SIEMENS

Maintainer's Handbook

MICROPROCESSOR BASED GRADE CROSSING PREDICTOR MODEL 3000 FAMILY

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

CHANGE NOTICE

The following change(s) have been made to the Microprocessor Based Grade Crossing Predictor Model 3000 Family Maintainer's Handbook, document number SIG-00-99-01.

March 2009 (change from version B to version C)

- Brought manual into accordance with information presented in SIG-00-00-02 Ver. C, Microprocessor Based Grade Crossing Predictor Model 3000 Family Installation and Instruction Manual, Sections 5, 6, and 7. These changes reordered the way information contained in WARNINGS, CAUTIONS, and NOTES was presented.
- Page iii: Changed Safetran's California Division's telephone number to (909) 532-5300 and fax number to (909) 532-5400.
- Page vii: All Table of Contents (TOC) pages renumbered.
- Page viii: All Table of Contents (TOC) pages renumbered.
- Page ix: All Table of Contents (TOC) pages renumbered.
- Page x: Inserted blank page
- Page 1: WARNINGS placed before NOTES on Page.
- Page 3: Added NOTE regarding Enhanced Track Shunting Detection (ED) amended the Set to Default conditions a through e.
- Page 11: Changed range of values on UAX1 and ENA to 0 to 500; Replaced MS/GCP with Prime
- Page 12: Reworded Note regarding ENA/UAX2
- Page 20: Deleted NOTE following step 18.1.
- Page 21: Changed BAUD RATE to 9600; Corrected module to 80014 from 80044.
- Page 27: Inserted NOTE regarding the U.S. Congress and Daylight Savings Time
- Page 29: Inserted steps 27.7 and 27.8.
- Page 31: Inserted WARNING regarding Incorrect DAX/Prime Prediction Offset times.

CHANGE NOTICE (Continued)

- Page 32: Deleted steps concerning Transfer MS to GCP.
- Page 33: Inserted steps concerning Transfer MS to GCP Prime T1. Added new information in Step 31.
- Page 35: Deleted the requirement to call Safetran Technical Support from the WARNING.
- Page 36: Added asterisk to OFF (*OFF) in Message Displayed column; changed WARNING to clarify effects of rust build-up.
- Page 37: Changed bullet points for clarity
- Page 40: Added J version software info to WARNING and NOTE; Deleted time duration from end of WARNING.
- Page 41: Changed range of value from 10 to 500 seconds. Reworded NOTE.
- Page 46: Changed NOTE to reflect prime and relay drive outputs.
- Page 47: Changed NOTE regarding activation of the crossing
- Page 48: Changed Step reference in Comments block from 42 to 41.7 in Step 41.4.
- Page 50-51: Inserted Steps 43.3 and 43.4
- Page 52: Changed Value range in Step 46.2; reworded NOTE.
- Page 53: Changed Value range in Step 47.2
- Page 54: Reworded NOTE.
- Page 56: Deleted frequency from step 2.
- Page 57: Changed duration of Setup to 70 seconds.
- Page 60: Reworded WARNING.
- Page 61: Corrected typo on Insulated.
- Page 73: Reworded NOTE.
- Page 76: Changed name of section to clarify module affected. Changed Step numbers from Step 5 (IPI) to Step 6.

CHANGE NOTICE (Concluded)

- Page 78: Reworded CAUTION.
- Page 79: Reworded NOTE
- Pages 80 – 86: Changed name of section to clarify module affected. Renumbered Step 5 (IPI) et al., to Step 6 et al.
- Page 83: Changed title of chart to reflect module affected.
- Page 87: Changed to Step 7.
- Page 88: Corrected typos on two bottom bullet comments
- Pages 88 – 89: Renumbered from Step 7 to Step 8.
- Page 94: Reworded step 1.6 in both options
- Page 110: Changed order of module replacement in numbers 6 & 7.
- Page 126: Changed Title of page to Insulated Joint Bypass (IJB) Coupler Field Test. Reworded WARNING.
- Page 127: Changed Title of page to Locating Bad Bonds.
- Page 128: Changed Title of page to Termination Shunt Field Test; reworded WARNING
- Page 129: Added Low EX data

February 2014 (Change from Version C to Version C.1)

- Rebrand for Siemens throughout, change font to Arial

September 2014 (Change from Version C.1 to Version C.2)

- Page 85: Added NOTE: If the IPI track circuit experiences same-frequency interference in adverse ballast conditions the source may be further than 5000 feet away.
- Moved step 6.10 to page 86.

Table of Contents

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PROGRAMMING

WARNING

THE 3000 GCP MUST BE PROGRAMMED CORRECTLY FOR THE LOCATION AND APPLICATION. FAILURE TO DO SO MAY RESULT IN SHORT OR NO WARNING TIME!

WHEN INSTALLING, TESTING, OR PERFORMING MAINTENANCE ON OR NEAR A 3000 SYSTEM, ENSURE ADEQUATE SAFETY PRECAUTIONS ARE TAKEN FOR PERSONNEL, VEHICULAR, AND TRAIN TRAFFIC.

IF ANY OF THE PROGRAM CHANGES LISTED IN THE TABLE BELOW ARE MADE, SYSTEM RECALIBRATION IS REQUIRED (SEE CALIBRATION SECTION).

NOTE

Refer to the 3000 GCP Application History Card (which should have been completed prior to programming) for values to be entered during programming.

Program changes can be made on in-service 3000 GCP's at any time, providing no train is present in the approach.

The symbols shown below are used throughout this manual and correspond to the indicated keys on the GCP keypad: ▲ (up arrow) or ▼ (down arrow) or by the name printed on the button.

PROGRAM CHANGE	SETUP FOR CALIBRATION	SETUP FOR APPROACH LENGTH*	SETUP FOR LINEARIZATION*
Increased Number of Tracks From 1 to 2	Required For Track 2 Only	Required For Track 2 Only	Required For Track 2 Only
GCP Frequency	Required For Both Tracks	Required For Both Tracks	Required For Both Tracks
Unidirectional to Bidirectional or Bidirectional to Unidirectional	Required For Changed Track Only	Required For Changed Track Only	Required For Changed Track Only
Transmit Level Changed From Medium to Maximum or Maximum to Medium	Required For Changed Track Only	Not Required	Not Required
Approach Length	Required For Changed Track Only	Required For Changed Track Only	Required For Changed Track Only
Ballast Compensation Value	Required For Changed Track Only	Not Required	Not Required

*Setup For Approach Length and Setup For Linearization are combined into a single calibration procedure.

NOTE

If any of conditions (a) through (e) listed below apply, relay drive may be inhibited and the following message will be flashed on the display every 2 seconds:

SET TO DEFAULT REQUIRED

The system must be programmed to Set To Default parameters to initialize the database before proceeding with application programming. To initialize the database, proceed with programming step number 1 (see page 4). However, if none of the conditions listed below apply, skip step 1 and proceed to step 2 to begin application programming.

a. Initial installation
b. Processor module is replaced with another containing a different software level.
c. Program PROM's on processor module (80014 or 80044) are replaced with PROM's containing a different software level.
d. Program in flash memory on 80214 processor module is changed to a different software level.
e. Control interface assembly (80020 or 80029) is replaced (includes attached printed circuit board (80017 or 80153).

NOTE

If the Model 3000 GCP is equipped with an 80044 or 80214 processor module, and the enhanced track-shunting detection (ED) operating mode is enabled, ***ED*** appears in the upper right corner of the system status display when poor shunting conditions are detected. The ***ED*** indication remains on the display for the duration of the train move (until the train leaves the track circuit).

The value/parameter messages displayed in the following steps indicate the system default setting. If the current data is correct, do not press the **NEW DATA** key but simply press the down arrow (▼) to advance to the next step.

SET TO DEFAULT

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
1	**FUNCTION**			**T1 SWITCH TO MS** **EZ LEVEL: 10**
1.1	**▲**			**SET TO DEFAULT**
1.2	**NEW DATA**			**SET T0 DEFAULT** **PRESS ENTER**
1.3	**ENTER**		Setup message may intermittently appear; this indicates that Calibration (page 52) is required.	**SETUP T1 AND T2** **REQUIRED**
			SET TO DEFAULT message displays when installation of default parameters is complete. After a delay of 2 seconds, the word **COMPLETE** momentarily appears in the display. The system must now be completely reprogrammed starting with step 2.	**SET TO DEFAULT** **COMPLETE**

APPLICATION PROGRAMMING PROCEDURES

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
2	**PROGRAM**		Default value is **2**.	**PROGRAM NUMBER OF TRACKS: 2**
2.1	**NEW DATA**			
2.2		**1** or **2**	Enter number of tracks monitored	
2.3	**ENTER**			
3	▼		Default value is **790 Hz.**	**PROGRAM FREQUENCY: 790** or **PROGRAM T1 FREQUENCY: 790** Display is determined by Processor module installed.
3.1	**NEW DATA**			
3.2		45 to 999	Enter frequency of transceiver module.	
3.3	**ENTER**			
3.4			If system is equipped with 80014 or 80044 Processors, proceed to step 4.	
3.5	**TRACK 2**		If system is equipped with 80214 Processor, press **TRACK 2** key and repeat steps 3.1 thru 3.3 for track 2.	
3.6	**TRACK 1**			

Application Programming Procedures (Continued)

NOTE

NOTE: If the 80214 is installed in a single frequency case, the frequency for track 2 must be the same as track 1, otherwise a **Track 2 Frequency Error** will occur.

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
4	▼		Default is **UNIDIRECTIONAL**.	
4.1	**NEW DATA**		System application toggles between **UNIDIRECTIONAL** and **BIDIRECTIONAL** each time **NEW DATA** key is pressed.	**PROGRAM T1 UNIDIRECTIONAL** or **PROGRAM T1 BIDIRECTIONAL**
4.2	**ENTER**		Press **ENTER** key when desired application is displayed.	
4.3			If system was programmed for one track in step 2.2, proceed to step 5.	
4.4	**TRACK 2**		If system was programmed for two tracks in step 2.2, press **TRACK 2** key and repeat step 4.1 and 4.2 for track 2.	
4.5	**TRACK 1**			

Application Programming Procedures (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
5	▼		Default is **MEDIUM**.	**PROGRAM T1 XMIT LEVEL: MEDIUM** or **PROGRAM T1 XMIT LEVEL: MAXIMIUM**
5.1	**NEW DATA**		Transceiver transmit level toggles between **MEDIUM** and **MAXIMUM** each time **NEW DATA** key is pressed.	
5.2	**ENTER**		Press **ENTER** key when desired transmit level is displayed.	
5.3			If system was programmed for one track in step 2.2, proceed to step 6.	
5.4	**TRACK 2**		If system was programmed for two tracks in step 2.2, press **TRACK 2** key and repeat step 5.1 and 5.2 for track 2.	
5.5	**TRACK 1**			

Application Programming Procedures (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
6	▼		Default is **PREDICTOR**.	**PROGRAM T1 PREDICTOR**
6.1	**NEW DATA**		Display toggles between **PREDICTOR** and **MOTION SENSOR** each time **NEW DATA** key is pressed.	
6.2	**ENTER**		Press **ENTER** key when desired mode of operation is displayed.	
6.3			If system was programmed for one track in step 2.2, proceed to step 7.	
6.4	**TRACK 2**		If system was programmed for two tracks in step 2.2, press **TRACK 2** key and repeat steps 6.1 & 6.2 for track 2.	
6.5	**TRACK 1**			

Application Programming Procedures (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
7	▼		Default is **35** seconds.	**PROGRAM T1** **WARNING TIME: 35**
7.1	**NEW DATA**			
7.2		**25** to **99**	Enter track-warning time in seconds.	
7.3	**ENTER**			
7.4			If system was programmed for one track in step 2.2, proceed to step 8.	
7.5	**TRACK 2**		If system was programmed for two tracks in step 2.2, press **TRACK 2** key and repeat steps 7.1 thru 7.3 for track 2.	
7.6	**TRACK 1**			

Application Programming Procedures (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
8	▼		Default is **3000** feet.	**PROGRAM T1** **APPROACH: 3000** The approach distance display alternates with the computed display: **PROGRAM T1** **COMPUTED: 3240**
8.1	**NEW DATA**			
8.2		0000 to 9999	Enter approach distance in feet.	
8.3	**ENTER**			
8.4			I If system was programmed for one track in step 2.2, proceed to step 9.	
8.5	**TRACK 2**		If system was programmed for two tracks in step 2.2, press **TRACK 2** key and repeat steps 8.1, 8.2, and 8.3 for track 2.	
8.6	**TRACK 1**			

Application Programming Procedures (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
9	▼		Default is 25 seconds.	**PROGRAM UAX1** **PICKUP DELAY: 25**
9.1	**NEW DATA**			
9.2		0 (OFF) to 500	Enter pickup delay time in seconds for UAX 1.	
9.3	**ENTER**			

WARNING

WHEN THE UAX FEATURE IS OFF (0 IS ENTERED), THE FRONT PANEL UAX TERMINALS HAVE NO CONTROL OVER PRIME RELAY DRIVE.

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
10	▼		Default is **25** seconds.	**PROGRAM ENA/UAX2** **PICKUP DELAY: 25**
10.1	**NEW DATA**			
10.2		**0** (**ENA**) to **500**	Enter pickup delay time for UAX 2 in seconds.	

Application Programming Procedures (Continued)

NOTE

When UAX2 is programmed to zero (0) seconds, the terminal functions as ENA with no pickup delay and is typically used for cascading multiple GCP outputs.

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
10.3	**ENTER**			
11	▼		Default is **0** feet.	
11.1	**NEW DATA**			
11.2		**0** to **999**	Enter island distance in feet.	
11.3	**ENTER**			
11.4			If system was programmed for one track in step 2.2, proceed to step 12.	**PROGRAM T1** **ISLAND: 0**
11.5	**TRACK 2**		If system was programmed for two tracks in step 2.2, press **TRACK 2** key and repeat steps 11.1 thru 11.3 for track 2.	
11.6	**TRACK 1**			

Application Programming Procedures (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
12	▼		Default is **0**.	
12.1	**NEW DATA**			
12.2		**0** to **8**	Enter number of DAX's in system.	
12.3	**ENTER**			**PROGRAM NUMBER OF DAXS: 0**
12.4			If 0 (zero) is entered in step 12.2, proceed to step 16.	
12.5			If a number from 1 to 8 is entered in step 12.2, proceed to step 13.	

NOTE

For 3000 GCP's equipped with an 80044 or 80214 processor module, numbers representing four additional DAX circuits (5 through 8) can be entered; however, these entries are reserved exclusively for 8-DAX GCP Models 3008 and 3008D2. Because GCP Models 3000, 3000D2, and 3000D2L can only accommodate a maximum of two DAX modules (four DAX circuits), the parameters for DAX circuits identified as E(5), F(6), G(7), and H(8) will be displayed on these units (if the number of DAX circuits entered is greater than 4), but will be ignored by the system.

Application Programming Procedures (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
13	▼		Default for track 1 is A, C, E, & G Default for track 2 is B, D, F, & H	
13.1	**NEW DATA**			**PROGRAM DAX A** **TRACK: 1**
13.2		**1** or **2**	Enter DAX track assignment (1 for T1 or 2 for T2).	
13.3	**ENTER**			
14	▼		Default is **0** (preempt).	
14.1	**NEW DATA**			**PROGRAM DAX A** **DISTANCE: 0** or **PROGRAM DAX A** **DISTANCE: PREEMPT**
14.2		0 (PREEMPT) to 9999	Enter the DAX offset distance in feet.	
14.3	**ENTER**			

Application Programming Procedures (Concluded)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
15	▼		Default is **35** or **45** seconds depending on Processor module	**PROGRAM DAX A WARNING TIME: 35** or **PROGRAM DAX A WARNING TIME: 45**
15.1	**NEW DATA**			
15.2		**25** to **99**	Enter the DAX warning time in seconds.	
15.3	**ENTER**			
15.4			If two or more DAX's are selected (step 12.2), repeat steps 13 through 15.3 for each additional DAX.	
16	▼		Default is **MASTER**.	**PROGRAM SLAVING MASTER**
16.1	**NEW DATA**		The display toggles between Master and Slave each time the **NEW DATA** key is pressed.	
16.2		MASTER or SLAVE	Select the slaving status for the 3000 GCP case.	
16.3	**ENTER**			

NOTE

Default is **DISABLED**. To leave the password feature in its current status, proceed to step 18.

PASSWORD PROGRAMMING PROCEDURES

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
17	▼		To enable the password feature (**DISABLED** is displayed), proceed to step 17.1.	**PROGRAM PASSWORD DISABLED** or **PROGRAM PASSWORD ENABLED** Display determined by current password status

NOTE

To change the current password code (ENABLED is displayed), proceed to step 17.7. To disable the password feature, proceed to step 17.15.

Enable Password

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
17.1	**NEW DATA**			**ENTER NEW PASSWORD:**
17.2		********	Enter new four-digit password.	
17.3	**ENTER**			**CONFIRM NEW PASSWORD**
17.4		********	Re-enter new password.	
17.5	**ENTER**		Password feature enabled and new password installed.	**PROGRAM PASSWORD ENABLED**
17.6			Proceed to step 18.	

Change Password

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
17.7	**NEW DATA**			**ENTER OLD PASSWORD:**
17.8		********	Enter existing four-digit password.	
17.9	**ENTER**			**ENTER NEW PASSWORD:**
17.10		********	Enter new four-digit password.	
17.11	**ENTER**			**CONFIRM NEW PASSWORD:**
17.12		********	Re-enter new password.	
17.13	**ENTER**		New password installed.	**PROGRAM PASSWORD ENABLED**
17.14			Proceed to step 18.	

Disable Password

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
17.15	**NEW DATA**			**ENTER OLD PASSWORD:**
17.16		********	Enter current four-digit password.	
17.17	**ENTER**		Enter no number	**ENTER NEW PASSWORD:**
17.18	**CLEAR**		Password feature disabled.	**PROGRAM PASSWORD DISABLED**

NOTE

Steps 18 through 25.2 apply to the Data Recorder Module (80015/80115). Perform these steps as required.

DATA RECORDER PROGRAMMING

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
18	▼		Default is **NOT INSTALLED**.	**PROGRAM RECORDER NOT INSTALLED** or **PROGRAM RECORDER INSTALLED** Display determined by current recorder status
18.1	**NEW DATA**		Each time **NEW DATA** key is pressed, entry toggles between **NOT INSTALLED** and **INSTALLED**. If Data Recorder module is installed, select **INSTALLED**. If Data Recorder module is not installed, select **NOT INSTALLED.**	
18.2	**ENTER**		Press **ENTER** key when applicable data recorder option is displayed.	
18.3			If I**NSTALLED** is selected, proceed to step 19.	
18.4			If **NOT INSTALLED** is selected, proceed to step 26.	

EXTERNAL PC OR PRINTER PROGRAMMING

NOTE

Steps 19 through 22.3 set the RS232C interface port parameters to enable the 3000 GCP to communicate with an external PC or printer, and may be performed at a future date prior to downloading recorded data to a PC or printing.

An external PC or printer, may be connected to the data recorder module (80015/801115) via the 9-pin RS232C connector located on the front edge of the module. Refer to the applicable PC software or printer manufacturer's manual to determine the appropriate values to enter.

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
19	▼		Default value for units equipped with 80014 Processor Module is **300**. Default value for units equipped with 80044 or 80214 Processor Module is **9600**.	**PROGRAM RS-232-C BAUD RATE: 9600**
19.1	**NEW DATA**			
19.2	**▲ or ▼**	**300, 1200, 2400, 4800,** or **9600**	Use arrow keys to display the PC/printer baud rate.	
19.3	**ENTER**			

External PC or Printer Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
20	▼		Default value for units equipped with 80014 Processor module is 7. Default value for units equipped with 80044 or 80214 Processor module is 8.	**PROGRAM RS-232-C** **DATA BITS: 8**
20.1	**NEW DATA**			
20.2	**▲ or ▲**	**7** or **8**	Use arrow keys to display the number of data bits for the PC/printer.	
20.3	**ENTER**			
21	▼		Default value for units equipped with 80014 Processor module is 2. Default value for units equipped with 80044 or 80214 Processor module is 1.	**PROGRAM RS-232-C** **STOP BITS: 1**
21.1	**NEW DATA**			
21.2	**▲ or ▲**	**1** or **2**	Use arrow keys to display the number of stop bits for the PC/printer.	
21.3	**ENTER**			

External PC or Printer Programming (Concluded)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
22	▼		Default is NONE.	
22.1	**NEW DATA**			
22.2	**▲ or ▼**	**NONE, ODD, EVEN, MARK**, or **SPACE**	Use arrow keys to display the type of parity used by the PC/printer.	**PROGRAM RS-232-C** **PARITY: NONE**
22.3	**ENTER**			

DATE AND TIME PROGRAMMING

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
23	**▼**			(Example) **PROGRAM DATE** **FRI 03 JAN 2008**
23.1	**NEW DATA**			
23.2		##	Enter the day of the month. The entry must consist of two digits (01, 12, 27, etc.).	
23.3	**▲ or ▼**		Use arrow keys to display the desired month entry.	
23.4	**NEW DATA**			
23.5		####	Enter all four digits for the year entry (1999, 2000, etc.). As the last digit is entered, the applicable day of the week is automatically displayed.	
23.6			Review all time entries and change as necessary.	
23.7	**ENTER**			

Date and Time Programming (Continued)

NOTE

If 24-hour (military) time format is used, be sure to enter the hours in the same format (01, 02 18, etc.).

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
24	▼			
24.1	**NEW DATA**			**PROGRAM TIME**
24.2		##	Enter hours. Entry must consist of two digits (01, 02. etc.).	**12:45:56 (24 HR)**

NOTE

To ensure precise time setting, it may be helpful to set the minutes entry approximately two minutes ahead of the actual time to allow sufficient time to complete steps 24.4 and 24.5 below. Then, when the entered minutes time arrives, step 24.6 can be performed.

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
24.3		##	Enter minutes. Entry must consist of two digits (06,12, 18, etc.).	**PROGRAM TIME 12:45:56 (24 HR)**

Date and Time Programming (Concluded)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
24.4		##	Enter seconds. Entry must consist of two digits (05, 15, 30, etc.).	**PROGRAM TIME 12:45:56 (24 HR)**
24.5	▼ or ▲	24 HR, AM, or PM	Use arrow keys to display desired time format entry.	
24.6	**ENTER**			
24.7			Verify that the seconds portion of the display is now advancing.	
25	▼		Default is **OFF**.	**PROGRAM DAYLIGHT SAVINGS: ON**
25.1	**NEW DATA**		Each time **NEW DATA** key is pressed, entry toggles between **OFF** and **ON**. Select **ON** for daylight savings time. Select **OFF** for standard time.	
25.2	**ENTER**			

EXTENDED APPLICATION PROGRAMMING

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
26	**FUNCTION**		Default is **EZ = 10**.	
26.1	**NEW DATA**			
26.2		**0** (**OFF**) to **100**	Enter EZ level at which predictor to motion sensor switchover occurs.	
26.3	**ENTER**			**T1 SWITCH TO MS**
26.4			If system was programmed for one track in step 2.2, proceed to step 27.	**EZ LEVEL: 10**
26.5	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the **TRACK 2** key and repeat steps 26.1 thru 26.3 for track 2.	
26.6	**TRACK 1**			

NOTE

Safetran Systems software does not support the changes passed by the US Congress in regards to shifting Daylight Savings Time from the traditional dates as has been the case since the change became effective in October/November 2007.

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
27	▼		Default is **0** (OFF)	
27.1	**NEW DATA**			
27.2		**0** (**OFF**) to **500**	Enter the time in seconds that the indicated track circuit will remain in the motion sensor mode before reverting to the grade crossing predictor mode.	**TRANSFER DELAY MS TO GCP T1: OFF**

NOTE

The Transfer Delay and the Advance Preempt Timer functions both exercise control of the MS/GCP CONTROL terminal; therefore, only one of these functions may be used at one time.

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
27.3	**ENTER**			**TRANSFER DELAY MS TO GCP T1: OFF**
27.4			If system was programmed for one track in step 2.2, proceed to step 27.7.	

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
27.5	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the TRACK 2 key and repeat steps 27.1 thru 27.3 for track 2.	
27.6	**TRACK 1**			
27.7			If the system is equipped with an 80214 Processor having a revision level of A01E or later and a transfer delay value of 1 to 500 seconds is set in step 27.2, proceed to step 28.	**TRANSFER DELAY MS TO GCP T1: OFF**
27.8			If the system is equipped with an 80044 Processor module or the transfer delay value set in step 27.2 is **0** (OFF), proceed to step 29.	

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
28	▼		Message display when one or more DAX circuits are selected (step 12.2) and corresponding DAX distance values are assigned (step 14.2). When message displays, proceed to step 28.1. Default is **OFF**.	**TRANSFER MS TO GCP DAX A: OFF**
			Message display when no DAX circuits are selected (step 12.2) or no distance value is set for the assigned DAX (step 14.2). When message displays, proceed to step 29.1. Default is **OFF**.	**PRIME PREDICTION OFFSET T1: OFF**
28.1	**NEW DATA**		Each time **NEW DATA** key is pressed, entry toggles between **OFF** and **ON**.	
28.2	**ENTER**		Press the **ENTER** key when the desired transfer status is displayed.	

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
28.3			If two or more DAX circuits are selected (step 12.2), repeat steps 28 thru 28.2 for each additional DAX circuit.	
28.4	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the **TRACK 2** key and repeat steps 28.1 thru 28.3 for track 2.	**TRANSFER MS TO GCP DAX B: OFF**
28.5	**TRACK 1**			

WARNING

ENTERING AN INCORRECT DAX AND/OR PRIME PREDICTION OFFSET DISTANCE MAY RESULT IN SHORT OR NO WARNING TIME.

WHEN A GCP TRACK CIRCUIT INCLUDES AN ISLAND, DO NOT USE PRIME PREDICTION OFFSET (PPO). WHEN A PPO DISTANCE (OTHER THAN 0) IS ENTERED, THE ISLAND CIRCUIT DOES NOT DE-ENERGIZE THE PRIME OUTPUT. THE WARNING SYSTEM WILL RECOVER WITH A TRAIN OCCUPYING THE ISLAND CIRCUIT AFTER THE PRIME PICKUP TIMER RUNS.

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
29	▼		Default is **0** (OFF)	**PRIME PREDICTION OFFSET T1: OFF**
29.1	**NEW DATA**			
29.2		0 (OFF) to 9999	Enter the prime prediction offset distance for the indicated track in feet.	
29.3	**ENTER**			
29.4			If system was programmed for one track in step 2.2, proceed to step 29.7.	
29.5	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the **TRACK 2** key and repeat steps 29.1 thru 29.3 for track 2.	
29.6	**TRACK 1**			
29.7			If the system is equipped with 80214 Processor Module having a revision level of A01E or later & prime prediction offset is set for a value greater than 0, proceed to step 30.	
29.8			If the prime prediction offset distance is set to OFF, proceed to step 32.	

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
30	▲		Press and release the up arrow (▲) until the **Transfer MS to GCP Prime** message displays.	**TRANSFER MS TO GCP PRIME T1: OFF**
30.1	**NEW DATA**		Each time **NEW DATA** key is pressed, entry toggles between **OFF** and **ON**.	
30.2			Press the ENTER key when the desired transfer timer function is displayed.	
30.3	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the TRACK 2 key and repeat steps 30.1 and 30.2 for track 2.	
30.4	**TRACK 1**			
31	▼		Press and release the down arrow (▼) until the Pickup Delay Prime message displays.	**PICKUP DELAY DAX A: 15**
31.1	**NEW DATA**			
31.2		**8** to **500**	Enter the length of time in seconds from the point at which motion ceases in the approach until the gates pick up.	
31.3	**ENTER**			

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
32	▼		Default is **15** seconds. This step is applicable only when the system is programmed for one or more DAX.	
32.1	**NEW DATA**			
32.2		**0** (**OFF**) to **500**	Enter the length of time in seconds from the point at which motion ceases in the indicated DAX approach until the gates pick up when a train stops in the DAX approach.	**PICKUP DELAY** **DAX A: 15**
32.3	**ENTER**			
32.4			Repeat steps 32 thru 32.3 for each additional DAX circuit in the system (B, C, and D).	
33	▼			**COMPENSATION VALUE T1: 1300**

Extended Application Programming (Continued)

WARNING

THE DEFAULT COMPENSATION VALUE IS AUTOMATICALLY CALCULATED BY THE 3000 GCP SYSTEM. DO NOT CHANGE THIS VALUE WITHOUT PROPER INSTRUCTIONS.

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
33.1	**NEW DATA**			
33.2		1000 to 2000	Enter the compensation value for the track indicated.	
33.3	**ENTER**			
33.4			If system was programmed for one track in step 2.2, proceed to step 33.7.	**COMPENSATION VALUE T1: 1400**
33.5	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the TRACK 2 key and repeat steps 33.1 thru 33.3 for track 2.	
33.6	**TRACK 1**			
33.7			If the system is equipped with an 80044 or 80214 Processor module, proceed to step 34.	

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
33.8			If the system is equipped with an 80014 Processor module, proceed to step 36.	**T1 ENHANCED DETECTION: *OFF**
34	▼		Default is **OFF**.	

WARNING

RUST BUILD-UP ON THE RAILS MAY NOT ALLOW TRACK SHUNTING TO OCCUR EVEN THOUGH ENHANCED DETECTION IS PROGRAMMED TO "ON." IF RUST WERE TO BUILD UP TO A DEGREE THAT NO TRACK SHUNTING OCCURS (EZ DOES NOT CHANGE), THE MODEL 3000 GCP WILL NOT SENSE TRAIN MOVEMENTS.

DO NOT CONNECT THE DC SHUNTING ENHANCER PANEL 80049 TO THE MODEL 3000 GCP UAX (UAX1) TERMINALS IF OTHER WIRES ARE ALREADY CONNECTED TO THESE TERMINALS.

IF THIS CONDITION EXISTS, CONTACT SIEMENS RAIL AUTOMATION CORPORATION ENGINEERING AT 1-800-793-7233 BEFORE PROCEEDING.

Extended Application Programming (Continued)

NOTE

Intermittent poor shunting can result just about anywhere due to numerous causes but generally occurs due to infrequent track usage, lightly weighted cars, passenger and transit operation, spillage from rail cars, and rail contamination.

Lack of any shunting generally occurs in dark territory where no DC or AC track circuits exist and few trains run.

Track shunting in dark territory can be easily improved using methods similar to those employed in style-C track circuits. This involves the use of one insulated joint at the far end of each approach and the application of a DC voltage to the track at the crossing to improve shunting and thus allow the 3000 Enhanced Detection software to function properly.

The Safetran DC Shunting Enhancer Panel, 80049, provides a cost effective solution for improving shunting in dark territory:

- A nominal 6 volts DC is applied to the track at the crossing to break down the film on the rails.
- This DC voltage is isolated from the battery.
- A minimum of two insulated joints are required, one at the far end of each approach.
- The DC Shunting Enhancement Panel can also be easily incorporated in applications involving overlapping approaches from two or more crossings.
- Narrow-band termination shunts must be used. Do not use wideband or hardwire shunts for terminations.

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
34.1	**NEW DATA**		The ED operating mode for track 1 toggles between **ON** and **OFF** each time the **NEW DATA** key is pressed.	
34.2	**ENTER**		Press the **ENTER** key when the desired mode status is displayed.	
34.3			If system was programmed for one track in step 2.2, proceed to step 34.6.	
34.4	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the TRACK 2 key and repeat steps 34.1 and 34.2 for track 2.	**T1 ENHANCED DETECTION: *OFF**
34.5	**TRACK 1**			
34.6			If the ED operating mode is programmed to **ON**, proceed to step 35.	
34.7			If the ED operating mode is programmed to **OFF**, proceed to step 37.	

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
35	▼		Default is **NO**.	
35.1	**NEW DATA**		The back-to-back display toggles between **NO** and **YES** each time the **NEW DATA** key is pressed.	**BACK TO BACK T1 AND T2: NO**

NOTE

Select YES when two unidirectional units are in the same Model 3000 GCP case and the associated approaches are located on opposite sides of the same pair of insulated joints and are at a crossing.

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
35.2	**ENTER**		Press the **ENTER** key when the applicable condition is displayed.	**BACK TO BACK T1 AND T2: YES**
36	▼		Default is **10** seconds.	**STATION STOP TIMER T1: 10**

Extended Application Programming (Continued)

WARNING

IN SOFTWARE VERSIONS J AND EARLIER, WHEN THE STATION STOP TIMER IS PROGRAMMED TO A TIME OTHER THAN 10 SECONDS (MINIMUM VALUE), THERE MUST NOT BE ANY TRAIN MOVES APPROACHING THE CROSSING BETWEEN THE TIME A TRAIN LEAVES THE ISLAND AT THE CROSSING AND THE PROGRAMMED TIME OF THE STATION STOP TIMER ELAPSES.

NOTE

In software versions J and earlier, the Station Stop Timer can be programmed to run for up to a maximum of 500 seconds, but should normally be left at the default setting of **10** seconds. The timer is initiated automatically after a train leaves the island circuit and operates in conjunction with the enhanced detection logic. If the train makes a station stop after passing the crossing, the timer can be programmed for up to 500 seconds to prevent tail rings due to poor shunting after the train has stopped and then departs from the station. This timer is active only if Enhanced Detection is programmed **ON**.

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
36.1	**NEW DATA**			**STATION STOP TIMER T1: 10**
36.2		10 to 500	Enter the required Station Stop Timer value in seconds on the alphanumeric keypad.	

NOTE

This entry is used when a passenger station platform is located within the 3000 GCP approach. The value entered on the keypad establishes the time interval (in seconds) that the train stops in the station.

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
36.3	**ENTER**			**STATION STOP TIMER T2: 10**
36.4			If system was programmed for one track in step 2.2, proceed to step 37.	
36.5	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the **TRACK 2** key and repeat steps 36.1 thru 36.3 for track 2.	

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
36.6	**TRACK 1**			
37	▼		Default is **4**.	**NUMBER OF TRACK WIRES T1: 4**
37.1	**NEW DATA**			
37.2		**4** to **6**	Enter the number of track wires for the indicated track.	
37.3	**ENTER**			
37.4			If system was programmed for one track in step 2.2, proceed to step 37.7.	
37.5	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the TRACK 2 key and repeat steps 37.1 thru 37.3 for track 2.	
37.6	**TRACK 1**			
37.7			If the system is equipped with an 80044 or 80214 Processor module, proceed to step 38.	
37.8			If the system is equipped with an 80014 Processor module, proceed to step 44.	

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
38	▼		Default is **0**. Optional, perform only if needed.	**T1 LOW EX ADJUSTMENT: 0**
38.1			If Low EX Adjustment is required for track 1, proceed to step 38.2; otherwise, proceed to step 38.6.	
38.2	**NEW DATA**			

WARNING

DO NOT ARBITRARILY REDUCE THE EX OPERATING THRESHOLD. IMPROPER ADJUSTMENT MAY CAUSE SHORT OR NO WARNING TIME.

NOTE

The EX operating threshold has already been reduced to 39 in the 80044 and 80214 processors and should be sufficiently low for most applications.

Before reducing the threshold, thoroughly test the ballast at the location to determine whether conditions permit the threshold reduction (see SIG-00-00-02, Model 3000 GCP Instruction and Installation Manual, section 7, paragraph 7.7.3.2 for the Low EX Test Procedure).

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
38.3		**0** to **5**	Enter the low EX threshold adjustment value for the indicated track.	
38.4	**ENTER**			
38.5			If system was programmed for one track in step 2.2, proceed to step 38.8.	
38.6	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the **TRACK 2** key and repeat steps 38.2 thru 38.4 for track 2.	**T2 LOW EX ADJUSTMENT: 0**
38.7	**TRACK 1**			
38.8			If the system is equipped with an 80214 Processor module having a revision level of 9V121 – A01C or later, proceed to step 39.	
38.9			If the system is equipped with an 80044 Processor module or an 80214 Processor module with a revision level of 9V121 – A01B or earlier, proceed to step 44.	

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
39	▼		Default is **OFF.**	**LOW EZ DETECTION** **EZ=70 T1:OFF**
39.1	**NEW DATA**		The entry toggles between **NO** and **YES** each time the **NEW DATA** key is pressed.	

NOTE

When programmed ON this function detects a significant reduction of EZ.

Low EZ detection occurs when EZ is constantly less than 70 for a period of time exceeding the Low EZ Detection Timer value (see paragraph 4.17.4).

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
39.2	**ENTER**		Press the **ENTER** key when the desired EZ detection entry is displayed.	**LOW EZ DETECTION** **EZ=70 T1:OFF**
39.3			If system was programmed for one track in step 2.2, proceed to step 39.6.	

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
39.4	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the **TRACK 2** key and repeat steps 39.1 and 39.2 for track 2.	
39.5	**TRACK 1**			**LOW EZ DETECTION**
39.6			If low EZ detection is programmed to **ON**, proceed to step 40.	**EZ=70 T1:OFF**
39.7			If low EZ detection is programmed to **OFF**, proceed to step 41.	
40	▼		Default is **10** minutes.	
40.1	**NEW DATA**			**LOW EZ DETECTION**
40.2		**02** to **99** minutes	Enter the low EZ detection timer value in minutes.	**TIMER T1: 10**

NOTE

This value is the time between the detection of a low EZ value and the de-energizing of the associated track prime and DAX relay drive outputs.

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
40.3	**ENTER**			**LOW EZ DETECTION TIMER T1: 10**
40.4			If the system is programmed for one track (step 2.2), proceed to step 41.	
40.5	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the **TRACK 2** key and repeat steps 40.1 thru 40.3 for track 2.	
40.6	**TRACK 1**			
41	▼		Default is **OFF**.	**POSITIVE START EZ LEVEL T1: OFF**
41.1	**NEW DATA**			

NOTE

When programmed, the positive start function enables the immediate activation of the crossing warning device whenever the track circuit EZ level drops below the programmed positive start EZ value.

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
41.2		**0** (**OFF**) to **99**	Enter the positive start EZ level value.	**POSITIVE START EZ LEVEL T1: OFF**
41.3	**ENTER**			
41.4			If system was programmed for one track in step 2.2, proceed to step 41.7.	
41.5	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the **TRACK 2** key and repeat steps 41.1 thru 41.3 for track 2.	
41.6	**TRACK 1**			
41.7			If the positive start EZ level value is set to **00** (NONE), proceed to step 43.	
41.8			If the positive start EZ level value is set to a value between **01** and **99**, proceed to step 42.	
42	▼		Default is **NONE**.	**POSITIVE START TIMEOUT T1: NONE**

NOTE

This display appears only when the Positive Start EZ Level option is enabled.

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
42.1	**NEW DATA**			**POSITIVE START TIMEOUT T1: NONE**
42.2		**NONE** (**0**) to **99**	Enter the positive start timeout value.	

NOTE

The programmed value determines when Continuous Positive Start timeout will occur.

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
42.3	**ENTER**			**POSITIVE START TIMEOUT T2: NONE**
42.4			If system was programmed for one track in step 2.2, proceed to step 43.	
42.5	**TRACK 2**		If system was programmed for two tracks in step 2.2, press the TRACK 2 key and repeat steps 42.1 thru 42.3 for track 2.	
42.6	**TRACK 1**			

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
43	▼		Default is **NORMAL**.	**SET AT OPERATION** **OUT: NORMAL**
43.1	**NEW DATA**		The entry toggles between **NORMAL** and **DIAGNOSTICS** each time the **NEW DATA** key is pressed.	

NOTE

This function allows the automatic transfer (AT) output to be utilized either as a drive for an external Automatic Transfer unit or as an error indication signal. To select normal External Automatic Transfer unit operation, select NORMAL. To select the AT error indication function, select DIAGNOSTICS.

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
43.2	**ENTER**		Press the **ENTER** key when the desired automatic transfer function is displayed.	**SET AT OPERATION** **OUT: NORMAL**
43.3			If a Data Recorder Module or a SEAR node is installed, proceed to step 44.	

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
43.4			If no data recorder is installed, proceed to step 46.	
44	▼		Default is **ON**.	**DIAGNOSTIC MESSAGES: ON**
44.1	**NEW DATA**		The entry toggles between **ON** and **OFF** each time the **NEW DATA** key is pressed.	

NOTE

This display appears only when a Data Recorder module is installed or when a SEAR Node has been programmed into the GCP from a SEAR.

When programmed ON, this function allows a large number of new GCP diagnostic messages to be sent to either the Data Recorder module or the SEA/R recorder by the 80214 software.

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
44.2	**ENTER**		Press the **ENTER** key when the desired entry is displayed.	**DIAGNOSTIC MESSAGES: ON**

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
44.3			If Diagnostic Messages are programmed to **ON**, proceed to step 45.	**DIAGNOSTIC MESSAGES: ON**
44.4			If Diagnostic Messages are programmed to **OFF**, proceed to step 46.	
45	▼		Default is **ON**.	**DAX MESSAGES: OFF**
45.1	**NEW DATA**		The entry toggles between **ON** and **OFF** each time the **NEW DATA** key is pressed.	
45.2	**ENTER**		Press the **ENTER** key when the desired entry is displayed.	
46	▼		Default is OFF.	**ADVANCE PREEMPT TIMER: OFF**
46.1	**NEW DATA**			
46.2		**OFF** (**0**) to **99**	Enter the advance preempt timer value.	

NOTE

The value programmed sets the time interval between the start of traffic signal preemption and the maximum delayed start time of the crossing signals.

Extended Application Programming (Continued)

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
46.3	**ENTER**		Press the **ENTER** key when the desired entry is displayed.	**ADVANCE PREEMPT TIMER: OFF**
47	▼		Default is **NORMAL**.	**MOTION SENSING LEVEL T1: NORMAL**

NOTE

This function is normally used in conjunction with Transfer Delay timer operation.

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
47.1	**NEW DATA**			**MOTION SENSING**
47.2		NORMAL 0 to 99	Enter the motion sensor level value.	**LEVEL T1: NORMAL**

NOTE

The motion sensing level function enables control of motion sensitivity.

An entry of 0 (zero) produces a NORMAL indication on the display and establishes motion sensitivity of approximately 30 mph at end of a 3000-foot approach.

Extended Application Programming (Concluded)

NOTE

An entry of 100 produces maximum motion sensitivity of approximately 1 mph at the feed points and 2 mph within the approach(es).

STEP NO.	KEY PRESSED	DATA ENTRY KEY SEQUENCE	COMMENTS	MESSAGE DISPLAYED
47.3	**ENTER**		Press the **ENTER** key when the desired entry is displayed.	**MOTION SENSING LEVEL T2: NORMAL**
47.4			If system was programmed for one track in step 2.2, proceed to step 48.	
47.5			If system was programmed for two tracks in step 2.2, press the **TRACK 2** key and repeat steps 47.1 through 47.3 for track 2.	
48	▼		See step 1.	**SET TO DEFAULT**

NOTE

The routine performed by step 47 was performed in step 1, or it was not required.

CALIBRATION PROCEDURES

WARNING

WHEN INSTALLING, TESTING, OR PERFORMING MAINTENANCE ON OR NEAR A MODEL 3000 GCP SYSTEM, ENSURE ADEQUATE SAFETY PRECAUTIONS ARE TAKEN FOR PERSONNEL, VEHICULAR AND TRAIN TRAFFIC.

NOTE

Before proceeding with calibration, ensure that track bonding is good and that all termination shunts, all insulated joint couplers, and all track isolation devices (battery chokes, code isolation units, etc.) are installed.

If the 3000 GCP is calibrated under poor ballast conditions, it may require recalibration when the ballast conditions improve.

If the GCP is equipped with either an 80044 or 80214 processor, verify that the Enhanced Detection mode in the Function menu is programmed “OFF” prior to performing the following procedures.

Turn off Cab Signal (60 or 100 Hz) before performing calibration.

Verify approaches before proceeding with calibration. Working from one end of the track circuit to the other, measure and mark termination and 50% points.

To perform calibration and linearization, the following equipment is required:

- Hardwire shunt
- Model 3000 GCP History Card
- Measuring Wheel
- Fluke 73 or equivalent meter

AUTOMATIC SWITCH OVER SYSTEMS ONLY (MAIN UNIT)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
1		If GCP is a dual system with switchover, set transfer switch on the Transfer Timer Module (80023, 80028, 80037) to MAIN	**STATUS T1** **EZ: 99 EX: 99**

SETUP FOR CALIBRATION – TRACK 1 AND TRACK 2

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
2		If cab signal is used, turn it off at this time.	
2.1	**TRACK 1**		
2.2	**SETUP** **(press & hold)**	Release key when display at right appears	**SETUP T1 FOR CALIBRATION**

SETUP FOR CALIBRATION – TRACK 1 AND TRACK 2 (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
2.3	**ENTER**	If GCP is a dual system with switchover, set transfer switch on the Transfer Timer Module (80023, 80028, 80037) to MAIN	**SETUP T1** **IN PROGRESS: #**

NOTE

Setup requires approximately 70 seconds to complete.

- The number at the right end of the lower display line (in the MESSAGE DISPLAYED column above) increases to 6 as setup progresses.
- Once automatic setup has begun, pressing any key on the keyboard aborts the setup procedure.
- When setup is complete, the message “Setup T1 Complete” is displayed for approximately 2 seconds

SETUP T1
COMPLETE

A status display similar to that shown in steps 2.4 and 2.5 below then appears.

The EZ and EX values displayed are calibrated values.

- The EZ value should be between 98 and 102
- EX should be between 50 and 100. If the EX value is 40 or lower (possibly even a negative value), phasing of the 3000 track wires may be incorrect.

SETUP FOR CALIBRATION – TRACK 1 AND TRACK 2 (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
2.4		If EX is 40 or lower and EZ is 115 or higher, refer to the troubleshooting section of this handbook.	
2.5		Record the EZ and EX values from the status display on History Card (see next page for sample). EZ should be between **98** and **102** EX should be between **50** and **100**	**STATUS T1** **EZ: 99 EX: 99**

SETUP FOR CALIBRATION – TRACK 1 AND TRACK 2 (Continued)

CALIBRATION HISTORY

80012 DC VOLTAGE READINGS AFTER CALIBRATION		CALIBRATION HISTORY EZ/EX VALUES TRACK UNOCCUPIED		LINEARIZATION HISTORY						
				HARDWIRE SHUNT AT TERMINATION SHUNT			HARDWIRE SHUNT AT 50 PERCENT POINT OF TRACK			
T1	T2	EZ	EX	EZ VALUE	EX VALUE	EZ VALUE / 2	NO LINEARIZATION		LINEARIZATION COMPLETE	
Z1=	Z1=						EZ	EX	STEP ±	EZ
Z2=	Z2=									
EAST/NORTH	TRACK 1	100	87							
WEST/SOUTH	TRACK 1									
EAST/NORTH	TRACK 2									
WEST/SOUTH	TRACK 2									

"CALIBRATION HISTORY" section on back of History Card with example track 1 EZ and EX values.

NOTE

Located at the lower front edge of the 80012 module are three test jacks labeled "Z1", "Z2" and "COM". In a normally operating system, a DC voltage ranging from 7.5 to 10.0 will be present on both Z1 and Z2 (same voltage level on Z1 and Z2). This voltage level varies depending on ballast and approach length.

SETUP FOR CALIBRATION – TRACK 1 AND TRACK 2 (Concluded)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
2.6		Measure and record the Z1 and Z2 values for the track being calibrated in the appropriate space on History Card (see next page for sample).	**STATUS T1 EZ: 99 EX: 99**
2.7		If Z1 and Z2 values are higher or lower than the normal range or are different by more than 0.5 volt, refer to the troubleshooting section of this handbook.	
2.8	**TRACK 2**	If GCP is dual track system, repeat steps 2.2 through 2.7 for track 2.	**STATUS T2 EZ: 99 EX: 99**
2.9		If the cab signal was turned off in step 2, turn it on.	

SETUP FOR APPROACH LENGTH AND LINEARIZATION (COMBINED CALIBRATION PROCEDURE)

WARNING

INSULATED JOINT BYPASS COUPLERS, 62531-F AND 62631-F MUST NOT BE USED WITH THE MODEL 3000 GCP.

THE MINIMUM DISTANCES TO THE INSULATED JOINTS SPECIFIED IN THE INSTRUCTION AND INSTALLATION MANUAL APPLY TO THE MODEL 3000 GCP ONLY; NOT TO ANY OF THE EARLIER SAFETRAN GCP'S (MODELS 660, 600, 400, AND/OR 300).

Setup for Approach Length and Linearization (Continued)

WARNING

WHEN THE MODEL 3000 GCP IS PROGRAMMED AS A PREDICTOR, THE 62785-F INSULATED JOINT BYPASS COUPLER CANNOT BE USED TO BYPASS INSULATED JOINTS WITHIN THE INNER TWO-THIRDS OF AN APPROACH, EXCEPT AS SPECIFIED IN SIG-00-00-02, MODEL 3000 GCP INSTRUCTION AND INSTALLATION MANUAL, TABLE 3-13 F.

THE SETUP FOR APPROACH LENGTH AND LINEARIZATION CALIBRATION PROCEDURE MUST BE PERFORMED AT EACH INSTALLATION TO ENSURE WARNING TIME ACCURACY.

NOTE

The setup for approach length and setup for linearization procedures are combined into a single procedure to simplify track-shunting requirements.

- The combined procedure calculates a modified approach length based on actual approach length (distance to the termination shunt from the crossing track wires) plus the electrical characteristics of the termination shunt and any simulated track placed in series with the shunt.
- This procedure is essential to achieving warning time accuracy, especially for DAX and prime prediction offset circuits.

Setup for Approach Length and Linearization (Continued)

NOTE

The linearization procedure compensates for lumped loads in the 3000 GCP approach that can affect the linearity of EZ over the length of the approach and thus is also essential to achieving warning time accuracy.

The types of loads that can affect linearity include:

- Narrow-band shunts of other frequencies in the 3000 GCP approaches. This may occur when MS/GCP approaches overlap in unidirectional or bidirectional installations.
- Other track equipment in the 3000 GCP approaches such as audio frequency overlays, coded track, etc.
- Missing or incorrect type battery chokes.

The following items are required to perform Approach Length and Linearization:

- One (1) Hardwire shunt
- One (1) Model 3000 GCP History Card

Setup for Approach Length and Linearization (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
3		If GCP is equipped with either an 80044 or 80214 processor, verify that Enhanced Detection mode in Function menu is programmed "**OFF**" before attempting approach length and setup for linearization procedures**.**	**STATUS T2** **EZ: 99 EX: 99**
3.1	**TRACK 1** or **TRACK 2**	If **TRACK 2** pressed, T2 will replace T1 in display examples.	

NOTE

Where applicable, record the requested information at each step on the Application History Card.

The programmed approach length recorded on the History Card is the distance from the termination shunt to the GCP track wires at the crossing. For bidirectional applications, the recorded value is the longest shunt-to-wire distance. Measure and record this distance accurately (within ± 1% of actual distance.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
3.2		Place hardwire shunt across termination shunt.	

Setup for Approach Length and Linearization (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
3.3		Record EZ value at termination shunt on the History Card (see sample on Page 66). For example: East Track 1 EZ value at termination shunt: **88**	**STATUS T1** **EZ: 88 EX: 99**
3.4		Divide the EZ value recorded in step 3.3 by 2. The result is the calculated EZ value at the 50% point in the approach. Record the calculated EZ/2 value on the History Card (see example on Page 66). For example: East Track 1 Calculated EZ/2 = 88/2 = **44**	

NOTE

Depending on frequency, type of termination shunt and approach length, EZ values down to the high 60's may occur.

Simulated track inductors in series with the termination shunt will also affect EZ values.

Setup for Approach Length and Linearization (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
3.5		Remove hardwire shunt from across the termination shunt, accurately locate the 50% point (±1%) and place the hardwire shunt at that point.	
3.6		Record EZ value at 50% point on the History Card (see sample on Page 66). For example: East Track 1 "No Linearization" EZ value at 50% point of approach: **40** Remove the hardwire shunt.	**STATUS T1** **EZ: 80 EX: 99**
3.7		If unidirectional (or simulated bidirectional) proceed with step 3.14. Otherwise, install the hardwire shunt at the 50% point of the other approach.	
3.8		Record EZ value at 50% point on the History Card (see sample on Page 66). For example: West Track 1 "No Linearization" EZ value at 50% point of approach: **35**	

Setup for Approach Length and Linearization (Continued)

CALIBRATION HISTORY

80012 DC VOLTAGE READINGS AFTER CALIBRATION		CALIBRATION HISTORY		LINEARIZATION HISTORY						
		EZ/EX VALUES TRACK UNOCCUPIED		HARDWIRE SHUNT AT TERMINATION SHUNT			HARDWIRE SHUNT AT 50 PERCENT POINT OF TRACK			
T1	T2	EZ	EX	EZ VALUE	EX VALUE	EZ VALUE / 2	NO LINEARIZATION		LINEARIZATION COMPLETE	
Z1=9.5	Z1=						EZ	EX	STEP ±	EZ
Z2=9.5	Z2=									
EAST/NORTH	TRACK 1	100	87	88		44				
WEST/SOUTH	TRACK 1									
EAST/NORTH	TRACK 2									
WEST/SOUTH	TRACK 2									

"CALIBRATION HISTORY" section on back of History Card with values measured and calculated based on previous examples entered.

Setup for Approach Length and Linearization (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
3.9		Remove the hardwire shunt from the 50% point and install it across the termination shunt in the same approach.	
3.10		Record EZ value at termination shunt on the History Card (see sample Page 68). For example: West Track 1 EZ value at termination shunt: **92** Remove the hardwire shunt.	
3.11		Divide the EZ value recorded in step 3.10 by 2. The result is the calculated EZ value at the 50% point in the approach. Record on History Card (see sample next page). For example: West Track 1 Calculated EZ/2 = 92/2 = **46**	
3.12		Record the calculated EZ value for the 50% point in the approach on the History Card (see sample on page 68).	

Setup for Approach Length and Linearization (Continued)

CALIBRATION HISTORY

80012 DC VOLTAGE READINGS AFTER CALIBRATION		CALIBRATION HISTORY EZ/EX VALUES TRACK UNOCCUPIED		LINEARIZATION HISTORY						
				HARDWIRE SHUNT AT TERMINATION SHUNT			HARDWIRE SHUNT AT 50 PERCENT POINT OF TRACK			
T1	T2	EZ	EX	EZ VALUE	EX VALUE	EZ VALUE / 2	NO LINEARIZATION		LINEARIZATION COMPLETE	
Z1=9.5	Z1=						EZ	EX	STEP ±	EZ
Z2=9.5	Z2=									
EAST/NORTH	TRACK 1	100	87	88		44	40			
WEST/SOUTH	TRACK 1			92		46	35			
EAST/NORTH	TRACK 2									
WEST/SOUTH	TRACK 2									

"CALIBRATION HISTORY" section on back of History Card with values measured and calculated based on previous examples entered.

Setup for Approach Length and Linearization (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
3.13	**SETUP (press & hold)**	Hold for approximately 3 seconds, then release.	
3.14	▼	Press until this message displayed.	**SETUP T1 FOR APPROACH LENGTH**
3.15	**ENTER**		**TERMINATE T1 APPROACH EZ: XX**
3.16	**NEW DATA**		
3.17		From the History Card "**CALIBRATION HISTORY**" section, select the smaller EZ value recorded at the termination shunts and enter this number into the GCP. Note: From the previous examples, this is the East Track 1 value (**88**).	**TERMINATE T1 APPROACH EZ: 88**

NOTE

If one approach has a simulated track inductor installed to balance the approach lengths, use the EZ value from the other approach.

Setup for Approach Length and Linearization (Concluded)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
3.17	**ENTER**	The display alternates between the programmed approach length and the computed approach length. (Values shown at right are examples and may vary)	**PROGRAM T1** **APPROACH: 3000** **PROGRAM T1** **COMPUTED: 3400**
3.18		Record the programmed (SELECTED) and COMPUTED approach distances on the front of the History Card (see figure below).	

WARNING TIME SELECTED	T1:_____ Sec.	_____ Sec.	_____ Sec.
	T2:_____ Sec.	_____ Sec.	_____ Sec.
APPROACH DISTANCE → SELECTED	T1: **3000** Ft.	_____ Ft.	_____ Ft.
	T2:_____ Ft.	_____ Ft.	_____ Ft.
→ COMPUTED	T1: **3400** Ft.	_____ Ft.	_____ Ft.
	T2:_____ Ft.	_____ Ft.	_____ Ft.
UAX1 PICKUP DELAY (UAX) (0 = OFF)	_____ Sec.	_____ Sec.	_____ Sec.

Figure shows portion of front of History Card with approach distances entered.

LINEARIZATION

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
4		If unidirectional, go directly to Step 4.2. If bidirectional, go to Step 4.1.	
4.1		From the "CALIBRATION HISTORY" (see example on Page 68), compare the highest recorded "NO LINEARIZATION" EZ value at the 50% point with the corresponding calculated EZ/2 value. From the example, the highest recorded EZ at the 50% point is 40 for East Track 1. If the two values are within ±1 of each other, no further action is required for this installation. Proceed to Step 4.9. If the EZ values are not within ±1 of each other, LINEARIZATION steps will be required. Go to Step 4.2.	
4.2	**SETUP (press & hold)**	Hold for approximately 3 seconds, then release	**SETUP T1 FOR CALIBRATION**
4.3	▼	Press until this message displayed.	**SETUP T1 FOR LINEARIZATION**

Linearization (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
4.4	**ENTER**		**LINEARIZATION T1** **VALUE: +0 EZ : 99**

NOTE

Steps 4.5, 4.6 and 4.7 calculate the correction steps needed to maintain the linearity of EZ over the length of the approach. The examples shown utilize the values provided in the History Card on Page 68.

Linearization (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
4.5		Subtract the EZ value recorded in step 3.8 from the EZ/2 value calculated in step 3.6. Example: EZ/2 – EZ = delta (Δ) value 44 – 40 = + 4	**LINEARIZATION T1** **VALUE: +0 EZ : 99**

Linearization (Continued)

NOTE

When the EZ value is greater than the calculated EZ/2 value the Δ value has a negative (-) value. If the EZ value measured was 49 then 44 - 49 = - 5 and a negative value (-10) to be entered in step No. 4.6.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
4.6		Multiply the Δ value calculated in step 4.5 by 2 to obtain the linearization correction steps. Example: +4 x 2 = + 8 (plus 8 steps)	
4.7		Record the linearization correction steps obtained in step 4.7 on the History Card (see Page 75).	
4.8	**NEW DATA**	The cursor flashes in the first digit of the **LINEARIZATION STEP** value.	**LINEARIZATION T1** **VALUE: +_0 EZ : 99**
4.9	▲ or ▼	Press the up arrow for positive steps or the down arrow for negative steps until the required number of steps is displayed with the proper sign (+ or -).	
	ENTER	Enters the **LINEARIZATION STEP** value. Record the **LINEARIZATION STEP** value and its sign (+/-) on the History Card (see Page 75).	

Linearization (Continued)

NOTE

If the LINEARIZATION steps exceed ± 25, an abnormal lumped load may exist and the condition should be investigated. This may be the result of an incorrect termination shunt frequency or a shunt location in the 3000 GCP approach. It may also be the result of high resistance bonds, improperly installed battery chokes or defective joint couplers.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
4.9	**TRACK 2**	For two-track systems, press the **TRACK 2** key and repeat steps 3.2 through 4.8 for track 2. At completion of step 4.8, proceed to step 4.10.	
4.10		If the Enhanced Detection mode in the Function menu was originally programmed **ON** and then programmed to **OFF** in Step 3, program the Enhanced Detection mode again to **ON**.	
4.11	**SYSTEM STATUS**	The Model 3000 GCP returns to the System Status Mode. Actual EZ and EX values may vary from those shown.	**STATUS T1** **EZ: 100 EX: 87**

Linearization (Concluded)

CALIBRATION HISTORY

80012 DC VOLTAGE READINGS AFTER CALIBRATION		CALIBRATION HISTORY		LINEARIZATION HISTORY						
		EZ/EX VALUES TRACK UNOCCUPIED		HARDWIRE SHUNT AT TERMINATION SHUNT			HARDWIRE SHUNT AT 50 PERCENT POINT OF TRACK			
T1	T2	EZ	EX	EZ VALUE	EX VALUE	EZ VALUE / 2	NO LINEARIZATION		LINEARIZATION COMPLETE	
Z1=9.5	Z1=						EZ	EX	STEP ±	EZ
Z2=9.5	Z2=									
EAST/NORTH	TRACK 1	100	87	88		44	40		+8	
WEST/SOUTH	TRACK 1			92		46	35			
EAST/NORTH	TRACK 2									
WEST/SOUTH	TRACK 2									

"CALIBRATION HISTORY" section of History Card with LINEARIZATION steps recorded

ISLAND ADJUSTMENT (80011 MODULE) – TRACK 1 AND TRACK 2

NOTE

If the 3000 GCP includes one or two island modules (80011), perform the following island circuit adjustment procedure for track 1 first (leftmost 80011 module in the case) then for track 2, if applicable.

If the microprocessor-based Intelligent Processor Island (IPI) module (80211) is used in place of the 80011, skip steps 5 through 5.7 and perform the island calibration procedure in steps 6 through 6.14 (pages 80 – 86)**.**

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
5		Determine the island frequency of the track circuit to be adjusted.	
5.1		Temporarily install a hardwire shunt at the distance beyond the island receiver rail connections specified for the corresponding island frequency in the Shunt Distance Chart (80011 Module) on the following page.	

Island Adjustment (80011 Module) (Continued)
Shunt Distance Chart (80011 Module)

ISLAND FREQUENCY (KHZ)	0.12 OHM SENSITIVITY SHUNT DISTANCE (FT)	0.3 OHM SENSITIVITY SHUNT DISTANCE (FT)	0.4 OHM SENSITIVITY SHUNT DISTANCE (FT)	0.5 OHM SENSITIVITY SHUNT DISTANCE (FT)
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

NOTE:

For all installations where poor shunting has been experienced or is anticipated, 0.3 ohm shunting sensitivity calibration is recommended.

Island Adjustment (80011 Module) (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
5.2		Adjust island module (80011) gain potentiometer (**ADJ**) CW until island module **STATUS LED** indicator lights, then slowly adjust potentiometer CCW until the indicator just extinguishes.	

NOTE

At some installations, the **STATUS LED** indicator may not light even when the island gain potentiometer is adjusted to the fully CW position. However, this condition is satisfactory provided the indicator lights when the hardwire shunt installed in step 5.1 is removed from the rails.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
5.3		Remove the hardwire shunt installed in step 5.1 from the rails.	

CAUTION

LOWERING THE ISLAND FREQUENCY MAY BE REQUIRED IN LONGER CIRCUITS WITH POOR BALLAST CONDITIONS.

Island Adjustment (80011 Module) (Concluded)

NOTE

At installations where poor island shunting is encountered, an adjustment procedure using 0.3 ohm shunting sensitivity is recommended.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
5.4		Shunt the island receiver track wires with a 0.06-ohm shunt. Verify that the appropriate Island Relay Drive is deenergized and the crossing is activated.	
5.5		Remove the shunt.	
5.6		Shunt the island transmitter track wires with a 0.06-ohm shunt. Verify that the appropriate Island Relay Drive is deenergized and the crossing is activated.	
5.7		Remove the 0.06-ohm shunt.	

ISLAND ADJUSTMENT (80211 MODULE) – TRACK 1 AND TRACK 2

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
6		Cycle GCP case power and note the software version of the IPI Module.	

NOTE

The software version is identified on the IPI display for approximately 5 seconds at power up.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
6.1		Set the Model 3000 GCP case **POWER** switch to the **OFF** position. Remove the Intelligent Processor Island (IPI) Module 80211 from the case.	
6.2		Select the desired IPI operating frequency by installing the provided shorting block across the appropriate pair of frequency selection pins on the 16-position header.	
6.3		If the software version noted in step 6 is A01D or earlier, proceed to step 6.6.	

Island Adjustment (80211 Module) (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
6.4		On modules running software version A01E or later set the pickup delay time for the IPI module as required using the A and B header positions.	

NOTE

Modules running software version A01E and later are supplied with two pickup delay time selection jumpers.

Pickup Delay Jumper Placement

INSTALL JUMPER IN THESE HEADER POSITIONS	PICKUP DELAY TIME ADDED (SECONDS)
A & B	0
A	2
B	4
NO JUMPER ON A OR B	6

Island Adjustment (80211 Module) (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
6.5		Reinstall the IPI Module in the case	
6.6		Set the Model 3000 GCP case **POWER** switch to the **ON** position.	

NOTE

Make sure that power is applied to the IPI module for a minimum of 20 seconds before proceeding to step 6.7. Only one frequency selection jumper is allowed. A missing frequency jumper, or two or more frequency jumpers render an invalid selection.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
6.7		Temporarily install a **hardwire** shunt at the appropriate distance beyond the receiver rail connections as specified in the Shunt Distance Chart (80211 Module) on the next page.	

NOTE

The island circuit Shunt Distance Chart provides shunt distance values for shunting sensitivities of 0.12, 0.3, 0.4, and 0.5 ohms for areas where poor shunting is a problem.

Island Adjustment (80211 Module) (Continued)
Shunt Distance Chart (80211 Module)

ISLAND FREQUENCY (KHZ)	0.12 OHM SENSITIVITY SHUNT DISTANCE (FT)	0.3 OHM SENSITIVITY SHUNT DISTANCE (FT)	0.4 OHM SENSITIVITY SHUNT DISTANCE (FT)	0.5 OHM SENSITIVITY SHUNT DISTANCE (FT)
2.14	20.0	50	67	84
2.63	17.0	43	58	72
3.24	13.0	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

Island Adjustment (80211 Module) (Continued)

NOTE

For all installations where poor shunting has been experienced or is anticipated, a 4-second pickup delay jumper setting and 0.3 ohm shunting sensitivity calibration are recommended.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
6.8		Press and hold the IPI calibration select push button for 2 seconds until **REL** (release) appears on the display. Immediately release the push button and then momentarily press it again within 2 seconds. The automated calibration process starts and **CAL*** appears on the display.	**CAL***

NOTE

The IPI module remains in the automatic Calibration mode for approximately 20 seconds. During the calibration process, the display indicates **CAL*** for 6 seconds, **DONE** momentarily, **BOOT** for 9 seconds, and then the software revision level is displayed for 5 seconds. When the calibration process is complete, the IPI operating frequency is displayed (alternates with pickup delay setting when running A01E and later software versions).

Island Adjustment (80211 Module) (Continued)

NOTE

If **FAIL** appears on the display, the calibration process did not complete. Should this happen, cycle the IPI power and then repeat steps 6.7 and 6.8. If **FAIL** appears again, review application and/or replace module.

NOTE

In certain applications with adverse ballast conditions the IPI track circuit may experience interference from islands with the same frequency at distances further than 5000 feet away.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
6.9		Once the calibration cycle is complete and the IPI operating frequency (and pickup delay if applicable) appears on the display, verify the following: • That the frequency is correct • The pickup delay setting is correct (if applicable) • That the IPI STATUS indicator is off • That the IPI relay drive voltage is 0 VDC	

Island Adjustment (80211 Module) (Concluded)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
6.10		Remove the hardwire shunt installed in step 6.7 and then verify the following: • That IPI STATUS indicator is lit • That IPI relay drive voltage is more than 10 VDC	
6.11		Shunt the island receiver track wires with a 0.06-ohm shunt. Verify that the appropriate Island Relay Drive is deenergized and the crossing is activated.	
6.12		Remove the shunt.	
6.13		Shunt the island transmitter track wires with a 0.06-ohm shunt. Verify that the appropriate Island Relay Drive is deenergized and the crossing is activated.	
6.14		Remove the shunt.	

AUTOMATIC SWITCH OVER SYSTEMS ONLY (STANDBY UNIT)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
7		If either of the following conditions exists, set the **STBY/AUTO/MAIN** transfer switch located on the associated transfer timer module to the **STBY** position. Otherwise proceed to **OPERATIONAL CHECKS**. • The GCP is a dual system with automatic switch over. • Two Model 3000 GCP's are operated in conjunction with an 80024 Automatic Transfer Timer Unit. Repeat steps 2 through 6.14 on the standby unit. At completion of step 6.14, proceed to step 8	

NOTE

The following dual-system GCP models incorporate automatic switchover: 3000D2, 3000D2L, 3008D2, and 3000ND2.

If necessary, move keyboard / display assembly to the standby module set (lower bay in 3000D2 and 3008D2 units, and center of case in 3000D2L).

DAX SETTING ON TRANSFER TIMER MODULE (80027/80028)

(3000DW, 3000D2L, 3008D2, AND 3000ND2 UNITS ONLY)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
8		Set the 3000 GCP case **POWER** switch to **OFF.**	
8.1		Remove the transfer timer module (80028/80037) from the case.	
(3000D2, 3000D2L, and 3000ND2 units)			
8.2		Set the Transfer Timer module DAX selection switch(es) according to the following: • If an 80028 Transfer Timer module is used in a 3000D2 or 3000D2L unit, configure switch S1 on the module to correspond to the DAX's programmed for the system. For example, when A and B DAX circuits are used, S1 is set as follows: o Slide the controls for sections A and B to the DAX used position (labeled on left side of switch). o Slide the controls for sections C and D to the **DAX NOT USED** position (labeled on right of switch).	

DAX Setting on Transfer Timer Module (Concluded)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
		• If an 80028 Transfer Timer module is used in a 3000ND2 unit, set all switch S1 sections to the **DAX NOT USED** position. • If an 80037 Transfer Timer module is used in a 3008D2 unit, configure switches SW1 and SW2 on the module to correspond to the DAX circuits programmed for the system. For example, when DAX circuits A through F are used, SW1 and SW2 are set as follows: o Slide the controls for switch SW2 sections A, B, C, and D (labeled on board) to the DAX used position. o Slide the controls for switch SW1 sections E and F, (labeled on board) to the DAX used position. o Slide the controls for SW1 sections G and H to the DAX NOT USED position (labeled to right of switch).	
8.3		Return the transfer timer module to its original card slot in the GCP case.	
8.4		Set the GCP case **POWER** switch to the **ON** position.	

AUTOMATIC SWITCHOVER TEST

MODELS 3000D2, 3000D2L, 3008D2, AND 3000ND2 AND MODELS 3000 AND 3000ND OPERATE IN CONJUNCTION WITH EXTERNAL AUTOMATIC TRANSFER TIMER UNIT, 80024

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
9		On the automatic transfer timer module (80028, 80037, or 80023), set **STBY/AUTO/MAIN** transfer switch to the **AUTO** (center) position.	
9.1		**80028 or 80037 automatic transfer timer module:** Momentarily press the **RESET** switch to the up position until the **XFER LED** on the 80028/80037 module lights. **80024 automatic transfer timer unit:** Momentarily press the **RESET** push button until the **NO XFER WHEN LIT LED** indicator on the 80024 unit lights.	
9.2		On the automatic transfer timer module, press and hold the **TEST** switch in the **TEST** position until the corresponding **XFER** LED is extinguished. Transfer to the standby module set should occur within 4 seconds, verifying that the timer is operational.	

Automatic Switchover Test (Concluded)

NOTE

During normal operation, transfer occurs within 3 minutes (factory default setting) if a failure is detected in one module set. A different transfer time interval can be selected via DIP switch **S1** (80023), **S4** (80028), or **SW3** (80037).

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
9.3		**80028 or 80037 automatic transfer timer module:** Set the RESET switch to the RESET (up) position. **80024 automatic transfer timer unit:** Momentarily press the RESET push button.	
9.4		Verify that the main GCP module set is operating and the **XFER LED** indicator on the 80028/80037 module or the **NO XFER WHEN LIT LED** indicator on the 80024 unit (whichever is applicable) is lighted. The unit is now ready to perform the transfer function in the event a module failure is detected. (Continue to Operational Checks.)	

NOTE

If necessary, return the keyboard/display assembly to its original position in the main module set.

OPERATIONAL CHECKS AND PERIODIC MAINTENANCE

WARNING

PRIOR TO PERFORMING OPERATIONAL CHECKS ON A MODEL 3000 GCP SYSTEM, ENSURE ADEQUATE SAFETY PRECAUTIONS ARE TAKEN FOR PERSONNEL, VEHICULAR, AND TRAIN TRAFFIC.

NOTE

Prior to performing operational checks, verify the EZ values for approach(es) are within acceptable limits (EZ should be between 98 and 102).

Following system calibration and prior to placing the system in service, perform the operational checks, memory clear functions (optional) and Input and Output tests described in the following procedures.

Also located at the end of this section are periodic maintenance recommendations.

UAX CHECKOUT

WARNING

WHEN THE UAX FEATURE IS OFF (NO TIME ENTERED); THE UAX TERMINALS ON THE GCP FRONT PANEL HAVE NO CONTROL OVER MS/GCP RELAY DRIVE.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
1		**3000 GCP programmed for UAX (value other than 0 entered in Program menu for UAX pickup delay time):** Momentarily remove the wire connected to **TB2-7** (+UAX) (**TB3-7** on 8-DAX units) and verify that the crossing protection activates immediately. Otherwise, proceed to step 1.7.	
1.1		Return the wire removed in step 1 to the +UAX terminal.	
1.2		Verify that the crossing protection continues to operate for the length of time programmed for the UAX pickup delay.	
1.3		Deenergize the line circuit that controls the UAX terminals at the far end.	
1.4		Verify that the UAX is deenergized while the line circuit is deenergized and that the crossing activates.	

UAX Checkout (Concluded)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
1.5		Reenergize the line circuit.	
1.6		**If 3000 GCP ENA/ UAX2 pickup delay time is set to 0:** Go to step 2.	
		If 3000 GCP ENA/ UAX2 pickup delay time is set to greater than 0: Momentarily remove the wire connected to TB1-5 (ENA) and verify that the crossing protection activates immediately.	
1.7		Return the wire removed in step 1.6 to the ENA terminal.	
1.8		Verify that the crossing protection continues to operate for the length of time programmed for the UAX2 pickup delay.	
1.9		Deenergize the line circuit that controls the ENA terminal at the far end.	
1.10		Verify that UAX2 is deenergized while the line circuit is deenergized and that the crossing activates.	
1.11		Reenergize the line circuit.	

TRACK WIRE VERIFICATION (TRACK WIRE ROUTING/CONNECTION TEST)

NOTE

Failure of the following tests indicates problems in the track wire routing and/or connections.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
2	**STATUS**	**Display at right appears (actual EZ and EX values may vary).**	**STATUS T1** **EZ: 99 EX: 97**
2.1	**TRACK 1**	Select track 1.	
2.2		Remove one transmit wire from the rail connection and verify the following: • Crossing activates • Associated island circuit (if used) deactivates • Displayed EZ value changes to 0 • Error 8113 (T1) or 8117 (T2) displays	**STATUS T1** **EZ: 0 EX: 106** alternates with **ERROR 8113 <1>** **T1 XMIT CURRENT**
2.3		Verify 0 VDC at test jacks Z1 and Z2 of 80012 Transceiver module for associated track.	
2.4		Replace transmit wire and allow GCP to time out.	
2.5		Clear error messages from memory (OPERATIONAL CHECKS steps 4 through 4.2)	

Track Wire Verification (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
2.6	**STATUS**	Display at right appears (actual EZ and EX values may vary).	**STATUS T1** **EZ: 99 EX: 97**
2.7		Remove one receive wire from the rail connection and verify the following: • Crossing activates • Associated island circuit (if used) deactivates • Displayed EZ value changes to 0 • Error 9111 (T1) or 9112 (T2) displays	**STATUS T1** **EZ: 0 EX: 106** alternates with **ERROR 9111 <1>** **T1 GAIN CHECK**
2.8		Verify 0 VDC at test jack **Z1** and 7.5 to 10.0 VDC at **Z2** of 80012 Transceiver Module for associated track.	
2.9		Replace receive wire and allow GCP to time out.	
2.10		Clear error messages from memory (**OPERATIONAL CHECKS** steps 4 through 4.2)	
2.11	**STATUS**	The display at right appears (actual EZ and EX values may vary).	**STATUS T1** **EZ: 99 EX: 97**

Track Wire Verification (Concluded)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
2.12		Place a hardwire shunt across the tracks at the transmit wire connections and verify the following: • Associated island circuit (if used) deactivates • Displayed EZ value changes to less than 2	
2.13		Verify less than 0.25 VDC at test jacks **Z1** and **Z2** of 80012 Transceiver Module for associated track.	
2.14		Remove the hardwire shunt (step 2.12), place it across the tracks at the receive wire connections and verify the following: • Associated island circuit (if used) deactivates • Displayed EZ value changes to less than 2	
2.15		Verify the following at test jacks **Z1** and **Z2** of 80012 Transceiver Module for associated track: • Less than 0.25 VDC at Z1 • In 4-wire applications, less than 2.0 VDC at Z2 • In 6-wire applications, less than 0.25 VDC at Z2	
2.16		Remove the shunt installed in step 2.14	
2.17	**TRACK 2**	If unit services two tracks, select **TRACK 2** and repeat steps 2.2 - 2.16.	

OPERATIONAL PERFORMANCE CHECKS

NOTE

Located at the lower front edge of the 80012 module are three test jacks labeled "Z1", “Z2” and “COM”. In a normally operating system, a DC voltage ranging from 7.5 to 10.0 will be present on both Z1 and Z2 (same voltage level on Z1 and Z2). This voltage level varies depending on ballast and approach length.

System operational performance must be verified by observing system operation and the change in EZ during inbound train moves on each approach. Proceed with the operational checks below:

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
3	**STATUS**	The display at right appears (actual EZ and EX values may vary)	**STATUS T1** **EZ: 100 EX: 87**
3.1	**TRACK 1**	Select track 1.	

Operational Performance Checks (Continued)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
3.2		Verify that the EZ value changes as follows: • The EZ value for a good shunting track must begin to decrease from the no-train value (ideally 100) as an incoming train passes the termination shunt and should decrease smoothly to zero (0) as the train arrives at the crossing. • For bidirectional installations, the value should increase as the train leaves the crossing and continue increasing smoothly until the last car passes the termination shunt.	

WARNING

IF A RAPID CHANGE OCCURS IN THE VALUE OF EZ AT ANY TIME WHILE 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.

Operational Performance Checks (Continued)

NOTE

In some bidirectional applications, approaches are of different lengths and a simulated track is placed in one approach circuit to make the approaches appear electrically equal. In this application, there is a normal and acceptable decrease in EZ as a train just enters the GCP approach when passing a set of insulated joints.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
3.3		In applications where poor shunting is expected, be sure that the Enhanced Detection mode (enhanced detection software available with 80044 and 80214 processor modules), has been programmed “ON” (Function menu) and that adequate warning times are verified.	

Operational Performance Checks (Continued)

WARNING

ENSURE THAT INBOUND TRAIN SHUNTING IS ADEQUATE FOR MODEL 3000 GCP ENHANCED DETECTION OPERATION BY VERIFYING THAT EZ IS CONSISTANTLY VARYING (CHANGING) ON INBOUND TRAINS THROUGHOUT THE GCP APPROACH CIRCUIT. ALSO VERIFY THAT EZ IS CONSISTANTLY LESS THAN 25 WHEN THE HEAD END OF EACH TRAIN ARRIVES AT A POINT APPROXIMATELY 50 FEET PRIOR TO THE GCP TRACK WIRES AT THE CROSSING. IF THERE IS ANY QUESTION REGARDING THE SHUNTING CHARACTERISTICS AT AN INSTALLATION, CONTACT SIEMENS RAIL AUTOMATION CORPORATION TECHNICAL SUPPORT.

Operational Performance Checks (Concluded)

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
3.4		If the 6-volt **DC Shunting Enhancer Panel, 80049**, is used to improve wheel-to-rail shunting: Verify that there is a minimum of 5.0 volts DC on the track with no train present.	
		If the 6-volt DC Shunting Enhancer Panel, 80049, is not used: Go to step 3.8.	
3.5		Remove AC power from the panel.	
3.6		Verify that a minimum of 4.5 volts DC is still present on the track.	
3.7		Restore AC power to the panel.	
3.8		**Verify proper warning times on speed limit train moves, including all DAX and preempt circuits.** This completes vital calibration of the Model 3000 GCP.	
3.9	**TRACK 2**	For two track systems, repeat steps 3.2 through 3.8 for **TRACK 2**.	

CLEARING RECORDED DIAGNOSTIC MESSAGES FROM MEMORY

During programming, calibration, or normal system operation, any diagnostic messages generated by the system are stored in memory. The messages are identified by four-digit codes that are found in the Troubleshooting section of this manual. To view the recorded messages, first press the **ERROR** key and then use the arrow keys to scroll through the messages.

Following system installation or maintenance, it is frequently desirable to clear the portion of memory where these messages are stored prior to leaving the crossing site. This ensures a fresh start with no old data contained in memory.

NOTE

Clearing this portion of memory also resets the HZ (highest EZ value recorded) and LX (lowest EX value recorded) values in memory to the present values of EZ and EX.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
4	**SYSTEM RESET**	Display at right appears	**SYSTEM RESET**
4.1	**SYSTEM RESET (press & hold approximately 3 seconds)**	Display at right appears Release the SYSTEM RESET key	**PRESS ENTER TO CLEAR ERRORS**
4.2	**ENTER**	When memory is clear, the display at right appears	**ERROR < 0>**

CLEARING TRAIN MOVE HISTORY FROM MEMORY

During normal operation, the system records certain parameters relating to train moves within the track section monitored by the Model 3000 GCP (warning time, detected speed, average speed, and island speed). The recorded train move data is stored in memory and can be viewed by pressing the history key on the keyboard.

STEP NO.	KEY PRESSED	COMMENTS	MESSAGE DISPLAYED
5	**SYSTEM RESET**	Display at right appears	**SYSTEM RESET**
5.1	**SYSTEM RESET (press & hold approximately 3 seconds)**	Display at right appears Release the SYSTEM RESET key	**PRESS ENTER TO CLEAR ERRORS**
5.2	▼	Display at right appears	**PRESS ENTER TO CLEAR HISTORY**
5.3	**ENTER**	When memory is clear, the display at right appears	**HISTORY < 0>**

INPUT AND OUTPUT TESTS

Following system calibration and prior to placing the system in service, perform the Input and Output tests described in the following pages.

WARNING

WHENEVER SYSTEM TESTING OR MONITORING IS PERFORMED AT A HIGHWAY GRADE CROSSING, ENSURE ADEQUATE PROTECTION IS PROVIDED FOR PERSONNEL, VEHICLES AND TRAINS.

NOTE

After completion of any system configuration changes or software changes, perform the Input and Output Tests described on the following pages.

Prior to monitoring operation with trains, the following items should be verified:

1. One at a time, open all inputs to **UAX 1** and **UAX 2** terminals and verify that warning system operates.
2. One at a time, power off all MS/GCP systems that feed **ENA** for this 3000 GCP. Verify that warning system operates.
3. If Advanced Preemption is selected, open input to **MS/GCP CONTROL** terminal. Verify correct time interval prior to warning system operation.
4. One at a time, open each DAX output. Verify DAX relay or UAX at proper crossing drops out.

Input and Output Tests (Concluded)

5. Verify that all other external logic (Wraps, XTrk, Sticks, DC Islands, etc.) operate warning system as intended.
6. One at a time, shunt Island Receive Wires with a hardwire shunt. Verify that proper island drops and warning system operates. Verify that EZ and Z1 are equal to zero with shunt on track.

NOTE

Warning system may not operate if Prime Prediction Offset is used or Model 3000 GCP is applied as a remote.

7. From the crossing, go out to the 25% point in the approach. Place one side of a hardwire shunt solidly on one rail. Repeatedly bounce the other side multiple times on the other rail until the warning system activates. This may require up to 10 seconds.

- If train movement will not occur for a long period of time, perform the following alternative test before placing in service.

8. Alternately shunt each termination and verify that EZ drops to the value recorded in the “Setup for Approach Length and Linearization” calibration procedure on the Model 3000 GCP History Card.

PERIODIC MAINTENANCE

The following maintenance routines should be performed on a monthly basis, or as indicated:

1. Note and record EZ, EX, Z1 and Z2 values. If the values measured deviate from the latest values recorded on the 3000 GCP History Card by 20% or more, determine the cause.

NOTE

Located at the lower front edge of the 80012 module are three test jacks labeled "Z1", “Z2” and “COM”. Measure Z1 and Z2 at these jacks.

2. Download history log from Data Recorder or note Train and Error History from display.
3. Analyze Error information. Any error that occurs more than three times should be investigated (see Troubleshooting Section). **Especially note presence of Frequency, Low EX, High EZ, EX process and Self-Check errors. If any of these occur frequently, Poor Shunting could be the cause.**
4. Analyze train history. Warning time variations outside the norm should be investigated. Speed information that frequently shows 0 mph or over 100 mph can be an indication of poor shunting.
5. Perform “System Calibration” on at least a semiannual basis.

TROUBLESHOOTING

When a 3000 GCP detects a problem in the track circuit, the system will go into failure. If the unit is set up unidirectional, the portion of track to check is easy to determine. However, for bidirectional installations, either approach could be involved.

Start by recording the EZ and EX values and any error code appearing on the GCP display. Analyzing this data can give a good indication of the problem. The most common track problems are open or shorted track circuits. Usually, a low EZ value indicates a short and a high EZ value indicates an open. But this still does not indicate which approach is involved.

The Transceiver module (80012) provides a means of determining which approach to investigate. Located at the lower front edge of the 80012 module are three test jacks labeled "Z1", “Z2” and “COM”. In a normally operating system with no problems, a DC voltage ranging from 7.5 to 10.0 will be present on both Z1 and Z2 (same voltage level on Z1 and Z2). This voltage level varies depending on ballast and approach length.

When a track circuit failure occurs, the voltages at Z1 and Z2 will change in relationship to the normal voltage range and possibly to each other as follows:

- If the Z1 and Z2 voltages move higher or lower than the normal range (7.5 to 10.0 VDC), but remain equal to each other, the problem in the track circuit lies on the transmitter side of the crossing.
- If the Z1 and Z2 voltages move higher or lower than the normal range (7.5 to 10.0 VDC), but their values differ by more than 0.5 VDC, the problem in the track circuit most likely lies on the receiver side of the crossing.

Additional troubleshooting information and procedures are provided in the following pages.

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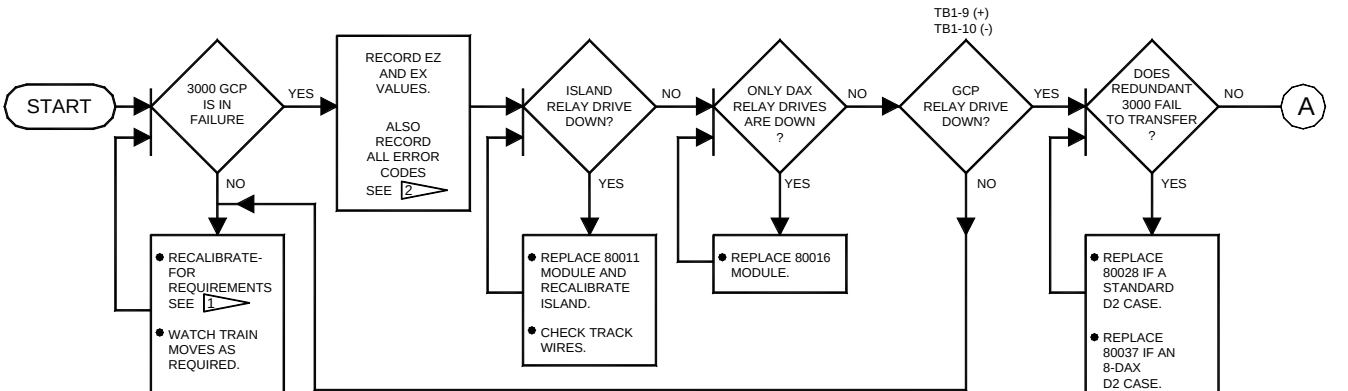
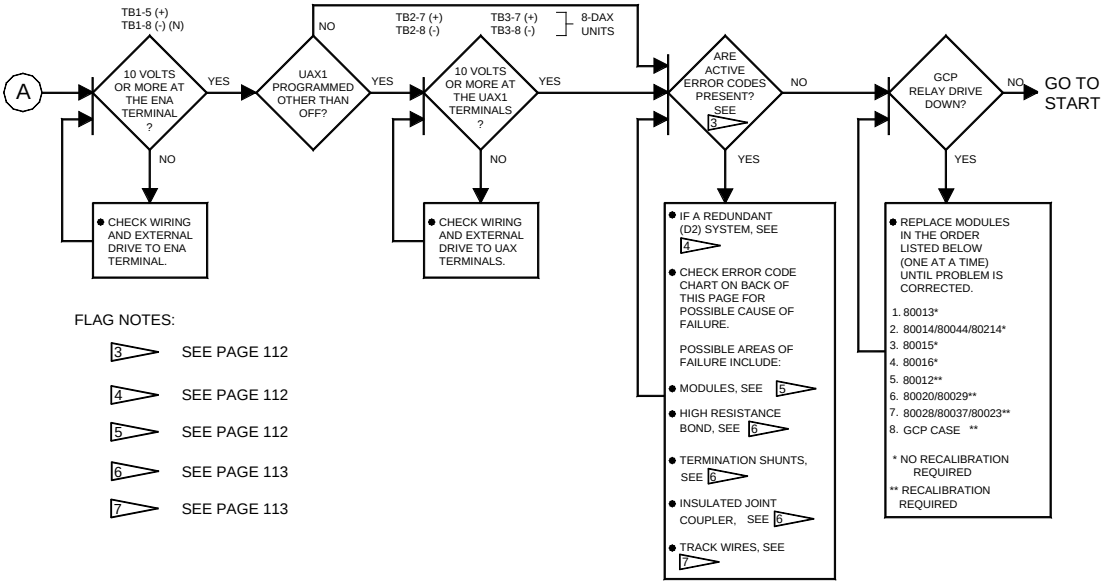
MODEL 3000 GRADE CROSSING PREDICTOR TROUBLESHOOTING DIAGRAMS



FLAG NOTES:

1 SEE PAGE 111

2 SEE PAGE 111



FLAG NOTES:

3 SEE PAGE 112

4 SEE PAGE 112

5 SEE PAGE 112

6 SEE PAGE 113

7 SEE PAGE 113

Troubleshooting (Continued)

1

See Recalibration/Reprogramming Requirement Charts on pages 115, 116, 117 and 118.

2

Erratic shunting, including that caused by maintenance vehicles, is generally recognized by multiple error codes which may include any combination of the following:

TRACK 1		TRACK 2	
ERROR CODE	**TEXT DISPLAYED**	**ERROR CODE**	**TEXT DISPLAYED**
8201	T1 FREQUENCY	8202	T2 FREQUENCY
9011	T1 LOW EX	9013	T2 LOW EX
9015	T1 HIGH EZ	9016	T2 HIGH EZ
8300	T1 SELF-CHECK	8301	T2 SELF-CHECK

NOTE

When using an 80044 or 80214 processor module with the Enhanced Detection (ED) operating mode enabled (On), erratic shunting will produce message code 9400 (T1) or 9401 (T2) in addition to the above error codes.

Troubleshooting (Continued)

3

To determine if there are current active error codes, proceed as follows:

1. Press and hold SYSTEM RESET key for approximately 3 seconds until the following message is displayed.

PRESS ENTER TO CLEAR ERRORS

2. Press the ENTER key.

NOTES:

Any error codes that remain after the above steps are performed are active and current. Look up the error code number(s) in the Error Code Charts beginning on page 119 to determine possible cause.

If EZ value is less than 3 and 3000 GCP power is interrupted for any reason, or a system error occurs, relay drive will not recover until EZ value is greater than 3. However, if the low EZ is caused by a train in the approach, this condition can be manually overridden with a “system reset”.

4

If a redundant (D2) system, then switch to the standby unit and see if the identical failure is present. If it is, the problem is generally track related.

5

See Error Code Charts beginning on page 119.

Troubleshooting (Concluded)

6

High resistance bonds, insulated joint couplers/track connections, or termination shunts/track connections can produce the following error codes:

ERROR CODE	TEXT DISPLAYED	TRACK AFFECTED
9015	T1 HIGH EZ	T1
9016	T2 HIGH EZ	T2

7

Possible increased track wire resistance or track connections can produce the following error codes:

ERROR CODE	TEXT DISPLAYED	TRACK AFFECTED
8113	T1 XMIT CURRENT	T1
8117	T2 XMIT CURRENT	T2
9111	T1 GAIN CHECK	T1
9112	T2 GAIN CHECK	T2
9021	T1 CHECK CHANNEL	T1
9022	T2 CHECK CHANNEL	T2

RECALIBRATION AND REPROGRAMMING REQUIREMENTS

Recalibration/Reprogramming Requirements Due to Module Replacement

MODULE/ASSEMBLY REPLACEMENT REQUIRING RECALIBRATION		SETUP FOR CALIBRATION REQUIRED	SETUP FOR APPROACH LENGTH AND LINEARIZATION REQUIRED	ISLAND ADJUSTMENT REQUIRED	SET TO DEFAULT AND REPROGRAMMING REQUIRED
80011 / 80211	Island	No	No	Yes (For track associated with 80011/80211 only)	No
80012	Transceiver	Yes (For track associated with 80012 only)	No	No	No
80013	Relay Drive	No	No	No	No
80014, 80044, 80214	Processor	No	No	No	No

*When a new software level is added (new PROM's) or the control interface assembly is replaced, first set the system to the default parameters and then perform complete reprogramming and recalibration.

**Can be accomplished by re-entering the EZ and linearization data from the History card.

Recalibration/Reprogramming Requirements Due to Module Replacement (Continued)

MODULE/ASSEMBLY REPLACEMENT REQUIRING RECALIBRATION		SETUP FOR CALIBRATION REQUIRED	SETUP FOR APPROACH LENGTH AND LINEARIZATION REQUIRED	ISLAND ADJUSTMENT REQUIRED	SET TO DEFAULT AND REPROGRAMMING REQUIRED
80014, 80044, 80214	Processor (With new software level)*	Yes (Both tracks)	Yes** (Both tracks)	No	Yes (Both tracks)
80015/ 80115	Data Recorder	No	No	No	No
80016	DAX	No	No	No	No
80020, 80029	Control Interface Assembly*	Yes (Both tracks)	Yes** (Both tracks)	No	Yes (Both tracks)
80023, 80028, 80037	Switch Over	Yes (Both tracks)	No	Yes (Both tracks)	No

*When a new software level is added (new PROM's) or the control interface assembly is replaced, first set the system to the default parameters and then perform complete reprogramming and recalibration.

**Can be accomplished by re-entering the EZ and linearization data from the History card.

Recalibration/Reprogramming Requirements Due to Programming Changes

PROGRAMMING CHANGES REQUIRING RECALIBRATION	SETUP FOR CALIBRATION REQUIRED	SETUP FOR APPROACH LENGTH AND LINEARIZATION REQUIRED
Increased Number of Tracks From 1 to 2	Yes (For track 2 only)	Yes (For track 2 only)
GCP Frequency Changed	Yes (Both tracks)	Yes (Both tracks)
Application Changed From: Unidirectional to Bidirectional or Bidirectional to Unidirectional	Yes (Only for the track that was changed)	Yes (Only for the track that was changed)
Transmit Level Changed From: Medium to Maximum or Maximum to Medium	Yes (Only for the track that was changed)	No
Approach Length Changed	Yes (Only for the track that was changed)	Yes (Only for the track that was changed)
Ballast Compensation Value Changed	Yes (Only for the track that was changed)	No

Recalibration/Reprogramming Requirements Due to Track Equipment Changes

TRACK EQUIPMENT CHANGES REQUIRING RECALIBRATION	SETUP FOR CALIBRATION REQUIRED	SETUP FOR APPROACH LENGTH AND LINEARIZATION REQUIRED	ISLAND ADJUSTMENT REQUIRED
Termination Shunts Changed or Moved to New Location*	Yes	Yes	No
Termination Shunts of Other Frequencies Added, Removed From, or Moved Within 3000 GCP Approach(es)	Yes	Yes	No
Wideband Insulated Joint Couplers (8A076 or 8A077) Replaced in 3000 GCP Approach(es)	Yes	No	No
Tuned Insulated Joint Couplers (62785-f) Replaced in 3000 GCP Approach(es)	Yes	Yes	No
3000 GCP Track Wire(s) Replaced	Yes	No	Yes

* Approach length in the Program menu must be changed to reflect the new approach length.

ERROR CODE CHART

ERROR CODE	TEXT DISPLAYED	DESCRIPTION	POSSIBLE CAUSE
1100	ROM	ROM Checksum Error	80014/80044/80214 Processor Module
1200	RAM	RAM Read/Write Error	80014/80044/80214 Processor Module
1300	NOVRAM	NOVRAM Checksum Error	80020/80029 Keyboard/Display Interface Module
1400	ROM	ROM Checksum Error (System Reset)	80014/80044/80214 Processor Module
1500	RAM	RAM Read/Write Error (System Reset)	80014/80044/80214 Processor Module
1600	NOVRAM	NOVRAM Checksum Error (System Reset)	80020/80029 Keyboard/Display Interface Module
4000	ENA INPUT	ENA Input Error	80013 Relay Drive Module
4001	UAX INPUT	UAX Input Error	80013 Relay Drive Module
4002	T1 ISLAND INPUT	Island Relay Drive 1 Input Error	80013 Relay Drive Module
4003	T2 ISLAND INPUT	Island Relay Drive 2 Input Error	80013 Relay Drive Module
4004	MS/GCP CONTROL	MS/GCP Control Input Error	80013 Relay Drive Module

Error Code Chart (Continued)

ERROR CODE	TEXT DISPLAYED	DESCRIPTION	POSSIBLE CAUSE
4100	DAX A OUTPUT	DAX A Relay Drive Output Error	80016 DAX Module (number 1*)
4101	DAX B OUTPUT	DAX B Relay Drive Output Error	80016 DAX Module (number 1*)
4102	GCP OUTPUT	Prime GCP Relay Drive Output Error	80013 Relay Drive Module
4103	DAX C OUTPUT	DAX C Relay Drive Output Error	80016 DAX Module (number 2*)
4104	DAX D OUTPUT	DAX D Relay Drive Output Error	80016 DAX Module (number 2*)
4105	AT OUTPUT	Approach Track Output Error	80013 Relay Drive Module
4106	DAX E OUTPUT	DAX E Relay Drive Output Error	80016 DAX Module (number 3*)
4107	DAX F OUTPUT	DAX F Relay Drive Output Error	80016 DAX Module (number 3*)
4108	DAX G OUTPUT	DAX G Relay Drive Output Error	80016 DAX Module (number 4*)
4109	DAX H OUTPUT	DAX H Relay Drive Output Error	80016 DAX Module (number 4*)
5001	DATA RECORDER	Data Recorder Not Responding	80015 Data Recorder Module
5002	DATA RECORDER	Incorrect Data Transmission	80015 Data Recorder Module
5003	RECORDER ROM	Recorder ROM Checksum Error	80015 Data Recorder Module
5004	RECORDER RAM	Recorder RAM Checksum Error	80015 Data Recorder Module

* Numbered from left end of case

Error Code Chart (Continued)

ERROR CODE	TEXT DISPLAYED	DESCRIPTION	POSSIBLE CAUSE
8001	-5 VOLT SUPPLY	- 5 Volt Power Out of Range	80013 Relay Drive Module
8002	+5 VOLT SUPPLY	+5 Volt Power Out of Range	80013 Relay Drive Module
8003	T1 -8V SUPPLY	Track 1 -8 Volt Power Out of Range	80012 Transceiver Module (left)
8004	T1 +8V SUPPLY	Track 1 +8 Volt Power Out of Range	80012 Transceiver Module (left)
8005	T2 -8V SUPPLY	Track 2 -8 Volt Power Out of Range	80012 Transceiver Module (right)
8006	T2 +8V SUPPLY	Track 2 +8 Volt Power Out of Range	80012 Transceiver Module (right)
8007	-15 VOLT SUPPLY	-15 Volt Power Supply Out of Range	80013 Relay Drive Module
8008	+15 VOLT SUPPLY	+15 Volt Power Supply Out of Range	80013 Relay Drive Module
8111	T1 XMT VOLTAGE	Track 1 Transmitter Voltage Too Low	80012 Transceiver Module or High Voltage on Track
8112	T1 XMT VOLTAGE	Track 1 Transmitter Voltage Too High	80012 Transceiver Module or High Voltage on Track
8113	T1 XMIT CURRENT	Track 1 Transmit Current Low	80012 Transceiver Module (left), transmit track wires
8114	T1 XMIT CURRENT	Track 1 Transmit Current High	80012 Transceiver Module (left)

Error Code Chart (Continued)

ERROR CODE	TEXT DISPLAYED	DESCRIPTION	POSSIBLE CAUSE
8115	T2 XMT VOLTAGE	Track 2 Transmitter Voltage Too Low	80012 Transceiver Module or High Voltage on Track
8116	T2 XMT VOLTAGE	Track 2 Transmitter Voltage Too High	80012 Transceiver Module or High Voltage on Track
8117	T2 XMIT CURRENT	Track 2 Transmit Current Low	80012 Transceiver Module (right), transmit track wires
8118	T2 XMIT CURRENT	Track 2 Transmit Current High	80012 Transceiver Module (right)
8200	FREQUENCY	Processor Frequency Out of Range	80014/80044/80214 Processor Module
8201	T1 FREQUENCY	Track 1 Frequency Out of Range	80012 Transceiver Module (left)
8202	T2 FREQUENCY	Track 2 Frequency Out of Range	80012 Transceiver Module (right)
8203	T1 XMT FREQ	Track 1 Transmitter Frequency Out of Tolerance	80214 Processor Module
8204	T2 XMT FREQ	Track 2 Transmitter Frequency Out of Tolerance	80214 Processor Module
8300	T1 SELF-CHECK	Track 1 Self-check Not Successful	80012 Transceiver Module (left)
8301	T2 SELF-CHECK	Track 2 Self-check Not Successful	80012 Transceiver Module (right)

Error Code Chart (Continued)

ERROR CODE	TEXT DISPLAYED	DESCRIPTION	POSSIBLE CAUSE
9001	T1 LOW PHASE	Track 1 Phase Low	80012 Transceiver Module or Track Wires
9002	T1 HIGH PHASE	Track 1 Phase High	80012 Transceiver Module or Track Wires
9003	T2 LOW PHASE	Track 2 Phase Low	80012 Transceiver Module or Track Wires
9004	T2 HIGH PHASE	Track 2 Phase High	80012 Transceiver Module or Track Wires
9011	T1 LOW EX	Track 1 EX Under Low Limit	Low Ballast
9012	T1 HIGH EX	Track 1 EX Over High Limit	80012 Transceiver Module (left)
9013	T2 LOW EX	Track 2 EX Under Low Limit	Low Ballast
9014	T2 HIGH EX	Track 2 EX Over High Limit	80012 Transceiver Module (right)
9015	T1 HIGH EZ	Track 1 EZ Over High Limit	Bond, Termination, tunable insulated joint bypass couplers, or connections
9016	T2 HIGH EZ	Track 2 EZ Over High Limit	Bond, Termination, tunable insulated joint bypass couplers, or connections
9021	T1 CHECK CHANNEL	Track 1 Channel 2 EZ Over High Limit	80012 Transceiver Module (left), transmit track wires
9022	T2 CHECK CHANNEL	Track 2 Channel 2 EZ Over High Limit	80012 Transceiver Module (right), transmit track wires

Error Code Chart (Continued)

ERROR CODE	TEXT DISPLAYED	DESCRIPTION	POSSIBLE CAUSE
8411	T1 SELF-CHECK	Track 1 Self-check Not Successful	80012 Transceiver Module (for T1) or 80214 Processor Module
8412	T2 SELF-CHECK	Track 2 Self-check Not Successful	80012 Transceiver Module (for T2) or 80214 Processor Module
8413	T1 SELF-CHECK	Track 1 Self-check Not Successful	80012 Transceiver Module (for T1) or 80214 Processor Module
8414	T2 SELF-CHECK	Track 2 Self-check Not Successful	80012 Transceiver Module (for T2) or 80214 Processor Module
8421	T1 SELF-CHECK	Track 1 Self-check Not Successful	80012 Transceiver Module (for T1) or 80214 Processor Module
8422	T2 SELF-CHECK	Track 2 Self-check Not Successful	80012 Transceiver Module (for T2) or 80214 Processor Module
8431	T1 SELF-CHECK	Track 1 Self-check Not Successful	80013 Relay Drive Module or 80214 Processor Module
8432	T2 SELF-CHECK	Track 2 Self-check Not Successful	80013 Relay Drive Module or 80214 Processor Module

Error Code Chart (Continued)

ERROR CODE	TEXT DISPLAYED	DESCRIPTION	POSSIBLE CAUSE
8441	T1 SELF-CHECK	Track 1 Self-check Not Successful	80012 Transceiver Module (for T1) or 80214 Processor Module
8442	T2 SELF-CHECK	Track 2 Self-check Not Successful	80012 Transceiver Module (for T2) or 80214 Processor Module
8451	T1 SELF-CHECK	Track 1 Self-check Not Successful	80012 Transceiver Module (for T1) or 80214 Processor Module
8452	T2 SELF-CHECK	Track 2 Self-check Not Successful	80012 Transceiver Module (for T2) or 80214 Processor Module
8453	T1 SELF-CHECK	Track 1 Self-check Not Successful	80012 Transceiver Module (for T1) or 80214 Processor Module
8454	T2 SELF-CHECK	Track 2 Self-check Not Successful	80012 Transceiver Module (for T2) or 80214 Processor Module
8461	T1 SELF-CHECK	Track 1 Self-check Not Successful	80012 Transceiver Module (for T1) or 80214 Processor Module
8462	T2 SELF-CHECK	Track 2 Self-check Not Successful	80012 Transceiver Module (for T2) or 80214 Processor Module

Error Code Chart (Concluded)

ERROR CODE	TEXT DISPLAYED	DESCRIPTION	POSSIBLE CAUSE
9023	T1 LOW EZ DETECT	Indicates Track 1 EZ Below 70 with Low EZ Option Selected	
9024	T2 LOW EZ DETECT	Indicates Track 2 EZ Below 70 with Low EZ Option Selected	
9031	T1 LOW EX *ADJ*	Track 1 EX Under Low Adjustment	Low Ballast
9032	T1 ADJ LOW EX	Track 1 EX Under 39	Low Ballast
9033	T2 LOW EX *ADJ*	Track 2 EX Under Low Adjustment	Low Ballast
9034	T2 ADJ LOW EX	Track 2 EX Under 39	Low Ballast
9111	T1 GAIN CHECK	Track 1 Channel 2 Out of Range	Bond Within Island, Receiver Connection, track wires
9112	T2 GAIN CHECK	Track 2 Channel 2 Out of Range	Bond Within Island, Receiver Connection, track wires
9115	T1 EX PROCESS	Track 1 EX Process Error	High Resistance Bond
9116	T2 EX PROCESS	Track 2 EX Process Error	High Resistance Bond
9400*	T1 ENHANCED DET	Track 1 Switched to *ED* Mode	Poor Track Shunting Conditions on Track 1
9401*	T2 ENHANCED DET	Track 2 Switched to *ED* Mode	Poor Track Shunting Conditions on Track 2

* Applies only to units equipped with 80044 or 80214 processor modules.

Insulated Joint Bypass (IJB) Coupler Field Test

WARNING

1. **A NARROW BAND SHUNT MUST NEVER BE USED TO REPLACE A DEFECTIVE IJB COUPLER.**
2. **IN A SIX-WIRE CONFIGURATION THE 62664-MF BIDIRECTIONAL SIMULATION COUPLER MUST NOT BE CONNECTED TO THE TRANSMIT (XMT) WIRES. IF THE COUPLER IS CONNECTED TO THE TRANSMIT WIRES OF THIS CONFIGURATION, AN OPEN TRANSMITTER TRACK WIRE WILL NOT BE DETECTED. THIS CAN ADVERSELY AFFECT GCP OPERATION.**
3. **INSULATED JOINT BYPASS COUPLERS, 62531-F AND 62631-F, MUST NOT BE USED WITH THE 3000 GCP.**
4. **THE TUNED JOINT COUPLER MUST BE TUNED PRIOR TO PERFORMING SETUP FOR APPROACH LENGTH AND LINEARIZATION PROCEDURES DURING THE TRACK CALIBRATION PROCESS.**

Couplers can be field tested for proper operation as follows:

1. Connect a hardwire shunt on the crossing side of the joint coupler. Note the EZ value: _____
2. Move the hardwire shunt to the termination side of the joint coupler. Note the EZ value: _____
3. Remove the hardwire shunt.
4. Note the difference in EZ values recorded in steps 2 and 4.

- When the coupler is a wideband shunt, if the difference in EZ is more than $\pm$ 2, the wideband shunt is defective.
- When the coupler is a TIJC (located in the outer half of the approach), if the EZ difference is more than $\pm$ 3, the TIJC may be mistuned or defective.

Locating Bad Bonds

Bad bonds can be located as follows:

NOTE

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

1. Note the EX value with no shunt: _____
2. Place a hardwire shunt at the 50% point of the approach.
3. Note the EX value: _____
4. Note the difference in EX values recorded in steps 1 and 3.

- EX should always increase in value as a shunt is placed closer to the crossing. It does not matter if the shunt is a train or hardwire – **EX MUST INCREASE!**
- If the EX value recorded in step 3 is greater than the EX value in step 1, the bad bond is between the hardwire shunt and the termination.
- If the EX value recorded in step 3 is lower than the EX value in step 1, the bad bond is between the hardwire shunt and the crossing.

5. Continue placing the hardwire shunt closer or farther away from the starting point based on the value in step 3. As soon as EX increases in value, the last bond passed is the bad bond.

Termination Shunt Field Test

WARNING

1. **A NARROW BAND SHUNT MUST NEVER BE USED TO REPLACE A DEFECTIVE IJB COUPLER.**
2. **THE 8A076A OR 8A077 WIDEBAND SHUNTS MUST NOT BE USED TO BYPASS INSULATED JOINTS IN DC CODED TRACK CIRCUITS OR WHERE AC OR CODED AC CIRCUITS EXIST.**
3. **THE 62775-F NARROW-BAND OR THE 62775-XXXX MULTIFREQUENCY NARROW-BAND SHUNTS MUST NOT BE USED ANYWHERE WITHIN A MODEL 300 OR 400 GCP APPROACH; THE 62780-F NARROW-BAND SHUNT OR THE 62775-XXXX MULTIFREQUENCY NARROW-BAND IS RECOMMENDED FOR THESE APPLICATIONS.**
4. **CAREFULLY TIGHTEN ALL NUTS ON ALL FREQUENCY JUMPERS, THEN INSTALL A SECOND NUT TO SECURELY LOCK THE ASSEMBLY.**

Test termination shunt as follows:

1. Note the EZ value: _____
2. Install a hardwire shunt across the termination. Note the change in EZ: _____

NOTE

Lower frequencies and shorter approaches produce a greater change.

- If termination is hardwire, no EZ change should occur.
- If termination is wideband, an EZ change of no more than ± 2 should occur.
- If termination is NBS, a decrease in EZ of up to 30 can occur depending upon frequency and approach length.
- If termination is NBS and an increase in EZ is noted, then the NBS is defective.

Resolving Low EX Issues

If a low EX condition is occurring at a cutover of a new installation, check for the following:

- Bad bonds
- Defective insulated joint couplers
- Missing battery choke in approaches
- Defective gauge rods or switch rods
- Open termination shunt
- Improper application of other frequency NBS in the approaches. Refer to 3000 GCP Application Guidelines Manual, Section 3
- For further information regarding Low EX, see SIG-00-00-02, Model 3000 GCP Instruction and Installation Manual, section 7, paragraph 7.7.3.

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