SIEMENS

APPLICATION REFERENCE MANUAL

WayConneX® Configuration Tool (WCCT)

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VERSION C.3

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DOCUMENT HISTORY

Version	Release Date	Sections Changed	Details of Change
A	Oct 2015	All	Initial Release
B	July 2016	All	Change Wayside Controller to WayConneX®
			Add WayTraX Module
			Add PSO Module
		Glossary	Add WayTraX
		Section 2	Pg 2-3 Sec 2.1 update Fig 2-3
			Pg 2-4 Sec 2.2 update Fig 2-4 and Fig 2-5
			Pg 2-5 Sec 2.2 update Fig 2-6 and Fig 2-7
			Pg 2-6 Sec 2.2 update Fig 2-8
			Pg 2-7 Sec 2.3 update Fig 2-10
		Section 3	Pg 3-22 Sec 3.6 WayTraX Editor add Section
			Pg 3-43 Sec 3.12 PSO Module Editor add Section
			Pg 3-49 Sec 3.13 BVPI8 Module Editor add Section
			Pg 3-51 Sec 3.14 BVPI10 Module Editor add Section
		Section 4	Pg 4-16 Sec 4.2.9 add CTIO, LDIO, and LDIOST
		Section 5	Pg 5-24 Sec 5.1.2 correct data
			Pg 5-26 Sec 5.2.2 correct data & Sec 5.3.2 correct VPI data
			Pg 5-27 Sec 5.4 VPI Module add Table 5-3 & Sec 5.4.2 correct data
			Pg 5-30 Sec 5.8 WayTraX Module add Section
			Pg 5-31 Sec 5.9 PSO Module add Section
			Pg 5-33 Sec 5.10 BVPI Module add Section
			Pg 5-34 Sec 5.11 BVPI10 Module add Section
			Pg 5-39 Sec 5.12.6 LDIO: Long Distance Coded Track Channels add Section
			Pg 5-41 Sec 5.12.7 LDIOST Long Distance Coded Track Send Twice Channels add Section
			Pg 5-42 PSOTX Transmitter Channel add Section
			Pg 5-43 PSORX: Receiver Channel add Section
			Pg 5-44 BVPI: Bipolar VPI Channel add Section
		Section 6	Pg 6-2 Sec 6.2.1 update Fig 6-2
			Pg 6-4 Sec 6.2.1 update Fig 6-4
			Pg 6-5 Sec 6.2.2 update Fig 6-5
		Section 7	Pg 7-13 Sec 7.7.2 WayTraX Module add Section

C	Aug 2017	All	Updates for new WCCT and section reorganization.
C.1	Oct 2019	3.4.3 3.4.2.1 Table 3-2 Section 3.8 Section 3.10 Section 3.19.1	Added Warnings. Added TrackType and ConnectionType to Table 3-2. Removed 3.8 Waytrax Editor (not released yet). Removed 3.10 Searchlight Editor (obsolete). Added information to PSO Editor for PSO-E. Added Note.
C.2	Apr 2021	Section 1.4	Added Section on valid WayConneX Modules
C.3	Apr 2024	All	Removed all references to GEO.
		Glossary	Updates to glossary.
		Section 1	Figure 1-1: Added latest configuration chart.
		Section 3	Section 3.3 Chassis Editor – deleted content for GEO Chassis. Added warning at end of section.
			Section 3.5 Coded Track Module Editor – updates to this section to show that only freight code rates are currently supported.
			Section VLP2 Module Editor – removed.
			Section 3.6 Coded Line Module Editor – deleted content, this module is no longer supported.
			Section 3.9 PSO Module Editor – content deleted for outdated version of editor. Content added to Table 3-8 PSO Module parameters. Added Table 3 9: PSO Receiver States. Updated content throughout.
		Section 4	Section 4 VLP2 content removed – no longer needed.
			Section 4.2 Select Chassis section updated for current chassis options.
		Appendix A	Appendix A VLP2 content removed – no longer needed.
		Appendix E	Appendix E Added note regarding old chassis names that are no longer valid.

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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 Mobility, Inc. Application Engineering.

ELECTROSTATIC DISCHARGE (ESD) PRECAUTIONS

Static electricity can damage electronic circuitry, particularly low voltage components such as the integrated circuits commonly used throughout the electronics industry. Therefore, procedures have been adopted industry-wide which make it possible to avoid the sometimes invisible damage caused by electrostatic discharge (ESD) during the handling, shipping, and storage of electronic modules and components. Siemens Mobility, Inc. has instituted these practices at its manufacturing facility and encourages its customers to adopt them as well to lessen the likelihood of equipment damage in the field due to ESD. Some of the basic protective practices include the following:

- Ground yourself before touching card cages, assemblies, modules, or components.
- Remove power from card cages and assemblies before removing or installing modules.
- Remove circuit boards (modules) from card cages by the ejector lever only. If an ejector lever is not provided, grasp the edge of the circuit board but avoid touching circuit traces or components.
- Handle circuit boards by the edges only.
- Never physically touch circuit board or connector contact fingers or allow these fingers to come in contact with an insulator (e.g., plastic, rubber, etc.).
- When not in use, place circuit boards in approved static-shielding bags, contact fingers first. Remove circuit boards from static-shielding bags by grasping the ejector lever or the edge of the board only. Each bag should include a caution label on the outside indicating static-sensitive contents.
- Cover workbench surfaces used for repair of electronic equipment with static dissipative workbench matting.
- Use integrated circuit extractor/inserter tools designed to remove and install electrostatic-sensitive integrated circuit devices such as PROMs (OK Industries, Inc., Model EX-2 Extractor and Model MOS-40 Inserter (or equivalent) are highly recommended).
- Utilize only anti-static cushioning material in equipment shipping and storage containers.

For information concerning ESD material applications, please contact the Technical Support Staff at 1-800-793-7233.

GLOSSARY

TERM **DESCRIPTION**

AAR: Association of American Railroads – an organization that establishes uniformity and standardization among different railroad systems.

AREMA: American Railroad Equipment Manufacturing Association – an organization that supersedes AAR.

Aspect: (Signal Aspect) The name given to a signal aspect used in PTC interface.

ATCS: Advanced Train Control System – a set of standards compiled by the AAR for controlling all aspects of train operation.

ECD: External Configuration Device – a USB (Flash Memory) device mounted inside the chassis of the WayConneX unit. The ECD is used to store site-specific configuration data (MCF, SIN, UCN, and card parameters) for the CPU.

Group: A sub-header under the Line entry, to organize the information created by the WCCT. The Group location is where the chassis, NVLP, and MCFs of a track layout are stored. The Group entry has a number, name, state location and milepost that can be associated with ATCS addressing.

I/O Module: Circuit cards contained within the WayConneX® chassis. These modules pass input and output information to tracks, signals, and other railroad equipment.

Line: A sub-header under Railroad to organize the information created by the WCCT. The Line entry has a number, name and description that can be associated with ATCS addressing.

MEF: Module Executable File – the executive software running in the CPU. The user can download the MEF through the DTU port to update the software.

MCF: Module Configuration File – the site-specific configuration information created by the WCCT, and downloaded into the ECD, using the Web UI on the CPU III.

Menu Path: The logical path from the WCCT menu bar to appropriate sub menus for completing a task.

PSO Phase Shift Overlay Track Circuit Module.

PTC: Positive Train Control

PTC UCN: The Unique Check Number associated with the PTC logic in the MCF

Railroad: The main header for the information created by the WCCT. The Railroad has a number, mnemonic and name that can be associated with ATCS addressing.

TERM **DESCRIPTION**

SIN: Site Identification Number – the 12-digit ATCS address for the WayConneX equipment downloaded through the Diagnostic serial port on the CPU and stored in the ECD. The SIN has the form 7.RRR.LLL.GGG.SS stored in binary coded decimal, with each digit in one nibble. The digit 0 is represented by “A” and 0 is used as a null byte.

Site Location: The location where WayConneX chassis is installed, usually within close proximity of the signal or switch that the unit is controlling.

UCN: Unique Check Number – a 32-bit CRC calculated over the MCF and stored in the ECD to detect file corruption. The UCN is created by the WCCT and entered into the CPU to verify proper configuration.

VPI: Vital Parallel Input – a module input circuit the function of which affects the safety of train operation.

VRO: Vital Relay Output – a module output circuit the function of which affects the safety of train operation.

WCCT: WayConneX Configuration Tool

SECTION 1 GENERAL DESCRIPTION

1.0 INTRODUCTION

The Siemens WayConneX® Configuration Tool (WCCT) is a Windows® based computer application used to create application programs for the Siemens WayConneX system.

This manual describes how this tool can be used to create application programs using traditional Boolean logic.

This WCCT application reference manual comprises the following information:

- Section 1 describes part specifications and requirements.
- Section 2 explains how to set up the program.
- Section 3 explains how to edit each module in the chassis.
- Section 4 includes an overview of how to create an application.
- Sections 5 and 6 contain detailed information on builds, validation testing, and reports.

1.1 COMPUTER SYSTEM REQUIREMENTS

The following list indicates the minimum computer requirements for the WCCT programming application:

- 800 x 600 display.
- 1.5 GHz processor or faster.
- 2 GB of RAM.
- 32 GB Hard disk space.
- Microsoft® Windows Operating System 10.

1.2 ORDERING INFORMATION

The Siemens part number for the WCCT Application is shown in the following table.

Part Number	Description
Z224-9VD24-A010	WayConneX Configuration Tool

1.3 MCF VERIFICATION

Verification and Validation (V&V) of the MCF, as with all software, requires code level and system level testing. The WCCT includes tools that facilitate lower level V&V activities and Siemens recommends a V&V approach, using a combination of simulation and decompilation. A system level approach, such as rack testing, is a required V&V activity, based on the system safety analysis.

⚠ WARNING

WARNING

BEFORE BEING PLACED IN LIVE-SERVICE, THE MCF GENERATED USING THE WCCT MUST BE VERIFIED AND VALIDATED TO ENSURE SAFETY.

1.3.1 Simulation (Recommended)

Interactive simulation may be used to test the logical operation of the application. All logical combinations of input states may be explicitly commanded and all resulting output states may be inspected using relay logic simulation to ensure expected operation of configuration data and vital logic.

1.3.2 Validation (Recommended)

Module Configuration Files are compiled from data entered by the user into the graphical user interfaces and stored as source files. The Validation step is used to re-generate the original source files from compiled Module Configuration Files. The tool compares the original project files with the decompiled project files and produces a difference report that indicates whether any problems were found.

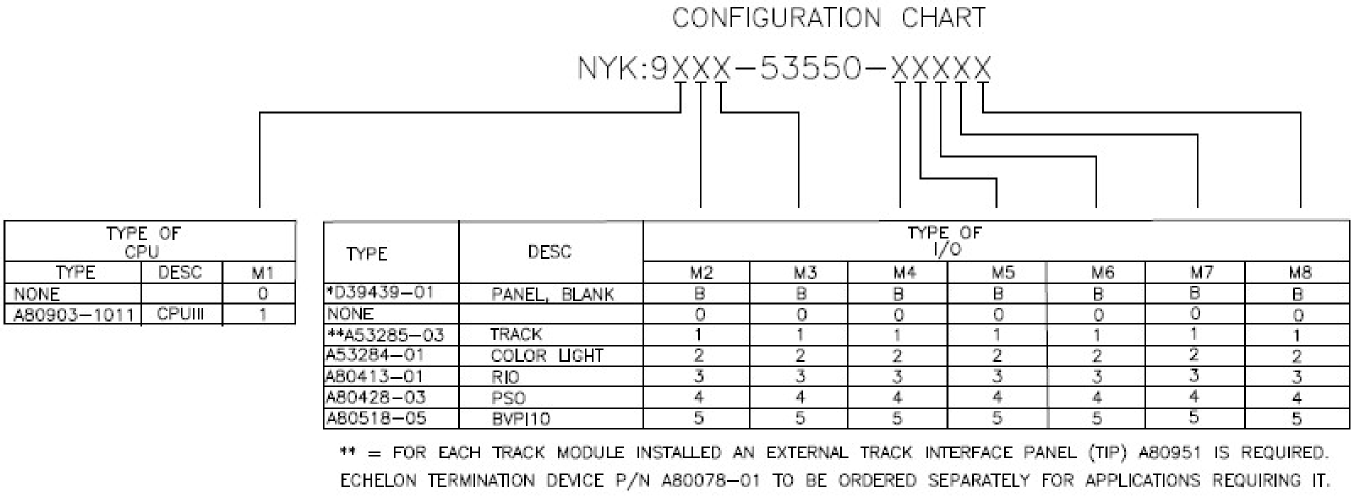
1.3.3 System Test (e.g. Rack Test) (Required)

The system test verifies the resultant MCF against actual hardware and executive software. As part of the system test, the Program Report obtained from the OCE and target WayConneX system must be generated and reviewed to ensure all configuration parameters and default settings are accurately represented.

The person performing the system test must be familiar with the application logic and the software application used.

1.4 WAYCONNEX MODULES

As of the publication date of this manual, only the following modules have been released for use in WayConneX and are available:



TYPE OF CPU		
TYPE	DESC	M1
NONE		0
A80903-1011	CPUIII	1

TYPE	DESC	TYPE OF I/O						
		M2	M3	M4	M5	M6	M7	M8
*D39439-01	PANEL, BLANK	B	B	B	B	B	B	B
NONE		0	0	0	0	0	0	0
**A53285-03	TRACK	1	1	1	1	1	1	1
A53284-01	COLOR LIGHT	2	2	2	2	2	2	2
A80413-01	RIO	3	3	3	3	3	3	3
A80428-03	PSO	4	4	4	4	4	4	4
A80518-05	BVPI10	5	5	5	5	5	5	5

** = FOR EACH TRACK MODULE INSTALLED AN EXTERNAL TRACK INTERFACE PANEL (TIP) A80951 IS REQUIRED.
ECHELON TERMINATION DEVICE P/N A80078-01 TO BE ORDERED SEPARATELY FOR APPLICATIONS REQUIRING IT.

Figure 1-1 WayConneX Module Configuration Chart (A53550)

SECTION 2 PROGRAM SETUP AND CONFIGURATION

2.0 PROGRAM INSTALLATION STEPS

Complete the following steps to complete the installation process:

1. Open the folder location that contains the WCCT package.
2. Locate the file named Setup.exe. Double-click the Setup file to begin the installation process.
3. Follow the on-screen instructions to install the applications.
4. Restart the computer to complete the installation.

The following subsections detail the functions found under the file tab and other related functions for program setup and configuration.

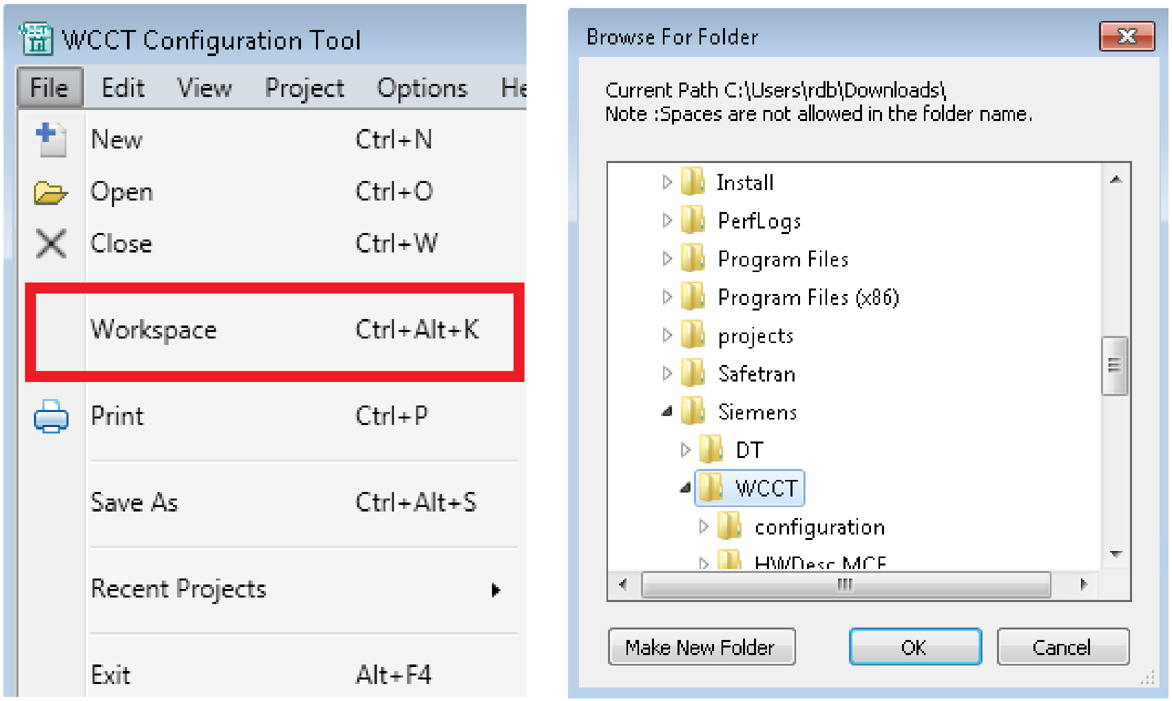
2.1 MANAGING PROJECTS

The WCCT allows the user to open one project at a time.

2.1.1 Setting File Workspace

By default, the tool will store new projects in c:\Siemens\WCCT\Workspace.

To use a different location for a project, first set the new workspace using **File > Workspace**.

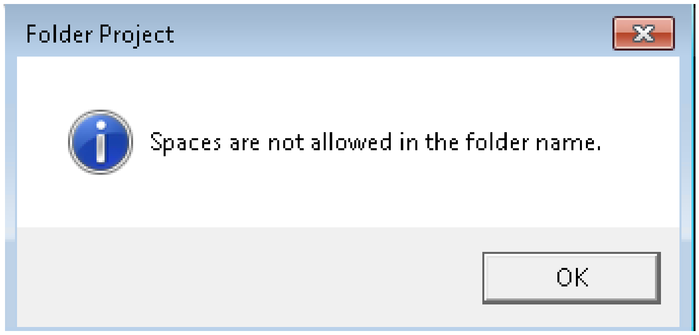


Current Path C:\Users\rdb\Downloads\
Note :Spaces are not allowed in the folder name.

Figure 2-1 Select Workspace

This brings up a window where the user can set the new workspace.

Make sure that there are no spaces in the path that has been selected. If there are spaces the tool will give the following error message:



Spaces are not allowed in the folder name.

Figure 2-2 Spaces in Path Error

2.1.2 Creating a New Project

To create a new project, either select **File>New>Project**, select the **New** icon or use the **Ctrl N** shortcut.

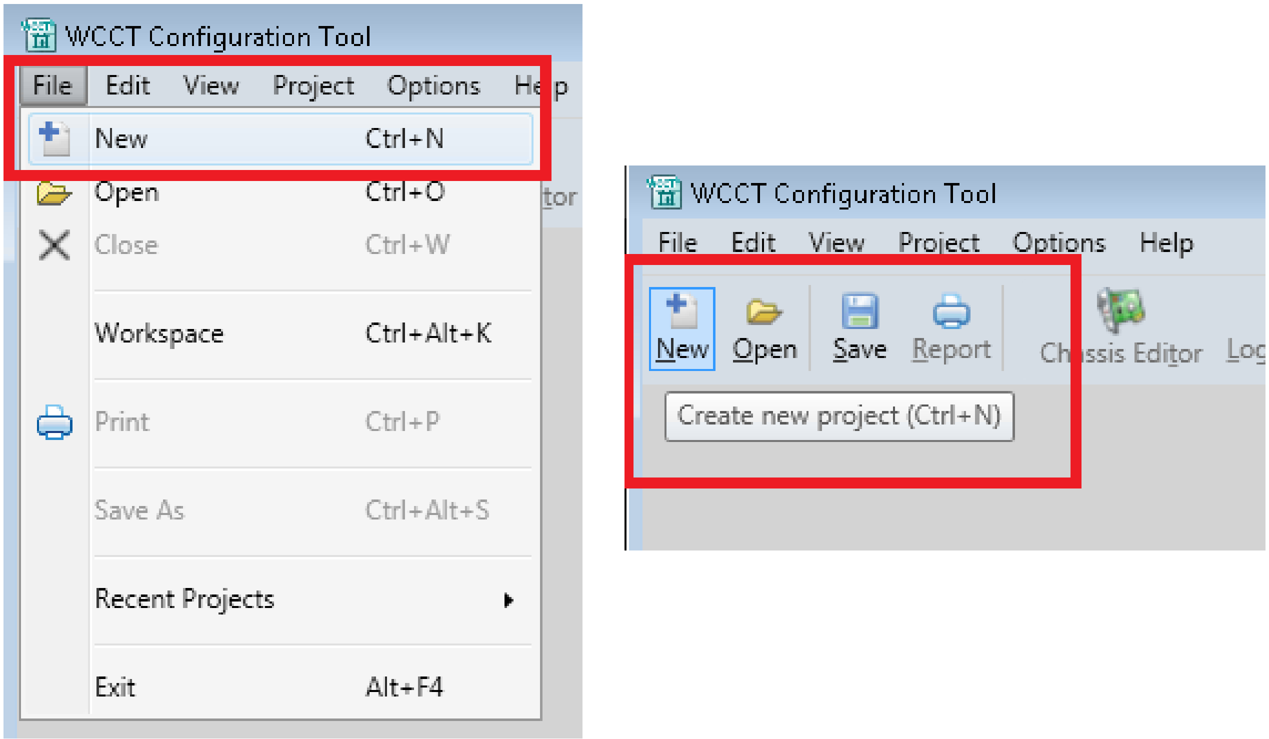
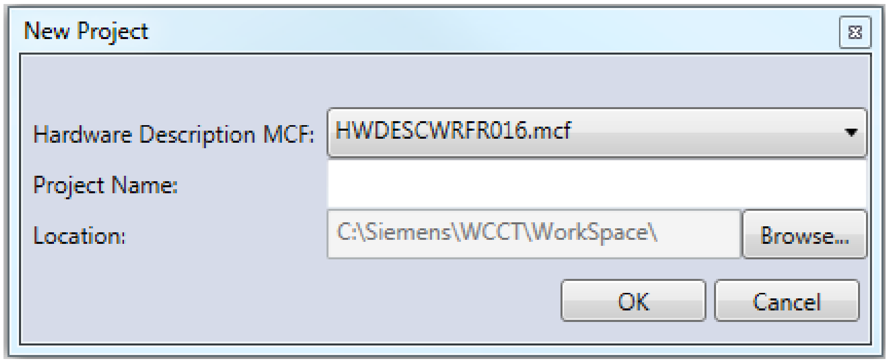


Figure 2-3 Creating a New Project

This brings up the **New Project Window**. From this, type in the project name (alphanumeric or underscore, 12 characters long, cannot include spaces or other punctuation).



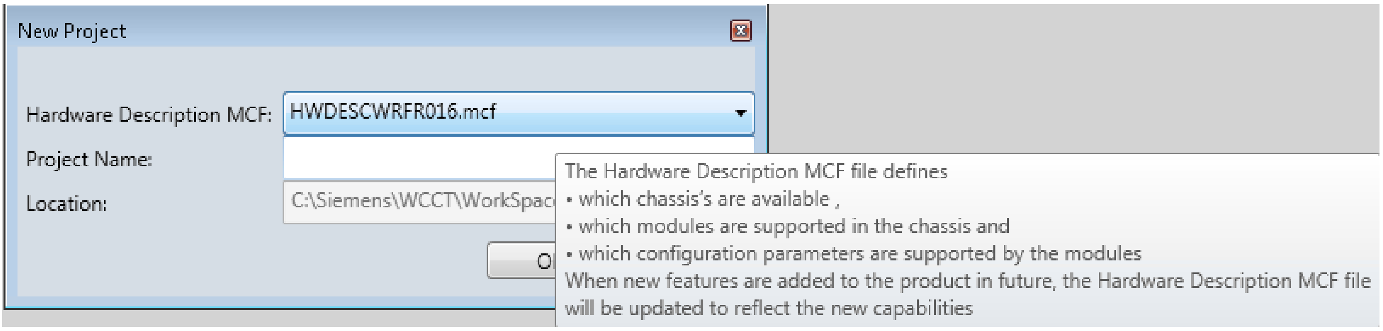
Hardware Description MCF: HWDESCWRFR016.mcf

Project Name:

Location: C:\Siemens\WCCT\WorkSpace\

Figure 2-4 New Project Window

To change the location where you want to keep your projects, select the **Browse** button next to the Location field. The default location is shown in the following figure.



Hardware Description MCF: HWDESCWRFR016.mcf

Project Name:

Location: C:\Siemens\WCCT\WorkSpac

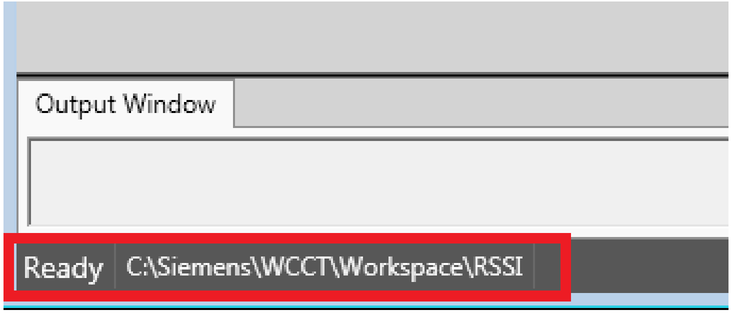
The Hardware Description MCF file defines
- which chassis's are available ,
- which modules are supported in the chassis and
- which configuration parameters are supported by the modules

When new features are added to the product in future, the Hardware Description MCF file will be updated to reflect the new capabilities

Figure 2-5 Hardware Description MCF

The Hardware Description MCF is used to define module properties used by the tool. Generally, you will use the latest version available.

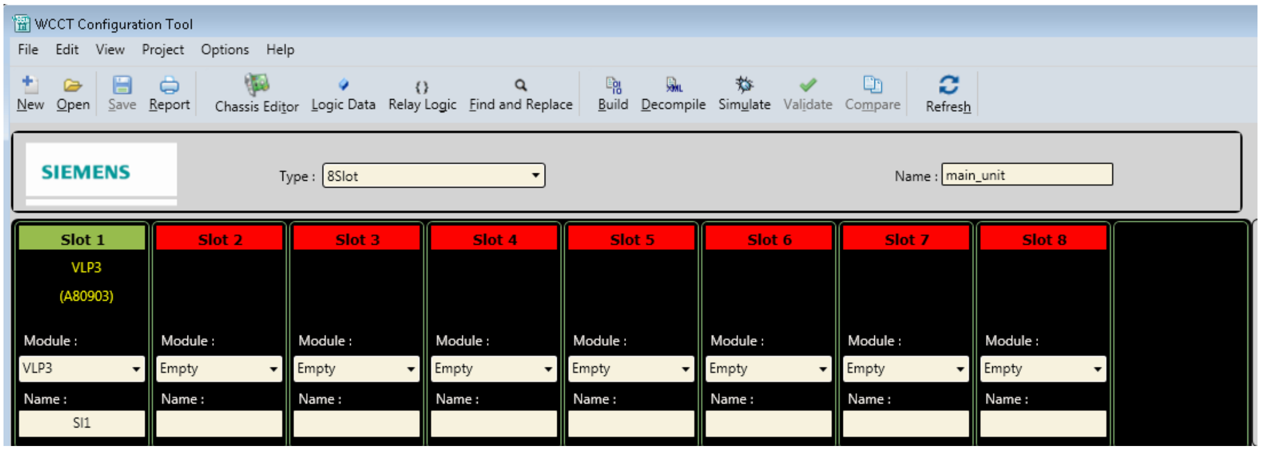
The new project will be created and will show up in the selected location. The new status bar at the bottom of the main window will show the current project.



Ready C:\Siemens\WCCT\Workspace\RSSI

Figure 2-6 Status Bar

The project opens with the chassis editor showing the default 8Slot chassis with the VLP3 (CPU III) in slot 1.


WCCT Configuration Tool
File Edit View Options Help
New Open Save Report Chassis Editor Logic Data Relay Logic Find and Replace Build Decompile Simulate Validate Compare Refresh
SIEMENS
Slot 1 Slot 2 Slot 3 Slot 4 Slot 5 Slot 6 Slot 7 Slot 8
VLP3
(A80903)
Module :
Name :

Type : 8Slot

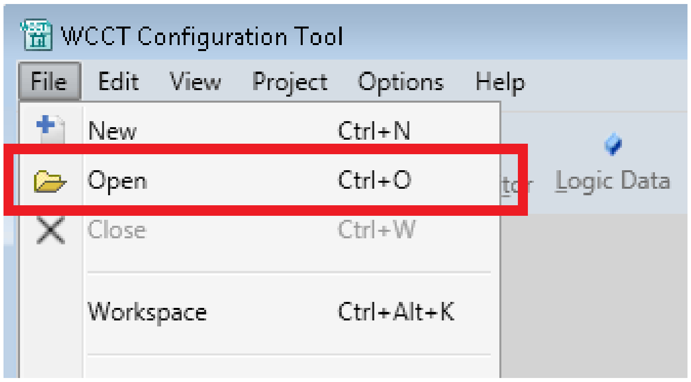
Name : main_unit

	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8
Module :	VLP3	Empty	Empty	Empty	Empty	Empty	Empty	Empty
Name :	SI1							

Figure 2-7 Chassis Editor Opening Screen

2.1.3 Opening a Project

To open a project, select **File>Open** or the **Open** icon or the **Ctrl O** shortcut.



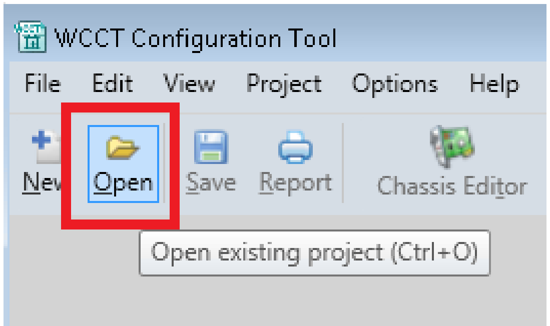
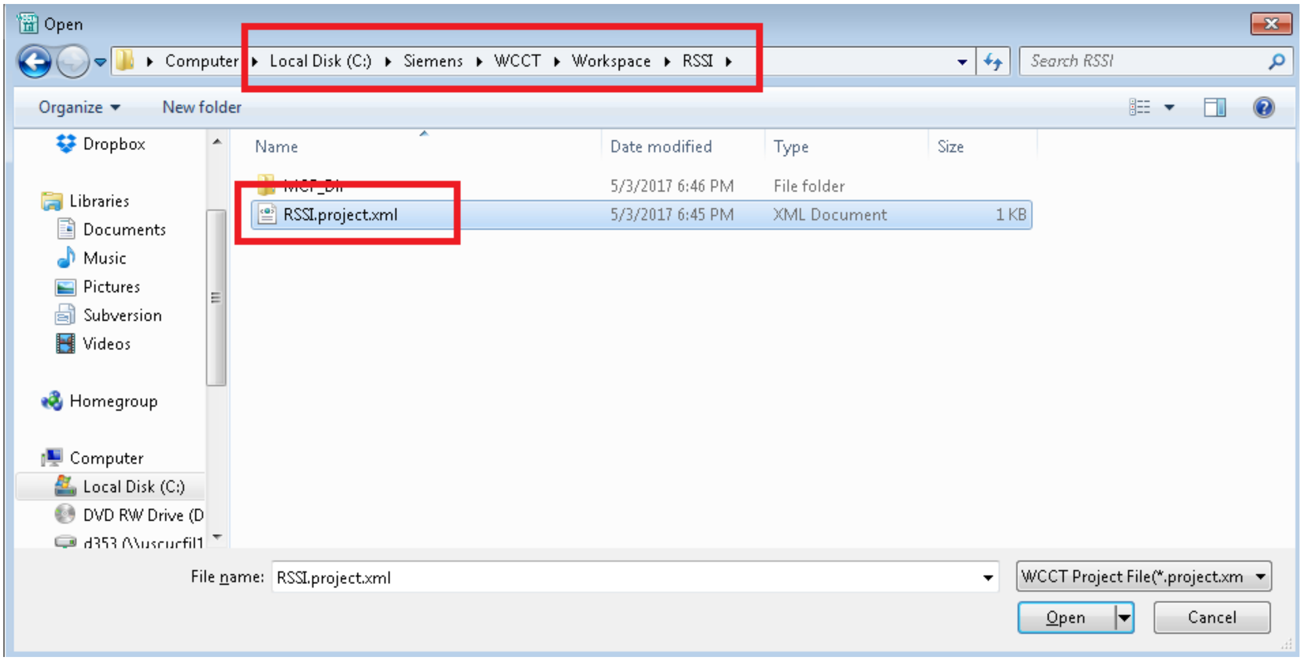

WCCT Configuration Tool
File Edit View Project Options Help
New Open Save Report Chassis Editor
Open existing project (Ctrl+O)

Figure 2-8 Select Open Project

This opens the **Open** window from which the user can select the folder and .xml file for the project. Double-click on the file or select **Open**.



File name: RSSI.project.xml

Figure 2-9 Opening a Project

This will open the project at the chassis editor. To open projects created with the older, Eclipse-based WCCT (version 1.3.6 and earlier) see Appendix E.

2.1.4 Closing a Project

Select the **File>Close** or the **Ctrl W** shortcut to close the current project.

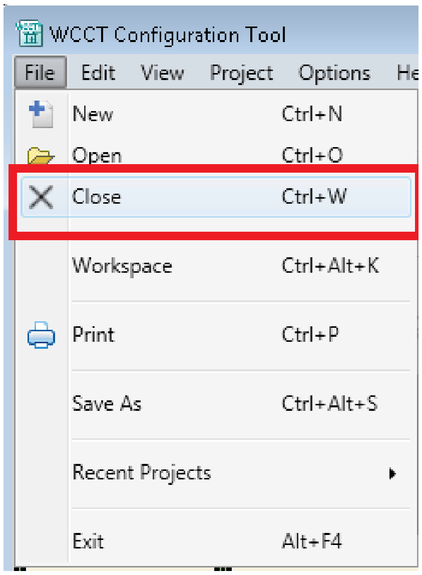


Figure 2-10 Closing Projects

2.1.5 Copying a Project

To copy a project, open the project to be copied, then select **File>Save As**.

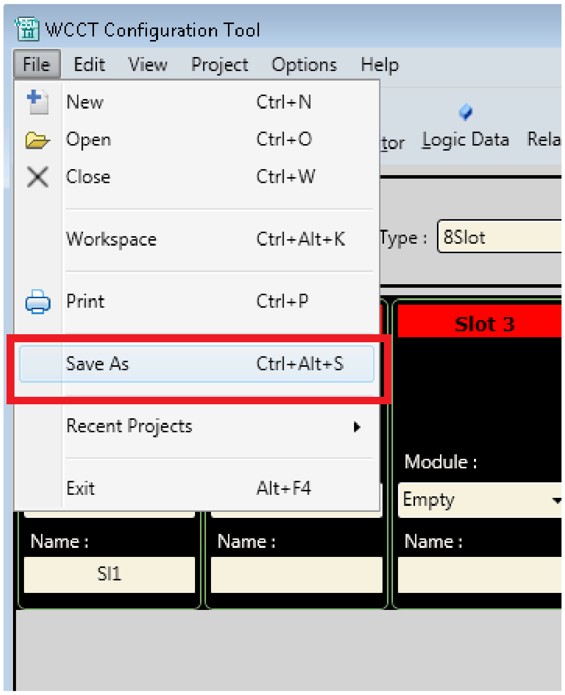


Figure 2-11 Save As Option

This will open the **Save As** window. Enter the new project name and, if required, select a different location using the **Browse** button. A copy of the project will be made and the WCCT will open the new project.

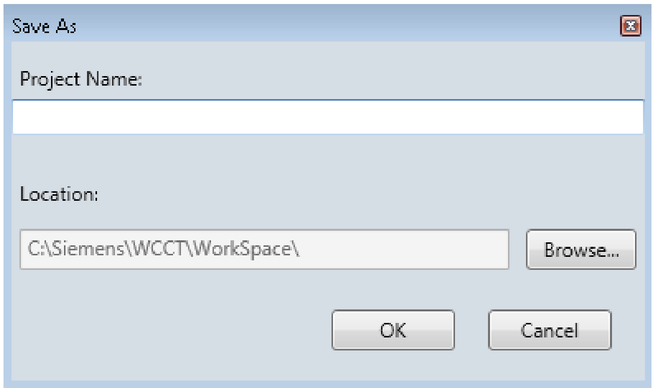


Figure 2-12 Save As Window

NOTE

NOTE

Using the **Save As** function only copies the source files for the project (.project xml, .gc and .gl files). It does not copy the output files under the MCF_Dir folder (i.e. the MCF, or the reports).

2.1.6 Deleting a Project

The tool does not provide a way to delete a project. To delete a project, find the project's location in Windows Explorer and delete it from there, for example to delete project test2, right-click on the file name and select **Delete**.

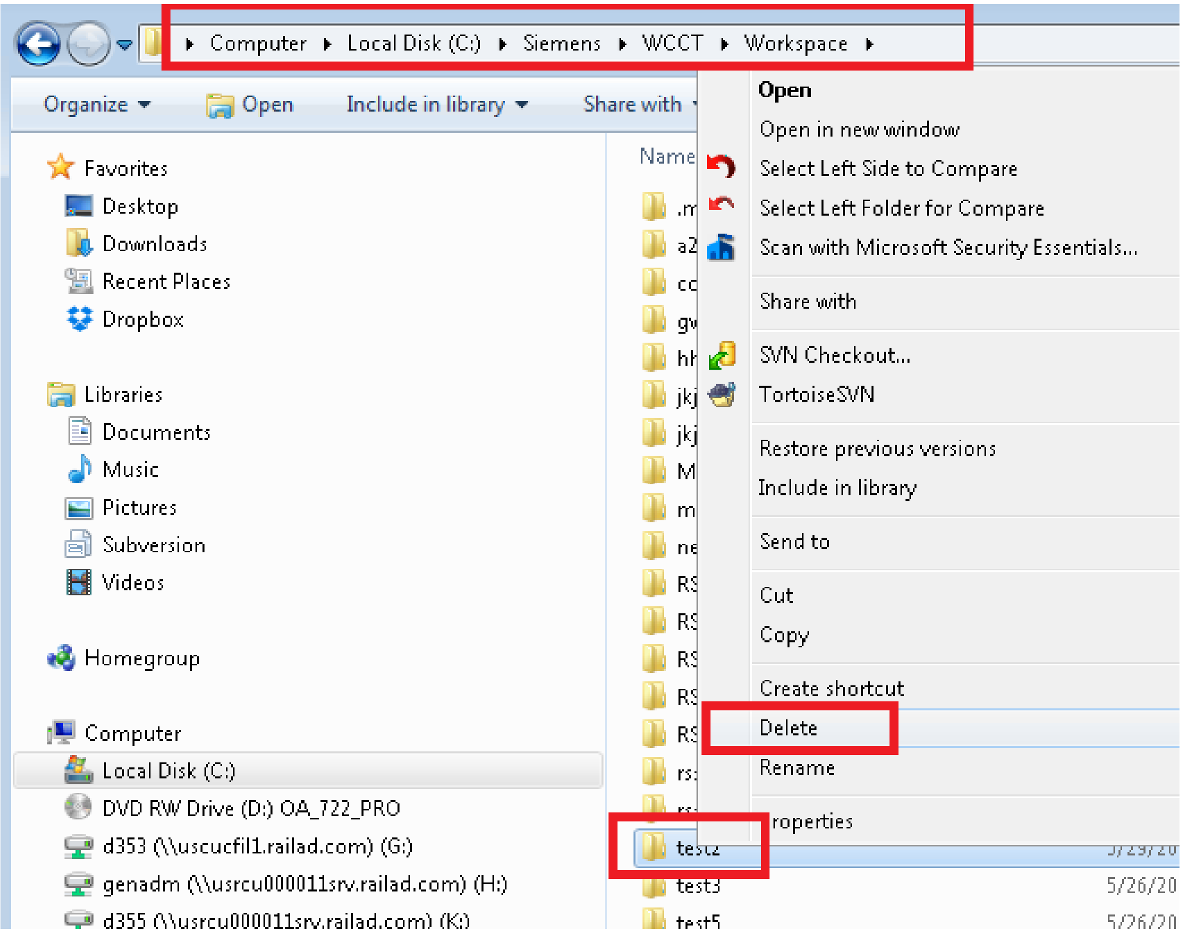


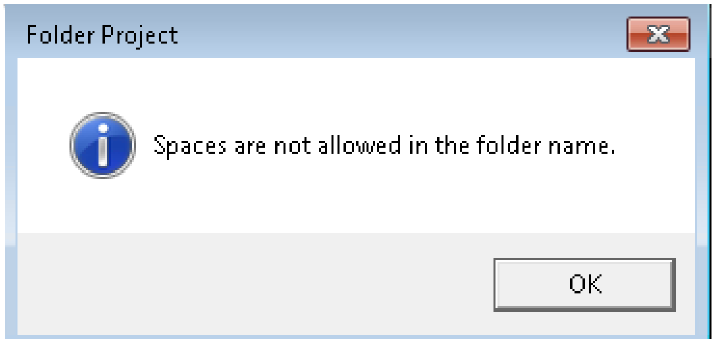
Figure 2-13 Delete Project from Windows

2.1.7 Renaming a Project

To rename a project do a **Save As** to save the project with a new name, then delete the old files using Windows.

2.1.8 Moving Projects

If you want to move a project to a different location, you can just copy the project folder from one place to another in Windows. Ensure that there are no spaces in the file path or else the tool will give the following error when you try and open it:



Folder Project

Spaces are not allowed in the folder name.

Figure 2-14 Space Not Allowed Error

2.2 ENTERING DATA IN WCCT

The WCCT provides a graphical user interface in which to enter data.

Use the chassis editor (Section 3.3) to:

- select the chassis.
- select the modules in the chassis.
- set the default configuration parameters for the module.
- set the names for input and output states used by the module.

Use the logic data editor (Section 3.12) to:

- enter interval variables.
- enter timers.
- enter configurable property.
- define a menu system.

Use the relay logic editor (Section 3.14) to:

- enter the relay logic.

SECTION 3 EDITORS

3.0 INTRODUCTION

This section describes each of the editor types in the WCCT.

3.1 SETTINGS EDITOR

The settings editor allows the user to select options that apply to the WCCT for all projects. To open this editor, select the **Settings** submenu from the **Options** menu.

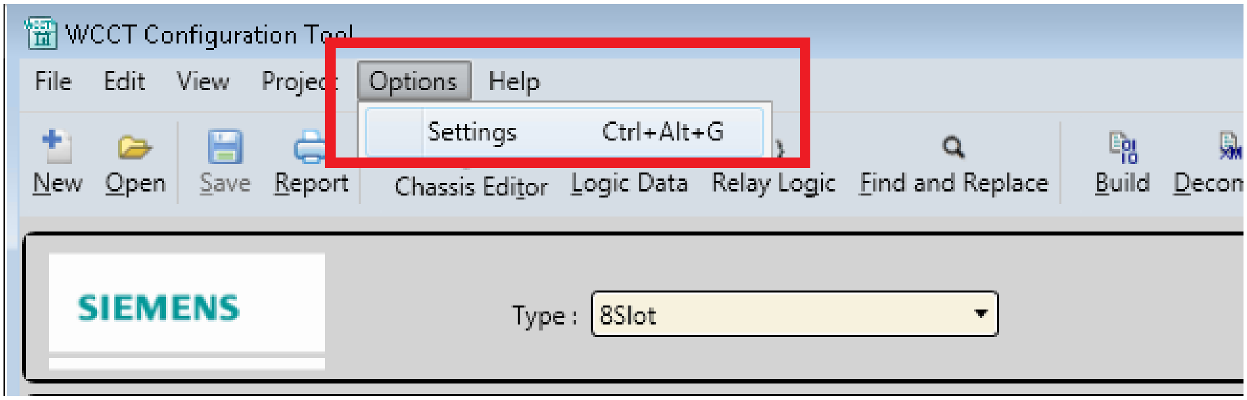
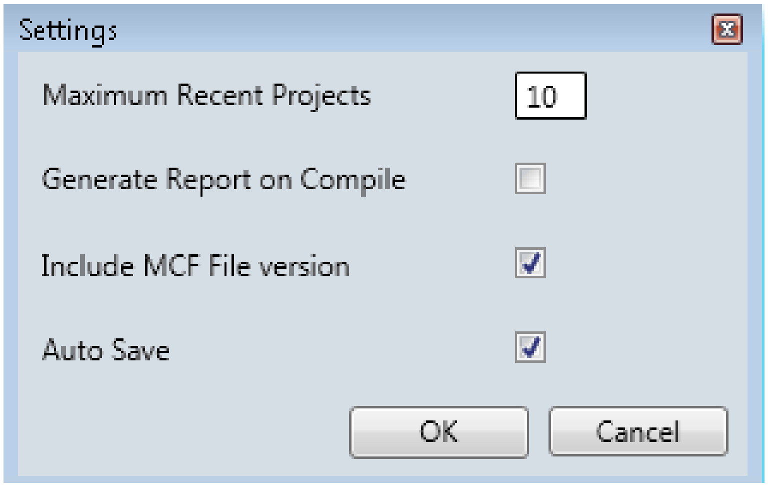


Figure 3-1 Selecting Settings

The settings editor is shown in the following figure.



Maximum Recent Projects 10

Generate Report on Compile ☐

Include MCF File version ☑

Auto Save ☑

Figure 3-2 Settings Window

Each of the options on the Settings window is described in the following sub-sections.

3.1.1 Maximum Recent Projects

The **Maximum Recent Projects** field indicates how many recent projects are shown under the menu: **File>Recent Projects**. Any change to this field will not take effect until the WCCT has been closed and re-opened.

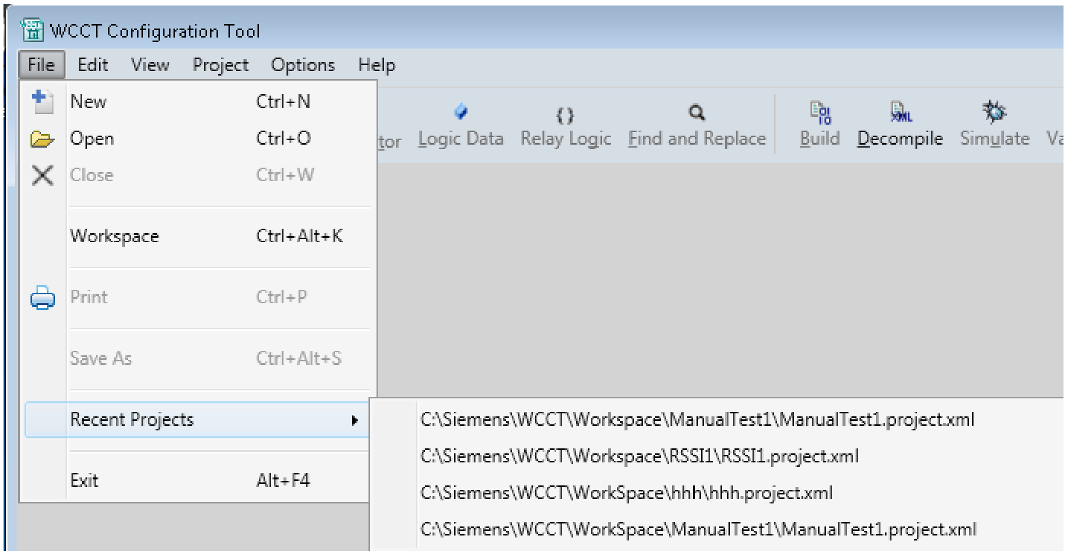


Figure 3-3 Recent Projects

3.1.2 Generate Report on Compile

When the **Generate Report on Compile** checkbox is checked, the WCCT will create an updated PDF for the project whenever the user builds the MCF. When it is not checked, the report is only generated when the user presses the **Report** button.

3.1.3 Include MCF File Version

When the **Include MCF File version** checkbox is checked, the MCF version set in the Project Properties window will be part of the file names for the build products (MCF, report, log file, txt file).

For example, if the MCF version is 002, the file names includes the 002.

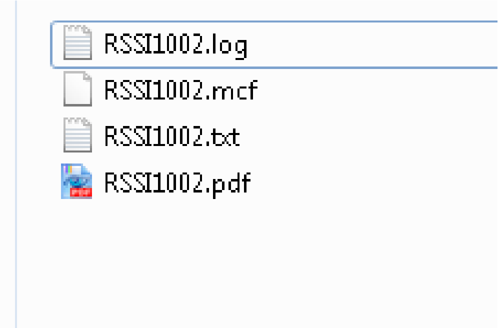
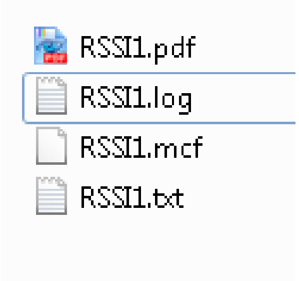


Figure 3-4 Output Files in MCF_Dir

If this is unchecked, the MCF Version is not included in the file name.



RSSI1.pdf
RSSI1.log
RSSI1.mcf
RSSI1.txt

Figure 3-5 Output Files in MCF_Dir, with no Version in the File Name

3.1.4 Auto Save

When **Auto Save** is checked and the user makes changes to an equation in the Relay Logic Editor, and then selects to leave the equation, the WCCT will automatically save the changes to the last equation. When Auto Save is not checked and the user selects to leave an open equation, the WCCT will prompt the user to save changes before they go to the next equation.

3.2 PROJECT PROPERTY EDITOR

To open this editor, select the Project Properties submenu from the Project menu or use the **Ctrl K** shortcut.

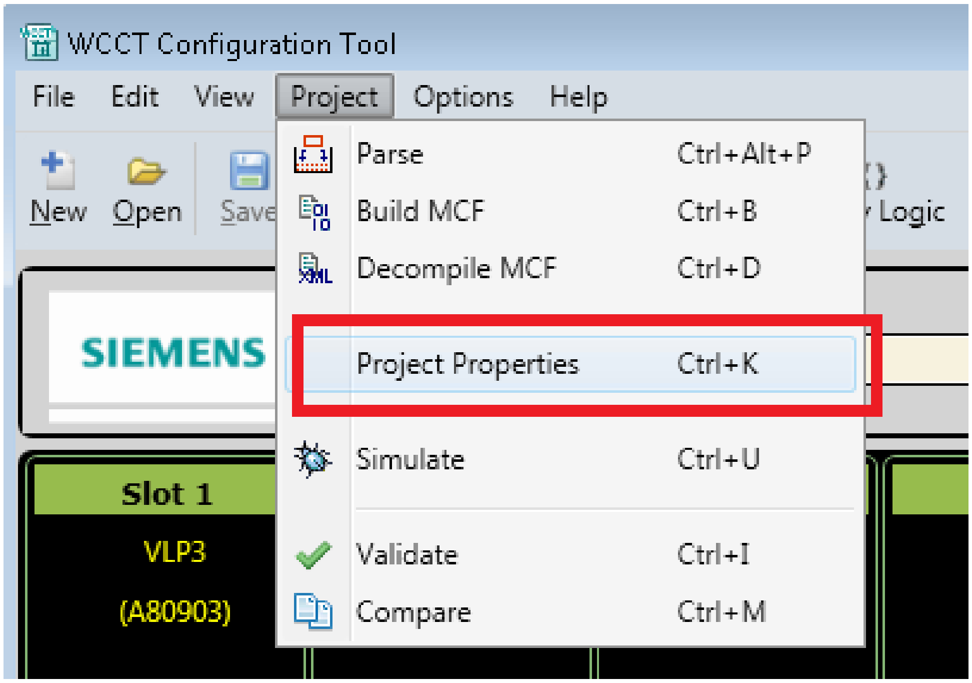
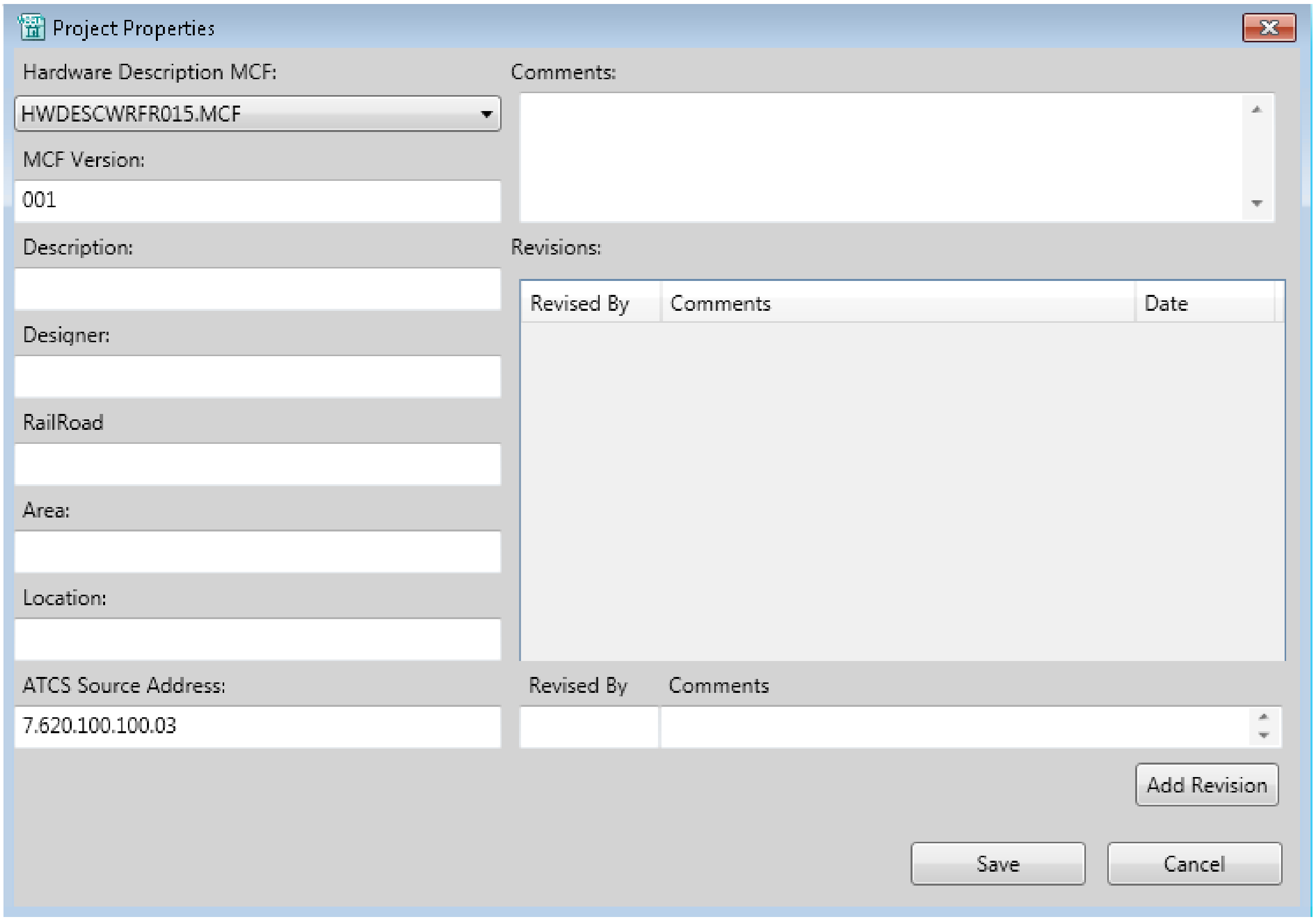


Figure 3-6 Selecting Project Properties

This window allows the user to:

- Change the HW Description MCF.
- Change the MCF version.
- Enter descriptive fields regarding the project.
- Enter the ATCS Address for the system.
- Enter revision information.
- The HW Description MCF is used to define the capability of the modules used in the system. If a new module type is added, or the capability of a module changed, Siemens will release a new HWDESC MCF. If hardware is installed in the field without the new change, the user can elect to keep using the old version of the HWDESC to maintain compatibility.



Project Properties

Hardware Description MCF: HWDESCWRFR015.MCF

MCF Version: 001

Description:

Designer:

RailRoad

Area:

Location:

ATCS Source Address: 7.620.100.100.03

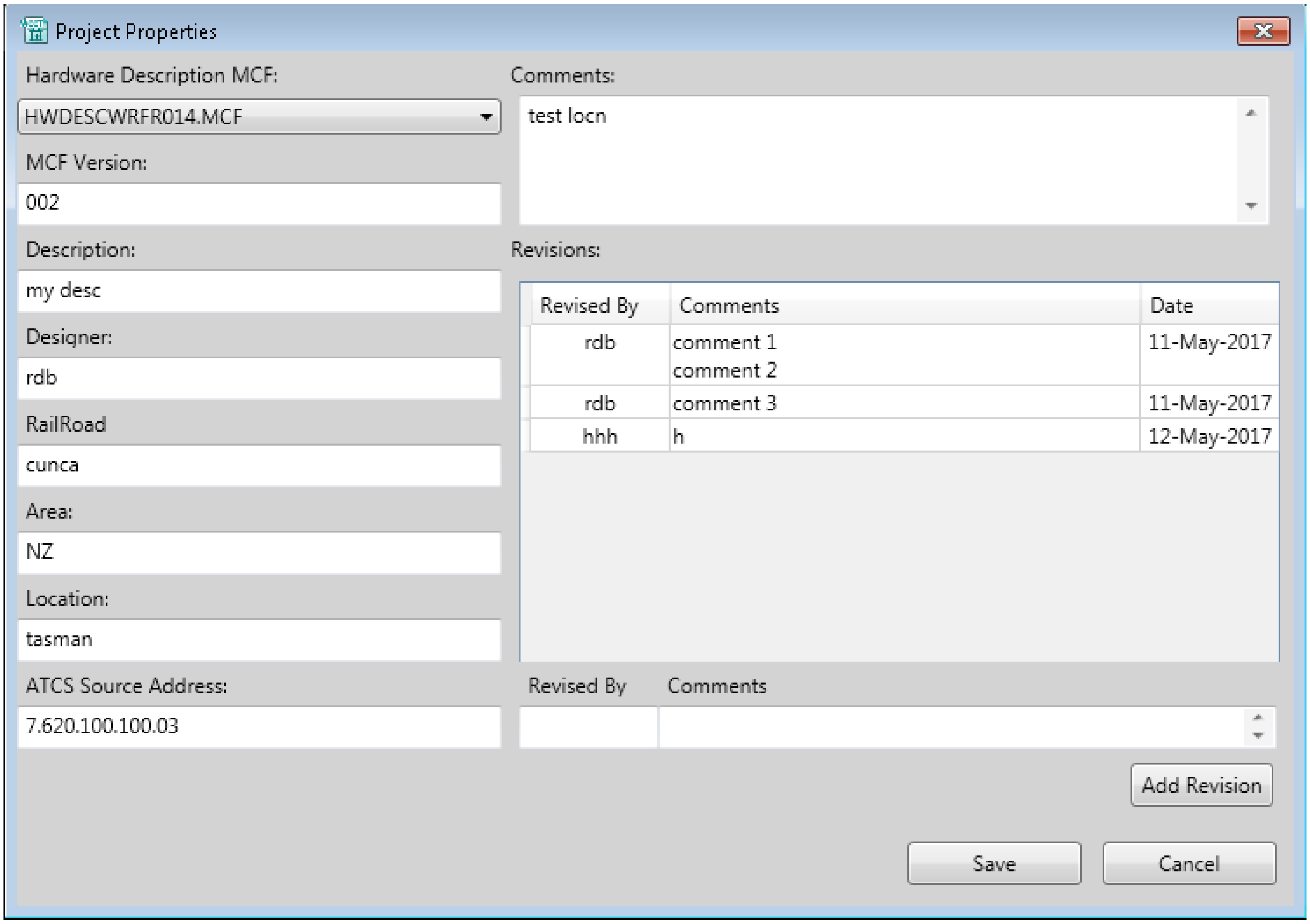
Comments:

Revisions:

Revised By	Comments	Date

Figure 3-7 Project Property Editor

To add new revision information, enter data in the **Revised By** and associated **Comment** text box and press **Add Revision** button. The WCCT will add a date stamped entry in the **Revisions** text box.



Hardware Description MCF: HWDESCWRFR014.MCF

MCF Version: 002

Description: my desc

Designer: rdb

RailRoad: cunca

Area: NZ

Location: tasman

ATCS Source Address: 7.620.100.100.03

Comments: test locn

Revisions:

Revised By	Comments	Date
rdb	comment 1 comment 2	11-May-2017
rdb	comment 3	11-May-2017
hhh	h	12-May-2017

Revised By

Comments

Figure 3-8 Project Property Editor - Adding Revisions

The ATCS Source address is the ATCS address of the WayConneX system. It has to be entered in the form 7.RRR.LLL.GGG.SS, where:

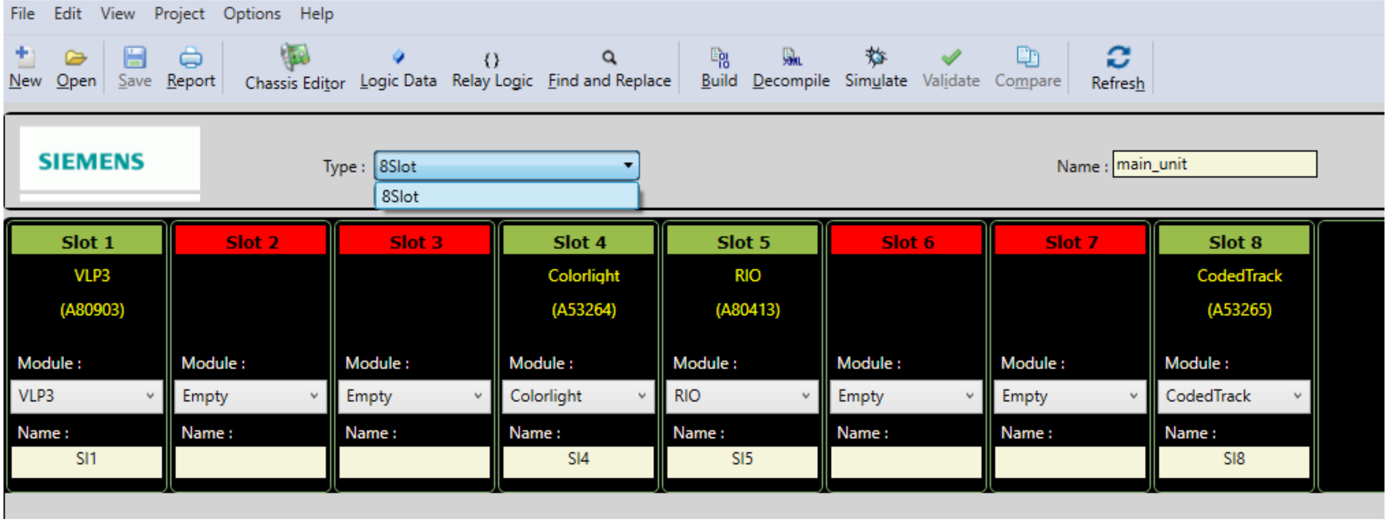
- RRR in range 1-999
- LLL in range 1-999
- GGG in range 1-998
- SS in range 03-98

The ATCS address is included in the UCN. The user may change the ATCS address later. This can be done when adjusting the configuration settings using the OCE for specific sites in which the MCF is intended to be used.

3.3 CHASSIS EDITOR

The chassis editor allows selection of the chassis type and shows which modules are present in the chassis. The only supported chassis is the WayConneX 8Slot generic chassis.

Chassis	System	CPU required	Slot 1
8Slot	WayConneX	CPU III (A80903)	VLP3



Type : 8Slot

8Slot

Name : main_unit

Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8
VLP3 (A80903)			Colorlight (A53264)	RIO (A80413)			CodedTrack (A53265)
Module : VLP3	Module : Empty	Module : Empty	Module : Colorlight	Module : RIO	Module : Empty	Module : Empty	Module : CodedTrack
Name : SI1	Name :	Name :	Name : SI4	Name : SI5	Name :	Name :	Name : SI8

Figure 3-9 Selecting Chassis

The user may want to change module types in an existing system. Since the majority of the modules provide differing functionality, when changing one module to another, the module data from the old module is deleted.

The WCCT allows the user to copy a module from one slot to another. Right-click on the module and select **Copy**, then select the slot to be copied to.

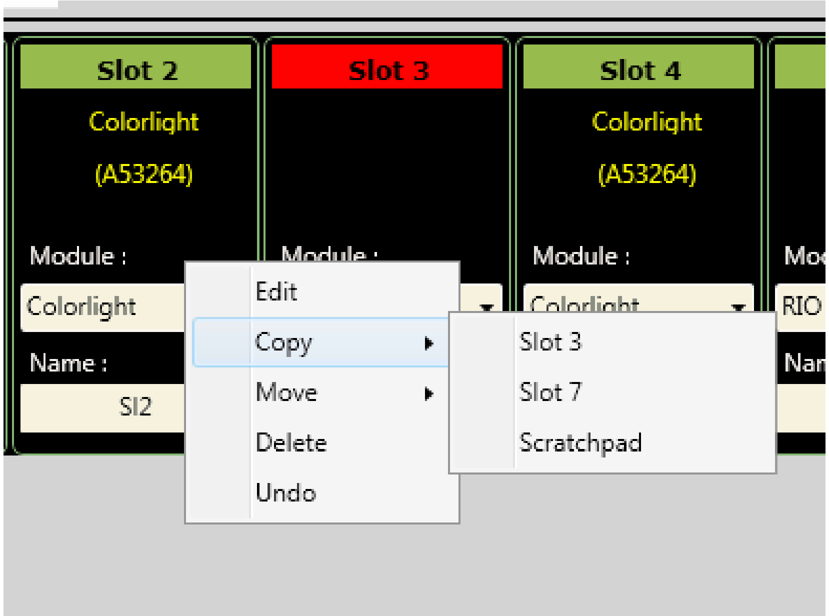


Figure 3-10 Copy Module

The module will appear with a red bar (i.e. unsaved). Select the **Save** button (Ctrl S) to save the change.

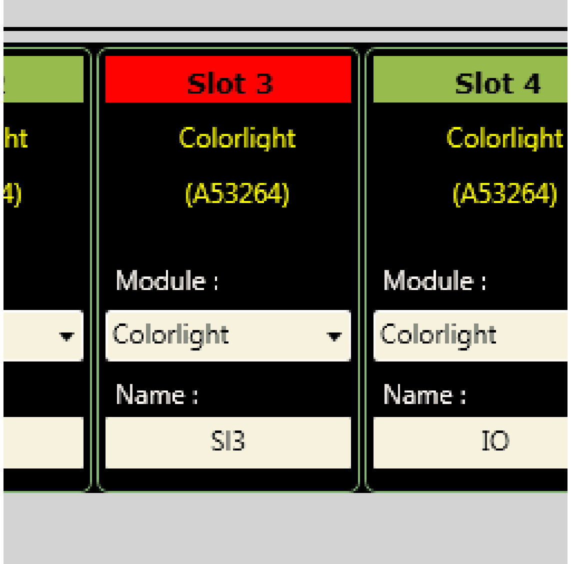
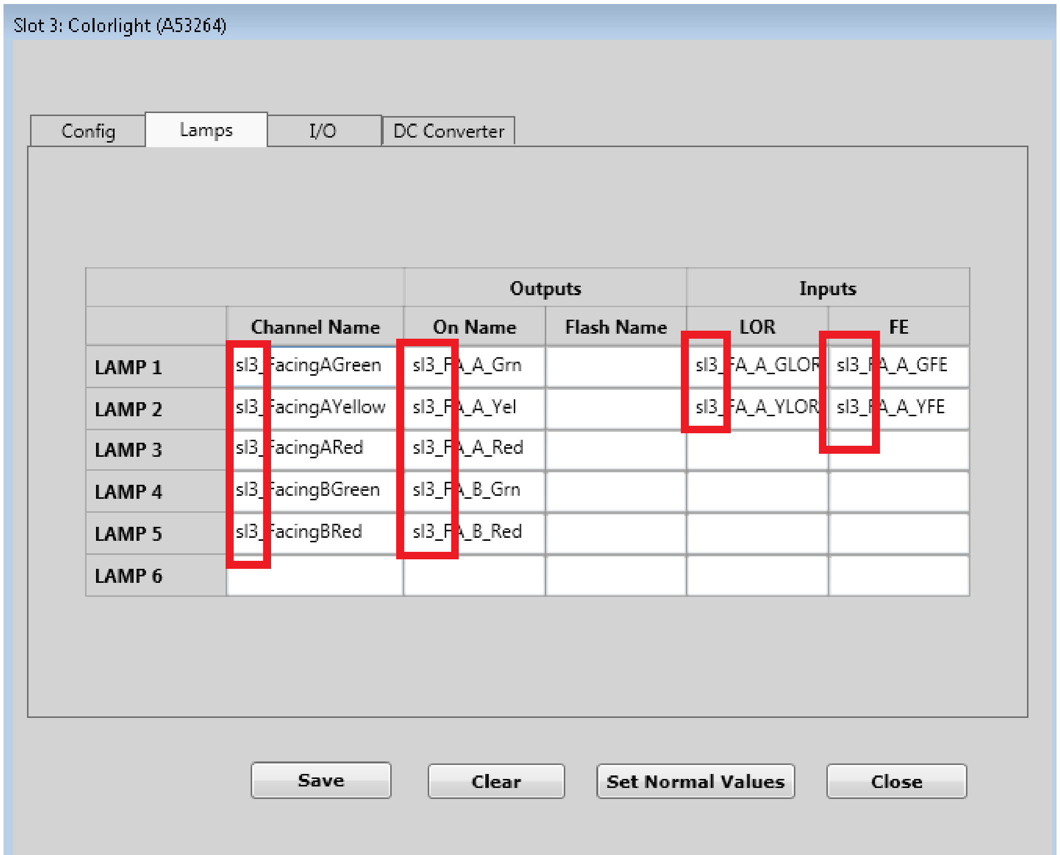


Figure 3-11 Red Bar On Copied Module

When the copy is made, the module configuration properties channel and I/O states are copied. To avoid duplicating logic state names, all the logic states are prefixed with the new slot number as shown in the following figure. To edit the module, double-click and then change the logic state to the required names.

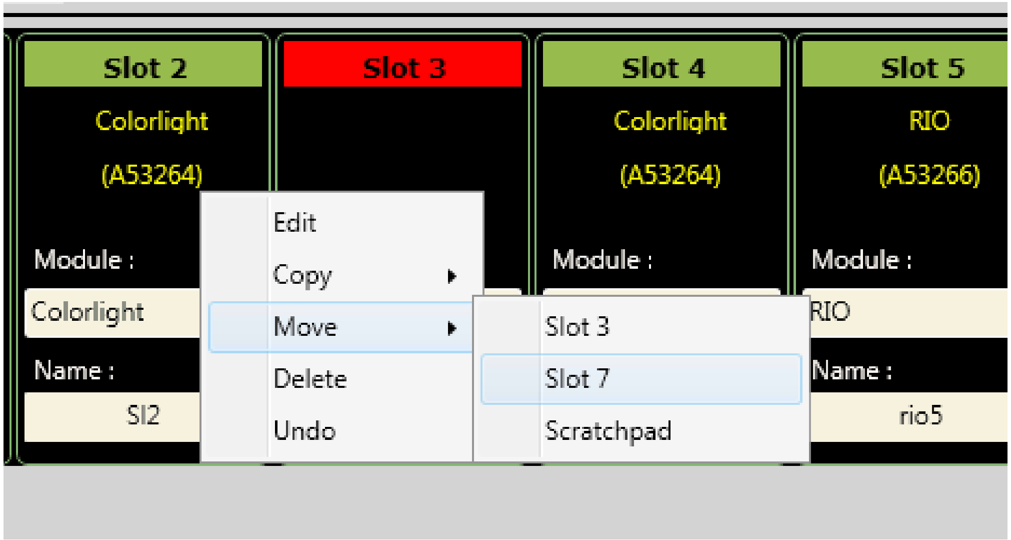


Slot 3: Colorlight (A53264)

		Outputs		Inputs	
	Channel Name	On Name	Flash Name	LOR	FE
LAMP 1	sl3_FacingAGreen	sl3_FA_A_Grn		sl3_FA_A_GLOR	sl3_FA_A_GFE
LAMP 2	sl3_FacingAYellow	sl3_FA_A_Yel		sl3_FA_A_YLOR	sl3_FA_A_YFE
LAMP 3	sl3_FacingARed	sl3_FA_A_Red			
LAMP 4	sl3_FacingBGreen	sl3_FA_B_Grn			
LAMP 5	sl3_FacingBRed	sl3_FA_B_Red			
LAMP 6					

Figure 3-12 I/O Names after Copy

The WCCT allows the user to move a module from one slot to another. To do so, right-click on the module to be moved and select **Move**, then select the new slot location as shown in the following figure.



Module : Colorlight
Name : SI2

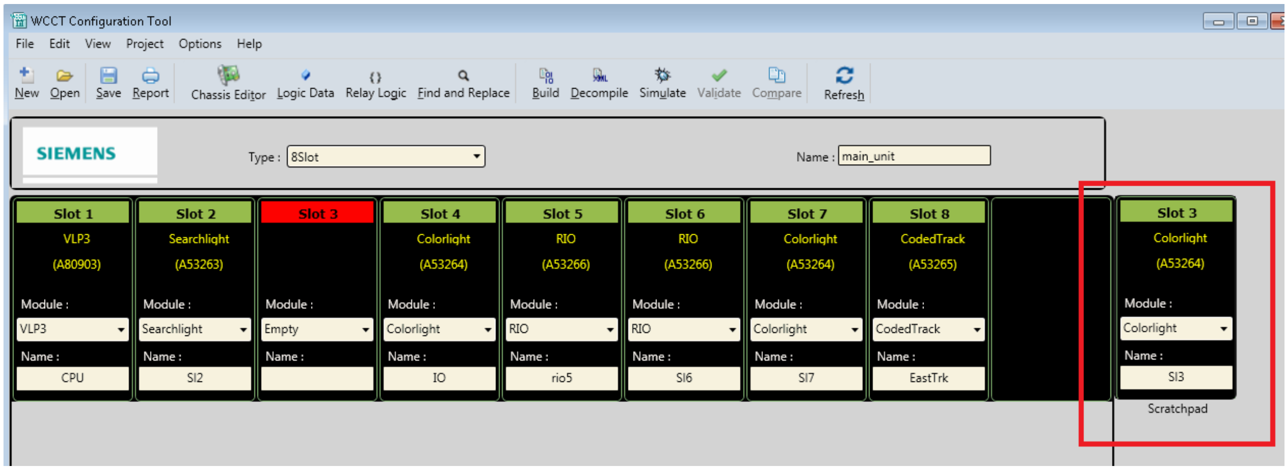
Module :
Name :

Module : RIO
Name : rio5

Figure 3-13 Moving a Module

When the module is moved, the previous slot is set to empty and the module is moved to the new slot location. If the current name of the module is still the default, e.g. SL2, then it will be changed to reflect the new slot. However, if the user has given the module a specific name, that name will be transferred to the new slot.

The scratchpad slot is like a Cut/Paste buffer. A module can be copied into it temporarily and then moved/copied back to a real slot. For example, if all the slots on the current chassis are full and the user wants to reposition modules, a module can be moved to the scratchpad temporarily while another module is moved into the empty slot, and then the first module can be moved from the scratchpad to its new location.



Type : 8Slot

Name : main_unit

Slot	Module type	Part	Module :	Name :
Slot 1	VLP3	(A80903)	VLP3	CPU
Slot 2	Searchlight	(A53263)	Searchlight	SI2
Slot 3			Empty	
Slot 4	Colorlight	(A53264)	Colorlight	IO
Slot 5	RIO	(A53266)	RIO	rio5
Slot 6	RIO	(A53266)	RIO	SI6
Slot 7	Colorlight	(A53264)	Colorlight	SI7
Slot 8	CodedTrack	(A53265)	CodedTrack	EastTrk
Slot 3 (Scratchpad)	Colorlight	(A53264)	Colorlight	SI3

Figure 3-14 Scratchpad

To delete a module, right-click and select the **Delete** option or set the slot to empty and press **Save**. To delete multiple modules, set them all to empty and press **Save**. The WCCT will ask for confirmation before the modules are deleted.

⚠ WARNING

WARNING

IF THE CPU LOSES COMMUNICATION TO AN I/O MODULE FOR TWO SECONDS, THE CPU WILL SET THE STATES EXPECTED TO BE RECEIVED FROM THAT MODULE TO THEIR RESTRICTIVE VALUES, FOR EXAMPLE, VITAL INPUTS DE-ENERGIZED, TRACK CIRCUIT OCCUPIED, AND LAMPS LOR.

THE APPLICATION SHOULD BE DESIGNED TO ACCOUNT FOR THIS WHERE NECESSARY TO ENSURE SAFE SYSTEM OPERATION.

3.4 VLP3 MODULE EDITOR

The VLP3 module editor has four tabs

- Config
- Vital VComms
- NV Controller
- PTC Logic IF.

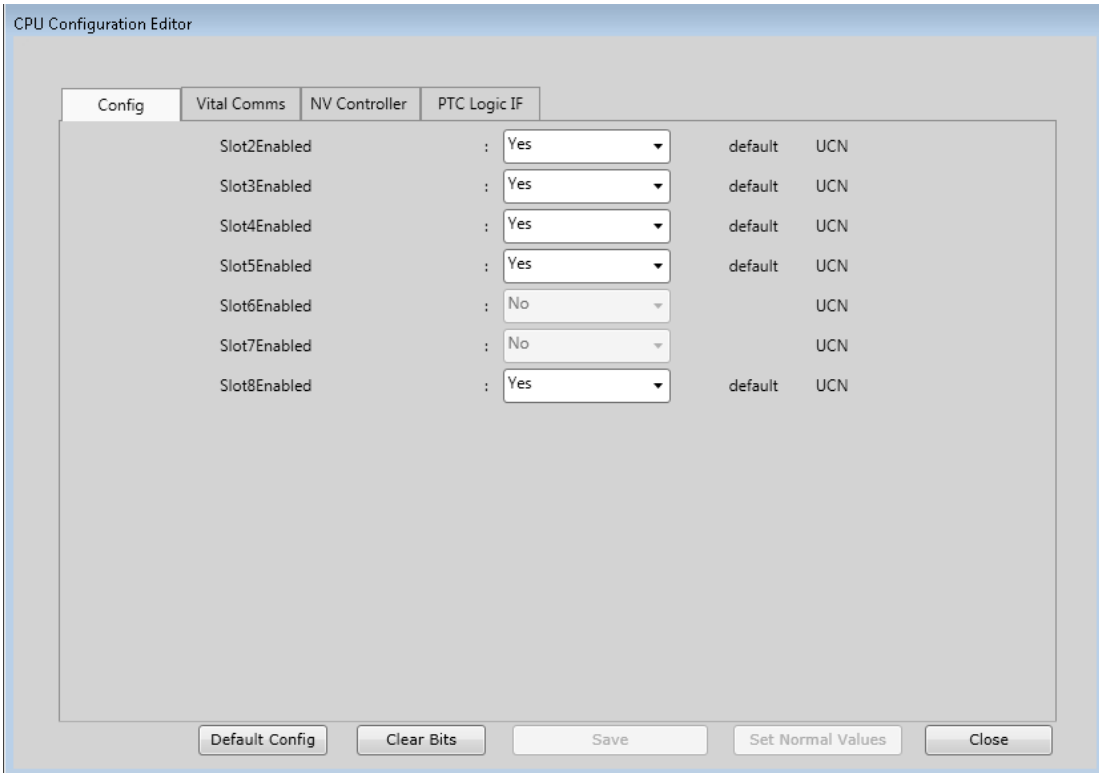
Each of the VLP3 module editor tabs is described in the following sub-sections.

3.4.1 Config Tab

The Config tab allows the user to change the default configuration parameters for the VLP3 module. These parameters indicate whether an I/O module in a slot is enabled or not. If the slot is empty in the chassis, the enabled property will be set to No.

This feature would be used for an application where some modules may be optionally populated. If a module is marked as not enabled, the CPU III will not try to establish communication with that module.

The status reported from an optional module, which is not populated in the chassis, will report its safe states, just as if the module was meant to be present, but is not plugged in. VPIs will report de-energized, but if there is an optional Colorlight module which will report back its lamp states as LOR/FE, it may be necessary to create a Property in the Logic Data Editor that can be used to mask these states.



Slot2Enabled	:	Yes	default	UCN
Slot3Enabled	:	Yes	default	UCN
Slot4Enabled	:	Yes	default	UCN
Slot5Enabled	:	Yes	default	UCN
Slot6Enabled	:	No		UCN
Slot7Enabled	:	No		UCN
Slot8Enabled	:	Yes	default	UCN

Figure 3-15 Slot Enabled Status Display

These parameters are all included in the UCN.

- **Default Config** button will set the values back to their default (Enabled = Yes).
- **Clear Bits** button does nothing on this screen
- **Set Normal Values** brings up the editor that allows the Normal Values to be set for CPU related I/O
- **Save** – Saves changes
- **Close** – Closes window

3.4.2 Vital Comms Tab

The Vital Comms tab allows the user to define vital communication channels between WayConneX units. There are two tabs on the editor: Config and MsgBits. These are described in the following sub-sections.

3.4.2.1 Vital Comms Config Tab

This tab allows the user to select default values for the Vital Comms channel configuration used in this MCF. Vital Comms links are ATCS message-based and thus the message will contain the ATCS address of this WayConneX unit as the source address, and the ATCS Address of the unit being communicated with as the destination address. The ATCS of the WayConneX is set in the Project Properties menu, see Section 3.2.

The ATCS of the neighboring unit can either be set directly by entering it in the Destination Address text box or by specifying the ATCS address of the remote unit relative to the ATCS address of the main unit via the RRR, LLL, GGG and SS Offset fields.

The general format for the full ATCS address is: 7.RRR.LLL.GGG.SS.DD

Where:

RRR – Railroad number (1-999)

LLL – Line number (1-999)

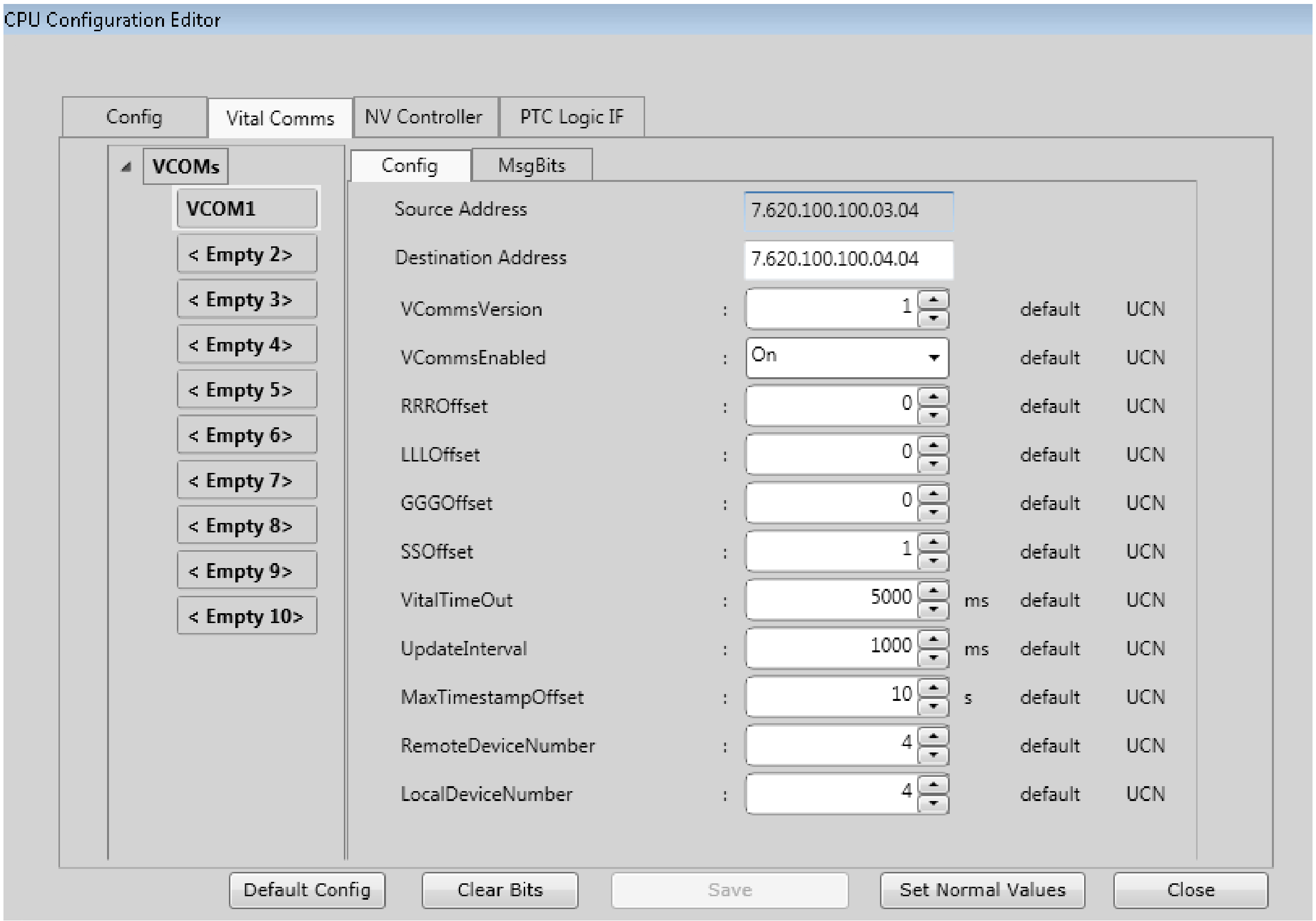
GGG – Group number (1-999)

SS – Subnode number (3-98)

DD – device number (2-90)

If the user updates the Destination Address, the WCCT will automatically recalculate and update the Offset fields. Similarly, if the user updates offset fields, the WCCT will automatically recalculate and update the Destination Address.

If more than one Vital Comms channel is used between the same source and destination addresses (i.e. if RRROffset, LLLOffset, GGGOffset and SSOffset are the same for more than one VComms channel) then the local device numbers need to be made unique for each channel.



Source Address 7.620.100.100.03.04

Destination Address 7.620.100.100.04.04

VCommsVersion :	1		default	UCN
VCommsEnabled :	On		default	UCN
RRROffset :	0		default	UCN
LLLOffset :	0		default	UCN
GGGOffset :	0		default	UCN
SSOffset :	1		default	UCN
VitalTimeOut :	5000	ms	default	UCN
UpdateInterval :	1000	ms	default	UCN
MaxTimestampOffset :	10	s	default	UCN
RemoteDeviceNumber :	4		default	UCN
LocalDeviceNumber :	4		default	UCN

Figure 3-16 Vital Communications Configurations Parameters

⚠ WARNING

WARNING

THE VITAL TIMEOUT SHOULD BE SET TO AT LEAST THREE TIMES THE UPDATE INTERVAL SO THAT IF SINGLE MESSAGES ARE LOST, THE SESSION IS NOT LOST AND THE OPERATION IS NOT AFFECTED. VITAL MESSAGES ARE NOT ACKNOWLEDGED END-TO-END; THUS THE APPLICATION LOGIC SHOULD NOT RELY UPON SHORT (< VITAL TIMEOUT) TRANSITIONS OF INPUT STATES FOR SAFETY CRITICAL FUNCTIONS AS THEY CANNOT BE GUARANTEED TO BE SEEN.

Table 3-1 Vital Communications Parameters

Destination Address	Default is derived from ATCS address set in Project Properties with SS offset of 1	This is the ATCS address of the neighboring unit.
VCommsVersion	Default 1, Range 1-250	This is a version number for message data content for this channel. This should match the version number on the receiving end. The VComms version number can be used to ensure that if a change is made to the Vital message content for an installed location, that both sides of the link are updated in order for communication to be successfully established.
VCommsEnabled	Default On, Range On, Off	A Vital Comms link can be disabled by setting this to **Off**. This can be used in a case where the Vital Comms link is optional in the application.
RRROffset	Default 0, Range - see Note at end of table.	This is the offset in the Railroad number part of the ATCS address from the ATCS address of this unit.
LLL Offset	Default 0, Range - see Note at end of table.	This is the offset in the Line number part of the ATCS address from the ATCS address of this unit.
GGG Offset	Default 0, Range - see Note at end of table.	This is the offset in the Group number part of the ATCS address from the ATCS address of this unit.
SS Offset	Default 0, Range - see Note at end of table.	This is the offset in the Subnode number part of the ATCS address from the ATCS address of this unit.
VitalTimeOut	Default 5000 ms, Range 1,000-60,000 ms	If no valid ATCS message is received from the remote WayConneX for this time, then the link will go into a restrictive, out-of-session state, and all the received bits will report de-energized into the logic.
UpdateInterval	Default 1000 ms, Range 400-30,000 ms	Vital ATCS messages are sent out periodically at this time interval. It is recommended that the VitalTimeOut is at least three times the UpdateInterval + 200ms, so that several messages in a row won't be lost before the unit loses session.
MaxTimestamp Offset	Default 10 s, Range 5-30 s	This is used by the WayConneX to determine if a message is stale.

RemoteDevice Number	Default 4, Range 4-90	This is the Device number (DD) part of the ATCS address of the destination address. Each Vital Comms channel must have a unique local and remote device number.
LocalDevice Number	Range 4-90	This is the Device number (DD) part of the ATCS address of the local address, each Vital Comms channel must have a unique local and remote device number.

NOTE

NOTE

The full range of the RRR/LLL/GGG offset is -999 to +999, and SS -99 to +99. However, in practice, these are not used. The WCCT will not allow a value to be set for the offsets which results in an illegal ATCS address, thus, the range of these parameters depends upon the actual ATCS address set in the Project Properties window.

All these parameters are all included in the UCN.

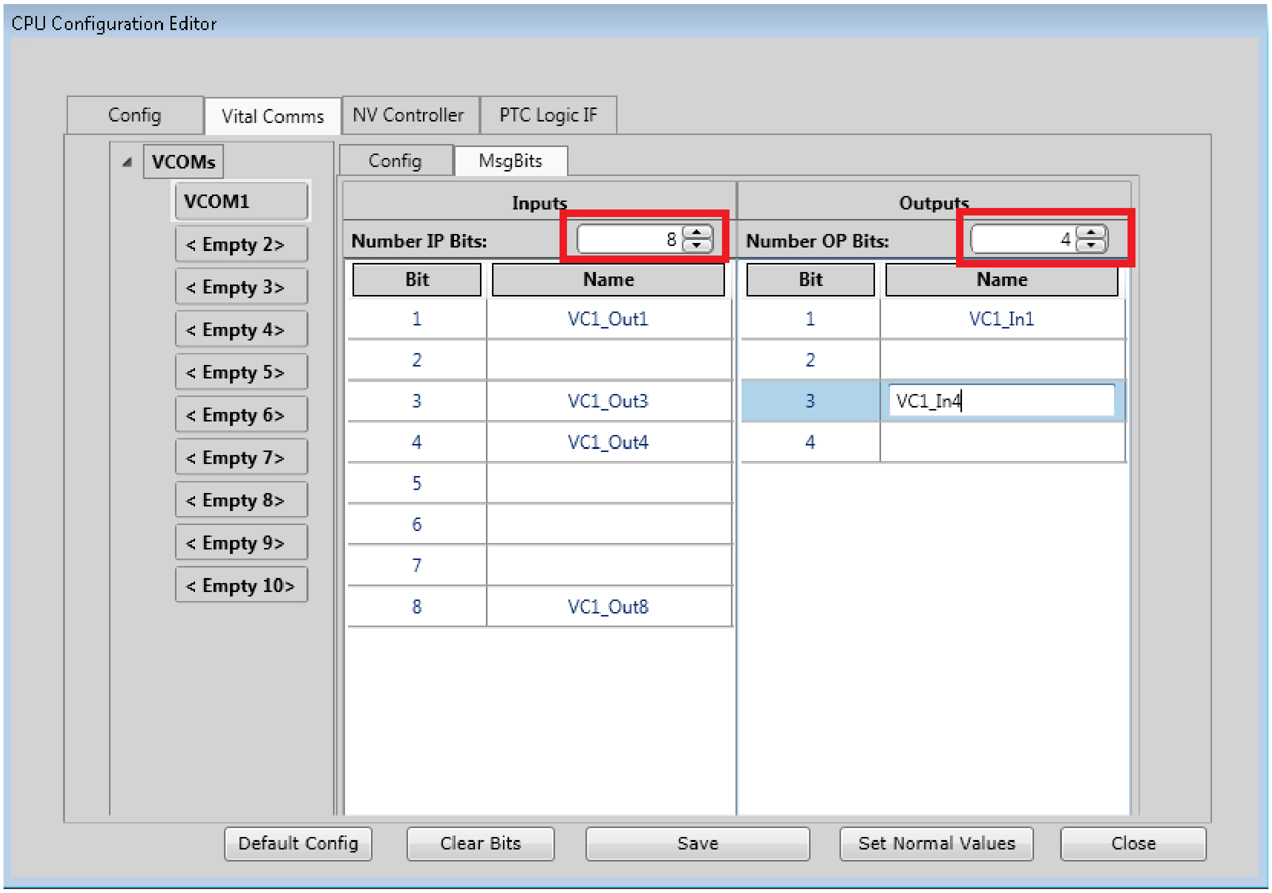
The buttons available on this screen have the following functions:

- Default Config: sets the values back to their default values.
- Clear Bits: no function on this screen.
- Save: saves changes.
- Set Normal Value: bring up Normal Values window.
- Close: closes window.

3.4.2.2 Vital Comms MsgBits Tab

The MsgBits tab allows the user to define how many bits are used in the input and output Vital ATCS messages and the names of those bits.

To create a new Vital Comms channel, select the next empty channel and enter the number of IP and OP bits required, then enter names for the message bits.



Number IP Bits: 8

Bit	Name
1	VC1_Out1
2	
3	VC1_Out3
4	VC1_Out4
5	
6	
7	
8	VC1_Out8

Number OP Bits: 4

Bit	Name
1	VC1_In1
2	
3	VC1_In4
4	

Figure 3-17 Select Number IP/OP bits in Vital Comms

For the VLP3, the maximum Number of OP bits is 255 and the maximum Number of IP bits is 255.

Not all the bits in the message need to be used, they can be left blank.

NOTE

NOTE

The WCCT will check that the names entered on this screen are not duplicates of any other logic state names entered in the project, e.g. I/O module inputs and outputs and Boolean variables entered in Logic Data Editor. The user should write a Boolean equation to set the state of the output bits named here.

The buttons available on this screen have the following functions:

- Default Config – sets the values on the Config screen back to their default values.
- Clear Bits – clears all assigned bits on the Msg Bits screen.
- Save – saves changes.
- Set Normal Value – brings up the Normal Values window.
- Close – closes window.

3.4.3 NV Controller Tab

The NV Controller tab allows the user to define the interface to a non-vital controller such as the SEAR II. There are two tabs: Config and MsgBits. These are described in the following sub-sections.

⚠ WARNING

WARNING

CONTROLS RECEIVED FROM THE OFFICE ARE NON-VITAL, CARE MUST BE TAKEN WHEN WRITING THE APPLICATION LOGIC TO ENSURE THAT CONTROL BITS CANNOT CAUSE UNSAFE CONDITIONS IN THE VITAL LOGIC.

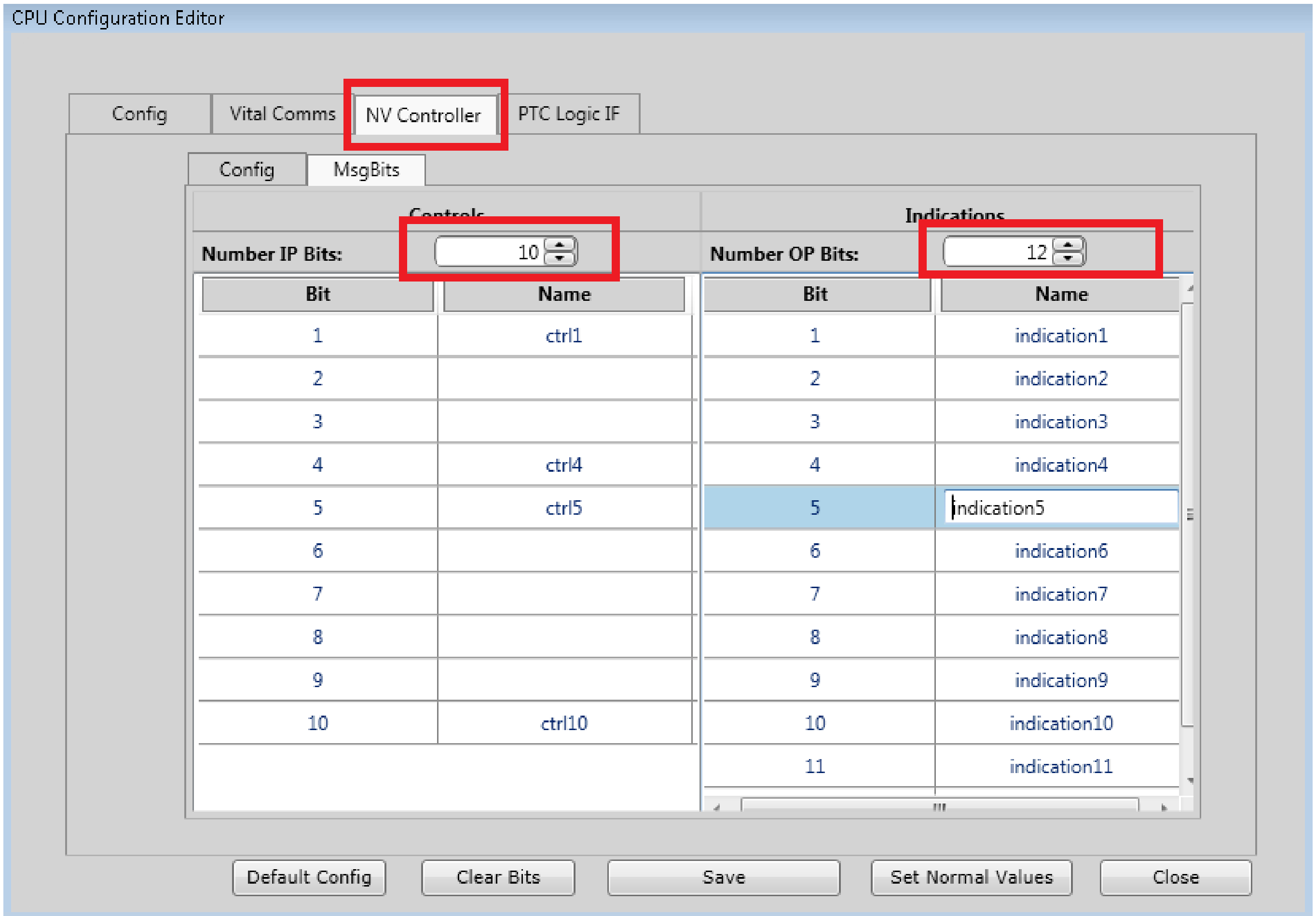
3.4.3.1 NV Controller Config Tab

There are no configuration parameters applicable to this option.

3.4.3.2 NV Controller MsgBits Tab

The MsgBits Tab allows the user to define how many bits are used in the input (control) and output (indication) ATCS messages to the NV Controller, and names of these bits.

Enter the number of IP and OP bits required. For the VLP3, the maximum number of OP bits is 255 and the maximum Number of IP bits is 255. Then enter the names for the required Control and Indication bits.



Controls

Number IP Bits: 10

Bit	Name
1	ctrl1
2	
3	
4	ctrl4
5	ctrl5
6	
7	
8	
9	
10	ctrl10

Indications

Number OP Bits: 12

Bit	Name
1	indication1
2	indication2
3	indication3
4	indication4
5	indication5
6	indication6
7	indication7
8	indication8
9	indication9
10	indication10
11	indication11

Figure 3-18 Configuring Message Bits

Not all the bits in the message need to be used, they can be left blank.

The buttons available on this screen have the following functions:

- Default Config – no function on this screen.
- Clear Bits – will clear all the assigned bits on the Msg Bits screen.
- Save – Saves changes.
- Set Normal Value – Bring up Normal Values window.
- Close – Closes window.

NOTE

NOTE

The WCCT will check that the names entered on this screen are not duplicates of any other logic state names entered in the project, e.g. I/O module inputs and outputs and Boolean variables entered in Logic Data Editor. The user should write a Boolean equation to set the state of the output bits named here.

3.4.4 PTC Logic If Tab

The PTC Logic IF tab allows the user to define the interface to the PTC system. It has three tabs: PTC Devices, Aspects, and MsgBits, which will be described in the following sub-sections.

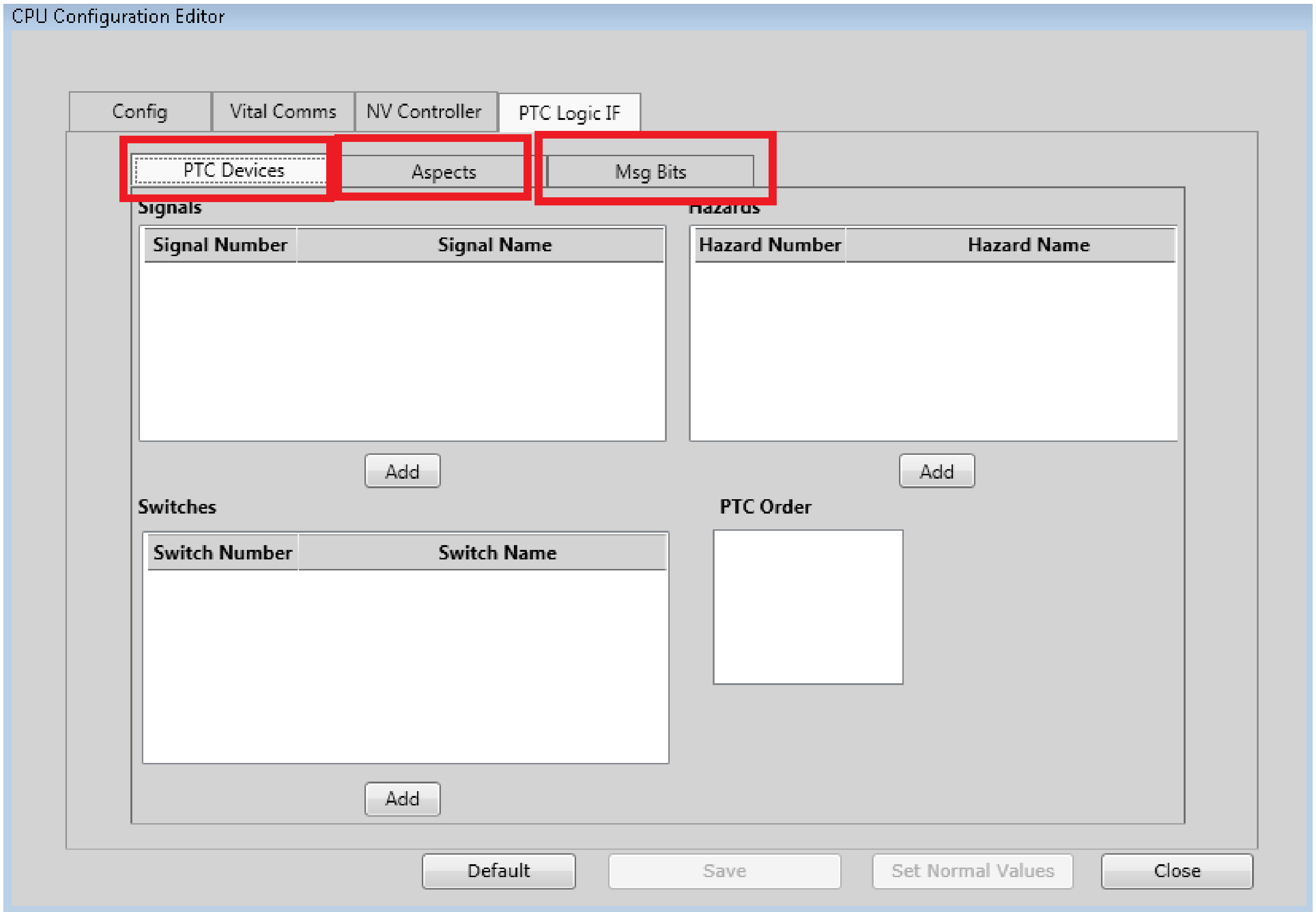
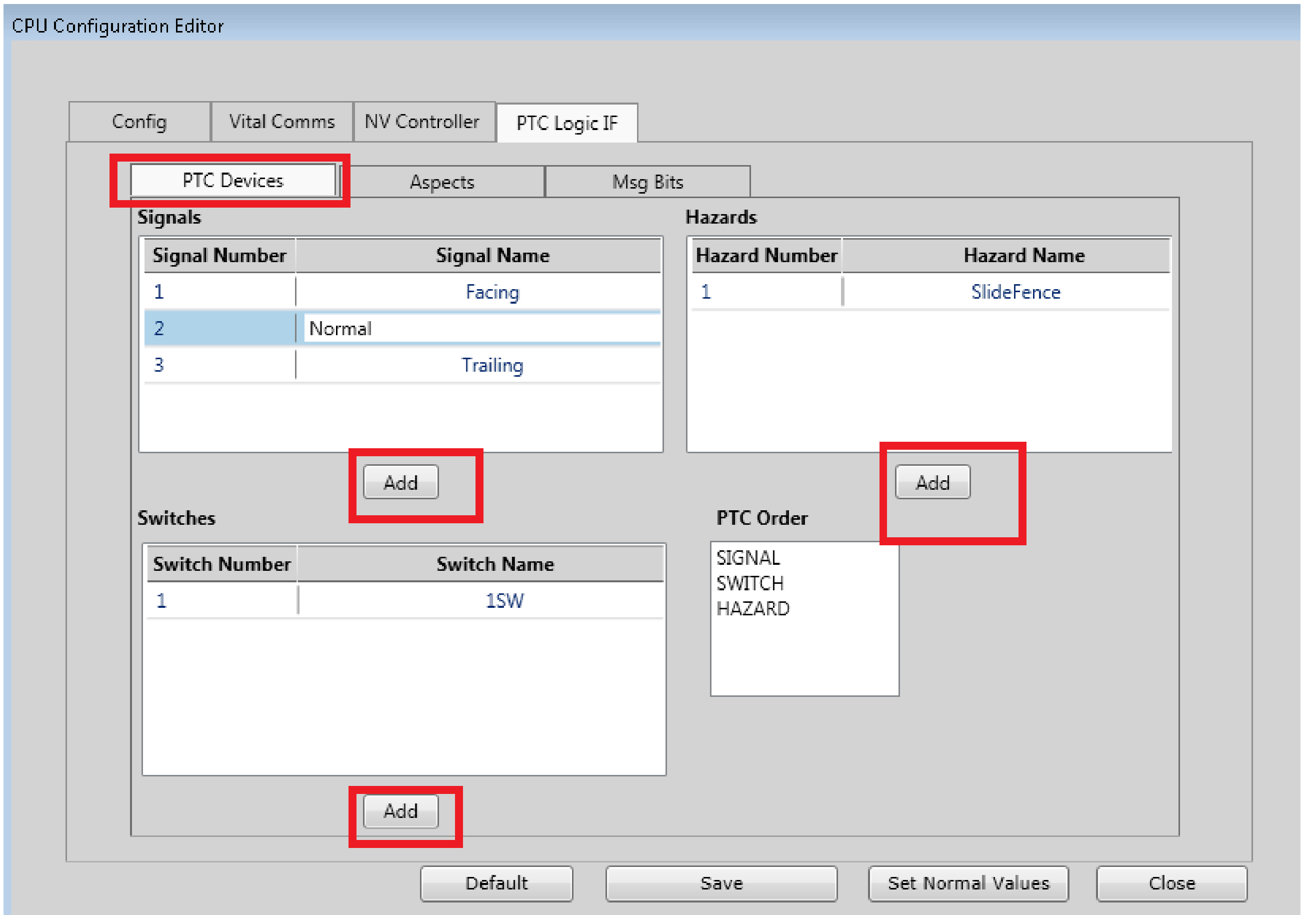


Figure 3-19 PTC Logic Tabs

3.4.4.1 PTC Logic If: PTC Devices Tab

The PTC Devices tab is used to specify which PTC devices are used in the system. Use the **Add** button under the Signals, Switches, and Hazards boxes to add new devices.



Signals

Signal Number	Signal Name
1	Facing
2	Normal
3	Trailing

Hazards

Hazard Number	Hazard Name
1	SlideFence

Switches

Switch Number	Switch Name
1	1SW

PTC Order

SIGNAL
SWITCH
HAZARD

Figure 3-20 Adding Devices in PTC Logic IF Window

Select **Save** to save data.

The order in which the devices will be reported in the PTC message is determined by the PTC order first and then the order within the Signals, Switches, and Hazards boxes.

For example, using the screen shown in the previous figure, the devices will be reported in the following order:

- Facing Signal
- Normal Signal
- Trailing Signal
- 1SW

To change the order of whether signals, switches, or hazards are reported, right-click on the PTC order box and use the **Move Up/Move Down** to change the order.

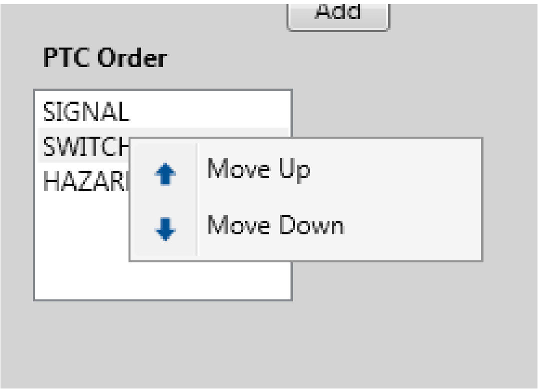
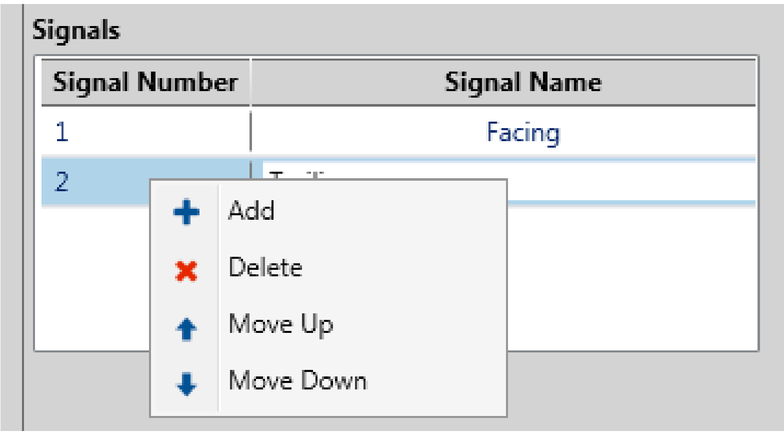


Figure 3-21 Changing Order of Signals, Switches, and Hazards

If the order of signals within the group of signals needs to be changed or a signal needs deleting, right-click in the signal number field and use the drop-down menu to rearrange, delete, or add signals.



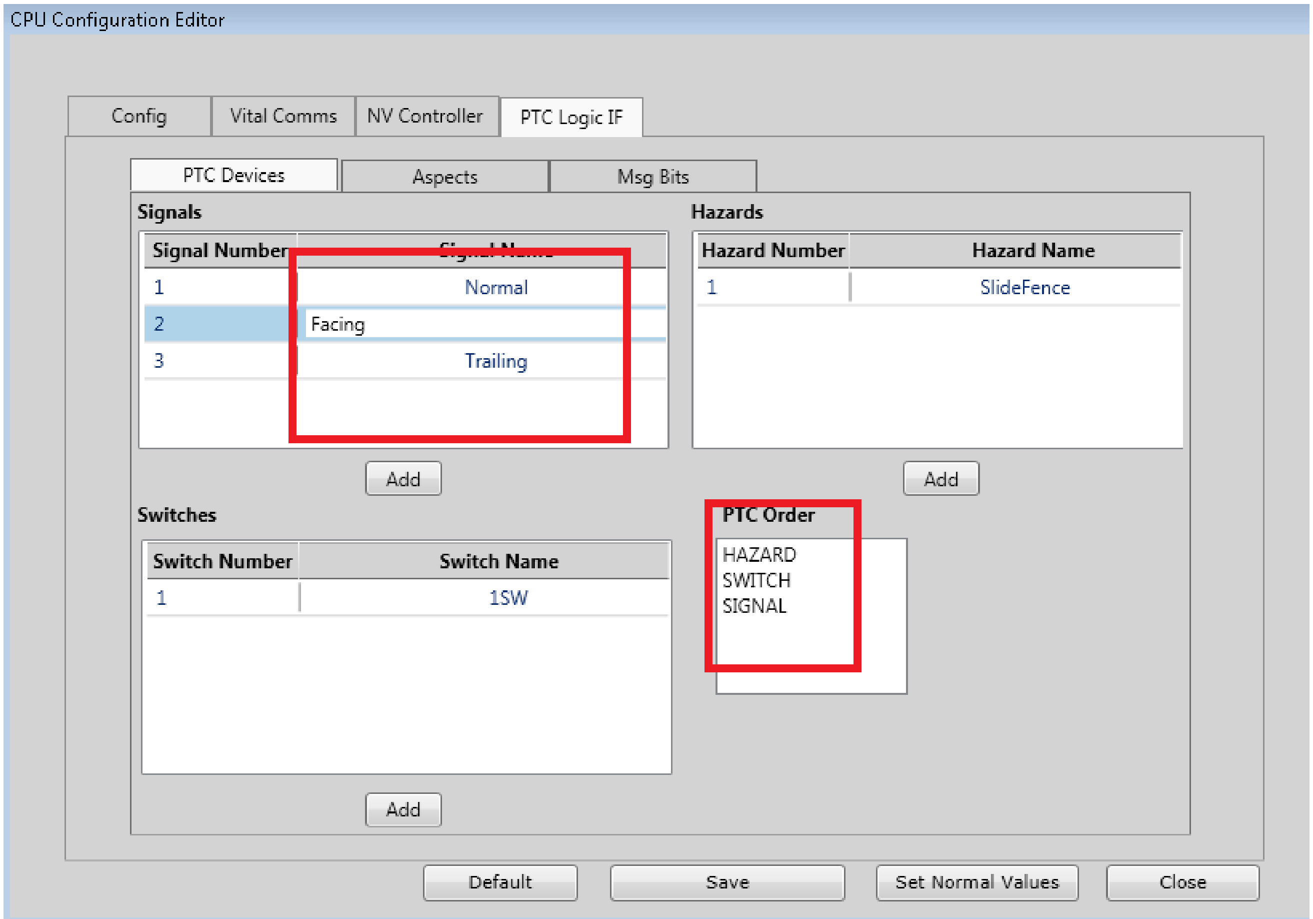
Signal Number	Signal Name
1	Facing
2	

Figure 3-22 Deleting and/or Adding Signals, Switches, and Hazards

Similar drop-down menus exist for Switches and Hazard Detectors.

In the following figure, the order is changed to report hazards first, then switches and lastly signals. This would result in the devices being reported in the following order:

- SlideFence
- 1SW
- Normal Signal
- Facing Signal
- Trailing Signal



Signals

Signal Number	Signal Name
1	Normal
2	Facing
3	Trailing

Hazards

Hazard Number	Hazard Name
1	SlideFence

Switches

Switch Number	Switch Name
1	1SW

PTC Order

HAZARD
SWITCH
SIGNAL

Figure 3-23 PTC Device Order Changed

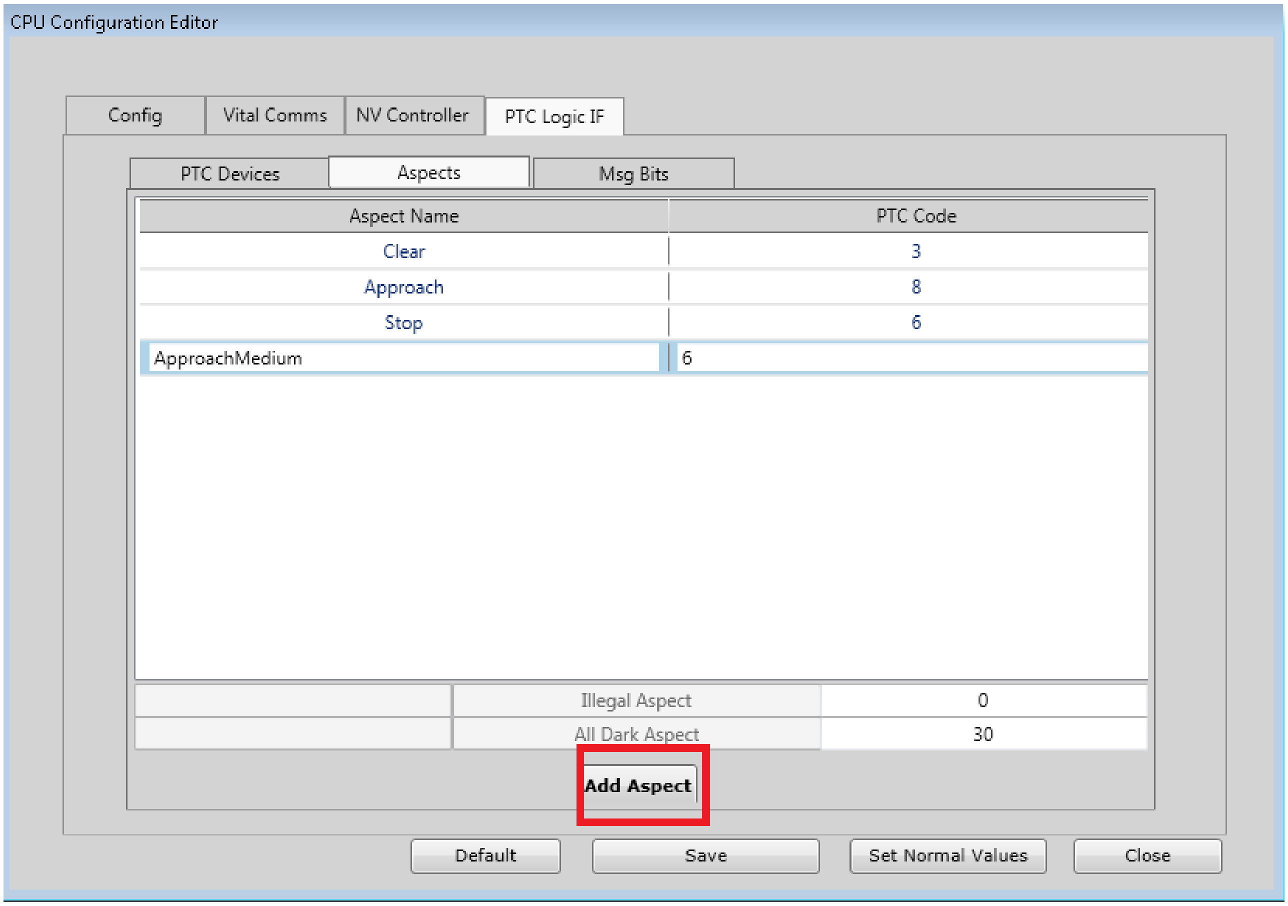
3.4.4.2 PTC Logic If: Aspects Tab

The aspects tab is used to specify which PTC aspects each signal will report and to assign a PTC Code to the aspect.

Two aspects are provided by default:

- The Illegal Aspect, with a default value of 0. This aspect will be reported by the CPU if aspect multiple bits are set at once by the logic.
- The All Dark Aspect, with a default value of 30. This aspect will be reported by the CPU if no aspect bits are set by the logic.

Use the **Add Aspect** button to add in new aspects and change the aspect name and PTC Code as needed.



Aspect Name	PTC Code
Clear	3
Approach	8
Stop	6
ApproachMedium	6

	Illegal Aspect	0
	All Dark Aspect	30

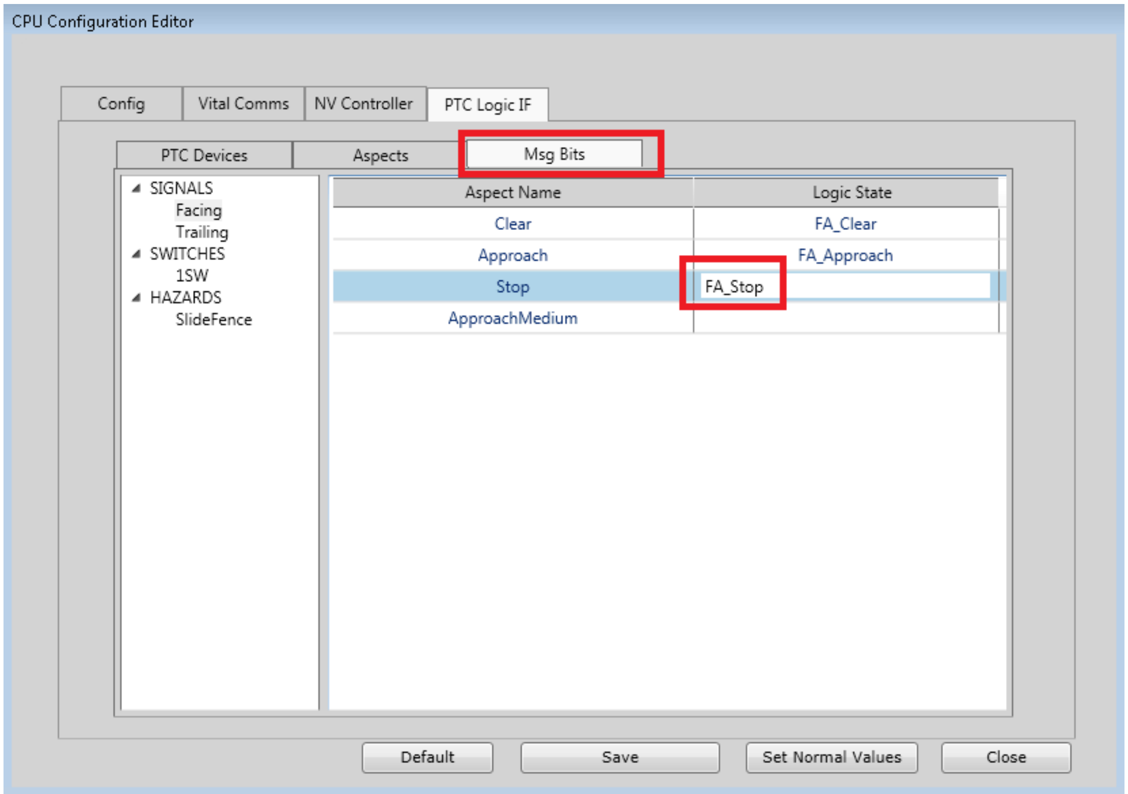
Figure 3-24 Aspects Tab

Aspects can be added with different Aspect Names but the same PTC Code. This setup may be used when creating an application that is used on territories that may have different names for the same signal aspect.

3.4.4.3 PTC Logic If: MsgBits Tab

For signals, the Msg Bits screen is used to assign logic states that can be set by the logic to select the desired aspect code for that signal.

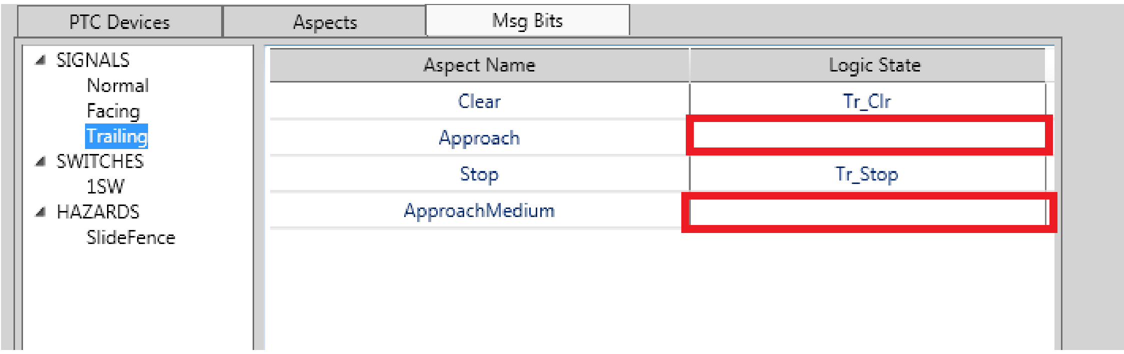
The left window shows the list of PTC devices. Select each Signal in turn and assign a Logic state name to each aspect that the signal can display, as shown in the following figure.



Aspect Name	Logic State
Clear	FA_Clear
Approach	FA_Approach
Stop	FA_Stop
ApproachMedium	

Figure 3-25 Assigning Msg Bit Names

If the signal doesn’t display a particular aspect, leave the logic state field blank.

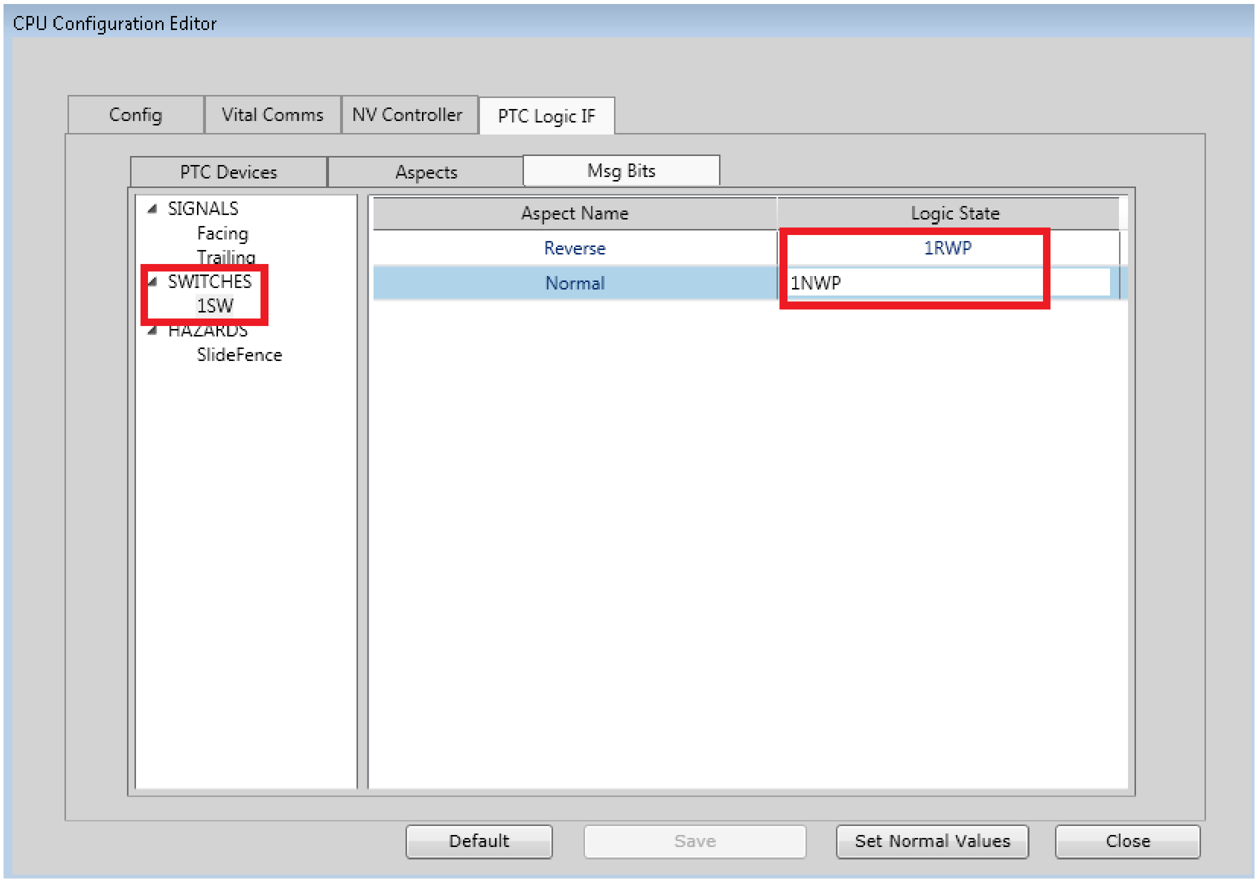


Aspect Name	Logic State
Clear	Tr_Clr
Approach	
Stop	Tr_Stop
ApproachMedium	

Figure 3-26 No Aspect to Display

In the logic section, write an equation for each of the logic state names in the list above to set its state to true when the desired PTC aspect is to be displayed. The signal may darken due to an approach lighting situation, but logically it can still have an aspect set.

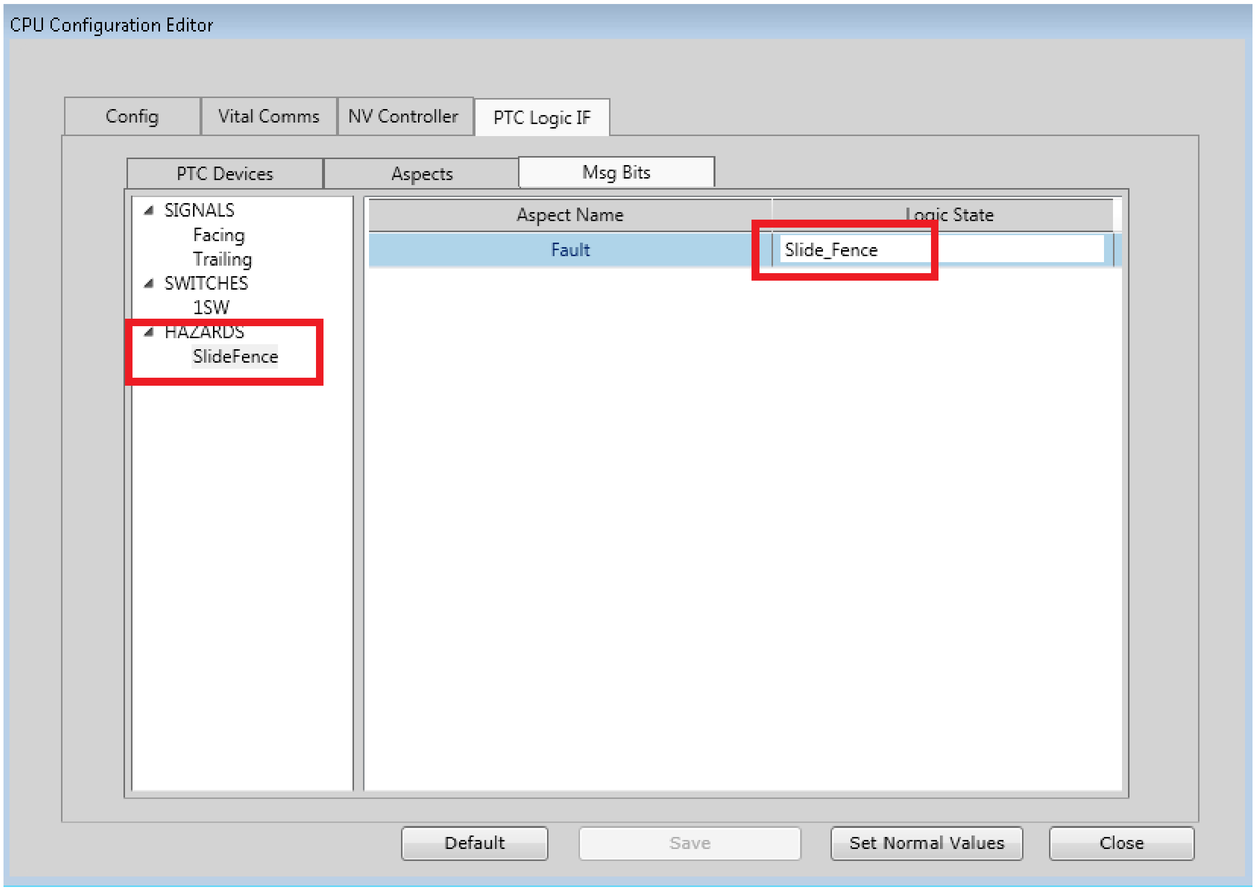
To set the switch states, select the switch from the list shown, and enter logic state names for the reverse and normal positions. In the logic section write an equation to set the reverse and normal logic states.



Aspect Name	Logic State
Reverse	1RWP
Normal	1NWP

Figure 3-27 Setting Switch States

To set the hazard states, select the hazard from the list shown, and enter logic state names for the fault state. In the logic section, write an equation to set this state.



Aspect Name	Logic State
Fault	Slide_Fence

Figure 3-28 Setting Hazard States

3.5 CODED TRACK MODULE EDITOR

The Coded Track Module Editor has three tabs:

- Config
- CT I/O
- Other OPs

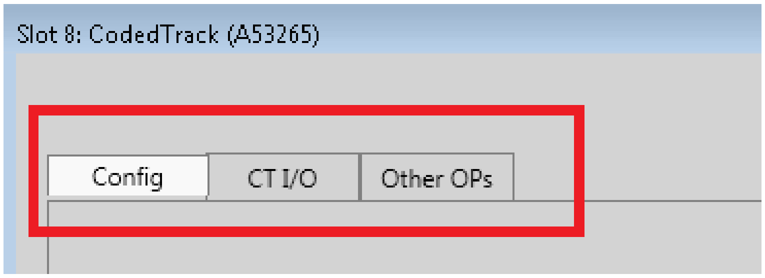
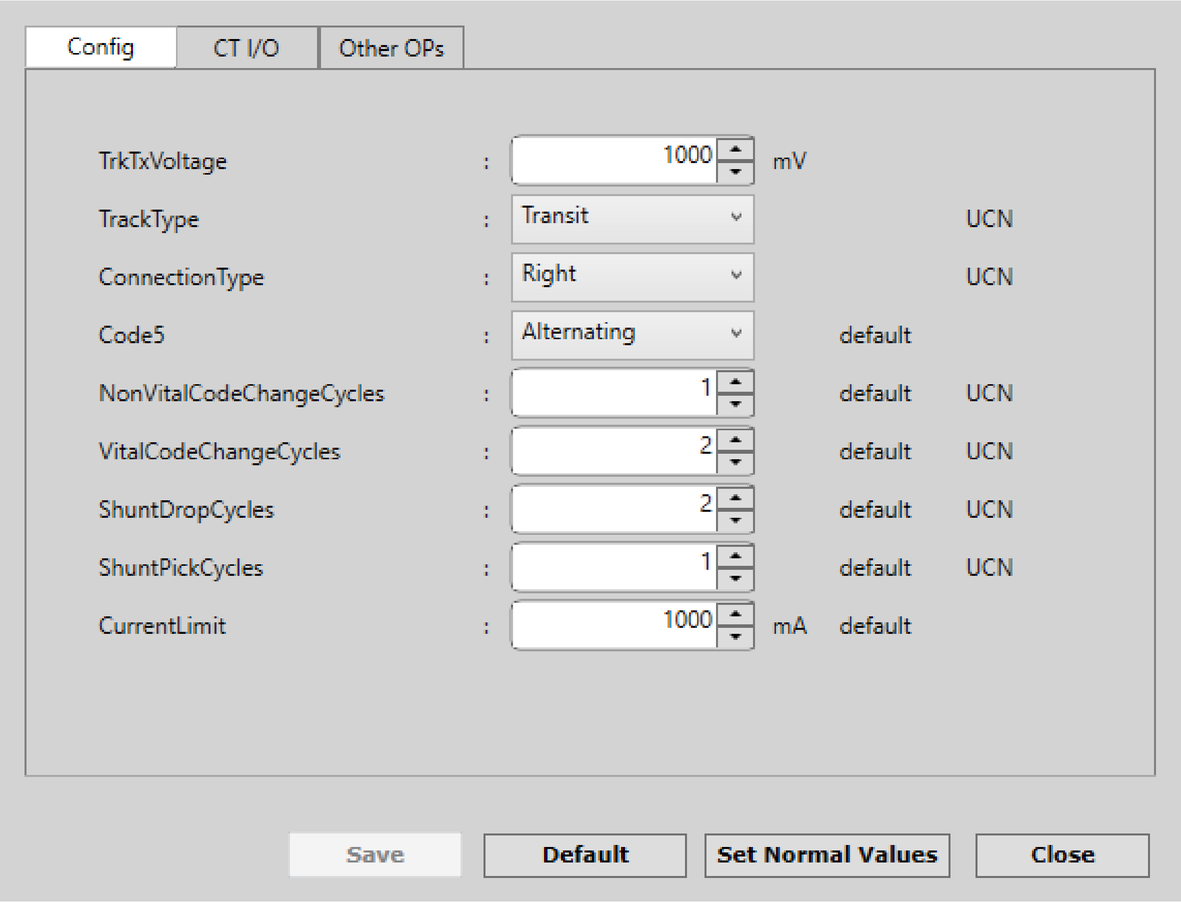


Figure 3-29 Coded Track Editor

Each of the Coded Track Module Editor tabs is described in the following sub-sections.

3.5.1 Config Tab

The Config tab allows the user to set values for track module configuration parameters. Generally, the UCN protected configuration parameters are set in the MCF. The track voltage is usually set in the field.



TrkTxVoltage	:	1000	mV		
TrackType	:	Transit			UCN
ConnectionType	:	Right			UCN
Code5	:	Alternating		default	
NonVitalCodeChangeCycles	:	1		default	UCN
VitalCodeChangeCycles	:	2		default	UCN
ShuntDropCycles	:	2		default	UCN
ShuntPickCycles	:	1		default	UCN
CurrentLimit	:	1000	mA	default	

Figure 3-30 Coded Track Configuration Parameters

At this time, the WayConneX only supports freight code rates. Transit code rates are not supported.

The following table describes the coded track configuration parameters.

Table 3-2 CodedTrack Configuration Parameters and Descriptions

Parameter	Default	Range	Comments	UCN
TrkTxVoltage	0 mV	0-4,000 mV in 20 ms steps	This sets the voltage for the track card transmitter. Its value is usually set in the field.	No
TrackType	Freight	Freight, Transit	This is used to select whether the track module uses freight or transit code rates. Note: Only freight is supported at this time.	Yes
ConnectionType	Left	Left, Right	This is only visible when TrackType is set to Transit. It is used to select whether the track module is communicating to another track module in the left or right side of a chassis. Note the Electrocode 4 uses a different cycle times to left and right sides, this parameter is used to match that.	Yes
Code5	Alternating	Alternating Standard Long	This is used to specify which type of the code pattern is used for code 5. Option Long is not available if TrackType set to transit.	No
EC4 Compatibility	EC4	EC4Plus EC4	This is used to specify whether the code patterns are compatible with Electrocode 4 or Electrocode 4+. Not visible if TrackType is set to transit.	No
NonVitalCode ChangeCycles	1	1 to 3	This is used to specify how many code cycles a non-vital code has to be received before the change is reported. Default usually set in MCF.	Yes
VitalCode ChangeCycles	2	1 to 3	This is used to specify how many code cycles a vital code has to be received before the change is reported. Default usually set in MCF.	Yes
ShuntDrop Cycles	2	1 to 8	This is used to specify how many code cycles the code has to be lost before reporting that the track is shunted. Required default usually set in MCF.	Yes
ShuntPick Cycles	1	1 to 8	This is used to specify how many code cycles the code has to be seen before reporting that the track is not shunted. Default usually set in MCF.	Yes
CurrentLimit	1,000 mA	1,000 to 10,000 mA in 50 mA steps	This is used to specify the maximum current that the track module can received before it turns off its transmitter. It is used to prevent the module sending codes when a train is shunting the rail. Usually set in the field.	No

3.5.2 CT I/O Tab

The CT I/O tab is used to:

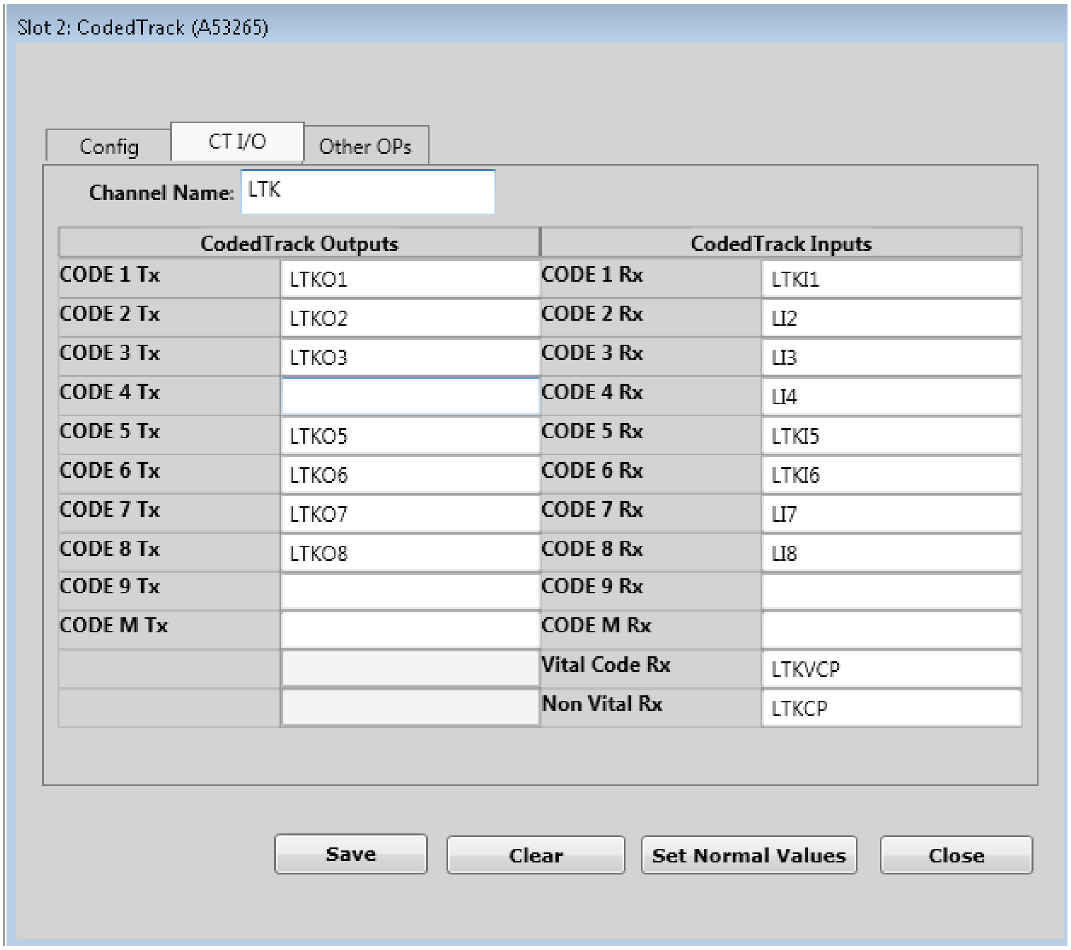
- Enter the logic states that are used to set specific track codes.
- Enter logic state names that are set when track codes are received.

NOTE

NOTE

On all screens where input and output bits names are entered:

a) the name can be up to 30 characters long, contain only upper and lower case letters, numbers, and underscores (_).
b) the name must contain a letter or underscore, it cannot be all numbers.
c) the name cannot be a duplicate of a logic state name entered anywhere else, i.e. I/O module editors, CPU editor, Logic Data Editor.
d) though upper and lower case names can be entered, the duplicate checking is not case sensitive, so the name Input1 is treated as a duplicate of INPUT1 and input1.



Channel Name: LTK

CodedTrack Outputs		CodedTrack Inputs	
CODE 1 Tx	LTKO1	CODE 1 Rx	LTKI1
CODE 2 Tx	LTKO2	CODE 2 Rx	LI2
CODE 3 Tx	LTKO3	CODE 3 Rx	LI3
CODE 4 Tx		CODE 4 Rx	LI4
CODE 5 Tx	LTKO5	CODE 5 Rx	LTKI5
CODE 6 Tx	LTKO6	CODE 6 Rx	LTKI6
CODE 7 Tx	LTKO7	CODE 7 Rx	LI7
CODE 8 Tx	LTKO8	CODE 8 Rx	LI8
CODE 9 Tx		CODE 9 Rx	
CODE M Tx		CODE M Rx	
		Vital Code Rx	LTKVCP
		Non Vital Rx	LTKCP

Figure 3-31 Coded Track I/O Parameters

NOTE

NOTE

a) When transmitting a vital code (2,3,4,7,8,9) or non-vital code (5,6,M), the code 1 bit must also be set.

b) When the code 6 bit is set, the track module will transmit 1 pulse of track 6 then go back to transmitting the previously commanded code. e.g. if code bits Code 1 and 7 then 6 bit is set as well, track card send 1 pulse of code 6, then goes back to transmitting a code 7.To send another code 6 pulse, the code 6 bit has to be cleared in the logic for at least 1 Electrocode code cycle then set again.

c) The Non-Vital Rx bit is set when any code has been received in the last code cycle.

d) The Vital Code Rx bit is set when any vital code has been received in the last code cycle.

e) When a shunt on the track is removed, the Non-Vital Rx and Vital Code Rx bits will be set before the non-vital code bits (1,5,6,M) or vital code bits (2,3,4,7,8,9) are set.

f) Once a code has been set for a number of cycles greater or equal to the configured value of Shunt pick cycles, the code bits will be set (provided the code has been seen for at least the values of Code change cycles)

g) Code M is not available if TrackType is set to Transit.

Example:

Consider a shunted track circuit which is receiving a code 1,7 from transmit end (but not received at rx end while shunted), the shunt is then lifted.

ShuntPick = 4

VitalCodeChangeCycles = 2

NonVitalCodeChangeCycles = 1

Table 3-3 Shunt Code Reference 1

	Shunt	Remove Shunt	No Shunt	No Shunt	No Shunt	No Shunt
Code Cycle No.	1	2	3	4	5	6
Code Pulse Received	None	1,7	1,7	1,7	1,7	1,7
Rx Code bits set	None	NVC VC	NVC VC	NVC VC	NVC VC 1,7	NVC VC 1,7

The code 1 and 7 bits are not set until they have been received for 4 cycles.

Example:

Consider a non-shunted track circuit which is receiving a code 1,7 and is then shunted.

ShuntDrop = 2
VitalCodeChangeCycles = 2
NonVitalCodeChangeCycles = 1

Table 3-4 Shunt Code Reference 2

	No Shunt	Shunt	Shunt	Shunt	Shunt	Shunt
Code Cycle number	1	2	3	4	5	6
Code Pulse received	1,7	-	-	-	-	-
Rx Code bits set	NVC VC 1,7	1,7	-	-	-	-

The code pulse is lost, so the NVC and VC bits clear, but the vital code persists for the number of ShuntDrop delay cycles.

The timing of the shunt may result in the second pulse of the vital code being cut off, and leaving the first, so the logic may also see:

Table 3-5 Shunt Code Reference 3

	No Shunt	Shunt	Shunt	Shunt	Shunt	Shunt
Code Cycle number	1	2	3	4	5	6
Code Pulse received	1,7	1	-	-	-	-
Rx Code bits set	NVC VC 1, 7	NVC 1	-	-	-	-

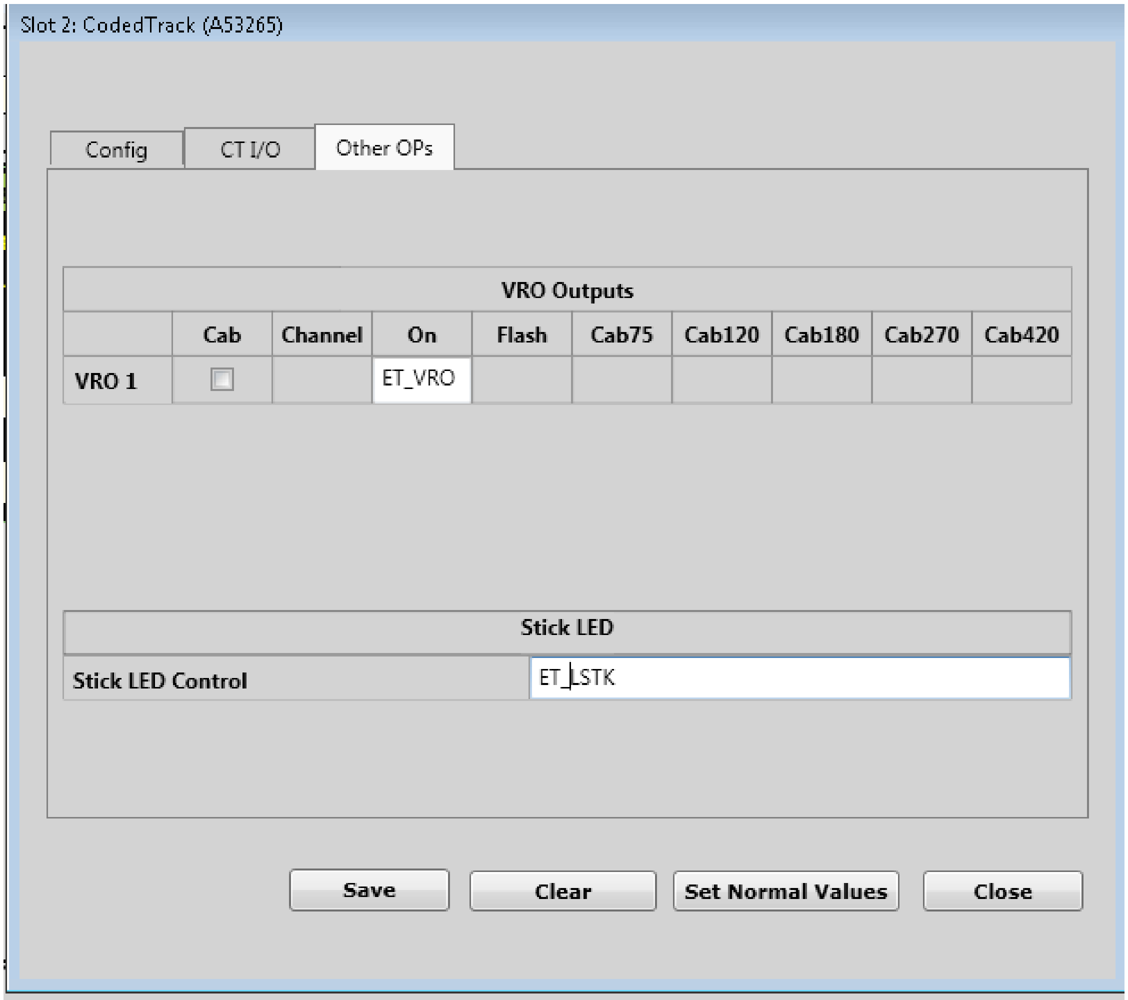
When code 5 and M are used in alternating mode, the track module takes care of alternating the code, the logic just has to set the Code 5 Tx or Code M Tx bit to true.

3.5.3 Other OPs Tab

The Other OPs tab is used to set controls for the Vital Output on the track module and control its LED. The LED is usually used to indicate when a stick is set.

Enter variable names for the VRO On State and the Stick LED control.

The Vital Output can also be used to generate cab output signals. To use it in this mode, select the Cab check box, then enter logic state names that can be used to set the desired cab rates. Only one cab rate bit can be set at once by the Boolean logic, if multiple bits are set, the track card will reboot.



VRO Outputs

	Cab	Channel	On	Flash	Cab75	Cab120	Cab180	Cab270	Cab420
VRO 1	□		ET_VRO						

Stick LED

Stick LED Control	ET_LSTK

Figure 3-32 Configuring VRO Outputs

3.6 CODED LINE MODULE EDITOR

This module is no longer supported in the WCCT and WayConneX system.

3.7 COLORLIGHT MODULE EDITOR

The Colorlight Module Editor has four tabs:

- Config
- Lamps
- I/O
- DC Converter

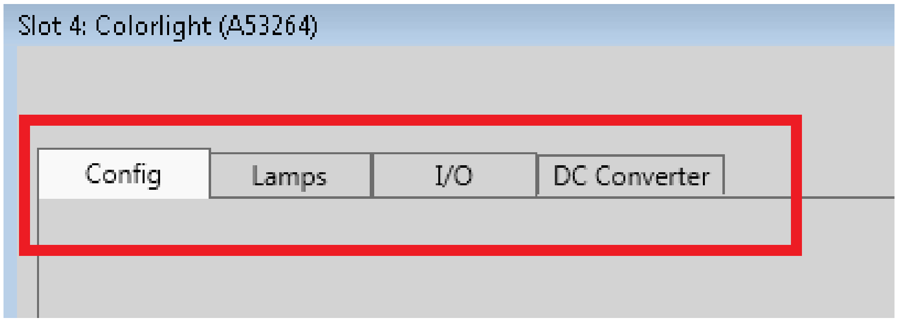
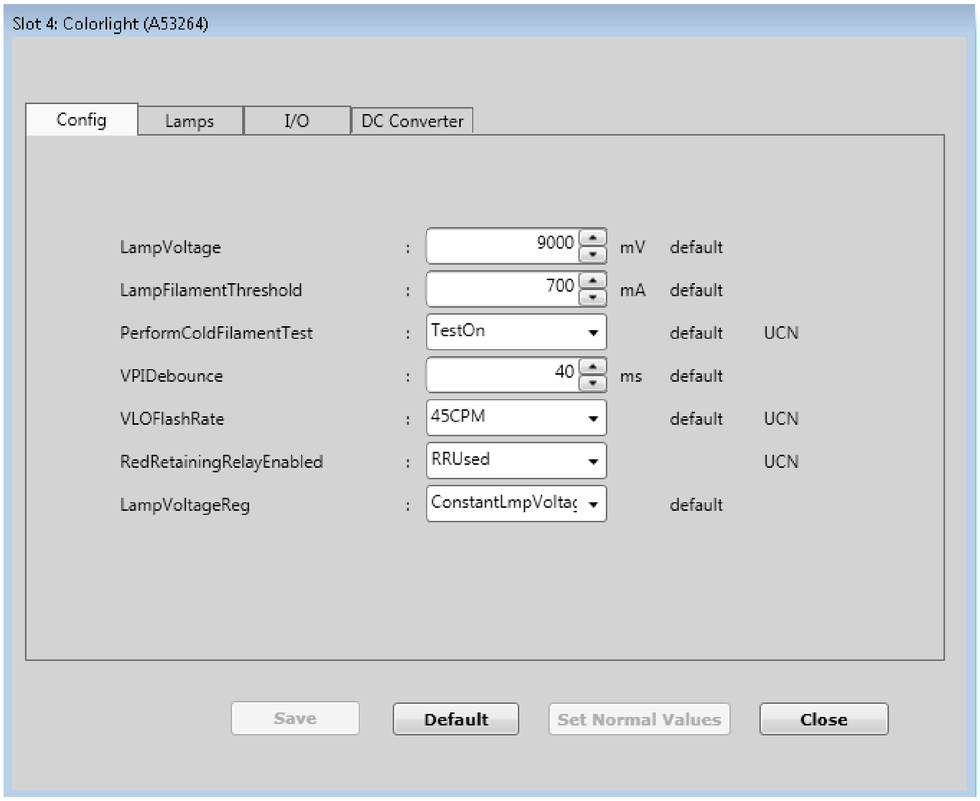


Figure 3-33 Colorlight Editor Tabs

Each of the Colorlight Module Editor tabs is described in the following sub-sections.

3.7.1 Config Tab

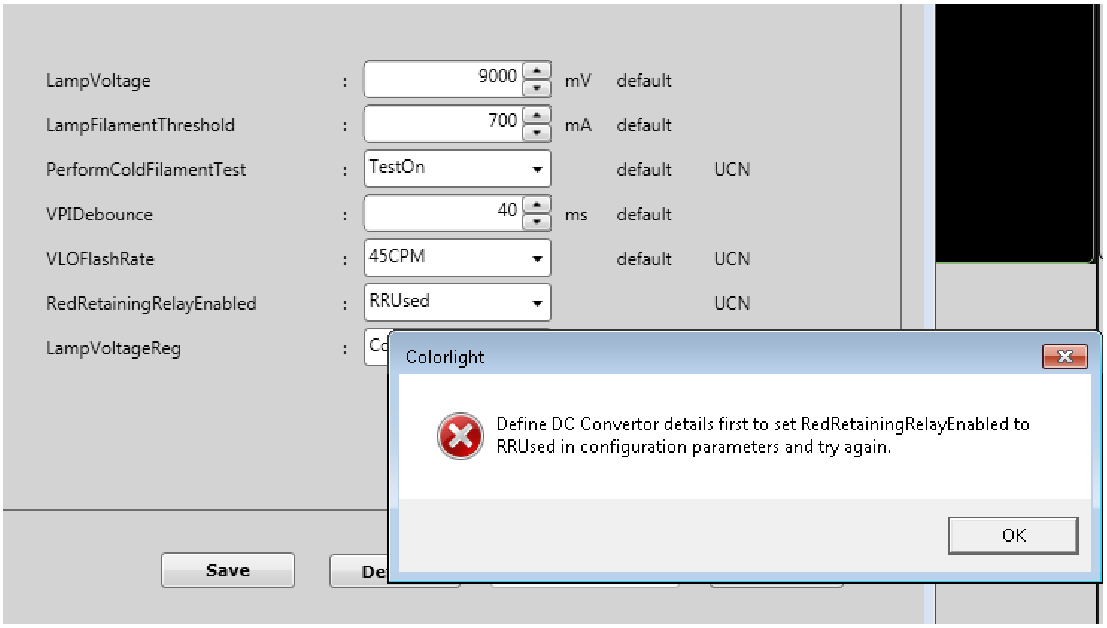
The Config tab allows the user to set values for Colorlight module configuration parameters. Generally, the UCN protected ones are set in the MCF.



LampVoltage	:	9000	mV	default	
LampFilamentThreshold	:	700	mA	default	
PerformColdFilamentTest	:	TestOn		default	UCN
VPIDebounce	:	40	ms	default	
VLOFlashRate	:	45CPM		default	UCN
RedRetainingRelayEnabled	:	RRUsed			UCN
LampVoltageReg	:	ConstantLmpVoltaç		default	

Figure 3-34 Colorlight Module Config Editor

If RedRetainingRelayEnabled is set to RRUsed, the user must write logic to control the converter channel. The WCCT will give a warning that the converter must be defined if the parameter is changed and no converter channel is defined.



LampVoltage	:	9000	mV	default	
LampFilamentThreshold	:	700	mA	default	
PerformColdFilamentTest	:	TestOn		default	UCN
VPIDebounce	:	40	ms	default	
VLOFlashRate	:	45CPM		default	UCN
RedRetainingRelayEnabled	:	RRUsed			UCN
LampVoltageReg	:	Co			

Colorlight

Define DC Convertor details first to set RedRetainingRelayEnabled to RRUsed in configuration parameters and try again.

Figure 3-35 Colorlight Module RRUsed Warning Message

For usage of the RedRetainingRelayEnabled parameter, see Section 3.7.4.

The following table describes the Colorlight configuration parameters.

Table 3-6 Colorlight Configuration Parameters

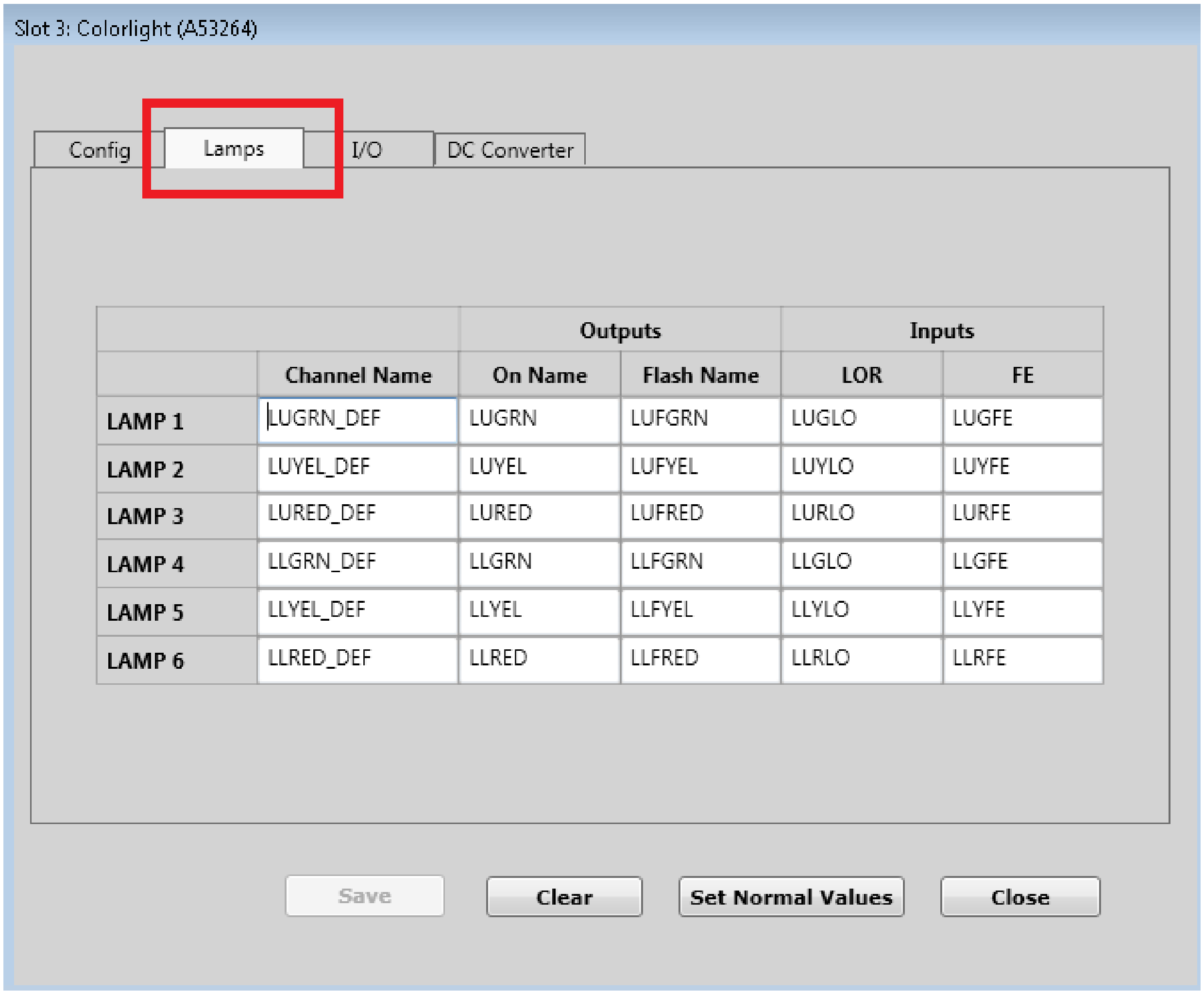
Parameter	Default	Range	Comments	UCN
LampVoltage	9,000 mV	9,000 mV to 13,000 mV in 20 mV steps	Used to set the lamp voltage for all 6 lamps on the board Usually set in field	No
LampFilament Threshold	700 mA	150 mA to 2,500 mA in 10 mA steps	Used to set the threshold for LOR detection current	No
PerformCold FilamentTest	TestOn	TestOn, TestOff	Used to indicate whether cold filament testing is done. Should be kept at TestOn. Usually set in MCF	Yes
VPIDebounce	40 ms	20 ms to 200 ms in 2 ms steps	Set VPI Debounce time. (milliseconds)	No
VLOFlashRate	45 CPM	40 CPM 45 CPM 50 CPM 55 CPM 60 CPM 65 CPM	Used to select the flash rate for flashing lamps (CPM) with 50% duty cycle Usually set in MCF	Yes
RedRetaining RelayEnabled	RRNotUsed	RRNotUsed, RRUsed	See VSTOP section for how to set this Usually set in MCF	Yes
LampVoltage Reg	Constant Lmp Voltage	ConstantLmp Voltage VariableLmp Voltage	The module will try and maintain a constant lamp voltage. If AC power is off this can cause the battery voltage to drain more rapidly. By setting this to VariableLmpVoltage the module will gradually reduce the lamp voltage as the battery voltage drops.	Yes

3.7.2 Lamps Tab

The Lamps tab is used to:

- Enter the logic states that are used to control the lamps on and flash states.
- Enter the logic state names that are set when a lamp reports a light out condition (LOR) or foreign energy (FE).

First enter a channel name for each used lamp. To ensure that the lamps have the correct color displayed when shown on the CPU user interfaces (Web UI of the CPU III) the channel name must contain the color of the lamp in the following form: Green, Grn, Yellow, Yel, Red, Lunar, Lun (lower or upper case). Enter names for output controls to turn lamps on or flash them. Enter names for states that will be set if lamps detect Light Out (LOR) or foreign energy (FE).



		Outputs		Inputs	
	Channel Name	On Name	Flash Name	LOR	FE
LAMP 1	LUGRN_DEF	LUGRN	LUFGRN	LUGLO	LUGFE
LAMP 2	LUYEL_DEF	LUYEL	LUFYEL	LUYLO	LUYFE
LAMP 3	LURED_DEF	LURED	LUFRED	LURLO	LURFE
LAMP 4	LLGRN_DEF	LLGRN	LLFGRN	LLGLO	LLGFE
LAMP 5	LLYEL_DEF	LLYEL	LLFYEL	LLYLO	LLYFE
LAMP 6	LLRED_DEF	LLRED	LLFRED	LLRLO	LLRFE

Figure 3-36 Entering Lamp Channel Names

NOTE

NOTE

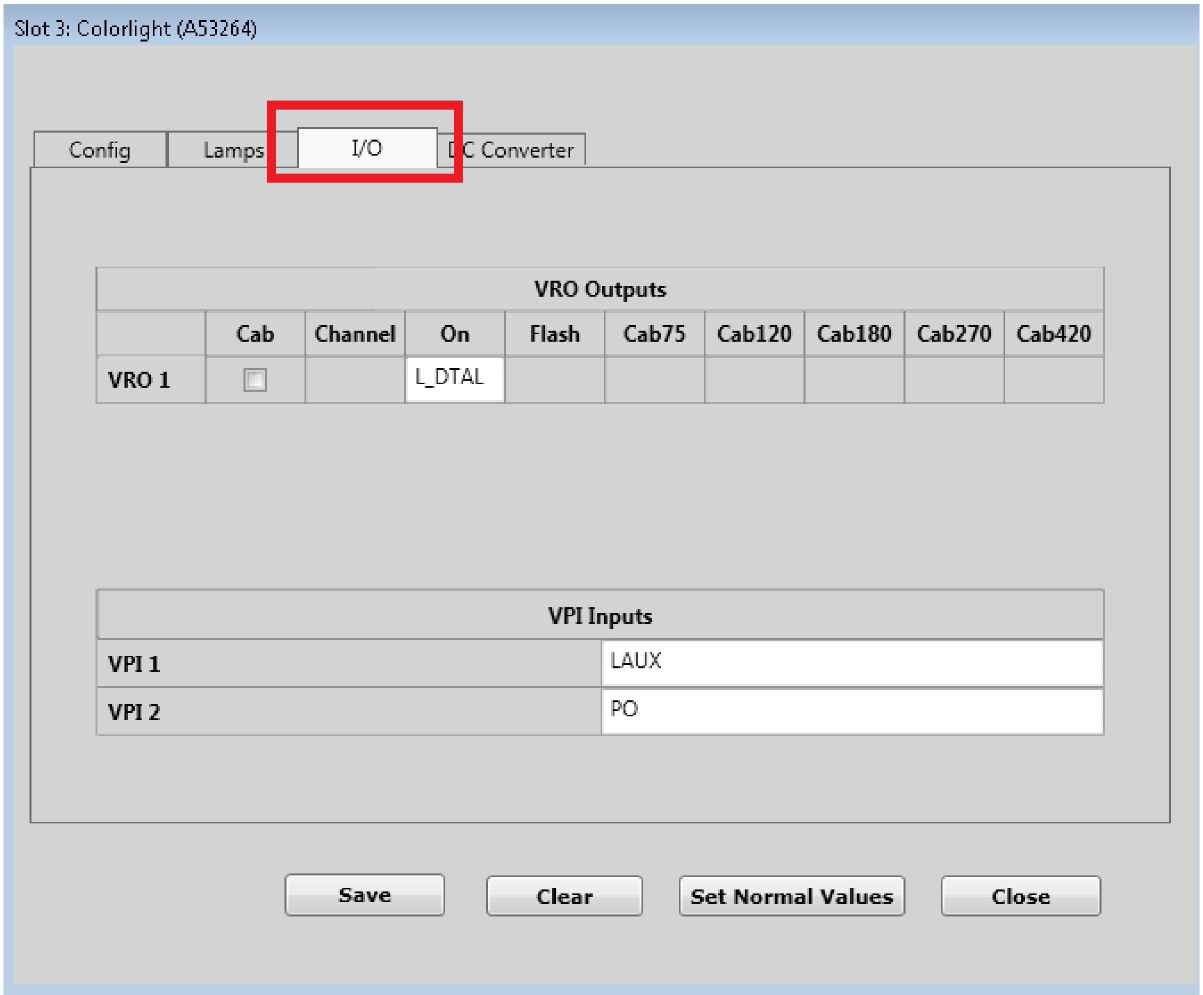
- To flash a lamp, set the **Flash** state to true. The **On** state may be set to true or false.
- When a lamp detects it has a burned out filament, it will report the LOR state as true, and will turn off the lamp , even if the application logic still has the On state (or Flash) set true.
- When a lamp detects it has foreign energy applied to it, it will turn off the DC-DC convertor and all lamps will report LOR. If foreign energy is still detected on the lamp after all the lamps of this card have been turned off, it will report FE for that lamp.

If the Colorlight module is not in session with the CPU (e.g. it has been removed, or has failed), the logic will set the reported states of the LOR and FE bits to true.

3.7.3 I/O Tab

The Colorlight module has a Vital Relay Output and two Vital Parallel Inputs (VPI). Use the I/O tab to:

- set controls for turning on the VRO, or setting it to generate a Cab rate (see Coded Track Section 3.5).
- set logic states that will indicate the state of the VPIs.



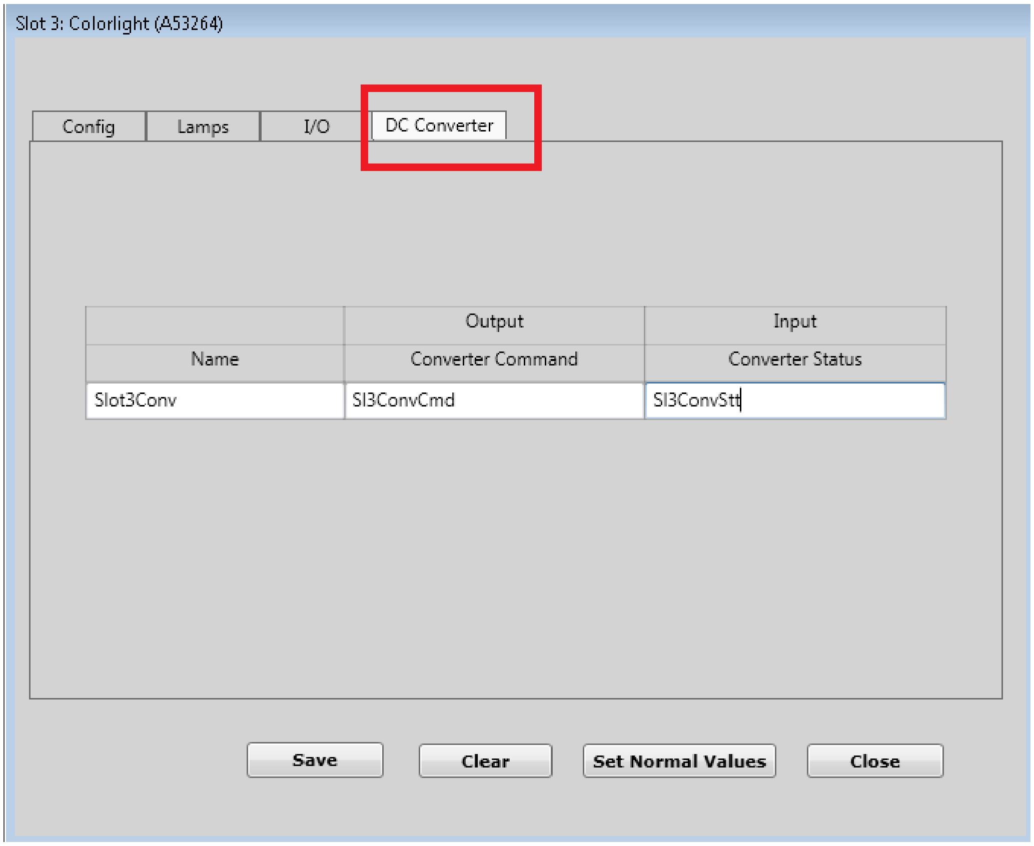
VRO Outputs									
	Cab	Channel	On	Flash	Cab75	Cab120	Cab180	Cab270	Cab420
VRO 1	□		L_DTAL						

VPI Inputs	
VPI 1	LAUX
VPI 2	PO

Figure 3-37 Colorlight VRO and VPI

3.7.4 DC Converter Tab

Use the DC Converter tab to set the state to control the DC-DC converter to the Colorlight module and read its status. First enter a channel name, then enter names for commands and status.



	Output	Input
Name	Converter Command	Converter Status
Slot3Conv	Sl3ConvCmd	Sl3ConvStt

Figure 3-38 DC Converter States

Monitoring the state of the convertor and controlling it is only necessary when the configuration parameter RedRetainingRelayEnabled is set to RRUsed.

When RedRetainingRelayEnabled is set to RRNotUsed the DC-DC convertor on the Colorlight module is controlled purely by the module executive software. For example, if foreign energy is detected on a lamp, the DC-DC convertor is shut off and all lamps turned off. When the foreign energy is removed, the module executive software will automatically turn the convertor back on.

When RedRetainingRelayEnabled is set to RRUsed, the DC-DC convertor has to be turned on using the Convertor Command bit set from the logic (see previous page). The purpose for this is in case there is a signal whose heads are split across multiple Colorlight modules; because, if foreign energy is detected on one module and the DC-DC convertor turned off (as detected by the convertor Status bit) the application logic can be used to de-energize the DC-DC convertor on the other module. If a RedRetainingRelay is used to break the contacts on signal heads that are split across different modules, the DC-DC convertor on the two modules needs to be switched on at the same time, from the application logic.

3.8 RIO MODULE EDITOR

The RIO Module Editor has three tabs:

- Config
- Outputs
- Inputs

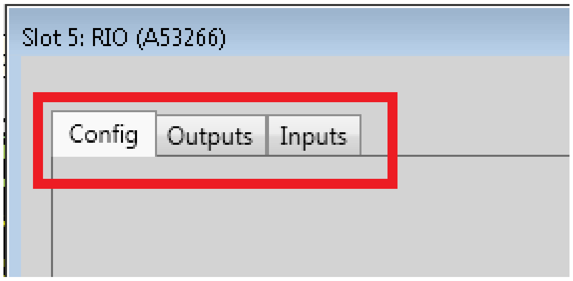
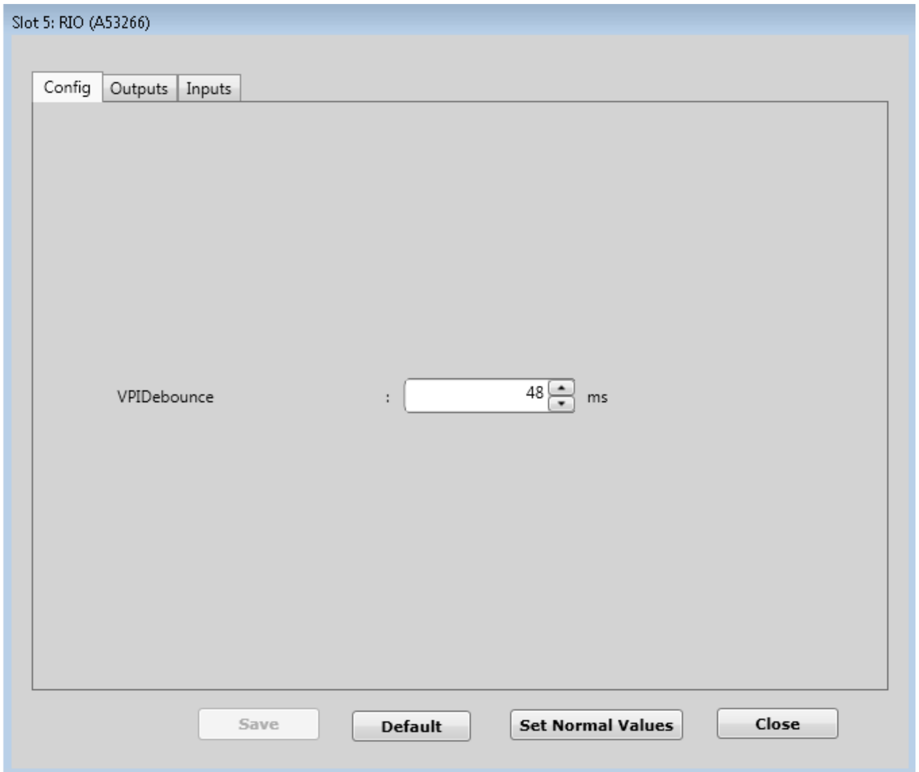


Figure 3-39 RIO Editor Tab

Each of the RIO Module Editor tabs is described in the following sub-sections.

3.8.1 Config Tab

The Config tab allows the user to set the VPI debounce for the inputs.



VPIDebounce : 48 ms

Figure 3-40 RIO Module Editor

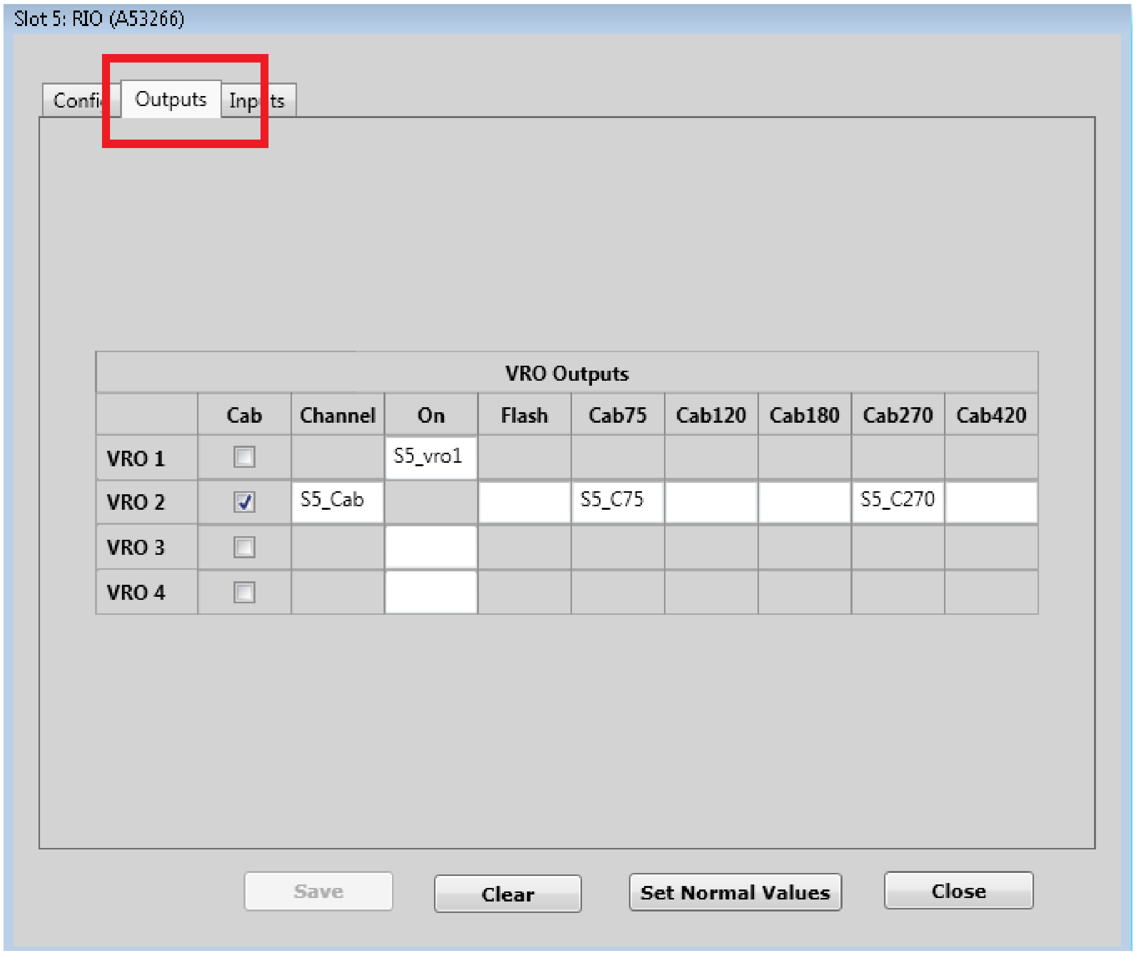
The following table describes the RIO Configuration parameters.

Table 3-7 RIO Configuration Parameter

Parameter	Default	Range	Comment	UCN
VPIDebounce	40 ms	20 to 200 ms in 2 ms steps	Set VPI Debounce time in milliseconds	No

3.8.2 Outputs Tab

The Outputs tab allows the user to set logic state names for the four VROs on the module. The VROs can be used as steady on/off, or in the Cab Mode (see Coded Track Section 3.5.3).



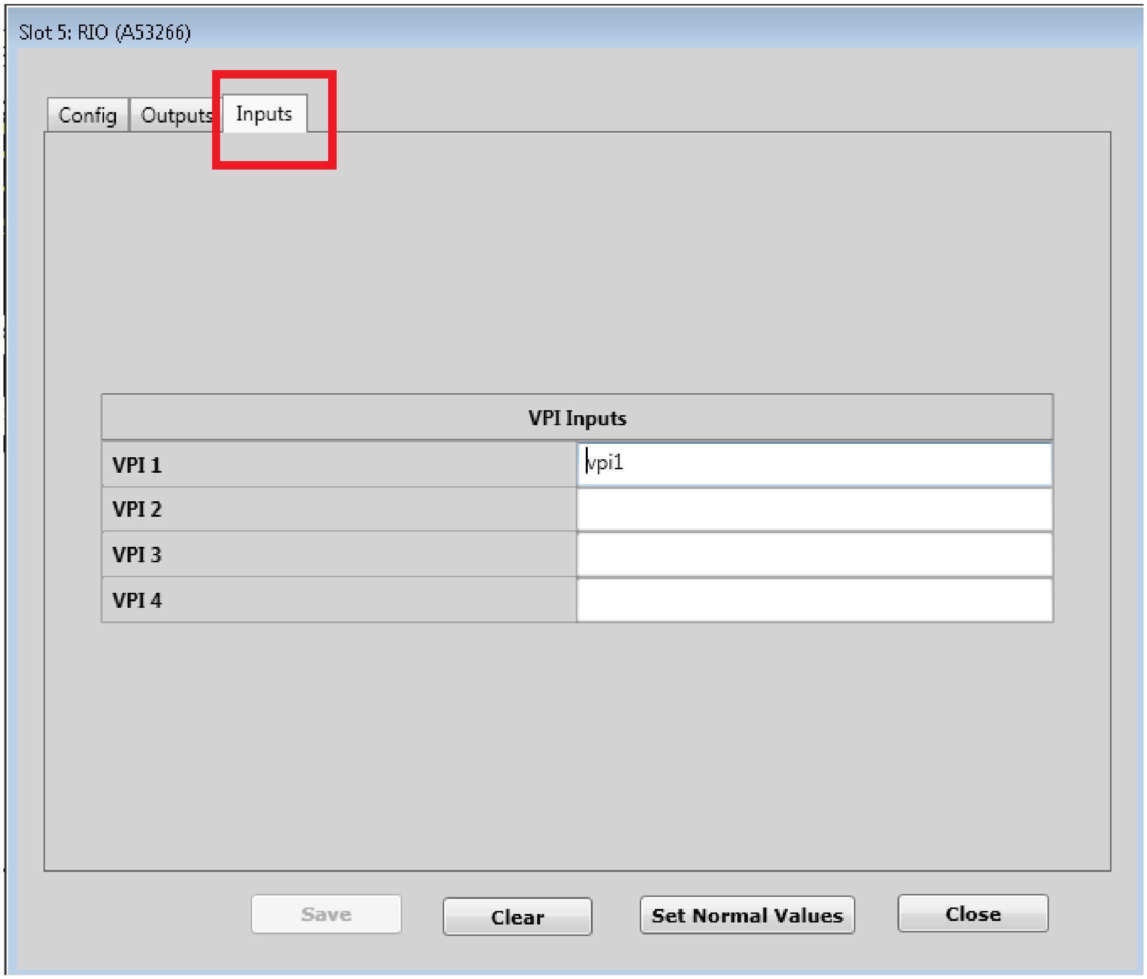
VRO Outputs

	Cab	Channel	On	Flash	Cab75	Cab120	Cab180	Cab270	Cab420
VRO 1	□		S5_vro1						
VRO 2	☑	S5_Cab			S5_C75			S5_C270	
VRO 3	□								
VRO 4	□								

Figure 3-41 RIO VRO Outputs

3.8.3 Inputs Tab

The Inputs tab allows the user to set logic state names for the four VPIs on the module. Under failure the VPI will always report de-energized.



VPI Inputs	
VPI 1	vpi1
VPI 2	
VPI 3	
VPI 4	

Figure 3-42 RIO VPI Inputs

3.9 PSO MODULE EDITOR

WCCT version 1.8.1.7 and later support the A80428-3 version of the PSO module. Prior WCCT versions supported the A80428-6 version of the PSO module, which is no longer supported as of WCCT version 1.8.1.7.

The PSO Module Editor has four tabs:

- Config
- PSO
- Outputs
- Inputs.

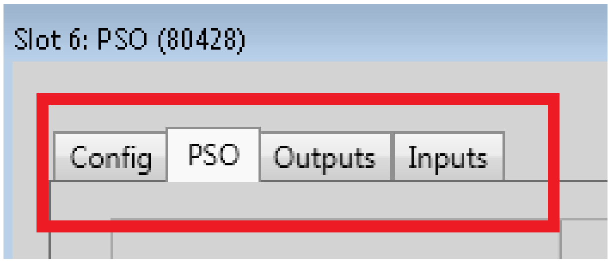


Figure 3-43 PSO Editor Tab

Each of the PSO Module Editor tabs is described in the following sub-sections.

3.9.1 Config Tab

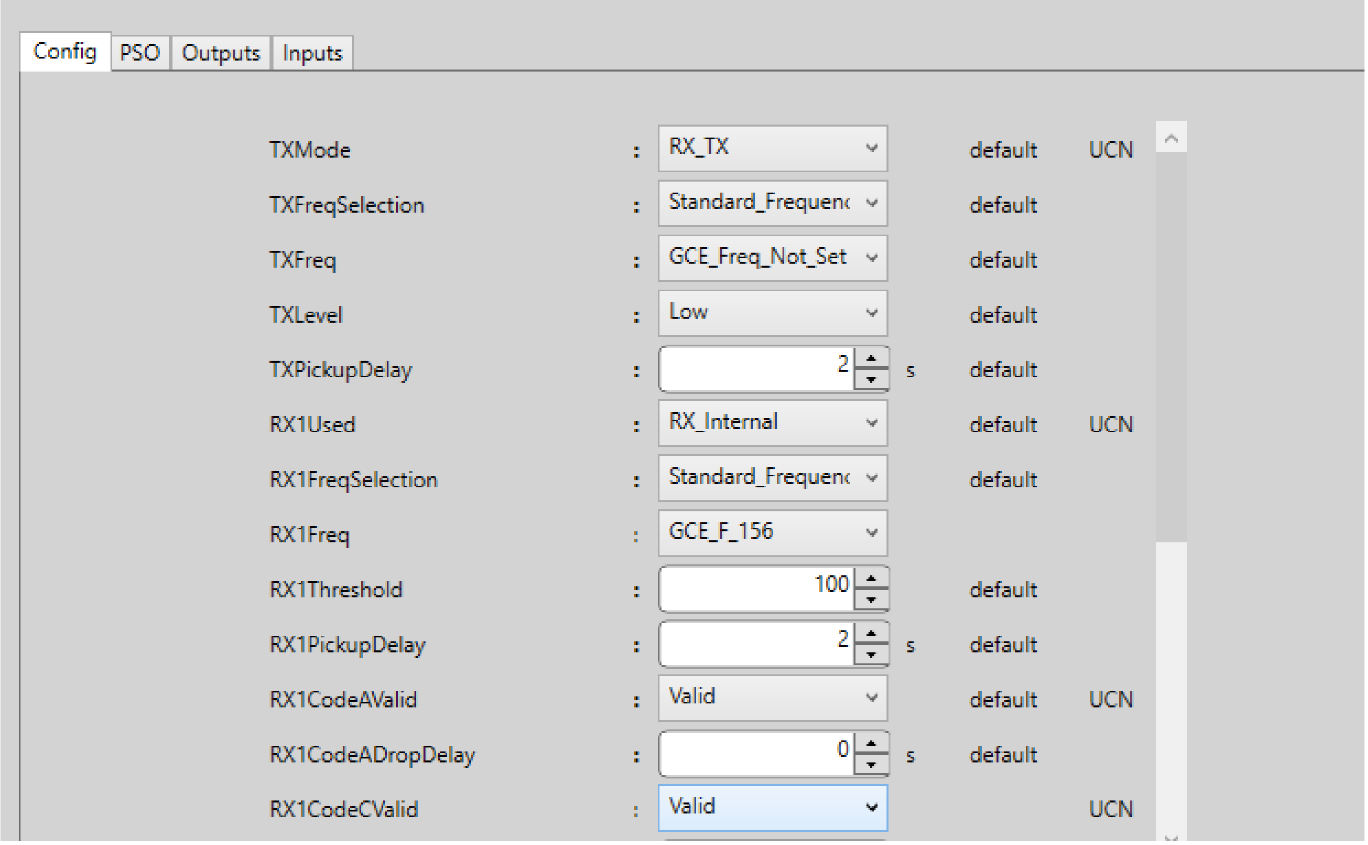
The Config tab allows the user to first set the TXMode.

The TXMode currently has two possible options:

- RX_TX – this allows the user to configure the PSO transmitter and one or two PSO receivers.
- Rx_Only. – this allows the user to configure one or two PSO receivers.

WCCT version 1.8.1.7 also shows provisions for the future TXMode option of ‘Crossing’. This feature is still under test and has no functionality in WCCT version 1.8.1.7.

The remaining parameters shown on the Config tab depend on the TXMode value. The following figure shows an example of possible parameters.



TXMode	:	RX_TX		default	UCN
TXFreqSelection	:	Standard_Frequenc		default	
TXFreq	:	GCE_Freq_Not_Set		default	
TXLevel	:	Low		default	
TXPickupDelay	:	2	s	default	
RX1Used	:	RX_Internal		default	UCN
RX1FreqSelection	:	Standard_Frequenc		default	
RX1Freq	:	GCE_F_156			
RX1Threshold	:	100		default	
RX1PickupDelay	:	2	s	default	
RX1CodeAValid	:	Valid		default	UCN
RX1CodeADropDelay	:	0	s	default	
RX1CodeCValid	:	Valid			UCN

Figure 3-44 PSO Module Editor with TXMode set to RX_TX

The following table describes the PSO configuration parameters.

Table 3-8 PSO Module Parameters

Parameter	Default	Range	Comments	UCN
TxMode	RX_TX	RX_TX Rx_Only	Used to set the mode the PSO module is used in.	Yes
TxFreq	Not_Set	Not_Set, F_156 to F_20200	Used to set the PSO transmitter frequency. Frequencies are listed as standard frequencies, followed by alternate frequencies.	No
TxLevel	Tx_Low	Low High	Used to set the transit level for the transmitter.	No
TxPickupDelay	2	0-30 s	Pickup delay if transmitter enable used.	No

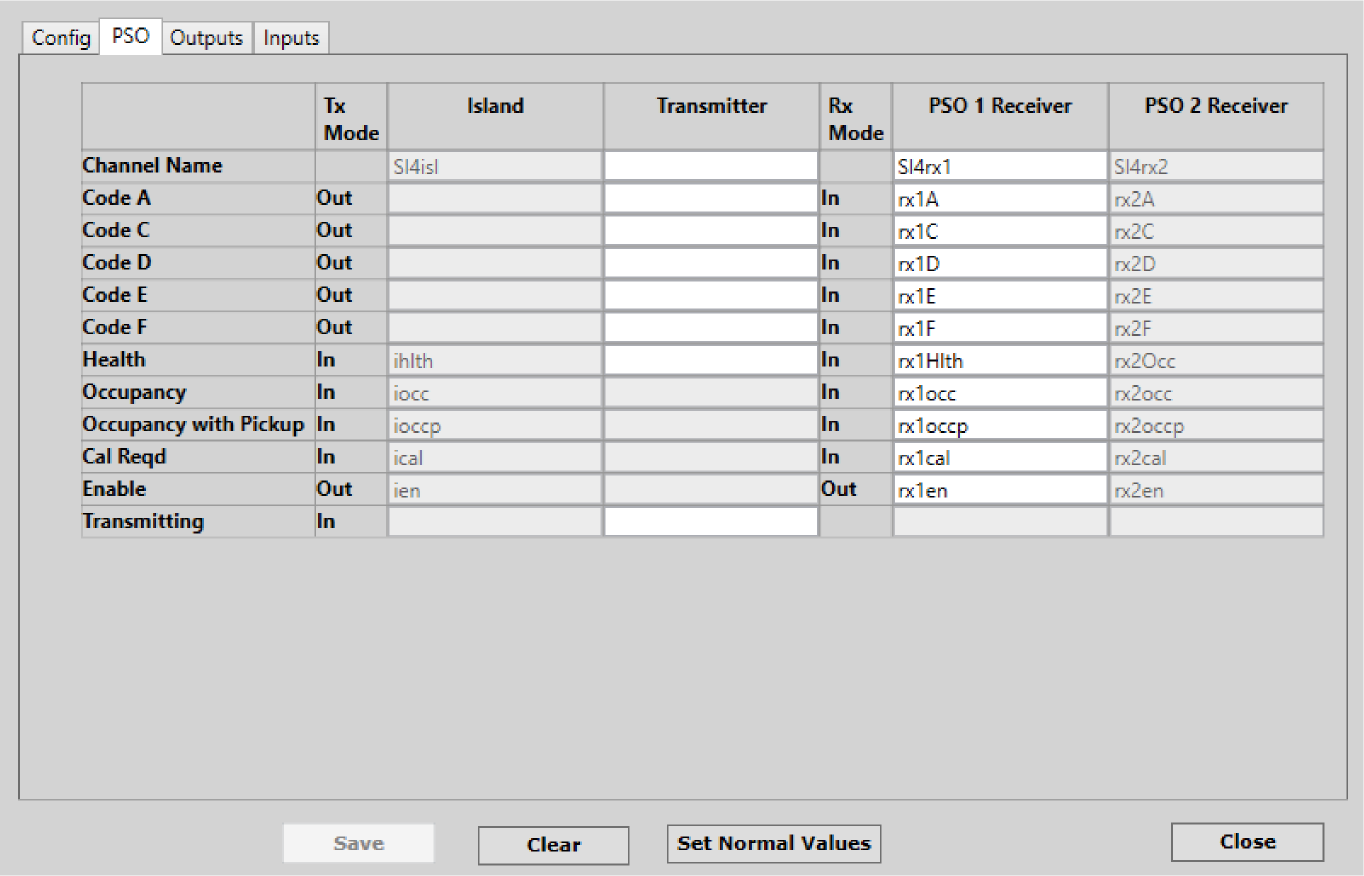
Parameter	Default	Range	Comments	UCN
RX1Used	RX_Internal	RX_NotUsed RX_Internal	Used to indicate whether the PSO receiver 1 is used or not.	Yes
RX1Freq	Not_Set	Not_Set F_156 to F_20200	Used to set the PSO receiver 1 frequency. Frequencies are listed as standard frequencies, followed by alternate frequencies.	No
RX1Threshold	100	100-9999	Used to set the PSO receiver 1 threshold.	No
RX1PickupDelay	2	0-30	Used to set the PSO receiver 1 pickup delay.	No
RX1CodeAValid	Valid	Invalid, Valid	Used to indicate whether code A is a valid code for this PSO receiver.	Yes
RX1CodeADrop Delay	0	0-99	Used to set the drop delay applied when the PSO is currently receiving a code A and the track becomes occupied.	No
RX1CodeCValid	Valid	Invalid, Valid	Used to indicate whether code C is a valid code for this PSO receiver.	Yes
RX1CodeCDrop Delay	0	0-99	Used to set the drop delay applied when the PSO is currently receiving a code C and the track becomes occupied.	No
RX1CodeDValid	Valid	Invalid, Valid	Used to indicate whether code D is a valid code for this PSO receiver.	Yes
RX1CodeDDrop Delay	0	0-99	Used to set the drop delay applied when the PSO is currently receiving a code D and the track becomes occupied.	No
RX1CodeEValid	Valid	Invalid, Valid	Used to indicate whether code E is a valid code for this PSO receiver.	Yes

Parameter	Default	Range	Comments	UCN
RX1CodeEDrop Delay	0	0-99	Used to set the drop delay applied when the PSO is currently receiving a code E and the track becomes occupied.	No
RX1CodeFValid	Valid	Invalid, Valid	Used to indicate whether code F is a valid code for this PSO receiver.	Yes
RX1CodeFDrop Delay	0	0-99	Used to set the drop delay applied when the PSO is currently receiving a code F and the track becomes occupied.	No
RX2Used	RX_Internal	RX_NotUsed RX_Internal	Used to indicate whether the PSO receiver 2 is used or not.	Yes
RX2Freq	Not_Set	Not_Set F_156 to F_20200	Used to set the PSO receiver 2 frequency. Frequencies are listed as standard frequencies, followed by alternate frequencies.	No
RX2Threshold	100	100-9999	Used to set the PSO receiver 2 threshold.	No
RX2PickupDelay	2	0-30	Used to set the PSO receiver 2 pickup delay.	No
RX2CodeAValid	Valid	Invalid, Valid	Used to indicate whether code A is a valid code for this PSO receiver.	Yes
RX2CodeADrop Delay	0	0-99	Used to set the drop delay applied when the PSO is currently receiving a code A and the track becomes occupied.	No
RX2CodeCValid	Valid	Invalid, Valid	Used to indicate whether code C is a valid code for this PSO receiver.	Yes

Parameter	Default	Range	Comments	UCN
RX2CodeCDrop Delay	0	0-99	Used to set the drop delay applied when the PSO is currently receiving a code C and the track becomes occupied.	No
RX2CodeDValid	Valid	Invalid, Valid	Used to indicate whether code D is a valid code for this PSO receiver.	Yes
RX2CodeDDrop Delay	0	0-99	Used to set the drop delay applied when the PSO is currently receiving a code D and the track becomes occupied.	No
RX2CodeEValid	Valid	Invalid, Valid	Used to indicate whether code E is a valid code for this PSO receiver.	Yes
RX2CodeEDrop Delay	0	0-99	Used to set the drop delay applied when the PSO is currently receiving a code E and the track becomes occupied.	No
RX2CodeFValid	Valid	Invalid, Valid	Used to indicate whether code F is a valid code for this PSO receiver.	Yes
RX2CodeFDrop Delay	0	0-99	Used to set the drop delay applied when the PSO is currently receiving a code F and the track becomes occupied.	No
BVPIDebounce	Debounce_ 100 ms	50, 100, 150, 200, and 250 ms	Used to set the debounce on the VPIs on the module.	No

3.9.2 PSO Tab

The options that are enabled with the PSO tab depend on whether the PSO transmitter is enabled and which PSO receivers are enabled.



	Tx Mode	Island	Transmitter	Rx Mode	PSO 1 Receiver	PSO 2 Receiver
Channel Name		SI4isl			SI4rx1	SI4rx2
Code A	Out			In	rx1A	rx2A
Code C	Out			In	rx1C	rx2C
Code D	Out			In	rx1D	rx2D
Code E	Out			In	rx1E	rx2E
Code F	Out			In	rx1F	rx2F
Health	In	ihlth		In	rx1Hlth	rx2Occ
Occupancy	In	iocc		In	rx1occ	rx2occ
Occupancy with Pickup	In	ioccp		In	rx1occp	rx2occp
Cal Reqd	In	ical		In	rx1cal	rx2cal
Enable	Out	ien		Out	rx1en	rx2en
Transmitting	In					

Figure 3-45 PSO Tab with Transmitter and Receiver 1 Enabled

For the transmitter, the PSO tab allows the user to:

- set the names of states that enable the code to be transmitted. Only one of the codes A,C,D,E,F can be set at one time. If multiple bits are set, the PSO transmitter will transmit no code.
- set the name for the transmitter **Health** state. This is true when the transmitter is healthy.

The transmitting bit indicates whether the transmitter is currently commanded to transmit a code or not.

For the receiver, the PSO tab allows the user to:

- set the names of the variables that are set that represent whether the PSO received a specific code (A,C,D,E,F). The PSO will only be able to receive a specific code if the associated Rx code 'X' Valid is set to valid. These are set to true when the specific code is received.
- set the name for the receiver **Health** state. This is true when the receiver is healthy.
- set names for the **Occupancy** and **Occupancy with Pickup** states. The **Occupancy** state represents whether the PSO receiver has seen the signal above threshold and valid code for approximately 300 ms. The **Occupancy with Pickup** is set to true once the receiver has seen the signal above threshold and a valid code continuously for longer than the configured pickup delay. There are four combinations of these states that represent the following conditions:

Table 3-9 PSO Receiver States

PSO Receiver State	**Receiver Bits**	
	Occupancy	**Occupancy with Pickup**
Occupied	False	False
Running Pickup Delay	True	False
Running Drop Delay	False	True
Unoccupied	True	True

- set the names of the variables that are set using the **Cal Reqd** state. These will represent whether the PSO receiver requires calibration. Refer to the following note regarding the **Health** state and the **Cal Reqd** state.

NOTE

NOTE

The **Health** state and the **Cal Reqd** state are independent of each other. The **Health** state is not set to false when the **Cal Reqd** bit is set.

- set the name for the receiver **Enable** state. This state can be tied to an input of logic that can be used to cause the PSO to report occupied. If this is not required, it MUST be set to true, otherwise the PSO receiver will report occupied.

NOTE

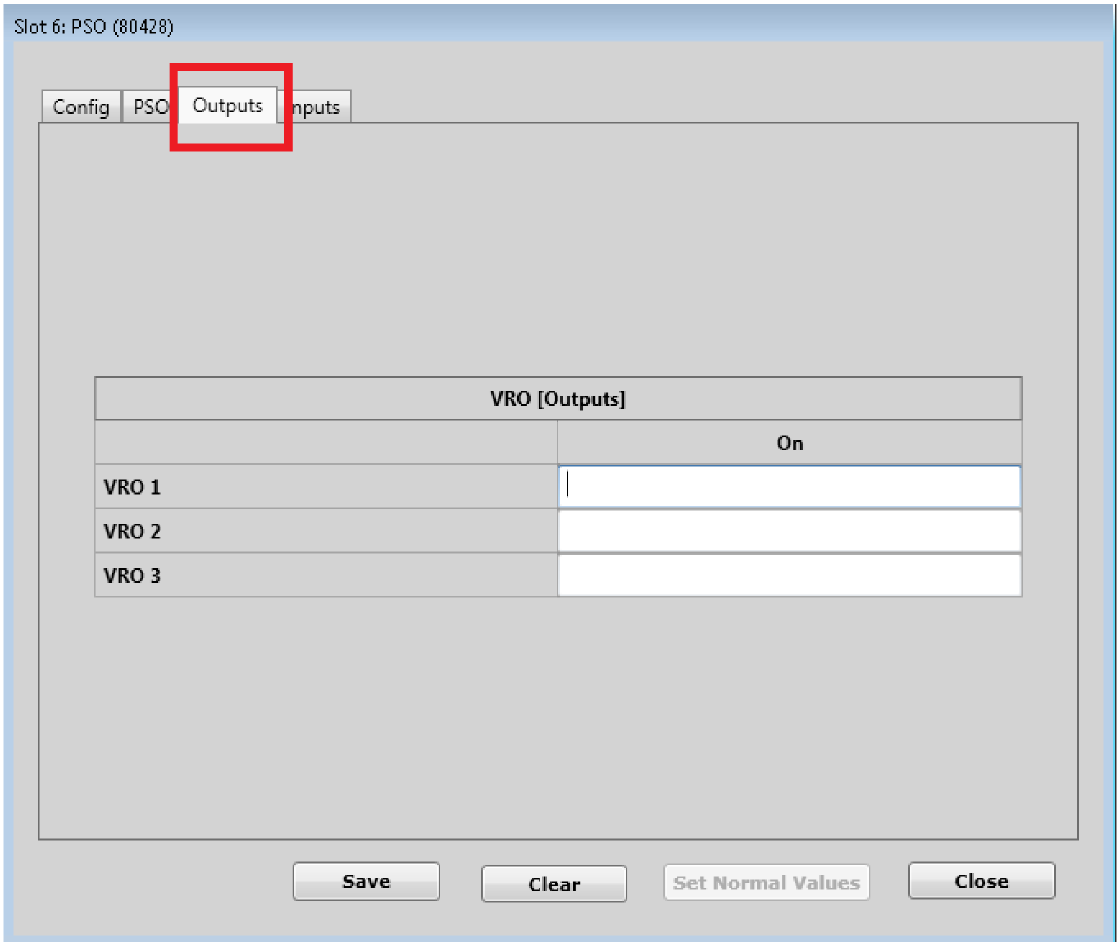
NOTE

The receiver 'n' **Enable 'Out'** state must be set to true by the application logic to enable receiver 'n'.

The island column is not available in release version 1.8.1.7.

3.9.3 Outputs Tab

The Outputs tab allows the user to set logic state names for the three VROs on the module.

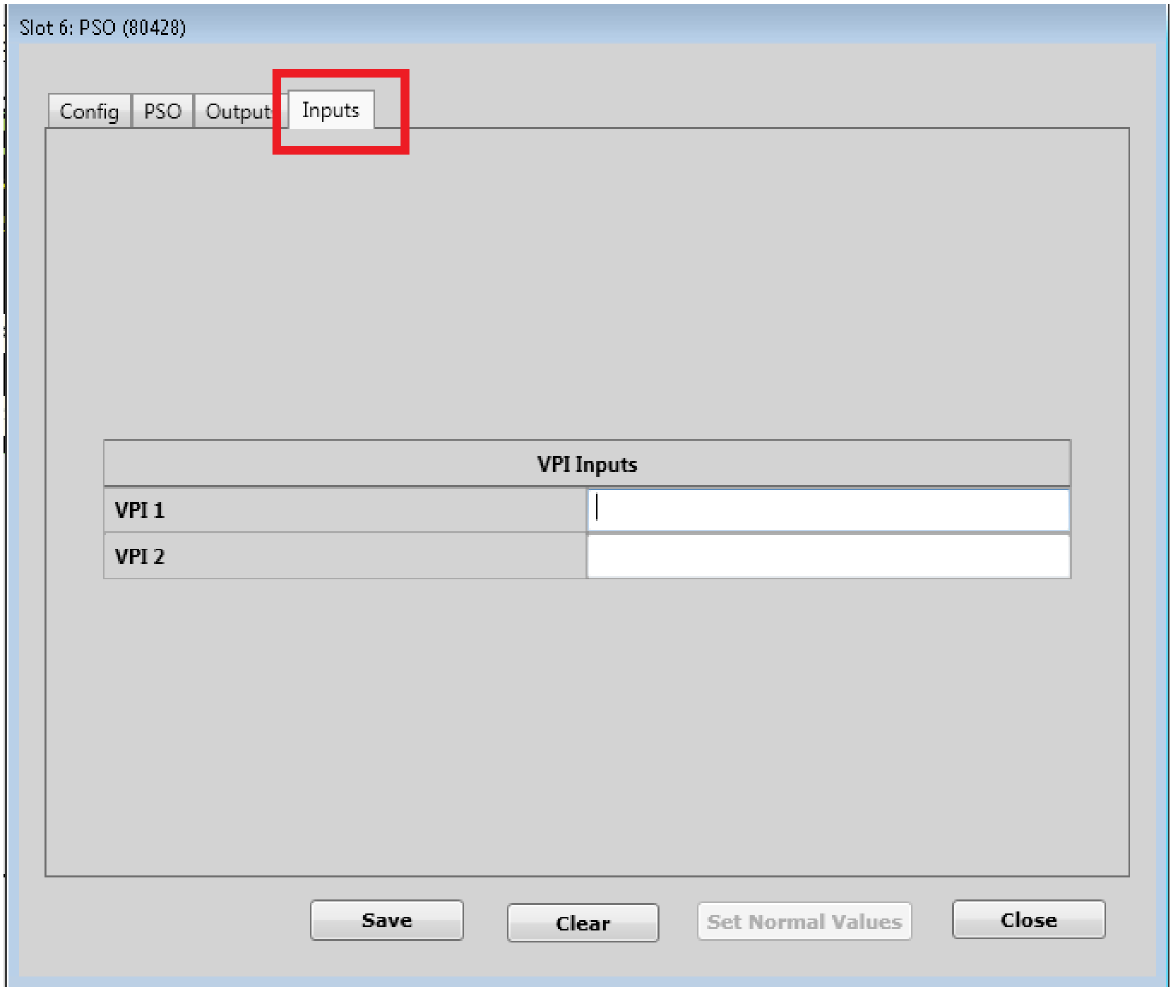


VRO [Outputs]	
	On
VRO 1	
VRO 2	
VRO 3	

Figure 3-46 PSO VRO Outputs

3.9.4 Inputs Tab

The Inputs tab allows the user to set logic state names for the two VPIs on the module. Under failure, the VPI will always report de-energized.



VPI Inputs	
VPI 1	
VPI 2	

Figure 3-47 PSO VPI Inputs

3.10 BVPI8 MODULE EDITOR

The BVPI8 Module Editor has three tabs:

- Config
- Outputs
- Inputs.

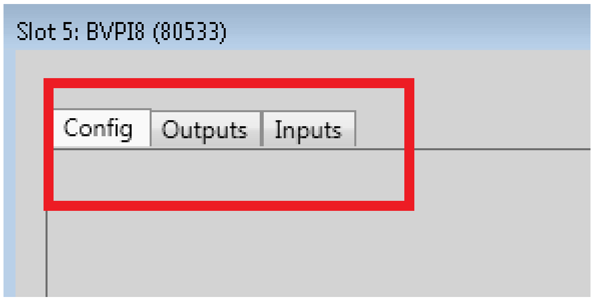
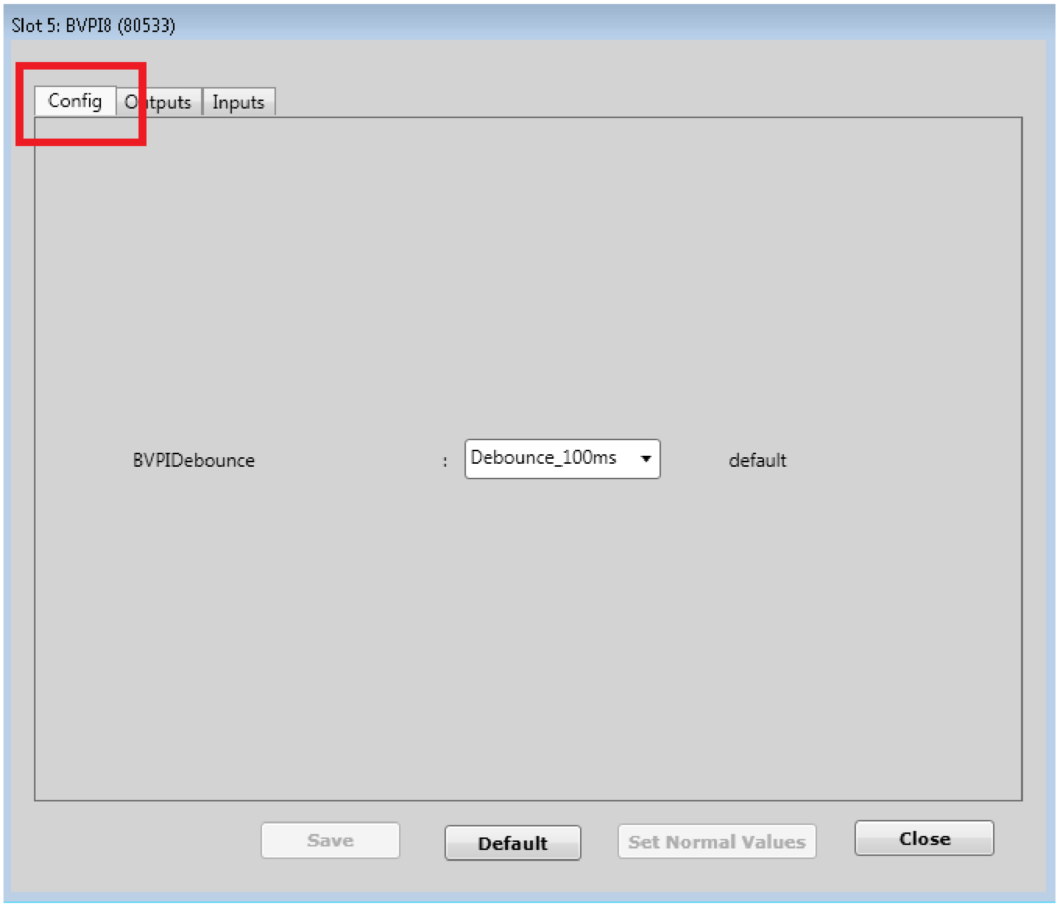


Figure 3-48 BVPI8 Editor Tab

Each of the BVPI8 Module Editor tabs is described in the following sub-sections.

3.10.1 Config Tab

The Config tab allows the user to set the VPI debounce for the inputs.



BVPIDebounce : Debounce_100ms default

Figure 3-49 BVPI8 Configuration Parameter

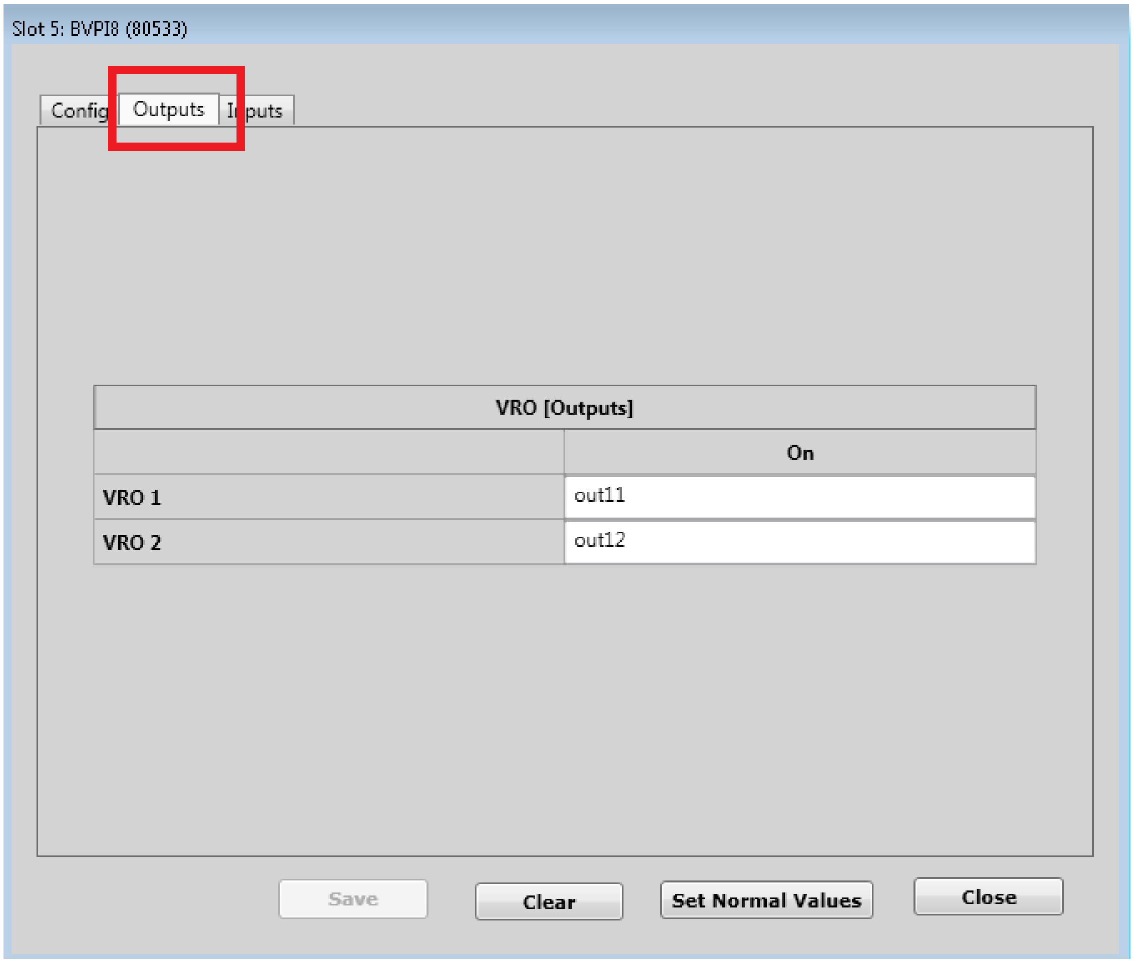
The following table describes the BVPI8 configuration parameters.

Table 3-10 BVPI8 Configuration Parameter

Parameter	Default	Range	Comments	UCN
BVPIDebounce	100 ms	50, 100, 150, 200, 250 ms	This is used to set the debounce on the inputs	No

3.10.2 Outputs Tab

The Outputs tab allows the user to set logic state names for the two VROs on the module.



VRO [Outputs]	
	On
VRO 1	out11
VRO 2	out12

Figure 3-50 BVPI8 VRO Outputs

3.10.3 Inputs Tab

The Inputs tab allows the user to set logic states names for the eight Bipolar VPIs on the module.

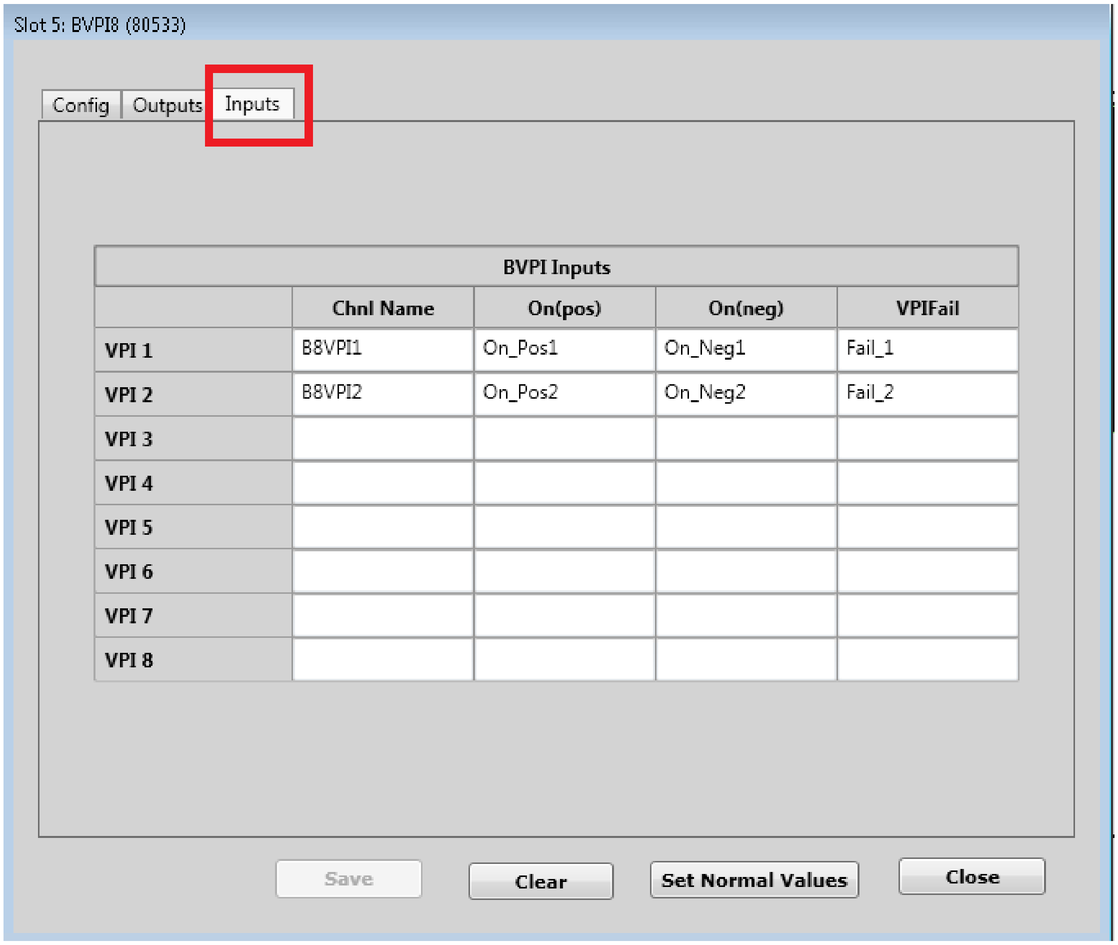
The On (pos) is the state set when the input has a positive voltage applied, and the On (neg) is the state set when the input has a negative voltage applied.

NOTE

NOTE

Under failure the VPI will always report de-energized and the Fail bit will be set.

The health state defaults to true when the module is not in session.



BVPI Inputs				
	Chnl Name	On(pos)	On(neg)	VPIFail
VPI 1	B8VPI1	On_Pos1	On_Neg1	Fail_1
VPI 2	B8VPI2	On_Pos2	On_Neg2	Fail_2
VPI 3				
VPI 4				
VPI 5				
VPI 6				
VPI 7				
VPI 8				

Figure 3-51 BVPI8 VPI Inputs

3.11 BVPI10 MODULE EDITOR

The BVPI8 Module Editor has two tabs:

- Config
- Inputs

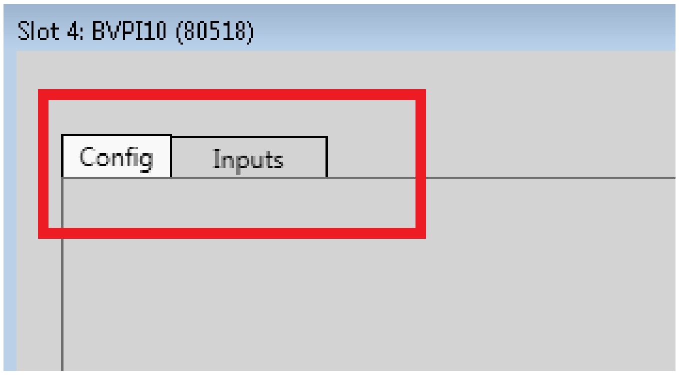
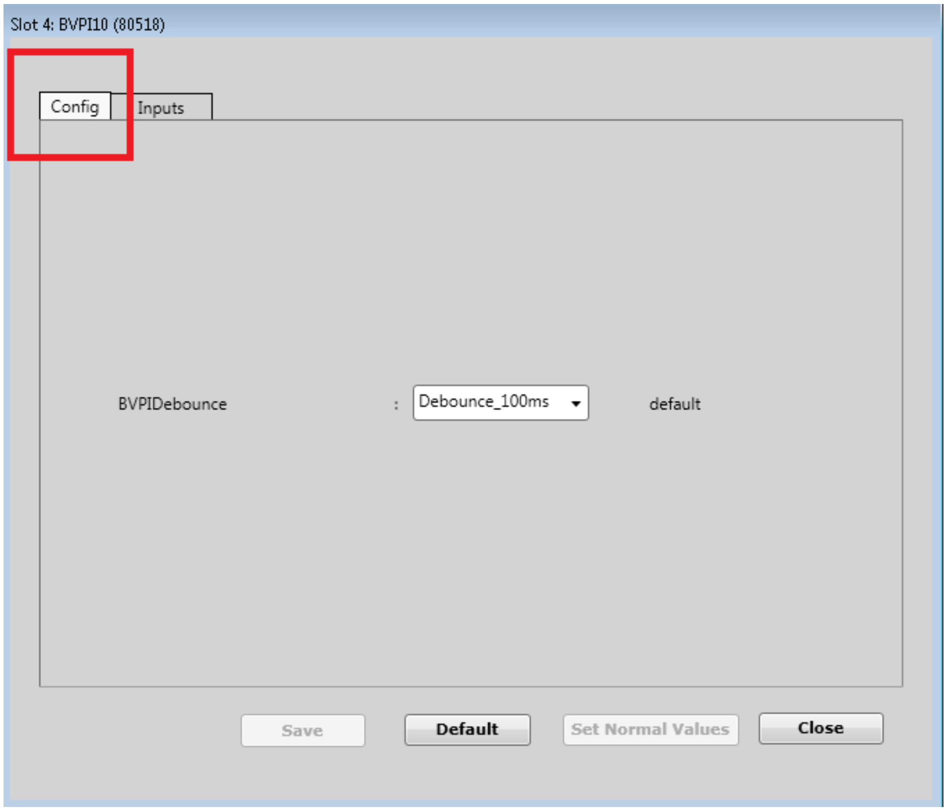


Figure 3-52 BVPI10 Editor Tab

Each of the BVPI10 Module Editor tabs is described in the following sub-sections.

3.11.1 Config Tab

The Config tab allows the user to set the VPI debounce for the inputs.



BVPIDebounce : Debounce_100ms default

Figure 3-53 BVPI10 Configuration Parameters

The following table describes the BVPI10 configuration parameters.

Table 3-11 BVPI10 Configuration Parameter

Parameter	Default	Range	Comment	UCN
BVPIDebounce	100 ms	100, 150, 200, 250 ms	This is used to set the debounce on the inputs.	No

3.11.2 Inputs Tab

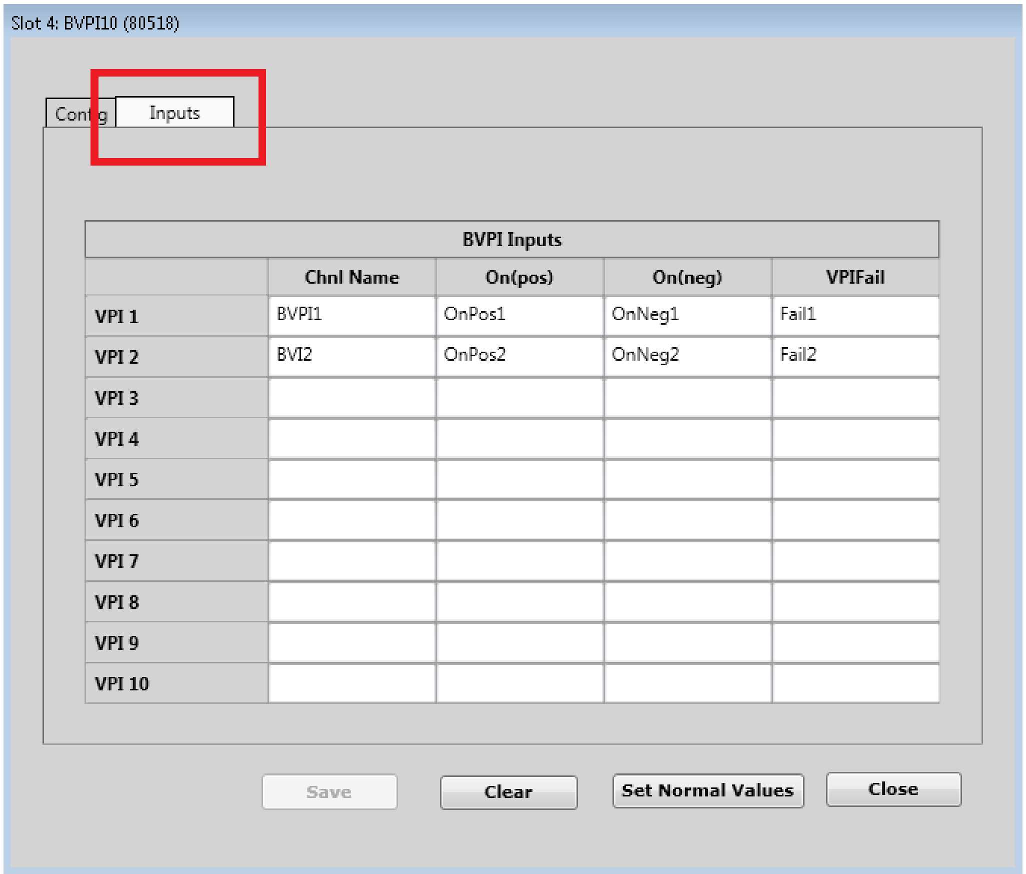
The Inputs tab allows the user to set logic states names for the 10 Bipolar VPIs on the module.

The On (pos) is the state set when the input has a positive voltage applied, and the On (neg) is the state set when the input has a negative voltage applied.

NOTE

NOTE

Under failure, the VPI will always report de-energized and a Fail bit will be set. The health state defaults to true when the module is not in session.



Slot 4: BVPI10 (80518)

BVPI Inputs

	Chnl Name	On(pos)	On(neg)	VPIFail
VPI 1	BVPI1	OnPos1	OnNeg1	Fail1
VPI 2	BVI2	OnPos2	OnNeg2	Fail2
VPI 3				
VPI 4				
VPI 5				
VPI 6				
VPI 7				
VPI 8				
VPI 9				
VPI 10				

Figure 3-54 BVPI10 VPI Inputs

3.12 LOGIC DATA EDITOR

To enter the Logic Data Editor, either select the **Logic Data** icon, or from **Edit>Logic Data** or use the shortcut **Ctrl L**. The Editor will open at the Boolean Variables window.

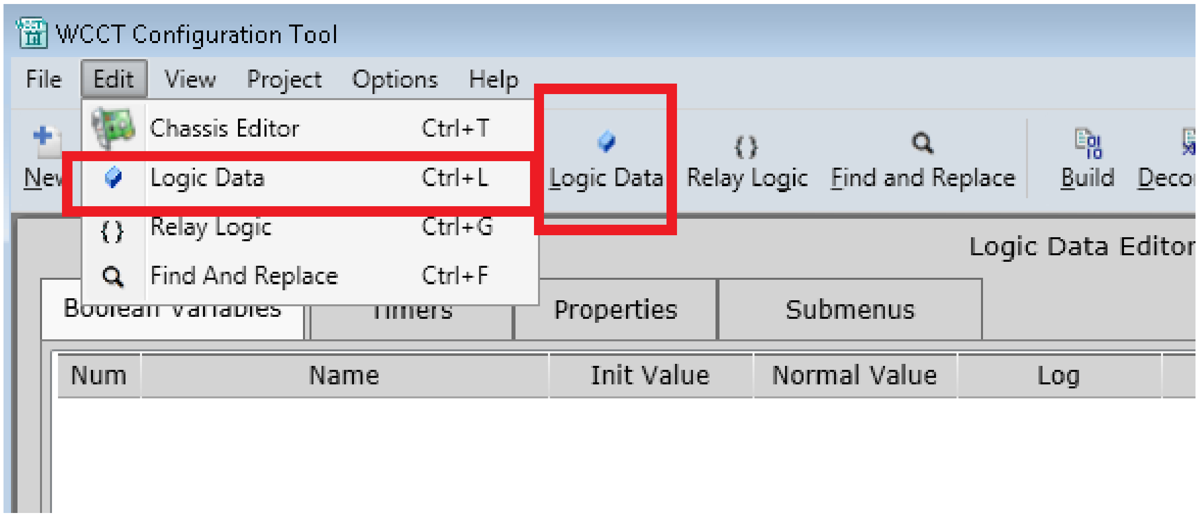


Figure 3-55 Selecting Logic Data Editor

3.12.1 Boolean Variables Editor

This editor is used to enter Boolean variables that are internal to the logic, i.e. they are not outputs or inputs. A logic equation should be written to set the state of each Boolean variable and in general, logic equations are written read the state of the variable. The only exception to this would be if the state was used for logging purposes only, in which case it would be set but not read.

Use the **Add** button to add new states to the end of the list.

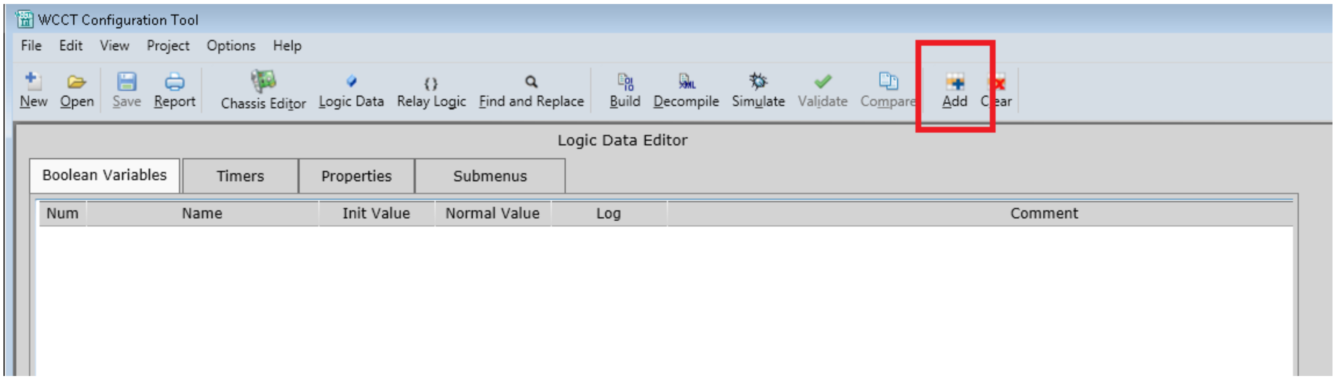


Figure 3-56 Boolean Variables Editor

Right-click on the Num column of an existing state and use **Insert Before** or **Insert After** to insert a new state in the middle of the list.

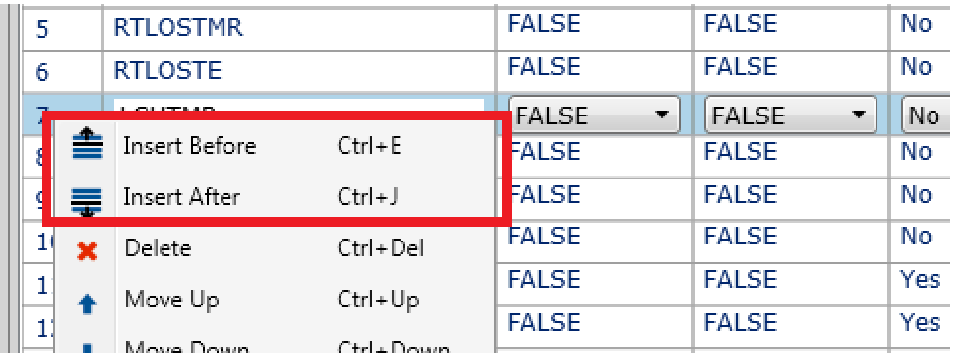


Figure 3-57 Insert Menu

For each variable enter:

- the variable name,
- the initial value (default is false),
- the normal value which is the state of the contact/coil shown in the relay logic,
- whether the variable should be logged on change of state in the CPU log,
- a comment can be added if necessary next to each variable, multi-line comments are allowed.

NOTE

NOTE

a) The name can be up to 16 characters long, and contain only upper and lower case letters, number and '_"
b) The name must contain a letter or '_', it cannot be all numbers
c) The name cannot be a duplicate of a logic state name entered anywhere else, i.e. I/O module editors, CPU editors, Logic Data Editor,
d) Though upper and lower case names can be entered, the duplicate checking is not case sensitive, so the name Input1 is treated as a duplicate of INPUT1 and input1.

To rearrange the list of variables, right-click in the **Num** column and use the **Move up**, **Move Down**, **Cut**, **Paste**, or **Delete** menus shown in the following figure. The short cuts for these actions are also shown in the following figure.

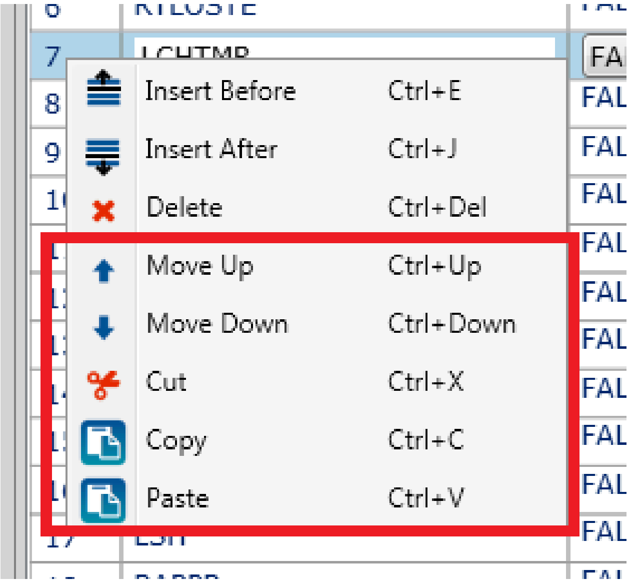


Figure 3-58 Rearrange Variables Menu

An easy way to add similarly named variables is to use Copy/Paste using short cuts **Ctrl C** and **Ctrl V** and edit the copied values to the correct values.

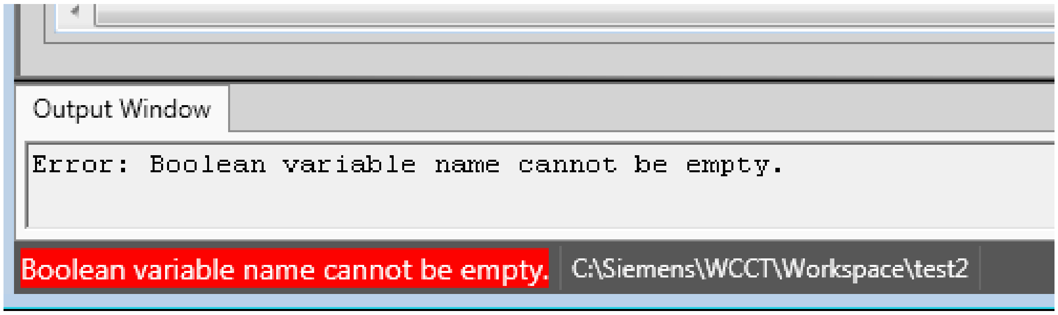
The WCCT allows up to 3000 variables. The names can be up to 16 characters long. If a VLP3 is used, up to 300 variables can be marked as being logged.

NOTE

NOTE

Currently, the WCCT allows the user to set more than the allowed number of variables as logged in the Logic Data Editor; however, the limit error is detected when the project is parsed.

Each name has to be filled in, otherwise, an error message is shown when attempting to save. Right-click and use **Delete** to delete an empty row that is not required.

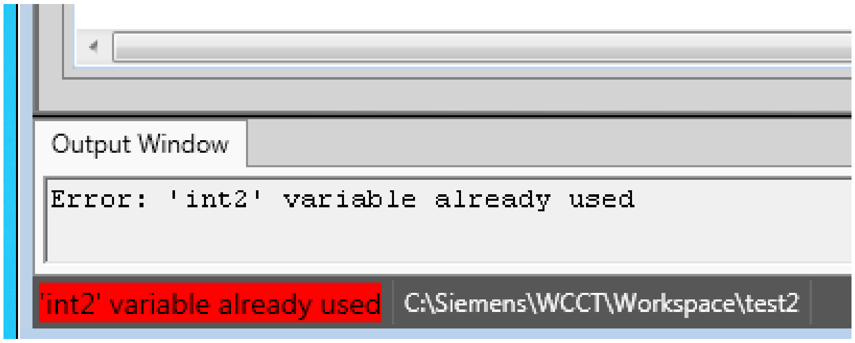


```
Error: Boolean variable name cannot be empty.
```

Boolean variable name cannot be empty. C:\Siemens\WCCT\Workspace\test2

Figure 3-59 Deleting Rows

The names have to be unique, or the WCCT will give an error.



```
Error: 'int2' variable already used
```

'int2' variable already used C:\Siemens\WCCT\Workspace\test2

Figure 3-60 Duplicate Variable Error Message

To delete a variable, select the variable to be deleted and then right-click in the Num column and select **Delete.**

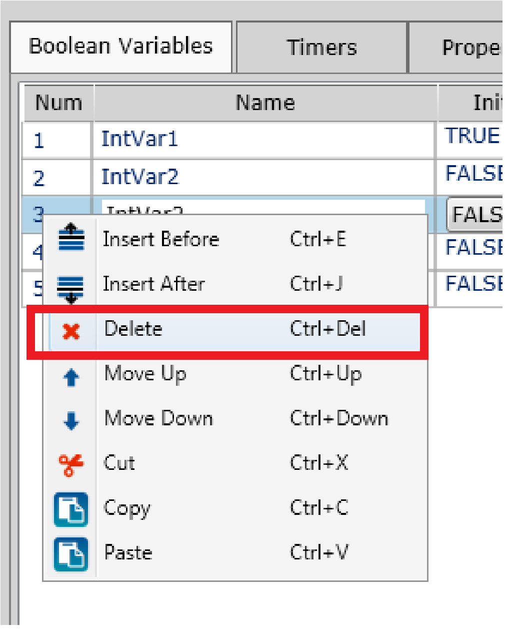


Figure 3-61 Delete Variable

To change the order of the internal variables, right-click in the Num column of the variable and select **Move Up**, **Move Down**, **Cut**, or **Paste** as required.

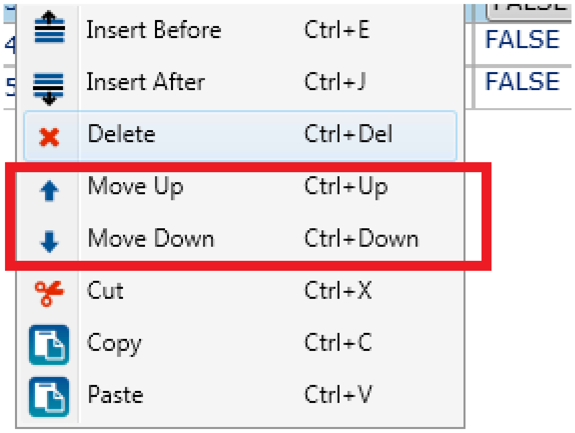


Figure 3-62 Change Variable Order Menu

To Clear all the variable names, select the Clear icon.

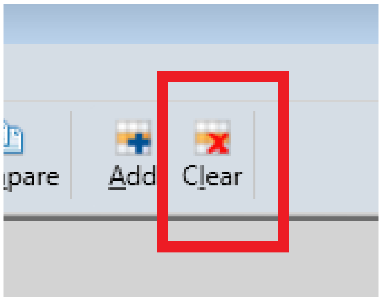
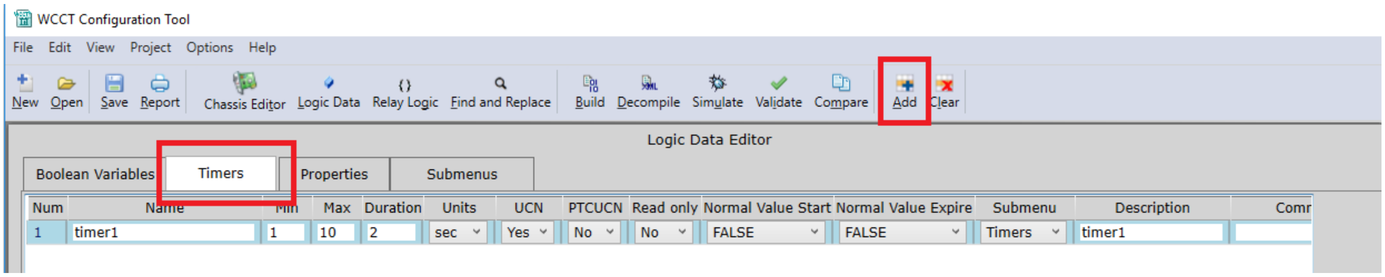


Figure 3-63 Clearing Logic Data Menu

To find a specific variable or to do a string replace, select the **Find/Replace** function. See Find and Replace section for details.

3.12.2 Timers Editor

Select the Timers tab and press **Add** to add new timers.


WCCT Configuration Tool
File Edit View Project Options Help
New Open Save Report Chassis Editor Logic Data Relay Logic Find and Replace Build Decompile Simulate Validate Compare Add Clear
Logic Data Editor
Boolean Variables
Timers
Properties
Submenus

Num	Name	Min	Max	Duration	Units	UCN	PTCUCN	Read only	Normal Value Start	Normal Value Expire	Submenu	Description	Comr
1	timer1	1	10	2	sec	Yes	No	No	FALSE	FALSE	Timers	timer1	

Figure 3-64 Timers Editor

For each timer, enter:

- Name – to be used in the logic equations. The name can include upper and lower case letters and numbers, and '_' is allowed. The maximum length is 20 characters. It must not start with a number.
- Min/Max – minimum and maximum timer values.
- Duration in seconds or milliseconds (depending on units).
- Units –select either seconds or milliseconds. If milliseconds is selected as the units, the timer duration and range have to be entered in 100 ms increments. The maximum values of timers are 3600 s, 3600 ms.
- Select whether the timer value is included in the UCN calculation or not.
- Select whether timer value is included in the PTC UCN calculation or not.
- If it is required to change the timer value in the field, set **Read Only** to **No**.
- Set **Normal Value Start** to set the state of the timer coil displayed in the relay logic.
- Use **Normal Value Expire** to set the state of the timer contact displayed in the relay logic.
- Use the submenu field to select which menu the timer is displayed on when the user views the configuration menus with the Web UI when connected to the CPU. The menu will default to **Timers**.
- Enter a description for the timer. The description is the name the timer will have in the user interface menus. A description is required. If left blank, pressing **Save** will automatically set the description to the timer name. The maximum length of the description is 40 characters and it can have upper and lower case letters, numbers, spaces, and most standard punctuation (, . ; etc.). '_' is allowed.
- A comment can be added for each timer if required. The comment is optional.

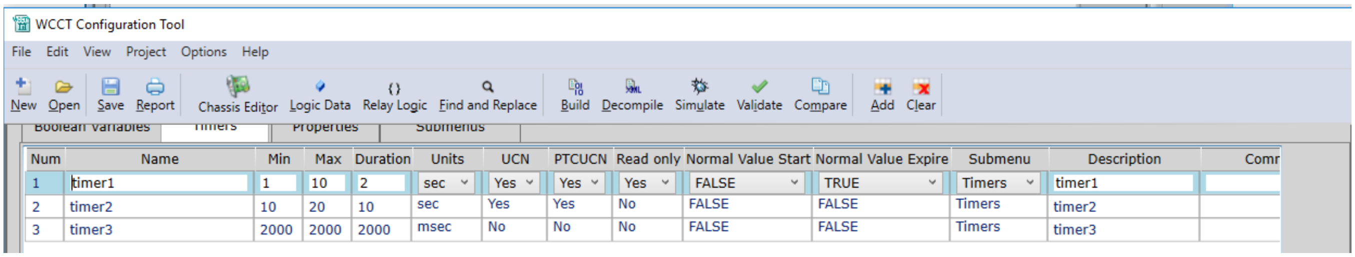
⚠ WARNING

WARNING

TIMERS WHOSE INCORRECT SETTING COULD CAUSE A SAFETY ISSUE MUST BE INCLUDED IN THE UCN TO PREVENT UNAUTHORIZED CHANGES.

The OCE (for WayConneX) will be used to define the timer and property settings for a particular installation of an MCF and obtain the required UCN.

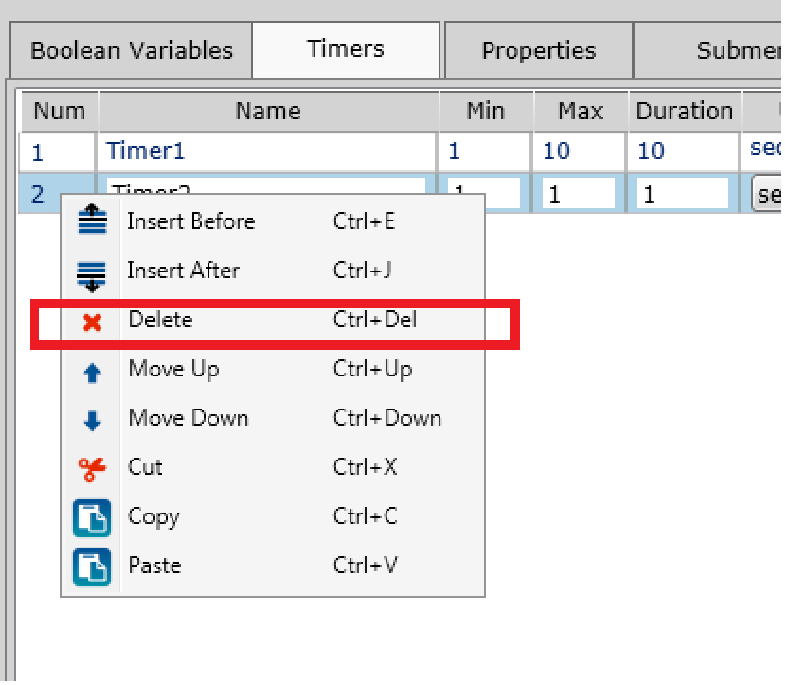
The VLP3 used in WayConneX supports up to 120 timers .



Num	Name	Min	Max	Duration	Units	UCN	PTCUCN	Read only	Normal Value Start	Normal Value Expire	Submenu	Description	Comr
1	timer1	1	10	2	sec	Yes	Yes	Yes	FALSE	TRUE	Timers	timer1	
2	timer2	10	20	10	sec	Yes	Yes	No	FALSE	FALSE	Timers	timer2	
3	timer3	2000	2000	2000	msec	No	No	No	FALSE	FALSE	Timers	timer3	

Figure 3-65 Timer Configuration

To change the order of the timers listed, right-click on the Num column and use the **Move Up**, **Move Down**, **Cut** and **Paste** options. To add a new timer at a specific place in the timer list, use the **Insert Before** or **Insert After** options. To delete a timer, use the **Delete** option from this menu.



Num	Name	Min	Max	Duration	
1	Timer1	1	10	10	se
2	Timer2	1	1	1	se

Figure 3-66 Delete Timer

An easy way to add a similarly named timer is to use the Copy/Paste options (**Ctrl C** and **Ctrl V**) and then edit the copied timer to the correct values. All configurable timers will appear on one menu screen along with properties, unless otherwise specified. See Submenu Section 3.13 for details on how to create submenus.

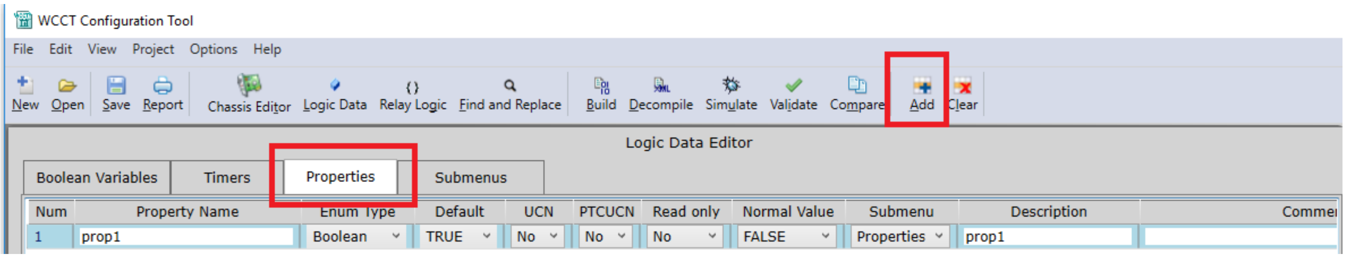
NOTE

NOTE

The CPU III supports a maximum of 25 configurable items per page. If there are more than 25 configurable timers, create submenus with 25 or less items per page.

3.12.3 Properties Editor

To create an application that can be used in multiple field sites, it may require different field configurable settings to tailor the logic to that specific site. To create field configurable properties, select the **Properties** tab on the logic data editor. Click the **Add** button to enter new properties.



Num	Property Name	Enum Type	Default	UCN	PTCUCN	Read only	Normal Value	Submenu	Description	Commen
1	prop1	Boolean	TRUE	No	No	No	FALSE	Properties	prop1	

Figure 3-67 Properties Editor

For each property:

- Enter the property name – this is what will be used in the logic to reference the state of this property in the logic. The name is up to 40 characters, upper or lower case letters, numbers or underscores (_).
- The enum type will default to Boolean which is currently the only supported type.
- Select the required default value of the property from the drop-down menu, the default value is true.
- Select whether the property value is included in the UCN calculation or not.
- Select whether the property value is included in the PTC UCN calculation or not.
- Set **Normal Value** to indicate how the Property relay contact will be displayed in the relay logic.
- Set the **Read Only** column to **Yes** to prevent the property value being changed in the field.
- Use the submenu field to select which menu the Property is displayed on when the user views the configuration menus with the Web UI when connected to the CPU. The menu will default to **Properties**.
- Enter a description for the property. The description is the name the property will have in the user interface menus. A description is required. If the user leaves the description blank when they press **Save**, the WCCT will automatically set the description to the property name. The name is up to 40 characters and can have: upper and lower case letters, numbers, spaces, most standard punctuation (, . ; etc.), and underscores (_). Max length 40 characters.
- A comment can be added for each property if required. The comment is optional.

⚠ WARNING

WARNING

PROPERTIES WHOSE INCORRECT SETTING COULD CAUSE A SAFETY ISSUE MUST BE INCLUDED IN THE UCN TO PREVENT UNAUTHORIZED CHANGES.

The OCE (for WayConneX) may be used to change the default timer and property values set in the MCF to configure them for a particular installation of an MCF and obtain the required UCN.

The WCCT supports up to 100 properties.

To change the order of the way the properties are listed, right-click on the Num column and use the **Move Up**, **Move Down**, **Cut** and **Paste** options. To add new properties at a specific place in the properties list, use the **Insert Before** or **Insert After** options. To delete a property, use the delete option from this menu. Short cuts are available for these operations as shown in the following figure.

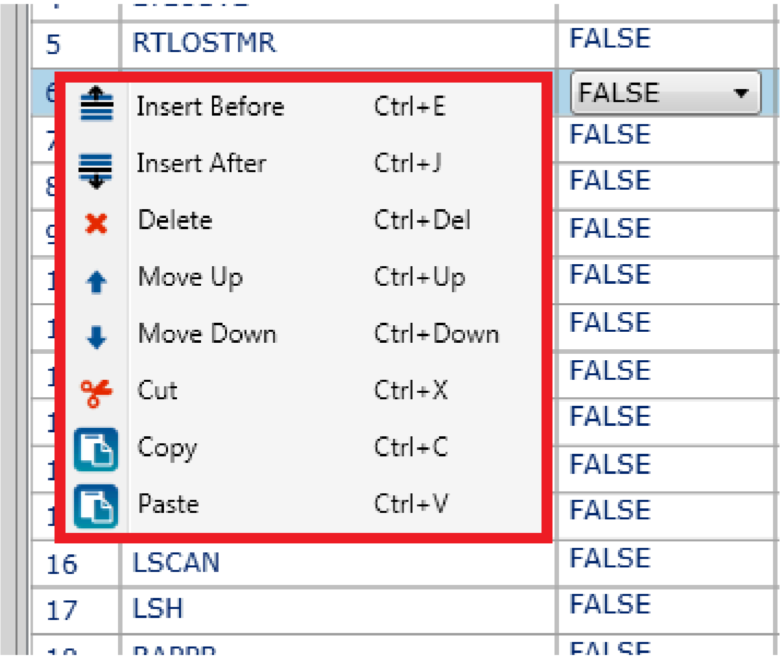


Figure 3-68   Change Order of Properties

An easy way to add a similarly named property is to use the Copy/Paste options (**Ctrl C** and **Ctrl V**) and then edit the copied properties to the correct values.

All properties will appear on the properties menu screen unless otherwise specified, see Section 3.13 for details on how to create submenus.

NOTE

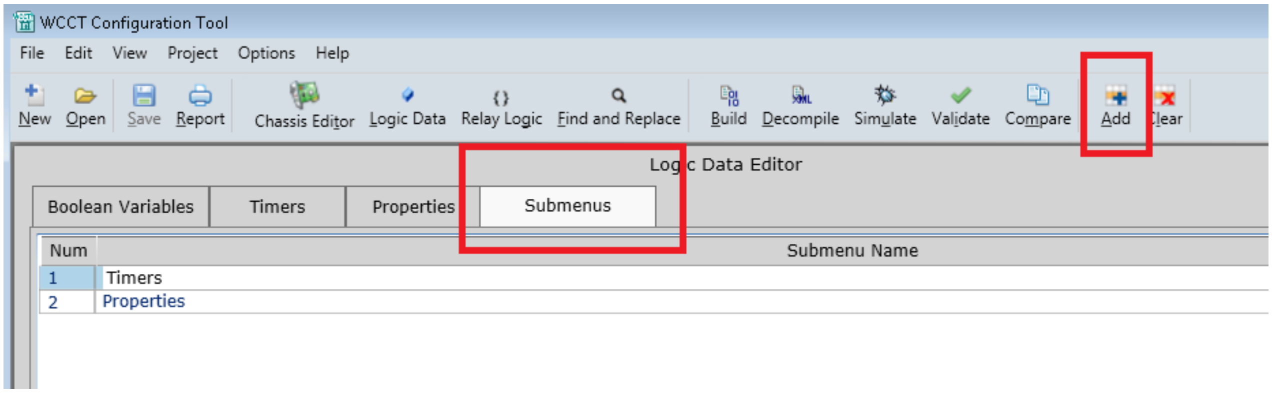
NOTE

The CPU III supports a maximum of 25 configurable items per page. If there are more than 25 configurable timers and properties in an application, the user must create submenus with 25 or less items per page.

3.13 CREATING SUBMENUS FOR CONFIGURABLE VALUES

By default the WCCT will put timers on a submenu called **Timers**, and properties on a submenu called **Properties**.

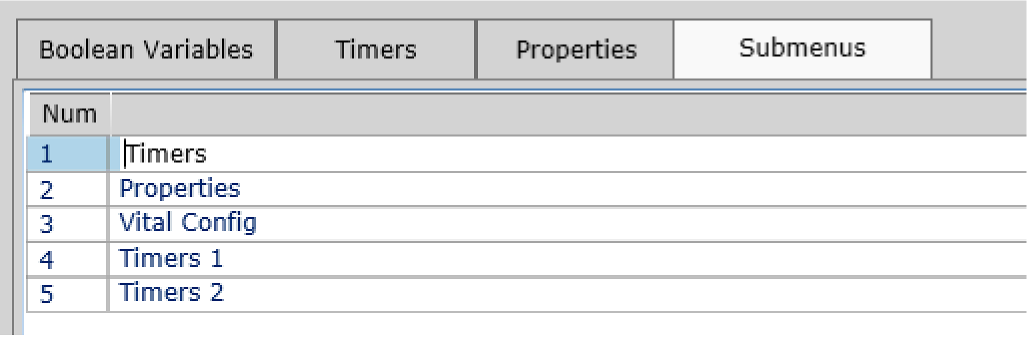
To create submenus for the properties, select the Submenu tab in the Logic Data Editor and use the **Add** icon to add new submenus.


WCCT Configuration Tool
File Edit View Project Options Help
New Open Save Report Chassis Editor Logic Data Relay Logic Find and Replace Build Decompile Simulate Validate Compare Add Clear
Logic Data Editor
Boolean Variables Timers Properties Submenu

Num	Submenu Name
1	Timers
2	Properties

Figure 3-69 Submenu Screen

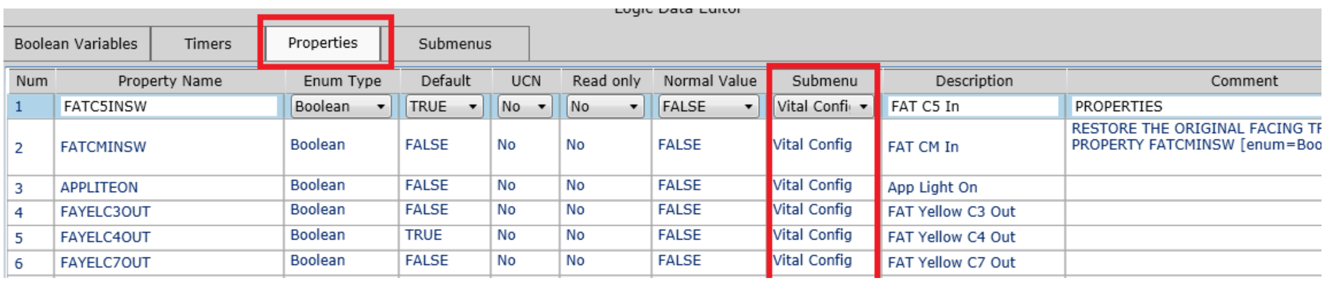
The Timers and Properties submenus are created by default and cannot be deleted or moved. New submenus can be added. The following example shows that three new submenus have been added to the submenu tab.



Num	
1	Timers
2	Properties
3	Vital Config
4	Timers 1
5	Timers 2

Figure 3-70 New Submenus

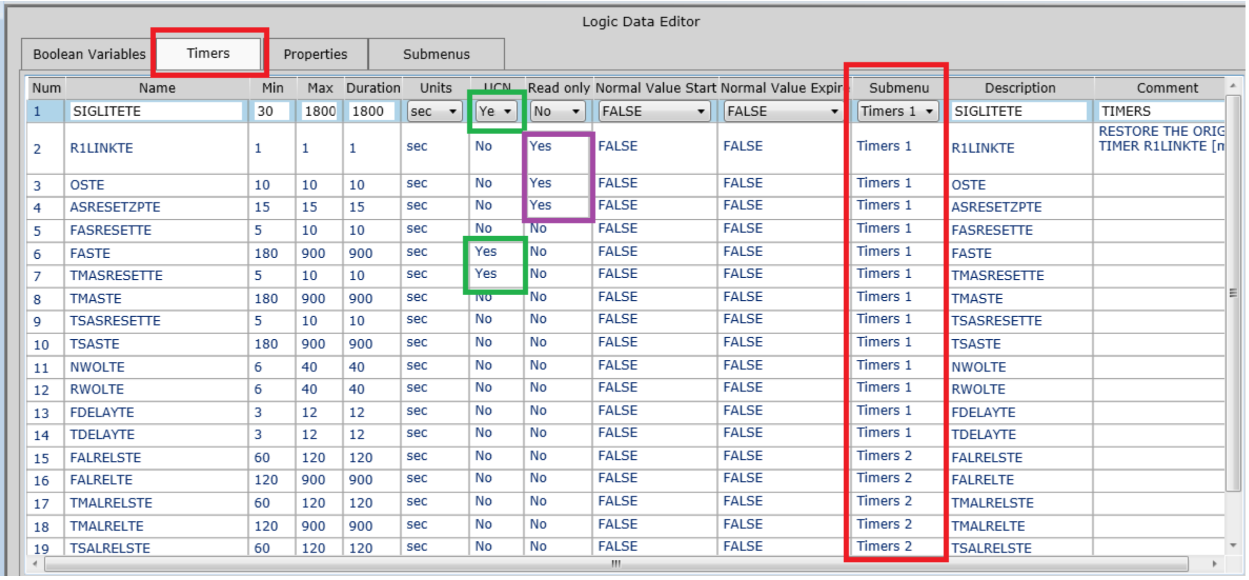
Once the submenus are created, go back to the Timer and Property tabs and assign the timers and properties to the new submenus as follows:



Num	Property Name	Enum Type	Default	UCN	Read only	Normal Value	Submenu	Description	Comment
1	FATC5INSW	Boolean	TRUE	No	No	FALSE	Vital Confi	FAT C5 In	PROPERTIES
2	FATCMINSW	Boolean	FALSE	No	No	FALSE	Vital Config	FAT CM In	RESTORE THE ORIGINAL FACING TF PROPERTY FATCMINSW [enum=Boo
3	APPLITEON	Boolean	FALSE	No	No	FALSE	Vital Config	App Light On	
4	FAYELC3OUT	Boolean	FALSE	No	No	FALSE	Vital Config	FAT Yellow C3 Out	
5	FAYELC4OUT	Boolean	TRUE	No	No	FALSE	Vital Config	FAT Yellow C4 Out	
6	FAYELC7OUT	Boolean	FALSE	No	No	FALSE	Vital Config	FAT Yellow C7 Out	

Figure 3-71 Assign Submenu on Property Page

In the following figure, some Logic Data timers have been assigned to the submenus Timer 1 and Timer 2. Some timers have been set as **Read Only** (purple box) and as **UCN protected** (green box).

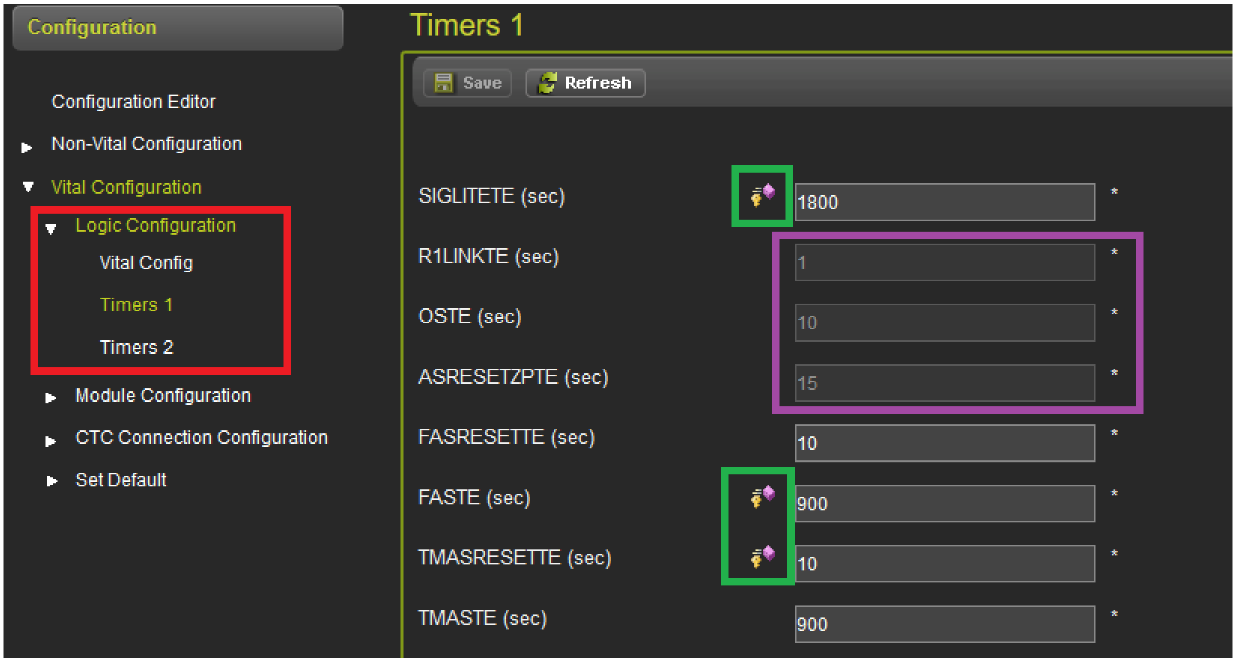


Num	Name	Min	Max	Duration	Units	UCN	Read only	Normal Value Start	Normal Value Expir	Submenu	Description	Comment
1	SIGLITETE	30	1800	1800	sec	Ye	No	FALSE	FALSE	Timers 1	SIGLITETE	TIMERS
2	R1LINKTE	1	1	1	sec	No	Yes	FALSE	FALSE	Timers 1	R1LINKTE	RESTORE THE ORIG TIMER R1LINKTE [n
3	OSTE	10	10	10	sec	No	Yes	FALSE	FALSE	Timers 1	OSTE	
4	ASRESETZPTE	15	15	15	sec	No	Yes	FALSE	FALSE	Timers 1	ASRESETZPTE	
5	FASRESETTE	5	10	10	sec	No	No	FALSE	FALSE	Timers 1	FASRESETTE	
6	FASTE	180	900	900	sec	Yes	No	FALSE	FALSE	Timers 1	FASTE	
7	TMASRESETTE	5	10	10	sec	Yes	No	FALSE	FALSE	Timers 1	TMASRESETTE	
8	TMASTE	180	900	900	sec	No	No	FALSE	FALSE	Timers 1	TMASTE	
9	TSASRESETTE	5	10	10	sec	No	No	FALSE	FALSE	Timers 1	TSASRESETTE	
10	TSASTE	180	900	900	sec	No	No	FALSE	FALSE	Timers 1	TSASTE	
11	NWOLTE	6	40	40	sec	No	No	FALSE	FALSE	Timers 1	NWOLTE	
12	RWOLTE	6	40	40	sec	No	No	FALSE	FALSE	Timers 1	RWOLTE	
13	FDELAYTE	3	12	12	sec	No	No	FALSE	FALSE	Timers 1	FDELAYTE	
14	TDELAYTE	3	12	12	sec	No	No	FALSE	FALSE	Timers 1	TDELAYTE	
15	FALRELSTE	60	120	120	sec	No	No	FALSE	FALSE	Timers 2	FALRELSTE	
16	FALRELTE	120	900	900	sec	No	No	FALSE	FALSE	Timers 2	FALRELTE	
17	TMALRELSTE	60	120	120	sec	No	No	FALSE	FALSE	Timers 2	TMALRELSTE	
18	TMALRELTE	120	900	900	sec	No	No	FALSE	FALSE	Timers 2	TMALRELTE	
19	TSALRELSTE	60	120	120	sec	No	No	FALSE	FALSE	Timers 2	TSALRELSTE	

Figure 3-72 Timers Assigned to New Submenus

This will result in the Web UI on the CPU III or OCE showing the new submenus under the Logic Configuration as shown in the red box in the following figure. The default Timer and Properties submenus are not shown under Logic Configuration as, in this case, they have no properties or timers associated with them.

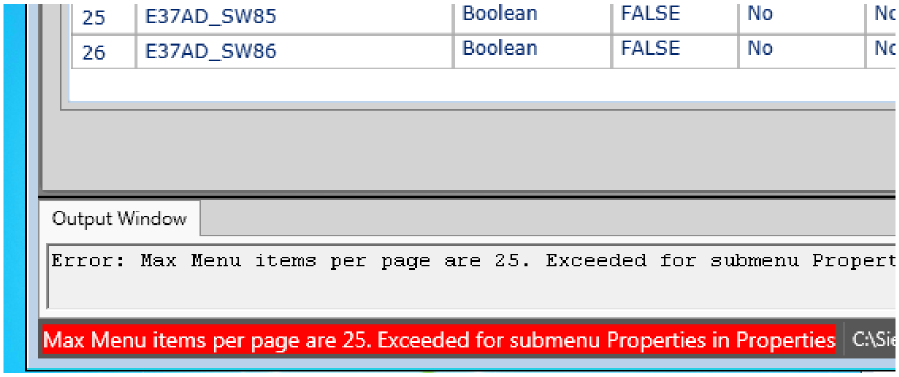
The figure also shows that the timers that have been marked **Read Only** in the WCCT (shown in the purple box) are greyed out in the Web UI to prevent them from being edited, and the timers that were marked as UCN in WCCT have the key symbol next to them (shown in green box).



SIGLITETE (sec)	1800	*
R1LINKTE (sec)	1	*
OSTE (sec)	10	*
ASRESETZPTE (sec)	15	*
FASRESETTE (sec)	10	*
FASTE (sec)	900	*
TMASRESETTE (sec)	10	*
TMASTE (sec)	900	*

Figure 3-73 Web UI Display Example – Submenus

Due to limits on the number of parameters allowed on one screen, submenus will need to be created if the CPU III application has more than 25 items on a page. If the limit is exceeded, the WCCT displays an error message such as the one shown in the following figure.



25	E37AD_SW85	Boolean	FALSE	No	Nc
26	E37AD_SW86	Boolean	FALSE	No	Nc

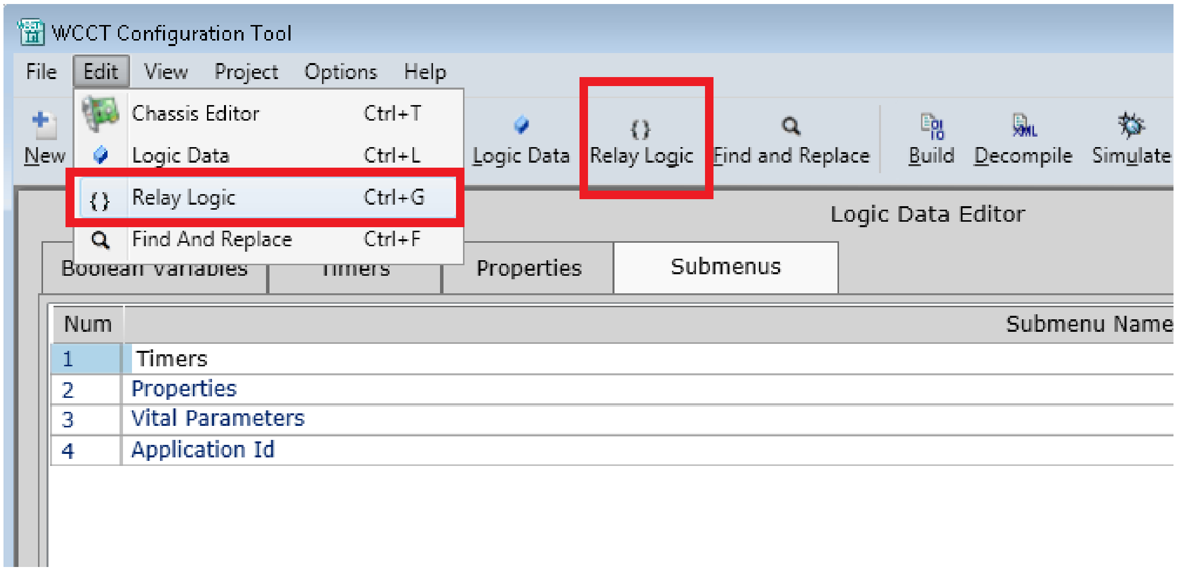
```
Error: Max Menu items per page are 25. Exceeded for submenu Propert
```

Max Menu items per page are 25. Exceeded for submenu Properties in Properties C:\Si

Figure 3-74 Items on a Page Error Message

3.14 RELAY LOGIC EDITOR

To open the Relay Logic Editor, select the Relay Logic icon from the tool bar, or **Edit>Relay Logic** from the menus, or use the **Ctrl G** shortcut.



Num	Submenu Name
1	Timers
2	Properties
3	Vital Parameters
4	Application Id

Figure 3-75 Selecting Relay Logic Editor

When there are no equations in a project, the Relay Logic Editor will appear as illustrated in the following figure.

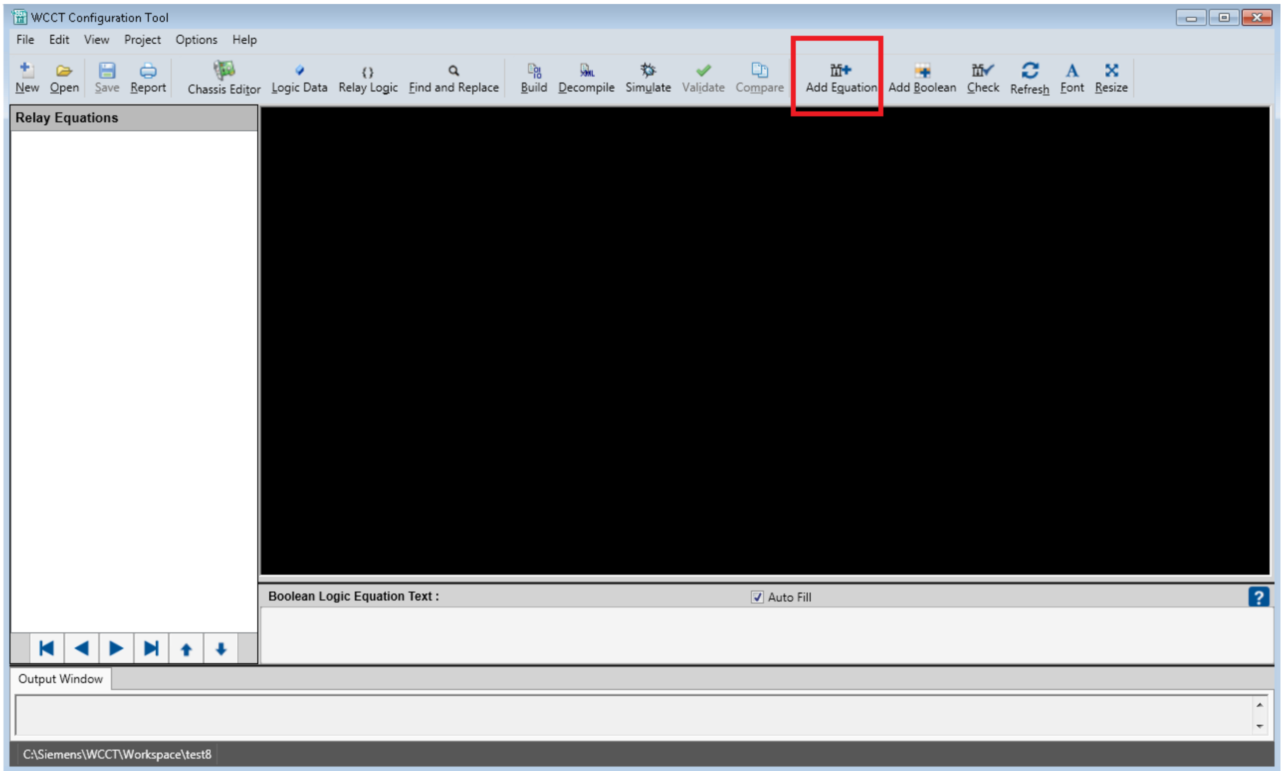
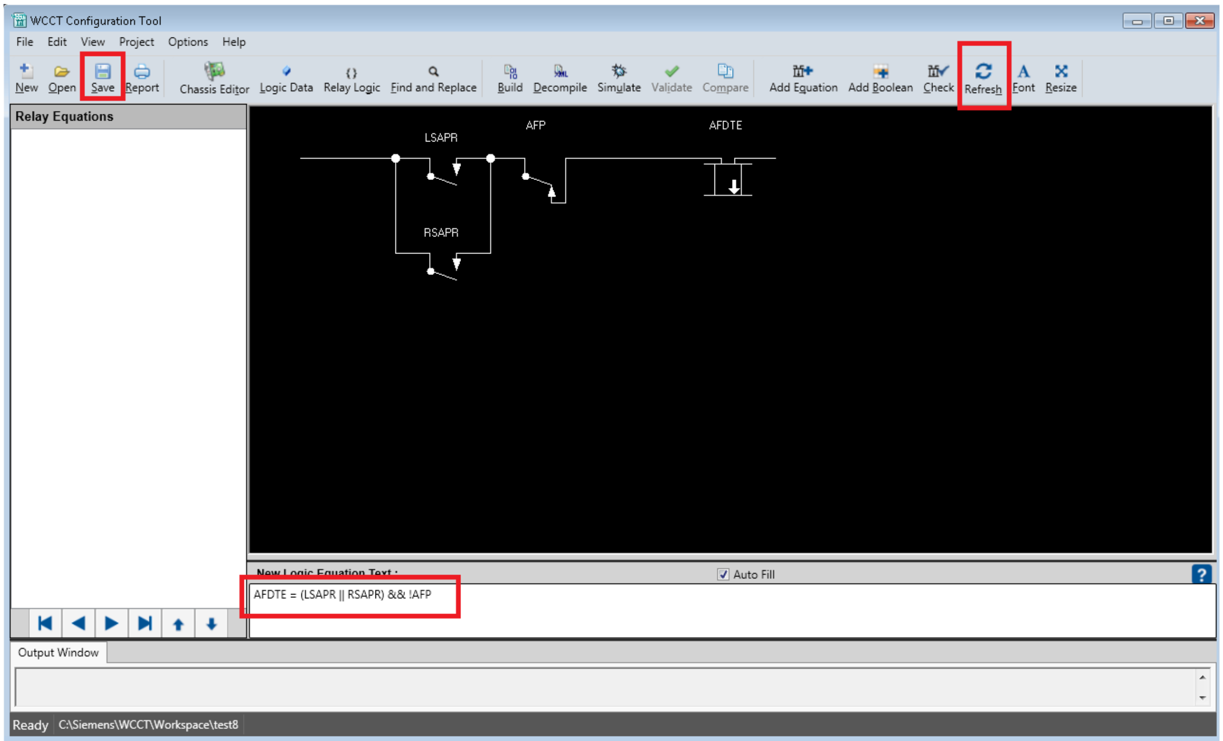


Figure 3-76 Initial Relay Logic Window

3.14.1 Adding and Editing Equations

To add an equation, select the **Add Equation** icon shown, then type the equation in Boolean format in the New Logic Equation text box and press **Refresh** or **Save** and the equation will appear in the left box and the relay logic equivalent in the top box.



AFDTE = (LSAPR || RSAPR) && !AFP

C:\Siemens\WCCT\Workspace\test8

Figure 3-77 Equation and Relay Logic Equivalent Display

Use the following symbols in the equations:

&& – AND

|| – OR

! – NOT

= – Assign

( ) – Parenthesis

To start a timer, use the following:

StartTimerCond ({expression}, {timername})

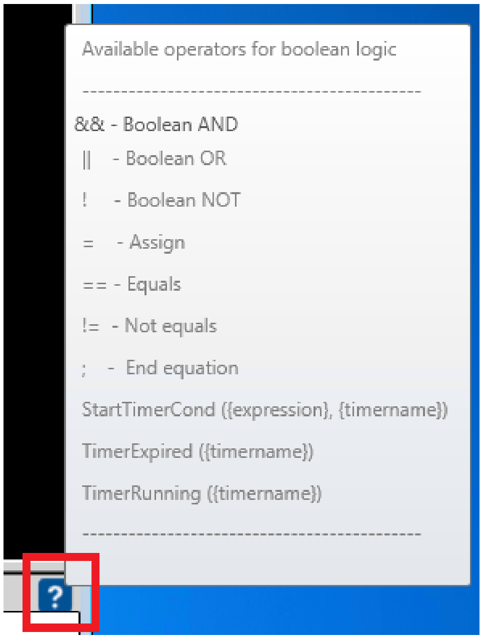
Where {expression} is a variable or a Boolean expression, and {timername} is a timer that was created in the Logic Data Editor timer tab.

NOTE

NOTE

{expression} cannot be set to TRUE, this is not supported. If a timer is required to start unconditionally, create a variable and set its value to TRUE. To check if a timer has expired, use TimerExpired ({timername}). StartTimerCond and TimerExpired are case sensitive.

Selecting the **?** displays a syntax help box showing a list of the available syntax.



Available operators for boolean logic

&& - Boolean AND

|| - Boolean OR

! - Boolean NOT

= - Assign

== - Equals

!= - Not equals

; - End equation

StartTimerCond ({expression}, {timername})

TimerExpired ({timername})

TimerRunning ({timername})

Figure 3-78 Syntax Help Box

Starting a timer based on a variable looks as follows in the relay view. The timer is marked with **TE** and the timer min, max, and duration are shown.

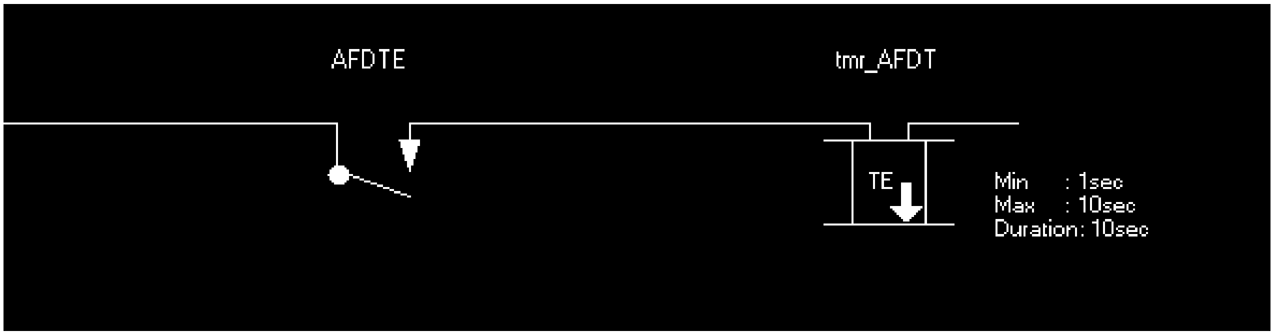
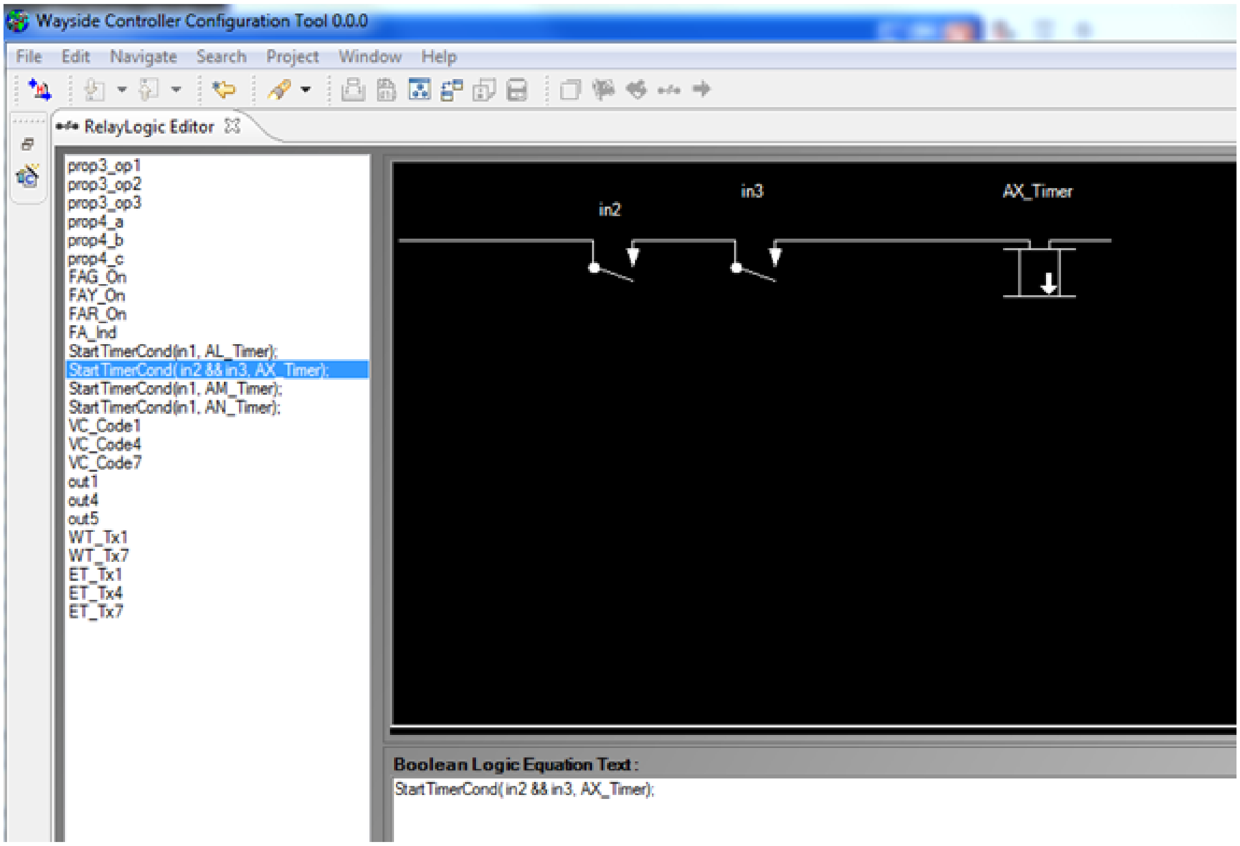


Figure 3-79 Starting a Timer Based on a Variable

Starting a timer based upon an expression looks as follows in the relay view:


Wayside Controller Configuration Tool 0.0.0
File
Edit
Navigate
Search
Project
Window
Help
RelayLogic Editor
in2
in3
AX_Timer
Boolean Logic Equation Text:

prop3_op1
prop3_op2
prop3_op3
prop4_a
prop4_b
prop4_c
FAG_On
FAY_On
FAR_On
FA_Ind
StartTimerCond(in1, AL_Timer);
StartTimerCond(in2 && in3, AX_Timer);
StartTimerCond(in1, AM_Timer);
StartTimerCond(in1, AN_Timer);
VC_Code1
VC_Code4
VC_Code7
out1
out4
out5
WT_Tx1
WT_Tx7
ET_Tx1
ET_Tx4
ET_Tx7

StartTimerCond(in2 && in3, AX_Timer);

Figure 3-80 Starting a Timer Based on an Expression

Checking the state of a timer looks like the following in relay view:

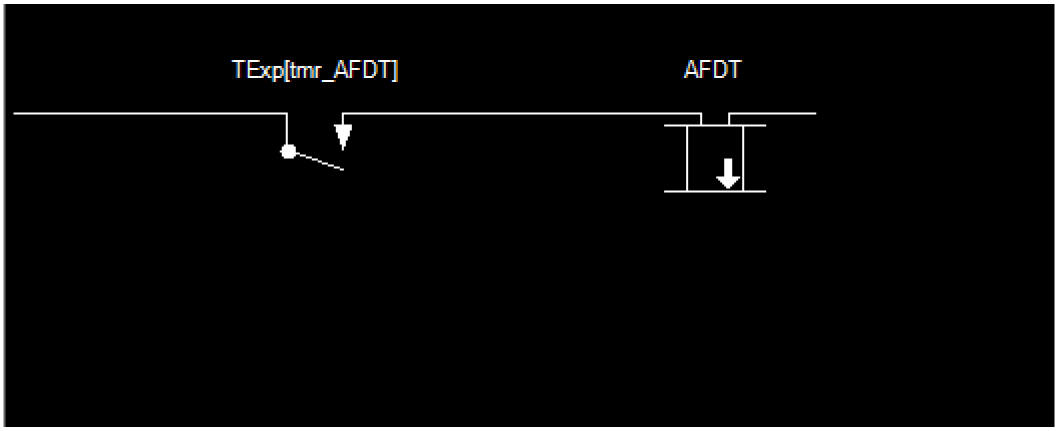


Figure 3-81 Checking a Timer State - Relay View

The state of the contacts and coils shown in the logic will depend on how the Normal values of these have been set in the Module I/O and Logic Data editors.

The Normal value can be changed by right-clicking on the contact or coil and selecting the **Toggle Normal Value**.

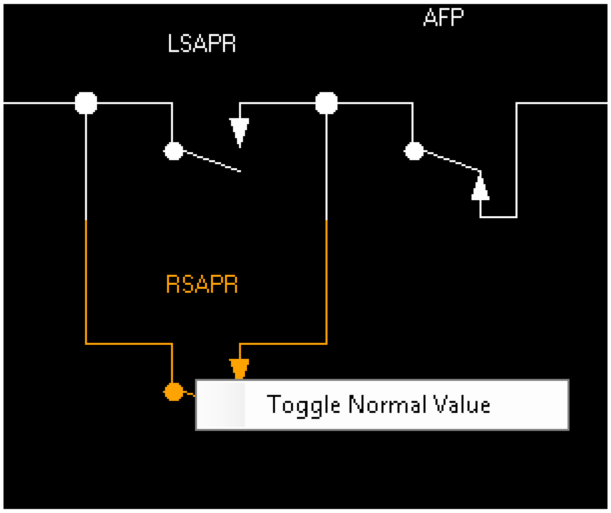


Figure 3-82 Changing Normal Value in Relay Editor

To add a new equation to the end of the list, select the **Add Equation** icon or use the shortcut **Ctrl+Alt Q**.

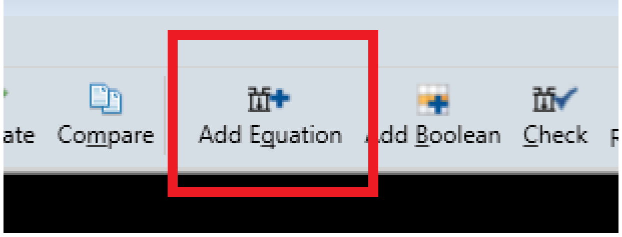
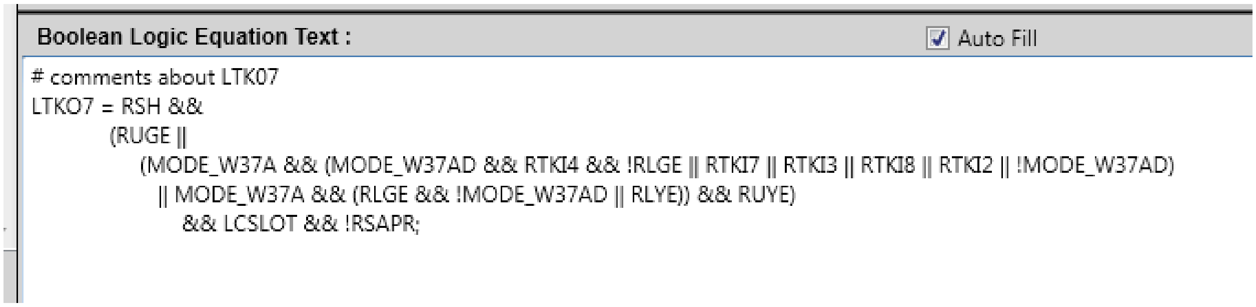


Figure 3-83 Add an Equation Icon

Type in the next equation in Boolean format; carriage returns and white space can be used in the text to make it more readable. Comments can be added in the text box preceding the equation, by using # to start the comment.



Boolean Logic Equation Text : ☑ Auto Fill

```
# comments about LTK07
LTKO7 = RSH &&
        (RUGE ||
           (MODE_W37A && (MODE_W37AD && RTKI4 && !RLGE || RTKI7 || RTKI3 || RTKI8 || RTKI2 || !MODE_W37AD)
             || MODE_W37A && (RLGE && !MODE_W37AD || RLYE)) && RUYE)
               && LCSLOT && !RSAPR;
```

Figure 3-84 Line Breaks in Equation Text

The window used to display the logic text can be expanded by putting the cursor on the black line just above the Boolean Logic Equation Text, until the cursor changes, then dragging the line upwards.

Continue to enter new equations.

NOTE

NOTE

Equations can be cut and pasted from other sources using the standard Ctrl C (copy) Ctrl V (paste) function. Multiple equations and their comments can be cut and pasted into the Boolean Logic Equation Text box.

When typing in a new equation, the editor provides an intelligent type-ahead function. As a new logic state name is typed in, a text box will show all existing logic states matching the letters typed. If the logic state has already been created, it can be selected from the list. Double-click to have it inserted automatically in the equation.

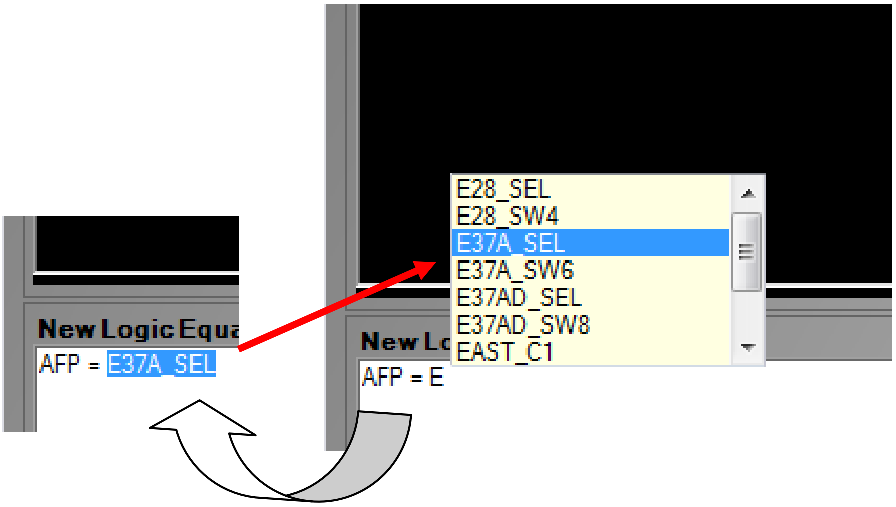
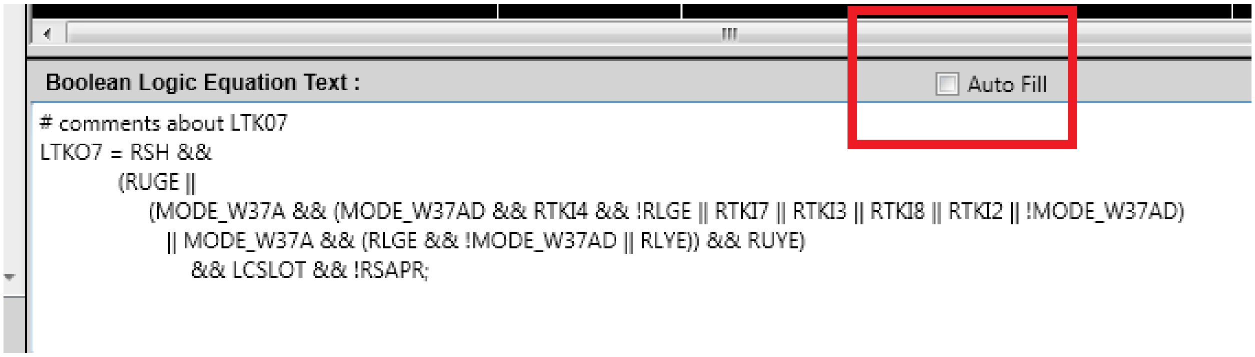


Figure 3-85   Type Ahead Function

To hide the type-ahead box when it pops up, press the ESC button. Sometimes it is useful to turn the type-ahead feature off. To do so, uncheck the **Auto Fill** checkbox.

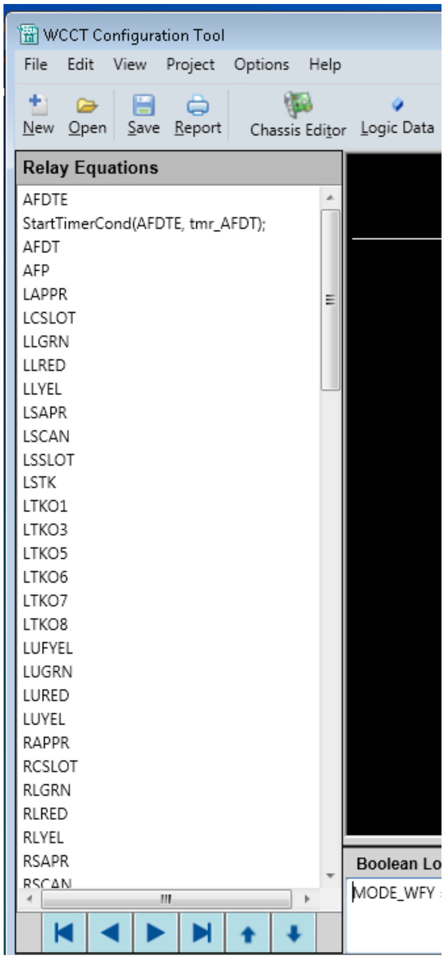


```
# comments about LTK07
LTKO7 = RSH &&
          (RUGE ||
              (MODE_W37A && (MODE_W37AD && RTKI4 && !RLGE || RTKI7 || RTKI3 || RTKI8 || RTKI2 || !MODE_W37AD)
                || MODE_W37A && (RLGE && !MODE_W37AD || RLYE)) && RUYE)
                   && LCSLOT && !RSAPR;
```

Figure 3-86   Turning Auto Fill Off

3.14.2 Navigating and Re-Ordering Equations

The Relay Editor will show a list of all the equations on the left side of the window.

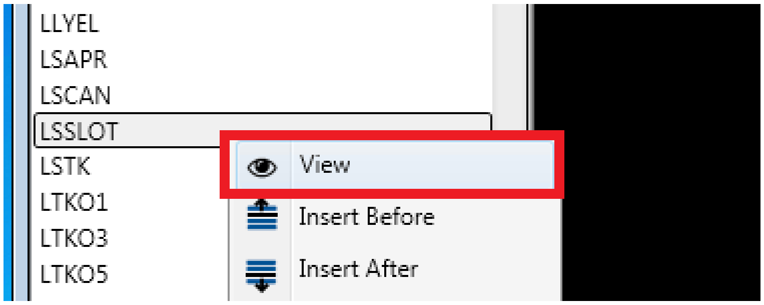


AFDTE
StartTimerCond(AFDTE, tmr_AFDT);
AFDT
AFP
LAPPR
LCSLOT
LLGRN
LLRED
LLYEL
LSAPR
LSCAN
LSSLOT
LSTK
LTKO1
LTKO3
LTKO5
LTKO6
LTKO7
LTKO8
LUFYEL
LUGRN
LURED
LUYEL
RAPPR
RCSLOT
RLGRN
RLRED
RLYEL
RSAPR
RSCAN

MODE_WFY

Figure 3-87 List of Relay Equations

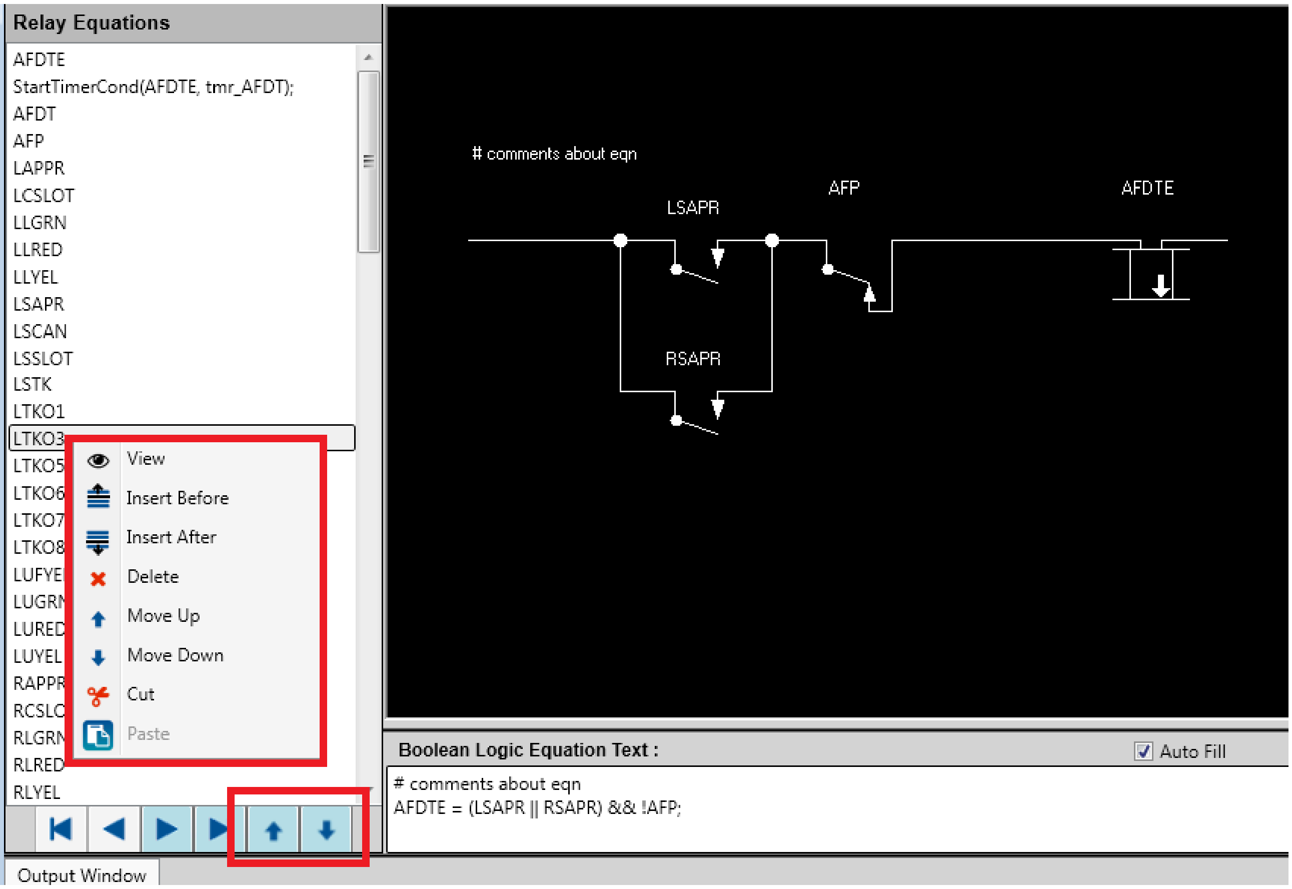
To view an equation, double-click it from the list on the left, or right-click and select **View**.



LLYEL
LSAPR
LSCAN
LSSLOT
LSTK
LTKO1
LTKO3
LTKO5

Figure 3-88 Selecting View

To rearrange the order of the logic, right-click on an equation in the left window and from there either cut/paste, move the equation up or down, or insert a new equation before or after this one. The left two buttons at the bottom also provide a quick way to move an equation up or down.



```
# comments about eqn
AFDTE = (LSAPR || RSAPR) && !AFP;
```

Figure 3-89 Rearrange Logic Order

When inserting a new equation, the header of the text box will indicate where it’s being inserted.

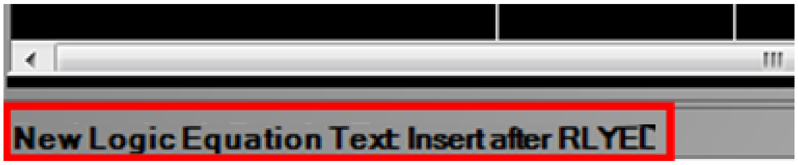
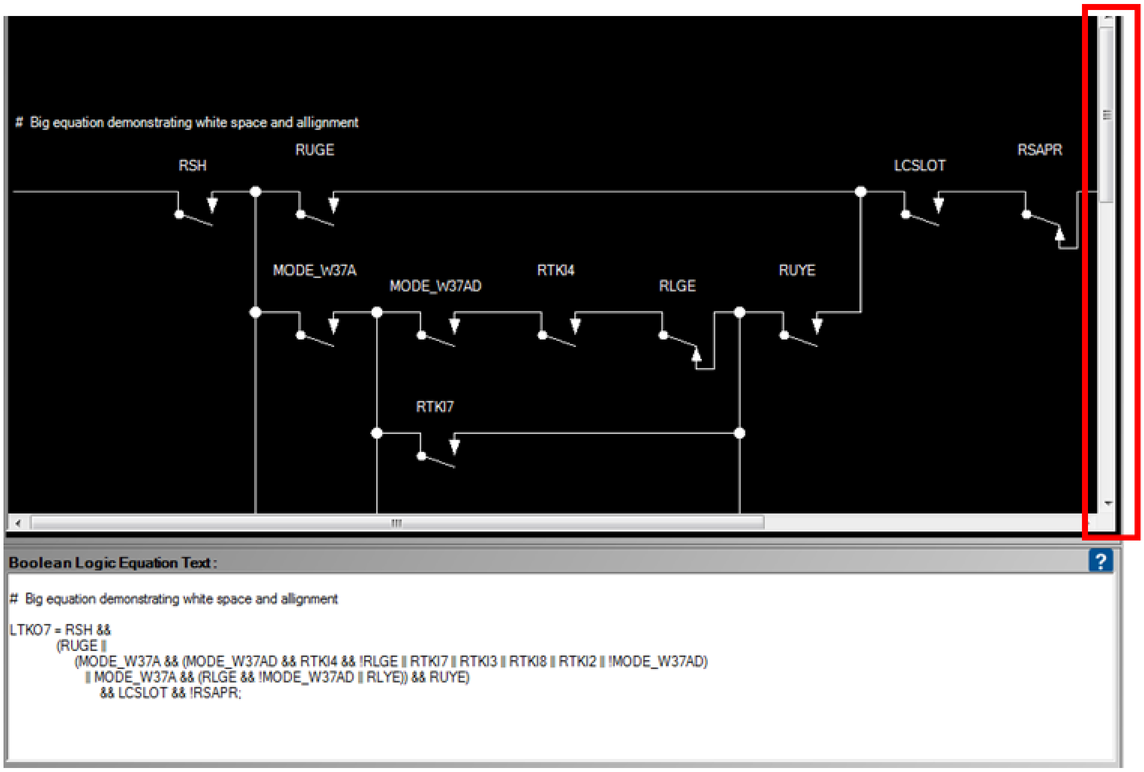


Figure 3-90 New Equation Header

If the relay equation becomes too large, scroll bars will appear so all of the equation can be viewed.



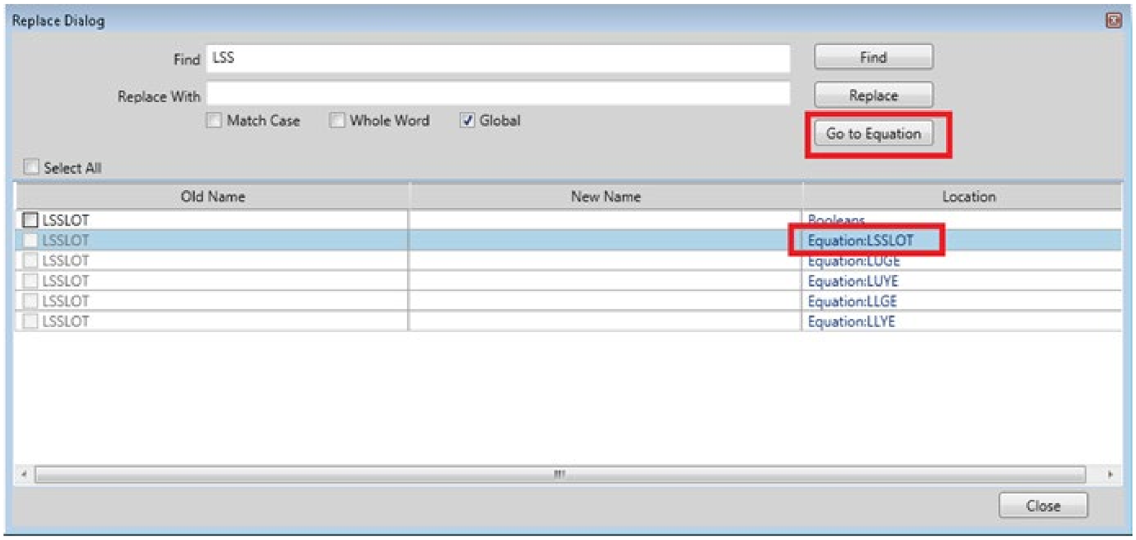
Boolean Logic Equation Text :

```
# Big equation demonstrating white space and allignment

LTKO7 = RSH &&
        (RUGE ||
           (MODE_W37A && (MODE_W37AD && RTKI4 && !RLGE || RTKI7 || RTKI3 || RTKI8 || RTKI2 || !MODE_W37AD)
             || MODE_W37A && (RLGE && !MODE_W37AD || RLYE)) && RUYE)
               && LCSLOT && !RSAPR;
```

Figure 3-91 Display Scroll Bars

Once the project has many equations it is useful to use the **Find and Replace** function to locate where logic states are defined or used. Enter the Logic State name to be found and press **Find**. The relevant equation can then be found in the location column. To go to this equation, double-click it, or select it and click **Go to Equation**.



Find: LSS

Replace With:

□ Match Case □ Whole Word ☑ Global

□ Select All

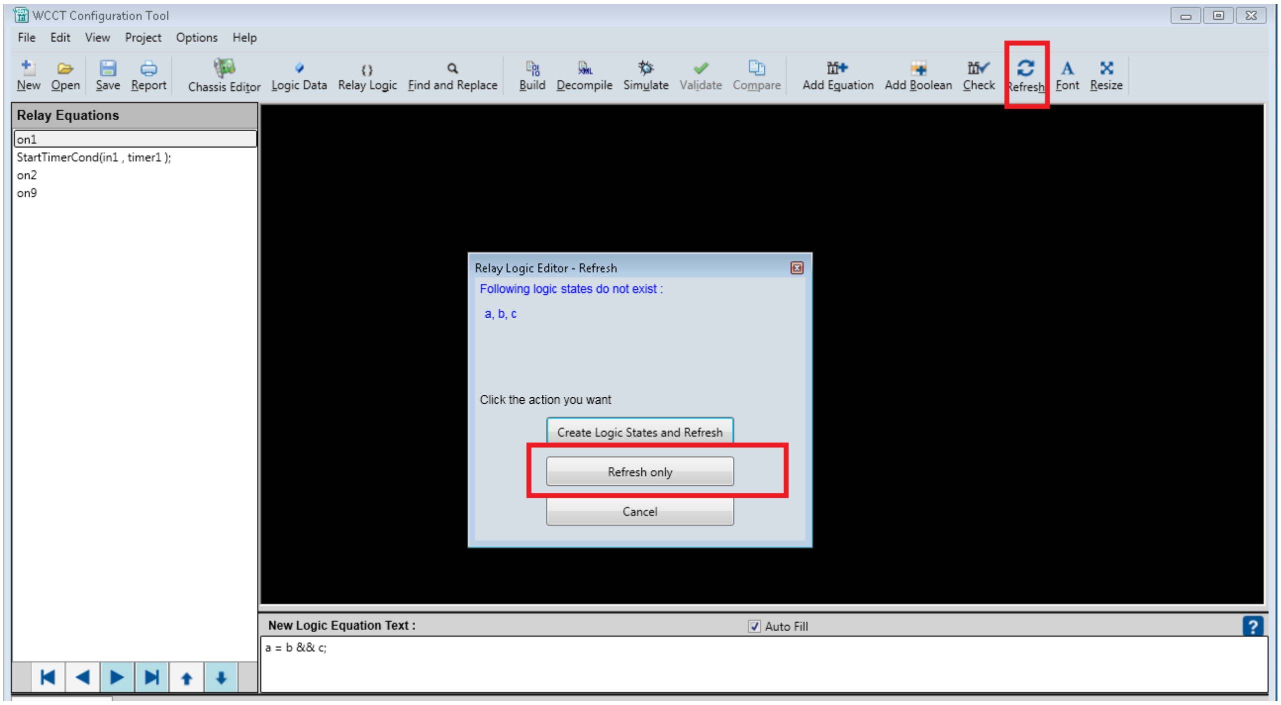
Old Name	New Name	Location
□ LSSLOT		Booleans
□ LSSLOT		Equation:LSSLOT
□ LSSLOT		Equation:LUGE
□ LSSLOT		Equation:LUYE
□ LSSLOT		Equation:LLGE
□ LSSLOT		Equation:LLYE

Figure 3-92 Equation Find Function

3.14.3 Check Equations and Adding Missing States

Once an equation has been typed in, it is often useful to display it to make sure its structure is correct before running any checks on it or permanently saving it. To do this, select the Refresh button. If all the logic states exist, the relay diagram will be shown. If some of the logic states do not exist, for instance they may be typed incorrectly or have not been entered yet, the WCCT will show the pop-up window in the following figure and list the states that do not exist.

Press refresh at this point to show the relay equation.



on1
StartTimerCond(in1 , timer1);
on2
on9

Relay Logic Editor - Refresh

Following logic states do not exist :

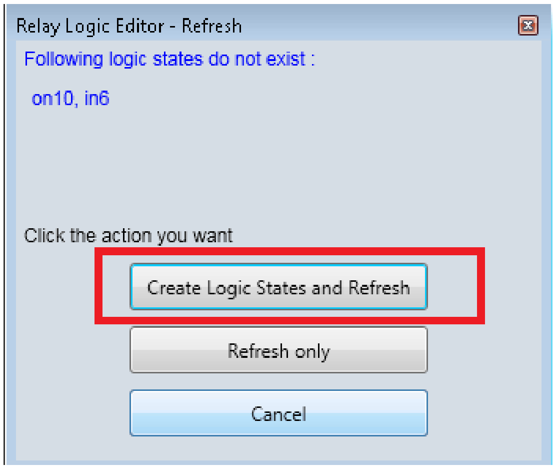
a, b, c

Click the action you want

a = b && c;

Figure 3-93 Refresh Logic Window

If terms have been typed incorrectly, press **Cancel** and go back and correct them. If there are logic states that need creating, press **Create Logic States and Refresh**.



Relay Logic Editor - Refresh

Following logic states do not exist :

on10, in6

Click the action you want

Figure 3-94 Refresh Logic Options

This will create the new logic states as internal variables with a default value of **False** and Log as **No**.

At this stage there is no easy way in the WCCT to change these variables to module inputs or outputs; either enter all inputs and outputs prior to writing the relay logic or create a new module input or output with a different name and write an equation to assign the new internal state to it.

If the **Create Logic States and Refresh** has been selected and the equation looks correct, you may proceed and check the equation using the **Check** icon from the top toolbar, as shown in the following figure.

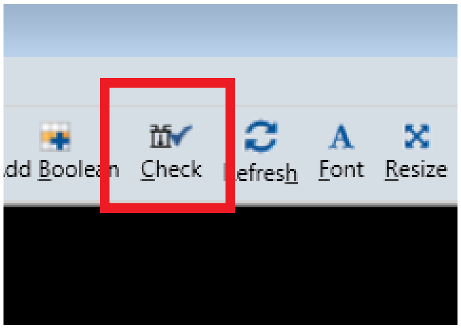
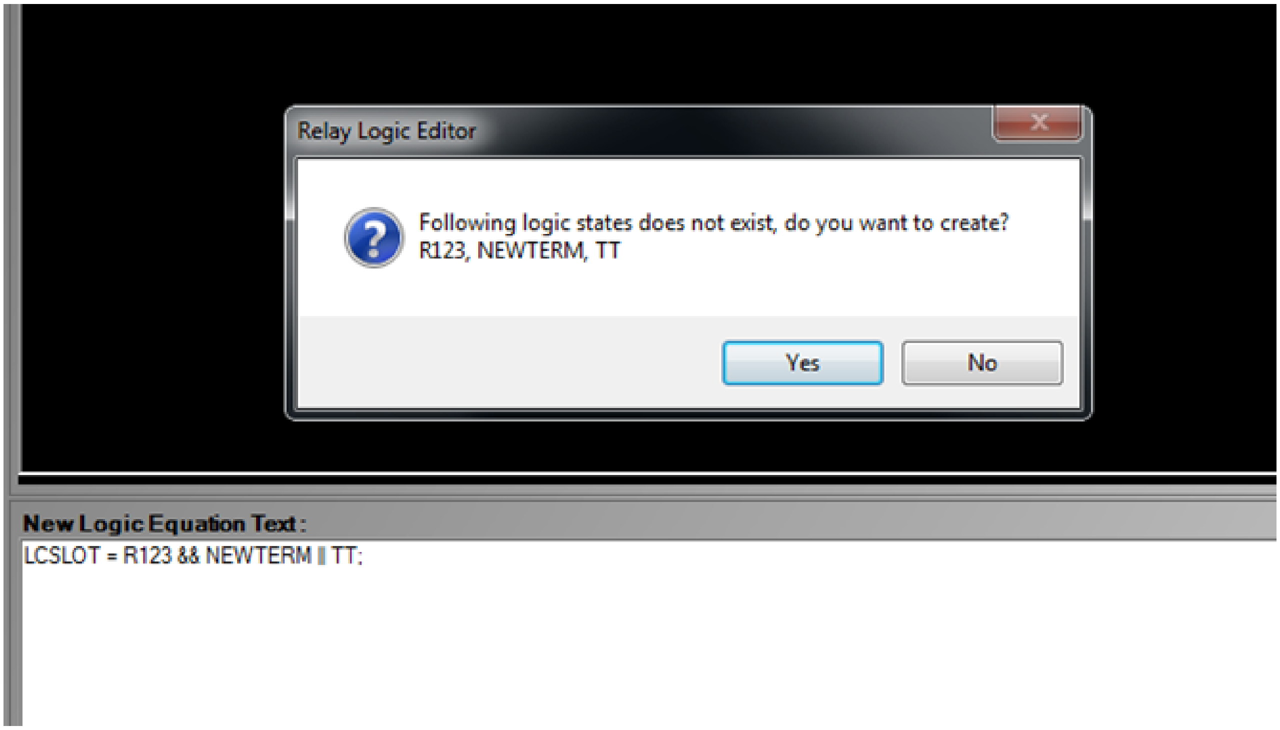


Figure 3-95 Check Equation Icon

This will check the syntax of the equation and whether the states in it exist. If the logic states don't exist, a message will indicate which ones don't exist and ask if you want to create them, as shown in the following figure.



Following logic states does not exist, do you want to create?
R123, NEWTERM, TT

New Logic Equation Text :

LCSLOT = R123 && NEWTERM || TT;

Figure 3-96 Check Equation Result Example

If you answer yes, the tool will create these Boolean variables with the default value **False**, and **Log** = **No**. If the properties of the new states need changing, go to the Logic Data Editor and change them there. If you do not desire to change the properties, you can go back and correct the logic state if you have made a typo, or manually add in the missing variable by selecting the **Add Boolean** icon.

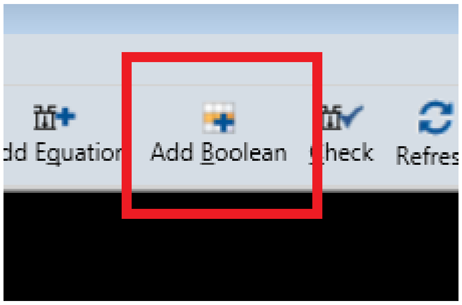
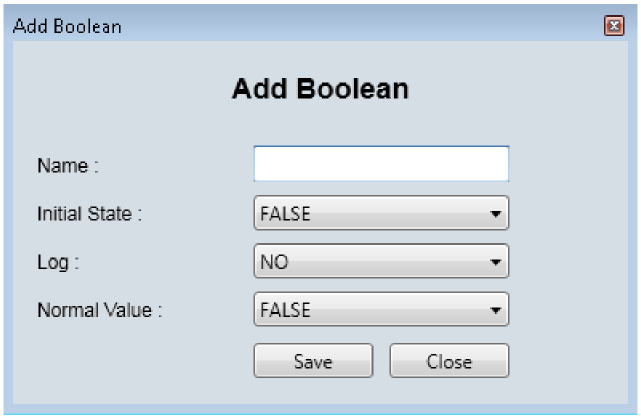


Figure 3-97 Add Boolean Icon

Add Boolean brings up a new window to add a new Boolean variable and set the properties.



Add Boolean

Add Boolean

Name :

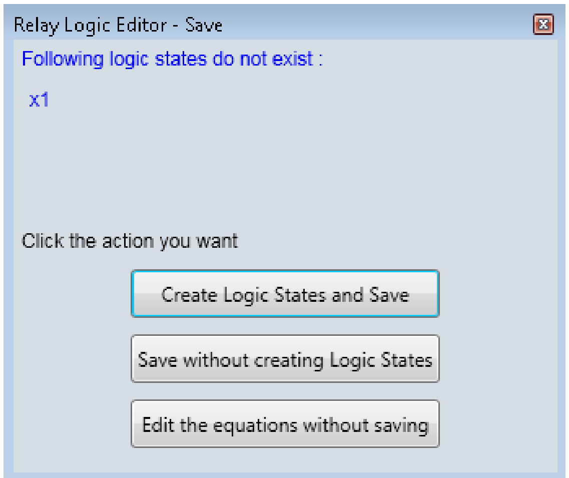
Initial State : FALSE

Log : NO

Normal Value : FALSE

Figure 3-98 Add Boolean Variable Properties

If an equation is typed in and **Save** selected, the tool will check whether the logic states exist. If some do not exist, the WCCT will show the following window indicating which logic states are missing.



Relay Logic Editor - Save

Following logic states do not exist :

x1

Click the action you want

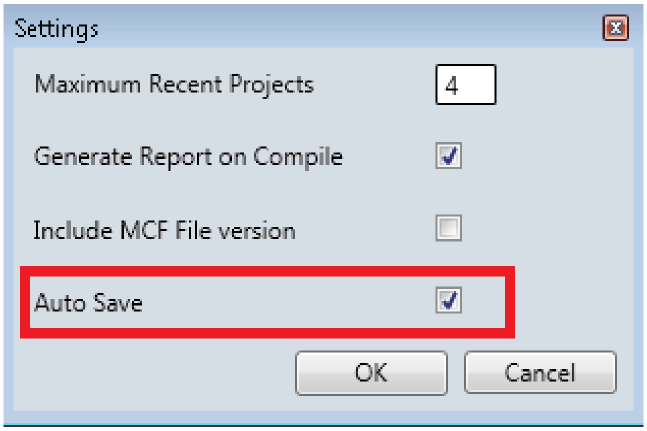
Create Logic States and Save
Save without creating Logic States
Edit the equations without saving

Figure 3-99 Logic State Check Result Window

Select **Save without creating Logic States** to continue without creating the missing states. If you do not want to proceed, select **Edit the Equations without Saving** and go back and correct the equation, or select **Create Logic States and Save** and have the WCCT automatically add the missing terms as Boolean Variables. You may want to continue with the save, if, for example, you have used a logic state that is an input or an output and will need to be added through one of the other editors.

Generally, it is expected that before the logic is written, all the input and outputs, timer and properties and most of the Boolean variables required have been created. The relay logic editor allows the user to add in new Boolean variables, but if new inputs or outputs are required, it is necessary to open the chassis editor and go to the appropriate module to add them. If more timers and properties are required, go to the Logic Data Editor to add them.

Under the **Options > Settings** menu there is a selection to auto save the logic.


Settings

Maximum Recent Projects 4

Generate Report on Compile ☑

Include MCF File version □

Auto Save ☑

Figure 3-100 Auto Save Logic

When this is selected, there are pending changes to the current equation, and the user chooses to move to another equation or out of the relay editor, the tool will automatically save the pending equation. As usual, if there are errors in the equation, the tool will show the error window (as per Figure **3-96**).

When Auto Save is not selected, there are pending equation changes, and the user chooses to move to another equation or out of the relay editor, the tool will ask the user whether they want to save their changes.

3.14.3.1 Resizing Equations

The relay contacts shown on the diagram can be resized by selecting the **Resize** icon.

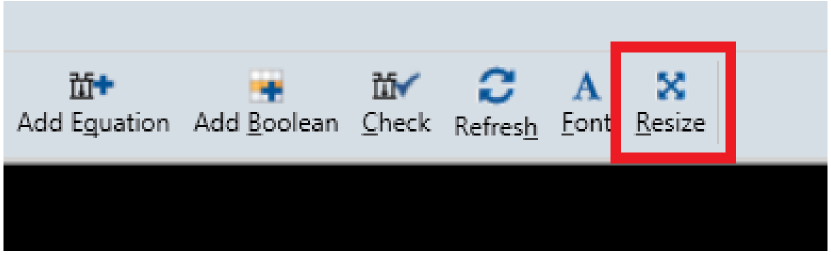
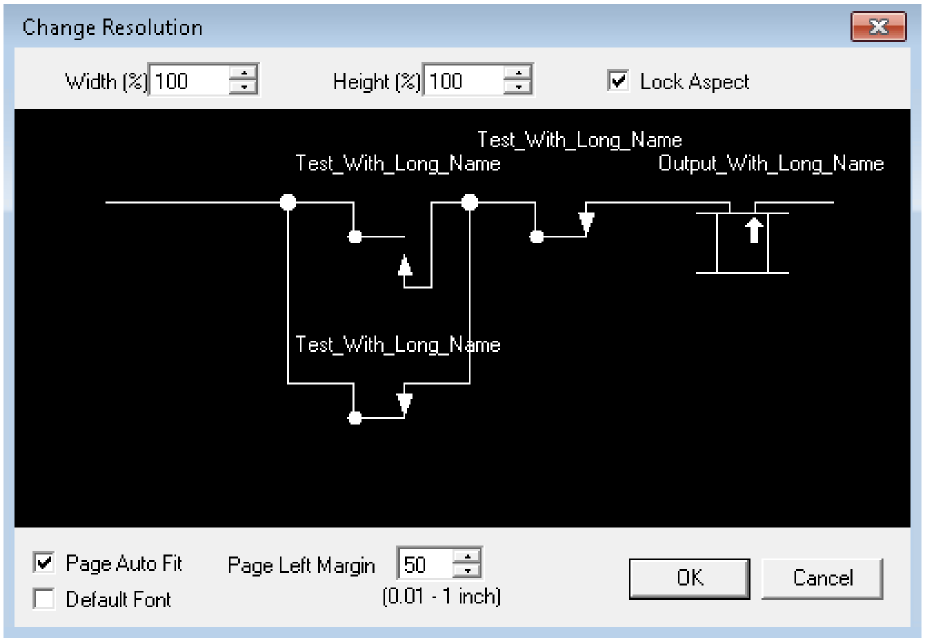


Figure 3-101 Selecting Resize

This brings up a window that lets the user change the size of the relays. This becomes more useful when printing the PDF report as it allows the user to adjust equations to fit the page. See the section on Relay Reports 6.7.



Change Resolution

Width (%) 100 Height (%) 100 ☑ Lock Aspect

☑ Page Auto Fit Page Left Margin 50

□ Default Font (0.01 - 1 inch)

Figure 3-102 Resize Windows

3.15 FIND AND REPLACE EDITOR

To bring up the Find and Replace editor, select **Edit > Find and Replace** from the menu, select the **Find and Replace** icon, or use the **Ctrl F** shortcut.

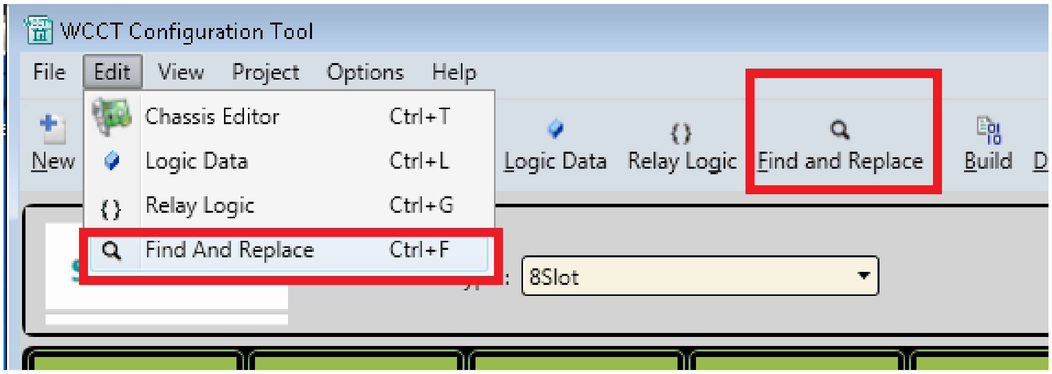
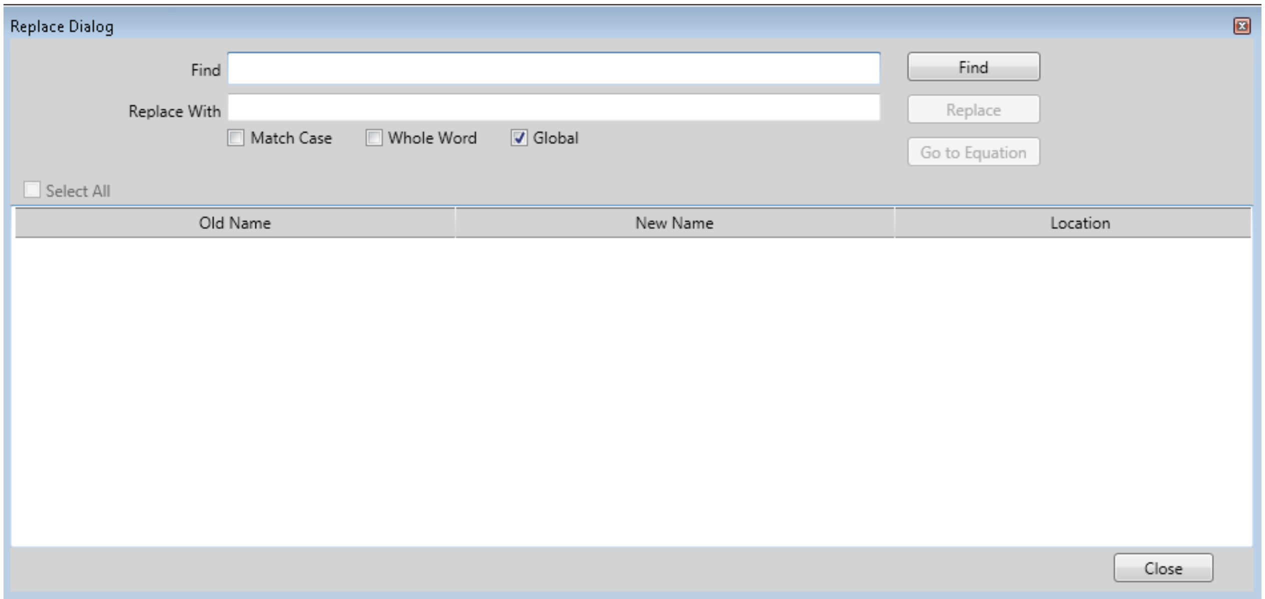


Figure 3-103 Selecting Find and Replace

The following window appears.



Replace Dialog

Find

Replace With

□ Match Case □ Whole Word ☑ Global

□ Select All

Old Name	New Name	Location

Figure 3-104 Find and Replace Window

The window can be used to find where logic states are used or can be used to rename them.

First type the string to be found. This can be a complete logic state name or a partial one.

To match the case in the find string, check the **Match Case** check box.

NOTE

NOTE

Logic state names can be entered as upper case, lower case, or mixed case, but the WCCT is not case sensitive in terms of how these are used.

For example, the logic states: LSSLOT, lsslot and LsSlot all refer to the same logic state.

To match the whole word, check the **Whole Word** check box.

The search results can be restricted to just the Editor that is currently open: for example, if **Global** is unchecked and the Chassis editor is currently open, the results only show matches that are used as module input and outputs; if the Logic Data editor is currently open, the results only show matches that are used the logic data editor; if the Relay Logic editor is currently open, the results only show matches that are used in the relay logic.

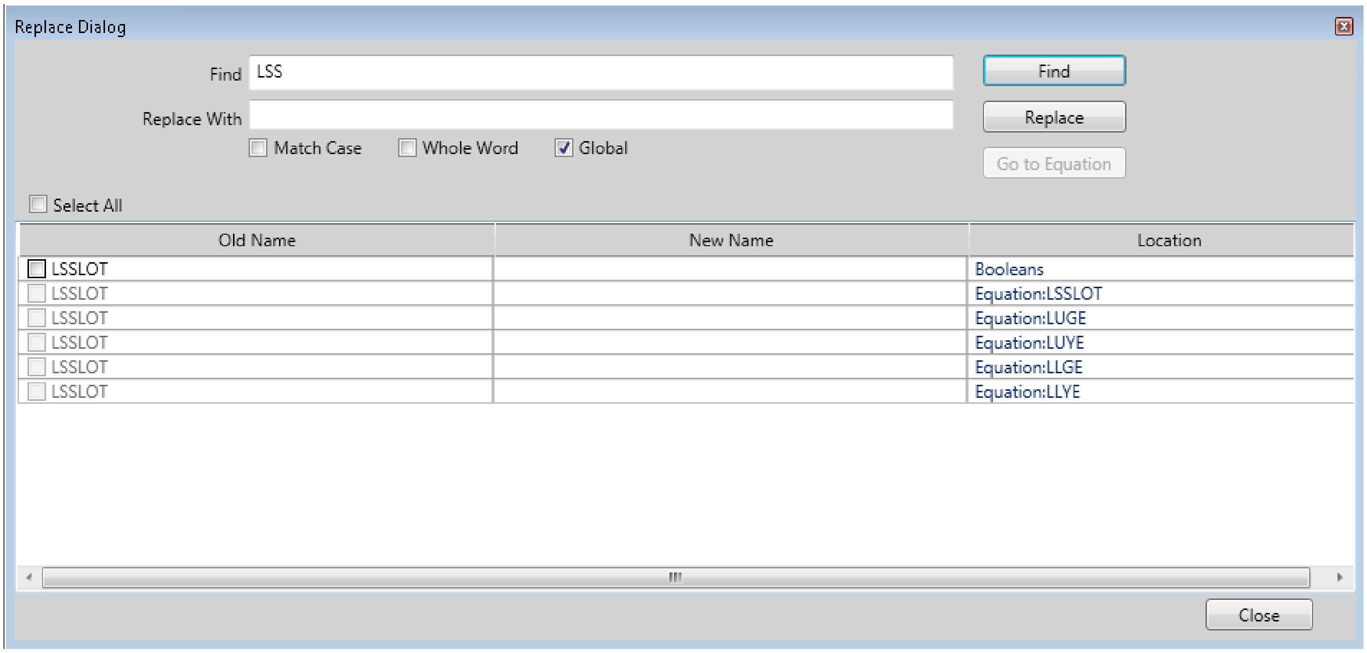
If **Global** is checked, the search results show matches from the whole project. Logic state names matching the entered text are shown in the **Old Name** column. The Location column shows where the logic state is found. It will show:

- Booleans
- Timer
- Properties
- Equation: {eqn name}
- Slot-{slot number}

NOTE

NOTE

Find also finds the names of submenus. These are marked in the location column as **Submenus**.



Replace Dialog

Find: LSS

Replace With:

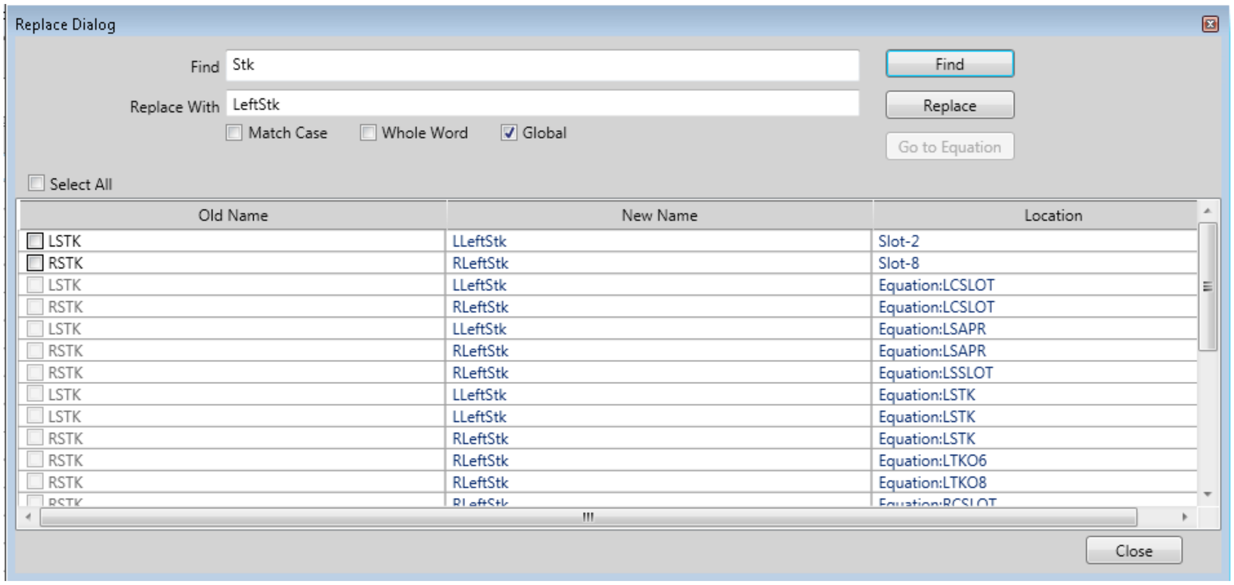
☐ Match Case ☐ Whole Word ☑ Global

☐ Select All

Old Name	New Name	Location
☐ LSSLOT		Booleans
☐ LSSLOT		Equation:LSSLOT
☐ LSSLOT		Equation:LUGE
☐ LSSLOT		Equation:LUYE
☐ LSSLOT		Equation:LLGE
☐ LSSLOT		Equation:LLYE

Figure 3-105 Enter Find String

To change the name(s) of a logic state, type the new text in the **Replace With** text box and press **Find**.



Find: Stk

Replace With: LeftStk

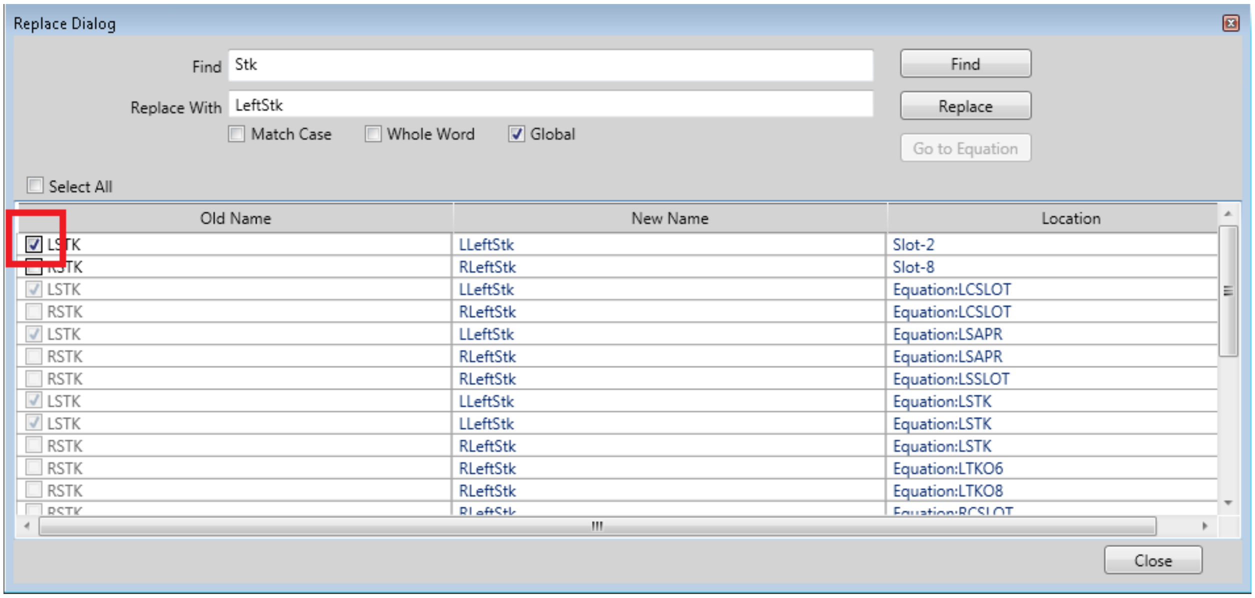
□ Match Case □ Whole Word ☑ Global

□ Select All

Old Name	New Name	Location
□ LSTK	LLeftStk	Slot-2
□ RSTK	RLeftStk	Slot-8
□ LSTK	LLeftStk	Equation:LCSLOT
□ RSTK	RLeftStk	Equation:LCSLOT
□ LSTK	LLeftStk	Equation:LSAPR
□ RSTK	RLeftStk	Equation:LSAPR
□ RSTK	RLeftStk	Equation:LSSLOT
□ LSTK	LLeftStk	Equation:LSTK
□ LSTK	LLeftStk	Equation:LSTK
□ RSTK	RLeftStk	Equation:LSTK
□ RSTK	RLeftStk	Equation:LTKO6
□ RSTK	RLeftStk	Equation:LTKO8
□ RSTK	RLeftStk	Equation:RCSLOT

Figure 3-106 Enter Replace String

Then select the rows to be replaced by checking the check box in the **Old Name** column. If identical names are found, only the first instance needs to be selected.



Find: Stk

Replace With: LeftStk

□ Match Case □ Whole Word ☑ Global

□ Select All

Old Name	New Name	Location
☑ LSTK	LLeftStk	Slot-2
□ RSTK	RLeftStk	Slot-8
☑ LSTK	LLeftStk	Equation:LCSLOT
□ RSTK	RLeftStk	Equation:LCSLOT
☑ LSTK	LLeftStk	Equation:LSAPR
□ RSTK	RLeftStk	Equation:LSAPR
□ RSTK	RLeftStk	Equation:LSSLOT
☑ LSTK	LLeftStk	Equation:LSTK
☑ LSTK	LLeftStk	Equation:LSTK
□ RSTK	RLeftStk	Equation:LSTK
□ RSTK	RLeftStk	Equation:LTKO6
□ RSTK	RLeftStk	Equation:LTKO8
□ RSTK	RLeftStk	Equation:RCSLOT

Figure 3-107 Selecting which Items to Replace

Once the rows are selected, press **Replace**. The WCCT will replace the selected rows with the new name.

SECTION 4 CREATING AN APPLICATION

4.0 GETTING STARTED

This section provides an introduction on how to get started with the WCCT to create a basic application. When the WCCT starts it will open with a blank workspace.

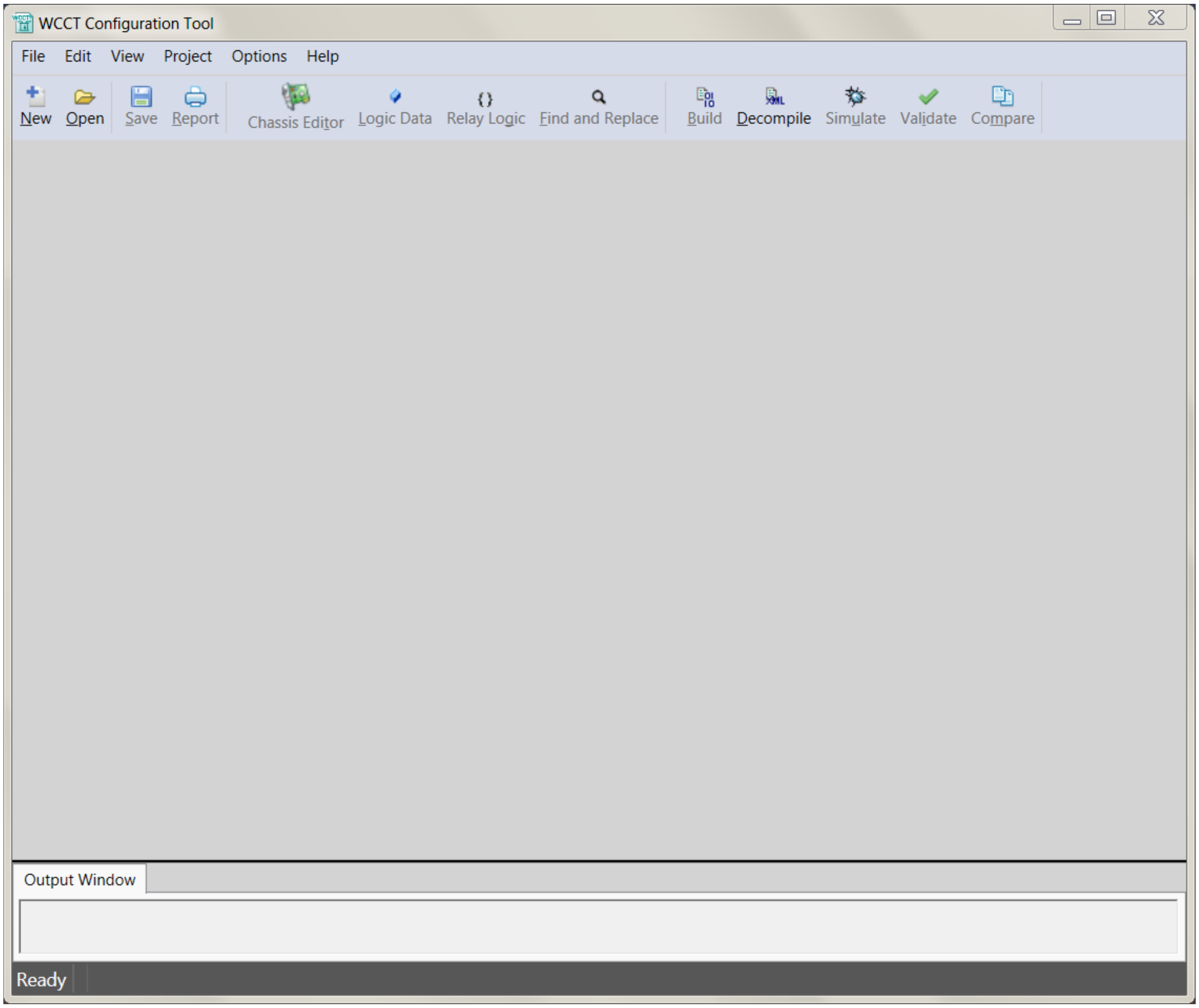


Figure 4-1 WCCT with No Project Open

From the main WCCT window, select **File>New**, the **New** icon, or use the **Ctrl + N** shortcut.

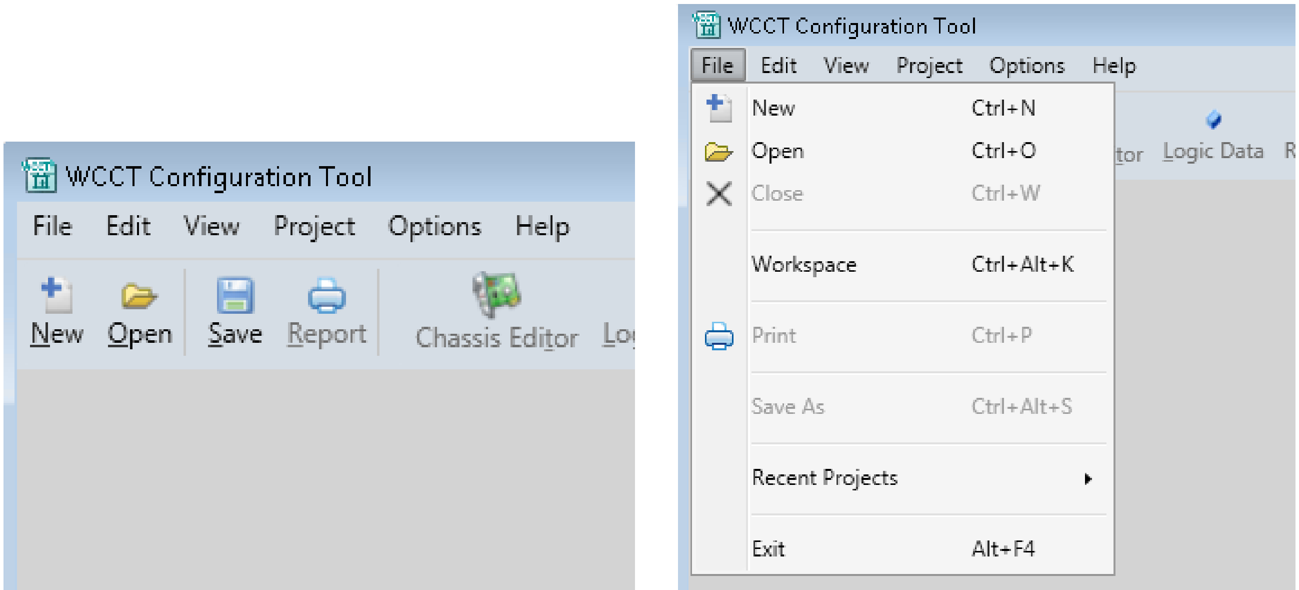
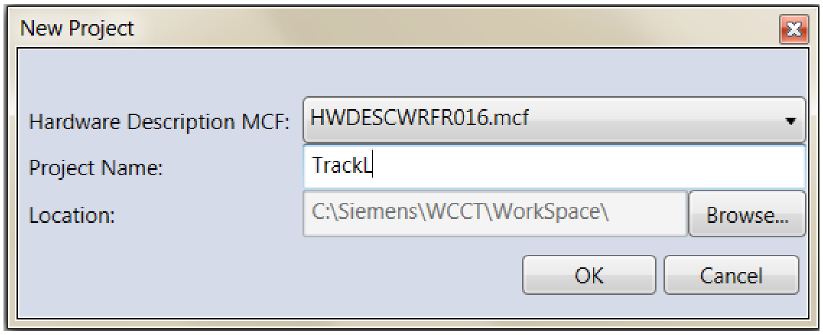


Figure 4-2 Creating a New Project

A new project window will open, type in the project name (spaces and special characters are not allowed).

To change the location where you want to keep your projects, select the **Browse** button next the **Location** field. The default **Location** is shown in the following figure. The default location for all projects can be changed – see setting Workspace in section 2.1.1.



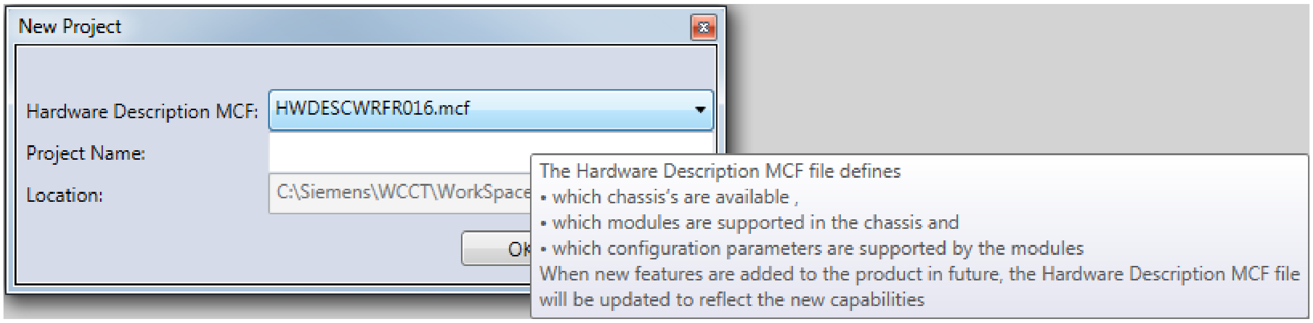
Hardware Description MCF: HWDESCWRFR016.mcf

Project Name: TrackL

Location: C:\Siemens\WCCT\WorkSpace\

Figure 4-3 New Project Window

The Hardware Description MCF is used to define module properties used by the tool. Generally, it is recommended to use the latest version available.



New Project

Hardware Description MCF: HWDESCWRFR016.mcf

Project Name:

Location: C:\Siemens\WCCT\WorkSpace

The Hardware Description MCF file defines
- which chassis's are available ,
- which modules are supported in the chassis and
- which configuration parameters are supported by the modules

When new features are added to the product in future, the Hardware Description MCF file will be updated to reflect the new capabilities

Figure 4-4 Hardware Description MCF

The WCCT will then open up the Chassis editor.

4.1 SET PROJECT PROPERTIES

First, set the project properties by selecting the **Project Properties** option from the Project menu.

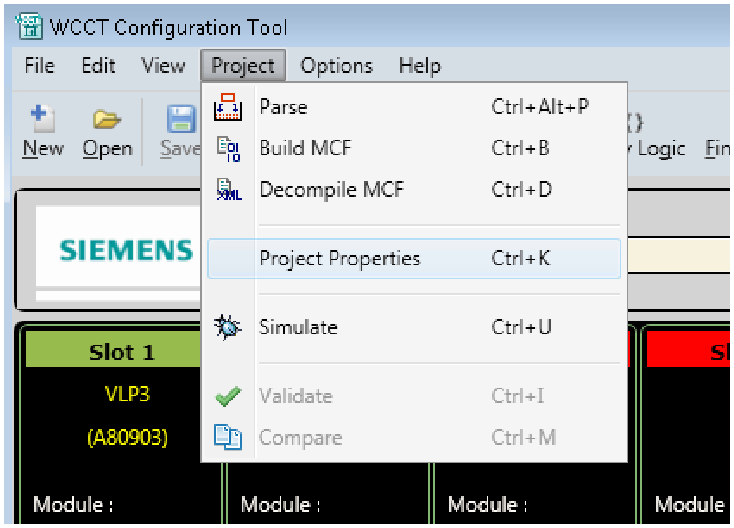
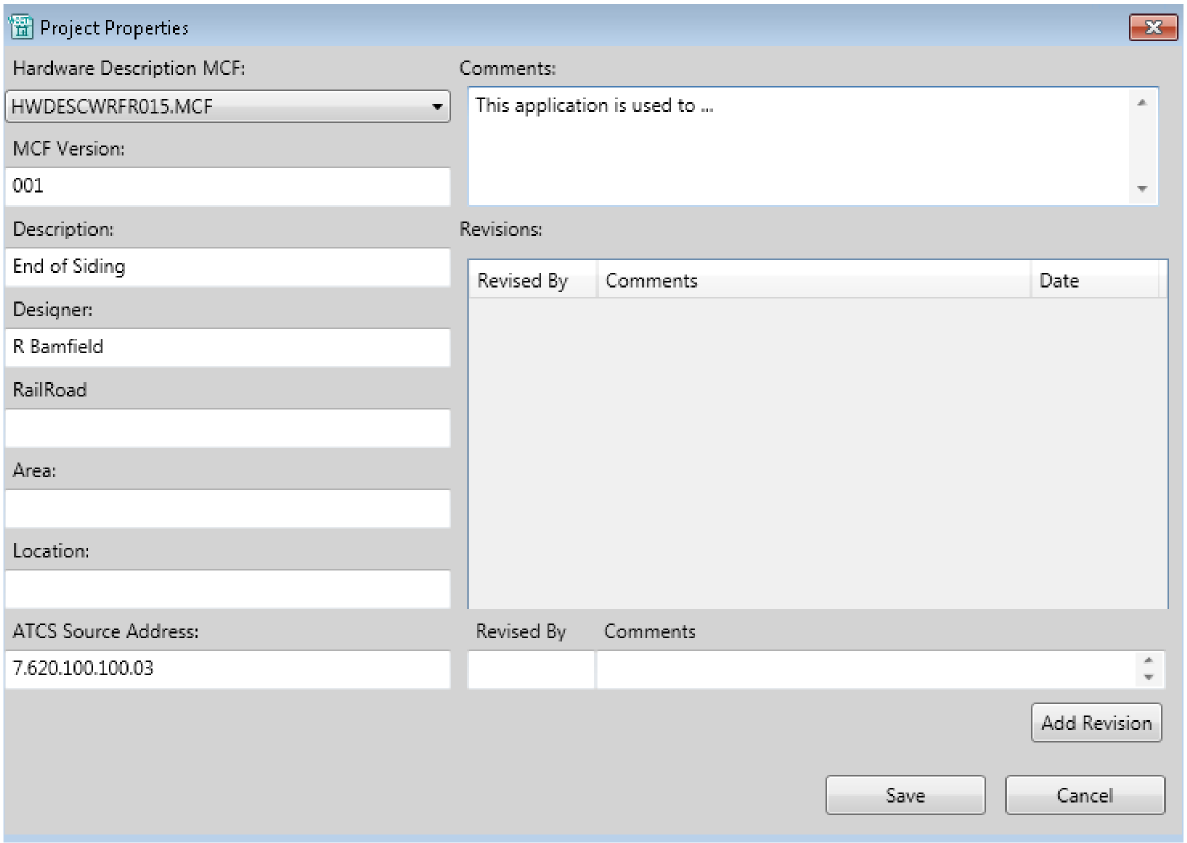


Figure 4-5 Project Properties

This will open the Project Properties window as shown in the following figure. Here, the user can enter information into the various fields describing the application. The MCF version number is usually part of the MCF file name; however, it can be excluded by using the **Options > Settings** menu.



Hardware Description MCF: HWDESCWRFR015.MCF

MCF Version: 001

Description: End of Siding

Designer: R Bamfield

RailRoad

Area:

Location:

ATCS Source Address: 7.620.100.100.03

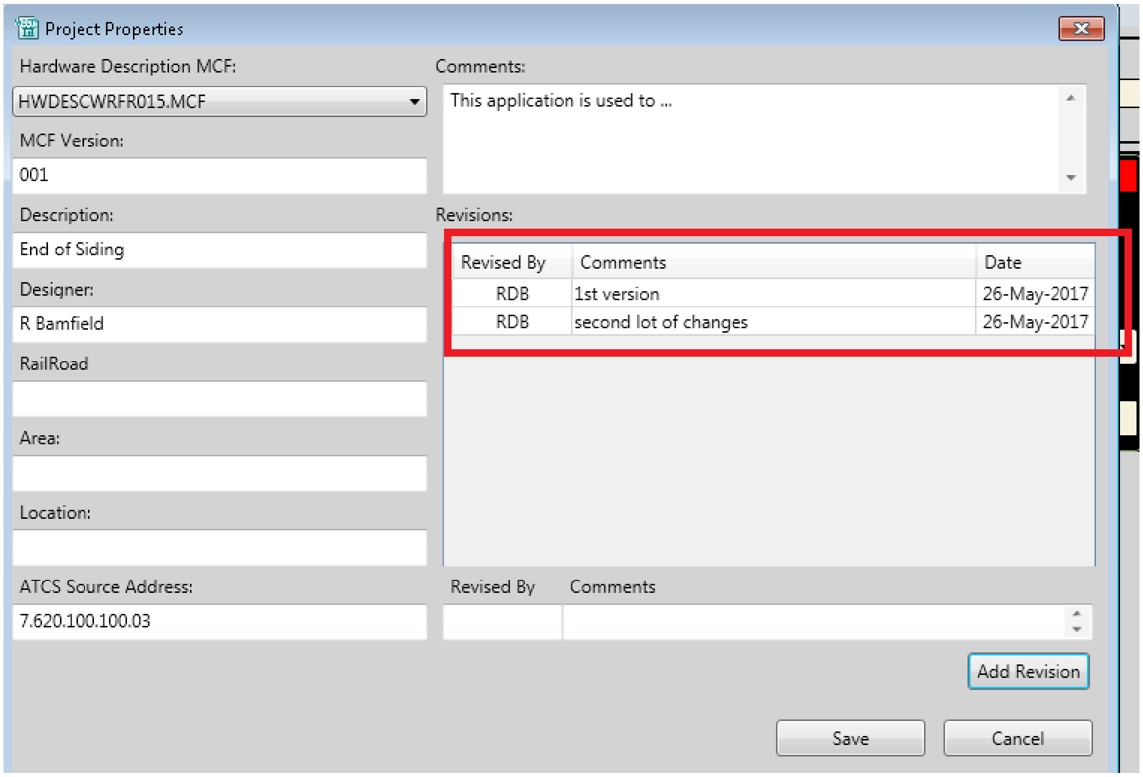
Comments: This application is used to ...

Revisions:

Revised By	Comments	Date

Figure 4-6 Project Properties Window

The user can add revision comments for the project by entering in the **Revised By** and **Comments** fields then pressing the **Add Revision** button.



Project Properties

Hardware Description MCF: HWDESCWRFR015.MCF

MCF Version: 001

Description: End of Siding

Designer: R Bamfield

RailRoad:

Area:

Location:

ATCS Source Address: 7.620.100.100.03

Comments: This application is used to ...

Revisions:

Revised By	Comments	Date
RDB	1st version	26-May-2017
RDB	second lot of changes	26-May-2017

Revised By:

Comments:

Figure 4-7   Setting Revision Comments

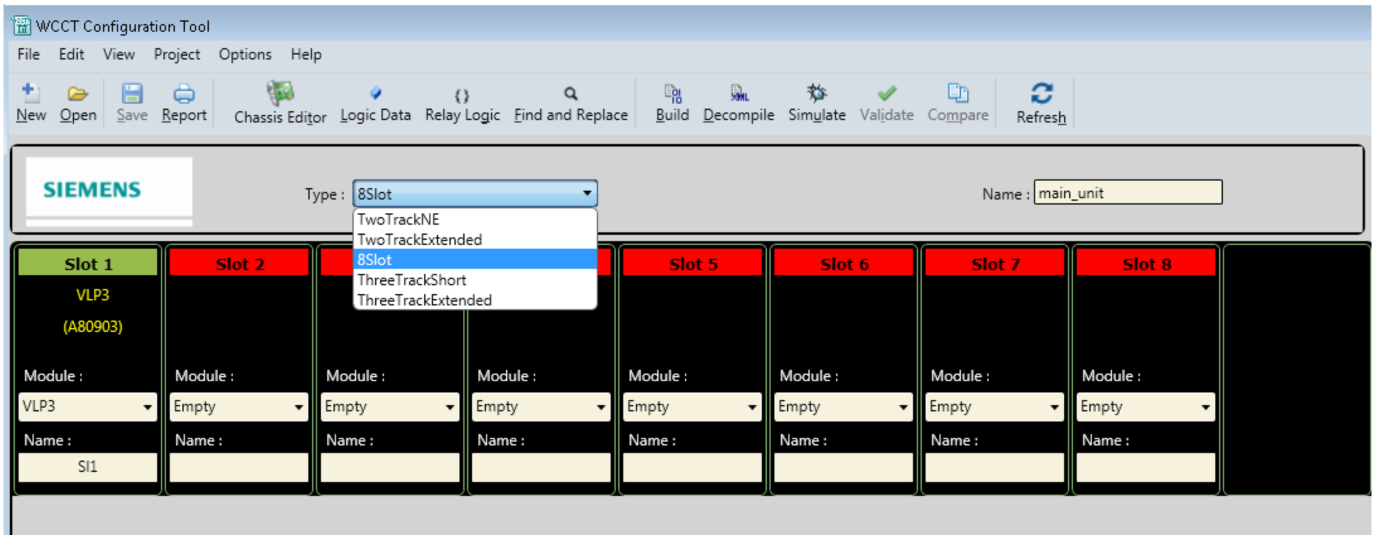
The user can also set the ATCS address of the WayConneX in this window. The ATCS address has to be in the form 7.RRR.LLL.GGG.SS where:

- RRR in range 1-999
- LLL in range 1-999
- GGG in range 1-998
- SS in range 03-98

Once the project properties have been set, click **Save** to close the window.

4.2 SELECT CHASSIS

The WCCT will show the Chassis Editor; this is where the user can select the modules required for the application. The default chassis type will be the 8Slot WayConneX chassis, which allows any I/O or track module in any of slots 2 through 8. WCCT releases of version 1.8.1.7 or later only support this chassis type.


WCCT Configuration Tool
File Edit View Project Options Help
New Open Save Report Chassis Editor Logic Data Relay Logic Find and Replace Build Decompile Simulate Validate Compare Refresh
SIEMENS
TwoTrackNE
TwoTrackExtended
8Slot
ThreeTrackShort
ThreeTrackExtended

Type : 8Slot

Name : main_unit

Slot 1 VLP3 (A80903) Module : VLP3 Name : SI1

Slot 2 Module : Empty Name :

Module : Empty Name :

Module : Empty Name :

Slot 5 Module : Empty Name :

Slot 6 Module : Empty Name :

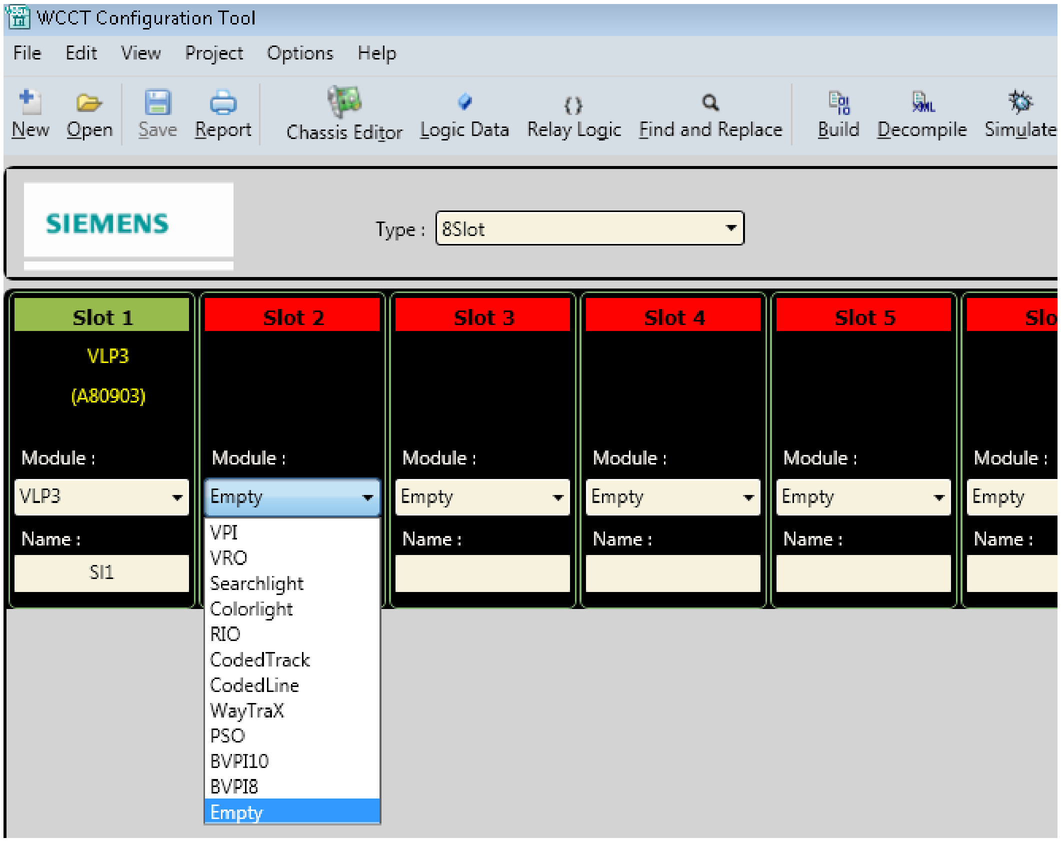
Slot 7 Module : Empty Name :

Slot 8 Module : Empty Name :

Figure 4-8 Chassis Editor

4.3 SELECTING MODULES

Click on the **Module** drop-down box on the required slot to select the desired module.


WCCT Configuration Tool
File Edit View Project Options Help
New Open Save Report Chassis Editor Logic Data Relay Logic Find and Replace Build Decompile Simulate
SIEMENS
VPI
VRO
Searchlight
Colorlight
RIO
CodedTrack
CodedLine
WayTraX
PSO
BVPI10
BVPI8
Empty

Type : 8Slot

Slot 1 VLP3 (A80903) Module : VLP3 Name : SI1

Slot 2 Module : Empty

Slot 3 Module : Empty Name :

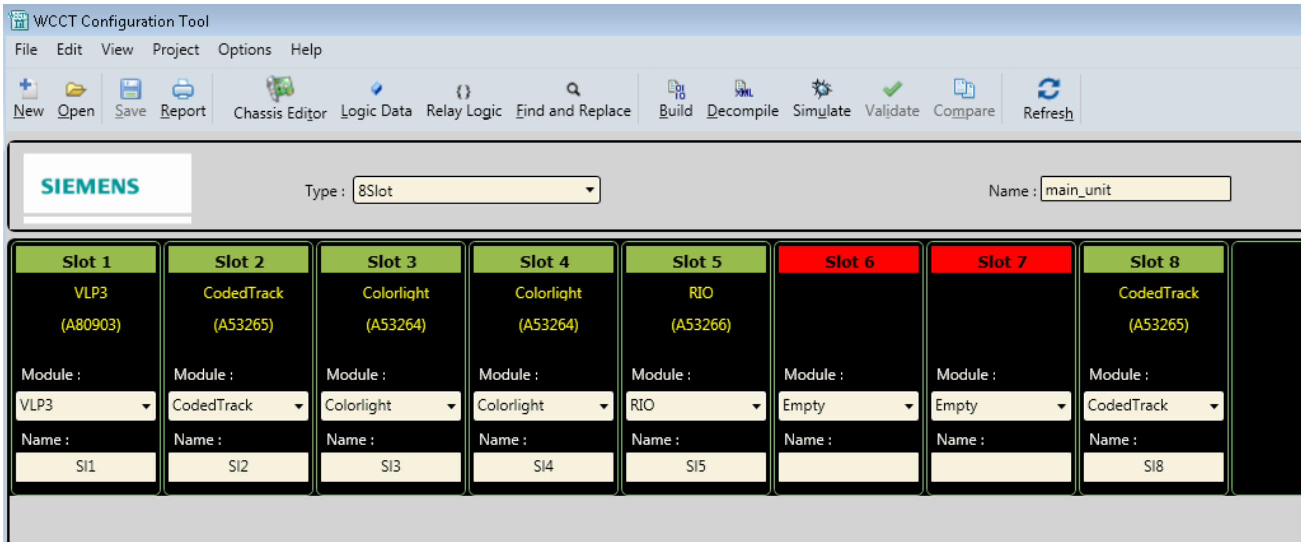
Slot 4 Module : Empty Name :

Slot 5 Module : Empty Name :

Slo Module : Empty Name :

Figure 4-9 WCCT Chassis Editor Selecting Modules

The WCCT shows the selected modules in green.



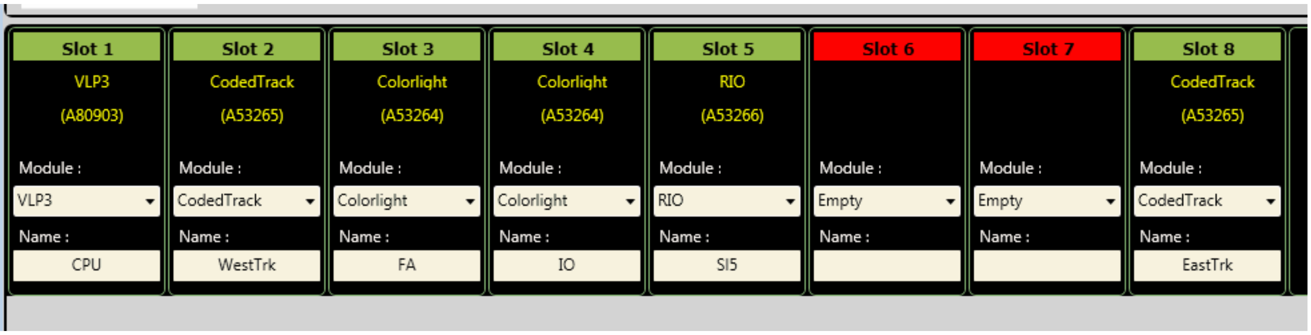
Type : 8Slot

Name : main_unit

Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8
VLP3	CodedTrack	Colorlight	Colorlight	RIO			CodedTrack
(A80903)	(A53265)	(A53264)	(A53264)	(A53266)			(A53265)
Module : VLP3	Module : CodedTrack	Module : Colorlight	Module : Colorlight	Module : RIO	Module : Empty	Module : Empty	Module : CodedTrack
Name : SI1	Name : SI2	Name : SI3	Name : SI4	Name : SI5	Name :	Name :	Name : SI8

Figure 4-10 Saved Modules Screen

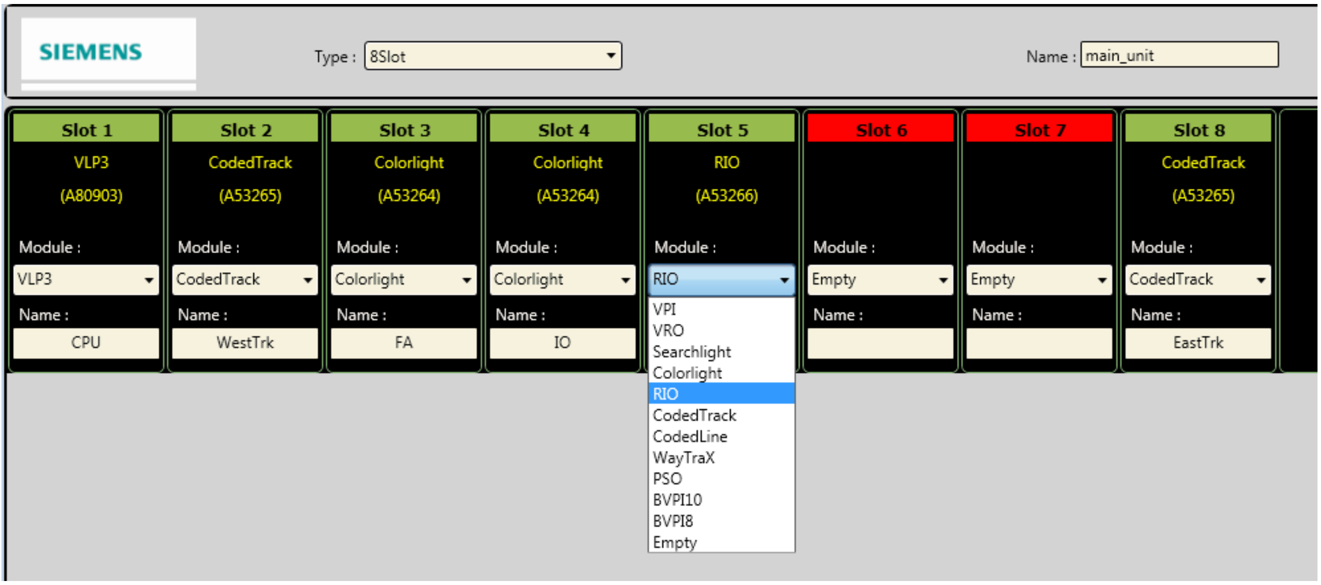
The default module names appear as SL1, SL2, etc. (meaning slot 1, slot 2). To change these, type in a new name for the module, e.g. CPU, WestTrk, FA, IO, etc. as shown in the following figure:



Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8
VLP3	CodedTrack	Colorlight	Colorlight	RIO			CodedTrack
(A80903)	(A53265)	(A53264)	(A53264)	(A53266)			(A53265)
Module : VLP3	Module : CodedTrack	Module : Colorlight	Module : Colorlight	Module : RIO	Module : Empty	Module : Empty	Module : CodedTrack
Name : CPU	Name : WestTrk	Name : FA	Name : IO	Name : SI5	Name :	Name :	Name : EastTrk

Figure 4-11 Setting Module Names

New modules can still be added by selecting empty slots.



SIEMENS

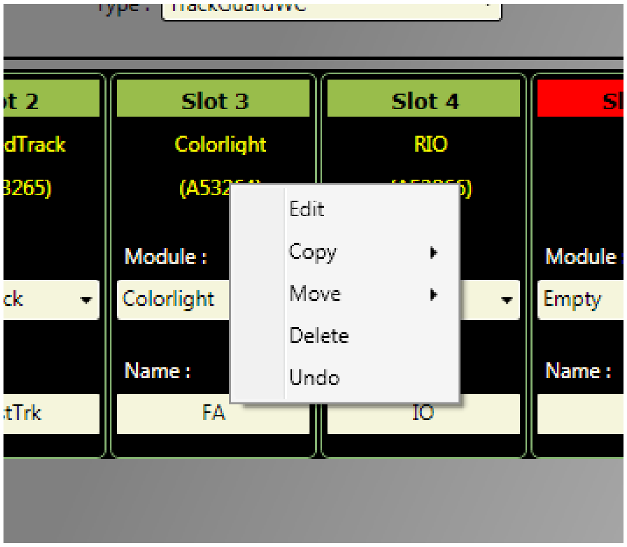
Type : 8Slot

Name : main_unit

Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8
VLP3	CodedTrack	Colorlight	Colorlight	RIO			CodedTrack
(A80903)	(A53265)	(A53264)	(A53264)	(A53266)			(A53265)
Module : VLP3	Module : CodedTrack	Module : Colorlight	Module : Colorlight	Module : RIO	Module : Empty	Module : Empty	Module : CodedTrack
Name : CPU	Name : WestTrk	Name : FA	Name : IO		Name :	Name :	Name : EastTrk

Figure 4-12 Adding New Modules

To edit the module, either double-click it or right-click and select **Edit** from the drop-down menu. The drop-down menu also allows the module to be deleted, copied, or the last change undone.



t 2	Slot 3	Slot 4	Sl
dTrack	Colorlight	RIO	
3265)	(A532		
	Module : Colorlight		Module Empty
tTrk	Name : FA	IO	Name :

Figure 4-13 Edit or Configure Modules

4.4 SETTING MODULE CONFIGURATION AND I/O NAMES

Double-click on a module or right-click and select **Edit**; this will bring up windows that allow the user to set the configuration parameters for each module and assign the names to the I/O points that are used in the application logic. Refer to Section 3.0 for further information.

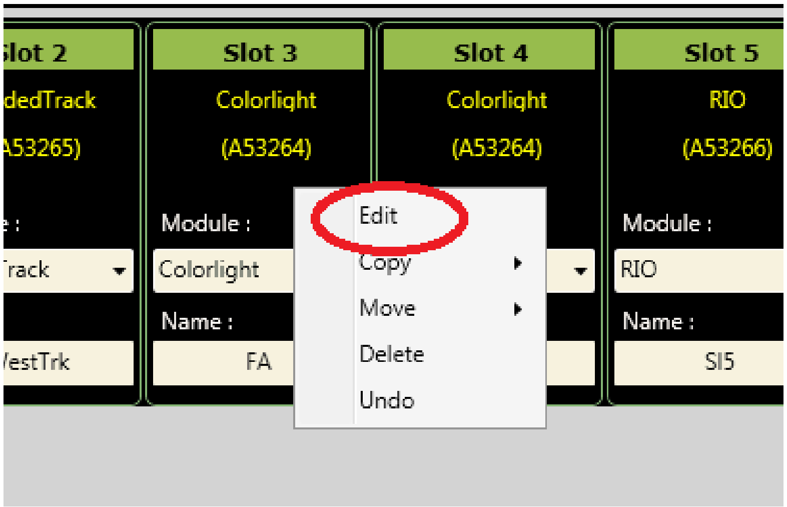


Figure 4-14 Setting Configuration Parameters

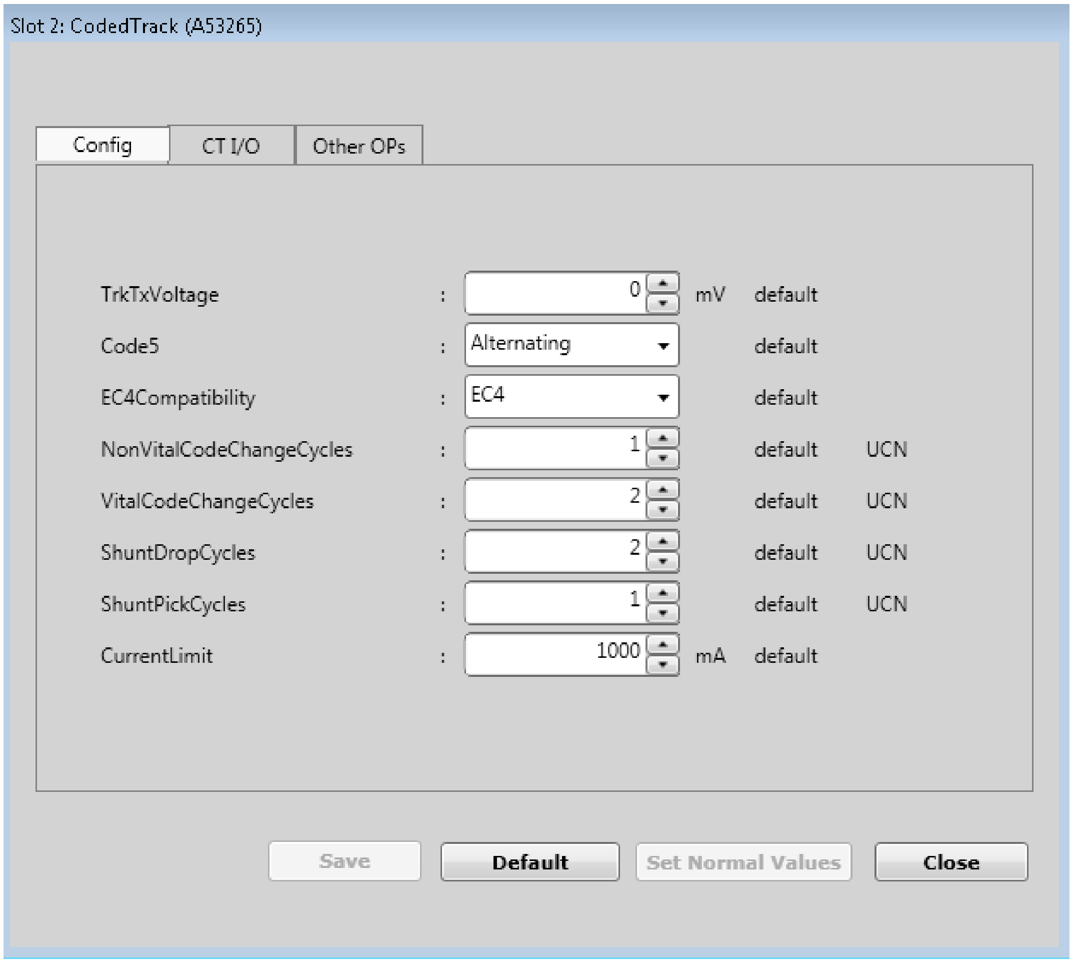
Selecting the **Edit** button for the **CodedTrack** slot, for example, brings up the following window which allows you to set the coded track configuration parameters.

NOTE

NOTE

These are the default configuration parameter settings for this MCF. The actual values to be used in a specific installation can be changed using the Office Configuration Editor (OCE) or set in the field.

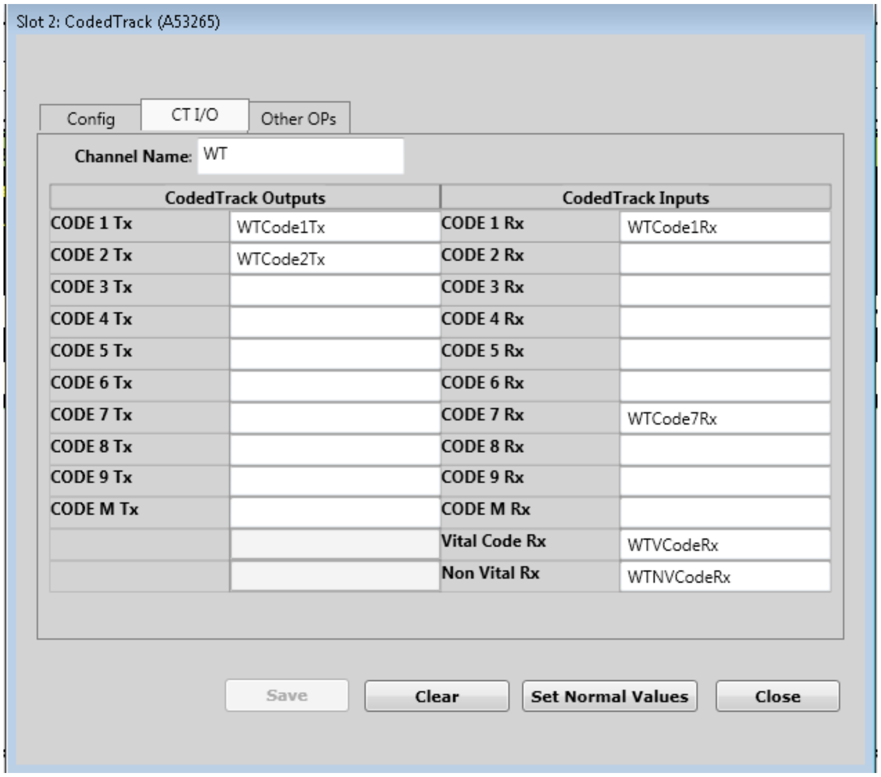
In the screen shown in the following figure, **default** indicates the parameter is still at its default value. UCN indicates the parameter is included in the UCN calculation. Selecting the **Default** button will set all parameters back to their default values.



TrkTxVoltage	:	0	mV	default	
Code5	:	Alternating		default	
EC4Compatibility	:	EC4		default	
NonVitalCodeChangeCycles	:	1		default	UCN
VitalCodeChangeCycles	:	2		default	UCN
ShuntDropCycles	:	2		default	UCN
ShuntPickCycles	:	1		default	UCN
CurrentLimit	:	1000	mA	default	

Figure 4-15 Configuration Editor

To assign names to the I/O to be used, select one of the tabs at the top of the window. Selecting CT I/O, for example, shows the available fields (as shown in the following figure). For coded track modules, a channel name needs to be entered, then the names for the Boolean variables (representing codes to be transmitted or received) can be added.



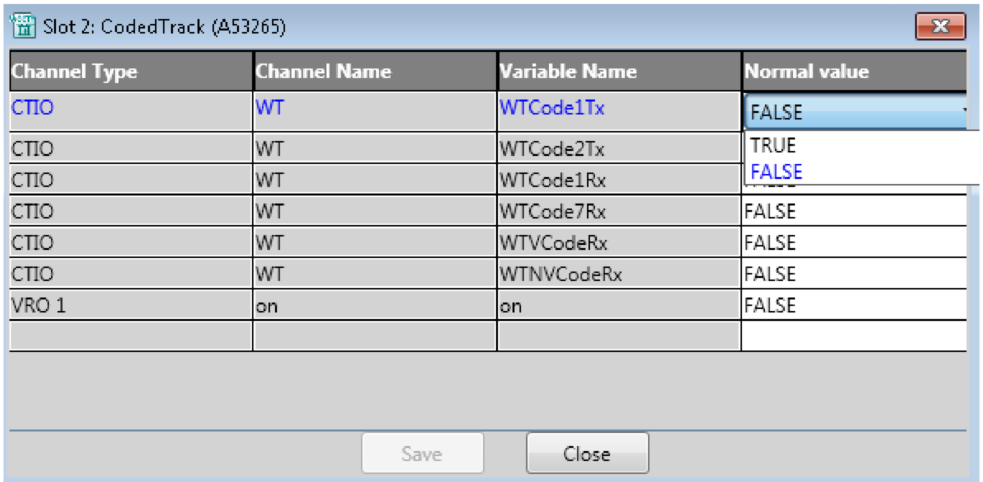
Channel Name: WT

CodedTrack Outputs		CodedTrack Inputs	
CODE 1 Tx	WTCode1Tx	CODE 1 Rx	WTCode1Rx
CODE 2 Tx	WTCode2Tx	CODE 2 Rx	
CODE 3 Tx		CODE 3 Rx	
CODE 4 Tx		CODE 4 Rx	
CODE 5 Tx		CODE 5 Rx	
CODE 6 Tx		CODE 6 Rx	
CODE 7 Tx		CODE 7 Rx	WTCode7Rx
CODE 8 Tx		CODE 8 Rx	
CODE 9 Tx		CODE 9 Rx	
CODE M Tx		CODE M Rx	
		Vital Code Rx	WTVCodeRx
		Non Vital Rx	WTNVCodeRx

Figure 4-16   Assigning Names to the I/O

To save changes at any time, use the **Save** button and continue. To delete all entries, select **Clear**. To select the normal states of the relay contacts that will be shown in the relay logic for these inputs, select the **Set Normal Values** button. This button can only be selected once inputted values are saved. This will bring up a window that allows the selection of the Normal Values for each state that has been defined for this module. Press the **Close** button once you have finished setting the Normal value.

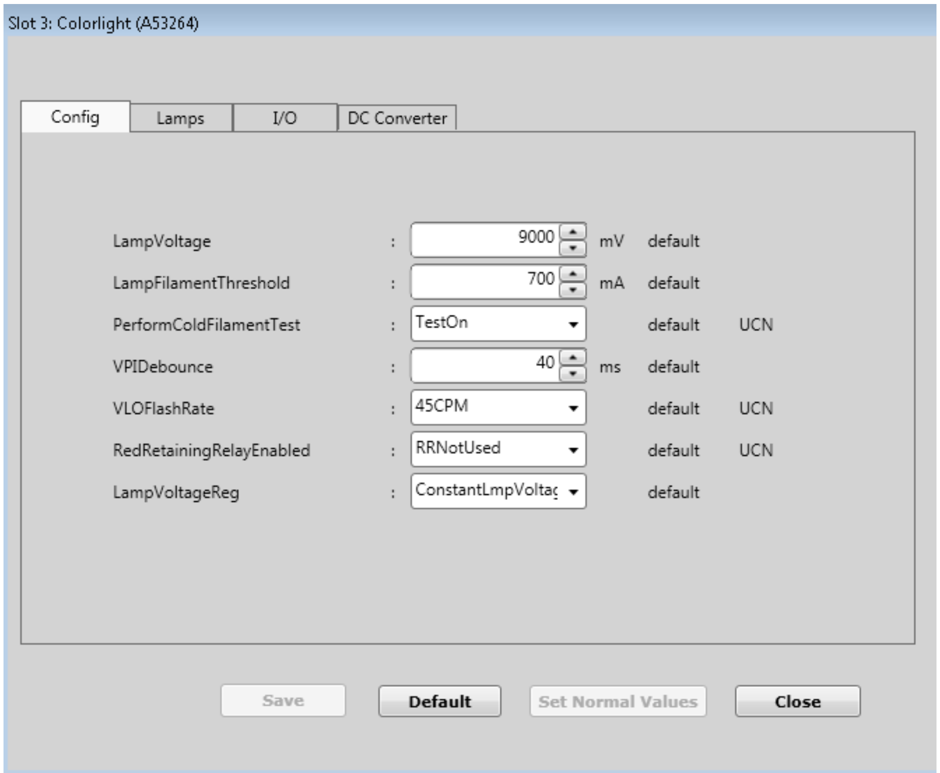
Since there are no scroll bars on the Normal State windows, use the up/down arrow keys to navigate.



Channel Type	Channel Name	Variable Name	Normal value
CTIO	WT	WTCode1Tx	FALSE
CTIO	WT	WTCode2Tx	
CTIO	WT	WTCode1Rx	
CTIO	WT	WTCode7Rx	FALSE
CTIO	WT	WTVCodeRx	FALSE
CTIO	WT	WTNVCodeRx	FALSE
VRO 1	on	on	FALSE

Figure 4-17   Normal State Window

Once the selected module is complete, close the window and select the next module. For the Colorlight module, follow the same process of right-clicking and selecting **Edit.** This will bring up its configuration parameters.



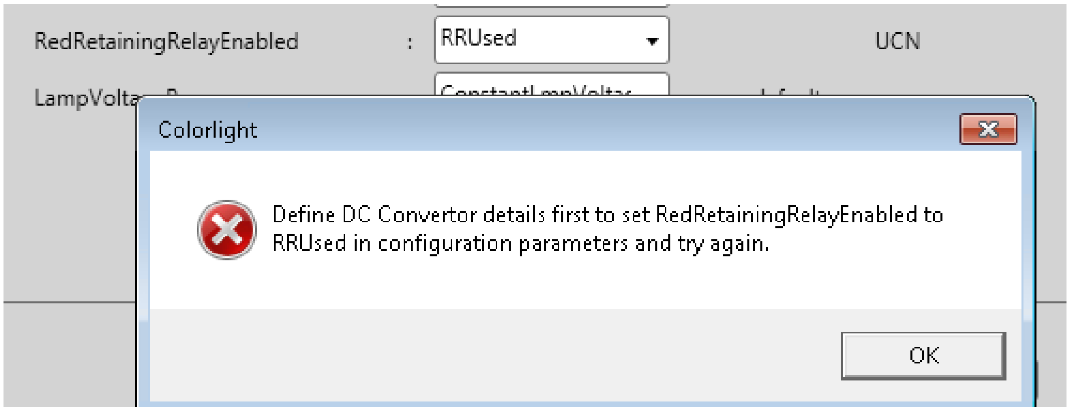
LampVoltage	:	9000	mV	default	
LampFilamentThreshold	:	700	mA	default	
PerformColdFilamentTest	:	TestOn		default	UCN
VPIDebounce	:	40	ms	default	
VLOFlashRate	:	45CPM		default	UCN
RedRetainingRelayEnabled	:	RRNotUsed		default	UCN
LampVoltageReg	:	ConstantLmpVoltag		default	

Figure 4-18 Saving Changes

NOTE

If RedRetainingRelayEnabled is set to RRUsed, then the DC Converter must be controlled by the application logic.

If no converter channel has been defined in the **DC Converter** tab, the WCCT will give a warning message that the converter channel needs to be defined. Before leaving the Colorlight module editor, go to the **DC Converter** tab and add in the necessary channel and logic state names (see section 3.7.4).



RedRetainingRelayEnabled : RRUsed UCN

Define DC Convertor details first to set RedRetainingRelayEnabled to RRUsed in configuration parameters and try again.

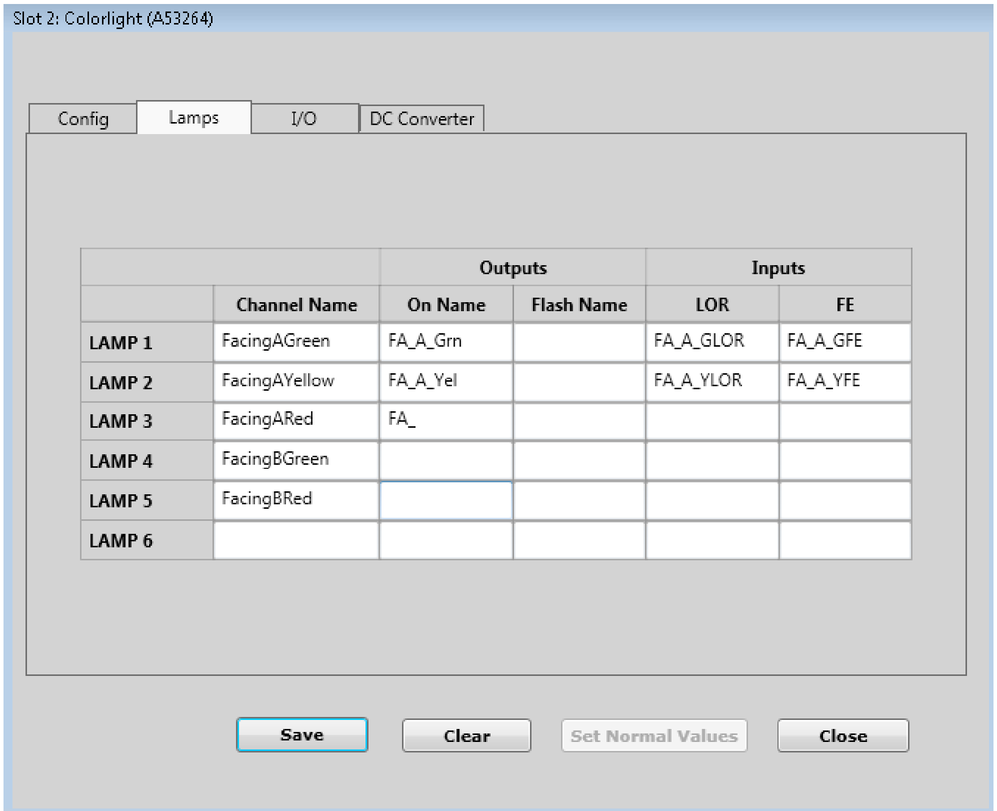
Figure 4-19 DC-DC Converter Warning

After the configuration changes have been made, enter names for the lamp controls and lamp feedback.

NOTE

NOTE

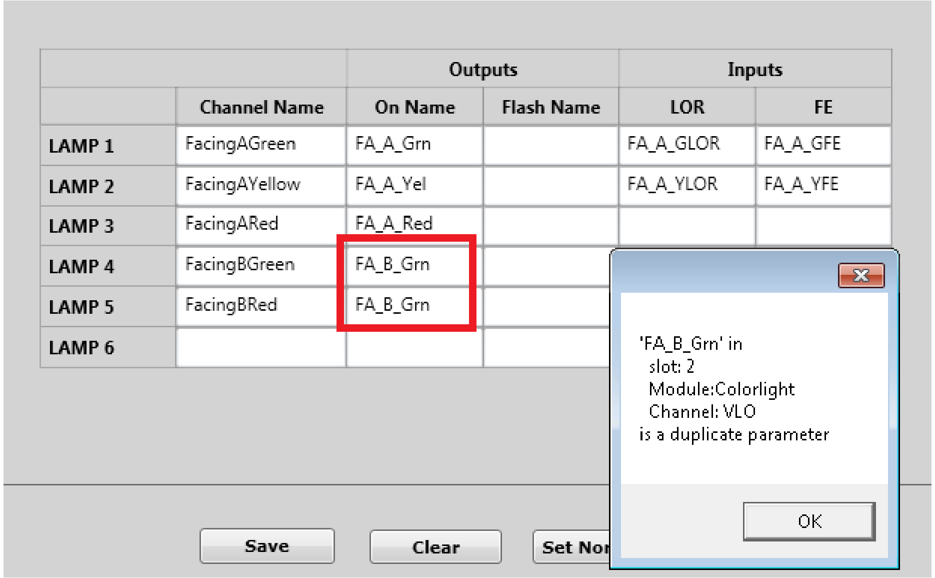
Ctrl C can be used to copy names and Ctrl V to paste.



		Outputs		Inputs	
	Channel Name	On Name	Flash Name	LOR	FE
LAMP 1	FacingAGreen	FA_A_Grn		FA_A_GLOR	FA_A_GFE
LAMP 2	FacingAYellow	FA_A_Yel		FA_A_YLOR	FA_A_YFE
LAMP 3	FacingARed	FA_			
LAMP 4	FacingBGreen				
LAMP 5	FacingBRed				
LAMP 6					

Figure 4-20 Entering Names for Lamps and Controls

If a duplicate name is found, the WCCT will indicate an error.

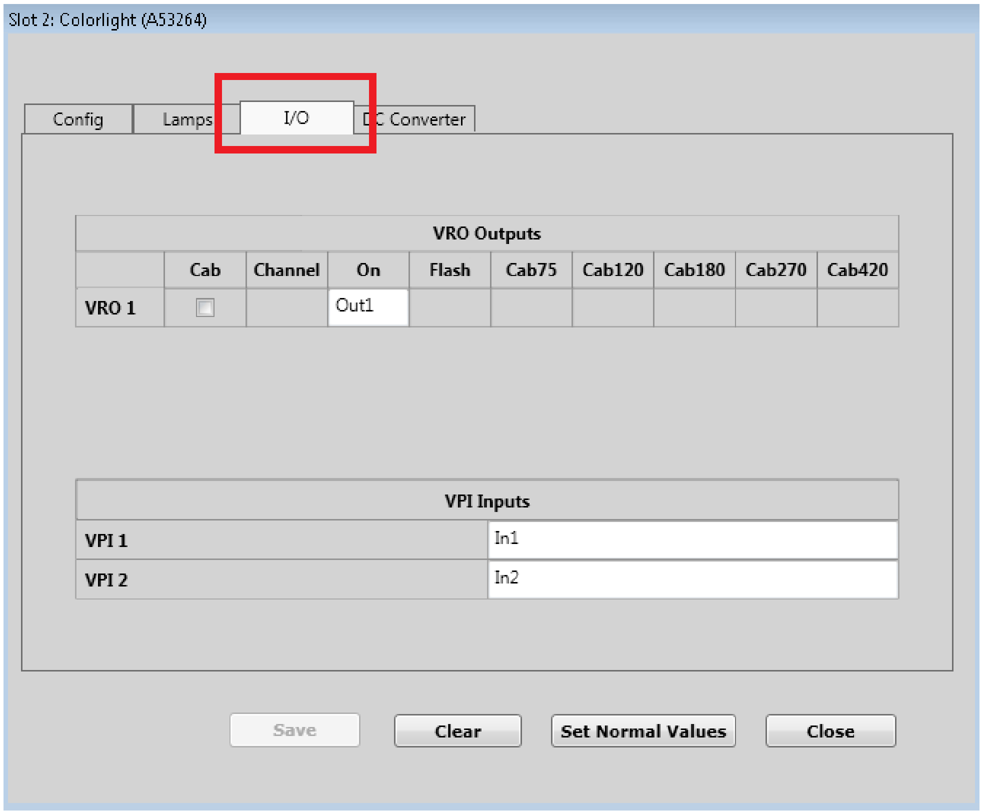


		Outputs		Inputs	
	Channel Name	On Name	Flash Name	LOR	FE
LAMP 1	FacingAGreen	FA_A_Grn		FA_A_GLOR	FA_A_GFE
LAMP 2	FacingAYellow	FA_A_Yel		FA_A_YLOR	FA_A_YFE
LAMP 3	FacingARed	FA_A_Red			
LAMP 4	FacingBGreen	FA_B_Grn			
LAMP 5	FacingBRed	FA_B_Grn			
LAMP 6					

'FA_B_Grn' in
slot: 2
Module:Colorlight
Channel: VLO
is a duplicate parameter

Figure 4-21 Duplicate Name Error Message

After the lamp control and feedback names have been entered, enter names for the vital input and outputs.



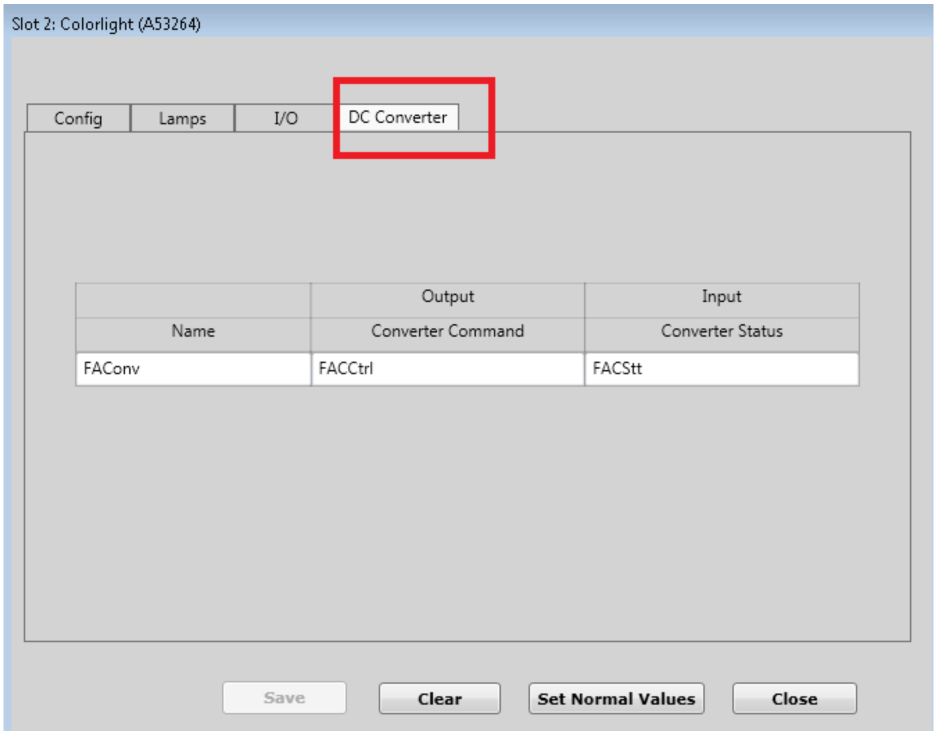
Slot 2: Colorlight (A53264)

	VRO Outputs								
	Cab	Channel	On	Flash	Cab75	Cab120	Cab180	Cab270	Cab420
VRO 1	□		Out1						

VPI Inputs	
VPI 1	In1
VPI 2	In2

Figure 4-22 Entering Vital Input and Output Names

If a signal is split over multiple modules, you may need to write logic to synchronize the DC-DC converters on the modules (see Section 3.7.4), in this case, select the DC Converter tab and enter a name for the Boolean states that will be used to control the converter and monitor its state.



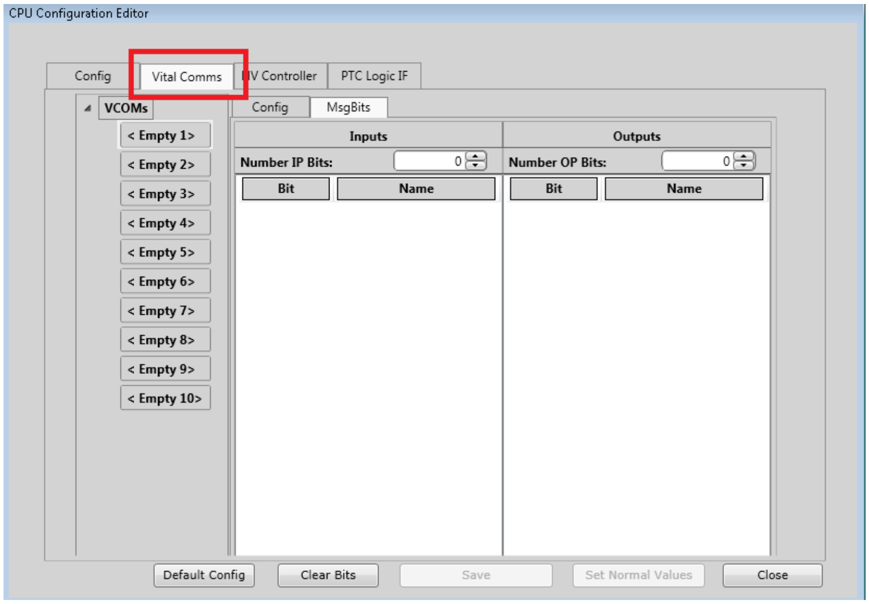
	Output	Input
Name	Converter Command	Converter Status
FAConv	FACCtrl	FACStt

Figure 4-23 Entering Boolean State Names for Converters

Proceed through each module, setting the configuration and I/O points. See individual I/O Module editor sections (Sections 3.4 through 3.11) for more details.

4.5 SETTING VITAL COMMUNICATIONS BETWEEN MULTIPLE WAYCONNEX

If the application uses multiple WayConneX chassis that need to communicate to each other, you will need to create vital communication links (VComms channels) between them. Double-click on the Slot 1 VLP3 module and then select the Vital Comms Tab. This will bring up the screen shown in the following graphic. Up to 10 vital communication channels can be created.

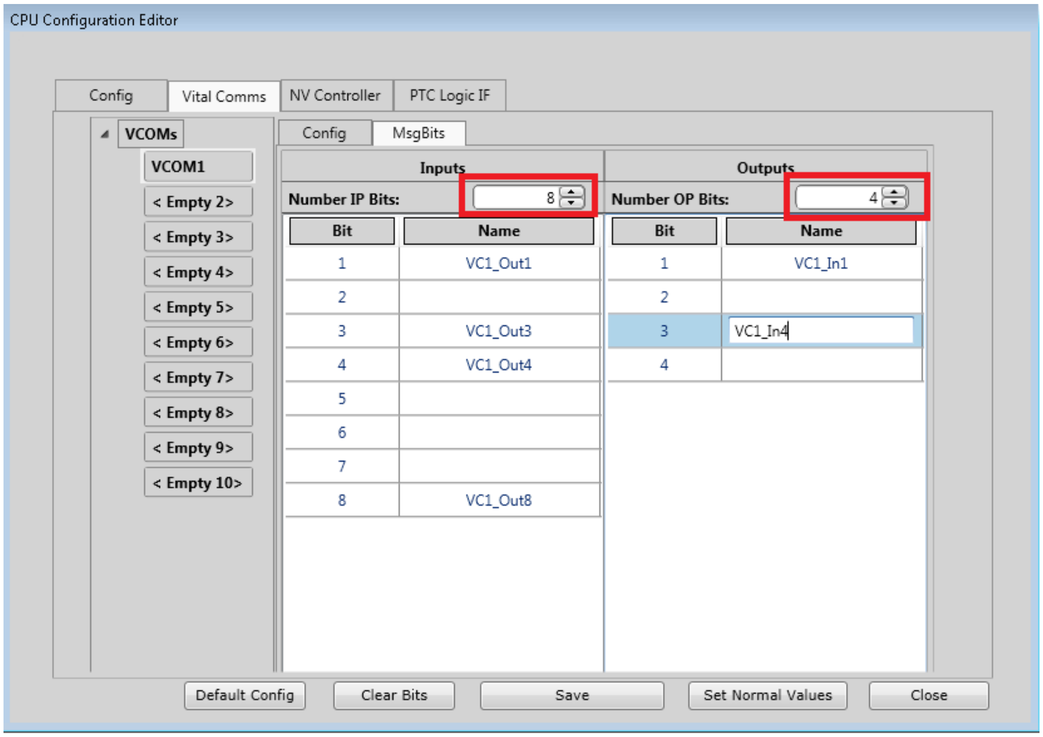


Number IP Bits: 0

Number OP Bits: 0

Figure 4-24 Setting Vital Communication Links for Multiple WayConneX

Select the required number of input and output bits for the first channel. Bits can be left empty if necessary.



Number IP Bits: 8

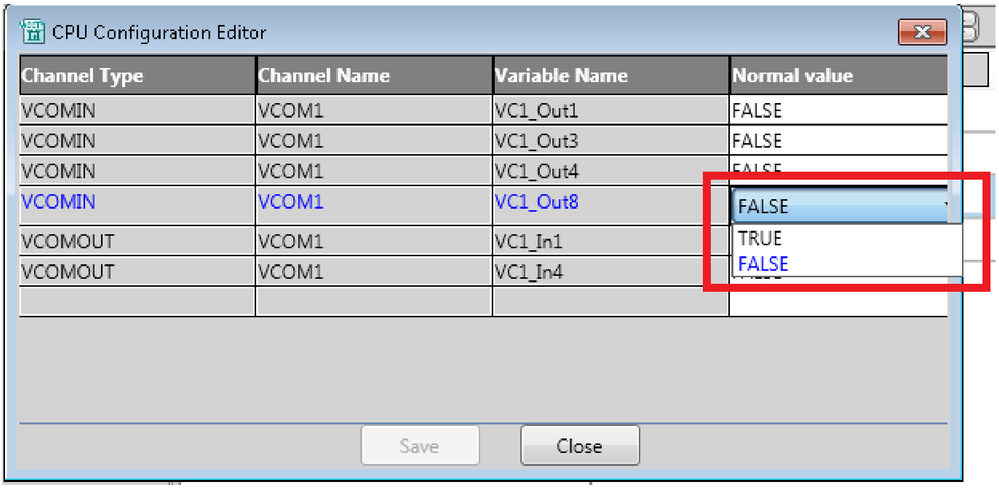
Bit	Name
1	VC1_Out1
2	
3	VC1_Out3
4	VC1_Out4
5	
6	
7	
8	VC1_Out8

Number OP Bits: 4

Bit	Name
1	VC1_In1
2	
3	VC1_In4
4	

Figure 4-25 Selecting Number of Input and Output Bits

The user can set normal values to be displayed for these inputs and outputs by selecting the **Set Normal Values** button. This will bring up a window like the one shown in the following figure where the user can select the Normal values.

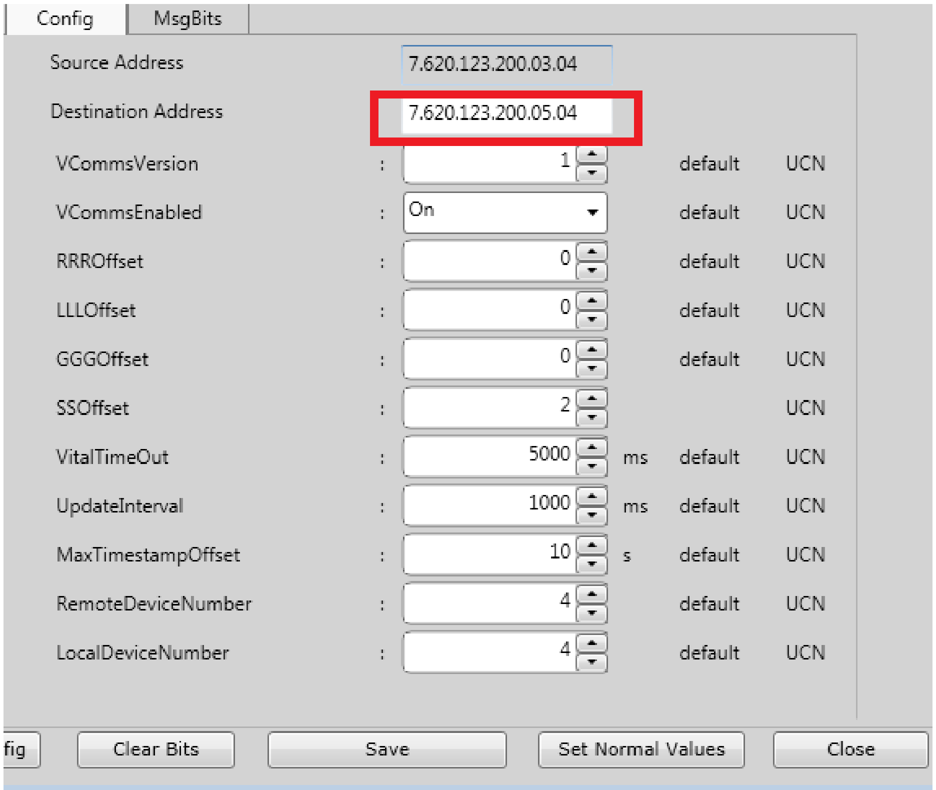


CPU Configuration Editor

Channel Type	Channel Name	Variable Name	Normal value
VCOMIN	VCOM1	VC1_Out1	FALSE
VCOMIN	VCOM1	VC1_Out3	FALSE
VCOMIN	VCOM1	VC1_Out4	FALSE
VCOMIN	VCOM1	VC1_Out8	FALSE
VCOMOUT	VCOM1	VC1_In1	
VCOMOUT	VCOM1	VC1_In4	

Figure 4-26 Setting Normal States

Select the **Config** tab to show the configuration properties for this VComms channel. As with all configuration parameters, the actual values used for a particular installation in the field will be set using the OCE.



Source Address		7.620.123.200.03.04			
Destination Address		7.620.123.200.05.04			
VCommsVersion	:	1		default	UCN
VCommsEnabled	:	On		default	UCN
RRROffset	:	0		default	UCN
LLLOffset	:	0		default	UCN
GGGOffset	:	0		default	UCN
SSOffset	:	2			UCN
VitalTimeOut	:	5000	ms	default	UCN
UpdateInterval	:	1000	ms	default	UCN
MaxTimestampOffset	:	10	s	default	UCN
RemoteDeviceNumber	:	4		default	UCN
LocalDeviceNumber	:	4		default	UCN

Figure 4-27 Vital Communication Parameter Configuration per Channel

The source ATCS address of the unit shown is set in the Project Properties. The destination ATCS address of the neighbor can be set either by editing the Destination address text box, or by changing the offsets (RRROffset, LLLOffset, GGGOffset, SSOffset). The WCCT will limit the value of the offsets entered so that the resulting address is not illegal.

When the value in the destination address is changed, the WCCT automatically recalculates the offsets. Similarly, if the offset values are changed, the WCCT recalculates the destination address. See section 3.4.2.1 for more details.

NOTE

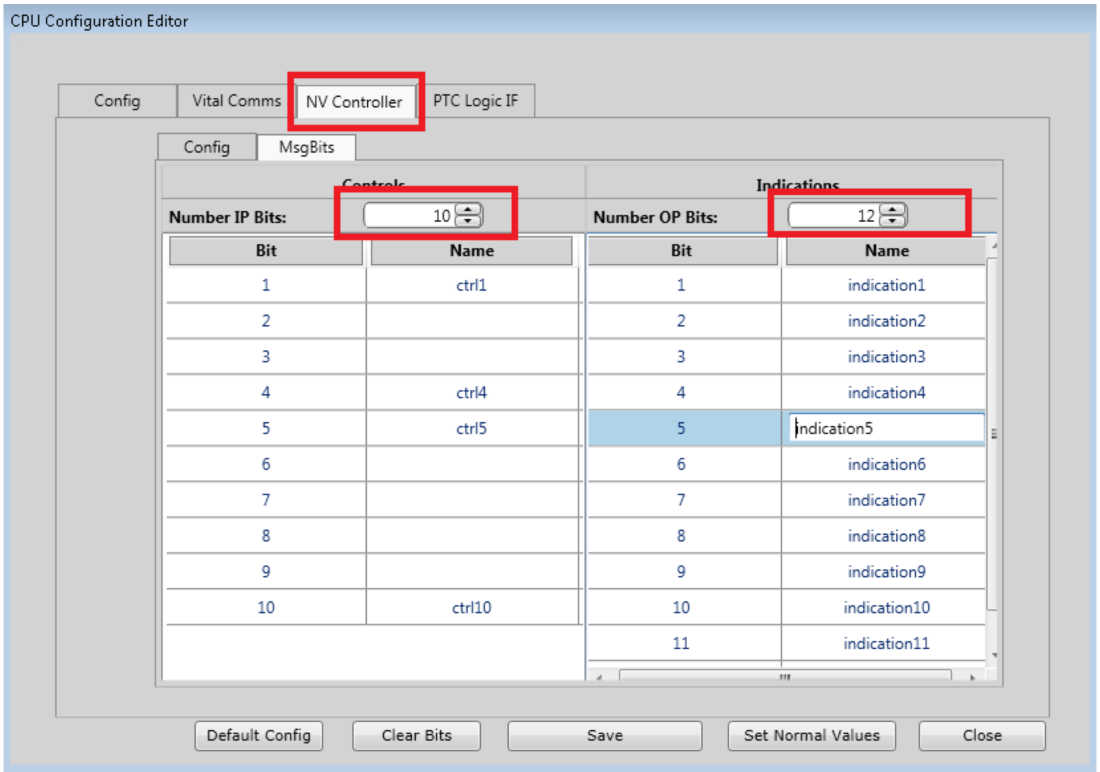
NOTE

Each VComms channels must have a unique set of ATCS source/destination addresses. If multiple VComms channels are used between the same WayConneX, give them unique Local and Remote Device Numbers.

4.6 SETTING INTERFACE TO A NON-VITAL CONTROLLER

If the application is at a control point and is required to receive controls from the dispatch system and send back indications to it, a non-vital controller such as the SEAR II can be used. The SEAR II will receive a control message from the dispatcher and, using its internal non-vital logic, will send a message on to each WayConneX it is connected to. Each WayConneX will send an indication message back to the SEAR II, and the SEAR II will consolidate this into one indication message back to the dispatcher.

In order to define the format of the Control and Indication message for one particular WayConneX, select the NV Controller tab. This will bring up a screen like the one illustrated in the following graphic.



Number IP Bits: 10

Number OP Bits: 12

Bit	Name	Bit	Name
1	ctrl1	1	indication1
2		2	indication2
3		3	indication3
4	ctrl4	4	indication4
5	ctrl5	5	indication5
6		6	indication6
7		7	indication7
8		8	indication8
9		9	indication9
10	ctrl10	10	indication10
		11	indication11

Figure 4-28 NV Controller Tab Display

Select the desired number of control bits and indication bits in the message. Then fill in the names to be used in the logic for the control (input) bits and indication (output) bits. Unused bits can be left blank. The WCCT will check to make sure the names used in this screen are unique. The user can set the normal values to be displayed for these inputs and outputs by selecting the **Set Normal Values** button.

4.7 SETTING INTERFACE TO PTC SYSTEM

If the application is required to send PTC messages to PTC equipped locomotives, the WCCT provides a straightforward way of defining the PTC message. PTC messages are only supported for WayConneX applications using CPU III. Selecting the **PTC Logic IF** tab will bring up the following screen.

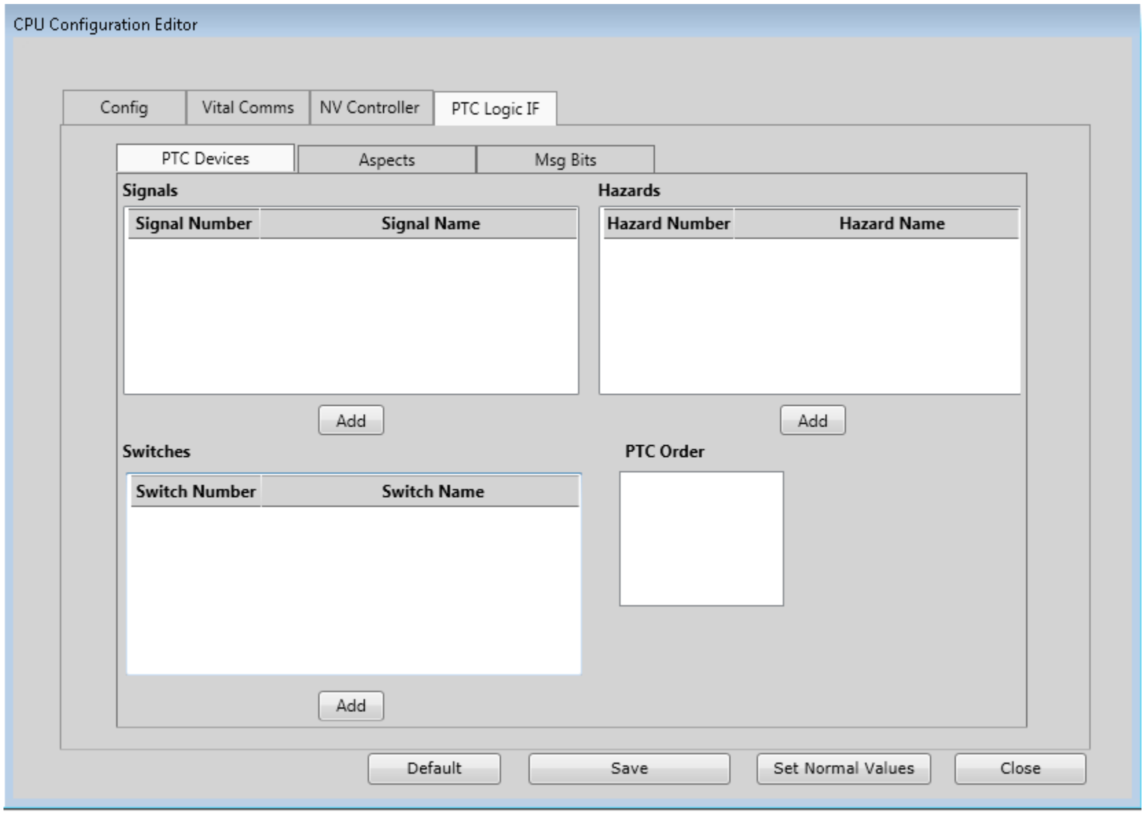
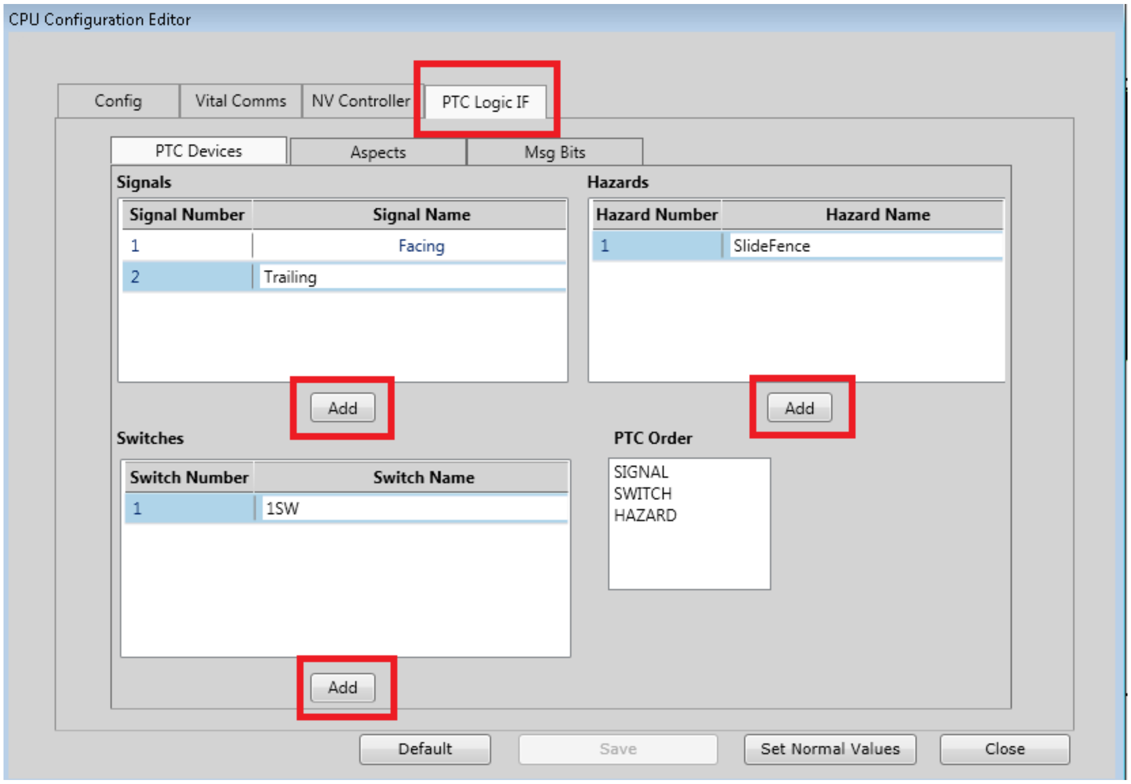


Figure 4-29 PTC Logic IF Tab Display

For each signal used in the application, press **Add** to add a signal and enter its name. The same process is repeated for switches and hazard detectors. The following figure illustrates a location with two signals, one switch, and one hazard detector.



Signals

Signal Number	Signal Name
1	Facing
2	Trailing

Hazards

Hazard Number	Hazard Name
1	SlideFence

Switches

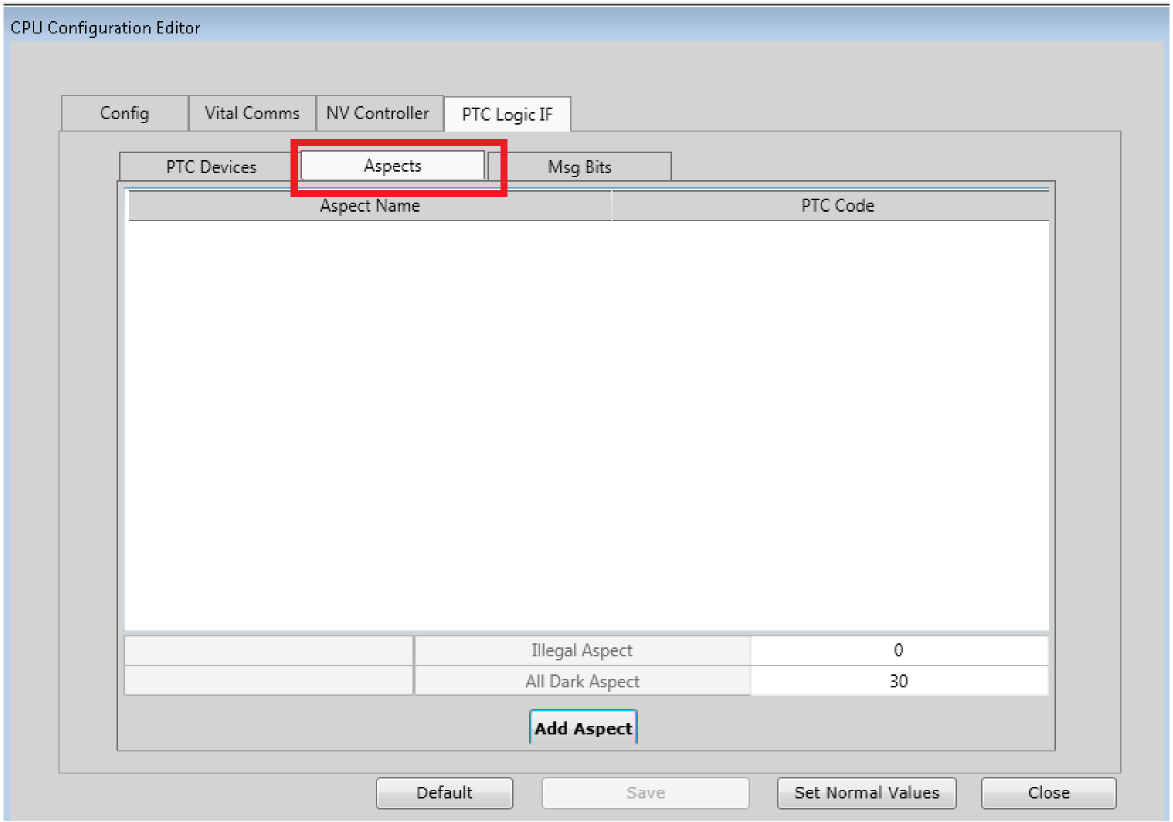
Switch Number	Switch Name
1	1SW

PTC Order

SIGNAL
SWITCH
HAZARD

Figure 4-30 Adding Signals, Switches, and Hazards

The default order for reporting PTC devices is Signals, Switch, and Hazard detector as shown in the text box in the lower right corner. Once the PTC devices have been entered, select **Save**, then, if signals are used, select the **Aspects** tab. On this tab the user can add in the signal aspects and their respective PTC Codes that are used by all the signals in this application. Two fixed aspects (**Illegal Aspect** and **All Dark Aspect)** are always present. By default they have the codes of 0 and 30 respectively, but these can be changed if required.

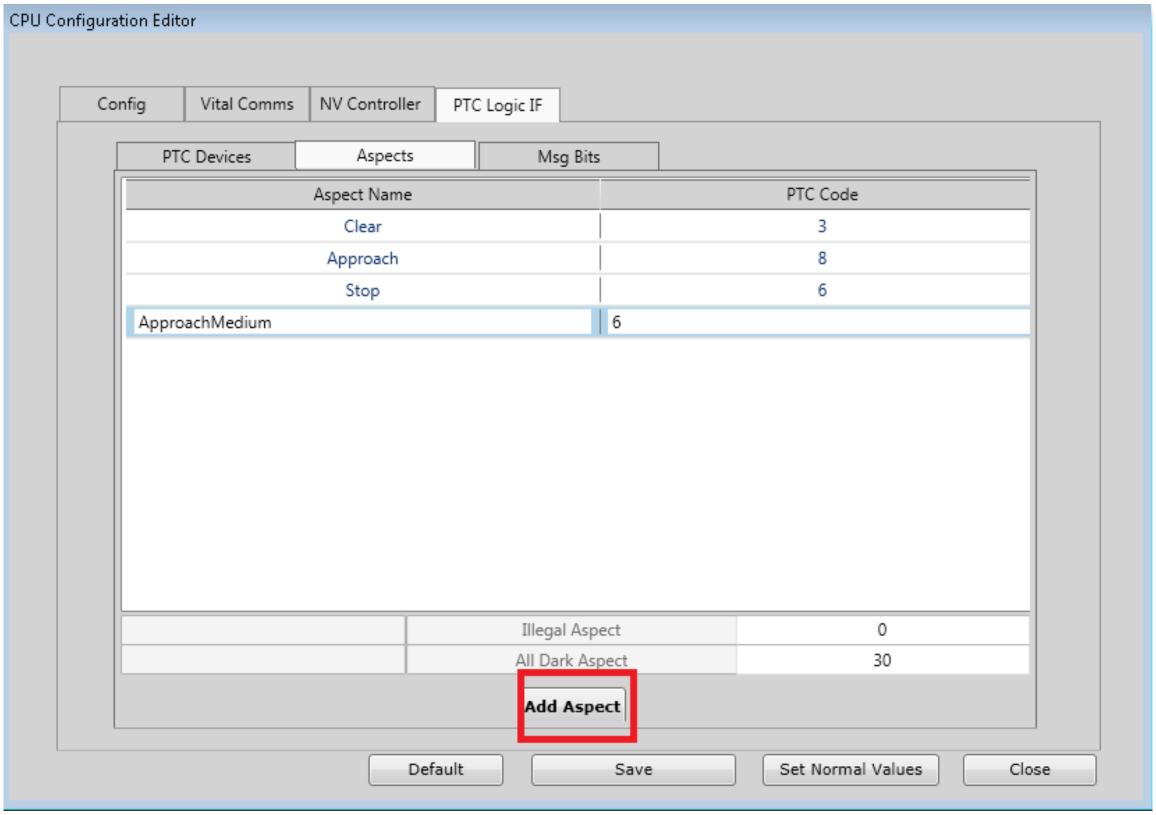


Aspect Name	PTC Code

	Illegal Aspect	0
	All Dark Aspect	30

Figure 4-31 Aspects Tab

Press the **Add Aspect** button to add in new aspects and define their PTC codes. An example is shown in the following figure.



Aspect Name	PTC Code
Clear	3
Approach	8
Stop	6
ApproachMedium	6

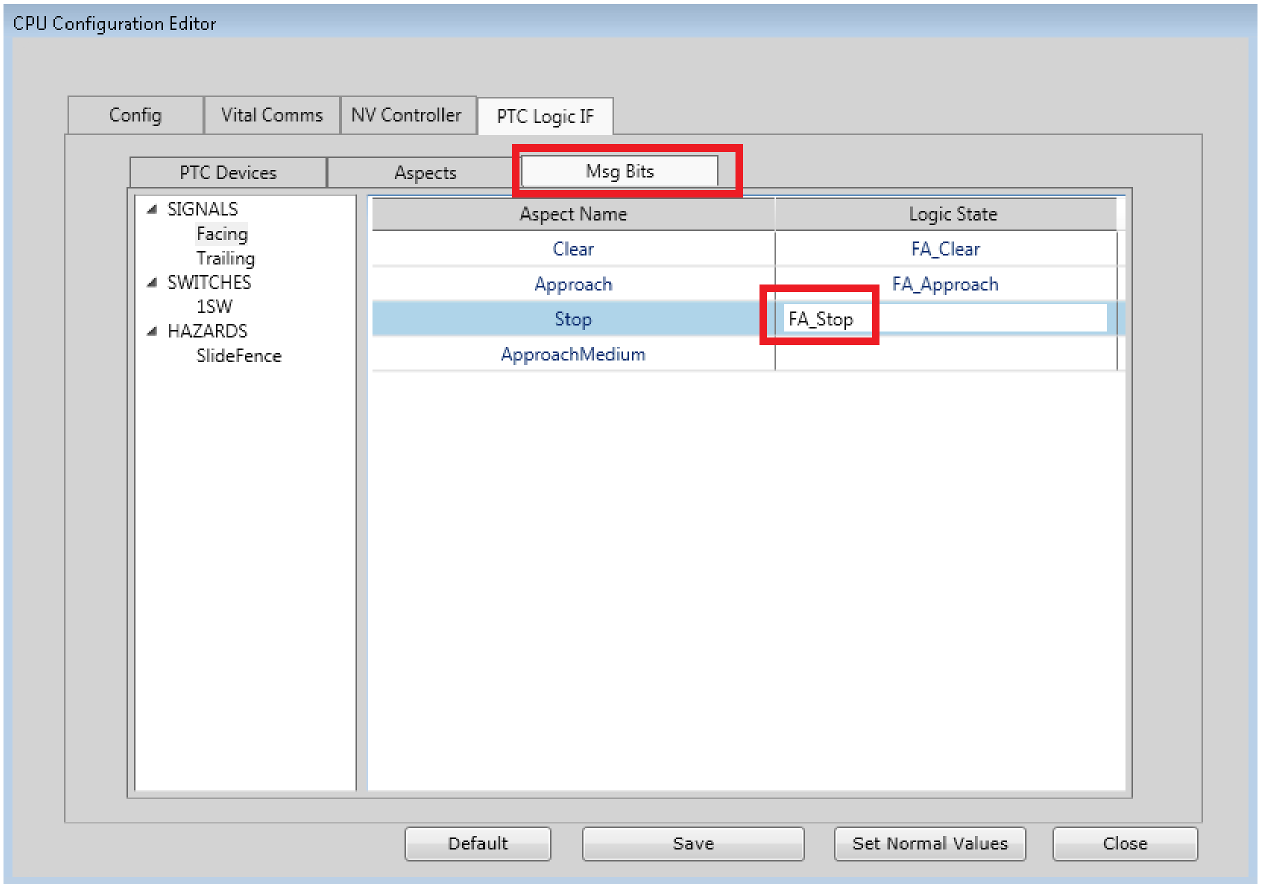
Illegal Aspect	0
All Dark Aspect	30

Figure 4-32 Adding Aspects and Defining PTC Codes

Spaces are not allowed in aspect names. Up to 30 aspects can be entered in addition to the **IllegalAspect** and **AllDarkAspect**. Multiple aspects can be entered with the same PTC code, so the same MCF could be used across multiple territories where the aspect is given different names.

The next step is to assign states to control the bits in the PTC message. Select the Msg Bits tab. This will show a list of all the PTC Devices on the left. For each signal, the names of each possible aspect entered in the aspect tab are shown.

Enter a logic state name for each aspect the respective signal is capable of displaying. If the signal does not use an aspect, leave the entry blank.

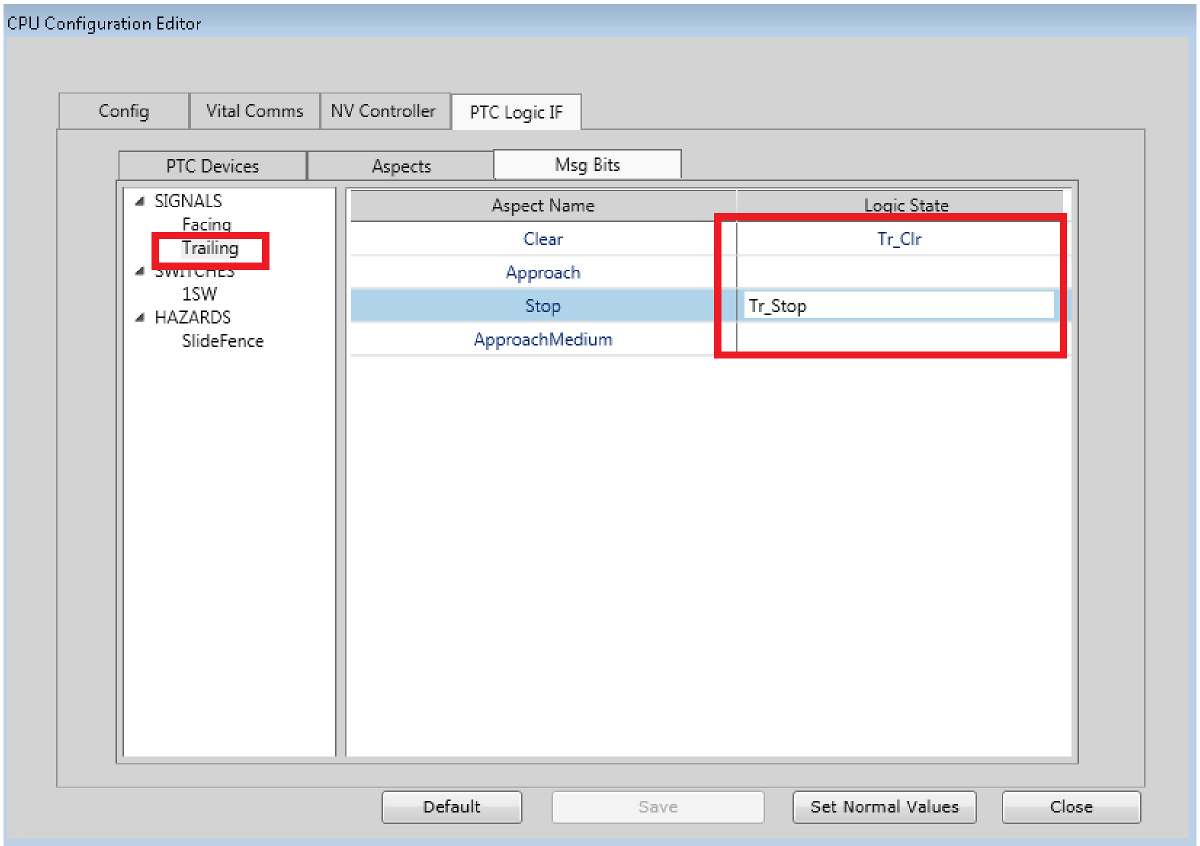


Aspect Name	Logic State
Clear	FA_Clear
Approach	FA_Approach
Stop	FA_Stop
ApproachMedium	

Figure 4-33 Entering Logic State Names

The WCCT will automatically create output logic states for the logic state names. When writing the application logic, set the states of these to the variables that indicate when the signal is displaying this aspect. Only one aspect bit should be set at once. If multiple aspect bits are set, the CPU III will send a PTC code with the value you defined for IllegalAspect. If no aspect bits are set, the CPU III will send a PTC code with the value you defined for AllDarkAspect.

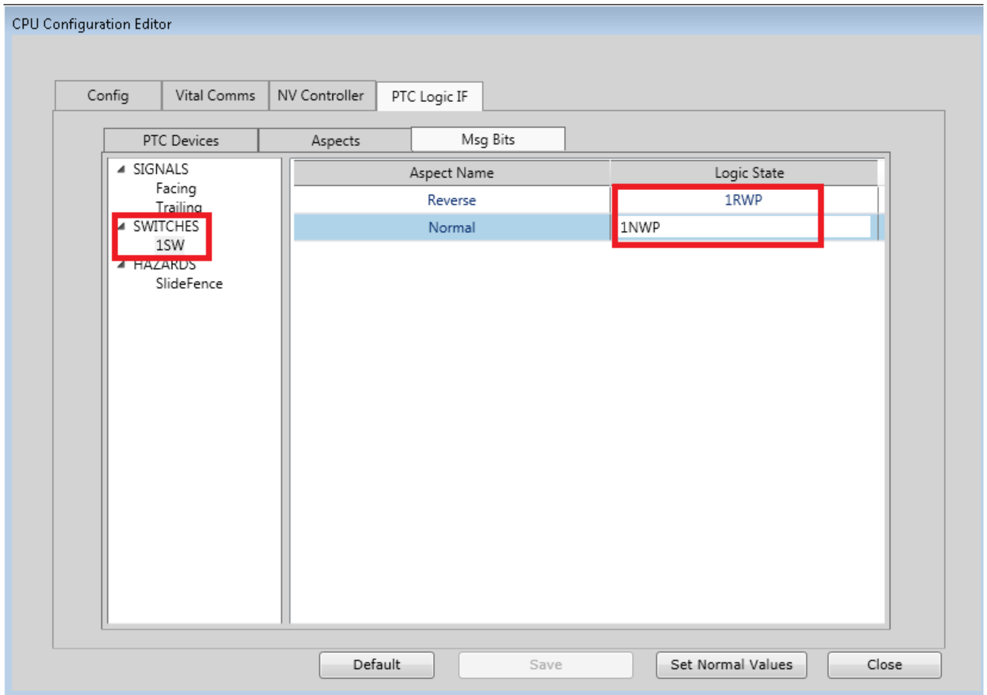
Repeat this for each Signal.



Aspect Name	Logic State
Clear	Tr_Clr
Approach	
Stop	Tr_Stop
ApproachMedium	

Figure 4-34 Setting Logic State Variables

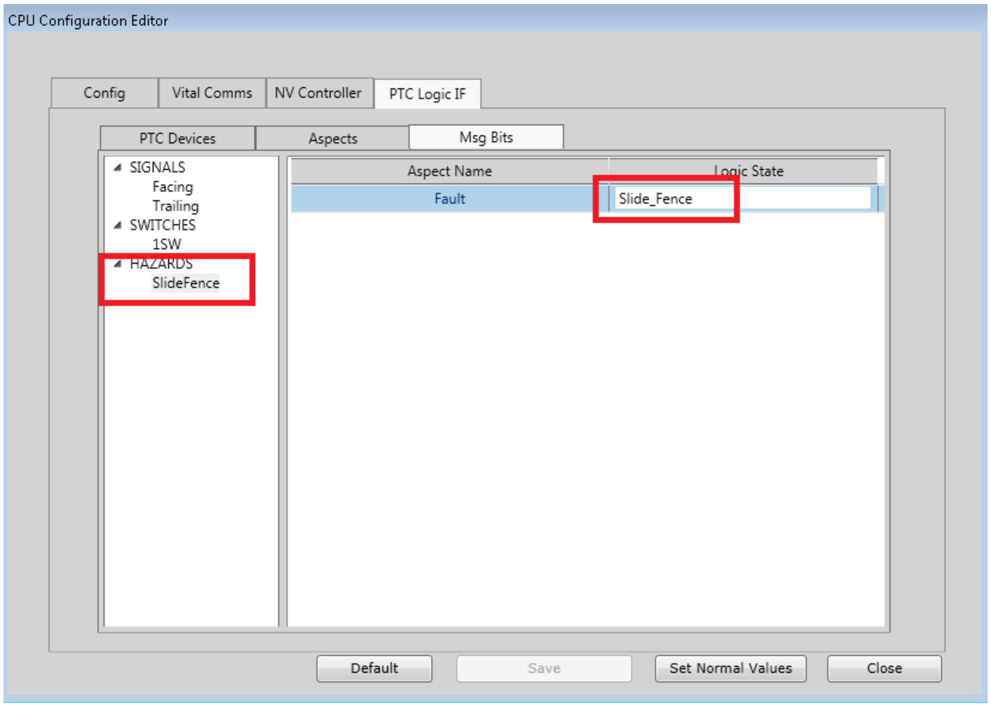
Once the signals have been completed, select the first switch, and enter the names of the logic states to be used to report the switch position. This will create new logic output variables with these names. If a duplicate name is entered, the WCCT will give an error and indicate fixing the duplicate is needed. If internal states already exist in the logic that indicate normal or reverse, write logic equations to set the logic state names entered on this tab to the values that already exist.



Aspect Name	Logic State
Reverse	1RWP
Normal	1NWP

Figure 4-35 Setting Logic State Names for PTC Logic IF

Once all switches are complete and the data saved, select each **Hazard Detector** and enter the names for the fault bit associated with the Hazard Detector.



Aspect Name	Logic State
Fault	Slide_Fence

Figure 4-36 Entering the Fault Bit Name for Hazard Detector

The user can set the normal values to be displayed for these PTC inputs and outputs by selecting the **Set Normal Values** button.

4.8 CREATING BOOLEAN VARIABLES

To add Boolean variables, timers, and field configurable properties, bring up the Logic Data Editor by selecting the **Logic Data** button or clicking **Logic Data** from the Edit menu or use the **Ctrl L** shortcut.

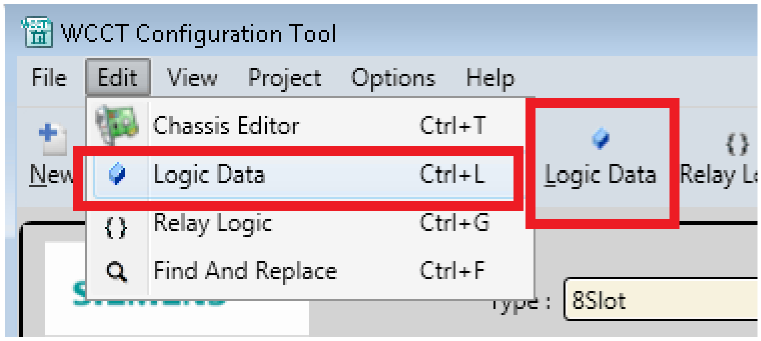


Figure 4-37 Logic Data Editor

This will then open the Logic Data Editor at the Boolean Variables tab.

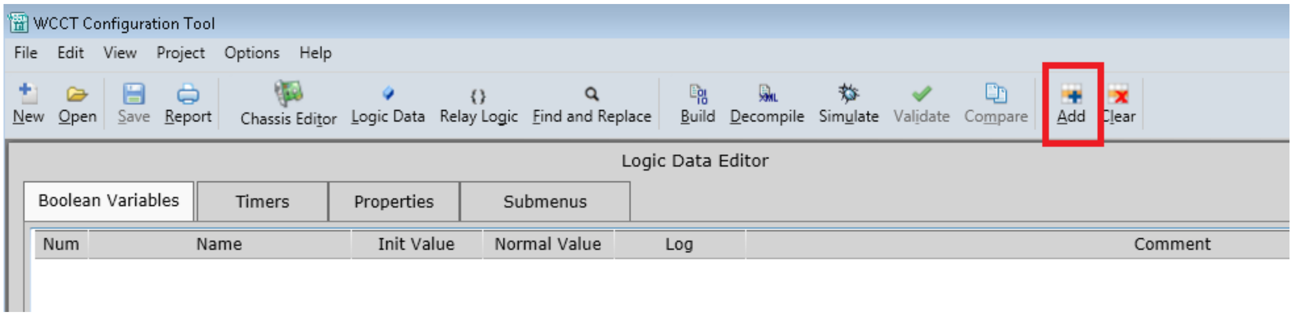
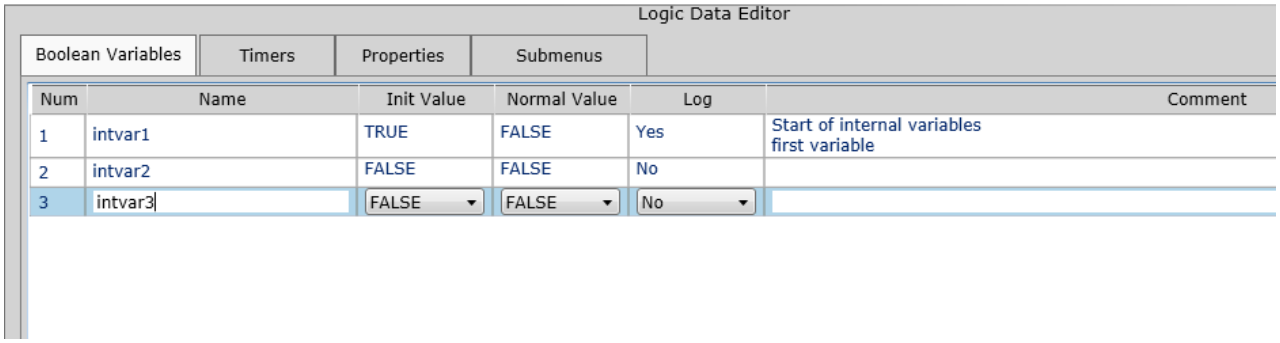


Figure 4-38 Boolean Variables Window

Select **Add** to add new internal Boolean logic states. Enter the name, the initial value (default is false), and whether the variable should be logged on change of state in the CPU log. A comment can be added if necessary next to each variable, multi-line comments are allowed.

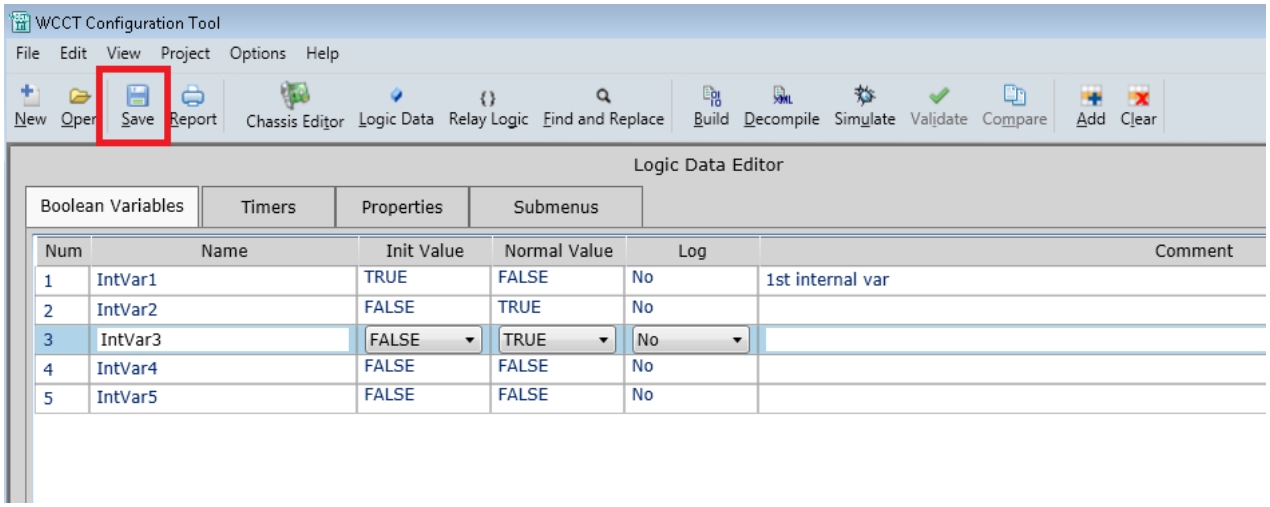
The WCCT allows up to 3000 variables. The names can be up to 16 characters long. If a VLP3 is used, up to 300 variables can be marked as being logged. When a variable is marked as logged, the CPU will create an entry in its log when that variable changes state. Input and output variables defined in the module editors are always logged on change of state.



Num	Name	Init Value	Normal Value	Log	Comment
1	intvar1	TRUE	FALSE	Yes	Start of internal variables first variable
2	intvar2	FALSE	FALSE	No	
3	intvar3	FALSE	FALSE	No	

Figure 4-39 Adding Internal Boolean Logic States

Use the **Save** button (or Ctrl S) to save changes. The save button is enabled whenever there are pending changes.



Num	Name	Init Value	Normal Value	Log	Comment
1	IntVar1	TRUE	FALSE	No	1st internal var
2	IntVar2	FALSE	TRUE	No	
3	IntVar3	FALSE	TRUE	No	
4	IntVar4	FALSE	FALSE	No	
5	IntVar5	FALSE	FALSE	No	

Figure 4-40 Saving Logic Data

The normal values of the relays corresponding to these variables shown on the relay view can be set by selecting the **Normal Value**. Right-click on the Num column to display a drop-down menu that allows rows to be moved up, down, new rows inserted, copied or pasted.

The standard **Ctrl C** and **Ctrl V** short cuts are very useful for copying and pasting whole rows.

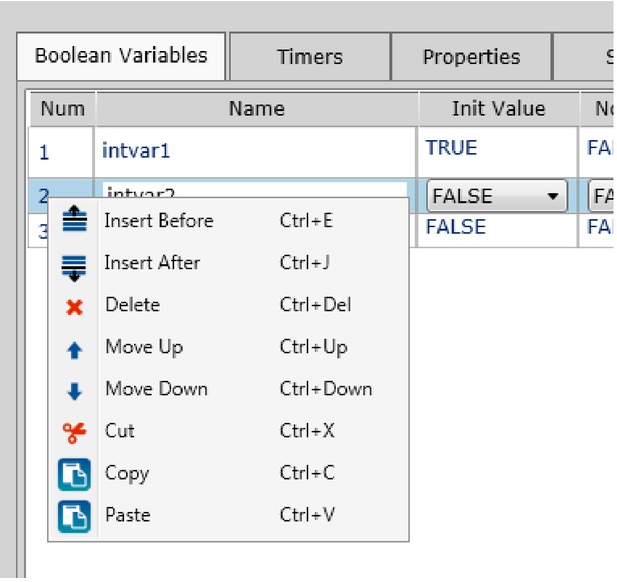
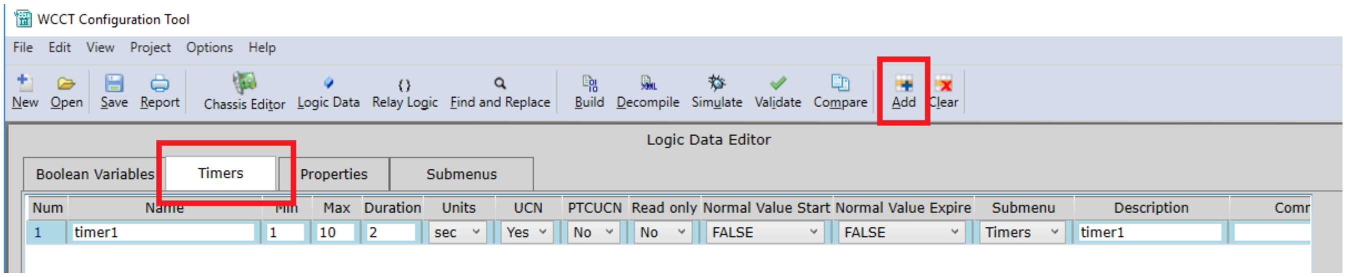


Figure 4-41 Options in Boolean Variables Window

4.9 ADDING TIMERS

Select the **Timers** tab from the Logic Data Editor and then press **Add** to add new timers.



Num	Name	Min	Max	Duration	Units	UCN	PTCUCN	Read only	Normal Value Start	Normal Value Expire	Submenu	Description	Comr
1	timer1	1	10	2	sec	Yes	No	No	FALSE	FALSE	Timers	timer1	

Figure 4-42 Adding New Timers

For each timer, enter:

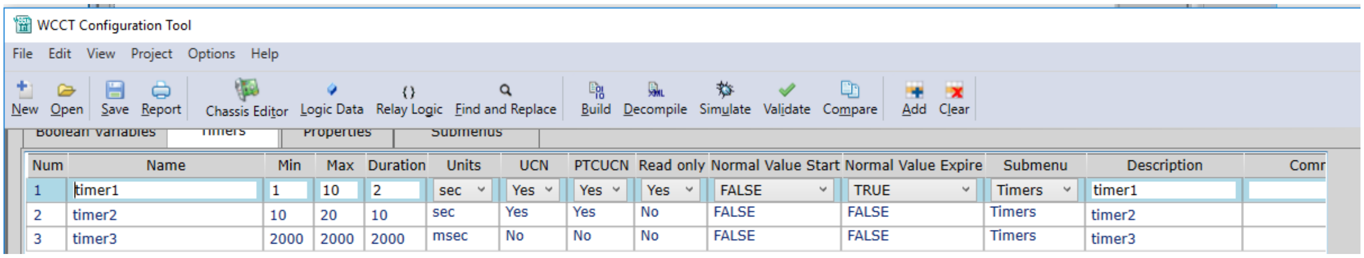
- Name (this is the name that will be used in the logic equations, so no spaces are allowed).
- Minimum and maximum values for the timer.
- Duration in seconds or milliseconds (depending on units).
- Units –select either seconds or milliseconds. If milliseconds is selected as the units, the timer duration and range have to be entered in 100 ms increments.
- Select whether the timer value is included in the UCN calculation or not.
- Select whether the timer value is included in the PTC UCN calculation or not.
- Select whether a timer is read-only or not. When the timer is read-only it is shown in the menu system of the WayConneX, but is not allowed to be edited.
- Set the Normal Value for Timer Start and the Normal Value for Timer end. These are used to display the correct relay coil/contact state in the relay editor.
- Enter a description for the timer. The description is the name the timer will have in the user interface menus. Spaces are allowed in this text. A description has to be added. If the user presses **Save** without entering a description, the WCCT will create a default description for the timer matching the user entered timer name.
- Select the submenu that the timer will appear on in the menu system of the WayConneX. This will default to the predefined **Timers** menu. To have the timer displayed on a different submenu, first go to the submenu tab and create a new submenu.
- A comment can be added for each timer if required. The comment is optional.

⚠ WARNING

WARNING

TIMERS WHOSE INCORRECT SETTING COULD CAUSE A SAFETY ISSUE MUST BE INCLUDED IN THE UCN TO PREVENT UNAUTHORIZED CHANGES.

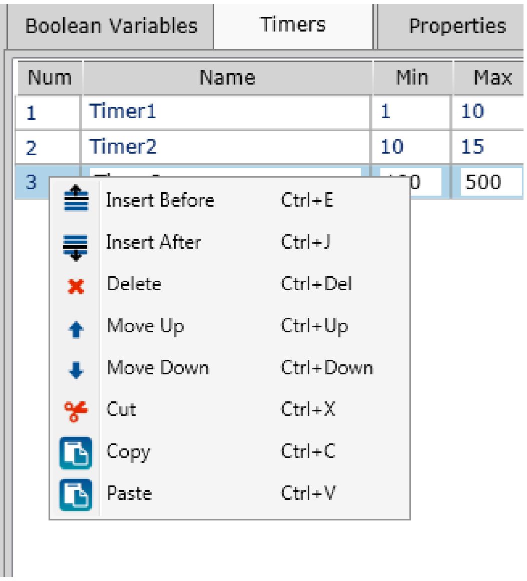
The OCE (for WayConneX) will be used to define the timer and property settings for a particular installation of an MCF and obtain the required UCN. The VLP3 used in the WayConneX platform supports up to 120 timers.


WCCT Configuration Tool
File Edit View Project Options Help
New Open Save Report Chassis Editor Logic Data Relay Logic Find and Replace Build Decompile Simulate Validate Compare Add Clear
Boolean Variables Timers Properties Submenus

Num	Name	Min	Max	Duration	Units	UCN	PTCUCN	Read only	Normal Value Start	Normal Value Expire	Submenu	Description	Comr
1	timer1	1	10	2	sec	Yes	Yes	Yes	FALSE	TRUE	Timers	timer1	
2	timer2	10	20	10	sec	Yes	Yes	No	FALSE	FALSE	Timers	timer2	
3	timer3	2000	2000	2000	msec	No	No	No	FALSE	FALSE	Timers	timer3	

Figure 4-43 Setting Timer Parameters

See the Timer Editor Section 3.12.2 for more details. Right-click on the Num column to display a drop-down menu that allows rows to be moved up, down, new rows inserted, copied, or pasted.

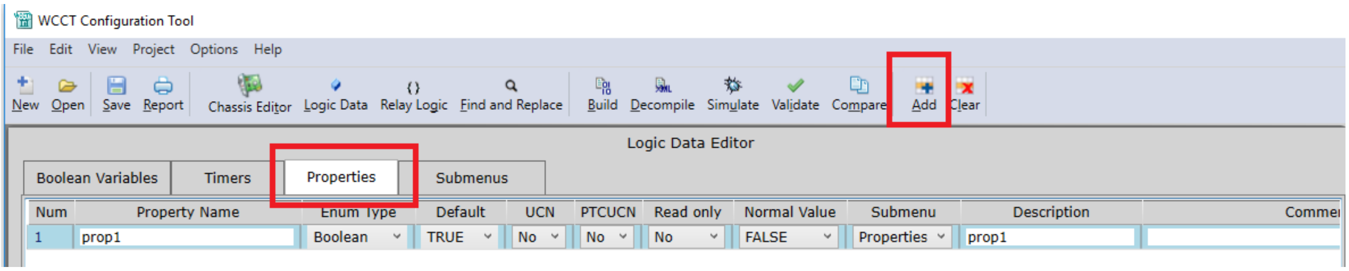


Num	Name	Min	Max
1	Timer1	1	10
2	Timer2	10	15
3			500

Figure 4-44 Options in Timer Window

4.10 ADDING FIELD CONFIGURABLE PROPERTIES

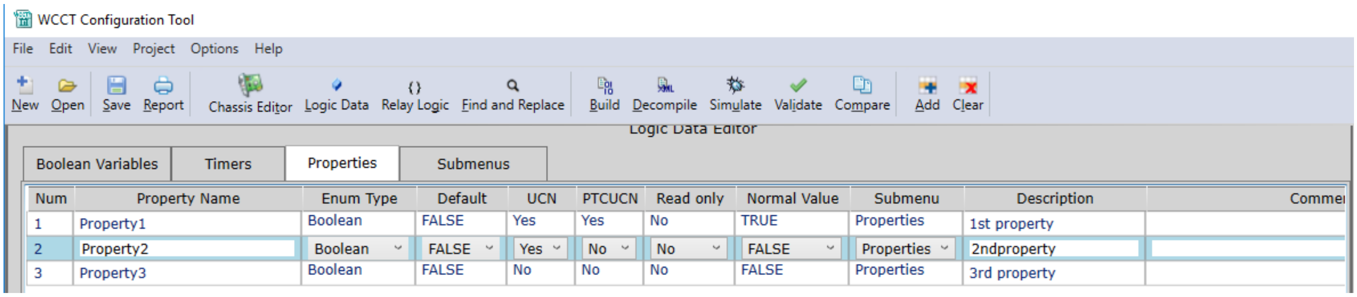
An application that can be used in multiple field sites may require different field configurable settings to tailor the logic to that specific site. To create these field configurable settings, select the **Properties** tab on the Logic Data Editor.


WCCT Configuration Tool
File Edit View Project Options Help
New Open Save Report Chassis Editor Logic Data Relay Logic Find and Replace Build Decompile Simulate Validate Compare Add Clear
Logic Data Editor
Boolean Variables Timers Properties Submenus

Num	Property Name	Enum Type	Default	UCN	PTCUCN	Read only	Normal Value	Submenu	Description	Comme
1	prop1	Boolean	TRUE	No	No	No	FALSE	Properties	prop1	

Figure 4-45 Adding Field Configurable Properties

Click **Add** to enter new properties.


WCCT Configuration Tool
File Edit View Project Options Help
New Open Save Report Chassis Editor Logic Data Relay Logic Find and Replace Build Decompile Simulate Validate Compare Add Clear
Logic Data Editor
Boolean Variables Timers Properties Submenus

Num	Property Name	Enum Type	Default	UCN	PTCUCN	Read only	Normal Value	Submenu	Description	Commei
1	Property1	Boolean	FALSE	Yes	Yes	No	TRUE	Properties	1st property	
2	Property2	Boolean	FALSE	Yes	No	No	FALSE	Properties	2ndproperty	
3	Property3	Boolean	FALSE	No	No	No	FALSE	Properties	3rd property	

Figure 4-46 Adding New Properties

For each property:

- Enter the property name – this is what will be used to reference the state of this property in the logic.
- The enum type will default to Boolean. Currently, this is the only supported type.
- Select the required default from the drop-down menu; default is true.
- Select whether the property value is included in the UCN calculation or not.
- Select whether the property value is included in the PTC UCN calculation or not.
- Select whether a property is read-only or not. When the property is read-only it is shown in the menu system of the WayConneX but is not allowed to be edited.
- Select the submenu that the property will appear on in the menu system of the WayConneX. This will default to the predefined **Properties** menu. To have the property displayed on a different submenu, first go to the submenu tab and create new submenus.
- Enter a description for the property - The description is the name the property will have in the user interface menus. Spaces are allowed in this text. A description has to be added. If the user presses **Save** without entering a description, the WCCT will create a default description for the property matching the user-entered property name.
- A comment can be added for each property if required. The comment is optional.

⚠ WARNING

WARNING

PROPERTIES WHOSE INCORRECT SETTING COULD CAUSE A SAFETY ISSUE MUST BE INCLUDED IN THE UCN TO PREVENT UNAUTHORIZED CHANGES.

The OCE (for WayConneX) will be used to define the timer and property settings for a particular installation of an MCF and obtain the required UCN.

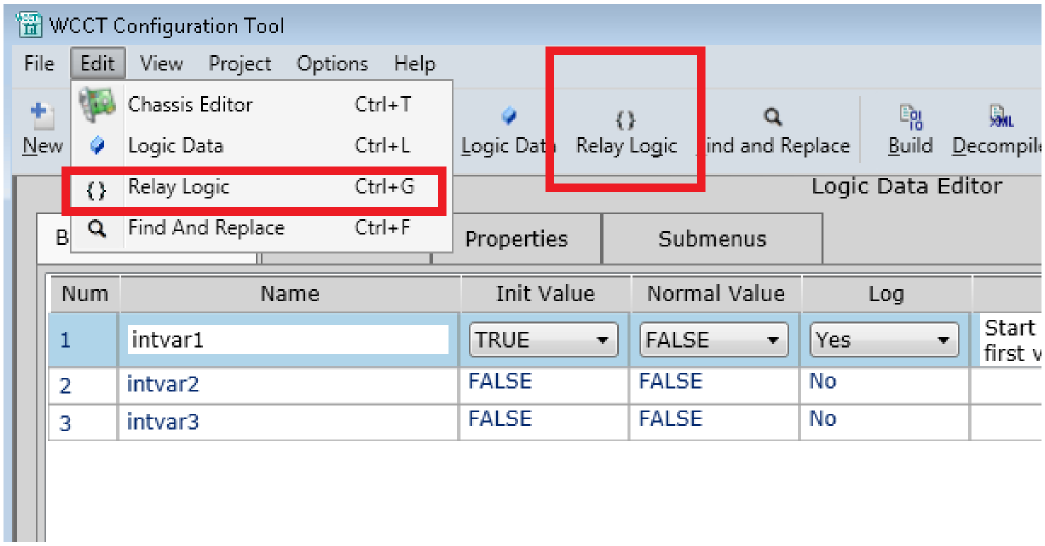
The WCCT supports up to 100 properties.

All properties will appear on one menu screen along with timers, unless otherwise specified. In a CPU III application, if more than 25 properties and timers are used, these need to be placed on separate submenus. See Submenu Section 3.13 for details on how to create submenus.

Right-click on the Num column to display a drop-down menu that allows rows to be moved up or down, new rows to be inserted, copied, or pasted.

4.11 ADDING LOGIC EQUATIONS USING RELAY LOGIC EDITOR

To add logic equations to a project, select the **Relay Logic** button, or the **Relay Logic** option from **Edit** menu, or use the **Ctrl G** shortcut.



Num	Name	Init Value	Normal Value	Log	
1	intvar1	TRUE	FALSE	Yes	Start first v
2	intvar2	FALSE	FALSE	No	
3	intvar3	FALSE	FALSE	No	

Figure 4-47 Relay Logic Editor - Selecting Project

When there are no equations in a project, the Relay Logic editor will appear as illustrated in the following figure.

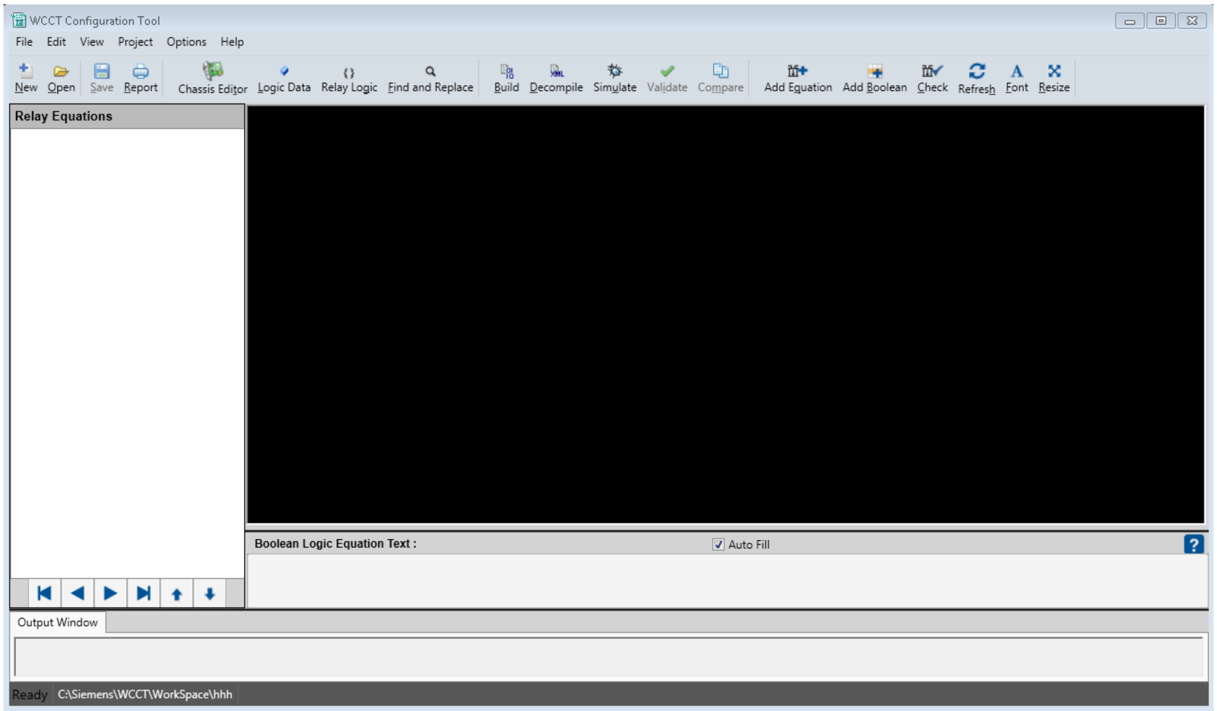
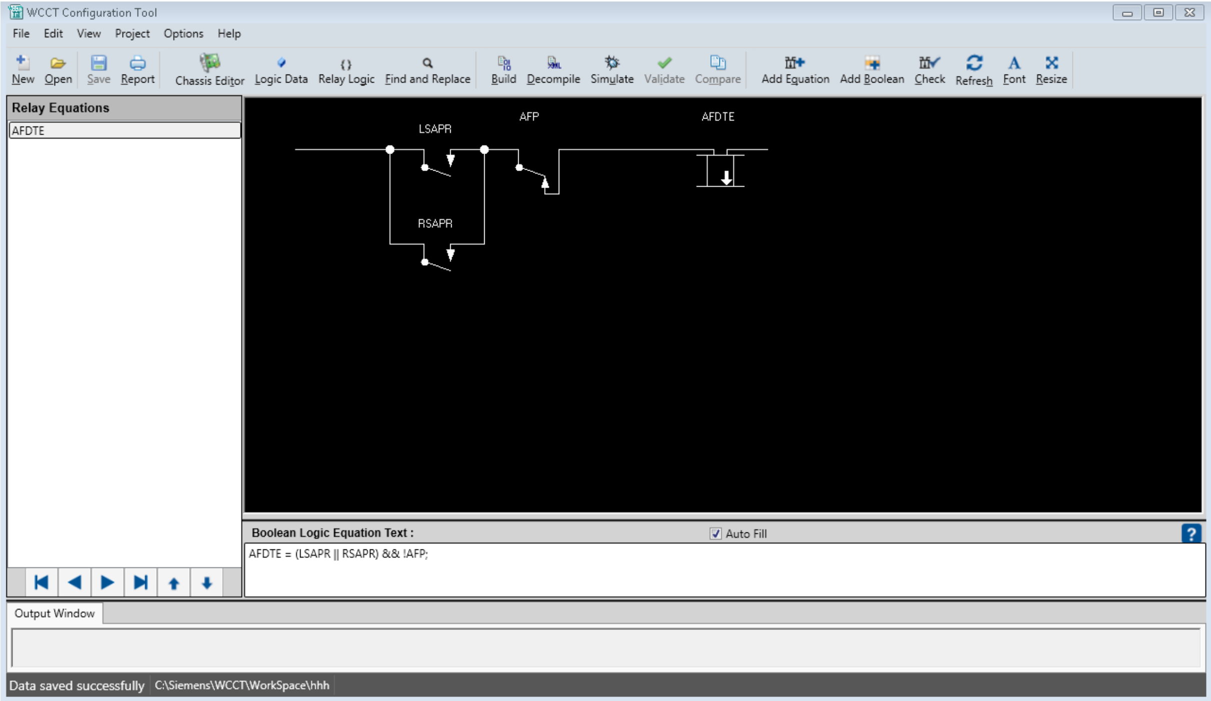


Figure 4-48 Relay Logic Editor Screen - No Equations

To enter an equation, select the **Add Equation** button or use the short cut **Ctrl + ALT + Q**. Type the equation in Boolean format in the Boolean Logic Equation Text box, and press save (Ctrl S) and the equation will appear in the left box and the relay logic equivalent in the top box, for example:



AFDTE = (LSAPR || RSAPR) && !AFP;

Data saved successfully C:\Siemens\WCCT\WorkSpace\hhh

Figure 4-49 Relay Logic Editor - Equation Present

Use the following symbols in the equations:

&&	AND
||	OR
!	Not
=	Assign
( )	

To start a timer, use the following:

StartTimerCond ({expression}, {timername})

Where {expression} is a variable or a Boolean expression and {timername} is a timer that was created in the Logic Data Editor timer tab.

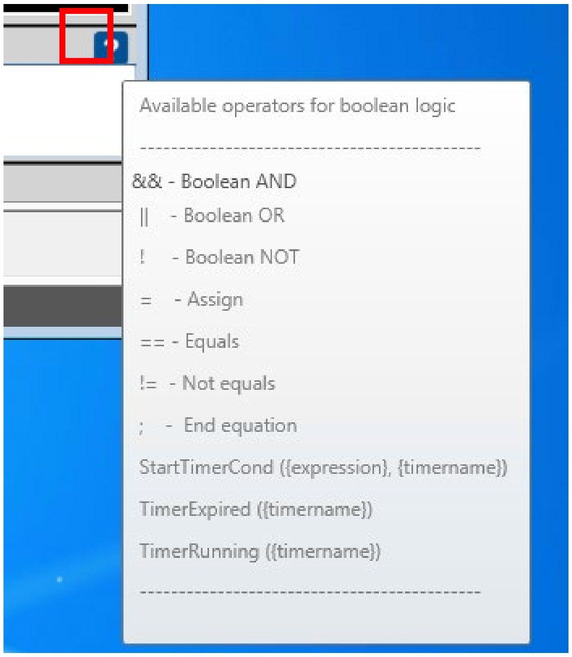
NOTE

NOTE

{expression} cannot be set to TRUE, this is not supported. If a timer is required to start unconditionally, create a variable and set its value to true.

To check if a timer has expired use: **TimerExpired** ({timername}).

Select the **?** in the lower right corner to bring down a help box which shows the syntax.



Available operators for boolean logic

&& - Boolean AND

|| - Boolean OR

! - Boolean NOT

= - Assign

== - Equals

!= - Not equals

; - End equation

StartTimerCond ({expression}, {timername})

TimerExpired ({timername})

TimerRunning ({timername})

Figure 4-50 Bringing Up a Help Box

To add a new equation to the end of the list, select the **Add Equation** icon or use the short cut **Ctrl + Alt + Q**.

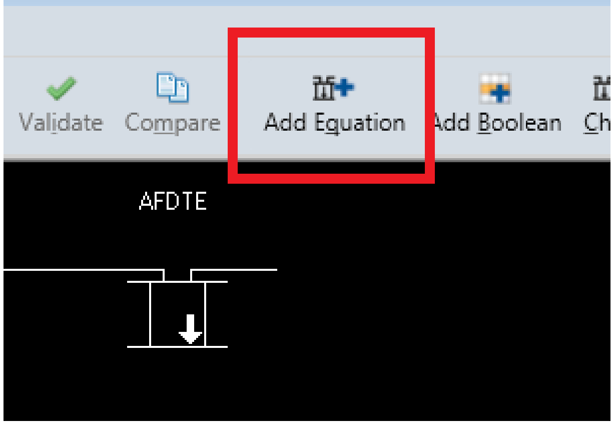
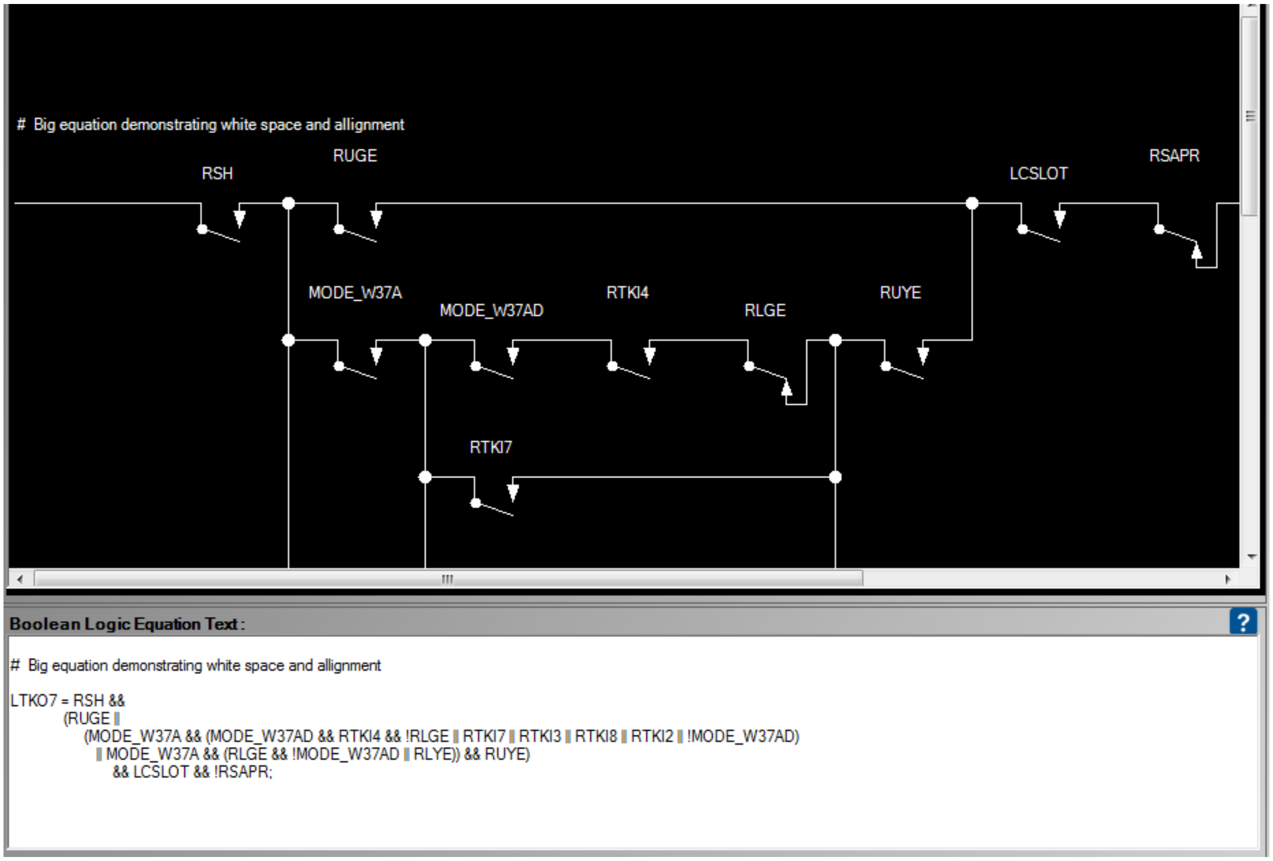


Figure 4-51 Adding a New Equation

To insert an equation before or after an existing one, right-click on the logic state name on the left and select **Insert Before** or **Insert After**. Carriage returns and white space can be used in the text to make it more readable. Comments can be added in the text box preceding the equation by using a pound sign (#) to start the comment. If the relay equation becomes too large, scroll bars appear to enable the user to view the entire equation.


# Big equation demonstrating white space and allignment
RSH
RUGE
LCSLOT
RSAPR
MODE_W37A
MODE_W37AD
RTKI4
RLGE
RUYE
RTKI7
Boolean Logic Equation Text :
?

```
# Big equation demonstrating white space and allignment

LTKO7 = RSH &&
          (RUGE ||
              (MODE_W37A && (MODE_W37AD && RTKI4 && !RLGE || RTKI7 || RTKI3 || RTKI8 || RTKI2 || !MODE_W37AD)
                || MODE_W37A && (RLGE && !MODE_W37AD || RLYE)) && RUYE)
                   && LCSLOT && !RSAPR;
```

Figure 4-52 Inserting an Equation - Before or After Existing Equation

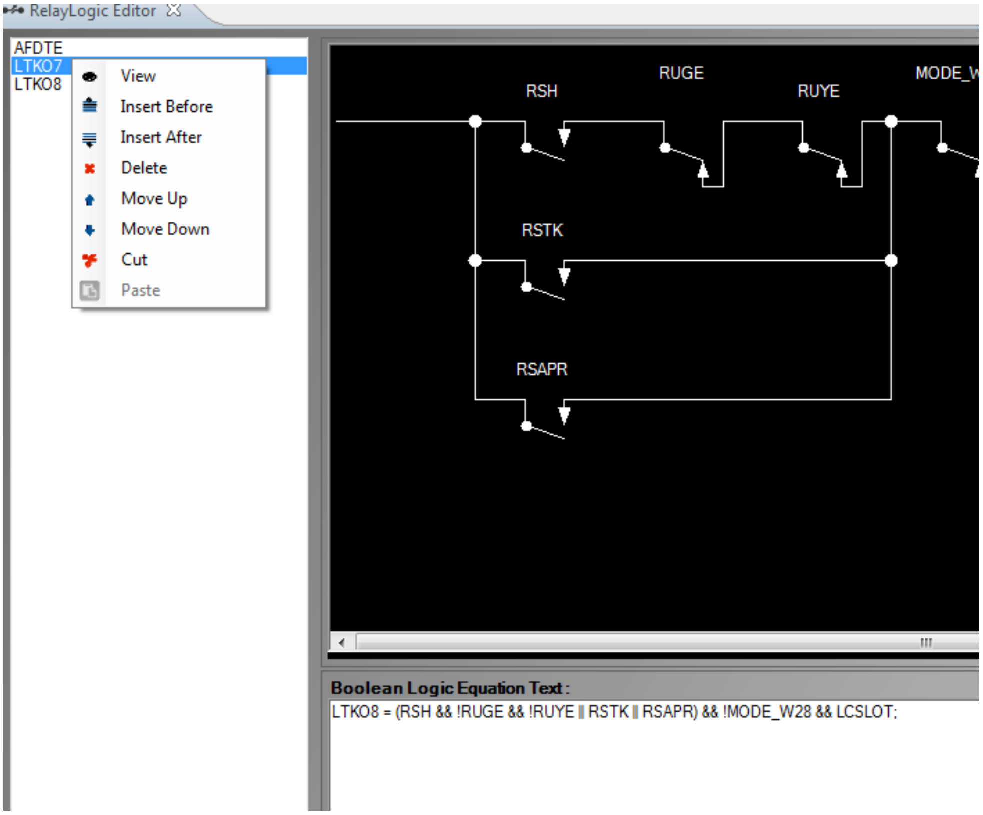
Continue to enter new equations.

NOTE

NOTE

Equations can be cut and pasted from another source into the Equation text box using standard Ctrl C (copy), Ctrl V (paste). Multiple equations can be copied into the box at one time.

As the list of equations grows, the user can change the order of equations or insert a new equation between existing ones. To do this, right-click on the relay coil name list on the left to get the drop-down menu shown in the following figure.



Boolean Logic Equation Text :

```
LTKO8 = (RSH && !RUGE && !RUYE || RSTK || RSAPR) && !MODE_W28 && LCSLOT;
```

Figure 4-53 Changing the Order of Equations

To view an equation, double-click it in the list on the left, or right-click and select **View**. Once the project has many equations, use the **Find** function to locate where logic states are used, as shown in the following figure.

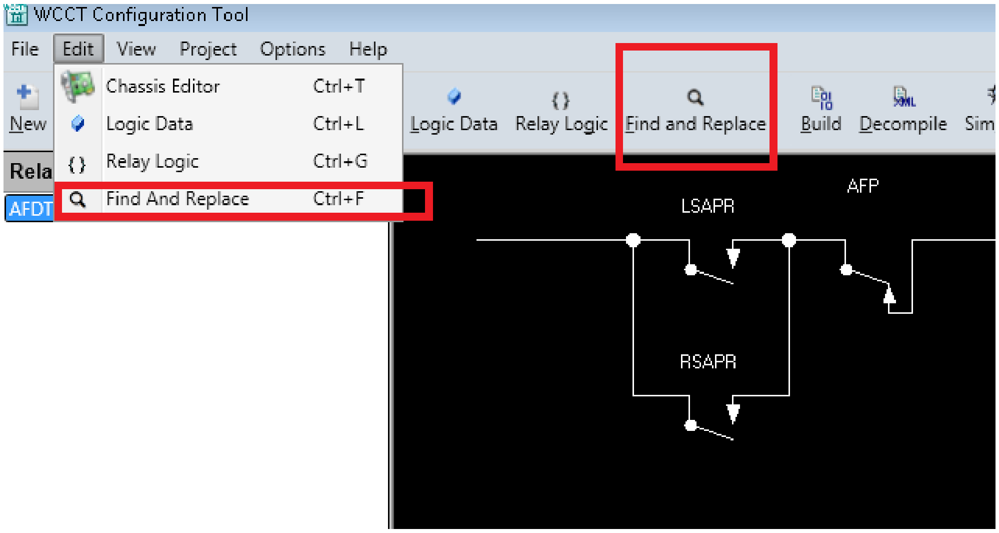
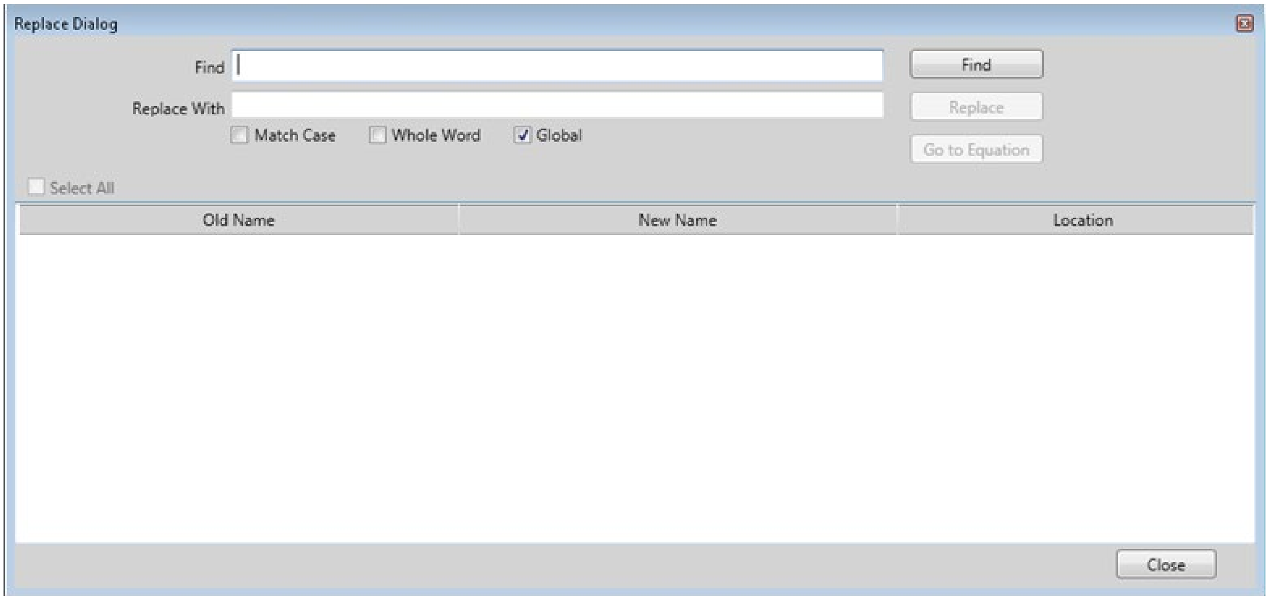


Figure 4-54 Using the Find Function

Select the **Find and Replace** icon or use **Ctrl F**. This will bring up the **Find and Replace** window shown in the following figure.



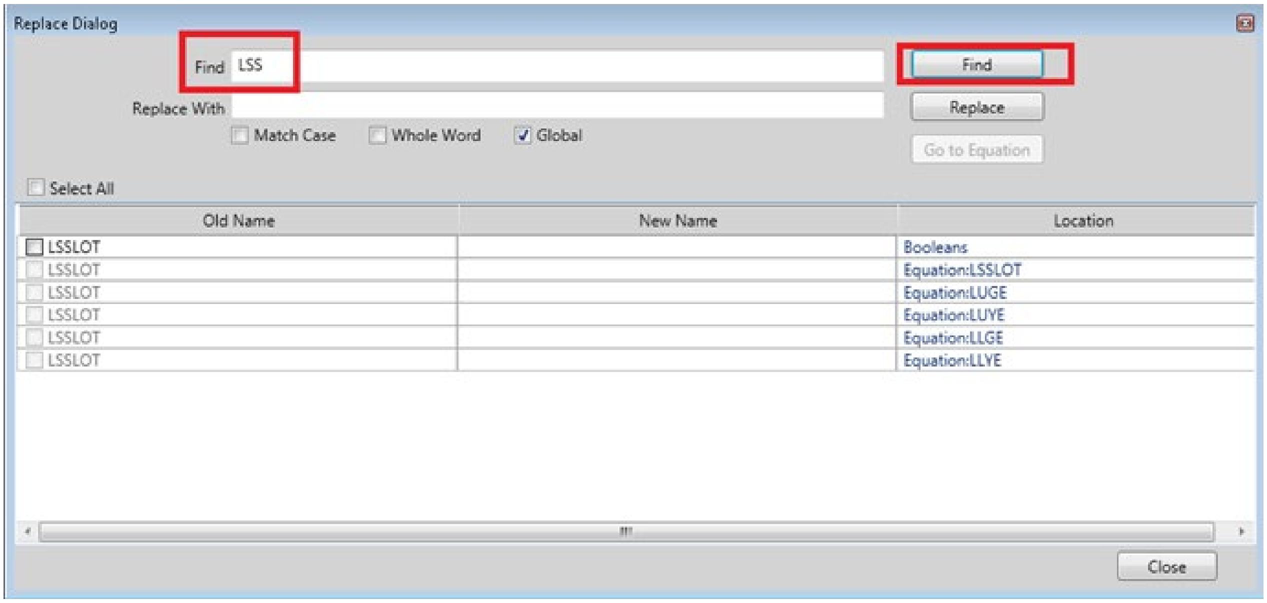
Find:

Replace With:

□ Match Case □ Whole Word ☑ Global

Figure 4-55 Find Equation

Type all or part of the logic state name in and click **Find.**



Find: LSS

Replace With:

□ Match Case □ Whole Word ☑ Global

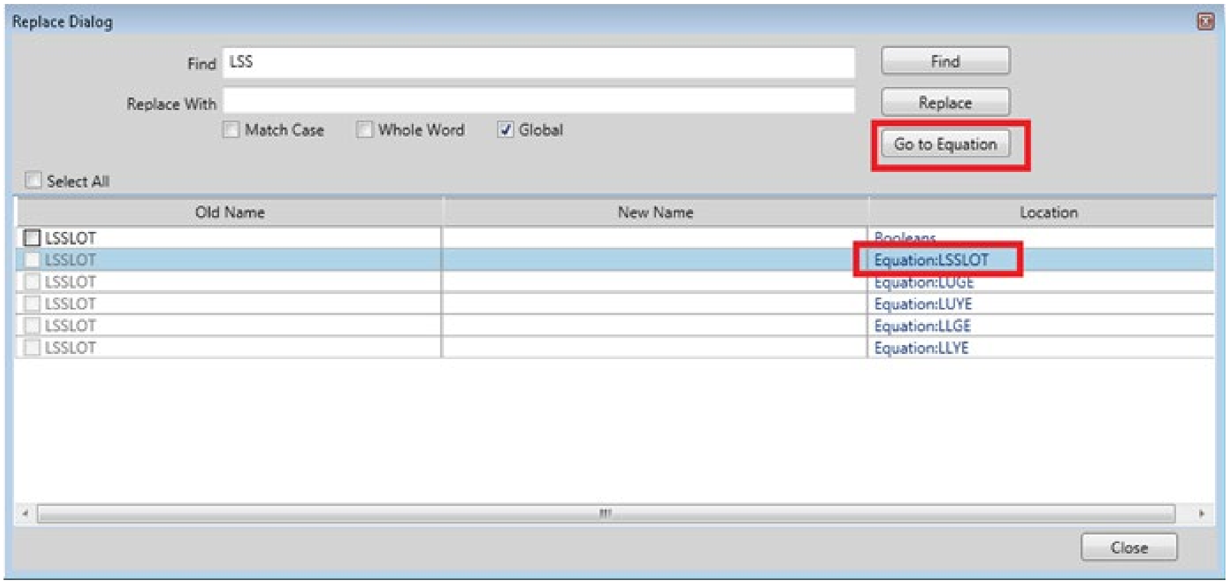
Old Name	New Name	Location
□ LSSLOT		Booleans
□ LSSLOT		Equation:LSSLOT
□ LSSLOT		Equation:LUGE
□ LSSLOT		Equation:LUYE
□ LSSLOT		Equation:LLGE
□ LSSLOT		Equation:LLYE

Figure 4-56 Find Name

The window will show all the matching names in the Old Name column, the New Name column will be blank initially.

The Location column will show all the places where the matching name is found:

- Booleans indicates it’s found in the Boolean tab of the Logic Data editor
- Equations: LSSLOT, for example, indicates it is found in the equation for LSSLOT
- Slot 2, for example, indicates it is found in module I/O for slot 2



Replace Dialog

Find: LSS

Replace With:

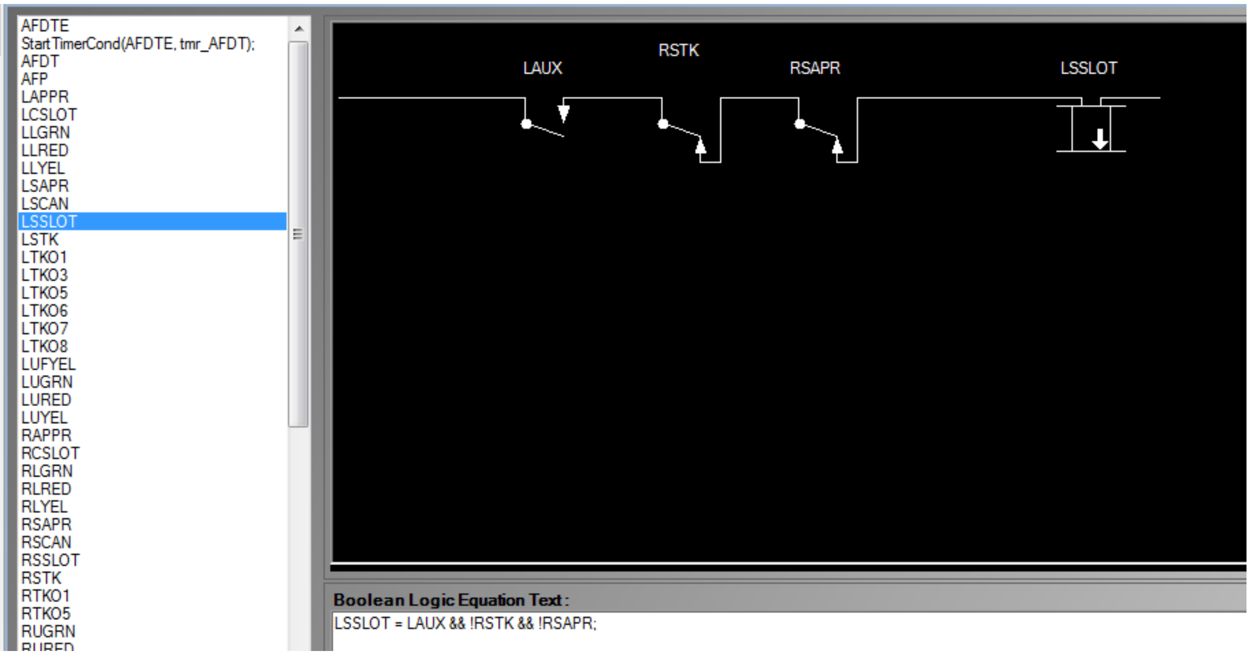
□ Match Case □ Whole Word ☑ Global

□ Select All

Old Name	New Name	Location
□ LSSLOT		Booleans
□ LSSLOT		Equation:LSSLOT
□ LSSLOT		Equation:LUGE
□ LSSLOT		Equation:LUYE
□ LSSLOT		Equation:LLGE
□ LSSLOT		Equation:LLYE

Figure 4-57 Go to Equation

If you double-click on the required equation or select it and press **Go to Equation**, the WCCT will open the equation in the editor.



AFDTE
StartTimerCond(AFDTE, tmr_AFDT);
AFDT
AFP
LAPPR
LCSLOT
LLGRN
LLRED
LLYEL
LSAPR
LSCAN
LSSLOT
LSTK
LTKO1
LTKO3
LTKO5
LTKO6
LTKO7
LTKO8
LUFYEL
LUGRN
LURED
LUYEL
RAPPR
RCSLOT
RLGRN
RLRED
RLYEL
RSAPR
RSCAN
RSSLOT
RSTK
RTKO1
RTKO5
RUGRN
RURED

Boolean Logic Equation Text:

LSSLOT = LAUX && !RSTK && !RSAPR;

Figure 4-58 Relay Editor Display

See the Relay Logic Editor section for more details.

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SECTION 5 SIMULATION

5.0 INTRODUCTION

The WCCT provides a relay logic-based simulation that allows the user to simulate their Boolean/Relay logic.

NOTE

NOTE

The simulation only reproduces the Boolean logic and does not simulate built in functions of the I/O modules. See section 5.8 for features of the I/O modules that may want to be considered while simulating or writing logic.

NOTE

NOTE

The simulation is performed using the logic equations in the MCF, but the equations displayed are the ones in the current Relay Logic view. This means that the project has to be compiled before it can be simulated. If the source files have changed and are newer than the MCF, when the user starts the simulation the WCCT will give a warning indicating that the project files have been modified. At this point the user can choose to continue the simulation or stop and recompile. If the user continues the simulation the results can be unpredictable if the current Boolean equations don't match those in the compiled MCF.

5.1 STARTING SIMULATION

To start the simulation, select the **Project>Simulate** option from the menu, the **Simulate** icon, or the **Ctrl U** shortcut.

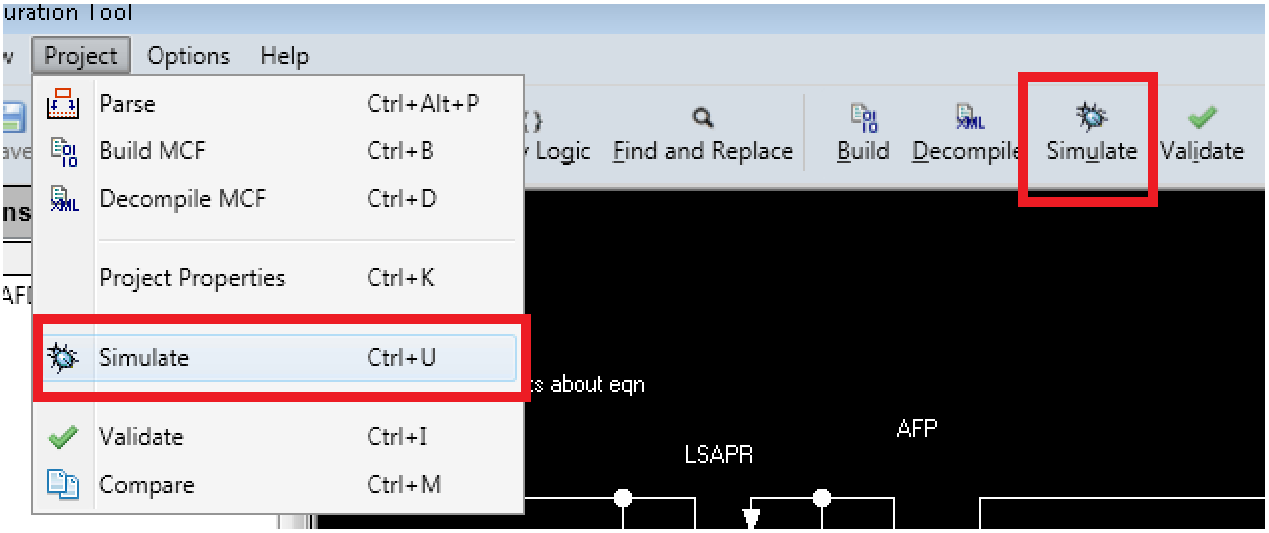
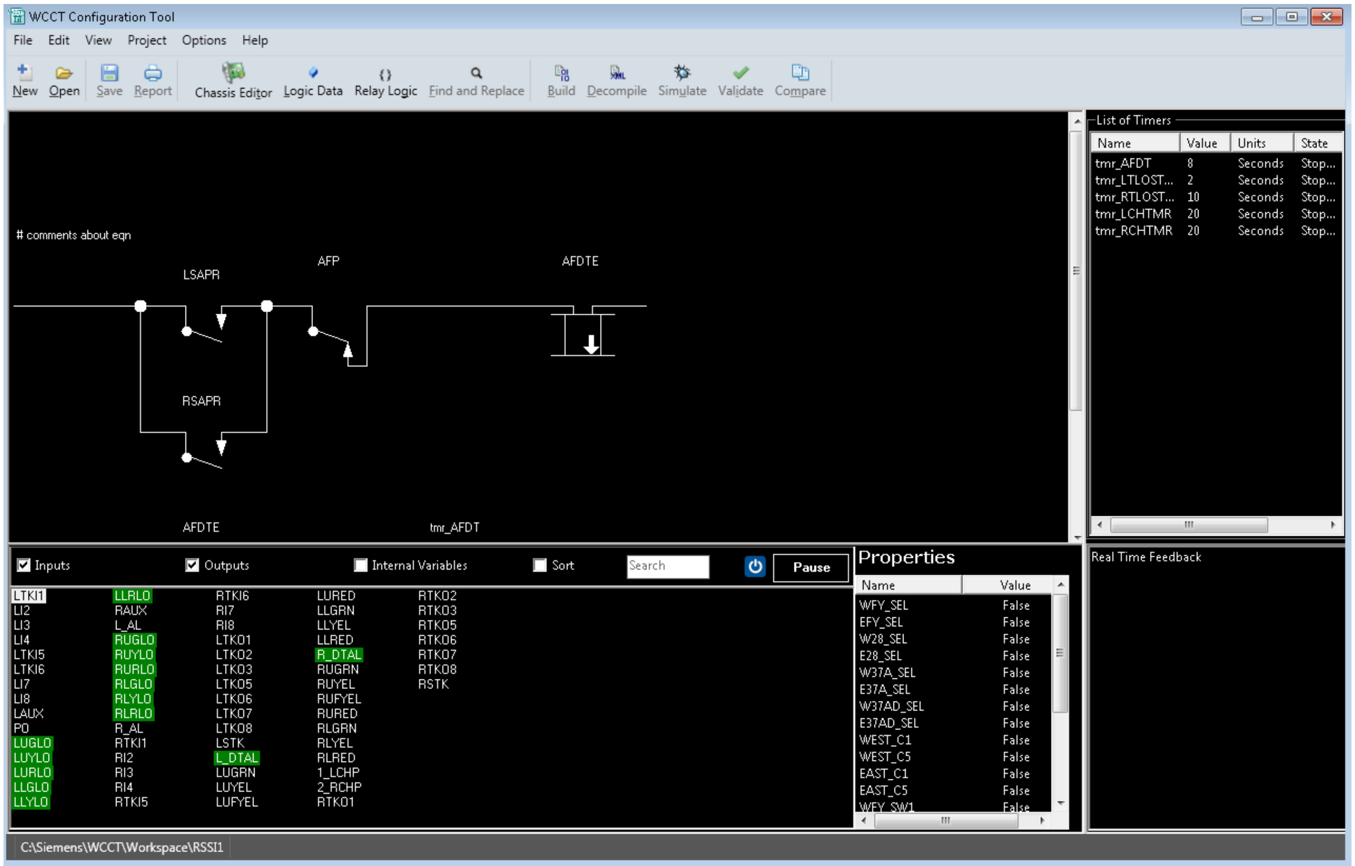


Figure 5-1 Start Simulation Windows

Starting the simulation brings up the simulation window as shown in the following figure.



List of Timers

Name	Value	Units	State
tmr_AFDT	8	Seconds	Stop...
tmr_LTLOST...	2	Seconds	Stop...
tmr_RTLOST...	10	Seconds	Stop...
tmr_LCHTMR	20	Seconds	Stop...
tmr_RCHTMR	20	Seconds	Stop...

LTKI1
LI2
LI3
LI4
LTKI5
LTKI6
LI7
LI8
LAUX
PO
LUGLO
LUYLO
LURLO
LLGLO
LLYLO
LLRLO
RAUX
L_AL
RUGLO
RUYLO
RURLO
RLGLO
RLYLO
RLRLO
R_AL
RTKI1
RI2
RI3
RI4
RTKI5
RTKI6
RI7
RI8
LTKO1
LTKO2
LTKO3
LTKO5
LTKO6
LTKO7
LTKO8
LSTK
L_DTAL
LUGRN
LUYEL
LUFYEL
LURED
LLGRN
LLYEL
LLRED
R_DTAL
RUGRN
RUYEL
RUFYEL
RURED
RLGRN
RLYEL
RLRED
1_LCHP
2_RCHP
RTKO1
RTKO2
RTKO3
RTKO5
RTKO6
RTKO7
RTKO8
RSTK

Properties

Name	Value
WFY_SEL	False
EFY_SEL	False
W28_SEL	False
E28_SEL	False
W37A_SEL	False
E37A_SEL	False
W37AD_SEL	False
E37AD_SEL	False
WEST_C1	False
WEST_C5	False
EAST_C1	False
EAST_C5	False
WFY_SW1	False

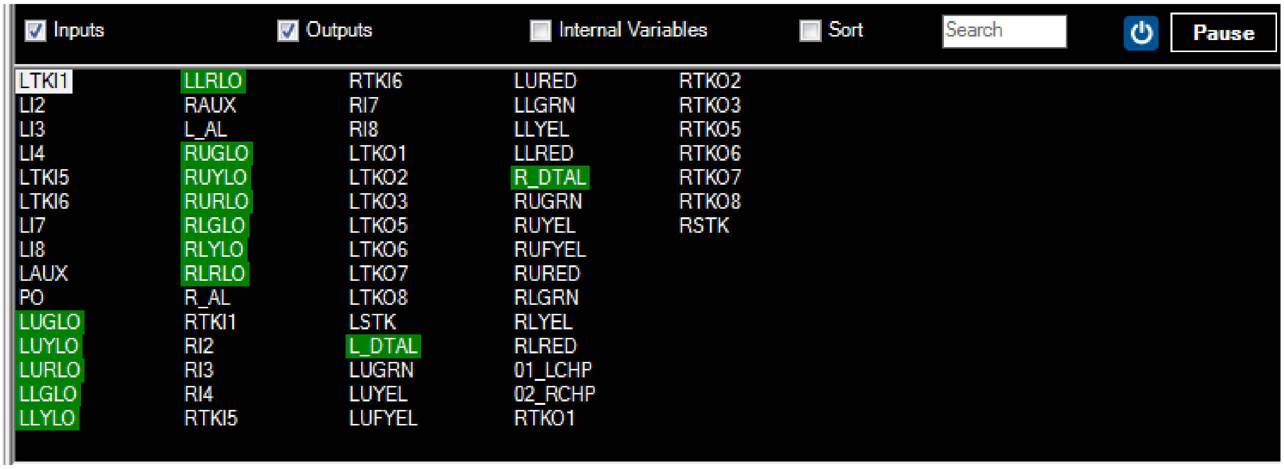
C:\Siemens\WCCT\Workspace\RSSI1

Figure 5-2   Simulation Opening Window

The simulation window is divided into the following sub windows:

- Logic state list Window
- Property Window
- Timer Window
- Real Time Feedback Window
- Relay Equation Window.

5.2 LOGIC STATE LIST WINDOW



☑ Inputs ☑ Outputs □ Internal Variables □ Sort Search Pause

LTKI1
LI2
LI3
LI4
LTKI5
LTKI6
LI7
LI8
LAUX
PO
LUGLO
LUYLO
LURLO
LLGLO
LLYLO
LLRLO
RAUX
L_AL
RUGLO
RUYLO
RURLO
RLGLO
RLYLO
RLRLO
R_AL
RTKI1
RI2
RI3
RI4
RTKI5
RTKI6
RI7
RI8
LTKO1
LTKO2
LTKO3
LTKO5
LTKO6
LTKO7
LTKO8
LSTK
L_DTAL
LUGRN
LUYEL
LUFYEL
LURED
LLGRN
LLYEL
LLRED
R_DTAL
RUGRN
RUYEL
RUFYEL
RURED
RLGRN
RLYEL
RLRED
01_LCHP
02_RCHP
RTKO1
RTKO2
RTKO3
RTKO5
RTKO6
RTKO7
RTKO8
RSTK

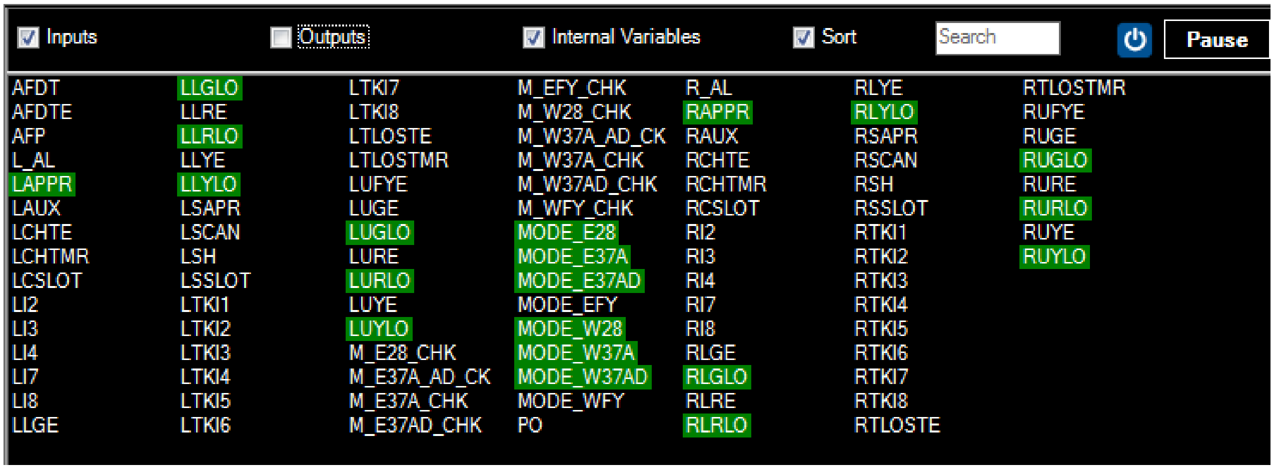
Figure 5-3 Logic State List Window

This shows the list of logic states used in the project. The inputs/outputs/internal variables check boxes allow you to view selected states.

Names shown with a green background represent energized variables.

Names shown without a green background represent de-energized variables.

Selecting the **Sort** check box will list the variables alphabetically.

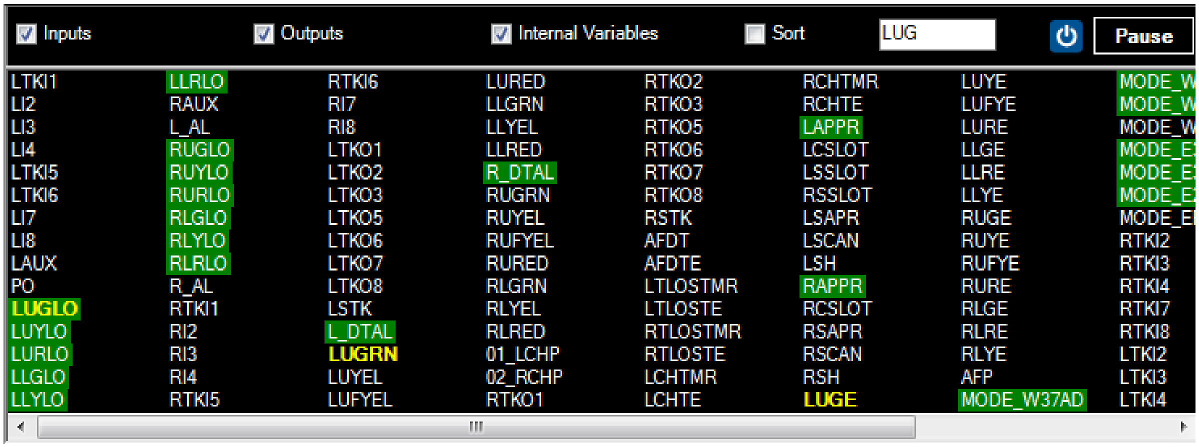


☑ Inputs □ Outputs ☑ Internal Variables ☑ Sort Search Pause

AFDT
AFDTE
AFP
L_AL
LAPPR
LAUX
LCHTE
LCHTMR
LCSLOT
LI2
LI3
LI4
LI7
LI8
LLGE
LLGLO
LLRE
LLRLO
LLYE
LLYLO
LSAPR
LSCAN
LSH
LSSLOT
LTKI1
LTKI2
LTKI3
LTKI4
LTKI5
LTKI6
LTKI7
LTKI8
LTLOSTE
LTLOSTMR
LUFYE
LUGE
LUGLO
LURE
LURLO
LUYE
LUYLO
M_E28_CHK
M_E37A_AD_CK
M_E37A_CHK
M_E37AD_CHK
M_EFY_CHK
M_W28_CHK
M_W37A_AD_CK
M_W37A_CHK
M_W37AD_CHK
M_WFY_CHK
MODE_E28
MODE_E37A
MODE_E37AD
MODE_EFY
MODE_W28
MODE_W37A
MODE_W37AD
MODE_WFY
PO
R_AL
RAPPR
RAUX
RCHTE
RCHTMR
RCSLOT
RI2
RI3
RI4
RI7
RI8
RLGE
RLGLO
RLRE
RLRLO
RLYE
RLYLO
RSAPR
RSCAN
RSH
RSSLOT
RTKI1
RTKI2
RTKI3
RTKI4
RTKI5
RTKI6
RTKI7
RTKI8
RTLOSTE
RTLOSTMR
RUFYE
RUGE
RUGLO
RURE
RURLO
RUYE
RUYLO

Figure 5-4 Logic State Window – Selection Options

If the **Sort** check box is not checked, the variables are listed in the order they appear in the Logic Data editor. To quickly find a variable without reading through the list, type all or part of the name in the search box.

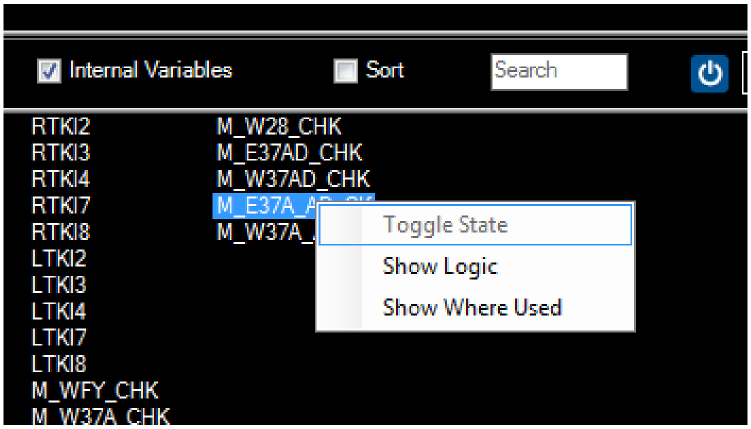


☑ Inputs ☑ Outputs ☑ Internal Variables □ Sort LUG

LTKI1	LLRLO	RTKI6	LURED	RTKO2	RCHTMR	LUYE	MODE_W
LI2	RAUX	RI7	LLGRN	RTKO3	RCHTE	LUFYE	MODE_W
LI3	L_AL	RI8	LLYEL	RTKO5	LAPPR	LURE	MODE_W
LI4	RUGLO	LTKO1	LLRED	RTKO6	LCSLOT	LLGE	MODE_E
LTKI5	RUYLO	LTKO2	R_DTAL	RTKO7	LSSLOT	LLRE	MODE_E
LTKI6	RURLO	LTKO3	RUGRN	RTKO8	RSSLOT	LLYE	MODE_E
LI7	RLGLO	LTKO5	RUYEL	RSTK	LSAPR	RUGE	MODE_E
LI8	RLYLO	LTKO6	RUFYEL	AFDT	LSCAN	RUYE	RTKI2
LAUX	RLRLO	LTKO7	RURED	AFDTE	LSH	RUFYE	RTKI3
PO	R_AL	LTKO8	RLGRN	LTLOSTMR	RAPPR	RURE	RTKI4
LUGLO	RTKI1	LSTK	RLYEL	LTLOSTE	RCSLOT	RLGE	RTKI7
LUYLO	RI2	L_DTAL	RLRED	RTLOSTMR	RSAPR	RLRE	RTKI8
LURLO	RI3	LUGRN	01_LCHP	RTLOSTE	RSCAN	RLYE	LTKI2
LLGLO	RI4	LUYEL	02_RCHP	LCHTMR	RSH	AFP	LTKI3
LLYLO	RTKI5	LUFYEL	RTKO1	LCHTE	LUGE	MODE_W37AD	LTKI4

Figure 5-5 Sort Box Not Checked

Right-clicking on a variable will show a drop-down menu with the following options:



☑ Internal Variables □ Sort Search

RTKI2	M_W28_CHK
RTKI3	M_E37AD_CHK
RTKI4	M_W37AD_CHK
RTKI7	M_E37A_A
RTKI8	M_W37A_
LTKI2	
LTKI3	
LTKI4	
LTKI7	
LTKI8	
M_WFY_CHK	
M_W37A_CHK	

Figure 5-6 Variables Drop-down Menu

If the variable is an input, the following are enabled:

- Toggle state
- Show Where Used

If the variable is an output, the following is enabled:

- Show Logic
- Show Where Used

If the variable is an internal state, the following are enabled:

- Show Where Used
- Show Logic

Selecting **Toggle Input** will change the input state to the opposite value.

Selecting **Show Logic** will add the relay equation that defines this logic state to the Relay Equation window.

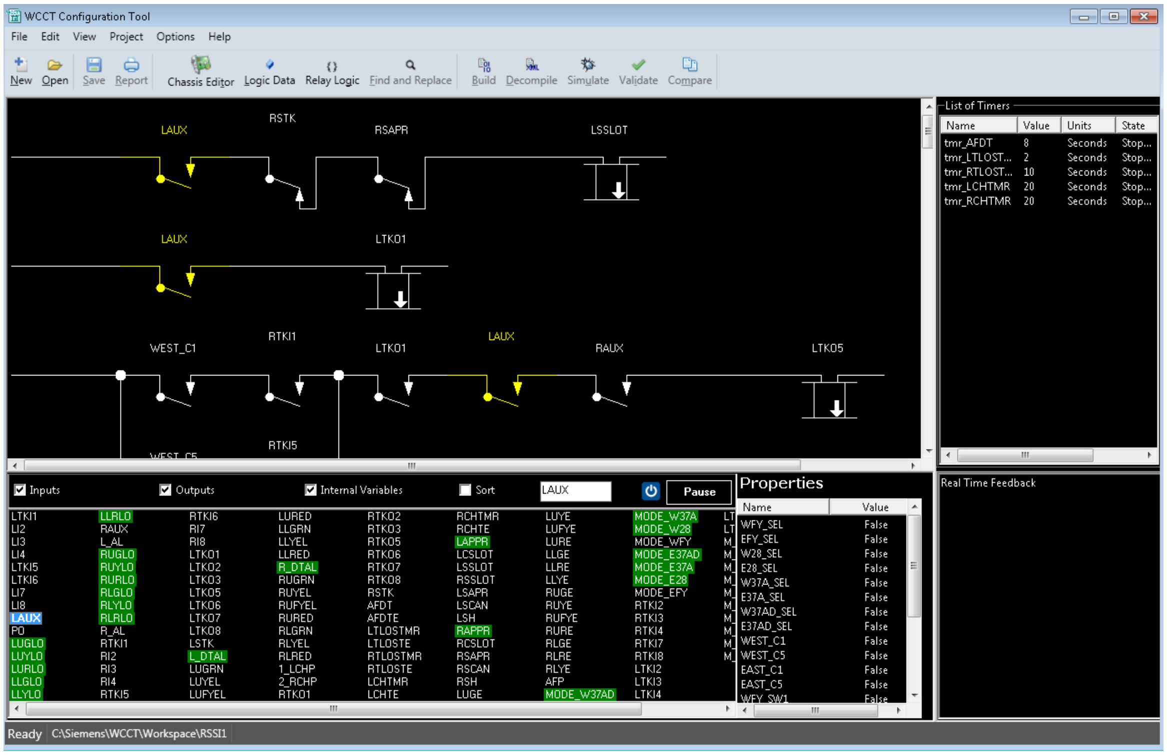
Selecting **Show Where Used** will add all the relay equations where this logic state is used to the Relay Equation window.

NOTE

NOTE

The above actions result in new equations being appended to the existing ones shown in the Relay Equation window. To clear the existing equations that are shown, right-click in the Relay Equation window and select either the option to **Clear Equation** or **Clear Display**.

For example, **Show Where Used** for LAUX displays the following information.



List of Timers

Name	Value	Units	State
tmr_AFDT	8	Seconds	Stop...
tmr_LTLOST...	2	Seconds	Stop...
tmr_RTLOST...	10	Seconds	Stop...
tmr_LCHTMR	20	Seconds	Stop...
tmr_RCHTMR	20	Seconds	Stop...

☑ Inputs ☑ Outputs ☑ Internal Variables ☐ Sort LAUX Pause

LTKI1	LLRLO	RTKI6	LURED	RTKO2	RCHTMR	LUYE	MODE_W37A	LT
LI2	RAUX	RI7	LLGRN	RTKO3	RCHTE	LUFYE	MODE_W28	LT
LI3	L_AL	RI8	LLYEL	RTKO5	LAPPR	LURE	MODE_WFY	M_
LI4	RUGLO	LTKO1	LLRED	RTKO6	LCSLOT	LLGE	MODE_E37AD	M_
LTKI5	RUYLO	LTKO2	R_DTAL	RTKO7	LSSLOT	LLRE	MODE_E37A	M_
LTKI6	RURLO	LTKO3	RUGRN	RTKO8	RSSLOT	LLYE	MODE_E28	M_
LI7	RLGLO	LTKO5	RUYEL	RSTK	LSAPR	RUGE	MODE_EFY	M_
LI8	RLYLO	LTKO6	RUFYEL	AFDT	LSCAN	RUYE	RTKI2	M_
LAUX	RLRLO	LTKO7	RURED	AFDTE	LSH	RUFYE	RTKI3	M_
PO	R_AL	LTKO8	RLGRN	LTLOSTMR	RAPPR	RURE	RTKI4	M_
LUGLO	RTKI1	LSTK	RLYEL	LTLOSTE	RCSLOT	RLGE	RTKI7	M_
LUYLO	RI2	L_DTAL	RLRED	RTLOSTMR	RSAPR	RLRE	RTKI8	M_
LURLO	RI3	LUGRN	1_LCHP	RTLOSTE	RSCAN	RLYE	LTKI2	
LLGLO	RI4	LUYEL	2_RCHP	LCHTMR	RSH	AFP	LTKI3	
LLYLO	RTKI5	LUFYEL	RTKO1	LCHTE	LUGE	MODE_W37AD	LTKI4	

Properties

Name	Value
WFY_SEL	False
EFY_SEL	False
W28_SEL	False
E28_SEL	False
W37A_SEL	False
E37A_SEL	False
W37AD_SEL	False
E37AD_SEL	False
WEST_C1	False
WEST_C5	False
EAST_C1	False
EAST_C5	False
WFY_SW1	False

Ready C:\Siemens\WCCT\Workspace\RSSI1

Figure 5-7 Show Logic Window

To reset the simulation back to its initial state, press the blue **Reset Simulator** button.

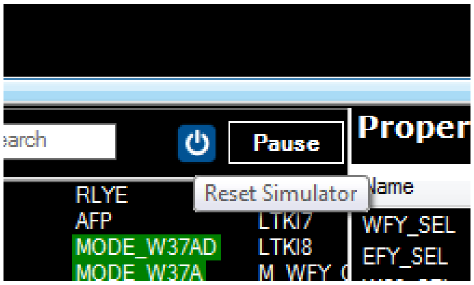


Figure 5-8 Reset Simulator Button

The normal mode of the simulator is to run the logic equations on change of state of an input (or timer or property) until they are stable, then wait for the next change.

In some cases, it may be necessary to change multiple inputs at the same time and then have the changes run through the logic together. For example, this may be needed in order to simulate how a coded track card changes from receiving one vital code to another, without dropping the vital code, or having two vital code bits present, e.g. a transition from receiving code 1,7 to receiving code 1,4.

In order to do this in the simulator, press the pause button.

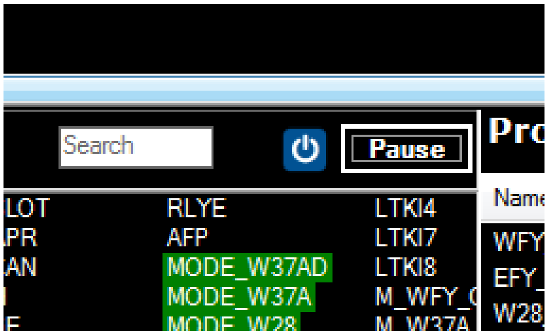


Figure 5-9 Simulator Pause Button

This will change to show **Resume** when the simulator is paused.

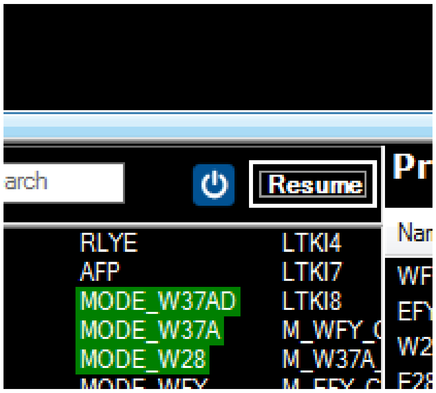


Figure 5-10 Simulator Resume Button

At that point, multiple inputs can be changed in this window and the logic won’t be executed until **Resume** is pressed.

NOTE

NOTE

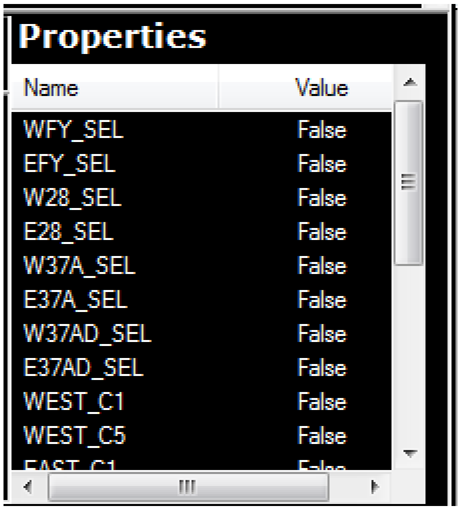
Currently, changing the state of an input from the relay diagram is not supported under pause mode.

If a property is changed, the logic will be executed even when paused.

If a timer is expired, the logic will be executed even when paused.

5.3 PROPERTIES WINDOW

The Properties window allows the values of configuration properties to be changed in the simulation.

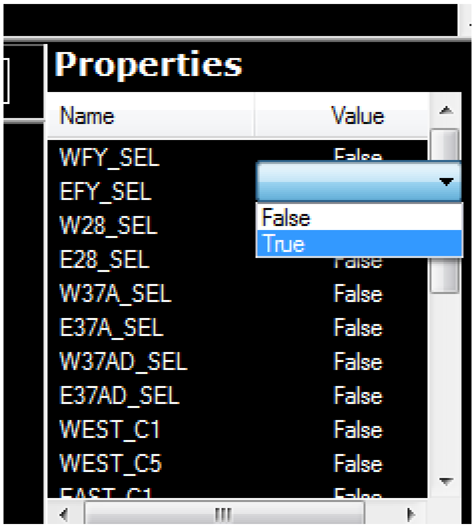


Properties

Name	Value
WFY_SEL	False
EFY_SEL	False
W28_SEL	False
E28_SEL	False
W37A_SEL	False
E37A_SEL	False
W37AD_SEL	False
E37AD_SEL	False
WEST_C1	False
WEST_C5	False
EAST_C1	False

Figure 5-11 Properties Window

Double-click on the true/false values to change them or right-click and select **Toggle State**.



Properties

Name	Value
WFY_SEL	False
EFY_SEL	False True
W28_SEL	
E28_SEL	False
W37A_SEL	False
E37A_SEL	False
W37AD_SEL	False
E37AD_SEL	False
WEST_C1	False
WEST_C5	False
EAST_C1	False

Figure 5-12 Properties Window - Selecting Values - True/ False

Right-click on a property to bring up the menu option to show where this property is used.

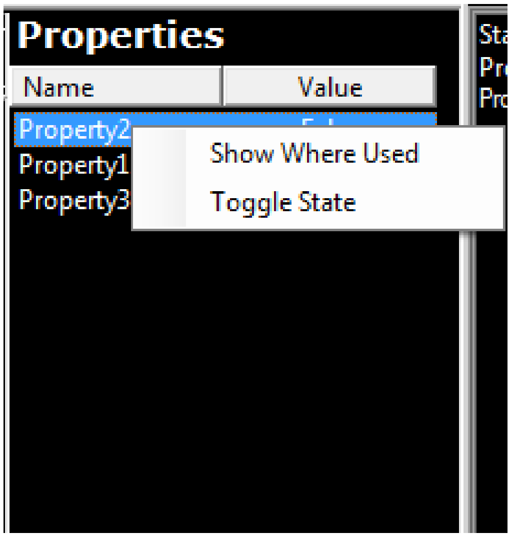


Figure 5-13   Properties Menu Options

If this is selected, the relay diagram will show all equations that use this property (as shown in the following figure).

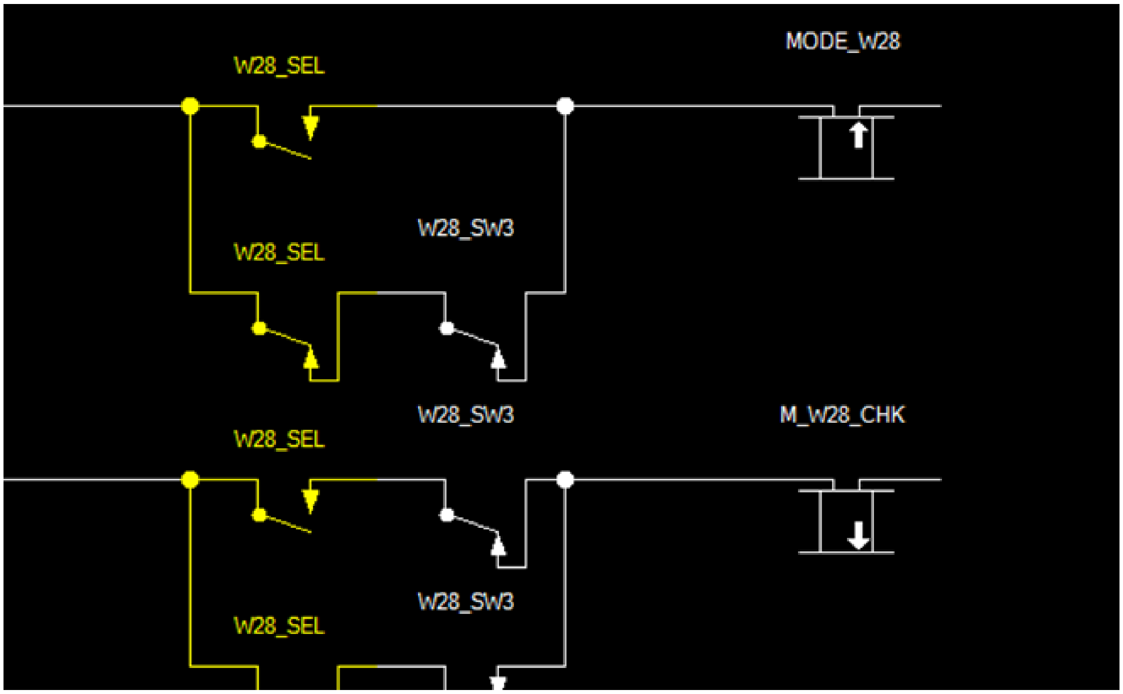
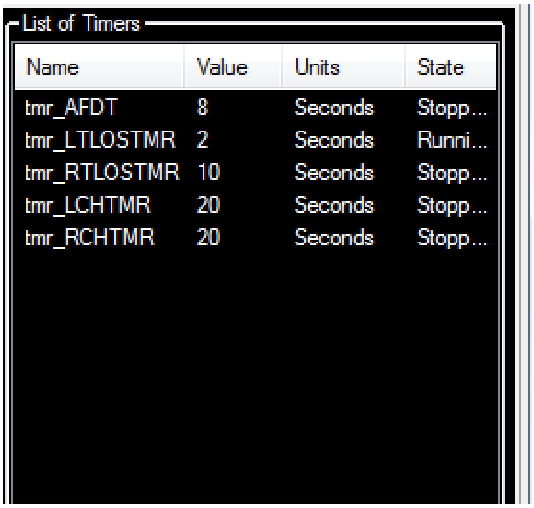


Figure 5-14   Relay Diagram Window - All Equations Used in Selected Property

5.4 LIST OF TIMERS WINDOW

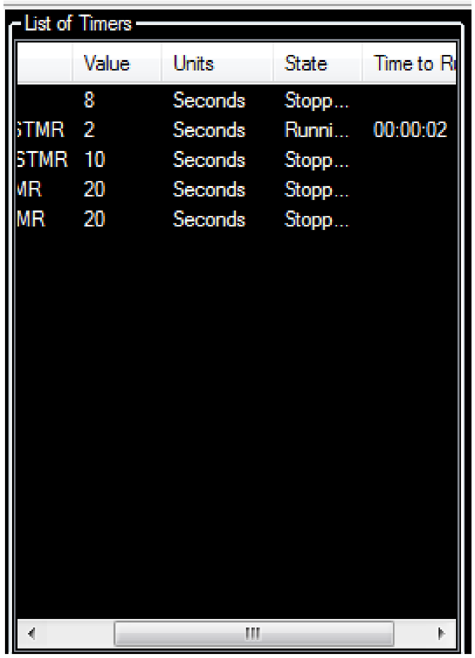
The **List of Timers** window shows the timers used in the program and the following specifications:

- Timer Name
- Timer Value
- Timer Units
- State of Timer (stopped, running, or expired)
- Time to Run on Timer in Seconds (scroll right to see this).



Name	Value	Units	State
tmr_AFDT	8	Seconds	Stopp...
tmr_LTLOSTMR	2	Seconds	Runni...
tmr_RTLOSTMR	10	Seconds	Stopp...
tmr_LCHTMR	20	Seconds	Stopp...
tmr_RCHTMR	20	Seconds	Stopp...

Figure 5-15 List of Timers Window

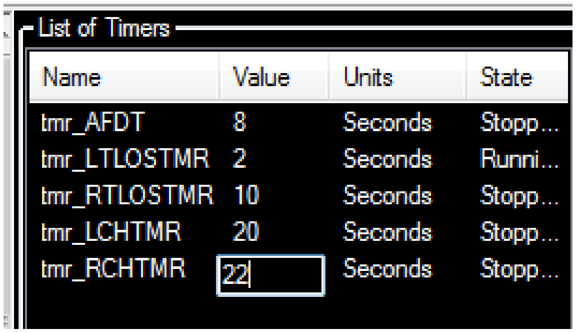


List of Timers

	Value	Units	State	Time to R
	8	Seconds	Stopp...	
;TMR	2	Seconds	Runni...	00:00:02
STMR	10	Seconds	Stopp...	
MR	20	Seconds	Stopp...	
MR	20	Seconds	Stopp...	

Figure 5-16 List of Timers - Runtime Status

The value of the timer can be changed by double-clicking on the value column and entering a new value. The timer value cannot be changed when the timer is running, only when it is stopped or expired.



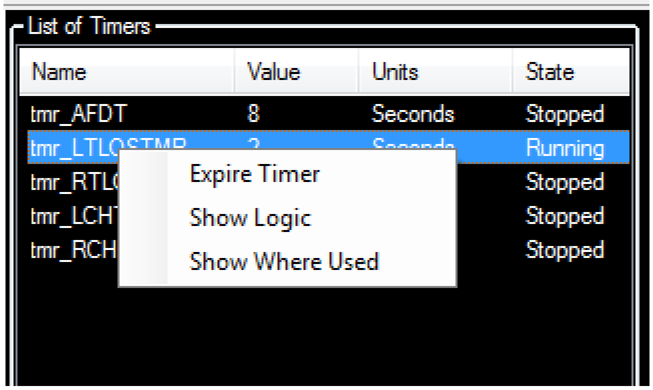
List of Timers

Name	Value	Units	State
tmr_AFDT	8	Seconds	Stopp...
tmr_LTLOSTMR	2	Seconds	Runni...
tmr_RTLOSTMR	10	Seconds	Stopp...
tmr_LCHTMR	20	Seconds	Stopp...
tmr_RCHTMR	22	Seconds	Stopp...

Figure 5-17 Changing Timer Values

If the timer is in milliseconds, the WCCT will enforce that you enter it into 100 ms increments. Right-click on a timer to bring up the options menu which contains:

- Expire Timer – sets a running timer to expired (only visible when timer is running)
- Show Logic – shows where timer coil is set
- Show Where Used – show all equations timer contact is used in


List of Timers

Name	Value	Units	State
tmr_AFDT	8	Seconds	Stopped
tmr_LTLQSTMP	2	Seconds	Running
tmr_RTL(			Stopped
tmr_LCH			Stopped
tmr_RCH			Stopped

Figure 5-18 Timer Menu Options

5.5 EXPIRING TIMERS

The simulation does not run real time. When an input changes, the logic executes until stable, then stops. When a timer is started, its time to run will remain at its configured value until a timer is expired. This method allows the user to debug the logic more easily, as timers are not expiring in real time while the user is trying to look at things.

When the user right-clicks on a running timer and selects the **Expire Timer** option, the simulation clock is incremented by the amount of time remaining on that timer + 0.1s and this timer will change to **Expired**.

If multiple timers are running, and the user selects one timer and expires it, the time to run for all the running timers is decremented by the time to run for the user-selected timer, so any timers with a shorter time to run will expire as well. This will ensure timers expire in their natural order.

For example, if there are three timers, all which started at the same time with the following values:

	Value	State	Time to Run
Timer A	1	Running	1:00
Timer B	5	Running	5:00
Timer C	10	Running	10:00

If the user expired Timer C, 10s will elapse on the simulation clock so all three timers will be set to **Expired**. If the user selects to expire timer A, 1.1 s will elapse on the simulation clock so the timer list will show:

	Value	State	Time to Run
Timer A	1	Expired	0:00
Timer B	5	Running	3:90
Timer C	10	Running	8:90

If the user then selects to expire timer B, 3.90 + 0.1 s will elapse on the simulation clock so the timer list will show:

	Value	State	Time to Run
Timer A	1	Expired	0:00
Timer B	5	Expired	0:00
Timer C	10	Running	4:90

5.6 TIMERS IN RELAY LOGIC

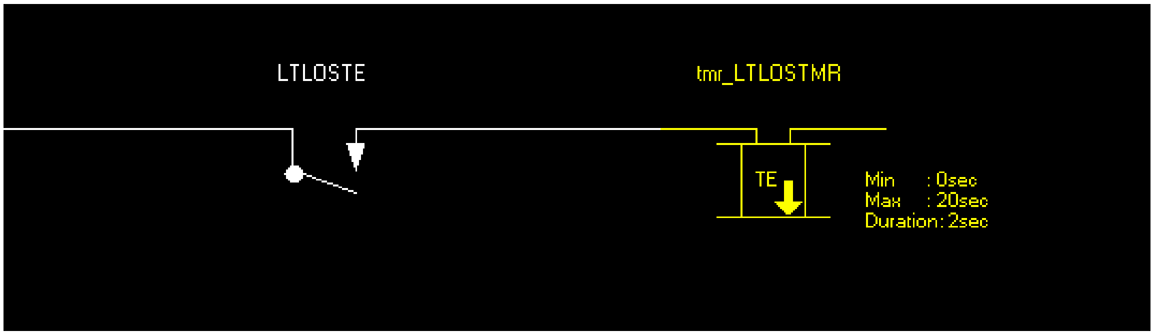
A timer will be show in the logic with its default parameter next to it and a TE in the relay coil.

NOTE

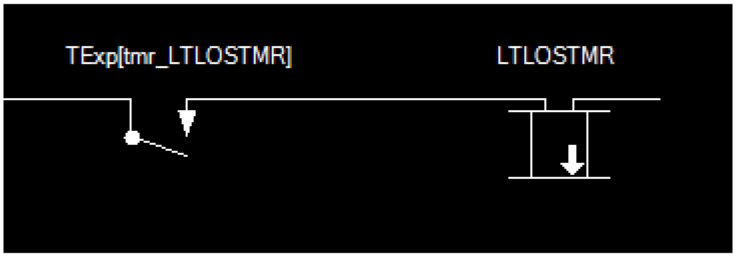
NOTE

The default value is that from the MCF, not the value set by the user during simulation, meaning this value will not match the value shown in the list of timers if the user has changed the value.

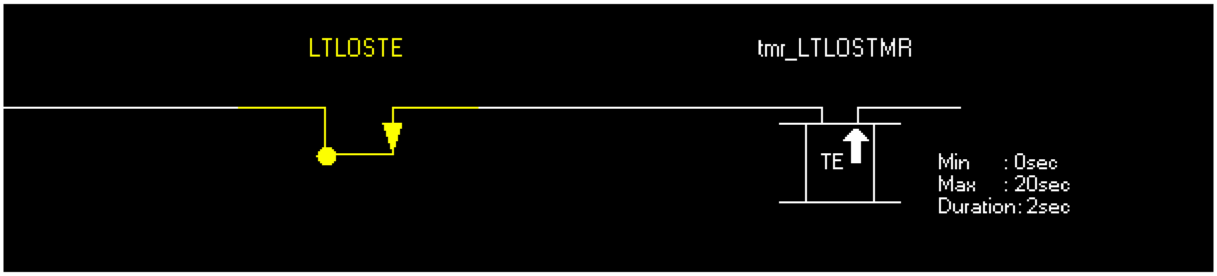
When the timer is stopped, it will show a down arrow as follows on the relay coil.

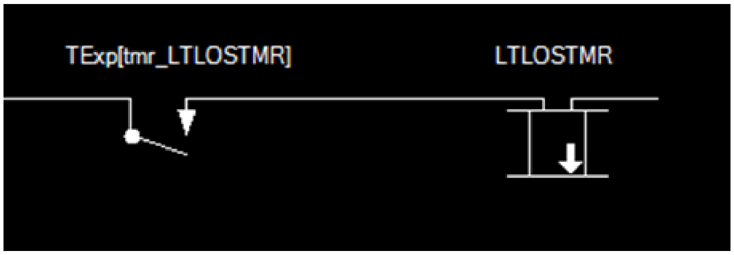


The relay contact is labeled with TExp and then the timer name.

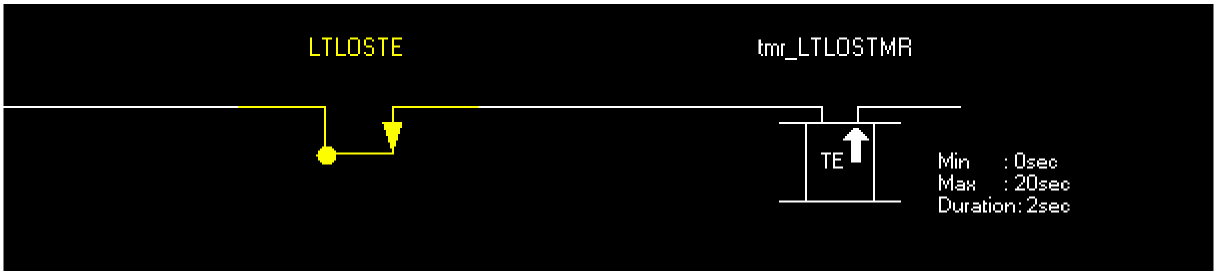


When the timer is running, the timer coil shows an up arrow for energized, and the relay contact still shows down while the timer is still running.

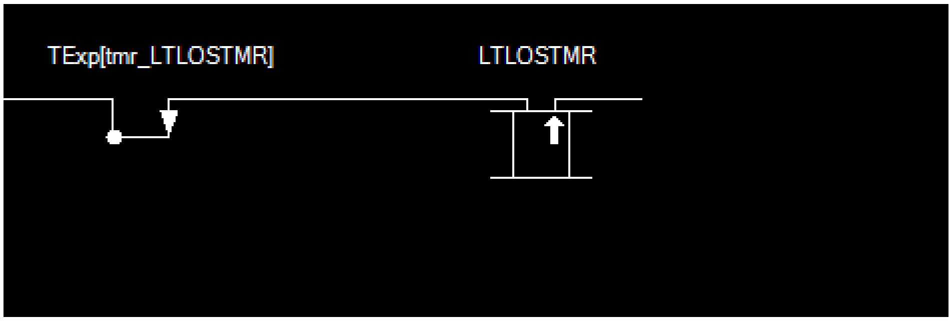




When the timer goes to expired, the relay coil still shows energized.



And now the timer contact also shows energized.



5.7 RELAY EQUATION VIEW

In this view the user can see the relay logic. Right-click on a relay contact or coil to get a drop-down menu that shows:

- Toggle State (for inputs only).
- Show Logic (for outputs and internal states only).
- Show Where Used.
- Clear Equation.
- Clear Display.

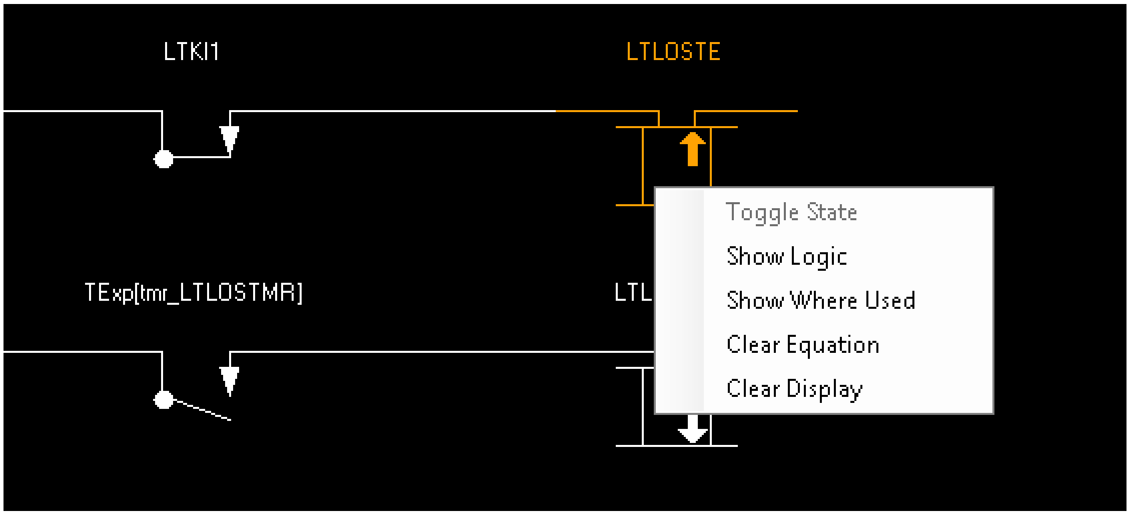


Figure 5-19 Relay Logic View Drop-Down Menu

Selecting toggle state will change the state of the input. Double-clicking on the relay contact will also toggle its state.

Show Logic will add the equation that defines the logic state to the current relay display view.

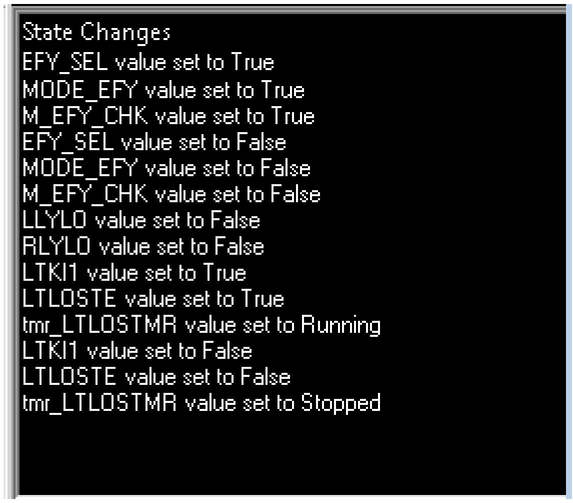
Show Where Used will add all the equations in which the selected logic state is used to the current relay display view.

Clear Equation will remove the selected equation from the current relay display view.

Clear Display will remove all equations from the current relay display view.

5.8 STATE CHANGES WINDOW

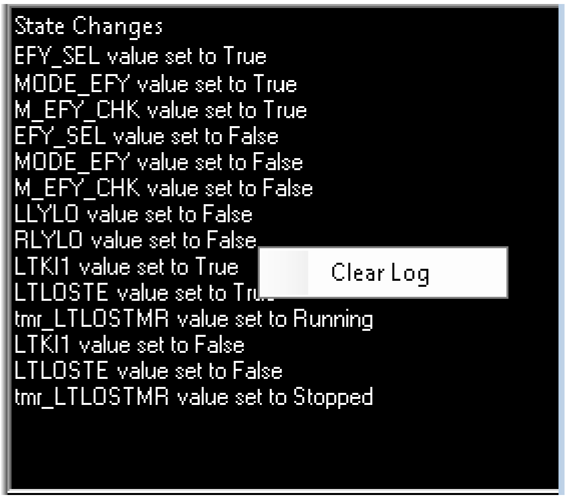
The State Changes window lists the changes in the states of relay contacts, coils, and change of timer states that occur during simulation.



```
State Changes
EFY_SEL value set to True
MODE_EFY value set to True
M_EFY_CHK value set to True
EFY_SEL value set to False
MODE_EFY value set to False
M_EFY_CHK value set to False
LLYLO value set to False
RLYLO value set to False
LTKI1 value set to True
LTLOSTE value set to True
tmr_LTLOSTMR value set to Running
LTKI1 value set to False
LTLOSTE value set to False
tmr_LTLOSTMR value set to Stopped
```

Figure 5-20 State Changes Window

To clear the log entries in the window, right-click in the window and select the **Clear Log** option.



```
State Changes
EFY_SEL value set to True
MODE_EFY value set to True
M_EFY_CHK value set to True
EFY_SEL value set to False
MODE_EFY value set to False
M_EFY_CHK value set to False
LLYLO value set to False
RLYLO value set to False
LTKI1 value set to True
LTLOSTE value set to True
tmr_LTLOSTMR value set to Running
LTKI1 value set to False
LTLOSTE value set to False
tmr_LTLOSTMR value set to Stopped
```

Figure 5-21 Clearing State Changes Window

5.9 I/O MODULE SPECIFIC SIMULATION CONSIDERATIONS

5.9.1 Code Track Module

- When transitioning from receiving one vital code to another, use the **Pause** button to avoid having the vital code bit drop out or two vital code bits being set at once.
- When simulating a track being shunted, first clear the Non-Vital Rx bit and Vital Rx bit, then **Pause** the simulation, clear any vital or non-vital codes and the code 1, then **Resume** the simulation.
- When simulating clearing a track shunt, first set the Non-Vital Rx bit and Vital Rx bits (could **Pause** and set both bits, then **Resume,** or set non-vital Rx first), then **Pause** the simulation, then set any vital or non-vital codes and the code 1, then **Resume** the simulation.

5.9.2 Colorlight Module

- When foreign energy is detected by a Colorlight card, it will set all its lamps to LOR, so when simulating foreign energy, manually set all the lamps to LOR.
- When foreign energy is detected by a Colorlight card, it will turn off its DC-DC Converter and report the converter status as de-energized, so if using the red-retaining options and simulating foreign energy, also clear the Colorlight Convertor status.

SECTION 6 CHECKING FILES

6.0 INTRODUCTION

The following section provides details on how to check for data errors within a file, as well as using the other functions that are available on the Project tab:

- Parsing a project
- Building the MCF
- Decompiling the MCF
- Validating the MCF
- Program Listing file
- Comparing files
- Project Report.

6.1 PARSING A PROJECT

In general, the specific editor where data is entered provides error messages if any of the data entered is illegal or inconsistent. However, there are some checks that are carried out when the project is compiled. These checks can also be performed without compiling the project. This is done by selecting **Project > Parse** from the Project menu.

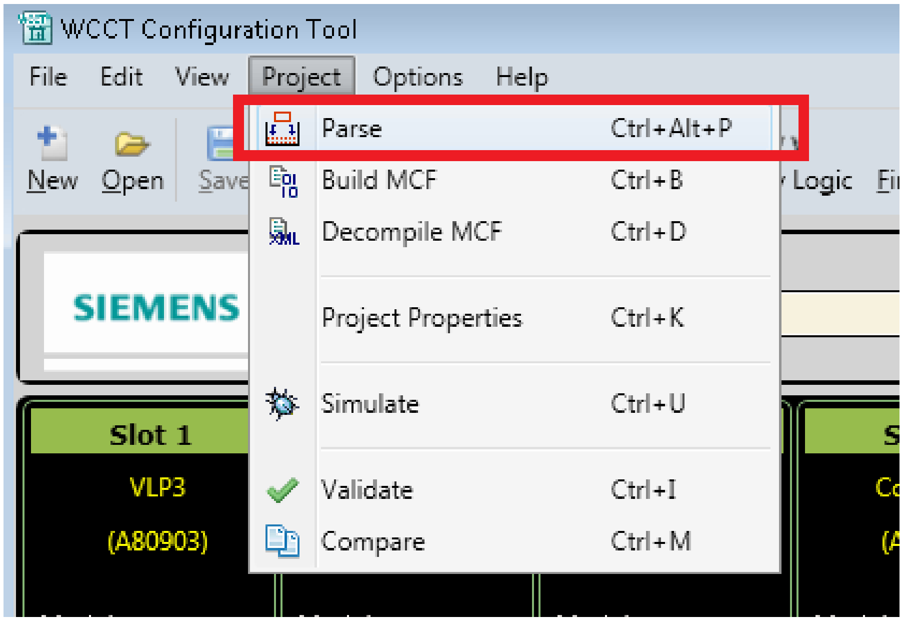
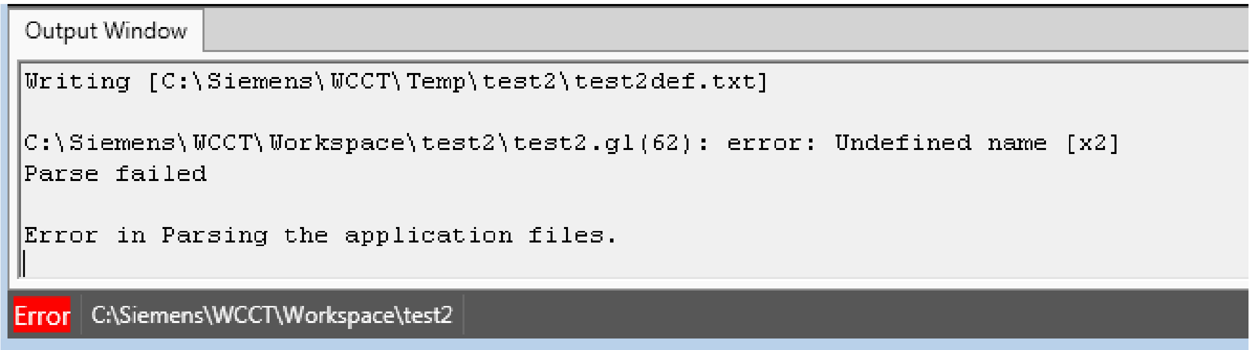


Figure 6-1 Parse Project Menu

The parse errors show up in the output window. The output window can be resized by dragging the top border up or down.

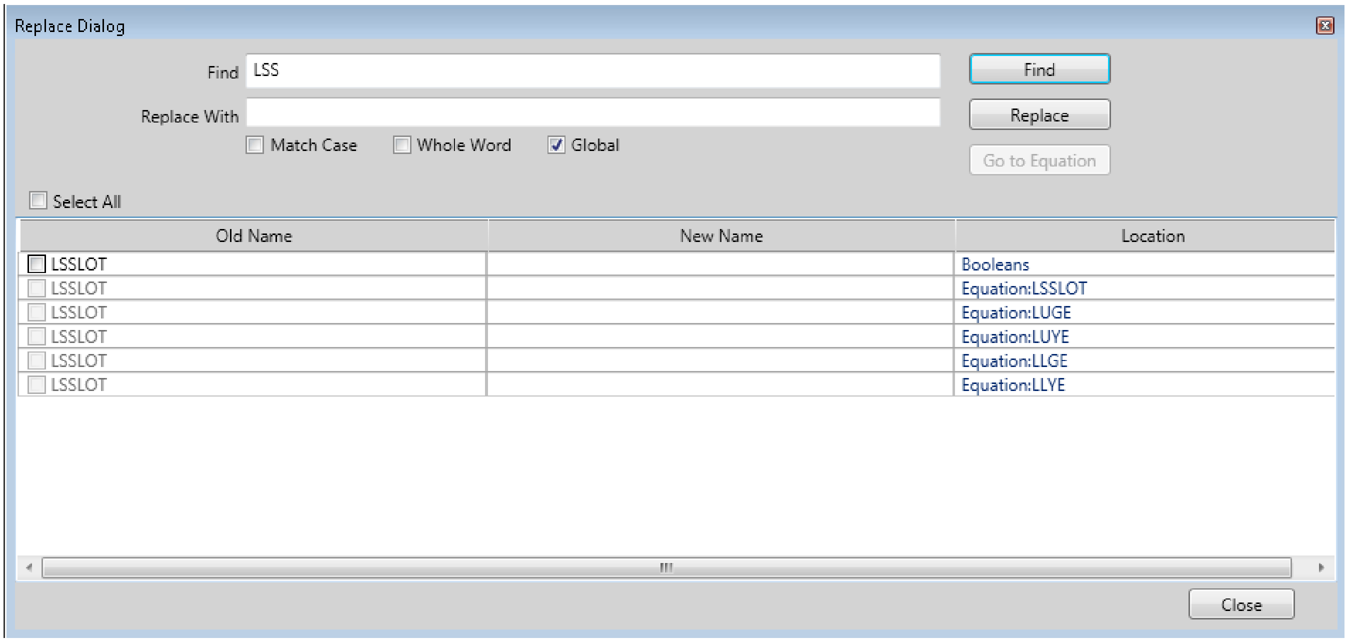


```
Writing [C:\Siemens\WCCT\Temp\test2\test2def.txt]

C:\Siemens\WCCT\Workspace\test2\test2.gl(62): error: Undefined name [x2]
Parse failed

Error in Parsing the application files.
```

Figure 6-2 File Error Indication on Console Window

As shown in the previous figure, the parse errors output window provides a reason for the error, such as, '**Undefined name [x2]**', and refers to a line number in the source file, such as, '**test2.gl (62)**'.

To find where the undefined name is located, use the **Find and Replace** function.



Replace Dialog

Find: LSS

Replace With:

□ Match Case □ Whole Word ☑ Global

□ Select All

Old Name	New Name	Location
□ LSSLOT		Booleans
□ LSSLOT		Equation:LSSLOT
□ LSSLOT		Equation:LUGE
□ LSSLOT		Equation:LUYE
□ LSSLOT		Equation:LLGE
□ LSSLOT		Equation:LLYE

Figure 6-3 Finding Undefined Variable

6.2 BUILDING THE MCF

To build the project MCF, select the **Build** icon, **Project>Build MCF**, or use the short cut **Ctrl B**.

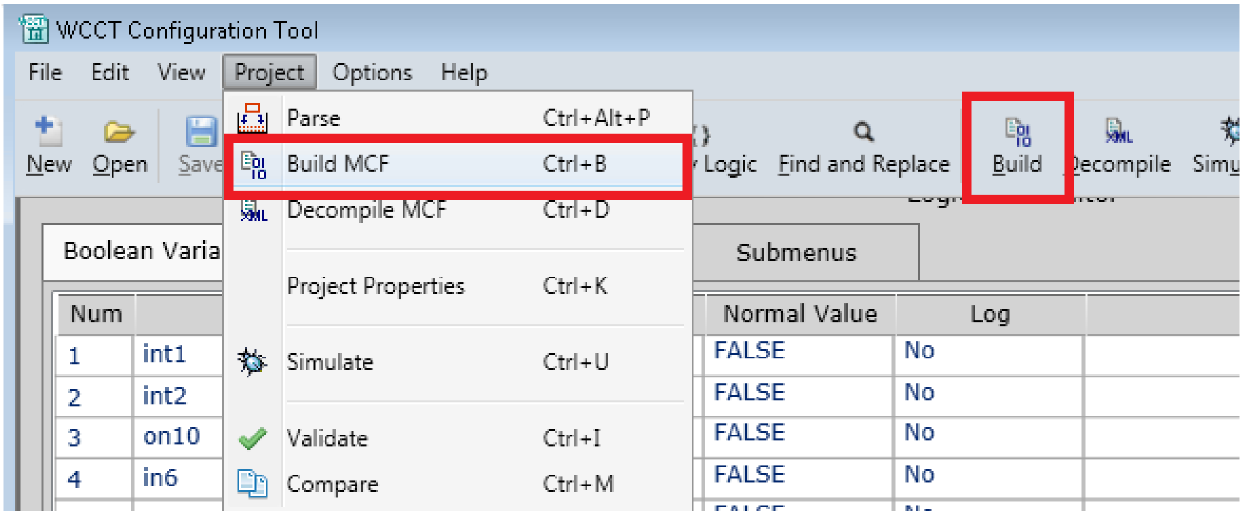
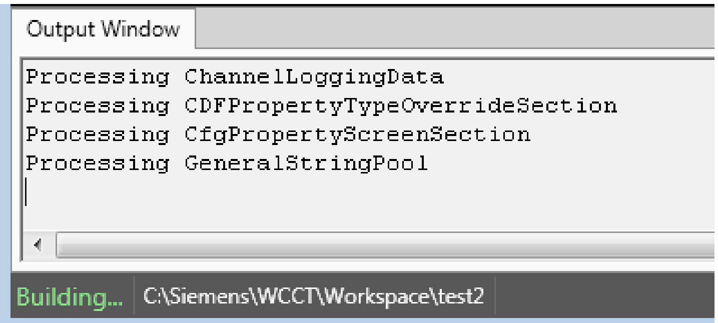


Figure 6-4 Building the Project

As the project is compiling, the output window shows the progress.



```
Processing ChannelLoggingData
Processing CDFPropertyTypeOverrideSection
Processing CfgPropertyScreenSection
Processing GeneralStringPool
```

Figure 6-5 Build Progress

When the compilation has finished, the following message will display near the end of the text in the console window:

```
XML To Binary MCF Generation Complete
Done
        1 file(s) copied.
        1 file(s) copied.


{main_unit}: Number of used logic states 8008 (maximum 50000)
```

The MCF file will be created in the MCF_Dir subdirectory of the project workspace.

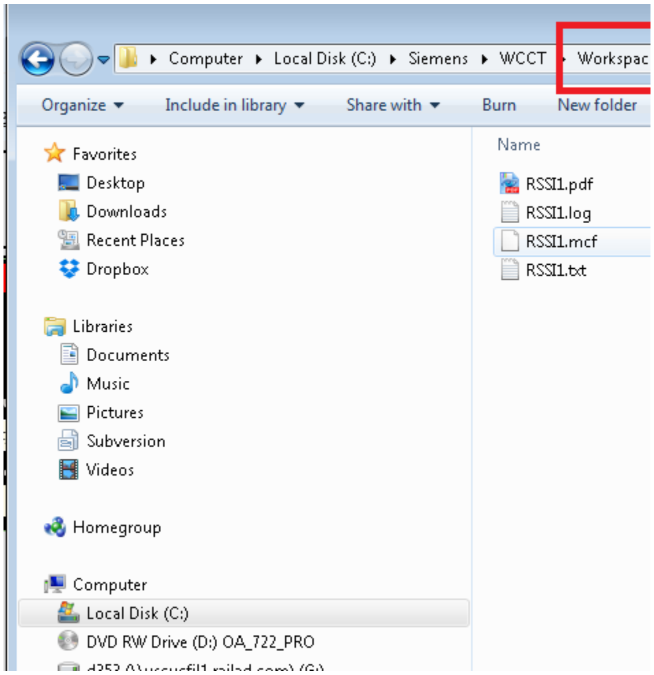


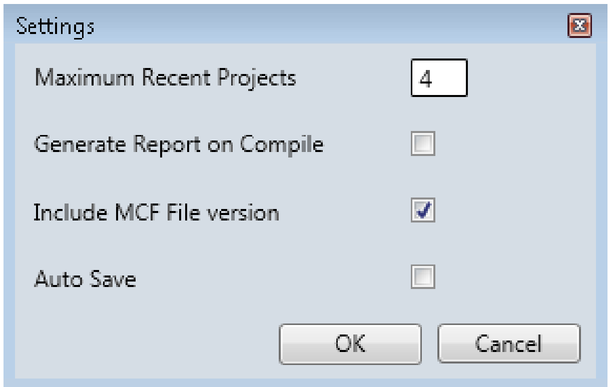
Figure 6-6 MCF Directory Window

A Log file is created in MCF_Dir folder, this is a text file and contains the CRC of the MCF, for example:

MCF CRC : 0x9CAB5836

This is the MCF CRC that is used to verify that the MCF is not corrupt and is the one the user loads into the WayConneX.

The MCF file and reports are named after the project and may or may not have the 3-digit version number appended to it, depending on how the user has set **Include MCF File Version** in the **Options > Settings** menu.



Settings

Maximum Recent Projects 4

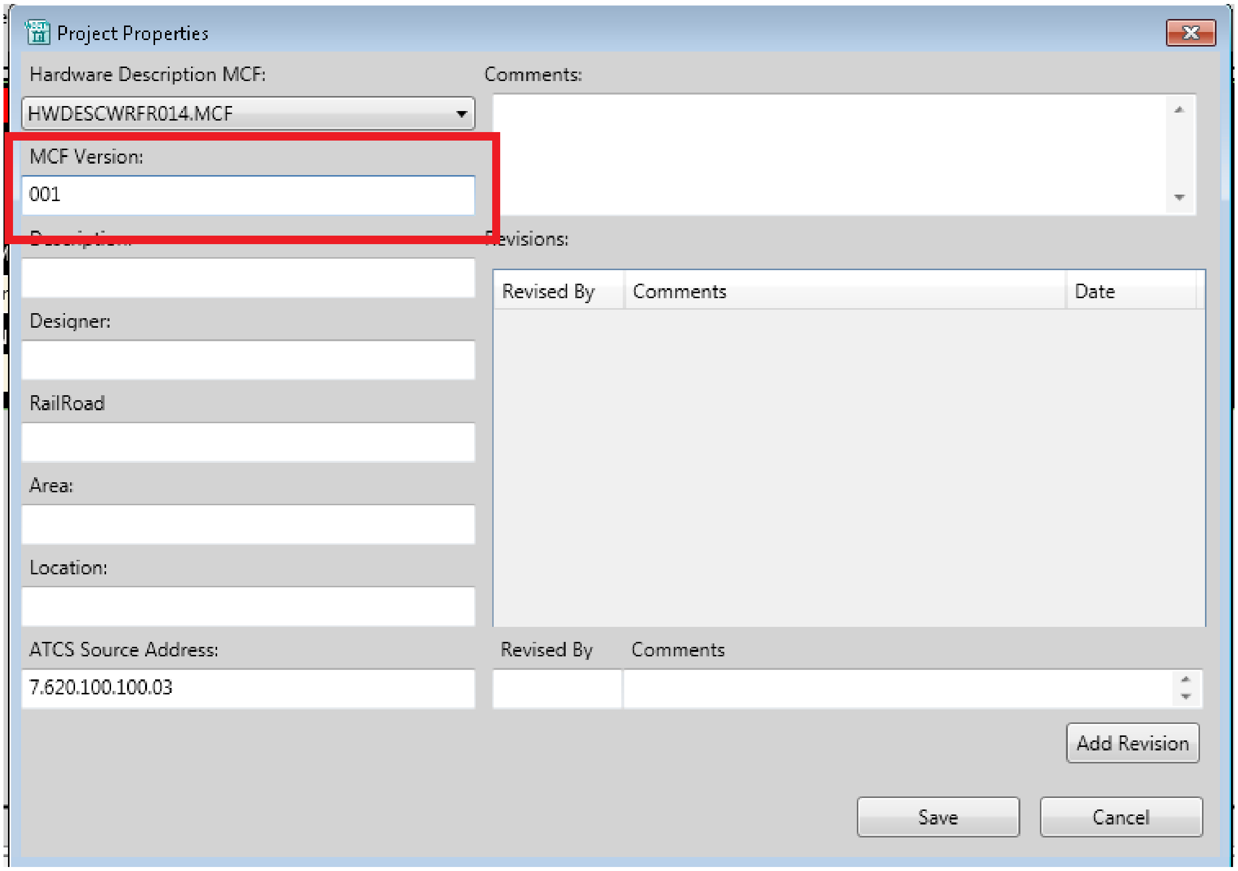
Generate Report on Compile ☐

Include MCF File version ☑

Auto Save ☐

Figure 6-7 Options/Settings Window

The MCF version is set in the **Project>Properties** window.



Hardware Description MCF: HWDESCWRFR014.MCF

MCF Version: 001

ATCS Source Address: 7.620.100.100.03

Figure 6-8 Project Properties - MCF Version

The build process also creates a text file (.txt) containing the program listing.

The tool may be configured so that the build process creates a PDF report containing the program listing and the relay logic diagrams. To turn this on, go to the **Options>Settings** window (see previous Options/Settings window) and check the **Generate Report on Compile** check box.

When the build process is started, the WCCT first performs the Parse check described in the previous section. It then performs some pre-compilation checks. The compilation may fail for other reasons, for example a module has been added, but is not used, or a limit has been exceeded. These errors are not detected until the final compilation stages and may result in somewhat cryptic error messages. Appendix A lists the more common error messages.

6.3 DECOMPILING THE MCF

The MCF file contains all the information inside it so that it can be decompiled back to its original source files. To decompile an MCF select the **Project>Decompile MCF** from the menu, the **Decompile** icon from the toolbar, or use the **Ctrl D** shortcut.

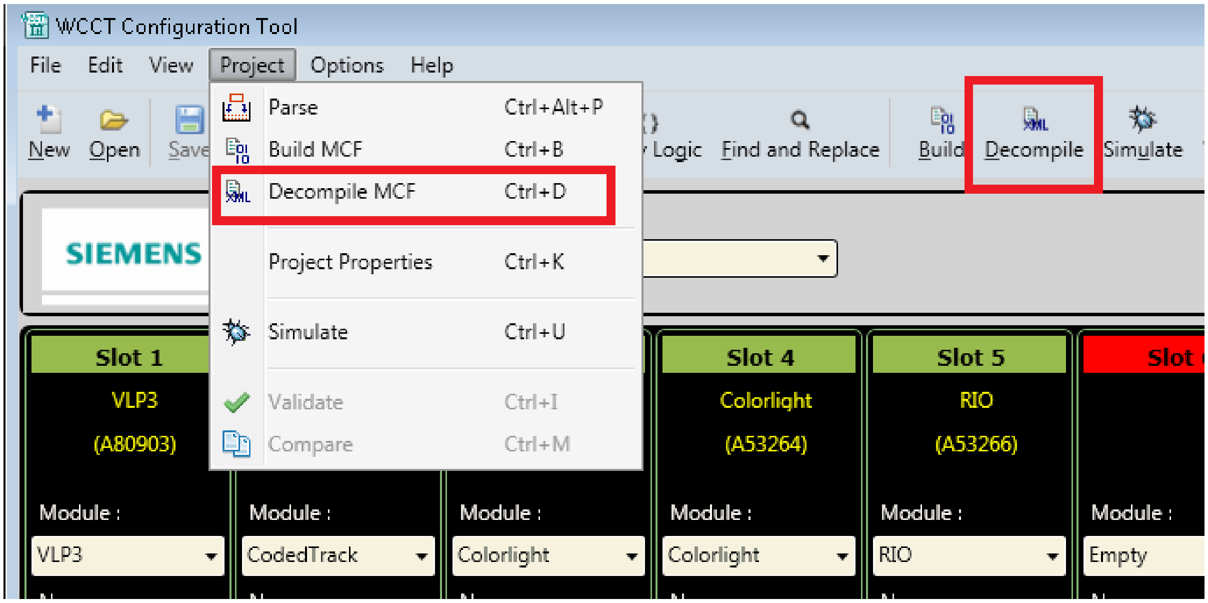


Figure 6-9 Decompile MCF Option

This brings up a browse window, from here select the file path of the MCF.

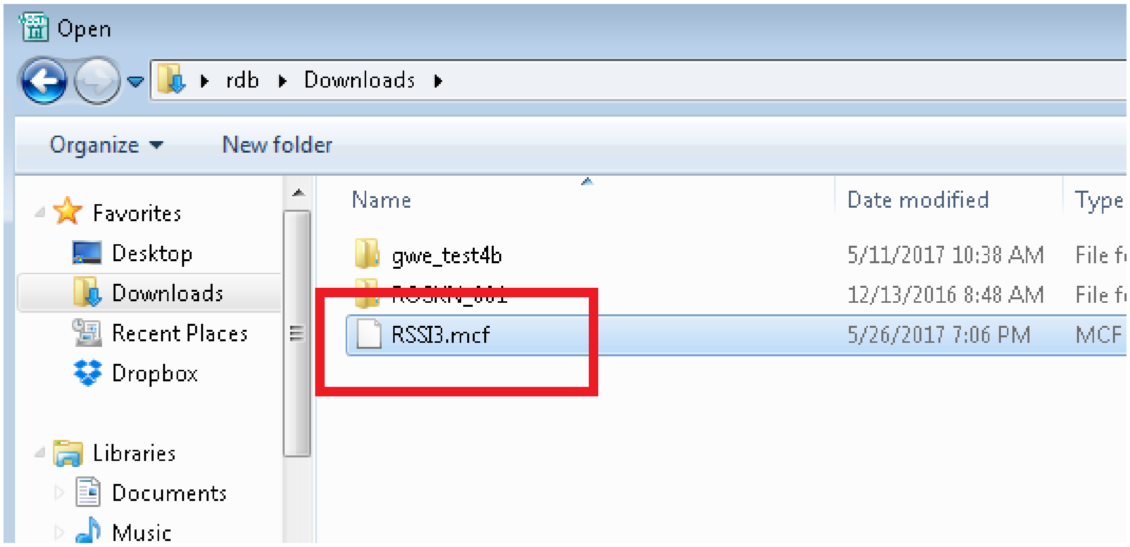


Figure 6-10 Selecting the MCF to Decompile

The MCF will be decompiled into a folder under the default Workspace and given the name {projectname}_Decomp001

The project will be left open after it is decompiled.

6.4 VALIDATING THE MCF

A key part of creating an MCF is to validate it. The validation process performs the following functions:

- decompiles the MCF back to its source files.
- compares the source files with the original source files.
- recompiles the decompiled project.
- compares the newly compiled MCF with the original MCF.
- creates validation report containing:
  - the difference between the original and decompiled source files.
  - the binary differences the between the original and newly compiled MCF.

To validate a project select **Validate** from the Project menu, select the **Validate** icon, or use the **Ctr I** shortcut.

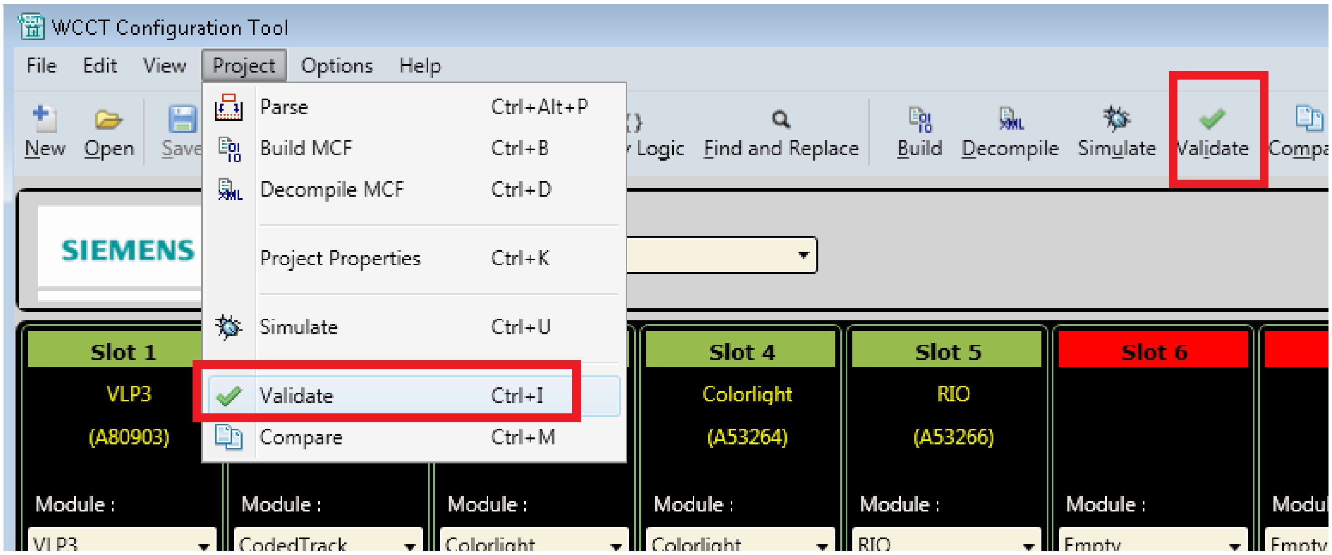
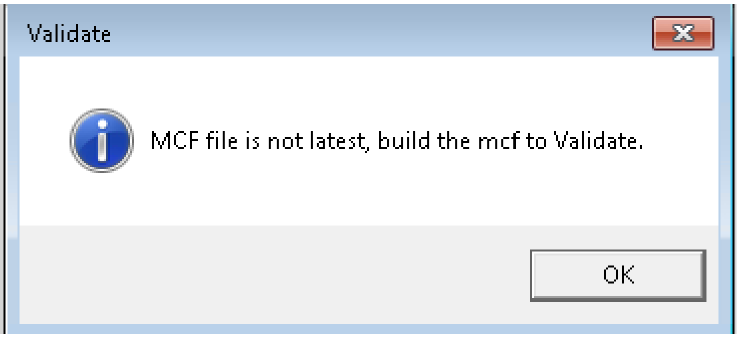


Figure 6-11 Selecting Validate Option

When **Validate** is selected it will first decompile the MCF. If there is no MCF, the validate button will be disabled. If the project source files have changed since the MCF was last built, the WCCT shows the following error message.



MCF file is not latest, build the mcf to Validate.

Figure 6-12   MCF Not Current Error

When the **Validate** operation completes successfully, the WCCT shows the following in the output window:

```
      Validation : Passed
```

The tool also opens up a text window containing the validation comparison and report.

This report has four sections; the first section shows the project name, MCF CRC, as shown in the following example.

```
-----------------------------------------------------------------------------------
WCCT    : 1.5.2
Project :test12
MCF Name :test12001.mcf
MCF CRC : 0x40100272
------------------------------------------------------------------------------------
Comparison Report Between :test12 and test12_v_DComp001
Generated: 5/29/2017 6:34:48 PM
```

The next two sections show the results of comparing the project source file and should have:

Number of Differences 0.

These sections are shown in the following example.

```
-------------------------------------Compare:BEGIN----------------------------------
[C:\Siemens\WCCT\Workspace\test12\test12.gc]
[C:\Siemens\WCCT\Workspace\test12_v_DComp001\test12.gc]
Files C:\Siemens\WCCT\Workspace\test12\test12.gc and
C:\Siemens\WCCT\Workspace\test12_v_DComp001\test12.gc are identical
Number of Differences : 0
-------------------------------------Compare:END------------------------------------

-------------------------------------Compare:BEGIN----------------------------------
[C:\Siemens\WCCT\Workspace\test12\test12.gl]
[C:\Siemens\WCCT\Workspace\test12_v_DComp001\test12.gl]
Files C:\Siemens\WCCT\Workspace\test12\test12.gl and
C:\Siemens\WCCT\Workspace\test12_v_DComp001\test12.gl are identical
Number of Differences : 0
-------------------------------------Compare:END------------------------------------
```

The last section shows the results of a binary comparison of the original MCF and the recreated MCF. There will be two known and acceptable differences listed here: the project date/time and the MCF CRC, as shown in the following example.

```
-------------------------------------Compare:BEGIN----------------------------------
[C:\Siemens\WCCT\Workspace\test12\MCF_Dir\test12001.txt]
[C:\Siemens\WCCT\Workspace\test12_v_DComp001\MCF_Dir\test12001.txt]
13,14c13,14
< * MCF File Time/ Date           :  29-May-2017 18:33
< * MCF CRC                       :  0x40100272
---
> * MCF File Time/ Date           :  29-May-2017 18:34
> * MCF CRC                       :  0xC67CB06
16c16
< * Report Date / Time            :  29-May-2017 18:33
---
> * Report Date / Time            :  29-May-2017 18:34
Number of Differences : 2
-------------------------------------Compare:END------------------------------------

Total Number of Differences Found : 2
Validation : Passed
```

The validation report is stored in the project workspace in the MCF_Dir folder and has the name:

{projectname}_Validate.txt

6.5 PROGRAM LISTING FILE

When the project is compiled, the WCCT creates a program listing file with the MCF name and a .txt extension.

This file has a header that shows the WCCT version information, the project name, the MCF name, the CRCs, and the information entered in the project properties window, for example:

```
**************************************************************************************
** WCCT Version                  :  1.5.2
** Part Number                   :  9vD24
** Copyright  ©  2017 Siemens
**************************************************************************************

**************************************************************************************
* Project Name                  :  RSSI1
* Version                       :  002
* Project Type                  :  Wayside Controller Configuration Tool
* MCF File Name                 :  RSSI1002.mcf
* MCF File Time/ Date           :  29-May-2017 18:49
* MCF CRC                       :  0x82861E37
* Hardware Description MCF      :  HWDESCWRFR014.MCF
* Report Date / Time            :  29-May-2017 18:49
* Description                   :  my desc
* Designer                      :  rdb
* RailRoad                      :  cunca
* Area                          :  NZ
* Location                      :  tasman
* ATCS Source Address           :  7.620.100.100.03
* Comments                      :  test locn
**************************************************************************************
* Revised By                    :  rdb
* Comments                      :  comment 1 comment 2
* Date                          :  11-May-2017

* Revised By                    :  rdb
* Comments                      :  comment 3
* Date                          :  11-May-2017

* Revised By                    :  hhh
* Comments                      :  h
* Date                          :  12-May-2017

**************************************************************************************
```

The report then contains the chassis information, for example:

```
**************************************************************************************
* Type: 8Slot
* Name: gwe_Main

* SLOTS:
*            Module              Name
*            ------------------- -------------------
*    Slot 1  VLP3                sl1
*    Slot 2  CodedTrack          Etrack
*    Slot 3  Colorlight          sl3
*    Slot 4  Colorlight          sl4
*    Slot 5  RIO                 sl5
*    Slot 6
*    Slot 7
*    Slot 8  CodedTrack          sl8

**************************************************************************************
```

For each module, the report shows the configuration information and module I/O, for example:

```
--------------------------------------------------------------------------------------
Slot 2 - CodedTrack
--------------------------------------------------------------------------------------

Configuration:
    TrkTxVoltage                      : 1500 mV
    Code5                             : Alternating             [Default]
    EC4Compatibility                  : EC4Plus
    NonVitalCodeChangeCycles          : 1                       [Default, UCN]
    VitalCodeChangeCycles             : 2                       [Default, UCN]
    ShuntDropCycles                   : 2                       [Default, UCN]
    ShuntPickCycles                   : 5                       [UCN]
    CurrentLimit                      : 10000 mA

CTIO:
    Channel Name: LTK
    CodedTrack Outputs:                        CodedTrack Inputs:
    -------------------                        ------------------
    Code 1 Tx :LTKO1                           Code 1 Rx :LTKI1
    Code 2 Tx :LTKO2                           Code 2 Rx :LI2
    Code 3 Tx :LTKO3                           Code 3 Rx :LI3
    Code 4 Tx :                                Code 4 Rx :LI4
    Code 5 Tx :LTKO5                           Code 5 Rx :LTKI5
    Code 6 Tx :LTKO6                           Code 6 Rx :LTKI6
    Code 7 Tx :LTKO7                           Code 7 Rx :LI7
    Code 8 Tx :LTKO8                           Code 8 Rx :LI8
    Code 9 Tx :                                Code 9 Rx :
    Code M Tx :                                Code M Rx :
                                           Vital Code Rx :LTKVCP
                                           Non Vital  Rx :LTKCP
```

```
VRO Outputs:

Stick LED:
    Stick LED Control : LSTK
```

The report then shows the sections from the Logic Data editor

```
**************************************************************************************
Logic Data
**************************************************************************************
--------------------------------------------------------------------------------------
Boolean Variables
--------------------------------------------------------------------------------------
Num Name                        Initial        Log       Normal      Comment
--------------------------------------------------------------------------------------
1   AFDT                        FALSE          No        FALSE
2   AFDTE                       FALSE          No        FALSE
3   LTLOSTMR                    FALSE          No        FALSE


--------------------------------------------------------------------------------------
Timers
--------------------------------------------------------------------------------------
Num Timer Name              Min  Max  DUR  Units Display                  ROnly UCN Cmnt
--------------------------------------------------------------------------------------
1   tmr_AFDT                8    8    8    sec   AFDT                     No    No  [1]
2   tmr_LTLOSTMR            0    20   2    sec   LTLOSTMR                 No    No
3   tmr_RTLOSTMR            0    20   10   sec   RTLOSTMR                 No    No
4   tmr_LCHTMR              20   20   20   sec   LCHTMR                   No    No
5   tmr_RCHTMR              20   20   20   sec   RCHTMR                   No    No
--------------------------------------------------------------------------------------
Timer Comments:
1.  tmr_AFDT               :TIMERS
```

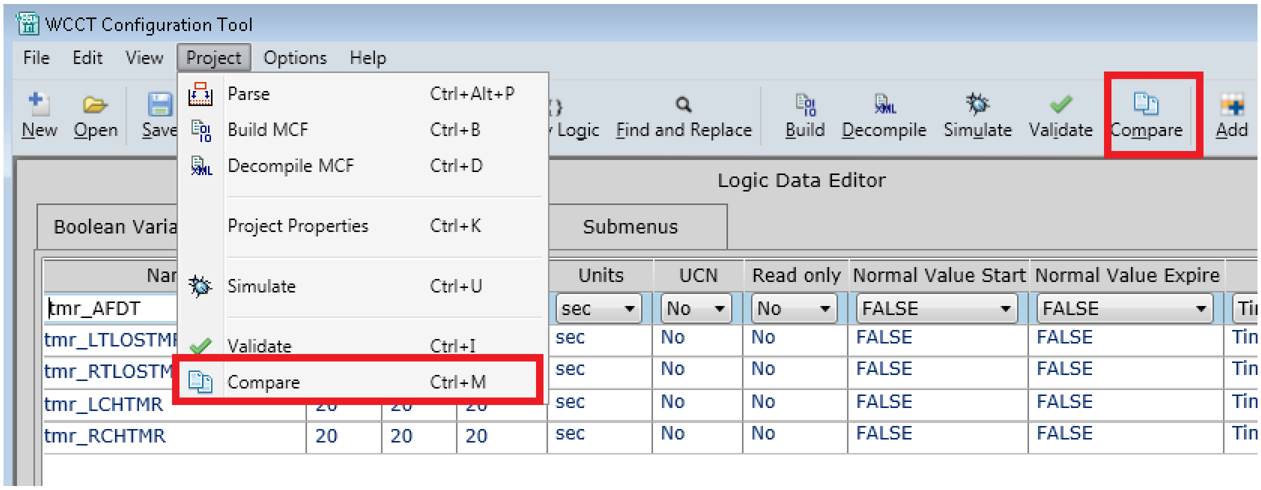
Comments are shown in the report as references to a list of comments below the table, as shown in the previous example.

The report finishes by listing the equations in Boolean text format.

```
**************************************************************************************
Equations
**************************************************************************************
# comments about eqn
AFDTE = (LSAPR || RSAPR) && !AFP;

StartTimerCond(AFDTE, tmr_AFDT);
```

6.6 COMPARING FILES

To compare two projects, first open one of them, then select **Compare** from the project menu, the **Compare** icon, or the **Ctrl M** shortcut. In order to compare projects, the projects must have been compiled so that the program listing files are available.



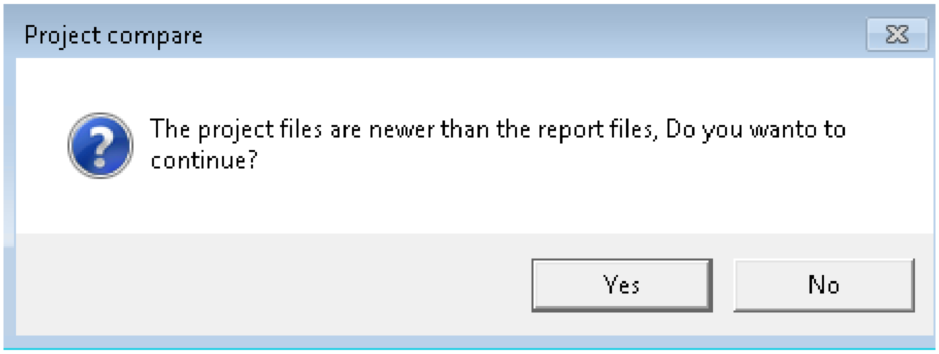
Nar				Units	UCN	Read only	Normal Value Start	Normal Value Expire	Ti
tmr_AFDT				sec	No	No	FALSE	FALSE	Ti
tmr_LTLOSTMI				sec	No	No	FALSE	FALSE	Tin
tmr_RTLOSTM				sec	No	No	FALSE	FALSE	Tin
tmr_LCHTMR	20	20	20	sec	No	No	FALSE	FALSE	Tin
tmr_RCHTMR	20	20	20	sec	No	No	FALSE	FALSE	Tin

Figure 6-13 Selecting the Compare Option

When **Compare** is selected, the WCCT will open a browse window. From here select the second project's **.project.xml** file.

The WCCT will do a comparison of the program listing files (see previous section for details) from the two projects and bring up a text window with the differences between the files.

If the listing files are not up to date (i.e. the project source files are newer than the listing file) the WCCT will give the following warning:


Project compare

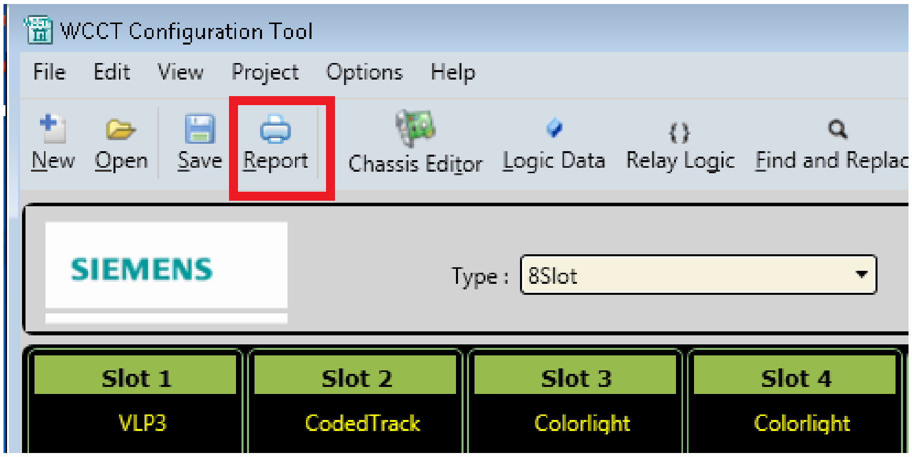
The project files are newer than the report files, Do you wanto to continue?

Figure 6-14 Listing File Not Current Warning

6.7 PROJECT REPORT

The WCCT creates a text version of the Program Listing that can be opened in a text editor, but this doesn’t contain the actual relay logic diagram. The WCCT can, however, also create a PDF version that will contain the relay logic diagrams.

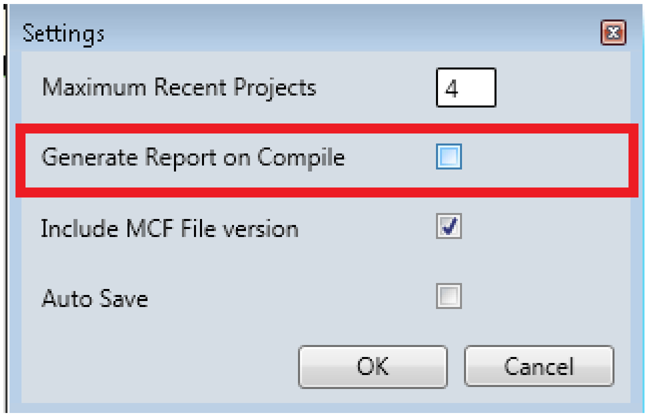
To create the report, select the **Report** icon or use the **Ctrl R** shortcut.



Type : 8Slot

Figure 6-15 Selecting the Report Option

The WCCT also has the option to create a new report whenever the MCF is built. To turn this option on or off, open the settings window from the **Options > Settings** menu and check the **Generate Report on Compile** check box if this is required.



Maximum Recent Projects 4

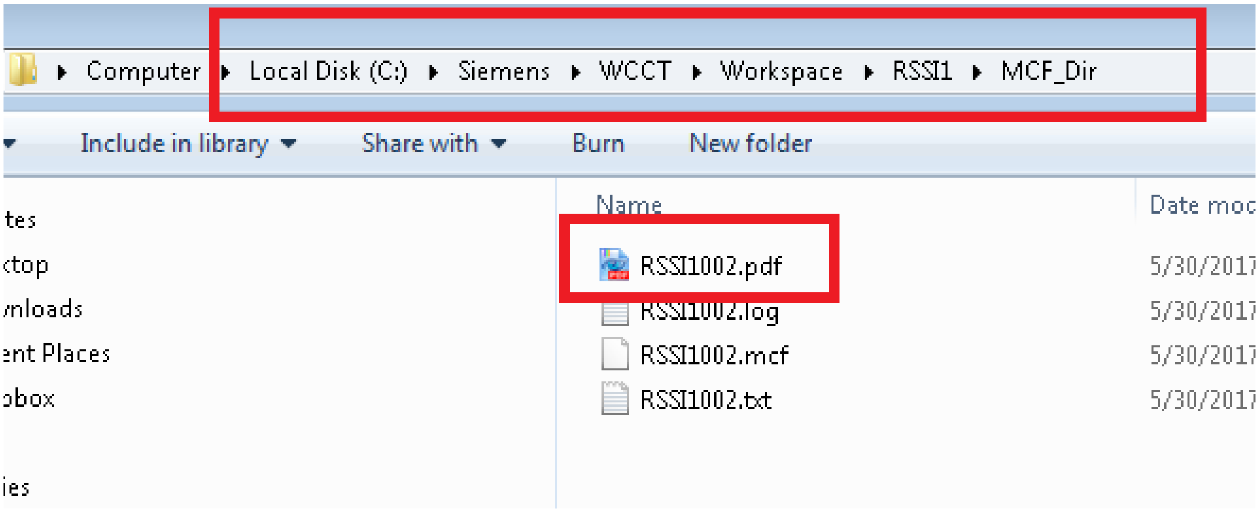
Generate Report on Compile ☐

Include MCF File version ☑

Auto Save ☐

Figure 6-16 Selecting to Generate Report on Compile

If **Generate Report on Compile** is checked, when the user presses **Build,** the WCCT will create the MCF and then create a {project}.pdf report file. The PDF report file will be stored in the usual location: {Workspace}/{project}MCF_Dir.



Computer ▸ Local Disk (C:) ▸ Siemens ▸ WCCT ▸ Workspace ▸ RSSI1 ▸ MCF_Dir

Name	Date moc
RSSI1002.pdf	5/30/2017
RSSI1002.log	5/30/2017
RSSI1002.mcf	5/30/2017
RSSI1002.txt	5/30/2017

Figure 6-17 Build Products

When the user presses the **Report** icon, a print preview window is created. Drag the corners of the window to re-size it. Use the **Zoom** to increase magnification.

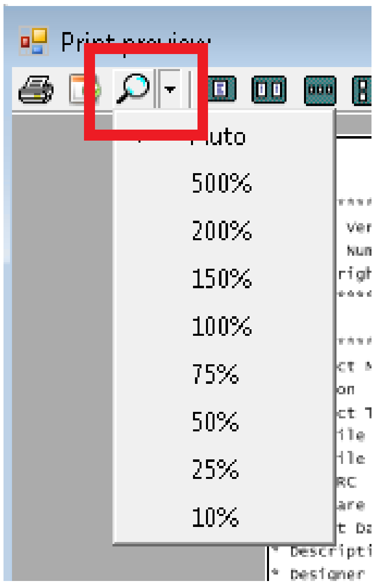
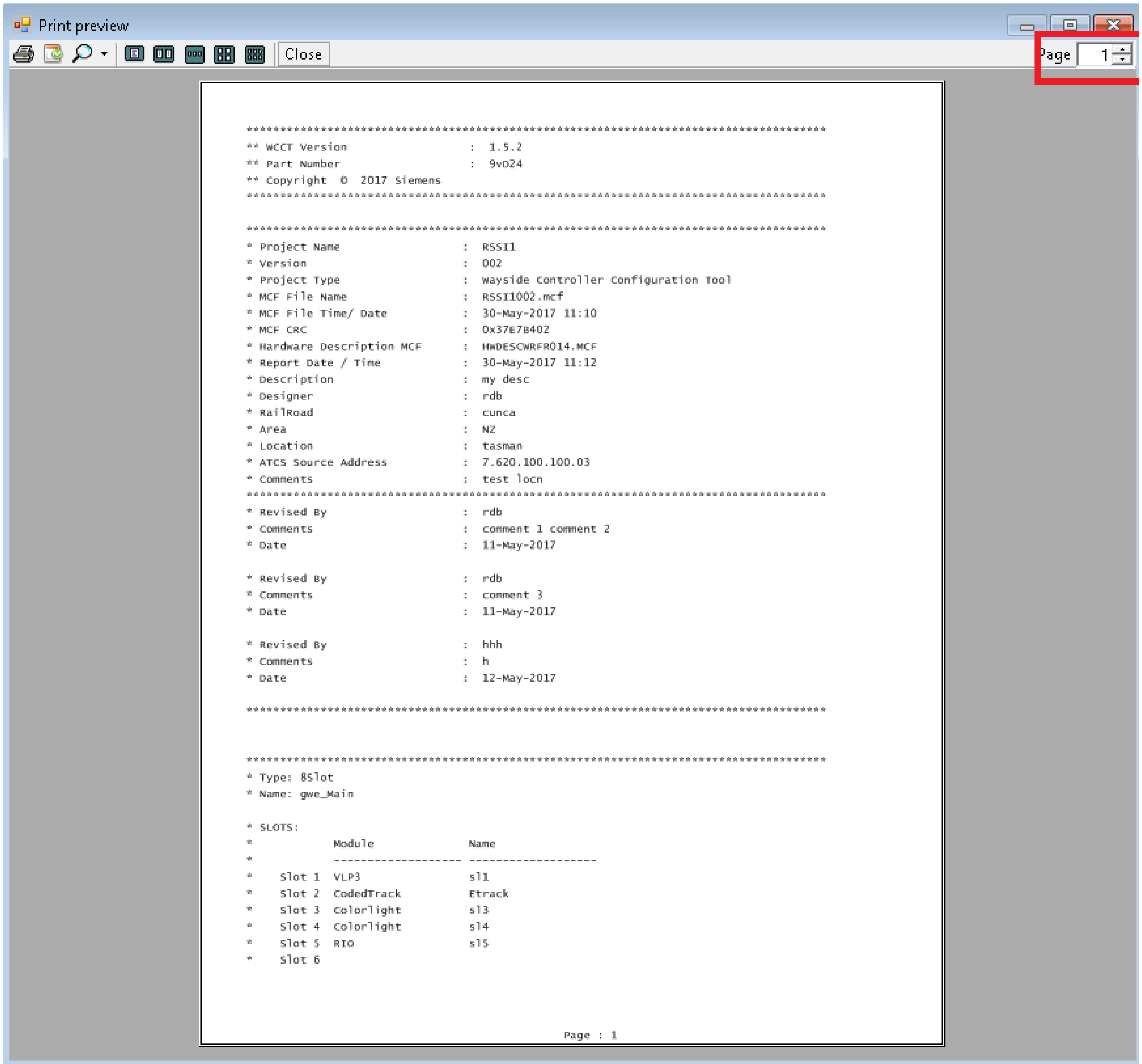


Figure 6-18 Print Preview Zoom

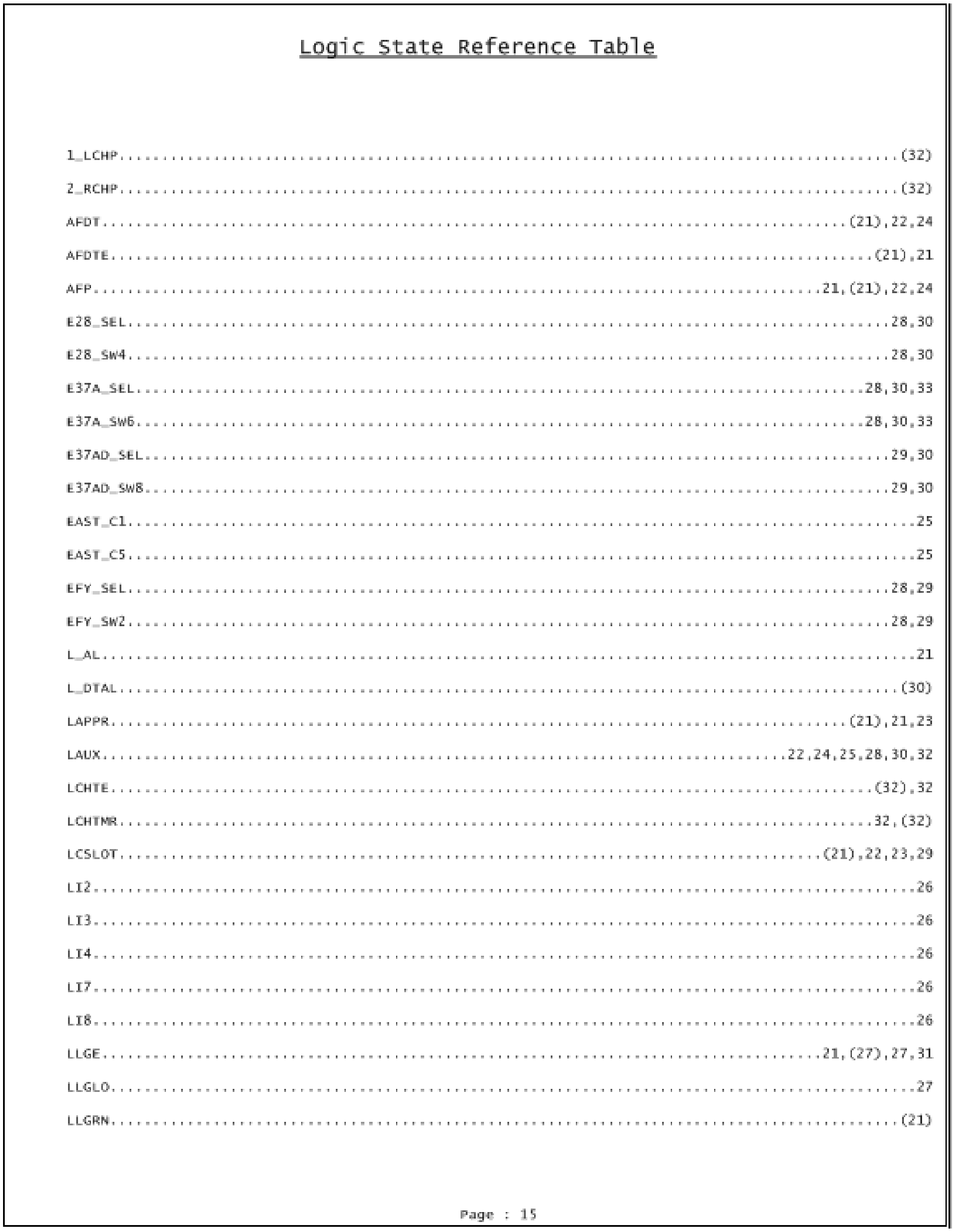
The report will start off with the identical information to the program listing. Use the page-up/down or the page selector in the top-right to navigate the report.



```
*****************************************************************************************
** WCCT Version                  :  1.5.2
** Part Number                   :  9VD24
** Copyright  ©  2017 Siemens
*****************************************************************************************

*****************************************************************************************
* Project Name                  :  RSSI1
* Version                       :  002
* Project Type                  :  Wayside Controller Configuration Tool
* MCF File Name                 :  RSSI1002.mcf
* MCF File Time/ Date           :  30-May-2017 11:10
* MCF CRC                       :  0x37E7B402
* Hardware Description MCF      :  HWDESCWRFR014.MCF
* Report Date / Time            :  30-May-2017 11:12
* Description                   :  my desc
* Designer                      :  rdb
* RailRoad                      :  cunca
* Area                          :  NZ
* Location                      :  tasman
* ATCS Source Address           :  7.620.100.100.03
* Comments                      :  test locn
*****************************************************************************************
* Revised By                    :  rdb
* Comments                      :  comment 1 comment 2
* Date                          :  11-May-2017

* Revised By                    :  rdb
* Comments                      :  comment 3
* Date                          :  11-May-2017

* Revised By                    :  hhh
* Comments                      :  h
* Date                          :  12-May-2017

*****************************************************************************************


*****************************************************************************************
* Type: 8Slot
* Name: gwe_Main

* SLOTS:
*            Module              Name
*            ------------------- -------------------
*    Slot 1  VLP3                sl1
*    Slot 2  CodedTrack          Ftrack
*    Slot 3  Colorlight          sl3
*    Slot 4  Colorlight          sl4
*    Slot 5  RIO                 sl5
*    Slot 6



                                   Page : 1
```

Figure 6-19   Print Preview

After showing the textual Boolean format for the logic, the report will show a logic state reference table. This shows the page numbers on which logic states are used. If the page number is in parentheses, this indicates the page number on which the logic state is defined, as shown in the following example.



```
                          Logic State Reference Table


1_LCHP..................................................................(32)
2_RCHP..................................................................(32)
AFDT...........................................................(21),22,24
AFDTE..............................................................(21),21
AFP.........................................................21,(21),22,24
E28_SEL................................................................28,30
E28_SW4................................................................28,30
E37A_SEL............................................................28,30,33
E37A_SW6............................................................28,30,33
E37AD_SEL..............................................................29,30
E37AD_SW8..............................................................29,30
EAST_C1...................................................................25
EAST_C5...................................................................25
EFY_SEL................................................................28,29
EFY_SW2................................................................28,29
L_AL......................................................................21
L_DTAL..................................................................(30)
LAPPR..........................................................(21),21,23
LAUX......................................................22,24,25,28,30,32
LCHTE..............................................................(32),32
LCHTMR.............................................................32,(32)
LCSLOT......................................................(21),22,23,29
LI2.......................................................................26
LI3.......................................................................26
LI4.......................................................................26
LI7.......................................................................26
LI8.......................................................................26
LLGE........................................................21,(27),27,31
LLGLO.....................................................................27
LLGRN...................................................................(21)


                                  Page : 15
```

Figure 6-20   Logic State Reference Table

After the logic state references, the report shows the relay logic diagrams.

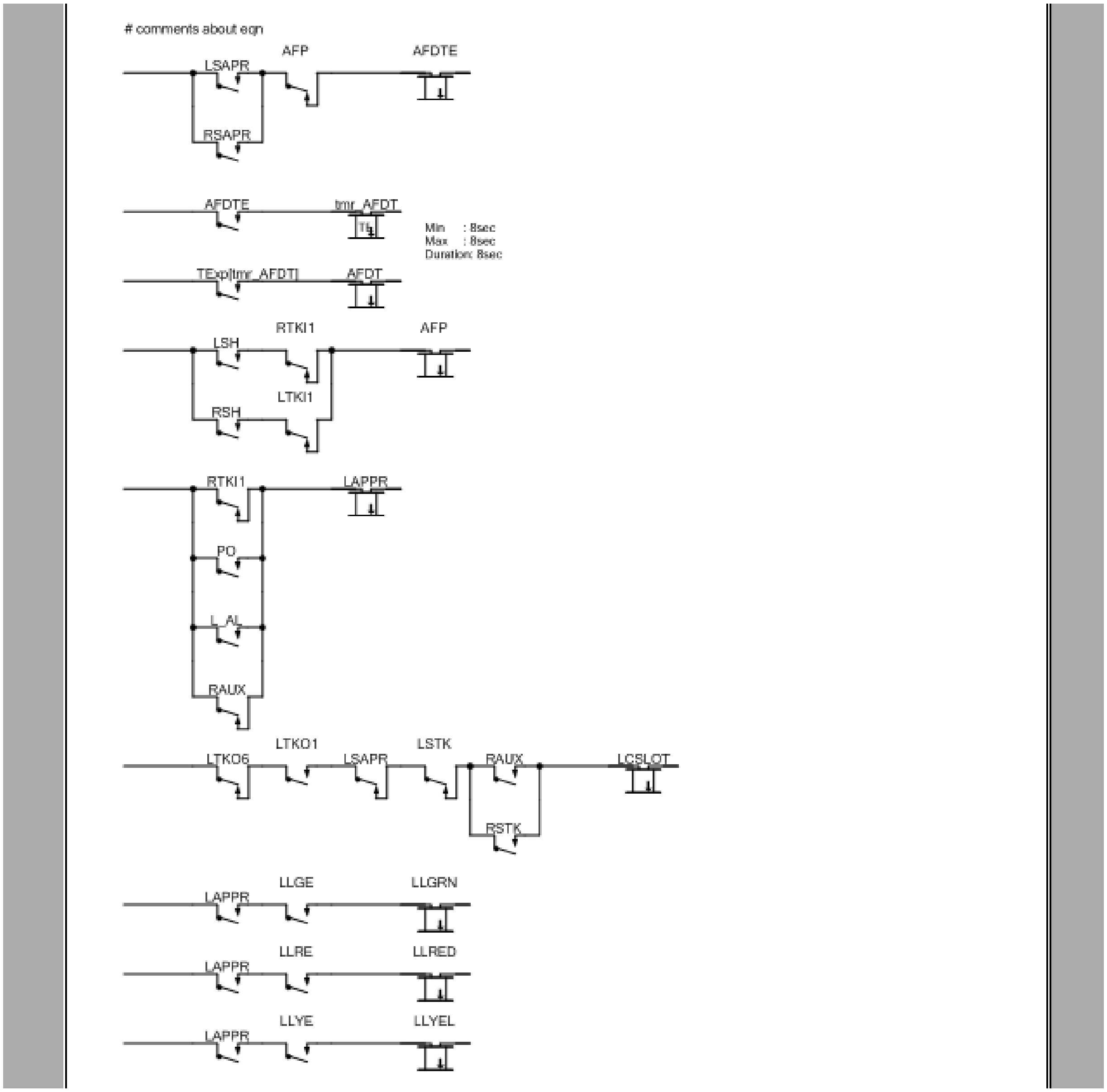
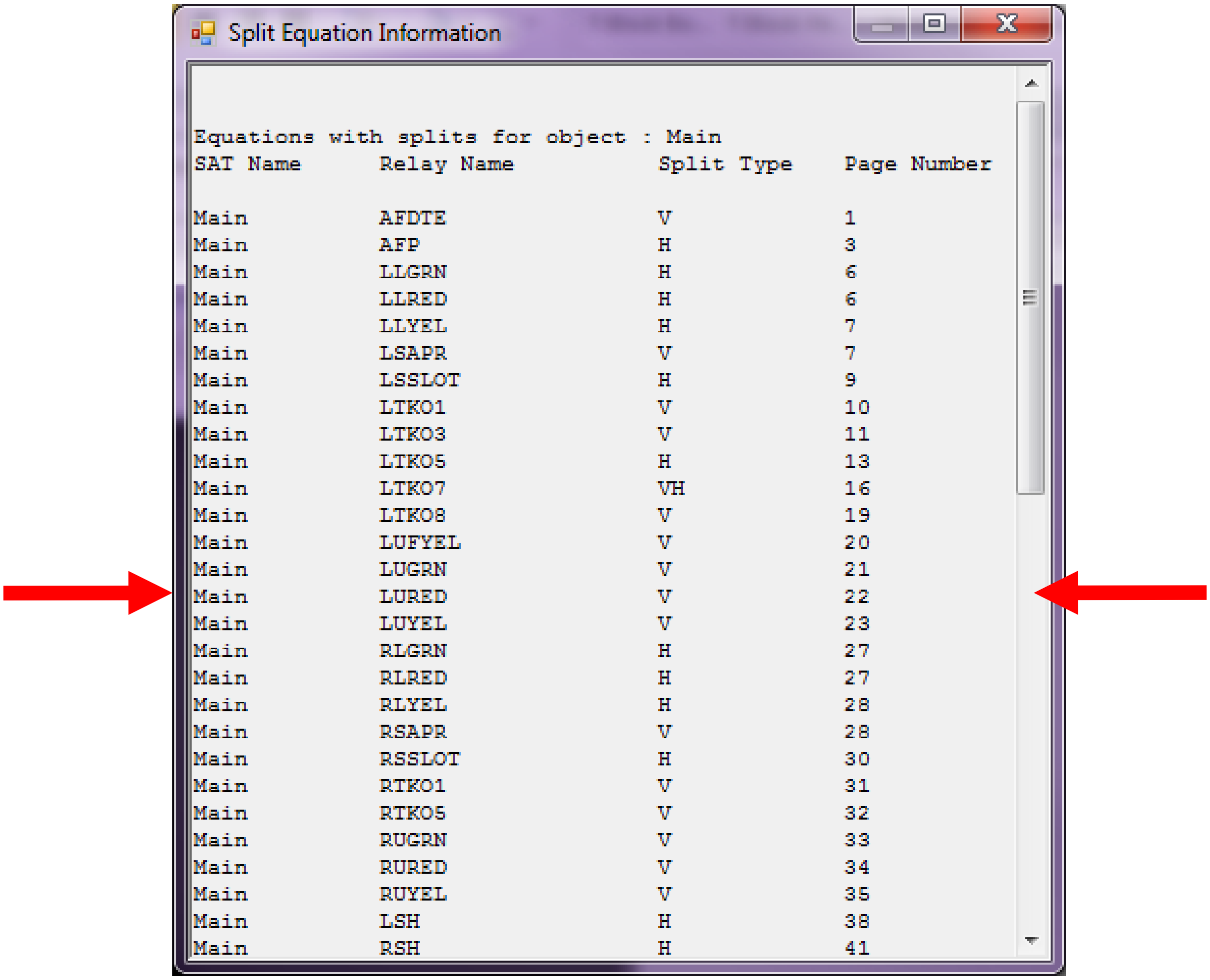


Figure 6-21 Relay Logic Diagram in Report

If equations are too deep or wide to fit on the page, they will be split across pages. If this happens, the WCCT brings up a window showing the **Split Equation Information**. This window shows which equations are split and what page they appear on. Split type is V (vertical), H (horizontal) or VH (vertical and horizontal).



```
Equations with splits for object : Main
SAT Name      Relay Name          Split Type    Page Number

Main          AFDTE               V             1
Main          AFP                 H             3
Main          LLGRN               H             6
Main          LLRED               H             6
Main          LLYEL               H             7
Main          LSAPR               V             7
Main          LSSLOT              H             9
Main          LTKO1               V             10
Main          LTKO3               V             11
Main          LTKO5               H             13
Main          LTKO7               VH            16
Main          LTKO8               V             19
Main          LUFYEL              V             20
Main          LUGRN               V             21
Main          LURED               V             22
Main          LUYEL               V             23
Main          RLGRN               H             27
Main          RLRED               H             27
Main          RLYEL               H             28
Main          RSAPR               V             28
Main          RSSLOT              H             30
Main          RTKO1               V             31
Main          RTKO5               V             32
Main          RUGRN               V             33
Main          RURED               V             34
Main          RUYEL               V             35
Main          LSH                 H             38
Main          RSH                 H             41
```

Figure 6-22   Split Equation Report

As shown in the following figure, this equation is split vertically and horizontally.

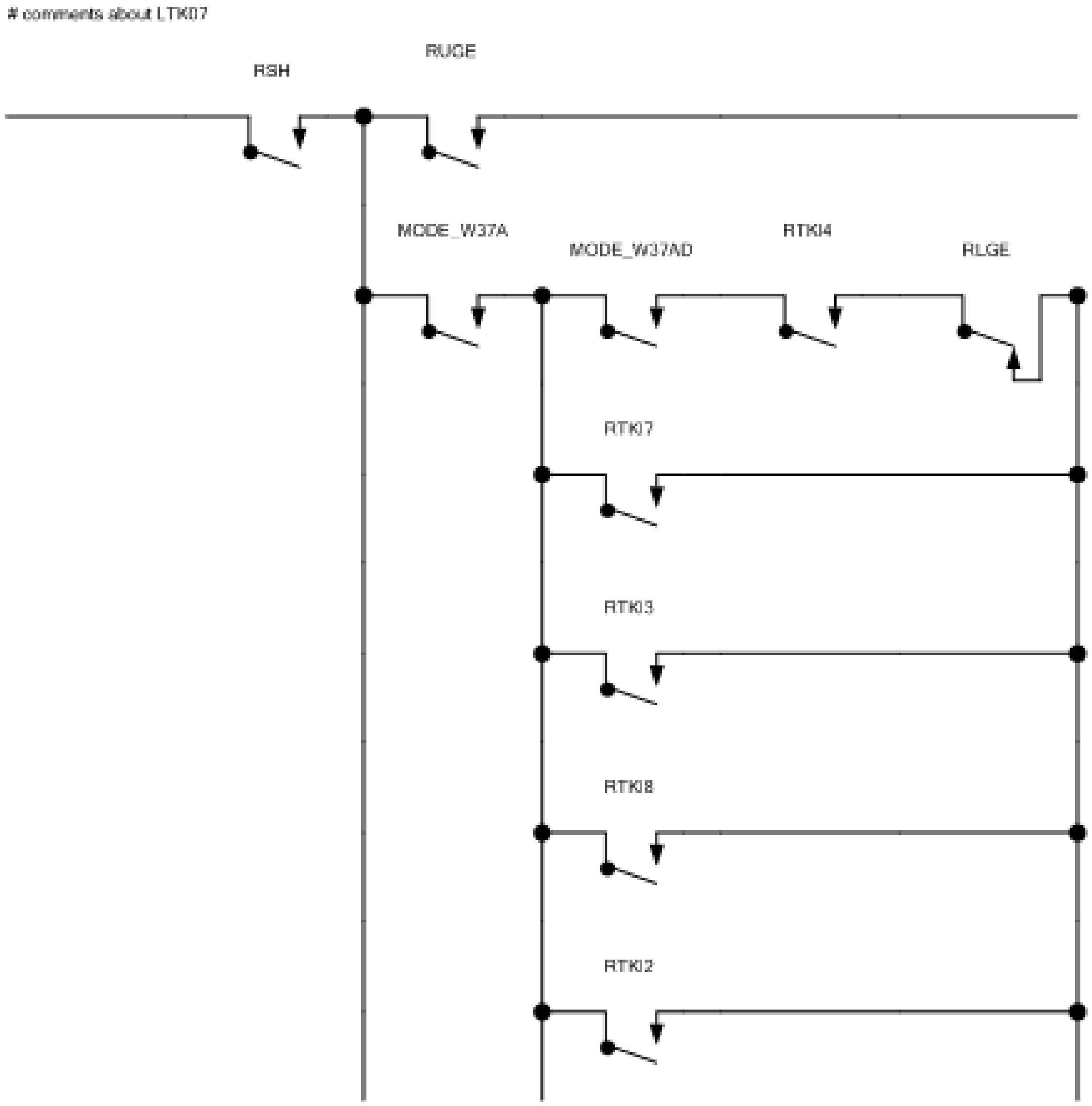


Figure 6-23 Split Equation Window Example

The user should inspect the print preview to see if it is readable enough. If too many equations are split, or the equations are too small, the relay sizes can be adjusted. To do this, close the report and go to the Relay Logic Editor and select the **Resize** icon or the **Ctrl +ALT + R** shortcut. See section 6.7.2 for details.

To change the paper size, select the **Printer Properties** from the print preview.

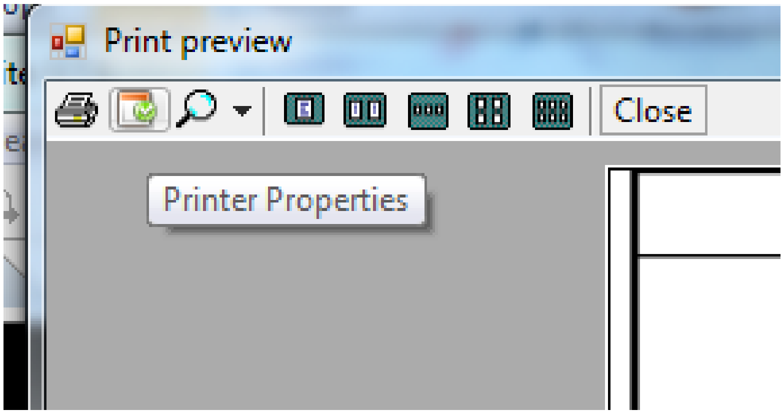
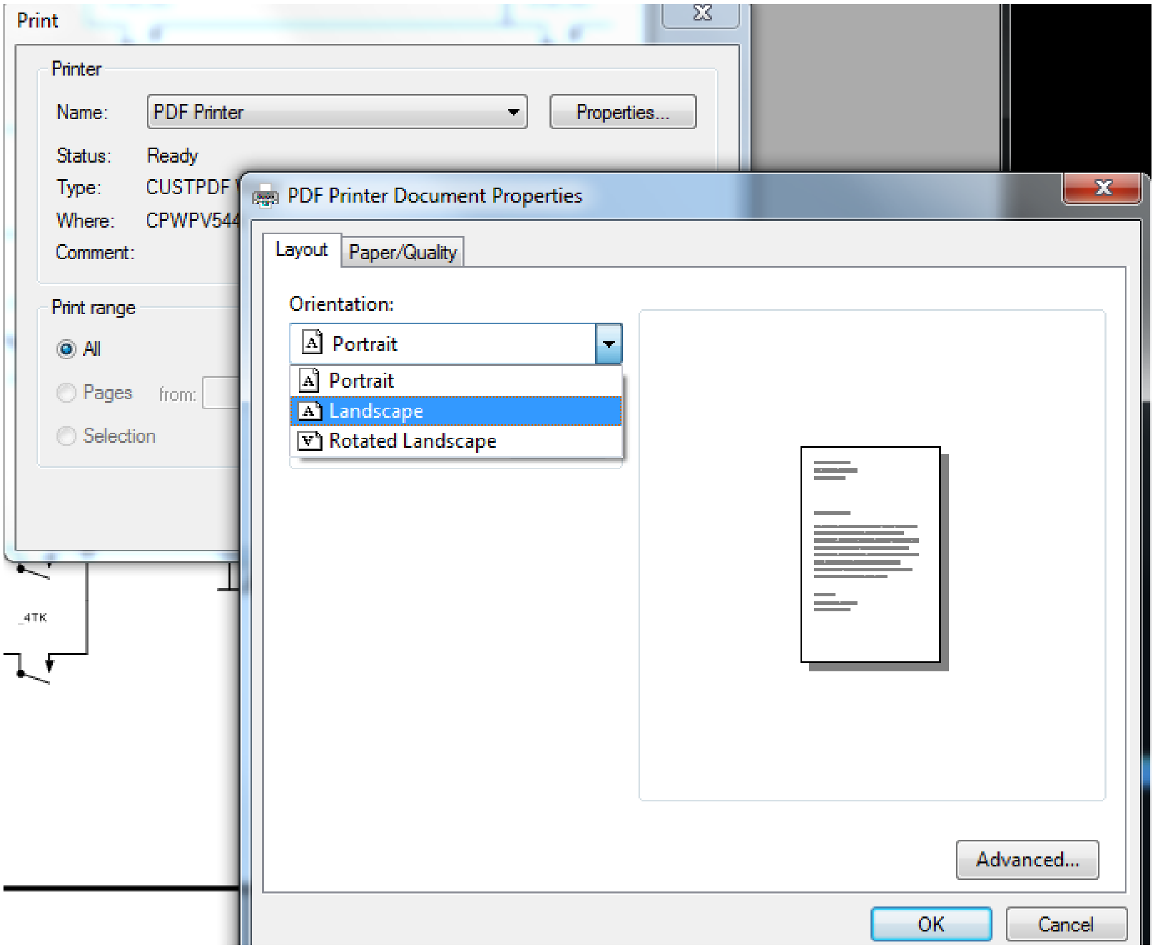


Figure 6-24 Printer Properties

Then select the appropriate orientation and paper size.


Print

Printer

Name: PDF Printer

Status: Ready

Type: CUSTPDF

Where: CPWPV544

Comment:

Print range

● All

○ Pages from:

○ Selection

PDF Printer Document Properties

Orientation: Portrait

Figure 6-25 Setting Printer Properties

As an example, the equation shown in the following figure became easier to read by changing the orientation to landscape.

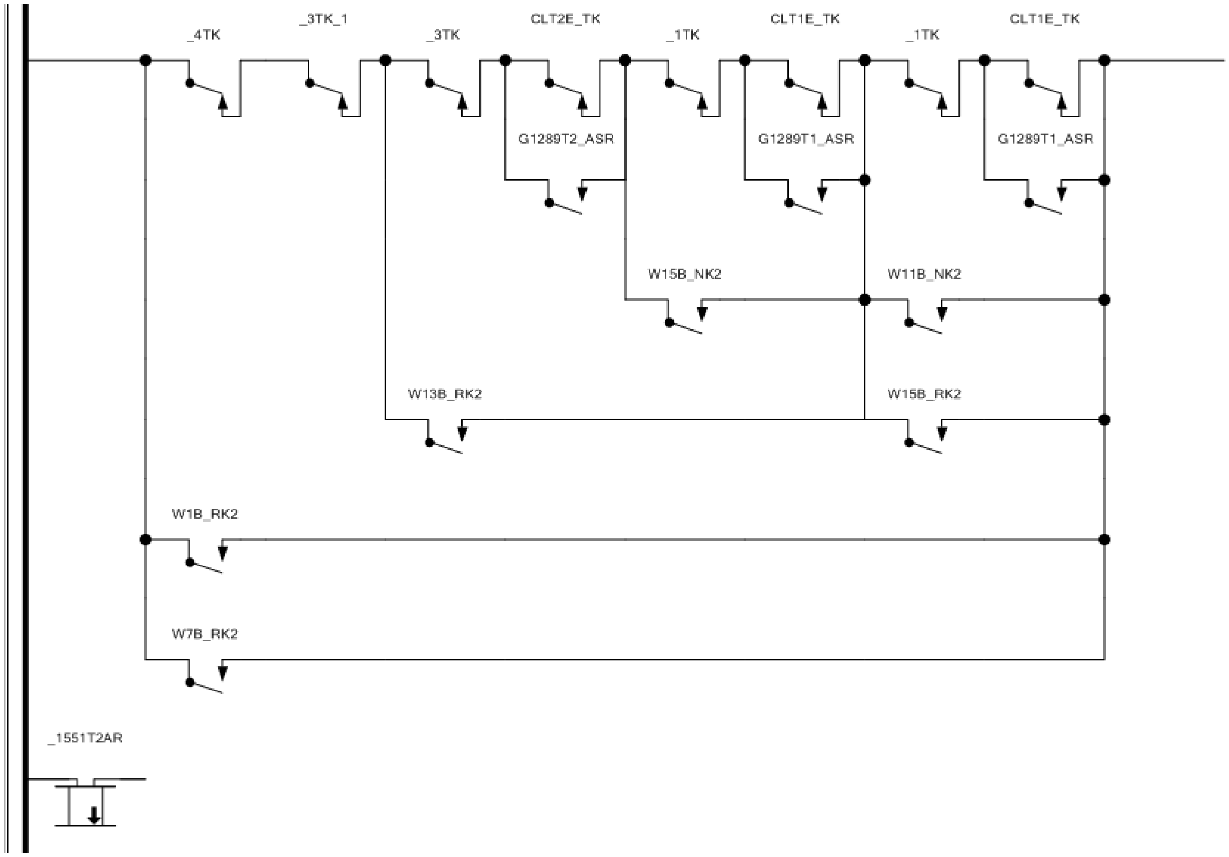


Figure 6-26 Large Split Equation

Also, by reducing the relay size from 100% to 90%, the entire equation is able to fit on one page.

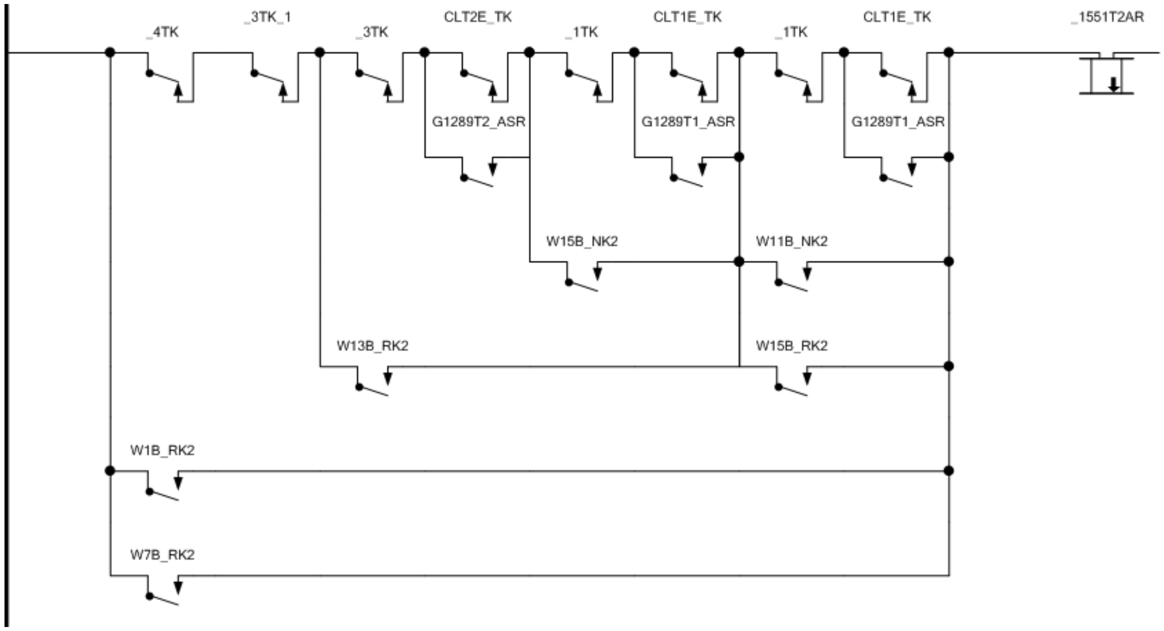
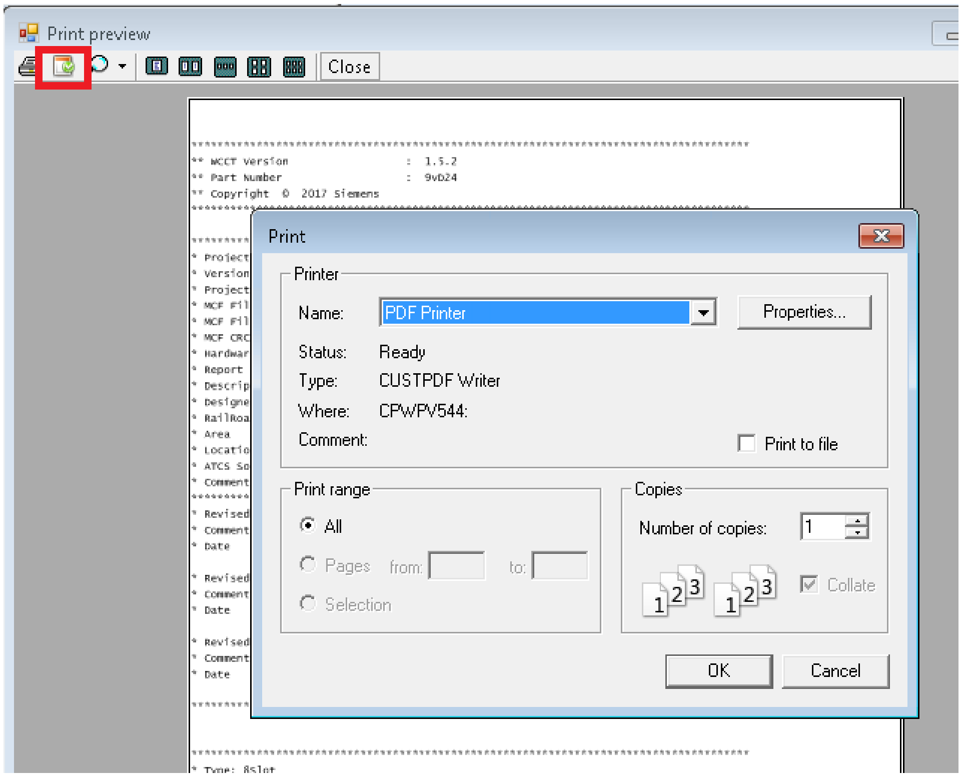


Figure 6-27 Page Landscape and Sizing Example

Before printing, setup the printer using the **Print Setup** button, shown in the following figure.



```
************************************************************************
** WCCT Version              :  1.5.2
** Part Number               :  9vD24
** Copyright  ©  2017 Siemens
************************************************************************

*********
* Project
* Version
* Project
* MCF Fil
* MCF Fil
* MCF CRC
* Hardwar
* Report
* Descrip
* Designe
* RailRoa
* Area
* Locatio
* ATCS So
* Comment
*********
* Revised
* Comment
* Date

* Revised
* Comment
* Date

* Revised
* Comment
* Date

*********

************************************************************************
* Type: 8Slot
```

Print

Printer

Name: PDF Printer

Status: Ready

Type: CUSTPDF Writer

Where: CPWPV544:

Comment:

☐ Print to file

Print range

● All

○ Pages from: to:

○ Selection

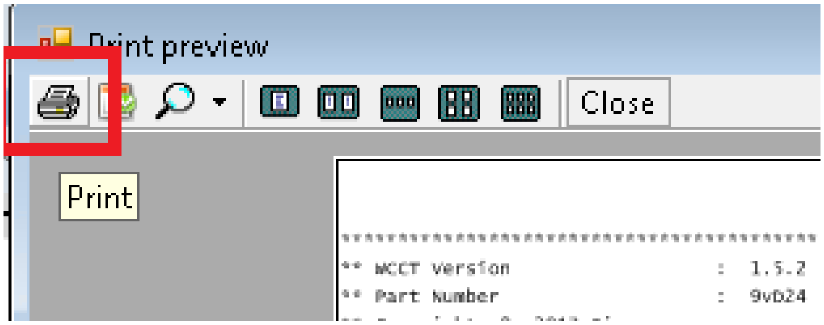
Copies

Number of copies: 1

☑ Collate

Figure 6-28 Print Setup

To create the PDF document from the **Print Preview** select the **Print** icon.



```
*******************************************
** WCCT version                    :  1.5.2
** Part Number                     :  9vD24
```

Figure 6-29 Printing the PDF

6.7.1 Changing the Font Size

Select the **Font** icon in the top-right of the Relay Editor to change the fonts.

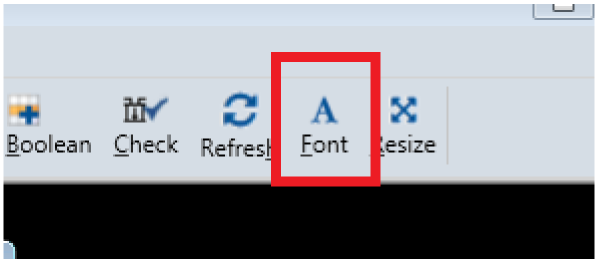
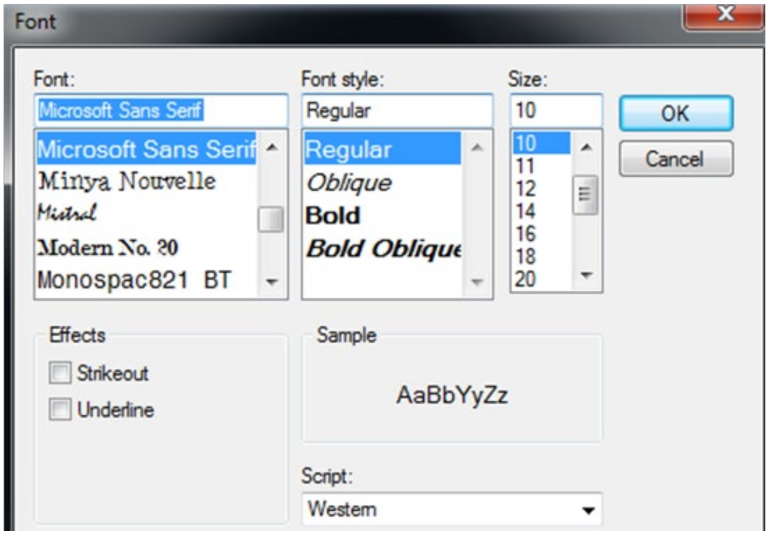


Figure 6-30 Changing Font

The **Font** selection window will appear as shown in the following figure.



Font: Microsoft Sans Serif

Font style: Regular

Size: 10

☐ Strikeout

☐ Underline

Script: Western

Figure 6-31 Font Selection window

6.7.2 Changing Relay Sizes

In order to be able to plot the relay diagram to a readable PDF, it may be necessary to change the relay sizes. Select the **Resize** icon or use the **Ctrl + Alt + R** shortcut to do this.

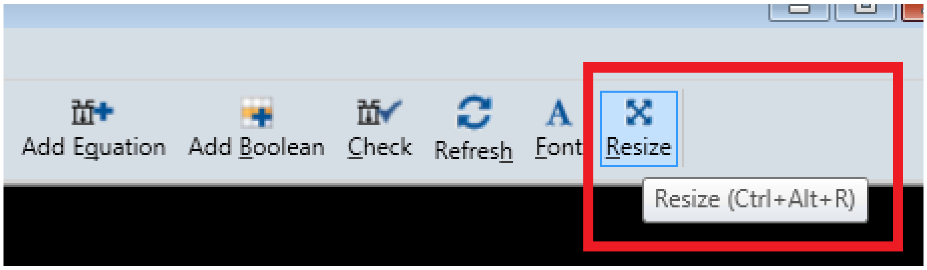
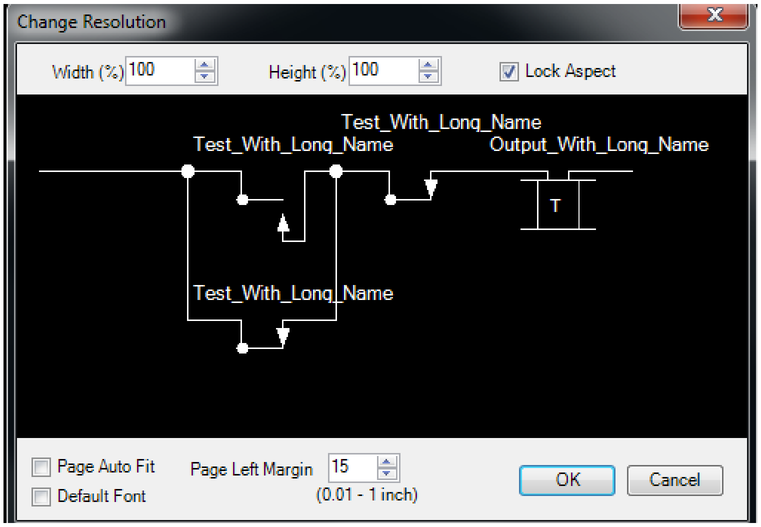


Figure 6-32 Changing Relay Size

The **Change Resolution Editor** will come up. The width and height of the relay can be changed. If the **Lock Aspect** is checked, the relays remain square with the height and width changing together.



Change Resolution

Width (%) 100 Height (%) 100 ☑ Lock Aspect

□ Page Auto Fit Page Left Margin 15

□ Default Font (0.01 - 1 inch)

Figure 6-33 Change Resolution Editor

If **Page Autofit** is selected, the WCCT will find the largest equation and scale everything down so that it fits. This may result in equations too small to read, in which case it is better to uncheck **Autofit** and manually adjust the height/width until a suitable compromise between equation size and number of page splits is found.

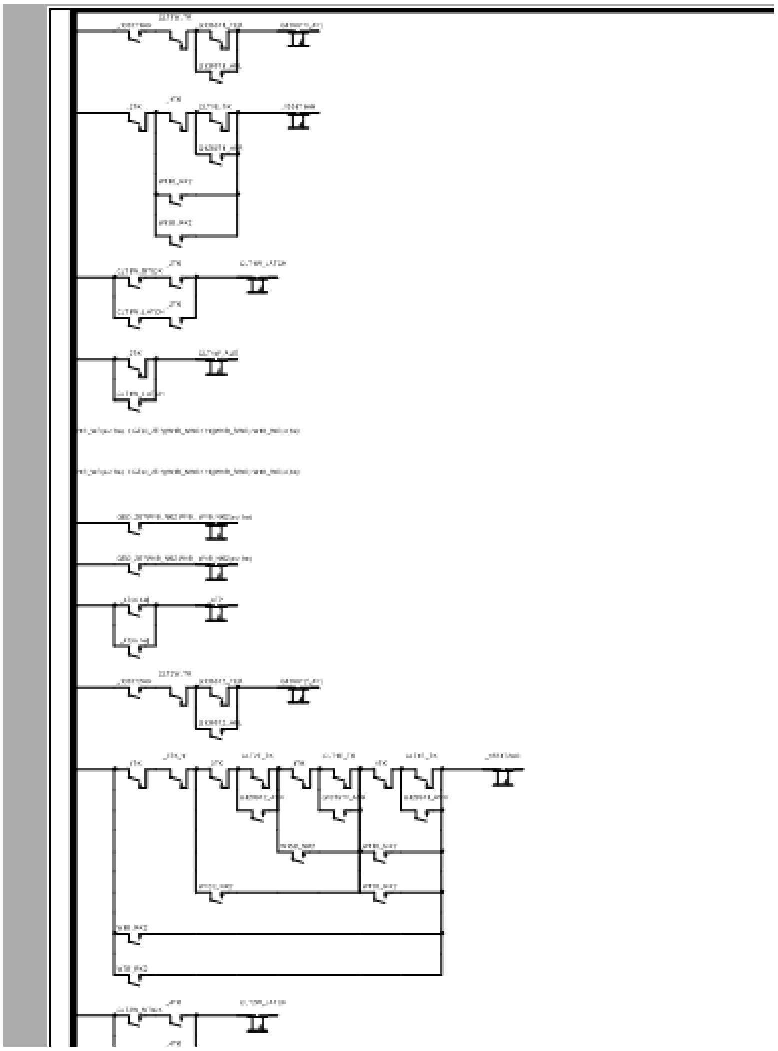
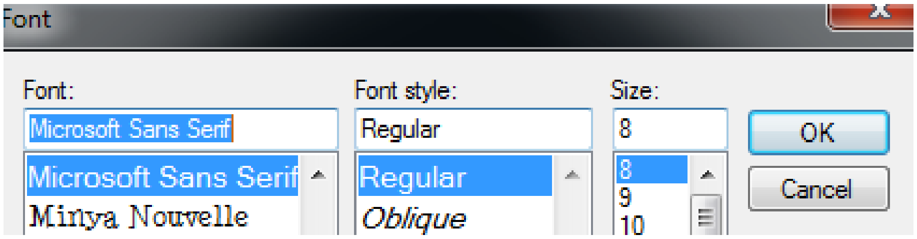


Figure 6-34 Autofit Window

This screen also allows the user to set the left margin. If the PDF is to be printed and bound into a book along its left edge, a left margin may be needed to avoid cutting off the plot. Change the value of **Page Left Margin** to adjust the white space on the left side of the page. Selecting the **Default Font** check box sets the fonts back to their default settings.



Font

Font: Microsoft Sans Serif

Font style: Regular

Size: 8

Figure 6-35 **Default Font**

APPENDIX A ERROR MESSAGES

ERROR MESSAGE TABLES

The following table lists some of the common errors that are detected by the parser.

Error Msg	Example and Remedy
(88): error: Failed to find module in slot [5] (slot is empty)	e.g. ASSIGN (Main, L_DTAL) (slot 5, VRO 5) No module has been defined in slot 5. Check that the slot number corresponds to a defined module.
(91): error: Invalid channel number [5]	ASSIGN (Main, L_DTAL) (slot 3, VRO 5) The module in slot 3 does not have 5 VRO channels. Check the module type and the number of I/O supported by it.
(13): error: Undefined name [ALL] in SAT scope [objMain]	This error message point to the line ACTIVATE Main (ALL) This is not the real cause, the real cause is a logic state is used in an ASSIGN statement that is not defined as either an input or output in the object, e.g. LA_DTAL does not exist ASSIGN (Main, LA_DTAL) (slot 3, VRO 1)
(92): error: syntax error, unexpected IDENTIFIER, expecting ')'	A WCCT keyword is not recognized e.g. ASSIGN is misspelled ASIGN (Main, R_DTAL) (slot 4, VRO 1)
(57): error: Undefined object name [GEO]	e.g. GWECONFIG GNSCL_RSSI [atcsconfig=GEO, subnode=SN_Main, gwe=GEOIITwoTrackExtended] The atcsconfig name shown above did not match the one defined in the ATCSCONFIG section ATCSCONFIG atcsGEO(
(57): error: Undefined name [_Main]	GWECONFIG GNSCL_RSSI [atcsconfig=atcsGEO, subnode=_Main, gwe=GEOIITwoTrackExtended](The subnode name show above did not match the one defined in the ATCSCONFIG section ATCSCONFIG atcsGEO(SUBNODE SN_Main [number=3](

Error Msg	Example and Remedy
(57): error: Invalid GWE type [GEOIITwoTrackExtende]	GWECONFIG GNSCL_RSSI [atcsconfig=atcsGEO, subnode=SN_Main, gwe=GEOIITwoTrackExtende](The chassis name used in the gwe is mistyped. He mod.tmpl.gc file for allowed chassis types.
(58): error: syntax error, unexpected MODULE, expecting '('	e.g. GWECONFIG GNSCL_RSSI [atcsconfig=atcsGEO, subnode=SN_Main, gwe=GEOIITwoTrackExtended] MODULE sl1 [slot=1, module=VLP3] ‘(‘ is missing
(19): error: Invalid name [WFY_SL]	e.g. LOGICALCONFIG lcGEO(OBJECT Main(# Vital Configuration WFY_SL [enable] = FALSE WFY_SL is not a property of the Main object.
(19): error: Invalid GL value type (enumerator expected)	e.g. LOGICALCONFIG lcGEO(OBJECT Main(# Vital Configuration WFY_SEL [enable] = 1 EFY_SEL [enable] = FALSE W28_SEL [enable] = FALSE Check allowed values for WFY_SEL (from lcGEOtmpl.gc) , in this case it’s a Boolean.

(61): error: Undefined value [EC5]	e.g.
	MODULE sl2 [slot=2, module=CodedTrack](
	VCOVoltage2 = 0 mV, # min=0, max=4000
	Code5 = Alternating,
	EC4Compatibility = EC5,
	EC5 is not a valid value, check the mod.tmpl.gc file for valid values.

(123): error: syntax error, unexpected ')', expecting '('	CONTROL NV_CTRL ((Main, NWZ) [bit=1], (Main, RWZ) [bit=2], (Main, FGZ) [bit=3],) There should be no comma on the last item.

Error Msg	Example and Remedy
(241): error: Missing VCOM Channel (In and Out).	e.g. VCOMIN VCOM_REMOTE1 ((Main, GAGG) [bit=1], (Main, GBRG) [bit=6]) VCOMOUT VCOM_REMOTE1 ((Main, OSTP) [bit=1]) VCOMCFG VCOM_REMOTE (Version = 1, The VCOMCFG name did not match the names for its VCOMIN or VCOMOUT channel.
(187): error: Invalid units [ms] for configuration parameter [MaxTimestampOffset] (expected [s])	e.g. MaxTimestampOffset = 10 ms Units should be ‘s’
(77): error: Undefined name [WEFTyp] in global scope	PROPERTY WEF_SEL [enum=WEFTyp, desc="Flash selection"] The enum name did not refer to a defined enumeration type.
(326): error: Undefined name [IN10]	OUT3 = !(IN1 && IN10 && WFY_SEL); IN10 is not a defined VARIABLE
(248): error: Invalid module [VLP2]	MODULE sl1 [slot=1, module=VLP2] Check that the module is allowed in the defined e.g. gwe=GEOIITwoTrackExtended by checking the mod.tmpl.gc file.
(99): error: Invalid maxvalue for [T1234567891234567890]	The maximum timer value is 65535 (seconds or ms) So the following error is given TIMER TIMER1 [minvalue=1, maxvalue=65536, defaultvalue=10, units="msec", desc="Timer 2", excludeucn]

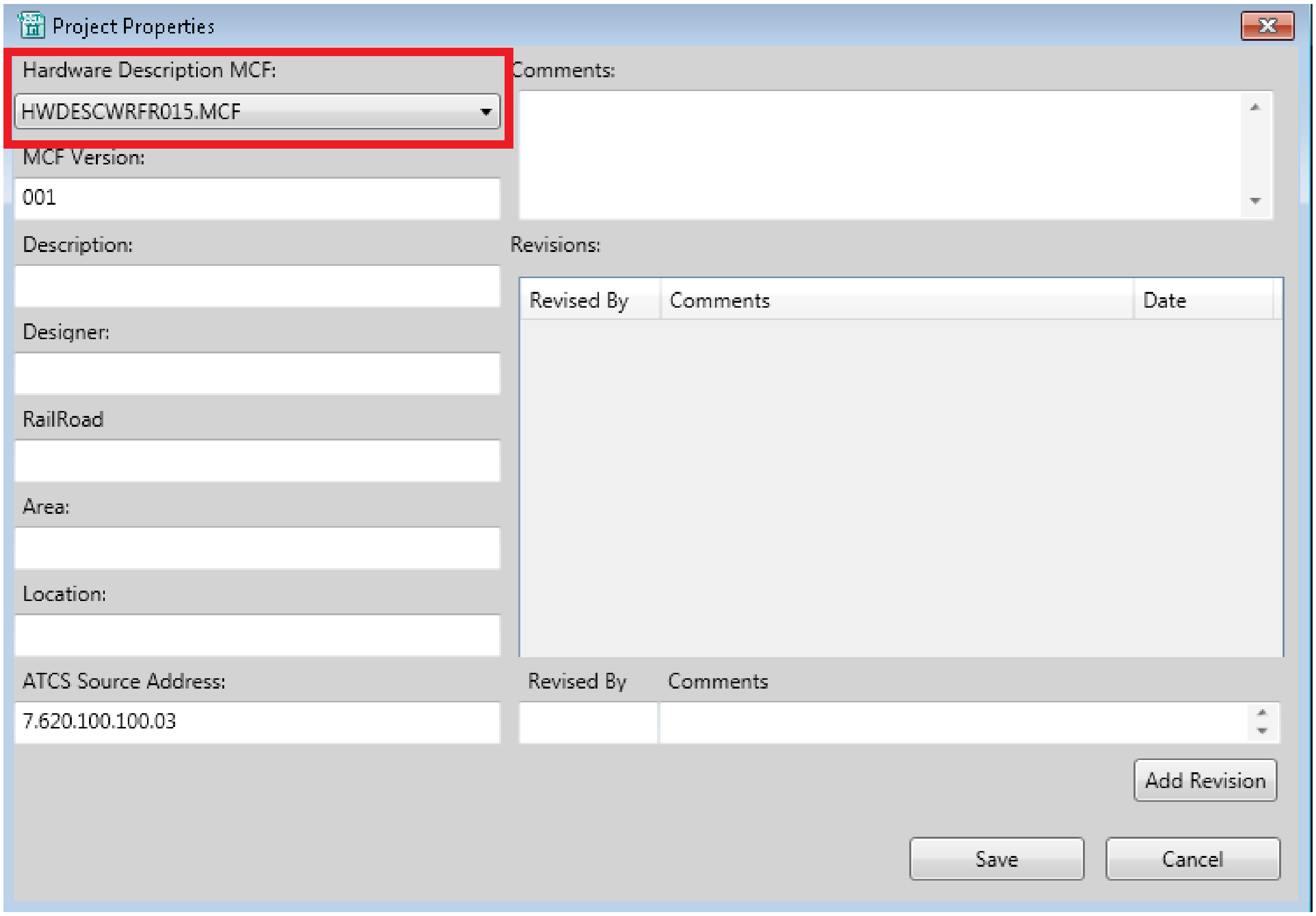
The following table lists some of the common errors that are detected when compiling.

Error Msg	Example and Remedy
ERROR: WriteMCFBinary:DOM parse error [-1072897660]. . maxInclusive constraint failed. The element: 'NumberOfSATTimers' has an invalid value according to its data type.	The number of TIMERs exceeds the maximum allowed by the selected CPU module in slot 1.
ERROR: WriteMCFBinary:DOM parse error [-1072897660]. . maxInclusive constraint failed. The element: 'MaxSATLogicState' has an invalid value according to its data type.	The number of VARIABLES exceeds the maximum allowed by the selected CPU module in slot 1.
ERROR: WriteMCFBinary:DOM parse error [-1072897660]. . maxInclusive constraint failed. The element: 'PropertyNameLength' has an invalid value according to its data type.	The name of a logged variable is too long, logged variables need to be less than 16 chars e.g. following name is 17 chars VARIABLE I123456789I1234567 [input, enum=Boolean, log]
ERROR: WriteMCFBinary:DOM parse error [-1072897660]. . maxInclusive constraint failed. The element: 'TimerNameLength' has an invalid value according to its data type.	The name of a timer is too long, maximum length is 20 characters e.g. following name is 21 chars TIMER T12345678912345678901 [minvalue=1, maxvalue=20, defaultvalue=10, units="msec", desc="Timer 2", excludeucn]
Error : Only 16 user editable properties are allowed on one configuration screen, go into Logic Data Editor Properties and Timers screens and move properties and timers onto their own screens such that there are less than 16 per screen using	Too many configuration properties and timers on 1 page, limit for VLP3 is 25 per page. Uses the “::” syntax to create submenus.

APPENDIX B HARDWARE DESCRIPTION FILES

HARDWARE DESCRIPTION FILES

The Hardware Description file (HWDESCWRFRxxx.mcf, xxx is the version number) is a file supplied with the WCCT that describes the available chassis' and modules in the WayConneX system. When the user parses or compiles a project, the WCCT checks against information in that file. Whenever the WayConneX is upgraded to support new module types or changes are made to existing ones that affect their configuration or I/O channels, a new HWDESC MCF is released. The existing projects the user has created will continue to use the HWDESC that was created originally, unless the user specifically upgrades them. If the user needs to update an existing project to use the new feature, they should upgrade to the new HWDESC file. To do this, right-click on the project and select **Change Hardware Description MCF**.



Hardware Description MCF: HWDESCWRFR015.MCF

MCF Version: 001

Description:

Designer:

RailRoad

Area:

Location:

ATCS Source Address: 7.620.100.100.03

Comments:

Revisions:

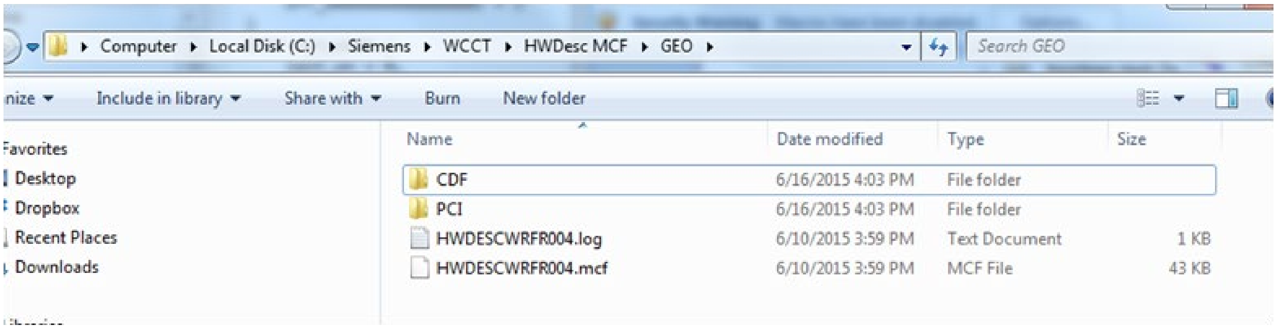
Revised By	Comments	Date

Figure B-1 Selecting HWDESC MCF

A drop-down list will appear with any other HWDESC MCFs that are available.

The WCCT only comes with the latest HWDESC MCF. If, in the future, an older HWDESC is required that is not present on the computer that the WCCT is installed on, get the old HWDESC and copy to the new machine as follows:

Navigate to the C:\siemens\WCCT\HWDescMCF\GEO directory and select the old HWDESC MCF file to copy from the old machine, copy the .log and .mcf for the version required to the new machine.



Name	Date modified	Type	Size
CDF	6/16/2015 4:03 PM	File folder	
PCI	6/16/2015 4:03 PM	File folder	
HWDESCWRFR004.log	6/10/2015 3:59 PM	Text Document	1 KB
HWDESCWRFR004.mcf	6/10/2015 3:59 PM	MCF File	43 KB

Figure B-2   HWDESC MCF File Location

APPENDIX C PARAMETER LIMITS

PARAMETER LIMITS

The following table details parameter limits.

Item	CPU III	Notes
Total Number of Variables	3000	
Number of Timers	120	
Number of VComms Channels	10	
Number of bits in VComms Channel	250	
Number of PTC signals	20	PTC not supported on CPU II+
Number of PTC switches	20	
Number of PTC hazard detectors	20	
Number of PTC aspects	32	

The following table details parameter limits for string formats.

Type	Max Length	Format
Property Names	40 characters	a-z, A-Z, “_”, 0-9. Not all numerical, can’t start with number
Property Description	40 characters	a-z, A-Z, “_”, 0-9, space, following punctuation characters . , ; : _ - !
Timer Name	20 characters	a-z, A-Z, “_”, 0-9. Not all numeric, can’t start with number
Timer Description	40 characters	a-z, A-Z, “_”, 0-9, space, following punctuation characters . , ; : _ - !
Channel Names	20 characters	a-z, A-Z, “_”, 0-9. Not all numerical
I/O Names	30 characters	a-z, A-Z, “_”, 0-9. Not all numerical
Boolean Variable Names	16 characters	a-z, A-Z, “_”, 0-9. Not all numerical
Project Name	13 characters	a-z, A-Z, “_”, 0-9, no spaces
Submenu Names	16 characters	a-z, A-Z, “_”, 0-9., space, following punctuation chars ‘ ; : _ - ! = / Note: comma, := and :: not allowed

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APPENDIX D WCCT SOURCE FILES

SOURCE FILES

The source files for a WCCT project consist of the following:

- .project.xml file
- .GC file
- .GL file.

The .project.xml contains a list of what other files are used

The .GC file contains:

- definition of the which chassis is used.
- which modules are used in the chassis.
- the default values for I/O module configuration parameters.
- how inputs and outputs variables are assigned to I/O modules.
- communications interface definitions for:
  - vital communication channels.
  - non-vital communication channel (controls, indications).
  - PTC interface channels.

The .GL file contains:

- the definition of inputs, output and internal variables (aka relays, Boolean states)
- the user logic.
- definition of user timers.
- definition of user configurable properties.

⚠ WARNING

WARNING

THE CONTENTS OF THE GC AND GL FILE ARE AUTOMATICALLY GENERATED FROM THE DATA ENTERED INTO THE EDITORS IT IS NOT RECOMMENDED THAT THE USER MANUALLY EDITS THESE FILES AS THIS COULD LEAD TO INCONSISTENCIES AND LOST DATA IF SUBSEQUENT CHANGES ARE MADE USING THE WINDOW EDITORS.

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APPENDIX E OPENING OLD PROJECTS

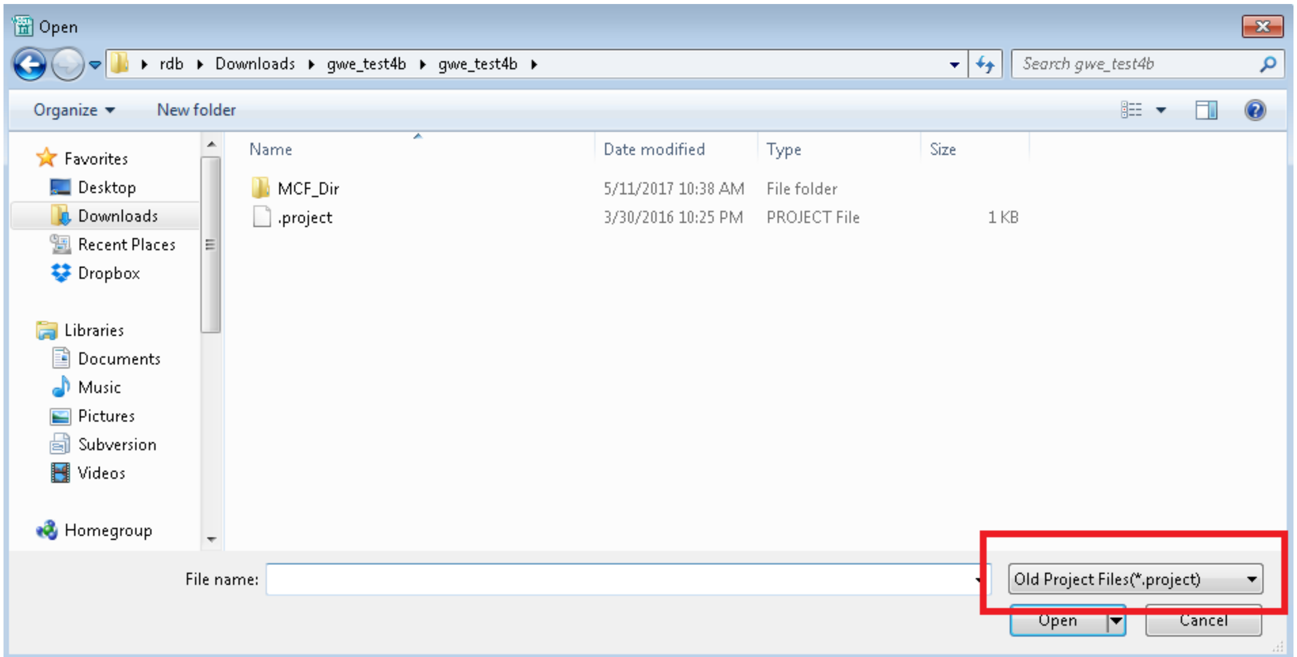
OPENING OLD PROJECTS

WCCT versions up to and including 1.3.6 used a different format and file name for the project file. The project file was called .project.

The new WCCT can be used to open old projects. When the project is opened, a copy of it will be created in the current workspace location and it will be upgraded to the new format, so a {projectname}.project.xml will be created.

The old project will have used an older version of the HWDESC MCF in which the names of the chassis are different.

To open the old project, select **Open** as usual. Then go to the location of the old project and change the drop-down menu in the bottom right to **Old Project Files (*.project)** as shown in the following figure. The .project for the old project will now be visible.



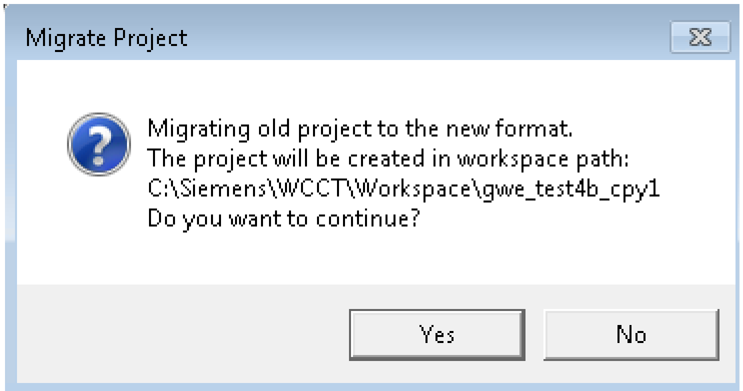
Name	Date modified	Type	Size
MCF_Dir	5/11/2017 10:38 AM	File folder	
.project	3/30/2016 10:25 PM	PROJECT File	1 KB

File name:

Old Project Files(*.project)

Figure E-1 Opening an Old Project

Select the .project file and double-click or select the **Open** button. The WCCT will show a message similar to the following figure.

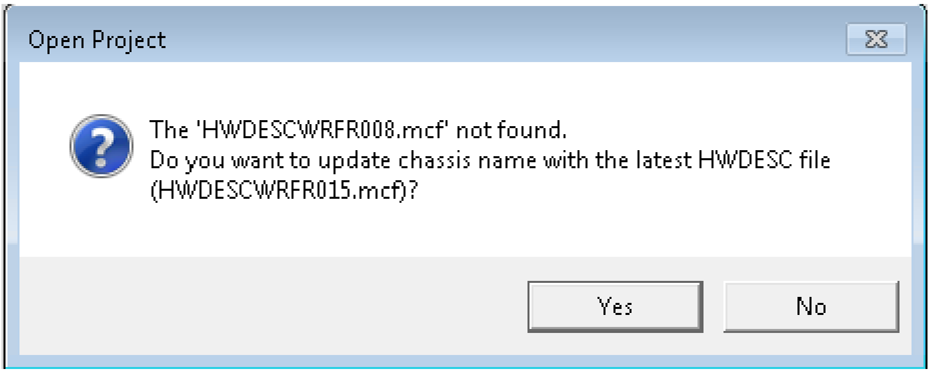


Migrating old project to the new format.
The project will be created in workspace path:
C:\Siemens\WCCT\Workspace\gwe_test4b_cpy1
Do you want to continue?

Figure E-2   Old Project Migration Message

If **No** is selected, the WCCT will close the window and nothing further will happen.

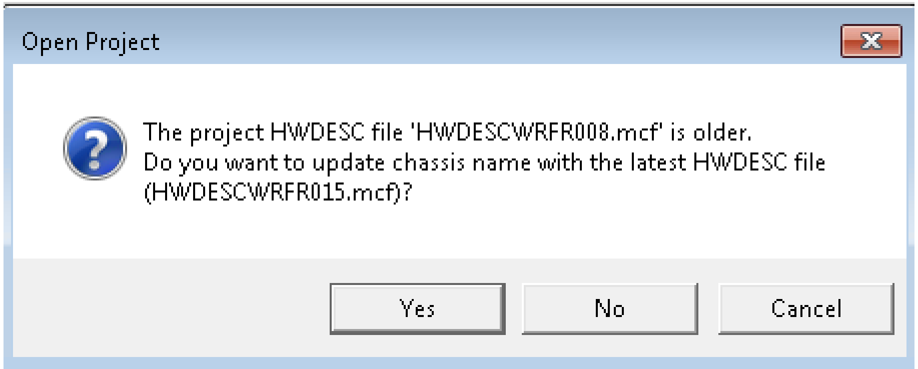
The old project will have been built with an older HWDESC MCF than the current one for the new WCCT, so, the WCCT will likely show a message similar to the following figure.



The 'HWDESCWRFR008.mcf' not found.
Do you want to update chassis name with the latest HWDESC file (HWDESCWRFR015.mcf)?

Figure E-3   Old HWDESC Not Found Message

If the HWDESC MCF has been installed, the message will be slightly different, such as the message shown in the following figure.



The project HWDESC file 'HWDESCWRFR008.mcf' is older.
Do you want to update chassis name with the latest HWDESC file (HWDESCWRFR015.mcf)?

Figure E-4   Upgrade to new HWDESC MCF Message

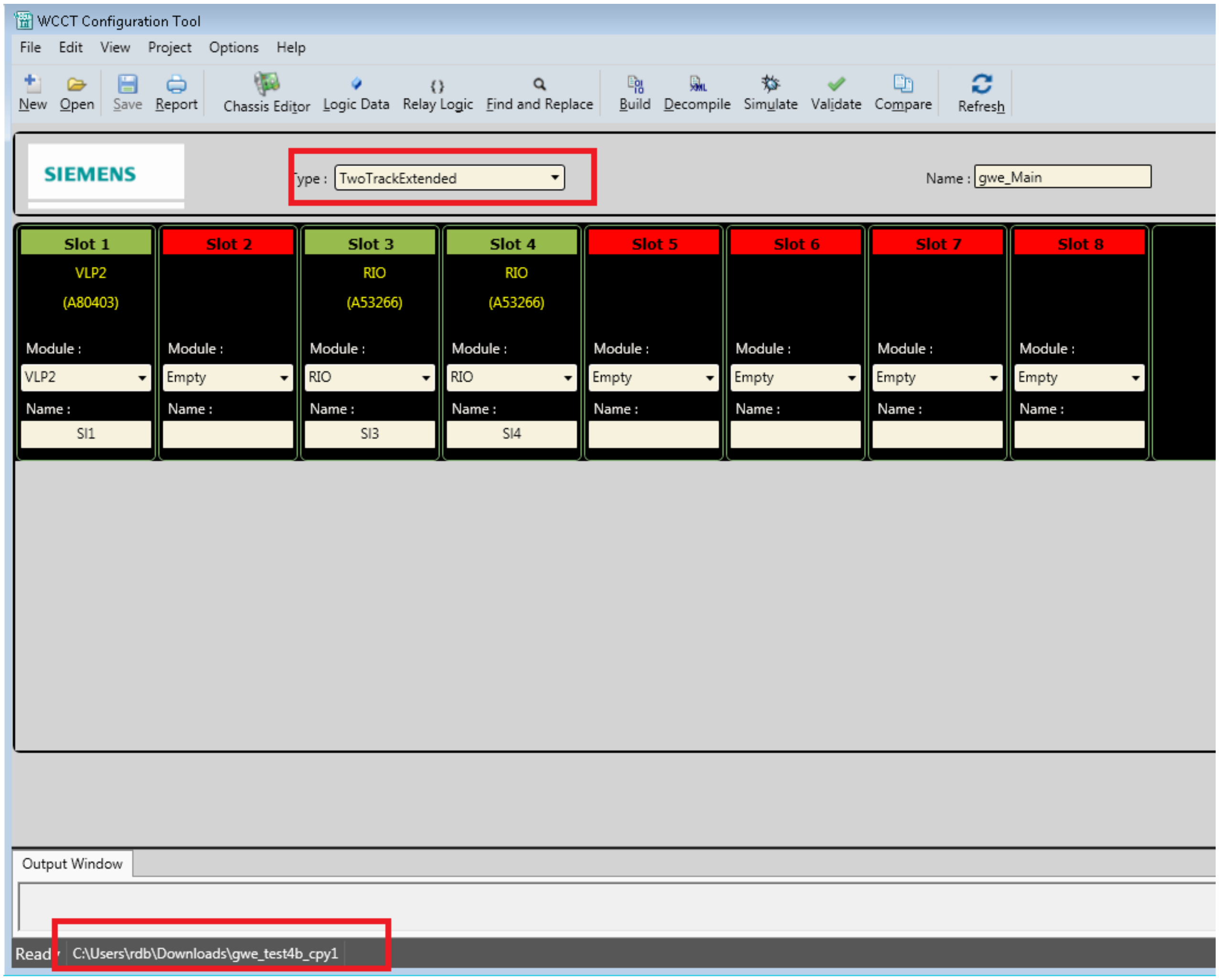
It is recommended to upgrade the projects to the new HWDESC, select **Yes**.

When this is done, the WCCT will upgrade the chassis information so the new chassis name is used, e. g. TwoTrackExtended. The new project will be saved in the new location, indicated in the bottom-right. The original old project is not modified in any way.

NOTE

NOTE

Many of the old chassis names used previously are no longer valid in WCCT version 1.8.1.7.



ype : TwoTrackExtended

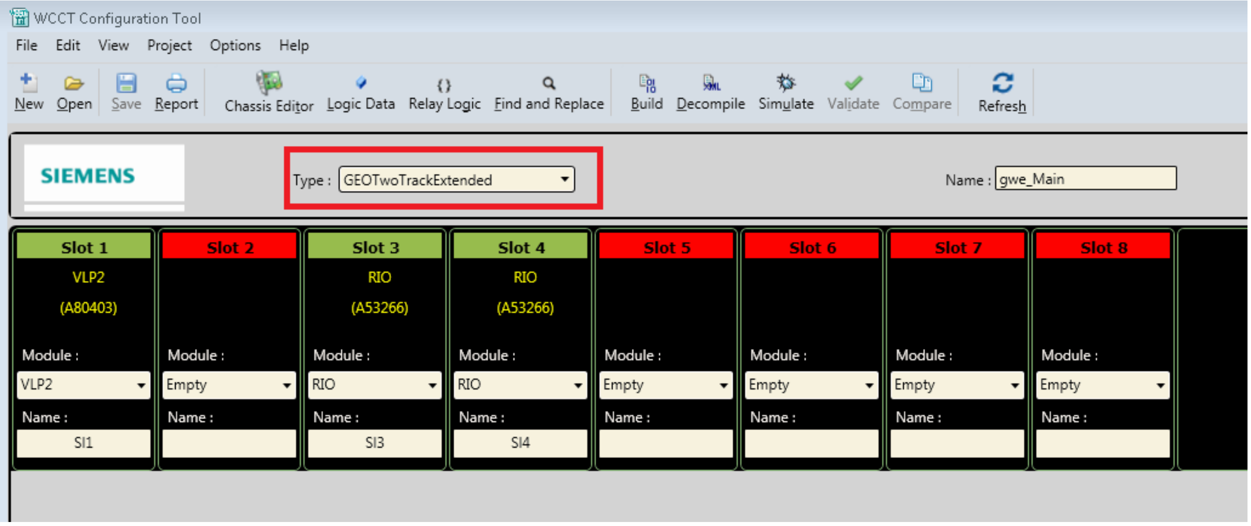
Name : gwe_Main

Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8
VLP2 (A80403)		RIO (A53266)	RIO (A53266)				
Module : VLP2	Module : Empty	Module : RIO	Module : RIO	Module : Empty	Module : Empty	Module : Empty	Module : Empty
Name : SI1	Name :	Name : SI3	Name : SI4	Name :	Name :	Name :	Name :

Read C:\Users\rdb\Downloads\gwe_test4b_cpy1

Figure E-5 Upgraded Project

If no is selected, the old chassis names are retained, e. g. GEOTwoTrackExtended.



Type : GEOTwoTrackExtended

Name : gwe_Main

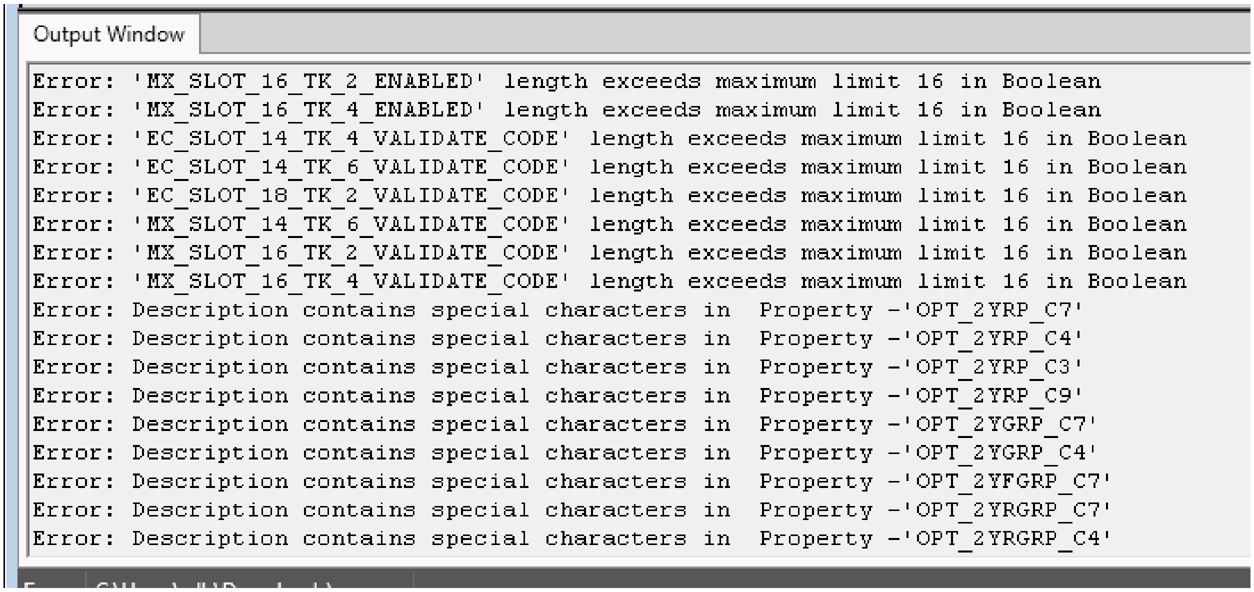
Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Slot 7	Slot 8
VLP2 (A80403)		RIO (A53266)	RIO (A53266)				
Module : VLP2	Module : Empty	Module : RIO	Module : RIO	Module : Empty	Module : Empty	Module : Empty	Module : Empty
Name : SI1	Name :	Name : SI3	Name : SI4	Name :	Name :	Name :	Name :

Figure E-6 Old Project

If a project of the same name already exists in the target workspace, the WCCT will not overwrite the existing one, but will append _cpy1, _cpy2 etc. to the project name.

Once the project has been upgraded, select the **Project>Parse** to check for errors.

Some of the syntax rules for projects created with the older WCCT are not quite the same as the new WCCT. On opening the project, the WCCT will list any errors it finds in the output window, for example:



```
Error: 'MX_SLOT_16_TK_2_ENABLED' length exceeds maximum limit 16 in Boolean
Error: 'MX_SLOT_16_TK_4_ENABLED' length exceeds maximum limit 16 in Boolean
Error: 'EC_SLOT_14_TK_4_VALIDATE_CODE' length exceeds maximum limit 16 in Boolean
Error: 'EC_SLOT_14_TK_6_VALIDATE_CODE' length exceeds maximum limit 16 in Boolean
Error: 'EC_SLOT_18_TK_2_VALIDATE_CODE' length exceeds maximum limit 16 in Boolean
Error: 'MX_SLOT_14_TK_6_VALIDATE_CODE' length exceeds maximum limit 16 in Boolean
Error: 'MX_SLOT_16_TK_2_VALIDATE_CODE' length exceeds maximum limit 16 in Boolean
Error: 'MX_SLOT_16_TK_4_VALIDATE_CODE' length exceeds maximum limit 16 in Boolean
Error: Description contains special characters in Property -'OPT_2YRP_C7'
Error: Description contains special characters in Property -'OPT_2YRP_C4'
Error: Description contains special characters in Property -'OPT_2YRP_C3'
Error: Description contains special characters in Property -'OPT_2YRP_C9'
Error: Description contains special characters in Property -'OPT_2YGRP_C7'
Error: Description contains special characters in Property -'OPT_2YGRP_C4'
Error: Description contains special characters in Property -'OPT_2YFGRP_C7'
Error: Description contains special characters in Property -'OPT_2YRGRP_C7'
Error: Description contains special characters in Property -'OPT_2YRGRP_C4'
```

Figure E-7 Upgraded Project Error Messages

If variable names are too long, use **Find and Replace** to fix them.

It is recommended to go through each editor and do a **Save** to see where the consistency checks fail.