SIEMENS

Model 3000+ Grade Crossing Predictor/Motion Sensor

Field Manual

DOCUMENT NO. SIG-00-18-01

VERSION A.1

FEBRUARY 2020

PROPRIETARY INFORMATION

TRANSLATIONS

WARRANTY INFORMATION

Siemens Mobility, Inc. warranty policy is as stated in the current Terms and Conditions of Sale document. Warranty adjustments will not be allowed for products or components which have been subjected to abuse, alteration, improper handling or installation, or which have not been operated in accordance with Seller's instructions. Alteration or removal of any serial number or identification mark voids the warranty.

FCC RULES COMPLIANCE

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.

See back cover for contact information.

Table of Contents

List of Figures

List of Tables

5

6

HOW TO USE THIS MANUAL

General Information

This handbook is intended to provide guidance to maintenance personnel on the following topics:

<u>**WARNING**</u>

RAILROADS OR AGENCIES ARE RESPONSIBLE FOR ENSURING ONLY PROPERLY TRAINED AND AUTHORIZED PERSONNEL HAVE ACCESS TO THE MODEL 3000+ GCP.

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

BEFORE PLACING THE MODEL 3000+ GCP INTO SERVICE FOLLOWING INSTALLATION, PROGRAMMING CHANGE, HARDWARE CHANGES, OR WIRING CHANGES:

- **VERIFY TRACKS ARE FREE OF ANY AND ALL TRACK RELATED ISSUES.**
- **VERIFY THE PROPER COMPONENTS ARE USED, WIRED, AND PROGRAMMED AS SPECIFIED BY THE RAILROAD'S OR AGENCY'S APPROVED WIRING/INSTALLATION DIAGRAMS AND PROCEDURES.**
- **VERIFY COMPLETE SYSTEM OPERATION AS SPECIFIED BY THE RAILROAD'S OR AGENCY'S TEST PROCEDURES.**
- **FAILURE TO FOLLOW THESE GUIDELINES MAY LEAD TO INCORRECT OR UNSAFE OPERATION OF THE TRACK CIRCUIT.**

SYSTEM CUTOVER

NOTE

This procedure does not supersede procedures of the maintaining railroad. This procedure is designed to supplement railroad procedures. In case of conflicts between procedures, the most restrictive procedure should govern.

Model 3000+ GCP System Cutover Form

The Model 3000+ GCP System Cutover Form, found in SIG-00-17-03 (Table 6-14), is used when installing, physically modifying, or after disarrangement of a Model 3000+ GCP.

NOTE

Modules may be removed and/or replaced from the case without removing power.

CIRCUIT AND PROGRAMMING VERIFICATION

Verify the Model 3000+ GCP modules shown on the circuit plans are properly inserted and secured into their appropriate slots (main/standby).

NOTE

The Main and Standby modules do not require independent programming. Both sets of modules operate from the same stored application program.

STEP 1

- Remove all connectors (green screw type and orange cage clamp) to the Model 3000+ GCP.
- Close battery buss to Model 3000+ GCP system case.
- Verify the voltage and polarity of the B and N wiring to the green plug connectors for the GCP.
- Insert only the green power plug connector above the CPU module and verify programming after system boots.
- If used, set the Model 3000+ GCP Transfer Timer Assembly 80468 timer transfer switch to MAIN.
- Review the program in the Model 3000+ GCP selecting **3) GCP Programming** and verify the programming via the Main Program Menu's submenus.
- Verify the programming per the approved site drawing, adding field measured parameters (approach, DAX offset and island distances, etc.).
- Scroll to **Program View**. Verify that the OCCN, CCN, and FCN against the site drawing and note the values on the System Cutover Form.

8

- Select **1) SITE Setup > 1 Site Configuration**. The Site Configuration screen appears.
- If required, enter any data needed so that all parameters match the approved site drawing.

STEP 2

- If used, verify the Echelon LAN wiring and termination is in place.
- Before connecting power to other GCP connectors, verify wiring to Model 3000+ GCP system, case wiring, wiring to surge panels, track, warning devices, and cable circuits to other locations.
- Connect track cable at house termination points.
- Connect other cable circuits at house termination points.

<div align="center">

<u>WARNING</u>

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

</div>

STEP 3

The wiring to loads must be applied in the following sequence to avoid damage:

- Verify battery polarity on green power plugs and orange input plug connector(s).
- Connect warning device wiring and cables at house termination points.
- Connect all other connectors to Model 3000+ GCP system.
- Connect all other electronic equipment to the battery busses.

VERIFY OFFICE CONFIGURATION CHECK NUMBERS

There are two methods to validate that the Office Configuration Check Number is per the circuit plan, either:

- Scroll to **Program View**
- Review the numbers presented in **1) Site Configuration**
- Or from the **System View** screen, scroll left to the **Diags and Reports** screen
- When the **Diags and Reports** screen opens, select **3) Check Numbers**

This completes the Model 3000+ system check out procedure.

WIRING OF KEYED INTERFACE CONNECTORS

WARNING

INCORRECT WIRING AND INSTALLATION WILL LEAD TO UNSAFE FUNCTIONING OF THE GCP. THE USER MUST FOLLOW CORRECT INSTALLATION PROCEDURES AND PERFORM INSTALLATION TESTING TO VERIFY CORRECTNESS OF THE WIRING AND SYSTEM PROGRAMMING PARAMETERS BEFORE PLACING THE GCP IN SERVICE.

External Wiring Connectors and Wire Size

All external wiring to a Model 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 Echelon Lon Talk should use communication grade twisted wires of at least 20 AWG.

The green Screw-Lock connectors for the CPU should use 10 AWG wire.

Wire Preparation

Strip insulation from the end of the wire as indicated in Figure 1.

Table 1   Wire Strip Lengths by Connector

Type of Connection	Strip Length
Screw-down	0.28" (7 mm)
Cage clamp	0.32" – 0.35" (8 – 9 mm)

It is recommended that a stripping tool be used which allows the strip length to be set accurately. The addition of ferrules is not required. Prepare all wires in this fashion.

Wire Insertion

For screw-down type connectors:

- Insert stripped end of a wire into the wire receptor of the connector until it stops.
- Verify that no portion of the wire insulation is in contact with the wire receptor.
- Tighten screw to a torque of 4.5 inch pounds (0.5 – 0.6 Nm). (About the same tightness as required when tightening a signal terminal nut.)
- Pull on wire to determine that it does not move within the connector. (Pull with about the same amount of force as when tightening boot laces.)
- If a wire is suspected of moving when pulled, remove the wire and run the wire receptor through its full range of motion. Repeat the above steps for this wire.
- Repeat the above steps for each wire being attached to the connector.

If any wire receptor fails to hold the wire securely, replace the screw-type connector with an appropriate cage-clamp style connector.

11

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 1)
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
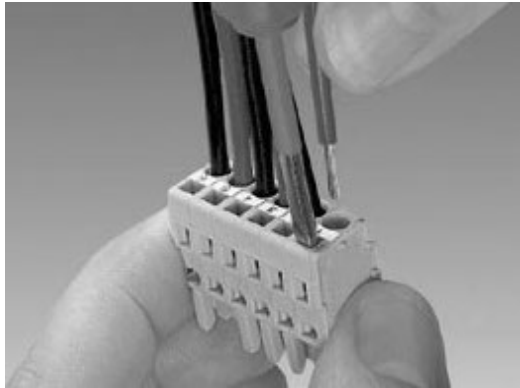
Figure 1   Inserting Wire in Cage Clamp Type Connector

<u>CAUTION</u>

USE THE CORRECT SCREWDRIVER SIZE TO PREVENT DAMAGE TO THE CONNECTOR.

<u>NOTE</u>

The recommended flat-bladed screwdriver blade size is 0.10" wide, 0.020" thick (2.5mm x 0.5mm).

CALIBRATION

The Model 3000+ GCP is programmed through the use of the A80485-1 Display or by the Web User Interface (Web U/I).

Model 3000+ GCP System Calibration consists of GCP Calibration and System Checkout.

WARNING

IF ISLAND STATUS IS CHANGED FROM NO TO INTERNAL, ISLAND RECALIBRATION MAY BE REQUIRED.

NOTE

If the CPU module MCF or the Track Module MEF is changed, requisite programming and recalibration will be required.

RECALIBRATION & REPROGRAMMING REQUIREMENTS DUE TO MODULE REPLACEMENT

The recalibration requirements due to the replacement of a module are shown in the following table.

Table 2   Recalibration & Reprogramming Requirements Due to Module/Chassis Replacement

Module/Assembly Replacement		Calibration Required				Reprogramming Required
		GCP CAL	GCP APP	GCP LIN	ISL CAL	
A80403	CPU	No	No	No	No	No
A40418	Track	Yes[1]	Yes/No[2]	Yes/No[2]	Yes	No
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
A80740	Chassis	Yes	Yes	Yes	Yes	Yes

Notes:
1. For track with changed A80418
2. May be bypassed using **BYPASS** button instead of the **START** button in calibration procedure
3. Plug-in located on chassis behind CPU Module. Requires same MCF as previously in use.

RECALIBRATION REQUIREMENTS DUE TO PROGRAM CHANGES

The GCP program changes that require track recalibration are indicated in the following table.

Table 3   Recalibration Requirements Due to Program Changes

Program Changes	Calibration Required				Reprogramming Required
	GCP CAL	GCP APP	GCP LIN	ISL CAL	
Increased Number of Tracks	Yes[1]	Yes[1]	Yes[1]	Yes[2]	Yes[1]
GCP Frequency Change	Yes[3]	Yes[3]	Yes[3]	No	No
Island Frequency Change	No	No	No	Yes[4]	No
Application changed from: Unidirectional to Bidirectional or Bidirectional to Unidirectional	Yes[5]	Yes[5]	Yes[5]	No	No
Transmit Level Changed from Medium to High or High to Medium					
Approach Length 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
Set to Default selected (and track parameters listed above changed from original settings)	Yes[9]	Yes[9]	Yes[9]	Yes[9]	Yes[10]

Notes:
1. For added tracks only
2. If island is used
3. For tracks with new GCP frequencies
4. For tracks with new island frequencies
5. For changed tracks only
6. If EZ varies more than 2
7. Can be bypassed
8. If changed to internal
9. For all tracks
10. Complete reprogramming required

RECALIBRATION REQUIREMENTS DUE TO TRACK EQUIPMENT CHANGES

Changes made to the existing track equipment that require track recalibration are shown in the following table.

Table 4   Recalibration Requirements Due to Track Equipment Changes

Program Changes	Calibration Required			
	GCP CAL	GCP APP	GCP LIN	ISL CAL
Termination Shunts Changed	Yes[1]	No	No	No
Termination Shunts Moved to New Location[3]	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
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
Notes: 1. For changed tracks only. 2. Calibration can be bypassed. 3. Approach distance in the Program menu must be changed to reflect the new approach distance prior to the start of track calibration. Otherwise, the system will prompt for recalibration.				

15

CALIBRATION PROCEDURES

WARNING

GCP TRACKS MUST BE VERIFIED TO BE FREE OF ANY AND ALL TRACK-RELATED ISSUES PRIOR TO BEING PLACED IN SERVICE. ANY TRACK-RELATED ISSUES THAT ARE IDENTIFIED MUST BE CORRECTED AND VERIFIED TO BE CORRECT PRIOR TO FINAL CALIBRATION AND LINEARIZATION.

NOTE

If the outlined procedures fail, they should be repeated once. If the error repeats, refer to the Troubleshooting section.

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)

GCP Calibration may also include the following manual procedure:

- Tuning the Tuned Joint Coupler (TJC)

WARNING

THE APPROACH AND LINEARIZATION PROCEDURES REQUIRE THE RECORDING OF THE COMPUTED APPROACH DISTANCES IN FEET (NOT THE EZ VALUE).

WHEN EDITING THE COMPUTED APPROACH DISTANCES, ENTER THE VALUE IN FEET (NOT THE EZ VALUE).

FAILURE TO ENTER DISTANCES IN FEET MAY RESULT IN SHORTER WARNING TIMES THAN INTENDED.

PERFORM THE FOLLOWING TUNING PROCEDURES ON THE TUNED JOINT COUPLER PRIOR TO BEGINNING THE LINEARIZATION PROCESS.

16

TUNING THE 62785-F TUNED JOINT COUPLER
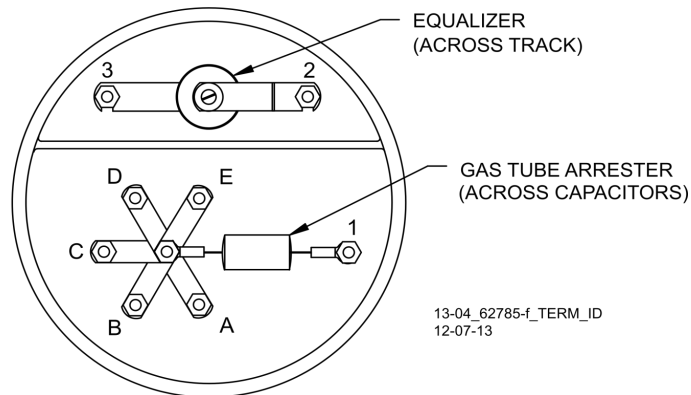
Figure 2   Tuned Joint Coupler, 62785-f

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 Coupler is available in standard Siemens frequencies of 156 Hz through 970 Hz.

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 5

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.

17

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 5 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 5 are observed.

Table 5 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.

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.

NOTE

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

The 62785-f Coupler is tuned by means of five standard AREMA binding posts which are labelled A through E (see Figure 3) and equipped with a special gold AREMA adjustment nut.

18
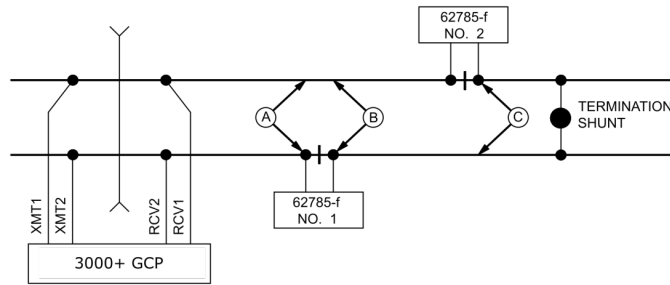
Staggered Insulated Joints
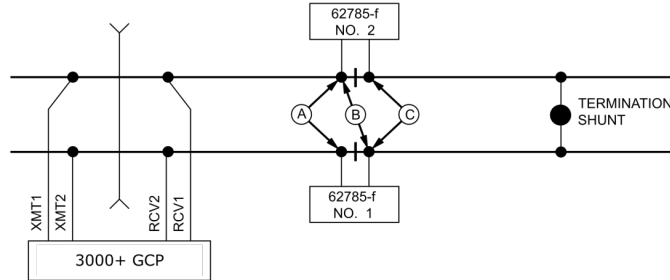
13-04_INST_DGRM_62785-f
12-07-13

Non-Staggered Insulated Joints

Figure 3   Shunt Placement for 62785-f Bypass Coupler

Table 5   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)	MINIMUM DISTANCE TO SECOND SET OF INSULATED JOINTS (FEET)
86	N/A	N/A
114	N/A	N/A
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.		

19

Table 6   Field Tuning Procedure #1

See Figure 3 above for locations referred to in this table.	
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)
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.
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.
Step 10	Completely recalibrate the Model 3000+ GCP to perform all operational checks while observing the smooth change in the EZ value across the couplers during a train move.

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.

Table 7 Field Tuning Procedure #2 for Couplers

	See Figure 3 above for locations referred to in this table.
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 7).
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.
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.

CALIBRATING A TRACK MODULE

WARNING

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. BEFORE STARTING CALIBRATION, ENSURE THAT TRACK BONDING IS GOOD, THAT ALL TERMINATION SHUNTS, INSULATED JOINT COUPLERS, AND TRACK ISOLATION DEVICES ARE INSTALLED AND THAT NO TRAINS ARE IN THE GCP APPROACHES.

NOTE

During approach calibration of the Model 3000+ GCP, when the island is de-energized, the EX value is locked to 100. During a new installation, an upgrade, or a Track Card replacement, with the EX locked at 100, the EZ may appear abnormally low. Once the island is energized, the EX unlocks and the EX and EZ display actual approach values based upon field conditions. The island for a given track module does not necessarily have to be on that particular module (or any module if an external island), depending upon circuit arrangement.

Track Module calibration is required if the Display's Track Detail screen depicts:

- GCP Calib Req
- Island Calib Req

Calibration screens depict:

- GCP Calib Req
- Approach Calib Req
- Linearization Calib Req
- Island Calib Req

During calibration, the Track Module 4-character display shows one of the following:

- GCAL – GCP Calibration in process
- GAPP – Approach Calibration in process
- GLIN – Linearization Calibration in process
- ICAL – Island Calibration in process

22

The Calibration screen indicates which calibrations are required with an empty box in each calibration select button. A check mark is displayed in the box when the indicated calibration is complete.

Table 8 GCP Calibration

Step 1	If transfer module A80468 is present, set the transfer switch to **MAIN**.
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 only shows enabled tracks.
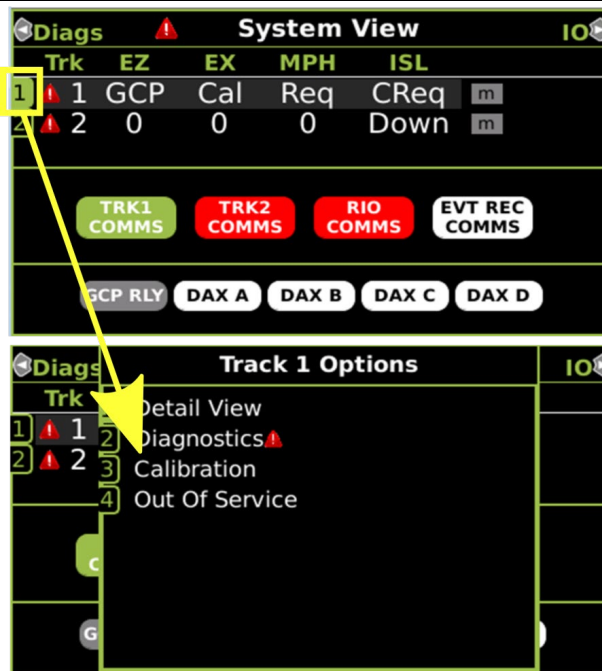
Figure 4   Opening the Calibration Window

Step 4	From the **Track Options** menu, select **3) Calibration** (See above). The Track "N" Window appears, depicting the Calibration status of: • GCP, along with EZ and EX values • Approach, along with Computed Distance • Linearization, along with Linearization Steps • Island, along with Island Status and Z Level If Calib Req appears on any of the above lines, calibration is required.

23

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. If a **Failed** message is received, try the calibration again. If it fails a second time, verify that the wiring is correct.

Figure 5   Start Calibration
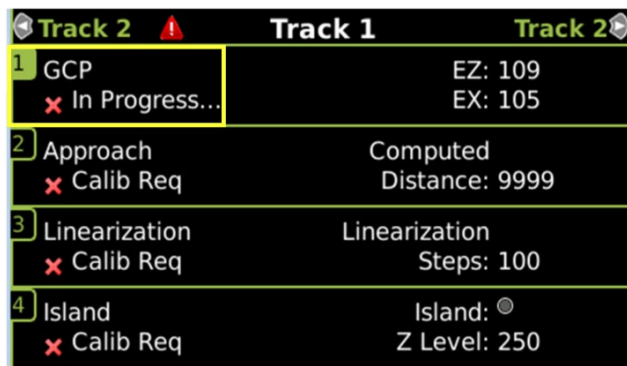
Figure 6   Calibration In Progress and Complete

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.
Step 7	If the cab signal was turned off in Step 2, turn it on.

24

The linearization procedure compensates for lumped loads in the Model 3000+ GCP approach that can affect the linearity of EZ over the length of the approach as a train approaches the crossing. The linearization is essential to improving warning time accuracy. Linearization may be affected by: narrow band shunts in other frequencies, which may occur when other GCP approaches overlap the GCP approach circuit; other track equipment in the GCP approach such as audio frequency, overlay track circuits, coded track circuits, etc.; and missing or incorrect track battery chokes.

WARNING

USE THE FOLLOWING BYPASS PROCEDURE ONLY IF THE CURRENT COMPUTED APPROACH DISTANCE AND LINEARIZATION VALUES ARE KNOWN TO BE CORRECT.

NOTE

If an in-service 3000+ GCP requires only that the GCP Calibration procedure be performed, the BYPASS procedure must be completed for both Approach and Linearization.

Table 9   Approach & 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**.

WARNING

THE APPROACH AND LINEARIZATION PROCEDURES REQUIRE THE RECORDING OF THE COMPUTED APPROACH DISTANCES IN FEET (<u>NOT THE EZ VALUE</u>). FAILURE TO ENTER DISTANCES IN FEET MAY RESULT IN SHORTER WARNING TIMES THAN INTENDED.

25

NOTE

Calibration Distance and Linearization Steps values are site historical data and must be recorded as specified in Table 10 and Table 11 in this manual as well as in SIG-00-17-03 Table 6-14 on both the History Card and the Site Cutover form.
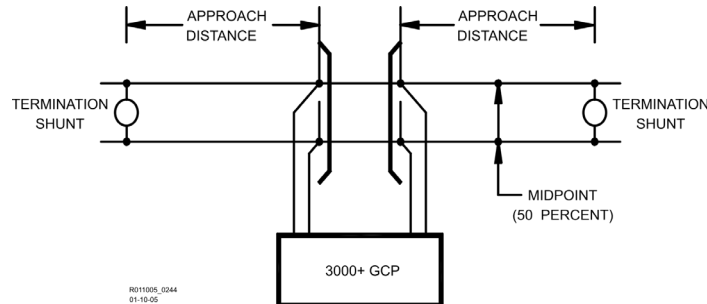
Figure 7   Midpoint Location

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 10 and Table 11). 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 10 and Table 11).
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.

26

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 10 and Table 11).
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 7).
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 10 and Table 11). The value should be between 68 and 132. If not, refer to Troubleshooting.
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 10 and Table 11) are the same as the values displayed on the **Track "N"** window.
Step 11	Remove the hardwire shunt from the track.
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.

27

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 10 and Table 11).
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 10 and Table 11)
Step 18	Accurately (within 1%) locate the midpoint of this approach and move the hardwire shunt to that point on the rails (see Figure 7)
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:
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 10 and Table 11). 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.

28

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 Calibration Values History form (Table 10 and Table 11), Step 9, go to Step 31. If the Linearization Steps value for the second approach (Table 10 and Table 11), 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 8, appears.

Figure 8   Enter New Values

Step 26	Enter the Linearization Step Value (Linearization Steps) recorded for the first approach, Step 9, Calibration Values History form (Table 10 and Table 11) 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, Calibration Values History form (Table 10 and Table 11), 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 (Table 10 and Table 11) for the first approach are the same as those displayed on the **Track "N"** window (see Figure 9).

Figure 9   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.

Table 10   Calibration Value History Form, 1st Approach

<table>
<tr><td>1</td><td colspan="6">CALIBRATION VALUES HISTORY FORM (APPROACH AND LINEARIZATION CALIBRATION)</td></tr>
<tr><td colspan="7">GCP#_____
Date of Calibration:_____
Name:_____
Location Information: _____</td></tr>
<tr><td colspan="7">CALIBRATION VALUES HISTORY</td></tr>
<tr><td></td><td colspan="2">1st Approach E/W (   )
N/S (   )</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td colspan="2">Calibrated Values (Step 1)</td><td colspan="2">Hardwire Across Termination Shunt (Step 2)</td><td>Computed Approach Distance (Ft) (Computed Distance) (Step 5)</td><td>Linearization Step Value (Linearization Steps) (Step 9)</td></tr>
<tr><td></td><td>EZ</td><td>EX</td><td>EZ</td><td>EX</td><td></td><td></td></tr>
<tr><td>Track 1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Track 2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Table 11   Calibration Value History Form 2nd Approach

1	CALIBRATION VALUES HISTORY FORM (APPROACH AND LINEARIZATION CALIBRATION)					
GCP#_____ Date of Calibration:_____ Name:_____ Location Information: _____						
CALIBRATION VALUES HISTORY						
	2nd Approach E/W ( ) N/S ( )					
	Calibrated Values (Step 1)		Hardwire Across Termination Shunt (Step 14)		Computed Approach Distance (Ft) (Computed Distance) (Step 17)	Linearization Step Value (Linearization Steps) (Step 21)
	EZ	EX	EZ	EX		
Track 1						
Track 2						

NOTE

This completes Approach and Linearization Calibration. If the system includes an internal island, proceed to Island Calibration (Island). If not, proceed to Table 12.

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

NOTE

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.

Table 12   Island Calibration

Step 1	If an Island circuit is used, select **4) Island** from the Display Main Screen. • The Island Calibration Window appears.
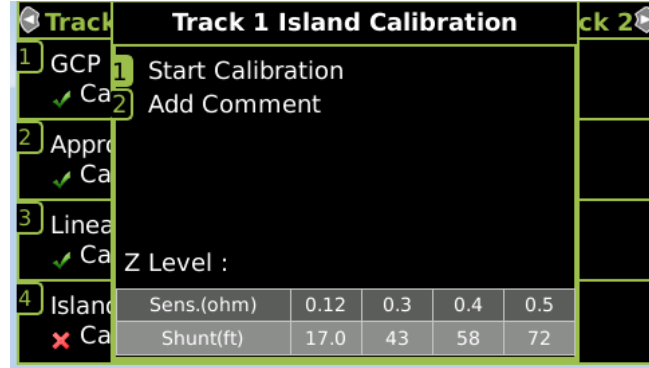
Figure 10   Island Calibration Window

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 10. • Ensure EZ value is less than or equal to 5.
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. Proceed to the Island Calibration Secondary Procedure (Table 13)

32

Table 13   Island Calibration Secondary Procedure

Step 1	Ensure that no external equipment is connected to the serial port on the track board.
Step 2	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. See Figure 11.

Figure 11   Island Calibration Window

Step 3	Remove the jumper(s) and allow the crossing to recover.
Step 4	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.
Step 5	Remove the jumper(s) and allow the crossing to recover.
Step 6	If either Island Z value is 40 or greater, perform a full island calibration as detailed in Table 12 Island Calibration.

Step 7	The full calibration in Table 12 Island Calibration includes repeating the steps in this procedure. Performing a full calibration will confirm if the board requires repair or just calibration.
Step 8	If either Island Z value is still 40 or greater after this calibration procedure, 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. 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 calibrations are complete for each remaining MAIN side Track Module installed, do the following:

- If a **Standby** set of modules is present, go to Standby Modules Calibration.

Table 14   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

Table 15   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 8 GCP Calibration.
Step 6	Follow the Calibration steps listed in Table 9 Approach & Linearization Calibration Bypass Procedure.
Step 7	Fill out the Calibration steps listed in Table 10 Calibration Value History Form, 1st Approach for the first approach, then the steps in Table 11 Calibration Value History Form 2nd Approach for the second approach.
Step 8	Follow the Calibration steps in Table 12 Island Calibration and Table 13 Island Calibration Secondary Procedure 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.

35

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

AFTER INITIAL PROGRAMMING OR PROGRAMMING MODULE, TRACK, OR WIRING CHANGES, TESTS MUST BE PERFORMED TO VERIFY PROPER OPERATION OF THE GCP PRIOR TO PLACING A SYSTEM IN SERVICE.

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.

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.

Table 16   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 at the programmed preemption warning time for advance 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 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

39

TROUBLESHOOTING

The GCP Display is the main diagnostic tool available to maintenance personnel.

The EZ and EX are shown for each track. A track status area is displayed for each track module in the system. The approximate speed of a train approaching the crossing is shown as a positive (+) number. The approximate speed of a train moving away from the crossing is shown as negative (-) number.

NOTE

If the Display is replaced, the logs remain on the removed Display, and any logs stored on the new Display will be shown when called.

Whenever any files are being saved using the Display, they may be saved either to another computer or to a USB Device.

SYSTEM STATUS INDICATORS AND LOGS

Detail View Track Status Window Color Scheme

From the System View screen, select the number of a Track to review. When the **Track "N" Options** window opens, select **1) Detail View**. The Module Details window opens.
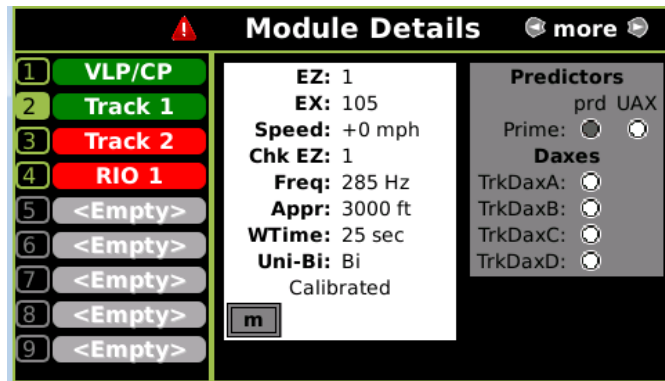
Figure 12   Track Detail Screen

The Module Details window has two sections. The left section utilizes the following colors:

- Green: The module is currently active and healthy
- Red: The module is currently active and unhealthy
- Grey: The module/slot is inactive and is depicted by <EMPTY>

40

The right section displays various information, with the type of information displayed depending upon the type of module depicted:

- VLP/CP Module
- Track Module

Selecting the VLP/CP Module line provides:

- Battery Voltage
- Internal Voltage
- Internal Temperature

Selecting the Track Module line provides information on four screens. The default screen depicts:

- Track Status details to include status colors
  - Gray: The Track Module is healthy, and no train is in the approach
  - White: The Track Module is healthy, and a Train is in the approach
  - Red: The Track Module is unhealthy
  - Flashing blue: The GCP or the GCP/Island is out of service.
- Predictor Status: selecting the Right Arrow once depicts:
  - Island Status
  - I/O Status
- Selecting the Right Arrow three times depicts the Track Programming values
- Selecting the Right Arrow a third time depicts TCN Status
- Selecting the Right Arrow a fourth time depicts EZ/EX Limits Status

Track Function Status: the status of optional track functions is displayed at the end of each row depicting active tracks.

- Enhanced Detection
  - "ed" indicates enhanced detection has been activated for the current train movement.
  - "ed" is only displayed when "Enhanced Detection Used" is set to YES and inbound poor shunting is detected.
- Xfer Delay MS to GCP
  - "m" indicates that the predictor switched to a motion sensor due to MS GCP Ctrl input being low or Xfer Delay MS to GCP timer is running.

41

System status:

- No Red DIAG triangle on top row = all tracks are calibrated
  - track conditions are within normal operating parameters
  - system is fully functional
- Red DIAG triangle on top row = unhealthy system or track condition exists.
  - displays system status
  - status window for affected track also displays red

Additional information is obtained by selecting the item number, which opens the **Track "N" Options** window and selecting **1) Detail View**. The **Module Details** window opens.

The **2) Diagnostics**, **3) Calibration**, and **4) Out Of Service** menus are also available when the track section is tapped in the main status window.

NOTE

The recorder speed information is intended solely as a maintenance tool.

The train speeds are relative and may be affected by track parameters that include:

- Insulated joint proximity
- Insulated joint couplers
- Overlapping termination shunts
- 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.

Reports and Logs

NOTE

If the Display is replaced, the logs remain on the removed Display, and any logs stored on the new Display will be shown when called.

There are three types of logs and one report that may be accessed as listed below:

- Event Log
- Diagnostic Log
- Train History Log
- Configuration Report

Event Log

The Event Log contains events generated by the CPU and sent to the display where they are time stamped, added to a log, and stored on the Display. In a redundant 3000+ system the Display log will contain events from both the Main and Standby systems.

Diagnostic Log

Combines entries for both Main and Standby.

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.

Train History Log

Contains a log of the last 20 train moves. The log shows which track the train was detected on, the recorded warning time in seconds, the detected train speed, the train speed at the island, and the average train speed.

Can be cleared by maintainer after review.

Select a train move entry and then the **VIEW** button to display the Train Move History Detail screen which includes:

- Average speed of train move
- Route of the train move, which is useful when multiple track circuits are used

Configuration Report

The Configuration Report can be created from the Configuration menu. It will show all the configuration parameters and version numbers.

43

SYSTEM TROUBLESHOOTING

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.

Diagnostics

Each module also has diagnostic LEDs, and may have a four-character display, that assists in setup, calibration, diagnostics and trouble-shooting. Refer to the Table of Contents at the front of this handbook to locate the exact Module required for LED and four-character display information.

When an unhealthy system or track condition exists, a red warning triangle is displayed. The status line for the affected track also displays a red warning triangle.

44

System Diagnostics

The Diagnostics Window can be accessed by:

1. Selecting the track by pressing the requisite button, then selecting **2) Diagnostics**. The DIAG screen opens.
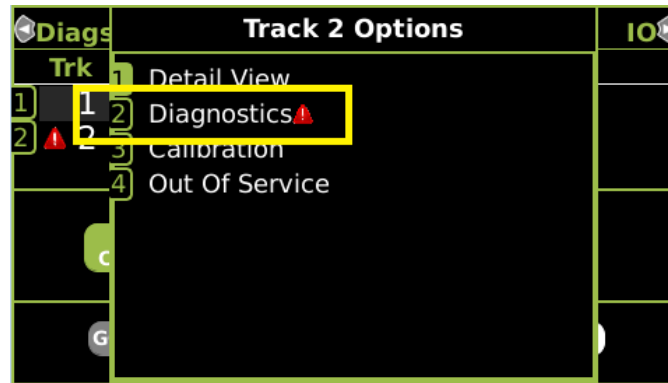
Figure 13   Unhealthy Track Module Diagnostics

Selecting one of the displayed error descriptions displays the diagnostic message shown in Table 17.

This screen lists the cause and remedies for the selected error. Use the UP and DOWN buttons as needed to view all of the data.

Troubleshooting the Modules

Use the following tables to troubleshoot the individual modules.

Table 17   Diagnosing CPU Module Problems

Display		Cause	Remedy
Panel	**Diag / Desc**		
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 / 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.	

45

Display		Cause	Remedy
Panel	**Diag / Desc**		
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.
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

Display		Cause	Remedy
Panel	**Diag / Desc**		
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.
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.

47

Display		Cause	Remedy
Panel	Diag / Desc		
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.
UCFG / VLP Unconfigured (Diag3018) / VLP is unconfigured and not communicating with I/O modules		Usually due to: Incorrect MCF CRC MCF not loaded MCF not stored in ECD (ECD replaced)	Check other diagnostic message for exact cause.

Table 18   Diagnosing Track Module Problems

Display		Cause	Remedy
Panel	Diag / Desc		
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

SIG-00-18-01   FEBRUARY 2020
Version: A.1

| Display | | Cause | Remedy |
Panel	Diag / Desc		
HIEZ / High EZ (Diag1002) / High EZ or high EZ check value detected		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	

Lockout and Release Track

If an EZ or check EZ value 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.

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**.

To clear the "LockOut" from the Web UI, click the yellow Lock-out message.

This will cause the following Local User presence message to be displayed:

Web User Permission
Do you allow Web User to change Protected Values and Update Software?
Press Back to deny
Or
Enter to allow

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.

Transfer Output

When the 3000+ GCP system is healthy, the transfer output is energized (on) as shown by LED2 lit 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.
- The module cannot provide the 12-volt output.

Troubleshooting information regarding each module may be found in Table 17 and Table 18.

50

Troubleshooting Flowchart
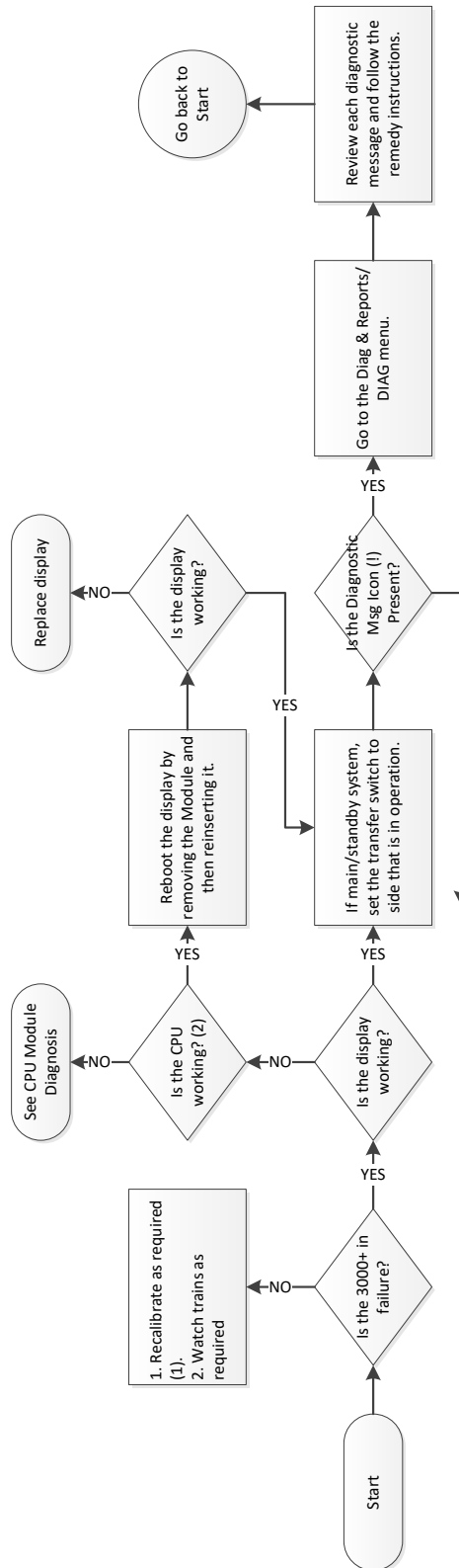
Figure 14   Troubleshooting Flowchart (Part 1)

51
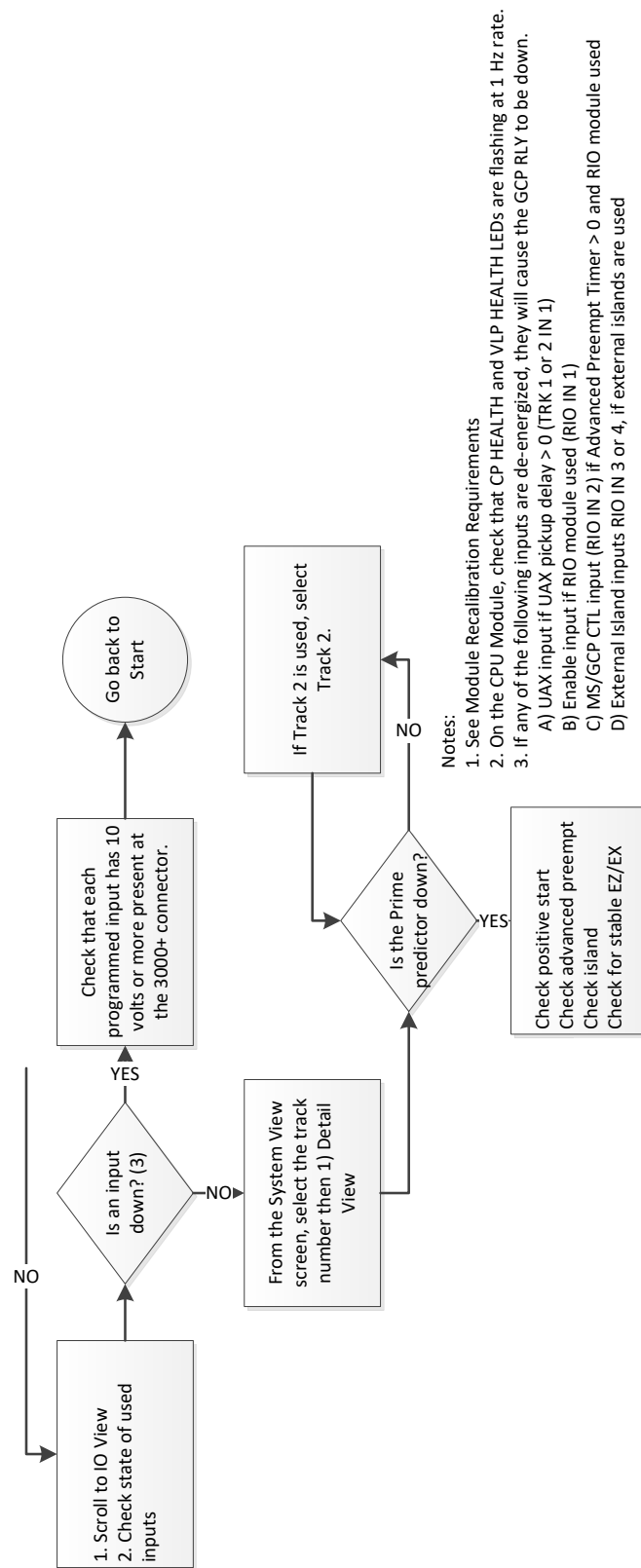
Figure 15   Troubleshooting Flowchart (Part 2)

The flowchart contains the following elements:

- **Go back to Start** (terminator)
- **Check that each programmed input has 10 volts or more present at the 3000+ connector.**
- **If Track 2 is used, select Track 2.**
- **Is the Prime predictor down?** (decision) — NO / YES
- **Is an input down? (3)** (decision) — YES / NO
- **From the System View screen, select the track number then 1) Detail View**
- **1. Scroll to IO View 2. Check state of used inputs**
- Check positive start / Check advanced preempt / Check island / Check for stable EZ/EX

Notes:
1. See Module Recalibration Requirements
2. On the CPU Module, check that CP HEALTH and VLP HEALTH LEDs are flashing at 1 Hz rate.
3. 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 IN 1)
   C) MS/GCP CTL input (RIO IN 2) if Advanced Preempt Timer > 0 and RIO module used
   D) External Island inputs RIO IN 3 or 4, if external islands are used

TESTING TRACKSIDE EQUIPMENT

Test trackside equipment as per the steps listed below.

Table 19   Insulated Joint Coupler Test

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.

Table 20   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 shunt 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 shunt 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.

Testing Termination Shunts: Hardwire, Wideband, and Narrow Band (NBS)

Table 21   Termination Shunt Test

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.

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 or within the island circuit including the feed wires.

Low EX

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.

54

When Low EX occurs at an in-service crossing, use Table 22 Low EZ Qualification Test 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

DO NOT LOWER THE LOW EX ADJUSTMENT BELOW 39 IF THERE IS NOT A FIVE POINT DROP IN EZ.

Table 22   Low EZ Qualification Test

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.

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.

Table 23   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

<u>WARNING</u>

DO NOT USE A NARROW BAND SHUNT TO REPLACE A DEFECTIVE COUPLER.

<u>CAUTION</u>

FOLLOWING AN INSTALLATION OF DUAL COUPLERS OR DUAL SHUNTS AROUND INSULATED JOINTS, VERIFY PROPER OPERATION OF THE TRACK CIRCUIT PRIOR TO PLACING IT INTO OPERATION.

Troubleshooting 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.

57

Table 24   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.
The Enable input is de-energized	The RIO module is used and the ENABLE input (IN1) is de-energized.

58

Reason	Cause
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

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.

Troubleshooting a Physical 3000+ GCP Input

After it is determined that a problem is caused by a de-energized physical input, use Table 25 Troubleshooting Inputs to isolate the cause.

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.

59

Table 25   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 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**.

60

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, 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 more than 1.0 volt, 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 event 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.

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.

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).

This section describes:

- How to take a track out of service using either: the display keypad, the display plus Out Of Service Inputs, or just the Out Of Service Inputs.
- 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

62

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.

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. The options are:

- Display
- Display + OOS IPs
- OOS IPs

<div align="center">

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.

</div>

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.

<div align="center">

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.

</div>

To Take a Track Out of 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"** window opens. Select the **4) Out Of Service** option from the track options menu to see the **Out of Service** screen, shown below.
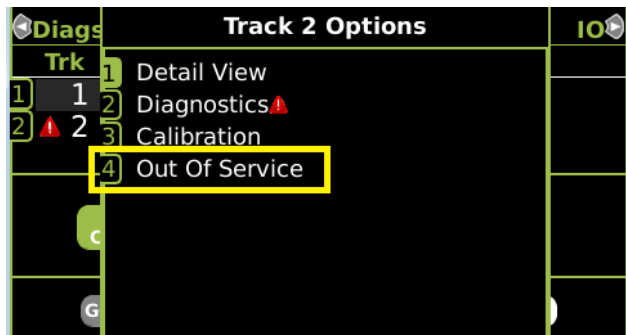
Figure 16   Track Out of Service Menu
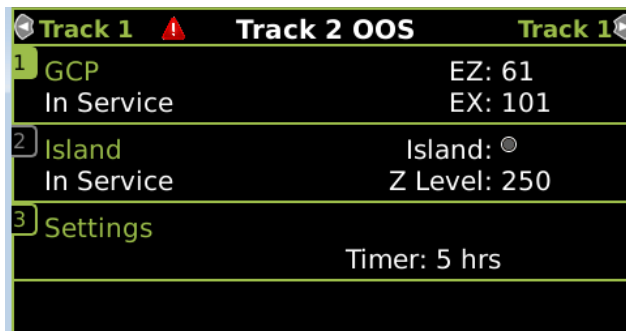
Figure 17   Track Out of Service Screen

First, select the Out of Service timeout. 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 the timer is not used.

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.

64

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 showing:

Are you sure you want to take GCP Out of Service?
Press Enter to Confirm and Continue
OR
Press Back to Cancel Request

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. Once the GCP approach is taken out of service the **Track "N" OOS** window shows **1) GCP Out of Service**.

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 **Track "N" ISL Out of Service** menu, press **1) Take Track "N" ISL Out of Service** to continue taking the island out of service. This will bring up the second confirmation screen showing:

Are you sure you want to take ISL Out of Service?
Press Enter to Confirm and Continue
OR
Press Back to Cancel Request

Press the **Enter** to continue. Once the Island is taken out of service the **Track "N" OOS** window will show the Island as Out Of Service.

Returning a Track to Service

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 18. Press 1 from the keypad, this will put the GCP back in service with no further confirmations.
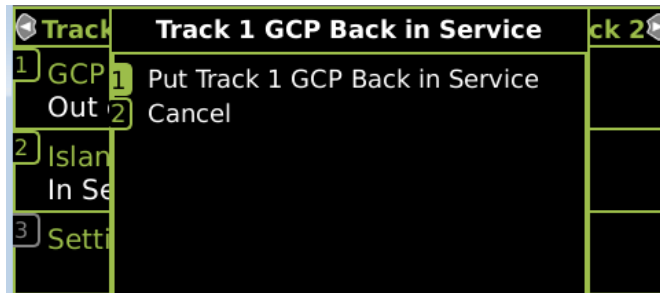
Figure 18   Put GCP Back in Service

NOTE

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

ENSURE THAT TRACK OUT OF SERVICE INPUTS ARE RETURNED TO DE-ENERGIZED WHEN THE TRACK IS PUT BACK INTO SERVICE.

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 Display.

WARNING

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

66

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.

PROGRAMMING

The 3000+ GCP programming is divided into three sections:

- Site Configuration
- GCP Programming
- Display Configuration

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.

Site Configuration

This section is used to set non-vital information, such as the Location, DOT number, ATCS address, etc.

GCP Programming

The Main Program Menu provides submenus that allow the user to navigate to different sections of the program.
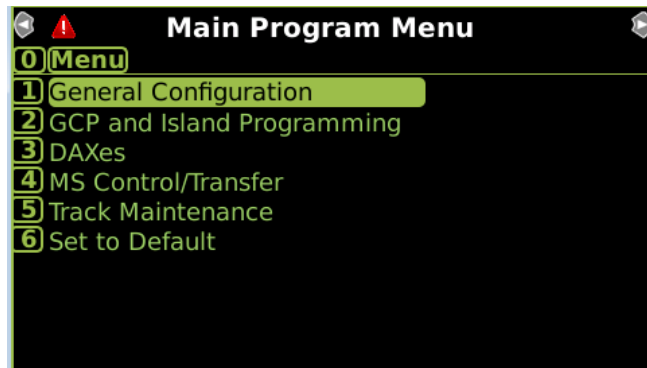
Display Configuration

This section is used to set non-vital parameters used by the display.

67

SECURITY

There are two security settings: None, and Maintainer. The default setting is None. When security is set to **Maintainer**, the maintainer level password is enabled and the GCP Programming parameters cannot be changed using the display keypad unless the correct Maintainer password is entered.

USB FILE STRUCTURE

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.

<u>**WARNING**</u>

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.

<u>**CAUTION**</u>

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 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 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)

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:

- SIEMENS
  - <DOT#>-<SITE NAME>
    - GCP4000
      - CONFIGURATIONS
        - .PAC FILES
      - REPORTS
        - <YYYY><MON>
- GCP4000
  - APPLICATIONS
    - .MCF
    - .PAC
  - EXECUTIVES
    - .MEF
    - .TGZ
    - .BIN

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 Siemens\<DOT#>-<Sitename>\GCP4000 folder.

Download/Upload Configuration (Pac) Files via USB Device

To download configuration file to USB 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**.
4. The Download configuration window opens, stating: **Download PAC File…Please do not Remove USB**.
5. When the file has downloaded from the display to the USB Drive, the PAC File Download window opens, stating: **Download Completed** then listing the file location, and stating: **Press Any Key to Continue**.

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:
Siemens\<DOT#>-<Site NAME>\GCP4000\Configurations

70

UPLOAD CONFIGURATION FILE TO GCP

The PAC file to be loaded first needs to be put on the USB stick in a folder called GCP4000\applications as described in preceding section.

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**.
4. The **Unlock Warning** window opens, displaying the message **Upload configuration will place the GCP in a restrictive state and activate the crossing warning system. Do you want to continue? Enter to continue Or Press Back to cancel request**.
5. The Save Configuration window opens, displaying the following message: **Do you want to save current configuration? Press Back to skip saving the existing configuration Or Enter to continue.**
6. 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.
7. 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.
8. 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.
9. The **Select File** window opens. Scroll down to select the correct PAC file. Select **Enter**.
10. The Upload Configuration window opens, stating: **Uploading configuration file…**
11. 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. 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

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

71

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 corner.

UPLOADING SOFTWARE USING A USB DEVICE

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.

Installing Software on CPU Module

<u>**WARNING**</u>

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.

<u>**CAUTION**</u>

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 or I/O modules.

Figure 19   Null Modem Adapter

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

- CPU Module
    - o VLP Port – File: VPH04_80.MEF (CPU II+ VLP executive software begins with VPH)
    - o DIAG (CP) Port – File: NCG04_80.MEF (CPU II+ CP executive software begins with NCG)
    - o DIAG (CP) Port – File: GCP3K-01-00.mcf, CRC= 2CF3E617
- Track Module
    - o DIAG Port – File: GCP04_80.mef (GCP Track module executive software starts with GCP)

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

73

Replace the VLP MEF

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**.
5. The Upload to System window opens stating: "Please check the serial cable connection before uploading. Press any key to continue."
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**. When asked by the Setup program to Erase the MEF, select **1) Yes**.
8. The **Select File** window opens. Scroll down to select the file to be installed. 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**.
11. The **Upload to System** window opens and states: "Exit software finished rebooting the module."
12. Press the **Back** button.

Replace the CP MEF

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**.
8. When asked by the Setup program to Erase the MEF, select **1) Yes**.
9. The **Select File** window opens. Scroll down to select the file to be installed, in this example: NCG04_80.MEF. Select **Enter**.

74

10. 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.
11. 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**.
12. The **Upload to System** window opens and states: **Exit software finished rebooting the module**.
13. Press the Back button. The USB SW Updates menu is shown.

Change the MCF

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. Select **2) Change MCF**.
6. When asked by the Setup program to Erase the MCF Flash, select **1) Yes**.
7. The **Select File** window opens. Scroll down to select the file to be installed, in this example gcp3k-01-00.mcf. Select **Enter**.
8. 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.

<u>**NOTE**</u>

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

75

Change the MCFCRC

1. Select **1) Change MCFCRC**. The **Enter MCF CRC for GCP** window opens.
2. Use the back arrow to clear the number that appears in the window. Use the keypad to enter the CRC issued with the software revision instructions. The CRC will always be 8 characters consisting of 0-9 and A-F. Once the number has been entered and verified correct, select **Enter**.
3. 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.
4. Press the Back button. Select **0) Exit View**.

This completes "Installing Software on the CPU Card."

Installing Software on the 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 (CP) 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.** When asked by the Setup program to Erase the MEF, select **1) Yes**.
7. The **Select File** window opens. Scroll down to select the file to be installed, then select **Enter**.
8. 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.
9. 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."
10. Press the **Back** button. If there is a second track module, repeat the procedure for the other track modules in the MAIN section of the GCP.

76

Installing Software on the 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 (CP) 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 after transferring the system to STANDBY side.

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

Transfer Card, A80468

The Transfer Card software is not field upgradeable and software changes must be performed at the factory.

78

Downloading Reports and Logs

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.
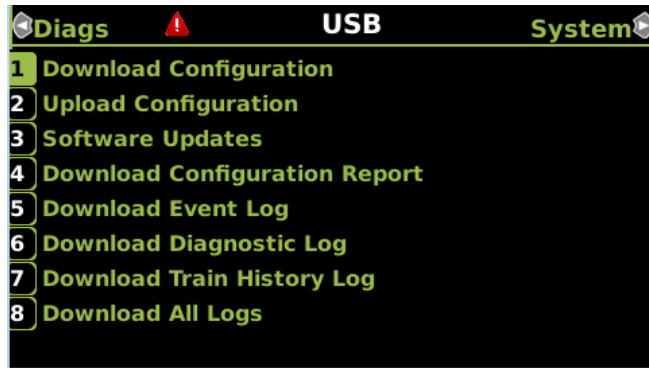
Figure 20 USB Menu

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**.

The file will be stored on the USB stick in a folder called:
Siemens\<DOT#>-<Site NAME>\gcp4000\Reports\yyyymmdd
With a file name given by: system_report_dd-mm-yyyy.txt

NOTE
Due to software commonality issues, the USB Display device utilizes folders titled GCP4000 rather than GCP3000+.

Repeat the above procedure for downloading any other desired log.

79

APPENDIX A   HARDWARE

CHASSIS CONFIGURATION

Each 3000+ GCP consists of:

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

Case Assemblies

Each 3000+ GCP case assembly consists of:

- powder-coated steel case
- backplane-mounted motherboard

Table 26   3000+ GCP Case Feature Overview

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

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

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
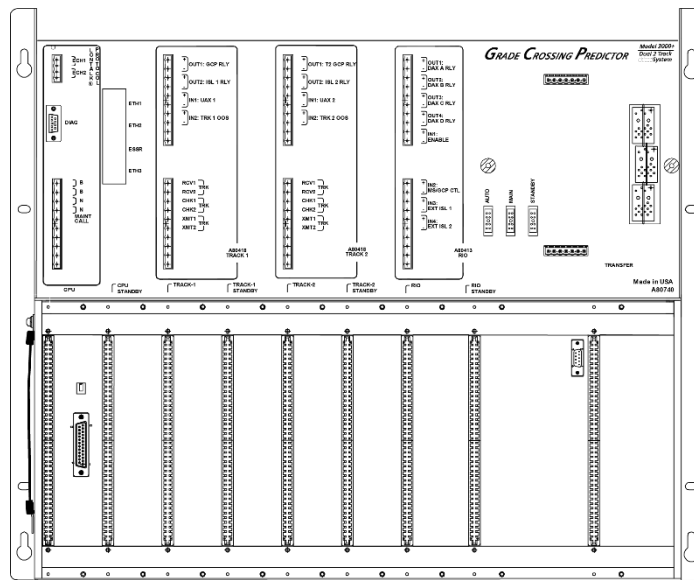
Figure 21   A80740 Dual Two Track Case

3000+ Case Modules and Subassembly

The A80740 case with the following modules installed is shown in Figure 22:

- A80403 Central Processor Unit Plus (CPU II+) 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)
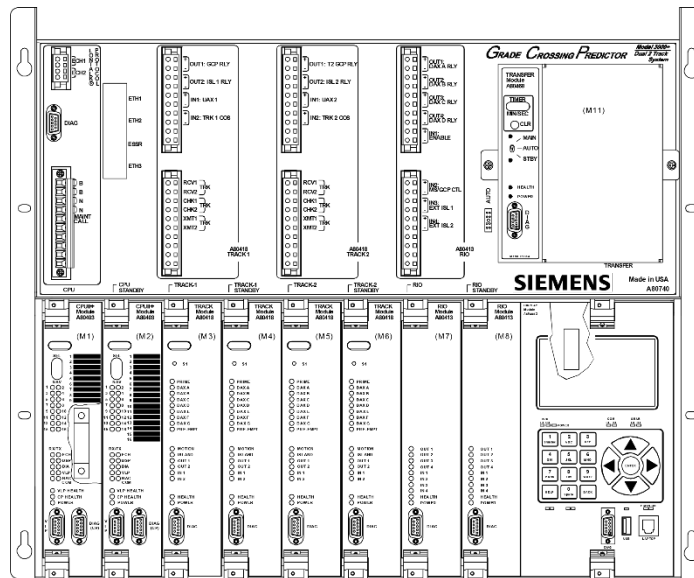
Figure 22   A80740 Case with Modules Installed

81

During normal operation, power is applied to the module set selected from the A80468 Transfer assembly.

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 on selecting Transfer Interval Time for further information and 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

Interface Connector to Module Relationship

The relationship between the interface connectors and the modules is shown in Table 27.

Table 27   Module to Interface Connector Relationship

MODULE	SLOT POSITION	INTERFACE CONNECTOR
A80403	M1	CPU
A80403	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

82

PLUG-IN MODULES AND SUBASSEMBLIES

CPU II+ Module, A80403

The A80403 CPU II+ Module is a central processing unit that:

- provides all vital logic processing functions for all 3000+ GCP chassis
- controls GCP LAN and non-vital serial communications
- interfaces with front panel CPU connectors
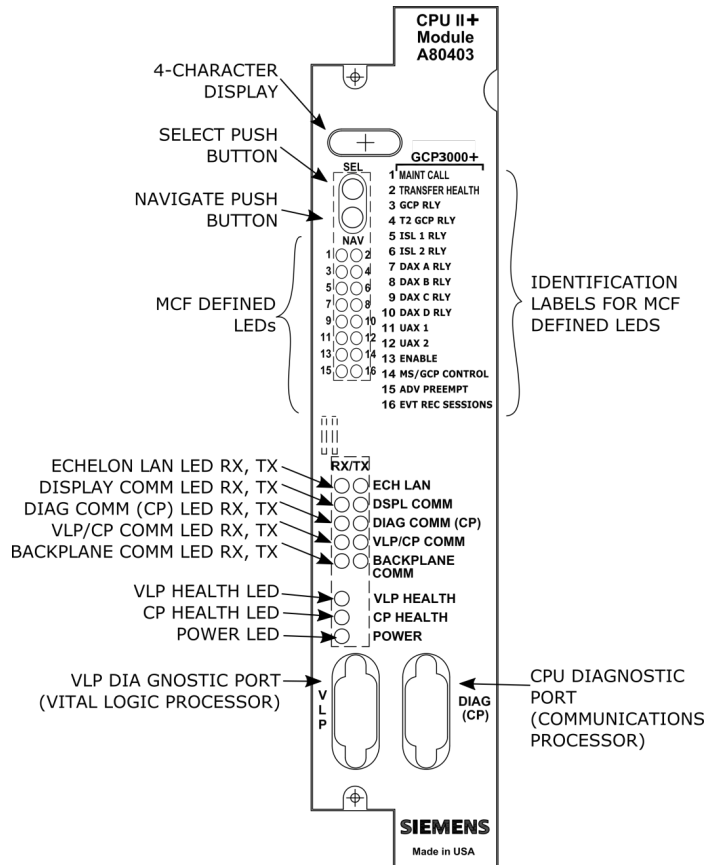
Figure 23   CPU II+ Front Panel

83

Table 28   CPU II+ User Interface

Component	Function		
4-Character Display	Displays alphanumeric representation of currently selected function menu item.		
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 or Not Used Off – Track 2 GCP RLY output is In Use and de-energized or has an error

84

Component	Function		
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
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

85

Component	Function		
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 Adv Preemption used) Off – MS/Control input is de-energized

86

Component	Function		
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
ECH LAN LEDs	**TX** flashes red when the CPU II+ is transmitting an ATCS message via the **LONTALK® LAN**.		
	RX flashes green when the CPU II+ is receiving an ATCS message via the **LONTALK® LAN**.		
DSPL COMM LEDs	**TX** flashes red when the CPU II+ is transmitting data to the Display Panel.		
	RX flashes green when the CPU II+ is receiving data from the Display Panel.		
DIAG COMM (CP) LEDs	**TX** flashes red when the CPU II+ is transmitting data on the communications processor diagnostic (**DIAG CP**) serial port.		
	RX flashes green when the CPU II+ is receiving data from the communications processor diagnostic (**DIAG CP**) serial port.		
VLP/CP COMM LEDs	**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).		

87

Component	Function
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 II+ module.
VLP Serial Port	9-pin diagnostic serial port for Vital Logic Processor.
DIAG (CP) Serial Port	9-pin diagnostic serial port for Communications Processor.

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.

The CPU has two processors: the Communications Processor (CP) and the 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 Model 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 CP is in progress. However, while the software transfer is in progress, the CP is not capable of logging state changes.

88

Table 29   Setup Menu Display

Indication	Mode	Meaning
DOWNLOAD-ING SETUP	Scrolls	The setup program is being down-loaded into the CP.
SETUP	Scrolls	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	Scrolls	CP is waiting for a new MEF.
DOWNLOAD-ING MEF	Scrolls	A new MEF is being downloaded into the CP.
WAITING FOR MCF	Scrolls	CP is waiting for a new MCF.
DOWNLOAD-ING MCF	Scrolls	A new MCF is being downloaded into the CP.
DONE	Steady	Setup mode is ending.
BOOT	Steady	The CP is rebooting.

Track Module, A80418

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

Vital I/O functions:

- Two isolated vital inputs
- Two isolated vital outputs

Track Module Front Panel

The Track module front panel is shown is. The user interface is described in Table 30.
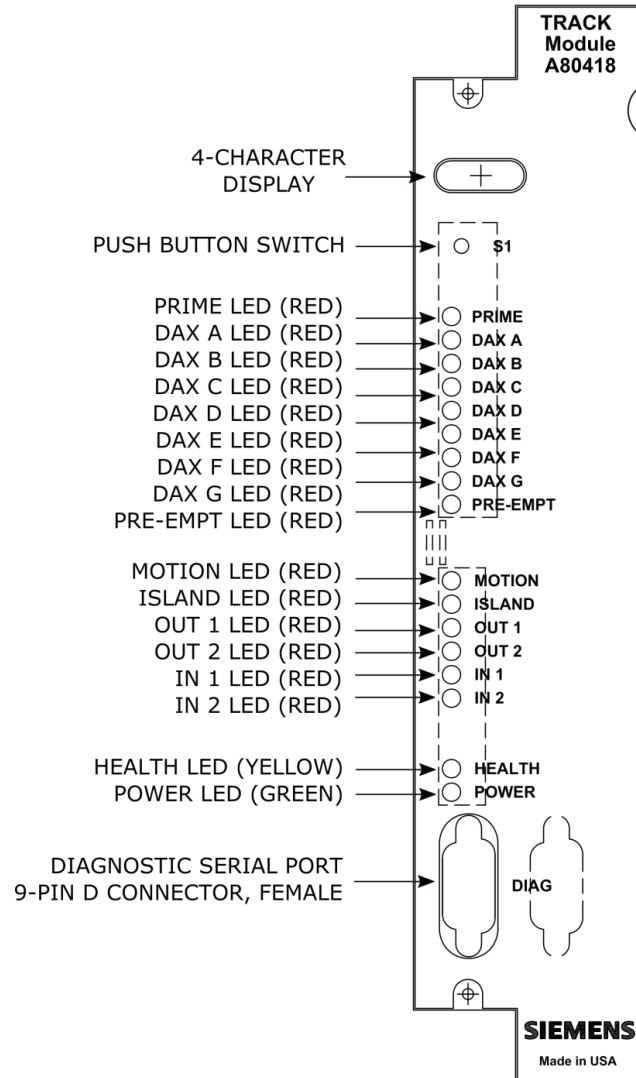
Figure 24   Track Module Front Panel

<u>**NOTE**</u>

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

Table 30   Track Module User Interface

Component	Function
4-Character Display	Displays module, track status, and diagnostic messages.
S1 Push Button Switch	For future applications
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
IN 1 LED (red)	On – input energized Off – input de-energized or not used

91

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 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

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.

92

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.

OUT 1 LED (RED)
OUT 2 LED (RED)
OUT 3 LED (RED)
OUT 4 LED (RED)
IN 1 LED (RED)
IN 2 LED (RED)
IN 3 LED (RED)
IN 4 LED (RED)
HEALTH LED (YELLOW)
POWER LED (GREEN)

DIAGNOSTIC SERIAL PORT
9-PIN D CONNECTOR, FEMALE
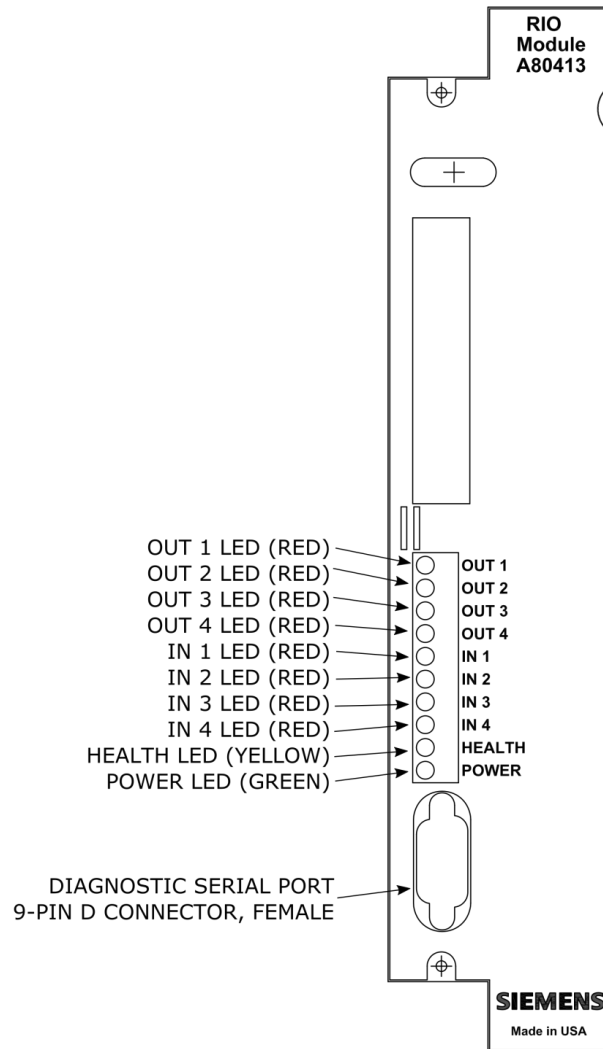
Figure 25   RIO Module Front Panel

Table 31   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 (1Hz) – 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.

94

Display Module, A80485

The A80485 display module, Figure 26, provides a touch-screen display to allow:

- Configuration programming
- Application programming
- Calibration programming
- System diagnostics
- System parameter display
- Track status display
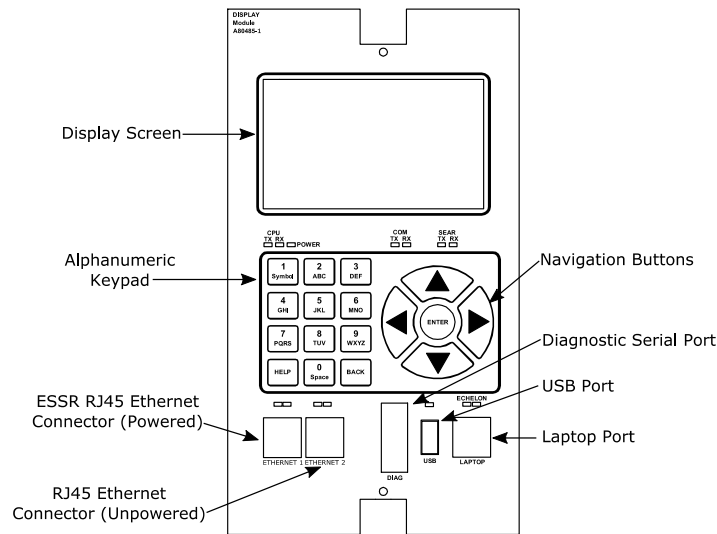
Figure 26   Display Module

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.

<u>NOTE</u>

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

95

Transfer Assembly User Interface

The Transfer assembly front panel is shown in Figure 27. The user interface is described in Table 32.
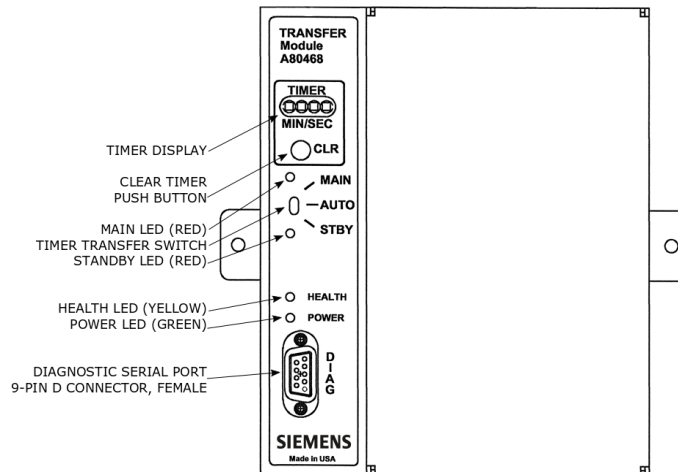
Figure 27   Transfer Assembly Front Panel

Table 32   Transfer Module User Interface

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 one second increments
CLR (Clear Timer) push button	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
MAIN LED (red)	On when: • Main modules are enabled while the Transfer Timer Switch is set to AUTO • Or Timer Transfer Switch is set to MAIN position

96

Component	Function
Time 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: ○ 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.
STANDBY LED (red)	On when: Standby modules are enabled while Transfer Timer Switch is set to AUTO Timer Transfer Switch is set to STBY position
HEALTH LED (yellow)	Flashes to indicate that the Transfer module is functioning normally
POWER LED (green)	LED is on steady when power is applied to the Transfer module.
DIAG Diagnostic Port	9-pin diagnostic serial port for Transfer module

NOTE

1. A switchover interval ranging from 1 to 31 minutes is selectable from the Transfer module.
2. The module is set at the factory for a switchover delay of three minutes.
3. During the switchover period, all vital outputs will be de-energized.

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 28.

- 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 33 to obtain the required delay time (see Figure 28).

POSITION S3-4

J96   S3 — S3

S3-4   S3-0 — POSITION S3-0
UP-OPEN (0)
DOWN-CLOSE (1)

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

J95
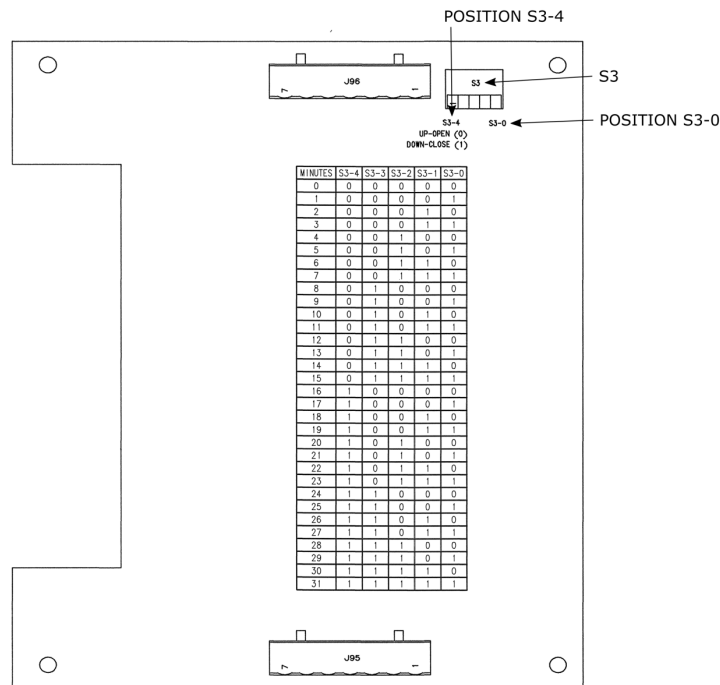
Figure 28   Transfer Module Assembly, A80468, S3 Switch Position

98

Table 33   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

0 = OPEN   1 = CLOSED   **Bold** = Default

99

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 29).

AUTO
TERMINAL

MAIN
TERMINAL

STANDBY
TERMINAL

RELAY

RELAY

RELAY

AUTO

MAIN

STANDBY

MWS_08-06_A80468_JMPR
10-20-17
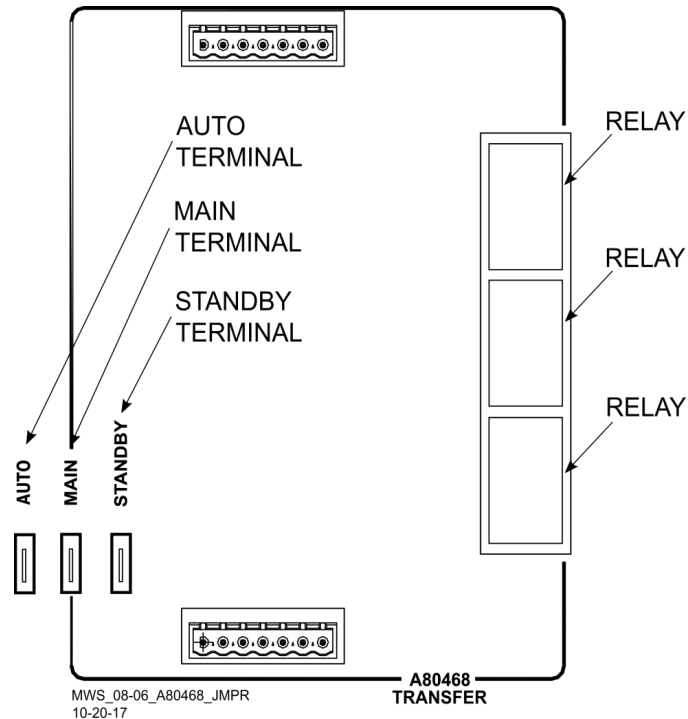
A80468
TRANSFER

Figure 29   Transfer Module (A80468) Fuse Positions

External Configuration Device (ECD) A80435

The ECD is a factory installed plug-in device on the 3000+ GCP backplane. 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.

<u>**WARNING**</u>

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.

100

Chassis Identification Chip (CIC)

The CIC is:

- A non-volatile memory chip
- Installed adjacent to the ECD on the GCP backplane.

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.

Interface Connector Functions

The Model 3000+ GCP interface connector functions are described in Table 34 through Table 37.

101

CPU Connectors

Table 34 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.

102

Track 1 Connectors

Table 35   Track 1 Connectors
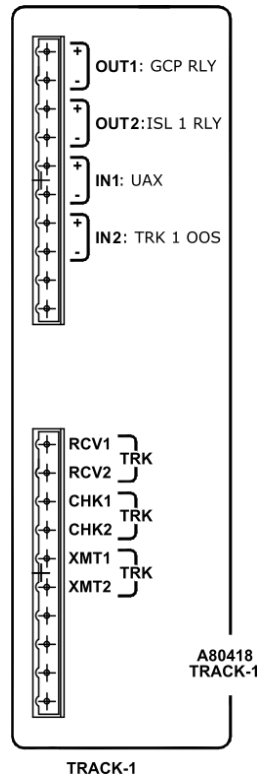
Connector	Pinout*		Function
TRACK-1	**+**	**GCP RLY**	GCP RLY for 3000+ (see note)
	-		
	+	**ISL 1 RLY**	Island relay output for track 1
	-		
	+	**UAX 1**	UAX input for track 1
	-		
	+	**TRK 1 OOS**	Out of service input for track 1
	-		
	+		Not used in 3000+ GCP
	-		
	TRK RCV1		Receiver input from track
	TRK RCV2		
	TRK CHK1		Check input from track
	TRK CHK2		
	TRK XMT1		Transmit output to track
	TRK XMT2		

Diagram labels:

OUT1: GCP RLY
OUT2: ISL 1 RLY
IN1: UAX
IN2: TRK 1 OOS

RCV1 / RCV2 TRK
CHK1 / CHK2 TRK
XMT1 / XMT2 TRK

A80418
TRACK-1

TRACK-1

NOTE

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

Track 2 Connectors

Table 36   Track 2 Connectors

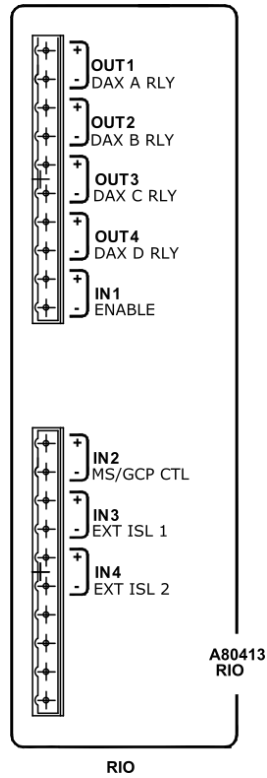| Connector	Pinout*		Function
TRACK-2	**+**	**T2 GCP RLY**	Track 2 GCP RLY for 3000+ (see note)
	-		
	+	**ISL 2 RLY**	Island relay output for track 2
	-		
	+	**UAX 2**	UAX input for track 2
	-		
	+	**TRK 2 OOS**	Out of service input for track 2
	-		
	+		Not used in 3000+ GCP
	-		
	TRK RCV1		Receiver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

NOTE

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

RIO Connectors

The RIO Module 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/GCO control, or external islands are used in the application.

Table 37   RIO Connectors

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 CTL input
	-		
	+	**EXT ISL 1**	External island 1 input
	-		
	+	**EXT ISL 2**	External island 2 input
	-		

OUT1 DAX A RLY
OUT2 DAX B RLY
OUT3 DAX C RLY
OUT4 DAX D RLY
IN1 ENABLE
IN2 MS/GCP CTL
IN3 EXT ISL 1
IN4 EXT ISL 2
A80413 RIO
RIO
RIO

105

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.

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 30).
- 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 performance.
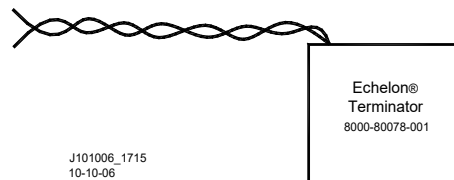
- The Echelon network can be connected to ECH1 on the 3000+ GCP
- The Echelon terminator can be connected to ECH2 on the 3000+ GCP
- Order Network Echelon Termination Unit, P/N: 8000-80078-001
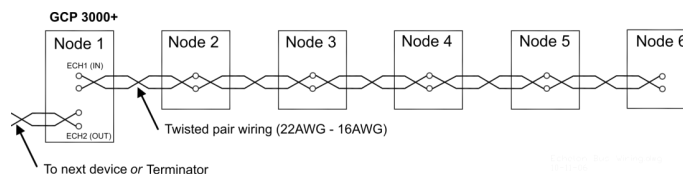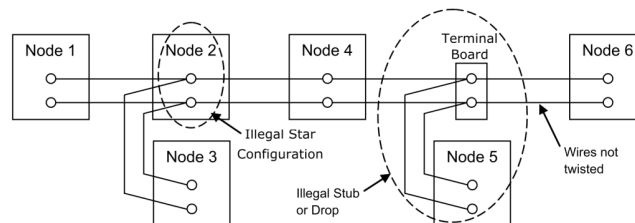
Figure 30   Echelon LAN Bus Wiring

106

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.

ATCS SITE ID ENTRY

Scroll to Program View and select **1) Site Configuration** menu. This dialog window:

- Displays the current information pertaining to the site
- Allows the current SIN to be changed
- A SIN may be changed as described in Table 38.

WARNING

CHANGING THE SITE IDENTIFICATION NUMBER WILL RESULT IN ACTIVATION OF WARNING DEVICES. BEFORE CHANGING THE SITE IDENTIFICATION NUMBER, ENSURE THAT ADEQUATE PRECAUTIONS ARE TAKEN TO WARN PEDESTRIANS, PERSONNEL, TRAINS, AND VEHICLES IN THE AREA UNTIL PROPER SYSTEM OPERATION HAS BEEN VERIFIED.

Table 38   Modify SIN Number

Step 1	From **Program View**, scroll to **1) Site Configuration**. The **Site Configuration** screen opens.
Step 2	Scroll down the menu to the following parameters and enter the required values from the approved site drawing by either using the Up or Down arrows to scroll to the required number or by directly entering the number using the keyboard: • On the ATCS – Railroad parameter, enter the RRR value. • On the ATCS – Line parameter, enter the LLL value. • On the ATCS – Group parameter, enter the GGG value. • On the ATCS – CPU2+ Subnode parameter, enter the SS value.
Step 3	Select the **Back** button until the **Program View** screen is displayed.
Step 4	The CPU module identifies the new SIN as the current site address.

108

APPENDIX B   GLOSSARY

TERM	DEFINITION
Advance Preemption:	Notification of an approaching train is forwarded to the highway traffic signal controller by railroad equipment in advance of activating the railroad active warning devices.
Advance Preemption Time:	This period of time is the difference in the Maximum Preemption Time required for highway traffic signal operation and the Minimum Warning Time needed for railroad operation.
AND:	AND circuits require all inputs to be energized for the output to be energized.
GCP RLY	The output that controls the local crossing. Equivalent to the XR relay.
ATCS:	Advanced Train Control System – An industry standard used in the 3000+ GCP for communications.
CCN:	Configuration Check Number – The 32 bit CRC of the configuration data.
CHK:	CHECK receiver on a track module connected to transmit wires that perform track wire integrity checks.
CHK EZ:	Check EZ is a signal value compared to main receiver EZ that is useful in troubleshooting.
CIC:	Chassis Identification Chip - A non-volatile memory chip that is installed adjacent to the ECD on the GCP backplane. Stores site specific information for both Main and Standby operations.
Computed Approach Distance:	The track approach length calculated by the GCP. The calculated distance between the wire connections on the rail and the termination shunt connections.

109

TERM	DEFINITION
CP:	Communications Processor – One of two microprocessors on the CPUII+ module, processes external communications for the GCP 3000+.
CRC:	Cyclical Redundancy Check - Used to determine that data has not been corrupted.
DAX:	Acronym for Downstream Adjacent Crossing (Xing). DAX outputs are used to send prediction information from an upstream GCP to a downstream GCP when insulated joints are in the approach circuit.
DIAG:	Diagnostic
Directionally Wired	Setting used to enable the GCP to determine train direction.
DOT Number:	Department Of Transportation crossing inventory number assigned to every highway-railroad crossing that consists of six numbers with an alpha suffix.
DT:	Diagnostic Terminal – The Diagnostic Terminal (DT) is a Siemens Rail Automation developed Windows® based software that can run on the Display Module or on a PC, which allows the user to perform programming, calibration, and troubleshooting.
ECD:	External Configuration Device – The non-volatile memory device on the GCP backplane used for storing the module configuration file.
Echelon:	A Local Area Network, LAN, used by the 3000+ GCP.
Enhanced Detection:	User selectable process that detects nonlinear fluctuations in track signal due to poor shunting and temporarily switches the track module from predictor to motion sensor.

TERM	DEFINITION
EX:	The EX value is a numerical indication of track ballast conditions relative to the leakage resistance between the rails. A value of 100 represents nominal good ballast. A value of 39 represents very poor ballast.
FCN	Field Check Number. The 32 bit CRC of the configuration data, including items that are protected by the Maintainer Password.
Flash Memory:	A type of non-volatile memory that can be reprogrammed in-circuit via software.
GCP:	Grade Crossing Predictor – A train detection device used as part of a highway-railroad grade crossing warning system to provide a relatively uniform warning time.
GCP APP:	GCP Approach length calibration into a hardwire shunt located at the termination shunt.
GCP CAL:	GCP Calibration into a termination shunt.
GCP LIN:	Approach Linearization calibration into a hardwire shunt located at the 50% point on the approach.
Highway-Railroad Grade Crossing Advance Warning Sign:	A traffic control sign (round yellow sign with RR and a black X) placed by the highway agency in advance of many highway-railroad grade crossings
Healthy:	The GCP system, modules and track circuit are operating as intended. Health is generally indicated by a yellow LED flashing at 1 Hz. Unhealthy conditions are indicated by faster flash rates (2 Hz and 4 Hz) or a dark Health LED.
Hz:	Hertz – Common reference for cycles per second or flashes per second.

111

TERM	DEFINITION
Interconnection	The electrical connection between the railroad active warning system and the traffic signal controller for the purpose of preemption.
IO or I/O:	Input/Output
ISL:	Island
ISL CAL:	Island calibration
kHz:	Kilohertz – 1000 Hz or 1000 cycles per second.
LAN:	Local Area Network – A limited network where the data transfer medium is generally wires or cable.
Linearization:	The linearization procedure compensates for lumped loads in the GCP approach that affects the linearity (slope) of EZ over the length of the approach.
Linearization Steps:	A calibration value that allows the GCP to compensate for non-linear EZ values within the approach circuit.
Lumped Load:	A section of track that has a lower ballast resistance than the rest of the approach because of switches, crossings, contamination, etc.
MAIN:	The primary GCP Modules (CPU, Track, and RIO Modules) that are in a dual GCP chassis.
Maintainer Password	The password set that allows field maintenance personnel access to field editable parameters.
MCF:	Module Configuration File – The GCP application logic file.
MEF:	Module Executable File – The GCP executive software program.
MS:	Motion Sensor – A train detection device used as part of a highway-railroad grade crossing warning system to provide a detection of a train approach.

TERM	DEFINITION
OCCN:	Office Configuration Check Number – The 32 bit CRC of the configuration data, excluding items that are protected by the Field Password.
OCE:	Office Configuration Editor – The PC version of the DT that can be used to create configuration package files (Pac files) for the Model 3000+ GCP system.
Offset Distance:	The distance between the track circuit connections of the remote GCP (sending DAX information) to the island track connections of the UAX GCP (receiving the information).
Out Of Service:	The process for taking one or more GCP approach circuits and / or approach and island circuits out of service.
PAC File:	A Model 3000+ GCP configuration Package File that can either be created in the office using the OCE, or downloaded from a Model 3000+ GCP system via the CP.
Pick Up Delay:	An internal delay time between when an input receives the signal to pick-up and when it actually responds.
Positive Start:	Activate crossing devices when EZ level is less than a programmed value.
Preemption:	The transfer of normal operation of traffic signals to a special control mode.
PRIME:	PRIME may be de-energized by a Track's prime predictor, UAX, advance preempt, and/or island, if zero offset is selected.
RIO:	Relay Input Output Module
RS232:	Industry standard serial port.
RX:	Receive
SIN:	Site (Subnode) Identification Number - A twelve-digit ATCS address representing the module as a subnode on the network.

113

TERM	DEFINITION
Standby:	The GCP Backup Modules (e.g., CPU, Track, and RIO modules) that are in a dual GCP chassis.
TCN	Track Check Number (TCN) is used to track changes due to re-calibration and adjustments made to key Track Modules specific setup variables.
TX:	Transmit
UAX:	Acronym for Upstream Adjacent Crossing (Xing). UAX inputs are used to receive prediction information from an upstream GCP as inputs to a downstream GCP when insulated joints are in the approach circuit.
USB Port:	Universal Serial Bus Port
USB Drive:	A memory device that plugs into a USB port which is commonly called flash drive or memory stick.
VLP:	Vital Logic Processor – One of two microprocessors on the CPUII+ module, processes GCP vital system logic.
Z Level:	An Island calibration value. A calibrated island will have a nominal Z Level of approximately 250. The Z Level approaches 0 when shunted.

FEBRUARY 2020

SIEMENS

Siemens Mobility, Inc. Rail Automation

700 East Waterfront Drive

Munhall, Pennsylvania 15120

1-800-793-SAFE

Siemens Mobility, Inc. Rail Automation

939 S. Main Street

Marion, Kentucky 42064

(800) 626-2710

Siemens Mobility, Inc. Rail Automation

2400 Nelson Miller Parkway

Louisville, Kentucky 40223

(502) 618-8800

Rail-Automation Website