SIEMENS

CONFIGURATION SUMMARY

SEAR III APPLICATION 9VC29-A01A PREPARED FOR NORFOLK SOUTHERN

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VERSION A.1

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DOCUMENT HISTORY

Version	Release Date	Sections Changed	Details of Change
A	12/4/13		Initial Release

NOTES, CAUTIONS, AND WARNINGS

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

⚠ WARNING

WARNING

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

⚠ CAUTION

CAUTION

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

NOTE

NOTE

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

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

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1.0 **INTRODUCTION**

This document supports installation and maintenance of SEAR IIi units configured with the 9VC29-A01A user program stored in flash memory. This document:

- Explains LED indications
- Lists setup steps unique to 9VC29-A01A
- Lists all messages generated by 9VC29-A01A
- Links specific tests and alarm messages to specific FRA regulations
- Lists connector / wire tag assignments
- Describes test modes supported by 9VC29-A01A

For further information on SEAR IIi, refer to the GRADE CROSSING PREDICTOR MODEL 4000 Reference Manual (document no. SIG-00-02-02).

NOTE

NOTE

Siemens Industry, Inc., Rail Automation is not responsible for any misunderstanding or misinterpretation of the federal regulations, or for any changes to the regulations occurring after the release of this document.

2.0 **USER MENU ITEMS – SITE SETUP**

The Table 2-1 lists configuration settings unique to 9VC29-A01A. Each row presents an entry in the site setup sequence. The first column shows the text that appears in the SEAR IIi Interface function area on the 4000 GCP display unit. The three middle columns give the options or define the range of values that may be entered. The rightmost column summarizes conditions that determine if that row's step will appear, for example: 'GATE TIP SENSORS' entry appears only if the entry for 'ENTRANCE GATES' is one or greater.

Table 2-1 User Menu Items - Site Setup

Question	Minimum / Sel. 1	Maximum / Sel. 2	Sel. 3	Sel. 4	Sel. 5	Sel. 6	Sel. 7	Sel. 8	Condition For Menu Display
RAILROAD NUMBER?	550	550							
CROSSING CONFIGURATION?	NORMAL	SPLIT GATE		EXTERNAL ENTRANCE GATE CNTRLR(S)					
AND1 USED AS XR?	NO	YES							
AND2 USED AS XR?	NO	YES							
AND3 USED AS XR?	NO	YES							
AND4 USED AS XR?	NO	YES							
AND5 USED AS XR?	NO	YES							
AND6 USED AS XR?	NO	YES							
AND7 USED AS XR?	NO	YES							
AND8 USED AS XR?	NO	YES							
XR CONTROLLED BY FOREIGN RR?	AND1	AND2	AND3	AND4	AND5	AND6	AND7	AND8	CROSSING CONFIGURATION= SPLIT GATE
ENTRANCE GATES?	0	8							
85% VOLTAGE RELAY OUT?	NO	YES							
BATTERY BANKS?	1	3							
BATT MON USED?	NO	YES							
INTERNAL CROSSING CONTROLLERS?	0	2							
EXTERNAL CROSSING CONTROLLERS?	0	2							
VHF COMMUNICATOR?	YES	NO							
DTMF ACTIVATION?	YES	NO							
ACTIVATION CODE?	1	999							DTMF ACTIVATION=YES
ACTIVATION TIMEOUT (SECONDS)?	30	600							DTMF ACTIVATION=YES
iLOD MODULES?	0	4							
ANY LED BULBS USED?	NO	YES							iLOD MODULES>0
VHF VOICE CHANNEL?	1	8							VHF COMMUNICATOR= YES
VHF DATA CHANNEL?	1	8							VHF COMMUNICATOR= YES
USE CELL MODEM NON-CRITICAL FEATURE?	NO	YES							

3.0 **DIGITAL INPUT STANDARD CONFIGURATION**

The following tables define the digital inputs for 9VC29-A01A. Table 3-1 defines the states and conditions for each input function. Table 3-2 shows the physical inputs available for each function. The inputs can be configured on the available 4000 GCP inputs or the two digital inputs on the SEAR IIi front panel as indicated in the second table.

Table 3-1 Input Function States And Conditions

Wire Tag	Normal	Energized	De-energized	Condition
POK 1	ON	ON	OFF	Configured on GCP 4000
POK 2	ON	ON	OFF	Configured on GCP 4000
DOOR 1	OFF	ON	OFF	Configured on GCP 4000
DOOR 2	OFF	ON	OFF	Configured on GCP 4000
NVD	OFF	ON	OFF	Configured on GCP 4000
SVD	OFF	ON	OFF	Configured on GCP 4000
VDH	OFF	ON	OFF	Configured on GCP 4000
GP 1.1	OFF	ON	OFF	Configured on GCP 4000
GP 1.2	OFF	ON	OFF	Configured on GCP 4000
GP 2.1	OFF	ON	OFF	Configured on GCP 4000
GP 2.2	OFF	ON	OFF	Configured on GCP 4000
GD 1.1	OFF	ON	OFF	Configured on GCP 4000
GD 1.2	OFF	ON	OFF	Configured on GCP 4000
GD 1.3	OFF	ON	OFF	Configured on GCP 4000
GD 1.4	OFF	ON	OFF	Configured on GCP 4000
GD 2.1	OFF	ON	OFF	Configured on GCP 4000
GD 2.2	OFF	ON	OFF	Configured on GCP 4000
GD 2.3	OFF	ON	OFF	Configured on GCP 4000
GD 2.4	OFF	ON	OFF	Configured on GCP 4000
TSS1	TSS	TSS	TSS	Configured on GCP 4000
TSS2	TSS	TSS	TSS	Configured on GCP 4000
TSS3	TSS	TSS	TSS	Configured on GCP 4000
TSS4	TSS	TSS	TSS	Configured on GCP 4000
TSS5	TSS	TSS	TSS	Configured on GCP 4000
TSS6	TSS	TSS	TSS	Configured on GCP 4000
TSS7	TSS	TSS	TSS	Configured on GCP 4000
TSS8	TSS	TSS	TSS	Configured on GCP 4000
GFT1	GFT	GFT	GFT	Configured on GCP 4000
GFT2	GFT	GFT	GFT	Configured on GCP 4000
GFT3	GFT	GFT	GFT	Configured on GCP 4000
General 1	OFF	ON	OFF	Configured on GCP 4000
General 2	OFF	ON	OFF	Configured on GCP 4000
General 3	OFF	ON	OFF	Configured on GCP 4000
General 4	OFF	ON	OFF	Configured on GCP 4000
TX	ON	ON	OFF	Configured on GCP 4000
EXT ISL 1	OFF	ON	OFF	Configured on GCP 4000
EXT ISL 2	OFF	ON	OFF	Configured on GCP 4000
EXT ISL 3	OFF	ON	OFF	Configured on GCP 4000

NOTE

The POK1 input is fed by battery through one front contact of every POK relay at the crossing location in a series connection. The POK2 input is fed by battery through one front contact of every POK relay at the crossing location in a parallel connection. If any relay in either the series or parallel circuit drops out, battery is removed from the associated POK input and the trouble light turns off. If there is only one POK relay at a crossing location, both POK1 and POK2 must be fed through a front contact of that relay.

Table 3-2 Physical Input Assignments

TAG	SEAR IIi		4000 GCP Front Panel																									
	DI O1	DI O2	SP2.1	SP3.1	SP4.1	SP5.1	SP6.1	SSCC7.1	SSCC7.2	SSCC7.3	SSCC7.4	SSCC7.5	SSCC8.1	SSCC8.2	SSCC8.3	SSCC8.4	SSCC8.5	IN1.1	IN1.2	IN2.1	IN2.2	IN3.1	IN3.2	IN4.1	IN4.2	IN5.1	IN5.2	IN6.1	IN6.2
POK 1	X	X	**P**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
POK 2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DOOR 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DOOR 2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NVD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SVD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
VDH	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GP 1.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GP 1.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GP 2.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	**P**	X	X	X	X	X	X	X	X	X	X	X	X
GP 2.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GD 1.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GD 1.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GD 1.3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GD 1.4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GD 2.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GD 2.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GD 2.3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GD 2.4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TSS 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
TSS 2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
TSS 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
TSS 4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
TSS 5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
TSS 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
TSS 7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
TSS 8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
GFT 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
GFT 2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
GFT 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X												
General 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
General 2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
General 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
General 4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TX	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
EXT ISL 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
EXT ISL 2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
EXT ISL 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Notes: X Indicates that this input may be used for this indication
P Indicates that this is the preferred input for this indication

4.0 USER PROGRAMMABLE LED **CONFIGURATION**

Table 4-1 defines the operation of the tri-color User Programmable LEDs for 9VC29-A01A. Table 4-2 lists the LED states displayed in various modes of operation.

Table 4-1 Programmable LED Configuration

LED	Alarm Numbers	Designator
T01	5, 18, 19, 35, 36	POWER
T02	9	GATE
T03	1	WARNING DEVICES
T04	4, 22	CROSSING
T05		RESERVED
T06		RESERVED
T07		RESERVED
T08		ONLINE

4.1 **LED STATES (T01 - T08)**

Table 4-2 LED States (T01 - T08)

LED	No Alarm / Reserved	In Alarm	Alarm Stop	User Test Mode Enabled	User Test Mode Disabled
T01	GREEN	FAST FLASH RED	SLOW FLASH RED		
T02	GREEN	FAST FLASH RED	SLOW FLASH RED		
T03	GREEN	FAST FLASH RED	SLOW FLASH RED		
T04	GREEN	FAST FLASH RED	SLOW FLASH RED		
T05					
T06					
T07					
T08				FAST FLASH RED	SLOW FLASH GREEN

5.0 **BATTERY INPUT CONFIGURATION**

Table 5-1 shows the 9VC29-A01A default names, software designators, resolutions and menu conditions for the SEAR IIi battery inputs on channels 1 through 4.

Table 5-1 Battery Input Channel Assignments

Channel	Menu Conditions		Name
	BATTERY	RAILROAD NUMBER	
1	BATTERY BANKS? >0	550	B12
2	BATTERY BANKS? >1	550	B16
3	BATTERY BANKS? >2	550	B16A
4	BATT MON USED? = YES	550	Batt Mon

6.0 **MESSAGES**

The tables in the following subsections list all of the messages generated by the 9VC29-A01A application. Messages generated by the SEAR IIi executive are not presented here.

Messages fall into categories defined by message numbers:

0	Internal SEAR IIi Messages
1-100	Application Alarms
101-200	Application Alarm Clears
201-230	Automatic Inspection Alarms
231-250	Application Information Messages
251-255	Automatic Inspection Information
1000-1099	Office Software Alarms
1100-1199	Office Software Alarm Clears

6.1 APPLICATION ALARMS

The 9VC29-A01A application generates the alarms shown in Table 6-1. These alarms will be preceded by two asterisks in the Event Log for easier viewing.

Table 6-1 Application Alarms

LED	Alarm Code	Name	Description	Sent To Office	Tested
T01	5	AC POWER OFF FOR 20 MINUTES	POK1 has been off for 20 minutes or more.	Yes	Always
T01	18	LOW B12	Battery Channel 1 is less than 85% of calibrated voltage for at least 20 seconds.	Yes	Always
T01	19	LOW B16	Battery Channel 2 is less than 85% of calibrated voltage for at least 20 seconds.	Yes	Always
T01	35	LOW B16A	Battery Channel 3 is less than 85% of calibrated voltage for at least 20 seconds.	Yes	Always
T01	36	LOW BATT MON	Battery Channel 4 is less than 85% of calibrated voltage for at least 20 seconds.	Yes	Always
T02	9	GATE POSITION FAIL **	1. Gate Control activates 2. Gate position fail time has elapsed 3. All gates are not DOWN (Entrance gates only)	Yes	Train Move
T03	1	CROSSING CONTROLLER FAILURE	Any crossing controller reports a Vital Health error or communications error and POK1 is ON for 30 seconds.	Yes	Always
T03		BULB OUT	1. Crossing Active for > 11 seconds or Foreign Railroad active > 11 seconds. 2. Island Occupied for > 4 seconds (not required for foreign train move) 3. A single bulb out condition exists (Not sent to office) (ANY LED BULBS USED=NO)	Yes	Train Move

LED	Alarm Code	Name	Description	Sent To Office	Tested
T04	4	CROSSING ACTIVE FOR XX	Crossing has been active for 20 minutes or longer.	20 min. intervals	Always
T04	22	PREEMPTION ALARM	Crossing Active and Preempt Health Input is Energized.	Yes	Train Move
T08		USER TEST MODE ENABLED	Application alarms will not be generated when enabled.	No	Always

** Island must be occupied at least four seconds for alarm to generate.

6.2 APPLICATION ALARM CLEARS

The messages shown in Table 6-2 report cleared alarms. These messages will be preceded by a single asterisk in the Event Log for easier viewing.

Table 6-2 Application Alarm Clears

LED	Alarm Code	Name	Description	Sent To Office	Tested
T01	105	AC POWER BACK ON	*POK1* back on for at least 1 minute.	Yes	Clears
T01	118	B12 NORMAL	*Low Battery Channel 1* alarm clears for 5 seconds.	Yes	Clears
T01	119	B16 NORMAL	*Low Battery Channel 2* alarm clears for 5 seconds.	Yes	Clears
T01	135	B16A NORMAL	*Low Battery Channel 3 alarm* clears for 5 seconds.	Yes	Clears
T01	136	BATT MON NORMAL	*Low Battery Channel 4 alarm* clears for 5 seconds.	Yes	Clears
T02	109	GATE POSITION FAIL CLEAR	*Gate Position Fail* alarm clears.	Yes	Clears
T03	101	CROSSING CONTROLLER NORMAL	*Crossing Controller Failure* clears	Yes	Clears
T04	104	CROSSING NORMAL	*Crossing Active Too Long* alarm clears.	Yes	Clears
T04	122	PREEMPTION NORMAL	*Preemption Fail* alarm clears.	Yes	Clears
T08		USER TEST MODE DISABLED	Application alarms will be generated when disabled	Yes	Clears

7.0 SPECIAL TRAIN MOVE CONDITIONS

The following definitions cover train move conditions monitored by the 9VC29-A01A application.

CrossingActive

Any AND that is used as an XR is de-energized.

IslandOccupied

Any island is occupied.

FullApproachMove

CrossingActive TRUE, IslandOccupied TRUE, and no train stop/slow train move has been detected.

8.0 AUTOMATED / MANUAL INSPECTION RESULTS

Table 8-1 presents a listing of test numbers that will appear in SEAR IIi records for 9VC29-A01A.

Table 8-1 Automated / Manual Inspection Results

Test Name	Test Description	Interval	Recorded Value
Test 251	B12		Voltage read
Test 251	B16		Voltage read
Test 251	B16A		Voltage read
Test 251	Batt Mon		Voltage read

9.0 **TEST MODES**

Three different test modes may be selected. These settings can be accessed by pressing the User Test button on the SEAR IIi interface (displayed on 4000 GCP Display Module), or through the 'Tests' option under the main menu of the terminal interface.

9.1 **USER TEST MODE**

When selected, this mode will cause all application messages numbered 1-240 to be ignored and not processed. These alarms will not be generated in the event buffer nor will they be sent to the Office. A **User Test Mode Enabled** and **User Test Mode Disabled** message will be sent to the Office when the mode is entered or exited, respectively. The maintainer will have the option of selecting 1, 4, 8 and 12 hour test modes. The local display will show **SKIP ALARMS: XXX MIN. User test mode will be enabled when a DTMF activation is requested. User test mode cannot be enabled locally when auto tests are ready to run. Additionally, DTMF activation is not allowed when auto tests are flagged as Ready To Run.**

9.2 **ACTIVATE INSPECTIONS**

When selected, this mode will cause the Automatic Inspections to be flagged as Ready To Run. A message is recorded to the event buffer indicating this status. It is also sent to the Office. In the event of a SEAR IIi reset while all Automatic Inspections are in Ready To Run mode, the tests will return to that state when the SEAR IIi comes back online. If the SEAR IIi resets while automatic inspections are being run, the SEAR IIi will save any existing results and restart the auto tests in 65 minutes. If all auto inspections have run and only manual tests remain, the unit will return to that state in the event of a SEAR IIi reset.

9.3 **MANUAL TESTS**

When selected, the user may enter results for manual tests. If an automated test fails, it will appear in this list. If Auto Inspections = NO then all tests may be entered manually. Corresponding test LED's will flash green when user has entered a pass value for a test. On the first of the month, test LED's will return to solid yellow indicating the next set of manual tests is ready to run.

10.0 **TROUBLE LIGHT CONTROL**

If POK1 or POK2 is off, the trouble light will be OFF. If POK1 and POK2 are on, the trouble light will be ON

11.0 **INSTALLATION NOTES**

11.1 **BATTERY/LAMP CALIBRATIONS**

Upon initial site setup, the user will be prompted to calibrate batteries and lamps. Any time that a battery or lamp is changed out, calibrations should be repeated. These portions of site setup can be performed individually onboard the SEAR IIi unit. They are located under MENU>SITE SETUP>LAMP CALIBRATIONS and MENU>SITE SETUP>BATTERY CALIBRATIONS. The user can then follow the prompts to re-calibrate. When calibrating lamps, all gates must be down in order to activate the gate tip sensors.

12.0 **CELL MODEM NON-CRITICAL FEATURE**

When a cell modem is selected as the office communication device, the cell modem non-critical feature may be used to reduce the minutes used on the device. Alarms/messages will be sent in when the health check occurs, when the comm queue is full (50 messages/alarms), any time a connection is initiated from WAMS or when one of the following alarms occurs:

CROSSING CONTROLLER FAILURE

WARNING TIME TK1-6 (if less than 20 seconds)

CROSSING ACTIVE FOR XX MINUTES

AC POWER OFF FOR 20 MINUTES

LOW BATTERY

To enable this feature, answer “YES” to “Use non-critical feature?” during site setup.

13.0 **STANDARD DTMF ACTIVATION**

When VHF communicators are utilized, the user may enable DTMF activation during site setup. The “activation code” and “activation timeout (seconds)” questions asked during site setup are related to DTMF activation. “Activation code” is a three digit code, usually, the last 3 digits of the DOT#, which will be used for activation. “Activation timeout (seconds)” is the time that the crossing will be allowed to stay active. The user’s radio must match the frequency that the VHF communicator is set to. To activate the crossing, you must enter the activation code, then #. To de-activate, enter the activation code, then *. To activate the lights only, enter the activation code, then 1, then #. To de-activate a lights only activation, enter the activation code, then 1, then *. Timers set in the GCP4K programming can add some delay to the activation/de-activation times.

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