



4000 GCP Crossing System Field Manual (Formerly Maintainer's Handbook)

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HOW TO USE THIS MANUAL

This handbook is intended to provide guidance to maintenance personnel. Information is provided in the indicated locations for the listed purpose:

System Cutover	Page 5
Calibration	Page 18
Operational Checks	Page 42
Troubleshooting	Page 51

WARNING

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

SYSTEM CUTOVER

MODEL 4000 GCP CUTOVER TEST PROCEDURE AND CHECK-OFF SHEET

The cutover test procedure should be used when initially installing, modifying, or after disarrangement of a GCP 4000 system and includes the SEAR2I and SEAR2I appliances (i.e., Mini Track Side Sensors, MTSS, Intelligent Light Out Detectors, iLODS, VHF Communicators, Ground Fault Tester, GFT, etc.)

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.

Results of the tests may be documented on the GCP 4000 Test Procedure Form, which is found in the Microprocessor Based Grade Crossing Predictor Model 4000 Family Application Guidelines, SIG-00-08-06.

Unless otherwise noted, the term 'activate crossing' means activating the flashing light signals and gates by de-energizing an AND 1 XR Enable input. Do not use an Emergency Activation input unless instructed to do so.

Equipment Needed:

- Hardwire test shunt
- 0.06 ohm test shunt
- Stop watch
- GCP 4000 Display Module, or PC with Diagnostic Terminal, DT, software.

- PC with HyperTerminal software may be needed for SEAR2I and communication setup
- Volt meter – Either a Agilent U1252A or equivalent with a True RMS AC + DC scale or a conventional volt-meter, which requires use of the conversion chart found in Table 15.

NOTE

It is not necessary to remove power from the GCP case before installing or removing modules. If possible, disconnect lamp load before removing or inserting SSCC3I modules.

CIRCUIT AND PROGRAMMING VERIFICATION

Verify the GCP 4000 modules shown on the circuit plans are properly inserted and secured into their appropriate slots (main/standby).

WARNING

THE SSCC3I MODULES SHALL BE SECURED WITH THE BUILT IN SCREW FASTENERS.

REMOVAL OF A SSCC3I WILL CAUSE THE GATES TO DESCEND IMMEDIATELY (WITHOUT GATE DELAY) AND THE LIGHTS WILL NOT ACTIVATE.

STEP 1

- Remove all connectors (green screw type and orange cage-clamp) to the GCP 4000.
- Close battery buss to 4000 system case.
- Verify the voltage and polarity of the B and N wiring to the GREEN plug connectors for the GCP and SSCC.
- Insert only the GREEN power plug connector above the CPU module and verify programming after system boots.
- If used, set the GCP 4000 Transfer Timer Module 80406 or Transfer Timer Assembly 80486 timer transfer switch to MAIN.
- Review the program in the GCP 4000 by selecting the PROG button on the GCP 4000 DT menu bar.
- Verify the programming per the text document in the circuit plans. Field measured parameters (approach, DAX offset and island distances) are added at this time.
 - If used, verify that the ATCS (SIN) number is per the circuit plan.
 - If used verify the office configuration check number is per the circuit plan.

NOTE

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

STEP 2

- If used, verify the Echelon LAN wiring and termination is in place.
 - Before connecting power to other GCP connectors, verify wiring to GCP 4000 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.

WARNING

DURING THE SSCC3I BOOT-UP PROCESS AND AFTER ALL WIRING IS CONNECTED:

THE CROSSING GATES WILL BE DOWN WITH CROSSING LAMPS FLASHING AND BELLS RINGING.

A80405 MODULE(S) WILL NOT BE RESPONSIVE TO CROSSING CONTROL INPUT FROM THE 4000 GCP.

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

CAUTION

THE SSCC3I MODULE HAS ACTIVE INTERNAL SHORT CIRCUIT PROTECTION FOR LAMP, BELL AND GATE CONTROL OUTPUTS THAT IS EFFECTIVE ONLY AFTER THE SSCC3I HAS BOOTED UP. THEREFORE, AT THE INITIAL CUTOVER IT IS IMPORTANT TO BOOT UP THE SYSTEM PRIOR TO CONNECTING EXTERNAL LOADS. SEE CONNECTION SEQUENCE BELOW IN STEP 3. DO NOT INSERT THE GCP 4000 SSCC3I GREEN CONNECTORS FOR: B, N, L1, L2, GC'S, BELLS, AND INPUTS

NOTE

Once the SSCC3I module has booted up (Health LED flashing at 1 Hz), the SSCC3I module has internal short circuit protection for lamp, bell and gate control outputs. Therefore, at the initial cutover it is important to boot up the system prior to connecting external loads.

STEP 3

- The SSCC3I connectors and wiring to loads must be applied in the following sequence to avoid damage:
- Open the lamp, gate GC control, GP inputs, GD inputs and bell circuits at the surge panel(s).
- Verify battery polarity on GREEN power plugs and ORANGE input plug connector(s).

- Connect the screw-lock power connector for each SSCC3I module and lock by tightening screws.
- Wait approximately 40 seconds for SSCC3I module(s) to boot up.
- Connect the GC/bell and GP/GD ORANGE Input cage–clamp plug connectors to the appropriate SSCC3I.
 - Close the lamp, gate control, GP/GD inputs and bell circuits on the surge panel(s).
 - Connect warning device wiring and cables at house termination points.
- Connect all other connectors to GCP 4000 system.
- Connect all other electronic equipment to the battery busses.

SEAR2I SETUP

Selecting the SEAR button at the top of the 4000 GCP Status Screen (Figure 1) brings up the SEAR Interface screen, Figure 2.

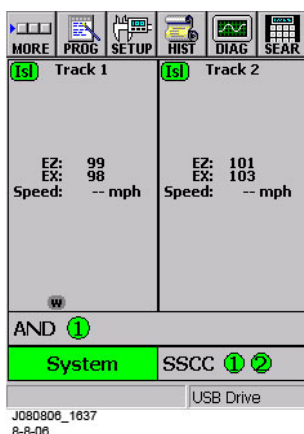


Figure 1: SEAR Button At Top Of Screen

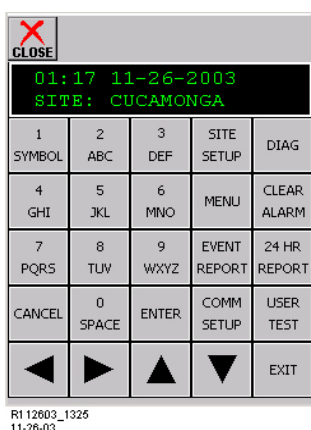


Figure 2: SEAR2I Interface

The interface may also be accessed by selecting the **Site Setup** item from the **SEAR** or the **TEMPLATE: SEAR** windows.

NOTE

The SEAR interface may be accessed only from the A80407 Display Module Diagnostic Terminal, DT, and not on the PC based DT.

Refer to SEAR2I Configuration Summary document for details of application CDL program, LEDs, and Alarms. ATCS address must be entered prior to SEAR2I communicating with GCP

Prior to beginning SEAR2I setup procedure have circuit plans showing SEAR2I setup page available for reference.

Site Setup must be run in its entirety directly from the SEAR Interface on the GCP 4000 Display. Filling in certain fields via laptop and other interfaces does not accomplish setup and cannot be substituted for Site Setup.

STEP 1:

Select SITE SETUP button on SEAR interface screen.

- Step through the 3 stages of site setup by answering each question as indicated by the SEAR2I setup page in the crossing's circuit plans.
 - Stage 1 will cover Date/Time, Site Identification Information, addressing, and serial port configuration. Refer to circuit plans for the specific answers such as ATCS address assignments. If plans do not have proper ATCS addresses, some portions of configuration cannot be completed."
 - Press **ENTER** to accept each step, or after revising each step.
 - Each stage will automatically compile when the end of the stage is reached.
- After stage 3 has compiled, the user will be prompted to install peripheral equipment on the echelon® network. (This step assigns the ATCS subnode address of each device)

This may include VHF communicators, iLODs, Analog/Digital I/O units, etc. If a Wayside Access Gateway, WAG, is used for communication protocol conversion, the WAG will be setup separately.

- When prompted, push the echelon® button on the side of each device and watch for "installed" to be shown on the display.
 - The button only needs to be depressed for approximately a second. The yellow LED next to the button will turn on during that time.

Step 2:

The next step in the site setup process is battery calibrations.

- At this point, the user will be prompted to turn off AC power and select **ENTER**.
- The batteries will settle for 3 minutes.
- The voltage of each battery channel is shown and the user will press **ENTER** for each if the voltages are correct.
- Then, a prompt will instruct to turn AC power back on.

STEP 3:

The last step is lamp calibration.

- The first calibration requires AC to be on.
- Activate the warning devices by opening the AND 1XR ENABLE input or by disconnecting the GC/Bell WAGO connector for a SSCC3I module.
 - This step requires that the SEAR Interface screen be displayed
 - Once the gates are horizontal (gate tip sensors on), press “enter”.
 - After 15 seconds the user is asked how many bulbs are on each sensor, if the correct amount is not shown, enter that value, when the correct number is shown press **ENTER**.

Next, the SEAR2I will prompt for the same calibration steps but with AC power off.

WAG NODE INSTALLATION

If a Wayside Access Gateway, WAG, is used as a protocol converter to Internet protocol, it will need to be installed as a module to the SEAR2I.

From the SEAR II keypad, select **MENU**.

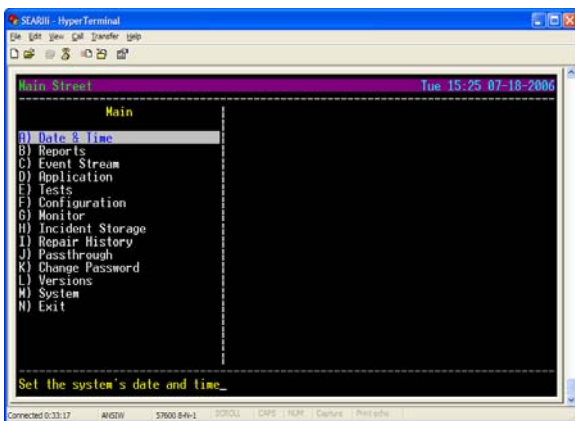


Figure 3: Sear Main Menu Window using Hyperterminal

- Press **down arrow** until you come to **CONFIGURATION**.
 - Press **ENTER** on the keypad to select it.
- Press **down arrow** until you come to **MODULES**.
- Press **ENTER** on the keypad to select it.
- **ADD MODULE** will be the first menu item displayed.
- Press **ENTER** to select it.
- The screen will read **MODULE TYPE**.
 - Press the Down Arrow key **WAG**.
 - Press **ENTER** to Select it.
 - Use the number/letter keys on the keypad to spell the Module Name. (Similar to the way you add a name on a cell phone.)
 - Press **ENTER** to enter the name you typed.
- Refer to site plans and enter proper NODE assignment.
 - Set NODE to 1, if assignment is not on plans.
- You will be returned to **MODULE MENU** at the **ADD MODULE** prompt.
- Press **EXIT** to return to the **CONFIGURATION** at the **MODULES** prompt.
- Press **EXIT** again.

- You will be prompted with **SAVE CONFIGURATION CHANGES? YES.** (You can press the UP or DOWN arrow to scroll between YES and NO.)
 - Press **ENTER** to select **YES**.
- The unit will recompile and save the changes.

Ensure the AUX Serial Port is set to the baud rate shown on circuit plans.

SEAR2I OPERATION

Now that site setup is complete, peripheral devices, as well as items onboard the SEAR2I will be checked for proper operation. This ensures that the SEAR2I is receiving all the information it needs for proper alarming and execution of the SEAR Application Program. Unless specified, all items below will be described assuming a laptop is present with a HyperTerminal connection to the SEAR2I's USER port. All items in this section can be done through similar menus from the GCP 4000 display module. Once HyperTerminal is running, enter **CTRL+L** on the computer to initiate the communication session with the SEAR2I. The following screen will be displayed. To select a menu item, press the letter corresponding to the menu item.

All peripheral equipment on the Echelon® network will need to be checked for good communication with the SEAR2I.

All of those modules can be checked in one screen by choosing, **Main>Monitor>Module Comm. status.**

The type of module will be shown on the left and the communication status will be on the right. The status of each module should be "GOOD".

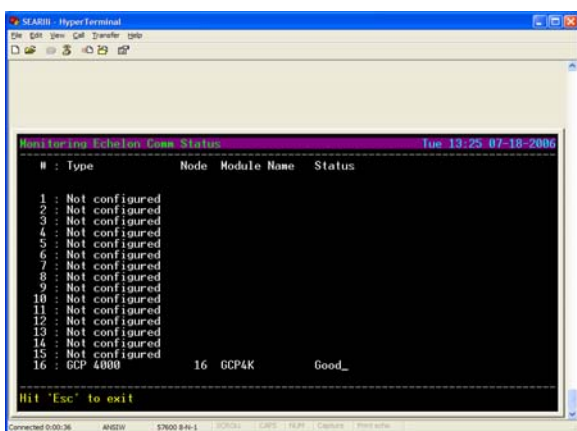


Figure 4: SEAR Echelon Communication Status

Verify iLOD operation by the following:

- Once good communication is verified, further checks of the iLOD can verify that it is seeing normal amperage/flash rates.
- The view these values in real time, select **Main>Monitor>Module I/O>** and then choose the iLOD unit to view.
 - In that screen both sensors are shown, the first iLOD unit will show EB1, EN1. When the lamps are flashed, both sensors should display that lamps are on, the

amperage reading, and the flash rate in flashes per minute.

- These values are shown in real time, they should be steady and not fluctuate. If the value fluctuates, the lighting circuit will need to be checked for intermittent operation.
- Verify operation of Ground Fault Testers (GFT's):
 - All LED's on the GFT units should be on steady. If the BAT 1 Fault or BAT 2 Fault LED's are slow flashing then they have detected a ground condition.
 - The GFT can be monitored at **Menu>Monitor>Onboard I/O>** and then use the right arrow keys until the GFT input is displayed. If the input shows STUCK LOW, that indicates the data wire between the GFT and SEAR2I is open and will need to be repaired.

If the data connection is good, the following would be displayed for GFT1:

- GFT1: HL=G MD=N B1=0 B2=0
- HL=G indicates that the GFT health is good.
- MD=N indicates hat test mode=no
- B1 & B2 = 0 shows that there are no ground faults on BAT 1 or BAT 2.
- A ground can be simulated on those inputs by running a wire from the ground input of the GFT to each BAT input, one at a time. The state of each BAT input will change to '1' if a ground is present.

Verify MTSS/gate tip/bell sensor:

- The MTSS can be monitored in the same screen as the GFT: **Menu>Monitor>Onboard I/O>**. As with the GFT, if the input shows STUCK LOW, then the data wire between the MTSS and SEAR2I is open and will need to be repaired.

If the data connection is good, the following would be displayed for TSS1:

- TSS1: U=1 D=0 T=0 A=0 P=0
- U=Gate Up
- D=Gate Down
- T=Gate Tip Sensor
- A=Bell Audio
- P=Bell Power

NOTE

These items can be either 1 or 0. In the example, U=1 so the gate up contact is energized. The other items are all deenergized. Dropping the gates to horizontal will activate the tip sensors and deenergize the gate up contact, changing the MTSS data to U=0 and T=1. Activating the bell will check the bell sensor, A & P should both equal 1 when the bell is on.

The SEAR2I relays must function properly in order to run automated inspection tests. These outputs are most easily tested using the SEAR menu on the GCP 4000 display module.

- Verify SEAR2I relays:
 - Go to MENU>DIAG/MONITOR>RELAYS>GndFltTest and press ENTER.
 - Then press '1' to energize the relay output. Both BAT FAULT LED's on the Ground Fault Testers should be flashing.
 - Now press '0' to deenergize the relay. The LED's should go on steady.
 - Press EXIT and then ENTER to get back into the RELAYS menu.
 - Select AC Control. Press '1' to energize the relay output. AC power to the chargers should go off, or Press '0' to deenergize the relay and be sure that AC power to the chargers is restored.

Press "exit" until the date/time main screen is visible.

SEAR2I Communication

Testing communications to the office can be accomplished using a menu function to generate a test alarm and by creating events that generate alarms. Before testing the SEAR Ili by sending alarms to the office, the unit must be configured for communications in the Site. Once a SEAR2I is configured thru Site Setup and communication established, the location will register itself with the WAMS office.

Test Communications with SEAR option on the display menu.

- In the SEAR Interface menu, select MENU (Figure 1
 - Press the down arrow to DIAG/Monitor press ENTER
 - Press the down arrow to FIELD COMM, press ENTER. TX: waiting... RX: waiting will be displayed (Figure 6If site is to hop data to, or receive data from, another crossing. To send a test packet to the other crossing Press 4 Figure 5).
 - Enter ATCS address of the other crossing.
- To send a test packet to the WAMS office:
 - Press 5 (Figure 6)
 - Enter railroad specific office address.
 - Refer to circuit plans for office address.

Typically, the office ATCS address is 2.RRR.00.0000, where RRR is the ATCS number assigned to the railroad.

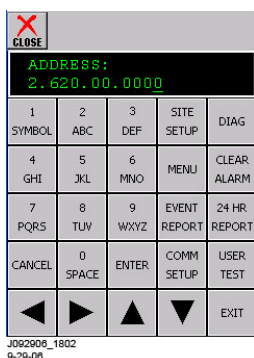


Figure 5: WAMS Office Address

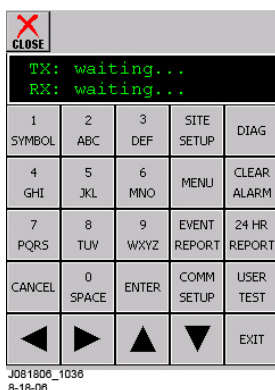


Figure 6: Waiting Message

Alarms

Alarm Generation is the final step in checking out the SEAR2I/WAMS interface. The following procedure tests the wiring of the various components in the SEAR/ WAMS sub-system.

Ground Fault Alarm

- A ground can be simulated on those inputs by running a wire from the ground input of the GFT to each BAT input, one at a time.
- Each Battery's LED will flash when ground is detected and a "Ground Fault Detected on xxx" alarm will be generated where xxx represents the Battery name.

Ground Fault Clear

- Removing the wire that simulates the ground will generate a Ground Fault Cleared message.
- Analyzer Failure Alarm
- Remove the connector that powers the GFT or that MTSS unit inside the gate mechanism. Doing so on either unit will cause an "Analyzer Failure" alarm.

Analyzer Normal

- Restoring the connector will generate an Analyzer Normal message.

WARNING

GATES WILL BEGIN TO LOWER IMMEDIATELY (WITHOUT GATE DELAY TIME) WHEN THE TRANSFER SWITCH IS USED TO SWAP BETWEEN HEALTHY UNITS. USE CAUTION WHEN TRANSFERRING CONTROL TO AVOID GATES HITTING VEHICLES OR PEDESTRIANS.

GCP Transferred Alarm

- Force the GCP to switch to Standby by the transfer switch on the Transfer Module.
- This will create a GCP Transferred Alarm.
- Forcing it to switch back will cause another GCP Transferred message.

WARNING

TAKE ALTERNATE MEANS TO WARN VEHICULAR TRAFFIC, PEDESTRIANS AND EMPLOYEES. REMOVAL OF A SSCC3I WILL CAUSE THE GATES TO DESCEND IMMEDIATELY (WITHOUT GATE DELAY); HOWEVER, THE LIGHTS WILL NOT ACTIVATE.

Crossing Controller Failure Alarm

- Temporarily remove a SSCC3I to generate Crossing Controller Failure alarm
- Restore SSCC3I for a Crossing Controller Normal message.
- False Detection Alarm
- Activate the crossing using test switch (or other method shown on plans) allowing the gates to drop and then cancel activation.
- After 30 minutes a False Detection alarm will be generated.
- If a normal train move occurs prior to the 30 minutes, a Pre-Ring alarm will be generated.
- AC Power Off For 20 Minutes Alarm
- Turn off AC power for at least 20 minutes and this alarm will be generated.
- AC Power Back On
- Restore power and wait at least 1 minute.

This completes the SEAR2li setup. Proceed to Maintenance Call (MC) light.

MAINTENANCE CALL (MC) LIGHT

Maintenance Call (MC) Light, if this feature is used, Verify that the MC light is lit

Verify that the MC extinguishes when:

- If used, Deenergizing the MAINT CALL RPT Input (observe input on I/O view).
- Restore MAINT CALL RPT input and MC lights.
- If power-off relay used to control MC light
- deenergize POK relay
- Restore POK relay and MC lights.

VERIFY OFFICE CONFIGURATION CHECK NUMBER

If used validate the office configuration check number is per the circuit plan.

This completes the 4000 system check out procedure.

WIRE PREPARATION & INSERTION INSTRUCTIONS FOR KEYED INTERFACE CONNECTORS**External Wiring Connectors and Wire Size**

All external wiring to a 4000 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 and the SSCC should use 10 AWG wire.

Wire Preparation

Strip insulation from the end of the wire as indicated in Figure 7 below.

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.)

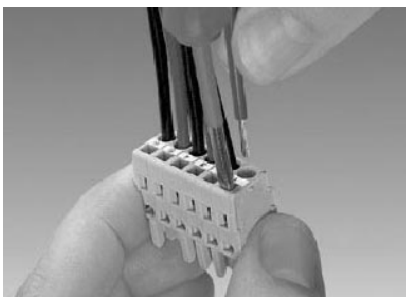
If a wire is suspected of moving when pulled, remove the wire and run the wire receptor through its full range of motion. Repeat steps 1 through 4 for this wire.

Repeat steps 1 through 4 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.

For cage clamp type connectors:

Insert blade of appropriate sized flat bladed screwdriver in rectangular slot in connector next to the wire receptor (see figure below).



MWS_08-06_WIRE_INSERT
04-15-08

Figure 7: Inserting Wire in Cage Clamp Type Connector

CAUTION

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

NOTE

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

- Lever the wire cage clamp open by pressing straight down on the screwdriver.
- Insert the stripped end of a wire into the fully-open wire receptor until it stops.
- Hold the wire in place and remove the screwdriver blade from the slot. The wire clamp closes down on the stripped end of the wire.

CALIBRATION

The Model 4000 GCP is programmed through the use of the Display Terminal (DT). The DT may either be operated through the Display Module, A80407_0X, or via laptop connection to the Diag Port on the top half of the case. Model 4000 GCP System Calibration consists of GCP calibration, SSCC lamp adjustment, and system checkout.

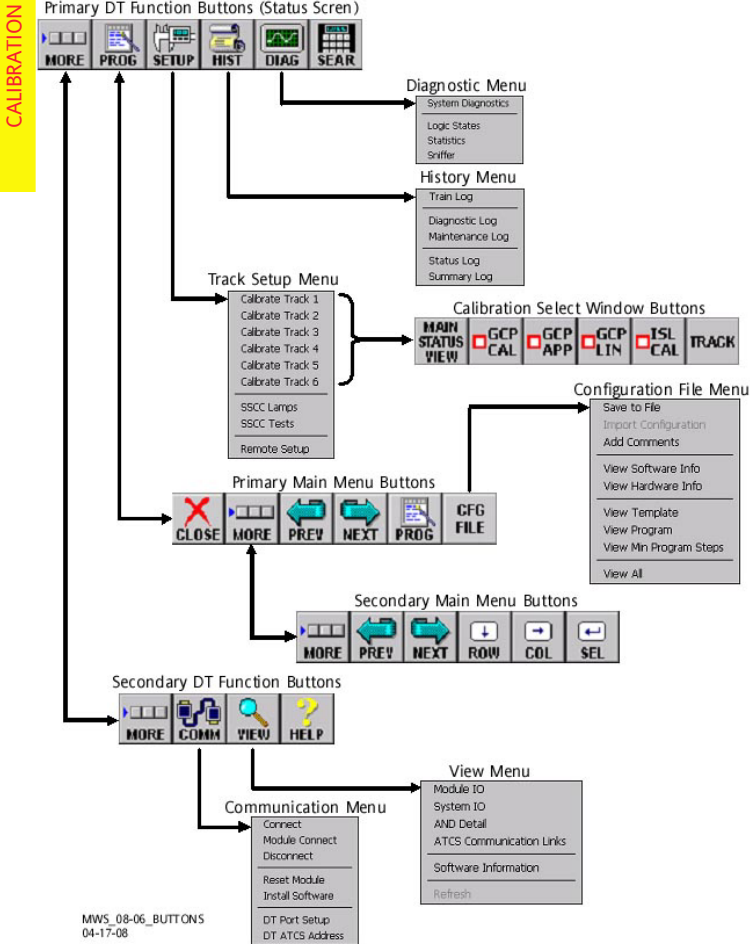


Figure 8: Display Terminal (DT) Buttons and Associated Menus

WARNING

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

NOTE

If CPU module MCF or Track module MEF are changed, complete programming and recalibration will be required. For additional information, see Appendix C.

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 Replacements

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
A80405	SSCC ⁵	No	No	No	No	No
A80407	Display (DT)	No	No	No	No	No
A80410	SEAR	No	No	No	No	N/A ³
A80438-2	ECD ⁴	No	No	No	No	No
n/a	Chassis	Yes	Yes	Yes	Yes	Yes
<p>Notes:</p> <p>For track with changed A80418.</p> <p>May be bypassed using BYPASS button instead of the START button in calibration procedure.</p> <p>Site setup required.</p> <p>1. Plug-in located on chassis behind CPU Module. Requires same MCF as previously in use.</p> <p>2. SSCC lamp voltages must be readjusted.</p> <p>3. Site Setup required.</p> <p>4. Plug-in located on chassis behind CPU Module. Requires same MCF as previously in use.</p> <p>5. SSCC lamp voltages must be readjusted</p>						

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

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: Unidirectional to Bidirectional, Bidirectional to Unidirectional or Unidirectional to Simulated Bidirectional	Yes ⁵	Yes ⁵	Yes ⁵	No	No
Transmit Level Changed					
Approach Distance Changed					
Ballast Compensation Value Changed					
Island Operation Changed from No to Internal or from Internal to No	Yes ⁶	No ⁷	No ⁷	Yes ⁸	No
Template Changed	Yes ⁹	Yes ⁹	Yes ⁹	Yes ⁹	Yes ¹⁰
Template Set To Default selected					
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 re-programming required NOTE: Uploading a new PAC may require re-calibration					

RECALIBRATION REQUIREMENTS DUE TO TRACK EQUIPMENT CHANGES

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

NOTE

Approach distance in the Program menu must be changed to reflect the new approach distance prior to start of track calibration. Otherwise, the system will prompt for recalibration.

Table 4: Recalibration Requirements Due to Track Equipment Changes

Table 4: Recalibration Requirements Due to Track Equipment Changes

Track Equipment 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	Yes ¹	Yes ¹	Yes ¹	No
Change of shunt or frequency in overlapping territory	Yes ¹	Yes ¹	Yes ¹	No
Termination Shunts of Other Frequencies Added, Removed From, or Moved Within the 4000 GCP Approaches)	Yes ¹	Yes ¹	Yes ¹	No
Wide band Insulated Joint Couplers (8A076 or 8A077) Replaced in 4000 GCP Approaches)	Yes ¹	No ²	No ²	No
Tuned Insulated Joint Couplers (62785-f) Replaced in 4000 GCP Approaches)	Yes ¹	Yes ¹	Yes ¹	No
4000 GCP Track Wire(s) Replaced	Yes ¹	No ²	No ²	Yes
Notes:				
1. For changed tracks only.				
2. Requires bypass.				

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 procedures:

- Tuning the Tuned Joint Coupler (TJC)
- GCP Calibration (GCP CAL)
- Approach Distance (APP CAL) and Linearization (LIN CAL) Calibration
- Island Calibration (ISL CAL)
- Standby Module Calibration

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.

Tuning the 62785-f Tuned Joint Coupler

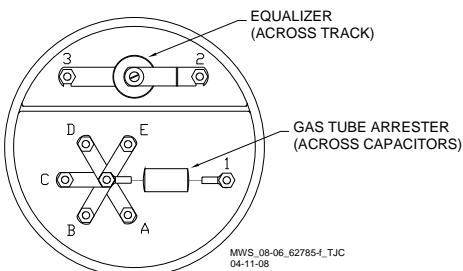


Figure 9: Tuned Joint Coupler, 62785-f

Table 5: Tuned Joint Coupler, 62785-f Minimum Distances

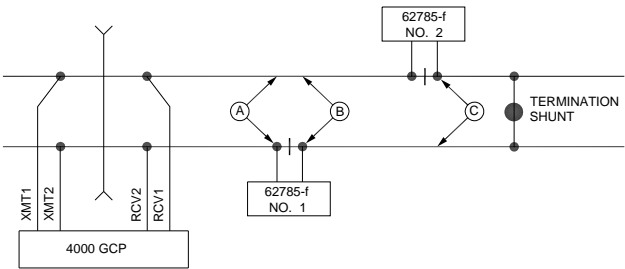
Table 5: Tuned Joint Coupler, 62785-f, Minimum Distances

Frequency (Hz)	Minimum Distance to 1 st Set of Insulated Joints (Feet)*	Minimum Distance to 2 nd Set of Insulated Joints (Feet)*
151 to 211	1500	2200
212 to 348	1000	1400
349 to 560	700	1000
561 to 790	500	800
791 to 979	400	700

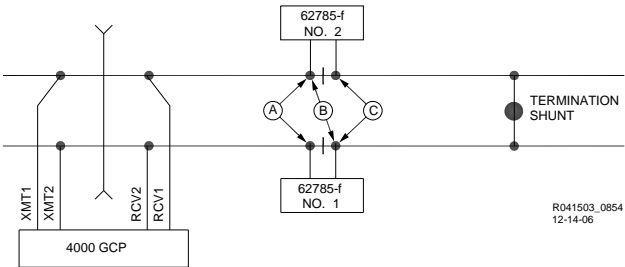
* Distance applies to insulated joints located on the same side of the crossing.

NOTE: Frequencies of 86 and 114 Hz are not normally used with the 62785-f coupler. Contact Safetran Technical Support (1-800-793-7233) for these applications.

CALIBRATION



Staggered Insulated Joints



Non-Staggered Insulated Joints

Figure 10: Shunt Placement For 62785f Bypass Coupler

WARNING

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

NOTE

While field tuning 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

- AREMA binding posts are labeled A through E (see Figure 9)
- AREMA binding posts are equipped with special gold AREMA adjustment nuts

Table 6: Tuning the 62785-f Tuned Joint Coupler

Table 6: Tuning the 62785-F Tuned Joint Coupler

See Figure 10 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 4000 GCP, setting the EZ value to 100.
Step 3	Place a hardwire test shunt across the track at location A.
Step 4	Note the EZ value appearing on the 4000 GCP display.
Step 5	Move the test shunt to location B.
Step 6	<p>Tune the Tunable Insulated Joint Bypass Coupler #1 to the same EZ value noted in Step 4.</p> <p>Tighten the gold nut on the Coupler #1 terminals labeled D, C, B, and A, in sequence beginning with terminal D.</p> <p>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.</p> <p>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.</p> <p>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.</p>
Step 7	Move the test shunt to location C.

Table 6: Tuning the 62785-F Tuned Joint Coupler

Step 8	<p>Tune the No. 2 Tunable Insulated Joint Bypass Coupler to the EZ value noted in step 4.</p> <p>Tighten the gold nut on the Coupler #2 terminals labeled D, C, B, and A, in sequence beginning with terminal D.</p> <p>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.</p> <p>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.</p> <p>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.</p>
Step 9	Remove the test shunt.
Step 10	Tighten a standard AREMA nut against each gold nut of both couplers to ensure all nuts are securely locked in position.
Step 11	Secure the end caps over the terminal end of both couplers.
Step 12	Completely recalibrate the 4000 GCP and perform all operational checks.
Step 13	Verify that a smooth change in the EZ value occurs 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.

Track Module calibration is required if:

- The DT Status Screen shows one of the following:
 - GCP Cal Req
 - GCP Approach Req
 - Linearization Req
 - Island Cal Req

- The Track Module 4-character display shows one of the following:
 - **GCAL**
 - **GAPP**
 - **GLIN**
 - **ICAL**

The DT 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.



Figure 11: Calibration Process

Table 7: GCP Calibration

Table 7: GCP Calibration

Step 1	If system has a transfer module, set the transfer switch to MAIN .
Step 2	Go to the Main Menu and select the SETUP button at the top of the display.
Step 3	From the menu that appears, select the track to calibrate. Menu shows only enabled tracks.
Step 4	Select the GCP CAL button. The GCP Calibration Window appears. The current EZ and EX values appear. If Calibration Req. appears below the EZ and EX values, calibration is required.
Step 5	Select the START button. The START button deactivates (grays out). The display shows an Initiating then an In Progress message during the calibration. The track module requires about 15 seconds to calibrate. If calibration is successful: The Calibration Select window appears. EZ should be 98 to 102 and the GCP CAL button has a green check in the box. If calibration is not successful, the display shows a Failed message.
Step 6	To record the reason for the recalibration in the Maintenance log, select the GCP CAL button. <ul style="list-style-type: none"> • The GCP Calibration Window appears.

Table 7: GCP Calibration

Step 7	Select the ADD LOG ENTRY button. <ul style="list-style-type: none"> The Log Entry Window opens.
Step 8	Type any notes concerning the reason and select OK to save the entry. <ul style="list-style-type: none"> Log Entry Window closes and the display returns to the GCP Calibration Window
Step 9	Select the CAL SELECT button. <ul style="list-style-type: none"> The display changes to Calibration Select Window.

The linearization procedure compensates for lumped loads in the Model 4000 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 overly 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 4000 GCP requires only that the **GCP CAL** procedure be performed, the **BYPASS** procedure must be completed for both **GCP APP** and **GCP LIN**. See next page.

Table 8: GCP APP & GCP LIN Calibration Bypass Procedure

Table 8: GCP APP & GCP LIN Calibration Bypass Procedure

Step 1	<ul style="list-style-type: none"> Once GCP CAL is completed, bypass the approach calibration by first selecting GCP APP and then BYPASS. Do not select START.
Step 2	Bypass the linearization calibration by first selecting GCP LIN and then BYPASS . <ul style="list-style-type: none"> Do not select START.

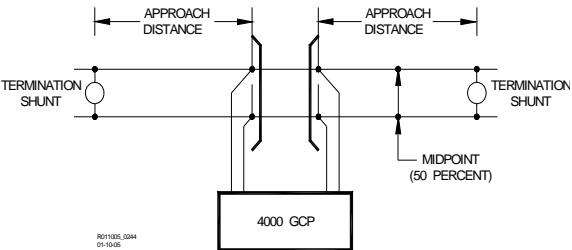


Figure 12: Midpoint Location (See Step 6 below)

WARNING

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

Table 9: Approach Distance and Linearization Calibration

Table 9: Approach Distance and Linearization Calibration

Step 1	<ul style="list-style-type: none">Record the EZ and EX values for the track (before installing hardwire shunt) in the Step 1 column (Calibrated Values) on the Calibration Values History form at the end of this procedure. Then, temporarily place a hardwire shunt across the termination shunt. For bidirectional installations, 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.
Step 3	Select the GCP APP button. <ul style="list-style-type: none">The GCP Approach Window appears.
Step 4	Select the START button. The START button deactivates (grays out). The display shows an Initiating then an In Progress message during the calibration. If calibration is successful: The Calibration Select window appears. The computed approach distance (Comp Dist) appears. The GCP APP button has a green check in the box. <ul style="list-style-type: none">If calibration is not successful, the display shows a Failed message (see Troubleshooting).
Step 5	Record the computed approach distance in feet for the track in the First Approach, Step 5 column (Comp Dist) on the Calibration Values History form at the end of this procedure.
Step 6	Accurately (within 1%) locate the midpoint of the longest approach and move the hardwire shunt to that point on the rails.
Step 7	Select the GCP LIN button. <ul style="list-style-type: none">The GCP Linearization Window appears.

Table 9: Approach Distance and Linearization Calibration

Step 8	<p>Select the START button.</p> <p>The START button deactivates (grays out).</p> <p>The display shows an Initiating then an In Progress message during the calibration.</p> <p>If calibration is successful:</p> <p>The Calibration Select window appears.</p> <p>The GCP LIN button has a green check in the box.</p> <p>If calibration is not successful, the display shows a Failed message (see Troubleshooting).</p>
Step 9	<p>Record the linearization step value for the track in the First Approach, Step 9 column (Lin Steps) on the Calibration Values History form at the end of this procedure.</p> <ul style="list-style-type: none"> • value between 68 and 132.
Step 10	<p>Verify that the computed approach distance in feet (Comp Dist, Step 5) and the linearization steps (Lin Steps, Step 9) values recorded on the Calibration Values History form are the same as the values displayed on the Calibration Select window.</p>
Step 11	<p>Remove the hardwire shunt from the track.</p>
Step 12	<p>If the approach is unidirectional or simulated bidirectional, go to step 31.</p> <p>If the track is bidirectional and the measured distance to the other termination shunt is within 10 % of the first approach distance, go to step 13.</p> <p>Otherwise, if the distance is clearly shorter, go to step 31.</p>
Step 13	<p>Temporarily place a hardwire shunt across the termination shunt of the other approach.</p>
Step 14	<p>Record the EZ and EX values for the track in the Second Approach, Step 14 column on the Calibration Values History form at the end of this procedure.</p>
Step 15	<p>Select the GCP APP button.</p> <ul style="list-style-type: none"> • The GCP Approach Window appears.
Step 16	<p>Select the START button.</p> <p>The START button deactivates (grays out).</p> <p>The display shows an Initiating then an In Progress message during the calibration.</p> <p>If calibration is successful:</p> <p>The Calibration Select window appears.</p> <p>The computed approach distance (Comp Dist) appears.</p> <p>The GCP APP button has a green check in the box.</p> <p>If calibration is not successful, the display shows a Failed message (see Troubleshooting).</p>

Table 9: Approach Distance and Linearization Calibration

CALIBRATION	Step 17	Record the computed approach distance in feet in the Second Approach, Step 17 column on the Calibration Values History form at the end of this procedure.
	Step 18	Accurately (within 1%) locate the midpoint of this approach and move the hardwire shunt to that point on the rails.
	Step 19	Select the GCP LIN button. The GCP Linearization Window appears.
	Step 20	Select the START button. The START button deactivates (grays out). The display shows an Initiating then an In Progress message during the calibration. If calibration is successful: The Calibration Select Window appears. GCP LIN button has a green check in box. <ul style="list-style-type: none"> If calibration is not successful, the display shows a Failed message (see Troubleshooting).
	Step 21	Record the linearization (Lin Steps) value (between 68 and 132) for the track in the Second Approach, Step 21 column (Lin Steps) on the Calibration Values History form at the end of this procedure. Verify that the computed approach distance in feet (Comp Dist , step 17) and the linearization steps (Lin Steps , step 21) values recorded are the same as the values displayed on the Calibration Select window.
	Step 22	Remove the hardwire shunt from the track.
	Step 23	If the Lin Steps value for the second approach (step 21) is greater than or the same as the Lin Steps value recorded for the first approach (step 9), go to step 31. If the Lin Steps value for the second approach (step 21) is less than the value recorded for the first approach (step 9), go to step 24.
	Step 24	Select the GCP LIN button. The GCP Linearization Window appears.
	Step 25	Select the EDIT button. <ul style="list-style-type: none"> The Linearization Steps dialog box appears.
	Step 26	Enter the Lin Steps value recorded on the Calibration Values History form for the first approach (step 9) into the New Value field using the keypad numbers and select UPDATE . <ul style="list-style-type: none"> The Calibration Select Window appears.
	Step 27	Select the GCP APP button. <ul style="list-style-type: none"> The GCP Approach Window appears.

Table 9: Approach Distance and Linearization Calibration

Step 28	Select the EDIT button. <ul style="list-style-type: none"> The Computed Approach Distance dialog box appears.
Step 29	Enter the computed approach distance (Comp Dist) value (in feet) recorded for the first approach (step 5) into the New Value field using the keypad numbers and select UPDATE . <ul style="list-style-type: none"> The Calibration Select Window appears.
Step 30	Verify that the computed approach distance (Comp Dist , step 5) and the linearization steps (Lin Steps , step 9) values recorded on the Calibration Values History form for the first approach are the same as those displayed on the Calibration Select window.
Step 31	To record the reason for the Calibration and store it in the Maintenance log, select the GCP LIN button and then the ADD LOG ENTRY button. <ul style="list-style-type: none"> Type any notes about the calibration and select OK to save the entry.

Table 10: Calibration Value History Form, 1st Approach

	Calibrated Values (Step 1)		1 st Approach E/W() (N/S)			
			Hardwire Across Term. Shunt (Step 2)		Computed Approach Distance (Comp Dist) (Step 5)	Linearization Step Value (Lin Steps) (Step 9)
	EZ	EX	EZ	EX		
Track 1						
Track 2						
Track 3						
Track 4						
Track 5						
Track 6						

Table 11: Calibration Value History Form 2nd Approach

	Calibrated Values (Step 1)		2 nd Approach E/W() (N/S)			
			Hardwire Across Term. Shunt (Step 14)		Computed Approach Distance (Comp Dist) (Step 17)	Linearization Step Value (Lin Steps) (Step 21)
	EZ	EX	EZ	EX		
Track 1						
Track 2						
Track 3						
Track 4						
Track 5						
Track 6						

NOTE

This completes **Approach and Linearization Calibration**. If the system includes an internal island, proceed to **Island Calibration (ISL CAL)**. If not, proceed to Table 14.

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

Table 12: Island Calibration

Step 1	If an Island circuit is used, select the ISL CAL button. <ul style="list-style-type: none">• The ISLAND CALIBRATION Window appears.
Step 2	Temporarily install a hardwire shunt beyond the island receiver rail connections at the appropriate distance specified below the Calibration Required message. <ul style="list-style-type: none">• Shunt distances for island frequencies are provided in the table following the Island Calibration procedure.
Step 3	Select the START button. The START button deactivates (grays out). The display shows an Initiating then an In Progress message during the calibration. If calibration is successful: The Calibration Select Window appears. The ISL CAL button has a green check in the box. <ul style="list-style-type: none">• If calibration is not successful the display shows a Failed message (see Troubleshooting).
Step 4	Verify that the island LED on the Main Status menu is off and remove the hardwire shunt. <ul style="list-style-type: none">• The island LED is now on.

Table 13: Island Shunt Distance

Table 13: Island Shunt Distance

Island Frequency (kHz)	Shunt Distance (Feet)			
	0.12 ohm Sensitivity	0.3 ohm Sensitivity	0.4 ohm Sensitivity	0.5 ohm Sensitivity
2.14	20	50	67	84
2.63	17	43	58	72
3.24	13	33	44	55
4.0	10.5	27	36	45
4.9	9.0	23	31	39
5.9	7.5	19	26	32
7.1	6.5	17	23	29
8.3	6.0	15	20	25
10.0	5.0	13	18	22
11.5	4.5	12	16	20
13.2	4.0	10	14	17
15.2	3.5	9	12	15
17.5	3.0	8	11	14
20.2	3.0	8	11	14

CALIBRATION

CAUTION

GATES WILL BEGIN TO LOWER IMMEDIATELY (WITHOUT GATE DELAY TIME) WHEN THE TRANSFER SWITCH IS USED TO SWAP BETWEEN HEALTHY UNITS. USE CAUTION WHEN TRANSFERRING CONTROL TO AVOID GATES HITTING VEHICLES OR PEDESTRIANS.

NOTE

Under normal conditions in the AUTO Transfer mode, gate delay time will run when the gates initially operate. If the trouble continues, the gates will already be lowered when the Transfer Module later swaps units.

Repeat all GCP approach, linearization, and island calibration steps for each MAIN side track module installed.

Table 14: Standby Modules Calibration

Table 14: Standby Modules Calibration

Step 1	On Transfer module A80406 (A80468), set the transfer switch to STBY .
Step 2	Go to the main Status menu and select the SETUP button at the top of the display.
Step 3	From the menu that appears, select the track to calibrate. <ul style="list-style-type: none"> Only enabled tracks appear on the menu.

Table 14: Standby Modules Calibration

CALIBRATION	Step 4	<p>Select the GCP CAL button.</p> <p>The GCP Calibration Window appears.</p> <p>The current EZ and EX values appear.</p> <ul style="list-style-type: none"> • If calibration is required, Calibration Req. appears below the EZ and EX values.
	Step 5	<p>Select the START button.</p> <p>The START button deactivates (grays out).</p> <p>The display shows an Initiating then an In Progress message during the calibration.</p> <p>The track module requires about 15 seconds to calibrate.</p> <p>If calibration is successful:</p> <ul style="list-style-type: none"> • The Calibration Select window appears. • EZ should be 98 to 102 and the GCP CAL button has a green check in the box. • If calibration is not successful, the display shows a Failed message (see Troubleshooting).
	Step 6	<p>Select the GCP APP button.</p> <p>The GCP Approach Window appears.</p> <p>The computed approach distance (Comp Dist) appears.</p> <p>This is the value calculated on the MAIN side.</p> <ul style="list-style-type: none"> • Calibration Req. appears at the bottom of the window.
	Step 7	<p>Select the BYPASS button.</p> <p>The computed approach distance is accepted as correct and the GCP APP button shows a green check in the box.</p>
	Step 8	<p>Select the GCP LIN button.</p> <p>The GCP Linearization Window displays.</p> <p>The current value for Linearization Steps displays.</p> <ul style="list-style-type: none"> • This is the value calculated on the MAIN side.
	Step 9	<p>Select the BYPASS button.</p> <p>The Linearization steps value is accepted as correct and the GCP LIN button shows a green check in the box.</p>
	Step 10	<p>If an internal Island circuit is used, select the ISL CAL button. If not used, go to step 14.</p> <ul style="list-style-type: none"> • The ISLAND CALIBRATION Window appears.
	Step 11	<p>Temporarily install a hardwire shunt beyond the island receiver rail connections at the appropriate distance specified below the Calibration Required message. (See also preceding Island Shunt Distance table.)</p>

Table 14: Standby Modules Calibration

Step 12	<p>Select the START button.</p> <p>The START button deactivates (grays out).</p> <p>The display shows an Initiating then an In Progress message during the calibration.</p> <p>If calibration is successful:</p> <p>The Calibration Select window appears.</p> <p>The ISL CAL button has a green check in the box.</p> <ul style="list-style-type: none"> • If calibration is not successful, the display shows a Failed message (see Troubleshooting).
Step 13	<p>Verify the island LED is off and remove the hardwire shunt.</p> <ul style="list-style-type: none"> • Island LED is now on.
Step 14	<p>Repeat steps 1 through 13 for each standby-side Track Module installed.</p>

ADJUSTING LAMP VOLTAGES FOR SSCC3, SSCC3A, SSCC3+, AND SSCC4

(when a “True RMS AC + DC” meter is not available)

General

WARNING

TO PREVENT AN OVER-VOLTAGE CONDITION AT THE LAMPS, USE A VOLTMETER WITH A “TRUE RMS AC + DC” SCALE AND MAKE ALL MEASUREMENTS USING THAT SCALE.

To accurately read the crossing lamp voltages, a “true rms AC + DC” multimeter (e.g., Agilent U1252A digital multimeter or equivalent) must be used. However, a conventional multimeter may be used, but the voltage reading will be lower than “true rms AC + DC” values. The variance is not a set percentage and is dependent on battery voltage. A conversion table for several conventional meters is provided in the table below.

Table 15: Multimeter Reading Variance From Actual Incandescent Lamp Voltage

Table 15: Multimeter Reading Variance from Actual Incandescent Lamp Voltage			
Battery Voltage	Regulated Lamp Drive Voltage Range	Measurement Below Actual Drive Voltage	
		Using Digital Multimeter (Agilent U1252A7 or equivalent)	Using Analog Multimeter (TS111)
13.3	9.0 to 12.0	1.3 volts	0.6 volt
	>12.0	0.91 volt	0.42 volt
14.7	9.0 to 12.0	2.2 volts	1.1 volts
	>12.0	1.54 volts	0.77 volt
15.8	9.0 to 12.0	2.6 volts	2.0 volts
	>12.0	1.82 volts	1.4 volts

NOTE

The variance table applies to incandescent lamps and only LED lamps that present a resistive load to the SSCC IV. For other kinds of LED lamps, it is recommended that the voltage measured by a meter which is set to “True RMS AC + DC” be considered as correct.

Meter Reading Conversion Examples

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

- Battery bank voltage is 14.7 volts
- Multimeters are set to read DC

Lamp Voltage Measurement Example 1

When setting crossing lamp voltages to 9.5 volts, the conventional meter reading is determined by subtracting the meter variance given in Table 15 from the desired lamp voltage.

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

- Desired lamp voltage = 9.5
- Meter variance for 14.7 volt battery = -2.2
- Meter reading = **7.3**

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

- Desired lamp voltage = 9.5
- Meter variance for 14.7 volt battery = -1.1
- Meter reading = **8.4**

Lamp Voltage Measurement Example 2

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

When verifying that the lamp voltages are greater than 8.5 VDC, the conventional meter reading is determined by subtracting the meter variance given in Table 15 from the minimum lamp voltage threshold.

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

- Minimum lamp voltage threshold = 8.5
- Meter variance for 13.3 volt battery = -1.3
- Minimum meter reading = **7.2**
-

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

- Minimum lamp voltage threshold = 8.5
- Meter variance for 13.3 volt battery = -0.6
- Minimum meter reading = **7.9**

SSCC3I LAMP VOLTAGE ADJUSTMENT

WARNING

TO BE ACCURATE, LAMP VOLTAGES MUST BE MEASURED AT THE LAMP. THE VOLTAGE ON THE DISPLAY IS THE VOLTAGE AT THE SSCC CONNECTOR. INACCURATE MEASUREMENTS MAY RESULT IN DIM LAMPS OR EARLY LAMP FAILURE.

NOTES

Before performing Lamp Voltage Adjustment procedure, the crossing controllers must be inactive; i.e., gates up, lights off and bell off.

If a train approaches during lamp adjustment, the crossing controllers will activate and the lamps will flash. Restart Lamp Voltage Adjustment Procedure following completion of train move.

The regulated output is a pulse-width modulated output that produces a square wave. A meter with a “True RMS AC + DC” scale is required to accurately measure the voltage See Table 15 for measuring voltages with a conventional meter.

IF SSCC3I modules are included in the system, proceed to **SSCC3I LAMP VOLTAGE ADJUSTMENT** and **SSCC LAMP TESTS**. Otherwise, proceed to **OPERATIONAL CHECKS**. Regardless of the actual location of the SSCCIII board on the physical case of the GCP, the tabs on the Lamp Setup Window depicts the two choices as Slot 8 SSCC3I and Slot 9 SSCC3I.

When “far gate” lamps and “near gate” lamps are driven from the same output, first adjust the lamp voltage on the far gate. Then adjust the lamp voltage on the near gate using adjustment resistors.

On the Lamp Setup screen dV indicates tenths of a volt (decivolt). 100 dV is equal to 10.0 volts. etc.

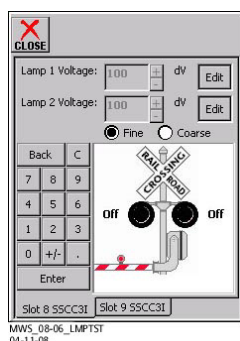


Figure 13: Adjust Lamp Voltage Window

Table 16: Crossing Controller Lamp Voltage Adjustments

Table 16: Crossing Controller Lamp Voltage Adjustment

Step 1	Select the Setup button at the top of the Main Status screen. <ul style="list-style-type: none"> The Track Setup Menu appears
Step 2	Select the SSCC Lamps entry of the Track Setup Menu <ul style="list-style-type: none"> The Lamp Setup window appears
Step 3	Select the Slot 8 SSCC3I tab at the bottom of the window.
Step 4	Select the Edit button to the right of the Lamp 1 Voltage field. (It may take a few seconds for Edit button to become active – turns black.) The Lamp 1 Voltage field highlights. <ul style="list-style-type: none"> The corresponding lamp output is turned on steady.
Step 5	Set the Lamp 1 Voltage field to the output voltage required to set the correct voltage at the lamps. Select either the Fine or Coarse adjustment button. Fine changes the voltage in 1 dV (0.1 V) steps Coarse changes the voltage in 5 dV (0.5 V steps) Increment the voltage display using the + or – buttons to the right of the Lamp Voltage 1 field. <ul style="list-style-type: none"> Measure voltage at the actual lamps.
Step 6	When the meter displays the correct voltage, select the Enter button at the bottom of the keypad. <ul style="list-style-type: none"> The Lamp 1 Voltage field deactivates. The new voltage value is saved. Corresponding lamp output is turned off.
Step 7	Select the Edit button to right of the Lamp 2 Voltage field. The Lamp 2 Voltage field highlights. <ul style="list-style-type: none"> Corresponding lamp output is turned on.

Table 16: Crossing Controller Lamp Voltage Adjustment

Step 8	<p>Set the Lamp 2 Voltage field to the output voltage required to set the correct voltage at the lamps.</p> <p>Select either the Fine or Coarse adjustment button.</p> <p>Increment the voltage display using the + or – buttons to the right of the Lamp Voltage 2 field.</p> <ul style="list-style-type: none"> • Measure the voltage at the actual lamps.
Step 9	<p>When your meter reads the correct voltage, select the Enter button at the bottom of the keypad.</p> <p>The Lamp 2 Voltage field deactivates.</p> <p>The new voltage value is saved.</p> <ul style="list-style-type: none"> • Corresponding lamp output is turned off.
Step 10	Select the Slot 9 SSCC3I tab at the bottom of the window.
Step 11	Repeat steps 4 through 9 for the second SSCCIIIi module.

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OPERATIONAL CHECKS

SSCC3I TEST MODE

WARNING

THE SSCC TEST MODE WILL NOT PREEMPT TRAFFIC SIGNALS. VERIFY THAT VEHICLES ARE CLEAR OF THE WARNING DEVICES BEFORE ACTIVATING THE SIGNALS.

NOTE

While in Test Mode, if a train approaches (XR input logic de-energizes), the test is cancelled and the crossing activates normally. When the train departs, the system remains in normal operation.

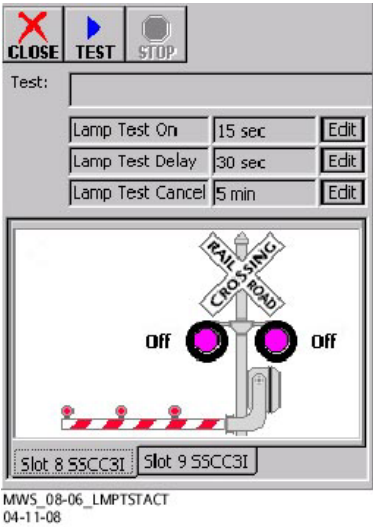


Figure 14: Lamp Test Activated

Table 17: Crossing Controller Lamp Test Selection

Table 17: Crossing Controller Lamp Test Selection

Step 1	Select the Setup button at the top of the Main Status screen. <ul style="list-style-type: none">The Track Setup Menu appears
Step 2	Select SSCC Tests entry from the Track Setup Menu <ul style="list-style-type: none">The SSCC Test window appears

The operation of each Solid State Crossing Controller (SSCC3I) can be tested from this window. Select the Crossing controller using tabs at the bottom of window:

- Slot 8 SSCC3I
- Slot 9 SSCC3I

Three function buttons at the top of the window control the SSCC tests.

- The **CLOSE** button closes the window and returns the display to the Status Screen.
- The **TEST** button opens the Test Initiation menu
 - Selection of item from menu:

- Starts selected item test
 - Closes menu
 - Identifies selected test in **Test:** field
- The **STOP** button stops a selected test.
Button is active when the test is started.

TEST ITEMS

The following SSCC tests may be performed:

- **Bell:** Turn on the bell output
- **Lamp 1:** Turn on Lamp 1 output
- **Lamp 2:** Turn on Lamp 2 output
- **Flash the Lamps:** Test the lamp outputs on both controllers
- **Test the crossing:** Flash the lights, ring the bell, run the gate delay, and then drop the gate.

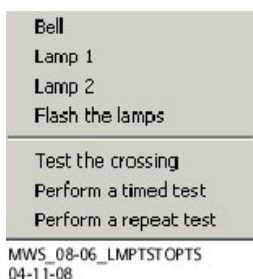


Figure 15: Lamp Test Options

After these tests have been started, they remain active until:

- the **Stop** button is selected,
- the Lamp Test cancel time expires
- the window is closed

Types of Timed Tests

Timed Tests: When the Timed Test is started, the GCP performs the following sequence:

- pauses for the programmed **Lamp Test Delay** time
- flashes the lamps for the programmed **Lamp Test On** time
- turns the lamps off
- stops the test.

Repeat Tests: When the Repeat Test is started, the GCP performs the following sequence:

- pauses for the programmed Lamp Test Delay time
- flashes the lamps for the programmed Lamp Test On time
- turns the lamps off for twice the programmed Lamp Test Delay time
- flashes the lamps for the programmed Lamp Test On time
- turns the lamps off
- stops the test.

Parameters for Timed Tests

Parameters for each SSCC timed test are set in the fields below the **Test:** field.

The **Lamp Test On** field designates the duration of the Lamp On test.

Select the **Edit** button to the right of the field to open the **Set Parameter** dialog box. This **Set Parameter** dialog box allows the test duration timer to be modified.

- Default value: **15 sec**
- Valid entry range: **15** to **60** seconds

The **Lamp Test Delay** field designates the time between test selection and test start. Select the **Edit** button to the right of the field to open the **Set Parameter** dialog box. This **Set Parameter** dialog box allows the **Lamp Test Delay** timer to be modified.

- Default value: **30 sec**
- Valid entry range: **30** to **120** seconds

The **Lamp Test Cancel** field designates the automatic test termination time following test initiation. Select the **Edit** button to the right of the field to open the **Set Parameter** dialog box. This **Set Parameter** dialog box allows the **Lamp Test Cancel** timer to be modified.

- Default value: **5 min**
- Valid entry range: **1** to **15** minutes

Test Status Indications

The status of the SSCCIII module appears in the gate display field at the bottom of the window during tests.

Four status notations appear during operational tests:

- **Off** indicates that the SSCCIII module lamp drive outputs are off.
- **Ring** indicates that the SSCCIII module bell output is energized.
- **Flash** indicates that the SSCCIII module lamp outputs are alternately energizing (flashing).
- **Failed** indicates that a bell, lamp, or crossing gate output failure has been detected.

GCP OPERATIONAL TEST MODE

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.

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 18: GCP Operational Tests

Table 18: GCP Operational Tests

Step 1	<p>Check tracks for:</p> <ul style="list-style-type: none">• Open transmit wire<ul style="list-style-type: none">○ Crossing activates○ EZ = 0• Open receive wire<ul style="list-style-type: none">○ Crossing activates○ EZ = 0
Step 2	<p>UAX, DAX Enables & AND Enable input(s), if these features are used:</p> <ul style="list-style-type: none">• Crossing activates when each remote DAX line circuit that controls a UAX, DAX Enable or AND 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	<p>DAX outputs and “Radio DAX” operation using Spread Spectrum Radio, if these features are used:</p> <ul style="list-style-type: none">• Downstream crossing activates when the appropriate DAX output or Radio DAX message is deenergized• DAX Pickup Delay time is correct

Table 18: GCP Operational Tests

OPERATIONAL CHECKS	Step 4	<p>WRAP logic, if this feature is used:</p> <ul style="list-style-type: none"> WRAP logic W is displayed on Main status screen for each corresponding wrapped track (when WRAP inputs are energized as seen on system I/O view). <p>W is removed from corresponding track on Main status screen when:</p> <ul style="list-style-type: none"> Corresponding track with wrap is shunted or Corresponding wrap input is deenergized <p>Measure WRAP LOS pickup delay from the time the wrap input is energized until the W is displayed on corresponding track status screen.</p> <p>Verify the LOS pickup delay time (minimum of 5 seconds).</p>
	Step 5	<p>OVERRIDE logic, if this feature is used.</p> <p>There may be one or up to three OVERRIDE inputs used depending on OVERRIDE programming. The OVERRIDE options are: ALL PREDICTORS Override or DAX A, DAX B and DAX C Override.</p> <p>When corresponding OVERRIDE input is energized, OVERRIDE Input Status is GREEN on System I/O view.</p> <ul style="list-style-type: none"> Observe that corresponding Override input changes to RED when: Corresponding switch in GCP approach is reversed or Corresponding signal field apparatus is changed from energized to deenergized or deenergized to energized depending on field signal logic for OVERRIDE.
	Step 6	<p>Traffic Signal Preemption, if this feature is used:</p> <p>The preempt output deenergizes:</p> <ul style="list-style-type: none"> When the prime deenergizes 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, which ever is sooner. Time should be equal to Adv Preemption timer value or shorter. <p>When used, Advance Preempt IP input open causes Preempt Output to de-energize and activates warning devices after the Advance Preempt Delay Timer times out. (Observe input on I/O view).</p> <p>When used, Preemption Health IP input open activates warning devices immediately (without advance preempt Delay time interval). (Observe input on I/O view).</p> <p>When used, Traffic Signal Health open initiates simultaneous preemption, rather than advance preemption, upon train detection</p>

Table 18: GCP Operational Tests

<p>Step 7</p>	<p>Island detection</p> <p>When used, observe the ISLAND symbol on tracks on the Main Status display.</p> <p>Place a 0.06 ohm shunt on island track wires</p> <p>ISLAND symbol is GRAY</p> <p>Observe island LED on track module as shunt is removed and while ISLAND Pickup Delay is timing</p> <p>ISLAND LED is flashing</p> <p>After the island pickup delay time expires on module and island LED is steady RED</p> <p>ISLAND symbol on Main display is GREEN, and warning devices are deactivated.</p>
<p>Step 8</p>	<p>Out of Service, OOS, if this feature is used:</p> <p>If the Display method is used:</p> <ul style="list-style-type: none"> • 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 <p>If Display + OOS IP input is used, then for each track:</p> <ul style="list-style-type: none"> • 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 <p>If OOS IP Input is used:</p> <ul style="list-style-type: none"> • 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 <p>If 4000 Case OOS IP Input used:</p> <ul style="list-style-type: none"> • Turn on 4000 Case OOS input. (observe input on I/O view). • Main Display indicates all track are OOS • Turn off 4000 Case OOS input • Main Display indicates all tracks are back in service

Table 18: GCP Operational Tests

OPERATIONAL CHECKS	Step 9	<p>Maintenance Call (MC) Light, if this feature is used:</p> <ul style="list-style-type: none"> • Verify that the light is lit • Verify that the MC extinguishes when one of the following occurs: • Taking a track out of service, or by energizing an out-of-service input. • If “Low Battery Enable” is ON, temporarily raise the “Low Battery Level” to above the battery voltage. • Removing CPU module from the chassis, which will activate the crossing also. <p>Restore the track, low battery level, or CPU module to operation and the MC light should turn on.</p>
	Step 10	<p>If Positive Start, Advanced Approach Prediction, and/or Sudden Shunt Detection are used:</p> <ul style="list-style-type: none"> • Shunt at the appropriate point • Take the required measurements • Reprogram EZ threshold levels as required

Finishing Step 9 completes the GCP operational checks / tests. Proceed to SSCC3I Operational Tests for SSCC calibration and operational checks / tests.

SSCC3I OPERATIONAL TESTS

After the system has been programmed, GCP calibrated and the lamp voltages have been adjusted, tests must be performed to verify the operation of the SSCC prior to placing the system in service. In addition to the operational tests required by the maintaining railroad, the SSCC operation should be further tested and verified as described in the SSCC Operational Tests procedure provided below.

WARNING

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

NOTE

While in Test Mode, if a train approaches (XR input logic de-energizes, the test is cancelled and the crossing activates normally. When the train departs, the system remains in normal operation.

If advance preemption is used, the preemption output and warning devices will operate as follows for the indicated method of activation:

- For a train move:
 - Pre-emption Output de-energizes at the pre-empt warning time.
 - Activation of the warning devices will be delayed until the Advance Pre-empt Timer times out, or the Prime Warning time is reached.
- Advance Pre-empt Input de-energized:
 - Pre-emption Output de-energizes
 - Activation of the warning devices will be delayed until the Advance Pre-empt Timer times out.
- AND 1 Enable Input de-energized:
 - Pre-emption Output de-energizes
 - Activation of the warning devices occurs simultaneously (no advance pre-empt time).
- "Test the Crossing" Test Mode;
 - Pre-emption Output de-energizes
 - Activation of the warning devices occurs simultaneously (no advance pre-empt time).

Table 19: SSCC Operational Tests

Table 19: SSCC Operational Tests

Step 1	Verify that the light/gate battery is charged.
Step 2	Verify that all connectors on the SSCC have been properly positioned, seated and secured.

Table 19: SSCC Operational Tests

Step 3	Verify that all the electrical connections in the Bell, Lamp, and Gate circuits are properly assembled, tightened and secured.
Step 4	Verify that all flashing lamps light and none are burned out.
Step 5	Verify that all lights have been aligned.
Step 6	Verify that the gates are operational.
Step 7	Verify that the bells are operational.
Step 8	Verify that all SSCC programming is correct (program and configure menus).
Step 9	Verify that all lamp voltages have been set.
Step 10	Momentarily turn on the flashers from the TEST menu and verify that the battery charger is operational and providing current to the lamps and battery.
Step 11	Verify that the gate delay time is correct.
Step 12	Verify that the lights continue to flash while the gates are rising.

After performing SSCC Lamp Mode Tests, GCP Operational Tests, and SSCC Operational Tests, verify proper Train Detection, Warning Times and Crossing Operation

Table 20: Train Detection, Warning Times and Crossing Operation

Table 20: Train Detection, Warning Times and Crossing Operation

Step 1	EZ continuity check on train moves: <ul style="list-style-type: none"> • 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.
Step 2	For MAIN and STANDBY, check warning times for inbound train moves on each approach including DAX operation..
Step 3	Check for proper gate / flasher / bell operation on all train moves.

TROUBLESHOOTING

The GCP Display Module is the main diagnostic tool available to maintenance personnel. The display is a touch screen activated device equipped with a timeout feature. To activate the display, touch it with the stylus. The track function status view is shown in Figure 16.

The EZ and EX are shown for each track. A track status area (two in the example in Figure 16) is displayed for each track module in the system (up to six). 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 Module is replaced, the logs remain on the removed Display Module, and any logs stored on the new Display Module will be shown when called.

NOTE

Whenever any files are being saved using the Display Terminal (DT) they may be saved either to a laptop or to a USB Device.

SYSTEM STATUS INDICATORS AND LOGS

Track Status Window Color Scheme

The status window background color indicates track status:

- Red: The Track Module is not installed, or the Track Module is unhealthy
- 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
- Flashing blue: The GCP or the island on the Track Module is out of service.

Track Function Status

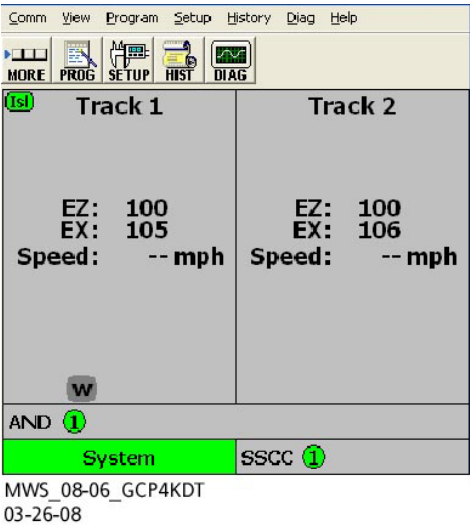


Figure 16: Model 4000 GCP DT Window

The status of optional track functions is displayed in the lower portion of each track status window.

- **Wrap Circuit Status**
 - “W” indicates Wrap input energized.
 - “W” is displayed only when Wrap input is energized and when “Track # Wrap Used” is set to YES.
- **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.
- **Motion Sensor Restart**

“m” indicates that the predictor switched to a motion sensor due to motion sensor control input being low or MS restart timer is running.

ISL and SSCC and System Status Indications

ISL:

- Gray symbol = island occupied
- Green symbol = island unoccupied or, if used, Wrap input energized regardless of occupancy state.
- No symbol = not used

AND:

- Status Bar indicates which AND functions are programmed as shown by a circled number.
- Gray circle = the AND function is de-energized and not Wrapped (if used).
- Green circle = the AND function is energized and not Wrapped (if used).
- Yellow circle = the AND function is Wrapped regardless of state of AND function logic.
- Flashing blue background = the AND functions are out of service.

SSCC:

- Status bar Indicates which SSCC3I are used as shown by circled number.
 - Green circle = not activated (lamps not flashing)
 - Grey circle = signals are activated (lamps flashing)

System:

- Green status bar = all tracks are calibrated
 - track conditions are within normal operating parameters
 - system is fully functional
- Red status bar = unhealthy system or track condition exists.
 - displays system status
 - status window for affected track also displays red

Additional information is obtained by tapping the track section with the stylus and selecting DETAILED STATUS VIEW. The TRACK DIAGNOSTICS and 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.

History Logs**NOTE**

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

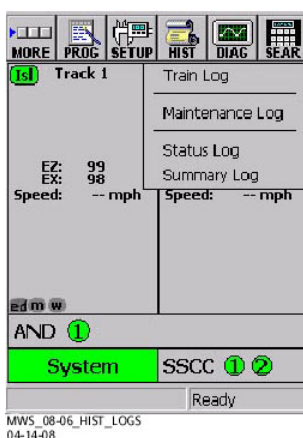


Figure 17: History Screen

Four history logs may be accessed as shown below:

Train Log

Separate log for Main and Standby:

- Train Log stored on CPU Module
- Main log on main CPU
- Standby log on standby CPU

Contains:

- Date and time of move
- Crossing warning time (**WT**)
- Detection (**Det**) speed
- Island (**Isl**) speed

Each move listing is designated by either an **X** (crossing) or **T** (track) to the right of the time entry.

Selecting the **ONLY** button selects only the crossing moves for display.

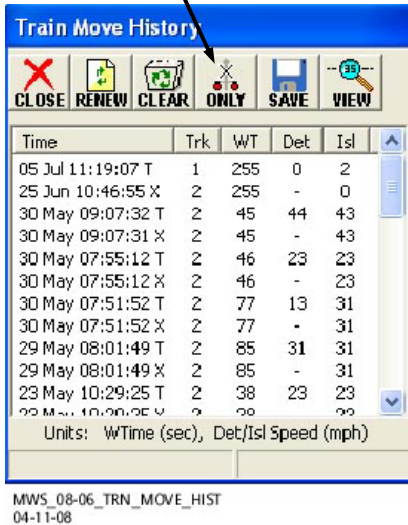


Figure 18: Train Move History Window

NOTE

The above screen shows a CLEAR button. It may be necessary to select a MORE button for the CLEAR button to appear. The CLEAR selection allows the maintainer to clear the log after it is reviewed so that only events that occur between this visit and the next visit will appear next time.

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

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



Figure 19: Train Movement History Detail Screen

NOTE

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

Maintenance Log

- Combines entries for both Main and Standby
- Maintenance Log stored on Display Module.

- Information from Main and Standby CPUs stored in same log.
- Captures events only while the Display Module is connected to the GCP.
- Contains programming changes
- Contains Calibration information
- Contains user entered maintenance notes (ADD LOG ENTRY). For instance Maintainer can add notes about weather, periodic tests, or reason for calibration.
- Can be cleared by maintainer after review.

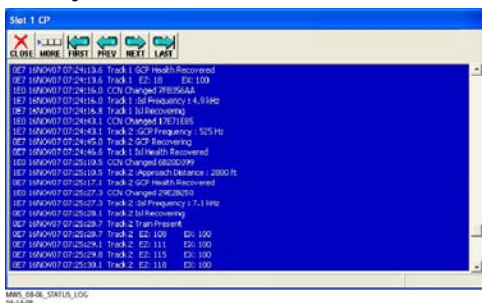


NOTE

Status Log

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

- Separate log for Main and Standby
- Status Log stored on CPU Module
- Main log on main CPU
- Standby log on standby CPU
- Contains all system events



Summary Log

- Can be cleared by maintainer after review

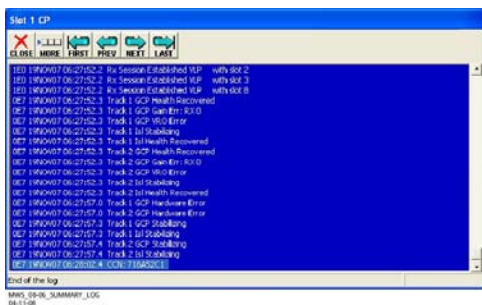


Figure 22: Summary Log

SYSTEM TROUBLESHOOTING

This subsection describes the method of troubleshooting a problem in a system that has previously been in service. When entering the signal house, the GCP display will be dark because the touch screen display has a timeout feature. To activate the display touch it with the stylus. The first step in troubleshooting a problem is to determine whether the components of a 4000 GCP system have detected a problem. When the 4000 GCP system is healthy, it shows the following:

- Track windows are gray (or white if a train has been detected) on the DT Display.
- System Status bar on DT Status Screen is green.
- Health LEDs on all modules (CPU, Track, RIO, and SSCCIII) are flashing slowly (1HZ).
- Transfer Module display is not counting down.
- SEAR Alarm LED's indicate that no alarms are present.
- CPU LED 1 is on, indicating that the Maintenance Call output is on.
- CPU LED 2 is on, indicating that the transfer signal is being generated.
- Power LEDs on all modules are on and steady.

If the system has detected a problem, use the System Diagnostics or the Track Diagnostics to locate the problem.

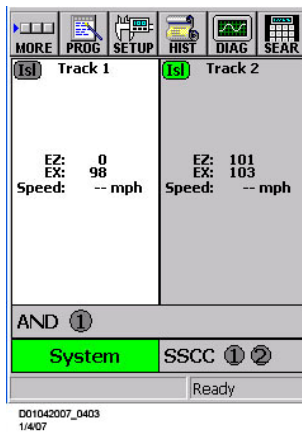


Figure 23: Model 4000 GCP DT Window

Diagnostics

When entering the signal house, the GCP display will be dark because the touch screen display has a timeout feature. To activate the display, touch it with the stylus. Each module also has diagnostic LEDs, and may have a four-character display, that assists in setup, calibration, diagnostics and troubleshooting. 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, the System status bar is displayed red. The status window for the affected track module will also be displayed red as shown below.

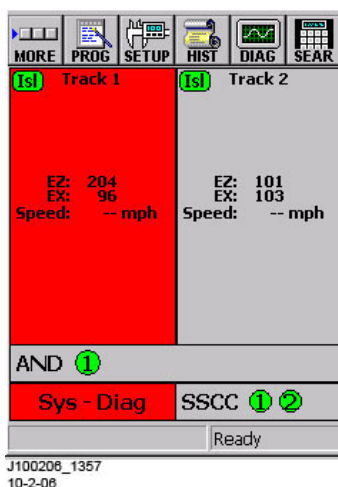


Figure 24: Unhealthy Model 4000 GCP DT Window

System Diagnostics

System Diagnostics Window can be accessed in two ways:

- Select the **DIAG.** button, then **System Diagnostics**.
- Select the System status bar, then **View System Diagnostics** from the pop-up menu.
 - Selecting one of the displayed error descriptions displays the diagnostic detail screen shown on the following page.

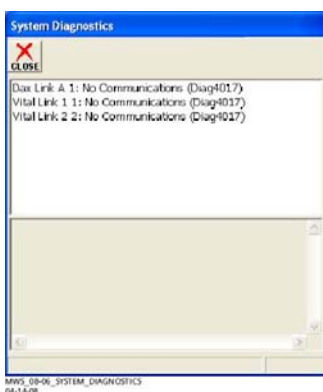


Figure 25: System Diagnostics Window

This screen lists the cause and remedies for the selected error. Use the vertical and horizontal scroll bars as needed to view all of the data.



Figure 26: System Diagnostics Window with Analysis Shown

Troubleshooting the Modules

Use the following tables to troubleshoot the individual modules.

Table 21: Diagnosing CPU Module Problems

Table 21: Diagnosing CPU Module Problems

Diag Display / Description	Cause	Remedy
CRC MCF CRC incorrect (Diag3004) / The MCF CRC is incorrect for the current MCF	MCF CRC entered is incorrect	Reload MCF CRC
	MCF is corrupt	Reload MCF
ADR ATCS Session address invalid (Diag3015) / The radio DAXing neighbor ATCS address of is invalid.	Usually occurs when ATCS Site Address (SIN) is not entered correctly	Reenter ATCS Site Address (SIN)
UCFG VLP Unconfigured (Diag3018) / VLP is unconfigured and not communicating with I/O modules	Usually due to: Incorrect MCF CRC MCF not loaded MCF not stored in ECD (ECD replaced) No ATCS Site ID (SIN) entered for radio DAX application	Check other diagnostic message for exact cause.

Table 22: Track Module Indications (Module States)

Track 22: Track Module Indications (Module States)

Indication	Meaning	Module State
CKEX	The check wire phase is incorrect	All predictors are de-energized
CHK1	The receive wire EZ reading is very low in comparison with the check wire EZ	All predictors are de-energized
CHK2	The check wire EZ reading is very low in comparison with the receive wire EZ	All predictors are de-energized
CHK4	The check wire and receive wire readings are more than 50 points different	All predictors are de-energized
GAPP	GCP Approach Calibration is required	All predictors are de-energized

Track 22: Track Module Indications (Module States)

Indication	Meaning	Module State
GCAL	GCP Calibration is required	All predictors are de-energized
GEXP	GCP detected decreasing phase which could be a bad bond	All predictors are de-energized
GFRQ	GCP frequency not set	All predictors are de-energized
GHWR	GCP hardware error	All predictors are de-energized
GIPS	Enhanced detection is turned on and the GCP detects poor shunting	Prime and Preempt de-energized (any zero offset predictors)
GLIN	GCP Linearization Calibration is required	All predictors are de-energized
GLCK	EZ or check EZ is below 3 after GCP has booted up Refer to the Troubleshooting section	All predictors are de-energized
GMAX	GCP module does not support MAX transmit level Set transmit level to Medium or High Change Module to A80418 newer than rev D	All predictors are de-energized
GOFS	MS/GCP Operation is Out of Service	All used predictors are energized All unused predictors are de-energized
GPRM	The Track Module is configured to expect an island and the prime has a non-zero offset value Set the prime to zero offset, if applicable If island is used at remote location, use a DAX not the prime Set the Island Connection to No Islands if no island is intended	All predictors are de-energized
GRCV	GCP receiver error	All predictors are de-energized
GSLV	GCP slaving error	No effect on predictors
GSTB	GCP is stabilizing after transmitter was turned on	All predictors are de-energized
GXMT	GCP transmitter error	All predictors are de-energized

Track 22: Track Module Indications (Module States)

Indication	Meaning	Module State
HIEZ	High EZ (>115) detected on main or check wires	All predictors are de-energized
ICAL	Island Calibration is required	Island is de-energized
ICON	Island Connect Error. The GCP Island Connection indicates an island is connected, but no island is turned on.	All predictors are de-energized
IFRQ	Island frequency not set	Island is de-energized
IOFS	Island Operation is Out of Service	Island energized
ISTB	Island is stabilizing after transmitter has been turned on	Island is de-energized
ITST	Island has detected a possible interfering signal	No effect on Island occupancy
IXMT	Island transmitter error	Island is de-energized
LWEX	Low EX detected Low EX Adjustment is usually 39	All predictors are de-energized
LWEZ	Low EZ detection is turned on and EZ has remained below the low detection level for longer than the low EZ detection time.	All predictors are de-energized
RECV (RE-COVERY)	The GCP is running a 30 second Recovery Time-out after an error has cleared.	All predictors are de-energized
RECV (RE-COVERY)	The Island is running a 30 second Recovery Time-out after an error has cleared.	Island is occupied
RXEX	The receive wire phase is incorrect	All predictors are de-energized
UCFG	Track module is unconfigured	All predictors are de-energized; Island is deenergized; Outputs are deenergized; Inputs are de-energized
VOER	Output hardware failure detected. Output is commanded on but is detected as off	Failed output(s) de-energized

Table 23: Track Module Indications (Remedies)

Table 23: Track Module Indications (Remedies)

TROUBLESHOOTING	Panel Indication – Diagnosis	Description	Cause	Remedy
	CHCK1 Gain Check – Receive Wire Error (Diag1008)	Receive signal level is low while check signal level is normal. Check EZ is normal and track EZ is very low value	High resistance or open connection in a receive wire.	Locate and repair open connection in the receive wires
	CHCK2 Gain Check – Check Wire Error (Diag1007)	Check signal level is low while transmit and receive levels are normal. Check EZ is very low while track EZ is normal value	High resistance or open connection in a check wire.	Locate and repair high resistance or open connection in check wires.
	CHCK4 Gain Check Error (Diag1010)	Receiver and check signal levels differ by a significant amount	If a train is present: <ul style="list-style-type: none"> • High resistance in transmitter track wires 	Locate and repair: <ul style="list-style-type: none"> • High resistance connections in transmitter track wires
	CHCK4 Gain Check Error (Diag1010)	Receiver and check signal levels differ by a significant amount	If no train is present: <ul style="list-style-type: none"> • High resistance in receiver or check receiver track wires • open track connection 	Locate and repair: <ul style="list-style-type: none"> • High resistance connections in receive or check track wires • open connections in receive or check track wires

Table 23: Track Module Indications (Remedies)

Panel Indication – Diagnosis	Description	Cause	Remedy
CKEX Check Wire EX Error (Diag1006)	Check wires and transmit wires are out of phase Generally occurs at cutover with 6-wire installations	The check wires and transmit wires are misphased.	Change the check wires connections so that: T1 & C1 are tied together T2 and C2 are tied together
GAPP GCP Approach Calibration Required (Diag1021)	GCP Approach Calibration Required	Approach is uncalibrated An approach reverts to its uncalibrated state when the: GCP is recalibrated Track Module is replaced Template is set to default or a new template is selected Programmed approach distance is changed MCF is changed	Access the appropriate GCP Calibration Window If the computed approach distance is correct, select the BYPASS button If the computed approach distance is known for this track from a previous calibration, enter the correct value by selecting the EDIT button. If the computed approach distance is incorrect and is unknown, perform the approach calibration as described in Section 6.

Table 23: Track Module Indications (Remedies)

Panel Indication – Diagnosis	Description	Cause	Remedy
GCAL GCP Calibration Required (Diag1020)	GCP Calibration Required	The Track Module is uncalibrated. A Track Module reverts to its uncalibrated state when the: Track Module is replaced MCF software is changed Template is set to default or a new template is selected Track Frequency is changed Approach distance is changed Compensation value is changed Transmit level is changed Directional (bi/uni) mode is changed	Access the appropriate Calibration Select Window and calibrate the GCP as described in Section 6.
GEXP EX Process Error (Diag1016)	Phase (EX) decreases as train approaches crossing	Possibly caused by: poor shunting high resistance bond generally located near the GCP track wires	Locate and repair high resistance bonds
GFRQ No GCP frequency Selected (Diag1012)	No track frequency set	MS/GCP Operation has been programmed as ON, but no GCP frequency has been selected	Select a GCP frequency from the GCP: track n program menu

Table 23: Track Module Indications (Remedies)

Panel Indication – Diagnosis	Description	Cause	Remedy
GHWR Track Hardware Error (Diag1019)	Track Hardware Error	This occurs when the Track Module detects that its hardware is not operating correctly	Replace the module
GIPS IPS Mode (Diag1013)	Inbound poor shunting (IPS) detected	IPS Mode is shown when the Track Module is configured with the Enhanced Detection option On and the module detects inbound poor shunting	None
GLCK Power Up Lockout Error (Diag1018)	EZ or Check EZ low after reboot	The EZ or Check EZ values are less than three after a power up. This could be caused by a train shunting the tracks near the feed point open receive or check wires	If a train is present, clear the lockout by selecting the Release Track icon on diagnostic terminal Status Screen If no trains are present repair the check and/or receive wires as required..

Table 23: Track Module Indications (Remedies)

Panel Indication – Diagnosis	Description	Cause	Remedy
GLIN GCP Linearization Required (Diag1022)	GCP Linearization Calibration Required	Linearization is uncalibrated Linearization reverts to its uncalibrated state when the: GCP is recalibrated Track Module is replaced Template is set to default or a new template is selected Programmed approach distance is changed MCF is changed	Go to the Setup Track Linearization Screen. If the linearization value is correct, select the BYPASS button. If the linearization value is known for this track from a previous calibration, enter the correct value by selecting the EDIT button. If the linearization value is incorrect or not known perform a linearization calibration as described in Section 6.
GMAX Transmitter Error (Diag1011)	GCP module does not support MAX transmit level	<ul style="list-style-type: none"> GCP module does not support MAX transmit level 	Set transmit level to MED or HIGH. Change Transmit Module to A80418 newer than rev D..
GOFS Out of Service Error	MS/GCP Operation is Out of Service		

Table 23: Track Module Indications (Remedies)

Panel Indication – Diagnosis	Description	Cause	Remedy
GPRM Program-Error	The Track Module is configured to expect an island and the prime has a non-zero offset value	Prime is set not set to zero.	Set the prime to zero offset, if applicable. If island is used at remote location, use a DAX not the prime. Set the Island Connection to NO Islands if no island is intended.
GRCV Receiver Error (Diag1014) or (Diag1015)	Track Module internal receiver channels differ	Unacceptable difference between the redundant receivers on the Track Module is detected	Replace Track Module
GSLV GCP Slave Signal Error (Diag1023)	Slaving Error	The Track Module is not receiving clock sync from the Primary Track Module. The primary Track Module is normally the module in the Track 1 Slot.	If only one Track Module is reporting the error, replace that module. If all Track Modules are reporting the error, replace the primary Track Module (generally T1).
GSTB GCP Stabilizing (Diag1001)	20 sec. stabilization period prior to start of normal operation.	System startup	Wait

Table 23: Track Module Indications (Remedies)

TROUBLESHOOTING	Panel Indication – Diagnosis	Description	Cause	Remedy
	GXMT Transmitter Error (Diag1011)	Transmitter cannot maintain a constant current	All installation: <ul style="list-style-type: none"> • High resistance or open transmit track wire • High resistance or open track wire rail connection 	Locate and repair open transmit wires or high resistance transmit wires connections.
	GXMT Transmitter Error (Diag1011)	Transmitter cannot maintain a constant current	Unidirectional installations only: <ul style="list-style-type: none"> • open termination • open coupler • open bond 	Locate and repair: <ul style="list-style-type: none"> • open termination • open coupler • open bond
	HIEZ High EZ (Diag1002)	High EZ or high EZ check value detected	Ballast has increased significantly since calibration	Recalibrate only after verifying that no other cause exists.
	HIEZ High EZ (Diag1002)	High EZ or high EZ check value detected	Broken rail	Repair broken rail
	HIEZ High EZ (Diag1002)	High EZ or high EZ check value detected	Defective insulated joint coupler	Replace defective insulated joint coupler
	HIEZ High EZ (Diag1002)	High EZ or high EZ check value detected	Defective termination shunt	Repair defective termination shunt
	HIEZ High EZ (Diag1002)	High EZ or high EZ check value detected	High resistance termination shunt connection	Repair high resistance connection to termination shunt
	HIEZ High EZ (Diag1002)	High EZ or high EZ check value detected	High-resistance track bond wire connection	Repair high resistance bond

Table 23: Track Module Indications (Remedies)

Panel Indication – Diagnosis	Description	Cause	Remedy
HIEZ High EZ (Diag1002)	High EZ or high EZ check value detected	Poor calibration	Recalibrate only after verifying that no other cause exists.
ICAL Island Calibration Required (Diag1305)	Island requires calibration	Calibration is required when the: Track Module is replaced MCF is changed Template is set to default or a new template is selected Island frequency is changed	Access the appropriate Calibration Select Window and calibrate the island as described in Section 6.
ICON Island Connect Error	The GCP Island Connection indicates that an island is connected, but no island is turned on.	Faulty programming. Bad Connection	Verify programming against plan. Check Island wiring
IFRQ No Island Frequency Selected (Diag1300)	No island frequency has been programmed	An Island Operation is requested but no island frequency is selected	Select an island frequency from the Program menu
ISTB Island Stabilizing (Diag1301)	Island stabilizing after a power up	On startup the Track module initiates a 20 second timeout to allow the island output to stabilize	Wait
ITST Island Self Test Error (Diag1302)	Variations in the island receive frequency	An interfering signal is causing large variations in the Island receive signal	Change island frequency

Table 23: Track Module Indications (Remedies)

Panel Indication – Diagnosis	Description	Cause	Remedy
ITST Island Self Test Error (Diag1302)	Variations in the island receive frequency	Defective Track Module	Replace the Track Module
IXMT Island Transmitter Error (Diag1304)	Island cannot supply a constant current	All installations Track Module detects: high resistance transmit track wire open transmit track wire high resistance or open track wire rail connection	Locate and repair defective wiring or connections
IXMT Island Transmitter Error (Diag1304)	Island cannot supply a constant current	Unidirectional installations Track Module also detects: <ul style="list-style-type: none"> • open termination • open joint coupler • open bond 	Locate and repair open termination, joint coupler, or bond
LWEX Low EX (Diag1003)	Low track ballast resistance detected.	Broken rail	Repair broken rail
LWEX Low EX (Diag1003)	Low track ballast resistance detected.	Low ballast	Determine cause of low ballast and compensate
LWEX Low EX (Diag1003)	Low track ballast resistance detected.	Low ballast and defective insulated joint coupler	Replace defective insulated joint coupler
LWEX Low EX (Diag1003)	Low track ballast resistance detected.	Low ballast and high resistance bond	Repair high resistance bond
LWEX Low EX (Diag1003)	Low track ballast resistance detected.	Mud or other contaminants within ballast	Verify EX Adjust as described in paragraph 5.2.9
LWEX Low EX (Diag1003)	Low track ballast resistance detected.	Poor drainage at crossing	Temporarily shorten the approach (see WARNING)

Table 23: Track Module Indications (Remedies)

Panel Indication – Diagnosis	Description	Cause	Remedy
LWEX Low EX (Diag1003)	Low track ballast resistance detected.	Salted crossing	Use a lower GCP frequency
LWEZ Low EX (Diag1004)	Low EZ Detection is programmed ON and its timer interval is exceeded.	A false shunt on the track	Remove false shunts from the track
LWEZ Low EX (Diag1004)	Low EZ Detection is programmed ON and its timer interval is exceeded.	A false shunt on the track	Check that EZ returns to normal after false shunt removal.
LWEZ Low EX (Diag1004)	Low EZ Detection is programmed ON and its timer interval is exceeded.	A train is on the approach for a time longer than the timer setting.	Temporarily turn off low EZ detection until train has left.
LWEZ Low EX (Diag1004)	Low EZ Detection is programmed ON and its timer interval is exceeded.	Open receive track wire	If false shunt is not found, refer to the diagnostics messages for open receive wire.
LWEZ Low EX (Diag1004)	Low EZ Detection is programmed ON and its timer interval is exceeded.	Open receive track wire	Repair
RECV GCP Recovering (Diag1000)	30 sec. recovery time-out	Clearing of system error	Wait

Table 23: Track Module Indications (Remedies)

TROUBLESHOOTING	Panel Indication – Diagnosis	Description	Cause	Remedy
	RECV Island Recovering (Diag1303)	Island recovering after self test	The Track module initiates a 30-second recovery timeout after an island error has cleared.	Wait
	RXEX Receive Wire EX Error (Diag1005)	Transmit and receive wires are out of phase Generally observed at cutover	The receive and transmit wires are connected to the wrong rail (mispased)	Change the track wire connections so that: T1 & R1 are connected to rail 1 T2 & R2 are connected to rail 2
	UCFG No Communications (Diag1017)	No communication to a Track Module.	Track Module is not communicating with the CPU.	Verify that a module is in appropriate slot
	UCFG No Communications (Diag1017)	No communication to a Track Module.	Track Module is not communicating with the CPU.	Replace the module if the Track Module is continuously rebooting. BOOT displays on 4-character display at one minute (approximate) intervals.

Table 23: Track Module Indications (Remedies)

Panel Indication – Diagnosis	Description	Cause	Remedy
UCFG No Commu- nications (Diag1017)	No communi- cation to a Track Module.	Track Module is not commu- nicating with the CPU.	If the Track Module is not continuously rebooting determine if UCFG is shown on the module's display. If only this module displays UCFG , replace it if all Track Modules display UCFG replace the CPU Module
VOER OUT Correspond- ence Check Error (Diag1200)	No Vital output voltage	A vital output is commanded to be on, but is producing no voltage. May be caused by: Open or shorted output Defective Track Module.	Check for an open or shorted output and repair as required. If the output is not open or shorted, replace the Track Module

Table 24: Diagnosing SSCC Module Problems

Table 24: Diagnosing SSCC Module Problems

Diag Display / Description	Cause	Remedy
Crossing Bank Failure (Diag2001) / SSCC3I module lamp drive output failure	Lamp driver bank A has failed.	Replace the SSCCIIIi module
Lamp Neutral Wire Open (Diag2002) / The SSCCIIIi has detected open lamp neutral wire	Lamp neutral wire is open	Repair open neutral wire to lamps

Table 24: Diagnosing SSCC Module Problems

Diag Display / Description	Cause	Remedy
Low Battery Warning (Diag2003) / SSCCIIIi detected low battery voltage	Battery voltage is below the programmed Low Battery Detection level. This may be caused by:	
	Incorrect Low Battery Detection Level setting	Correct Low Battery Detection Level setting:
	Defective battery charger operation	Perform battery charger maintenance
	Defective Battery operation	Perform battery maintenance
Lamp Voltage Limited (Diag2005)	Lamp voltages are set above the battery terminal voltage.	Reduce the lamp voltages to be less than the battery voltage
No Communications (Diag2017)	SSCCIIIi Module in wrong slot	Move Module to appropriate slot.
	SSCCIIIi Module defective. Indicated by: POWER light is off HEALTH LED is off for 10 seconds and then on for 10 seconds (module continuously reboots). HEALTH LED flash at fast rate (other modules function properly)	Replace SSCCIIIi Module
	CPU Module defective. Track Module displays read UNFG HEALTH LED's of all modules flash at fast rate	Replace CPU Module

NOTE

The SSCC3I module performs a self-diagnostic test at approximately noon each day. The test momentarily energizes each lamp output to verify operation. Four very brief flashes may be noticed on the L1 and then the L2 LEDs of each SSCC3I module during a normal test.

Where only LEDs lamps are used, a false lamp-neutral-wire-open condition may be detected when **Lamp Neutral Test** is set to **On**.

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

Effective with Revision D of the SSCCIIIi, **FLASH SYNC** is an isolated two-wire output.

If two Revision D or later SSCC3I units in the same chassis are operated by separate batteries, the FLASH SYNC returns are connected internally and no additional connection is required.

Revision D SSCC3I Modules can be identified by:

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

When using Revision C SSCC3I or earlier, or when external SSCC units are connected to a master SSCC3I and operated from a different battery, the following wiring must be provided for FLASH SYNC Return:

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

If an external SSCC IIIA, SSCC III PLUS, or SSCC IV is connected to a master SSCC3I:

- If the SSCC3I is Revision C or earlier, the negative terminals of the master SSCC3I and external SSCC must be wired together.
- If the SSCC3I is Revision D or later, the SSCC3I **FLASH SYNC** return (-) must be connected to **N** on the external SSCC.

The terminology for flash sync control differs between a GCP 4000 and an external SSCC device. The GCP 4000 terms Master and Slave SSCC, are called “Flash Sync Out” and “Flash Sync In” respectively in an external SSCC (Slave = Flash Sync In).

Release Track

When problems exist at initial start up or when transferring to or from MAIN and STBY, a 'Release Track' message is displayed as an added precaution during power up.

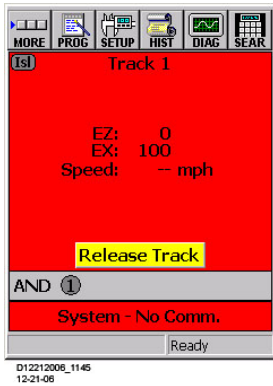


Figure 27: Release Track Window

Touch anywhere on the red Track Status area for the affected track with the stylus, then select **Track Diagnostic** from the pop-up menu.

Select a displayed error description and the lower portion of the screen opens a window to show a list of possible causes for that error.

After the cause of the power-up lockout problem is corrected, press the yellow Release Track area on the display to release the track.

The GCP 4000 is programmed with self-diagnostic causes and remedies for most common problems. Accessing the information is similar to the method above.

Diagnostics Log

The diagnostic log provides a time and date stamp of all previous errors. Select **DIAG**, then **DIAGNOSTIC LOG**.

- Can be used to provide important information for intermittent track or equipment problems.
- Log is stored in the Display Module.
- Captures events only while the Display Module is connected to the GCP.
- Can be cleared by maintainer after being reviewed.

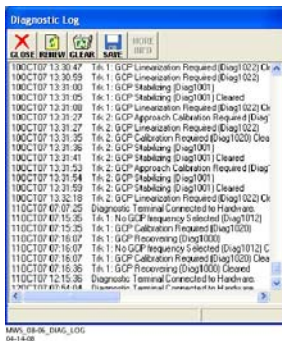


Figure 28: Diagnostic Log

Refer to the Troubleshooting Flow Chart, on Figure 29 Page 78 and Figure 30 on Page 79, to assist in system and track problem diagnosis.

Maintenance Call Lamp Output

NOTE

When energized, the MAINT CALL lamp output completes the circuit to the negative CPU battery. A MAINT CALL light can be connected between “B” and MAINT CALL. A series limiting resistor should be used to lower voltage across the lamp and limit the total current to 4 amps.

The Maintenance Call feature can provide an additional level of diagnostics. When the 4000 GCP system is healthy, the maintenance call output is energized.

The maintenance call output de-energizes when:

- The SEAR2I application program detects low voltage, power off indication or other custom conditions in the railroad specific application program.
- the CPU detects a battery voltage less than the programmed and enabled low battery threshold.
- an enabled SSCCIII module is unhealthy.
- an enabled SSCCIII module with low voltage detection “On” detects a battery voltage less than the programmed low battery threshold.
- the maintenance call repeater input is enabled and the maintenance call input is low.
- the maintenance call output is low when using SSCC IV and it detects low battery or vehicle detect health input is used and it is low
- out of service inputs are used and they are energized
- SEAR is used but not in session with GCP CPU

Transfer Output

When the 4000 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.
- a vital output on a Track or RIO Module is commanded on, but the module cannot provide the 12-volt output.

Troubleshooting information regarding each module may be found at:

- CPU Module Table 21
- Track Module: Table 22, and Table 23
- SSCC3I Module: Table 24

Troubleshooting Flowchart

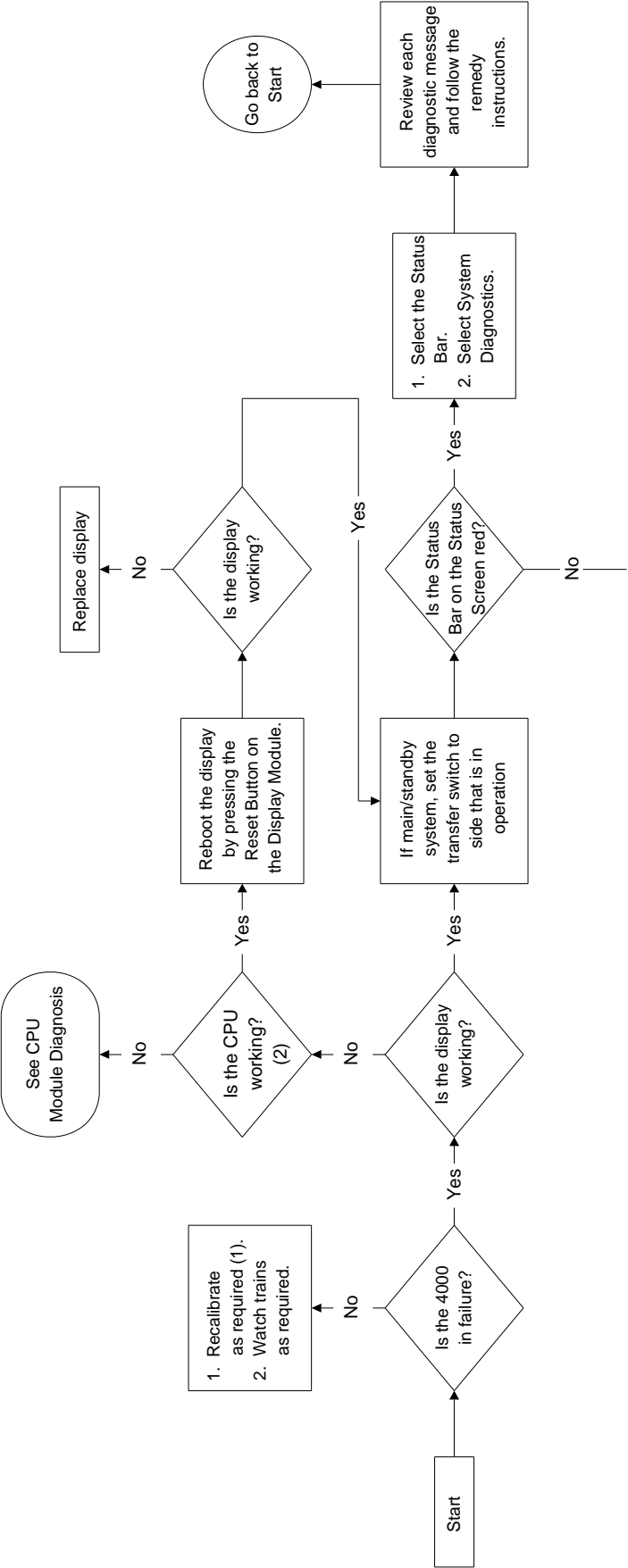
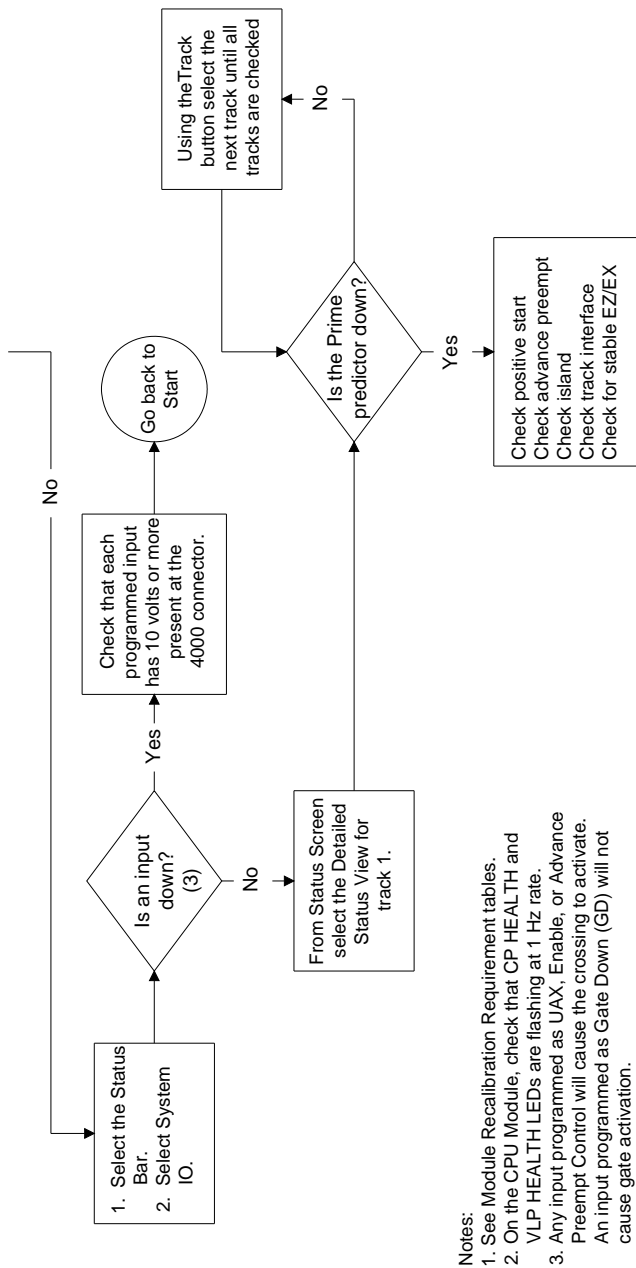


Figure 29: Troubleshooting Flowchart (Part 1)



Notes:

1. See Module Recalibration Requirement tables.
2. On the CPU Module, check that CP HEALTH and VLP HEALTH LEDs are flashing at 1 Hz rate.
3. Any input programmed as UAX, Enable, or Advance Preempt Control will cause the crossing to activate. An input programmed as Gate Down (GD) will not cause gate activation.

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Figure 30: Troubleshooting Flowchart (Part 2)

TESTING TRACKSIDE EQUIPMENT

Testing Insulated Joint Couplers

Table 25: Insulated Joint Coupler Test

Table 25: Insulated Joint Coupler Test

Step 1	Connect a hardwire shunt on the crossing side of the joint coupler.
Step 2	Note the EZ value: _____
Step 3	Move the hardwire shunt to the termination side of the joint coupler.
Step 4	Note the EZ value: _____
Step 5	Remove the hardwire shunt.
Step 6	<p>Note the difference in EZ values in steps 2 and 4.</p> <ul style="list-style-type: none">• Wideband shunt coupler - if the difference in EZ is more than 2, the wideband shunt is defective.• Tuned Insulated Joint Coupler, TIJC - (located in the outer half of the approach), if the EZ difference is more than 3, the TIJC is mistuned or defective.

TROUBLESHOOTING

Testing Rail Bonds

Table 26: Rail Bond Test

Table 26: Rail Bond Test

Step 1	Note the EX value with no shunt _____
Step 2	Place a hardwire shunt at the 50% point of the approach.
Step 3	Note the EX value: _____
Step 4	<p>Note the difference in EX values in steps 1 and 3. An EX value always increases as a shunt is placed closer to the crossing.</p> <p>If the EX value recorded in step 3 is greater than the EX value in step 1, the bad bond is between the hardwire and the termination.</p> <ul style="list-style-type: none">• If the EX value recorded in step 3 is lower than the EX value in step 1, the bad bond is between the hardwire and the crossing.
Step 5	<ul style="list-style-type: none">• Continue placing the hardwire shunt closer or further away from the starting point, based on the value in step 3. When the EX value increases, the last bond passed is the bad bond.

EZ must be greater than 15 for this test to work.

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

Table 27: Termination Shunt Test

Table 27: Termination Shunt Test

Step 1	Note the EZ value _____
Step 2	Install a hardwire shunt across the termination.
Step 3	<p>Note the change in EZ: _____</p> <p>If termination is hardwire, no EZ change occurs.</p> <p>If termination is wideband, an EZ change of no more than ± 2 occurs.</p> <p>If termination is NBS, EZ can decrease up to 30.</p> <p>Lower frequencies and shorter approaches produce a greater change.</p> <ul style="list-style-type: none">• If termination is NBS and an increase in EZ is noted, then the NBS is defective.

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 and components of a 4000 GCP system are healthy.

When the 4000 GCP system is healthy it shows the following:

- Track windows:
 - are gray (or white if a train is present) on DT Display
 - have no calibration required messages on DT Display
 - System Status bar on DT Status Screen is green
 - Health LEDs on all module (CPU, Track, RIO, SSCIIIi) are flashing slowly (1HZ)
- Transfer Module display time is not counting down
- SEAR Alarm LED's indicate that no alarms are present
- CPU LED 1 is on, indicating that the Maintenance Call output is on
- CPU LED 2 is on, 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 Chart, Figure 29 and Figure 30, to assist in system and track problem. If the track module is healthy, predictors can be de-energized for the following reasons:

Table 28: Troubleshooting a De-energized Predictor

Table 28: Troubleshooting a De-energized Predictor

Reason	How
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 Track Module is off the island is de-energized.
The predictor is running its pickup delay	<p>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.</p> <ul style="list-style-type: none"> • If the predictor does not recover after its programmed pickup delay time, it should be treated as de-energized.

Table 28: Troubleshooting a De-energized Predictor

Reason	How
Positive Start is enabled and the EZ level is below the programmed Positive Start EZ Level	Positive start is de-energizing the predictor. Enabled in the GCP: track n pos start program menu. Predictor will remain de-energized while the EZ is less than the positive state level plus 5. <ul style="list-style-type: none">• The current Track Module EZ is shown on the module's 4-character display and the Track Window of the DT Status Screen.
An UAX input is deenergized	A UAX input is programmed for the Track Module and the input is not energized or is running UAX Pickup delay.
A DAX Enable input is deenergized	A DAX Enable input is programmed for the Track Module and the input is not energized or is running DAX Enable Pickup delay.
A Preempt Health input is deenergized	A Preempt Health input is programmed for the Track Module and the input is not energized.
Interference is causing large EZ fluctuations which appear to be an approaching train	The rapid fluctuation of the displayed track EZ level by 5 to 10 points (or more) indicates the presence of interference.

An example of a predictor running the pickup delay is shown below. Note, the “--” indicates no speed and the hour glass symbol appears next to the PRIME predictor.

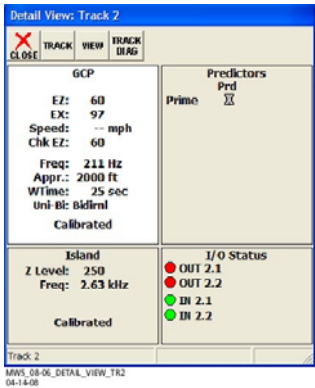


Figure 31: Track Detail Status View – Predictor Running

An example of a predictor below the POSITIVE START value is shown track’s DETAIL STATUS VIEW below. Note, the “--”

indicates no speed and the prime predictor is de-energized as indicated by the red circle.

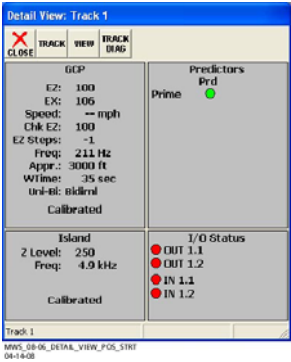


Figure 32: Track Detail Status View – Positive Start

High EZ and Low EX View History & Calibrated Approach

When in the track detail screen, selecting VIEW allows selection of the high EZ and low EX history (HEZ LEX) and the Computed Approach distance for that track.

The HEZ and LEX values are useful in determining when the EZ was high and when the EX was low. The maintainer may reset this information after review.

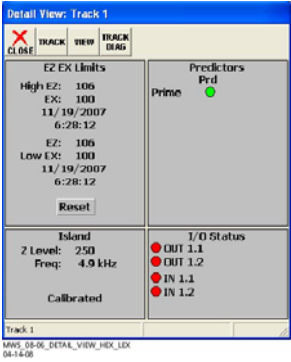


Figure 33: Track Detail Status View – HEX and LEX

NOTE

Removal of DC power from the 4000 GCP case is not required before removing or installing modules.

Troubleshooting A Physical 4000 GCP Input

To determine the status of the physical inputs and outputs, select **SYSTEM IO** in the **VIEW** menu. View either Input Only, Output Only, or Input/Output by pressing the MODE button.



Figure 34: System IO Window

Another useful screen for determining internal logic states is the AND detail screen, found by selecting **VIEW** then **AND Detail**. Note that the MAINT CALL output is also indicated. The status of Sim Preempt is shown as Simultaneous Preempt Output. Similarly, the status of Adv Preempt would be shown as Advance Preempt Output and Preempt Hlth input is shown as Preempt Health Input.

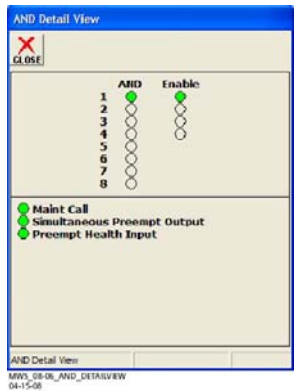


Figure 35: AND Detail View Window

After it is determined that a problem is caused by a de-energized physical input, use the following procedure to isolate the cause.

Table 29: Troubleshooting Inputs

Table 29: Troubleshooting Inputs	
Step 1	Determine the connections to the physical inputs by referring to the circuit plans for the location. These inputs may include: <ul style="list-style-type: none"> • a DAX circuit from a remote site • a preempt health input from a traffic preempt relay • other external inputs
Step 2	If the input is connected to other equipment that is not in this 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 energized, go to the remote site and check the output. If the input is de-energized, check the wiring from this point through to the GCP terminals.

WARNING

**TEMPORARY APPROACH LENGTH
REDUCTION MUST BE ACCOMPANIED
BY A CORRESPONDING REDUCTION IN
APPROACH TRAIN SPEED.**

NOTE

A power up lockout is indicated by a **Release Track** message that appears at the bottom of the corresponding Track Status Window. The lockout caused by the train shunt ($EZ < 3$) may be cleared by:

- accessing the Diagnostic Terminal Status Screen
- selecting the displayed message block within the affected Track Status Window

Troubleshooting Maintenance Call (MC) Light Problems

Several operations in the 4000 GCP system will turn-off the MAINT CALL (MC) light. This procedure assumes:

- The warning devices are not activated and modules are healthy, including SSCC IV and SEAR2I if used. (If system status bar is red, proceed with Troubleshooting Flowchart, Figure 29 and Figure 30)
- 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.

Observe LED 1 on CPU module (MCF Defined LED's, Figure 106), or **Maint Call** on **AND Detail** 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.

Refer to the circuit plans for the location and if a Maintenance Call Repeater Input is used, verify that the MC Repeater input is on. Check input LED on corresponding module, or check View System IO on System Status Bar. (On the **7 ADVANCED programming** screen, select **Site Options**. If the **Ext Maint Call Input** is set to **Yes**, an input must be programmed on an input assignment screen to **Maint Call Rpt IP** and the input must be on.)

Determine that the MC light functions by testing the lamp circuit as follows:

- Measure DC voltage between **B** (+ meter lead) and **MAINT CALL** (MC) out (- meter lead) on the green connector above the CPU.
- If voltage is within 0.5 volts of B, then the lamp or lamp circuit is open and must be repaired.
- If voltage is less than 1.0 volts, go to next step.
- Measure between **N** (- meter lead) and **MC** (+ meter lead) on the green connector.
- If voltage is within 0.5 volts of B, then the lamp circuit is okay, but the MC output is off.
- If LED 1 is on, replace CPU module
- If LED 1 is off, go to the next step
- Battery voltage may be low:

- If **Low Battery Enabled** is set to **ON** (on **11 SITE programming** screen), verify that the voltage on the CPU battery connector is more than the **Low Battery Level** shown.
- If **Low Battery Detection** is set to **Yes** (on **8 SSCC programming, SSCC: 1** screen), verify that the voltage on the SSCC 1 battery connector is more than the **Low Battery Level** shown.
- If **Low Battery Detection** is set to **Yes** (on **8 SSCC programming, SSCC: 2** screen), verify that the voltage on the SSCC 2 battery connector is more than the **Low Battery Level** shown.

If a SEAR2I is used it may monitor power off inputs (POK), external Battery Monitor or other SEAR2I Application Program specific logic.

Temporarily turning the SEAR off may isolate the MC problem:

- On the display, press **PROG**
- Select 2 BASIC Configuration
- On the **SEAR Used** line, press the **Yes**
- When 'New Value' updates to **No**, press **Update**
- If the MC light turns on, turn the SEAR2I back on:
- Select 2 BASIC Configuration
- On the SEAR Used line, press the **No**
- When New Value updates to **Yes**, press **Update**.

Refer to the circuit plans for the location and:

- Verify that the SEAR Site Setup is accurate.
- Verify all POK inputs are on.
- If used, verify that SEAR2I Application Program MC related parameters are correct. (Refer to SEAR2I Application Configuration Manual, SIG-0008-XX)
- On the display, press the **SEAR** button (on PC with HyperTerminal follow similar steps), then:
- Select **MENU**
- Press Down Arrow until **DIAG/MONITOR** is displayed, then press **ENTER**.
- Press Down Arrow until **Network I/O** is displayed, then press **ENTER**.
- Press Left or Right Arrow until **MODULE TO MONITOR?** displays **GCP4K**, then press **ENTER**.
- If **GCP4K COMM STATUS** is **Bad**, refer to the circuit plans for the location and verify the ATCS address of the GCP 4000 and the SEAR2I.
- If ATCS addresses are correct, replace CPU module.
- If **GCP4K COMM STATUS** is **Good**, replace the CPU module.
- If the MC light stays off, turn SEAR2I back on:
- Select 2 BASIC Configuration
- On the SEAR Used line, press the **No**
- When New Value updates to **Yes**, press **Update**
- If the MC light remains off, replace SEAR2I.
- If unit is redundant, transfer to opposite set of modules.

WARNING

AT CROSSINGS USING MEFS XNG02_00.MEF AND EARLIER, GATES WILL BEGIN TO LOWER IMMEDIATELY (WITHOUT GATE DELAY TIME) WHEN THE TRANSFER SWITCH IS USED TO SWAP BETWEEN HEALTHY UNITS. USE CAUTION WHEN TRANSFERRING CONTROL TO AVOID GATES HITTING VEHICLES OR PEDESTRIANS.

- If the MC lamp turns on, replace the initial CPU module.
- If the MC lamp stays off, call Safetran Technical Support.

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.

WARNING

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

CAUTION

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

OUT OF SERVICE FEATURE

WARNING

THE RAILROAD PROCEDURES GOVERNING HOW TO TAKE A TRACK CIRCUIT OUT OF SERVICE SHALL BE FOLLOWED. THE INSTRUCTIONS IN THIS SECTION MAY BE FOLLOWED ONLY IF ALLOWED BY THE RAILROAD.

This section describes how to take a track out of service. What logic functions are bypassed affect on other modules and I/O

How to place the track circuits(s) back in operation

The Out of Service Menu is accessed on the display by touching the desired track in the Track Status window on the display. Select OUT OF SERVICE from the drop down display.



Figure 36: Out of Service Window – GCP In Service

When the GCP OUT OF SERVICE is clicked, the following message will appear.

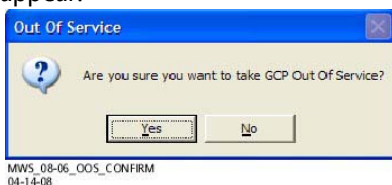


Figure 37: GCP Out of Service Confirmation Window

Once the GCP approach is taken out of service the option to take the ISL OUT OF SERVICE is presented.

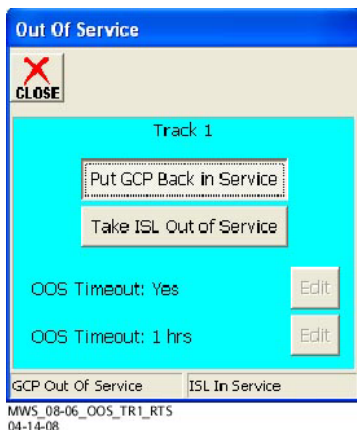


Figure 38: Out of Service Window – GCP Out of Service

When ISLAND OUT OF SERVICE is checked, the following message will appear.



Figure 39: Island Out of Service Confirmation Window

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 1 to 23 hours.

The OUT OF SERVICE TIMEOUT: YES can be turned off by selecting **EDIT**, then **NO**, which will take the track out of service until returned to service by the user. The time period

can be changed by selecting **EDIT** on the OUT OF SERVICE TIMEOUT: 1 HRS line. The NEW VALUE of 2 to 23 hours can be entered on the keypad, then press **UPDATE**.

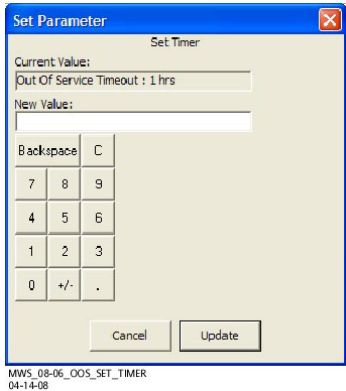


Figure 40: Set Out of Service Timeout Window

NOTE

If one or more tracks are taken out of service, the Out of Service Timeout covers all tracks taken out of service with one time interval.

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

- Return all tracks to service.
- Edit the Out of Service Timeout to the new value.
- Take the tracks out of service.

The following will be displayed to indicate the final selections.

When the OUT OF SERVICE screen is closed, the display returns to the TRACK STATUS SCREEN. Note that the out of service track is alternately flashing dark gray and light blue.

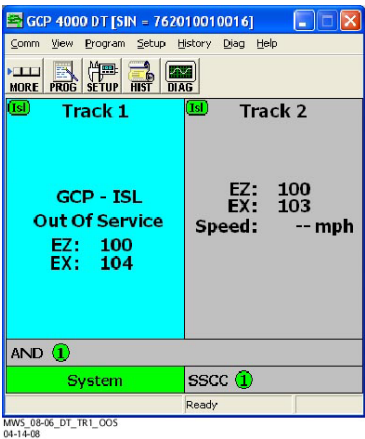


Figure 41: Model 4000 GCP DT Window – Track 1 OOS

To return the track(s) and island(s) to service, touch the desired TRACK STATUS screen and select the OUT OF SERVICE menu. Select **Put ISL Back in Service**.

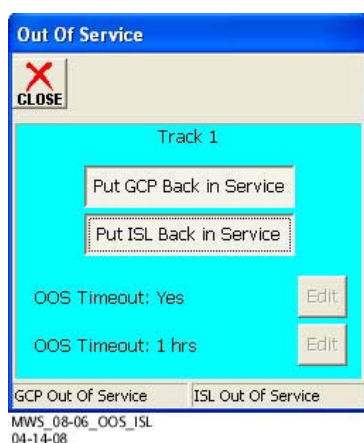


Figure 42: Return Track to Service Window

The GCP is returned to service in the same manner: Click on **Put GCP Back in Service**. The default OOS window appears.



Figure 43: Out of Service Window – Track 1 in Service

When the tracks are unselected, they are back in service.

WARNING

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

Out of Service Inputs

Sometimes it is desired to have an additional step be required to take a track out of service. When Out of Service Inputs are programmed, an input must be energized as well as the track out of service box checked for the track to be taken out of service.

WARNING

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

The Out of Service Input programming is found in the following screen by selecting ADVANCE PROGRAMMING.

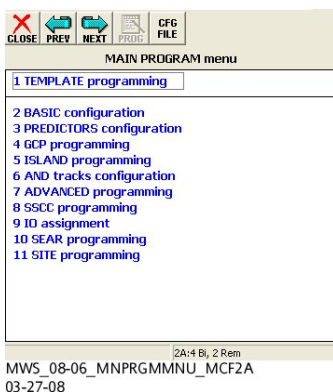


Figure 44: MAIN PROGRAM menu Window

Then select Out of Service.

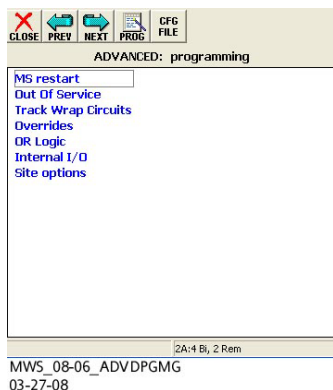


Figure 45: ADVANCED: programming Window

The following screen will appear.

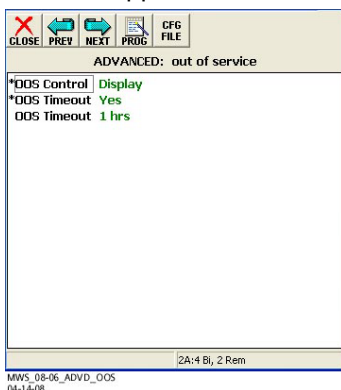


Figure 46: ADVANCED: out of service Window

If out of service inputs are set to Yes, the proper input must be energized.

Return Track to Service

De-energizing the Out of Service Input or un-checking the track Out of Service box will return the track to service.

NOTE

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.

SOFTWARE VERSIONS

This screen allows quick access to CPU, Track, SSCC, RIO and MCF software versions. It is accessed by pressing MORE, VIEW then SOFTWARE INFORMATION.

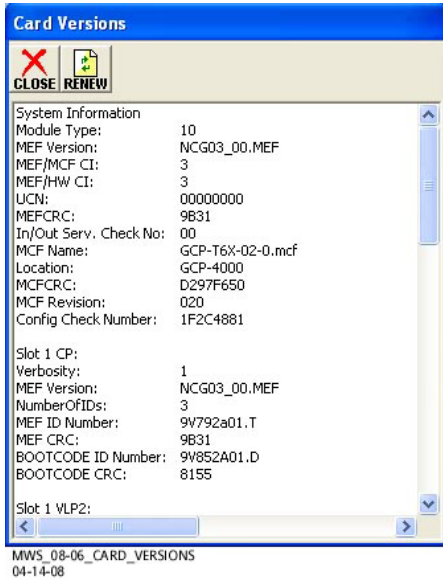


Figure 47: Card Versions Window

The SEAR2I software versions are determined by selecting the SEAR button on the display. Select MENU on the SEAR Keypad Display screen. Use the UP Arrow until the display says MAIN MENU VERSIONS. Press ENTER and display will alternate between the Executive and Application software version names.

The software running the Display Module is found by selecting HELP on the display.

PROGRAMMING

The design on the circuit plans for the crossing warning system determines the programming of the 4000 GCP.

WARNING

PROGRAM CHANGES MUST BE PERFORMED IN ACCORDANCE WITH RAILROAD PROCEDURES.

SYSTEM OPERATION MUST BE VERIFIED PRIOR TO PLACING SYSTEM IN SERVICE OR FOLLOWING PROGRAMMING, HARDWARE CHANGES, OR WIRING CHANGES.

Templates are used to simplify 4000 GCP programming. The GCP provides several templates that represent common track circuit arrangements, including bidirectional, unidirectional, end of siding, and crossovers, including remote GCPs.

Each template:

- Provides the simplified programming menus and programming defaults for a typical track arrangement and application
- Predefines default parameters for train detection
- Has rules that specify which:
 - Track circuits are unidirectional and bidirectional
 - Track circuits have islands (indicated by an *)
 - Islands are connected to multiple track circuits
 - Track circuits are remote and DAX towards the crossing
 - Track circuits are remote and DAX away from the crossing

PROGRAMMING THE MODEL 4000 GCP

NOTE

Please refer to the Railroad Installation Drawing or the Installation Plans for the exact parameters to be entered when programming the Model 4000 GCP.

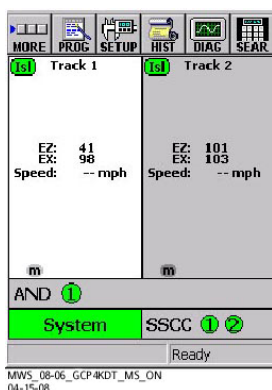


Figure 48: Model 4000 GCP DT Window

To program the Model 4000 GCP, select **PROG** from the GCP 4000 DT Window. The **MAIN PROGRAM menu** Window opens.

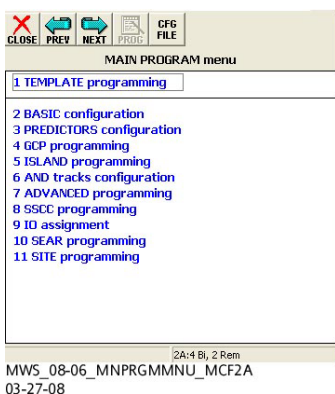


Figure 49: MAIN PROGRAM menu Window

The GCP can then be programmed using either the **1 TEMPLATE programming** feature, which passes through each upper level template used in the MCF, or by going through each individual submenu, i.e., **2 BASIC configuration, 5 ISLAND programming, 9 IO assignment**, etc.

FIELD AND SUPERVISOR PASSWORDS

NOTE

Field and Supervisor Passwords are used only on Model 4000 GCPs running MCF gcp-t6x-02-0.MCF that have Display II Modules, P/N A80407-03 that are use software version 4.8.0 or higher. Older versions of the MCF or older versions of the Display Panel and DT software have the Password Access feature found on the **SITE: programming** Window.

Asterisks (*) that appear in the menus depict parameters that may reveal additional parameters when chosen

The Model 4000 GCP Crossing System using cp-t6x-02-0.MCF or higher with a Display II Module using DT version 4.8.0 or higher have a two tier password system. The two types of passwords are Field Passwords and Supervisor Passwords. Supervisor Passwords are assigned to senior personnel who design the programming of the GCP. Field passwords are assigned to Field Maintainers, The Field Passwords are discussed in this manual.

There are now four methods of access to the 4000 GCP's editable parameters:

- No Passwords Used:
 - When both passwords are set to NO, anyone who gains access to the 4000 GCP can edit any parameter.
- Field Password only used
 - When the Field Password only is set to Yes, no parameters may be edited without the password, and all parameters may be edited when the Field Password is entered.
- Supervisor Password only used
 - When the Supervisor Password only is set to Yes, field parameters may be edited without the password, but once the password is entered, all parameters may be edited.
- Field Password and Supervisor Password both set to Yes.
 - When Field Password and Supervisor Password are both set to Yes, no parameters may be edited without either password being entered: if the Field Password is entered, only those parameters editable by field personnel may be edited; if the Supervisor Password is entered, all parameters may be edited.

Information regarding Supervisor Passwords and further discussion of all GCP parameters are found in Safetran's Application Guidelines for the Microprocessor Based Grade Crossing Predictor Model 4000 Family, Document Number SIG-00-03-19.

LOGIN USING THE FIELD PASSWORD

Begin the login process by selecting the **PROG** from the **GCP 4000 DT** Window. The **Enter Password** Window opens.



Figure 50: Model 4000 GCP DT Window

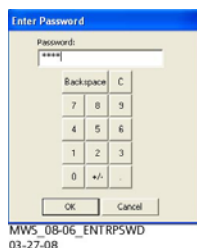


Figure 51: Enter Password Window

Enter the password and select **OK**. The Main Program Window Opens.

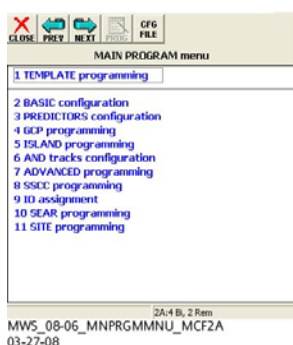


Figure 52: MAIN PROGRAM Window

PARAMETERS EDITABLE USING FIELD PASSWORD

The following field editable parameters are found within the programming windows. Those items that appear in grey are not field editable when using the field password. These displays are used to set the field editable parameters governing GCP operation.



Figure 53: GCP: track “n” Window

- **GCP Freq Category:** Range of values are Standard, Offset, or Other. The default setting is Standard.
- **GCP Frequency:** Range of values are in a pull-down list. The default setting is Not Set.
- **Approach Distance:** Range of values are 0 – 9999 ft. The default setting is 9999 ft.

- **GCP Transmit Level:** Range of values are Low, Medium and High. The default setting is Medium.
- **Island Distance:** Range of values are 0 – 999 ft. The default setting is 199 feet.

WARNING

INCORRECT “INBOUND PS SENSITIVITY” SETTINGS CAN RESULT IN REDUCED WARNING TIME.



Figure 54: GCP: track “n” enhanced det Window

- **Inbound PS (IPS) Sensitivity:** (Formerly known as Poor Shunting (PS) level.) Range of values are Off, Max, High, Medium, Low. The default setting is High.
- **Speed Limiting Used:** Range of values are Yes or No. The default setting is Yes.

WARNING

INCREASING “INBOUND PS SENSITIVITY” LEVEL TO MEDIUM OR HIGH MAY RESULT IN SLOWER REACTION OF SYSTEM TO TRAINS THAT STOP ON OUTBOUND AND START INBOUND BY UP TO 0.5 AND 1S RESPECTIVELY.

- **Outbound False Act Lvl:** (This was previously known as False Activate Level.) Range of values: Normal, Medium, High. The default setting is Normal.

WARNING

INCREASING “OUTBOUND FALSE ACT LVL” LEVEL TO MEDIUM OR HIGH MAY RESULT IN SLOWER REACTION OF SYSTEM TO TRAINS THAT STOP ON OUTBOUND AND START INBOUND BY UP TO 1S RESPECTIVELY.

- **Outbound PS Timer:** Range of values are 10 – 120 seconds. The default setting is 20s.
- **Trailing Switch Logic:** Range of values are Off and On. The default setting is On.

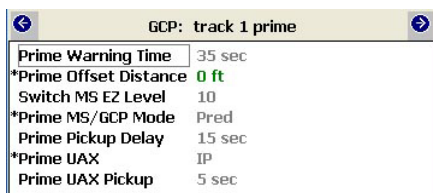


Figure 55: GCP: track “n” prime Window

- ***Prime Offset Distance:** Range of values are 0 – 9999 feet. The default setting is 0 feet.

GCP: track 1 Dax A	
Dax A Warning Time	35 sec
*Dax A Offset Distance	99 ft
Switch MS EZ Level	1
Pickup Delay Mode	Fixed
*Dax A MS/GCP Mode	Pred
Dax A Pickup Delay	15 sec
*Dax A Enable	Not Used

Figure 56: GCP: track “n” Dax “n” Window

- ***Dax Offset Distance:** Range of values are 0 – 9999 feet. The default setting is 99 feet.

GCP: track 1 preempt	
Prmpt Warning Time	45 sec
*Prmpt Offset Distance	0 ft
Switch MS EZ Level	10
*Prmpt MS/GCP Mode	Pred
Prmpt Pickup Delay	15 sec
*Prmpt Enable	Not Used

Figure 57: GCP: track “n” preempt Window

- ***Prmpt Offset Distance:** Range of values are 0 – 9999 feet. The default setting is 0 feet.

GCP: track 1 pos start	
*Positive Start	On
Positive Start Level	10
Positive Start Offset	0 ft
*Sudden Shnt Det Used	Yes
Sudden Shnt Det Level	70
Sudden Shnt Det Offset	0 ft
*Low EZ Detection Used	Yes
Low EZ Detection Level	70
Low EZ Detection Time	10 min
Low EZ Det Effect	Activate
Low EZ Det Override IP	No

Figure 58: GCP: track “n” pos start Window

- **Positive Start Level:** Range of values are 1 – 80. The default setting is 10.
- **Positive Start Offset:** Range of values are 0 – 9999 feet. The default setting is 0 feet.
- **Sudden Shnt Det Level:** Range of values are 5 – 75. The default setting is 70.
- **Sudden Shnt Det Offset:** Range of values are 0 – 9999 feet. The default setting is 0 feet.
- **Low EZ Detection Level:** Range of values are 50 – 80. The default setting is 70.

GCP: track 1 MS Control	
MS/GCP Ctrl IP Used	No
MS Sensitivity Level	0
Compensation Level	1300
Warn Time-Ballast Comp	High
Low EX Adjustment	39
Bidirn Dax Passthru	No
False Act on Train Stop	No
EX Limiting Used	Yes
EZ Correction Used	Yes

Figure 59: GCP: track “n” MS Control Window

- **MS Sensitivity Level:** Provides control of motion sensitivity. Range of values are 0 – 100. The default setting is 0.
- **Compensation Level:** Range of values are 1000 – 2000. The default setting is 1300.
- **Warn Time-Ballast Comp:** Range of values are None, Low, Medium and High. The default setting for approaches with an island is High, the default setting for approaches with no island is Low.

- **Low EX Adjustment:** Range of values are 39 to 34. The default setting is 39.
- **False Act on Train Stop:** Range of values is Yes or No. The default setting is No.
- **Ex Limiting Used:** Range of values is Yes or No. The default setting is Yes.
- **EZ Correction Used** Range of values is Yes or No. The default setting is Yes.

ISLAND: track 1	
Isl Frequency	8.3 kHz
Pickup Delay (2s +)	0 sec
*Isl Enable IP Used	No

Figure 60: ISLAND: track “n” Window

- **Isl Frequency:** Range of values are selected from the pulldown list. Default value is Not Set..

ADVANCED: restart track 1	
MS/GCP Restart EZ Level	80
Prime switch to MS	Yes
Dax A switch to MS	Yes
Dax B switch to MS	No
Preempt switch to MS	Yes

Figure 61: ADVANCED: restart track “n”

- **MS/GCP Restart EZ Level:** This option appears when the **ADVANCED: MS Restart** Window’s **MS/GCP Restart** parameter is set to Yes. Range of values is 5 – 80. The default value is 80.

ADVANCED: site options	
Daylight Savings	Off
Units	Standard
Maint Call Rpt IP Used	No
Emergency Activate IP	No
*EZ/EX Logging	Periodic
EZ/EX Log Interval	4 sec
EZ/EX Point Change	3

Figure 62: ADVANCED: site options Window

- ***EZ/EX Logging:** Range of values is No logging, Change, and Periodic. The default setting is Change
- **EZ/EX Logging Interval:** This parameter is visible when **Periodic** is selected in ***EZ/EX Logging**. Range of values is 1 to 5 seconds. The default setting is 5 seconds
- **EZ/EX Point Change:** This parameter is visible when **Change** is selected in ***EZ/EX Logging**. Range of values is 1 to 5. The default setting is 3.

SSCC: 1	
SSCC-1 Number of GPs	1
SSCC-1 Number of GDs	2
Flash Rate	50
*Low Battery Detection	Yes
Low Battery Level	90 dV
Flash Sync	master
Lamp Neutral Test	On
*Aux-1 Xng Ctrl Used	Yes
Aux-1 Xng Ctrl Hlth IP	Yes

Figure 63: SSCC: 1 Window

- ***Low Battery Detection:** Range of values is Yes or No. The default setting is Yes.
- **Low Battery Level:** Range of values is 90 – 150 dV. The default setting is 90 dV.

- **Lamp Neutral Test:** Range of values is On or Off. The default setting is On.

SEAR	
SEAR Subnode	99
DI 1	Not Used
DI 2	Not Used
Rly 1	Not Used
Rly 2	Not Used
Site Setup	

Figure 64: SEAR Window

- **SEAR Subnode:** Valid range of values is 1 – 99. The default setting is 99.

SITE: programming	
Radio Subnode	1
*Field Password	On
Field Password	9999
*Supervisor Password	On
*Low Battery Enabled	Off
ATCS Site Id Time Location	

Figure 65: SITE: programming Window

Radio Subnode: Displays the current radio subnode value. Valid range of values is 1 – 98. The default setting is 1.

- ***Field Password:** Range of values is On or Off. The default setting is Off.
- **Field Password:** Valid range of values is 0 – 9999. See your supervisor for the current Field Password.
- **Low Battery Enabled:** Valid range of values is Off or On. The default setting is Off.
- **Low Battery Level:** This parameter is visible when **Low Battery Enabled** is set to On. Range of values is 90 – 150 dV. The default setting is 90 dV.
- **Time:** Allows setting of the Date and Time.
- **Location:** Reflects the DOT Crossing Number,

All other parameters may be edited when the supervisor password is used.

ATCS INFORMATION

ATCS Communication

The ATCS communication window displays a real-time view of **in** and **out** vital messages for each vital serial communications link. Radio DAX link sessions are shown by LED #13 and LED #14 on the active CPU module.

Table 30: ATCS Communications Display Acronyms

Table 30: ATCS Communications Display Acronyms

Display Acronyms	Definition
AND1 – AND4	AND functions
T1P1	Track 1 Prime
T1P2 – T1P8	Track 1 DAX A-H
T1P9	Track 1 Preempt

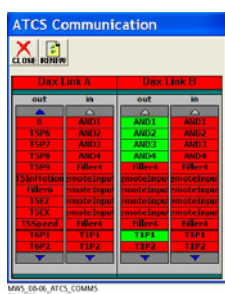


Figure 66: ATCS Communications Window

Connecting Echelon LONTALK Wiring

Vital ATCS serial protocol data may be incorporated with the LONTALK® protocol to facilitate:

- crossing control functions
- remote prediction operations via Spread Spectrum Radio (SSR)
- vital communications with other Safetran vital controllers

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 Safetran California Technical Support.

The following rules apply when using the Echelon LAN:

- Wire size is from #22AWG to #16AWG, stranded twisted pair.
- Each connection (node) must be wired in a daisy-chained bus configuration, no drops allowed (see Figure 68).
- 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 connection (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 Safetran Technical Support for assistance.
- In general, Echelon network requires a terminator for proper data transmission performance.
- The Echelon network can be connected to ECH1 on the 4000 GCP and the Echelon terminator can be connected to ECH2 on the 4000 GCP
- Order Network Echelon Termination Unit, part number 8000-80078-001
- For further information, see Safetran's Echelon Configuration Handbook, COM-00-07-09.

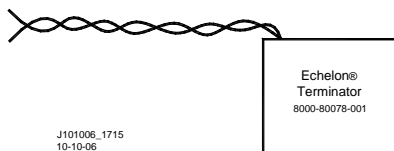


Figure 67: Safetran Echelon Terminator

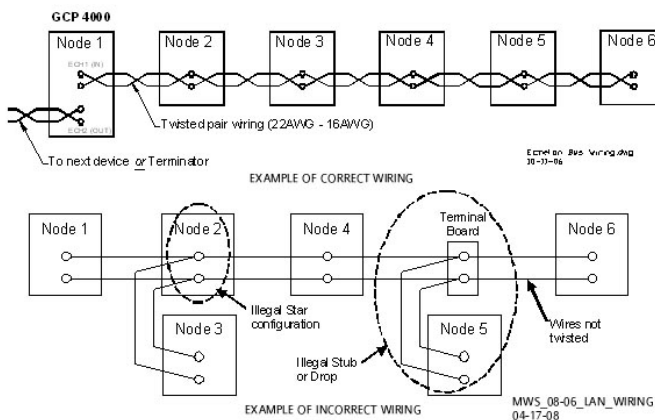


Figure 68: Echelon LAN Wiring Examples

ATCS SITE ID ENTRY

Selecting the **ATCS Site Id** entry on the **TEMPLATE: Site Info** menu window brings up the dialog window shown in Figure 69A. This dialog window:

Displays the current Site Identification Number (SIN)

Allows the current SIN to be changed

A SIN may be changed as described in Table 31, and is controlled by six function buttons

R0 12404_1445
09-01-04

A

R0 12604_0819
01-26-04

B

Figure 69: Site Identification Number Dialog Window

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.



Selecting the:

- **CLOSE** button closes the SIN Window and returns the display to the Status Screen.
- **CURR.** (current) button displays the current SIN in the Current SIN text box.
- **PEND.** Button



Changes the **Current SIN** text box to the

Pending SIN text box.



Displays the pending SIN in the **Pending SIN** text box.

A SIN is pending during the time interval between acceptance of a new SIN and the initiation of CPU reboot.

See Table 31, steps 5 through 7.



- **Apply** button sends a SIN change to the Verify text box and initiates a Confirmation CRC number.



- **Accept** button directs the DT to accept a SIN change and identify it as pending.



- **Cancel** button clears all data from the window text boxes.

Table 31: Changing Site ID Number

Table 31: Changing Site ID Number

<u>Step 1</u>	Select the ATCS Site Id entry from the TEMPLATE: Site Info menu window The SIN dialog window, Figure 69A, displays.
<u>Step 2</u>	Highlight the number displayed in the Current SIN text box. <ul style="list-style-type: none"> • If the site identification number (SIN) is not displayed in the Current SIN text box, select the Curr. button to display the SIN.
<u>Step 3</u>	Clear the current SIN entry and enter the new SIN using the keypad at the bottom of the window. The keypad Backspace button clears the right-most SIN position each time it is selected. The keypad Clear button clears the entire SIN display.
<u>Step 4</u>	Select the Apply button at the top of the window. The new SIN appears in the Verify text box change as shown in Figure 69B. The Apply button deactivates (grays out) and the Accept button becomes active. A confirmation cyclic redundancy check (CRC) number is placed at the bottom of the Verify text box.

Table 31: Changing Site ID Number

<u>Step 5</u>	<p>Use the scroll bar at the right of the Verify text box to display the bottom of text list.</p> <ul style="list-style-type: none"> The Confirmation CRC number appears as shown in Figure 69A.
<u>Step 6</u>	<p>Select the CRC: field and enter the displayed Confirmation CRC number using the keypad.</p>
<u>Step 7</u>	<p><u>Press the SEL button on the front of the CPU module.</u></p> <ul style="list-style-type: none"> The new SIN is embedded in the Chassis Identification Chip (CIC).
<u>Step 8</u>	<p>Select the Accept button at the top of the SIN Window.</p> <p>If the SIN window changes as shown in Figure 69B, proceed to step 10.</p> <p>The Accept button deactivates (grays out) Changes succeeded appears below the CRC text box.</p> <ul style="list-style-type: none"> End of Changes appears at the bottom of the Verify text box. If Changes Failed appears below the CRC text box verify that the CRC number within the CRC text box and the Verify text box match. <p>If the CRCs do not match repeat the procedure starting at step 7.</p> <ul style="list-style-type: none"> If the CRCs match cycle power to the CPU module and repeat the procedure starting at step 1.
<u>Step 9</u>	<p>Briefly cycle power to the power connector located above the CPU module. This can also be accomplished by cycling the Transfer Switch on redundant units.</p> <p>The CPU reboots.</p> <ul style="list-style-type: none"> The CPU module identifies the new SIN as the current site address
<u>Step 10</u>	<p>Select the Close button.</p> <ul style="list-style-type: none"> The SIN dialog window closes and is replaced by the Status Screen.

✖ CLOSE	✔ SIN CURR.	✔ SIN PEND.	⬅ Apply	✔ Accept	⛔ Cancel
-------------------	---------------------------------	---------------------------------	-------------------	--------------------	--------------------

Current SIN:

Verify: Confirmation CRC : SCDF
 End of Changes

CRC:

Backspace		Clear	
7	8	9	A B
4	5	6	C D
1	2	3	E F
0	+/-	.	

R012604_0822
01-26-04

A

✖ CLOSE	✔ SIN CURR.	✔ SIN PEND.	⬅ Apply	✔ Accept	⛔ Cancel
-------------------	---------------------------------	---------------------------------	-------------------	--------------------	--------------------

Current SIN:

Verify: Confirmation CRC : SCDF
 End of Changes

CRC:

Changes succeeded.

Backspace		Clear	
7	8	9	A B
4	5	6	C D
1	2	3	E F
0	+/-	.	

R012604_0829
01-26-04

B

Figure 70: Site Identification Number Window with CRC Display

DIAGNOSTIC TERMINAL RUNNING ON A PC

The Safetran Diagnostic Terminal (DT) is Windows ® based software for use with the GCP 4000 and other Safetran products. The procedures and programming steps previously described in this handbook using the GCP display can generally be performed with the PC that is connected to the GCP 4000. The exception is the SEAR2I, the SEAR2I is accessed through its own USER port, which is covered in the next section.

NOTE

Some newer personal computers do not come equipped with RS-232 serial communication ports. These computers come equipped with USB ports (Universal Serial Bus). Adapter Cables for converting USB to serial connections are commercially available in electronics stores. Depending on the PC some of USB to Serial Cables may not operate as desired. Contact Safetran Technical Support for additional information.

Installing DT on PC

The DT is available on a CD for installation on laptop or desktop PCs.

NOTE

Follow railroad specific procedures for installing software on railroad computers. Some companies require software to be approved by the company before it can be installed on company computers.

Insert the Diagnostic Terminal CD in the PC and follow the installation instructions. Connect the serial communications port of the PC to the DIAG (CP) port on the GCP with a DB9 serial cable or USB-Serial Adapter Cable. The USB or female end of the cable attaches to the PC. The male end connects to the GCP.

The following screen will appear.

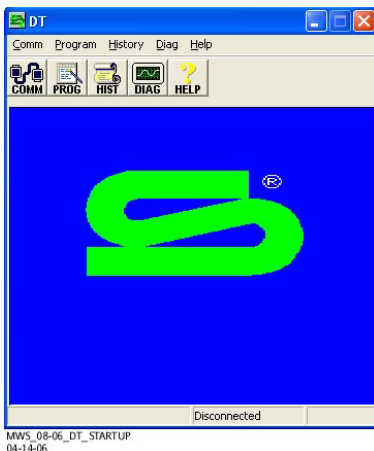


Figure 71: DT Startup Screen

To begin a session using the DT press the **COMM** button then select **CONNECT**. While the DT is learning the GCP configuration, the following screen appears. Note the bar at the bottom of the window indicates activity.

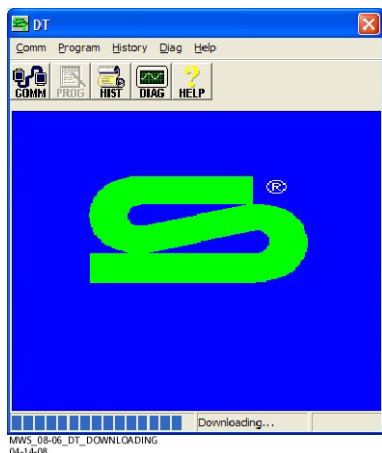


Figure 72: DT Startup Screen – Download in progress

It may be necessary to set the communications port setup between the PC and the GCP. Press the COMM button, then select the **DT Port Setup** menu.

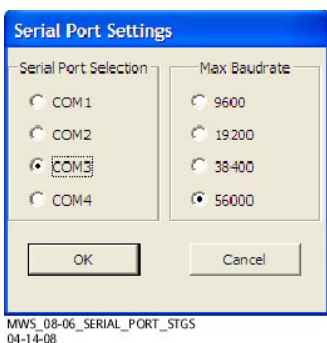


Figure 73: Serial Port Settings Window

The initial screen is the familiar TRACK STATUS window. Accessing menus is done by left-clicking the mouse on a command button or right-clicking on a window section.

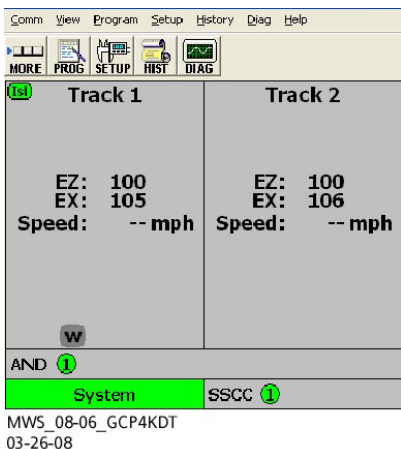


Figure 74: PC Based Model 4000 GCP DT Window

The following selections are accessed by right-clicking the desired indicated window:

- Track Status
- Detailed Status View
- Track Diagnostics
- Calibrate Track
- Out of Service
- AND – AND Detail View
- SYSTEM
- View System Diagnostics
- View System IO

Troubleshooting Problems on PC Based DT

PC settings may affect the appearance of the DT display and DT operation on some PCs. If the display does not appear correct or drop down menus do not function correctly, check the following items:

- Font is set to 'clear font'
- DPI is set to 'normal size (96 DPI)'
- Tahoma font properties are installed

To set display to 'clear font':

Place cursor on an open area of the Windows® background screen and right-click the mouse.

In the drop-down box select 'properties'.

A **Display Properties** window similar to the following (depends on Windows® version used) should appear.

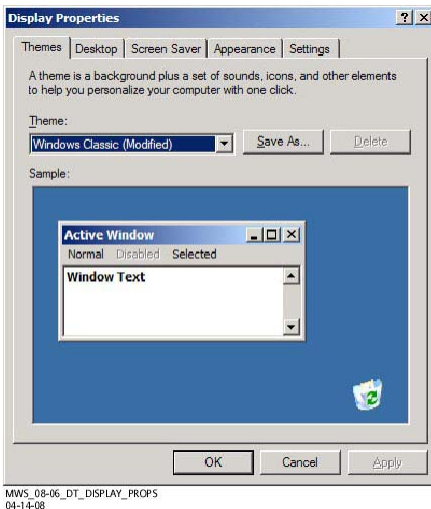
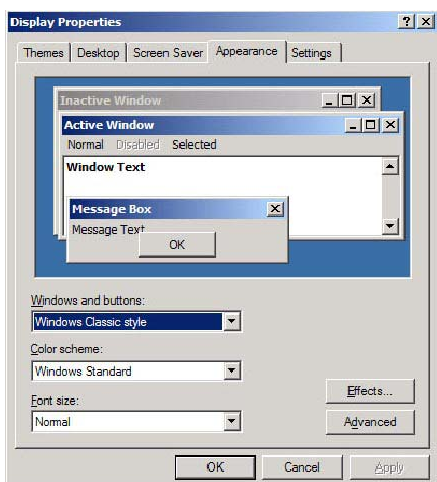


Figure 75: Display Properties Window

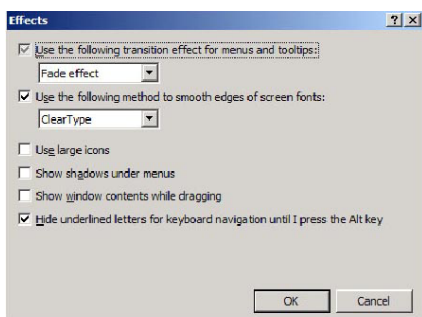
Select the 'Appearance' tab. A screen similar to the following should appear.



MWS_08-06_DT_DISPLAY_PROPS_APP
04-14-08

Figure 76: Display Properties Window _Appearance Tab

Select the 'Effects' button. A screen similar to the following should appear.



MWS_08-06_DT_EFFECTS
04-14-08

Figure 77: Effects Window

In the drop-down list below 'Use the following method to smooth edges of screen fonts', select 'Clear Type'.

If the check box next to 'Use the following method to smooth edges of screen fonts' is not checked, click on this box to enable the drop-down list.

To set the DPI setting:

Open the **Display Properties** window as described in step 1b above.

Select the 'Settings' tab. A screen similar to the following should appear.

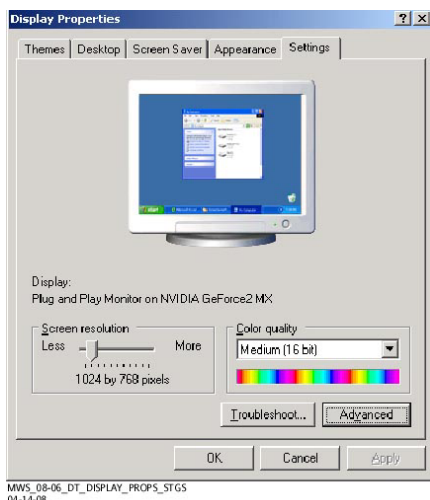


Figure 78: Display Properties Window - Settings Tab

Select the 'Advanced' button. A screen similar to the following should appear.

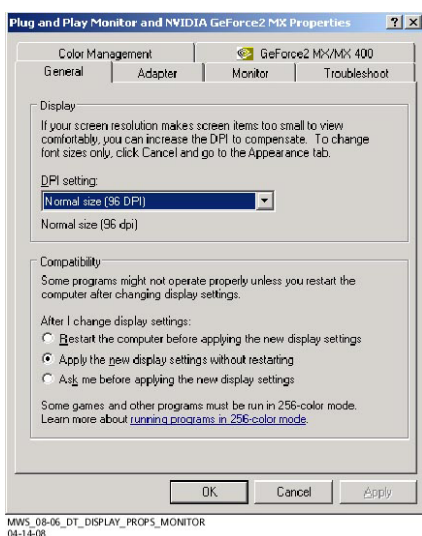


Figure 79 Display Properties Window – Monitor Setup Window

In the 'DPI setting' drop-down list, select 'Normal size (96 DPI)'.

To install Tahoma font properties:

Select the Windows® **Start** button (lower left corner of monitor display area).

Select 'Control Panel' (earlier versions of Windows® require 'Settings' then 'Control Panel').

Select 'Fonts'.

On the Fonts tool bar, select 'View'.

From the View drop-down list, select 'Refresh'.

Programmed Configuration Information

Programmed configuration information for the entire GCP or software and hardware versions for the active set of modules (MAIN or STBY) can be saved to a PAC (Package) file on the GCP. For the software and hardware versions for the inactive set of modules, use the switch on the transfer module to select the other set of modules. The SEAR configuration is accessed directly from the SEAR User port by selecting **Menu** and then **Configuration**.

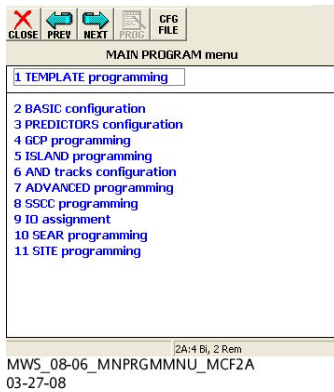


Figure 80: MAIN PROGRAM menu Window

When in the programming mode, press the **CFG FILE** button. Select Save to File. Note this may take several minutes. The file will be saved on the hard drive using the SAVE AS window.

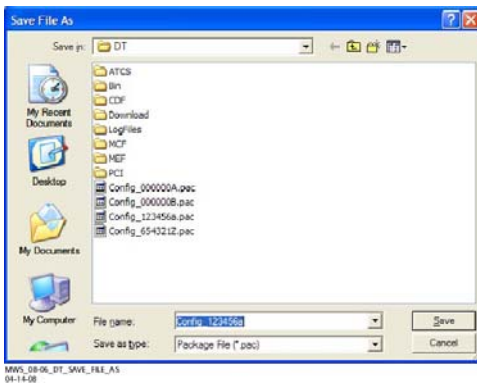


Figure 81: Save File As Window

While the file is being saved the MAIN MENU program screen will appear, but the selections will be inactive (gray).

Several important options and reports are generated from the PAC file and are accessed again through the **CFG FILE** button, as seen on the following screen.

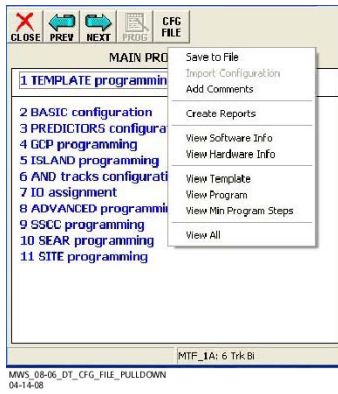


Figure 82: Configuration File (CFG File) Button Options

All View selections may be accessed from the GCP display but saving them to the PC allows easy retrieval and printing. The MIN PROGRAM STEPS Report, indicates the minimum programming steps that were entered to transform the initial template into the site specific programming of the GCP. When a template is selected that most closely describes the track layout of the crossing, the minimum program steps report will have the fewest steps. The above reports can be saved to the PC as text files by selecting the report, TEXT, SAVE.

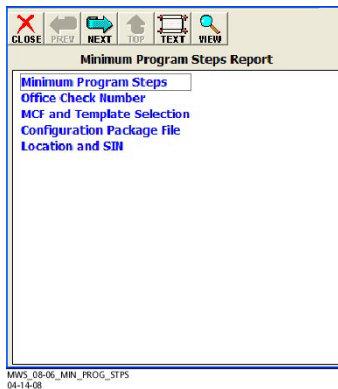


Figure 83: Minimum Program Steps Report Window

An example of the beginning of text file of the MIN PROGRAM STEPS report is shown below.

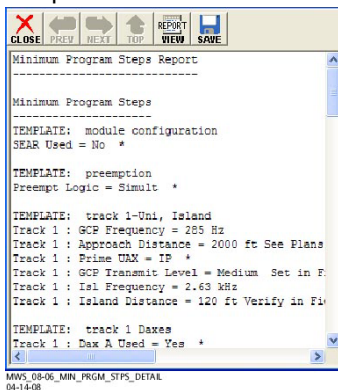


Figure 84: Minimum Program Steps Report

DIAGNOSTIC TERMINAL - INSTALLING SOFTWARE ON GCP 4000

The DT is also used to install new software issued by Safetran for the GCP 4000.

WARNING

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.

NOTE

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.

Future software revisions will be issued with instructions that describe which module and data port (connector) the software is to be loaded into. These software instructions may supersede portions of this manual.

Installing Software on CPU Module

NOTE

The examples in this section are used to explain how to install software and indicate screens that may be seen. 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.

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

- CPU Module
 - VLP Port – File: VPH02_50.MEF
 - DIAG (CP) Port – File: NCG02_80.MEF
 - DIAG (CP) Port – File: gcp_t6x_01_2.mcf, CRC=0DFE7A0C
- Track Module
 - DIAG Port – File: GCP02_60.MEF

The files should be copied to a folder in the C:\Safetran\DT folder or another convenient folder on the PC that will be used to install the software.

Connect the serial cable between the PC and the DIAG (CP) port of the CPU module. Open the DT software.

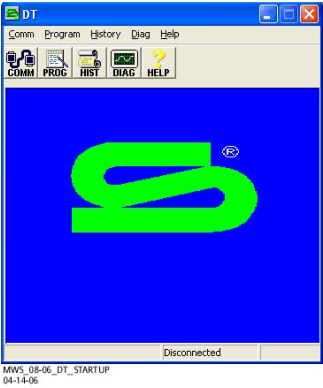


Figure 85: DT Startup Screen

Select **COMM**, then select **Install Software**. A prompt window will ask if you want to RESET MODULE. Select YES.



Figure 86: Reset Module Screen

The following Text Terminal Window will appear.

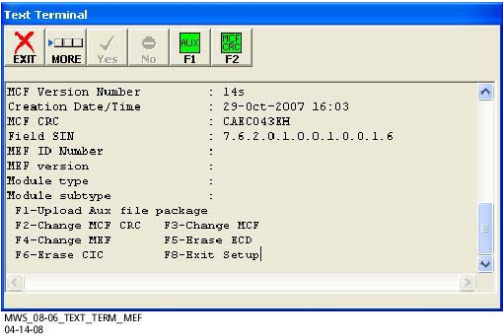


Figure 87: Text Terminal Window

Press F4, or select MORE then the MEF/F4 button.

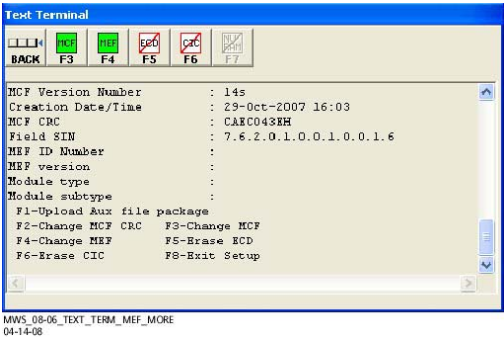


Figure 88: Text Terminal Window – More Button Depressed

If the Erase the MEF (Y/N)? prompt is displayed, select Y.

After erasing the previous MEF, the following window will appear.

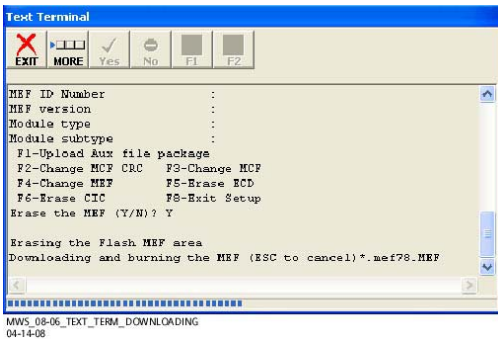


Figure 89: Text Terminal Window – Download in Progress

Select the file to be installed, in this example NCG02_80.MEF. This may take a few minutes. While the file is downloading, progress will be indicated on the bottom line of the window.

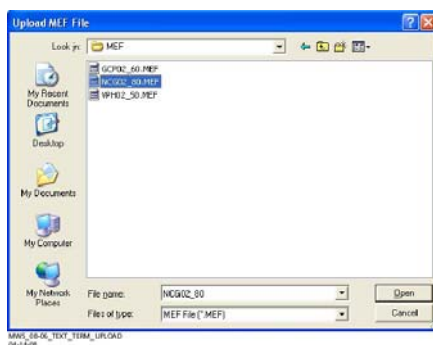


Figure 90: Upload MEF Window

When complete, the DT returns to the following screen.

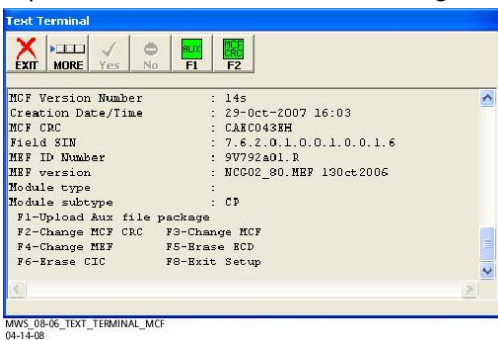


Figure 91: Text Terminal Window

Select **MCF/F3** to proceed with installing the mcf file. When prompted to erase the MCF area, select **Y**. Then select the gcp_t6x_01_2.mcf file.

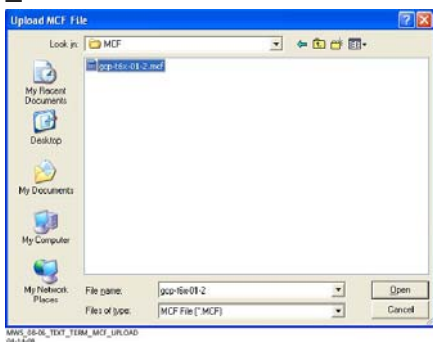


Figure 92: Upload MCF Window

Again, this step may take a few minutes. While it is downloading, progress will be indicated on the bottom line of the window.

NOTE

After the blue progress bar stops, the CPU loads a copy of the file to the ECD on the chassis. This will be indicated on the DT screen and on the 4 character display on the CPU as **LOADING TO ECD**. Wait until this process completes before proceeding.

The next step is to change the CRC of the MCF. Select **F2**, or press **BACK** and then select **MCF CRC/F2**.

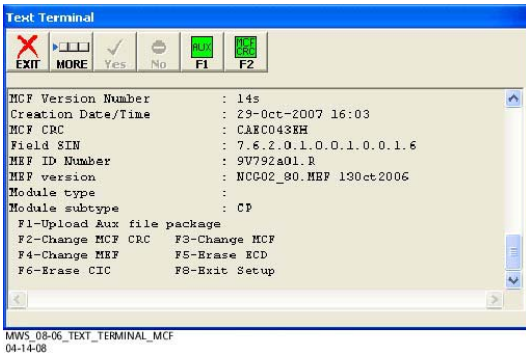


Figure 93: Text Terminal Window – Change MCF CRC

The following dialog box will be displayed. Enter the CRC issued with the software revision instructions. The CRC will always be 8 characters consisting of 0 through 9 and A through F.



Figure 94: MFCRC Window

This completes the software installation on the DIAG (CP) port. Next, the software will be installed on the VLP port. **EXIT** the screen. Remove the cable from the DIAG port and connect it to the VLP port. Select **COMM** and **Install Software**.

The following screen appears.

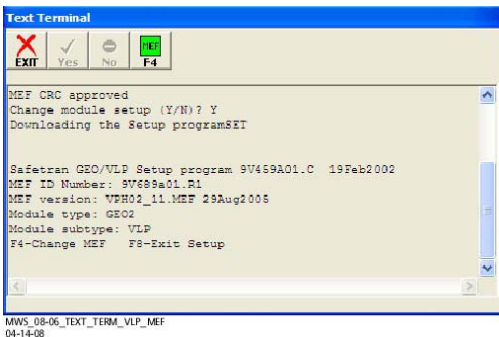


Figure 95: Text Terminal Window - Upload

Select **F4** and select **Y** when asked to erase the MEF.

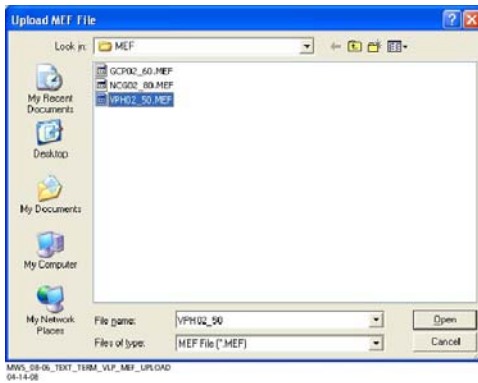


Figure 96: Upload MEF File Window

Select the file to load and select Open. This step may take a few minutes. While it is downloading, progress is indicated at the bottom of the window. When complete select **EXIT** and return to the DT screen.

Installing Software on Track Module

Per the instructions issued with the software revision, the next step is to install the GCP02_60.MEF files on the Track Modules.

The track software upgrade screen is shown below.

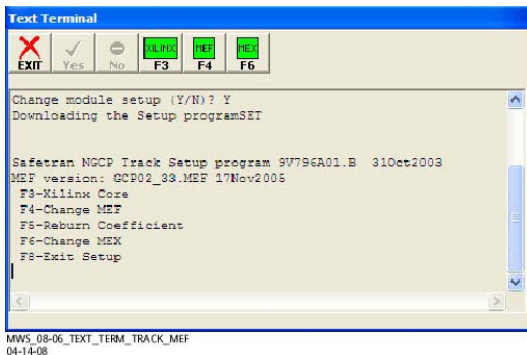


Figure 97: Text Terminal Window – Upload Track MEF

- Connect serial cable to DIAG Port on Track Module
- From the **COMM** menu, select **Install Software**
- Repeat the above steps when prompted.
- Repeat the procedure for the remaining Track Modules in the MAIN section of the GCP.
- Repeat the procedure for installing all files on the STANDBY modules.

Installing Software on SSCC3I Module

If the instructions issued with the software revision, call for upgrading the software in the SSCC3I Module, the next step is to install the specified MEF file on the SSCC modules.

The SSCC Modules have a master processor that controls slave processors, which control the independent lamp outputs. Therefore, there are separate MEFs for the master and slave processors.

From the **COMM** menu, select **Install Software**.

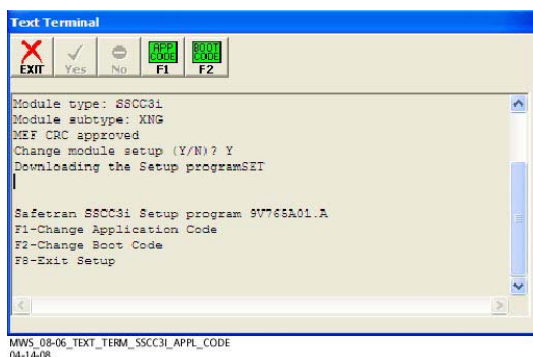


Figure 98: Text Terminal Window – Upload SSCC MEF

- Selecting F1 will change Application Code, which on the SSCC are MEF files. When loading software for Master/Slave operations, “Master” loads the MEF on the Master processor and “All Slaves” loads the MEF on the slave processors.
- Based on the issued instructions, load the new software.
- Repeat the procedure for the remaining SSCC3I Module.

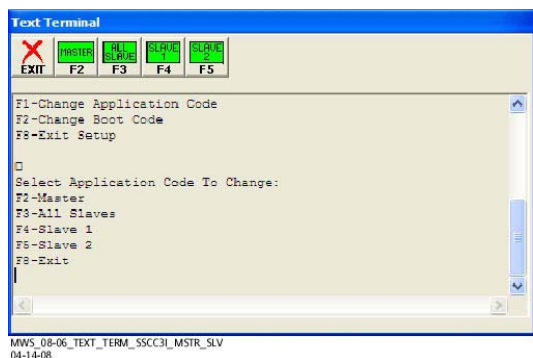


Figure 99: Text Terminal Window – Master and Slave MEF Upload

Loading software into the display module is discussed in Appendix E - Changing Display Module Software.

WARNING

WHEN LOADING SOFTWARE INTO SLAVE PROCESSORS, THE LIGHT ON THE LOADING PROCESSOR WILL NOT FLASH, BUT THE LIGHT ON THE OTHER PROCESSOR WILL.

CHANGING DISPLAY MODULE SOFTWARE

NOTE

Changing Display Module Software applies only to those Model 4000 GCPs using Display Modules, P/N A80407-01 or P/N A80407-02 using Display Terminal (DT) software version 4.6.0 or earlier. If the Model 4000 GCP has a Display II Module, P/N A80407-03 using DT software version 4.8.0 or newer, follow the procedures outlined in Appendix H – Display DT USB Wizard

The installation of software on the Display Module is a two-part process.

The DT Display Module software must be copied to a CompactFlash® card.

The DT software must be installed in the Display Module using the CompactFlash® Card and CompactFlash® to PCMCIA adapter (CompactFlash® PC Card Adapter).

INSTALLING SOFTWARE ON THE DT

Installation of DT to Compactflash® Card

Tools Needed:

- CD containing DT Display software
- CompactFlash® Card (minimum 32 MB)
- CompactFlash® PC Card Adapter (if needed)
- Computer equipped with one of the following:
- CompactFlash® Card slot
- Peripheral device with a CompactFlash® Card slot (CompactFlash® Reader)
- A PC Card slot (use CompactFlash® Card Adapter)

NOTE

CompactFlash® Cards up to 2 GB may be used for this application. However, any CompactFlash® Card used must be formatted for FAT (FAT 16) file format. In Windows® XP, go to **My Computer** and select the CompactFlash® Card. From the **File** menu select **Format>FAT**.

Insert CompactFlash® Card into computer/adaptor and confirm using Windows Explorer that the CompactFlash® Card is available.

Insert CD into CDROM drive. If auto run does not start the installation program, use Windows Explorer and navigate to the Setup.exe located on the installation CD. Start the Setup.exe application.

Select the drive identified as the CompactFlash® Card as the destination folder when prompted. Select Finish when done. Using Windows Explorer, navigate to the drive identified as the CompactFlash® Card. Using the Mouse, select the CompactFlash® Card with a right click and select “Eject” in

the popup menu. Confirm that no error messages are produced.

Remove the CompactFlash® Card from the computer. If a CompactFlash® PC Card Adapter was used, remove adapter and CompactFlash® Card together.

Installation of DT from Compactflash® Card to A80407 Display Module

Tools Needed for A80407 Display Module:

- CompactFlash® Card with DT files
- CompactFlash® PC Card Adapter

Remove the A80407 Display Module from the GCP chassis.

Locate boot DIP switch and turn off number 2 switch on A80407 Display Module (number 1 switch should already be off). See figure below.

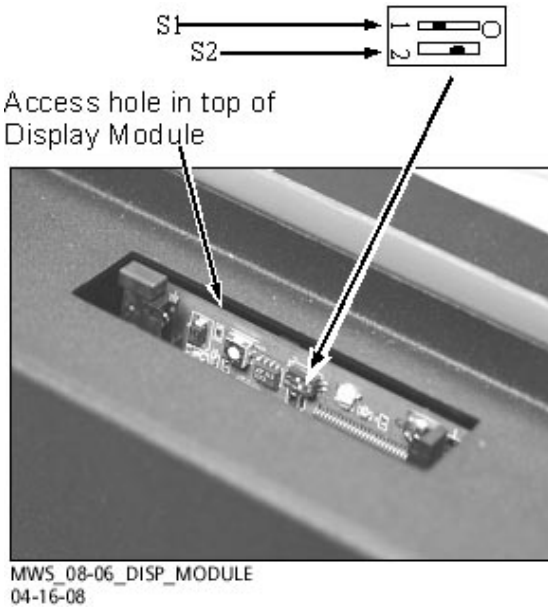


Figure 100: Top of Display Module A80407-01 & -02

Insert adapter with CompactFlash® Card into PCMCIA slot. See figure below.

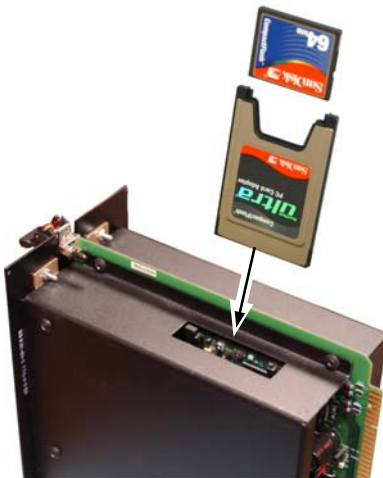


Figure 101: Display Module with CompactFlash® Card

Insert A80407 Display Module into appropriate slot in GCP chassis.

After the Display Module boots up, a stylus calibration screen will display (white screen with a target in the middle). Tap the target firmly and accurately at each location on the screen. The target will continue to move until the screen is aligned. When the screen displays “Time limit: ...”, tap anywhere to store the settings.

After stylus calibration screen closes, the following dialog should display:

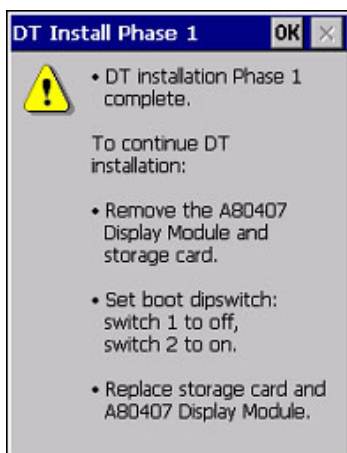


Figure 102: DT Install Phase 1 Window

Follow the instructions on the dialog. Note that the adapter with CompactFlash® Memory card (Storage card) must be returned to the PCMCIA slot.

After the A80407 Display Module boots up again, the following dialog should display:

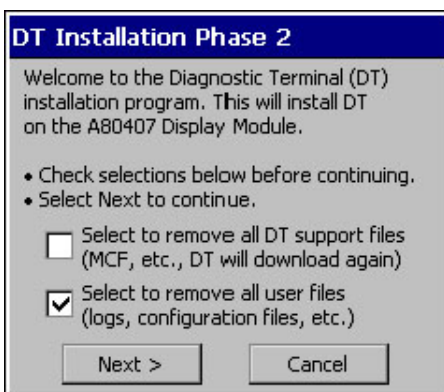


Figure 103: DT Installation Phase 2 Window

It is recommended that all files be removed (select both options). Select “Next >” when ready. Select “Yes” for confirm dialog (this will start installation).

After several minutes, a dialog should display that indicates installation is complete. Select Finish when ready. Remove CompactFlash® Card and adapter from A80407 Display Module. Replace the Display Module to start DT.

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APPENDIX A – HARDWARE

CHASSIS CONFIGURATIONS

Common Chassis Components

The various 4000 GCP chassis encountered in the field will have the following similarities (see Figure 104):

- Echelon connector location
- Chassis diagnostic port location, same as the DIAG (CP) port of the active CPU in dual units
- Battery/CPU interface connector location
- CPU Module connector location (left most card slot)
- CIC (Chassis Identification Chip) location
- ECD (External Configuration Device) location
- Grounding strap location
- Keyed Interface Connectors

NOTE

The keyed interface connectors used on the 4000 GCP front panel consist of both screw-down type and cage-clamp type connectors. Refer to page 16 for wire preparation and insertion instructions.

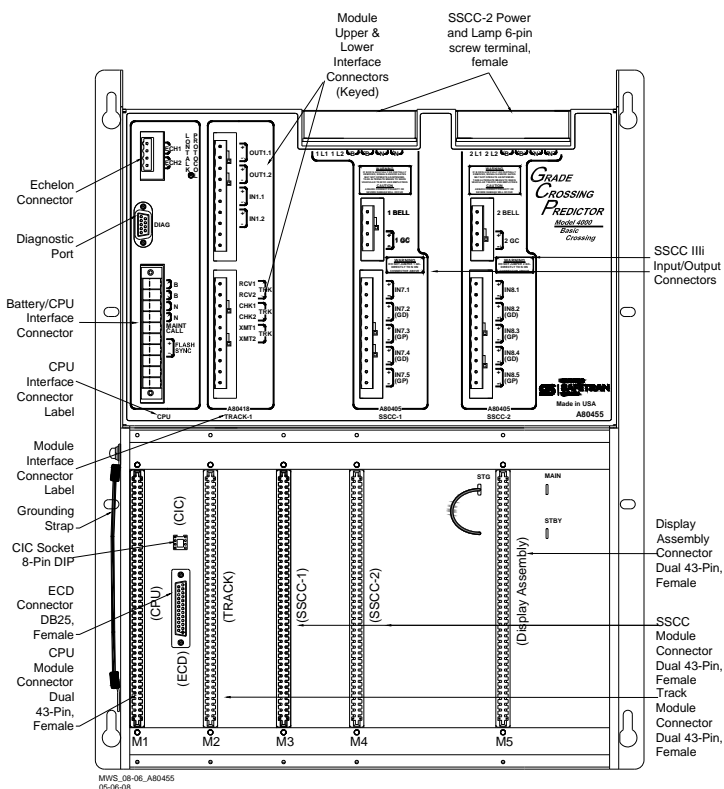


Figure 104: Common Chassis Component Locations

CPU MODULE USER INTERFACE (A80403)

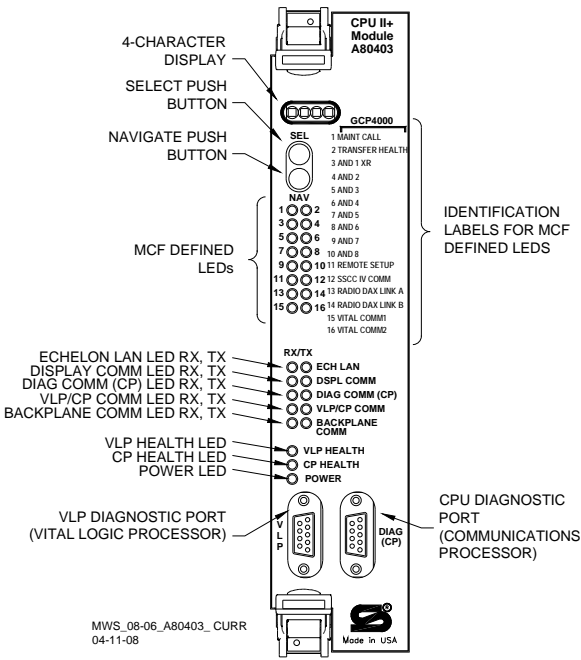


Figure 105: Central Processing Unit (CPU II+) Module, A80403, Current Production Units

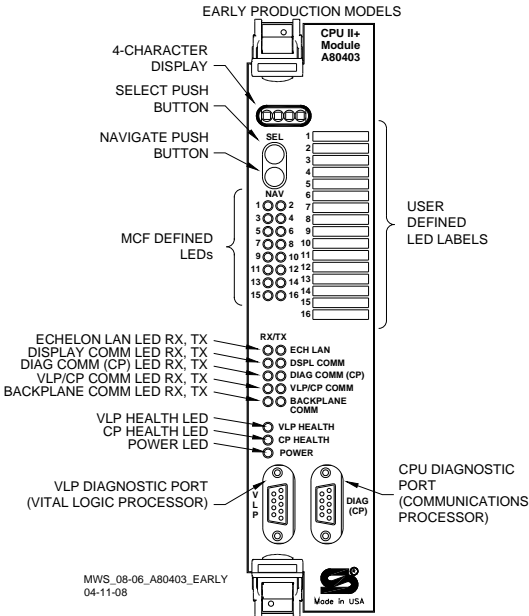


Figure 106: Central Processing Unit (CPU II+) Module, A80403, Early Production Units

Table 32: CPU Module LED Descriptions

Table 32: CPU Module LED Descriptions

LED		Function	Description
NAME	Color		
1 MAINT CALL	Red	Maintenance Call See page 77	On – maintenance call output on Off - maintenance call output off
2 TRANSFER HEALTH	Red	Transfer Output see page 77	On – transfer signal is being generated transfer card should not be counting down Off – transfer signal is not being generated If transfer card is in AUTO it should be counting down
3 AND 1 XR	Red	AND 1 XR	On – AND 1 XR is energized Off – AND 1 XR is De-energized
4 to 10 AND 2 through AND 8	Red	AND 2 through AND 8	On – AND is Energized Off – AND is De-energized or Not Used
11 REMOTE SETUP	Red	Remote Setup Session	On – The GCP has been primed for a remote one-person setup (see Appendix F) Flashing – Remote setup in progress Off – No remote setup is in progress
12 SSCC IV COMM	Red	SSCCIV Echelon Active	On – External SSCC IV Echelon is in session Off – External SSCC IV Echelon not used or not in session
13 RADIO DAX LINK A	Red	Radio DAX Link A	On – Radio DAX Link A is in session Off – Radio DAX Link A not used or not in session
14 RADIO DAX LINK B	Red	Radio DAX Link B	On – Radio DAX Link B is in session Off – Radio DAX Link B not used or not in session
15 VITAL COMM1	Red	Vital Comm 1	On – Vital Comm1 is in session
16 VITAL COMM2	Red	Vital Comm 2	On – Vital Comm2 is in session

Table 32: CPU Module LED Descriptions

LED		Function	Description
NAME	Color		
ECH LAN RX	Grn	Echelon Message Received	Flashes when the CPU is receiving an ATCS message via the Echelon LAN.
ECH LAN TX	Red	Echelon Message Sent	Flashes when the CPU is transmitting an ATCS message via the Echelon LAN.
DSPL COMM RX	Grn	Display Port Message Received	Flashes when the CPU is receiving data from the display module.
DSPL COMM TX	Red	Display Port Message Sent	Flashes when the CPU is sending data to the display module.
DIAG COMM (CP) RX	Grn	Diag Port Message Received	Flashes when the CPU is receiving data from the communications processor diagnostic (DIAG CP) serial port.
DIAG COMM (CP) TX	Red	Diag Port Message Sent	Flashes when the CPU is transmitting data on the communications processor diagnostic (DIAG CP) serial port.
VLP/CP COMM RX	Grn	Comm Message Received	Flashes when the VLP is receiving data from the CP.
VLP/CP COMM TX	Red	Comm Message Sent	Flashes when the VLP is transmitting data to the CP.
BACK-PLANE COMM RX	Grn	Backplane Message Received	Flashes when the VLP is receiving data from the serial bus.
BACK-PLANE COMM TX	Red	Backplane Message Sent	Flashes when the VLP is sending data onto the serial bus.
VLP HEALTH	Yel	VLP Health Status	Flashes slowly (1Hz) when the CPU VLP is functioning normally.
			Flashes fast (4Hz) when the VLP is unhealthy
CP HEALTH	Yel	CP Health Status	Flashes slowly (1Hz) when the CP is functioning normally.
POWER	Grn	Power Indication	On steadily when power is applied to the module.

Table 33: CPU Module Display Messages

Table 33: CPU Module Display Messages

Display	Mode	Meaning	System State
MCF Name; e.g. GCP-T6X-02-1	Scrolling	VLP is healthy	CPU is healthy.
BOOT	Steady	CPU is booting up.	CPU is booting up. Crossing is activated.
CRC*	Steady	MCF CRC is incorrect for the current MCF	Entered CRC does not match CRC of MCF. Crossing is activated.
MCF*	Steady	CPU is not healthy because the MCF is not valid.	Reboot CPU or reload MCF. Crossing is activated.
SIN*	Steady	Site Identification Number is invalid.	Enter valid SIN. Crossing is activated.
VLP UCFG	Scrolling	VLP is unconfigured.	No comm to I/O modules. Crossing is activated.
VLP INITIAL	Scrolling	The CP is transferring the configuration from NVRAM to the VLP.	No comm to I/O modules. Crossing is activated.
CMCF / *MCF	Scrolling	The CP is copying the MCF from the ECD into flash memory.	No comm to I/O modules. Crossing is activated.
NO VLP COMMS	Scrolling	The CP is not communicating with the VLP. VLP could be rebooting or performing its initial configuration checks	No comm to I/O modules. Crossing is activated.
EFLA	Steady	Erasing its flash memory in preparation for copying the MCF from the ECD into flash memory.	No comm to I/O modules. Crossing is activated.
ADR*	Steady	The radio DAXing neighbor ATCS address is invalid	Address of DAX session cannot be computed. Enter valid SIN

Table 33: CPU Module Display Messages

Display	Mode	Meaning	System State
INI*	Steady	Rebooting	System Reboot - Crossing is activated.
Exxx	Steady	Internal error, System will reboot. xxx is 3 digit hex number	Reload MCF - Crossing is activated.
LMCF	Steady	Rebooting	System Reboot - Crossing is activated.
ICLK	Steady	Rebooting	System Reboot - Crossing is activated.

Note: Steady messages may alternate with other messages

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 4000 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 or communicating to the SEAR2I.

Table 34: Setup Menu Display

Table 34: 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 USER INTERFACE (A80418)

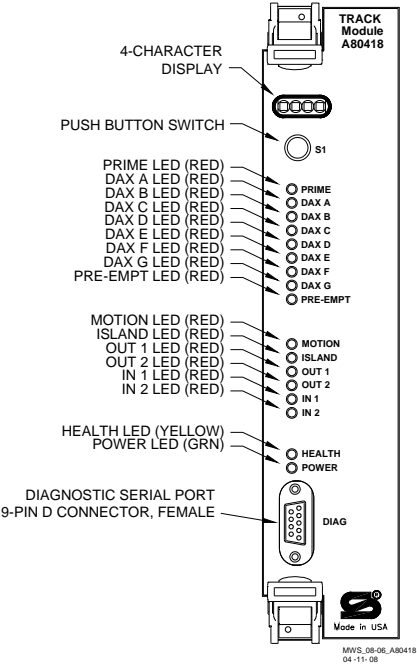


Figure 107: Track Module, A80418

Table 35: Track Module LED Descriptions

Track 35: Track Module LED Descriptions

LEDs		DESCRIPTION
NAME	COLOR	
PRIME	Red	On – Prime predictor is energized Off – Prime predictor is de-energized or not used Flashing - Prime predictor is running the programmed pickup delay
DAX A	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
DAX B	Red	On – DAX B predictor is energized Off – DAX B predictor is de-energized or not used Flashing – DAX B predictor is running its pickup delay
DAX C	Red	On – DAX C predictor is energized Off – DAX C predictor is de-energized or not used Flashing – DAX C predictor is running its pickup delay
DAX D	Red	On – DAX D predictor is energized Off – DAX D predictor is de-energized or not used Flashing – DAX D predictor is running its pickup delay

LEDs		DESCRIPTION
NAME	COLOR	
DAX E	Red	On – DAX E predictor is energized Off – DAX E predictor is de-energized or not used Flashing – DAX E predictor is running its pickup delay
DAX F	Red	On – DAX F predictor is energized Off – DAX F predictor is de-energized or not used Flashing – DAX F predictor is running its pickup delay
DAX G	Red	On – DAX G predictor is energized Off – DAX G predictor is de-energized or not used Flashing – DAX G predictor is running its pickup delay
PREEMPT	Red	On – Preempt predictor is energized Off – Preempt predictor is de-energized or not used Flashing – Preempt predictor is running its pickup delay
MOTION	Red	On – GCP has not detected motion Flash – GCP has detected motion below motion threshold Off – GCP has detected motion
ISLAND	Red	On – Island is unoccupied Off – Island is occupied Flashing – Island is running its pickup delay
OUT 1	Red	On – output energized Off – output de-energized or failed
OUT 2	Red	On – output energized Off – output de-energized or failed
IN 1	Red	On – input energized Off – input de-energized or failed
IN 2	Red	On – input energized Off – input de-energized or failed
HEALTH	Yellow	Slow (1Hz) – module is healthy and communicating with CPU. Fast (2Hz) – module is healthy but not communicating with CPU. Very Fast (4Hz) – module is unhealthy and communicating with CPU.
POWER	Green	On steadily when power is applied to the module
*GCP	*blinks on and off, GCP steady	Module is healthy • MS/GCP Operation is on No trains are detected on the approach

Track 35: Track Module LED Descriptions

LEDs		DESCRIPTION
NAME	COLOR	
*ISL	*blinks on and off, ISL steady	Module is healthy <ul style="list-style-type: none"> MS/GCP Operation is programmed “not used” Island Operation is used
Innn e.g. I085	Steady	The module has detected inbound motion. EZ is given by the value ‘nnn’
Snnn e. g. S045	Steady	The module has not detected inbound or outbound motion. EZ is given by the value ‘nnn’
Onnn e.g. O049	Steady	The module has detected outbound motion. EZ is given by the value ‘nnn’
*CAL	Switches between *CAL and GCAL or ICAL	GCP Calibration in progress

Table 36: Track Module Indications (Operational)

Track 36: Track Module Indications (Operational)

Indication	Mode	Meaning	Module State
*APP	Switches between *APP and GAPP	GCP Approach calibration in progress	All predictors are de-energized
*LIN	Switches between *LIN and GLIN	GCP Linearization in progress.	All predictors are de-energized
ICAL	Blinks on and off	Island Calibration in progress	Island is de-energized

Table 37: Boot-up Messages

Table 37: Boot-up Messages

Indication	Mode	Meaning	Module State
BOOT	Steady	The module is rebooting	All predictors, island, inputs and outputs are deenergized
INIT	Steady	The module is performing its initialization	All predictors, island, inputs and outputs are deenergized

Table 38: Module State During Boot-up

Table 38: Module State During Boot-up

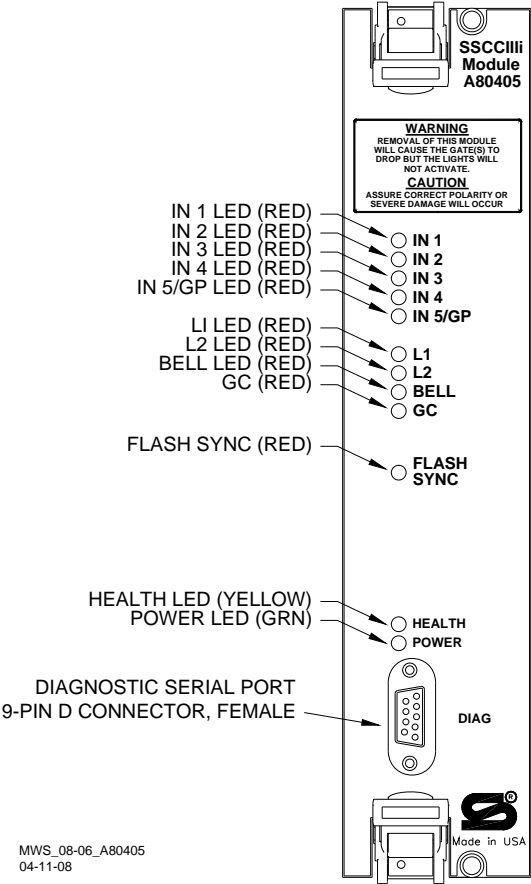
Indication	Module State
BOOT	Rebooting
INIT	Initializing
GHWR	Checking Hardware
UCFG	The module is unconfigured and awaiting its configuration from the CPU.
GSTB /ISTB	The GCP and Island are stabilizing
*GCP	Module is healthy

Table 39: Software Installation Messages

Table 39: Software Installation Messages

Indication	Mode	Meaning
BOOT	Steady	The setup program is loaded into the CP, the module is in setup mode, or the module is having a new MEF Downloaded

SOLID-STATE CROSSING CONTROLLER (SSCC3I) MODULE
USER INTERFACE (A80405)



**Figure 108: Solid State Crossing
Controller IIIi (SSCC3I) Module, A80405**

Table 40: SSCC3I LED Descriptions

Table 40: SSCC3I LED Descriptions

LED		Description
Name	Color	
IN 1	Red	On – input 1 energized Off – input 1 de-energized
IN 2	Red	On – input 2 energized Off – input 2 de-energized
IN 3	Red	On – input 3 energized Off – input 3 de-energized
IN 4	Red	On – input 4 energized Off – input 4 de-energized
IN 5/GP	Red	On – input 5 energized Off – input 5 de-energized
L1	Red	On – Lamp Output L1 is on Off – Lamp Output L1 is off
L2	Red	On – Lamp Output L2 is on Off – Lamp Output L2 is off

Table 40: SSCC3I LED Descriptions

LED		Description
Name	Color	
BELL	Red	On – bell output is on Off – bell output is off
GC	Red	On – gate control (GC) output is energized Off – gate control (GC) output is de-energized
FLASH SYNC	Red	Flashes when sync pulse is present at FLASH SYNC input/output
HEALTH	Yellow	Slow (1Hz) – module fully operational and communicating with CPU Fast (2Hz) – not communicating with CPU Very Fast (4Hz) – fault detected within the module
POWER	Green	On steadily when power is applied to the SSCC3I module

SSCC3I GENERAL INFORMATION

The A80405 Solid-State Crossing Controller IIIi (SSCC3I), Figure 108, is a plug-in module for the 4000 Grade Crossing Predictor (GCP). All multi-track 4000 GCP cases accommodate two A80405 modules. Each module provides:

- up to 20-amperes of lamp drive
- gate and bell control

A80405 module Interface is through GCP front-panel connectors.

- The A80405 module generally operates from a separate battery than the GCP portion of the system

The SSCCIIIi modules are integrated into the 4000 GCP system. Wiring between the GCP, the SSCC3I, and the SEAR2I is eliminated.

- not redundant

Unit Overview

The A80405 module is programmed, calibrated, and tested from the Display module of the 4000 GCP, is activated by internal logic from the 4000 GCP, monitors gate position inputs from the crossing gate mechanism, and provides activation for the bell, lamps, and gates of a crossing warning system

Module Function Control

The following A80405 module functions may be programmed:

- lamp flash rate
- gate control delay
- low battery threshold indication
- control maintenance call output
- test timer intervals
- crossing and lamp tests

- lamp flashing synchronization between the A80405 modules of multiple 4000 GCPs
- disabling of crossing bells while the gates are rising
- disabling of crossing bells while the gates are down
- requires gate down inputs to be energized

Crossing Controller Regulation for Lamp Voltage Outputs

- The circuits of the A80405 use pulse width modulation regulation
 - The pulsed output frequency is approximately 500 Hz.
 - The peak voltage of the pulse is approximately 1 volt below the battery input voltage.
 - Depending on the voltage in, the pulse width is automatically varied to give a regulated output.
 - The following examples assume the desired output is 10 volts:
 - Example 1: 16 volts in, the pulse is 15 volts and on 66% of the cycle.
 - Example 2: 13 volts in, the pulse is 12 volts and on 83% of the cycle.

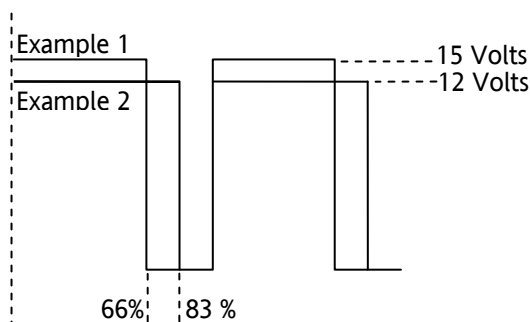


Figure 109: Pulse Width Modulation – Examples

NOTE

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

A conversion chart cross-referencing several conventional meters is in Using a Conventional Meter on Table 15.

Module Health

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

Yellow HEALTH LED reflects the health of the module:

- Flashes at 1 Hz rate when module fully operational.
- Flashes at 2 Hz rate when module not communicating with CPU module.

- Flashes at 8 Hz rate when fault is detected within the module.

Battery Surge Protection and Power Wiring

Battery surge protection for the SSCC is shown in Figure 110 below.

Primary surge protection for SSCC modules provided on SSCC battery (see inside dotted line)

Primary surge protection for I/O interconnect provided on lighting surge panels (see Page 140).

Provide power wiring to A80405 SSCC3I modules:

- via **B** and **N** contacts of the respective crossing controller connectors on 4000 GCP front panel.
- using poly-jacketed #10 AWG wire (recommended) for DC power and return between battery surge protection and the 4000 GCP crossing controller connectors.

Provide power wiring to the lighting surge panels:

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

0042006_1240
-20-06

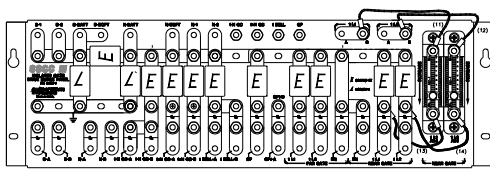
The A80405 modules use either of two SSCC III Lighting Surge Panel configurations to provide external I/O primary surge protection.

The Surge Panel configuration provides surge protection on all external I/O interconnects.

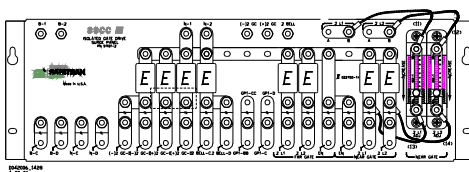
- arresters and equalizer for surge protection from transients on underground-cable battery voltage
- protection on all other I/O underground cable connections
- insulated links in the underground cable connections
- adjustable resistors in the **NEAR GATE** Lamp 1 (**1 L1**) and Lamp 2 (**1 L2**) circuits
- steering diodes for the Crossing Controller Gate Control output to provide isolation between the two crossing gate controls (see Figure 111)

NOTE

140



A: A91181-1



B: A91181-2

Figure 111: Isolated Return Lighting Surge Panels, A91181-1 & A91181-2

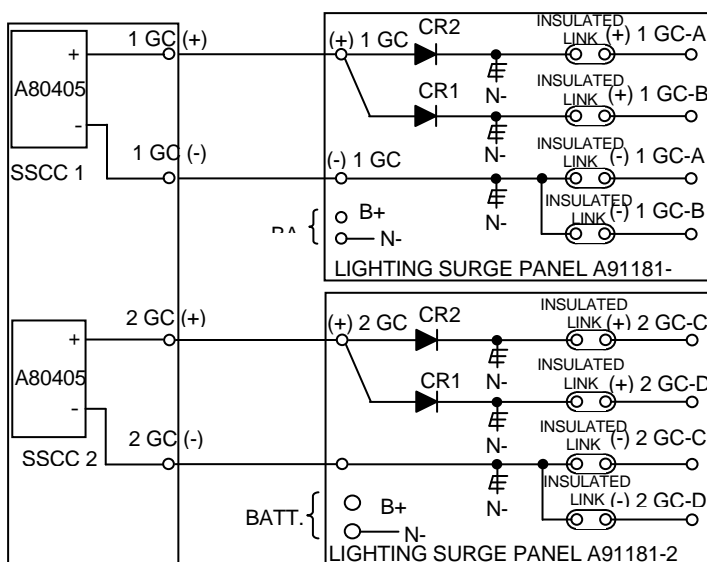


Figure 112: Typical Isolated Gate Control

SSCC3I OPERATION

The A80405 module provides drive for up to 20 amps of lamp current.

Failure Operation

The A80405 module continually performs self-diagnostic tests that result in complete on-line testing of module operation.

- If a critical failure is detected, the appropriate signal states are generated to immediately flash the crossing lamps and bring down the gates.

WARNING

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

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

VEHICULAR TRAFFIC, PEDESTRIANS AND EMPLOYEES.

Crossing Controller Module Installation

Two non-redundant A80405 Solid-State Crossing Controller IIIi (SSCC3I) modules can be installed in the 4000. Crossing Controller lamp and bell circuit wiring includes:

- Installation of wiring between the 4000 GCP Crossing Controller connectors and the SSCC III Lighting Surge Panels
- Installation of underground wiring between the SSCC III Lighting Surge Panels and the crossing Mast Junction Boxes
- Use of SSCC III Lighting Surge Panel(s)

Where one signal is controlled by each Controller Module, one surge panel (-1) may be used for both modules.

WARNING

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

WHEN TWO FLASHING LIGHT SIGNALS ARE CONTROLLED BY A SINGLE SSCC MODULE, A SINGLE SURGE PANEL MAY BE USED. JUMPER LINKS FROM A TO B MUST BE INSTALLED IN TWO PLACES.

Where two signals are controlled by a single Crossing Controller Module, one surge panel (-1) may be used. Where multiple signals are controlled by each Crossing Controller Module, an additional -2 surge panel is required and is wired and jumper links installed but connected to the second SSCC module connector.

Crossing Controller Connectors

The 4000 GCP Crossing Controller connectors accommodate all wiring between the A80405 module(s) and the 91181 SSCC3I Lighting Surge Panel(s).

Recommended crossing controller connector wire sizes are listed in Table 41.

- Use of stranded wire is recommended

Table 41: Minimum Recommended Crossing Controller Wire Sizes

Table 41: Minimum Recommended Crossing Controller Wire Sizes

External Wiring Connector	Pin	Connector Type	Wire Size
SSCC-1	1L1	6-pin screw terminal	10AWG
	1L2	6-pin screw terminal	10AWG
	B	6-pin screw terminal	10AWG
	N	6-pin screw terminal	10AWG
	1BELL	4-pin cage clamp	16AWG
	+1GC	4-pin cage clamp	16AWG
	-1GC	4-pin cage clamp	16AWG
	+1IN7.1	4-pin cage clamp	16AWG
	-1IN7.1	10-pin cage clamp	16AWG
	+IN7.2 (GD)	10-pin cage clamp	16AWG
	-IN7.2 (GD)	10-pin cage clamp	16AWG
	+IN7.3 (GP)	10-pin cage clamp	16AWG
	-IN7.3 (GP)	10-pin cage clamp	16AWG
	+IN7.4 (GD)	10-pin cage clamp	16AWG
	-IN7.4 (GD)	10-pin cage clamp	16AWG
	+IN7.5 (GP)	10-pin cage clamp	16AWG
	-IN7.5 (GP)	10-pin cage clamp	16AWG
SSCC-2	2L1	6-pin screw terminal	10AWG
	2L2	6-pin screw terminal	10AWG
	B	6-pin screw terminal	10AWG
	N	6-pin screw terminal	10AWG
	2BELL	4-pin cage clamp	16AWG
	+2GC	4-pin cage clamp	16AWG
	-2GC	4-pin cage clamp	16AWG
	+IN8.1	4-pin cage clamp	16AWG
	-IN8.1	10-pin cage clamp	16AWG
	+IN8.2 (GD)	10-pin cage clamp	16AWG
	-IN8.2 (GD)	10-pin cage clamp	16AWG
	+IN8.3 (GP)	10-pin cage clamp	16AWG
	-IN8.3 (GP)	10-pin cage clamp	16AWG
	+IN8.4 (GD)	10-pin cage clamp	16AWG
	-IN8.4 (GD)	10-pin cage clamp	16AWG
	+IN8.5 (GP)	10-pin cage clamp	16AWG
	-IN8.5 (GP)	10-pin cage clamp	16AWG

CAUTION

CROSSING WIRING MUST CONFORM TO APPROVED RAILROAD SCHEMATICS.

WHEN INSTALLING B AND N PIN WIRES, OBSERVE CORRECT POLARITY OR SEVERE DAMAGE TO THE A80405 MODULE WILL OCCUR. USE THE CORRECT SCREWDRIVER BLADE SIZE TO AVOID CONNECTOR DAMAGE. FOR WIRE PREPARATION AND INSERTION INSTRUCTIONS, REFER TO APPENDIX B.

Lamp and Bell Wiring to the Lighting Surge Panel

Recommended wire size for L1 and L2 between the Lighting Surge Panel and the 4000 SSCC power connector is number 10 AWG.

- Recommended wire size between the Lighting Surge Panel and the Mast Junction Box is number 6 AWG.
- The Lighting Surge Panel should be mounted as close as practical to the 4000 GCP.

WARNING

USE CAUTION WHEN SETTING BATTERY VOLTAGE, ESPECIALLY WHEN USING TEMPERATURE COMPENSATED BATTERY CHARGERS:

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

EXCEEDING 18 VDC WILL RESULT IN CONTROLLER DAMAGE.

OBSERVE CORRECT POLARITY WHEN CONNECTING BATTERY POWER TO THE B AND N CONTACTS ON THE CROSSING CONTROLLER CONNECTOR(S). INCORRECT POLARITY WILL RESULT IN SEVERE DAMAGE TO THE A80405 MODULE(S).

Crossing Controller DC Power Connections

The A80405 modules receive power via the Lighting Surge panel and the **CROSSING CONTROLLER** connectors as shown in Figure 110:

Surge panel provides primary battery surge protection.

- Secondary surge protection provided by each A80405 module

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

Poly-jacketed 10AWG wire is recommended for DC power and return between the lighting surge panel and the 4000 GCP.

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

Connecting Power at Initial Cutover or After Changes to Warning Device Wiring

Once the system has booted up, the SSCC3I module has internal short circuit protection for lamp, bell and gate control outputs. Therefore, at the initial cutover it is important to boot up the system prior to connecting external loads.

After external wiring is complete, the connectors must be applied as instructed in the following CAUTION before applying power to the 4000 GCP SSCC3I module(s).

WARNING

DURING THE SSCC3I BOOT-UP PROCESS AND AFTER ALL WIRING IS CONNECTED: THE CROSSING GATES WILL BE DOWN WITH CROSSING LAMPS FLASHING AND BELLS RINGING; A80405 MODULE(S) WILL NOT BE RESPONSIVE TO CROSSING CONTROL INPUT FROM THE 4000 GCP. TAKE ADEQUATE PRECAUTIONS TO WARN ANY PEDESTRIANS, PERSONNEL, TRAINS, AND VEHICLES IN THE AREA UNTIL PROPER SYSTEM OPERATION IS VERIFIED.

CAUTION

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

OPEN THE LAMP, GATE GC CONTROL, GP INPUTS, GD INPUTS AND BELL CIRCUITS AT THE SURGE PANEL(S).

VERIFY POLARITY ON POWER CONNECTOR(S).

CONNECT THE SCREW-LOCK POWER CONNECTOR FOR EACH SSCC3I MODULE AND LOCK BY TIGHTENING SCREWS.

WAIT APPROXIMATELY 40 SECONDS FOR SSCC3I MODULE(S) TO BOOT UP.

CONNECT THE GC/BELL AND GP/GD CAGE-CLAMP CONNECTORS FOR THE APPROPRIATE SSCC3I.

CLOSE THE LAMP, GATE CONTROL, GP/GD INPUTS AND BELL CIRCUITS ON THE SURGE PANEL(S).

RELAY INPUT OUTPUT (RIO) MODULE USER INTERFACE
(A80413)

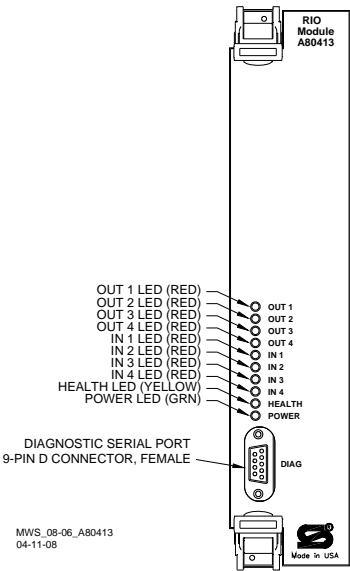


Figure 113: Relay Input Output Module (RIO), A80413

Table 42: RIO Module LED Descriptions

Table 42: RIO Module LED Descriptions

LED		Description
Name	Color	
OUT 1	Red	On – vital Output 1 energized Off – vital Output 1 de-energized
OUT 2	Red	On – vital Output 2 energized Off – Vital Output 2 de-energized
OUT 3	Red	On – vital Output 3 energized Off – vital Output 3 de-energized
OUT 4	Red	On – vital Output 4 energized Off – vital Output 4 de-energized
IN 1	Red	On – vital Input 1 energized Off – vital Input 1 de-energized
IN 2	Red	On – vital Input 2 energized Off – vital Input 2 de-energized
IN 3	Red	On – vital Input 3 energized Off – vital Input 3 de-energized
IN 4	Red	On – vital Input 4 energized Off – vital Input 4 de-energized
HEALTH	Yellow	Slow (1Hz) – module fully operational communicating with CPU Fast (2Hz) – module is not communicating with CPU Very Fast (4Hz) – fault detected within the module
POWER	Green	On steadily when power is applied to the RIO module

TRANSFER MODULES (A80406, A80468)

Two transfer modules are available depending on the 4000 GCP system chassis installed:

- A80406 Transfer Module - used in the Dual Four Track Chassis, A80400, and Dual Six Track Chassis, A80460.
- A80468 Transfer Module - used on the Dual Two Track Chassis, A80465.

The Timer Controls, LEDs, and Timer Display on each module function the same. Refer to Figure 114 and Figure 115 for control, LED and display locations.

WARNING

AT CROSSINGS USING MEFS XNG02_00.MEF AND EARLIER, GATES WILL BEGIN TO LOWER IMMEDIATELY (WITHOUT GATE DELAY TIME) WHEN THE TRANSFER SWITCH IS USED TO SWAP BETWEEN HEALTHY UNITS. USE CAUTION WHEN TRANSFERRING CONTROL TO AVOID GATES HITTING VEHICLES OR PEDESTRIANS.

NOTE

Under normal conditions in the AUTO Transfer mode, gate delay time will run when the gates initially operate. If the trouble continues, the gates will already be lowered when the Transfer Module later swaps units.

Transfer Module User Interfaces

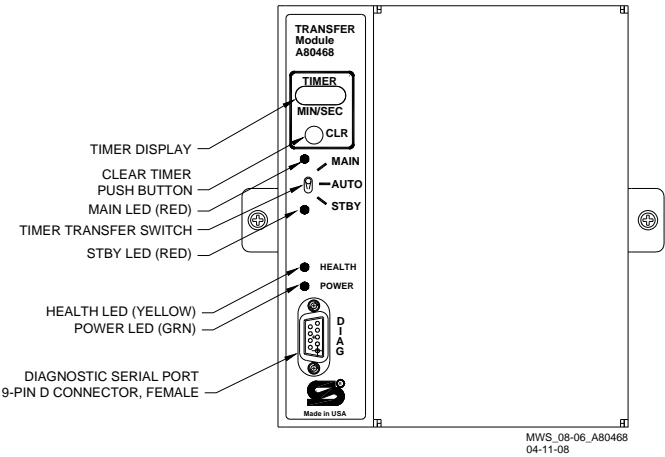


Figure 114: Transfer Module A80468, Front Panel

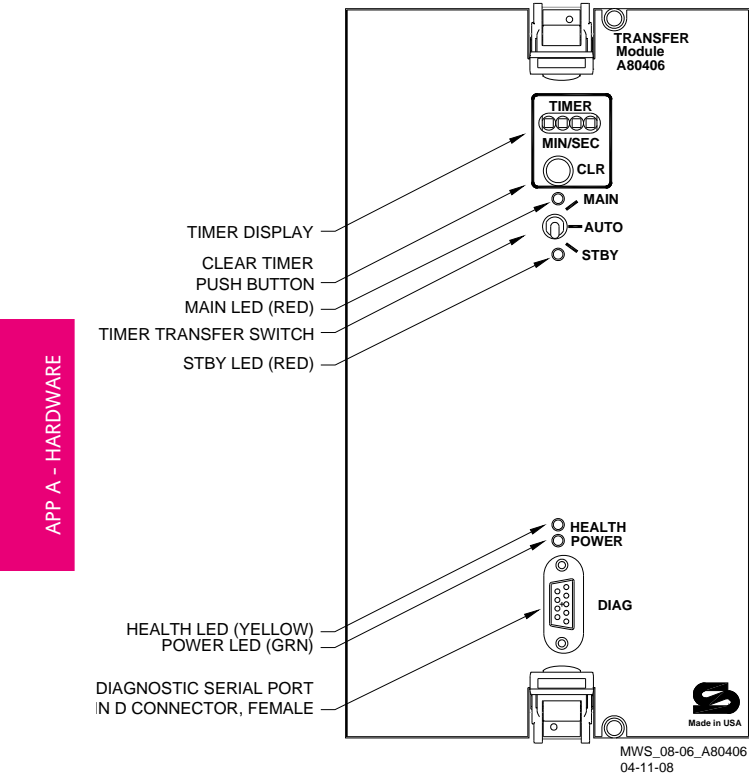


Figure 115: Transfer Module, A80406, Front Panel

Table 43: Transfer Module LED Descriptions

Table 43: Transfer Module LED Descriptions

LED		Description
Name	Color	
MAIN	Red	On – Main modules enabled while Transfer Timer Switch is set to AUTO or Transfer Timer Switch is set to MAIN Off – Main side is currently not powered

Table 43: Transfer Module LED Descriptions

LED		Description
Name	Color	
STBY	Red	On – Standby modules enabled while Transfer Timer Switch is set to AUTO or Transfer Timer Switch is set to STBY Off – Standby side is currently not powered
HEALTH	Yellow	Slow (1Hz) – Module is functioning normally
POWER	Green	On steadily when power is applied to the Transfer module

When transfer delay is set using DIP switch S3, the Transfer Module 4-character display shows the:

- set transfer delay time in minutes and seconds
- transfer timer delay count down in 1 sec. increments
- selected module set (MAIN or STBY)

Table 44: Transfer Module Timer Display Indications

Table 44: Transfer Module Timer Display Indications

Indication	Mode	Meaning	Module State
MAIN	Steady	Timer Transfer switch is set to Main	Main side is powered
STBY	Steady	Timer Transfer switch is set to Standby	Standby side is powered
MMSS e.g. 0240 (2 mins 40 secs)	Steady	If the number is not changing, the module is set to AUTO. This represents the programmed transfer time.	Main or Standby side is powered
MMSS e.g. 0200 (2 mins 00 secs)	Decreasing	If the number is decreasing, the module is set to AUTO. The currently selected side is unhealthy and this number represents the time taken until a transfer occurs.	Main or Standby side is powered
MMSS alternating with SWCH	Steady	SWCH shows the module has transferred since the CLR button was pressed	Main or Standby side is powered

Table 45: Transfer Module Timer Controls

Table 45: Transfer Module Timer Controls

Item	Function
CLR (Clear Timer) push button	Clears transfer delay time from counter. When pressed during timer countdown: Sets the timer to the selected Transfer Delay Interval, and Initiates immediate transfer of GCP operation to opposite modules. Switches MAIN to STANDBY or Switches STANDBY to MAIN
Timer Transfer Switch	Three-position toggle switch: MAIN position enables only main module operation and will not automatically transfer. AUTO position enables automatic switch over to opposite set of modules: 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 turn switch to AUTO .

Transfer Delay Interval Selection

The transfer delay interval for the transfer modules is set by the positions of the switch segments on switch assembly 3, (S3). The switch positions required to set the desired number of minutes are shown in Table 46; a similar table is located on each module. The delay range is 0 to 31 minutes, in 1 minute increments. The factory setting is 3 minutes.

NOTE

When viewing switch S3 with the transfer module in the normal operating position, the orientation of S3 on the A80468 module is inverted compared to the orientation of S3 on the A80406 module. This changes the location of switch position S3-0. Refer to Figure 116 and Figure 117 for switch position locations.

NOTE

After changing switches on S3, verify timer setting by switching the timer transfer switch to AUTO. The transfer time (MM:SS) will be displayed in minutes and seconds on the 4-character display.

Table 46: Transfer Delay Interval Settings

Table 46: Transfer Delay Interval Switch Settings

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

0 is OPEN (UP, away from board).

1 is CLOSED (DOWN, towards board)

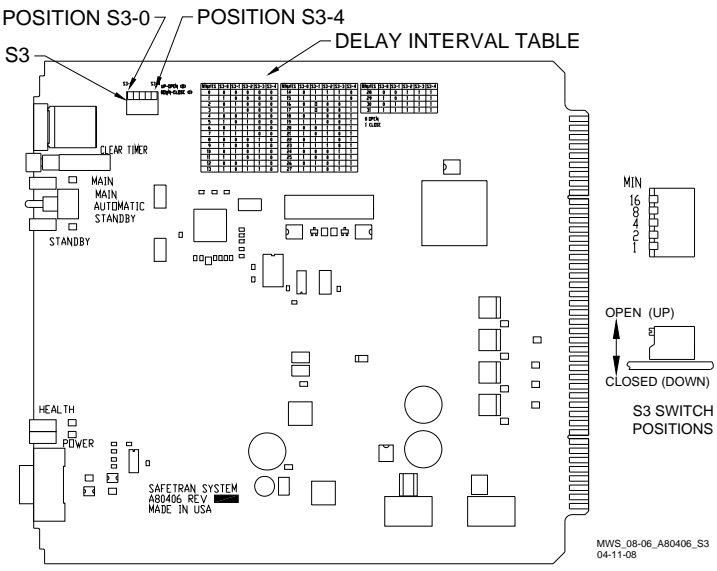


Figure 116: Transfer Module, A80406, S3 Switch Positions

APP A - HARDWARE

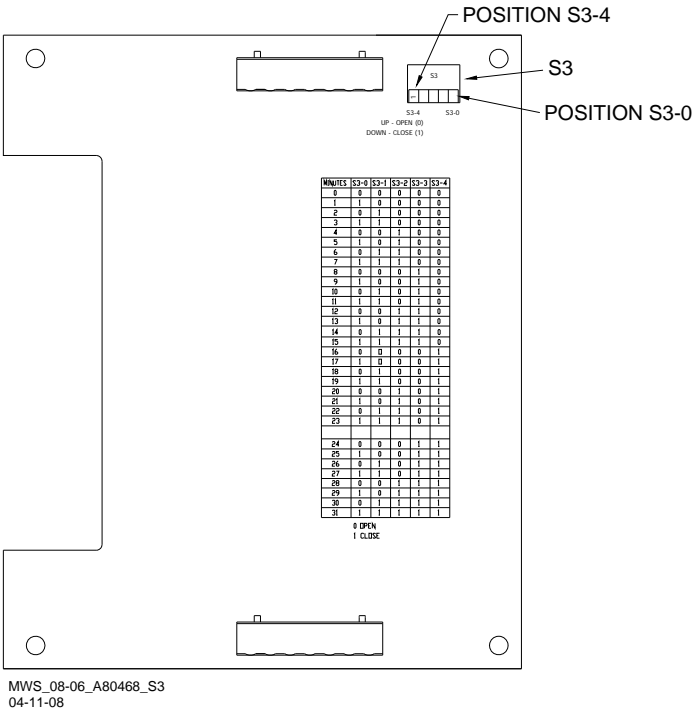


Figure 117: Transfer Module, A80468, S3 Switch Positions

Operation Without Transfer Module A80406

To disable the A80406 Transfer Module, remove the module from the chassis and move the jumper from the storage position, STG, to the MAIN or standby (STBY) position (see Figure 118).

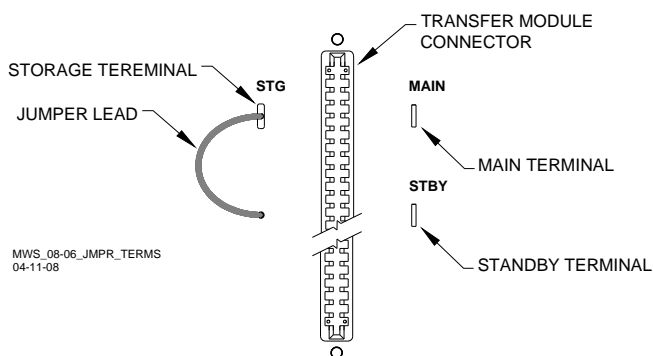


Figure 118: Transfer Module (A80406) Jumper Positions

Operation Without Transfer Module A80468

To disable the A80468 Transfer Module, remove the module from the chassis and move the jumper from the storage position, STG, to the MAIN or standby (STBY) position (see Figure 119).

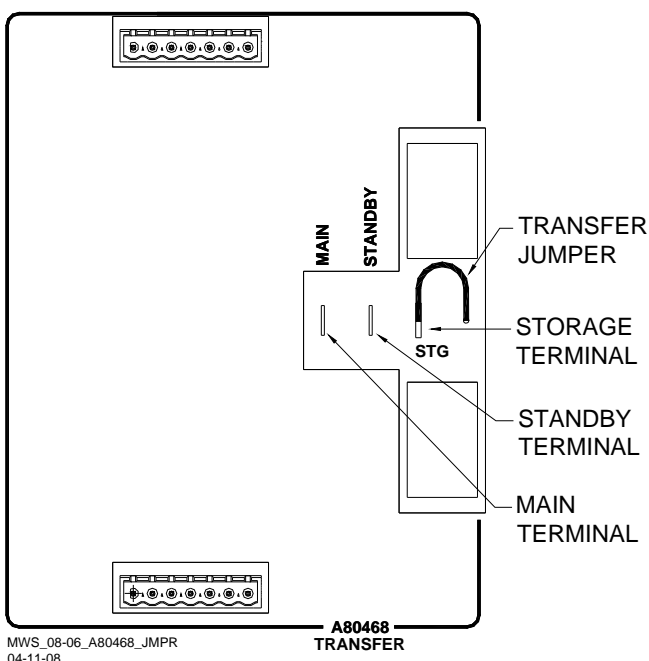


Figure 119: Transfer Module (A80468) Jumper Positions

APPENDIX B – OPTIONAL REMOTE CALIBRATION AND REMOTE CROSSING LAMP VOLTAGE ADJUSTMENT PROCEDURES

Optional remote GCP calibration and Crossing lamp voltage adjustment may be used as needed. The remote calibration and adjustment procedures are the same as the other procedures, except that the person doing the adjustment or calibration communicates directly with the GCP via VHF radio. The GCP sends voice options and the person performing the operation replies via a DTMF keypad on a VHF radio.

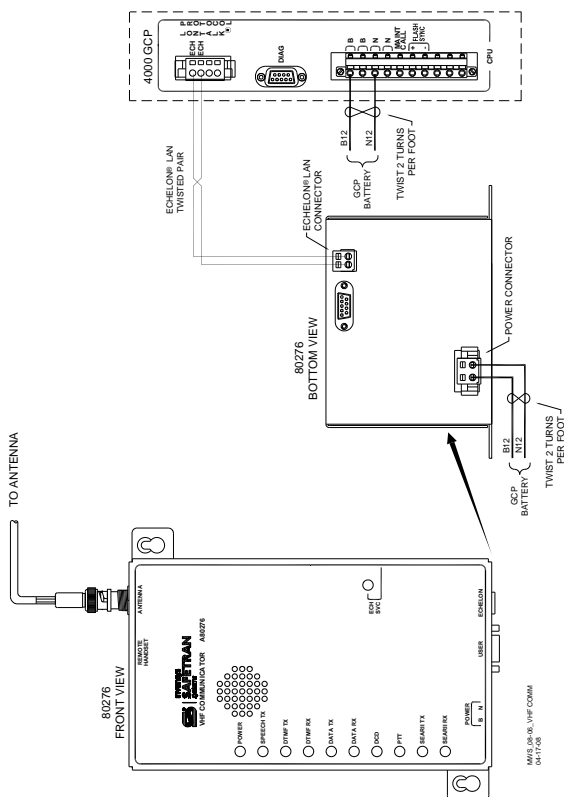


Figure 120: Connecting the VHF Communicator, A80276

To perform remote calibration and/or lamp adjustment the following are required:

1. Safetran VHF Communicator (A80276) programmed and connected to the GCP Echelon LAN.
 - VHF Communicator is a VHF Radio interface to the 4000 GCP that sends setup and calibration options to remote radio.
 - VHF Communicator set to a railroad VHF frequency.
2. Hand-held VHF radio with DTMF keypad.
 - Person doing remote calibration responds to options and sends commands to GCP.
 - Set to same frequency as VHF communicator.

Hardwire test shunt for calibration and appropriate voltmeter for lamp adjustments.

Obtain a one-time password from the GCP for remote operation.

Password expires in 60 minutes unless another setting is selected by user.

Previously during the programming stage, the DOT Crossing Number must be entered in the Location Information on the SITE INFO screen. During remote calibration, the DOT number is used to identify that the proper location is being calibrated.

This section includes flow charts for the commands and choices used in setup and calibration:

- Remote calibration setup
- Remote GCP and approach calibration
- Remote linearization calibration
- Remote crossing lamp voltage adjustment
- Remote calibration termination

NOTE

The GCP sends and receives commands via the VHF Communicator which includes a half-duplex radio. The radio can not receive a reply until it is finished transmitting. DO NOT send back responses until the message is completed.

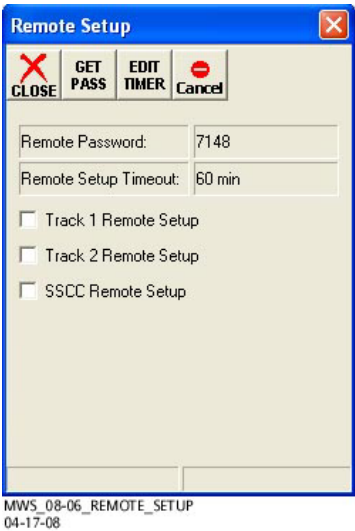


Figure 121: Remote Setup Window

Table 47: Remote Calibration Setup

Table 47: Remote Calibration Setup

Step 1	Select the Setup button from the DT Buttons at the top of the status Screen.
Step 2	From the menu that appears, select REMOTE SETUP . The Remote Setup dialog box displays.
Step 3	Select the GET PASS button. A Push button message appears in the message box at the bottom of the window.

Table 47: Remote Calibration Setup

Step 4	<p>Press the SEL pushbutton on the front panel of the CPU module.</p> <p>The Remote Setup dialog box changes.</p> <p>A four-digit password appears in the Remote Password value field (see Figure XXXX).</p> <p>Check boxes for each used track module and the SSCC appear below the Remote Password value field.</p>
Step 5	Record the four-digit password.
Step 6	<p>If the default 60-minute timeout is not long enough, select the EDIT TIMER button.</p> <ul style="list-style-type: none"> • The Set Timer dialog box displays.
Step 7	Using the keypad numbers, enter the required Setup Timeout value (range 1 – 120 minutes) into the New Value field.
Step 8	<p>Select the Update button.</p> <p>The dialog box closes and the Remote Setup dialog box appears.</p> <ul style="list-style-type: none"> • The new Remote Setup Timeout value displays.
Step 9	<p>Individually select each field of the Track and SSCC to be calibrated.</p> <ul style="list-style-type: none"> • A check appears in the check box of each selected field.
Step 10	<p>Select the CLOSE button.</p> <p>The Status Screen displays.</p>
Step 11	To perform an Island Calibration, go to the Island Calibration screen and record the shunt placement distance for shunting sensitivity.

WARNING

AFTER PERFORMING REMOTE GCP CALIBRATION USING THE VHF COMMUNICATOR, RETURN TO THE 4000 GCP AND VERIFY THAT EACH CALIBRATION IS PROPERLY IMPLEMENTED. REVIEW THE MAINTENANCE LOG OR THE CPU STATUS LOG AS PART OF THE VERIFICATION PROCESS.

Table 48: Remote Calibration

Table 48: Remote Calibration

Step 1	Press and Hold the Transmit button of the hand-held VHF radio.
Step 2	Enter *# followed by the password recorded in step 5 of Table 47.

Table 48: Remote Calibration

Step 3	Release the Transmit button of the hand-held VHF radio. An assigned Department Of Transportation (DOT) number (XXX) is verbally announced. The Root menu options are announced: “For location press 1” “For GCP press 2” “For SSCC press 3” “For Help press 4”
Step 4	Press and Hold the Transmit button then Press 2 . • GCP is selected.
Step 5	Release the Transmit button. • An “Enter track number” message is announced
Step 6	Press and Hold the Transmit button. • Enter the track number (N) to be calibrated (N = 1 to 6).
Step 7	Release the Transmit button. The Track Menu options are announced: “For GCP calibration press 1” “For approach calibration press 2” “For linearization press 3” “For island calibration press 4” “To monitor EZ EX press 5” • “To monitor island press 6”

NOTE

Figure 122 through Figure 126 provide a detailed flow chart of the “Remote User Interface Menu”.

Table 49: Remote GCP Calibration

Table 49: Remote GCP Calibration

Step 1	To perform the GCP Calibration: Press and Hold the Transmit button then press 3 . • GCP calibration is selected.
Step 2	Release the Transmit button. The Calibration Menu options are announced: “To start track N GCP calibration press 1” • “To monitor EZ EX press 2”
Step 3	Press and Hold the Transmit button then Press 1 .
Step 4	Release the Transmit button. • “Enter password for DOT XXX” is announced.
Step 5	Press and Hold the Transmit button then enter the password recorded in step 5 of Table 47.

Table 49: Remote GCP Calibration

Step 6	<p>Release the Transmit button.</p> <p>The following information messages are sequentially announced:</p> <p>“Initiating track N GCP calibration”</p> <p>“Track N GCP calibration in progress”</p> <p>If GCP calibration passes:</p> <p>The information messages are concluded with:</p> <p>“Track N GCP calibration passed”</p> <p>“EZ is ____”</p> <p>“EX is ____”</p> <p>The Track Menu options in step 7 of Table 48 are repeated.</p> <p>If GCP calibration fails:</p> <p>The information messages conclude with:</p> <p>“Track N GCP calibration failed”</p> <p>The calibration menu of step 2 is repeated.</p> <p>Refer to Section 7 for troubleshooting procedures.</p> <p>When the cause of the failure is corrected, repeat this procedure starting at step 3.</p> <ul style="list-style-type: none"> • If the Remote Setup Timeout selected in Table 47 step 6 expires, start again from Table 47
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Table 50: Remote Approach and Linearization Calibration

Table 50: Remote Approach and Linearization Calibration

APP B – REMOTE CALIBRATION	Step 1	<p>Temporarily place a hardwire shunt across the termination shunt.</p> <ul style="list-style-type: none"> • For bidirectional installations, use the termination shunt farthest from the crossing
	Step 2	<p>Press and Hold the Transmit button then Press 2.</p> <ul style="list-style-type: none"> • Approach calibration is selected.
	Step 3	<p>Release the Transmit button.</p> <ul style="list-style-type: none"> • The Calibration Menu options are announced: <p>“To start track N approach calibration press 1”</p> <ul style="list-style-type: none"> • “To monitor EZ EX press 2”
	Step 4	<p>Press and Hold the Transmit button. Then Press 1.</p>
	Step 5	<p>Release the Transmit button.</p> <ul style="list-style-type: none"> • “Enter password for DOT ____” is announced.
	Step 6	<p>Press and Hold the Transmit button then enter the password recorded in step 5 of Table 47.</p>

Table 50: Remote Approach and Linearization Calibration

Step 7	<p>Release the Transmit button.</p> <p>The following information messages are sequentially announced:</p> <p>“Initiating track N approach calibration”</p> <p>“Track N approach calibration in progress”</p> <p>If approach calibration passes:</p> <p>The information messages conclude with:</p> <p>“Track N approach calibration passed”</p> <p>“Computed approach distance ____ feet”</p> <ul style="list-style-type: none"> Record this distance as the first approach distance. <p>The Track Menu options in step 7 Table 48, are repeated.</p> <p>If approach calibration fails:</p> <p>The information messages conclude with:</p> <p>“Track N approach calibration failed”</p> <p>The calibration menu in step 3 is repeated.</p> <p>Refer to Section 7 for troubleshooting procedures.</p> <p>When the failure is corrected, repeat the procedure starting at step 3.</p> <ul style="list-style-type: none"> If the Remote Setup Timeout selected in Table 47 step 6 expires, start again from Table 47.
Step 8	<p>Accurately (within 1%) locate the midpoint of the longest approach and move the hardwire shunt to that point on the rails.</p>
Step 9	<p>Press and Hold the Transmit button and then Press 4.</p> <ul style="list-style-type: none"> Linearization is selected.
Step 10	<p>Release the Transmit button.</p> <p>The Calibration Menu options are announced:</p> <p>“To start track N linearization press 1”</p> <ul style="list-style-type: none"> “To monitor EZ EX press 2”
Step 11	<p>Press and hold the Transmit button then Press 1.</p>
Step 12	<p>Release the Transmit button.</p> <p>An “Enter password for DOT ____” directive is announced</p>
Step 13	<p>Press and hold the Transmit button and then enter the password recorded in step 5 of Table 47.</p>

Table 50: Remote Approach and Linearization Calibration

APP B – REMOTE CALIBRATION	Step 14	<p>Release the Transmit button.</p> <p>The following information messages are sequentially announced:</p> <p>“Initiating track N linearization”</p> <p>“Track N linearization in progress”</p> <ul style="list-style-type: none"> If linearization passes: <ul style="list-style-type: none"> the information messages conclude with: <p>“Track N linearization passed”</p> <p>“Linearization number _____”</p> <ul style="list-style-type: none"> Record this number as the first approach value. <p>The Track Menu options, step 7, Table 48, are repeated.</p> <p>If approach linearization fails:</p> <p>The information messages are concluded with:</p> <p>“Track N linearization failed”</p> <p>Release the Transmit button.</p> <ul style="list-style-type: none"> The calibration menu from step 10 is repeated. <p>Refer to Section 7 for troubleshooting procedures.</p> <ul style="list-style-type: none"> When the failure is corrected, repeat the procedure from step 10.
	Step 15	Remove the hardwire shunt from the track.
	Step 16	<p>If the approach is unidirectional or simulated bidirectional, go to step 38.</p> <p>If the track is bidirectional and the measured distance to the other termination shunt is within 10 % of the first approach go to step 17.</p> <p>Otherwise, if distance is clearly shorter, go to step 38.</p>
	Step 17	Temporarily place a hardwire shunt across the termination shunt of the other approach.
	Step 18	<p>Press and Hold the Transmit button then Press 2.</p> <ul style="list-style-type: none"> Approach calibration is selected.
	Step 19	<p>Release the Transmit button.</p> <ul style="list-style-type: none"> The Calibration Menu options are announced: <p>“To start track N approach calibration press 1”</p> <ul style="list-style-type: none"> “To monitor EZ EX press 2”
	Step 20	Press and Hold the Transmit button. Then Press 1 .
	Step 21	<p>Release the Transmit button.</p> <ul style="list-style-type: none"> “Enter password for DOT _____” is announced
	Step 22	Press and Hold the Transmit button then enter the password recorded in step 5 of Table 47.

Table 50: Remote Approach and Linearization Calibration

Step 23	<p>Release the Transmit button.</p> <p>The following information messages are sequentially announced:</p> <p>“Initiating track N approach calibration”</p> <p>“Track N approach calibration in progress”</p> <p>If approach calibration passes:</p> <p>The information messages conclude with:</p> <p>“Track N approach calibration passed”</p> <p>“Computed approach distance ____ feet”</p> <ul style="list-style-type: none"> Record this distance as the second approach distance value. <p>The Track Menu options in step 7 of Table 48, are repeated.</p> <p>If approach calibration fails:</p> <p>The information messages conclude with:</p> <p>“Track N approach calibration failed”</p> <p>The calibration menu in step 3 is repeated.</p> <p>Refer to Section 7 for troubleshooting procedures.</p> <p>When the failure is corrected, repeat the procedure starting at step 3.</p> <ul style="list-style-type: none"> If the Remote Setup Timeout selected in Table 47 step 6 expires, start again from Table 47.
Step 24	<p>Accurately (within 1%) locate the midpoint of this approach and move the hardwire shunt to that point on the rails.</p>
Step 25	<p>Press and Hold the Transmit button and then Press 4.</p> <ul style="list-style-type: none"> Linearization is selected.
Step 26	<p>Release the Transmit button.</p> <p>The Calibration Menu options are announced:</p> <p>“To start track N linearization press 1”</p> <ul style="list-style-type: none"> “To monitor EZ EX press 2”
Step 27	<p>Press and hold the Transmit button then Press 1.</p>
Step 28	<p>Release the Transmit button.</p> <p>An “Enter password for DOT ____” directive is announced</p>
Step 29	<p>Press and hold the Transmit button and then enter the password recorded in step 5 of Table 47.</p>

Table 50: Remote Approach and Linearization Calibration

Step 30	<p>Release the Transmit button.</p> <p>The following information messages are sequentially announced:</p> <p>“Initiating track N linearization”</p> <p>“Track N linearization in progress”</p> <ul style="list-style-type: none"> • If linearization passes: <ul style="list-style-type: none"> • the information messages conclude with: “Track N linearization passed” <p>“Linearization number _____”</p> <ul style="list-style-type: none"> • Record this number as the second approach linearity value. <p>The Track Menu options, step 7, Table 48, are repeated.</p> <p>If approach linearization fails:</p> <p>The information messages are concluded with: “Track N linearization failed”</p> <p>Release the Transmit button.</p> <ul style="list-style-type: none"> • The calibration menu from step 10 is repeated. <p>Refer to Section 7 for troubleshooting procedures.</p> <ul style="list-style-type: none"> • When the failure is corrected, repeat the procedure from step 10.
Step 31	Remove the hardwire shunt from the track.
Step 32	<p>If the Lin Steps value for the second approach is greater than or the same as the value recorded for the first approach in step 14, record the Lin Steps value.</p> <p>Go to step 38.</p> <p>If the Lin Steps value for the second approach is less than the value recorded in step 14, return to the bungalow and select the EDIT button of the track Linearization calibration menu.</p> <ul style="list-style-type: none"> • The Linearization Steps dialog box displays.
Step 33	Enter the Lin Steps value recorded for the first approach in step 14 into the New Value field using the keypad numbers and select UPDATE .
Step 34	<p>Select the GCP APP button.</p> <ul style="list-style-type: none"> • The GCP Approach Window appears.
Step 35	<p>Select the EDIT button.</p> <ul style="list-style-type: none"> • The Computed Approach Distance dialog box appears.
Step 36	<p>Enter the computed approach distance (Comp Dist) value recorded for the first approach in step 5 into the New Value field using the keypad numbers and select UPDATE.</p> <ul style="list-style-type: none"> • The Calibration Select Window appears.

Table 50: Remote Approach and Linearization Calibration

Step 37	Verify that the computed approach distance (Comp Dist) and the linearization steps (Lin Steps) values recorded for the first approach in steps 14 and 30 are the same as those displayed on the Calibration Select window
Step 38	Enter the distance and linearity values recorded for the first and second (if applicable) approach(es) on the CALIBRATION VALUES history on page 21 of the Application History card.
Step 39	<p>This completes Approach and Linearization calibration.</p> <p>To record the reason for the Calibration and store it in the Maintenance log, select the ADD LOG ENTRY button.</p> <ul style="list-style-type: none"> Type any notes about the calibration and select OK to save the entry.

Table 51: Remote Island Calibration

Table 51: Remote Island Calibration

Step 1	<p>Temporarily install a hardwire shunt beyond the island receiver rail connections.</p> <ul style="list-style-type: none"> Place the shunt at the distance recorded in Table 47, step 12.
Step 2	<p>Press and Hold the Transmit button then press 6.</p> <ul style="list-style-type: none"> Island calibration is selected.
Step 3	<p>Release the Transmit button.</p> <p>The Calibration Menu options are announced:</p> <p>“To start track N island calibration press 1”</p> <ul style="list-style-type: none"> “To monitor island signal level press 2”
Step 4	Press and Hold the Transmit button then press 1 .
Step 5	<p>Release the Transmit button.</p> <ul style="list-style-type: none"> An “Enter password for DOT ____” message is announced
Step 6	Press and Hold the Transmit button and enter the password recorded in step 5 of Table 47.

Table 51: Remote Island Calibration

Step 7	<p>Release the Transmit button.</p> <p>The following information messages are sequentially announced:</p> <p>“Initiating track N island calibration”</p> <p>“Track N island calibration in progress”</p> <p>If island calibration passes:</p> <p>The information messages conclude with:</p> <p>“Track N island calibration passed”</p> <p>“Island signal level n” (where n is around 100).</p> <p>The Track Menu options in step 7 Table 48 are repeated.</p> <p>If island calibration fails:</p> <p>The information messages conclude with:</p> <p>“Track N island calibration failed”</p> <p>Release the Transmit button.</p> <p>The calibration menu from step 3 is repeated.</p> <p>Refer to the Maintenance and Troubleshooting section for troubleshooting procedures.</p> <p>When the failure is corrected, repeat the procedure starting at step 2.</p>
Step 8	Remove the hardwire shunt.

NOTE

Before performing the remote lamp voltage adjustment procedure, the crossing controllers must be inactive; i.e. gates up, lamps off, and bell off. If a train approaches during lamp adjustment, the crossing controllers will activate and the lamps will flash.

Table 52: Remote Lamp Voltage Adjustments

Table 52: Remote Lamp Voltage Adjustment

Step 1	<p>Press and Hold the Transmit button. Then Press 3.</p> <ul style="list-style-type: none"> The remote SSCC menu is selected.
Step 2	<p>Release the Transmit button.</p> <ul style="list-style-type: none"> The SSCC Menu options are announced: <p>“SSCC 1 press 1”</p> <p>“SSCC 2 press 2”</p> <p>“Crossing press 3”</p>
Step 3	<p>Press and Hold the Transmit button. Then Press 1.</p> <ul style="list-style-type: none"> The SSCC Lamp 1 Menu is selected.
Step 4	<p>Release the Transmit button.</p> <ul style="list-style-type: none"> The SSCC 1 Lamp Menu options are announced: <p>“Lamp 1 press 1”</p> <p>“Lamp 2 press 2”</p> <p>“Lamp 1 voltage press 3”</p> <p>“Lamp 2 voltage press 4”</p>

Table 52: Remote Lamp Voltage Adjustment

Step 5	Press and Hold the Transmit button. Then Press 3 .
Step 6	Release the Transmit button. “SSCC 1 lamp 1 voltage ____ volts” is announced
Step 7	Press and Hold the Transmit button. Then Press * . • The SSCC 1 Lamp 1 Voltage Menu is selected.
Step 8	Release the Transmit button. • “SSCC 1 Lamp 1 Voltage” is announced, followed by: “up 1 volt press 1” “up one-half volt press 2” “up one-tenth volt press 3” “down 1 volt press 4” “down one-half volt press 5” “down one-tenth volt press 6” • SSCC 1 lamp 1 output is on and steady.
Step 9	Press and Hold the Transmit button. Then Press the number required to appropriately increment the voltage level at lamp 1.
Step 10	Release the Transmit button. “SSCC 1 lamp 1 voltage ____ volts” is announced.
Step 11	Repeat step 9 and 10 until the specified voltage reading is obtained at lamp 1. • Measure the voltage at lamp 1 using the correct meter (see Section 8).
Step 12	Press and Hold the Transmit button. Then Press * . • The SSCC 1 Lamp Menu is selected.
Step 13	Release the Transmit button. • The new lamp 1 voltage value is saved. The lamp 1 output is turned off. • The SSCC 1 Lamp Menu options are announced: “Lamp 1 press 1” “Lamp 2 press 2” “Lamp 1 voltage press 3” “Lamp 2 voltage press 4”
Step 14	Press and Hold the Transmit button. Then Press 4 .
Step 15	Release the Transmit button. “SSCC 1 lamp 2 voltage ____ volts” is announced
Step 16	Press and Hold the Transmit button. Then Press * . • The SSCC 1 Lamp 2 Voltage Menu is selected.

Table 52: Remote Lamp Voltage Adjustment

Step 17	<p>Release the Transmit button.</p> <ul style="list-style-type: none"> • “SSCC 1 Lamp 2 Voltage” is announced, followed by: “up 1 volt press 1” “up one-half volt press 2” “up one-tenth volt press 3” “down 1 volt press 4” “down one-half volt press 5” “down one-tenth volt press 6” • SSCC 1 lamp 2 output is on and steady.
Step 18	<p>Press and Hold the Transmit button. Then Press the number required to appropriately increment the voltage level at lamp 2.</p>
Step 19	<p>Release the Transmit button.</p> <ul style="list-style-type: none"> • “SSCC 1 lamp 2 voltage ____ volts” is announced.
Step 20	<p>Repeat steps 18 and 19 until the specified voltage reading is obtained at lamp 2.</p> <ul style="list-style-type: none"> • Measure the voltage at lamp 2 using the correct meter (see Section 8).
Step 21	<p>Press and Hold the Transmit button. Then Press *.</p> <ul style="list-style-type: none"> • The SSCC 1 Lamp Menu is selected.
Step 22	<p>Release the Transmit button.</p> <ul style="list-style-type: none"> • The new voltage value is saved. The lamp 1 output is turned off. • The SSCC 1 Lamp Menu options are announced: “Lamp 1 press 1” “Lamp 2 press 2” “Lamp 1 voltage press 3” • “Lamp 2 voltage press 4”
Step 23	<p>Press and Hold the Transmit button. Then Press *.</p> <ul style="list-style-type: none"> • The SSCC Menu is selected.
Step 24	<p>Release the Transmit button.</p> <ul style="list-style-type: none"> • The SSCC Menu options are announced: “SSCC 1 press 1” “SSCC 2 press 2” “Crossing press 3”
Step 25	<p>Press and Hold the Transmit button. Then Press 2.</p>
Step 26	<p>Release the Transmit button.</p> <ul style="list-style-type: none"> • The SSCC 2 Lamp Menu options are announced: “Lamp 1 press 1” “Lamp 2 press 2” “Lamp 1 voltage press 3” “Lamp 2 voltage press 4”

Table 52: Remote Lamp Voltage Adjustment

Step 27	Repeat steps 5 through 20 for SSCC 2.
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Table 53: Completing Remote Calibration

Table 53: Completing Remote Calibration

Step 1	Repeat all remote procedures for each track module selected in the Remote Calibration steps.
Step 2	To terminate the remote session: <ul style="list-style-type: none">• Press and Hold the Transmit button then press *##.
Step 3	Release the Transmit button. The remote setup is finished
Step 4	Return to the bungalow and check the Status log to ensure that the tracks were correctly calibrated. To access the Status Log, press the History Button on the display, then select Status Log.

REMOTE USER INTERFACE MENU

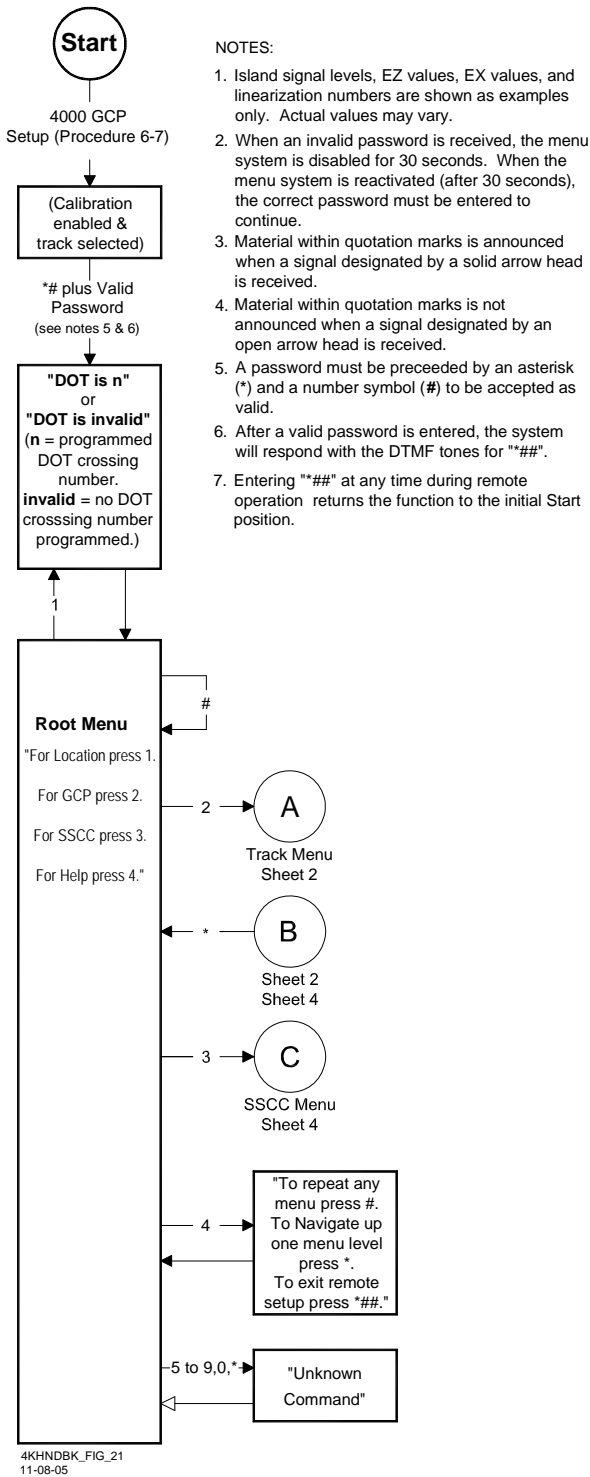


Figure 122: Remote User Interface Menu, Sheet 1

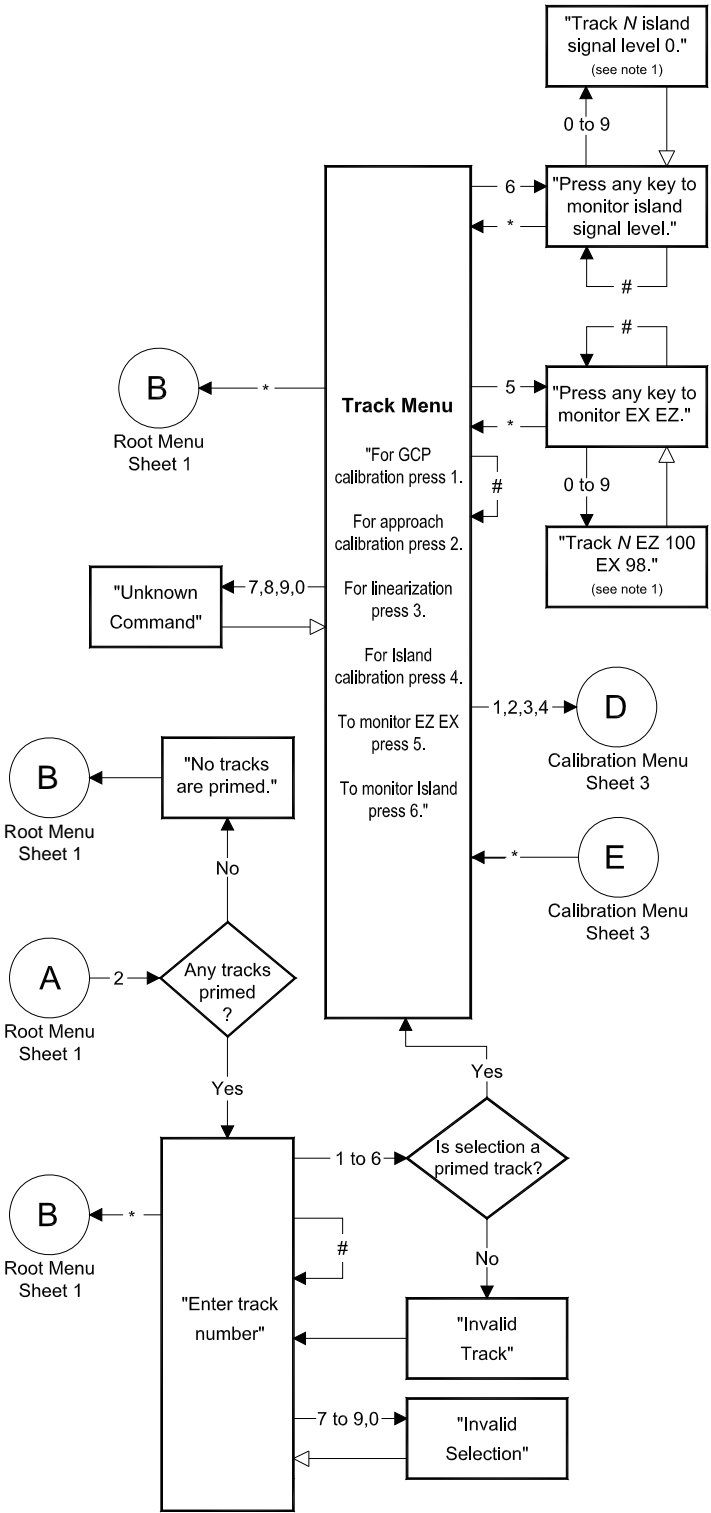


Figure 123: Remote User Interface Menu, Sheet 2

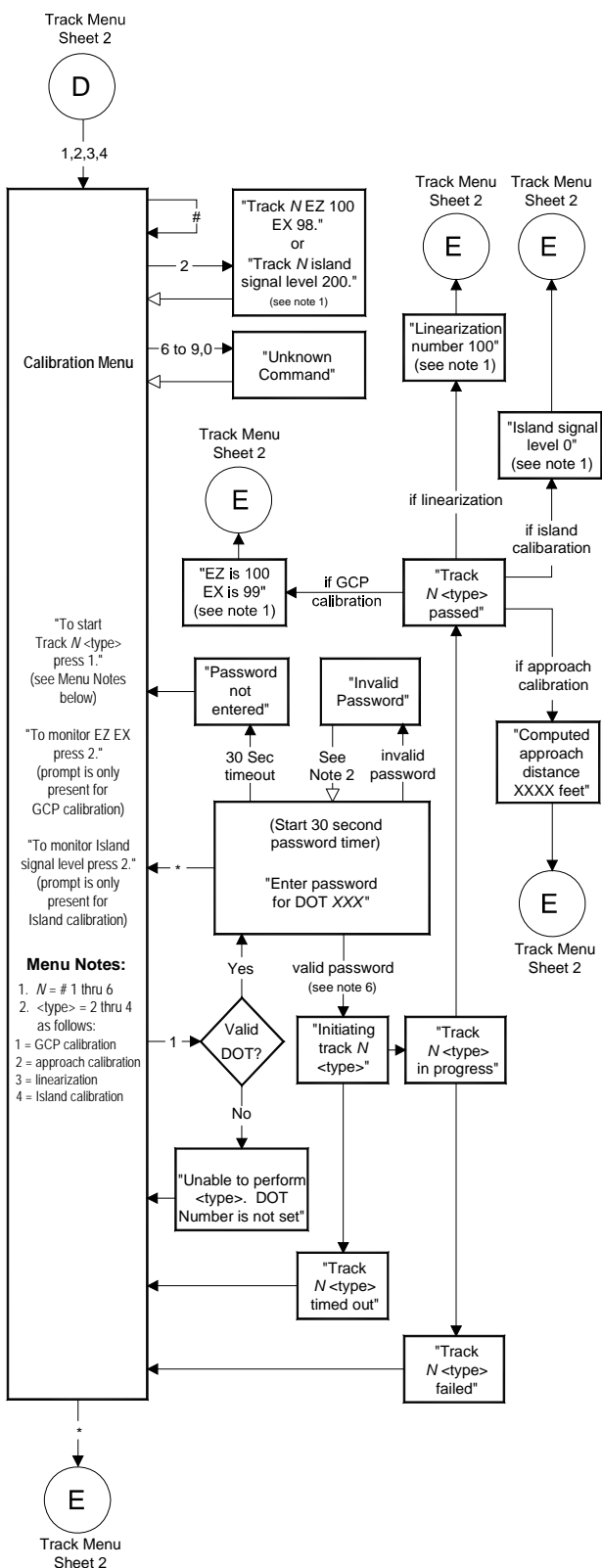


Figure 124: Remote User Interface Menu, Sheet 3

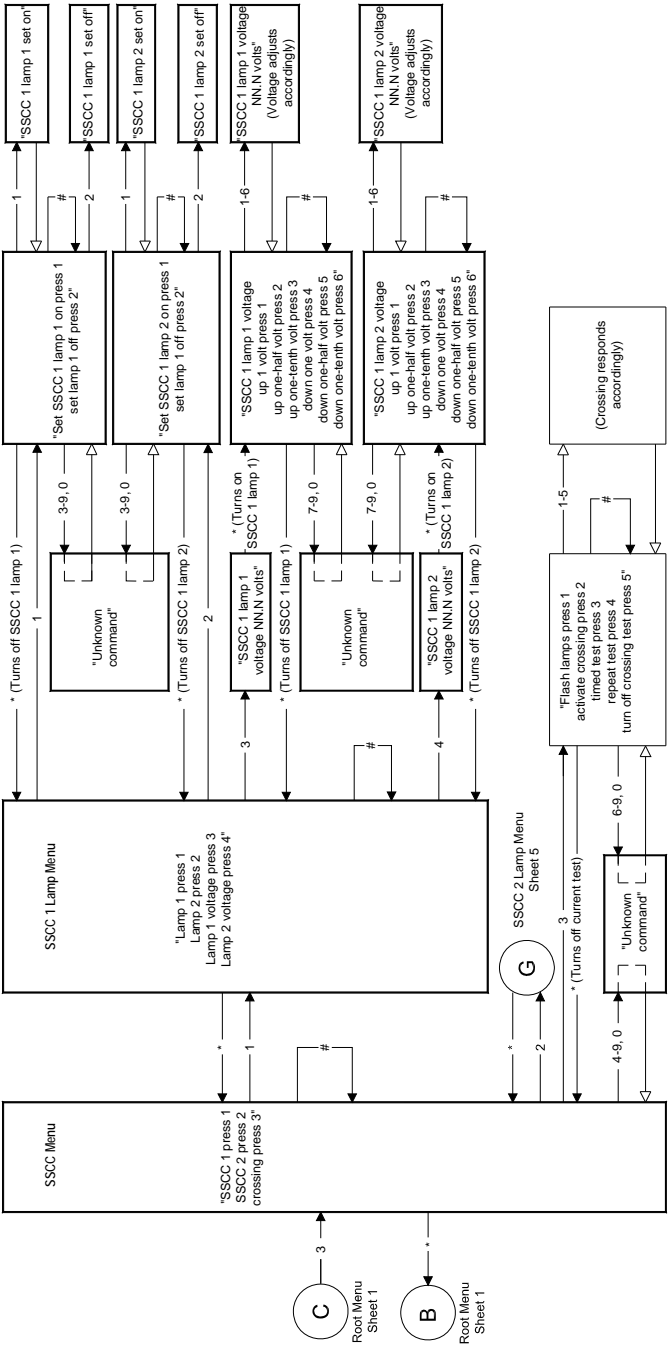


Figure 125: Remote User Interface Menu, Sheet 4

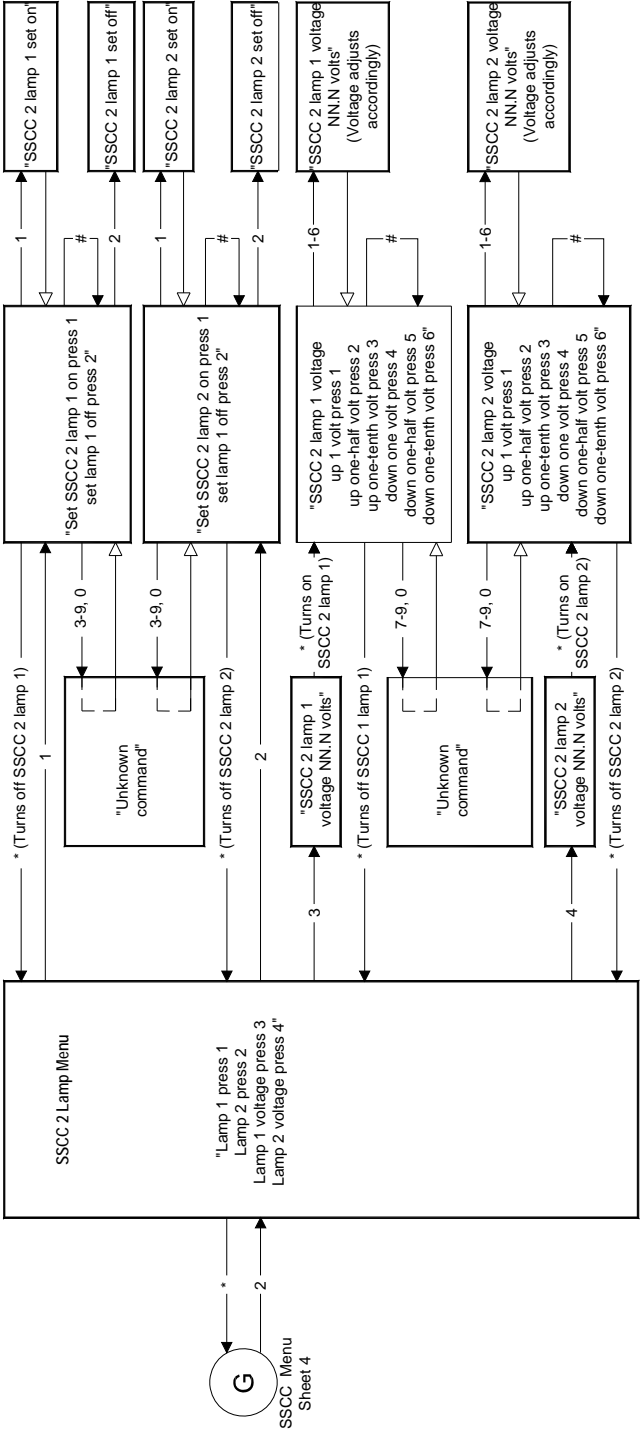


Figure 126: Remote User Interface Menu, Sheet 5

APPENDIX C – DISPLAY DT USB WIZARD

The USB Wizard is available only with the A80407-03 Display II Module based Diagnostic Terminal (DT) version 4.6.0 or higher and is not supported by the PC based DT. The USB Wizard allows GCP 4000 files to be saved to or uploaded from a USB drive. The following GCP 4000 file types can be saved to a USB drive connected to the Display Module:

- Configuration Package Files (PAC files)
- Train Move History Logs
- Maintenance Logs
- Status Logs
- Summary Logs
- SEAR2I
- Reports
- History
- Incidents

The following GCP 4000 file types can be uploaded from a USB drive connected to the Display Module:

- Configuration PAC files
- Module Executable Files (MEF)
- Module Configuration Files (MCF)
- MCF Cyclical Redundancy Check (CRC)
- SEAR2I
- Executive Software
- Control Description Language (CDL)
- Ladder Logic Executive file (LLW)
- Ladder Logic Label file (LLB)

USB WIZARD MENU

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

This menu may be returned to at any time by pressing the **WIZ** button at the top of the Main Status screen, providing the USB drive is still inserted in the port.

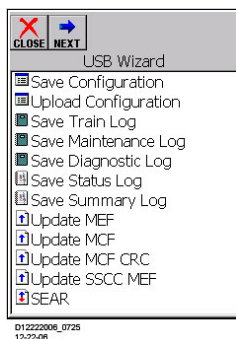


Figure 127: USB Wizard Window

Saving Files to USB Drive

To save a file to the USB drive:

- Insert USB drive in port,
- touch the appropriate function name on the USB Wizard menu and
- then press **NEXT**.

CAUTION

THE DEFAULT DESTINATION DRIVE ON THE DT WHEN SAVING FILES TO THE USB DRIVE IS “\HARD DISK”. DO NOT SAVE A FILE TO ANOTHER DRIVE BECAUSE IT MAY DISRUPT DISPLAY OPERATION.

NOTE

The SAVE function will default to a File Name of the file type to be saved. The “save as” file name may be edited.

To edit the name of the file:

Use the stylus to pick the location of added text in the file name.

Use the keyboard to backspace, add spaces or enter letters and numbers (process similar to editing names on a cell phone).

Save Configuration

- Select **Save Configuration** from the USB Wizard menu.
- Press **NEXT**. A file save screen is displayed.
- The name of the currently installed PAC file appears in the **File:** field. (Edit if necessary.)

NOTE

Other file names may appear in the display area above the **File:** field. These are PAC files currently located on the USB drive.

Press **SAVE** button.



Figure 128: Save Configuration Window

NOTE

During file save operation, progress is indicated on MAIN PROGRAM menu screen status bar.

Save Train/Maintenance/Diagnostic Log

The Save Train Log, Save Maintenance Log and Save Diagnostic Log functions are identical.

Select **Save Train / Maintenance / Diagnostic Log** from USB Wizard menu, then press **NEXT**. The applicable log screen appears (see typical screen below).

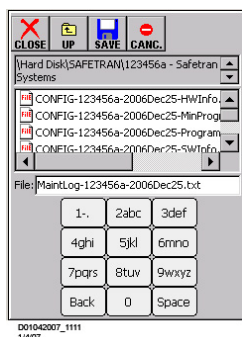


Figure 129: Save Maintenance Log Window

The default file name for the selected log type appears in the **File Name:** field on the log screen. (Edit if necessary.)

Press **SAVE** button

Save Status/Summary Log

Save Status and **Save Summary Log** functions are identical. Select **Save Status / Summary Log** from USB Wizard menu, then press **NEXT**. The Download screen appears.

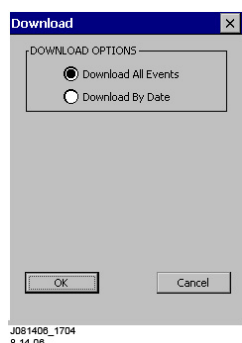


Figure 130: Download All Events Window

Select the Download Option.

If Download By Date is selected, Begin and End date sliders appear.

Move sliders to select download range.

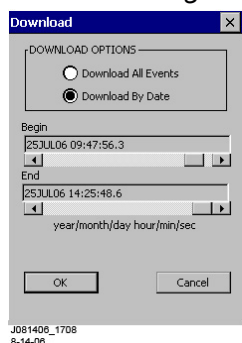


Figure 131: Download By Date Window

Press **OK** button.

During download, a download status screen is displayed.



Figure 132: Download In Process Window

After files are downloaded and ready to be saved, the log screen appears.

The default file name for the selected log type appears in the **File Name:** field on the log screen. (Edit if necessary.) Press **SAVE** button

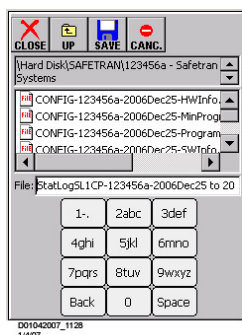


Figure 133: Save Status/Summary Log Window

Saving SEAR2I Reports and Files

Select **SEAR** from USB Wizard menu.

Press **NEXT**. The SEAR report screen appears.

Use the vertical scroll bar to view all menu entries.

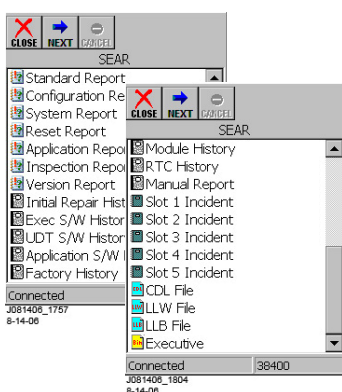


Figure 134: SEAR Report Windows

Save SEAR Standard / Application Report

The **Standard Report** and **Application Report** save functions are identical.

Select **Standard Report / Application Report** from SEAR report screen.

Press the **NEXT** button.

The event download screen appears.

Select the Download all events check box at the top of the screen or

Edit Start and End dates, if desired, by selecting the browse button located to the right of the date field.

Edit Start and End times, if desired, by selecting the up and down arrows located to the right of the time field.

Press the **OK** button.

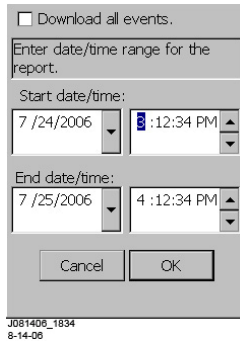


Figure 135: SEAR Event Download Window

The default file name for the selected report type appears in the **File:** field on the report select screen. (Edit if necessary.)

Press **SAVE** button

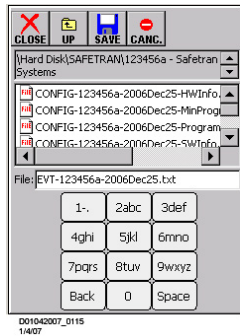


Figure 136: Save Event Window

Saving Miscellaneous SEAR Report and History Files

The process for saving the following reports and history files is the same.

Configuration Report	Exec S/W History
System report	UDT S/W History
Reset Report	Factory History
Inspection Report	Module History
Version Report	Initial Repair History
Application S/W History	Manual (Repair History) Report
Slot 1 – Slot 5 Incident Report	RTC (Real Time Clock) History

Select desired report or history entry (see list above) from SEAR report screen.

Press the **NEXT** button.

The report file name displays automatically in the **File:** field on the report/history file select screen.

NOTE

The names of previously saved report files are listed in the area above the **File:** field.

Press **SAVE** button.

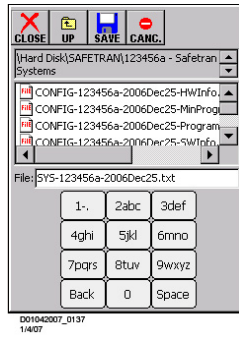


Figure 137: Save Miscellaneous Events Window

Uploading Software From the USB Drive

The process for uploading the following software from the USB drive is the same.

CDL File LLB File LLW File

Select desired software file entry (see list above) from SEAR report screen.

Press the **NEXT** button.

On the software file select screen (see typical below), touch the desired file name in the upper window.

The file name appears in the **File:** field.

Press **OPEN** button to upload the file.

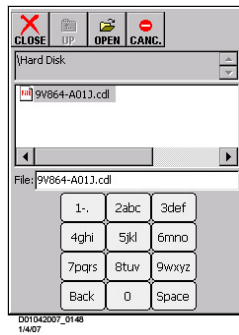


Figure 138: Upload Software Window

Uploading SEAR Executive (.bin file)

Select **SEAR** from USB Wizard menu.

Press **NEXT**. The SEAR report screen appears.

Scroll to the end of the menu and select **Executive**.

Press **NEXT**.

Verify that Null Modem adapter is attached to the DIAG port on the Display Module. Connect the DB9 cable between the Display Module and the SEAR USER port.

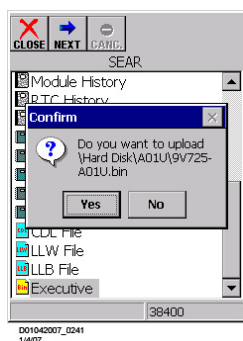


Figure 139: Update SEAR Executive Software Window

NOTE

Verify that the SEAR USER port baud rate is set to 38,400 bits per second.

Press **OK**.

On the software file select screen (see typical below), touch the desired **bin** file name in the upper window.

The file name appears in the **File:** field.

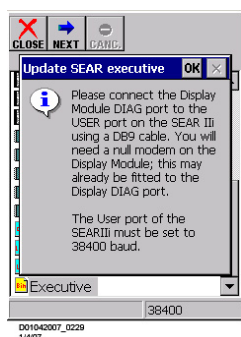


Figure 140: Software File Select Window

Press **OPEN** button to upload the file.

Confirm the correct bin file selection by pressing **Yes**.

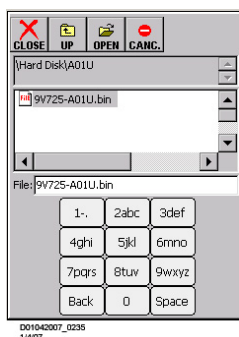


Figure 141: Bin File Selection Confirmation Window

The SEAR resets and then the new executive file is sent to the SEAR (status appears at bottom of screen).

When the upload is complete the following screen appears. Press **CLOSE**.

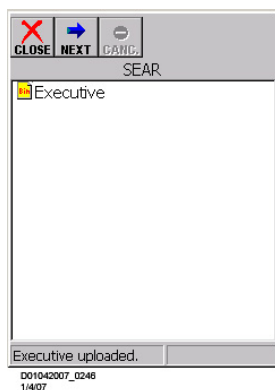


Figure 142: SEAR Executive Upload Window

Uploading Configuration, Updating MCF and MEF

WARNING

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

WHEN USING MCF GCP-T6X-01-2.MCF OR EARLIERGATES WILL BEGIN TO LOWER IMMEDIATELY (WITH GATE DELAY)

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

TESTS MUST BE PERFORMED TO VERIFY PROPER OPERATION OF GCP PRIOR TO PLACING THE SYSTEM BACK IN SERVICE

CAUTION

TO MINIMIZE THE TIME THAT SIGNALS ARE IN A RESTRICTIVE STATE, IF THE EXISTING CONFIGURATION NEEDS TO BE SAVED, SAVE IT PRIOR TO SELECTING “UPLOAD CONFIG-URATION” FROM THE USB WIZARD MENU. REFER TO PAGE 174.

NOTE

Display-based DT to module interface baud rate is 38,400 bits/Sec. PC-based DT to module interface baud rate is 56,000 bits/Sec. Therefore, uploading files via the Display DT will take approximately 50% longer than uploading from a PC.

Uploading Configuration (PAC file)

Select **Upload Configuration** in the USB Wizard menu.
Press the **NEXT** button.
The Main Program Menu screen appears.
An **Upload Warning** is displayed.

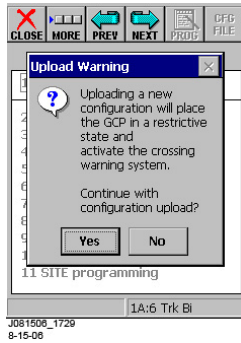


Figure 143: Upload PAC File Warning Window

WARNING

UPLOADING A NEW CONFIGURATION 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 VEHICLE IN THE AREA UNTIL PROPER SYSTEM OPERATION IS VERIFIED.

TESTS MUST BE PERFORMED TO VERIFY PROPER OPERATION OF GCP PRIOR TO PLACING THE SYSTEM BACK IN SERVICE

Press **YES** to continue

A prompt to save the current configuration is displayed.
Select **YES** to save the current configuration (see **Save Configuration** on page 174).
Select **NO** to continue without saving the current configuration.

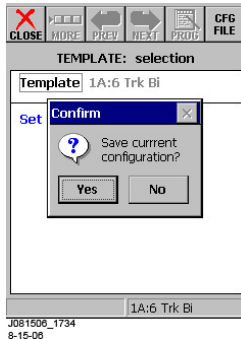


Figure 144: Save Configuration Window

When the PAC file select screen appears, select the Configuration PAC File that is to be copied by touching the name on the display. The name will appear in the **File:** field. Press the **OPEN** button to upload the file.



Figure 145: PAC Configuration Upload Window

Saving the new PAC file is a two step process.

Press the **SEL** push button on the active CPU module. This step must be completed within 5 minutes, or the process must be repeated.

Next, press **Yes** on the **Confirm** screen to save the PAC file parameter.

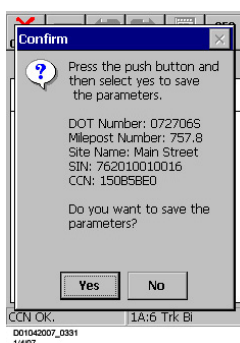


Figure 146: PAC Configuration Confirmation Window

NOTE

After the PAC file parameters are saved, the Main Status Screen may appear and indicate that track circuit calibration may be required.

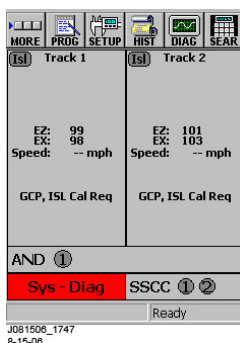


Figure 147: Model 4000 GCP DT Window

NOTE

Display II Modules running Display Terminal (DT) software version 4.8.0 will display two OCCNs. The first will be the OCCN for systems using DT version 4.6.0 or older, and the second will display the OCCN for DT version 4.8.0 or newer.

After uploading a new Configuration (PAC file), check the CCN and OCCN as follows:

- Press the **PROG** button at the top of the Main Status screen.
- Press the **CFG FILE** button at the top of the MAIN PROGRAM menu screen.
- Select '**View Check Numbers**' from the menu.

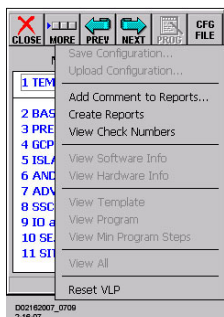


Figure 148: View Check Numbers Window

NOTE

CCN and OCCN calculation takes approximately 80 seconds. Calculation status is displayed in the left half of the DT status bar.



Figure 149: CCN Information Window

When the **CCN Information** screen appears, compare the current CCN and OCCN values to the ones presented in the Minimum Program Steps report. They should be the same. Press **OK** to return to the MAIN PROGRAM menu screen.

NOTE

To generate and view the Minimum Program Steps report, use the following procedure.

Press the **CFG FILE** button at the top of the MAIN PROGRAM menu screen.

Select '**Create Reports**' from the menu.

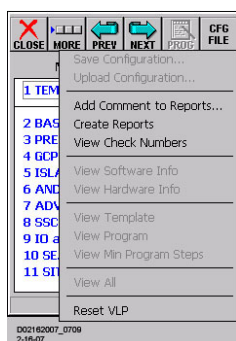


Figure 150: Create Reports Window

NOTE

Report generation may take 3 or 4 minutes. Status is displayed in the left half of the DT status bar. When the reports are ready, 'Reports created' appears at the left end of the DT status bar.

Press the **CFG FILE** button at the top of the MAIN PROGRAM menu screen.

Select '**View Min Program Steps**' from the menu.

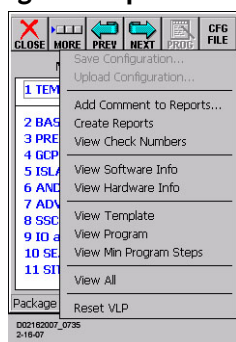


Figure 151: View Min Program Steps Window

The Minimum Program Steps Report menu appears.

Minimum Program Steps Report Window

Select '**Check Numbers**' from the menu.

The OCCN and CCN are displayed at the top of the Check Numbers Window.



Figure 152: CCN Information Window

Update MEF

NOTE

Use the following procedure to update the MEF for any module in the system including the SSCCIII.

Select **Update MEF** (or **Update SSCC MEF** if appropriate) in the USB Wizard menu.

Press the **NEXT** button.

A prompt screen appears instructing user to connect a DB9 serial cable between the Display Module DIAG port and the DIAG port of the module to be updated.



Figure 153: USB Wizard Message Window

Verify that the Null Modem Adapter is attached to the Display Module DIAG port, then make the cable connection. Press NEXT.

Select the MEF File that is to be copied by touching the name on the display. The name will appear in the **'File:'** box.

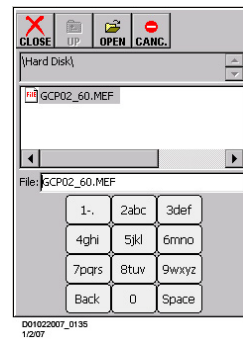


Figure 154: Copy MEF Window

Press the **OPEN** button. Confirm the correct MEF selection by pressing **Yes**.

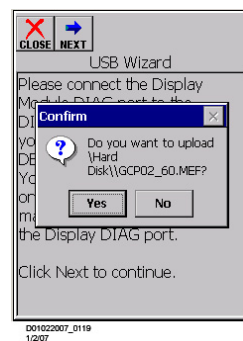


Figure 155: Confirm MEF Upload Window

After the Display connects to the module that the MEF is being downloaded to, the setup program is downloaded.

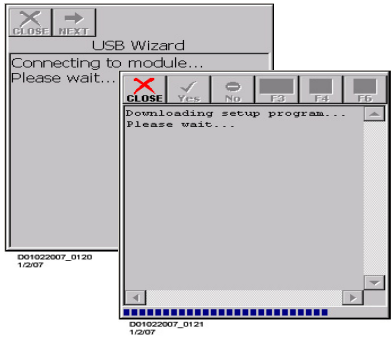


Figure 156: Upload Progress Window

The old MEF is removed,

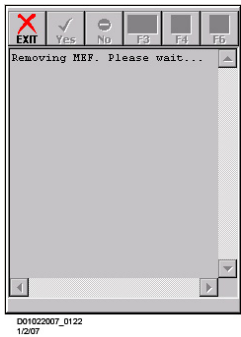


Figure 157: Removing MEF Window

And the new MEF is sent to the module.

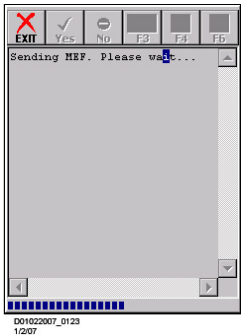


Figure 158: Sending New MEF Window

The file download may take several minutes and the blue progress bar indicates the download status. When the MEF download is complete, the software is updated. Press **EXIT** to continue.

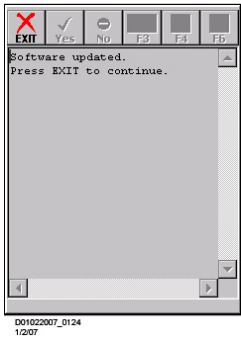


Figure 159: Press Exit to Continue Window

When the USB Wizard screen appears, either select another file type for update or press **CLOSE**.

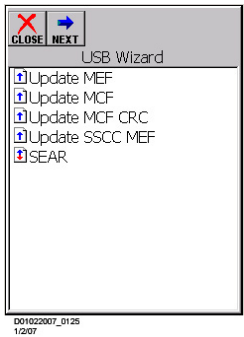


Figure 160: USB Wizard Window

When **CLOSE** is pressed, a screen with a **Connect** button is displayed. Press the **Connect** button to reconnect the Display with the system.



Figure 161: DT Connect Window

When the USB Wizard screen appears, either select another file type for update or press **CLOSE**.

A message is displayed indicating that the system will reboot and connect with the Display in 3 seconds.



Figure 162: System Reboot Window

Update MCF

Select **Update MCF** in the USB Wizard menu.
Press the **NEXT** button.

A prompt screen appears instructing user to connect a DB9 serial cable between the Display Module DIAG port and the DIAG port of the CPU module to be updated.

Verify that the Null Modem Adapter is attached to the Display Module DIAG port, then make the cable connection.

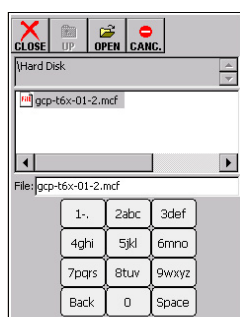


D01032007_0838
1-2/07

Figure 163: USB Wizard Null Modem Window

Press **NEXT**.

Select the MCF File that is to be copied by touching the name on the display. The name will appear in the 'File:' box.



D01032007_0852
1/3/07

Figure 164: Select MCF Window

Press the **OPEN** button.

Confirm the correct MCF selection by pressing **Yes**.



D01032007_0854
1/3/07

Figure 165: Upload MCF Confirmation Window

After the Display connects to the CPU module that the MCF is being downloaded to, the setup program is downloaded.



D01032007_0120
1/3/07

D01032007_0121
1/3/07

Figure 166: Downloading SETUP Window

The old MCF is then removed,

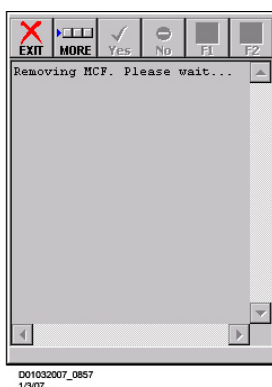


Figure 167: Removing MCF Window

And the new MCF is sent to the CPU module.
The file download may take several minutes and the blue progress bar indicates the download status.

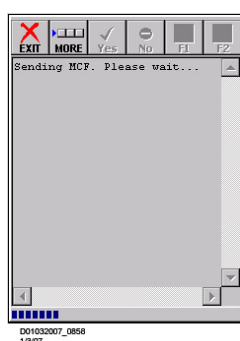


Figure 168: Sending MCF Window

When the MCF download is complete, the MCF is updated.

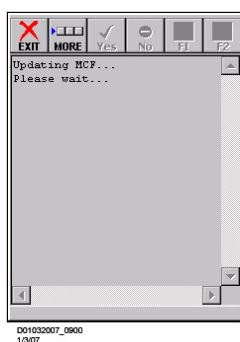


Figure 169: Updating MCF Window

Following MCF update, the MCF is copied from Flash memory to the ECD. This may take several minutes. “COPYING MCF TO ECD” scrolls on CPU display during this process.

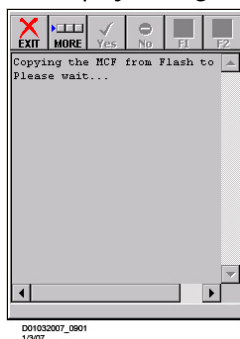


Figure 170: Copying the MCF To ECD Window

After the MCF is copied to the ECD, enter the MCF CRC to validate the new MCF. Use the stylus to enter the CRC from the displayed keypad. Then press **OK**.

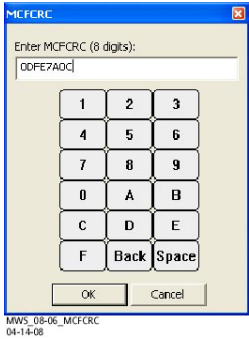


Figure 171: MCFCRC Window

Following entry of a valid MCF CRC, the software is updated. Press **EXIT** to continue.

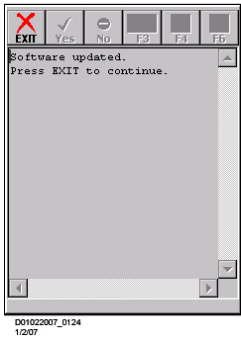


Figure 172: Update Complete Window

When the USB Wizard screen appears, either select another file type for update or press **CLOSE**.

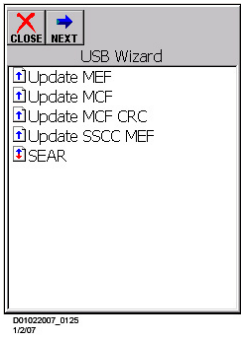


Figure 173: USB Wizard Window

When **CLOSE** is pressed, a screen with a **Connect** button is displayed. Press the **Connect** button to reconnect the Display with the system.



Figure 174: DT Connect Window

A message is displayed indicating that the system will reboot and connect with the Display in 3 seconds.

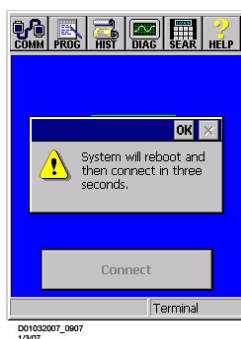


Figure 175: System Reboot Window

Update MCF CRC

Select **Update MCF CRC** in the USB Wizard menu.

Press the **NEXT** button.

A prompt screen appears instructing user to connect a DB9 serial cable between the Display Module DIAG port and the DIAG port of the CPU module to be updated.

Verify that the Null Modem Adapter is attached to the Display Module DIAG port, then make the cable connection.

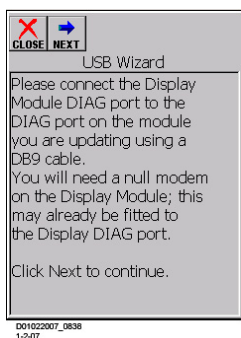


Figure 176: USB Wizard Null Modem Window

Press **NEXT**.

At the prompt to “Reset module”, press **Yes**.

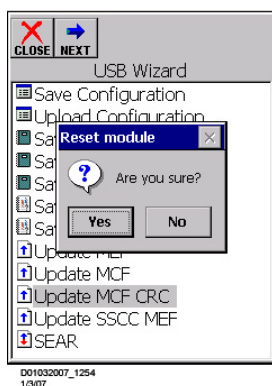


Figure 177: Reset Module Confirmation Window

The Display connects to the CPU module that the MCF CRC is being updated for and the setup program is downloaded.

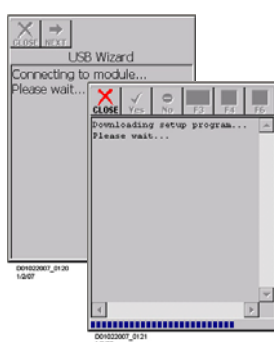


Figure 178: Downloading SETUP Window

Enter the new MCF CRC using the stylus and the displayed keypad. Then press **OK**.

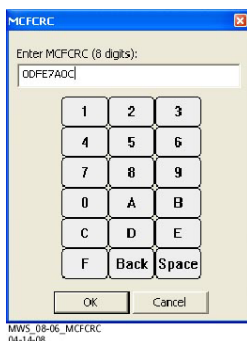


Figure 179: MCFCRC Window

Following entry of a valid MCF CRC, the software is updated. Press **CLOSE** to continue.

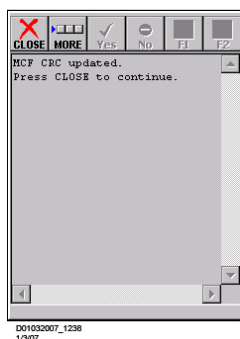


Figure 180: Upload Complete Window

When the USB Wizard screen appears, either select another file type for update or press **CLOSE**.

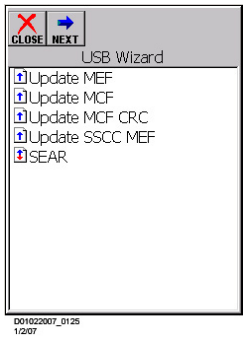


Figure 181: USB Wizard Window

When **CLOSE** is pressed, a screen with a **Connect** button is displayed. Press the **Connect** button to reconnect the Display with the system.



Figure 182: DT Connect Window

A message is displayed indicating that the system will reboot and connect with the Display in 3 seconds.



Figure 183: System Reboot Window

EZ/EX RECORDING

If the USB drive is left plugged into the USB port on the A80407 Display Module, EZ and EX values can be recorded in real time. To record the EZ and EX values, proceed as follows:

NOTE

This is not a function of the USB Wizard.

Press the **DIAG** button at the top of the Main Status screen. Select '**Record EZ & EX**' from the menu.

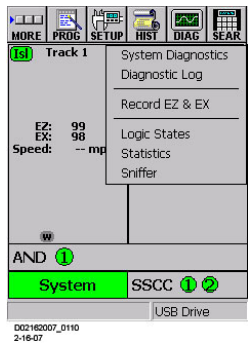


Figure 184: DT Diagnostics Window

A prompt screen appears prompting for confirmation. Press **Yes**.



Figure 185: EZ/EX Recording Window

On the screen that appears select the tracks to monitor for EZ and EX.



Figure 186: Select Tracks Window

Press **OK**.

On the report file screen, the name of the file where the EZ and EX values will be recorded is displayed in the **File:** field. Accept or change the name as needed.

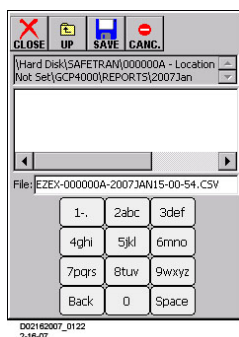


Figure 187: Report File Screen

Press **Save**.

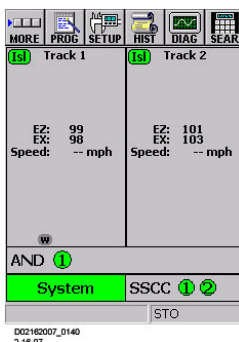


Figure 188: Model 4000 GCP DT Window

While EZ and EX values are being recorded, **STO** appears in the status bar to indicate that data is being stored.

To stop EZ / EX recording, press **DIAG**.
Select '✓Record EZ & EX' from the menu.

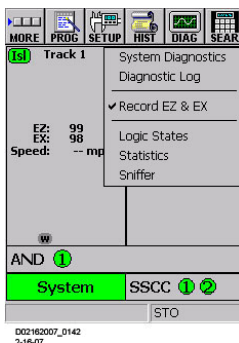


Figure 189: Start Record EZ & EX Selection Window

A prompt screen appears prompting for confirmation. Press **Yes**.



Figure 190: Stop Record EZ & EX Selection Window

The Main Status screen is displayed.

Using Recorded EZ & EX Files

The recorded values are stored in a .csv file that can be reviewed and graphed in Microsoft® Excel®.

To view .csv files open Microsoft Excel.

- Select File \Open.
- On the Open window, select ‘Text files (*.prn; *.txt; *.csv)’ in the Files of type: field.
- Type of select the file name to be viewed.
- Press **Open**.

The file data appears in columns similar to the figure below.

	A	B	C	D	E	F	G	H
1	Count	DateTime	T1 Ez	T1 Check	T1 Ex	T1 Ist Occ	T1 Prime	AND1 XR
2	0	#####	99	99	93	125	140	155
3	1	#####	99	99	93	125	140	155
4	2	#####	99	99	93	125	140	155
5	3	#####	99	100	93	125	140	155
6	4	#####	100	99	93	125	140	155
7	5	#####	85	91	98	125	140	155
8	6	#####	81	97	99	125	140	155
9	7	#####	93	94	93	125	140	155
10	8	#####	93	92	93	125	140	155
11	9	#####	92	90	93	125	140	155
12	10	#####	90	88	93	125	140	155
13	11	#####	87	85	93	125	140	155

D02162007_0226
2-16-07

Figure 191: Data File Layout Example

Select a column to graph by clicking on the column header (A through H in the figure above).

To select multiple columns, click the first column header then hold down the Ctrl key and click the additional column headers. Columns C, E and G selected in the figure above.

Select **Insert \Chart \ Line Chart**. Select a chart sample and then click **Finish**.

A chart similar to the one below is displayed.

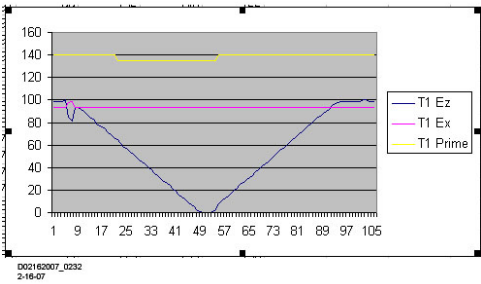


Figure 192: Prime, EZ, and EX Chart Example

APPENDIX D – GLOSSARY

GLOSSARY

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.
AND ENABLE:	An internal function that can be used to ‘connect’ an input to an AND circuit.
AND 1 XR:	The AND function that controls the local crossing. Is equivalent to the XR relay.
AND 2 thru 8:	Internal functions that are used to combine inputs.
ATCS:	Advanced Train Control System – An industry standard used in the 4000 GCP for communications.
CCN:	Configuration Check Number – The 32 bit CRC of the configuration data.
CDL:	Control Descriptor Language – The programming language used by application engineers to customize the operation, settings, and behavior of a SEAR II/III.
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.
CP:	Communications Processor – One of two microprocessors on the CPU1+ module, processes external communications for the GCP 4000.

GLOSSARY

CRC:	Cyclical Redundancy Check - Used to determine that data has not been corrupted.
CRTU:	Cellular Remote Telemetry Unit
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
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 Safetran developed Windows® based software that can run on the Display Module or on a PC, which allows the user to perform programming, calibration, and troubleshooting.
DTMF:	Dual Tone Multi-Frequency - The tones on a telephone or radio keypad.
ECD:	External Configuration Device – The non-volatile memory device on the GCP backplane used for storing the module configuration file.
Echelon:	A Local Area Network, LAN, used by the 4000 GCP.
EGOM	Exit Gate Operating Mode – A dynamic mode in which the exit gate operation is based on the presence and detection of vehicles between the stop bar or entrance gate and the exit gate.
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.
Entrance Gate:	A gate used at the entrance to a highway-railroad grade crossing, which is designed to release and lower by gravity from the full vertical position to the horizontal position under a loss of power condition or when the control energy (GC) is removed.

GLOSSARY

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.
Exit Gate:	A gate used at the exit from a highway-railroad grade crossing with Four Quadrant Gates to restrict wrong direction vehicular movements, which is designed to raise by gravity from the horizontal position to a vertical position great enough to allow vehicle clearing under a loss of power condition or when the control energy (GC) is removed.
FAR GATE:	On the same surge panel, the 'far gate' is the flashing light signal or gate with the largest voltage drop in the cable circuit. In general, if both signals have the same number and type of lamps and the same size cable conductors, the 'far gate' is the location with the longest cable run. The 'far gate' circuit on the surge panel does not have an adjustable resistor in series with L1 and L2 that provides voltage adjustment.
Field Password	The password set that allows field maintenance personnel access to field editable parameters.
Flash Memory:	A type of non-volatile memory that can be reprogrammed in-circuit via software.
Gate Delay Period:	The programmable time period from when the lights begin to flash until the gates begin to descend.
GC:	Gate Control
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.
GD:	Gate Down, input energized when gate arm is horizontal.

GLOSSARY

GFT:	Ground Fault Tester – An optional external device connected to the Echelon LAN that constantly monitors up to two batteries for ground faults and indicates battery status to the SEAR2I.
GP:	Gate Position – Input energized when gate is vertical.
GU:	Gate Up – Used in a user defined SEAR2I application program, (the same as GP).
Highway- Railroad Grade Crossing Advance Warning Sign:	A traffic control sign (round yellow sign with RR and a black X) placed by the highway agency in advance of many highway-railroad grade crossings
Healthy:	The GCP system, modules and track circuit are operating as intended. Health is generally indicated by a yellow LED flashing at 1 Hz (approximately the same flash rate as the FLASH SYNC on a controller or a flashing light signal). Unhealthy conditions are indicated by faster flash rates (2 Hz and 4 Hz) or a dark Health LED.
Hz:	Hertz – Common reference for cycles per second or flashes per second.
iLOD:	Intelligent Light Out Detector – used for measuring lamp current.
Interconnection:	The electrical connection between the railroad active warning system and the traffic signal controller for the purpose of preemption.
IO or I/O:	Input/Output
ISL:	Island
ISL CAL:	Island calibration
kHz:	Kilohertz – 1000 Hz or 1000 cycles per second.
LAMP 1 VOLTAGE:	Voltage on 1L1 or 2L1 lamp output of the crossing controller module, SSCC3I.
LAMP 2 VOLTAGE:	Voltage on the lamp 1L2 or 2L2 lamp output of the crossing controller module, SSCC3I.
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.

GLOSSARY

Linearization Steps:	A calibration value that allows the GCP to compensate for non-linear EZ values within the approach circuit.
LOS:	Loss of Shunt – Commonly due to rust and / or rail contamination. LOS timers provide a pick up delay function.
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.
MBT:	Abbreviation for Master Boot file
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.
MTSS:	Mini Trackside Sensor – A device located in the gate mechanism that combines input information from gate contacts, bell, and gate tip sensor and sends the information to the SEAR2I.
NEAR GATE:	On the same surge panel, the 'near gate' is the flashing light signal or gate with the lowest voltage drop in the cable circuit. In general, if both signals have the same number and type of lamps and the same size cable conductors, the 'near gate' is the location with the shortest cable run. The 'near gate' circuit on the surge panel has an adjustable resistor in series with L1 and L2 that provides additional voltage adjustment.
OCCN:	Office Configuration Check Number – The 32 bit CRC of the configuration data, excluding items that are protected by the Field Password.
OCE:	Office Configuration Editor – The PC version of the DT that can be used to create configuration package files (Pac files) for the GCP 4000 system.

GLOSSARY

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 GCP 4000 configuration Package File that can either be created in the office using the OCE, or downloaded from a GCP 4000 system via the CP.
Pick Up Delay:	An internal delay time between when an input receives the signal to pickup and when it actually responds.
POK:	Power Off Indication
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.
PSO-II, PSO-III, PSO4000:	Different models of Safetran's Phase Shift Overlay – a track circuit (transmitter at one location and receiver at another location) that supplies track occupancy information for crossing warning devices and other train or vehicle detection systems.
RADIO DAX:	DAX information transmitted via Spread Spectrum Radio or other communications devices.
RIO:	Relay Input Output Module
RS232:	Industry standard serial port.
RTU:	Remote Telemetry Unit
RX:	Receive
SEAR2I Application Program:	Programming for SEAR2I that controls alarms.
Simultaneous Preemption:	Notification of an approaching train is forwarded to the highway traffic signal controller unit or assembly and railroad active warning devices at the same time.
SIN:	Site (Subnode) Identification Number - A twelve-digit ATCS address representing the module as a subnode on the network.

GLOSSARY

Spread Spectrum:	A method of radio transmission in which the transmitted energy is evenly spread over the complete bandwidth of the radio, resulting in a low RF profile.
SSCC:	Solid State Crossing Controller
SSR:	Spread Spectrum Radio – A radio that utilizes spread spectrum transmission.
Standby:	The GCP Backup Modules (e.g., CPU, Track, and RIO modules) that are in a dual GCP chassis.
Supervisor Password	The password set that allows application design personnel access to office editable parameters.
True RMS AC+DC:	A scale on a multimeter that measures the effective combined AC and DC portions of the total voltage. Used to measure the pulsed output of a crossing controller.
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 are commonly called flash drives or memory sticks.
VHF Communicator:	Communications device used for remote operations and calibration as well as data communications.
VLP:	Vital Logic Processor – One of two microprocessors on the CPUII+ module, processes GCP vital system logic.
WAG	Wayside Access Gateway – The Safetran A53457 assembly converts Echelon® messages to Ethernet messages allowing Safetran equipment to use Ethernet Spread Spectrum radios A53325 for communications. WAG assembly A53457 also converts Echelon received messages to RS232 messages allowing the system to use modems for communication between Safetran equipment.
WAMS:	Wayside Alarm Management System – An office based application that communicates with and receives data from specially equipped crossings.

GLOSSARY

WCM:	Wayside Control Module – The Safetran A53105 assembly that centrally controls the functions of a Wayside Communications Package (WCP).
Wrap:	Common reference for a track circuit, or combination of track circuits that extend to or beyond the limits of a GCP approach, which provides train detection. Used to signify that a certain system function is being overridden based upon the state of a vital input.
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.

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