GarTech
LUIS Gen2 User's Guide
Version 2.0

Table of Contents

The Load Box User Interface System

Introduction

Introduction

The Load Box User Interface System, LUIS, is an engine simulator used to facilitate bench top engine control system hardware and software testing. The second generation LUIS system, LUIS Gen2, provides expanded capabilities from the original LUIS.

LUIS Physical Description

The LUIS is a bench top, PC controlled customizable load box. A standard LUIS Gen2 system configuration contains:

- Main Module
- Wavemaker Module
- 2 Analog Modules
- Switch Module
- Resistive Loads Module
- Injector and Application Specific Loads Module

In addition, the user can request additional modules of each type depending on what is needed for their application. New modules are constantly being developed along with the ability to create custom modules for specific applications. Check with the GarTech engineering staff for additional information.

This is a picture of a standard LUIS Gen2 system configuration.

Continued on next page

Introduction, Continued

LUIS Features The LUIIS Gen2 provides the following features.

- Open and closed loop engine speed simulation
- WaveMaker waveform generator, 8 channel arbitrary and 10 channel digital frequency outputs
- LUIS Gen2 PC application allowing user complete control over I/O setup
- Creation of configuration files to set up I/O for specific tests
- Up to 128 16 bit DAC outputs
- Up to 80 switch outputs
- (1) 30A relay output
- (4) 15A VBATT switched relay outputs
- Up to 72 resistive load inputs
- J1939 message simulation
- Upgradable firmware

Continued on next page

Chapter 1 – Installation and Setup

Overview

LUIS Hardware

The LUIS Gen2 has a main module that is connected to the PC via USB. Additional modules can be added including Wavemaker, Switch, Analog and Resistive Loads to customize the system to fit the user's specific needs.

LUIS Gen2 Software

The LUIS Gen2 comes with a graphical user interface for controlling all outputs as well as for setting up closed loop controls and J1939 simulation.

In This Section

This table outlines the topics covered in this section.

Section 1 – Software

Software

Introduction

The LUIS Gen2 has a graphical user interface that runs in the Windows environment. The LUIS GUI is made up of a tab system with a toolbar specific to each tab.

LUIS GUI Basic Environment

This diagram and table describe the basic LUIS Gen2 GUI environment.

	Description
1	Main Menu and Quick Access Toolbar
2	Tabs – Options change based on the tab selected
3	Workspace – All windows display in this space.

Continued on next page

Software, Continued

Windows	Activities within the LUIS Gen2 environment occur in windows which display in the workspace. Like any Windows 7 application, windows can be closed by clicking the X in the right-hand corner. By default, the **Startup** window displays when LUIS is started. This includes a list of recently used configurations, new help topics, news and the Gartech website. The LUIS software can be configured to not show the Startup Window by clicking the **Defaults** menu option on the **Home** tab and changing the *No Startup Page* option.
Downloading and Installing Drivers	Before the LUIS Gen2 hardware and software can be installed, the driver must be downloaded and installed. Go to www.gartechenterprises.com and visit the download center to download and then follow the on-screen steps to install.
Downloading and Installing Software	To install the LUIS Gen2 graphical user interface, visit the www.gartechenterprises.com download center and download the software. Follow the on-screen instructions to install the software.

Section 2 – Hardware

Overview

Introduction

LUIS Gen2 provides the ability to run a standard hardware configuration or add additional modules as needed.

In This Section

This table outlines the topics covered in this section.

Ordering Hardware

Gartech Contact Information

All hardware can be ordered from GarTech Enterprises, Inc.

Gartech Enterprises, Inc.
3037 W. State Road 256
Austin, IN 47102
812-794-4796
www.gartechenterprises.com
info@gartechenterprises.com

GarTech Part Numbers

This table lists the part number and descriptions for the LUIS hardware.

Part Number	Description
G01641-00	LUIS Gen2 Assembly: (1) Main Module (1) WavemakerIII Module (2) Analog Modules (1) Switch Module (1) Resistive Loads Module (1) Injector Loads Module
G01800-00	Main Module and Wavemaker III Module
G01801-00	Analog Module
G01802-00	Switch Module
G01803-00	Resistive Loads Module

GarTech Wiring Harnesses

The user can specify how they would like to connect the I/O from the LUIS hardware to the target application and a custom harness can be designed.

Setting Up a Standard LUIS Gen2

Introduction

The setup for a standard LUIS Gen 2 box is simple, requiring no special tools. Any ECM can be mounted to the top of the unit by moving the screw-in mounting pegs. It is then connected through a simple color-coded system. The unit communicates with the PC through a standard USB connection.

Hardware Needed

To set up the LUIS Gen2, the following hardware is required.

- Standard LUIS
- PC
- Electronic Control Module
- Wiring Harness
- DC Power Cable
- DC Power Supply
- AC Power Cable
- USB Cable
- Loads Module Cable
- Communications Cable

Setting Up the Hardware

This table outlines the physical connections required to set up the hardware to run a standard LUIS Gen2.

Step	Action
1	Unscrew and configure the ECM pegs on top of the box, shown in Figure 1, to accommodate the ECM and mount the ECM on the pegs.
2	Using the appropriate Wiring Harness, connect the Control Module to the LUIS Gen2 using the color coded ports on the back of the LUIS Gen2 box.
4	Connect the 8 pin ***Unswitched Power Out*** connector port on the back of the LUIS Main Module
5	Using the DC Power Cable, connect the LUIS Gen2 to the DC Power Supply using the *Vbatt In* port on the back of the LUIS Gen2, shown in Figure 2. Note: The DC Power Cable has a locking tab that must be depressed when disconnecting.

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Setting Up a Standard LUIS Gen2, Continued

Figure 1: Mounting the ECM

This image illustrates the mounting pegs on the top of the LUIS Gen2.

Figure 2: DC Power Connections

This picture illustrates the DC Power connection between the LUIS and the DC power supply.

Continued on next page

Setting Up a Standard LUIS Gen2, Continued

Setting Up the Hardware, Continued

This table continues to outline the physical connections required to setup the hardware to run a standard LUIS Gen2.

Step	Action
6	Using the Loads Module Cable, connect the Main Module to the Injector Specific Loads Module. Note: The cable is labeled *Main Module End* and *Load Module End* because it can be plugged in backwards.
6	Using the AC Power Cable, show in Figure 3, plug the LUIS in.
7	To complete the connection to the PC, plug a standard USB cable into the ***L-comm*** port on the back of the LUIS Gen2 and into a USB port on the PC.

Continued on next page

Setting Up a Standard LUIS Gen2, Continued

Figure 3: AC Power Supply

This picture illustrates the AC power connection.

Updating Devices

Introduction

Gartech may periodically issue firmware upgrades for the modules. When upgrades are made available via the Gartech website, the user must download the file to the PC before downloading to the hardware.

Updating Firmware

This table outlines the steps for updating firmware.

Step	Action
1	Download the appropriate firmware file from the Gartech website to the local PC.
2	Ensure the LUIS Gen2 box is connected to the PC and running.
3	From the LUIS Gen2 software **Home** tab, click the **Devices** icon. Result: The **Devices** window, shown in Figure 4, displays and the servers display in the *Servers* field.
4	In the *Servers* field, select the correct server. Result: The devices available on that server display.
5	In the *Servers* field, select the correct device. Result: The information for the device fills in on the right-hand side.
6	Click the <**Select File**> button. Result: The ***Firmware File*** dialog box opens where the user can browse and select the file downloaded in Step 1. Once the file is selected and the user clicks <**OK**>, the dialog box closes and the name displays in the *Firmware File* field.
7	Once the file has been selected and displays in the *Firmware File* field, click the <**Download**> button. Result: The status LED on the LUIS hardware will flash during the transfer then go out briefly while the hardware resets. A successful update results in the status LED turning back on.

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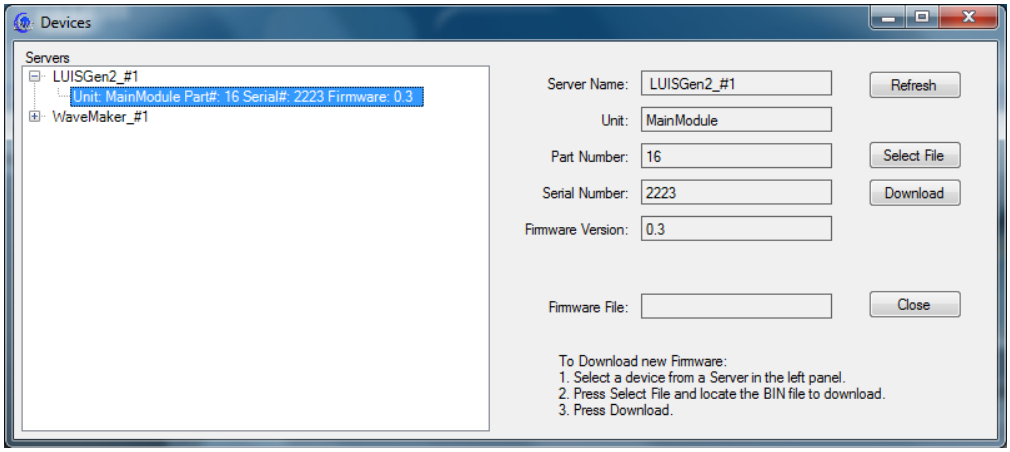
Updating Devices, Continued

Figure 4: Devices Window

This graphic is an example of the **Devices** window.



Notes

Chapter 2 – Navigating the LUIS Gen2 GUI

Overview

Introduction

The LUIS Gen2 graphical user interface provides a Windows based interface for communicating with the LUIS Gen2 box. The GUI is broken into 4 main tabs. All interaction takes place within windows in the workspace below these tabs.

Main Menu

The **Main** menu is accessed by clicking the LUIS icon on the upper left-hand portion of the window. This menu provides the ability to create a new configuration file or open/save an existing file. It also provides a list of recently opened configuration files and an interface to print the details of a configuration file.

Quick Access Toolbar

The Quick Access Toolbar displays, by default, above the tabs. This feature provides quick shortcuts for saving a configuration as well as adding or modifying a window. This toolbar can be moved to display below the main toolbar by clicking the down-arrow and selecting ***Show Below the Ribbon***.

Tabs

The tabs within the GUI are described below.

Tab	Description
Home	Provides the interface for working with configurations, interacting with hardware, managing tables and plug-ins, working with the WaveMaker application and setting defaults
Tools	Provides the interface for creating windows and building configurations
View	Provides an interface for navigating between open windows
Help	Provides on-line help

Continued on next page

Updating Devices, Continued

Hiding the Tabs

At any time the tabs can be hidden to provide more space in the workspace. Right-click on any empty spot on a tab and select the ***Minimize the Ribbon*** option. The tab ribbon is hidden and the tab names display across a narrow bar. Clicking on these names opens the tab and clicking again closes it. To maximize the tabs, right-click on the narrow bar where the tab names appear and deselect the ***Minimize the Ribbon*** option. The ribbon can also be minimized/maximized from the drop-down arrow on the Quick Access Toolbar.

In This Chapter

This table outlines the topics covered in this chapter.

Section 1 – The Home Tab

The Home Tab

Introduction

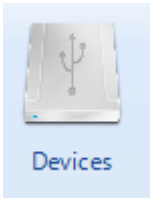
The **Home** tab is the tab that displays when the LUIS Gen2 software is opened. This tab provides the ability to update hardware, open the WaveMaker configuration, manipulate configuration files, set defaults as well as manage plug-ins and tables.

Home Tab Toolbar

This image shows the **Home** tab toolbar.

Hardware

The **Hardware** section of the **Home** tab toolbar provides the ability to do some basic updating to the hardware.

Icon	Description
	Opens the **Server Management** window where servers can be added and edited. For more information about servers, see Page 128.
	Opens the **Devices** window where the devices can be selected and new firmware can be downloaded. For more information about downloading firmware, see Page 12.

Continued on next page

The Home Tab, Continued

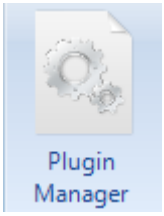
Hardware, Continued

This table continues to outline the capabilities available from the **Hardware** section of the **Home** tab toolbar.

Icon	Description
	Sets the value of all the controls in the current configuration to their default

Plug-Ins, Tables, Wavemaker and Datalink Simulation

The **Plug-Ins**, **Tables**, **WaveMaker** and **Datalink Simulation** sections of the **Home** tab toolbar provide the ability to manage plug-ins, tables and waveforms as well as simulate datalink messages.

Icon	Description
	View currently installed plugins
	Opens the **Table Management** window where interpolation tables can be defined. For more information about working with interpolation tables, see Page 65.
	Opens the **WaveMaker Management** window where waveforms can be defined for use with the WaveMaker application. For more information about the WaveMaker application see Page 78.

Continued on next page

The Home Tab, Continued

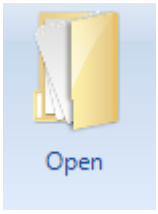
Plug-Ins, Tables, Wavemaker and Datalink Simulation, Continued

This table continues to outline the capabilities available from the **Plug-Ins**, **Tables**, **WaveMaker** and **Datalink Simulation** sections of the **Home** tab toolbar.

Icon	Description
	Opens the **J1939 Datalink Sensor Simulation Management** window where J1939 messages can be defined. For more information about J1939 Datalink Sensor Simulation see Page 108.

Manipulating Configuration Files

The **Configuration** section of the **Home** tab toolbar provides the ability the work with configuration files.

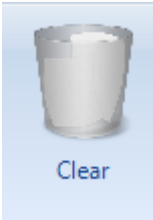
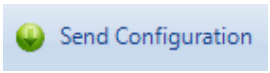
Icon	Description
	Opens the ***Configuration File*** dialog box where a configuration can be selected and opened.
	Opens the ***Configuration File*** dialog box where a configuration file can be saved.

Continued on next page

The Home Tab, Continued

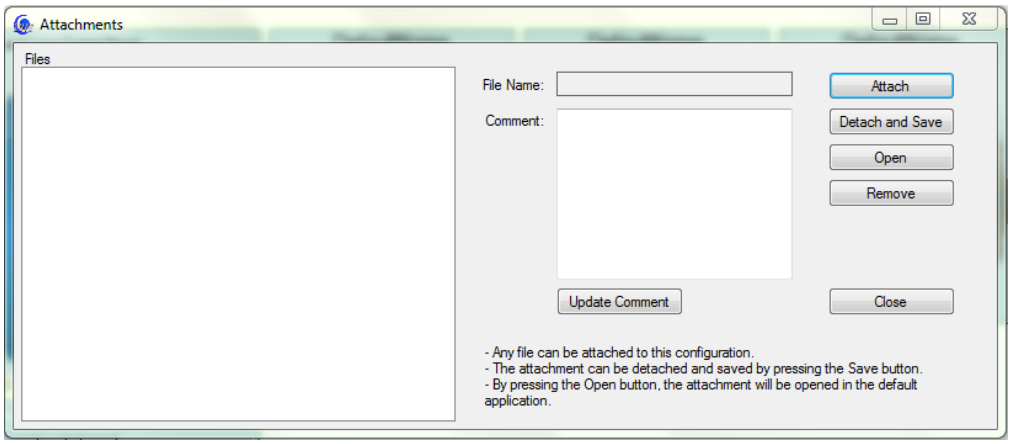
Manipulating Configuration Files

This table continues to outline the capabilities available from the **Configuration** section of the **Home** tab toolbar.

Icon	Description
	Clears the configuration.
	Sends the currently open configuration to the LUIS Gen2 hardware.
	Saves the current values of all controls as the new defaults.

Attaching Files

The **Attachments** icon on the **Home** tab toolbar opens the **Attachments** window where the user can attach a document, such as a wiring diagram, to the configuration. Once a file has been attached, the <**Detach and Save**> button can be used to save the file to the hard drive, and the <**Open**> button can be used to attempt to open the file using the default program for the file type.



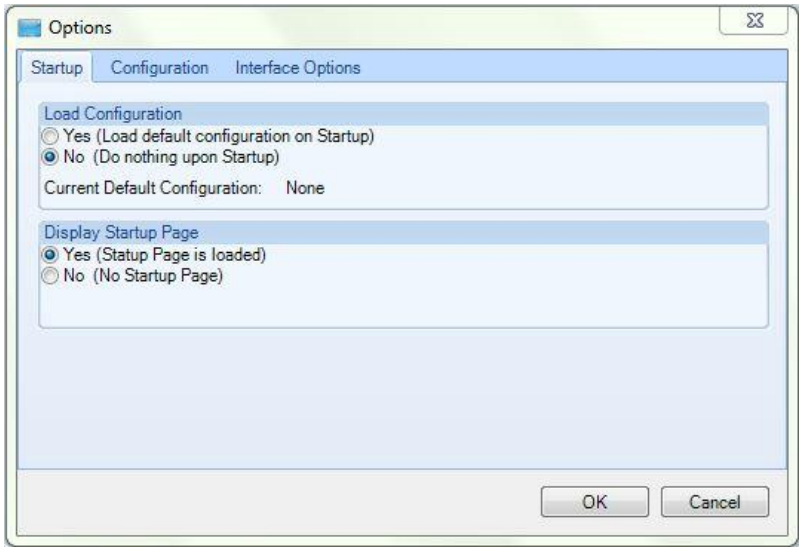
Continued on next page

The Home Tab, Continued

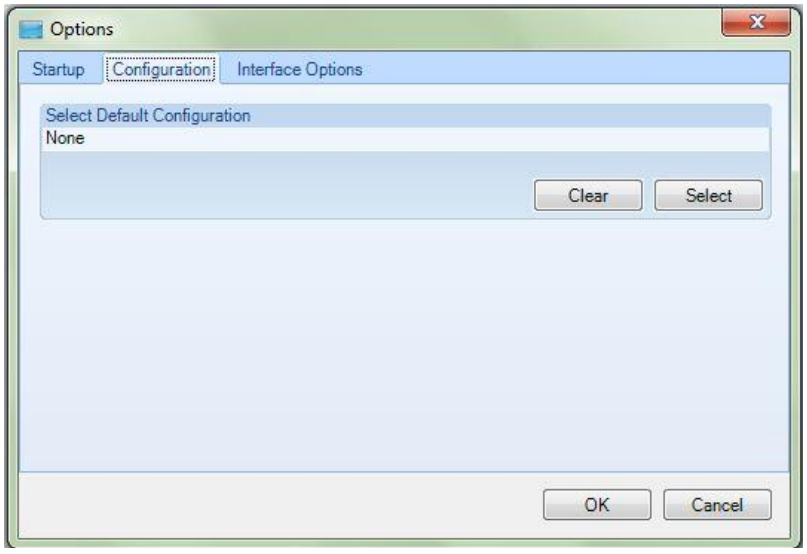
Defaults

The **Defaults** icon on the **Home** tab toolbar opens the **Options** window where defaults can be set for startup, configuration and interface.

The **Startup** defaults allow the user to set whether or not a configuration is loaded as well as if the Startup Page should be displayed at startup.



The **Configuration** defaults allow the user to set what should happen after a configuration file is loaded as well as set a default configuration file.



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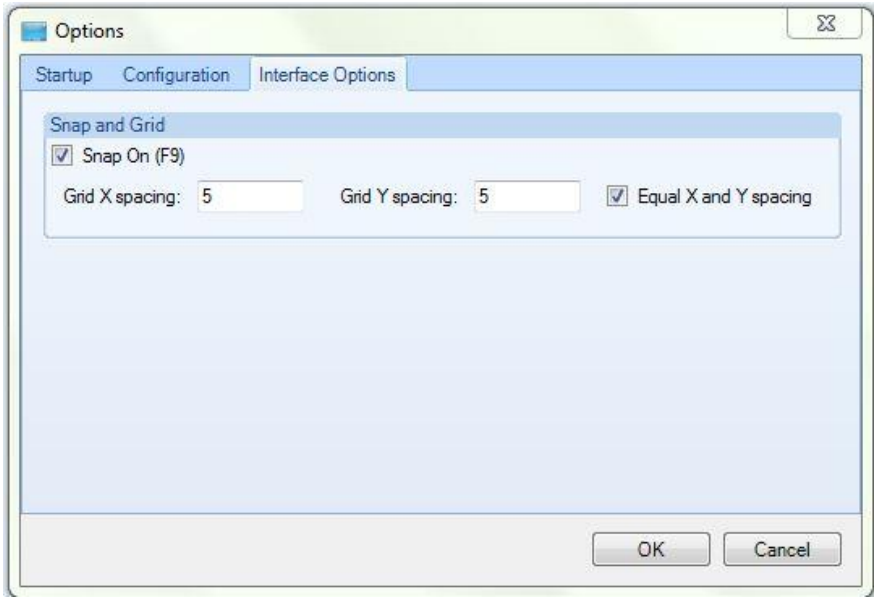
The Home Tab, Continued

Defaults, Continued

The **Interface** defaults allow the user to set grid options for laying out controls on windows. The **F9** key toggles the snap option on and off.



Section 2 – The Tools Tab

The Tools Tab

Introduction

Configuration files are built in user defined windows. The **Tools** tab provides the toolbar for adding windows in the workspace as well as tiles within windows. It also provides the interface for adding the desired controls to build the configuration.

Definitions

To easily work within the LUIS Gen2 GUI, it is necessary to understand some terminology.

Term	Definition
Window	A container in a configuration to which tiles can be added
Tile	A space within a window to which controls can be added and manipulated as a group. Every window has at least one tile.
Digital Display	A control that displays Engine Units, Counts and Millivolts digitally
Gauge	A control that displays values in a round or slider display
Indicator	A control that displays the status of resistive loads
Text Panel	A control that allows the user to add text to a configuration
Switch	A display that allows the user to add a momentary or toggle switch to the configuration
Closed Loop Control	A control that allows the user to create a simple closed loop engine speed model. This control is only available when using an ECM that outputs a public broadcast on the J1939 datalink
Dock	The process of fixing the position of a window within the workspace
Pin	The process of fixing the position of a window within the workspace in a way that it "window shades" to the last docked position when not active

Continued on next page

The Tools Tab, Continued

In This Section This table outlines the topics covered in this section.

Notes

Working with Windows

Introduction

Windows are the “containers” of tiles, and every window has at least one tile. Windows make up the base of a configuration file and display in the workspace. When a configuration file is saved, the position and status of all the windows are saved as well.

Window Status and Positions

Windows are placed within the workspace and can have one of four states: tabbed, dockable, dockable and floating or hidden.

Status	Description
Tabbed	When a window is tabbed, it remains in full screen mode and a tab with the window’s name displays at the top of the workspace. Tabbed windows cannot be moved or resized.
Dockable	When a window is dockable, it can be docked to the top, bottom, left or right side of the workspace. The width or length of the window can be adjusted from the dockable position by hovering over the edge of the window until the cursor changes to the re-sizing cursor.
Dockable and Floating	When a window is dockable and floating it floats above the workspace until it is re-docked. When the window is floating, it can be moved around the workspace by dragging it by the title bar. It can also be resized by hovering over the edges until the cursor changes to the re-sizing cursor.
Hidden	When a window is hidden, it no longer displays in the workspace. A hidden window can be unhidden by selecting it on the **View** tab.

Pinned / Unpinned

When a window is pinned, it will remain in the docked position whether it is the active window or not. When a window is unpinned, (auto hide), the window will “window shade” into a tab in the last docked position when not active. A window can be switched between pinned and unpinned by clicking the push pin icon in the upper right-hand corner of the window.

Continued on next page

Working with Windows, Continued

Window Status

In this image, the **Main** window is currently docked to the left-hand side of the workspace and unpinned. It window shades to the left-hand side of the workspace when not active. The **Frequency** window is docked to the bottom of the workspace, and the rest of the windows are tabbed across the top of the workspace.

Inactive, Unpinned Window

Tabbed Windows

Docked Window

Continued on next page

Working with Windows, Continued

Adding Windows

This table outlines the steps for adding a new window.

Step	Action
1	Add a new window. **Add Through…** / **Action…** **Tools** tab — Click the **Add Window** icon **Quick Access Toolbar** — Click the **Add Window** icon **Workspace** — Right-click any empty spot in the workspace, not inside a tile, and select the ***Add Window Pane*** option Result: The **Add Window Pane** window displays, as shown in Figure 5.
2	In the **Dock Location** section, select where the new window should be docked within the workspace.
3	If the window should be unpinned, (window shade to the docked position when not active), select the *Unpin* checkbox.
4	In the *Window Name* field, type the name for the window.
5	In the **Tile Layout** section, type the minimum number of columns and rows.
6	When the window has been defined, click the <**Add**> button. Result: The window is added to the workspace, as shown in Figure 6. Note that every window automatically has one tile called Default.

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Working with Windows, Continued

Figure 5: Add Window Pane

This is an example of the **Add Window Pane** window.

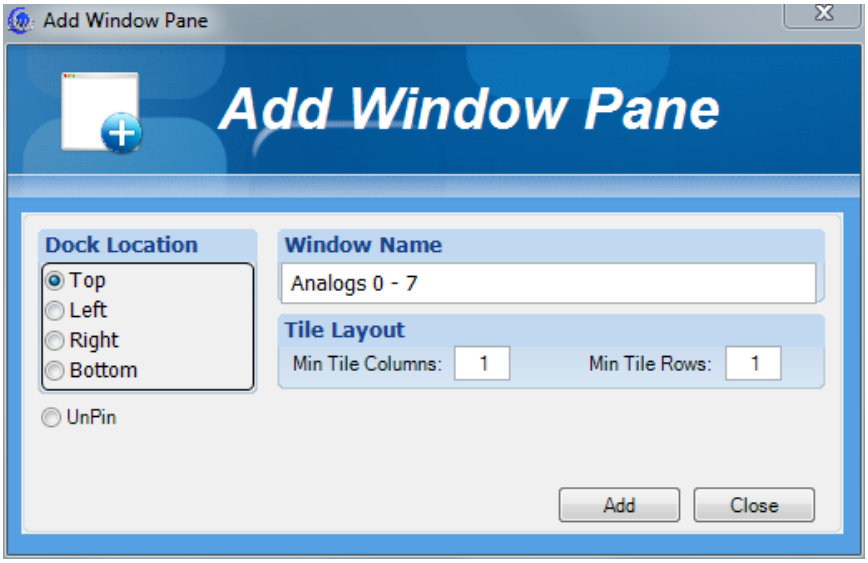
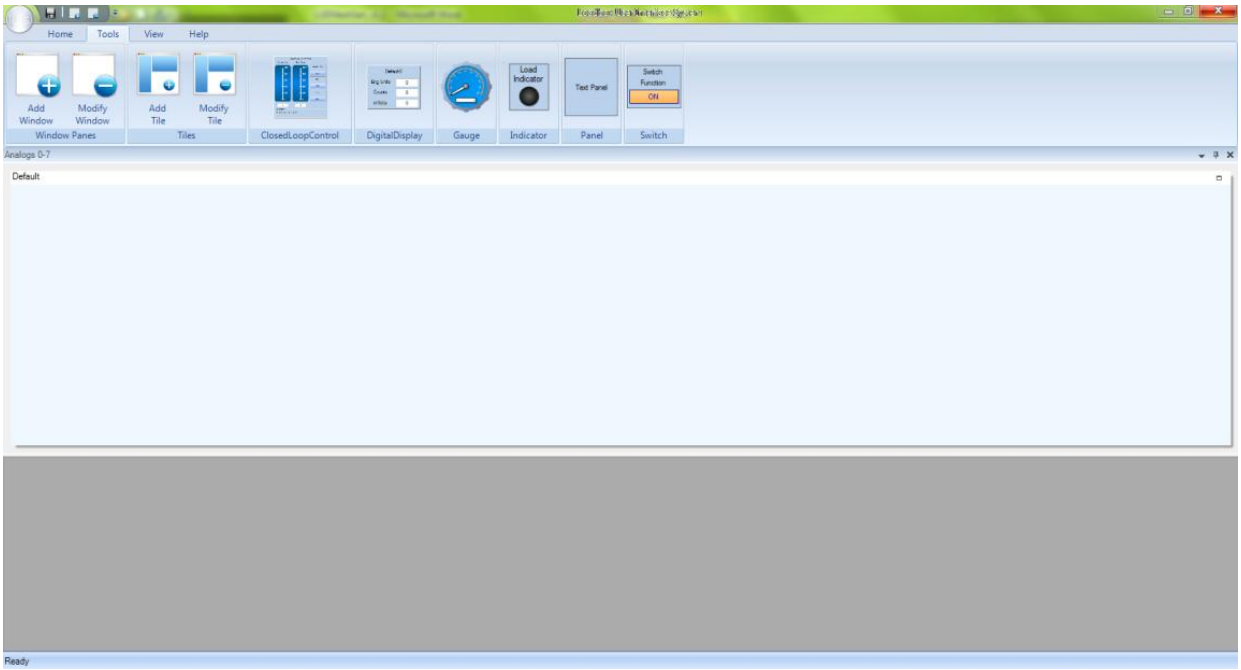


Figure 6: New Window

This is an example of a new window added to the workspace that is docked to the top.



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Working with Windows, Continued

Changing a Window's Status

A window's status can be changed between tabbed, dockable, dockable and floating and hidden in a couple of ways. This table describes changing status.

Change Status To	Action
Floating	To change any window's status to floating, right-click the title bar of the window and select the ***Floating*** option. A docked window can also be changed to floating by grabbing the window's title bar and pulling it away from its docked position. When moving a window that is floating, the **Docking** tools, shown in Figure 8, display. Dropping a window in these tools automatically docks the window to the selected position in the workspace. Dropping a window in the middle of the center docking tools changes the window's status to tabbed.
Dockable	To change a tabbed window's status to dockable, right-click the title bar of the window and select the ***Dockable*** option. The window docks to the last docked position. Note: Pinned windows must be unpinned before they can be changed.
Tabbed	To change a window to the tabbed status, right-click the title bar of the window and de-select the ***Dockable*** option. Alternatively, grab any window by the title bar and drag it to the middle of the center docking tools.
Hidden	To change any window's status to hidden, right-click the title bar of the window and select the ***Hidden*** option. Alternatively, click the X in the upper right-hand corner of the window's title bar. To un-hide the window, go to the **View** tab and click on the window in the toolbar.

Continued on next page

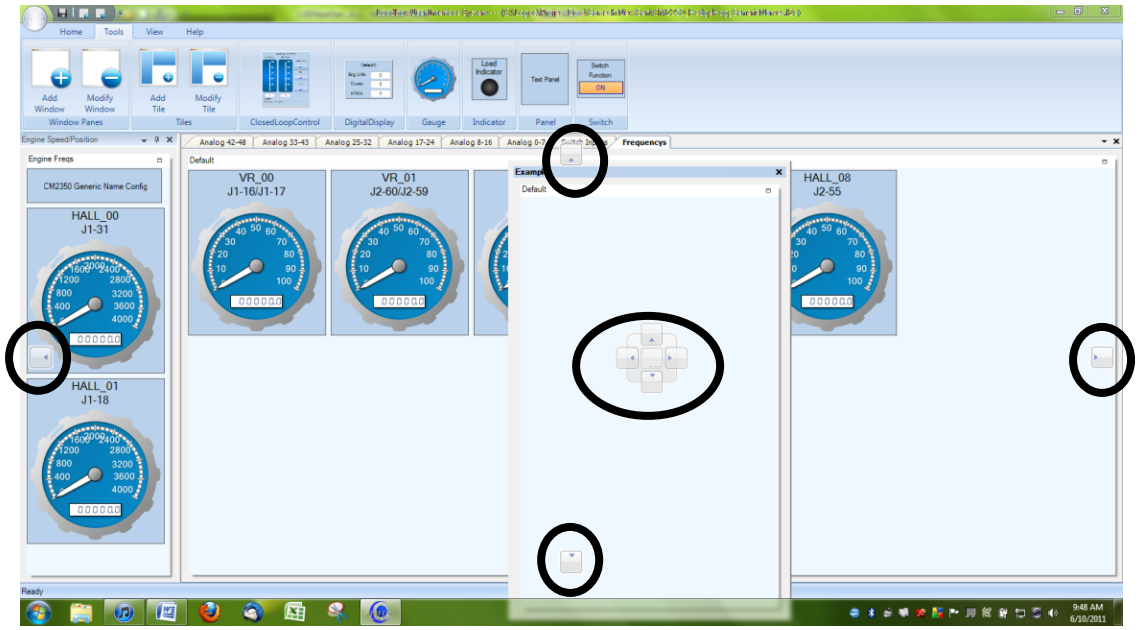
Working with Windows, Continued

Figure 7: Window Status

In this image, the **Main** window is currently unpinned and window shades to the left-hand side of the workspace. The **Frequency** window is docked to the bottom of the workspace, and the rest of the windows are tabbed across the top of the workspace.

Figure 8 Docking Tools

This image shows the docking tools.



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Working with Windows, Continued

Rows and Columns

Rows and columns within a window help organize the tiles within the widow. The number of rows and columns set in a window can be changed in a couple of ways.

From the **Tools** tab, click the **Modify Window** icon to open the **Modify/Delete Window Pane** window, shown in Figure 9. Select the window to modify from the *Window Panes* field, and change the number of rows and/or columns on the right. When finished, click the <**Apply**> button and then <**Close**>.

Right-click in any empty space in the window and select the ***Change Rows*** or ***Change Columns*** option.

Renaming a Window

A window's name can be changed in a couple of ways.

From the **Tools** tab, click the **Modify Window** icon to open the **Modify/Delete Window Pane** window. Select the window to modify from the *Window Panes* field and change the window's name on the right. When finished, click the <**Apply**> button and then <**Close**>.

Right-click in any empty space in the window and select the ***Rename Window Pane*** option.

Deleting a Window

To permanently delete a window from the configuration, right-click in an empty space in the window and select the ***Delete Window Pane*** option from the menu. Alternatively, from the **Tools** tab, click the **Modify Window** icon to open the **Modify/Delete Window Pane** window. Select the window to delete from the *Window Panes* field and click the <**Delete**> button.

Note: Clicking the **X** in the upper right-hand side of the title bar removes the window from the workspace but does not delete it from the configuration file.

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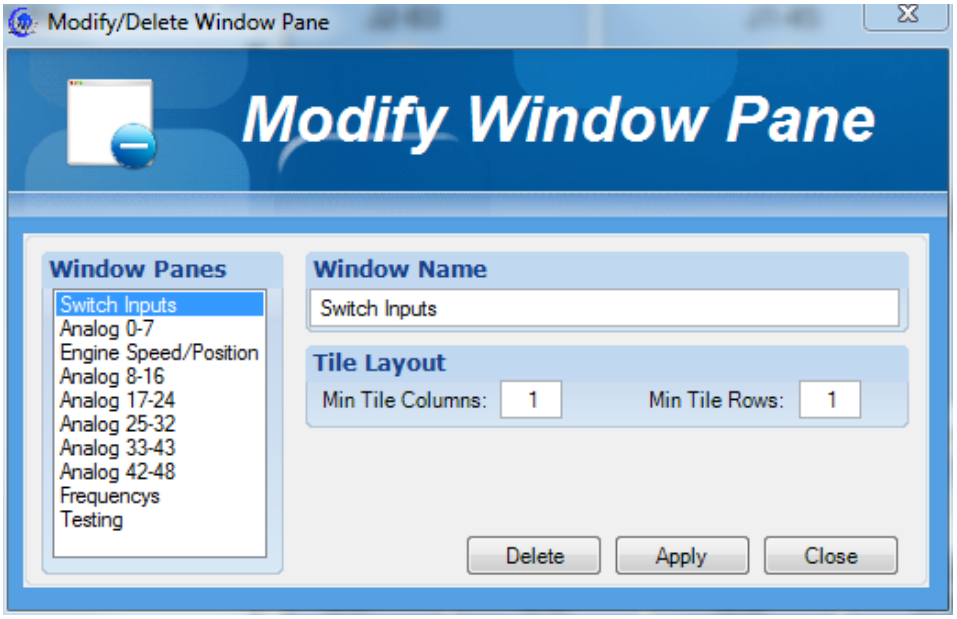
Working with Windows, Continued

Figure 9: Modify/ Delete Window Pane Window

This is an example of the **Modify/Delete Window Pane** window.



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Working with Windows, Continued

Exercise: Working with Windows

The purpose of this exercise is to familiarize users with the manipulation of windows in the LUIS Gen2 environment. This exercise assumes that the LUIS Gen2 hardware and software is already installed, the hardware is connected and turned on, and the software is open with no configuration file loaded.

Step	Action
Open a configuration file	
1	If the **Start** window is displayed in the workspace, click the **X** on the right-hand side of the title bar to close it.
2	On the **Home** tab, click the **Open** icon. Result: The **Configuration File** window displays.
3	Locate the sample.l2c file, select it and click <**Open**>. Result: The configuration file loads. This configuration file has 7 windows. The **Main** window is docked and unpinned to the left hand side of the screen and the remaining windows re tabbed.
Add a window	
5	On the **Tools** tab, click the **Add Window** icon. Result: The **Add Window Pane** window displays, as shown in Figure 10
6	In the **Dock Location** section, select the *Bottom* option.
7	In the *Window Name* field, type `Frequency`.
8	Leave the **Tile Layout** options set to the defaults of 1.
9	Leave the *Unpinned* option un-selected.
10	Click <**Add**> to add the window and <**Close**> to close the **Add Window Pane** window. Result: A new window called **Frequency** displays at the bottom of the workspace, as shown in Figure 11.
11	Resize the **Frequency** window to display the controls in the **Throttle** tab.

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Working with Windows, Continued

Figure 10: Add Window Pane Window

This image shows an example of the **Add Window Pane** window.

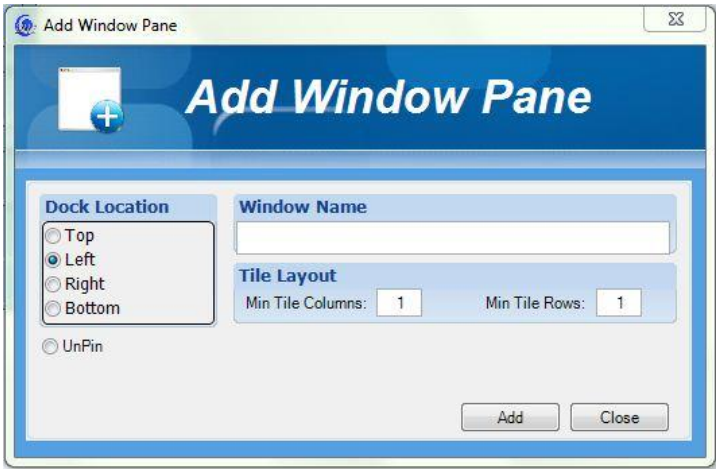
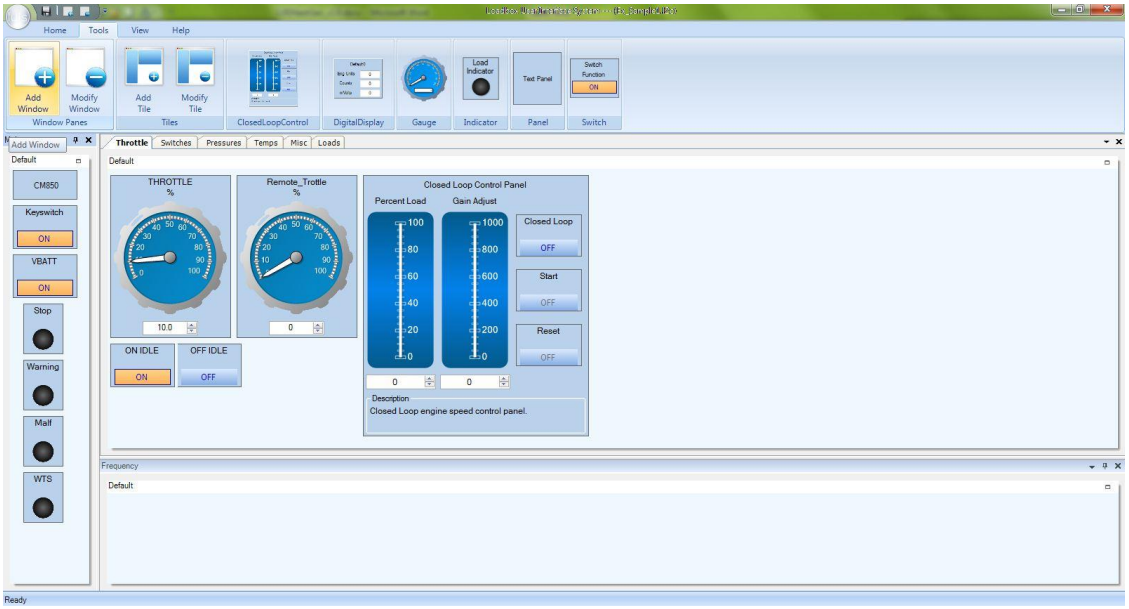


Figure 11: New Frequency Window

This image shows the workspace after adding the **Frequency** window to the sample configuration.



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Working with Windows, Continued

Exercise: Working with Windows, Continued

The purpose of this exercise is to familiarize users with the manipulation of windows in the LUIS Gen2 environment. This exercise assumes that the LUIS Gen2 hardware and software is already installed, the hardware is connected and turned on, and the software is open with no configuration file loaded.

Step	Action
Work with an unpinned window	
11	Locate the **Main** tab on the left-hand side of the workspace and hover over it. Result: The window slides out from the hidden position.
12	Click the push pin icon in the right-hand corner of the title bar. Result: The window is now pinned to the workspace, as shown in Figure 12. The **Main** tab disappears from its location on the left-hand side of the workspace. All the other windows resize to accommodate the new pinned window.
13	Click the push pin icon in the right-hand corner of the title bar again Result: The window is now unpinned, in auto-hide mode, and slides back into the tab on the left-hand side of the workspace.
Work with a floating window	
14	Right-click the title bar of the **Frequency** window and select the ***Floating*** option from the menu. Result: The window now floats above the workspace.
15	Drag the **Frequency** window by the title bar and drop it on the middle of the center docking tools, shown in Figure 13. Result: The **Frequency** window is now a tabbed window and displays at the end of the other window tabs.
16	Right-click on the **Frequency** tab and select the ***Dockable*** option from the menu. Result: The **Frequency** window returns to its docked position at the bottom of the workspace.

Continued on next page

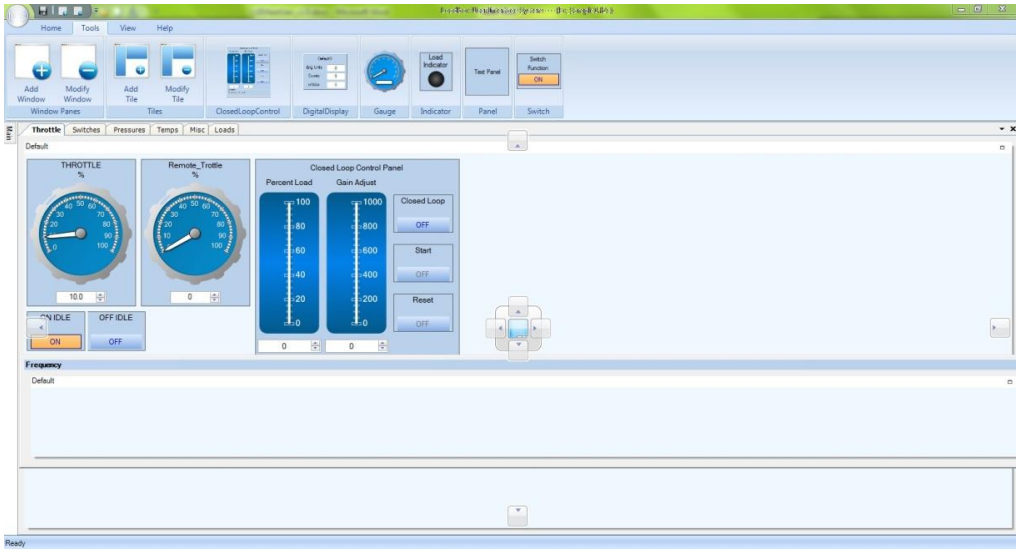
Working with Windows, Continued

Figure 12: Pinned Engine Speed/Position Window

This image shows the **Main** window in the pinned status.

Figure 13: Floating to Tabbed Window

This image shows dropping the **Frequency** floating window into the center docking tool.



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Working with Windows, Continued

Exercise: Working with Windows, Continued

The purpose of this exercise is to familiarize users with the manipulation of windows in the LUIS Gen2 environment. This exercise assumes that the LUIS Gen2 hardware and software is already installed, the hardware is connected and turned on, and the software is open with no configuration file loaded.

Step	Action
Hide a window	
17	Click the **X** icon on the right-hand side of the **Frequency** window title bar. Result: The **Frequency** window is removed from the workspace.
18	Go to the **View** tab, shown in Figure 14, and click the **Frequency** window icon. Result: The **Frequency** window returns to the workspace in its previous position.
Delete a window	
19	On the **Tools** tab, click the **Add Window** icon. Result: The **Add Window Pane** window displays.
20	In the *Window Name* field, type Testing and click <**Apply**>. Result: The new window is added to the workspace and the other windows resize to accommodate it.
21	Click the <**Close**> button. Result: The **Add Window Pane** window closes.
22	Right-click in the **Testing** window just above the **Default** tile and select the ***Delete Window Pane*** option, as shown in Figure 15. A dialog box displays to confirm the deletion. Click <**Yes**> to confirm. Result: The **Testing** window is removed from the workspace.
Save a configuration	
23	Save the current configuration to a new configuration file name by clicking the LUIS icon in the upper left-hand side of the window and selecting the ***Save As*** option. Result: The ***Configuration File*** dialog box displays where the new filename and location can be set.

Continued on next page

Working with Windows, Continued

Figure 14: The View Tab

This is an example of the **View** tab which shows all the windows in the configuration.

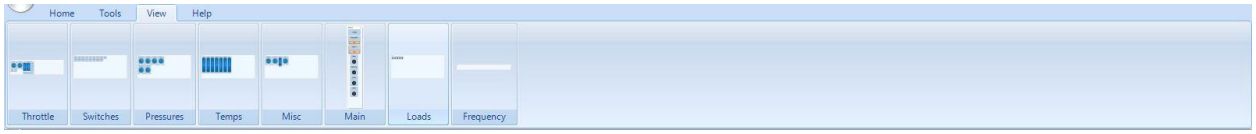
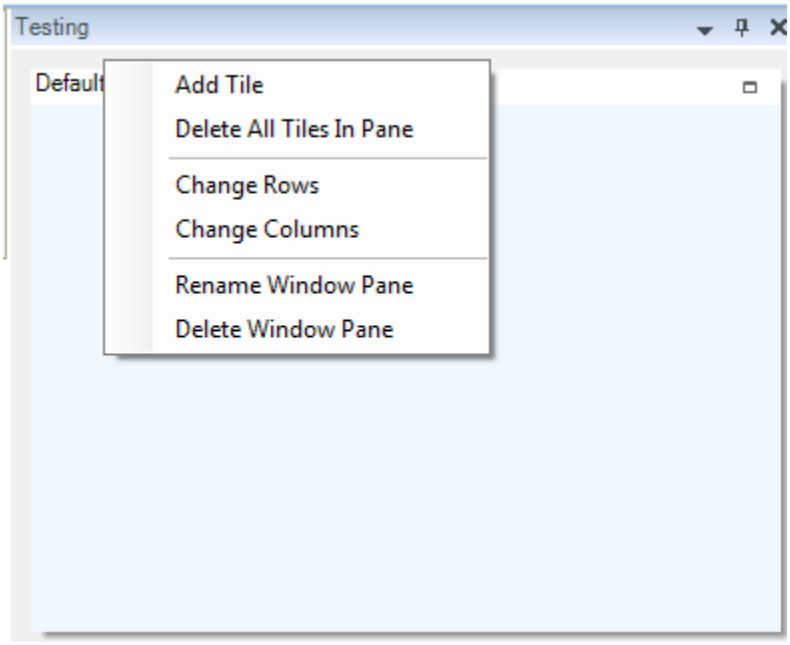


Figure 15: Deleting a Window

This is an example of the menu that displays when right-clicking within a window but not on a tile.



Working with Tiles

Introduction

Tiles are defined spaces within a window to which controls can be added. All the controls within a tile are moved and removed from a window as a group. Every window must have at least one tile.

Adding Tiles

Whenever a window is added to the workspace, a tile named Default is automatically created. Additional tiles can be added by clicking the **Add Tile** icon on the **Tools** tab. Alternatively, additional tiles can be added by right-clicking anywhere in a window and selecting the ***Add Tile*** option from the menu.

If the number of rows and/or columns has been set for the window, the new tile will fill in the next open column or row. If the number of rows and columns has not been set, the new tile will fill in where it will fit. Figure 16 shows an example of a window with two tiles.

Renaming Tiles

Tiles can be renamed using the ***Modify Tile*** dialog box, shown in Figure 17. This dialog box can be opened by right-clicking on a tile and selecting the ***Rename Tile*** option from the menu or by clicking the **Modify Tile** icon on the **Tools** tab. On the ***Modify Tile*** dialog box, select the window where the tile resides in the *Window Panes* field; select the tile in the *Tiles* field and type in a new name in the *Tile Name* field.

Moving and Resizing Tiles

Tiles can be moved by grabbing the title bar of the tile and dragging it to a new position within the window.

Tiles automatically resize as the window is resized. One tile can be enlarged to occupy the majority of the window, decreasing the size of the others, by clicking the **Enlarge** icon in the upper right-hand side of the title bar. Figure 18 shows an example of one tile being enlarged to occupy the majority of a tile.

Clearing Tiles

All controls can be removed from a tile by right-clicking in the tile and selecting the ***Clear Tile*** option from the menu

Deleting Tiles

Tiles can be deleted by right-clicking in the tile and selecting the ***Delete Tile*** option from the menu. Alternatively, tiles can be deleted using the <**Delete**> button on the ***Modify Tiles*** dialog box.

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Working with Tiles, Continued

Figure 16: Window with Two Tiles

This is an example of a window with two tiles named Speed and Tach.

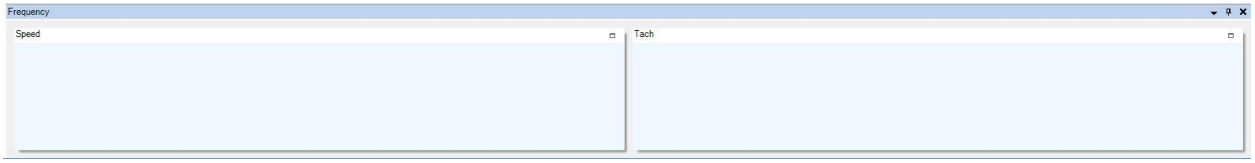


Figure 17: Modify Tile Window

This is an example of the **Modify Tile** window.

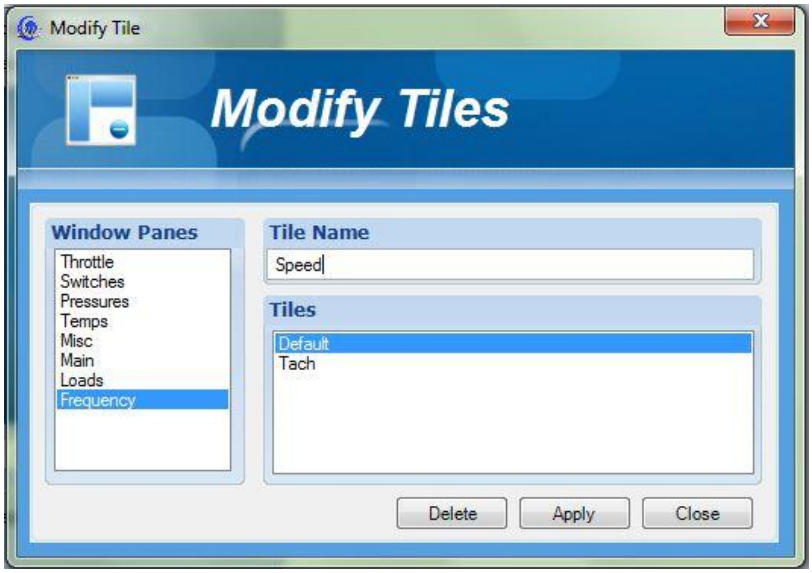


Figure 18: Enlarged Tile

This is an example of a window with two tiles where one tile is enlarged.

Continued on next page

Working with Tiles, Continued

Exercise: Working with Tiles

The purpose of this exercise is to familiarize users with the manipulation of tiles in the LUIS Gen2 environment. This exercise assumes that the LUIS Gen2 hardware and software is already installed, the hardware is connected and turned on, and the software is open with the configuration file saved in the previous exercise open.

Step	Action
Add a tile	
1	From the **Tools** tab, click the **Add Tile** icon. Result: The **Add Tile** window displays, as shown in Figure 19.
2	In the **Window Panes** section, select the ***Frequency*** option.
3	In the *Tile Name* field, type `Tach`.
4	Click the <**Add**> button. Result: A new tile named Tach is added to the **Frequency** window. The Default tile shrinks to accommodate the new tile.
Modify a Tile	
5	On the **Tools** tab, click the **Modify Tile** icon. Result: The **Modify Tile** window displays, as shown in Figure 20.
6	In the **Window Panes** section, select the *Frequency* option.
7	In the **Tile** section, select the *Default* option.
8	In the *Tile Name* field, type `Speed`.
9	Click the <**Apply**> button. Result: The Default tile's name changes to Speed.
10	Click the <**Close**> button. Result: The **Modify Tile** window closes.

Continued on next page

Working with Tiles, Continued

Figure 19: Add Tile Window

This is an example of the **Add Tile** window.

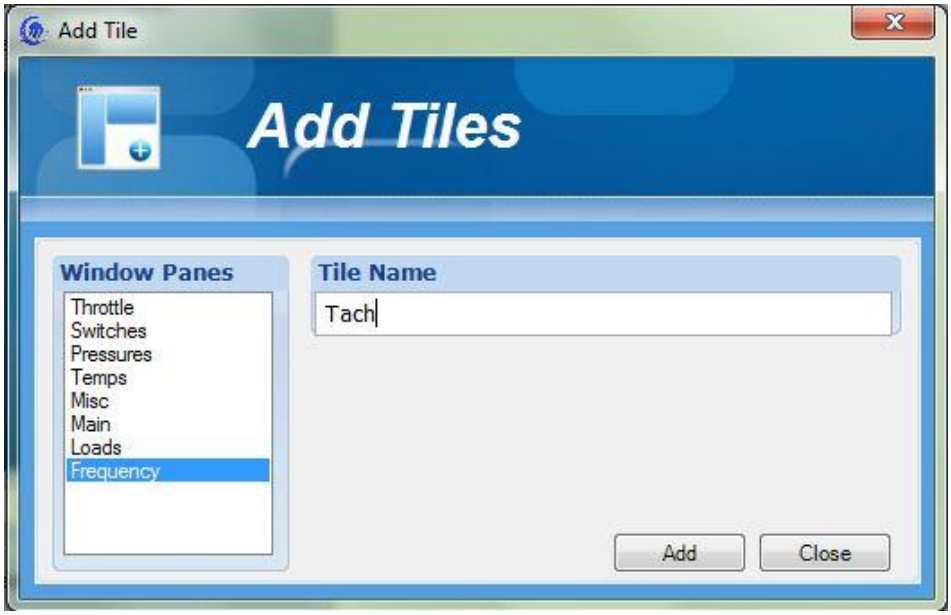
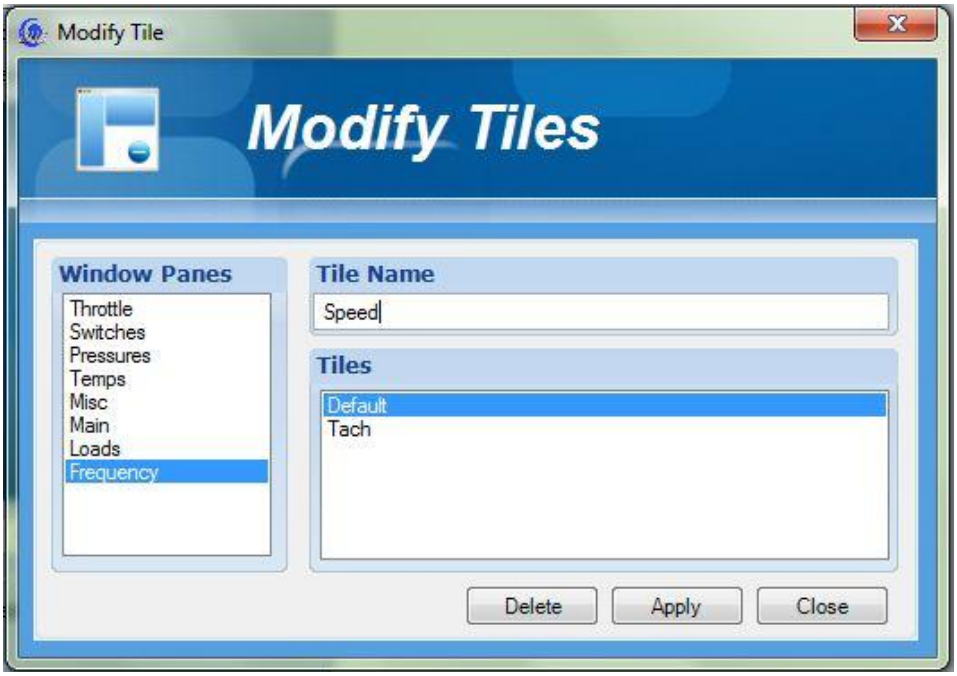


Figure 20: Modify Tile Window

This is an example of the **Modify Tile** window.



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Working with Tiles, Continued

Exercise: Working with Tiles

The purpose of this exercise is to familiarize users with the manipulation of tiles in the LUIS Gen2 environment. This exercise assumes that the LUIS Gen2 hardware and software is already installed, the hardware is connected and turned on, and the software is open with the configuration file saved in the previous exercise open.

Step	Action
Enlarge a tile	
11	Click the **Enlarge** icon in the upper right-hand corner of the **Speed** tile's title bar. Result: The **Speed** tile expands within the **Frequency** window and the **Tach** tile automatically shrinks, as shown in Figure 21.
12	Click the **Switch to Normal Mode** icon in the upper right-hand corner of the **Speed** tile's title bar. Result: The **Speed** tile shrink back within the **Frequency** window and the **Tach** tile automatically resizes.
Change tile configuration	
13	From the **Tools** tab, click the **Modify Window** icon. Result: The **Modify/Delete Window Pane** window opens, as shown in Figure 22.
14	In the **Window Panes** section, select the *Frequency* option.
15	In the **Tile Layout** section, change the *Min Tile Rows* to 2.
16	Click the <**Apply**> button. Result: The tiles within the **Frequency** window are now stacked to fill the minimum 2 rows set for the window, as shown in Figure 23.
17	Change the *Min Tile Rows* back to 1 and click the <**Apply**> button. Result: The tiles move back to one row and display next to each other.
18	Click the <**Close**> button. Result: The **Modify/Delete Window Pane** window closes.

Continued on next page

Working with Tiles, Continued

Figure 21: Enlarged Tile

This image is an example of one tile enlarged within a window.

Figure 22: Modify/Delete Window Pane Window

This is an example of the **Modify/Delete Window Pane** window.

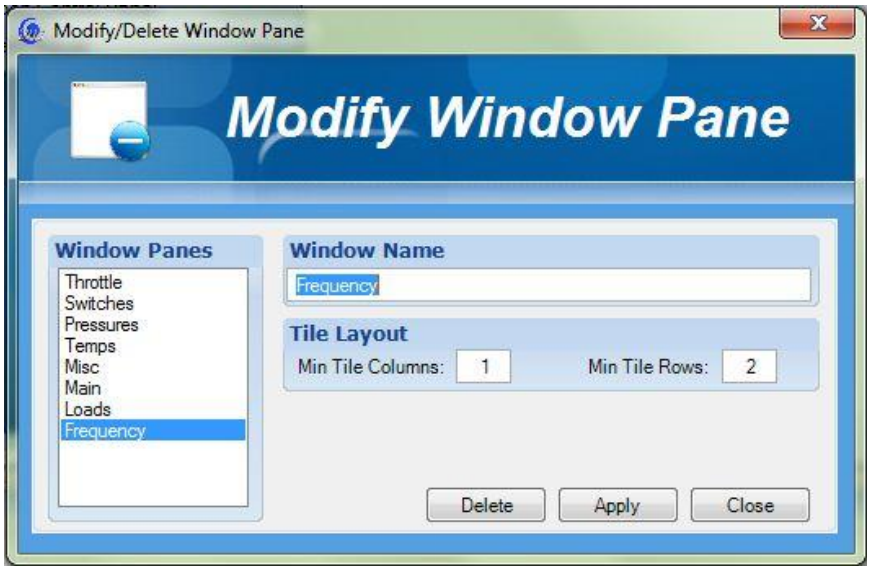

Figure 23: Window with 2 Rows

This image an example of a window with two tiles and a minimum of 2 rows.

Continued on next page

Working with Tiles, Continued

Exercise: Working with Tiles

The purpose of this exercise is to familiarize users with the manipulation of tiles in the LUIS Gen2 environment. This exercise assumes that the LUIS Gen2 hardware and software is already installed, the hardware is connected and turned on, and the software is open with the configuration file saved in the previous exercise open.

Step	Action
Reorganize tiles	
19	Grab the title bar of the **Speed** tile and drag it to the other side of the **Tach** tile. Result: The **Speed** tile moves to the other side of the **Tach** tile, as shown in Figure 24.
Deleting tiles	
20	Right-click on one of the tiles in the **Frequency** window and select the ***Add Tile*** option. Result: The **Tile Creation Entry** widow displays.
21	In the field, type `Test` and click <**OK**>. Result: A new tile named Test is added to the **Frequency** window.
22	Right-click on the **Test** tile and select the ***Delete Tile*** option. A dialog box displays to confirm the deletion. Click <**Yes**> to delete the tile. Result: The tile is removed and the other tiles automatically resize.
Save a configuration	
23	Save the current configuration by clicking the **Save** icon on the **Home** toolbar. Result: The Configuration File is saved.

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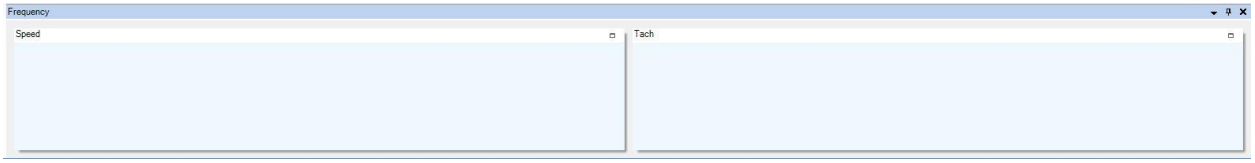
Working with Tiles, Continued

Figure 24: Window with Two Tiles

This is an example of a window with two tiles named Speed and Tach.



Working with Controls

Introduction

Controls are the gauges, switches, digital displays and text that display the values from the hardware. This section gives an overview of how to work with the control on the **Tools Tab**. For more information about each specific control, see **Chapter 7 – Controls** beginning on page 136.

Adding Controls

Controls are added to tiles within windows; they cannot sit directly on a window. To add a control, grab the desired control icon from the **Tools** tab and drag it to the desired tile.

Moving Controls

A control can be moved within the same tile by grabbing its title bar and dragging it to a new position. The grid spacing as well as whether or not controls should be snapped to the grid are set on the **Interface Options** tab on the **Options** window opened through the **Defaults** icon on the **Home** tab.

Copying and Pasting Controls

Any control can be copied by right-clicking on the control and selecting the ***Copy*** option from the menu, shown in Figure 25. To paste a control, right-click where the new control should be pasted and select the ***Paste*** option from the menu. Controls can be pasted between tiles and windows within an instance of the LUIS Gen2 GUI. Controls can also be pasted between multiple instances of the LUIS Gen2 GUI open on the same PC.

Paste Special

The properties of any control can be pasted onto another control by right-clicking on the original control and selecting the ***Copy*** option from the menu and then right-clicking on the recipient control and selecting the ***Paste Special*** option. The ***Paste Special*** dialog box, shown in Figure 26, displays where the user can select what properties should be pasted onto the control. These options include both appearance and operation.

Continued on next page

Working with Controls, Continued

Figure 25: Working with Controls

This image depicts the menu that displays when right-clicking on a control.

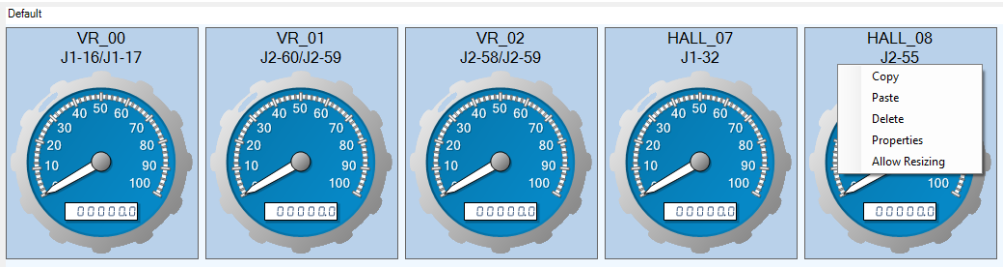
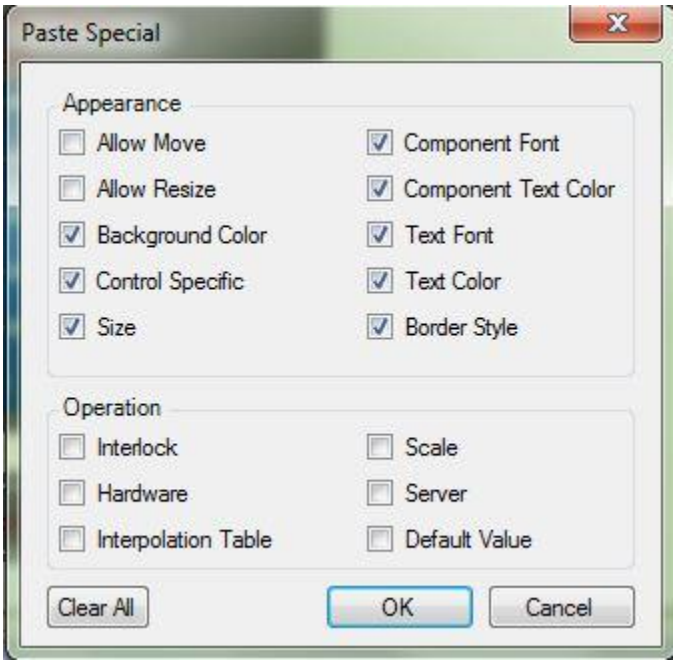


Figure 26: Paste Special

This image depicts the ***Paste Special*** dialog box.



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Working with Controls, Continued

Resizing Controls

A control can be resized by right-clicking on it and selecting the ***Allow Resizing*** option. Once resizing has been activated, click and drag the edges of the control to resize it. Once the control is the desired size, right-click it and select the ***Lock Size*** option to prevent accidentally resizing again.

Deleting Controls

To delete a control, right-click on the control and select the ***Delete*** option.

Formatting Controls

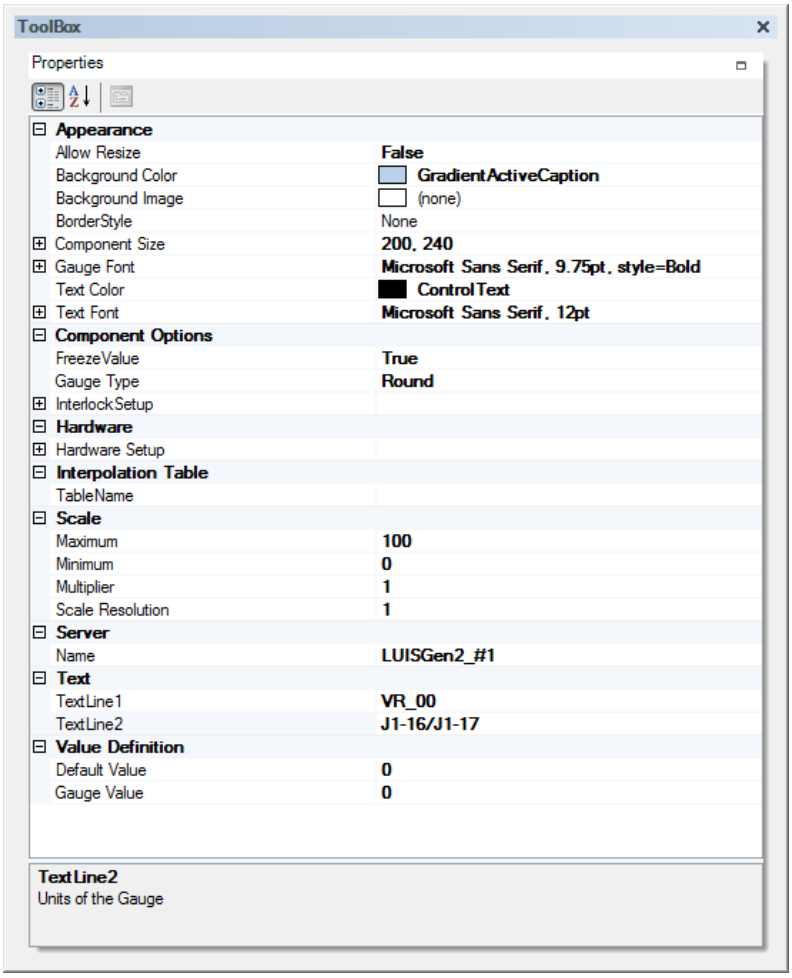
To format a control, right-click the control and select the ***Properties*** option from the menu. The ***ToolBox*** dialog box opens, as shown in Figure 27. The properties list varies with the type of control being formatted. For more information about formatting controls, see **Chapter 7 – Controls** beginning on page 136.

Continued on next page

Working with Controls, Continued

Figure 27: The Toolbox Dialog Box

This is an example of the ***Toolbox*** dialog box. The options available in the ***Toolbox*** depend on the type of control selected.



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Working with Controls, Continued

Exercise: Working with Controls

The purpose of this exercise is to familiarize users with the manipulation of controls in the LUIS Gen2 environment. This exercise assumes that the LUIS Gen2 hardware and software is already installed, the hardware is connected and turned on, and the software is open with the configuration file saved in the previous exercise open.

Step	Action
Adding controls	
1	On the **Tools** tab, grab and drag the **Gauge** icon to the **Speed** tile on the **Frequency** window. Note: When the gauge is dropped on the window a warning symbol displays on it. This indicates that the control has not yet been configured.
Formatting a control's operation	
2	Right-click on the gauge in the **Speed** tile on the **Frequency** window and select the ***Properties*** option from the menu. Result: The ***Toolbox*** dialog box displays, as shown in Figure 28.
3	In the **Hardware** section, next to the *Hardware Setup* field, click the <**…**> button. Result: The ***Hardware I/O Selection*** dialog box displays, as shown in Figure 29.
4	In the *Hardware Unit* field, select ***Wavemaker***. Result: The *Channel* field populates with the available channels in the selected hardware unit.
5	In the *Channel* field, select ***Digital_CH#1*** and click <**OK**>. Result: The ***Hardware I/O Selection*** dialog box closes and the *Channel* and *Type* fields are completed on the ***Toolbox*** dialog box.

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Working with Controls, Continued

Figure 28: The Toolbox Dialog Box

This is an example of the ***Toolbox*** dialog box.

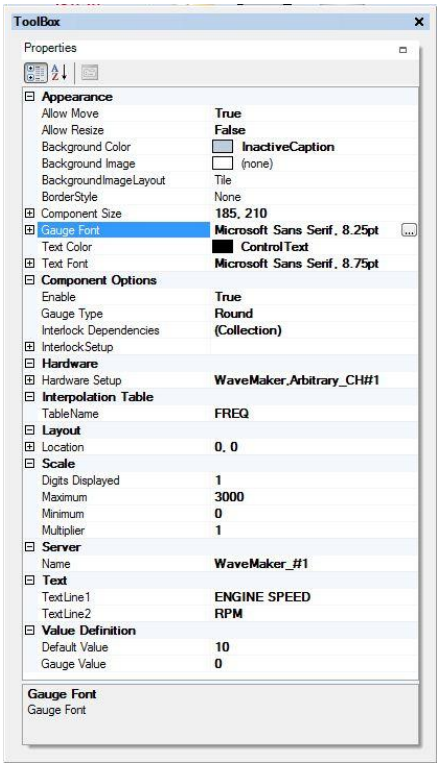
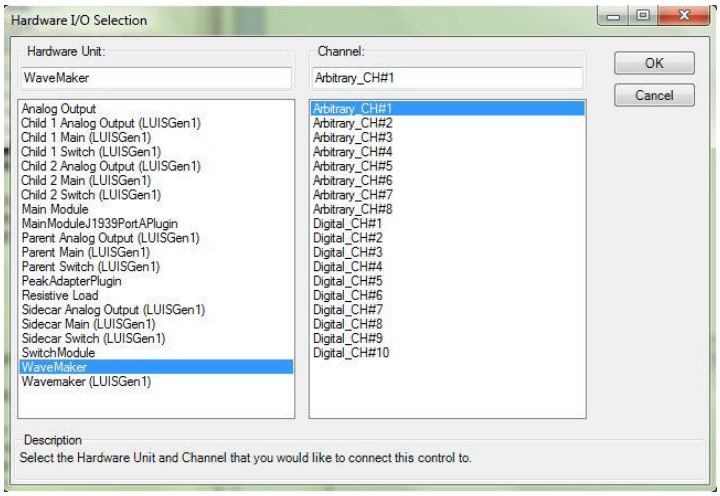


Figure 29: Hardware I/O Selection Dialog Box

This is an example of the ***Hardware I/O Selection*** dialog box.



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Working with Controls, Continued

Exercise: Working with Controls

The purpose of this exercise is to familiarize users with the manipulation of controls in the LUIS Gen2 environment. This exercise assumes that the LUIS Gen2 hardware and software is already installed, the hardware is connected and turned on, and the software is open with the configuration file saved in the previous exercise open.

Step	Action
6	In the **Interpolation Table** section, in the *Table Name* field, select the ***FREQ*** option from the dropdown list.
7	In the **Scale** section, in the *Maximum* field, type `3000`. Note: The scale on the gauge changes.
8	In the **Scale** section, in the *Minimum* field, type `1`.
9	In the **Scale** section, in the *Multiplier* field, type `1`.
10	In the **Server** section, in the *Name* field, select ***WaveMaker_#1*** from the dropdown list.
11	In the **Text** section, in the *TextLine1* field, type `ENGINE SPEED`. Result: The text on the gauge changes.
12	In the **Text** section, in the *TextLine2* field, type `RPM`. Result: The text on the gauge changes.
Formatting a control's appearance	
13	On the ***Toolbox*** dialog box, in the **Appearance** section, click the drop-down arrow next to the *Background Color* field. From the drop-down, pick the **Web** tab and select the ***Dark Red*** option. Result: The background color of the gauge changes.
14	In the **Gauge Font** section, click the <**…**> button. Result: The ***Font*** dialog box displays.
15	In the *Size* field, type 6 and click <**OK**>. Result: The ***Font*** dialog box closes and the size of the gauge font changes.
16	Close the ***Toolbox*** dialog box.

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Working with Controls, Continued

Figure 30: The Toolbox Dialog Box

This is an example of the ***Toolbox*** dialog box.

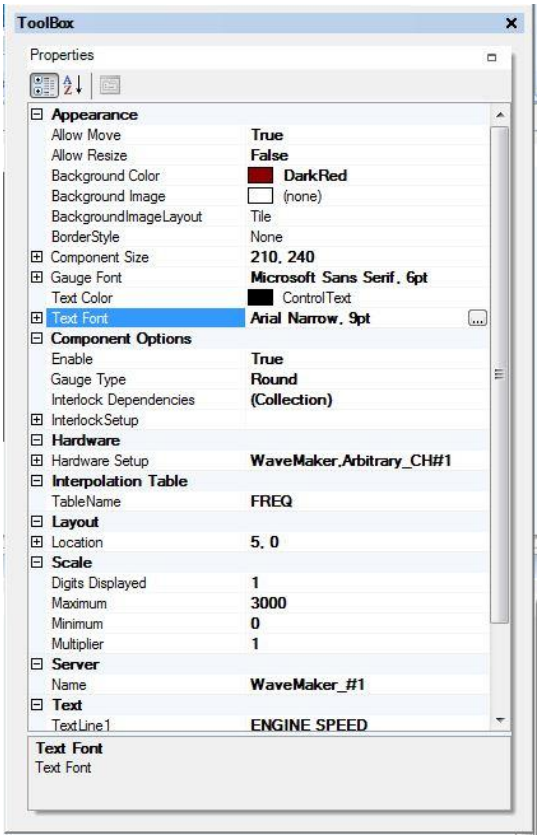

Figure 31: Modified Gauge

This image shows the gauge after the modifications have been made.

Continued on next page

Working with Controls, Continued

Exercise: Working with Controls

The purpose of this exercise is to familiarize users with the manipulation of controls in the LUIS Gen2 environment. This exercise assumes that the LUIS Gen2 hardware and software is already installed, the hardware is connected and turned on, and the software is open with the configuration file saved in the previous exercise open.

Step	Action
Resizing controls	
17	Right-click on the gauge and select the ***Allow Resizing*** option from the menu. Result: The gauge can now be resized by grabbing the outline of the gauge and pulling it in and out.
18	When the gauge has been resized, right-click on it and select the ***Lock Size*** option from the menu. Result: The gauge's size is now locked.
Moving controls	
19	Grab the gauge control by the title bar and drag it to a new position on the tile.
Copying and pasting controls	
20	Right-click on the gauge and select the ***Copy*** option from the menu.
21	Right-click anywhere in the current tile or another tile and select the ***Paste*** option. Result: A copy of the gauge is pasted on the tile.
Deleting controls	
22	Right-click on the gauge that was just pasted and select the ***Delete*** option from the menu. Result: The control is removed from the tile.

Continued on next page

Working with Controls, Continued

Figure 32: Formatted Gauge

This is an example of the formatted gauge on the **Frequency** window.

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Working with Controls, Continued

Exercise: Working with Controls

The purpose of this exercise is to familiarize users with the manipulation of controls in the LUIS Gen2 environment. This exercise assumes that the LUIS Gen2 hardware and software is already installed, the hardware is connected and turned on, and the software is open with the configuration file saved in the previous exercise open.

Step	Action
Paste Special	
23	Right-click on the ENGINE SPEED gauge in the **Frequency** window and select the ***Copy*** option.
24	Right-click on the THROTTLE gauge in the **Throttle** window tab and select the ***Paste Special*** option. Result: The ***Paste Special*** dialog box displays, as shown in Figure 33.
25	Ensure the *Background Color* and *Component Font* options are selected and all other are deselected. Then click <**OK**>. Result: The background color and component font properties from the ENGINE SPEED gauge are applied to the THROTTLE gauge, as shown in Figure 34.
Save a configuration	
26	Save the current configuration by clicking the **Save** icon on the **Home** toolbar. Result: The Configuration File is saved.

Continued on next page

Working with Controls, Continued

Figure 33: Paste Special

This image depicts the ***Paste Special*** dialog box.

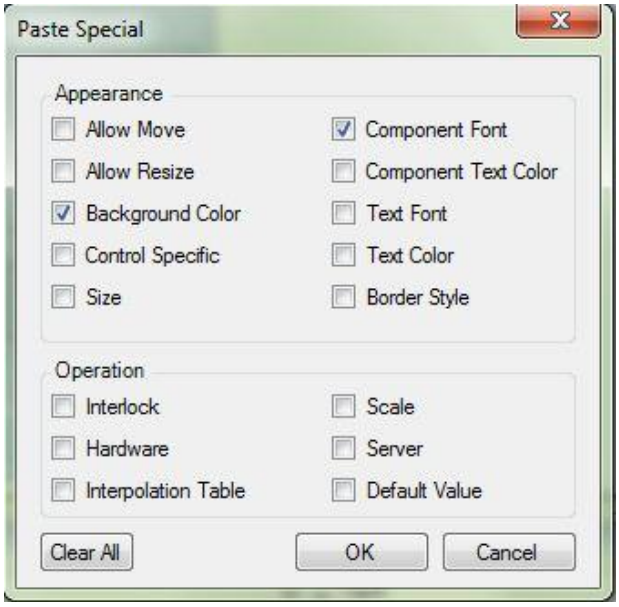
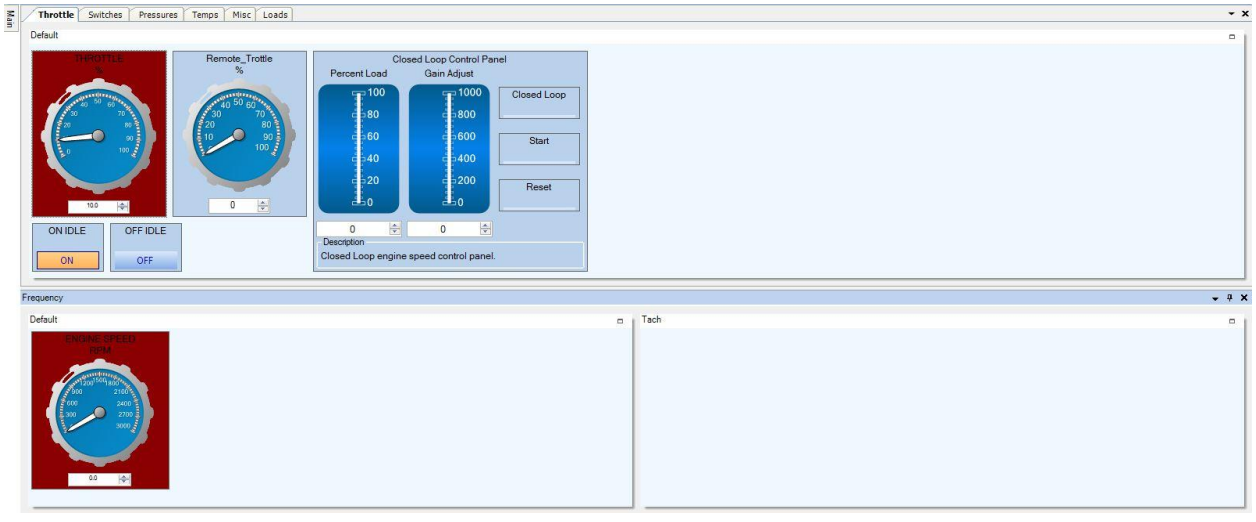


Figure 34: Reformatting Control

This is an example of pasting options from one gauge to another.

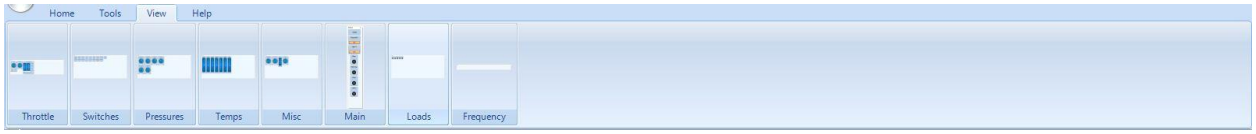


Section 3 – The View and Help Tabs

The View and Help Tabs

The View Tab

The **View** tab is a way to easily navigate between all windows within a configuration whether or not they are hidden. It is also the way to unhide a hidden window.



The Help Tab

The **Help** tab provides information about the current version of LUIS as well as on-line help.

Notes

Section 4 – Printing a Configuration File Summary

Printing a Configuration File Summary

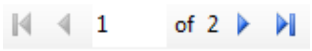
Introduction

LUIS Gen2 provides the ability to print a summary of all the controls within a configuration.

Configuration File Summary

The ***Configuration File*** dialog box displays all the controls in the configuration listed by server. To open the ***Configuration File*** dialog box, click the **LUIS** icon in the upper left-hand corner of the application and select the ***Print*** option.

The ***Configuration File*** dialog box, shown in Figure 35, provides a toolbar for navigating the summary as well as setting up the print options. This table and image describe the options on the toolbar.

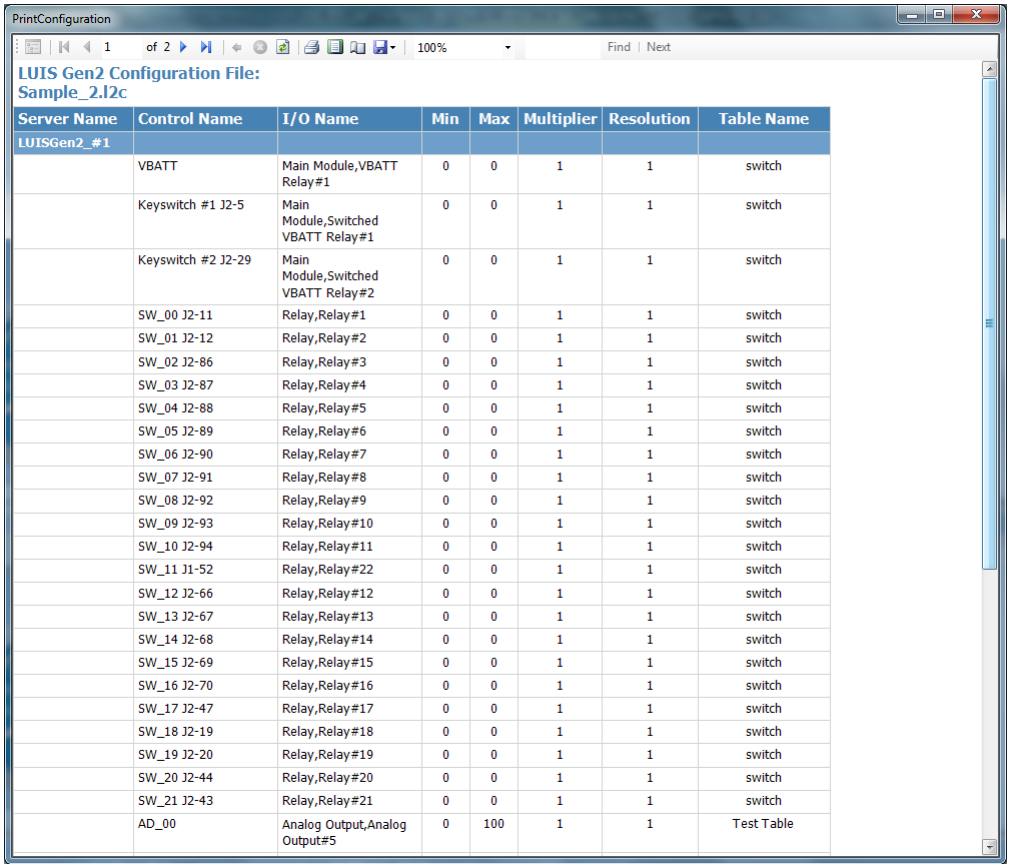
Icon	Description
	These icons are used to navigate through the pages of the summary within the ***Configuration File*** dialog box.
	This icon is used to refresh the control list.
	This icon is used to open the ***Print*** dialog box to print the summary.
	This icon is used to toggle between a print preview view and the standard view.
	This is used to set up the print options such as margins and orientation.
	This icon is used to export the file in either MS Excel or Adobe PDF format.
	This icon is used to set the size of the view within the ***Configuration File*** *dialog box.*
	These icons are used to search for text within the ***Configuration File*** dialog box.

Continued on next page

Printing a Configuration File Summary, Continued

Figure 35: Example Configuration File Dialog Box

This is an example of a configuration in the ***Configuration File*** dialog box.



Server Name	Control Name	I/O Name	Min	Max	Multiplier	Resolution	Table Name
LUISGen2_#1							
	VBATT	Main Module,VBATT Relay#1	0	0	1	1	switch
	Keyswitch #1 J2-5	Main Module,Switched VBATT Relay#1	0	0	1	1	switch
	Keyswitch #2 J2-29	Main Module,Switched VBATT Relay#2	0	0	1	1	switch
	SW_00 J2-11	Relay,Relay#1	0	0	1	1	switch
	SW_01 J2-12	Relay,Relay#2	0	0	1	1	switch
	SW_02 J2-86	Relay,Relay#3	0	0	1	1	switch
	SW_03 J2-87	Relay,Relay#4	0	0	1	1	switch
	SW_04 J2-88	Relay,Relay#5	0	0	1	1	switch
	SW_05 J2-89	Relay,Relay#6	0	0	1	1	switch
	SW_06 J2-90	Relay,Relay#7	0	0	1	1	switch
	SW_07 J2-91	Relay,Relay#8	0	0	1	1	switch
	SW_08 J2-92	Relay,Relay#9	0	0	1	1	switch
	SW_09 J2-93	Relay,Relay#10	0	0	1	1	switch
	SW_10 J2-94	Relay,Relay#11	0	0	1	1	switch
	SW_11 J1-52	Relay,Relay#22	0	0	1	1	switch
	SW_12 J2-66	Relay,Relay#12	0	0	1	1	switch
	SW_13 J2-67	Relay,Relay#13	0	0	1	1	switch
	SW_14 J2-68	Relay,Relay#14	0	0	1	1	switch
	SW_15 J2-69	Relay,Relay#15	0	0	1	1	switch
	SW_16 J2-70	Relay,Relay#16	0	0	1	1	switch
	SW_17 J2-47	Relay,Relay#17	0	0	1	1	switch
	SW_18 J2-19	Relay,Relay#18	0	0	1	1	switch
	SW_19 J2-20	Relay,Relay#19	0	0	1	1	switch
	SW_20 J2-44	Relay,Relay#20	0	0	1	1	switch
	SW_21 J2-43	Relay,Relay#21	0	0	1	1	switch
	AD_00	Analog Output,Analog Output#5	0	100	1	1	Test Table

Notes

Chapter 3 –Interpolation Tables

Overview

Introduction

Some of the components controlled by the LUIS Gen2 require an interpolation table to match the engineering unit that is on the gauge to a counts value. For example 32 PSI is 500 counts, which is a specific voltage that LUIS Gen2 outputs. The **Table Management** window within the LUIS Gen2 GUI provides the capability for building interpolation tables.

In This Chapter

This table outlines the topics covered in this chapter.

Section 1 – Creating an Interpolation Table

Creating an Interpolation Table

Introduction

Interpolation tables can be created from the **Home** tab by clicking the **Tables** icon. The data can be entered manually or cut and pasted from another application such as Microsoft Excel.

Creating an Interpolation Table

This table outlines the steps for creating an interpolation table.

Step	Action
1	From the **Home** tab, click the **Tables** icon. Result: The **Table Management** window opens, as shown in Figure 36.
2	Click the <**Add New**> button. Result: The **New Table Creation** dialog box displays, as shown in Figure 37.
3	In the field, type the name of the new interpolation table and click <**OK**>. Result: The new table name displays in the name field and the default values fill in the other fields. The table name also displays in the *Tables* field on the left-hand side of the frame.
4	In the *Input Units* field, type the engineering units of the table input or use None.
5	In the *Output Units* field, type the units of the table output.
6	In the *Resolution Scalar* field, type the multiplier that should be used to match the table output to the hardware limitations. Example: If the table output is set up for 10 bit, (1023 counts), and the hardware output is 16 bit, (65535 counts), then the conversion formula is Hardware Output / Table Output or 65535/1023 = 64. The resolution scalar is 64.

Continued on next page

Creating an Interpolation Table, Continued

Figure 36: Table Management Window

This is an example of the **Table Management** window.

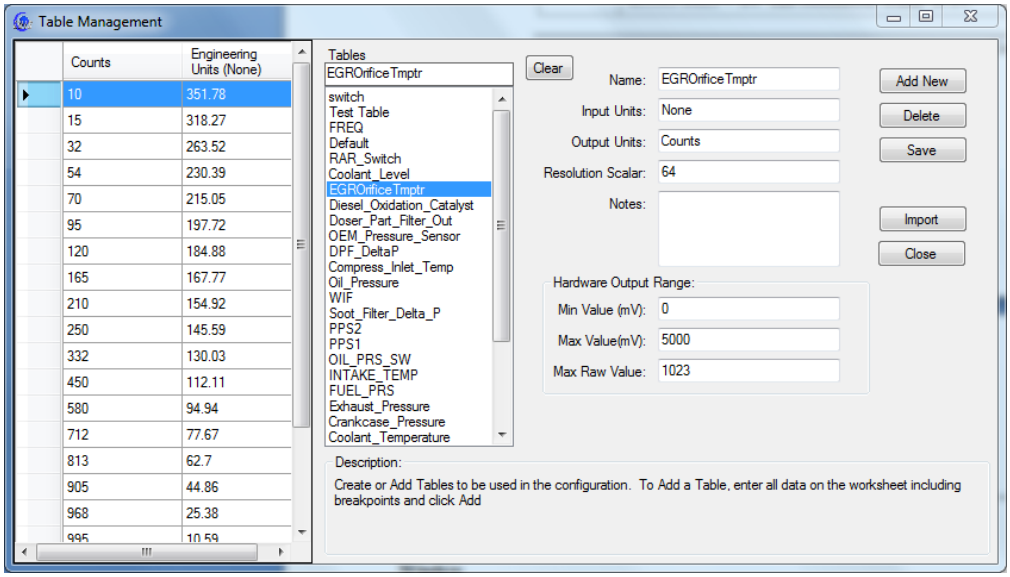
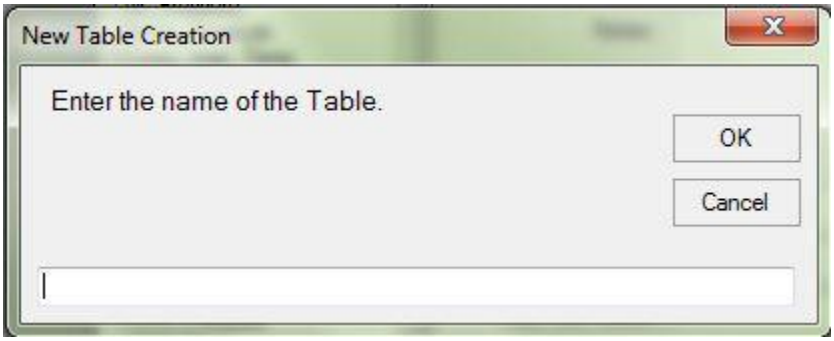


Figure 37: New Table Creation Dialog Box

This is an example of the **New Table Creation** dialog box.



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Creating an Interpolation Table, Continued

Creating an Interpolation Table, Continued

This table continues to outline the steps for creating an interpolation table.

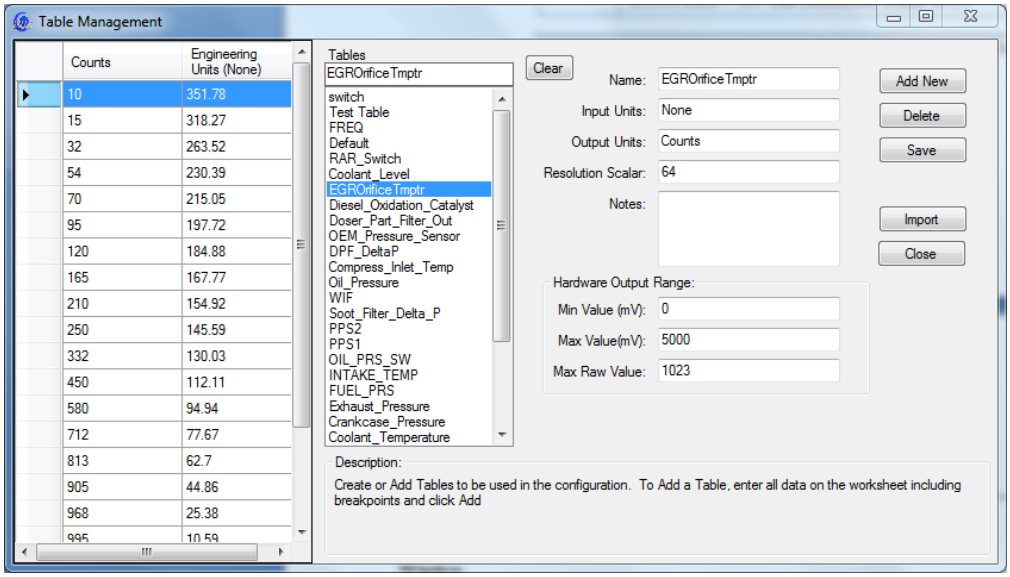
Step	Action
7	In the *Notes* section, type any notes to describe the table.
8	The *Min Value (mV)* field is the minimum hardware value used to calculate output voltages when digital to analog converters are used. The value is typically 0 mV. Note: This is only used for display purposes and does not affect hardware output.
9	The *Max Value (mV)* field is the maximum hardware value used to calculate output voltages when digital to analog converters are used. The value is typically 5000 mV. Note: This is only used for display purposes and does not affect hardware output.
10	The *Max Raw Value* field is the value used to calculate output voltages when digital to analog converters are used. A typical table would be set up for 10 bit output and a max raw value of 1023 would be needed. Note: This is only used for display purposes and does not affect hardware output.

Continued on next page

Creating an Interpolation Table, Continued

Figure 38: Table Management Window

This is an example of the **Table Management** window.



Continued on next page

Creating an Interpolation Table, Continued

Creating an Interpolation Table, Continued

This table continues to outline the steps for creating an interpolation table.

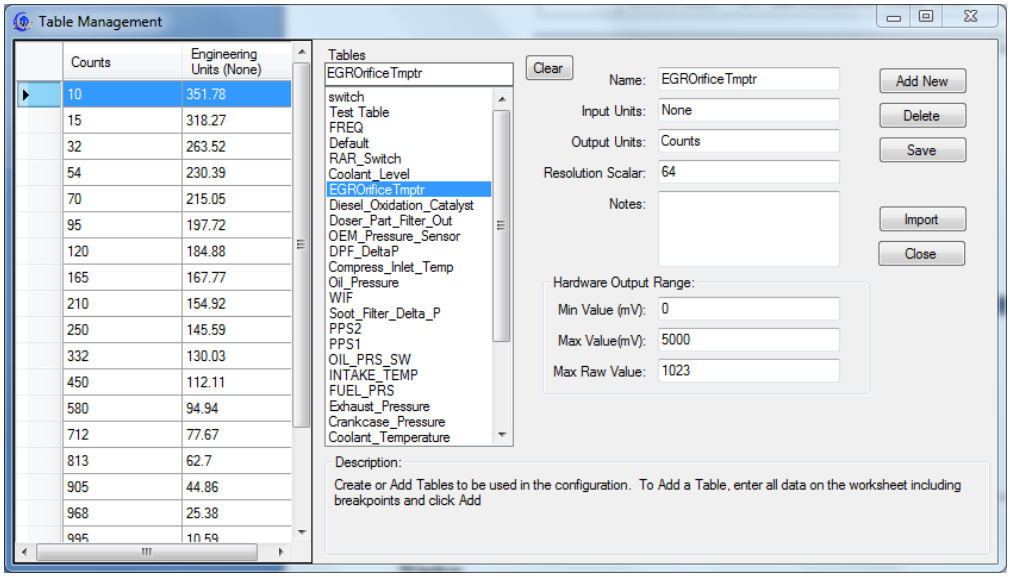
Step	Action
11	Once the interpolation table is set up, the table values should be entered. Note: Before entering values, ensure that the correct table is highlighted in the *Tables* list. **To…** / **Then…** Enter values manually — Type the values into the table on the left-hand side of the window using the **TAB** key to move between fields. Paste from another program — Copy the values from the other program. Return to the **Table Management** window and right-click in the first cell of the table on the left-hand side and select ***Paste*** from the menu.
12	Once the table has been set up and the values have been entered, click the <**Save**> button. Result: The interpolation table is saved and will be available in the **Interpolation Table** *Table Name* drop-down list for formatting controls.
13	Close the **Table Management** window and save the configuration file.

Continued on next page

Creating an Interpolation Table, Continued

Figure 39: Table Management Window

This is an example of the **Table Management** window.



Section 2 – Editing an Interpolation Table

Editing an Interpolation Table

Introduction

Interpolation tables can be edited if the set up for the table or the values in the table need to change.

Editing an Interpolation Table

This table outlines the steps for editing an interpolation table.

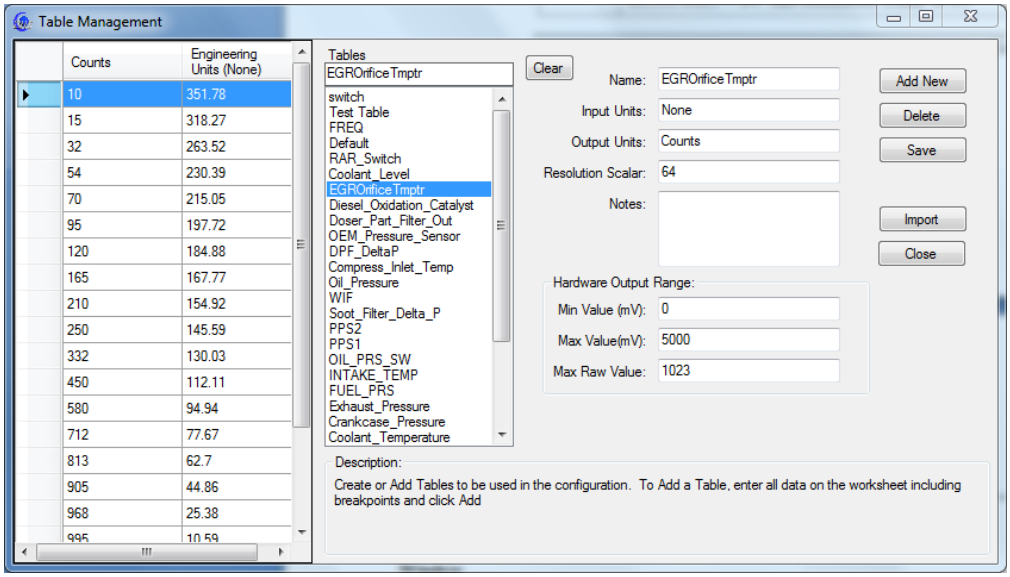
Step	Action
1	Ensure that the correct configuration file is open and then from the **Home** tab, click the **Tables** icon. Result: The **Table Management** window displays, as shown in Figure 40.
2	In the *Tables* list, highlight the table to edit. Result: The setup information displays on the right-hand side of the window and the table data is filled in on the left-hand side.
3	Make the required changes to the setup and/or the data.
4	Click the <**Save**> button. Result: The changes are saved.
5	Close the **Table Management** window and save the configuration file.

Continued on next page

Editing an Interpolation Table, Continued

Figure 40: Table Management Window

This is an example of the **Table Management** window.



Section 3 – Importing an Interpolation Table

Importing an Interpolation Table

Introduction

An existing interpolation table can be imported into a configuration file. LUIS Gen2 can import both Gen1 and Gen2 files.

Importing and Interpolation Table

This table outlines the steps for importing an interpolation table.

Step	Action
1	Ensure that the correct configuration file is open then from the **Home** tab, click the **Tables** icon. Result: The **Table Management** window displays, as shown in Figure 41.
2	Click the <**Import**> button. Result: The ***Import Tables*** dialog box displays.
3	Browse for and select the appropriate configuration file that contains the desired interpolation table. Note: To import a Gen1 file or other text file, select .txt instead of .l2c in the file type dropdown list.
4	Click the <**Open**> button. Result: The **Select Items** window, shown in Figure 42, displays with all the interpolation tables in that configuration file.
5	Select each of the interpolation tables to import and click the <**Import**> button. Note: If all the interpolation tables should be imported, click the <**Select All**> button. Result: The selected table(s) is/are imported and display in the *Tables* list on the **Table Management** window.
6	Close the **Table Management** window and save the configuration file.

Continued on next page

Importing an Interpolation Table, Continued

Figure 41: Table Management Window

This is an example of the **Table Management** window.

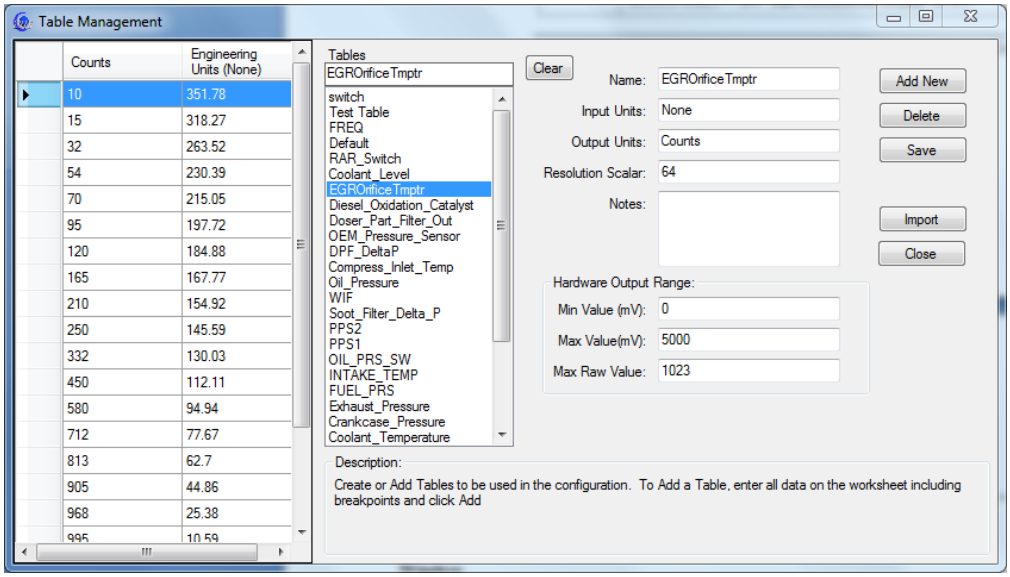
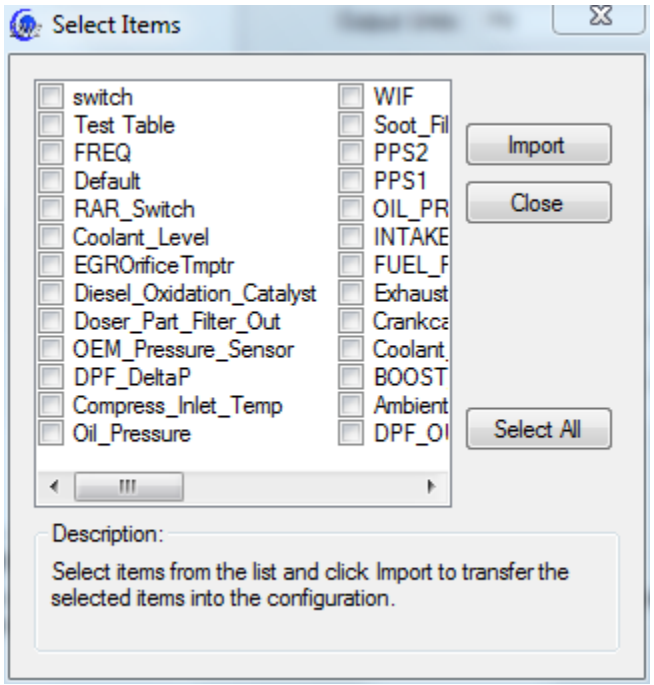


Figure 42: Select Items Window

This is an example of the **Select Items** window.



Section 4 – Deleting an Interpolation Table

Deleting an Interpolation Table

Introduction

If an interpolation table is no longer needed in a configuration, it can be deleted. An interpolation table can only be deleted if it is not associated with any control within the configuration.

Deleting an Interpolation Table

This table outlines the steps for deleting an interpolation table.

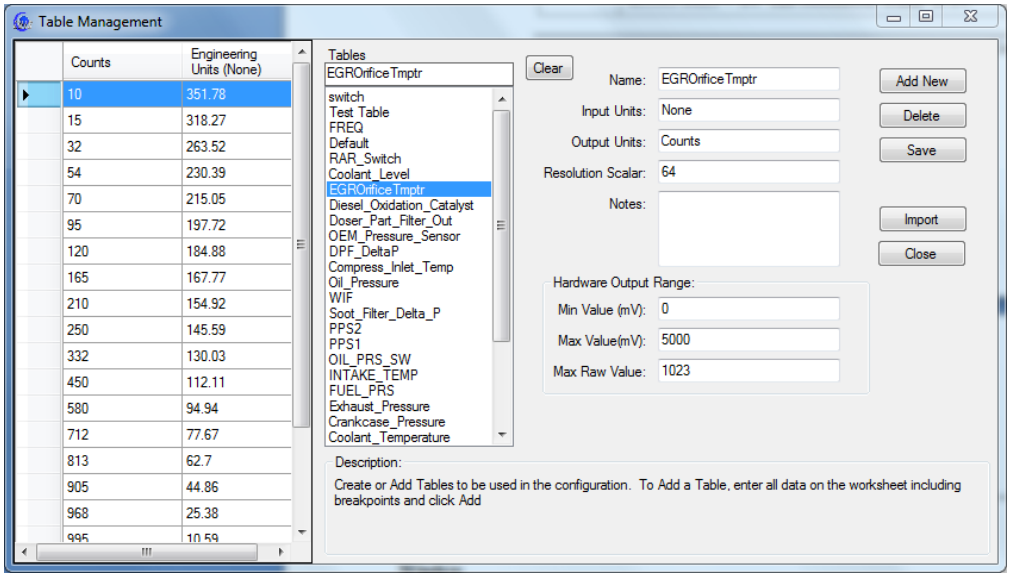
Step	Action
1	Ensure that the correct configuration file is open then from the **Home** tab, click the **Tables** icon. Result: The **Table Management** window displays, as shown in Figure 43.
2	In the *Tables* list, highlight the table to delete.
3	Click the <**Delete**> button. Result: A dialog box displays to confirm the action. Click yes to delete the table. The table is removed from the *Tables* list and the configuration file.
4	Close the **Table Management** window and save the configuration file.

Continued on next page

Deleting an Interpolation Table, Continued

Figure 43: Table Management Window

This is an example of the **Table Management** window.



Chapter 4 – Waveforms

Overview

Introduction

The Wavemaker module has built in support for specific waveform data. LUIS Gen2 supports both Generation 1 and Generation 2 waveform management. Generation 1 uses the Peak Adapter servers, and the available waveforms are resident in the firmware. Generation 2 uses the WaveMaker servers, and users can define and import waveforms. Each waveform must have a unique name within a configuration file. The **Wavemaker Management** window is used for viewing and defining waveforms as well as for assigning waveforms to channels.

In This Chapter

This table outlines the topics covered in this chapter.

Section 1 – Working with Gen2 Waveforms

Overview

Introduction LUIS Gen2 waveforms use the WaveMaker server. The user defines the waveforms on the server and then assigns these waveforms to either digital or arbitrary channels. LUIS Gen2 has 8 specific arbitrary channels and 10 specific digital channels.

In This Section This table outlines the topics covered in this section.

Defining a Gen2 Waveform

Introduction

Waveforms are defined within a configuration on the **Waveform Management** window. The left-hand side of this window provides the interface for defining waveforms as well as maintaining a list of all the waveforms in this configuration.

Defining a Gen2 Waveform

This table outlines the steps for defining a waveform.

Step	Action
1	With the appropriate configuration file open, from the **Home** tab, click the **Waveforms/Channels** icon. Result: The **WaveMaker Management** window displays, as shown in Figure 44.
2	Click the **LUIS Gen2** tab at the top of the window. Result: The interface for defining Gen2 waveforms and assigning them to channels displays.
3	On the left-hand side of the window in the **Waveform Definition** section, click the <**Add New**> button. Result: The ***New Waveform Creation*** dialog box displays, as shown in Figure 45.
4	In the field, type the name of the waveform and click <**OK**>. Result: The name displays in the *Name* field as well as being listed in the waveform library field.
5	In the *Card Output (mv)* table, create the waveform. **To…** / **Then…** Create manually / Type in the values for the waveform using the **TAB** key to navigate the table.

Continued on next page

Defining a Gen2 Waveform, Continued

Figure 44: WaveMaker Management Window

This is an example of the **WaveMaker Management** window open to the LUIS Gen2 tab.

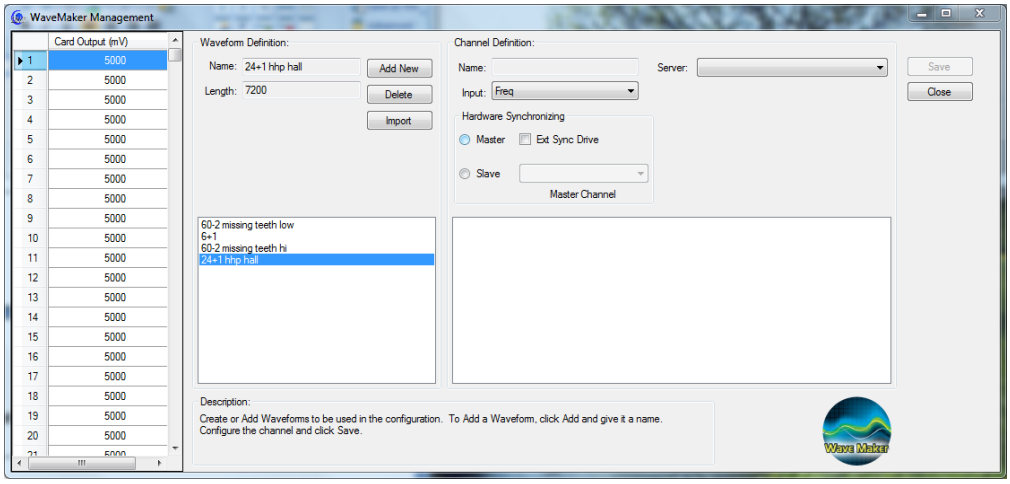
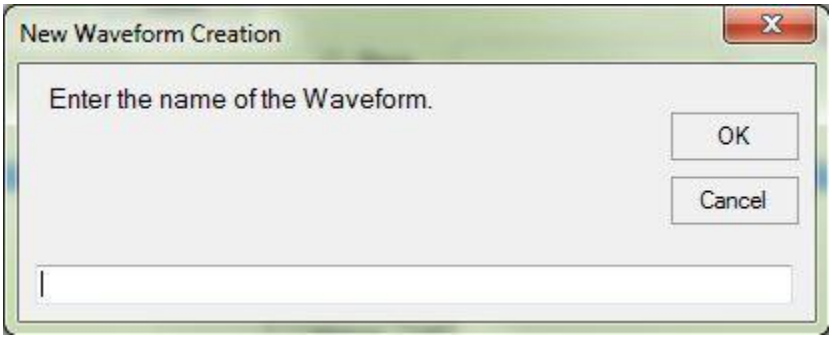


Figure 45: New Waveform Creation Dialog Box

This is an example of the ***New Waveform Creation*** dialog box.



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Defining a Gen2 Waveform, Continued

Defining a Gen2 Waveform, Continued

This table continues to outline the steps for defining a waveform.

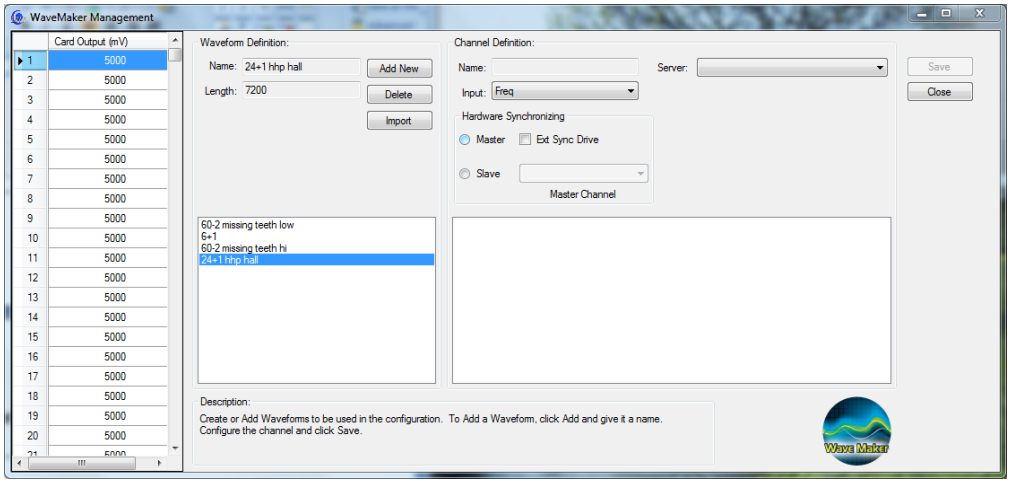
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>5</td><td>Continued…
<table>
<tr><th>To…</th><th>Then…</th></tr>
<tr><td>Copy from an alternate source such as Microsoft Excel</td><td>Open the source and copy the data.
Return to the WaveMaker Management window, right-click in the first cell and select the Paste option from the menu.</td></tr>
</table></td></tr>
<tr><td>6</td><td>As the waveform data is entered, the Length field is automatically populated with the number of cells.</td></tr>
<tr><td>7</td><td>When the waveform has been defined, click the <Save> button.
Note: To save the changes permanently to the configuration file, click the <Save> icon on the LUIS Home tab.</td></tr>
</table>

Continued on next page

Defining a Gen2 Waveform, Continued

Figure 46: WaveMaker Management Window

This is an example of the **WaveMaker Management** window open to the LUIS Gen2 tab.



Importing a Gen2 Waveform

Introduction

Waveforms can be imported from other configuration files. Remember that each waveform within a configuration file must have a unique name. The next section describes how to rename a waveform.

Importing a Gen2 Waveform

This table outlines the steps for importing a waveform.

Step	Action
1	With the appropriate configuration file open, from the **Home** tab, click the **Waveforms/Channels** icon. Result: The **WaveMaker Management** window displays, as shown in Figure 47.
2	Click the **LUIS Gen2** tab at the top of the window. Result: The interface for defining Gen2 waveforms and assigning them to channels displays.
3	On the left-hand side of the window in the **Waveform Definition** section, click the <**Import**> button. Result: The ***Import Waveform*** dialog box displays.
4	Browse for and select the configuration file that has the desired waveform(s) and click the <**Open**> button. Result: The **Select Items** window, shown in Figure 48, displays listing all the waveforms defined in the selected configuration file. Note: To select a Gen1 waveform file, change the file type dropdown list from .l2c to .cff.
5	Select the waveform(s) to import and click the <**Import**> button. Note: To import all the waveforms in the configuration, click the <**Select All**> button. Result: The waveforms selected are imported and display in the library field.

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Importing a Gen2 Waveform, Continued

Figure 47: WaveMaker Management Window

This is an example of the **WaveMaker Management** window open to the LUIS Gen2 tab.

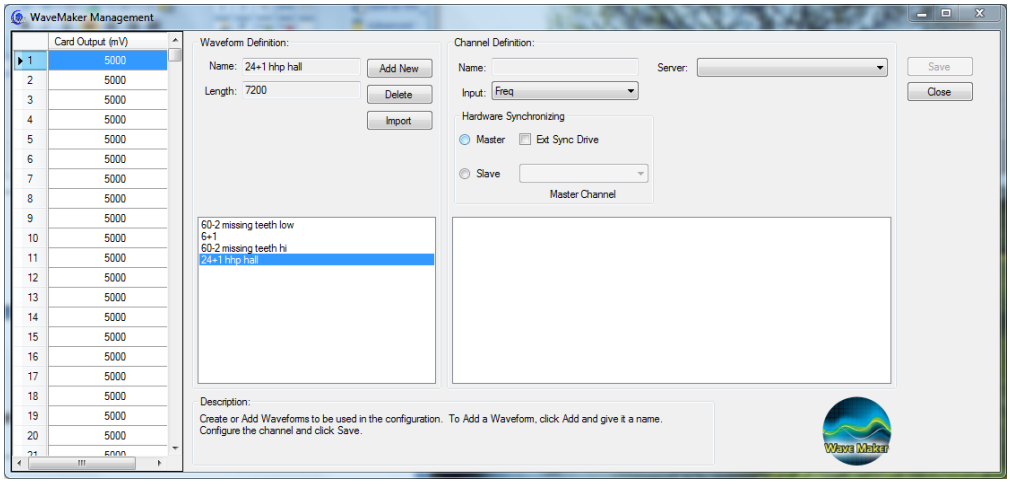
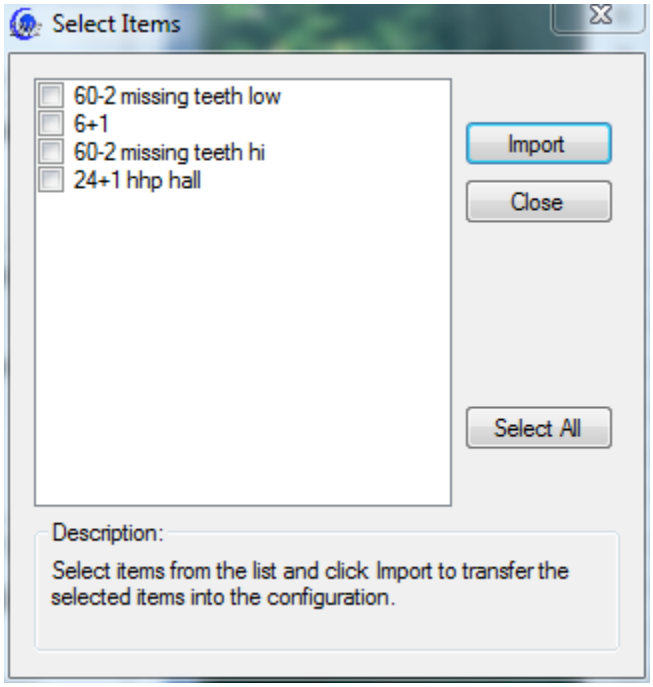


Figure 48: Select Items Window

This is an example of the **Select Items** window.



Renaming a Gen2 Waveform

Introduction

After a waveform has been defined, its name can be changed through the **WaveMaker Management** window.

Renaming a Gen2 Waveform

This table outlines the steps for renaming a waveform.

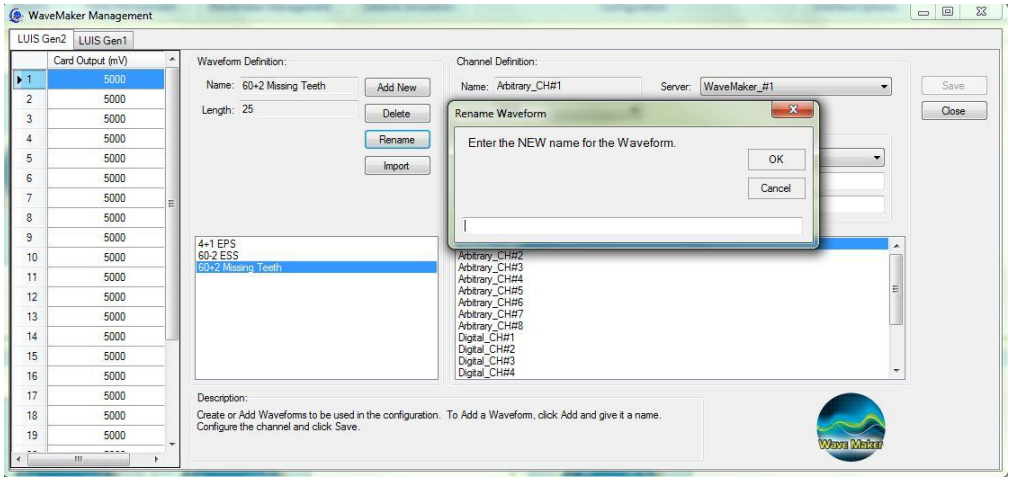
Step	Action
1	With the appropriate configuration file open, from the **Home** tab, click the **Waveforms/Channels** icon. Result: The **WaveMaker Management** window displays.
2	Click the **LUIS Gen2** tab at the top of the window. Result: The interface for defining Gen2 waveforms and assigning them to channels displays.
3	On the left-hand side of the window, in the waveform library field, highlight the waveform to rename. Result: The waveform's data displays.
4	Click the <**Rename**> button. Result: The ***Rename Waveform*** dialog box, shown in Figure 49, displays.
5	Type the new name for the waveform and click <**OK**>. Result: The dialog box closes and the name of the waveform is changed in both the *Name* field and waveform library list. Note: The change is automatically saved to the waveform, but the configuration needs to be saved to make the changes permanent in the configuration file.

Continued on next page

Renaming a Gen2 Waveform, Continued

Figure 49: Rename Waveform Dialog Box

This image depicts the ***Rename Waveform*** dialog box.



Continued on next page

Assigning a Gen2 Waveform

Introduction

After waveforms have been defined, they can be assigned to channels on the **WaveMaker Management** window. The same waveform can be assigned to multiple channels within a configuration.

Hardware Synchronizing

Channels can be set to be synchronized. When using this option, one channel must be set to be the master. Any channel that should sync with that channel will be a slave to it.

Channels can also be synchronized with an external drive. When this is the case, the master channel must be set as a master and also as an external sync drive. This allows the channel to output its drive signal externally and other WaveMaker units can use it as a master.

Assigning a Gen2 Waveform

This table outlines the steps for assigning a waveform to a channel.

Step	Action
1	With the appropriate configuration file open, from the **Home** tab, click the **Waveforms/Channels** icon. Result: The **WaveMaker Management** window displays, as shown in Figure 50.
2	Click the **LUIS Gen2** tab at the top of the window. Result: The interface for defining Gen2 waveforms and assigning them to channels displays.
3	In the *Server* field, select the correct server for the channel to assign. Result: The channels available on the selected server display in the channels list and the first channel's information is filled in to the fields.
4	Select the desired channel from the channel list. Result: The channel's information populates the fields.
5	In the *Input* field, select the correct input.

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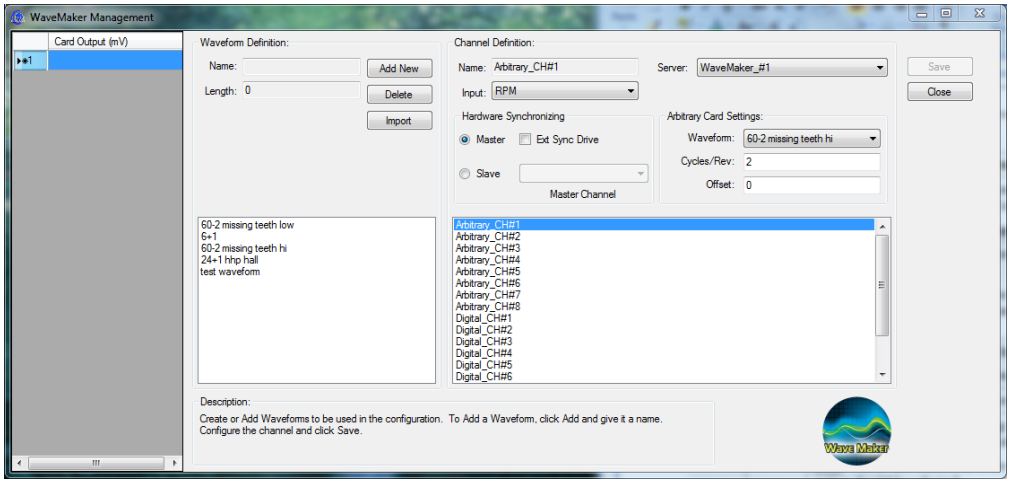
Assigning a Gen2 Waveform, Continued

Figure 50: WaveMaker Management LUIS Gen2 Window

This is an example of the **WaveMaker Management** window when assigning a LUIS Gen2 waveform.



Continued on next page

Assigning a Gen2 Waveform, Continued

Assigning a Gen2 Waveform, Continued

This table continues to outline the steps for assigning a waveform to a channel.

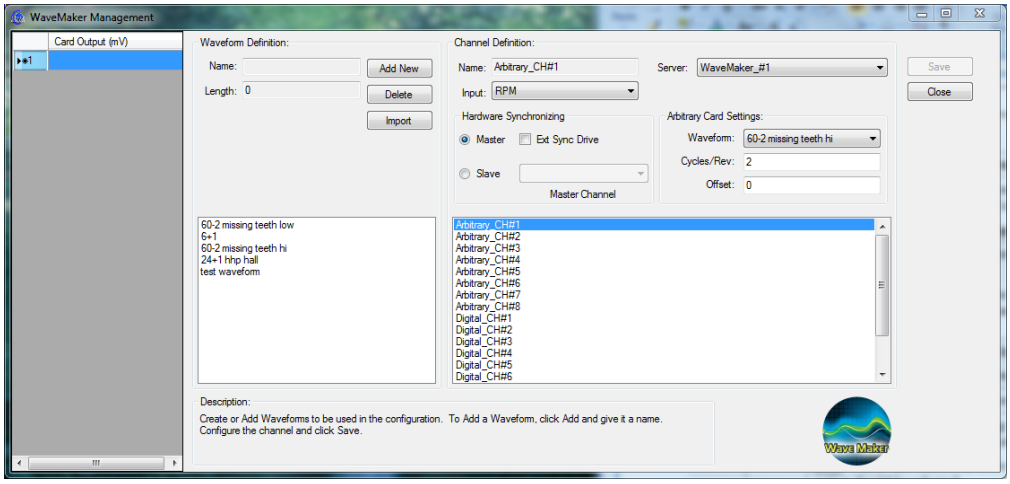
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>6</td><td>In the Hardware Synchronizing section, select if this channel should be a Master, Slave or Master and External Sync Drive.
Note: Unless this channel is to be a slave to another, the Master option should be selected.</td></tr>
<tr><td>7</td><td>If the channel is a Slave, select its Master Channel from the dropdown list.
Note: If this channel is to sync to an external sync drive, select the Ext Sync Drive option. This channel will automatically sync with whichever channel on the external sync drive was set up as the external sync master.</td></tr>
<tr><td>8</td><td>The Card Settings section will differ depending on whether the user is defining an arbitrary or digital channel.
<table>
<tr><th>Channel Type</th><th>Settings</th></tr>
<tr><td rowspan="3">Arbitrary</td><td>In the Waveform field, select the desired waveform from the list.
Note: Only waveforms in this configuration are available.</td></tr>
<tr><td>If the Input setting is set to RPM, the Cycles/Rev must be set correctly to complete the required calculations. In the Cycles/Rev field, type the number of cycles per revolution for the waveform data pattern.
Note: Two revolutions are typically used to make a complete cycle of data.</td></tr>
<tr><td>The Offset field allows arbitrary channels that sync with each other to shift the waveform by a number of data points. If an offset is required, type the amount to offset in this field.</td></tr>
</table>
</td></tr>
</table>

Continued on next page

Assigning a Gen2 Waveform, Continued

Figure 51: WaveMaker Management Window

This is an example of the **WaveMaker Management** window when defining an arbitrary channel for LUIS Gen2.



Continued on next page

Assigning a Gen2 Waveform, Continued

Assigning a Gen2 Waveform, Continued

This table continues to outline the steps for assigning a waveform to a channel.

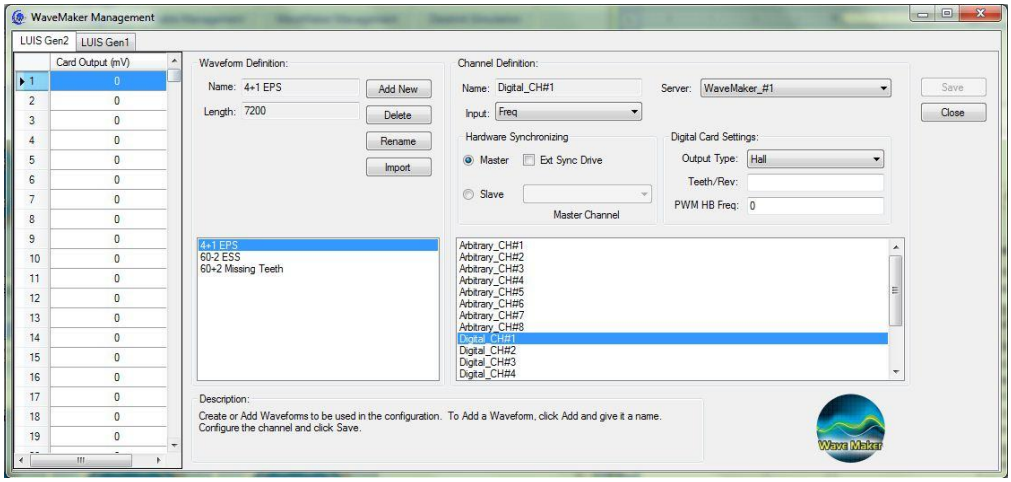
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>8</td><td>Continued
<table>
<tr><th>Channel Type</th><th>Settings</th></tr>
<tr><td rowspan="3">Digital</td><td>In the Output field, select the correct output type.</td></tr>
<tr><td>If the number of teeth per revolution of the flywheel is necessary, enter this number in the Teeth/Rev field.</td></tr>
<tr><td>If PWM operation is desired for the channel, enter its heart beat frequency in the PWM HB Freq field. If PWM operation is not desired, this value should be set to 0.</td></tr>
</table></td></tr>
<tr><td>9</td><td>When all the assignments have been made, click the <**Save**> button.
Note: This button saves the changes to the waveforms, but the configuration needs to be saved to make the changes permanent in the configuration file.</td></tr>
</table>

Continued on next page

Assigning a Gen2 Waveform, Continued

Figure 52: WaveMaker Management Window

This is an example of the **WaveMaker Management** window when defining a digital channel for LUIS Gen2.



Exercise: Defining and Assigning a Gen2 Waveform

Exercise: Defining and Assigning a Gen2 Waveform

The purpose of this exercise is to familiarize the user with using the **WaveMaker Management** window to define and assign Gen2 waveforms.

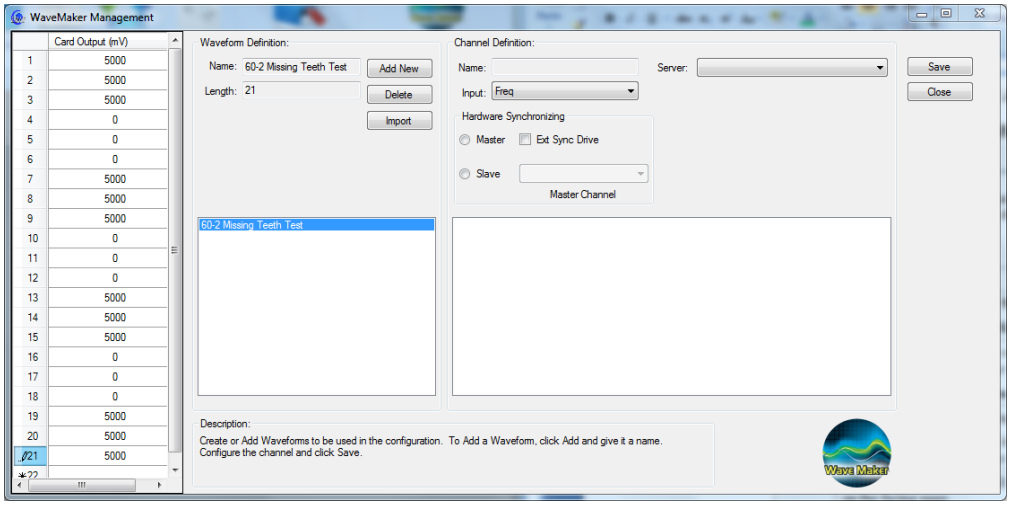
Step	Action
Define a waveform	
1	On the **Home** tab, click the **Waveforms/Channels** icon. Result: The **WaveMaker Management** window opens, as shown in Figure 53.
2	Click the **LUIS Gen2** tab at the top of the window. Result: The interface for working with Gen2 waveforms displays.
3	On the left-hand side of the window, in the **Waveform Definition** section, click the <**Add New**> button. Result: The **New Waveform Creation** window displays.
4	In the field, type `60-2 Missing Teeth Test` and click <**OK**>. Result: The new waveform is added to the waveform library list and the name displays in the *Name* field.
5	In the *Card Output* table, fill in the value displayed in the image on the facing page. Result: As the table is populated, the *Length* field reflects the number of values in the table.
6	Click the <**Save**> button. Result: The waveform is saved to the library. It is important to note that if the configuration file is closed without saving, this waveform will be lost.

Continued on next page

Exercise: Defining and Assigning a Gen2 Waveform, Continued

Figure 53: Table Definition

This image displays the value for the table being created in Step 5.



Continued on next page

Exercise: Defining and Assigning a Gen2 Waveform, Continued

Exercise: Defining and Assigning a Waveform, Continued

The purpose of this exercise is to familiarize the user with using the **WaveMaker Management** window to define and assign waveforms.

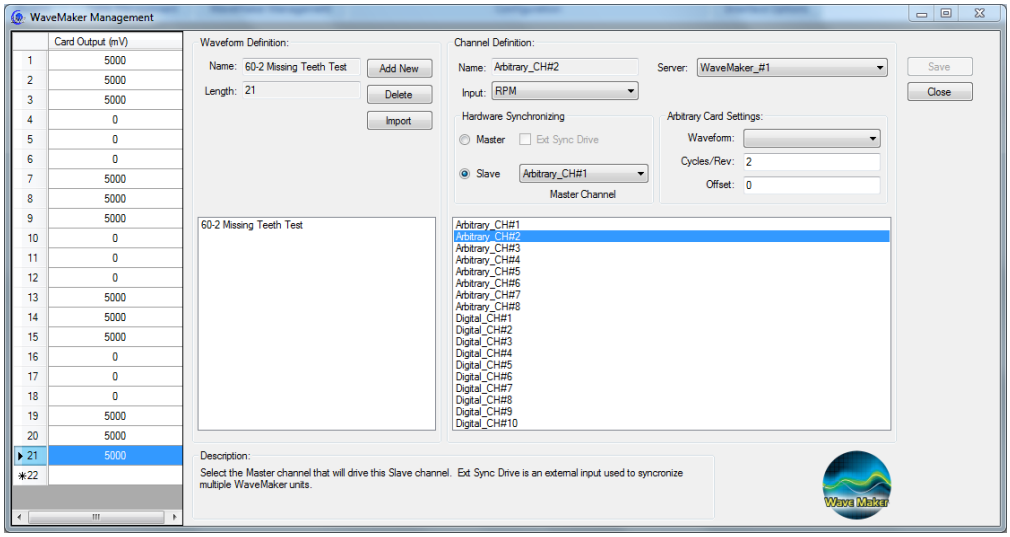
Step	Action
Assign a waveform	
7	On the right-hand side of the **WaveMaker Management** window, in the **Channel Definition** section, from the *Server* dropdown list, select WaveMaker_#1. Result: The list of channels available in WaveMaker_#1 display in the channel list field. The first channel is highlighted, and its information displays in the fields.
8	Ensure that Arbitrary_CH#1 is highlighted in the channels list. In the **Arbitrary Card Settings** section, from the *Waveform* dropdown list, select *60-2 Missing Teeth Test*.
9	Click the <**Save**> button.
10	In the channel list field, click on Arbitrary_CH#2. Result: The fields are filled with the information for this channel.
11	In the **Hardware Synchronizing** section, select the *Slave* option.
12	From the *Master Channel* select the Arbitrary_CH#1 option. Note: This sets Arbitrary_CH#2 to be synced with Arbitrary_CH#1.
13	In the **Arbitrary Card Settings** section, from the *Waveform* dropdown list, select *60-2 Missing Teeth Test*.
14	Click the <**Save**> button. Result: The waveform information is saved.
15	Close the **WaveMaker Management** window and save the configuration.

Continued on next page

Exercise: Defining and Assigning a Gen2 Waveform, Continued

Figure 54: Assigning a Waveform

This image is an example of assigning a waveform.



Notes

Section 2 – Working with Gen1 Waveforms

Overview

Introduction

LUIS Gen1 waveforms use the Peak Adapter servers. The waveforms are all resident in the firmware and cannot be modified by the user. Because of the way the Gen1 firmware was coded, Gen1 waveforms must be loaded into Channel 1. The waveform combination will automatically be loaded into Channel 1 and Channel 2. The **WaveMaker Management** window is used to assign the desired waveform into Channel 1.

In This Section

This table outlines the topics covered in this section.

Assigning a Gen1 Waveform

Introduction

All Gen1 waveforms are resident in the firmware, and they can be assigned to Channel 1 on the **WaveMaker Management** window.

Hardware Synchronizing

Channels can be set to be synchronized. When using this option, Channel #1 will be used as the master, and any other channel that is set to sync will be a slave to that channel.

Assigning a Gen1 Waveform

This table outlines the steps for assigning a waveform to a channel.

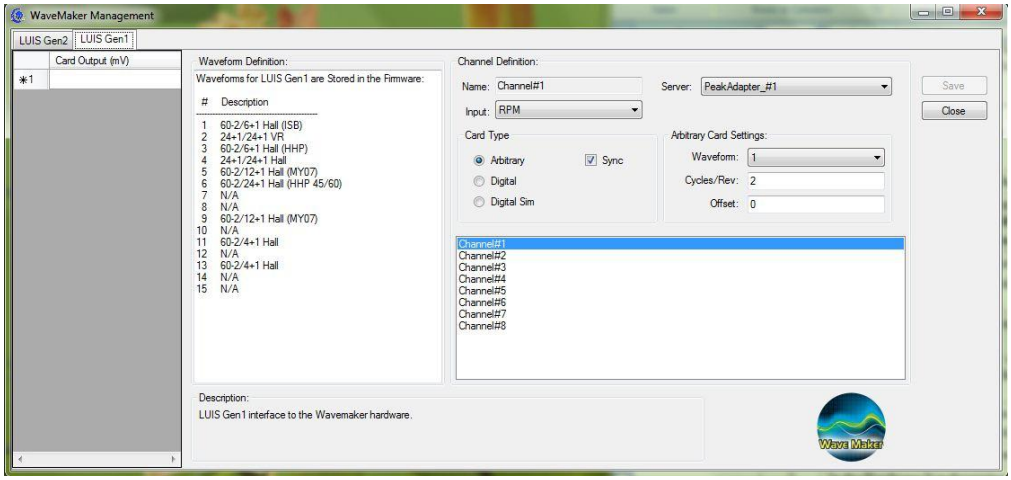
Step	Action
1	With the appropriate configuration file open, from the **Home** tab, click the **Waveforms/Channels** icon. Result: The **WaveMaker Management** window displays.
2	Click the **LUIS Gen1** tab at the top of the window. Result: The interface for assigning the Gen1 waveforms resident in the firmware displays, as shown in Figure 55.
3	In the *Server* field, select the correct server for the channel to assign.
4	To assign a waveform, ensure that *Channel#1* is selected. If setting up a digital channel, select the desired channel from the list. Result: The channel's information populates the fields.
5	In the *Input* field, select the correct input.
6	In the **Channel Definition** section, select *Arbitrary*, *Digital*, or *Digital Simulation*. Note: Waveforms can only be assigned to arbitrary channels.
7	If this channel should be synced to Channel #1, select the *Sync* option.

Continued on next page

Assigning a Gen1 Waveform, Continued

Figure 55: WaveMaker Management LUIS Gen1 Window

This is an example of the **WaveMaker Management** window open to the **LUIS Gen1** tab.



Continued on next page

Assigning a Gen1 Waveform, Continued

Assigning a Gen1 Waveform, Continued

This table continues to outline the steps for assigning a waveform to a channel.

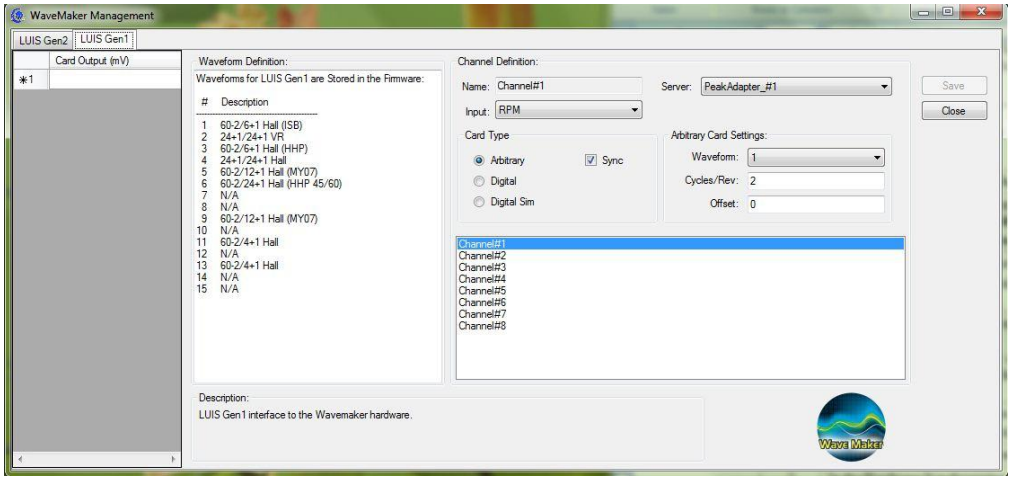
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>8</td><td>The Card Settings section will differ depending on whether the user is defining an arbitrary or digital channel.
<table>
<tr><th>Channel Type</th><th>Settings</th></tr>
<tr><td rowspan="3">Arbitrary</td><td>In the Waveform field, select the desired waveform number from the list.
Note: The numbers in the list correspond to the numbers listed in the Waveform Definition field on the left-hand side of the window.</td></tr>
<tr><td>If the Input setting is set to RPM, the Cycles/Rev must be set correctly to complete the required calculations. In the Cycles/Rev field, type the number of cycles per revolution for the waveform data pattern.
Note: Two revolutions are typically used to make a complete cycle of data.</td></tr>
<tr><td>The Offset field allows arbitrary channels that sync with the master to shift the waveform by a number of data points. If an offset is required, type the amount to offset in this field.</td></tr>
</table></td></tr>
</table>

Continued on next page

Assigning a Gen1 Waveform, Continued

Figure 56: WaveMaker Management LUIS Gen1 Window

This is an example of the **WaveMaker Management** window when defining an arbitrary channel for LUIS Gen1.



Continued on next page

Assigning a Gen1 Waveform, Continued

Assigning a Gen1 Waveform, Continued

This table continues to outline the steps for assigning a waveform to a channel.

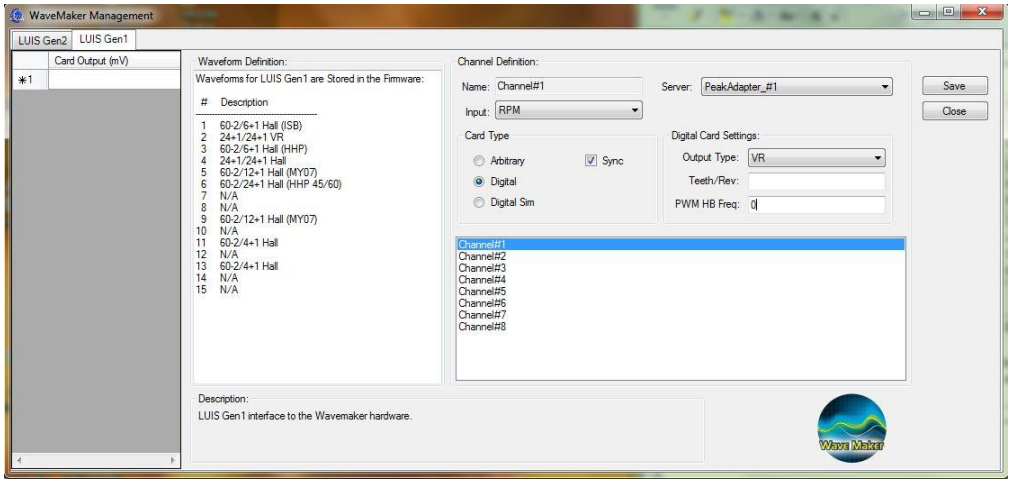
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>8</td><td>Continued
<table>
<tr><th>Channel Type</th><th>Settings</th></tr>
<tr><td rowspan="3">Digital or Digital Sim</td><td>In the Output field, select the correct output type.</td></tr>
<tr><td>If the number of teeth per revolution of the flywheel is necessary, enter this number in the Teeth/Rev field.</td></tr>
<tr><td>If PWM operation is desired for the channel, enter its heart beat frequency in the PWM HB Freq field. If PWM operation is not desired, this value should be set to 0.</td></tr>
</table></td></tr>
<tr><td>9</td><td>When all the assignments have been made, click the Save button.
Note: This button saves the changes to the waveforms, but the configuration needs to be saved to make the changes permanent in the configuration file.</td></tr>
</table>

Continued on next page

Assigning a Gen1 Waveform, Continued

Figure 57: WaveMaker Management LUIS Gen1 Window

This is an example of the **WaveMaker Management** window when defining a digital channel for LUIS Gen1.



Exercise: Assigning a Gen1 Waveform

Exercise: Defining and Assigning a Gen1 Waveform

The purpose of this exercise is to familiarize the user with using the **WaveMaker Management** window to define and assign waveforms.

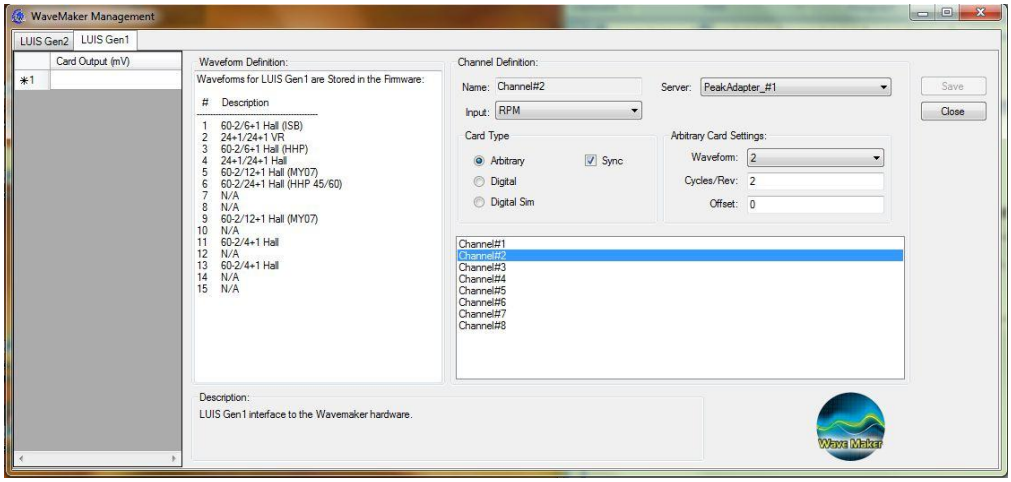
Step	Action
1	On the **Home** tab, click the **Waveforms/Channels** icon. Result: The **WaveMaker Management** window opens.
2	Click the **LUIS Gen1** tab at the top of the window. Result: The interface for assigning the Gen1 waveforms resident in the firmware displays, as shown in Figure 58.
3	On the right-hand side of the **WaveMaker Management** window, in the **Channel Definition** section, from the *Server* dropdown list, select PeakAdapter_#1. Result: The first channel is highlighted, and its information displays in the fields.
4	Select Channel#1 in the channels list. In the *Input* field, select RPM.
5	In the **Card Type** section, select the *Arbitrary* option.
7	In the **Arbitrary Card Settings** section, in the *Waveform* field, select 2 from the dropdown list. Note: This sets the waveform to be 24+1/24+1 VR as indicated in the *Waveform Definition* field on the left-hand side of the window.
8	In the Cycles/Rev field, type 2.
9	In the *Offset* field, type 0.
10	Click the <**Save**> button. Result: The waveform information is saved.
11	Close the **WaveMaker Management** window and save the configuration.

Continued on next page

Exercise: Assigning a Gen1 Waveform, Continued

Figure 58: Assigning a Waveform

This image is an example of assigning a waveform.



Notes

Chapter 5 – J1939 Sensors

Overview

Introduction

Luis Gen2 provides the ability to receive J1939 messages through either the CAN servers or the Peak Adapter servers. The Main Module is used to broadcast J1939 messages. Messages and parameters are defined through the **J1939 Datalink Sensor Simulation Management** window.

In This Chapter

This table outlines the topics covered in this chapter.

Section 1 – Setting up J1939 Messages

Overview

Introduction

User can define J1939 messages that can transmit data through the Main Module or receive data through the Peak Adapter or CAN servers.

In This Section

This table outlines the topics covered in this section.

Notes

Setting Up J1939 Messages to Transmit

Setting Up J1939 Messages to Transmit

This table outlines the steps for setting up J1939 messages to transmit through the CAN servers.

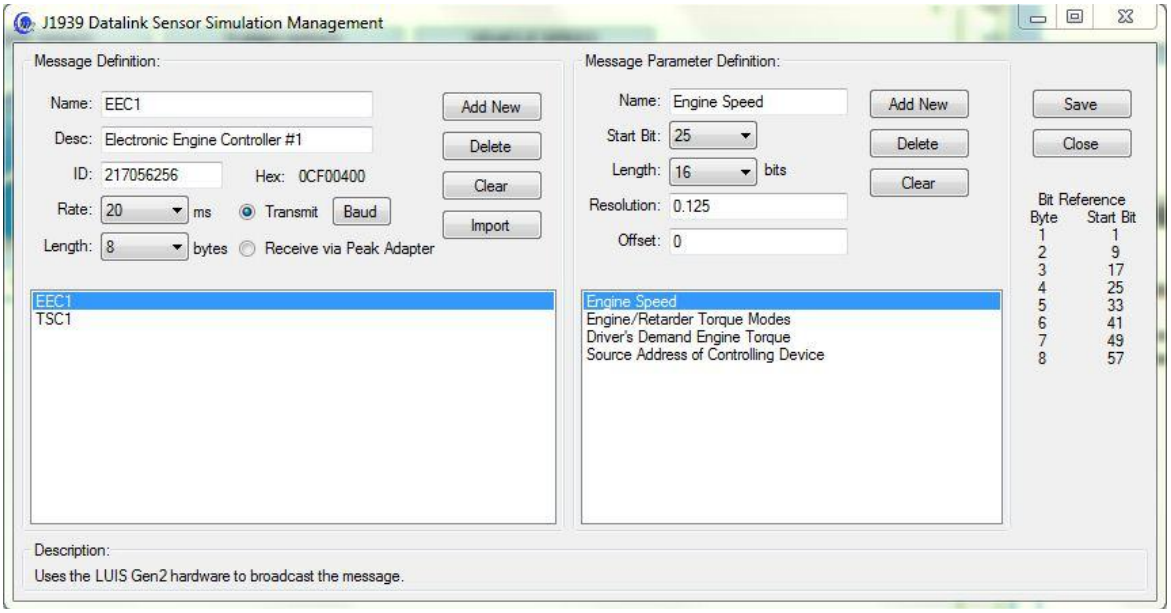
Step	Action
1	With the appropriate configuration file open, from the **Home** tab, click the **SAE J1939 Sensors** icon. Result: The **J1939 Datalink Sensor Simulation Management** window displays, as shown in Figure 59.
2	On the left-hand side of the window click the <**Add New**> button. Result: The ***New Message Creation*** dialog box displays.
3	In the field, type the unique name of the J1939 message and click <**OK**>. Result: The name displays in the *Name* field as well as in the message list below. Defaults are loaded into the other fields.
4	In the *Desc* field, type a description of the message.
5	In the *ID* field, type the message ID. The message ID is the Parameter Group Number along with its Priority Bits and Source/Destination address. Note: Decimal values are valid. As the ID is typed, the Hex name displays.
6	In the *Rate* field, select the appropriate rate, in milliseconds, from the dropdown list. Note: This is the rate the message is transmitting on the CAN bus.
7	In the *Length* field, select the number of bytes that make up the data load for the message from the dropdown list.

Continued on next page

Setting Up J1939 Messages to Transmit to Transmit, Continued

Figure 59: J1939 Datalink Sensor Simulation Management Window

This is an example of the **J1939 Datalink Sensor Simulation Management** window.



Continued on next page

Setting Up J1939 Messages to Transmit to Transmit, Continued

Setting Up J1939 Messages to Transmit, Continued

This table continues to outline the steps for setting up J1939 messages to transmit through the CAN servers.

Step	Action
8	Ensure that the *Transmit* option is selected.
9	Click the <**Baud**> button. Result: The ***Configure the Baud Rate for CAN Bus*** dialog box displays, as shown in Figure 61.
10	From the *CAN Bus Plugin* field, select the appropriate plugin.
11	From the *Baud Rate* dropdown list, select the desired baud rate for the data transmission.
12	When the rate has been set up, click the <**Save**> button. Result: The changes are saved and the dialog box closes.
13	When the message has been defined, click the <**Save**> button. Result: The message definition is saved, but the configuration needs to be saved to make the changes permanent in the configuration file.

Continued on next page

Setting Up J1939 Messages to Transmit to Transmit, Continued

Figure 60: J1939 Datalink Sensor Simulation Management Window

This is an example of the **J1939 Datalink Sensor Simulation Management** window.

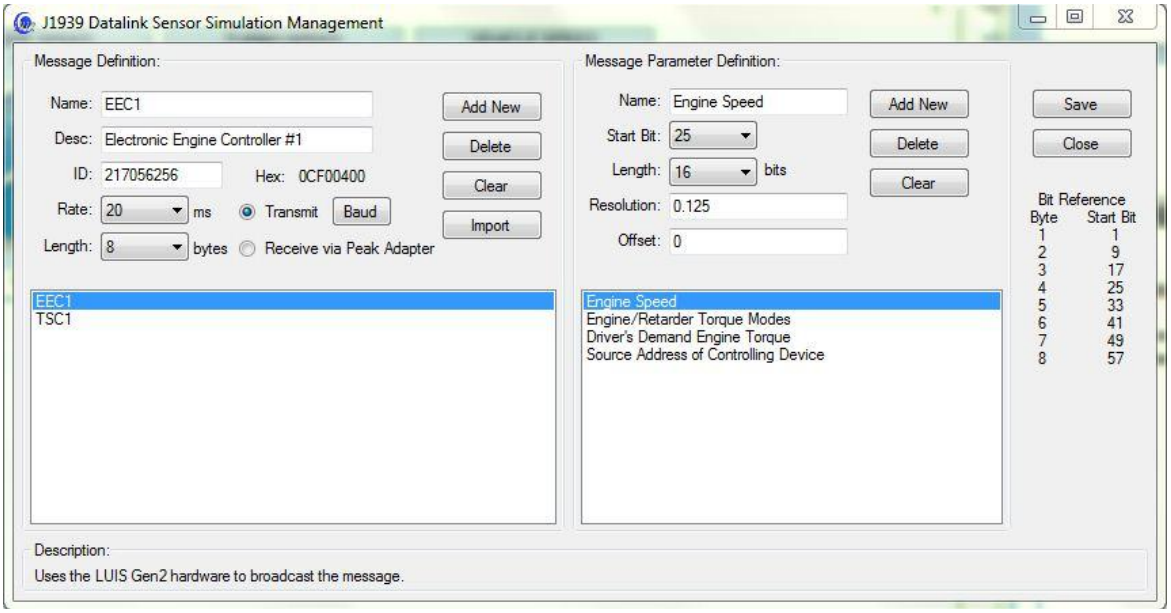
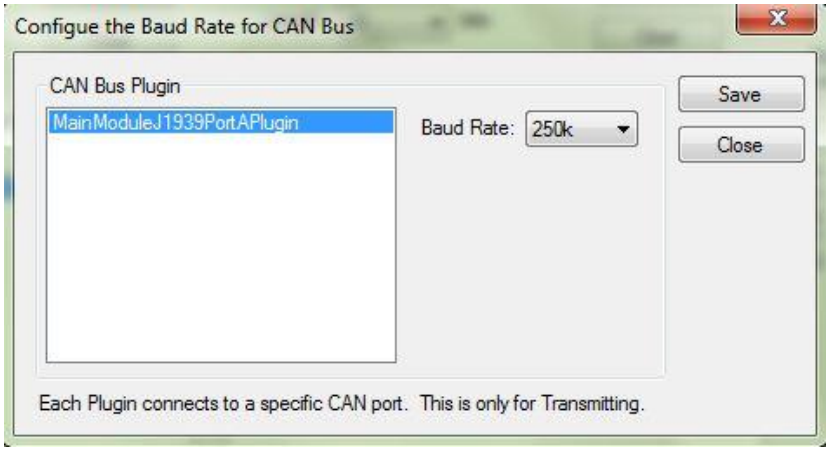


Figure 61: Configure the Baud Rate for Can Bus Dialog Box

This is an example of the ***Configure the Baud Rate for Can Bus*** dialog box.



Setting Up J1939 Messages to Receive

Setting Up J1939 Messages to Receive

This table outlines the steps for setting up J1939 messages to receive through the Peak Adapter servers.

Step	Action
1	With the appropriate configuration file open, from the **Home** tab, click the **SAE J1939 Sensors** icon. Result: The **J1939 Datalink Sensor Simulation Management** window displays, as shown in Figure 62.
2	On the left-hand side of the window click the <**Add New**> button. Result: The ***New Message Creation*** dialog box displays, as shown in Figure 63.
3	In the field, type the unique name of the J1939 message and click <**OK**>. Result: The name displays in the *Name* field as well as in the message list below. Defaults are loaded into the other fields.
4	In the *Desc* field, type a description of the message.
5	In the *ID* field, type the message ID. The message ID is the Parameter Group Number along with its Priority Bits and Source/Destination address. Note: Decimal values are valid. As the ID is typed, the Hex name displays.
6	The *Rate* and *Length* fields are not necessary when setting up J1939 messages to receive.
7	Ensure that the *Receive via Peak Adapter* option is selected.
8	When the message has been defined, click the <**Save**> button. Result: The message definition is saved, but the configuration needs to be saved to make the changes permanent in the configuration file.

Continued on next page

Setting Up J1939 Messages to Receive to Receive, Continued

Figure 62: J1939 Datalink Sensor Simulation Management Window

This is an example of the **J1939 Datalink Sensor Simulation Management** window.

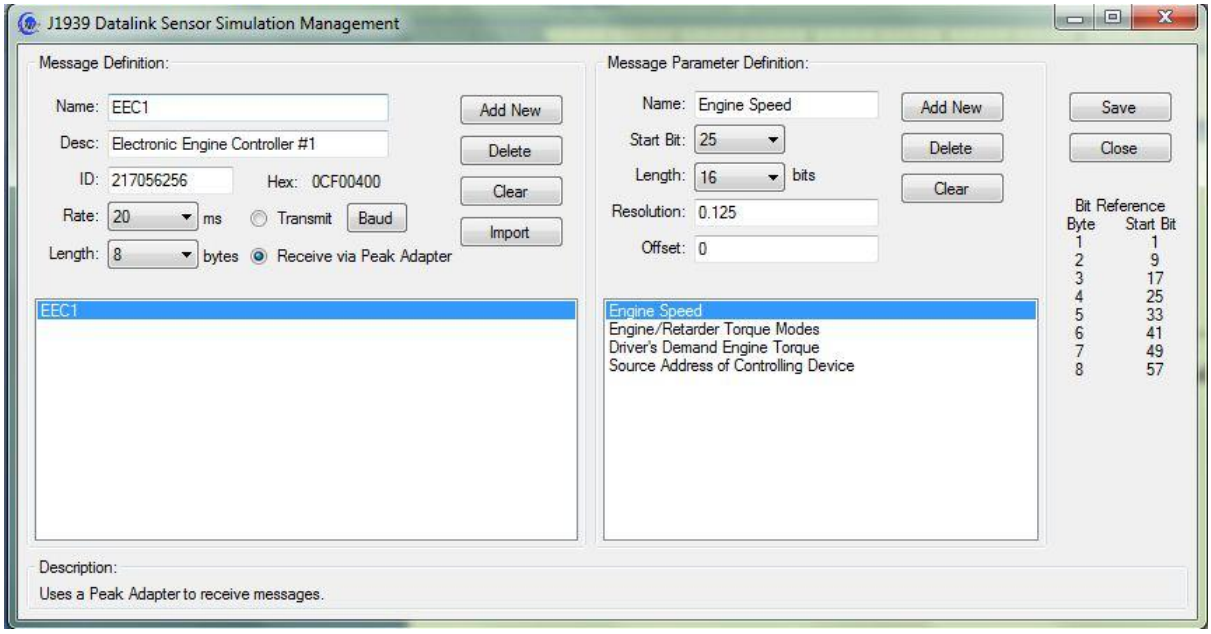
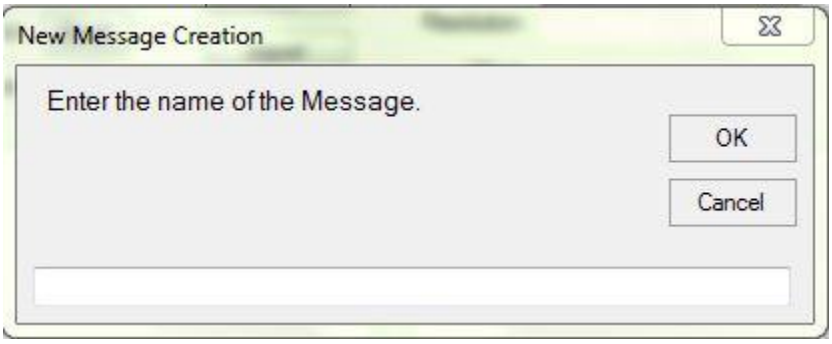


Figure 63: New Message Creation Dialog Box

This image is an example of the ***New Message Creation*** dialog box.



Importing J1939 Messages

Introduction

J1939 Messages and their parameters defined in other configuration files can be imported in to the current configuration.

Importing J1939 Definitions

This table outlines the steps for importing J1939 messages and parameters.

Step	Action
1	With the appropriate configuration file open, from the **Home** tab, click the **SAE J1939 Sensors** icon. Result: The **J1939 Datalink Sensor Simulation Management** window displays, as shown in Figure 64.
2	Click the <**Import**> button. Result: The ***Import Message*** dialog box displays.
3	Browse for and find the configuration from which the J1939 Messages should be imported then click <**Open**>. Result: The ***Select Items*** dialog box displays, as shown in Figure 65, with the message definitions displayed.
4	Select each of the messages to import and click <**Import**>. Note: The messages and their parameters are imported. If attempting to import a message with a duplicate name, LUIS will prompt whether or not to continue.
5	Once the messages have been imported, click the <**Save**> button on the far right-hand side of the window to save the changes. Note: Save the configuration to make the changes permanent to the configuration file.

Continued on next page

Importing J1939 MessagesImporting J1939 Messages,
Continued

Figure 64: J1939 Datalink Sensor Simulation Management Window

This is an example of the **J1939 Datalink Sensor Simulation Management** window.

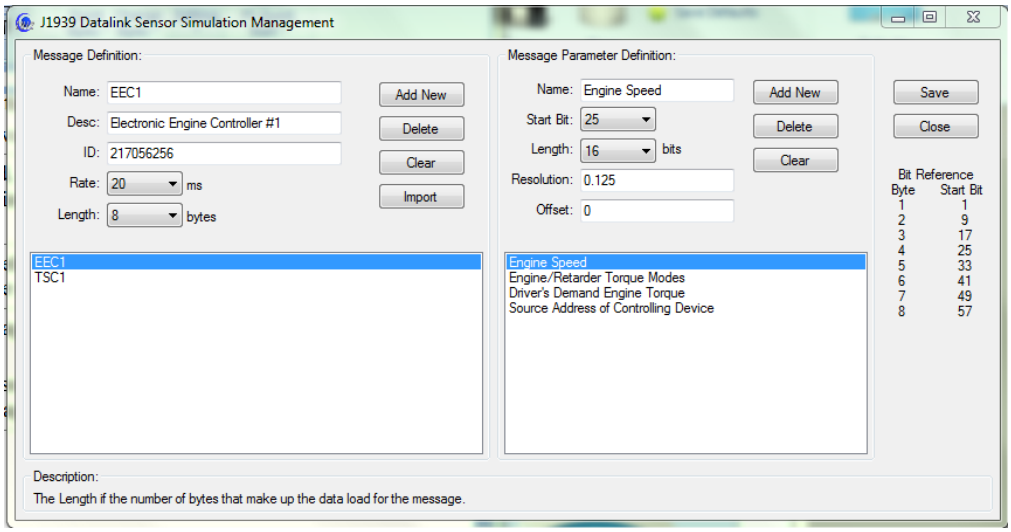
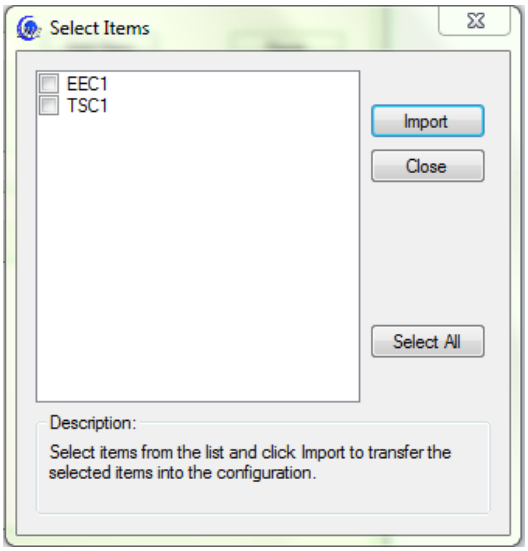


Figure 65: Select Items Dialog Box

This is an example of the ***Select Items*** dialog box.



Setting Up J1939 Parameters

Setting Up J1939 Parameters

Introduction

Once a J1939 message has been set up, the user can define the parameters within that message. This is accomplished through the **J1939 Datalink Sensor Simulation Management** window..

Setting Up J1939 Message Parameters

This table outlines the steps for setting up J1939 message parameters.

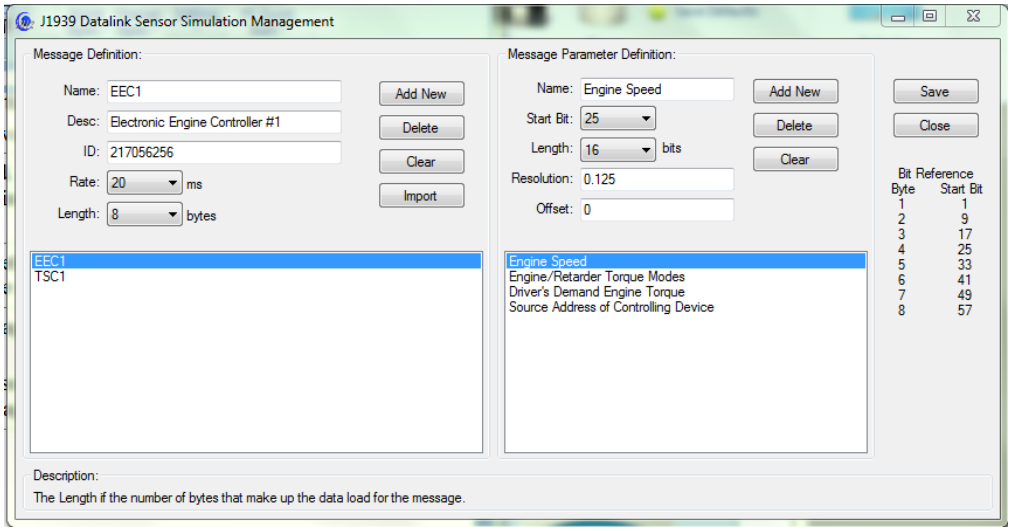
Step	Action
1	With the appropriate configuration file open, from the **Home** tab, click the **SAE J1939 Sensors** icon. Result: The **J1939 Datalink Sensor Simulation Management** window displays, as shown in Figure 66.
2	Verify the correct message definition has been set up. If it has not, set it up according to the steps in the previous sections of this chapter.
3	On the **Message Definition** side of the window, select the desired J1939 Message.
4	On the **Message Parameter Definition** side of the window, in the *Name* field, type a name for the parameter. Note: Parameter names must be unique.
5	In the *Start Bit* field, select the start bit for the parameter. Note: The start bit is the first bit in the data load for the message where this parameter data starts.
6	In the *Length* field, select the number of bits that make up the parameter.
7	In the *Resolution* field, enter the value per bit in engineering units. Note: This value is used to convert the engineering units on a gauge to the actual transmitted data.

Continued on next page

Setting Up J1939 Parameters, Continued

Figure 66: J1939 Datalink Sensor Simulation Management Window

This is an example of the **J1939 Datalink Sensor Simulation Management** window.



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Setting Up J1939 Parameters, Continued

Setting Up J1939 Message Parameters, Continued

This table continues to outline the steps for setting up J1939 message parameters.

Step	Action
8	In the Offset field, that the value of the data is offset. Note: This value is used to convert the engineering units on a gauge to the actual transmitted data.
9	Once the parameter has been defined, click the <**Add New**> button. Result: The parameter is saved to the message and displays in the field below the parameter definition fields.
10	To save the changes to the configuration, click the <**Save**> button on the far right-hand side of the window. Note: Save the configuration to make the changes permanent to the configuration file.

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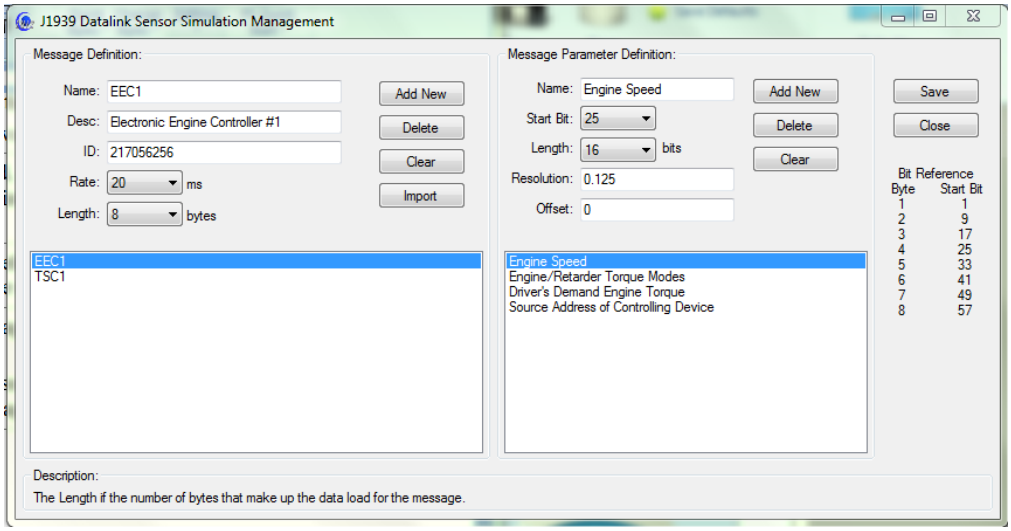
Setting Up J1939 Parameters, Continued

Figure 67: J1939 Datalink Sensor Simulation Management Window

This is an example of the **J1939 Datalink Sensor Simulation Management** window.



Section 3 – Assigning J1939 Parameters to Gauges

Assigning J1939 Parameters to Gauges

Introduction

Once J1939 messages and parameters have been defined, the parameters can be assigned to gauges within the LUIS Gen2 workspace.

Assigning a J1939 Parameter to a Gauge

This table outlines the steps for assigning a J1939 parameter to a gauge.

Step	Action
1	Add a gauge to the appropriate tile within the configuration.
2	Right-Click the control and select the ***Properties*** option from the menu. Result: The ***Toolbox*** dialog box displays, as shown in Figure 68.
3	In the **Component Options** section, use ***Enable*** option to determine if the value of the control should be enabled, *True*, or not disabled, *False*.
4	In the **Component Options** section, use the ***Gauge Type*** option to set if the gauge is *Round* or *Slider*.
5	In the **Hardware** section, click the <**…**> button next to the ***Hardware Setup*** option. Result: The ***Hardware I/O Selection*** dialog box displays, as shown in Figure 69.
6	In the *Hardware Unit* field, select either the *MainModuleJ1939PortAPlugin* or the *PeakAdapterPlugin* option. Result: The channels available in that module display in the *Channel* field.
7	In the *Channel* field, select the appropriate channel.
8	Click <**OK**> to close the dialog box. Result: The dialog box closes and the ***Channel*** and ***Type*** under ***Hardware Setup*** are filled in with the selection.

Continued on next page

Assigning J1939 Parameters to Gauges, Continued

Figure 68: Toolbox Dialog Box

This is an example of the ***Toolbox*** dialog box.

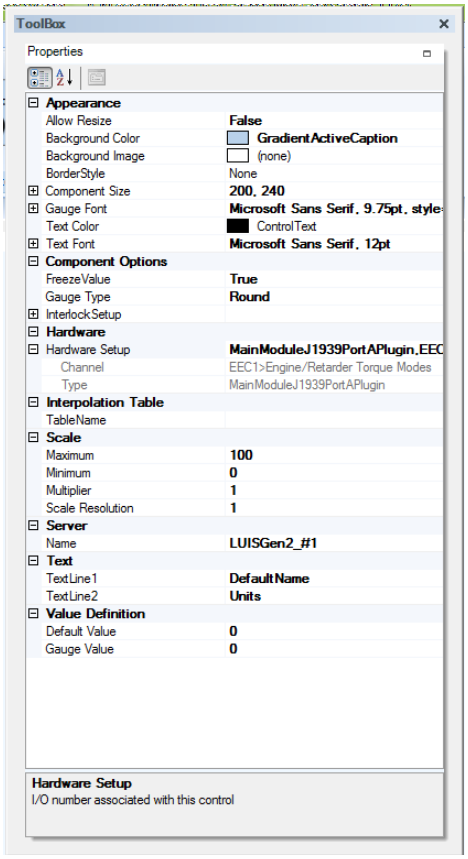
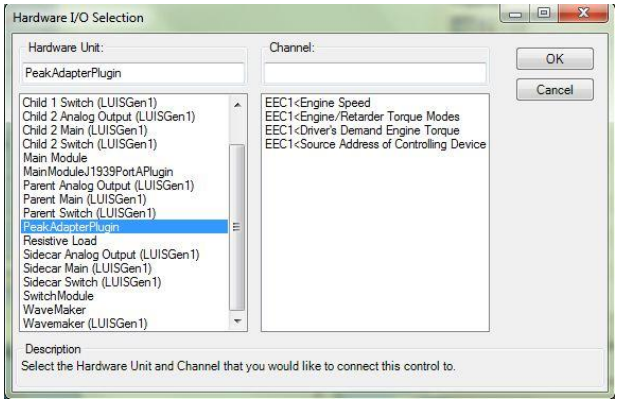


Figure 69: The Hardware I/O Selection Dialog Box

This is an example of the ***Hardware I/O Selection*** dialog box.



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Assigning J1939 Parameters to Gauges, Continued

Assigning a J1939 Parameter to a Gauge, Continued

This table continues to outline the steps for assigning a J1939 parameter to a gauge.

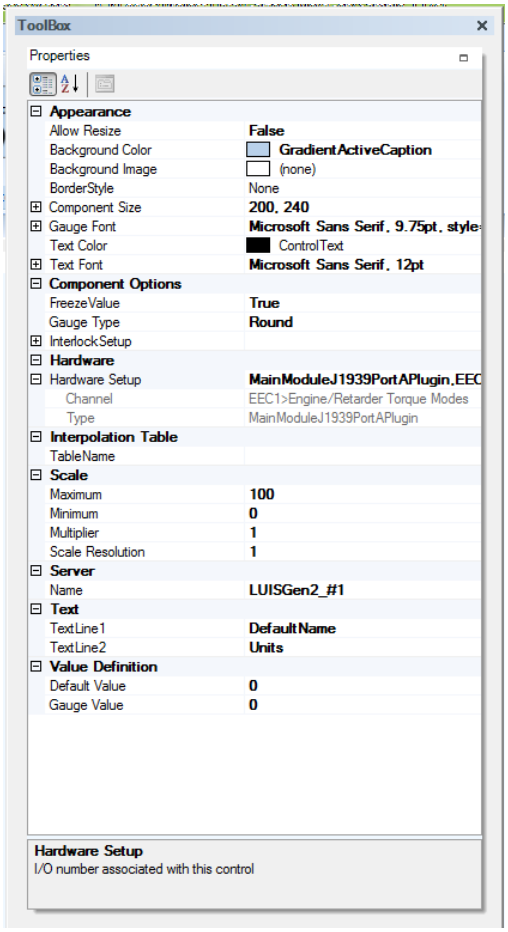
Step	Action
9	In the **Interpolation Table** section, use the down arrow next to the ***Table Name*** option to select the appropriate interpolation table.
10	In the **Scale** section, the scale for the control can be set including the ***Minimum*** and ***Maximum*** values as well as the ***Multiplier*** and ***Scale Resolution***.
11	In the **Server** section, use the down arrow next to the ***Name*** option to select the appropriate server.
12	In the **Text** section, the ***TextLine1*** and ***TextLine2*** options are used to define the label that displays at the top of the control.
13	The **Value Definition** section can be used to set the Def***ault Value*** for the control.
14	The rest of the options on the ***Properties*** dialog box are used to control the look of the control. These can be set as desired by the user. Note: More information about Interlock Setup can be found in the following chapter.

Continued on next page

Assigning J1939 Parameters to Gauges, Continued

Figure 70: Toolbox Dialog Box

This is an example of the ***Toolbox*** dialog box.



Notes

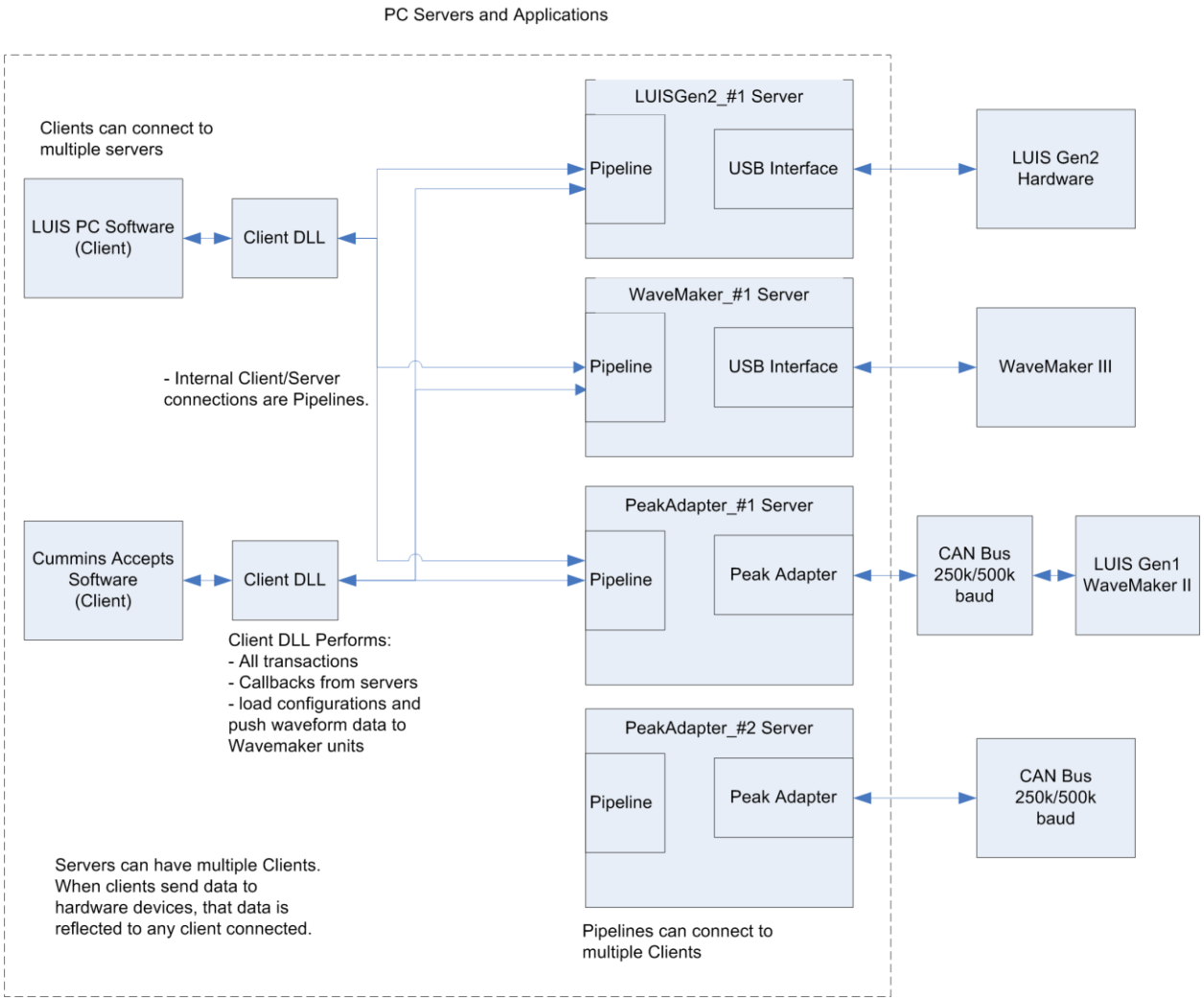
Chapter 6 – Servers

Overview

Introduction

The LUIS Gen2 has the ability to run multiple servers which connect to a separate USB interface. Each server can have multiple clients so that when data is sent to hardware devices, the data is reflected to any client connected.

This diagram illustrates the hardware/software architecture.



In this architecture, the Client DLL performs all transactions, callbacks from servers as well as loading configurations and pushing waveform data to Wavemaker units.

Continued on next page

Overview, Continued

Interface Types

There are three types of interfaces for servers. This table describes each type.

Interface Type	Description
Pipe	An internal Windows connection in the PC
TCP	Network interface connection utilizing Transmission Control Protocol
HTTP	Network interface connection utilizing HyperText Transport Protocol

In This Chapter

This table outlines the topics covered in this chapter.

Notes

Section 1 – Setting Up Servers

Setting Up Servers

Introduction

Before a server can be used in the LUIS Gen2 software, the server and interface types must be set up.

Setting Up Servers

This table outlines the steps for setting up a server.

Step	Action
1	On the **Home** tab, click the **Server List** icon. Result: The **Server Management** window, shown in Figure 71, displays and the current servers are listed in the *Servers* field on the left-hand side.
2	Click the <**Add New**> button. Result: The ***New Server Creation*** dialog box displays, as shown in Figure 72.
3	Type the name of the new server and click <**OK**>. Result: The new server is added to the *Servers* field on the left-hand side of the window, the name of the new server displays in the *Name* field on the right-hand side of the window, and the default information is filled in.
4	From the *Server Type* dropdown list, select the appropriate server type.
5	From the *Interface Type* dropdown list, select the appropriate interface type.
6	If the *Interface Type* is Pipe, then in the *Pipename* field type the correct pipename.
7	In the *Description* field, type a brief description of the server, if desired.
8	If the *Server Type* is Peak Adapter, then in the *NetName* field, type the name of the net to which the server should connect.
8	The *Status* field indicates the status of the server. If the server is disconnected, attempt to connect to the server by clicking the <**Connect**> button.
9	When the server is set up, click the <**Save**> button.
10	Close the **Server Management** window and save the configuration file.

Continued on next page

Setting Up Servers, Continued

Figure 71: Server Management Window

This is an example of the **Server Management** window.

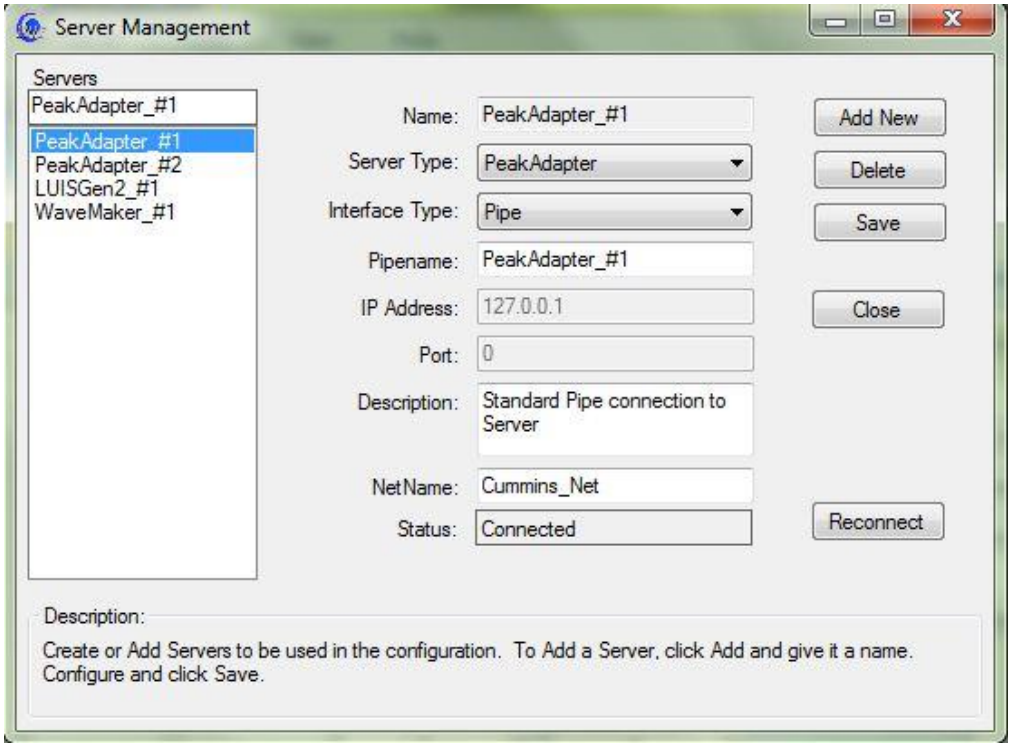
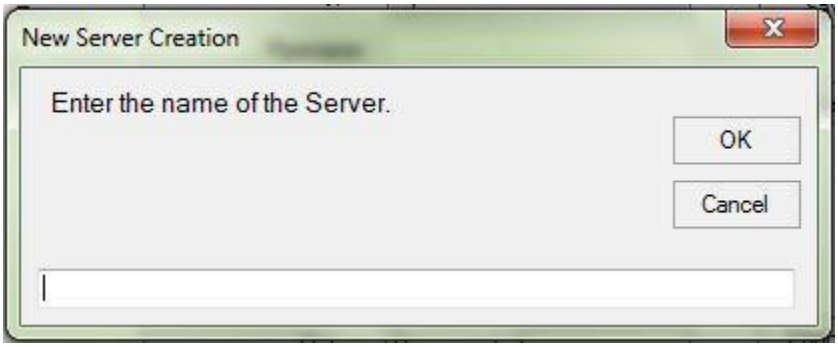


Figure 72: New Server Creation Dialog Box

This image is an example of the ***New Server Creation*** dialog box.



Section 2 – Deleting Servers

Deleting Servers

Deleting a Server

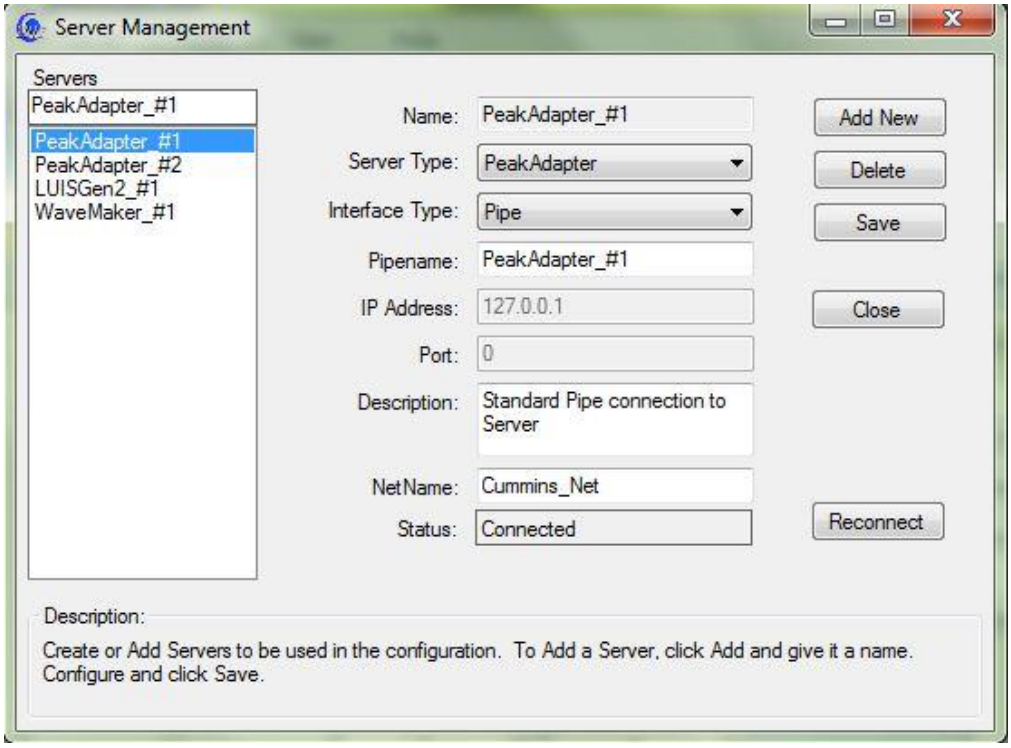
To delete a server, open the **Server Management** window by clicking the **Server List** icon on the **Home** tab. Select the server to delete from the *Servers* list on the left-hand side of the window and click the <**Delete**> button. A dialog box displays to confirm the removal of the server. Click <**OK**> to delete the server. To make the changes permanent in the configuration file, be sure to save the configuration.

Continued on next page

Deleting Servers, Continued

Figure 73: Server Management Window

This is an example of the **Server Management** window.



Notes

Chapter 7 – Controls

Overview

Introduction

There are four types of controls used within the LUIS Gen2 environment to interact with the hardware: **Closed Loop Control**, **Digital Display**, **Gauge** and **Switch**. In addition, there is the **Panel** control that provides the option of adding labels. How these controls are manipulated within the GUI is explained in **Chapter 2 – Navigating the LUIS Gen2 GUI**. This chapter provides additional information about setting up and using each control type to interact with the hardware.

In This Chapter

This table outlines the topics covered in this chapter.

Section 1 – Closed Loop Control

Closed Loop Control

Introduction

The LUIS Gen2 can be set to run closed loop engine speed control. In this mode, the engine speed signal generated by the load box responds similarly to an actual engine. J1939 public broadcast **must be running** in the ECM to run in closed loop mode.

Closed Loop Control Panel

The **Closed Loop Control Panel** consists of five elements. Figure 74 and this table describe these elements.

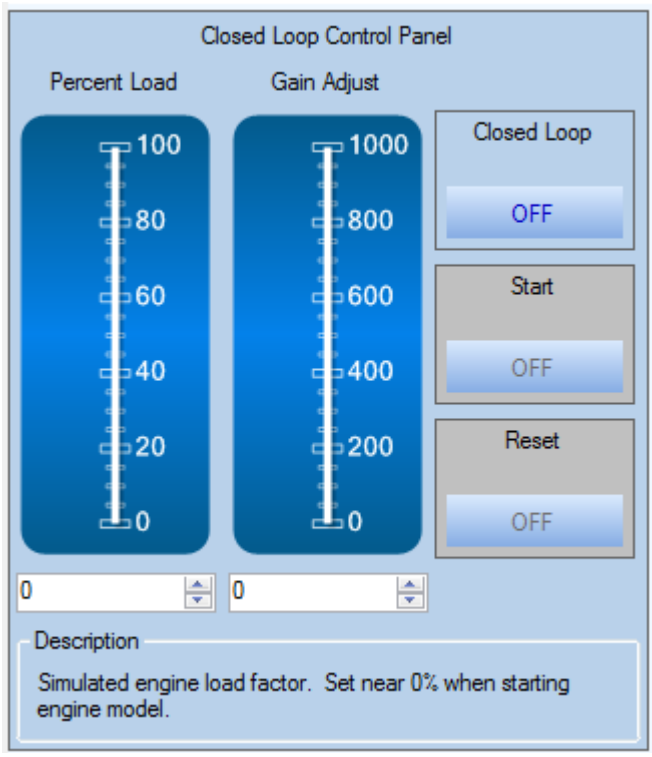
Element	Description
Percent Load	Either the slider or the digital display can be used to set the percent load for the model.
Gain Adjust	Either the slider or the digital display can be used to set the gain adjust for the model.
<**Closed Loop**>	This button is used to set the loop to closed or open. The button reads the current status, so when the button says <**ON**> it indicates that closed loop mode is on.
<**Start**>	This button is used to start closed loop control. This control is only available when the **Closed Loop** mode is **ON**.
<**Reset**>	This button sets the model back to zero load/rpm. This control is only available when the **Closed Loop** mode is **ON**.

Continued on next page

Closed Loop Control, Continued

Figure 74: Closed Loop Panel

This is an example of a **Closed Loop Panel** control.



Continued on next page

Closed Loop Control, Continued

Configuring the Closed Loop Control

This table outlines the steps for configuration a **Closed Loop Control**.

Step	Action
1	Add a **Closed Loop Control**, as shown in Figure 75, to a tile by dragging it from the **Tools Tab**.
2	Right-Click the control and **Select** the ***Properties*** option from the menu. Result: The ***Toolbox*** dialog box displays, as shown in Figure 76.
3	In the **Hardware** section, the *ECM Source ID* is the J1939 source address of the ECM that should be used for the control when running multiple ECMs. If only running one ECM, the source ID will be 0.
4	In the **Hardware** section, click the <**…**> button next to the ***Hardware Setup*** option. Result: The ***Hardware I/O Selection*** dialog box displays.
5	In the *Hardware Unit* field, select the Wavemaker. Result: The channels available in that module displays in the *Channel* field.
6	In the *Channel* field, select the appropriate channel. ***Important Note***: The **Closed Loop Control** must be set to the Engine Speed Channel in the WaveMaker.
7	Click <**OK**> to closed the dialog box. Result: The dialog box closes and the ***Channel*** and ***Type*** under ***Hardware Setup*** are filled in with the selections.
8	In the **Interpolation Table** section, use the down arrow next to the ***Table Name*** option to select the appropriate interpolation table. ***Important Note***: The Interpolation Table must match the interpolation table used for the Engine Speed channel.
9	In the **Server** section, use the down arrow next to the ***Name*** option to select the appropriate server. Note: Gen1 uses the Peak Adapter and Gen2 uses the Wavemaker server.

Continued on next page

Closed Loop Control, Continued

Figure 75: Closed Loop Panel Control

This is an example of a **Closed Loop Panel** control.

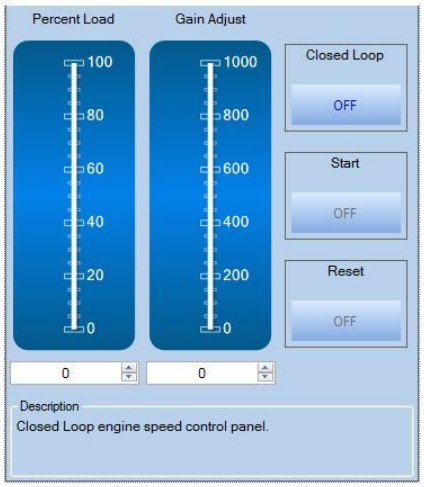
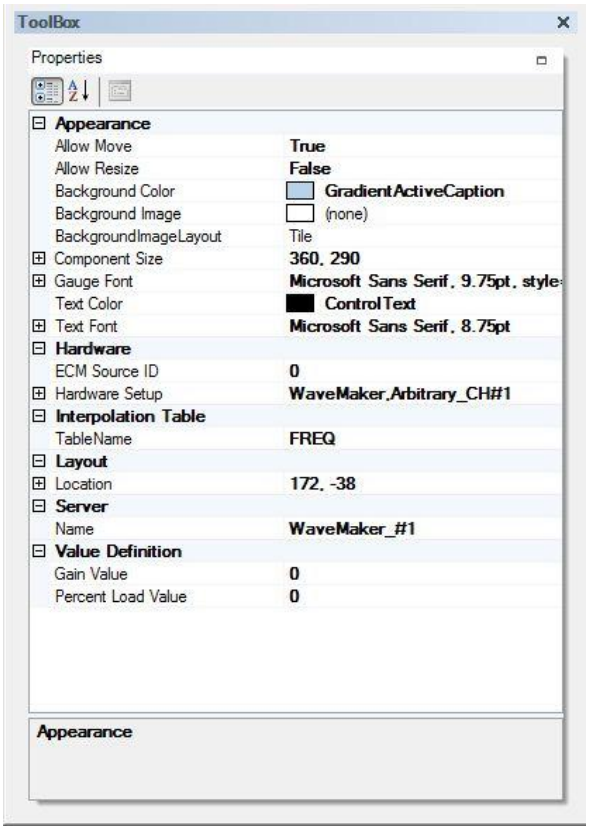


Figure 76: Closed Loop Control Properties

This is an example of the ***Toolbox*** dialog box for a **Closed Loop Control**.



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Closed Loop Control, Continued

Configuring the Closed Loop Control, Continued

This table continues to outline the steps for configuration a **Closed Loop Control**.

Step	Action
10	The **Value Definition** section can be used to set the ***Gain Value*** and ***Percent Load Value***. These values can also be set using the slider or the digital display on the panel.
11	The rest of the options on the ***Toolbox*** dialog box are used to control the look of the control. These can be set as desired by the user.

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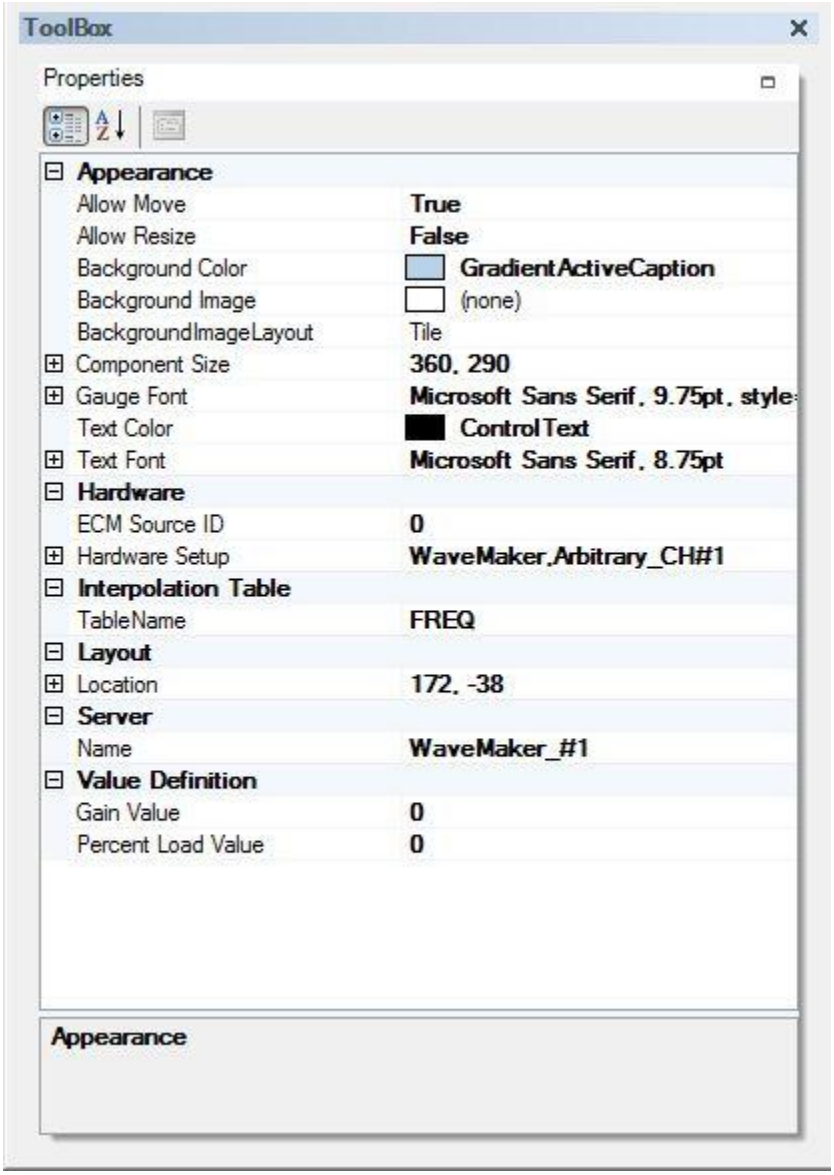
Closed Loop Control, Continued

Closed Loop Control Properties

This is an example of the ***Toolbox*** dialog box for a **Closed Loop Control**.



Section 2 – Digital Displays

Digital Displays

Introduction

The **Digital Display** control provides a simple digital display of engineering units, counts and/or millivolts for an assigned channel.

Digital Display

The **Digital Display** consists of four elements. The label is always present, but the ***Eng Units***, ***Counts***, and ***mVolts*** displays can be displayed or hidden. Figure 77 and this table describe these elements.

Element	Description
Label	Displays a user defined label for the control
Eng Units	Displays the engineering units
Counts	Displays the counts
mVolts	Displays the millivolts

Configuring the Digital Display Control

This table outlines the steps for configuring a **Digital Display** control.

Step	Action
1	Add a **Digital Display**, shown in Figure 77, to a tile by dragging it from the **Tools** tab.
2	Right-Click the control and **Select** the ***Properties*** option from the menu. Result: The ***Toolbox*** dialog box displays, as shown in Figure 78.
3	Determine which of the elements to display on the control. To remove an element from the display, in the **Appearance** section of the ***Toolbox***, delete the units for the appropriate element: ***Eng Units***, ***Table Units***, and/or ***Hardware Output Units***. Result: When the units are deleted, the element is removed from the **Digital Display**.

Continued on next page

Digital Displays, Continued

Figure 77: Digital Display

This is an example of a digital display control displaying all elements.

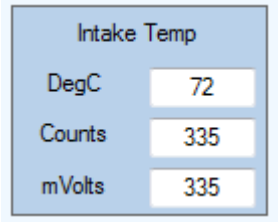
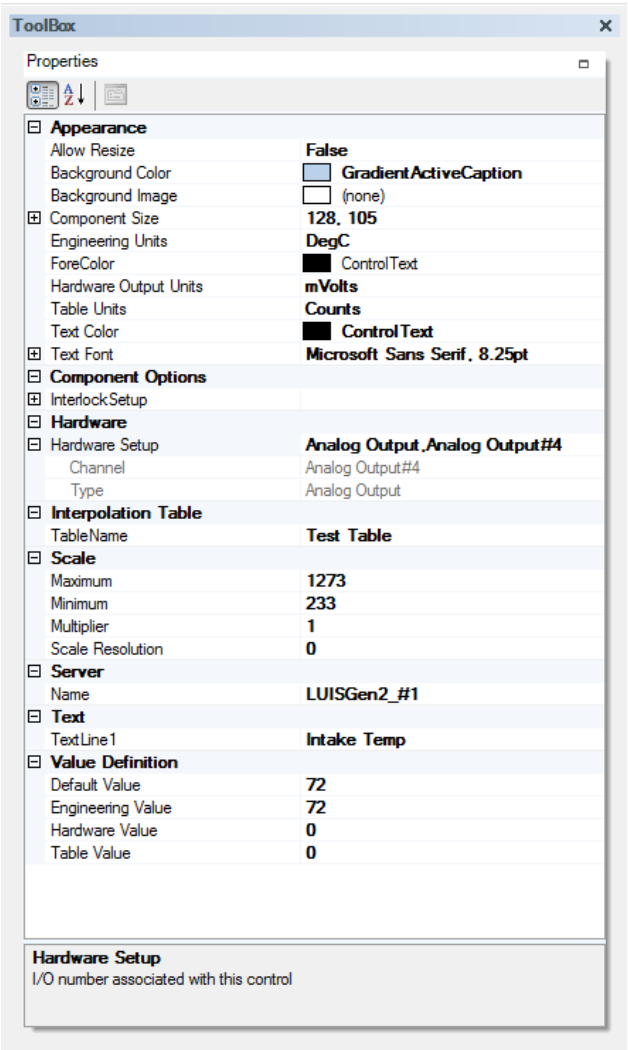


Figure 78: Digital Display Properties

This is an example of the ***Toolbox*** dialog box for a **Digital Display** control.



Digital Displays, Continued

Configuring the Digital Display Control, Control

This table continues to outline the steps for configuring a **Digital Display** control.

Step	Action
4	In the **Hardware** section, click the <**…**> button next to the ***Hardware Setup*** option. Result: The ***Hardware I/O Selection*** dialog box displays.
5	In the *Hardware Unit* field, select the appropriate module. Result: The channels available in that module displays in the *Channel* field.
6	In the *Channel* field, select the appropriate channel.
7	Click <**OK**> to closed the dialog box. Result: The dialog box closes and the ***Channel*** and ***Type*** under ***Hardware Setup*** are filled in with the selection.
8	In the **Interpolation Table** section, use the down arrow next to the ***Table Name*** option to select the appropriate interpolation table.
9	In the **Scale** section, the scale for the control can be set including the ***Minimum*** and ***Maximum*** values as well as the ***Multiplier*** and ***Scale Resolution***.
10	In the **Server** section, use the down arrow next to the ***Name*** option to select the appropriate server.
11	In the **Text** section, the ***TextLine1*** option is used to define the label that displays at the top of the control.
12	The **Value Definition** section can be used to set the ***Default Value*** for the control.
13	The **Interlock** section is used to interlock the value of this control with a parent control. More information about using interlocks can be found on Page 160.
14	The rest of the options on the ***Properties*** dialog box are used to control the look of the control. These can be set as desired by the user. Note: More information about **Interlock Setup** can be found later in this chapter.

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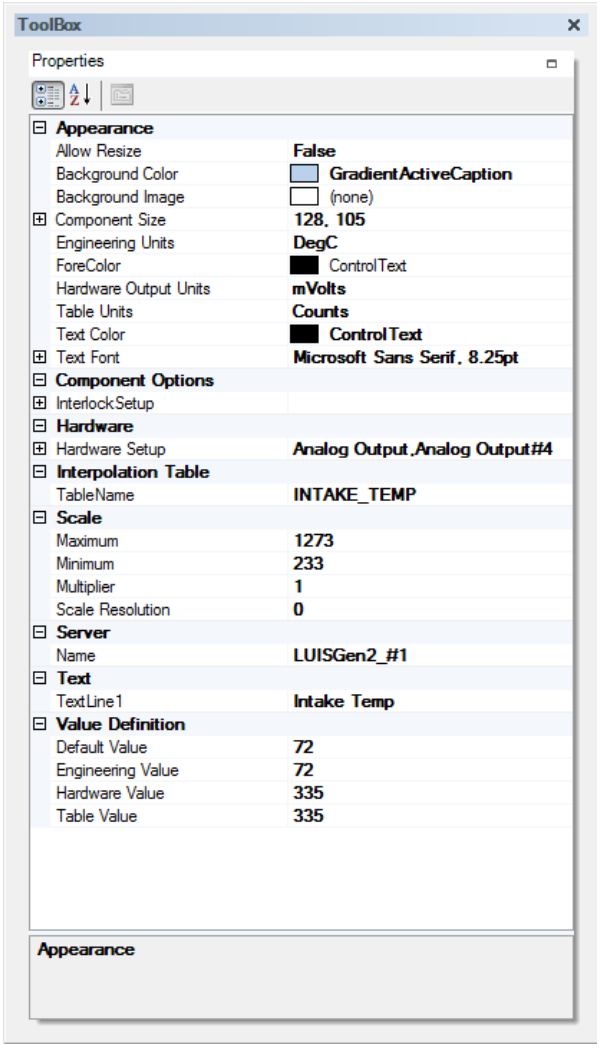
Digital Displays, Continued

Figure 79: Digital Display Properties

This is an example of the ***Toolbox*** dialog box for a **Digital Display** control.



Section 3 – Gauges

Gauges

Introduction

The **Gauge** control provides a round or slider gauge to display and interact with the value of the assigned channel.

Gauges

The Gauge control consists of three elements. This table and Figure 80 describe the **Gauge** control.

Element	Description
Label	Displays a user defined label for the control
Gauge	Graphical display of the value of the control
Digital Display	Digital readout of the value of the control

Configuring the Gauge Control

This table outlines the steps for configuring a **Digital Display** control.

Step	Action
1	Add a **Gauge**, shown in Figure 80, to a tile by dragging it from the **Tools** tab.
2	Right-Click the control and **Select** the ***Properties*** option from the menu. Result: The ***Toolbox*** dialog box displays, as shown in Figure 81.
3	In the **Component Options** section, use ***Enable*** option to determine if the value of the control should be enabled, *True*, or disabled, *False*.
4	In the **Component Options** section, use the ***Gauge Type*** option to set if the gauge is *Round* or *Slider*.
5	In the **Hardware** section, click the <**…**> button next to the ***Hardware Setup*** option. Result: The ***Hardware I/O Selection*** dialog box displays.
6	In the *Hardware Unit* field, select the appropriate module. Result: The channels available in that module displays in the *Channel* field.
7	In the *Channel* field, select the appropriate channel.

Continued on next page

Gauges, Continued

Figure 80: Gauges

These images are examples of both the round and slider gauge controls.

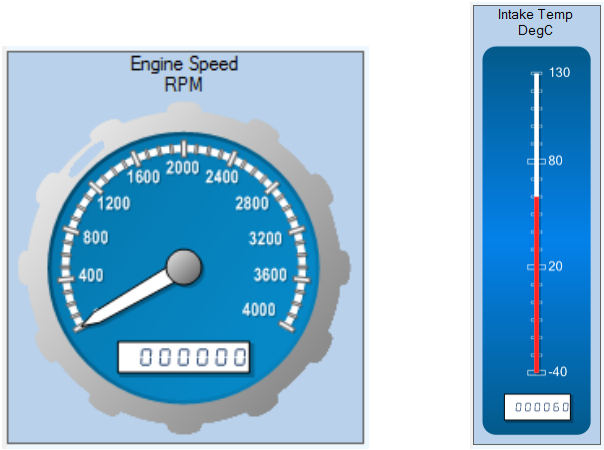
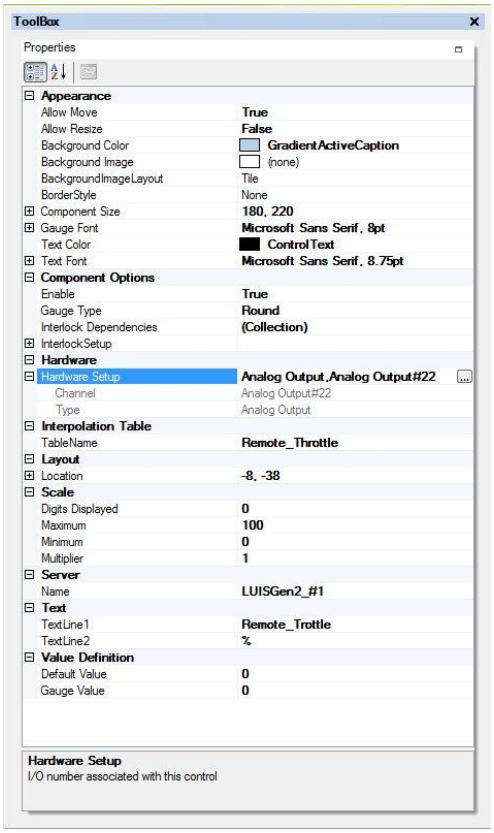


Figure 81: Gauge Properties

This is an example of the ***ToolBox*** dialog box for configuring gauges.



Continued on next page

Gauges, Continued

Configuring the Gauge Control, Continued

This table continues to outline the steps for configuring a **Digital Display** control.

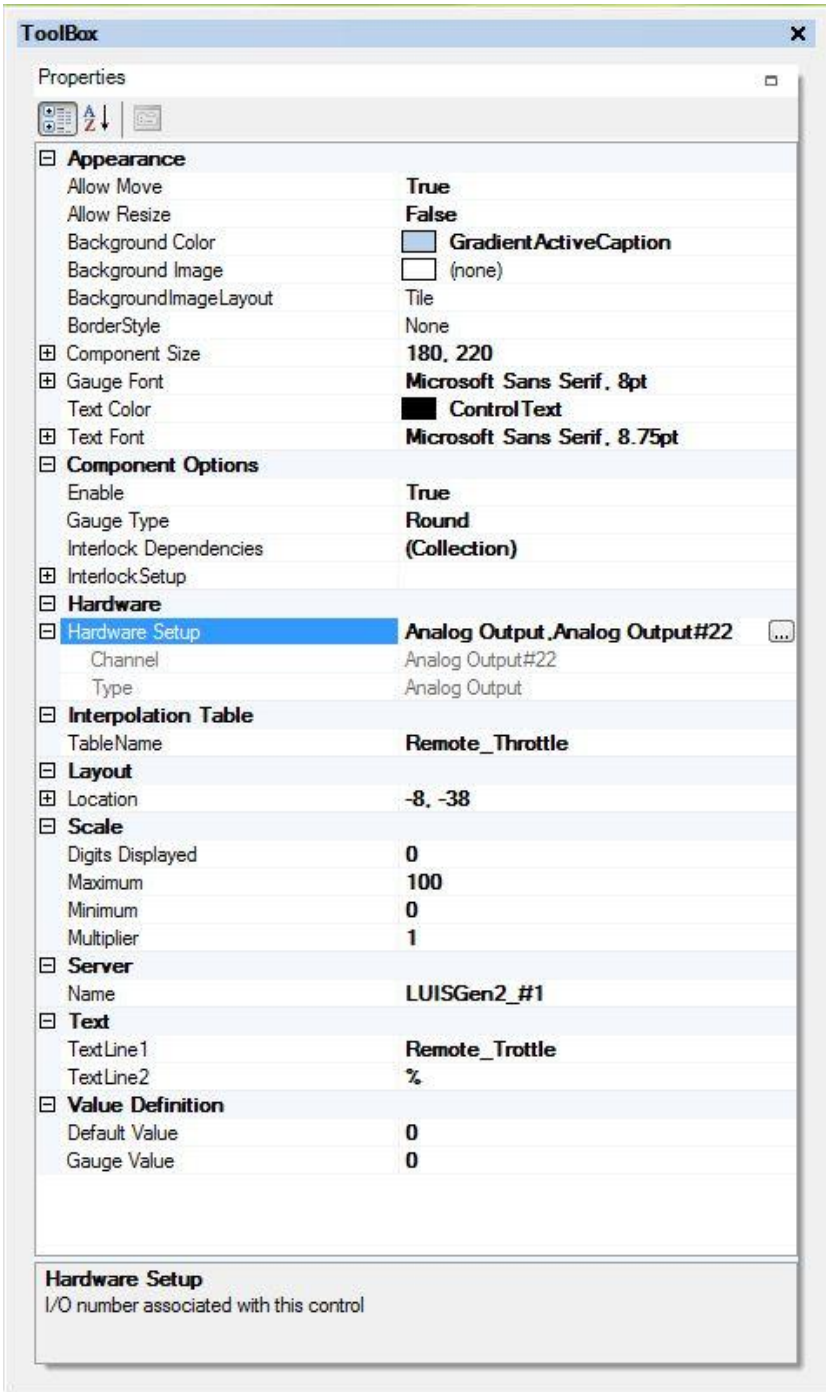
Step	Action
8	Click <**OK**> to close the dialog box. Result: The dialog box closes and the ***Channel*** and ***Type*** under ***Hardware Setup*** are filled in with the selection.
9	In the **Interpolation Table** section, use the down arrow next to the ***Table Name*** option to select the appropriate interpolation table.
10	In the **Scale** section, the scale for the control can be set including the ***Minimum*** and ***Maximum*** values as well as the ***Multiplier*** and ***Scale Resolution***.
11	In the **Server** section, use the down arrow next to the ***Name*** option to select the appropriate server.
12	In the **Text** section, the ***TextLine1*** and ***TextLine2*** options are used to define the label that displays at the top of the control.
13	The **Value Definition** section can be used to set the ***Default Value*** for the control.
14	The **Interlock** section is used to interlock the value of this control with a parent control. More information about using interlocks can be found on Page 160.
15	The rest of the options on the ***Properties*** dialog box are used to control the look of the control. These can be set as desired by the user.

Continued on next page

Gauges, Continued

Figure 82: Gauge Properties

This is an example of the ***ToolBox*** dialog box for configuring gauges.



Section 4 – Indicators

Indicators

Introduction

The **Indicator** control displays the status of a resistive load. The status is updated every 100 milliseconds.

Indicators

The **Indicator** control consists of two elements. Figure 83 and this table describe these elements.

Element	Description
Label	Displays a user defined label for the control
Indicator	Graphical indicator that is grey when OFF and the user defined color when ON. Note: The default indicator ON color is red.

Configuring the Indicator Control

This table outlines the steps for configuring an **Indicator** control.

Step	Action
1	Add an **Indicator**, as shown in Figure 83, to a tile by dragging it from the **Tools** tab.
2	Right-Click the control and **Select** the ***Properties*** option from the menu. Result: The ***Toolbox*** dialog box displays, as shown in Figure 84.
3	In the **Appearance** section, set the ***Indicator Color*** to the desired color.
4	In the **Hardware** section, click the <**…**> button next to the ***Hardware Setup*** option. Result: The ***Hardware I/O Selection*** dialog box displays.
5	In the *Hardware Unit* field, select the ***Resistive Load*** option. Result: The channels available in that module displays in the *Channel* field.
6	In the *Channel* field, select the appropriate channel.

Continued on next page

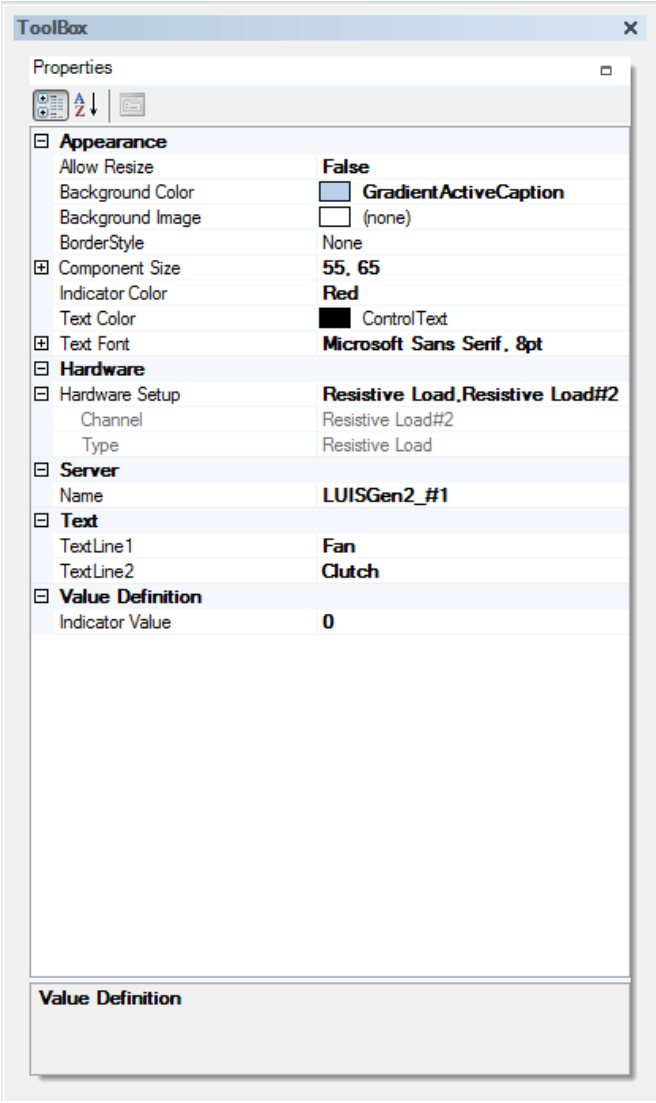
Indicators, Continued

Figure 83: Indicators

This is an example of an **Indicator** control.

Figure 84: Indicator Control Properties

This is an example of the ***ToolBox*** dialog box for an **Indicator** control.



Continued on next page

Indicators, Continued

Configuring the Indicator Control, Continued

This table continues to outline the steps for configuring an **Indicator** control.

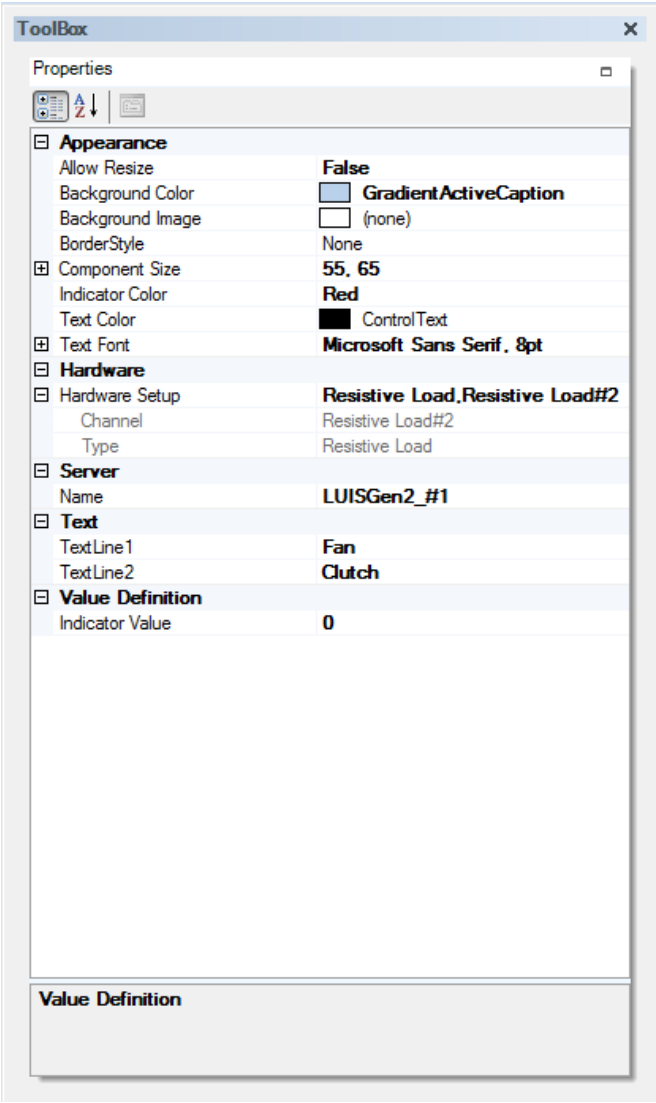
Step	Action
7	Click <**OK**> to close the dialog box. Result: The dialog box closes and the ***Channel*** and ***Type*** under **Hardware Setup** are filled in with the selection.
8	In the **Text** section, the ***TextLine1*** and ***TextLine2*** options are used to define the label that displays at the top of the control.
9	The **Value Definition** section can be used to set the ***Indicator Value*** for the control.
10	The rest of the options on the ***Properties*** dialog box are used to control the look of the control. These can be set as desired by the user.

Continued on next page

Indicators, Continued

Figure 85: Indicator Control Properties

This is an example of the ***ToolBox*** dialog box for an **Indicator** control.



Section 5 – Switches

Switches

Introduction

The **Switch** control provides the ability to interact with On/Off or True/False values in the hardware. Switches can be set as a toggle where the value remains in the current state until the switch is tripped again or momentary which trips the switch and then immediately returns to the default state.

Switches

The **Switch** control consists of two elements. Figure 86 and this table describe these elements.

Element	Description
Label	Displays a user defined label for the control
Switch	Graphical button that trips the switch

Configuring the Switch Control

This table outlines the steps for configuring a **Switch** control.

Step	Action
1	Add a **Switch**, shown in Figure 86, to a tile by dragging it from the **Tools** tab.
2	Right-Click the control and **Select** the ***Properties*** option from the menu. Result: The ***Toolbox*** dialog box displays, as shown in Figure 87.
3	In the **Component Options** section, use the ***Enable*** option to determine if the value of the control should be enabled, *True*, or disabled, *False*.
4	In the ***Switch Type*** field, select either *Toggle* or *Momentary*.
5	In the ***SwitchClosedText*** field, type the word that should display when the switch is closed.
6	In the ***SwitchOpenText*** field, type the word that should display when the switch is open.

Continued on next page

Switches, Continued

Figure 86: Switches

This image is an example of a **Switch** control.

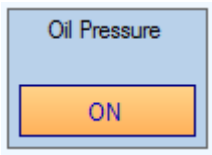
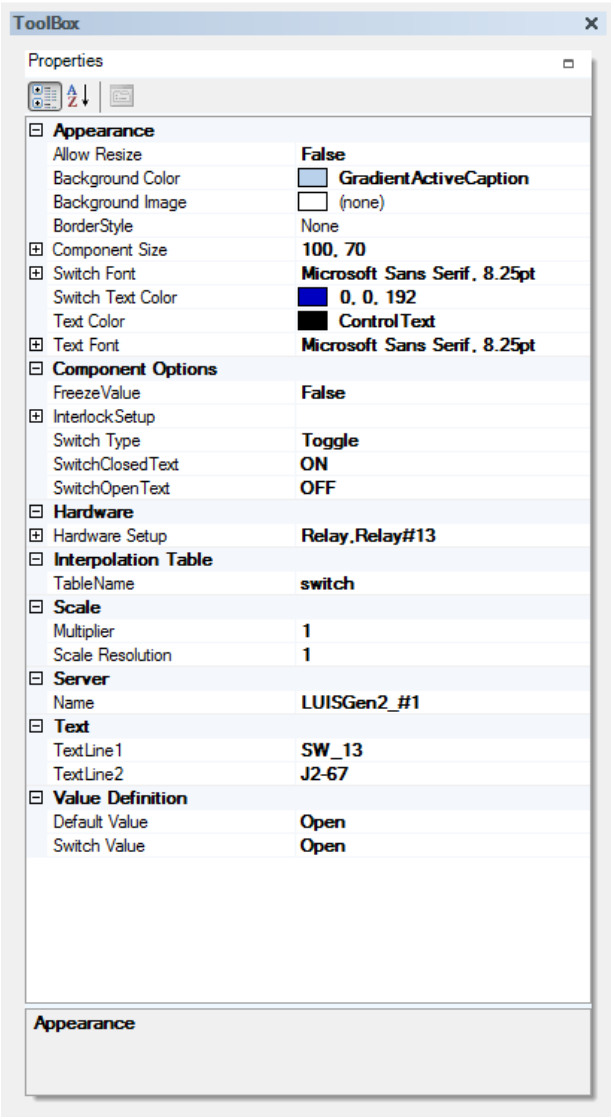


Figure 87: Switch Control Properties

This is an example of the ***ToolBox*** dialog box for a switch control.



Continued on next page

Switches, Continued

Configuring the Switch Control

This table outlines the steps for configuring a **Switch** control.

Step	Action
8	In the **Hardware** section, click the <**…**> button next to the ***Hardware Setup*** option. Result: The ***Hardware I/O Selection*** dialog box displays.
9	In the *Hardware Unit* field, select the appropriate module. Result: The channels available in that module displays in the *Channel* field.
10	In the *Channel* field, select the appropriate channel.
11	Click <**OK**> to close the dialog box. Result: The dialog box closes and the ***Channel*** and ***Type*** under ***Hardware Setup*** are filled in with the selection.
12	In the **Interpolation Table** section, use the down arrow next to the ***Table Name*** option to select the appropriate interpolation table.
13	In the **Scale** section, the scale for the control can be set including the ***Multiplier*** and ***Scale Resolution***.
14	In the **Server** section, use the down arrow next to the ***Name*** option to select the appropriate server.
15	In the **Text** section, the ***TextLine1*** and ***TextLine2*** options are used to define the label that displays at the top of the control.
16	The **Value Definition** section can be used to set the ***Default Value*** for the control.
17	The **Interlock** section is used to interlock the value of this control with a parent control. More information about using interlocks can be found on Page 160.
18	The rest of the options on the ***Properties*** dialog box are used to control the look of the control. These can be set as desired by the user.

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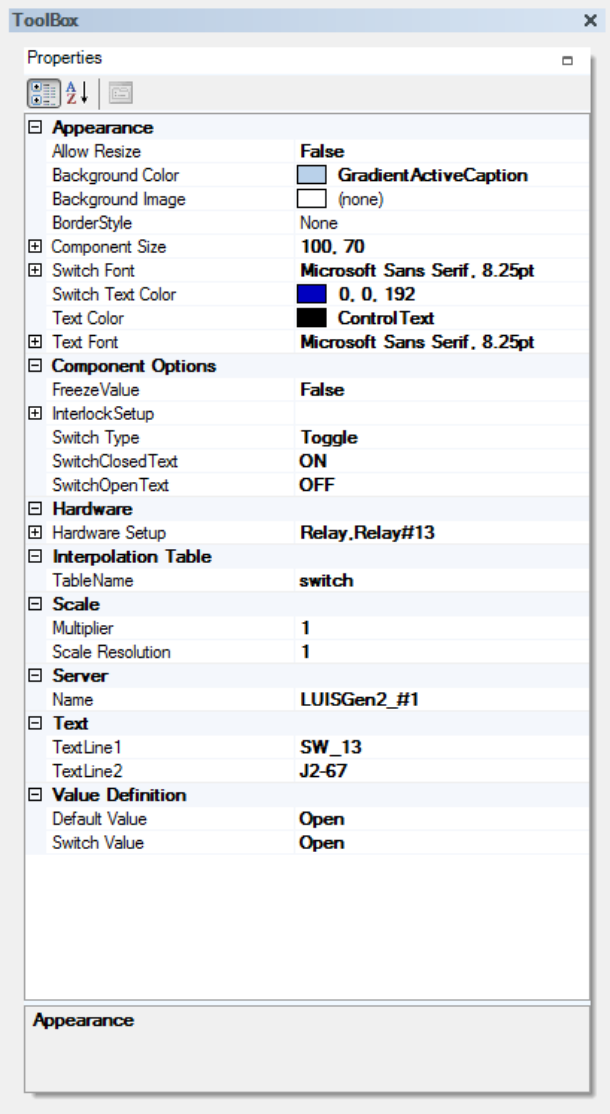
Switches, Continued

Figure 88: Switch Control Properties

This is an example of the ***ToolBox*** dialog box for a switch control.



Section 6 – Interlocking Controls

Interlocking Controls

Introduction

LUIS Gen2 supports the option of interlocking controls causing the values of the interlocked control(s) to change with the parent control. It is important to note that interlocks are only one level deep. Multiple child interlocks ca not be nested. The interlocking options for the child controls are set up in the ***ToolBox*** dialog box for the controls.

Interlocking Controls

This table outlines the steps for setting up a child control to be interlocked with another control.

Step	Action
1	Ensure that the parent control has been set up.
2	Right-click the control that should be set up as the child. Result: The ***ToolBox*** dialog box displays.
3	In the **Interlock Setup** section, click the <**…**> button. Result: The ***Interlock Options*** dialog box displays, as shown in Figure 89.
4	In the **Interlock** section, set the interlock to be *Non-Inverting* or *Inverting*. When the interlock is set to inverting, the child control value changes in the inverse of the parent.
5	In the **Hardware Unit** section, select the hardware unit of the parent control. Result: The *Channel* field populates with the available channels.
6	In the **Channel** section, select the channel of the parent control.
7	In the **Interlock On Value** section, select the appropriate value on which to interlock.
8	When finished, click the <**OK**> button. Result: The dialog box closes and the *Channel*, *InterlockOperation*, *InterlockValueName*, and *Type* fields are filled in on the ***ToolBox*** dialog box.

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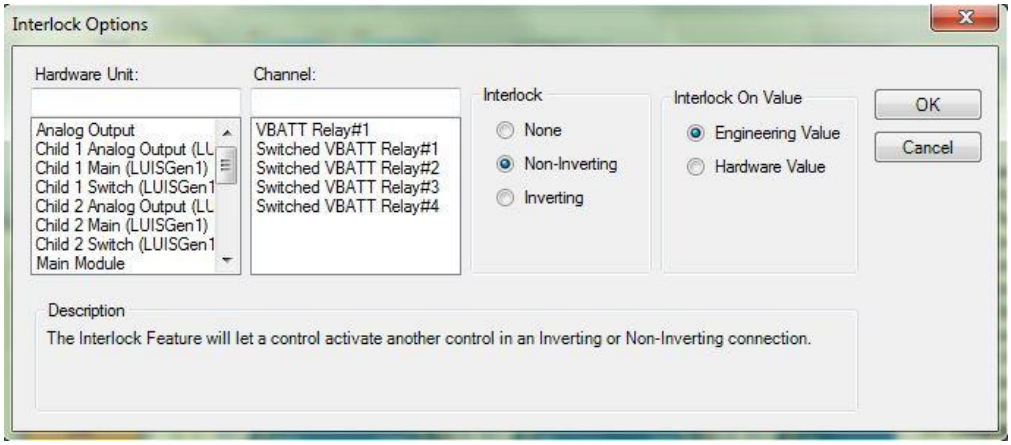
Interlocking Controls, Continued

Figure 89: Interlock Options Dialog Box

This is an example of the ***Interlock Options*** dialog box.



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Interlocking Controls, Continued

Viewing Children

The ***Interlock Dependencies*** dialog box allows the user to see all other controls interlocked to the selected control. This table outlines the steps for viewing the children of a selected control.

Step	Action
1	Right-click the control. Result: The ***ToolBox*** dialog box displays.
2	Next to the *Interlock Dependencies* field, click the <**…**> button. Result: The ***Interlock Dependencies*** dialog box displays, as shown in Figure 90. This dialog box lists each of the channels that are interlocked with the selected control.

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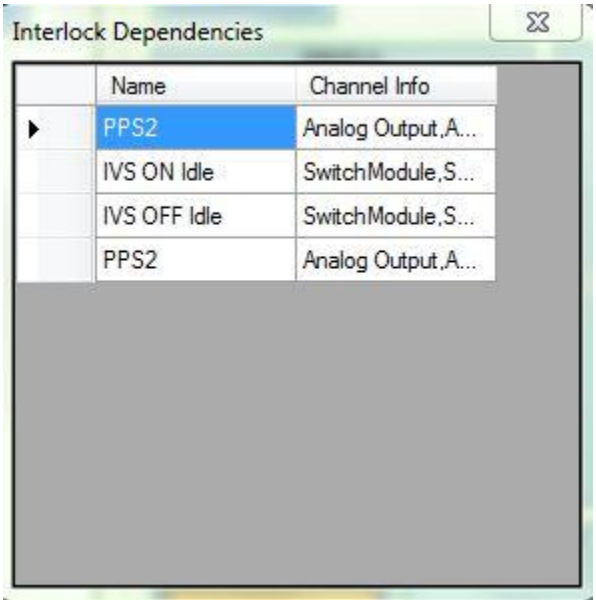
Interlocking Controls, Continued

Figure 90: Interlock Dependencies Dialog Box

This is an example of the ***Interlock Dependencies*** dialog box.



Section 7 – Panels

Panels

Introduction

The **Panel** control provides the ability to create text boxes for labels.

Using the Panel Control

This table outlines the steps for using the **Panel** control as a label.

Step	Action
1	Add a **Panel** control to a window by dragging it from the **Tools** tab.
2	Click in the default text. Result: The cursor changes to a text editing cursor.
3	Type the desired label using **CTRL**+**ENTER** to move to a new line.
4	To change the text color, size or alignment right-click the control and select the ***Properties*** option from the menu. Result: The ***ToolBox*** dialog box displays, as shown in Figure 91.
5	Use the options in the **Appearance** section to make changes to the text.

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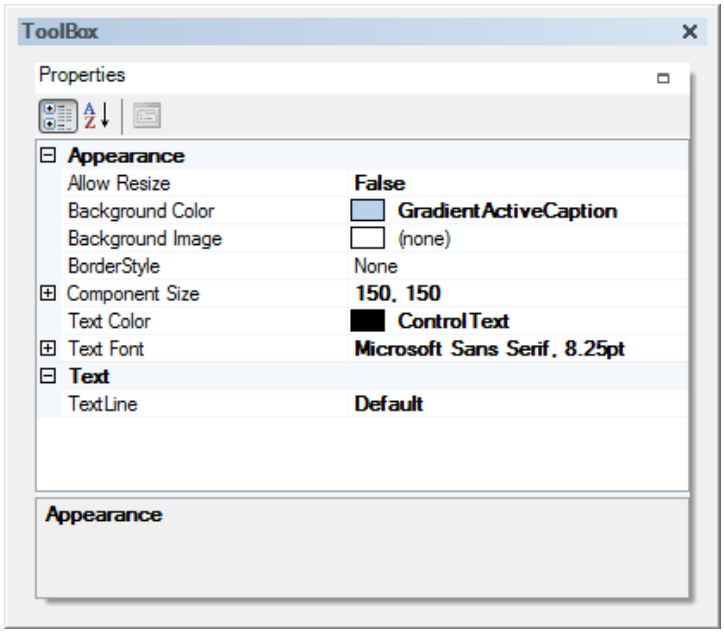
Panels, Continued

Figure 91: Panel Properties

This is an example of the ***ToolBox*** dialog box for the **Panel** control.



Notes

Chapter 8 – Module Descriptions

Overview

Overview

This chapter provides additional technical information about the LUIS Gen2 module hardware.

Introduction

A standard LUIS Gen2 system configuration contains:

- Main Module
- Wavemaker Module
- 2 Analog Modules
- Switch Module
- Resistive Loads Module
- Injector and Application Specific Loads Module

In addition, the user can request additional modules of each type depending on what is needed for their application. New modules are constantly being developed along with the ability to create custom modules for specific applications. Check with the GarTech engineering staff for additional information.

In This Chapter

This table outlines the topic covered in this section.

Section 1 – Main Module

Main Module

Front Panel Description

This table outlines the controls found on the front panel of the Main LUIS Gen2 module.

Control	Function
Power LED	Indicates the internal power supply is powered on and functioning normally.
Status LED	Indicates that the module has completed its power up sequence and is ready to accept commands from the PC.
VBATT LED	Indicates that a VBATT source is connected and the VBATT relay is turned on. Note: If the relay is on, but no VBATT source is connected, the LED will not turn on.
VBATT Test Point	Provides a method for measuring VBATT voltage. Note: The test point is current limited to 20mA.
RELAY 1-4 LEDs	Indicates that a relay source is connected and is turned on. Note: If the relay is on, but no source is connected, the LED will not turn on.
RELAY 1-4 Test Points	Provides a method for measuring relay voltage. Note: The relay is current limited to 20mA.

Continued on next page

Main Module, Continued

Back Panel Description

This table outlines the controls found on the back panel of the Main LUIS Gen2 module.

Control	Function
AC inlet	Provides connection to AC power.
VBATT IN	Provides connection to VBATT source. Note: Acceptable VBATT source range is 0 – 32V, 30A.
USB Inlet	Provides connection to PC via standard USB cable.
Power Out	Provides 8 pin connection for the application harness.
J1939 SENSOR SIMULATION	Provides a J1939 port for sensor simulation broadcast and RS232 connection for serial port control using legacy DLB commands.
LOADS MODULE	Provides power and GarTech proprietary control bus connections to the injector loads module.

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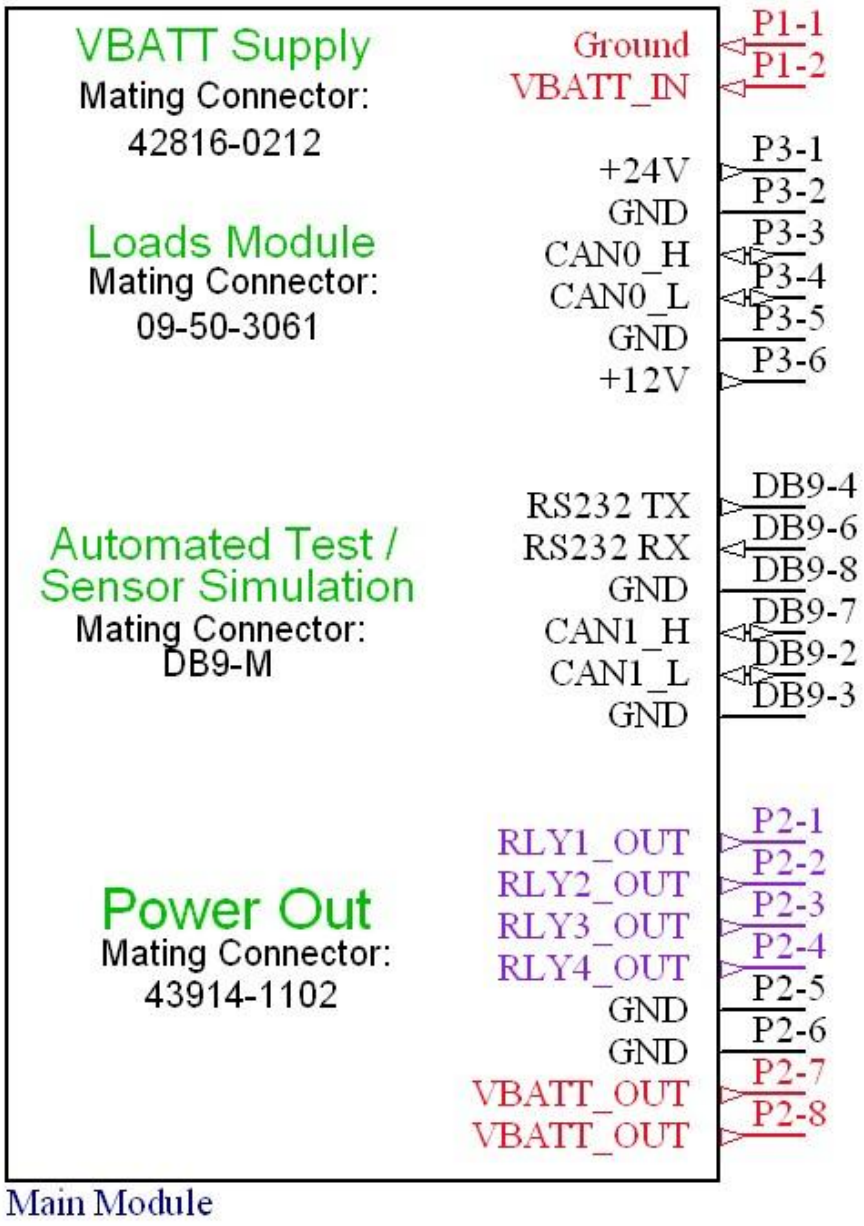
Main Module, Continued

Main Module Pinout

This diagram illustrates the pinout for the main module.



Section 2 – Wavemaker Module

Wavemaker Module

Introduction

Each Wavemaker Module supports up to 8 arbitrary waveform outputs with an arbitrary waveform card required for each channel. The arbitrary waveform outputs may range +/-6v, 12 bit resolution and up to 32 k datapoints per channel. In addition, any channel may be synchronized with any other channel.

Each Wavemaker Module includes 10 digital outputs. These outputs can be set for 0-5v or +/-5v square wave output, up to 1MHz. Any digital channel may be synchronized with any other digital or arbitrary channel.

Panel Descriptions

The front panel of the Wavemaker Module provides indicator LEDS as well as output test points. The rear panel provides the connection to the ECM.

This table describes the controls found on the front panel.

Control	Function
POWER LED	Indicates that the internal power supply is powered on and functioning normally.
STATUS LED	Indicates that the module has completed its power up sequence and is ready to accept commands from the PC.

Continued on next page

Wavemaker Module, Continued

Panel Descriptions, Continued

This table continues to describe the controls found on the front panel of the Wavemaker Module.

Control	Function
Output Test Points	Provides a method for measuring voltage for each of the outputs.
ARBITRARY LEDs	Indicates if a card is installed for each of the arbitrary channels.
DIGITAL LEDs	Indicates if a card is installed for each of the digital channels.

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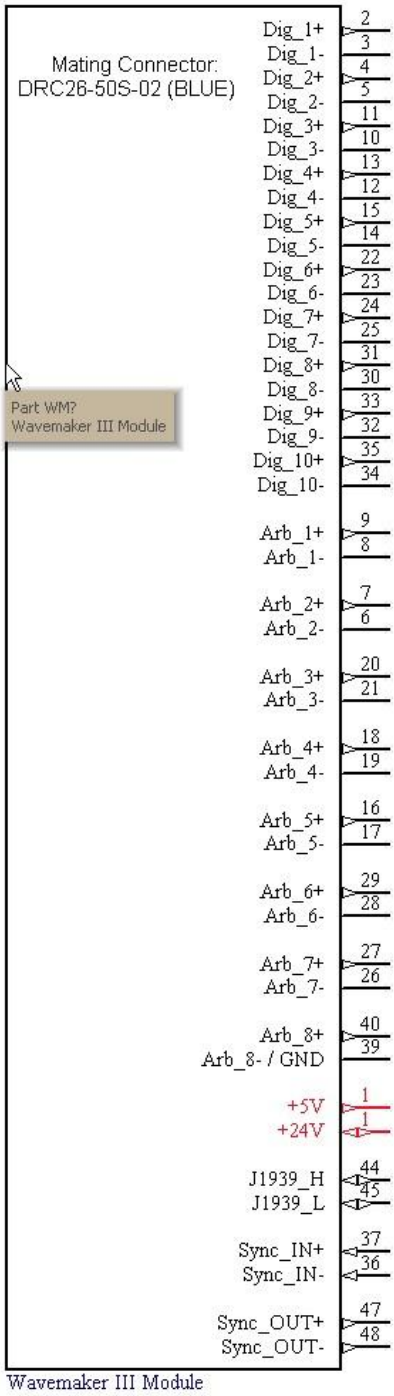
Wavemaker Module, Continued

Wavemaker Module Pinout

This diagram illustrates the pinout for the Wavemaker module.



Section 3 - Analog Module Description

Analog Module Description

Introduction

The analog outputs are arranged in groups of 4, and each group requires a reference voltage input. The reference voltage range is 0=15v. All outputs are 16 bit and are scaled from 0-Vref with a 20mA current limit per output. Up to 4 Analog Modules are supported by the system.

Panel Descriptions

The front panel of the Analog Module provides indicates LEDS and test points, and the rear panel provides the connection to the ECM.

This table describes the controls on the front panel.

Control	Function
POWER LED	Indicates that the internal power supply is powered on and functioning normally.
STATUS LED	Indicates that the module has completed its power up sequence and is ready to accept commands from the PC.
Test Points	Provides a method for measuring voltage for each of the outputs. Note: The test points are limited to 20mA output.

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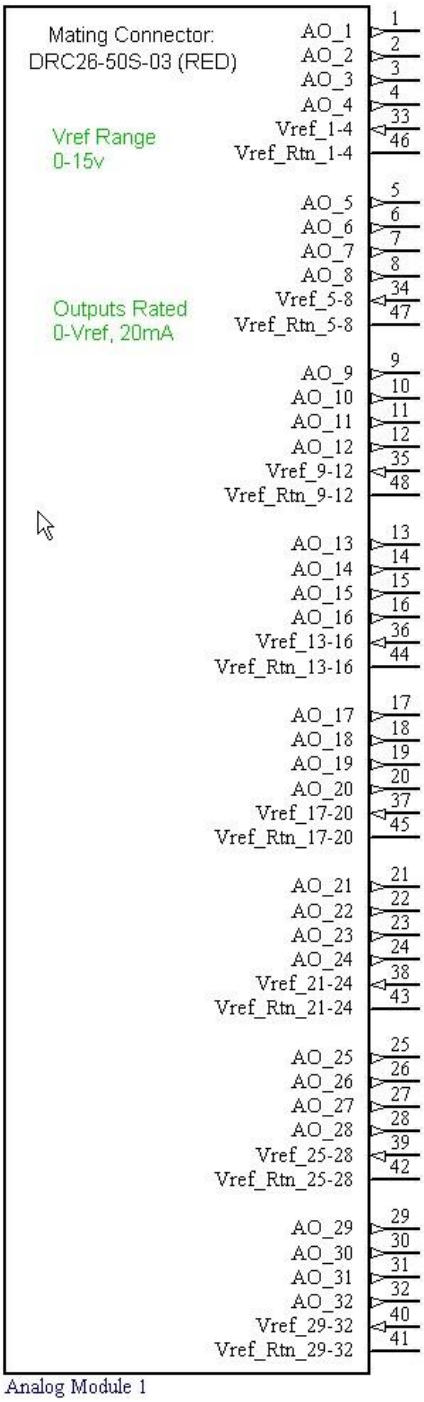
Analog Module Description, Continued

Analog Module Pinout

This diagram illustrates the pinout for the Analog module.



Analog Module 1

Section 4 – Switch Module Description

Switch Module Description

Introduction

Switch contacts are rated for 1.5A. The internal switch relay commons are connected in groups of 5. If a jumper is inserted between pins 41 and 50 at the rear panel, the commons remain in the groups of 5. However, if no jumper is connected, all 8 group commons are in turn tied together making all switch commons equal. Up to 2 switch modules are supported by the system.

Panel Descriptions

The front panel of the Switch Module provides indicates LEDS and the rear panel provides the connection to the ECM.

This table describes the controls found on the front panel.

Control	Function
POWER LED	Indicates that the internal power supply is powered on and functioning normally.
STATUS LED	Indicates that module has completed its power up sequence and is ready to accept commands from the PC.
SWITCH STATUS LEDs	Indicates the ON/OFF state of each switch.

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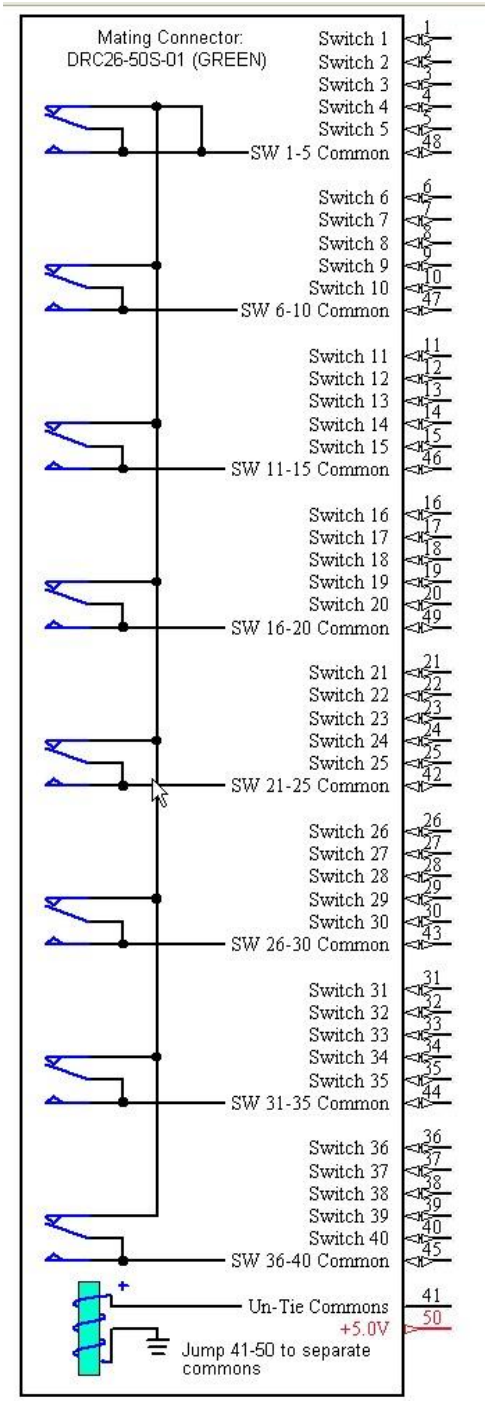
Switch Module Description, Continued

Switch Module Pinout

This diagram illustrates the pinout for the Switch Module.



Section 5 – Resistive Loads Module Description

Resistive Loads Module Description

Introduction

The Resistive Loads Module contains a total of twelve 1k ohm loads and twenty-four 100 ohm loads. Four of the 100 ohm loads are used to drive 30A automotive relays, and the relay contracts are available at the back panel of the connector.

Panel Descriptions

The front panel of the Resistive Loads Module provides indicator LEDS and the rear panel provides the relay contacts.

This table describes the controls found on the front panel.

Control	Function
POWER LED	Indicates that the internal power supply is powered on and functioning normally.
STATUS LED	Indicates that the module has completed its power up sequence and is ready to accept commands from the PC.
RELAY STAUS LEDs	Indicates whether each load is being driven.

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Resistive Loads Module Description, Continued

Resistive Loads Pinout

This diagram illustrates the pinouts for the Resistive Loads Module.