



## **CONFIGURATION SUMMARY**

# **SEAR II APPLICATION 9VC28-A01A PREPARED FOR NORFOLK SOUTHERN**

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VERSION A.1

Siemens Industry, Inc., Rail Automation  
9568 Archibald Ave., Suite 100,  
Rancho Cucamonga, California 91730  
1-800-793-7233

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

**DOCUMENT HISTORY**

Version	Release Date	Sections Changed	Details of Change
A	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 II units configured with the 9VC28-A01A user program stored in flash memory. This document:

- Explains LED indications
- Lists setup steps unique to 9VC28-A01A
- Lists all messages generated by 9VC28-A01A
- Links specific tests and alarm messages to specific FRA regulations
- Lists connector / wire tag assignments
- Describes test modes supported by 9VC28-A01A

For further information on SEAR II, including configuration of executive software, refer to the SEAR II – Installation & Operation manual (document no. SIG-00-02-07).

**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 that are unique to 9VC28-A01A. Each row presents an entry in the site setup sequence. The first column shows the text that appears on the SEAR II screen or in the terminal display. The four 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: the 'TOTAL NUMBER OF GCP NODES' entry will appear only if the entry for 'CONSTANT WARNING DEVICE' equals 'GCP'.

**Table 2-1 User Menu Items - Site Setup**

Question	Minimum / Selection 1	Maximum / Selection 2	Selection 3	Selection 4	Selection 5	Selection 6	Condition For Menu Display
RAILROAD NUMBER?	550	550					
CROSSING CONFIGURATION?	STANDARD	LARGE	SPLIT GATE	ISLAND ONLY	CP COLLECTOR	REMOTE	
NUMBER OF XR INPUTS?	0	4					CROSSING CONFIGURATION <>ISLAND ONLY
NUMBER OF ISL INPUTS?	0	4					
CONSTANT WARNING DEVICE?	GCP	OTHER	NONE				CROSSING CONFIGURATION <>CP COLLECTOR
TOTAL NUMBER OF GCP NODES?	1	7					CONSTANT WARNING DEVICE = GCP
CROSSING CONTROLLER 1?	SSCC IIIA/plus	SSCC IV	SSCC II	SSCC III	OTHER	NONE	
CROSSING CONTROLLER 2?	NONE	SSCC IIIA/plus	SSCC IV	SSCC II	SSCC III	OTHER	CROSSING CONTROLLER 1<>NONE
POK2?	NO	YES					CROSSING CONTROLLER 1=OTHER OR NONE
TLITE FUNCTION?	TLITE ONLY	TLITE/POK 2					CROSSING CONTROLLER 1=SSCCIII/plus OR SSCC IV OR SSCC III OR SSCC II
MAIN / STANDBY?	YES	NO					CONSTANT WARNING DEVICE<>NO
AUXILIARY TRACKS?	0	2					CROSSING CONFIGURATION <>SPLIT GATE
ENTRANCE GATES?	0	4					CROSSING CONFIGURATION <>LARGE
EXIT GATES?	0	2					CROSSING CONFIGURATION <>LARGE, ENTRANCE GATES<3



Question	Minimum / Selection 1	Maximum / Selection 2	Selection 3	Selection 4	Selection 5	Selection 6	Condition For Menu Display
EXIT GATES?	0	1					CROSSING CONFIGURATION <>LARGE, ENTRANCE GATES=3
ENTRANCE GATES?	0	8					CROSSING CONFIGURATION =LARGE
EXIT GATES?	0	4					CROSSING CONFIGURATION =LARGE, ENTRANCE GATES<5
EXIT GATES?	0	3					CROSSING CONFIGURATION =LARGE, ENTRANCE GATES=5
EXIT GATES?	0	2					CROSSING CONFIGURATION =LARGE, ENTRANCE GATES=6
EXIT GATES?	0	1					CROSSING CONFIGURATION =LARGE, ENTRANCE GATES=7
NUMBER OF UAX INPUTS?	0	2					CROSSING CONFIGURATION <>CP COLLECTOR
BATTERY BANKS?	1	6					
PREEMPTION?	NO	NORMAL	ADVANCED				CROSSING CONFIGURATION <>CP COLLECTOR
VHF COMMUNICATOR?	YES	NO					
DTMF ACTIVATION?	NO	YES					VHF COMMUNICATOR =YES
ACTIVATION CODE?	1	999					DTMF ACTIVATION=YES
ACTIVATION TIMEOUT (SECONDS)?	30	600					DTMF ACTIVATION=YES
iLOD MODULES?	0	4					CROSSING CONFIGURATION <>CP COLLECTOR
VHF VOICE CHANNEL?	1	8					VHF COMMUNICATOR =YES
VHF DATA CHANNEL?	1	8					VHF COMMUNICATOR =YES

### 3.0 DIGITAL INPUT STANDARD CONFIGURATION

The following defines the inputs for the 18 digital inputs at the bottom left of the SEAR II front panel for 9VC28-A01A. Table 3-1 defines input assignments when the Crossing Configuration is not a “Large” or “CP Collector” site. Table 3-2 defines input assignments when the Crossing Configuration is selected as “Large”. Table 3-3 defines inputs assigned to the external digital I/O unit when a “Large” Crossing Configuration is selected. Once inputs are assigned based on the site setup answers, they cannot be changed.

**Table 3-1 Standard Crossing Configuration, Not “Large” or “CP Collector” Site**

Chan	Name	Wire Tag	Normal	Energized	De-Energized	Menu Condition
01	XR1	XR1	UP	UP	DOWN	CROSSING CONFIGURATION=STANDARD OR SPLIT GATE
02	XR2	XR2	UP	UP	DOWN	CROSSING CONFIGURATION=STANDARD OR SPLIT GATE, NUMBER OF TRACKS>1
03	ISLAND 1	ISL1	UP	UP	DOWN	CROSSING CONFIGURATION<>REMOTE
04	ISLAND 2	ISL2	UP	UP	DOWN	CROSSING CONFIGURATION<>REMOTE, NUMBER OF ISL INPUTS>1
05	MAIN/ STANDBY	M/S	MAIN	MAIN	STANDBY	MAIN/STANDBY=YES
06	BELL OUT	BELL OUT	OFF	ON	OFF	CROSSING CONFIGURATION<>REMOTE
11	GATE CONTROL	GCOUT1	OFF	ON	OFF	ENTRANCE GATES>0
12	UAX	UAX	UP	UP	DOWN	NUMBER OF UAX INPUTS>0
13	AUX TRACK(S)	AUX	UP	UP	DOWN	CROSSING CONFIGURATION <>SPLIT GATE
13	FOREIGN RAILROAD	FRR	UP	UP	DOWN	CROSSING CONFIGURATION = SPLIT GATE
15	EXIT GATE CONTROL	EGCOUT	OFF	ON	OFF	EXIT GATES>0, BATTERY BANKS<3
16	PREEMPT	PREEMPT	OFF	ON	OFF	PREEMPTION<>NO
17	120 VAC	120 VAC	ON	ON	OFF	
18	POK2	POK2	ON	ON	OFF	CROSSING CONTROLLER 1 =NO OR OTHER
18	TROUBLE LIGHT	TLITE	ON	ON	OFF	CROSSING CONTROLLER 1 <>NO OR OTHER

**Table 3-2 Crossing Configuration, When Site Selected as “Large”**

Chan	Name	Wire Tag	Normal	Energized	De-energized	Menu Condition
01	MAIN/ STANDBY	M/S	MAIN	MAIN	STANDBY	MAIN/STANDBY= YES
02	BELL OUT	BELL OUT	OFF	ON	OFF	
03	BELL OUT 2	BELL OUT 2	OFF	ON	OFF	
15	TROUBLE LIGHT	TLITE	ON	ON	OFF	CROSSING CONTROLLER 1 <>NO OR OTHER
15	POK2	POK2	ON	ON	OFF	CROSSING CONTROLLER 1 =NO OR OTHER
16	PREEMPT	PREEMPT	OFF	ON	OFF	PREEMPTION<>NO
17	120 VAC	120 VAC	ON	ON	OFF	

**Table 3-3 Crossing Configuration, When Inputs Assigned to External Digital I/O and “Large” Site**

Chan	Name	Wire Tag	Normal	Energized	De-energized	Menu Condition
01	XR1	XR1	UP	UP	DOWN	NUMBER OF TRACKS>0
02	XR2	XR2	UP	UP	DOWN	NUMBER OF TRACKS>1
03	XR3	XR3	UP	UP	DOWN	NUMBER OF TRACKS>2
04	XR4	XR4	UP	UP	DOWN	NUMBER OF TRACKS>3
05	ISLAND 1	ISL1	UP	UP	DOWN	NUMBER OF ISL INPUTS>0
06	ISLAND 2	ISL2	UP	UP	DOWN	NUMBER OF ISL INPUTS>1
07	ISLAND 3	ISL3	UP	UP	DOWN	NUMBER OF ISL INPUTS>2
08	ISLAND 4	ISL4	UP	UP	DOWN	NUMBER OF ISL INPUTS>3
09	GATE CONTROL	GCOUT1	OFF	ON	OFF	ENTRANCE GATES>0
10	EXIT GATE CONTROL	EGCOUT	OFF	ON	OFF	EXIT GATES>0
11	AUX TRACK 1	AUX	UP	UP	DOWN	AUXILLARY TRACKS>0
12	AUX TRACK 2	AUX2	UP	UP	DOWN	AUXILLARY TRACKS>1
13	UAX	UAX	UP	UP	DOWN	NUMBER OF UAX INPUTS>0
14	UAX2/ ENA	UAX2/ ENA	UP	UP	DOWN	NUMBER OF UAX INPUTS>1
15	TROUBLE LIGHT 2	TLITE2	ON	ON	OFF	CROSSING CONTROLLER 2 <>NO OR OTHER

#### 4.0 INDICATOR LED CONFIGURATION

This table and the following material on LED conventions define operation of the red Indicator LEDs for 9VC28-A01A.

**Table 4-1 Operation of Red Indicator LEDs**

<b>LED</b>	<b>Alarm Numbers</b>	<b>Designator</b>	<b>Checked</b>
I01	1	CROSSING CONTROLLER FAILURE	ALWAYS
I04	4	CROSSING ACTIVE 20+ MINUTES	ALWAYS
I05	5	AC POWER OFF 20+ MINUTES	ALWAYS
I09	9	GATE POSITION FAIL	TRAIN MOVE
I15	18, 19, 35, 36, 39, 40	LOW BATTERY	ALWAYS
I16	22	PREEMPTION FAIL	TRAIN MOVE

#### 4.1 STANDARD LED CONVENTIONS

1. LEDs are ON (RED) steady when in Normal Mode.
2. LEDs FLASH FAST when an alarm condition exists.
3. LEDs FLASH SLOW if an alarm has occurred since the last time the CLEAR ALARM key was pressed, but has been cleared.
4. The CLEAR ALARM key will clear out alarms if the conditions that caused them no longer exist.
5. Any alarm associated with a train move can be cleared by the CLEAR ALARM key even if there has not been a train move without an alarm since the alarm occurred.

## 5.0 BATTERY INPUT CONFIGURATION

The following table shows the 9VC28-A01A default names, software designators, and resolutions for the three battery inputs at the lower right-hand corner of the SEAR II front panel.

**Table 5-1 Battery Input Channel Assignments**

Chan	Name	Designator	Resolution	Menu Condition
01	B12	B12	1 VDC	
02	B16	B16	1 VDC	BATTERY BANKS>1
02	UNUSEDV2	UNUSEDV2	5 VDC	BATTERY BANKS=1
03	B16A	B16A	1 VDC	BATTERY BANKS>2
03	UNUSEDV3	UNUSEDV3	5 VDC	BATTERY BANKS=1
01 Analog Module	BATT4	BATT4	1 VDC	BATTERY BANKS>3
02 Analog Module	BATT5	BATT5	1 VDC	BATTERY BANKS>4
03 Analog Module	BATT6	BATT6	1 VDC	BATTERY BANKS>5

## 6.0 RELAY OUTPUT CONFIGURATION

Table 6-1 shows the 9VC28-A01A default names and software designators for the two relay outputs of the SEAR II Digital I/O unit.

**Table 6-1 Default Names and Software Designators for the SEAR II Digital I/O Unit Relay Outputs**

Chan	Name	Designator	Normal	Energized	De-energized	Menu Condition
01 Digital I/O Module	KDR	KDR	OFF	ON	OFF	CROSSING CONFIGURATION=LARGE, DTMF ACTIVATION=YES
02 Digital I/O Module	LKR	LKR	OFF	ON	OFF	CROSSING CONFIGURATION=LARGE, DTMF ACTIVATION=YES

## 7.0 MESSAGES

The tables in the following subsections list all of the messages generated by the 9VC28-A01A application. Messages generated by the SEAR II executive are not presented here.

Messages fall into categories defined by message numbers:

0	Internal SEAR II Messages
1-100	Application Alarms
101-200	Application Alarm Clears
201-230	Automatic Inspection Alarms
231-240	Application Information Messages
241-250	Reserved
251-255	Automatic Inspection Information
1000-1099	Office Software Alarms
1099-1199	Office Software Alarm Clears

## 7.1 APPLICATION ALARMS

The 9VC28-A01A application generates these alarms.

**Table 7-1 Application Alarms**

Alarm #	LED	Name	Description	Sent To Office	Tested
1	I01	Crossing Controller Failure	TLITE OFF and 120 VAC NORMAL for 30 seconds.	Yes	Always
4	I04	Crossing Active Too Long	Crossing has been active (CrossingActive TRUE) for 20 minutes or longer.	20 min. intervals	Always
5	I05	AC Power Off For 20 Minutes	120 VAC has been off for 20 minutes or more.	Yes	Always
9	I09	Gate Position Fail	1. Gate control activates 2. 20 second elapses 3. All entrance gates are not DOWN	Yes	Train Move
18	I15	Low B12	B12 is less than 85% of calibrated voltage for at least 20 seconds.	Yes	Always
19	I15	Low B16	B16 is less than 85% of calibrated voltage for at least 20 seconds.	Yes	Always
22	I16	Preemption Alarm	CrossingActive and PREEMPT is ON	Yes	Train Move
35	I15	Low B16A	B16A is less than 85% of calibrated voltage for at least 20 seconds.	Yes	Always
36	I15	Low BATT4	BATT4 is less than 85% of calibrated voltage for at least 20 seconds.	Yes	Always
39	I15	Low BATT5	BATT5 is less than 85% of calibrated voltage for at least 20 seconds.	Yes	Always
40	I15	Low BATT6	BATT6 is less than 85% of calibrated voltage for at least 20 seconds.	Yes	Always

## 7.2 APPLICATION ALARM CLEARS

These messages report cleared alarms.

**Table 7-2 Application Alarm Clears**

Alarm #	LED	Name	Description	Sent To Office	Tested
101	---	Crossing Controller Normal	<i>Crossing controller Fail</i> alarm clears.	Yes	Clears
104	---	Crossing Normal	<i>CrossingActive Too Long</i> alarm clears.	Yes	Clears
105	---	AC Power Back On	<i>AC Power Off For 20 Minutes</i> alarm clears for at least 1 minute.	Yes	Clear
109	---	Gates Normal	<i>Gate Position Fail</i> alarm clears.	Yes	Clears
118	---	B12 Normal	<i>Low B12</i> alarm clears for 5 seconds.	Yes	Clears
119	---	B16 Normal	<i>Low B16</i> alarm clears for 5 seconds.	Yes	Clears
122	---	Preempt Normal	<i>Fail Preempt Test</i> alarm clears.	Yes	Clears
135	---	B16A Normal	<i>Low B16A</i> alarm clears for 5 seconds.	Yes	Clears
136	---	BATT4 Normal	<i>Low BATT4</i> alarm clears for 5 seconds.	Yes	Clears
139	---	BATT5 Normal	<i>Low BATT5</i> alarm clears for 5 seconds.	Yes	Clears
140	---	BATT6 Normal	<i>Low BATT6</i> alarm clears for 5 seconds.	Yes	Clears

## 7.3 OFFICE GENERATED MESSAGES

Office software working with 9VC28-A01A sends these messages.

**Table 7-3 Office Generated Messages**

Alarm #	Name	Description	Sent To Office	Tested
1000	?? Off Line	<i>Generated by Office Software when field sites fail to report in as required.</i>	No	Always
1100	?? On Line	<i>Generated by Office Software after alarm #1000 has been generated for a site. Indicates the field site is reporting normally again.</i>	No	Clears

## 8.0 SPECIAL TRAIN MOVE CONDITIONS

The following definitions cover train move conditions monitored by the 9VC28-A01A application.

### **CrossingActive**

Any XR, ISL, or UAX input is de-energized.

### **IslandOccupied**

Any ISL input is de-energized.

### **FullApproachMove**

CrossingActive TRUE and IslandOccupied TRUE. GCP sites will not send this if train speed <15mph.

## 9.0 AUTOMATED / MANUAL INSPECTION RESULTS

The following table presents a listing of test numbers that will appear in SEAR II records for 9VC28-A01A.

**Table 9-1 Automated / Manual Inspection Results**

Test #	Test Name	Test Description	Interval	Recorded Value
2	Test 251	B12	A 5 minute test executed once during a train move with AC power removed from battery charger	Voltage read
3	Test 251	B16		Voltage read
29	Test 251	B16A		Voltage read
30	Test 251	BATT4		Voltage read
33	Test 251	BATT5		Voltage read
34	Test 251	BATT6		Voltage read



## 10.0 TEST MODES

Two different test modes may be selected. These settings can be accessed through the User Test button on the SEAR II front panel.

### 10.1 USER DIAG

This mode has selections for disabling alarms and starting automatic inspections locally. When a Field Test is activated it will cause all field-generated alarms numbered 1-200 to be ignored and not processed. These alarms will not be generated in the event buffer nor will they be sent to the Office. The maintainer will have the option of selecting 1, 4, 8 and 12-hour test modes. The local display will show **“SKIP ALARMS: XX MIN”**. To disable a Field Test select “Disable – Test Mode”.

Selecting “Start – Automatic Inspection” will set the Automatic Inspections to be flagged as Ready To Run. A message is recorded to the event buffer indicating that the tests have been started locally. It is also sent to the Office. Automatic Inspections will not run if the Crossing Configuration is set to Island Only, Remote, or CP Collector.

### 10.2 MANUAL INSPECTIONS

This mode allows for the entry of monthly manual inspections. The list of tests will also include any failed automated tests that now require manual entry. All automated and manual tests must pass in order for results to be sent to the office and for automatic inspections to run again. If all tests have not passed by month end, all remaining results will be sent to the office and saved to that month. Automatic tests will then be able to restart.

## 11.0 INSTALLATION NOTES

### 11.1 GCP NODE INSTALLATION

GCP nodes should be installed top to bottom, redundant to standalone. For instance, if there is 1 redundant GCP onsite, and 1 standalone, the main unit on the first GCP would be node GCP1 and the standby would be node GCP2. The main unit on the second GCP would be node GCP3. Odd numbered nodes should always be assigned to the Main units and even to the Standby. The user will be prompted to install the odd numbered nodes first to reduce the number of transfers necessary for install. The user may be prompted to install other nodes between the installation of GCP1 and GCP3.

### 11.2 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 II 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.

# SIEMENS

**Siemens Industry, Inc., Rail Automation**

2400 Nelson Miller Parkway  
Louisville, Kentucky 40223  
(502) 618-8800

**Siemens Industry, Inc., Rail Automation**

California R&D Division  
9568 Archibald Ave., Suite 100  
Rancho Cucamonga, California 91730  
(909) 532-5300