contamination

Lack of any shunting generally occurs in dark territory where no DC or AC track circuits exist and few trains run. Track shunting in dark territory can be easily improved using methods similar to those employed in style-C track circuits (but without the need for so many insulated joints). This involves the use of one insulated joint at the far end of each approach and the application of a DC voltage to the track at the crossing.

These measures improve shunting, thus allowing the Model 3000+ GCP Enhanced Detection software to function optimally.

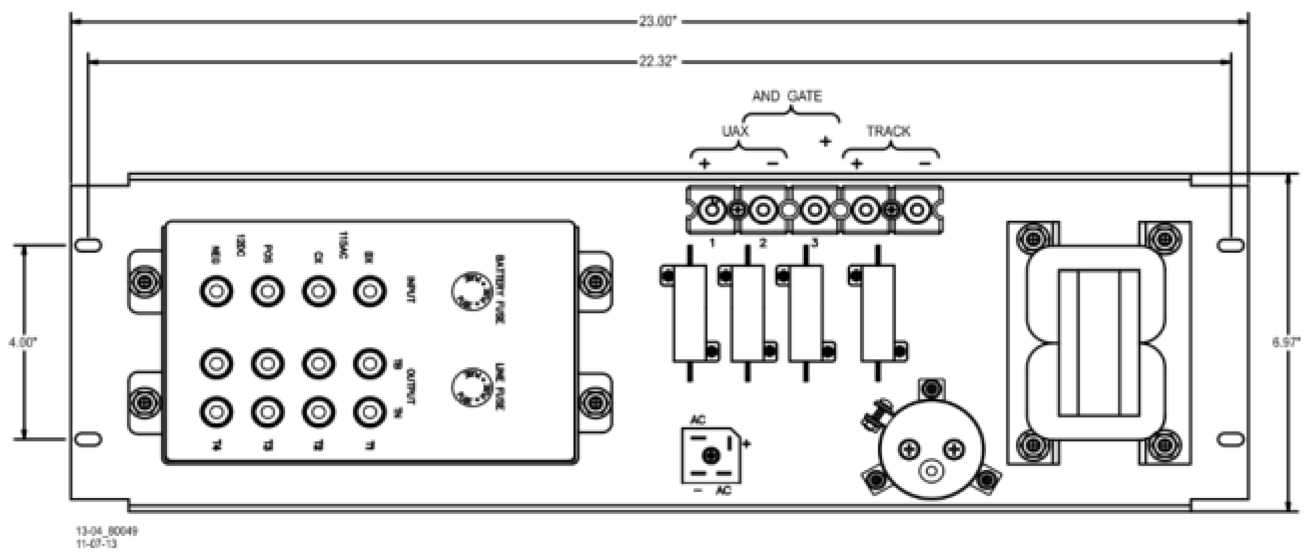

Figure 3-4 DC Shunting Enhancer Panel, 80049

3.3.1 Track Output Voltage

The Siemens 80049 DC Shunting Enhancer Panel, Figure 3-4, applies a nominal 6 volts DC to the track at the crossing to break down any insulating film that may develop on the rails. This DC voltage is isolated from the battery and is generated from a 110 volt AC step-down transformer when AC is present or utilizes battery powered DC-to-DC converter when AC is off. The panel switches automatically to the DC-to-DC converter output if AC fails.

3.3.2 Monitor Output Voltage

The **Monitor Output** voltage is applied to a Model 3000+ GCP UAX input for the applicable track input. Loss of the Monitor Output voltage will activate the crossing. The UAX must be programmed with a minimum of a five-second pickup delay.

3.3.3 Track Requirements

Installation of the Siemens 80049 DC Shunting Enhancer Panel requires the placement of at least one joint at the far end of each approach. The insulated joints are required to confine the DC track voltage to the crossing. The insulated joints can be located beyond the approach narrow-band shunt termination as desired.

The 80049 panel can be rack, wall, or shelf mounted. See Figure 3-4 for mounting dimensions.

WARNING

THE TERMINATION SHUNTS MUST BE 62775-F OR 62780-F NARROW-BAND SHUNTS.

GCP TRANSMIT WIRES MUST FIRST BE ROUTED TO THE ENHANCER PANEL TRACK CONNECTIONS AND THEN ON TO THE TRACK; IF NOT, SOME FAILURES CANNOT BE DETECTED BY THE SYSTEM. (SEE Figure 3-3).

CAUTION

WHEN TWO OR MORE DARK TERRITORY CROSSINGS OVERLAP, ENSURE THAT EACH MODEL 3000+ GCP CROSSING HAS AN 80049 PANEL IN OPERATION AND THAT THE POLARITY OF THE TRACK VOLTAGE TO THE RAIL FROM ALL 80049 PANELS IS THE SAME AT EACH CROSSING.

NOTE

The DC Shunting Enhancer Panel can be used with applications involving overlapping approaches from two or more crossings without the use of additional insulated joints.

A typical DC Shunting Enhancer Panel application drawing for a two track application is provided in Figure 3-7 and for two overlapping crossings is provided in Figure 3-8.

3.3.4 Interface Terminal Connections

The DC Shunting Enhancer Panel is equipped with eight user interface terminals. These terminals are connected as shown in Figure 3-5.

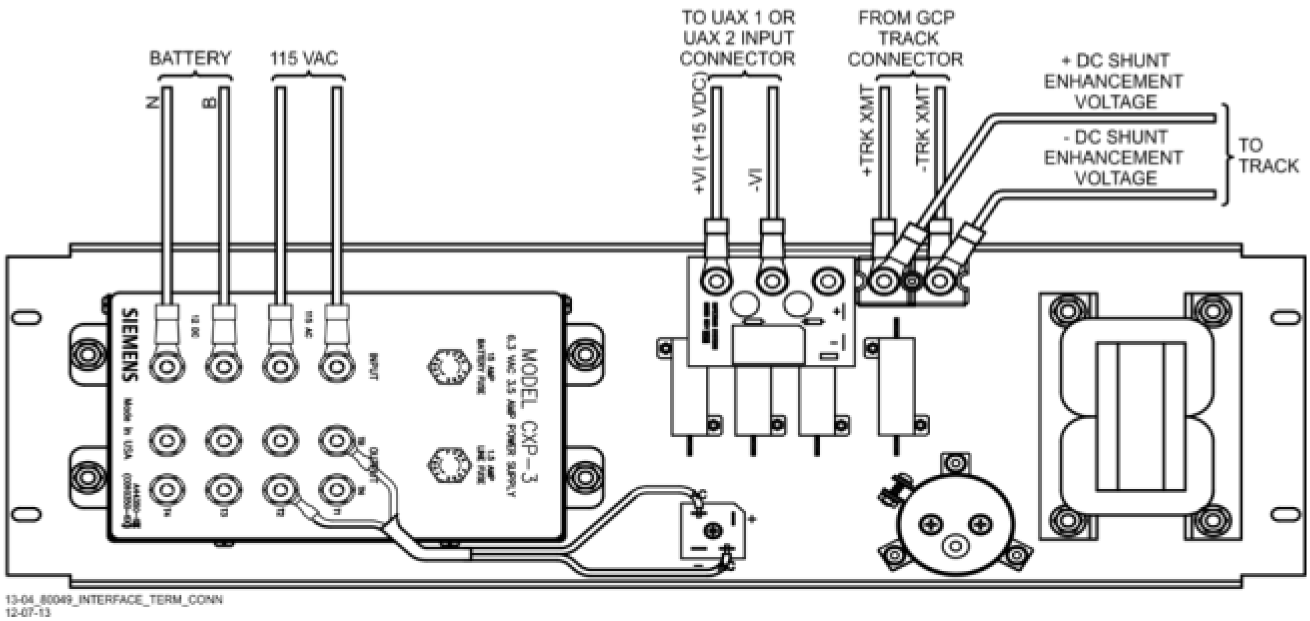

Figure 3-5 DC Shunting Enhancer Panel, 80049, Interface Terminal Connections

3.3.5 DC Shunting Enhancer Panel Specifications

Table 3-3 DC Shunting Enhancer Panel Specifications

PARAMETER	VALUES
CXP Input Power	
AC Voltage	95 to 130 VAC
DC Voltage	11 to 16 VDC
DC Current (AC present)	0 amps
DC Current (AC not present)	0.25 amps with no train and high ballast resistance 2.5 amps with train shunting track
Environmental Temperature Range	-40 °F to +160 °F (-40 °C to +71 °C)
UAX Output	+15.0 ± 0.2 VDC
Surge Protection	Primary protection required for AC input and battery Secondary protection provided internally
Humidity	95%, non-condensing

PARAMETER	VALUES
Dimensions	
-1 unit:	6.97 inches (17.704 centimeters) high 23.0 inches (58.420 centimeters) wide 10.75 inches (27.305 centimeters) deep
-5 unit:	6.97 inches (17.704 centimeters) high 23.0 inches (58.420 centimeters) wide 5.75 inches (14.605 centimeters) deep
Weight	-1 unit: 32 pounds (14.4 kilograms) (approximate) -5 unit: 17 pounds (7.65 kilograms) (approximately)
Mounting Dimensions	The DC Shunting Enhancer Panel can be rack, wall, or shelf mounted. The Panel mounting dimensions are provided in Figure 3-6.

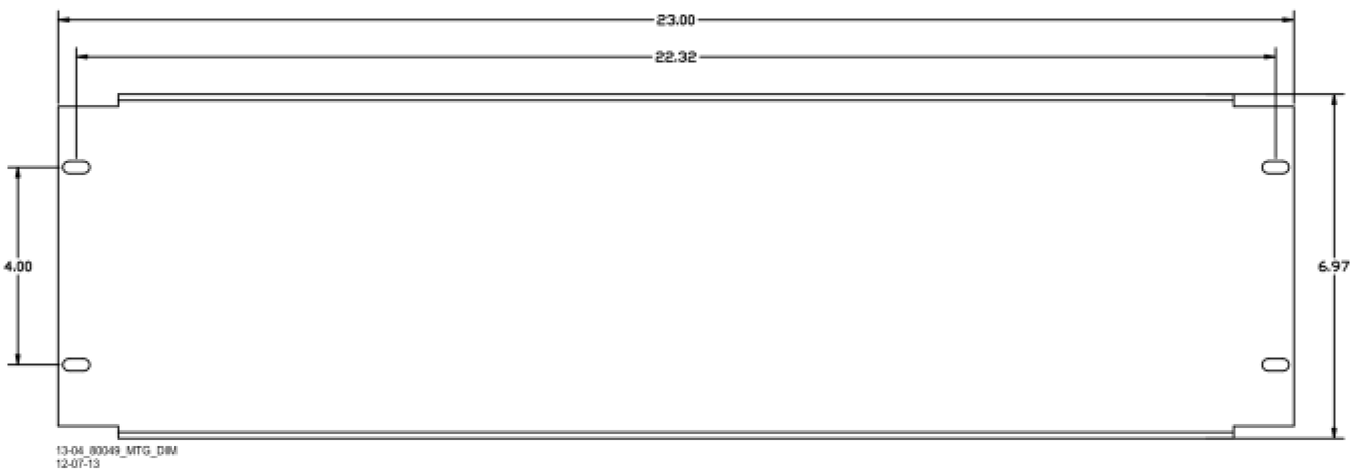

Figure 3-6 DC Shunting Enhancer Panel Mounting Dimensions

3.3.6 DC Shunting Enhancer Panel Configuration Options

Two DC Shunting Enhancer Panel configuration options are available. These configurations are described in Table 3-4.

Table 3-4 DC Shunting Enhancer Panel Configuration Options

PART NUMBER	OPTION DESCRIPTION
8000-80049-0001	Panel with CXP-3 DC-to-AC Inverter
8000-80049-0005	Panel without CXP-3 DC-to-AC Inverter Used in two track applications

3.3.7 Two Track and Overlapping Crossing Applications

When two 80049 Panels are required with applications involving two tracks at a crossing, the first panel is an 80049-0001 and the second panel may be an 80049-0001 or 80049-0005.

NOTE

NOTE

When the -5 panel is used, it must be connected to the isolated 6.3 VAC inverter output of the first panel as shown in Figure 3-7.

When there are two crossings that have overlapping approaches, this application may be implemented as shown in Figure 3-8.

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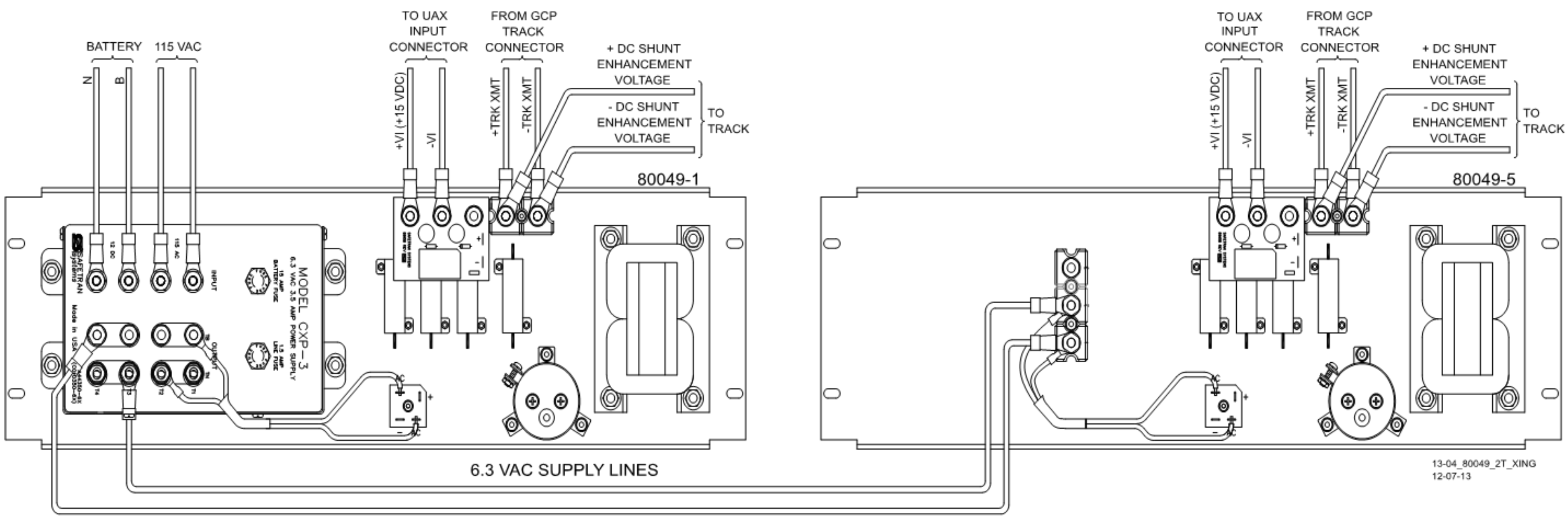


Figure 3-7   DC Shunting Enhancer Panels for Two Track Crossing

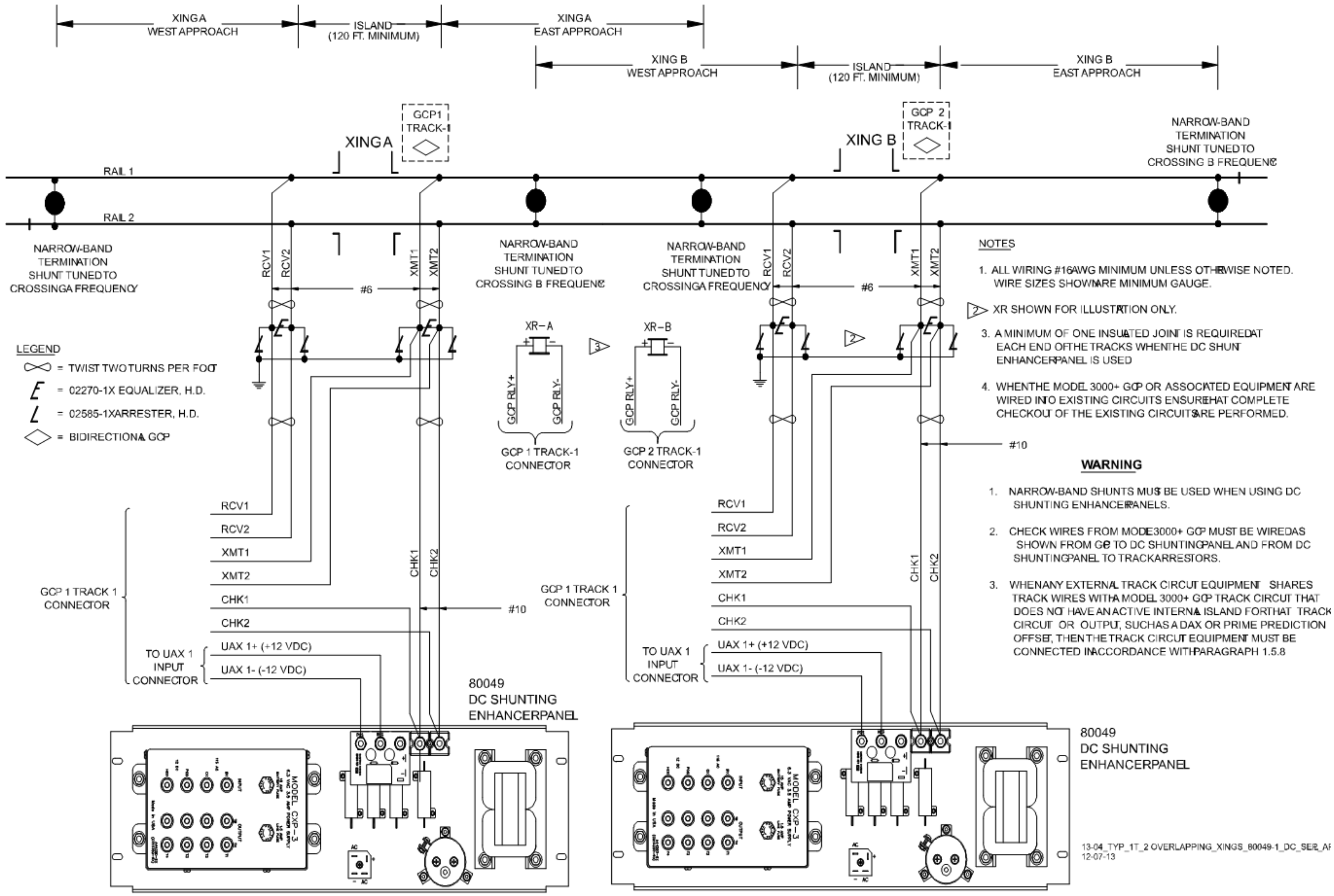


Figure 3-8 DC Shunting Enhancer Panels for Overlapping Crossings

3.4 NARROW-BAND SHUNT, 62775-F

WARNING

THE 62775-F SHUNT MUST NOT BE USED ANYWHERE WITHIN A MODEL 300 OR 400 GCP APPROACH; NARROW-BAND SHUNT 62780-F IS RECOMMENDED FOR THESE APPLICATIONS.

CAUTION

WHEN ADDING OR REPLACING TERMINATION SHUNTS, APPROPRIATE TESTS MUSTS BE MADE TO DETERMINE THAT THE TERMINATION SHUNT DID NOT ADVERSELY AFFECT OTHER HIGHWAY CROSSING WARNING SYSTEM OR WAYSIDE SIGNAL SYSTEM TRACK CIRCUITS.

THE SHUNT SHOULD BE CONNECTED AS CLOSE AS PRACTICABLE TO THE RAILS (WITHIN THE #6 AWG WIRE LEAD LENGTH OF 10 FT. [3.04 M]) AND, TO AFFORD MAXIMUM PROTECTION FROM PHYSICAL DAMAGE, BE ENCASED IN A PROTECTIVE ENCLOSURE OR BURIED (EITHER VERTICALLY OR HORIZONTALLY) AT AN APPROPRIATE DEPTH TO PROVIDE MAXIMUM PROTECTION FROM PHYSICAL DAMAGE.

NOTE

It is not necessary to bury the Narrow band shunt (62775-f) below the frost line.

The 62775-f Narrow-band Shunt (Figure 3-17) is intended for use in areas where other AC frequencies or DC coded track circuits are present, but where only the Model 3000+ GCP frequency should be terminated.

This shunt requires no special tuning and is generally preferred for most applications.

The 62775-f Narrow-band Shunt is housed in a cylindrical case with a pair of 10-foot leads extending from one end.

This shunt is available in any fixed frequency (Hz) listed in the chart below.

Table 3-5 Frequencies Available with Narrow Band Shunt, 62775-F

86	151	285	522	753
100	156	326	525	790
114	172	348	560	816
134	210	392	630	881
141	211	430	645	970
149	267	452	686	979

3.4.1 Narrow-band Shunt, 62775-F Specifications

Dimensions:	16 inches (40.640 centimeters) long 5 inches (12.700 centimeters) in diameter
Weight:	10 pounds (approximately 4.54 kilograms)
Frequencies:	See Table 3-5
Leads:	10 feet (3.047.62 Meters); number 6 AWG, stranded, black PVC

3.5 NARROW-BAND SHUNT, 62780-F

CAUTION

WHEN ADDING OR REPLACING TERMINATION SHUNTS, APPROPRIATE TESTS MUSTS BE MADE TO DETERMINE THAT THE TERMINATION SHUNT DID NOT ADVERSELY AFFECT OTHER HIGHWAY CROSSING WARNING SYSTEM OR WAYSIDE SIGNAL SYSTEM TRACK CIRCUITS.

THE SHUNT SHOULD BE CONNECTED AS CLOSE AS PRACTICABLE TO THE RAILS (WITHIN THE #6 AWG WIRE LEAD LENGTH OF 10 FT. [3.04 M]) AND, TO AFFORD MAXIMUM PROTECTION FROM PHYSICAL DAMAGE, BE ENCASED IN A PROTECTIVE ENCLOSURE OR BURIED (EITHER VERTICALLY OR HORIZONTALLY) AT AN APPROPRIATE DEPTH TO PROVIDE MAXIMUM PROTECTION FROM PHYSICAL DAMAGE.

NOTE

It is not necessary to bury the shunt below the frost line.

The Narrow-band Shunt, 62780-f (Figure 3-9) is intended for use in areas where other AC frequencies or DC coded track circuits are present, but where only the Model 3000+ GCP frequency should be terminated.

- Similar to the Narrow-band Termination Shunt, 62775 (Paragraph 3.4).
- The 62780 Shunt produces less loading effect on adjacent frequencies (10 ohms reactance) than the 62775 Shunt:
- This shunt can be used in territories with overlapping Model 3000, 3000+, 4000 and Model 5000 GCP approaches.
- The 62780 Narrow-band Shunt is compatible with all Siemens Motion Sensors and GCPs.

This shunt is available in any one of 26 frequencies ranging from 86 Hz to 979 Hz as shown in the following chart (Siemens frequencies are shown in **boldface** type).

Table 3-6 Frequencies Available with Narrow Band Shunt, 62780

86	151	**211**	326	**430**	**525**	**645**	**790**	**970**
100	**156**	267	**348**	452	560	686	816	979
114	210	**285**	392	522	630	753	881	

The Narrow-band Shunt, 62780 is housed in a cylindrical case with a pair of 10-foot leads extending from one end.

3.5.1 Narrow-band Shunt, 62780-F Specifications

Dimensions: 14.125 inches (35.9 centimeters) long
4.125 inches (10.5 centimeters) in diameter
Weight: 7 pounds (approximately 3.18 kilograms)
Frequencies: See Table 3-6
Leads: 10 feet (304.8 centimeters); number 6 AWG, stranded, black PVC

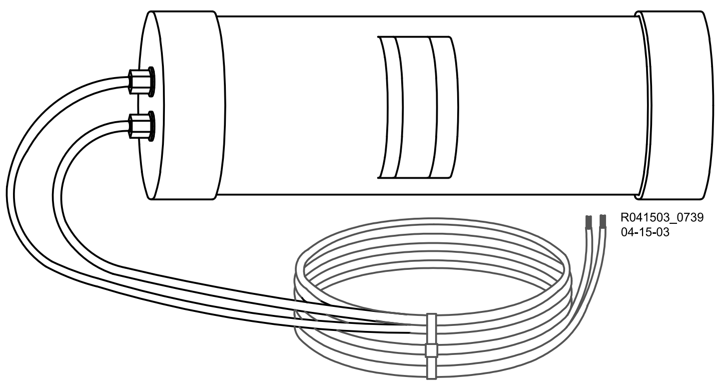


Figure 3-9 Narrow-band Shunt, 62775-F/62780-F

Figure 3-10 Multi-frequency, Narrow-band Shunt, 62775/62780

3.6 MULTI-FREQUENCY NARROW-BAND SHUNT, 62775

The 62775-XXXX Multi-frequency Narrow-band Shunt, like its single frequency counterpart, is designed to terminate specific track frequencies in areas where other audio frequencies or DC coded track circuits are present.

WARNING

WARNING

THE 62775 MULTI-FREQUENCY NARROW-BAND SHUNT MAY NOT BE USED IF A 3000+ GCP APPROACH OVERLAPS A MODEL 300 OR A MODEL 400 GCP APPROACH. USE THE 62780-XXXX SHUNT INSTEAD.

NOTE

NOTE

It is not necessary to bury the 62775-f Narrow-band Shunt below the frost line.

3.6.1 Physical Description

The Multi-frequency Narrow-band Shunt, 62775, (Figure 3-11) is slightly longer than its single-frequency counterpart (Figure 3-9), but exhibits the same electrical characteristics as the basic single-frequency unit. The Shunt is housed in a cylindrical case with a pair of 10-foot leads extending from one end and seven standard AREMA terminals extending from the other. The terminals are covered by a removable, pliable, end cap secured in place by a sturdy stainless steel clamp.

3.6.2 Frequency Selection

The Multi-frequency Narrow-band Shunt is available in eight frequency ranges. Each frequency is selected by means of the seven standard AREMA binding posts. The terminals are labeled A through G, and jumpered to select the desired shunting frequency (Table 3-7).

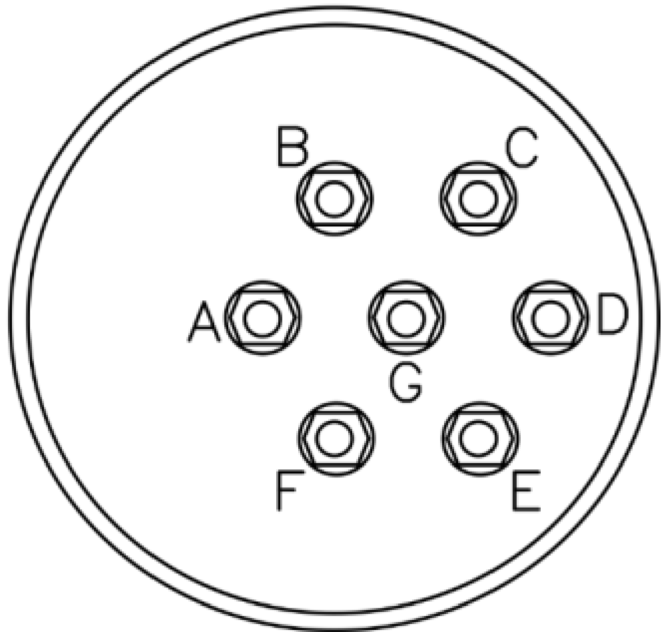


Figure 3-11 Multi-frequency Narrow-band Shunt, 62775/62780 AREMA Binding Posts

NOTE

NOTE

Terminal jumper hardware is supplied with each Shunt. The Shunt is shipped with no factory jumpers installed and is therefore electrically open and does not load any frequency on the track. Install jumpers for the desired frequency before placing the unit into service. A label located inside the removable end cap identifies the terminal jumpering for each frequency.

The pliable end cap covering the terminal end of the Shunt is secured in place by a sturdy stainless steel clamp for protection against moisture.

3.6.3 Multi-frequency Narrow-band Shunt, 62775 Specifications

Dimensions:	22 inches (55.88 centimeters) long 5 inches (12.7 centimeters) in diameter
Weight:	10 pounds (approximately 4.54 kilograms)
Frequencies:	See Table 3-5
Leads:	10 feet (304.8 centimeters); number 6 AWG, stranded, black PVC

Table 3-7 Multi-frequency Narrow-band Shunt, 62775 Frequency Selection Jumpers

SHUNT PART NUMBER	FREQUENCY (HZ)	JUMPER SHUNT TERMINALS
62775-8621	86	A-F, G-D, D-E, E-F
	114	B-G, G-D, D-E
	156	C-D, D-G
	211	C-D
62775-1543	156	A-F, G-C, C-D, D-E, E-F
	211	A-G, G-C, C-D, D-E
	285	B-C, C-D, D-G,
	348	B-C, C-D
	430	B-C
62775-2132*	211	A-F, G-C, C-D, D-E, E-F
	267	B-G, G-C, C-D, D-E
	285	B-C, C-D, D-G
	313	B-C, C-D
	326	B-C
62775-2152	211	A-F, G-C, C-D, D-E, E-F
	285	B-C, C-D, D-E, E-G
	348	B-C, C-D, D-G
	430	B-C, C-D
	525	B-C
62775-3448*	348	A-B, B-C, C-D, D-E, E-F, F-G
	389	A-B, B-C, C-D, D-E, E-F
	392	A-B, B-C, C-D, D-E
	430	A-B, B-C, C-D
	452	A-B, B-C
	483.5	A-B
62775-3497	348	A-B, B-C, C-D, D-E, E-F, F-G
	430	A-B, B-C, C-D, D-E, E-F
	525	A-B, B-C, C-D, D-E
	645	A-B, B-C, C-D
	790	A-B, B-C
	970	A-B
62775-5274*	522	A-B, B-C, C-D, D-E, E-F, F-G
	525	A-B, B-C, C-D, D-E, E-F
	560	A-B, B-C, C-D, D-E
	645	A-B, B-C, C-D
	669.9	A-B, B-C
	746.8	A-B

SHUNT PART NUMBER	FREQUENCY (HZ)	JUMPER SHUNT TERMINALS
62775-7910*	790	A-B, B-C, C-D, D-E, E-F, F-G
	816	A-B, B-C, C-D, D-E, E-F
	832.5	A-B, B-C, C-D, D-E
	970	A-B, B-C, C-D
	979	A-B, B-C
	1034	A-B

*Available for special applications only

3.7 MULTI-FREQUENCY NARROW-BAND SHUNT, 62780

WARNING

WARNING

CAREFULLY TIGHTEN ALL NUTS ON ALL FREQUENCY JUMPERS, AND THEN INSTALL A SECOND NUT TO SECURELY LOCK THE ASSEMBLY.

CAUTION

CAUTION

WHEN ADDING OR REPLACING TERMINATION SHUNTS, APPROPRIATE TESTS MUST BE MADE TO DETERMINE THAT THE TERMINATION SHUNT DID NOT ADVERSELY AFFECT OTHER HIGHWAY CROSSING WARNING SYSTEM OR WAYSIDE SIGNAL SYSTEM TRACK CIRCUITS.

THE SHUNT SHOULD BE CONNECTED AS CLOSE AS PRACTICABLE TO THE RAILS (WITHIN THE #6 AWG WIRE LEAD LENGTH OF 10 FT. [3.04 M]) AND, TO AFFORD MAXIMUM PROTECTION FROM PHYSICAL DAMAGE, BE ENCASED IN A PROTECTIVE ENCLOSURE OR BURIED (EITHER VERTICALLY OR HORIZONTALLY) AT AN APPROPRIATE DEPTH TO PROVIDE MAXIMUM PROTECTION FROM PHYSICAL DAMAGE.

NOTE

NOTE

The Multi-frequency Narrow-band Shunt is shipped with no factory jumpers installed and is, therefore, electrically open and does not load any frequency on the track. Install jumpers for the desired frequency before placing the unit in service.

NOTE

NOTE

It is not necessary to bury the 62780 Narrow-band Shunt below the frost line.

The Multi-frequency Narrow-band Shunt, 62780 Figure 3-10, can be used in territories with overlapping Model 3000, 3000+, 4000 and Model 5000 GCP approaches.

The Multi-frequency Narrow-band shunt also:

- Produces less loading effect on adjacent frequencies (10 ohms reactance) than the 62775 Shunt (Paragraph 3.6)
- Is compatible with all Siemens GCPs and Motion Sensors.
- Is available in four multi-frequency versions (see Table 3-8).
- Is housed in a hermetically-sealed, cylindrical case.

A pair of 10-foot leads extends from one end of the case. Seven standard AREMA terminals extend from the opposite end of the case.

- AREMA terminals are jumpered to select the desired shunt frequency
- AREMA terminals are labeled A through G
- Terminal jumper hardware is supplied with each Multi-frequency Shunt
- A label located inside the removable end cap identifies the terminal jumpers required for each frequency

The pliable end cap covers the terminal end of the Shunt is secured in place by a sturdy stainless steel clamp for protection against moisture.

Table 3-8 Multi-frequency Narrow-band Shunt, 62780 Frequency Selection Jumpers

SHUNT PART NUMBER	FREQUENCY (HZ)	JUMPER SHUNT TERMINALS
62780-8621	86	A-F, G-D, D-E, E-F
	114	B-G, G-D, D-E
	156	C-D, D-G
	211	C-D
62780-1543	156	A-F, G-C, C-D, D-E, E-F
	211	A-G, G-C, C-D, D-E
	285	B-C, D-G, C-D
	348	B-C, C-D
	430	B-C
62780-2152*	211	A-F, G-C, C-D, D-E, E-F
	285	B-C, C-D, D-E, C-G
	348	B-C, C-D, D-G
	430	B-C, C-D
	525	B-C
62780-5297	525	A-B, B-C, C-D, D-E
	645	A-B, B-C, C-D
	790	A-B, B-C
	970	A-B

*Available for special applications only

3.7.1 Multi-frequency Narrow-band Shunt, 62780 Specifications

Dimensions:	22 inches (55.88 centimeters) long 5 inches (12.7 centimeters) in diameter
Weight:	10 pounds (approximately 4.54 kilograms)
Frequencies:	See Table 3-6
Leads:	10 feet (304.8 centimeters); number 6 AWG, stranded, black PVC

3.8 WIDEBAND SHUNT, 8A076A

The Wideband Shunt, 8A076A (Figure 3-12) provides an effective short circuit to AC but presents an open circuit to DC. This shunt may be used as a termination shunt where no other frequencies (other than the GCP) are present or to bypass existing insulated joints required for DC signaling purposes within the track circuit.

The Wideband Shunt is housed in a cylindrical case with a pair of 10-foot leads extending from one end.

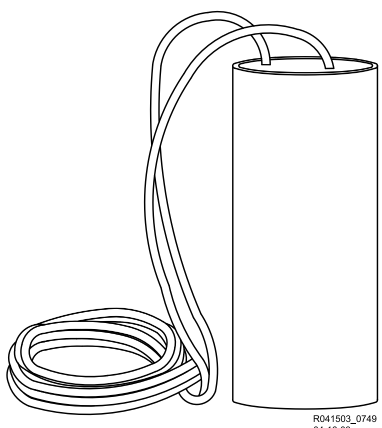


Figure 3-12 Wideband Shunt, 8A076A

WARNING

THE 8A076A OR 8A077 WIDEBAND SHUNTS MUST NOT BE USED TO BYPASS INSULATED JOINTS IN DC CODED TRACK CIRCUITS OR WHERE AC OR CODED AC CIRCUITS EXIST.

CAUTION

CAUTION

WHEN ADDING OR REPLACING TERMINATION SHUNTS, APPROPRIATE TESTS MUST BE MADE TO DETERMINE THAT THE TERMINATION SHUNT DID NOT ADVERSELY AFFECT OTHER HIGHWAY CROSSING WARNING SYSTEM OR WAYSIDE SIGNAL SYSTEM TRACK CIRCUITS.

THE SHUNT SHOULD BE CONNECTED AS CLOSE AS PRACTICABLE TO THE RAILS (WITHIN THE #6 AWG WIRE LEAD LENGTH OF 10 FT. [3.04 M]) AND, TO AFFORD MAXIMUM PROTECTION FROM PHYSICAL DAMAGE, BE ENCASED IN A PROTECTIVE ENCLOSURE OR BURIED (EITHER VERTICALLY OR HORIZONTALLY) AT AN APPROPRIATE DEPTH TO PROVIDE MAXIMUM PROTECTION FROM PHYSICAL DAMAGE.

NOTE

NOTE

The use of dual wideband couplers, part number 8A077, is not recommended for Model 3000+ GCP applications.

NOTE

NOTE

It is not necessary to bury the 8A076A Wide-band Shunt below the frost line.

3.8.1 Wideband Shunt Specifications

Dimensions:	7.5 inches (19.05 centimeters) long 3.35 inches (8.509 centimeters) in diameter
Weight:	7 pounds (approximately 3.18 kilograms)
Leads:	10 feet (304.8 centimeters); number 6 AWG, stranded, black PVC

3.9 SIMULATED TRACK INDUCTOR, 8V617 (USED WITH MULTI-FREQUENCY SHUNTS)

The Simulated Track Inductor, 8V617 (Figure 3-13) is intended for use with Siemens' Multi-frequency Narrow-band Shunts (62775/62780).

In bidirectional motion sensor and grade crossing predictor installations, insulated joints located in one approach frequently prevent both termination shunts from being installed at equal distances from the MS/GCP feed point as required.

The 8V617 Simulated Track Inductor is used with the Shunt in the shorter approach to compensate for the reduced distance (Figure 3-14).

Each Inductor:

- Consists of an insulated, toroid-wound coil with a pair of 4-inch number 18 AWG stranded wire leads with 1/4-inch ring terminals attached.
- Is supplied in 21 configurations to simulate track lengths ranging from 200 to 4,000 feet in 200-foot increments plus 4,400 feet.
- Is identified with the basic part number followed by a dash number indicating the simulated distance in feet as listed in Table 3-9.

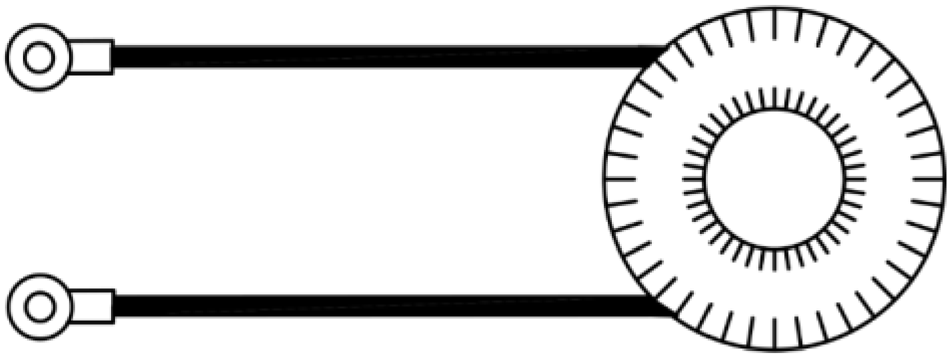


Figure 3-13 Simulated Track Inductor, 8V617

Table 3-9 Simulated Track Inductor Part Number Listing

BASIC PART NO.	DASH NUMBER = DISTANCE (FT/M)		
8V617	-0200 (61) -0400 (122) -0600 (183) -0800 (244) -1000 ((309) -1200 (366) -1400 (427)	-1600 (488) -1800 (549) -2000 (610) -2200 (671) -2400 (732) -2600 (793) -2800 (854)	-3000 (450) -3200 (976) -3400 (1037) -3600 (1098) -3800 (1159) -4000 (1220) -4400 (1342)

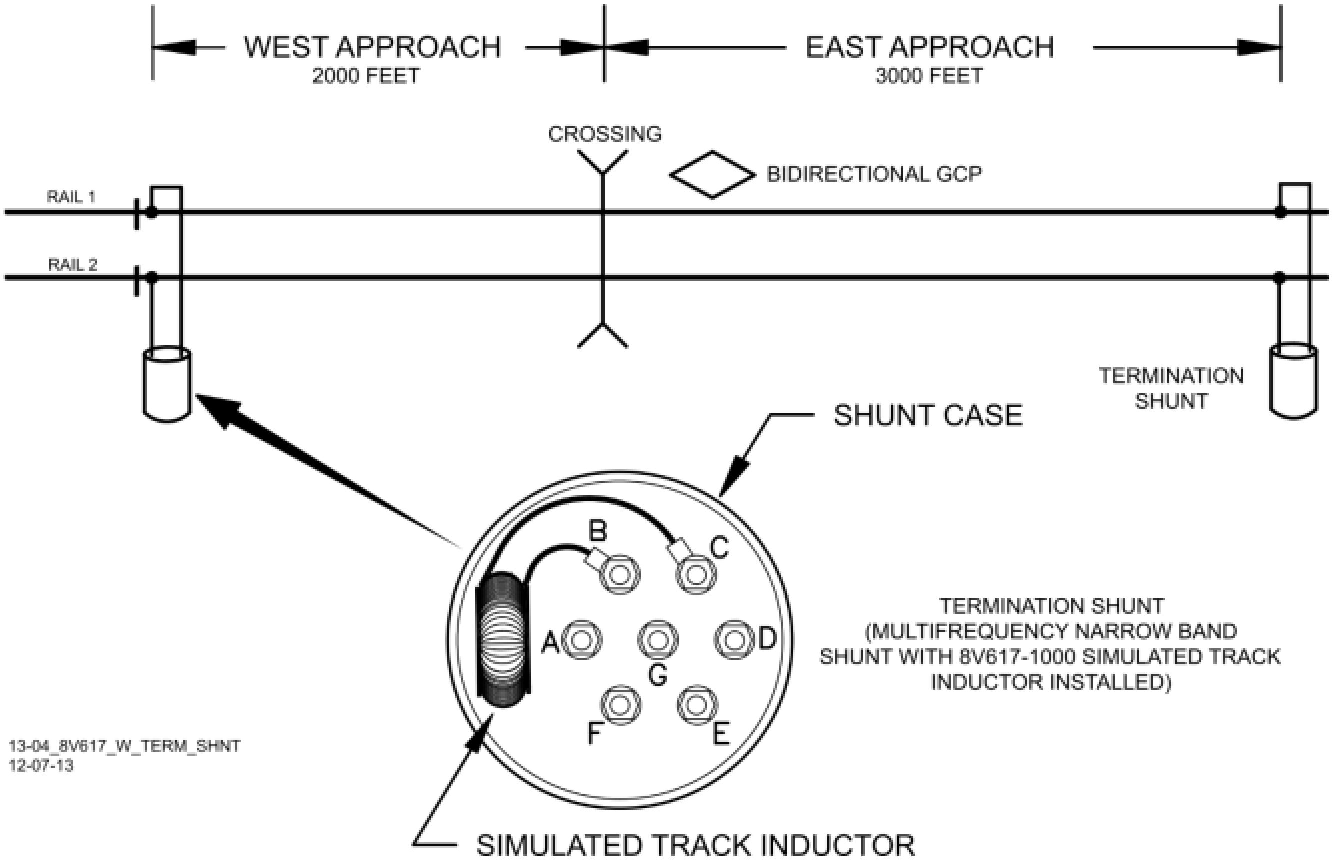


Figure 3-14 Simulated Track Inductor Used with Termination Shunt

3.9.1 Simulated Track Inductor Installation

WARNING

BEFORE INSTALLING, VERIFY THAT THE 8V617 INDUCTOR IS THE CORRECT DISTANCE VALUE FOR THE APPLICATION.

ALWAYS WRAP THE INDUCTOR IN THE FOAM INSULATION (INCLUDED WITH THE INDUCTOR) THAT PROVIDES INSULATION FROM THE TERMINAL POSTS (AS SHOWN IN Figure 3-15).

NOTE

Refer to the small chart inside the end cap for terminal strapping information. If the chart is missing or illegible, refer to Table 3-7 (62775) or Table 3-8 (62780) in this manual.

Position the inductor with the leads extending horizontally toward the side (not upward) to prevent interference with the shunt end cap.

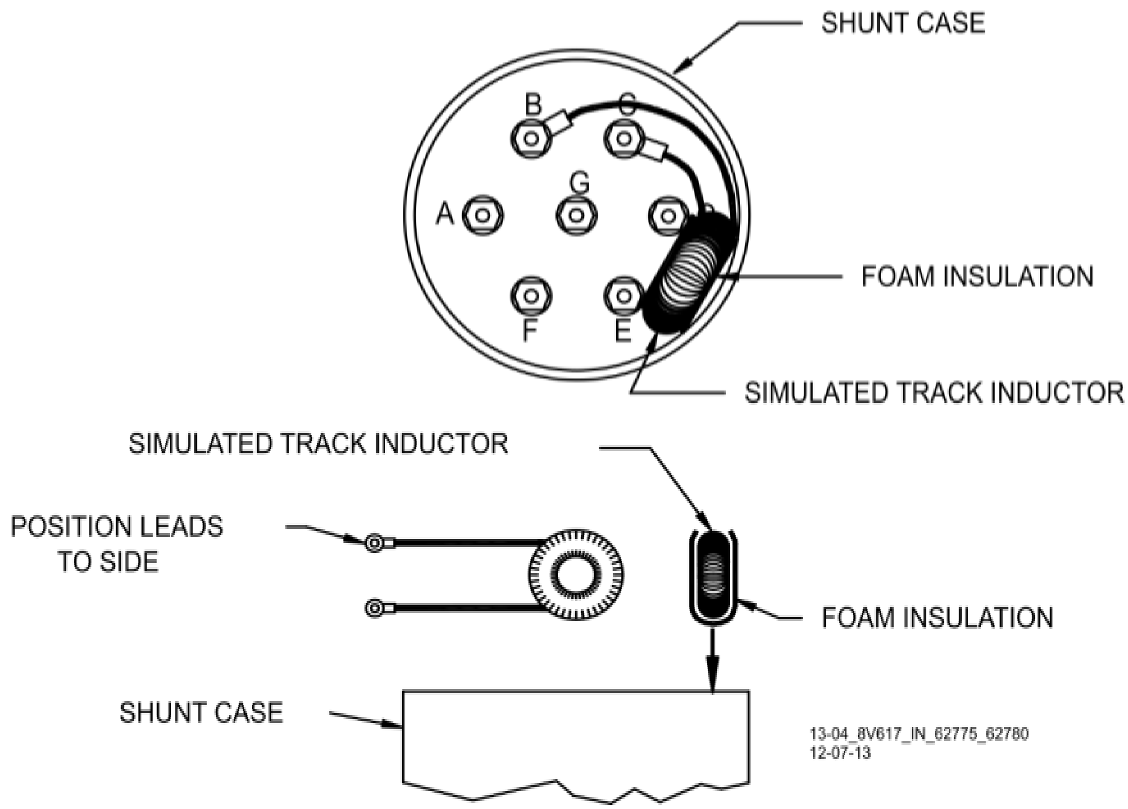


Figure 3-15 Typical Installation of 8V617 in 62775/62780 Shunt

Step 1: Determine the Shunt frequency and compensating distance required.

Step 2: Loosen the clamp and remove the end cap from the Shunt to gain access to the frequency-selection terminals.

Step 3: Refer to Table 3-10 and note the inductor mounting terminals for the applicable shunt and frequency.

Step 4: Remove the nuts, washers, and shorting link from the shunt terminals indicated. Discard the shorting link.

Step 5: Install the inductor in its place by connecting the inductor leads to the two terminals. Install the washers and nuts and tighten securely.

Step 6: Wrap the inductor in the foam insulation (included with the inductor) as shown in Figure 3-15 and carefully insert into the Shunt housing between the terminals and case at the approximate location shown.

Step 7: Return the end cap to its original position on the Shunt and tighten the clamp securely.

3.9.2 8V617 Simulated Track Inductor Specifications

Diameter:	1.875 inches (4.763 centimeters)
Thickness:	0.875 inches (2.223 centimeters)
Weight:	5 ounces (141.75 grams)

Table 3-10 Simulated Track Inductor, 8V617, Mounting Terminals

NARROW-BAND SHUNT PART NUMBER	FREQUENCY (HZ)	REMOVE SHORTING LINK AND CONNECT INDUCTOR LEADS BETWEEN SHUNT TERMINALS
62775/62780-8621	86	A and F
	114	B and G
	156	C and D
	211	C and D
62775/62780-1543	156	A and F
	211	A and G
	285	B and C
	348	B and C
	430	B and C
62775-2132*	211	A and F
	267	B and G
	285	B and C
	313	B and C
	326	B and C
62775/62780-2152*	211	A and F
	285	B and C
	348	B and C
	430	B and C
	525	B and C
62775-3448*	348	A and B
	389	A and B
	392	A and B
	430	A and B
	452	A and B
	483.5	A and B
62775-2132*	211	A and F
	267	B and G
	285	B and C
	313	B and C
	326	B and C

NARROW-BAND SHUNT PART NUMBER	FREQUENCY (HZ)	REMOVE SHORTING LINK AND CONNECT INDUCTOR LEADS BETWEEN SHUNT TERMINALS
62775/62780-2152*	211	A and F
	285	B and C
	348	B and C
	430	B and C
	525	B and C
62775-3448*	348	A and B
	389	A and B
	392	A and B
	430	A and B
	452	A and B
	483.5	A and B
62775-3497	348	A and B
	430	A and B
	525	A and B
	645	A and B
	790	A and B
	970	A and B
62775-7910*	790	A and B
	816	A and B
	832.5	A and B
	970	A and B
	979	A and B
	1034	A and B
62775-5274*	522	A and B
	525	A and B
	560	A and B
	645	A and B
	669.9	A and B
	746.8	A and B
62780-5297	525	A and B
	645	A and B
	790	A and B
	970	A and B

*Available for special applications only

3.10 ADJUSTABLE INDUCTOR ASSEMBLY, 8A398-6

The Adjustable Inductor Assembly, 8A398 is intended for use with Siemens's Single-frequency Narrow-band Shunts (62775-f/62780-f) to balance the approaches of a bidirectional application when the approaches differ by more than 10%. Insulated joints located in one approach frequently prevent both termination shunts from being installed at approximately equal distances from the Model 3000+ GCP feed point as required.

- Adjustable Inductor Assembly, 8A398-6 (Figure 3-16), may be used along with the Shunt in the shorter approach to compensate for the reduced distance as shown in Figure 3-17.
- The Adjustable Inductor Assembly consists of a 3-inch diameter ABS plastic enclosure with mounting brackets at the base.
- Seven AREMA terminals extend from the top of the assembly
- Terminals accommodate connections to six inductors that are connected in series and housed within the sealed unit

NOTE

NOTE

When configuring the 8A398-6 Adjustable Inductor, simulated track length is selectable in 50 ft (15.2 meter) increments ranging from 50 to 3150 ft (15.2-960.1 meters)

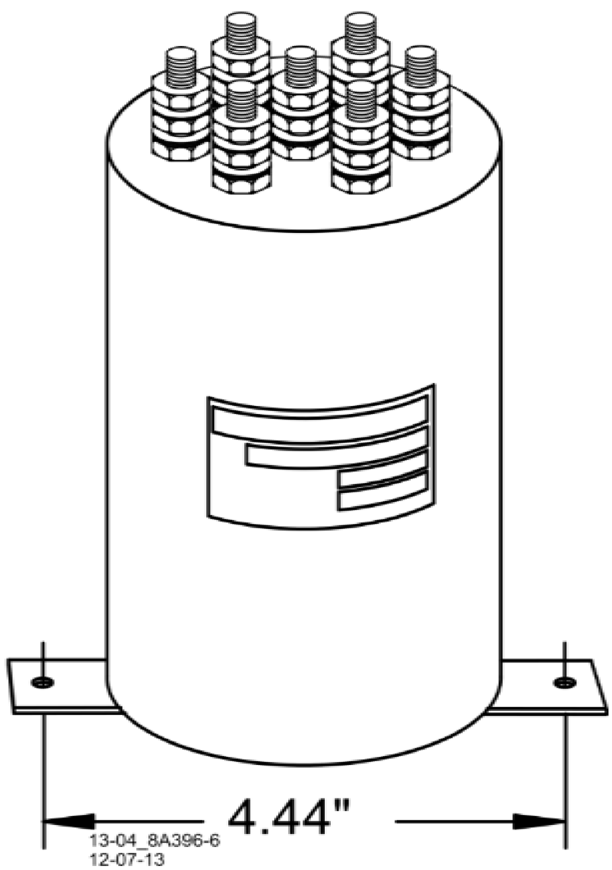


Figure 3-16 Adjustable Inductor Assembly, 8A398-6

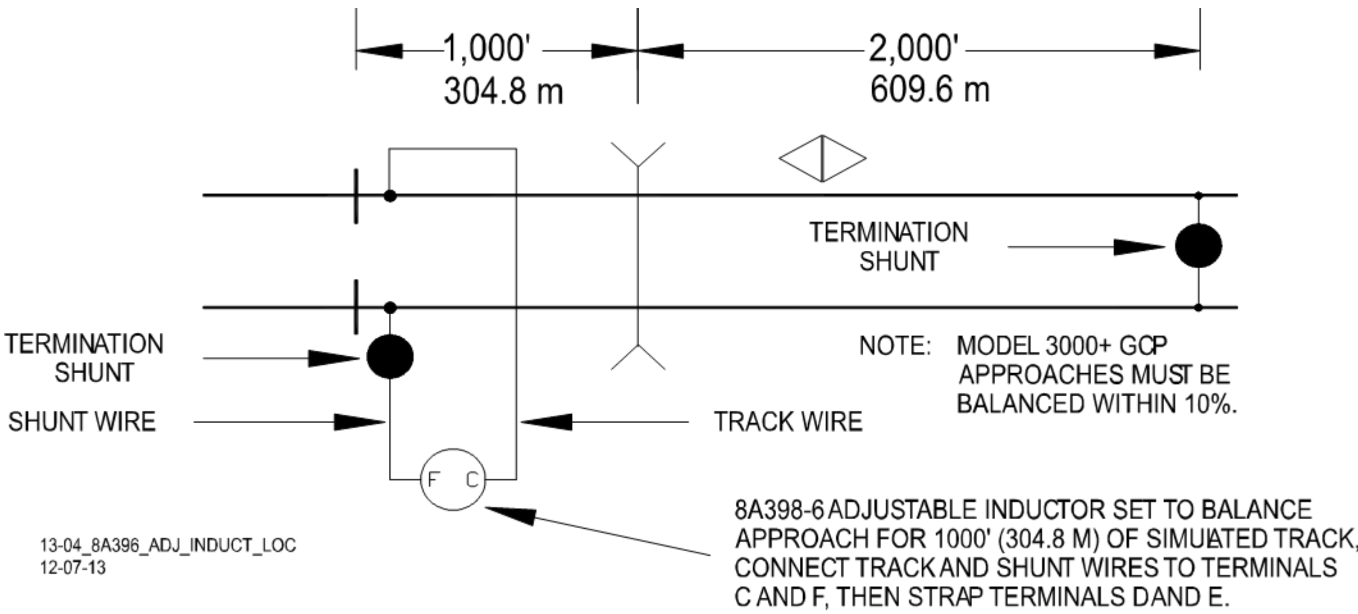


Figure 3-17 Adjustable Inductor Used with Termination Shunt

3.10.1 Adjustable Inductor Configuration

Step 1: Refer to Table 3-11 and locate the desired simulated track length (column 1).

Step 2: Read across the table to determine which inductors (indicated by terminal pairs in column 2) are required to simulate that length (i.e., for a simulated track length of 1,000 feet, terminals C and F are indicated).

Step 3: Connect the track wire and the shunt wire (see Figure 3-17) to the two terminals indicated in column 2.

Step 4: Install a strap between the terminal pairs indicated in column 3. This shorts the inductor(s) located between the track and shunt wire connecting terminals (Figure 3-17) which are not required for the desired length. To continue the example given in Step 2, when the track and shunt wires are connected to terminals C and F, a simulated track length of 1400 feet (800 + 400 + 200) is selected. Placing a strap between terminals D and E shorts the 400-foot inductor, removing it from the series circuit.

Table 3-11 Adjustable Inductor Assembly, 8A398-6, Terminal Connections

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 1	COLUMN 2	COLUMN 3
SIMULATED TRACK LENGTH FEET/METERS	**SET TRACK & SHUNT WIRES TO TERMINALS**	**CONNECT SHORTING STRAP(S) TO THESE TERMINALS**	**SIMULATED TRACK LENGTH FEET/METERS**	**CONNECT TRACK AND SHUNT WIRES TO TERMINALS**	**CONNECT SHORTING STRAP(S) BETWEEN THESE TERMINALS**
50/16	A-B		1650/503	A-G	B-C, C-D, D-E, E-F
100/31	B-C				
150/46	A-C		1700/519	B-G	C-D, D-E, E-F
200/61	C-D		1750/134	A-G	C-D, D-E, E-F
250/77	A-D	B-C	1800/549	C-G	D-E, E-F
300/92	B-D		1850/564	A-G	B-C, D-E, E-F
350/107	A-D		1900/580	B-G	D-E, E-F
400/122	D-E		1950/595	A-G	D-E, E-F
450/137	A-E	B-C, C-D	2000/610	D-G	E-F
500/153	B-E	C-D	2050/625	A-G	B-C, C-D, E-F
550/168	A-E	C-D	2100/640	B-G	C-D, E-F
600/183	C-E		2150/656	A-G	C-D, E-F
650/199	A-E	B-C	2200/671	C-G	E-F
700/214	B-E		2250/686	A-G	B-C, E-F
750/229	A-E		2300/701	B-G	E-F
800/244	E-F		2350/717	A-G	E-F
850/259	A-F	B-C, C-D, D-E	2400/732	E-G	
900/275	B-F	C-D, D-E	2450/747	A-G	B-C, C-D, D-E
950/282	A-F	C-D, D-E	2500/762	B-G	C-D, D-E
1000/305	C-F	D-E	2550/778	A-G	C-D, D-E
1050/320	A-F	B-C, D-E	2600/793	C-G	D-E
1100/336	B-F	D-E	2650/808	A-G	B-C, D-E
1150/351	A-F	D-E	2700/823	B-G	D-E
1200/366	D-F		2750/839	AG	D-E
1250/381	A-F	B-C, C-D	2800/854	D-G	
1300/397	B-F	C-D	2850/869	A-G	B-C, C-D, D-E
1350/412	A-F	C-D	2900/884	B-G	C-D
1400/427	C-F		2950/899	A-G	C-D
1450/442	A-F	B-C	3000/914	C-G	
1500/458	B-F		3050/930	A-G	B-C
1550/473	A-F		3100/945	B-G	C-D, D-E, E-F
1600/488	F-G		3150/961	A-G	C-D, D-E, E-F

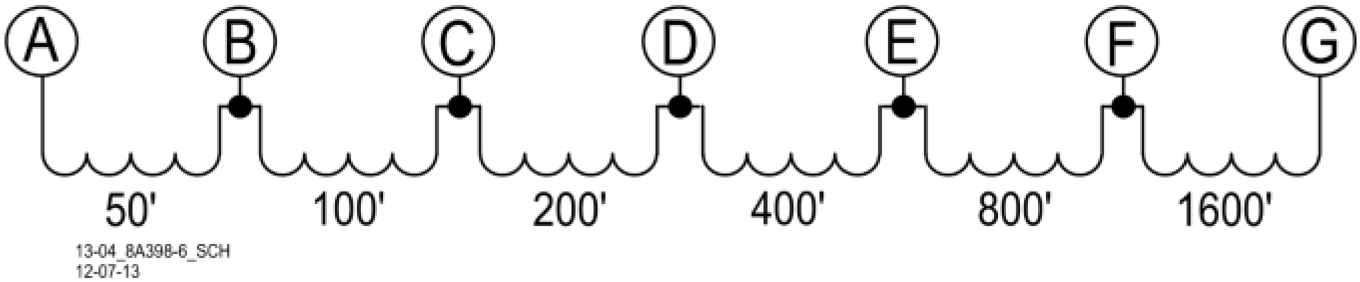


Figure 3-18 Adjustable Inductor, 8A398-6 Schematic

3.10.2 8A398-6 Adjustable Inductor Assembly Specifications

Diameter:	3.375 inches (8.573 centimeters)
Height:	9 inches (22.860 centimeters to top of AREMA terminals)
Weight:	5 pounds, 12 ounces (2.59 kilograms)

3.11 TRACK CIRCUIT ISOLATION DEVICES

Several types of track circuit isolation devices are available for both DC and AC coded track applications. The following discussions are grouped by coded track circuit types.

NOTE

NOTE

The recommendations presented in the following paragraphs are general in nature and no attempt has been made to cover all applications.

Battery chokes and code isolation devices described here are designed for mounting inside a weatherproof enclosure.

If there are any questions concerning these recommendations or applications, contact Siemens Technical Support for assistance.

3.11.1 Steady Energy DC Track Circuits

NOTE

NOTE

If the track connection for the DC track circuit are 2,000 ft (609.8 m) or more beyond the GCP approach termination shunt, a battery choke is not required (see Figure 3-19).

A DC track circuit should be equipped with a battery choke when its battery is located:

- Within the Model 3000/4000/5000/3000+ GCP approach
- Less than 2,000 ft. (609.8 m) beyond the approach termination.

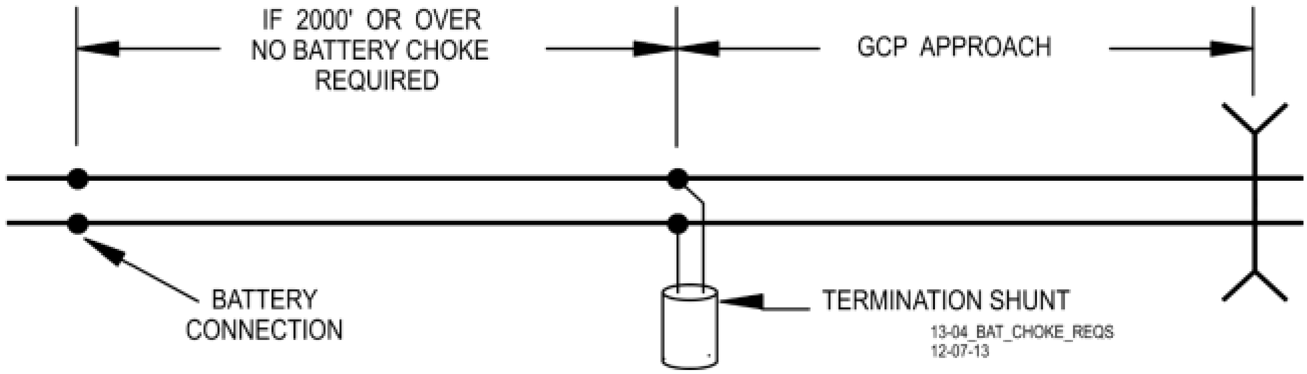


Figure 3-19 Battery Choke Requirements

Either of the following Battery Chokes may be used: (see limitations in the following paragraphs):

- Part number 8A065A
- Part number 62648.

The use of battery chokes is subject to the following limitations:

- Operation of long DC track circuits with very low ballast conditions may be affected by the DC resistance (DCR) of the 8A065A Battery Choke (DCR of 8A065A is 0.40 ohm). Such track circuits should use the 62648 Battery Choke, which has a DCR of 0.10 ohm.
- When a rectified track circuit is used and the GCP is operating at 114 Hz, an 8A076A Wideband Shunt (Paragraph 3.8) should be used together with the Battery Choke to eliminate 120 Hz ripple. This application is illustrated in Figure 3-20.

The 62648 and 8A065A Battery Chokes each consist of a large inductance coil with two top-mounted AREMA terminals and a mounting base (see Figure 3-21).

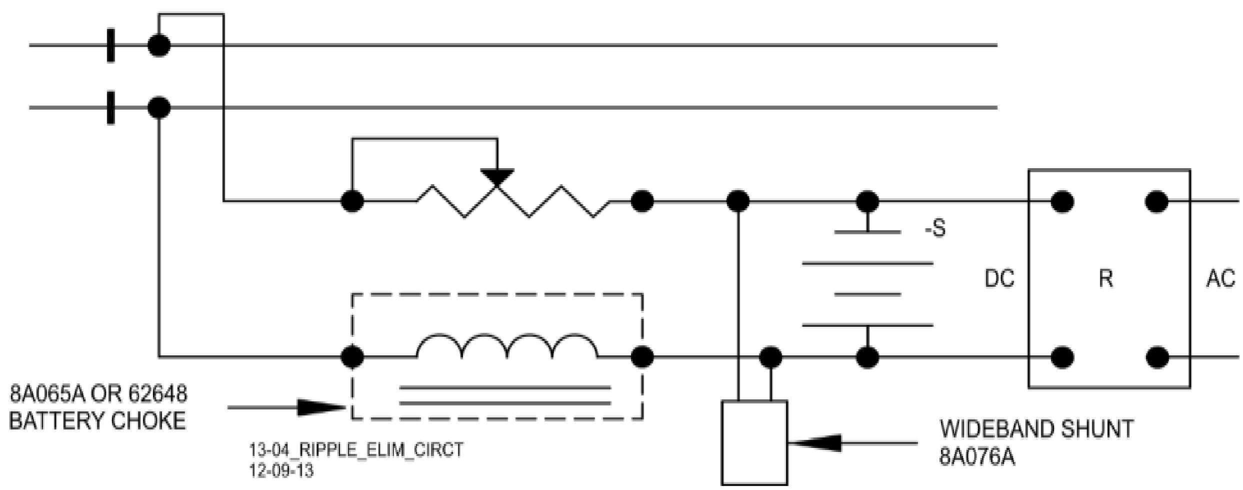


Figure 3-20 Ripple Elimination Circuit

3.11.1.1 Battery Chokes Specifications, 62648 and 8A065A

Diameter:	4.5 inches (11.43 centimeters) wide
	5 inches (12.7 centimeters) deep
	8.5 inches (21.59 centimeters) high (to top of terminal studs)
Weight:	17 pounds (approximately 7.72 kilograms)

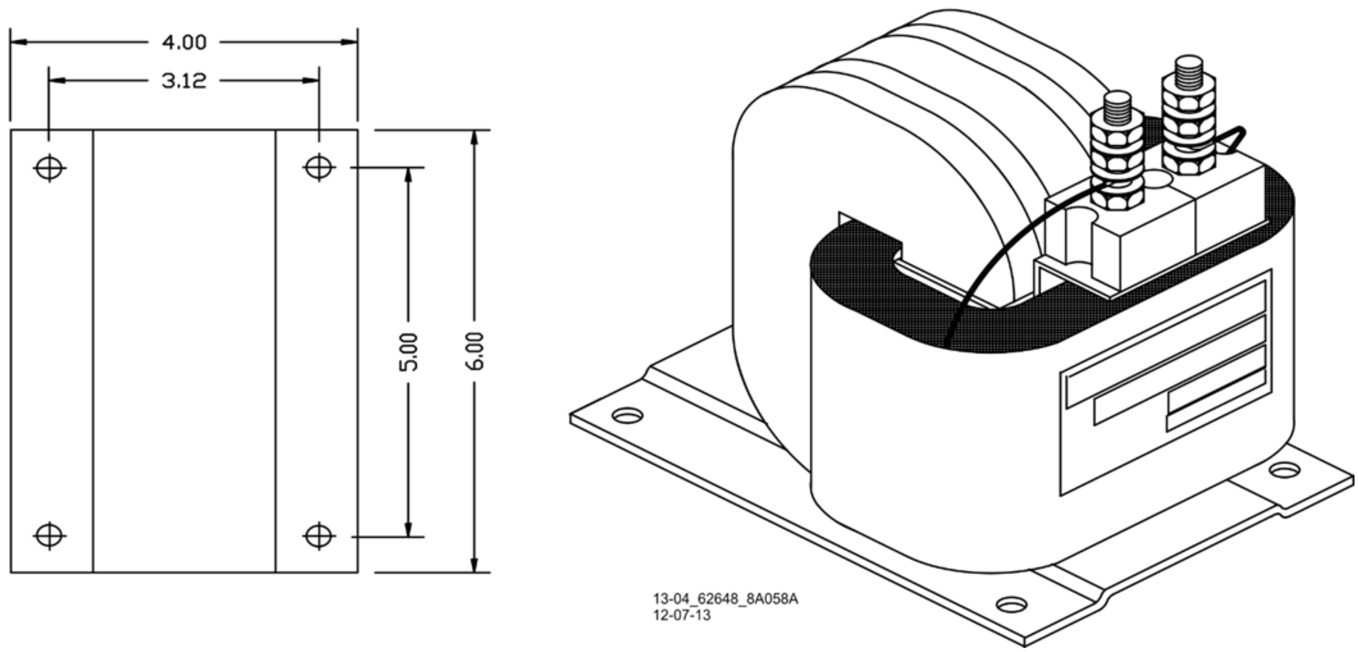


Figure 3-21 Battery Choke with Mounting Dimensions, 62648/8A065A

3.11.2 Siemens GEO Electronic DC Coded Track System

The standard Siemens Model 3000+ GCP frequencies of 86 Hz and above are compatible with GEO. Track circuits and Isolation Devices are generally not required in the GEO transmitter rail connections. GCP frequencies of 86, 114, 156, and 211 Hz require use of high transmit power and the GEO Track Noise Suppression Filter, A53252. The GEO Filter must be installed on the filter terminals of the GEO chassis at the signal location for the above mentioned frequencies.

3.11.3 ElectroCode Genrakode™ Electronic Coded Track System

Model 3000+ GCP frequencies of 86 Hz and above can normally be used with ElectroCode Genrakode™ Electronic Coded Track System.

- All frequencies of 211 Hz and lower require use of high current track drive.
- In certain instances, 285 Hz may also require high current.
- For frequencies of 211 Hz and lower, a 6A342-5 filter may be required when the ElectroCode Genrakode™ transmitter is located within the Model 3000+ GCP approach. It is acceptable to have ElectroCode TF-f filters installed at existing locations.

NOTE

NOTE

Under some circumstances, an external track filter may be required when electronic coded track is located within the Model 3000+ GCP approach. As with any coded track system, the lower the transmit level, the less interference to GCP units.

3.11.4 Relay Coded DC Track

Most relay coded DC track installations require the use of DC Code Isolation units. A code isolation unit is a special battery choke that aids in preventing coded track battery and track relays from causing high interference with the Model 3000+ GCP. There are three Siemens DC Code Isolation units: the 6A342-1 DC Code Isolation Unit, used in single polarity systems, the 6A342-3 DC Code Isolation Unit, which is used in dual polarity systems, and finally the 6A342-5 DC Code Isolation Unit used in Electrocode type systems.

3.11.5 DC Code Isolation Unit, 6A342-1

The 6A342-1 DC Code Isolation Unit, Figure 3-22, is used in most single polarity code systems. It consists of filter components (L1, C1, R1, and CR1) and three AREMA binding posts on a mounting base. The 6A342-3 DC Code Isolation Unit is used in GRS Trakode (dual polarity) relay systems.

WARNING

WARNING

THE SINGLE POLARITY CODED TRACK CIRCUIT MUST BE CAREFULLY REVIEWED TO ENSURE THAT ALL TRANSMIT AND RECEIVE CODES ARE OF THE SAME POLARITY PRIOR TO INSTALLING ANY 6A341-1 UNIT. IF THE POLARITY IS IN DOUBT, INSTALL TWO 6A342-3 ISOLATION UNITS AT EACH END OF THE TRACK CIRCUIT. SAME INSTALLATION AS THE DUAL POLARITY CODED TRACK CIRCUIT.

CONTACT SIEMENS TECHNICAL SUPPORT AT 800-793-7233 FOR DETAILS.

NOTE

NOTE

All wiring to terminals 1 and 2 on the Isolation units should be number 6 AWG. This significantly reduces current losses to the track relay during low track ballast conditions. Frequencies below 211 Hz require high GCP track drive current.

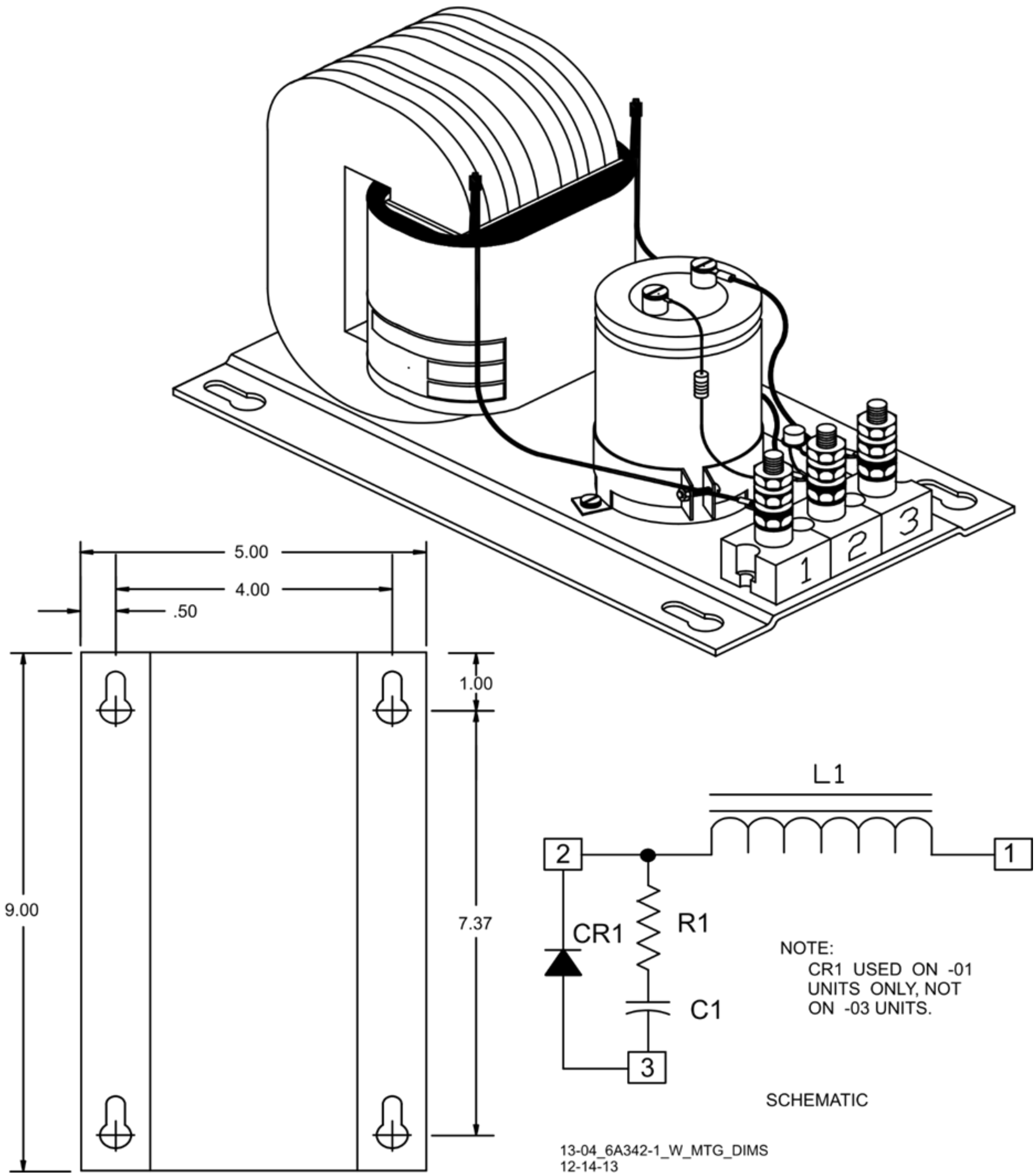


Figure 3-22 DC Code Isolation Unit, 6A342-1, with Mounting Dimensions

WARNING

ALWAYS VERIFY PROPER CODE SYSTEM OPERATION FOLLOWING INSTALLATION OF THE ISOLATION UNIT.

3.11.5.1 DC Code Isolation Unit, 6A342-1 Specifications

Diameter:	5 inches (12.7 centimeters) wide
	9 inches (22.86 centimeters) deep
	5.75 inches (14.605 centimeters) high
Weight:	15 pounds (approximately 6.81 kilograms)

3.11.5.2 DC Code Isolation Unit, 6A342-1 Applications

Three applications for the 6A342-1 DC Code Isolation Units are discussed in the following paragraphs.

3.11.5.3 Single Polarity Systems (Fixed Polarity)

NOTE

To limit current losses to the track relay during low track ballast conditions, use number 6 AWG wires to terminals 1 and 2 on the isolation units.

The 6A342-1 Code Isolation unit can be used in most single (fixed) polarity code systems. A single polarity code system must have the same received and transmitted polarities to use this Code Isolation unit. Most rate code systems (75, 120, 180 ppm) are of this type. Figure 3-23 illustrates a typical 6A342-1 Code Isolation unit installation in a single polarity code system.

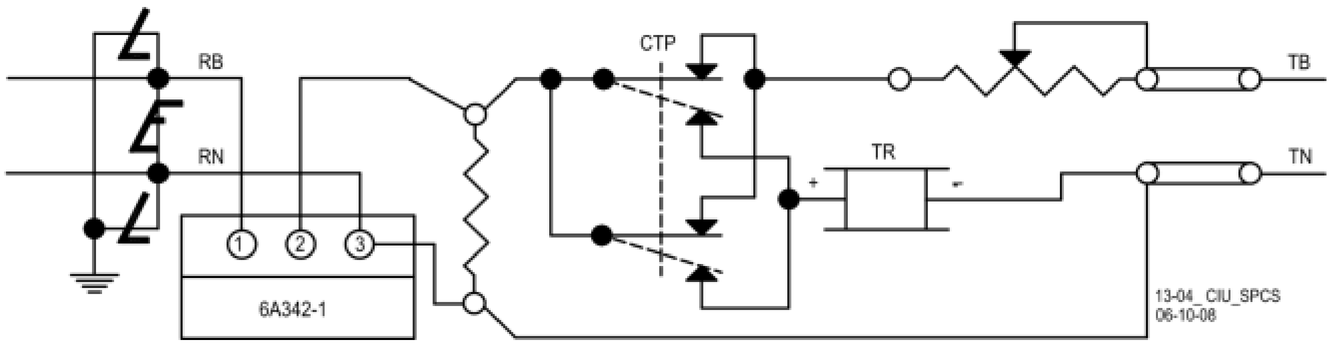


Figure 3-23   Code Isolation Unit in a Single Polarity Code System

3.11.5.4 GRS Trakode (Dual Polarity) Systems

WARNING

TO INSTALL THE UNIT AS SHOWN, A TRANSFER DELAY (TD) RELAY MUST BE USED. DO NOT INSTALL ANY CODE ISOLATION CIRCUIT IN GRS TRAKODE WITHOUT USE OF THE TD RELAY.

ALWAYS VERIFY PROPER CODE SYSTEM OPERATION FOLLOWING INSTALLATION OF AN ISOLATION UNIT.

NOTE

To limit current losses to the track relay during low track ballast conditions, use number 6 AWG wires to terminals 1 and 2 on the isolation units.

Figure 3-24 illustrates the 6A342-1 Code Isolation unit installed in a GRS Trakode system.

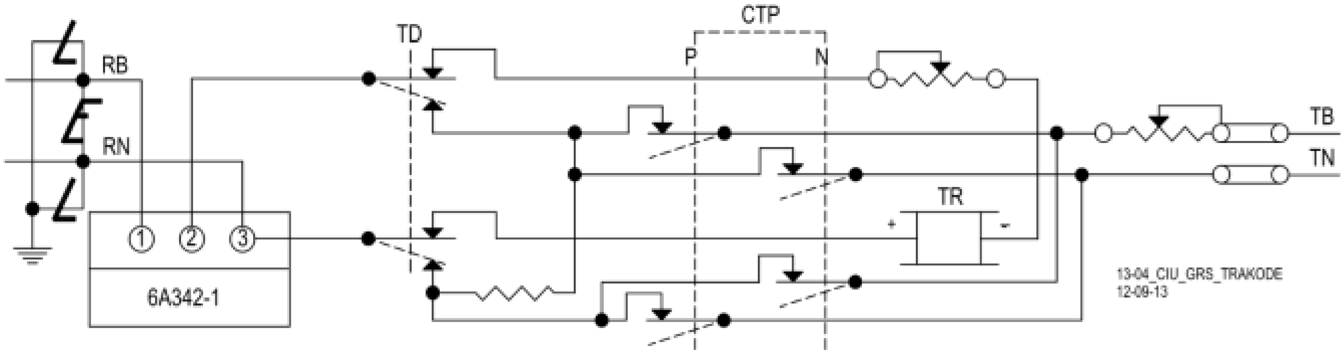


Figure 3-24 Code Isolation Unit Installation in a GRS Trakode System

3.11.5.5 Dual Polarity (Polar) Coded Track Systems Other Than GRS Trakode

WARNING

ALWAYS VERIFY PROPER CODE SYSTEM OPERATION FOLLOWING INSTALLATION OF AN ISOLATION UNIT.

A dual polarity system is one in which the received code polarity is opposite to that of the transmitted code.

3.11.6 DC Code Isolation Unit, 6A342-3

The 6A342-3 Code Isolation unit can be used in a dual polarity system; however, two 6A342-3 units must be specifically placed at each end of the circuit for proper filtering. The application will depend upon the track circuit configuration. Contact Siemens Technical Support for assistance in dual polarity code systems.

3.11.7 AC Code Isolation Units

WARNING

ALWAYS VERIFY PROPER CODE SYSTEM OPERATION FOLLOWING INSTALLATION OF AN ISOLATION UNIT.

CAB signal and style C track circuit installations require the use of an AC Code Isolation unit such as the 8A466-3 (Figure 3-25) or the 8A470-100 (Figure 3-26). Both of these units should be used only with GCP frequencies of 790 Hz and higher in style C track circuit installations. Contact Siemens Technical Support for specific information.

3.11.7.1 AC Code Isolation Unit, 8A466-3

The 8A466-3 AC Code isolation unit is used in 60 Hz CAB signal track circuit installations to reduce 60 Hz harmonics from being applied to the track. It is used with GCP frequencies 156 Hz and higher. It is housed in a steel case with top mounted AREMA binding posts provided for track connections.

3.11.7.2 AC Code Isolation Unit, 8A466-3 Specifications

Dimensions:	10.15 inches (25.781 centimeters) wide 11.78 inches (29.921 centimeters) deep 7.62 inches (19.355 centimeters) high
Weight:	26 pounds (approximately 11.8 kilograms)

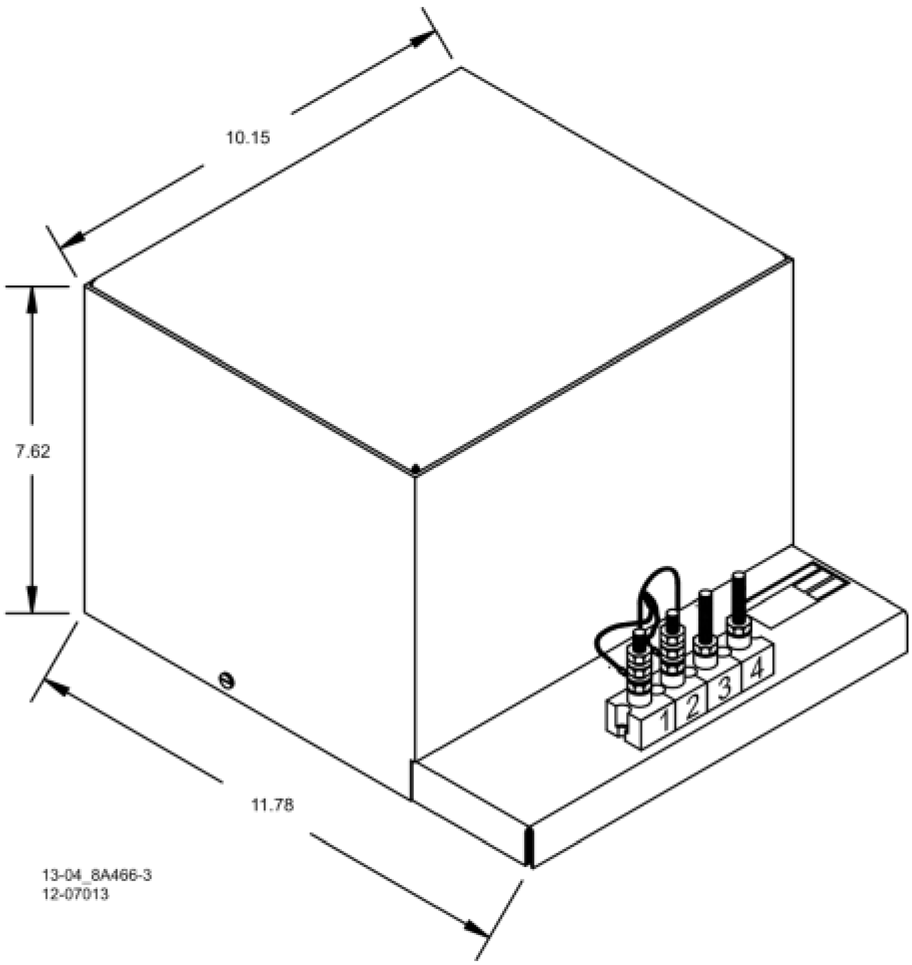


Figure 3-25 AC Code Isolation Unit, 8A466-3

3.11.7.3 AC Code Isolation Unit, 8A470-100

The 8A470-100 AC Code isolation unit is used in 100 Hz CAB signal track circuit installations to reduce 100 Hz harmonics from being applied to the track. It is used with GCP frequencies 211 Hz and higher. It is mounted on an aluminum case with two top mounted AREMA binding posts provided for track connections.

3.11.7.4 Code Isolation Unit, 8A470-100 AC Specifications

Dimensions:	5 inches (12.7 centimeters) wide 9.4 inches (23.876 centimeters) deep 9 inches (22.86 centimeters) high
Weight:	5 pounds (approximately 2.27 kilograms)

3.11.7.5 Cab Signal AC

WARNING

WARNING

ALWAYS VERIFY PROPER CODE SYSTEM OPERATION FOLLOWING INSTALLATION OF A CAB SIGNAL UNIT.

Application of Model 3000+ GCP systems in cab territory using the 8A466-3, 60 Hz AC Code Isolation Unit or the 8A470-100, 100 Hz Isolation Unit is shown in Figure 3-27.

For other installations, contact Siemens Technical Support for assistance.

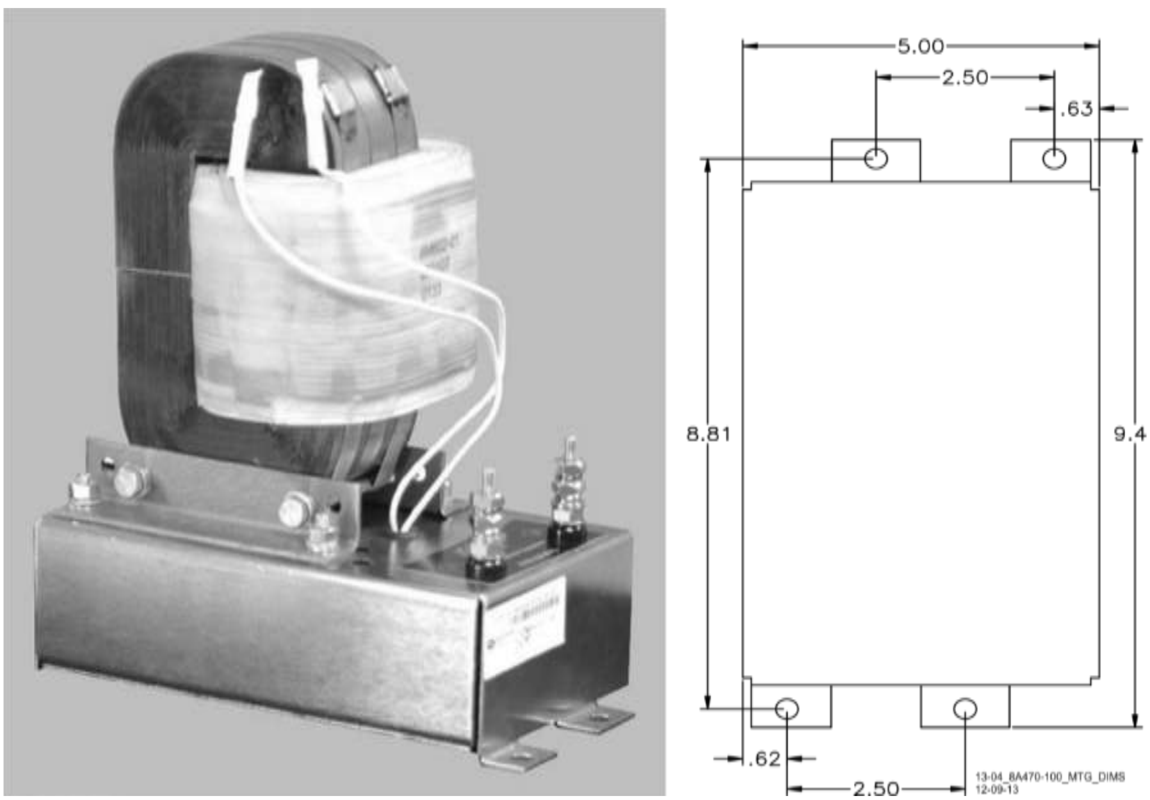


Figure 3-26 AC Code Unit, 8A470-100, with Mounting Dimensions

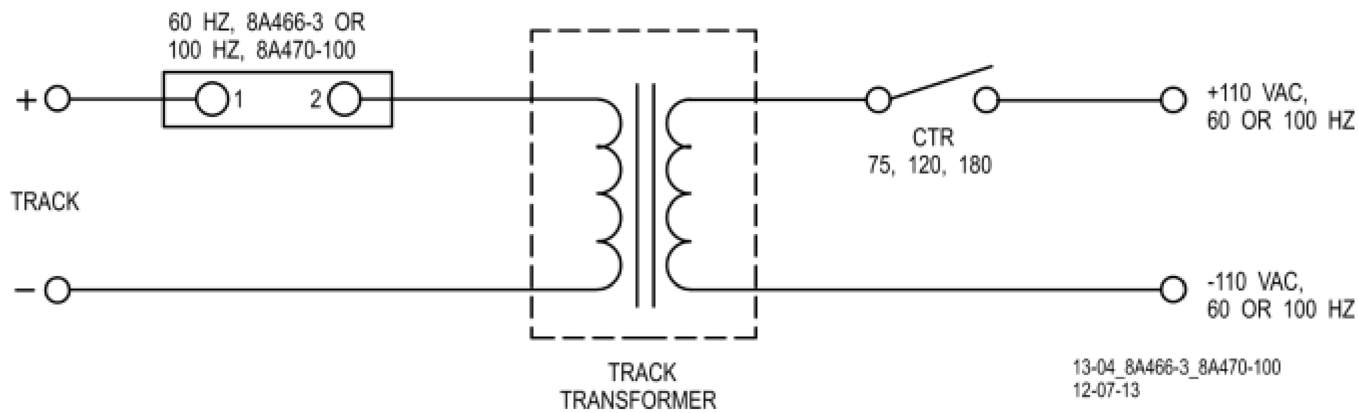


Figure 3-27 AC Code Isolation Unit Used in CAB Territory

3.11.7.6 Style C Track Circuits

The 60 Hz AC Code Isolation unit (8A466-3) is used with style C track circuits as shown in Figure 3-28.

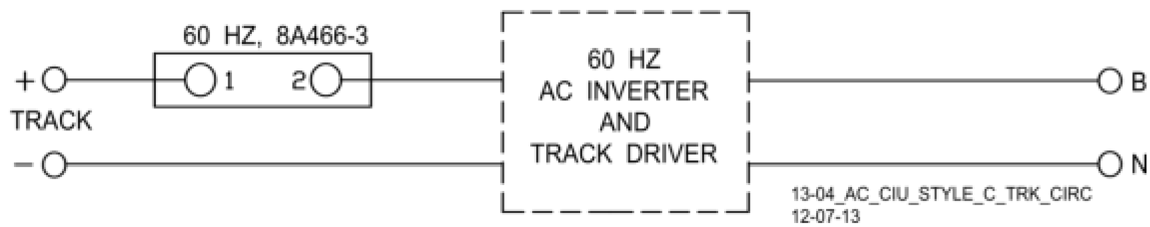


Figure 3-28 AC Code Isolation Unit Used in Style C Track Circuits

3.11.7.7 AC Code Isolation Unit, 8A471-180

For special applications, 180 Hz AC Code Isolation Unit (8A471-180) is also available. Contact Siemens Technical Support for specific information.

3.12 TUNABLE INSULATED JOINT BYPASS COUPLER, 62785-F

The Tunable Insulated Joint Bypass Coupler, 62785-f is the only tuned bypass coupler to be used with the Model 3000+ GCP for bypassing insulated joints in DC coded track.

- The 62785-f Bypass Coupler is used in all Model 3000+ GCP applications requiring the use of an insulated joint bypass coupler.
- The 62785-f Coupler is available in standard Siemens frequencies of 156 Hz through 970 Hz.

WARNING

> **WARNING**
>
> **INSULATED JOINT BYPASS COUPLERS, 62531-F AND 62631-F, MUST NOT BE USED WITH THE MODEL 3000+ GCP.**
>
> **WHEN THE MODEL 3000+ GCP IS PROGRAMMED AS A PREDICTOR, THE 62785-F COUPLER CANNOT BE USED TO BYPASS INSULATED JOINTS WITHIN THE INNER TWO-THIRDS OF AN APPROACH, EXCEPT AS SPECIFIED IN Table 3-12**
>
> **THE TUNED JOINT COUPLER MUST BE TUNED PRIOR TO PERFORMING SETUP FOR APPROACH LENGTH AND LINEARIZATION PROCEDURES DURING THE TRACK CALIBRATION PROCESS.**
>
> **ONLY 62785-F TUNED BYPASS COUPLERS MAY BE USED TO BYPASS INSULATED JOINTS IN CODED DC TRACK CIRCUITS.**

The application guidelines for Tunable Insulated Joint Bypass Coupler, 62785-f when used only with the Model 3000+ GCP have been expanded as follows:

- In DC coded track circuits, the insulated joints within an approach may be bypassed using the Siemens 62785-f Tunable Insulated Joint Bypass Coupler, provided the minimum distances specified in Table 3-12 are observed.
- The 62785-f Coupler must be field tuned to pass the Model 3000+ GCP operating frequency (f) around insulated joints in DC or coded DC track circuits.
- Field tuning of the Coupler enables precise frequency adjustment for track and joint parameters.
- The Coupler must be located within 10 feet of the insulated joints that it is coupling.
- The minimum distance to the insulated joints is generally a function of the Model 3000+ GCP operating frequency; i.e., the lower the operating frequency, the longer the minimum distance.

Two sets of insulated joints may be coupled in any single approach, provided the minimum operating distances specified in Table 3-12 are observed.

Table 3-12 indicates the minimum operating distances (in feet) to the first and second set of insulated joints that are coupled with 62785-f couplers for Model 3000+ GCP operation.

Table 3-12 Minimum Distance to Insulated Joints When Coupled with Tunable Insulated Joint Bypass Coupler, 62785-F

FREQUENCY (HZ)	MINIMUM DISTANCE TO FIRST SET OF INSULATED JOINTS (FEET/METERS)	MINIMUM DISTANCE TO SECOND SET OF INSULATED JOINTS (FEET/METERS)
86	N/A	N/A
114	2000/610	3000/914
151 – 211	1500/458	2200/671
212 – 348	1000/305	1400/427
349 – 560	700/214	1000/305
561 – 790	500/153	800/244
791 – 979	400/122	700/214

*Distance applies to insulated joints located on the same side of the crossing.

The Coupler is housed in a 6-inch (15.24 cm) diameter case.

- A pair of 10 foot, number 6 AWG leads extend from one end
- Eight AREMA terminals extend from the other end (see Figure 3-29)
- Five of the terminals (labeled A through E) are equipped with special gold test nuts that are used to tune the Coupler.

WARNING

WARNING

AT THE COMPLETION OF THE FIELD TUNING, THE 62785-F BYPASS COUPLERS ENSURE THAT A STANDARD AREMA NUT IS TIGHTENED SECURELY AGAINST EACH GOLD NUT ON TERMINALS A THROUGH E INCLUDING THE TERMINALS THAT ARE NOT TIGHTENED DOWN.

NOTE

NOTE

While field tuning the 62785-F Bypass Coupler, tightening the nut on the terminal E produces maximum change in EZ value. Tightening the nut on terminal A produces minimum change.

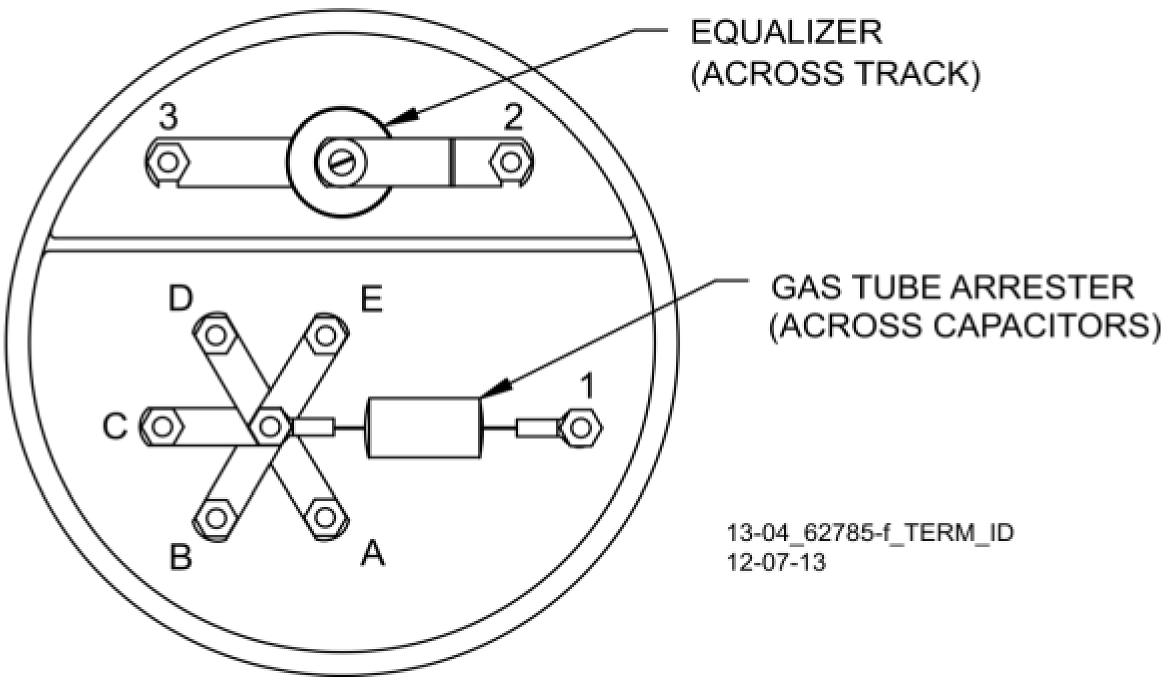


Figure 3-29 Terminal Identification, 62785-f Tunable Insulated joint Coupler

The Coupler is tuned in the following sequence:

- The gold nut on terminal E is tightened first.
- Calibrate the Model 3000+ GCP so that the EZ value is 100
- Next, a hardwire shunt is placed across the tracks, first on one side of the coupler and then on the other, tightening one or more of the remaining nuts in sequence to obtain the minimum change in EZ value across the joint.

NOTE

NOTE

Tightening the nut on terminal E produces maximum change in EZ value and tightening the nut on terminal A produces minimum change.

- When the adjustment is complete, a second (standard) AREMA nut is tightened on each of the terminals to lock the gold adjusting nuts firmly in position.
- Next, an equalizer and a gas tube for capacitor protection are connected to the remaining AREMA terminals to provide complete surge protection.
- Finally, a pliable end cap is secured in place over the terminal end of the coupler by a sturdy stainless steel clamp to provide protection against moisture and dust.

There are two different tuning procedures to tune the Tunable Insulated Joint Bypass Coupler depending on where the coupler(s) is/are located in the approach. Use the procedure outlined in Paragraph 3.12.1 primarily. Use the procedure outlined in Paragraph 3.12.2 as an alternate. Refer to Figure 3-30 when performing either of the following tuning procedures.

CAUTION

CAUTION

THE COUPLER SHOULD BE CONNECTED WITHIN 10 FEET (3.048 METERS) OF THE RAILS TO AFFORD MAXIMUM PROTECTION FROM PHYSICAL DAMAGE, IT SHOULD BE ENCASED IN A PROTECTIVE ENCLOSURE OR BURIED (EITHER VERTICALLY OR HORIZONTALLY) AT AN APPROPRIATE DEPTH TO PROVIDE MAXIMUM PROECTION FROM PHYSICAL DAMAGE.

NOTE

NOTE

Multiple couplers often require the procedures in Paragraph 3.12.2 for proper setup.

NOTE

NOTE

It is not necessary to bury the coupler below the frost line.

3.12.1 Field Tuning Procedure #1

Refer to the appropriate installation diagram in Figure 3-30 for the following tuning procedure.

Step 1: Tighten the gold nut securely on terminal E of each coupler.
Step 2: Calibrate the Model 3000+ GCP so that the EZ value is 100.
Step 3: Place a hardwire test shunt across the track at location A (refer to Figure 3-30).
Step 4: Make note of the EZ value appearing on the Model 3000+ GCP display.
Step 5: Move the test shunt to location B.
Step 6: Tune the Tunable Insulated Joint Bypass Coupler #1 to the same EZ value noted in Step 4.

- Tighten the gold nut on the Coupler #1 terminals labeled D, C, B, and A, in sequence beginning with terminal D.
- If tightening a nut results in an EZ value that is lower than the value recorded in step 4, loosen the nut and tighten the next nut in sequence.
- If, after tightening a nut, the EZ value remains higher than the value recorded in step 4, leave the nut tightened and tighten the next nut in sequence.
- Continue to tighten nuts D through A as necessary to obtain an EZ value that is approximately the same as that recorded in step 4.

Step 7: Move the test shunt to location C.

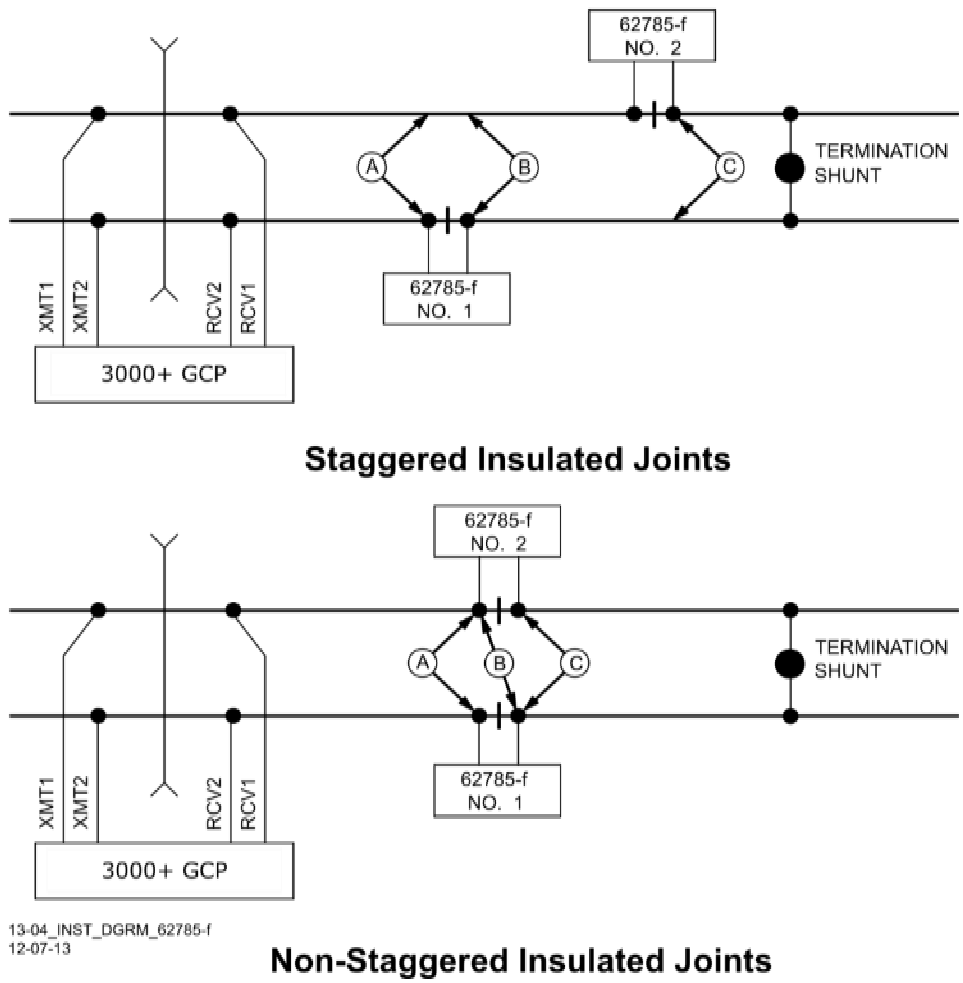


Figure 3-30 Typical Installation Diagrams Using the 62785-f Coupler

Step 8: Tune the No. 2 Tunable Insulated Joint Bypass Coupler to the EZ value noted in step 4.

- Tighten the gold nut on the Coupler #1 terminals labeled D, C, B, and A, in sequence beginning with terminal D.
- If tightening a nut results in an EZ value that is lower than the value recorded in step 4, loosen the nut and tighten the next nut in sequence.
- If, after tightening a nut, the EZ value remains higher than the value recorded in step 4, leave the nut tightened and tighten the next nut in sequence. Continue to tighten nuts D through A as necessary to obtain an EZ value that is approximately the same as that recorded in step 4.

Step 9: Remove the test shunt and tighten a standard AREMA nut against each gold nut to ensure all nuts are securely locked in position.

WARNING

WARNING

ENSURE THAT A STANDARD AREMA NUT IS TIGHTENED SECURELY AGAINST EACH GOLD NUT ON TERMINALS A THROUGH E, INCLUDING THE TERMINALS THAT ARE NOT TIGHTENED DOWN.

Step 10: Completely recalibrate the Model 3000+ GCP and perform all operational checks while observing the smooth change in the EZ value across the couplers during a train move.

3.12.2 Field Tuning Procedure #2 for Couplers

Step 1: Tighten the gold nut securely on terminal E of each coupler.
Step 2: Calibrate the Model 3000+ GCP EZ value to 100.
Step 3: Place a hardwire test shunt across the track at location A (refer to Figure 3-30).
Step 4: Make a note of the EZ and EX values on the Model 3000+ GCP display.
Step 5: Move the test shunt to location B.
Step 6: Tune the Tunable Insulated Joint Bypass Coupler #1 EX value to above 75. The EZ value may be as much as 8 points above the value noted in Step 4.
Step 7: Move the test shunt to location C.
Step 8: Tune the Tunable Insulated Joint Bypass Coupler #2 so the EX value stays above 75. The EZ value may be as much as 16 points above the value note in Step 4.
Step 9: Remove the test shunt and tighten a standard AREMA nut against each gold nut to ensure all nuts are securely locked in position.

WARNING

WARNING

ENSURE THAT A STANDARD AREMA NUT IS TIGHTENED SECURELY AGAINST EACH GOLD NUT ON TERMINALS A THROUGH E. TERMINALS THAT ARE NOT USED FOR TUNING THE COUPLER MUST HAVE THEIR GOLD NUTS REMOVED.

Step 10: Completely recalibrate the Model 3000+ GCP and perform all the operational checks while observing the relatively smooth change in the EZ value across the couplers during a train move.

3.12.3 Tunable Insulated Joint Bypass Coupler, 62785-f Specifications

Dimensions:	18 inches (45.72 centimeters) long 6 inches (15.24 centimeters) in diameter
Weight:	12 pounds (approximately 5.45 kilograms)
Leads:	10 feet (3.048 meters); #6 AWG, stranded, black PVC
Surge Suppresser:	Equalizer, 022700-21X, Siemens No. Z803-00052-0001
Part Numbers:	Gas Tube Arrester, Siemens No. Z803-00053-0001

3.13 MS/GCP TERMINATION SHUNT BURIAL KIT, 62776

The MS/GCP Termination Shunt Burial Kit, 62776, is designed to protect Narrow-band Termination Shunts while they are buried in the space between adjacent railroad ties.

3.13.1 Kit Contents

The MS/GCP Termination Shunt Burial Kit, 62776, consists of a 26-inch length enclosure of 6-inch diameter black PVC tubing, a 7x24-inch, 1/4-inch thick steel plate, a pliable rubber cap with an adjustable stainless steel clamp, and two ¼ X 3-inch lag bolts (not shown).

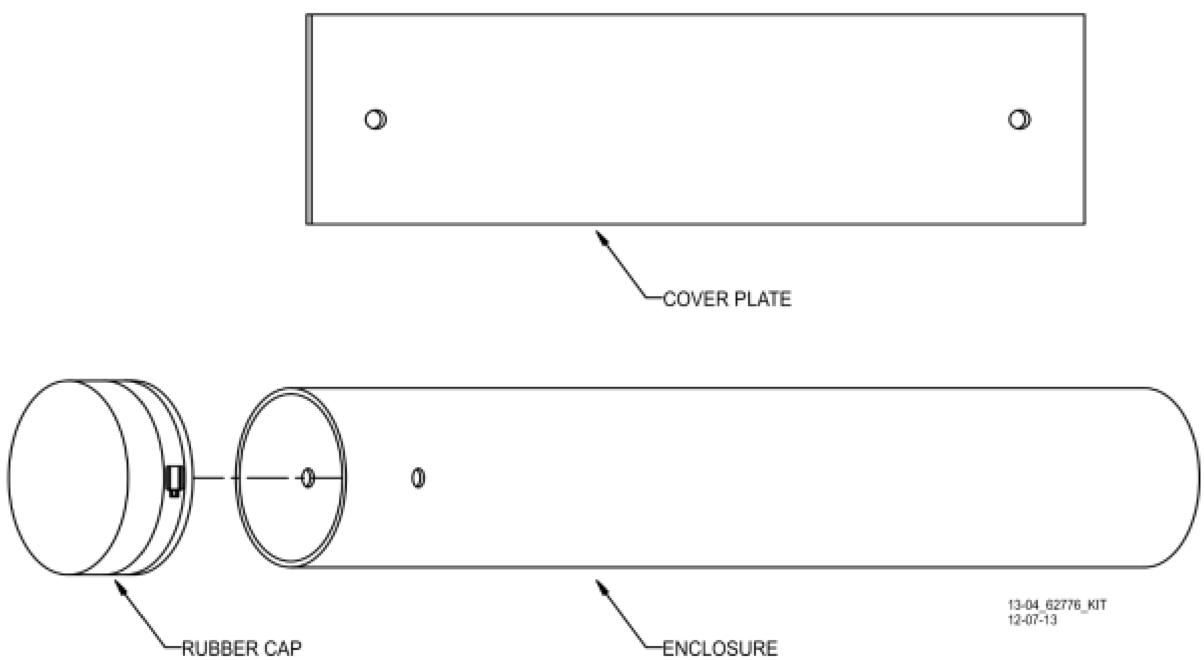


Figure 3-31 MS/GCP Termination Shunt Burial Kit, 62776

One end of the tubing is fitted with a pliable rubber cap that is secured in place by an adjustable stainless steel clamp. Two 5/8-inch diameter holes located near the capped end of the tube accommodate the shunt leads.

3.13.2 Kit Use

The enclosure is normally buried in a vertical position between the ties.

- The Termination Shunt is lowered into the enclosure and the two leads routed through the holes in the enclosure wall and connected to the rails using standard procedures.
- The cap is then secured over the top of the enclosure using the stainless steel clamp.
- The steel plate is centered over the buried enclosure/shunt and securely fastened to each tie using the two 1/4x3-inch lag bolts provided.

3.13.3 62776 Shunt Kit Assembly Specifications

Dimensions	
Enclosure (PVC):	24 inches (60.96 centimeters) long (w/o end cap) 6 inches (15.24 centimeters) in diameter (inside)
Cover Plate (Steel):	24 inches (60.96 centimeters) long 7 inches (17.78 centimeters) wide 0.25 inches (0.635 centimeters) thick
Weight	
Enclosure:	5 pounds (2.27 kilograms)
Cover Plate:	12 pounds (5.44 kilograms)

3.14 SURGE PANELS, 80026-XX

The 80026-XX Surge Panels are available in a combination of equalizers and arresters to provide protection for battery and/or track circuits.

WARNING

ANY ALTERNATIVE SURGE PROTECTION DEVICE MUST BE ANALYZED TO ENSURE THAT FAILURE MODES OF DEVICE DO NOT COMPROMISE SAFETY OR MODEL 3000+ GCP SYSTEM. FOR EXAMPLE, BUT NOT LIMITED TO UNINTENTIONAL EARTH GROUNDS ON CONTROL CIRCUITS OR SHORTS ON TRACK CIRCUITS.

3.14.1 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 3-13. Rack mount Surge Panel applications are listed in Table 3-14.

NOTE

For surge protection requirements not listed or for custom designed Surge Panels, contact Siemens Technical Support.

3.14.2 Surge Panel Nomenclature and Mounting Dimensions

Surge panel nomenclature and mounting dimensions are provided on the figures identified in Table 3-13 and Table 3-14.

3.14.3 Surge Panel Arresters

WARNING

DO NOT MOUNT ARRESTERS WITH ELECTRODES POINTED IN THE DOWN POSITION TO MINIMIZE THE POTENTIAL OF SHORT CIRCUIT.

A typical Surge Panel arrester is shown in Figure 3-32.

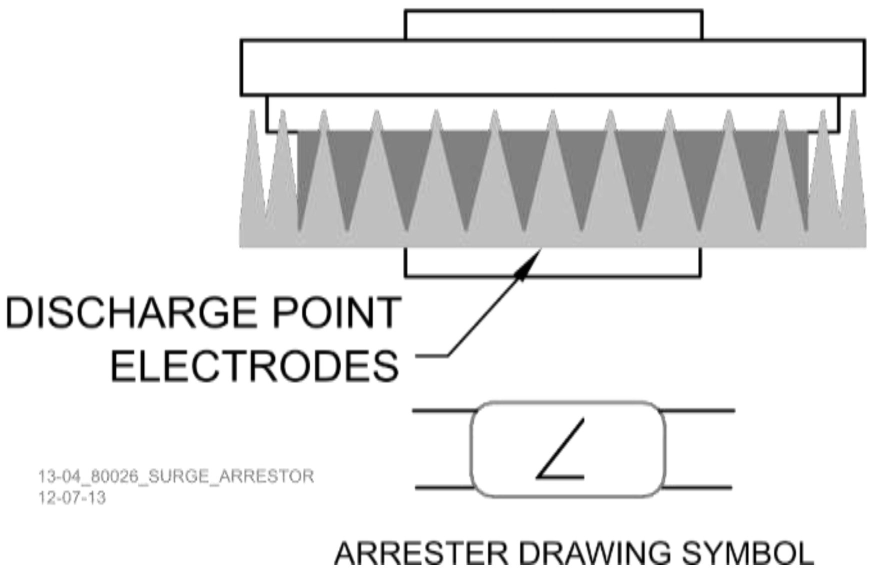


Figure 3-32 Typical 80026 Surge Panel Arrester Mounting Position

Table 3-13 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 (14.453 cm) Depth: 3.625 in (9.208 cm)	6 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 (14.453 cm) Depth: 3.625 in (9.208 cm)	4 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 (14.453 cm) Depth: 3.625 in (9.208 cm)	3 lb (1.36 kg) (approximate)

Table 3-14 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 (12.598 cm) Width: 23 in (58.42 cm) Depth: 4.535 in (11.519 cm)	5 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 (12.598 cm) Width: 23 in (58.42 cm) Depth: 4.535 in (11.519 cm)	6 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 (12.598 cm) Width: 23 in (58.42 cm) Depth: 4.535 in (11.519 cm)	7 lb. (3.18 kg) (approximate)
80026-34	3-37	Protects 1 track circuit. • Use with -31 panel for subsequent track circuit protection.	Height: 4.96 in (12.598 cm) Width: 23 in (58.42 cm) Depth: 4.535 in (11.519 cm)	6 lb. (2.72 kg) (approximate)
80026-35	3-38	Protects 2 track circuits.	Height: 4.96 in (12.598 cm) Width: 23 in (58.42 cm) Depth: 4.535 in (11.519 cm)	7 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 (12.598 cm) Width: 23 in (58.42 cm) Depth: 4.535 in (11.519 cm)	6 lb. (2.72 kg) (approximate)
80026-37	3-39	Protects 1 battery circuit.	Height: 4.96 in (12.598 cm) Width: 23 in (58.42 cm) Depth: 4.535 in (11.519 cm)	6 lb. (2.72 kg) (approximate)
80026-38	3-39	Protects 2 track circuits. • Used in application with six wires on one track and four on the other	Height: 4.96 in (12.598 cm) Width: 23 in (58.42 cm) Depth: 4.535 in (11.519 cm)	8 lb (3.64 kg) (approximate)

PART NO.	FIG.	DESCRIPTION	DIMENSIONS	WEIGHT
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 (12.598 cm) Width: 23 in (58.42 cm) Depth: 4.535 in (11.519 cm)	6 lb. (2.72 kg) (approximate)
80026-41	3-40	Protects 110 VAC circuits. • Used when 20-ampere solid-state crossing controller (91070A) is used in conjunction with MS4000 • Includes four 15-ampere resettable circuit breakers and one 15-ampere GFCI duplex outlet	Height: 4.96 in (12.598 cm) Width: 23 in (58.42 cm) Depth: 4.535 in (11.519 cm)	9 lb (4.09 kg) (approximate)
80026-41A	3-40	Protects 110 VAC circuits. • Used when 40-ampere solid-state crossing controller (91075A) is used in conjunction with MS4000 • Includes three 15-ampere and one 25-ampere resettable circuit breakers and one 15-ampere GFCI duplex outlet	Height: 4.96 in (12.598 cm) Width: 23 in (58.42 cm) Depth: 4.535 in (11.519 cm)	9 lb (4.09 kg) (approximate)
80026-47	3-41	Protects 2 battery circuits and 1 track circuit. • Used with motion sensor battery and second battery	Height: 4.96 in (12.598 cm) Width: 23 in (58.42 cm) Depth: 4.535 in (11.519 cm)	7 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 (12.598 cm) Width: 23 in (58.42 cm) Depth: 4.535 in (11.519 cm)	7 lb (3.18 kg) (approximate)

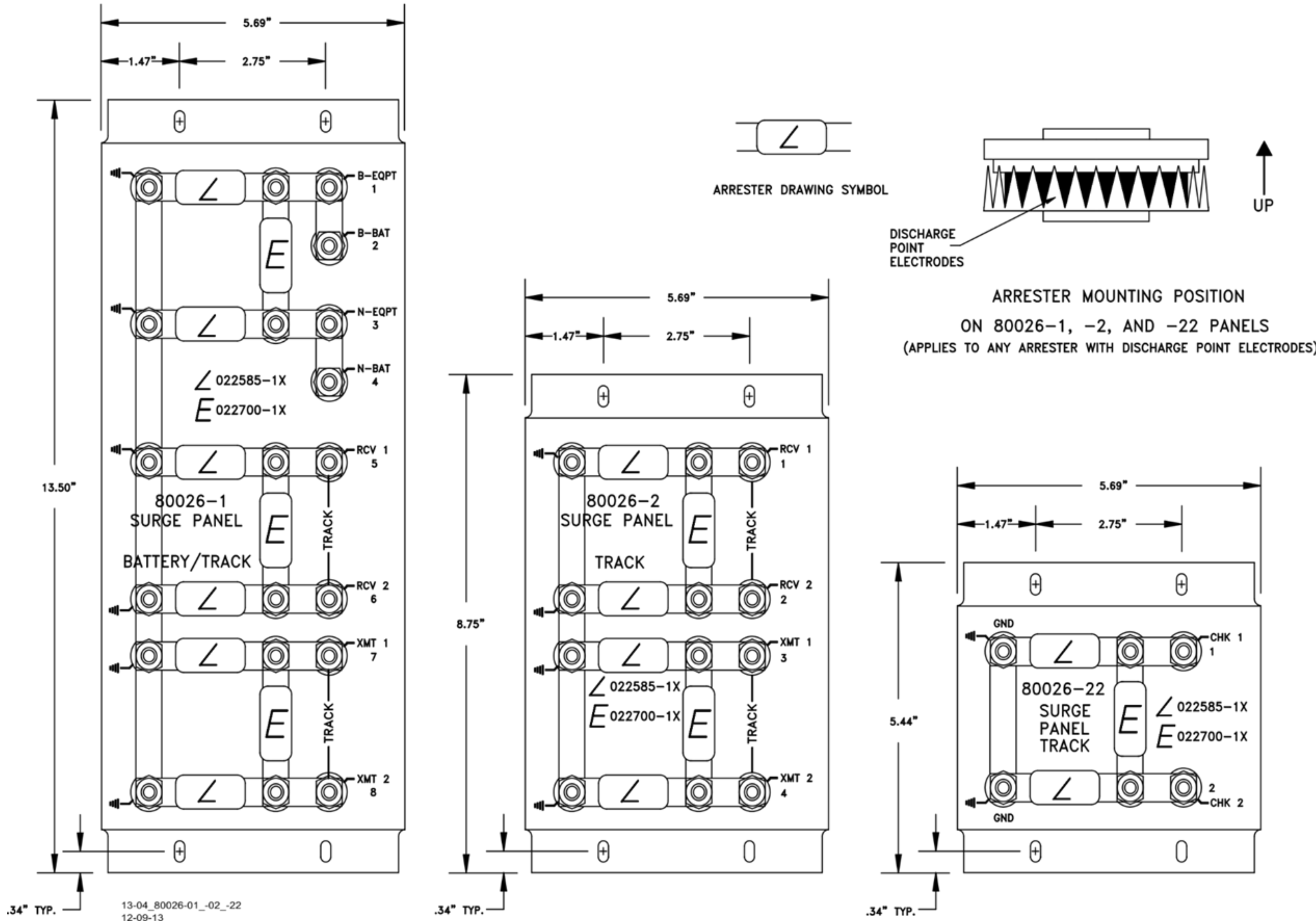


Figure 3-33 Wall Mount Surge Panels, 80026-01, -02, and -22

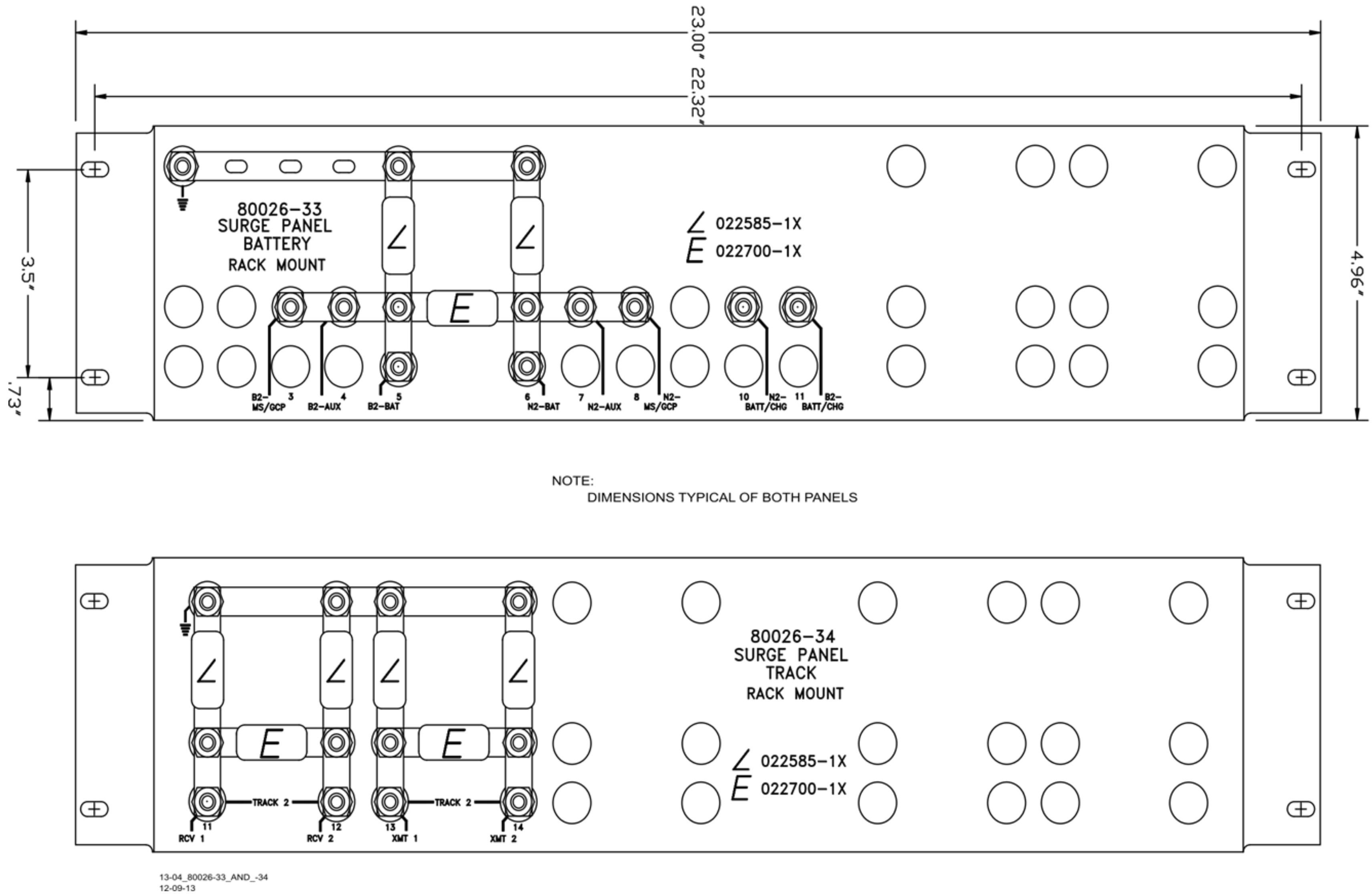


Figure 3-34   Rack Mounted Surge Panels, 80026-31 and -32

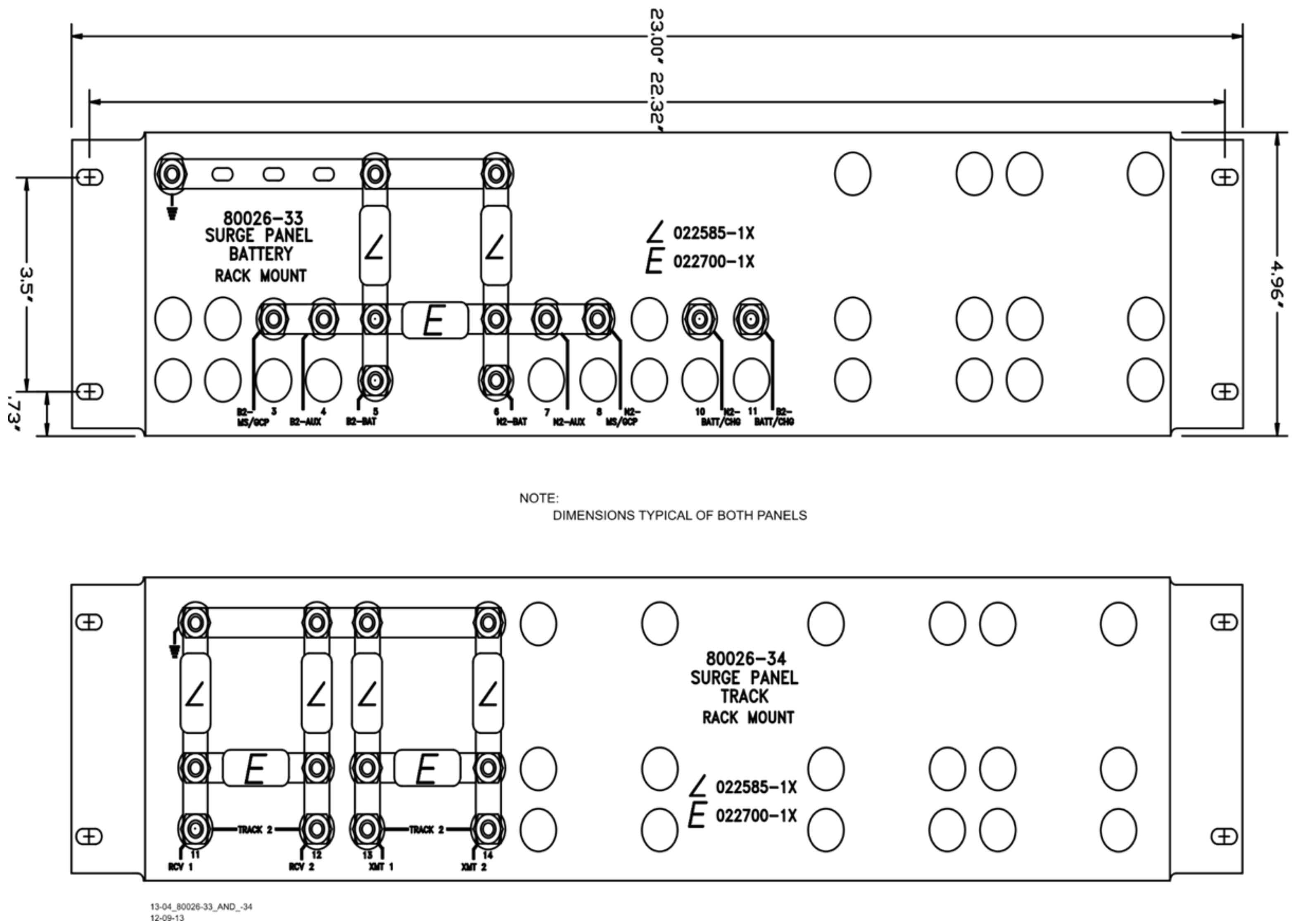


Figure 3-35 Rack Mounted Surge Panels, 80026-33 and -34

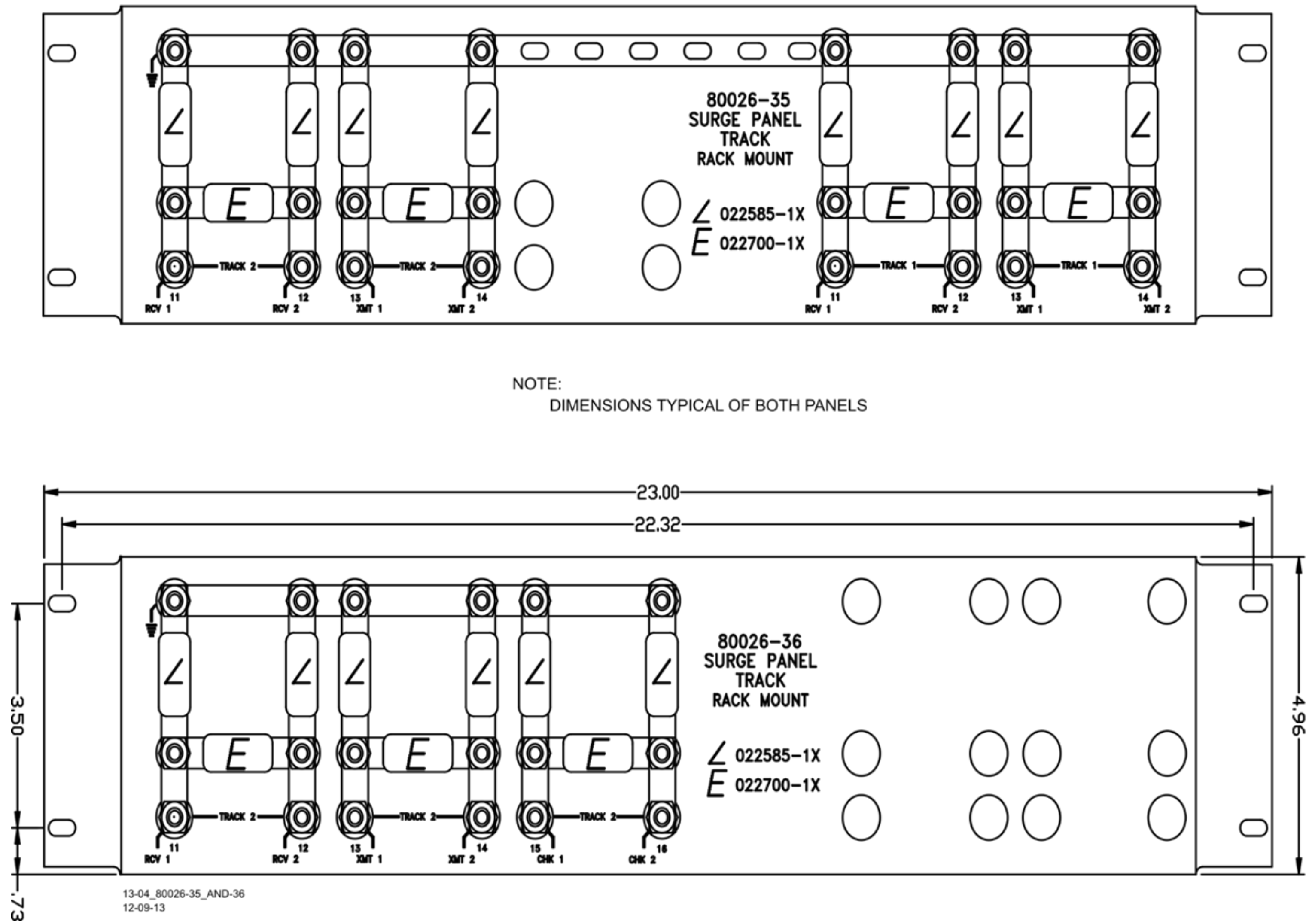


Figure 3-36   Rack Mounted Surge Panels, 80026-35 and -36

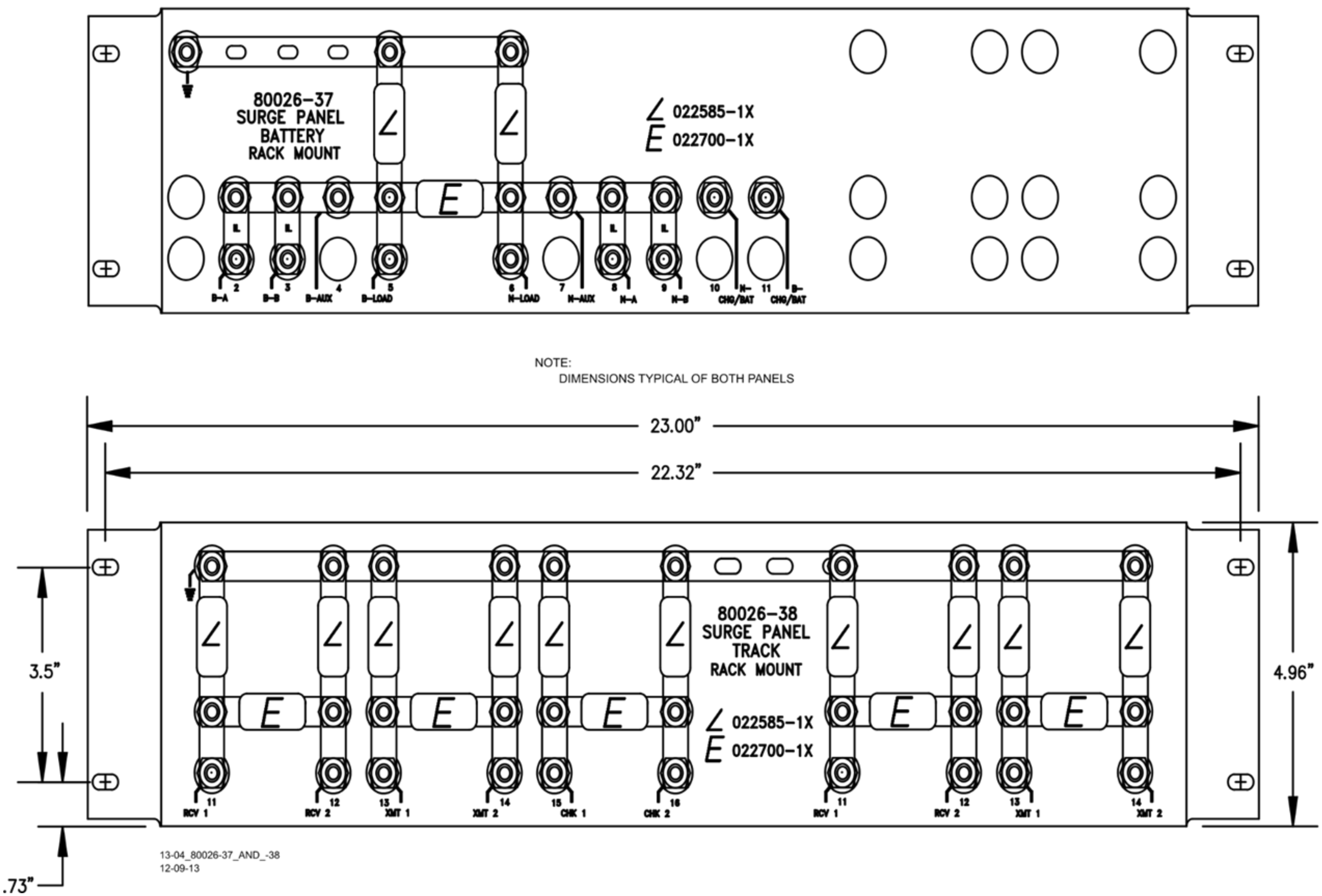


Figure 3-37 Rack Mounted Surge Panels, 80026-37 and -38

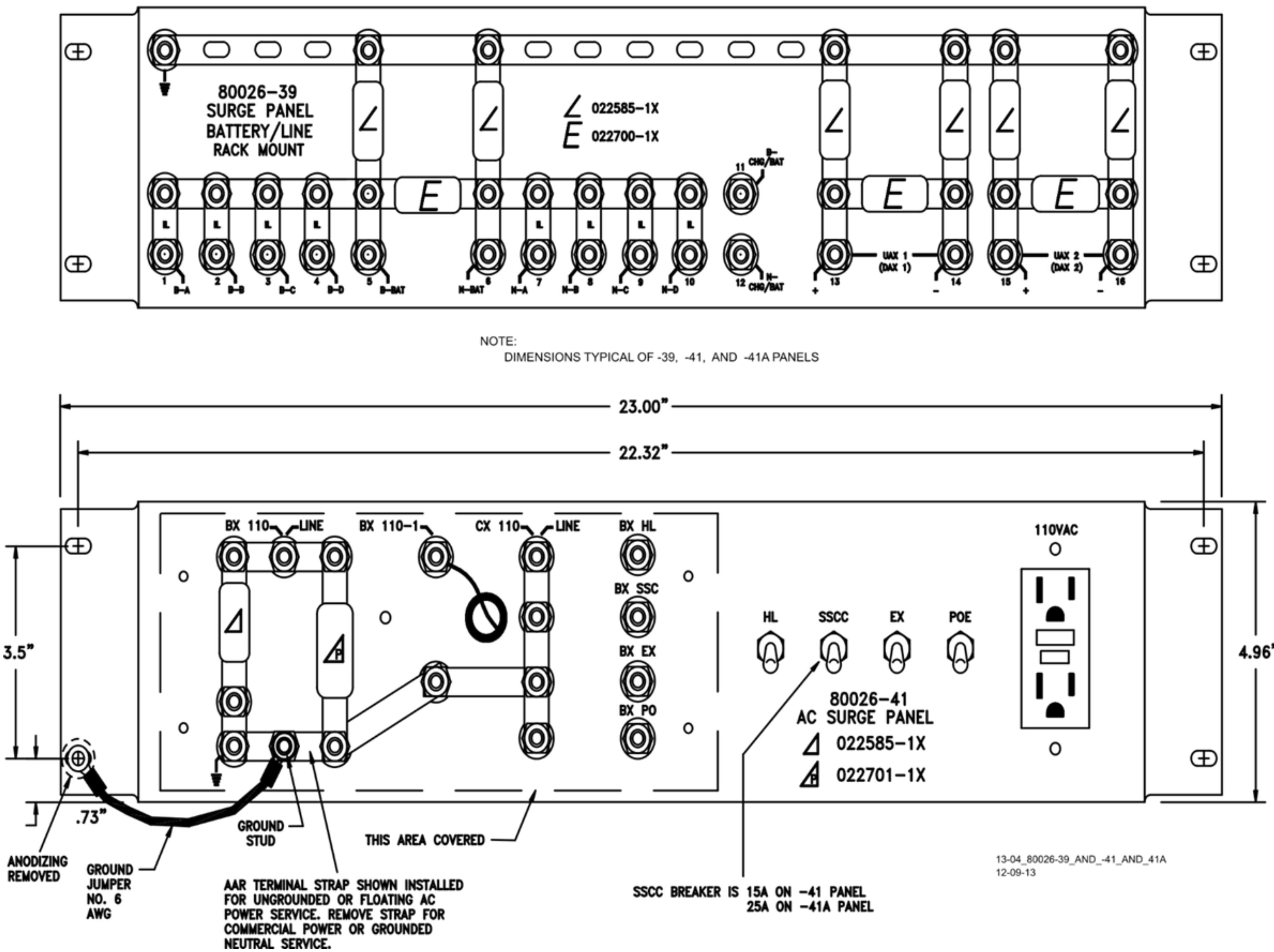


Figure 3-38 Rack Mounted Surge Panels, 80026-39, -41 and -41A

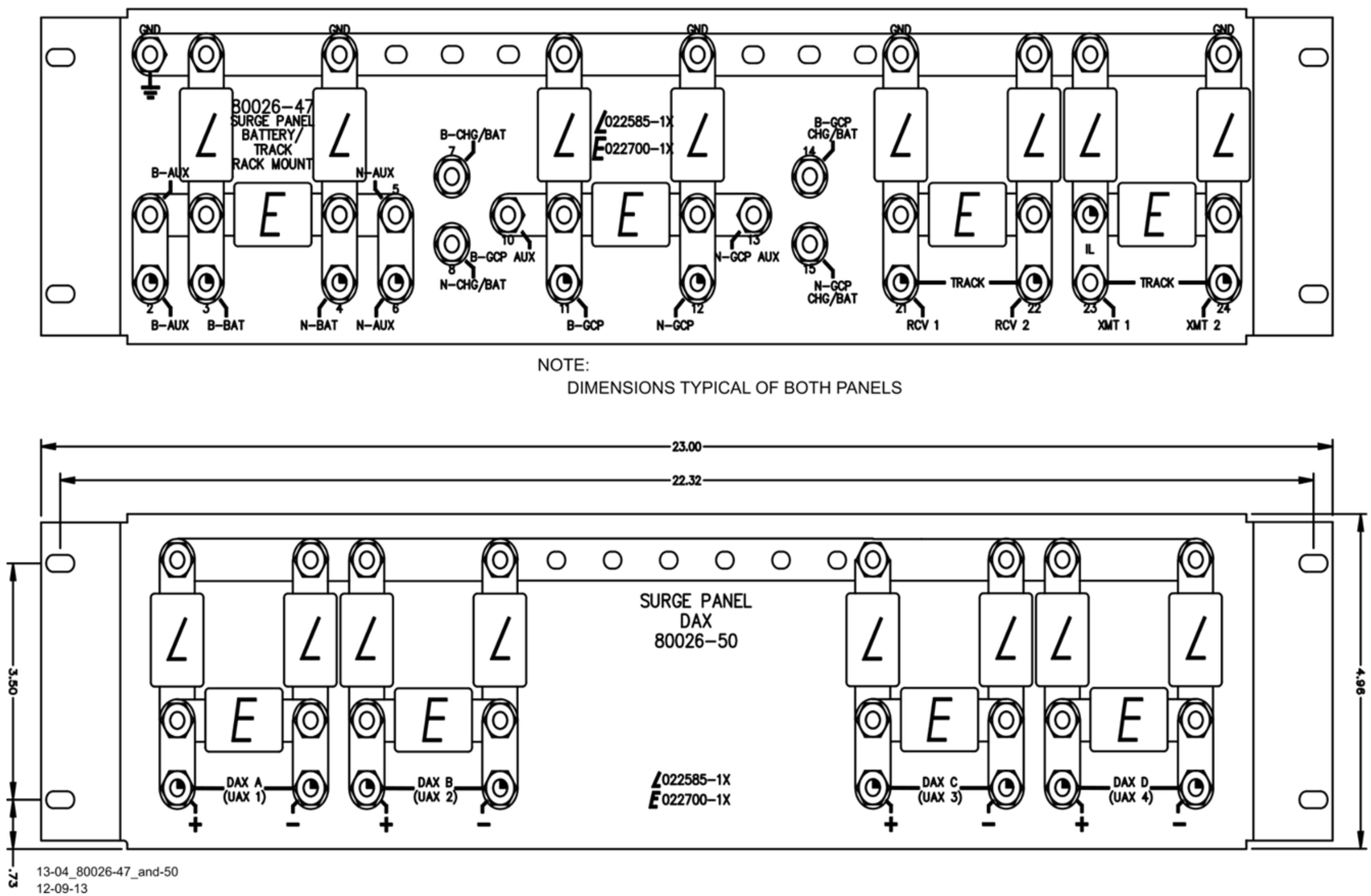


Figure 3-39   Rack Mounted Surge Panels 80026-47 and 80026-50

3.15 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.

3.15.1 Rectifier Panel Assembly Nomenclature and Mounting Dimensions

Rectifier Panel Assembly, 80033 nomenclature and mounting dimensions are provided on Figure 3-40.

Table 3-15 Rectifier Panel Assembly, 80033 Specifications

PARAMETER	VALUE
Height	10.46 in (26.568 cm)
Width	23 in (58.42 cm)
Depth	2.75 in (6.985 cm)
Weight	7 lbs (3.18 kg) (approximate)

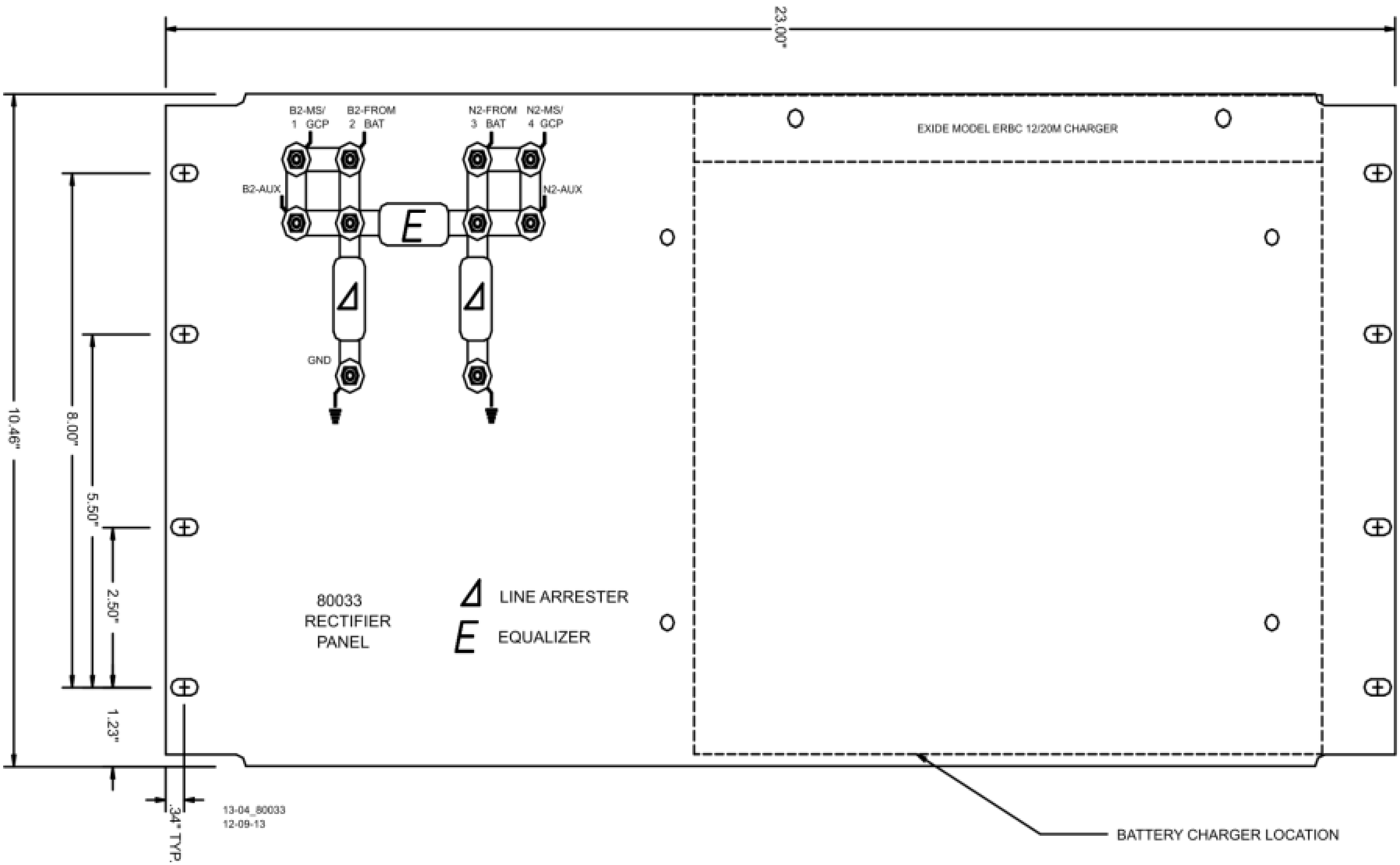


Figure 3-40 Rectifier Panel Assembly, 80033

3.16 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 on Figure 3-41.

Table 3-16 Cable Termination Panel Assembly, 91042 Specifications

PARAMETER	VALUE
Height	3.96 in (10.058 cm)
Width	23 in (58.42 cm)
Depth	2.25 in (5.715 cm)
Weight	7 lbs (3.18 kg) (approximate)

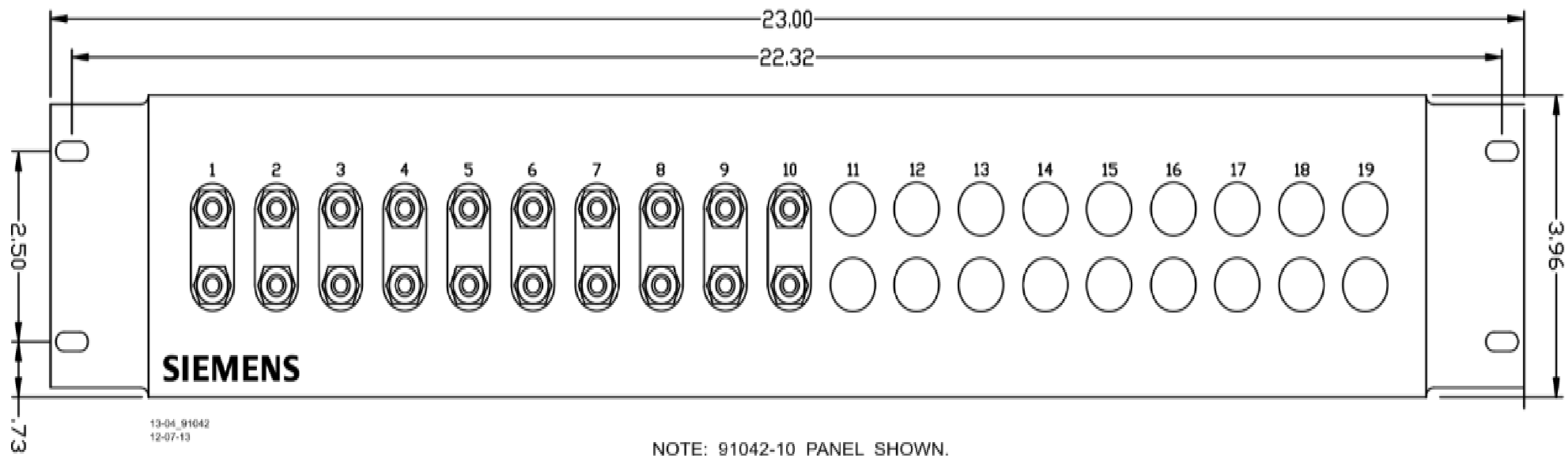


Figure 3-41 Cable Termination Panel Assembly, 91042

SECTION 4 **DISPLAY MENU SCREENS**

4.0 GENERAL

The Display Module's programming interface (Display) is a Siemens-developed, Linux-based software.

4.1 DISPLAY MODULE

The display module provides the user interface that allows:

Status and Diagnostic Monitoring:

- Viewing track status (EZ, EX, speed)
- Island status
- Input and output status

Model 3000+ GCP configuration:

- Upload a configuration package (PAC) file to the CPU II+ or CPU III from the Display's USB drive, or from the Web User Interface (WebUI),
- Download the configuration package (PAC) file from the CPU II+ or CPU III and save it on the Display's USB drive or to the user's PC via the Web User Interface (WebUI).

Software installation to include the following types of software:

- Master Configuration File (MCF) for the CPU II+ or CPU III module
- Master Executive Files (MEF) to the CPU II+ or CPU III, Track and RIO modules
- Non-Vital Executive Files to the Display

Generate, and copy the following reports:

- Configuration (Config) Report

Generate, and copy the following logs

- Event Log
- Diagnostic Log
- Train Log

4.2 DISPLAY SCREENS

The Display portrays five top-level menu screens.

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

To navigate these menu screens:

- Press a number to go to the indicated submenu
- Use the up and down keys to change the highlighted menu, then press **Enter**
- Use the right and left arrows to move from one screen to the next in a cyclical order

Use the **Back** key to go back up to a higher menu. Use the 0 key to move back to the top level Main program menu. Holding the back key for 3s in any screen will navigate back to the top of the menu tree, and then the left and right arrows can be used to get back to the system view.

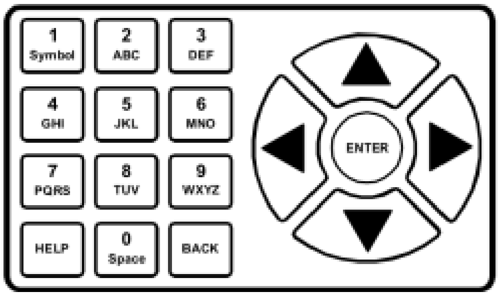


Figure 4-1 Display Keypad

4.2.1 System View Screen

The System View screen provides information regarding the status of:

- Track Data section which shows the status of the used tracks
- Comms Status section which communication status of track, RIO and event recorder
- Relay Output Status section which shows the status of GCP and DAX relay outputs

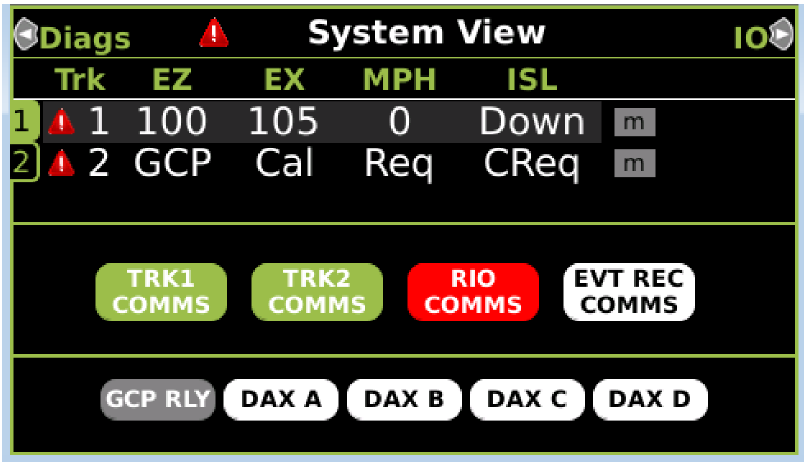


Figure 4-2 Display System View Screen

To easily get back to the System View screen from any other screen in the menu system, just hold the back key for 3s; this will take you back to the top level menus, then press right/left arrow keys until System View is seen.

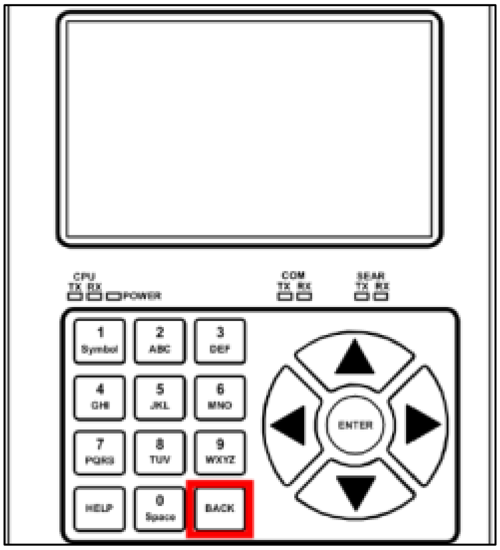


Figure 4-3 Display Keypad Back Key

4.2.1.1 The Track Data Section

The Track Data section provides the following indicators and information (Figure 4-2):

Track number e.g. 1 – 2

Calibration Status of GCP and Island:

When GCP calibration is required, the display shows **GCP Cal Req** under EZ/EX/MPH as shown for track 1 above.

When Island calibration is required, the display shows **CReq** under ISL as show for track 2 in Figure 4-2.

A train on approach is depicted by a warning triangle with a locomotive in it.

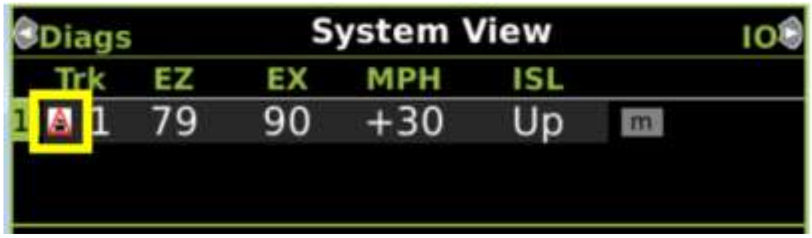


Figure 4-4 Train on Approach Icon

EZ Value – see Trk 1 in Figure 4-4

EX Value– see Trk 1 in Figure 4-4

Train speed measured in MPH – see Trk 1 in Figure 4-4

Island Status shown as:

- Up (unoccupied)
- Down (occupied)
- NA (not applicable) if island not used

NOTE

NOTE

If the 3000+ GCP is configured for metric units, speeds will be shown in km/h and distance in meters.

Additional Information: Out of Service

GCP OOS flashes between blue and white to indicate that the GCP approach circuit is out of service. If the island is used, it will be shown in service.

OOS flashes between blue and white to indicates that both the GCP approach circuit and island circuit are out of service

Figure 4-5 System View Out Service Indication

Enhanced Detection

When a track module has detected unstable EZ/EX readings that are characteristic of poor shunting, and the module has switched into enhanced detection mode, the display will indicate this with ‘ed’ in the Track Data section.

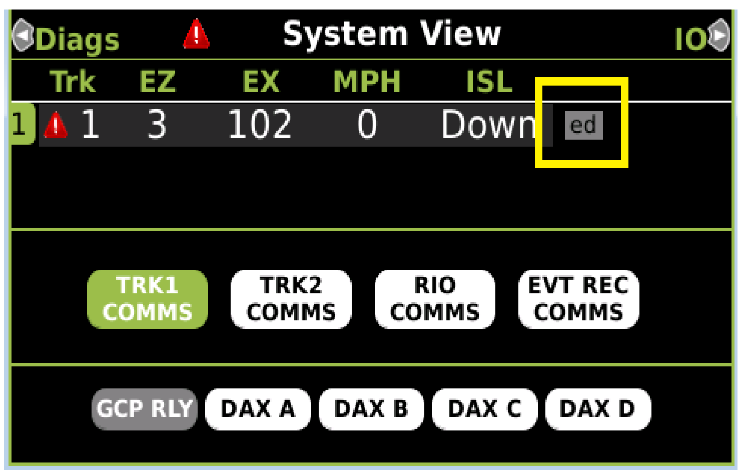


Figure 4-6 Enhanced Detection

Motion Control Active

When the 3000+ GCP has been transferred from a predictor to a motion sensor because either the GCP/MS Control input is de-energized, or the Xfer Delay MS to GCP timer is running, the display will show the 'm' symbol in the track data section for the affected track.

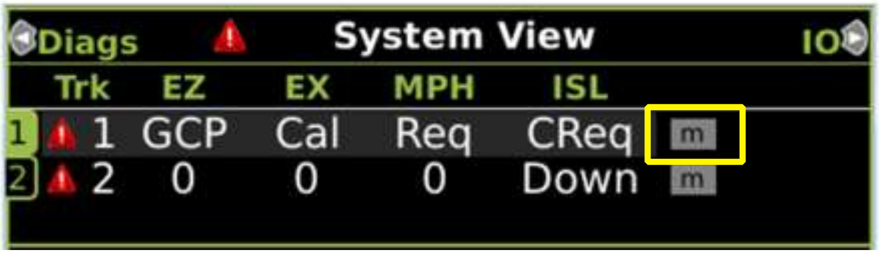


Figure 4-7 System View Motion Control Indication

Diagnostic Indication

When there is a diagnostic message available related to the track module, the system view will indicate this with a red triangle to the left of the track number as shown in Figure 4-7.

Comms Status Section

The Comms Data section shows the communication status of track, RIO, and event recorder. If a module is not configured as used, the comms status will show as white. When the module is communicating properly, the status will show green. When the module is configured for use but is not communicating with the CPU, the status will show red.

For example, the following figure shows a 3000+ GCP configured for one track, so track 2 is shown in white as it is not used. The RIO card is configured for use but the card has not been plugged in, so the RIO Comms shows in red. The event recorder is not configured as used so it shows in white.

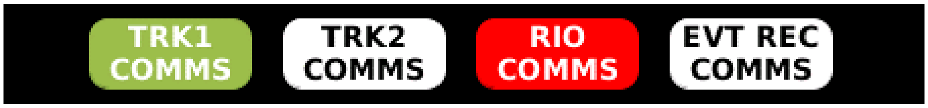


Figure 4-8 Display Comms Status

Relay Output Status Section

The Relay Output Status section shows the state of the GCP and DAX RLY outputs. If DAXes are not used, these are shown in white. Energized outputs are shown in green and de-energized in grey. If an output on a module has failed, i.e. it is in a de-energized state when it is commanded to be energized, the RLY status will show it in red.

For example, the following shows the GCP RLY output as: de-energized, DAX A and DAX B RLY outputs as: energized, and DAX C and DAX D RLY outputs as: not used.

Figure 4-9 Display System Relay Status

The Track Data section has submenus indicated by the green circle and number next to each track shown in the yellow box below.

Figure 4-10 System Track Submenus Buttons

Press the 1 on the display keypad to show the track 1 submenu, or press 2 for the track 2 submenu as shown in Figure 4-12.

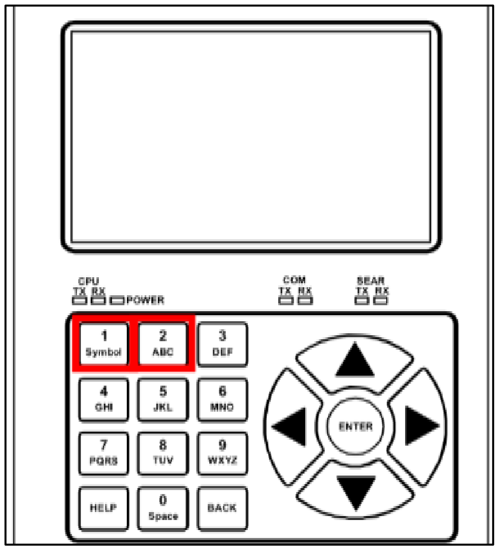


Figure 4-11 Display Keypad Number 1 & 2 Buttons

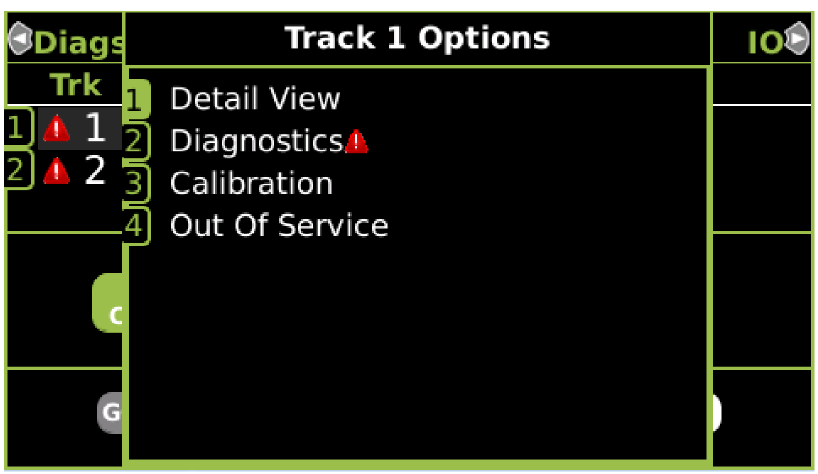


Figure 4-12 System Track Submenus

The individual submenus are discussed in the sections following.

4.2.1.2 Detail View

When **Detail View** is selected from the track submenu, the **Module Details** screen (shown in Figure 4-13) will appear, providing further information for that module. The Check EZ value is shown on this screen. The panel on the right shows the state of the Prime and DAX predictor states from the track module. The DAX predictions are labeled TrkDaxA thru TrkDaxD here, to differentiate them from the actual DAX RLY outputs. The TrkDax is an input into the state of the corresponding DAX RLY output.

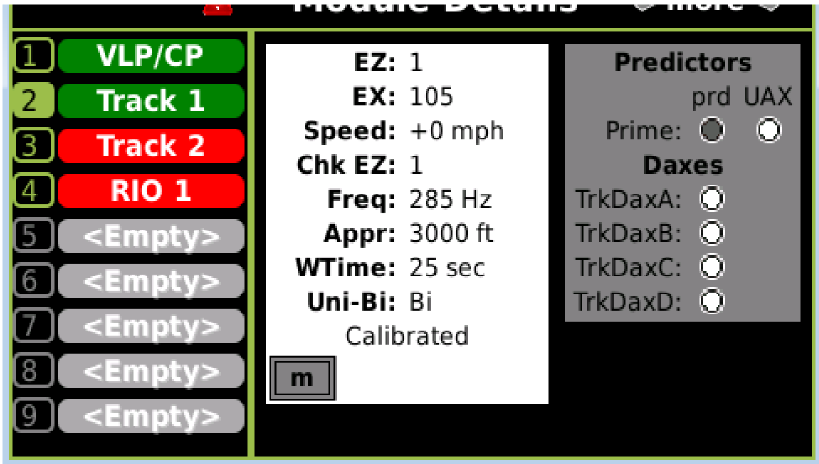


Figure 4-13 Track Detail Screen

Use the left and right arrow keys to navigate through the detail screens of the selected module.

The next screen shown by navigating with the right arrow key will display the details of the island and I/O. This screen is primarily used to see the Z level for the island when the internal island circuit on the module is used. The Z level represents the normalized signal level on the island. When the value is below 100, the island becomes occupied. The island will start its pickup delay timer running when the Z level goes back over 110. The display does not show values over 250, even though the island level will generally be much higher.

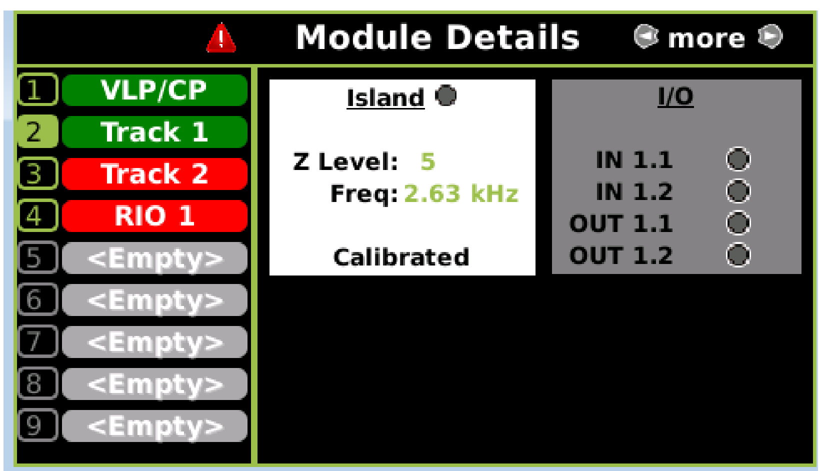


Figure 4-14 Track Detail Screen: Island / I/O

The next screen shows the main track configuration settings.

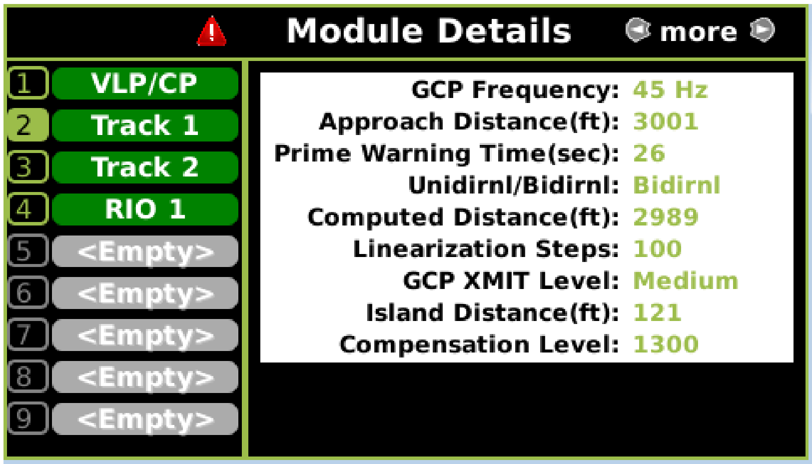


Figure 4-15 Track Detail Screen: Main Configuration Settings

The next screen shows the track check number and the date and time it was last changed.

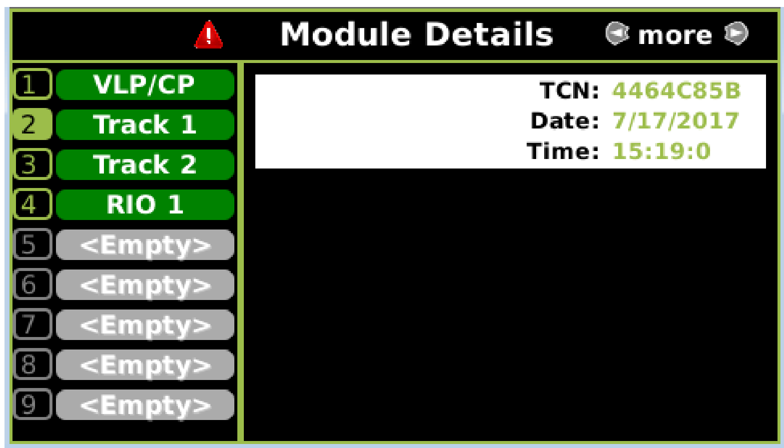
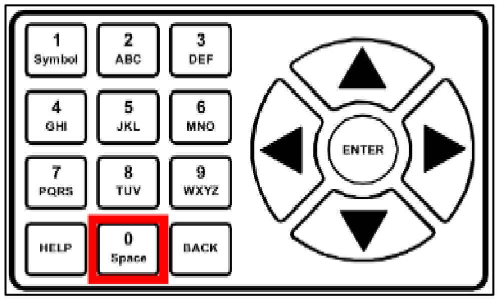


Figure 4-16 Track Detail Screen: TCN

The last screen shows the EZ / EX limits. The information available on this screen:

- The highest EZ value the track has recorded since this screen was last reset and the EX value at that time. The time/date this occurred is shown.
- The lowest EX value the track has recorded since this screen was last reset and the EZ value at that time. The time/date this occurred is shown.

The values can be reset by pressing the 0 on the keypad.



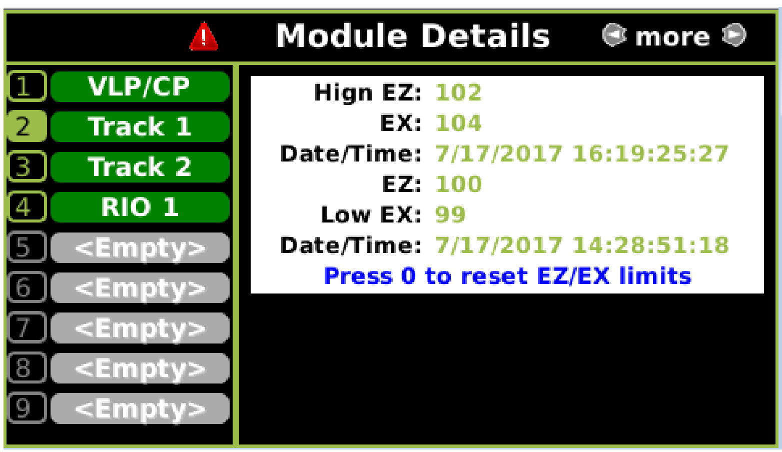


Figure 4-17 Track Detail Screen: High EX / Low EX Limits

To select a different module, either use the up and down keys (see Figure 4-18) or select the number corresponding to the module shown on the left side of the screen.

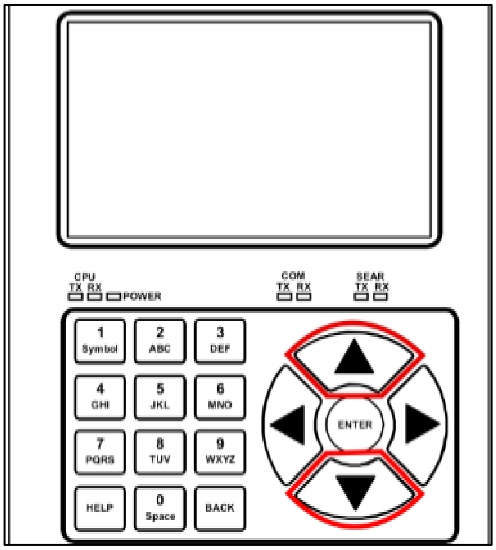


Figure 4-18 Display Module Up and Down Arrow Keys

The RIO module screen shows the status of the I/O on the RIO.

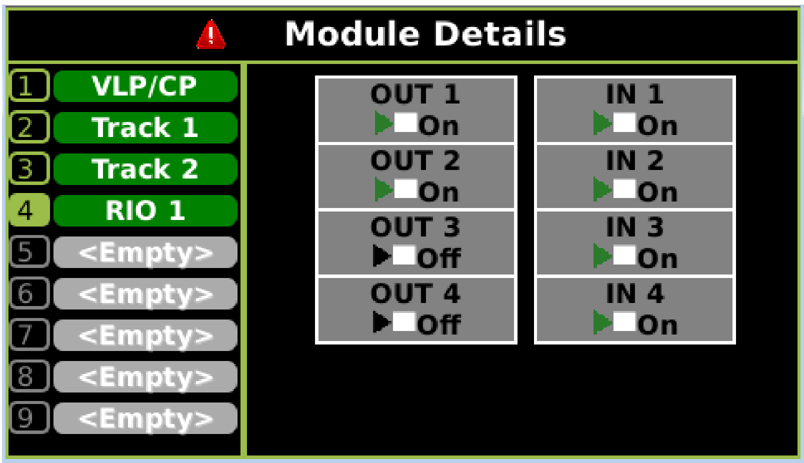


Figure 4-19 RIO Detail Screen

The VLP/CP module screen shows the battery voltages and temperatures monitored by the CPU.

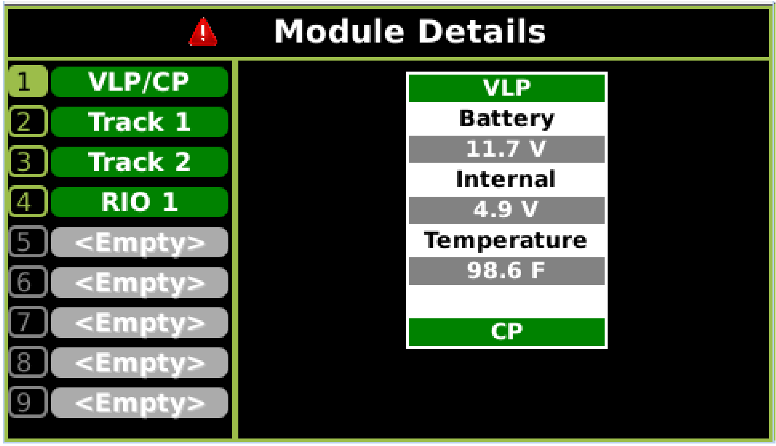


Figure 4-20 CPU Detail Screen

If the Enter key is pressed from the detailed View of a RIO or Track module, the left hand menu will be shown. If Enter is pressed from the detailed View of a VLP/CP Module, the right-hand menu will be shown.

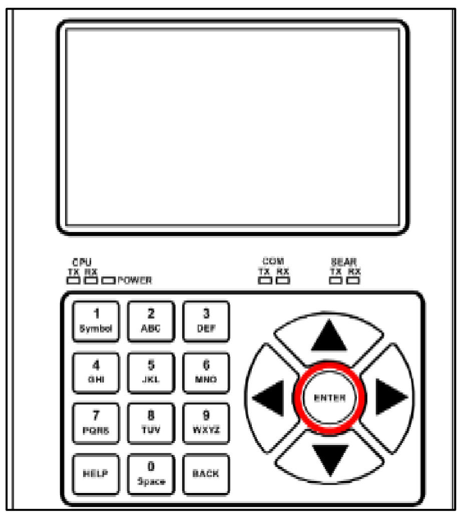


Figure 4-21 Display Keypad Enter Key

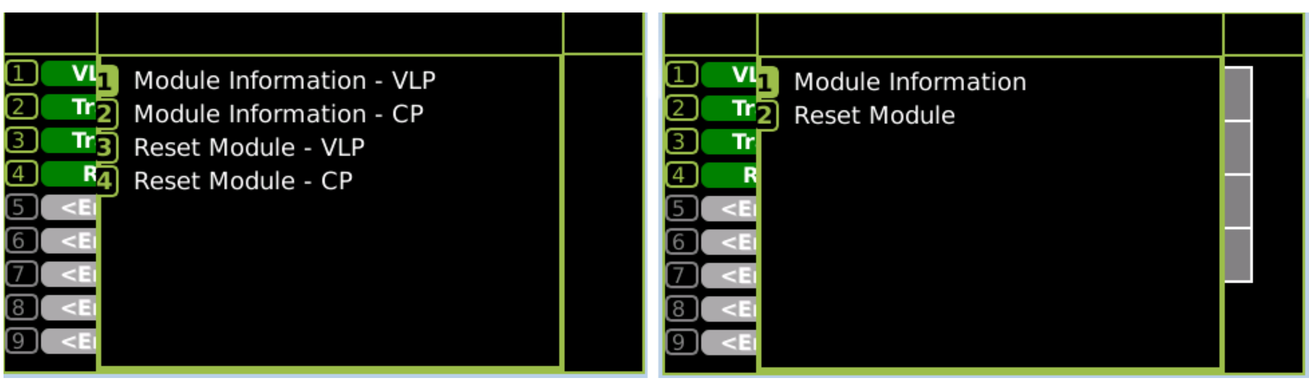


Figure 4-22 Detail Screen Submenus

The module can be reset by selecting the **2) Reset Module** menu item shown in Figure 4-22.

The Module Details screens can be used as an alternative to the Configuration report as a way to check the software and hardware versions.

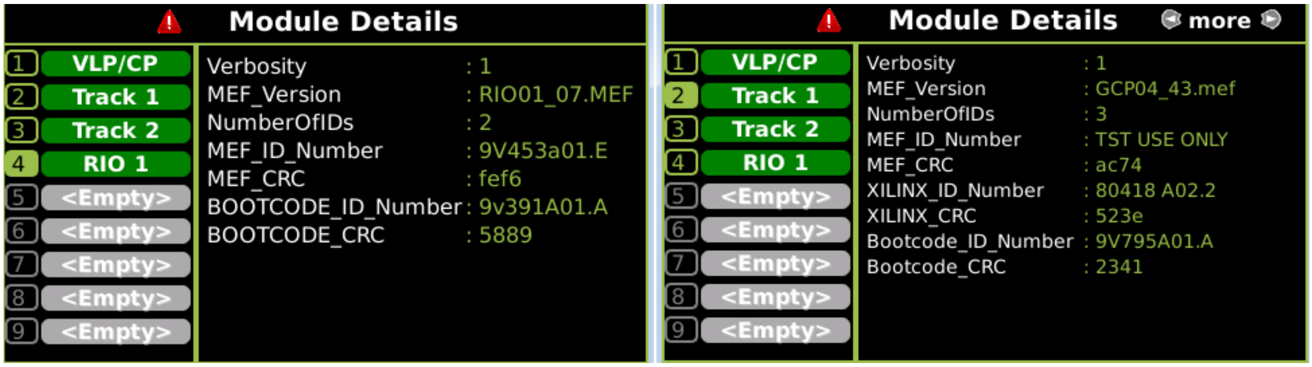


Figure 4-23 Detail Screen Module Information

4.2.1.3 Diagnostics

Selecting the Diagnostics from the Track Options menu will bring up the Diag screen that shows diagnostic messages specific to this module. More information about a specific diagnostic message can be found by first selecting the message and then pressing the **Enter** button. See section 4.2.4.1 for more details.

Figure 4-24 Track Diagnostic Screen

4.2.1.4 Calibration

Selecting the Calibration menu from the Track Option will bring up the Calibration screen for the specified module.

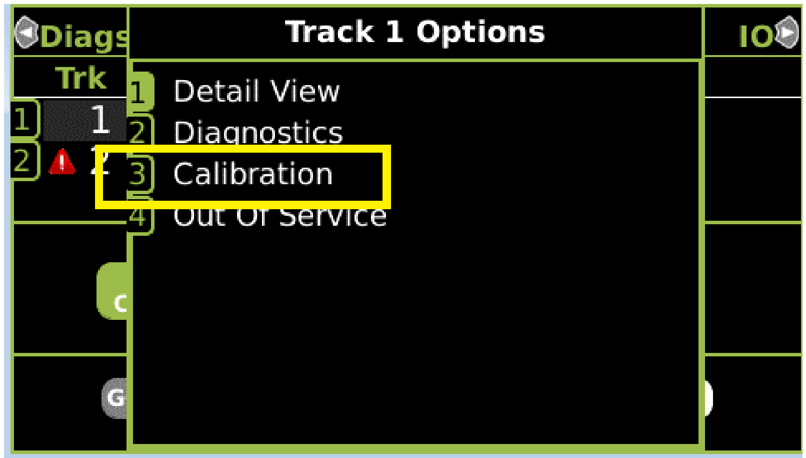


Figure 4-25 Track Options - Calibration

The Calibration screen will show the status of the calibration steps. If calibration is required, the screen shows a red cross and **Calib Req** as shown on the left below, if the calibration has been performed, the screen shows a green check and **Calibrated** as shown on the right below.

Figure 4-26 Track Calibration

Section 6.2 describes in detail how to perform the GCP calibration, approach calibration, linearization, and island calibration procedures.

4.2.1.5 Out Of Service

WARNING

SEE SECTION 7.8 FOR FULL DETAILS, PRECAUTIONS, AND WARNINGS FOR TAKING TRACKS OUT OF SERVICE.

THE RAILROAD PROCEDURES GOVERNING HOW TO TAKE A TRACK CIRCUIT OUT OF SERVICE SHALL BE FOLLOWED. REQUIRED OPERATIONAL TESTS SHALL BE PERFORMED IN ACCORDANCE WITH RAILROAD PROCEDURES WHEN RESTORING TRACKS TO SERVICE.

Access the **Out Of Service** Menu on the display by selecting the desired track in the System View window on the display. The Track "N" Options window opens. To open the menus for taking the GCP and Island out of service, select **4) Out Of Service** from the drop down display.

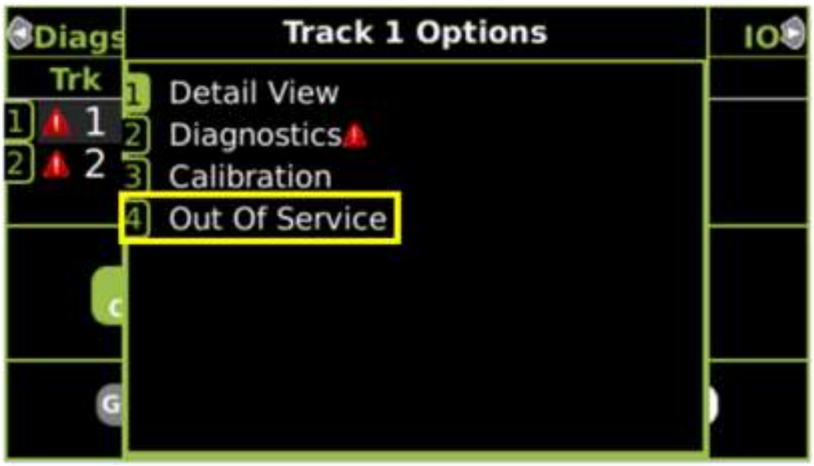


Figure 4-27 Track Options

The Track OOS screen will open and from here either the GCP or Island can be taken out of service and the Out of Service timer can be adjusted. See section 7.8 for full details.

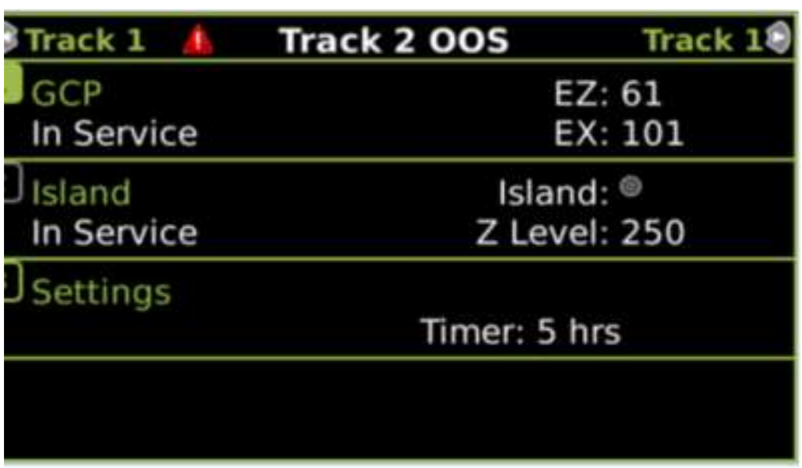


Figure 4-28 Track Out Of Service Menu

Once either the Island or GCP is taken out of service, the Track “N” OOS window shows **Out of Service**.

When the Track “N” OOS screen is closed by selecting the **Back** on the keypad, the display returns to the System View window. An Out of Service (OOS) icon will be shown at the end of the track row.

Figure 4-29 GCP Out of Service Icon

4.2.1.6 Returning a Track to Service

To return the track(s) and island(s) to service, select the desired track by selecting that track number. From the Track “N” Options window, select **4) Out of Service**. Select either the GCP or Island to display the options: **1) Put Track “N” GCP (ISL) Back in Service**, and **2) Cancel**. Selecting 1 will put the GCP back in service with no further confirmations.

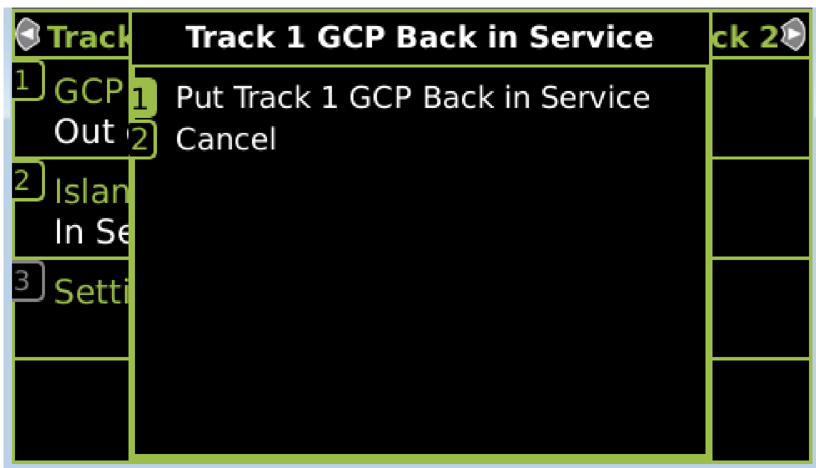


Figure 4-30 Placing a Track Back in Service

On the Track “N” OOS screen, **1) GCP** now reads: **In Service**. Exit the Track “N” OOS window by selecting **BACK**. The System View screen appears, with the track previously Out of Service no longer displaying OOS at the end of the track row.

WARNING

REQUIRED OPERATIONAL TESTS SHALL BE PERFORMED IN ACCORDANCE WITH RAILROAD PROCEDURES WHEN RESTORING TRACKS TO SERVICE.

4.2.1.7 Out of Service Inputs

The Model 3000+ allows a track to be taken out of service in one of two ways: either the Out of Service input is energized to take the track out of service, or the system can be set up in such a way that the display must be used in conjunction with the Out of Service input to take a track out of service.

WARNING

THE RAILROAD PROCEDURES FOR APPLYING TEMPORARY JUMPERS MUST BE FOLLOWED WHEN ENERGIZING THE "OUT OF SERVICE" INPUT(S).

To enable an OOS Input:

- Scroll to **Program View > 2) GCP Programming > 1) General Configuration**.
- Select OOS Control by pressing **Enter**. The OOS Control window opens with the following parameters:
    - Display* – no OOS inputs used
    - Display+OOS IPs – OOS inputs and display used
    - OOS IPs – Only OOS inputs used, display not used

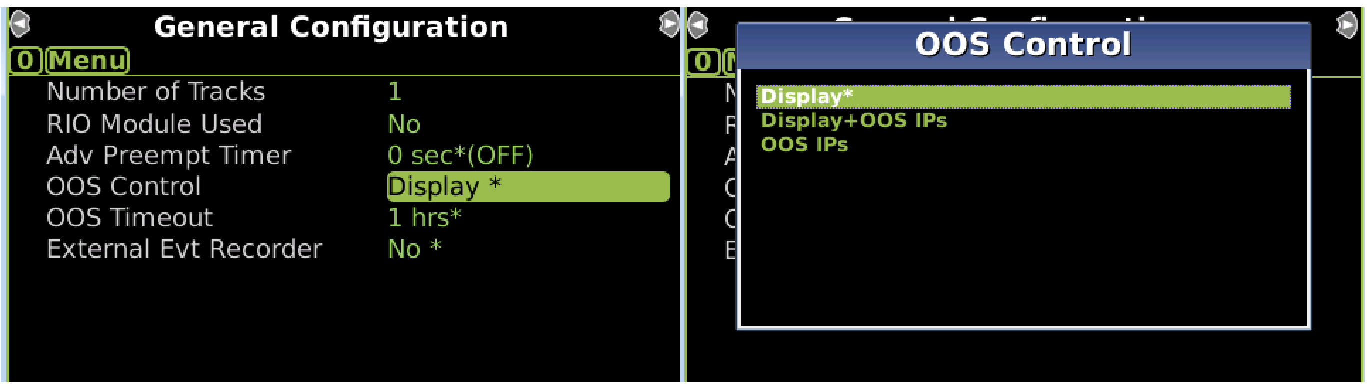


Figure 4-31 OOS Control

- Select the type input desired then select **Enter**.
- If either Display+OOS IPs or OOS IPs is chosen, the proper input must be energized (TRK 1 OOS, TRK 2 OOS) in order to take a track out of service.

WARNING

IF OOS IPS IS SELECTED, ENERGIZING THE TRK OOS INPUT WILL TAKE BOTH THE GCP APPROACH AND ISLAND OUT OF SERVICE.

4.2.2 I/O Screen

The I/O View screen provides users with the status of all I/Os on the Model 3000+ GCP as well as some other general indications for other high level states.

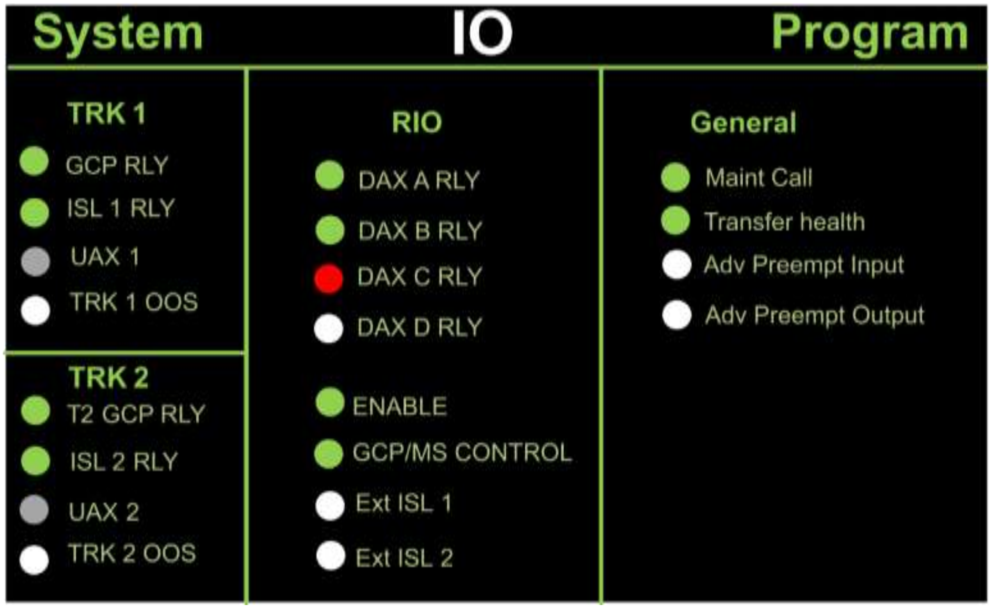


Figure 4-32 I/O Screen

The following colors are used to represent the states:

- Green – input or output is energized
- Grey– input or output is de-energized
- Red – input or output is failed or unhealthy
- White– input or output is not configured for use by the system

The I/O View screen shows the following:

- Track 1 outputs (GCP RLY, ISL 1 RLY) and inputs (UAX 1, TRK 1 OOS)
- Track 2 outputs (T2 GCP RLY, ISL 2 RLY) and inputs (UAX 2, TRK 2 OOS)
- RIO outputs (DAX A thru D RLY) and inputs (Enable, GCP/MS Control, Ext ISL 1,2)
- Maintenance Call output state
    - Green indicates system healthy, maintenance call output will be on, and so the maintenance call light on bungalow will be off
    - Red indicates system unhealthy, maintenance call output will be off, and so the maintenance call light on bungalow will be on
- Transfer health – this indicates whether the CPU is driving the transfer output which prevents the transfer module timer from starting its count down.
- Advance Preempt Input state – when advance preemption is used, this shows the state of the advance preemption input. This input is shared with the GCP/MS Control input (IO input 2)
- Advance Preempt Output state – when advance preemption is used, this shows the state of the advance preemption output. One of the DAXes will be configured as a Preempt, so physically, the output will be connected to a DAX RLY output

When a track or RIO module is not used, the I/O view will indicate **NOT USED** as shown in the Figure 4-33.

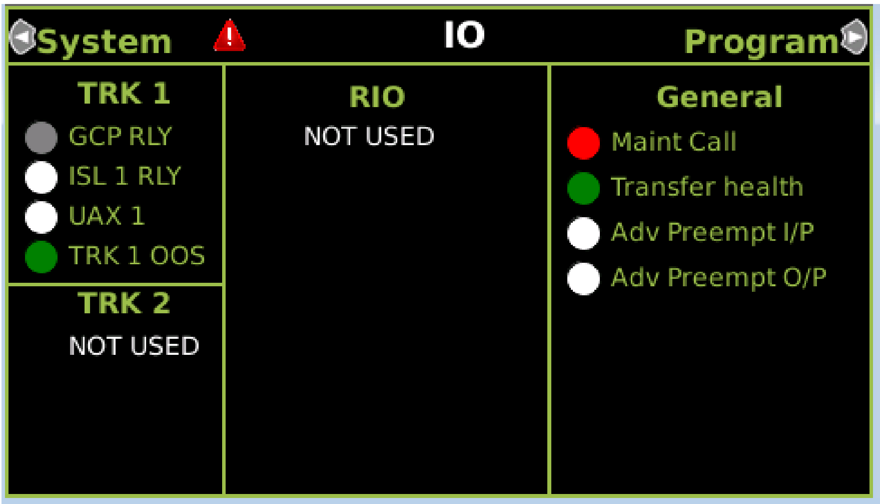


Figure 4-33 I/O View with TRK2 and RIO Not Used

4.2.3 Program View Screen

The Program View screen is where all parameters required for GCP operation are set. There are three main submenus:

Site Configuration is used to set up the non-vital site information, for example, site name, milepost, DOT number

GCP Programming is used to set the vital parameters that control the operation of the 3000+ GCP

Display Programming is used to set non-vital settings related to the operation of the display.

The numbers in the top right of the Program View Screen indicates the values of various check numbers used to verify the programming:

OCCN – Office Configuration Check number, used to verify that the configuration settings prescribed by the design office are correct

CCN - Configuration Check number, a check number that covers every configuration parameter that is part of the GCP programming. This number can be used to check whether anything in the vital programming has been changed.

FCN – Field Check number: a check number that changes when changes are made to the calibration of the GCP. The check number will change whenever a GCP, approach, linearization, or island calibration is performed.

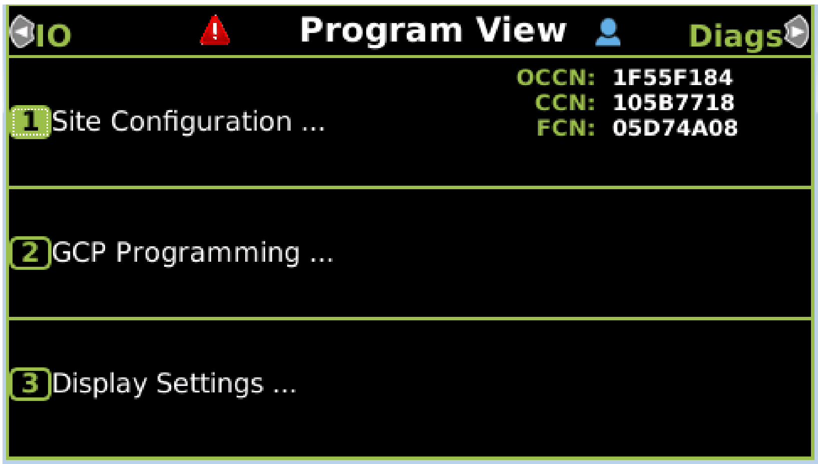


Figure 4-34 Program View Screen

The configuration parameters are either:

- Text based – where a text value can be entered using the keypad
- Numeric – where a numerical value is entered
- Enumerated – where a value is chosen from a list

For a numeric value, if any out-of-range value is entered, the display will give a warning and show the valid range.

Figure 4-35 Numeric Value Error

The GCP Programming menu has the submenus illustrated in the following figure.

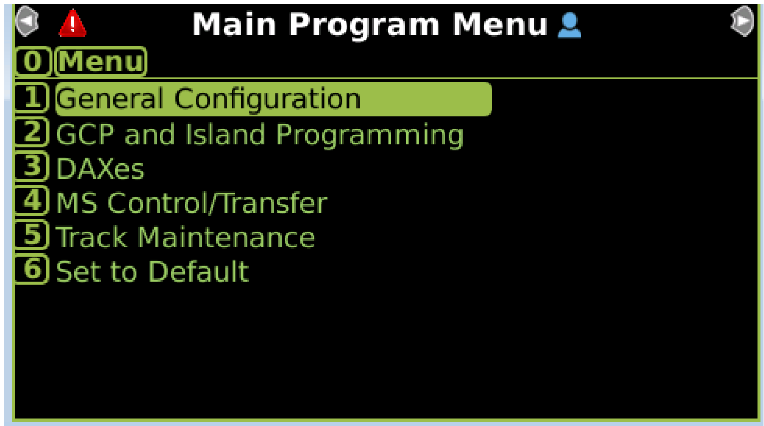
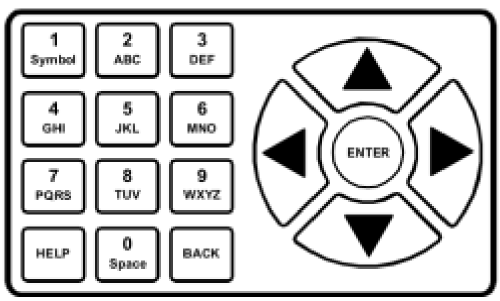


Figure 4-36 GCP Programming Main Program Menu

To navigate this menu:

- Press a number to go to the indicated submenu
- Use the up and down keys to change the highlighted menu, then press **Enter**
- Use the right and left arrows to move from one screen to the next in a cyclical order

Use the **Back** key to go back up to a higher menu. Use the 0 key to move back to the top level Main program menu. Holding the back key for 3s in any screen will navigate back to the top of the menu tree, then the left and right arrows can be used to get back to the system view.



When on a screen with parameter values, use the up and down arrows to change which property is selected, then press **Enter** to edit the value.

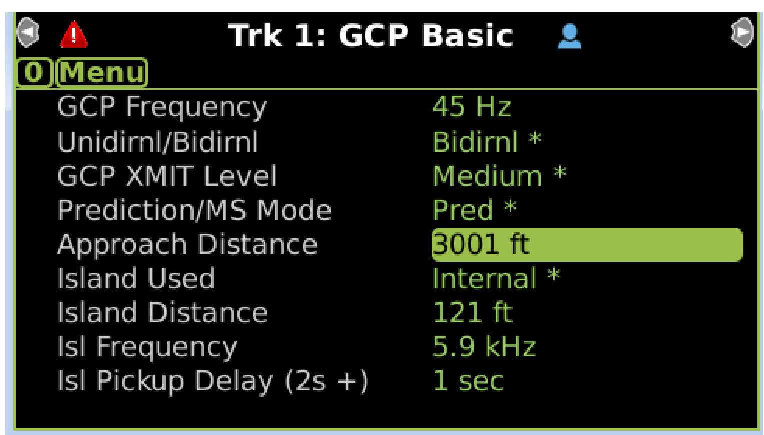


Figure 4-37 GCP Programming Selecting Parameter

When editing a parameter, use the **Back** button to delete the current value, then retype the value using the numbers on the keypad, or use the up and down keys to increment or decrement the value. Press **Enter** to save the value and return to the previous menu.

Figure 4-38 GCP Programming Editing Numeric Parameter

For enumerated values, use the up and down keys to select the required value, then press the **Enter** key to save it.

Section 5.3 describes each configuration parameter in detail.

When the Maintainer password has been enabled from the Security menu, the user will not be able to change any GCP Programming parameters unless the correct maintainer password has been entered. When the user enters the GCP Programming menu (left), they will be prompted to enter the Maintainer password (right).

Figure 4-39 Enter Maintainer Password

To enable the parameters for editing, enter the correct maintainer password, and the program will open as normal. If an incorrect password is entered, or no password is entered, the program menu will open with all parameters set to Read Only; the values are shown in white, rather than the usual green.

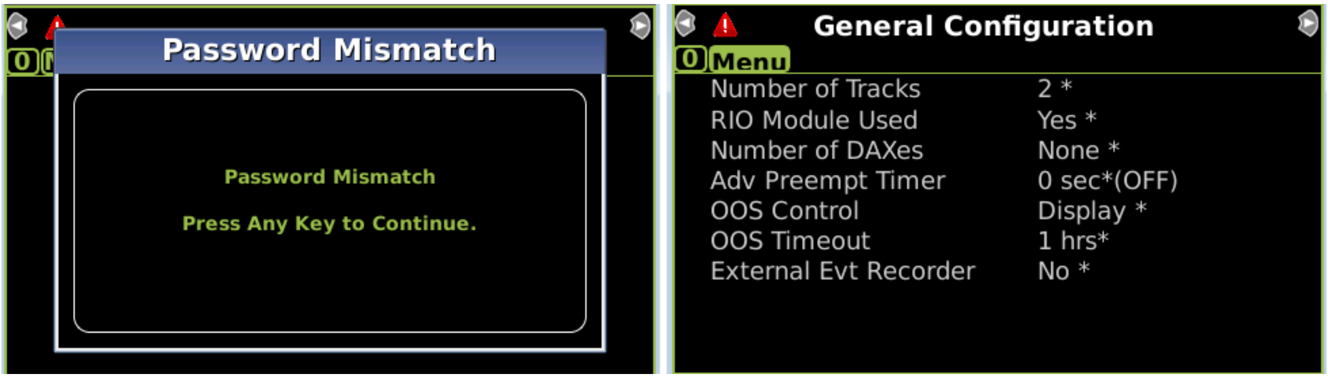


Figure 4-40   Incorrect Maintainer Password

The display will request the password each time the GCP Programming screen is entered.

NOTE

NOTE

If the maintainer password is enabled and the password has been forgotten, contact Siemens for a temporary password.

4.2.4   Diags and Reports Screen

The Diags and Reports screen is used to see diagnostic information about the system or view logs.

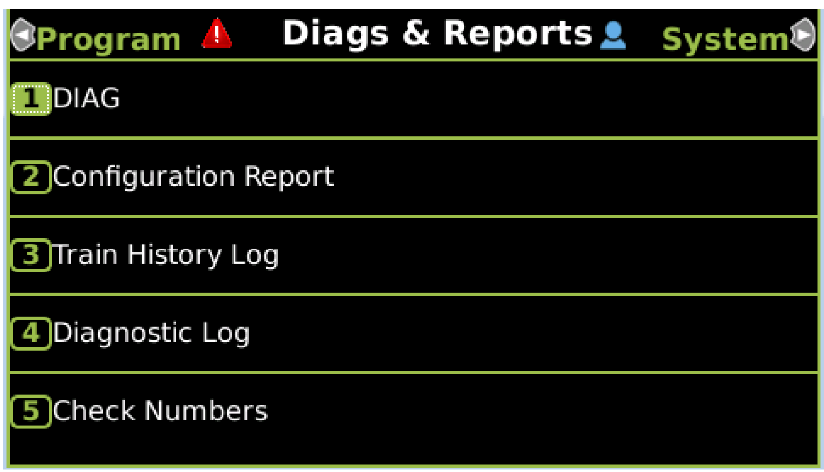


Figure 4-41   Diag & Reports Screen

4.2.4.1 The Diag Screen

The Diag Screen shows all the Diagnostic Messages that are currently being generated by the system; for example, see Figure 4-42.

If the system is healthy the Diag screen will show “No Diag Msgs present!”

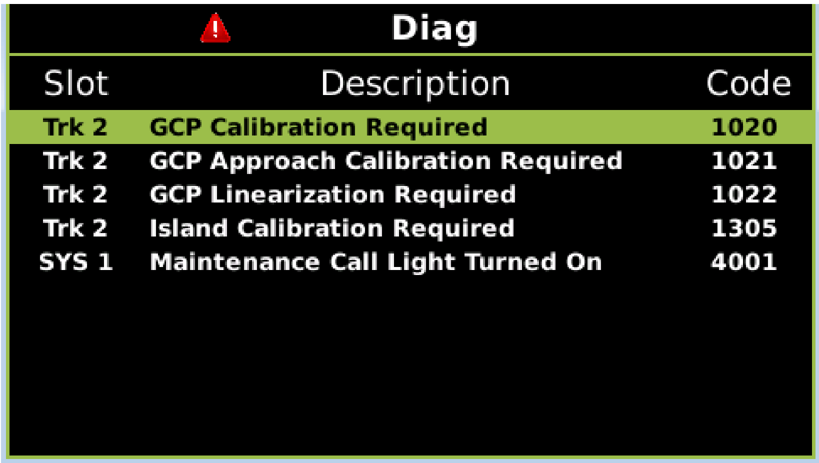


Figure 4-42 Diag Message Screen

To see further information regarding a specific diagnostic message, use the up and down arrow keys to select the desired message, then press the Enter key. The display will show the potential cause of the problem and suggest remedies to help fix it. Use the up / down keys to scroll up and down and the Back key to go back to the previous menu.

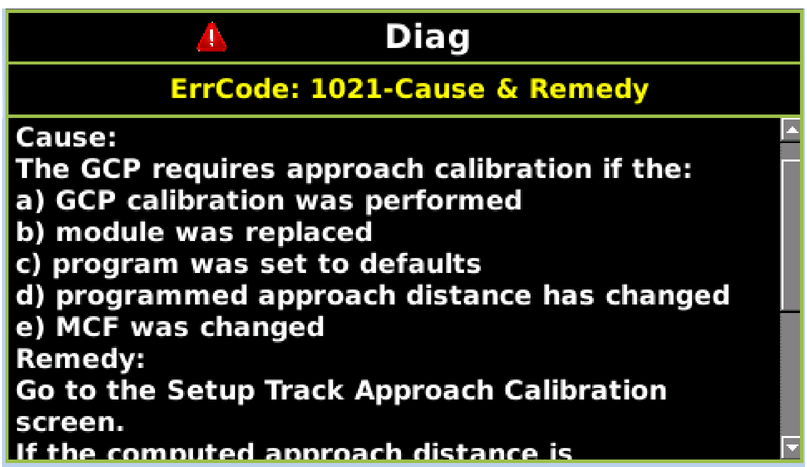


Figure 4-43 Diag Message Detail Screen

4.2.4.2 Configuration Report

When the configuration screen is entered, the display will first generate the report, see figure below on the left. When the report is complete, the display will show a list of options that can be used to browse the various sections of the report (below right).

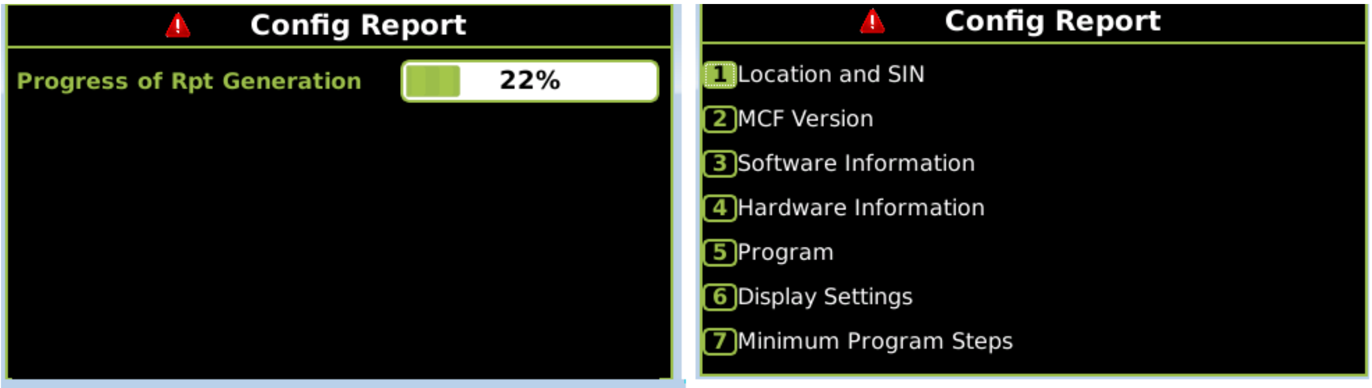
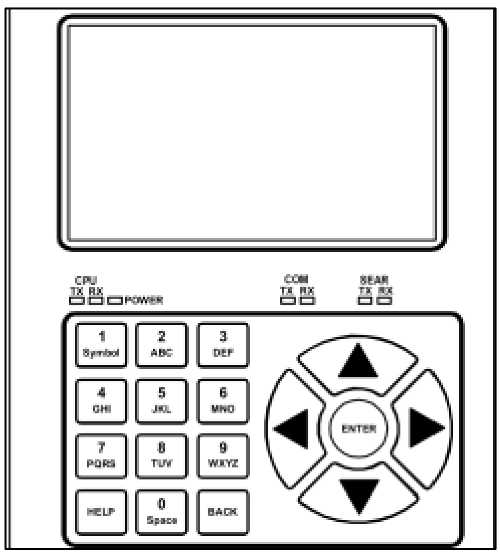


Figure 4-44 Configuration Report

Use keypad to select a section number and the display will show the data from that section.



Use the up / down keys to navigate the data. Use the **Help** key to obtain the navigation keys:

1	- Start of page
2	- End of page
Left Arrow	- Previous page
Right Arrow	- Next page
3	- Previous report section
9	- Next report section
Back	- Close window

4.2.4.3 Train History Log

If the Train History Log is selected, the display will show a time and date stamped log containing the last 20 train moves.

The log shows the following:

- Trk – which track the train was detected on.
- WT – the recorded warning time in seconds.
- Det – the detected train speed.
- Isl – the train speed at the island.
- Avg – the average train speed.

If the Units are set to standard in the Site Configuration, the speeds are shown in mph. If the Units are set to metric, the speeds are shown in km/h.

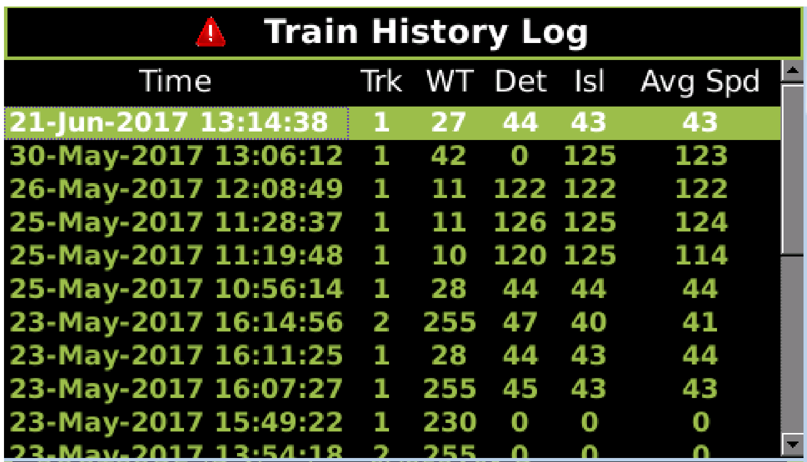


Figure 4-45 Train History Log

Pressing the **Help** button will show the navigation options for this screen.

1	- Start of page
2	- End of page
Left Arrow	- Previous page
Right Arrow	- Next page
Space	- Clear Log
8	- Refresh Log
Back	- Close window

If Space is pressed, the display will ask for confirmation before the log is cleared.

4.2.4.4 Diagnostic Log

The Diagnostic log shows a time-stamped log of the when the diagnostic messages shown in the DIAG menu occur and when the diagnostic message is cleared. For example, at 16:19:14 track 1 showed GCP Stabilizing, then at 16:19:29 this message was cleared.

Figure 4-46 Diagnostic Log Screen

Pressing the **Help** button will show the navigation options for this screen.

1	- Start of page
2	- End of page
4	- Show real time log
5	- Stop real time log
Left Arrow	- Previous page
Right Arrow	- Next page
Back	- Close window

4.2.4.5 Check Numbers

The check numbers screen will show the following check numbers:

- OCCN – Office Configuration Check number, used to verify configuration that the settings prescribed by the design office are correct
- CCN - Configuration Check number, a check number that covers every configuration parameter that is part of the GCP programming. This number can be used to check whether anything in the vital programming has been changed.
- FCN – Field Check number: a check number that changes when changes are made to the calibration of the GCP. The check number will change whenever a GCP, approach, linearization, or island calibration is performed.

The screen also allows hidden parameters to be reset. In the GCP programming menus, changing one parameter may cause other parameters to be hidden, for example if the RIO Used is set to no, all the DAX configuration parameters are hidden and cannot be edited.

The OCCN is calculated over all configuration parameters marked as having been included in the OCCN calculation defined by the MCF, regardless of whether they are hidden or not. This may result in the OCCN shown on this screen not matching the one listed on the configuration provided for the office. This discrepancy is due to some parameter that is not currently visible to the user not having the same value as the one used in the office. To avoid this potential issue, select the **Reset Hidden Parameters** button; this will cause the display to set all hidden parameters back to their defaults values. If the OCCN does not match now, check each parameter in turn against the default configuration.

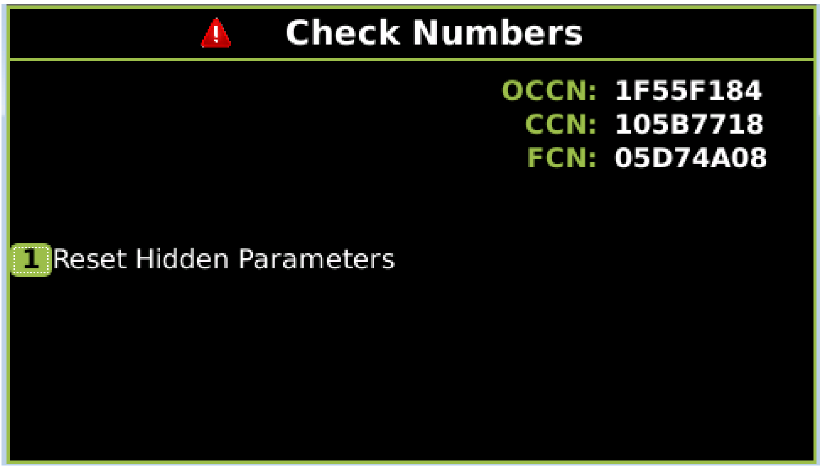


Figure 4-47 Check Numbers Screen

4.2.5 USB Menus Screen

When a USB stick is inserted in to the Display, the menu shown in the following figure will appear. This menu can also be accessed by using left arrows from the System View screen, or right arrows from the Diags and Report screen.

The menu allows various reports to be downloaded on to the USB stick, or software uploaded from the USB stick to the Model 3000+ GCP system.

Figure 4-48 USB Menu

4.2.5.1 Download Configuration

This is used to download the configuration file from the 3000+ GCP. The configuration file is known as the PAC file. The PAC file can be opened offline using the OCE tool (See manual SIG-00-11-15B). The PAC file can be used as a back up to the 3000+ GCP configuration and it can be loaded back into the system using the Upload Configuration step described below.

See section 4.4.1 for the detailed procedure for downloading a configuration file

4.2.5.2 Upload Configuration

The Upload Configuration option is used to upload a new configuration file (PAC file) to the Model 3000+ GCP. The PAC file may have been a previously saved file or may have been created by the OCE tool (See manual SIG-00-11-15B).

See section 4.4.2 for the detailed procedure for uploading configuration file.

4.2.5.3 Software Updates

The Model 3000+ GCP allows new software to be uploaded to modules from the USB, see section 4.5.1 for a detailed procedure on uploading new software from a USB.

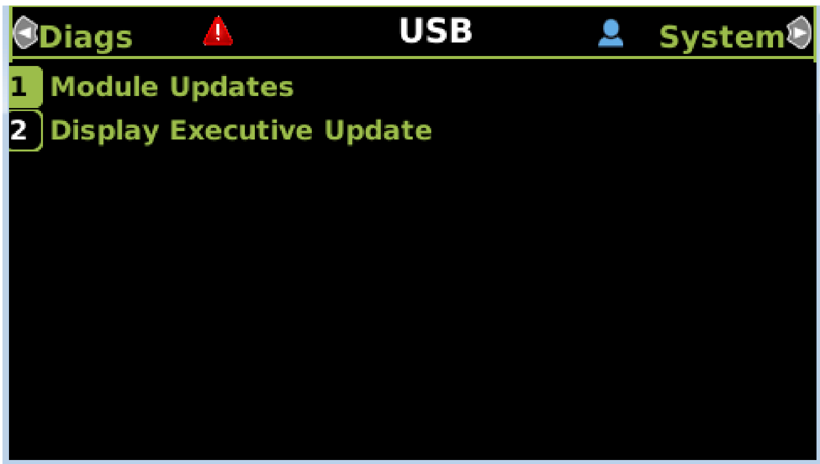


Figure 4-49 Software Update Options

4.2.5.4 Download Configuration Report

Use this option to download a copy of the configuration report for the system. The display will show the status of the download as **In Progress, Finalizing** then **Complete** as shown below.

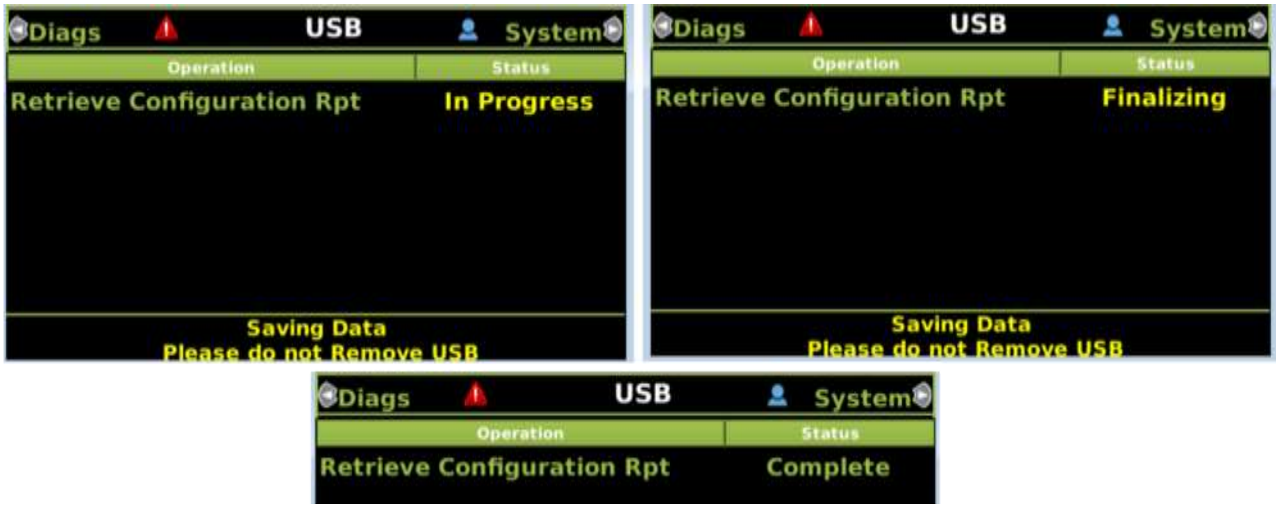


Figure 4-50 Download Configuration Report

The file will be stored on the USB stick in a folder called:

Safetran\DOT-SITENAME\GCP4000\Reports\yyyymmdd

With a file name given by: system_report_dd-mm-yyyy.txt

NOTE

NOTE

Due to software commonality issues, the USB Display device utilizes folders titled GCP4000 rather than GCP 3000+.

4.2.5.5 Download Event Log

When this is selected, the display will show the options illustrated in the following figure. Select the desired option.

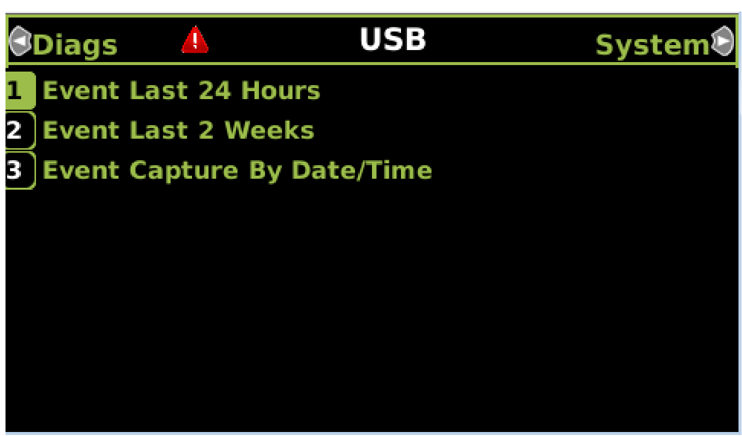


Figure 4-51 Download Event Log

If Option 1 or 2 is chosen, the display will then show the progress of the upload as **In Progress** then **Complete**.

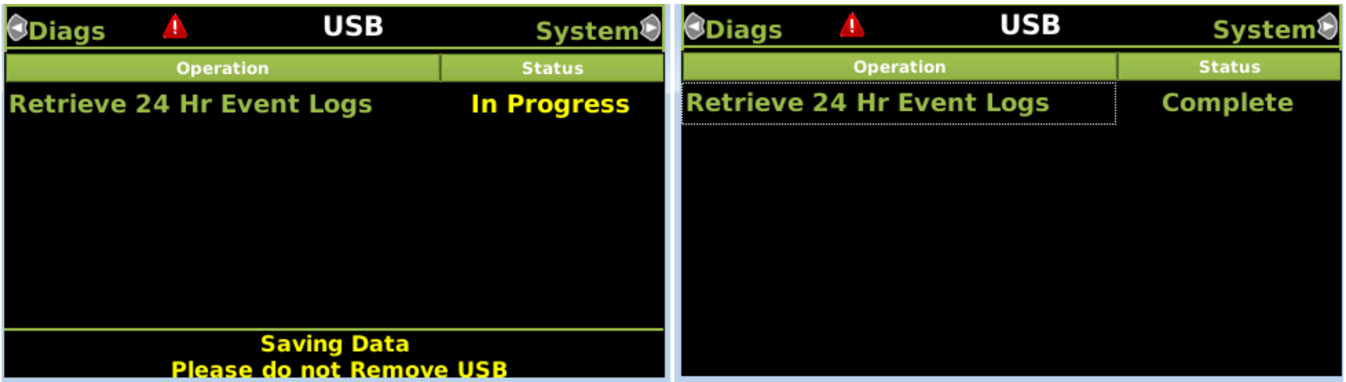


Figure 4-52 Download Event Log Status

If Option 3 is chosen, the display will allow the user to set the start time, date, and end time. Use the left/right/up/down keys to select the required field to edit, then press **Enter**. To select the new time or date, the up/down arrow keys can be used to decrement or increment the field, and the right key used to move to the next field. When the time and date have been selected, navigate to the **Download** button and select **Enter**. The display will show the download status as above.

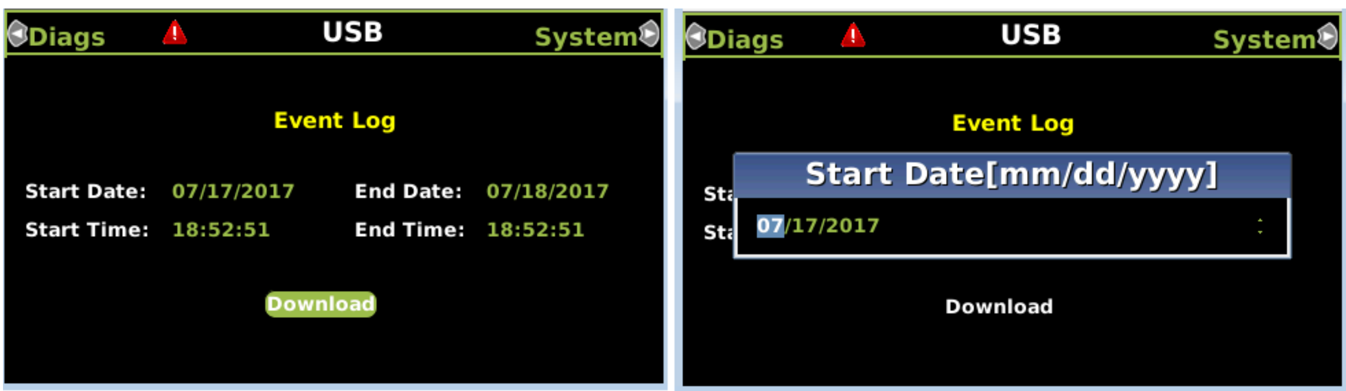


Figure 4-53 Download Event Log Status

The logs are downloaded into a folder on the USB called:

Safetran\DOT-SITENAME\GCP4000\Reports\yyyymmdd

With a file name given by: EvtLog <DOT#>-yyyymmdd to yyyymmdd.txt

4.2.5.6 Download Diagnostic Log

When **Download Diagnostic Log** is selected, the display will show the progress of the download as **in Progress**, it then indicates every 1000 records downloaded, then **Finalizing**, then **Complete**.

Figure 4-54 Download Diagnostic Log

The train log will be stored in a folder on the USB called:

Safetran\DOT-SITENAME\GCP4000\Reports\yyyymmdd

With a file name given by: DiagLog-<DOT#>-yyyymmdd to yyyymmdd.txt

4.2.5.7 Download Train History Log

When the **Download Train History Log** is selected, the display will then show the progress of the download as **In Progress, Finalizing** then **Complete**.

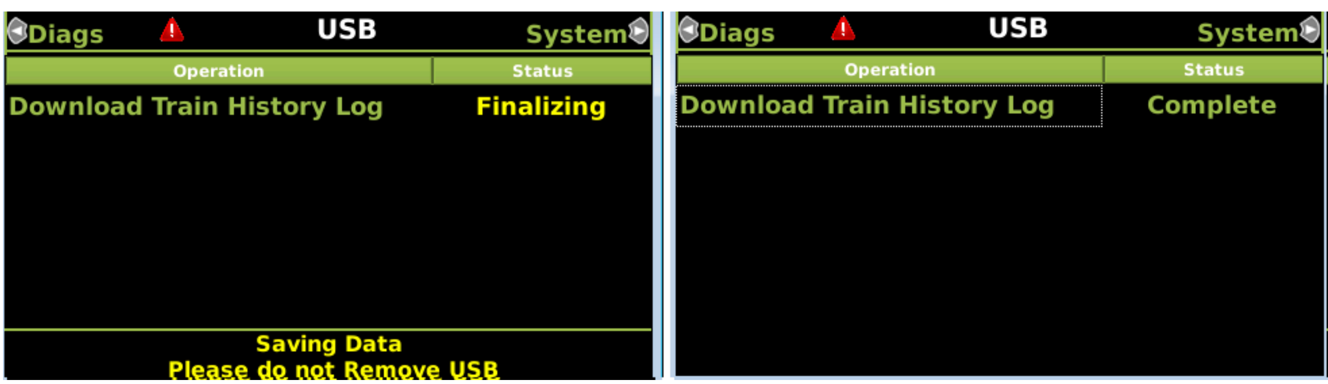


Figure 4-55 Train History Log

The train log will be stored in a folder on the USB called:

Safetran\DOT-SITENAME\GCP4000\Reports\yyyymmdd

With a file name given by: TrainLogAll--yyyymmdd.txt

4.2.5.8 Download All Logs

This option is used to download all the logs available in the system. The display will show the progress as illustrated in the following figure.

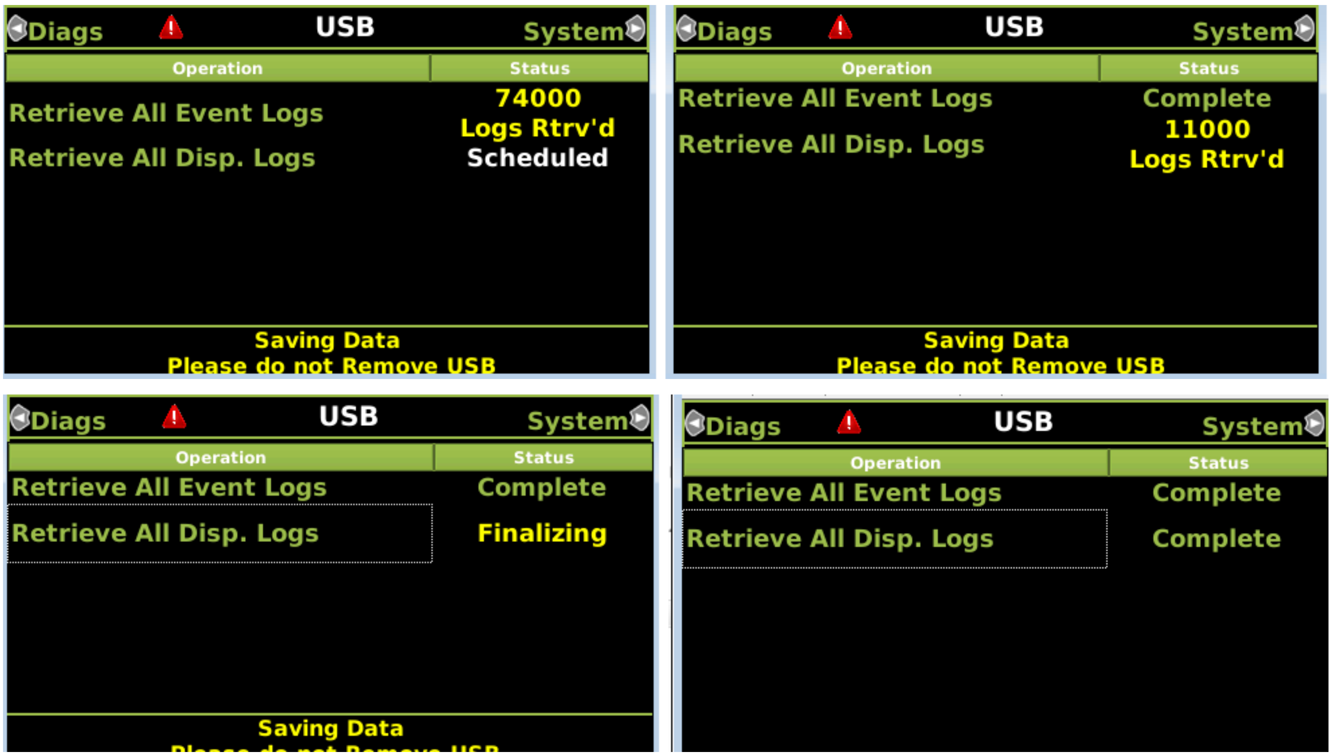


Figure 4-56 Download All Logs

The event and display logs are downloaded and will be stored in a folder on the USB called:

Safetran\DOT-SITENAME\GCP4000\Reports\yyyymmdd

With a file name given by:

EvtLog-<DOT#>-yyyymmdd to yyyymmdd.txt

DispLog-<DOT#>-yyyymmdd to yyyymmdd.txt

NOTE

NOTE
The Display log is primarily for Siemens use.

4.2.6 Atypical Display Module Indications

4.2.6.1 Display Module when Display/CPU Connecting

If the Display module is not in session with the CPU, this is indicated as shown in the figure below on the left. During the connection process, the display will show the progress bar for approximately 30 seconds as shown on the right.

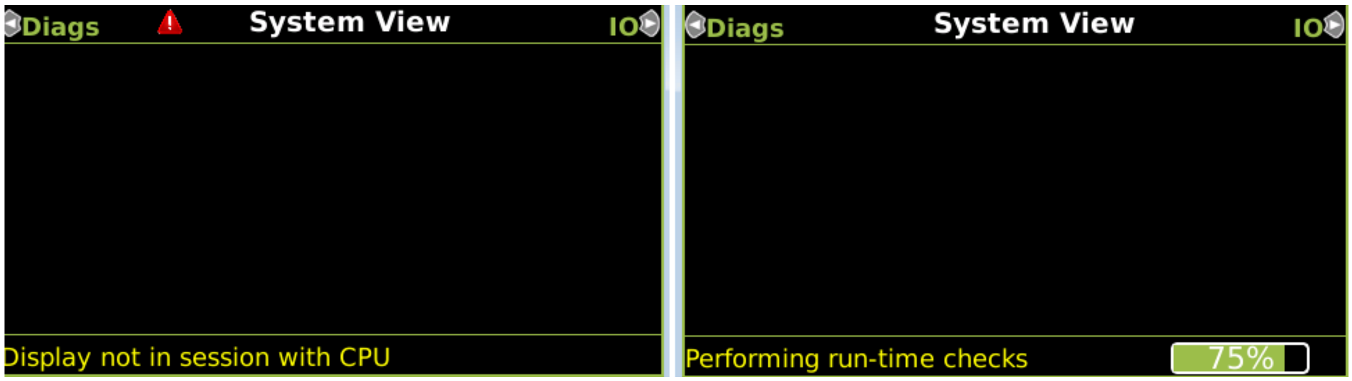


Figure 4-57 Connection Progress Bar

When this is complete, the display will show the Diagnostics screen (if diagnostic messages are present) or it will show the System View.

4.2.6.2 Display when VLP in Edit Mode

When a configuration file is loaded, the display shows the following message:

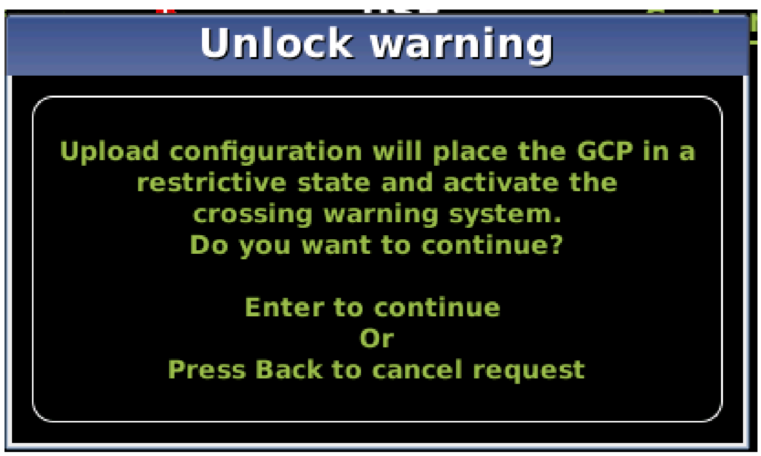


Figure 4-58 Unlock Warning

If the user continues, the VLP is first put into a safe unconfigured state. If the upload process is abandoned without getting to the point where the VLP is reset, the System View will show the message illustrated in the following figure. To get the system out of this state, reset the VLP by selecting the Reset VLP and pressing enter.

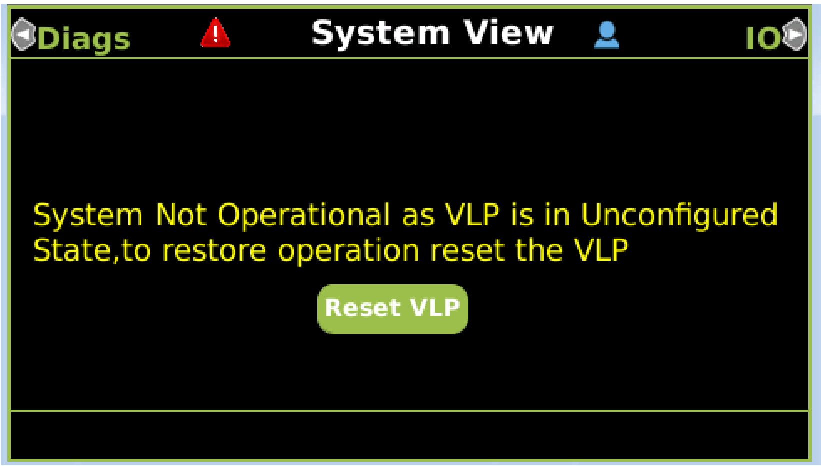


Figure 4-59 VLP in Unconfigured State

4.2.6.3 Display when VLP has Configuration Errors

If an incorrect MCF CRC is entered when loading the MCF, or an invalid MCF is loaded, the System View will show the message illustrated in the following figure. Go to the Diags screen and look at the diagnostic messages present to get more details of the problem.

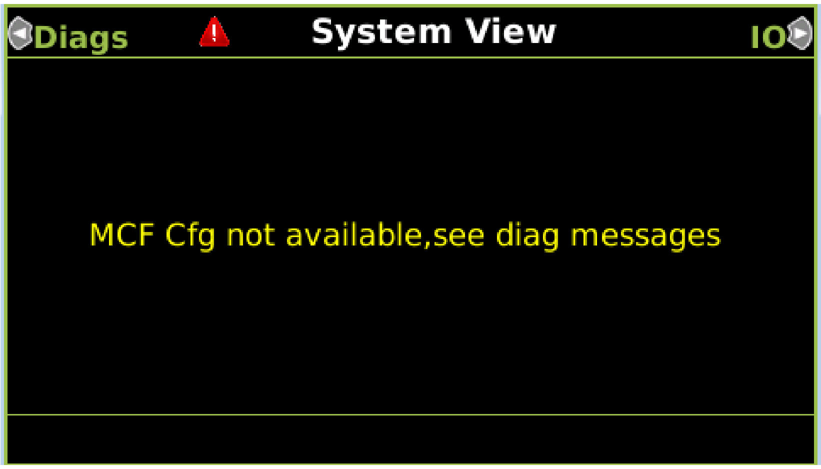


Figure 4-60 Incorrect MCF Loaded

4.3 USB FILE STRUCTURE

4.3.1 Setting up a USB Device for Use

New software issued by Siemens Rail Automation for the Model 3000+ GCP is installed via the A80485-1 Display using a USB Device.

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.

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 PROPER OPERATION OF GCP PRIOR TO 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 PRIOR TO SELECTING “UPLOAD CONFIGURATION” FROM THE USB WIZARD MENU.

NOTE

Due to software commonality issues, the USB Display device utilizes folders titled GCP4000 rather than GCP 3000+.

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.

Current software configuration for the CPU II+ 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 the CPU III, an Ethernet 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 Model 3000+ GCP 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)

4.3.1.1 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
    - 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.

4.4 DOWNLOAD/UPLOAD CONFIGURATION (PAC) FILES VIA USB DEVICE

4.4.1 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**.

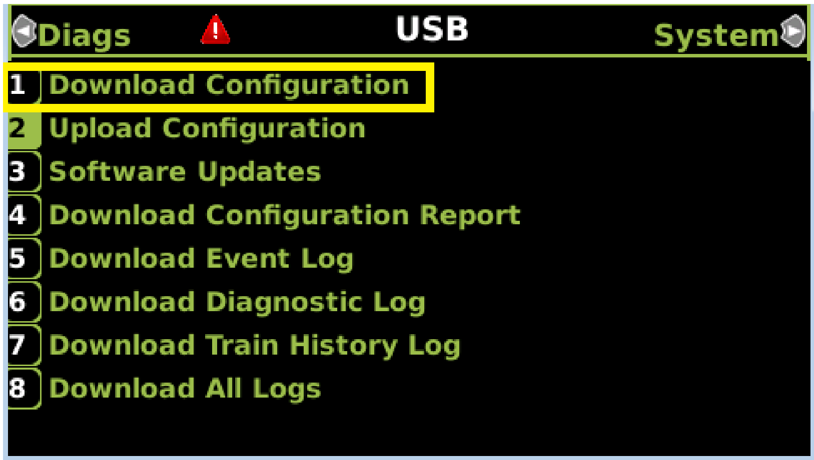


Figure 4-61 Select Download Configuration

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

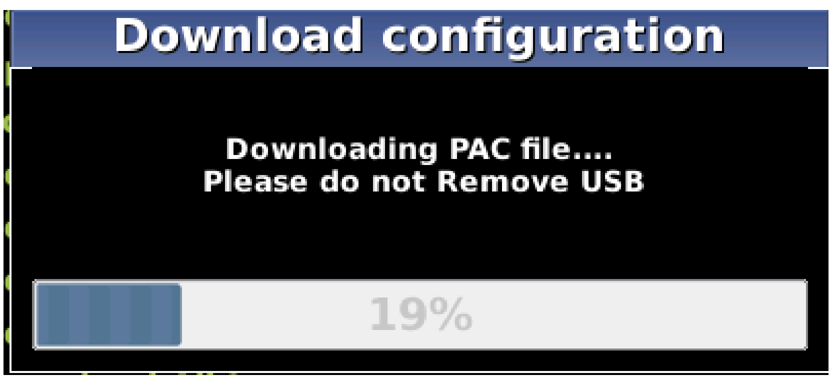


Figure 4-62 Download Progress

5. 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.

Figure 4-63 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 PROPER OPERATION OF GCP PRIOR TO 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 PRIOR TO SELECTING “UPLOAD CONFIGURATION” FROM THE USB WIZARD MENU.

NOTE

Due to software commonality issues, the USB Display device utilizes folders titled GCP4000 rather than GCP 3000+.

4.4.2 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 4.3.1.2.

Perform the following actions:

1. Insert USB Drive in USB slot on front of 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**.

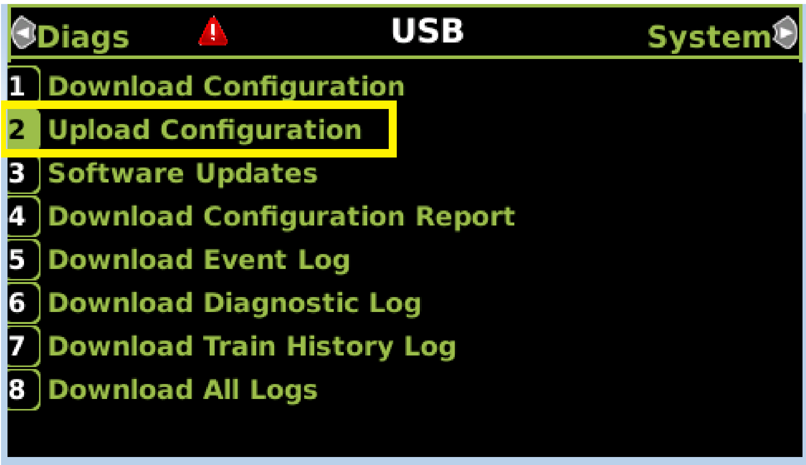


Figure 4-64 Upload Configuration

4. The **Unlock Warning** window opens, displaying the message shown in the figure below.

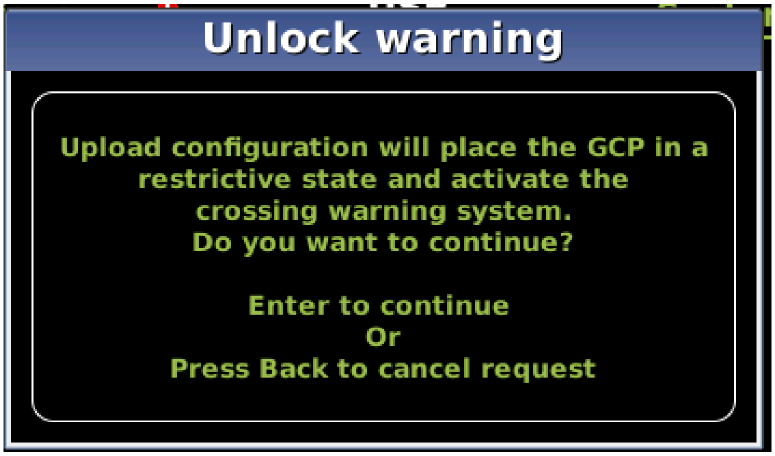


Figure 4-65 Unlock Warning Message Window

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.

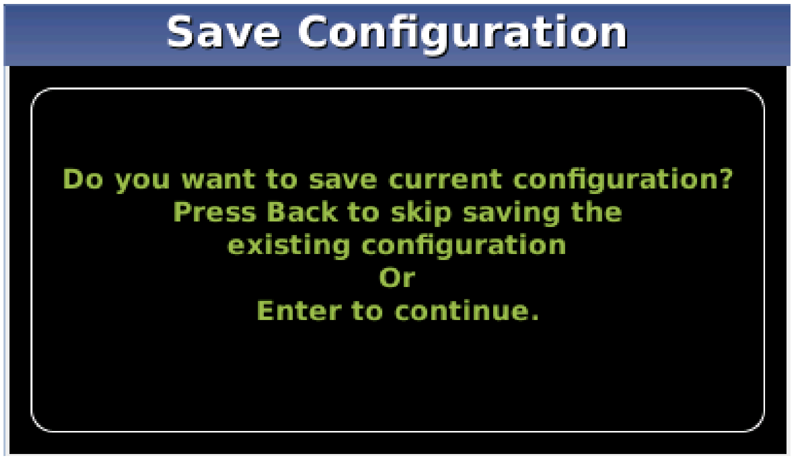


Figure 4-66 Save Configuration

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.

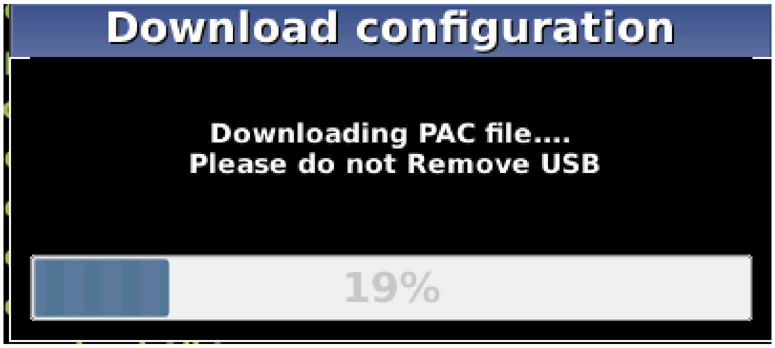


Figure 4-67 Download Configuration

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**.

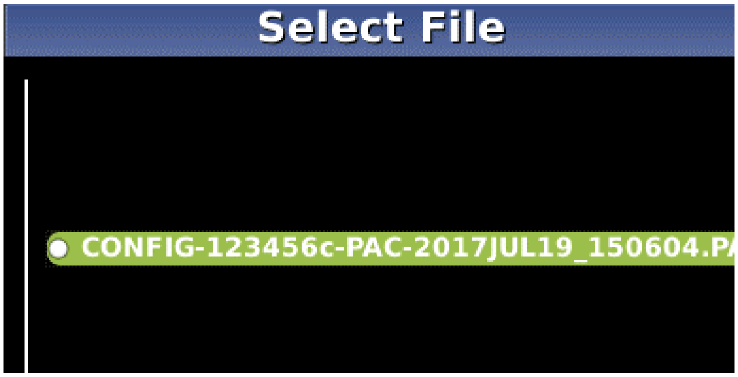


Figure 4-68 Select PAC File

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

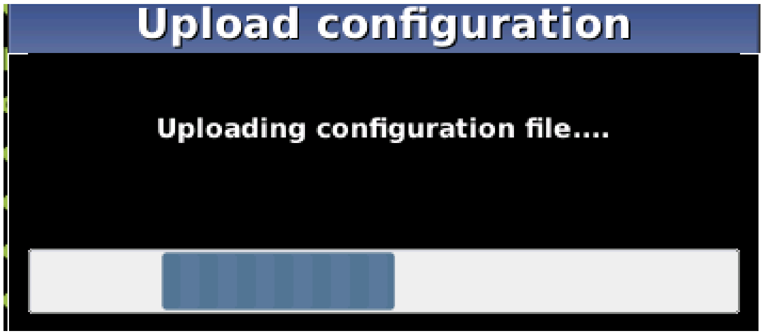


Figure 4-69 Uploading Configuration

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.

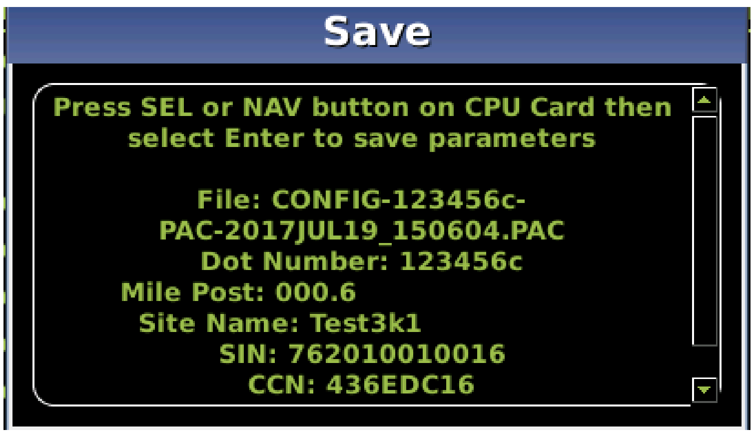


Figure 4-70 Save Window

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.

4.4.3 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.

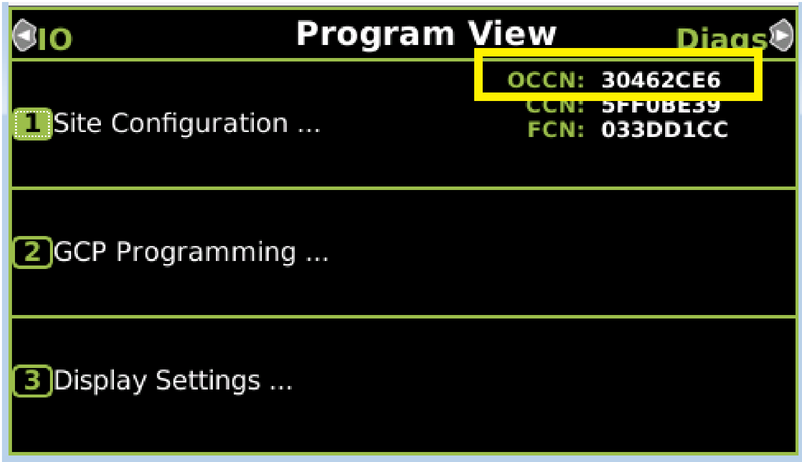


Figure 4-71 Checking the OCCN

4.5 SOFTWARE UPDATES

4.5.1 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. This menu may be returned to at any time by pressing the **Back** button, providing the USB drive is still inserted in the port.

4.5.1.1 Installing Software on CPU II+ 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 PROPER OPERATION OF GCP PRIOR TO 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 PRIOR TO SELECTING “UPLOAD CONFIGURATION” FROM THE USB WIZARD MENU.

The examples in this section are used to explain how to install software via the display using USB devices. 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 Model 3000+ GCP. 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 prior to attempting to place the GCP back into operation.

Current software configuration requires installing a serial cable with a null modem adapter between the A80485-1 Display's DIAG connector and the DIAG port on the CPU II+ or I/O modules.

Figure 4-72 Null Modem Adapter

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

- CPU II+ Module
  - VLP Port – File: VPH04_80.MEF (CPU II+ VLP executive software begins with VPH)
  - DIAG (CP) Port – File: NCG04_80.MEF (CPU II+ CP executive software begins with NCG)
  - DIAG (CP) Port – File: GCP3K-01-00.mcf, CRC= 2CF3E617

The files should be copied to the GCP4000/Executive folder of the USB drive.

4.5.1.2 Replace VLP MEF on CPU II+

Perform the following actions:

1. Insert USB Drive in USB slot on front of 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 VLP port of the CPU module.
4. From the USB menu Select **1) Software Updates > 1) Module Updates**.

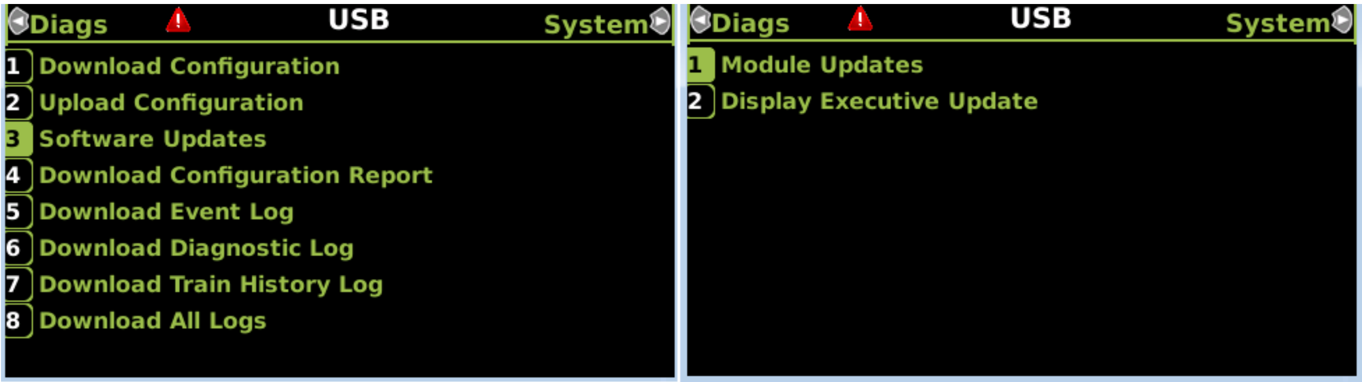


Figure 4-73 Module Update Menu

5. The Upload to System window opens stating: **Please check the serial cable connection before uploading. Press any key to continue.**

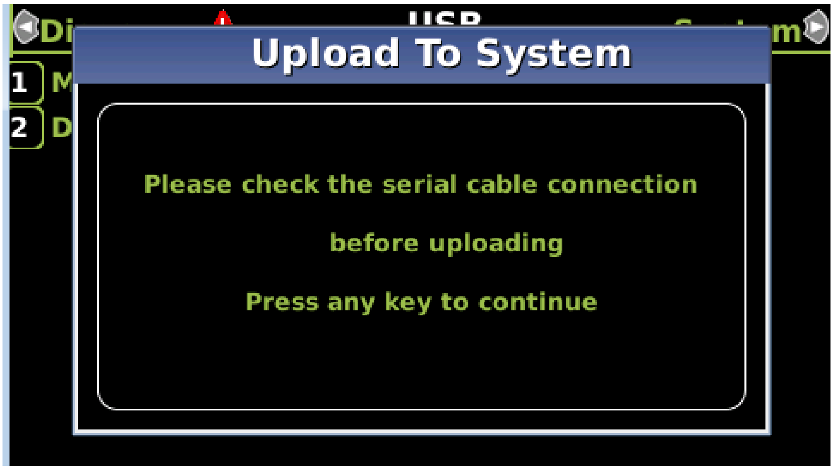


Figure 4-74 Upload Window

6. Verify that the serial cable is well seated on both ends, then press any key. The Setup program begins loading.
7. Select 1) Change MEF.

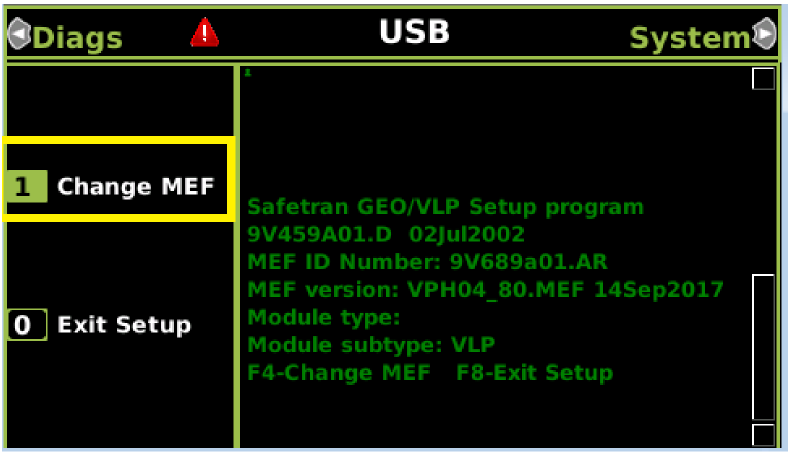


Figure 4-75 Change MEF

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

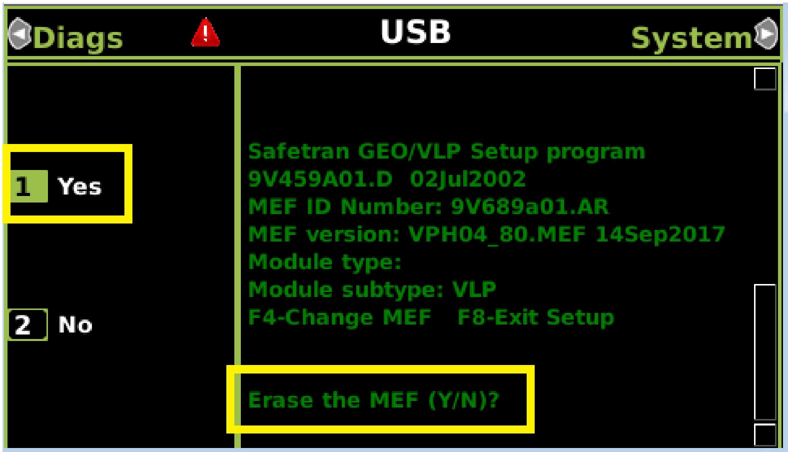


Figure 4-76 Erase the MEF

9. The **Select File** window opens.

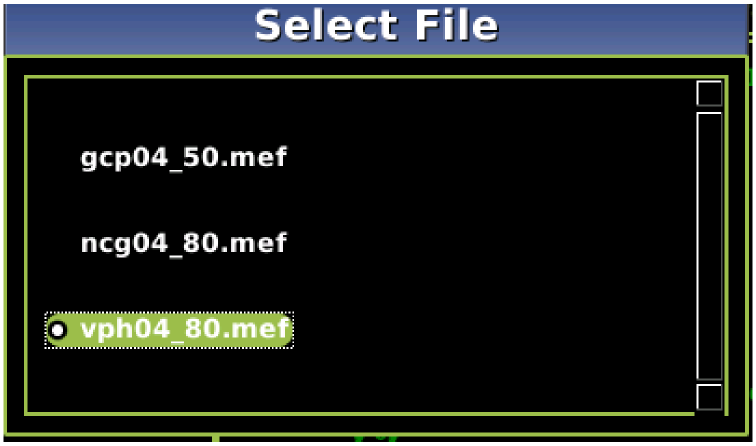


Figure 4-77 Select File Window

10. Scroll down to select the file to be installed, in this example VPH04_80.MEF. Select **Enter**.

11. 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.

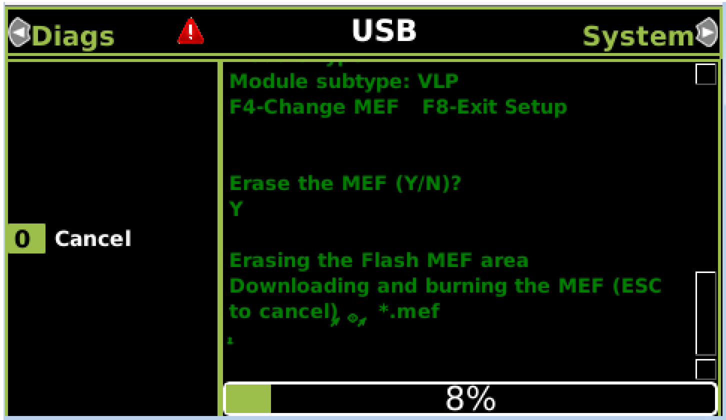


Figure 4-78 File Loading Status

12. When complete, the Display text provides all of the module update options. Select **0) Exit Setup**.

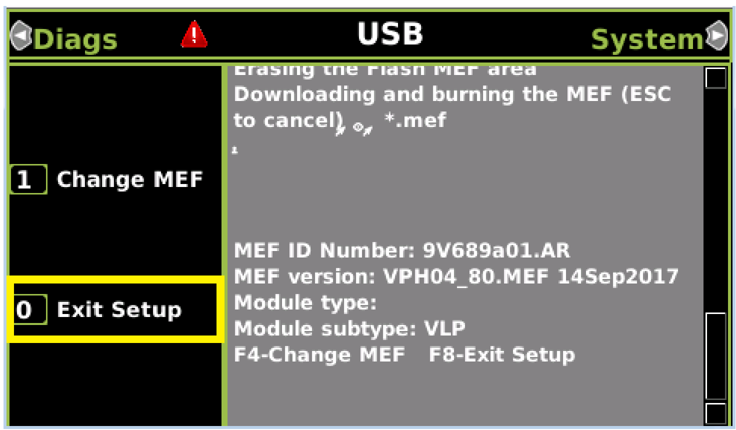


Figure 4-79 Select Exit Setup

13. The Upload to System window opens and states: **Exit software finished rebooting the module**.

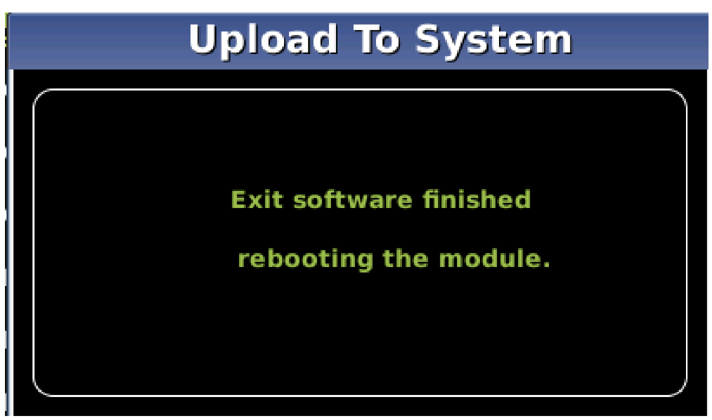


Figure 4-80 Exit Software

14. Press the **Back** button.

4.5.1.3 Replace CP MEF on CPU II+

Perform the following actions:

1. Insert USB Drive in USB slot on front of 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 (CP) port of the CPU module.
4. From the USB menu, select **1) Software Updates > 1) Module Updates**.
5. The Upload to System window opens stating: **Please check the serial cable connection before uploading**.
6. Verify that the serial cable is well seated on both ends, then press any key. The Setup program begins loading.
7. Select **3) Change MEF**.

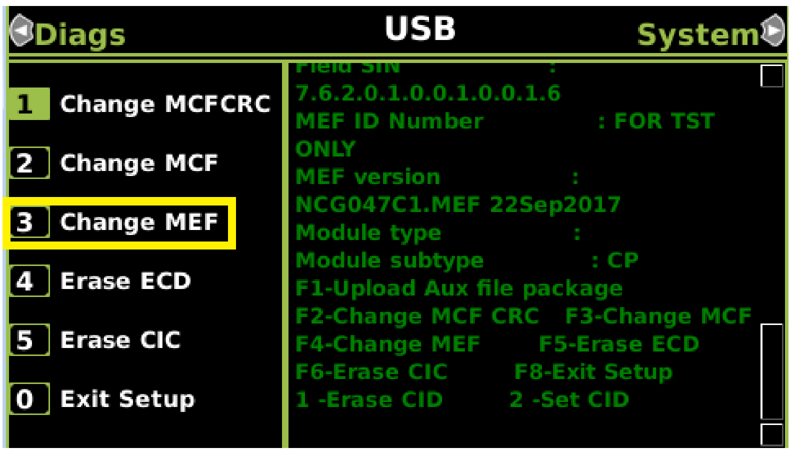


Figure 4-81 Change MEF

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

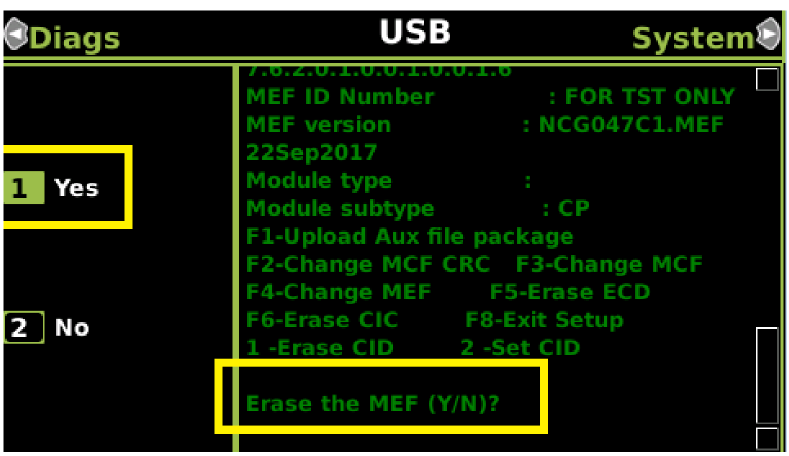


Figure 4-82 Erase MEF

9. The **Select File** window opens.

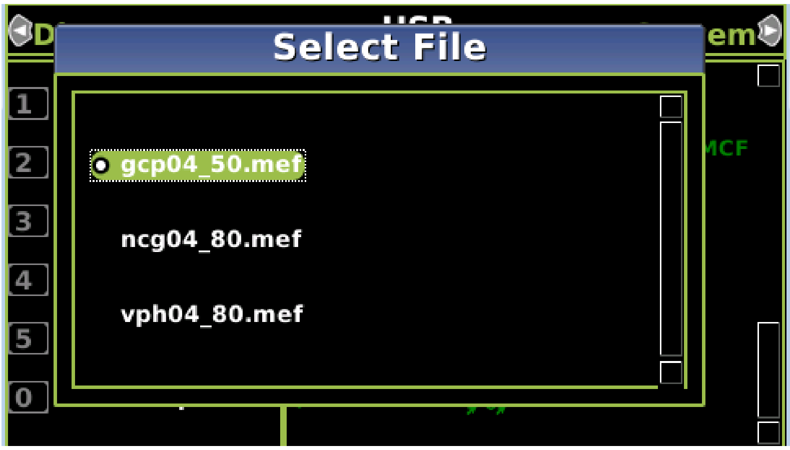


Figure 4-83 Select File Window

10. Scroll down to select the file to be installed, in this example: NCG04_80.MEF. Select **Enter**.
11. 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.

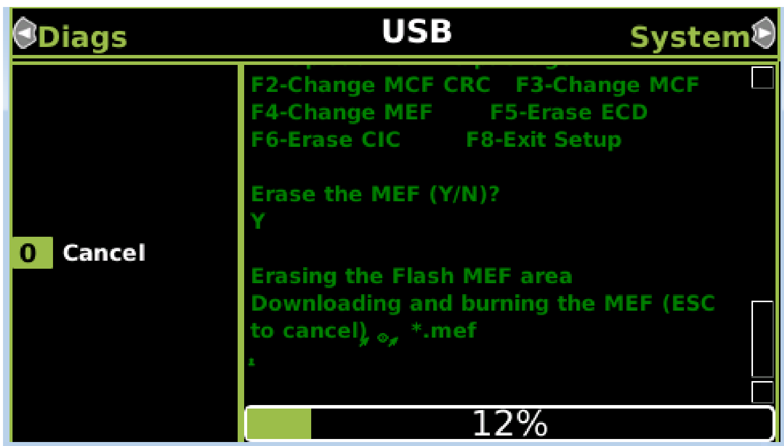


Figure 4-84 Progress Bar

12. 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**.

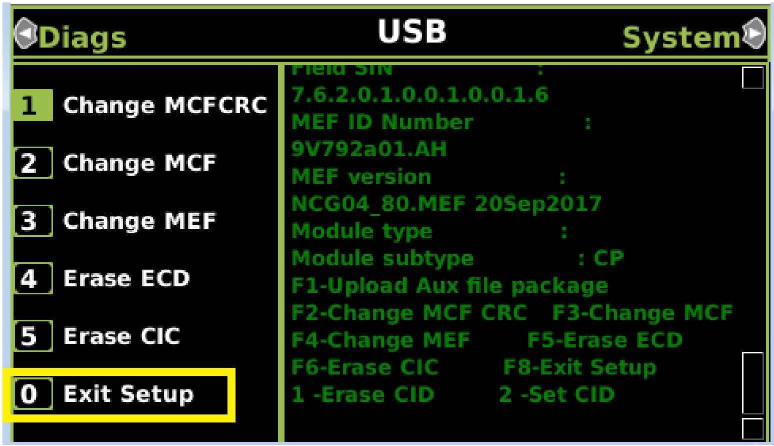


Figure 4-85 Exit Setup

13. The **Upload to System** window opens and states: **Exit software finished rebooting the module**.
14. Press the Back button. The USB SW Updates menu is shown (as per 4.5.1.2 Step 4).

4.5.1.4 Change the MCF on CPU II+ via USB

Perform the following actions:

1. Insert USB Drive in USB slot on front of 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 (CP) port of the CPU module.
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 **2) Change MCF**.

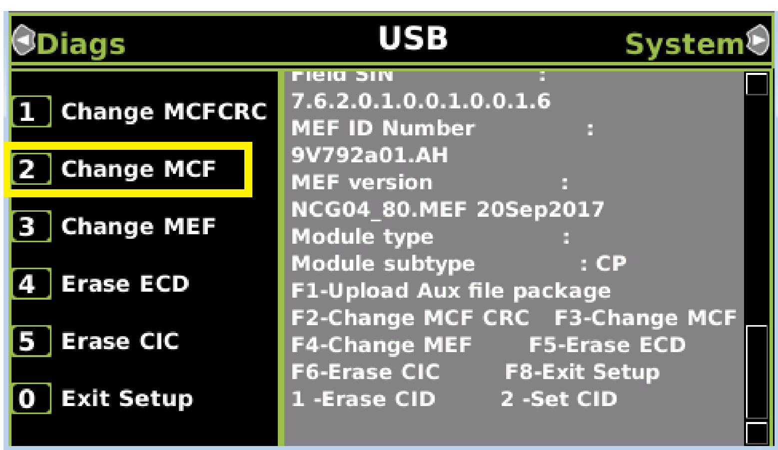


Figure 4-86 Change MCF

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

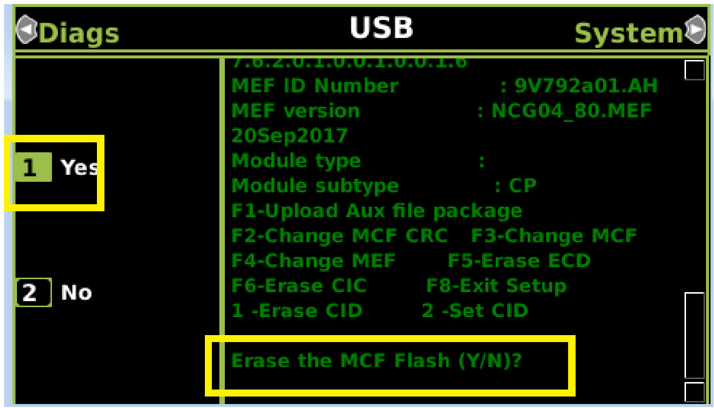


Figure 4-87 Erase the MCF Flash

8. The **Select File** window opens.

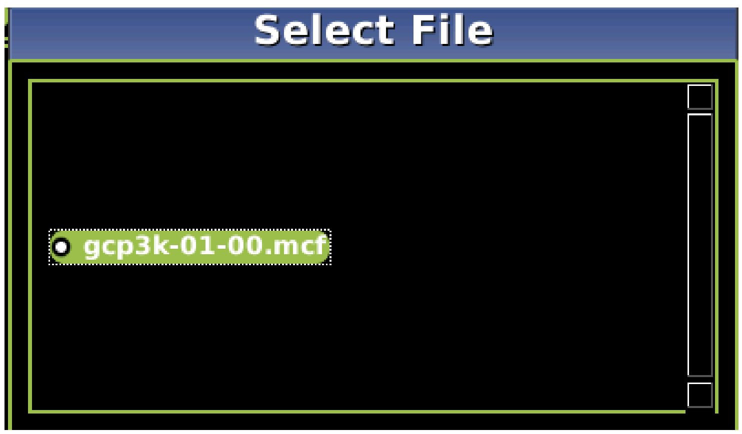


Figure 4-88 Select File Window

9. Scroll down to select the file to be installed, in this example gcp3k-01-00.mcf. Select **Enter**.
10. 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.

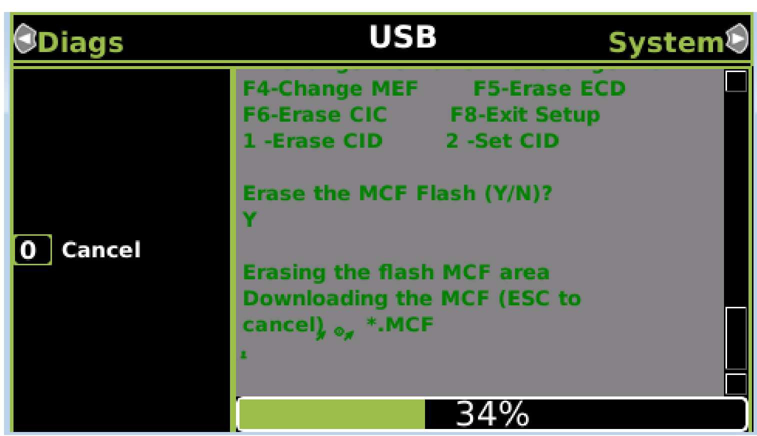


Figure 4-89 Loading Progress Bar

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, 4-character display shows SETUP.

4.5.1.5 Change the MCFCRC

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

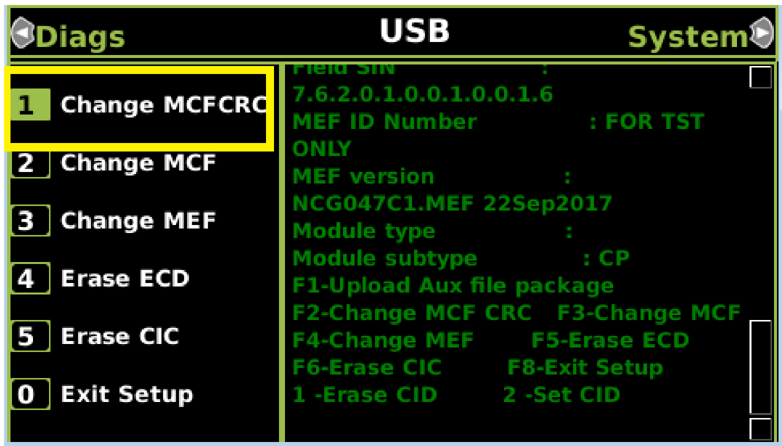


Figure 4-90 Change MCFCRC

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

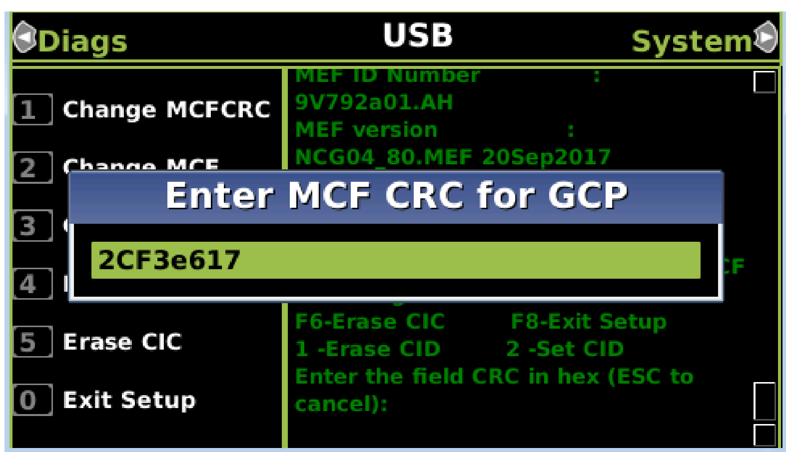


Figure 4-91 Enter MCF CRC for GCP

3. Use the back arrow to clear the number that appears in the window and 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.

4.5.1.6 Installing Software on 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 PROPER OPERATION OF GCP PRIOR TO 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 PRIOR TO 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 Model 3000+ GCP. 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 prior to attempting to place the GCP back into operation.

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

- CPU III Module
    - DIAG (CP) File: GCPNCP3_MEF_1.1.32r.tgz (CPU III CP executive software begins with GCP)
    - VLP File: 9VC72-V3H00_02.010.MEF
    - 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.

4.5.1.7 Replace CP MEF on CPU III via USB Drive

Perform the following actions:

1. Insert USB Drive in USB slot on front of 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 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.

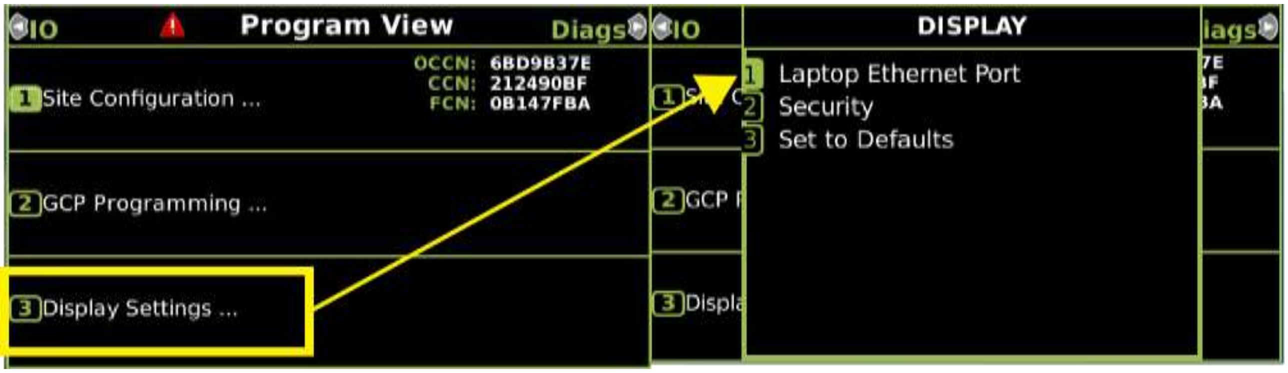


Figure 4-92 Ethernet Menu

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

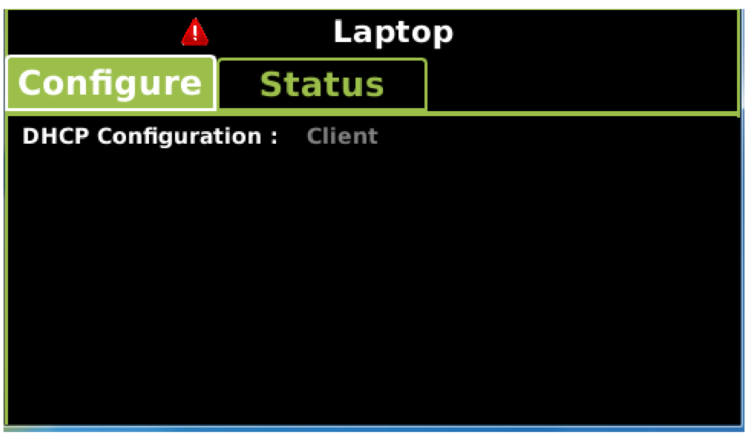


Figure 4-93 DHCP Configuration

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

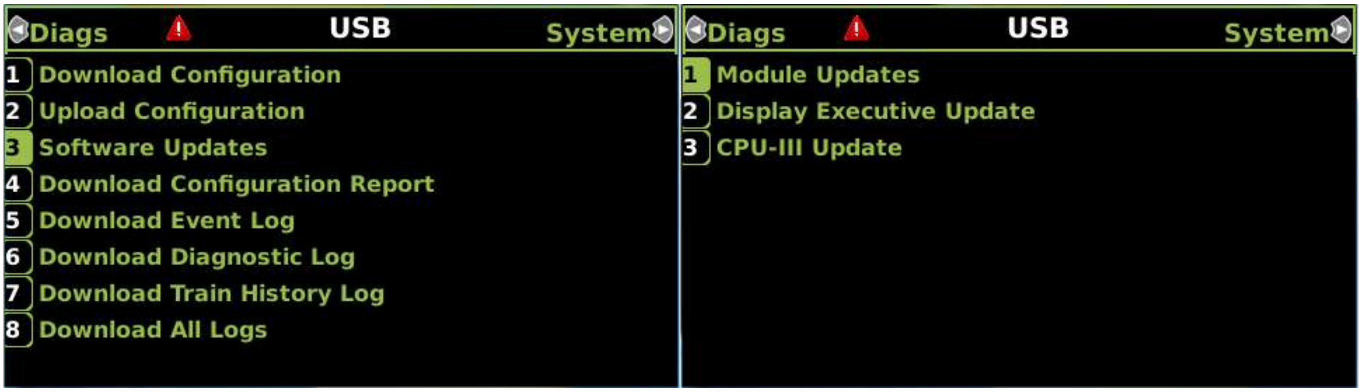


Figure 4-94 CPU-III Update

7. 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.
8. Select **1) Change CP MEF**.

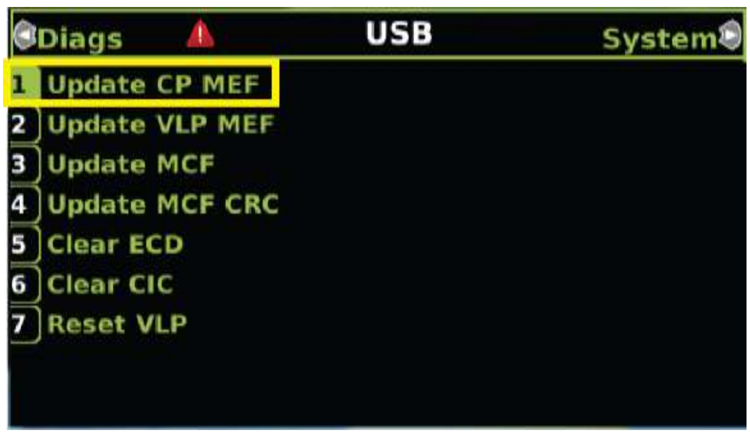


Figure 4-95 Change CP MEF

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

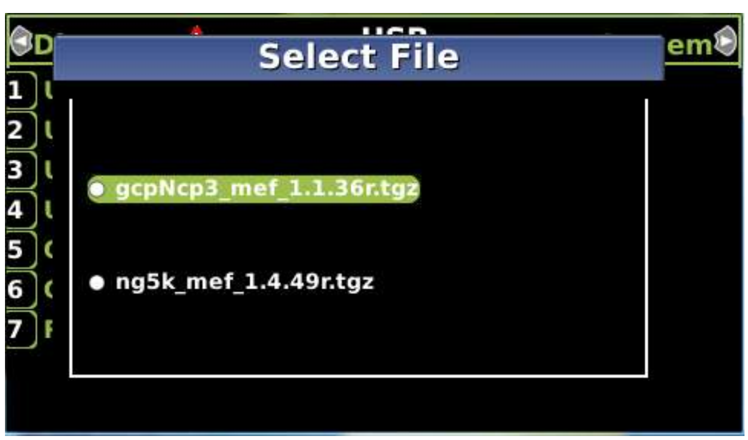


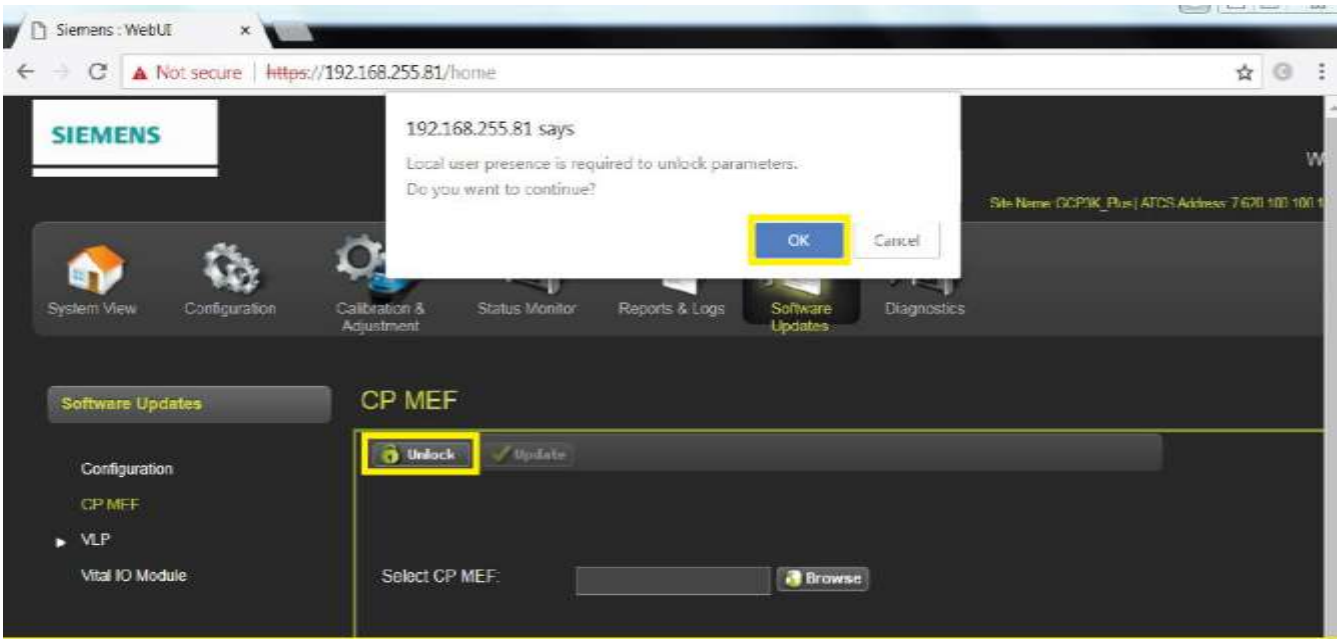
Figure 4-96 Select File Window

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 4.5.1.7 Step 6).

4.5.1.8 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 GCP 3000+ unit via the selector buttons on the front of the CPU III unit. Type into a compatible web browser with https:// in front of it.
3. Log into the WebUI using the appropriate User Name and Password.

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



5. Confirm user presence with 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.

4.5.1.9 Replace VLP MEF on CPU III via USB drive

Perform the following actions:

1. Insert USB Drive in USB slot on front of 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.

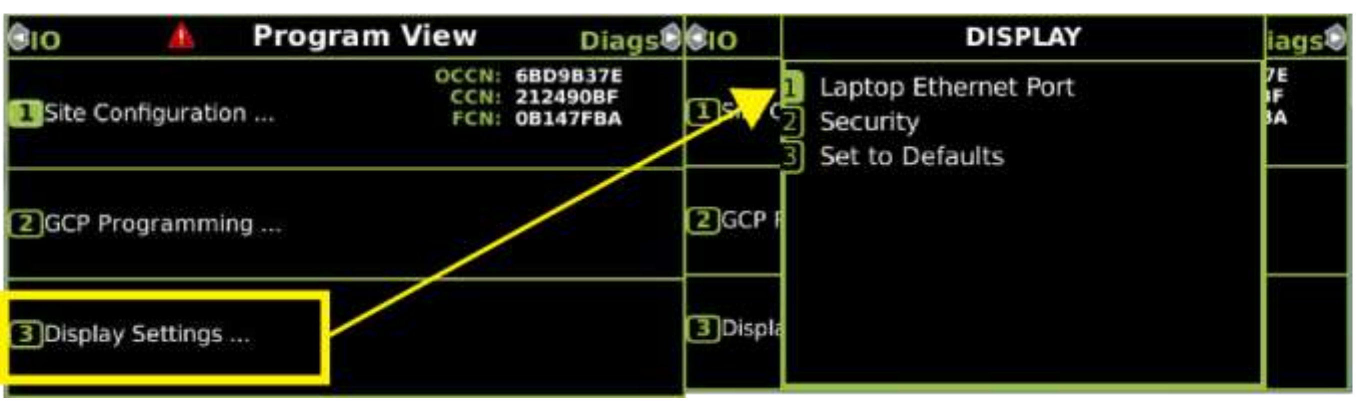


Figure 4-97 Ethernet Menu

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

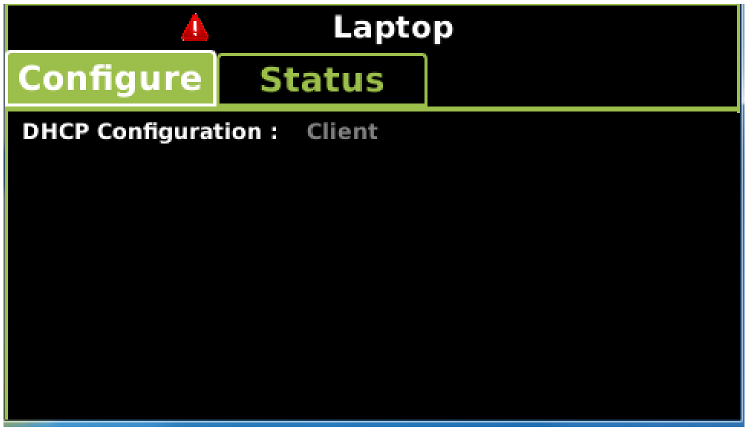


Figure 4-98 DHCP Configuration

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

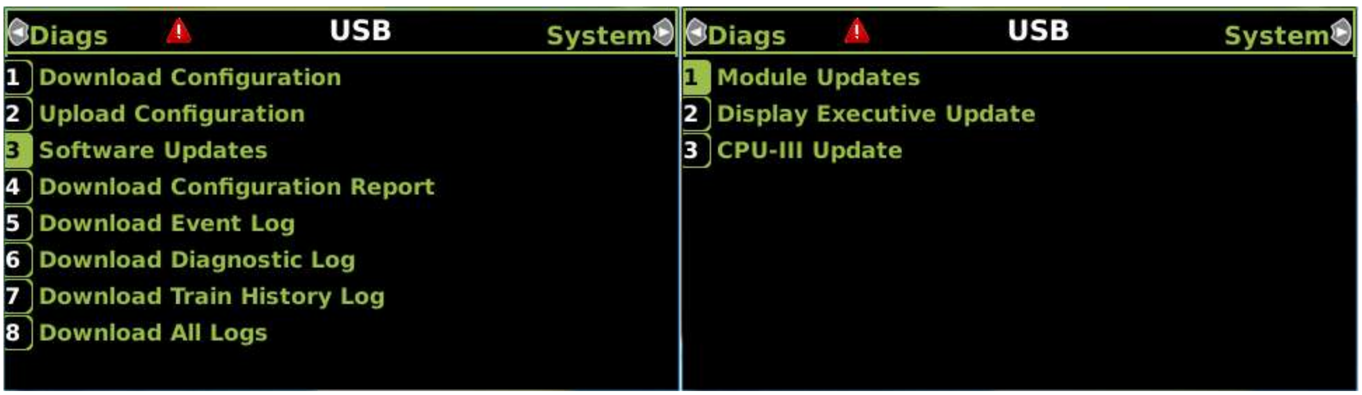


Figure 4-99 Software Update Menu

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

Figure 4-100 Change MEF

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

10. The **Select File** window opens.

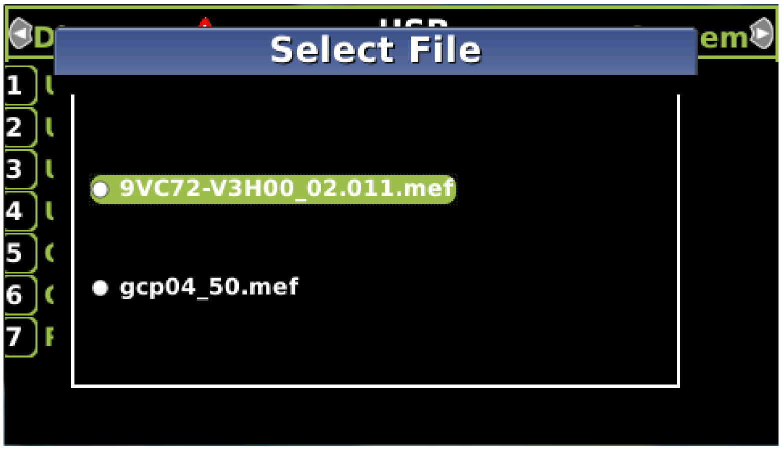


Figure 4-101 Select File Window

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**.

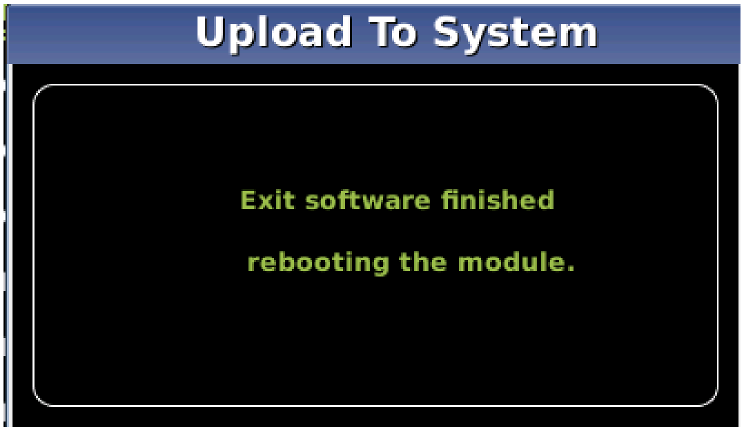


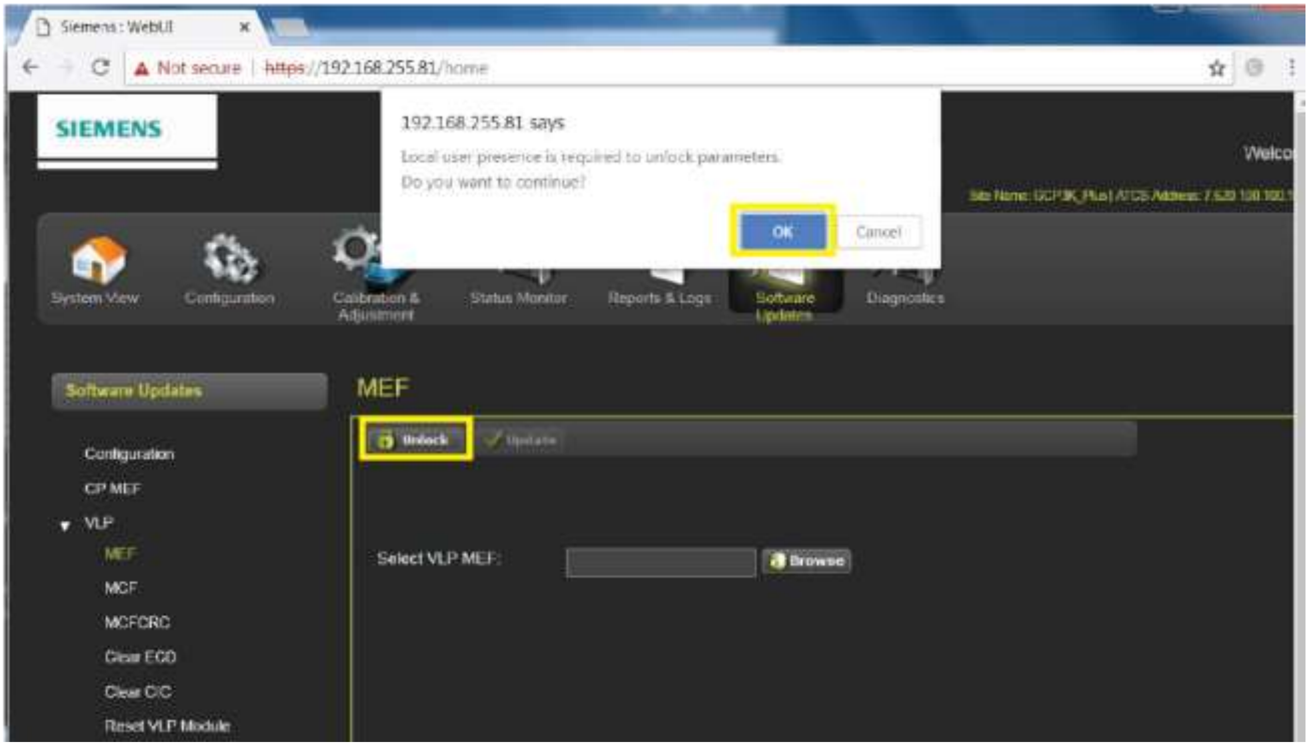
Figure 4-102 Exit Software

15. Press the **Back** button.

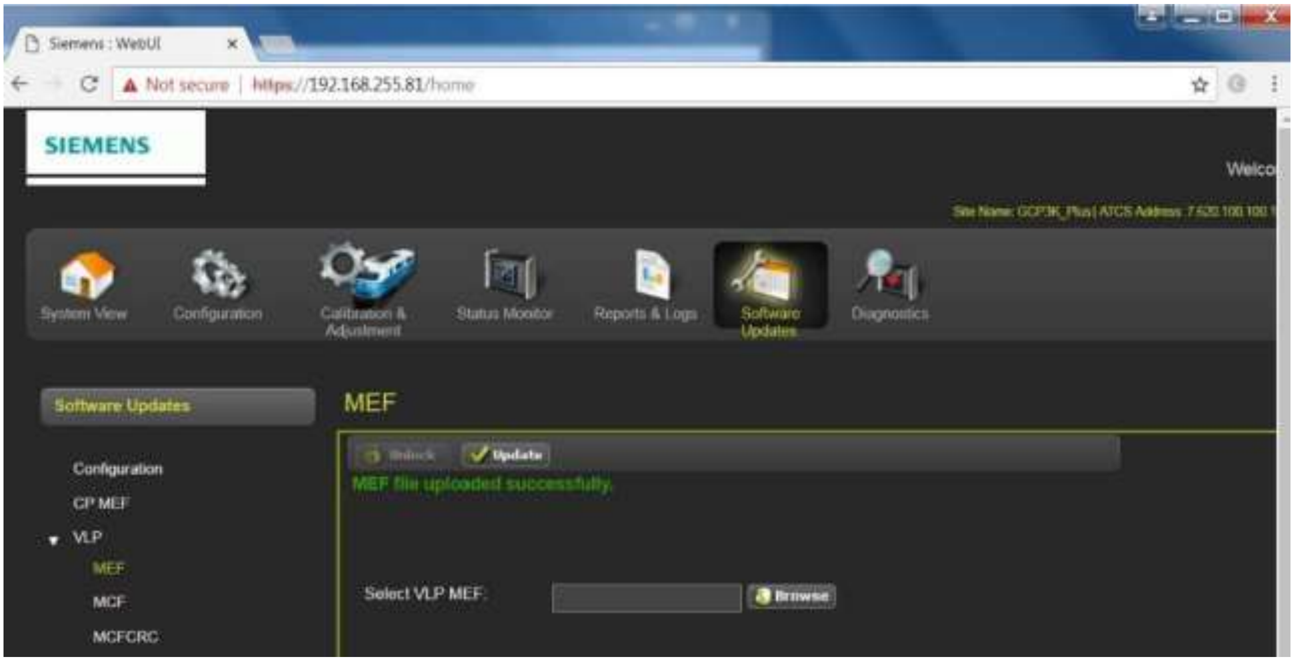
4.5.1.10 Replace VLP MEF on CPU III via WebUI

1. Locate the IP address of the GCP 3000+ unit via the selector buttons on the front of the CPU III unit. Type into a compatible web browser with https:// in front of it.
2. Login to the WebUI using the appropriate User Name and Password.

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



4. Confirm user presence with 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.



4.5.1.11 Change the MCF on CPU III via USB

Perform the following actions:

1. Insert USB Drive in USB slot on front of 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.

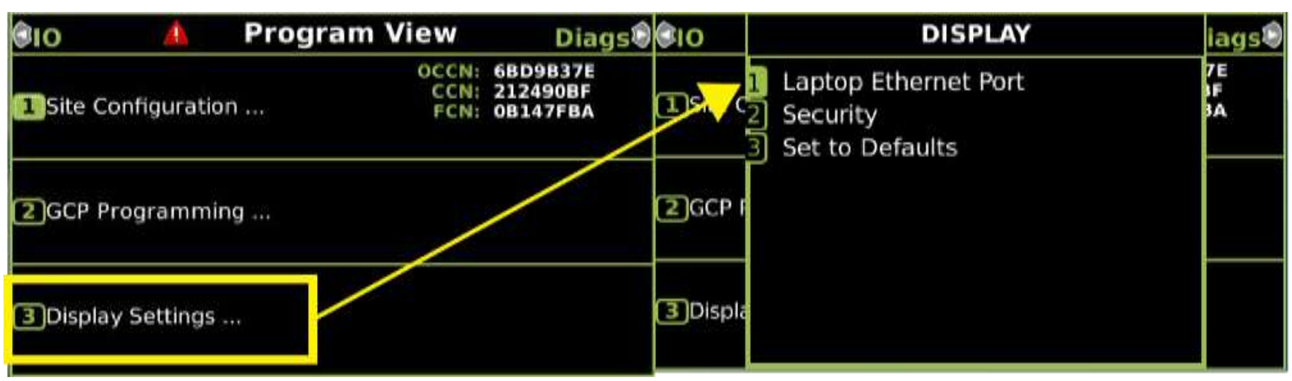


Figure 4-103 Ethernet Menu

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

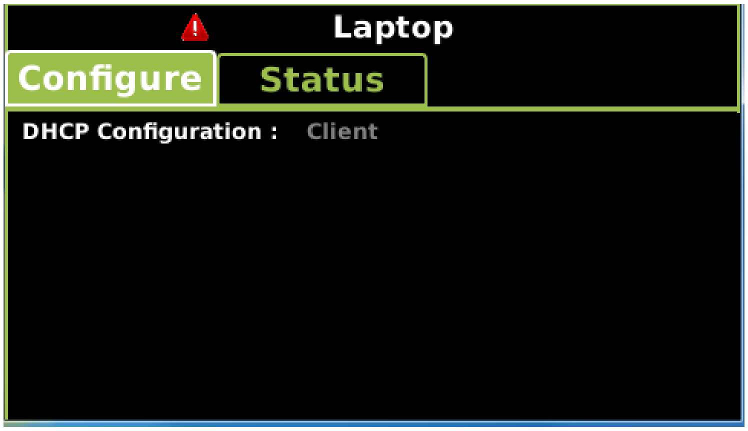


Figure 4-104 DHCP Configuration

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

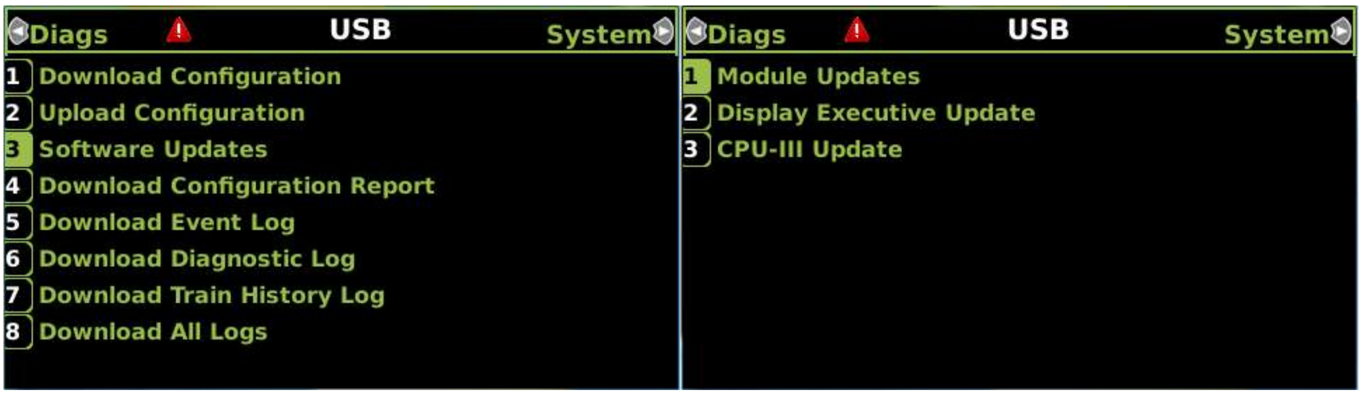


Figure 4-105 Software Update Menu

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

Figure 4-106 Update MCF

9. When asked by the Setup program to Erase the MCF Flash, select **1) Yes**.

10. The **Select File** window opens.

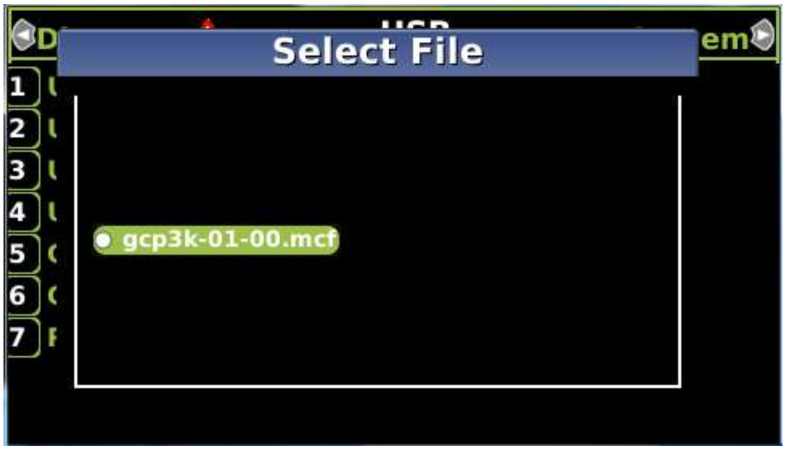


Figure 4-107   Select File Window

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.

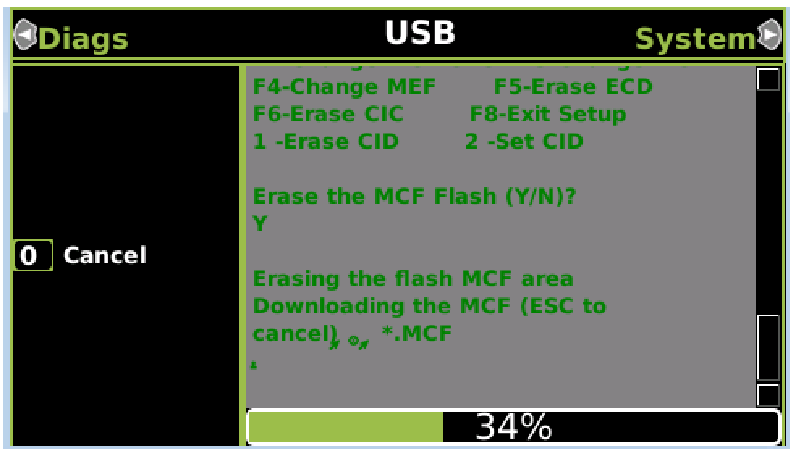


Figure 4-108   Loading Progress Bar

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, 4-character display shows SETUP.

4.5.1.12 Change the MCFCRC

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

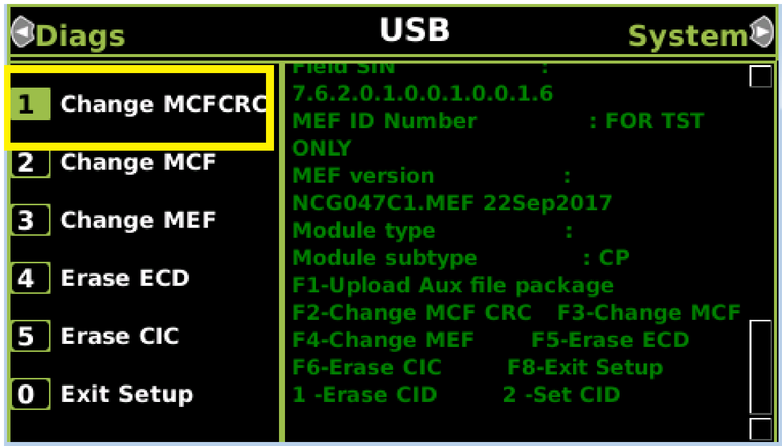


Figure 4-109 Change MCFCRC

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

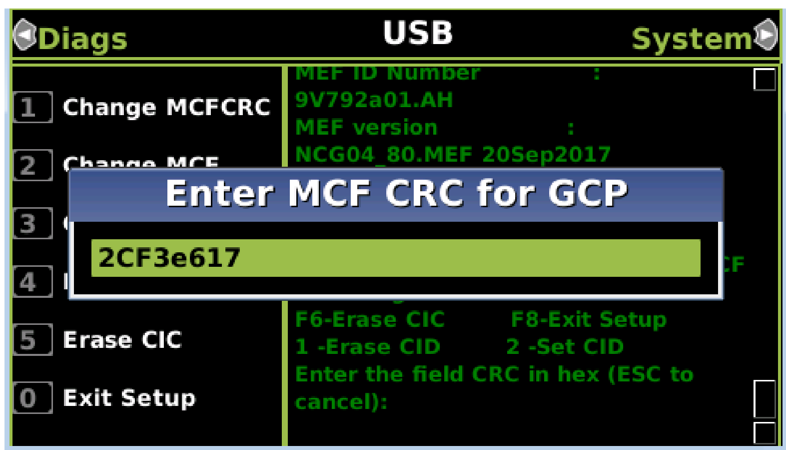


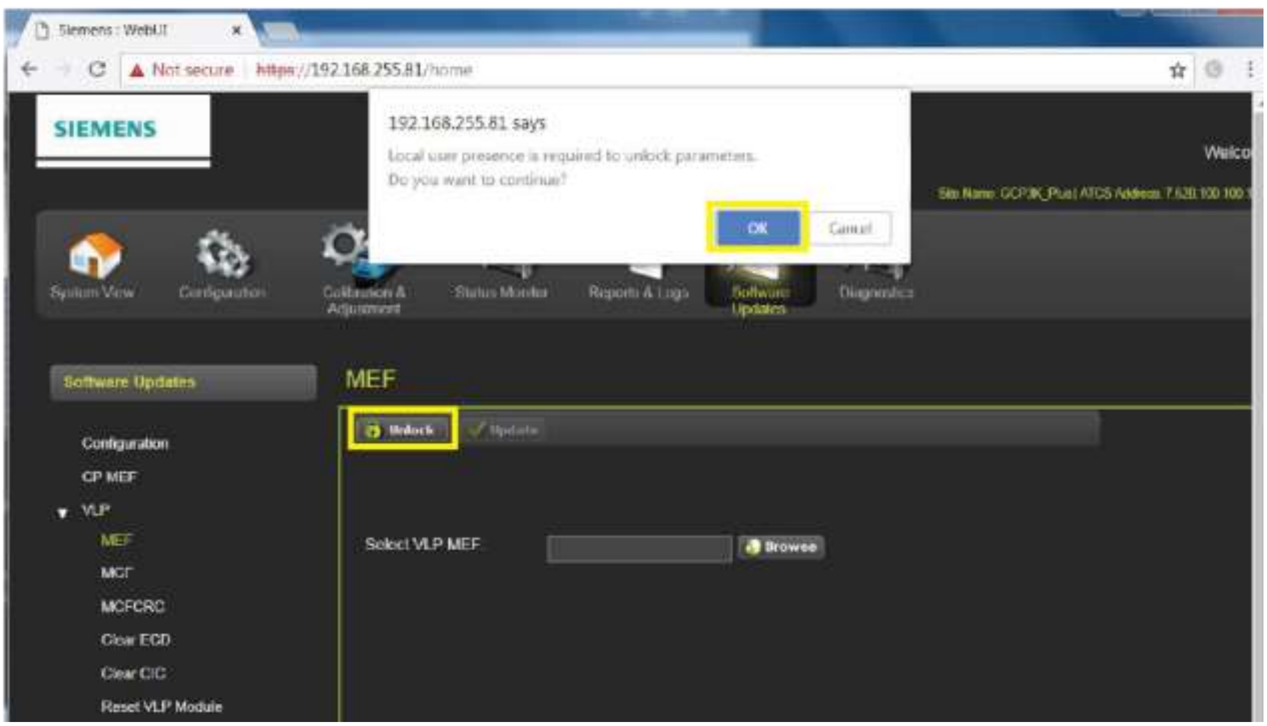
Figure 4-110 Enter MCF CRC for GCP

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.

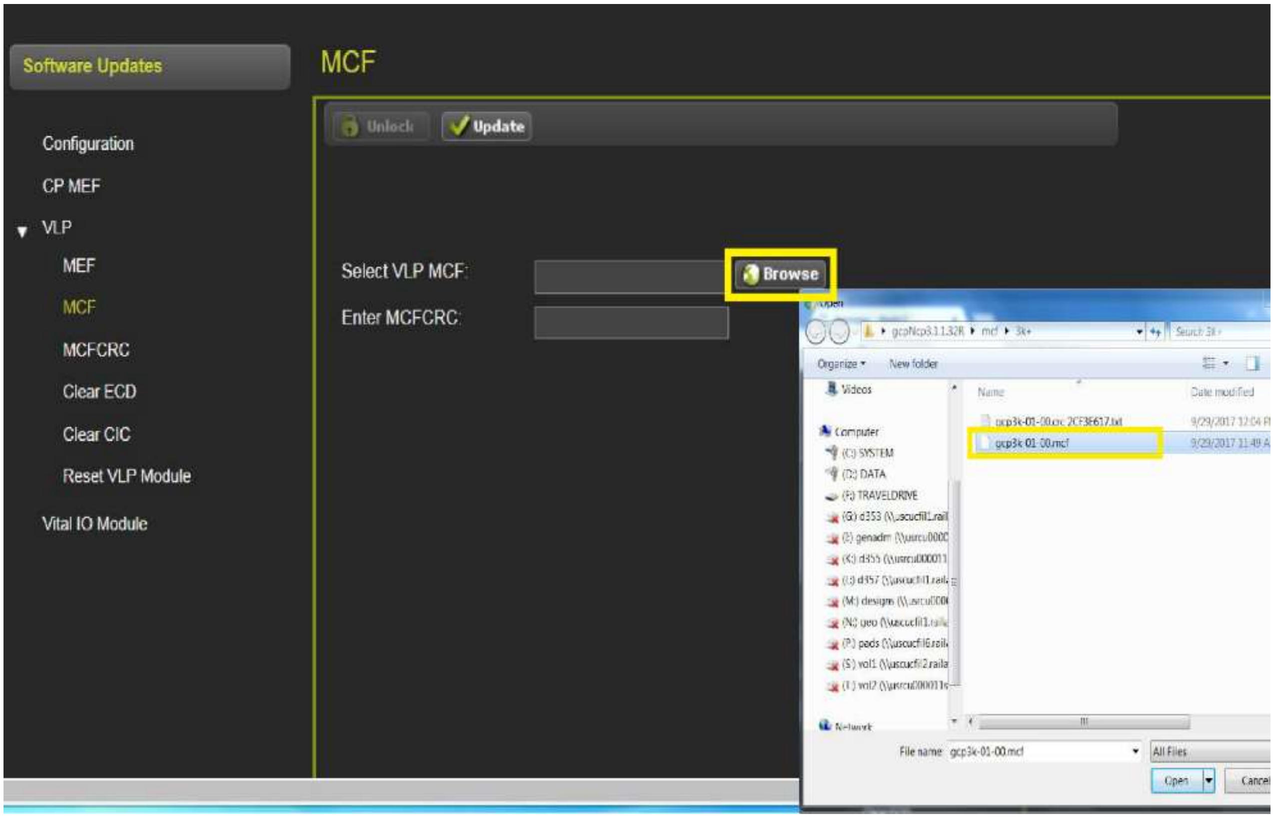
4.5.1.13 Change the MCF on CPU III via WebUI

1. Locate the IP address of the GCP 3000+ unit via the selector buttons on the front of the CPU III unit. Type into a compatible web browser with https:// in front of it.
2. Login to the WebUI using the appropriate User Name and Password.

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



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



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

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

4.5.2 Installing Software on Track Module

To install the GCP04_50.mef files on the Track Modules.

Perform the following actions:

1. Insert USB Drive in USB slot on front of 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**.

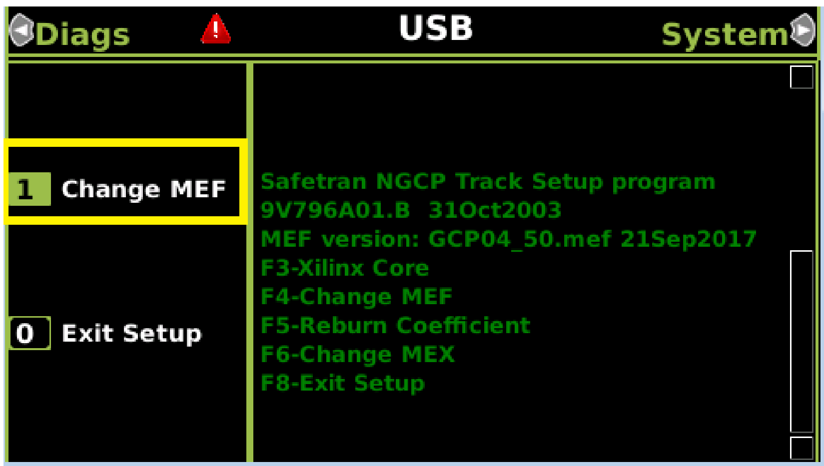


Figure 4-111 Change MEF

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**.

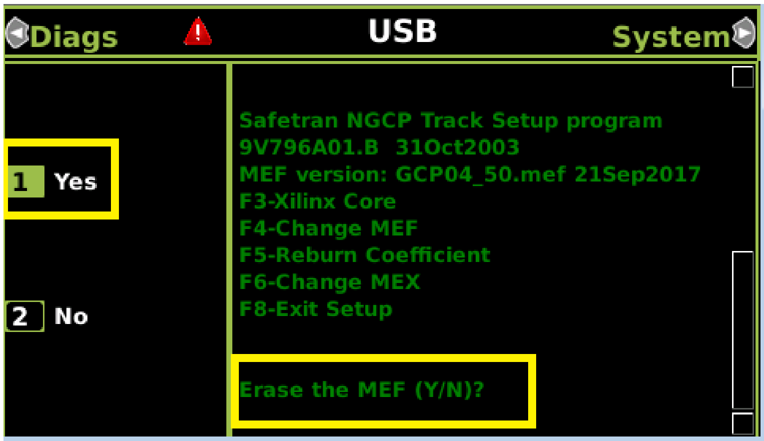


Figure 4-112 Erase MEF

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

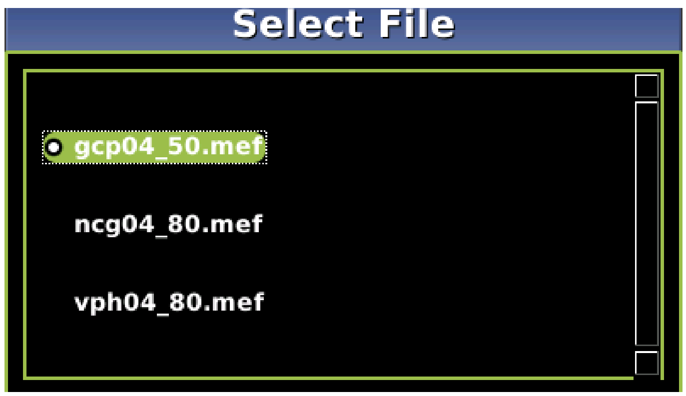


Figure 4-113 Select File Window

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.

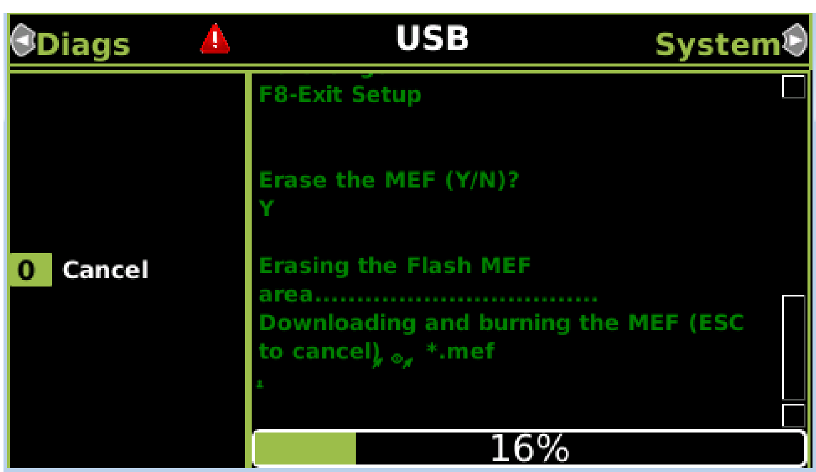


Figure 4-114 MEF Loading

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 is a second track module, repeat the procedure for the other track modules in the MAIN section of the GCP.

4.5.3 Installing Software on RIO Module

To install the RIO01_07.MEF files on the RIO Modules.

Perform the following actions:

1. Insert USB Drive in USB slot on front of 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.

Repeat the above procedures for installing all files on the STANDBY modules.

4.5.4 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 USB slot on front of 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**.

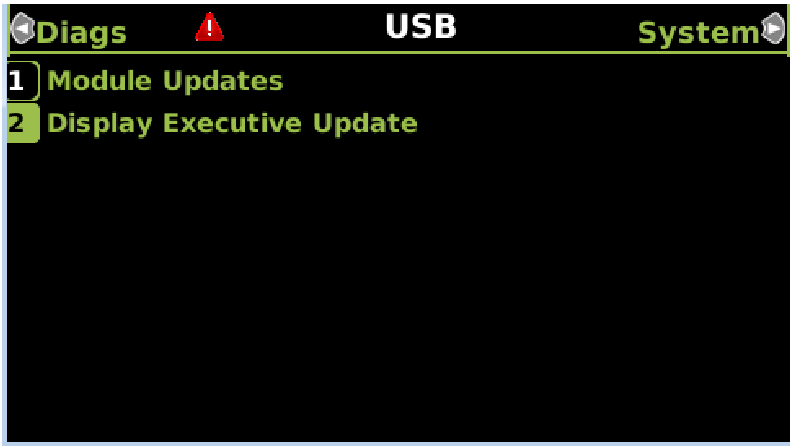


Figure 4-115 USB Update Window

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

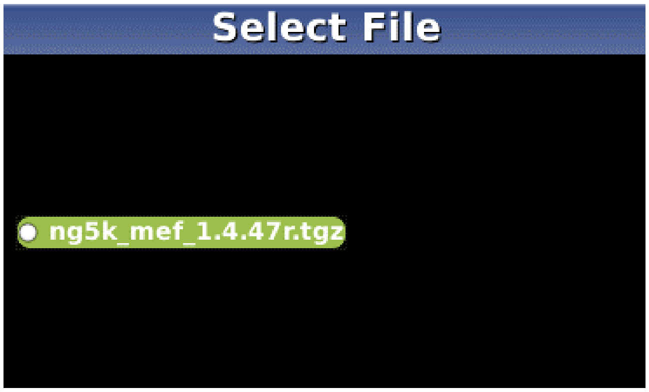


Figure 4-116 Select File Window

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**.

4.5.5 Transfer Card, A80468.

The Transfer Card software is not field upgradable and software changes are performed at the factory.

4.6 WEB USER INTERFACE SCREENS

The Display and CPU III modules provide a Web Interface which enables the user to configure the 3000+ GCP locally as well as remotely through the Laptop/Ethernet Port (RJ-45) on the front of the Display Module, and the Laptop/Ethernet port on the front of the CPU III module. The Display Laptop Port default protocol is set as DHCP Server. The CPU III will default to operating as a Server as well. If they are to be connected to a network, however, they will need to be configured as Clients. The default IP address for the Display from the factory is https://192.168.255.81. The CPU III will display an IP address scrolling across the four-character display. This can be accessed by using the Select button to move between the scrolling displayed text. The WebUI uses the HTTP Secure (https) protocol. The Display and CPU III DHCP Server protocol will assign the laptop an IP address and connect the user to the GCP. The Display and CPU III support the following web browsers:

- IE 10 and 11
- Firefox (version 46.x)
- Chrome (version 55.x)

Open a web browser and type in the IP address of the Display. The browser may give the following screens regarding the connection.

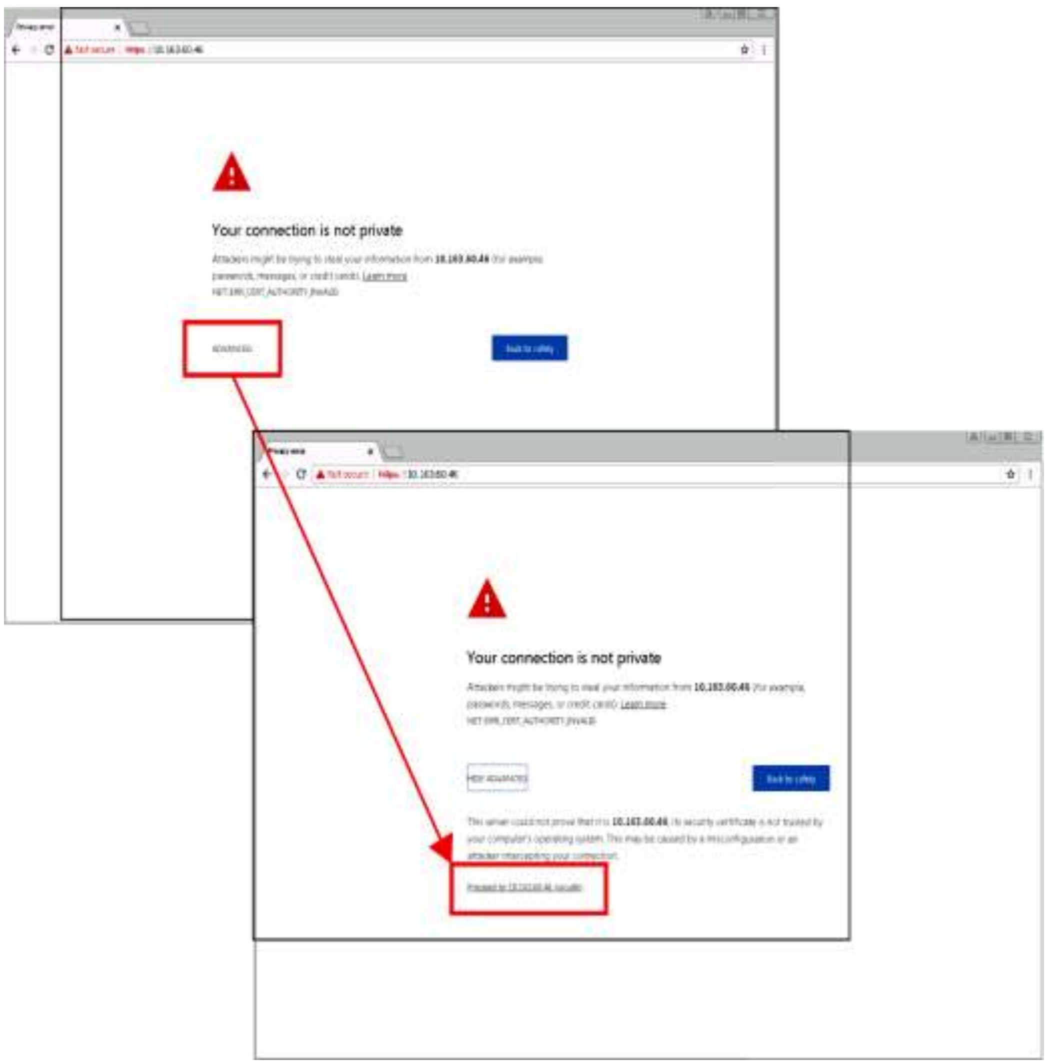


Figure 4-117 Unsecure Connection Warning

Click the **Advanced** option and select the option to proceed to the WebUI.

The WebUI will then appear. Select the user name as Maintainer (default). The Admin is for Siemens personnel use only.

The default password is GCP3000+ (case sensitive) to open the session. If the security has not been set to enable a maintainer password, this 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 GCP3000+ may still be used to access the WebUI, but the user will be unable to change GCP Programming parameters.

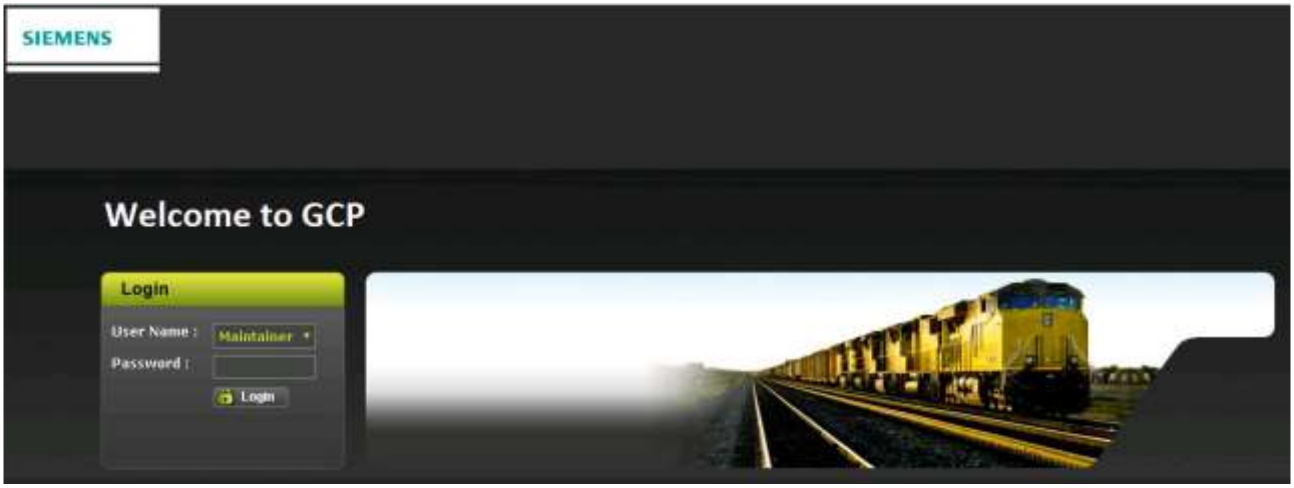


Figure 4-118 WebUI Login Screen

NOTE

The passwords **GCP4000** and **GCP5000** are also valid Maintainer login passwords, this is because the Display Module is a common module with the 4000 and 5000 GCP products.

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

NOTE

The 3000+ GCP web server 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.

See Section 4.6.9 for instructions on using the 3000+ GCP Display on a network.

The WebUI has buttons at the top which allow the user to select the various functions.

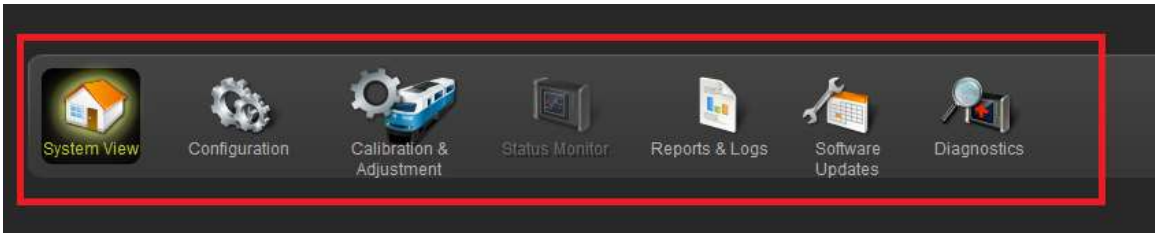


Figure 4-119 WebUI Tool Bar

> **NOTE**
>
> If the WebUI is used with the CPU III while the Display is also in session, a reduced number of menu items will be available. Reference Section 4.6.10 for full listing of menus available/unavailable. If there is no Display in the unit, the WebUI can still be used with the CPU III and all menus will be available that are accessible from the Display, excepting those specific to the Display unit.

4.6.1 System View

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

Figure 4-120 System View

The System View shows the status of each track module. The same convention as the Display screens is used for the LED icons.

- Green – energized
- Grey – de-energized
- White – function not configured as used in 3000+
- Red – unhealthy / failed

If a GCP is not fully calibrated, the required calibrations are indicated, as shown below for Track 2. The Island status is indicated as

- Up – unoccupied
- Down – occupied
- Not Used – not used
- Cal Req – calibration required

If diagnostic messages are present related to a track module, the system view will show the red diagnostic indictor on that track.

The track panel shows the configured GCP and island frequencies.

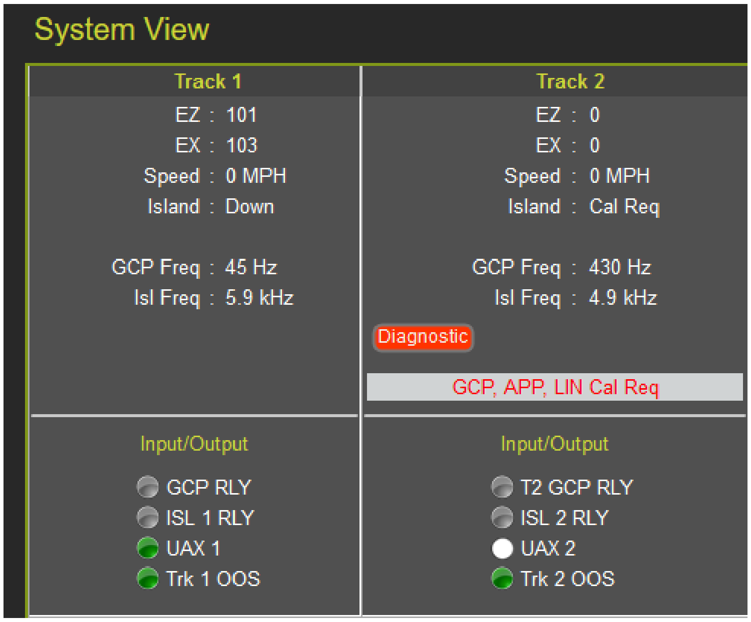


Figure 4-121 System View Track Information

If an external island is used, this is indicated as shown below for track 1. The island status still shows Up/Down, but the display shows ‘Isl External’.

Or, if track 2 is using track 1’s island, this is indicated as shown for track 2 below. The island is marked as ‘Not Used’ and the track as ‘Uses Trk 1 Island’ – in this case, look at the island state for track 1 to see what is being used by track 2.

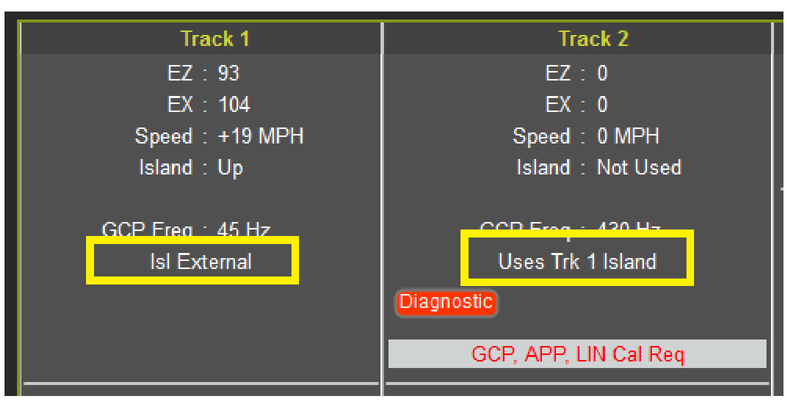


Figure 4-122 System View Island Indications

The System View shows the RIO status as follows:

- Communications from CPU to RIO module, green if healthy, red if unhealthy.
- The states of the outputs (DAX A.. D RLY) and input (ENABLE.. EXT ISL 2)

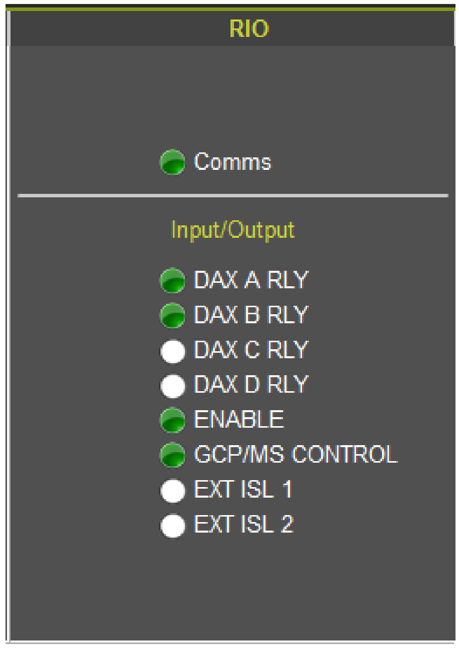


Figure 4-123   RIO Status Indications

System View also shows other general status indications:

- Maintenance Call output state:
  - green indicates system healthy, maintenance call output will be on, and so the maintenance call light on bungalow will be off
  - red indicates system unhealthy, maintenance call, if used, output will be off, and so the maintenance call light on bungalow will be on
  - Transfer health – this indicates whether the CPU is driving the transfer output which prevents the transfer module timer from starting its count down.
  - Advance Preempt Input state – when advance preemption is used, this shows the state of the advance preemption input. This input is shared with the GCP/MS Control input (IO input 2)
  - Advance Preempt Output state – when advance preemption is used, this shows the state of the advance preemption output. One of the DAXes will be configured as a Preempt, so physically the output will be connected to a DAX RLY output
  - Evt Rec Comms – this indicates whether the CPU is in session with an external event recorder via the Echelon.

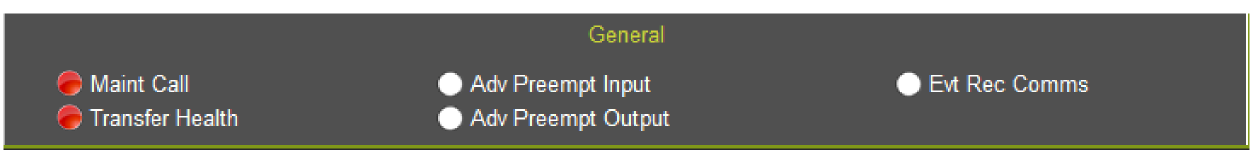


Figure 4-124   General Status Indications

The System View has menus on the left that allow other WebUI screens to be accessed.

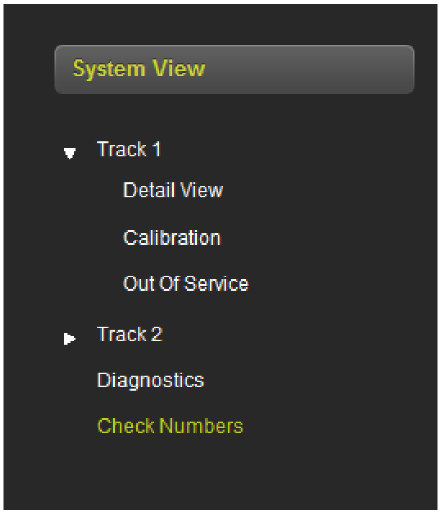


Figure 4-125 System View Menus

If track 2 or the RIO module is not used, the System View will show the following:

Figure 4-126 Track and RIO Not Used

4.6.1.1 Track – Detail View

The track detail view shows more detailed information about the track module. This screen is primarily used to see the information shown in Figure 4-127 (highlighted with yellow boxes) as this is not available elsewhere on the WebUI:

- Check EZ – value of EZ on the check wires,
- Island Z Level – the island signal level, where 100 or lower indicates occupancy,
- Track Check Number (TCN) and date and time it was last changed.

The Island Z level represents the normalized signal level on the island. When the value is below 100 the island becomes occupied, the island will start its pickup delay timer running when the Z level goes back over 110. The display does not show values over 250, even though the island level will generally be much higher.

The track detail screen also shows the user the EZ/EX limits information consisting of:

- the highest EZ value the track has recorded since this screen was last reset and the EX value at that time. The time/date this occurred is shown.
- the lowest EX value the track has recorded since this screen was last reset and the EZ value at that time. The time/date this occurred is shown.

The values can be reset by pressing the **Reset** button.

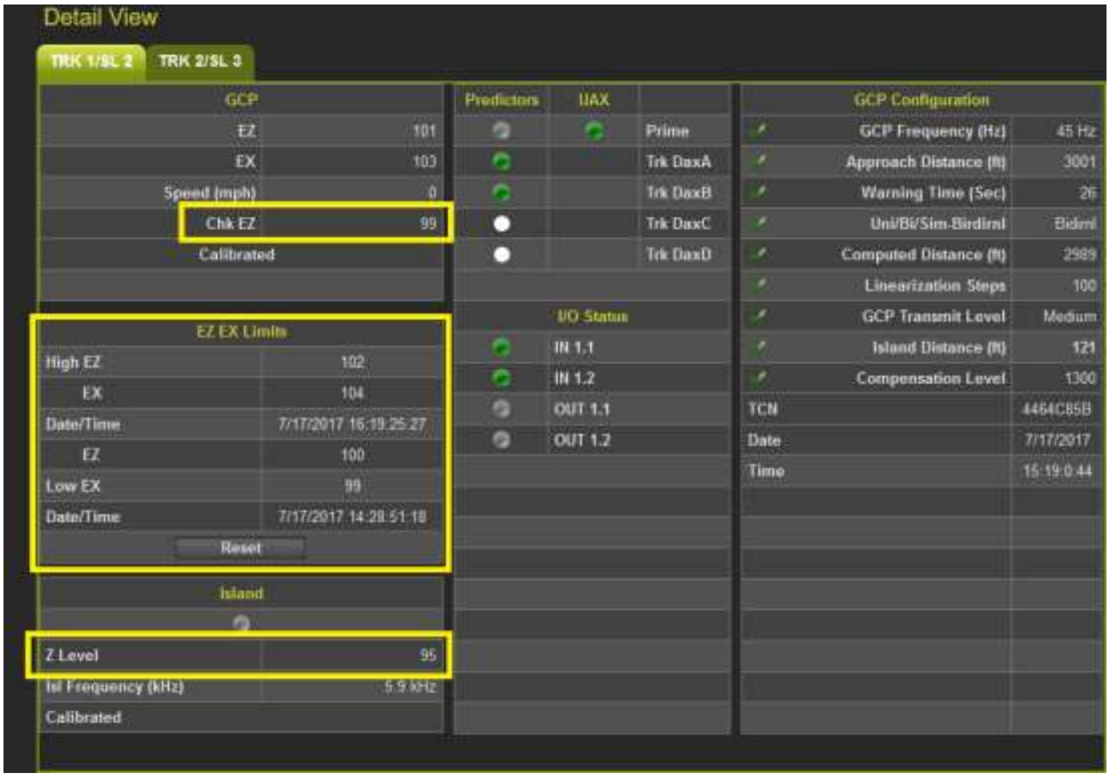


Figure 4-127 Track Detail View

4.6.1.2 Track - Calibration

The calibration screen can be accessed from the **System View Track Calibration** menu or from the **Calibration & Adjustment** icon on the tool bar.

Figure 4-128 Selecting Calibration

The Calibration screen shows the state of the calibration for the specified track. If the calibrations are complete, these are marked with a green check mark as shown in Figure 4-129.

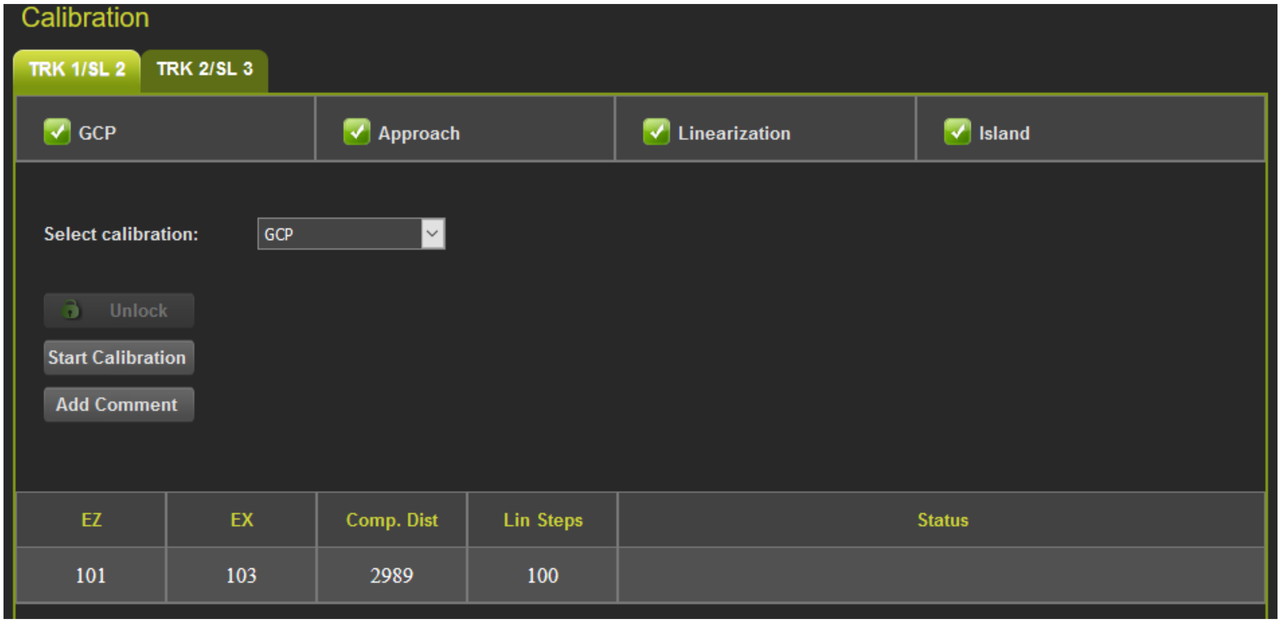


Figure 4-129 Calibration Not Required

If the calibrations are required, these are marked with a red check box as shown in Figure 4-130.

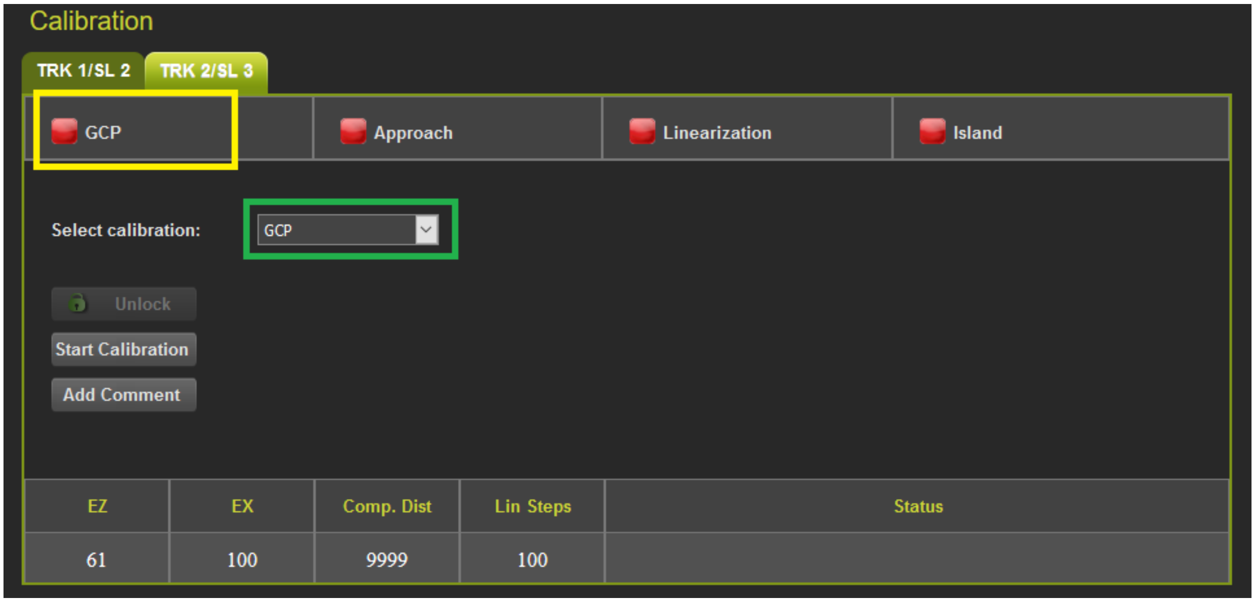


Figure 4-130 Calibration Required

To select which calibration to perform, either click on a specific calibration in the menu bar, for example, GCP shown in the yellow box above, or select the calibration from the drop-down menu shown in green box (Figure 4-130).

When the island calibration is selected, the WebUI will show the distance at which the shunt should be placed. The distances shown are automatically calculated for the island frequency that has been configured.

Figure 4-131 Island Calibration

See Section 6.2 for the detailed instructions on performing calibrations.

4.6.1.3 Track – Out-of-Service

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.

REQUIRED OPERATIONAL TESTS SHALL 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).

The WebUI can be used to take the 3000+ GCP approach circuit and the island circuit out of service. There are three methods of using the Out of Service feature on the 3000+ GCP. The method used is selected in the GCP Programming by using OOS Control parameter. The options are:

- Display
- Display + OOS IPs
- OOS IPs

WARNING

WARNING

INPUTS FOR “OUT OF SERVICE” SHOULD BE WIRED IN A PERMANENT MANNER IN ACCORDANCE WITH CIRCUIT PLANS. DO NOT USE TEST TERMINALS OR SWITCHES THAT CAN VIBRATE CLOSE TO ENERGIZED OOS INPUTS.

When **OOS Control** is set to **Display**, the Web or Local UI by itself can be used to take a GCP approach or island out of service.

When **OOS Control** is set to **Display+OOS IPs**, the WebUI is used in conjunction with the Trk Out of Service inputs (IN 2 on the each track module) to take a GCP approach or island out of service.

When **OOS Control** is set to **OOS IPs,** the WebUI is not used in taking the GCP approach and island out of service, only the Trk Out of service inputs are used.

Selecting the **Track Out of Service** screen will show the **Out of Service** screen as shown below.

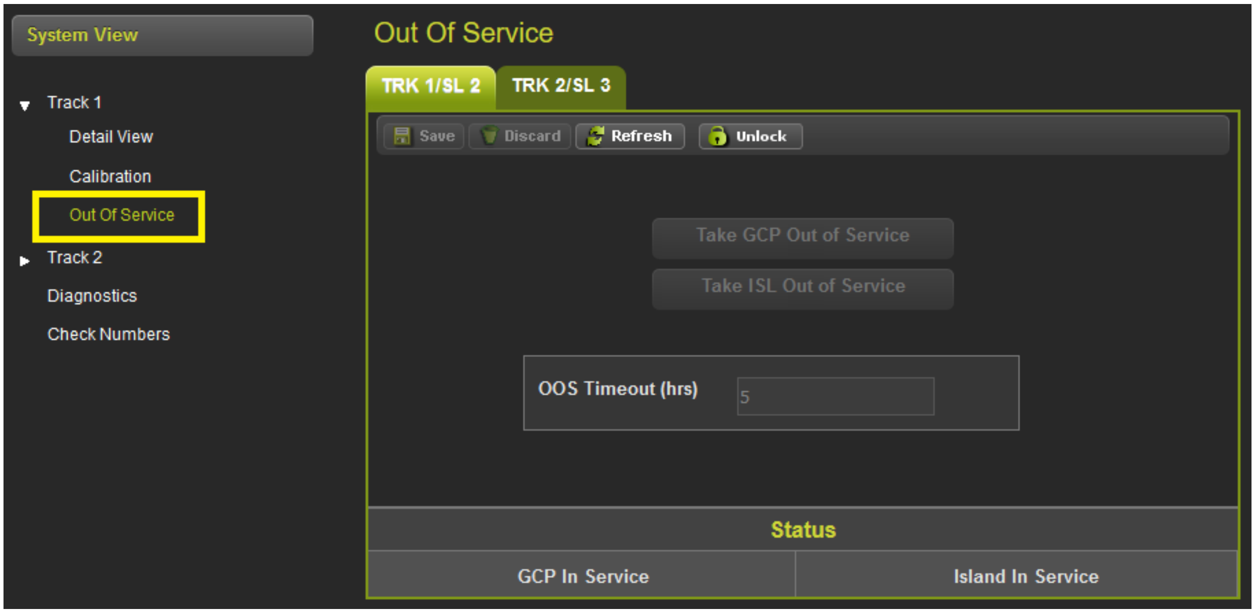


Figure 4-132 WebUI Out of Service

Since the WebUI may be used remotely, before anything can be changed on this page, the screen has to be unlocked by demonstrating that there is a person at the actual GCP in the field. Select the **Unlock** button and then have the person in the field use the keypad to acknowledge the message shown on the display, see Section 4.6.7 for more information.

Once local user presence has been confirmed, other buttons will be enabled as shown below.

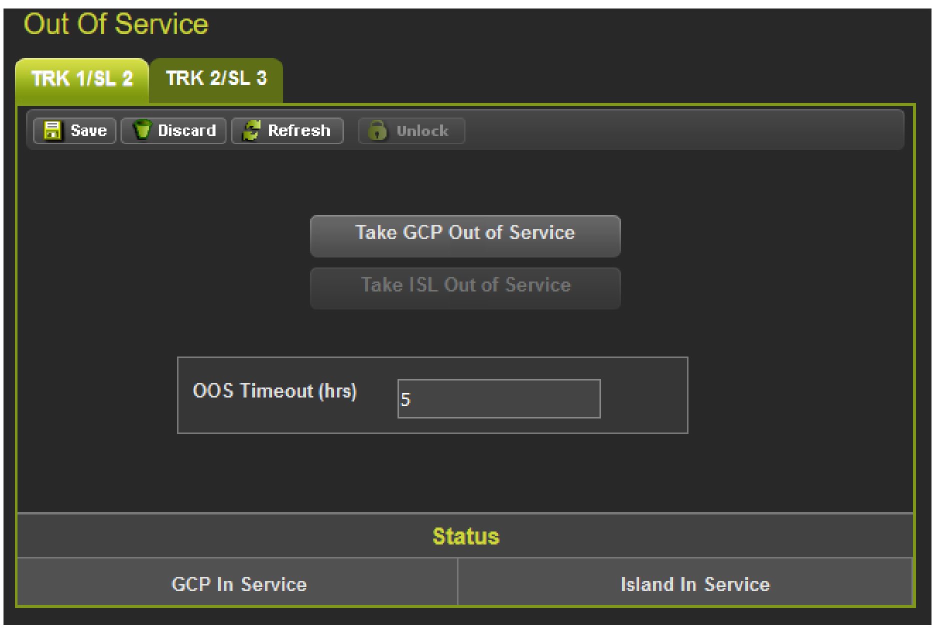


Figure 4-133 WebUI: Out of Service Unlocked

First, enter the **Out of Service Timeout** that is required, and press **Save**. The timer cannot be changed once a track is out of service, so it needs to be set first. The valid values are 0 to 23 hours, where the value 0 means that the timeout is not being used.

NOTE

NOTE

The **Out of Service Timeout** covers all tracks taken out of service with one time interval.

If the timer is running for one track out of service, and it is desired to take the other track out of service for an added amount of time, do the following:

- Return to the first track service
- Edit the **Out of Service Timeout** to the new value
- Take both tracks out of service

If the Transfer Module transfers while a track is out of service, the track will be returned to service and may activate the warning devices.

If **OOS Control** is set to **Display+OOS IPs**, energize the Trk OOS Input on the track module (IN2) according to railroad procedure before continuing and then select the **Take GCP Out of Service** button. The WebUI will ask for confirmation as shown below.

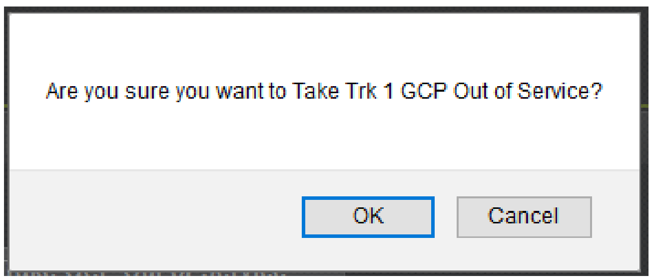


Figure 4-134 WebUI: Out of Service Acknowledge

Select **OK** if required. The WebUI will now show: **GCP Out of Service** as shown in Figure 4-135 on the left. The System View will show the GCP OOS icon flashing between blue and white.

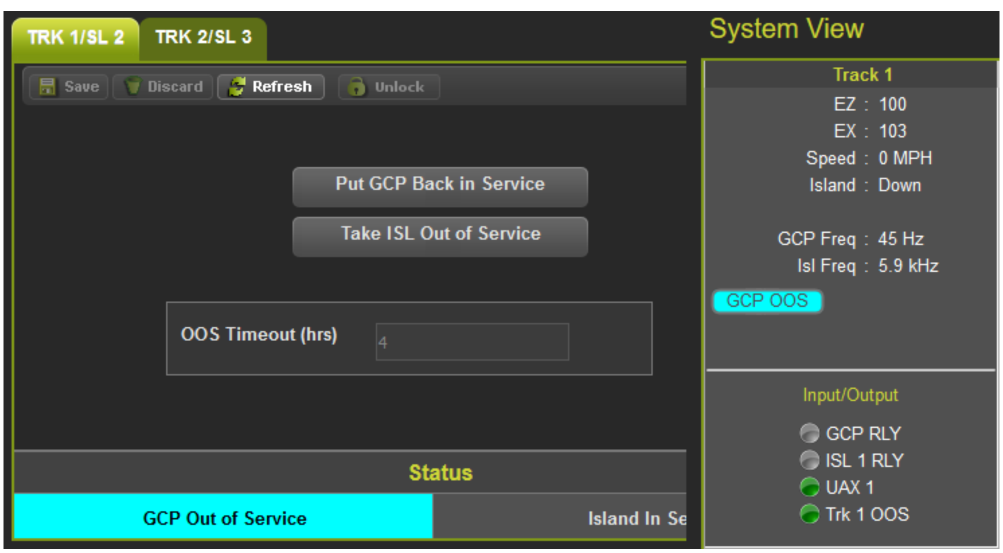


Figure 4-135 WebUI: Out of Service Indications

The track module will also display the message GOFS on its four-character display. The maintenance call output on the 3000+ GCP will turn off, causing the maintenance call lamp to go off, if it is wired. The maintenance call light is illuminated when running properly, if it goes dark, that indicates a problem at the location.

To return the GCP to service, if **OOS Control** is set to **Display+OOS IPS**, de-energize the track OOS input on the track module.

If **OOS Control** is set to **Display**, use the WebUI module and select the **Put GCP Back in Service** button shown in Figure 4-135 above. (This requires local user presence - Section 4.6.7).

NOTE

NOTE

When a GCP is OOS but the island remains in service, the crossing will activate when the island is occupied.

NOTE

NOTE

Putting the GCP back in service will also put the island back in service if it was out of service.

If the **OOS Control** is set to **Display+OOS IPs** and the Trk OOS Input is still energized, performing the above step will put the track back in service; however, the maintenance lamp call will remain off while the Trk OOS Input is still energized. Similarly, if the out of service timer expires and the Trk OOS Input is still energized, the maintenance call lamp will remain off.

WARNING

WARNING

ENSURE THAT TRACK OUT-OF-SERVICE INPUT IS RETURNED TO DE-ENERGIZED WHEN THE TRACK IS PUT BACK IN SERVICE.

NOTE

NOTE

The island cannot be taken out of service by itself, the GCP has to be first taken out of service.

If **OOS Control** is set to **OOS IPs** the options to take the GCP out of service will not be enabled on the **Out of Service** screen.

To take the island out of service, first take the GCP out of service, then select the **Take ISL Out of Service** button shown in Figure 4-135 above.

This will bring up the following confirmation screen.

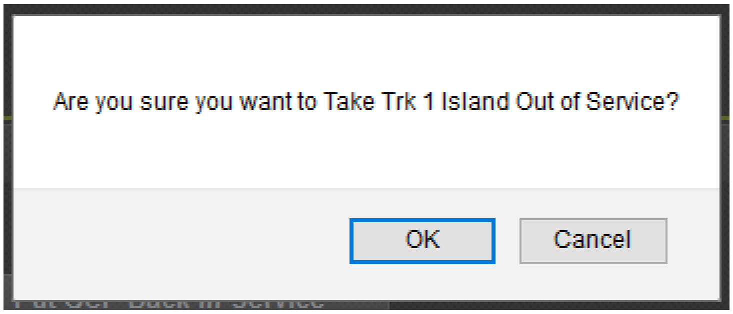


Figure 4-136 Island Out of Service Confirmation

If required, select **OK** to continue.

The **Out of Service** screen will now show the Island as **Out of Service**, and the top system level screen will show the message **GCP-ISL OOS** that will alternate between blue and white. The track module will display the messages **GOFS** and **IOFS** on its four-character display. As before, the maintenance call output on the 3000+ will turn off, this will cause the maintenance call lamp to go off, if it is wired.

Figure 4-137 Island Out of Service Indications on WebUI

If **OOS Control** is set to **Display+ OOS IPs**, to return the GCP and island to service, de-energize the track OOS input on the track module. If only the island needs to be put back in service, use the WebUI and select the **Put ISL Back in Service**.

NOTE

NOTE

Either the WebUI or Display Keypad can be used to put the GCP and Island in or out of service.

4.6.1.4 Diagnostics

Selecting the Diagnostics menu from the System view will show the Diagnostics screen. This shows diagnostic messages present in the system. The slot column shows which component this is related to:

- Trk 1 or Trk 2 indicates a diagnostic message related to a track module.
- RIO 1 indicates a diagnostic message related to RIO module
- SYS 1 indicates a system diagnostic message not specific to a track or RIO module

If a specific message is selected, the display will show possible causes of this diagnostic messages and remedies to help fix it.

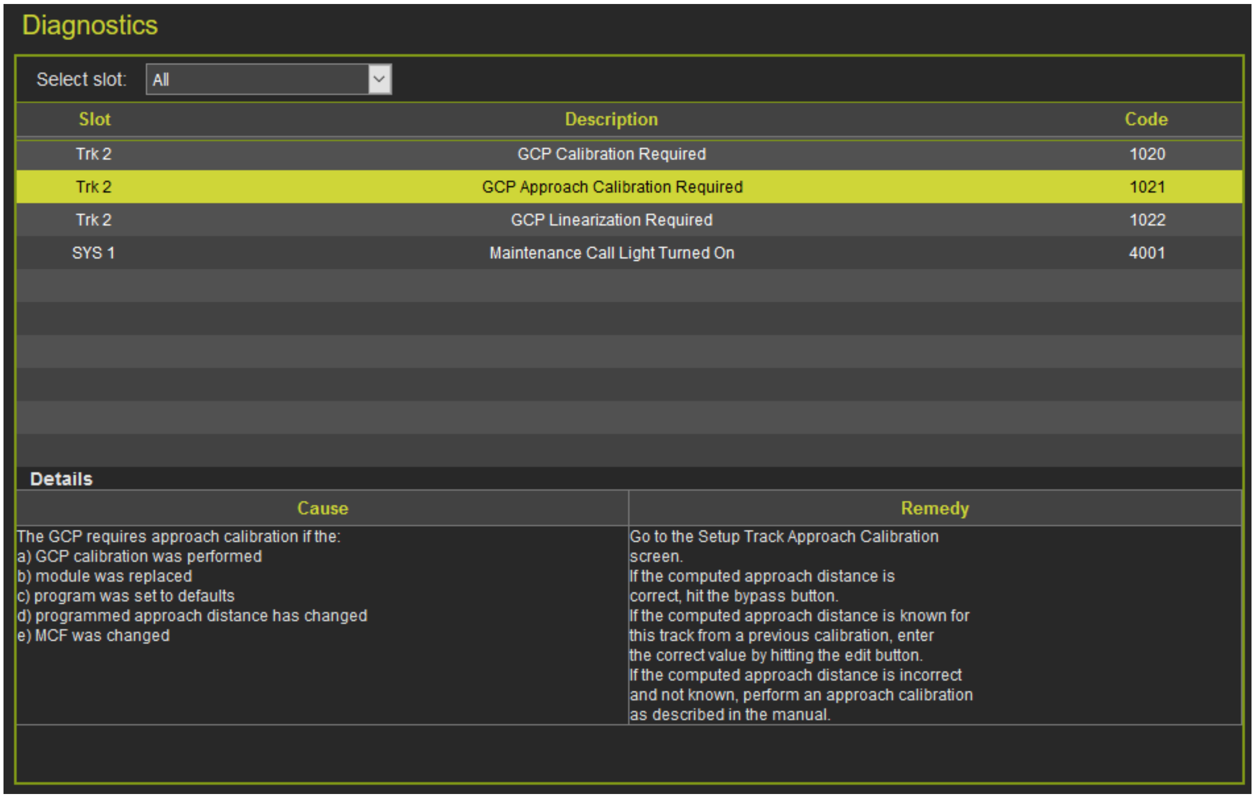


Figure 4-138 Diagnostic Message

4.6.1.5 Check Numbers

The check numbers screen will show the following check numbers:

- MCF Name – the name/version of the MCF
- MCF CRC – the CRC of the MCF that is running
- CCN - Configuration Check number, a check number that covers every configuration parameter that is part of the GCP programming and can be used to check whether anything in the vital programming has been changed.
- OCCN – Office Configuration Check number, used to verify configuration settings prescribed by design office are correct
- FCN – Field Check number: a check number that changes when changes are made to the calibration of the GCP. The check number will change whenever a GCP, approach, linearization or island calibration is performed.

The screen also allows hidden parameters to be reset. See description in Section 4.2.4.5 for use of this.

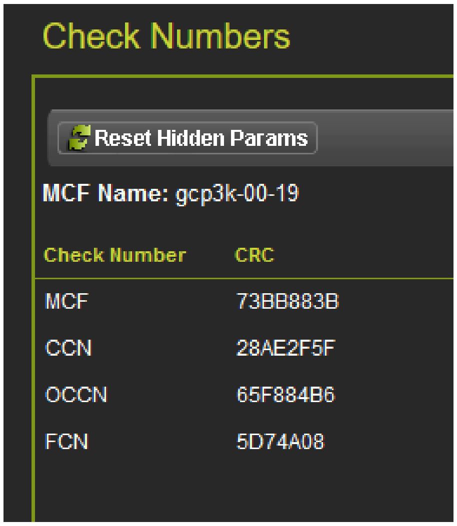


Figure 4-139 WebUI: Check Number

4.6.2 Configuration

When the configuration icon on the tool bar is selected, the WebUI will show the menu illustrated in the figure below on the left.

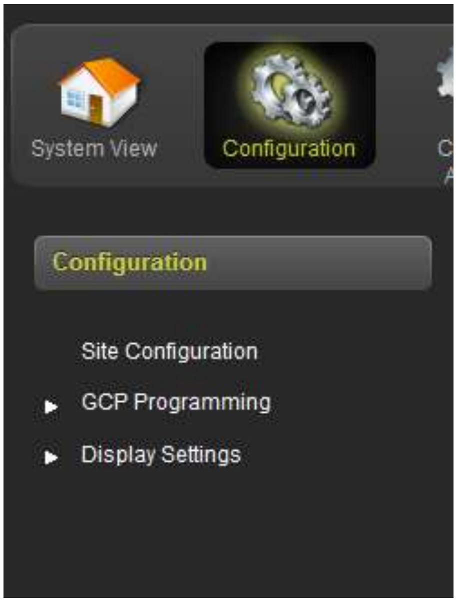


Figure 4-140 WebUI: Configuration Menus

- **Site Configuration** is used to set up the non-vital site information, for example, site name, milepost, DOT number
- **GCP Programming** is used to set the vital parameters that control the operation and the 3000+ GCP
- **Display Programming** is used to set non-vital settings related to the operation of the display.

Section 5.0 discusses the programming options in detail.

4.6.2.1 Site Configuration

This screen is used to set the non-vital site information, for example, site name, milepost, DOT number. To edit, first unlock and confirm local user presence (see Section 4.6.7). The fields will now be editable. To change the values in a field, type in the new value and then press the **Save** button. Multiple fields on this page can be edited. If there are unsaved changes and a new screen is selected, the WebUI will prompt the user to save or discard the changes.

To discard changes without saving, press the **Discard** button.

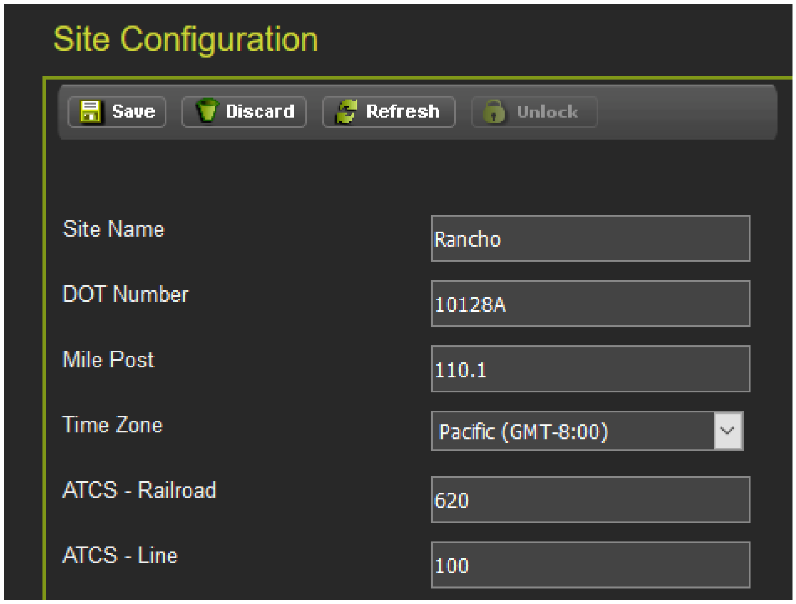


Figure 4-141 WebUI: Site Configuration

The WebUI will not accept invalid characters in text fields. If the data entered is out of range, the WebUI will flag this with an error.

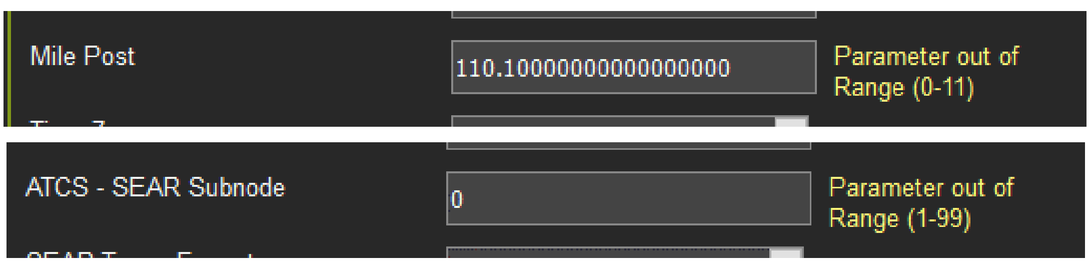


Figure 4-142 WebUI: Error Checking

NOTE

NOTE

The Site and DOT numbers are to create file paths or file names when files are downloaded to a USB memory device.

NOTE

NOTE

Changing the ATCS Railroad, Line, Group, Display or Subnode or CPU II+/CPU III subnode will cause the Display to disconnect from the CPU and then reconnect.

4.6.2.2 GCP Programming

This screen is used to set parameters that affect the operation of the GCP and its ability to detect trains and provide a constant warning time. The design on the circuit plans for the crossing warning system determines the programming of the 3000+ GCP.

WARNING

WARNING

PROGRAM CHANGES MUST BE PERFORMED IN ACCORDANCE WITH RAILROAD PROCEDURES. SYSTEM OPERATION MUST BE VERIFIED PRIOR TO PLACING SYSTEM IN SERVICE OR FOLLOWING PROGRAMMING, HARDWARE OR WIRING CHANGES.

To edit the parameters, first unlock and confirm local user presence (see Section 4.6.7). The fields will now be editable.

NOTE

NOTE

If the Security Enabled is set to Maintainer, the correct Maintainer password has to be entered in the WebUI in order to edit parameters. If the default password is used, the GCP programming parameter will remain locked.

To edit a field, either select from the drop-down list, or enter a numerical value as appropriate.

Multiple fields on this page can be changed before saving. After the required fields are changed, press **Save** to implement the changes. If there are unsaved changes and a new screen is selected, the WebUI will prompt the user to save or discard the changes.

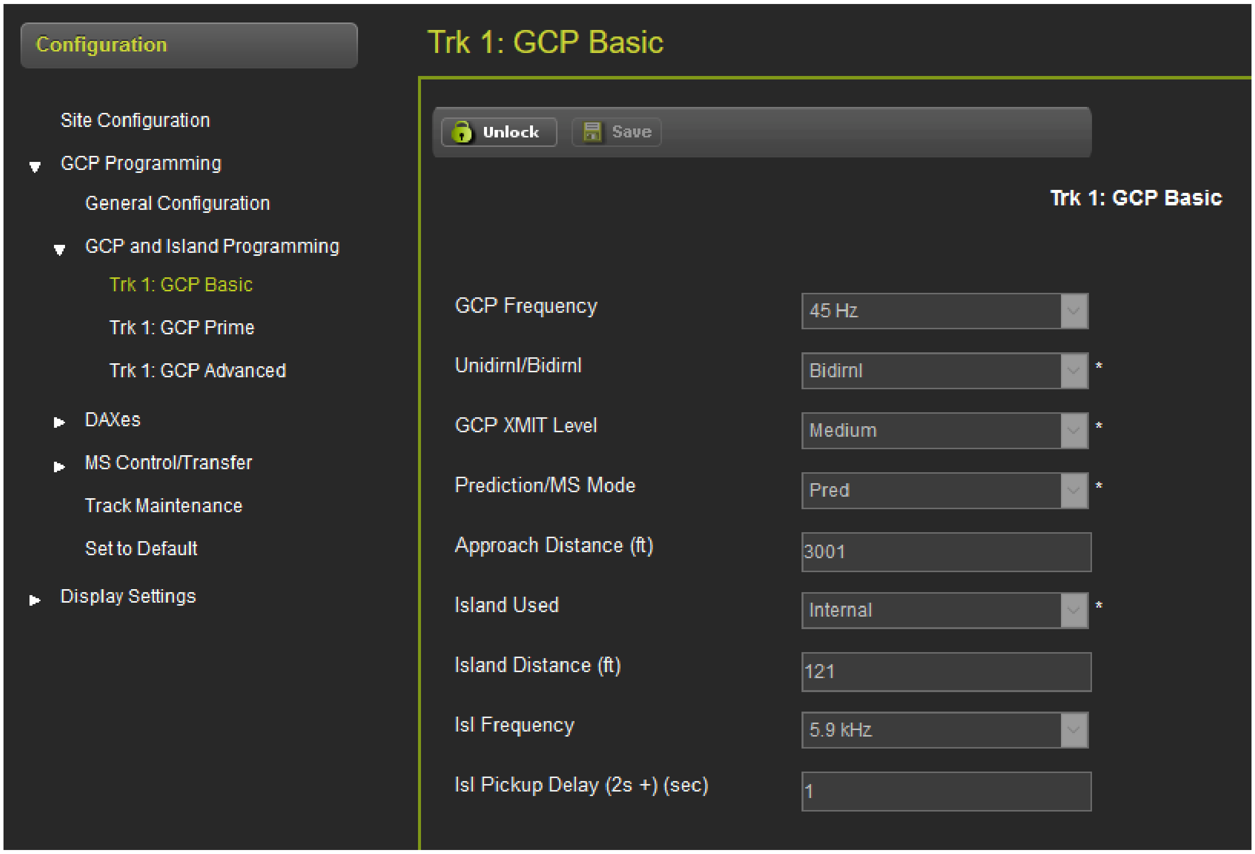


Figure 4-143   WebUI: GCP Programming

Some parameters get hidden based upon the value or other parameters. The hidden parameter is not visible until the parameter that causes it to be hidden is saved.

For example, the Prime Pickup Delay Mode is only visible when the Prime Prediction Offset is not 0. So, if the plans indicate to change the Pickup Delay Mode, the Prime Prediction Offset first has to be changed to a non-zero value and then the changes saved before the Pickup Delay Mode is visible.

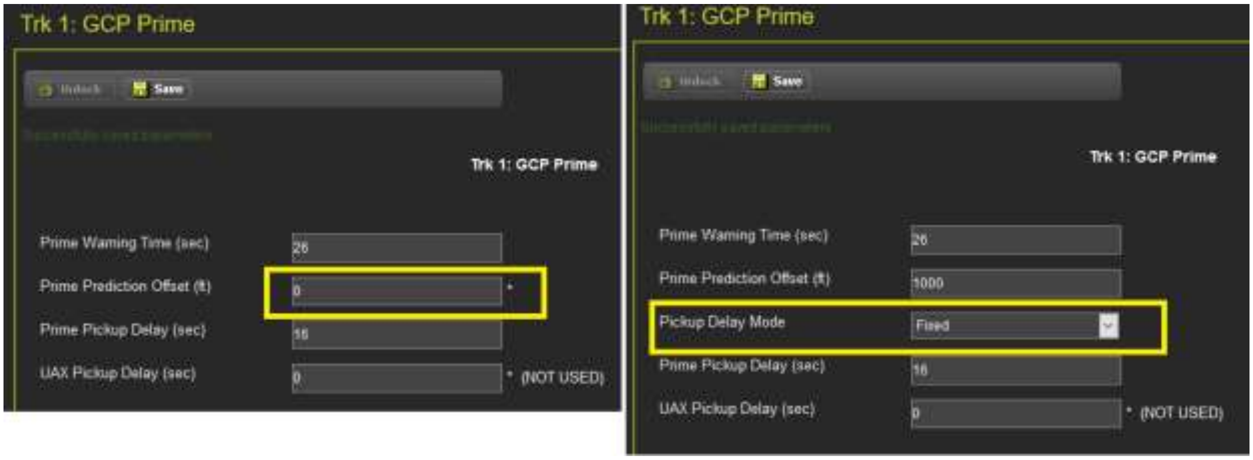


Figure 4-144 WebUI: Hidden Parameters

The * to the left of the value indicates that the parameter is set to its default value.

The 3000 GCP had some numerical parameters where 0 represented a **Not Used** or **Off** condition. In order to emulate this on the 3000+ GCP, these specific parameters that use an **Off** value will show this in text to the right of the value, as shown in the following examples:

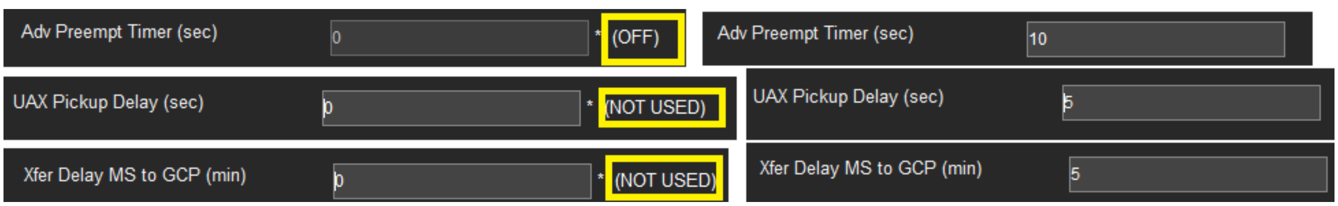


Figure 4-145 WebUI: Off Values

Changes to some parameters cause the options in the left-hand menu to change. For example, the DAXes menu is empty unless the **Number of DAXes** is greater than 0 in the **General Configuration** menu.

4.6.3 Calibration and Adjustment

This icon will bring up the same calibration page as the **Track Calibration** menu described in Section 4.6.1.2, see that section for details.

4.6.4 Status Monitor

The Status monitor icon is shown on the tool bar but is disabled. This function is only available when logged into the WebUI in as the Admin user.

4.6.5 Reports and Logs

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

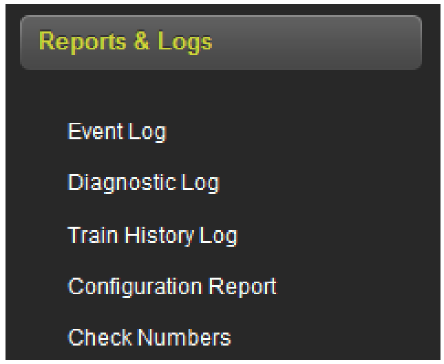


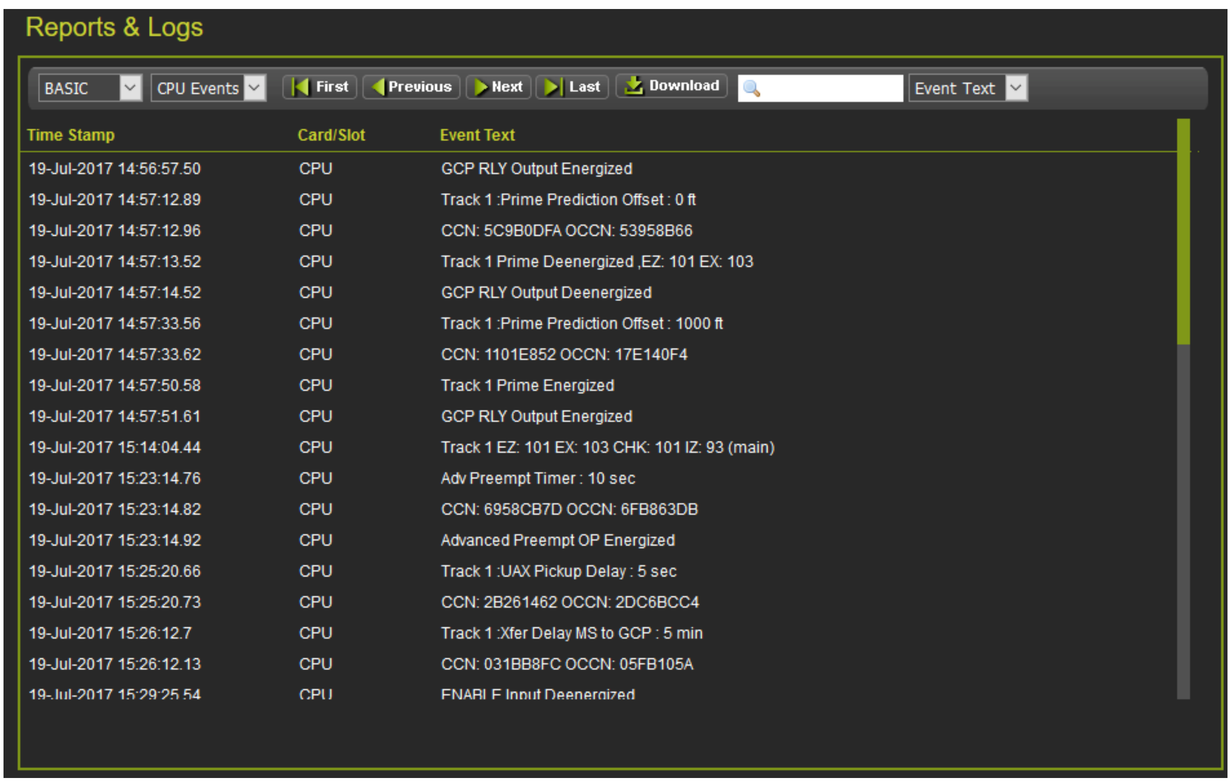
Figure 4-146 WebUI: Reports and Logs Menus

The WebUI will also display the last events in event log when the Reports and Logs are first entered.

4.6.5.1 Event Log

The display contains an event log. The events in here are generated by the CPU and sent to the display where they are time stamped and added to the log. In a redundant 3000+ system, the Display log will contain events from both the main and standby systems.

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.



Time Stamp	Card/Slot	Event Text
19-Jul-2017 14:56:57.50	CPU	GCP RLY Output Energized
19-Jul-2017 14:57:12.89	CPU	Track 1 :Prime Prediction Offset : 0 ft
19-Jul-2017 14:57:12.96	CPU	CCN: 5C9B0DFA OCCN: 53958B66
19-Jul-2017 14:57:13.52	CPU	Track 1 Prime Deenergized ,EZ: 101 EX: 103
19-Jul-2017 14:57:14.52	CPU	GCP RLY Output Deenergized
19-Jul-2017 14:57:33.56	CPU	Track 1 :Prime Prediction Offset : 1000 ft
19-Jul-2017 14:57:33.62	CPU	CCN: 1101E852 OCCN: 17E140F4
19-Jul-2017 14:57:50.58	CPU	Track 1 Prime Energized
19-Jul-2017 14:57:51.61	CPU	GCP RLY Output Energized
19-Jul-2017 15:14:04.44	CPU	Track 1 EZ: 101 EX: 103 CHK: 101 IZ: 93 (main)
19-Jul-2017 15:23:14.76	CPU	Adv Preempt Timer : 10 sec
19-Jul-2017 15:23:14.82	CPU	CCN: 6958CB7D OCCN: 6FB863DB
19-Jul-2017 15:23:14.92	CPU	Advanced Preempt OP Energized
19-Jul-2017 15:25:20.66	CPU	Track 1 :UAX Pickup Delay : 5 sec
19-Jul-2017 15:25:20.73	CPU	CCN: 2B261462 OCCN: 2DC6BCC4
19-Jul-2017 15:26:12.7	CPU	Track 1 :Xfer Delay MS to GCP : 5 min
19-Jul-2017 15:26:12.13	CPU	CCN: 031BB8FC OCCN: 05FB105A
19-Jul-2017 15:29:25.54	CPU	ENABLE Input Deenergized

Figure 4-147 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 shown. Enter the text to be filtered, then press enter.

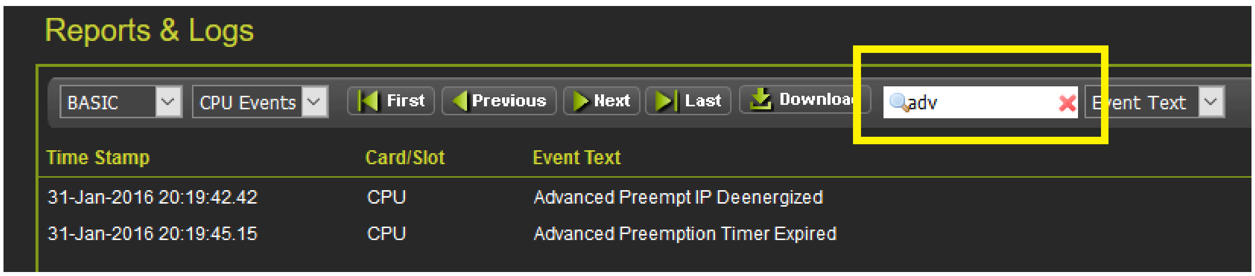


Figure 4-148 WebUI: Event Log Text Filter

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.

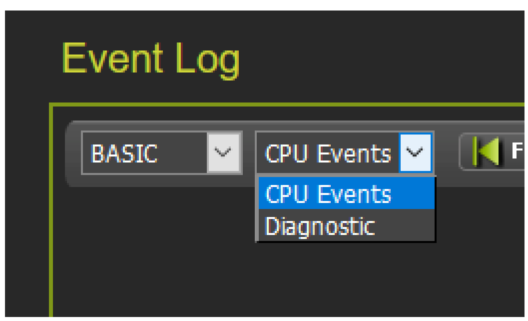


Figure 4-149 WebUI: Log Selection Filter

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

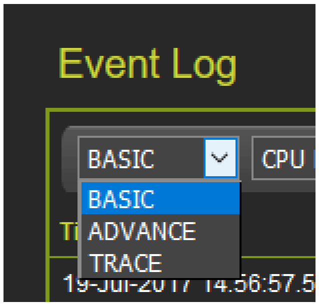


Figure 4-150 WebUI: Event Log Mode

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.

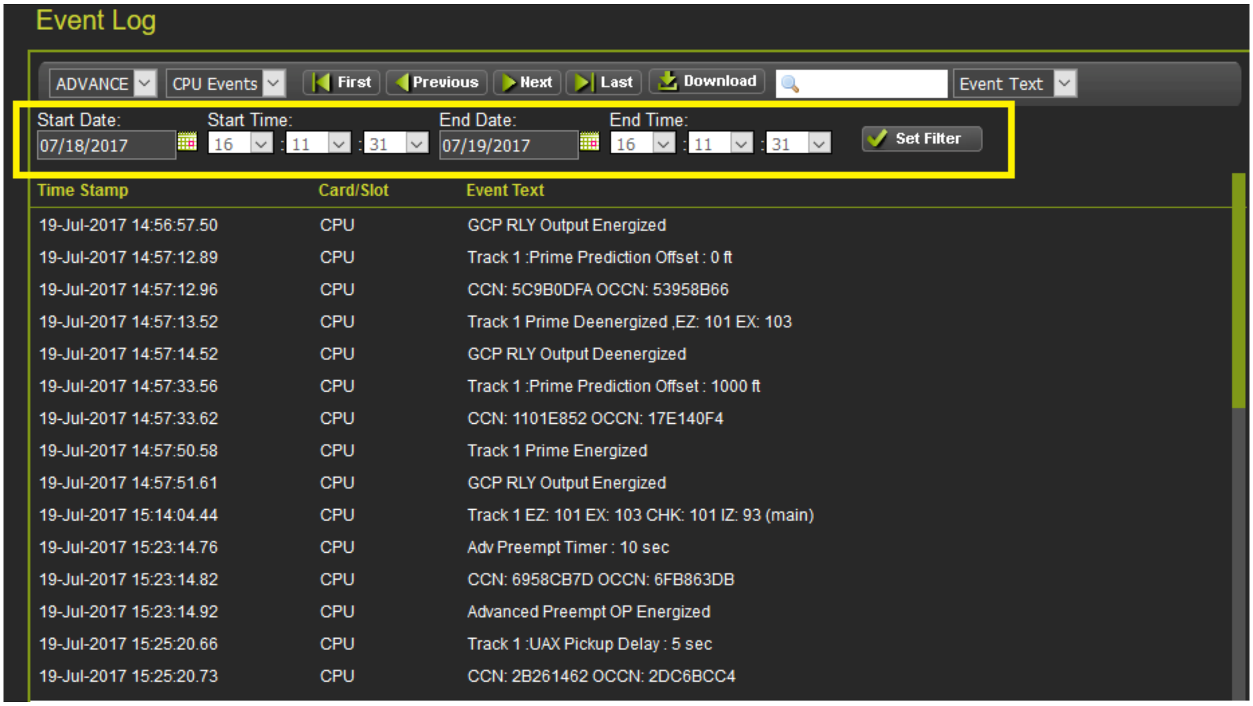


Figure 4-151 WebUI: Event Log ADVANCE Mode

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.

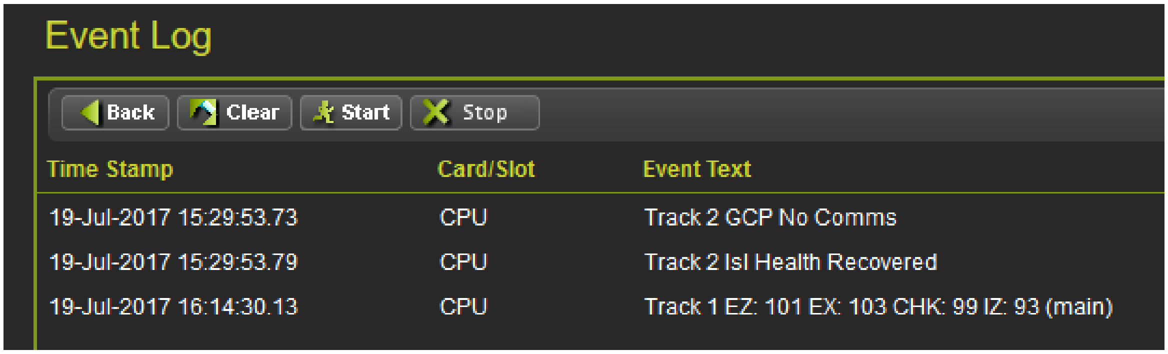


Figure 4-152 WebUI: Event Log TRACE Mode

4.6.5.2 Diagnostic Log

The Diagnostic log contains entries for whenever a diagnostic message is generated or cleared. The events in here are generated by the CPU and sent to the display where they are time stamped and added to the log. In a redundant 3000+ system, the Display log will contain events from both the main and standby systems.

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 display as they are logged.

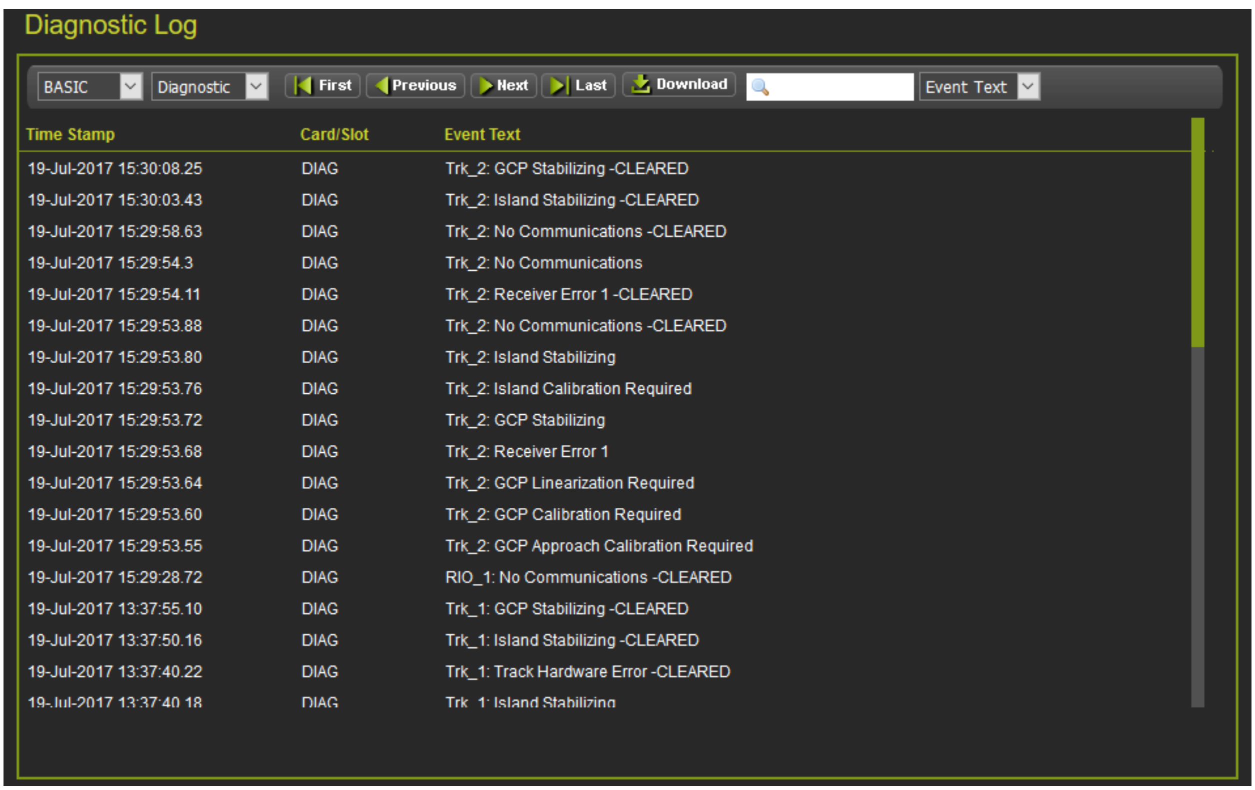


Figure 4-153 WebUI: Diagnostic Log

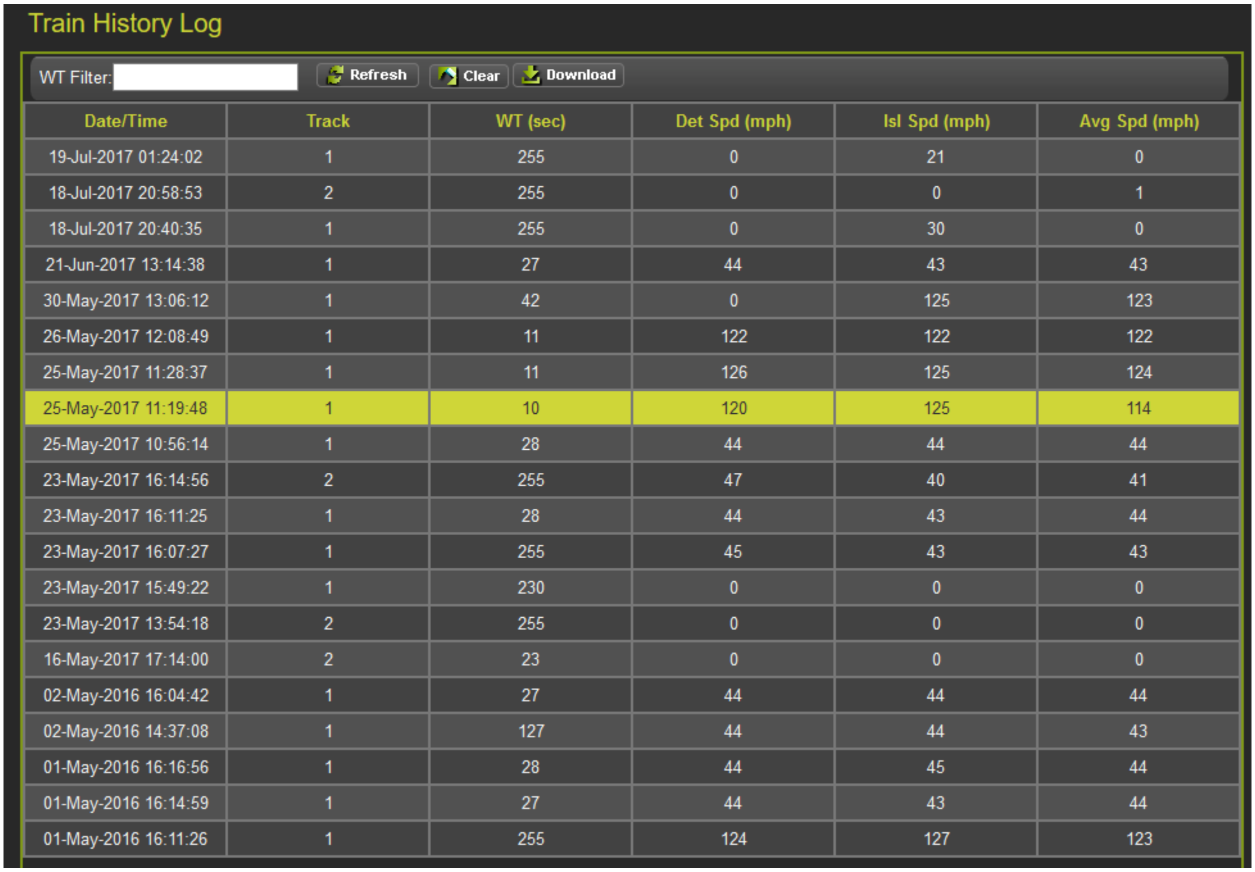
The menu bar allows navigation of the log and downloading is the same as for the Event Log. See the Event Log Section 4.2.5.5 for details.

4.6.5.3 Train History Log

The train history log contains a log of the last 20 train moves. The log shows the following:

- Trk - which track the train was detected on.
- WT – the recorded warning time in seconds.
- Det – the detected train speed.
- Isl – the train speed at the island.
- Avg – the average train speed.

If the units are set to standard in the Site Configuration, the speeds are shown in mph. If the units are set to metric, the speeds are shown in km/h.



Date/Time	Track	WT (sec)	Det Spd (mph)	Isl Spd (mph)	Avg Spd (mph)
19-Jul-2017 01:24:02	1	255	0	21	0
18-Jul-2017 20:58:53	2	255	0	0	1
18-Jul-2017 20:40:35	1	255	0	30	0
21-Jun-2017 13:14:38	1	27	44	43	43
30-May-2017 13:06:12	1	42	0	125	123
26-May-2017 12:08:49	1	11	122	122	122
25-May-2017 11:28:37	1	11	126	125	124
25-May-2017 11:19:48	1	10	120	125	114
25-May-2017 10:56:14	1	28	44	44	44
23-May-2017 16:14:56	2	255	47	40	41
23-May-2017 16:11:25	1	28	44	43	44
23-May-2017 16:07:27	1	255	45	43	43
23-May-2017 15:49:22	1	230	0	0	0
23-May-2017 13:54:18	2	255	0	0	0
16-May-2017 17:14:00	2	23	0	0	0
02-May-2016 16:04:42	1	27	44	44	44
02-May-2016 14:37:08	1	127	44	44	43
01-May-2016 16:16:56	1	28	44	45	44
01-May-2016 16:14:59	1	27	44	43	44
01-May-2016 16:11:26	1	255	124	127	123

Figure 4-154 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.

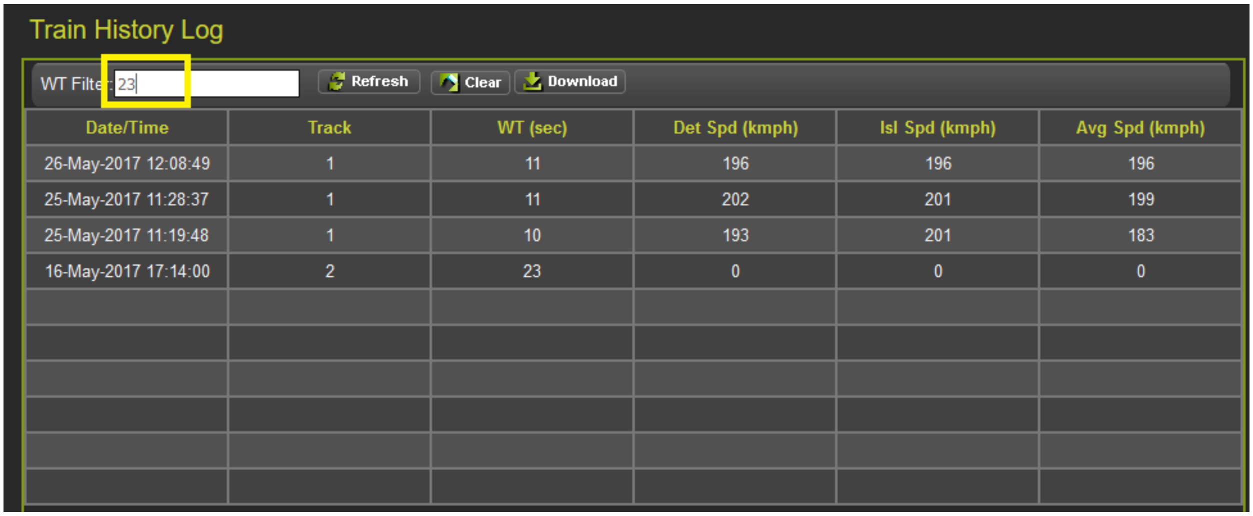


Figure 4-155 WebUI: Train History Log WT Filter

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.

4.6.5.4 Configuration Report

Selecting the Configuration Menu will bring up the screen shown in the following figure. Press the **Create** button to create the report.

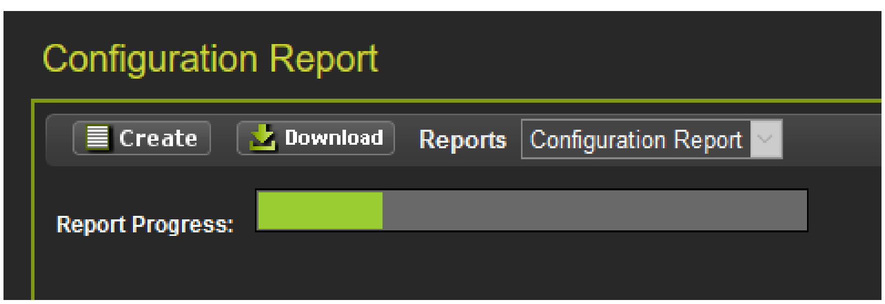


Figure 4-156 WebUI: Configuration Report Progress

After the report has been created, it will show up as illustrated in Figure 4-157. 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.

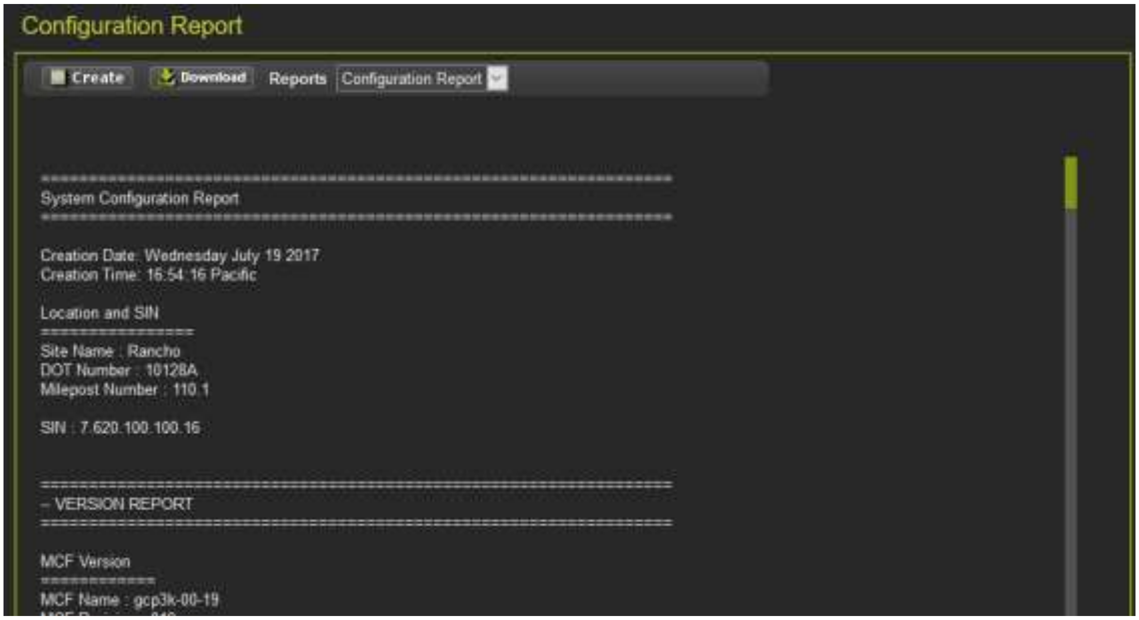


Figure 4-157 WebUI: Configuration Report

4.6.5.5 Check Numbers

This menu provides an alternative way to see the check number from the System View menu. The check numbers shown here are the same as described in Section 4.6.1.5.

4.6.6 Software Updates

When the software updates icon is selected, the WebUI will show the menu options illustrated in the following figure. The screen will open with the **Configuration** options.

Figure 4-158 WebUI: Software Updates

4.6.6.1 Configuration

This menu is used to download the configuration file (PAC file) from the 3000+ GCP or to upload a new one. The configuration file is known as the PAC file. The PAC file can be opened offline using the OCE tool (See manual SIG-00-11-15). The PAC file can be used as a back up to the 3000+ GCP configuration and loaded back into the system using the Upload Configuration step described below.

First, unlock the screen if needed. To download the configuration, select the download button. The WebUI will start to download the file and show the progress as in figure below left. Occasionally the download may fail, if this happens, select the download again.

Once the download is complete, the WebUI will ask to **Save** or open the file (exact format of this depends on browser used). Select to save the file, as the file is in binary format and cannot be opened using standard Windows software. The PAC file name is created from the combination of the DOT number and date - e.g. CONFIG-{DOT number}-PAC-{date}...{time}..

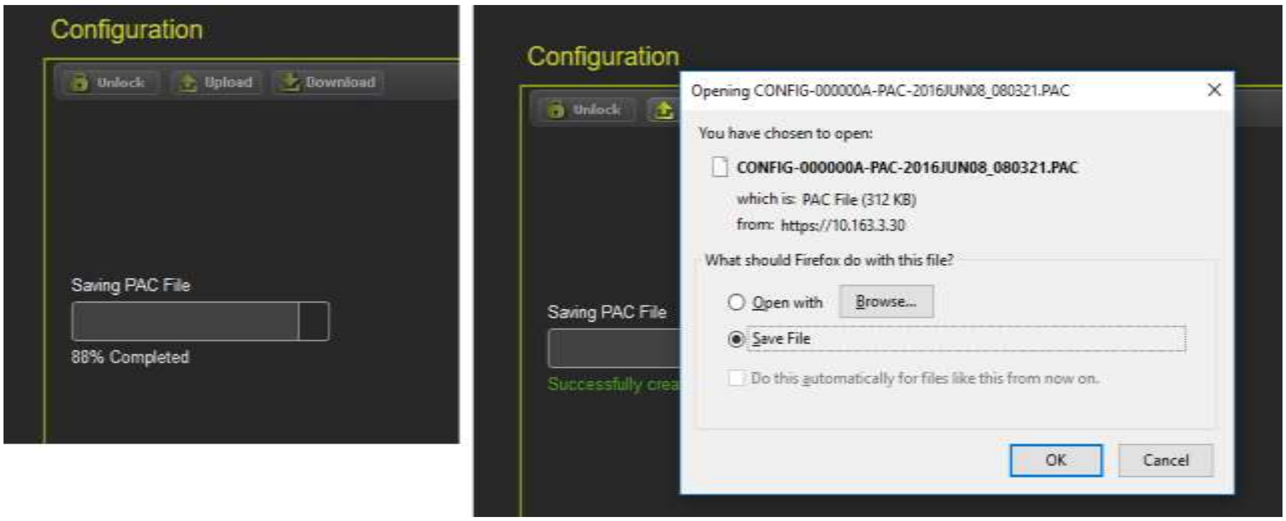


Figure 4-159 WebUI: Configuration Download

To upload a new configuration file, select the **Upload** button. The WebUI will show the warning message illustrated in the figure above on the left. If **Yes** is selected, the WebUI will ask to save the current configuration first. Select the desired option.

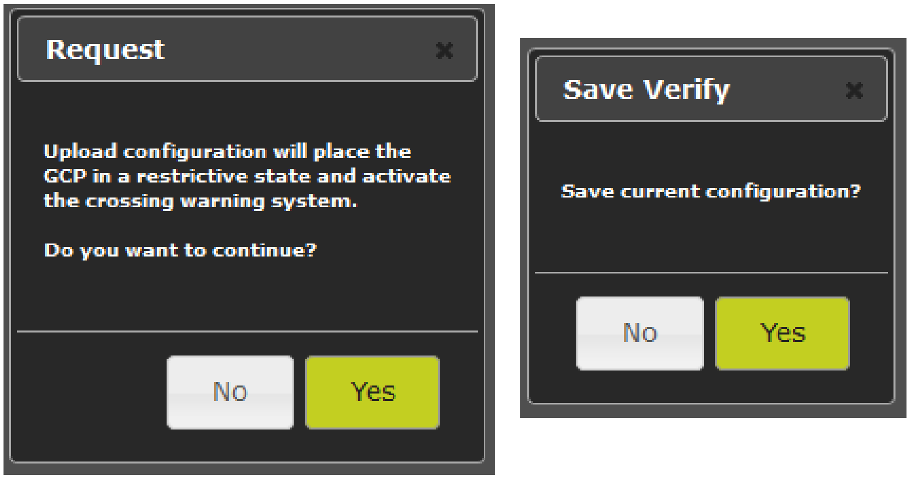


Figure 4-160 WebUI: Configuration Upload Messages

WARNING

UPLOADING A NEW CONFIGURATION WILL PUT THE GCP INTO A RESTRICTIVE STATE AND ACTIVATE THE CROSSING.

WARNING

IF A NEW CONFIGURATION FILE IS LOADED INTO THE GCP, THE GCP WILL HAVE TO BE RETESTED ACCORDING TO RAILROAD STANDARDS.

If **Yes** is selected, the WebUI will download the current configuration as shown in the figure below. If **No** is selected, the message below is shown immediately. Select the configuration file to be loaded.

NOTE

The GCP must be running the same MCF that the PC file was created for. If the PAC file is created for a different MCF, the WebUI will reject the upload.

Once the file has been selected, the WebUI will ask for confirmation.

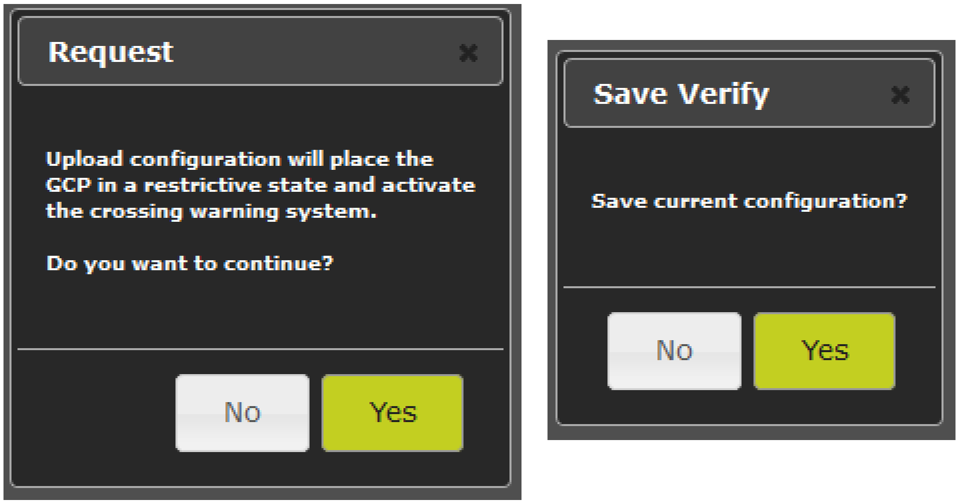


Figure 4-161 WebUI: Configuration Upload File Selection

If the user decides not to continue the upload process, select **No**. At this point the CPU is in a restrictive state and the crossing will be active. The old configuration has not been lost at this point, to get the CPU back into its previous operational state, reset the VLP module (see Section 4.6.6.3).

If the user wants to continue and load the selected PAC file, press **Yes**. The WebUI will show the progress, (Figure 4-162, left) then give the message shown in Figure 4-162 on the right, which gives one final confirmation to continue. At this stage, the user has to prove there is someone in the field at this location by having them press a pushbutton on the CPU module. Once a button has been pressed, select **Yes** to continue. The configuration will not be updated in the CPU and the CPU will reboot, this will cause the display to temporarily lose the session with the CPU.

If the upload is cancelled at the stage above, and the user wants to put the CPU back into an operational state, the VLP will need to be rebooted as described previously.

Figure 4-162 WebUI: Configuration Upload Progress and Final Check

4.6.6.2 Vital CPU/Module

NOTE

NOTE

In order to load new software into a CPU II+ (A80403), track module (A80418) or RIO module (A80413) a serial cable with null modem needs to be connected between the serial port on the front of the display and the DIAG port on the module whose software is to be updated.

NOTE

NOTE

In order to load new software into a track module (A80418) or RIO module (A80413) from the CPU III, a serial cable with null modem needs to be connected between the serial port on the front of the CPU III and the DIAG port on the module whose software is to be updated. To update software on the CPU III itself, an Ethernet cable can be plugged directly into the module itself and the WebUI used, or if the unit is on the network, the IP address of the CPU III can be used to login remotely.

To update the software on the CPU II+, Track or RIO module, select the Vital CPU / Module option. To update software on the CPU III, reference Section 4.5.1.6. Unlock the screen as per section 4.6.7 then select the **Install Software** button.

The WebUI will ask the user to confirm that there is a serial cable connected between the display and module to be uploaded. If the cable is connected, press **OK** to continue.

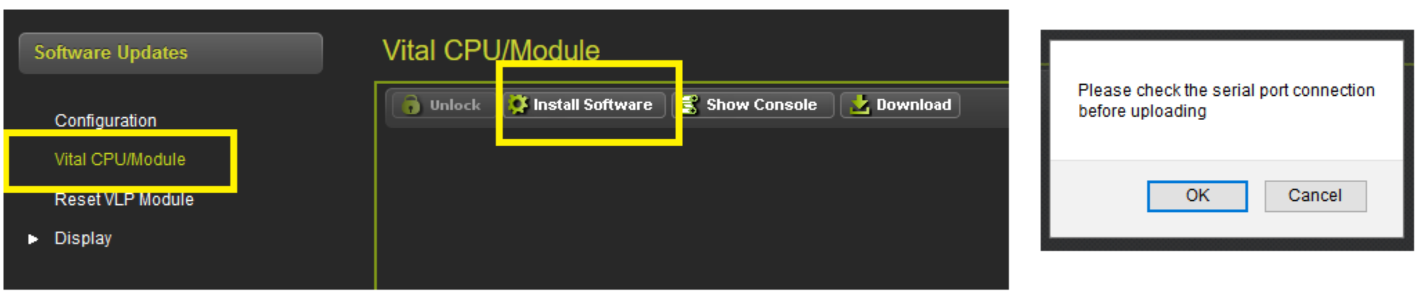


Figure 4-163 WebUI: Module Upload

The display module will then transfer the load setup code to the module to be updated and provide a menu of options.

See Section 4.2.5.3 for full instructions on loading module software.

See Sections 4.5.1.8 and 4.5.1.10 for uploading software via the WebUI onto the CPU III.

4.6.6.3 Reset VLP Module

This menu is used to reset the VLP module. This may be necessary if an attempt has been made to load a new configuration as described in section 4.6.2 and the process cancelled before complete. Unlock the screen as described in section 4.6.7, then press the **Reset VLP** button and the WebUI will ask for confirmation first.

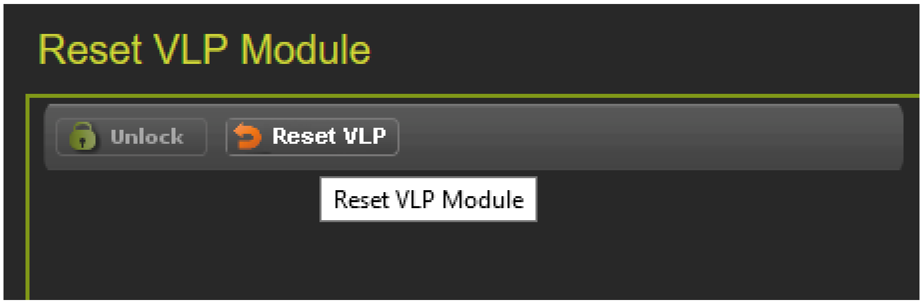


Figure 4-164 WebUI: Reset VLP

4.6.6.4 Display

To update the software on the display, select the Display / Executive option, use the browse button to select the correct tgz file for the display, then press **Upload**.

NOTE

NOTE

This menu is only available on the Display module and will not appear when the WebUI is used with the CPU III.

The Display executive can be recognized as it will have a name of the format ng5k_mef_x.y.zzr.tgz.

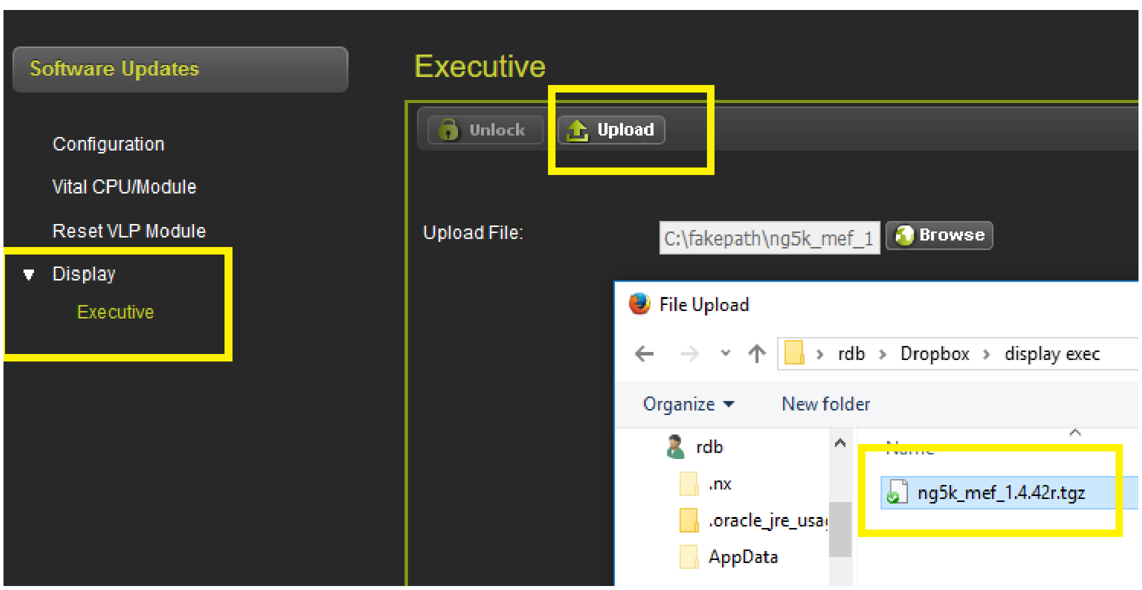


Figure 4-165 WebUI: Reset Upload Display Executive

CAUTION

ENSURE THAT THE FILE SELECTED IS ACTUALLY FOR THE DISPLAY (NAME HAS FORMAT ng5k_mef_x.y.zzr.tgz). LOADING THE TGZ FILE FOR A DIFFERENT PRODUCT MAY CAUSE THE DISPLAY TO GET LOCKED UP.

4.6.7 Local User Presence

Since the WebUI may be used to connect to the 3000+ GCP remotely, it is necessary to confirm that someone is present at the location before certain operations such as changing GCP programming or re-calibration can be performed.

To enable the GCP programming or Calibration, first unlock the screen from the WebUI by pressing the **Unlock** button.

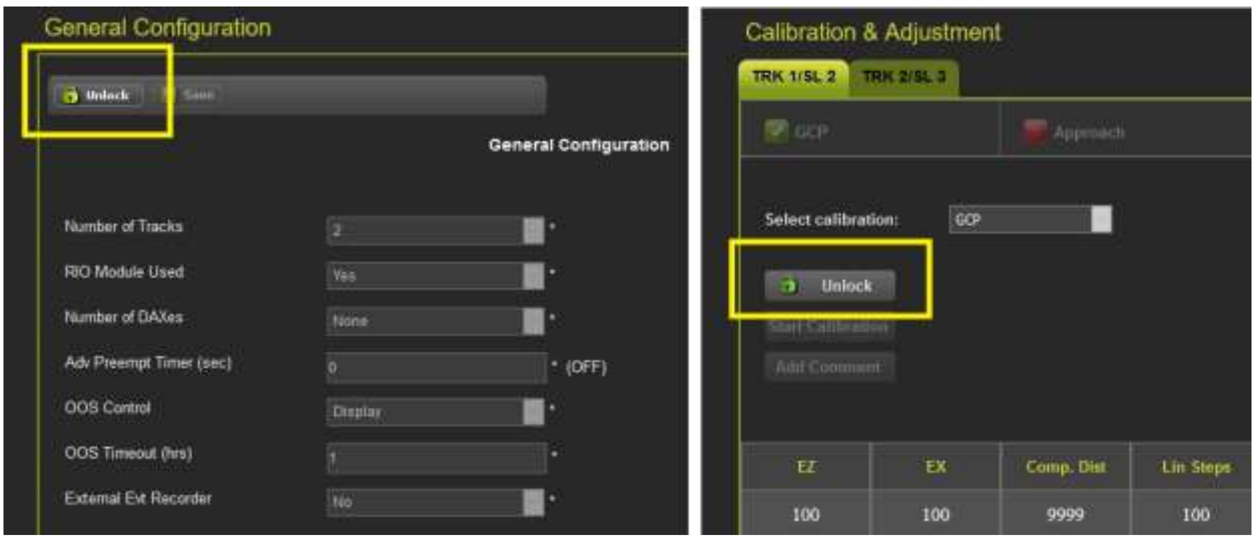


Figure 4-166 WebUI: Unlock

The WebUI will show the message below on the left, asking for confirmation to continue. Select **OK** and the WebUI will show the message below on the right.

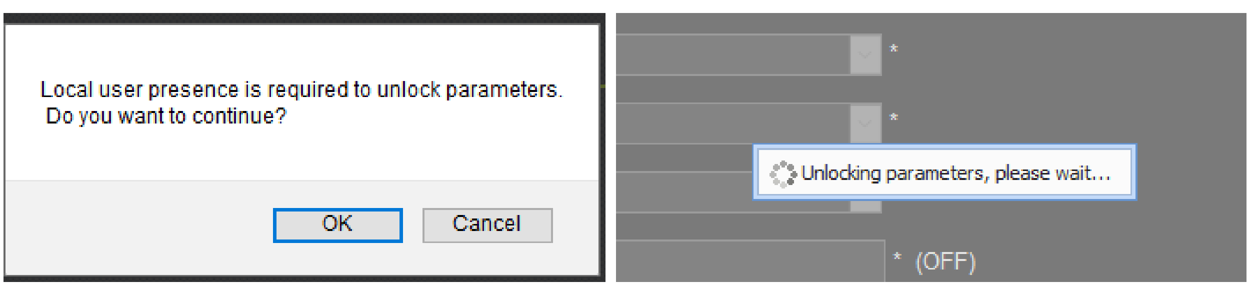


Figure 4-167 WebUI: Confirm Local User Presence

At this point, the display module will show the message in the following figure to the user in the field. The user in the field will press **Enter** to confirm that the remote user may continue, or the local user may deny the remote user editing access by pressing the back key.

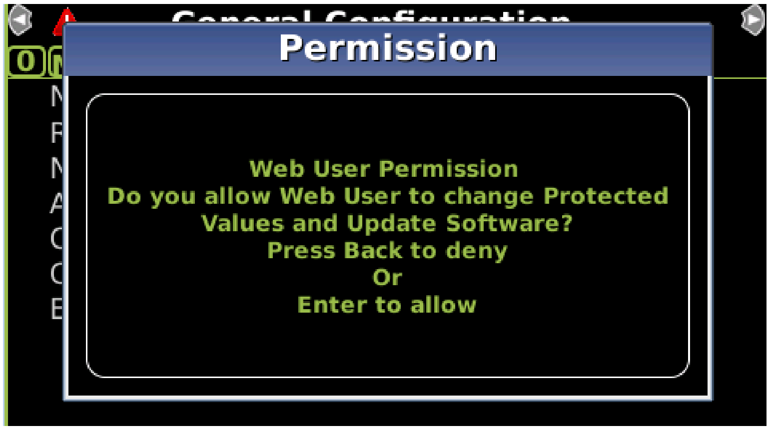


Figure 4-168 Display: Confirm Local User Presence

If the local user denies access to the remote user, the WebUI will show the **Failed** message in the figure below on the left. If there is no confirmation by the local user, the WebUI will show the timeout message in the figure below on the right.

Figure 4-169 WebUI Local User Presence Error Messages

The local user can tell when a remote user still has Editing permission as the program and calibration screens will show the little blue man indication shown in the yellow box below.

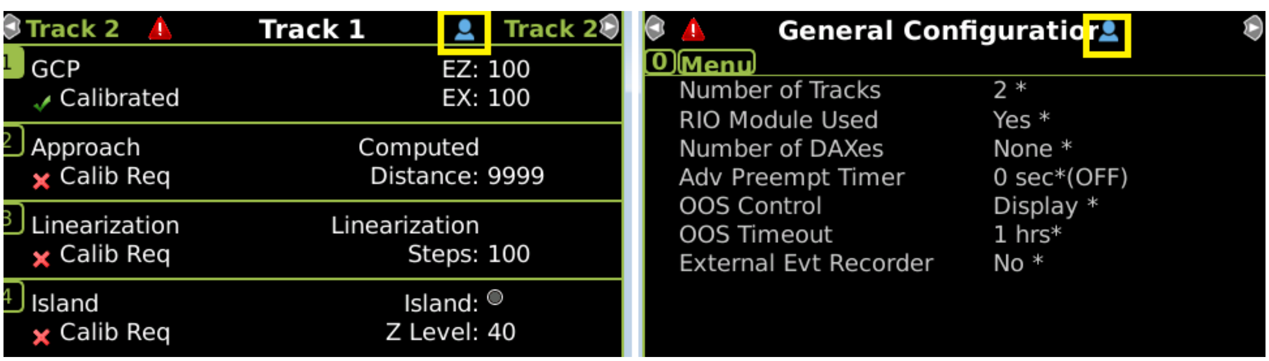


Figure 4-170 Display Local User Presence Indicator

4.6.8 WebUI Display / CPU Connecting

If the Display module is not in session with the CPU, it will be indicated with just a red exclamation point as illustrated in the top pane below. During the connection process, the display will show the icon in the second pane below (boxed in yellow). The last pane indicates Creating Real Time Database.

Figure 4-171 Display Module Not in Session

When this is complete, the display will show the Diagnostics screen (if Diagnostic messages are present) or it will show the System View.

If the VLP is in the unconfigured state, for example, the user has started the upload configuration process, but not gone through the final step of rebooting the VLP, then the WebUI System View will show an indication of this at the bottom of the screen as shown below.

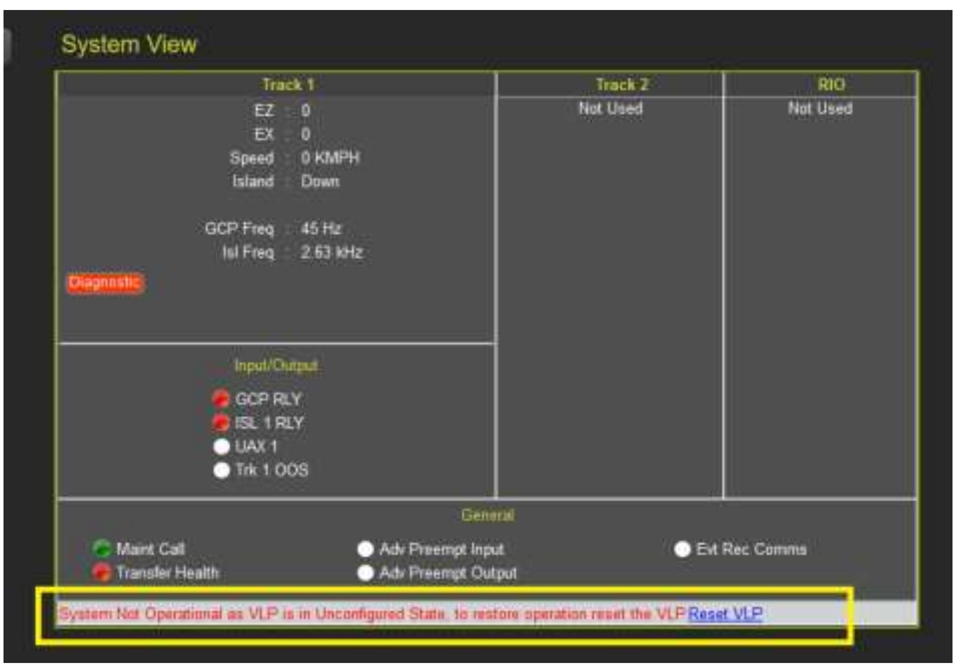


Figure 4-172 WebUI when VLP Unconfigured

If the system is in an unconfigured state for a different reason, for example, the MCF CRC is incorrect, the System View will show the message in the following figure:

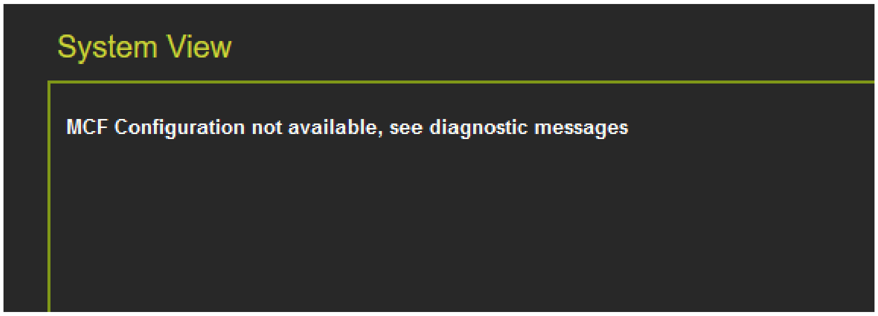


Figure 4-173   WebUI System View when VLP Unconfigured due to MCF CRC Error

At this point, check the diagnostic messages to see what the problem is. Examples are shown in Figure 4-174.

Figure 4-174   WebUI System Diagnostics when VLP is Unconfigured due to MCF CRC Error

4.6.9 Using Display on a Network

If the equipment is to be connected to a network, it will be necessary for the user to set the Ethernet port as a Client, failure to do so will cause an interruption of the network since two DHCP servers will be introduced onto the network. In the client mode, the network will assign an IP address to the Display.

To find the assigned IP Address:

- go to the Display module Program View and select the Display Settings,
- select the Laptop Ethernet Port option
- select the Status tab
- record the IP address, this is the Ethernet address that has been assigned to the display by the network

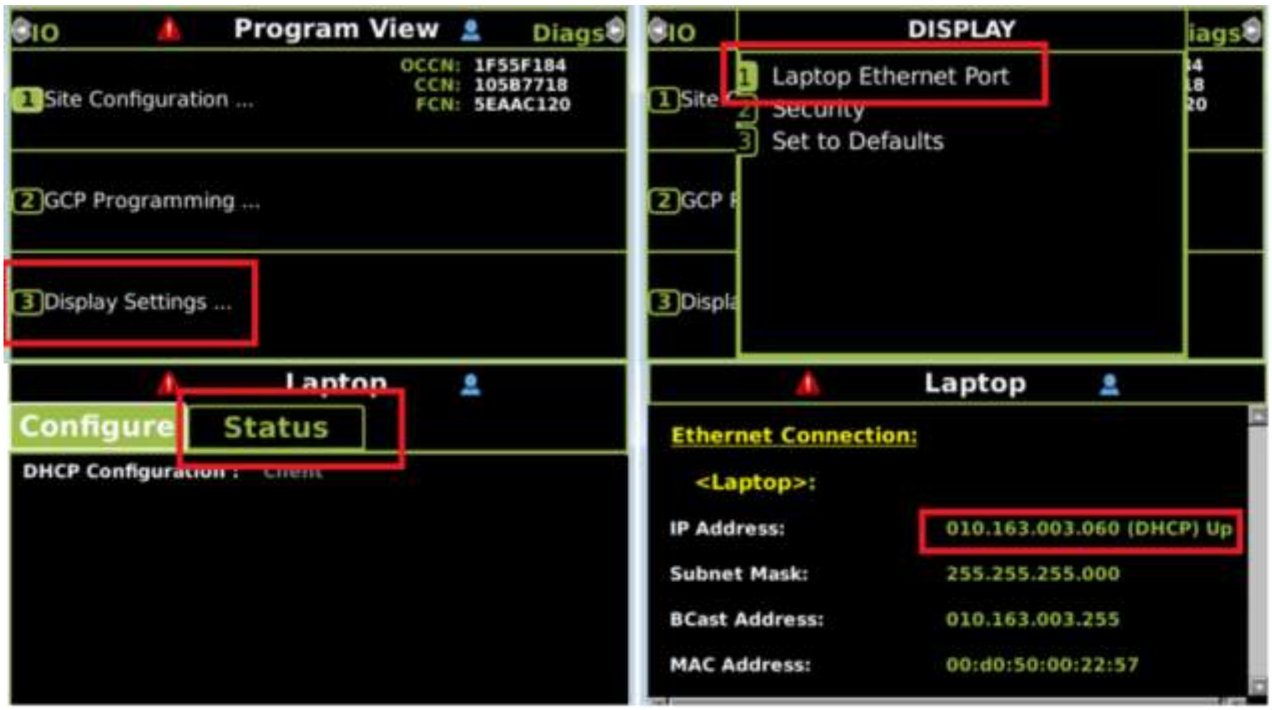


Figure 4-175 Finding IP Client Address

Enter the IP address shown on the display on your web browser to connect to the Display. When connecting to a network, a notice that the connection is not secure may appear as shown in Figure 4-117. Click on the **Advanced** button and a new screen will pop up, click on the **Add Exception** button to bring up another screen, click on the **Confirm Security Exception** which will allow the connection to continue. Checking the **Permanently Store This Exception** box will remember this setting.

Once the password has been entered, the WebUI will open with the System View screen, provided there are no Diagnostic messages present in the system. In the event there are Diagnostic messages present, the Diagnostic page will appear instead of the System View. (See Section 4.6.1.4 for Diagnostic Screen details).

4.6.10 WebUI Menus Available on CPU III While Display Also in Session

If a user connects to the CPU III via the WebUI while the Display is in session, some menus will be unavailable, and the message shown in Figure 4-176, “Display In Session” will be visible.

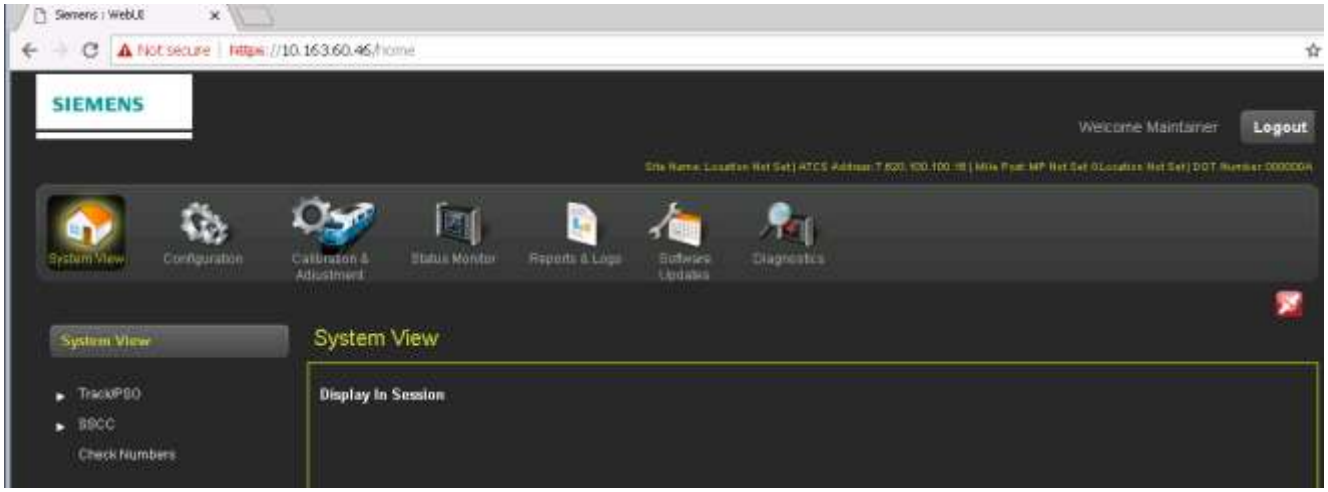


Figure 4-176 Display In Session

Below is a listing of the WebUI menus and their status when the Display is in session.

System View

- Track/PSO - Unavailable
- SSCC - Unavailable

Configuration

- Site Configuration- Unavailable
- GCP Programming- Unavailable
    - Setup Wizard- Unavailable
- CP Programming- Unavailable
- Laptop Port - Available
- Router Settings - Available
- Log Setup- Unavailable
- Security- Unavailable
- Web Server - Available
- Set to Default - Available

Calibration & Adjustment

- Track/PSO- Unavailable
- SSCC - Unavailable

Status Monitor

- IO View - Unavailable
- Logical View - Unavailable
- Module IO View - Unavailable
- Comm View - Unavailable
- Logic Status - Unavailable

- Ethernet Status - Available
- Route Table - Available
- Statistics - Available

Reports & Logs

- CP Status Log - Available
- Diagnostic Log - Available
- Train History - Available
- Maintenance Log - Available
- Reports - Available
- EZ/EX Recording - Available
- Track Data - Available
- VLP/IO Card Logs - Unavailable
- Check Numbers - Unavailable

Software Updates

- Configuration - Unavailable
- CP MEF - Available
- VLP - all items - Available
- Vital I/O Module - Available

Diagnostics

- System Diagnostics - Unavailable

SECTION 5 **PROGRAMMING**

5.0 GENERAL

The programming parameters in the Model 3000+ GCP are designed to match very closely with those of the old Model 3000 GCP so that users familiar with the Model 3000 GCP can easily understand the 3000+. Because of the difference in display modules used, the actual layout and means by which these parameters are entered is different.

5.1 PROGRAMMING DETAILS

The figures used to illustrate the GCP programming in this section will be taken from the local user interface of the display. The WebUI will show equivalent screens. This section will focus on the programming parameters themselves, rather than how to use the keypad and display or WebUI, see Section 4.0 for instructions on using these.

WARNING

THE 3000+ GCP MUST BE PROGRAMMED CORRECTLY FOR THE LOCATION AND APPLICATION. FAILURE TO DO SO MAY RESULT IN SHORT OR NO WARNING TIME.

WARNING

WHEN INSTALLING, TESTING, OR PERFORMING MAINTENANCE ON OR NEAR A 3000+ GCP SYSTEM, ENSURE ADEQUATE SAFETY PRECAUTIONS ARE TAKEN FOR PERSONNEL, VEHICULAR AND TRAIN TRAFFIC.

NOTE

Please refer to the Railroad Installation Drawing or the Installation Plans for the exact parameters to be entered when programming the Model 3000+ GCP.

The 3000+ GCP programming is divided into three sections:

- Site Configuration
- GCP Programming
- Display Programming

5.2 SITE CONFIGURATION

This section is used to set non-vital information, such as the location, DOT number, ATCS address.

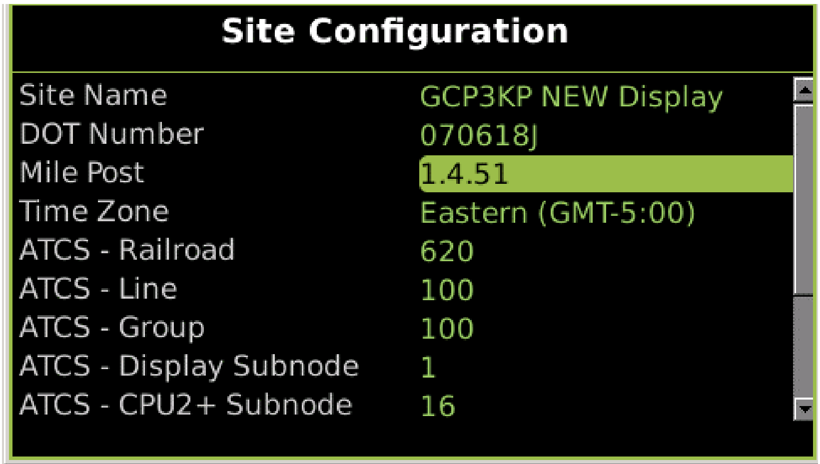


Figure 5-1 Site Configuration Menu

Site Name: Enter the site name, 0-20 characters

DOT Number: Enter the Department of Transportation (DOT) Number, if required, 0-7 characters

Milepost: Enter the milepost, if required, 0-11 characters

Time Zone: Select the appropriate Time Zone for the location

ATCS Address: The ATCS Address of the GCP CPU has the format 7.RRR.LLL.GGG.SS,

The ATCS Address is used if the 3000+ GCP is used to communicate with an external event recorder such as the Argus. The Argus and 3000+ GCP will need to have the same values for the RRR, LLL and GGG parts of the ATCS address. In order to get the two to communicate the GCP needs to be configured with the SS part of the Argus' address.

Set the RRR using the ATCS – Railroad parameter, range 0-999, default 620

Set the LLL using the ATCS – Line parameter, range 0-999, default 100

Set the GGG using the ATCS – Group parameter, range 0-999, default 100

Set the SS using the ATCS – CPU II+ (CPU III) Subnode parameter, range 3-98, default 16

The ATCS subnode of the display module using the ATCS – Display Subnode parameter, range 1-99, default 1.

If an external event recorder such as the Argus is used, set the ATCS Subnode of this using the ATCS – Argus Subnode parameter, range 1-99, default 99.

Units of Measure: Standard, Metric, default Standard.

If the 3000+ GCP is configured for metric units:

- Distances will be shown on the display and WebUI screens and in logs in meters.
- Approach distances and offset distances can be programmed in meters.
- Speeds will be shown on the display, WebUI screens, and in logs as km/h.

Date: Use this to set the date. This is used for time stamping the log entries.

Time: Use this to set the time. This is used for time stamping the log entries.

5.3 GCP PROGRAMMING

The following table shows a list of the available GCP programming parameters. The Track column indicates whether a separate parameter is available for each track.

Table 5-1 GCP Programming Parameters

GCP Programming Parameter	Range	Default Value	Track	Reference	Included in OCCN
Number of Tracks	1-2	2	N/A	5.3.2	Yes
RIO Module Used	Yes, No	Yes	N/A	5.3.2	Yes
Number of DAXs	None,1-4	None	N/A	5.3.2	Yes
Adv Preempt Timer (sec)	0s (off), 1-500	0 (off)	N/A	5.3.2	Yes
OOS Control	Display, Display+OOS IPs, OOS IPs	Display	N/A	5.3.2	Yes
OOS Timeout (hrs)	0-23	1	N/A	5.3.2	No
External Evt Recorder	Yes, No	No	N/A	5.3.2	No
GCP Frequency	Not Set,86-999 Hz (see later for specific values)	Not Set	T1 / T2	5.3.3	Yes
Unidirnl/Bidirnl	Bidirn, Unidirnl	Bidirnl	T1 / T2	5.3.3	Yes
GCP XMIT level	Medium, High	Medium	T1 / T2	5.3.3	No
Prediction/MS Mode	Pred, MS	Pred	T1 / T2	5.3.3	Yes
Approach Distance (ft)	0-9999	9999	T1 / T2	5.3.3	Yes
Island Used	Internal, External Not Used	Internal	T1	5.3.3	Yes
Island Used	Internal, External Not Used T1Isl	Internal	T2	5.3.3	Yes
Island Distance (ft)	0-999	120	T1 / T2	5.3.3	No
Isl Frequency	Not Set, 2.14kHz - 20.2kHz (see later for specific values)	Not Set	T1 / T2	5.3.3	Yes
Isl Pickup Delay (2s+) (sec)	0-6s	0s	T1 / T2	5.3.3	Yes

GCP Programming Parameter	Range	Default Value	Track	Reference	Included in OCCN
Prime Warning Time (sec)	23-99s	25s	T1 / T2	5.3.3	Yes
Prime Prediction Offset (ft)	0-9909ft	0 ft	T1 / T2	5.3.3	Yes
Pickup Delay Mode	Auto, Fixed	Fixed	T1/T2	5.3.3	Yes
Prime Pickup Delay (sec)	8-500s	15s	T1 / T2	5.3.3	Yes
UAX Pickup Delay (sec)	0 (Not Used), 1-500	0 (Not Used)	T1 / T2	5.3.3	Yes
Enhanced Detection	On(Max), On(High), On(Med), On(Low), Off	On (High)	T1 / T2	5.3.3	Special (see section 5.5.2)
Speed Limiting Used	Yes, No	Yes	T1 / T2	5.3.3	No
Station Stop Timer (sec)	10-120	20	T1 / T2	5.3.3	No
Trailing Switch Logic	On, Off	On	T1 / T2	5.3.3	No
Low EZ Detection Used (EZ=70)	Off, On	Off	T1 / T2	5.3.3	Yes
Low EZ Detection Time (mins)	2-99	20	T1 / T2	5.3.3	Yes
Positive Start EZ Level	0 (OFF), 1-80	0 (OFF)	T1 / T2	5.3.3	Special (see section 5.5.2)
Positive Start Timeout			T1 / T2	5.3.3	Yes
Sudden Shunt Detn Level	0 (OFF), 0-75	0 (OFF)	T1 / T2	5.3.3	Special (see section 5.5.2)
Sudden Shunt Detn Offset	0-9999	0	T1 / T2	5.3.3	Yes
DAX A Track Assignment	Track 1, Track 2	Track 1		5.3.4	Yes
DAX A Warning Time (sec)	0-99	25	N/A	5.3.4	Yes
DAX A Offset Distance (ft)	0-9999	99	N/A	5.3.4	Yes
DAX A Pickup Delay Mode	Fixed, Auto	Auto	N/A	5.3.4	Yes

GCP Programming Parameter	Range	Default Value	Track	Reference	Included in OCCN
DAX A Pickup Delay (sec)	8-500	15	N/A	5.3.4	Yes
DAX B .. DAX D as per DAX A				5.3.4	
Same parameters as above for DAX B, C, D					
MS Sensitivity Level	Normal, 20,40,60,80,100	Normal	T1 / T2	5.3.5	No
Switch MS EZ level	0-100	10	T1 / T2	5.3.5	Yes
Xfer Delay MS to GCP (min)	0 (Not used), 1-60mins	0 (Not used)	T1 / T2	5.3.5	Yes
Prime Xfer MS to GCP	Off, On	Off		5.3.5	Yes
DAX A Xfer MS to GCP	Off, On	Off		5.3.5	Yes
DAX B Xfer MS to GCP	Off, On	Off		5.3.5	Yes
DAX C Xfer MS to GCP	Off, On	Off		5.3.5	Yes
DAX D Xfer MS to GCP	Off, On	Off		5.3.5	Yes
Low EX Adjustment	0-5	0	T1 / T2	5.3.6	No
Compensation Value	1000-2000	1300	T1 / T2	5.3.6	No

The following figures show each menu under GCP Programming in the order in which they appear. The values shown are all defaults, with the exception of “Number of DAXes,” this is set to 4 so that the DAX programming screens can be seen.

5.3.1 Main Program Menu

The Main Program Menu provides menus that allow the user to navigate to the top level of different sections of the program.

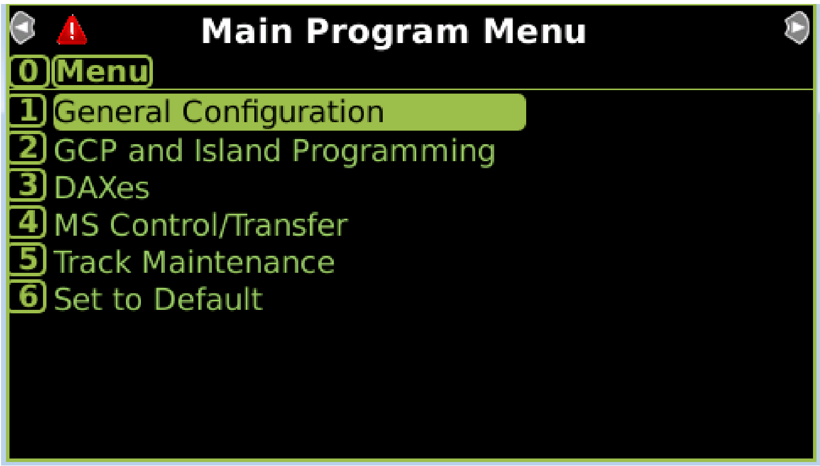


Figure 5-2 Main Program Menu

5.3.2 General Configuration

The General Configuration menu allows the user to configure top level system parameters.

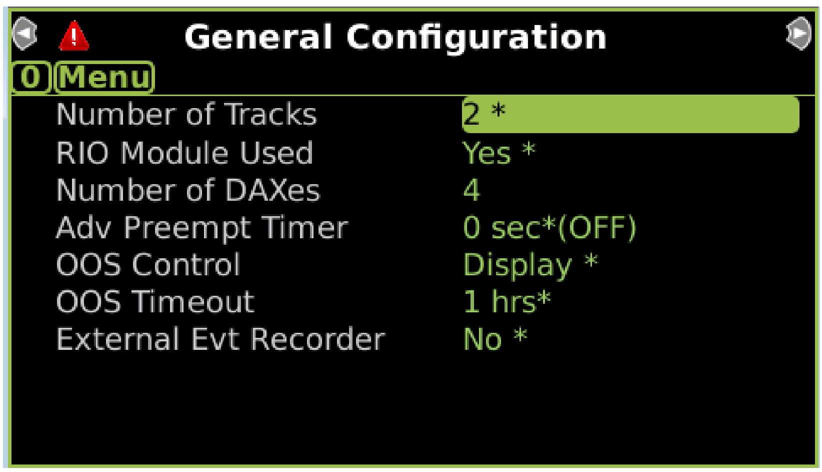


Figure 5-3 General Configuration

Number of Tracks: 1 or 2, the default is 2. Use this to set the number of track modules used.

RIO Module Used: Yes, No, the default is Yes. Use this to set whether the RIO module is used or not.

The RIO module will only be needed when the application requires:

- DAX Relay outputs
- DAX Preempt Outputs, for example for use with Advance Preemption
- Inputs from external island circuits, e.g. DC islands
- An Enable input
- Logic to switch GCP to MS mode

If the RIO module is used for normal operation, the Enable input (RIO input 1) and the GCP/MS Control input (RIO input 2) will normally need to be energized. The use of RIO inputs 3 and 4 is optional, these are used when an external DC island is used in place of the internal island on the track module.

If the RIO module is not used, the Enable and GCP/MS Control inputs do not need to be wired.

Number of DAXes: None or 1-4, the default is None. Set this to indicate how many DAXes are used. This option is not visible on the menu when **RIO Module Used** is set to **No**. The DAXes programming is described in Section 5.3.7.

Adv Preempt Timer: 0-99 seconds. If Advance preemption is not used, set this to 0 (display will indicate OFF). If Advance preemption is used, set the value of the timer to indicate the delay required between the preempt output de-energizing and the GCP RLY de-energizing. A DAX will be required to be configured as a Preempt, i.e. with offset distance of 0. See Section 1.2.5 for description of setting up an application for Advance Preemption.

OOS Control: Display, Display+OOS IPs, OOS IPs, default Display. The 3000+ GCP provides a feature that was not available on the 3000 GCP. This is the ability to take a track out of service without having to jumper the XR relay externally. The Out of Service feature provides 3 mode of operation:

- Display – in this mode, the user can take either the GCP approach, or the Island out of service just using display module, no external wiring is required.
- Display+OOS IPs – in this mode, the out of service input for the specific track module (IN2) first has to be energized and then the user can take either the GCP approach, or the Island out of service using display module.
- OOS IPs – in this mode only the out of service input for the specific track module (IN2) is required to be energized to take the GCP and the island out of service, there is no user input needed on the display. Both the GCP and Island are taken out of service, the user cannot choose just to take the GCP approach out of service as in the other modes.

OOS Timeout: 0-23 hrs, default 1hr. The Out of Service feature provides a time-out feature to protect against the GCP being accidently left out of service. When any track is taken out service, the timer is started with its configured value. When the timer expires, all out of service GCPs and Island are put back into service. When this is set to 0, this means that the out-of-service timeout is not used.

NOTE

The Out of Service timer is started when any GCP or island is first put out of service. The timer is not restarted when the second track is taken out of service.

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. REQUIRED OPERATIONAL TESTS SHALL 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).

WARNING

INPUTS FOR "OUT OF SERVICE" SHOULD BE WIRED IN A PERMANENT MANNER IN ACCORDANCE WITH CIRCUIT PLANS. DO NOT USE TEST TERMINALS OR SWITCHES THAT CAN VIBRATE CLOSED TO ENERGIZE OOS INPUTS.

If the OOS Control is set to OOS IPs, and a track is taken out of service by energizing an input, this will start the OOS timeout timer. When the timer expires, the track will be put back in service, even though the Track OOS input is still energized; however, if the CPU was to reboot, for example by switching from the main to the standby side in a redundant configuration, the track will go out of service again and the Out of Service timer will be restarted.

If the OOS Control is set to Display or Display+OOS IPs, a track is taken out of service, and the CPU was then to reboot, (for example, by switching from the main to the standby side in a redundant configuration) the tracks will remain in service unless specifically taken out of service again using the display.

WARNING

IF OOS CONTROL IS SET TO OOS IPS, AND TRK OOS INPUT IS ENERGIZED, IF THE CPU IS REBOOTED THE OOS TIMER WILL RESTART AND THE TRACK GO OUT OF SERVICE.

External Evt Recorder: Yes, No, the default is No. Use this to set whether an external event recorder is used with the 3000+ GCP, for example the SEAR II, Wayside Inspector, or Argus.

5.3.3 GCP and Island Programming

The GCP and Island screen provides menus that allow the user to navigate to different GCP sections of the program for track 1 or 2. If the number of tracks is set to 1, the track 2 menus are not visible.

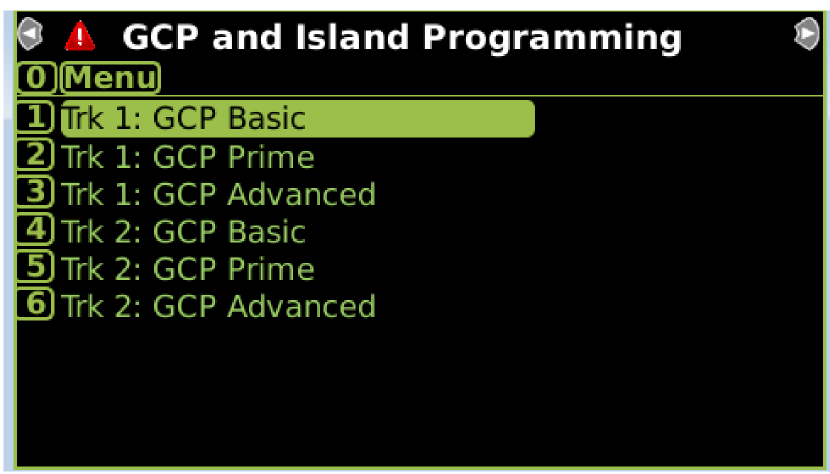


Figure 5-4 GCP and Island Programming

5.3.4 Trk 1 / 2 GCP Basic

The Trk 1: GCP Basic screen allows the user to configure essential parameters for track 1. Track 2 has an identical screen.

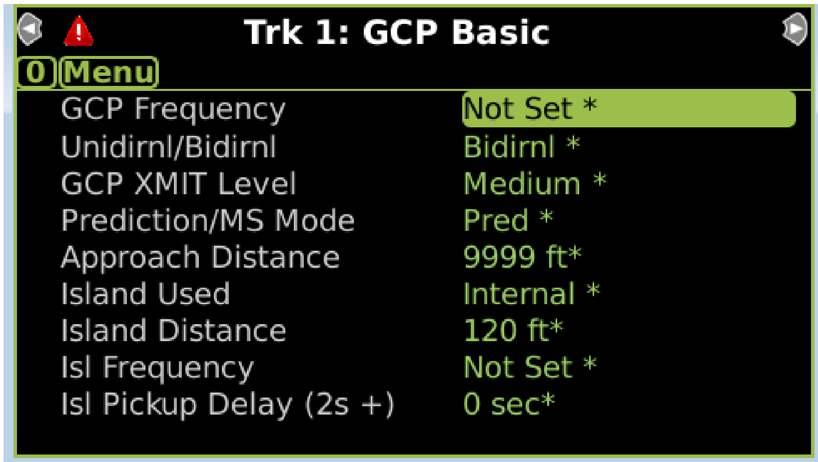


Figure 5-5 Track 1 GCP Basic

GCP Frequency: The GCP frequency provides a set of discrete values that the user can choose from (unlike the 3000 GCP where the frequency is adjusted in 1Hz intervals). The default is **Not Set**.

The frequencies are separated into 3 groups:

Standard Frequencies: 86, 114, 156, 211, 285, 348, 430, 525, 645, 790, 970 Hz

Offset Frequencies: 85.5, 86.5, 87, 113, 113.5, 114.5, 115, 155, 155.5, 156.5, 157, 210, 212, 284, 286, 347, 349, 429, 431, 523, 527, 643, 647, 788, 792, 968, 972 Hz

Other Frequencies: 44, 45, 46, 141, 149, 151, 237, 239, 249, 250, 267, 326, 392, 452, 522, 560, 630, 686, 753, 816, 881, 979, 999 Hz

Standard frequencies will be the most commonly used.

If the same GCP frequency is to be used on two different units, interference may occur due to coupling between them. In the 3000 GCP this is avoided by slaving the two units so that their transmit signals are synchronized. Slaving is not supported in the 3000+ GCP, instead, offset frequencies should be used. For example, rather than both units using 86HZ, one can be programmed to 85.5 and the other to 86.5Hz

Other frequencies are useful when there are specific types of noise on the track. Contact Siemens if further information is required.

See the 3000+ GCP Application Guidelines (SIG-00-17-04) for rules regarding selection of GCP frequencies.

Unidirnl/Bidirnl: Unidirnl, Bidirnl, the default is Bidirnl. Use this to set whether the track module has a unidirectional or bidirectional approach. If a simulated bidirectional circuit is used on a unidirectional approach, set this to Bidirectional (see Section 3.12.1)

GCP XMIT Level: Medium, High, the default is Medium. Medium is used in most applications. High is used in applications where there is a large amount of noise on the track.

Prediction/MS Mode: Pred, MS, the default is MS. If this is set to MS, the Prime and DAX Preempts (DAXes with zero offset distance) will be set to motion sensor mode.

Approach Distance: 1-9999 feet. Used to set the approach distance.

Island Used: Internal, External, No, T1 ISL, the default is Internal. This is used to select which type of island circuit is used. To use the internal island on the track module, set this to internal, then set the island frequency. If no island is used, for example in a remote application, set this to **No**. If some other external equipment provides the island, for example a DC island, set this to External and wire the output from the external island to the RIO input 3 Ext Island 1 for track 1, or RIO input 4 Ext Island 2 for track 2.

For a back-to-back location where this is an insulated joint at a crossing, track 1 will always have the island, so select the appropriate value from Internal or External. Track 2 will share the island information from track 1, so set Trk 2 Island Used to the value T1 ISL.

Island Distance: 0 – 999 ft, the default is 120. Set this to define the length of the island. This value is always visible and does not depend upon the Island Used selection. This value is used in DAXing applications to determine the Post Joint detection time and in some cases, this value is required even when there is no actual island circuit.

Isl Frequency: Not Used, 2.14, 2.63, 3.24, 4.0, 4.0, 5.9, 7.1, 8.3, 10.0, 11.5, 13.2, 15.2, 17.5 20.2 kHz. This is only visible when Island Used is set to Internal. Use this to set the frequency of the internal island, see the 3000+ GCP Application Guidelines (SIG-00-17-04) for rules regarding selection of island frequencies.

Isl Pickup Delay (2s+): 0-6 seconds, the default is 0. This setting is only visible when **Island Used** is set to Internal. Use this to set the pickup delay for the internal island. The island has a built in pickup delay 2s, the value selected here adds additional time to the 2s.

Isl Pickup Delay: 0-500 seconds, the default is 1. This setting is only visible when **Island Used** is set to **External**. Use this to set the pickup delay for the external island. The external island may already have a built in pickup delay, use this value to add additional time to the pickup delay provided by the external equipment.

5.3.5 Trk 1 / 2 GCP Prime

The Trk 1: GCP Prime screen allows the user to configure parameter related to the operation of the Prime predictor on track 1. Track 2 has an identical screen.

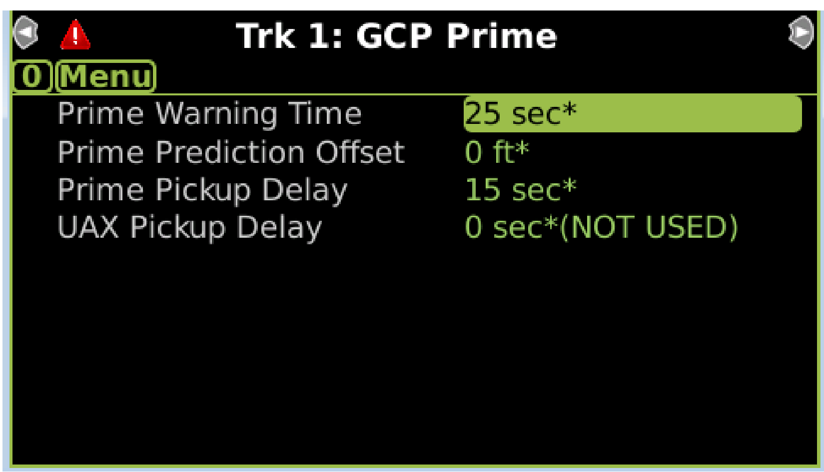


Figure 5-6 Track 1 GCP Prime

Prime Warning Time: 23 – 99 seconds, the default is 25. Set this to set the warning time for the Prime predictor.

Prime Prediction Offset: 0-9999 feet, the default is 0. Use this to set the offset distance for the prime prediction. This is only used when the track module is being used at a remote location where there is no island.

⚠ WARNING

> **WARNING**
>
> **WHEN A GCP TRACK CIRCUIT INCLUDES AN ISLAND, DO NOT USE PRIME PREDICTION OFFSET. WHEN THE PRIME PREDICTION OFFSET IS SET TO A VALUE GREATER THAN 0, THE ISLAND CIRCUIT DOES NOT DE-ENERGIZE THE PRIME OUTPUT. THE WARNING SYSTEM WILL RECOVER WITH A TRAIN OCCUPYING THE ISLAND CIRCUIT AFTER THE PRIME PICKUP TIMER RUNS OUT.**

Pickup Delay Mode: Auto, Fixed, the default is Fixed. This parameter is only visible if the **Prime Prediction Offset** is set to a non-zero value. This parameter is used to determine how the pickup delay is calculated for post joint detection predictions. If the mode is set to Auto, the track module will calculate a pickup delay such that the Prime will pick up when the train is predicted to reach the remote crossing (i.e. a distance down the track equal to the prime prediction offset).

If the mode is set to Fixed, the track module will calculate a pickup delay such that the Prime will pick up when the train is 8s past the insulated joint. The Island Distance programmed in Section 5.3.3 is used in the calculations to determine the position of the joints.

Prime Pickup Delay: 8-500 seconds, the default is 15. Used to set the pickup delay for the prime predictor. The pickup delay will start when motion stops, and when the delay has elapsed, the Prime will pick up. The pickup delay may be truncated after the train leaves the island. This pickup delay will not apply in all cases when the Prime Prediction Offset is not 0.

UAX Pickup Delay: 0-500 seconds, the default is 0 (Not Used). Use this to indicate whether the UAX input and its pickup delay is used or not: 0 means that the UAX is not used. When the UAX is used, set the appropriate pickup delay by entering a non-zero value here. The appropriate UAX input, Track 1 IN 1 or Track 2 IN 1 will need to be wired, see Section 2.3.3.

5.3.6 Trk 1 / 2 GCP Advanced

The Trk 1: GCP Prime screen allows the user to configure advanced parameter settings related to the operation of the track 1. Track 2 has an identical screen.

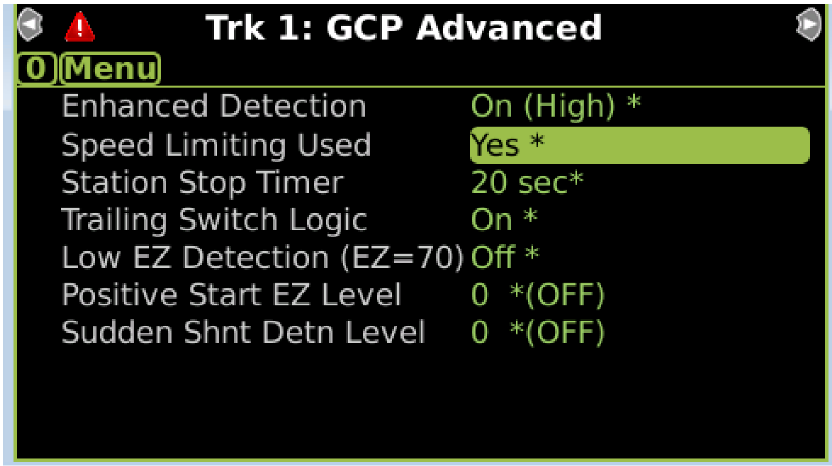


Figure 5-7 Track 1 GCP Advanced

The last three items shown in Figure 5-7 have additional parameters that are visible when they are enabled as shown in Figure 5-8.

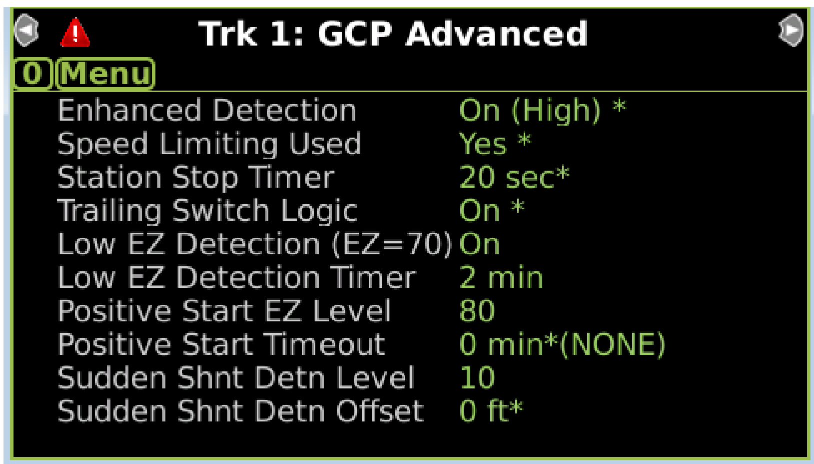


Figure 5-8 Track 1 GCP Advanced Cont.

Enhanced Detection: Off, On (Max), On (High), On (Med), On (Low), the default is On (High). Enhanced Detection allows use of 3000+ GCP in areas where poor track shunting conditions may occur. On (Max) provides the highest sensitivity for detecting poor shunting, while On (Low) provides the least sensitivity and Off turns it off. The default setting of On (High) is generally used for most applications.

When inbound poor shunting is detected on a specific Track Module, the track module will:

- Immediately cause the Prime and all DAX predictors to de-energize and automatically switch all the predictors to highly sensitive motion sensor operation
- The term “ed” is displayed on the associated main track display

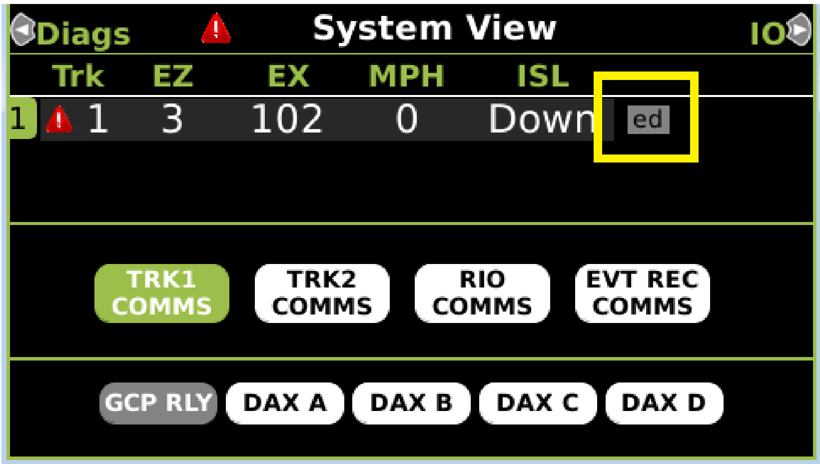


Figure 5-9 Enhanced Detection Example

Detection of poor shunting is caused by nonlinear fluctuations of track EZ signal (speed variation detection). The track module will continue to operate as conventional grade crossing predictor as long as poor shunting conditions are not detected.

NOTE

NOTE

Enhanced Detection activation can result in longer than programmed Warning Times at:

- Remote prediction (DAX) locations
- Crossings where slower trains are encountered

Enhanced Detection should be used where passenger trains, commuter, or other light rail vehicles operate.

Speed Limiting Used: Yes, No, the default is Yes. This is a feature that is very useful when poor shunting or track related discontinuities occur in EZ. On the Model 3000+ GCP, an additional highly sensitive motion detection operation is in use to detect inbound motion when trains first enter an approach. When this inbound train motion is detected, the GCP switches from computing of standard train speed to speed limiting train speed. Poor shunting causes train speeds to vary erratically. Speed limiting stores the highest train speed detected. The system collects data every half second, storing the highest speed and allowing reductions that reflect train braking profiles. If an inbound train stops in the approach, the GCP will revert back to standard speed detection until the train begins moving. Once inbound motion is detected, speed limiting will go back into operation.

Station Stop Timer: 10-120s, the default is 20s. The Station Stop Timer is used to prevent poor shunt detection causing false activations for trains that make a station stop after passing the crossing. Poor shunt detection may:

- occur as the train departs from the station
- result in tail rings

The timer is initiated automatically when a train stops after leaving the island circuit. The timer should be programmed for an interval longer than the time the train normally remains stopped at the station.

Trailing Switch Logic: On, Off, the default is On. This is used to prevent tail rings caused by the wheel noise of a train entering the approach on a trailing switch. It can be left on for most applications.

Low EZ Detection (EZ=70): Off, On, the default is Off. This is used to turn on the Low EZ detection function which is used to detect false shunts left on the track. When Low EZ Detection is turned on, if the EZ drops below 70 for a time exceeding the configured Low EZ Detection Timer value, the GCP RLY output for the configured track will be de-energized and the track is determined to be unhealthy.

Low EZ Detection Timer: 2-99 min, the default is 2. This is only visible when Low EZ Detection (EZ=70) is set to On. Use this to set the time after which a track is declared unhealthy if EZ remains under 70.

Positive Start EZ Level: 0-80, the default is 0 (OFF). When this is set to a non-zero value, the positive start function is active. When EZ drops to below the configured EZ level, the GCP RLY will de-energize and remain de-energized until either:

1. The train occupying the island leaves the island,
2. EZ rises by 5 points above this level or
3. EZ is less than the Positive Start EZ Level for more than the configured value of the Positive Start Timeout (when this is not set to 0).

Positive Start Timeout: 0-99 mins, the default is 0 (NONE). This is only visible when Positive Start EZ Level is not zero. When this is set to 0 (NONE), the positive start will not time out, the GCP RLY will remain de-energized while conditions 1 and 2 are not met above. When this is set to a non-zero value, the positive start will time out after this time and GCP RLY will energize even if EZ is still less than the Positive Start EZ Level

Sudden Shnt Detn Level: 0-75, the default is 0 (OFF). Sudden Shunt Detection is used to immediately activate the crossing when the train first passes the remote insulated joints and will allow the crossing to recover should the train stop before entering the island. Set **Sudden Shnt Detn Level** to 0 when this feature is not used. When Sudden Shunt Detection is to be used, set the Sudden Shnt Detn Level to an EZ level to a value 10 points higher than the EZ level observed when a hardwire shunt is placed at the joints, see Section 3.4 for details. When sudden shunt is detected, the GCP RLY and all DAX Preempt assigned to this track will de-energize

Sudden Shnt Detn Offset: 0-9999 ft, the default is 0. When the value is set to 0, DAXes (with non-zero offset distance) are not affected by the Sudden Shunt. If Sudden Shnt Detn Offset is set to a non-zero value, all DAXes with an offset distance less than this value will also be de-energized when Sudden Shunt is detected.

5.3.7 DAXes

The DAXes screen provides menus that allow the user to navigate to the programming screen for DAXes. The menu will only show enabled DAXES; for example, if Number of DAXes is set to 1, only DAX A is visible.

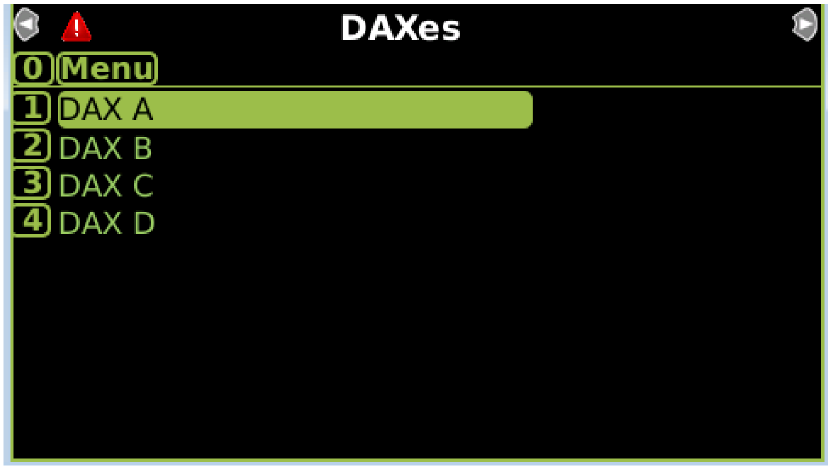


Figure 5-10 DAXes

5.3.8 DAX A to DAX D

The DAX A to DAX D screens allow the user to set the configuration for enabled DAXes. The properties for DAX A are described below, DAX B, C and D have similar properties.

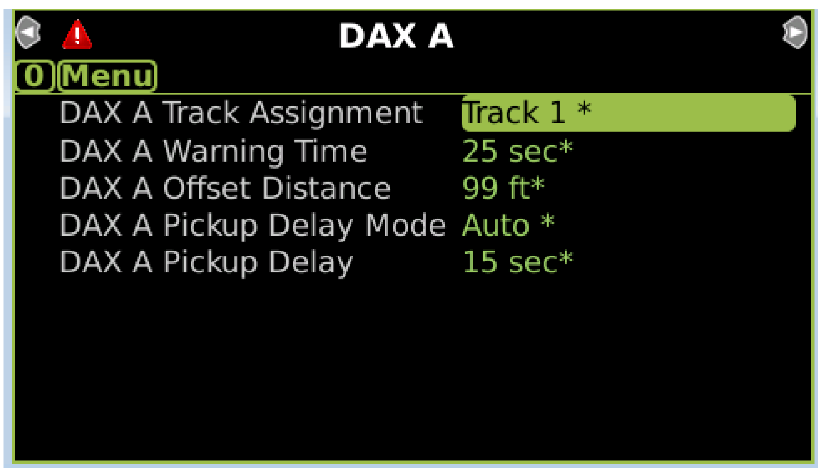


Figure 5-11 DAX A

DAX A Track Assignment: Track 1, Track 2, the default is Track 1. Use this to set which track is being used to control the DAX RLY output.

DAX A Warning Time: 23-99 seconds, the default is 25. This is used to set the warning time for the DAX.

DAX A Offset Distance: 0-9999 feet, the default is 99. This is used to set the offset distance for the DAX. If the offset distance is set to 0, the DAX is used as a Preempt and the display screen will show this as follows.

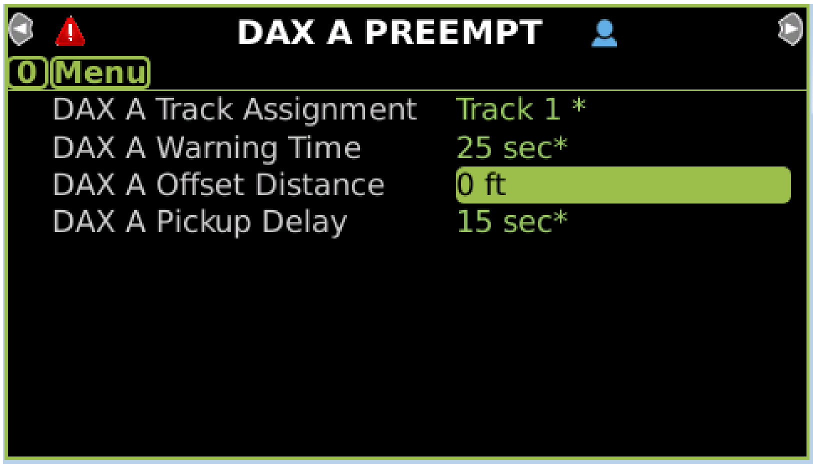


Figure 5-12 DAX A PREEMPT

NOTE

NOTE

When a DAX has an offset, the DAX RLY output will not be de-energized if the island is occupied, or the ENABLE input or UAX input is de-energized.

DAX A Pickup Delay Mode: Auto, Fixed, the default is Auto. This parameter is only visible if the **DAX A Offset** is set to a non-zero value. This parameter is used to determine how the pickup delay is calculated for post joint detection predictions. If the mode is set to Auto, the track module will calculate a pickup delay such that the DAX will pick up when the train is predicted to reach the remote crossing (i.e. a distance down the track equal to the DAX Offset Distance).

DAX A Pickup Delay: 8-500 seconds, the default is 15. Used to set the pickup delay for the DAX. The pickup delay will start when motion stops. The DAX RLY will energize when the delay has elapsed. If the DAX has 0 offset distance (i.e. DAX preempt) the pickup delay may be truncated after the train leaves the island. This pickup delay will not generally be used in through train moves when the DAX Offset Distance is not 0 as the rules governing the Auto and Fixed pickup delays described above will dictate the actual pickup delay.

5.3.9 MS Control / Transfer

The MS Control / Transfer screen provides menus that allow the user to navigate to the programming screen for these functions for each track.

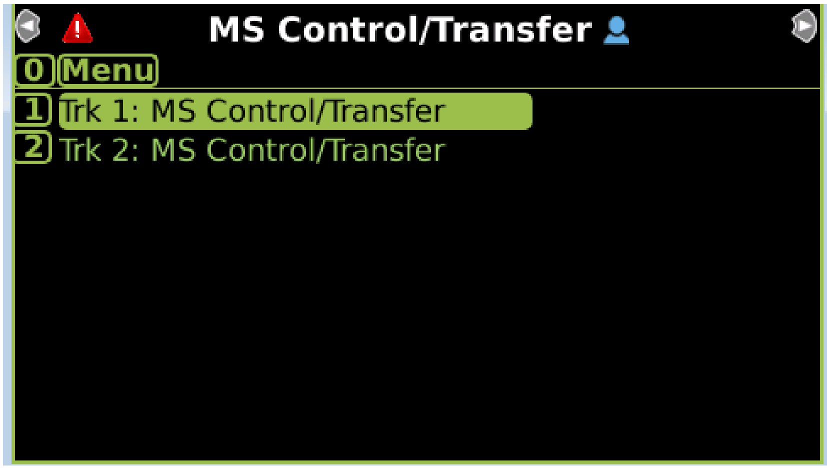


Figure 5-13 MS Control / Transfer

5.3.10 Trk 1 / 2: MS Control / Transfer

This screen allows the user to configure settings related to the use of the 3000+ GCP as a motion sensor.

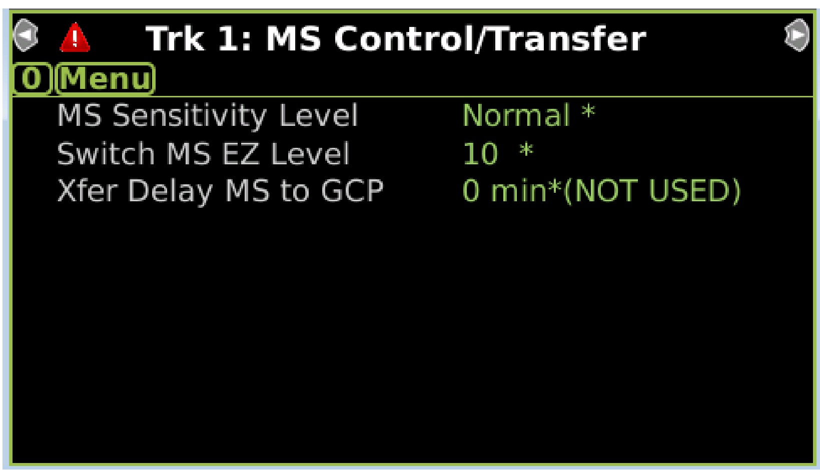


Figure 5-14 Trk 1: MS Control / Transfer

MS Sensitivity Level: Normal, 20, 40, 60, 80, 100, the default is Normal. Motion sensing sensitivity can be adjusted on each track using the MS Sensitivity Level field parameter. Table 5-2 shows the variation in motion sensing detection relative to train speed at the far end of the approach. In most general applications, this can be left at 0.

As an example:

- The value of Normal provides motion sensitivity of approximately 30 mph at end of a 3000-foot approach and approximately 1 mph at the feed points.
- The value of 100 provides motion sensitivity of approximately 1 mph at the feed points and 2 mph within the approach.

Table 5-2 MS Detection Threshold Relative to Sensitivity Level Setting for 3000 Foot Approach

MOTION SENSITIVITY LEVEL VALUE	MOTION SENSING DETECTION THRESHOLD IN MPH
0	30
50	15
80	6
100	1

Switch MS EZ Level: 0 -100, the default is 10. This is used to control the point near the crossing at which the track module switches from being a predictor to a motion sensor. When the prime or a DAX has an offset, it is not affected by this setting.

Xfer Delay MS to GCP: 0-60 mins, the default is 0 (Not Used). This parameter is primarily used when there is a station stop on the approach close to a crossing. When the train stops at the station and then restarts, it is desirable to detect the train as quickly as possible and activate the crossing. This feature allows the GCP to be held as a motion sensor while the train is stopped at the station so that it can be detected more quickly as it restarts. When the train is detected as having stopped, the transfer delay will start and the Prime and all Preempt predictors assigned to this track will be held as motion sensors, until a time equal to the configured value of **Xfer Delay MS to GCP** has elapsed. When the GCP/MS Control input energizes, it will also start the transfer timer for the track if the **Xfer Delay MS to GCP** is non-zero. See Model 3000+ Application Manual (SIG-00-17-04) for details of how to use this feature. The parameters shown in the following figure may also be visible when the Xfer Delay MS to GCP is used.

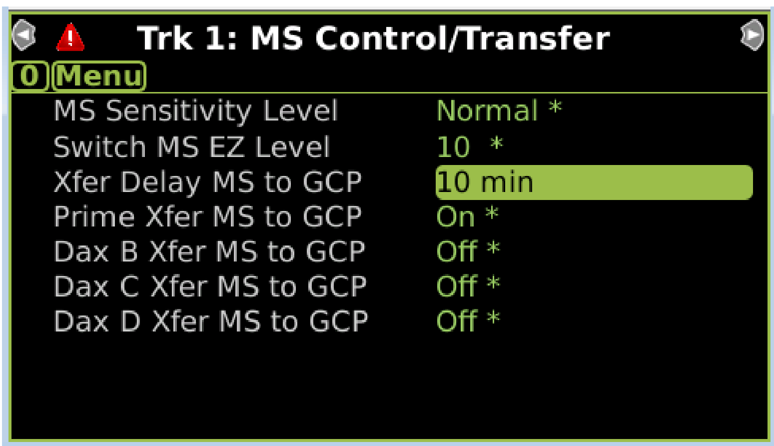


Figure 5-15 Trk 1: MS Control / Transfer Xfer Delay Used

When the Prime or DAXes have zero offset, they are automatically switched to motion sensor when the MS/GCP Control input is de-energized or the transfer delay timer is running. If the Prime or DAXes have a non-zero offset, the user can choose whether to have the predictor be affected by the motion control or not, using the following parameters.

Prime Xfer MS to GCP: On, Off, the default is On. This is only visible if the Prime Prediction Offset is not zero. Set to On to have the Prime be held as a motion sensor by the transfer delay timer.

DAX A Xfer MS to GCP – DAX D Xfer MS to GCP: On, Off, the default is Off. This is only visible if the DAX Offset Distance is not zero and the DAX is assigned to this track. Set to On to have the DAX be held as a motion sensor by the transfer delay timer. For example, the following screen shows a case where the Prime has an offset (Prime Xfer MS to GCP is visible) and 4 DAXes are used, but DAX A is not visible as it either has a 0 offset, or is assigned to track 2.

5.3.11 Track Maintenance

The Track Maintenance screen shows values that may need adjusting by the maintainer based upon changes in track ballast.

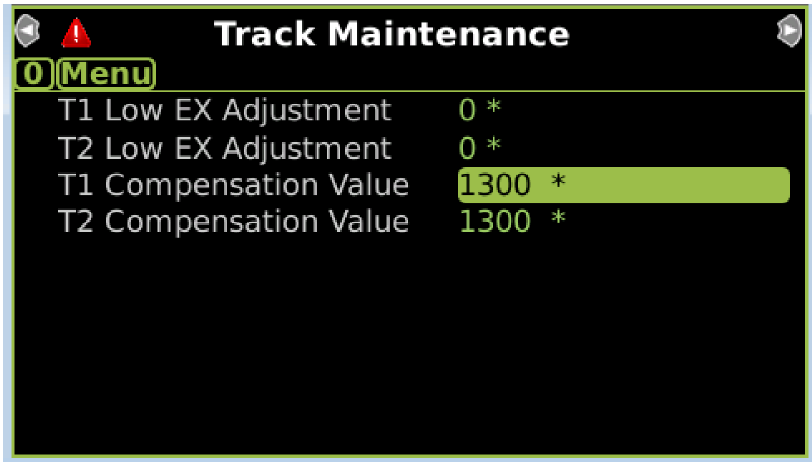


Figure 5-16 Track Maintenance

T1 / T2 Low EX Adjustment: 0-5, the default is 0. This value is used to lower the value of EX that causes the track module to go into Low EX error. When this is set to 0, the track module goes into Low EX error at EX 39, the **Low EX Adjustment** lowers this value by the indicated amount. For example, if **Low EX Adjustment** is set to 5, the track module will go into error at an EX of 39 – 5, i.e. EX 34.

This value should only be adjusted by properly following the procedure described in Procedure 7.5.

WARNING

WARNING

DO NOT ARBITRARILY REDUCE THE EX OPERATING THRESHOLD IMPROPER ADJUSTMENT MAY CAUSE SHORT OR NO WARNING TIME.

T1 / T2 Compensation Value: 1000-2000, default 1300. This value is used by the 3000+ GCP track module to determine how EZ changes with changes in EX (ballast).

WARNING

WARNING

DO NOT CHANGE THE COMPENSATION VALUE WITHOUT PROPER INSTRUCTIONS FROM SIEMENS TECHNICAL SUPPORT.

5.3.12 Set to Default

Use the **Set to Defaults** menu to set all the 3000+ GCP programming parameters back to their default values.

WARNING

ONCE VALUES ARE RESET TO DEFAULT, THERE IS NO RECOVERY OF PREVIOUS VALUES.

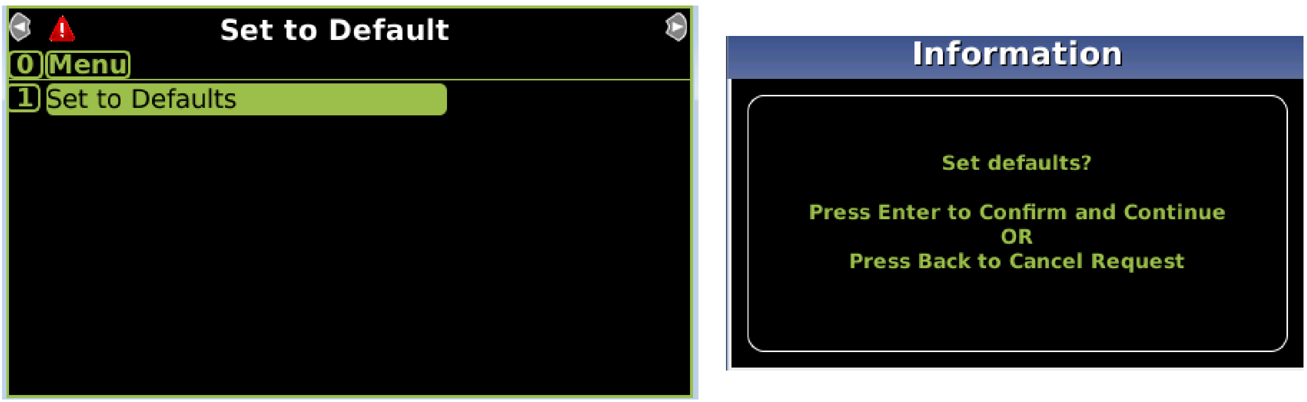


Figure 5-17 Set to Defaults

5.4 DISPLAY CONFIGURATION

This section is used to set non-vital parameters used by the display.

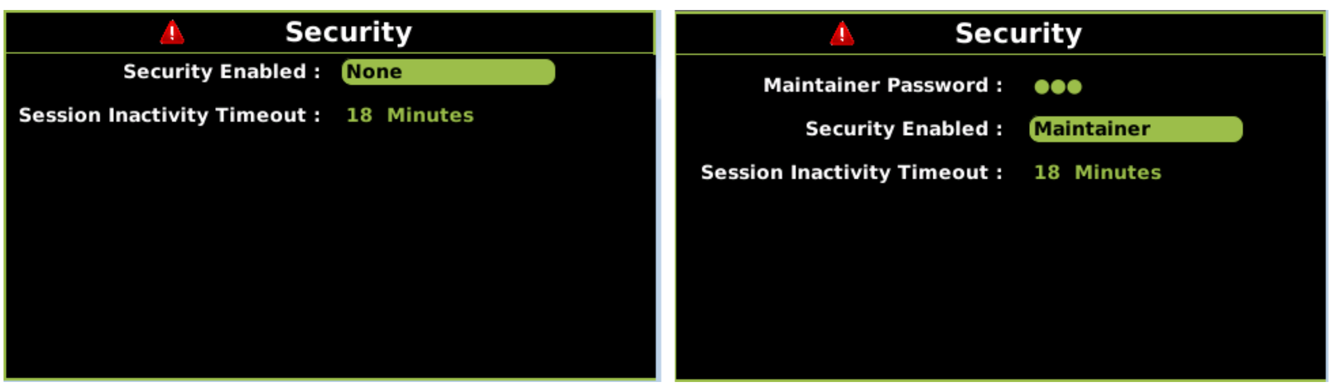


Figure 5-18 Display Security Menu

Security: None, Maintainer, the default is None. When this is set to **Maintainer** the maintainer level password is enabled and a new maintainer password can be entered.

When Security is set to Maintainer, the GCP Programming parameters cannot be changed using the display keypad or WebUI unless the correct Maintainer password is entered. See Section 4.6 for details.

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.

Laptop Ethernet Port: This is hardcoded to being a DHCP Server with IP Address 192.168.255.81.

5.5 CONFIGURATION CHECK NUMBERS

The software used in the Model 3000+ GCP generate various 32-bit Cyclical Redundancy Check (CRC) numbers which can be used to determine whether the configuration matches the office plans or whether the configuration has changed since the previous value was recorded.

The four check numbers are:

- CCN – Configuration Check Number
- OCCN – Office Configuration Check Number
- TCN – Track Configuration Check Number
- FCN – Field Configuration Check Number

5.5.1 Configuration Check Number (CCN)

This value is the check number that covers:

a) The MCF CRC
b) The ATCS Address of the CPU
c) The GCP Programming parameters, with the exception of the Out of Service Timeout

If this check number is recorded after the system is installed and commissioned, it can be used to check that there have been no changes in the GCP Programming.

5.5.2 Office Configuration Check Number (OCCN)

This value is the check number that covers:

a) The MCF CRC
b) The ATCS Address of the CPU
c) Selected GCP Programming parameters designated as being included in the OCCN

This check number is generally used to check that the configuration supplied by the design office matches that programmed into the GCP. The parameters that are included in the OCCN are ones that typically can be specified by the office, ones which may need adjustment in the field are not included, for example, parameters which specify an EZ level.

The Table 5-3 shows which parameters are included in the OCCN.

Some parameters have special rules regarding the OCCN. For the parameters listed in the table below, the OCCN changes when the parameter is changed from an **Off** value (0) to an **On** (non-zero) value, but the OCCN does not change when different **On** values are chosen. The rationale behind this is the design office wants to control whether the feature is enabled, but does not want the OCCN changing if adjustments to the actual value are needed in the field.

Table 5-3 Parameters Included in the OCCN

Parameter	OCCN Changes When:
Enhanced Detection	Value changed to Off Value changed to be not Off
Positive Start EZ Level	Value changed to 0 (Off) Value changed to be non-zero
Sudden Shnt Detn Level	Value changed to 0 (Off) Value changed to be non-zero

5.5.3 Track and Field Configuration Check Numbers (TCN and FCN)

This Track Check Number is a value that will change every time the track module is calibrated (GCP, Approach, Linearization or Island). Each Track module has its own TCN.

The Field Configuration Check Number (FCN) is a value composed of the TCNs for both track modules.

This field check number can be used by the maintainer to check whether any calibrations have been performed since they last visited the site. If the maintainer finds the FCN is different from the value they last recorded, they can look at the track detail screen at the track check numbers and find when the date and time they were last changed.

5.6 OFFICE CONFIGURATION EDITOR

The Office Configuration Editor (see manual SIG-00-11-15) can be used to create the configuration for the GCP offline in a format that can be loaded into the GCP.

NOTE

NOTE

OCE Versions 2.4.5 and earlier do not support the 3000+ GCP. Use an OCE version later than 2.4.5 with the 3000+.

The OCE can either be used to:

- Create the configuration file (known as the PAC file) which can be loaded using a USB stick plugged into the display, or using the WebUI (See Section 4.4.2 for details on how to load the file)
- Create the Minimum Program Report. This report will only show the parameters which have been changed from their default values. The Configuration report can then be downloaded from the box and the Minimum Program Report compared to the one from the office, or the display used to look at the Min Program Report, as shown below.

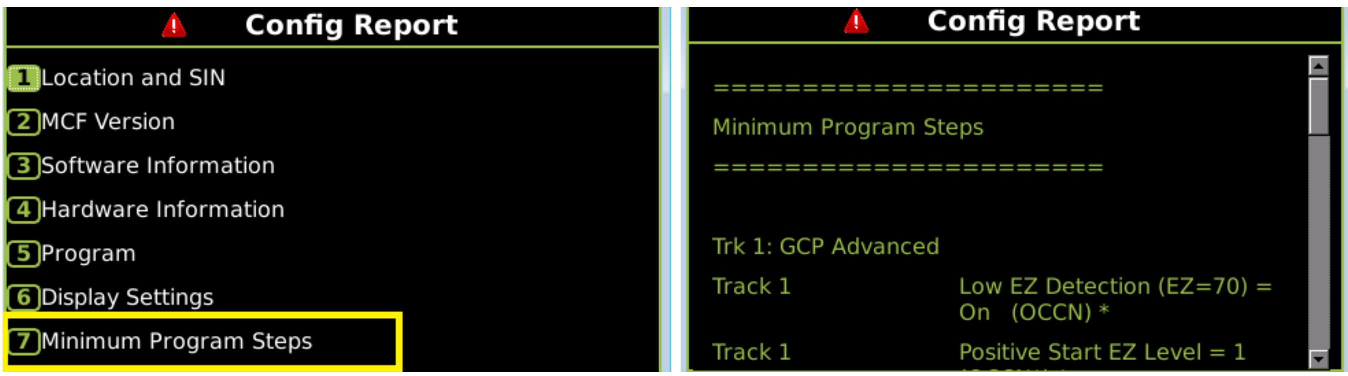


Figure 5-19 Min Program Report

===

Minimum Program Steps

===

Trk 1: GCP Advanced
Track 1 : Low EZ Detection (EZ=70) = On (OCCN) *
Track 1 : Positive Start EZ Level = 1 (OCCN*) *
Track 1 : Positive Start Timeout = 1 min (OCCN) *
Track 1 : Sudden Shnt Detn Level = 1 (OCCN*) *

Trk 1: MS Control/Transfer
Track 1 : Xfer Delay MS to GCP = 1 min (OCCN) *
* Parameter is part of office configuration check number calculation

Check Numbers:
Office Configuration Check Number: 57084C6E
Config. Check Number: 2486B792

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SECTION 6 **GCP CALIBRATION AND SYSTEM OPERATIONAL CHECKS**

6.0 GENERAL

This section details the programming methods and procedures for the Model 3000+ GCP.

6.1 GCP CALIBRATION AND SYSTEM OPERATIONAL CHECKS

The GCP 3000+ System Calibration consists of GCP calibration and system checkout.

GCP calibration is divided into the following automated procedures:

- GCP calibration (GCP CAL)
- Approach distance calibration (APP CAL)
- Approach linearization (LIN CAL)
- Island calibration (ISL CAL)

NOTE

NOTE

The Main and Standby set of modules require independent GCP and Island calibration.

Following successful completion of Main Track Module calibration, the APP CAL and LIN CAL steps for the Standby Track Modules may be bypassed as described in Paragraph 6.1.3.1, STANDBY MODULES CALIBRATION as it accepts the Main Track Module calculations.

It is not necessary to turn off Enhanced Detection when calibrating track modules.

6.1.1 Calibration Required Message

The Display System View Screen, Figure 6-1, shows the calibration status for each track.

- **GCP, ISL CAL Req** message appears before calibration initiation.

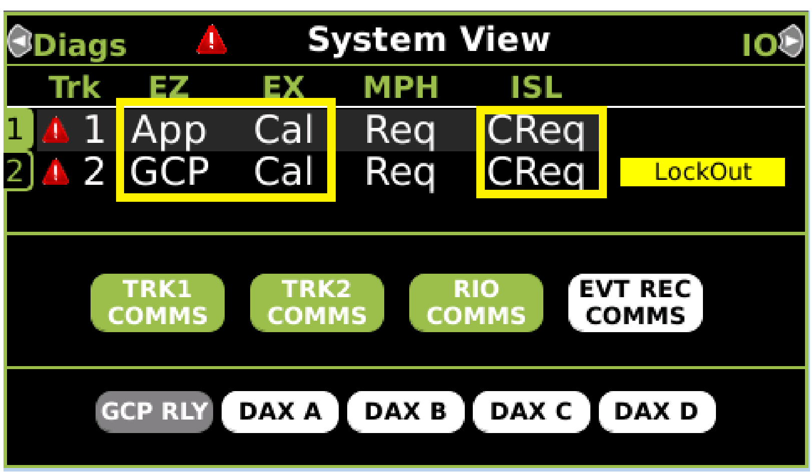


Figure 6-1 Two Track Status Screen Display Prior to Calibration

6.1.2 System Programming Requirements

Before calibration, the 3000+ GCP must be programmed using the procedures provided in SECTION 5.

- If the system was previously programmed, verify that system programming corresponds to the railroad application instructions for the applicable tracks.
- The main and standby sets of modules are not programmed independently.
- System programming is done only once.
- Both module sets operate from the same stored application program.

6.1.3 In Service Recalibration Due to Failed Modules

The following in-service modules may be replaced without recalibration of the GCP:

- CPU, A80403/A80903
- RIO, A80413
- Transfer Module A80468
- Display Module, A80485

In-service Track Module recalibration may be required due to:

- Failed module replacement
- Program changes
- Track equipment changes
- Module software (MEF) changes in the field

6.1.3.1 In Service Recalibration Requirements Due to Failed Track Module Replacement

Recalibration must be performed for the associated track when a failed A80418 Track Module is replaced.

- Only the GCP (GCP CAL) and Island (ISL CAL) procedures must be completed.
- The Island calibration (ISL CAL) procedure is initiated only if the island is used.
- The GCP Approach distance (GCP APP) and GCP Linearization (GCP LIN) procedures may be bypassed by selecting the BYPASS button.
- Previous approach distance and linearization values remain unchanged, eliminating the need for additional track shunt placement.

NOTE

NOTE

It is not necessary to remove power from the 3000 + GCP case before removing or installing modules.

6.1.3.2 Recalibration Requirements Due to Program Changes

The GCP program changes that required track recalibration are indicated in Table 6-1. Recalibration is required if **Yes** is included in the corresponding column; for example, if the number of tracks in the installation is increased, perform the following calibration procedures for the added tracks only:

- Setup for calibration
- Setup for approach distance
- Linearization
- Island (if used)

Table 6-1 Recalibration Requirements Due to Programming Changes

Program Changes	Calibration Required				Reprogramming Required	Notes
	GCP CAL	GCP APP	GCP LIN	ISL CAL		
Increased Number of Tracks	Yes[1]	Yes[1]	Yes[1]	Yes[2]	Yes[1]	1. For added tracks only 2. If Island is used
GCP Frequency Change	Yes[3]	Yes[3]	Yes[3]	No	No	3. For tracks with new GCP frequencies
Island Frequency Change	No	No	No	Yes[4]	No	4. For tracks with new island frequencies
Application changed from: Unidirectional to Bidirectional, Bidirectional to Unidirectional	Yes[5]	Yes[5]	Yes[5]	No	No	5. For changed tracks only
Transmit Level Changed From: Medium to High or High to Medium						
Approach distance Changed						
Ballast Compensation Value Changed						
Island Operation Changed from No/External/T1 Isl to Internal or from Internal to No/External/T1 Isl	Yes[6]	No[7]	No[7]	Yes[8]	No	6. If EZ varies more than 2 7. Can be bypassed 8. If changed to internal
Set to Default selected (and track parameters listed above changed from original settings)	Yes[9]	Yes[9]	Yes[9]	Yes[9]	Yes[10]	9. For all tracks 10. Complete re-programming required

6.1.4 Recalibration Requirements Due to Track Equipment Changes

Changes made to the existing track equipment that require track recalibration are shown in Table 6-2.

Recalibration is required if **Yes** is included in the corresponding column. For example, when existing termination shunts in an installation are moved to a different location, the approach distance entered in the Program menu for that track must be changed to reflect the new approach distance. The GCP, Calibration, Approach distance and Linearization procedures must be performed.

NOTE

NOTE

Approach distance in the Program menu must be changed to reflect the new approach distance prior to start of track calibration.

Table 6-2 Recalibration Requirements Due to Track Equipment Changes

Track Equipment Changes	Calibration Required				Notes
	GCP CAL	GCP APP	GCP LIN	ISL CAL	
Termination Shunts Changed	Yes[1]	No	No	No	1. For changed tracks only
Termination Shunts Moved to New Location	Yes[1]	Yes[1]	Yes[1]	No	
Termination Shunts of Other Frequencies Added, Removed From, or Moved Within the 3000+ GCP Approach(es)	Yes[1]	Yes[1]	Yes[1]	No	
Wide band Insulated Joint Couplers (8A076 or 8A077) Replaced in 3000+ GCP Approach(es)	Yes[1]	No[2]	No[2]	No	
Tuned Insulated Joint Couplers (62785-f) Replaced in 3000+ GCP Approaches)	Yes[1]	Yes[1]	Yes[1]	No	
3000+ GCP Track Wire(s) Replaced	Yes[1]	No[2]	No[2]	Yes	2. Requires bypass

6.1.5 In Service Recalibration if Shifts in EZ Occurs from Ballast Drying

In general, an in-service recalibration of a 3000+ GCP is seldom required. In some applications, however, EZ shifts of greater than 10 points can be observed as ballast changes from wet to dry or the reverse. In these cases, a seasonal recalibration using only the **GCP CAL** procedure may be used along with the following BYPASS procedures for **GCP APP** and **GCP LIN**.

- The BYPASS procedure accepts the current values for the computed approach and linearization steps and removes the APP CAL and LIN CAL notifications from the System View.
- This eliminates placing hardwire shunts on the track as required by the calibration procedure.
- Once **GCP CAL** is completed, bypass the approach calibration by first selecting **GCP APP** and then **BYPASS**.
- Do not select **START**.
- Bypass the linearization calibration by first selecting **GCP LIN** and then **BYPASS**.
- Do not select **START**.

WARNING

WARNING

USE THE BYPASS PROCEDURE ONLY IF THE CURRENT COMPUTED APPROACH DISTANCE AND LINEARIZATION VALUES ARE KNOWN TO BE CORRECT.

DO NOT RECALIBRATE IF AN IN-SERVICE TRACK SUDDENLY HAS A LARGE JUMP IN EZ OR HIGH SIGNAL ERROR. THE CAUSE MAY BE A TRACK, BOND, COUPLER, OR SHUNT RELATED PROBLEM WHICH MUST BE INVESTIGATED AND CORRECTED BEFORE CONSIDERING RECALIBRATION.

WARNING

WARNING

BEFORE STARTING CALIBRATION, ENSURE THAT:

- **TRACK BONDING IS GOOD**
- **ALL TERMINATION SHUNTS, INSULATED JOINT COUPLERS, AND TRACK ISOLATED DEVICES ARE INSTALLED**
- **NO TRAINS ARE IN THE GCP APPROACHES**

NOTE

NOTE

The Display prevents the BYPASS procedure being performed if the GCP Calibration was done because of a programming value change.

6.2 GCP MAIN MODULES CALIBRATION

When possible, all GCP Calibration procedures should be done when ballast is dry. If calibration is done when ballast is wet, recalibration may be required later when the ballast is dry.

NOTE

NOTE

The Display System View shows GCP CAL for each track parameter requiring calibration.

Table 6-3   GCP Calibration

<table>
<tr><td>Step 1</td><td>If transfer module A80468 is present, set the transfer switch to MAIN.</td></tr>
<tr><td>Step 2</td><td>If a 60 or 100 Hz Cab Signal is in use, turn it off at this time.
From the System View menu, select the track to calibrate, i.e. 1 or 2 by entering that number on the keypad. The menu only shows enabled tracks.</td></tr>
<tr><td colspan="2">

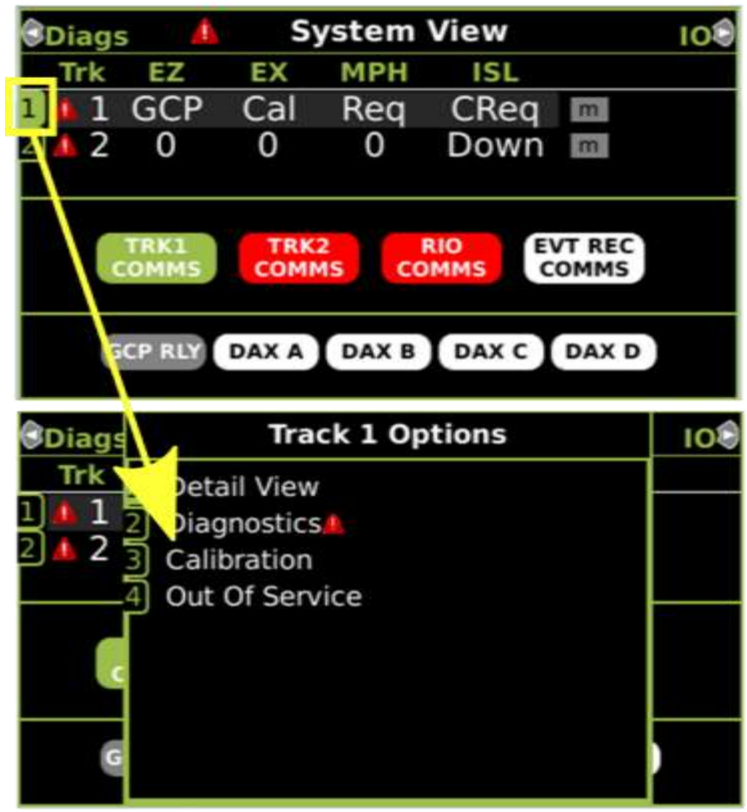


Figure 6-2   Opening the Calibration Window

</td></tr>
<tr><td>Step 4</td><td>From the Track Options menu, select 3) Calibration (See above).
The Track “N” Window appears, depicting the Calibration status of:
1) GCP, along with EZ and EX values
2) Approach, along with Computed Distance
3) Linearization, along with Linearization Steps
4) Island, along with Island Status and Z Level
If Calib Req appears on any of the above lines, calibration is required (see Figure 6-3).</td></tr>
</table>

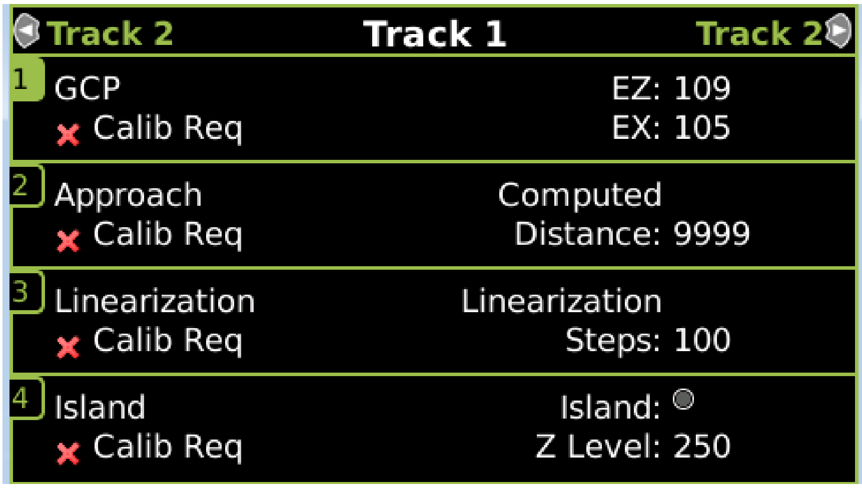


Figure 6-3 Calibration Required

Step 5	Select **1) GCP**. The Track "N" GCP Calibration Window opens, listing **1) Start Calibration** and **2) Add Comment**. **Select 1) Start Calibration**. The display depicts **Initiating**, **In Progress** messages during calibration. If calibration is successful: **Passed, Please Wait** appears in the window. EZ should be 98 to 102 and the **1) GCP** line has a green check next to **Calibrated**. If calibration is not successful, the display shows a **Failed** message.

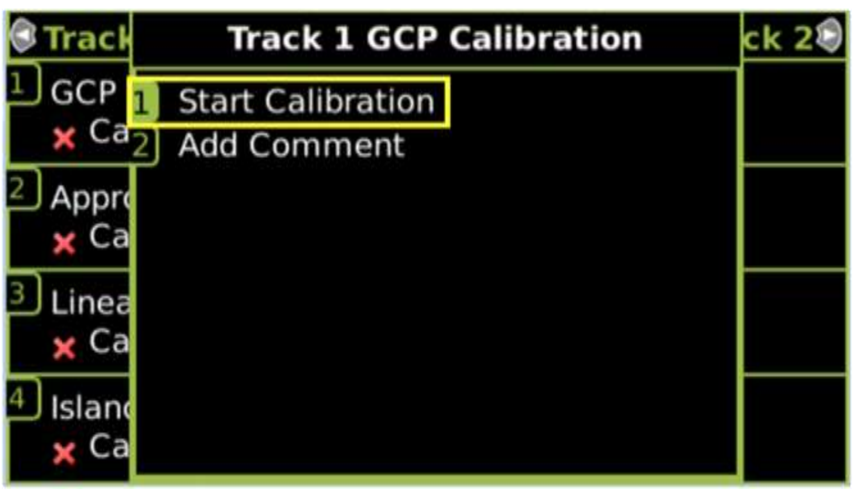


Figure 6-4 Start Calibration

Figure 6-5 Calibration In Progress and Complete

Step 6	To record the date and time stamped reason for the recalibration and store it in the log, select the **1) GCP** button and then the **2) Add Comment** button. Type any notes on the reason for recalibration and select **Enter** to save the entry. The Comment Entry window closes and the display returns to the **GCP Calibration** window, Figure 6-6.

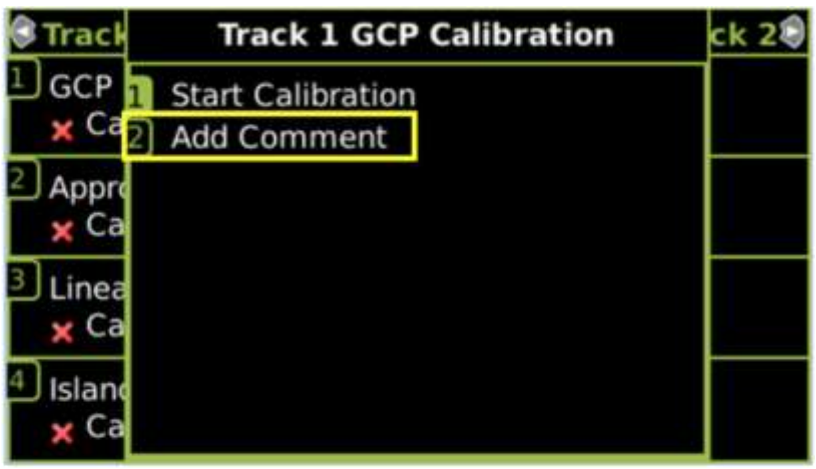


Figure 6-6 Add Comment Option

Step 7	If the cab signal was turned off in Step 2, turn it on.

This completes the GCP Calibration. Proceed to 6.3, Approach distance and Linearization Calibration.

6.3 APPROACH DISTANCE AND LINEARIZATION CALIBRATION

NOTE

NOTE

1. The setup for approach distance and setup for linearization procedures are combined into a single procedure to simplify track-shunting requirements.
   a. The combined procedure calculates a modified approach distance based on actual approach distance (distance to the termination shunt from the crossing track wires) plus the electrical characteristics of the termination shunt and any simulated track impedance placed in series with the shunt.
   b. This procedure is essential to improving warning time accuracy, especially for DAX and prime prediction offset circuits.
2. The linearization procedure compensates for lumped loads in the 3000+ GCP approach that can affect the linearity of EZ over the length of the approach as a train approaches the crossing.
   a. The linearization is essential to improving warning time accuracy.
3. The types of loads that can affect the linearity of the approach circuit include:
   a. Narrow-band shunts of other frequencies in the 3000+ GCP approach circuits, which may occur when other GCP approaches overlap the GCP approach circuit.
   b. Other track equipment in the 3000+ GCP approaches such as audio frequency overlay track circuits, coded track circuits, etc.
   c. Missing or incorrect track battery chokes.

⚠ WARNING

WARNING

1. **THE APPROACH AND LINEARIZATION PROCEDURES REQUIRE THE RECORDING OF THE COMPUTED APPROACH DISTANCES IN FEET (NOT THE EZ VALUE).**
2. **WHEN EDITING THE COMPUTED APPROACH DISTANCES, ENTER THE VALUE IN FEET (NOT THE EZ VALUE).**
3. **FAILURE TO ENTER DISTANCES IN FEET MAY RESULT IN SHORTER WARNING TIMES THAN INTENDED.**

When Metric units are used, computer approach distances are entered in meters, not feet.

Table 6-4 Approach and Linearization Calibration Bypass Procedure

Step 1	Once GCP Calibration is completed, bypass the approach calibration by first selecting **2) Approach**. After the **Track "N" Approach Calibration** Window opens, select **3) Bypass**. Do not select **1) Start Calibration**.
Step 2	Bypass the linearization calibration by first selecting **3) Linearization**. After the **Track "N" Linearization Calibration** Window opens, select **3) Bypass**. Do not select **1) Start Calibration**.

NOTE

Calibration Distance and Linearization Steps values are site historical data and must be recorded as specified in Table 6-5 and Table 6-7 in this manual as well as in Table 6-13 on both the History Card and the Site Cutover form.

Table 6-5 Approach and Linearization Calibration 1

Step 1	Record the EZ and EX values for the track (before installing the hardwire shunt) in the **Step 1** column (**Calibrated Values**) on the CALIBRATION VALUES HISTORY form (Table 6-7). Then, temporarily place a hardwire shunt across the termination shunt. For bidirectional installation, use the termination shunt farthest from the crossing.
Step 2	Record the EZ and EX values for the track in the First Approach, Step 2 column on the CALIBRATION VALUES HISTORY form (Table 6-7).
Step 3	Select the **2) Approach**. The **Track "N" Approach Calibration** Window opens, listing **1) Start Calibration**, **2) Edit**, **3) Bypass** and **4) Add Comment**.
Step 4	Select **1) Start Calibration**. The display reports **Initiating**, then **In Progress** during the calibration. If calibration is successful: • **Passed, Please Wait** appears in the window, followed by **Calibrated**. • The Computed Distance value appears and the 2) Approach line has a green check next to **Calibrated**. If calibration is not successful, the display shows a **Failed** message.

Figure 6-7 GCP Approach Calibration Window Before and After Approach Calibration

Step 5	Record the computed approach distance in feet for the track in **First Approach**, **Step 5** column (**Comp Dist**) on CALIBRATION VALUES HISTORY form (Table 6-7).
Step 6	Accurately (within 1%) locate the midpoint of the longest approach and move the hardwire shunt to that point on the rails (see Figure 6-8).
Step 7	Select **3) Linearization**. The **Track "N" Linearization Calibration** Window opens, listing **1) Start Calibration, 2) Edit, 3) Bypass** and **4) Add Comment**.
Step 8	Select **1) Start Calibration**. The display reports **Initiating**, then **In Progress** during the calibration. If calibration is successful: • **Passed, Please Wait** appears in the window, followed by **Calibrated**. • The Linearization Steps value appears and the **3) Linearization** line has a green check next to **Calibrated**. If calibration is not successful, the display shows a **Failed** message.
Step 9	Record the linearization step value for the track in the **First Approach, Step 9** column (**Linearization Steps**) on the CALIBRATION VALUES HISTORY form (Table 6-7). The value should be between 68 and 132. If not, refer to Troubleshooting, found in Section 7.7
Step 10	**Verify** that the computed approach distance in feet (**Comp Dist, Step 5**) and the linearization steps (**Linearization Steps, Step 9**) values recorded on the CALIBRATION VALUES HISTORY form (Table 6-7) are the same as the values displayed on the **Track "N"** window.
Step 11	Remove the hardwire shunt from the track.

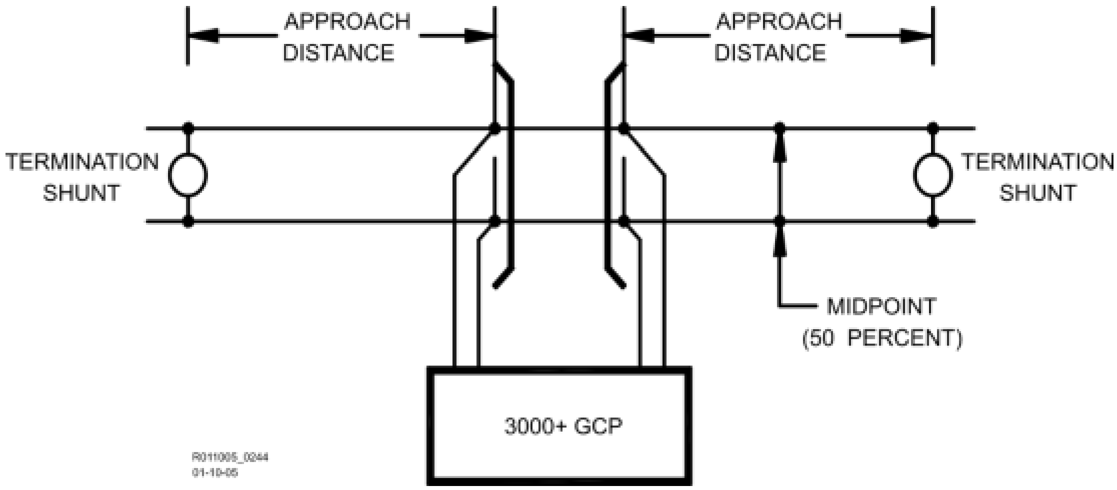


Figure 6-8 Midpoint Location

Table 6-6 Approach and Linearization Calibration 2

Step 12	If the approach is unidirectional or simulated bidirectional, go to step 31. If the track is bidirectional and the measured distance to the other termination shunt is within 10% of the distance of the first approach, go to step 13. Otherwise, if the distance is clearly shorter, go to step 31.
Step 13	Temporarily place a hardwire shunt across the termination shunt of the other approach.
Step 14	Record the EZ and EX values for the track in the **Second Approach, Step 14** column on the CALIBRATION VALUES HISTORY form (Table 6-7).
Step 15	Select **2) Approach**. The **Track "N" Approach Calibration** Window opens, listing **1) Start Calibration**, **2) Edit 3) Bypass**, and **4) Add Comment**.
Step 16	Select **1) Start Calibration**. The display reports **Initiating**, then **In Progress** during the calibration. If calibration is successful: • **Passed, Please Wait** appears in the window, followed by **Calibrated**. • The Computed Distance value appears and the **2) Approach** line has a green check next to **Calibrated**. If calibration is not successful, the display shows a **Failed** message.
Step 17	Record the computed approach distance in feet for the track in the **Second Approach**, **Step 16** column (**Comp Dist**) on the CALIBRATION VALUES HISTORY form (Table 6-7)
Step 18	Accurately (within 1%) locate the midpoint of this approach and move the hardwire shunt to that point on the rails (see Figure 6-8)
Step 19	Select **3) Linearization**. The **Track "N" Linearization Calibration** Window opens, listing **1) Start Calibration**, **2) Edit**, **3) Bypass** and **4) Add Comment**

Step 20	Select **1) Start Calibration**. The display reports **Initiating**, then **In Progress** during the calibration. If calibration is successful: • **Passed, Please Wait** appears in the window, followed by **Calibrated**. • The Linearization Steps value appears and the **2) Approach** line has a green check next to **Calibrated**. If calibration is not successful, the display shows a **Failed** message.
Step 21	Record the linearization (**Linearization Steps**) for the track in the **Second Approach**, **Step 21** column (Linearization Steps) on the CALIBRATION VALUES HISTORY form (Table 6-7). Value between 68 and 132. Verify that the computed approach distance in feet (**Computed Distance**, Step 17) and the linearization steps (**Linearization Steps**, Step 21) values recorded are the same as the values displayed on the **Calibration Select** window.
Step 22	Remove the hardwire shunt from the track.
Step 23	If the Linearization Steps value for the second approach, Step 21, is greater than or the same as the Linearization Steps value recorded for the first approach (Table 6-7), Step 9, go to Step 31. If the Linearization Steps value for the second approach (Table 6-7), Step 21, is less than the value recorded for the first approach, Step 9, go to Step 24.
Step 24	Select **3) Linearization**. The **Track "N" Linearization Calibration Window** opens, listing **1) Start Calibration, 2) Edit**, and **3) Bypass**, **4) Add Comment**
Step 25	Select **2) Edit** button. The **New Value** dialog box, Figure 6-9, appears.

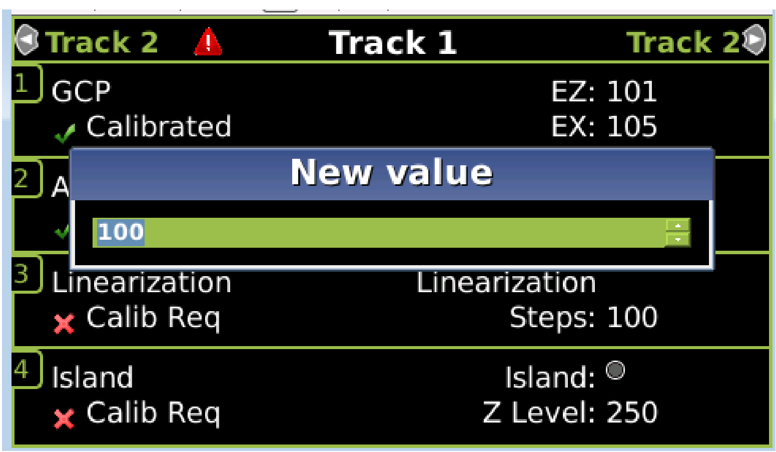


Figure 6-9 Enter New Values

Step 26	Enter the Linearization Step Value (Linearization Steps) recorded for the first approach, Step 9, (see CALIBRATION VALUES HISTORY form (Table 6-7) into the **New Value field** using the keypad numbers and select **ENTER**. The entered value appears on **3) Linearization**.

Step 27	Select **2) Approach**. The **Track "N" Approach Calibration Window** opens, listing **1) Start Calibration, 2) Edit**, **3) Bypass**, and **4) Add Comment**.
Step 28	Select the **2) Edit** button The **Computed Approach Distance** dialog box appears.
Step 29	Enter the computed approach distance (**Computed Distance**) value (in feet) recorded for the first approach (Table 6-7), Step 5, into the **New Value field** using the keypad numbers and select **Enter**. The entered value appears on **2) Approach**.
Step 30	Verify that the computed approach distance (**Comp Dist**, Step 5) and the linearization steps (**Linearization Steps**, Step 9) values recorded on the CALIBRATION VALUES HISTORY form for the first approach are the same as those displayed on the **Track "N"** window (see Figure 6-10).

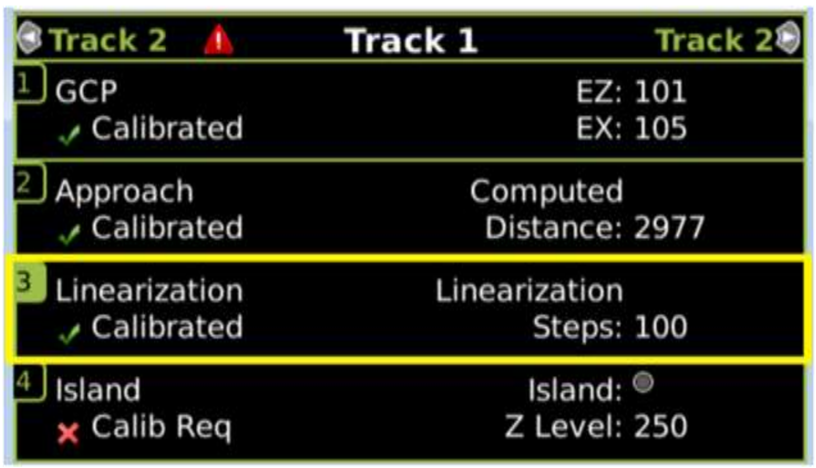


Figure 6-10 Linearization Values

Step 31	To record the reason for the Calibration and store it in the event log, select **3) Linearization** and then **4) Add Comment.** • Type any notes about the calibration and select **Enter** to save the entry.

This completes Approach and Linearization Calibration. Proceed to Paragraph 6.4 for Island calibration. If an island is not present, select **MAIN STATUS VIEW** button, then, if a **Standby** set of modules is present, go to Paragraph 6.5, **STANDBY MODULES CALIBRATION**.

Table 6-7 Calibrated Value History Form

1	**CALIBRATION VALUES HISTORY FORM (APPROACH AND LINEARIZATION CALIBRATION)**									
GCP#: ________										
Date of Calibration: ________					Name: ________					
Location Information: ________										
CALIBRATION VALUES HISTORY										
			First Approach E/W ( ) N/S				**Second Approach E/W ( ) N/S**			
	Calibrated Values (Step 1)		**Hardwire Across Term. Shunt (Step 2)**		**Computed Approach Distance (Comp Dist) (Step 5)**	**Linearization Step Value (Linearization Steps) (Step 9)**	**Hardwire Across Term. Shunt (Step 14)**		**Computed Approach Distance (Comp Dist) (Step 17)**	**Linearization Step Value (Linearization Steps) (Step 21)**
	EZ	**EX**	**EZ**	**EX**			**EZ**	**EX**		
Track 1										
Track 2										

This completes Approach and Linearization Calibration. If the system includes an internal island, proceed to Island Calibration. If not, proceed to Standby Module Calibration, Section 6.4.

6.4 ISLAND CALIBRATION

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

NOTE

NOTE

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.

NOTE

NOTE

Be sure to follow all railroad, agency, or regulatory policies regarding the type and application of jumpers. Siemens recommends the use of jumper wires that are 18 AWG or larger.

Table 6-8 Island Calibration Procedure

Step 1	If an Island circuit is used, select **4) Island** from the Display Main Screen. • The ISLAND CALIBRATION Window appears.

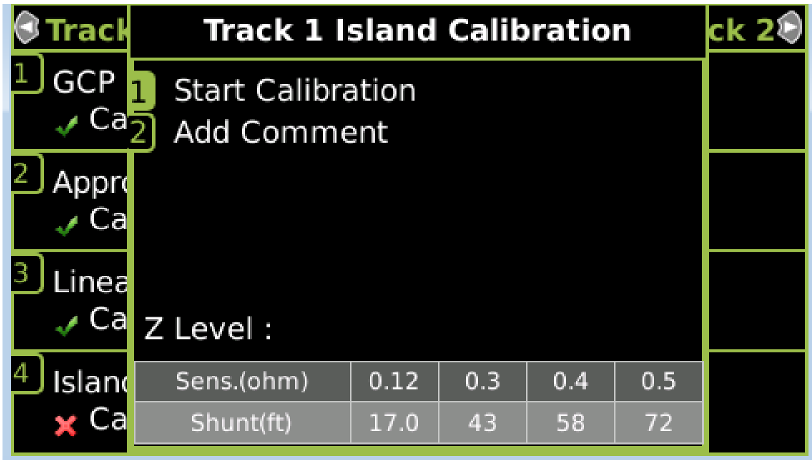


Figure 6-11 Island Calibration Window

Step 2	Temporarily install a hardwire shunt beyond the island receiver rail connections at the appropriate distance specified below the **Calibration Required** message. • Shunt distances for island frequencies are provided in the table following the Island Calibration procedure. The appropriate ones for the configured island frequency are also shown on the calibration screen as shown in Figure 6-11. • Ensure EZ value is less than or equal to 5, confirming that the calibration shunt has a good connection to the rail. See Figure 6-12.

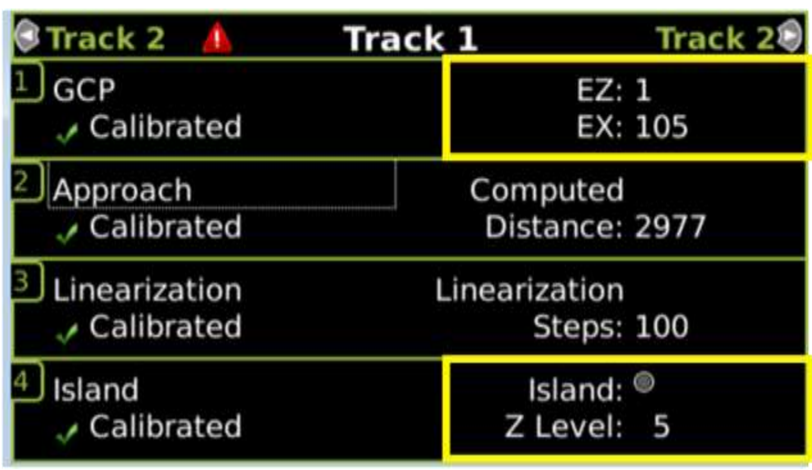


Figure 6-12 Track Calibration View EZ Level and Island Z Level

Step 3	Select **1) Start Calibration**. The display reports **Initiating**, then **In Progress** during the calibration. If calibration is successful: • **Passed, Please Wait** appears in the window, followed by **Calibrated**. • The Z Level value appears and the 4) Island line has a green check next to **Calibrated**. • If calibration is not successful, the display shows a **Failed** message (see Troubleshooting).
Step 4	Verify that the Island indicator on the **4) Island** line is grey and remove the hardwire shunt. • The island indicator is now green.
Step 5	Ensure that no external equipment is connected to the serial port on the track board.
Step 6	Following railroad policies concerning the use of jumper wires. Place a jumper wire across the RCV1 and RCV2 receiver wires at the main terminal board and verify the EZ value is less than or equal to 5. If the EZ value is greater than 5 and the jumper is confirmed to be securely connected, use additional jumper wires in parallel until an EZ less than or equal to 5 is achieved. The crossing should activate. Note the Island Z value with the jumper applied. See Figure 6-13.

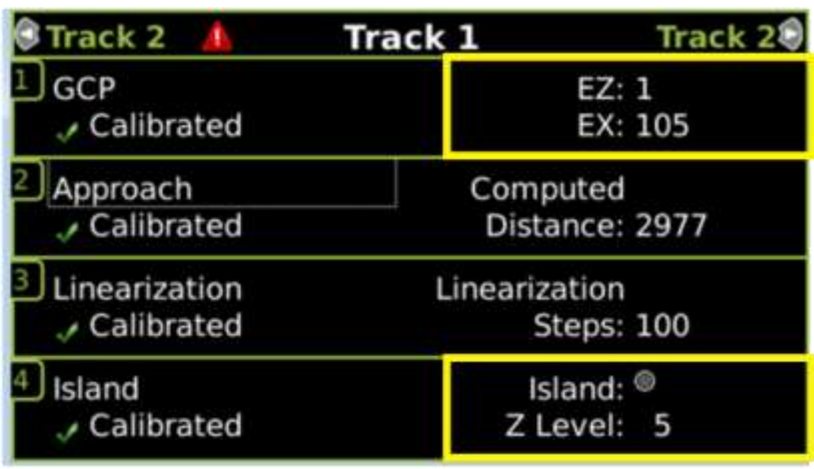


Figure 6-13 Island Calibration Window

Step 7	Remove the jumper(s) and allow the crossing to recover.
Step 8	Following railroad policies concerning the use of jumper wires. Place a jumper wire across the XMT1 and XMT2 transmitter wires at the main terminal board and verify the EZ value is less than or equal to 5. If the EZ value is greater than 5 and the jumper is confirmed to be securely connected, use additional jumper wires in parallel until an EZ less than or equal to 5 is achieved. The crossing should activate. Note the Island Z value with the jumper applied.

Step 9	Remove the jumper(s) and allow the crossing to recover.
Step 10	If either Island Z value is 40 or greater, remove the board from service and contact Siemens Rail Automation Technical Support at (800) 793-7233 Option 1. Inform the operator you have a track board that failed functional checks for Island Z value. Be prepared to provide the following information: 1. Your contact information 2. Part number 3. Serial number and hardware version 4. The EZ and Island Z values recorded during the test.

When GCP, approach, linearization, and island calibration are complete for each remaining MAIN side Track Module installed, do one of the following:

- If a **Standby** set of modules is present, go to Paragraph 6.4, Standby Modules Calibration.

Table 6-9 Island Shunt Distance

Island Frequency (kHz)	Shunt Distance (Feet/Meters)			
	0.12 ohm Sensitivity	0.3 ohm Sensitivity	0.4 ohm Sensitivity	0.5 ohm Sensitivity
2.14	20/6.10	50/15.24	67/20.42	84/25.60
2.63	17/5.18	43/13.11	58/17.68	72/21.95
3.24	13/3.96	33/10.06	44/13.41	55/16.76
4.0	10.5/3.20	27/8.23	36/10.97	45/13.72
4.9	9.0/2.74	23/7.01	31/9.45	39/11.89
5.9	7.5/2.29	19/5.79	26/7.92	32/9.75
7.1	6.5/1.98	17/5.18	23/7.01	29/8.84
8.3	6.0/1.82	15/4.57	20/6.10	25/7.62
10.0	5.0/1.50	13/3.96	18/5.49	22/6.71
11.5	4.5/1.37	12/3.66	16/4.88	20/6.10
13.2	4.0/1.22	10/3.20	14/4.27	17/5.18
15.2	3.5/1.07	9/2.74	12/3.66	15/4.57
17.5	3.0/0.91	8/2.44	11/3.35	14/4.27
20.2	3.0/0.91	8/2.44	11/3.35	14/4.27

Repeat all GCP, Approach, Linearization, and Island calibration steps for each MAIN side module installed.

6.5 STANDBY MODULES CALIBRATION

Table 6-10 Standby Module Calibration

Step 1	On Transfer module A80468, set the transfer switch to **STBY**.
Step 2	If a 60 or 100 Hz Cab Signal is in use, turn it off at this time.
Step 3	From the **System View** menu, select the track to calibrate, i.e., 1 or 2 by entering that number on the keypad. The menu shows only enabled tracks.
Step 4	From the Track Options menu, select **3) Calibration**. The **Track "N"** Window appears, depicting the Calibration status of: 1) GCP, along with EZ and EX values 2) Approach, along with Computed Distance 3) Linearization, along with Linearization Steps 4) Island, along with Island Status and Island Z Level If Calibration Required appears on any of the above lines, calibration is required.
Step 5	Follow the Calibration steps listed in Table 6-3 GCP Calibration.
Step 6	Follow the Calibration steps listed in Table 6-4 Approach and Linearization Calibration Bypass Procedure.
Step 7	Follow the Calibration steps listed in Table 6-5 Approach and Linearization Calibration 1 for the first approach, then the steps in Table 6-6 Approach and Linearization Calibration 2 for the second approach.
Step 8	Follow the Calibration steps in Table 6-8 Island Calibration to complete the Calibration process for the Standby Module.
Step 9	To record the reason for the Calibration and store it in the event log, select the appropriate Menu item (1-4) and then **4) Add Comment**. • Type any notes about the calibration and select **Enter** to save the entry.
Step 10	Repeat steps 1 through 8 if a second standby-side Track Module is installed.

6.5.1 Calibration Completion

At the completion of the successful GCP calibration, set the Transfer switch on the transfer module to the MAIN and then to the AUTO position.

This completes the Standby Modules Calibration.

6.6 GCP OPERATIONAL CHECKS

Prior to placing a system in service, tests must be performed to verify proper system operation and I/O wiring. Proceed to next step if a feature is not used.

WARNING

WARNING

AFTER INITIAL PROGRAMMING OR PROGRAMMING CHANGES, TESTS MUST BE PERFORMED TO VERIFY PROPER OPERATION OF THE GCP PRIOR TO PLACING THE SYSTEM IN SERVICE.

Table 6-11 GCP Operational Checks

Step 1	Check tracks for:
	• Open transmit wire
	  ○ Crossing activates
	  ○ EZ = 0
	• Open receive wire
	  ○ Crossing activates
	  ○ EZ = 0

Step 2	UAX, ENABLE input(s), if these features are used: • Crossing activates when each remote DAX line circuit that controls a UAX, or 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	DAX outputs, if these features are used: • Downstream crossing activates when the appropriate DAX output is de-energized • DAX Pickup Delay time is correct
Step 4	Traffic Signal Preemption, if this feature is used: • The DAX preempt output de-energizes when the prime de-energizes for simultaneous preemption. • The warning devices activate when the prime predictor predicts, or after the Advance Preempt Delay timer times out, whichever is sooner. Time should be equal to Adv Preemption timer value or shorter. • When used, Advance Preempt IP input open causes DAX Preempt Output to de-energize and activates warning devices after the Advance Preempt Delay Timer times out. (Observe input on I/O view).

Step 5	Island detection: • When used, observe the ISLAND symbol on tracks on the Main Status display • Place a 0.06 ohm shunt on island track wires • ISLAND RLY output de-energizes (OUT 2 on track module) and Island symbol is GRAY on display • Observe island LED on track module as shunt is removed and while ISLAND Pickup Delay is timing • ISLAND LED is flashing • After the island pickup delay time expires on module and island LED is steady RED • ISLAND symbol on Main display is GREEN, and warning devices are deactivated.
Step 6	Out of Service, OOS, if this feature is used on the Display: • Take each track out of service using the display. • Observe display indicates track is OOS • Return track to service • Display indicates track is back in service If Display + OOS IP input is used, then for each track: • Turn on OOS input for the track (observe input on I/O view). • Take track OOS using the display • Display indicates track is OOS • Turn off OOS input • Display indicates track is back in service If OOS IP Input is used: • Turn on OOS input for the track (observe input on I/O view). • Main Display indicates track is OOS • Turn off OOS input • Display indicates track is back in service
Step 7	Train Detection, Warning Times and Crossing Operation • EZ continuity check on train moves: • Crossing devices activate and EZ value decreases smoothly (without rapid change) for an approaching train. • Crossing devices turn off when island recovers after train move and the EZ rises smoothly (without rapid change) as the train recedes. • For MAIN and STANDBY, check warning times for inbound train moves on each approach including DAX operation.

Step 8	Maintenance Call (MC) Light, if this feature is used: • Verify that the light is illuminated • Verify that the MC extinguishes when one of the following occurs: • The track is taken out of service, or an out-of-service input is energized. • The CPU module is removed from the chassis (which will activate the crossing also). Restore the track, or CPU module to operation and the MC light should turn on.
Step 9	If Positive Start, and/or Sudden Shunt Detection are used: • Shunt at the appropriate point • Take the required measurements • Reprogram EZ threshold levels as required

Finishing Step 7 or, if required, Step 9 completes the GCP Operational Checks / Tests.

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.

WARNING

IF A RAPID CHANGE OCCURS IN THE VALUE OF EZ AT ANY TIME THE TRAIN IS MOVING WITHIN THE TERMINATION SHUNTS, TRACK DISCONTINUITY CAUSED BY A HIGH RESISTANCE BOND OR A DEFECTIVE COUPLER IS INDICATED. LOCATE AND CORRECT THE PROBLEM IMMEDIATELY.

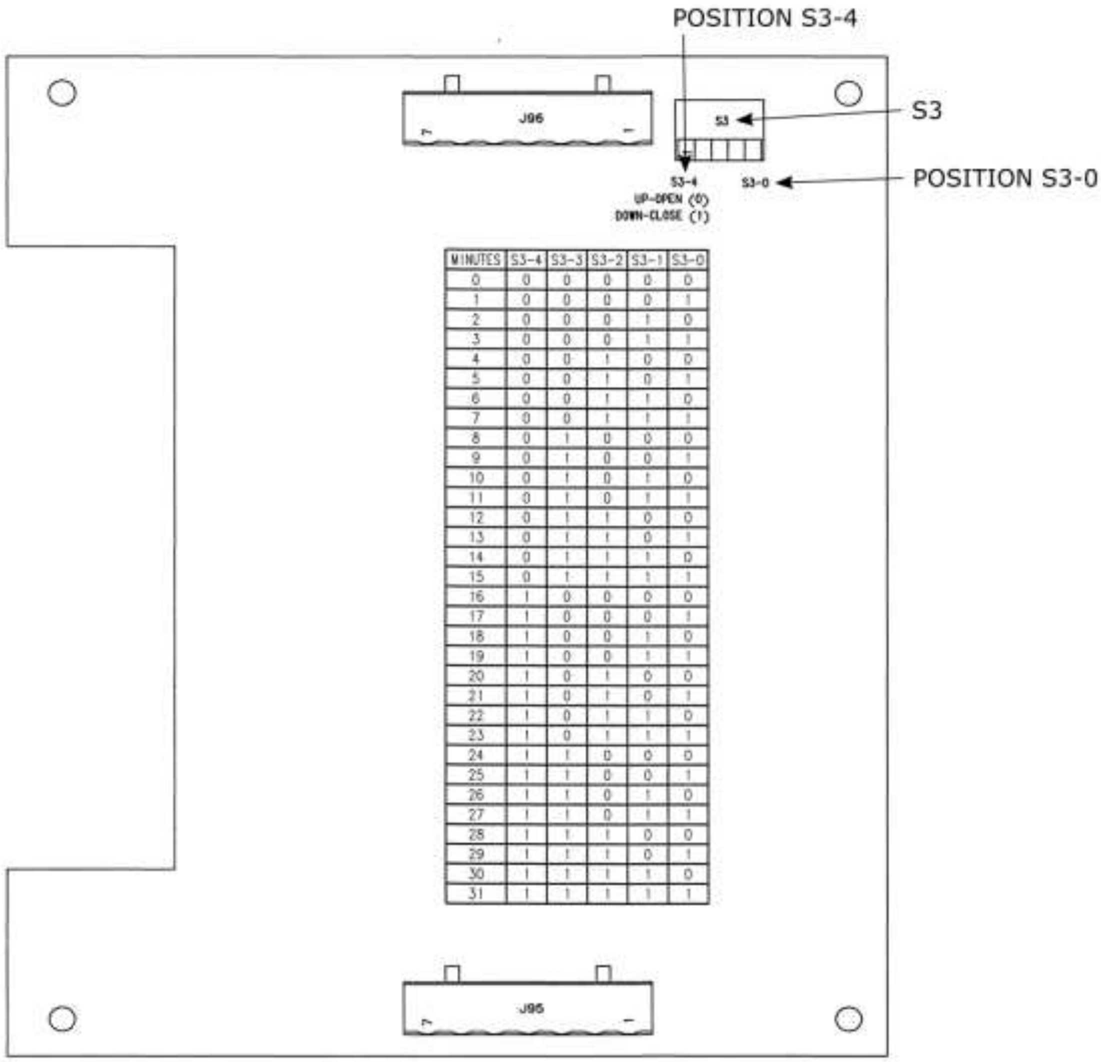
6.7 TRANSFER INTERVAL SELECTION

The transfer timer interval is preset in the factory for three minutes and normally does not require any change. A shorter time than three minutes is not recommended. If a longer time is desired, the interval time is selected by means of DIP switch S3 located on the Transfer Module.

6.7.1 Transfer Module A80469 on Transfer Assembly A80468

The transfer timer interval is selected by means of DIP switch S3 located on the back of the A80469 Transfer Module as shown in Figure 6-14.

- The module is accessible by removing the mounting screws on either side of the A80468 assembly and unplugging the unit from the front of the 3000+ GCP case.
- The switch levers of S3 are set to the positions designated in Table 6-12 to obtain the required delay time (See Figure 2-11).



MINUTES	S3-4	S3-3	S3-2	S3-1	S3-0
0	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
4	0	0	1	0	0
5	0	0	1	0	1
6	0	0	1	1	0
7	0	0	1	1	1
8	0	1	0	0	0
9	0	1	0	0	1
10	0	1	0	1	0
11	0	1	0	1	1
12	0	1	1	0	0
13	0	1	1	0	1
14	0	1	1	1	0
15	0	1	1	1	1
16	1	0	0	0	0
17	1	0	0	0	1
18	1	0	0	1	0
19	1	0	0	1	1
20	1	0	1	0	0
21	1	0	1	0	1
22	1	0	1	1	0
23	1	0	1	1	1
24	1	1	0	0	0
25	1	1	0	0	1
26	1	1	0	1	0
27	1	1	0	1	1
28	1	1	1	0	0
29	1	1	1	0	1
30	1	1	1	1	0
31	1	1	1	1	1

Figure 6-14 Transfer Module Assembly, A80468, S3 Switch Position

Table 6-12 Transfer Delay Interval Table (for S3 on A80468 Module Assembly)

Minutes	S3-0	S3-1	S3-2	S3-3	S3-4
0	0	0	0	0	0
1	1	0	0	0	0
2	0	1	0	0	0
3	**1**	**1**	**0**	**0**	**0**
4	0	0	1	0	0
5	1	0	1	0	0
6	0	1	1	0	0
7	1	1	1	0	0
8	0	0	0	1	0
9	1	0	0	1	0
10	0	1	0	1	0
11	1	1	0	1	0
12	0	0	1	1	0
13	1	0	1	1	0
14	0	1	1	1	0
15	1	1	1	1	0
16	0	0	0	0	1
17	1	0	0	0	1
18	0	1	0	0	1
19	1	1	0	0	1
20	0	0	1	0	1
21	1	0	1	0	1
22	0	1	1	0	1
23	1	1	1	0	1
24	0	0	0	1	1
25	1	0	0	1	1
26	0	1	0	1	1
27	1	1	0	1	1
28	0	0	1	1	1
29	1	0	1	1	1
30	0	1	1	1	1
31	1	1	1	1	1

0 = OPEN

1 = CLOSE

Bold = DEFAULT

6.7.2 Operation without Transfer Module Assembly A80468

To disable the A80468 Transfer Module Assembly, remove the module from the chassis, then move the fuse from the terminal labeled AUTO and insert it into the fuse terminal for the side that is to be powered, either MAIN or STANDBY (see Figure 6-15).

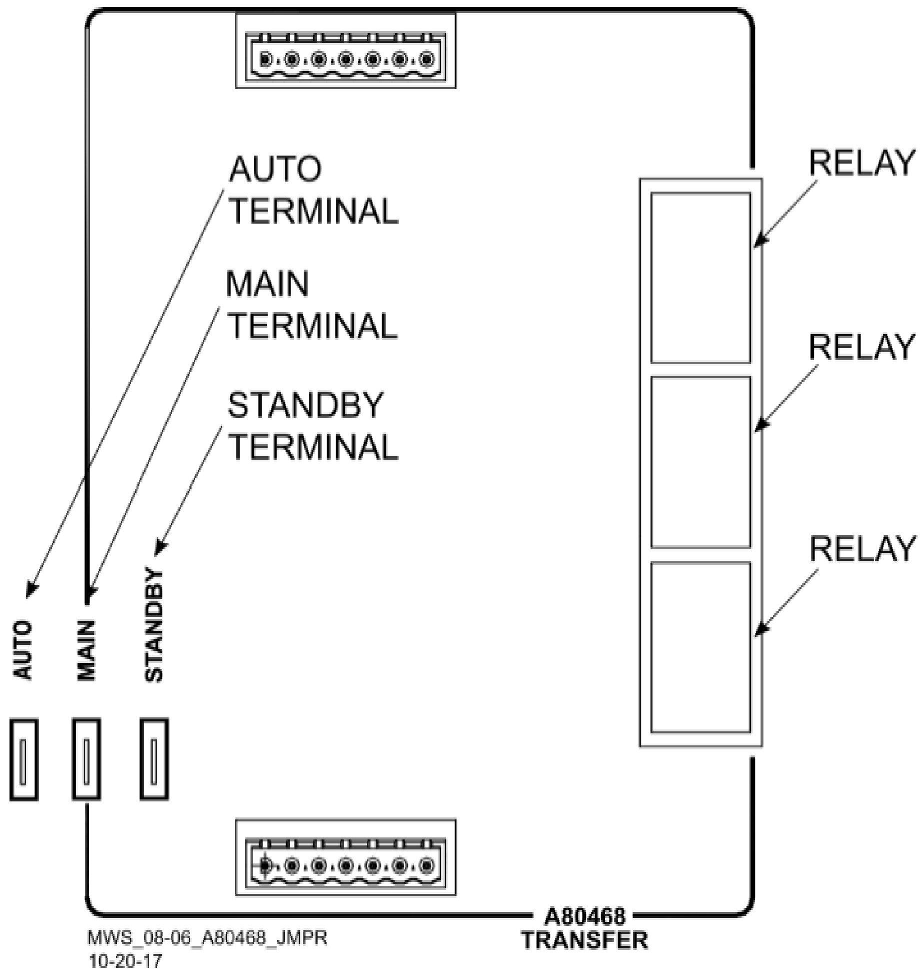


Figure 6-15 Transfer Module (A80468) Jumper Positions

Table 6-13 System Cutover Test Form

Model 3000+ GCP System Cutover Test Form	
Crossing Name:_____________________	**Date:**_______ **-** _______ **-** __________________
DOT Number:__ __ __ __ __ __ __ __ ___	**Milepost:**________________________________
Number of GCP Tracks: ______________	**Standby Y or N Signed:** ___________________
Type & Number of each type of Warning Devices: Traffic Signal Preemption (check): Gates_____ Pairs of FLS _____ Bell _____ None _____ Advance _____ Simultaneous_____	
Place a check in the appropriate space when the procedure has been checked, verified, or completed. Write n/a if procedure is not applicable. Write X if track# is not applicable. Verify wiring and programming in accordance with the location's circuit plans. Verify polarity and voltage with a meter. If as-built wiring or programming is different from the circuit plans, explain in remarks area. **Do not connect power to GCP 3000+ or GCP outputs to warning devices until instructed to do so.**	

Test Procedure

Preliminary (Transfer switch set to MAIN)

Verify:

___GCP modules in correct slots and inserted properly

___CPU battery voltage and polarity

___GCP programming

___ATCS SIN

___Office configuration check number (OCN)

___Wiring to GCP & Surge equipment

___Wiring to Track

___Wiring to Warning Devices

___Wiring to other cables

___Connect remainder of connections on GCP system

___Connect other equipment to battery buss

6.2 GCP Calibration

Track Circuit (circle)

___GCP Calibration 1 2

6.3 Approach & Linearization

___GCP App. & Lin 1 2

6.4 Island Calibration

___GCP Island Cal. 1 2

___Shunt Island 1 2

6.5 Standby Calibration

___GCP Calibration 1 2

___GCP App & Lin 1 2

___GCP Island Cal. 1 2

___Shunt Island 1 2

6.6 GCP Operational Tests

Track Circuit (circle)

___Open Trans. wire 1 2

___Open Recv. wire 1 2

___Open DAX ckts 1 2

___DAX pickup time 1 2

___Open UAX ckts 1 2

___UAX pickup time 1 2

___Open ENABLE Input

GCP Operational Tests (continued)

Traffic Signal Preemption

___ Train Detection drops preempt output

___ Adv. Preempt input drops preempt out

___ Verify Adv Preempt Time Interval

Train Detection M=Main S=Standby

Observe train move(s) Track Circuit (circle)

___ EZ decrease without rapid changes M 1 2 S 1 2

___ EZ increase without rapid changes M 1 2 S 1 2

___ Proper Warning Time M 1 2 S 1 2

___ Proper Preempt Time M 1 2 S 1 2

___ Proper DAX Time M 1 2 S 1 2

___ Island Operation M 1 2 S 1 2

___ Crossing Recovery M 1 2 S 1 2

___ Out of Service 1 2

Maintenance Call (MC) Light

___ Maint. Call light output on

___ Maint Call light output turns off

Verify Office Configuration Check Number

____

Remarks:

SECTION 7 DIAGNOSTICS AND TROUBLESHOOTING

7.0 GENERAL

This section describes how to diagnose and troubleshoot the 3000+ GCP.

7.1 CPU II+ MODULE

The CPU II+ module, Figure 7-1, includes LEDs and a 4-character display.

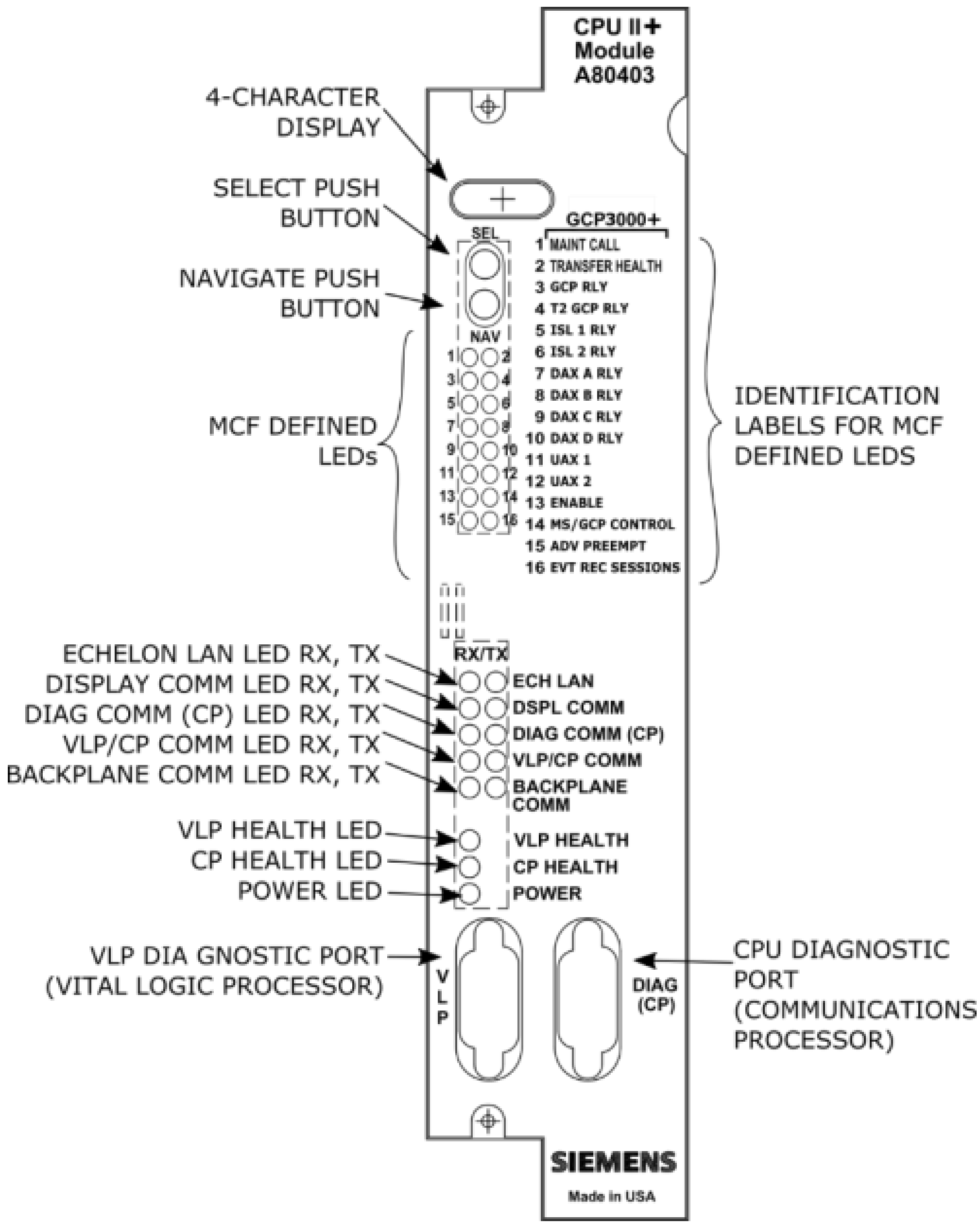


Figure 7-1 CPU II+ Module

7.2 CPU III MODULE

The CPU III module, Figure 7-2, includes LEDs and a 4-character display.

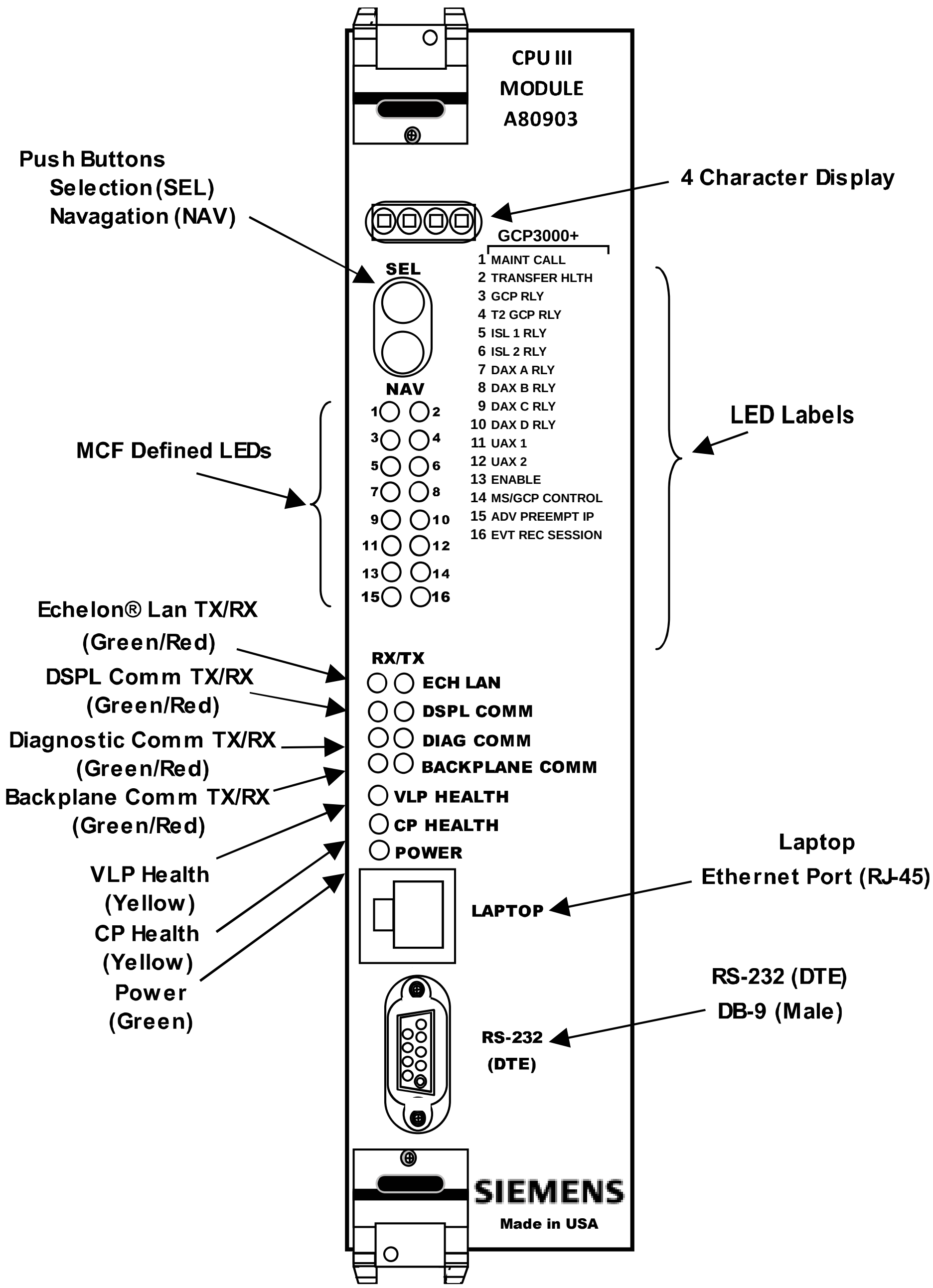


Figure 7-2 CPU III Module

7.2.1 CPU Front Panel LEDs

Table 7-1 Front Panel LED Descriptions

Component	Function		
4-Character Display	Displays alphanumeric representation of currently selected function menu item. (Refer to Table 7-9 for diagnostic messages.)		
Select Push Button (**SEL**)	Used to select menu item displayed on 4-Character Display.		
Navigate Push Button (**NAV**)	Used to select an available function menu.		
16 MCF Defined LEDs	**Color**	**Function**	**Indication**
1 (MAINT CALL)	Red	Maintenance Call see maintenance call logic section	On – maintenance call output on Off – maintenance call output off
2 (TRANSFER HEALTH)	Red	Transfer Output see transfer output section	On – transfer signal is being generated transfer card should not be counting down Off – transfer signal is not being generated If transfer card is in **AUTO** it should be counting down
3 (GCP RLY)	Red	GCP RLY output state	On – GCP RLY is energized Off – GCP RLY is de-energized
4 (T2 GCP RLY)	Red	Track 2 GCP RLY output state	On – Track 2 GCP RLY output is energized or not used Off – Track 2 GCP RLY output is de-energized
5 (ISL 1 RLY)	Red	Island 1 Relay output state	On – Island 1 is unoccupied or Island 1 is not used Off – Island 1 is occupied
6 (ISL 2 RLY)	Red	Island 2 Relay output state	On – Island 2 is unoccupied or Island 2 is not used Off – Island 2 is occupied
7 (DAX A RLY)	Red	DAX A Relay output state	On – DAX A RLY output is energized or DAX A RLY is not used Off – DAX A RLY output is de-energized
8 (DAX B RLY)	Red	DAX B Relay output state	On – DAX B RLY output is energized or DAX B RLY is not used Off – DAX B RLY output is de-energized

16 MCF Defined LEDs	Color	Function	Indication
9 (DAX C RLY)	Red	DAX C Relay output state	On – DAX C RLY output is energized or DAX C RLY is not used Off – DAX C RLY output is de-energized
10 (DAX D RLY)	Red	DAX D relay output state	On – DAX D RLY output is energized or DAX D RLY is not used Off – DAX D RLY output is de-energized
11 (UAX 1)	Red	Track 1 UAX input state	On – Track 1 UAX input is energized or Track 1 UAX input is not used Off – Track 1 UAX input is de-energized
12 (UAX 2)	Red	Track 2 UAX input state	On – Track 2 UAX input in energized or Track 2 UAX input is not used Off – Track 2 UAX input is de-energized
13 (ENABLE)	Red	Enable input state	On – Enable input is energized or not used (i.e. RIO not used) Off – Enabled input is de-energized
14 (MS/GCP CONTROL)	Red	MS/GCP Control input state	On – MS/Control input is energized or not used (i.e. RIO not used or Adv Preemption used) Off – MS/Control input is de-energized
15 (ADV PREEMPT IP)	Red	ADV Preempt Control Input state	On – Advance Preemption input is energized or not used (i.e. RIO not used or Adv Preemption not used) Off – Advance Preemption input is de-energized and Advance Preemption is used
16 (EVT REC SESSION)	Red	External Event recorder session state	On – external event recorder is in session or no external event record used Off – external event recorder is used but not in session

Table 7-2 Front Panel LED Descriptions

LED Name	Color	Function	Description
ECH LAN TX	Red	Echelon Message Transmitted	Flashes when a message is transmitted by the CPU to another device on the echelon; e.g. SEAR2
ECH LAN RX	Green	Echelon Message Received	Flashes when a message is received by the CPU from another device on the echelon; e.g. SEAR2
DSPL COMM TX	Red	Display Port Message Transmitted	Flashes when a message is transmitted by the CPU to the display
DSPL COMM RX	Green	Display Port Message Received	Flashes when a message is received by the CPU from the display
DIAG COMM TX	Red	Diag Port Message Transmitted	Flashes when a message is transmitted by the CPU to the diagnostic port
DIAG COMM RX	Green	Diag Port Message Received	Flashes when a message is received by the CPU from the diagnostic port
VLP/CP COMM TX (CPU II+ Only)	Red	VLP to CP Comms Message Transmitted	Flashes when a message is transmitted by the CP to the VLP
VLP/CP COMM RX (CPU II+ Only)	Green	VLP to CP Comms Message Received	Flashes when a message is received by the CP from the VLP
BACKPLANE COMM TX	Red	Backplane Message Transmitted	Flashes when a message is transmitted by the VLP to an IO module
BACKPLANE COMM RX	Green	VLP to CP Comms Message Received	Flashes when a message is received by the VLP from an IO module
VLP HEALTH	Yellow	VLP Health Status	Flashes slowly (1Hz) when the VLP is healthy Flashes fast (4Hz) when the VLP is unhealthy
CP HEALTH	Yellow	CP Health Status	Flashes slowly (1Hz) when the CP is healthy Flashes fast (2Hz) when the CP is unhealthy
POWER	Green	Power Indication	On steady when power is applied to the module

NOTE

NOTE

The state of LEDs 1-16 are chosen so that in a normal healthy 3000+ GCP with the GCP RLY output energized, all 16 LEDS will be on. If an LED is off, it will either represent that an input or output that is currently in use is de-energized, or in an unhealthy condition.

7.2.1.1 CPU 4 Character Display

The four character display on the CPU shows the current state of the CPU.

The meanings of the display's indications are described in Table 7-3.

Table 7-3 CPU Four Character Display Normal Start-up Sequence

Indication	Mode	Meaning	System State
BOOT	Steady	Boot code running	No communication to I/O modules. Crossing is activated.
INIT	Steady	CPU is initializing	No communication to I/O modules. Crossing is activated.
LMCF	Steady	CPU is loading MCF	No communication to I/O modules. Crossing is activated.
ICHK	Steady	CPU is performing initialization checks	No communication to I/O modules. Crossing is activated.
ERR: INIT	Scrolling	CP is up, VLP completing initialization	No communication to I/O modules. Crossing is activated.
CP SW: NCGxx_xx.MEF **VLP SW: VPHxx_xx.MEF**	Scrolling	CP and VLP software version shown for a few seconds after startup, select button can be used to scroll back to these during operation.	CPU is healthy
IP Address (CPU III Only)	Scrolling	Select button can be used to toggle between CP, VLP, and IP address.	CPU is healthy
GCP3K-xx-xx.MCF	Scrolling	MCF name scrolls when VLP is healthy	CPU is healthy

Table 7-4   CPU Four Character Display Error Codes

Indication	Mode	Meaning	System State
ERR: INIT	Scrolling	VLP is not in session with CP	No communication to I/O modules. Crossing is activated
ERR: CRC	Scrolling	An incorrect MCF CRC has been entered	No communication to I/O modules. Crossing is activated
ERR: UCFG	Scrolling	VLP is configured, see other diagnostic messages for reason	No communication to I/O modules. Crossing is activated
ERR: MCF	Scrolling	There is no valid MCF loaded	No communication to I/O modules. Crossing is activated
ERR: DIN	Scrolling	Incompatible Display module software is being used, or the Windows DT software is being used. The Windows DT software is not compatible with the 3000+ GCP.	CPU is healthy
ERR: CRPT	Scrolling	Configuration parameters are corrupt. Reload the configuration	No communication to I/O modules. Crossing is activated
ERR: DFT	Scrolling	Configuration parameters have been set to defaults	CPU is healthy Crossing is activated
RST:USER	Scrolling	User has requested to reset the CP	
EFLA **1% TO 100%** **DONE**	Steady	EFLA indicates CPU is erasing its flash memory % - indicates CPU is copying MCF from ECD into flash memory DONE – indicates MCF has been copied	No communication to I/O modules. Crossing is activated

7.2.1.2 Setup Menu Display

The CPU (II+ and III) has two processors:

- Communication processor (CP)
- Vital Logic Processor (VLP).
- When new software is installed into the CP, the VLP continues running without interruption until the CP setup is complete.
- This means that if the 3000+ GCP system is healthy and the crossing is not active, the VLP continues to correctly control the crossing while the new software installation into the CPU is in progress.

Table 7-5 Setup Menu Display

Indication	Mode	Meaning
DOWNLOADING SETUP	Scrolling	The setup program is being downloaded into the CP.
SETUP	Scrolling	The CP is in setup mode, i.e., MCF, MCF CRC, or CP MEF is being changed.
WAIT	Steady	CP is erasing flash memory.
WAITING FOR MEF	Scrolling	CP is waiting for a new MEF.
DOWNLOADING MEF	Scrolling	A new MEF is being downloaded into the CP.
WAITING FOR MCF	Scrolling	CP is waiting for a new MCF.
DOWNLOADING MCF	Scrolling	A new MCF is being downloaded into the CP.
DONE	Steady	Setup mode is ending.
BOOT	Steady	The CP is rebooting.

7.3 TRACK MODULE

The Track module, Figure 7-3, includes LEDs and a four-character display.

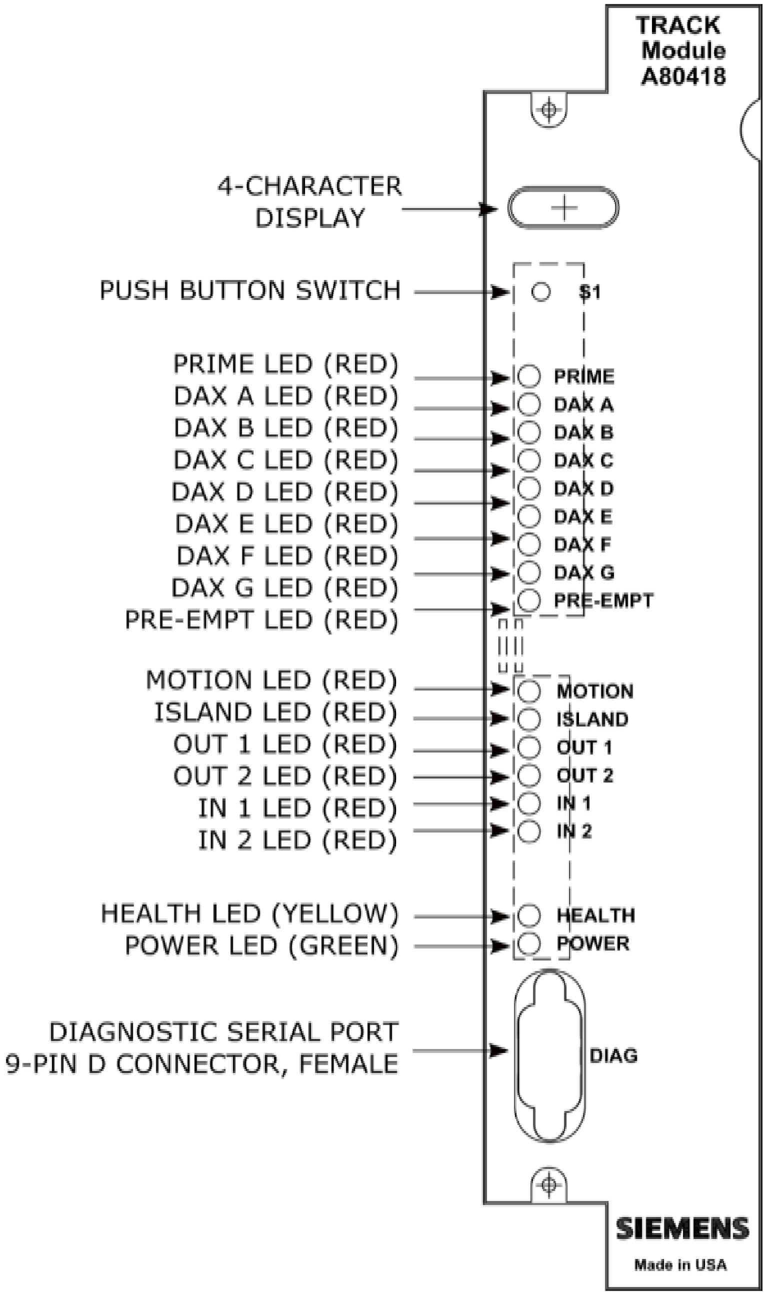


Figure 7-3 Track Module

7.3.1 Track LEDs

The track module LEDs are described in Table 7-6.

NOTE

NOTE

The track module is common with 4000 GCP, MS4000 and 5000 GCP systems. Some functions are not applicable when used in the 3000+ GCP.

Table 7-6 Track LEDs

LED Name	Color	Description
PRIME	Red	On – Prime predictor is energized Off – Prime predictor is de-energized or not used Flashing – Prime predictor is running the programmed pickup delay See note [1]
DAX A-D	Red	On – DAX A predictor is energized Off – DAX D predictor is de-energized or not used Flashing – DAX A predictor is running its pickup delay See not [2]
DAX E DAX G	Red	These are not used in the 3000+ GCP and will be off
PREEMPT	Red	These are not used in the 3000+ GCP and will be off
MOTION	Red	On – GCP has not detected motion Off – GCP has detected motion
ISLAND	Red	On – Internal Island is unoccupied Off – Internal Island is occupied Flashing – Internal island is running its pickup delay See note [3]
OUT 1	Red	On – output energized Off – output de-energized or failed
OUT 2	Red	On – output energized Off – output de-energized or failed
IN 1	Red	On – input energized Off – input de-energized
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 not communicating with CPU Very Fast (4Hz) – module is unhealthy and communicating with CPU
POWER	Green	LED is on steady when power is applied to the module

Note [1]: The Prime predictor LEDs on a track module represents the state of the Prime prediction process from that track module. It does not represent the state of the final GCP RLY (or T2 GCP RLY) output. The track's Prime prediction process is an input into the final GCP RLY / T2 GCP RLY output state. To see the actual state of the GCP RLY / T2 GCP RLY output look at CPU Module LEDs 3 and 4 respectively.

Note [2]: The DAX predictor LEDs on a track module represent the state of the DAX prediction process from that track module. They do not represent the state of the final DAX RLY output. The track's DAX prediction process is an input into the final DAX RLY output state. To see the actual state of the DAX RLY output look at CPU Module LEDs 7-10.

Note [3]: The ISLAND LEDs on a track module represents the occupancy state from the internal island on that module. It does not represent the state of the final ISL RLY output. If the internal island is not being used the ISLAND LED will be off. To see the actual state of the ISL RLY output look at CPU Module LEDs 5-6.

7.3.2 Track Four-Character Display

The four-character display on the Track Module shows the current module function.

The information can be broken into five categories:

- Normal Operation
- Calibration
- Diagnostics
- Boot up
- Software Installation

7.3.3 Normal Operation

The messages that appear during normal operation are shown in Table 7-7. The display will show each message for a second then move to the next one.

NOTE

Pressing the S1 button on the track module will stop the display rotating around the different values so that one particular value can be seen. Press the S1 button again to scroll round the different values.

Table 7-7 Normal Operation

Indication	Mode	Meaning	Module State
Innn e.g. **I250**	Steady	“nnn” indicates the Island Z signal level. The island shunts when this falls below 100. If the internal island is not used, this message is not shown.	Performing train predictions
Znnn e.g. **Z100**	Steady	“nnn” indicates the GCP EZ value.	Performing train predictions
Xnnn e.g. **X093**	Steady	“nnn” indicates the GCP EX value.	Performing train predictions

7.3.3.1 Calibration

The messages that appear during calibration are shown in Table 7-8.

Table 7-8 Calibration Messages

Indication	Mode	Meaning	Module State
GCAL	Blinks on and off	GCP Calibration in progress	All predictors de-energized
GAPP	Blinks on and off	GCP Approach in progress	All predictors de-energized
GLIN	Blinks on and off	GCP Linearization in progress	All predictors energized
ICAL	Blinks on and off	Island Calibration in progress	Island de-energized

7.3.3.2 Diagnostics

When the Track Module is unhealthy or requires calibration, a 4-character diagnostic code is shown on its display.

- If more than one diagnostic code is present, the module scrolls around the list of messages.
- The possible diagnostic codes are shown in Table 7-9

Table 7-9 Diagnostics Messages

Indication	Meaning	Module State
CKEX	The Check wire phase is incorrect	All predictors de-energized
CHK 1	The receive wire EZ reading is very low in comparison with the check wire EZ	All predictors de-energized
CHK 2	The check wire EZ reading is very low in comparison with the receive wire EZ	All predictors de-energized
CHK 4	The check wire and receive wire readings are more than 50 points different	All predictors de-energized
GAPP	GCP Approach Calibration is required	All predictors de-energized
GCAL	GCP Calibration is required	All predictors de-energized

Indication	Meaning	Module State
GEXP	GCP has detected a decreasing phase that could be a bad bond	All predictors de-energized
GFRQ	GCP frequency not set	All predictors de-energized
GHWR	GCP hardware error	All predictors de-energized
GIPS	Enhanced detection has been turned on and the GCP has detected poor shunting	Prime and Preempt de-energized (any zero offset predictors)
GLIN	GCP Linearization Calibration is required	All predictors are energized
GLCK	EZ or check EZ is below 3 after GCP has booted up. Possible broken wires	All predictors de-energized
GOFS	MS/GCP Operation is Out of Service	All used predictors are energized All unused predictors are de-energized
GRCV	GCP receiver error	All predictors are de-energized
GSLV	GCP slaving error	No effect on predictors
GSTB	GCP is stabilizing after transmitter has been turned on	All predictors are de-energized
GXMT	GCP transmitter error	All predictors are de-energized
GNOS	GCP noise error. Too much noise on track to predict correctly	All predictors are de-energized
G3KN	Track card does not support GCP 3000+ functionality. Ensure GCP4_50.mef or later is loaded	Outputs de-energized
HIEZ	High EZ (>115) detected on main or check wires	All predictors are de-energized
ICAL	Island Calibration is required	Island is de-energized
IFRQ	Island frequency not set	Island is de-energized
IOFS	Island Operation is Out of Service	Island is energized
ISTB	Island is stabilizing after transmitter has been turned on	Island is de-energized
ITST	Island has detected a possible interfering signal	No effect on Island occupancy
IXMT	Island transmitter error	Island is de-energized
LWEX	Low EX detected Low EX Adjustment is usually 39	All predictors are de-energized

Indication	Meaning	Module State
LWEZ	Low EZ detection is turned on and EZ has remained below the low detection level for longer than the low EZ detection time.	All predictors are de-energized
RECV (RECOVERY)	The GCP is running a 30 second recovery time-out after an error has cleared	All predictors are de-energized
RECV (RECOVERY)	The Island is running a 30 second recovery Time-out after an error has cleared	Island is occupied
RXEX	The receive wire phase is incorrect	All predictors de-energized
UCFG	Track module is unconfigured	All predictors de-energized Island de-energized Outputs de-energized Inputs de-energized
VOER	Output hardware failure detected Output is commanded on but is detected as off	Failed output(s) de-energized

7.3.3.3 Boot Up

The messages that can appear during boot-up are shown in Table 7-10.

Table 7-10 Boot-up Messages

Indication	Mode	Meaning	Module State
BOOT	Steady	The module is rebooting	All predictors, islands, inputs and outputs are de-energized
INIT	Steady	The module is performing its initialization	All predictors, islands, inputs and outputs are de-energized

The normal sequence of messages that may be seen on boot-up of a healthy track module that is fully calibrated is shown in Table 7-11.

Table 7-11 Module State During Bootup

Indication	Module State
BOOT	Rebooting
INIT	Initializing
GHWR	Checking hardware
UCFG	The module is un-configured and awaiting its configuration from the CPU
GSTB and ISTB	The GCP and Island are stabilizing
Innn / Znnn / Xnnn	Alternating EZ/EX/Island Z values indicate the module is healthy

7.3.3.4 Software Installation

When new software is installed, the message shown in Table 7-12 normally displays while the software is being downloaded.

Table 7-12 Software Installation Messages

Indication	Mode	Meaning
BOOT	Steady	The setup program is being downloaded into the CP The module is in setup mode The module is having a new MEF download

7.4 RIO MODULE

Ten LEDs are on the front panel of the RIO module as shown in Figure 7-4.

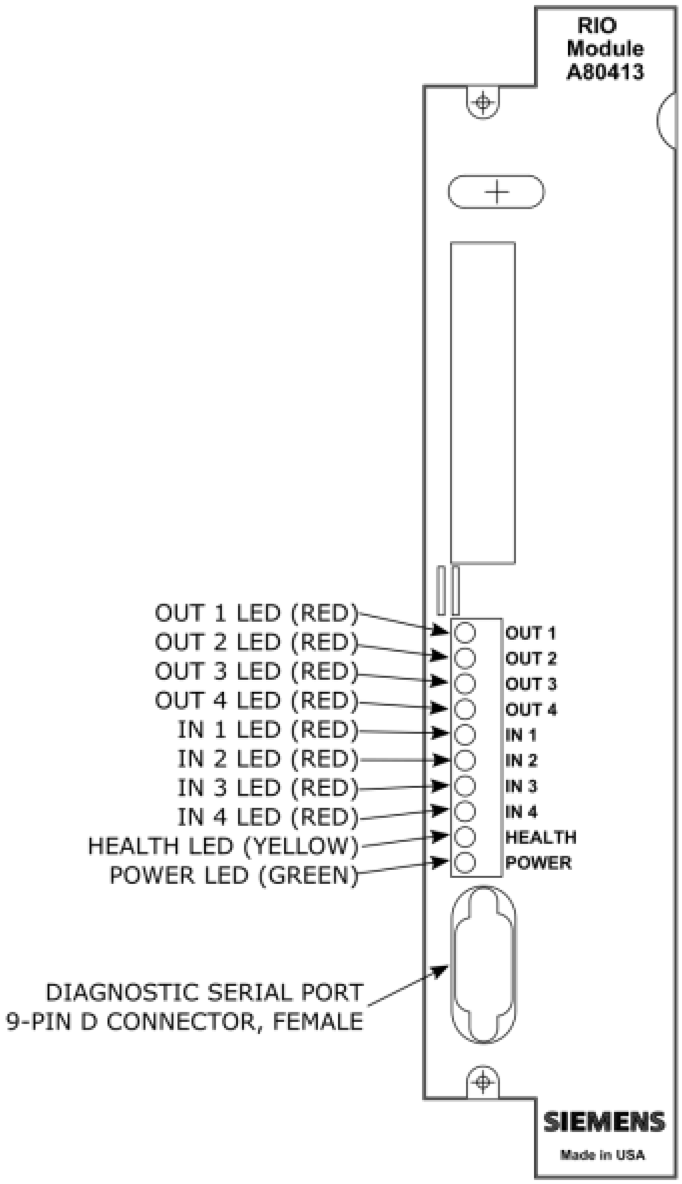


Figure 7-4 RIO Module

7.4.1 RIO LEDS

The functional descriptions of the RIO Module LEDs are provided in Table 7-13. The I/O functions have predefined functions in the Model 3000+ GCP.

Table 7-13 Front of the RIO Module

LED	Color	Description
OUT 1	Red	On when the DAX A RLY output is energized.
OUT 2	Red	On when the DAX B RLY output is energized.
OUT 3	Red	On when the DAX C RLY output is energized.
OUT 4	Red	On when the DAX D RLY output is energized.
IN 1	Red	On when the ENABLE input is energized.
IN 2	Red	On when the MS/GCP Control input is energized.
IN 3	Red	On when the External Island 1 input is energized.
IN 4	Red	On when the External Island 2 input is energized.
HEALTH	Yellow	Slow (1 Hz) – module is healthy and communicating with CPU Fast (2 Hz) – module is not communicating with CPU Very Fast (4 Hz) – module is unhealthy
POWER	Green	This LED is on steady when power is applied to the module

7.5 A80468 TRANSFER ASSEMBLY

The A80468 Transfer assembly provides operational switchover from the main modules to the standby GCP modules when main module failure is detected. Switchover occurs after a set transfer delay interval.

The standby modules are powered off and disconnected from the interface connectors until switchover occurs.

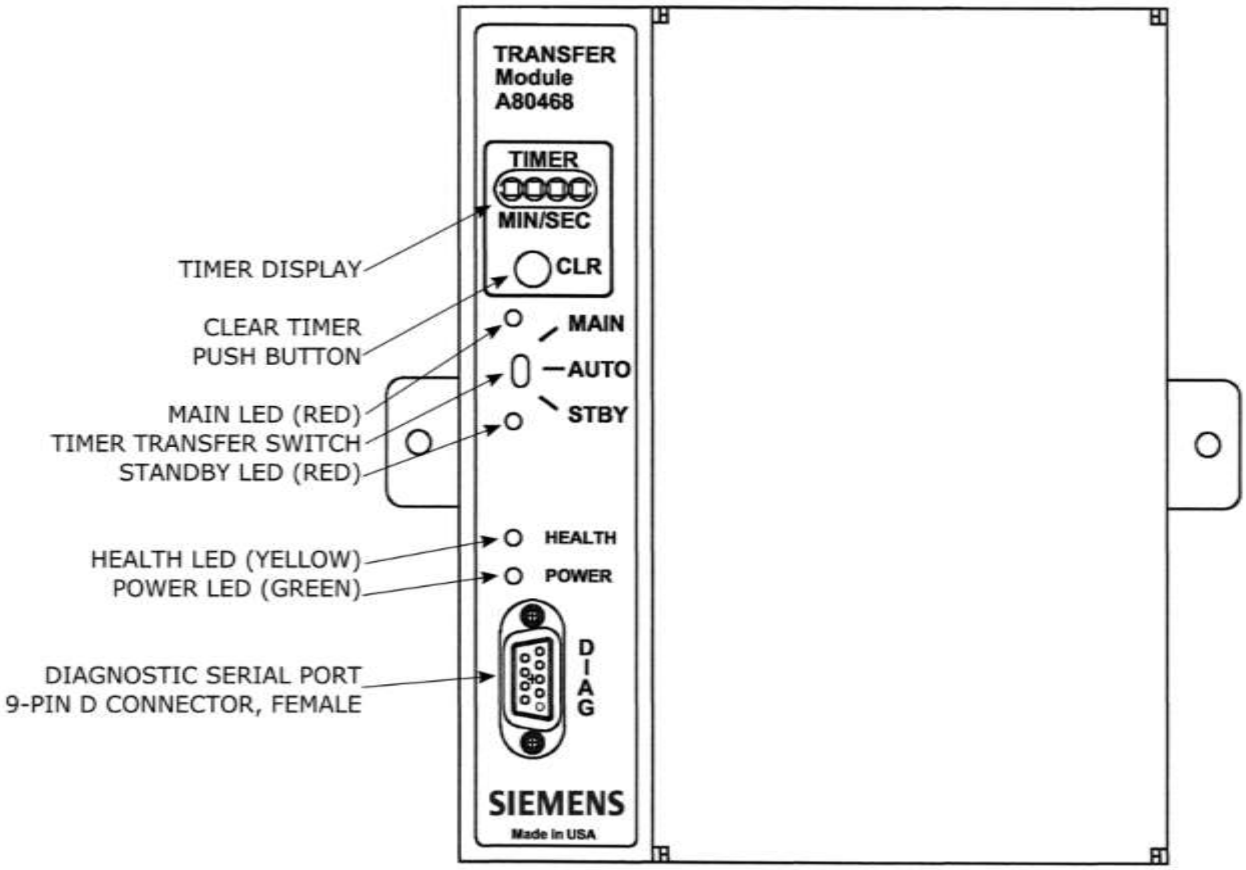


Figure 7-5 Transfer Module

7.5.1 Transfer Module Indicators

The functional description of the Transfer Module LEDs is shown in Table 7-14.

The functional meaning for each indication on the four-character display is shown in

Table 7-15.

Table 7-14 Transfer Module LEDs

Component	Function
Timer Display	When transfer delay is set using the DIP switch (S3), the **TIMER** Display: 1. Shows the set transfer delay in minutes and seconds 2. Shows transfer timer delay count down in 1 second increments
CLR (Clear Timer) push button	Clears transfer delay time from counter. When pressed during timer countdown: 1. Sets the timer to the selected Transfer Delay Interval 2. Initiates immediate transfer of GCP operation to opposite modules
MAIN LED	Lights red when: 1. Main modules are enabled while Transfer Timer Switch is set to **AUTO** 2. Timer Transfer Switch is set to **MAIN** position
Timer Transfer Switch	Three-position toggle switch: • **MAIN** position enables only main module operation and will not automatically transfer. • **AUTO** position enables automatic switch over to opposite set of modules and transfers from main modules to standby modules, when main module failure is detected, or transfers from standby modules to main modules when standby module failure is detected. • **STBY** position enables only standby module operation and will not automatically transfer. • To switch from one set of modules (**MAIN** or **STBY**) to the other set of modules when the transfer time is not counting down, move the switch from **AUTO** to the desired position **MAIN** or **STBY**). Then return switch to **AUTO**.
STANDBY LED	Lights red when: 1. Standby modules are enabled while Transfer Time Switch is set to AUTO. 2. Timer Transfer Switch is set it STBY position.
HEALTH LED	Flashes yellow to indicate that the Transfer module is functioning normally.
POWER LED	Lights green to indicate that power is applied to the Transfer module.
DIAG Diagnostic Port	9-pin diagnostic serial port for Transfer module.

Table 7-15 Transfer Module Four-Character Display

Indication	Display State	Description
MAIN	Steady	Module switch is set to Main and Main side is powered
STBY	Steady	Module switch is set Standby and Standby side is powered
MMSS e.g. 0240 (2 minutes 40 seconds)	Steady	If the number is not changing, and the module is set to **AUTO**, indication represents the programmed transfer time. Either Main or Standby side may be powered.
MMSS e.g. 0200 (2 minutes 00 seconds)	Decreasing	If the number is decreasing and the module is set to **AUTO**, the currently selected side is unhealthy and the number represents the time left until a transfer occurs. Either Main or Standby side may be powered.
MMSS alternating with **SWCH**	Steady	**SWCH** indicates that the module has transferred since the **CLR** button was last pressed. Either Main or Standby side may be powered.

NOTE

NOTE

1. A switchover interval ranging from 1 to 31 minutes is selectable from the Transfer module
   a. The module is set at the factory for a switchover delay of 3 minutes.
2. During the switchover period, the crossing gates, lights, and bells are activated.

7.6 DISPLAY MODULE

The A80485 display module, Figure 7-6, provides a keypad and touch-screen display which allows:

- configuration programming
- application programming
- calibration programming
- system diagnostics
- system parameter display
- track status display

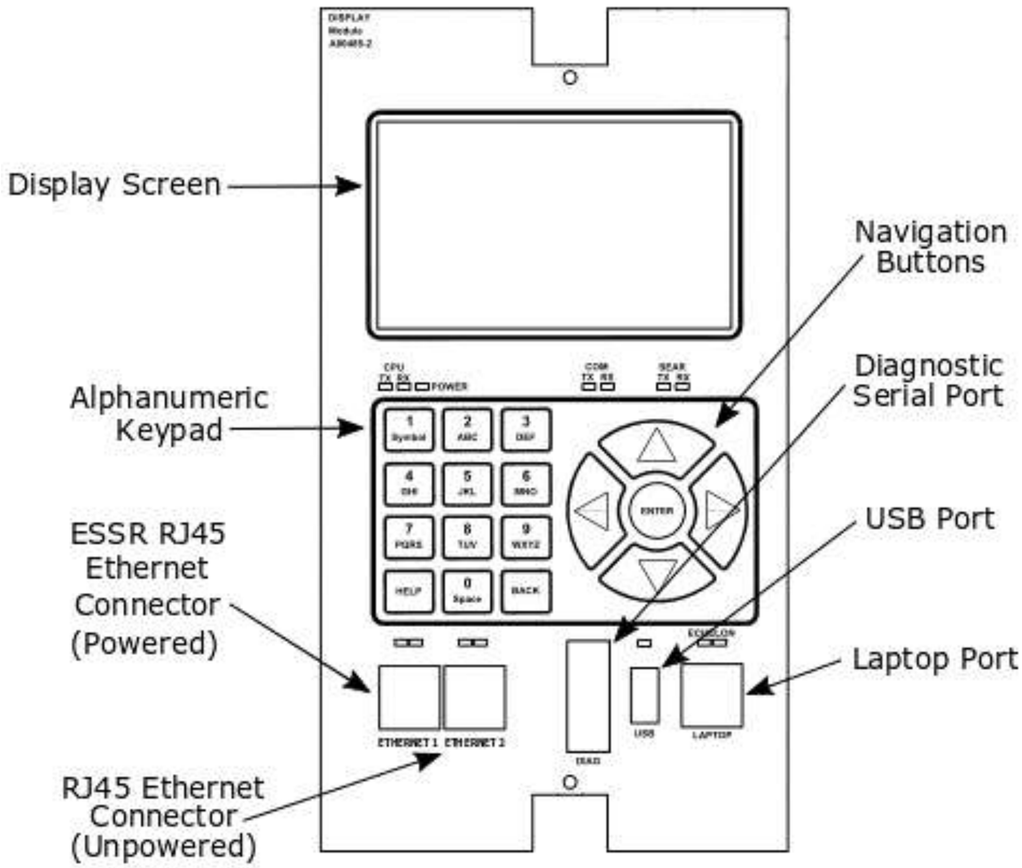


Figure 7-6 Display Module

7.6.1 Track and System Diagnostic Windows

The Display immediately shows the health of the system.

7.6.1.1 Unhealthy Track Condition

If any track is unhealthy, the corresponding track status shows a red triangle indicating a diagnostic message is present.

When GCP calibration is required, the display shows **GCP Cal Req** under EZ/EX/MPH as shown for track 2 below.

When Island calibration is required, display shows **CReq** under ISL as show for track 2 below.

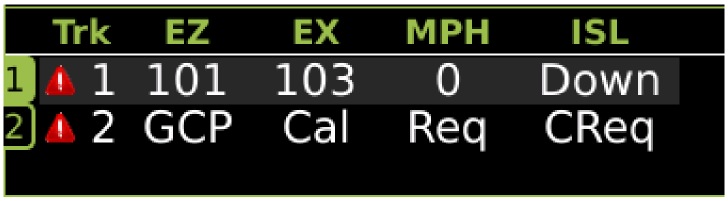


Figure 7-7 Example Track Unhealthy Screen

If a module is not communicating with the CPU, the system view will show a red Comms Status indicator for that module.

Figure 7-8 Display Comms Status

7.6.1.1.1 Healthy Track Condition

If all track modules are healthy, the track status will show no red triangles and will show the EZ, EX, speed and island status.

7.6.1.1.2 Unhealthy Track Module

When a Track Module is unhealthy, the red diagnostic triangle indication is present. Select the track number on the keypad for the module and then the Diagnostics option (2). This will bring up the diagnostics messages.

Figure 7-9 Unhealthy Track Module Diagnostics

To see further information regarding a specific diagnostic message, use the up and down arrow keys to select the desired message, then press the enter key. The display will show the potential cause of the problem and suggest remedies to help fix it. Use the up / down keys to scroll up and down, and the back key to go back to the previous menu.

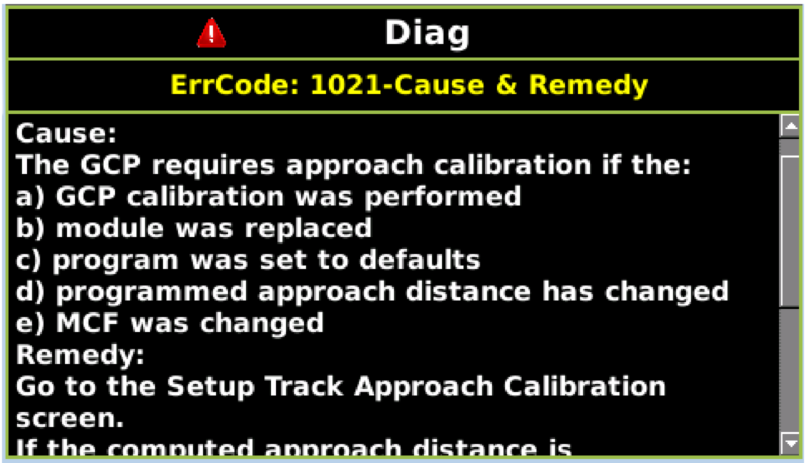


Figure 7-10 Track Diagnostic Message Windows

Some diagnostic messages appear after the initial problem has been eliminated and the GCP is recovering.

Two examples are:

- GCP recovering
- Island Recovering

A Track Module is considered unhealthy during its recovery period and predictors on the module remain de-energized.

If the track modules do not have a red triangle beside them, but there is still a triangle on the top bar of the window, a diagnostic message is present that is not specifically related to a track.

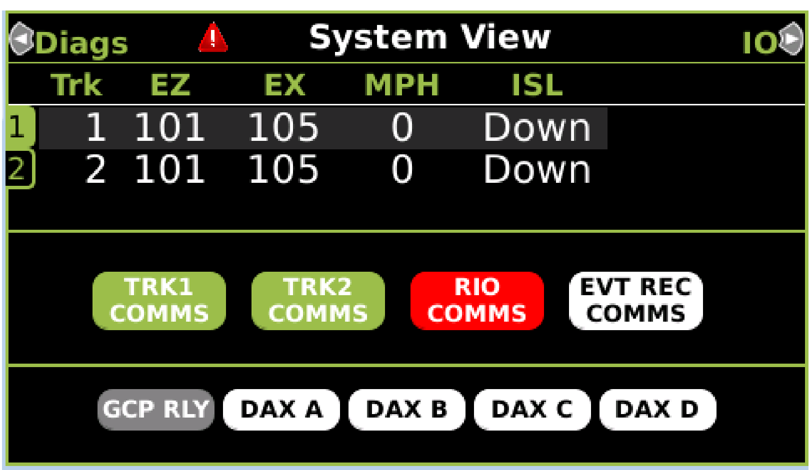


Figure 7-11 Diagnostic Message

To see the diagnostic messages for the whole system, select the right arrow to go to the Diag and Reports screen, then select **1) DIAG** to see the Diag screen.

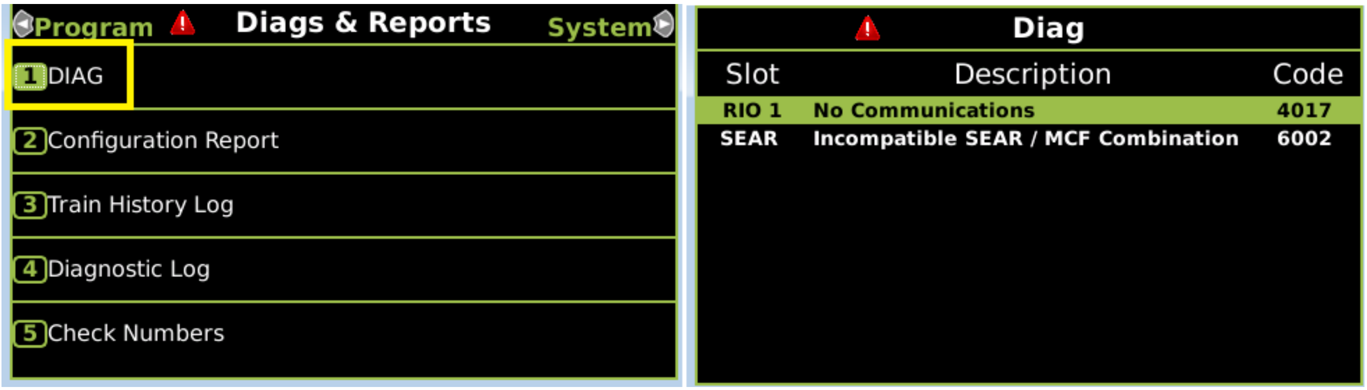


Figure 7-12 Module Diagnostic Message Windows

In some situations, the System View on the Display may show a message indicating that the MCF configuration is not available.

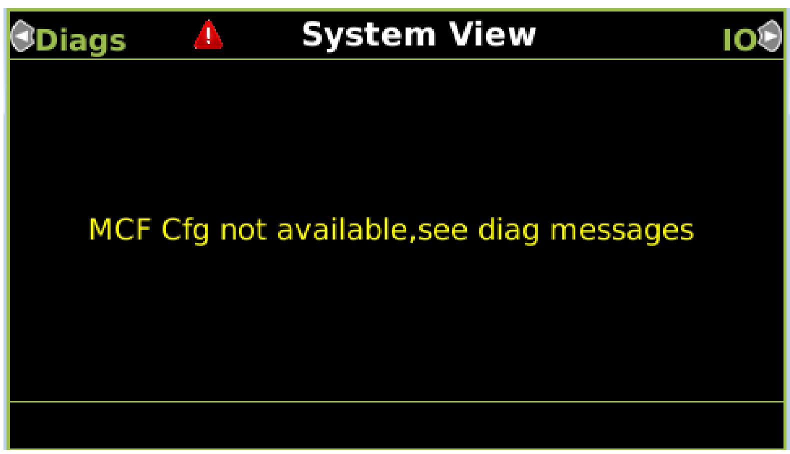


Figure 7-13 MCF Configuration Not Available

This will typically be due to not having the MCF or MCF CRC loaded properly. Check the Diag message for more information. A message such as “MCF CRC incorrect” may be present.

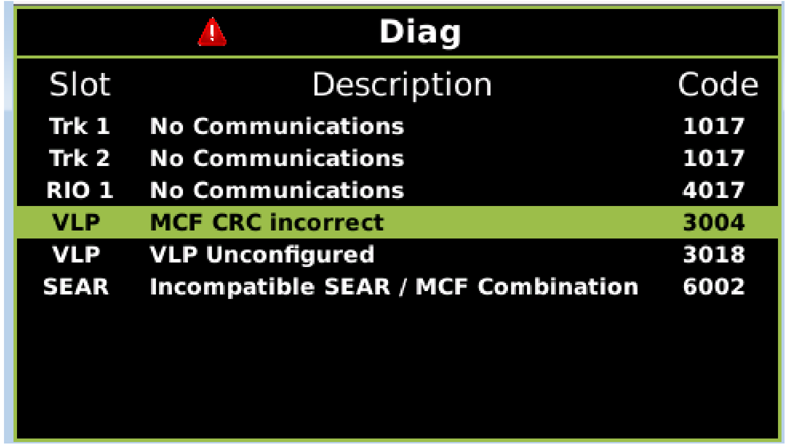


Figure 7-14 Diagnosis Message

7.6.1.2 Diagnostic Log

The Track Diagnostic and Diagnostic View windows show diagnostics messages that are currently present in the system.

The 3000+ provides a time-stamped log of diagnostic message. This log will show when a diagnostic message was first present and then when it cleared.

To see previous diagnostic messages that may have appeared but were subsequently cleared; select the **Diagnostic Log** entry (4) from the Diags & Reports screen as shown in Figure 7-15.

The diagnostic log resides in the Display Module which enables events from the main and standby side to be stored. The events in the diagnostic log are date and time stamped to indicate when the event occurred.

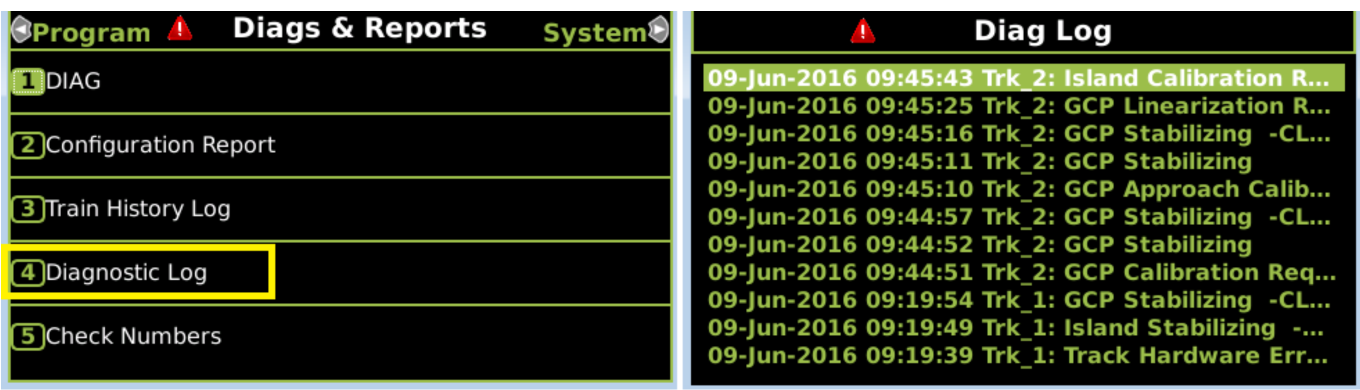


Figure 7-15 Diagnostic Log

7.6.1.3 Event Log

The Event log resides in the Display Module which enables events from main and standby side to be stored. The events in the diagnostic log are date and time stamped to indicate when the event occurred.

The Event log provides detailed information about each train move.

The information provided includes:

- Changes in Prime and DAX predictor states
- UAX states
- Input and output states
- EZ levels
- EX levels
- Speed recordings
- Observed warning times

An event log of a typical train move is show in the example below.

Example Event Log

```
AC91  29-Sep-2017 15:02:08.40 Test3k1 CPU  STAT Track 1 Train Present
62C1  29-Sep-2017 15:02:08.52 Test3k1 CPU  STAT Track 1   EZ: 91   EX: 97   Speed: 50  mph    IZ: 250
FD55  29-Sep-2017 15:02:09.41 Test3k1 CPU  STAT Track 1   EZ: 88   EX: 97   Speed: 48  mph    IZ: 250
A105  29-Sep-2017 15:02:11.01 Test3k1 CPU  STAT Track 1   EZ: 85   EX: 97   Speed: 45  mph    IZ: 250
F33E  29-Sep-2017 15:02:12.62 Test3k1 CPU  STAT Track 1   EZ: 82   EX: 97   Speed: 46  mph    IZ: 250
66E3  29-Sep-2017 15:02:13.42 Test3k1 CPU  STAT Track 1   EZ: 79   EX: 97   Speed: 46  mph    IZ: 250
DD8B  29-Sep-2017 15:02:15.01 Test3k1 CPU  STAT Track 1   EZ: 76   EX: 97   Speed: 45  mph    IZ: 250
9B1E  29-Sep-2017 15:02:16.62 Test3k1 CPU  STAT Track 1   EZ: 73   EX: 97   Speed: 45  mph    IZ: 250
0088  29-Sep-2017 15:02:17.60 Test3k1 CPU  STAT Track 1   EZ: 70   EX: 97   Speed: 45  mph    IZ: 250
157A  29-Sep-2017 15:02:19.33 Test3k1 CPU  STAT Track 1   EZ: 67   EX: 97   Speed: 45  mph    IZ: 250
2037  29-Sep-2017 15:02:20.74 Test3k1 CPU  STAT Track 1   EZ: 64   EX: 97   Speed: 45  mph    IZ: 250
D912  29-Sep-2017 15:02:22.30 Test3k1 CPU  STAT Track 1 Prime   Deenergized ,EZ: 61  EX: 97  Spd: 44 mph
4440  29-Sep-2017 15:02:22.40 Test3k1 CPU  STAT Track 1 Dax A   Deenergized ,EZ: 61  EX: 97  Spd: 44 mph
56F0  29-Sep-2017 15:02:22.50 Test3k1 CPU  STAT Track 1 Dax B   Deenergized ,EZ: 61  EX: 97  Spd: 44 mph
E8ED  29-Sep-2017 15:02:22.61 Test3k1 CPU  STAT Track 1   EZ: 61   EX: 97   Speed: 44  mph    IZ: 250
167C  29-Sep-2017 15:02:22.73 Test3k1 CPU  STAT DAX A RLY Output  Deenergized
0584  29-Sep-2017 15:02:22.79 Test3k1 CPU  STAT DAX B RLY Output  Deenergized
B898  29-Sep-2017 15:02:23.31 Test3k1 CPU  STAT Track 1   EZ: 58   EX: 97   Speed: 44  mph    IZ: 250
```

```
AC56  29-Sep-2017 15:02:23.39 Test3k1 CPU  STAT GCP RLY Output  Deenergized
4E9E  29-Sep-2017 15:02:24.74 Test3k1 CPU  STAT Track 1   EZ: 55   EX: 97   Speed: 44  mph    IZ: 250
3035  29-Sep-2017 15:02:26.28 Test3k1 CPU  STAT Track 1   EZ: 52   EX: 96   Speed: 45  mph    IZ: 250
F4D3  29-Sep-2017 15:02:27.31 Test3k1 CPU  STAT Track 1   EZ: 49   EX: 96   Speed: 45  mph    IZ: 250
91AE  29-Sep-2017 15:02:28.90 Test3k1 CPU  STAT Track 1   EZ: 46   EX: 96   Speed: 45  mph    IZ: 250
7A5D  29-Sep-2017 15:02:30.50 Test3k1 CPU  STAT Track 1   EZ: 43   EX: 96   Speed: 45  mph    IZ: 250
AC0E  29-Sep-2017 15:02:31.59 Test3k1 CPU  STAT Track 1   EZ: 40   EX: 96   Speed: 45  mph    IZ: 250
FAE3  29-Sep-2017 15:02:32.99 Test3k1 CPU  STAT Track 1   EZ: 37   EX: 96   Speed: 46  mph    IZ: 250
9BA7  29-Sep-2017 15:02:34.60 Test3k1 CPU  STAT Track 1   EZ: 34   EX: 96   Speed: 46  mph    IZ: 250
CBB7  29-Sep-2017 15:02:35.59 Test3k1 CPU  STAT Track 1   EZ: 31   EX: 96   Speed: 46  mph    IZ: 250
378C  29-Sep-2017 15:02:36.97 Test3k1 CPU  STAT Track 1   EZ: 28   EX: 96   Speed: 46  mph    IZ: 250
82D6  29-Sep-2017 15:02:38.57 Test3k1 CPU  STAT Track 1   EZ: 24   EX: 96   Speed: 46  mph    IZ: 250
B8D1  29-Sep-2017 15:02:40.20 Test3k1 CPU  STAT Track 1   EZ: 21   EX: 95   Speed: 46  mph    IZ: 250
2884  29-Sep-2017 15:02:41.57 Test3k1 CPU  STAT Track 1   EZ: 18   EX: 95   Speed: 46  mph    IZ: 250
8BB5  29-Sep-2017 15:02:42.57 Test3k1 CPU  STAT Track 1   EZ: 15   EX: 95   Speed: 46  mph    IZ: 250
38F9  29-Sep-2017 15:02:44.16 Test3k1 CPU  STAT Track 1   EZ: 12   EX: 94   Speed: 45  mph    IZ: 250
039D  29-Sep-2017 15:02:44.59 Test3k1 CPU  STAT Track 1   EZ: 11   EX: 97   Speed: 45  mph    IZ: 250
37A6  29-Sep-2017 15:02:46.27 Test3k1 CPU  STAT Track 1   EZ: 8    EX: 97   Speed: 45  mph    IZ: 250
E52E  29-Sep-2017 15:02:47.28 Test3k1 CPU  STAT Track 1   EZ: 5    EX: 97   CHK: 4   IZ: 250
485E  29-Sep-2017 15:02:48.91 Test3k1 CPU  STAT Track 1   EZ: 2    EX: 97                     IZ: 11
0ABF  29-Sep-2017 15:02:49.18 Test3k1 CPU  STAT Track 1 Island Deenergized
393C  29-Sep-2017 15:02:49.19 Test3k1 CPU  STAT Train Move Trk: 1, WTime: 26  s, Speeds: 44  44  0   mph
1925  29-Sep-2017 15:02:50.06 Test3k1 CPU  STAT ISL 1 RLY Output  Deenergized
28F4  29-Sep-2017 15:02:59.07 Test3k1 CPU  STAT Track 1   EZ: 18   EX: 97                     IZ: 250
27B7  29-Sep-2017 15:02:59.46 Test3k1 CPU  STAT Track 1 Prime    Energized
D5E1  29-Sep-2017 15:02:59.56 Test3k1 CPU  STAT Track 1 Dax A    Energized
E07D  29-Sep-2017 15:02:59.66 Test3k1 CPU  STAT Track 1 Dax B    Energized
8F14  29-Sep-2017 15:02:59.76 Test3k1 CPU  STAT Track 1   EZ: 43   EX: 97                     IZ: 250
ABEC  29-Sep-2017 15:02:59.88 Test3k1 CPU  STAT DAX A RLY Output  Energized
F307  29-Sep-2017 15:02:59.98 Test3k1 CPU  STAT DAX B RLY Output  Energized
4EAF  29-Sep-2017 15:03:00.08 Test3k1 CPU  STAT Track 1   EZ: 68   EX: 97                     IZ: 250
4F56  29-Sep-2017 15:03:00.58 Test3k1 CPU  STAT Track 1   EZ: 93   EX: 97                     IZ: 250
15C0  29-Sep-2017 15:03:00.64 Test3k1 CPU  STAT Track 1 Island Energized
D705  29-Sep-2017 15:03:00.74 Test3k1 CPU  STAT GCP RLY Output  Energized
4707  29-Sep-2017 15:03:01.16 Test3k1 CPU  STAT Track 1   EZ: 99   EX: 97                     IZ: 250
1427  29-Sep-2017 15:03:01.55 Test3k1 CPU  STAT ISL 1 RLY Output  Energized
4C83  29-Sep-2017 15:03:09.74 Test3k1 CPU  STAT Track 1 No Train Present
```

This log contains the following information:

- Train is detected in the approach at 15:02:08
- Track 1 Prime and DAXes Predictors on track card de-energize at 15:02:22 when EZ is 61 and train speed 44mph
- This causes DAX RLY outputs and GCP RLY output to de-energized (15:02:22- 15:02:23)

- The log shows the progress of the train showing an event log entry when EZ changes by 3 points
- The island is de-energized at 15:02:49 causing ISL 1 RLY output to de-energize (15:02:50)
- The train move warning time is recorded as 26 seconds at 15:02:49
- The train clears the crossing Island at 015:03:00
- This causes GCP RLY output to recover at 15:03:0
- The last event of the train move shows no train present at 15:03:09 when EZ > 85 and no outbound train movement is seen.

7.6.2 Maintenance Call Output

(LED #1 on CPU Module)

When the 3000+ GCP system is healthy, the maintenance call output is energized (On).

The maintenance call output de-energizes when:

- Out of service inputs are used and an out of service input is energized
- A track is out of service
- An external event recorder is used and it is requesting the maintenance call off
- An external event recorder is used and it is out of session

7.6.3 Transfer Output

(LED #2 on CPU Module)

When the 3000+ GCP system is healthy, the transfer output is energized (On).

- This output level inhibits the Transfer Module counting down and the subsequent transfer to the backup side when the Transfer Module is in the auto mode.

The transfer output is de-energized (Off) when:

- A module is programmed as used but is not communicating with the CPU
- MS/GCP or Island operation on a Track Module is unhealthy
- A vital output on a Track or RIO Module is commanded on, but the module cannot provide the 12-volt output
- Module has failed

7.7 TROUBLESHOOTING

On the Display:

- A red triangle appears on the track status line if a diagnostic message is present.
- The GCP RLY indicator on the bottom left side of the screen is green when the system is healthy and the GCP RLY output is energized.

On the individual modules:

- Health LEDs on all modules (CPU, Track, RIO are flashing slowly (1HZ).
- Transfer Module display is not counting down.
- Power LEDs on all modules are on and steady.

On the CPU Module:

- CPU LED 1 is illuminated, indicating that the Maintenance Call output is on.
- CPU LED 2 is illuminated, indicating that the transfer signal is being generated.

If the system has detected a problem, use the System Diag screen or the Track Diagnostics to locate the problem.

Refer to the Trackside Troubleshooting Flow Chart, Figure 7-17, to assist in system and track problem diagnosis.

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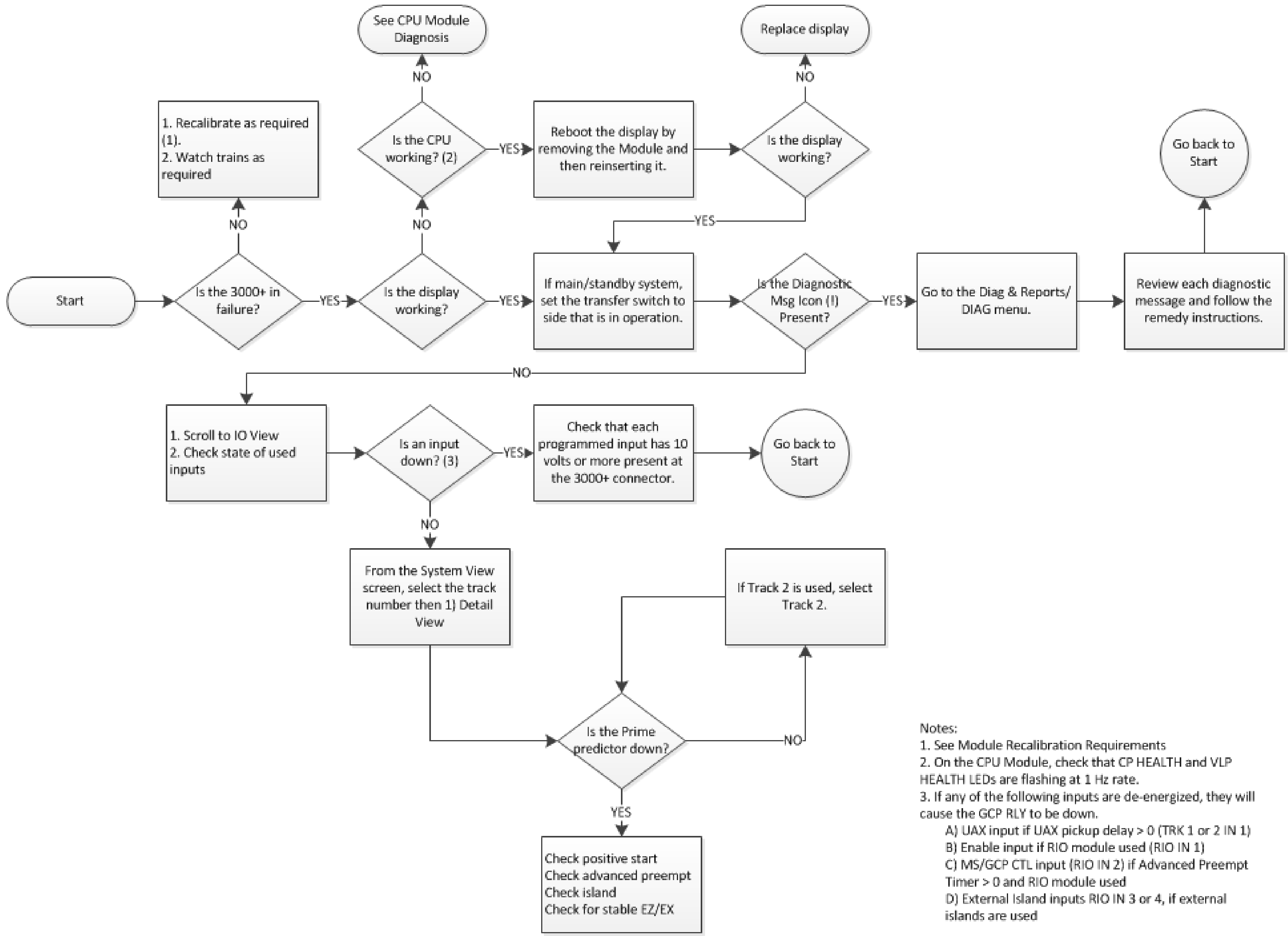
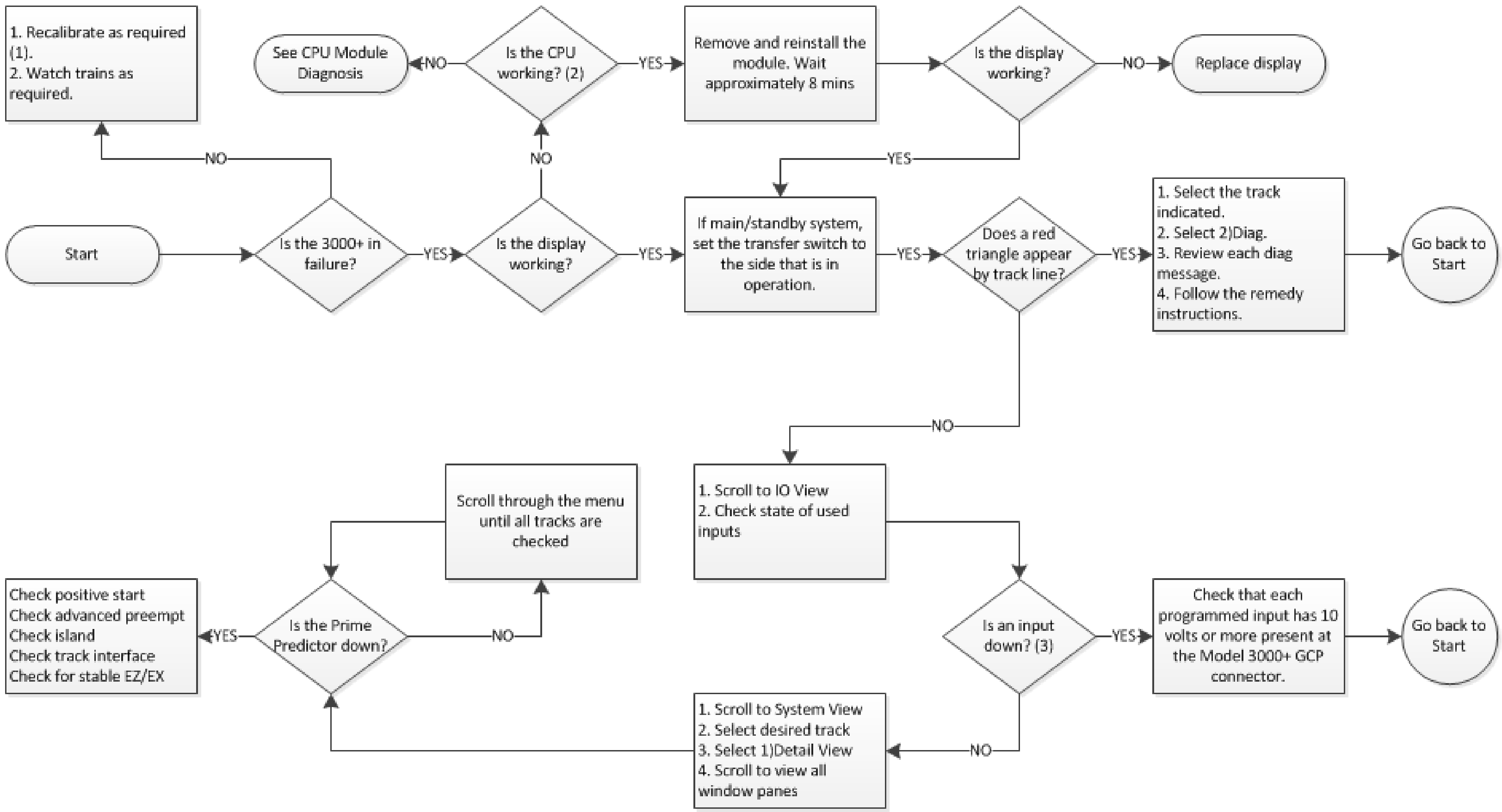


Figure 7-16 CPU Troubleshooting Flow Chart



Notes:
1. See Module Recalibration Requirements Tables.
2. On the CPU Module, check that CP Health and VLP HEALTH LEDs are flashing at 1 Hz rate.
3. Any input programmed as UAX, Enable, or Advance Preempt Control will cause the crossing to activate.
4. If any of the following inputs are de-energized, they will cause the GCP RLY to be down.
   A. UAX input if UAX pickup delay > 0 (TRK 1 or 2 IN 1)
   B. Enable input if RIO module used (RIO IN1)
   C. MS/GCP CTL input (RIO IN2) if Adv Preempt Timer > 0 and RIO module is used.
   D. External Island inputs RIO IN 3 or 4, if external island is used.

Figure 7-17 Trackside Troubleshooting Flowchart

7.7.1 Track Recalibration Requirements

The Track Module calibration requirements for new installations and GCP modules already in service can be determined by observing the following:

- Track Module Four-Character display shows one of the following indications:
  - **GCAL**
  - **GAPP**
  - **GLIN**
  - **ICAL**
- System View screen on the Display Module shows one of the following indications:
  - **GCP Cal Req**
  - **App Cal Req**
  - **Lin Cal Req**
  - **CReq**

WARNING

WARNING

RECALIBRATION OF AN IN-SERVICE TRACK MODULE SHOULD BE DONE ONLY:

- **WHEN A FAILED TRACK MODULE IS REPLACED**
- **AFTER TRACK, BOND, COUPLER OR SHUNT RELATED PROBLEMS ARE INVESTIGATED AND CORRECTED**
- **IF AN IN-SERVICE TRACK MODULE SUDDENLY HAS A HIGH EZ (HIGH SIGNAL ERROR).**

NOTE

NOTE

Removal of power from the 3000+ GCP case is not required before removing or installing modules.

NOTE

NOTE

If CPU Module MCF is changed, complete programming and recalibration is required. If the Track Module MEF is changed, complete recalibration is required.

7.7.2 Module Replacement Recalibration Requirements

The recalibration requirements due to the replacement of a module are shown in Table 7-16.

Table 7-16 Recalibration Requirements Due to Module/Chassis Replacement

Module/Assembly Replacement		Calibration Required				Reprogramming Required	Notes
		GCP CAL	GCP APP	GCP LIN	ISL CAL		
A80403/ A80903	CPU	No	No	No	No	No	1. For track with changed A80418
A40418	Track	Yes[1]	Yes/ No[2]	Yes/ No[2]	Yes	No	2. May be bypassed using **BYPASS** button instead of the **START** button in calibration procedure
A40413	RIO (I/O)	No	No	No	No	No	
A80406	Transfer	No	No	No	No	No	
A80485	Display	No	No	No	No	No	
A80438-2	ECD[3]	No	No	No	No	Yes	3. Plug-in located on chassis behind CPU Module. Requires same MCF as previously in use.
N/A	Chassis	Yes	Yes	Yes	Yes	Yes	

7.7.3 Program Changes Procedure Requirements

The GCP program changes that require track recalibration are indicated in Table 7-17.

Table 7-17 Programming Changes Recalibration Requirements

<table>
<tr><th rowspan="2">Program Changes</th><th colspan="4">Calibration Required</th><th rowspan="2">Reprogramming Required</th><th rowspan="2">Notes</th></tr>
<tr><th>GCP CAL</th><th>GCP APP</th><th>GCP LIN</th><th>ISL CAL</th></tr>
<tr><td>Increased Number of Tracks</td><td>Yes[1]</td><td>Yes[1]</td><td>Yes[1]</td><td>Yes[2]</td><td>Yes[1]</td><td>1. For added tracks only
2. If island is used</td></tr>
<tr><td>GCP Frequency Change</td><td>Yes[3]</td><td>Yes[3]</td><td>Yes[3]</td><td>No</td><td>No</td><td>3. For tracks with new frequencies</td></tr>
<tr><td>Application changed from: Unidirectional to Bidirectional or Bidirectional to Unidirectional</td><td rowspan="4">Yes[4]</td><td rowspan="4">Yes[4]</td><td rowspan="4">Yes[4]</td><td rowspan="4">No</td><td rowspan="4">No</td><td rowspan="4">4. For changed tracks only</td></tr>
<tr><td>Transmit Level Changed from Medium to High or High to Medium</td></tr>
<tr><td>Approach Length Changed</td></tr>
<tr><td>Ballast Compensation Value Changed</td></tr>
<tr><td>Island Operation Changed to Internal</td><td>Yes[5]</td><td>No[6]</td><td>No[6]</td><td>Yes</td><td>No</td><td>5. If EZ is less than 98 or greater than 102
6. Calibration can be bypassed</td></tr>
<tr><td>Set to Default Selected[9]</td><td>Yes[7]</td><td>Yes[7]</td><td>Yes[7]</td><td>Yes[7]</td><td>Yes[8]</td><td>7. For all tracks
8. Complete re-programming required
9. Calibration is only required after a set to default if the GCPs are subsequently programmed to a different frequency than previously set.</td></tr>
</table>

7.7.4 Recalibration Due to Track Equipment Changes

Changes made to the existing track equipment that require track recalibration are shown in Table 7-18.

NOTE

NOTE

Approach length in Program menu must be changed to reflect the new approach length prior to start of track calibration.

Table 7-18 Recalibration Requirements Due to Track Equipment Changes

Program Changes	Calibration Required				Notes
	GCP CAL	GCP APP	GCP LIN	ISL CAL	
Termination Shunts Changed	Yes	No	No	No	1. For changed tracks only
Termination Shunts Moved to New Location	Yes[1]	Yes[1]	Yes[1]	No	
Termination Shunts of Other Frequencies Added, Removed from, or Moved Within the GCP 3000+ Approach(es)	Yes[1]	Yes[1]	Yes[1]	No	
Wide band Insulated Joint Couplers (8A076 or 8A077) Replaced in GCP 3000+ Approach(es)	Yes[1]	No[2]	No[2]	No	2. Calibration can be bypassed
Tuned Insulated Joint Couplers (62785-F) Replaced in GCP 3000+ Approach(es)	Yes[1]	Yes[1]	Yes[1]	No	
GCP 3000+ Track Wire(s) Replaced	Yes[1]	No[2]	No[2]	Yes	

7.7.5 Determining the Cause of a De-energized Predictor

This subsection describes the method of troubleshooting a problem in a system that has previously been in service.

The first step in troubleshooting a problem is to determine whether the GCP track circuit continuity is functioning properly and the components of the 3000+ GCP system are healthy.

When a 3000+ GCP system is healthy it shows the following:

- Track windows:
    - Have no trouble icons present on Display
    - Have no “Calibration Required” messages on Display
    - Health LEDs on all modules (CPU, Track, RIO) are flashing slowly (1Hz)
- Transfer Module display time is not counting down
- CPU LED 1 is illuminated, indicating that the Maintenance Call output is on
- CPU LED 2 is illuminated, indicating that the transfer signal is not allowing transfer
- Power LEDs on all modules are on and steady

If the system is unhealthy, use the System Diagnostics or the Track Diagnostics to locate the problem.

Refer to the Troubleshooting Flow Charts to assist in system and track problem diagnosis. If the track module is healthy, predictors can be de-energized for the reasons shown in the following table.

Table 7-19 Troubleshooting a De-energized Predictor

Reason	Cause
The track module senses that EZ is decreasing at a rate that is fast enough to trigger the prediction.	An approaching train
The predictor (usually Prime and Preempt) has a zero offset distance and the island used by the MS/GCP is de-energized	If the Island LED on the CPU (5 for ISL 1, 6 for ISL 2) is off, the island is de-energized.
The predictor is running its pickup delay	If the Track Module LED for this predictor is flashing or the Track Detail View shows an hour glass symbol for the predictor, the predictor is running its pickup delay. • If the predictor does not recover after its programmed pickup delay time, it should be treated as de-energized.
Positive Start is enabled and the EZ level is below the programmed Positive Start EZ Level	Positive Start is de-energizing the predictor. • Positive Start is used, i.e. Positive Start EZ Level > 0 in the Trk n: GCP Advanced program menu. • Predictor will remain de-energized while the EZ is less than the Positive Start EZ Level plus 5. • The current Track Module’s EZ is shown on the module’s 4-character display and on the Display System View.
A UAX input is de-energized	The UAX is used, i.e. UAX Pickup Delay > 0 on Trk n: GCP Prime menu and the UAX input is not energized or is running the configured UAX Pickup delay.

Reason	Cause
The Enable input is de-energized	The RIO module is used and the ENABLE input (IN1) is de-energized.
Interference is causing large EZ fluctuations which appear to be an approaching train	The rapid fluctuation of the displayed track EZ level by 5 to 10 points (or more) indicates the presence of interference. System View shows ED, Track Module’s display shows GIPS

7.7.6 Troubleshooting a Physical Input

After it is determined that a problem is caused by a de-energized physical input, use Procedure 7.1 to isolate the cause.

NOTE

NOTE

Removal of DC power from the Model 3000+ GCP case is not required before removing or installing modules.

To determine the status of the physical inputs and outputs, scroll to I/O View. This shows the states of all the inputs and outputs on the 3000+ GCP.

White = Not Used
Grey = De-energized
Green = Energized
Red = Output is Unhealthy

After it is determined that a problem is caused by a de-energized physical input, use the following procedure to isolate the cause.

Procedure 7.1 Troubleshooting Inputs

Step 1	Determine the connections to the physical inputs by referring to the circuit plans for the location. These inputs may include: • A DAX circuit from a remote site connected to a UAX input • External Island • Other external inputs
Step 2	If the input is connected to other equipment that not in the bungalow, go to step 5.
Step 3	Verify that the output of the other equipment is energized using either the indications from that equipment or a meter.
Step 4	If the output of the other equipment is energized, but the GCP input is not, check the wiring between the equipment and the GCP.
Step 5	Using a meter, check the remote connection input at the point it enters the bungalow. • If the input is de-energized, check the wiring from this point through to the GCP terminals. • If the input is energized, go to the remote site and check the output.

WARNING

IF APPROACH LENGTH IS REDUCED, MAXIMUM TRAIN SPEED MUST ALSO BE CORRESPONDINGLY REDUCED.

NOTE

A power up lockout is caused by EZ or check EZ being less than 3 when the track card powers up. This is indicated by a **Release Track** message that appears at the end of the corresponding Track Status line. If it has been determined that the lockout is caused by the train shunt, it may be cleared by:

- Selecting the track number on the display then selecting the option 5) Release Track (see section 7.7.8)

7.7.7 Track Module Diagnostics

Table 7-20 may be used as an aid in diagnosis of Track Module Problems.

Table 7-20 Diagnosing Track Module Problems

Display		Description	Cause	Remedy
Panel	**Diag**			
RECV	**GCP Recovering (Diag1000)**	30 sec. recovery time-out	Clearing of system error	Wait
GSTB	**GCP Stabilizing (Diag1001)**	20 sec. stabilization period prior to start of normal operation.	System startup	Wait
G3KN	**G3KN (Diag1306)**	The track module does not support GCP 3000+ operation	Old software in track module	Load software GCP04_50.mef or later
HIEZ	**High EZ (Diag1002)**	High EZ or high EZ check value detected	High resistance track bond wire connection	Repair high resistance bond
			Broken rail	Repair broken rail
			Defective termination shunt	Repair defective termination shunt
			High resistance termination shunt connection	Repair high resistance connection to termination shunt
			Defective insulated joint coupler	Replace defective insulated joint coupler
			Poor calibration	Recalibrate only after verifying that no other cause exists
			Ballast has increased significantly since calibration	

WARNING

TEMPORARY APPROACH LENGTH REDUCTION MUST BE ACCOMPANIED BY A CORRESPONDING REDUCTION IN APPROACH TRAIN SPEED.

Table 7-21 Diagnosing Track Module Problems

Display		Description	Cause	Remedy
Panel	**Diag**			
LWEX	**Low EX (Diag1003)**	Low track ballast resistance detected.	Salted crossing	Use a lower GCP frequency
			Poor drainage at crossing	Temporarily shorten the approach (see WARNING)
			Mud or other contaminants within ballast	Verify EX Adjust as described in Paragraph TBD
			Low ballast	Determine cause of low ballast and compensate
			Broken rail	Repair broken rail
			Low ballast and high resistance bond	Repair high resistance bond
			Low ballast and defective insulated joint coupler	Replace defective insulated joint coupler
LWEZ	**Low EZ Detected (Diag1004)**	Low EZ Detection is programmed ON and its timer interval is exceeded.	A train is on the approach for a time longer than the timer setting.	Temporarily turn off low EZ detection until train has left.
			A false shunt on the track.	Remove false shunts from the track
				Check that EZ returns to normal after false shunt removal.
			Open receive track wire.	If false shunt is not found, refer to the diagnostics messages for open receive wire.
				Repair
RXEX	**Receive Wire EX Error (Diag1005)**	Transmit and receive wires are out of phase • Generally observed at cutover	The receive and transmit wires are connected to the wrong rail (mis-phased)	Change the track wire connection so that: • T1 & R1 are connected to rail 1 • T2 & R2 are connected to rail 2
CKEX	**Check Wire EX Error (Diag1006)**	Check wires and transmit wires are out of phase • Generally occurs at cutover with six-wire installations	The check wires and transmit wires are mis-phased.	Change the check wires connections so that: • T1 & C1 are tied together • T2 & C2 are tied together

Display		Description	Cause	Remedy
Panel	**Diag**			
CHCK2	**Gain Check – Check Wire Error (Diag1007)**	Check signal level is low while transmit and receive levels are normal. Check EZ is very low while track EZ is normal value.	High resistance or open connection in a check wire.	Locate and repair high resistance or open connection in check wires.
CHCK1	**Gain Check – Receive Wire Error (1008)**	Receive signal level is low while check signal level is normal. Check EZ is normal and track EZ is very low value.	High resistance or open connection in a receive wire.	Locate and repair open connection in the receive wires.
CHCK3	**Gain Check Island Error (Diag1007)**	The receiver and check wires have low reading (train at EZ=0), but island is not occupied. (Only shows when GCP and Island share same pair of transmit wires).	Poor connection of receive/check wires or poor shunting or bad calibration data.	Locate and repair high resistance or open connections in check/receive wires. Recalibrate island.
CHCK4	**Gain Check Error (Diag1010)**	Receiver and check signal levels differ by a significant amount	If no train is present: • High resistance in receiver or check receiver track wires • Open track connection	Locate and repair: • High resistance connections in receive or check track wires • Open connections in receive or check track wires
			If a train is present: • High resistance in transmitter track wires	Locate and repair: • High resistance connections in transmitter track wires

Display		Description	Cause	Remedy
Panel	Diag			
GMXT	**Transmitter Error (Diag1011)**	Transmitter cannot maintain a constant current	All installation: • High resistance or open transmit track wire • High resistance or open track wire rail connection	Locate and repair open transmit wires or high resistance transmit wires connections.
			Unidirectional installations only: • Open termination • Open coupler • Open bond	Locate and repair: • Open termination • Open coupler • Open bond
GNOS	**GCP Noise Error (Diag1205)**	Too much noise on track to predict properly	The track signal received by the track module is too noisy and saturating the hardware	a) Check for sources of noise b) If none found, replace the track module
GFRQ	**No GCP Frequency Selected (Diag1012)**	No track frequency set	MS/GCP Operation has been programmed as ON, but no GCP frequency has been selected	Select a GCP frequency from the **GCP: track *n*** program menu
GIPS	**IPS Mode (Diag1013)**	Inbound poor shunting (IPS) detected.	**IPS Mode** is shown when the Track Module is configured with the Enhanced Detection option On and the module detects in-bound poor shunting	None
GRCV	**Receiver Error (Diag1014) Or (Diag1015)**	Track Module internal receiver channels differ	Unacceptable difference between the redundant receivers on the Track is detected	Replace Track Module
GEXP	**EX Process Error (Diag1016)**	Phase (EX) decreases as train approaches crossing	Possibly caused by: • Poor shunting • High resistance bond generally located near the GCP track wires	Locate and repair high resistance bonds

Display		Description	Cause	Remedy
Panel	Diag			
UCFG	**No Communications (Diag1017)**	No communication to a Track Module.	Track Module is not communicating with the CPU.	Verify that a module is appropriate slot
				Replace the module if the Track Module is continuously rebooting. • **BOOT** displays on four-character display at one minute (approximate) intervals.
				If the Track Module is not continuously rebooting determine if **UCFC** is shown on the module's display. • If only this module displays **UCFG**, replace it • If all Track Modules display **UCFG** replace the CPU Module.
VOER	**OUT Correspondence Check Error (Diag1200)**	No Vital output voltage	A vital output is commanded to be on, but is producing no voltage. May be caused by: Open or shorted output Defective Track Module.	Check for an open or shorted output and repair as required. If the output is not open or shorted, replace the Track Module.

Table 7-22 Diagnosing Track Module Problems

<table>
<tr><th colspan="2">Display</th><th rowspan="2">Description</th><th rowspan="2">Cause</th><th rowspan="2">Remedy</th></tr>
<tr><th>Panel</th><th>Diag</th></tr>
<tr><td rowspan="2">GLCK</td><td rowspan="2">Power Up Lockout Error (Daig1018)</td><td rowspan="2">EZ or Check EZ low after reboot</td><td rowspan="2">The EZ or Check EZ values are less than three after a power up.
This could be caused by:
• a train shunting the tracks near the feed point
• open receive or check wires
• see section 7.7.8 for more details</td><td>If a train is present, clear the lockout by selecting the Release Track icon on diagnostic terminal Status Screen.</td></tr>
<tr><td>If no trains are present repair the check and/or receive wires as required.</td></tr>
<tr><td>GMAX</td><td>Transmitter Error (Diag1202)</td><td>GCP Module does not support MAX transmit level</td><td>GCP Module does not support MAX transmit level</td><td>Set transmit level to MED or HIGH. Change Transmit Module to A80418 newer that Rev D.</td></tr>
<tr><td>GOFS</td><td>Out of Service Message</td><td>MS/GCP Operation is Out of Service</td><td>GCP module is taken Out of Service</td><td>Return GCP to service by either using display or input.</td></tr>
<tr><td>GHWR</td><td>Track Hardware Error (Diag1019)</td><td>Track Hardware Error</td><td>This occurs when the Track Module detects that its hardware is not operating correctly</td><td>Replace the module</td></tr>
</table>

Display		Description	Cause	Remedy
Panel	**Diag**			
GCAL	**GCP Calibration Required (Diag1020)**	GCP Calibration Required	The Track Module is uncalibrated. A Track Module reverts to its uncalibrated state when the: • Track Module is replaced • MCF software is changed • Template is set to default or a new template is selected • Track Frequency is changed • Approach distance is changed • Compensation value is changed • Transmit level is changed • Directional (bi/uni) mode is changed	Access the appropriate Calibration Select Window and calibrate the GCP as described in Table 6-3.
GAPP	**GCP Approach Calibration Required (Diag1021)**	GCP Approach Calibration Required	Approach is uncalibrated An approach reverts to its uncalibrated state when the: • GCP is recalibrated • Track Module is replaced • Template is set to default or new template is selected • Programmed approach distance is changed • MCF is changed	Access the appropriate GCP Calibration Window • If the computed approach distance is correct, select the **BYPASS** button • If the computed approach distance is known for this track from a previous calibration, enter the correct value by selecting the **EDIT** button. • If the computed approach distance is incorrect and is unknown, perform the approach calibration as described in Table 6-5.

Display		Description	Cause	Remedy
Panel	**Diag**			
GLIN	**GCP Linearization Required (Diag1022)**	GCP Linearization Calibration Required	Linearization is uncalibrated Linearization reverts to its uncalibrated state when the: • GCP is recalibrated • Track Module is replaced Template is set to default or a new template is selected • Programmed approach distance is changed • MCF is changed	Go to the Setup Track Linearization Screen. • If the linearization value is correct, select the **BYPASS** button. • If the linearization value is known for this track from a previous calibration, enter the correct value by selecting the **EDIT** button. • If the linearization value is incorrect or not known perform a linearization calibration as described in Table 6-6.
GSWR	**Software Compatibility Error (Diag1201)**	Software is incompatible between Track Card MEF and CPU MCF	The software (MEF) in the Track Card is incompatible with the MCF running in the CPU	Install: Latest track Module MEF Latest MCF
GXMT	**Transmitter Error (Diag1011)**	Transmitter cannot maintain a constant current	All installations: • High resistance or open transmit track wire • High resistance or open track wire rail connection	Locate and repair open transmit wires or high resistance transmit wires con
			Unidirectional installations only: • Open termination • Open coupler • Open bond	Locate and repair: • Open termination • Open coupler • Open bond
VOER	**OUT Correspondence Check Error (Diag1200)**	No Vital output voltage	A vital output is commanded to be on, but is producing no voltage. May be caused by: • Open or shorted output • Defective Track Module	Check for an open or shorted output and repair as required.
				If the output is not open or shorted, replace the Track Module.

Display		Description	Cause	Remedy
Panel	**Diag**			
IFRQ	**No Island Frequency Selected (Diag1300)**	No island frequency has been programmed	An Island Operation is requested but no island frequency is selected	Select an island frequency from the Program menu
ISTB	**Island Stabilizing (Diag1301)**	Island stabilizing after a power up	On startup the Track module initiates a 20 second timeout to allow the island output to stabilize	Wait
RECV	**GCP Recovering (Diag1000)**	30 sec recovery time-out	Clearing of system error	Wait
	Island Recovering (Diag1303)	Island recovering after self test	The Track module initiates a 30-second recovery timeout after an island error has cleared.	Wait
IXMT	**Island Transmitter Error (Diag1304)**	Island cannot supply a constant current	All installations Track Module detects: • high resistance transmit track wire • open transmit track wire • high resistance or open track wire rail connection	Locate and repair defective wiring or connections
			Unidirectional installations Track Module also detects: • Open termination • Open joint coupler • Open bond	Locate and repair open termination, joint coupler, or bond.
ICAL	**Island Calibration Required (Diag1305)**	Island requires calibration	Calibration is required when the: • Track Module is replaced • MCF is changed • Template is set to default or a new template is selected • Island frequency is changed	Access the appropriate Calibration Select Window and calibrate the island as described in Section 6.4.
G3KN	**GCP3000+ Not Supported (Diag1306)**	MEF is not compatible with GCP 3000+ operation	The software running on this GCP track module does not support the GCP 3000+	Update the MEF to at least version GCP4_50.mef

7.7.8 Lockout & Release Track

If an EZ or check EZ below 3 is detected when the track module powers up, this may be an indication of a broken wire, or a train standing on the track. A “LockOut” message is displayed as an added precaution during the power up and the GCP RLY and DAX output will remain de-energized. If this is caused by a train and the train leaves the circuit, the LockOut will clear automatically.

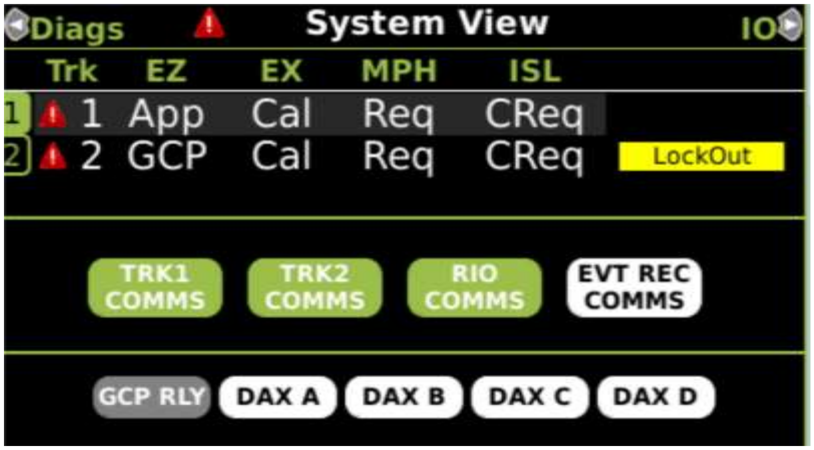


Figure 7-18 Lockout Message Displayed

The user can clear the lockout from the keypad on the display by selecting the track number (1 or 2) then when the Track “N” Options window opens, select **5) Release Track**.

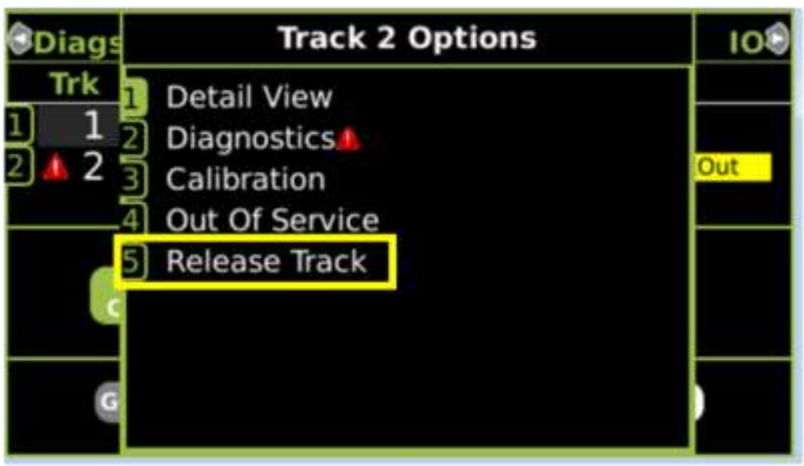


Figure 7-19 Release Track

To clear the “LockOut” from the WebUI, click the yellow Lockout message.

Figure 7-20 Lockout Message

This will cause the following Local User presence message to be displayed, to confirm that someone is present in the field. Select **OK**, then acknowledge the message on the display. The lockout message will then be cleared.

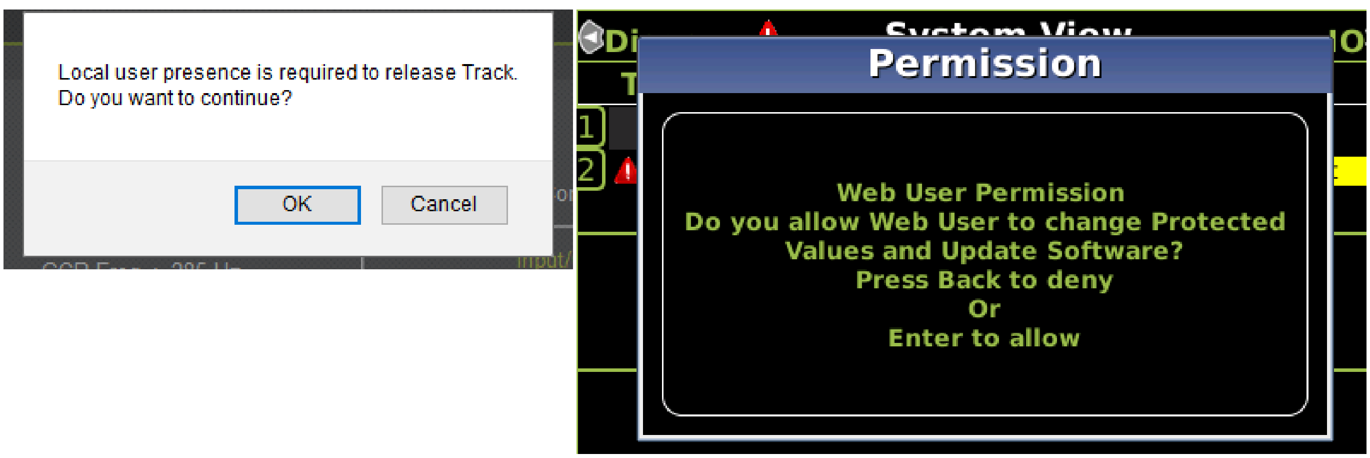


Figure 7-21 Confirm Local User Presence

7.7.9 Diagnostics Log

The diagnostic log provides a time and date stamp of all previous errors. Scroll to Diags & Reports, select **3) Reports** and **Logs > 2) Logs > then Diagnostic Log**. Use the scrolling arrows to scroll to the Start Date, then select **Enter**. Select the date by using the arrows to select the **Start Date** and then the **Start Time**; finally, select **Show Diagnostic Log**.

- Can be used to provide important information for intermittent track or equipment problems.
- Log is stored in the Display Module.
- Captures events only while the Display Module is connected to the GCP.
- Can be cleared by maintainer after being reviewed.

Refer to the Trackside Troubleshooting Flow Chart, Figure 7-17 and Figure 7-16, to assist in system and track problem diagnosis.

7.7.10 Maintenance Call Lamp Output

> **NOTE**
>
> When energized, the MAINT CALL lamp output completes the circuit to the negative CPU battery. A MAINT CALL light can be connected between "B" and MAINT CALL. A series limiting resistor should be used to lower voltage across the lamp and limit the total current to 4 amps.

The Maintenance Call feature can provide an additional level of diagnostics. When the 3000+ GCP system is healthy, the maintenance call output is energized.

The maintenance call output de-energizes when:

- External Event recorder option is set and the event recorder's application program detects low voltage, power off indication or other custom conditions in the railroad specific application program
- Out of Service inputs are used and they are energized

7.7.11 Transfer Output

When the 3000+ GCP system is healthy, the transfer output is energized (On) as shown by LED2 being illuminated on the active CPU module.

- This output level stops the Transfer Module from counting down and transferring to the opposite side when the Transfer Module is in the auto mode.

The transfer output is de-energized (Off) when:

- A module is programmed as used but is not communicating with the CPU.
- MS/GCP or Island operation on a Track Module is unhealthy.

Troubleshooting information regarding each module may be found at:

- CPU Module Table 7-23
- Track Module: Table 7-20, Table 7-21, and Table 7-22

7.7.12 CPU Module Diagnostics

Table 7-23 may be used as an aid in the diagnosis of CPU Module Problems.

Table 7-23 Diagnosing CPU Module Problems

Display		Description	Cause	Remedy
Panel	**Diag**			
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	Purchase a CPU with a higher capability or obtain an MCF requiring lower capability CPU
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 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 MAIN CPU	1. Remove Standby CPU and repower unit. 2. If CIC error clears, the Standby CPU is bad; replace bad card. 3. If error does not clear, remove Main CPU, return Standby CPU to original slot, and switch to Standby. 4. If error clears, MAIN CPU is bad; replace card. 5. If error does not clear, CIC is bad; replace GCP chassis.
CIC	**CIC Access Error (Diag3022)**	CPU unable to access data stored in CIC	If CIC access error is on STANDBY CPU Card	1. Remove Main CPU and repower unit. 2. If CIC error clears, the Main CPU is bad; replace bad card. 3. If error does not clear, remove Standby CPU, return Main CPU to original slot, and switch to Main. 4. If error clears, Standby CPU is bad; replace card. 5. If error does not clear, CIC is bad; replace GCP chassis.

Display		Description	Cause	Remedy
Panel	**Diag**			
CRC	**MCF CRC incorrect (Diag3004)**	The MCF CRC is incorrect for the current MCF	MCF CRC entered is incorrect (Diag 3004)	Reload MCF CRC
			MCF is corrupt (Diag 3003)	Reload 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
DFT	**Default Values set (Diag3001)**	Operating parameters have been set to default	New MCF has been loaded	Set the operating parameter
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.

Display		Description	Cause	Remedy
Panel	**Diag**			
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 MCF for this hardware.
UCF G	**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)	Check other diagnostic message for exact cause.

7.7.13 Troubleshooting Track Problems

The following paragraphs describe how to find and correct common track problems.

7.7.13.1 Couplers

Couplers can be field tested for proper operation as described in Procedure 7.2.

WARNING

WARNING

DO NOT USE A NARROW BAND SHUNT TO REPLACE A DEFECTIVE COUPLER.

Procedure 7.2 Insulated Bypass Coupler Tests

Step 1	Connect a hardwire shunt on the crossing side of the joint coupler.
Step 2	Record the EZ value: _______________
Step 3	Move the hardwire shunt to the termination side of the joint coupler.
Step 4	Record the EZ value: _______________
Step 5	Remove the hardwire shunt.
Step 6	Determine the difference in the EZ values recorded in Steps 2 and 4. • If the coupler is a wideband shunt, and the difference in EZ is more than ± 2, the wideband shunt is defective. • If the coupler is a TIJC (located in the outer half of the approach), and the EZ difference is more than ± 3, the TIJC may be mistuned or defective.

7.7.13.2 Rail Bonds

High resistance bonds can be located as described in Procedure 7.3.

NOTE

NOTE

EZ must be above 15 for the bond test to be used.

Procedure 7.3 Rail Bond Tests

Step 1	Record the EX value with no shunt: ________________
Step 2	Place a hardwire shunt at the 50% point of the approach.
Step 3	Record the EX value: ________________
Step 4	Note the difference in EX values recorded in steps 1 and 3. • EX always increases as a shunt is placed closer to the crossing. • Whether the shunt is a train or hardwire, EX must increase. • If the EX value recorded in step 3 is greater than the EX value in step 1, the bad bond is between the hardwire and the termination. • If the EX value recorded in step 3 is lower than the EX value in step 1, the bad bond is between the hardwire and the crossing.
Step 5	Continue placing the hardwire shunt closer or farther away from the starting point based on the value noted in step 4. • Where EX increases in value, the last bond passed in the defective bond.

EZ must be greater than 15 for this test to work.

7.7.13.3 Termination Shunts

Termination shunts can be tested as described in Procedure 7.4.

Procedure 7.4 Termination Shunts Tests

Step 1	Record the EZ value: ________________
Step 2	Install a hardwire shunt across the termination.
Step 3	Record the change in EZ: ________________ • If termination is hardwire, no EZ change should occur. • If termination is wideband, an EZ change of no more than ± 2 should occur. • If termination is NBS, a decrease in EZ of up to 30 can occur, depending upon frequency and approach length. • Lower frequencies and shorter approaches produce a greater change. • If termination is NBS and an increase in EZ is noted, then the NBS is defective.

7.7.13.4 Testing for Track Circuit Issues

Track Circuit Problems

When a failure occurs in a bi-directional GCP track circuit, the EZ and CHECK EZ on the Detailed Status View will generally change in relationship to the normal range and possibly to each other as follows:

- If EZ and Check EZ move higher or lower than normal, but remain relatively equal to each other, the track circuit problem lies on the transmitter side of the crossing.
- If EZ and Check EZ move higher or lower than normal, but their values differ by more than 5, the track circuit problem most likely lies on the receiver side of the crossing.

7.7.14 Low EX

A Low EX condition exists when EX is below 39.

7.7.14.1 At New Installations

If a Low EX condition is occurring at a cutover of a new installation, check the following:

- Defective Bonds
- Defective insulated joint couplers
- Missing battery choke in approaches
- Defective gauge rods or switch rods
- Open termination shunt
- Improper application of other frequency NBS in the approaches.

7.7.14.2 At in-Service Installations

When Low EX occurs at an in-service crossing, use Procedure 7.5 to determine whether the Low EX Adjustment can safely be lowered below 39.

- Low EX condition commonly occurs at an in-service crossing when track conditions are extremely wet and possibly salted.

WARNING

WARNING

DO NOT LOWER THE LOW EX ADJUSTMENT BELOW 39 IF THERE IS NOT A FIVE-POINT DROP IN EZ.

Procedure 7.5 Low EX Qualification Tests

Step 1	With EX below 39, connect a hardwire shunt at the termination shunt of the longest approach.
Step 2	Record the EZ value: _________________
Step 3	Move the hardwire shunt in to the 90% point of the approach.
Step 4	Record the EZ value: _________________ • If the EZ value at the 90% point is at least 5 less than the EZ value at the termination shunt (step 2), the Low EX Adjustment can safely be lowered below 39, proceed to step 5. • If the EZ value does not drop 5 points, the Low EX Adjustment cannot be safely lowered below 39. • **Do not** continue.
Step 5	Scroll to **Program View > 2) GCP Programming > 5) Track Maintenance**. The Track Maintenance screen opens.
Step 6	Select the **Next** button until the **GCP: track 1 MS Control** window displays.
Step 7	Enter a new EX adjustment value for the required track between 0 and 5, press **Enter**. The new value appears as the Low EX Adjustment entry value.
Step 8	Press the **Back** button until **Program View** appears again.

7.7.14.3 Nuisance Activation – Rail Phase Check

In situations where the EZ value is shifting between 5 to 20 points concurrently with the EX value shifting from 2 to 5 points, checking the rail to ground voltage is required. From within the enclosure at the terminal block, measure the AC voltage from RCV1 to ground, and then measure the AC voltage from RCV2 to ground. The ideal measurement is identical. When VRCV1 differs from VRCV2 by approximately 0.75V or higher, nuisance activations may occur. Typically, the cause of this problem is a failing insulating joint or arrestor in the signal block.

Procedure 7.6 Nuisance Activation Rail Phase Check

Step 1	V_{RCV1} to ground value: ____________ VAC
Step 2	V_{RCV2} to ground value: ____________ VAC
Step 3	Note the difference: ___________ VAC Ideally, the difference is 0 VAC. When V_{RCV1} differs from V_{RCV2} by approximately 0.75V or higher, nuisance activations may occur. Typically, the cause of this problem is a failing insulating joint or arrestor in the signal block

⚠ WARNING

WARNING

DO NOT USE A NARROW BAND SHUNT TO REPLACE A DEFECTIVE COUPLER.

⚠ CAUTION

CAUTION

FOLLOWING INSTALLATION OF DUAL COUPLERS OR DUAL SHUNTS AROUND INSULATED JOINTS, VERIFY PROPER OPERATION OF THE TRACK CIRCUIT PRIOR TO PLACING IT INTO OPERATION.

7.7.15 High EZ and Low EX History & Calibrated Approach

Review of the high EZ and low EX history (HEZ LEX) and the Computed Approach distance for a track can assist in troubleshooting efforts. The HEZ and LEX values are useful in determining when the EZ was high and when the EX was low.

To review the information:

- From the System View screen, select the number of the Track to review.
- When the Track “N” Options window opens, select 1) Detail View. The Module Details window opens.
- Press the Left Arrow once to view the screen showing the HEZ LEX. Record the HEZ value (__________) and the LEX value (__________).
- Press the Left Arrow three times more to view the screen showing the Computed Distance. Record the Computed Distance (__________).

The maintainer may reset the HEZ LEX information after review.

7.7.16 Troubleshooting Maintenance Call (MC) Light Problems

There are several operations in the 3000+ GCP system that will turn-off the MAINT CALL (MC) light. This procedure assumes:

- The warning devices are not activated and modules are healthy, including External event recorder (Argus/SEAR II) if used.
- No track is out-of-service
- MC operation is being placed in service for the first time and wiring must be checked.

The following procedure checks the most common items first. If the MAINT CALL light does not turn on after a step, proceed to the next step.

1. Observe LED 1 on CPU module (Table 7-1), or Maint Call on I/O Status screen
    - If LED 1 is on, or Maint Call is Green, go to step 3.
    - If LED 1 is off, or Maint Call is Red, go to step 2.
2. Determine that the MC light functions by testing the lamp circuit as follows:
    - Measure DC voltage between B (+ meter lead) and MAINT CALL (MC) out (- meter lead) on the green connector above the CPU.
        - If voltage is within 0.5 volts of B, then the lamp or lamp circuit is open and must be repaired.
        - If voltage is less than 1.0 volts, go to next step.
    - Measure between N (- meter lead) and MC (+ meter lead) on the green connector.
        - If voltage is within 0.5 volts of B, then the lamp circuit is okay, but the MC output is off.
        - If LED 1 is on, replace CPU module
        - If LED 1 is off, go to the next step
3. If an external event recorder, such as the Argus or SEAR II is used, it may monitor power off inputs (POK), external Battery Monitor or other Recorder Application Program specific logic.
    - Temporarily turning the event recorder off may isolate the MC problem:
        - On the display, select the Program View / GCP Programming / General Configuration
        - Change External Evt Recorder to No
    - If the MC light turns on, turn the even recorder back on:
        - On the display, select the Program View / GCP Programming / General Configuration
        - Change External Evt Recorder to Yes
    - Refer to the circuit plans for the location and:
        - Verify that the event recorder’s Site Setup is accurate.
        - Verify all POK inputs are on.
        - If used, verify that the Application Program MC related parameters are correct. (Refer to Application Configuration Summary)
        - See appropriate event recorder manual for more details.
4. If unit is redundant, transfer to opposite set of modules.
    - If the MC lamp turns on, replace the initial CPU module.
    - If the MC lamp stays off, call Siemens Technical Support.

7.8 OUT OF SERVICE FEATURE

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.

This section describes:

- How to take a track out of service using the display keypad (see section 4.6.1.3 for instructions on using the WebUI).
- What logic functions are bypassed and the effect of that bypass on other modules and I/O
- How to place the track circuits(s) back in operation

The Out of Service selection has a timer option, which will restore the track back to service after the specified time. The default setting for the timer is 1 hour. The range is 0 to 23 hours. The value 0 means the Out of Service Timeout is not used. When 0 is selected the display will show it as NOT USED.

The OOS Timeout can be viewed and changed from either the Track "N" OOS menu under item **3) Settings**, or from the GCP Programming / General Configuration menu.

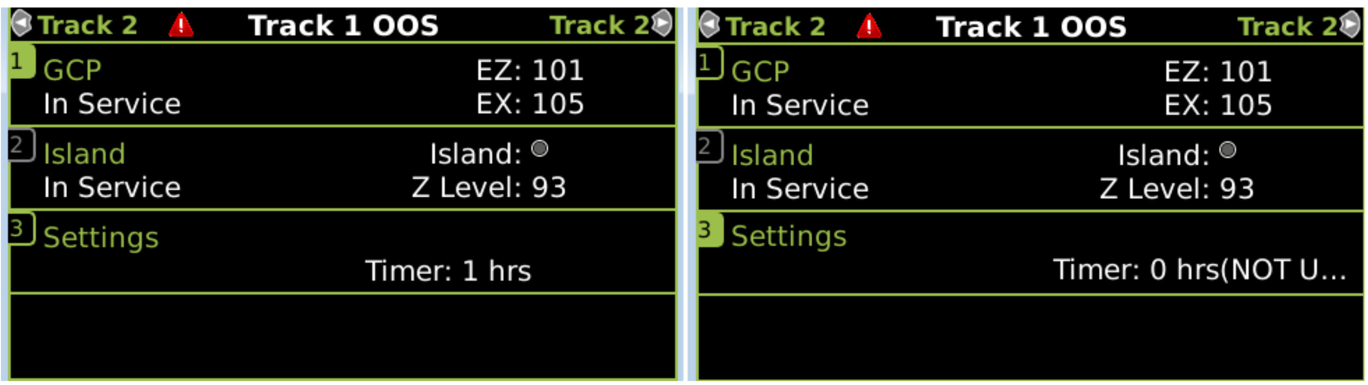


Figure 7-22 OOS Timeout Menu

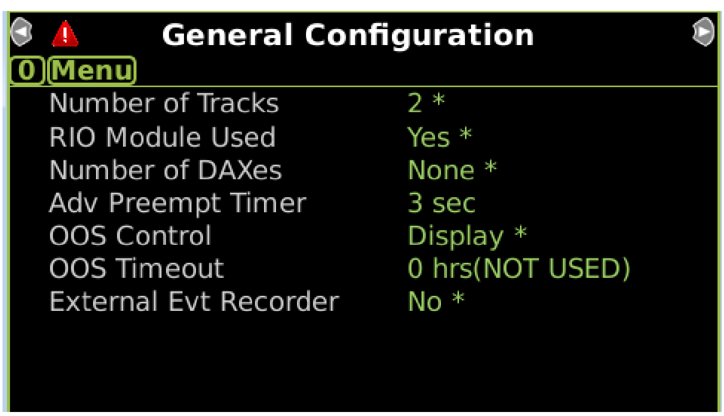


Figure 7-23 General Configuration: OOS Settings

7.8.1 Out of Service

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.

REQUIRED OPERATIONAL TESTS SHALL 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).

The display can be used to take the 3000+ GCP approach circuit and the island circuit out of service. There are three methods of using the Out Of Service feature on the 3000+. The method used is selected in the GCP Programming by using OOS Control parameter, see Section 5.3.2 for details. The options are:

- Display
- Display + OOS IPs
- OOS IPs

WARNING

INPUTS FOR "OUT OF SERVICE" SHOULD BE WIRED IN A PERMANENT MANNER IN ACCORDANCE WITH CIRCUIT PLANS. DO NOT USE TEST TERMINALS OR SWITCHES THAT CAN VIBRATE CLOSED TO ENERGIZE OOS INPUTS.

When **OOS Control** is set to **Display**, the display module by itself can be used to take a GCP approach or island out of service.

When **OOS Control** is set to **Display+OOS IPs**, the display module is used in conjunction with the Trk Out of Service inputs (IN 2 on the each track module) to take a GCP approach or island out of service.

When **OOS Control** is set to **OOS IPs**, the display module is not used in taking the GCP approach and island out of service, only the Trk Out of service inputs are used.

WARNING

WHEN OOS CONTROL IS SET TO OOS IPS, ENERGIZING A TRACK'S OOS INPUT WILL TAKE BOTH THE GCP APPROACH AND THE ISLAND OUT OF SERVICE.

Select the **Out of Service** option from the track options menu to see the Out of Service screen, shown below to the left.

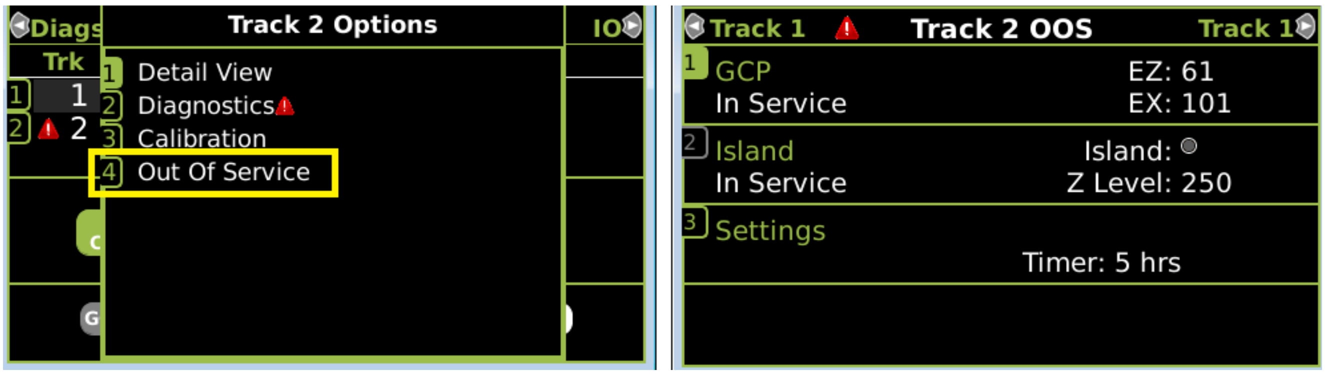


Figure 7-24 Track Out of Service

First, select the out of service timeout, this is shown as the timer above. When the GCP or Island is taken out of service, this timer will start. When the timer expires, the GCP and island will be put back in service. The timer is selectable between 0 and 23 hours, where 0 means that the timer is not used.

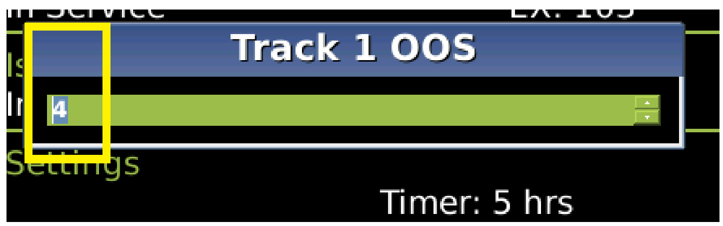


Figure 7-25 Out of Service Timer

NOTE

NOTE

The Out of Service Timeout covers all tracks taken out of service with one time interval.

If the timer is running for one track out of service, and it is desired to take the other track out of service for an added amount of time, do the following:

- Return the first track to service
- Edit the Out of Service Timeout to the new value
- Take both tracks out of service

If the Transfer Module transfers while a track is out of service, the track will be returned to service and may activate the warning devices.

If **OOS Control** is set to **Display+OOS IPs**, energize the Trk OOS Input on the track module (IN2) before continuing.

To take the GCP approach circuit out of service, press 1 on the keypad, this will bring up the confirmation screen shown on the left below. Press the 1 again to continue to take the GCP out of service. This will then bring up the second confirmation screen on the right. Press **Enter** to continue.

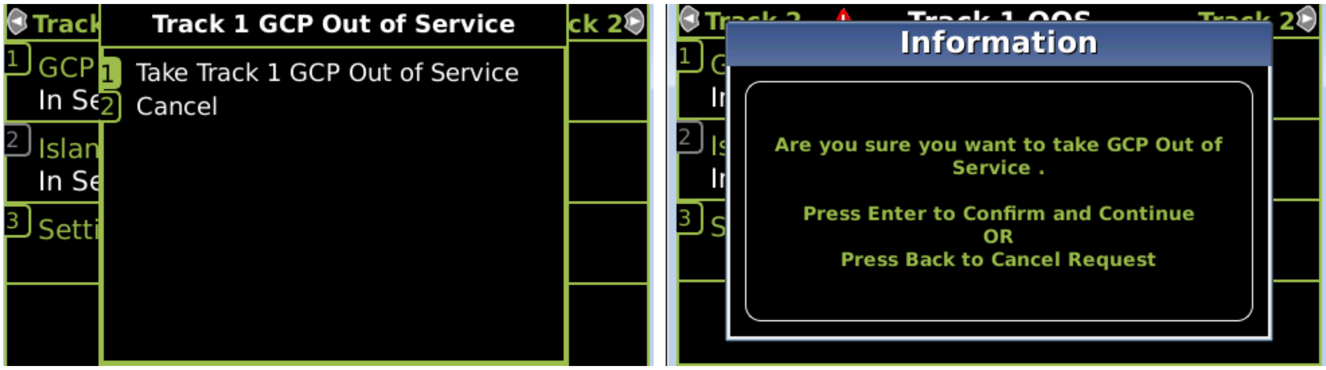


Figure 7-26 GCP Out of Service Confirmation

The Out of Service screen will now show the GCP as Out of Service, and the top system level screen will show the message GCP OOS that will alternate between blue and white. The track module will also display the message GOFS on its 4 character display. The maintenance call output on the 3000+ GCP will turn off, this will cause the maintenance call lamp to go on, if it is wired.

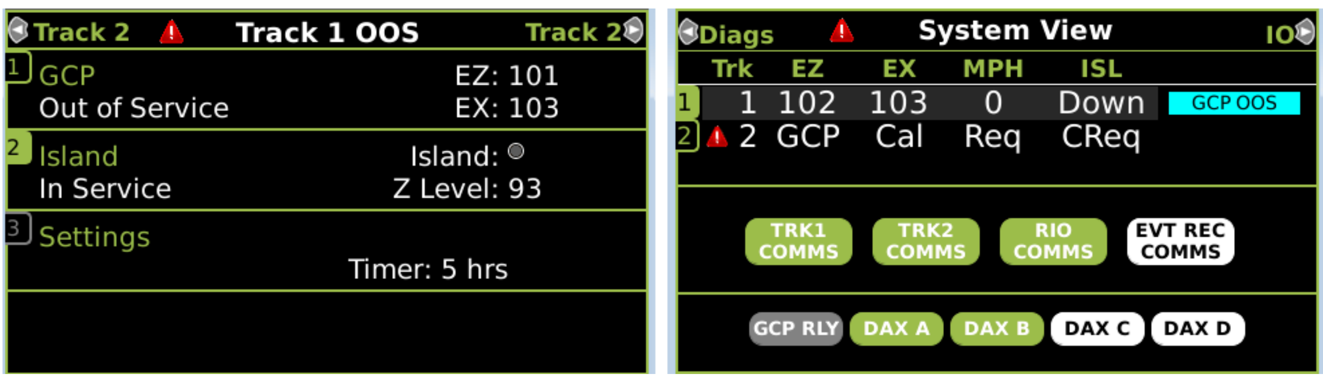


Figure 7-27 Out of Service Indications on Display

To return the GCP to service, if **OOS Control** is set to ***Display+OOS IPs***, de-energize the track OOS Input on the track module.

If **OOS Control** is set to ***Display***, use the display module as follows: Select the **Track Options Out of Service** menu as before, press 1 to select the GCP; this will show the screen illustrated in Figure 7-28. Press 1 from the keypad, this will put the GCP back in service with no further confirmations.

NOTE

NOTE

When a GCP is OOS but the island remains in service, the crossing will activate when the island is occupied.

NOTE

NOTE

Putting the GCP back in service will also put the island back in service if it was out of service.

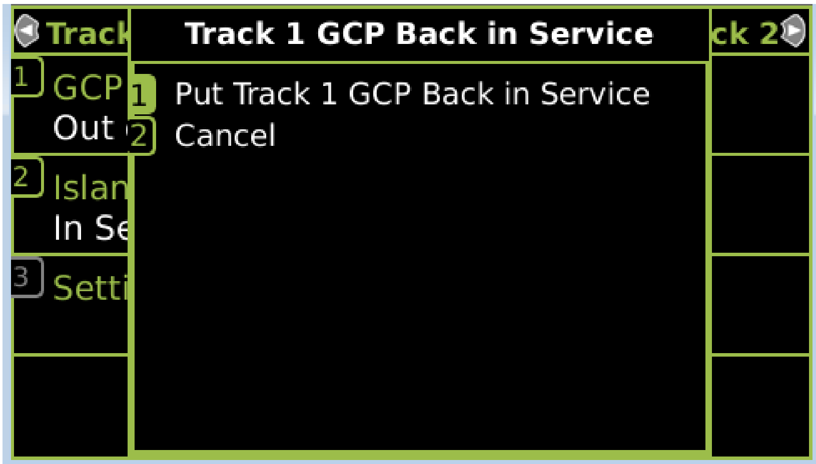


Figure 7-28 Put GCP Back in Service

If the OOS Control is set to Display+OOS IPs and the Trk OOS Input is still energized, performing the above step will put the track back in service; however, the maintenance lamp call will remain on while the Trk OOS input is still energized. Similarly, if the Out of Service timer expires and the Trk OOS input is still energized, the maintenance call lamp will remain on.

WARNING

WARNING

ENSURE THAT TRACK OUT OF SERVICE INPUTS ARE RETURNED TO DE-ENERGIZED WHEN THE TRACK IS PUT BACK IN SERVICE.

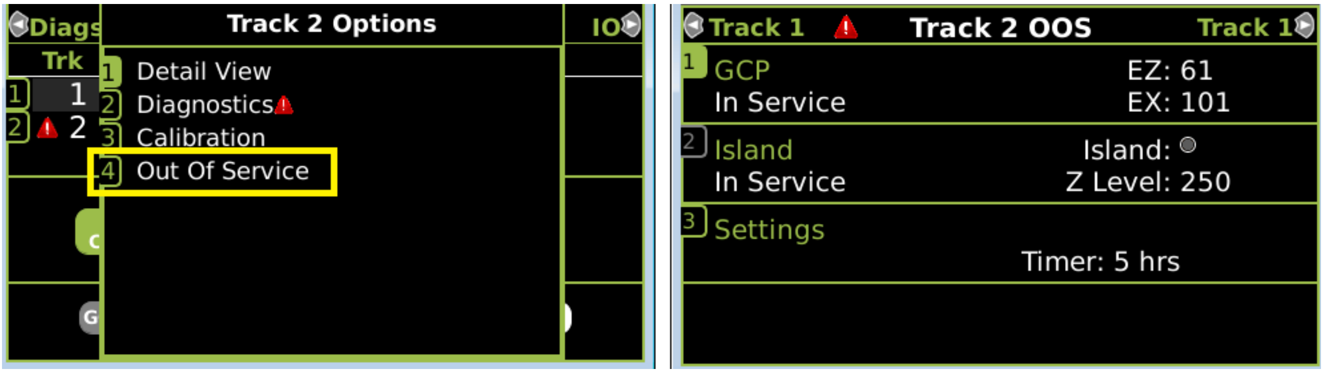
NOTE

NOTE

The island cannot be taken out of service by itself, the GCP has to be first taken out of service.

If **OOS Control** is set to **OOS IPs** the options to take the GCP out of service will not be enabled on this screen.

To take the island out of service, first take the GCP out of service, then press 2 on the keypad.



This will bring up the confirmation screen shown below on the left. Press the **1) Take Track “N” ISL Out of Service** to continue to take the island out of service. This will then bring up the second confirmation screen on the right. Press the Enter to continue.

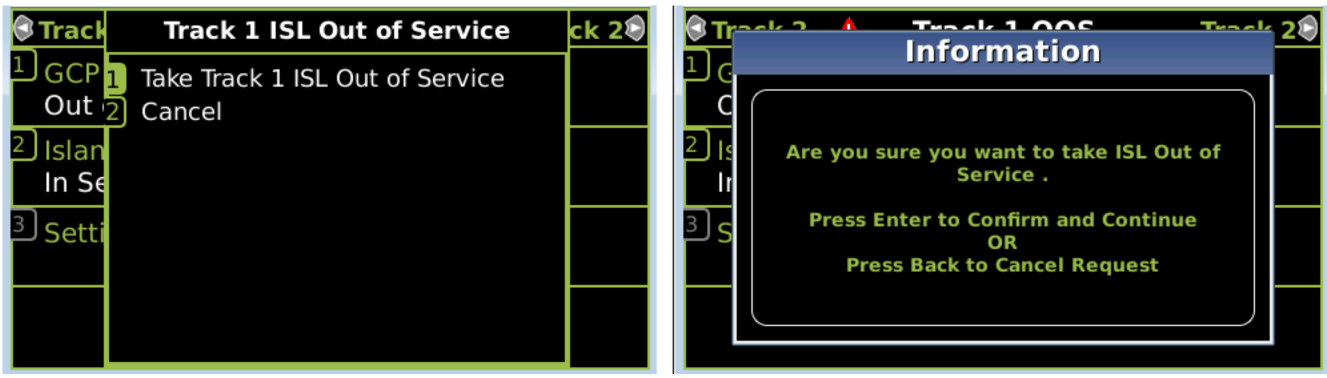


Figure 7-29   Island Out of Service Confirmation

The Out of Service screen will now show the Island as **Out of Service**, and the top system level screen will show the message **OOS** that will alternate between blue and white. The track module will display the messages GOFS and IOFS on its 4 character display. As before, the maintenance call output on the 3000+ will turn off; this will cause the maintenance call lamp to go on, if it is wired.

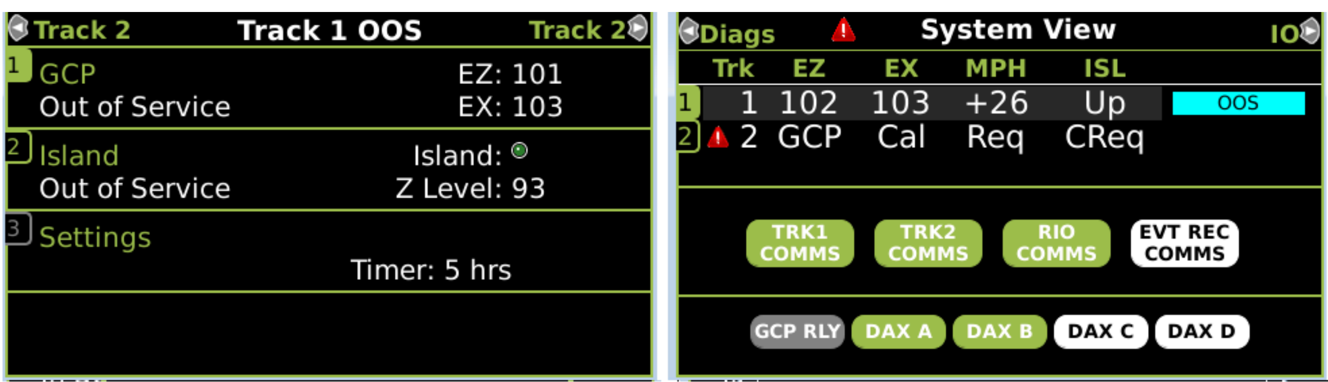
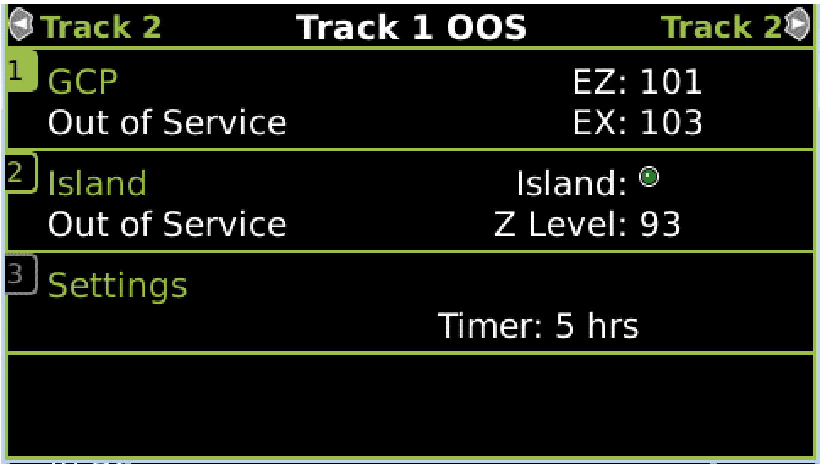


Figure 7-30   Island Out of Service Indications on Display

If **OOS Control** is set to **Display+OOS IPs**, to return the GCP and island to in service, de-energize the track OOS input on the track module. If only the island needs to be put back into service, use the display module as described below.

If **OOS Control** is set to **Display**, use the display module as follows: select the **Track Options Out of Service** menu as before, then press 2 to select the Island.



The menu illustrated in Figure 7-31 will then appear. Press 1 from the keypad, this will put the Island back in service with no further confirmations.

Figure 7-31 Put Island Back in Service

7.9 SOFTWARE VERSIONS

To determine the software versions, scroll to **Diags & Reports > 2) Configuration Report**. The Configuration Report window opens. Select **3) Software Information**. The Software Information for Slots 1 – 3 and the display are listed. Scroll down to see the information as shown in Figure 7-32.

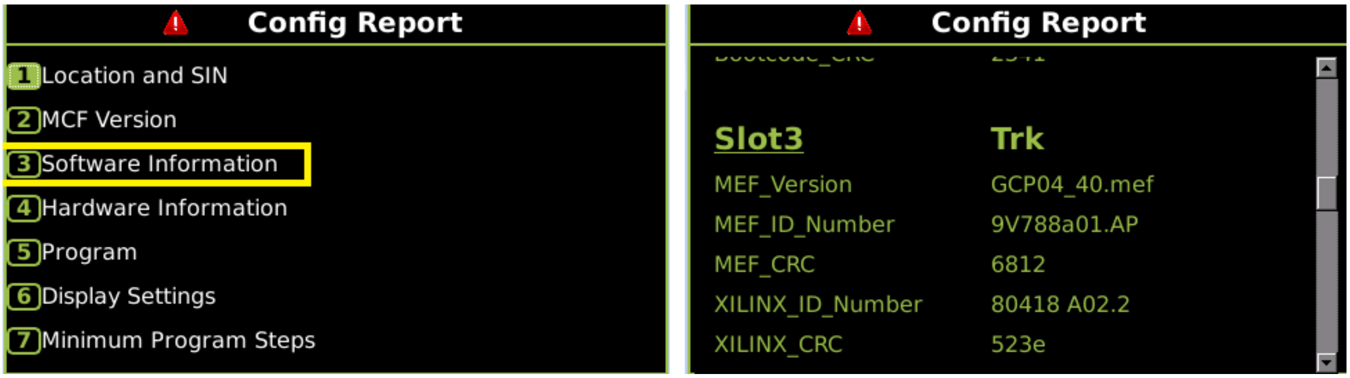


Figure 7-32 Software Versions

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APPENDIX A INSTALLATION OF FERRITE BEADS

CAUTION

PRIOR TO INSTALLATION OF THE FERRITE BEADS, RECORD EZ/EX AND ISLAND Z VALUES FOR THE ACTIVE TRACK MODULES WHERE FERRITE BEADS ARE TO BE INSTALLED; THESE VALUES SHOULD BE RECORDED WITH THE GCP APPROACH CLEAR.

The following guidelines are for the application of Ferrite Beads to the transmitter (XMT1/XMT2) and receiver (RCV1/RCV2) wires [not the check wires] of an affected GCP that incorporates an internal island circuit. The ferrite beads shall be installed on all track slots at the termination point of the XMT1/XMT2 and RCV1/RCV2 wires on the GCP chassis as shown in Figure 7-33. There are two different sizes of ferrite beads. The smaller of the two is to be installed on the transmitter **[XMT1/XMT2]** wires. The larger of the two is to be installed on the receiver **[RCV1/RCV2]** wires.

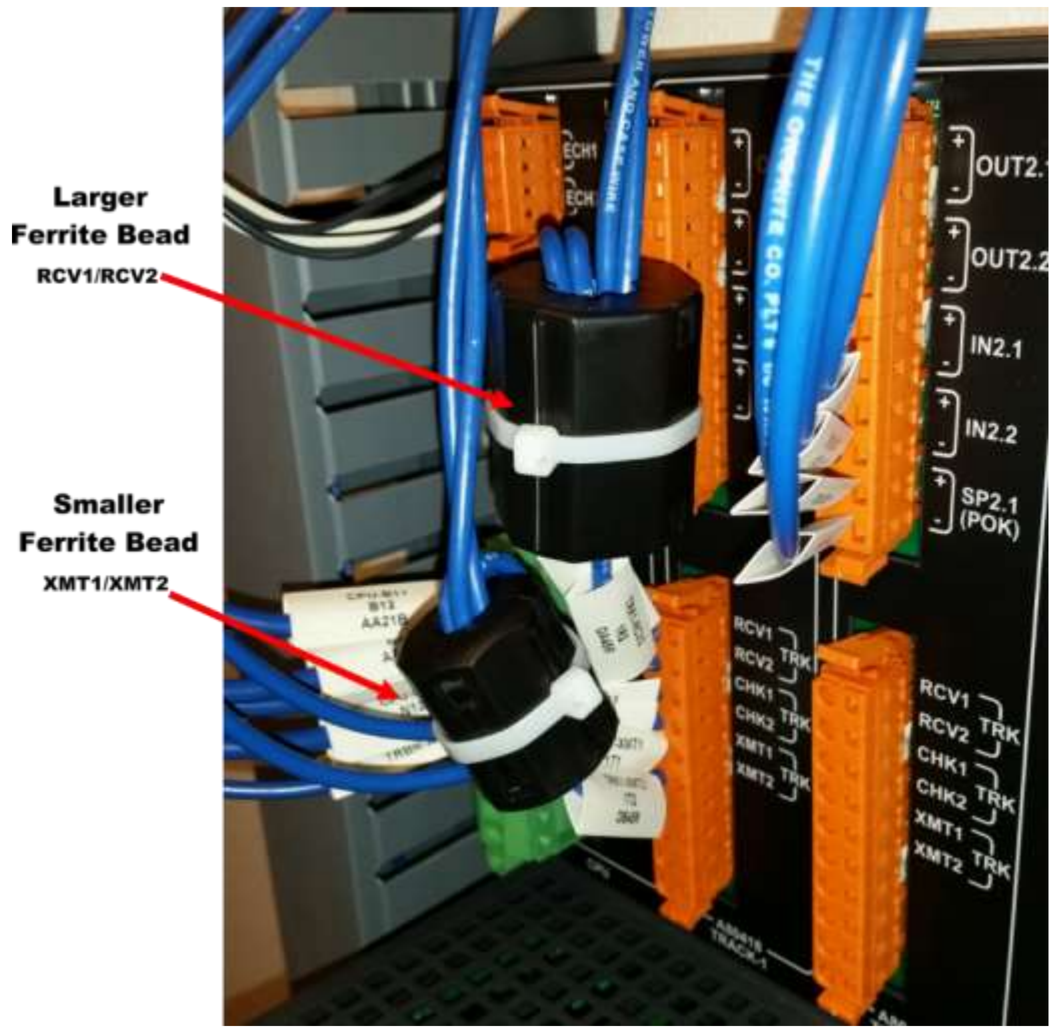

Figure 7-33 Ferrite Bead Sizes

The ferrite beads require a single wrap of the wires **[XMT1/XMT2] [RCV1/RCV2]** around the ferrite bead before securing the transmitter or receiver wires to the Wago connector as shown in Figure 7-34. The ferrite beads should be installed within two to three inches of the Wago connector. The sleeve tag can be used as a reference to determine this distance as shown in Figure 7-34. Close the ferrite bead, ensuring the securing tabs have properly seated and have snapped into the locked position. Once ferrite bead is installed, a zip tie can be used to secure the ferrite bead and wires in place, preventing movement and the unintentional opening of the ferrite bead.

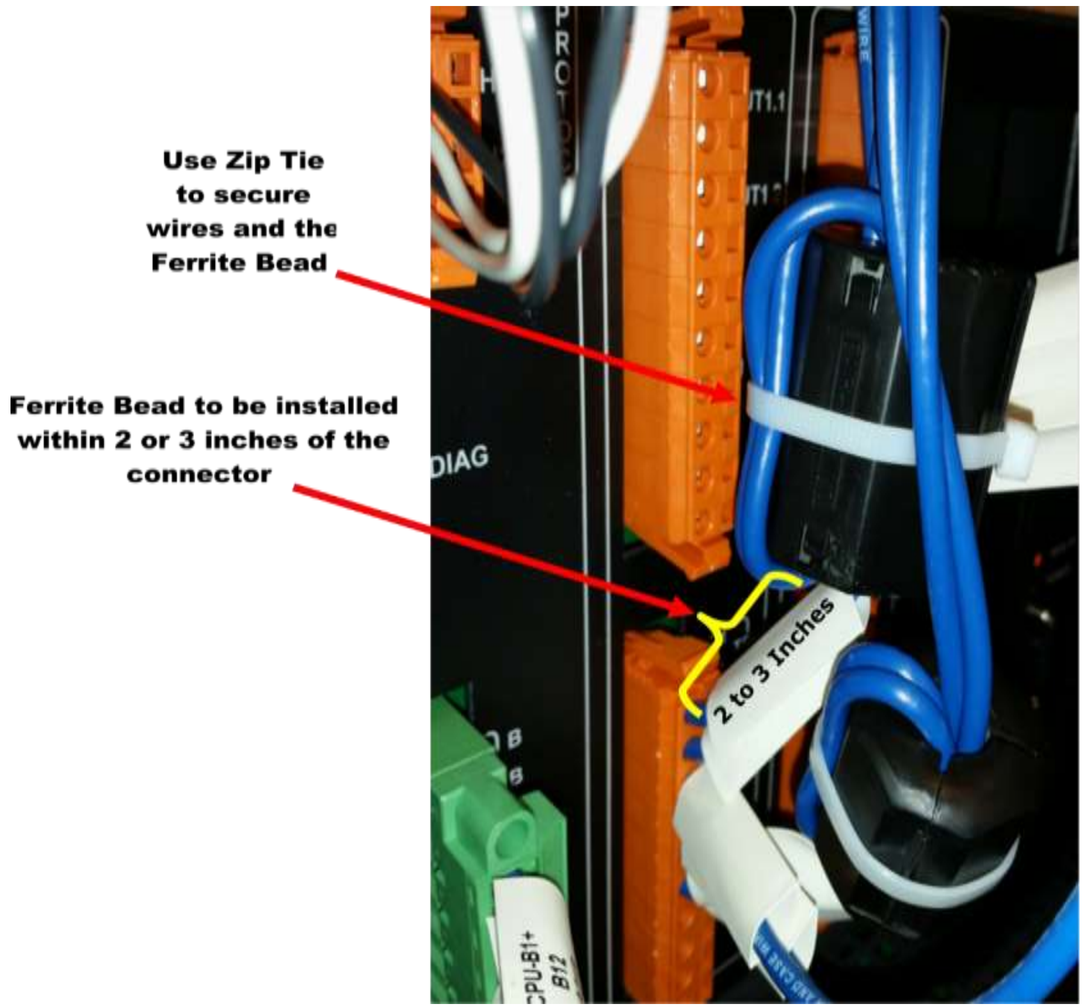

Figure 7-34 Ferrite Bead Installation Guide

CAUTION

WITH FERRITE BEADS INSTALLED, AGAIN RECORD EZ/EX AND ISLAND Z VALUES OF ACTIVE TRACK MODULES [WITH APPROACH CLEAR] AND COMPARE TO READINGS RECORDED PREVIOUSLY. VALUES SHOULD DIFFER NO GREATER THAN 3 POINTS BETWEEN THE TWO RECORDED VALUES.

The installation of ferrite beads on the GCP does not require any re-calibration of the track circuits, and has no effect in the GCP's ability to detect trains.

The installation of ferrite beads is compatible with all hardware revisions of the 80418 Track Module.

Ferrite Bead Kit Ordering Information

A Ferrite Bead Kit for the 80418 Track Card will be provided by Siemens.

Table A-1 Ferrite Bead Ordering Information

Part Number	Revision	Description
K80418-1	A	Kit, CSB 3-15E, 80418 Track Card

For additional kits contact Siemens Customer Service at (800) 626-2710

For technical assistance please contact Siemens Rail Automation Technical Support at (800) 793-7233 Option 1.